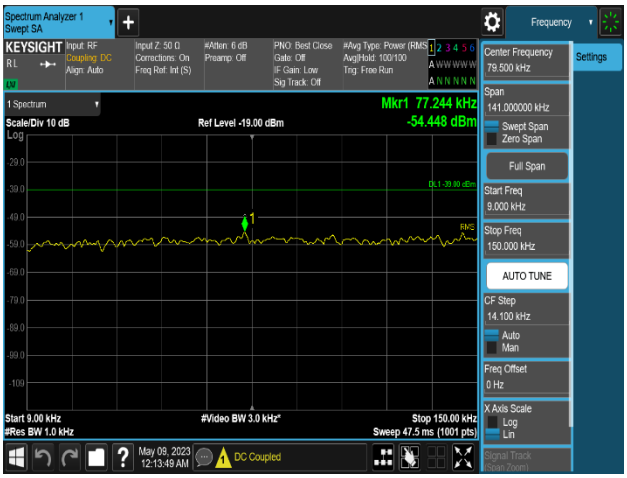
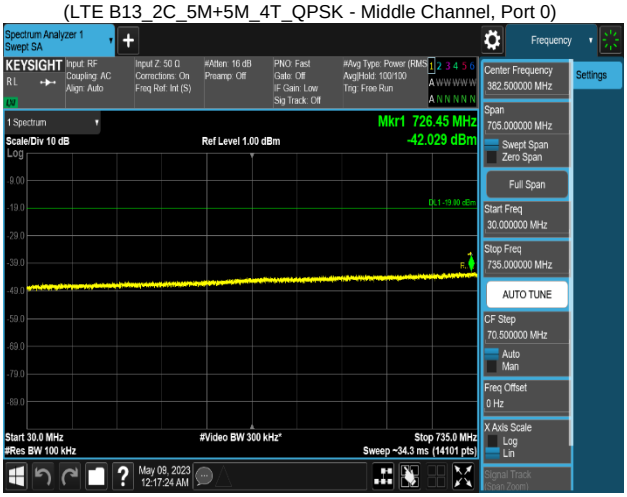
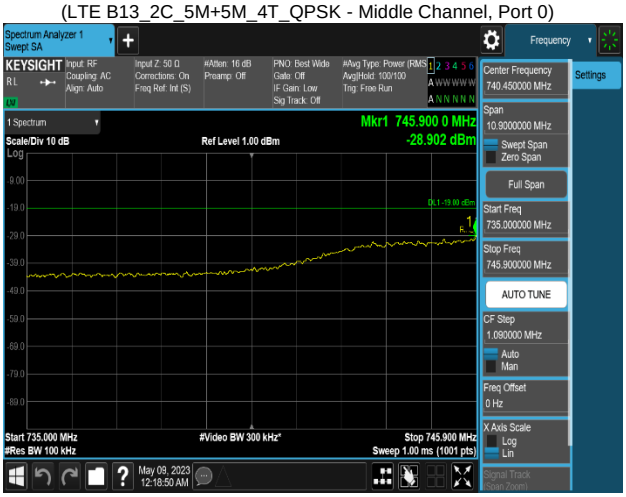


Plot 8-778. Conducted Spurious Emission Plot
9 kHz to 150 kHz
(LTE B13_2C_5M+5M_4T_QPSK - Middle Channel, Port 0)

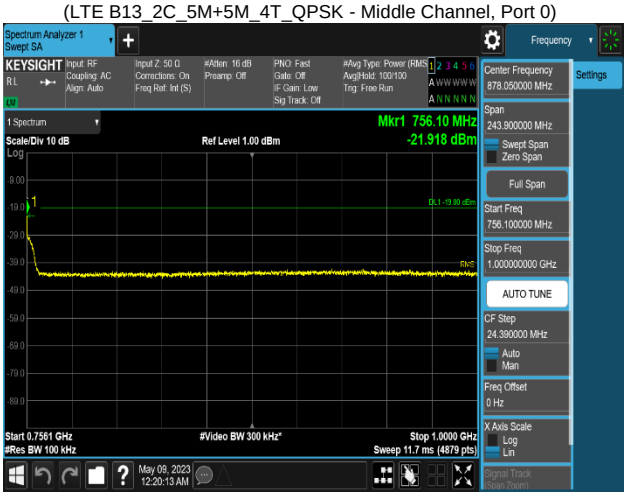
Plot 8-779. Conducted Spurious Emission Plot
150 kHz to 30 MHz
(LTE B13_2C_5M+5M_4T_QPSK - Middle Channel, Port 0)



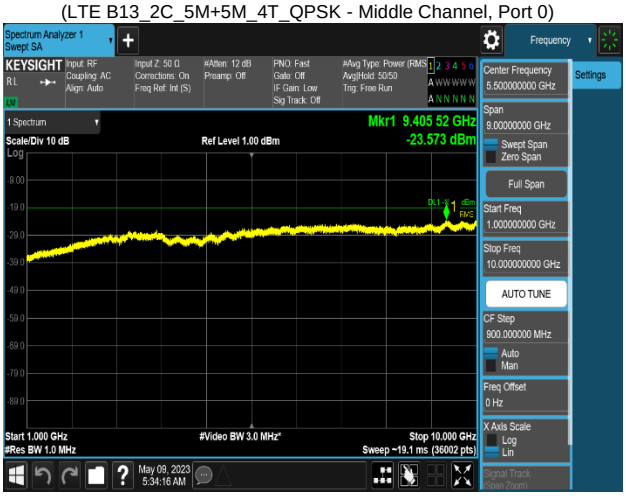
Plot 8-780. Conducted Spurious Emission Plot
30 MHz to 735 MHz
(LTE B13_2C_5M+5M_4T_QPSK - Middle Channel, Port 0)



Plot 8-781. Conducted Spurious Emission Plot
735 MHz to 745.9 MHz
(LTE B13_2C_5M+5M_4T_QPSK - Middle Channel, Port 0)

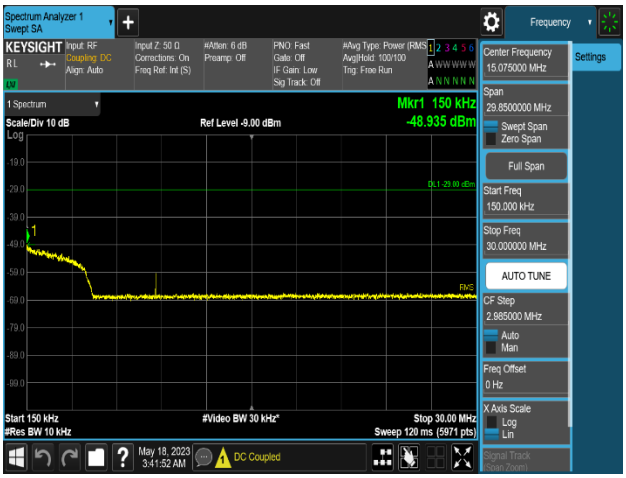


Plot 8-782. Conducted Spurious Emission Plot
756.1 MHz to 1 GHz
(LTE B13_2C_5M+5M_4T_QPSK - Middle Channel, Port 0)

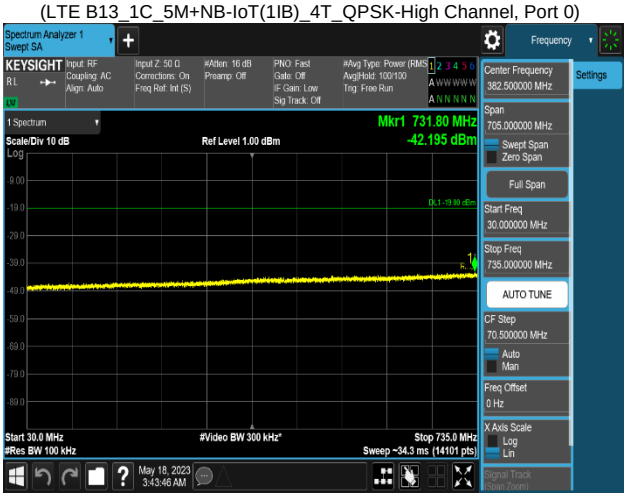


Plot 8-783. Conducted Spurious Emission Plot
1 GHz to 10 GHz
(LTE B13_2C_5M+5M_4T_QPSK - Middle Channel, Port 0)

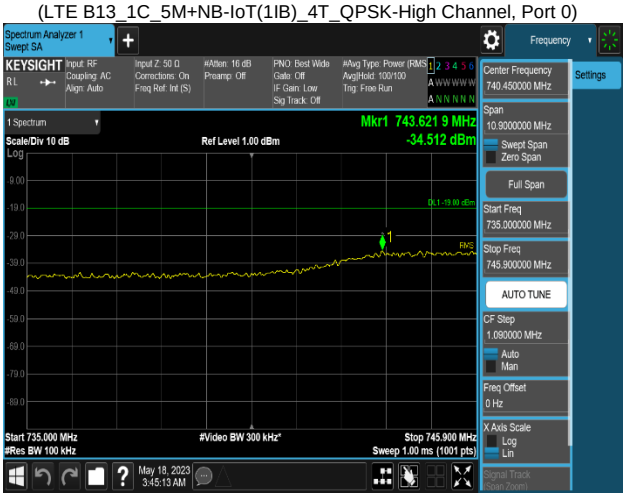
Plot 8-784. Conducted Spurious Emission Plot
9 kHz to 150 kHz
(LTE B13_1C_5M+NB-IoT(1IB)_4T_QPSK-High Channel, Port 0)



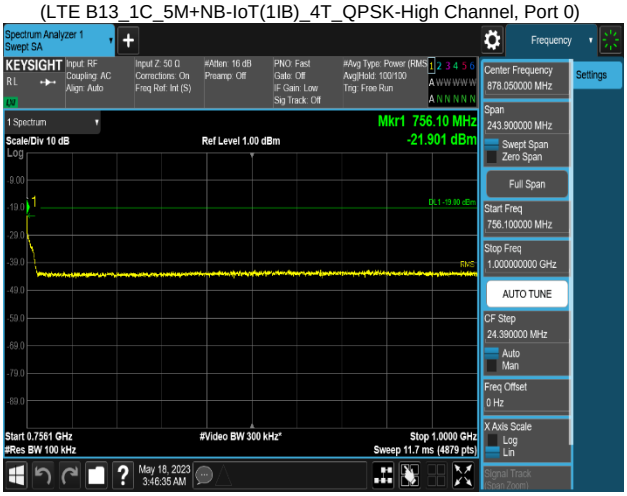
Plot 8-785. Conducted Spurious Emission Plot
150 kHz to 30 MHz
(LTE B13_1C_5M+NB-IoT(1IB)_4T_QPSK-High Channel, Port 0)



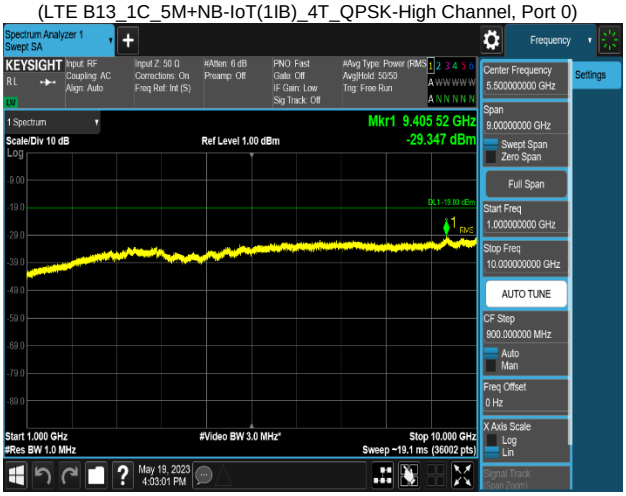
Plot 8-786. Conducted Spurious Emission Plot
30 MHz to 735 MHz
(LTE B13_1C_5M+NB-IoT(1IB)_4T_QPSK-High Channel, Port 0)



Plot 8-787. Conducted Spurious Emission Plot
735 MHz to 745.9 MHz
(LTE B13_1C_5M+NB-IoT(1IB)_4T_QPSK-High Channel, Port 0)

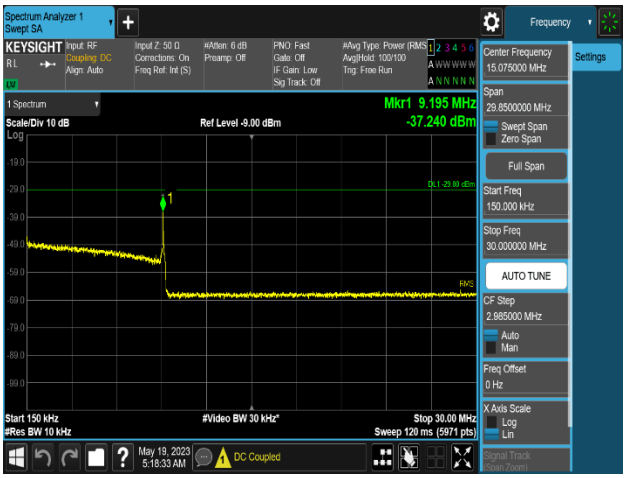


Plot 8-788. Conducted Spurious Emission Plot
756.1 MHz to 1 GHz
(LTE B13_1C_5M+NB-IoT(1IB)_4T_QPSK-High Channel, Port 0)

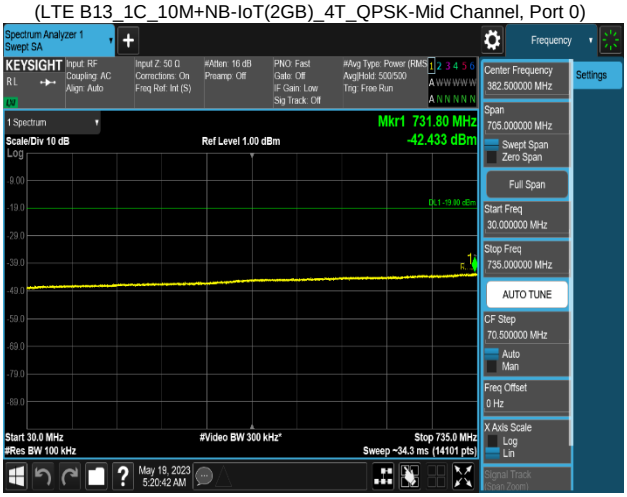


Plot 8-789. Conducted Spurious Emission Plot
1 GHz to 10 GHz
(LTE B13_1C_5M+NB-IoT(1IB)_4T_QPSK-High Channel, Port 0)

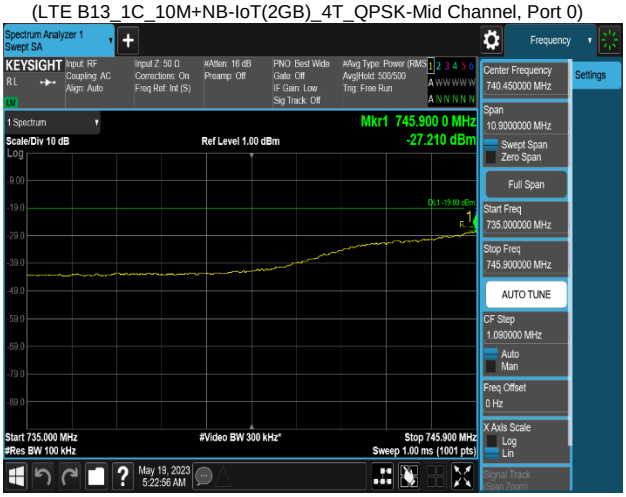
Plot 8-790. Conducted Spurious Emission Plot
9 kHz to 150 kHz
(LTE B13_1C_10M+NB-IoT(2GB)_4T_QPSK-Mid Channel, Port 0)



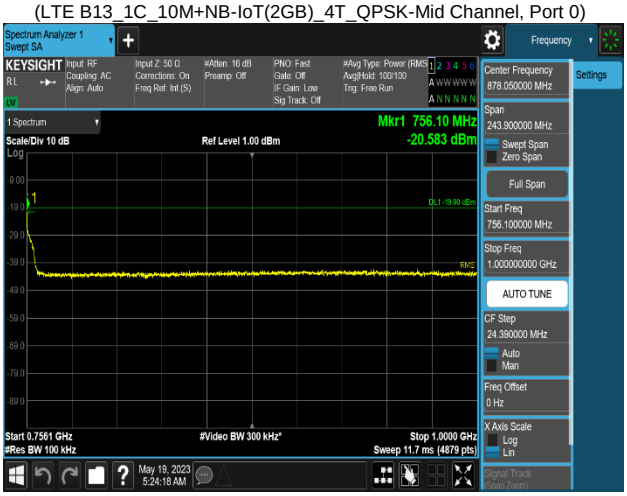
Plot 8-791. Conducted Spurious Emission Plot
150 kHz to 30 MHz
(LTE B13_1C_10M+NB-IoT(2GB)_4T_QPSK-Mid Channel, Port 0)



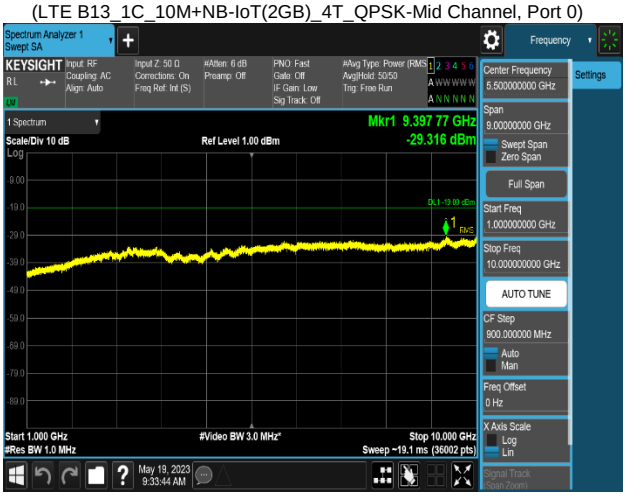
Plot 8-792. Conducted Spurious Emission Plot
30 MHz to 735 MHz
(LTE B13_1C_10M+NB-IoT(2GB)_4T_QPSK-Mid Channel, Port 0)



Plot 8-793. Conducted Spurious Emission Plot
735 MHz to 745.9 MHz
(LTE B13_1C_10M+NB-IoT(2GB)_4T_QPSK-Mid Channel, Port 0)

