



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





# Amphenol® High Frequency Contacts for Multi-pin Connectors

12-130-4

HIGH PERFORMANCE CONNECTORS AND CONTACTS PROVIDE SECURE, RELIABLE DATA TRANSMISSION

CONCENTRIC TWINAX



COAXIAL



TRIAx



TWINAX PC TAIL



DIFFERENTIAL TWINAX

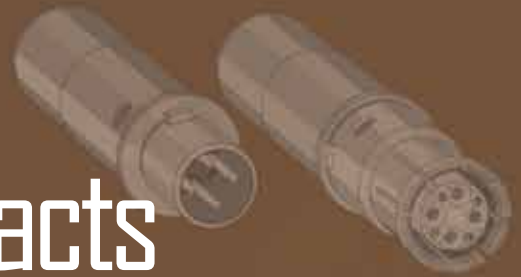


QUADRAX CONTACTS . DIFFERENTIAL TWINAX CONTACTS . TRANSITION ADAPTERS



**Amphenol**  
Aerospace

# Amphenol High Frequency Contacts



CONCENTRIC  
TWINAX



COAXIAL



“Split-Pair”  
Quadrax Contact  
& Cable

TWINAX PC TAIL

TRIAx



DIFFERENTIAL  
TWINAX



QUADRAX



## TABLE OF CONTENTS

- Table of Contents . . . . . 2
- Overview of Amphenol’s High Frequency Contacts . . . . . 3-7
- Cable Systems . . . . . 8
- Cable Usage Guide . . . . . 9-12

### MIL-DTL-38999 Circular Connector Overview . . . . . 13

#### Contacts for MIL-DTL-38999 Connectors:

- Quadrax Contacts . . . . . 14-16
- New “Split-Pair” Quadrax Contacts . . . . . 17-20
- Differential Twinax Contacts . . . . . 21, 22
- Compliant Quadrax and PC Tail Quadrax Contacts . . . . . 23
- Quadrax Transition & Differential Twinax Transitional Adapters . . . . . 24-26
- Differential Twinax Transition Adapters . . . . . 27
- Micro D-Twinax Transition Adapters . . . . . 28-30
- Insert Arrangements for MIL-DTL-38999, Series III . . . . . 31, 32
- How to Order 38999 Series III with Quadrax 100 ohm Contacts . . . . . 33
- Coaxial Contacts . . . . . 34-37
- Matched Impedance Coaxial Contacts . . . . . 38
- Typical Contact Installation Instructions for Coax Contacts . . . . . 39
- High Frequency Contacts (DC to 40 GHz) . . . . . 40
- Twinax Contacts . . . . . 41-43
- Triax Contacts . . . . . 44
- Coax, Twinax & Triax PC Tail Contacts . . . . . 45-47
- Insert Patterns for MIL-DTL-38999 Series III Incorporating Coax, Twinax and Triax Contacts . . . . . 48-50

### Standard MIL-DTL-5015 & Heavy Duty MIL-DTL-22992 Circular Connector Overview . . . . . 51

#### Contacts for Standard MIL-DTL-5015 & Heavy Duty

#### MIL-DTL-22992 Connectors:

- Coaxial Contacts . . . . . 52, 53
- Insert Patterns for Standard MIL-DTL-5015 and Heavy Duty MIL-DTL-22992 Incorporating Coax Contacts . . . . . 54
- Rectangular Rack & Panel Connectors that incorporate High Speed . . . . . 55, 56
- Additional Contact Styles from Amphenol . . . . . 57
- Guide for Selecting High Frequency Contacts and Cables . . . . . 58



## High Frequency Contacts Typical Markets:

- Military & Commercial Aviation
- Military Vehicles
- Missiles & Ordnance
- C4ISR





# Amphenol® High Frequency Contacts

Provide High Speed Transmission and Operate in High Frequency Conditions



*When you need superior electrical performance plus shielding to eliminate interference from outside electrical sources in a connector, Amphenol has the most reliable contact solutions.*

Amphenol offers a very wide range of contacts that provide high speed transmission and operate in high frequency conditions. You can be assured of interconnection compatibility when you come to Amphenol for your contact needs as well as your connector needs. Amphenol's expertise in interconnection solutions assures that your contacts will mate properly and will perform to the application specifications of your particular requirements.

*MIL-DTL-38999 CONNECTORS - The high performance series most ideal for integrating high speed and high frequency contacts. MIL-DTL-38999, Series I, II and III are by far the choice of connector for today's avionics needs - these subminiature family connectors are ideally suited for the incorporation of shielded contacts.*



This catalog section is primarily devoted to the high speed and high frequency contact options for use in MIL-DTL-38999 Connectors, which include:

Coaxial	Concentric Twinax	Triax	Quadrax	Differential Twinax	High Frequency	Transition Adapters
Pin and socket contacts designed for RF/microwave and shielded wire applications. Sizes 4, 8, 12 & 16	Pin and socket contacts designed for protection from magnetic and electrostatic interference including nuclear electromagnetic pulse. Sizes 8 & 12	Pin and socket contacts designed for shielded wire applications with 3 conductors. Sizes 8, 10 & 12	Size 8 pin and socket contacts. An outer contact with 4 strategically spaced inner contacts forming two 100 or 150 Ohm matched impedance differential pairs.	Size 8 pin and socket contacts. An outer contact with 2 inner contacts spaced to form one 100 or 150 Ohm matched impedance differential pair.	Size 8 Coaxial contacts that provide high frequencies (DC to 40 GHz). Unique "Float Mount" technology maintains tight mechanical tolerances.	Matched impedance quadrax and twinax transition adapters provide a method of launching from the high speed connectors to PCB boards.

Other series of connectors from Amphenol Aerospace, in addition to 38999 connectors, can incorporate shielded contacts. These include the following (and are also covered in this catalog section):

- Amphenol® Heavy Duty Circular Connectors, MIL-DTL-22992 - with coax contacts.
- Amphenol® Printed Circuit Board Connectors - Rectangular connectors with standard low mating force brush contacts can have hybrid arrangements with coax contacts.
- LRM Interconnects - Rectangular module and backplane connectors with standard low mating force brush contacts can have hybrid arrangements with coax contacts.
- Amphenol® ARINC 600 and R27 Rack & Panel Connectors are available with quadrax, coax, twinax and differential twinax contacts.

The Cable Usage Guide is a key reference to help guide you in selecting the contacts best suited to your needs. Since most shielded wire applications start with a fixed requirement for cable types, the guide refers you to the Amphenol connector family utilizing contacts which are compatible with the cable characteristics.

For more information on other Amphenol connectors with shielded contacts:

- Amphenol® Circular Connectors, MIL-DTL-26482, Series 1 are available with coaxial contacts, size 8 and 12 for crimp and solder type. See catalog 12-070 on-line at [www.amphenol-industrial.com](http://www.amphenol-industrial.com), or consult Amphenol Industrial Operations.
- Amphenol® MS/Standard, MIL-DTL-5015 Circular Connectors are available with size 4, 8 and 12 coax contacts. Consult Amphenol Industrial Operations for more information or on-line at [www.amphenol-industrial.com](http://www.amphenol-industrial.com).

For more information on connectors with fiber optics see the Fiber Optic section of this catalog or consult Amphenol Aerospace, Sidney, NY.

*See High Frequency Contact Designer's Guide at end of this catalog.*





Amphenol provides the latest technology in high speed contacts - differential twinax and quadrax contacts, size 8, for use in MIL-DTL-38999 Special\* Circular Connectors.

### DIFFERENTIAL TWINAX CONTACTS

High speed Differential Twinax contacts consist of an outer contact with two inner contacts spaced to form one 100 or 150 Ohm controlled impedance differential pair. See pages 385 and 386 for performance data and ordering of Differential Twinax contacts, and consult Amphenol Aerospace for more information.



**Differential Twinax Contact**



**Quadrax Contact**

### QUADRAX CONTACTS

- High speed Quadrax contacts consist of an outer contact with four inner contacts spaced to form two 100 or 150 Ohm controlled impedance differential pair.
- Both contacts, when used in Amphenol MIL-DTL-38999 Series III and ARINC type connectors, provide an excellent alternative for harsh environment applications such as:
  - Ethernet 100 Base-T-100 Ohm
  - Gigabit Ethernet 1000 Base-T-100 Ohm
  - Fibre Channel-150 Ohm
  - IEEE1394B FireWire-110 Ohm

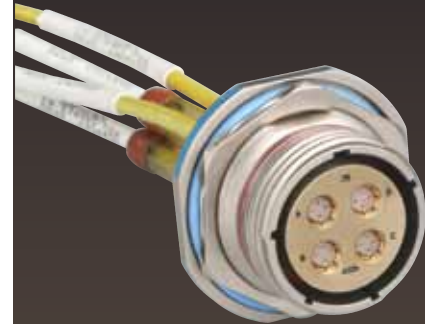
Differential Twinax and Quadrax contact options include:

- Crimp or printed circuit board termination
- Established designs to accommodate a variety of cable types and gages
- Ground plane connectors can incorporate quadrax contacts. These connections have conductive inserts that ground the outer conductor of the contact body to the shell of the connector. They accommodate size 8 and 12 shielded contacts of which the size 8 can be quadrax type.

See pages 378-380 for performance data of Quadrax contacts. Consult Amphenol Aerospace for further information needed.

\* Requires modified connector to accommodate keyed contacts.

*Differential Twinax and Quadrax contacts provide high data transfer rates, low power consumption, and excellent EMI capability. They offer controlled impedance of 100 or 150 Ohm and are ideal for use in harsh environments.*



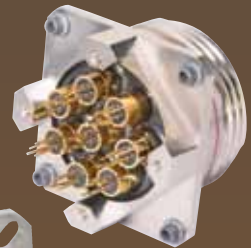
*D38999 Series III  
Ground Plane Connectors with Quadrax  
PCB Socket contacts*



*D38999 Series III  
with Quadrax and  
Power Contacts*



*D38999 Series III  
Connectors (standoff  
shell at right and  
standard shell below)  
with Quadrax PC Tail  
Contacts*



## QUADRAX CONTACTS FOR ARINC CONNECTORS

Amphenol ARINC 600 Rack and Panel connectors can incorporate high speed quadrax contacts as well as coax, twinax and differential twinax contacts. R27 Rack and Panel connectors use the same contacts as ARINC 600 connectors. For more information about rack and panel connectors contact Amphenol Aerospace, Sidney, NY.



**Quadrax Contact for ARINC Connectors**

## BOARD LEVEL CONNECTORS WITH COMPLIANT QUADRAX CONTACTS

Amphenol also provides compliant quadrax socket contacts and Quadrax pin contacts with PC tails for attaching to printed circuit boards. See page 387 for more information.



**Compliant Quadrax Socket and PCB Tail Quadrax Pin**

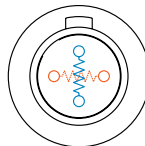
## FEED-THROUGH CONNECTOR WITH QUADRAX CONTACTS

Amphenol's feed-through connector is double-ended for through bulkhead applications. Consult Amphenol for more information.



## Quadrax Terminators

Amphenol offers a terminator assembly which is a low reactance, resistive impedance match to the characteristic impedance of a transmission line. It is used to terminate the far ends of a transmission line or an open tap so that the energy from signals traveling down the transmission line is absorbed within the resistor and not reflected back down the transmission line causing signal interference (noise). Consult Amphenol for more information.



