

# DuPont 110X

HIGH VOLTAGE THICK FILM RESISTOR COMPOSITION

## Technical Data Sheet

### Product Benefits

- 100 K $\Omega$  /sq - 1G $\Omega$  /sq resistivity
- Superior TCR
- Excellent VCR behavior
- Co-fireable with terminations
- Excellent blend behavior

### Processing Substrates

Reported properties are based on tests with Coors 96% alumina substrates. Substrates of other chemical composition or from other manufacturers may result in variations in performance.

### Terminations

Unless otherwise stated, reported properties are based on tests with DuPont 6277 silver/palladium conductor composition prefired at 850°C.

### Composition Properties

Test	Properties
Viscosity (Pa.S) [Brookfield HBT/RVt* utility cup and spindle [SC4-14], 10 rpm, 25°C)	80-120
Thinner	DuPont 4553
*1105, 1107 and 1109 use HBT 1106 and 1108 use RVT	

TCR and resistivity (R) offset data have been provided for DuPont 7770, a silver/platinum conductor composition and DuPont 7474, a 3:1 silver/palladium conductor composition.

**Table 1 — Fire Resistor Properties**

	1105	1106	1107	1108	1109
Resistivity, $\Omega$ /sq	80 K–100 K	1M $\pm$ 10%	10M $\pm$ 10%	100M $\pm$ 10%	1.0 - 1.4G
Coefficient of Variation (CV),	<5	<5	<5	<5	<15
Temperature Coefficient of Resistance (TCR),					
Hot, ppm/°C	0 $\pm$ 100	0 $\pm$ 100	0 $\pm$ 100	0 $\pm$ 150	—
Cold, ppm/°C	0 $\pm$ 100	0 $\pm$ 100	0 $\pm$ 100	—	—
Voltage Coefficient of Resistance (VCR), ppm/V/mm, 30 V/300 V	-60	-60	-140	-350	-2,000
Load Life—1,000 hr					
Irreversible, %DR	-0.5	-0.5	-0.5	-0.5	-0.5
Short Term Overload Voltage (STOL),					
1,000 V 5 sec, % DR	-0.5	-0.1	0.0	-0.2	—
1,000 V 10 sec, %DR	-1.0	0.0	-0.1	-0.1	—
Electrostatic Discharge (ESD)					
1 x 5000 V, %DR	—	0.0	—	—	—
Pulsed Voltage, %DR					
Stability, 1 kV, 100 pulses 1.5 mm x 1.5 mm	0.0	0.0	-0.1	-0.1	—

All test on 1.0 mm x 1.0 mm untrimmed resistors unless otherwise noted.

This table shows anticipated typical physical properties for DuPont 110X based on specific controlled experiments in our labs and are not intended to represent the product specifications, details of which are available upon request.

### Resistor Geometry

DuPont 110X Series compositions are Quality Assurance tested using a 1.0 mm x 1.0 mm resistor with prefired DuPont 6277 silver/palladium conductor termination. Variations in resistor geometry will cause variations in R and TCR.

### Printing Conditions

Specified properties are based on resistors printed to  $20 \pm 2 \mu\text{m}$  dried print thickness.

### Drying Conditions

Prints should be allowed to level 5–10 min at room temperature and then dried 10–15 min at  $150^\circ\text{C}$ .

### Firing

DuPont 110X Series resistor properties are based on resistors fired with a  $850^\circ\text{C}$ , 30-min profile.

Figure 1. TCR vs. R.

