

Validation Services High-Tg and High Thermal Reliability Laminate and Prepreg



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ROPS Compliant Lead Free Process Compatible

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**TU-768** 

Core: TU-768

Prepreg: TU-768P

TU-768 / TU-768P laminate / prepreg are made of high quality woven E-glass coated with the epoxy resin system, which provides the laminates with UV-block characteristic, and compatibility with automated optical inspection (AOI) process. These products are suitable for boards that need to survive severe thermal cycles, or to experience excessive assembly work. TU-768 laminates exhibit excellent CTE, superior chemical resistance and thermal stability plus CAF resistance property.

## **Applications**

- Consumer Electronics
- Server, workstation
- Automotive

## Performance and Processing Advantages

- Lead Free process compatible
- Excellent coefficient of thermal expansion
- Anti-CAF property
- Superior chemical and thermal resistance
- Fluorescence for AOI
- Moisture resistance

#### **Industry Approvals**

- IPC-4101E Type Designation : /98, /99, /101, /126
- IPC-4101E/126 Validation Services QPL Certified
- UL Designation ANSI Grade: FR-4.0
- UL File Number: E189572Flammability Rating: 94V-0
- Maximum Operating Temperature: 130°C

# Standard Availability

- Thickness: 0.002" [0.05mm] to 0.062" [1.58mm], available in sheet or panel form
- Copper Foil Cladding: 1/8 to 12 oz (HTE) for built-up; 1/8 to 3 oz (HTE) for double sides and H to 2 oz (MLS)
- Prepregs: Available in roll or panel form
- Glass Styles: 106, 1080, 2113, 2116, 1506 and 7628 etc.









