



MDR Connector Selection Guide

High Density Input/Output Connectors

3M™ Mini Delta Ribbon (MDR) Connectors

Performance and Reliability in Miniature

The Mini Delta Ribbon (MDR) is a half pitch interconnect system from 3M, designed to meet the needs of high speed/density input/output applications. With more than 20 years on the market, the MDR system is an established and well-proven solution for high density I/O.

MDR enjoys widespread acceptance by offering a combination of design features:

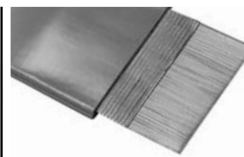
- Shielded shells provide EMI/ESD protection
- Pre-loaded ribbon contacts provide proven reliable connection
- IDC U-shaped contacts allow mass termination
- Wide range of pin counts and form factors enable design flexibility

As one of the world's most innovative companies, 3M is continually developing its products to meet your I/O needs. The current range of MDR system components can easily be expanded to meet the specific requirements of a broad range of applications.

The MDR connector system contains a ribbon-style contact based on 0.050" centerlines. Both the receptacle and the mating plug contain pre-loaded contacts for reliable contact during insertion and withdrawal cycles. The cable connectors utilize an insulation stripping U-contact to connect to the cable conductor wires. The contact is stamped from a high performance copper alloy, which provides an excellent combination of mechanical strength, electrical conductivity and corrosion resistance.










Dedicated 3M™ Cables for Series 101xx-60x0 EC



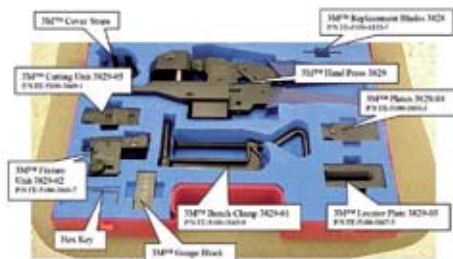
Cable Type/Description	Round Shielded Jacketed Discrete Wire Cable	Round Shielded Jacketed Discrete Wire Cable	Round Shielded Jacketed Discrete Wire Cable	Pleated Foil Shielded Cable
3M Cable Series	3600B	3644B	KU-C-KMPVV	90101
Features	<ul style="list-style-type: none"> - Twisted pairs - Dual shielding - 35 db average shielding effectiveness - Reduced crosstalk - CL2 listed for external use - Wire OD tailored for use with MDR 	<ul style="list-style-type: none"> - Twisted pairs - Dual shielding - 35 db average shielding effectiveness - Reduced crosstalk - Suitable for 100 Ohm balanced impedance applications - CL2 listed for external use - Wire OD tailored for use with MDR 	<ul style="list-style-type: none"> - Twisted pairs - Reduced crosstalk - Very flexible 	<ul style="list-style-type: none"> - Thick jacket for external applications - Suitable for 50 Ohm unbalanced and 100 Ohm balanced impedance applications - 35 db average shielding effectiveness - Very low crosstalk - CL2 listed for external use
Conductor Size	28 AWG	28 AWG	28 AWG	30 AWG
Conductor Material	Tinned Copper	Tinned Copper	Tinned Copper	Tinned Copper
Conductor Stranding	7 x 0.127 (7x36)	7 x 0.127 (7x36)	7 x 0.127 (7x36)	Solid
Conductor Quantity	2 to 100 (1 x 50 Pairs)	14 to 100 (7 x 50 Pairs)	14 to 100 (7 to 50 Pairs)	20 to 100
Primary Insulation	PVC	Polyolefin	PVC	TPE
Primary Color	Color Coded	Color Coded	Color Coded	Translucent
Jacket Insulation	PVC	PVC	PVC	PVC
Jacket Color	Beige (Black optional)	Beige (Black optional)	Cream	Gray
Shield	Aluminum Foil + Copper Braid	Aluminum Foil + Copper Braid	Tinned Copper Braid	Pleated Copper Foil
Voltage Rating USA / EU [V]	N.E.C. 725, CL2 / <50	N.E.C. 725, CL2 / <50	30 / <50	N.E.C. 725, CL2 / <50
Temperature Min. [°C]	-20	-20	-20	-
Temperature Max. [°C]	+75	+75	+60	+75
UL Recognition / Listing	- / ✓	- / ✓		✓ / ✓
Flammability UL / CUL	N.E.C. 725, CL2 / FT1	N.E.C. 725, CL2 / FT1	VW-1	N.E.C. 725, CL2 / FT1
RoHS compliant	✓	✓	✓	✓
Download by Tech Sheet Number: www.3M.com/interconnects [use the search window]	TS-0388	TS-0826	TS-2272	TS-0285

