Micromax™ 4321

Electronic Inks & Pastes

PRODUCT DESCRIPTION

1Ω/sq - 1MΩ/sq Resistors For Cermet Trimmers And Potentiometers

Micromax™ 4300-Series Resistors are cadmium free* and designed for use in high performance cermet trimmers and potentiometers. Micromax™ 4300-Series Resistors are intended to be applied to ceramic substrates by screen printing and fired in a conveyor furnace in an air (oxidizing) atmosphere, to form specific resistive elements.

Product benefits

- Cadmium free*
- Improved low ohm performance
- Suitable for various wiper materials including stainless steel
- Excellent contact resistance variation (CRV), rotational life, and solder dip stability
- Compatible with high silver containing conductors
- Fast Firing - 850°C, 30 min profile

*Cadmium 'free' as used herein means that this is 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	Variable resistor	
Solvent or thinner	Micromax™ 8250	
Blend member or series	4300srs	

TECHNICAL DATA

Rheological Properties	Value	Unit
Viscosity[1]	120 to 200	Pa.s

Application Technique	Value	Unit
Mask mesh	325	
Mask emulsion	10 to 16	µm
Drying time	10 to 15	min
Drying temperature	150	°C
Theoretical coverage[2]	95	cm²/g
Recommended film thickness	23 to 27	µm
Leveling time	10 to 15	min

Electrical Properties	Value	Unit
Resistivity[3]	30 to 120	Ohm per square
Hot Temperature Coefficient Resistance[4]	-200 to 200	ppm/°C
Cold Temperature Coefficient Resistance[5]	-200 to 200	ppm/°C
Short Term Overload Voltage[6]	≥28	V/mm
Standard Working Voltage[7]	11.2	V/mm
Maximum Rated Power Dissipation[8]	1186	m/(W.mm²)

Storage and Stability	Value	Unit
Shelf life[9]	6	months

[1]Brookfield HAT, UC&SP;, SC4-14/6R, 10 rpm, 25°C ± 0.2°C
[2]based on average fired thickness of 10µm for pads
[3]10 x 1.25mm resistor; Micromax™ 7780 termination, tolerance
[4]at +25°C to +125°C
[5]at -55°C to +25°C
[6]short time overload voltage; 5 sec pulse sufficient to cause 0.25% change in resistance
[7]standard working voltage : 0.4 x STOL
[8]maximum rated power dissipation; SWV² / R (ohms)
[9]in unopened containers, from date of shipment, stable environment at room temperature between 5°C - 30°C

PROCESSING GUIDELINES

Blendability

Adjacent members of Micromax™ 4300-Series are blendable.

Substrates

Properties are based on tests using 96% alumina substrates. Substrates of other compositions and from various manufacturers may result in variations in performance properties. Care must be taken to avoid air-bubble entrapment. It is the responsibility of users to determine the effects of

the above variables in their particular situations.

Printing

Micromax™ 4300-Series 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 0.5-1 minute.

Note : Optimum printing characteristics of Micromax™ 4300-Series Resistors are generally achieved in the temperature range 20-23°C. Specified properties are based on resistors printed to 23-27µm dried print thickness. This is generally achieved using a 325-mesh stainless steel screen with a 10-16µm emulsion thickness. Control and reproducibility of print thickness is essential to obtain predictable, reproducible fired resistor properties.

