Micromax™ 1749R

Electronic Inks and Pastes

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 ΔR 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	Micromax™ 4036
Blend member or series	17 Resistors Series [1]

[1]: Blend Member B

Rheological properties

Viscosity	145 - 210[2]	Pa.s

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

Application technique

Mask mesh	200[3]	
Mask emulsion	12 - 18	µm
Drying time	10 - 15	min
Drying temperature	150	°C
Theoretical coverage	80 - 110	cm^2/g
Recommended film thickness, dried	22 - 28	µm
Leveling time	5 - 10	min

[3]: Screen Types: Stainless steel

Electrical properties

Surface resistivity	9E7 - 1.1E8[4]	mOhm per square
Hot Temperature Coefficient Resistance	-100 - 100[5]	ppm/K
Cold Temperature Coefficient Resistance	-100 - 100[6]	ppm/K
Noise	2[7]	dB
Short Term Overload Voltage	280[8]	V/mm
Standard Working Voltage	110[9]	V/mm

Micromax™ 1749R

Electronic Inks and Pastes

Maximum Rated Power Dissipation	120[10]	m/(W.mm²)
Voltage Coefficient of Resistance	-40[11]	ppm

[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 to 125°C

[6]: Temperature Coefficient of Resistance -55 to 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)²/Resistance

[11]: ppm/V/mm, Resistor geometry 1 mm x 1 mm laser trimmed with P-cut to 1.5x average fired value. VCR measured from 5-50 VDC.

Storage and stability

Shelf life	6[12]	months

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

Additional information

How to use

Processing

- **Terminations**
  - Unless otherwise stated, reported properties are based on tests with Micromax™ 9308 silver/palladium conductor composition, prefired at 850°C. Excellent resulls 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 Assursance 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 propreties 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.

Micromax™ 1749R

Electronic Inks and Pastes

- Drying
  - Prints should be allowed to level at room temperature and then dried.
- Effect of variations in thickness
  - Print thickness outside the 20-30 µm 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
  - 10kΩ/sq or lower resistors change very slightly on refiring. The 100k and 1MΩ/sq resistors show significant increases in resistivity on refiring; however, TCR's remain well within the ±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).