

DuPont QM44

DIELECTRIC

Technical Data Sheet

Product Description

DuPont QM44 is a filled, crystallizable screen printed thick film dielectric composition and is an integral element of the DuPont QM44 multilayer system. It is a versatile dielectric for use in both high reliability and low cost MCM (Multi-Chip Module) and hybrid interconnect applications.

Product Benefits

- Broad conductor compatibility (gold, silver, and mixed metal)
- Thin, 2 print, hermetic dielectric film.
- High resistance to E.M.F. (electro-motive force) blistering and shorting.
- Robust electrical and mechanical properties.
- Compatible co-fire conductors.

Processing Substrates

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

Printing

Printing should be carried out in a clean and well ventilated area. The combined fired thickness of the dielectric should be $30 \pm 2 \mu\text{m}$. This can generally be obtained by printing the individual layers with a 230-280 mesh stainless steel screen at speeds of 6 ips.

Drying

Allow prints to level for 5-10 minutes at room temperature. Then dry for 10-15 minutes at 150°C .

Typical Fired Properties

Test	Properties
Fired thickness (μm)	30 ± 2
Via Resolution (μm)	250-300 (diameter)
Max. no. circuit layers	< 8
Camber*** (mil/in)	< 2

Typical Electrical Properties

Dielectric Constant (@ 1 KHZ)	8 - 10
Dissipation Factor (@ 1 KHZ)	< 0.2%
Insulation Resistance (@ 100VDC)	$\geq 10^{12}$
Leakage Current* ($\mu\text{A}/\text{cm}^2$)	< 1
Breakdown Voltage (V/30 μm)	> 1000
EMF Blister Resistance**	> 30 firings

* Standard measurements made after 5 min @ 10VDC

** Maximum no. of firings performed without blisters observed with Substrate/gold/dielectric/silver configuration

*** Measured deflection of 5" x 1" substrate with 5 circuit layers. Single-sided.

Composition Properties

Viscosity (Pa.s) (Brookfield HBT, UC&SP, 50 rpm, 25°C)	80-120
Thinner	DuPont 4553
Coverage (cm^2/g) (based on a fired thickness of 14 μm)	110-130

Firing

Fire each dielectric print separately in well ventilated moving conveyor furnace, in air. A 30-minute cycle with a peak temperature of 850°C held for 10 minutes should be used.

Storage and Shelf Life

Containers should be stored, tightly sealed, in a clean, stable environment at room temperature (<25°C). Shelf life of material in unopened containers is six months from date of shipment. Some settling of solids may occur and compositions should be thoroughly mixed prior to use.

System Elements

	Silver	Mixed Metal	Gold
Top Conductor	QM22 (3:1) 7484 (3:1) 6277 (6:1) QM18 (100:1)	5771 (gold) 4597R (solderable) QG150(fine line)	5771 4597R QG150
Inner Conductor	QM17 (Pt/Ag) QM14 (Ag)	QM17 QM14	5771 QG150
Via Fill	QM34	QM34 (inner) QM35 (top)	5747
Resistor Series	S1X0	S1X0	S1X0

* Bold/Italic type denotes that the conductor may be cofired on QM44

Dielectric
QM44 A filled, crystallizable, two print Dielectric Composition

Silver Conductors
QM22 A unique 3:1 silver/palladium, cofire or sequentially fire, not for aluminum Wirebonding.
7484 3:1 silver/palladium sequentially fire only, used when Al wire bonding is needed.
6277 6:1 silver/palladium sequentially fire only.
QM17 silver/platinum, cofire or sequentially fire internal conductor, sequentially fire top conductor for traces only
QM18 silver/platinum, cofire or sequentially fire top conductor
QM14 silver, cofire or sequentially fire internal conductor, sequentially fire top conductor, sequentially fire top conductor for traces only.
QM34 A unique silver via fill, cofire or sequentially fire, not for connecting silver to gold conductors.
QM35 A unique silver/platinum via fill, used as transition via for connecting silver to gold conductors, not recommended for stacked vias.

Gold Conductors
5771 A general purpose cadmium-free* gold, internal & top conductor, cofire or sequentially fire, not for large (>2 mil) aluminum wire bonding.
QG150 Cadmium-free* high density gold conductor, cofire or sequentially fire.
4597R Cadmium-free* replacement of 4596 (solderable gold), cofire or sequentially fire.
5747 Cadmium-free* replacement of 5727 (gold via fill), cofire or sequentially fire.

