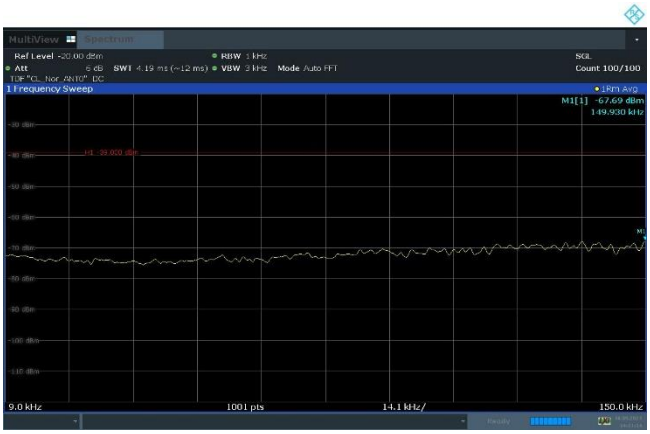
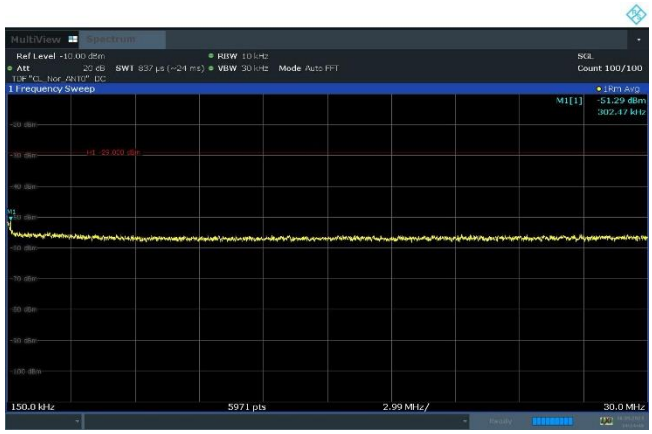
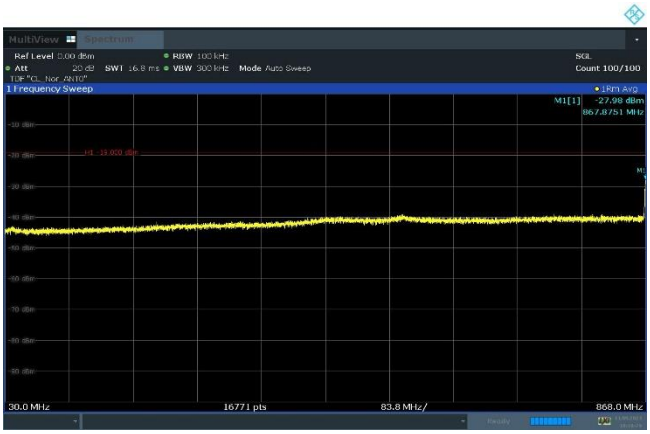


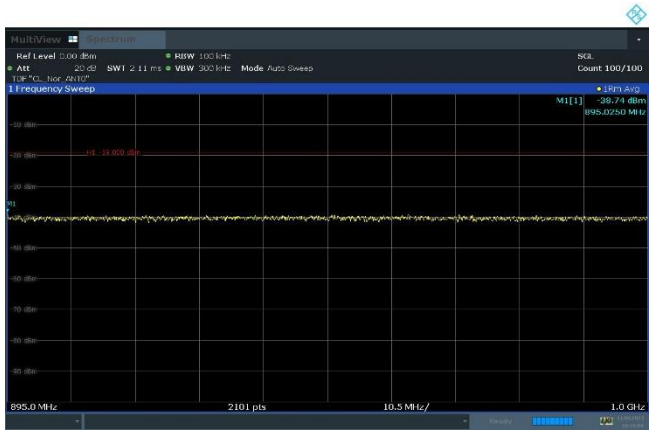
Plot 8-79. Conducted Spurious Emission Plot
9 kHz to 150 kHz
(B5_1C_5M_QPSK - Low Channel, Port 0)



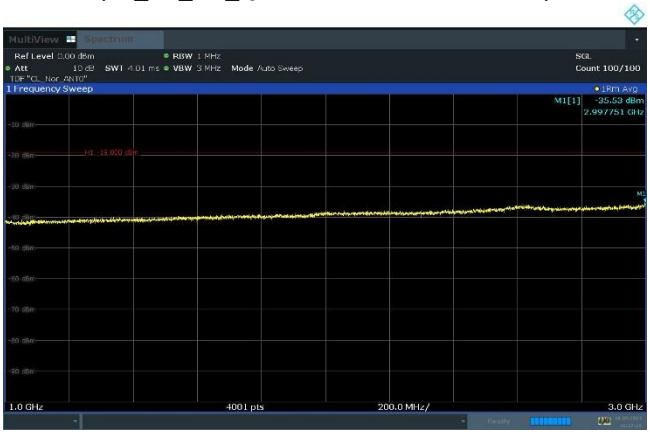
Plot 8-80. Conducted Spurious Emission Plot
150 kHz to 30 MHz
(B5_1C_5M_QPSK - Low Channel, Port 0)



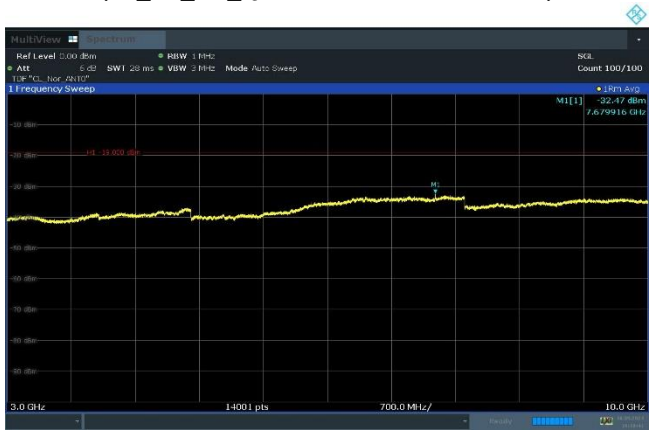
Plot 8-81. Conducted Spurious Emission Plot
30 MHz to 868 MHz
(B5_1C_5M_QPSK - Low Channel, Port 0)



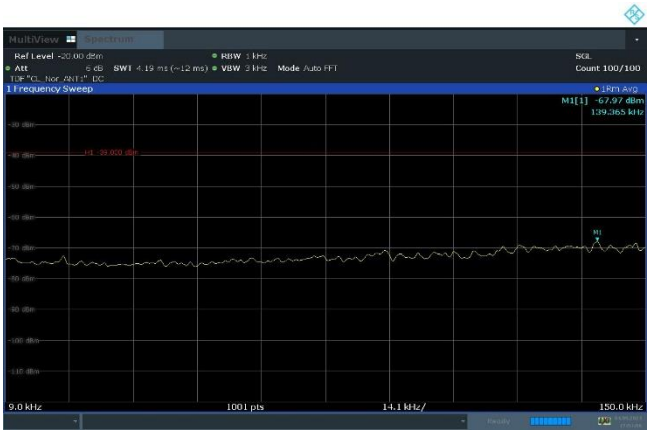
Plot 8-82. Conducted Spurious Emission Plot
895 MHz to 1 GHz
(B5_1C_5M_QPSK - Low Channel, Port 0)



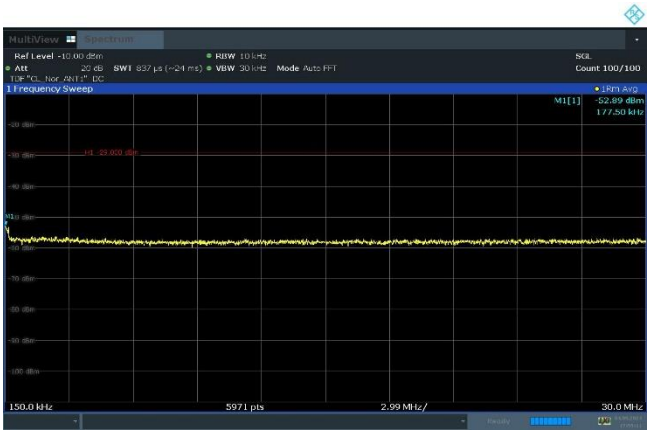
Plot 8-83. Conducted Spurious Emission Plot
1 GHz to 3 GHz
(B5_1C_5M_QPSK - Low Channel, Port 0)



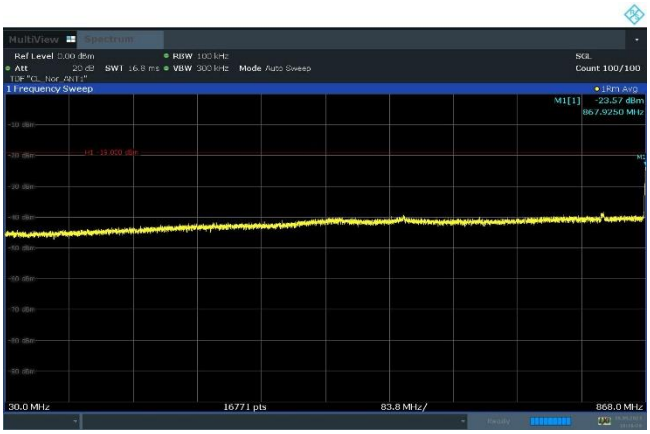
Plot 8-84. Conducted Spurious Emission Plot
3 GHz to 10 GHz
(B5_1C_5M_QPSK - Low Channel, Port 0)



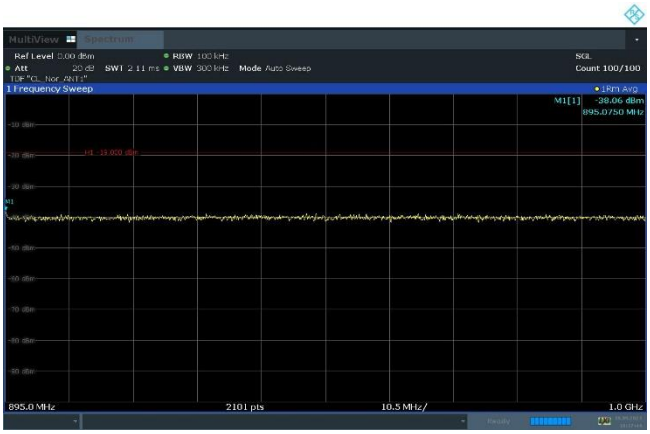
Plot 8-85. Conducted Spurious Emission Plot
9 kHz to 150 kHz
(n5_1C_5M_QPSK - Low Channel, Port 1)



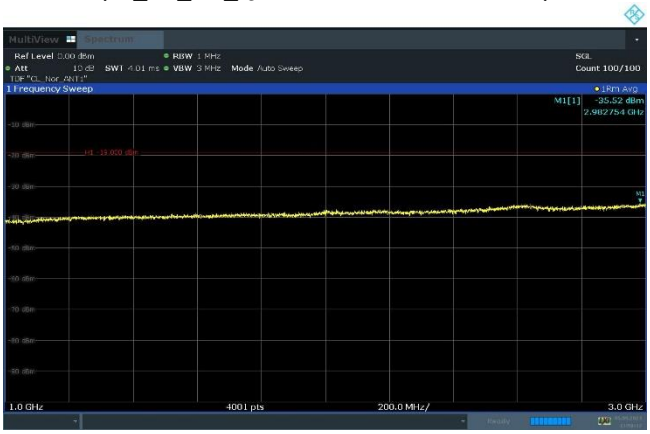
Plot 8-86. Conducted Spurious Emission Plot
150 kHz to 30 MHz
(n5_1C_5M_QPSK - Low Channel, Port 1)



