

DuPont 00x0A

60mΩ/sq to 10MegΩ/sq RESISTOR SERIES

Technical Data Sheet

Product Description

Designed to give an ideal balance of properties, the DuPont 00x0A Series has been specifically developed for Chip Resistor applications. It has also been shown to have excellent performance properties for hybrid and multilayer applications. It meets the market need for smaller resistors and lower costs. This cadmium free* series is fully blendable between adjacent members.

Product Benefits

- Resistors are cofirable with specified termination
- Optimized for high speed (to 30cm/sec) printing
- High speed laser trimmable
- Exceptional ESD Stability
- Excellent power handling stability
- Low Quantech noise

Processing Features

- Low sensitivity to firing
- Fast firing –850°C/30 minute profile
- Linear blend behaviour

Recommended Processing Conditions Substrates

Reported properties are based on tests with 96% alumina substrates. Good performance properties have also been observed on DuPont QM44 dielectric. Substrates of other compositions may yield variation in performance properties.

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

Termination

DuPont 00x0A resistors were designed for use with high silver-containing terminations. Reported properties were obtained using DuPont 5426 Ag/Pd termination. Similar performance properties have been observed with other DuPont gold and silver-bearing conductors.

Printing

Properties are based on resistors printed to $20 \pm 2 \mu\text{m}$ dried thickness. This can be achieved by using 250 - 325 mesh screens with emulsions of 10-15 μm . Resistors smaller than 0.3x0.3mm will require finer mesh screen to achieve the desired print resolution. Although Resistance and TCR values will change, similar functional properties have been observed with thinner dried film prints (<18 μm). To optimize laser trainability, dried thickness >22 μm should be avoided.

Thinner

DuPont 00x0A Series has been optimized for screen printing and thinning is not normally required or recommended. DuPont 8250 thinner may be added sparingly to compensate for evaporative losses.

Drying

Parts should be allowed to level at room temperature for 5-10 minutes and then dried for 10-15 minutes at 150°C.

Firing

Properties are based on a 30 minute firing cycle (100°C -100°C) with 10 minutes at a peak temperature of 850°C. DuPont 00x0A was designed to allow cofiring of selected termination materials with the resistors. Sample profile is shown in Figure 3.

Blending

DuPont 00x0A Series is blendable between each adjacent member (i.e. DuPont 0004A will blend with DuPont 0001A and DuPont 0010A). Blend curves are shown in Figure 2.

Design Effects

Length and termination effects on DuPont 00x0A resistance are shown in Figure 1.

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).

**Table 1
Resistor Properties ¹**

	Resistivity ² (Ω/sq)	Shipping Tolerance	Hot TCR ³ (ppm/C)	Cold TCR ³ (ppm/C)	Viscosity ⁴ (Pa.S)	Solids (%)
00L2	0.06	±0.01Ω	<400	<400	80-180	63-66
00L1	0.160	±0.02Ω	±100	±100	80-180	62-67
0001A	1	±15%	±100	±100	80-180	62-65
0004A	4	+0-30%	0 to 100	±100	100-150	58-62
0010A	10	±15%	20 to 60	-60 to -10	100-180	57-60
0020A	100	±15%	10 to 50	-60 to 10	110-180	56-59
0030A	1K	±15%	-10 to 30	-60 to 10	110-180	57-60
0040A	10K	±15%	10 to 50	-60 to 0	110-180	56-59
0050A	100K	±15%	10 to 50	-60 to 0	110-180	56-59
0060A	1M	±15%	20 to 40	-60 to 0	110-180	58-62
0070G	11.5M	±40%	-20 to 50	-100 to +50	110-180	57 - 62

¹ Shipping specifications

² Based on dry thickness normalized to 20μm and cofired with dry DuPont 5426 termination 30 minute cycle at 850°C Resistor geometry—0.8x0.8mm

³ Temperature Coefficient of Resistance. Hot TCR 25°C to 125°C. Cold TCR 25°C to -55°C

