ROGERS CORPORATION

Advanced Circuit Materials

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Data Sheet
RT/duroid 6035HTC

RT/duroid® 6035HTC High Frequency Laminate

Features	Benefits
High thermal conductivity	• Improved dielectric heat dissipation, enabling lower operating temperatures for high power applications
Low loss tangent	• Excellent high frequency performance
Thermally stable low profile and reverse treated copper foil	• Lower insertion loss and excellent thermal stability of traces
Advanced filler system	• Improved drillability and extended tool life compared to alumina-containing circuit materials

Applications:
• High power RF and microwave amplifiers
• Power amplifiers, couplers, filters, combiners, power dividers

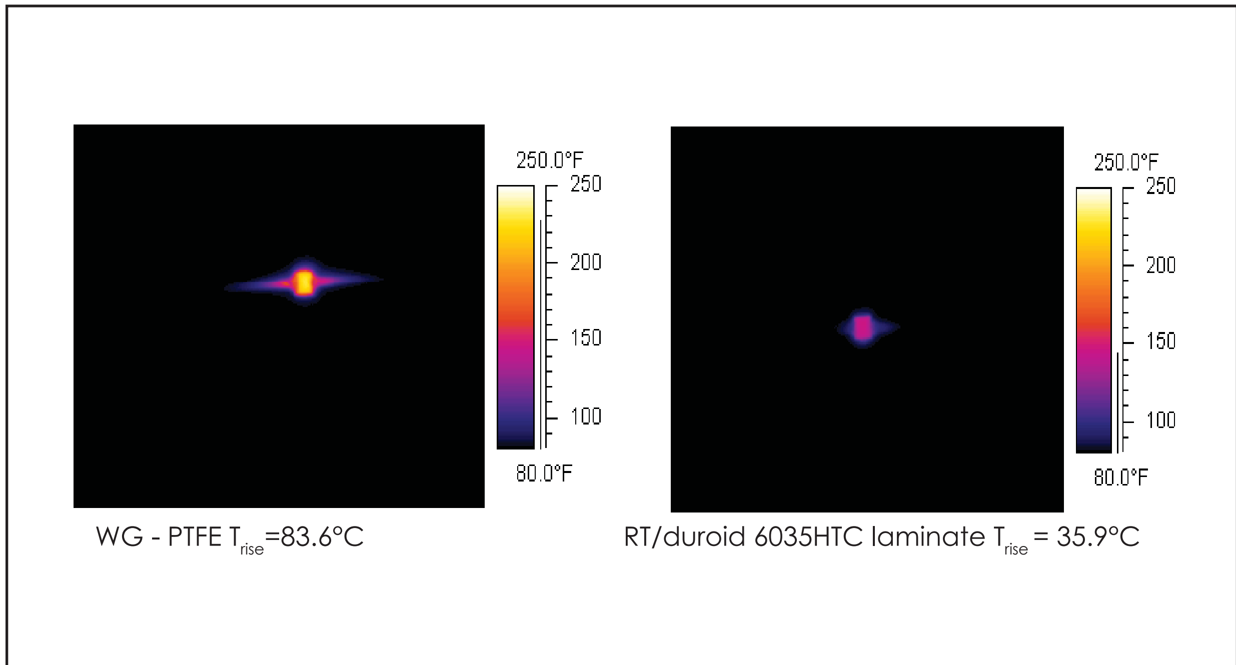
RT/duroid® 6035HTC high frequency circuit materials are ceramic filled PTFE composites for use in high power RF and microwave applications.

With a thermal conductivity of almost 2.4 times the standard RT/duroid 6000 products, and copper foil (ED and reverse treat) with excellent long term thermal stability, RT/duroid 6035HTC laminates are an exceptional choice for high power applications.

Rogers advanced filler system enables excellent drillability, reducing drilling costs as compared to standard high thermally conductive laminates which use alumina fillers,

At increasing power levels, Rogers measured the heat rise of a resistor placed on a microstrip circuit attached to a controlled heat sink. Thermal imaging was used to generate temperature rise data.