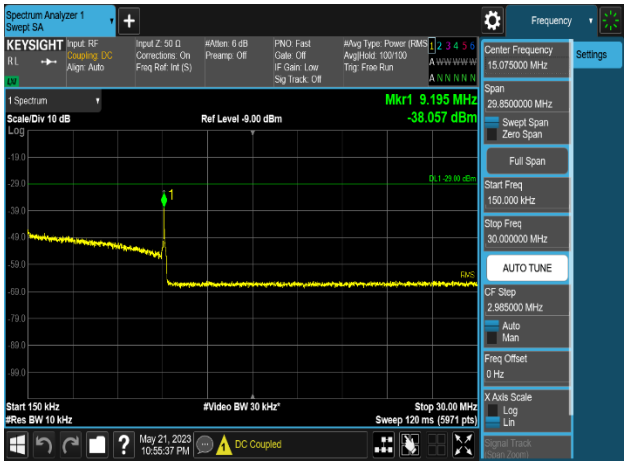


Plot 8-794. Conducted Spurious Emission Plot
756.1 MHz to 1 GHz
(LTE B13_1C_10M+NB-IoT(2GB)_4T_QPSK-Mid Channel, Port 0)

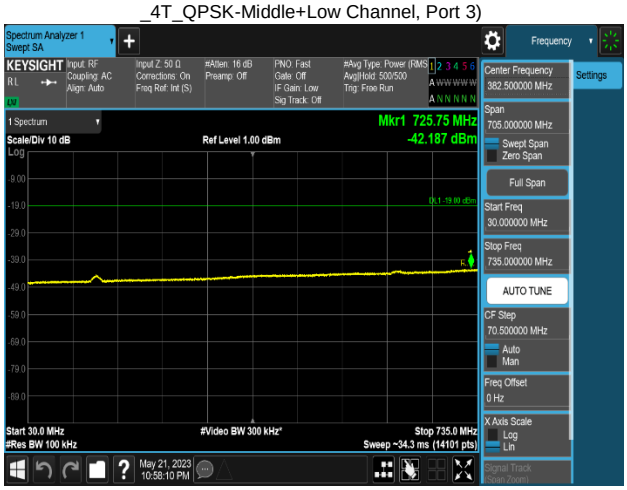


Plot 8-795. Conducted Spurious Emission Plot
1 GHz to 10 GHz
(LTE B13_1C_10M+NB-IoT(2GB)_4T_QPSK-Mid Channel, Port 0)

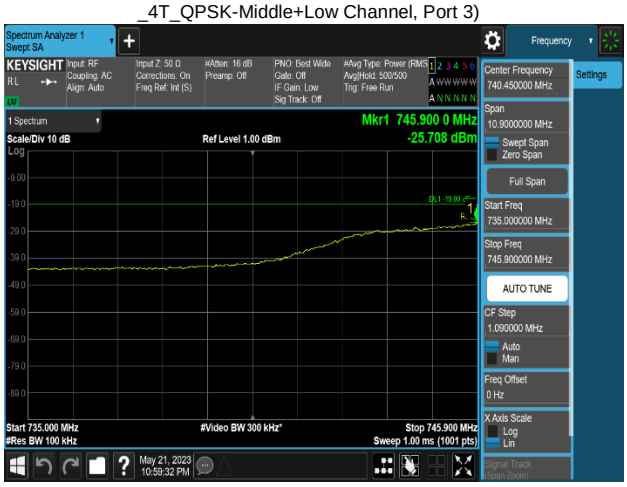
Plot 8-796. Conducted Spurious Emission Plot
9 kHz to 150 kHz
(Multi-Band_LTE B13_1C_10M+NB-IoT(2GB)+LTE B5_1C_10M
_4T_QPSK-Middle+Low Channel, Port 3)



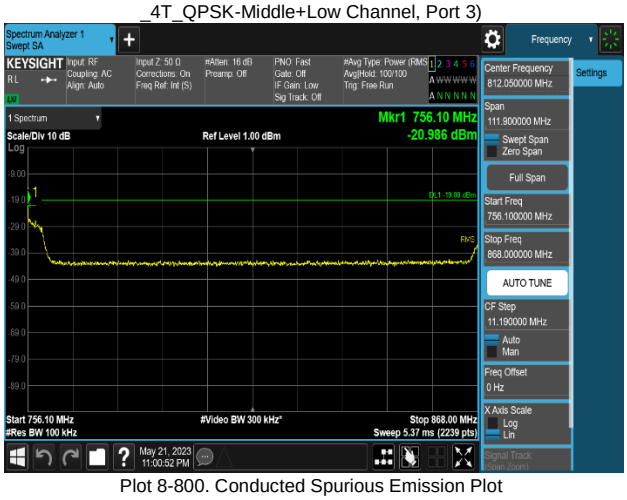
Plot 8-797. Conducted Spurious Emission Plot
150 kHz to 30 MHz
(Multi-Band_LTE B13_1C_10M+NB-IoT(2GB)+LTE B5_1C_10M
_4T_QPSK-Middle+Low Channel, Port 3)



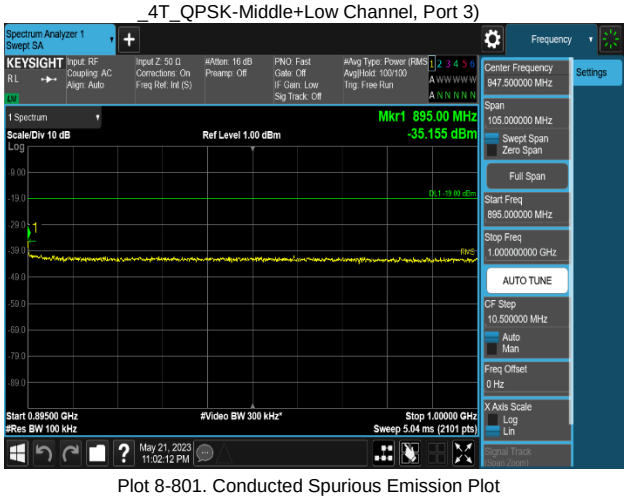
Plot 8-798. Conducted Spurious Emission Plot
30 MHz to 735 MHz
(Multi-Band_LTE B13_1C_10M+NB-IoT(2GB)+LTE B5_1C_10M
_4T_QPSK-Middle+Low Channel, Port 3)



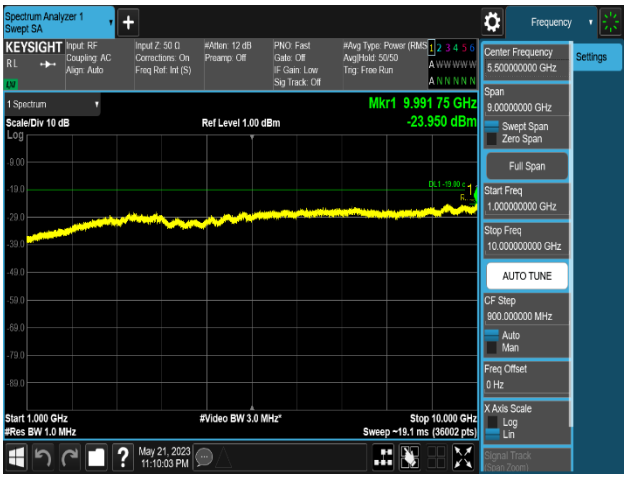
Plot 8-799. Conducted Spurious Emission Plot
735 MHz to 745.9 MHz
(Multi-Band_LTE B13_1C_10M+NB-IoT(2GB)+LTE B5_1C_10M
_4T_QPSK-Middle+Low Channel, Port 3)



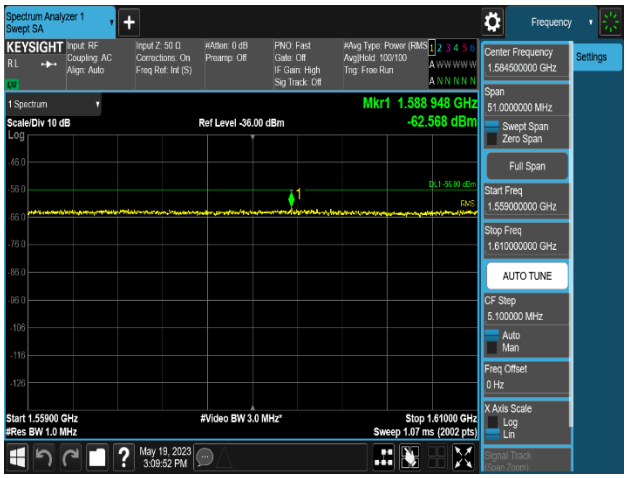
Plot 8-800. Conducted Spurious Emission Plot
756.1 MHz to 868 GHz
(Multi-Band_LTE B13_1C_10M+NB-IoT(2GB)+LTE B5_1C_10M
_4T_QPSK-Middle+Low Channel, Port 3)



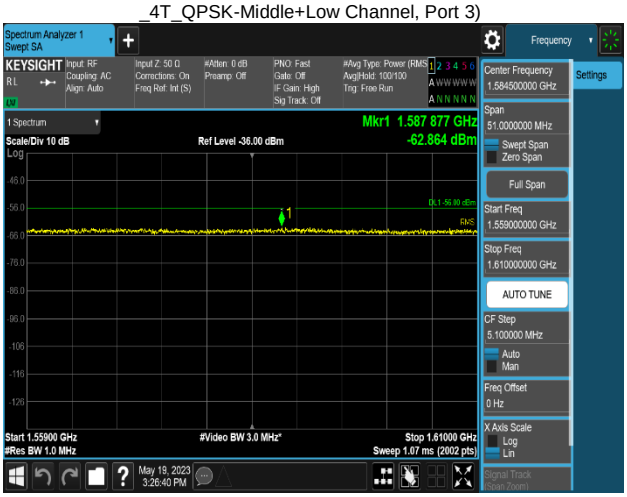
Plot 8-801. Conducted Spurious Emission Plot
895 MHz to 1 GHz
(Multi-Band_LTE B13_1C_10M+NB-IoT(2GB)+LTE B5_1C_10M
_4T_QPSK-Middle+Low Channel, Port 3)



Plot 8-802. Conducted Spurious Emission Plot
1 GHz to 10 GHz
(Multi-Band_LTE B13_1C_10M+NB-IoT(2GB)+LTE B5_1C_10M _4T_QPSK-Middle+Low Channel, Port 3)

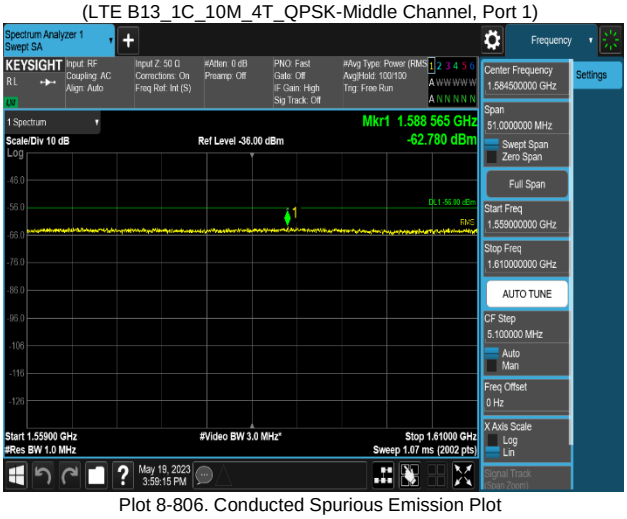


Plot 8-803. Conducted Spurious Emission Plot
1 559 MHz to 1 610 MHz
(LTE B13_1C_5M_4T_QPSK - Low Channel, Port 3)

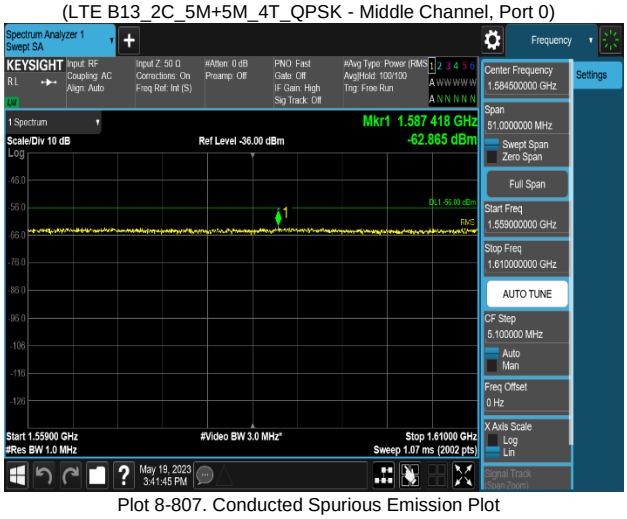


Plot 8-804. Conducted Spurious Emission Plot
1 559 MHz to 1 610 MHz
(LTE B13_1C_10M_4T_QPSK-Middle Channel, Port 1)

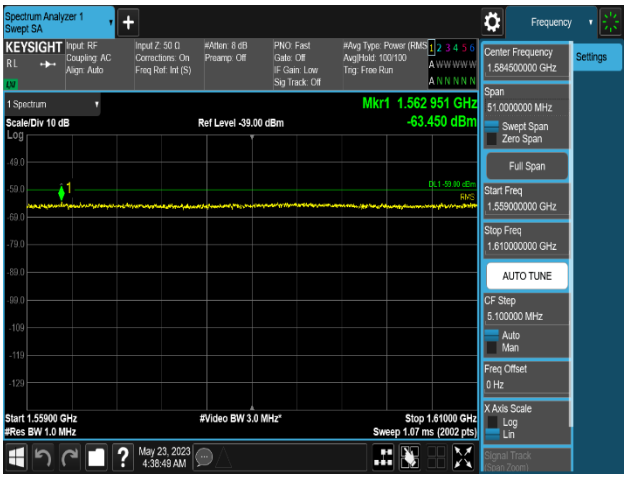
Plot 8-805. Conducted Spurious Emission Plot
1 559 MHz to 1 610 MHz
(LTE B13_2C_5M+5M_4T_QPSK - Middle Channel, Port 0)



Plot 8-806. Conducted Spurious Emission Plot
1 559 MHz to 1 610 MHz
(LTE B13_1C_5M+NB-IoT(1IB)_4T_QPSK-High Channel, Port 3)



Plot 8-807. Conducted Spurious Emission Plot
1 559 MHz to 1 610 MHz
(LTE B13_1C_10M+NB-IoT(1IB+1GB)_4T_QPSK-Middle Channel, Port 3)



Plot 8-808. Conducted Spurious Emission Plot
1 559 MHz to 1 610 MHz
(Multi-Band_LTE B13_2C_5M+5M+DSS B(n)5_1C_10M+NR n5_1C_10M+LTE B5_1C_5M_4T_QPSK-Middle+Low Channel, Port 2)

8.7 Frequency Stability

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of KDB 971168 D01 v03r01.
The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for DC powered equipment.

Test Description

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).

2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

   Frequency measurements are made -30°C to +50°C in 10°C increments. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Limit

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

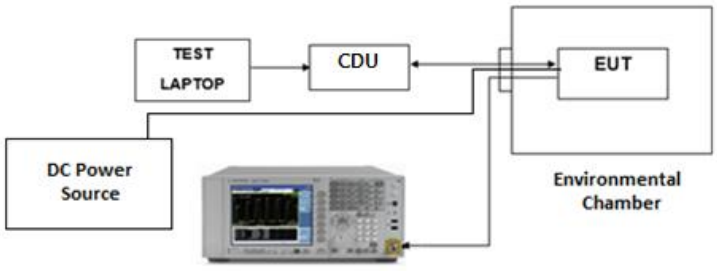


Figure 8-6. Test Instrument & Measurement Setup

Test Notes

None.

OPERATING FREQUENCY: 881,500,000 Hz
REFERENCE VOLTAGE: -48.00 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	-48.00	+ 20 (Ref)	881,500,000	0	0.0000000
100 %		- 30	881,499,998	-2	-0.0000002
100 %		- 20	881,500,000	0	0.0000000
100 %		- 10	881,500,001	1	0.0000001
100 %		0	881,499,999	-1	-0.0000001
100 %		+ 10	881,500,000	0	0.0000000
100 %		+ 30	881,500,000	0	0.0000000
100 %		+ 40	881,500,000	0	0.0000000
100 %		+ 50	881,500,000	0	0.0000000
85 %	-40.80	+ 20	881,500,001	1	0.0000001
115 %	-55.20	+ 20	881,500,000	0	0.0000000

Table 8-314. Frequency Stability Summary Data (LTE B5_1C_5M)

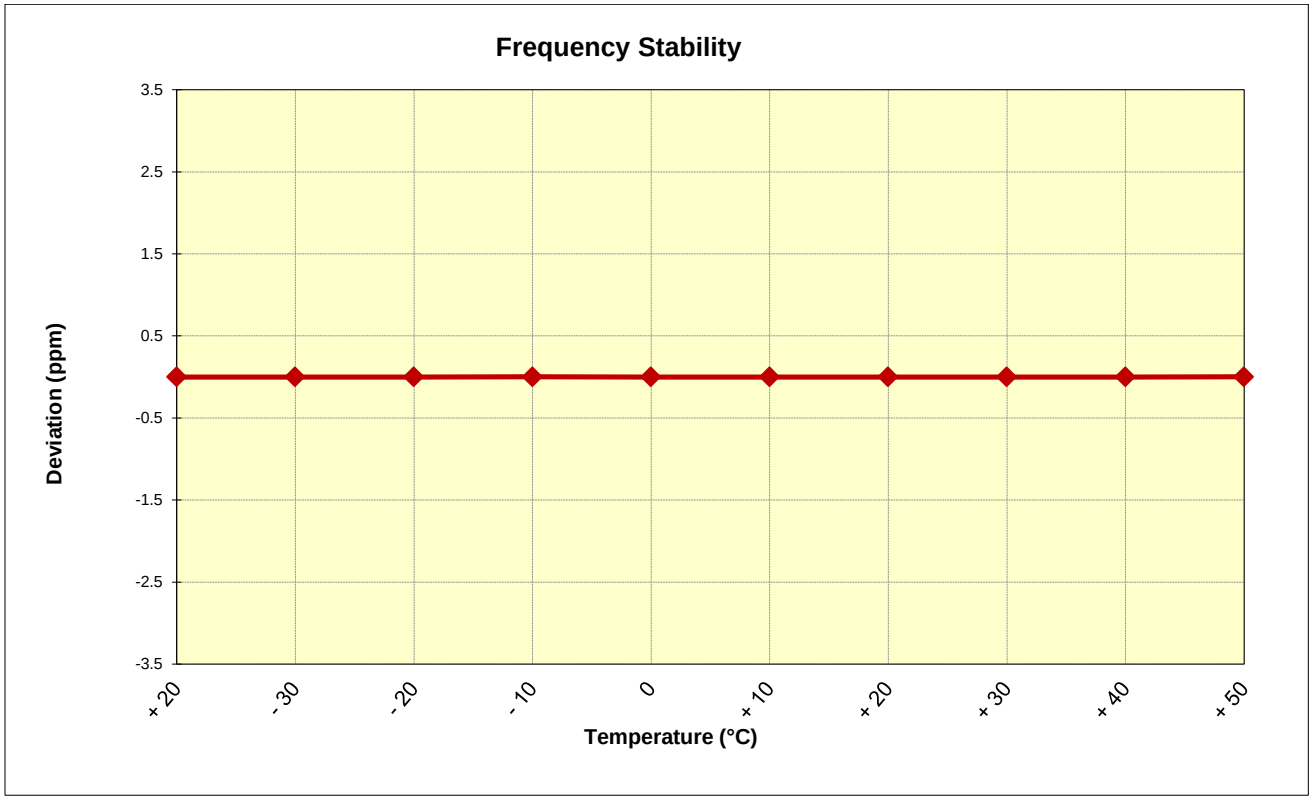


Figure 8-7. Frequency Stability Graph (LTE B5_1C_5M)

