

R/flex® 1000 Circuit Materials

For Long Life Dynamic Flexing

Description

R/flex® 1000 circuit materials from Rogers Corporation are high performance polyimide film based laminates, with rolled annealed copper foil, and coversheets ideally suited for constructing single and double sided flexible circuitry. The R/flex 1000 system has been used for more than 20 years in demanding dynamic flexing applications where millions of flex cycles are required, in semiconductor packaging in which low levels of ionic contamination are advantageous, and in tape automated bonding (TAB) applications.

Its high modulus thermosetting phenolic butyral adhesive system exhibits excellent electrical properties and good chemical resistance. R/flex®1000 laminates are UL rated with continuous operating temperatures of 105°C.

The family of R/flex® flexible circuit materials is manufactured under rigorous process control. Process capabilities are continuously monitored for all critical properties such as peel strength and dimensional stability. Our manufacturing process assures that R/flex circuit materials are as consistent from lot-to-lot as they are from roll-to-roll and within a roll.

Product Features

- High flex life provides for improved long-term reliability in demanding dynamic flexing applications
- SPC manufacturing assures minimum variability and maximum lot-to-lot uniformity
- Uniform adhesive thickness improves performance in controlled impedance applications
- Good temperature resistance for continuous operation at temperatures of at least 105° C

Applicable Specifications

Laminate - IPC-4204/10
Coversheet and Bonding Film- IPC-4203/11
UL File - # E122972

Available Configurations: Many available configurations are not standard; please check with your Rogers representative.

Laminate

Copper weight: ½, 1, or 2 oz./ft.² treated rolled copper. (Other copper foils available on special order).

Polyimide film thickness: ½, 1, 2, 3, or 5 mils
(13, 25, 50, 75, 125 µm)

Adhesive thickness: Standard laminate adhesive thickness is 0.8 mil (~20 µm). Adhesive thickness other than standard is available on special order.

Sizes: Laminate available in rolls:

- 24" (610mm) wide

Laminate also available in sheets upon special order.

Laminate Designation

Side 1 copper thickness in oz./ft.² _____ R/flex 1000-L-XXX
Polyimide film thickness in mils** _____
Side 2 copper thickness in oz./ft.² _____

Coversheet and Bonding Film

Adhesive thickness: ½, 1 and 1.8 mils
(13, 25, 45 µm)

Polyimide film thickness: ½, 1, 2, 3, or 5 mils
(13, 25, 50, 75, 125 µm)

Sizes:

Coversheet and Bonding Film available in rolls:

- 24" (610mm) wide

Coversheet and Bonding Film also available in sheets upon special order.

Coversheet (C) and Bonding Film (B)

Designation _____ R/flex 1000-C-XX0
1000-B-X00

Side 1 adhesive thickness in mils _____
Polyimide film thickness: in mils** _____
Side 2 adhesive thickness in mils _____

** Use "H" for ½ mil Polyimide.

Storage

R/flex® 1000 coversheets and bonding films use B-staged adhesive systems that will retain their original properties for a minimum of six months if stored at 40-65°F (4-18°C) in their original packaging. It is recommended that laminates be stored in a clean and dry area.

Typical Values

R/flex®1000

Properties	Laminate	Coversheet	Units	Test Method	
	(1 oz./2mil-1oz./50µm)	(2mil/50µm)			
Electrical Properties					
Dielectric Constant	3.6	3.6	@1 MHz	IPC-TM-650, 2.5.5.3	
Dissipation Factor	0.04	0.04	@1 MHz	IPC-TM-650, 2.5.5.3	
Dielectric Strength	>8000	>8000	volts/mil	ASTM-D-149	
Insulation Resistance	10 ⁷	10 ⁷	megohms	IPC-TM-650, 2.6.3.2	
Volume Resistivity	10 ⁹	10 ⁹	megohms/cm	IPC-TM-650, 2.5.17	
Surface Resistance	10 ⁶	10 ⁶	megohms	IPC-TM-650, 2.5.17	
Moisture-insulation resistance	10 ⁶	10 ⁶	megohms	IPC-TM-650, 2.6.3.2	
Physical and Thermal Properties					
Flammability (with coverfilm)	VTM-1	NR		UL-94	
Moisture Absorption	2.4	2.4	%	IPC-TM-650, 2.6.2	
Solder Float (Method A)	PASS	PASS		IPC-TM-650, 2.4.13	
Maximum Operating Temperature (MOT)	105	105	°C	UL746E	
Dimensional Stability	Method A (MD)	NA	%	IPC-TM-650, 2.2.4	
	Method B (MD)	-0.07			
	Method C (MD)	-0.20			
Mechanical Properties					
Peel Strength	As received (to treated copper)	6 (1050)	6 (1050)	lb./in. (N/m)	IPC-TM-650, 2.5.9
	After solder float	6 (1050)	6 (1050)		
Flexural Endurance	4000	NA	cycles	IPC-TM-650, 2.4.3	

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

Chemical Resistance*

	Condition(1)		Effect (2)		Condition(1)		Effect (2)
	Temp	Time			Temp	Time	
Water	25°C	30 min.	none	Aromatic hydrocarbon	25°C	6 months	none
H ₂ SO ₄ 10%	25°C	5 min.	none	Straight chain hydrocarbon	25°C	6 months	none
HCl 20%	25°C	5 min.	none	Trichloroethylene	25°C	30 min.	none
NaOH 5%	100°C	5 min.	none (3)	Freon TF	25°C	30 min.	none
(NH ₄) ₂ S ₂ O ₈	100°C	30 min.	none	Freon TMC	25°C	30 min.	none
FeCl ₃ 42Be	60°C	30 min.	none	Methyl alcohol	25°C	30 min.	none
Alkaline copper etching solutions, photoresists and strippers (except hot phenol types)	60°C	30 min.	none	Isopropyl alcohol	25°C	30 min.	none
				Methylene chloride	25°C	5 min.	(4)
				MEK	25°C	5 min.	none
				Cresols, phenol	100°C	2 min.	dissolves adhesive

* Refers to cured adhesive

Footnotes: (1) Preconditioning by drying at 100°C prior to immersion is necessary to remove moisture. (2) "None" signifies no noticeable change in surface condition at 10x magnification. (3) Strong, hot NaOH solutions (30%) will dissolve the polyimide film and should be avoided. (4) Adhesive swells and is slightly softened. Upon drying, adhesive recovers to initial condition.

The information in this data sheet 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 application. The user should determine the suitability of Rogers' circuit materials for each application.