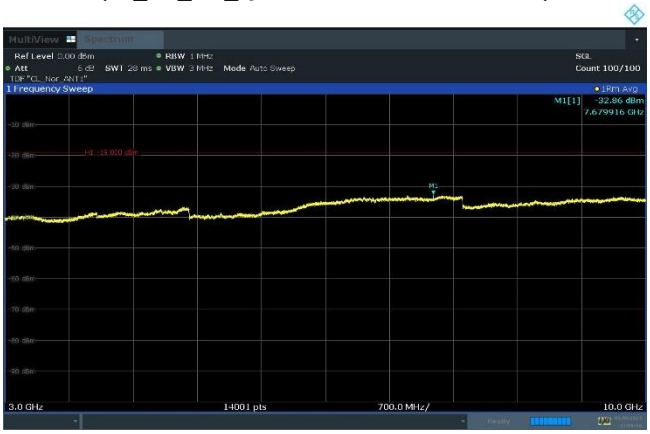
Plot 8-87. Conducted Spurious Emission Plot
30 MHz to 868 MHz
(n5_1C_5M_QPSK - Low Channel, Port 1)



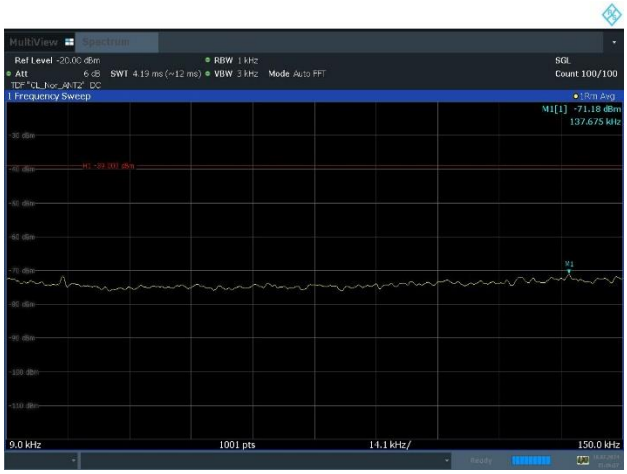
Plot 8-88. Conducted Spurious Emission Plot
895 MHz to 1 GHz
(n5_1C_5M_QPSK - Low Channel, Port 1)



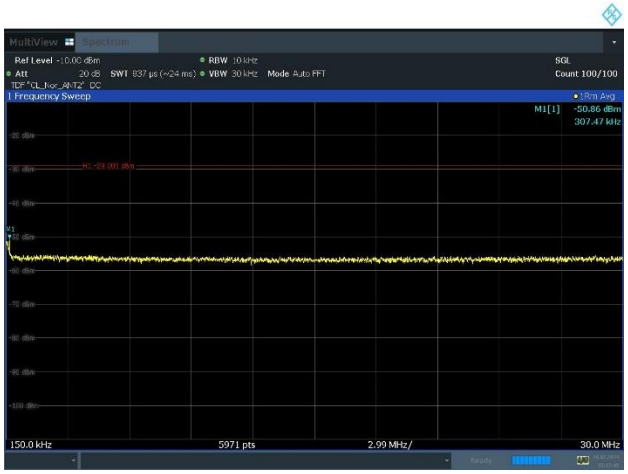
Plot 8-89. Conducted Spurious Emission Plot
1 GHz to 3 GHz
(n5_1C_5M_QPSK - Low Channel, Port 1)



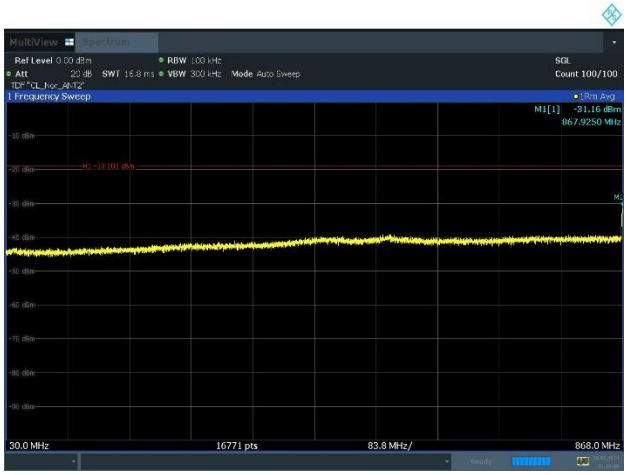
Plot 8-90. Conducted Spurious Emission Plot
3 GHz to 10 GHz
(n5_1C_5M_QPSK - Low Channel, Port 1)



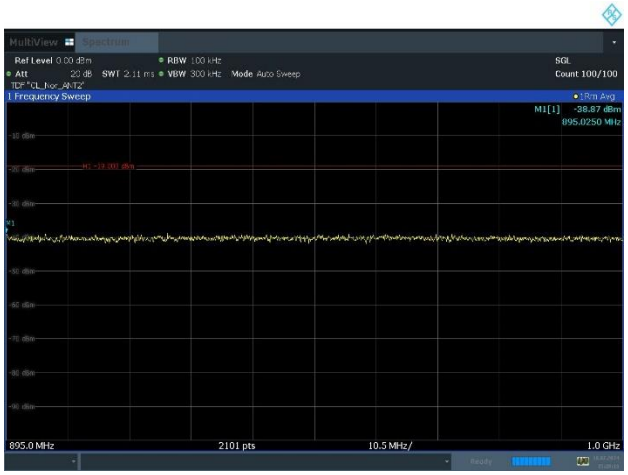
Plot 8-91. Conducted Spurious Emission Plot
9 kHz to 150 kHz
(n5_3C_5M+5M+5M_16QAM - Low Channel, Port 2)



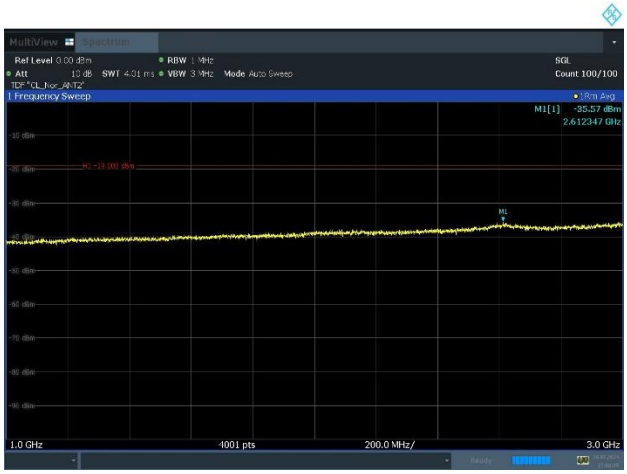
Plot 8-92. Conducted Spurious Emission Plot
150 kHz to 30 MHz
(n5_3C_5M+5M+5M_16QAM - Low Channel, Port 2)



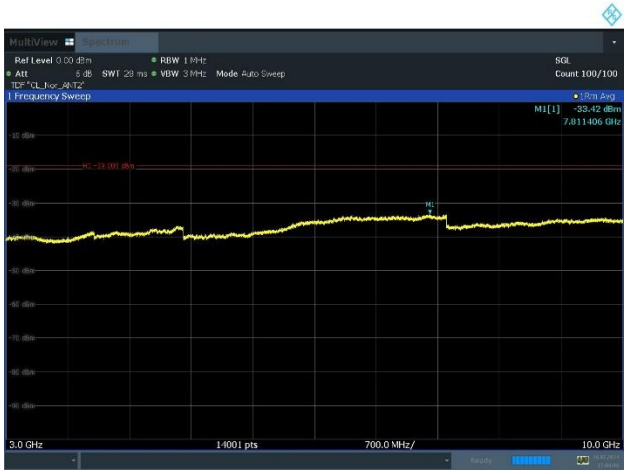
Plot 8-93. Conducted Spurious Emission Plot
30 MHz to 868 MHz
(n5_3C_5M+5M+5M_16QAM - Low Channel, Port 2)



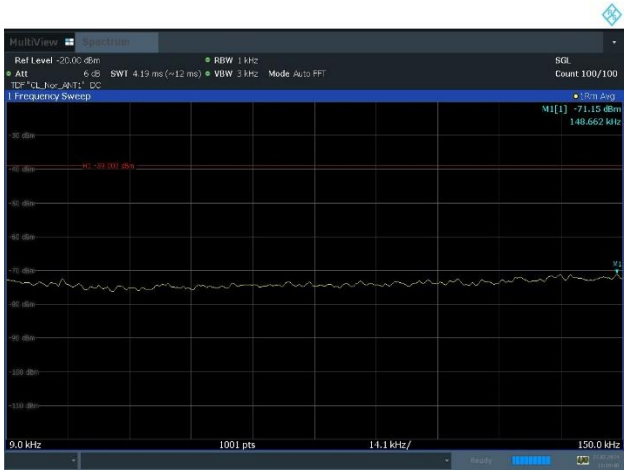
Plot 8-94. Conducted Spurious Emission Plot
895 MHz to 1 GHz
(n5_3C_5M+5M+5M_16QAM - Low Channel, Port 2)



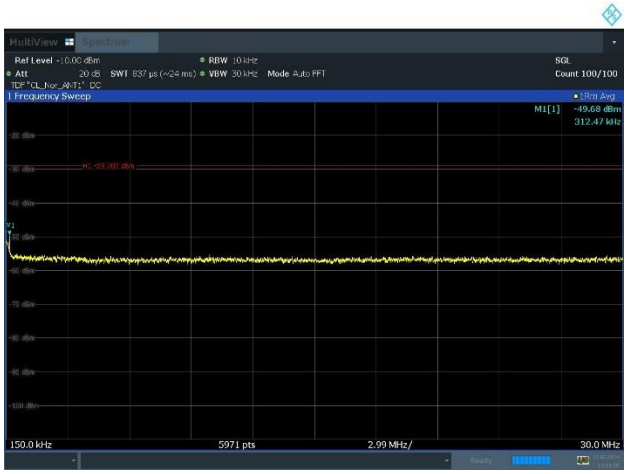
Plot 8-95. Conducted Spurious Emission Plot
1 GHz to 3 GHz
(n5_3C_5M+5M+5M_16QAM - Low Channel, Port 2)



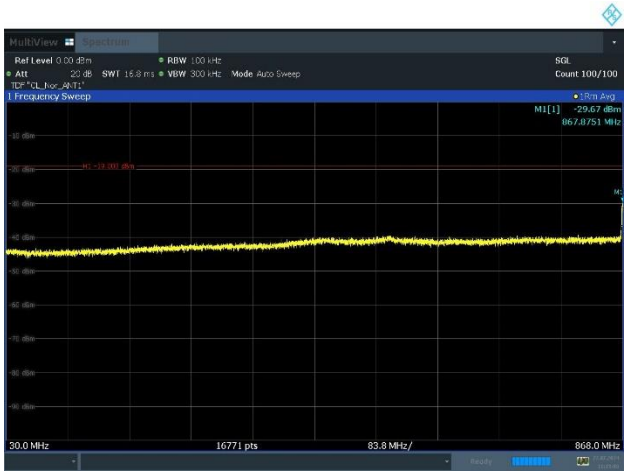
Plot 8-96. Conducted Spurious Emission Plot
3 GHz to 10 GHz
(n5_3C_5M+5M+5M_16QAM - Low Channel, Port 2)



