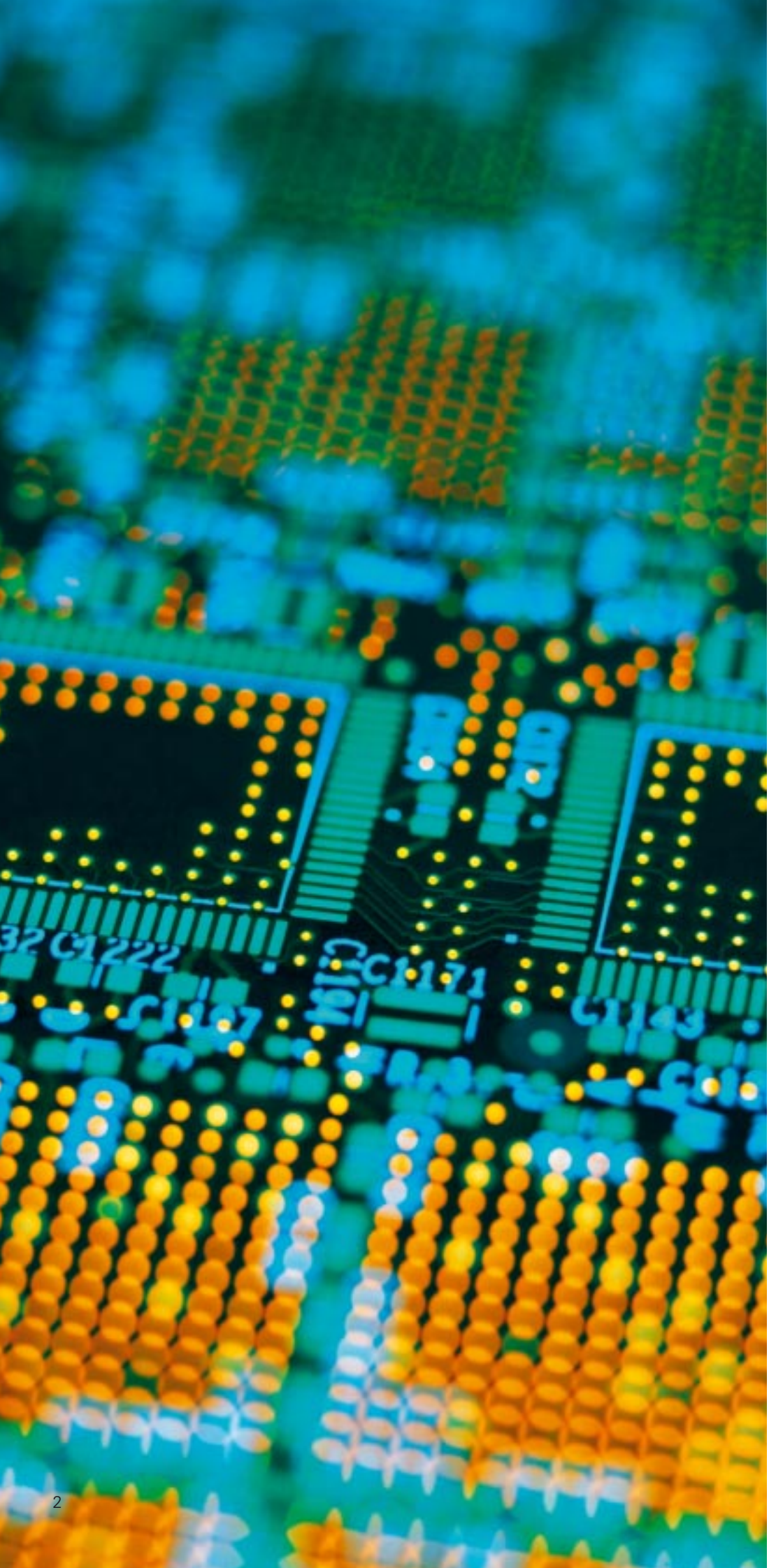
isola

B-DE 104 ML/2

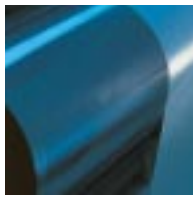
DURAVER®-E-Cu quality 104 ML

Base materials

for multilayers



Quality and security to give you the edge



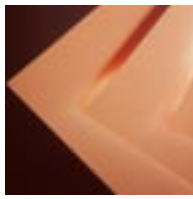
The demands imposed with regard to the performance of circuit boards are rising constantly, be it for communications or computer systems, automobile electronics or medical technology. Not only the electrical and thermal values, but also the dimensional stability and surface quality must be adapted to the particular application in question and meet today's requirements.

Isola is a pioneer in the manufacture of thin laminates and prepregs for multilayer systems.

Depending on the requirements imposed on the product, Isola supplies a wide range of glass fabric reinforced base materials. Isola thin laminates and prepregs for multilayer circuit boards are made from selected raw materials. In combination with a tried-and-tested production concept and uncompromising quality controls, they are the best possible base for sophisticated and acknowledged products.

Current product information can also be found in the Internet under www.isolaAG.com

Contents



Innovative solutions for individual applications

Thin laminates DURAVER®-E-Cu quality 104 ML

The performance of a multilayer circuit board essentially depends on the right choice of thin laminates and prepregs. Great care is taken by Isola to ensure the correct combination of raw materials.

Thin laminates of DURAVER®-E-Cu quality 104 ML have been specially developed for use in multilayer systems, from 4-layer multilayers to complex versions with 20 or more layers. They are based on epoxy fibre glass laminate and are the classical Isola laminate. Their range of applications encompasses almost all electronic assemblies.

