

# Micromax™ 1731

## Microcircuit and Component Materials

### Series 17 Resistors

### High Reliability Hybrid Microcircuits And Precision Resistor Network 10Ω - 1MΩ/sq Silver Alloy Terminations

Micromax™ Series 1700 Resistor Compositions have been developed as part of a materials system for use in the manufacture of high reliability hybrid circuits requiring high stability, low TCR, and low process sensitivity.

### Product benefits

- Post laser trim stability of less than 0.5% average  $\Delta R$  under all standard testing conditions.
- TCRs of less than 100 ppm/°C, even with blends.
- Low sensitivity to variations in firing temperature, time at peak and resistor geometry.

### Product information

Solvent or thinner  
Blend member or series

[1]: Blend Member A

Micromax™ 4036  
17 Resistors Series <sup>[1]</sup>

### Rheological properties

Viscosity

145 - 210<sup>[2]</sup> Pa.s

[2]: HAT UC & #14 Spindle, 10rpm, 25°C±1°C

### Application technique

Mask mesh

200<sup>[3]</sup>

Mask emulsion

12 - 18 μm

Drying time

10 - 15 min

Drying temperature

150 °C

Theoretical coverage

80 - 110 cm<sup>2</sup>/g

Recommended film thickness, dried

22 - 28 μm

Leveling time

5 - 10 min

[3]: stainless steel

### Electrical properties

Surface resistivity

900000 - mOhm per  
1.1E6<sup>[4]</sup> square

Hot Temperature Coefficient Resistance

-50 - 50<sup>[5]</sup> ppm/K

Cold Temperature Coefficient Resistance

-50 - 50<sup>[6]</sup> ppm/K

Noise

-15<sup>[7]</sup> dB

Short Term Overload Voltage

≥60 V/mm

Standard Working Voltage

25<sup>[9]</sup> V/mm

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Maximum Rated Power Dissipation

625<sup>[10]</sup> m/(W.mm<sup>2</sup>)

[4]: Typical resistor properties based on laboratory tests using recommended processing conditions: terminations : Micromax™ Palladium/Silver Conductor Composition 9308 prefired at 850 °C; substrate : 96% alumina; printing : 200-mesh stainless steel screen (18 µm emulsion thickness) to a dried thickness of 25±3 µm; firing : 60-min cycle to peak temperature of 850 °C for 10 minutes. Shipping specifications. Resistor geometry : 1.5 mm x 1.5 mm.

[5]: Temperature Coefficient of Resistance +25+125 °C

[6]: Temperature Coefficient of Resistance -55+25 °C

[7]: Resistor geometry : 1 mm x 1 mm, Firing cycle, 60 minute cycle to peak temperature of 850 °C for 10 minutes.

[8]: Short Term Overload Voltage : required (5 second duration) to induce a resistance change of 0.25% in a 1 mm x 1 mm resistor at 25 °C.

[9]: Standard working voltage : 0.4 x Short Term Overload Voltage.

[10]: Maximum Rated Power Dissipation : (Standard Working Voltage)<sup>2</sup>/Resistance

## Storage and stability

Shelf life

6<sup>[11]</sup> months

[11]: in unopened containers, from date of shipment, at temperature <25° C

## Additional information

How to use

## Processing

### • Termination

- Unless otherwise stated, reported properties are based on tests with Micromax™ 9308 silver/palladium conductor composition, prefired at 850 °C. Excellent results have also been obtained using other silver/palladium conductor compositions. The precious metal alloy compositions are prefired at 850 °C.

### • Substrates

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

### • Resistor geometry

- Micromax™ Series 1700 compositions are Quality Assurance tested using a 1.5 mm x 1.5 mm resistor with prefired silver/palladium Micromax™ 9308 terminations. Variations in resistor geometry will result in slight variations in resistivity and TCR.

### • Printing

- Specified properties are based on resistors printed to 25±3 µm dried print thickness. This is readily achieved using 200-mesh stainless steel screens with 15±3 µm emulsion thickness. Nylon or polyester screens may be used in some applications although a lower mesh count of 150-175 will usually be required to achieve equivalent print thickness.

### • Drying

- Prints should be allowed to level at room temperature and then

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dried.

- **Effect of variations in thickness**
  - Print thickness outside the 20-30  $\mu\text{m}$  range may result in compromised TCR and/or stability characteristics.
- **Firing**
  - Micromax™ Series 1700 resistivity and TCR specifications are based on a 60-min firing cycle with a 10-min peak at 850 °C, 20 min above 800 °C and 30 min above 600 °C.
- **Refire sensitivity**
  - 10k $\Omega$ /sq or lower resistors change very slightly on refiring. The 100k and 1M $\Omega$ /sq resistors show significant increases in resistivity on refiring; however, TCR's remain well within the  $\pm 100$  ppm/°C limits.
- **Encapsulant**
  - In general, glass encapsulation is not required. However, in applications which require mechanical protection or protection from extreme environments such as high temperature nitrogen or forming gas, Micromax™ QQ550 encapsulant fired at 500 °C is recommended. Glass encapsulation of 1 mm x 1 mm resistors terminated with silver/palladium Micromax™ 9308 shifts the resistivity of Micromax™ Series 1700 resistors by less than 1%.

### Properties

- Information in this datasheet shows anticipated typical physical properties for Micromax™ 1700 series based on specific controlled experiments in our labs and are not intended to represent the product specifications, details of which are available upon request.

### 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 Safety Data Sheet (SDS).

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