

# Soluciones OEM para la industria Electrónica

Guía de selección de productos

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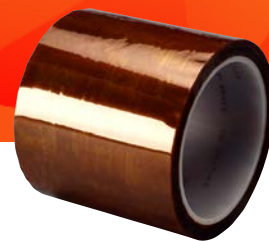
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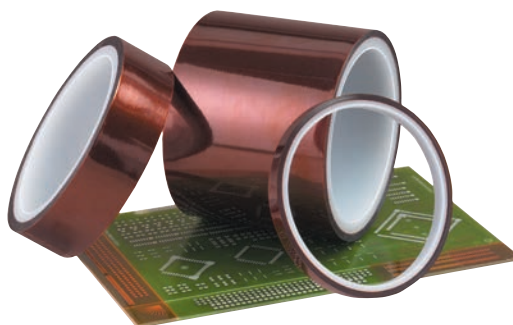


## Cintas de Alta Temperatura

Las cintas 3M de alta temperatura proporcionan protección de enmascaramiento para una gran variedad de aplicaciones y pueden soportar rangos de temperatura hasta 260°C (500°F).

Disponibles en papel, PVC, poliéster y poliimida.

| Producto                                   | Sustrato                       | Adhesivo                       | Espesor total<br>mm / (mil) | Adhesión al<br>acero<br>N/100mm /<br>(oz/in) | Resistencia<br>a la rotura<br>N/100mm /<br>(lb/in) | Elongación<br>a la rotura<br>(%) | Rango de<br>temperatura<br>°C | Comentarios                                                    |
|--------------------------------------------|--------------------------------|--------------------------------|-----------------------------|----------------------------------------------|----------------------------------------------------|----------------------------------|-------------------------------|----------------------------------------------------------------|
| <b>3M™ Circuit Board Fabrication Tapes</b> |                                |                                |                             |                                              |                                                    |                                  |                               |                                                                |
| <b>851</b>                                 | Poliéster                      | Mezcla<br>silicona /<br>caucho | 0,09<br>(3,6)               | 29<br>(27)                                   | 368<br>(27)                                        | 124                              | -40 a +155                    | Color verde. Plating de<br>circuitos. Plating con<br>silicona. |
| <b>1280</b>                                | Poliéster                      | Mezcla<br>silicona /<br>caucho | 0,09<br>(3,6)               | 34<br>(31)                                   | 525<br>(30)                                        | 135                              | -40 a +155                    | Color rojo. Plating de<br>circuitos. Plating con<br>silicona.  |
| <b>3M™ High Temperature Tapes</b>          |                                |                                |                             |                                              |                                                    |                                  |                               |                                                                |
| <b>5413</b>                                | Poliimida                      | Silicona                       | 0,07<br>(2,7)               | 24<br>(22)                                   | 578<br>(33)                                        | 62                               | -73 a +260                    | Color ámbar. Film de alta<br>temperatura.                      |
| <b>5414</b>                                | Alcohol<br>polivinílico<br>PVA | Sintético                      | 0,053<br>(2,1)              | 40<br>(36)                                   | 105<br>(6)                                         | 334                              | -40 a +240                    | Color transparente. Soluble<br>en agua.                        |
| <b>5419</b>                                | Poliimida                      | Silicona                       | 0,07<br>(2,7)               | 22<br>(20)                                   | 578<br>(33)                                        | 60                               | -73 a +260                    | Color ámbar. Baja estática<br>para ola de soldadura.           |
| <b>5433</b>                                | Poliimida                      | Silicona                       | 0,07<br>(2,7)               | 22<br>(20)                                   | 578<br>(33)                                        | 60                               | -73 a +260                    | Color ámbar. Cinta 5419<br>con liner.                          |
| <b>7413T<br/>/7413TL</b>                   | Poliimida                      | Silicona                       | 0,06<br>(2,4)               | 20<br>(18)                                   | 508<br>(29)                                        | 62                               | -73 a +260                    | Color ámbar. Cinta de uso<br>general. Alta temperatura.        |
| <b>7419</b>                                | Poliimida                      | Acrílico                       | 0,046<br>(1,8)              | 19<br>(17)                                   | -                                                  | 60                               | +260                          | Color ámbar. Sin silicona.<br>Baja estática.                   |





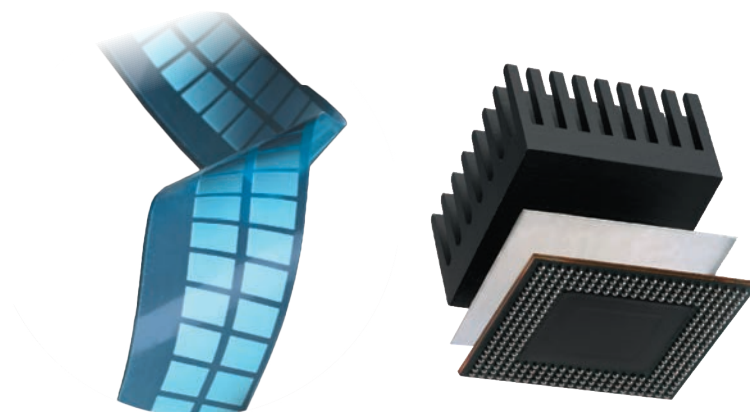
## Cintas Transferidoras Térmicas

Esta gama de cintas de alta adherencia ofrece una transferencia térmica eficiente para una amplia serie de aplicaciones que requieren una solución de gestión térmica: unión de disipadores y dispersores de calor junto a otros dispositivos de enfriamiento, encapsulados y demás aplicaciones en electrónica de potencia. Cada

cinta combina el adhesivo acrílico de alto rendimiento 3M con una matriz cerámica altamente conductora para una interfaz térmica extremadamente fiable y fácil de usar. Su alta conformabilidad proporciona un excelente recubrimiento en las superficies.

| Producto                                                              | Descripción       |                  |          |                                  | Adhesión al acero                              | Propiedades térmicas                   |                                | Propiedades eléctricas      |                                 | Grado de inflamabilidad UL | Temperatura máxima de operación (°C) |                               |
|-----------------------------------------------------------------------|-------------------|------------------|----------|----------------------------------|------------------------------------------------|----------------------------------------|--------------------------------|-----------------------------|---------------------------------|----------------------------|--------------------------------------|-------------------------------|
|                                                                       | Sustrato          | Espesor mm (mil) | Filler   | Liner                            | Esfuerzo de pelado @ 72 hr, Dwell at RT (N/cm) | Conductividad (W/m-K 3M ASTM D5470 TM) | Impedancia °C-cm²/W (°C-in²/W) | Rigidez dieléctrica (kV/mm) | Resistividad volumétrica (Ω/cm) |                            | Corto plazo (horas – días)           | Largo plazo (semanas – meses) |
| 3M™ High Adhesion Thermally Conductive Adhesive Transfer Tape (TCATT) |                   |                  |          |                                  |                                                |                                        |                                |                             |                                 |                            |                                      |                               |
| 8805                                                                  | Polímero acrílico | 0,13 (5)         | Cerámico | Poliéster Siliconado Doble liner | 5,8                                            | 0,6                                    | 3,2 (0,5)                      | 26                          | 5,2 × 10 <sup>11</sup>          | NA <sup>(1)</sup>          | 125 - 150                            | 90 - 100                      |
| 8810                                                                  | Polímero acrílico | 0,25 (10)        | Cerámico | Poliéster Siliconado Doble liner | 8,3                                            | 0,6                                    | 5,8 (0,9)                      | 26                          | 3,9 × 10 <sup>11</sup>          |                            | 125 - 150                            | 90 - 100                      |
| 8815                                                                  | Polímero acrílico | 0,38 (15)        | Cerámico | Poliéster Siliconado Doble liner | 9,8                                            | 0,6                                    | 7,7 (1,2)                      | 26                          | 3,8 × 10 <sup>11</sup>          |                            | 125 - 150                            | 90 - 100                      |
| 8820                                                                  | Polímero acrílico | 0,51 (20)        | Cerámico | Poliéster Siliconado Doble liner | 11,9                                           | 0,6                                    | 9,7 (1,5)                      | 26                          | 3,8 × 10 <sup>11</sup>          |                            | 125 - 150                            | 90 - 100                      |
| 8926                                                                  | Polímero acrílico | 0,2 0,25 0,50    | Cerámico | Poliéster Siliconado Doble liner | –                                              | 1,5                                    | 8,49 8,74 9,70                 | 15                          | –                               | UL 94 V0                   | 80                                   |                               |
| 8708                                                                  | Polímero acrílico | 0,13 0,25 0,5    | Cerámico | Papel protector liner una cara   | –                                              | 0,6                                    | –                              | 15                          | –                               | UL 94 V0                   | 80                                   |                               |

1 Las cintas adhesivas no están diseñadas para ser usadas independientemente como un solo componente, sino que se reconocen para su uso con sustratos específicos y la cinta/sustrato se somete a una prueba de UL.



# Soluciones Electrónicas



## Adhesivos Epoxy Conductores

Esta gama de adhesivos líquidos tiene una fuerza de adhesión estructural superior y fácil aplicación tanto para área automatizada como para dispensación manual. La

línea de unión ultrafina ayuda a lograr una baja impedancia térmica.

| Producto                                | Descripción |                 |                            |       | Propiedades térmicas   |                                  | Propiedades eléctricas      |                                 | Temperatura máxima de operación    |
|-----------------------------------------|-------------|-----------------|----------------------------|-------|------------------------|----------------------------------|-----------------------------|---------------------------------|------------------------------------|
|                                         | Sustrato    | Filler          | Formato                    | Color | Conductividad (W/m-K)* | Impedancia °C-cm²/W (°C-in²/W)** | Rigidez dieléctrica (kV/mm) | Resistividad volumétrica (Ω-cm) | Largo plazo (semanas - meses) (°C) |
| <b>3M™ Thermally Conductive Epoxies</b> |             |                 |                            |       |                        |                                  |                             |                                 |                                    |
| <b>TC-2707</b>                          | Epoxi       | Nitrato de Boro | 2-partes Epoxy/3M Duo-Pak. | Gris  | 0,72                   | 0,67 (0,105)                     | 2,1                         | $1,6 \times 10^{11}$            | 90                                 |
| <b>TC-2810</b>                          | Epoxi       | Aluminio        | 2-partes Epoxy/3M Duo-Pak. | Crema | 0,8-1,4                | 0,32 (0,05)                      | 3                           | $7,58 \times 10^{12}$           | 90                                 |

\* 3M ASTM D5470 TM

\*\* 2,0mil (50µm) espesor línea de adhesión

## Grasa Conductora

La grasa térmicamente conductora es un material de interfaz térmica de alto rendimiento para la transferencia de energía desde una fuente (procesadores LED y electrónica de potencia) a un disipador de calor. La mezcla

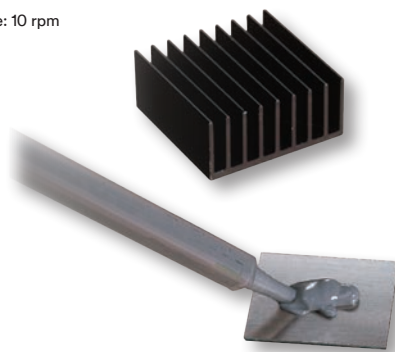
patentada de rellenos inorgánicos contenidos en una matriz orgánica (sin silicona) garantiza una alta conductividad térmica y una baja resistencia térmica.

| Producto                               | Descripción           |          |            | Propiedades térmicas   |                                  | Propiedades eléctricas      |                                 | Temperatura máxima de operación |                                    |
|----------------------------------------|-----------------------|----------|------------|------------------------|----------------------------------|-----------------------------|---------------------------------|---------------------------------|------------------------------------|
|                                        | Sustrato              | Filler   | Viscosidad | Conductividad (W/m-K)* | Impedancia °C-cm²/W (°C-in²/W)** | Rigidez dieléctrica (kV/mm) | Resistividad volumétrica (Ω-cm) | Corto plazo (horas - días) (°C) | Largo plazo (semanas - meses) (°C) |
| <b>3M™ Thermally Conductive Grease</b> |                       |          |            |                        |                                  |                             |                                 |                                 |                                    |
| <b>TCG-2035</b>                        | Polímero sin silicona | Cerámico | 2100/150*  | 4,1                    | 0,081 (0,0127)                   | 4,7                         | $1,36 \times 10^9$              | 125 - 150                       | 100 - 125                          |
| <b>TCG-2036</b>                        | Polímero sin silicona | Cerámico | 110000***  | 2,7                    | 0,139 (0,0218)                   | 3,7                         | $3,7 \times 10^8$               | -                               | -                                  |

