

Micromax™ 1748R

Electronic Inks & Pastes

PRODUCT DESCRIPTION

Series Resistors System HR Compositions

Micromax™ 17G-Series screen printable resistor compositions are specially formulated and tested for use on gold conductor terminations. These compositions range from 3 Ω /sq to 1 M Ω /sq. Each member is blendable with the adjacent members. There are no blend breaks. The length effects have been characterized for very small resistors.

Product benefits

- Qualified and tested on Au conductor
- Excellent encapsulated and unencapsulated post laser trim stability after laser trimming and long-term storage
- Optimized for 60 minute 850°C firing profile
- Fully blendable resistor series
- Phthalate, Cadmium, Nickel oxide free*

* Phthalate, Cadmium and Nickel oxide 'free' as used herein means that cadmium, phthalate and nickel oxide are not intentional ingredients in and are not intentionally added to the referenced product. Trace amounts however may be present.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

PRODUCT INFORMATION

Application	Hybrid resistor
Solvent or thinner	Micromax™ 4036
Blend member or series	17Gsrs

TECHNICAL DATA

Rheological Properties		Value	Unit
Viscosity ¹		145 to 210	Pa.s
Application Technique		Value	Unit
Mask mesh ²		200	
Mask emulsion ³		12 to 18	µm
Drying time		10 to 15	min
Drying temperature		150	°C
Theoretical coverage ⁴		80 to 110	cm ² /g
Recommended film thickness		22 to 28	µm
Leveling time		≥10	min
Electrical Properties		Value	Unit
Resistivity ⁵		90 to 110	kOhm per square
Hot Temperature Coefficient Resistance ⁶		-100 to 100	ppm/°C
Cold Temperature Coefficient Resistance ⁷		-100 to 100	ppm/°C
Noise ⁸		2	dB
Short Term Overload Voltage ⁹		280	V/mm
Standard Working Voltage ¹⁰		110	V/mm
Maximum Rated Power Dissipation ¹¹		120	m/(W.mm ²)
Storage and Stability		Value	Unit
Shelf life ¹²		6	months

¹Brookfield HAT, UC&SP,, SC4-14/6R, 10 rpm, 25°C ± 0.2°C

²Screen Types: Stainless steel

³Screen Types: Stainless steel

⁴based on wet thickness of 50µm

⁵Shipping specifications: Reported to Dried thickness 25µm. Fired on Micromax™ 5780R Au preferred termination.

Resistor geometry: 1.5 mm x 1.5 mm. Firing: 60-min cycle to peak temperature of 850°C for 10 min. All tests performed on 96% alumina substrate.

⁶temperature coefficient of resistance : 25 to 125°C

⁷temperature coefficient of resistance : -55 to 25°C

⁸resistor geometry : 1mm x 1mm; firing cycle : 60 min cycle to peak temperature of 850°C for 10 min

⁹short term overload voltage : voltage required (5 sec duration) to induce a resistance change of 0.25% in a 1mm x 1mm

trimmed resistor at 25°C

¹⁰ standard working voltage : 0.4 x short term overload voltage

¹¹ maximum rated power = (standard working voltage)² / resistance

¹² in unopened containers, from date of shipment, stable environment at room temperature between 5°C - 30°C

PROCESSING GUIDELINES

Design & compatibility

Compatibility

Whilst Micromax™ has tested this composition with the materials specified above and the recommended processing conditions, it is impossible or impractical to cover every combination of materials, customer processing conditions and circuit layouts. It is therefore essential that customers thoroughly evaluate the material in their specific situations in order to completely satisfy themselves with the overall quality and suitability of the composition for its intended application(s).

Terminations

Use of a different termination material may cause a shift of TCR and resistivity values from those stated.

Blendability

Adjacent members of Micromax™ 17G-Series are blendable.

Substrates

Substrates of different compositions and from various manufacturers may result in variations in performance properties.

Screen types

200 mesh stainless steel screen with a 12-18µm emulsion build up. Nylon or polyester screens may be used in some applications. A 150-175 mesh screen will usually be required to achieve equivalent print thickness.

Recommended dried thickness 25+/-3µm.

Printing

The composition should be thoroughly mixed before use. This is best achieved by slow, gentle hand stirring with a clean burr-free spatula (flexible plastic or stainless steel) for about 1-2 minutes. Care must be taken to avoid air entrapment. Printing should be performed in a well-ventilated area.

Note: Optimum printing characteristics are generally achieved in the room temperature range of 20°C - 23°C. It is therefore important that the material, in its container, is at the temperature prior to commencement of printing. Class 10,000 printing area is recommended for building complex hybrids and multilayer circuits, otherwise severe yield losses could occur.

Thinning

Micromax™ 17G-Series compositions are optimized for screen printing and thinning is not normally required. Use the Micromax™ recommended thinner for slight adjustments to viscosity or to replace evaporation losses. The use of too much thinner or the use of a non-recommended thinner may affect the rheological behavior of the material and its printing characteristics.

Drying

Allow prints to level for over 10 minutes at room temperature, then dry for ≥ 10 -15 minutes at 150°C.