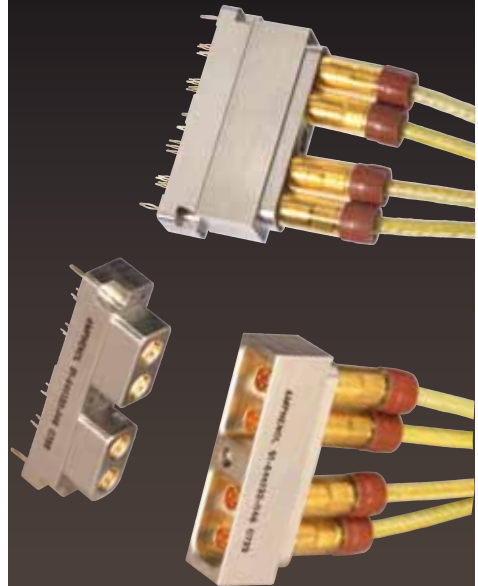
**Quadrax Terminator**

## Transition Adapters

In conjunction with its Differential Twinax and Quadrax contacts, Amphenol has developed a full line of Transition Adapters in order to facilitate launching of controlled impedance signals to printed circuit boards. These use differential twinax or quadrax 90° or straight receptacles and they can be either threaded or cable to board direct. The threaded transition adapters provide an ideal method of disconnecting the differential twinax or quadrax connector from the board.

See pages 388-390 for further description, performance data and ordering of transition adapters.

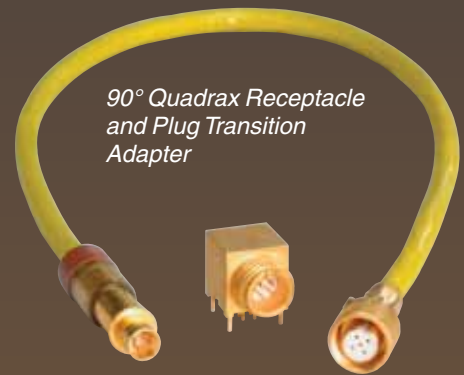
*Board Level Connector with Compliant Quadrax Contacts*



*Straight Quadrax Receptacle Contact*



*90° Quadrax Receptacle and Plug Transition Adapter*



*90° Differential Twinax Receptacle and Plug Transition Adapter*





Optional choices, other than standard crimp or solder 500 cycle and 1500 cycle contacts, are often required for high frequency interconnections. Amphenol offers shielded contacts for RF applications as well as balanced high sensitivity circuits.

## SHIELDED COAXIAL CONTACTS

High speed Coax contacts within a connector provide the shielding protection, and many cases the RF/microwave performance, needed in the circuitry of many applications.



**Shielded Coax Contacts**

All popular series of Amphenol circular connectors and many rectangular connectors are available with coax contacts. Diameters are standardized in sizes 4, 8, 12 and 16 so that coaxial contacts may be interchanged with power contacts in connector arrangements which include those sizes. Popular RG cable types and a variety of other commercial coaxial cables can be accommodated. See page 398 for coax contact performance data. Matched impedance size 12 coax contacts are also available (see page 402). The use of coax contacts within a connector, compared to the use of individual coaxial/shielded connectors, offers advantages of savings in space and weight and no cross-mating difficulties. Coax and standard contacts may be mixed within the connector to meet special signal needs. The connector itself offers further protection and environmental integrity through the grommets and seals used, and coaxial junction is protected by the connector outer shell.

## CONCENTRIC TWINAX SHIELDED CONTACTS

High performance shielding capabilities are available with Concentric Twinax contacts. These are designed for protection from magnetic and electrostatic interference including nuclear electro-magnetic pulse. The contact is crimp terminable to twisted shielded cable and is fully scoop-proof (recessed pins) in MIL-DTL-38999 connectors. The concentric twinax contact is engineered to maintain shield integrity through a multi-pin circular connector and does not require contact polarization within the insert. Size 8 concentric twinax contacts were developed for use in MIL-STD-1553B Airborne multiplex data bus applications. Ideal for this application need is the high performance Tri-Start connector with its fully scoop-proof feature of recessed pins.



**Concentric Twinax Contacts Size 8**



**MIL-DTL-38999 Lanyard "Breakaway" Connector with Concentric Twinax Contacts, Qualified for MIL-STD-1760**

The concentric twinax contact is crimp terminable to twisted shielded cable. Size 12 concentric twinax contacts were developed for SAAB. They can be used in any size 12 cavity of D38999 I, II or III or SJT connector.

Size 8 & 12 coax, triax or twinax contacts or size 16 coax contacts are available in Ground Plane Connectors (See photo preceding page). These are MIL-DTL-38999 Series III connectors for data bus, LAN and coax/triax/twinax transmission lines with conductive inserts that ground the outer contact conductor to the shell. They are sold "less contacts"

*Amphenol® Shielded Contacts provide design versatility for electrical circuitry. Shielded contacts are used to eliminate interference from outside electrical sources, when standard crimp or solder contacts are not enough.*



*MIL-DTL-38999 Connector with High Speed Coax Contacts*



*Size 8 Coax Pin Contact*

*Concentric Twinax Size 12 Contacts*



*MIL-DTL-38999 Connector with Concentric Twinax Contacts*



# Coax Contacts with Frequency

Range of DC to 40 GHz

## HIGH FREQUENCY COAX CONTACTS WITH “FLOAT MOUNT” TECHNOLOGY

Amphenol Aerospace now offers DC to 40 GHz size 8 coaxial contacts for the D38999 housing and standard inserts. These contacts can be terminated to a multiple of cable types depending on the application.

By using standard interfaces that are based on MIL-STD-348 and can be installed in any D38999 size 8 insert, Amphenol has transformed the circular connector industry. This technology expands the use of D38999 connectors to include the microwave transmission lines within the multi-port configuration without change to a custom connector.

The high frequencies are maintained by Amphenol’s unique “Float Mount” technology. This technology allows for consistent microwave performance while maintaining tight mechanical tolerances. This consistency provides superior electrical performance and, unlike other blindmate connectors, will maintain an accurate phase length when mated. See page 404 for specifications, performances and ordering of this contact.



**High Frequency Size 8 Coax Contacts with “Float Mount” Technology**

## Twinax Contacts for Printed Circuit Board Applications

### PC TAIL TWINAX CONTACTS

Amphenol provides Printed Circuit Tail Twinax contacts for MIL-DTL-38999 Series I and III circular connectors and also for ARINC 404 and ARINC 600 rectangular connectors. High reliability is assured with factory pre-assembled contacts and standardized termination to the board.

See pages 409-411 for performance data and ordering of PC tail twinax contacts, and consult Amphenol Aerospace for further information needed. Also see the Printed Circuit Board, and the Series I, II, III section for MIL-DTL-38999 connectors.



**Variety of PC Tail Twinax Contacts**

### TRIAX CONTACTS WITH THREE CONDUCTORS FOR USE WITH TRIAX CABLE

Amphenol supplies sizes 8, 10 and 12 triax contacts for use in MIL-DTL-38999 Series I, II and III connectors. Triax contacts provide additional shielding when terminated to triax cable having solid or stranded center conductors. See cable compatibility in the Cable Usage Guide and performance data and ordering of triax contacts on pages 408-411. Each of the three conductors of the triax contact is separated by dielectric insulation to isolate ground planes and to improve shielding effectiveness. All conductors are crimp terminated for high reliability and ease of assembly. Triax contacts may be specified for direct connection to printed circuit boards. For maximum system flexibility, triax contacts may be mixed with coax, twinax and power contacts in a single connector.



**Triax Contacts**

*HF38999 - D38999 Connectors with High Frequency Coax Contacts*

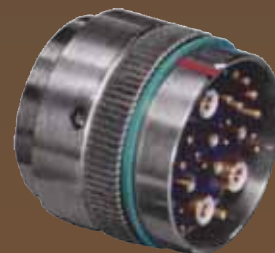


*D38999 Connectors with PC Tail Twinax Contacts*



*Printed Circuit Twinax Contacts provide a cost effective packaging solution for limited space applications where connectors are attached to printed circuit boards.*

*Rail Launch MIL-STD-1760 Connector with Triax Contacts*

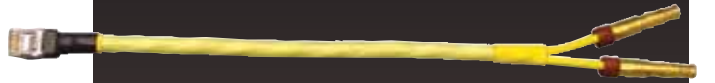




**CABLE ASSEMBLY CAPABILITIES**

Amphenol provides a large array of cable assemblies with high speed quadrax and differential twinax contacts, as well as coax and concentric twinax contacts. This page shows a few examples. The Cable Usage Guide pages that follow list the design possibilities for these high speed contacts.

Amphenol strives to offer customers the widest range of cable assemblies, keeping abreast of the latest cable types in the marketplace. Please consult with the contact product managers at Amphenol Aerospace for assistance in designing the cable assembly that suits your particular needs. From a simple one-cable interconnection, to a multiple cable system, Amphenol can design and supply your cable needs for high frequency contacts and connectors. See the High Frequency Contact Designer's Guide at the end of this catalog



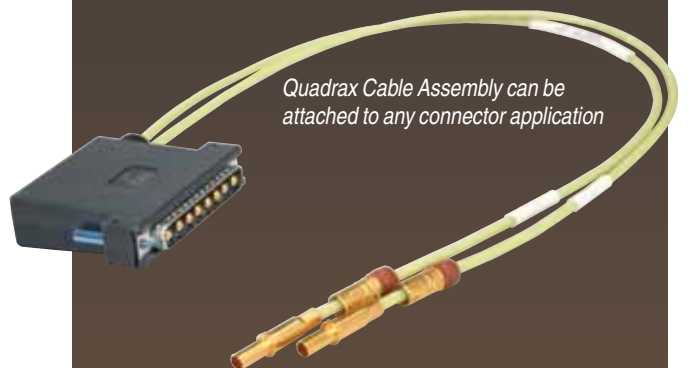
*Eight Wire Gigabit Ethernet Assembly*



*Quadrax Contact with 8P8C "RJ45"  
Jack Ethernet Assembly*



**Variety of Quadrax Cable Assemblies**



*Quadrax Cable Assembly can be  
attached to any connector application*

**TESTING OF CABLES**

Rigid testing is performed 100% on cable assemblies at Amphenol before they are shipped to make sure they meet customer requirements. These requirements include tests such as DWV, resistance and continuity. Amphenol has the background experience and understanding of harsh environmental testing to assure reliable "end-to-end" interconnect solutions.

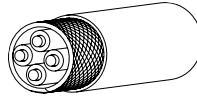


*Quadrax Cable Assembly attached to Board  
Level Compliant Quadrax Connector*

Use the Cable Usage Guide on pages 373-376 as follows:

1. Locate the cable you are using in Cable Type column. For cables not listed consult Amphenol Aerospace.
2. Refer to the Amphenol Connector section which features contacts/adapters for this cable. Connector size, performance features and insert pattern availability may influence your choice.
3. Order your connector and contacts or transition adapters by following the procedure given in the section for the connector series selected. These instructions are supplemented by the Amphenol Catalog Section covering the basic connector.

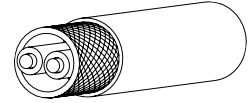
**Quadrax Contacts**  
**CABLE USAGE GUIDE**  
**D38999 Series III\* Connectors**



Cable Type		Nominal Impedance (ohms)	
Draka Fileca	F-4703-3	100	
	F-4703-4		
	F-4704-5		
	F-47-4-6		
Filotex	ET2PC236		
	ET2PF870		
PIC Wire	E50424		
	E50426		
	E51424		
Tensolite	NF22Q100		
	NF24Q100		
	NF24Q100-1		
	NF24Q100-01-200C		
	NF26Q100		
	NF26Q100-1		
	NF26-2Q100		
	24443/03130X-4(LD)		
	24443/03166X-4(LD)		
	24443/9P025X-4(LD)		
	23450/04090X-4 (LD)		
	24443/C20714X-4(LD)		
	Gore		RCN7688
			RCN8513
RCN8672			
S280W502-4			
JSF-18-3			
Themax	956-4TN		
	956-5		
	T956-4T200		
	MX100Q-24		
Tensolite	24450/03089X-4(LD)		
Gore	RCN8487		
JSFY02-1			
JSF18			
Tensolite	26473/02006X-4(LD)		
Gore	RCN8328		

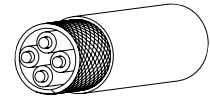
\* Requires modified connector to accommodate keyed contacts.