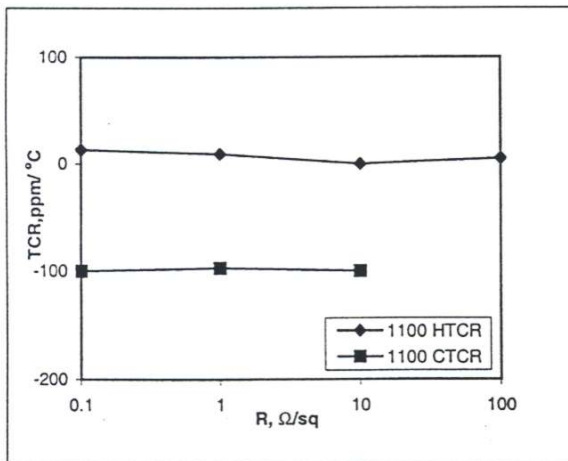


Figure 2. DuPont 110X Series Blend

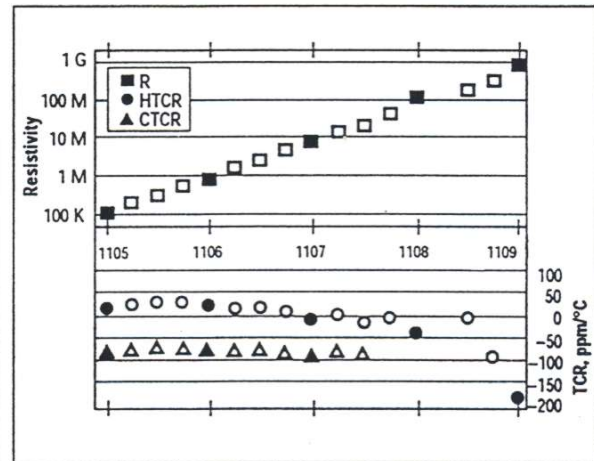


Figure 3. VCR vs. R

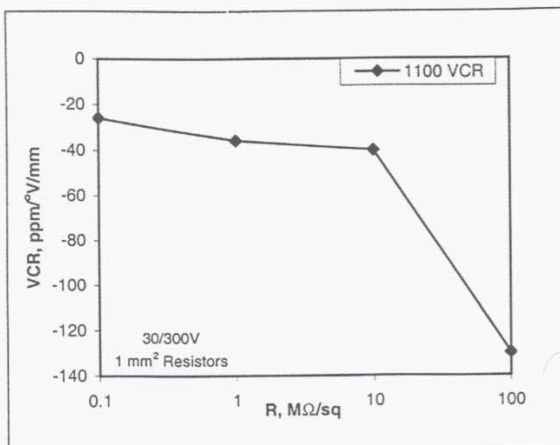


Figure 4. Load Life vs. Time

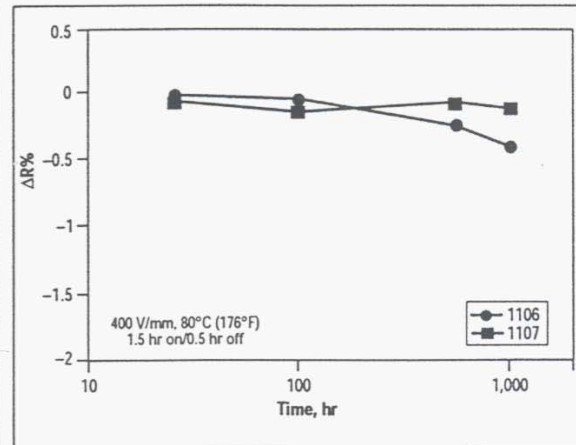


Figure 5. Resistivity vs. Firing Temperature

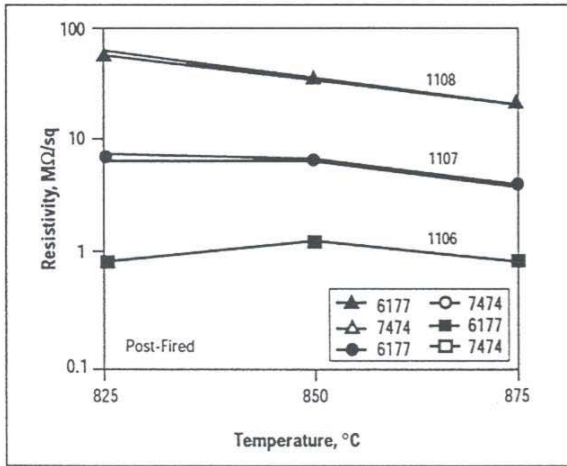


Figure 6. HTCR vs. Firing Temperature

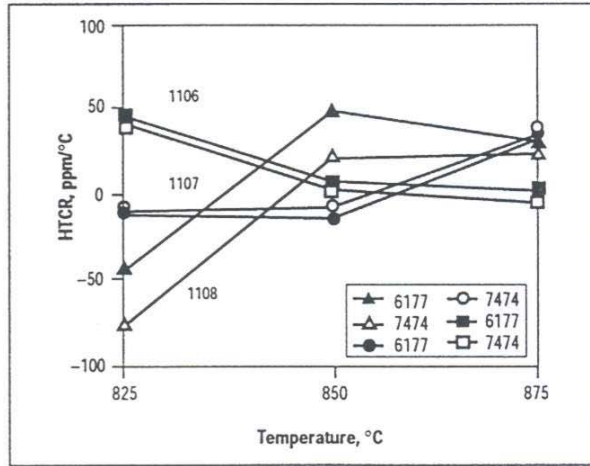