Dry in a well-ventilated oven or conveyor dryer.

Firing

850°C peak held for 10 minutes on 60 minute cycle in an air atmosphere. Micromax™ 17G-Series 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.

Fire in well-ventilated belt, conveyor furnace or static furnace. Air flows and extraction rates should be optimized to ensure that oxidizing conditions exist within the muffle and that no exhaust gases enter the room.

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™ encapsulant compositions QQ550 and QQ620 are recommended.

Resistor geometry

Micromax™ 17G-Series compositions are quality Assured tested using a 1.5mm x 1.5mm resistor with prefired Micromax™ Au termination. Variations in resistor geometry will result in slight variations of resistivity and TCR values. Length effect curves are based on tests of 0.5-1.5 mm wide resistors varying in aspect ratio from 0.4 - 4.0sq.

Properties

All values reported here are results of experiments in our laboratories intended to illustrate product performance potential with a given experimental design. They are not intended to represent the product's specifications, details of which are available upon demand.

General

Performance will depend to a large degree on care exercised in screen printing. Scrupulous care should be taken to keep the composition, printing screens and other tools free of metal contamination. Dust, lint and other particulate matter may also contribute to poor yields.

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.

Chart 1. Firing Profile

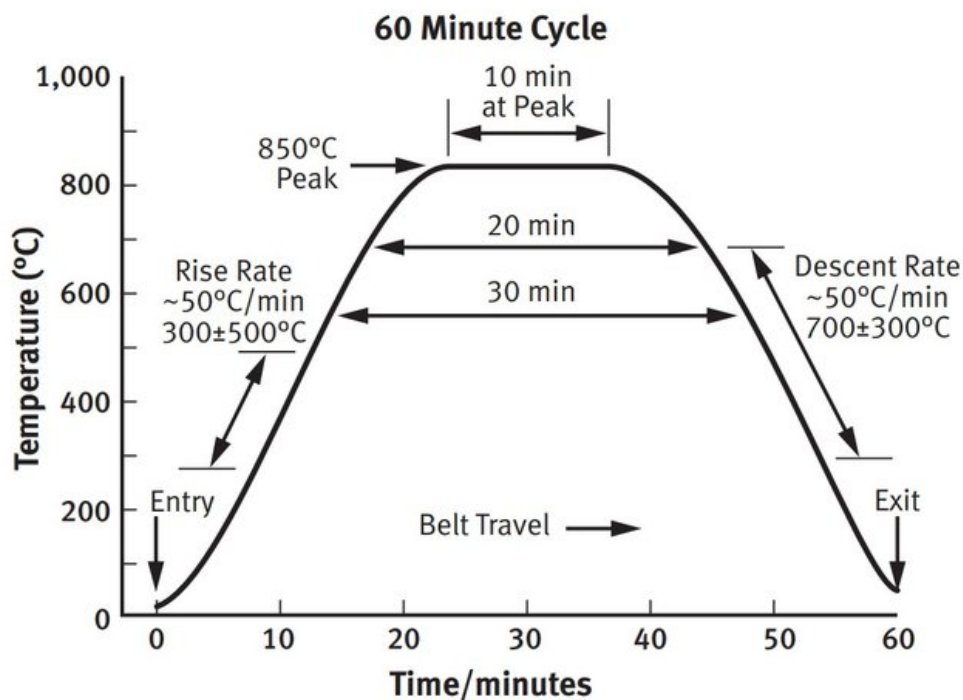


Figure 2. Blending Characteristics

Adjacent members of 17G-Series are blendable. Resistivities and TCRs blend smoothly and predictably for all blend ratios.

The data required in these curves were generated using resistors terminated with prefired 5715 Au Conductor.

