



Advanced Connectivity Solutions

## PRODUCT SELECTOR GUIDE

Rogers Corporation was founded in 1832 and has over 60 years of experience as a global supplier of high performance RF materials.

Rogers Corporation's Advanced Connectivity Solutions (ACS) is the world's leading manufacturer of high performance dielectrics, laminates and prepregs used in microwave and RF printed circuit and related applications in Aerospace & Defense, Wireless & Wireline (digital) Infrastructure, Automotive Radar Sensor, Satellite TV, Mobile Internet Device and High End Chip Scale Packaging.

ACS is headquartered in Chandler, Arizona. Additional manufacturing, sales and technical service locations in North America, Europe and Asia enable Rogers to support our global customers at the local level.



Beyond recently expanded manufacturing capability, an extensive and growing product portfolio supports a wide array of application needs and environments. Rogers' application and technical service engineers are ready to assist in material selection, for design and PCB manufacturing phases of your product development process.



With unmatched industry expertise, Rogers Corporation continues to conceive and develop new material solutions for ever more challenging problems. For example, over the last several years Rogers Corporation introduced thermal management materials and continues to innovate to meet the needs for a range of emerging higher power applications. Our dedication to improving on electrical characterization capabilities, already best in class, enables us to anticipate questions and work collaboratively to push the material performance envelope.

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# LAMINATES

| Product               | Dielectric Constant,<br>$\epsilon_r$ @ 10 GHz<br>(2.5 GHz)<br>(Typical)  |                         | Dissipation <sup>(1)</sup> Factor<br>TAN $\delta$ @ 10 GHz<br>(2.5 GHz)<br>(Typical) | Thermal <sup>(2)</sup><br>Coefficient of $\epsilon_r$<br>-50°C to 150°C<br>ppm/°C<br>(Typical) | Volume<br>Resistivity<br>Mohm • cm<br>(Typical) | Surface<br>Resistivity<br>Mohm<br>(Typical) | Water <sup>(4)</sup><br>Absorption<br>D48/50<br>%<br>(Typical) |
|-----------------------|--------------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------|----------------------------------------------------------------|
|                       | Process <sup>(1)</sup>                                                   | Design <sup>(11)</sup>  |                                                                                      |                                                                                                |                                                 |                                             |                                                                |
| <b>ML SERIES™</b>     | <b>92ML™</b><br>Woven Glass Reinforced<br>Modified Epoxy Laminates       | 5.3 (1 MHz)             | –                                                                                    | 0.011 (1 MHz)                                                                                  | –                                               | 4.9 X 10 <sup>9</sup>                       | (22) 0.12                                                      |
|                       | <b>92ML StaCool™</b><br>Woven Glass Reinforced<br>Modified Epoxy IMS     | 5.3 (1 MHz)             | –                                                                                    | 0.011 (1 MHz)                                                                                  | –                                               | 4.9 X 10 <sup>9</sup>                       | (22) 0.12                                                      |
| <b>AD SERIES™</b>     | <b>AD250C™</b><br>Woven Glass Reinforced PTFE<br>Antenna Grade Laminates | 2.50 ± 0.04             | 2.52                                                                                 | 0.0013                                                                                         | –117                                            | 4.8 X 10 <sup>8</sup>                       | (22) 0.04                                                      |
|                       | <b>AD255C™</b><br>Woven Glass Reinforced PTFE<br>Antenna Grade Laminates | 2.55 ± 0.04             | 2.60                                                                                 | 0.0013                                                                                         | –110                                            | 7.4 X 10 <sup>8</sup>                       | (22) 0.03                                                      |
|                       | <b>AD300D™</b><br>Woven Glass Reinforced PTFE<br>Antenna Grade Laminates | 2.97, 3.03<br>± 0.05    | 2.94, 3.00                                                                           | 0.0021                                                                                         | –73                                             | 1.7 X 10 <sup>8</sup>                       | 0.04                                                           |
|                       | <b>AD350A™</b><br>Woven Glass Reinforced PTFE<br>Antenna Grade Laminates | 3.50 ± 0.05             | 3.54                                                                                 | 0.0033                                                                                         | –57                                             | 1.5 X 10 <sup>9</sup>                       | (22) 0.10                                                      |
|                       | <b>AD1000™</b><br>Woven Glass Reinforced PTFE                            | 10.20* ± 0.35           | 10.2                                                                                 | 0.0023                                                                                         | –380                                            | 1.4 X 10 <sup>9</sup>                       | (22) 0.03                                                      |
| <b>CLTE SERIES™</b>   | <b>CLTE-XT™</b><br>Woven Glass Reinforced PTFE                           | 2.94* ± 0.03            | 2.94                                                                                 | 0.0012                                                                                         | –9                                              | 4.3 X 10 <sup>8</sup>                       | (22) 0.02                                                      |
|                       | <b>CLTE™</b><br>Woven Glass Reinforced PTFE                              | 2.98 ± 0.04             | 2.98                                                                                 | 0.0023                                                                                         | –9                                              | 1.4 X 10 <sup>9</sup>                       | (22) 0.04                                                      |
|                       | <b>CLTE-AT™</b><br>Woven Glass Reinforced PTFE                           | 3.00 ± 0.04             | 3.00                                                                                 | 0.0013                                                                                         | –10                                             | 4.3 X 10 <sup>8</sup>                       | (22) 0.03                                                      |
|                       | <b>CLTE-MW™</b><br>Woven Glass Reinforced PTFE                           | 2.94 – 3.02 ± 0.04      | 3.03 to 3.10                                                                         | 0.0015                                                                                         | –35                                             | 1.3 X 10 <sup>7</sup>                       | (22) 0.03                                                      |
| <b>CUCLAD® SERIES</b> | <b>CuClad® 217</b><br>Cross-Plied Woven Glass<br>Reinforced PTFE         | 2.17, 2.20<br>± 0.02    | 2.17, 2.20                                                                           | 0.0009                                                                                         | –151                                            | 2.3 X 10 <sup>8</sup>                       | (22) 0.02                                                      |
|                       | <b>CuClad 233</b><br>Cross-Plied Woven Glass<br>Reinforced PTFE          | 2.33 ± 0.02             | 2.40                                                                                 | 0.0013                                                                                         | –171                                            | 8.0 X 10 <sup>8</sup>                       | (22) 0.02                                                      |
|                       | <b>CuClad 250</b><br>Cross-Plied Woven Glass<br>Reinforced PTFE          | 2.40 to 2.55*<br>± 0.04 | 2.40 to 2.60*                                                                        | 0.0017                                                                                         | –170                                            | 8.0 X 10 <sup>9</sup>                       | (22) 0.03                                                      |
| <b>DICLAD® SERIES</b> | <b>DiClad® 880</b><br>Woven Glass Reinforced PTFE                        | 2.17, 2.20<br>± 0.02    | 2.2                                                                                  | 0.0009                                                                                         | –160                                            | 1.4 X 10 <sup>9</sup>                       | (22) 0.02                                                      |
|                       | <b>DiClad 870</b><br>Woven Glass Reinforced PTFE                         | 2.33 ± 0.04             | 2.33                                                                                 | 0.0013                                                                                         | –161                                            | 1.5 X 10 <sup>9</sup>                       | (22) 0.02                                                      |
|                       | <b>DiClad 527</b><br>Woven Glass Reinforced PTFE                         | 2.40 to 2.60*<br>± 0.04 | 2.40 to 2.60*                                                                        | 0.0017                                                                                         | –153                                            | 1.2 X 10 <sup>9</sup>                       | (22) 0.03                                                      |

| Thermal Conductivity<br>W/(m·K)<br>(Typical)<br>50°C<br>ASTM D5470 | Coefficient of Thermal Expansion <sup>(6)</sup><br>-55° to 288°C<br>ppm/°C<br>(Typical) |    |     | Peel Strength<br>1 oz (35µm)<br>ED Foil lbs/in.<br>(N/mm)<br>(Typical) | Density<br>g/cm <sup>3</sup><br>(Typical) | Flammability<br>Rating<br>UL 94 | Lead-Free <sup>(9)</sup><br>Process<br>Compatible | PIM <sup>(23)</sup><br>dBc<br>(Typical) | Product                                                                  |                 |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----|-----|------------------------------------------------------------------------|-------------------------------------------|---------------------------------|---------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------|-----------------|
|                                                                    | X                                                                                       | Y  | Z   |                                                                        |                                           |                                 |                                                   |                                         |                                                                          |                 |
| 1.60                                                               | 18                                                                                      | 18 | 27  | 7.6                                                                    | 2.26                                      | V-0                             | YES                                               | -                                       | <b>92ML™</b><br>Woven Glass Reinforced<br>Modified Epoxy Laminates       | ML SERIES™      |
| 1.60                                                               | 18                                                                                      | 18 | 27  | 7.6                                                                    | 2.26                                      | V-0                             | YES                                               | -                                       | <b>92ML StaCool™</b><br>Woven Glass Reinforced<br>Modified Epoxy IMS     |                 |
| 0.33                                                               | 47                                                                                      | 29 | 196 | 14.8<br>(2.6)                                                          | 2.28                                      | V-0                             | YES                                               | -164                                    | <b>AD250C™</b><br>Woven Glass Reinforced PTFE<br>Antenna Grade Laminates | AD SERIES™      |
| 0.35                                                               | 34                                                                                      | 26 | 196 | 13.6<br>(2.4)                                                          | 2.28                                      | V-0                             | YES                                               | -164                                    | <b>AD255C™</b><br>Woven Glass Reinforced PTFE<br>Antenna Grade Laminates |                 |
| 0.37                                                               | 24                                                                                      | 23 | 98  | 3.20<br>(18.3)                                                         | 2.23                                      | V-0                             | YES                                               | -159                                    | <b>AD300D™</b><br>Woven Glass Reinforced PTFE<br>Antenna Grade Laminates |                 |
| 0.44                                                               | 18                                                                                      | 18 | 63  | 14.7<br>(2.6)                                                          | 2.43                                      | V-0                             | YES                                               | -164                                    | <b>AD350A™</b><br>Woven Glass Reinforced PTFE<br>Antenna Grade Laminates |                 |
| 0.81                                                               | 8                                                                                       | 10 | 20  | 12.0<br>(2.14)                                                         | 3.20                                      | V-0                             | YES                                               | -                                       | <b>AD1000™</b><br>Woven Glass Reinforced PTFE                            |                 |
| 0.56                                                               | 8                                                                                       | 8  | 20  | 7.2<br>(1.29)                                                          | 2.02                                      | V-0                             | YES                                               | -                                       | <b>CLTE-XT™</b><br>Woven Glass Reinforced PTFE                           | CLTE SERIES™    |
| 0.50                                                               | 10                                                                                      | 12 | 34  | 7.0<br>(1.25)                                                          | 2.38                                      | V-0                             | YES                                               | -                                       | <b>CLTE™</b><br>Woven Glass Reinforced PTFE                              |                 |
| 0.64                                                               | 8                                                                                       | 8  | 20  | 6.5<br>(1.16)                                                          | 2.06                                      | V-0                             | YES                                               | -                                       | <b>CLTE-AT™</b><br>Woven Glass Reinforced PTFE                           |                 |
| 0.42                                                               | 8                                                                                       | 8  | 30  | 1.1<br>(6.0)                                                           | 2.1                                       | V-0                             | YES                                               | -                                       | <b>CLTE-MW™</b><br>Woven Glass Reinforced PTFE                           |                 |
| 0.26                                                               | 29                                                                                      | 28 | 246 | 14.0<br>(2.50)                                                         | 2.23                                      | V-0                             | YES                                               | -                                       | <b>CuClad® 217</b><br>Cross-Plied Woven Glass<br>Reinforced PTFE         | CUCLAD® SERIES  |
| 0.26                                                               | 23                                                                                      | 24 | 194 | 14.0<br>(2.50)                                                         | 2.26                                      | V-0                             | YES                                               | -                                       | <b>CuClad 233</b><br>Cross-Plied Woven Glass<br>Reinforced PTFE          |                 |
| 0.25                                                               | 18                                                                                      | 19 | 177 | 14.0<br>(2.50)                                                         | 2.31                                      | V-0                             | YES                                               | -                                       | <b>CuClad 250</b><br>Cross-Plied Woven Glass<br>Reinforced PTFE          |                 |
| 0.26                                                               | 25                                                                                      | 34 | 252 | 14.0<br>(2.50)                                                         | 2.23                                      | V-0                             | YES                                               | -                                       | <b>DiClad® 880</b><br>Woven Glass Reinforced PTFE                        | DICALAD® SERIES |
| 0.26                                                               | 17                                                                                      | 29 | 217 | 14.0<br>(2.50)                                                         | 2.26                                      | V-0                             | YES                                               | -                                       | <b>DiClad 870</b><br>Woven Glass Reinforced PTFE                         |                 |
| 0.25                                                               | 14                                                                                      | 21 | 173 | 14.0<br>(2.50)                                                         | 2.31                                      | V-0                             | YES                                               | -                                       | <b>DiClad 527</b><br>Woven Glass Reinforced PTFE                         |                 |