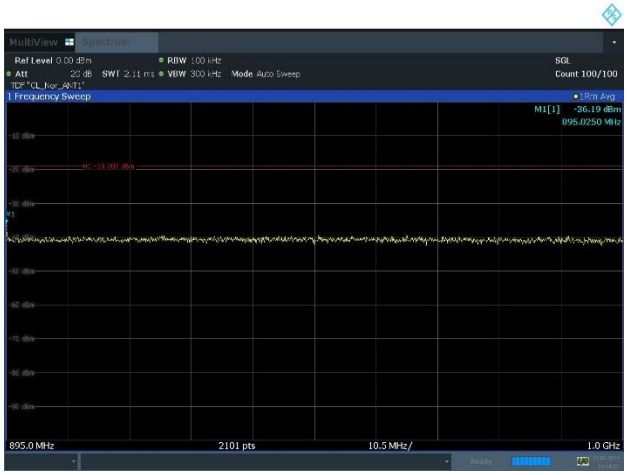
Plot 8-97. Conducted Spurious Emission Plot
9 kHz to 150 kHz
(n5_3NC_5M+5M+5M_QPSK - Mid Channel, Port 1)



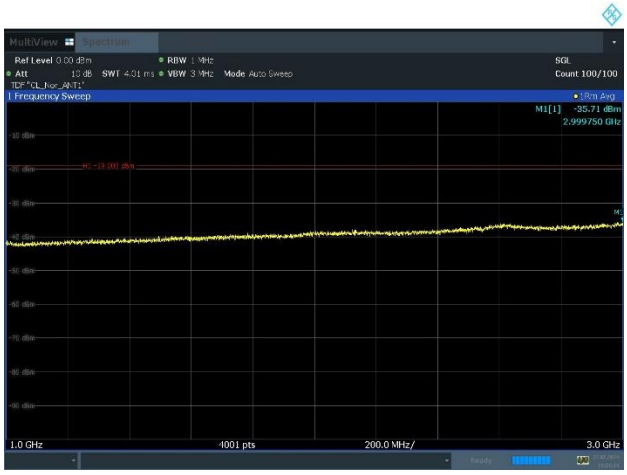
Plot 8-98. Conducted Spurious Emission Plot
150 kHz to 30 MHz
(n5_3NC_5M+5M+5M_QPSK - Mid Channel, Port 1)



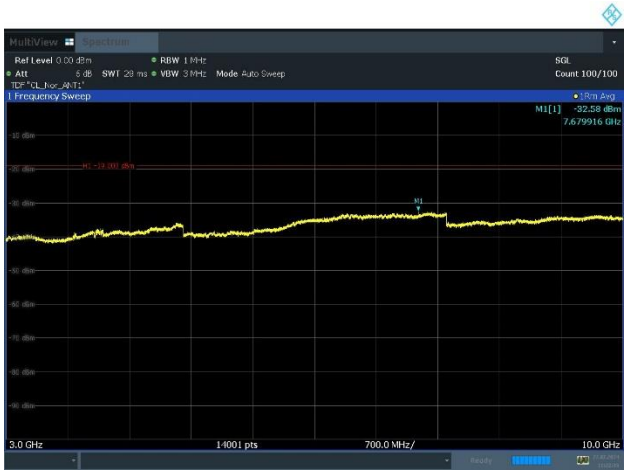
Plot 8-99. Conducted Spurious Emission Plot
30 MHz to 868 MHz
(n5_3NC_5M+5M+5M_QPSK - Mid Channel, Port 1)



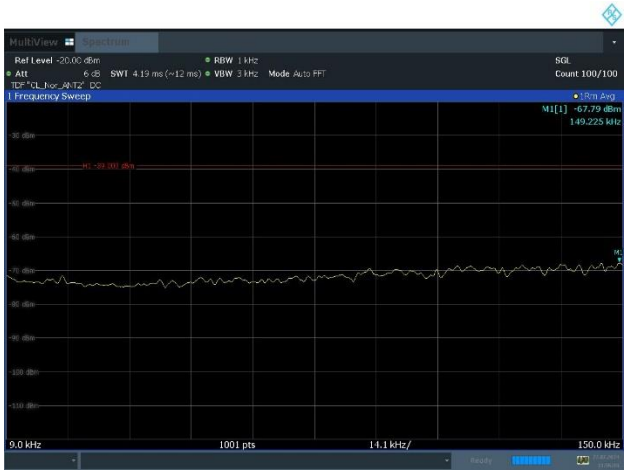
Plot 8-100. Conducted Spurious Emission Plot
895 MHz to 1 GHz
(n5_3NC_5M+5M+5M_QPSK - Mid Channel, Port 1)



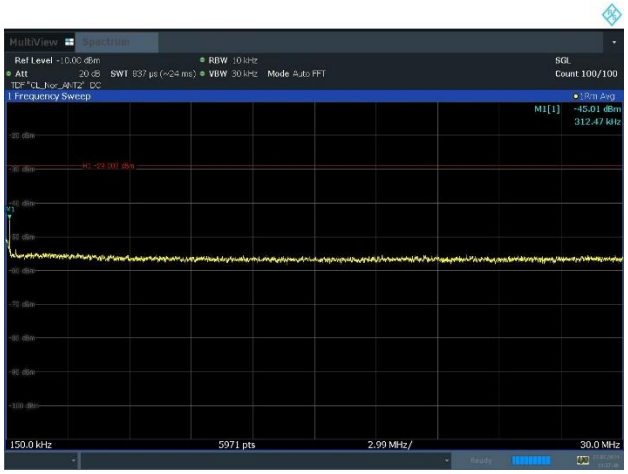
Plot 8-101. Conducted Spurious Emission Plot
1 GHz to 3 GHz
(n5_3NC_5M+5M+5M_QPSK - Mid Channel, Port 1)



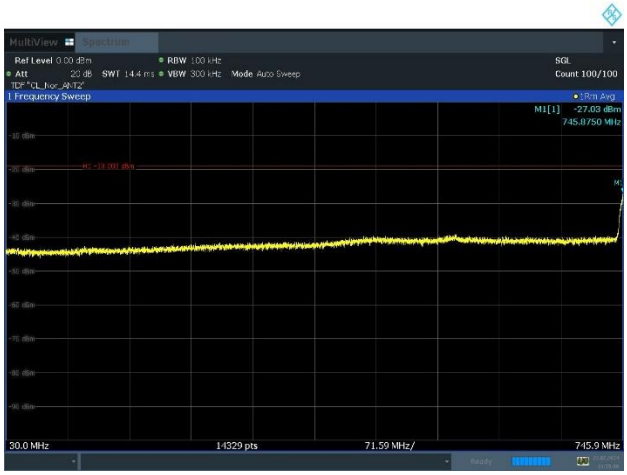
Plot 8-102. Conducted Spurious Emission Plot
3 GHz to 10 GHz
(n5_3NC_5M+5M+5M_QPSK - Mid Channel, Port 1)



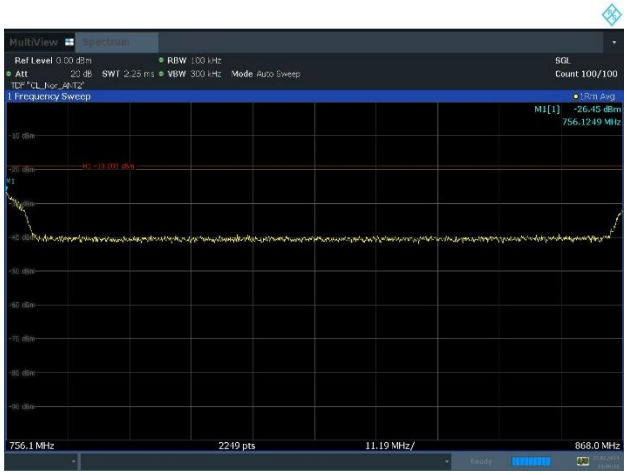
Plot 8-103. Conducted Spurious Emission Plot
9 kHz to 150 kHz
(Multi band operation_n13_1C_10M+
n5_3C_5M+5M+5M_QPSK - Mid Channel, Port 2)



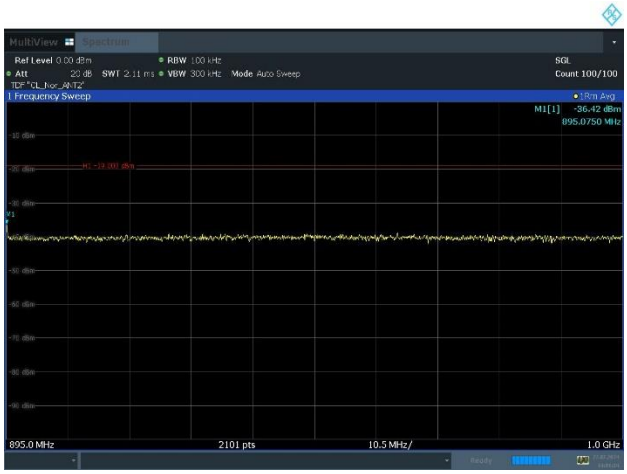
Plot 8-104. Conducted Spurious Emission Plot
150 kHz to 30 MHz
(Multi band operation_n13_1C_10M+
n5_3C_5M+5M+5M_QPSK - Mid Channel, Port 2)



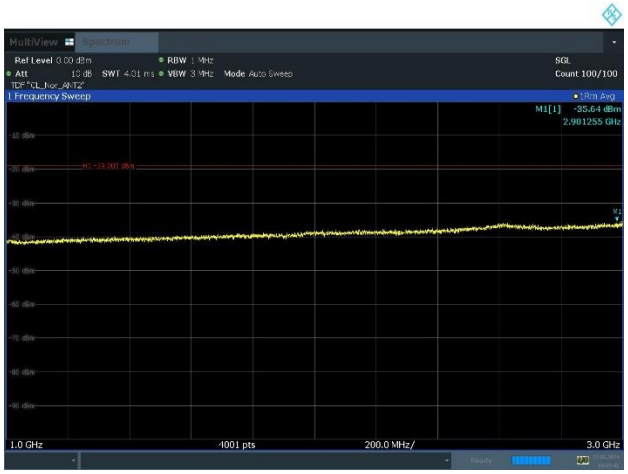
Plot 8-105. Conducted Spurious Emission Plot
30 MHz to 745.9 MHz
(Multi band operation_n13_1C_10M+
n5_3C_5M+5M+5M_QPSK - Mid Channel, Port 2)



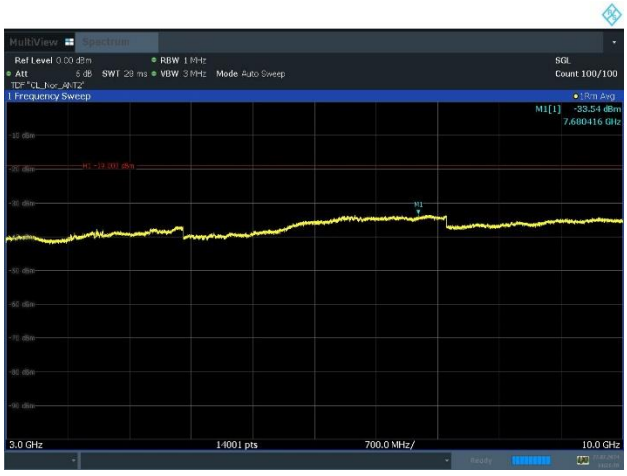
Plot 8-106. Conducted Spurious Emission Plot
756.1 MHz to 868 GHz
(Multi band operation_n13_1C_10M+
n5_3C_5M+5M+5M_QPSK - Mid Channel, Port 2)



Plot 8-107. Conducted Spurious Emission Plot
895 MHz to 1 GHz
(Multi band operation_n13_1C_10M+
n5_3C_5M+5M+5M_QPSK - Mid Channel, Port 2)



Plot 8-108. Conducted Spurious Emission Plot
1 GHz to 3 GHz
(Multi band operation_n13_1C_10M+
n5_3C_5M+5M+5M_QPSK - Mid Channel, Port 2)



Plot 8-109. Conducted Spurious Emission Plot
3 GHz to 10 GHz
(Multi band operation_n13_1C_10M+
n5_3C_5M+5M+5M_QPSK - Mid Channel, Port 2)

8.7 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

§22.917(a), §27.53(c)

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.