\* 3M ASTM D5470 TM

\*\* @ espesor línea de adhesión de <0,05 mm (2 mil)

\*\*\* Viscosímetro Brookfield DV-II + Pro a 25°C, Spindle #S05, Shear Rate: 10 rpm



# Soluciones Electrónicas



## Bonding Films

Los bonding film de 3M combinan algunas de las mejores características de los films de 3M con la tecnología "hot melt", proporcionando excelentes propiedades sobre una gran variedad de sustratos, desde tejidos, poliolefinas a polímeros de cristal líquido así como en materiales sensibles a la temperatura o metales. Por sus

características dieléctricas, crean una capa aislante y, dado su espesor uniforme, podemos generar líneas de adhesión muy precisas. Disponible en formas troqueladas con diversos tamaños y formas para su aplicación manual o automatizada. Aptos para aplicaciones donde se requiera un ensamblado rápido.

| Producto   | Resina base      | Color      | Espesor mm/(mils) | Tiempo curado / adhesión (s) | Temperatura de adhesión (°C) | Elongación (%) | Resistencia cizalladura solape Al (psi) | Resistencia al pelado 90° Al (pwi) | Comentarios                                                              |
|------------|------------------|------------|-------------------|------------------------------|------------------------------|----------------|-----------------------------------------|------------------------------------|--------------------------------------------------------------------------|
| <b>406</b> | EAA              | Traslúcido | 0,076 (3,0)       | 2 - 5                        | 160                          | 750            | 1090                                    | 16,6                               | Flexible, buena adhesión en variedad de sustratos, especialmente metales |
| <b>583</b> | Nitrilo fenólico | Marrón     | 0,051 (2,0)       | 2 - 5                        | 121                          | 800            | 630                                     | 10                                 | Film adhesivo seco activado por calor o disolvente                       |
| <b>588</b> | Nitrilo fenólico | Amarillo   | 0,152 (6,0)       | 2 - 5                        | 121                          | 250            | 880                                     | 20                                 | Film adhesivo seco activado por calor                                    |

## Films Adhesivos Conductores Anisótropos (ACF)

Los ACF son films termoadhesivos conductores eléctricos en el eje Z compuestos por termoplásticos y adhesivos reticulables por calor aleatoriamente dopados con partículas conductoras. Estas partículas permiten

la interconexión de líneas de circuitos a través de este espesor de adhesivo (eje Z, perpendicular al plano del film), pero están lo suficientemente distanciadas para ser aislantes en el plano del adhesivo.

| Producto    | Espesor (µm) | Dopante                 | Mínimo pitch (µm) | Tiempo curado / adhesión (s) | Temperatura de adhesión (°C) | Comentarios                                                                                                                                                                              |
|-------------|--------------|-------------------------|-------------------|------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>5363</b> | 40           | Níquel chapado Oro      | 200               | 10 - 15                      | 180 - 200                    | Para conexión de cobre sobre circuitos flexibles de poliimida a PCB o entre circuitos flexibles. Excelente fiabilidad a altas temperaturas. Rápido adhesivado.                           |
| <b>7303</b> | 74           | Vidrio recubierto Plata | 500               | 20 - 30                      | 135 - 150                    | Para conexión de tinta de plata en poliéster o cobre sobre circuitos flexibles de poliimida a PCB y entre circuitos flexibles. Excelente resistencia a bajas temperaturas y disolventes. |



# Soluciones EMI/EMC



## Electrically Conductive Adhesive Transfer Tapes (ECATT)

Las ECATT están diseñadas con unas propiedades técnicas para ayudar en una amplia variedad de operaciones de ensamblado en electrónica, desde la unión de pantallas EMI y gaskets a puestas a tierra y adhesivado

de circuitos flexibles y PCB's; ahorrando tiempo y mejorando el rendimiento y fiabilidad del producto final.

| Producto      | Espesor (µm) | Conductividad Z ó XYZ | Filler Conductor | Adhesivo                          | Resistencia de contacto |                 | Comentarios                                                                                                                              |
|---------------|--------------|-----------------------|------------------|-----------------------------------|-------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------|
|               |              |                       |                  |                                   | Lámina de cobre         | Gold Flex a PCB |                                                                                                                                          |
| <b>9703</b>   | 50           | Z                     | Plata            | ECATT acrílico de bajo outgassing | <0,2                    | <0,2            | Eje Z. Bajo outgassing.                                                                                                                  |
| <b>9707</b>   | 50           | XYZ                   | Plata            | ECATT acrílico de alta adhesión   | <0,2                    | <0,3            | Alta adhesión. Buen apantallamiento EMI para alta frecuencia en la línea de adhesión. Baja resistencia de contacto con acero inoxidable. |
| <b>9709SL</b> | 50           | XYZ                   | Plata            | ECATT acrílico estándar           | <0,2                    | <0,2            | Apantallamiento EMI. Liner premium.                                                                                                      |
| <b>9713</b>   | 89           | XYZ                   | Ni/Cu            | ECATT acrílico estándar           | <0,4                    | <7,5            | Malla conductora no tejida.                                                                                                              |
| <b>9720S</b>  | 35           | XYZ                   | Ni/Cu            | ECATT acrílico de alta adhesión   | <0,2                    | <0,5            | Baja resistencia de contacto. Buena adhesión.                                                                                            |
| <b>9723</b>   | 60           | XYZ                   | Ni/Cu            | ECATT acrílico de alta adhesión   | <0,2                    | <0,4            | Baja resistencia de contacto. Alta adhesión.                                                                                             |

## Tabla comparativa de propiedades

| Producto      | Resistencia de contacto |            | Apantallamiento EMI en la línea de Adhesión | Conformabilidad | Resistencia de pelado | Adhesión | Conductividad térmica |
|---------------|-------------------------|------------|---------------------------------------------|-----------------|-----------------------|----------|-----------------------|
|               | Flex a Acero inoxidable | Flex a PCB |                                             |                 |                       |          |                       |
| <b>9703</b>   | +++                     | +++        |                                             | +               | +                     | ++       | +                     |
| <b>9707</b>   | +++                     | +++        | +++                                         | +++             | +++                   | +        | +++                   |
| <b>9709SL</b> | +++                     | +++        | +++                                         | +++             | +                     | ++       | +++                   |
| <b>9713</b>   | ++                      | +          | +                                           | +               | +                     | +        | +                     |
| <b>9720S</b>  | ++                      | +          | +                                           | +               | +                     | +        | +                     |
| <b>9723</b>   | ++                      | +++        | +                                           | ++              | +++                   | +        | +                     |

# Soluciones EMI/EMC



## ECG Conductive Pads y Gaskets

Los Electrically Conductive Gaskets (ECG) son cintas compresibles con buena conductividad eléctrica y excelentes propiedades de amortiguación/recuperación. Ofrecen un excelente rendimiento de relleno de huecos a la vez que mantienen un buen potencial de conexión a tierra eléctrica. Estos productos ofrecen conductividad a través de su espesor (eje Z) y en el plano del adhesivo (planos X-Y). Son ideales para aplicaciones de cintas de

juntas EMI/EMC entre sustratos comunes tales como superficies metálicas, incluyendo sustratos chapados en metal. El adhesivo utilizado en los productos de ECG de 3M es una cinta de transferencia de adhesivo conductor de electricidad (ECATT) de alto rendimiento.

**La serie ECG-70XX tiene adhesivo en una cara y la serie ECG-80XX en las dos caras.**

| Producto        | Descripción   |                                  |                        |        |                     | Propiedades térmicas                       | Propiedades eléctricas                             |                                                      |                                      |
|-----------------|---------------|----------------------------------|------------------------|--------|---------------------|--------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------|
|                 | Espesor (μm)  | Sustrato                         | Adhesivo               | Filler | Liner               | Conductividad térmica (W/m-K) <sup>1</sup> | Eje Z Resistencia 1 (1 in × 1 in) (Ω) <sup>2</sup> | Eje Z Resistencia 2 (10 mm × 10 mm) (Ω) <sup>2</sup> | Resistencia superficial <sup>3</sup> |
| <b>ECG7033H</b> | 0,35<br>±0,05 |                                  |                        |        |                     |                                            |                                                    |                                                      |                                      |
| <b>ECG7053H</b> | 0,55<br>±0,05 | Espuma de poliuretano metalizada | PSA Acrílico una cara  | Níquel | Papel recubierto PE | 0,9                                        | <0,05                                              | <0,1                                                 | <0,1                                 |
| <b>ECG7073H</b> | 0,75<br>±0,05 |                                  |                        |        |                     |                                            |                                                    |                                                      |                                      |
| <b>ECG8035H</b> | 0,35<br>±0,05 | Espuma de poliuretano metalizada | PSA Acrílico dos caras | Níquel | Papel recubierto PE | 0,9                                        | <0,05                                              | <0,1                                                 | <0,1                                 |
| <b>ECG8055H</b> | 0,55<br>±0,05 |                                  |                        |        |                     |                                            |                                                    |                                                      |                                      |
| <b>ECG8075H</b> | 0,75<br>±0,05 |                                  |                        |        |                     |                                            |                                                    |                                                      |                                      |

<sup>1</sup> QTM-500

<sup>2</sup> 3M TS-EMC-0001

<sup>3</sup> 3M TS-KOR-939





# Soluciones EMI/EMC



## Absorbentes EMI

Los absorbentes EMI están diseñados para disipar y absorber EMI en las frecuencias más comunes. Las opciones de alta y baja frecuencia están disponibles, y hay múltiples espesores disponibles para adaptarse a diversas aplicaciones.

Estos materiales son flexibles y ofrecen una alta permeabilidad y pérdida magnética en el rango de frecuencia deseado.

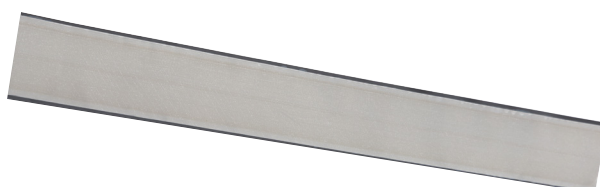
| Producto         | Tipo       | Adhesivo     | Espesor (mm) | Permeabilidad Magnética (@ 1MHz) | Rango de frecuencias |              | Rango Temperatura (°C) | Conductividad térmica (W/m-K) |
|------------------|------------|--------------|--------------|----------------------------------|----------------------|--------------|------------------------|-------------------------------|
|                  |            |              |              |                                  | Mínima (MHz)         | Máxima (GHz) |                        |                               |
| <b>AB5000HF</b>  | Absorbente | No conductor | 0,2 (1,0)    | 30                               | 200                  | 10           | -25 a +85              | 0,6                           |
| <b>AB5000SHF</b> | Absorbente | No conductor | 0,5          | 50                               | 50                   | 10           | -25 a +85              | 0,7                           |
| <b>AB6005SHF</b> | Híbrido    | No conductor | 0,105        | 50                               | 10                   | 18           | -30 a +105             | –                             |
| <b>AB7000HF</b>  | Absorbente | No conductor | 0,13 (0,25)  | 110                              | 500                  | 2,4 (3)      | -25 a +85              | –                             |

## Aislantes Magnéticos

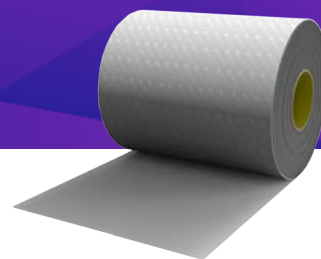
Nuestra gama de soluciones de aislantes magnéticos de flujo ofrece una mejor estabilización de imagen en aplicaciones de cámara en OIS, mejora el Near Field

(NF) y la RFID señal de antena, mejora de transmisión de señales en aplicaciones de carga inalámbrica y, además, evita interferencias entre audífonos y teléfonos.

| Producto      | Tipo | Espesor (mm) | Permeabilidad Magnética | Rango de Frecuencias (MHz) | Rango de Temperatura (°C) |
|---------------|------|--------------|-------------------------|----------------------------|---------------------------|
| <b>EM80KM</b> | FFDM | 0,05         | 80.000 @ 0,1 MHz        | –                          | -25 a +110                |
| <b>EM04TP</b> | FFDM | 0,1          | 30 - 40 @ 1 MHz         | <20                        | -25 a +90                 |
| <b>EM15TP</b> | FFDM | 0,1          | 150 @ 1 MHz             | 10 - 150                   | -25 a +90                 |
| <b>EM15TF</b> | FFDM | 0,1          | 150 @ 3 MHz             | 1 - 100                    | -30 a +85                 |



# Soluciones antivibración



## 3M™ Bumpons™

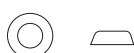
Nuestra gama de 3M™ Bumpons™ son la alternativa perfecta a los topes tradicionales. De aplicación sencilla, son fiables y persisten al paso del tiempo, manteniendo la estética y sin endurecerse. Podremos utilizarlos como pie antideslizante, como amortiguador de ruidos y vibraciones, o como espaciador para la correcta circulación del aire.

