

### 5.5 OUT-OF-BAND EMISSION LIMITS

Standard FCC Part §2.1051, §27.53

#### The test was performed according to:

ANSI C63.26, KDB 935210 D05 v01r03: 3.6

#### 5.5.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the out-of-band emission limit for industrial signal boosters. The limits itself come from the applicable rule part for each operating band.

The EUT was connected to the test setup according to the following diagram:



FCC Part 22/24/27/90 Industrial signal booster - Test Setup; Out-of-band emissions

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.



## 5.5.2 TEST REQUIREMENTS / LIMITS

#### Part 27; Miscellaneous Wireless Communication Services

#### Subpart C – Technical standards

#### §27.53 – Emission limits

#### Band 30

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(1) For base and fixed stations' operations in the 2305-2320 MHz band and the 2345-2360 MHz band:

(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 mHz, 72 + 10 log (P) dB on all frequencies between 2367.5 mHz, and 75 + 10 log (P) dB above 2370 MHz.

(2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:

(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;



(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

(3) For fixed CPE stations operating in the 2305-2320 MHz and 2345-2360 MHz bands transmitting with 2 watts per 5 megahertz average EIRP or less:

(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P) dB$  above 2365 MHz.

(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than:  $43 + 10 \log (P) dB$  on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P) dB$  above 2365 MHz.

(5) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.



(6) [Reserved]

(7) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power;

(8) Waiver requests of any of the out-of-band emission limits in paragraphs (a)(1) through (a)(7) of this section shall be entertained only if interference protection equivalent to that afforded by the limits is shown;

(9) [Reserved]

(10) The out-of-band emissions limits in paragraphs (a)(1) through (a)(3) of this section may be modified by the private contractual agreement of all affected licensees, who must maintain a copy of the agreement in their station files and disclose it to prospective assignees, transferees, or spectrum lessees and, upon request, to the Commission.

#### Band 41 BRS (LBS/MBS/UBS)

(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

(1) Prior to the transition, and thereafter, solely within the MBS, for analog operations with an EIRP in excess of -9 dBW, the signal shall be attenuated at the channel edges by at least 38 dB relative to the peak visual carrier, then linearly sloping from that level to at least 60 dB of attenuation at 1 MHz below the lower band edge and 0.5 MHz above the upper band edge, and attenuated at least 60 dB at all other frequencies.

(2) For digital base stations, the attenuation shall be not less than 43 + 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.



# 5.5.3 TEST PROTOCOL

| Band 41 BRS ( | (LBS), downlink | , Number     | of input sign                | als = 1                 |  |  |                            |
|---------------|-----------------|--------------|------------------------------|-------------------------|--|--|----------------------------|
| Signal Type   | Input Power     | Band<br>Edge | Signal<br>Frequency<br>[MHz] | Input<br>Power<br>[dBm] | Maximum<br>Out-of-<br>band<br>Power<br>[dBm] | Limit<br>Out-of-<br>band<br>Power<br>[dBm] | Margin<br>to Limit<br>[dB] |
| Narrowband    | 0.3 dB < AGC    | lower        | 2496.2                       | -1.6                    | -22.2  | -13.0                                      | 9.2                        |
| Narrowband    | 3 dB > AGC      | lower        | 2496.2                       | 1.7                     | -21-6  | -13.0                                      | 8.6                        |
| Wideband      | 0.3 dB < AGC    | lower        | 2498.5                       | -1.4                    | -22.0  | -13.0                                      | 9.0                        |
| Wideband      | 3 dB > AGC      | lower        | 2498.5                       | 1.9                     | -22.1  | -13.0                                      | 9.1                        |
| Narrowband    | 0.3 dB < AGC    | upper        | 2567.8                       | -1.6                    | -21.4  | -13.0                                      | 8.4                        |
| Narrowband    | 3 dB > AGC      | upper        | 2567.8                       | 1.8                     | -22.0  | -13.0                                      | 9.0                        |
| Wideband      | 0.3 dB < AGC    | upper        | 2565.5                       | -1.3                    | -19.7  | -13.0                                      | 6.7                        |
| Wideband      | 3 dB > AGC      | upper        | 2565.5                       | 1.9                     | -19.7  | -13.0                                      | 6.7                        |

| Band 4         | 1 BRS (LBS), do | wnlink,      | Number of in                       | put signals :                      | = 2                     |  |  |                               |
|----------------|-----------------|--------------|------------------------------------|------------------------------------|-------------------------|--|--|-------------------------------|
| Signal<br>Type | Input Power     | Band<br>Edge | Signal<br>Frequency<br>f1<br>[MHz] | Signal<br>Frequency<br>f2<br>[MHz] | Input<br>Power<br>[dBm] | Maximum<br>Out-of-<br>band<br>Power<br>[dBm] | Limit<br>Out-of-<br>band<br>Power<br>[dBm] | Margin<br>to<br>Limit<br>[dB] |
| NB             | 0.3 dB < AGC    | lower        | 2496.2                             | 2496.4                             | -1.6                    | -25.7  | -13.0                                      | 12.7                          |
| NB             | 3 dB > AGC      | lower        | 2496.2                             | 2496.4                             | 1.7                     | -24.4  | -13.0                                      | 11.4                          |
| WB             | 0.3 dB < AGC    | lower        | 2498.5                             | 2501.0                             | -1.4                    | -22.3  | -13.0                                      | 9.3                           |
| WB             | 3 dB > AGC      | lower        | 2498.5                             | 2501.0                             | 1.9                     | -22.1  | -13.0                                      | 9.1                           |
| NB             | 0.3 dB < AGC    | upper        | 2567.8                             | 2567.6                             | -1.6                    | -24.8  | -13.0                                      | 11.8                          |
| NB             | 3 dB > AGC      | upper        | 2567.8                             | 2567.6                             | 1.8                     | -23.8  | -13.0                                      | 10.8                          |
| WB             | 0.3 dB < AGC    | upper        | 2565.5                             | 2563.0                             | -1.3                    | -20.0  | -13.0                                      | 7.0                           |
| WB             | 3 dB > AGC      | upper        | 2565.5                             | 2563.0                             | 1.9                     | -19.6  | -13.0                                      | 6.6                           |



| Band 41 BRS | (MBS), downlink | , Number     | of input sigr                | als = 1                 |  |  |                            |
|-------------|-----------------|--------------|------------------------------|-------------------------|--|--|----------------------------|
| Signal Type | Input Power     | Band<br>Edge | Signal<br>Frequency<br>[MHz] | Input<br>Power<br>[dBm] | Maximum<br>Out-of-<br>band<br>Power<br>[dBm] | Limit<br>Out-of-<br>band<br>Power<br>[dBm] | Margin<br>to Limit<br>[dB] |
| Narrowband  | 0.3 dB < AGC    | lower        | 2572.2                       | -3.0                    | -14.2  | -13.0                                      | 1.2                        |
| Narrowband  | 3 dB > AGC      | lower        | 2572.2                       | 0.2                     | -13.9  | -13.0                                      | 0.9                        |
| Wideband    | 0.3 dB < AGC    | lower        | 2574.5                       | -2.3                    | -20.1  | -13.0                                      | 7.1                        |
| Wideband    | 3 dB > AGC      | lower        | 2574.5                       | 1.0                     | -20.4  | -13.0                                      | 7.4                        |
| Narrowband  | 0.3 dB < AGC    | upper        | 2613.8                       | -2.8                    | -13.5  | -13.0                                      | 0.5                        |
| Narrowband  | 3 dB > AGC      | upper        | 2613.8                       | 0.6                     | -13.8  | -13.0                                      | 0.8                        |
| Wideband    | 0.3 dB < AGC    | upper        | 2611.5                       | -2.0                    | -20.1  | -13.0                                      | 7.1                        |
| Wideband    | 3 dB > AGC      | upper        | 2611.5                       | 1.4                     | -20.6  | -13.0                                      | 7.6                        |

Band 41 BRS (MBS), downlink, Number of input signals = 2

| Signal<br>Type | Input Power  | Band<br>Edge | Signal<br>Frequency<br>f1<br>[MHz] | Signal<br>Frequency<br>f2<br>[MHz] | Input<br>Power<br>[dBm] | Maximum<br>Out-of-<br>band<br>Power<br>[dBm] | Limit<br>Out-of-<br>band<br>Power<br>[dBm] | Margin<br>to<br>Limit<br>[dB] |
|----------------|--------------|--------------|------------------------------------|------------------------------------|-------------------------|--|--|-------------------------------|
| NB             | 0.3 dB < AGC | lower        | 2572.2                             | 2572.4                             | -3.0                    | -17.8  | -13.0                                      | 4.8                           |
| NB             | 3 dB > AGC   | lower        | 2572.2                             | 2572.4                             | 0.2                     | -16.8  | -13.0                                      | 3.8                           |
| WB             | 0.3 dB < AGC | lower        | 2574.5                             | 2577.0                             | -2.3                    | -20.6  | -13.0                                      | 7.6                           |
| WB             | 3 dB > AGC   | lower        | 2574.5                             | 2577.0                             | 1.0                     | -20.9  | -13.0                                      | 7.9                           |
| NB             | 0.3 dB < AGC | upper        | 2613.8                             | 2613.6                             | -2.8                    | -16.7  | -13.0                                      | 3.7                           |
| NB             | 3 dB > AGC   | upper        | 2613.8                             | 2613.6                             | 0.6                     | -15.2  | -13.0                                      | 2.2                           |
| WB             | 0.3 dB < AGC | upper        | 2611.5                             | 2609.0                             | -2.0                    | -20.9  | -13.0                                      | 7.9                           |
| WB             | 3 dB > AGC   | upper        | 2611.5                             | 2609.0                             | 1.4                     | -21.1  | -13.0                                      | 8.1                           |



| Band 41 BRS ( | (UBS), downlink | , Number     | of input sign                | als = 1                 |  |  | ]                          |
|---------------|-----------------|--------------|------------------------------|-------------------------|--|--|----------------------------|
| Signal Type   | Input Power     | Band<br>Edge | Signal<br>Frequency<br>[MHz] | Input<br>Power<br>[dBm] | Maximum<br>Out-of-<br>band<br>Power<br>[dBm] | Limit<br>Out-of-<br>band<br>Power<br>[dBm] | Margin<br>to Limit<br>[dB] |
| Narrowband    | 0.3 dB < AGC    | lower        | 2618.2                       | -2.3                    | -20.3  | -13.0                                      | 7.3                        |
| Narrowband    | 3 dB > AGC      | lower        | 2618.2                       | 0.9                     | -20.2  | -13.0                                      | 7.2                        |
| Wideband      | 0.3 dB < AGC    | lower        | 2620.5                       | -1.9                    | -19.8  | -13.0                                      | 6.8                        |
| Wideband      | 3 dB > AGC      | lower        | 2620.5                       | 1.4                     | -20.2  | -13.0                                      | 7.2                        |
| Narrowband    | 0.3 dB < AGC    | upper        | 2589.8                       | -0.8                    | -21.4  | -13.0                                      | 8.4                        |
| Narrowband    | 3 dB > AGC      | upper        | 2589.8                       | 2.5                     | -20.6  | -13.0                                      | 7.6                        |
| Wideband      | 0.3 dB < AGC    | upper        | 2687.5                       | -0.7                    | -20.2  | -13.0                                      | 7.2                        |
| Wideband      | 3 dB > AGC      | upper        | 2687.5                       | 2.7                     | -19.9  | -13.0                                      | 6.9                        |

Band 41 BRS (UBS), downlink, Number of input signals = 2

| Signal<br>Type | Input Power  | Band<br>Edge | Signal<br>Frequency<br>f1<br>[MHz] | Signal<br>Frequency<br>f2<br>[MHz] | Input<br>Power<br>[dBm] | Maximum<br>Out-of-<br>band<br>Power<br>[dBm] | Limit<br>Out-of-<br>band<br>Power<br>[dBm] | Margin<br>to<br>Limit<br>[dB] |
|----------------|--------------|--------------|------------------------------------|------------------------------------|-------------------------|--|--|-------------------------------|
| NB             | 0.3 dB < AGC | lower        | 2618.2                             | 2618.4                             | -2.3                    | -23.0  | -13.0                                      | 10.0                          |
| NB             | 3 dB > AGC   | lower        | 2618.2                             | 2618.4                             | 0.9                     | -23.1  | -13.0                                      | 10.1                          |
| WB             | 0.3 dB < AGC | lower        | 2620.5                             | 2623.0                             | -1.9                    | -19.8  | -13.0                                      | 6.8                           |
| WB             | 3 dB > AGC   | lower        | 2620.5                             | 2623.0                             | 1.4                     | -20.2  | -13.0                                      | 7.2                           |
| NB             | 0.3 dB < AGC | upper        | 2589.8                             | 2589.6                             | -0.8                    | -22.6  | -13.0                                      | 9.6                           |
| NB             | 3 dB > AGC   | upper        | 2589.8                             | 2589.6                             | 2.5                     | -23.3  | -13.0                                      | 10.3                          |
| WB             | 0.3 dB < AGC | upper        | 2687.5                             | 2685.0                             | -0.7                    | -20.6  | -13.0                                      | 7.6                           |
| WB             | 3 dB > AGC   | upper        | 2687.5                             | 2685.0                             | 2.7                     | -20.9  | -13.0                                      | 7.9                           |



| Band 30 WCS | 2300, downlink | Number       | of input sign                | als = 1                 |  |  | ]                          |
|-------------|----------------|--------------|------------------------------|-------------------------|--|--|----------------------------|
| Signal Type | Input Power    | Band<br>Edge | Signal<br>Frequency<br>[MHz] | Input<br>Power<br>[dBm] | Maximum<br>Out-of-<br>band<br>Power<br>[dBm] | Limit<br>Out-of-<br>band<br>Power<br>[dBm] | Margin<br>to Limit<br>[dB] |
| Narrowband  | 0.3 dB < AGC   | lower        | 2350.2                       | -4.0                    | -20.6  | -13.0                                      | 7.6                        |
| Narrowband  | 3 dB > AGC     | lower        | 2350.2                       | -0.5                    | -21.3  | -13.0                                      | 8.3                        |
| Wideband    | 0.3 dB < AGC   | lower        | 2352.5                       | -3.7                    | -20.9  | -13.0                                      | 7.9                        |
| Wideband    | 3 dB > AGC     | lower        | 2352.5                       | -0.4                    | -20.7  | -13.0                                      | 7.7                        |
| Narrowband  | 0.3 dB < AGC   | upper        | 2359.8                       | -4.0                    | -21.2  | -13.0                                      | 8.2                        |
| Narrowband  | 3 dB > AGC     | upper        | 2359.8                       | -0.6                    | -20.9  | -13.0                                      | 7.9                        |
| Wideband    | 0.3 dB < AGC   | upper        | 2357.5                       | -3.6                    | -20.1  | -13.0                                      | 7.1                        |
| Wideband    | 3 dB > AGC     | upper        | 2357.5                       | -0.4                    | -18.9  | -13.0                                      | 5.9                        |

