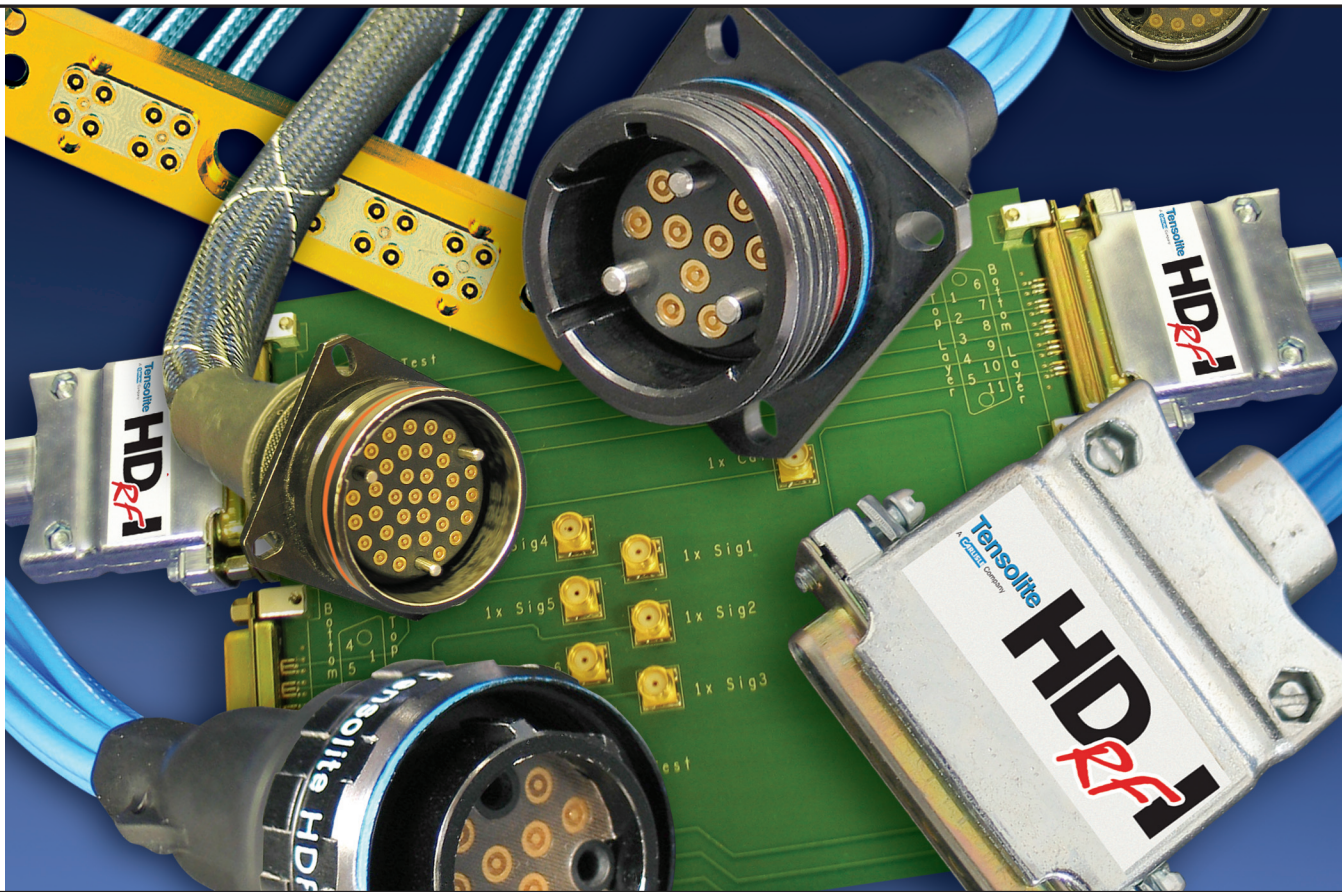


# HDRFI™ Series

Tensolite High-Performance Cable  
& Interconnect Systems

**HD** **RF** **I**™ High  
Density  
RF  
Interconnect



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**40GHZ**

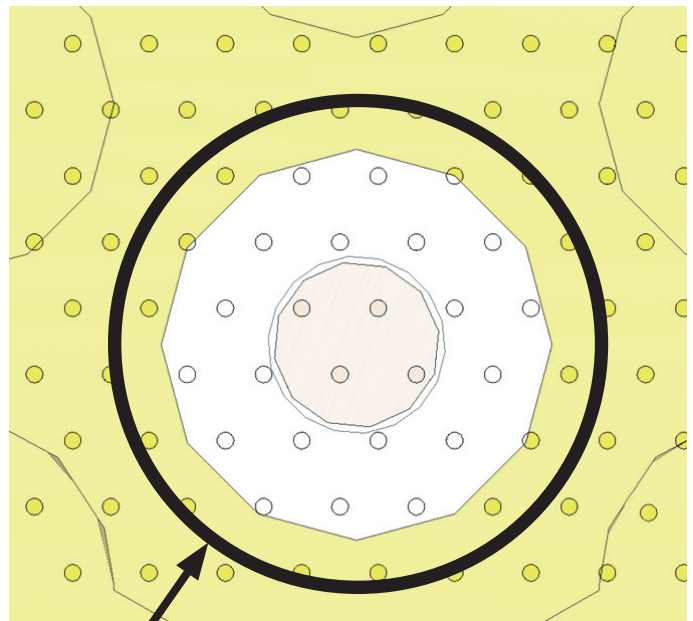
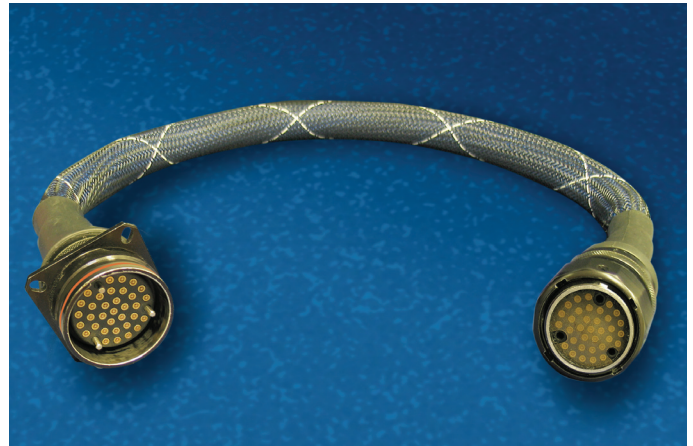
# High Density RF Interconnect

HDRFI™ is a patented Tensolite connection system that transfers high frequency signals through a unique planar interface. This planar interface removes the need for typical pin and socket connections by utilizing a z-axis elastomer to provide the electrical path between the mated connectors. The elastomer is made up of silicone, impregnated with gold plated stainless steel wires and is arranged on a .035mm pitch. When compressed by the mating halves, the gold plated wires mechanically connect the two planar surfaces and creates an electrical EMI barrier to provide excellent isolation.

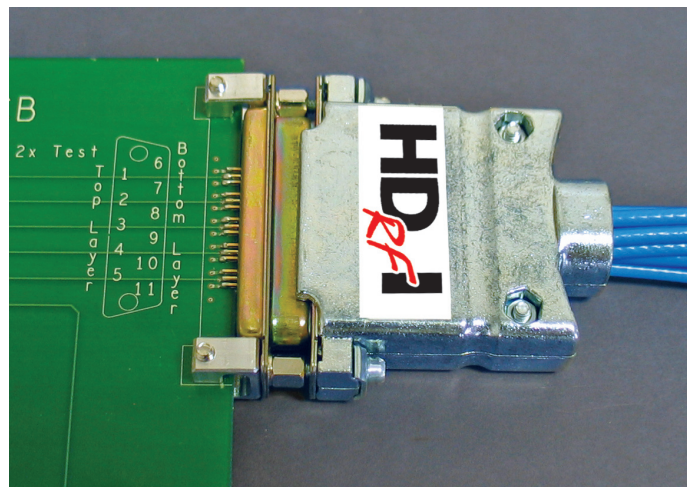
HDRFI™ is available only as an assembly in three product line offerings: D-Sub, RF Circular and custom applications. The assemblies can be used with a 26AWG coax for internal applications or 24AWG for external requirements. Consult factory for more information.

## Features / Benefits

- High Bandwidth
- High Density
- Small Form Factor
- Center to Center spacing 0.130"
- Eliminates Stubbing
- Alignment of the connector is not made through the RF path
- Can be used differentially or single ended



Effective Electrical Outer Conductor



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# High Density RF Interconnect



## RF D-Sub

The RF D-Sub connector family is available in four different shell sizes and can be used in cable to cable, cable to board or board to board applications. Designed with high performance in mind, the insert arrangements are maximized to hold more impedance controlled size 16 type RF contacts than any other D-sub connector on the market today. The HDRFI™ RF contacts are press-in style and the connectors can accommodate standard D-sub backshells and mounting hardware.

## RF Circular

The RF Circular connector family is designed for high performance applications. The insert arrangements are maximized to hold more impedance controlled size 16 type RF contacts than any other circular connector on the market today. The product line consists of shell sizes 15 – 25 and are based on the D38999 specification. The HDRFI™ RF contacts are press-in style and the connectors can accommodate standard D38999 backshells and hardware.

## RF Circular – Mixed Signal

The RF Circular – Mixed Signal connector family is a perfect solution to combine both power and high frequency RF contacts into the same connector body. The product line consists of shell sizes 15 – 25 and are based on the D38999 specification. The signal pins are size 20, rated to 7 amps and are combined with the HDRFI™ RF contacts. All of the contacts are press-in style and the connectors can accommodate standard D38999 backshells and hardware.