Drying

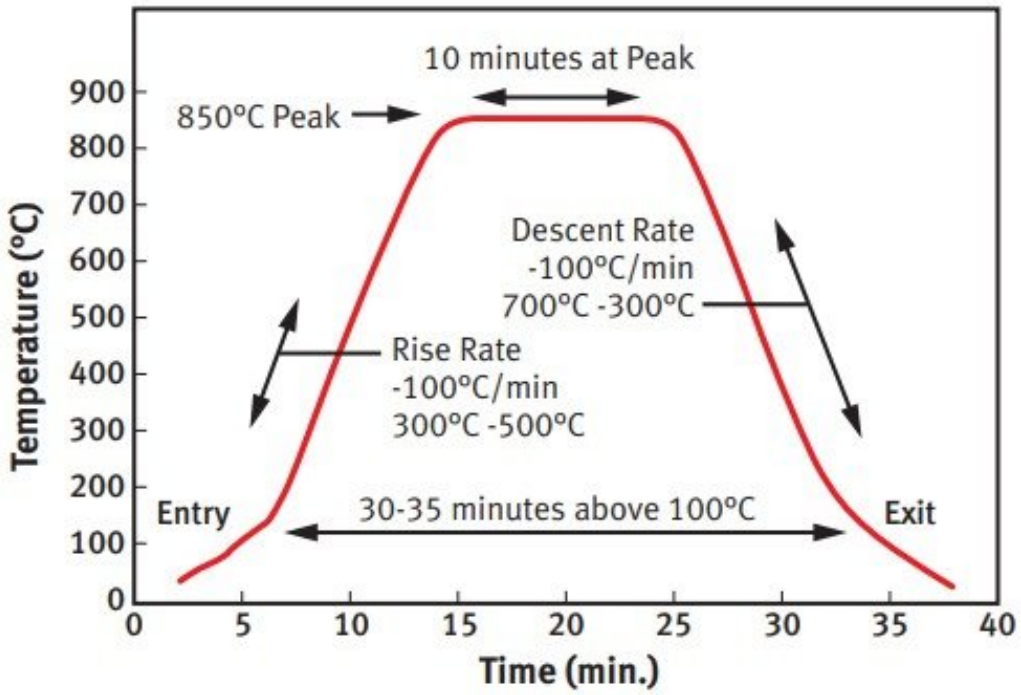
Allow the wet print to level for 10-15 minutes at room temperature in a clean draft free environment, followed by drying for 10-15 minutes at 150°C in a well ventilated oven or conveyor dryer.

Firing

It is essential that the air supply to the furnace is clean, dry and free of contaminants. Micromax™ 4300-Series Resistors are fired on a 30-minute firing cycle to a peak of 850°C held for 10 minutes.

Variations in peak firing 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 shifts of resistivity and TCR.

FIGURE 1. 30 MINUTES PROFILE



Properties

Typical Fired Properties 4300srs

	4308	4311	4321	4331	4341	4351	4361
Resistivity	1	10	100	1K	10K	100K	1M
Tolerance	0.3-1.2	3-12	30-120	300-1.2K	3K-12K	30K-120K	300K-1.2M
HTCR	0±200	0±200	0±200	0±200	0±200	0±200	0±200
CTCR	0±200	0±200	0±200	0±200	0±200	0±200	0±200
STOL	6	11	28	30	22	65	33
SWV	2.4	4.4	11.2	12	8.8	26	13.2
MRPD	5236	1574	1186	144	9	11.6	0.2
CRV	<1	<1	<1	<1	<1	<1	<1
Rotational Life	<1	<1	<1	<1	<1	<1	<1

- Resistivity (Ωsq) : 10 x 1.25mm resistor; Micromax™ 7780 termination
- Tolerance (Ω) : Resistivity Tolerance
- HTCR (ppm/C) : Hot Temperature Coefficient Resistance, at +25°C to +125°C
- CTCR (ppm/C) : Cold Temperature Coefficient Resistance, at -55°C to +25°C

• STOL (V/mm) : Short Term Overload Voltage, 5 sec pulse sufficient to cause 0.25% change in resistance
• SWV (V/mm) : Standard Working Voltage, 0.4 x STOL
• MRPD (mW/mm²) : Maximum Rated Power Dissipation, SWV² / R (ohms)
• CRV : 10 finger Paliney wiper, 50 gram force, 10 x 1.25mm resistor
• Rotational Life : 200 cycle

Information in this datasheet shows anticipated typical physical properties for Micromax™ 4300 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 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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