3M™ Mini Delta Ribbon (MDR) System for I/O Applications, 0.050" x 0.050"

	Wiremount Connectors				Boardmount Plug Connectors		Specialties
							
Pincount	IDC Wiremount Plug, Shielded	Solder Plug, Shielded	Non-Shielded IDC Plug	IDC Wiremount Receptacle	Straddlemount Plug	Through-Hole Plug, Right Angle, Shielded	Through-Hole Plug, Straight
14	10114-6000 EC	10114-3000 PC (PE)					
20	10120-6000 EC	10120-3000 PC (PE)		10220-0210 EC		10120-x2y2 PC	
26	10126-6000 EC	10126-3000 PC (PE)		10226-0210 EC	10126-900x PL (PC)	10126-x2y2 PC	
36	10136-6000 EC	10136-3000 PC (PE)		10236-0210 EC		10136-x2y2 PC	
40	10140-6000 EC	10140-3000 PC (PE)		10240-0210 EC			
50	10150-6000 EC	10150-3000 PC (PE)	10150-8x00 EE	10250-0210 EC	10150-900x PL (PC)	10150-x2y2 PC	10150-4CZ3 PL
68	10168-60x0 EC		10168-8x00 EE	10268-0210 EC	10168-900x PL (PC)		
72							
80	10180-6000 EC						
100	101A0-6000 EC				101A0-900x PL (PC)		101A0-4CZ3 PL
136							
200							
	Wire Accommodation: x = 0 Black Cover: 28 AWG Stranded, 30 AWG Solid (Standard) x = 1 Gray Cover: 26 AWG Solid (Available in 68 Contact only) Assembly Press 10960 Handtool 3829		x = 0 with Strain Relief (Standard) x = 1 without Strain Relief (Special Order)		PC = 30μ" (0.76 μm) Gold PL = 8μ" Flash Gold x: A = Compatible Board thickness 1 mm (Standard) O = 1.6 mm (Special Order) Solder Tail-Gold Flash	x = 5 normal type x = 7 reverse type Panel/Board Retention Feature y = : 1 = M2.5 panel/M2.5 screw lock B = M2.5 panel/ground lock 4 = # 4-40 panel/4-40 screw lock E = # 4-40 panel/ ground lock	
Plating Wiping Area	30μ" (0.76 μm) Gold	PC = 30μ" (0.76 μm) Gold PE = 20μ" (0.50 μm) Gold	30μ" (0.76 μm) Gold	30μ" (0.76 μm) Gold	30μ" (0.76 μm) Gold 8μ" (0.20 μm) Gold	30μ" (0.76 μm) Gold	8μ" (0.20 μm) Gold
UL File	E68080	E68080	E68080	E68080	E68080	E68080	
UL Flammability	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0
Temp. Range	-20°C to +85°C	-55°C to +105°C	-20°C to +85°C	-20°C to +85°C	-20°C to +85°C	-20°C to +85°C	-20°C to +85°C
*RoHS Compliant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tech Sheet No.	TS-0423	TS-0669	TS-0514	TS-0425	TS-0698	TS-0620	TS-0716

3M™ MDR Hand Tool Kit 3829

For the assembly of 3M™ MDR Wiremount Plug 101xx-60x0 (14-68 pos) Series onto 3M™ Round Jacketed Discrete Wire Cables (e.g. Series 3600, 3647, KU-C-).



3M™ MDR Assembly Press 10960

For the assembly of the 3M™ MDR Wiremount Plug 101XX-60x0 (14-100 pos.) Series onto 3M™ Round Jacketed Discrete Wire Cables (e.g. Series 3600, 3647, KU-C-).