Dentro de nuestra gama de 3M™ Bumpons™ encontramos diferentes posibilidades, categorizando nuestros productos como se presenta a continuación.

### Por forma:



Semiesfera



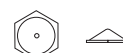
Cilíndrico con parte superior plana



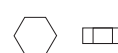
Piramidal



Cilíndrico con parte superior cóncava



Hexagonal piramidal



Hexagonal

### Por color:



Gris



Marrón



Negro



Blanco



Transparente

### Por adhesión:

#### Acrílico A - 20

Superficies de alta energía

Resistencia al corte

ABS o policarbonato

#### Goma sintética R - 25

Superficies de baja energía

Excelente adhesión inmediata

Polietileno o polipropileno

#### Goma natural R - 30

Superficies versátiles

Alta adherencia

## Otras soluciones

Además de todas las soluciones que se especifican en este catálogo, hay muchas otras que pueden interesarle como la gama de fluidos Novec™ para limpieza y recubrimientos, la gama de cables y conectores Interconnect para electrónica, las resinas Scotchcast™ para

recubrimientos aislantes eléctricos, la gama de material termorretráctil y nuestras espumas técnicas E-A-R. Para más información sobre todos estos productos, puede ponerse en contacto con nosotros en el siguiente email: [consultaselectronica@mmm.com](mailto:consultaselectronica@mmm.com)



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### Nota Importante

Antes de utilizar estos productos, deberá evaluar y determinar si son adecuados para la aplicación prevista. Usted asume todos los riesgos y responsabilidades asociados a dicha aplicación.

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### Soluciones Electrónicas

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# Cables and Accessories Selection guide. **Power inside.**

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# 3M™ Connectors and Cable Mating guide



| Connectors      |                                          |                                      |                                      |                                      |                                       |
|-----------------|------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|
| Connector Pitch | 2.54mm x 2.54mm<br>(0.100" x 0.100")     | 2.00mm x 2.00mm<br>(0.079" x 0.079") | 1.27mm x 2.54mm<br>(0.050" x 0.100") | 1.27mm x 1.27mm<br>(0.050" x 0.050") | 1.27mm x 1.27mm<br>(0.050" x 0.050")  |
|                 | 3M™ Four-Wall Headers and PCB Connectors | 3M™ Shrouded Boardmount Header       | 3M™ Tripolarized Header              | 3M™ Shrouded Boardmount Header       | 3M™ Mini Delta Ribbon (MDR) Connector |
| Header Series   | 2500, 3000, 4600, 78XX, 303XX            | 1552                                 | 810                                  | 452                                  | 101, 103 (Shell)                      |
|                 | 3M™ Wiremount Socket                     | 3M™ Ribbon Cable Socket              | 3M™ Tripolarized Wiremount Socket    | 3M™ Ribbon Cable Wiremount Socket    | 3M™ Mini Delta Ribbon (MDR) Connector |
| Socket Series   | 3000, 891, CHG, 7964                     | 1522                                 | 820                                  | 451                                  | 102                                   |

| Cables                                |                                                       |                   |                                                 |                                                 |                                          |
|---------------------------------------|-------------------------------------------------------|-------------------|-------------------------------------------------|-------------------------------------------------|------------------------------------------|
| Cable Pitch (if flat)                 | 0.050"                                                | 1mm               | 0.025"                                          | 0.025"                                          | 0.025"                                   |
| Basic Cable Series #                  | 3365                                                  | 3625              | 3754                                            | 3754                                            | 3600                                     |
| 3M™ Round Conductor Flat Cable        | 3365, 3667, 3539, 3319, 3801, 3355, 3770, HF365, 3601 | 3625, HF625, 3250 | 3754, 3447, 3756, 3749, 3609, 3604, HF447, 7700 | 3754, 3447, 3756, 3749, 3609, 3604, HF447, 7700 | 3754, 3447, 3756, 3749, 3609, 3604       |
| 3M™ Color Coded Flat Cable            | 3302, 3811                                            |                   |                                                 |                                                 |                                          |
| 3M™ Twisted Pair Flat Cable           | 1700, HF100                                           |                   |                                                 |                                                 |                                          |
| 3M™ Jacketed Flat Ribbon Cable        | 3603, 3602, 3517, 90104, 90204, HF017                 |                   | 90111, 90101, 90202, 90201, 90211, 93101        | 90111, 90101, 90202, 90201, 90211, 93101        | 90111, 90101, 90202, 90201, 90211, 93101 |
| 3M™ Round Jacketed Flat Cable         | 3759, 3758, 3659, HF759, HF659                        |                   | 3896                                            | 3896                                            | 3896                                     |
| 3M™ Twisted Pair Round Jacketed Cable | 3600B, 3644, 3647, 3750 HF644                         |                   |                                                 |                                                 | 3600B, 3644, 3647B, 3750 HF644           |

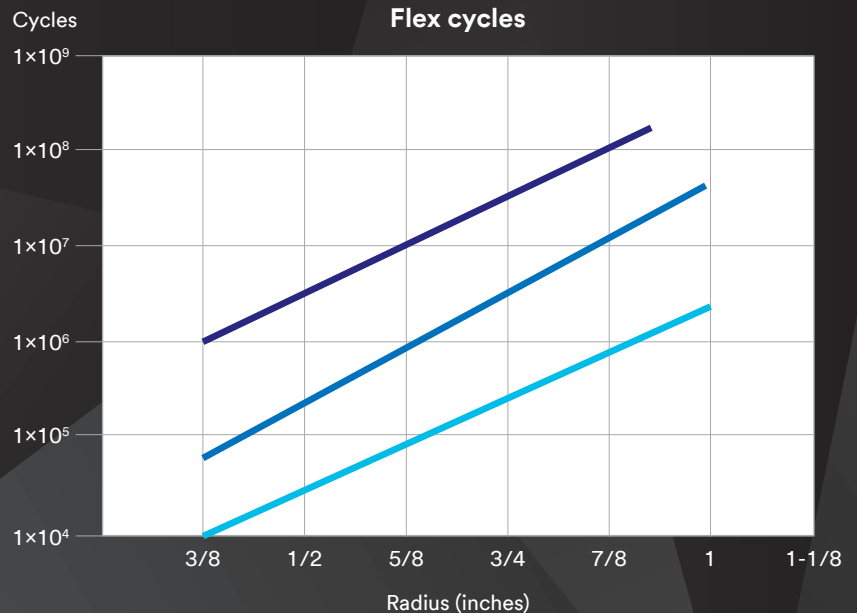
# 3M™ Flex Cycles

Each of the three cables represented in this chart consist of 28 AWG stranded conductors on 0.050" (1.27mm) wire spacing.

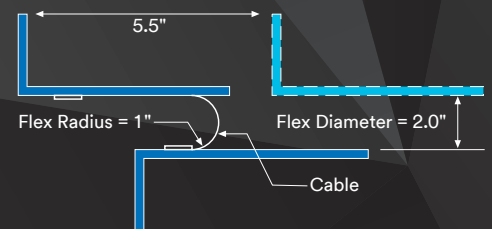
The 3M 3319/HF319/3250 cable represents conductors which consist of 19 strands, in which each of the strands are 40 AWG silver plated high-strength copper alloy (ex. at 7/8" bended radius = ~100 million flexes cycles).

The 3M 3539/HF539 cable represents conductors which consist of 19 strands, in which each of the strands are 40 AWG tinned soft copper (ex. at 7/8" bended radius = ~10 million flexes cycles).

The 3M 3365/HF365 cable represents conductors which consist of 7 strands, in which each of the strands are 36 AWG tinned soft copper (ex. at 7/8" bended radius = ~1 million flexes cycles).



The "Rolling Flex Test" flexed the cable 180° around a radius closely resembling typical usage, as represented in the illustration to the right. For more details download the tech sheet TS-0732.

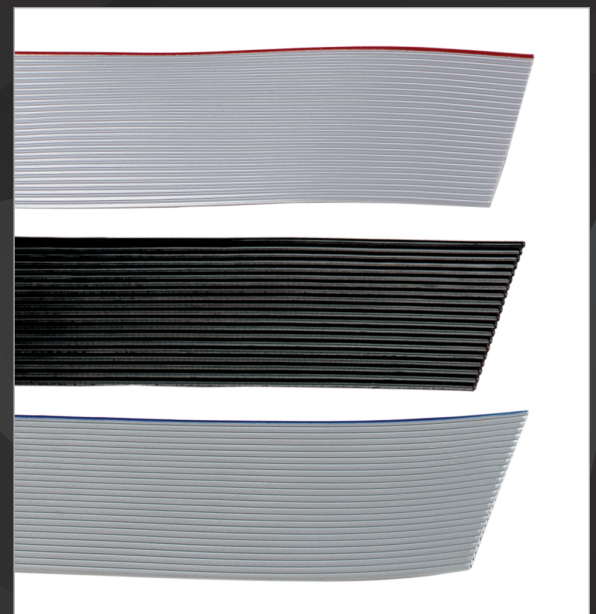


## AWG conversion table

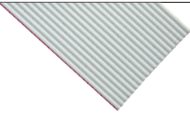
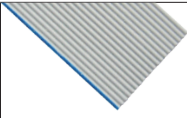
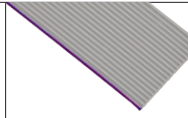
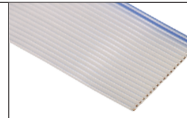
| AWG | Stranded Wires |                            | Conductor                  |               |
|-----|----------------|----------------------------|----------------------------|---------------|
|     | Number         | Outside Diameter (mm/inch) | Outside Diameter (mm/inch) | Cross Section |
| 22  | 1              | 0.643/0.0253               | 0.64/0.0253                | 0.326/640     |
|     | 7              | 0.254/0.0100               | 0.78/0.0300                | 0.355/700     |
|     | 19             | 0.160/0.0063               | 0.81/0.0320                | 0.382/750     |
| 24  | 1              | 0.510/0.0201               | 0.51/0.0201                | 0.205/404     |
|     | 7              | 0.203/0.0080               | 0.61/0.0240                | 0.227/448     |
|     | 19             | 0.127/0.0050               | 0.64/0.0250                | 0.241/475     |
| 26  | 1              | 0.404/0.0159               | 0.40/0.0159                | 0.128/253     |
|     | 7              | 0.160/0.0063               | 0.48/0.0190                | 0.141/275     |
|     | 19             | 0.102/0.0040               | 0.51/0.0200                | 0.149/304     |
| 28  | 1              | 0.320/0.0126               | 0.32/0.0126                | 0.080/124     |
|     | 7              | 0.127/0.0050               | 0.38/0.0150                | 0.089/175     |
|     | 19             | 0.080/0.0031               | 0.40/0.0160                | 0.092/201     |
| 30  | 1              | 0.250/0.0100               | 0.25/0.0100                | 0.050/100     |
|     | 7              | 0.102/0.0040               | 0.30/0.0120                | 0.057/112     |

## 3M™ Flat Ribbon Cable

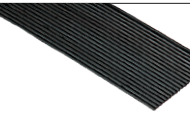
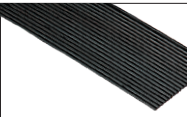
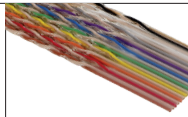
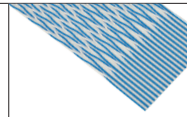
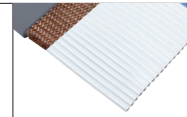
Ask your local 3M contact.

