

## **Resistor Networks Include Screen-Test Flow for EEE-INST-002, MIL-PRF-83401 Compliance**



Vishay Precision Group has released new hermetically sealed precision resistor network devices (PRND) with a screen/test flow in compliance with EEE-INST-002 (Tables 2A and 3A, Film/Foil, Level 1) and MIL-PRF-83401. For high-reliability military and aerospace applications such as satellites, space rovers, and deep-space probes, the PRNDs provide low absolute TCR of  $\pm 2$  ppm/ $^{\circ}\text{C}$  typical from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ ,  $+25^{\circ}\text{C}$  ref.; load-life stability to  $\pm 0.05$  percent typical; and a load-life ratio stability of  $\pm 0.02$  percent typical at  $+70^{\circ}\text{C}$  for 2,000 hours at rated power. Custom configured to requested circuit schematics and specifications, VPR's EEE-INST-002-compliant PRNDs are hermetically sealed networks consisting of multiple Bulk Metal Foil hybrid chip resistors connected by gold-wire bonding inside ceramic packages. Using Bulk Metal Foil technology, PRNDs offer fundamentally low TCR, desirable tolerance matching and tracking, and very small drifts with load over time. According to the company, typical performance for PRNDs ranges up to 15 times better than the requirements of the MIL-PRF-83401 spec.

The combination of the PRNDs' ceramic package — which has the advantage of electrical isolation on the underside and high heat dissipation capability — hermetic sealing, and the arrangement of the chips within the package, helps preserve uniform conditions inside it for maximum environmental protection. The result is improved load life stability and better performance for high-temperature and high-moisture environments.

Offered in dual-in-line (DIP), flatpack, gull wing, and leadless chip carrier (LCC) package configurations, the PRNDs feature a wide resistance range from 5  $\Omega$  per chip, with lower and higher values available with tolerance matching to  $\pm 0.005\%$ . Any resistance value within this range is available at any tolerance with no additional cost or lead time effect. The devices provide a power rating to 1.4 W per package (150 mW per resistor) at an ambient temperature of  $+70^{\circ}\text{C}$ .

The resistor networks feature a rise time of 1.0 ns with effectively no ringing, a thermal stabilization time of  $<1$  s (nominal value achieved within 10 ppm of steady

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Published on Electronic Component News (<http://www.ecnmag.com>)

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state value), current noise of 0.010  $\mu\text{Vrms}$  per volt of applied voltage (<-40 dB), a voltage coefficient of <0.1 ppm/V, and a shelf-life stability of  $\pm 2$  ppm typical after at least six years. Offered with gold-plated terminations, the devices provide a non-inductive (<0.08  $\mu\text{H}$ ), non-capacitive design.

VFR's hermetic networks are based on fabrication from a standing inventory of packages and resistor chips. This permits quick delivery of prototypes because there are no masks to design or trial processing to be made. Further, it allows a large combination of values, tolerances, and circuits. The chip and wire approach allows for standard or custom schematics with no engineering or setup charges, and with no minimum quantities required.

### Vishay Precision Group

610-407-4800, [www.vishaypg.com](http://www.vishaypg.com) [1]

### Source URL (retrieved on 09/30/2014 - 11:09am):

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[1] <http://www.vishaypg.com>