Accessories:

- 10960 -2000 Hand Press
- 10961 Cutting Unit; includes 2 spare blades (10970-9)
- 10962-2000 Fixture Unit; includes 14, 20, 26, 36, 40, 50, 68, 80 and 100 position connector stops
- 10964-1 Cable Clamp; Black, 14-50 position
- 10964-2 Cable Clamp; Silver, 68-100 position



Through-Hole Receptacle Connectors



Right Angle Condo Receptacle	Receptacle, Right Angle, SCSI-2 Layout	Receptacle, Straight, Through-Hole, Solder Tails	Receptacle, Right Angle, Through-Hole Solder Tails, Shielded, Diecast		Receptacle, Right Angle, Through-Hole, Solder Tails, Shielded	Receptacle, Straight, Through-Hole, Compliant Pin, Shielded	
		x10214-62y2 PC	x10214-52y2 PC	x10214-52y3 PC	10214-55x3 PC	10214-R2xTS	10214-R2xCS
		x10220-62y2 PC	x10220-52y2 PC	x10220-52y3 PC	10220-55x3 PC		10220-R2xCS
		x10226-62y2 PC	x10226-52y2 PC	x10226-52y3 PC	10226-55x3 PC	10226-R2xTS	10226-R2xCS
		x10236-62y2 PC	x10236-52y2 PC	x10236-52y3 PC	10236-55x3 PC	10236-R2xTS	10236-R2xCS
10220-M218 PE 10220-L8A9 PE		x10240-62y2 PC	x10240-52y2 PC	x10240-52y3 PC	10240-55x3 PC	10240-R2xTS	10240-R2xCS
		x10250-62y2 PC	x10250-52y2 PC	x10250-52y3 PC	10250-55x3 PC	10250-R2xTS	10250-R2xCS
	10268-5JBE PC	x10268-62y2 PC	x10268-52y2 PC	x10268-52y3 PC	10268-55x3 PC	10268-R2xTS	10268-R2xCS
10236-M218 PE							
		x10280-62y2 PC	x10280-52y2 PC	x10280-52y3 PC		10280-R2xTS	10280-R2xCS
10250-M218 PE 10250-PB17 PE 10250-L219 PE		x102A0-62y2 PC	x102A0-52y2 PC	x102A0-52y3 PC			
10268-M218 PE 10268-L219 PE							
102A0-M218 PE							
	Solder Tail Length 0.15" (3.9 mm) PC = Flash Gold over Ni	Solder Tail Length 0.134" (3.4 mm) Standard PC = Flash Gold over Ni x: Blank = -20°C to +85°C N = -55°C to +105°C Lockstand thread: y = 0 M2.6 (Special) y = 1 M2.5 (Standard)	Solder Tail Length 0.15" (3.9 mm) Standard 14-40 postion x: Blank = -20°C to +85°C N = -55°C to +105°C Panel/Board Retention Features y = 1 = M2.5 panel/ M2.5 screw lock B = M2.5 panel/ground lock G = M2.5 panel with 0.86" ground lock (-52y3) 50-100 postion Panel/Board Retention Features y = 4 = # 4-40 panel/4-40 screw lock E = # 4-40 panel/ground lock G = # 4-40 panel with 0.86" ground lock (-52y3)	Solder Tail Length 0.11" (2.8 mm) Special Order	Solder Tail Length 0.11" (2.8 mm) Standard 14-40 postion, Panelmount thread size: x = G M2.5 20, 36, 50, 68 pos, Panelmount thread size: x = H # 4-40 PC = Flash Gold over Ni	PCB Press-Fit Hole T = Solder plated Lockstand thread: x = 0 M2.6 (Special) x = 1 M2.5 (Standard) x = H # 4-40 Assembly Tooling 10991 Stopper Block 10992 Press Block	PCB Press-Fit Hole C = Cu/pre flux
20µ" (0.50 µm) Gold	30µ" (0.76 µm) Gold	30µ" (0.76 µm) Gold	30µ" (0.76 µm) Gold		30µ" (0.76 µm) Gold	30µ" (0.76 µm) Gold	
E68080	E68080	E68080	E68080		E68080	E68080	
UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0		UL 94V-0	UL 94V-0	
-20°C to +85°C	-55°C to +85°C	See option x: above	See option x: above		-55°C to +105°C	-20°C to +85°C	
Yes	Yes	Yes	Yes		Yes	Yes	
TS-0671	TS-2216	TS-0427	TS-0531		TS-0621	TS-0961	