## Custom Applications

HDRFI™ can be customized to fit almost any application. From custom board connectors, to insert arrangements that can have a common ground plane, to having each signal path isolated from each other.



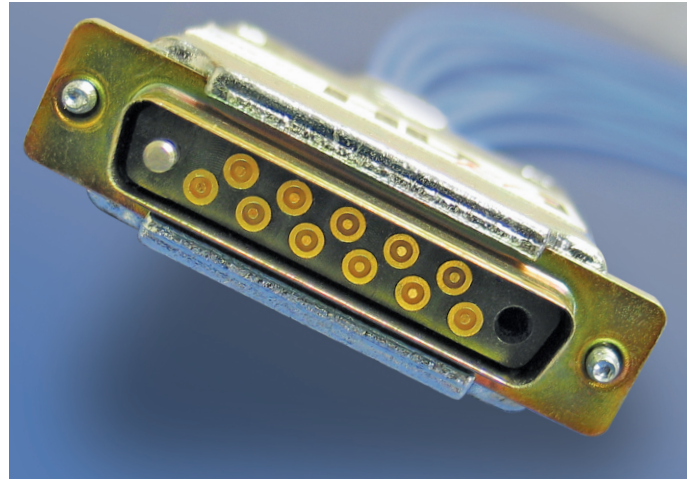
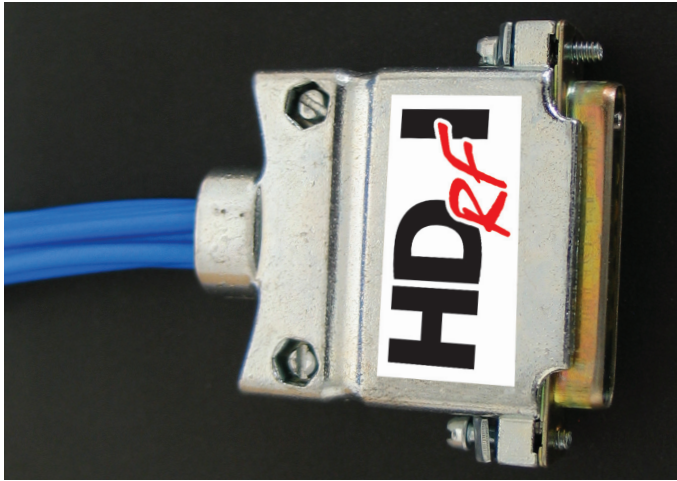
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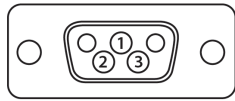
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# High Density RF Interconnect

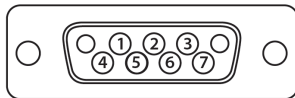
## RF-DSUB Series



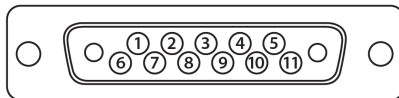
### Mating Face View



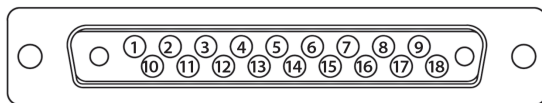
Size 1, 3 signals



Size 2, 7 signals

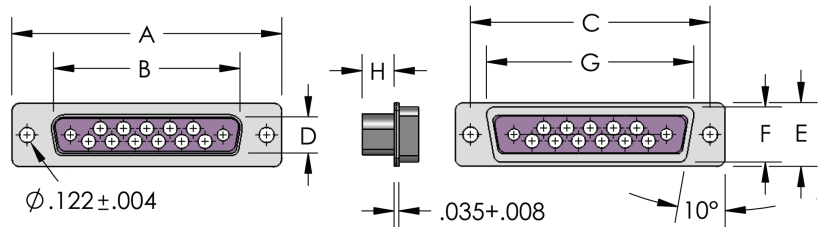


Size 3, 11 signals



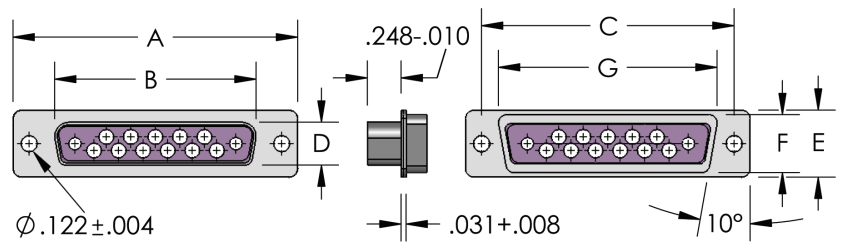
Size 4, 18 signals

### Size 3 Data Plug (shown)



Shell Size	A $\pm .016$	B $+ .008$	C $\pm .006$	D $+ .008$	E $\pm .016$	F $\pm .012$	G $\pm .012$	H $- .012$
1	1.213	0.665	0.984	0.323	0.492	0.425	0.760	0.240
2	1.539	0.992	1.311	0.323	0.492	0.425	1.083	0.240
3	2.087	1.531	1.852	0.323	0.492	0.425	1.626	0.236
4	2.728	2.177	2.500	0.323	0.492	0.425	2.272	0.236