# LAMINATES

| Product         |                                                                                              | Dielectric Constant,<br>ε <sub>r</sub> @ 10 GHz<br>(2.5 GHz)<br>(Typical) |                        | Dissipation <sup>(1)</sup> Factor<br>TAN δ @ 10 GHz<br>(2.5 GHz)<br>(Typical) | Thermal <sup>(2)</sup><br>Coefficient of ε <sub>r</sub><br>-50°C to 150°C<br>ppm/°C<br>(Typical) | Volume<br>Resistivity<br>Mohm • cm<br>(Typical) | Surface<br>Resistivity<br>Mohm<br>(Typical) | Water <sup>(4)</sup><br>Absorption<br>D48/50<br>%<br>(Typical) |
|-----------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------|----------------------------------------------------------------|
|                 |                                                                                              | Process <sup>(1)</sup>                                                    | Design <sup>(11)</sup> |                                                                               |                                                                                                  |                                                 |                                             |                                                                |
| ISOCLAD® SERIES | <b>IsoClad® 917</b><br>Non-Woven Glass Reinforced PTFE                                       | 2.17 ± 0.02                                                               | 2.17                   | 0.0013                                                                        | -157                                                                                             | 1.5 X 10 <sup>10</sup>                          | 1.0 X 10 <sup>9</sup>                       | <sup>(22)</sup> 0.04                                           |
|                 | <b>IsoClad 933</b><br>Non-Woven Glass Reinforced PTFE                                        | 2.33 ± 0.04                                                               | 2.33                   | 0.0016                                                                        | -132                                                                                             | 3.5 X 10 <sup>8</sup>                           | 1.0 X 10 <sup>8</sup>                       | <sup>(22)</sup> 0.05                                           |
| KAPPA™          | <b>Kappa™ 438</b><br>Hydrocarbon / Ceramic / Woven Glass<br>UL 94 V-0 Laminates              | 4.10 ± 0.08                                                               | 4.38                   | 0.005                                                                         | -21                                                                                              | 2.9 X 10 <sup>9</sup>                           | 6.2 X 10 <sup>7</sup>                       | 0.12                                                           |
| RO1000®         | <b>XtremeSpeed™ R01200™</b><br>PTFE Ceramic<br>Woven Glass Reinforced                        | 3.03 – 3.10                                                               | 3.03 – 3.10            | 0.0017                                                                        | -35                                                                                              | 1.3 X 10 <sup>7</sup>                           | 2.5 X 10 <sup>6</sup>                       | 0.03                                                           |
| RO3000® SERIES  | <b>R03003G2™</b><br>PTFE Ceramic                                                             | 3.00 ± 0.04                                                               | <sup>(29)</sup> 3.07   | 0.0011                                                                        | -35                                                                                              | 1.4 X 10 <sup>9</sup>                           | 2.6 X 10 <sup>8</sup>                       | 0.06                                                           |
|                 | <b>R03003™</b><br>PTFE Ceramic                                                               | <sup>(7)</sup> 3.00 ± 0.04                                                | 3.00                   | 0.0010                                                                        | -3                                                                                               | 1 X 10 <sup>7</sup>                             | 1 X 10 <sup>7</sup>                         | 0.04                                                           |
|                 | <b>R03035™</b><br>PTFE Ceramic                                                               | 3.50± 0.05                                                                | 3.60                   | 0.0015                                                                        | -45                                                                                              | 1 X 10 <sup>7</sup>                             | 1 X 10 <sup>7</sup>                         | 0.04                                                           |
|                 | <b>R03006™</b><br>PTFE Ceramic                                                               | 6.15 ± 0.15                                                               | 6.5                    | 0.002                                                                         | -262                                                                                             | 1 X 10 <sup>5</sup>                             | 1 X 10 <sup>5</sup>                         | 0.02                                                           |
|                 | <b>R03010™</b><br>PTFE Ceramic                                                               | 10.20 ± 0.30                                                              | 11.2                   | 0.0022                                                                        | -395                                                                                             | 1 X 10 <sup>5</sup>                             | 1 X 10 <sup>5</sup>                         | 0.05                                                           |
|                 | <b>R03210™</b><br>PTFE Ceramic<br>Woven Glass Reinforced                                     | 10.20 ± 0.50                                                              | 10.8                   | 0.0027                                                                        | -459                                                                                             | 1 X 10 <sup>3</sup>                             | 1 X 10 <sup>3</sup>                         | 0.12                                                           |
| RO4000® SERIES  | <b>R04003C™</b><br>Hydrocarbon / Ceramic / Woven Glass                                       | 3.38 ± 0.05                                                               | 3.55                   | 0.0027                                                                        | +40                                                                                              | 1.7 X 10 <sup>10</sup>                          | 4.2 X 10 <sup>9</sup>                       | 0.04                                                           |
|                 | <b>R04350B™</b><br>Hydrocarbon / Ceramic / Woven Glass                                       | 3.48 ± 0.05                                                               | 3.66                   | 0.0037                                                                        | +50                                                                                              | 1.2 X 10 <sup>10</sup>                          | 5.7 X 10 <sup>9</sup>                       | 0.05                                                           |
|                 | <b>R04360G2™</b><br>Hydrocarbon / Ceramic / Woven Glass                                      | 6.15 ± 0.15                                                               | 6.4                    | 0.0038                                                                        | -131                                                                                             | 4 X 10 <sup>7</sup>                             | 9 X 10 <sup>6</sup>                         | 0.08                                                           |
|                 | <b>R04830™</b><br>Hydrocarbon / Ceramic / Woven Glass                                        | 3.25 ± 0.05                                                               | 3.24                   | 0.0033                                                                        | -30                                                                                              | 9.6 X 10 <sup>9</sup>                           | 1.1 X 10 <sup>8</sup>                       | 0.15                                                           |
|                 | <sup>(16)</sup> <b>R04835T™</b><br>Hydrocarbon / Ceramic / Woven Glass                       | 3.33 ± 0.05                                                               | 3.52                   | 0.0030                                                                        | -0.4                                                                                             | 1.34 X 10 <sup>8</sup>                          | 1.17 X 10 <sup>6</sup>                      | 0.20                                                           |
|                 | <b>R04835™</b><br>Hydrocarbon / Ceramic / Woven Glass                                        | 3.48 ± 0.05                                                               | 3.66                   | 0.0037                                                                        | +50                                                                                              | 1 X 10 <sup>10</sup>                            | 1 X 10 <sup>9</sup>                         | 0.05                                                           |
|                 | <b>R04533™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>Antenna Grade Laminates             | 3.30 ± 0.08                                                               | 3.45                   | 0.0025<br>(0.0020)                                                            | +40                                                                                              | 1.1 X 10 <sup>10</sup>                          | 9.9 X 10 <sup>8</sup>                       | 0.02                                                           |
|                 | <b>R04534™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>Antenna Grade Laminates             | 3.40 ± 0.08                                                               | 3.55                   | 0.0027<br>(0.0022)                                                            | +40                                                                                              | 1.7 X 10 <sup>10</sup>                          | 4.2 X 10 <sup>9</sup>                       | 0.06                                                           |
|                 | <b>R04535™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>UL 94 V-0 Antenna Grade Laminates   | 3.44 ± 0.08                                                               | 3.60                   | 0.0037<br>(0.0032)                                                            | +50                                                                                              | 1.2 X 10 <sup>10</sup>                          | 5.7 X 10 <sup>9</sup>                       | 0.09                                                           |
|                 | <b>R04725JXR™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>Antenna Grade Laminates          | 2.55 ±0.05                                                                | 2.64                   | 0.0026<br>(0.0022)                                                            | +34                                                                                              | 2.16 X 10 <sup>8</sup>                          | 4.8 X 10 <sup>7</sup>                       | 0.24                                                           |
|                 | <b>R04730JXR™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>Antenna Grade Laminates          | 3.00 ±0.05                                                                | 2.98                   | 0.0027<br>(0.0023)                                                            | +32                                                                                              | 5.96 X 10 <sup>8</sup>                          | 1.68 X 10 <sup>8</sup>                      | 0.14                                                           |
|                 | <b>R04730G3™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>UL 94 V-0 Antenna Grade Laminates | 3.00 ± 0.05                                                               | 2.98                   | 0.0029<br>(0.0023)                                                            | +26                                                                                              | 4.78 X 10 <sup>8</sup>                          | 2.78 X 10 <sup>8</sup>                      | 0.15                                                           |

| Thermal Conductivity<br>W/(m·K)<br>(Typical)<br>50°C<br>ASTM D5470 | Coefficient of Thermal Expansion <sup>(6)</sup><br>-55° to 288°C<br>ppm/°C<br>(Typical) |      |      | Peel Strength<br>1 oz (35µm)<br>ED Foil lbs/in.<br>(N/mm)<br>(Typical) | Density<br>g/cm <sup>3</sup><br>(Typical) | Flammability<br>Rating<br>UL 94 | Lead-Free <sup>(9)</sup><br>Process<br>Compatible | PIM <sup>(23)</sup><br>dBc<br>(Typical) | Product                                                                                      |                 |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------|------|------------------------------------------------------------------------|-------------------------------------------|---------------------------------|---------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------|-----------------|
|                                                                    | X                                                                                       | Y    | Z    |                                                                        |                                           |                                 |                                                   |                                         |                                                                                              |                 |
| 0.26                                                               | 46                                                                                      | 47   | 236  | 10.0<br>(1.79)                                                         | 2.23                                      | V-0                             | YES                                               | -                                       | <b>IsoClad® 917</b><br>Non-Woven Glass Reinforced PTFE                                       | ISOCLAD® SERIES |
| 0.26                                                               | 31                                                                                      | 35   | 203  | 10.0<br>(1.79)                                                         | 2.27                                      | V-0                             | YES                                               | -                                       | <b>IsoClad 933</b><br>Non-Woven Glass Reinforced PTFE                                        |                 |
| 0.64                                                               | 13                                                                                      | 16   | 42   | 5.8                                                                    | 1.99                                      | V-0                             | YES                                               | -                                       | <b>Kappa™ 438</b><br>Hydrocarbon / Ceramic / Woven Glass<br>UL 94 V-0 Laminates              | KAPPA™          |
| 0.42                                                               | 8                                                                                       | 8    | 30   | >4.5                                                                   | 2.1                                       | V-0                             | YES                                               | -                                       | <b>XtremeSpeed™ R01200™</b><br>PTFE Ceramic<br>Woven Glass Reinforced                        | RO1000®         |
| 0.43                                                               | 16                                                                                      | 17   | 18   | <sup>(30)</sup> 16.5                                                   | 2.15                                      | V-0                             | YES                                               | -                                       | <b>R03003G2™</b><br>PTFE Ceramic                                                             | RO3000® SERIES  |
| 0.50                                                               | 17                                                                                      | 16   | 25   | 12.7<br>(2.2)                                                          | 2.1                                       | V-0                             | YES                                               | -                                       | <b>R03003™</b><br>PTFE Ceramic                                                               |                 |
| 0.50                                                               | 17                                                                                      | 17   | 24   | 10.2<br>(1.8)                                                          | 2.1                                       | V-0                             | YES                                               | -                                       | <b>R03035™</b><br>PTFE Ceramic                                                               |                 |
| 0.79                                                               | 17                                                                                      | 17   | 24   | 7.1<br>(1.2)                                                           | 2.6                                       | V-0                             | YES                                               | -                                       | <b>R03006™</b><br>PTFE Ceramic                                                               |                 |
| 0.95                                                               | 13                                                                                      | 11   | 16   | 9.4<br>(1.6)                                                           | 2.8                                       | V-0                             | YES                                               | -                                       | <b>R03010™</b><br>PTFE Ceramic                                                               |                 |
| 0.81                                                               | 13                                                                                      | 13   | 34   | 11.0<br>(1.9)                                                          | 3                                         | V-0                             | YES                                               | -                                       | <b>R03210™</b><br>PTFE Ceramic<br>Woven Glass Reinforced                                     | RO4000® SERIES  |
| 0.71                                                               | 11                                                                                      | 14   | 46   | 6.0<br>(1.05)                                                          | 1.8                                       | NON FR                          | YES                                               | -                                       | <b>R04003C™</b><br>Hydrocarbon / Ceramic / Woven Glass                                       |                 |
| 0.69                                                               | 10                                                                                      | 12   | 32   | 5.0<br>(0.88)                                                          | 1.9                                       | V-0                             | YES                                               | -                                       | <b>R04350B™</b><br>Hydrocarbon / Ceramic / Woven Glass                                       |                 |
| 0.75                                                               | 13                                                                                      | 14   | 28   | 5.2<br>(0.91)                                                          | 2.16                                      | V-0                             | YES                                               | -                                       | <b>R04360G2™</b><br>Hydrocarbon / Ceramic / Woven Glass                                      |                 |
| 0.45                                                               | 23                                                                                      | 23   | 110  | 0.67<br>(3.8)                                                          | 1.68                                      | V-0                             | YES                                               | -                                       | <b>R04830™</b><br>Hydrocarbon / Ceramic / Woven Glass                                        |                 |
| 0.53<br>0.52 @ 80°                                                 | 14                                                                                      | 16   | 62   | 3.0<br>(0.53)                                                          | 1.81                                      | V-0                             | YES                                               | -                                       | <sup>(16)</sup> <b>R04835T™</b><br>Hydrocarbon / Ceramic / Woven Glass                       |                 |
| 0.66                                                               | 10                                                                                      | 12   | 31   | 5.0<br>(0.88)                                                          | 1.92                                      | V-0                             | YES                                               | -                                       | <b>R04835™</b><br>Hydrocarbon / Ceramic / Woven Glass                                        |                 |
| 0.60                                                               | 13                                                                                      | 11   | 37   | 6.9<br>(1.2)                                                           | 1.8                                       | NON FR                          | YES                                               | -157                                    | <b>R04533™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>Antenna Grade Laminates             |                 |
| 0.60                                                               | 11                                                                                      | 14   | 46   | 6.3<br>(1.1)                                                           | 1.8                                       | NON FR                          | YES                                               | -157                                    | <b>R04534™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>Antenna Grade Laminates             |                 |
| 0.6                                                                | 16                                                                                      | 17   | 50   | 5.1<br>(0.9)                                                           | 1.9                                       | V-0                             | YES                                               | -157                                    | <b>R04535™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>UL 94 V-0 Antenna Grade Laminates   |                 |
| <sup>(19)</sup> 0.38                                               | 13.9                                                                                    | 19.0 | 25.6 | 8.5<br>(1.49)                                                          | 1.27                                      | NON FR                          | YES                                               | ≤-160                                   | <b>R04725JXR™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>Antenna Grade Laminates          |                 |
| <sup>(19)</sup> 0.49                                               | 11.3                                                                                    | 13.5 | 21.1 | 8.4<br>(1.47)                                                          | 1.53                                      | NON FR                          | YES                                               | ≤-160                                   | <b>R04730JXR™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>Antenna Grade Laminates          |                 |
| 0.42                                                               | 13.7                                                                                    | 14.7 | 30.3 | 5.0<br>(0.88)                                                          | 1.58                                      | V-0                             | YES                                               | ≤-160                                   | <b>R04730G3™</b><br>Hydrocarbon / Ceramic / Woven Glass<br>UL 94 V-0 Antenna Grade Laminates |                 |

