

Data Sheet

High Reliability Glass Epoxy Multi-layer Materials



Laminate R-1755C
Prepreg R-1650C

| | | |
|-------------|---------------------------|--|
| UL/ANSI | FR-4 | A green rectangular logo with a white clover-like symbol and the text "RoHS Compliant" in white. |
| IPC-4101 | Primary:/101 | |
| Slash Sheet | Secondary:/21 /97 /121 | |

July 2011 No.11070116

Specification / Laminate R-1755C

No.; 11070116-1

| Property | | Units | Test Method | Condition | Value | |
|------------------|-----------------------------------|------------|-------------------|---------------------|-------------|---------------------|
| THERMAL | Glass Transition Temp (Tg) | °C | DSC | As received | 135 | |
| | | | TMA | As received | 135 | |
| | | | DMA | As received | 155 | |
| | Thermal Decomposition Temp (Td) | | °C | TGA | As received | 370 |
| | Time to Delam (T288) | Without Cu | min | IPC TM-650 2.4.24.1 | As received | 60 |
| | | With Cu | min | IPC TM-650 2.4.24.1 | As received | 35 |
| | CTE : $\alpha 1$ | X - axis | ppm / °C | IPC TM-650 2.4.24 | < Tg | 11 - 13 |
| | | Y - axis | ppm / °C | IPC TM-650 2.4.24 | < Tg | 13 - 15 |
| Z - axis | | ppm / °C | IPC TM-650 2.4.24 | < Tg | 50 | |
| CTE : $\alpha 2$ | Z - axis | ppm / °C | IPC TM-650 2.4.24 | > Tg | 260 | |
| ELECTRICAL | Volume Resistivity | | M Ω - cm | IPC TM-650 2.5.17.1 | C-96/35/90 | 1 x 10 ⁹ |
| | Surface Resistivity | | M Ω | IPC TM-650 2.5.17.1 | C-96/35/90 | 1 x 10 ⁸ |
| | Dielectric Constant (Dk) | @1MHz | - | IPC TM-650 2.5.5.9 | C-24/23/50 | 4.7 |
| | | @ 1GHz | - | IPC TM-650 2.5.5.9 | C-24/23/50 | 4.3 |
| | Dissipation Factor (Df) | @1MHz | - | IPC TM-650 2.5.5.9 | C-24/23/50 | 0.013 |
| | | @ 1GHz | - | IPC TM-650 2.5.5.9 | C-24/23/50 | 0.015 |
| PHYSICAL | Water Absorption | | % | IPC TM-650 2.6.2.1 | D-24/23 | 0.12 |
| | Peel Strength | 1oz | kN / m | IPC TM-650 2.4.8 | As Received | 1.5 |
| | Flammability | | - | UL | C-48/23/50 | 94V-0 |

Sample thickness ; 32 mil (0.8 mm)

*The data above show actual values and are not guaranteed.

Specification / Laminate R-1755C

1MHz - 1GHz ; IPC TM650-2.5.5.9

| Nominal Thickness | | Cloth Style | Typical Resin Content (%) | Typical Dk | | | Typical Df | | |
|-------------------|------|----------------|---------------------------|------------|--------|------|------------|--------|-------|
| mil | mm | | | 1MHz | 100MHz | 1GHz | 1MHz | 100MHz | 1GHz |
| 2.5 | 0.06 | 1080 x 1ply | 56 | 4.4 | 4.1 | 4.0 | 0.014 | 0.016 | 0.017 |
| 4 | 0.1 | 2116 x 1ply | 46 | 4.7 | 4.4 | 4.3 | 0.013 | 0.015 | 0.015 |
| 6 | 0.15 | 1501 x 1ply | 42 | 4.8 | 4.5 | 4.4 | 0.013 | 0.015 | 0.015 |
| 8 | 0.2 | 7628 x 1ply | 46 | 4.7 | 4.4 | 4.3 | 0.013 | 0.015 | 0.015 |
| 12 | 0.3 | 1501 x 2ply | 42 | 4.8 | 4.5 | 4.4 | 0.013 | 0.015 | 0.015 |
| 16 | 0.4 | 7628 x 2ply | 46 | 4.7 | 4.4 | 4.3 | 0.013 | 0.015 | 0.015 |
| 20 | 0.5 | 7628/2116/7628 | 46 | 4.7 | 4.4 | 4.3 | 0.013 | 0.015 | 0.015 |
| 24 | 0.6 | 7628 x 3ply | 46 | 4.7 | 4.4 | 4.3 | 0.013 | 0.015 | 0.015 |

