# Micromax™ S150

## Electronic Inks and Pastes

### 10 Ω/sq - 1 MΩ/sq Resistor Compositions

Micromax™ S1X0 Series Resistor System is specially formulated for use with the Micromax™ QM44 Multilayer System.

## Product benefits

- Tight TCR control.
- Low sensitivity to firing temperature and time
- Minimum length and thickness effects on resistivity and TCR
- Minimum shifts of resistivity and TCR on re-firing
- Thinner printing (20µm dried thickness)
- Compatible with Ag and Ag/Pd termination metallurgies

## Product information

| | |
|---|---|
| Blend member or series | S1X0srs resistor |

## Application technique

| | | |
|---|---|---|
| Mask mesh | 325 | |
| Mask emulsion | 10 - 15 | µm |
| Drying time | 10 - 15 | min |
| Drying temperature | 150 | °C |
| Recommended film thickness, dried | 18 - 22 | µm |
| Leveling time | 5 - 10 | min |

## Electrical properties

| | | |
|---|---|---|
| Surface resistivity | 9E7 - 1.1E8[1] | mOhm per square |
| Hot Temperature Coefficient Resistance | 0 - 75[2] | ppm/K |
| Cold Temperature Coefficient Resistance | -75 - 25[3] | ppm/K |
| Electrostatic discharge, 5kV | -0.3[4] | (avgDeltaR)(%) |
| Noise | -1[5] | dB |
| Short Term Overload Voltage | ≥400 | V/mm |
| Standard Working Voltage | 160[7] | V/mm |
| Maximum Rated Power Dissipation | 160[8] | m/(W.mm²) |

[1]: resistor geometry 1.0 x 1.0 mm, measured on untrimmed resistors

[2]: measured on untrimmed resistors, hot TCR measured from +25 to +125°C

[3]: measured on untrimmed resistors, cold TCR measured from -55 to +25°C

[4]: 5x 5000V, measured on resistors trimmed to 1.5x its as-fired value

[5]: measured on resistors trimmed to 1.5x its as-fired value

[6]: short time overload voltage : 5 second pulse Voltage required to cause a 0.25% change in resistor trimmed to 1.5x its as - fired value, voltage/resistor length

[7]: standard working voltage : 0.4 x STOL, measured on resistors trimmed to 1.5x its as-fired value

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[8]: maximum rated power dissipation; $SWV^2$ / R (ohms), measured on resistors trimmed to 1.5x its as-fired value

## Storage and stability

| | |
|---|---|
| Shelf life | 6[9] months |

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

## Additional information

How to use

### Processing

- Blendability
  - Adjacent members of the Series are blendable.
- Printing
  - Micromax™ Series S1X0 Resistor Compositions should be thoroughly mixed before use. This is best achieved by slow, gentle, hand stirring with a clean burr-free spatula (flexible plastic) for 1-2 minutes. Care must be taken to avoid air entrapment.
  - Note : Optimum printing characteristics are generally achieved in the temperature range of 20°C - 23°C. It is therefore important that material in its container is at this temperature prior to commencement of printing.
  - Specified properties are based on resistors printed to 20±2µm dried print thickness. This is generally achieved using a 325-mesh stainless steel screen with 10-15µm emulsion thickness. Print speeds of 10 to 20 cm/s may be used. Control and reproducibility of print thickness is essential to obtain predictable, reproducible fired resistor properties.
- Drying
  - Allow prints to level for 5-10 minutes at room temperature in a clean, environment, followed by drying for 10-15 minutes at 150°C.
- Firing
  - Care must be taken to ensure that any gases/vapors from other chemicals/materials (e.g. halogenated solvents) do not enter the furnace muffle. It is also essential that the air supply to the furnace is clean, dry and free of contaminants. Air flows and extraction rates should be optimized to ensure that oxidizing conditions exist within the muffle, and that no furnace exhaust gases enter the room.
  - Micromax™ Series S1X0 series resistors should be fired on a 30 minute firing cycle to a peak temperature of 850°C held for 10 minutes. Variations in the peak firing temperature and/or the time at the peak temperature may result in variations in the final fired properties. Resistor compositions must be fired in clean air; insufficient airflow or pollution of the air in the furnace may result in

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shifts of resistivity or TCR.

- Encapsulant
  - Encapsulation is not required to meet published performance. For applications which require mechanical protection from extreme environments, low temperature encapsulant Micromax™ QQ550 or Micromax™ QQ600 is recommended prior to laser trimming.
- Laser trimming
  - Trim parameters should be selected to achieve a clean laser cut (kerf) and it is recommended to cut into the substrate by 5-7µm. The preferred range of laser trim parameters are as follows: bite size 0.12 to 0.17 mils, power 0.9-1.1 watts at a frequency of 3-4 KHZ.

