



isola

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IS620i

Base material
for high-frequency
applications

CAF
ENHANCED

Low loss base material with a stable dielectric behaviour over frequency

IS620i

IS620i is a base material for high frequency applications, especially ranging from 2 to 10 GHz. The low dielectric number ϵ_f and the small dissipation factor $\tan \delta$, which are constant over a wide frequency range, lead to a low damping factor, which guarantees a high signal integrity.

A glass transition temperature of 220 °C, a decomposition temperature of over 360 °C and a z-axis expansion of only 55 ppm/k result additionally in a very high thermal reliability, even under cyclical temperature loading. Lead free soldering techniques are therefore no problem for the IS620i. IS620i is a cost-efficient alternative to many special high frequency base materials for high speed and low loss applications.

The resin matrix allows the use of conventional process parameters.

Supply forms and storage

The laminates are produced in standard sheet size: 1225 x 1070 mm warp. Prepregs are available with a standard roll width of approx. 1250 mm (location oriented).

Other sheet sizes and roll widths are available on request.

Laminate and prepreg panels are cut to specification.

The durability in the original packaging (moisture barrier foil including dry pack and humidity indicator card) is 3 months at < 23 °C and relative humidity of < 50 % (see IPC-4101). A storage at < 5 °C does not prolong the durability. In principle we recommend to hermetically repackage laminates as well as prepregs after opening the original packaging.

When removing chilled product from storage, take appropriate steps to prevent condensation.

Typical Applications

- Broadcast
- Workstation and Server
- Base stations
- Antennas
- Other high speed applications

- Production of printed circuit boards with conventional processes
- CAF-enhanced
- Cycle resistant

Special Properties

- Improved dielectric properties to increase data rates and improve signal integrity: $D_f = 0.008 - 0.009$ and $D_k = 3.5 - 3.7$ at 2 to 10 GHz
- High thermal reliability:
 $T_{260} > 30$ min
 T_g nominal 220 °C

Raw materials

The same types of E-glass-fabric are used as for our standard qualities. Typical copper foil thicknesses (18, 35, 70 μm) correspond to IPC-4562, grade 3 (HTG-quality). For laminates with a thickness ≤ 0.1 mm DSTHP foils with HTG properties are used.

Laminates are only available with double sided copper cladding.

IS620i Standard prepregs

Prepreg type	Nominal thickness		Resin content %
	mm	inch	
106 LU01	0.064	0.0025	75 \pm 3
1080 LU01	0.084	0.0033	65 \pm 3
106 LF32	0.064	0.0025	75 \pm 3
1080 LF32	0.084	0.0033	64 \pm 3
2113 LF01	0.107	0.0040	58 \pm 3
2116 LF11	0.127	0.0050	55 \pm 3
7628 LF32	0.198	0.0080	45 \pm 3

Other thicknesses on request.

IS620i Standard laminate constructions

Nominal thickness		Thickness tolerances IPC 4101 B cl. C (mm)	Standard Constructions Düren	Resin content %
mm	inch			
0.050	0.0020	± 0.013	1 - 106	70 \pm 3
0.068	0.0027	± 0.013	1 - 1080	60 \pm 3
0.075	0.0030	± 0.013	1 - 1080	63 \pm 3
0.100	0.0040	± 0.013	1 - 2113	57 \pm 3
0.125	0.0050	± 0.018	2 - 1080	57 \pm 3
0.150	0.0060	± 0.018	2 - 1080	63 \pm 3
0.175	0.0070	± 0.025	1 - 7628	41 \pm 3
0.200	0.0080	± 0.025	1 - 7628 M	45 \pm 3
0.250	0.0100	± 0.025	2 - 2165	47 \pm 3
0.300	0.0120	± 0.038	2 - 2157	47 \pm 3
0.360	0.0140	± 0.038	3 - 2116	52 \pm 3
0.410	0.01614	± 0.038	2 - 7628 M	45 \pm 3
0.500	0.0197	± 0.050	4 - 2165	47 \pm 3
0.540	0.0210	± 0.050	4 - 2165	50 \pm 3
0.610	0.0240	± 0.050	4 - 2157	47 \pm 3
0.800	0.3150	± 0.075	4 - 7628M	45 \pm 3

Other thicknesses and additionally limited thickness tolerances on request. Constructions of resin rich prepregs with thinner glass fabrics, which are interchangeable with other high frequency materials are available on request.

