Test the ON/OFF power of your TD-LTE base station

The R&S®FSW signal and spectrum analyzer provides the high dynamic range needed to accurately measure the ON/OFF power of your transmitter in accordance with 3GPP TS 36.141.

Your task

TDD-based communications systems divide the time domain into transmission and reception periods. Transition between both has to be very fast in order to efficiently use the resources in the time domain. Verifying these ON and OFF power levels of a base transceiver station during design demands test instruments with high dynamic ranges.

TD-LTE base stations need to pass two transmit ON/OFF power tests defined in chapter 6.4 of the 3GPP TS 36.141 technical specification:

Transmitter OFF power

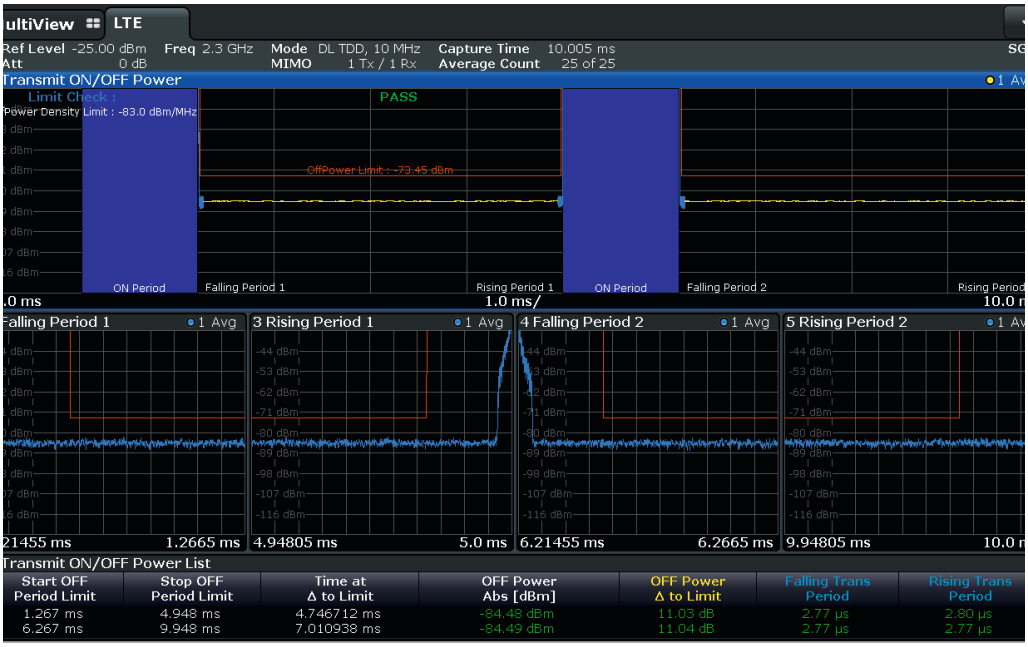
The purpose of the transmitter OFF power test in chapter 6.4.1 is to verify that the output power of the base station does not exceed the specified limit during the OFF period of the signal.

Transmitter transient period

The purpose of the transmitter transient period test in chapter 6.4.2 is to verify that the time period during which the transmitter is changing from ON to OFF, or vice versa, is short enough to prevent interference with adjacent timeslots.

According to the specification, both tests are to be performed at the transmitter's maximum output power during the ON periods. As an operating output power up to 46 dBm is present, measures must be taken to protect the measuring instruments from damage.

RF attenuators do not provide an adequate solution because they increase the ambient noise level during the OFF periods, which can make the signal indistinguishable from the noise floor. Moreover, the transmitter transient period test demands rise and fall times of less than 17 µs, which requires maximum timing accuracy.



The R&S®FSW with the R&S®FSW-K104 measurement option offers maximum timing accuracy to make ON/OFF power transients of TD-LTE base stations visible.

ROHDE&SCHWARZ

T&M solution

Rohde&Schwarz offers an easy-to-use test setup based on the R&S®FSW signal and spectrum analyzer. This set-up enables high dynamic range measurements, fulfilling the demanding timing accuracy specified by 3GPP.

An RF limiter is applied to reduce the peak power at the analyzer input while maintaining the absolute level of the noise floor during OFF power periods.

To meet the timing accuracy requirement and to protect the measuring instrument, an RF limiter is required with a maximum output leakage of 20 dBm and a maximum response and recovery time of 1 µs each.