## Properties

- Typical fired properties are based on the following :
  - Termination : Micromax™ QM22 Ag/Pb, Dried thickness of 20±2µm; Resistor geometry 1.0mm x 1.0mm
  - Firing : 30 min cycle 850°C peak for 10 minutes
  - Substrate : Micromax™ QM44. Resistance and TCR are measured on untrimmed resistors
  - STOL, SWV, MRPD, Quan-tech Noise, and ESD were measured on resistors trimmed to 1.5x its as-fired value.
- Information in this datasheet shows anticipated typical physical properties for Micromax™ S1X0srs resistor 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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**Figure 1. Typical Firing Profile**

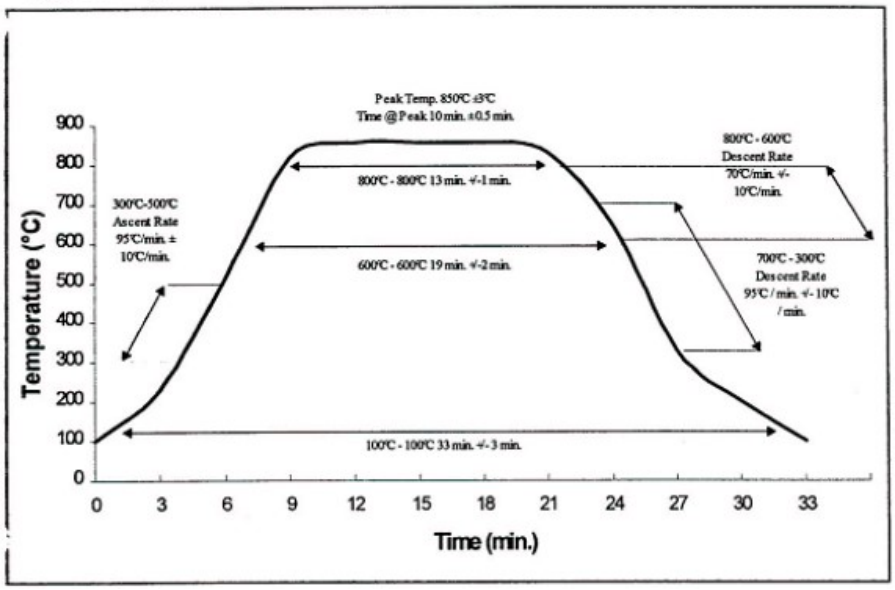
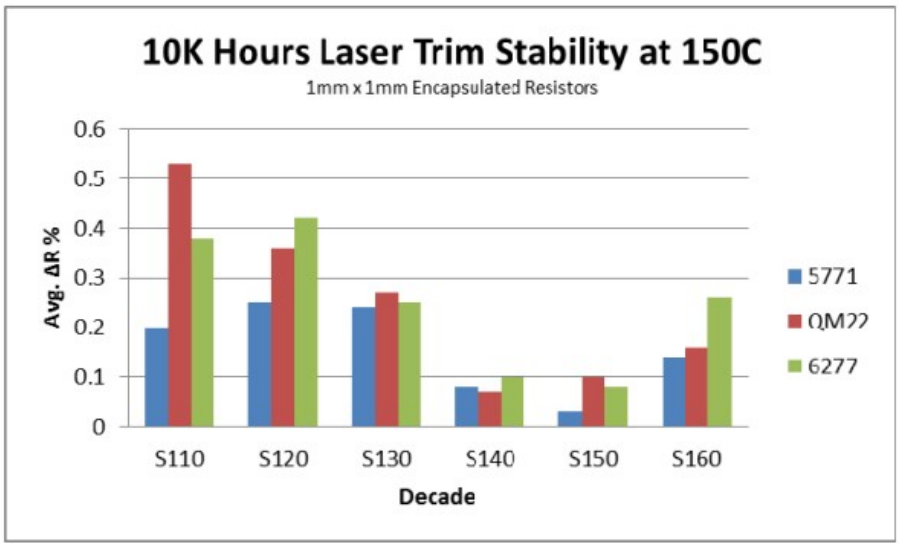