Band 30 WCS 2300, downlink, Number of input signals = 2

| Signal<br>Type | Input Power  | Band<br>Edge | Signal<br>Frequency<br>f1<br>[MHz] | Signal<br>Frequency<br>f2<br>[MHz] | Input<br>Power<br>[dBm] | Maximum<br>Out-of-<br>band<br>Power<br>[dBm] | Limit<br>Out-of-<br>band<br>Power<br>[dBm] | Margin<br>to<br>Limit<br>[dB] |
|----------------|--------------|--------------|------------------------------------|------------------------------------|-------------------------|--|--|-------------------------------|
| NB             | 0.3 dB < AGC | lower        | 2350.2                             | 2350.4                             | -4.0                    | -23.1  | -13.0                                      | 10.1                          |
| NB             | 3 dB > AGC   | lower        | 2350.2                             | 2350.4                             | -0.5                    | -23.9  | -13.0                                      | 10.9                          |
| WB             | 0.3 dB < AGC | lower        | 2352.5                             | 2355.0                             | -3.7                    | -21.4  | -13.0                                      | 8.4                           |
| WB             | 3 dB > AGC   | lower        | 2352.5                             | 2355.0                             | -0.4                    | -21.0  | -13.0                                      | 8.0                           |
| NB             | 0.3 dB < AGC | upper        | 2359.8                             | 2359.6                             | -4.0                    | -23.2  | -13.0                                      | 10.2                          |
| NB             | 3 dB > AGC   | upper        | 2359.8                             | 2359.6                             | -0.6                    | -23.4  | -13.0                                      | 10.4                          |
| WB             | 0.3 dB < AGC | upper        | 2357.5                             | 2355.0                             | -3.6                    | -21.4  | -13.0                                      | 8.4                           |
| WB             | 3 dB > AGC   | upper        | 2357.5                             | 2355.0                             | -0.4                    | -21.5  | -13.0                                      | 8.5                           |



## 5.5.4 MEASUREMENT PLOT

#### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: lower; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 1

| Spectrum 🔆   |                            |  |               |  |
|--|----------------------------|--|---------------|--|
| Ref Level         60.00         dBm           Att         50         dB           SGL         Count         100/100  | Offset 30<br>SWT 94<br>TDF | .00 dB <b>● RBW</b> 2 kHz<br>8.1 µs <b>● VBW</b> 5 kHz | Mode Auto FFT | X  |
| ⊖1Sa AvgPwr  |                            |  |               |  |
| Limit Check<br>Line li   |                            | PASS<br>Pass   | M1[1]         | -22.21 dBm<br>2.495999500 GHz  |
| 50 dBm   |                            |  |               |  |
| 40 dBm   |                            |  |               |  |
| 30 dBm   |                            |  |               |  |
| 20 dBm   |                            |  |               |  |
| 10 dBm   |                            |  |               |  |
| 0 dBm  |                            |  |               |  |
| li-10 dBm  |                            |  |               |  |
| -20 dBm  |                            |  |               | 4  |
| -30 dBm  |                            |  |               |  |
| and the second state of th |                            | ,  |               | and the second s |
| Start 2.493 GHz  |                            | 3000   | pts           | Stop 2.496 GHz   |
|  |                            |  | Ready         | 11.10.2019<br>10.11.00   |
| 3.6.2 out of band emi  | BRS Low A                  | NT 1 GSM lower lcar                                    | rier -0.3     |  |
| dB 2.493G 2.496G   |                            |  |               |  |

## Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: lower; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 1

| Spectrum 🐨   | Offcot 20 | 00 d0 👄 <b>00 W</b> 0 k |              |       |   | 7           |
|--|-----------|-------------------------|--------------|-------|---|-------------|
| Att 50 dB  | SWT 94    | 18.1 us 👄 VBW 5 k       | Hz Mode Auto | 0 FFT |   |             |
| SGL Count 100/100  | TDF       | . –                     |              |       |   |             |
| ∋1Sa AvgPwr  |           |                         |              |       |   |             |
| Limit Check  |           | PASS                    | M1           | [1]   |   | -21.58 dB   |
| Line li  |           | PASS                    |              | 1     | 2.49  | 5995500 GF  |
| 50 dBm   |           |                         |              |       |   |             |
| (a. la   |           |                         |              |       |   |             |
| 40 aBm   |           |                         |              |       |   |             |
| 20. d9m  |           |                         |              |       |   |             |
| 30 UBIII   |           |                         |              |       |   |             |
| 20 dam   |           |                         |              |       |   |             |
| 20 0611  |           |                         |              |       |   |             |
| 10 d8m   |           |                         |              |       |   |             |
| 10 0011  |           |                         |              |       |   |             |
| 0 dBm  |           |                         |              |       |   |             |
| o ubiii  |           |                         |              |       |   |             |
| 10 dBm   |           |                         |              |       |   |             |
| -10 0011   |           |                         |              |       |   |             |
| -20 dBm  |           |                         |              |       |   |             |
|  |           |                         |              |       |   |             |
| -30 dBm  |           |                         |              |       |   |             |
|  |           |                         |              |       |   |             |
| Provident and an and a second se |           | *****                   |              |       | In the second |             |
| start 2.493 GHZ  |           | 3                       | uuu pts      |       | Stc   | p 2.496 GHz |
|  |           |                         | R €          | ady   | 490   |             |

3.6.2 out of band emi BRS Low ANT 1 GSM lower lcarrie: dB 2.493G 2.496G



### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: lower; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 1



### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: lower; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 1

| Spectrum 🌸         |              |                     |                  |     | 7           |
|--------------------|--------------|---------------------|------------------|-----|-------------|
| Ref Level 60.00 dB | m Offset 30. | 00 dB 👄 RBW 50 ki   | Hz               |     |             |
| Att 50 0           | 18 SWI 3     | 4.9 μs 🖶 ΥΒΜ 200 ki | HZ MODE AUTO FFI |     |             |
| SGE COURT 100/100  | 101          |                     |                  |     |             |
| Limit Check        |              | PASS                | M1[1]            |     | -22.14 dB   |
| Line li            |              | PASS                |                  | 2.4 | 49559450 GH |
| 50 dBm             |              |                     |                  |     |             |
| 40 dBm             |              |                     |                  |     |             |
| 30 dBm             |              |                     |                  |     |             |
| 20 dBm             |              |                     |                  |     |             |
| 10 dBm             |              |                     |                  |     |             |
| 0 dBm              |              |                     |                  |     |             |
| -10 dBm            |              |                     |                  |     |             |
| -20 dBm            |              |                     |                  | MI  |             |
| -30 dBm            |              |                     |                  |     |             |
| Start 2.493 GHz    |              | 200                 | 1 pts            | Sto | op 2.496 GH |
|                    |              |                     | Ready            | 120 | 11.10.2019  |

3.6.2 out of band emi BRS Low ANT 1 AWGN lower lcarrier +3.0 dB 2.493G 2.496G



### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: upper; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 1



Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: upper; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 1

| Ref Level         60.00 dBm           Att         50 dB           SGL Count         100/100 | Offset 30.1<br>SWT 948<br>TDF | 00 dB <b>● RBW</b> 2 kHz<br>1.1 µs <b>● VBW</b> 5 kHz | Mode Auto FFT |                    |                 |
|---|-------------------------------|---|---------------|--------------------|-----------------|
| e 1Sa AvgPwr<br>Limit Check<br>Line li  |                               | PASS<br>PASS  | M1[1]         | -22.0<br>2.5680025 | )1 dBi<br>00 GH |
| 40 dBm  |                               |   |               |                    |                 |
| 30 dBm  |                               |   |               |                    |                 |
| 20 dBm  |                               |   |               |                    |                 |
| 10 dBm  |                               |   |               |                    |                 |
| 0 dBm   |                               |   |               |                    |                 |
| -10 dBm   |                               |   |               |                    |                 |
| 20 dBm-   |                               |   |               |                    |                 |
| -B0 dBm   |                               |   |               |                    |                 |
| Start 2.568 GHz   |                               |   | D pts         | Stop 2.57          | 1 GH            |

3.6.2 out of band emi BRS Low ANT 1 GSM upper lcarrier +3.0 dB 2.568G 2.571G



### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: upper; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 1



Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: upper; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 1

| Ref Level 60.00 dBm | Offset 30.00 dB  RBW 50 | kHz               | (             |
|---------------------|-------------------------|-------------------|---------------|
| Att 50 dB           | SWT 37.9 µs 曼 VBW 200   | kHz Mode Auto FFT |               |
| SGL Count 100/100   | TDF                     |                   |               |
| ∋1Sa AvgPwr         |                         |                   |               |
| Limit Check         | PASS                    | M1[1]             | -19.74 dB     |
| Line li             | PASS                    |                   | 2.56914170 G  |
| 50 dBm-             |                         |                   |               |
| 40 dBm              |                         |                   |               |
| 30 dBm              |                         |                   |               |
| 20 dBm              |                         |                   |               |
| 10 dBm              |                         |                   |               |
| ) dBm               |                         |                   |               |
| -10 dBm             |                         |                   |               |
|                     | M1                      |                   |               |
| -29 dBm             |                         | ++                |               |
| -30 dBm             |                         |                   |               |
| Start 2.568 GHz     | 20                      | 01 pts            | Stop 2.571 GH |

3.6.2 out of band emi BRS Low ANT 1 AWGN upper lcarrier +3.0 dB 2.568G 2.571G



### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: lower; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 2



dB 2.493G 2.496G

## Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: lower; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 2

| Att 50 d          | m Offset 30.00 dB ● 1<br>B SWT 948.1 µs ● 1 | RBW 2 kHz<br>VBW 5 kHz Mo | de Auto FFT                            |      |                          |
|-------------------|---|---------------------------|--|------|--------------------------|
| SGL Count 100/100 | TDF   |                           |  |      |                          |
| Limit Check       | P/<br>P/                                    | 188<br>188                | M1[1]                                  | 2.49 | -24.40 dBr<br>5995500 GH |
| 50 dBm            |   |                           |  |      | _                        |
| 40 dBm            |   |                           |  |      |                          |
| 30 dBm            |   |                           |  |      |                          |
| 20 dBm            |   |                           |  |      |                          |
| 10 dBm            |   |                           |  |      |                          |
| 0 dBm             |   |                           |  |      |                          |
| -10 dBm           |   |                           |  |      |                          |
| -20 dBm           |   |                           |  |      |                          |
| -30 dBm           |   |                           |  |      |                          |
| Start 2.493 GHz   | ************                                | 3000 pts                  | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | Sto  | p 2.496 GHz              |

3.6.2 out of band emi BRS Low ANT 1 GSM lower 2carriers +3.0 dB 2.493G 2.496G



### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: lower; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 2



3 dB 2.493G 2.496G

## Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: lower; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00   | dBm Offset 3 | 0.00 dB 👄 RBW 50 kH         | z                |               |
|-------------------|--------------|-----------------------------|------------------|---------------|
| Att               | 50 dB SWT    | 37.9 µs <b>⊜ VBW</b> 200 kH | iz Mode Auto FFT |               |
| SGL Count 100/    | 100 TDF      |                             |                  |               |
| ∋1Sa AvgPwr       |              |                             |                  |               |
| Limit Check       |              | PASS                        | M1[1]            | -22.13 dB     |
| Line II<br>50 dBm |              | PASS                        |                  | 2.49363490 G  |
| 30 dBill          |              |                             |                  |               |
| 40 dBm            |              |                             |                  |               |
|                   |              |                             |                  |               |
| 30 dBm            |              |                             |                  |               |
|                   |              |                             |                  |               |
| 20 dBm            |              |                             |                  |               |
|                   |              |                             |                  |               |
| 10 dBm            |              |                             |                  |               |
|                   |              |                             |                  |               |
| 0 dBm             |              |                             |                  |               |
|                   |              |                             |                  |               |
| -10 dBm           |              |                             |                  |               |
|                   | M1           |                             |                  |               |
| -2U dBm           |              |                             |                  |               |
| 20 d0m            |              |                             |                  |               |
| -SU UBIII         |              |                             |                  |               |
|                   |              |                             |                  |               |
| Start 2.493 GHz   | 2            | 2001                        | L pts            | Stop 2.496 GH |

3.6.2 out of band emi BRS Low ANT 1 AWGN lower 2carriers +3. 0 dB 2.493G 2.496G



### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: upper; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 2



### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: upper; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 2

| Spectrum 💥          |                         |   | 7              |
|---------------------|-------------------------|---|----------------|
| Ref Level 60.00 dBm | Offset 30.00 dB   RBW 2 | (Hz Mode Auto FFT   |                |
| SGL Count 100/100   | TDF                     | Ma Mode Autorn  |                |
| ∋1Sa AvgPwr         |                         |   |                |
| Limit Check         | PASS                    | M1[1]   | -23.82 dB      |
| Line li             | PASS                    |   | 2.568000500 GI |
| 50 dBm              |                         |   |                |
| 40 dBm              |                         |   |                |
| 30 dBm              |                         |   |                |
| 20 dBm              |                         |   |                |
| 10 dBm              |                         |   |                |
| 0 dBm               |                         |   |                |
| -10 dBm             |                         |   |                |
| F20 dBm             |                         |   |                |
| -20 dBm-            |                         |   |                |
| Start 2.568 GHz     |                         | on the second | Stop 2.571 GH  |
| 1                   |                         | Deedu   | 11.10.2019     |