Technical Values

IS620i

Specification Sheet #:	IPC-4101B/30
Reinforcement:	woven E-glass
Resin system:	primary: bismaleimid/triazin (BT) • secondary: epoxy
Flame Retardant Mechanism:	brominated epoxy resin • minimum UL requirement: HB
Fillers:	none
ID Reference:	UL/ANSI: GPY • ANSI: GPY/30 • RoHS-compliant
Glass Transition (T _g):	170 °C – 220 °C

Explanations:

C = preconditioning in moist

E = preconditioning at temperature

The figures following the letter symbols indicate with the first digit the duration of the preconditioning in hours, with the second digit the preconditioning temperature in °C and with the third digit the relativ humidity.

Properties	Unit	Laminate thickness < 0.50 mm		Laminate thickness ≥ 0.50 mm	
		Specification	Isola-Value	Specification	Isola-Value
1. Peel Strength , minimum					
A. Low Profile copper foil and very low profile copper foil – all copper weights > 17 µm	N/mm	0.55	n/a*	0.55	n/a*
B. Standard profile copper foil (35 µm)					
1. After thermal stress	N/mm	0.90	1.2	0.90	1.2
2. At 150 °C	N/mm	0.35	1.3	0.35	1.3
3. After process solutions	N/mm	0.70	n/a*	0.70	n/a*
C. All other foil – composite	N/mm	n/a*	n/a*	n/a*	n/a*
2. Volume Resistivity , minimum					
A. C-96/35/90	MΩ · cm	1.0 · 10 ⁶	2.0 · 10 ⁷	n/a*	n/a*
B. After moisture resistance	MΩ · cm	n/a*	n/a*	1.0 · 10 ⁶	4.3 · 10 ⁷
C. At elevated temperature E-24/125	MΩ · cm	1.0 · 10 ³	7.1 · 10 ⁷	1.0 · 10 ³	6.8 · 10 ⁷
3. Surface Resistivity , minimum					
A. C-96/35/90	MΩ	1.0 · 10 ⁶	7,3 · 10 ⁶	n/a*	n/a*
B. After moisture resistance	MΩ	n/a*	n/a*	1.0 · 10 ⁶	2.8 · 10 ⁶
C. At elevated temperature E-24/125	MΩ	1.0 · 10 ⁵	1.0 · 10 ⁸	1.0 · 10 ⁵	8.8 · 10 ⁶
4. Moisture Absorption , maximum	%	n/a*	n/a*	0.35	0.25
5. Dielectric Breakdown , minimum	kV	n/a*	n/a*	40	42
6. Permittivity @ 1 MHz , maximum (Laminate or prepreg as laminated)		4.8	3.5 - 3.7	4.8	4.45
7. Loss Tangent @ 1 MHz , maximum (Laminate or prepreg as laminated)		0.020	0.008	0.020	0.008
8. Flexural Strength , minimum					
A. Length direction	N/mm ²	n/a*	n/a*	369	460
B. Cross direction	N/mm ²	n/a*	n/a*	325	340
9. Flexural Strength @ Elevated Temperature, 150 °C Length direction, minimum	N/mm ²	n/a*	n/a*	207	365
10. Thermal Stress @ 288 °C , minimum					
A. Unetched	s	≥ 10	≥ 10	≥ 10	≥ 10
B. Etched	s	≥ 10	≥ 10	≥ 10	≥ 10
11. Electric Strength , minimum (Laminate or prepreg as laminated)	kV/mm	30	37	n/a*	n/a*
12. Flammability	class	HB	V-0	HB	V-0
13. Glass Transition Temperature (T_g) DSC	°C	170 - 220	220	170 - 220	220
14. Coefficient of Thermal Expansion (CTE) TMA					
x Fill direction (below T _g /above T _g)	ppm/K	–	–	–	15/13
y Warp direction (below T _g /above T _g)	ppm/K	–	–	–	12/5
z Vertical (below T _g /above T _g)	ppm/K	–	–	–	55/230