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Specification / Laminate R-1755C

2GHz-10GHz ; IPC TM650-2.5.5.5

| Nominal Thickness | | Cloth Style | Resin Contents (%) | Typical Dk | | | | | Typical Df | | | | |
|-------------------|------|----------------|--------------------|------------|------|------|------|-------|------------|-------|-------|-------|-------|
| mil | mm | | | 2GHz | 4GHz | 6GHz | 8GHz | 10GHz | 2GHz | 4GHz | 6GHz | 8GHz | 10GHz |
| 2.5 | 0.06 | 1080 x 1ply | 56 | 4.0 | 4.0 | 3.9 | 3.9 | 3.9 | 0.018 | 0.018 | 0.019 | 0.019 | 0.020 |
| 4 | 0.1 | 2116 x 1ply | 46 | 4.3 | 4.3 | 4.3 | 4.2 | 4.2 | 0.016 | 0.017 | 0.017 | 0.018 | 0.019 |
| 6 | 0.15 | 1501 x 1ply | 42 | 4.4 | 4.4 | 4.4 | 4.3 | 4.3 | 0.015 | 0.016 | 0.017 | 0.018 | 0.019 |
| 8 | 0.2 | 7628 x 1ply | 46 | 4.3 | 4.3 | 4.3 | 4.2 | 4.2 | 0.016 | 0.017 | 0.017 | 0.018 | 0.019 |
| 12 | 0.3 | 1501 x 2ply | 42 | 4.4 | 4.4 | 4.4 | 4.3 | 4.3 | 0.015 | 0.016 | 0.017 | 0.018 | 0.019 |
| 16 | 0.4 | 7628 x 2ply | 46 | 4.3 | 4.3 | 4.3 | 4.2 | 4.2 | 0.016 | 0.017 | 0.017 | 0.018 | 0.019 |
| 20 | 0.5 | 7628/2116/7628 | 46 | 4.3 | 4.3 | 4.3 | 4.2 | 4.2 | 0.016 | 0.017 | 0.017 | 0.018 | 0.019 |
| 24 | 0.6 | 7628 x 3ply | 46 | 4.3 | 4.3 | 4.3 | 4.2 | 4.2 | 0.016 | 0.017 | 0.017 | 0.018 | 0.019 |

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Specification / Prepreg R-1650C

1MHz - 1GHz ; IPC TM650-2.5.5.9

| Cloth Style | Resin Contents (%) | Typical Thickness (μm) | Typical Dk | | | Typical Df | | |
|-------------|--------------------|------------------------|------------|--------|------|------------|--------|-------|
| | | | 1MHz | 100MHz | 1GHz | 1MHz | 100MHz | 1GHz |
| 1078 | 63 | 75 | 4.3 | 4.0 | 3.8 | 0.015 | 0.017 | 0.018 |
| | 65 | 80 | 4.3 | 3.9 | 3.8 | 0.015 | 0.017 | 0.019 |
| | 68 | 89 | 4.2 | 3.8 | 3.7 | 0.015 | 0.017 | 0.019 |
| 1080 | 63 | 73 | 4.3 | 4.0 | 3.8 | 0.015 | 0.017 | 0.018 |
| | 65 | 78 | 4.3 | 3.9 | 3.8 | 0.015 | 0.017 | 0.019 |
| | 68 | 87 | 4.2 | 3.8 | 3.7 | 0.015 | 0.017 | 0.019 |
| 2116 | 45 | 99 | 4.7 | 4.4 | 4.3 | 0.013 | 0.015 | 0.015 |
| | 48 | 107 | 4.6 | 4.3 | 4.2 | 0.013 | 0.015 | 0.015 |
| | 52 | 118 | 4.5 | 4.2 | 4.1 | 0.014 | 0.016 | 0.016 |
| 1501 | 44 | 154 | 4.7 | 4.4 | 4.3 | 0.013 | 0.015 | 0.015 |
| | 48 | 170 | 4.6 | 4.3 | 4.2 | 0.013 | 0.015 | 0.015 |
| | 52 | 188 | 4.5 | 4.2 | 4.1 | 0.014 | 0.016 | 0.016 |
| 7628 | 45 | 200 | 4.7 | 4.4 | 4.3 | 0.013 | 0.015 | 0.015 |
| | 48 | 215 | 4.6 | 4.3 | 4.2 | 0.013 | 0.015 | 0.015 |
| | 52 | 238 | 4.5 | 4.2 | 4.1 | 0.014 | 0.016 | 0.016 |