**Differential Twinax Contacts**  
**CABLE USAGE GUIDE**  
**D38999 Series III\* Connectors**



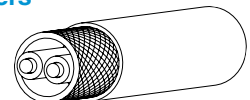
Cable Type		Nominal Impedance (ohms)
Tensolite	26463/70460X-2	98
ST5M1284-003		
Draka Fileca	2709-3	100
PIC Wire	E10224	
Tensolite	NF24T100-200C Space	
	23460/05114X-2(LD)	
	24463/03220T-2(LD)	
	24463/05099X-8(LD)	
	26453/03184X-2(LD)	
	24463/9P025X-2(LD)	
Raychem	0026A0024, 0024G0024	
S280W502-6		
JSFY11-24		
Gore	GSC-05-827300-00	
Themax	956-6262, 956-1T200	
	12814	
	MX 100-24	
Tensolite	26483/03071X-2(LD)	150

**Quadrax Transition Adapters**  
**CABLE USAGE GUIDE**  
**D38999 Series III\* Connectors**  
**or ARINC 600 Connectors**



Cable Type		Nominal Impedance (ohms)	
Draka Fileca	F-4703-3	100	
	F-4704-4		
Tensolite	NF22Q100		
	NF22Q100-01		
	NF24Q100		
	NF26Q100		
Themax	956-5		
Gore	GSC-10-8273900		
Tensolite	26473/02006X-4(LD)		150

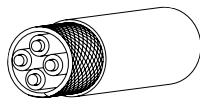
**Differential Twinax Transition Adapters**  
**CABLE USAGE GUIDE**  
**D38999 Series III\* Connectors**  
**or ARINC 600 Connectors**



Cable Type		Nominal Impedance (ohms)
M17/176-00002		78
Tensolite	224463/9P025X-2	100
	24463/9P025X-2(LD)	
Tensolite	26483/03071X-2	150

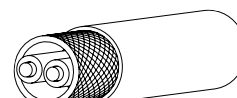


**Quadrax Contacts**  
**CABLE USAGE GUIDE**  
**ARINC 600 Rack & Panel Connectors**



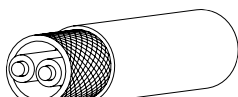
Cable Type		Nominal Impedance (ohms)	
Draka Fileca	F-4703-3	100	
	F-4704-5, F4704-4		
Tensolite	NF22Q100		
	NF24Q100		
	24443/03130X-4(LD)		
	24443/9P025X-4(LD)		
S280W502-4			
JSFY02-1			110
Gore	RCN8328		150
Tensolite	26473/02006X-4(LD)		

**Differential Twinax Contacts**  
**CABLE USAGE GUIDE**  
**ARINC 600 Rack & Panel Connectors**



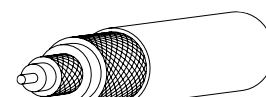
Cable Type		Nominal Impedance (ohms)
ABS0386WF24		100
ASNE0272TK22		100
ASNE0272TK24		100
Tensolite	24463/9P025X-2(LD)	100

**Concentric Twinax Contacts**  
**CABLE USAGE GUIDE**  
**D38999 Series I, II, III & SJT Connectors**



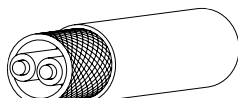
Cable Type		Nominal Impedance (ohms)
EPD32263A		77
EPD22189B		77
M17/176-00002		77
GSC-12-2548-00		77
GC875TM24H		77
GSC-12-81095-00		77
Raychem	10602	77
	10606	77
	10612	77
	10613	77
	10614	77
23089/RC		77
05A0771		77
T10971		77
7724C8664		77
7726D0664		77
782OD0111 (20 AWG)		78
0024G0024		100
5M2022-003		100
HS5930		100
S280W502-1		100
CXN2268		100

**Triax Contacts**  
**CABLE USAGE GUIDE**  
**D38999 Series I, II, III & SJT Connectors**



Cable Type		Nominal Impedance (ohms)
JN1088WT		50
5M2397-002		75
81264-02		75
JN1088WU		75
Gore	GSC-03-81497-00	75
RG179 (Coax Cable)		75
Tensolite	28988/50823LXX-1	75
Tensolite	28988/50823LXX-1	75
Thermatics	12447	75
10602 (Twinax Cable)		77
5M2559-001		95
81264-01		95
ST5M1323-001		95
Champlain	81-00700	95
Tensolite	28598/9C026LT-1	95
	26895/90334X-1	95
Teledyne	13809	95
11914/1		95
Times AA6603		95
RGX179		75

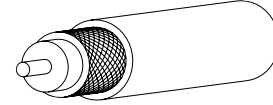
**Concentric Twinax Contacts**  
**CABLE USAGE GUIDE**  
**ARINC 600 Rack & Panel Connectors**



Cable Type	Nominal Impedance (ohms)
S280W502-1	100

Use the Cable Usage Guides on this page for Coax Contacts as follows:

1. Locate the cable you are using in Cable Type column. For cables not listed consult Amphenol Aerospace.
2. Refer to the Amphenol connector section which features contacts for this cable, as indicated by a • in the appropriate column. If more than one connector series utilizes contacts designed for your cable, investigate each of them. Connector size, performance features and insert pattern availability may influence your choice.
3. Order your connector and coax contact by following the procedure given in the section for the connector series selected. These instructions are supplemented by the Amphenol Catalog Section covering the basic connector.
4. The Additional Contacts column of this guide is used to indicate an additional availability of contact designs for older cable types or capability. Consult Amphenol Aerospace for further information.



## Coax Contacts CABLE USAGE GUIDE

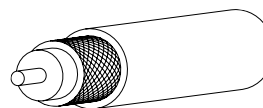
Cable Type		Nominal Impedance (ohms)	For Circular (MIL-DTL-38999 type)	For Standard & Heavy Duty Circular (MIL-DTL-5015 type) (MIL-DTL-22992 type)	For Rectangular Connectors	Additional Contacts (Consult Amphenol)
RG-5B/U	(M17/073-RG212)	50				•
RG-6A/U	(M17/2-RG6)	75				•
RG-7/U		97				•
RG-9B/U	(M17/075-RG214)	50				•
RG-11A/U	(M17/6-RG11)	75				•
RG-12A/U	(M17/6-RG12)	75				•
RG-13A/U		74				•
RG-21A/U		53				•
RG-55B/U	(M17/084-RG223)	53		•	•	
RG-58C/U	(M17/028-RG058)	50		•	•	
RG-58	(M17/155-00001)	50	•			
RG-59B/U	(M17/29-RG59)	75		•		
RG-62A/U	(M17/030-RG062)	93		•		
RG-62B/U		93		•		
RG-63B/U	(M17/31-RG63)	125				•
RG-71B/U	(M17/90-RG71)	93				•
RG-87A/U		50				•
RG-115/U		50				•
RG-115A/U		50				•
RG-116/U		50				•
RG-122/U	(M17/054-RG122)	50			•	•
RG-133A/U	(M17/100-RG133)	95				•
RG-140/U	(M17/110-RG302)	75		•		
RG-141A/U		50		•	•	
RG-142A/U		50		•	•	•
RG-142B/U	(M17/060-RG142)	50	•	•	•	•
RG-143A/U		50				•
RG-161/U		70	•	•		
RG-174A/U	(M17/119-RG174)	50	•	•		
RG-178B/U	(M17/093-RG178)	50	•	•		
RG-179B/U	(M17/094-RG179)	75	•	•		
RG-180B/U	(M17/095-RG180)	95	•	•	•	
RG-187A/U	(M17/094-RG179)	75	•	•		
RG-188A/U	(M17/113-RG316)	50	•	•		
RG-188 Double Braid		50				
RG-195A/U	(M17/095-RG180)	95	•	•	•	
RG-195 Double Braid		95				
RG-196A/U	(M17/169-00001)	50	•	•		
RG-210/U		93		•		
RG-212/U	(M17/073-RG212)	50		•		•
RG-214/U	(M17/075-RG214)	50				•
RG-216/U	(M17/77-RG216)	75				•
RG-222/U		50				•
RG-223/U	(M17/084-RG223)	50	•	•	•	
RG-225/U	(M17/86-RG225)	50				•
RG-227/U		50				•
RG-302/U	(M17/110-RG302)	75		•		

CHART CONTINUES ON NEXT PAGE

NOTE: For information on coax contacts for Miniature circular connectors, MIL-DTL-26482 Series 1, see catalog 12-070 and consult Amphenol Industrial Operations.

NOTE: MIL-DTL-38999 supersedes MIL-C-38999.  
MIL-DTL-5015 supersedes MIL-C-38999.  
MIL-DTL-22992 supersedes MIL-C-22992





## Coax Contacts CABLE USAGE GUIDE, cont.

Cable Type		Nominal Impedance (ohms)	For Circular (MIL-DTL-38999 type)	For Standard & Heavy Duty Circular (MIL-DTL-5015 type) (MIL-DTL-22992 type)	For Rectangular Connectors	Additional Contacts (Consult Amphenol)
RG-303/U	(M17/111-RG303)	50		•	•	
RG-304/U	(M17/112-RG304)	50				•
RG-316/U	(M17/113-RG316)	50	•	•		
RD-316 Double Braid	(M17/152-00001)	50	•			
RG-400	(M17/128-RG400)	50	•			
M/A-COM 5M2869-001		50	•		•	
5022A1311-D		50	•			
Beldon 9307		50	•			
FA-19X		50	•			
T-Flex-402		50	•			
T-Flex-405		50	•			
Filotex ET124962		50	•			
JN1088WT	(Triax)	50	•			
JN1088WU	(Triax)	75	•			
PAN6422XQ		50	•			
PAN6422XY		75	•			
PAN6595XM	(Triax)	75	•			
Haveg	51-04486		•			
	81-00207		•			
Gore	GWN1159A		•			
	CXN3403		•			
Times	AA3248		•			
Teledyne	11299		•			
Raychem	5021D1331-0	50	•			
	5021D1331-9	50	•			
	5022D1312-9	50	•			
	7527A1318	75	•			
	9527A1314	95	•			
	9528A1318	95	•			
	9530A5314	95	•			
9530D5314	95	•				
Thermatics	2929-29		•			
Tensolite	30850/87T-1		•			
Thermax	50C-25A-DS-1		•			
	ESC352001	50	•			
	ESC432101	50	•			

For Cable not found in the Coax Contact Cable Usage Guide, refer to these general dimensional ranges:  
(In general, for D38999 Connectors, the size 8, 12 and 16 Coax Contacts will terminate cable in the following ranges )

### SIZE 16

.012 / .0215 Center Conductor (Stranded)
.031 / .066 Dielectric
.085 Max Outer braid (must be round for crimp termination)
.102 Max. Jacket

### SIZE 12

.012 / .0215 Center Conductor (Stranded)
.031 / .105 Dielectric
.126 Max Outer braid (must be round for crimp termination)
.145 Max. Jacket

### SIZE 8

.012 / .0395 Center Conductor (Stranded)
.055 / .133 Dielectric
.180 Max Outer braid (must be round for crimp termination)
.201 Max. Jacket

Special coax contacts may be available for cables outside of ranges shown. Consult Amphenol Aerospace for further assistance in selection of coax contact cables.

