



# DUPONT™ INTERRA™ embedded passive materials

## HK 04J PLANAR CAPACITOR LAMINATE

### DESCRIPTION

DuPont™ Interra™ HK 04J is a thin laminate with a polyimide dielectric designed to function as a power and ground plane in printed wiring boards (PWBs). This laminate is excellent for power bus decoupling, EMI and power plane impedance reduction at high frequencies. Interra™ HK 04j laminates are ideal for applications such as embedded capacitance technology for PWB or semiconductor packaging, and high speed digital applications for reduced impedance. Interra™ HK 04J is compatible with existing PWB processes, including double-sided processing, and its thin design maximizes capacitance density, reduces inductance and decreases board or package thickness.

### SPECIFICATIONS

- High copper-polyimide adhesion strength
- Flexibility improves handling yields during innerlayer processing
- Uniform thickness
- Excellent stability of dielectric constant and loss tangent over wide frequency and temperature ranges (1kHz to 15 GHz; -55°C to 125°C)
- Environmentally friendly; halogen free
- UL94 V-0

### CONSTRUCTION

Standard Interra™ HK 04J products are listed in **Table 1**. Interra™ HK 04J is constructed with a dielectric thickness of 12 and 25 microns (1/2 and 1 mil). All products are supplied as double-sided laminate using reverse treated electrodeposited copper in 18, 36, and 72 micron thicknesses (1/2, 1, 2 ounce). Rolled annealed copper is available upon request.

**Table 1. Standard Interra™ HK 04J Product Offerings**

Product Code	Dielectric Constant	Dielectric Thickness	Copper Thickness (side 1)	Copper Thickness (side 2)
HK 04J2518E	3.5	25µm	18µm	18µm
HK 04J2536E	3.5	25µm	36µm	36µm
HK 04J2572E	3.5	25µm	72µm	72µm
HK 04J7423E	3.5	12µm	36µm	36µm
HK 04J7420E	3.5	12µm	72µm	72µm
HK 04J7341E	3.5	25µm	18µm	36µm
HK 04J7403E	3.5	25µm	36µm	72µm

### PACKAGING

Interra™ HK 04J laminate is supplied in the following standard panel sizes:

- 24" x 36" (610 mm x 914 mm)
- 24" x 18" (610 mm x 457 mm)
- 12" x 18" (305 mm x 457 mm)

Other sizes are available by special order. All Interra™ HK packaging materials are 100% recyclable.

### PROCESSING

Interra™ HK 04J products are available for processing using existing PWB processes, including double-sided processing.

### STORAGE CONDITIONS AND SHELF LIFE

Interra™ HK 04J laminate products are warranted for two years when stored in the original packaging at temperatures of 4°-29°C (40°-85°F) and below 70% relative humidity. The products do not require refrigeration and should not be frozen. The material should be kept clean and well protected from physical damage.

### SAFE HANDLING

Although DuPont is not aware of anyone developing contact dermatitis when using Interra™ HK 04J products, some individuals may be more sensitive than others. Anyone handling Interra™ HK 04J should wash their hands with soap and water before eating, smoking or using restroom facilities. Gloves, finger cots and finger pads should be changed daily.

As with all thin copper laminates, sharp edges present a potential hazard during handling. All personnel involved in handling Interra™ HK 04J laminates should be cautioned and provided with suitable gloves to minimize potential cuts.

Interra™ HK 04J laminate is cured at elevated temperatures. The curing reaction does not produce any vapors, although impurities may volatilize. When drilling or routing parts made with Interra™ HK 04J laminate, provide adequate vacuum around the drill head to minimize worker exposure to dust.

Interra™ HK laminates do not contain polybrominated biphenyls (PBBs) or polybrominated biphenyl oxides (PBBOs).



## DUPONT™ INTERRA™ EMBEDDED PASSIVE MATERIALS

**Table 2. HK 04J Properties**

HK04J25	HK04J25	HK04J12
Dielectric Thickness $\mu\text{m}$ (mil)	25 (1.0)	12 (0.5)
Dielectric Type	Polyimide	Polyimide
Capacitance Density, nF/in <sup>2</sup>	0.8	1.7
Capacitance Density, pF/cm <sup>2</sup>	125	260
Dielectric Constant at 1 MHz	3.5	3.5
Loss Tangent at 1 MHz	0.005	0.005
Dielectric Strength, kV/mil	6-7	8
HiPot Test Voltage Pass, V <sub>dc</sub>	500 (1500)	500
Adhesion to Cu (Peel strength) N/mm (pli)	1.8 (10)	1.4 (8)
Surface Resistivity, ohm	>10 <sup>14</sup>	>10 <sup>14</sup>
Volume Resistivity, ohm-cm	>10 <sup>16</sup>	>10 <sup>16</sup>
Tensile Strength, Mpa (kpsi)	>345 (>50)	>345 (>50)
Elastic Modulus, Mpa (kpsi)	(6000) 900	5600 (800)
Elongation, %	>50	>50
CTE 50-200C, ppm/C	21	18
Water Absorption, %	0.8	0.8
Density, gm/cm <sup>3</sup>	1.4	1.4
T <sub>g</sub> , °C	225/315	225/315
Thermal Decomposition Temperature, °C (2%/5% in N <sub>2</sub> )	560/580	560/580
Solder Float, 3 min at 288°C (550°F)	Pass	Pass
Solder Float, 10 sec at 288°C # times	>10	>10
HAST, 120C/85% RH/2 atm	Pass	Pass
Thermal Shock, -65°C to 125°C/15 min zone dwell 100 cycles	Pass	Pass
Thermal Shock, -35°C/125°C, 400 cycles	Pass	Pass
Thermal Stress, 20 sec at 288°C, # of cycles	>10	>10
Electro-Migration, 85°C/85%RH, V <sub>dc</sub> Bias	1000 hrs at 50 V <sub>dc</sub>	1000 hrs at 50 V <sub>dc</sub>
Flammability	UL 94 V-0	UL 94 V-0

**FOR MORE INFORMATION ON DUPONT™ INTERRA™ HK 04J EMBEDDED PASSIVE MATERIALS , PLEASE CONTACT YOUR LOCAL REPRESENTATIVE, OR VISIT OUR WEBSITE:**

**interra.dupont.com**

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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102-4.

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