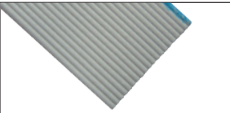
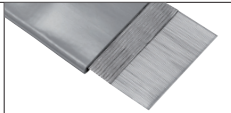
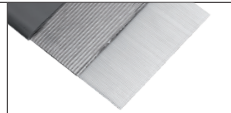
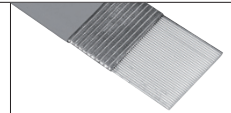
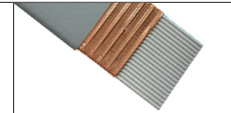
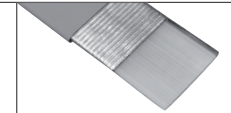
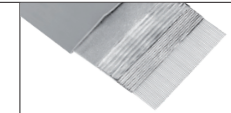


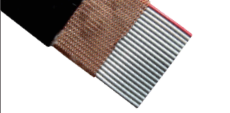
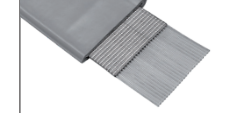
All 3M flat- and round-cables permit termination to a broad line of IDC connectors.

|                                                               |                        |                                                                   |                                                                     |                                                                                                   |                                                                                                   |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cable Type/Description                                        | 3M™ Round Conductor Flat Cable                                                                         | 3M™ Round Conductor Flat Cable                                                                                                                    | 3M™ Round Conductor Flat Cable                                                                                                                       | 3M™ Round Conductor Flat Cable                                                                                                                                                      | 3M™ Round Conductor Flat Cable                                                                                                                                                      |
| Pitch/Centerline (mm)                                         | 0.635                                                                                                  | 0.635                                                                                                                                             | 0.635                                                                                                                                                | 0.635                                                                                                                                                                               | 0.635                                                                                                                                                                               |
| 3M Cable Series                                               | 3754                                                                                                   | 3749                                                                                                                                              | HF447                                                                                                                                                | 3604                                                                                                                                                                                | 3609                                                                                                                                                                                |
| Features                                                      | <ul style="list-style-type: none"> <li>The “basic stranded cable” for 1.27mm IDC connectors</li> </ul> | <ul style="list-style-type: none"> <li>The “basic solid cable” for 1.27mm IDC connectors</li> <li>Meets SCSI-3 Fast-20 Zo requirements</li> </ul> | <ul style="list-style-type: none"> <li>LSZH – Low Smoke (IEC 61034-2:2005)</li> <li>Low toxicity of combustion gases (NF X 70-100-2:2006)</li> </ul> | <ul style="list-style-type: none"> <li>Excellent abrasion and chemical resistance</li> <li>Excellent mechanical durability</li> <li>For extreme temperature requirements</li> </ul> | <ul style="list-style-type: none"> <li>Excellent abrasion and chemical resistance</li> <li>Excellent mechanical durability</li> <li>For extreme temperature requirements</li> </ul> |
| Conductor Size                                                | 30 AWG                                                                                                 | 30 AWG                                                                                                                                            | 30 AWG                                                                                                                                               | 30 AWG                                                                                                                                                                              | 30 AWG                                                                                                                                                                              |
| Conductor Material                                            | Tinned Copper                                                                                          | Tinned Copper                                                                                                                                     | Tinned Copper                                                                                                                                        | Silver Plated Copper                                                                                                                                                                | Silver Plated Copper                                                                                                                                                                |
| Conductor Stranding                                           | 7 × 0.102                                                                                              | Solid                                                                                                                                             | Solid                                                                                                                                                | Solid                                                                                                                                                                               | 7 × 0.102                                                                                                                                                                           |
| Conductor Quantity                                            | 10 to 100                                                                                              | 10 to 100                                                                                                                                         | 10 to 100                                                                                                                                            | 4 to 100                                                                                                                                                                            | 4 to 100                                                                                                                                                                            |
| Primary Insulation                                            | PVC                                                                                                    | TPE                                                                                                                                               | LSHF EVA/PO                                                                                                                                          | FEP                                                                                                                                                                                 | FEP                                                                                                                                                                                 |
| Primary Color                                                 | Gray                                                                                                   | Gray                                                                                                                                              | Dark Gray                                                                                                                                            | Opaque White                                                                                                                                                                        | Opaque White                                                                                                                                                                        |
| Jacket Insulation                                             |                                                                                                        |                                                                                                                                                   |                                                                                                                                                      |                                                                                                                                                                                     |                                                                                                                                                                                     |
| Jacket Color                                                  |                                                                                                        |                                                                                                                                                   |                                                                                                                                                      |                                                                                                                                                                                     |                                                                                                                                                                                     |
| Shield                                                        |                                                                                                        |                                                                                                                                                   |                                                                                                                                                      |                                                                                                                                                                                     |                                                                                                                                                                                     |
| Voltage Rating USA/EU (V)                                     | 30/<50                                                                                                 | 150/<50                                                                                                                                           | 30/<50                                                                                                                                               | 150/<50                                                                                                                                                                             | 150/<50                                                                                                                                                                             |
| Temperature Min. (°C)                                         | -20                                                                                                    | -40                                                                                                                                               | -40                                                                                                                                                  | -55                                                                                                                                                                                 | -55                                                                                                                                                                                 |
| Temperature Max. (°C)                                         | +105                                                                                                   | +105                                                                                                                                              | +90                                                                                                                                                  | +150                                                                                                                                                                                | +150                                                                                                                                                                                |
| UL Recognition/Listing                                        | ✓/-                                                                                                    | ✓/-                                                                                                                                               |                                                                                                                                                      | ✓/-                                                                                                                                                                                 | ✓/-                                                                                                                                                                                 |
| Flammability UL/CSA                                           | VW-1/FT1                                                                                               | VW-1/FT1                                                                                                                                          | Horizontal                                                                                                                                           | VW-1/-                                                                                                                                                                              | VW-1/-                                                                                                                                                                              |
| RoHS compliant                                                | ✓                                                                                                      | ✓                                                                                                                                                 | ✓                                                                                                                                                    | ✓                                                                                                                                                                                   | ✓                                                                                                                                                                                   |
| Download by Tech Sheet Number: 3M.com (use the search window) | TS-0875                                                                                                | TS-0068                                                                                                                                           | TS-2343                                                                                                                                              | TS-0653                                                                                                                                                                             | TS-0654                                                                                                                                                                             |

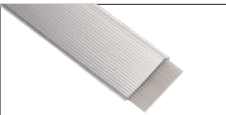
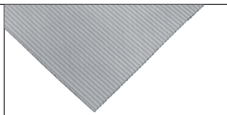
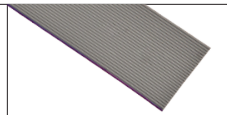
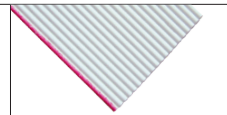
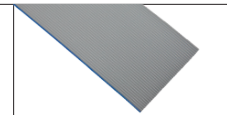
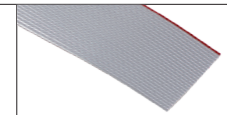
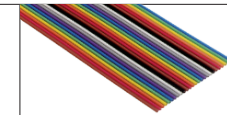
All 3M flat- and round-cables permit termination to a broad line of IDC connectors.

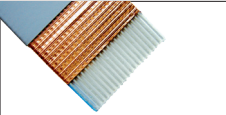
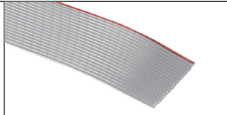
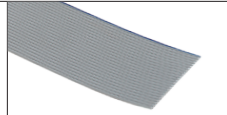
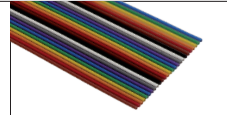
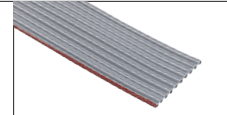
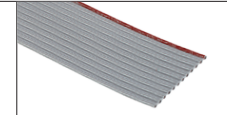
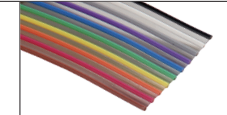
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|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cable Type/Description                                        | 3M™ Round Conductor High Flex Life Flat Cable                                                    | 3M™ High Flex Life Flat Cable                                                                                                                                                                                                                                                                                                                                          | 3M™ Twisted Pair Flat Cable                                                                                                                                                           | 3M™ Twisted Pair Flat Cable                                                                                                                          | 3M™ Shielded Jacketed Flat Cable                                                                                                                                                                                                                                                                                                                          |
| Pitch/Centerline (mm)                                         | 1.27                                                                                             | 1.0                                                                                                                                                                                                                                                                                                                                                                    | 1.27                                                                                                                                                                                  | 1.27                                                                                                                                                 | 1.27                                                                                                                                                                                                                                                                                                                                                      |
| 3M Cable Series                                               | 3319                                                                                             | 3250                                                                                                                                                                                                                                                                                                                                                                   | 1700                                                                                                                                                                                  | HF100                                                                                                                                                | HF017                                                                                                                                                                                                                                                                                                                                                     |
| Features                                                      | <ul style="list-style-type: none"> <li>~100 Million flex cycles at 7/8" bended radius</li> </ul> | <ul style="list-style-type: none"> <li>High flex life of 100 million cycles at 1-3/4" diameter</li> <li>19 stands of high-strength copper alloy provide long flex life for dynamic applications</li> <li>28 AWG wire on 1mm wire spacing permits mass termination to a broad line of IDC connectors</li> <li>Zippable for branching or discrete termination</li> </ul> | <ul style="list-style-type: none"> <li>Color coded for wire identification</li> <li>Reduced crosstalk</li> <li>Different lengths of split bonded repeat sections available</li> </ul> | <ul style="list-style-type: none"> <li>LSZH – Low Smoke (IEC 61034-2:2005)</li> <li>Low toxicity of combustion gases (NF X 70-100-2:2006)</li> </ul> | <ul style="list-style-type: none"> <li>28 AWG stranded wire on 0.05" centers permits mass termination to broad line of IDC connectors</li> <li>LSZH – Low Smoke (IEC 61034-2:2005)</li> <li>Low toxicity of combustion gases (NF X 70-100-2:2006)</li> <li>360 degree expanded copper shielding provides 20 dB average shielding effectiveness</li> </ul> |
| Conductor Size                                                | 28 AWG                                                                                           | 28 AWG                                                                                                                                                                                                                                                                                                                                                                 | 28 AWG                                                                                                                                                                                | 28 AWG                                                                                                                                               | 28 AWG                                                                                                                                                                                                                                                                                                                                                    |
| Conductor Material                                            | Silver Plated Copper Alloy                                                                       | Silver Plated Copper Alloy                                                                                                                                                                                                                                                                                                                                             | Tinned Copper                                                                                                                                                                         | Tinned Copper                                                                                                                                        | Tinned Stranded Copper                                                                                                                                                                                                                                                                                                                                    |
| Conductor Stranding                                           | 19 × 0.079                                                                                       | 19 × 0.080                                                                                                                                                                                                                                                                                                                                                             | 7 × 0.127                                                                                                                                                                             | 7 × 0.127                                                                                                                                            | 7 × 0.102                                                                                                                                                                                                                                                                                                                                                 |
| Conductor Quantity                                            | 9 to 64                                                                                          | 6 to 50                                                                                                                                                                                                                                                                                                                                                                | 10 to 64 (5 to 32 Pair)                                                                                                                                                               | 10 to 64 (5 to 32 Pair)                                                                                                                              | 9 to 64                                                                                                                                                                                                                                                                                                                                                   |
| Primary Insulation                                            | PVC                                                                                              | PVC                                                                                                                                                                                                                                                                                                                                                                    | PVC                                                                                                                                                                                   | Halogen-Free Polyolefin                                                                                                                              | Halogen-Free Polyolefin                                                                                                                                                                                                                                                                                                                                   |
| Primary Color                                                 | Black                                                                                            | Black                                                                                                                                                                                                                                                                                                                                                                  | 10 Color Repeat                                                                                                                                                                       | Blue/White                                                                                                                                           | Dark Gray                                                                                                                                                                                                                                                                                                                                                 |
| Jacket Insulation                                             |                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                       |                                                                                                                                                      | PO                                                                                                                                                                                                                                                                                                                                                        |
| Jacket Color                                                  |                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                       |                                                                                                                                                      | Dark Gray                                                                                                                                                                                                                                                                                                                                                 |
| Shield                                                        |                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                       |                                                                                                                                                      | Copper Braid                                                                                                                                                                                                                                                                                                                                              |
| Voltage Rating USA/EU (V)                                     | <50                                                                                              | 300/<50                                                                                                                                                                                                                                                                                                                                                                | 300/<50                                                                                                                                                                               | 150/<50                                                                                                                                              | <50                                                                                                                                                                                                                                                                                                                                                       |
| Temperature Min. (°C)                                         | -20                                                                                              | -20                                                                                                                                                                                                                                                                                                                                                                    | -20                                                                                                                                                                                   | -40                                                                                                                                                  | -40                                                                                                                                                                                                                                                                                                                                                       |
| Temperature Max. (°C)                                         | +105                                                                                             | +105                                                                                                                                                                                                                                                                                                                                                                   | +105                                                                                                                                                                                  | +105                                                                                                                                                 | +105                                                                                                                                                                                                                                                                                                                                                      |
| UL Recognition/Listing                                        | ✓/✓                                                                                              | ✓/✓                                                                                                                                                                                                                                                                                                                                                                    | ✓/-                                                                                                                                                                                   | ✓/-                                                                                                                                                  | ✓/-                                                                                                                                                                                                                                                                                                                                                       |
| Flammability UL/CSA                                           | VW-1/FT1                                                                                         | VW-1/FT1                                                                                                                                                                                                                                                                                                                                                               | VW-1/FT1                                                                                                                                                                              | Horizontal                                                                                                                                           | VW-1/FT1                                                                                                                                                                                                                                                                                                                                                  |
| RoHS compliant                                                | ✓                                                                                                | ✓                                                                                                                                                                                                                                                                                                                                                                      | ✓                                                                                                                                                                                     | ✓                                                                                                                                                    | ✓                                                                                                                                                                                                                                                                                                                                                         |
| Download by Tech Sheet Number: 3M.com (use the search window) | TS-0059                                                                                          | TS-2694                                                                                                                                                                                                                                                                                                                                                                | TS-0115                                                                                                                                                                               | TS-2345-A                                                                                                                                            | TS-2345-A                                                                                                                                                                                                                                                                                                                                                 |

