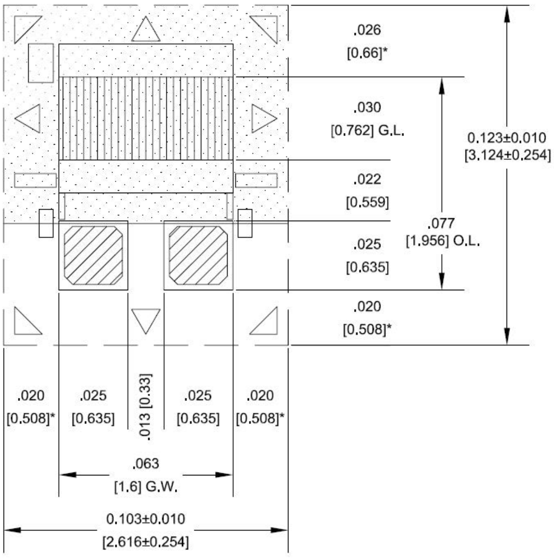
C5K-06-S5145-350/33F Planar Rosette Datasheet

Main properties



- High performance linear Strain Gage with compact grids and matrix size, for stress determination in precise locations
- 350Ω grid for reduced self-heating when using substrates with lower heat conductivity such as PCBs
- Strain Gage is pre-wired with high performance, high temperature, color coded wires for wide applications
- Gage and wires standard operating temperature: -75 to 200˚C
- Easy to use packaging with engineering data

Item		Value
Resistance		350±0.2%
Gage Factor		1.9
Transverse Sensitivity		2.8%
Operating Temperature		-75 to 200˚C
Structure	Backing	Polyimide, 20µm
	Resistive Foil	NiCr
	Encapsulation	Epoxy, 10-12µm
Thermal performance coefficients on package, per gage lot		

*Values above referenced to gage only

** GF and TS values for K93 ingot, for other ingots slight variations are possible, indicated on package

Wires

- 3ft AWG36 Teflon insulated, thin, twisted and flexible for easy hanlding
- 3 wires configuration per grid for canclellation of wire's thermally induced errors
- Stripped and tinned at ends for easy integration directly to DAQ terminals
- High Operating temperature up to 200 ˚C
- Color coding:

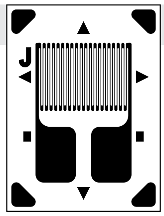
Grid 1	
Pad A	Pad B
Black+white wire	Red Wire

Complies to

- **IPC–JEDEC 9702** Monotonic Bend Characteristics of Board-Level Interconnects
- **IPC–JEDEC 9704** Printed Wiring Board Strain Gage Test Guideline
- **JEDEC JESD22-B111** Board Level Drop Test Method of Components for Handheld Electronic Products

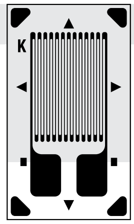
Advanced Sensors

N2A SERIES



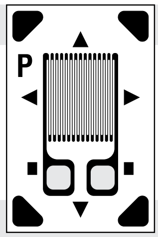
N2A gages are oconstantan-alloy patterns constructed on a thin, laminated, polyimide-film backing. This series is capable of low and repeatable creep performance. Construction is very rugged, which will help prevent gage handling damage. Advanced Sensors N2A gages are offered with epoxy encapsulation as standard. An open-faced version can be supplied upon request.

J2A SERIES



J2A gages are encapsulated constantan-alloy patterns. Both the encapsulation and backing are thin, laminated polyimide film. Gage soldering tabs are exposed for simplified lead connections. Creep performance is equal to the N2A Series, although the presence of an encapsulating layer will require a change in creep code selection to maintain the same performance.