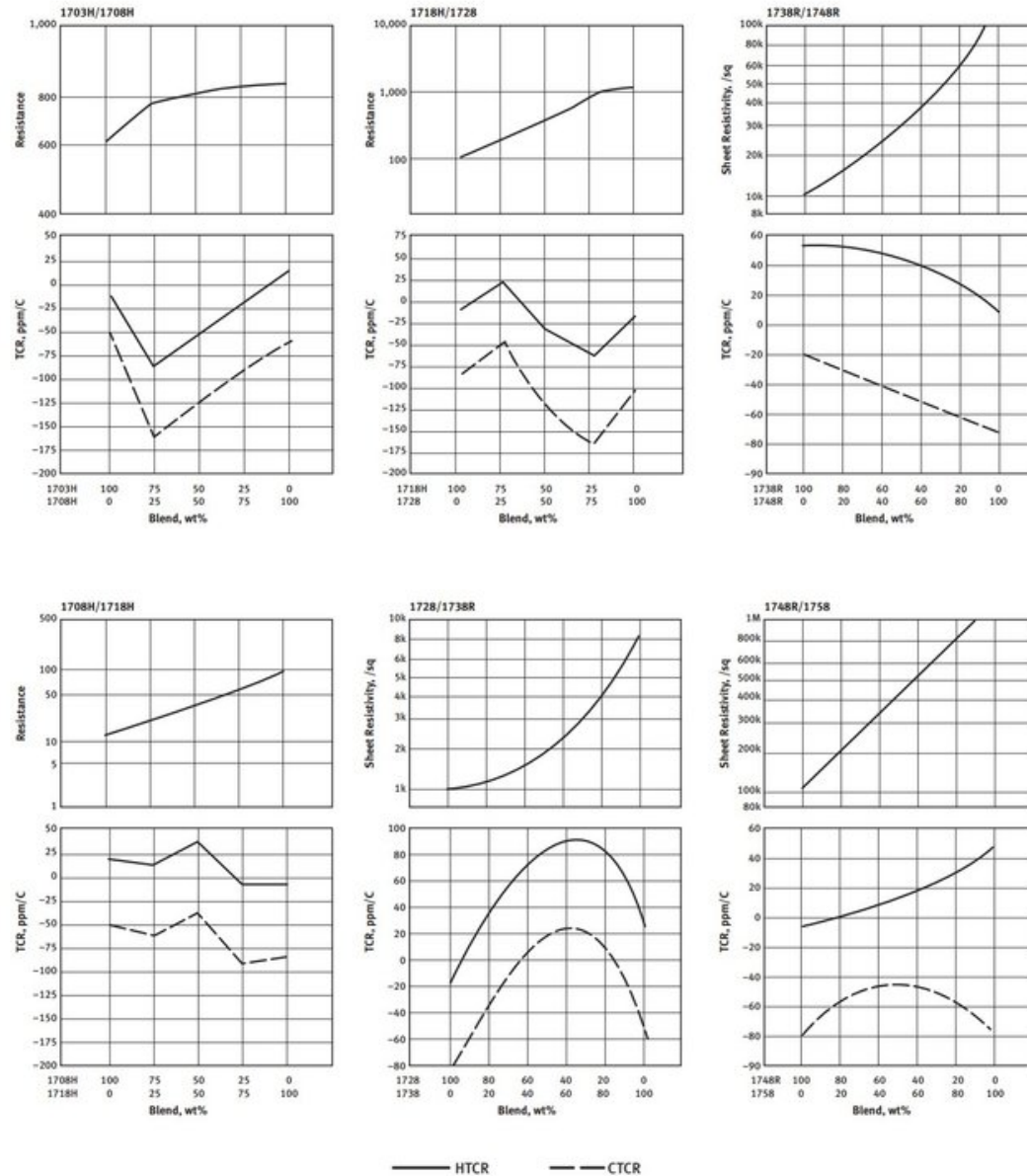
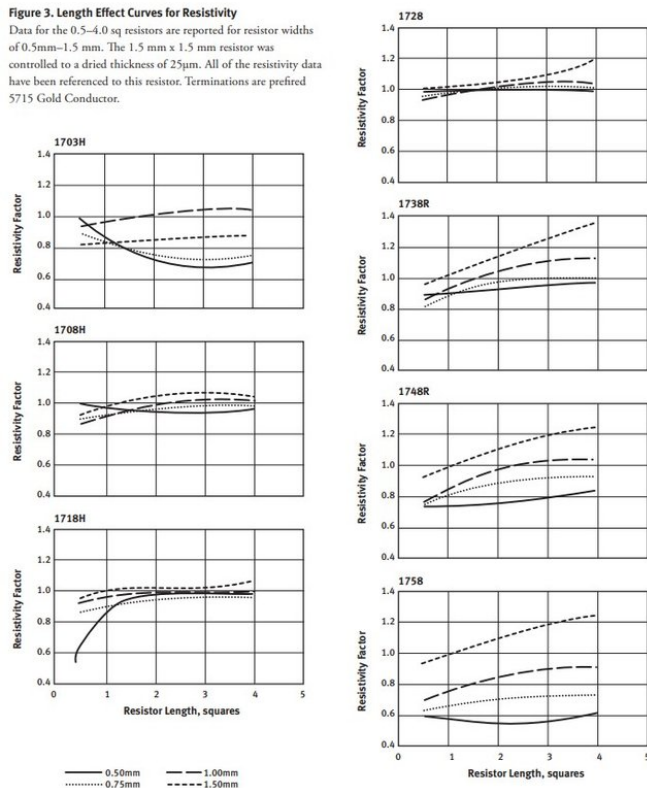


Figure 3. Length Effect Curves for Resistivity

Data for the 0.5–4.0 sq resistors are reported for resistor widths of 0.5mm–1.5 mm. The 1.5 mm x 1.5 mm resistor was controlled to a dried thickness of 25µm. All of the resistivity data have been referenced to this resistor. Terminations are preferred 5715 Gold Conductor.



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

www.macdermidalpha.com

North America

470 Research Drive
Wilmington, DE, USA
855.622.7813

Europe

Bristol & Bath Science Park
Dirac Crescent, Emersons Green,
Bristol, BS16 7FR, United Kingdom

Asia

No. 45 Hsing-Point Road
Taoyuan City, 330457 Taiwan
886.3.3773588

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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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