

DuPont 4300 Series Resistors

1Ω/sq - 1MΩ/sq RESISTORS FOR CERMET TRIMMERS AND POTENTIOMETERS

Technical Data Sheet

Product Description

DuPont 4300-Series Resistors are cadmium free* and designed for use in high performance cermet trimmers and potentiometers. DuPont 4300-Series Resistors are intended to be applied to ceramic substrates by screen printing and fired in a conveyor furnace in an air (oxidizing) atmosphere, to form specific resistive elements.

Product Benefits

- Cadmium free*
- Improved low ohm performance
- Suitable for various wiper materials including stainless steel
- Excellent contact resistance variation (CRV), rotational life, and solder dip stability
- Compatible with high silver containing conductors
- Fast Firing - 850°C, 30 min profile

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

Processing

Substrates

Properties are based on tests using 96% alumina substrates. Substrates of other compositions and from various manufacturers may result in variations in performance properties. Care must be taken to avoid air-bubble entrapment. It is the responsibility of users to determine the effects of the above variables in their particular situations.

Composition Properties

Test	Properties
Viscosity (Pa.s) [Brookfield HBT, SC-4-14/6r [UC&SP], 10 rpm, 25°C +0.2°C	120-200
Coverage ¹ (cm ² /g)	95
Thinner	DuPont 8250
<small>¹ Based on average fired thickness of 10 μm (0.4 mil) for pads</small>	

Drying

Allow the wet print to level for 10-15 minutes at room temperature in a clean draft free environment, followed by drying for 10-15 minutes at 150°C in a well ventilated oven or conveyor dryer.

Screen Printing Equipment

DuPont 4300-Series Resistor compositions should be thoroughly mixed before use. This is best achieved by slow, gentle hand stirring with a clean, burr-free spatula (flexible plastic) for 0.5 - 1 minute. Note: Optimum printing characteristics of DuPont 4300-Series Resistors are generally achieved in the temperature range 20-23° C. Specified properties are based on resistors printed to 23 - 27 μm dried print thickness. This is generally achieved using a 325-mesh stainless steel screen with a 10-16 μm emulsion thickness. Control and reproducibility of print thickness is essential to obtain predictable, reproducible fired resistor properties.

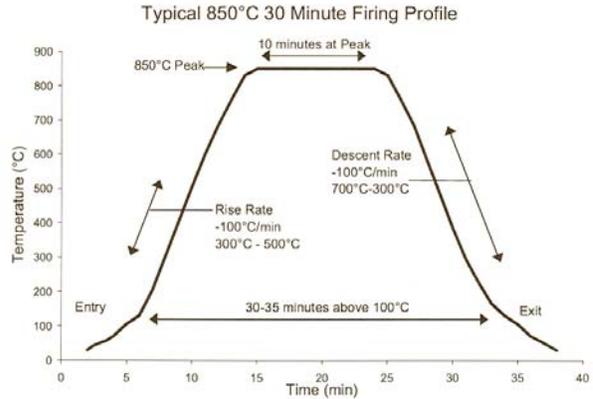
Firing

It is essential that the air supply to the furnace is clean, dry and free of contaminants. DuPont 4300-Series Resistors are fired on a 30-minute firing cycle to a peak of 850°C held for 10 minutes (see figure 1). Variations in peak firing temperature may result in variations in the final fired properties. Resistor compositions must be fired in clean air. Insufficient airflow or pollution of the air in the furnace may result in shifts of resistivity and TCR.

Blend Behavior

Adjacent members of DuPont 4300-Series are blendable.

Figure 1



Typical Fired Properties

	4308	4311	4321	4331	4341	4351	4361
Resistivity (Ω/sq) ¹	1	10	100	1K	10K	100K	1M
Tolerance (Ω)	0.3-1.2	3.0-12.0	30-120	300-1.2K	3K-12K	30K-120K	300K-1.2M
HTCR (ppm/C) ²	0±200	0±200	0±200	0±200	0±200	0±200	0±200
CTCR (ppm/C) ³	0±200	0±200	0±200	0±200	0±200	0±200	0±200
STOL (V/mm) ⁴	6	11	28	30	22	65	33
SWV (V/mm) ⁵	2.4	4.4	11.2	12	8.8	26	13.2
MRPD (mW/mm ²) ⁶	5236	1574	1186	144	9	11.6	0.2
CRV ⁷	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Rotational Life ⁷	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
(200 Cycle)							

- 1) 10x1.25mm resistor; 25µm dry; DuPont 7780 Termination
- 2) +25C to +125C
- 3) +25C to -55C
- 4) Short Time Overload Voltage; 5 sec pulse sufficient to cause 0.25% change in resistance
- 5) Standard Working Voltage; 0.4xSTOL
- 6) Max Rated Power Dissipation; SWV²/R (ohms)
- 7) 10 finger Paliney wiper; 50gram force; 10x1.25mm resistor



The miracles of science™

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.

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 4300 series 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>