### Size 3 Data Receptacle (shown)



Shell Size	A $\pm .016$	B $- .008$	C $\pm .006$	D $- .008$	E $\pm .016$	F $\pm .012$	G $\pm .012$
1	1.213	0.646	0.984	0.315	0.492	0.425	0.760
2	1.539	0.972	1.311	0.315	0.492	0.425	1.083
3	2.087	1.516	1.852	0.315	0.492	0.425	1.626
4	2.728	2.161	2.500	0.315	0.492	0.425	2.272



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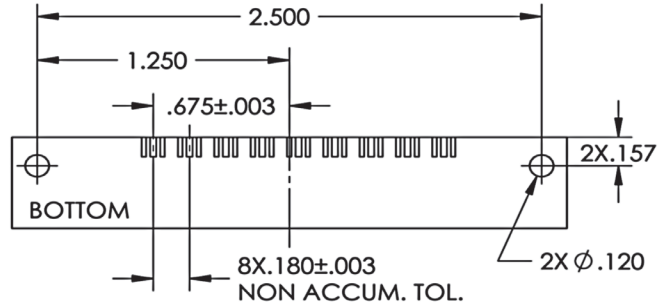
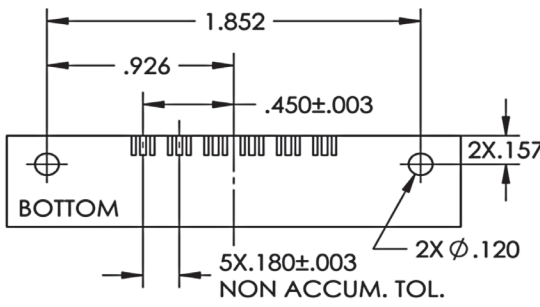
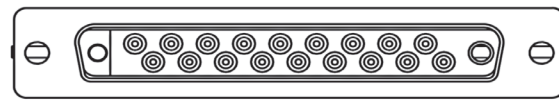
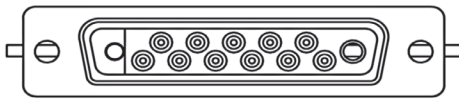
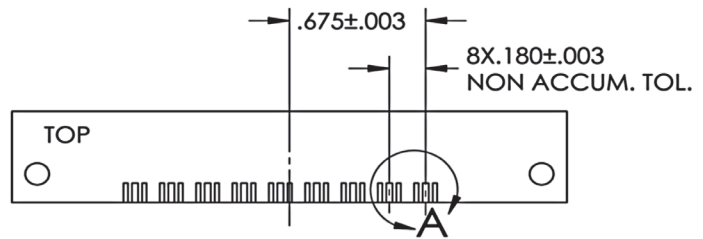
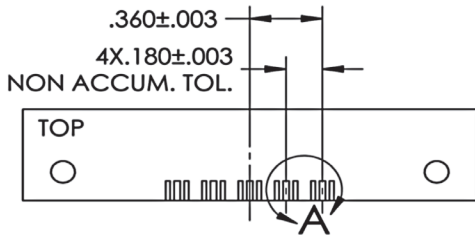
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# High Density RF Interconnect

## RF D-Sub



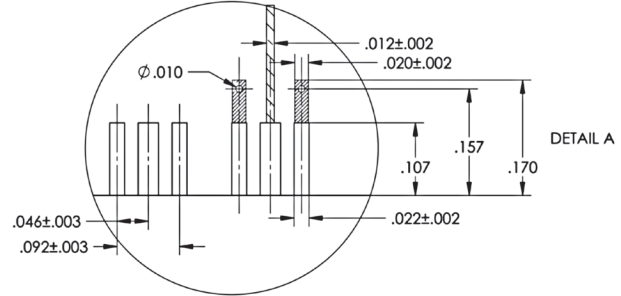
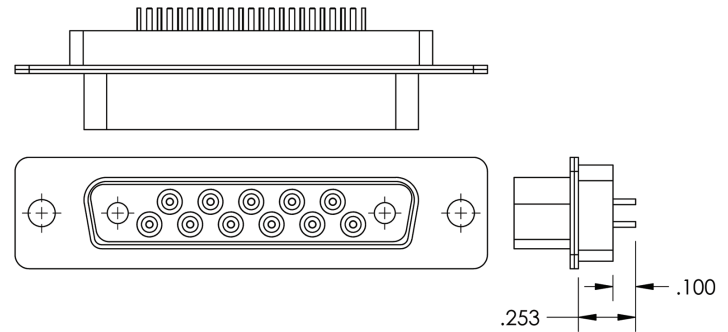
**Size 3 Plug**

**Size 4 Plug**

**NOTES: SUGGESTED PAD LAYOUT FOR MICROSTRIP LINE**

1. BOARD MATERIAL SHALL BE FR4 OR EQUIVALENT, DIELECTRIC CONSTANT = 4.0 TANGENT LOSS = .021
2. SOLDERMASK SHALL BE LIQUID PHOTO IMAGEABLE (LPI) BOTH SIDES OVER BARE COPPER. THICKNESS = 35 MicroMeters +/- 0.5 MicroMeter.
3. LAYER(1) TOP AND LAYER4(BOTTOM) ARE THE CONTROLLED IMPEDANCE BOARD (SIGNAL LINE: 50 Ohm +/-5% (LINE WIDTH 11.5 MILS.)
4. BOARD STACK-UP AND VIA STRUCTURE.