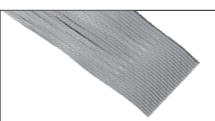
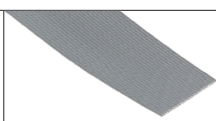
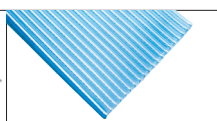
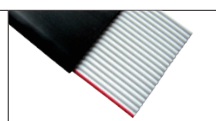
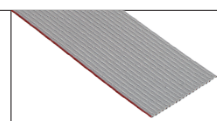
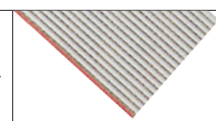
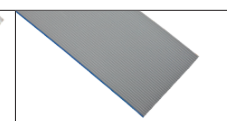
|                                                                                  |                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                  |                                                                                                                                                                         |                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                                                                                                                                                                          |                                                                                                                                                                     |                                                                                                                                                                  |                                                                                        |                                                                                                                                           |                                                                                                                                                                                                            |
| <b>3M™ Round Conductor Flat Cable</b>                                            | <b>3M™ Pleated Foil Shielded Flat Cable</b>                                                                                                                                                                                                                              | <b>3M™ Pleated Foil Shielded Flat Cable</b>                                                                                                                                                                                                         | <b>3M™ Pleated Foil Shielded Flat Cable</b>                                                                                                                                                                                                      | <b>3M™ Pleated Foil Shielded Flat Cable</b>                                                                                                                             | <b>3M™ Pleated Foil Shielded Flat Cable</b>                                                                                                                                                                                 | <b>3M™ Low Skew Pleated Foil Shielded Flat Cable</b>                                                                                                                                                                                                                                         |
| <b>0.635</b>                                                                     | <b>0.635</b>                                                                                                                                                                                                                                                             | <b>0.635</b>                                                                                                                                                                                                                                        | <b>0.635</b>                                                                                                                                                                                                                                     | <b>0.635</b>                                                                                                                                                            | <b>0.635</b>                                                                                                                                                                                                                | <b>0.635</b>                                                                                                                                                                                                                                                                                 |
| <b>3756</b>                                                                      | <b>90101</b>                                                                                                                                                                                                                                                             | <b>90111</b>                                                                                                                                                                                                                                        | <b>90201</b>                                                                                                                                                                                                                                     | <b>90202</b>                                                                                                                                                            | <b>90211</b>                                                                                                                                                                                                                | <b>93101</b>                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>• Meets SCSI-3 Zo requirements</li> </ul> | <ul style="list-style-type: none"> <li>• Thick jacket for external applications</li> <li>• 50 Ohm unbalanced and 100 Ohm balanced impedance applications</li> <li>• 35 dB average shielding effectiveness</li> <li>• Very low crosstalk</li> <li>• CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>• Thick jacket for external applications</li> <li>• 75 Ohm unbalanced impedance applications</li> <li>• 35 dB average shielding effectiveness</li> <li>• Very low crosstalk</li> <li>• CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>• Thin cover for internal applications</li> <li>• 50 Ohm unbalanced and 100 Ohm balanced impedance applications</li> <li>• 35 dB average shielding effectiveness</li> <li>• Very low crosstalk</li> </ul> | <ul style="list-style-type: none"> <li>• Thin cover for internal applications</li> <li>• 35 dB average shielding effectiveness</li> <li>• Very low crosstalk</li> </ul> | <ul style="list-style-type: none"> <li>• Thin cover for internal applications</li> <li>• 75 Ohm unbalanced impedance applications</li> <li>• 35 dB average shielding effectiveness</li> <li>• Very low crosstalk</li> </ul> | <ul style="list-style-type: none"> <li>• Thick jacket for external applications</li> <li>• 50 Ohm unbalanced and 100 Ohm balanced impedance applications</li> <li>• 35 dB average shielding effectiveness</li> <li>• Very low crosstalk</li> <li>• CL2 Listed</li> <li>• Low Skew</li> </ul> |
| 30 AWG                                                                           | 30 AWG                                                                                                                                                                                                                                                                   | 30 AWG                                                                                                                                                                                                                                              | 30 AWG                                                                                                                                                                                                                                           | 30 AWG                                                                                                                                                                  | 30 AWG                                                                                                                                                                                                                      | 30 AWG                                                                                                                                                                                                                                                                                       |
| Tinned Copper                                                                    | Tinned Copper                                                                                                                                                                                                                                                            | Tinned Copper                                                                                                                                                                                                                                       | Tinned Copper                                                                                                                                                                                                                                    | Tinned Copper                                                                                                                                                           | Tinned Copper                                                                                                                                                                                                               | Tinned Copper                                                                                                                                                                                                                                                                                |
| 7 × 0.102                                                                        | Solid                                                                                                                                                                                                                                                                    | Solid                                                                                                                                                                                                                                               | Solid                                                                                                                                                                                                                                            | 7 × 0.102                                                                                                                                                               | Solid                                                                                                                                                                                                                       | Solid                                                                                                                                                                                                                                                                                        |
| 4 to 100                                                                         | 20 to 100                                                                                                                                                                                                                                                                | 20 to 100                                                                                                                                                                                                                                           | 20 to 100                                                                                                                                                                                                                                        | 20 to 100                                                                                                                                                               | 20 to 100                                                                                                                                                                                                                   | 50 to 100                                                                                                                                                                                                                                                                                    |
| TPE                                                                              | TPE                                                                                                                                                                                                                                                                      | TPE                                                                                                                                                                                                                                                 | TPE                                                                                                                                                                                                                                              | TPE                                                                                                                                                                     | TPE                                                                                                                                                                                                                         | TPE                                                                                                                                                                                                                                                                                          |
| Gray                                                                             | Translucent                                                                                                                                                                                                                                                              | Translucent                                                                                                                                                                                                                                         | Translucent                                                                                                                                                                                                                                      | Translucent                                                                                                                                                             | Translucent                                                                                                                                                                                                                 | Translucent                                                                                                                                                                                                                                                                                  |
|                                                                                  | PVC                                                                                                                                                                                                                                                                      | PVC                                                                                                                                                                                                                                                 | TPE                                                                                                                                                                                                                                              | TPE                                                                                                                                                                     | TPE                                                                                                                                                                                                                         | PVC                                                                                                                                                                                                                                                                                          |
|                                                                                  | Gray                                                                                                                                                                                                                                                                     | Gray                                                                                                                                                                                                                                                | Gray                                                                                                                                                                                                                                             | Gray                                                                                                                                                                    | Gray                                                                                                                                                                                                                        | Gray                                                                                                                                                                                                                                                                                         |
|                                                                                  | Pleated Copper Foil                                                                                                                                                                                                                                                      | Pleated Copper Foil                                                                                                                                                                                                                                 | Pleated Copper Foil                                                                                                                                                                                                                              | Pleated Copper Foil                                                                                                                                                     | Pleated Copper Foil                                                                                                                                                                                                         | Pleated Copper Foil                                                                                                                                                                                                                                                                          |
| 150/<50                                                                          | N.E.C. 725, CL2/<50                                                                                                                                                                                                                                                      | N.E.C. 725, CL2/<50                                                                                                                                                                                                                                 | 150/<50                                                                                                                                                                                                                                          | 150/<50                                                                                                                                                                 | 150/<50                                                                                                                                                                                                                     | N.E.C. 725 CL2/<50                                                                                                                                                                                                                                                                           |
| -40                                                                              | -20                                                                                                                                                                                                                                                                      | -20                                                                                                                                                                                                                                                 | -20                                                                                                                                                                                                                                              | -20                                                                                                                                                                     | -20                                                                                                                                                                                                                         | -20                                                                                                                                                                                                                                                                                          |
| +105                                                                             | +75                                                                                                                                                                                                                                                                      | +75                                                                                                                                                                                                                                                 | +105                                                                                                                                                                                                                                             | +105                                                                                                                                                                    | +105                                                                                                                                                                                                                        | +75                                                                                                                                                                                                                                                                                          |
| ✓/✓                                                                              | ✓/✓                                                                                                                                                                                                                                                                      | ✓/✓                                                                                                                                                                                                                                                 | ✓/✓                                                                                                                                                                                                                                              | ✓/✓                                                                                                                                                                     | ✓/✓                                                                                                                                                                                                                         | ✓/✓                                                                                                                                                                                                                                                                                          |
| VW-1/FT1                                                                         | N.E.C. 725, CL2/FT1                                                                                                                                                                                                                                                      | N.E.C. 725, CL2/FT1                                                                                                                                                                                                                                 | VW-1/FT1                                                                                                                                                                                                                                         | VW-1/FT1                                                                                                                                                                | VW-1/FT1                                                                                                                                                                                                                    | N.E.C. 725, CL2/FT1                                                                                                                                                                                                                                                                          |
| ✓                                                                                | ✓                                                                                                                                                                                                                                                                        | ✓                                                                                                                                                                                                                                                   | ✓                                                                                                                                                                                                                                                | ✓                                                                                                                                                                       | ✓                                                                                                                                                                                                                           | ✓                                                                                                                                                                                                                                                                                            |
| TS-0508                                                                          | TS-0285                                                                                                                                                                                                                                                                  | TS-0451                                                                                                                                                                                                                                             | TS-0402                                                                                                                                                                                                                                          | TS-0730                                                                                                                                                                 | TS-0598                                                                                                                                                                                                                     | TS-0876                                                                                                                                                                                                                                                                                      |

