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QM44H Multilayer Dielectric

Thick Film Composition Data Sheet

All values reported here are results of experiments in our laboratories intended to illustrate product performance potential with a given experimental design. They are not intended to represent the product's specifications, details of which are available upon demand.

Product Description

QM44H is a filled, crystalizable screen printed thick film dielectric composition and is an integral element of the QM44 multilayer system. It is a versatile dielectric intended for use in both high reliability and low cost MCM and hybrid interconnect applications.

Key Features:

- Broad conductor compatibility (Gold, silver and mixed metal)
- Compatible with cofirable conductors
- Highly resistant to EMF blistering and shorting
- Robust electrical and mechanical properties
- Dense, hermetic microstructure

Design Note

The fired thickness of the dielectric layer should be at least 30µm between the conducting layers this can be achieved with 2 prints of the dielectric. Each printed dielectric layer should be separately fired. Co-firing is not recommended.

Compatibility

Whilst DuPont has tested this composition with the recommended processing conditions, it is impossible or impractical to cover every combination of materials, customer

Composition Properties

Viscosity [Pa.s]	300 - 400
Brookfield 2xHAT, Utility cup & spindle (SC4-14/6R), 10rpm, 25°C ± 0.2°C	
Coverage[cm²/g]	110 - 130
(based on an average fired thickness of 14µm)	
Thinner	4553

Processing Conditions

Printing	230 to 280 stainless steel screen, at a print speed of 15cm/sec (See design note)
Drying	Allow prints to level for 10 -15 minutes at room temperature, then dry for 10-15 minutes at 150°C
Firing	850°C peak held for 10 minutes on 30 minute cycle in an air atmosphere

Typical Fired Properties*

Physical:	
Total Fired Thickness [µm]	>30
Camber [µm/cm]^A	<20
Electrical:	
Dielectric constant [@ 1MHz]	8 - 10
Dissipation Factor [@ 1MHz]	<0.5%
Leakage Current¹[µA.cm²]	<1
Insulation Resistance[30µm]	>10¹² @100VDC
Mean Breakdown Voltage[30µm]	>1.6kV
EMF Blister Resistance²	>30 firings

Notes

- * Based on Laboratory data using recommended processing procedures
Top and bottom conductor: AgPd 7484
- A Measured deflection of 12.5cm x 2.5cm substrate with 5 circuit layers, single sided
- 1 Standard measurements made after 5 minutes at 10 VDC
- 2 Maximum number of firings performed without blisters observed with Substrate/Au/Dielectric/Dielectric/Ag configuration

processing conditions and circuit layouts.

It is therefore essential that customers thoroughly evaluate the material in their specific situations in order to completely satisfy themselves with the overall quality and suitability of the composition for its intended application(s).

Recommended Processing Procedure

Storage

Containers may be stored in a clean, stable environment at room temperature (< 25°C), with their lids tightly sealed. Storage in freezers (temperature < 0°C) is NOT recommended as this could cause irreversible changes in the material.

For guidance regarding storage of material, please consult DuPont Technical Note EUT 7.2 “Shelf Life Policy”.

Shelf life

This composition has a shelf life of 6 months from date of shipment for factory-sealed (unopened) containers, stored under room-temperature conditions.

Substrates

Properties are based on tests on 96% alumina substrates. Substrates of different compositions and from various manufacturers may result in variations in performance properties.

Thinner

This composition is optimized for screen printing, thinning is not normally required.

Use the DuPont recommended thinner for slight adjustments to viscosity or to replace evaporation

losses. The use of too much thinner or the use of a non recommended thinner may affect the rheological behaviour of the material and its printing characteristics. Refer to table - “Composition Properties”

Printing

The composition should be thoroughly mixed before use. This is best achieved by slow, gently, hand stirring with a clean burr-free spatula (flexible plastic or stainless steel) for 1-2 minutes. Care must be taken to avoid air entrapment. Printing should be performed in a clean and well ventilated area. Additional information on requirements for printing areas is contained in DuPont Technical Guide EUT 7.3 “Processing - Screen Printing Rooms”, available on request.

Note: optimum printing characteristics are generally achieved in the room temperature range of 20°C-23°C. It is therefore important that the material, in its container, is at this temperature prior to commencement of printing. Class 10,000 printing area is recommended for building complex hybrids and multilayer circuits, otherwise severe yield losses could occur. Refer to table - “Processing Conditions”

Drying

Allow prints to level at room temperature, then dry in a well ventilated oven or conveyor dryer. Refer to table - “Processing Conditions”

Firing

Fire in a well ventilated belt, conveyor furnace, or static furnace. Air flows and extraction

rates should be optimized to ensure that oxidizing conditions exist within the muffle, and that no exhaust gases enter the room.

Full information on requirements for firing is contained in DuPont Technical Guide EUT 7.4 “Process Guide - Firing”. Refer to table - “Processing Conditions”

General

Performance will depend to a large degree on care exercised in screen printing. Scrupulous care should be taken to keep the composition, printing screens and other tools free of metal contamination. Dust, lint and other particulate matter may also contribute to poor yields.

Health/Safety considerations

DuPont thick film compositions are intended for use in an industrial environment by trained personnel. All appropriate health / safety regulations regarding storage, handling and processing of such materials should be complied with. For information on health / safety regulations please refer to the specific product MSDS and to the DuPont Safety Guide EUT 7.1 “Practical Safe Handling of Thick Film Compositions”.