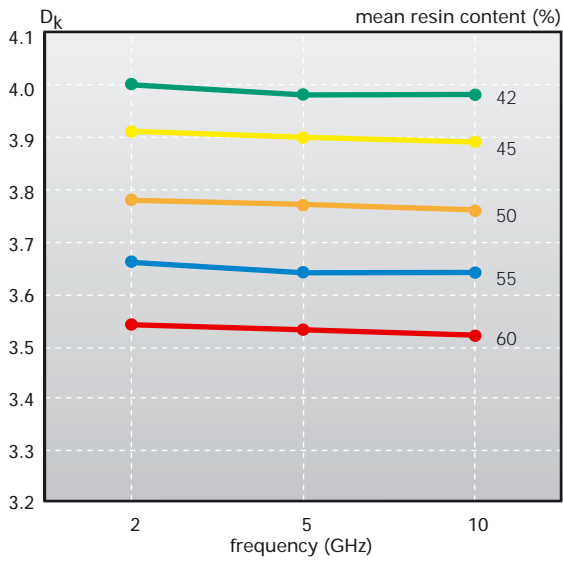
*not applicable

Tests are carried out in accordance with IPC-650 test methods.

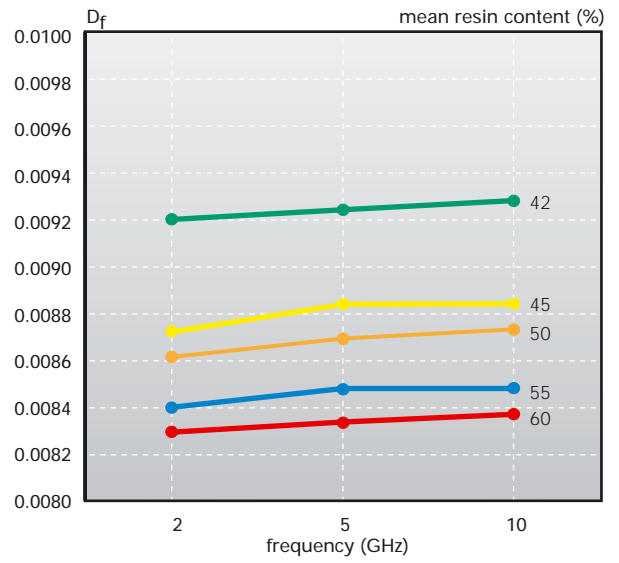
Our information and our eventual advice for the application of our products in any form (for instance oral, written or by tests) is given carefully and by the best of our knowledge but is not binding and is provided without making any representation or warranty, expressed or implied, and without any liability. The user is not released also in the case of our prior testing or if the use is based on our practical application advice from its sole responsibility to use our product and to insure the correct application, the condition and fitness of our product for this application as well as the condition and fitness of the product itself.

Dielectric Properties

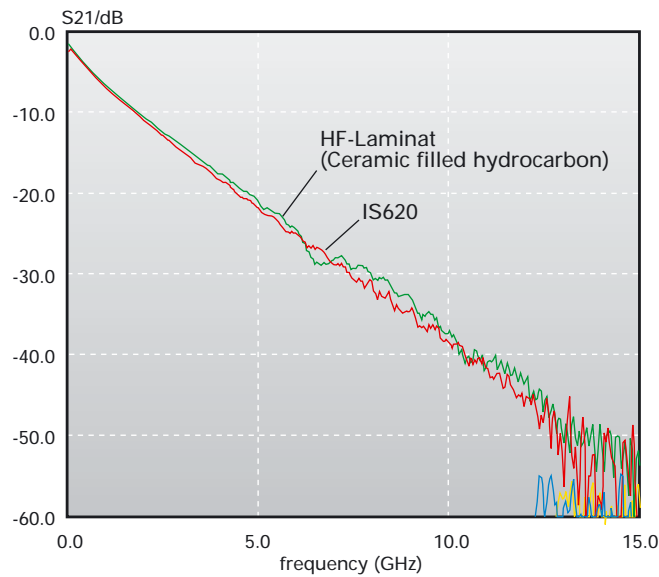
Dielectric constant in addition to frequency and resin content



