FAST AND RELIABLE POWER MEASUREMENTS IN THE SATELLITE INDUSTRY

In the satellite sector, components, subsystems and entire satellites must be qualified in a thermal vacuum chamber before they can be used in space. This qualification proves that equipment can not only survive but also function in the harsh conditions encountered during launch and in space.

R&S®NRP33SN-V thermal vacuum chamber compatible power sensor

The adoption of new, higher frequency bands and accuracy requirements demands highly precise, reliable power measurements. To attain this level of precision, power measurements must be taken directly on the DUT inside a thermal vacuum chamber to avoid losses and reflections. The power sensors not only have to function in a high vacuum but also must be able to withstand temperature fluctuations without contaminating the thermal vacuum chamber (TVAC) through outgassing. This is critical because materials have different outgassing rates and must be selected carefully to keep the vacuum chamber free of contaminants. The materials used in TVAC sensors are screened against NASA and ESA outgassing databases to ensure they are vacuum compatible. Materials identified as potentially critical or that are not in the database are then tested individually.

Your task

The TVAC test is one of the most complex, time consuming and expensive test setups, which is why satellite manufacturers require RF power measurement solutions that:

- Provide confidence in power measurement results and avoid errors
- Are easy to set up, calibrate and operate
- Will not contaminate the chamber by outgassing volatile organic compounds (VOC)

Rohde&Schwarz solution

New technology makes it possible to put the sensor close to the DUT where it belongs. Putting the sensor inside the TVAC (see next page) eliminates contamination risk and greatly enhances measurement reliability and speed.

The R&S®NRP33SN-V and R&S®NRP67SN-V TVAC-compliant power sensors and their accessories are specially designed to fulfill thermal vacuum requirements. All components are baked in a vacuum chamber during the production process to reduce outgassing to a minimum. Venting holes in the housing ensure pressure equalization between the inside of the sensor and its environment, and threaded mounting holes ensure easy and safe mounting. In addition, matching digital LAN cables with a feedthrough option are made of vacuum-friendly materials, baked and shrink wrapped to prevent contamination.

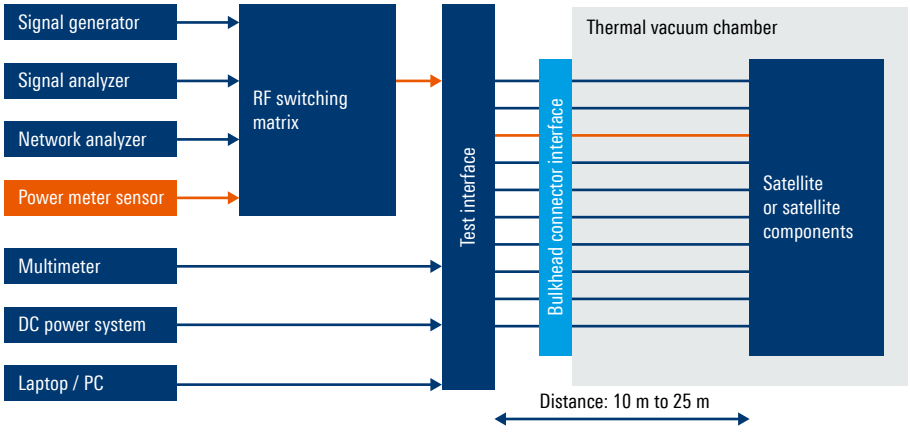
This new approach enables the sensor to be directly connected to the satellite or component I/O inside the TVAC. This greatly improves accuracy by eliminating long RF cables that cause temperature-dependent changes in insertion loss and SWR. Accurate power measurement readings can be taken directly from the power sensor without going through lengthy and complex calibration routines.

Additional benefits

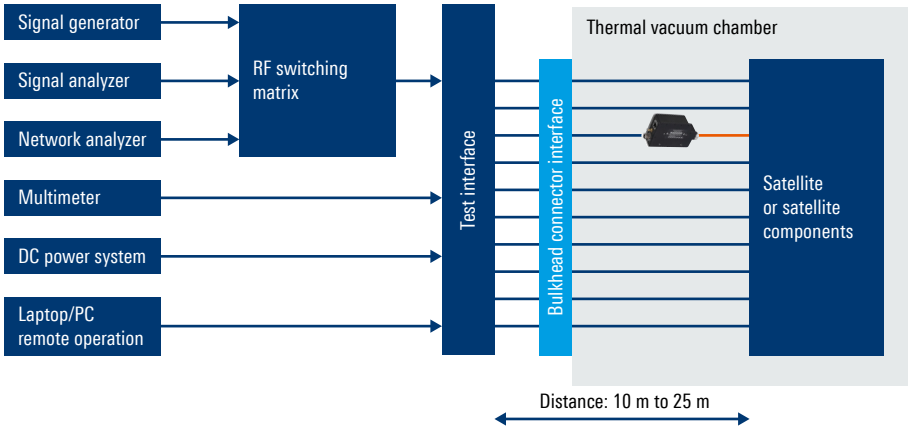
With a broad frequency range starting from as low as 10 MHz and extending to 67 GHz, the R&S®NRPxxSN-V sensors are optimized for satellite and space applications by covering a broad range of satellite bands. With a wide power range, reaching as high as 93 dB, the sensors can also measure both output signals and small reflected signals without having to switch sensors to cover different power ranges.

With power over Ethernet (PoE) connectivity, R&S®NRPxxSN-V sensors can be remotely controlled over a distance of up to 100 meters with standard LAN connectivity. Long-distance remote monitoring with unlimited range is also possible by connecting the sensor to a secure, shared network. The power sensor can be remotely controlled from anywhere using a standard web browser.

The traditional approach: meet contamination requirements by keeping the sensor outside the TVAC, compromising measurement reliability and speed



The new approach: power sensor inside the TVAC



ORDERING INFORMATION

Designation	Type	Order No.
TVAC-compliant three-path diode power sensor		
100 pW to 200 mW, 10 MHz to 33 GHz, LAN version, TVAC-compliant	R&S®NRP33SN-V	1419.0129.02
100 pW to 100 mW, 50 MHz to 67 GHz, LAN version, TVAC-compliant	R&S®NRP67SN-V	1424.6415.02
Recommended extras		
Ethernet power sensor cable, air side, Micro-D (m) to RJ-45, up to 60 m	R&S®NRP-ZKASMD	1425.2420.xx
Ethernet cable for TVAC applications, RJ-45 to Micro-D, up to 60 m	R&S®NRP-ZKVSMD	1425.2413.xx
Ethernet cable for TVAC applications, 2 × RJ-45, up to 60 m	R&S®NRP-ZKVSRJ	1425.2407.xx

Rohde&Schwarz GmbH&Co. KG
www.rohde-schwarz.com

Rohde&Schwarz training
www.training.rohde-schwarz.com
Rohde&Schwarz customer support
www.rohde-schwarz.com/support

PD 5216.4862.92 | Version 01.00 | October 2022 (ja)
Fast and reliable power measurements in the satellite industry
Data without tolerance limits is not binding | Subject to change

5216486292
5216.4862.92 01.00 PDP/PDW 1 en