OPERATING FREQUENCY: 748,500,000 Hz
REFERENCE VOLTAGE: -48.00 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	-48.00	+ 20 (Ref)	748,499,999	0	0.0000000
100 %		- 30	748,500,000	1	0.0000001
100 %		- 20	748,499,999	0	0.0000000
100 %		- 10	748,500,000	1	0.0000001
100 %		0	748,500,000	1	0.0000001
100 %		+ 10	748,500,001	2	0.0000003
100 %		+ 30	748,499,999	0	0.0000000
100 %		+ 40	748,500,001	2	0.0000003
100 %		+ 50	748,500,000	1	0.0000001
85 %	-40.80	+ 20	748,500,000	1	0.0000001
115 %	-55.20	+ 20	748,500,000	1	0.0000001

Table 8-315. Frequency Stability Summary Data (LTE B13_1C_5M)

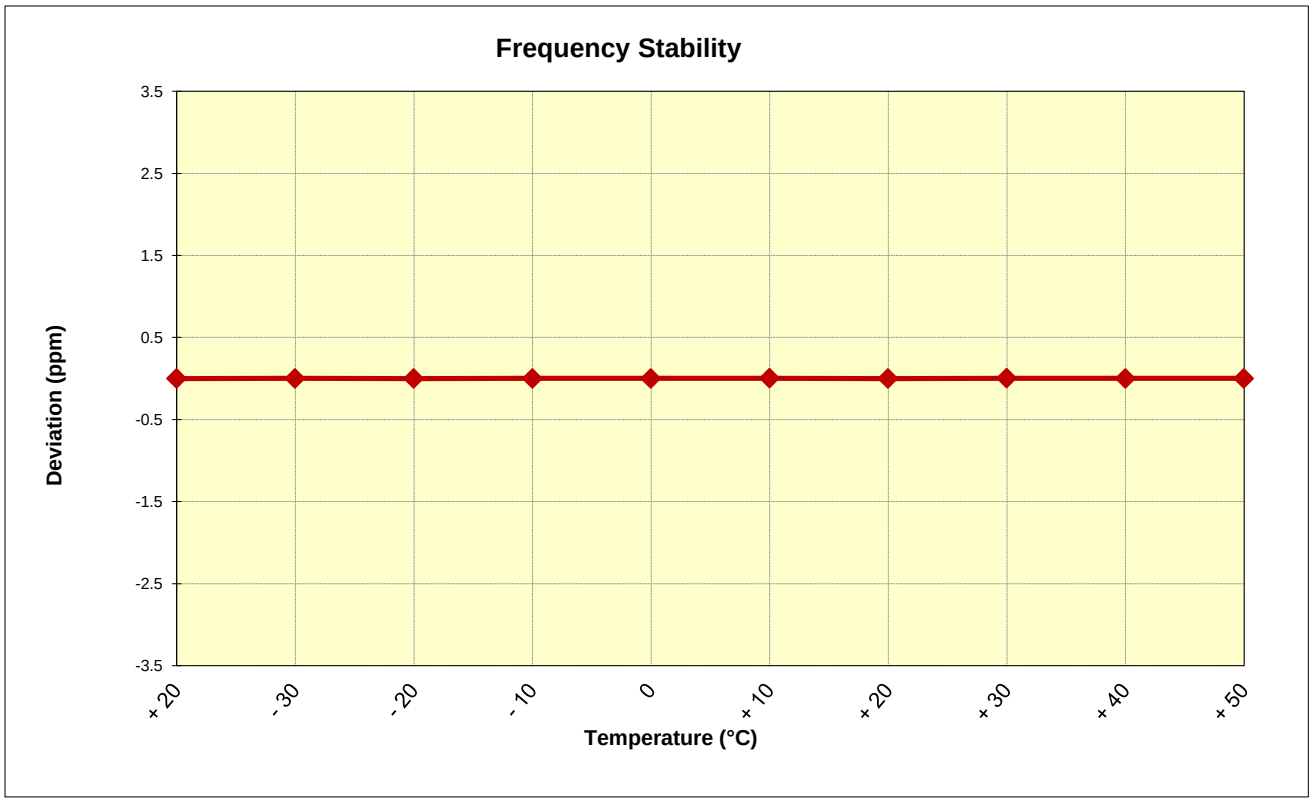


Figure 8-8. Frequency Stability Graph (LTE B13_1C_5M)

8.8 Radiated spurious emission

Test Overview

Radiated spurious emissions measurements are performed using the field strength method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized broadband tri-log antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedure Used

ANSI C63.26 - Section 5.5.3.2

Test Setting

1. Start frequency was set to 30 MHz and stop frequency was set to at least 10 * the fundamental frequency
2. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1GHz
3. VBW ≥ 3 x RBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = Peak for the pre-scan, (In cases where the level is within 2 dB of the limit, the final measurement is taken using RMS detector.)
6. Trace mode = Max Hold (In cases where the level is within 2 dB of the limit, the final measurement is taken using triggering/gating and trace averaging.)
7. The trace was allowed to stabilize.

Limit

The power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

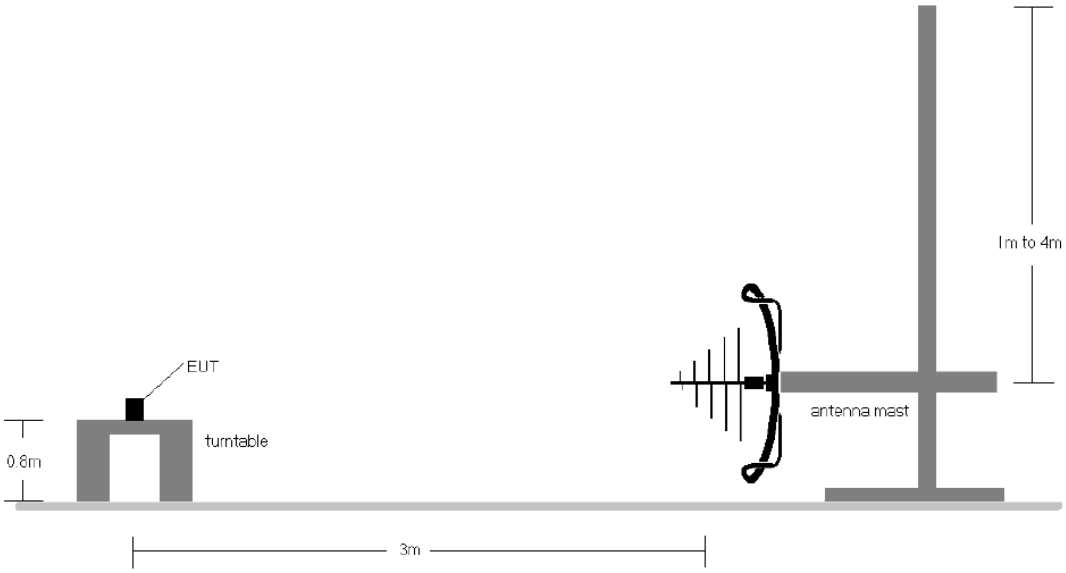


Figure 8-9. Test Instrument & Measurement Setup < 1 GHz

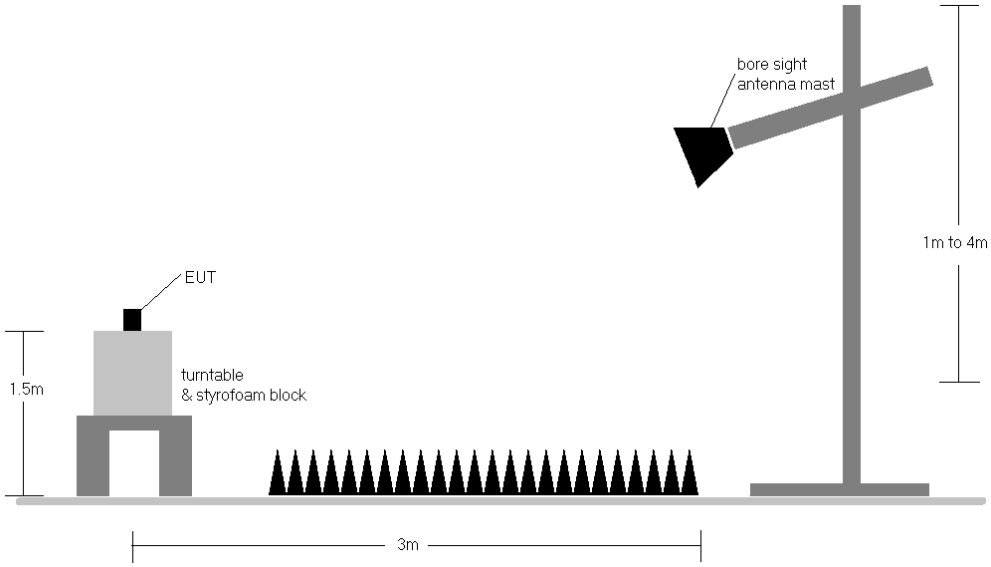


Figure 8-10. Test Instrument & Measurement Setup > 1 GHz

Test Notes

1. The average EIRP reported below is calculated per 5.2.7 of ANSI C63.26-2015 which states:

   The measured e.i.r.p is converted to E-field in V/m. Then the distance correction is applied before converted back to calculated e.i.r.p.as explained in KDB 971168 D01 D01 v03r01.

Effective Isotropic Radiated Power Sample Calculation

Field Strength [dBµV/m] = Measured Value [dBm] + 107 + AFCL [dB/m]

= -74.28 [dBm] + 107 + 10.01 [dB/m] = 42.73 dBµV/m

e.i.r.p. [dBm] = E[dB μV/m] + 20 $\log_{10}$(d[m]) - 104.8

= 42.73 dB[μV/m] + (20*log (3)) - 104.8

= -52.53 dBm

*AFCL (dB/m) contains measurement antenna factor(dB/m) and cable loss(dB) as below:

Frequency [MHz]	Antenna Factor (dB/m)	Chamber measurement cable loss + amplifier [dB]	AFCL (dB/m)
983.42	23.07	2.07	25.14
9784.35	37.64	-27.63	10.01

Table 8-316. Adopted AFCL value in the calculation

2. The EUT was tested in both horizontal and vertical antenna polarizations and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, channel bandwidth configurations shown in the tables below.

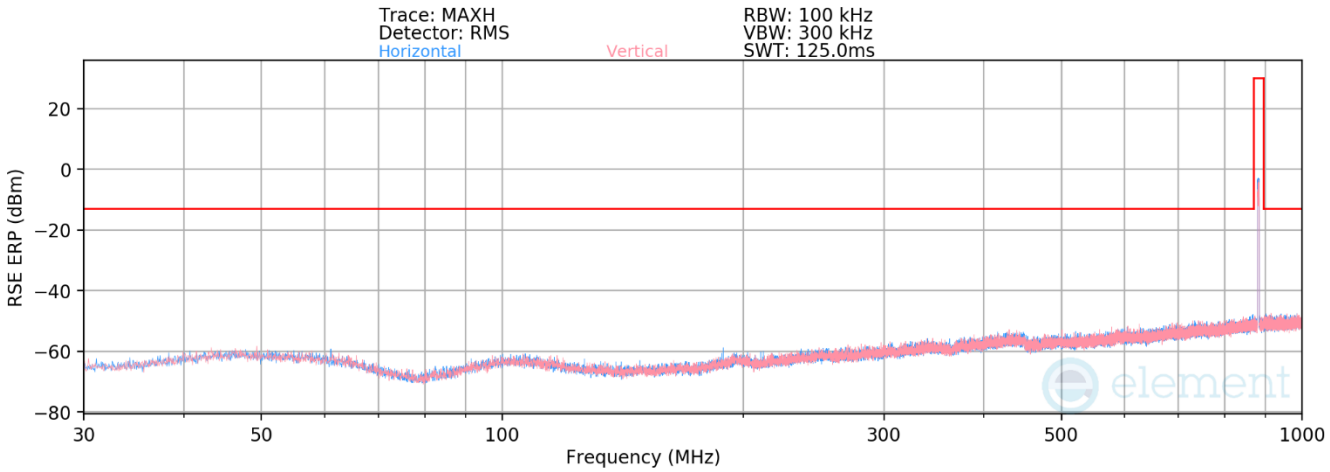
3. The spectrum is measured from 30 MHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

4. All emissions were measured at a 3-meter test distance.

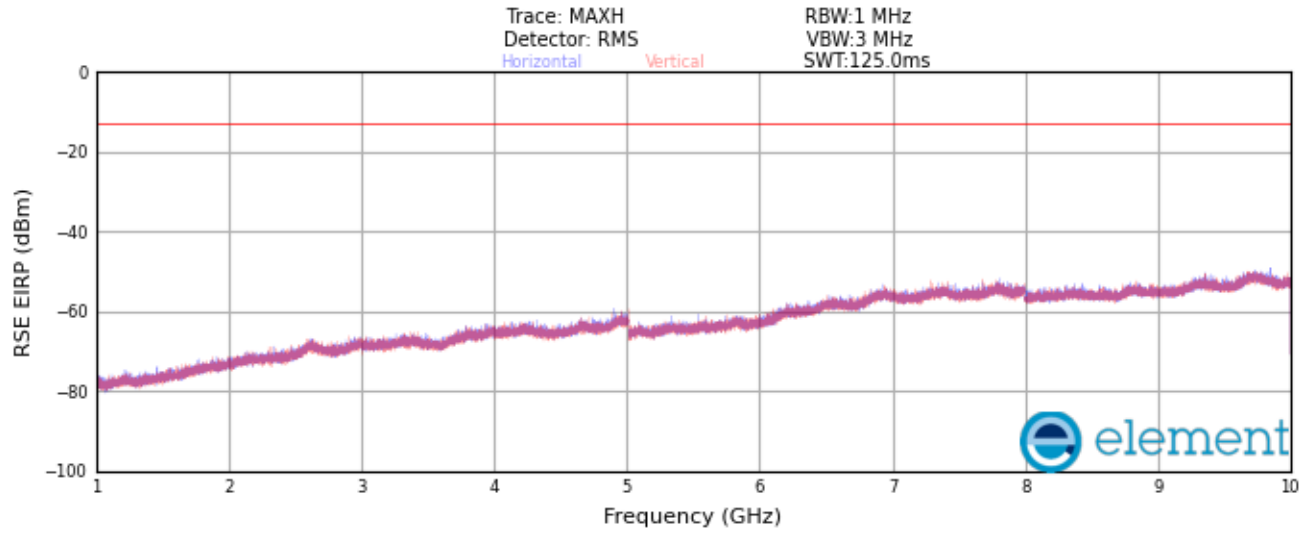
5. Spurious emissions were measured with all EUT antennas transmitting simultaneously and all antenna ports terminated.

6. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

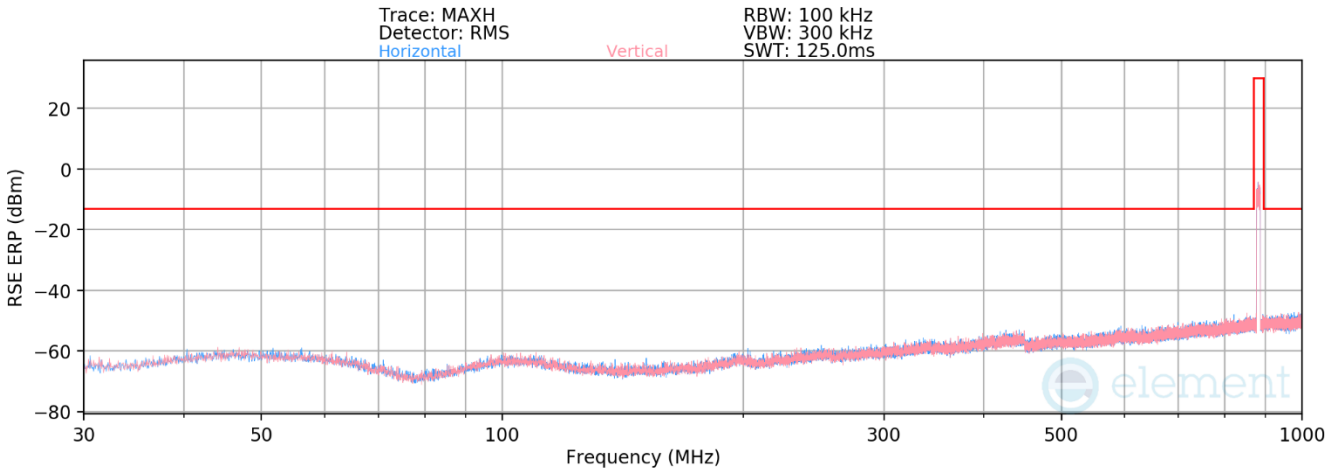
7. All modes of operation were investigated and the worst case configuration results are reported in this section.