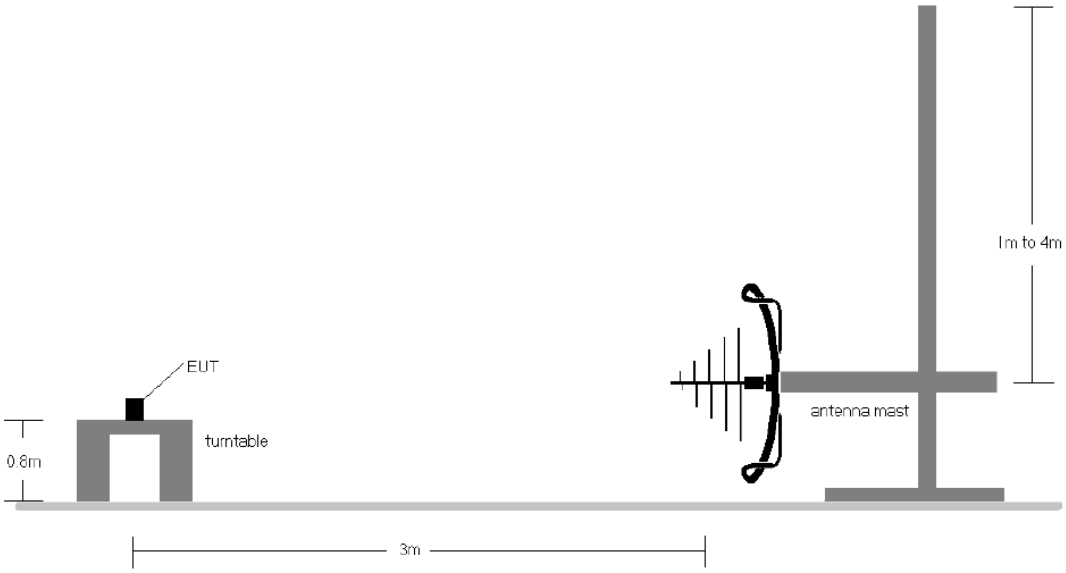


Figure 8-6. Test Instrument & Measurement Setup < 1 GHz

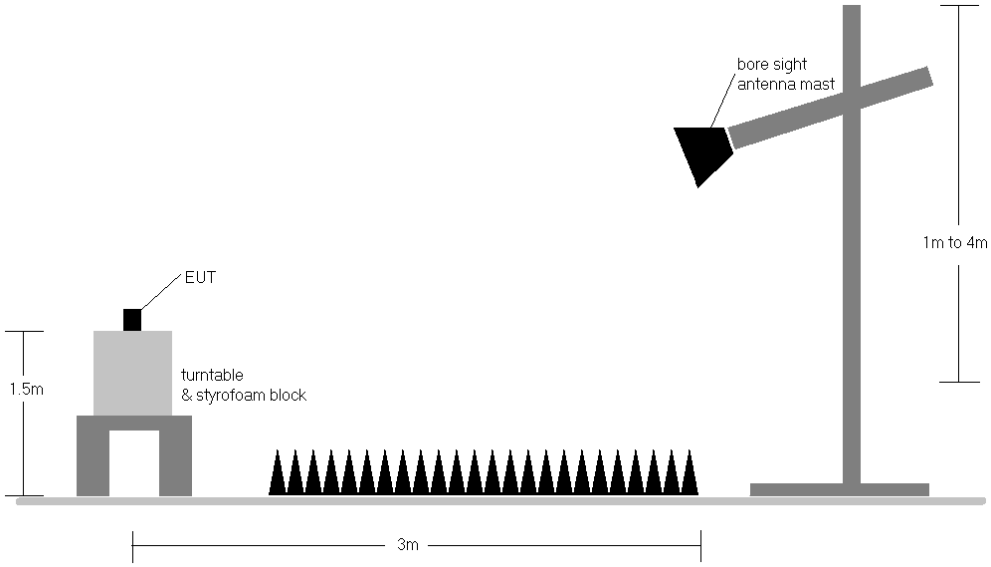


Figure 8-7. Test Instrument & Measurement Setup > 1 GHz

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]

= -71.39 [dBm] + 107 + 8.24 [dB/m] = 43.85 dBµV/m

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

= 43.85 dB[μV/m] + (20*log (3)) - 104.8

= -51.41 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)
996.89	29.14	2.34	31.47
7998.49	37.10	-28.86	8.24

Table 8-36. 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.

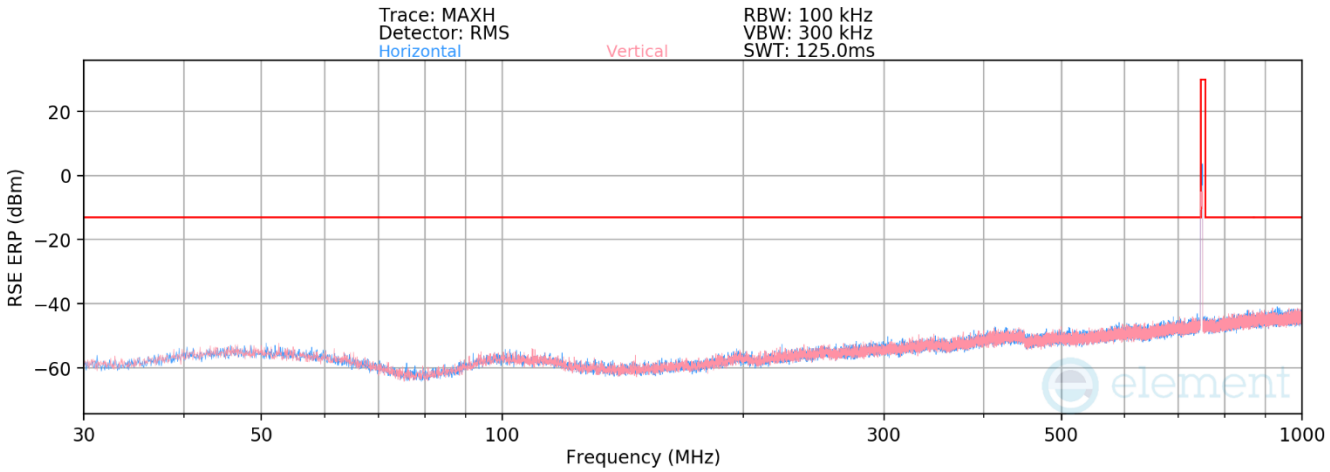
3. The spectrum is measured from 30 MHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

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

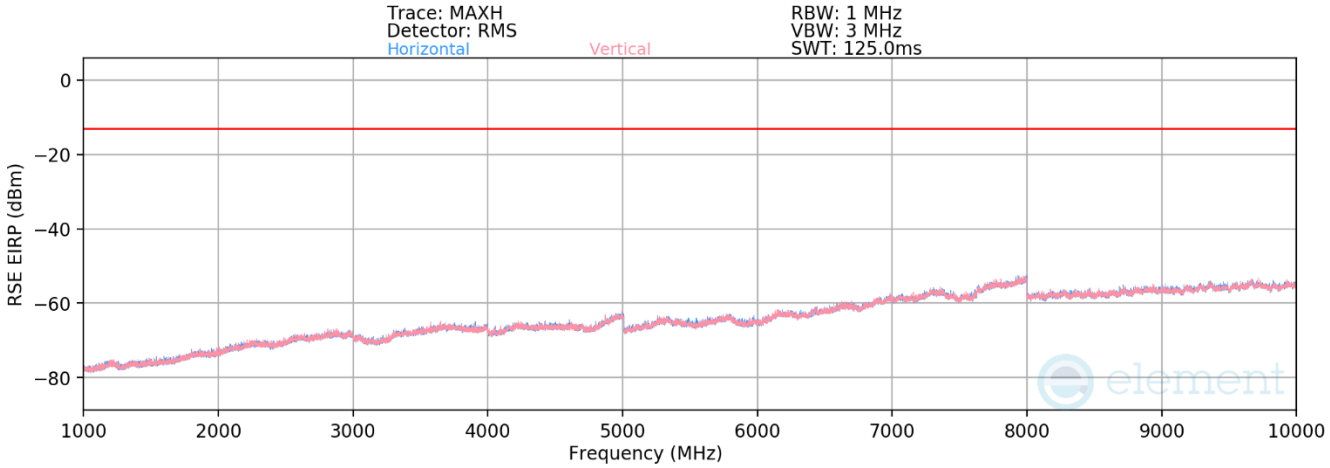
5. Spurious emissions were measured with all EUT antennas transmitting simultaneously and all antenna ports terminated.

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

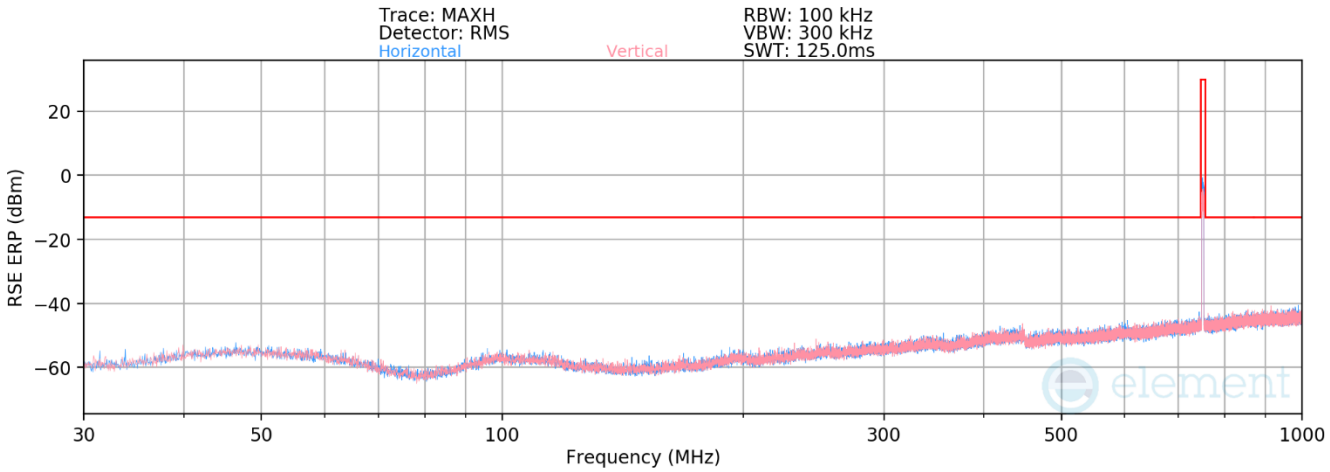
7. All modes of operation were investigated and the worst case configuration results are reported in this section.



