GÖTTLE
LEITERPLATTENTECHNIK

LAMINATES AND MORE FOR PCB

# ILM

# FR4-Laminates

# ILM-R1 / GF12

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## ILM-R1 /GF12 – Laminate Property Values:

| Test item | | test condition | standard value | typical value |
|---|---|---|---|---|
| 1.Peel strength lb/inch, minimum [H OZ]<br>Receiving status<br>After thermal stress<br>high temperature | | <br>A<br>A<br>125℃ | <br>≥6.0<br>≥6.0<br>≥4.0 | <br>6.0-8.0<br>6.0-8.0<br>5.5 |
| 2. min. volume resistance at high temp. [MΩ.CM] | | E-24/125 | $\geq 10^3$ | $3\times10^6$ |
| 3.min. surface resistance at high temp. [MΩ] | | E-24/125 | $\geq 10^3$ | $3\times10^6$ |
| 4.Absorption, maximum (%) | | E-1/105 + des | ≤0.80 | 0.15-0.30 |
| 5.Breakdown voltage, minimum value (KV)<br>step (thickness ≥ 0.50 mm) ≥0.50 mm) | | D-48/50<br>D-0.5/23 | ≥40 | 65 |
| 6. min. Bending strength [N/mm2] (thickn. ≥ 0.50 mm)<br>vertical<br>Zonal | | <br>A<br>A | <br>≥415<br>≥345 | <br>490<br>410 |
| 7. Arc resistance, minimum, second | | D-48/50; D-0.5/23 | ≥60 | 90 |
| 8. Flame retardancy | | A | UL94V0 | UL94V0 |
| 9. Solderability | | A | solderable | solderable |
| 10. Dielectric constant, 1MHz Max, 1MHz | | A | ≤ 5.4 | 4.5-4.8 |
| 11. Loss tangent, 1MHz Max, 1MHz | | A | ≤0.035 | 0.020-0.030 |
| 12.Bow and Twist [%]<br>Double sides (thickness > 0,78mm; 300x300mm)<br>Single sides (thickness > 0.78mm; 300x300mm)<br>Double sides (thickness 0.5~0.78 mm; 300×300mm)<br>Single sides (thickness 0.5~0.78 mm; 300×300mm) | | <br>A<br>A<br>A<br>A | <br>≤1.0<br>≤1.5<br>≤1.5<br>≤2.0 | <br>0.15-0.50<br>0.25-0.60<br>0.20-0.55<br>0.30-0.70 |
| 13. Thermal stress, 288°C, Tin drift 10 sec.<br>Unetched sample | | <br>A | <br>NO DEFECT | <br>60-100sec. |
| 14.Glass transition temperature, TG [DSC, °C] | | A | ≥135 | 140±5 |
| 15.Z-axis expansion coefficient CTE | Before Tg (µm/m°C) | TMA | — | 60 |
| | After Tg (µm/m°C) | TMA | — | 270 |
| | 50～260°C [%] | TMA | — | 4.5 |
| 16. Process adaptability: suitable for conventional processing. | | | | |
| 17. Scope of application: Except for all types of electronics, circuits and measuring instruments | | | | |
| 18. Applicable lines: No special restrictions | | | | |
| 19. Applicable board surface: single piece area ≤ 300 × 300mm, aspect ratio ≤ 5. | | | | |

1: Test conditions: A = normal condition; D [t]/[ϑ] = thermostatic water bath; E[t]/[ϑ] = test at elevated temperature; [t]/[ϑ] = test for a time t [hour] at a temperature ϑ (°C); des = dry sample and cool down to normal temperature.

2: The specification of twist and bow is suitable for CCL only.