Wire Accommodations and Accessories

MDR Screws
For Boardlock and Panel Mounting
TS-0142

MDR Jack Sockets
For I/O Panel Mounting
TS-0142

Part Number	Technical Sheet	Type	Cable	Shell	Dust Cover	Tooling
101xx-3000	TS-0669	Shielded Solder Plug	Discrete 24-30 AWG	103xx-52F0 103xx-52y0-008 103xx-42y0-008		
101xx-60x0	TS-0423	Shielded IDC Plug	Discrete 26-30 AWG	See Chart		10960 Hand Tool 3829
101xx-8000	TS-0514	Non-Shielded IDC Plug	0.025" pitch flat Solid 30 AWG	N/A	3412-102xx	10980-3
101xx-900A	TS-0698	Straddlemount Plug	-	N/A	TS-0399	N/A
102xx-0210	TS-0425	Panelmount IDC Receptacle	0.050" pitch flat 28-30 AWG	N/A		10951
102xx-R2xxS	TS-0961	Boardmount Compliant Pin Shielded Receptacle	-	N/A		10991-xx / 10992-xx

3M™ Shrunk Delta Ribbon System

SMT Receptacle Connectors



SMT Receptacle Connectors



Through-Hole Connectors



Receptacle, Shielded, SMT, Straight	Die-Cast Receptacle, Shielded, SMT, Right Angle	Receptacle, Shielded, SMT, Right Angle	Receptacle, Shielded SMT, Straight	Receptacle, Shielded, Through-Hole, Right Angle	Receptacle, Shielded, SMT, Right Angle	Receptacle, Shielded, Through-Hole, Straight	Pincount
	10214-1S10-PC	10214-1210 PE		12214-51x0-00 FR	12214-82x0-00 FR	12214-11x0-00 FR	14
10220-22x0 PE	10220-1S10-PC	10220-1210 PE					20
10226-22x0 PE	10226-1S10-PC	10226-1210 PE	10226-1A10 PE	12226-51x0-00 FR PE	12226-82x0-00 FR	12226-11x0-00 FR	26
10236-22x0 PE							36
	10240-1S10-PC	10240-1210 PE					40
	10250-1S10-PC	10250-1210 PE		12250-51X0-00 FR			50
							68
							72
							80
							100
							132
							200
Panel/Board Retention for high data rate	Rugged die-cast body resists tipping during automated soldering operations	Ultra low signal skew for high data rate transmission	Ultra low signal skew for high data rate transmission	X = 0 without Jack Socket X = 5 with Jack Socket	X = 0 without Jack Socket X = 5 with Jack Socket	X = 0 without Jack Socket X = 5 with Jack Socket	
x = 1 M2.5 (Standard) x = 0 M2.6 (Special)	Ultra low signal skew for high data rate transmission		Horizontally balanced to resist tipping during wave soldering	I/O Mounting Hardware Jack Sockets 12600-S-08 12600-S-10 12600-S-12	I/O Mounting Hardware Jack Sockets 12600-S-08 12600-S-10 12600-S-12	I/O Mounting Hardware Jack Sockets 12600-S-08 12600-S-10 12600-S-12	
				TS-2123	TS-2123	TS-2123	
20µ" (0.76 µm) Gold	L = 8 µ" Gold with Lubricant Treatment, E = 20 µ" Gold, C = 30 µ" Gold	20µ" (0.76 µm) Gold	20µ" (0.76 µm) Gold	30µ" (0.76 µm) Gold	30µ" (0.76 µm) Gold	30µ" (0.76 µm) Gold	Plating Wiping Area
E68080	E68080	E68080	E68080	E68080	E68080	E68080	UL-File
UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL-Flammability
-55°C to +85°C	-55°C to +85°C	-55°C to +85°C	-55°C to +85°C	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C	Temp. Range
Yes	Yes	Yes	Yes	Yes	Yes	Yes	*RoHS Compliant
TS-0638	TS-2242	TS-0755	TS-0874	TS-2124	TS-2125	TS-2126	Tech Sheet No.