3.6.2 out of band emi BRS Low ANT 1 GSM upper 2carriers +3.0 dB 2.568G 2.571G



### Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: upper; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 2



Band: 41 BRS (LBS); ANT 1; Frequency: 2.4960 GHz to 2.5680 GHz; Band Edge: upper; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00 dB | m Offset 3 | 0.00 dB 👄 RBW 50 k         | Hz               |   | (*             |
|--------------------|------------|----------------------------|------------------|---|----------------|
| Att 50 d           | B SWT      | 37.9 µs 👄 <b>VBW</b> 200 k | Hz Mode Auto FFT |   |                |
| SGL Count 100/100  | TDF        |                            |                  |   |                |
| ∋1Sa AvgPwr        |            |                            |                  |   |                |
| Limit Check        |            | PASS                       | M1[1]            |   | -19.64 dBi     |
| Line li            |            | PASS                       |                  | 1 | 2.56808770 GH  |
| 30 dbiii           |            |                            |                  |   |                |
| 40 d0-             |            |                            |                  |   |                |
| 40 UBIN            |            |                            |                  |   |                |
| 20 d0              |            |                            |                  |   |                |
| 30 UBIII           |            |                            |                  |   |                |
| 00 d0              |            |                            |                  |   |                |
| 20 UBIII           |            |                            |                  |   |                |
| 10.10.1            |            |                            |                  |   |                |
| IU dBm             |            |                            |                  |   |                |
| 0.40-              |            |                            |                  |   |                |
| U UBIII            |            |                            |                  |   |                |
| 10 dBm             |            |                            |                  |   |                |
| -10 UBIII-         |            |                            |                  |   |                |
| M1<br>20 dBm       |            |                            |                  |   |                |
|                    |            |                            |                  |   |                |
| -30 dBm            |            |                            |                  |   |                |
| -so ubiii          |            |                            |                  |   |                |
|                    |            |                            |                  |   |                |
| Start 2.568 GHz    |            | 200                        | 11 pts           |   | Stop 2.571 GHz |

3.6.2 out of band emi BRS Low ANT 1 AWGN upper 2carriers +3. 0 dB 2.568G 2.571G



### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: lower; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 1



Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: lower; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 1

| Ref Level 60.00 dBm                             | Offset 30.00 dB 🖷 RBW 2 kHz  |               | (                     |
|---|--|---------------|-----------------------|
| Att 50 dB                                       | SWT 948.1 µs 👄 VBW 5 kHz   | Mode Auto FFT |                       |
| 3GL Count 100/100                               | TDF  |               |                       |
| 1Sa AvgPwr                                      |  |               |                       |
| Limit Check                                     | PASS   | M1[1]         | -13.90 dE             |
| Line II   | PASS   |               | 2.571984500 G         |
| o ubin  |  |               |                       |
| 0 dBm   |  |               |                       |
| dBm   |  |               |                       |
| 10 dBm  |  |               |                       |
| 20 dBm  |  |               |                       |
| 30 dBm  |  |               |                       |
| 1. 10-14 10 10 10 10 10 10 10 10 10 10 10 10 10 | any water and the set in grade and the set in the set i | -             | musers may in a faith |
| itart 2.569 GHz                                 | 300  | 0 pts         | Stop 2.572 GF         |

3.6.2 out of band emi BRS Mid ANT 1 GSM lower lcarrier +3.0 dB 2.569G 2.572G



#### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: lower; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 1



### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: lower; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 1

| Bof and 60.00 db  | ··· Offcot 30 (          |                          |                   |      | ( 7           |
|-------------------|--------------------------|--------------------------|-------------------|------|---------------|
| Att 50 d          | n Onset 30.0<br>B SWT 37 | 0 us = KBW 501           | KHZ Mode Auto FFT |      |               |
| SGL Count 100/100 | TDF                      | .5 p5 <b>- 75</b> n 2001 | Mode Adtorn       |      |               |
| 1Sa AvgPwr        |                          |                          |                   |      |               |
| Limit Check       |                          | PASS                     | M1[1]             |      | -20.40 dB     |
| Line li           |                          | PASS                     | 1                 |      | 2.57199930 G  |
| 50 dBm            |                          |                          |                   |      |               |
| 40 dBm            |                          |                          |                   |      |               |
| 30 dBm            |                          |                          |                   |      |               |
| 20 dBm            |                          |                          |                   |      |               |
| 10 dBm            |                          |                          |                   |      |               |
| 0 dBm             | +                        |                          |                   |      |               |
| -10 dBm           |                          |                          |                   |      |               |
| -20 dBm           | ++                       |                          |                   | +    | ~             |
| -30 dBm           |                          |                          |                   |      |               |
| Start 2.569 GHz   |                          | 20                       | D1 pts            |      | Stop 2.572 GH |
| Π I               |                          |                          | Ready             | 4.30 | 15.10.2019    |

3.6.2 out of band emi BRS Mid ANT 1 AWGN lower lcarrier +3.0 dB 2.569G 2.572G



### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: upper; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 1



### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: upper; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 1

| Spectrum 🖌  |  |                   |                                       |  |  | T I  |
|---|--|-------------------|---------------------------------------|--|--|--|
| Ref Level 60.00 dBm   | Offset 30.                             | 00 dB 👄 RBW 2 kH  | iz                                    |  |  |  |
| Att 50 08   | 5WI 948<br>TDF                         | 8.1 µs 🖷 VBW 5 KF | 12 MODE AUTO                          | ) FF I                                 |  |  |
| 1Sa AvgPwr  | 101                                    |                   |                                       |  |  |  |
| Limit Check   |  | PASS              | M1                                    | [1]                                    |  | -13.83 dBi   |
| Line li   |  | PASS              |                                       |  | 2.614  | 1008500 GH   |
| 50 dBm  |  |                   |                                       |  |  |  |
|   |  |                   |                                       |  |  |  |
| 40 dBm  |  |                   | -                                     |  |  |  |
|   |  |                   |                                       |  |  |  |
| 30 dBm  |  |                   |                                       |  |  |  |
|   |  |                   |                                       |  |  |  |
| 20 dBm  |  |                   |                                       |  |  |  |
|   |  |                   |                                       |  |  |  |
| 10 dBm  |  |                   |                                       |  |  |  |
|   |  |                   |                                       |  |  |  |
| U dBm   |  |                   |                                       |  |  |  |
| 10 40 m   |  |                   |                                       |  |  |  |
| ETO dBm   |  |                   |                                       |  |  |  |
| an dam  |  |                   |                                       |  |  |  |
| -20 ubiii   |  |                   |                                       |  |  |  |
| 20 000  |  |                   |                                       |  |  |  |
| -30 COMPANY - State - |  |                   |                                       |  |  |  |
|   | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | ***************   | an align milion (see ) and a share of | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | - and a second and a second and a second | and the second |
| Start 2.614 GHz   |  | 30                | 00 pts                                |  | Stop   | p 2.617 GHz  |
|   |  |                   | Re                                    | ady                                    | 4,40   | 15.10.2019   |

dB 2.614G 2.617G



#### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: upper; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 1



### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: upper; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 1

| Spectrum 🔆          |                  |                   |                  |      | T N           |
|---------------------|------------------|-------------------|------------------|------|---------------|
| Ref Level 60.00 dBn | n Offset 30.     | 00 dB 👄 RBW 50 k  | Hz               |      |               |
| SGL Count 100/100   | 5 3001 37<br>TDF | .9 µs 🖶 ¥BW 200 k | INZ MOUE AUTOFFT |      |               |
| )1Sa AvgPwr         |                  |                   |                  |      |               |
| Limit Check         |                  | PASS              | M1[1]            |      | -20.62 dB     |
| Line li             |                  | PASS              |                  |      | 2.61449850 GH |
| 50 dBm              |                  |                   |                  |      |               |
| 40 d0m              |                  |                   |                  |      |               |
| 40 UBIII            |                  |                   |                  |      |               |
| 30 dBm              |                  |                   |                  |      |               |
| oo abiii            |                  |                   |                  |      |               |
| 20 dBm              |                  |                   |                  |      |               |
|                     |                  |                   |                  |      |               |
| 10 dBm              |                  |                   |                  |      |               |
|                     |                  |                   |                  |      |               |
| 0 dBm               | ++               |                   |                  |      |               |
|                     |                  |                   |                  |      |               |
| -10 dBm             | + +              |                   |                  |      |               |
| MI                  |                  |                   |                  |      |               |
| -20 dBm             | + - +            | ~                 |                  |      | ~             |
|                     |                  |                   |                  |      |               |
| -30 dBm             | + +              |                   |                  |      |               |
|                     |                  |                   |                  |      |               |
| Start 2.614 GHz     | 1                | 200               | 11 pts           | 1 1  | Stop 2.617 GH |
|                     |                  |                   | Ready            | 4.00 | 15.10.2019    |

3.6.2 out of band emi BRS Mid ANT 1 AWGN upper lcarrier +3.0 dB 2.614G 2.617G



### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: lower; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 2



Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: lower; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00 dB | m Offset 30.0     | 00 dB 😑 RBW 2 kHz        |  |     | (`            |
|--------------------|-------------------|--------------------------|--|-----|---------------|
| Att 50 c           | iB <b>SWT</b> 948 | .1 µs 👄 <b>VBW</b> 5 kHz | Mode Auto FFT                          |     |               |
| SGL Count 100/100  | TDF               |                          |  |     |               |
| ●1Sa AvgPwr        |                   |                          |  |     |               |
| Limit Check        |                   | PASS                     | M1[1]                                  |     | -16.77 dB     |
| 50 dBm             |                   | PADO                     |  | + + |               |
| 40 dBm             |                   |                          |  |     |               |
| 30 dBm             |                   |                          |  |     |               |
| 20 dBm             |                   |                          |  |     |               |
| 10 dBm             |                   |                          |  |     |               |
| 0 dBm              |                   |                          |  |     |               |
| -10 dBm            |                   |                          |  |     |               |
| -20 dBm            |                   |                          |  |     |               |
| -30 dBm            |                   |                          |  |     |               |
|                    |                   |                          | hard hard and a second here the second | 12  |               |
| Start 2.569 GHz    |                   | 3000                     | pts                                    |     | Stop 2.572 GH |

3.6.2 out of band emi BRS Mid ANT 1 GSM lower 2carriers +3.0 dB 2.569G 2.572G  $\,$ 



#### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: lower; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 2



3 dB 2.569G 2.572G

## Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: lower; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00 dBm Off | set 30.00 dB 😑 RBW - 50 k | :Hz              |               |
|-------------------------|---------------------------|------------------|---------------|
| Att 50 dB SW            | 7T 37.9 μs 👄 VBW 200 k    | Hz Mode Auto FFT |               |
| SGL Count 100/100       | TDF                       |                  |               |
| 1Sa AvgPwr              |                           |                  |               |
| Limit Check             | PASS                      | M1[1]            | -20.87 dB     |
| 50 dBm                  | PASS                      |                  | 2.37187180 G  |
|                         |                           |                  |               |
| 40 d0m                  |                           |                  |               |
| 40 UBIII                |                           |                  |               |
| 20 d9m                  |                           |                  |               |
| SO UBIN                 |                           |                  |               |
| 00 d0                   |                           |                  |               |
| 20 UBIII                |                           |                  |               |
|                         |                           |                  |               |
| IU dBm                  |                           |                  |               |
|                         |                           |                  |               |
| U dBm                   |                           |                  |               |
|                         |                           |                  |               |
| -10 dBm-                |                           |                  |               |
| 00.40-                  |                           |                  | M1            |
| -20 0011                |                           |                  |               |
| 20 db                   |                           |                  |               |
| -30 abm                 |                           |                  |               |
|                         |                           |                  |               |
| Start 2.569 GHz         | 200                       | 11 pts           | Stop 2.572 GH |

3.6.2 out of band emi BRS Mid ANT 1 AWGN lower 2carriers +3. 0 dB 2.569G 2.572G



### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: upper; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 2



### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: upper; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 2

| Spectrum 💥  |  |               |                              |
|---|--|---------------|------------------------------|
| Ref Level         60.00         dBm           Att         50         dB           SGL         Count         100/100 | Offset 30.00 dB ● RBW 2 kHz<br>SWT 948.1 µs ● VBW 5 kHz<br>TDF | Mode Auto FFT |                              |
| 1Sa AvgPwr  |  |               |                              |
| Limit Check<br>Line li  | PASS<br>PASS   | M1[1]         | -15.24 dBr<br>2.614005500 GH |
| 50 dBm  |  |               |                              |
| 40 dBm  |  |               |                              |
| 30 dBm  |  |               |                              |
| 20 dBm  |  |               |                              |
| 10 dBm  |  |               |                              |
| 0 dBm   |  |               |                              |
| 10 dBm  |  |               |                              |
| -20 dBm   |  |               |                              |
| -30 dBm   |  |               |                              |
| Start 2.614 GHz   | 300  | 0 pts         | Stop 2.617 GH                |
| Ĭ   |  | Ready         | 15.10.2019                   |

3.6.2 out of band emi BRS Mid ANT 1 GSM upper 2carriers +3.0 dB 2.614G 2.617G



#### Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: upper; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 2



3 dB 2.614G 2.617G

## Band: 41 BRS (MBS); ANT 1; Frequency: 2.5720 GHz to 2.6140 GHz; Band Edge: upper; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 2

| Reflevel 60.00 dBm | Offset 30.00 dB = RBW 50 | kHz               |               |
|--------------------|--------------------------|-------------------|---------------|
| Att 50 dB          | SWT 37.9 µs • VBW 200    | kHz Mode Auto FFT |               |
| SGL Count 100/100  | TDF                      |                   |               |
| ∋1Sa AvgPwr        |                          |                   |               |
| Limit Check        | PASS                     | M1[1]             | -21.12 dB     |
| Line li            | PASS                     |                   | 2.61420160 GF |
| 50 dBm             |                          |                   |               |
| 40 dBm             |                          |                   |               |
| 30 dBm             |                          |                   |               |
| 20 dBm             |                          |                   |               |
| 10 dBm             |                          |                   |               |
| 0 dBm              |                          |                   |               |
| -10 dBm            |                          |                   |               |
| -20 dBr            |                          |                   |               |
| -30 dBm            |                          |                   |               |
| Start 2.614 GHz    | 20                       | 01 pts            | Stop 2.617 GH |

