

Micromax™ 0060A

Electronic Inks and Pastes

00X0A Resistor Series

Designed to give an ideal balance of properties, the Micromax™ 00x0A Series has been specifically developed for Chip Resistor applications. Excellent electrical properties have been achieved while satisfying the market needs of lower overall cost, smaller resistors and process insensitivity when used with high silver terminations. Micromax™ 00X0A Series is fully blendable allowing a wide range of resistance without sacrifice of electrical properties.

The series is Cadmium, Nickel and Phthalate free*.

Product benefits

- Exceptional ESD stability
- Excellent power handling stability
- Low Quan-Tech noise
- Well controlled TCRs
- Small TCR length and thickness effects
- Linear blend behavior of electrical properties between adjacent members
- Excellent thermal cycle stability
- 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.

Processing features

- Co-fireable with specified termination
- Optimized high resolution printing speeds of up to 30cm/sec
- Fast firing – 850 °C/30 minute profile

Product information

Solvent or thinner	Micromax™ 8250
Blend member or series	00X0Asrs

Rheological properties

Viscosity	110 - 180 ^[1] Pa.s
[1]: Brookfield HAT 10 rpm, UC&SP (SC4-14/6R), 25 °C ± 0.2 °C	

Application technique

Mask mesh	250 - 325
Mask emulsion	10 - 15 µm
Drying time	10 - 15 min
Drying temperature	150 °C

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Recommended film thickness, dried	18 - 22 μm
Leveling time	5 - 10 min

Electrical properties

Surface resistivity	8.5E8 ^[2] mOhm per 1.15E9 ^[3] square
Hot Temperature Coefficient Resistance	20 - 40 ^[4] ppm/K
Cold Temperature Coefficient Resistance	-60 - 0 ^[5] ppm/K
Electrostatic discharge, 5kV	-0.1 - 0.1 ^[6] (avgDeltaR)(%)
Noise	$\leq$ -6 ^[7] dB

[2]: Unless otherwise noted, resistors were printed on Micromax™ 5426 terminations at 18-22 μm dried thickness, then co-fired in 30 minute cycles with 850°C peak for 10 minutes. Resistor geometry is 0.8 x 0.8mm.

[3]: Unless otherwise noted, resistors were printed on Micromax™ 5426 terminations at 18-22 μm dried thickness, then co-fired in 30 minute cycles with 850°C peak for 10 minutes. Resistor geometry is 0.8 x 0.8mm.

[4]: Temperature coefficient of resistance from 25°C to 125°C for Hot TCR.

[5]: Temperature coefficient of resistance from 25°C to -55°C for Cold TCR.

[6]: Electrostatic discharge using 100pF/1500 Ω R/C network. Untrimmed resistors, 0.8mm x 0.8mm.

[7]: Using Quan-Tech Model 315C meter, untrimmed 0.8mm x 0.8mm resistors.

Storage and stability

Shelf life	6 ^[8] months
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[8]: in unopened containers, from date of shipment, at temperature <25°C

Additional information

How to use

Processing

• Terminations

- Micromax™ 00x0A resistors were designed for use with high silver-containing terminations. Reported properties were obtained using Micromax™ 5426 Ag/Pd termination. Data with other terminations is available.

• Blendability

- Micromax™ 00x0A Series is blendable between each adjacent member.

• Substrates

- Reported properties are based on tests with 96% alumina substrates. Good performance properties have also been observed on Micromax™ QM44 dielectric. Substrates of other compositions may yield variation in performance properties.

• Printing

- Unless otherwise noted, properties are based on resistors printed to 20 $\pm$ 2 μm dried thickness. This can be achieved by using 250-325 mesh screens with emulsions of 10-15 μm . Resistors smaller than 0.3x0.3mm will require finer mesh screen to achieve

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the desired print resolution. Although Resistance and TCR values will change, similar functional properties have been observed with thinner dried film prints ($<18\mu\text{m}$). To optimize laser trainability, dried thickness $>22\mu\text{m}$ should be avoided.

- **Thinning**

- Micromax™ 00x0A Series has been optimized for screen printing and thinning is not normally required or recommended. Micromax™ 8250 thinner may be added sparingly to compensate for evaporative losses.

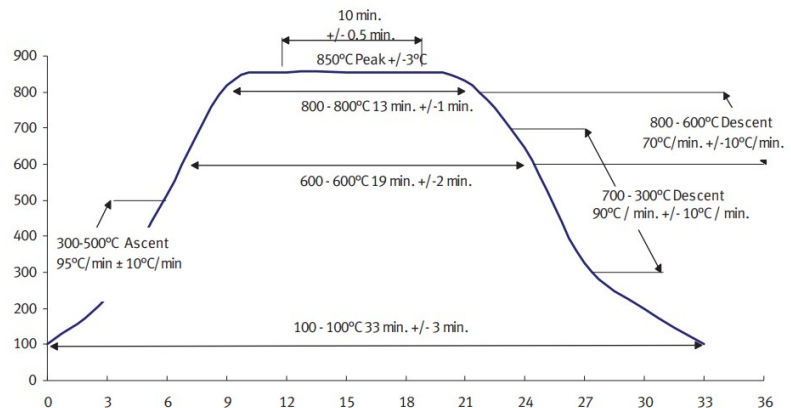
- **Drying**

- Parts should be allowed to level at room temperature and then dried.

- **Firing**

- Properties are based on a 30 minute firing cycle ($100^{\circ}\text{C} - 100^{\circ}\text{C}$) with 10 minutes at a peak temperature of 850°C . Micromax™ 00x0A was designed to allow cofiring of selected termination materials with the resistors. See sample furnace profile.

Typical 30 Minute Furnace Profile



Storage and shelf life

Containers should be stored, tightly sealed, in a clean, stable environment at a temperature of $0-5^{\circ}\text{C}$ for Micromax™ 00L2C and at room temperature ($<25^{\circ}\text{C}$) for other Micromax™ 00x0A Series. 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.