RF limiters reflect almost all of the transmitted power. To avoid shutdown of the base station, it might be necessary to add an isolator and an external attenuator to absorb the reflected wave. Such a test setup is in accordance with 3GPP since the ON period of the signal is not subject to any restrictions.

In order to achieve the demanding timing accuracy, it is essential to use an external trigger and to compensate the time interval between the trigger event and the frame start, i.e. the trigger-to-frame interval.

This time alignment measurement is carried out with the R&S®FSW-K104 EUTRA/LTE TDD BS measurements option for analyzing TD-LTE downlink signals, and is performed prior to the power measurement.

The estimated trigger-to-frame value will be taken into account automatically for all subsequent measurements. Equipping the R&S®FSW with the R&S®FSW-B24 preamplifier option improves the signal-to-noise ratio during OFF-period measurements and delivers the required measurement accuracy.

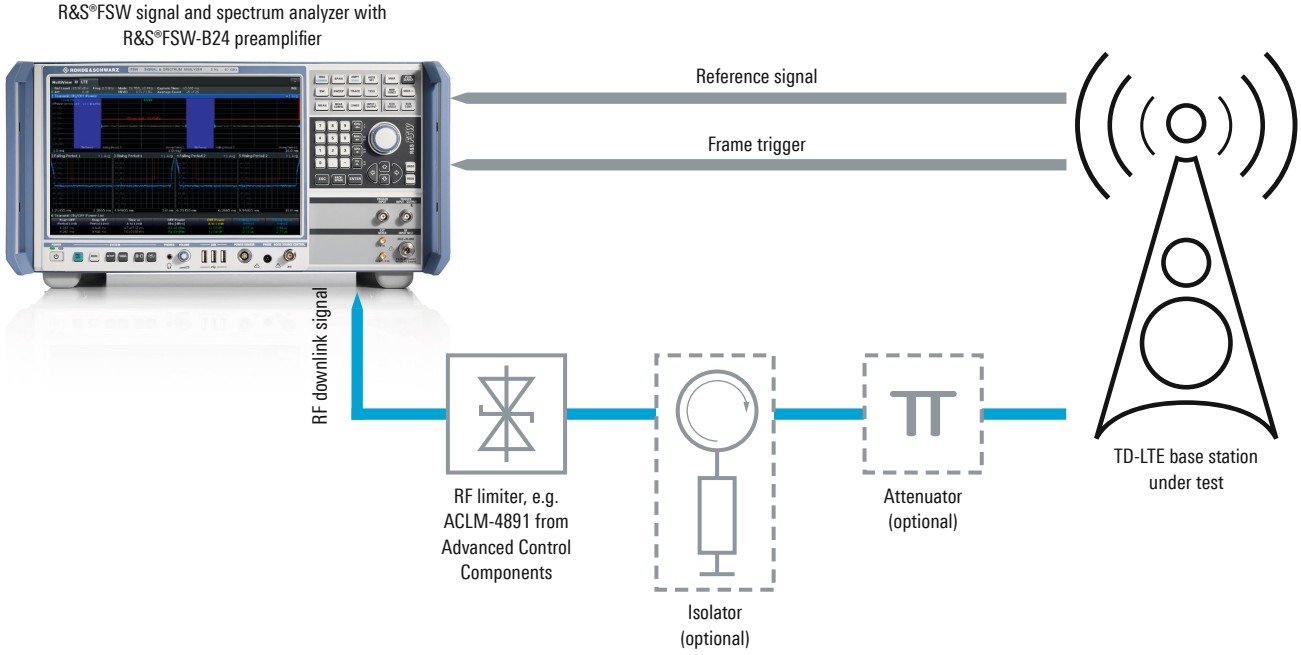
The R&S®FSW-K104 measurement option automatically processes the captured data. Results are provided as a power vs. time graph and in form of a result table containing PASS/FAIL information combined with delta-to-limit values. The R&S®FSW can be controlled remotely, making this an ideal solution for use in automated test systems.

A detailed description on how to perform ON/OFF power measurements is provided in the R&S®FSW-K10x LTE DL user manual.

See also:

http://www.rohde-schwarz.com/technology/LTE
http://www.rohde-schwarz.com/product/FSW

Test setup for accurate ON/OFF power measurements on TD-LTE base transceiver stations



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PD PD 5214.4842.92 | Version 02.00 | January 2017 (we)
Test the ON/OFF power of your TD-LTE base station
Data without tolerance limits is not binding | Subject to change

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