All thin laminates of DURAVER®-E-Cu quality 104 ML correspond to NEMA Grade FR-4 and meet the requirements of the norms IPC 4101A, IEC and DIN EN 60249.
Their glass transition temperature (T_g) of approx. 135 °C means that the ΔT_g value of 3 °C is not exceeded.

DURAVER®-E-Cu quality 104 ML Standard Constructions

Nominal thickness (Substrate without Cu)		**Thickness tolerance**		**Construction**	**Mean resin content**
		IPC 4101A cl. B	IPC 4101A cl. C		
mm	inch	mm	mm		%
0.050	0.002	0.018	0.013	1 x 106	72.8
0.075	0.003	0.018	0.013	1 x 1080	61.3
0.100	0.004	0.018	0.013	1 x 1634	42.5
0.125	0.005	0.025	0.018	1 x 1647	48.1
0.150	0.006	0.025	0.018	1 x 1651	47.4
0.200	0.008	0.038	0.025	1 x 7628	45.7
0.250	0.010	0.038	0.025	2 x 1647	48.1
0.300	0.012	0.050	0.038	2 x 1651	47.4
0.360	0.014	0.050	0.038	2 x 7628	41.3
0.410	0.016	0.050	0.038	2 x 7628	43.8
0.460	0.018	0.050	0.038	1 x 7628 1 x 2125 1 x 7628	45.0
0.510	0.020	0.064	0.050	3 x 7628	39.6
0.560	0.022	0.064	0.050	3 x 7628	41.3
0.610	0.024	0.064	0.050	3 x 7628	43.8
0.710	0.028	0.064	0.050	4 x 7628	41.3
0.760	0.030	0.064	0.050	4 x 7628	43.0
0.900	0.035	0.100	0.075	5 x 7628	41.3
1.000	0.039	0.100	0.075	5 x 7628	43.8
1.080	0.042	0.130	0.075	6 x 7628	41.3
1.200	0.047	0.130	0.075	6 x 7628	43.8

Supply forms

One-sided and two-sided copper-clad laminates are available in all standard foil thicknesses and qualities.

Sheets

The laminates are produced in the following sheet sizes:

1165 mm x 1070 mm
1225 mm x 1070 mm *
1225 mm x 925 mm *
1285 mm x 1070 mm

Tolerance: + 3.0 mm
- 0 mm

*The warp in the glass fabric runs parallel to the short side of the sheet (as in the case of rigid laminates) for standardization reasons.