# LAMINATES

| Product        |                                                                                | Dielectric Constant,<br>ε <sub>r</sub> @ 10 GHz<br>(2.5 GHz)<br>(Typical) |                                       | Dissipation <sup>(1)</sup> Factor<br>TAN δ @ 10 GHz<br>(2.5 GHz)<br>(Typical) | Thermal <sup>(2)</sup><br>Coefficient of ε <sub>r</sub><br>-50°C to 150°C<br>ppm/°C<br>(Typical) | Volume<br>Resistivity<br>Mohm • cm<br>(Typical) | Surface<br>Resistivity<br>Mohm<br>(Typical) | Water <sup>(4)</sup><br>Absorption<br>D48/50<br>%<br>(Typical) |
|----------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------|----------------------------------------------------------------|
|                |                                                                                | Process <sup>(1)</sup>                                                    | Design <sup>(11)</sup>                |                                                                               |                                                                                                  |                                                 |                                             |                                                                |
| RT/DUROID 5000 | <b>RT/duroid® 5880LZ</b><br>Filled PTFE Composite                              | 2.00 ± 0.04                                                               | 2.00                                  | 0.0021                                                                        | +20                                                                                              | 1.74 X 10 <sup>7</sup>                          | 2.08 X 10 <sup>6</sup>                      | 0.03                                                           |
|                | <b>RT/duroid 5880</b><br>PTFE Random Glass Fiber                               | 2.20 ± 0.02                                                               | 2.20                                  | 0.0009                                                                        | -125                                                                                             | 2 X 10 <sup>7</sup>                             | 3 X 10 <sup>7</sup>                         | 0.02                                                           |
|                | <b>RT/duroid 5870</b><br>PTFE Random Glass Fiber                               | 2.33 ± 0.02                                                               | 2.33                                  | 0.0012                                                                        | -115                                                                                             | 2 X 10 <sup>7</sup>                             | 2 X 10 <sup>7</sup>                         | 0.02                                                           |
| RT/DUROID 6000 | <b>RT/duroid 6002</b><br>PTFE Ceramic                                          | 2.94 ± 0.04                                                               | 2.94                                  | 0.0012                                                                        | +12                                                                                              | 1 X 10 <sup>6</sup>                             | 1 X 10 <sup>7</sup>                         | 0.02                                                           |
|                | <b>RT/duroid 6202PR</b> <sup>(20)</sup><br>PTFE Ceramic Woven Glass Reinforced | 2.90 to 3.00<br>± 0.04                                                    | 2.90 to 3.00                          | 0.0020                                                                        | <sup>(8)</sup> +5 to -15                                                                         | 1 X 10 <sup>10</sup>                            | 1 X 10 <sup>9</sup>                         | 0.03                                                           |
|                | <b>RT/duroid 6202</b><br>PTFE Ceramic Woven Glass Reinforced                   | <sup>(8)</sup> 2.90 to 3.06                                               | <sup>(8)</sup> 2.90 to 3.06<br>± 0.04 | 0.0015                                                                        | <sup>(8)</sup> +5 to -15                                                                         | 1 X 10 <sup>6</sup>                             | 1 X 10 <sup>9</sup>                         | 0.04                                                           |
|                | <b>RT/duroid 6035HTC</b><br>PTFE Ceramic                                       | 3.50 ± 0.05                                                               | 3.60                                  | 0.0013                                                                        | -66                                                                                              | 1 X 10 <sup>8</sup>                             | 1 X 10 <sup>8</sup>                         | <sup>(12)</sup> 0.06                                           |
|                | <b>RT/duroid 6006</b><br>PTFE Ceramic                                          | 6.15 ± 0.15                                                               | 6.45                                  | 0.0027                                                                        | -410                                                                                             | 2 X 10 <sup>7</sup>                             | 7 X 10 <sup>7</sup>                         | 0.05                                                           |
|                | <b>RT/duroid 6010.2LM</b><br>PTFE Ceramic                                      | 10.20 ± 0.25                                                              | 10.7                                  | 0.0023                                                                        | -425                                                                                             | 5 X 10 <sup>5</sup>                             | 5 X 10 <sup>6</sup>                         | 0.01                                                           |
| TC SERIES      | <b>TC350™</b><br>PTFE Ceramic Woven Glass Reinforced                           | 3.50 ± 0.05                                                               | 3.50                                  | 0.0020                                                                        | -9                                                                                               | 7.4 X 10 <sup>6</sup>                           | 3.2 X 10 <sup>7</sup>                       | <sup>(22)</sup> 0.05                                           |
|                | <b>TC350 Plus</b><br>PTFE Ceramic Woven Glass Reinforced                       | 3.50 ± 0.05                                                               | 3.62                                  | 0.0017                                                                        | -42                                                                                              | 9.4 X 10 <sup>11</sup>                          | 3.3 X 10 <sup>12</sup>                      | <sup>(25)</sup> 0.05                                           |
|                | <b>TC600™</b><br>PTFE Ceramic Woven Glass Reinforced                           | 6.15 ± 0.15                                                               | 6.15                                  | 0.0020                                                                        | -75                                                                                              | 1.6 X 10 <sup>9</sup>                           | 3.1 X 10 <sup>9</sup>                       | <sup>(22)</sup> 0.03                                           |
| TMM SERIES     | <b>TMM® 3</b><br>Hydrocarbon Ceramic                                           | 3.27 ± 0.032                                                              | 3.45                                  | 0.0020                                                                        | +37                                                                                              | 3 X 10 <sup>9</sup>                             | 9 x 10 <sup>9</sup>                         | <sup>(10)</sup> 0.06                                           |
|                | <b>TMM 4</b><br>Hydrocarbon Ceramic                                            | 4.50 ± 0.045                                                              | 4.7                                   | 0.0020                                                                        | +15                                                                                              | 6 X 10 <sup>8*</sup>                            | 1 x 10 <sup>9</sup>                         | <sup>(10)</sup> 0.07                                           |
|                | <b>TMM 6</b><br>Hydrocarbon Ceramic                                            | 6.00 ± 0.08                                                               | 6.3                                   | 0.0023                                                                        | -11                                                                                              | 1 X 10 <sup>8*</sup>                            | 1 x 10 <sup>9</sup>                         | <sup>(10)</sup> 0.06                                           |
|                | <b>TMM 10</b><br>Hydrocarbon Ceramic                                           | 9.20 ± 0.23                                                               | 9.8                                   | 0.0022                                                                        | -38                                                                                              | 2 X 10 <sup>8</sup>                             | 4 X 10 <sup>7</sup>                         | <sup>(10)</sup> 0.09                                           |
|                | <b>TMM 10i</b><br>Hydrocarbon Ceramic                                          | 9.80 ± 0.245                                                              | 9.9                                   | 0.0020                                                                        | -43                                                                                              | 2 X 10 <sup>8</sup>                             | 4 X 10 <sup>7</sup>                         | <sup>(10)</sup> 0.16                                           |
|                | <b>TMM 13i</b><br>Hydrocarbon Ceramic                                          | <sup>(14)</sup> 12.85 ± 0.35                                              | 12.2                                  | 0.0019                                                                        | -70                                                                                              | -                                               | -                                           | 0.13                                                           |

| Thermal Conductivity<br>W/(m•K)<br>(Typical)<br>50°C<br>ASTM D5470 | Coefficient of Thermal Expansion <sup>(6)</sup><br>-55° to 288°C<br>ppm/°C<br>(Typical) |    |     | Peel Strength<br>1 oz (35µm)<br>ED Foil lbs/in.<br>(N/mm)<br>(Typical) | Density<br>g/cm <sup>3</sup><br>(Typical) | Flammability<br>Rating<br>UL 94 | Lead-Free <sup>(9)</sup><br>Process<br>Compatible | PIM <sup>(23)</sup><br>dBc<br>(Typical) | Product                                                                        |                |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----|-----|------------------------------------------------------------------------|-------------------------------------------|---------------------------------|---------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------|----------------|
|                                                                    | X                                                                                       | Y  | Z   |                                                                        |                                           |                                 |                                                   |                                         |                                                                                |                |
| 0.33                                                               | 54                                                                                      | 47 | 40  | >4.0                                                                   | 1.4                                       | V-0                             | YES                                               | -                                       | <b>RT/duroid® 5880LZ</b><br>Filled PTFE Composite                              | RT/DUROID 5000 |
| 0.20                                                               | 31                                                                                      | 48 | 237 | 31.2<br>(5.5)                                                          | 2.2                                       | V-0                             | YES                                               | -                                       | <b>RT/duroid 5880</b><br>PTFE Random Glass Fiber                               |                |
| 0.22                                                               | 22                                                                                      | 28 | 173 | 27.2<br>(4.8)                                                          | 2.2                                       | V-0                             | YES                                               | -                                       | <b>RT/duroid 5870</b><br>PTFE Random Glass Fiber                               |                |
| 0.60                                                               | 16                                                                                      | 16 | 24  | 8.9<br>(1.6)                                                           | 2.1                                       | V-0                             | YES                                               | -                                       | <b>RT/duroid 6002</b><br>PTFE Ceramic                                          | RT/DUROID 6000 |
| 0.68                                                               | 15                                                                                      | 15 | 30  | 14.3<br>(2.5)                                                          | 2.1                                       | V-0                             | YES                                               | -                                       | <b>RT/duroid 6202PR</b> <sup>(20)</sup><br>PTFE Ceramic Woven Glass Reinforced |                |
| 0.68                                                               | 15                                                                                      | 15 | 30  | 9.1<br>(1.6)                                                           | 2.1                                       | V-0                             | YES                                               | -                                       | <b>RT/duroid 6202</b><br>PTFE Ceramic Woven Glass Reinforced                   |                |
| 1.44                                                               | 19                                                                                      | 19 | 39  | 7.9<br>(1.4)                                                           | 2.2                                       | V-0                             | YES                                               | -                                       | <b>RT/duroid 6035HTC</b><br>PTFE Ceramic                                       |                |
| 0.49                                                               | 47                                                                                      | 34 | 117 | 14.3<br>(2.5)                                                          | 2.7                                       | V-0                             | YES                                               | -                                       | <b>RT/duroid 6006</b><br>PTFE Ceramic                                          |                |
| 0.86                                                               | 24                                                                                      | 24 | 47  | 12.3<br>(2.1)                                                          | 3.1                                       | V-0                             | YES                                               | -                                       | <b>RT/duroid 6010.2LM</b><br>PTFE Ceramic                                      | TC SERIES      |
| 0.72<br><sup>(27)</sup> 1.0                                        | 7                                                                                       | 7  | 23  | 7.0                                                                    | 2.3                                       | V-0                             | YES                                               | -                                       | <b>TC350™</b><br>PTFE Ceramic Woven Glass Reinforced                           |                |
| 1.24                                                               | 10                                                                                      | 9  | 38  | 3.8 (0.7)                                                              | TBD                                       | V-0                             | YES                                               | TBD                                     | <b>TC350 Plus</b><br>PTFE Ceramic Woven Glass Reinforced                       |                |
| 1.10                                                               | 9                                                                                       | 9  | 35  | 8.0                                                                    | 3.0                                       | V-0                             | YES                                               | -                                       | <b>TC600™</b><br>PTFE Ceramic Woven Glass Reinforced                           | TMM SERIES     |
| 0.70                                                               | 15                                                                                      | 15 | 23  | 5.7<br>(1.0)                                                           | 1.8                                       | NON FR                          | YES                                               | -                                       | <b>TMM® 3</b><br>Hydrocarbon Ceramic                                           |                |
| 0.70                                                               | 16                                                                                      | 16 | 21  | 5.7<br>(1.0)                                                           | 2.1                                       | NON FR                          | YES                                               | -                                       | <b>TMM 4</b><br>Hydrocarbon Ceramic                                            |                |
| 0.72                                                               | 18                                                                                      | 18 | 26  | 5.7<br>(1.0)                                                           | 2.4                                       | NON FR                          | YES                                               | -                                       | <b>TMM 6</b><br>Hydrocarbon Ceramic                                            |                |
| 0.76                                                               | 21                                                                                      | 21 | 20  | 5<br>(0.9)                                                             | 2.8                                       | NON FR                          | YES                                               | -                                       | <b>TMM 10</b><br>Hydrocarbon Ceramic                                           |                |
| 0.76                                                               | 19                                                                                      | 19 | 20  | 5<br>(0.9)                                                             | 2.8                                       | NON FR                          | YES                                               | -                                       | <b>TMM 10i</b><br>Hydrocarbon Ceramic                                          |                |
| <sup>(17)</sup> 0.76                                               | 19                                                                                      | 19 | 20  | 4<br>(0.7)                                                             | 3.0                                       | NON FR                          | YES                                               | -                                       | <b>TMM 13i</b><br>Hydrocarbon Ceramic                                          |                |

# BONDING MATERIALS

| Product                                                                                        | Dielectric <sup>(1)</sup><br>Constant,<br>$\epsilon_r$<br>(Typical) | Dissipation <sup>(1)</sup> Factor<br>TAN $\delta$ @ 10 GHz<br>(Typical) | Volume<br>Resistivity<br>Mohm • cm<br>(Typical) | Water <sup>(4)</sup><br>Absorption<br>D48/50 %<br>(Typical) | Thermal <sup>(5)</sup><br>Conductivity<br>W/(m•K) (Typical)<br>50°C ASTM D5470 |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------|
| <b>92ML™ Prepreg</b>                                                                           | 5.3 (1 MHz)                                                         | 0.011 (1 MHz)                                                           | 4.9 X 10 <sup>9</sup>                           | 0.12 <sup>(25)</sup>                                        | 1.60 <sup>(26)</sup>                                                           |
| <b>2929 Bondply</b>                                                                            | 2.94 ± 0.05                                                         | 0.0030                                                                  | <sup>(21)</sup> 7.4 X 10 <sup>9</sup>           | 0.1                                                         | 0.40                                                                           |
| <b>COOLSPAN® TECA</b><br>Thermoset Thermally & Electrically<br>Conductive Adhesive (TECA) Film | N/A                                                                 | N/A                                                                     | 3.8 X 10 <sup>-10</sup><br>(Conductive)         | N/A                                                         | 6.00                                                                           |
| <b>6250 Bonding Film</b>                                                                       | 2.32                                                                | 0.0013                                                                  | 1.0 X 10 <sup>10</sup>                          | 0.01 <sup>(22)</sup>                                        | 0.17                                                                           |
| <b>6700 Bonding Film</b>                                                                       | 2.35                                                                | 0.0025                                                                  | 1.0 X 10 <sup>12</sup>                          | 0.01 <sup>(22)</sup>                                        | 0.17                                                                           |
| <b>R03003™</b><br>Ceramic PTFE Bondply                                                         | 3.00 ± 0.04                                                         | 0.0010                                                                  | 1 X 10 <sup>7</sup>                             | 0.04                                                        | 0.50                                                                           |
| <b>R03006™</b><br>Ceramic PTFE Bondply                                                         | 6.15 ± 0.15                                                         | 0.0020                                                                  | 1 X 10 <sup>5</sup>                             | 0.02                                                        | 0.79                                                                           |
| <b>R03010™</b><br>Ceramic PTFE Bondply                                                         | 10.20 ± 0.30                                                        | 0.0022                                                                  | 1 X 10 <sup>5</sup>                             | 0.05                                                        | 0.95                                                                           |
| <b>R04460G2™</b><br>Hydrocarbon / Ceramic / Woven Glass / Prepreg                              | 6.15 ± 0.15                                                         | 0.0040                                                                  | 9.1 X 10 <sup>8</sup>                           | 0.13                                                        | 0.67                                                                           |
| <sup>(28)</sup> <b>R04450T™</b><br>Hydrocarbon / Ceramic / Woven Glass / Prepreg               | 3.23 ± 0.05                                                         | 0.0039                                                                  | 2.9 X 10 <sup>9</sup>                           | 0.11                                                        | 0.50                                                                           |
| <b>R04450F™</b><br>Hydrocarbon / Ceramic / Woven Glass / Prepreg                               | 3.52 ± 0.05                                                         | 0.0040                                                                  | 8.93 X 10 <sup>8</sup>                          | 0.09                                                        | 0.65                                                                           |
| <b>RT/duroid® 6002</b><br>Ceramic PTFE Bondply                                                 | 2.94 ± 0.04                                                         | 0.0012                                                                  | 1 X 10 <sup>6</sup>                             | <0.10                                                       | 0.60                                                                           |