L1 (TOP)	1.6 MILS	.5 oz Cu-PLATING
CORE	7.0 MILS	
L2 (GND/PLANE)	.65 MIL	.5 oz Cu
PREPREG	44.5 MILS	
L3(GND/PLANE)	.65 MILS	.5 oz Cu
CORE	7.0 MILS	
L4(BOTTOM)	1.6 MILS	.5 oz Cu-PLATING
TOTAL THICKNESS	63 MILS +/- 10%	



The RF D-Sub product can be launched in an edge mount configuration, as shown above, or vertically. Consult factory for vertical PCB layouts.



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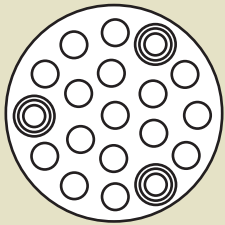
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# High Density RF Interconnect

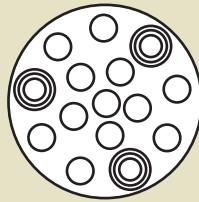
## RF Circular



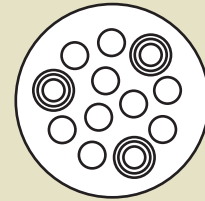
### Insert Arrangements - RF



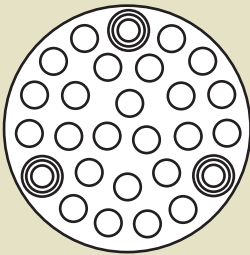
Shell 19  
16 - RF



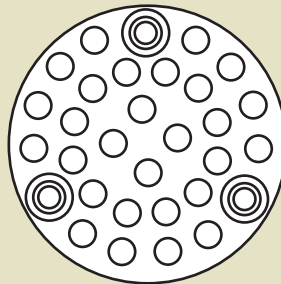
Shell 17  
12 - RF



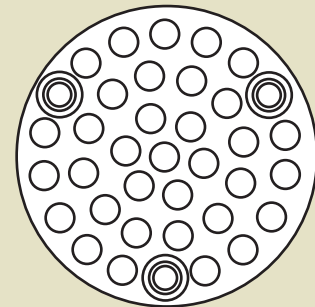
Shell 15  
9 - RF



Shell 21  
24 - RF



Shell 23  
28 - RF



Shell 25  
34 - RF



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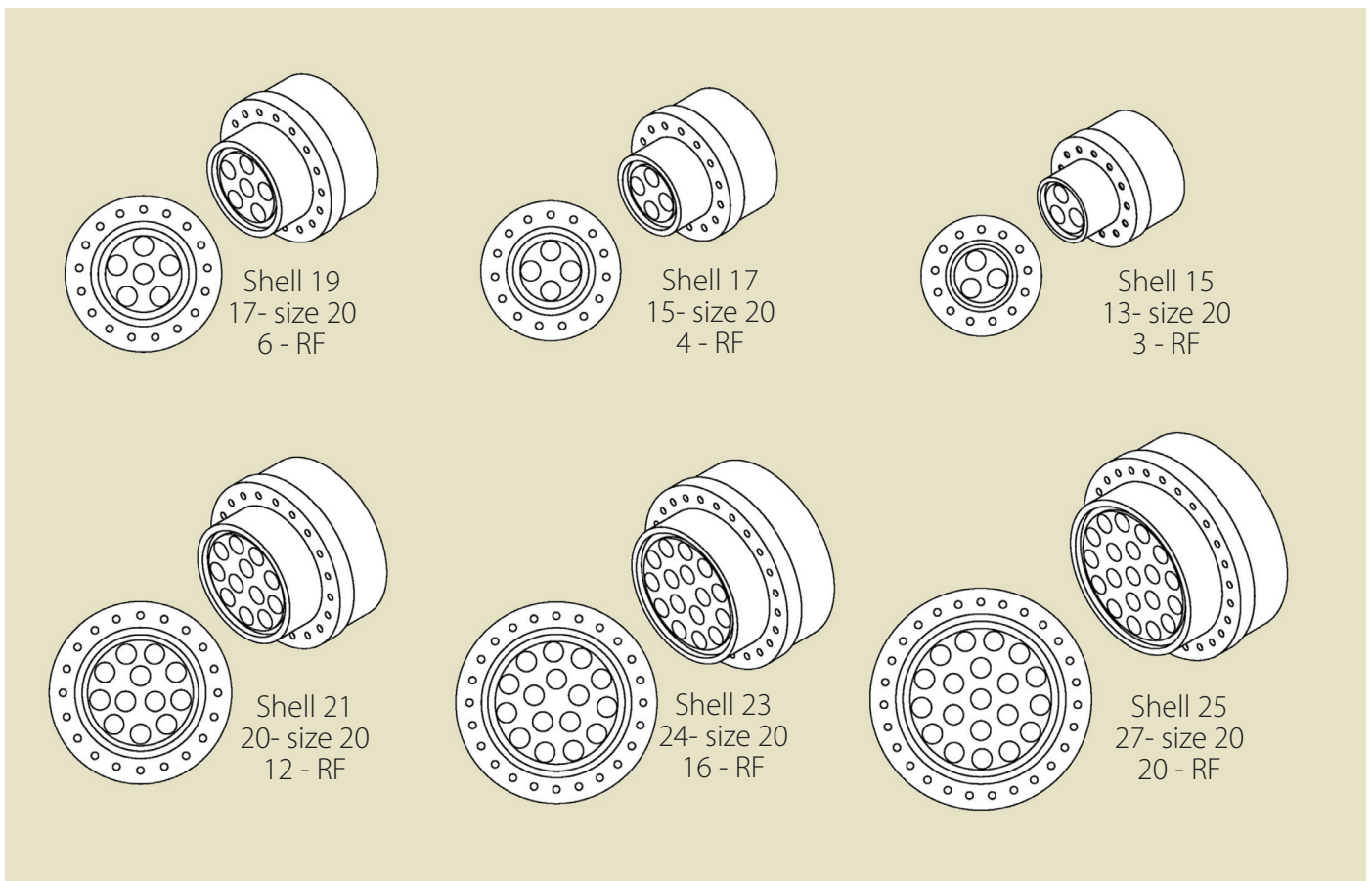