⁴ Brookfield HAT Viscometer 10 rpm, UC&SP (SC4-14/6R), 25°C±0.2°C



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Typical Fired Properties ¹

						1000 hr Laser Trim Stability		
	Short Time Overload Voltage ² (V/mm)	Std Working Voltage ³ (V/mm)	Max Rated Power ⁴ (mW/mm ²)	ESD 5KV (avgΔR)	Quan-tech Noise (dB)	25°C (avgΔR)	150°C (avgΔR)	85°C/85%Rel Humidity (avgΔR)
00L2	0.25	0.1	45	<-0.3%	40	<0.1%	<-0.2%	<0.5%
00L1	0.2	0.08	57	<-0.2%	46	<0.1%	<0.2%	<0.4%
0001A	1.0	0.4	121	<0.3%	40	<0.1%	<0.1%	<0.1%
0004A	6.3	2.5	1375	<0.1%	-40	<0.5%	<0.6%	<0.5%
0010A	7.8	3.1	470	<0.1%	-35	<0.2%	<0.2%	<0.4%
0020A	27	11	697	<0.1%	-35	<0.1%	<0.5%	<0.4%
0030A	94	38	781	<1.0%	-18	<0.1%	<0.2%	<0.2%
0040A	187	75	244	<3.0%	-11	<0.1%	<0.2%	<0.2%
0050A	450	180	177	<0.2%	-6	<0.1%	<0.2%	<0.2%
0060A	435	174	14	<0.1%	6	<0.1%	<0.2%	<0.3%
0070G	25	10	0.01	<0.2%	OR	<0.2%	<0.5%	<0.5%

1 1x1mm resistor trimmed with single plunge cut to 1.5X the as-fired value.

2 STOL = 5 second duration voltage required to induce a 0.25% change in resistance (DuPont 0010A – DuPont 0070A)

Note: Resistance shift limit for 00L1 and 00L2 is 0.5%.