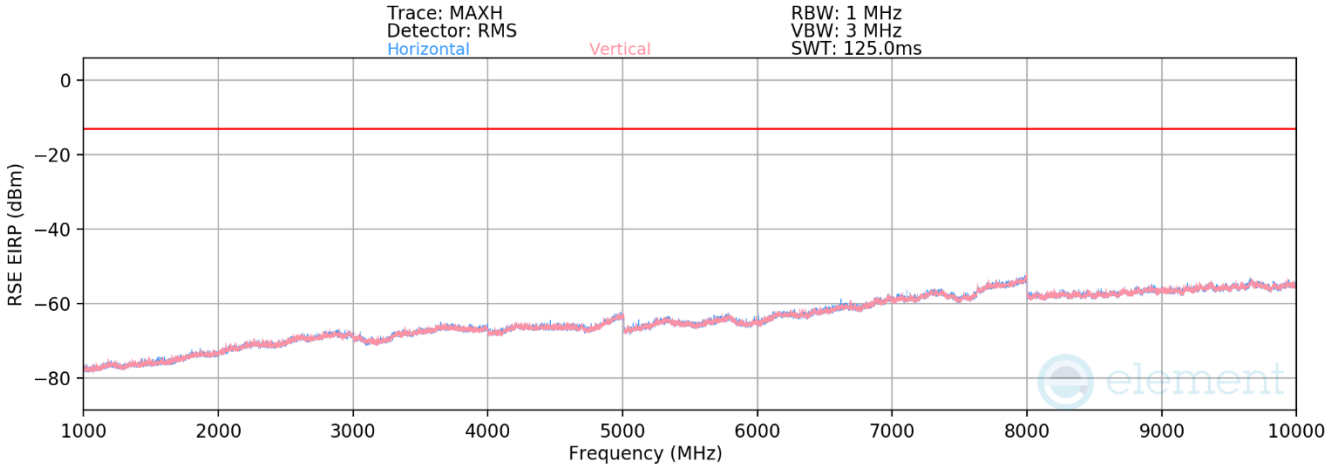
Plot 8-110. Radiated spurious emission_30 MHz to 1000 MHz (n13_1C_5M_Low Channel)



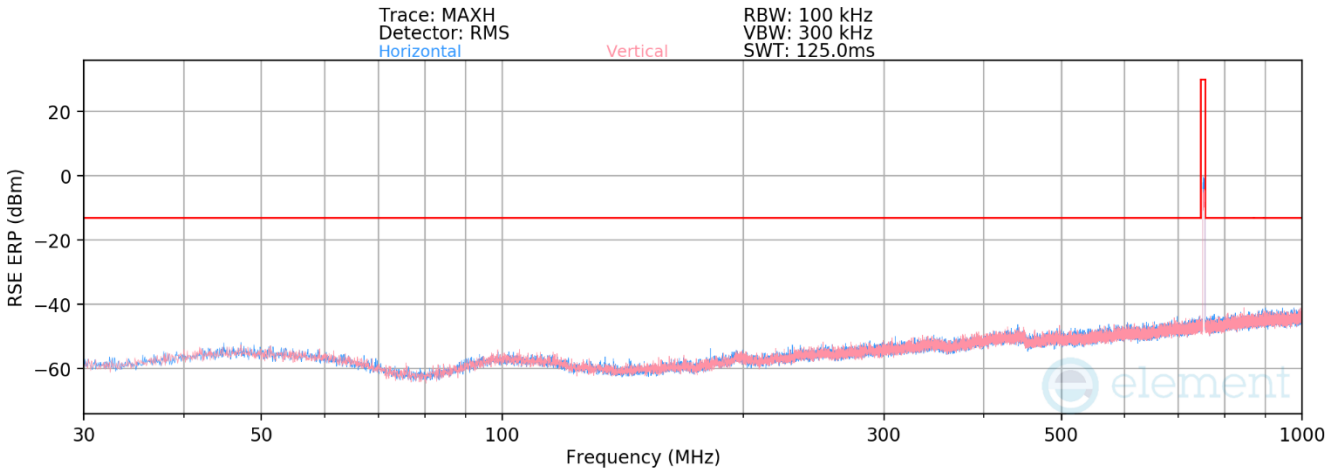
Plot 8-111. Radiated spurious emission_1 GHz to 10 GHz (n13_1C_5M_Low Channel)



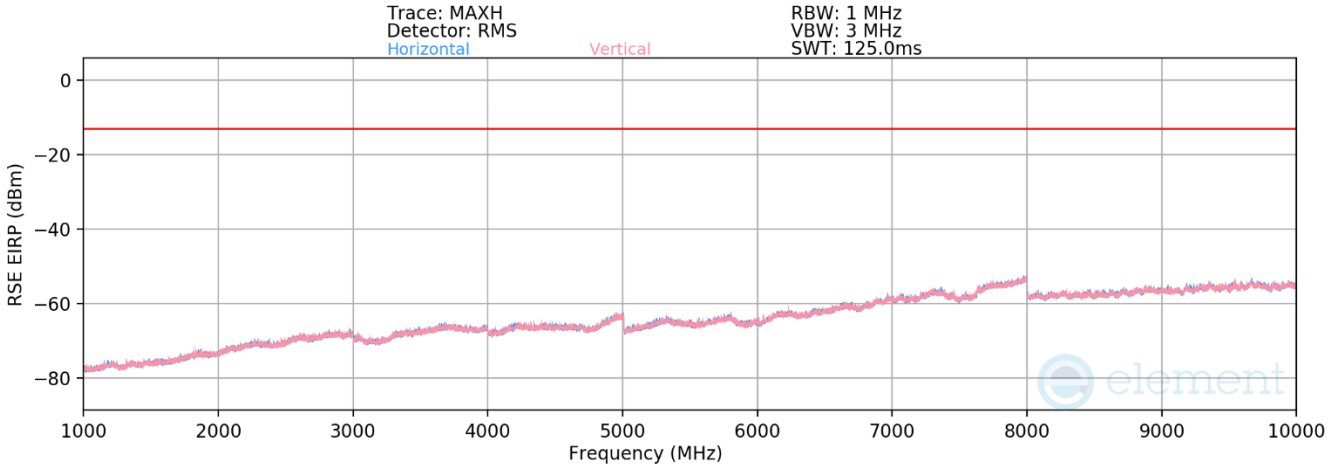
Plot 8-112. Radiated spurious emission_30 MHz to 1000 MHz (n13_1C_5M_Mid Channel)



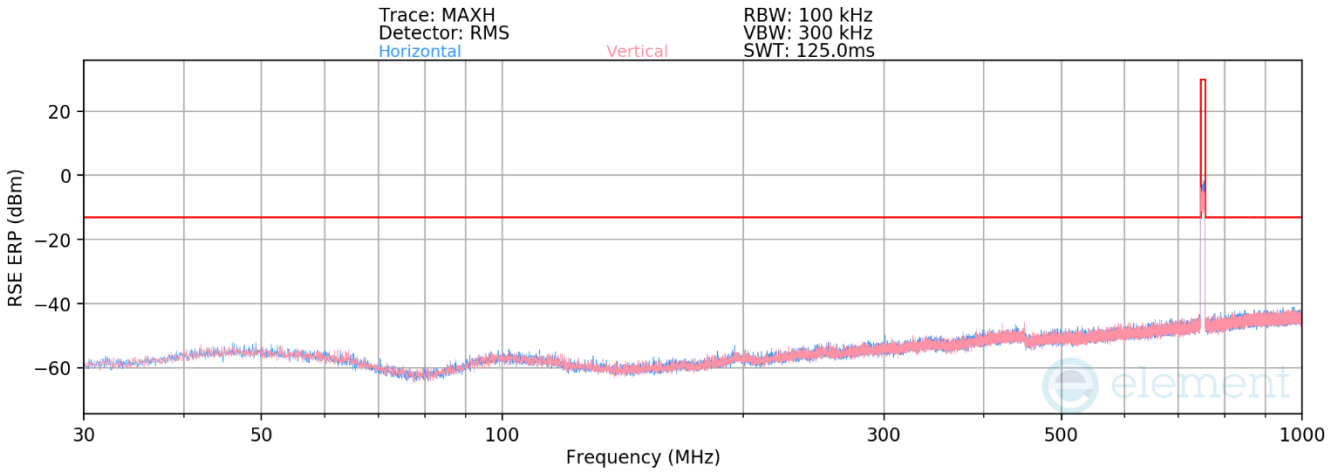
Plot 8-113. Radiated spurious emission_1 GHz to 10 GHz (n13_1C_5M_Mid Channel)



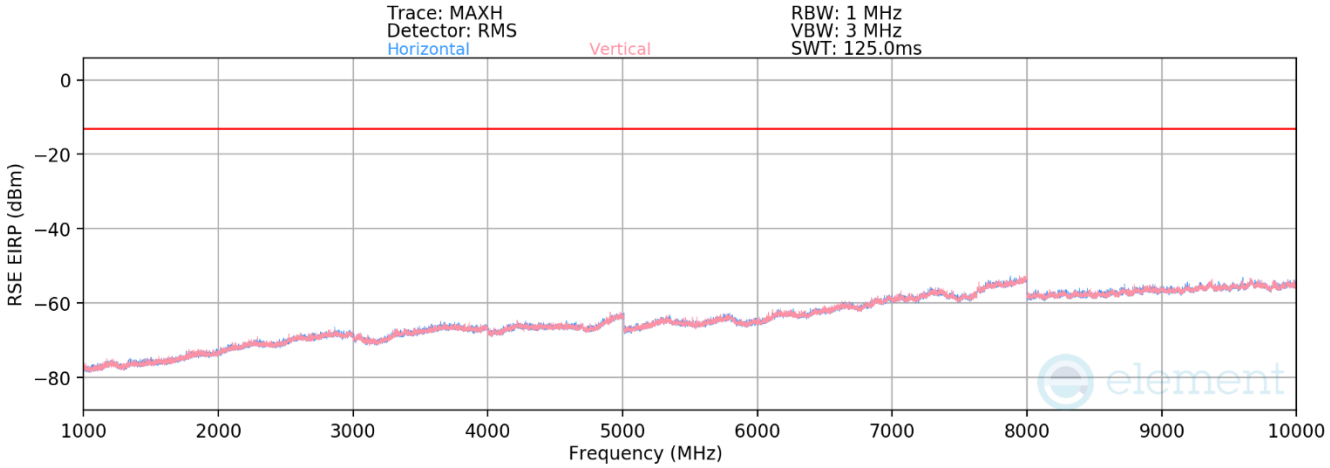
Plot 8-114. Radiated spurious emission_30 MHz to 1000 MHz (n13_1C_5M_High Channel)



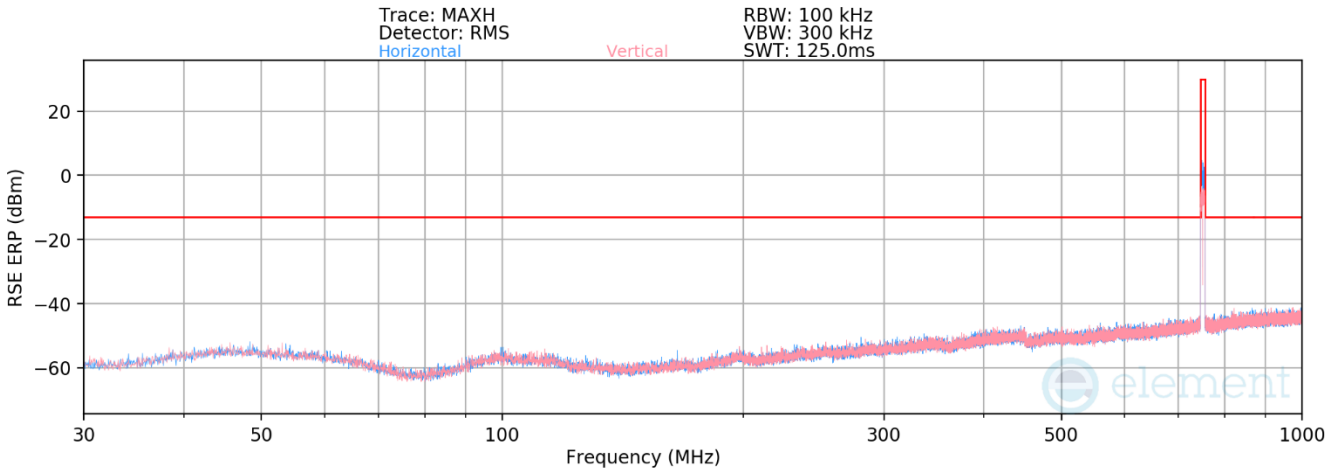
Plot 8-115. Radiated spurious emission_1 GHz to 10 GHz (n13_1C_5M_High Channel)



