

# Micromax™ QS872

## Electronic Inks and Pastes

### QS87 Series Resistors

The Micromax™ QS87 series resistor were designed for thick film hybrid applications and typically use high silver content termination materials. There is no blend break with this system which can provide values ranging between 1 ohm to 100 Meg ohms per square. The Micromax™ QS87 series members provide very good laser trim stability.

### Product information

Solvent or thinner	Micromax™ 4036
Blend member or series	QS87 Series Resistors

### Rheological properties

Viscosity	145 - 210 <sup>[1]</sup> Pa.s
[1]: Brookfield HBT, UC&S 10rpm, 25°C	

### Application technique

Mask mesh	200
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	23 - 27 µm
Leveling time	5 - 10 min

### Electrical properties

Surface resistivity	100000 <sup>[2]</sup> mOhm per square
Hot Temperature Coefficient Resistance	-100 - 100 <sup>[3]</sup> ppm/K
Cold Temperature Coefficient Resistance	-100 - 100 <sup>[4]</sup> ppm/K
Electrostatic discharge, 5kV	-0.1 <sup>[5]</sup> (avgDeltaR)(%)
Electrostatic discharge, other voltage	0.1 <sup>[6]</sup> (avgDeltaR)(%)
Noise	-19 <sup>[7]</sup> dB
Short Term Overload Voltage	≥30 V/mm
Standard Working Voltage	12 <sup>[9]</sup> V/mm
Maximum Rated Power Dissipation	900 <sup>[10]</sup> m/(W.mm <sup>2</sup> )

[2]: Shipping Specification (%) ±10. Coefficient of Variation (CV%) ≤5. Resistor geometry R, TCR, CV : 1.5 x 1.5mm.

[3]: Hot TCR measured from +25°C to +125°C.

[4]: Cold TCR measured from -55°C to +25°C.

[5]: Electrostatic Discharge measures the ΔR% after 1 pulse at specified voltage. Resistor geometry STOL, ESD, Noise : 1 x 1 mm laser trimmed to 1.5 x fired value.

[6]: @2KV. Electrostatic Discharge measures the ΔR% after 1 pulse at specified voltage.

[7]: Quan Tech Noise Unencapsulated resistors, Equipment limitations precluded testing of 1 MΩ/sq resistor.

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[8]: STOL : Short term overload voltage required (5 second duration) to induce a permanent resistance change of <0.25%.

[9]: Standard Working Voltage :  $0.4 \times \text{STOL}$

[10]: Maximum Rated Power Dissipation :  $(\text{Standard Working Voltage})^2 / \text{Resistance}$

### Storage and stability

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

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

### Additional information

How to use

### Processing

- **Terminations**

- Reported properties are based on tests with Micromax™ QS170 silver/platinum conductor composition, prefired at 850 °C. Excellent results have also been obtained using Micromax™ QS175 silver, prefired at 850 °C.

- **Substrates**

- Properties are based on tests on 96% alumina substrates. Substrates of other chemical compositions or from various manufacturers may result in variations in performance characteristics.

- **Printing**

- Specified properties are based on resistors printed to  $25 \pm 2 \mu\text{m}$  dried print thickness. This is readily achieved using 200-mesh stainless steel screens with  $15 \pm 3 \mu\text{m}$  emulsion thicknesses.

- **Drying**

- Print should be allowed to level at room temperature, then dried.

- **Firing**

- Resistivity and TCR specifications are based on the recommended short firing profile with a 10 minute peak at 850 °C.

- **Encapsulant**

- In general, glass encapsulation is not required. However, for applications in need of mechanical protection or protection from extreme environments such as high temperature nitrogen or forming gas, encapsulant Micromax™ QQ550 fired at 500 °C is recommended.

### Properties

- Information in this datasheet shows anticipated typical physical properties for Micromax™ QS87 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.

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### 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).

NOTICE TO USERS: Values shown are based on testing of laboratory test specimens and represent data that fall within the standard range of properties for natural material. These values alone do not represent a sufficient basis for any part design and are not intended for use in establishing maximum, minimum, or ranges of values for specification purposes. Colourants or other additives may cause significant variations in data values. Properties of moulded parts can be influenced by a wide variety of factors including, but not limited to, material selection, additives, part design, processing conditions and environmental exposure. Other than those products expressly identified as medical grade (including by MT® product designation or otherwise), Celanese's products are not intended for use in medical or dental implants. Regardless of any such product designation, any determination of the suitability of a particular material and part design for any use contemplated by the users and the manner of such use is the sole responsibility of the users, who must assure themselves that the material as subsequently processed meets the needs of their particular product or use. To the best of our knowledge, the information contained in this publication is accurate; however, we do not assume any liability whatsoever for the accuracy and completeness of such information. The information contained in this publication should not be construed as a promise or guarantee of specific properties of our products. It is the sole responsibility of the users to investigate whether any existing patents are infringed by the use of the materials mentioned in this publication. Moreover, there is a need to reduce human exposure to many materials to the lowest practical limits in view of possible adverse effects. To the extent that any hazards may have been mentioned in this publication, we neither suggest nor guarantee that such hazards are the only ones that exist. We recommend that persons intending to rely on any recommendation or to use any equipment, processing technique or material mentioned in this publication should satisfy themselves that they can meet all applicable safety and health standards. We strongly recommend that users seek and adhere to the manufacturer's current instructions for handling each material they use, and entrust the handling of such material to adequately trained personnel only. Please call the telephone numbers listed for additional technical information. Call Customer Services for the appropriate Materials Safety Data Sheets (MSDS) before attempting to process our products.

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