3 SWV = 0.4xSTOL

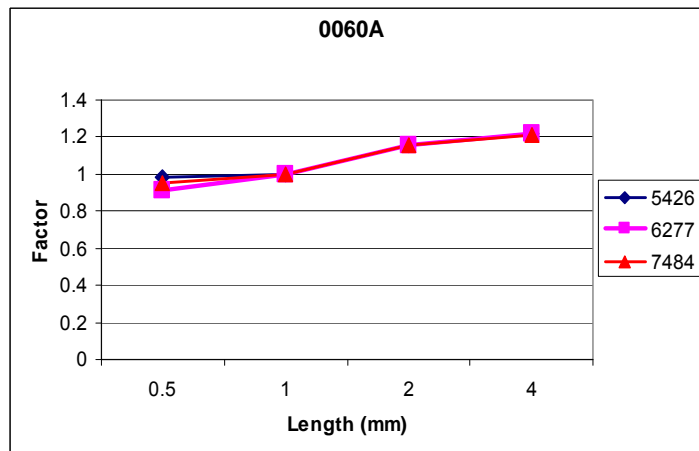
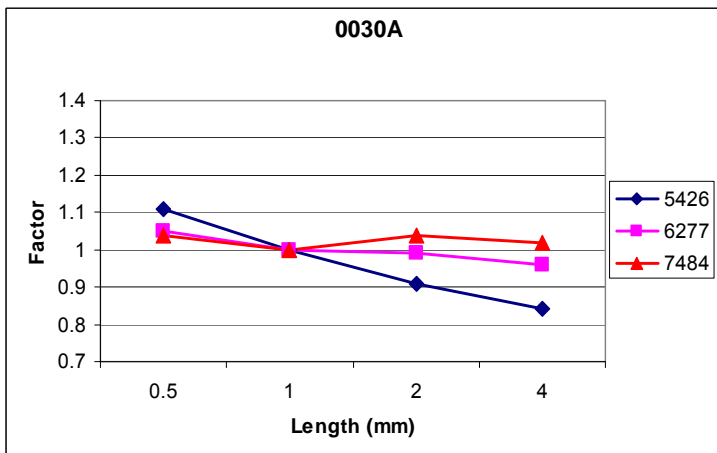
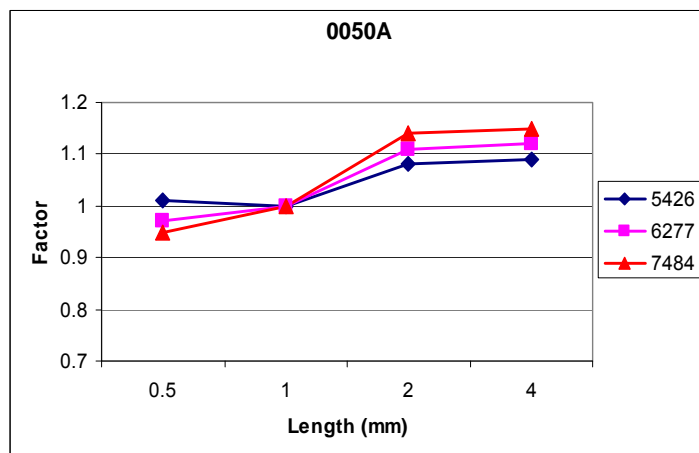
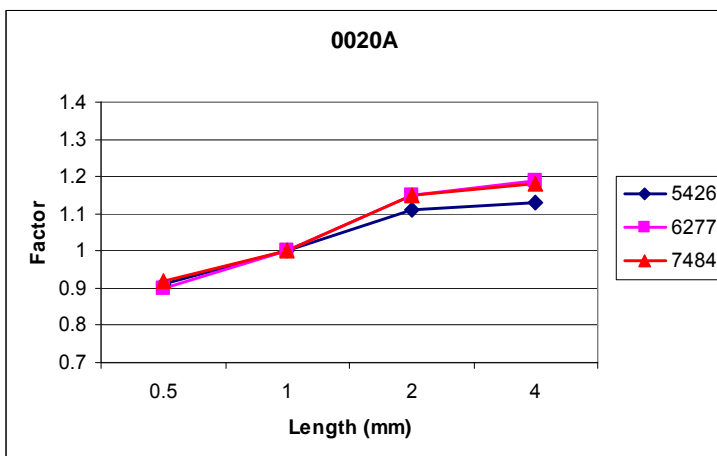
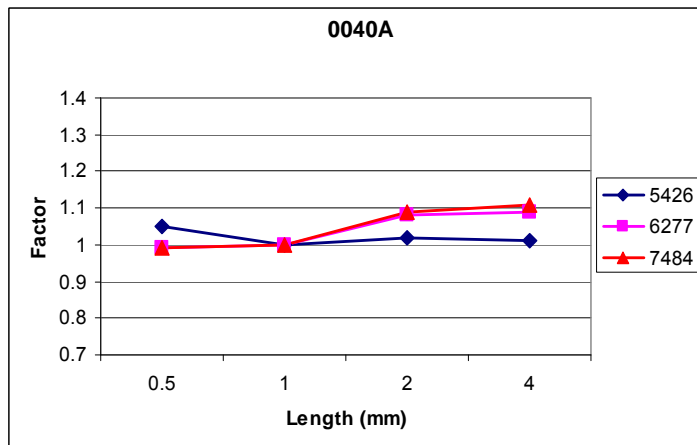
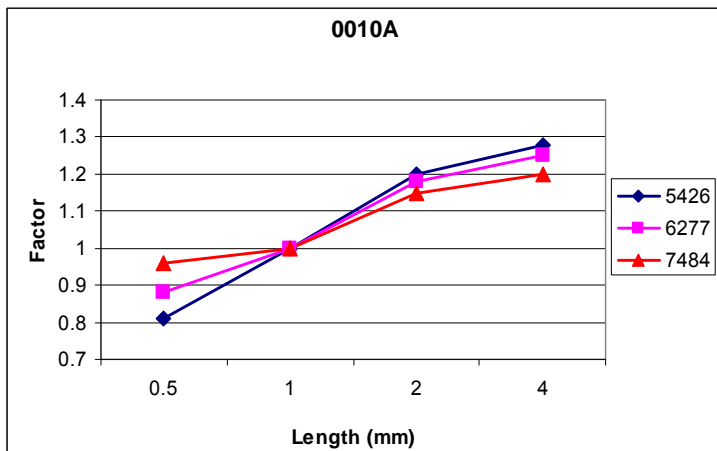
4 MRPD = SWV²/trimmed resistance