Comparison of WG-PTFE and RT/duroid 6035HTC Thermal Images at 4 Watts:



WG - PTFE T_{rise}=83.6°C

RT/duroid 6035HTC laminate T_{rise} = 35.9°C

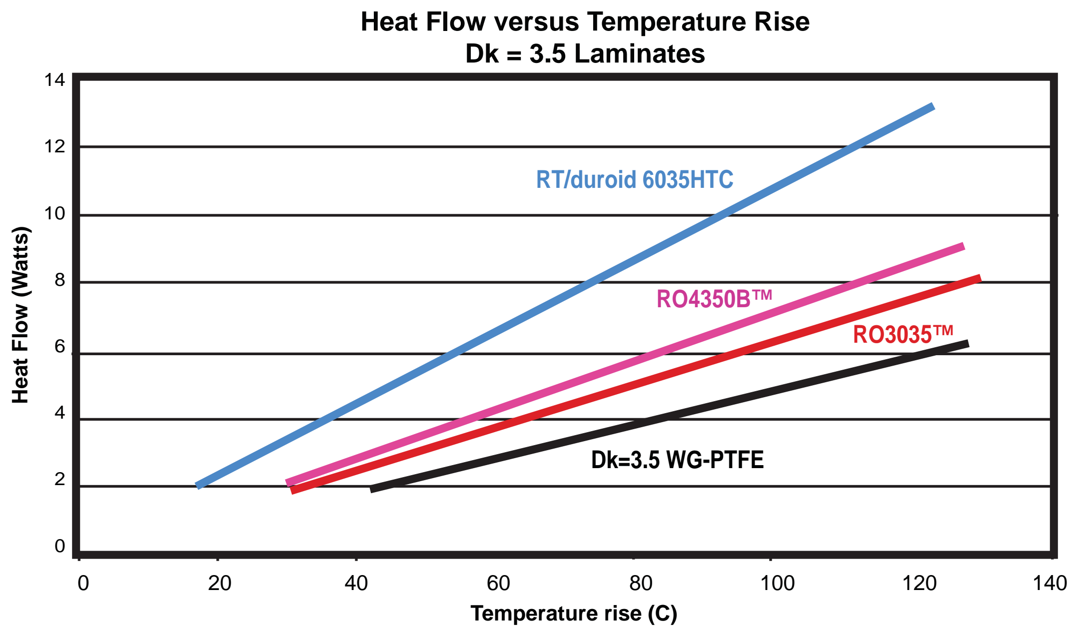


Chart 1. Four different 3.5 Dk laminate materials were tested, and the RT/duroid 6035HTC most effectively dissipated heat away from the resistor to enable the lowest temperature rise.

