

RoHS Laminates	Standard FR-4				High Frequency		Low Loss
Click on Suppliers Icon to Visit their Home Page	Panasonic	isola	Nelco	isola	ROGERS	ROGERS	Panasonic
Click on Material Name for Web Link to Data Sheet	Panasonic R-1755V	Isola IS410	Nelco N4000-29	Isola PCL-FR-370HR	Rogers RO4003C	Rogers RO4350B	Panasonic Megtron 6
IPC-4101 Material Type Specification Sheet Numbers	21, 24, 26 97, 98, 101, 126	21, 24, 26, 28 121, 124, 129	26, 28 98, 99, 126	24, 26 98, 99, 101, 126	IPC-4103/10	IPC-4103/11	126 (Non-Epoxy)
Dielectric Constant (Dk)							
1 MHz	4.68	4.6	4.5	4.85	-	-	-
1 GHz (*=2 GHz)	4.31	3.76*	4.3	4.04*	-	-	3.6*
10 GHz	4.16	3.69	4.2	3.92	3.38	3.48	-
Dissipation Factor (Df)							
1 MHz	0.0153	0.023	0.016	0.016	-	-	-
1 GHz (*=2 GHz **=2.5 GHz)	0.0153	0.021*	0.015*	0.021*	0.0021**	0.0031**	0.0020*
10 GHz	0.0220	0.0250	0.0170	0.0250	0.0027	0.0037	-
MECHANICAL							
Peel Strength - 1oz Cu After Thermal Stress (lbs/in)	6.5	9.0	10.1	9.0	6.0	5.0	5.0
CTE Z-axis (50°C - 288°C) Pre-Tg / Post-Tg (ppm / °C)	45/260	65/250	55/265	45/220	46	50	45/245
CTE Z-axis (50°C - 288°C)	2.8%	3.5%	3.0%	2.8%	-	-	-
THERMAL							
Glass Transition Temp. (Tg) DSC Method *=DMA Method	190°C*	180°C	≥185°C	180°C	>280°C	>280°C	210°C*
Thermal Decomposition (Td) TGA Method (5% wt. loss)	350°C	350°C	350°C	340°C	425°C	390°C	400°C
T ₂₆₀ (Minutes)	>60	>60	>60	60	>180	>180	>60
T ₂₈₈ (Minutes)	>15	>20	15	>10	>180	>180	>30
Thermal Stress (10 Sec @ 288°C *=260°C)	10x	6x	Passed	Passed	10x*	10x*	10x
CAF Resistant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CTI (PLC)	3	3	3	3	0	0	-
Flammability Rating (UL94)	V-0	V-0	V-0	V-0	N/A	V-0	V-0
UL Approval	Yes	Yes	Yes	Yes	-	Yes	Pending

All information contained on this page represents laminate manufactures values, and are subject to change.