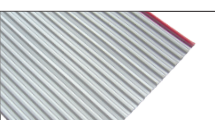
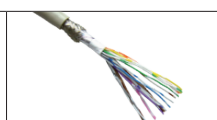
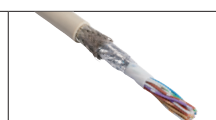
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|                                                                     |                                                                                                                                                                       |                                                                                                                               |                                                                                                                               |                                                                      |                                                                                                                                                                |                                                                                                                                                                                     |
| <b>3M™ Shielded Jacketed Flat Cable</b>                                                                                                              | <b>3M™ Shielded Jacketed Twisted Pair Flat Cable</b>                                                                                                                                                                                                     | <b>3M™ Round Jacketed Flat Cable</b>                                                                                                                                                                             | <b>3M™ Round Shielded Jacketed Flat Cable</b>                                                                                                                                                                    | <b>3M™ Round, Jacketed Flat Cable</b>                                                                                                                    | <b>3M™ Round, Shielded/Jacketed Flat Cable</b>                                                                                                                                                                                                      | <b>3M™ Pleated Foil Shielded Flat Cable</b>                                                                                                                                                                                                                              |
| <b>1.27</b>                                                                                                                                          | <b>1.27</b>                                                                                                                                                                                                                                              | <b>1.27</b>                                                                                                                                                                                                      | <b>1.27</b>                                                                                                                                                                                                      | <b>1.27</b>                                                                                                                                              | <b>1.27</b>                                                                                                                                                                                                                                         | <b>1.27</b>                                                                                                                                                                                                                                                              |
| <b>3517</b>                                                                                                                                          | <b>1785</b>                                                                                                                                                                                                                                              | <b>3759</b>                                                                                                                                                                                                      | <b>3659</b>                                                                                                                                                                                                      | <b>HF759</b>                                                                                                                                             | <b>HF659</b>                                                                                                                                                                                                                                        | <b>90104</b>                                                                                                                                                                                                                                                             |
| <ul style="list-style-type: none"> <li>• For external applications</li> <li>• 20 dB average shielding effectiveness</li> <li>• CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>• Reduced crosstalk</li> <li>• Different lengths of split bonded repeat sections available</li> <li>• For external applications</li> <li>• 20 dB average shielding effectiveness</li> <li>• CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>• For external applications</li> <li>• Flat sections permit mass termination on 2.4" centers</li> <li>• Construction allows easy routing</li> <li>• CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>• For external applications</li> <li>• Flat sections permit mass termination on 2.4" centers</li> <li>• Construction allows easy routing</li> <li>• CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>• LSZH – Low Smoke (IEC 61034-2:2005)</li> <li>• Low toxicity of combustion gases (NF X 70-100-2:2006)</li> </ul> | <ul style="list-style-type: none"> <li>• LSZH – Low Smoke (IEC 61034-2:2005) to broad line of IDC connectors</li> <li>• Low toxicity of combustion gases (NF X 70-100-2:2006)</li> <li>• Dual shielding provides 35 dB average shielding</li> </ul> | <ul style="list-style-type: none"> <li>• Thick jacket for external applications</li> <li>• 50 Ohm unbalanced and 100 Ohm balanced impedance applications</li> <li>• 35 dB average shielding effectiveness</li> <li>• Very low crosstalk</li> <li>• CL2 Listed</li> </ul> |
| 28 AWG                                                                                                                                               | 28 AWG                                                                                                                                                                                                                                                   | 28 AWG                                                                                                                                                                                                           | 28 AWG                                                                                                                                                                                                           | 28 AWG                                                                                                                                                   | 28 AWG                                                                                                                                                                                                                                              | 28 AWG                                                                                                                                                                                                                                                                   |
| Tinned Copper                                                                                                                                        | Tinned Copper                                                                                                                                                                                                                                            | Tinned Copper                                                                                                                                                                                                    | Tinned Copper                                                                                                                                                                                                    | Tinned Copper                                                                                                                                            | Tinned Copper                                                                                                                                                                                                                                       | Tinned Copper                                                                                                                                                                                                                                                            |
| 7 × 0.127                                                                                                                                            | 7 × 0.127                                                                                                                                                                                                                                                | 7 × 0.127                                                                                                                                                                                                        | 7 × 0.127                                                                                                                                                                                                        | 7 × 0.127                                                                                                                                                | 7 × 0.127                                                                                                                                                                                                                                           | 7 × 0.127                                                                                                                                                                                                                                                                |
| 9 to 64                                                                                                                                              | 20 to 64 (10 to 32 pair)                                                                                                                                                                                                                                 | 9 to 64                                                                                                                                                                                                          | 9 to 64                                                                                                                                                                                                          | 9 to 64                                                                                                                                                  | 9 to 64                                                                                                                                                                                                                                             | 15 to 64                                                                                                                                                                                                                                                                 |
| PVC                                                                                                                                                  | PVC                                                                                                                                                                                                                                                      | PVC                                                                                                                                                                                                              | PVC                                                                                                                                                                                                              | Halogen-Free Polyolefin                                                                                                                                  | Halogen-Free Polyolefin                                                                                                                                                                                                                             | TPE                                                                                                                                                                                                                                                                      |
| Gray                                                                                                                                                 | 10 Color Repeat/White                                                                                                                                                                                                                                    | Gray                                                                                                                                                                                                             | Gray                                                                                                                                                                                                             | Dark Gray                                                                                                                                                | Dark Gray                                                                                                                                                                                                                                           | Translucent                                                                                                                                                                                                                                                              |
| PVC                                                                                                                                                  | PVC                                                                                                                                                                                                                                                      | PVC                                                                                                                                                                                                              | PVC                                                                                                                                                                                                              | PO                                                                                                                                                       | PO                                                                                                                                                                                                                                                  | PVC                                                                                                                                                                                                                                                                      |
| Black                                                                                                                                                | Black                                                                                                                                                                                                                                                    | Black                                                                                                                                                                                                            | Black                                                                                                                                                                                                            | Dark Gray                                                                                                                                                | Dark Gray                                                                                                                                                                                                                                           | Gray                                                                                                                                                                                                                                                                     |
| Expanded Copper                                                                                                                                      | Expanded Copper                                                                                                                                                                                                                                          |                                                                                                                                                                                                                  | Copper Braid                                                                                                                                                                                                     |                                                                                                                                                          | Aluminum Foil/Copper Braid                                                                                                                                                                                                                          | Pleated Copper Foil                                                                                                                                                                                                                                                      |
| 300/<50                                                                                                                                              | 150/<50                                                                                                                                                                                                                                                  | 300/<50                                                                                                                                                                                                          | 300/<50                                                                                                                                                                                                          | 150/<50                                                                                                                                                  | 150/<50                                                                                                                                                                                                                                             | Article 725 CL2/<50                                                                                                                                                                                                                                                      |
| -20                                                                                                                                                  | -20                                                                                                                                                                                                                                                      | -20                                                                                                                                                                                                              | -20                                                                                                                                                                                                              | -40                                                                                                                                                      | -40                                                                                                                                                                                                                                                 | -20                                                                                                                                                                                                                                                                      |
| +80                                                                                                                                                  | +80                                                                                                                                                                                                                                                      | +80                                                                                                                                                                                                              | +80                                                                                                                                                                                                              | +105                                                                                                                                                     | +105                                                                                                                                                                                                                                                | +75                                                                                                                                                                                                                                                                      |
| ✓/✓                                                                                                                                                  | ✓/✓                                                                                                                                                                                                                                                      | ✓/✓                                                                                                                                                                                                              | ✓/✓                                                                                                                                                                                                              | ✓/✓                                                                                                                                                      | ✓/✓                                                                                                                                                                                                                                                 | ✓/✓                                                                                                                                                                                                                                                                      |
| N.E.C. 725, CL2/FT1                                                                                                                                  | N.E.C. 725, CL2/FT1                                                                                                                                                                                                                                      | N.E.C. 725, CL2/FT1                                                                                                                                                                                              | N.E.C. 725, CL2/FT1                                                                                                                                                                                              | VW-1 /-                                                                                                                                                  | VW-1 /-                                                                                                                                                                                                                                             | N.E.C. 725, CL2/FT1                                                                                                                                                                                                                                                      |
| ✓                                                                                                                                                    | ✓                                                                                                                                                                                                                                                        | ✓                                                                                                                                                                                                                | ✓                                                                                                                                                                                                                | ✓                                                                                                                                                        | ✓                                                                                                                                                                                                                                                   | ✓                                                                                                                                                                                                                                                                        |
| TS-0069                                                                                                                                              | TS-0308                                                                                                                                                                                                                                                  | TS-0070                                                                                                                                                                                                          | TS-0083                                                                                                                                                                                                          | TS-2336                                                                                                                                                  | TS-2335                                                                                                                                                                                                                                             | TS-0288                                                                                                                                                                                                                                                                  |