MDR Connector Mating Chart



Part No.	Tech Sheet	Description	Surfacemount		Through-Hole		
			Straight	Right Angle	Straight	Right Angle	Condo
101xx-3000	TS-0669	MDR Solder Plug, Shielded	102xx-22x0 PE	102xx-1210 PE 10226-1A10 XE	102xx-62x2 PC	102xx-55x3 PC 102xx-52xx PC	102xx-M218 10220-L8A9 PE 10250-PB17 PE
101xx-60x0	TS-0423	MDR IDC Wiremount Plug, Shielded		102xx-1S10 XE			
101xx-900x	TS-0698	MDR Straddlemount Plug	N/A	102xx-1210 PE 102xx-1S10 XE	102xx-62x2 PC	102xx-55x3 PC 102xx-52xx PC	N/A
Part No.	Tech Sheet	Description	Straddlemount	Wiremount	Solder		
102xx-0210 102xx-R2xxS	TS-0425 TS-0961	MDR Boardmount Plug	101xx-900x	101xx-60x0 xx	101xx-3000 xx		

3M™ Shielded Cable Junction Shell – Round

– Flat

Plastic			Metal		Metal	Dedicated Connectors
						
10314-3210-000			10314-A200-00	10314- A500-00		10114-6000 EC
10320-3210-000			10320-A200-00		10320-1230-00	10120-6000 EC
10326-3210-000			10326-A200-00	10326- A500-00	10326-1230-00	10126-6000 EC
10336-3210-000		10326-32J0-00x	10336-A200-00	10336- A500-00	10336-1230-00	10136-6000 EC
10340-3210-000			10340-A200-00	10340- A500-00	10340-1230-00	10140-6000 EC
10350-3210-000	10350-3280-000-x	10350-32J0-00x	10350-A200-00	10350- A500-00	10350-1230-00	10150-6000 EC
10368-3210-000	10368-3280-000-x	10368-32J0-00x	10368-A200-00	10368- A500-00	10368-12R1-00	10168-6000 EC
	10380-3280-000-x			10380- A500-00	10380-12R1-00	10180-6000 EC
			103A0-A200-00		103A0-12R1-00	101A0-6000 EC
Beige (Standard) Options: Medium Gray, Black	Cable Exit Inside Diameter of Bushing x: 0 = 10.0 mm 1 = 11.0 mm	Beige (Standard) x: 0 = Beige (Standard) 3 = Medium Gray (Special) 6 = Black (Special)				Comments
UL 94V-0	UL 94V-0	UL 94V-0				UL Flammability
Yes	Yes	Yes	Yes	Yes	Yes	*RoHS Compliant
3600 3647 KU-C-..	3600 3647 KU-C-..	3600 3647 KU-C-..	3600 3647 KU-C-..	3600 3647 KU-C-..	3749 90102, 90201 90111, 90211	Dedicated Cables for Series (101xx-60x0 EC)
TS-0571	TS-0534	TS-0535	TS-0341	TS-0394	TS-0655 (-1230-00) TS-0396 (-1230-00) TS-0666 (-12R1)	Tech Sheet No.

3M™ Unshielded Round Cable Junction Shell

Plastic				
				Dedicated Connectors
10314-52A0-008	10314-52F0-008	10314-42A0-008	10314-42F0-008	10114-3000 PC (PE)
10320-52A0-008	10320-52F0-008	10320-42A0-008	10320-42F0-008	10120-3000 PC (PE)
10326-52A0-008	10326-52F0-008	10326-42A0-008	10326-42F0-008	10126-3000 PC (PE)
10336-52A0-008	10336-52F0-008	10336-42A0-008	10336-42F0-008	10136-3000 PC (PE)
				10140-3000 PC (PE)
10350-52A0-008	10350-52F0-008	10350-42A0-008	10350-42F0-008	10150-3000 PC (PE)
Plastic Shell, Unshielded Groundplate attached M2.6 Jack Screw	Plastic Shell, Unshielded Groundplate attached Latch	Plastic Shell, Unshielded M2.6 Jack Screw	Plastic Shell, Unshielded Latch	Comments
UL 94V-0	UL 94V-0	UL 94V-0	UL 94V-0	UL Flammability
Yes	Yes	Yes	Yes	*RoHS Compliant
Solderable discrete wire round cable				Dedicated Cables for Series 101xx-3000 (101xx-60x0 EC)
Contact your local 3M sales office	TS-0670	Contact your local 3M sales office	Contact your local 3M sales office	Tech Sheet No.