# MIL-DTL-38999 Circular Connector

## Overview

Amphenol® Connectors are ideally suited for the incorporation of shielded contacts for high performance interconnection applications. The circular family is built around MIL-DTL-38999 specifications, with Mil-approved and commercial styles offered. Normal operating voltage for circulars with power contacts only is up to 900 VAC (RMS) at sea level.

### The MIL-DTL-38999 family offer these features for contact termination flexibility:

- Widest selection of insert arrangements that can incorporate:
  - Size 8 high speed Quadrax and Differential Twinax contacts for MIL-DTL-38999 Series III (specially modified to accommodate keyed contacts)
  - Transition adapters for use in attaching D38999 Series III connectors with high speed quadrax or differential contacts to PCB boards
  - Size 8, 12 and 16 Coax contacts
  - Size 8 and 12 Twinax contacts
  - Size 8, 10 & 12 Triax contacts
- Wide selection of connector shell styles and sizes
- Scoop-Proof recessed design in LJT-R, TV-R and SJT-R connectors provide protection for contacts
- Standard power contacts are crimp rear release, qualified to SAE AS39029
- Coax, Twinax, and Triax contacts employ the same retention system as power contacts, simplifying user substitution

### GENERAL ORDERING INFORMATION

Amphenol MIL-DTL-38999, which feature rear removable contacts, are normally supplied with a full complement of power contacts, separately packaged. Coax, twinax and triax contacts are ordered by part number as referenced in the part number charts on the following pages of this catalog, and are substituted for the power contacts at the time of the cable or equipment assembly. If the application is for coax, twinax or triax contacts only, the connector may be ordered *less contacts* and no power contacts will be supplied.

### HOW TO ORDER CONNECTORS AND HIGH FREQUENCY CONTACTS

- Select the Circular Series desired.  
(See features of each series given briefly on this page and in-depth in the other sections of this catalog, which are on-line at [www.amphenol-aerospace.com](http://www.amphenol-aerospace.com)).
- Series I - LJT-R Connectors
- Series II - JT-R Connectors
- Series III - TV-R Connectors
- SJT\* - SJT-R Connectors
- See Amphe-Lite (Industrial 38999 type) Catalog 12-094
- Select the quadrax, differential twinax, coax, twinax and/or triax contacts or the transition adapters that are needed from the tables on the following pages that correspond to the cable being used.
- Select the insert arrangement to accommodate required number of contacts. Insert patterns for quadrax and differential twinax contacts are on pages 395,396. Insert patterns for coax, twinax and triax contacts are on pages 404-406.
- Complete the connector part number from the connector series catalog, incorporating the chosen insert pattern number. See detailed how to order page 397 for ordering 38999, Series III with quadrax and differential twinax contacts. Consult Amphenol for assistance in ordering 38999 circulars with coax, twinax and triax contacts.
- Consult Amphenol Aerospace for ordering information for connectors with PC tail contacts, and for transition adapters.
- If connector is ordered less contacts, power contacts and/or sealing plugs may be ordered separately to fill out the insert arrangement.



TV-R, Tri-Start, D38999 Series III

- High performance capability series for both general duty and severe environment applications
  - Offers the widest range of Subminiature Family Mil-Spec qualified options in contact and connector styles
  - Threaded coupling; completely mates in one turn; crimp termination
  - Superior EMI/EMP shielding effectiveness
  - Scoop-proof design (recessed pins)
  - Available in aluminum, stainless steel and firewall, or lightweight composite styles
- See 38999 section Series III for complete information on this section.



JT-R, D38999 Series II

See 38999 section Series II, JT for complete information on this series.

- Shorter profile connector series for applications requiring maximum space savings
- Bayonet coupling, crimp termination
- Also available in solder termination types under MIL-DTL-27599 Series II



LJT-R, D38999 Series I

See 38999 section Series I, LJT for complete information on this series.

- Scoop-proof (recessed pins)
- Bayonet coupling, crimp termination
- Also available in solder termination types under MIL-DTL-27599 Series II



Amphe-Lite, 38999 Type

See Catalog 12-094 for complete information on this series.

- Commercial/Industrial 38999 Series III type
- Cost effective high performance connector for severe environments or general duty industrial applications
- Consult Amphenol Industrial Operations for further information 12-094 catalog is on-line at [www.amphenol-industrial.com](http://www.amphenol-industrial.com).



SJT-R, 38999 Type

See the SJT section of this catalog.

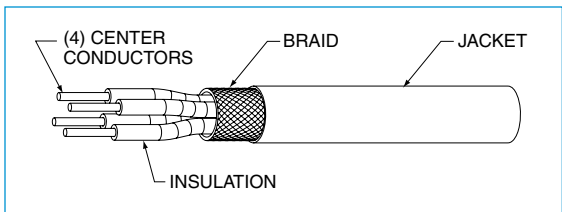
- Amphenol proprietary series (non-MS) which is a further expansion of the basic JT family, but incorporates the LJT scoop-proof design
- Compliant with several European specifications

NOTE: SAE AS39029 supersedes MIL-C-39029.  
NOTE: MIL-DTL-38999 supersedes MIL-C-38999.  
MIL-DTL-27599 supersedes MIL-C-27599

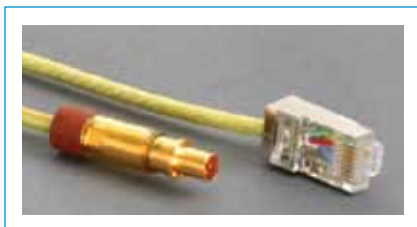
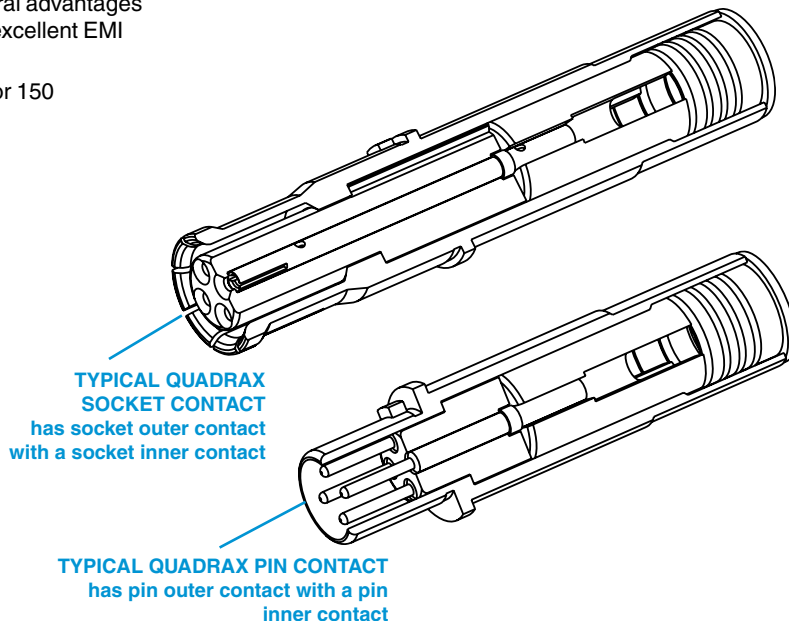


**Amphenol® Quadrax Contacts** -offer several advantages for high data transfer rates, low power consumption and excellent EMI compatibility:

- Four strategically spaced inner contacts form two 100 or 150 Ohm matched impedance differential pairs
- Outer contact has rugged wall section for durability
- Available in size 8 crimp termination style
- Also available in size 8 with PC tails (see page 379)
- Requires modification of MIL-DTL-38999 connector to accommodate keyed contacts



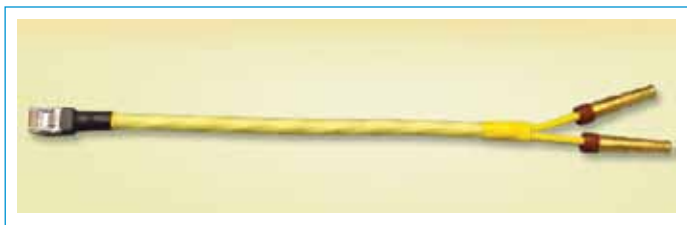
Cable Illustration - Quadrax Contact



Quadrax Pin with 8P8C "RJ45" Jack



Quadrax Pin Size 8 and MIL-DTL-38999 Series III Connector

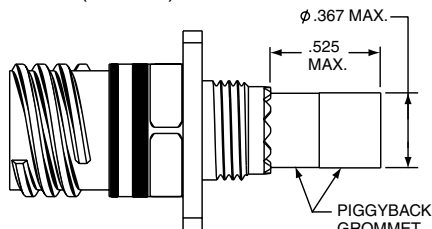


Quadrax in an Eight Wire Gigabit Ethernet Assembly

### Suggested Strain Relief - Insert Arrangements 9-5 or 19-18 with Quadrax Contacts

Due to the piggyback grommet interference with normal strain reliefs on the shell size 9 only, the recommended strain relief for the connector is: Amphenol part number TGW-R-5309-10 (OD Cad) or TGF-R-5309-10 (Electroless nickel)

- shell size 9 only. For 19-18 insert pattern, recommended backshell: Glenair 367-221-NF. This is recommended due to the proximity of the size 8 contacts in relation to the shell.



Also see Quadrax contacts for ARINC 600 and R27 Rack and Panel Connectors on page 419 and 420.

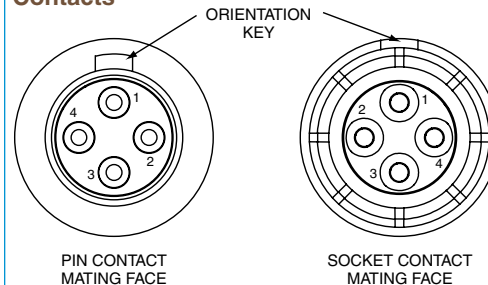
### Quadrax Contacts are gold plated, crimp termination

Finish of mating contacts parts: supplied with 0.000050 min. gold over nickel on mating parts. Consult Amphenol for availability of other finishes.

#### Quadrax Size 8 Contact Performance:

- Bandwidth: Up to 3 Gigahertz
- Data Rate: Exceeding 3 Gbits/sec.
- Voltage Rating: 500 Vrms max. @ sea level
- Dielectric Withstanding Voltage: 1000 VAC rms between all inner contacts @ sea level, 500 VAC rms between inner and outer contacts @ sea level

### Suggested Numbering for Quadrax Contacts



Differential Pairs, contacts 1-3, 2-4.

See page 397 for part number ordering of popularly used 38999 Series III connectors with 100 ohm quadrax contacts.

Quadrax differential pairs are 1 and 3, 2 and 4.