Loss factor in addition to frequency and resin content



Frequency Domain



Insertion loss S₂₁ from 45 MHz to 15 GHz.
length l = 1000 mm

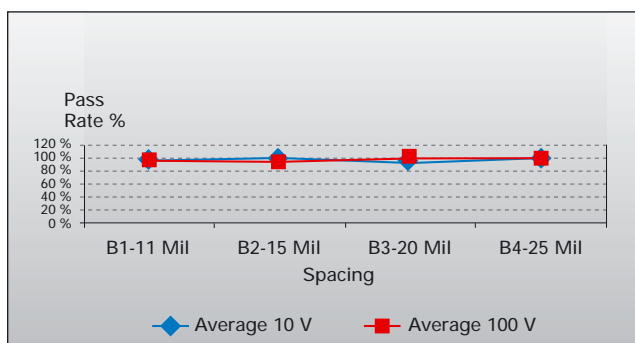
CAF-Testing

Stripline

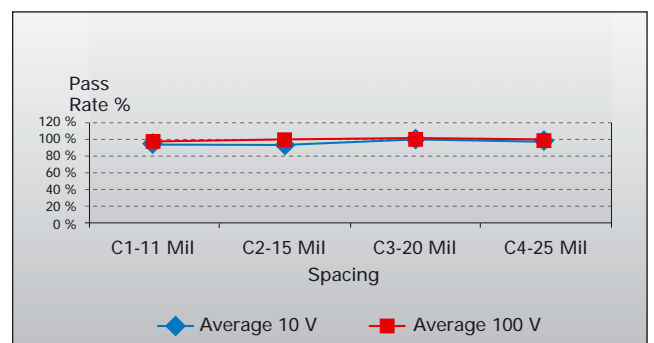
length l = 90 cm

Simulation due to dielectric values

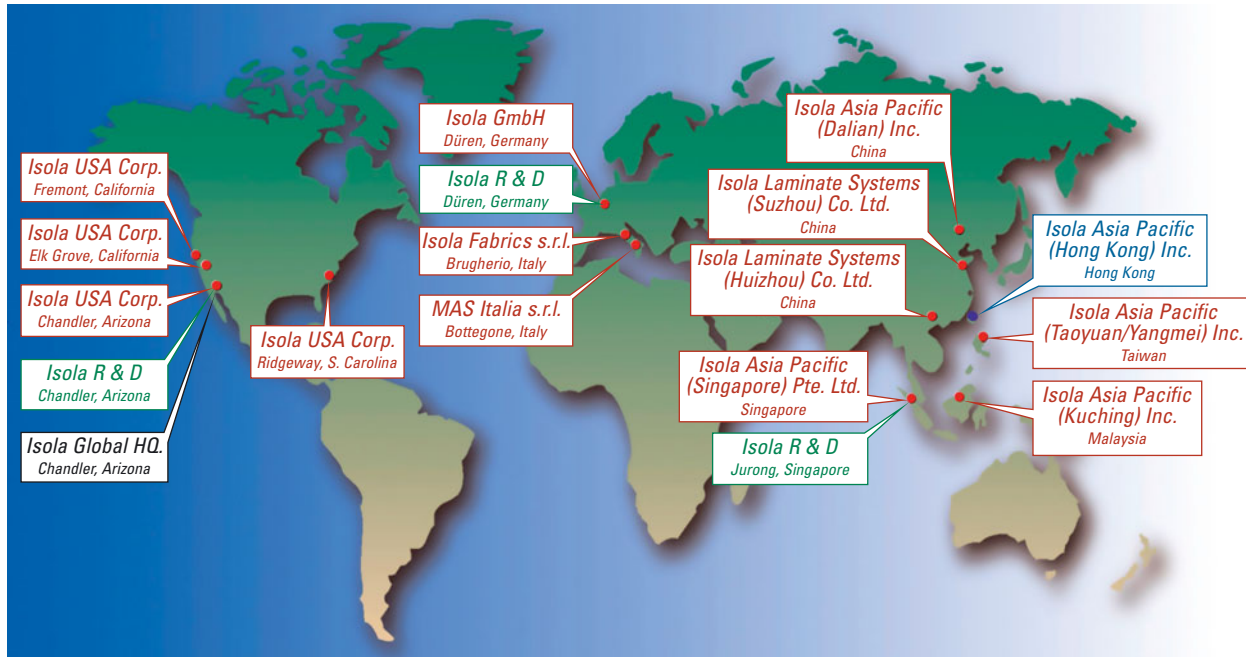
IS620i CAF Results-2116 Glass Style - Hole to Plane Spacing



IS620i CAF Results-2116 Glass Style - Diagonal Spacing Hole to Hole



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