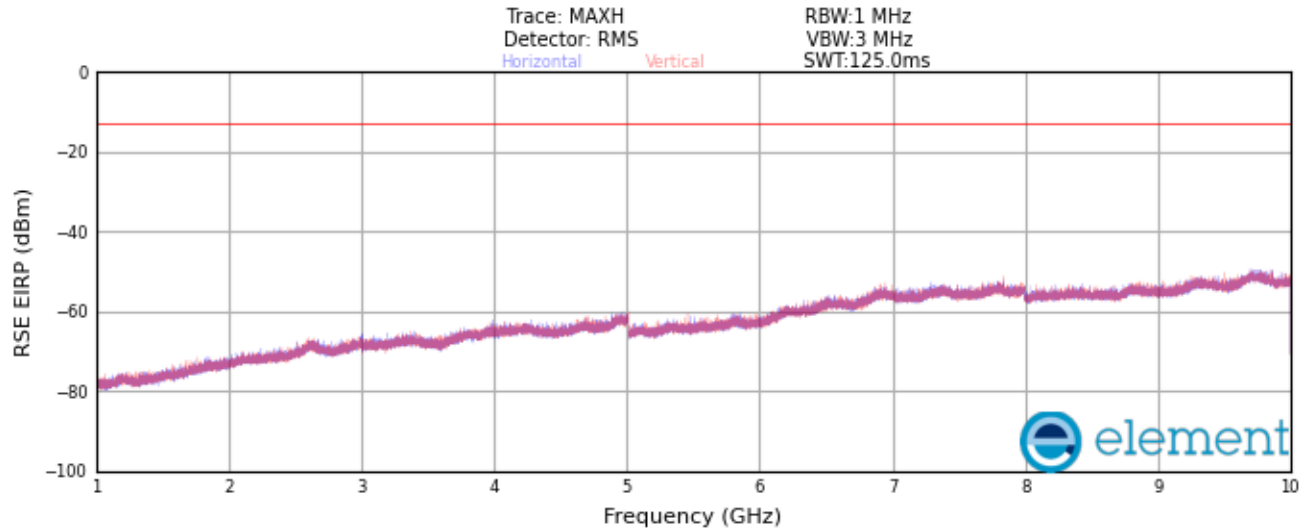
Plot 8-809. Radiated spurious emission_30 MHz to 1000 MHz (LTE B5_1C_5M_Mid Channel)



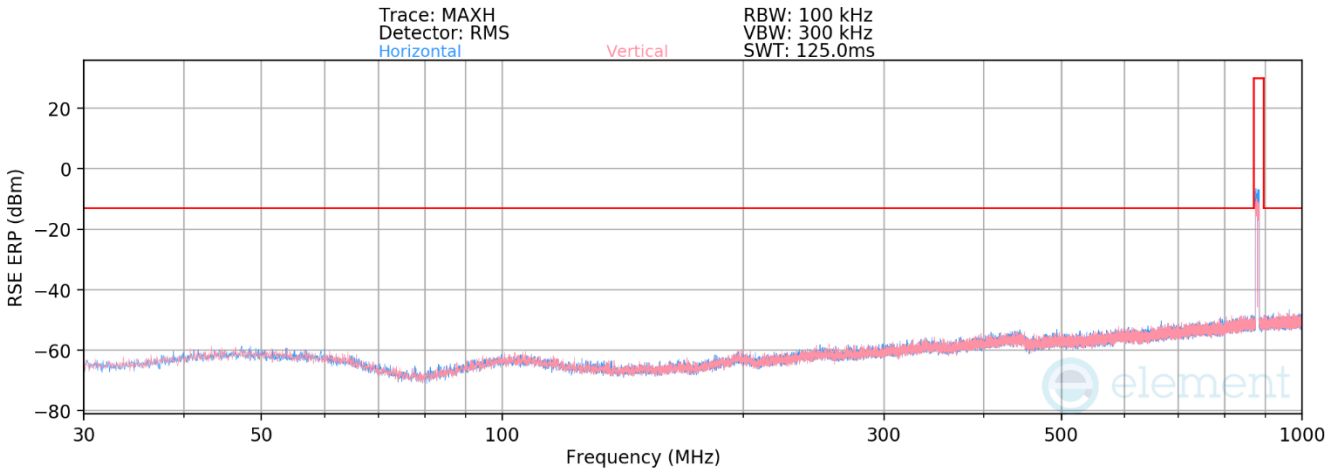
Plot 8-810. Radiated spurious emission_1 GHz to 10 GHz (LTE B5_1C_5M_Mid Channel)



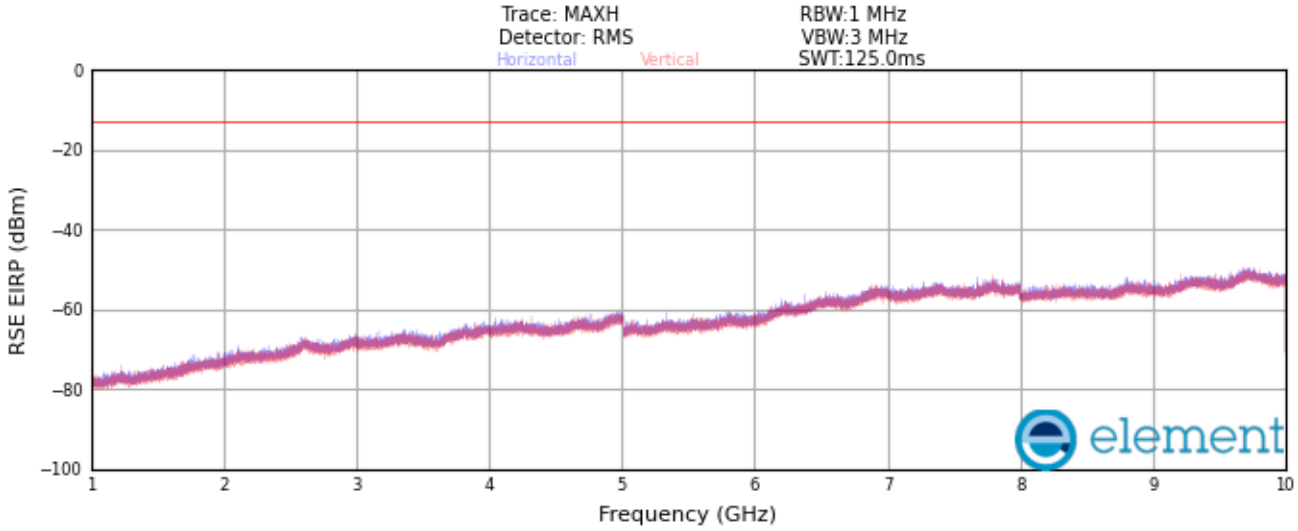
Plot 8-811. Radiated spurious emission_30 MHz to 1000 MHz (LTE B5_1C_10M_Mid Channel)



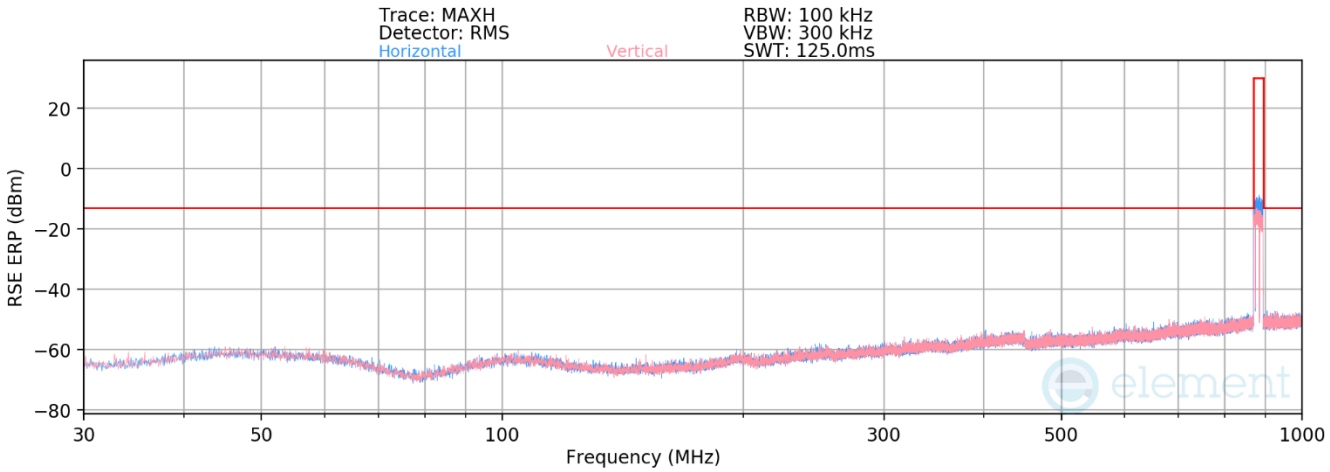
Plot 8-812. Radiated spurious emission_1 GHz to 10 GHz (LTE B5_1C_10M_Mid Channel)



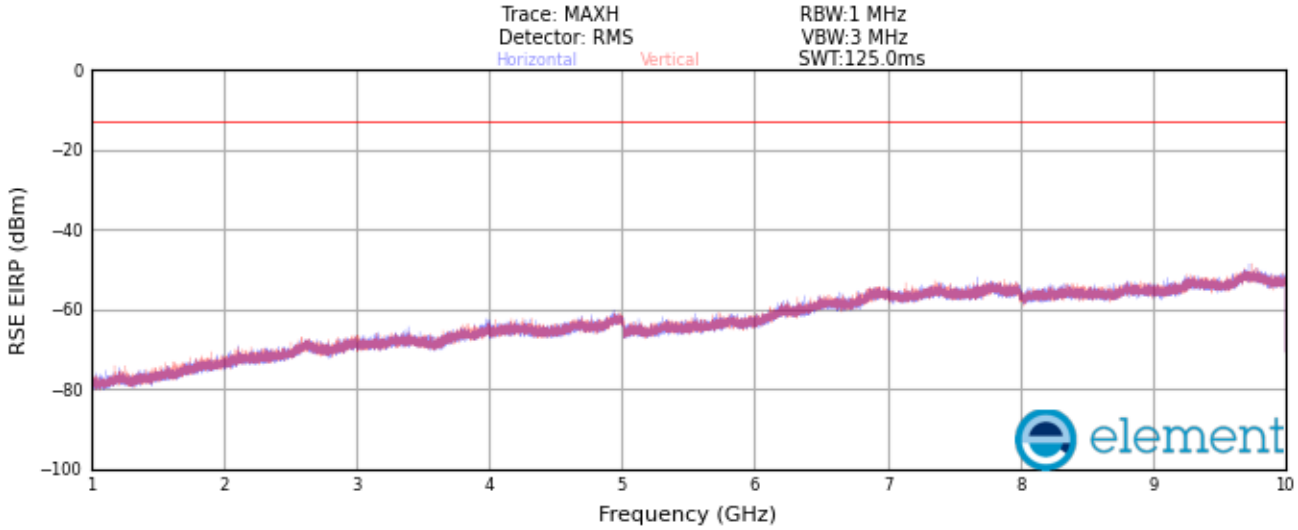
Plot 8-813. Radiated spurious emission_30 MHz to 1000 MHz (LTE B5_2C_5M+5M_Mid Channel)



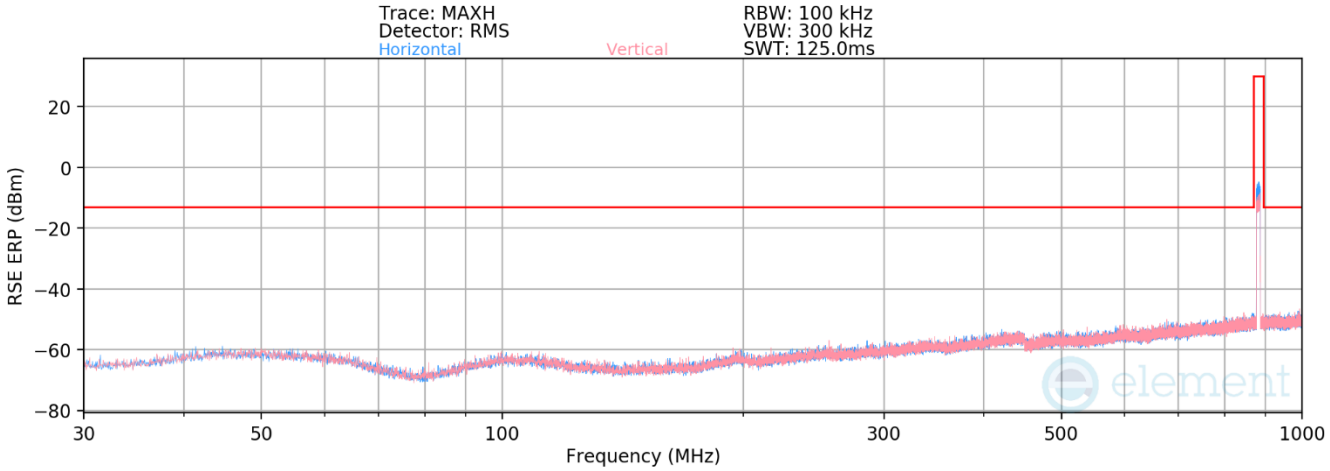
Plot 8-814. Radiated spurious emission_1 GHz to 10 GHz (LTE B5_2C_5M+5M_Mid Channel)



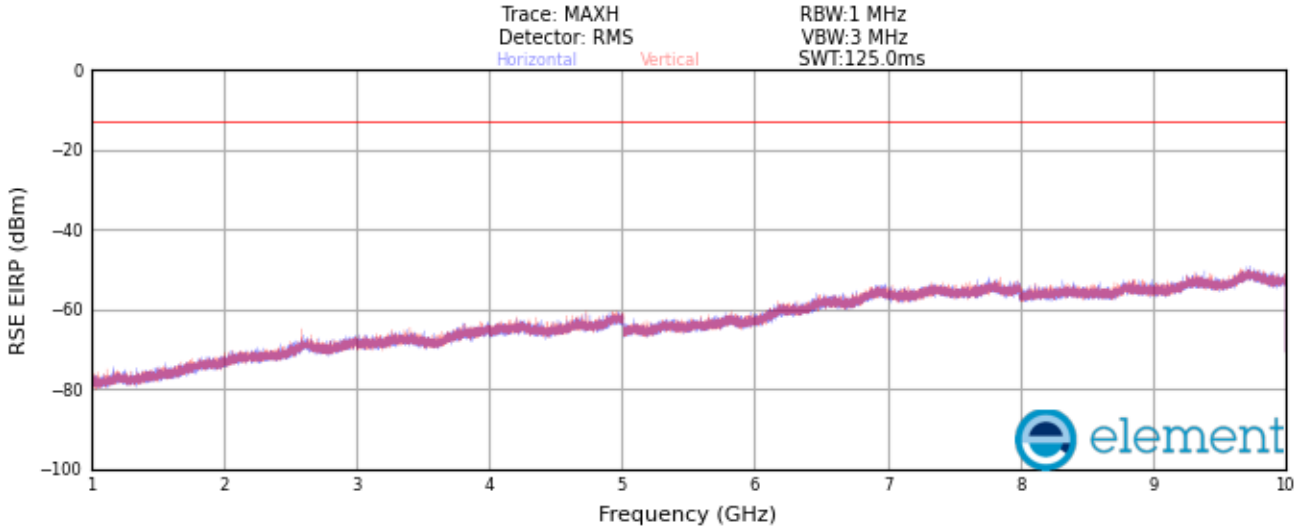
Plot 8-815. Radiated spurious emission_30 MHz to 1000 MHz (LTE B5_3C_5M+10M+10M_Mid Channel)



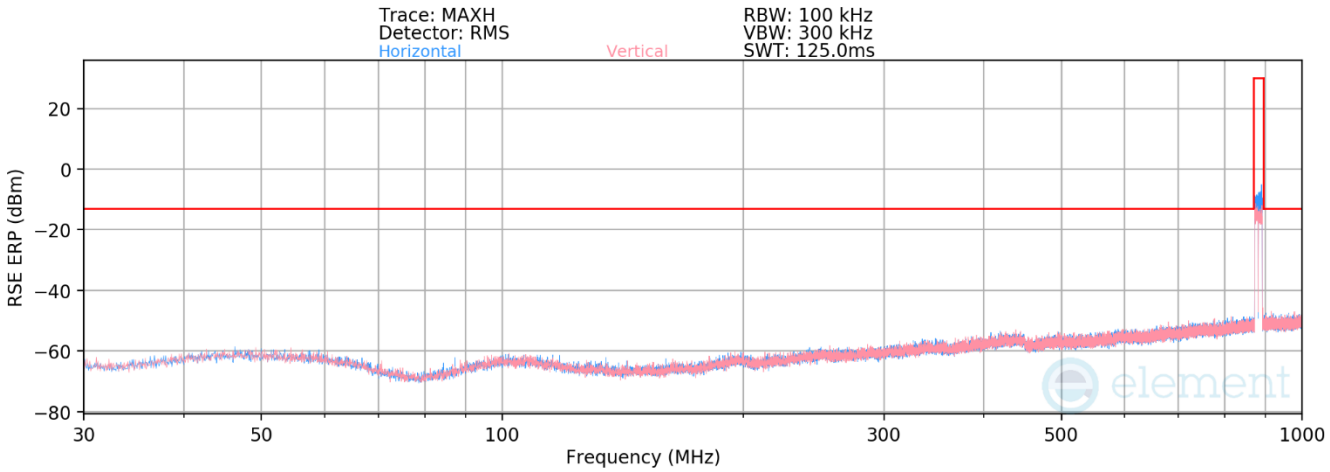
Plot 8-816. Radiated spurious emission_1 GHz to 10 GHz (LTE B5_3C_5M+10M+10M_Mid Channel)