5 AVG ΔR after 5 pulses



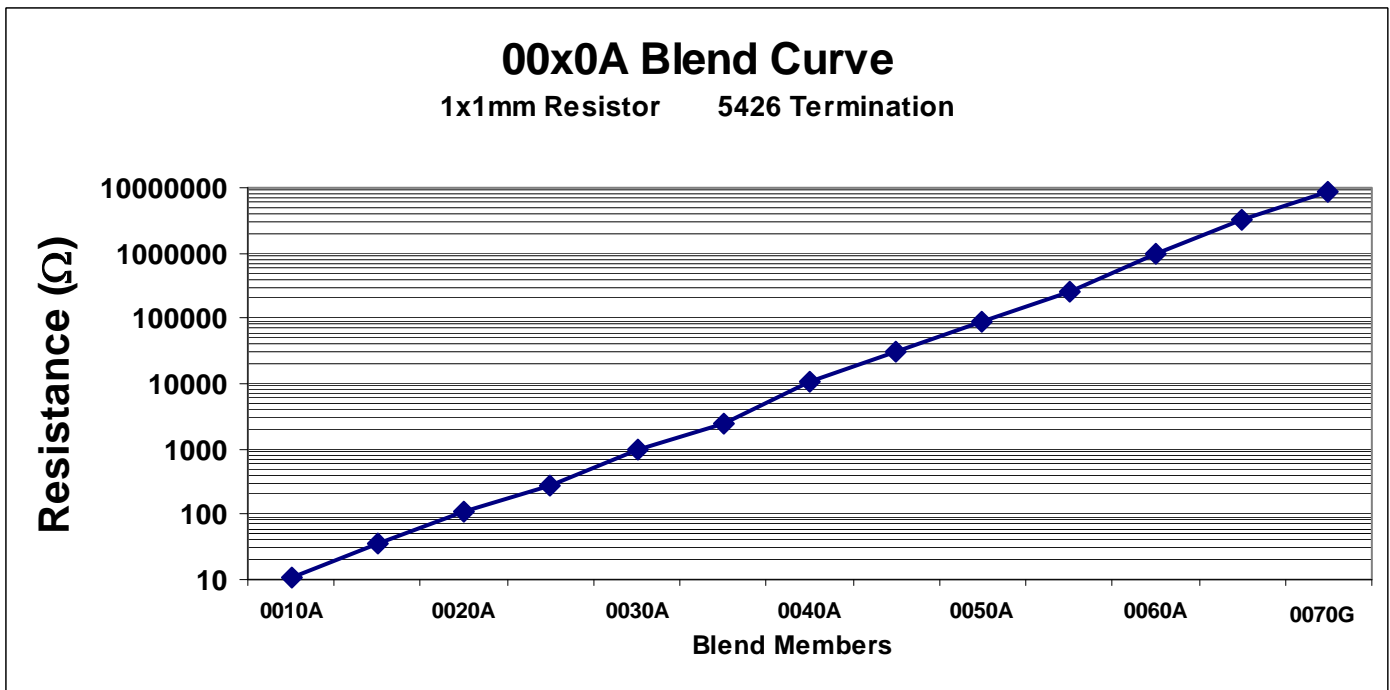
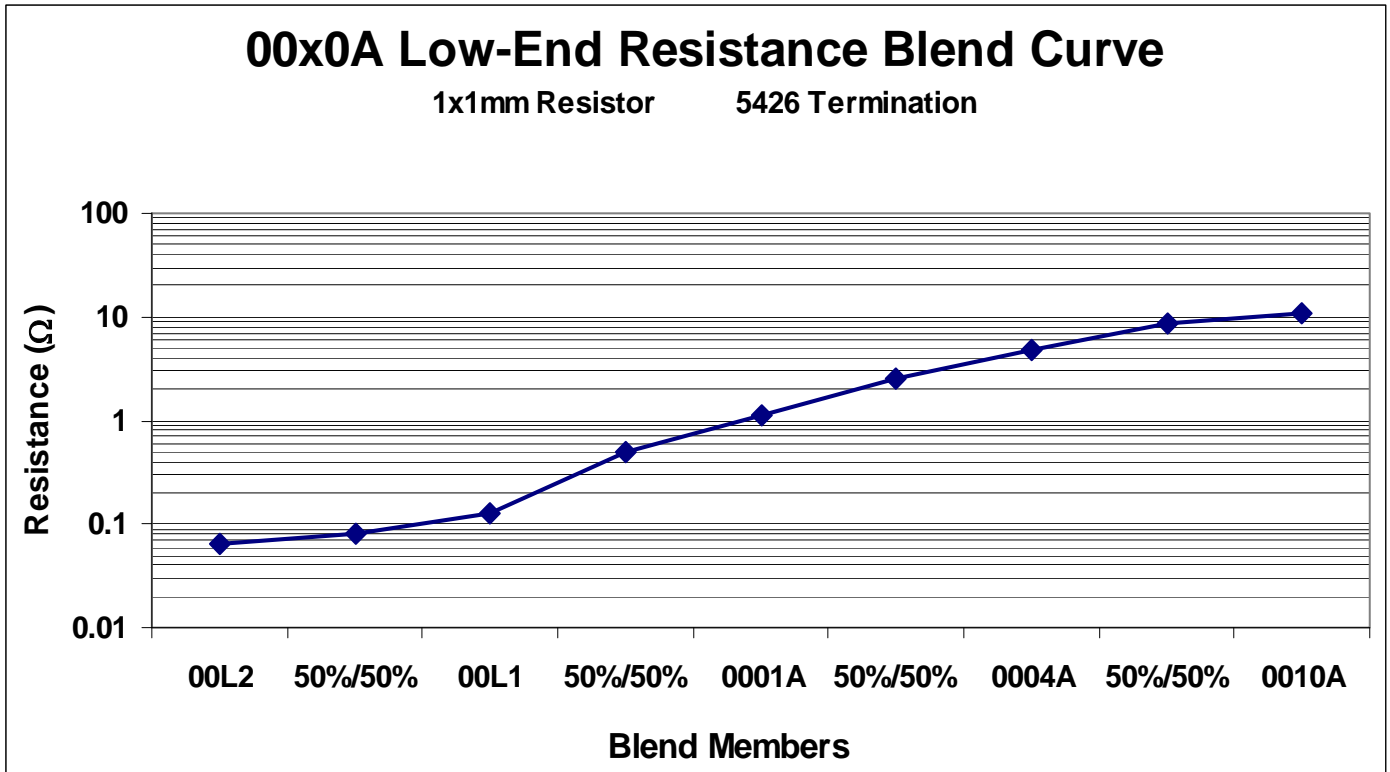
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Figure 1
DuPont 00x0A Length and Termination Effects
(Effect on Resistance Based on 1 mm Width)



