

DuPont™ Interra™ Embedded Passive Materials

HK 04 PLANAR CAPACITOR LAMINATE

Description

DuPont™ Interra™ HK 04 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 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 04 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; -40°C to 120°C)
- Environmentally friendly; halogen free
- UL94 V-0

Constructions

Standard Interra™ HK 04 products are listed in **Table 1**. Interra™ HK 04 is constructed with a dielectric thickness of 25 microns (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 04 Product Offerings

Product Code	Dielectric Constant	Dielectric Thickness	Copper Thickness
HK 042518E	3.5	25µm	18µm
HK 042536E	3.5	25µm	36µm
HK 042572E	3.5	25µm	72µm

Packaging

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

- 24" x 36" (610 mm x 914 mm)
- 24" x 18" (610 mm x 457 mm)
- 24" x 12" (610 mm x 305 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 04 products are available for processing using existing PWB processes, including double-sided processing.

Storage Conditions and Shelf Life

Interra™ HK 04 laminate products are warranted for one year 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 04 products, some individuals may be more sensitive than others. Anyone handling Interra™ HK 04 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 04 laminates should be cautioned and provided with suitable gloves to minimize potential cuts.

Interra™ HK 04 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 04 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).

Table 2
HK04 Properties

Property	HK0425	HK04J18	HK04J12
Dielectric Thickness um (mil)	25 (1.0)	18 (0.7)	12 (0.5)
Dielectric Type	Polyimide	Polyimide	Polyimide
Capacitance Density, nF/in ²	0.8	1.1	1.7
Capacitance Density, pF/cm ²	125	170	260
Dielectric Constant at 1 MHz	3.5	3.5	3.5
Loss Tangent at 1 MHz	0.005	0.005	0.005
Dielectric Strength, kV/mil	6-7	7	8
HiPot Test Voltage Pass, VDC	500 (1500)	500	500
Adhesion to Cu (Peel strength) N/mm (pli)	1.8 (10)	1.4 (8)	1.4 (8)
Surface Resistivity, ohm	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴
Volume Resistivity, ohm-cm	>10 ¹⁶	>10 ¹⁶	>10 ¹⁶
Tensile Strength, Mpa (kpsi)	>345 (>50)	>345 (>50)	>345 (>50)
Elastic Modulus, Mpa (kpsi)	(6000) 900	(6000) 900	5600 (800)
Elongation, %	>50	>50	>50
CTE 50-200C, ppm/C	21	18	18
Water Absorption, %	0.8	0.8	0.8
Density, gm/cm ³	1.4	1.4	1.4
Tg, degree C	200/315	220/315	220/315
Solder Float, 3 min at 288C (550F)	Pass	Pass	Pass
Solder Float, 10 sec at 288C # times	>10	>10	>10
HAST, 120C/85% RH/2 atm	Pass	Pass	Pass
Thermal Shock, -65C to 125C/15 min zone dwell 100 cycles	Pass	Pass	Pass
Thermal Shock, -35C/125C, 400 cycles	Pass	Pass	Pass
Thermal Stress, 20 sec at 288C, # of cycles	>10	>10	>10
Electro-Migration, 85/85, 35 VDC Bias	1000 hrs at 50 VDC	1000 hrs at 50 VDC	1000 hrs at 50 VDC
Flammability	V-0	V-0	V-0

For more information on Interra™ or other DuPont Electronic Technologies products, please contact your local representative:

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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.

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