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# Micromax™ 1731

## Microcircuit and Component Materials

### Series 17 Resistors
### High Reliability Hybrid Microcircuits And Precision Resistor Network 10Ω - 1MΩ/sq Silver Alloy Terminations

Micromax™ Series 1700 Resistor Compositions have been developed as part of a materials system for use in the manufacture of high reliability hybrid circuits requiring high stability, low TCR, and low process sensitivity.

## Product benefits

- Post laser trim stability of less than 0.5% average ΔR under all standard testing conditions.
- TCRs of less than 100 ppm/°C, even with blends.
- Low sensitivity to variations in firing temperature, time at peak and resistor geometry.

## Product information

| | |
|---|---|
| Solvent or thinner | Micromax™ 4036 |
| Blend member or series | 17 Resistors Series [1] |

[1]: Blend Member A

## Rheological properties

| | | |
|---|---|---|
| Viscosity | 145 - 210[2] | Pa.s |

[2]: HAT UC & #14 Spindle, 10rpm, 25°C±1°C

## Application technique

| | | |
|---|---|---|
| Mask mesh | 200[3] | |
| Mask emulsion | 12 - 18 | µm |
| Drying time | 10 - 15 | min |
| Drying temperature | 150 | °C |
| Theoretical coverage | 80 - 110 | $cm^2/g$ |
| Recommended film thickness, dried | 22 - 28 | µm |
| Leveling time | 5 - 10 | min |

[3]: stainless steel

## Electrical properties

| | | |
|---|---|---|
| Surface resistivity | 900000 - 1.1E6[4] | mOhm per square |
| Hot Temperature Coefficient Resistance | -50 - 50[5] | ppm/K |
| Cold Temperature Coefficient Resistance | -50 - 50[6] | ppm/K |
| Noise | -15[7] | dB |
| Short Term Overload Voltage | ≥60 | V/mm |
| Standard Working Voltage | 25[9] | V/mm |

# Micromax™ 1731

## Microcircuit and Component Materials

| | | |
|---|---|---|
| Maximum Rated Power Dissipation | 625[10] | m/(W.mm²) |

[4]: Typical resistor properties based on laboratory tests using recommended processing conditions: terminations : Micromax™ Palladium/Silver Conductor Composition 9308 prefired at 850°C; substrate : 96% alumina; printing : 200-mesh stainless steel screen (18 µm emulsion thickness) to a dried thickness of 25±3 µm; firing : 60-min cycle to peak temperature of 850°C for 10 minutes. Shipping specifications. Resistor geometry : 1.5 mm x 1.5 mm.

[5]: Temperature Coefficient of Resistance +25+125°C

[6]: Temperature Coefficient of Resistance -55+25°C

[7]: Resistor geometry : 1 mm x 1 mm, Firing cycle, 60 minute cycle to peak temperature of 850°C for 10 minutes.

[8]: Short Term Overload Voltage : required (5 second duration) to induce a resistance change of 0.25% in a 1 mm x 1 mm resistor at 25°C.

[9]: Standard working voltage : 0.4 x Short Term Overload Voltage.

[10]: Maximum Rated Power Dissipation : (Standard Working Voltage)²/Resistance

## Storage and stability

| | | |
|---|---|---|
| Shelf life | 6[11] | months |

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

## Additional information

How to use

### Processing

- Termination
  - Unless otherwise stated, reported properties are based on tests with Micromax™ 9308 silver/palladium conductor composition, prefired at 850°C. Excellent resulls have also been obtained using other silver/palladium conductor compositions. The precious metal alloy compositions are prefired at 850°C.
- Substrates
  - Reported properties are based on tests on 96% alumina substrates. Substrates of other compositions and from various manufactures may result in variations in performance properties.
- Resistor geometry
  - Micromax™ Series 1700 compositions are Quality Assursance tested using a 1.5 mm x 1.5 mm resistor with prefired silver/palladium Micromax™ 9308 terminations. Variations in resistor geometry will result in slight variations in resistivity and TCR.
- Printing
  - Specified propreties are based on resistors printed to 25±3 µm dried print thickness. This is readily achieved using 200-mesh stainless steel screens with 15±3 µm emulsion thickness. Nylon or polyester screens may be used in some applications although a lower mesh count of 150-175 will usually be required to achieve equivalent print thickness.
- Drying
  - Prints should be allowed to level at room temperature and then

# Micromax™ 1731

Microcircuit and Component Materials

dried.

- Effect of variations in thickness
  - Print thickness outside the 20-30 µm range may result in compromised TCR and/or stability characteristics.
- Firing
  - Micromax™ Series 1700 resistivity and TCR specifications are based on a 60-min firing cycle with a 10-min peak at 850 °C, 20 min above 800 °C and 30 min above 600 °C.
- Refire sensitivity
  - 10kΩ/sq or lower resistors change very slightly on refiring. The 100k and 1MΩ/sq resistors show significant increases in resistivity on refiring; however, TCR's remain well within the ±100 ppm/°C limits.
- Encapsulant
  - In general, glass encapsulation is not required. However, in applications which require mechanical protection or protection from extreme environments such as high temperature nitrogen or forming gas, Micromax™ QQ550 encapsulant fired at 500 °C is recommended. Glass encapsulation of 1 mm x 1 mm resistors terminated with silver/palladium Micromax™ 9308 shifts the resistivity of Micromax™ Series 1700 resistors by less than 1%.

## Properties

- Information in this datasheet shows anticipated typical physical properties for Micromax™ 1700 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 (<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).

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