## Properties Notes:

- (1) Measured by IPC-TM-650 method 2.5.5.5 @ ~10 GHz, 23°C. Materials were based on testing raw substrate material.  $\epsilon_r$  values and tolerance reported by IPC-TM-650 method 2.5.5.5 are the basis for quality acceptance, but for some products these values may be incorrect for design engineering applications, especially those in microstrip. We recommend that prototype boards of a new design be verified for electrical performance.
- (2) Measured by IPC-TM-650 method 2.5.5.5 at ~10GHz modified.
- (3) Typical values are mean values derived from populations of measurements involving multiple lots of the specific foil type.
- (4) Measured after 48±1 hours immersion at 50±1°C in accordance with the ASTM D570 standard.
- (5) Tested by ASTM C518.
- (6) Tested by IPC-TM-650 2.4.41. Values are average over temperature range but not necessarily linear. However for RT/duroid 6002 and TMM grades the response is essentially linear.
- (7) The nominal dielectric constant of an 0.060" thick R03003 laminate as measured by IPC-TM-2.5.5.5 will be 3.04 due to the elimination of biasing caused by air gaps in the test fixture. For further information refer to Rogers' T.R. 5242.
- (8) Due to construction limitations, the dielectric constant of 0.005" laminates is 3.06 ± 0.04; 0.010" and 0.015" laminates are 3.02 ± 0.04; TCDK is +5 for the higher Dk range; and for 2.90 TCDK is -15
- (9) Rogers' high frequency laminates and prepregs are lead-free process compatible and in accordance with IEC 61249-2-21.
- (10) TMM\* material test conditions D24/50 (twenty-four hours at 50°C) on 0.050" (1.27mm) thick specimens. TMM13i test condition D48/50.
- (11) Design Dk is determined by testing thick microstrip transmission line circuits and reporting the thickness-axis dielectric constant of the raw material without the influence of copper. For more information, refer to the article on the Rogers website titled "The Influence of Test Method, Conductor Profile, and Substrate Anisotropy on the Permittivity Values Required for Accurate Modeling of High Frequency Planar Circuits", which was featured in a publication Sept. 2012. <http://www.rogerscorp.com/acs/articles.aspx>
- (12) Testing conditions: 24 hours @ 23 C, specimens etched free of copper
- (13) Available only with LoPro® copper foil
- (14) Measured by IPC-TM-650 method 2.5.5.6.
- (15) 2oz available on TC350 Plus only
- (16) Values for 2.5 mil thickness.
- (17) Estimated

| Coefficient of Thermal Expansion <sup>(6)</sup><br>0° - 100°C ppm/°C<br>(Typical) |    |    | Density<br>g/cm <sup>3</sup><br>(Typical) | Flammability<br>Rating<br>UL 94 | Lead-Free <sup>(9)</sup><br>Process<br>Compatible | Press<br>Temperatures |     | Product                                                                          |
|-----------------------------------------------------------------------------------|----|----|-------------------------------------------|---------------------------------|---------------------------------------------------|-----------------------|-----|----------------------------------------------------------------------------------|
| X                                                                                 | Y  | Z  |                                           |                                 |                                                   | F                     | C   |                                                                                  |
| 18                                                                                | 18 | 27 | 2.26                                      | V-0                             | YES                                               | 365                   | 185 | <b>92ML™ Prepreg</b>                                                             |
| 50                                                                                | 50 | 50 | 1.50                                      | NON-FR                          | YES                                               | 450                   | 232 | <b>2929 Bondply</b>                                                              |
| 45                                                                                | 45 | 45 | 4.60                                      | NON-FR                          | YES                                               | 350                   | 175 | <b>COOLSPAN®</b><br>Thermoset & Electrically<br>Conductive Adhesive (TECA) Film  |
| -                                                                                 | -  | -  | 0.93                                      | -                               | NO                                                | 275                   | 135 | <b>6250 Bonding Film</b>                                                         |
| -                                                                                 | -  | -  | 2.10                                      | -                               | NO                                                | 450                   | 232 | <b>6700 Bonding Film</b>                                                         |
| 17                                                                                | 16 | 25 | 2.10                                      | V-0                             | YES                                               | 700                   | 370 | <b>R03003™</b><br>Ceramic PTFE Bondply                                           |
| 17                                                                                | 17 | 24 | 2.60                                      | V-0                             | YES                                               | 700                   | 370 | <b>R03006™</b><br>Ceramic PTFE Bondply                                           |
| 13                                                                                | 11 | 16 | 2.80                                      | V-0                             | YES                                               | 700                   | 370 | <b>R03010™</b><br>Ceramic PTFE Bondply                                           |
| 15                                                                                | 18 | 43 | 2.22                                      | V-0                             | YES                                               | 350                   | 175 | <b>R04460G2™</b><br>Hydrocarbon / Ceramic / Woven Glass / Prepreg                |
| 20                                                                                | 21 | 57 | 1.83                                      | V-0                             | YES                                               | 350                   | 175 | <sup>(28)</sup> <b>R04450T™</b><br>Hydrocarbon / Ceramic / Woven Glass / Prepreg |
| 19                                                                                | 17 | 50 | 1.83                                      | V-0                             | YES                                               | 350                   | 175 | <b>R04450F™</b><br>Hydrocarbon / Ceramic / Woven Glass / Prepreg                 |
| 16                                                                                | 16 | 24 | 2.10                                      | V-0                             | YES                                               | 700                   | 370 | <b>RT/duroid® 6002</b><br>Ceramic PTFE Bondply                                   |

#### Properties Notes Continued:

(18) IPC-TM-650.2.5.5.5.1

(19) Test method: ASTM D5470-12 @ 50°C

(20) PR stands for Planar Resistor. Resistive foil, if required, must be specified when ordering 6202PR laminate.

(21) Conditions 125°C/24 hours. Test method IPC-TM-650 2.5.17.1

(22) Measured after 24+½-0 hours immersion at 23 ± 1°C in accordance with the ASTM D570 standard.

(23) 12 microstrip transmission line test circuit on 0.060" thick laminate.

(24) N/A

(25) (D24/23) IPC TM-650 2.6.2.1

(26) ASTM E1461

(27) 1.0 W/(m•K) based on ASTM E1461

(28) Values for 3 mil thickness.

(29) Measured using differential phase length method at 77GHz.

(30) Value shown is for 1/2 oz ED copper.

Typical values are a representation of an average value for the population of the property.  
For specification values contact Rogers Corporation.

The information contained in this Product Selector Guide is intended to assist you in designing with Rogers' circuit materials. It is not intended to and does not create any warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose. The user should determine the suitability of Rogers' circuit materials for each application.

Prolonged exposure in an oxidative environment may cause changes to the dielectric properties of hydrocarbon based materials. The rate of change increases at higher temperatures and is highly dependent on the circuit design. Although Rogers' high frequency materials have been used successfully in innumerable applications and reports of oxidation resulting in performance problems are extremely rare, Rogers recommends the customer evaluate each material and design combination to determine fitness for use over the entire life of the end product.

# Metal Claddings

| Foil Type        |                                              | Weight or Thickness | Surface Roughness Sq(μm) or RMS(μm) |                                                                                                                                                                                                                          | Products                                                                                                                                                                   |
|------------------|----------------------------------------------|---------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  |                                              |                     | Dielectric Side                     | Top Side                                                                                                                                                                                                                 |                                                                                                                                                                            |
| Rolled           | 1 oz (35 μm)                                 | 0.4                 | 0.3                                 | XtremeSpeed™ R01200™, R03003™, R03035™, RT/duroid® 5870, 5880, 6002, 6202, CLTE™, CLTE-AT™, CLTE-XT™, CLTE-MW™, CuClad® 217, CuClad® 233, CuClad® 250, DiClad® 527, DiClad® 870, DiClad® 880, IsoClad® 917, IsoClad® 933 |                                                                                                                                                                            |
|                  | ½ oz. (18 μm)                                | 0.4                 | 0.3                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
| Electrodeposited | 2 oz (70 μm)                                 | 1.6                 | 0.4                                 | TC350™, TC600™, AD250™, AD255™, AD300™, AD350™                                                                                                                                                                           |                                                                                                                                                                            |
|                  | 1 oz (35 μm)                                 | 1.5                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | ½ oz. (18 μm)                                | 1.6                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | 2 oz (70 μm)                                 | 3.0                 | 0.4                                 | CuClad 217, CuClad 233, CuClad 250, DiClad 527, DiClad 870, DiClad 880, IsoClad 917, IsoClad 933, CuClad, CLTE, CLTE-AT, CLTE-XT, CLTE-MW, AD1000™                                                                       |                                                                                                                                                                            |
|                  | 1 oz (35 μm)                                 | 1.7                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | ½ oz. (18 μm)                                | 1.5                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | 1 oz (35 μm)                                 | 2.4                 | 0.4                                 | R03003, R03006, R03010, R03035, R03210, RT/duroid 5870, 5880, 5880LZ, 6002, 6035HTC(not available with 1/4 oz cu) , 6202, 6006, 6010.2LM, TMM® 3,4, 6,10, 10i, 13i                                                       |                                                                                                                                                                            |
|                  | ½ oz. (18 μm)                                | 2.0                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | ¼ oz. (9 μm)                                 | 1.3                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | 4 oz (140 μm)                                | 3.0                 | 0.4                                 | 92ML™ Series, 92ML™ StaCool                                                                                                                                                                                              |                                                                                                                                                                            |
|                  | 3 oz (105 μm)                                | 3.2                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | 2 oz. (70 μm)                                | 3.5                 | 0.4                                 | Kappa™ 438, R04003C™, R04350B™, R04360G2™ R04533™, R04534™, R04535™, R04835™, 92ML Series, 92ML StaCool, CU4000                                                                                                          |                                                                                                                                                                            |
|                  | 1 oz. (35 μm)                                | 3.2                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | ½ oz. (18 μm)                                | 2.8                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | 1 oz. (35 μm)                                | 0.5                 | 0.4                                 | XtremeSpeed R01200, AD300D™-IM™, AD255C™-IM, DiClad 880®-IM                                                                                                                                                              |                                                                                                                                                                            |
|                  | ½ oz. (18 μm)                                | 0.5                 | 0.4                                 | XtremeSpeed R01200                                                                                                                                                                                                       |                                                                                                                                                                            |
|                  | 2 oz. (70 μm)                                | -                   | 0.4                                 | R04835T™<br>R03003G2™ (1/2oz, 1oz only)                                                                                                                                                                                  |                                                                                                                                                                            |
|                  | 1 oz. (35 μm)                                | -                   | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | ½ oz. (18 μm)                                | 0.7                 | 0.4                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
|                  | Electrodeposited Low Profile Reverse Treated | 2 oz. (70 μm)       | 1.0                                 | 2.0                                                                                                                                                                                                                      | DiClad 527, DiClad 870, DiClad 880, IsoClad 917, IsoClad 933, CuClad 217, CuClad 233, CuClad 250, CLTE, CLTE-AT, CLTE-XT, CLTE-MW, AD1000, XtremeSpeed R01200 (2 oz. only) |
| 1 oz. (35 μm)    |                                              | 1.0                 | 1.3                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
| ½ oz. (18 μm)    |                                              | 1.0                 | 0.8                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
| 2 oz. (70 μm)    |                                              | 1.0                 | 1.8                                 | AD250, AD255, AD300, AD350, RT/duroid 6002, 6006, 6010.2LM, 6202, 6002PR, 6202PR, TC350, TC600, TC350™ Plus                                                                                                              |                                                                                                                                                                            |
| 1 oz. (35 μm)    |                                              | 1.0                 | 1.5                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
| ½ oz. (18 μm)    |                                              | 1.0                 | 1.0                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
| LoPro® Foil      | 1 oz. (35 μm)                                | 0.9                 | 1.3                                 | R04003C, R04350B, R04533, R04534, R04535, R04725JXR™, R04730JXR™, R04730G3™, R04830™, R04835, CU4000 LoPro                                                                                                               |                                                                                                                                                                            |
|                  | ½ oz. (18 μm)                                | 0.9                 | 0.8                                 |                                                                                                                                                                                                                          |                                                                                                                                                                            |
| Resistive Foil   | NiCr Ticer TCR-HF<br>½ oz. (18 μm)           | 0.8                 | 0.4                                 | R04003C, R04350B, R04360G2, R04835                                                                                                                                                                                       |                                                                                                                                                                            |
|                  | OhmegaPly®<br>½ oz (18 μm)                   | 1.7                 | 0.4                                 | R04003C                                                                                                                                                                                                                  |                                                                                                                                                                            |
|                  | OhmegaPly<br>½ oz. (18 μm)                   | 1.2                 | 0.4                                 | CuClad 217, CuClad 233, CuClad 250, CLTE, CLTE-XT, DiClad 527, DiClad 870, DiClad 880, IsoClad 917, IsoClad 933, R03003, R03006, R03010, R03035, R03210, RT/duroid 5870, 5880, 6002, 6202, 6006, 6010.2LM                |                                                                                                                                                                            |
| Plates           | Alloy                                        | Machinability       | Density gm/cm³                      | Thermal Conductivity W/(m•K)                                                                                                                                                                                             | Coefficient of Thermal Expansion ppm/C                                                                                                                                     |
| Aluminum         | 6061                                         | Poor                | 2.7                                 | 150                                                                                                                                                                                                                      | 24                                                                                                                                                                         |
| Brass            | 70/30 Cartridge                              | Good                | 8.5                                 | 120                                                                                                                                                                                                                      | 20                                                                                                                                                                         |
| Copper           | 110                                          | Fair to Good        | 8.9                                 | 390                                                                                                                                                                                                                      | 17                                                                                                                                                                         |

| Property                  | Electrodeposited (ED) |                  |                  |                  | Rolled (RLD)     |                  |                  |
|---------------------------|-----------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                           | ¼ oz (9 μm)           | 0.5 oz (18 μm)   | 1 oz. (35 μm)    | 2 oz (70 μm)     | 0.5 oz (18 μm)   | 1 oz. (35 μm)    | 2 oz.(70 μm)     |
| Tensile Strength, kpsi    | 15                    | 33               | 40               | 40               | 20               | 22               | 28               |
| Elongation, %             | 2                     | 2                | 3                | 3                | 8                | 13               | 27               |
| Vol Resistivity mohm • cm | -                     | 1.66             | 1.62             | 1.62             | 1.78             | 1.74             | 1.74             |
| Thickness: in (μm)        | 0.0004<br>(10.2)      | 0.0007<br>(17.8) | 0.0014<br>(35.6) | 0.0028<br>(71.1) | 0.0007<br>(17.8) | 0.0014<br>(35.6) | 0.0028<br>(71.1) |

Rogers Advanced Connectivity Solutions (ACS) produces upon request a select number of copper clad laminates using commercially available, subtractively processed resistive foils. Resistive foil technology enables the use of planar resistors within the circuit boards that are made from our laminate products. The availability of these resistive foils varies depending on each particular copper clad laminate product offered by ACS. However, in general ACS uses both OhmegaPly® foil from Ohmega Technologies, Inc. (<http://ohmega.com/>) and TCR® foil from Ticer Technologies (<http://www.ticertechnologies.com/>). ACS customers are encouraged to research the specific resistive foil products that are available as well as the performance and processing details from each foil supplier prior to placing orders with Rogers.

