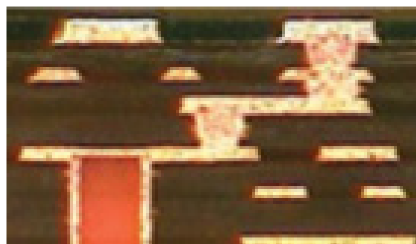
RF TECHNOLOGY OVERVIEW

Product Type - Characteristics

- Mixed Dielectrics for RF & Digital
- Buried / Blind / Microvia Interconnects
- Exposed Cavities - Multi Depth
- Sequential Lamination
- Formed PCB's
- Ormet Interconnections
- Back Drilling – Via Stub Reduction
- Hole Fill - Low DK / Low Loss
- Metal Core & Metal Back
- Planar Resistors - Ohmega + Ticer
- Screened Ink Resistors

Ormet Paste Interconnections

Via Fencing and Edge Plating for EMI Suppression



Stacked Microvias

RF Related Processes

- Sodium Etch
- Plasma Helium
- Autoclave
- Fusion Bond
- Hydroscan
- Specialty Hole Fill
- Laser Direct Imaging
- Laser Drilling
- Front to Back Scope
- Optical Drill / Mill
- ENEPIG, ENIG, Soft Au
- RF Test - Vector Network Analyzer (VNA)
- RF Assembly

Blind Vias
Hybrid – Mixed Dielectrics

TYPICAL RF MATERIAL & PROPERTIES

Material	Dk	Loss (Df)	Typical Freq	Cost Factor	Description
370HR	4.30	0.0250	less than 1 Ghz	1.00	Epoxy woven glass
Taconic TLY	2.20	0.0009	Up to 70 Ghz	7.00	Teflon- woven glass reinforced
Taconic RF35	3.50	0.0025	Up to 10 Ghz	6.00	Teflon-ceramic filled, woven glass reinforced
Arlon CLTE	2.94	0.0024	Up to 20 Ghz	8.00	Teflon-ceramic filled, woven glass reinforced
Arlon CLTE-XT	2.94	0.0012	Up to 40 Ghz	10.00	Teflon-ceramic filled, woven glass reinforced
Rogers 3003	3.00	0.0013	Up to 20 Ghz	8.00	Teflon-ceramic filled
Rogers 3203	3.02	0.0016	Up to 20 Ghz	8.00	Teflon-ceramic filled, woven glass reinforced
Rogers 4350	3.48	0.0040	Up to 10 Ghz	5.00	Ceramic filled hydrocarbon, woven glass reinforced
Rogers 5880	2.20	0.0009	Up to 100 Ghz	20.00	Teflon-random glass reinforced
Rogers 6002	2.94	0.0012	Up to 40 Ghz	25.00	Teflon-ceramic filled
Rogers 6202	2.94	0.0013	Up to 40 Ghz	1 5.00	Teflon-ceramic filled, woven glass reinforced
Rogers 6010	10.20	0.0020	Up to 20 Ghz	30.00	Teflon-ceramic filled

DESIGN FOR MANUFACTURING GUIDELINES FOR RF PRODUCTS

CRITICAL ATTRIBUTE

Feature to Feature Criteria	Standard	Advanced
Line Width / Space (inner layers)		
.5 oz copper	.0045” min. /.004” min.	.004” min. /.0035” min.
1 oz copper	.005” min. /.0045” min.	.005” min. /.004” min.
2 oz copper	.0065” min. /.005” min.	.006” min. /.005” min.
Line Width / Space (outer layers)		
1 oz copper	.005” min. /.0045” min.	.005” min. /.004” min.
2 oz copper	.0065” min. /.005” min.	.006” min. /.005” min.

CRITICAL ATTRIBUTE

Mechanical Process Related Criteria	Standard	Advanced
General		
Rout edge to ground plane	.025” min.	.015” min.
Routed hole tolerance	+/-.005	+/-.003”
Inside radius	.047”	.032”
Edge of cavity to nearest thru hole	. 030” min.	.020” min.
Rout to imaged feature tolerance	+/-.007”	+/-.003”
Outside dimension tolerance	+/-.007”	+/-.005”
Controlled depth rout / mill	.007” min.	.005” min.
Backdrill stub length	+/-.005”	+/-.003”
PTH drill to copper feature	.015” min.	.010” min.
NPTH drill to copper feature	.015” min.	.010” min.
Drill to board edge	.020” min.	.0135” min.
Finished PTH size tolerance	+/-.003”	+/-.002”
Non-PTH size tolerance	+/-.002”	+/-.001”
Drill true position (DTP)	.008 (RMC)	.006” (RMC)

Hole Related Criteria	Standard		Advanced	
Annular Ring (inner layers)	Class II tangency	Class III .001”	Class II tangency	Class III .001”
One lamination				
Pad dia. for .5 oz copper	Drill + .014”	Drill + .016”	Drill + .012”	Drill + .014”
Pad dia. for 1 oz copper	Drill + .014”	Drill + .016”	Drill + .012”	Drill + .016”
Pad dia. for 2 oz copper	Drill + .016”	Drill + .018”	Drill + .014”	Drill + .016”
Two laminations				
Pad dia. for .5 oz copper	Drill + .016”	Drill + .018”	Drill + .014”	Drill + .016”
Pad dia. for 1 oz copper	Drill + .016”	Drill + .018”	Drill + .014”	Drill + .016”
Pad dia. for 2 oz copper	Drill + .018”	Drill + .020”	Drill + .016”	Drill + .018”
Three laminations				
Pad dia. for .5 oz copper	Drill + .018”	Drill + .020”	Drill + .016”	Drill + .018”
Pad dia. for 1 oz copper	Drill + .018”	Drill + .020”	Drill + .016”	Drill + .018”
Pad dia. for 2 oz copper	Drill + .020”	Drill + .022”	Drill + .018”	Drill + .020”