3.6.2 out of band emi BRS Mid ANT 1 AWGN upper 2carriers +3. 0 dB 2.614G 2.617G



### Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: lower; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 1



Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: lower; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 1

| Ref Level 60.00 dB                    | m Offset 30.0 | IO dB 😑 RBW 2 kHz |  |     |              |
|---------------------------------------|---------------|-------------------|--|-----|--------------|
| Att 50 c                              | IB SWT 948    | .1 µs 👄 VBW 5 kHz | Mode Auto FFT                          |     |              |
| 1Sa AvgPwr                            | TDF           |                   |  |     |              |
| Limit Check                           |               | PASS              | M1[1]                                  |     | -20.24 dB    |
| Line li                               |               | PASS              |  | 2.6 | 517998500 G  |
| 50 dBm                                |               |                   |  |     |              |
| 40 dBm                                |               |                   |  |     |              |
| 30 dBm                                |               |                   |  |     |              |
| 20 dBm                                |               |                   |  |     |              |
| 10 dBm                                |               |                   |  |     |              |
| 0 dBm                                 |               |                   |  |     |              |
| 10 dBm                                |               |                   |  |     |              |
| 20 dBm                                |               |                   |  |     |              |
| -30 dBm                               |               |                   |  |     |              |
| relevingtographic and a second second |               |                   | wether gains and the second second for | -   | man          |
| Start 2.615 GHz                       |               | 3000              | pts                                    | s   | top 2.618 GH |

3.6.2 out of band emi BRS High ANT 1 GSM lower lcarrier +3.0 dB 2.615G 2.618G



### Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: lower; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 1



3 dB 2.615G 2.618G

## Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: lower; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 1

| Ref Level 60.00 dBm | Offset 30.0 | 0 dB 👄 RBW 50 k          | Hz               |    |              |
|---------------------|-------------|--------------------------|------------------|----|--------------|
| Att 50 dB           | SWT 37      | .9 µs 👄 <b>VBW</b> 200 k | Hz Mode Auto FFT |    |              |
| SGL Count 100/100   | TDF         |                          |                  |    |              |
| ∋1Sa AvgPwr         |             |                          |                  |    |              |
| Limit Check         |             | PASS                     | M1[1]            |    | -20.21 dB    |
| Line li             |             | PASS                     |                  | 2. | .61776390 GF |
| 50 dBm              |             |                          |                  |    |              |
| 40 dBm              |             |                          |                  |    |              |
| 30 dBm              |             |                          |                  |    |              |
| 20 dBm              |             |                          |                  |    |              |
| 10 dBm              |             |                          |                  |    |              |
| 0 dBm               |             |                          |                  |    |              |
| -10 dBm             |             |                          |                  |    |              |
| -20 dBm             |             |                          |                  |    | M1           |
| -30 dBm             |             |                          |                  |    |              |
| Start 2.615 GHz     |             | 200                      | )1 pts           | SI | op 2.618 GH  |

3.6.2 out of band emi BRS High ANT 1 AWGN lower lcarrier +3. 0 dB 2.615G 2.618G



### Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: upper; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 1



## Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: upper; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 1

| Reflevel 60.00 dBm                  | Offset 30.0                            | 0 dB 👄 RBW 2 kHz  |  |   |               |
|-------------------------------------|--|---|--|---|---------------|
| Att 50 dB                           | SWT 948.                               | 1 µs 🖶 VBW 5 kHz  | Mode Auto FFT  |   |               |
| SGL Count 100/100                   | TDF                                    |   |  |   |               |
| ∋1Sa AvgPwr                         |  |   |  |   |               |
| Limit Check                         |  | PASS  | M1[1]  |   | -20.61 dB     |
| Line li                             |  | PASS  |  | 2 | .690000500 GI |
| 50 dBm                              |  |   |  |   |               |
| 40 dBm                              |  |   |  |   |               |
| 30 dBm                              |  |   |  |   |               |
| 20 dBm                              |  |   |  |   |               |
| 10 dBm                              |  |   |  |   |               |
| 0 dBm                               |  |   |  |   |               |
| -10 dBm                             |  |   |  |   |               |
| -20 dBm                             |  |   |  |   |               |
| -80 dBm                             |  |   |  |   |               |
| Nature Andrew States and Street and | ************************************** | angun galan ang galan ang ang ang ang ang ang ang ang ang a | and a second | , |               |
| Start 2.69 GHz                      |  | 3000  | pts  |   | Stop 2.693 GH |

3.6.2 out of band emi BRS High ANT 1 GSM upper lcarrier +3.0 dB 2.690G 2.693G



### Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: upper; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 1



3 dB 2.690G 2.693G

## Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: upper; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 1

| Spectrum 💥          |                           |                    | T T           |
|---------------------|---------------------------|--------------------|---------------|
| Ref Level 60.00 dBn | n Offset 30.00 dB 👄 RBW 5 | 50 kHz             |               |
| SGL Count 100/100   | TDF                       | JUKHZ MOUE AUTOFFT |               |
| ∋1Sa AvqPwr         |                           |                    |               |
| Limit Check         | PASS                      | M1[1]              | -19.91 dB     |
| Line li             | PASS                      |                    | 2.69050900 GF |
| 50 dBm              |                           |                    |               |
| 40 dBm              |                           |                    |               |
| 30 dBm              |                           |                    |               |
| 20 dBm              |                           |                    |               |
| 10 dBm              |                           |                    |               |
| 0 dBm               |                           |                    |               |
| -10 dBm             |                           |                    |               |
| 20 dBm              |                           | ++                 |               |
| -30 dBm             |                           |                    |               |
| Start 2.69 GHz      |                           | 2001 pts           | Stop 2,693 GH |
|                     |                           | ,                  | 15.10.2019    |

3.6.2 out of band emi BRS High ANT 1 AWGN upper lcarrier +3. 0 dB 2.690G 2.693G



### Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: lower; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 2



3 dB 2.615G 2.618G

## Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: lower; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00 dB   | m Offset 30.                       | 00 dB 👄 RBW 2 kHz  |  |  |
|--|------------------------------------|--------------------|--|--|
| Att 50 (   | 1B SWT 948                         | 3.1 µs 👄 VBW 5 kHz | Mode Auto FFT  |  |
| SGE COURT 100/100  | TDF                                |                    |  |  |
| Limit Check  |                                    | PASS               | M1[1]  | -23.07 dBr   |
| Line li  |                                    | PASS               |  | <br>2.617998500 GF   |
| 50 dBm   |                                    |                    |  |  |
| 40 dBm   |                                    |                    |  |  |
| 30 dBm   |                                    |                    |  |  |
| 20 dBm   |                                    |                    |  |  |
| 10 dBm   |                                    |                    |  |  |
| 0 dBm  |                                    |                    |  |  |
| -10 dBm  |                                    |                    |  |  |
| -20 dBm  |                                    |                    |  |  |
| -30 dBm  |                                    |                    |  | <br>ار بینماند.  |
| and the second | the second provide a second second |                    | af all a star and a star of a star o | <br>and the second |
| Start 2.615 GHz  |                                    | 3000               | pts  | Stop 2.618 GHz   |

3.6.2 out of band emi BRS High ANT 1 GSM lower 2carriers +3. 0 dB 2.615G 2.618G



### Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: lower; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 2



Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: lower; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 2

| Bof Lough 60.00 dbm | Offect 30.00 dt = RRW | 50 kus                |               |
|---------------------|-----------------------|-----------------------|---------------|
| Att 50 dB           | SWT 37.9 us = VBW     | 200 kHz Mode Auto FET |               |
| SGL Count 100/100   | TDF                   |                       |               |
| 1Sa AvgPwr          |                       |                       |               |
| Limit Check         | PASS                  | M1[1]                 | -20.97 dB     |
| Line li             | PASS                  |                       | 2.61527360 G  |
| 50 dBm              |                       |                       |               |
| 10 dBm              |                       |                       |               |
| 30 dBm              |                       |                       |               |
| 20 dBm              |                       |                       |               |
| 10 dBm              |                       |                       |               |
| ) dBm               |                       |                       |               |
| 10 dBm              |                       |                       |               |
| 20 dBm 1            |                       |                       |               |
| 30 dBm              |                       |                       |               |
| Start 2.615 GHz     |                       | 2001 pts              | Stop 2.618 GH |

3.6.2 out of band emi BRS High ANT 1 AWGN lower 2carriers +3 .0 dB 2.615G 2.618G



### Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: upper; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 2



3 dB 2.690G 2.693G

## Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: upper; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 2

| Reflevel 60 00 dBm | Offset 30.00 dB 🖷 B                | 2 PW 2 PH2    |  |               |
|--------------------|------------------------------------|---------------|--|---------------|
| Att 50 dB          | SWT 948.1 µs • V                   | BW 5 kHz Mode | Auto FFT   |               |
| SGL Count 100/100  | TDF                                |               |  |               |
| ∋1Sa AvgPwr        |                                    |               |  |               |
| Limit Check        | PA                                 | 88            | M1[1]  | -23.25 dB     |
| Line li            | PA                                 | .85           | 1 1  | 2.690000500 G |
| 50 dBm-            |                                    |               |  |               |
| 40 dBm             |                                    |               |  |               |
| 30 dBm             |                                    |               |  |               |
| 20 dBm             |                                    |               |  |               |
| 10 dBm             |                                    |               |  |               |
| 0 dBm              |                                    |               |  |               |
| -10 dBm            |                                    |               |  |               |
| -20 dBm-           |                                    |               |  |               |
| -80 dBm            |                                    |               |  |               |
| Start 2.69 GHz     | www.anggaratassitekine-inakaasiata | 3000 pts      | 144477 54,7444 AND | Stop 2.693 GH |

3.6.2 out of band emi BRS High ANT 1 GSM upper 2carriers +3. 0 dB 2.690G 2.693G



### Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: upper; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 2



### Band: 41 BRS (UBS); ANT 1; Frequency: 2.6180 GHz to 2.6900 GHz; Band Edge: upper; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00 dBm | Offset 30.00 dB 👄 RBW             | 50 kHz                | <b>L</b>      |
|---------------------|-----------------------------------|-----------------------|---------------|
| Att 50 dB           | <b>SWT</b> 37.9 µs 👄 <b>VBW</b> 2 | 200 kHz Mode Auto FFT |               |
| SGL Count 100/100   | TDF                               |                       |               |
| ∋1Sa AvgPwr         |                                   |                       |               |
| Limit Check         | PASS                              | M1[1]                 | -20.87 dB     |
| Line li             | PASS                              |                       | 2.69256750 GF |
| 50 dBm              |                                   |                       |               |
| 40 dBm              |                                   |                       |               |
| 30 dBm              |                                   |                       |               |
| 20 dBm              |                                   |                       |               |
| 10 dBm              |                                   |                       |               |
| 0 dBm               |                                   |                       |               |
| -10 dBm             |                                   |                       |               |
| -20 dBm             |                                   |                       | M1            |
| -30 dBm             |                                   |                       |               |
| Start 2.69 GHz      |                                   | 2001 pts              | Stop 2.693 GH |

3.6.2 out of band emi BRS High ANT 1 AWGN upper 2carriers +3 .0 dB 2.690G 2.693G



### Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 1



### Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 1

| Ref Level 60.00 dBm | Offset 30.00 dB 🖷 RBW 2  | kHz               |                |
|---------------------|--|-------------------|----------------|
| Att 50 dB           | SWT 948.1 µs • VBW 5   | kHz Mode Auto FFT |                |
| 1Sa AvgPwr          | TDF  |                   |                |
| Limit (theck        | PARS   | M1[1]             | -21 27 dB      |
| Line li             | PASS   | (initial)         | 2.349999500 GF |
| 0 dBm               |  |                   |                |
|                     |  |                   |                |
| 0 dBm               |  |                   |                |
| 0 dBm               |  |                   |                |
| 0 dBm               |  |                   |                |
| 0 40                |  |                   |                |
| o abiii             |  |                   |                |
| dBm                 |  |                   |                |
| 10 dBm              |  |                   |                |
| 20 dBm              |  |                   |                |
|                     |  |                   |                |
| 30 dBm              |  |                   |                |
| tart 2.347 GHz      | illerindettersseligerendensetige falleringen in die tekensetige eine einer | 3000 pts          | Ston 2.35 GH   |

3.6.2 out of band emi WCS 2300 GSM lower lcarrier +3.0 dB 2. 347G 2.350G



### Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 1



### Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 1

| Ref Level 60.00 dBm | Offset 30.00 dB    | RBW 50 kH    | Z               |     | <b>`</b>      |
|---------------------|--------------------|--------------|-----------------|-----|---------------|
| Att 50 dB           | <b>SWT</b> 37.9 μs | 👄 VBW 200 kH | z Mode Auto FFT |     |               |
| SGL Count 100/100   | TDF                |              |                 |     |               |
| ∋1Sa AvgPwr         |                    |              |                 |     |               |
| Limit Check         |                    | PASS         | M1[1]           |     | -20.66 dB     |
| Line li             |                    | PASS         | 1               | 1 1 | 2.34999930 GF |
| SU dBm              |                    |              |                 |     |               |
| 40 dBm              |                    |              |                 |     |               |
| 30 dBm              |                    |              |                 |     |               |
| 20 dBm              |                    |              |                 |     |               |
| 10 dBm              |                    |              |                 |     |               |
| 0 dBm               |                    |              |                 |     |               |
| -10 dBm             |                    |              |                 |     |               |
| -20 dBm             |                    |              |                 | +   | ~~~~          |
| -30 dBm             |                    |              |                 |     |               |
| Start 2.347 GHz     |                    | 2001         | pts             |     | Stop 2.35 GH  |

