

RoHS Laminates	Standard FR-4				High Frequency		Low Loss
<a href="#">Click on Suppliers Icon to Visit their Home Page</a>	<b>Panasonic</b>	<b>isola</b>	<b>Nelco</b>	<b>isola</b>	ROGERS	ROGERS	<b>Panasonic</b>
<a href="#">Click on Material Name for Web Link to Data Sheet</a>	Panasonic R-1755	Isola IS410	Nelco N4000-29	Isola PCL-FR-370HR	Rogers RO4003C	Rogers RO4350B	Panasonic Megtron 6
IPC-4101 Material Type Specification Sheet Numbers	24, 26 121, 124, 129	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)
<b>Dielectric Constant (Dk)</b>							
1 MHz	4.4-4.7	4.6	4.5	4.85	-	-	-
1 GHz (*=2 GHz)	4.37	3.76*	4.3	4.04*	-	-	3.6*
10 GHz	4.22	3.69	4.2	3.92	3.38	3.48	-
<b>Dissipation Factor (Df)</b>							
1 MHz	0.013	0.023	0.016	0.016	-	-	-
1 GHz (*=2 GHz **=2.5 GHz)	0.015	0.021*	0.015*	0.021*	0.0021**	0.0031**	0.0020*
10 GHz	0.018	0.025	0.017	0.025	0.0027	0.0037	-
<b>MECHANICAL</b>							
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)	60/260	65/250	55/265	45/220	46	50	45/245
CTE Z-axis (50°C - 288°C)	3.2%	3.5%	3.0%	2.8%	-	-	-
<b>THERMAL</b>							
Glass Transition Temp. (Tg) DSC Method * =DMA Method	175°C	180°C	≥185°C	180°C	>280°C	>280°C	210°C*
Thermal Decomposition (Td) TGA Method (5% wt. loss)	364°C	350°C	350°C	340°C	425°C	390°C	400°C
T <sub>260</sub> (Minutes)	>120	>60	>60	60	>180	>180	>60
T <sub>288</sub> (Minutes)	60	>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	Pending	-	Yes	Pending

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