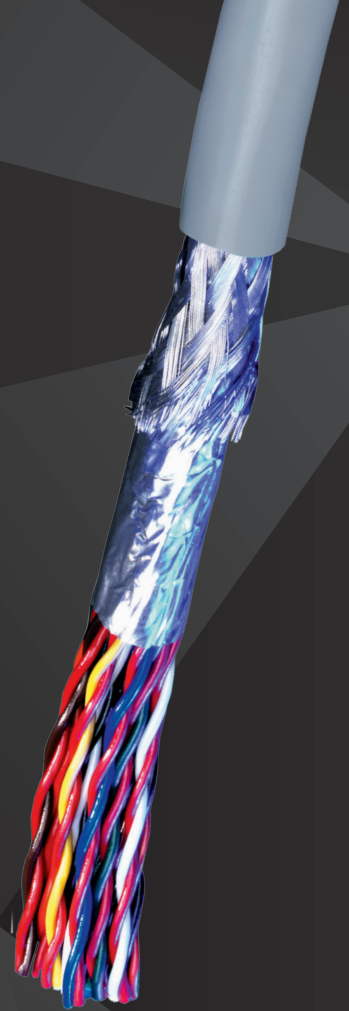


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|                                                                                                                                                                                                                                                                           |  |                                                                      |  |                                                                                                                            |                                                                            |     |
| <b>3M™ Round Conductor Flat Controlled Impedance Cable</b>                                                                                                                                                                                                                                                                                              | <b>3M™ Round Conductor Flat Cable</b>                                            | <b>3M™ Round Conductor Flat Cable</b>                                                                                                                | <b>3M™ Round Conductor Flat Cable</b>                                            | <b>3M™ Round Conductor Flat Cable</b>                                                                                                                                                                       | <b>3M™ Round Conductor Flat Cable</b>                                                                                                                        | <b>3M™ Round Conductor Flat Cable</b>                                                 |
| <b>0.635</b>                                                                                                                                                                                                                                                                                                                                            | <b>0.85</b>                                                                      | <b>1.0</b>                                                                                                                                           | <b>1.0</b>                                                                       | <b>1.27</b>                                                                                                                                                                                                 | <b>1.27</b>                                                                                                                                                  | <b>1.27</b>                                                                           |
| <b>7700</b>                                                                                                                                                                                                                                                                                                                                             | <b>3849</b>                                                                      | <b>HF625</b>                                                                                                                                         | <b>3625</b>                                                                      | <b>HF365</b>                                                                                                                                                                                                | <b>3365</b>                                                                                                                                                  | <b>3302</b>                                                                           |
| <ul style="list-style-type: none"> <li>Controlled Impedance</li> <li>Fast, flat, foldable ribbon cable construction fit for IDC</li> <li>Terminate it to IDC connector, or solder it directly to a PCB</li> <li>95 Ohm impedance cable delivers up to 5 Gbps over 1 meter using the 3M™ Wire-to-Board System, 1.27 mm, 450 Series connectors</li> </ul> | <ul style="list-style-type: none"> <li>3 row DIN connector compatible</li> </ul> | <ul style="list-style-type: none"> <li>LSZH – Low Smoke (IEC 61034-2:2005)</li> <li>Low toxicity of combustion gases (NF X 70-100-2:2006)</li> </ul> | <ul style="list-style-type: none"> <li>2mm IDC connectors</li> </ul>             | <ul style="list-style-type: none"> <li>LSZH – Low Smoke (IEC 61034-2:2005)</li> <li>Low toxicity of combustion gases (NF X 70-100-2:2006)</li> <li>~ 1 Million flex cycles at 7/8" bended radius</li> </ul> | <ul style="list-style-type: none"> <li>The "basic stranded cable" for 2.54mm IDC connectors</li> <li>~1 Million flex cycles at 7/8" bended radius</li> </ul> | <ul style="list-style-type: none"> <li>Color coded for wire identification</li> </ul> |
| 30 AWG                                                                                                                                                                                                                                                                                                                                                  | 30 AWG                                                                           | 28 AWG                                                                                                                                               | 28 AWG                                                                           | 28 AWG                                                                                                                                                                                                      | 28 AWG                                                                                                                                                       | 28 AWG                                                                                |
| Tinned Copper                                                                                                                                                                                                                                                                                                                                           | Tinned Copper                                                                    | Tinned Copper                                                                                                                                        | Tinned Copper                                                                    | Tinned Copper                                                                                                                                                                                               | Tinned Copper                                                                                                                                                | Tinned Copper                                                                         |
| Solid                                                                                                                                                                                                                                                                                                                                                   | 7 × 0.102                                                                        | 7 × 0.127                                                                                                                                            | 7 × 0.127                                                                        | 7 × 0.127                                                                                                                                                                                                   | 7 × 0.127                                                                                                                                                    | 7 × 0.127                                                                             |
| 10 to 100                                                                                                                                                                                                                                                                                                                                               | 96                                                                               | 6 to 50                                                                                                                                              | 6 to 50                                                                          | 6 to 64                                                                                                                                                                                                     | 9 to 64                                                                                                                                                      | 9 to 64                                                                               |
| Polyolefin                                                                                                                                                                                                                                                                                                                                              | PVC                                                                              | Halogen-Free Polyolefin                                                                                                                              | PVC                                                                              | Halogen-Free Polyolefin                                                                                                                                                                                     | PVC                                                                                                                                                          | PVC                                                                                   |
| Silver                                                                                                                                                                                                                                                                                                                                                  | Gray                                                                             | Dark Gray                                                                                                                                            | Gray                                                                             | Dark Gray                                                                                                                                                                                                   | Gray                                                                                                                                                         | 10 Color Repeat                                                                       |
| Polyolefin                                                                                                                                                                                                                                                                                                                                              |                                                                                  |                                                                                                                                                      |                                                                                  |                                                                                                                                                                                                             |                                                                                                                                                              |                                                                                       |
| Aluminum Foil, Polyester                                                                                                                                                                                                                                                                                                                                |                                                                                  |                                                                                                                                                      |                                                                                  |                                                                                                                                                                                                             |                                                                                                                                                              |                                                                                       |
| 30/30                                                                                                                                                                                                                                                                                                                                                   | 300/<50                                                                          | 300/<50                                                                                                                                              | 300/<50                                                                          | 300/<50                                                                                                                                                                                                     | 300/<50                                                                                                                                                      | 300/<50                                                                               |
| -20                                                                                                                                                                                                                                                                                                                                                     | -20                                                                              | -40                                                                                                                                                  | -20                                                                              | -40                                                                                                                                                                                                         | -20                                                                                                                                                          | -20                                                                                   |
| +80                                                                                                                                                                                                                                                                                                                                                     | +105                                                                             | +105                                                                                                                                                 | +105                                                                             | +105                                                                                                                                                                                                        | +105                                                                                                                                                         | +105                                                                                  |
| ✓/-                                                                                                                                                                                                                                                                                                                                                     | ✓/-                                                                              | ✓/-                                                                                                                                                  | ✓/-                                                                              | ✓/-                                                                                                                                                                                                         | ✓/-                                                                                                                                                          | ✓/-                                                                                   |
| Horizontal/FT2                                                                                                                                                                                                                                                                                                                                          | VW-1/FT1                                                                         | Horizontal                                                                                                                                           | VW-1/FT1                                                                         | Horizontal                                                                                                                                                                                                  | VW-1/FT1                                                                                                                                                     | VW-1/FT1                                                                              |
| ✓                                                                                                                                                                                                                                                                                                                                                       | ✓                                                                                | ✓                                                                                                                                                    | ✓                                                                                | ✓                                                                                                                                                                                                           | ✓                                                                                                                                                            | ✓                                                                                     |
| TS-2667                                                                                                                                                                                                                                                                                                                                                 | TS-0573                                                                          | TS-2338                                                                                                                                              | TS-0452                                                                          | TS-2334                                                                                                                                                                                                     | TS-0419                                                                                                                                                      | TS-0123                                                                               |

|                                                                                                                                                                                                                                                              |                                                                                     |                                                                                                                       |                                                                                                                                |                                                                                      |                                                                                       |                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                             |  |                                    |                                             |  |  |                                           |
| <b>3M™ Pleated Foil Shielded Flat Cable</b>                                                                                                                                                                                                                  | <b>3M™ Round Conductor Flat Cable</b>                                               | <b>3M™ Round Conductor Flat Cable</b>                                                                                 | <b>3M™ Round Conductor Flat Cable</b>                                                                                          | <b>3M™ Round Conductor Flat Cable</b>                                                | <b>3M™ Round Conductor Flat Cable</b>                                                 | <b>3M™ Round Conductor Flat Cable</b>                                                                                          |
| <b>1.27</b>                                                                                                                                                                                                                                                  | <b>1.27</b>                                                                         | <b>1.27</b>                                                                                                           | <b>1.27</b>                                                                                                                    | <b>2.54</b>                                                                          | <b>2.54</b>                                                                           | <b>3.96</b>                                                                                                                    |
| <b>90204</b>                                                                                                                                                                                                                                                 | <b>3801</b>                                                                         | <b>3770</b>                                                                                                           | <b>3811</b>                                                                                                                    | <b>8124</b>                                                                          | <b>8125</b>                                                                           | <b>3391</b>                                                                                                                    |
| <ul style="list-style-type: none"> <li>Thin cover for internal applications</li> <li>50 Ohm unbalanced and 100 Ohm balanced impedance applications</li> <li>35 dB average shielding effectiveness</li> <li>Very low crosstalk</li> <li>CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>For higher current applications</li> </ul>   | <ul style="list-style-type: none"> <li>For higher current applications</li> <li>Extended temperature range</li> </ul> | <ul style="list-style-type: none"> <li>For higher current applications</li> <li>Color coded for wire identification</li> </ul> | <ul style="list-style-type: none"> <li>For higher current applications</li> </ul>    | <ul style="list-style-type: none"> <li>For higher current applications</li> </ul>     | <ul style="list-style-type: none"> <li>For higher current applications</li> <li>Color coded for wire identification</li> </ul> |
| 28 AWG                                                                                                                                                                                                                                                       | 26 AWG                                                                              | 26 AWG                                                                                                                | 26 AWG                                                                                                                         | 22 AWG                                                                               | 24 AWG                                                                                | 22 AWG                                                                                                                         |
| Tinned Copper                                                                                                                                                                                                                                                | Tinned Copper                                                                       | Tinned Copper                                                                                                         | Tinned Copper                                                                                                                  | Tinned Copper                                                                        | Tinned Copper                                                                         | Tinned Copper                                                                                                                  |
| 7 × 0.127                                                                                                                                                                                                                                                    | 7 × 0.160                                                                           | 7 × 0.160                                                                                                             | 7 × 0.160                                                                                                                      | 7 × 0.254                                                                            | 7 × 0.203                                                                             | 7 × 0.254                                                                                                                      |
| 15 to 64                                                                                                                                                                                                                                                     | 9 to 64                                                                             | 9 to 64                                                                                                               | 9 to 64                                                                                                                        | 5 to 40                                                                              | 6 to 30                                                                               | 4 to 22                                                                                                                        |
| TPE                                                                                                                                                                                                                                                          | PVC                                                                                 | TPE                                                                                                                   | PVC                                                                                                                            | PVC                                                                                  | PVC                                                                                   | PVC                                                                                                                            |
| Translucent                                                                                                                                                                                                                                                  | Gray (Optional Black)                                                               | Gray                                                                                                                  | 10 Color Repeat                                                                                                                | Dark Gray                                                                            | Dark Gray                                                                             | 10 Color Repeat                                                                                                                |
| TPE                                                                                                                                                                                                                                                          |                                                                                     |                                                                                                                       |                                                                                                                                |                                                                                      |                                                                                       |                                                                                                                                |
| Gray                                                                                                                                                                                                                                                         |                                                                                     |                                                                                                                       |                                                                                                                                |                                                                                      |                                                                                       |                                                                                                                                |
| Pleated Copper Foil                                                                                                                                                                                                                                          |                                                                                     |                                                                                                                       |                                                                                                                                |                                                                                      |                                                                                       |                                                                                                                                |
| 300/<50                                                                                                                                                                                                                                                      | 300/<50                                                                             | 300/<50                                                                                                               | 300/<50                                                                                                                        | 300/<50                                                                              | 300/<50                                                                               | 600/<50                                                                                                                        |
| -20                                                                                                                                                                                                                                                          | -20                                                                                 | -40                                                                                                                   | -20                                                                                                                            | -20                                                                                  | -20                                                                                   | -20                                                                                                                            |
| +105                                                                                                                                                                                                                                                         | +105                                                                                | +105                                                                                                                  | +105                                                                                                                           | +105                                                                                 | +105                                                                                  | +80                                                                                                                            |
| ✓/-                                                                                                                                                                                                                                                          | ✓/-                                                                                 | ✓/-                                                                                                                   | ✓/-                                                                                                                            | ✓/-                                                                                  | ✓/-                                                                                   | ✓/-                                                                                                                            |
| VW-1/FT1                                                                                                                                                                                                                                                     | VW-1/FT1                                                                            | Horizontal                                                                                                            | VW-1/FT1                                                                                                                       | VW-1/FT1                                                                             | VW-1/-                                                                                | VW-1/-                                                                                                                         |
| ✓                                                                                                                                                                                                                                                            | ✓                                                                                   | ✓                                                                                                                     | ✓                                                                                                                              | ✓                                                                                    | ✓                                                                                     | ✓                                                                                                                              |
| TS-0403                                                                                                                                                                                                                                                      | TS-0063                                                                             | TS-0342                                                                                                               | TS-0122                                                                                                                        | TS-0084                                                                              | TS-0259                                                                               | TS-0079                                                                                                                        |