3.6.2 out of band emi WCS 2300 AWGN lower lcarrier +3.0 dB 2 .347G 2.350G



### Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 1



### Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 1

| Ref Level 60.00 dBm     | Offset 30.00 | ) dB 👄 RBW 2 kH                        | z         |         |                  | (`            |
|-------------------------|--------------|--|-----------|---------|------------------|---------------|
| Att 50 dB               | SWT 948.     | L µs 👄 VBW 5 kH                        | z Mode Au | to FFT  |                  |               |
| SGL Count 100/100       | TDF          |  |           |         |                  |               |
| ∋1Sa AvgPwr             |              |  |           |         |                  |               |
| Limit Check             |              | PASS                                   | M         | 1[1]    |                  | -20.93 dB     |
| Line li                 |              | PASS                                   |           |         | 2                | .360002500 GH |
| 50 dBm                  |              |  |           |         |                  |               |
| 40 dBm                  |              |  |           |         |                  |               |
| 30 dBm                  |              |  |           |         |                  |               |
| 20 dBm                  |              |  |           |         |                  |               |
| 10 dBm                  |              |  |           |         |                  |               |
| 0 dBm                   |              |  |           |         |                  |               |
| -10 dBm                 |              |  |           |         |                  |               |
| -20 dBm                 |              |  |           |         |                  |               |
| -30 dBm                 |              |  |           |         |                  |               |
| harrison and the second | -            | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ |           |         | -american and an |               |
| Start 2.36 GHz          |              | 30                                     | 00 pts    |         |                  | Stop 2.363 GH |
| T T                     |              |  |           | eady [] | 4.00             | 14.10.2019    |

3.6.2 out of band emi WCS 2300 GSM upper lcarrier +3.0 dB 2. 360G 2.363G



### Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 1



### Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 1

| Att 50 dB              | SWT 37       | 7.9 μs 👄 <b>VBW</b> 200 | kHz Mode Auto FFT |                                |  |
|------------------------|--------------|-------------------------|-------------------|--------------------------------|--|
| 1Sa AvgPwr             | TUF          |                         |                   |                                |  |
| Limit Check<br>Line li | PASS<br>PASS |                         | M1[1]             | <br>-18.68 dB<br>2.36008470 GF |  |
| 50 dBm                 |              |                         |                   |                                |  |
| 40 dBm                 |              |                         |                   |                                |  |
| 30 dBm                 |              |                         |                   |                                |  |
| 20 dBm                 |              |                         |                   |                                |  |
| 10 dBm                 |              |                         |                   |                                |  |
| 0 dBm                  |              |                         |                   |                                |  |
| -10 dBm                |              |                         |                   |                                |  |
| 20 dBm                 |              |                         |                   |                                |  |
| -30 dBm                |              |                         |                   |                                |  |
| Start 2.36 GHz         |              | 20                      | 01 pts            | Stop 2.363 GH                  |  |

3.6.2 out of band emi WCS 2300 AWGN upper lcarrier +3.0 dB 2 .360G 2.363G


# Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 2



# Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00 dB   | m Offset 30.00 dB 👄 RB | W 2 kHz               | •  |
|--|------------------------|-----------------------|--|
| Att 50 d   | IB SWT 948.1 µs 🖷 VB   | W 5 kHz Mode Auto FFT |  |
| 3GE Count 100/100 3GE Count 100/100  | 101                    |                       |  |
| Limit Check  | PAS                    | S M1[1]               | -23.93 dB  |
| Line li  | PAS                    | s i j                 | 2.349988500 GF   |
| 50 dBm   |                        |                       |  |
| 40 dBm   |                        |                       |  |
| 30 dBm   |                        |                       |  |
| 20 dBm   |                        |                       |  |
| 10 dBm   |                        |                       |  |
| 0 dBm  |                        |                       |  |
| -10 dBm  |                        |                       |  |
| -20 dBm  |                        |                       |  |
| -30 dBm  |                        |                       |  |
| an the second state of the |                        |                       | man man and and and and a second a |
| Start 2.347 GHz  | • • •                  | 3000 pts              | Stop 2.35 GH   |

3.6.2 out of band emi WCS 2300 GSM lower 2carriers +3.0 dB 2 .347G 2.350G



# Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 2



# Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: lower; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00 dBm | Offset 30.00 dB | 😑 RBW 50 k   | Hz               | · · · ·           |
|---------------------|-----------------|--------------|------------------|-------------------|
| Att 50 dB           | SWT 37.9 μs     | 👄 VBW 200 ki | Hz Mode Auto FFT |                   |
| SGL Count 100/100   | TDF             |              |                  |                   |
| €1Sa AvgPwr         |                 |              |                  |                   |
| Limit Check         |                 | PASS         | M1[1]            | -21.04 dB         |
| Line li             |                 | PASS         |                  | <br>2.34977290 GI |
| 50 dBm              |                 |              |                  |                   |
| 40 dBm              |                 |              |                  |                   |
| 30 dBm              |                 |              |                  |                   |
| 20 dBm              |                 |              |                  |                   |
| 10 dBm              |                 |              |                  |                   |
| 0 dBm               |                 |              |                  |                   |
| -10 dBm             |                 |              |                  |                   |
| -20 dBm             |                 |              |                  | M1                |
| -30 dBm             |                 |              |                  |                   |
| Start 2.347 GHz     |                 | 200          | 1 pts            | Stop 2.35 GH      |

3.6.2 out of band emi WCS 2300 AWGN lower 2carriers +3.0 dB 2.347G 2.350G



# Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: GSM; Input Power = 0.3 dB < AGC; Number of signals 2



# Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: GSM; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00 dBm  | Offset 30.00 dB 👄 RBW 2  | kHz                                    | <b>L</b>                                 |
|--|--|--|--|
| Att 50 dB  | SWT 948.1 µs 🖷 VBW 5   | kHz Mode Auto FFT                      |  |
| SGL Count 100/100  | TDF  |  |  |
| Lingit dhe sh  | D A DO   |  | 00.44.40                                 |
| Limit Greck  | PASS   | MILI                                   | -23,44 dB<br>2,260002500 Cl              |
| i0 dBm   | 1455   |  | 2.000002000 G                            |
|  |  |  |  |
| IO dBm   | ·  |  |  |
| 0 00.00  |  |  |  |
| IO dBm   |  |  |  |
|  |  |  |  |
| 0 d8m  |  |  |  |
| o ubiii  |  |  |  |
| 0.40-  |  |  |  |
| O UBIII  |  |  |  |
| - dD-m   |  |  |  |
| ubiii  |  |  |  |
| 10 10-   |  |  |  |
| IU dBm   |  |  |  |
| 00 d0-   |  |  |  |
| 20 UBII  |  |  |  |
|  |  |  |  |
| 3U dBm   |  |  |  |
| and the second s | and the second descent of the second descent and the second descent and the second descent descent descent des | ``#################################### | 14-14-14-14-14-14-14-14-14-14-14-14-14-1 |
| Start 2.36 GHz   | · · · · · · · · · · · · · · · · · · ·  | 3000 pts                               | Stop 2.363 GH                            |

3.6.2 out of band emi WCS 2300 GSM upper 2carriers +3.0 dB 2 .360G 2.363G



# Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: AWGN; Input Power = 0.3 dB < AGC; Number of signals 2



# Band: 30 WCS 2300; ANT1; Frequency: 2.3500 GHz to 2.3600 GHz; Band Edge: upper; Mod: AWGN; Input Power = 3 dB > AGC; Number of signals 2

| Ref Level 60.00 dBn | n Offset 30    | 00 dB 👄 RBW 50 k          | :Hz              |    | (             |
|---------------------|----------------|---------------------------|------------------|----|---------------|
| Att 50 di           | в <b>swt</b> з | 7.9 µs 👄 <b>VBW</b> 200 k | Hz Mode Auto FFT |    |               |
| SGL Count 100/100   | TDF            |                           |                  |    |               |
| 1Sa AvgPwr          |                |                           |                  |    |               |
| Limit Check         |                | PASS                      | M1[1]            |    | -21.45 dB     |
| 50 dBm              |                | PASS                      |                  |    | 2.30008440 G  |
|                     |                |                           |                  |    |               |
| 40 40 -             |                |                           |                  |    |               |
| +0 uBin             |                |                           |                  |    |               |
|                     |                |                           |                  |    |               |
| 3U dBm              |                |                           |                  |    |               |
|                     |                |                           |                  |    |               |
| 20 dBm              |                |                           |                  |    |               |
|                     |                |                           |                  |    |               |
| 10 dBm              |                |                           |                  | -  |               |
|                     |                |                           |                  |    |               |
| 0 dBm               |                |                           |                  | ++ |               |
|                     |                |                           |                  |    |               |
| -10 dBm             |                |                           |                  | ++ |               |
|                     |                |                           |                  |    |               |
| -20 dBm             | M1             |                           |                  |    |               |
|                     |                |                           |                  |    |               |
| -30 dBm             |                |                           |                  |    |               |
| 00 0011             |                |                           |                  |    |               |
|                     |                |                           |                  |    |               |
| Start 2.36 GHz      |                | 200                       | )1 pts           |    | Stop 2.363 GH |
|                     |                |                           | Ready            |    | 14.10.2019    |
|                     |                |                           |                  |    |               |

# 5.5.5 TEST EQUIPMENT USED

- Conducted



## 5.6 OUT-OF-BAND REJECTION

Standard FCC Part 27

**The test was performed according to:** ANSI C63.26

## 5.6.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the out-of-band rejection test case for industrial signal boosters.

The EUT was connected to the test setup according to the following diagram:



FCC Part 22/24/27/90 Industrial signal booster – Test Setup; Out-of-band rejection

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyzer settings can be directly found in the measurement diagrams.

5.6.2 TEST REQUIREMENTS / LIMITS For this test case exists no applicable limit



# 5.6.3 TEST PROTOCOL

| Band 41 BRS (LBS                    |                          |  |  |                             |
|-------------------------------------|--------------------------|--|--|-----------------------------|
| Highest Power<br>Frequency<br>[MHz] | Output<br>Power<br>[dBm] | Lower<br>Highest Power<br>-20 dB<br>Frequency<br>[MHz] | Upper<br>Highest Power<br>-20 dB<br>Frequency<br>[MHz] | 20 dB<br>Bandwidth<br>[MHz] |
| 2534.0                              | 34.9                     | 2492.5   | 2571.7   | 79.2                        |

| Band 41 BRS (MBS                    |                          |  |  |                             |
|-------------------------------------|--------------------------|--|--|-----------------------------|
| Highest Power<br>Frequency<br>[MHz] | Output<br>Power<br>[dBm] | Lower<br>Highest Power<br>-20 dB<br>Frequency<br>[MHz] | Upper<br>Highest Power<br>-20 dB<br>Frequency<br>[MHz] | 20 dB<br>Bandwidth<br>[MHz] |
| 2595.0                              | 36.8                     | 2570.3   | 2615.7   | 45.5                        |

| Band 41 BRS (UBS                    |                          |  |  |                             |
|-------------------------------------|--------------------------|--|--|-----------------------------|
| Highest Power<br>Frequency<br>[MHz] | Output<br>Power<br>[dBm] | Lower<br>Highest Power<br>-20 dB<br>Frequency<br>[MHz] | Upper<br>Highest Power<br>-20 dB<br>Frequency<br>[MHz] | 20 dB<br>Bandwidth<br>[MHz] |
| 2650.0                              | 37.0                     | 2614.3   | 1693.5   | 79.2                        |

| Band 30 WCS, dov                    |                          |  |  |                             |
|-------------------------------------|--------------------------|--|--|-----------------------------|
| Highest Power<br>Frequency<br>[MHz] | Output<br>Power<br>[dBm] | Lower<br>Highest Power<br>-20 dB<br>Frequency<br>[MHz] | Upper<br>Highest Power<br>-20 dB<br>Frequency<br>[MHz] | 20 dB<br>Bandwidth<br>[MHz] |
| 2357.8                              | 37.4                     | 2349.7   | 2360.3   | 10.6                        |

Remark: Please see next sub-clause for the measurement plot.



# 5.6.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")



#### Frequency Band = Band 41 BRS (LBS), Direction = RF downlink

20dB



# Frequency Band = Band 41 BRS (MBS), Direction = RF downlink

3.3 Out of band rejection BRS Mid ANT 1 2.59300G 20dB



| Spectrum                | 1   |   |                         |                |  |
|-------------------------|---|---|-------------------------|----------------|--|
| Ref Level<br>Att<br>TDF | 60.00 dBm<br>50 dB  | Offset 30.00 dB 🖷<br>SWT 10 ms 🖷  | RBW 3 MHz<br>VBW 10 MHz | Mode Auto Swee | p  |
| ●1Pk Max                |   |   |                         |                |  |
|                         |   |   |                         | M1[1]          | 36.99 dBr  |
| 50 dBm-                 |   |   |                         |                | 2.6500000 GH   |
|                         |   |   |                         | ndB            | 20.00 d  |
| 40 dBm                  |   |   | M1                      | BW             | 79.164000000 MH  |
|                         |   |   |                         | QTACLUI        |  |
| 30 dBm                  |   |   |                         |                |  |
|                         |   |   | тб                      | 12             |  |
| 20 dBm-                 |   |   | Ý                       | V              |  |
| 10 d8m                  |   |   |                         | 1              |  |
| TO UBIL                 | abara Manadashi da shi da s | and the second secon | *                       |                | er a se en se en esta en esta en esta en esta en esta en esta esta esta esta esta esta esta esta |
| 0 dBm                   |   |   |                         |                |  |
|                         |   |   |                         |                |  |
| -10 dBm-                |   |   |                         |                |  |
|                         |   |   |                         |                |  |
| -20 dBm                 |   |   |                         |                |  |
|                         |   |   |                         |                |  |
| -30 dBm                 |   |   |                         |                |  |
|                         |   |   |                         |                |  |
| CF 2.654 G              | Hz  |   | 10000 p                 | ots            | Span 360.0 MHz   |
| Marker                  |   |   |                         |                |  |
| Type Ref                | f Trc   | X-value   | Y-value                 | Function       | Function Result  |
| M1                      | 1   | 2.65 GHz  | 36.99 dBm               | ndB down       | 79.164 MHz   |
| T1                      | 1   | 2.614346 GHz  | 17.33 dBm               | ndB            | 20.00 dB   |
| 12                      | 1   | 2.69351 GHz   | 17.11 dBm               | Q factor       | 33.5   |
|                         | ][  |   |                         | Measuring      | 15.10.2019   |

Frequency Band = Band 41 BRS (UBS), Direction = RF downlink

3.3 Out of band rejection BRS High ANT 1 2.65400G \_20dB

Spectrum Ref Level 60.00 dBm Att 50 dB 
 Offset
 30.00 dB ●
 RBW
 300 kHz

 SWT
 19 μs
 ♥ VBW
 1 MHz
 Mode Auto FFT TDF 🔵 1Pk Ma M1[1] 37.41 dB 2.35780000 GH 50 dBm ndB M1\_Bw \_\_\_\_Qfactor 20.00 GP 20.00 d 0000 MF 10.62 40 dBm 222. 30 dBm 20 dBm 10 dBm-0 dBmm ma . -10 dBm -20 dBm--30 dBm-CF 2.355 GHz 10000 pts Span 50.0 MHz Marker Function n ndB down n ndB n Q factor 
 Type
 Ref
 Trc

 M1
 1

 T1
 1

 T2
 1
 X-value 2.3578 GHz 2.3496925 GHz 2.3603125 GHz Y-value 37.41 dBm 17.54 dBm 17.26 dBm Function Result 10.62 MHz 20.00 dB 222.0 **III (2**) 3.3 Out of band rejection WCS 2300 2.35500G

# Frequency Band = Band 30 WCS 2300, Direction = RF downlink

3.3 Out of band rejection WCS 2300 2.35500G \_20dB

# 5.6.5 TEST EQUIPMENT USED

- Conducted



# 5.7 FIELD STRENGTH OF SPURIOUS RADIATION

Standard FCC Part 27, §27.53

# **The test was performed according to:** ANSI C63.26

#### 5.7.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable radiated spurious emission measurements per § 2.1053

The EUT was connected to the test setup according to the following diagram:







The test set-up was made in accordance to the general provisions of ANSI C63.4 in a typical installation configuration. The Equipment Under Test (EUT) was set up on a non-conductive table  $1.5 \times 1.5 \text{ m}^2$  in the semi-anechoic chamber, 0.8 meter above the ground or floorstanding arrangement shall be placed on the horizontal ground reference plane. The influence of the EUT support table that is used between 30-1000 MHz was evaluated. For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. The highest emissions between 30 MHz to 1000 MHz were analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions.