# Quadrax Contacts for MIL-DTL-38999 Series III, Application Data



## TV-R Series, MIL-DTL-38999 Series III\* Connectors

### QUADRAX CONTACTS FOR USE IN TV-R CONNECTORS

Cable	Contact Part Number (Termination Instruction Sheet)**		Impedance (Ohms)	Inner Conductor (AWG)	Contact Size	Electrical Protocol††	Crimping Tools	
	Pin	Socket					Inner Contact	Outer Contact
Draka Fileca F-4703-3, F4704-4, Filotex ET 2PC236, Filotex ET2PF870, PIC Wire E50424 ABS0972, Tensolite 23450/04090X-4(LD) Draka Fileca F-4704-5, ABS1503 KD 24	21-033384-021 (L-2119-A)	21-033385-021 (L-2119-A)	100	24	8	Ethernet, 1000 Base-T Gigabit Ethernet	M22520/2-01 with Positioner M22520/2-37 or with Daniels Positioner K709	M22520/5-01 with Die Set M22520/5-45 (Location A)
Tensolite NF24Q100, NF24Q100-01, 24443/9P025X-4(LD), S280W502-4, 24443/03130X-4(LD), 24443/C20714X-4(LD), 24450/0120X-4(LD), NF24-2Q100, TYCO CEC-RWC-18664, GORE GSC-01-81869-01, 24443/03166X-4(LD), Thermax T956-4T200, Pic Wire E51424, Thermax MX100Q-24, NF24Q100-01-200C (Space)	21-033384-051 (L-2119-D)	21-033385-051 (L-2119-D)		24		Ethernet, 1000 Base-T Gigabit Ethernet		
Tensolite NF22Q100, NF22Q100-01, Thermax 956-5, GORE RCN 7688	21-033384-061 (L-2119-H)	21-033385-061 (L-2119-H)		22		Ethernet (100 Mbps), 1000 Base-T Gigabit Ethernet (1 Gbps)		
Tensolite NF26Q100, NF26Q100-01, NF26-2Q100, PIC E51426	21-033384-071 (L-2119-AB)	21-033385-071 (L-2119-AB)		26		Ethernet (100 Mbps), 1000 Base-T Gigabit Ethernet (1 Gbps)		
S280W502-4/BMS13-72T03C04G024	21-033384-141 (BACC47GM1)	21-033385-141 (BACC45GN1)		24				
Draka Fileca F-4704-6, Gore RCN 8672	21-033384-151 (L-2119-AW)	21-033385-151 (L-2119-AW)		26		Ethernet (100 Mbps), 1000 Base-T Gigabit Ethernet (1 Gbps)		
Tensolite NF24Q100-01 (same as 21-03338( ) -51, uses EMI Piggyback)	21-033384-161 (L-2119-BE)	21-033385-161 (L-2119-BE)		24		Ethernet (100 Mbps), 1000 Base-T Gigabit Ethernet (1 Gbps)		
Gore RCN8513, JSFY18-3	21-033384-171 (L-2119-BN)	21-033385-171 (L-2119-BN)		22		Ethernet (100 Mbps), 1000 Base-T Gigabit Ethernet (1 Gbps)		
Tensolite NF22Q100 Special Box pattern, only mates with 21-0333( ) -181	21-033384-181 (L-2119-BP)	21-033385-181 (L-2119-BP)		22		Ethernet (100 Mbps), 1000 Base-T Gigabit Ethernet (1 Gbps)		
Tensolite NF24Q100, NF24Q100-01 for 2.5 Gbps applications	21-033384-191 (L-2119-BS)	21-033385-191 (L-2119-BS)		24		• Serial FPDP Applications (2.5 Gbps) (Typical app run at 150 Ohms) • HDMI 1.3		
USB2 (28433/02171LX-4)	21-033384-101†	21-033385-101†	90	USB2.0 (480 Mbps)				
Tensolite 24450/03089X-4(LD) Gore RCN8647	21-033384-211	21-033385-211	110	24	IEEE 1394B Firewire			
JSFY02-1, JSFY18	21-033384-221	21-033385-221		24	IEEE 1394B Firewire			
Gore RCN8487, JSFY18	21-033384-231	21-033385-231		24	IEEE 1394B Firewire			
Tensolite 24450/03089X-4(LD) Same as 21-03338( ) -211 but Box pattern, mates with 21-03338( ) -241 only	21-033384-241†	21-033385-241†		24	IEEE 1394B Firewire			
F-4703, ABS1503KD24	21-033384-281	21-033385-281	100		Meets EN3155-074			
Tensolite 26473/02006X-4(LD)/Gore RCN8328 (not for new designs, use 21-033450/1 series)	21-033384-31 (L-2119-B)	21-033385-031 (L-2119-B)	150	26				

CHART CONTINUES ON NEXT PAGE

#### QUADRAX CONTACT DATA

Contacts are inserted by hand. Refer to termination instructions listed. Contacts are removed with a removal tool. Recommended tool is MIL-I-81969/14-06, Daniels DRK-264-8. Refer to termination instructions listed. Finish of mating contact parts: Contact part numbers shown in the chart above are supplied gold plated per ASTM B488 Type II, Code C, .000050 min. thick over nickel plate per AMS-QQ-N-290, Class 2, .000030/.000150 thick.

Daniels crimping tools available from Daniels Mfg. Corp. 6103 Anno Ave., Orlando, FL 32809

\* Requires modified connector to accommodate keyed contacts.

\*\*Termination instructions are packaged with each contact and can be found on-line at: [www.amphenol-aerospace.com/serviceinstructions.asp](http://www.amphenol-aerospace.com/serviceinstructions.asp)

† Consult Amphenol for current release of this contact or instruction sheet if applicable.

†† Test reports available for indicated protocols. Consult Amphenol Aerospace. Typical applications run at 150 Ohms



### TV-R Series, MIL-DTL-38999 Series III\* Connectors

QUADRAX CONTACTS FOR USE IN TV-R CONNECTORS								
Cable	Contact Part Number <i>(Termination Instruction Sheet)**</i>		Impedance (Ohms)	Inner Conductor (AWG)	Contact Size	Electrical Protocol††	Crimping Tools	
	Pin	Socket					Inner Contact	Outer Contact
Tensolite 26473/02006X-4(LD) Same as 21-033384/5-31 but box pattern (not for new designs, use 21-033450/1 series) Gore RCN8328	21-033384-201†	21-033385-201†	150	26	8	Fibre-Channel (1 GBPS, 2 GBPS, 1G/2G), 1000 Base-CX (1.25 GBPS), SCSI-2 (3.2 GBPS)	M22520/2-01 with Positioner M22520/2-37 or with Daniels Positioner K709	M22520/5-01 with Die Set M22520/5-45 (Location A)
Gore RCN7625	21-033384-271	21-033385-271						
Tensolite 26473/02006X-4(LD), Gore RCN8328	21-033450-001 (L-2119-BW)	21-033451-001 (L-2119-BW)		26				
Tensolite 26473/02006X-4(LD), Gore RCN8328 (same as 21-033450/1-1 except box pattern. Mates with 21-033450/1-11 only.	21-033450-011†	21-033451-011†		26				

Contact Part Number		Impedance (Ohms)	L Dim	Pretinned
Pin	Socket			
21-033398-021	21-033397-021	100 Ohm	1.035	X
21-033398-031	21-033397-031	100 Ohm	0.866	
21-033398-061	21-033397-061	150 Ohm	1.035	
21-033398-071	21-033397-071	150 Ohm	0.494	X
21-033398-081	21-033397-081	150 Ohm	0.780	X
21-033398-091	21-033397-091	100 Ohm	0.840	X
21-033398-111	21-033397-111	100 Ohm	0.708	
21-033398-121	21-033397-121	100 Ohm	0.859	
21-033398-131	21-033397-131	150 Ohm	0.780	X
21-033398-141	21-033397-141	100 Ohm	0.615	
21-033398-151	21-033397-151	150 Ohm	0.815	
21-033398-191	21-033397-191	100 Ohm	0.605	
21-033398-211	21-033397-211	150 Ohm	0.815	X
21-033398-221	21-033397-221	100 Ohm	0.775	
21-033398-231	21-033397-231	100 Ohm	0.494	
21-033398-241	21-033397-241	100 Ohm	0.741	
21-033398-251	21-033397-251	100 Ohm	0.788	
21-033398-271	21-033397-271	100 Ohm	0.741	
21-033398-281	21-033397-281	100 Ohm	0.806	
21-033398-291	21-033397-291	100 Ohm	1.035	
21-033398-301	21-033397-301	100 Ohm	0.836	
21-033398-311	21-033397-311	100 Ohm	0.940	
21-033398-341	21-033397-341	100 Ohm	0.901	
21-033398-351	21-033397-351	100 Ohm	0.871	
21-033398-361	21-033397-361	100 Ohm	0.939	
21-033398-371	21-033397-371	100 Ohm	0.672	
21-033398-381	21-033397-381	100 Ohm	0.914	
21-033398-391	21-033397-391	100 Ohm	0.360	
21-033398-401	21-033397-401	100 Ohm	1.009	
21-033398-411	21-033397-411	150 Ohm	0.866	
21-033398-421	21-033397-421	100 Ohm	1.169	
21-033398-431	21-033397-431	100 Ohm	0.819	
21-033398-451	21-033397-451	150 Ohm	0.494	
21-033398-461	21-033397-461	100 Ohm	0.761	
21-033398-471	21-033397-471	100 Ohm	0.889	
21-033398-481	21-033397-481	100 Ohm	0.971	
21-033398-491	21-033397-491	100 Ohm	0.418	
21-033398-501	21-033397-501	100 Ohm	0.875	
21-033398-511	21-033397-511	100/150 Ohm	0.699	
21-033398-521	21-033397-521	100 Ohm	0.582	
21-033398-531	21-033397-531	100 Ohm	0.666	
21-033398-541	21-033397-541	100 Ohm	0.946	
21-033398-551	21-033397-551	100 Ohm	0.788	X
21-033398-561	21-033397-561	100 Ohm	0.815	

Contact Part Number		Impedance (Ohms)	L Dim	Pretinned
Pin	Socket			
21-033398-581	21-033397-581	100 Ohm	0.721	
21-033398-591	21-033397-591	100/150 Ohm	0.939	
21-033398-601	21-033397-601	100 Ohm	0.939	
21-033398-611	21-033397-611	100 Ohm	1.366	
21-033452-011	21-033453-011	150 Ohm	1.035 (mates to 21-033450/51 series)	
21-033452-021	21-033453-021	150 Ohm	0.815 (mates to 21-033450/51 series)	
21-033452-031	21-033453-031	150 Ohm	0.815 (mates to 21-033450/51 series)	X
21-033452-041	21-033453-041	150 Ohm	0.866 (mates to 21-033450/51 series)	
21-033452-051	21-033453-051	150 Ohm	0.494 (mates to 21-033450/51 series)	
21-033452-061	21-033453-061	150 Ohm	0.582 (mates to 21-033450/51 series)	
21-033452-071	21-033453-071	150 Ohm	0.939 (mates to 21-033450/51 series)	

Daniels crimping tools are available from Daniels Mfg. Corp. 6103 Anno Ave., Orlando, FL 32809

\* Requires modified connector to accommodate keyed contacts.

\*\* Termination instructions are packaged with each contact and can be found on-line at: [www.amphenol-aerospace.com/serviceinstructions.asp](http://www.amphenol-aerospace.com/serviceinstructions.asp)

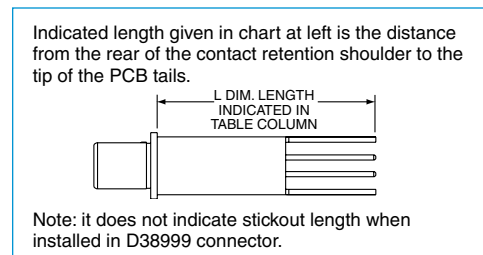
† Consult Amphenol Aerospace for current release of this contact or instruction sheet if applicable.

†† Test reports available for indicated protocols. Consult Amphenol Aerospace.

\*\*\* Must be used with 21-033321-005 piggyback grommet seal.

SEALING PLUGS	
Sealing Plugs for use with D38999 Connectors using Quadrax Contacts - Size 8 Cavities	Part Number
***Standard Plastic	T3-4008-59P
Standard Plastic to be used with PCB tails (shorter tail length)	T3-4008-59P1
***Metal sealing plug - can be used when mating with contacts on mating half	21-033899-8Q1
Metal sealing plug used with PCB's and mating contact on mating half	21-033899-8Q2

PIGGYBACK GROMMET	
Grommet for use with D38999 Connectors using Quadrax Contacts	Part Number
Metallized piggyback grommet	21-033321-023



# New “Split-Pair” Quadrax Contacts & Cables

## Assemblies for MIL-DTL-38999, Series III

### for use with CAT6A Type Cable

Amphenol Aerospace offers the high performance interconnect solution for CAT6A type cable.

