Your Challenge

Equipment for use in space applications need to go through stringent environmental tests in order to proof that it can survive extreme conditions during launch or in space. One of the most complex and expensive tests is the thermal vacuum (TVAC) test. Satellite manufacturers require a RF power measurement solution that can:

- Improve power measurement accuracy – greater confidence in power measurement results
- Simplify the measurement setup and calibration procedure – minimize human errors and complete the TVAC test faster
- Cover a wide range of satellite signals – ease of maintenance and calibration with a single family of power sensors
- Survive the vacuum environment without outgassing – the sensor will not contaminate the chamber or limit the chamber from going lower in pressure.

Your Solution

The Keysight U2049XA LAN wide dynamic range power sensor is the world’s first LAN power sensor, and enables accurate RF and microwave power measurements from 10 MHz to 33 GHz. The U2049XA also comes with a thermal vacuum option (Option TVA), making it the world’s first TVAC power sensor, and allows you to place the sensor inside a TVAC chamber without worrying that it will outgas and contaminate your chamber.

Typical TVAC Test Setup

RF power meter and sensor are typically installed outside the chamber and are routed into the chamber via long RF cables.

The New Paradigm

TVAC qualified PoE/LAN power sensors are connected directly to the input and output of the satellite inside the thermal vacuum chamber.

New TVAC test setup with sensors connected directly to the input or output of the satellite for improved accuracy and a simplified test setup.
Your Solution

Thermal vacuum option (U2049XA, Option TVA)

The TVAC power sensor is designed with low level materials with minimum outgassing properties. Under vacuum, different materials have different outgassing rates and are capable of contaminating the vacuum chamber. To ensure that all the materials used in the U2049XA are vacuum compatible, all the materials are matched against the NASA/ESA outgassing database. Items not listed in the database are subjected to materials screening in accordance to ECSS-Q-ST-70 02C. The full sensor assembly must also undergo stringent TVAC qualification tests to ensure that it can measure accurately over a wide range of temperatures in a vacuum environment. The sensor is subjected to operation tests ranging from -10 to +60 °C and non-operating storage tests from -40 to +100 °C under vacuum conditions.

Improve measurement accuracy and simplified test setup or calibration procedure

You can now connect the sensor directly to the input and output of the satellite or components inside the TVAC chamber, removing the need to use a long RF cable that could cause changes in insertion loss and SWR due to the temperature. By eliminating the uncertainties caused by poor SWR (mismatch error) and insertion loss, accuracy is greatly improved. You can also obtain accurate output power measurements directly from the power sensor without going through complex calibration routines, saving you time during setup and minimizing operator’s errors due to complex calibration procedures.

Cover a wide range of satellite signals

With a broad frequency range of 10 MHz to 33 GHz, the U2049XA is optimized for satellite and space applications by covering a wide range of satellite bands. With a wide power range of -70 to +20 dBm, the sensor is also capable of measuring both output signals and small reflected signals without having to switch sensors to cover different power ranges.

Enable long distance remote monitoring and automatic calibration

With Power over Ethernet (PoE) connectivity, the U2049XA is capable of long distance remote monitoring of up to 100 meters with the standard LAN cable. Long distance remote monitoring more than 100 meters is also possible by connecting the U2049XA to a shared network via the network switch or PoE hubs. The power sensor can be controlled remotely from any part of the world with a standard web browser and the Keysight BenchVUE software. Together with Keysight patented internal zero and calibration capability and excellent long term drift performance, the U2049XA enables automated performance monitoring without needing human intervention.

Broadband coverage for accurate average power measurements of any complex modulated signals

The U2049XA utilizes a four-path diodes design that enables all the diode paths to operate in their square law region, allowing the sensor to provide accurate RMS power for any broadband, complex modulated signals. It is a future-proof solution that enables you to measure broader bandwidth multi-carrier signals up to a few hundreds megahertz bandwidth.

The U2049XA comes in two variants: the standard U2049XA Option 100, which is designed for regular use outside of a TVAC chamber, and Option TVA, which is TVAC qualified for use inside a TVAC chamber. For more information on the U2049XA LAN power sensor, please visit www.keysight.com/find/widedynamicsensor.

From Hewlett-Packard through Agilent to Keysight

For more than 75 years, we’ve been helping you unlock measurement insights. Our unique combination of hardware, software and people can help you reach your next breakthrough.

Unlocking measurement insights since 1939.