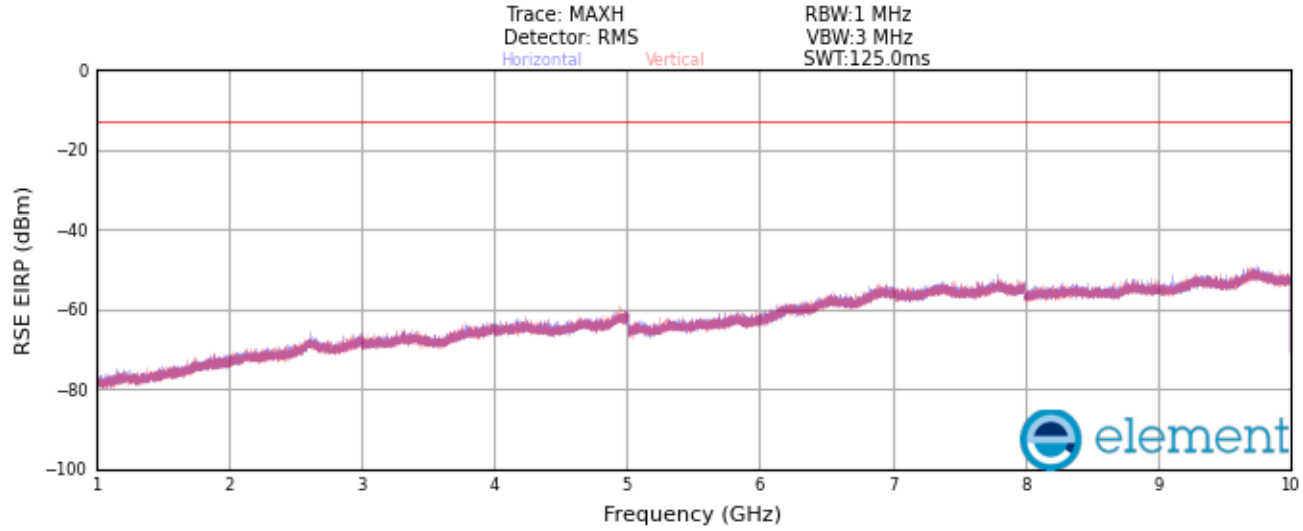
Plot 8-817. Radiated spurious emission_30 MHz to 1000 MHz (DSS B(n)5_1C_10M_Mid Channel)



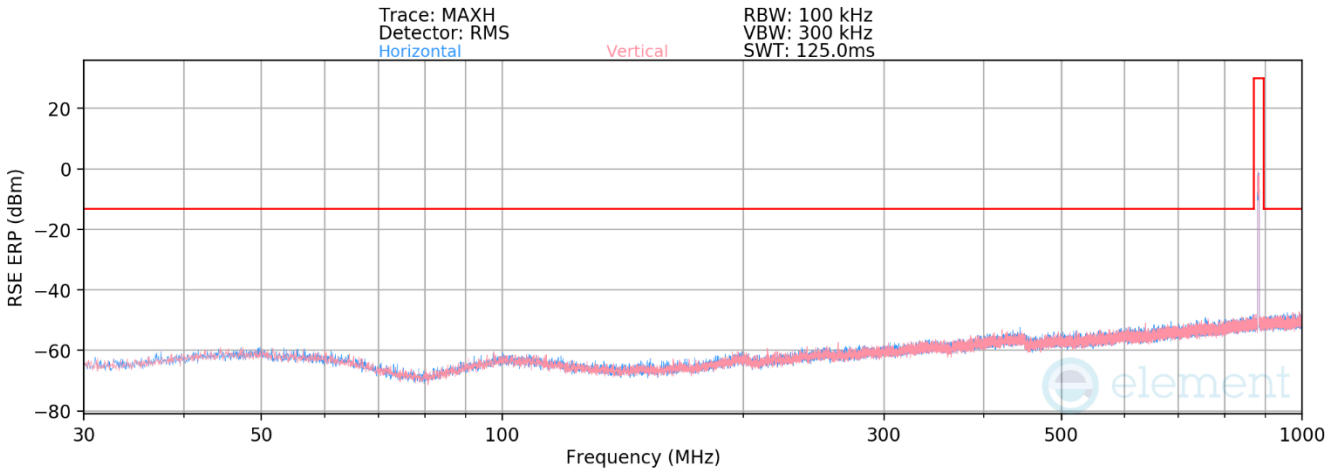
Plot 8-818. Radiated spurious emission_1 GHz to 10 GHz (DSS B(n)5_1C_10M_Mid Channel)



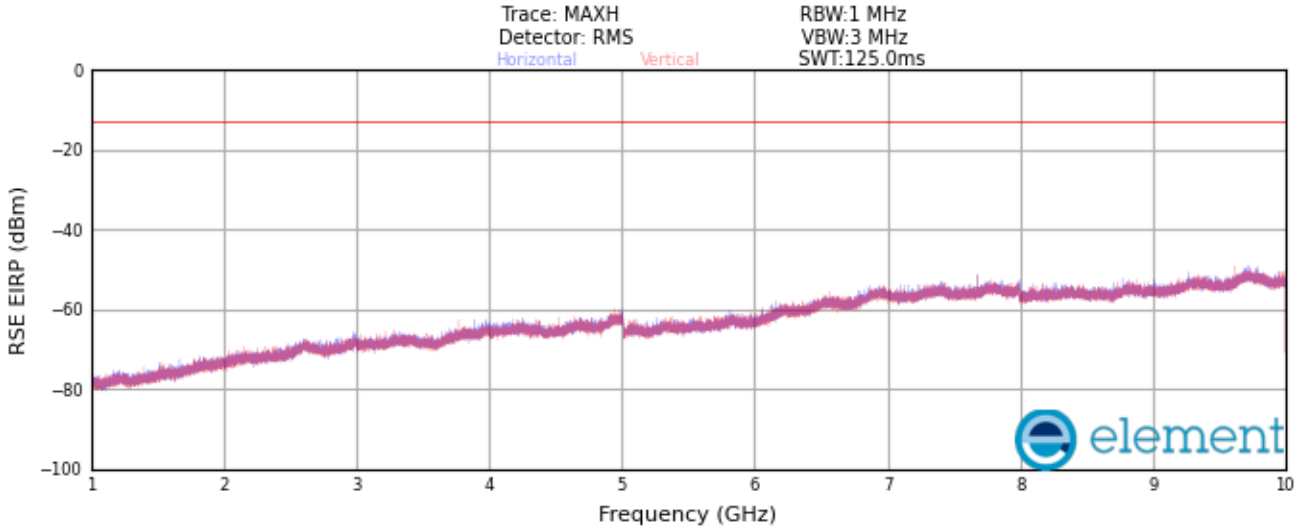
Plot 8-819. Radiated spurious emission_30 MHz to 1000 MHz (DSS B(n)5_2C_10M+10M_Mid Channel)



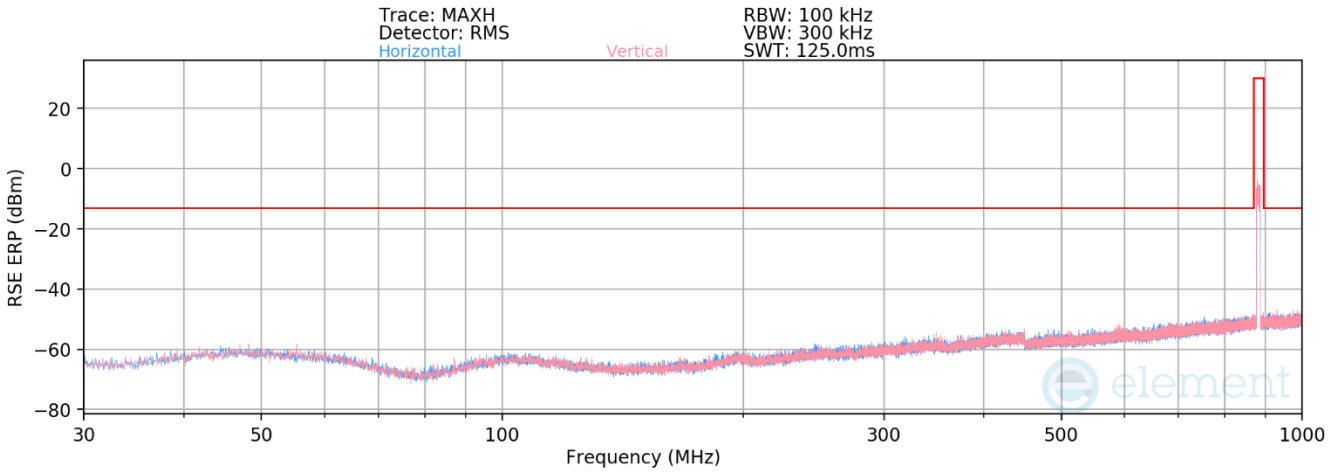
Plot 8-820. Radiated spurious emission_1 GHz to 10 GHz (DSS B(n)5_2C_10M+10M_Mid Channel)



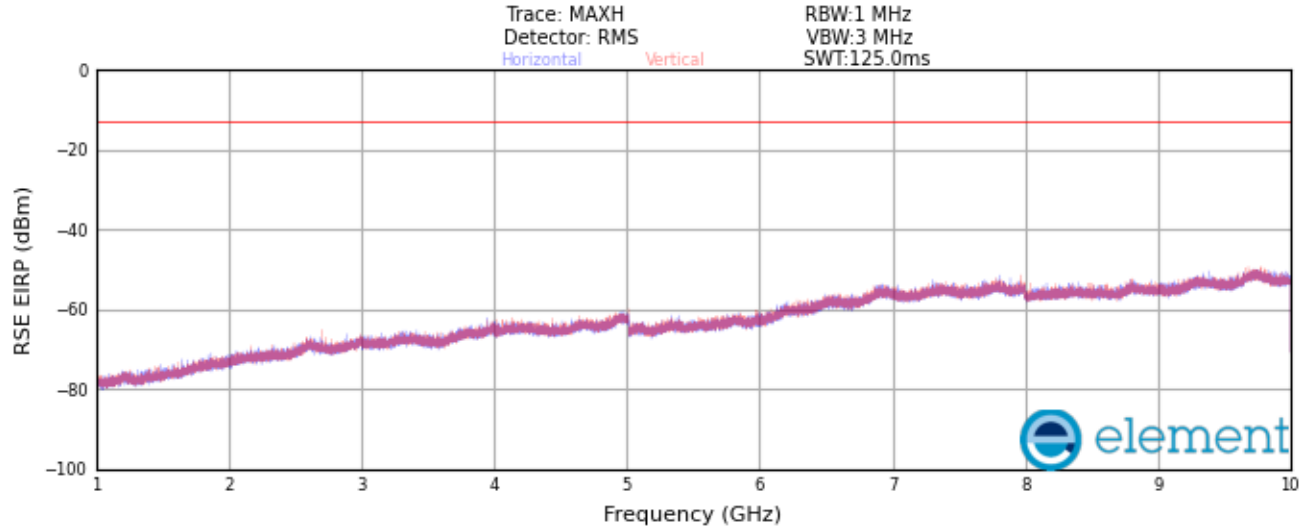
Plot 8-821. Radiated spurious emission_30 MHz to 1000 MHz (NR n5_1C_5M_Mid Channel)



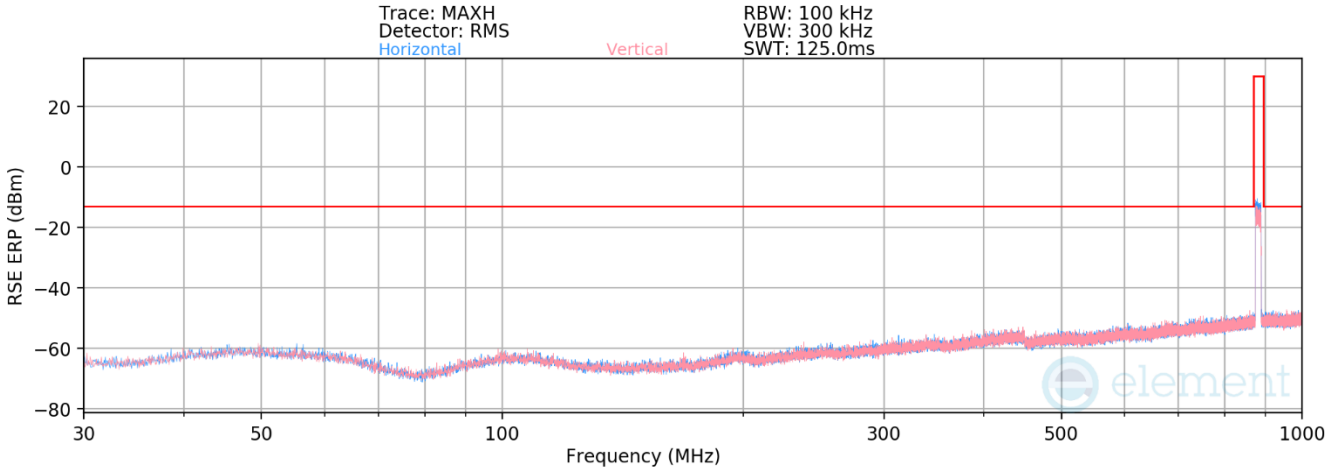
Plot 8-822. Radiated spurious emission_1 GHz to 10 GHz (NR n5_1C_5M_Mid Channel)



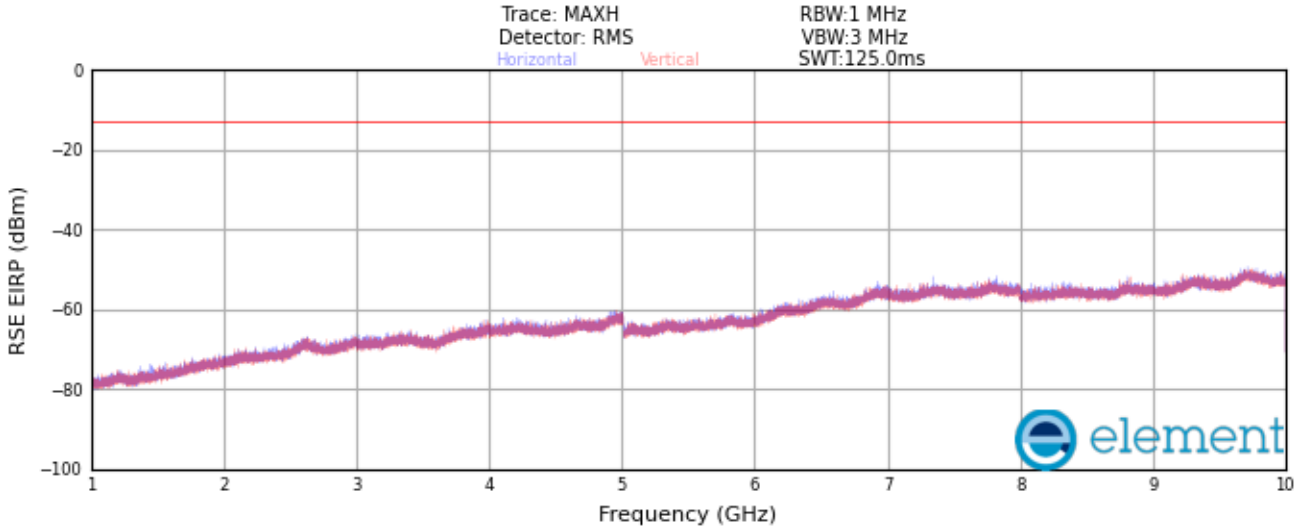
Plot 8-823. Radiated spurious emission_30 MHz to 1000 MHz (NR n5_1C_10M_Mid Channel)



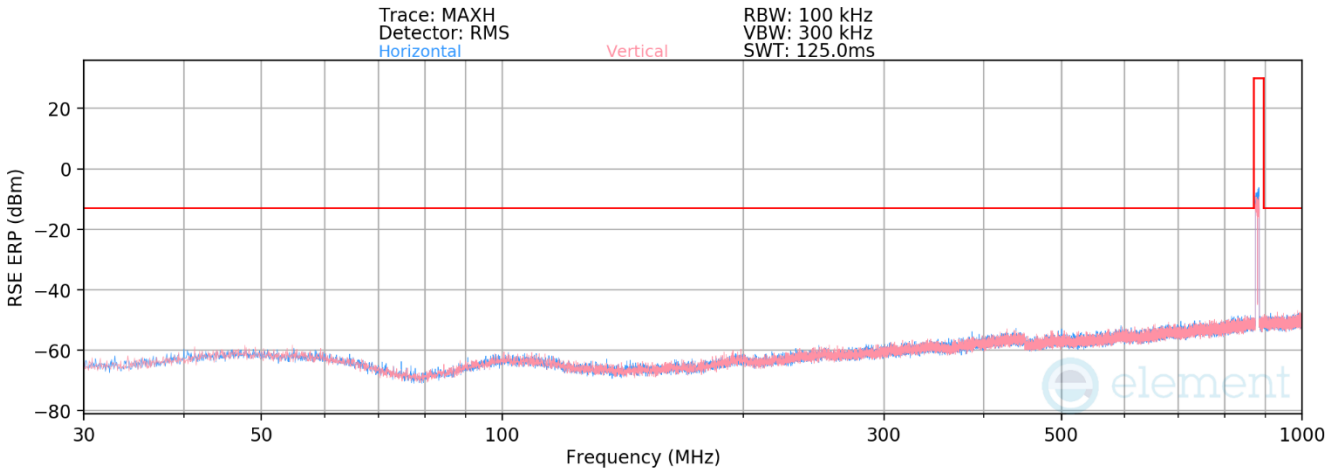
Plot 8-824. Radiated spurious emission_1 GHz to 10 GHz (NR n5_1C_10M_Mid Channel)



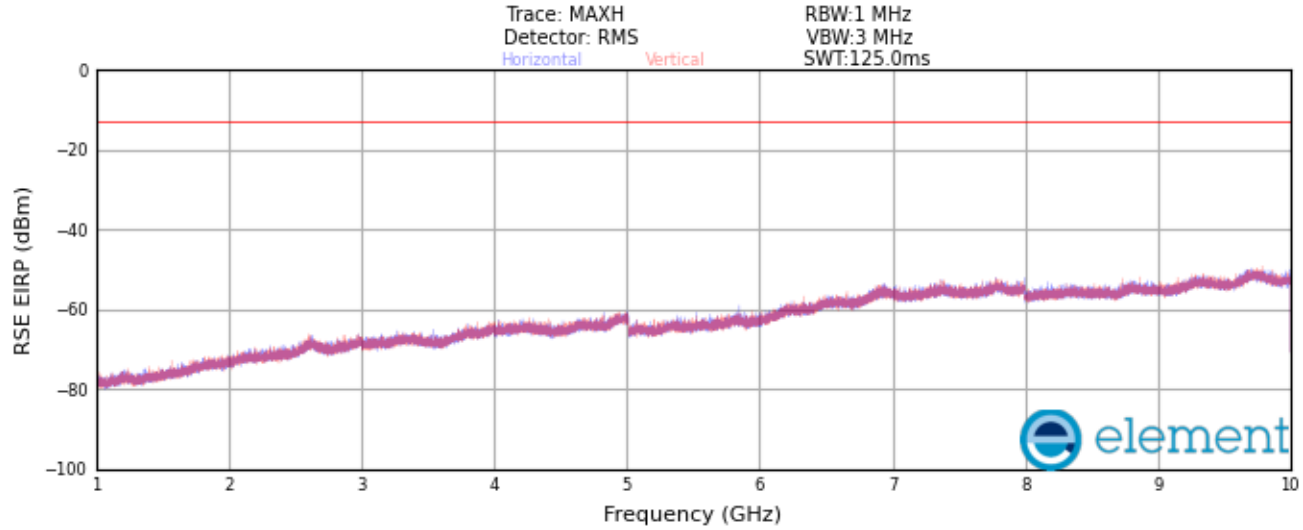
Plot 8-825. Radiated spurious emission_30 MHz to 1000 MHz (NR n5_1C_15M_Mid Channel)