N2K SERIES

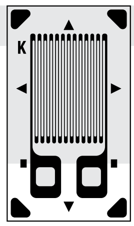


N2K gages are modified-Karma-alloy patterns constructed on a thin, laminated, polyimide-film backing. All N2K gages are supplied with gold soldering pads (DG) for ease of leadwire attachment. Copper soldering pads are also available. Most gages in the N2K Series can also be modulus compensated. Advanced Sensors N2K gages are offered with epoxy encapsulation as standard. An open-faced version can be supplied upon request.

N5K SERIES

N5K gages are modified-Karma-alloy patterns constructed on a thin, laminated, polyimide-film backing constructed to improve gage performance at elevated temperatures. All N5K gages are supplied with gold soldering pads (DG) for ease of leadwire attachment. Copper soldering pads are also available. Most gages in the N5K Series can also be modulus compensated. Advanced Sensors N5K gages are offered with epoxy encapsulation as standard.

J5K SERIES



J5K gages are encapsulated, modified-Karma-alloy patterns specially constructed to improve gage performance at elevated temperatures. Because of the laminated polyimide-film backing and encapsulation, all J5K patterns are fully flexible without being brittle. Gold soldering pads (DG) as well as copper soldering pads (DP) are exposed for simplified lead connections. Some J5K gages can be supplied with modulus-compensation (EMC) options. For best high-temperature performance, J5K-Series gages should be installed with M-Bond 450 high-temperature adhesive.

GAGE SERIES	TEMPERATURE RANGE		GAGE FACTOR (SEE NOTE)	FATIGUE LIFE	
	STATIC	DYNAMIC		STRAIN LEVEL IN $\mu\varepsilon$	NUMBER OF CYCLES
N2A	–100° to +200°F (–75° to +95°C)	Same as Static	2.05 nom.	±1500 1500	10^{7} 10^{8} (2)
J2A	–100° to +200°F (–75° to +95°C)	Same as Static	2.05 nom.	±1700 1700	10^{6} 10^{7} (2)
N2K	–100° to +200°F (–75° to +95°C)	Same as Static	2.1 nom. (1)	±1800	10^{7}
N5K	–100° to +400°F (–75° to +205°C)	–320° to +500°F (–195° to +260°C)	2.1 nom. (1)	±1800	10^{7}
J5K	–100° to +400°F (–75° to +205°C)	–320° to +500°F (–195° to +260°C)	2.1 nom. (1)	± 2000 1800	10^{7} 10^{8} (2)

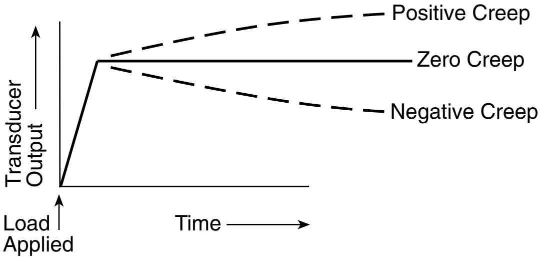
Notes:
Advanced Sensors gages are supplied with nominal gage factor values that will vary slightly with pattern. They are not suitable for strain measurement in stress analysis applications. Request our Precision Strain Gages databook, or contact our Applications Engineering Department, for a complete listing of gages for precision strain measurement applications.
(1) Nominal gage factor is 2.2 for EMC options.
(2) Unidirectional strain.

Advanced Sensors

CREEP COMPENSATION

Commercial transducers regularly achieve a creep specification of less than ± 0.02% of full scale (FS) for a 20-minute test. To attain this level on a high production basis, it is usually necessary to match the strain gage's creep characteristic to the spring element creep.

Most *Transducer-Class* gages can be adjusted in design to exhibit either a positive or negative creep under load. Spring element materials exhibit only positive creep under load. (See figure below.)



Since transducer creep depends on several variables such as spring element material, heat treatment, strain field, adhesive type and test temperature, it is not possible to predict the proper gage compensation necessary to achieve the best creep result.

