

Micromax™ 2104

Electronic Inks & Pastes

PRODUCT DESCRIPTION

2100 Series Resistor Compositions For Hybrid Circuits

Micromax™ 2100 Series resistor compositions are designed to provide excellent electrical properties, lower overall process sensitivity, for Hybrid circuits with new resistor materials technology.

Product characteristics

- HTCR's of less than 50 ppm/°C @0 – 70°C
- Low noise
- Excellent electrostatics
- Discharge (ESD)
- Excellent short term
- Overload (STOL)

Processing features

- Low sensitivity to peak firing temperature
- No blend break from 1Ω to 10MΩ/sq.
- Small shifts of resistivity and TCR on re-firing
- Designed to give high power performance at low thickness (18μm dry thickness)
- Compatible with Hi-Ag termination Micromax™ 5164N (Pt/Ag), or Pd/Ag.
- Excellent printability
- Small length and thickness effects on resistivity and TCR
- Cadmium, Nickel and Phthalate free*

*Cadmium, Nickel and Phthalate 'free' as used herein means that cadmium, nickel and phthalate are not intentional ingredients in and are not intentionally added to the referenced product. Trace amount however may be present.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

PRODUCT INFORMATION

General Properties	Value Unit
Application	Hybrid resistor
Solvent or thinner	Micromax™ 8250
Blend member or series	2100srs

TECHNICAL DATA

Application Technique	Value Unit
Mask mesh ¹	325
Mask emulsion	5 to 10 µm
Drying time	10 min
Drying temperature	150 °C
Recommended film thickness	16 to 20 µm
Leveling time	5 to 10 min

Electrical Properties	Value Unit
Resistivity ²	2.8 to 4 Ohm per square
Hot Temperature Coefficient Resistance ³	-50 to 50 ppm/°C
Cold Temperature Coefficient Resistance ⁴	-50 to 50 ppm/°C
Temperature Coefficient Resistance, length effect ⁵	≤40 ppm
Temperature Coefficient Resistance, firing sensitivity ⁶	≤1 ppm/°C
Electrostatic discharge ⁷	≤0.1 (avgDeltaR)(%)
Electrostatic discharge ⁸	≤1 (avgDeltaR)(%)
Noise ⁹	≤-35 dB

Storage and Stability	Value Unit
Shelf life ¹⁰	6 months

¹Screen Types: Stainless steel

²Unless otherwise noted, resistors were printed on Micromax™ 5164N terminations at 18µm dried thickness. Then fired in 30 minute cycle with 850°C peak for 10 minutes. Resistor geometry is 1.0mm x 1.0mm. Shipping specifications for

resistivity are as shown.

³Temperature coefficient of resistance from +25 to +70 for hot TCR

⁴Temperature coefficient of resistance from +25 to 0°C for cold TCR

⁵Difference in TCR between 0.3mm and 0.8mm resistor length.

⁶The effect of firing temperature on TCRs between 825 and 875°C, ppm/°C/°C.

⁷Untrimmed resistors, 0.8mm x 0.8mm @ 5kV. Electrostatic discharge using 100pF/1500ΩR/C network.

⁸Untrimmed resistors, 0.5mm x 0.5mm @ 25kV. Electrostatic discharge using 100pF/1500ΩR/C network.

⁹Quan-Tech model 315C, Untrimmed resistors, 0.8mm x 0.8mm.

¹⁰In unopened containers, from date of shipment, stable environment at room temperature between 5°C - 30°C

PROCESSING GUIDELINES

Terminations

Micromax™ 2100 Series are designed for use with high silver terminations. Reported properties are obtained on Micromax™ 5164N Pt/Ag terminations.

Blendability

Adjacent members of Micromax™ 2100 Series are totally blendable. Electrical performance between members approaches linear behavior. Log resistance versus blind ratio is nearly linear.

Substrates

Reported properties are based on tests with 96% alumina substrates. Substrates of other compositions may yield variation in performance properties.

Printing

Properties are based on resistors printed to 18±2µm dried thickness. This is achieved by using 325 mesh stainless steel screen with emulsion thickness of 5 to 10µm. Resistors smaller than 0.3mm x 0.3mm are best printed using a 400 mesh stainless steel screen.

Thinning

Micromax™ 2100 Series is optimized for screen printing and thinning is not normally required. For minor adjustment, Micromax™ thinner 8250 is recommended.

Drying

Prints should be allowed to level at room temperature then dried.

Firing

Properties are based on a 30 minutes firing cycle with 10 minutes at a peak of 850°C.

Encapsulant

Micromax™ 2100 Series is compatible with glass encapsulant fired at 500-560°C.

Laser trimming

Micromax™ 2100 Series is designed to allow fast laser trimming to achieve tight resistor tolerances. Table gives suggested laser trimming parameters. Laser trimming may be optimized by the user.

Storage and shelf life

Containers should be stored, tightly sealed, in a clean, stable environment at room temperature between 5°C - 30°C. Shelf life of material in unopened containers is 6 months from date of shipment. Some settling of solids may occur and compositions should be thoroughly mixed prior to use.

Storage conditions on the product data sheets are intended to represent long-term material storage recommendations and not a shipping or temperature-at-receipt requirement.

Transportation: Under normal shipping conditions, without temperature control, Micromax™ products are not expected to exhibit a change in quality or fitness for use. Should extraordinary events result in extended transportation periods, Micromax™ recommends customers confirm products remain suitable for the intended application.

Safety and handling

For safety and handling information pertaining to this product, read Safety Data Sheet (SDS).

SAFETY & WARNING

It is recommended that the company/operator read and review the Safety Data Sheets for the appropriate health and safety warnings before use.

Safety Data Sheets are available.

WASTE TREATMENT

Prior to using any recommendations or suggestions for waste treatment, the user is required to know the appropriate local/state/federal regulations for on-site or off-site treatment which may require permits. If there is any conflict regarding our recommendations, local/state/federal regulations take precedence.

CONTACT INFORMATION

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Also read carefully warning and safety information on the Safety Data Sheet. This data sheet contains technical information required for safe and economical operation of this product. READ IT THOROUGHLY PRIOR TO PRODUCT USE. Emergency safety directory assistance: US 1 202 464 2554, Europe + 44 1235 239 670, Asia + 65 3158 1074, Brazil 0800 707 7022 and 0800 172 020, Mexico 01800 002 1400 and (55) 5559 1588

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