# Thickness, Tolerance & Panel Size inches (mm)

## Laminates

| Product       | Standard Dielectric Thickness<br>(Without The Cladding)                                                                                                                                                           | Available Claddings                                                                                                                                                                                              | Standard Panel Sizes                                     |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| 92ML™         | 0.003" (0.076mm) ± 0.0007"<br>0.004" (0.102mm) ± 0.0007"<br>0.006" (0.152mm) ± 0.0010"<br>0.008" (0.203mm) ± 0.0015"                                                                                              | 1 oz (35µm), 2 oz (70µm), 3 oz (105µm), 4 oz (140µm) ED                                                                                                                                                          | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)   |
| 92ML StaCool™ | 0.003" (0.076mm) ± 0.0007"<br>0.004" (0.102mm) ± 0.0007"<br>0.006" (0.152mm) ± 0.0010"<br>0.008" (0.203mm) ± 0.0015"                                                                                              | 1 oz (35µm), 2 oz (70µm), 3 oz (105µm), 4 oz (140µm) ED<br>0.040", 0.059", 0.079"<br>Thick Al - 5052 and 6061 alloys                                                                                             | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)   |
| AD250C™       | 0.020" (0.508mm) ± 0.0020"<br>0.030" (0.762mm) ± 0.0020"<br>0.060" (1.524mm) ± 0.0030"<br>0.125" (3.175mm) ± 0.0060"                                                                                              | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT                                                                                                                             | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)   |
| AD255C™       | 0.030" (0.762mm) ± 0.0020"<br>0.040" (1.016mm) ± 0.0020"<br>0.060" (1.524mm) ± 0.0030"<br>0.125" (3.175mm) ± 0.0060"                                                                                              | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT                                                                                                                             | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)   |
| AD300D™       | 0.030" (0.762mm)<br>0.060" (1.524mm)                                                                                                                                                                              | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>1 oz (35µm) IM                                                                                                                                                       | 24" X 18" (610mm X 457mm)<br>48" X 54" (1220mm X 1372mm) |
| AD350A™       | 0.020" (0.508mm) ± 0.0015"<br>0.030" (0.762mm) ± 0.0020"<br>0.060" (1.524mm) ± 0.0030"<br>0.120" (3.048mm) ± 0.0060"                                                                                              | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT                                                                                                                             | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)   |
| AD1000™       | 0.0105" (0.267mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0015"<br>0.030" (0.762mm) ± 0.0020"<br>0.059" (1.499mm) ± 0.0030"<br>0.120" (3.048mm) ± 0.0060"                                                               | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>Thick metal Aluminum, Copper, Brass                                                                                      | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm)   |
| CLTE-XT™      | 0.0051" (0.130mm) ± 0.0005"<br>0.0094" (0.239mm) ± 0.0007"<br>0.0145" (0.368mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0010"<br>0.030" (0.762mm) ± 0.0010"<br>0.060" (1.524mm) ± 0.0020"<br>0.120" (3.048mm) ± 0.0050" | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled<br>½ oz (18µm), 1 oz (35µm) Ohmega resistive foil<br>Thick metal Aluminum, Copper, Brass | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm)   |

Other dielectric thicknesses and panel sizes may be available. Contact customer service.

# Thickness, Tolerance & Panel Size inches (mm)

## Laminates

| Product      | Standard Dielectric Thickness<br>(Without The Cladding)                                                                                                                                                                                       | Available Claddings                                                                                                                                                                                              | Standard Panel Sizes                                   |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| CLTE™        | 0.0053" (0.135mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0010"<br>0.015" (0.381mm) ± 0.0015"<br>0.020" (0.508mm) ± 0.0020"<br>0.024" (0.610mm) ± 0.0020"<br>0.030" (0.762mm) ± 0.0020"<br>0.060" (1.524mm) ± 0.0040"<br>0.125" (3.175mm) ± 0.0060" | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled<br>½ oz (18µm), 1 oz (35µm) Ohmega Resistive Foil<br>Thick metal Aluminum, Copper, Brass | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm) |
| CLTE-AT™     | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0007"<br>0.015" (0.381mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0015"<br>0.030" (0.762mm) ± 0.0020"<br>0.060" (1.524mm) ± 0.0030"<br>0.120" (3.048mm) ± 0.0060"                                | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled                                                                                          | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm) |
| CLTE-MW™     | 0.003" (0.076mm) ± 0.0005"<br>0.004" (0.102mm) ± 0.0005"<br>0.005" (0.127mm) ± 0.0007"<br>0.006" (0.152mm) ± 0.0007"<br>0.007" (0.178mm) ± 0.001"<br>0.008" (0.203mm) ± 0.001"<br>0.010" (0.254mm) ± 0.001"                                   | ½ oz (18µm), 1 oz (35µm), 2oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm), 2oz (70µm) Rolled                                                                                | 12"x 18" (305mm x 457mm)<br>24"x 18" (610mm x 457mm)   |
| CuClad® 217  | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0015"<br>0.031" (0.787mm) ± 0.0020"<br>0.062" (1.524mm) ± 0.0020"<br>0.125" (3.175mm) ± 0.0040"<br>0.250" (6.350mm) ± 0.0080"                                | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled<br>½ oz (18µm), 1 oz (35µm) Ohmega Resistive Foil<br>Thick metal Aluminum, Copper, Brass | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm) |
| CuClad 233   | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0015"<br>0.031" (0.787mm) ± 0.0020"<br>0.062" (1.575mm) ± 0.0020"<br>0.125" (3.175mm) ± 0.0040"<br>0.250" (6.350mm) ± 0.0080"                                | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled<br>½ oz (18µm), 1 oz (35µm) Ohmega Resistive Foil<br>Thick metal Aluminum, Copper, Brass | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm) |
| CuClad 250   | 0.0053" (0.135mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0009"<br>0.020" (0.508mm) ± 0.0020"<br>0.031" (0.787mm) ± 0.0020"<br>0.062" (1.575mm) ± 0.0020"<br>0.125" (3.175mm) ± 0.0040"                                                             | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled<br>½ oz (18µm), 1 oz (35µm) Ohmega Resistive Foil<br>Thick metal Aluminum, Copper, Brass | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm) |
| DiClad® 880  | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0015"<br>0.030" (0.762mm) ± 0.0020"<br>0.060" (1.524mm) ± 0.0020"<br>0.125" (3.175mm) ± 0.0040"                                                              | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled<br>½ oz (18µm), 1 oz (35µm) Ohmega Resistive Foil<br>Thick metal Aluminum, Copper, Brass | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm) |
| DiClad 870   | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0015"<br>0.030" (0.762mm) ± 0.0020"<br>0.060" (1.524mm) ± 0.0030"<br>0.125" (3.175mm) ± 0.0040"                                                              | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled<br>½ oz (18µm), 1 oz (35µm) Ohmega Resistive Foil<br>Thick metal Aluminum, Copper, Brass | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm) |
| DiClad 527   | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0020"<br>0.031" (0.787mm) ± 0.0020"<br>0.060" (1.524mm) ± 0.0020"<br>0.125" (3.175mm) ± 0.0050"                                                              | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled<br>½ oz (18µm), 1 oz (35µm) Ohmega Resistive Foil<br>Thick metal Aluminum, Copper, Brass | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm) |
| IsoClad® 917 | 0.005" (0.127mm) ± 0.0007"<br>0.010" (0.254mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0020"<br>0.031" (0.787mm) ± 0.0020"<br>0.062" (1.524mm) ± 0.0030"<br>0.125" (3.175mm) ± 0.0090"<br>0.250" (6.350mm) ± 0.0120"                                | ½ oz (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) RT<br>½ oz (18µm), 1 oz (35µm) rolled<br>½ oz (18µm), 1 oz (35µm) Ohmega Resistive Foil<br>Thick metal Aluminum, Copper, Brass | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm) |

Other dielectric thicknesses and panel sizes may be available. Contact customer service.

# Thickness, Tolerance & Panel Size inches (mm)

## Laminates

| Product                                                                                   | Standard Dielectric Thickness<br>(Without The Cladding)                                                                                                                                                                                                                                                                                                                                   | Available Claddings                                                                                                                                                                                                                                                           | Standard Panel Sizes                                                                                                                                            |
|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kappa™ 438                                                                                | 0.020" (0.508mm) ± 0.0015"<br>0.030" (0.762mm) ± 0.0020"<br>0.040" (1.016mm) ± 0.0030"<br>0.060" (1.524mm) ± 0.0040"                                                                                                                                                                                                                                                                      | ½ oz (18µm) ED, 1 oz (35µm) ED                                                                                                                                                                                                                                                | 24" X 18" (610mm X 457mm)<br>24.25" X 18.25" (616mm X 464mm)<br>48" X 36" (1220mm X 914mm)<br>48.25" X 36.25" (1226mm X 921mm)                                  |
| XtremeSpeed™ R01200™                                                                      | 0.003" (0.076mm)<br>0.004" (0.102mm)<br>0.005" (0.127mm)<br>0.006" (0.152mm)<br>0.007" (0.178mm)<br>0.008" (0.203mm)<br>0.010" (0.254mm)                                                                                                                                                                                                                                                  | ½ oz (18µm), 1 oz (35µm) RA<br>2 oz (70µm) ED & Reverse Treat                                                                                                                                                                                                                 | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>24" X 36" (610mm X 914mm)                                                                             |
| R03003G2™                                                                                 | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0007"                                                                                                                                                                                                                                                                                                                                  | ½ oz (18µm) ED, 1 oz (35µm) ED                                                                                                                                                                                                                                                | 24" X 18" (610mm X 457mm)<br>24" X 21" (610mm X 533mm)                                                                                                          |
| R03003™<br>R03035™                                                                        | 0.005" (0.127mm) ± 0.0005"<br>(R03203 not available with 0.005" (0.127mm))<br>0.010" (0.254mm) ± 0.0007"<br>0.020" (0.508mm) ± 0.001"<br>0.030" (0.762mm) ± 0.0015"<br>0.060" (1.524mm) ± 0.003"<br>Additional non-standard thicknesses available between 0.005" and 0.250"                                                                                                               | ¼ oz (9µm) ED, ½ oz (18µm) ED, 1 oz (35µm) ED, 2 oz (70µm) ED<br><br>½ oz (18µm), 1 oz (35µm), 2 oz (70µm) Rolled Cu<br>* Additional charges may apply for Rolled Cu<br><br>½ oz (18µm) and 1 oz (35µm) Ohmega Resistive Foil                                                 | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)                                                                                                          |
| R03006™<br>R03010™<br>*R03210™<br>*not available in 0.005" (0.127mm) and 0.010" (0.254mm) | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0007"<br>0.025" (0.635mm) ± 0.001"<br>0.050" (1.270mm) ± 0.002"<br>Additional non-standard thicknesses available between 0.005" and 0.250"                                                                                                                                                                                             | ½ oz (18µm) ED, 1 oz (35µm) ED<br><br>½ oz (18µm), 1 oz (35µm)<br>LoPro reverse treated ED foil<br><br>½ oz (18µm), 1 oz (35µm)<br>Ohmega Resistive Foil                                                                                                                      | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)                                                                                                          |
| R04725JXR™                                                                                | 0.0307" (0.780mm) ± 0.002"<br>0.0607" (1.542mm) ± 0.004"                                                                                                                                                                                                                                                                                                                                  | ½ oz (18µm), 1 oz (35µm)<br>LoPro reverse treated ED foil                                                                                                                                                                                                                     | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>24" X 36" (610mm X 914mm)<br>48" X 36" (1220mm X 914mm)<br>Larger sizes may be available upon request |
| R04730JXR™ / R04730G3™                                                                    | 0.0057" (0.145mm) ± 0.0007" (R04730G3 only)<br>0.0107" (0.272mm) ± 0.001" (R04730G3 only)<br>0.0207" (0.529mm) ± 0.001"<br>0.0307" (0.780mm) ± 0.002"<br>0.0407" (1.034mm) ± 0.003"<br>0.0607" (1.542mm) ± 0.004"                                                                                                                                                                         | ½ oz (18µm), 1 oz (35µm)<br>LoPro reverse treated ED foil                                                                                                                                                                                                                     | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>24" X 36" (610mm X 914mm)<br>48" X 36" (1220mm X 914mm)<br>Larger sizes may be available upon request |
| R04533™                                                                                   | 0.030" (0.762mm) ± 0.002"<br>0.040" (1.016mm) ± 0.003"<br>0.060" (1.524mm) ± 0.004"                                                                                                                                                                                                                                                                                                       | ½ oz (18µm) ED, 1 oz (35µm) ED                                                                                                                                                                                                                                                | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>24" X 36" (610mm X 914mm)<br>48" X 36" (1220mm X 914mm)                                               |
|                                                                                           | 0.0307" (0.780mm) ± 0.002"<br>0.0407" (1.034mm) ± 0.003"<br>0.0607" (1.542mm) ± 0.004"                                                                                                                                                                                                                                                                                                    | ½ oz (18µm), 1 oz (35µm)<br>LoPro reverse treated ED foil                                                                                                                                                                                                                     |                                                                                                                                                                 |
| *R04003C™<br>R04360G2™                                                                    | 0.008" (0.203mm) ± 0.001"<br>0.012" (0.305mm) ± 0.001"<br>0.016" (0.406mm) ± 0.0015"<br>0.020" (0.508mm) ± 0.0015"<br>0.032" (0.813mm) ± 0.002"<br>0.060" (1.524mm) ± 0.004"<br>*Non-standard thicknesses available in 4 mil increments starting from a 20 mil base                                                                                                                       | ½ oz (18µm) ED, 1 oz (35µm) ED, 2 oz (70µm) ED<br><br>½ oz (18µm), 1 oz (35µm)<br>LoPro reverse treated ED foil<br>LoPro foil will add .0007" (0.0177mm) to the board thickness<br>LoPro foil not available with R04360G2 laminate<br><br>½ oz Ticer Resistive Foil available | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>48" X 36" (1220mm X 914mm)                                                                            |
| R04350B™/ R04835™                                                                         | 0.0040" (0.101mm) ± 0.0007"<br>(R04835 0.0040" available with LoPro foil only)<br>0.0066" (0.168mm) ± 0.0007"<br>0.010" (0.254mm) ± 0.001"<br>0.0133" (0.338mm) ± 0.0015"<br>0.0166" (0.422mm) ± 0.0015"<br>0.020" (0.508mm) ± 0.0015"<br>0.030" (0.762mm) ± 0.002"<br>0.060" (1.524mm) ± 0.004"<br>*Non-standard thicknesses available in 3.3 mil increments starting from a 20 mil base | ½ oz (18µm) ED, 1 oz (35µm) ED, 2 oz (70µm) ED<br><br>½ oz (18µm), 1 oz (35µm)<br>LoPro reverse treated ED foil<br>LoPro foil will add .0007" (0.0177mm) to the board thickness<br><br>½ oz Ticer Resistive Foil available                                                    | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>48" X 36" (1220mm X 914mm)                                                                            |
| R04835T™                                                                                  | 0.0025" (0.064mm) ± 0.0006<br>0.0030" (0.076mm) ± 0.0006<br>0.0040" (0.101mm) ± 0.0006                                                                                                                                                                                                                                                                                                    | ½ oz (18µm) ED, 1 oz (35µm) ED                                                                                                                                                                                                                                                | 12"x 18" (305mm X 457mm)<br>24"x 18" (610mm X 457mm)                                                                                                            |

Other dielectric thicknesses and panel sizes may be available. Contact customer service.