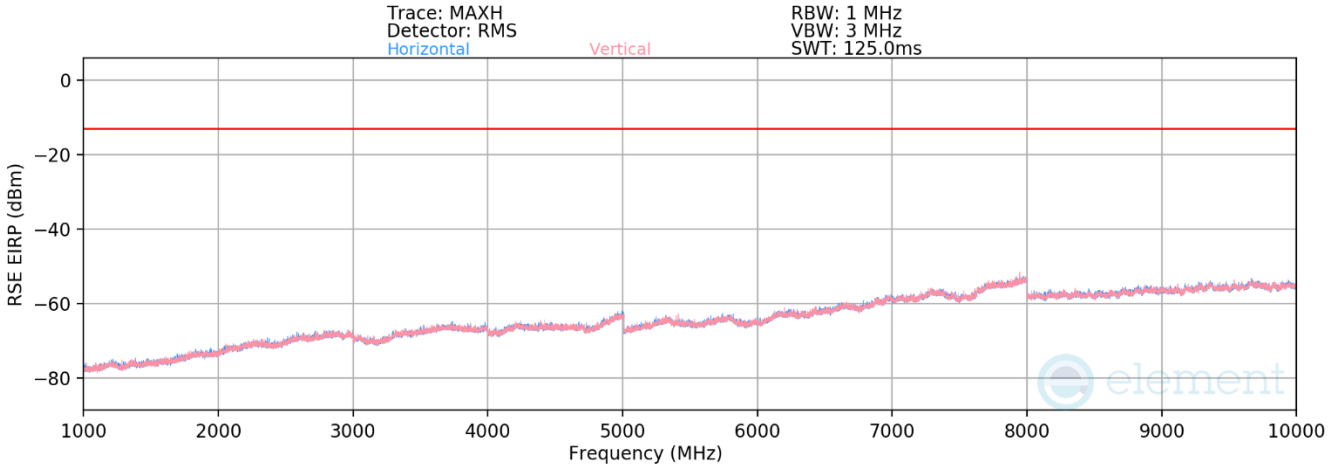
Plot 8-116. Radiated spurious emission_30 MHz to 1000 MHz (n13_1C_10M_Mid Channel)



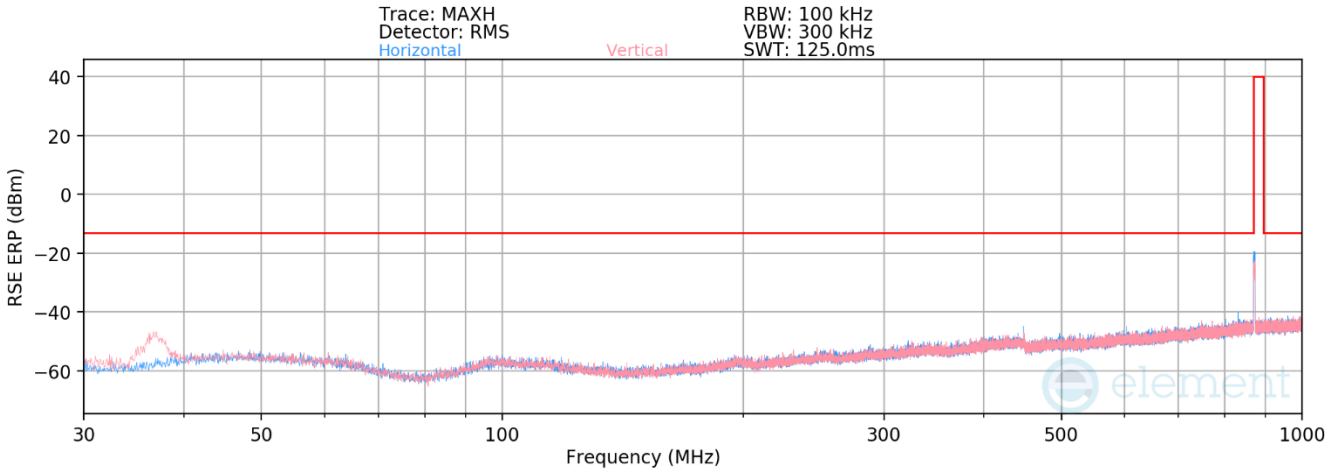
Plot 8-117. Radiated spurious emission_1 GHz to 10 GHz (n13_1C_10M_Mid Channel)



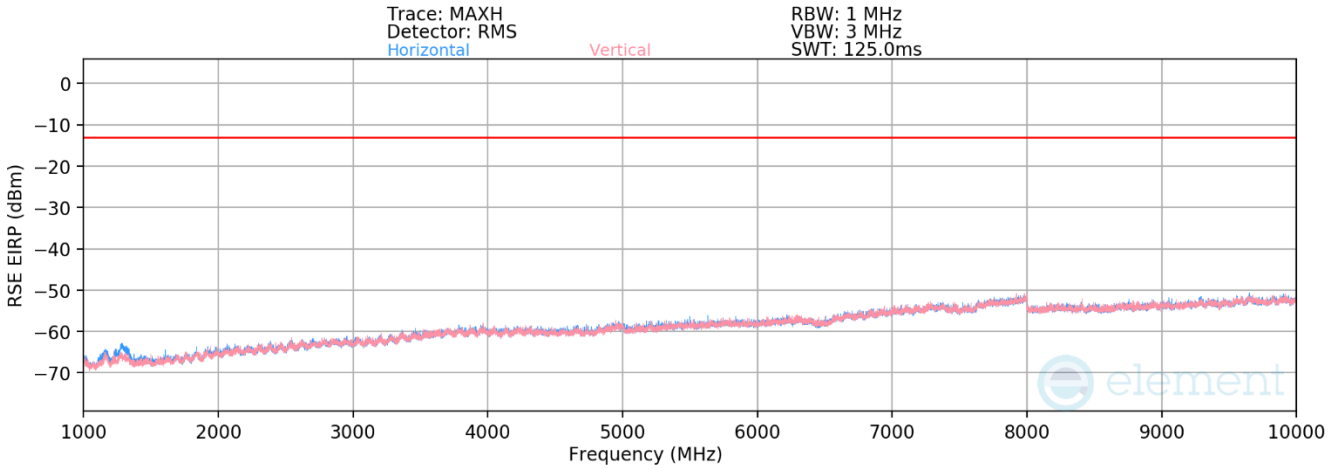
Plot 8-118. Radiated spurious emission_30 MHz to 1000 MHz (n13_2C_5M+5M_Mid Channel)



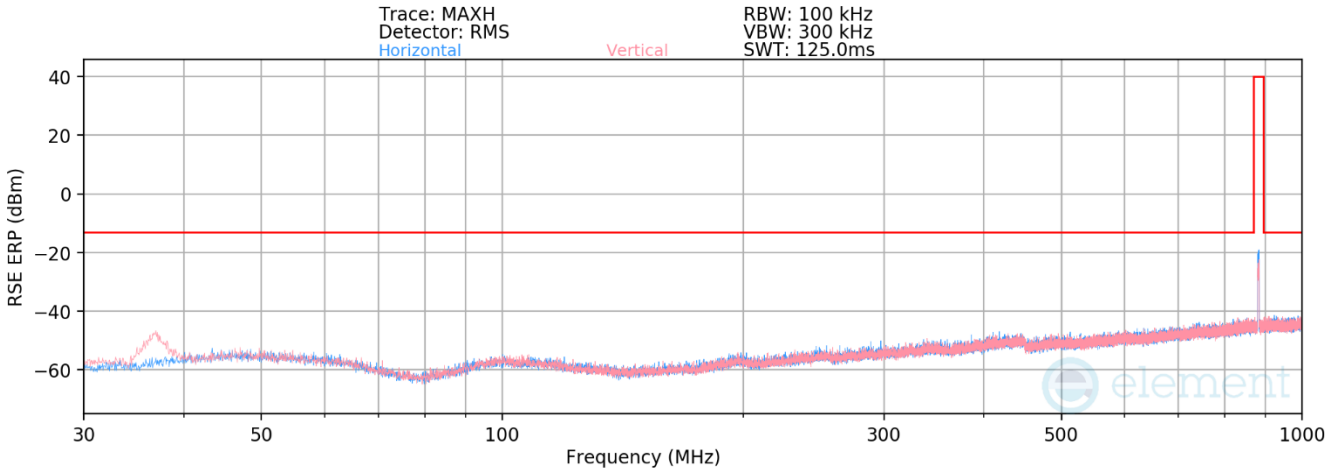
Plot 8-119. Radiated spurious emission_1 GHz to 10 GHz (n13_2C_5M+5M_Mid Channel)



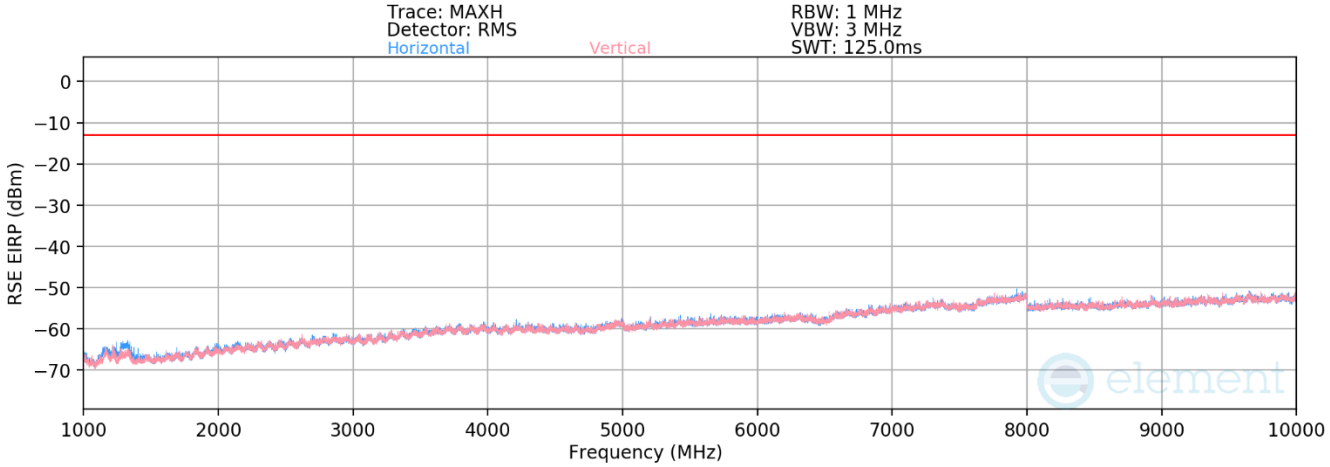
Plot 8-120. Radiated spurious emission_30 MHz to 1000 MHz (B5_1C_5M_Low Channel)



