

How To Perform ACLR Test Using A WSA-408

Sage Instruments - Application Note - 2026-04-18

Purpose of the test

ACLR (Adjacent Channel Leakage Ratio) or ACPR (Adjacent Channel Power Ratio) is a generalized multi-adjacent-channel power measurement test based on Spectrum Analysis to make sure a broad-band signal source is transmitting the right amount of composite power within the designated channel band and not generating unacceptable amounts of out-of-band emissions. When only one channel is selected, this test can also function as a generic power sensor to measure the integrated composite signal power (RSSI) of any bandwidth-constrained steady-state signals.

Basic setup

Figure 1 shows what ACLR test was designed for originally, the 4G-LTE base station transmitter power characterizations.

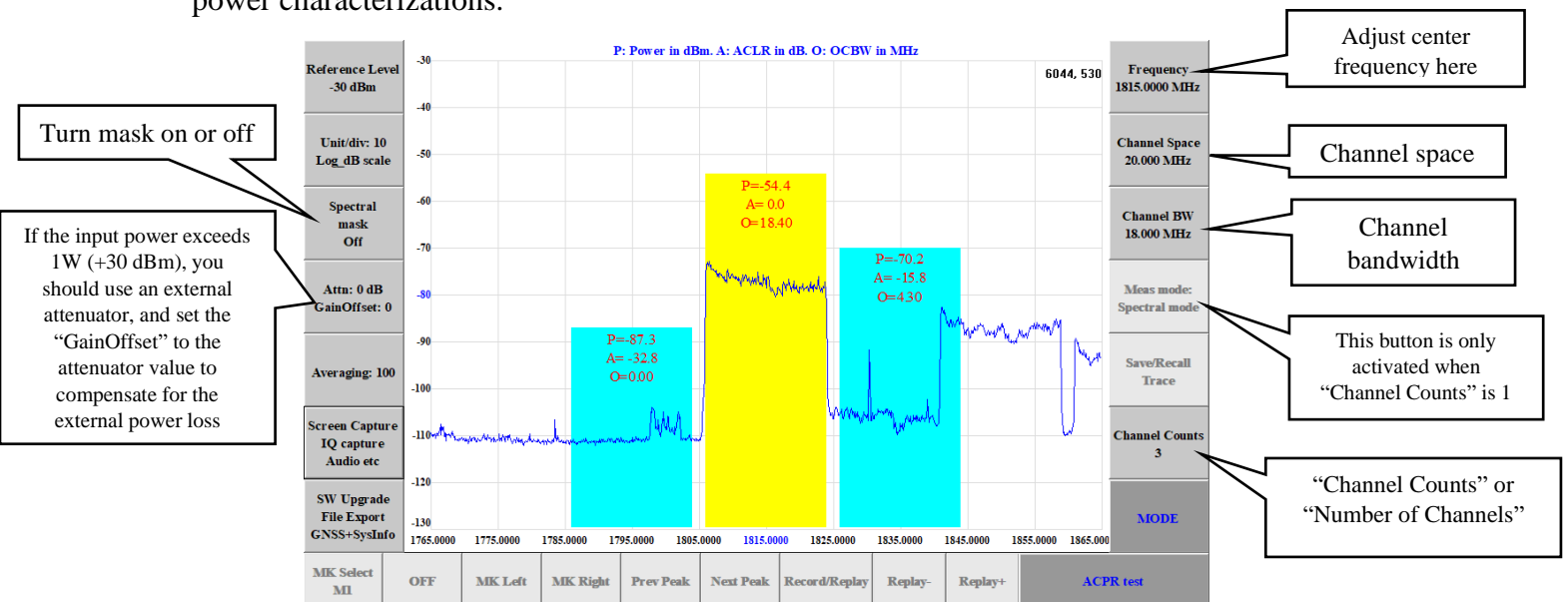


Figure 1 - The “simplest” ACLR test configuration

In Figure 1, 3 channels are set up (the right 6 button shows “Channel Counts=3”). The 3 channels are colored, with the center one in yellow and two adjacent ones in light green. For 4G-LTE, the standard LTE channel spacing is always 5, 10 or 20 MHz, whereas the actual LTE