# Thickness, Tolerance & Panel Size inches (mm)

## Laminates

| Product                              | Standard Dielectric Thickness<br>(Without The Cladding)                                                                                                                                                                                                                                                                                                              | Available Claddings                                                                                                                                                                                                                                                                                                 | Standard Panel Sizes                                                                                                                                                                                              |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R04830™                              | 0.0050" (0.127mm) ± 0.0006"<br>0.0094" (0.239mm) ± 0.0010"                                                                                                                                                                                                                                                                                                           | ½ oz (18µm), 1 oz (35µm) LoPro reverse treated ED foil                                                                                                                                                                                                                                                              | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>48" X 36" (1220mm X 914mm)                                                                                                                              |
| R04534™                              | 0.032" (0.813mm) ± 0.002"<br>0.040" (1.016mm) ± 0.003"<br>0.060" (1.524mm) ± 0.004"                                                                                                                                                                                                                                                                                  | ½ oz (18µm) ED, 1 oz (35µm) ED                                                                                                                                                                                                                                                                                      | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>24" X 36" (610mm X 914mm)<br>48" X 36" (1220mm X 914mm)                                                                                                 |
|                                      | 0.0327" (0.831mm) ± 0.002"<br>0.0407" (1.034mm) ± 0.003"<br>0.0607" (1.542mm) ± 0.004"                                                                                                                                                                                                                                                                               | ½ oz (18µm), 1 oz (35µm)<br>LoPro reverse treated ED foil                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                   |
| R04535™                              | 0.030" (0.762mm) ± 0.002"<br>0.040" (1.016mm) ± 0.003"<br>0.060" (1.524mm) ± 0.004"                                                                                                                                                                                                                                                                                  | ½ oz (18µm) ED, 1 oz (35µm) ED                                                                                                                                                                                                                                                                                      | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>24" X 36" (610mm X 914mm)<br>48" X 36" (1220mm X 914mm)                                                                                                 |
|                                      | 0.0307" (0.780mm) ± 0.002"<br>0.0407" (1.034mm) ± 0.003"<br>0.0607" (1.542mm) ± 0.004"                                                                                                                                                                                                                                                                               | ½ oz (18µm), 1 oz (35µm)<br>LoPro reverse treated ED foil                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                   |
| RT/duroid 5880LZ                     | 0.010" (0.254mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0010"<br>0.025" (0.635mm) ± 0.0020"<br>0.030" (0.762mm) ± 0.0020"<br>0.040" (1.016mm) ± 0.0020"<br>0.050" (1.270mm) ± 0.0030"<br>0.100" (2.540mm) ± 0.0050"<br>0.170" (4.318 mm) ± 0.0080"<br>Non-standard and custom thicknesses available.<br>Please check with Rogers' Representative to confirm availability. | ½ oz (18µm) ED, 1 oz (35µm) ED                                                                                                                                                                                                                                                                                      | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>Non-Standard size available up to<br>24" X 54" (610mm X 1372mm)                                                                                         |
| RT/duroid® 5870<br>RT/duroid 5880    | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0007"<br>0.015" (0.381mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0010"<br>0.031" (0.787mm) ± 0.0010"<br>0.062" (1.575mm) ± 0.0020"<br>Non-standard and custom thicknesses available.<br>Please check with Rogers' Representative to confirm availability.                                                              | ¼ oz (9µm)*, ½ (18µm), 1 oz (35µm), 2 oz (70µm)* ED<br>½ (18µm), 1 oz (35µm), 2 oz (70µm)* Rolled Copper<br>½ (18µm), 1 oz (35µm), 2 oz (70µm)* Reverse Treated<br>½ (18µm), 1 oz (35µm) Ohmega resistive foil<br><br>Aluminum, Copper, Brass thick metal claddings may be available based on dielectric thickness* | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm)<br>Non-Standard size may be available up to<br>18" X 48" (457mm X 1219mm)                                                                                  |
| RT/duroid 6002                       | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0007"<br>0.020" (0.508mm) ± 0.0010"<br>0.030" (0.762mm) ± 0.0015"<br>0.060" (1.524mm) ± 0.0020"<br>0.120" (3.048mm) ± 0.0060"<br>Non-standard and custom thicknesses available.<br>Please check with Rogers' Representative to confirm availability.                                                              | ¼ oz (9µm)*, ½ (18µm), 1 oz (35µm), 2 oz (70µm)* ED<br>½ (18µm), 1 oz (35µm), 2 oz (70µm)* Rolled Copper<br>½ (18µm), 1 oz (35µm) Ohmega resistive foil<br>½ (18µm), 1 oz (35µm), 2 oz (70µm)* Reverse Treated<br><br>Aluminum, Copper, Brass thick metal claddings may be available based on dielectric thickness* | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm)<br>Non-Standard size available up to<br>24" X 54" (610mm X 1372mm)                                                                                         |
| RT/duroid 6202                       | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0007"<br>0.015" (0.381mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0010"<br>0.030" (0.762mm) ± 0.0010"<br>0.060" (1.524mm) ± 0.0020"                                                                                                                                                                                     | ¼ oz (9µm)*, ½ (18µm), 1 oz (35µm), 2 oz (70µm)* ED<br>½ (18µm), 1 oz (35µm), 2 oz (70µm)* Rolled Copper<br>½ (18µm), 1 oz (35µm) Ohmega resistive foil<br>½ (18µm), 1 oz (35µm), 2 oz (70µm)* Reverse Treated                                                                                                      | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>Non-Standard size available up to<br>24" X 54" (610mm X 1372mm)                                                                                         |
| RT/duroid 6202PR                     | 0.005" (0.127mm) ± 0.0005"<br>0.010" (0.254mm) ± 0.0007"<br>0.015" (0.381mm) ± 0.0010"<br>0.020" (0.508mm) ± 0.0010"                                                                                                                                                                                                                                                 | ¼ oz (9µm)*, ½ (18µm), 1 oz (35µm), 2 oz (70µm)* ED<br>½ (18µm), 1 oz (35µm), 2 oz (70µm)* Reverse Treated<br>½ (18µm), 1 oz (35µm), 2 oz (70µm)* Rolled Copper<br>½ (18µm), 1 oz (35µm) Ohmega-ply® resistive foil                                                                                                 | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>Non-Standard size available up to<br>24" X 54" (610mm X 1372mm)                                                                                         |
| RT/duroid 6035HTC                    | 0.010" (0.254mm) ± 0.0007"<br>0.020" (0.508mm) ± 0.001"<br>0.030" (0.762mm) ± 0.0015"<br>0.060" (1.524mm) ± 0.003"                                                                                                                                                                                                                                                   | ½ (18µm), 1 oz (35µm), 2 oz (70µm) ED<br>½ (18µm), 1 oz (35µm) Reverse Treated                                                                                                                                                                                                                                      | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)                                                                                                                                                            |
| RT/duroid 6010.2LM<br>RT/duroid 6006 | 0.010" (0.254mm) ± 0.0010"<br>0.025" (0.635mm) ± 0.0010"<br>0.050" (1.270mm) ± 0.0020"<br>0.075" (1.905mm) ± 0.0040"<br>0.100" (2.540mm) ± 0.0050"<br>Non-standard and custom thicknesses available.<br>Please check with Rogers' Representative to confirm availability.                                                                                            | ¼ oz (9µm)*, ½ (18µm), 1 oz (35µm), 2* ED<br>½ (18µm), 1 oz (35µm), 2 oz (70µm)* Reverse Treated<br>½ (18µm), 1 oz (35µm) Ohmega resistive foil<br><br>Aluminum, Copper, Brass thick metal claddings may be available based on dielectric thickness*                                                                | 10" X 10" (254mm X 254mm)<br>10" X 20" (254mm X 508mm)<br>18" X 12" (457mm X 305mm)<br><br>18" X 12" and 18" X 24" Available in 0.025" Dielectric Thickness Increments Only and not Available in 0.010" (0.254mm) |

Other dielectric thicknesses and panel sizes may be available. Contact customer service.

\* Please check with Rogers' representative to confirm availability.

## Thickness, Tolerance & Panel Size inches (mm)

## Laminates

[illegible]

Other dielectric thicknesses and panel sizes may be available. Contact customer service.

## Thickness, Tolerance & Panel Size inches (mm)

## Bonding Materials

| Product                                                                                        | Standard Dielectric Thickness<br>(Without The Cladding)                                   | Available Claddings | Standard Panel Sizes                                                                      |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------|
| <b>2929</b><br>Thermoset Bondply                                                               | 0.0015" (0.038mm)<br>0.0020" (0.051mm)<br>0.0030" (0.076mm)                               | N/A                 | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm)                                    |
| <b>92ML Prepreg</b><br>Ceramic Filled Thermoset Prepreg                                        | 104 88% 0.0032" (0.081mm)<br>106 90% 0.0042" (0.107mm)<br>1080 85% 0.0060" (0.152mm)      | N/A                 | 24" X 18" (610mm X 457mm)<br>12" X 18" (305mm X 457mm)                                    |
| <b>COOLSPAN® TECA</b><br>Thermoset Thermally & Electrically<br>Conductive Adhesive (TECA) Film | 0.0020" (0.051mm) ± 0.0005"<br>0.0040" (0.102mm) ± 0.0005"                                | N/A                 | 10" X 12" (254mm X 305mm)                                                                 |
| <b>6250</b><br>Thermoplastic Bonding Film                                                      | 0.0015" (0.038mm)                                                                         | N/A                 | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>24" X 30' Roll (610mm X 9.144m) |
| <b>6700</b><br>Thermoplastic Bonding Film                                                      | 0.0015" (0.038mm)<br>0.0030" (0.076mm)                                                    | N/A                 | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>24" X 30' Roll (610mm X 9.144m) |
| <b>R03003™, R03006™, R03010™ Bondply</b><br>Thermoplastic - Ceramic PTFE Bondply               | 0.0050" (0.127mm)                                                                         | N/A                 | 25.5" X 18" (648mm X 457mm)                                                               |
| <b>R04450F™</b><br>Thermoset - Hydrocarbon /<br>Ceramic / Woven Glass / Prepreg                | 0.0040" (0.102mm) ± 0.0007"                                                               | N/A                 | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>48" X 36" (1220mm X 914mm)      |
| <b>R04450T</b><br>Thermoset - Hydrocarbon /<br>Ceramic / Woven Glass / Prepreg                 | 0.0030" (0.076mm) ± 0.0007"<br>0.0040" (0.101mm) ± 0.0007"<br>0.0050" (0.127mm) ± 0.0007" | N/A                 | 12" X 18" (305mm X 457mm)<br>24" X 18" (610mm X 457mm)<br>48" X 36" (1220mm X 914mm)      |
| <b>R04460G2</b><br>Thermoset - Hydrocarbon /<br>Ceramic / Woven Glass / Prepreg                | 0.0040" (0.101mm) ± 0.0007"                                                               | N/A                 | 24" X 18" (610mm X 457mm)                                                                 |
| <b>RT/duroid® 6002</b><br>Thermoplastic - Ceramic PTFE Bondply                                 | 0.0025" (0.064mm)                                                                         | N/A                 | 18" X 12" (457mm X 305mm)<br>18" X 24" (457mm X 610mm)                                    |

Other dielectric thicknesses and panel sizes may be available. Contact customer service.

# Ordering Materials From Rogers Advanced Connectivity Solutions:

Rogers Corporation has global customer service locations to assist with the order process. Please see the back of the guide to determine which office in the Americas, Europe or Asia is most convenient for you.

The following represents a typical process for determining a material to purchase and placing an order:

## Step 1

### Determining the ACS Material Product Grade to Use

Rogers Advanced Connectivity Solutions provides a wide range of specialty material types (PTFE, hydrocarbon ceramic, LCP, etc.) to offer unique combinations of electrical, thermal and mechanical properties. Performance requirements usually determine which ACS Product Grade best suits the application. For example, if requirements point to material with the lowest dissipation factor (tan d) combined with a high dielectric constant, that may lead to one of our PTFE offerings. In another example mechanical strength may be required, pointing to a thermoset product, such as RO4000® laminate.

Common examples of ACS product grades include: RT/duroid® 5880, CLTE-XT™, RO4350B™, RO3003™, and TMM®. It is critical to pick the correct material grade when you order. Our technical experts are happy to assist you in making that determination.

## Step 2

### Choosing Thickness and Thickness Tolerance

Following IPC guidelines, laminate thickness is specified as dielectric thickness and does not include thickness of copper foil or other metal claddings. In most cases, thickness tolerance is defined by product grade and thickness. However, custom tolerances are considered upon request for certain high reliability products (RT/duroid and CLTE Series™ laminates are examples).

Special charges may apply for customers requesting non-standard thicknesses or tolerances. Please see pages 13-17 for a list of standard panel sizes and thicknesses by product grade.

## Step 3

### Selecting Cladding Type

Rogers offers cladding options which include ¼, ½, 1, & 2 oz. electrodeposited copper foil; ½, 1, & 2 oz. reverse treated copper foil; and ½, 1, & 2 oz. rolled copper foil. Not all laminate systems are available with all copper foil claddings. For example, TMM and RO4000 series laminates are not supplied with ¼ oz. electrodeposited foil or rolled copper foil.