**FEATURES & BENEFITS:**

- Overall higher bandwidth than standard CAT5E quadrax
- Enhanced crosstalk performance (compared to standard quadrax) due to compatibility with shielded twisted pair of cables
- Can be used for a variety of high speed applications beyond current quadrax design\*\*
- Four strategically spaced inner contacts form two 100 Ohm matched impedance differential pairs
- Outer contact has rugged wall section for durability
- Available in size 8 crimp termination style
- Also available in size 8 PC tails
- Can be installed into existing quadrax contact connector cavities
- Requires modification of MIL-DTL-38999 connector to accommodate keyed contacts



MIL-DTL-38999 Series III Connectors with “Split-Pair” Quadrax Contacts for use with CAT6A Type Cable



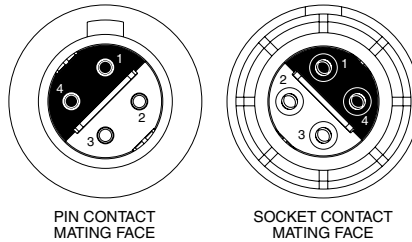
“Split-Pair” Quadrax Contacts for use with CAT6A Type Cable

**APPLICATIONS:**

For use with, but not limited to, the following electrical protocols :

- 10/100/1000/10GBASE-T Ethernet
- DVI
- USB 2.0
- Serial RapidIO (up to 3.125 Gbps)
- PCI-Express 2.0
- HDMI 1.3a
- SATA 2.0 (up to 3 GHz)

**Suggested Numbering for Quadrax Contacts**



Differential Pairs: 1 & 4, 2 & 3

**SPLIT-PAIR QUADRAX CONTACT\* PART NUMBERS:**

Crimp Style Part Number	Cable	AWG
<b>PIN 21-033470-001</b>	<b>Thermax 1536-224</b>	<b>24</b>
<b>SOCKET 21-033471-001</b>		
<b>PIN 21-033470-021</b>	<b>Thermax 1536-195</b>	<b>26</b>
<b>SOCKET 21-033471-021</b>		

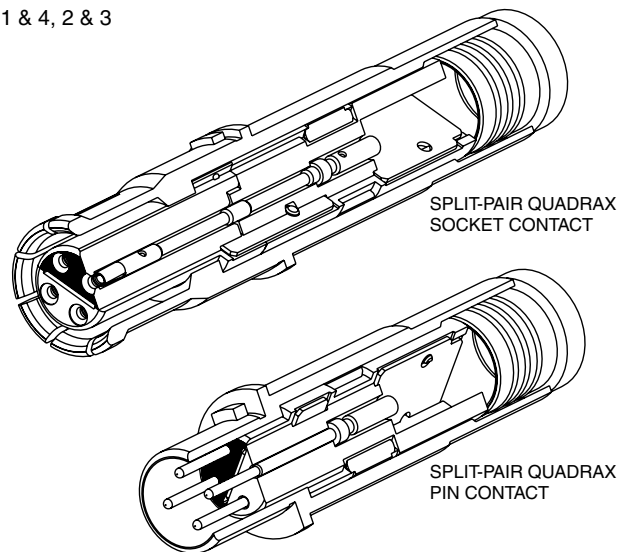
**CRIMP TOOLS:**

Outer Contact	Inner Contact
<b>DANIELS M22520/5-01 with die set Y1999 or M22520/5-45</b>	<b>DANIELS M22520/2-01 with positioner K1777</b>

Daniels crimping tools are available from Daniels Mfg. Corp. 6103 Anno Ave., Orlando, FL 32809

REMOVAL TOOL: **M81969/14-12**

\* Patent pending.



### PCB QUADRAX PIN

PCB Pin Part Numbers	Impedance	Length ±.015
21-033466-011	100 Ohm	1.035
21-033466-021		.815
21-033466-031*		.815
21-033466-041		.866
21-033466-051		.494
21-033466-061		.582
21-033466-071		.815
21-033466-081		.840

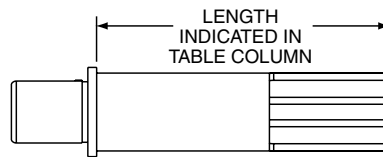
### PCB QUADRAX SOCKET

PCB Socket Part Numbers	Impedance	Length ±.015
21-033467-011	100 Ohm	1.035
21-033467-021		.815
21-033467-031*		.815
21-033467-041		.866
21-033467-051		.494
21-033467-061		.582
21-033467-071		.815
21-033467-081		.840

\*Pretinned

Indicated length given in charts above is the distance from the rear of the contact retention shoulder to the tip of the PCB tails.

Note: it does not indicate stickout length when installed in D38999 connector.



### TRANSITION ADAPTERS FOR LAUNCHING SIGNALS TO PC BOARDS

100 OHM QUADRAX TRANSITION ADAPTERS FOR LAUNCHING CONTROLLED IMPEDANCE SIGNALS TO PC BOARDS					
Quadrax Type Adapter/ Cable or PCB Tail Length	Illustration of Adapter	Part Number		Impedance (Ohms)	Mating Thread Size
		Plug	Receptacle		
Quadrax Plug Adapter/ Thermax 1536-224		21-033468-011		100	.375
PCB Quadrax Receptacle 90 Degree Adapter/ Tail Length .110			21-033469-001		
PCB Quadrax Receptacle Straight Adapter/ Tail Length .110			21-033469-011		
Quadrax Receptacle 90 degree Adapter with cable to board/ Thermax 1536-224			21-033469-021		
Quadrax Receptacle Straight Adapter with cable to board/ .195 tail length Thermax 1536-224					



# New “Split-Pair” Quadrax Contacts

## Frequencies & Performance Data

For use with the following, but not limited to, electrical protocols:

10/100/1000/10GBASE-T Ethernet

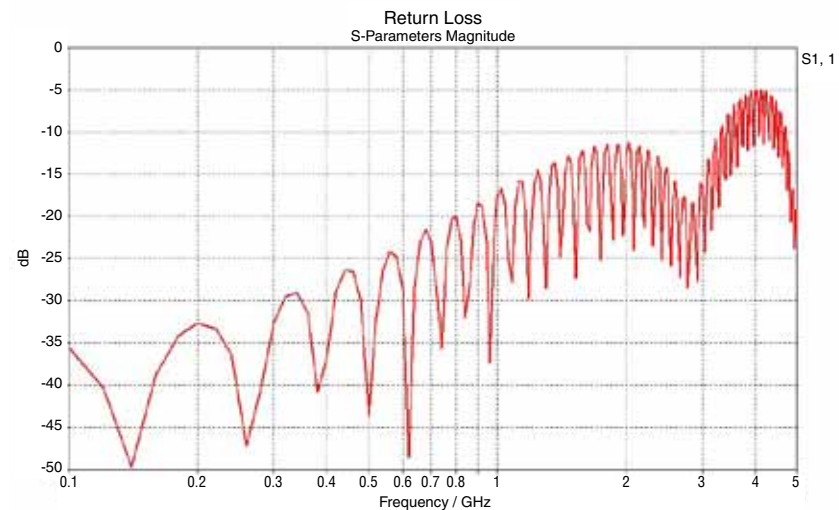
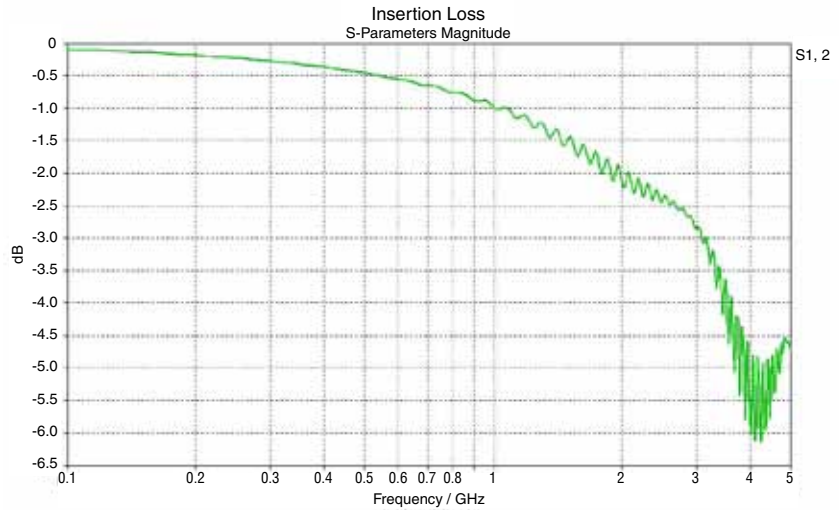
- DVI
- USB 2.0
- Serial RapidIO (up to 3.125 Gbps)
- PCI-Express 2.0
- HDMI 1.3a
- SATA 2.0 (up to 3 GHz)

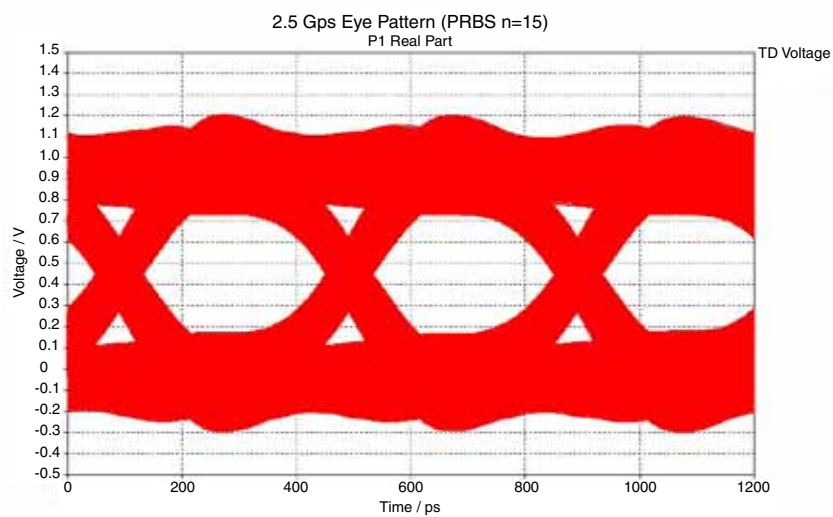
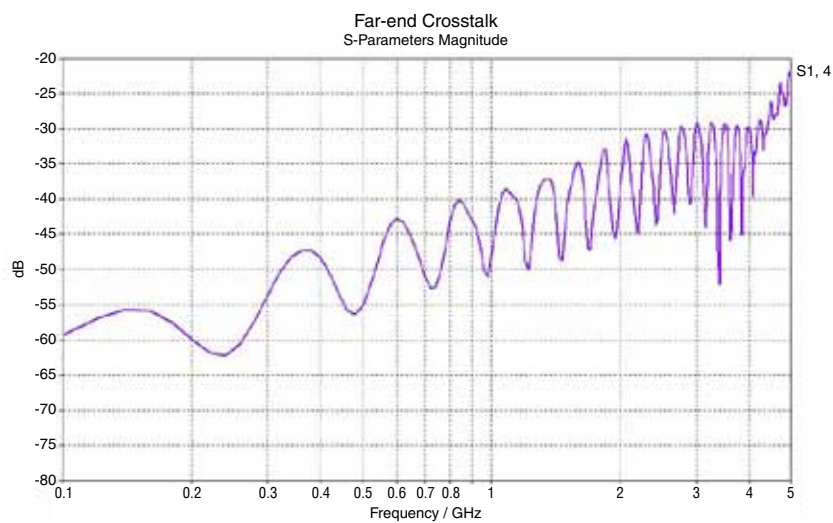
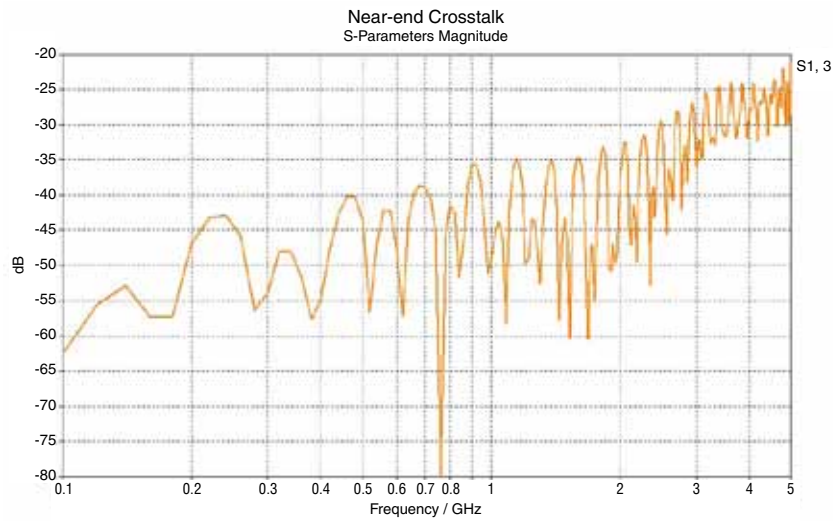
### FREQUENCIES OF INTEREST