channel bandwidths are 4.5, 9 and 18 MHz. This is why you have two buttons to set up, the “Channel Space” (20 MHz here) and “Channel Bandwidth” (18 MHz here). Naturally, “Channel Space” should always be greater or equal the “Channel Bandwidth”. Such constraints are auto-enforced in the software. When changing one value, the other value may also change automatically to make sure such constraint is always met. Here, each colored block is 18 MHz wide, but space between them (from center to center) is 20 MHz. Within the main yellow-colored block, “P=-54.4” means the total composite power of this 18 MHz wide channel is -54.4 dBm. “A=0” (Adjacent channel leakage ratio) is always 0 for the center main channel. “O=18.4” is the estimated occupied band width of 18.4 MHz (best effort estimation based on 3GPP’s 99% power definition). For the channel to the left, “P=-87.3” (channel power of -87.3 dBm) and “A=-32.8”, meaning this left channel’s power is 32.8 dB lower than the center one.

Turning on the mask

Pressing the left 3 button “Spectral mask” will turn the mask ON or OFF, as shown in Figure 2.

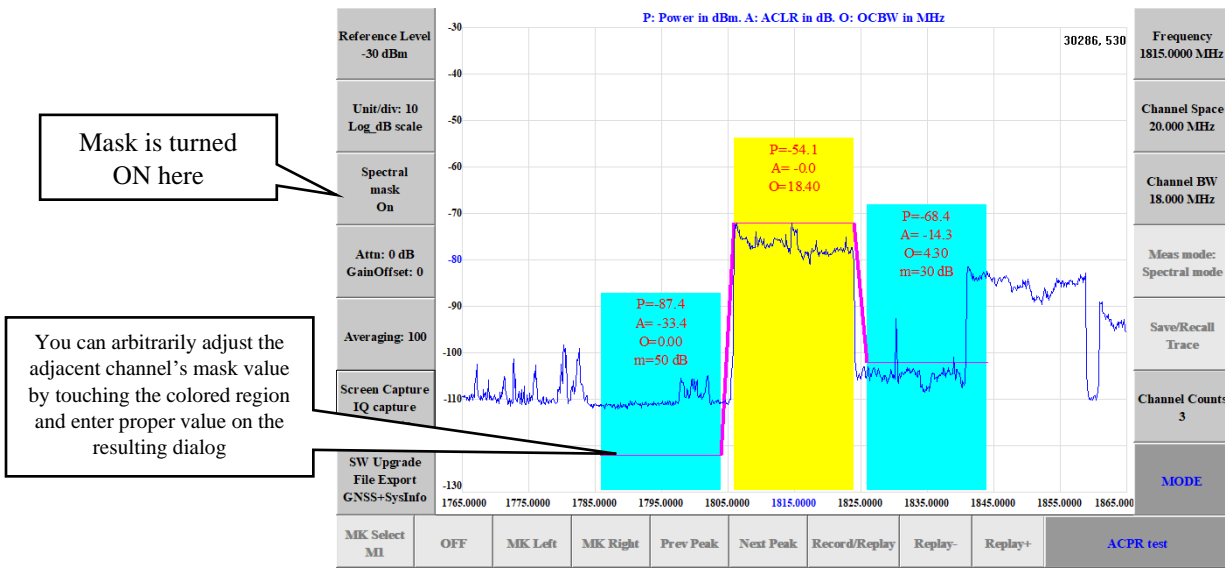


Figure 2 - Display example after turning on the mask. “m=50 dB” means the current mask value for the left channel is set to “50 dB”. You can change it by touching the colored region and then enter a new value on the pop-up dialog. Notice that the center channel’s mask is unchangeable and it’s auto-referenced to the main channel’s peak value.

Power meter (RSSI) mode

As shown in Figure 3, once the “Channel Counts” is set to 1, the “Meas mode” button becomes activated. You can toggle it between “RSSI mode” and “Spectral mode”. If your intention is to measure the integrated composite power within a specified channel bandwidth, you should use the “RSSI” mode, as shown below.