# High Density RF Interconnect

*RF Circular—Mixed Signal*



## Insert Arrangements - MS



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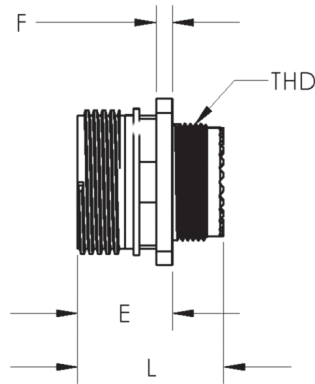
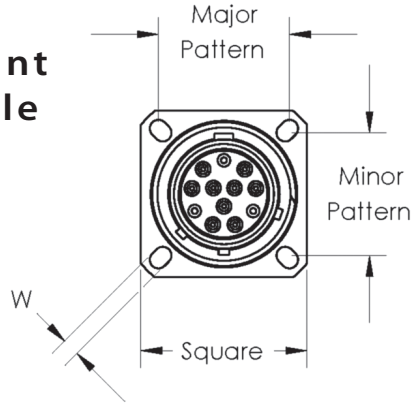
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# High Density RF Interconnect

## RF Circular

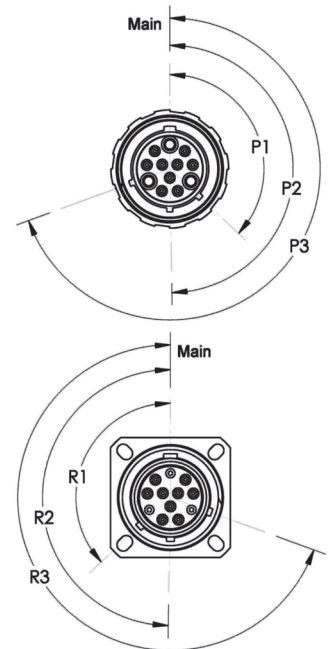
### Wall Mount Receptacle



Shell Size	Square	Pattern Major	Pattern Minor	W	THD	L	F	E	Panel Hole +.005
15	1.230	.970	.906	.125	M22 x 1.0	1.080	.120	.700	1.005
17	1.312	1.062	.970	.125	M25 x 1.0	1.080	.120	.700	1.195
19	1.437	1.156	1.062	.125	M28 x 1.0	1.080	.120	.700	1.255
21	1.562	1.250	1.156	.125	M31 x 1.0	1.080	.120	.700	1.380
23	1.688	1.375	1.250	.125	M34 x 1.0	1.080	.120	.700	1.515
25	1.812	1.500	1.375	.125	M37 x 1.0	1.080	.120	.700	1.630

### Keying Options

MATING VIEW				
Key / Angle (cw from 12:00)	Main	P1	P2	P3
Normal	0	133	180	250
A	0	135	180	225
B	0	95	180	212
C	0	100	155	200
D	0	75	155	200
E	0	30	155	280



