

# **Technical Data Sheet**

THICK FILM MATERIALS

Product Type: Dielectrics Product Name: IP9227



2-Layer Lead Free Multilayer Dielectric

# Description

IP9227 is a gray-blue 850 °C firing dielectric composition. It withstands harsh conditions such as thermal shock cycling and hot temperature applications to meet requirements of automotive industry. IP9227 displays the following benefits:

## Key Benefits

- Expansion coefficient is closely matched with that of alumina, to provide for minimal substrate bowing
- Extremely dense, hermetic fired film allows for excellent electrical performance in a 2 layer, large area build-up
- Excellent solderability and adhesion of Ag, Ag/Pd, Ag/Pt, Au and Au/Pt conductors on top of dielectric
- Excellent wire bondability of Ag and Au based conductors on top of dielectric
- Resistors can be processed on top of dielectric
- Absence of the "Battery Effect" in more than 12 refinings<sup>3</sup>

A separation of dissimilar conductor metallizations such as gold and silver is possible without formation of blisters. This enables the use of more cost-effective, highconductivity pure silver conductors underneath the dielectric

- Compatible with high reliability laser trimming methods
- Free of lead, cadmium, nickel and phthalate

## Processing

1) Spatulate well prior to processing.

When stored in a refrigerator, allow paste to come to room temperature prior to opening, to avoid condensation.

### 2) Printing:

165 – 230 mesh stainless steel screen with Direct Coating (no emulsion). To achieve optimum performance two individually fired layers with a total thickness of at least 40 μm are recommended. A 230 mesh screen will offer best via resolution.

- 3) Level at room temperature for 10 15 minutes.
- 4) Dry at 150 °C for 10 20 minutes.
- 5) Fire in air, with a 30 60 minute cycle to a peak temperature of 850 °C. Dwell time of 10 – 12 minutes. All layers of the interconnect structure fired separately. Properties are unaffected by multiple refirings.
- Conductor and dielectric film thicknesses should be controlled carefully, to ensure high yield in production. Conductor thickness under dielectric film should not exceed 12 μm FFT.

### Thinner

HVS 507

Typical Properties (Paste)		
Form	Pseudoplastic paste	
Viscosity	40 – 60 Pas (23 °C, D = 33/s)	
Solids	74.5 ± 1.5 %	
Printing Speed	Up to 10 cm/s	
Coverage	c. 70 cm²/g (35 µm wet film thickness)	
Shelf Life	6 months from date of shipment with correct storage (in a dry, cool $(5 - 25 \degree C)$ and dark place with container tightly shut).	

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Typical Properties (Fired	ל) <sup>1</sup>
Fired Film Thickness <sup>2</sup> (FFT)	$\geq$ 40 $\mu$ m (2 separately fired layers)
Rel. Diel. Constant K (25 °C, 1 kHz)	8 – 10
Dissipation Factor (25 °C, 1 kHz)	< 1.0 %
Insulation Resistance (25 °C, 100 VDC)	> $10^{12} \Omega x cm$
Breakdown Voltage	> 500 V DC (per 40 µm FF
Via Resolution	300 µm

### Legend

- <sup>1)</sup> Typical property based on laboratory test methods. For optimum results all materials should be fired in a profiled furnace supplied with dried, hydrocarbon and other contaminant free air (see Process Procedure (PP) – 1): also depend in general on associated conductor materials employed, processing conditions and measurement methods.
- $^{2)}$  Measured after printing with a 200 mesh steel screen; screen thickness and emulsion thickness combined was c. 110  $\mu m.$
- <sup>3)</sup> Tested with C 5729 and C 1076 SD

Compatibility		
Conductors	Ag	C8728
	AgPt	C4729 C4731 (LPA614-085)
	Au	C5729

For more information see Application Note of IP9227.

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