Thick metal claddings such as aluminum, copper and brass are available on Rogers RT/duroid, CLTE™, DiClad®, CuClad® and IsoClad® laminates and may be based on dielectric thickness. Thick aluminum, copper, and brass claddings are also available in a range of thicknesses and thickness tolerances. Thick aluminum and brass claddings are available on most TMM laminates. Please note, thick metal cladding is not available on RO4000 laminates.

Some material grades may be supplied unclad. Call Rogers' Customer Service Representatives to discuss options.

## Step 4

### Picking your Panel Size\*

Finally, you need to select the panel size dimensions you desire. For example, a very common panel size in the printed circuit board industry is 24" (610mm) x 18" (457mm).

Please note, different product grades may have different standard panel sizes due to unique manufacturing processes. Special charges typically apply for non-standard panel sizes. Please see pages 14-19 for a list of standard panel sizes and thicknesses by product grade.

\*Various terminology is used in the industry to represent panel dimensions. Rogers' panel dimensions are always listed as: Cross machine(Y) x Machine direction(X).

## Specification Requirements and Terms and Conditions of Sale

Rogers material specifications are applicable unless otherwise agreed upon prior to order. Certificates of conformance are available for purchased goods. All other requirements must be discussed at the time the order is placed. If special testing or data generation is required, additional costs may be incurred.



For Rogers Terms and Conditions of Sale, please go to:  
[www.rogerscorp.com/pages/termsconditions.aspx](http://www.rogerscorp.com/pages/termsconditions.aspx)

## About Advanced Connectivity Solutions

Advanced Connectivity Solutions manufactures high frequency laminates and prepregs for applications in wireless base station, aerospace and defense, automotive, high-speed digital and advanced chip packaging industries. All of our products are manufactured in ISO-9001:2008 certified facilities.

## IPC Slash Sheet Definitions

| Product   | Legacy 4103/ | 4103A/ |
|-----------|--------------|--------|
| RO4003C   | 10           | 240    |
| RO4350B   | 11           | 240    |
| RO4835    | 11           | 240    |
| RO4360G2  | NA           | 270    |
| RO4533    | 10           | 240    |
| RO4534    | 10           | 240    |
| RO4535    | 11           | 240    |
| RO4725JXR | NA           | 220    |
| RO4730JXR | NA           | 230    |
| RO4450F   | 11           | 540    |
| RO4450T   | NA           | 540    |
| RO4460G2  | NA           | 570    |
| RO4835T   | NA           | 240    |

Rogers' high frequency laminates can be purchased by contacting a Rogers' Customer Service Representative. Refer to back cover for contact information.

## Interpreting Rogers Part Descriptions:

5880

Product Grade

18x12

Panel Size

H2/H2

Metal Cladding

R3

Revision  
Number  
(When Ap-  
plicable)

0200+-001

Dielectric Thickness & Tolerance

DI

Dielectric  
Thickness  
(When  
Applicable)

OV

May See OV Which  
Stands For Overall  
Thickness  
(When Applicable)

## ROGERS Copper Foil Designation

| Copper Weight | Rogers Clad Designation | IPC-4562A                                            |                        |                                    |                      |
|---------------|-------------------------|------------------------------------------------------|------------------------|------------------------------------|----------------------|
|               |                         | Foil Grade (1.2.4)                                   | Foil Thickness (1.2.5) | Bond Enhancement Treatment (1.2.6) | Foil Profile (1.2.7) |
| 1/4 oz        | HQ                      | Standard Electrodeposited (STD-E)                    | Q (9 μm)               | Single-sided treatment (S)         | Low (L)              |
|               | CQ                      |                                                      |                        |                                    | Very low (V)         |
| 1/2 oz        | 5E                      | High Temperature Elongation Electrodeposited (HTE-E) |                        | S                                  | Standard (S)         |
|               | 5ED                     |                                                      |                        |                                    |                      |
|               | 5E                      |                                                      |                        |                                    |                      |
|               | 5ED                     |                                                      |                        | Reverse-treated (R) LoPro R        |                      |
|               | HH                      |                                                      |                        |                                    |                      |
|               | 5TC                     |                                                      |                        |                                    |                      |
|               | SH                      | As Rolled Wrought (AR-W)                             | H (1/2 oz, 18 μm)      | S                                  | V                    |
|               | AH                      |                                                      |                        |                                    |                      |
|               | 5R                      |                                                      |                        |                                    |                      |
|               | 5RD                     |                                                      |                        |                                    |                      |
|               | 25RFO(1)(2)-5E(D)       | HTE-E                                                |                        | S-25 OPS Ohmega                    | S                    |
|               | 50RFO(1)(2)-5E(D)       |                                                      |                        | S-50 OPS Ohmega                    |                      |
|               | 100RFO(1)(2)-5E(D)      |                                                      |                        | S-100 OPS Ohmega                   |                      |
|               | 25RFT(3)(4)-5E(D)       |                                                      |                        | S-25 OPS Ticer                     |                      |
|               | 50RFT(3)(4)-5E(D)       |                                                      |                        | S-50 OPS Ticer                     |                      |
|               | 100RFT(3)(4)-5E(D)      |                                                      |                        | S-100 OPS Ticer                    |                      |
| 1 oz          | 1E                      | HTE-E                                                |                        | S                                  | S                    |
|               | 1ED                     |                                                      |                        |                                    | L                    |
|               | 1E                      |                                                      |                        |                                    |                      |
|               | 1ED                     |                                                      |                        | R-LoPro R                          |                      |
|               | H1                      |                                                      |                        |                                    |                      |
|               | 1TC                     |                                                      |                        |                                    | AR-W                 |
|               | S1                      |                                                      |                        |                                    |                      |
|               | A1                      |                                                      |                        |                                    |                      |
|               | 1R                      |                                                      |                        |                                    |                      |
|               | 1RD                     | HTE-E                                                |                        | S-25 OPS Ohmega                    | S                    |
|               | 25RFO(1)(2)-1E(D)       |                                                      |                        | S-50 OPS Ohmega                    |                      |
|               | 50RFO(1)(2)-1E(D)       |                                                      |                        | S-100 OPS Ohmega                   |                      |
|               | 100RFO(1)(2)-1E(D)      |                                                      |                        | S-25 OPS Ticer                     |                      |
|               | 25RFT(3)(4)-1E(D)       |                                                      |                        | S-50 OPS Ticer                     |                      |
|               | 50RFT(3)(4)-1E(D)       |                                                      |                        | S-100 OPS Ticer                    |                      |
|               | 100RFT(3)(4)-1E(D)      |                                                      |                        |                                    |                      |
| 2 oz          | 2E                      | HTE-E                                                | 2 (2 oz, 70 μm)        | S                                  | S                    |
|               | 2ED                     |                                                      |                        | R                                  | L                    |
|               | H2                      |                                                      |                        |                                    |                      |
|               | S2                      | AR-W                                                 |                        | S                                  | V                    |
|               | A2                      |                                                      |                        |                                    |                      |
|               | 2R                      |                                                      |                        |                                    |                      |
|               | 2RD                     |                                                      |                        |                                    |                      |



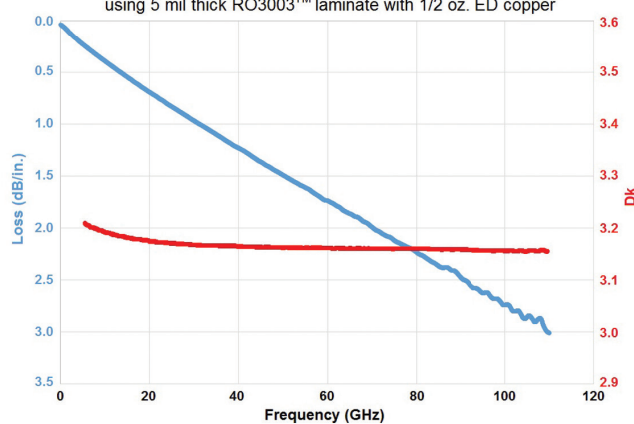


## Electrical Characterization Capabilities

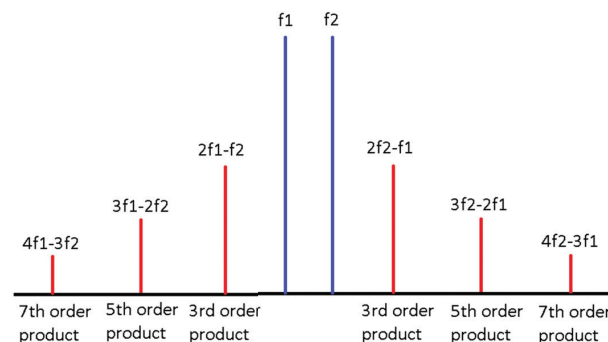
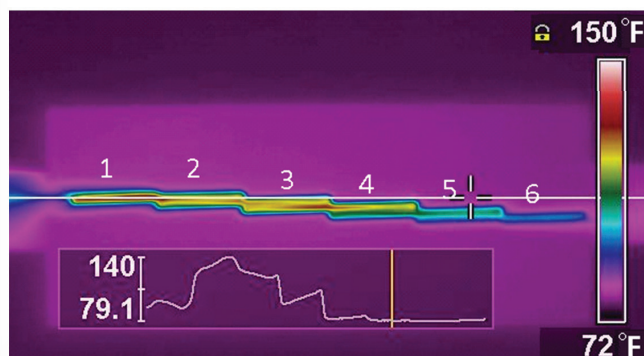
### Multiple Test Methods Used:

- Clamped Stripline Resonator
- Split Post Dielectric Resonator
- Full Sheet Resonance
- Ring Resonators
- Waveguide Perturbation

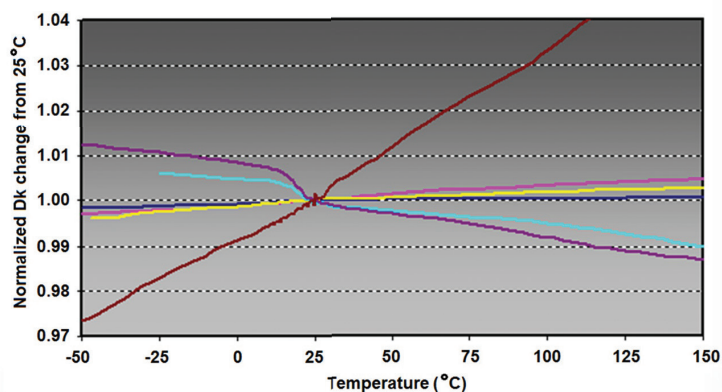
Microstrip 50 ohm transmission line circuit testing, differential length method using 5 mil thick RO3003™ laminate with 1/2 oz. ED copper



Very wideband insertion loss & phase measurements



PIM Testing Capabilities



Circuit Materials:

|           |            |                     |
|-----------|------------|---------------------|
| RO3003™   | RO4003™    | RO4835™             |
| PTFE / WG | Epoxy / WG | PTFE / Ceramic / WG |

| Product              | AUTOMOTIVE    |                         |                    |
|----------------------|---------------|-------------------------|--------------------|
|                      | Active Safety | Telematics/Infotainment | Thermal Management |
| 2929 Bondply         |               |                         |                    |
| 92ML™                |               |                         | √                  |
| 92ML StaCool™        |               |                         | √                  |
| AD250C™              |               | √                       |                    |
| AD255C™              |               | √                       |                    |
| AD300D™              |               | √                       |                    |
| AD350A™              |               | √                       |                    |
| CLTE-XT™             |               |                         |                    |
| CLTE™                |               |                         |                    |
| CLTE-AI™             | √             |                         |                    |
| CLTE-MW™             | √             |                         |                    |
| CuClad® 217          |               |                         |                    |
| CuClad 233           |               |                         |                    |
| CuClad 250           |               |                         |                    |
| 6250 Bonding Film    |               |                         |                    |
| 6700 Bonding Film    |               |                         |                    |
| COOLSPAN®            |               |                         | √                  |
| DiClad® 880          |               |                         |                    |
| DiClad 870           |               |                         |                    |
| DiClad 527           |               |                         |                    |
| IM Series™           |               |                         |                    |
| IsoClad® 917         |               |                         |                    |
| IsoClad 933          |               |                         |                    |
| Kappa™ 438           |               | √                       |                    |
| XtremeSpeed™ R01200™ |               |                         |                    |
| R03003G2™            | √             |                         |                    |
| R03003™              | √             | √                       |                    |
| R03035™              |               |                         |                    |
| R03006™              |               |                         |                    |
| R03010™              |               |                         |                    |
| R03210™              |               |                         |                    |
| R04725JXR™           |               |                         |                    |
| R04730JXR™           |               |                         |                    |
| R04730G3™            |               |                         |                    |
| R04533™              |               |                         |                    |
| R04003C™             |               |                         |                    |
| R04534™              |               |                         |                    |
| R04350B™             |               |                         |                    |
| R04450F™             | √             | √                       |                    |
| R04450T™             | √             | √                       |                    |
| R04460G2™            |               |                         |                    |
| R04835™              | √             | √                       |                    |
| R04835T™             | √             |                         |                    |
| R04535™              |               |                         |                    |
| R04360G2™            |               |                         |                    |
| R04830™              | √             |                         |                    |
| RT/duroid® 5880LZ    |               |                         |                    |
| RT/duroid 5880       |               |                         |                    |
| RT/duroid 5870       |               |                         |                    |
| RT/duroid 6002       |               |                         |                    |
| RT/duroid 6202PR     |               |                         |                    |
| RT/duroid 6202       |               |                         |                    |
| RT/duroid 6006       |               |                         |                    |
| RT/duroid 6035HTC    |               |                         |                    |
| RT/duroid 6010.2LM   |               |                         |                    |
| TC350™               |               |                         |                    |
| TC350 Plus           |               |                         |                    |
| TC600™               |               |                         |                    |
| TMM® 3               |               |                         |                    |
| TMM 4                |               |                         |                    |
| TMM 6                |               |                         |                    |
| TMM 10               |               |                         |                    |
| TMM 10i              |               |                         |                    |
| TMM 13i              |               |                         |                    |