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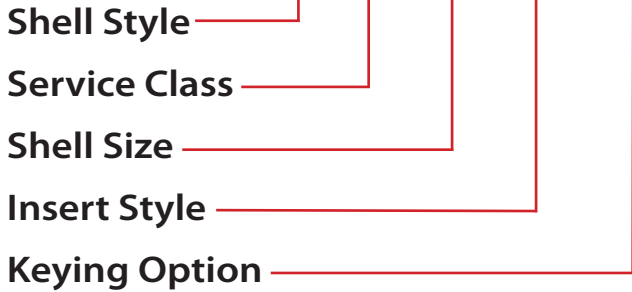
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# High Density RF Interconnect

## RF Circular Connector Part Numbering

**HDRFI/ 10 A 21 MS N**



### Shell Style:

- 10 – Wall Mount Receptacle
- 20 – Straight Plug
- 30 – Jam Nut Receptacle

### Service Class:

- A – Cadmium per QQ-P-416F  
Type 2, Class 2
- B – Black Anodize per Mil-A-8625  
Type II, .4 mil
- C – Electroless Nickel  
per ASTM 733-90 SC2,  
Type 1, Class 5

### Shell Size:

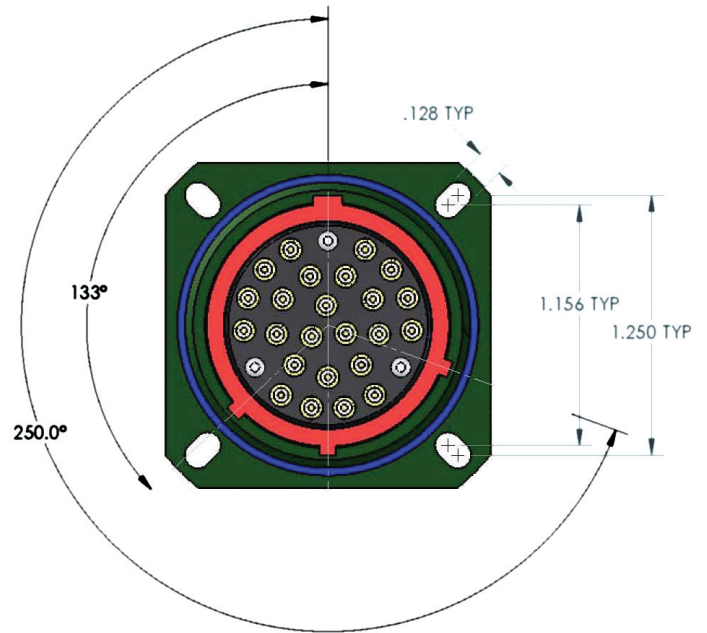
- 15 – 17 – 19 – 21 – 23 – 25

### Insert Style:

- RF – Loaded w/ RF contacts only
- MS – Mixed Signal

### Keying Options:

See page 8 for keying options



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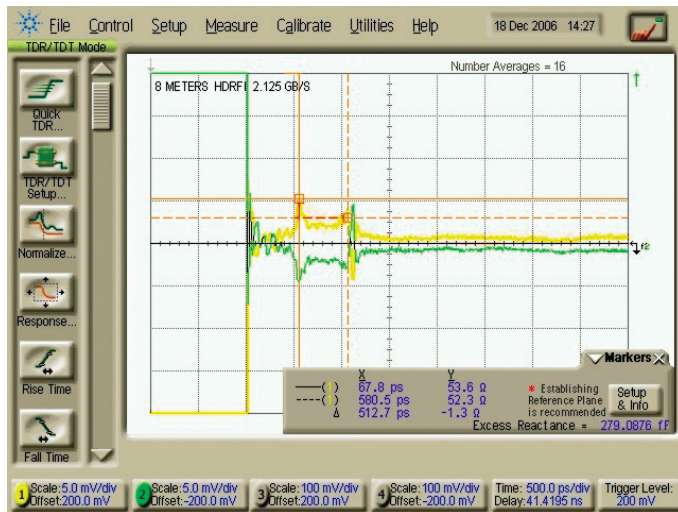
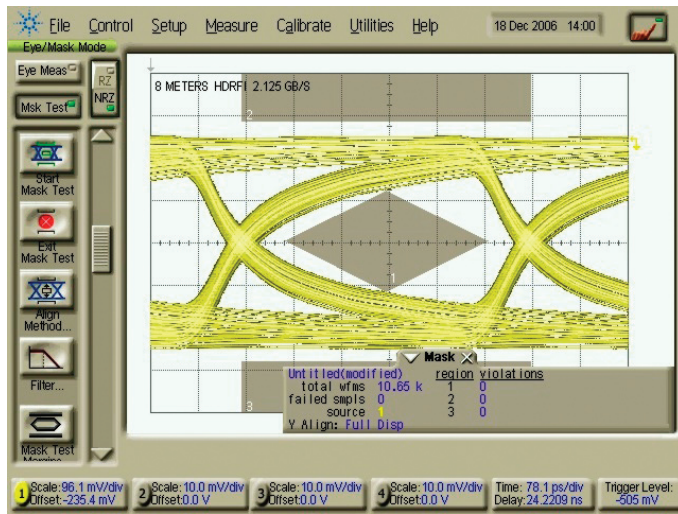
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# High Density RF Interconnect