Panels

Panels are supplied cut to specifications, with a minimum thickness of 0.2 mm, on request also with mechanically profiled edges.

Tolerance: ≤ 300 mm ± 0.5 mm
> 300 mm ± 0.8 mm

Angular deviation:
± 0.40 mm/100 mm edge length

± 0.15 mm/100 mm edge length
for ground edges.

Various forms of identification are also available, such as laser marking, embossing or ink-jet printing (also as barcode). Pre-cut panels greatly improve the logistics, eliminate additional handling and reduce the risk of damage to the surface.

Isola thin laminates are adjusted to absorb UV light. This property helps to reduce the pseudo-error rate in auto-optical inspections (AOI), particularly when using AOI laser scanners which operate with fluorescent methods. Undesired through-exposure (ghosting) on the opposite side is avoided when exposing the solder resist to UV light.

Important note for processing

The warp and weft of the laminates and prepregs must run in the same directions in the multilayers to be laminated. When ordering panels, it is therefore important to specify which value is to correspond to the warp direction.

Universal prepregs for greater flexibility

Prepregs
DURAVER®-E quality 104 ML

Flexibility and process optimization are factors of great importance in the circuit board industry.
Sophisticated production techniques and high-grade base materials are needed in order to meet customers' individual wishes – particularly when producing multilayers.

In close cooperation with customers, Isola has developed a universal prepreg which can be processed without difficulty using every known modern bonding technology.

Properties

Universal prepregs of DURAVER®-E quality 104 ML are characterized by their:

- Resin content
- Gel time
- Viscosity

They are produced on modern treaters which operate with radiant heat. This is the only way to guarantee that the prepreg values remain within close limits over the full width of the fabric web. The resin content is measured and adjusted on-line. The process capability is optimized with a Cpk-value* of > 1.5.

Advantages of the universal prepreg

- Only one prepreg type for different bonding techniques
- Therefore simplified logistics and handling, no stock duplication
- Unchanging quality standards
- Short delivery times

*Cpk = Process capability index

Technical data
Standards and approvals

Prepreg type (textile type)		Nominal thickness mm	inch	Resin content %	Residual gel time s	Viscosity Pa · s	Scaled Flow (calculation basis hydraulic press) mil/Prepreg	mm/Prepreg	Calculated thickness (calculation basis autoklave) mm
104	AT 01	0.040	0.0016	72 ± 3	165 ± 20	80 ± 15	1.5 ± 0,2	0.038 ± 0.005	0.041
106	AT 01	0.050	0.0020	73 ± 3	165 ± 20	80 ± 15	1.9 ± 0,2	0.048 ± 0.005	0.059
1080	AT 01	0.063	0.0025	62 ± 3	165 ± 20	80 ± 15	2.7 ± 0,3	0.069 ± 0.008	0.078
2125	AT 01	0.100	0.0039	53 ± 3	165 ± 20	80 ± 15	3.9 ± 0,3	0.099 ± 0.008	0.106
2116	AT 01	0.115	0.0045	50 ± 3	165 ± 20	80 ± 15	4.7 ± 0,3	0.119 ± 0.008	0.120
1651	AT 01	0.150	0.0059	47 ± 3	165 ± 20	80 ± 15	5.6 ± 0,3	0.142 ± 0.008	0.154
7628	AT 01	0.180	0.0071	45 ± 3	165 ± 20	80 ± 15	7.0 ± 0,3	0.178 ± 0.008	0.210
7628	AT 97	0.200	0.0079	50 ± 3	145 ± 15	60 ± 15	7.2 ± 0,3	0.183 ± 0.008	0.226

Other fabric types on request.

International standards	
DIN EN 60249-3-1	EP-GC
NEMA-LI 1-1989	FR-4
IPC 4101A/21	

Approvals
Underwriters' Laboratories Inc.
File-No. E41625

Supply forms and storage

Prepregs are supplied in rolls or panels.