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Specification / Prepreg R-1650C

2GHz-10GHz ; IPC TM650-2.5.5.5

| Cloth Style | Resin Contents % | Typical Thickness (μm) | Typical Dk | | | | | Typical Df | | | | |
|-------------|------------------|------------------------|------------|------|------|------|-------|------------|-------|-------|-------|-------|
| | | | 2GHz | 4GHz | 6GHz | 8GHz | 10GHz | 2GHz | 4GHz | 6GHz | 8GHz | 10GHz |
| 1078 | 63 | 75 | 3.8 | 3.8 | 3.8 | 3.7 | 3.7 | 0.019 | 0.019 | 0.020 | 0.020 | 0.021 |
| | 65 | 80 | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 0.020 | 0.020 | 0.020 | 0.021 | 0.021 |
| | 68 | 89 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 0.020 | 0.020 | 0.021 | 0.021 | 0.021 |
| 1080 | 63 | 73 | 3.8 | 3.8 | 3.8 | 3.7 | 3.7 | 0.019 | 0.019 | 0.020 | 0.020 | 0.021 |
| | 65 | 78 | 3.7 | 3.7 | 3.6 | 3.6 | 3.6 | 0.020 | 0.020 | 0.020 | 0.021 | 0.021 |
| | 68 | 87 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 0.020 | 0.020 | 0.021 | 0.021 | 0.021 |
| 2116 | 45 | 99 | 4.3 | 4.3 | 4.3 | 4.2 | 4.2 | 0.016 | 0.016 | 0.017 | 0.018 | 0.019 |
| | 48 | 107 | 4.2 | 4.2 | 4.1 | 4.1 | 4.1 | 0.016 | 0.017 | 0.018 | 0.018 | 0.019 |
| | 52 | 118 | 4.0 | 4.0 | 4.0 | 3.9 | 3.9 | 0.017 | 0.017 | 0.018 | 0.019 | 0.020 |
| 1501 | 44 | 154 | 4.3 | 4.3 | 4.3 | 4.3 | 4.2 | 0.016 | 0.016 | 0.017 | 0.018 | 0.019 |
| | 48 | 170 | 4.2 | 4.2 | 4.1 | 4.1 | 4.1 | 0.016 | 0.017 | 0.018 | 0.018 | 0.019 |
| | 52 | 188 | 4.0 | 4.0 | 4.0 | 3.9 | 3.9 | 0.017 | 0.017 | 0.018 | 0.019 | 0.020 |
| 7628 | 45 | 200 | 4.3 | 4.3 | 4.3 | 4.2 | 4.2 | 0.016 | 0.016 | 0.017 | 0.018 | 0.019 |
| | 48 | 215 | 4.2 | 4.2 | 4.2 | 4.1 | 4.1 | 0.016 | 0.017 | 0.018 | 0.018 | 0.019 |
| | 52 | 238 | 4.0 | 4.0 | 4.0 | 3.9 | 3.9 | 0.017 | 0.017 | 0.018 | 0.019 | 0.020 |

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