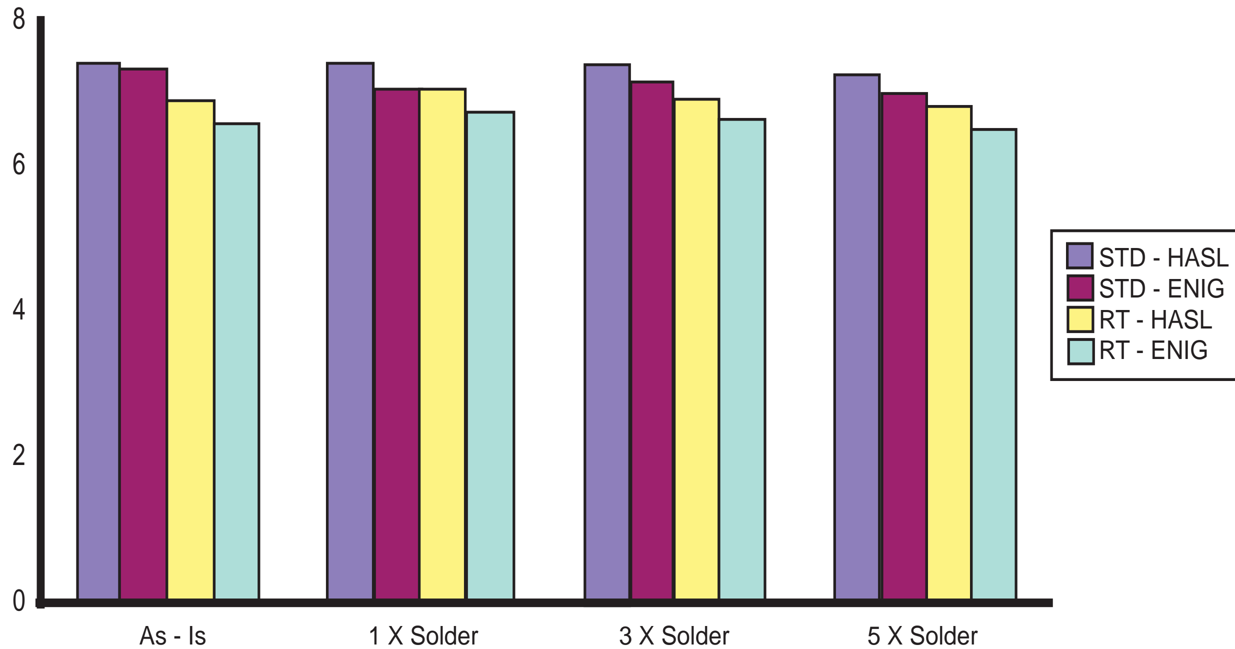


Chart 2 illustrates the stable copper peel strength maintained on 0.125" copper trace widths after multiple sixty-second exposures to 288°C(550°F) solder. Rogers matched copper foils to RT/duroid 6035HTC, which exhibit excellent thermal stability after multiple high temperature exposures enabling long-term reliability of circuitry for high power, high temperature applications.

Typical Values					RT/duroid 6035HTC High Frequency Laminates
Property	**Typical Value [1]**	**Direction**	**Units**	**Condition**	**Test Method**
Dielectric Constant, ε_r Process	3.50 ± 0.05	Z		10 GHz/23°C	IPC-TM-650 2.5.5.5 Clamped Stripline
[2]Dielectric Constant, ε_r Design	3.6	Z		8 GHz - 40 GHz	Differential Phase Length Method
Dissipation Factor,	0.0013	Z		10 GHz/23°C	IPC-TM-650, 2.5.5.5
Thermal Coefficient of ε_r	-66	Z	ppm/°C	-50°C to 150°C	mod IPC-TM-650, 2.5.5.5
Volume Resistivity	10^8		MΩ•cm	COND A	IPC-TM-650, 2.5.17.1
Surface Resistivity	10^8		MΩ	COND A	IPC-TM-650, 2.5.17.1
Tensile Modulus	329 244	MD CMD	kpsi	40 hrs @ 23°C/50RH	ASTM D638
Dimensional Stability	-0.11 -0.08	CMD MD	mm/m (mils/inch)	0.030" 1 oz EDC foil Thickness after etch +E4/105	IPC-TM-650, 2.4.39A
Coefficient of Thermal Expansion	19	X	ppm/°C	-55 to 288°C	ASTM D-3386
	19	Y			
	39	Z			
Thermal Conductivity	1.44		W/m/K	80°C	ASTM C518
Moisture Absorption	0.06		%	D24/23	IPC-TM-650 2.6.2.1 ASTM D570
Density	2.2		gm/cm³	23°C	ASTM D-792
Copper Peel Strength	7.9		pli	20 sec.@ 288°C	IPC-TM-650 2.4.8
Flammability	V-O anticipated				UL 94
Lead-Free Process Compatible	YES				

* Reported UL values are preliminary and reflect anticipated results of full UL testing.

[1] Typical values are a representation of an average value for the population of the property. For specification values contact Rogers Corporation.
[2] The design Dk is an average number from several different tested lots of material and on the most common thickness/s. If more detailed information is required, please contact Rogers Corporation. Refer to Rogers' technical paper "Dielectric Properties of High Frequency Materials" available at http://www.rogerscorp.com/acm.

Standard Thickness	Standard Panel Size:	Standard Copper Cladding
0.010" (0.254mm) 0.020" (0.508mm) 0.030" (0.762mm) 0.060" (1.524mm)	12" X 18" (305 X457mm) 24" X 18" (610 X 457mm)	½ oz. (18µm), 1 oz. (35µm) electrodeposited copper foil and reverse treat copper foil.

The information in this data sheet is intended to assist you in designing with Rogers' circuit material laminates. 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 or that the results shown on this data sheet will be achieved by a user for a particular purpose. The user should determine the suitability of Rogers' circuit material laminates for each application.

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Issued 11/2010 0926-1110-.5 CC **Publication** #92-153