

Following are some of components which industry can develop for SAC/ISRO

1. Hybrid PCB
2. SMA & TNC Connector
3. Micro-D Connector
4. High frequency Crystal Filter
5. Multi pin header

1. HYBRID PCB

Objective: Realization of Hybrid PCB for space use through indigenous vendors.

Introduction: A Hybrid Printed Circuit Board (PCB) multilayer is a PCB that uses dissimilar materials with the intent of optimizing electrical performance, improved system reliability and focused towards high-frequency RF application. It uses materials with significantly different critical properties than those associated with a traditional multilayer PCB. It could use a mix of FR-4 materials with high frequency PTFE materials, or a mix of different high-frequency materials with different di-electric constant in one multilayer board.

Hybrid PCB enables designers to integrate wide range of electronic circuits. This proposal is for indigenous vendor development for Realization of Space-grade Hybrid Multilayer PCB.

Salient features of Hybrid PCB:

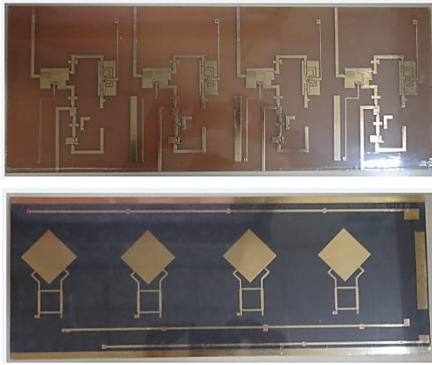
1. Combining the RF and high digital electronic designs on a single PCB
2. Reduction of overall electronics package size
3. Reduction or elimination of cables and wiring harnesses
4. Better electrical performance, Integrated EMI shielding
5. Provides additional thermal path
6. Use of FR4 increases rigidity and eases assembly of components on PCB
7. Improved reliability
8. The cost of hybrid PCB is lower than the cost associated with two or more conventional PCBs and related hardware

Scope of Work: The vendor shall fabricate and supply Multi-Layer boards having high Tg FR4 layers combined with other layers of different RF PTFE/high frequency hydrocarbon laminates.

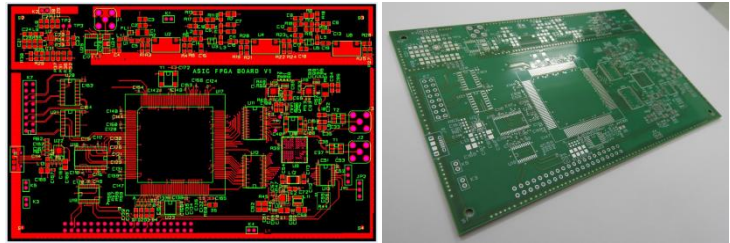
For space qualification, vendor need to fabricate test samples for qualification as per ISRO-PAX-304. The pattern for qualification samples and test coupon will be provided by SAC/ISRO.

SAC/ISRO will conduct qualification testing and on successful completion of qualification, vendor is declared as qualified vendor to supply Hybrid MLBs for space use.

Typical Hybrid MLBs figures:










Four layer Construction: Rogers 4003C & Rogers 2929 Bondply



Ten layer Construction: Rogers 4003C & Isola 370HR

2. SMA / TNC CONNECTORS

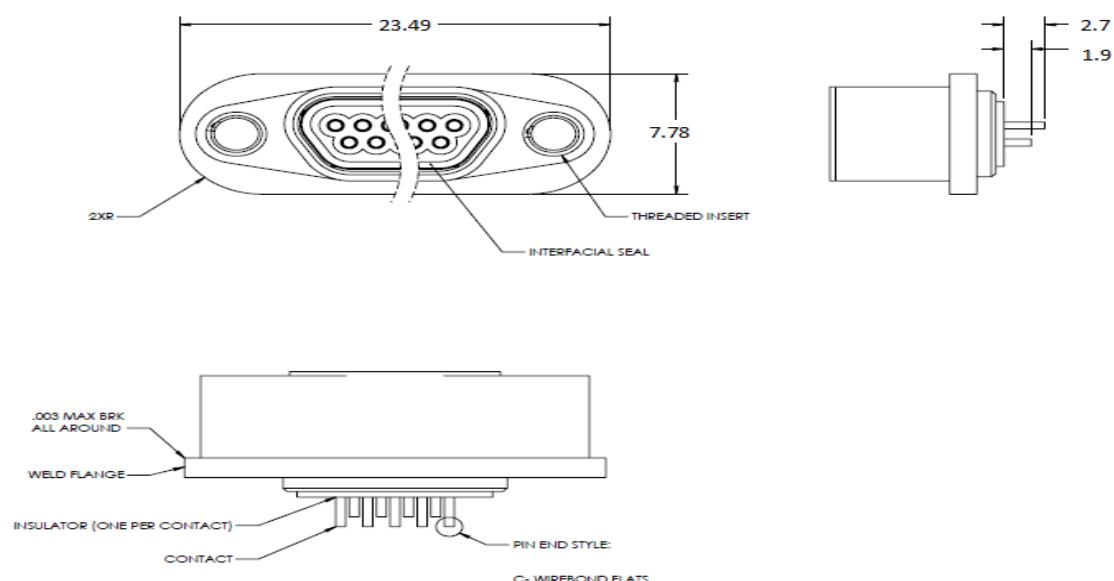
 <p>SMA (F) flanged connector, Tab terminal</p>	<p>Major Specifications :</p> <ol style="list-style-type: none"> 1. Freq. range : DC to 18 GHz 2. Insertion Loss : $0.05 \sqrt{f}$ dB (i.e. 0.21 dB) 3. VSWR : $1.05 + 0.015 f$ (i.e. 1.32 @ 18GHz)
 <p>SMA (F) Flanged connector solder pot terminal</p>	<p>Major Specifications :</p> <ol style="list-style-type: none"> 1. Freq. range : DC to 18 GHz 2. Insertion Loss : $0.05 \sqrt{f}$ dB (i.e. 0.21 dB) 3. VSWR : $1.05 + 0.015 f$ (i.e. 1.32 @ 18GHz)
 <p>SMA (F) Flanged connector extended dielectric</p>	<p>Major Specifications :</p> <ol style="list-style-type: none"> 1. Freq. range : DC to 18 GHz 2. Insertion Loss : $0.05 \sqrt{f}$ dB (i.e. 0.21 dB) 3. VSWR : $1.05 + 0.015 f$ (i.e. 1.32 @ 18GHz)
 <p>SMA (M) Flanged connector extended dielectric</p>	<p>Major Specifications:</p> <ol style="list-style-type: none"> 1. Freq. range : DC to 18 GHz 2. Insertion Loss : $0.05 \sqrt{f}$ dB (i.e. 0.21 dB) 3. VSWR : $1.05 + 0.005 f$ (i.e. 1.14 @ 18GHz)

 <p>SMA (M) elbow connector for RG 402 cable</p>	<p>Major Specifications:</p> <ol style="list-style-type: none"> 1. Freq. range : DC to 12.4 GHz 2. Insertion Loss : $0.10 \sqrt{f}$ dB (i.e. 0.35 dB) 3. VSWR : $1.10 + 0.01 f$ (i.e. 1.22 @12.4GHz)
 <p>TNC (M) cable connector</p>	<p>Major Specifications:</p> <ol style="list-style-type: none"> 1. Freq. range : DC to 18 GHz 2. Insertion Loss : $0.06 \sqrt{f}$ dB (i.e. 0.25 dB) 3. VSWR : $1.10 + 0.005 f$ (i.e. 1.9 @18 GHz) 4. Power handling in vacuum : 220W @1.5 GHz
 <p>TNC (F) flange connector</p>	<p>Major Specifications:</p> <ol style="list-style-type: none"> 1. Freq. range : DC to 5 GHz 2. Insertion Loss : $0.05 \sqrt{f}$ dB (i.e. 0.11 dB @ 5 GHz) 3. VSWR : $1.10 + 0.010 f$ (i.e. 1.15 @ 5 GHz)