Frequency (GHz)	Insertion Loss (dB)	Return Loss (dB)	NEXT (dB)	FEXT (dB)
0.1	0.09	35.68	62.36	59.29
0.24	0.22	36.44	42.87	62.25
0.5	0.45	43.66	43.63	55.22
0.625	0.57	43.49	53.68	43.53
1	0.98	17.82	49.26	48.33
1.25	1.29	15.1	43.57	44.12
1.5	1.47	17.94	46.02	40.78
1.7	1.86	12.23	48.01	47.23
2	2.11	12.9	37.45	38.12
2.5	2.42	15.97	29.9	31.52
3	2.86	16.52	35.94	29.36

### PERFORMANCE DATA

The following graphs on this page and the next page provide performance data on Amphenol® 10GBASE signal integrity (SI) quadrax contacts. Testing was done with 2 mated contacts terminated on both ends of 1 meter Thermax cable.





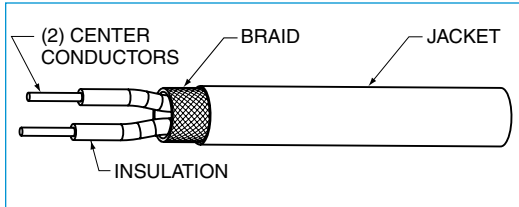
# Differential Twinax Contacts, MIL-DTL-38999

## Series III, General Description

### Amphenol® Differential Twinax Contacts -

Offer several advantages for high data transfer rates, low power consumption and excellent EMI compatibility:

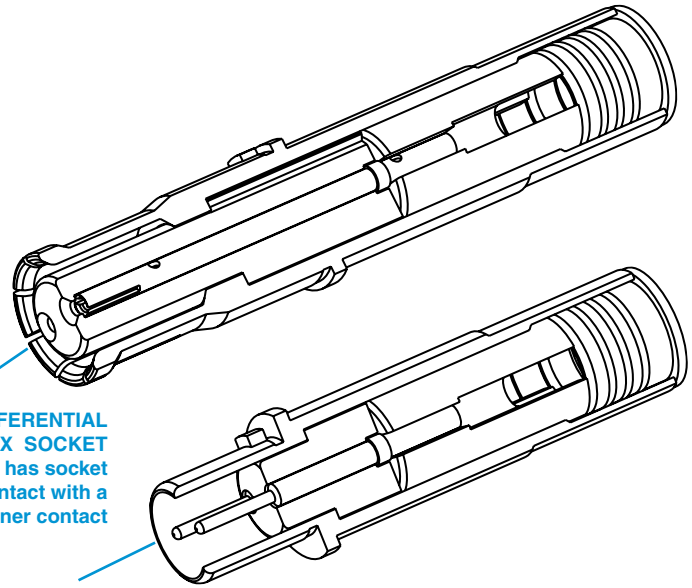
- Two strategically spaced inner contacts form two 100 or 150 Ohm matched impedance differential pairs
- Outer contact has rugged wall section for durability
- Available in size 8 crimp termination style
- Also available in size 8 with PC tails (see page 386)
- Requires modification of MIL-DTL-38999 connector to accommodate keyed contacts



Cable Illustration - Differential Twinax Contact

**TYPICAL DIFFERENTIAL TWINAX SOCKET CONTACT** has socket outer contact with a socket inner contact

**TYPICAL DIFFERENTIAL TWINAX PIN CONTACT** has pin outer contact with a pin inner contact



Differential Twinax Socket Contact



Differential Twinax Pin Contact

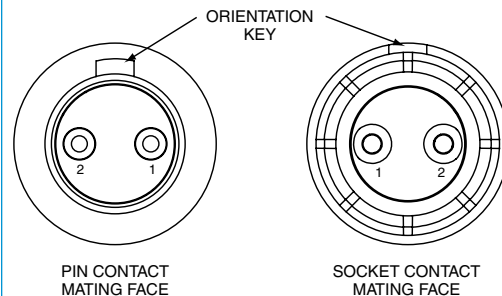
### Differential Twinax Contacts are Gold plated, Crimp Termination

Finish of mating contacts parts: supplied with 0.000050 min. gold over nickel on mating parts. Consult Amphenol for availability of other finishes.

### Differential Twinax Size 8 Contact Performance:

- Bandwidth: Up to 3 Gigahertz
- Data Rate: Exceeding 3 Gbits/sec.
- Voltage Rating: 500 Vrms max. @ sea level
- Dielectric Withstanding Voltage: 1000 VAC rms between all inner contacts @ sea level 500 VAC rms between inner and outer contacts @ sea level

### Suggested Numbering for Differential Twinax Contacts





## TV-R Series, MIL-DTL-38999 Series III\* Connectors

DIFFERENTIAL TWINAX CONTACTS FOR USE IN TV-R CONNECTORS							
Cable	Contact Part Number (Termination Instruction Sheet)**		Impedance (Ohms)	Contact Size	Electrical Protocol††	Crimping Tools	
	Pin	Socket				Inner Contact	Outer Contact
Tensolite 24463/05099X-8(LD), Thermax MX 100-24, Tensolite 24463/9P025X-2(LD), Thermax 12814, ST5M1284-003 (98 Ohm), 26463/70460X-2 (98 Ohm), PIC E10224, Fileca 2709-3, NF24T100-200C (Space), S280W502-1	21-033387-021 (L-2119-E)	21-033388-021 (L-2119-E)	100	8	Ethernet, USB	M22520/2-01 with Positioner M22520/2-37 or with Daniels Positioner K709	M22520/5-01 with Die Set M22520/5-45 (Location A)
GORE GSC-05-827300-00 Tensolite 26453/03184X-2(LD) Thermax 956-626Z	21-033387-051*** (L-2119-AY)	21-033388-051*** (L-2119-AY)					
Tensolite 26453/03184X-2(LD), Thermax 956-626Z, GORE GSC-05-827300-00 ASNE08072003-09	21-033387-041 (L-2119-T)	21-033388-041 (L-2119-T)					
23460/05114X-2(LD), PIC E1024	21-033387-061 (L-2119-BH)	21-033388-061 (L-2119-BH)					
Raychem 0026A0024, M17/176-00002 (77 Ohm)	21-033387-071 (L-2119-BJ)	21-033388-071 (L-2119-BJ)					
JSFY11-24, Tensolite 24463/03220T-2(LD), Thermax 956-1T200	21-033387-091 (L-2119-BT)	21-033388-091 (L-2119-BT)					
S280W502-6, Tensolite 24463/9P026X-2(LD)	21-033387-101 (L-2119-AK)	21-033388-101 (L-2119-AK)					
AXON P509782	21-033387-131	21-033388-131	100				
Tensolite 26453/03184X-2(LD)	21-033387-151	21-033388-151	100				
Tensolite 26483/03071X-2(LD)	21-033387-031 (L-2119-AC)	21-033388-031 (L-2119-AC)	150				
Tensolite 26483/03071X-2(LD)	21-033456-001 (L-2119-BX)†	21-033457-001 (L-2119-BX)†			Fibre Channel, 1000 Base-CX Ethernet		

PCB DIFFERENTIAL TWINAX CONTACTS FOR USE IN TV-R CONNECTORS				
PCB Quadrax Contacts	Contact Part Number		Impedance (Ohms)	Contact Size
	Pin	Socket		
PCB (1.035 Length)	21-033834-001	21-033835-001	100	8
PCB (.788 Length)	21-033834-031	21-033835-031		
PCB (.494 Length)	21-033834-041	21-033835-041		
PCB (.939 Length)	21-033834-051	21-033835-051		
PCB (.780 Length)	21-033834-061	21-033835-061		
PCB (.871 Length)	21-033834-071	21-033835-071		
PCB (.937 Length)	21-033834-081	21-033835-081		
PCB (1.035 Length)	21-033834-091	21-033835-091		
PCB (.843 Length)	21-033834-101	21-033835-101		
PCB (.806 Length)	21-033834-111	21-033835-111		
PCB (.908 Length)	21-033834-121	21-033835-121		
PCB (.530 Length)	21-033834-131	21-033835-131		
PCB (.819 Length)	21-033834-141	21-033835-141		
PCB (1.035 Length)	21-033834-021	21-033835-021		
PCB (1.035 Length) mates to 210-33456/57 series	21-033458-001	21-033457-001	150	

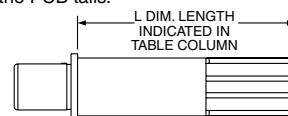
Daniels crimping tools are available from Daniels Mfg. Corp. 6103 Anno Ave., Orlando, FL 32809

\* Requires modified connector to accommodate keyed contacts.

\*\*\* Indicated contact is vacuum degassed  
†† Test reports available for indicated protocols.  
Consult Amphenol Aerospace.

\*\*Termination instructions are packaged with each contact and can be found on-line at:  
[www.amphenol-aerospace.com/serviceinstructions.asp](http://www.amphenol-aerospace.com/serviceinstructions.asp)  
† Consult Amphenol Aerospace for current release of this instruction sheet.

Indicated length given in chart at left is the distance from the rear of the contact retention shoulder to the tip of the PCB tails.



Note: it does not indicate stickout length when installed in D38999 connector.

### DIFFERENTIAL TWINAX CONTACT DATA

Contacts are inserted by hand. Refer to termination instructions listed.  
Contacts are removed with a removal tool. Recommended tool is MIL-I-81969/14-06, Daniels DRK-264-8. Refer to termination instructions listed.

Finish of mating contact parts: Contact part numbers shown in the chart above are supplied gold plated per ASTM B488 Type II, Code C, .000050 min. thick over nickel plate per AMS-QQ-N-290, Class 2, .000030/.000150 thick.

# Compliant Quadrax Contacts and PC Tail

## Quadrax Contacts for Attachment to PC Boards

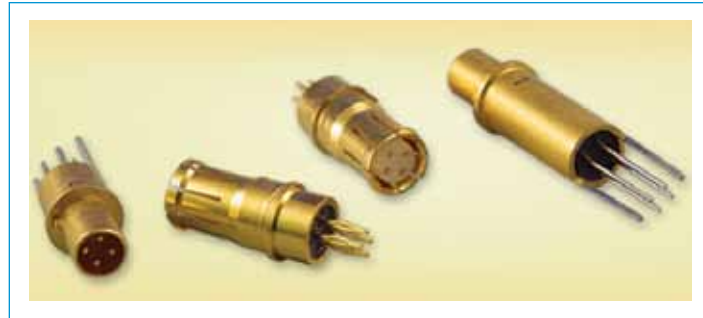
### General Description

#### Amphenol® Quadrax Contacts for Printed Circuit Board Attachment

- Available for MIL-DTL-38999 Series III Circular connectors with straight PC tail termination and with compliant pin termination. These provide the ideal solution for bringing high speed data transmission to the board.