KEY: √ = Recommended Material

| CONNECTED DEVICES        |                         |                    | Product              |
|--------------------------|-------------------------|--------------------|----------------------|
| Internet of Things (IoT) | Mobile Internet Devices | Thermal Management |                      |
|                          |                         |                    | 2929 Bondply         |
|                          |                         | √                  | 92ML™                |
|                          |                         | √                  | 92ML StaCool™        |
|                          |                         |                    | AD250C™              |
|                          |                         |                    | AD255C™              |
|                          |                         |                    | AD300D™              |
|                          |                         |                    | AD350A™              |
|                          |                         |                    | CLTE-XT™             |
|                          |                         |                    | CLTE™                |
|                          |                         |                    | CLTE-AT™             |
|                          |                         |                    | CLTE-MW™             |
|                          |                         |                    | CuClad® 217          |
|                          |                         |                    | CuClad 233           |
|                          |                         |                    | CuClad 250           |
|                          |                         |                    | 6250 Bonding Film    |
|                          |                         |                    | 6700 Bonding Film    |
|                          |                         | √                  | COOLSPAN®            |
|                          |                         |                    | DiClad® 880          |
|                          |                         |                    | DiClad 870           |
|                          |                         |                    | DiClad 527           |
|                          |                         |                    | IM Series™           |
|                          |                         |                    | IsoClad® 917         |
|                          |                         |                    | IsoClad 933          |
| √                        |                         |                    | Kappa™ 438           |
|                          |                         |                    | XtremeSpeed™ R01200™ |
|                          |                         |                    | R03003G2™            |
|                          |                         |                    | R03003™              |
|                          |                         |                    | R03035™              |
| √                        | √                       |                    | R03006™              |
| √                        | √                       |                    | R03010™              |
|                          |                         |                    | R03210™              |
|                          |                         |                    | R04725JXR™           |
|                          |                         |                    | R04730JXR™           |
|                          |                         |                    | R04730G3™            |
|                          |                         |                    | R04533™              |
| √                        |                         |                    | R04003C™             |
|                          |                         |                    | R04534™              |
| √                        | √                       |                    | R04350B™             |
|                          |                         |                    | R04450F™             |
| √                        |                         |                    | R04450T™             |
| √                        |                         |                    | R04460G2™            |
| √                        | √                       |                    | R04835™              |
| √                        |                         |                    | R04835T™             |
|                          |                         |                    | R04535™              |
| √                        | √                       |                    | R04360G2™            |
|                          |                         |                    | R04830™              |
|                          |                         |                    | RT/duroid® 5880LZ    |
|                          |                         |                    | RT/duroid 5880       |
|                          |                         |                    | RT/duroid 5870       |
|                          |                         |                    | RT/duroid 6002       |
|                          |                         |                    | RT/duroid 6202PR     |
|                          |                         |                    | RT/duroid 6202       |
|                          |                         |                    | RT/duroid 6006       |
|                          |                         |                    | RT/duroid 6035HTC    |
|                          |                         |                    | RT/duroid 6010.2LM   |
|                          |                         | √                  | TC350™               |
|                          |                         | √                  | TC350 Plus           |
|                          |                         | √                  | TC600™               |
|                          |                         |                    | TMM® 3               |
|                          |                         |                    | TMM 4                |
|                          |                         |                    | TMM 6                |
|                          |                         |                    | TMM 10               |
|                          |                         |                    | TMM 10i              |
|                          |                         |                    | TMM 13i              |

# Primary Markets

KEY: ✓ = Recommended Material

| Product              | HIGH RELIABILITY |                        |               |                     |
|----------------------|------------------|------------------------|---------------|---------------------|
|                      | Antenna Systems  | Communications Systems | Radar Systems | Space Based Systems |
| 2929 Bondply         | ✓                | ✓                      | ✓             | ✓                   |
| 92ML™                |                  | ✓                      |               |                     |
| 92ML StaCool™        |                  | ✓                      |               |                     |
| AD250C™              | ✓                | ✓                      |               |                     |
| AD255C™              | ✓                | ✓                      |               |                     |
| AD300D™              | ✓                | ✓                      |               |                     |
| AD350A™              | ✓                | ✓                      |               |                     |
| CLTE-XT™             | ✓                | ✓                      | ✓             | ✓                   |
| CLTE™                | ✓                | ✓                      | ✓             | ✓                   |
| CLTE-AI™             | ✓                | ✓                      | ✓             | ✓                   |
| CLTE-MW™             | ✓                | ✓                      | ✓             | ✓                   |
| CuClad® 217          | ✓                | ✓                      | ✓             | ✓                   |
| CuClad 233           | ✓                | ✓                      | ✓             | ✓                   |
| CuClad 250           | ✓                | ✓                      | ✓             | ✓                   |
| 6250 Bonding Film    | ✓                | ✓                      |               | ✓                   |
| 6700 Bonding Film    | ✓                | ✓                      |               | ✓                   |
| COOLSPAN®            |                  |                        | ✓             |                     |
| DiClad® 880          |                  |                        |               |                     |
| DiClad 870           |                  |                        |               |                     |
| DiClad 527           |                  |                        |               |                     |
| IM Series™           | ✓                | ✓                      |               |                     |
| IsoClad® 917         |                  |                        |               |                     |
| IsoClad 933          |                  |                        |               |                     |
| Kappa™ 438           |                  |                        |               |                     |
| XtremeSpeed™ R01200™ |                  |                        |               |                     |
| R03003G2™            |                  |                        |               |                     |
| R03003™              | ✓                | ✓                      | ✓             |                     |
| R03035™              | ✓                | ✓                      | ✓             |                     |
| R03006™              | ✓                | ✓                      | ✓             |                     |
| R03010™              | ✓                | ✓                      | ✓             |                     |
| R03210™              | ✓                | ✓                      | ✓             | ✓                   |
| R04725JXR™           |                  |                        |               |                     |
| R04730JXR™           |                  |                        |               |                     |
| R04730G3™            |                  |                        |               |                     |
| R04533™              |                  |                        |               |                     |
| R04003C™             |                  | ✓                      | ✓             |                     |
| R04534™              |                  |                        |               |                     |
| R04350B™             |                  | ✓                      | ✓             |                     |
| R04450F™             |                  | ✓                      | ✓             |                     |
| R04450T™             |                  | ✓                      | ✓             |                     |
| R04460G2™            |                  | ✓                      | ✓             |                     |
| R04835™              |                  | ✓                      | ✓             |                     |
| R04835T™             |                  | ✓                      | ✓             |                     |
| R04535™              |                  |                        |               |                     |
| R04360G2™            |                  | ✓                      | ✓             |                     |
| R04830™              |                  |                        |               |                     |
| RT/duroid® 5880LZ    | ✓                | ✓                      | ✓             | ✓                   |
| RT/duroid 5880       | ✓                | ✓                      | ✓             | ✓                   |
| RT/duroid 5870       | ✓                | ✓                      | ✓             | ✓                   |
| RT/duroid 6002       | ✓                | ✓                      | ✓             | ✓                   |
| RT/duroid 6202PR     | ✓                | ✓                      | ✓             | ✓                   |
| RT/duroid 6202       | ✓                | ✓                      | ✓             | ✓                   |
| RT/duroid 6006       | ✓                | ✓                      | ✓             | ✓                   |
| RT/duroid 6035HTC    | ✓                | ✓                      | ✓             | ✓                   |
| RT/duroid 6010.2LM   | ✓                | ✓                      | ✓             | ✓                   |
| TC350™               |                  |                        | ✓             |                     |
| TC350 Plus           |                  |                        | ✓             |                     |
| TC600™               |                  |                        | ✓             |                     |
| TMM® 3               | ✓                |                        | ✓             | ✓                   |
| TMM 4                | ✓                |                        | ✓             | ✓                   |
| TMM 6                | ✓                |                        | ✓             | ✓                   |
| TMM 10               | ✓                |                        | ✓             | ✓                   |
| TMM 10i              | ✓                |                        | ✓             | ✓                   |
| TMM 13i              | ✓                |                        | ✓             | ✓                   |

KEY: ✓ = Recommended Material

| WIRED INFRASTRUCTURE |                   |                    | Product              |
|----------------------|-------------------|--------------------|----------------------|
| Computing            | IP Infrastructure | Test & Measurement |                      |
| ✓                    | ✓                 | ✓                  | 2929 Bondply         |
|                      |                   |                    | 92ML™                |
|                      |                   |                    | 92ML StaCool™        |
|                      |                   |                    | AD250C™              |
|                      |                   |                    | AD255C™              |
|                      |                   |                    | AD300D™              |
|                      |                   |                    | AD350A™              |
|                      |                   |                    | CLTE-XT™             |
|                      |                   |                    | CLTE™                |
|                      |                   |                    | CLTE-AT™             |
|                      |                   |                    | CLTE-MW™             |
|                      |                   |                    | CuClad® 217          |
|                      |                   |                    | CuClad 233           |
|                      |                   |                    | CuClad 250           |
|                      |                   |                    | 6250 Bonding Film    |
|                      |                   |                    | 6700 Bonding Film    |
|                      |                   |                    | COOLSPAN®            |
|                      |                   |                    | DiClad® 880          |
|                      |                   |                    | DiClad 870           |
|                      |                   |                    | DiClad 527           |
|                      |                   |                    | IM Series™           |
|                      |                   |                    | IsoClad® 917         |
|                      |                   |                    | IsoClad 933          |
|                      |                   |                    | Kappa™ 438           |
| ✓                    | ✓                 | ✓                  | XtremeSpeed™ R01200™ |
|                      |                   |                    | R03003G2™            |
|                      |                   |                    | R03003™              |
|                      |                   |                    | R03035™              |
|                      |                   |                    | R03006™              |
|                      |                   |                    | R03010™              |
|                      |                   |                    | R03210™              |
|                      |                   |                    | R04725JXR™           |
|                      |                   |                    | R04730JXR™           |
|                      |                   |                    | R04730G3™            |
|                      |                   |                    | R04533™              |
| ✓                    | ✓                 | ✓                  | R04003C™             |
|                      |                   |                    | R04534™              |
| ✓                    | ✓                 | ✓                  | R04350B™             |
| ✓                    | ✓                 | ✓                  | R04450F™             |
|                      |                   |                    | R04450T™             |
|                      |                   |                    | R04460G2™            |
| ✓                    | ✓                 | ✓                  | R04835™              |
| ✓                    | ✓                 | ✓                  | R04835T™             |
|                      |                   |                    | R04535™              |
|                      |                   |                    | R04360G2™            |
|                      |                   |                    | R04830™              |
|                      |                   |                    | RT/duroid® 5880LZ    |
|                      |                   |                    | RT/duroid 5880       |
|                      |                   |                    | RT/duroid 5870       |
|                      |                   |                    | RT/duroid 6002       |
|                      |                   |                    | RT/duroid 6202PR     |
|                      |                   |                    | RT/duroid 6202       |
|                      |                   |                    | RT/duroid 6006       |
|                      |                   |                    | RT/duroid 6035HTC    |
|                      |                   |                    | RT/duroid 6010.2LM   |
|                      |                   |                    | TC350™               |
|                      |                   |                    | TC350 Plus           |
|                      |                   |                    | TC600™               |
|                      |                   |                    | TMM® 3               |
|                      |                   |                    | TMM 4                |
|                      |                   |                    | TMM 6                |
|                      |                   |                    | TMM 10               |
|                      |                   |                    | TMM 10i              |
|                      |                   |                    | TMM 13i              |

# Primary Markets

KEY: √ = Recommended Material

| Product              | WIRELESS INFRASTRUCTURE |                 |                  |                 |
|----------------------|-------------------------|-----------------|------------------|-----------------|
|                      | Antennas                | Backhaul Radios | Power Amplifiers | Small Cells/DAS |
| 2929 Bondply         |                         |                 |                  |                 |
| 92ML™                |                         |                 |                  |                 |
| 92ML StaCool™        |                         |                 |                  |                 |
| AD250C™              | √                       |                 |                  |                 |
| AD255C™              | √                       |                 |                  |                 |
| AD300D™              | √                       |                 |                  |                 |
| AD350A™              | √                       |                 |                  |                 |
| CLTE-XT™             |                         |                 |                  |                 |
| CLTE™                |                         |                 |                  |                 |
| CLTE-AT™             |                         | √               | √                |                 |
| CLTE-MW™             |                         | √               | √                |                 |
| CuClad® 217          |                         |                 |                  |                 |
| CuClad 233           |                         |                 |                  |                 |
| CuClad 250           |                         |                 |                  |                 |
| 6250 Bonding Film    |                         |                 |                  |                 |
| 6700 Bonding Film    |                         |                 |                  |                 |
| COOLSPAN®            |                         |                 |                  |                 |
| DiClad® 880          |                         |                 |                  |                 |
| DiClad 870           |                         |                 |                  |                 |
| DiClad 527           |                         |                 |                  |                 |
| IM Series™           | √                       |                 |                  |                 |
| IsoClad® 917         |                         |                 |                  |                 |
| IsoClad 933          |                         |                 |                  |                 |
| Kappa™ 438           |                         |                 |                  | √               |
| XtremeSpeed™ R01200™ |                         |                 |                  |                 |
| R03003G2™            |                         |                 |                  |                 |
| R03003™              |                         | √               | √                |                 |
| R03035™              |                         |                 | √                |                 |
| R03006™              |                         |                 | √                |                 |
| R03010™              |                         |                 |                  |                 |
| R03210™              |                         |                 |                  |                 |
| R04725JXR™           | √                       |                 |                  |                 |
| R04730JXR™           | √                       |                 |                  |                 |
| R04730G3™            | √                       |                 |                  |                 |
| R04533™              | √                       |                 |                  |                 |
| R04003C™             |                         |                 |                  |                 |
| R04534™              | √                       |                 |                  |                 |
| R04350B™             |                         | √               | √                | √               |
| R04450F™             |                         |                 | √                |                 |
| R04450T™             |                         | √               | √                | √               |
| R04460G2™            |                         | √               | √                | √               |
| R04835™              |                         | √               | √                | √               |
| R04835T™             |                         | √               | √                | √               |
| R04535™              |                         |                 |                  |                 |
| R04360G2™            |                         | √               | √                | √               |
| R04830™              |                         |                 |                  |                 |
| RT/duroid® 5880LZ    |                         |                 |                  |                 |
| RT/duroid 5880       |                         |                 |                  |                 |
| RT/duroid 5870       |                         |                 |                  |                 |
| RT/duroid 6002       |                         |                 |                  |                 |
| RT/duroid 6202PR     |                         |                 |                  |                 |
| RT/duroid 6202       |                         |                 |                  |                 |
| RT/duroid 6006       |                         |                 |                  |                 |
| RT/duroid 6035HTC    |                         |                 |                  |                 |
| RT/duroid 6010.2LM   |                         |                 |                  |                 |
| TC350™               |                         | √               |                  |                 |
| TC350 Plus           |                         |                 | √                |                 |
| TC600™               |                         | √               |                  |                 |
| TMM® 3               |                         |                 |                  |                 |
| TMM 4                |                         |                 |                  |                 |
| TMM 6                |                         |                 |                  |                 |
| TMM 10               |                         |                 |                  |                 |
| TMM 10i              |                         |                 |                  |                 |
| TMM 13i              |                         |                 |                  |                 |

# Notes

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# ROGERS cares



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### Environmental Protection:

We are committed to compliance with regulations. We are consistently looking for ways to make the work we do safer and better for the environment.



### Employee Safety:

Workplace safety and employee health is a priority. Production is shut down immediately if something is unsafe. The priority always is for employees to go home in the same condition they arrived to work.



### Social Consciousness & Community Participation:

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