## Electrical Performance

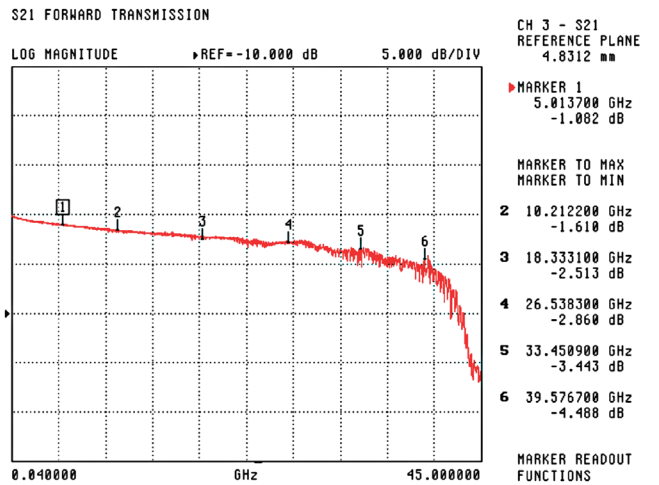
### Digital Applications

The eye pattern data is based on the Double Speed Fibre Channel protocol at 8 meters long without equalization using Tensolite HFF-1087 cable. The HDRFI™ coax contacts were set as a differential signal in a RF D-Sub shell size 2.

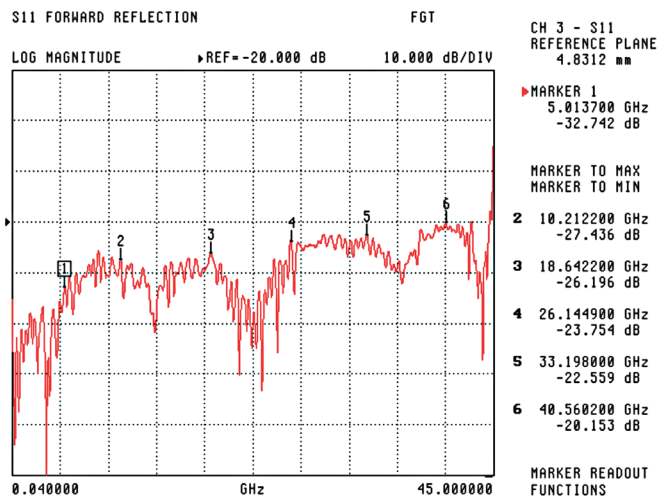


### RF Applications

The test below is the typical RF performance of an HDRFI™ assembly to 40GHz. The configuration includes a mated pair of Tensolite's HDRFI™ coax connectors with Tensolite HFF-1087 cable and SMP connectors at the ends that attach to the test leads .



Attenuation plot of HDRFI mated interface including 2 feet of 24AWG low loss coax and connector adapters.



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# High Density RF Interconnect

## Specifications

### Mechanical

On-Center Spacing	0.130" Center to Center Minimum
Mating/Compression Force	1.5 Lbs / Contact
Durability	2,000 Mating Cycles
Operating Temperature	-20°C to +120°C

### Electrical

Insulation Resistance	100 Megohms Minimum
Dielectric Withstand Voltage	1,000 Vrms @ Sea Level
Current Rating @ 70°C	1.0 Amp
Contact Resistance (max)	150mOhms
Impedance, Nominal	50Ω
CW Power Rating (max)	20 Watts
Frequency Range	to 40GHz
Insertion Loss (mated pair)	0.25dB @ 40GHz
VSWR (max)	
Up to 4 GHz	1.18
4 – 12 GHz	1.25
12 – 18 GHz	1.35
18 – 26 GHz	1.40
26 – 40 GHz	1.45

### Environmental

Mechanical Shock	EIA 364, Test #27	70 G's, 10 Milisecond, 1/2 sine, 5 cycles
Random Vibration	EIA 364, Test #28	8.8 G's RMS, 50 to 2k hz, 1 hr/axis, 3 axis
Mixed Flowing Gas	EIA 364, Test #65	C1 <sub>2</sub> 10 ppb, NO <sub>2</sub> 200 ppb, H <sub>2</sub> S 10 ppb, SO <sub>2</sub> 100 ppb, exposure 20 days, mated
Thermal Shock	EIA 364 Test #32	-65°C to 150°C, 5 cycles, mated
Humidity (Thermal Cycling)	EIA 364 Test #31	25°C to 65°C @ 90 to 95% R.H., continuous 500 hours, mated
Temperature Life	EIA 364 Test #17	120°C, 500 hours 1.0 Amp, mated



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# **CARLISLE**

**INTERCONNECT TECHNOLOGIES**

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