Figure 7. Cofired vs. Post-Fired Resistors

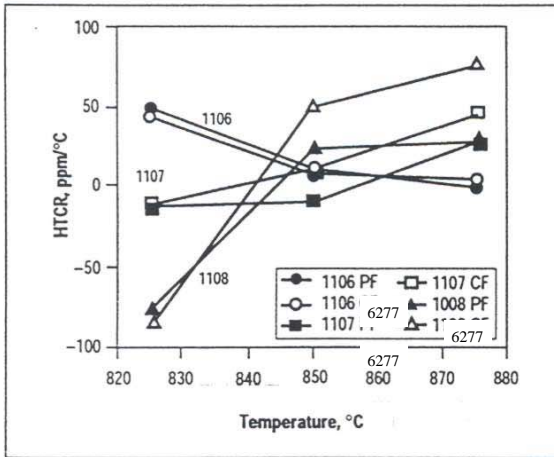


Figure 8. Length Effects

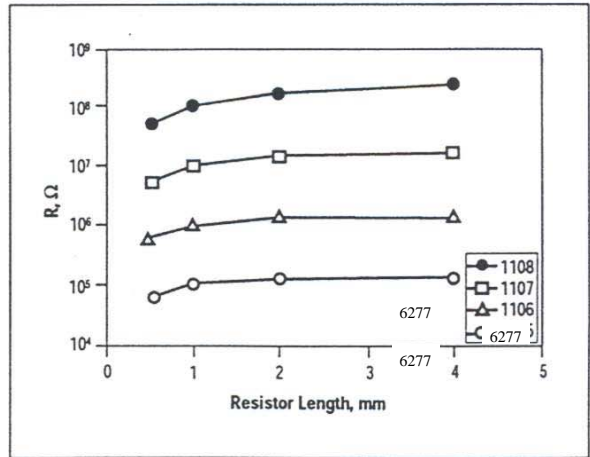


Figure 9. Length Effects

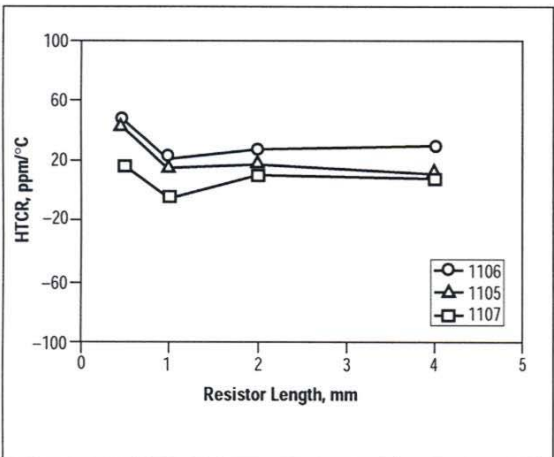
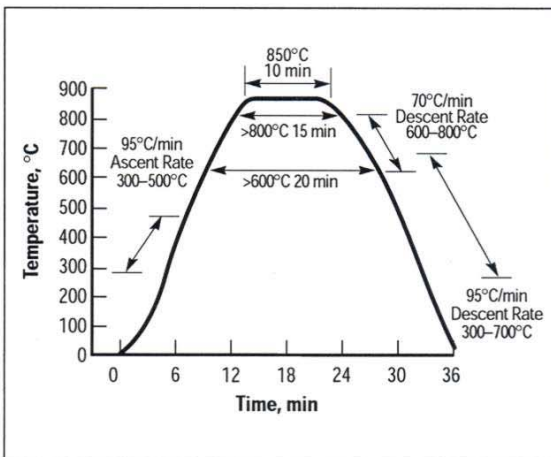


Figure 10. Recommended 30 minute Profile



## 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).

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