

Technical Data Sheet

THICK FILM MATERIALS

Product Type: Dielectrics

Product Name: IP9227



2-Layer Lead Free Multilayer Dielectric

Description

IP 9227 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. IP 9227 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 refinings³
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, high-conductivity pure silver conductors underneath the dielectric
- **Compatible with high reliability laser trimming methods**
- Free of lead, cadmium, nickel and phthalate
- REACH⁴ and ROHS⁵ compliant

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.
- 6) 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 cm ² /g (35 µm wet film thickness)
Shelf Life	6 months from date of shipment with correct storage (in a dry, cool (5 – 25 °C) and dark place with container tightly shut).

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Typical Properties (Fired)¹

Fired Film Thickness ² (FFT)	≥ 40 µm (2 separately fired layers)
Rel. Diel. Constant K (25 °C, 1 kHz)	8 – 10
Dissipation Factor (25 °C, 1 kHz)	< 0.2 %
Insulation Resistance (25 °C, 100 VDC)	> 10 ¹² Ω x cm
Breakdown Voltage	> 500 V DC (per 40 µm FFT)
Via Resolution	300 µm

Legend

- 1) 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 µm.
- 3) Tested with C 5729 and C 1076 SD
- 4) REACH compliant according to the latest * Annex XIV to Regulation (EC) of the European Parliament and of the council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (“REACH”) by European Chemicals Agency and its subsequent amendments; the material does not contain any substance listed in Annex XIV
- 5) RoHS compliant according to the latest * Directives (European Union) of Restriction of Hazardous Substances (“RoHS”) and its subsequent amendments (including the exceptions related to Pb).

Compatibility

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

* See the data sheet issue date (DD/MM/YY) as reference of validity of latest edition which is available on request

For more information see Application Note of IP9227.

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