Supply forms

Rolls:

Standard widths (tolerance ± 5.0 mm)
1090 mm
1255 mm

Standard lengths
Approx. 150-300 m, depending on the type of fabric

Panels:

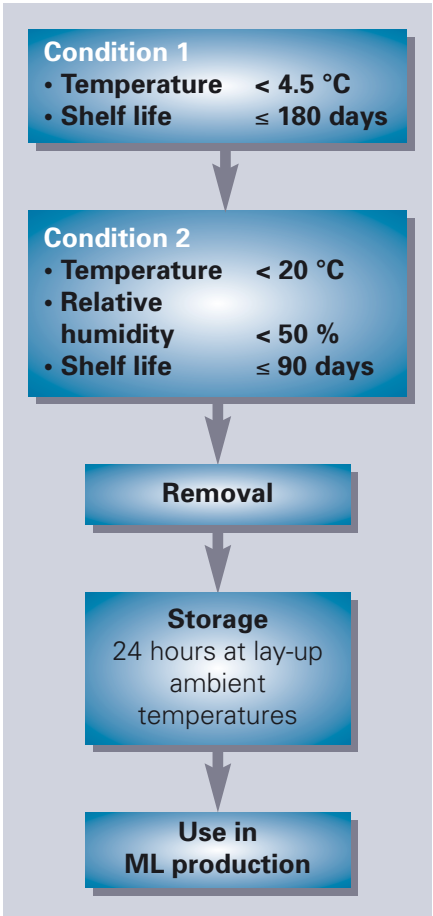
Produced to customer's specifications (Tolerance ± 1.0 mm)

Correct handling and storage of the prepregs are essential prerequisites for troublefree processing. Isola prepregs are tested in accordance with delivery specifications immediately before being packaged. The test values obtained in such tests are stated on every package.

If required, the panels can also be tooled in accordance with specifications, i.e. provided with the reference system for PIN-LAM technology.

Various blanking tools are available.

Technical notes for storage of prepregs



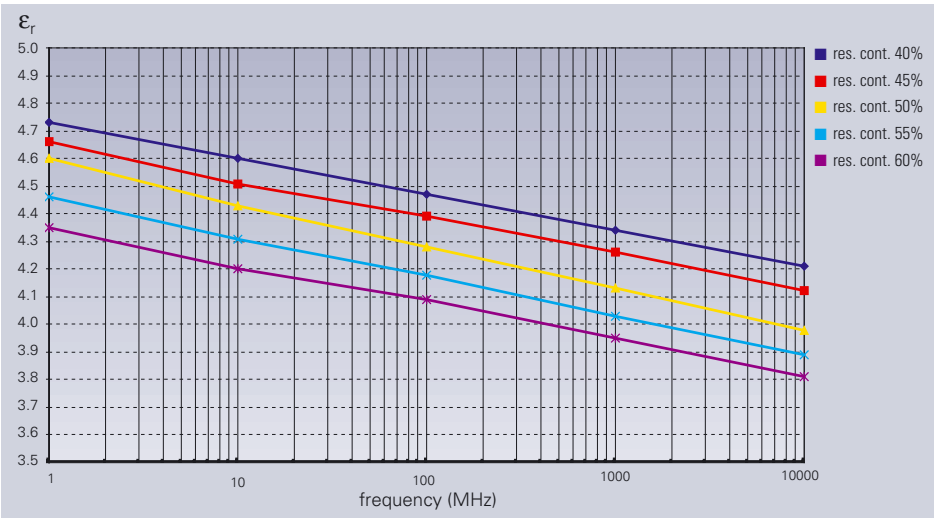
Multilayer press parameters

The flow properties (rheology) and polymerization of the prepregs used for multilayer production are decisively influenced by the following parameters:

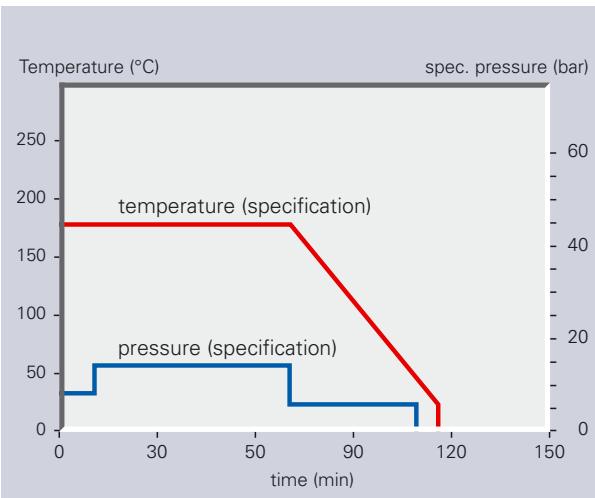
- **Prepreg type**
- **Type of multilayer:**
  Format, Construction, Layout
- **Package:**
  Mould, Padding, Separating sheets, Package height
- **Press parameters:**
  Temperature profile, Pressure profile, Vacuum support

Dielectric constant depending on frequency

Loss factor from 1 MHz to 10 GHz = 0.0195 ± 0.005



Recommended press parameters



Temperature profile

Load: 180 °C

180 °C → hold for 70 min

180 °C → Transfer to cooling press (cooling app. 45 min)

Pressure profile

Load: 8 bar

8 bar → hold for 10 min

8 bar → (at once) 15 bar

15 bar → hold for 60 min

15 bar → Transfer to cooling press (contactpressure)

Isola high-bay warehouse in Düren

Technical Values

DURAVER®-E-Cu quality 104 ML

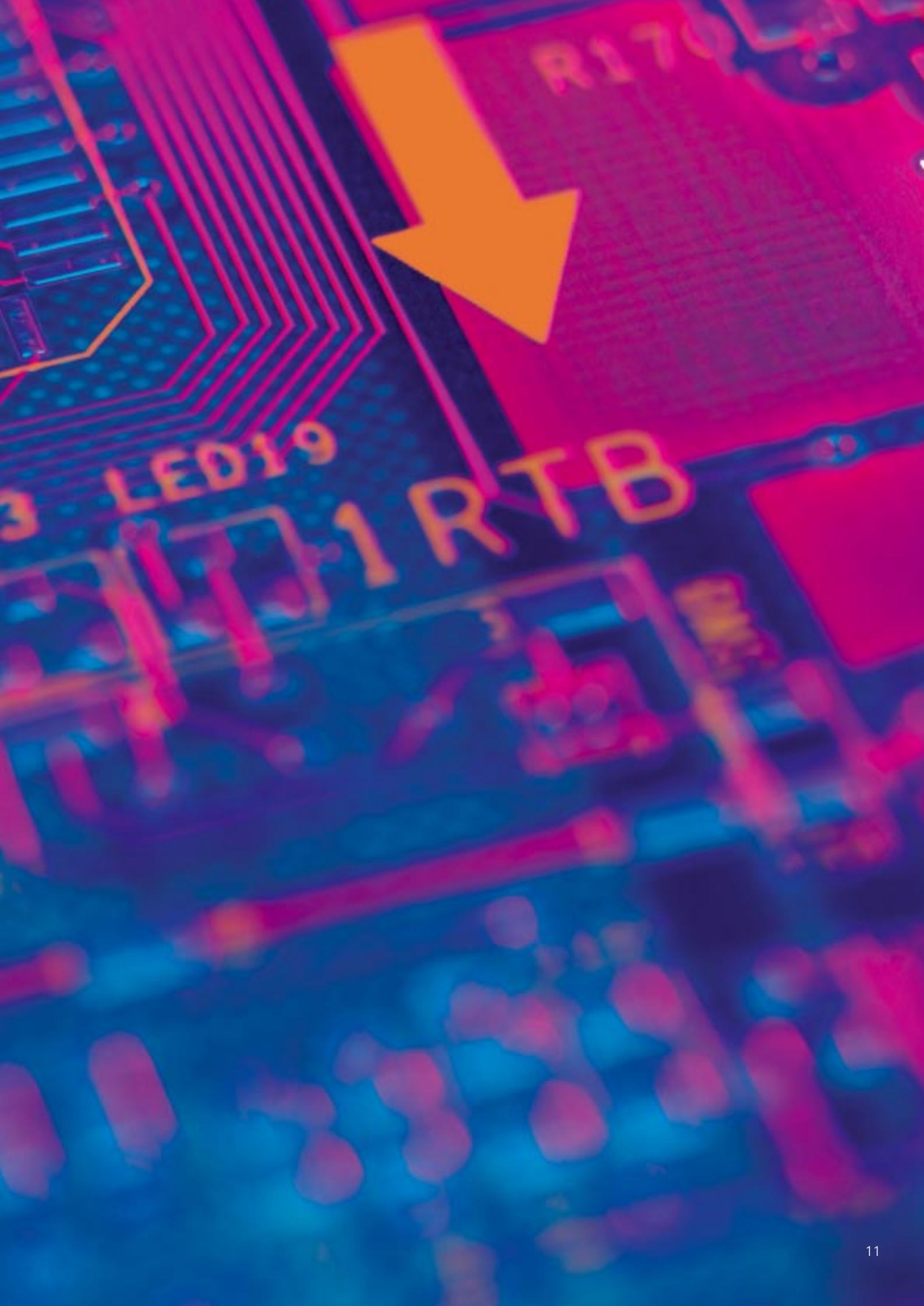
Specification Sheet #:	IPC-4101A/21
Reinforcement:	Woven E-glass
Resin system:	Primary: Difunctional Epoxy • Secondary: Multifunctional Epoxy
Flame Retardant Mechanism:	Bromine • Minimum UL 94 Requirement: V-1
Fillers:	N/A
ID Reference:	UL/ANSI: FR-4 • ANSI: FR-4/21
Glass Transition (T_g):	110 °C - 150 °C