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Thermal  Tg (DMA) 190°C 180°C 180°C 190°C 180°C				
Thermal  Tg (DMA) 190°C 180°C 180°C 27 (TMA) 170°C 180°C 27 (TMA) 170°C 350°C 27 (TMA) 170°C 350°C 27 (TMA) 170°C 350°C 27 (TMA) 170°C 350°C 27 (TGA) 350°C 27 (TGA) 350°C 27 (TGA) 350°C 27 (TGA) 27 (T	Typical Properties for TU-768	Laminate		
Tg (DMA)   Tg (DNA)   Tg (DNC)   180°C   180°C   180°C   180°C   170°C   2 340°C		Typical Values	Conditioning	IPC-4101 /126
Tg (DSC) 180°C	Thermal			
Tg (TMA) 170°C				> 170°C
CTE x-axis CTE y-axis CTE y-axis CTE z-axis         11~15 ppm/°C 11~15 ppm/°C 2.7 %         E-2/105         N/A N/A 3.0%           Thermal Stress, Solder Float, 288°C         > 60 sec         A         > 10 sec           T260 T288 T300         > 60 min > 15 min > 2 min         > 30 min > 15 min > 2 min           Flammability         94V-0         E-2/105         > 15 min > 2 min           Flammability         94V-0         E-24/125         94V-0           Electrical           Permittivity (RC50%) 1GHz (SPC method/HP 4291B) 5GHz (SPC method) 10GHz (SPC	Tg (TMA)	170°C	E-2/105	
CTE y-axis         11~15 ppm/°C         E-2/105         N/A         < 3.0%	Td (TGA)	350°C		> 340°C
CTE z-axis       2.7 %       < 3.0%			5.0/105	•
Thermal Stress,   Solder Float, 288°C   Solder Float, 290°C   S			E-2/105	•
Solder Float, 288°C   > 60 sec   A   > 10 sec	The word Chare			< 3.0%
T288		> 60 sec	Α	> 10 sec
T288	T260	> 60 min		> 30 min
Flammability   94V-0   E-24/125   94V-0			E-2/105	
Permittivity (RC50%)	T300	> 2 min	·	> 2 min
Permittivity (RC50%)         1 GHz (SPC method/HP 4291B)         4.4/4.3         < 5.2	Flammability	94V-0	E-24/125	94V-0
1GHz (SPC method) HP 4291B) 5GHz (SPC method)       4.3 (3.3 (3.3 (3.3 (3.3 (3.3 (3.3 (3.3 (	Electrical			
1GHz (SPC method) HP 4291B) 5GHz (SPC method)       4.3       E-2/105       N/A N/A N/A         Loss Tangent (RC50%) 1GHz (SPC method)       0.019/0.018 0.021 0.023       < 0.035 N/A N/A	Permittivity (RC50%)			
10GHz (SPC method)   4.3   N/A		•	F 2/10F	
1 GHz (SPC method/HP4291B) 5 GHz (SPC method)       0.019/0.018 0.021 0.023       = -2/105       < 0.035 N/A N/A         Volume Resistivity       > 1010 MΩ·cm       C-96/35/90       > 106 MΩ·cm         Surface Resistivity       > 108 MΩ       C-96/35/90       > 104 MΩ         Electric Strength       > 40 KV/mm       A       > 30 KV/mm         Dielectric Breakdown Voltage       > 50 KV       A       > 40 KV         Mechanical         Young's Modulus Warp Direction Fill Direction       25 GPa 22 GPa       A       N/A         Flexural Strength Lengthwise Crosswise       > 60,000 psi > 50,000 psi > S0,000 psi       A       > 60,000 psi > S0,000 psi         Peel Strength, 1.0 oz RTF Cu foil       7~9 lb/in       A       > 4 lb/in			E-2/105	•
1 GHz (SPC method/HP4291B) 5 GHz (SPC method)       0.019/0.018 0.021 0.023       = -2/105       < 0.035 N/A N/A         Volume Resistivity       > 1010 MΩ·cm       C-96/35/90       > 106 MΩ·cm         Surface Resistivity       > 108 MΩ       C-96/35/90       > 104 MΩ         Electric Strength       > 40 KV/mm       A       > 30 KV/mm         Dielectric Breakdown Voltage       > 50 KV       A       > 40 KV         Mechanical         Young's Modulus Warp Direction Fill Direction       25 GPa 22 GPa       A       N/A         Flexural Strength Lengthwise Crosswise       > 60,000 psi > 50,000 psi > S0,000 psi       A       > 60,000 psi > S0,000 psi         Peel Strength, 1.0 oz RTF Cu foil       7~9 lb/in       A       > 4 lb/in	(DCF000)			·
5GHz (SPC method)       0.021 0.023       E-2/105       N/A N/A         Volume Resistivity       > 1010 MΩ·cm       C-96/35/90       > 106 MΩ·cm         Surface Resistivity       > 108 MΩ       C-96/35/90       > 104 MΩ         Electric Strength       > 40 KV/mm       A       > 30 KV/mm         Dielectric Breakdown Voltage       > 50 KV       A       > 40 KV         Mechanical         Young's Modulus Warp Direction Fill Direction       25 GPa 22 GPa       A       N/A         Flexural Strength Lengthwise Crosswise       > 60,000 psi A       > 60,000 psi A       > 50,000 psi A         Peel Strength, 1.0 oz RTF Cu foil       7~9 lb/in       A       > 4 lb/in	<b>9</b>	0.019/0.018		< 0.035
Volume Resistivity > 10¹0 MΩ·cm	5GHz (SPC method)	0.021	E-2/105	N/A
Surface Resistivity > 108 M\Omega C-96/35/90 > 104 M\Omega Strength > 40 KV/mm A > 30 KV/mm  Dielectric Breakdown Voltage > 50 KV A > 40 KV  Mechanical  Young's Modulus Warp Direction Fill Direction 22 GPa A N/A  Flexural Strength Lengthwise Crosswise > 50,000 psi A > 50,000 psi A > 50,000 psi Peel Strength, 1.0 oz RTF Cu foil 7~9 lb/in A > 4 lb/in	10GHz (SPC method)	0.023		N/A
Electric Strength > 40 KV/mm A > 30 KV/mm  Dielectric Breakdown Voltage > 50 KV A > 40 KV  Mechanical  Young's Modulus Warp Direction Fill Direction 22 GPa Flexural Strength Lengthwise Crosswise > 60,000 psi Crosswise > 50,000 psi A > 60,000 psi A > 50,000 psi A > 50,000 psi A > 4 lb/in	Volume Resistivity	$> 10^{10}~\text{M}\Omega \cdot \text{cm}$	C-96/35/90	$> 10^6~\text{M}\Omega \cdot \text{cm}$
Dielectric Breakdown Voltage > 50 KV A > 40 KV  Mechanical  Young's Modulus Warp Direction Fill Direction Fill Direction Flexural Strength Lengthwise Crosswise Peel Strength, 1.0 oz RTF Cu foil  7~9 lb/in  A > 40 KV  A > 40 KV  A > 40 KV	Surface Resistivity	$> 10^8 \ M\Omega$	C-96/35/90	$> 10^4~\text{M}\Omega$
Young's Modulus Warp Direction Fill Direction Fill Direction  Flexural Strength Lengthwise Crosswise  Peel Strength, 1.0 oz RTF Cu foil  Power of the strength	Electric Strength	> 40 KV/mm	Α	> 30 KV/mm
Young's Modulus Warp Direction Fill Direction  Flexural Strength Lengthwise Crosswise  > 60,000 psi A > 60,000 psi A > 50,000 psi A > 50,000 psi A > 50,000 psi A > 4 lb/in	Dielectric Breakdown Voltage	> 50 KV	Α	> 40 KV
Warp Direction         25 GPa 22 GPa         A         N/A           Flexural Strength Lengthwise Crosswise         > 60,000 psi A > 50,000 psi A > 50,000 psi         > 50,000 psi A > 50,000 psi           Peel Strength, 1.0 oz RTF Cu foil         7~9 lb/in         A         > 4 lb/in	Mechanical			
Warp Direction         25 GPa 22 GPa         A         N/A           Flexural Strength Lengthwise Crosswise         > 60,000 psi A > 50,000 psi A > 50,000 psi         > 50,000 psi A > 50,000 psi           Peel Strength, 1.0 oz RTF Cu foil         7~9 lb/in         A         > 4 lb/in				
Flexural Strength     Lengthwise	Warp Direction		Δ	N/Δ
Lengthwise Crosswise       > 60,000 psi A S0,000 psi A S	Fill Direction	22 GPa	^	IV/A
Crosswise         > 50,000 psi         A         > 50,000 psi           Peel Strength,         1.0 oz RTF Cu foil         7~9 lb/in         A         > 4 lb/in				
Peel Strength, 1.0 oz RTF Cu foil  7~9 lb/in  A > 4 lb/in				
1.0 oz ŘTF Cu foil 7~9 lb/in A > 4 lb/in		> 30,000 psi	Α	> 50,000 psi
Water Absorption 0.18 % E 1/105 (D. 24/22		7~9 lb/in	Α	> 4 lb/in
Water Augururur V.10 % F-1/103+D-74/73 < U.8 %	Water Absorption	0.18 %	E-1/105+D-24/23	< 0.8 %

# NOTE:

- 1. Property values are for information purposes only and not intended for specification.
- 2. Any sales of these products will be governed by the terms and conditions of the agreement under which they are sold.