Most of the gages in this catalog list one available creep compensation code. Since it is not possible to predetermine the creep characteristics of a particular transducer, it is suggested that the standard creep code be ordered in quantities sufficient to evaluate three or four transducers. Where creep levels are high enough to warrant correction, a different creep compensation, either more negative or more positive, depending on test results, can often be recommended.

A complicating factor in creep code selection is that while different gage patterns may list the same creep code, they do not necessarily exhibit the same creep behavior. This is because the gage backing selection, gridline width and gage length also influence creep characteristics.

It should also be noted that this type of creep correction is generally limited to transducers exhibiting less than ±0.1% FS creep. Higher creep levels in the positive direction are often the result of poor spring element material selection. Negative creep values in excess of 0.1% FS generally are the result of a faulty gage installation.

MODULUS COMPENSATION (EMC) OPTION

Many of the K-alloy gages in this catalog are available in a special form which permits the gage factor change with temperature to be adjusted over a wide range during gage manufacture.

Properly matched to the transducer spring element, these EMC (Effective Modulus Compensation) gages can provide very good self-correction of changes in transducer span versus temperature. A compensation better than ±0.0008%/°F (±0.0014%/°C) can readily be achieved in many cases.

While this may at first appear to be the "ideal" strain gage for transducers, there are certain factors that should be considered prior to selecting EMC gages for a given application:

1. EMC gages cost more than other gages. In most cases the difference is great enough to offset the additional cost of span/temperature resistors.
2. EMC gages must be "matched" to the transducer spring material. Depending on the degree of compensation accuracy desired, the standard EMC options may not yield the "best fit" compensation on the spring material in use. In these cases, a special foil lot which possesses the desired compensation would be required. There is normally a minimum order requirement and set-up charge for special foil lots.
3. Transducer spring materials may not have batch-to-batch repeatability sufficient to maintain specifications when using the same EMC gages. New material lot testing is therefore necessary for high precision units.

Despite these limitations, EMC gages can often be advantageous for transducer manufacturers.

The following standard EMC options are available:

OPTION M1

Gage factor slope is –1.50% per 100°F (–2.70% per 100°C). Provides span-versus-temperature compensation for many stainless steels.

OPTION M2

Gage factor slope is –2.35% per 100°F (–4.23% per 100°C). Provides span-versus-temperature compensation for most aluminum alloys.

OPTION M3

Gage factor slope is –1.25% per 100°F (–2.25% per 100°C). Provides span-versus-temperature compensation for many tool steels.

OPTION M4

Gage factor slope is –1.35% per 100°F (–2.43% per 100°C). Provides "mid-range" compensation between M1 and M3.

Advanced Sensors

Example: XXX - XX - S5XXXX - XXX / DX / EX

Carrier Matrix (Backing)

- **N2**: Special polyimide
- **J2**: Encapsulated N2
- **N5:** High temperature N2
- **J5**: High temperature J2

Foil Alloy

- **A**: Constantan
- **K**: Modified Karma

Self-Temperature-Compensation (S-T-C)

Self-Temperature-Compensation (S-T-C) number approximating the thermal expansion coefficient of the transducer material in ppm/°F. S-T-C values of 06 (steels) and 13 (aluminum alloys) are normally stocked. MC is substituted for S-T-C for modulus compensated gages.

Pattern Code

6-digit code, with the first characters “S5”, and the last character a creep code letter, where applicable.

Resistance in Ohms

Resistance in Ohms, (C = x 100)

Gold/Copper Soldering Pad

- **DG:** Standard Gold plating on N2K, N5K, J5K series.
- **DP:** Copper plating option available upon request.

Optional Grid Encapsulation Feature

- **E3:** 0.0004-inch (0.01 mm)-thick epoxy film covering of sensing grid. Solder tabs exposed.
- **E4:** A softer version of E3 for better gage flexibility, with same film thickness.
- **E5:** 0.0004-inch (0.01 mm)-thick film covering of sensing grid with extremely high elongation. Solder tabs exposed.