Resistors
S1X0 Variant of the 2000 Series Resistor Composition for QM44, 10 ohm-1Meg ohm, sequentially fire.

*Cadmium "free" as used herein means that these are not intentionally added to the referenced product. Trace amounts however may be present.



The miracles of science™

Safety and Handling

For Safety and Handling information pertaining to this product, read the Material Safety Data Sheet (MSDS).

Copyright © 2009 DuPont. All rights reserved. The DuPont Oval, DuPont™, The miracles of science™, Green Tape™ and all products or words denoted with © or ™ are registered trademarks or trademarks of E. I. du Pont de Nemours and Company or its affiliates ("DuPont"). NO PART OF THIS MATERIAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING OR OTHERWISE WITHOUT THE PRIOR WRITTEN PERMISSION OF DUPONT.

Caution: Do not use in medical applications involving implantation in the human body or contact with internal body fluids or tissue unless the product is provided by DuPont under a formal written contract consistent with the DuPont Policy Regarding Medical Applications of DuPont Materials H-50103-2 ("Medical Applications Policy") and which expressly acknowledges the contemplated use. For additional information, please request a copy of DuPont Medical Caution Statement H-50102-2 and the DuPont Medical Applications Policy.

The information provided herein is offered for the product user's consideration and examination. While the information is based on data believed to be reliable, DuPont makes no warranties, expressed or implied as to the data's accuracy or reliability and assumes no liability arising out of its use. The data shown are the result of DuPont laboratory experiments and are intended to illustrate potential product performance within a given experimental design under specific, controlled laboratory conditions. While the data provided herein falls within anticipated normal range of product properties based on such experiments, it should not be used to establish specification limits or used alone as the basis of design. It is the product user's responsibility to satisfy itself that the product is suitable for the user's intended use. Because DuPont neither controls nor can anticipate the many different end-uses and end-use and processing conditions under which this information and/or the product described herein may be used, DuPont does not guarantee the usefulness of the information or the suitability of its products in any given application. Users should conduct their own tests to determine the appropriateness of the products for their particular purpose.

The product user must decide what measures are necessary to safely use the product, either alone or in combination with other products, also taking into consideration the conditions of its facilities, processes, operations, and its environmental, health and safety compliance obligations under any applicable laws.

This information may be subject to revision as new knowledge and experience become available. This publication is not to be taken as a license to operate under, or recommendation to infringe any patent.



The miracles of science™

For more information on DuPont QM44 or other DuPont Microcircuit Materials products, please contact your local representative:

Americas

DuPont Microcircuit Materials
14 T.W. Alexander Drive
Research Triangle Park, NC 27709
Tel.: 800-284-3382

Europe

Du Pont (U.K.) Limited
Coldharbour Lane
Bristol BS16 1QD
U.K.
Tel.: 44-117-931-3191

Asia

DuPont Kabushiki Kaisha
Sanno Park Tower, 11-1
Nagata-cho 2-chome
Chiyoda-ku, Tokyo 100-611
Japan
Tel.: 81-3-5521-8650

DuPont Taiwan Ltd
45, Hsing-Pont Road,
Taoyuan, Taiwan 330
Tel.: 886-3-377-3616

DuPont China Holding Co. Ltd
Bldg 11, 399 Keyuan Rd., Zhangji Hi-Tech Park,
Pudong New District, Shanghai 201203, China
Tel.: 86-21-6386-6366 ext.2202

DuPont Korea Inc.
3~5th Floor, Asia tower #726,
Yeoksam-dong, Gangnam-gu
Seoul 135-719, Korea
Tel.: 82-10-6385-5399

E. I. DuPont India Private Limited
7th Floor, Tower C, DLF Cyber Greens,
Sector-25A, DLF City, Phase-III,
Gurgaon 122 002 Haryana, India
Tel.: 91-124-4091818

Du Pont Company (Singapore) Pte Ltd
1 HarbourFront Place, #11-01
HarbourFront Tower One,
Singapore 098633
Tel.: 65-6586-3022

<http://mcm.dupont.com>