TerraGreen® 400GE

Halogen-free, Ultra Low Loss Material

Tg 200°C Td 380°C Dk 3.29 Df 0.0026

IPC-4101 /134 UL - File Number E41625

TerraGreen® 400GE laminate materials are our most advanced ultra-high speed, halogen free ultra-low loss design solution.

PRODUCT FEATURES

Industry Recognition

- UL File Number: E41625
- RoHS Compliant

Performance Attributes

- CAF resistant
- Low moisture absorption
- Halogen free
- 6x 260°C reflow capable
- 6x 288°C solder float capable

Processing Advantages

- FR-4 process compatible
- Excellent Fill and Flow
- Multiple lamination cycles
- HDI technology compatible

PRODUCT AVAILABILITY

Standard Material Offering: Laminate

- 2 to 10 mil (0.05 to 0.25 mm)

Copper Foil Type

- HVLP3 (VLP1) ≤1.1 micron Rz JIS

Copper Weight

- ½, 1 and 2 oz (18, 35 and 70 µm) available
- Thinner copper foil available

Standard Material Offering: Prepreg

- Tooling of prepreg panels
- Moisture barrier packaging

Glass Fabric Availability

- E-glass
- Square weave glass
- Mechanically spread glass

ORDERING INFORMATION:

Contact your local sales representative or contact info@isola-group.com for further information.

TerraGreen® 400GE is our Halogen Free material solution for next generation 5G infrastructure, data center systems, high end computing, wired & wireless communications and AI applications with data rates >100 Gb/s. Our novel resin system, RTF3 (<2.5 µm Rz JIS) copper foil and e-glass is our lowest cost member of the TerraGreen 400G® family of products.

The TerraGreen® 400GE resin system has proven superior CAF performance on tight pitch testing. CAF performance is enhanced by the resin systems excellent interlaminar and bond line adhesion strength.

TerraGreen® 400GE is lead free compatible and sequential lamination capable and can be processed utilizing standard PCB equipment and processing steps. TerraGreen® 400GE meets UL94 V-0.

PRODUCT ATTRIBUTES

HIGH DENSITY INTERCONNECT | HALOGEN FREE | HIGH SPEED DIGITAL | HIGH THERMAL RELIABILITY | Image not found or type unknown

TYPICAL MARKET APPLICATIONS

AUTOMOTIVE & TRANSPORTATION | NETWORKING & COMMUNICATIONS | AEROSPACE & DEFENSE | COMPUTING, STORAGE & PERIPHERALS

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Typical Values Table

Property		Typical Value	Units	Test Method
			Metric (English)	IPC-TM-650 (or as noted)
Glass Transition Temperature (Tg) by DSC		200	°C	2.4.25C
Glass Transition Temperature (Tg) by DMA		215	°C	2.4.24.4
Glass Transition Temperature (Tg) by TMA		180	°C	2.4.24C
Decomposition Temperature (Td) by TGA @ 5% weight loss		>380C	°C	2.4.24.6
Time to Delaminate by TMA (Copper removed)	A. T288 B. T300	60+	Minutes	2.4.24.1
Z-Axis CTE	A. Pre-Tg B. Post-Tg C. 50 to 260°C, (Total Expansion)	37 170 1.8	ppm/°C ppm/°C %	2.4.24C
X/Y-Axis CTE		12/13	ppm/°C	2.4.24C
Thermal Conductivity		0.54	W/m·K	ASTM E1952
Thermal Stress 10 sec @ 288ºC (550.4ºF)	A. Unetched B. Etched	Pass	Pass Visual	2.4.13.1
Dk, Permittivity	A. @ 10 GHz B. @ 20 GHz	3.29 3.25	—	2.5.5.5
Df, Loss Tangent	A. @ 10 GHz B. @ 20 GHz	0.0026	—	2.5.5.5
Volume Resistivity	C-96/35/90	$2.0x10^8$	MΩ-cm	2.5.17.1
Surface Resistivity	C-96/35/90	$2.0x10^7$	MΩ	2.5.17.1
Dielectric Breakdown		70	kV	2.5.6B
Arc Resistance		180	Seconds	2.5.1B
Electric Strength (Laminate & laminated prepreg)		67 (1700)	kV/mm (V/mil)	2.5.6.2A
Comparative Tracking Index (CTI)		2 (250-399)	Class (Volts)	UL 746A ASTM D3638
Peel Strength	A. Low profile and very low profile copper foil B. Low profile and very low profile copper foil ... After thermal stress	0.7 (4.1)	N/mm (lb/inch)	2.4.8C 2.4.8.2A
Flexural Strength	A. Length direction B. Cross direction	393 (57) 338 (49)	MPa (kpsi)	2.4.4B
Tensile Strength	A. Length direction B. Cross direction	220 (32) 193 (28)	MPa (kpsi)	ASTM D3039
Young's Modulus	A. Length direction B. Cross direction	14.5 (2100) 13.0 (1900)	GPa(kpsi)	ASTM D790-15e2
Flexural Modulus	A. Lengthwise B. Crosswise	12.1 (1750) 11.7(1700)	GPa (kpsi)	ASTM D790-15e2
Moisture Absorption		<0.1	%	2.6.2.1A
Flammability (Laminate & laminated prepreg)		V-0	Rating	UL 94
Relative Thermal Index (RTI)		140	°C	UL 746

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NOTES

Visit our site http://www.isola-group.com for more details.
Revisions:
A: Initial release - 1/23
B: Corrected units for Youngs Modulus from MPa to GPa - 1/24
C: Corrected laminate thickness offering from maximum 18 mils to 10 mils, updated copper foil offering - 3/24

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