The measurement procedure is implemented into the EMI test software BAT EMC from NEXIO. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered by a DC power source. ?

#### 1. Measurement above 30 MHz and up to 1 GHz

**Step 1:** Preliminary scan

This is a preliminary test to identify the highest amplitudes relative to the limit. Settings for step 1:

- Antenna distance: 10 m
- Detector: Peak-Maxhold / Quasipeak (FFT-based)
- Frequency range: 30 1000 MHz
- Frequency steps: 30 kHz
- IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 ms
- Turntable angle range: -180° to 180°
- Turntable step size: 15°
- Height variation range: 1 4 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

#### Step 2: Adjustment measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by  $\pm$  45° around this value. During this action, the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position, the antenna height will also slowly vary by  $\pm$  100 cm around the antenna height determined. During this action, the value of emission is also continuously measured. The highest emission will also be recorded and adjusted.

- Detector: Peak Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range:  $\pm$  30 ° around the determined value
- Antenna Polarisation: max. value determined in step 1

#### Step 3: Final measurement with QP detector

With the settings determined in step 3, the final measurement will be performed: EMI receiver settings for step 4:



- Detector: Quasi-Peak (< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF Bandwidth: 120 kHz
- Measuring time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

#### 3. Measurement above 1 GHz

The following modifications apply to the measurement procedure for the frequency range above 1 GHz:

#### Step 1:

The Equipment Under Test (EUT) was set up on a non-conductive support at 1.5 m height in the semi-anechoic chamber. Absorbers are placed around and between the turn table and the antenna tower.

All steps were performed with one height (1.5 m) of the receiving antenna only.

The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 30 °.

The turn table step size (azimuth angle) for the preliminary measurement is 15 °. **Step 2:** 

The maximum RFI field strength was determined during the measurement by rotating the turntable ( $\pm 180$  degrees) and varying the height of the receive antenna (h = 1 ... 4 m) with a additional tilt function of the antenna.The turn table azimuth will slowly vary by  $\pm 15^{\circ}$ . EMI receiver settings (for all steps):

- Detector: Peak, Average
- IF Bandwidth = 1 MHz

#### Step 3:

Spectrum analyser settings for step 3:

- Detector: Peak / Average
- Measured frequencies: in step 1 determined frequencies
- IF Bandwidth: 1 MHz
- Measuring time: 1 s

#### 5.7.2 TEST REQUIREMENTS / LIMITS

#### FCC Part 2.1053; Measurement required: Field strength of spurious radiation:

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate.



#### Part 27; Miscellaneous Wireless Communication Services

#### Subpart C – Technical standards

#### §27.53 – Emission limits

#### Band 30

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(1) For base and fixed stations' operations in the 2305-2320 MHz band and the 2345-2360 MHz band:

(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

(2) For fixed customer premises equipment (CPE) stations operating in the 2305-2320 MHz band and the 2345-2360 MHz band transmitting with more than 2 watts per 5 megahertz average EIRP:

(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;

(ii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2300 and 2305 MHz, 70 + 10 log (P) dB on all frequencies between 2287.5 and 2300 MHz, 72 + 10 log (P) dB on all frequencies between 2285 and 2287.5 MHz, and 75 + 10 log (P) dB below 2285 MHz;



(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2362.5 MHz, 55 + 10 log (P) dB on all frequencies between 2362.5 and 2365 MHz, 70 + 10 log (P) dB on all frequencies between 2365 and 2367.5 MHz, 72 + 10 log (P) dB on all frequencies between 2367.5 and 2370 MHz, and 75 + 10 log (P) dB above 2370 MHz.

(3) For fixed CPE stations operating in the 2305-2320 MHz and 2345-2360 MHz bands transmitting with 2 watts per 5 megahertz average EIRP or less:

(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P) dB$  above 2365 MHz.

(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than:  $43 + 10 \log (P) dB$  on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log (P) dB$  on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than  $61 + 10 \log (P) dB$  on all frequencies between 2324 and 2328 MHz and on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than  $67 + 10 \log (P) dB$  on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than  $43 + 10 \log (P) dB$  on all frequencies between 2360 and 2365 MHz, and not less than  $70 + 10 \log (P) dB$  above 2365 MHz.

(5) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 1 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.



(6) [Reserved]

(7) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power;

(8) Waiver requests of any of the out-of-band emission limits in paragraphs (a)(1) through (a)(7) of this section shall be entertained only if interference protection equivalent to that afforded by the limits is shown;

(9) [Reserved]

(10) The out-of-band emissions limits in paragraphs (a)(1) through (a)(3) of this section may be modified by the private contractual agreement of all affected licensees, who must maintain a copy of the agreement in their station files and disclose it to prospective assignees, transferees, or spectrum lessees and, upon request, to the Commission.

#### Band 41 BRS (LBS/MBS/UBS)

(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

(1) Prior to the transition, and thereafter, solely within the MBS, for analog operations with an EIRP in excess of -9 dBW, the signal shall be attenuated at the channel edges by at least 38 dB relative to the peak visual carrier, then linearly sloping from that level to at least 60 dB of attenuation at 1 MHz below the lower band edge and 0.5 MHz above the upper band edge, and attenuated at least 60 dB at all other frequencies.

(2) For digital base stations, the attenuation shall be not less than 43 + 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.



# 5.7.3 TEST PROTOCOL

| Band 41 BRS (LBS), downlink; |                            |                          |          |              |                |                            |
|------------------------------|----------------------------|--------------------------|----------|--------------|----------------|----------------------------|
| Spurious<br>Freq.<br>[MHz]   | Spurious<br>Level<br>[dBm] | P <sub>in</sub><br>[dBm] | Detector | RBW<br>[kHz] | Limit<br>[dBm] | Margin<br>to Limit<br>[dB] |
| 1699.8                       | -53.4                      | -6.4/-8.0/-6.4           | PEAK     | 100          | -13.0          | 40.4                       |
| 2532.0                       | -28.4                      | -6.4/-8.0/-6.4           | PEAK     | 100          | -13.0          | 15.4                       |
| 5064.0                       | -33.0                      | -6.4/-8.0/-6.4           | PEAK     | 100          | -13.0          | 20.0                       |
| 2496.2                       | -26.2                      | -6.4/-8.0/-6.4           | PEAK     | 100          | -13.0          | 13.2                       |
| 2532.0                       | -29.8                      | -6.4/-8.0/-6.4           | PEAK     | 100          | -13.0          | 16.8                       |
| 5064.0                       | -37.0                      | -6.4/-8.0/-6.4           | PEAK     | 100          | -13.0          | 24.0                       |
| 10946.6                      | -23.6                      | -6.4/-8.0/-6.4           | PEAK     | 100          | -13.0          | 10.6                       |

| Band 41 BRS (              | (MBS), downlin             | k;                       |          |              |                |                            |
|----------------------------|----------------------------|--------------------------|----------|--------------|----------------|----------------------------|
| Spurious<br>Freq.<br>[MHz] | Spurious<br>Level<br>[dBm] | P <sub>in</sub><br>[dBm] | Detector | RBW<br>[kHz] | Limit<br>[dBm] | Margin<br>to Limit<br>[dB] |
| 2572.2                     | -25.0                      | -7.1/-8.0/-7.6           | PEAK     | 100          | -13.0          | 12.0                       |
| 5186.0                     | -36.3                      | -7.1/-8.0/-7.6           | PEAK     | 100          | -13.0          | 23.3                       |
| 2572.2                     | -26.8                      | -7.1/-8.0/-7.6           | PEAK     | 100          | -13.0          | 13.8                       |
| 5186.0                     | -41.6                      | -7.1/-8.0/-7.6           | PEAK     | 100          | -13.0          | 28.6                       |
| 10926.5                    | -23.1                      | -7.1/-8.0/-7.6           | PEAK     | 100          | -13.0          | 10.1                       |

| Band 41 BRS                | (UBS), downlink            | (;                       |          |              |                |                            |
|----------------------------|----------------------------|--------------------------|----------|--------------|----------------|----------------------------|
| Spurious<br>Freq.<br>[MHz] | Spurious<br>Level<br>[dBm] | P <sub>in</sub><br>[dBm] | Detector | RBW<br>[kHz] | Limit<br>[dBm] | Margin<br>to Limit<br>[dB] |
| 1467.9                     | -59.6                      | -7.1/-8.3/-5.6           | PEAK     | 100          | -13.0          | 46.6                       |
| 2464.0                     | -52.8                      | -7.1/-8.3/-5.6           | PEAK     | 100          | -13.0          | 39.8                       |
| 2654.0                     | -32.1                      | -7.1/-8.3/-5.6           | PEAK     | 100          | -13.0          | 19.1                       |
| 5308.0                     | -41.2                      | -7.1/-8.3/-5.6           | PEAK     | 100          | -13.0          | 28.2                       |
| 2618.2                     | -34.5                      | -7.1/-8.3/-5.6           | PEAK     | 100          | -13.0          | 21.5                       |
| 5308.1                     | -41.4                      | -7.1/-8.3/-5.6           | PEAK     | 100          | -13.0          | 28.4                       |
| 10944.8                    | -23.5                      | -7.1/-8.3/-5.6           | PEAK     | 100          | -13.0          | 10.5                       |

| Band 30 WCS                |                            |                          |          |              |                |                            |
|----------------------------|----------------------------|--------------------------|----------|--------------|----------------|----------------------------|
| Spurious<br>Freq.<br>[MHz] | Spurious<br>Level<br>[dBm] | P <sub>in</sub><br>[dBm] | Detector | RBW<br>[kHz] | Limit<br>[dBm] | Margin<br>to Limit<br>[dB] |
| 1689.0                     | -54.0                      | -8.8/-8.2/-8.8           | PEAK     | 100          | -13.0          | 41.0                       |
| 2350.2                     | -29.2                      | -8.8/-8.2/-8.8           | PEAK     | 100          | -13.0          | 16.2                       |
| 2359.8                     | -27.3                      | -8.8/-8.2/-8.8           | PEAK     | 100          | -13.0          | 14.3                       |
| 2355.0                     | -22.4                      | -8.8/-8.2/-8.8           | PEAK     | 100          | -13.0          | 9.4                        |
| 10957.1                    | -23.9                      | -8.8/-8.2/-8.8           | PEAK     | 100          | -13.0          | 10.9                       |

Remark: Please see next sub-clause for the measurement plot.