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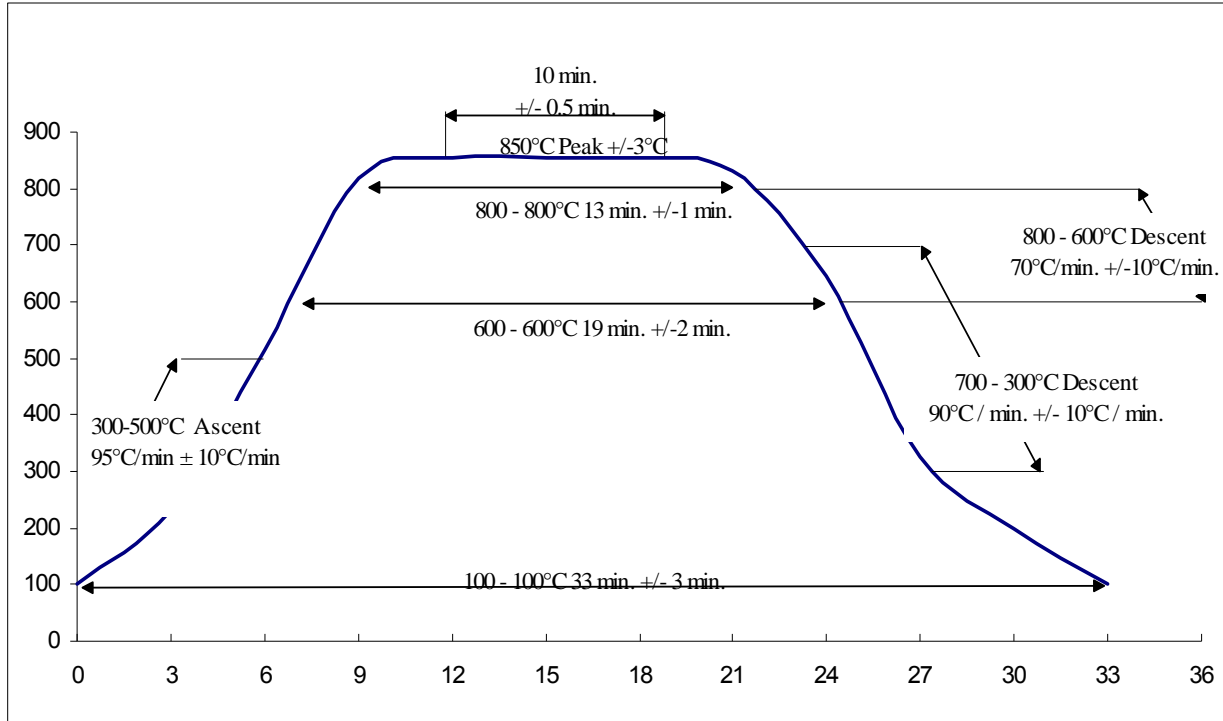
Figure 2
Effects of Blending on Resistance



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Figure 3

Typical 30 Minute Furnace Profile



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