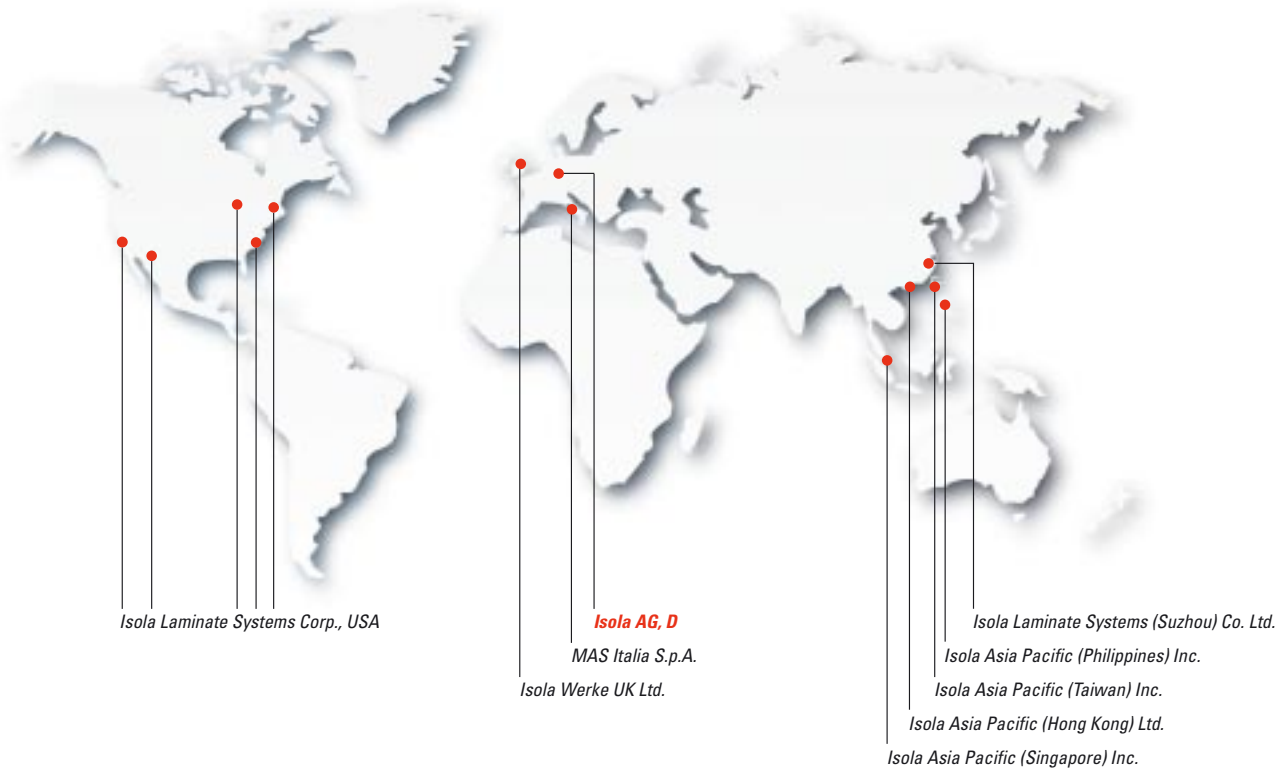
Explanations:
C = preconditioning in humidity chamber
E = preconditioning at temperature