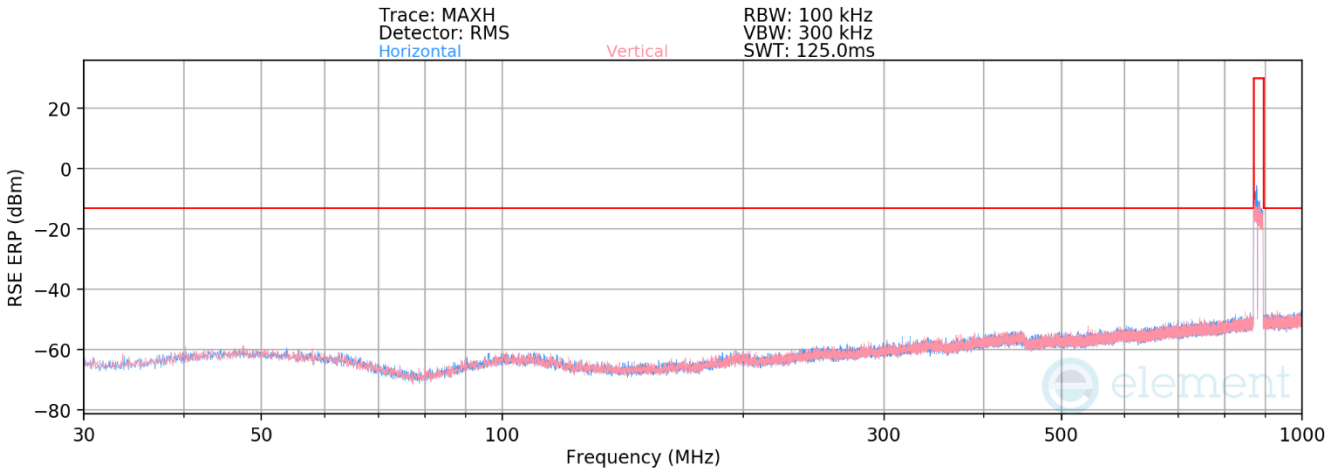
Plot 8-826. Radiated spurious emission_1 GHz to 10 GHz (NR n5_1C_15M_Mid Channel)



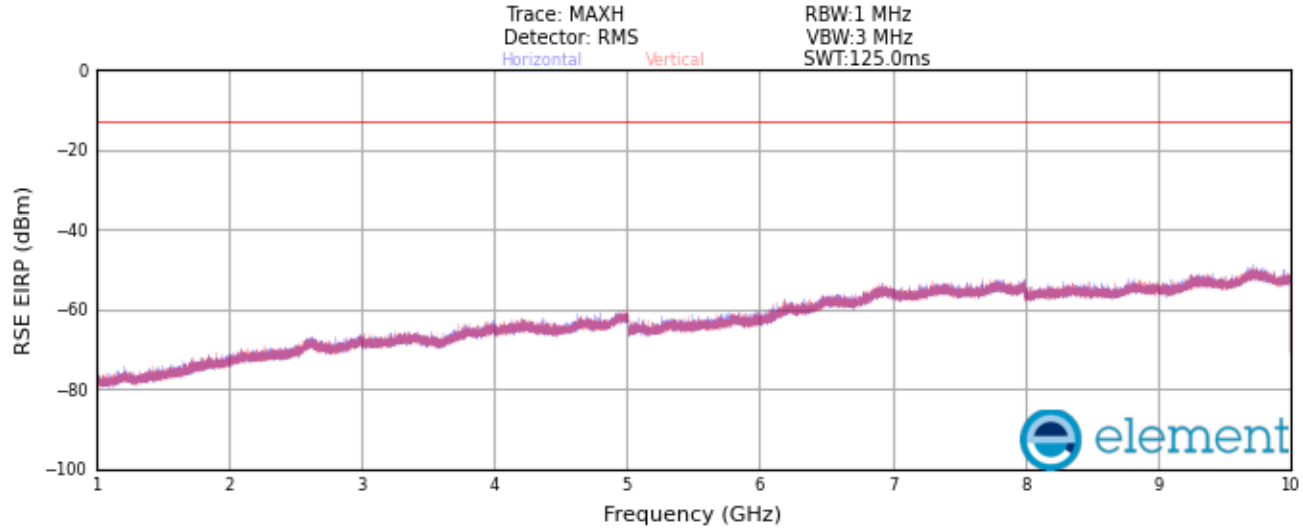
Plot 8-827. Radiated spurious emission_30 MHz to 1000 MHz (NR n5_2C_5M+5M_Mid Channel)



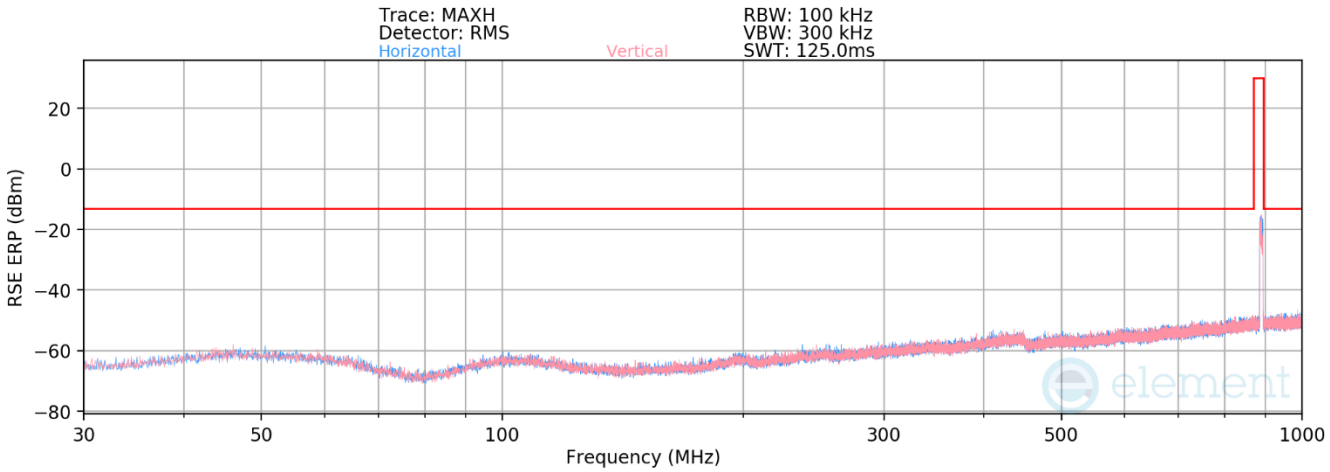
Plot 8-828. Radiated spurious emission_1 GHz to 10 GHz (NR n5_2C_5M+5M _Mid Channel)



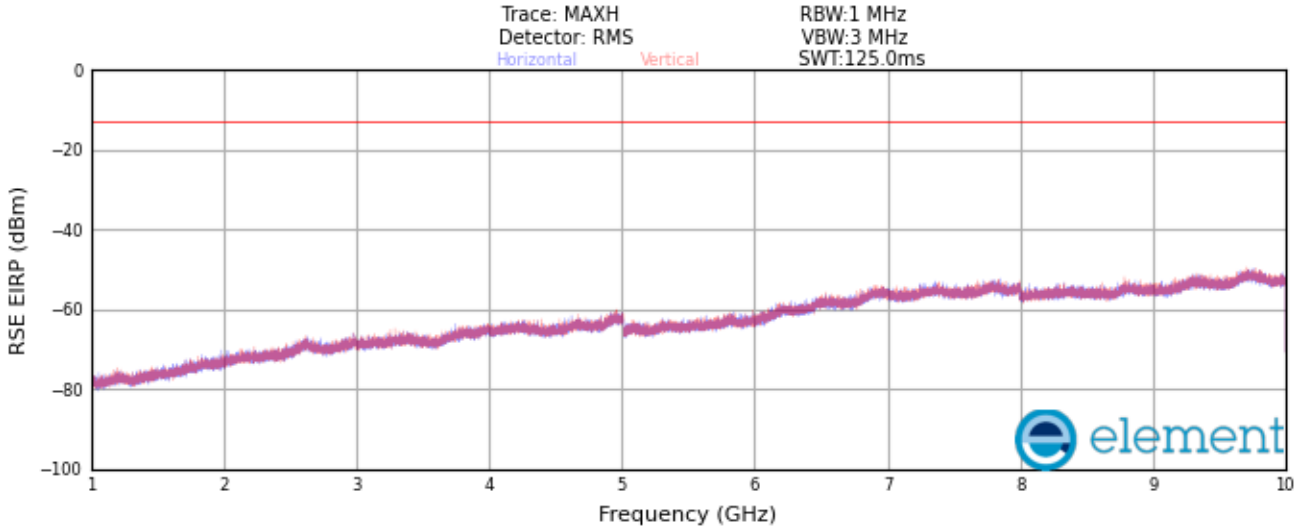
Plot 8-829. Radiated spurious emission_30 MHz to 1000 MHz (NR n5_2C_10M+15M _Mid Channel)



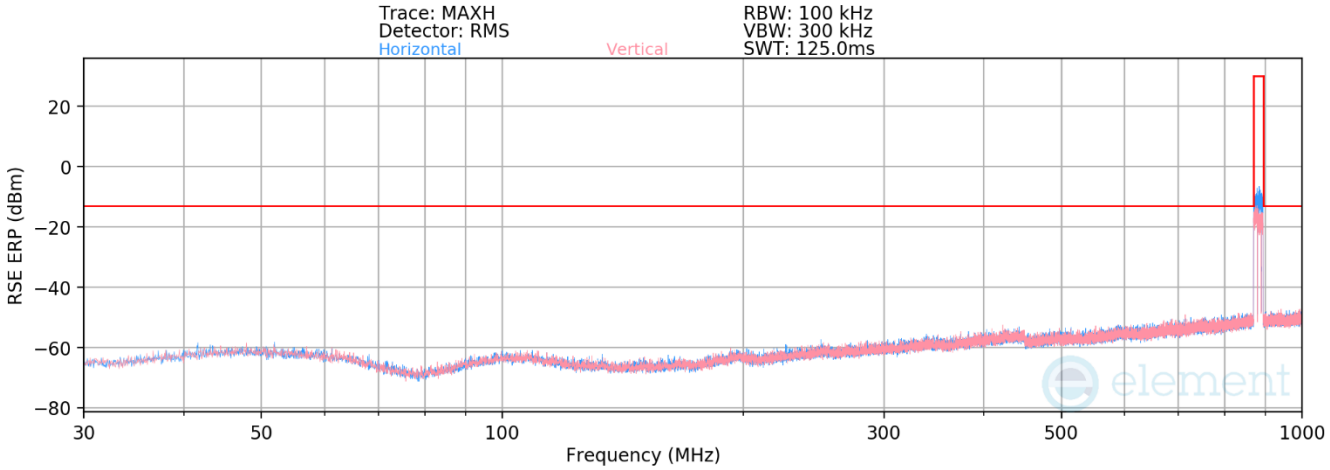
Plot 8-830. Radiated spurious emission_1 GHz to 10 GHz (NR n5_2C_10M+15M Channel)



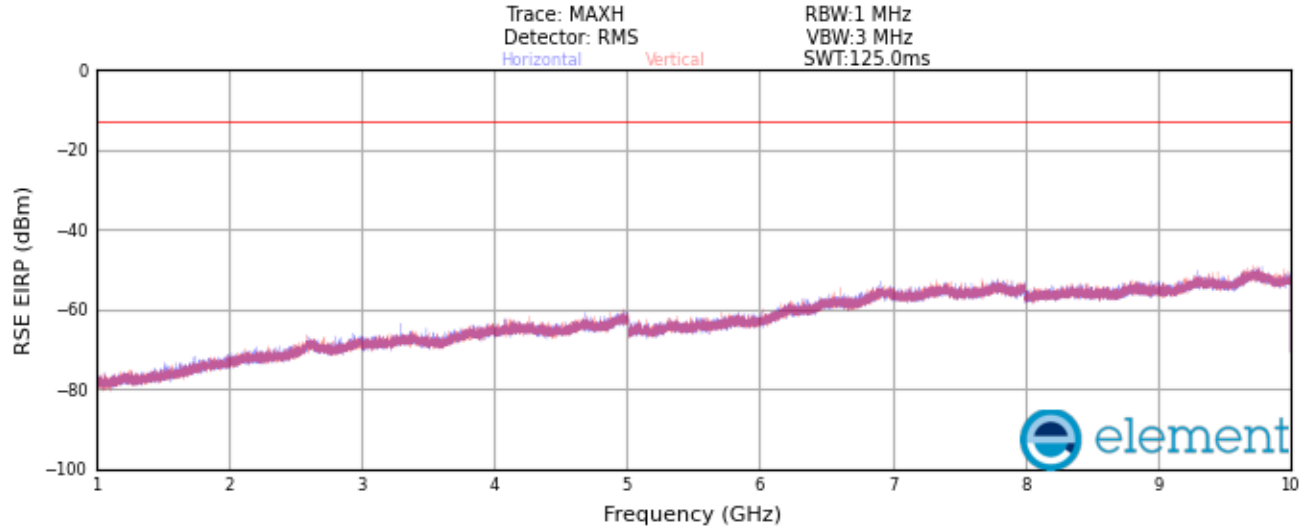
Plot 8-831. Radiated spurious emission_30 MHz to 1000 MHz (MSR 2C_DSS B(n)5_1C_10M+LTE B5_1C_5M_Mid Channel)



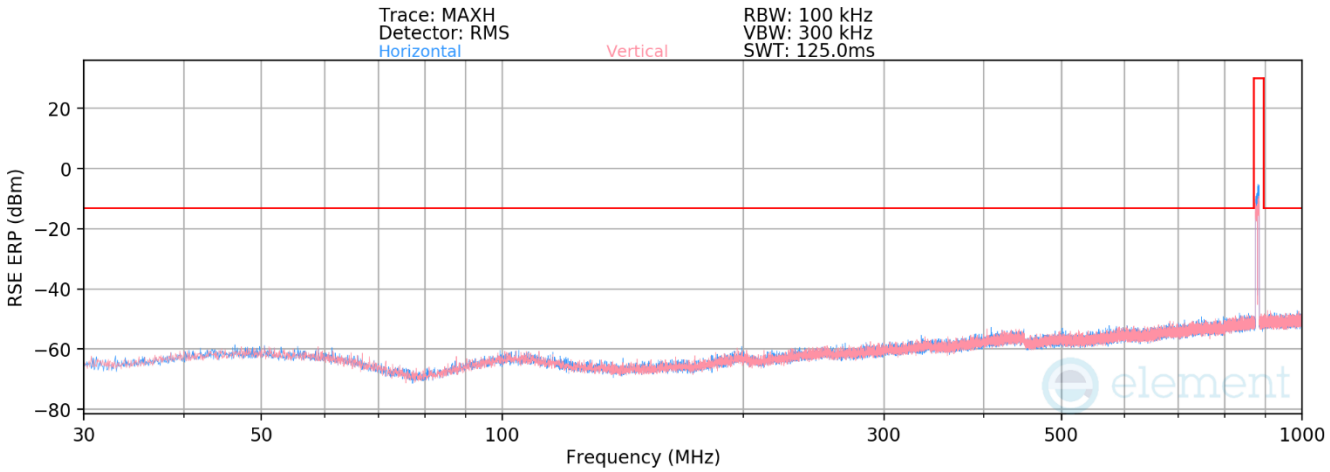
Plot 8-832. Radiated spurious emission_1 GHz to 10 GHz (MSR 2C_DSS B(n)5_1C_10M+LTE B5_1C_5M_ Mid Channel)



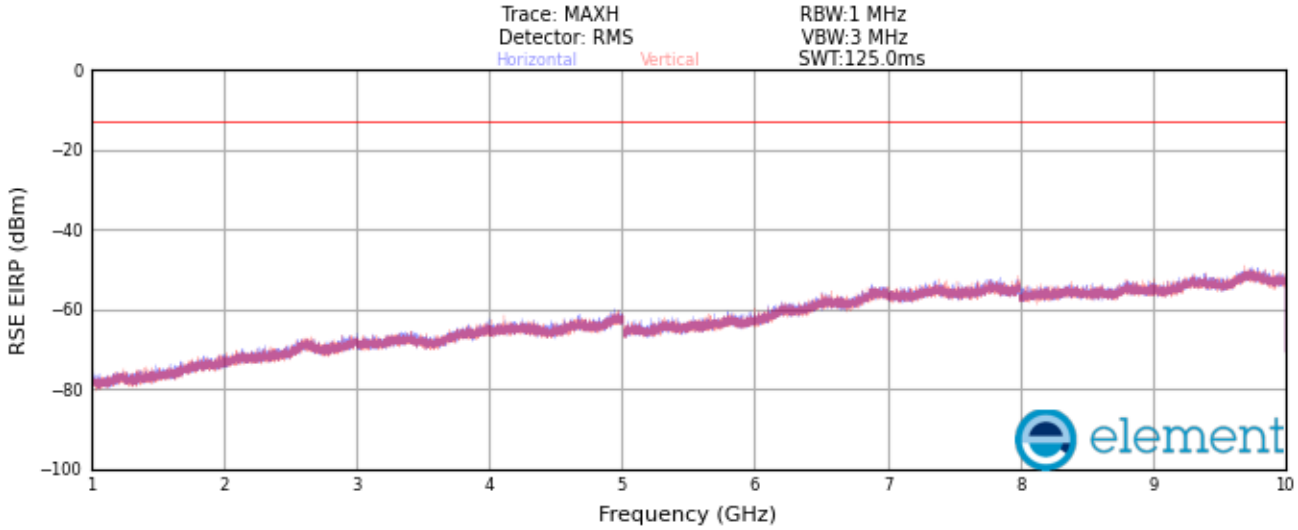
Plot 8-833. Radiated spurious emission_30 MHz to 1000 MHz
(MSR 3C_DSS B(n)5_2C_10M+10M+LTE B5_1C_5M _Mid Channel)



