GNSS receiver testing in accordance to RED 2014/53/EU Article 3.2

Rohde&Schwarz presents a customizable solution for testing GNSS receivers to ensure a certain resilience against (legal) interference from neighboring bands.

Your challenge

What is different when testing GNSS receivers? Currently, the bands adjacent to GNSS frequencies are not used by high-power signals, and there is no legislation on receiver performance. Therefore, many not only low-cost GNSS receivers are highly susceptible to interference. This prevents regulatory authorities from assigning these bands to new services, such as mobile broadband services, which contradicts the goal of efficient spectrum usage.

To achieve the goal of increased spectral efficiency, the European Commission agreed on a directive (RED 2014/53/EU Article 3.2.) that requires all GNSS receivers to ensure a certain resilience against (legal) interference from neighbor bands. This directive requires all classes of GNSS receivers (navigation devices, mobile devices, GPS-based watches, high-end measurement instruments, other devices that use GNSS, etc.) to be certified and fulfill this requirement in line with ETSI EN 303413.

To obtain the CE mark, all receivers sold in the European Union after June 13, 2017 have to ensure that they fulfill this directive.

GNSS receiver manufacturers can self-certify the compliance of their GNSS receivers or test it at a notified body (validated test houses).

Our solution

The R&S®GNSS-RxT test system is a scalable and re-usable solution that addresses the diversified market of GNSS receiver testing. No matter what device is under test is, it's all about GNSS receiver spurious and adjacent frequency band selectivity testing, preferably conducted.

User-friendly GUI

Test cases can be easily executed and parametrized via the well-known R&S®CMWrun GUI. Integrated automation in the R&S®CMWrun GUI speeds up test time and provides comfortable handling. The R&S®CMWrun GUI is also used for other applications such as eCall and ERA Glonass.

Testing GNSS receiver spurious emission

Like any other electronic device, flaws in the design can lead to spurious emissions from local oscillators or clocks. To rule out potential harm for other devices, EN 303413 mandates analysis of the spectrum from 30 MHz to 8.3 GHz, similar to the requirements for 2.4 GHz ISM band, which are covered in EN 300328.

Testing GNSS receiver adjacent frequency band selectivity

The following fully automated and reliable measurements are performed with R&S®GNSS-RxT

- C/N0 without interferer in adjacent band vs. C/N0 with interferer in adjacent band
- Interferer signal is a 1 MHz windowed white Gaussian noise signal
- Closest frequencies are 1554 MHz and 1615 MHz, both at –105 dBm
- Highest interferer power is –65 dBm at 1524 MHz
- Covers L1, L2 and L5, as well as GPS, Glonass, BeiDou, Galileo, SBAS if supported by receiver

Required equipment

- R&S®FSV spectrum analyzer (already used in the R&S®TS8997 WLAN test system)
- R&S®SMW dual-channel vector signal generator (compatible with the R&S®TS8997 WLAN test system)
- PC running test cases
- Cabling set (combiner and a few cables)

Supported technologies

- GPS
- Glonass
- BeiDou
- Galileo
- L1, L2, L5

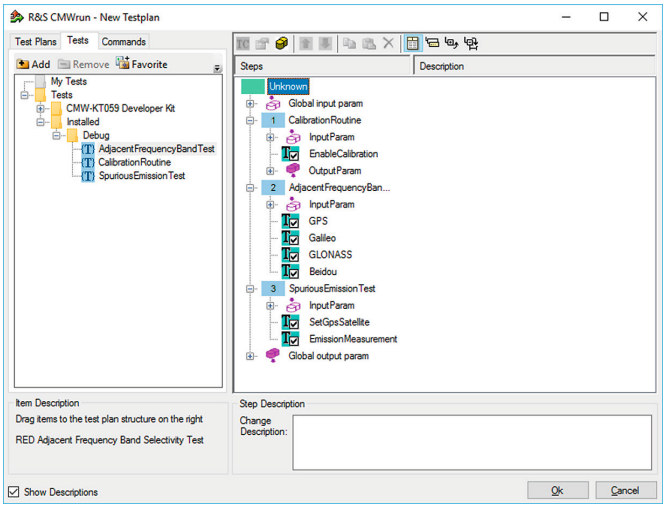
Why us and not them?

- One-stop shopping with turnkey solution from a single source
- Full coverage of EN 303413 (adjacent frequency selectivity and spurious emission)
- Automation of NMEA capable devices
- Automation of Android devices
- Scalable size and portable design
- Easy-to-use GUI
- Automated calibration routine
- Less CAPEX through re-usability of same hardware as in other application such as R&S®TS8997, R&S®TS-LBS
- Re-usable for other RED tests such as EN 300328/ EN 301893
- Extendable to radiated testing
- Generation of automated test reports
- Highly accurate Rohde&Schwarz signal generator and spectrum analyzer

See also:

www.rohde-schwarz.com/product/GNSS-RXT

R&S®CMWrun GUI and reporting



Global Navigation Satellite System	No interfering signal [dB-Hz]	With interfering signal [dB-Hz]	Decrease of C/N [dB-Hz]		Decrease < 1 dB ?
Frequency band = 1518-1525 MHz, Test point centre frequency = 1524 MHz, Adjacent frequency signal power level = -65 dBm					
GPS	8	43	-35		Passed
Frequency band = 1525-1549 MHz, Test point centre frequency = 1548 MHz, Adjacent frequency signal power level = -95 dBm					
GPS	8	43	-35		Passed
Frequency band = 1549-1559 MHz, Test point centre frequency = 1554 MHz, Adjacent frequency signal power level = -105 dBm					
GPS	8	43	-35		Passed
Frequency band = 1610-1626 MHz, Test point centre frequency = 1615 MHz, Adjacent frequency signal power level = -105 dBm					
GPS	8	43	-35		Passed
Frequency band = 1626-1640 MHz, Test point centre frequency = 1627 MHz, Adjacent frequency signal power level = -85 dBm					
GPS	8	43	-35		Passed

Rohde&Schwarz GmbH&Co. KG
Europe, Africa, Middle East | +49 89 4129 12345
North America | 1 888 TEST RSA (1 888 837 87 72)
Latin America | +1 410 910 79 88
Asia Pacific | +65 65 13 04 88
China | +86 800 810 82 28 | +86 400 650 58 96
www.rohde-schwarz.com
customersupport@rohde-schwarz.com

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