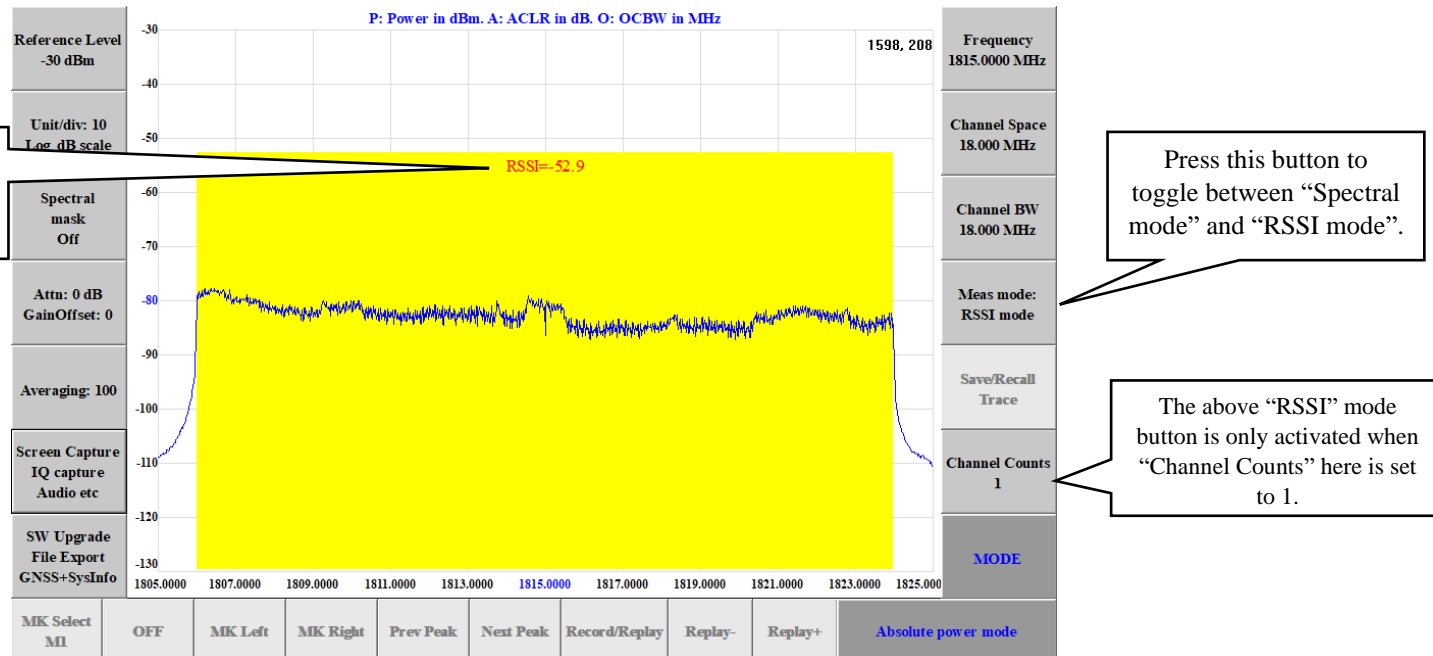


Figure 3 - Turning ACLR test into an RSSI power meter

Software upgrade for narrower channel bandwidth operation

The software version prior to 20260418, although allows a user to enter a channel bandwidth as small as 0.01 MHz (10 kHz), yet the color-coded display will be unreadable. If you need to measure channel power of bandwidth below 1 MHz, you should update the software to 20260418 or later version, which will handle the sub-MHz narrow band display properly without over-crowding the displayed text. Figures 4 shows a few examples of very narrow channel bandwidth setting cases (180 kHz, and 25 kHz) using the new software.

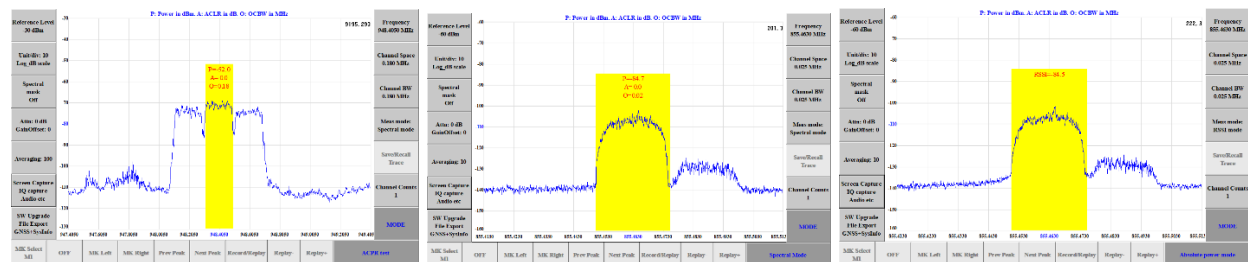


Figure 4 - A few examples showing sub-MHz channel bandwidth settings using the newer software