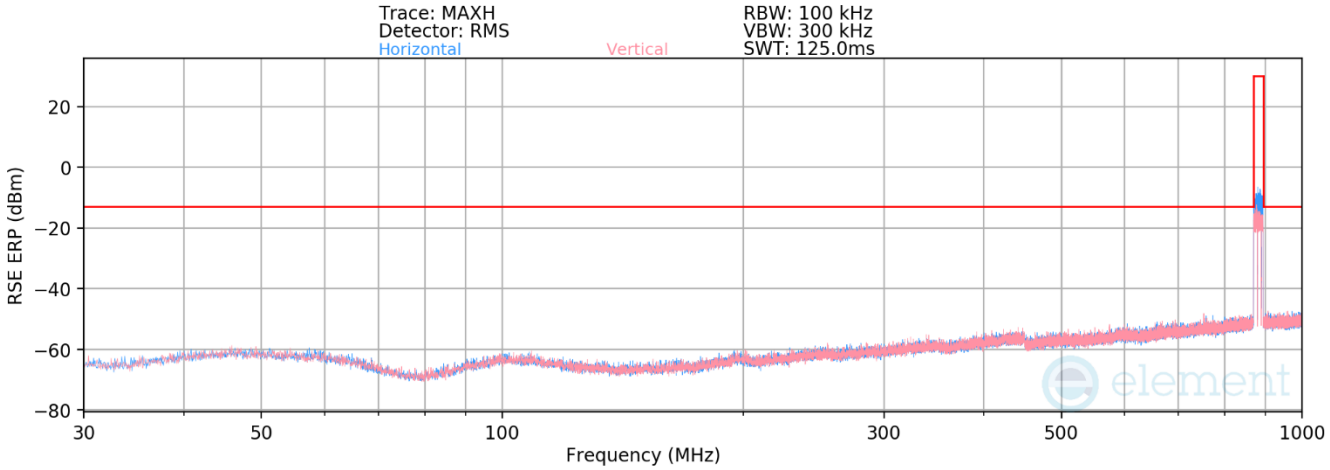
Plot 8-834. Radiated spurious emission_1 GHz to 10 GHz
(MSR 3C_DSS B(n)5_2C_10M+10M+LTE B5_1C_5M _Mid Channel)



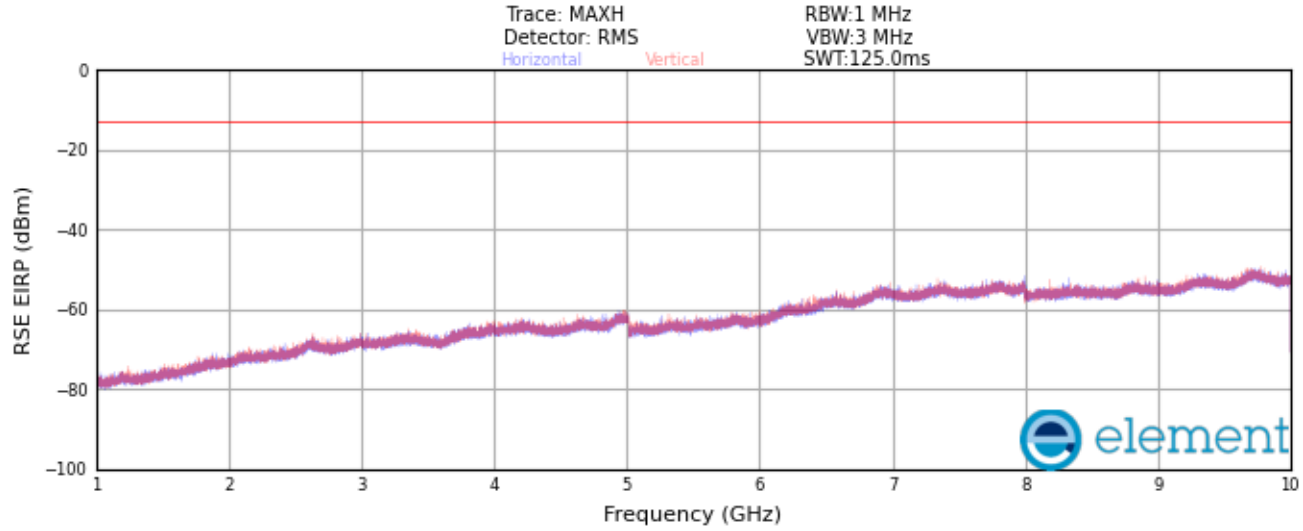
Plot 8-835. Radiated spurious emission_30 MHz to 1000 MHz (MSR 2C_NR n5_1C_5M+LTE B5_1C_5M_Mid Channel)



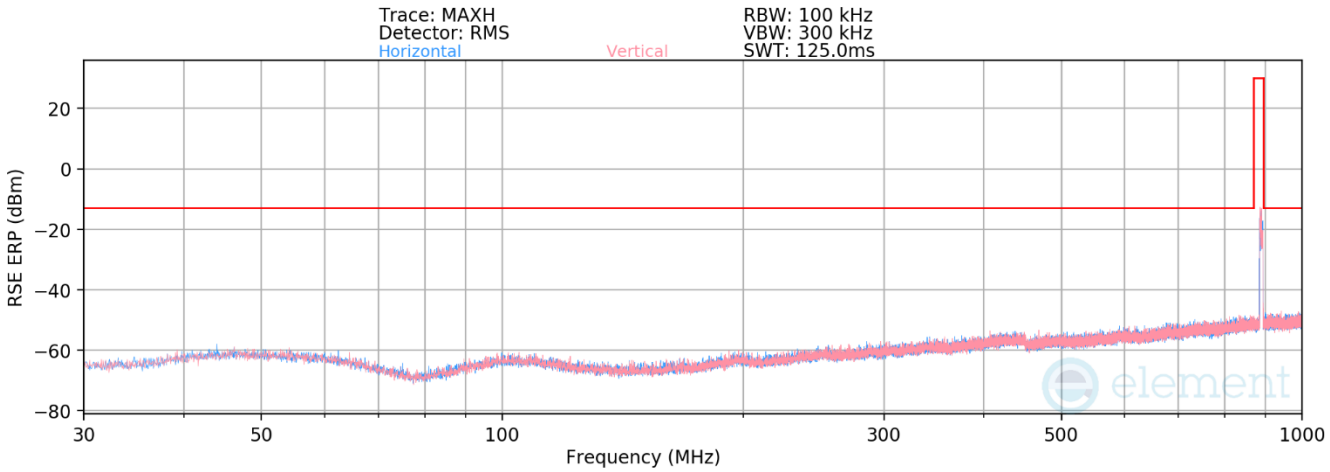
Plot 8-836. Radiated spurious emission_1 GHz to 10 GHz (MSR 2C_NR n5_1C_5M+LTE B5_1C_5M_Mid Channel)



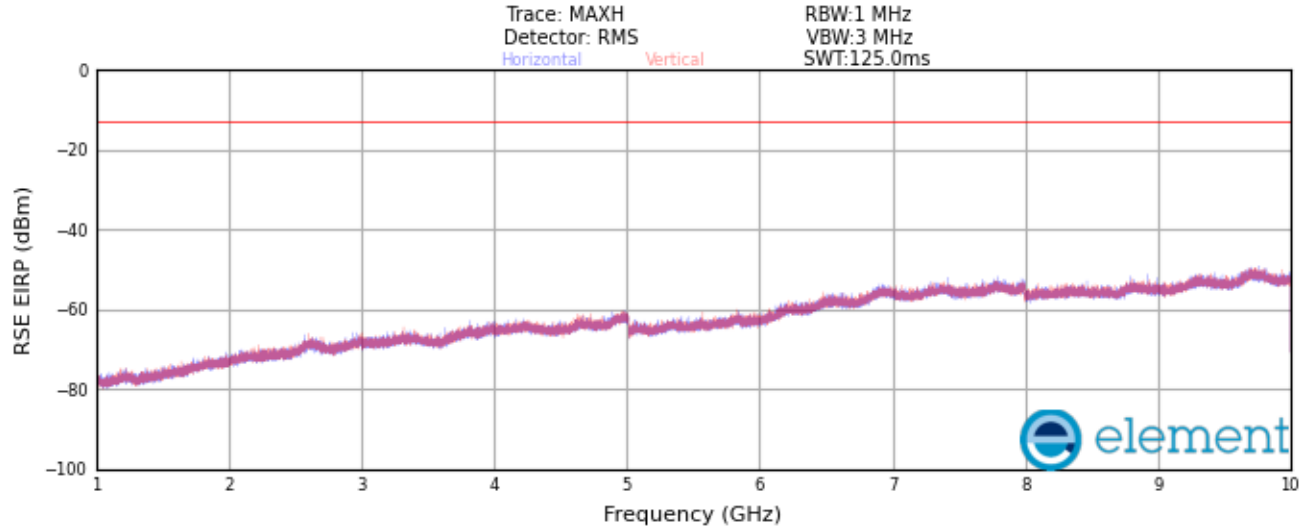
Plot 8-837. Radiated spurious emission_30 MHz to 1000 MHz
(MSR 3C_NR n5_2C_10M+10M+LTE B5_1C_5M_Mid Channel)



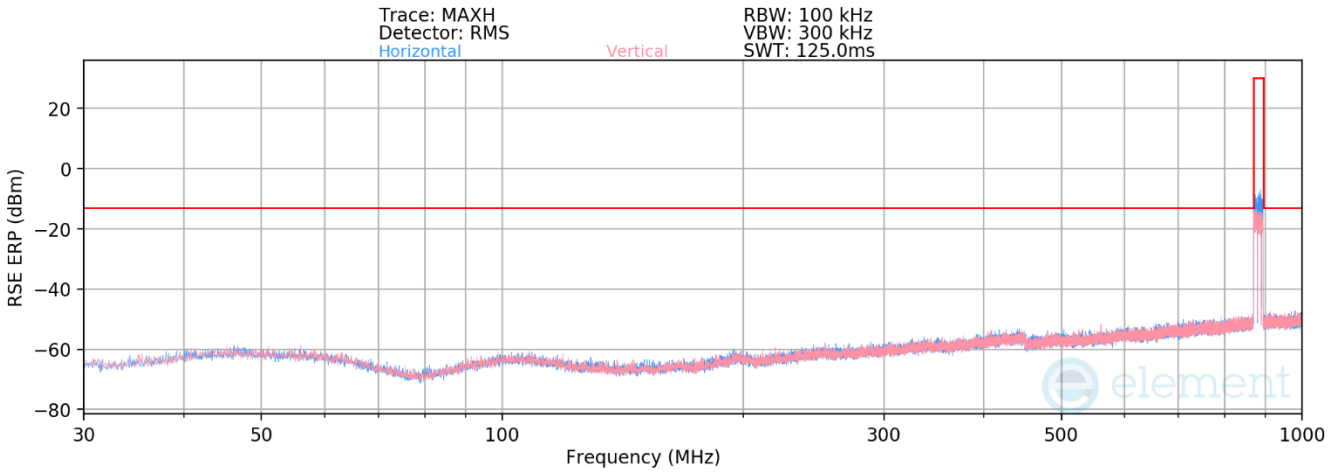
Plot 8-838. Radiated spurious emission_1 GHz to 10 GHz
(MSR 3C_NR n5_2C_10M+10M+LTE B5_1C_5M_Mid Channel)



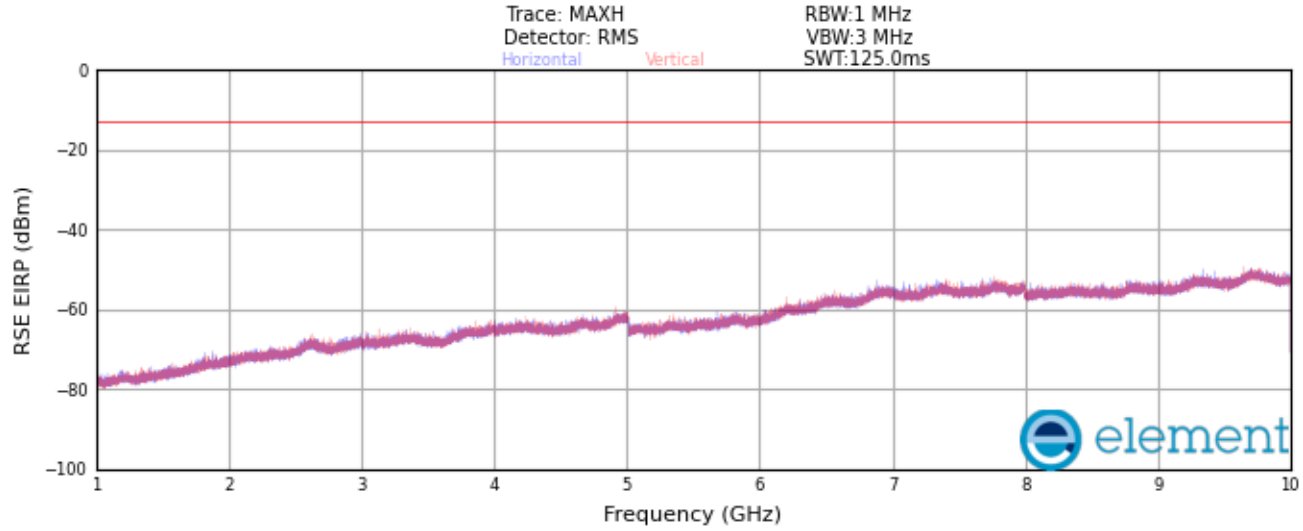
Plot 8-839. Radiated spurious emission_30 MHz to 1000 MHz (MSR 2C_DSS B(n)5_1C_10M+NR n5_1C_5M _Mid Channel)



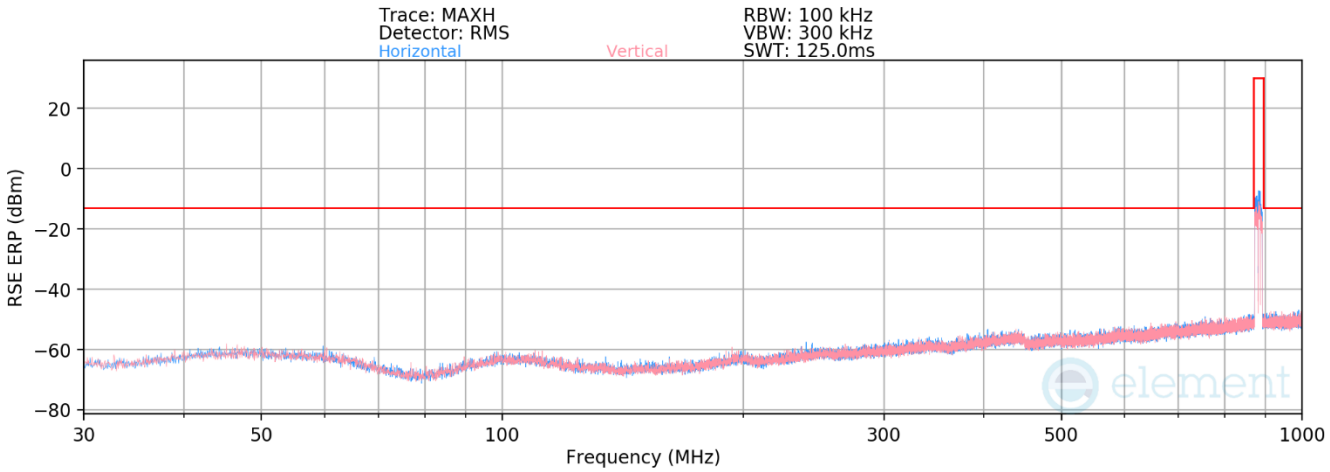
Plot 8-840. Radiated spurious emission_1 GHz to 10 GHz (MSR 2C_DSS B(n)5_1C_10M+NR n5_1C_5M _Mid Channel)



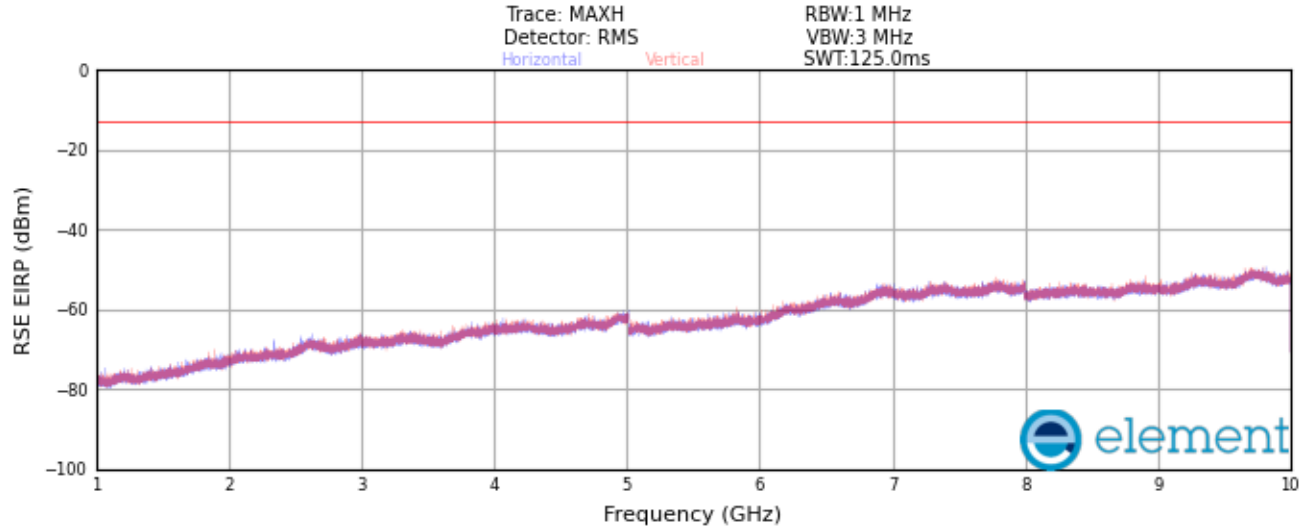
Plot 8-841. Radiated spurious emission_30 MHz to 1000 MHz (MSR 2C_DSS B(n)5_1C_10M+NR n5_1C_15M _Mid Channel)