# 5.7.4 MEASUREMENT PLOT

-60 -70 -80 -90

-100 \_\_\_\_\_\_ 30MHz

#### Frequency Band = Band 41 BRS (LBS); Test Frequencies = low, mid and high; Direction = RF downlink



Man

Frequency

1GHz Polarization: Horizonta





Frequency

1 GHz - 18 GHz



## 18 GHz - 27 GHz

|           |   |  | <ul> <li>FCC/FCC -13 dBm - Average/3.0m/</li> <li>FCC/FCC -13 dBm - Peak/3.0m/</li> <li>Meas.Peak (Vertical)</li> <li>Meas.Avg (Vertical)</li> <li>Meas.RMS (Vertical)</li> </ul>  |
|-----------|---|--|--|
|           | 0   |  |  |
| dBm<br>-1 | 0   |  |  |
| -2        |   |  |  |
| -3        | .0  |  |  |
| -4        | .0  |  | the sector of the sector standards   |
| -5        | man man and a second | اللى سارىخانى يارىپايلامارى سارى مايارى مەرىپى دىنچە، كاھىرىدىكارىدى يەن مەرىپايىر مەرىپايلىرى بارىيار دىن يەرىپايلى مەرىپايلى مەرىپايلى بارىيارى بارىيار بارىيارى | And a state of the |
| -6        | 60  |  |  |
| -7        | .0  |  |  |
| -8        | .0  |  |  |
| -9        |   |  |  |
| -10       |   |  |  |
|           | 18GHz   | Frequency  | 27GHz<br>Polarization: Vertical  |

FCC/FCC -13 dBm - RMS/3.0m/
 FCC/FCC -13 dBm - Average/3.0m/
 FCC/FCC -13 dBm - Peak/3.0m/
 Meas.Peak (Horizontal)
 Meas.Avg (Horizontal)
 Meas.RMS (Horizontal)

FCC/FCC -13 dBm - RMS/3.0m/

| 0           |   |  |   |
|-------------|---|--|---|
| dBm<br>-10. |   |  |   |
|             |   |  |   |
| -20 .       |   |  |   |
| -30 .       |   |  |   |
| -40         |   |  |   |
| -50         | Marking and provident and a stand and a stand and a stand and a stand | والمراجع والمرور ويعاديها والمراجع والمراجع والمرور والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع المراجع والمراجع والم | ىرىنا ئەسەب مەلەر مەمەر بەلەرەل بەرەلەر يەرەل يەرەل يەرەل يەرەل يەرەل يەرەل يەرەل يەرەل يەرەل يەرەپ يەلەرەر يەر<br>يەرەل يەرەب يەرەل يەرەپ ئەلەرە يەرەل يەرەل يەرەل يەرەل يەرەپ ئەل يەرەپ ئەرەپ ئەرەپ ئەرەپ ئەرەپ ئەرەپ ئەرەپ ئەرەپ |
| -60         |   |  |   |
| -70         |   |  |   |
| -80         |   |  |   |
| -90         |   |  |   |
| 100         |   |  |   |
| -100        | 18GHz   |  | 27GHz   |
|             |   | Frequency  | Polarization: Horizontal  |





#### Frequency Band = Band 41 BRS (MBS); Test Frequencies = low, mid and high; Direction = RF downlink 30 MHz - 1 GHz

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Frequency

1 GHz - 18 GHz

-80

1GHz

18GHz Polarization: Horizontal



#### 18 GHz - 27 GHz



FCC/FCC -13 dBm - RMS/3.0m/ FCC/FCC -13 dBm - Average/3.0m/

FCC/FCC -13 dBm - Peak/3.0m/

| 0       |   |  |                                   |
|---------|---|--|-----------------------------------|
| dBm -10 |   |  |                                   |
| -20     |   | ¥  |                                   |
| -30     |   |  |                                   |
| -40     |   |  |                                   |
| -50     | where an an and a start and a | مىلىرىمىلىيىلىقى بەلەپلىرىيەرنىيەمىلىمەتلىقىلىلىكى ئەرىلىيە ئەلىلىمەتلىقى بەلىرەك ئالايىلىيە ئاھىلىلىكى ئالىكىيىش بىلىلىيىسىسى |                                   |
| -60     |   |  |                                   |
| -70     |   |  |                                   |
| -80     |   |  |                                   |
| -90     |   |  |                                   |
| -100    |   |  |                                   |
|         | 18GHz   | Frequency  | 27GHz<br>Polarization: Horizontal |

Level (Manual suspects) (Horizontal)
 Meas.Peak (Horizontal)

Meas.Avg (Horizontal)

<sup>—</sup> Meas.RMS (Horizontal)

<sup>×</sup> Average (Finals 18G-26G) (Horizontal)

<sup>×</sup> LIMIT AV (Finals 18G-26G) (Horizontal)



# Frequency Band = Band 41 BRS (UBS); Test Frequencies = low, mid and high; Direction = RF downlink



30 MHz - 1 GHz





Frequency

1 GHz - 18 GHz

1GHz

18GHz Polarization: Horizontal



## 18 GHz - 27 GHz

|            |  |   | FCC/FCC -13 dBm - Peak/3.0m/<br>Meas.Peak (Vertical)<br>Meas.Avg (Vertical)<br>Meas.RMS (Vertical)              |
|------------|--|---|---|
| 0          |  |   |   |
| dBm<br>-10 |  |   |   |
| -20        |  |   |   |
| -30        |  |   |   |
| 40         |  |   |   |
| -40        | Malance and an all the strategic and a strateg | and and and an an and and | provide the second s |
| -60        |  |   |   |
| -70        |  |   |   |
| -80        |  |   |   |
| -90        |  |   |   |
| -100       |  |   |   |
|            | '18GHz   | Frequency   | 27GHz<br>Polarization: Vertical   |

FCC/FCC -13 dBm - RMS/3.0m/
 FCC/FCC -13 dBm - Average/3.0m/
 FCC/FCC -13 dBm - Peak/3.0m/
 Meas.Peak (Horizontal)
 Meas.Avg (Horizontal)
 Meas.RMS (Horizontal)

FCC/FCC -13 dBm - RMS/3.0m/ FCC/FCC -13 dBm - Average/3.0m/

| 0           |  |  |   |
|-------------|--|--|---|
| dBm<br>-10_ |  |  |   |
| -20 _       |  |  |   |
| -30 _       |  |  |   |
| -40         |  |  |   |
| -50         | Any age address have been a state and a state of the second s | المعالم والماء المامين والماعين والماعلين والمحافظ المتحد ومنافعا المحافظ المحافظ المحافظ المحافظ المحافظ والمحال والمحال والمحالي | May may on it was a new market with the second s |
|             |  |  | ~~~~~~  |
| -00 -       |  |  |   |
| -70 _       |  |  |   |
| -80 _       |  |  |   |
| -90 _       |  |  |   |
| -100 _      |  |  |   |
|             | 18GHz  | Frequency  | 27GHz<br>Polarization: Horizontal   |



# Frequency Band = Band 30 WCS 2300; Test Frequencies = low, mid and high; Direction = RF downlink



~ Mm

Frequency

30 MHz - 1 GHz

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-50 -60 -70 -80

-90 -100 30MHz

1GHz Polarization: Horizontal





1 GHz - 18 GHz



#### 18 GHz - 27 GHz





# 5.7.5 FIELD STRENGTH CALCULATIONS

FS = SA + AF + CL + PA

Where as:

- **FS** = Field strength
- **SA** = EMC test receiver reading
- **AF** = Antenna factor
- **CL** = Cable loss
- **PA** = Preamplifier

## 5.7.6 TEST EQUIPMENT USED

- Radiated Emissions



# 6 TEST EQUIPMENT

# 1 Conducted

| Ref.No. | Туре     | Description  | Manufacturer    | Inventory no. | Last<br>Calibration | Calibration<br>Due |
|---------|----------|--|-----------------|---------------|---------------------|--------------------|
| 1.1     | FSV40    | Signal Analyzer<br>10 Hz - 40 GHz                                    | Rohde & Schwarz | E2050         | 2019-10             | 2020-10            |
| 1.2     | SMBV100A | Vector Signal Generator<br>9 kHz - 6 GHz                             | Rohde & Schwarz | G2089         | 2017-08             | 2020-08            |
| 1.3     | SMIQ     | Vector Signal Generator<br>9 kHz – 3.3 GHz                           | Rohde & Schwarz | G1509         | 2018-10             | 2021-10            |
| 1.4     | SMIQ     | Vector Signal Generator<br>9 kHz – 3.3 GHz                           | Rohde & Schwarz | G1510         | 2018-10             | 2021-10            |
| 1.5     | ESH3-Z5  | Line Impedance<br>Stabilisation Network<br>(LISN)<br>150 Hz – 30 MHz | Rohde & Schwarz | K794          | 2019-02             | 2020-10            |
| 1.6     | 30.3015  | ThermoHygro<br>Datalogger  | TFA             | X 507         | 2018-08             | 2020-08            |
| 1.7     | BAT-EMC  | Software   | Nexio           | V3.18.0.32    |                     |                    |

#### 2 Radiated Emissions

| Ref.No. | Туре           | Description                         | Manufacturer    | Inventory no. | Last<br>Calibration | Calibration<br>Due |
|---------|----------------|-------------------------------------|-----------------|---------------|---------------------|--------------------|
| 2.1     | ESU40          | EMI test receiver<br>10 Hz - 40 GHz | Rohde & Schwarz | E2025         | 2018-10             | 2020-10            |
| 2.2     | HFH2-Z2        | Antenna<br>9 kHz – 30 MHz           | Rohde & Schwarz | K549          | 2018-10             | 2020-10            |
| 2.3     | CBL 6111C      | Antenna<br>30 MHz – 1 GHz           | Chase           | K1026         | 2018-12             | 2019-12            |
| 2.4     | HL 025         | Antenna<br>1 GHz - 18 GHz           | Rohde & Schwarz | K1114         | 2019-06             | 2020-06            |
| 2.5     | MWH-1826/B     | Antenna<br>18 GHz – 26.5 GHz        | ARA Inc.        | K1042         | 2018-11             | 2020-11            |
| 2.6     | MWH-2640/B     | Antenna<br>26 GHz - 40 GHz          | ARA Inc.        | K1043         | 2018-11             | 2020-11            |
| 2.7     | AM1431         | Pre amplifier<br>10 kHz – 1 GHz     | Miteq           | K1721         | 2019-10             | 2021-10            |
| 2.8     | AFS4-00102000  | Preamplifier<br>100 MHz - 20 GHz    | Miteq           | K817          | 2019-08             | 2021-08            |
| 2.9     | AFS4-00102000  | Preamplifier<br>100 MHz - 20 GHz    | Miteq           | K838          | 2019-10             | 2020-10            |
| 2.10    | JS43-1800-4000 | Preamplifier<br>18 GHz - 40 GHz     | Miteq           | K1104         | 2019-05             | 2020-10            |
| 2.11    | BAT-EMC        | Software                            | Nexio           | V3.18.0.32    |                     |                    |

The calibration interval is the time interval between "Last Calibration" and "Calibration Due"



# 7 ANTENNA FACTORS, CABLE LOSS AND SAMPLE CALCULATIONS

This chapter contains the antenna factors with their corresponding path loss of the used measurement path for all antennas as well as the insertion loss of the LISN.

|       | LISN<br>insertion<br>loss<br>ESH3-Z5<br>K794 | Cable loss<br>1<br>(inside<br>chamber<br>K1865 | Cable loss<br>2<br>(chamber to<br>receiver )<br>K1125 | Limiter<br>K877 |
|-------|--|--|---|-----------------|
| dB    | dB   | dB   | dB  | dB              |
| 10.25 | 0.12   | 0.05   | 0.18  | 9.90            |
| 10.91 | 0.25   | 0.17   | 0.55  | 9.94            |
| 11.15 | 0.39   | 0.21   | 0.61  | 9.94            |
| 11.35 | 0.42   | 0.25   | 0.71  | 9.97            |
| 11.53 | 0.52   | 0.26   | 0.77  | 9.98            |
| 11.72 | 0.63   | 0.29   | 0.82  | 9.98            |
| 11.90 | 0.72   | 0.30   | 0.86  | 10.02           |
| 12.03 | 0.80   | 0.31   | 0.89  | 10.03           |
| 12.19 | 0.88   | 0.33   | 0.94  | 10.04           |
| 12.29 | 0.91   | 0.34   | 0.98  | 10.06           |
| 12.40 | 0.94   | 0.36   | 1.02  | 10.08           |
| 12.53 | 0.97   | 0.37   | 1.07  | 10.12           |
| 12.60 | 0.99   | 0.39   | 1.10  | 10.12           |
| 12.69 | 1.02   | 0.40   | 1.15  | 10.12           |

# 7.1 LISN ROHDE & SCHWARZ ESH3-Z5 (150 KHZ - 30 MHZ)

#### Sample calculation

 $U_{\text{LISN}}$  (dB  $\mu$ V) = U (dB  $\mu$ V) + Corr. (dB) U = Receiver reading LISN Insertion loss = Voltage Division Factor of LISN Corr. = sum of single correction factors of used LISN, cables, switch units (if used) Linear interpolation will be used for frequencies in between the values in the table.



| Frequenci | AF<br>HFH-  | Corr   | Cable loss<br>1 (inside<br>chamber) | Cable loss 2<br>(chamber to<br>receiver) | Distance<br>corr.<br>(-40 dB/ | d <sub>Limit</sub><br>(meas.<br>distance | d <sub>used</sub><br>(meas.<br>distance |
|-----------|-------------|--------|-------------------------------------|--|-------------------------------|--|---|
| Frequency | <u> </u>    | Corr.  | K1865                               | K1122 + K1761                            | decade)                       | (limit)                                  | (used)                                  |
| MHz       | 0B<br>(1/m) | dB     | dB                                  | dB                                       | dB                            | m  | m                                       |
| 0.009     | 22.30       | -79.96 | 0.01                                | 0.03                                     | -80                           | 300                                      | 3                                       |
| 0.01      | 22.30       | -79.95 | 0.02                                | 0.03                                     | -80                           | 300                                      | 3                                       |
| 0.015     | 21.55       | -79.94 | 0.03                                | 0.03                                     | -80                           | 300                                      | 3                                       |
| 0.02      | 20.80       | -79.93 | 0.04                                | 0.03                                     | -80                           | 300                                      | 3                                       |
| 0.025     | 20.50       | -79.93 | 0.04                                | 0.03                                     | -80                           | 300                                      | 3                                       |
| 0.03      | 20.20       | -79.92 | 0.05                                | 0.03                                     | -80                           | 300                                      | 3                                       |
| 0.05      | 20.00       | -79.92 | 0.05                                | 0.03                                     | -80                           | 300                                      | 3                                       |
| 0.08      | 19.88       | -79.91 | 0.05                                | 0.04                                     | -80                           | 300                                      | 3                                       |
| 0.1       | 19.80       | -79.91 | 0.05                                | 0.04                                     | -80                           | 300                                      | 3                                       |
| 0.2       | 19.79       | -79.91 | 0.05                                | 0.04                                     | -80                           | 300                                      | 3                                       |
| 0.3       | 19.78       | -79.88 | 0.06                                | 0.06                                     | -80                           | 300                                      | 3                                       |
| 0.49      | 19.76       | -79.87 | 0.06                                | 0.07                                     | -80                           | 300                                      | 3                                       |
| 0.490001  | 19.76       | -39.87 | 0.06                                | 0.07                                     | -40                           | 30                                       | 3                                       |
| 0.5       | 19.76       | -39.87 | 0.06                                | 0.07                                     | -40                           | 30                                       | 3                                       |
| 0.8       | 19.72       | -39.84 | 0.07                                | 0.09                                     | -40                           | 30                                       | 3                                       |
| 1         | 19.70       | -39.84 | 0.07                                | 0.09                                     | -40                           | 30                                       | 3                                       |
| 2         | 19.73       | -39.77 | 0.10                                | 0.13                                     | -40                           | 30                                       | 3                                       |
| 3         | 19.77       | -39.70 | 0.13                                | 0.17                                     | -40                           | 30                                       | 3                                       |
| 4         | 19.80       | -39.65 | 0.16                                | 0.19                                     | -40                           | 30                                       | 3                                       |
| 5         | 19.70       | -39.62 | 0.17                                | 0.21                                     | -40                           | 30                                       | 3                                       |
| 6         | 19.60       | -39.58 | 0.19                                | 0.23                                     | -40                           | 30                                       | 3                                       |
| 8         | 19.50       | -39.50 | 0.24                                | 0.26                                     | -40                           | 30                                       | 3                                       |
| 10        | 19.50       | -39.45 | 0.25                                | 0.30                                     | -40                           | 30                                       | 3                                       |
| 12        | 20.00       | -39.42 | 0.26                                | 0.32                                     | -40                           | 30                                       | 3                                       |
| 14        | 20.36       | -39.37 | 0.29                                | 0.34                                     | -40                           | 30                                       | 3                                       |
| 16        | 20.43       | -39.33 | 0.30                                | 0.37                                     | -40                           | 30                                       | 3                                       |
| 18        | 20.47       | -39.30 | 0.31                                | 0.39                                     | -40                           | 30                                       | 3                                       |
| 20        | 20.48       | -39.26 | 0.33                                | 0.41                                     | -40                           | 30                                       | 3                                       |
| 22        | 20.37       | -39.24 | 0.34                                | 0.42                                     | -40                           | 30                                       | 3                                       |
| 24        | 20.25       | -39.19 | 0.36                                | 0.45                                     | -40                           | 30                                       | 3                                       |
| 26        | 20.09       | -39.16 | 0.37                                | 0.47                                     | -40                           | 30                                       | 3                                       |
| 28        | 19.90       | -39.12 | 0.39                                | 0.49                                     | -40                           | 30                                       | 3                                       |
| 30        | 19.70       | -39.09 | 0.40                                | 0.51                                     | -40                           | 30                                       | 3                                       |