|                                                                                                     |                                                                                  |                                                                                                                                                                                     |                                                                                                 |                                                                                                                                                                                                             |                                                                                                 |                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |  |                                                                                                     |                 |                                                                                                                            |               |                                                                                                                            |
| <b>3M™ Round Conductor Flat Cable</b>                                                               | <b>3M™ Round Conductor Flat Cable</b>                                            | <b>3M™ Round Conductor Flat Cable</b>                                                                                                                                               | <b>3M™ Jacketed Flat Cable</b>                                                                  | <b>3M™ Round Conductor Medium Flex Life Flat Cable</b>                                                                                                                                                      | <b>3M™ Round Conductor Medium Flex Life Flat Cable</b>                                          | <b>3M™ High Flex Life Cable</b>                                                                                                                                                                              |
| <b>1.27</b>                                                                                         | <b>1.27</b>                                                                      | <b>1.27</b>                                                                                                                                                                         | <b>1.27</b>                                                                                     | <b>1.27</b>                                                                                                                                                                                                 | <b>1.27</b>                                                                                     | <b>1.27</b>                                                                                                                                                                                                  |
| <b>3667</b>                                                                                         | <b>3355</b>                                                                      | <b>3601</b>                                                                                                                                                                         | <b>3603</b>                                                                                     | <b>HF539</b>                                                                                                                                                                                                | <b>3539</b>                                                                                     | <b>HF319</b>                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>Split conductor sections allow for easier routing</li> </ul> | <ul style="list-style-type: none"> <li>Extended temperature range</li> </ul>     | <ul style="list-style-type: none"> <li>Excellent abrasion and chemical resistance</li> <li>Excellent mechanical durability</li> <li>For extreme temperature requirements</li> </ul> | <ul style="list-style-type: none"> <li>For external applications</li> <li>CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>~10 Million flex cycles at 7/8" bended radius</li> <li>LSZH – Low Smoke (IEC 61034-2:2005)</li> <li>Low toxicity of combustion gases (NF X 70-100-2:2006)</li> </ul> | <ul style="list-style-type: none"> <li>~10 Million flex cycles at 7/8" bended radius</li> </ul> | <ul style="list-style-type: none"> <li>~100 Million flex cycles at 7/8" bended radius</li> <li>LSZH – Low Smoke (IEC 61034-2:2005)</li> <li>Low toxicity of combustion gases (NF X 70-100-2:2006)</li> </ul> |
| 28 AWG                                                                                              | 28 AWG                                                                           | 28 AWG                                                                                                                                                                              | 28 AWG                                                                                          | 28 AWG                                                                                                                                                                                                      | 28 AWG                                                                                          | 28 AWG                                                                                                                                                                                                       |
| Tinned Copper                                                                                       | Tinned Copper                                                                    | Silver Plated Copper                                                                                                                                                                | Tinned Copper                                                                                   | Tinned Copper                                                                                                                                                                                               | Silver Plated Copper Alloy                                                                      | Silver Plated Copper Alloy                                                                                                                                                                                   |
| 7 × 0.127                                                                                           | 7 × 0.127                                                                        | 7 × 0.127                                                                                                                                                                           | 7 × 0.127                                                                                       | 19 × 0.079                                                                                                                                                                                                  | 19 × 0.079                                                                                      | 19 × 0.079                                                                                                                                                                                                   |
| 10 to 64                                                                                            | 9 to 64                                                                          | 4 to 60                                                                                                                                                                             | 10 to 64                                                                                        | 6 to 64                                                                                                                                                                                                     | 9 to 64                                                                                         | 9 to 64                                                                                                                                                                                                      |
| PVC                                                                                                 | TPE                                                                              | FEP                                                                                                                                                                                 | PVC                                                                                             | Halogen-Free Polyolefin                                                                                                                                                                                     | PVC                                                                                             | Halogen-Free Polyolefin                                                                                                                                                                                      |
| Gray                                                                                                | Gray                                                                             | Opaque White                                                                                                                                                                        | Gray                                                                                            | Dark Gray                                                                                                                                                                                                   | Black                                                                                           | Dark Gray                                                                                                                                                                                                    |
|                                                                                                     |                                                                                  |                                                                                                                                                                                     | PVC                                                                                             |                                                                                                                                                                                                             |                                                                                                 |                                                                                                                                                                                                              |
|                                                                                                     |                                                                                  |                                                                                                                                                                                     | Black                                                                                           |                                                                                                                                                                                                             |                                                                                                 |                                                                                                                                                                                                              |
|                                                                                                     |                                                                                  |                                                                                                                                                                                     |                                                                                                 |                                                                                                                                                                                                             |                                                                                                 |                                                                                                                                                                                                              |
| 300/<50                                                                                             | 300/<50                                                                          | 300/<50                                                                                                                                                                             | 300/<50                                                                                         | 300/<50                                                                                                                                                                                                     | 300/<50                                                                                         | 300/<50                                                                                                                                                                                                      |
| -20                                                                                                 | -40                                                                              | -55                                                                                                                                                                                 | -20                                                                                             | -40                                                                                                                                                                                                         | -20                                                                                             | -40                                                                                                                                                                                                          |
| +105                                                                                                | +105                                                                             | +200                                                                                                                                                                                | +80                                                                                             | +105                                                                                                                                                                                                        | +105                                                                                            | +105                                                                                                                                                                                                         |
| ✓/-                                                                                                 | ✓/-                                                                              | ✓/-                                                                                                                                                                                 | ✓/✓                                                                                             | ✓/✓                                                                                                                                                                                                         | ✓/-                                                                                             | ✓                                                                                                                                                                                                            |
| VW-1/FT1                                                                                            | Horizontal/-                                                                     | VW-1/-                                                                                                                                                                              | N.E.C. 725, CL2/FT1                                                                             | Horizontal                                                                                                                                                                                                  | VW-1/FT1                                                                                        | Horizontal                                                                                                                                                                                                   |
| ✓                                                                                                   | ✓                                                                                | ✓                                                                                                                                                                                   | ✓                                                                                               | ✓                                                                                                                                                                                                           | ✓                                                                                               | ✓                                                                                                                                                                                                            |
| TS-0247                                                                                             | TS-0317                                                                          | TS-0553                                                                                                                                                                             | TS-0060                                                                                         | TS-2565                                                                                                                                                                                                     | TS-0059                                                                                         | TS-2342                                                                                                                                                                                                      |

|                                                                                   |                                                                                                                                                                                       |                                                                                     |                                                                                                                                                                                       |                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                                                                                                    |  |                                                                                                    |                                                                                                                                                                                 |                                                                                                                                                                                                                |
| <b>3M™ Round Conductor Flat Cable</b>                                             | <b>3M™ Round Shielded Jacketed Discrete Wire Cable</b>                                                                                                                                | <b>3M™ Round Shielded Jacketed Discrete Wire Cable</b>                              | <b>3M™ Round Shielded Jacketed Discrete Wire Cable</b>                                                                                                                                | <b>3M™ Round Shielded Jacketed Discrete Wire Cable</b>                                                                                                                                                                                                              | <b>3M™ Round Shielded Jacketed Discrete Wire Cable</b>                                                                                                                                                                                                                                              |
| <b>3.96</b>                                                                       |                                                                                                                                                                                       |                                                                                     |                                                                                                                                                                                       |                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                     |
| <b>8132</b>                                                                       | <b>3600B</b>                                                                                                                                                                          | <b>3644B</b>                                                                        | <b>HF644</b>                                                                                                                                                                          | <b>3647B</b>                                                                                                                                                                                                                                                        | <b>3750</b>                                                                                                                                                                                                                                                                                         |
| <ul style="list-style-type: none"> <li>For higher current applications</li> </ul> | <ul style="list-style-type: none"> <li>Twisted Pairs</li> <li>Dual shielding</li> <li>35 dB average shielding effectiveness</li> <li>Reduced crosstalk</li> <li>CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>1.1426"</li> </ul>                           | <ul style="list-style-type: none"> <li>Twisted Pairs</li> <li>Dual shielding</li> <li>35 dB average shielding effectiveness</li> <li>Reduced crosstalk</li> <li>CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>Twisted Pairs</li> <li>Dual shielding</li> <li>35 dB average shielding effectiveness</li> <li>Reduced crosstalk</li> <li>100 Ohm balanced impedance applications</li> <li>IEEE 1284 compliant</li> <li>CL2 Listed</li> </ul> | <ul style="list-style-type: none"> <li>Twisted Pairs</li> <li>Dual shielding</li> <li>35 dB average shielding effectiveness</li> <li>Reduced crosstalk</li> <li>For higher current applications</li> <li>50 Ohm balanced and 100 Ohm balanced impedance applications</li> <li>CL2 Listed</li> </ul> |
| 18 AWG                                                                            | 28 AWG                                                                                                                                                                                | 28 AWG                                                                              | 28 AWG                                                                                                                                                                                | 28 AWG                                                                                                                                                                                                                                                              | 26 AWG                                                                                                                                                                                                                                                                                              |
|                                                                                   | Tinned Copper                                                                                                                                                                         | Tinned Copper                                                                       | Tinned Copper                                                                                                                                                                         | Tinned Copper                                                                                                                                                                                                                                                       | Tinned Copper                                                                                                                                                                                                                                                                                       |
| 19 × 0.254                                                                        | 7 × 0.127                                                                                                                                                                             | 7 × 0.127                                                                           | 7 × 0.127                                                                                                                                                                             | 7 × 0.127                                                                                                                                                                                                                                                           | 7 × 0.160                                                                                                                                                                                                                                                                                           |
| 4 to 24                                                                           | 14 to 100 (7 to 50 Pair)                                                                                                                                                              | 14 to 100 (7 to 50 Pair)                                                            | 14 to 100 (7 to 50 Pair)                                                                                                                                                              | 72 (36 Pair)                                                                                                                                                                                                                                                        | 10 to 60 (5 to 30 Pair)                                                                                                                                                                                                                                                                             |
| PVC                                                                               | PVC                                                                                                                                                                                   | PO                                                                                  | EVA Polyolefin Blends                                                                                                                                                                 | PO                                                                                                                                                                                                                                                                  | PVC                                                                                                                                                                                                                                                                                                 |
| Dark Gray                                                                         | Color Coded                                                                                                                                                                           | Color Coded                                                                         | Color Coded                                                                                                                                                                           | Color Coded                                                                                                                                                                                                                                                         | Color Coded                                                                                                                                                                                                                                                                                         |
|                                                                                   | PVC                                                                                                                                                                                   | PVC                                                                                 | Halogen-Free EVA                                                                                                                                                                      | PVC                                                                                                                                                                                                                                                                 | PVC                                                                                                                                                                                                                                                                                                 |
|                                                                                   | Beige (Black Optional)                                                                                                                                                                | Beige (Black Optional)                                                              | Beige                                                                                                                                                                                 | Beige                                                                                                                                                                                                                                                               | Gray                                                                                                                                                                                                                                                                                                |
|                                                                                   | Aluminum/Foil/Copper Braid                                                                                                                                                            | Tinned Copper Braid                                                                 | Aluminum/Foil/Copper Braid                                                                                                                                                            | Aluminum/Foil/Copper Braid                                                                                                                                                                                                                                          | Aluminum/Foil/Copper Braid                                                                                                                                                                                                                                                                          |
| 300/<50                                                                           | N.E.C. 725, CL2/<50                                                                                                                                                                   | N.E.C. 725, CL2/<50                                                                 | N.E.C. 725, CL2/<50                                                                                                                                                                   | N.E.C. 725, CL2/<50                                                                                                                                                                                                                                                 | 300/<50                                                                                                                                                                                                                                                                                             |
| -20                                                                               | -20                                                                                                                                                                                   | -20                                                                                 | -40                                                                                                                                                                                   | -20                                                                                                                                                                                                                                                                 | -20                                                                                                                                                                                                                                                                                                 |
| +80                                                                               | +75                                                                                                                                                                                   | +75                                                                                 | +75                                                                                                                                                                                   | +75                                                                                                                                                                                                                                                                 | +75                                                                                                                                                                                                                                                                                                 |
| ✓/-                                                                               | ✓/✓                                                                                                                                                                                   | ✓/-                                                                                 | ✓/✓                                                                                                                                                                                   | ✓/✓                                                                                                                                                                                                                                                                 | ✓/✓                                                                                                                                                                                                                                                                                                 |
| VW-1/-                                                                            | N.E.C. 725, CL2/FT1                                                                                                                                                                   | N.E.C. 725, CL2/FT1                                                                 | N.E.C. 725, CL2/FT1                                                                                                                                                                   | N.E.C. 725, CL2/FT1                                                                                                                                                                                                                                                 | N.E.C. 725, CL2/FT1                                                                                                                                                                                                                                                                                 |
| ✓                                                                                 | ✓                                                                                                                                                                                     | ✓                                                                                   | ✓                                                                                                                                                                                     | ✓                                                                                                                                                                                                                                                                   | ✓                                                                                                                                                                                                                                                                                                   |
| TS-0057                                                                           | TS-0388                                                                                                                                                                               | TS-0826                                                                             | 78-5100-2355-5                                                                                                                                                                        | TS-0582                                                                                                                                                                                                                                                             | TS-0072                                                                                                                                                                                                                                                                                             |



**Safety Data Sheet:** Consult Safety Data Sheet before use.

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