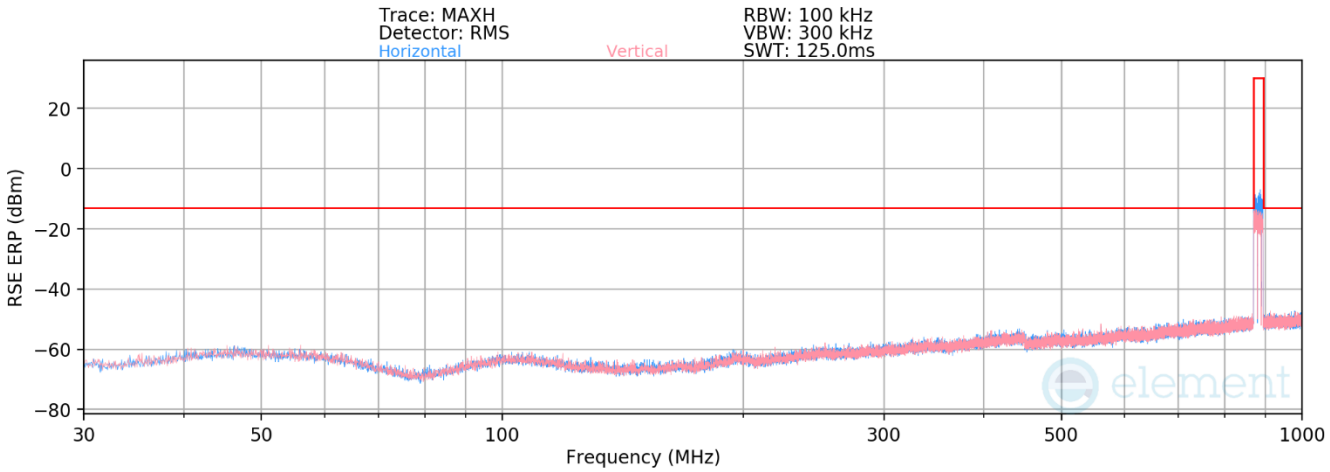
Plot 8-842. Radiated spurious emission_1 GHz to 10 GHz (MSR 2C_DSS B(n)5_1C_10M+NR n5_1C_15M _Mid Channel)



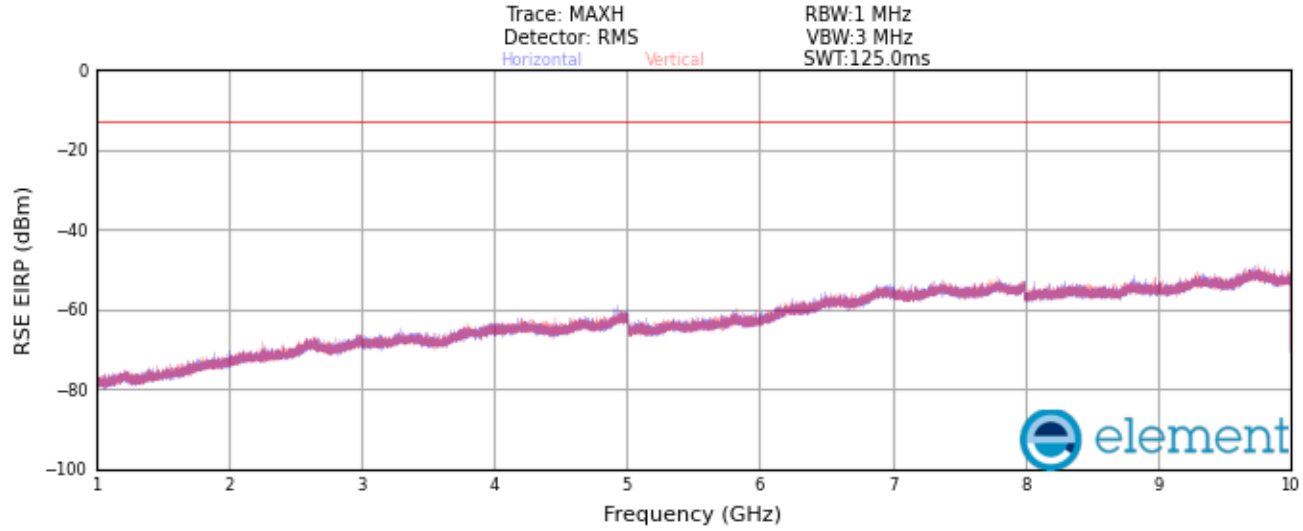
Plot 8-843. Radiated spurious emission_30 MHz to 1000 MHz
(MSR 3C_DSS B(n)5_1C_10M+NR n5_1C_5M+LTE B5_1C_5M _Mid Channel)



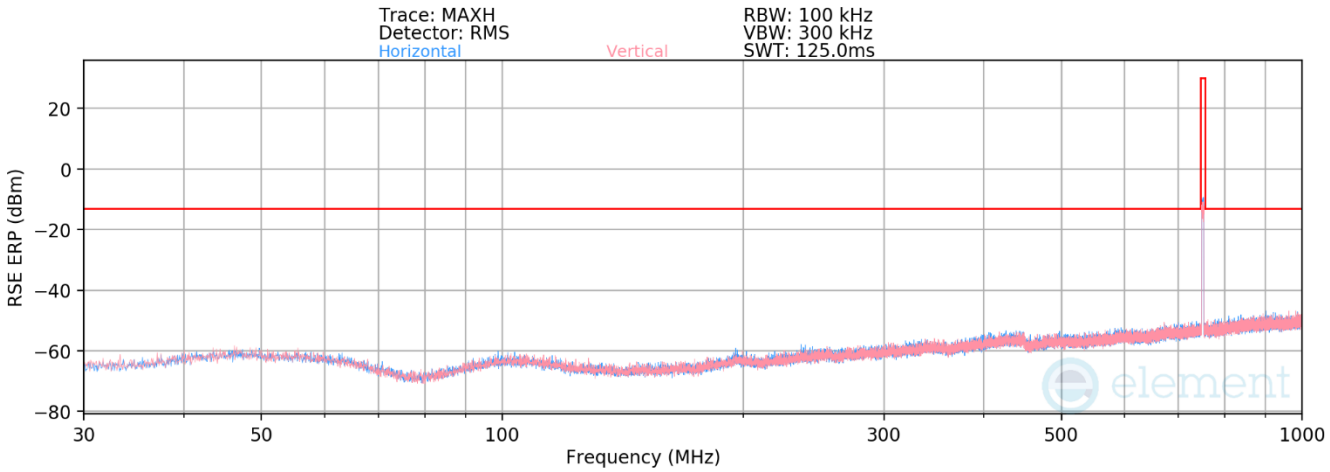
Plot 8-844. Radiated spurious emission_1 GHz to 10 GHz
(MSR 3C_DSS B(n)5_1C_10M+NR n5_1C_5M+LTE B5_1C_5M _Mid Channel)



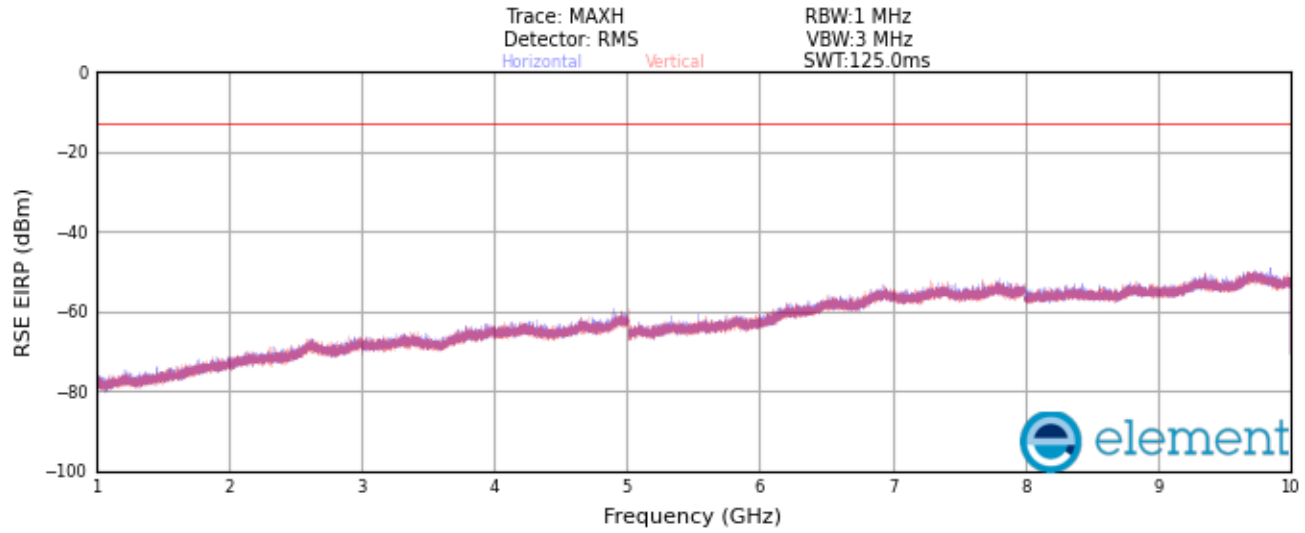
Plot 8-845. Radiated spurious emission_30 MHz to 1000 MHz
(MSR 3C_DSS B(n)5_1C_10M+NR n5_1C_10M+LTE B5_1C_5M _Mid Channel)



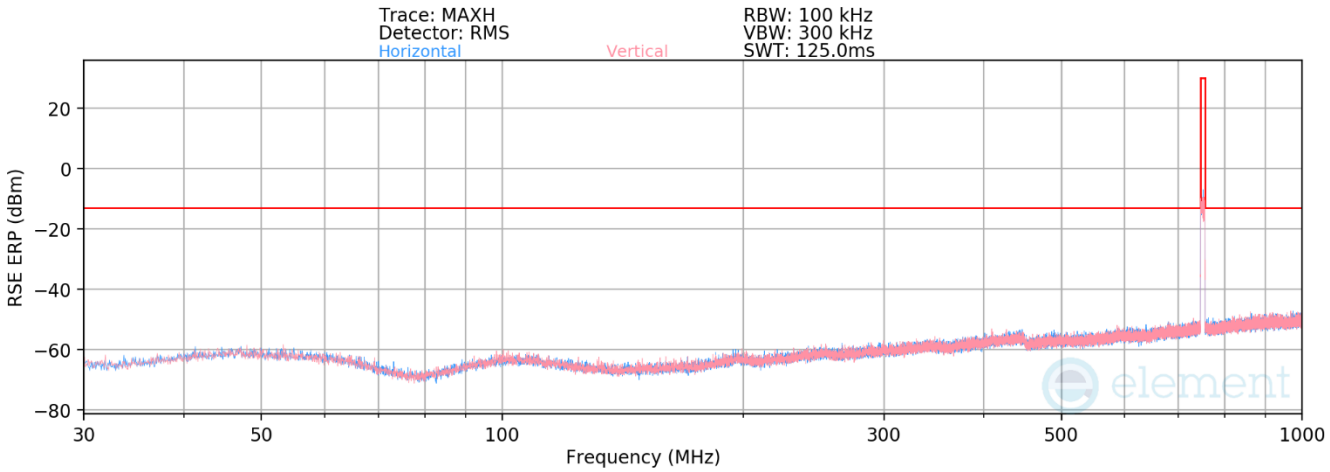
Plot 8-846. Radiated spurious emission_1 GHz to 10 GHz
(MSR 3C_DSS B(n)5_1C_10M+NR n5_1C_10M+LTE B5_1C_5M _Mid Channel)



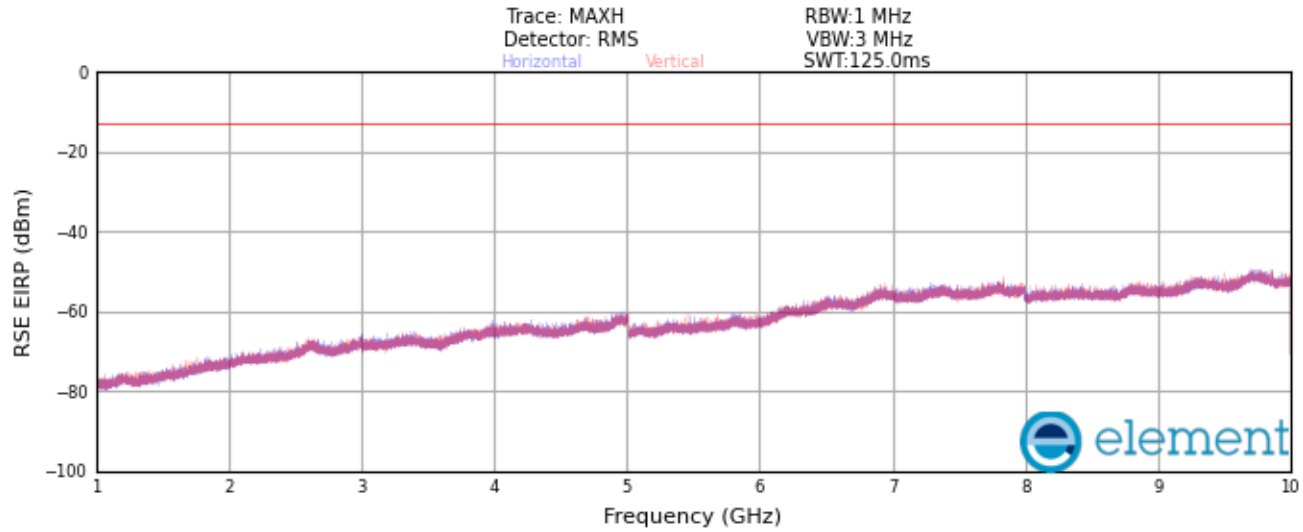
Plot 8-847. Radiated spurious emission_30 MHz to 1000 MHz (LTE B13_1C_5M _Mid Channel)



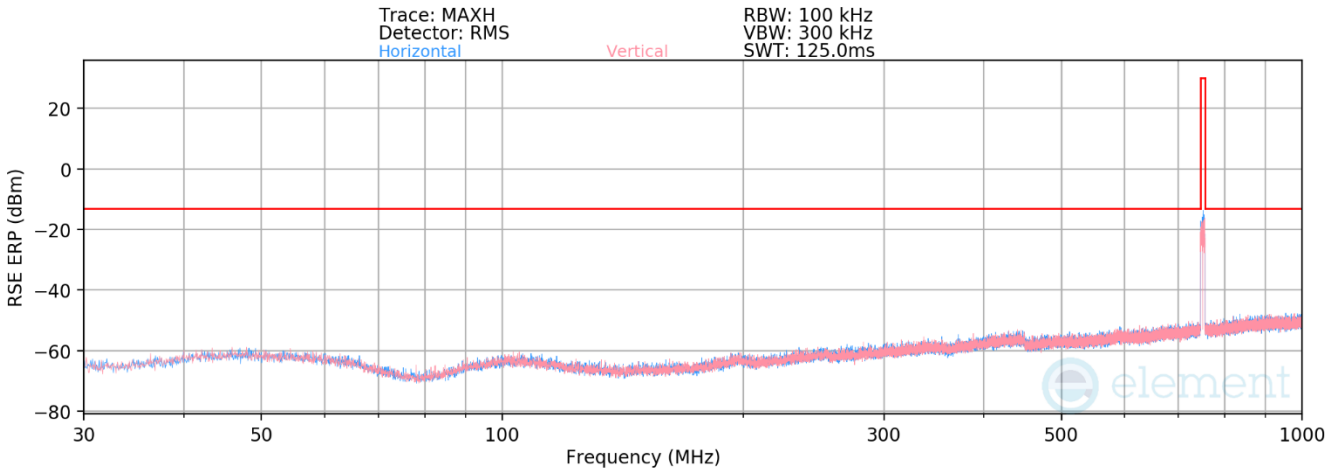
Plot 8-848. Radiated spurious emission_1 GHz to 10 GHz (LTE B13_1C_5M _Mid Channel)



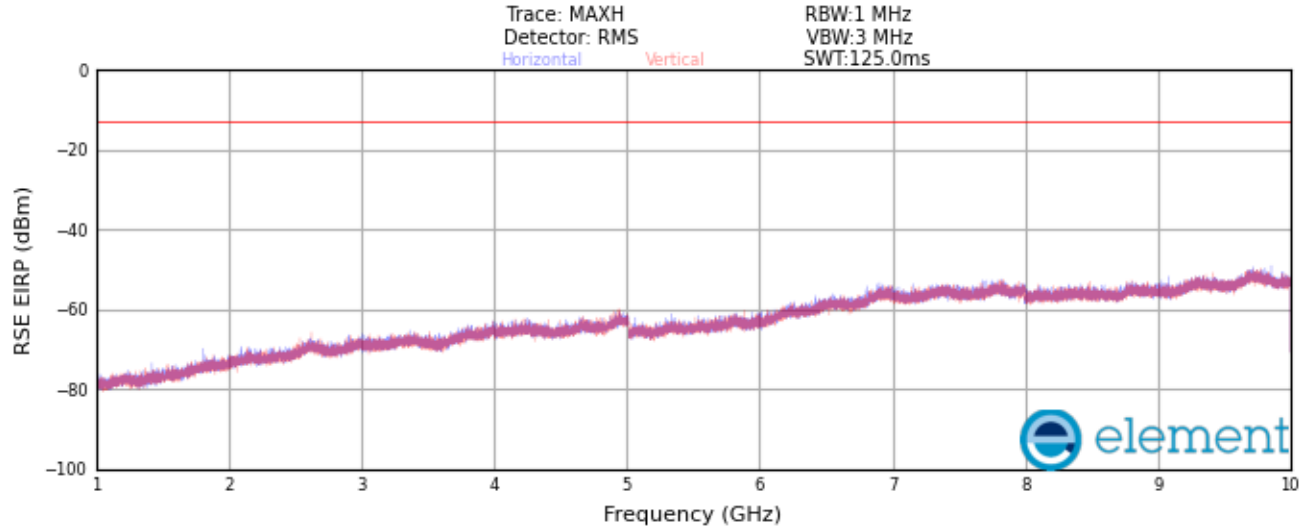
Plot 8-849. Radiated spurious emission_30 MHz to 1000 MHz (LTE B13_1C_10M _Mid Channel)



Plot 8-850. Radiated spurious emission_1 GHz to 10 GHz (LTE B13_1C_10M _Mid Channel)



Plot 8-851. Radiated spurious emission_30 MHz to 1000 MHz (LTE B13_2C_5M+5M _Mid Channel)



Plot 8-852. Radiated spurious emission_1 GHz to 10 GHz (LTE B13_2C_5M+5M _Mid Channel)