MIL-DTL-38999, SERIES III CONNECTOR WITH PC TAIL CONTACTS. This arrangement has 33 size 22D and 2 Quadrax PC tail contacts.



Compliant Pin Quadrax and PC Tail Quadrax Contacts

MIL-DTL-38999, SERIES III CONNECTOR WITH PC TAIL CONTACTS. This arrangement has 8 Quadrax PC tail contacts.

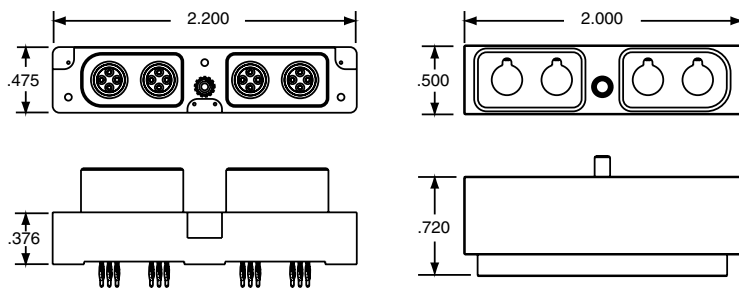


#### Amphenol® Quadrax Contacts for Rectangular Board Level Connectors

- Incorporate the same size 8 Quadrax PCB contacts as used in circular 38999 connectors.

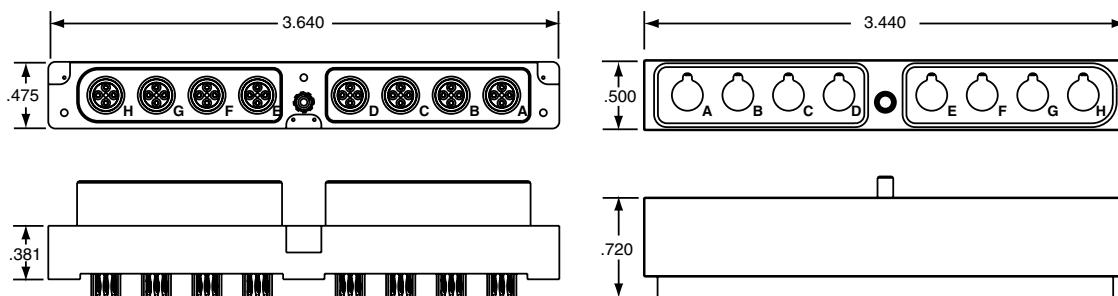
- Size 8 Quadrax Compliant contacts with hole diameters:
  - .025 ±.002 PTH Quadrax contact
  - .040 ±.003 PTH shell grounding
  - Accommodates backplane .125 inch min. thickness
- Consult Amphenol Aerospace for availability of additional connector configurations

##### 4 POSITION BOARD LEVEL CONNECTOR WITH QUADRAX



Compliant Pin Quadrax Board Level Connector

##### 8 POSITION BOARD LEVEL CONNECTOR WITH QUADRAX

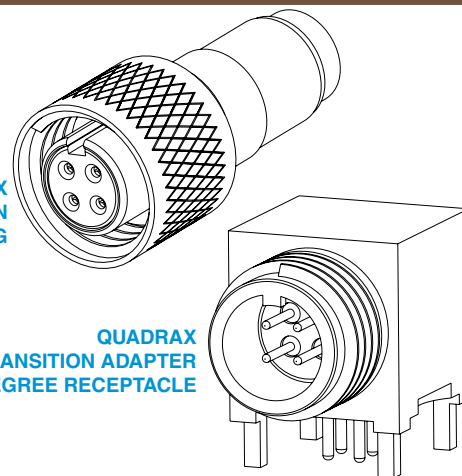


# Quadrax Transition Adapters and Differential Twinax Transition Adapters

## General Description

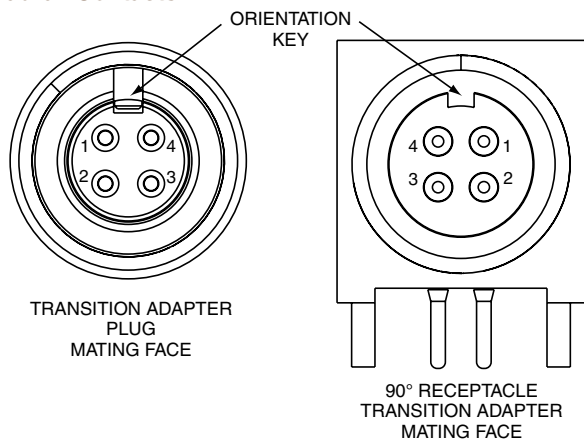
**Amphenol® Transition Adapters** - Are used to facilitate launching of controlled impedance signals to printed circuit boards. Amphenol provides transition adapters in both contact types:

- Quadrax transition adapters, 90° or straight receptacles threaded or cable to board style
- Differential twinax transition adapters, 90° or straight receptacles, threaded or cable to board style



90° Quadrax Receptacle and Plug Transition Adapter

### Suggested Numbering for Transition Adapters with Quadrax Contacts



90° Differential Twinax Receptacle and Plug Transition Adapter

### TRANSITION ADAPTER DATA

Finish of mating contact parts: Contacts are supplied gold plated per ASTM B488 Type II, Code C, .000050 min. thick over nickel plate per AMS-QQ-N-290, Class 2, .000030/.000150 thick.

### ELECTRICAL PROTOCOLS FOR QUADRAX TRANSITION ADAPTERS

Part Number		Impedance (Ohms)	Electrical Protocol††
Plug	Receptacle		
21-033836-031		100	Ethernet, gigabit Ether
21-033836-041			Ethernet, gigabit Ether
21-033836-051			Ethernet, gigabit Ether
21-033836-061			Ethernet, gigabit Ether
	21-033837-081 (90 degree)		
	21-033837-091 (90 degree)		
	21-033837-041 (90 degree)		
	21-033837-051 (straight)		Ethernet, gigabit Ether
	21-033837-061 (90 degree)		
	21-033837-141 (90 degree)		
21-033837-101		150	
21-033836-021			1000 Base CX, Fibre channel
	21-033837-021 (90 degree)		
	21-033837-211 (jam nut)		1000 Base CX, Fibre channel
	21-033837-031 (straight)		
	21-033837-071 (90 degree)		
21-033837-111			

### ELECTRICAL PROTOCOLS FOR DIFFERENTIAL TWINAX TRANSITION ADAPTERS

Part Number		Impedance (Ohms)	Electrical Protocol††
Plug	Receptacle		
21-033832-81		100	
21-033832-21			Ethernet
	21-033833-021 (90 degree)		
	21-033833-031 (90 degree)		Ethernet
	21-033833-151 (90 degree)		
21-033832-111†			
	21-033833-161† (90 degree)		
	21-033833-171† (90 degree)		
	21-033833-091 (90 degree)		
	21-033833-051 (90 degree)		
	21-033833-141 (90 degree)		
21-033832-91		150	
	21-033833-111 (90 degree)		
	21-033833-181† (90 degree)		
	21-033833-101 (90 degree)		

† Consult Amphenol Aerospace for current release of this adapter.  
 †† Test reports available for indicated protocols; consult Amphenol Aerospace.



# Quadrax Transition Adapters

## for Attachment to PC Boards

### Application Data

100 OHM QUADRAX TRANSITION ADAPTERS FOR LAUNCHING CONTROLLED IMPEDANCE SIGNALS TO PC BOARDS											
Quadrax Type Adapter/ Cable or PCB Tail Length	Illustration of Adapter	Part Number (Termination Instruction Sheet)**		Impedance (Ohms)	Mating Thread Size	Crimping Tools					
		Plug	Receptacle			Inner Contact	Outer Contact				
Quadrax Plug Adapter/ Tensolite NF24Q100, NF24Q100-01 24443/9P025X-4(LD) S280W502-4 24443/03130X-4(LD) Thermax 956-4TN		21-033836-031 (L-2119-U)		100	.375	M22520/2-01 with Positioner M22520/2-37 or with Daniels Positioner K709	M22520/5-01 with Die Set M22520/5-45 (Location A)				
Quadrax Plug Adapter/ Tensolite NF22Q100, NF22Q100-01, Thermax 956-5, Tensolite 24450/030894-4(LD) Draka Fileca F-4704-5		21-033836-041 (L-2119-W)†									
Quadrax Plug Adapter/ Draka Fileca F-4703-3, F-4704-4		21-033836-051 (L-2119-Y)									
Quadrax Plug Adapter/ NF26Q100		21-033836-061 (L-2119-AM)†									
Gore RCN8724 (30 awg)		21-033836-071									
Gore ACN1042 (28 awg) Gore RCN8973		21-033836-101									
Quadrax Plug Adapter/ Hexnut with Lock Wire Holes Tensolite NF24Q100-01		21-033836-081		100	.375	M22520/2-01 with Positioner M22520/2-37 or with Daniels Positioner K709	M22520/5-01 with Die Set M22520/5-45 (Location A)				
Quadrax Receptacle Straight Adapter in-line jam nut (threaded)/ GSC-10-8273900			21-033837-081 (L-2119-AR)†								
Quadrax Receptacle Straight Adapter in-line jam nut (threaded) Tensolite NF24Q100-01			21-033837-261								
Quadrax Receptacle Straight Adapter in-line (threaded)/NF24Q100 Tensolite NF24Q100-01, Tensolite 24443/9P025X -4 (LD), S280W502-4, Tensolite 24443/03130X-4 (LD), Thermax 956-4TN			21-033837-091 (L-2119-BL)								
PCB Quadrax Receptacle 90 Degree Adapter/Tail Length .110			21-033837-041					100	.375	NA	NA
PCB Quadrax Receptacle 90 Degree Adapter/Tail Length .200			21-033837-201								
PCB Quadrax Receptacle Straight Adapter/Tail Length .110			21-033837-051								
PCB Quadrax Receptacle Straight Adapter/Special Tail Length (.200)			21-033837-061								
Straight adapter Tail Length .175			21-033837-131								
Quadrax Receptacle 90 degree Adapter with cable to board/ NF24Q100 Tail Length .110			21-033837-141 (L-2119-BB)†					100	.375	M22520/2-01 with Positioner M22520/2-37 or with Daniels Positioner K709	M22520/5-01 with Die Set M22520/5-45 (Location A)
Quadrax Receptacle 90 degree Adapter with cable to board/ ABS1503KD24 Tail Length .110 Tensolite NF22Q100-01 Thermax 956-5 Draka Fileca F4704-5			21-033837-231								
Quadrax Receptacle Straight Adapter with cable to board/ NF24Q100, NF24Q100-01 Tail Length .195			21-033837-101 (L-2119-AN)								
Quadrax receptacle straight adapter w/ cable to board, Tail length .195 Draka Fileca F-4703-3, F-4703-4				21-033837-241							

Daniels crimping tools are available from Daniels Mfg. Corp. 6103 Anno Ave., Orlando, FL 32809

\*\* Termination instructions are packaged with each contact and can be found on-line at: [www.amphenol-aerospace.com/serviceinstructions.asp](http://www.amphenol-aerospace.com/serviceinstructions.asp)

† Consult Amphenol Aerospace for current release of this adapter and instruction sheet if applicable.

See electrical protocols for transition adapters on page 388.