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 relative humidity.

Properties	Units	Specification	Isola-Value
		Laminate thickness < 0.50 mm	Laminate thickness < 0.50 mm
1. Peel Strength, minimum			
A. Low profile copper foil and very low profile profile copper foil – all copper weights >17 microns	N/mm	0.70	1.40
B. Standard profile copper foil (35 microns)			
1. After thermal stress	N/mm	0.80	1.95
2. At 125 °C	N/mm	0.70	1.85
3. After process solutions	N/mm	0.55	1.90
C. All other foil composite	N/mm	–	–
2. Volume Resistivity, minimum			
A. C-96/35/90	MΩ · cm	$1.0 \cdot 10^6$	$6.0 \cdot 10^6$
B. After moisture resistance	MΩ · cm	–	–
C. At elevated temperature E 24/125	MΩ · cm	$1.0 \cdot 10^3$	$7.2 \cdot 10^6$
3. Surface Resistivity, minimum			
A. C-96/35/90	MΩ	$1.0 \cdot 10^4$	$1.3 \cdot 10^6$
B. After moisture resistance	MΩ	–	–
C. At elevated temperature E 24/125	MΩ	$1.0 \cdot 10^3$	$3.7 \cdot 10^7$
4. Moisture Absorption, maximum	%	–	–
5. Dielectric Breakdown, maximum	kV	–	–
6. Permittivity @ 1 MHz, maximum (Laminate or prepreg as laminated)		5.4	4.6 - 4.9
7. Loss Tangent @ 1MHz, maximum (Laminate or prepreg as laminated)		0.035	0.020
8. Flexural Strength, minimum			
A. Length direction	N/mm^2	–	–
B. Cross direction	N/mm^2	–	–
9. Flexural Strength @ Elevated Temperature, length direction, minimum	N/mm^2	–	–
10. Thermal Stress at 288 °C, minimum			
A. Unetched	s	≥ 10	≥ 10
B. Etched	s	≥ 10	≥ 10
11. Electric Strength, minimum (Laminate or prepreg as laminated)	kV/mm	30	39
12. Flammability			
A. Average burn time, maximum	s	5	3
B. Individual burn time, maximum	s	10	5
13. Glass Transition Temperature (T_g) DSC	°C	–	135

All of this Technical Information has been determined with due care and thoroughness. However, because the conditions of use and the process and application technologies employed can vary so greatly, the provided data and figures can only serve as nonbinding guidelines. They do not constitute a guarantee that the purchased item will possess certain attributes. For this reason, no liability whatsoever can be assumed for them. The buyer is obliged to check the suitability of all supplied products.


R17
LED19
1RTB



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