3. MICRO D CONNECTOR: (9, 15, 25 PIN)

Sr. No.	Specifications	Value
1.	Current rating	3Amp (minimum)
2.	Insulation resistance	5000 Mega ohms (minimum)
3.	Contact resistance	10 Milliohms (maximum)
4.	Engagement Force	10 oz (maximum)
5.	Separation Force	0.5 oz (minimum)
6.	Shell / weld flange Shell finish	Laser weldable Aluminum alloy 4047 as per ASTM B247 / AL alloy 4032 Conversion coat with MIL-C-5541, Class CL1A
7.	Socket contacts	Beryllium Copper Alloy 172/173 in accordance with ASTM 196/197 with gold plating as per ASTM-B488-01 TYPE-III, 0.00005 / 0.000100 THICK, Flat type suitable for ribbon bonding (welding) having different length in two rows.
8.	Leak rate	$\leq 1 \times 10^{-9}$ cc/s He @ 1 atm Diff. pressure

9.	Interfacial Seals	Fluorosilicone elastomer (Typ)
10.	Dust caps	Polyethylene thermoplastic material; ESD safe
11.	Interface drawing	As per MIL-STD-83513



4. HIGH FREQUENCY CRYSTAL FILTER:

Sr. No.	Parameter	Unit	Specification
1	Centre Frequency (CF)	MHz	40 MHz to 139 MHz
2	Insertion Loss (max)	dB	6.5 dB
3	Bandwidth 1 dB (min) 3 dB (max)	KHz	± 6 KHz ± 10 KHz
4	Pass Band Ripple (in 3dB BW)	dB	≤ 1 dB
5	Stop Band attenuation (min) at CF ± 20 MHz at CF $\pm (1\text{MHz to } 20 \text{ MHz})$	dB	50 dB 70 dB
6	Spurious response better than	dBc	-70 dBc
7	Impedance	Ohm	50 Ohm
8	Input / Output Return Loss in CF $\pm 3\text{KHz}$ CF $\pm 6 \text{ KHz}$	dB	15 dB 12 dB
9	Maximum Input Level (Damage)	dBm	+3 dBm
10	Temperature range	Deg $^{\circ}\text{C}$	-10 $^{\circ}$ to 60 $^{\circ}\text{C}$

5. MULTI-PIN HEADER

S. No.	Parameter	Specification	
Electrical Specifications			
1	Material	Compatible for attachment to Gold plated AlSiC surface	
2	Metal Finish	Compatible for Reflow & Epoxy attachment	
3	Interconnection with Header Pins	Thru 1-mil gold wire or 5-mil Gold Ribbon at Pin end	
4	Leak Rate	Less than 1 x 10-8 cc/sec	
5	Insulation Resistance (Min.)	1000 Mega Ohm	
6	DWV (Pin to Ground)	500	
7	Current Rating (Min.)	2 A	
8	Soldering Temperature	250 Deg. C	
Mechanical Specifications			
	No. of Pins	9-Pin	4-Pin
10	L (+/-0.002”), Max.	0.51(12.95)	0.36(9.15)
11	W (Max.)	0.11+/-0.002(2.79+/-0.05)	
12	H (Max.)	0.060+/-0.002(1.53+/-0.05)	
13	D (Max.)	0.018+/-0.0015(0.46+/-0.038)	
14	X (Max.)	0.05 Non- cumulative (1.27)	
15	L1/L2 (Max.)	0.500/0.125 (+/- 0.005) [12.7/3.175(+/-0.127)]	

