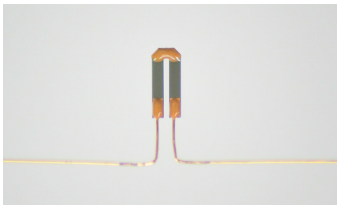
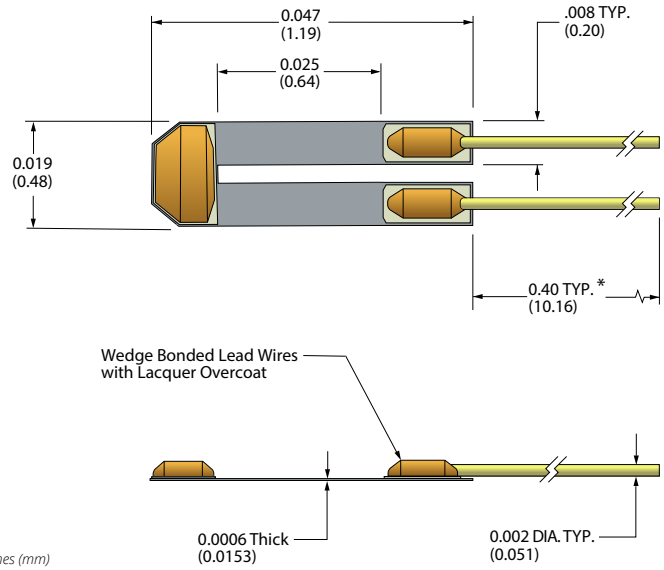
SC “U” Semiconductor Strain Gages

Introduction



The Piezo-Metrics SC line of semiconductor strain gages is fabricated using our newest technological process for our “P” doped bulk silicon. By design, this process produces Precision_Matched™ SC “U” strain gages with superior gage-to-gage matching in terms of reduced Gage Factor (GF) and Temperature Coefficient of Resistance (TCR) variabilities and increased dimensional uniformity across the entire lot.

SC “U” Gage Outline



Dimensions in Inches (mm)

Standard SC “U” Strain Gages

SC Bar Gage Part Number	Lead Attachment	Resistance Ohms@ 78°F	Typical Gage Factor	Typical TCR (% / 100°F)
SC-047-500U-WB - [ ]	Wedge Bond	540 ± 50	120	22
SC-047-1000U-WB - [ ]	Wedge Bond	1075 ± 100	130	29

Standard Gage Specifications

Materials	Czochralski pulled boron doped silicon
Leads	.002 dia. Pure Gold (99.99%) x 0.40 in. long leads.
Contact Pads	Deposited gold with titanium tungsten adhesion layer
Lead Attachments	Wedge Bonded with reinforced Lacquer Overcoat
Operating Strain	±2000 μ inch/inch (3000 μ inch/inch max.)
Linearity	Better than ±0.25% to 600 μ inch/inch Better than ±1.50% to 1500 μ inch/inch
Max. Operating Temperature	500°F

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Precision_Matched™ SC Gage-to-Gage Matching

Each set of Precision_Matched™ SC strain gages is selected from areas of the wafer with common characteristics which dramatically increases the uniformity of (TCR) and (GF) within the matched sets. The gage-to-gage ambient nominal resistance matching tolerance is determined by the uniformity of the resistivity across the gage wafer. Gage lot testing is performed to monitor and document the gage-to-gage variations of the nominal resistance of the gages within a matched set. The table, below, shows the measured gage-to-gage variations as a function of nominal gage resistance and set size. The measured variations are typical of the Precision_Matched™ SC "U" strain gages.

Typical Gage-to-Gage	**SC-047-500U-WB-[ ] (500 Ω)**		**SC-047-1000U-WB-[ ] (1000 Ω)**	
Set Matching @ 78°F	**Variation (%)**	**Variation (Ohms)**	**Variation (%)**	**Variation (Ohms)**
Set Size: - 2	0.31	1.70	0.25	2.70
- 4	0.44	2.40	0.47	5.10
- 8	0.52	2.80	0.80	8.60

Precision_Matched™ SC Strain Gage Lot Testing Metrics

The Precision_Matched™ SC "U" strain gages are characterized on a Lot basis rather than on an individual basis to take advantage of the uniformity that our state-of-the-art processing brings. Characterization on a Lot basis means that a statistically relevant sample is removed from each wafer gage lot and is characterized in terms of gage resistance, Temperature Coefficient of Resistance (TCR) and Gage Factor (GF). These lot-based metrics are used for quality control, lot acceptance, and ensure tighter uniformity of matched sets across the entire gage lot.
An example set of SC gage lot metrics is given in the table below. Each lot will have its own set of lot metrics.

Example SC Gage Lot Metrics	**SC-047-500U-WB-[ ] (500 Ω)**	**SC-047-1000U-WB-[ ] (1000 Ω)**
Lot Number	5056	5038
Gage Resistance @ 78°F (Ohms)	509 +/- 30	1058 +/- 49
Gage Factor (GF)	123 +/- 3	128 +/- 4
Temperature Coefficient of Resistance (TCR) (%/100°F)	22.9 +/- 1.9	28.3 +/- 2.0

Precision_Matched™ SC gages are packaged individually or in matched sets, and include a Cert of Conformance with metrics data and lot traceability.

Ordering Information

Example

A - B	SC-047-1000U-WB - 4
A. SC "U" Strain Gage Part Number (500 Ω or 1000 Ω)	**A.** **SC-047-1000U-WB** indicates this is model **SC** semiconductor strain gages with a base resistance of **1075** ohms.
B. Matched Set Size • - 4 Matched set of 4 gages with temperature Data • - 2 Matched set of 2 gages with temperature Data • - 1 Single gage with temperature Data *For Matched Sets of 5 up to sets of 16 Consult Factory*	**B.** **- 4** specifies a Precision_Matched™ set of (4) semiconductor strain gages.

* *Gage Leads are typically formed with a 90° bend due to manufacturing & packaging processes. If specific gage lead forming is required - Consult Factory.*

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