**Figure 2**



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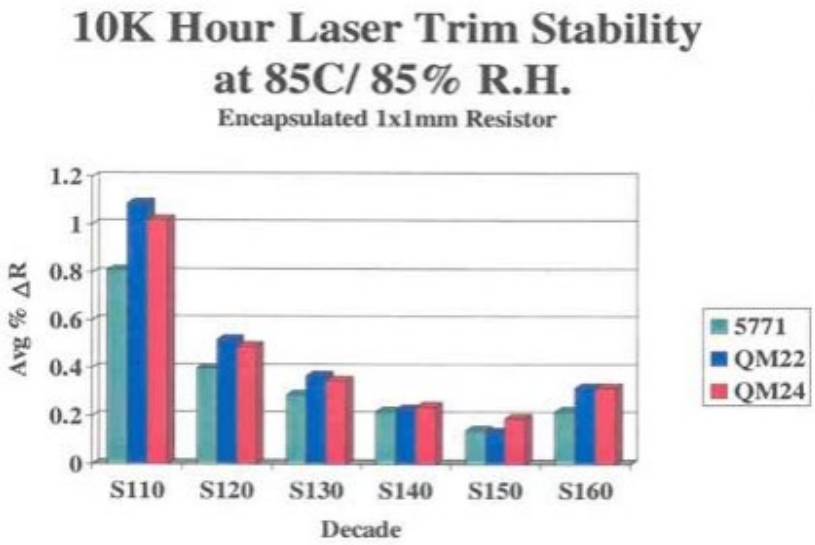


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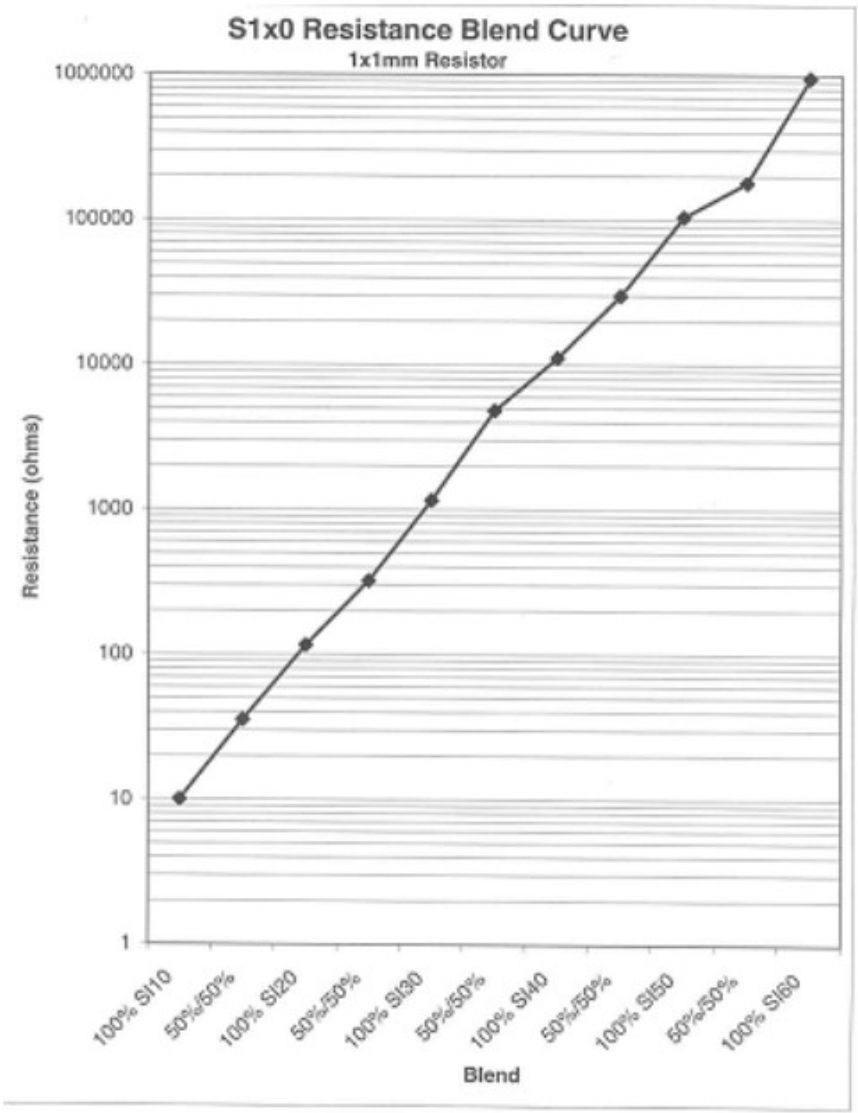


## Storage and shelf life

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

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Sheet (SDS).



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