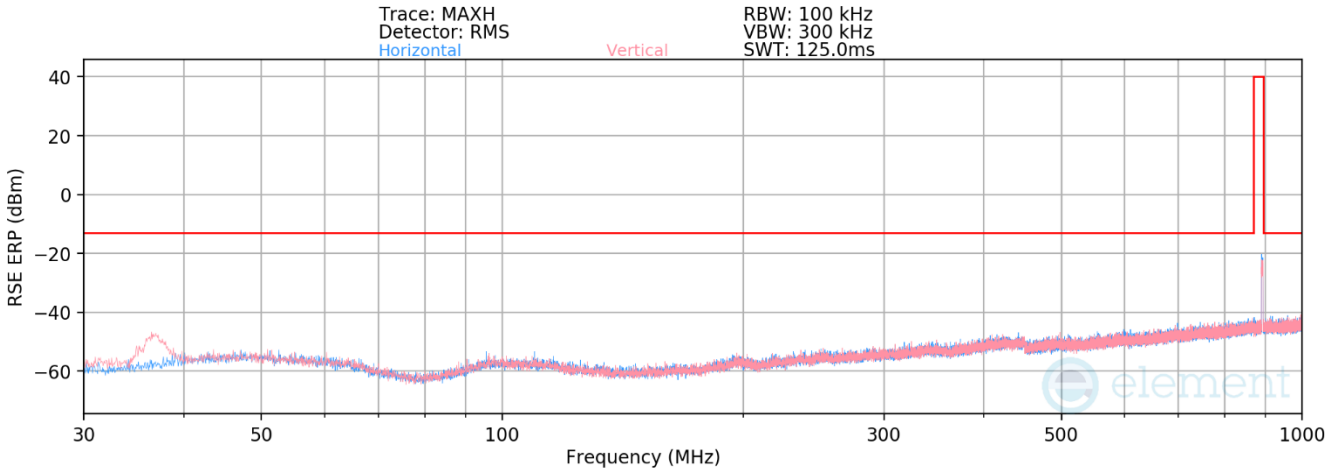
Plot 8-121. Radiated spurious emission_1 GHz to 10 GHz (B5_1C_5M_Low Channel)



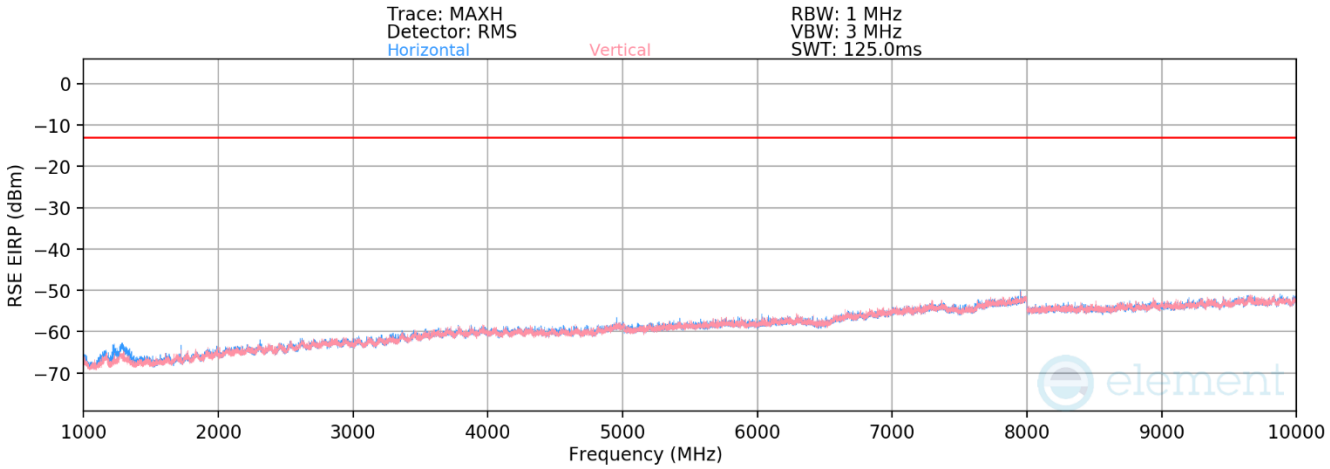
Plot 8-122. Radiated spurious emission_30 MHz to 1000 MHz (B5_1C_5M_Mid Channel)



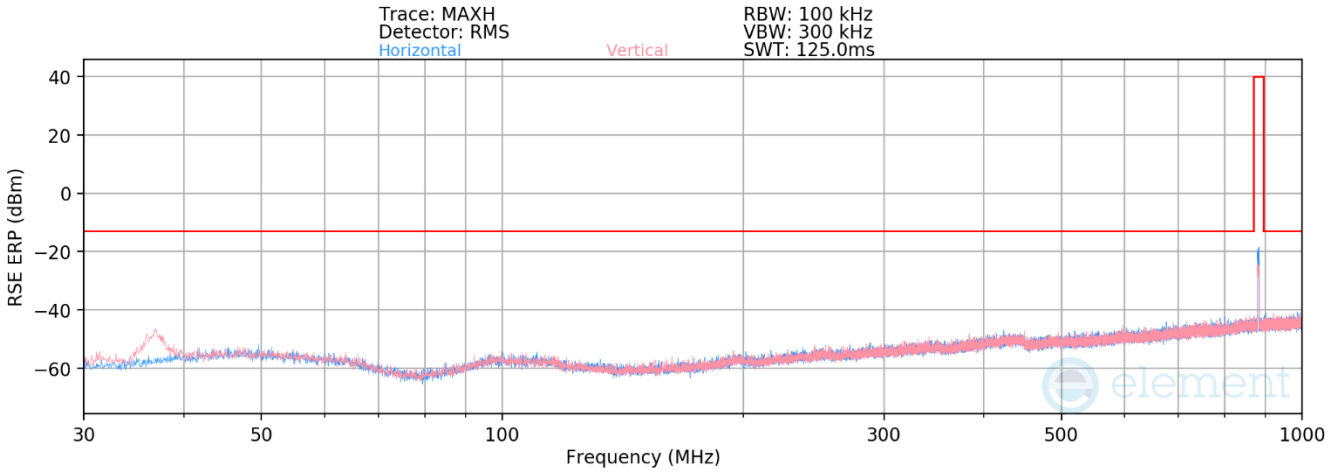
Plot 8-123. Radiated spurious emission_1 GHz to 10 GHz (B5_1C_5M_Mid Channel)



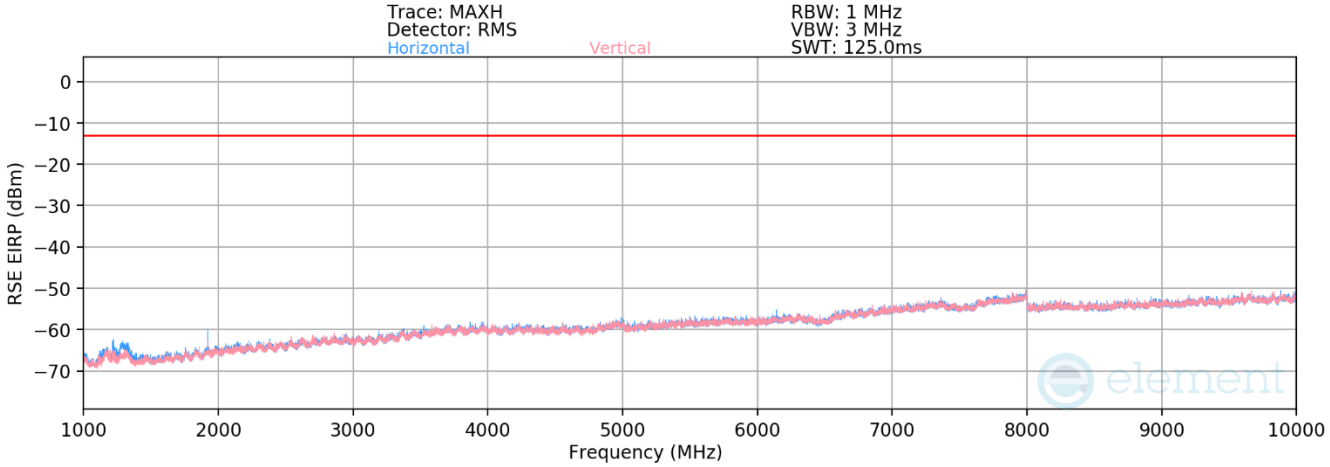
Plot 8-124. Radiated spurious emission_30 MHz to 1000 MHz (B5_1C_5M_High Channel)



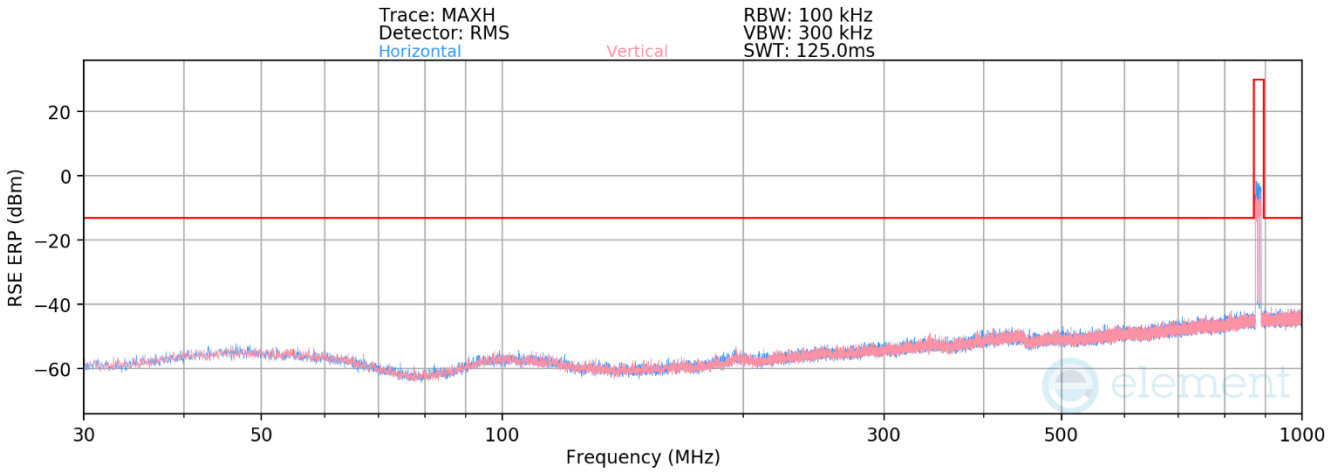
Plot 8-125. Radiated spurious emission_1 GHz to 10 GHz (B5_1C_5M_High Channel)