High Speed MDR Cable Assemblies

3M™ Mini Delta Ribbon (MDR) High Speed Transmission System

The 3M MDR High Speed Transmission System is a digital interconnect system designed to meet the needs of today's high performance data transmission applications.

Low Voltage Differential Signaling (LVDS) technology meets the requirements for a general purpose, high bandwidth interface for serial and parallel data at speeds up to 655 Mbps. The LVDS Standard is based on the use of 100 Ohm differential impedance transmission medium from driver to receiver. Signal skew is the largest factor inhibiting speed within a system and can occur at all points along the transmission path: driver to receiver circuits, circuit board traces, cables and connectors. Both types of skew within pair skew and channel skew can prohibit optimum performance in high speed transmission systems. 3M MDR Connectors provide an excellent solution for the demanding requirements of LVDS applications.

3M™ LVDS/TMDS High Speed Cable Assemblies Transmission Systems



- Several shielded differential pairs (according to application)
- Supports **VESA/DFP** standard for 20-position MDR at host device
- LCD monitor assembly for Panel Link™/TMDS interface
- Solution for Digital Displays, Datacom and Telecom applications
- Supports **LVDS FP Link, Flat Link™, Channel Link™, Panel Link™/TMDS** electrical interfaces
- Each differential twin-ax pair has foil shield and drain wire
- Entire cable bundle is shielded with foil and braid for additional signal protection
- Rugged MDR ribbon type contact
- Quick release latches or thumbscrews
- RoHS* compliant

*RoHS Statement:

"RoHS Compliant 2005/95/EC" means that the product or part ("Product") does not contain any of the substances in excess of the maximum concentration values in EU Directive 2002/95/EC, as amended by Commission Decision 2005/618/EC, unless the substance is in an application that is exempt under EU RoHS. This information represents 3M's knowledge and belief, which may be based in whole or in part on information provided by third party suppliers to 3M.

In the event any product is proven not to conform with 3M's Regulatory Information Appendix, then 3M's entire liability and Buyer's exclusive remedy will be in accordance with the Warranty (see back cover).

3M™ MDR High Speed Cable Assemblies for Camera Link® Standard Machine Vision Applications

- Supports the Automated Imaging Association's Camera Link Standard for industrial camera to frame grabber communications
- 11 shielded twisted pairs and four drain wires
- Entire cable bundle is shielded with foil and braid for additional signal protection
- Rugged MDR ribbon type contact
- Rugged thumbscrew retention
- EMI shielded junction shell in either plastic or overmolded construction
- RoHS* compliant



3M™ Shrunk Delta Ribbon (SDR) High Speed Cable Assemblies for Mini Camera Link® Standard Machine Vision Applications

- Supports AIA Industrial Mini Camera Link Standard for new Mini C/L camera to frame grabber applications
- 11 shielded twisted pairs with four drain wires
- Entire cable bundle is shielded with foil and braid for additional signal protection
- Rugged ribbon contact type
- Rugged thumbscrew retention
- Available right angle overmolded SDR backshells eliminate bend radius
- EMI shielded cable assembly
- Available in configurations to mate between Mini Camera Link and Camera Link products



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Important Notice

Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use.

Warranty; Limited Remedy; Limited Liability.

3M's product warranty is stated in its Product Literature available upon request. **3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** If this product is defective within the warranty period stated above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. Except where prohibited by law, 3M will not be liable for any loss or damage arising from this 3M product, whether direct, indirect, special, incidental or consequential regardless of the legal theory asserted.



**Electronic Solutions Division
Interconnect Products**

6801 River Place Blvd.
Austin, TX 78726-9000
800/225 5373
Fax 800/325 5329
www.3M.com/interconnects

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