# 7.2 ANTENNA ROHDE & SCHWARZ HFH2-Z2 (9 KHZ – 30 MHZ)

#### Sample calculation

 $E (dB \mu V/m) = U (dB \mu V) + AF (dB 1/m) + Corr. (dB)$ 

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable) distance correction =  $-40 * LOG (d_{limit}/d_{used})$ 

Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values



# 7.3 ANTENNA CHASE CBL 6111C (30 MHZ - 1 GHZ)

#### (d<sub>Limit</sub> = 10 m)

|      |          |        | Cable loss | Pre-      | Cable    | Cable loss  |          |
|------|----------|--------|------------|-----------|----------|-------------|----------|
|      | CBL      |        | 1 (inside  | amplifier | loss 2   | 3           | dused    |
|      | 6111C    |        | chamber to |           | (under   | (Chamber    | (meas.   |
|      |          |        | floor)     | K1721     | chamber) | to receiver | distance |
| -    | K1026    | Corr.  | K1813      |           | K1121    | K1761       | (used)   |
| MHz  | dB (1/m) | dB     | dB         | dB        | dB       | dB          | m        |
| 30   | 24.7     | -37.78 | 0.02       | -38.26    | 0.40     | 0.06        | 10       |
| 50   | 14.2     | -37.49 | 0.28       | -38.38    | 0.50     | 0.11        | 10       |
| 100  | 15.6     | -37.31 | 0.52       | -38.66    | 0.71     | 0.12        | 10       |
| 150  | 16.6     | -37.17 | 0.73       | -38.85    | 0.81     | 0.14        | 10       |
| 200  | 14.5     | -36.85 | 0.95       | -38.90    | 0.94     | 0.16        | 10       |
| 250  | 18.0     | -36.56 | 1.10       | -38.91    | 1.07     | 0.18        | 10       |
| 300  | 18.8     | -36.05 | 1.20       | -38.65    | 1.20     | 0.20        | 10       |
| 350  | 20.0     | -35.87 | 1.29       | -38.63    | 1.25     | 0.22        | 10       |
| 400  | 21.4     | -35.57 | 1.36       | -38.54    | 1.38     | 0.23        | 10       |
| 450  | 22.4     | -35.14 | 1.42       | -38.25    | 1.45     | 0.24        | 10       |
| 500  | 23.3     | -34.64 | 1.49       | -37.91    | 1.52     | 0.26        | 10       |
| 550  | 24.8     | -34.47 | 1.54       | -37.84    | 1.56     | 0.27        | 10       |
| 600  | 25.0     | -34.20 | 1.60       | -37.73    | 1.65     | 0.28        | 10       |
| 650  | 25.9     | -34.30 | 1.64       | -37.99    | 1.75     | 0.30        | 10       |
| 700  | 26.0     | -33.98 | 1.71       | -37.80    | 1.81     | 0.30        | 10       |
| 750  | 27.9     | -33.99 | 1.77       | -37.95    | 1.87     | 0.32        | 10       |
| 800  | 27.0     | -34.32 | 1.80       | -38.34    | 1.90     | 0.32        | 10       |
| 850  | 28.9     | -34.24 | 1.85       | -38.41    | 1.98     | 0.34        | 10       |
| 900  | 28.5     | -34.76 | 1.91       | -39.02    | 2.00     | 0.35        | 10       |
| 950  | 30.5     | -34.50 | 1.93       | -38.89    | 2.10     | 0.36        | 10       |
| 1000 | 29.8     | -34.03 | 1.99       | -38.57    | 2.18     | 0.37        | 10       |

#### Sample calculation

 $E (dB \mu V/m) = U (dB \mu V) + AF (dB 1/m) + Corr. (dB)$ 

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable) distance correction =  $-20 \times LOG (d_{Limit}/d_{used})$ Linear interpolation will be used for frequencies in between the values in the table.

Tables show an extract of values.



|           | AF       |        |   |         | Cable     |
|-----------|----------|--------|---|---------|-----------|
|           | R&S      |        |   |         | loss (to  |
|           | HL 025   |        |   | Pre-amp | receiver) |
| Frequency | K1114    | Corr.  |   | K838    | K1910     |
| MHz       | dB (1/m) | dB     |   | dB      | dB        |
| 1000      | 21.27    | -19.15 |   | -20.92  | 1.77      |
| 2000      | 27.32    | -18.10 |   | -20.60  | 2.50      |
| 3000      | 30.97    | -17.33 |   | -20.43  | 3.10      |
| 4000      | 33.48    | -17.01 |   | -20.58  | 3.57      |
| 5000      | 34.99    | -17.04 |   | -21.08  | 4.04      |
| 6000      | 36.98    | -17.09 |   | -21.52  | 4.43      |
| 7000      | 37.94    | -16.73 |   | -21.53  | 4.80      |
| 8000      | 39.21    | -15.81 |   | -20.97  | 5.16      |
| 9000      | 40.62    | -15.02 |   | -20.44  | 5.42      |
| 10000     | 41.78    | -14.62 |   | -20.42  | 5.80      |
| 11000     | 43.05    | -14.75 |   | -20.83  | 6.08      |
| 12000     | 43.12    | -15.07 |   | -21.41  | 6.34      |
| 13000     | 43.51    | -15.50 |   | -22.10  | 6.60      |
| 14000     | 44.53    | -15.62 |   | -22.48  | 6.86      |
| 15000     | 44.96    | -15.47 |   | -22.55  | 7.08      |
| 16000     | 45.57    | -15.14 | 1 | -22.49  | 7.35      |
| 17000     | 45.66    | -15.44 | 1 | -22.90  | 7.46      |
| 18000     | 45.44    | -15.41 | 1 | -23.27  | 7.86      |

# 7.4 ANTENNA ROHDE & SCHWARZ HL 025 (1 GHZ - 18 GHZ)

#### Sample calculation

 $E (dB \mu V/m) = U (dB \mu V) + AF (dB 1/m) + Corr. (dB)$ 

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable) Linear interpolation will be used for frequencies in between the values in the table. Tables show an extract of values.



# 7.5 ANTENNA ARA INC. MWH-1826-B (18 GHZ - 26.5 GHZ) PARTIALLY IN CONJUNCTION WITH PRE-AMPLIFIER MITEQ JS43-1800-4000: THE USE OF THE PRE-AMPLIFIER IS DEPENDENT FROM THE FIELD STRENGTH

|           | AF       |        |   |
|-----------|----------|--------|---|
|           | MWH-     |        |   |
|           | 1826/B   |        | F |
| Frequency | K1042    | Corr.  |   |
| MHz       | dB (1/m) | dB     |   |
| 18000     | 32.6     | -35.37 |   |
| 18500     | 32.5     | -38.45 |   |
| 19000     | 32.6     | -37.84 |   |
| 19500     | 32.7     | -37.10 |   |
| 20000     | 32.7     | -37.27 |   |
| 20500     | 32.9     | -37.16 |   |
| 21000     | 33.1     | -36.82 |   |
| 21500     | 33.0     | -36.80 |   |
| 22000     | 33.1     | -36.40 |   |
| 22500     | 33.2     | -35.94 |   |
| 23000     | 33.5     | -36.62 |   |
| 23500     | 33.5     | -35.26 |   |
| 24000     | 33.5     | -35.87 |   |
| 24500     | 33.8     | -36.22 |   |
| 25000     | 33.8     | -35.48 |   |
| 25500     | 33.8     | -35.37 |   |
| 26000     | 34.1     | -35.84 |   |
| 26500     | 34.4     | -35.49 |   |
| 27000     | 32.6     | -35.37 |   |

|         | Cable     |  |  |
|---------|-----------|--|--|
|         | loss (to  |  |  |
| Pre-amp | receiver) |  |  |
| K1104   | K1910     |  |  |
| dB      | dB        |  |  |
| -43.23  | 7.86      |  |  |
| -46.40  | 7.95      |  |  |
| -45.93  | 8.09      |  |  |
| -45.21  | 8.11      |  |  |
| -45.57  | 8.30      |  |  |
| -45.49  | 8.33      |  |  |
| -45.29  | 8.47      |  |  |
| -45.33  | 8.53      |  |  |
| -45.10  | 8.70      |  |  |
| -44.78  | 8.84      |  |  |
| -45.51  | 8.89      |  |  |
| -44.36  | 9.10      |  |  |
| -44.96  | 9.09      |  |  |
| -45.32  | 9.10      |  |  |
| -44.84  | 9.36      |  |  |
| -44.67  | 9.30      |  |  |
| -45.41  | 9.57      |  |  |
| -45.10  | 9.61      |  |  |
| -45.98  | 9.86      |  |  |

#### Sample calculation

E (dB  $\mu$ V/m) = U (dB  $\mu$ V) + AF (dB 1/m) + Corr. (dB) U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable) Linear interpolation will be used for frequencies in between the values in the table. Table shows an extract of values.



# 7.6 ANTENNA ARA INC. MWH-2640-B (26 GHZ – 40 GHZ) ) PARTIALLY IN CONJUNCTION WITH PRE-AMPLIFIER MITEQ JS43-1800-4000: THE USE OF THE PRE-AMPLIFIER IS DEPENDENT FROM THE FIELD STRENGTH

| 4 |           | -        |            |   |         |           |
|---|-----------|----------|------------|---|---------|-----------|
|   |           | AF       |            |   |         | Cable     |
|   |           |          |            |   | Dra ama | IUSS (to  |
|   | <b>F</b>  | 2640/B   | <b>C</b> - |   | Pre-amp | receiver) |
|   | Frequency | K1043    | Corr.      |   | К1104   | к1910     |
|   | GHz       | dB (1/m) | dB         | ļ | dB      | dB        |
|   | 26.5      | 35.8     | -36.27     |   | -45.88  | 9.61      |
|   | 27.0      | 35.5     | -36.12     |   | -45.98  | 9.86      |
|   | 28.0      | 36.4     | -35.66     |   | -45.55  | 9.89      |
|   | 29.0      | 35.9     | -37.11     |   | -47.07  | 9.96      |
|   | 30.0      | 36.3     | -37.49     |   | -47.70  | 10.21     |
|   | 31.0      | 36.2     | -36.47     |   | -46.93  | 10.46     |
|   | 32.0      | 36.7     | -35.66     |   | -46.14  | 10.48     |
|   | 33.0      | 37.0     | -36.77     |   | -47.58  | 10.81     |
|   | 34.0      | 37.2     | -37.33     |   | -48.43  | 11.10     |
|   | 35.0      | 37.1     | -38.50     |   | -49.69  | 11.19     |
|   | 36.0      | 37.4     | -39.25     |   | -50.76  | 11.51     |
|   | 37.0      | 37.6     | -38.84     |   | -50.33  | 11.49     |
|   | 38.0      | 37.8     | -36.63     |   | -48.24  | 11.61     |
|   | 39.0      | 38.0     | -32.15     |   | -43.94  | 11.79     |
|   | 40.0      | 37.9     | -30.37     |   | -42.22  | 11.85     |

#### Sample calculation

 $E (dB \mu V/m) = U (dB \mu V) + AF (dB 1/m) + Corr. (dB)$ 

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable) Linear interpolation will be used for frequencies in between the values in the table.

distance correction =  $-20 * LOG (d_{Limit}/d_{used})$ 

Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values.



# 8 MEASUREMENT UNCERTAINTIES

| KDB 935210 D05  | ECL       |
|---|-----------|
| Power measurement   | 0.68 dB   |
| Measuring AGC threshold level   | 0.90 dB   |
| Out of band rejection   | 0.90 dB   |
| Input-versus-output signal comparison   | 0.91 dB   |
| Mean power output   | 0.90 dB   |
| Measuring out-of-band/out-of-block<br>(including intermodulation) emissions and | 0.00 dB   |
| Out-of-band/out-of-block emissions  | 0.90 dB   |
| Spurious emissions conducted  | 2.18 dB   |
| Spurious emissions radiated mesurements   | 5.38 dB   |
| Total frequency uncertainty   | 2 x 10 -7 |

reference : ECL-MU5.4.6.3-EMC-14-001-V02.00 MU Wireless.xlsx

# 9 PHOTO REPORT

Labeling DUT




Measuring field strength of spurious radiation, Setup for 30 MHz to 1 GHz







Measuring field strength of spurious radiation, Setup for 1 GHz to 27 GHz