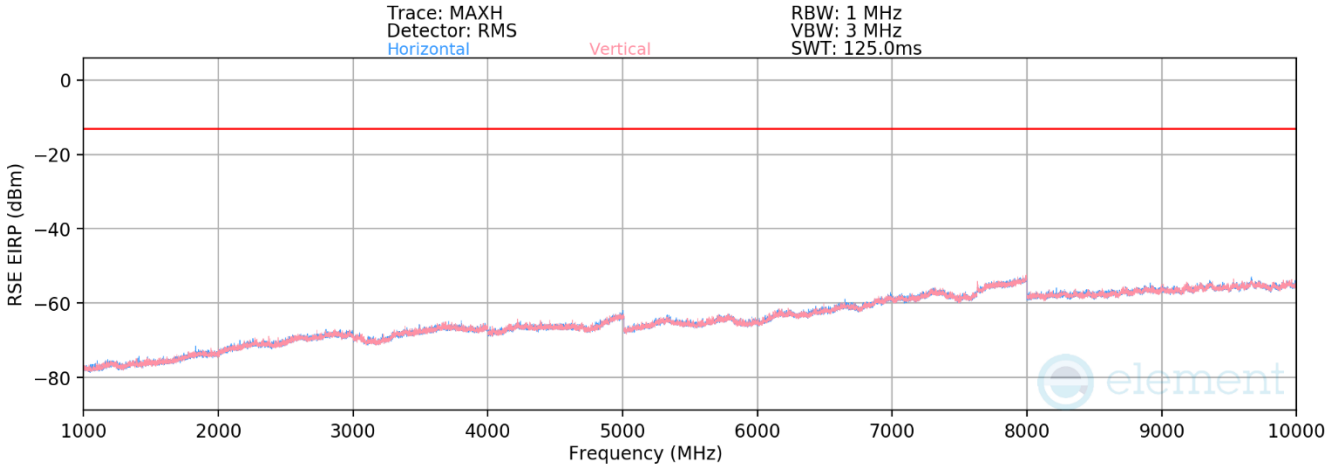
Plot 8-126. Radiated spurious emission_30 MHz to 1000 MHz (n5_1C_5M_Mid Channel)



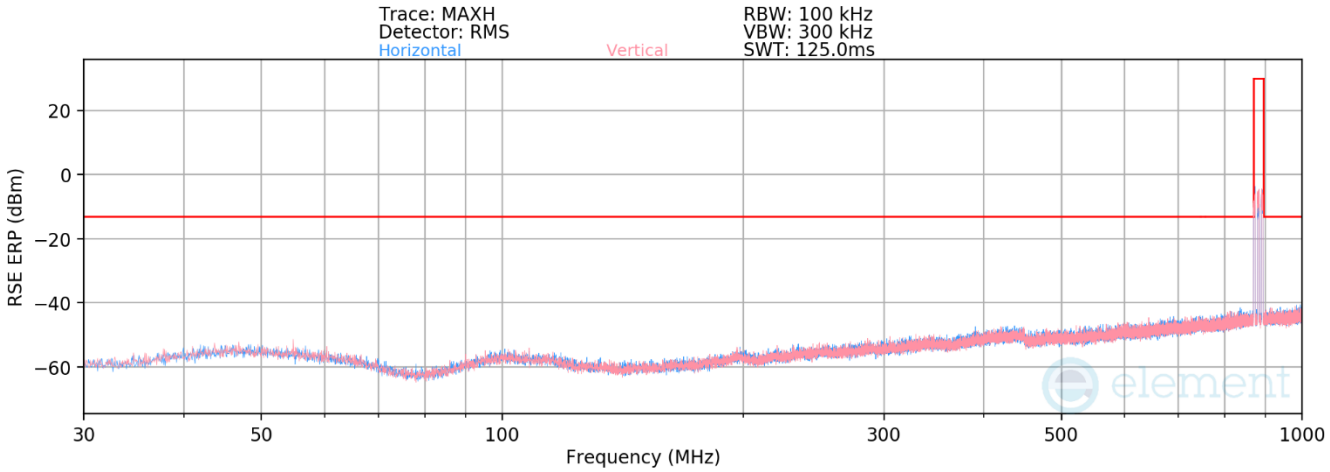
Plot 8-127. Radiated spurious emission_1 GHz to 10 GHz (n5_1C_5M_Mid Channel)



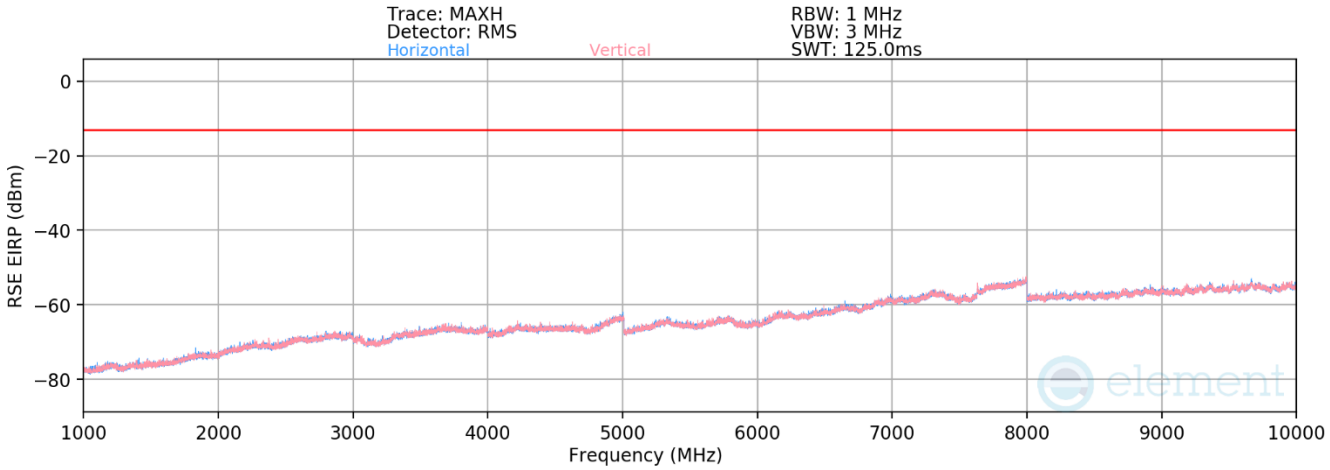
Plot 8-128. Radiated spurious emission_30 MHz to 1000 MHz (n5_3C_5M+5M+5M_Mid Channel)



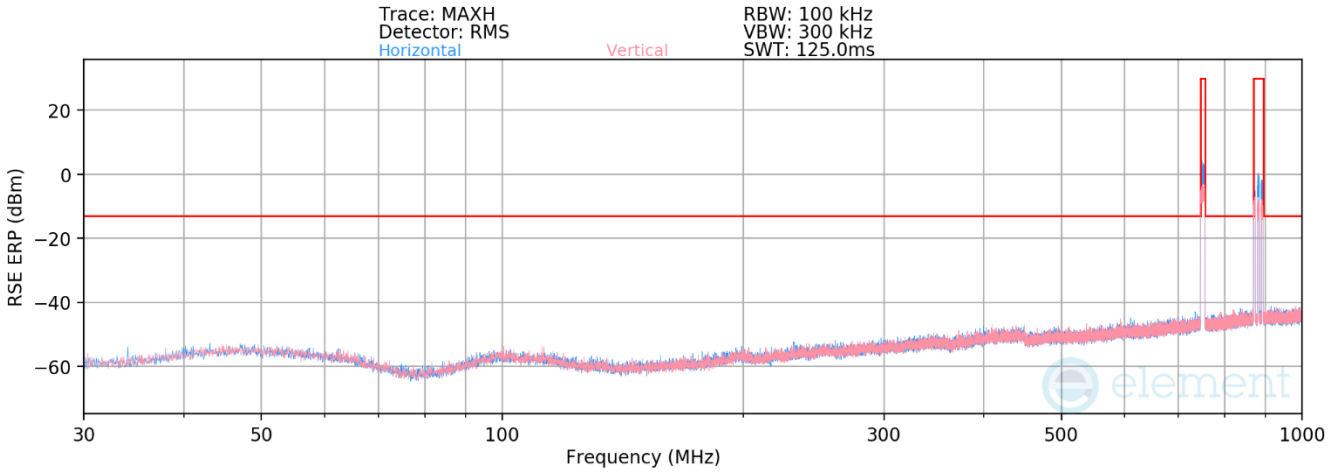
Plot 8-129. Radiated spurious emission_1 GHz to 10 GHz (n5_3C_5M+5M+5M_Mid Channel)



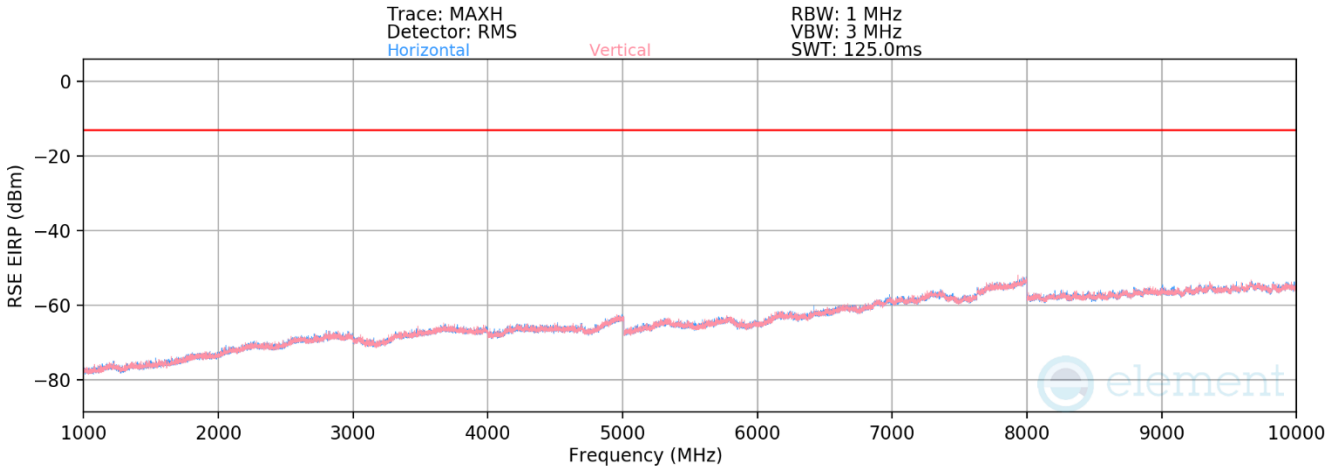
Plot 8-130. Radiated spurious emission_30 MHz to 1000 MHz (n5_3NC_5M+5M+5M_Mid Channel)



Plot 8-131. Radiated spurious emission_1 GHz to 10 GHz (n5_3NC_5M+5M+5M_Mid Channel)



Plot 8-132. Radiated spurious emission_30 MHz to 1000 MHz (Multi band operation_n13_1C_10M + n5_3C_5M+5M+5M)



Plot 8-133. Radiated spurious emission_1 GHz to 10 GHz (Multi band operation_n13_1C_10M + n5_3C_5M+5M+5M)

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Heigh [cm]	Turntable azimuth [degree]	Analyzer Level [dBm/MHz]	AFCL [dBm]	Field Strength [dBμV/m]	RSE EIRP [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]
996.89	H	100	90	-84.38	31.47	54.09	-41.16	-13.00	-28.16
991.87	V	200	180	-85.22	31.38	53.16	-42.10	-13.00	-29.10
7998.49	H	150	90	-71.39	8.24	43.85	-51.41	-13.00	-38.41
7996.34	V	200	90	-72.17	8.19	43.02	-52.24	-13.00	-39.24

Table 8-37. Radiated spurious emission Worst case Summary Data (n5_3C_5M+5M+5M_Mid Channel)

9.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung RRU(RF4461d) FCC ID: A3LRF4461D-13A** complies with all of the requirements of Part 22 & Part 27 FCC Rules.

10.0 APPENDIX. A

10.1 Conducted Average Output Power

Test Overview

A transmitter port of EUT is connected to the input of a signal analyzer. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Description

KDB 971168 D01 v03r01 – Section 5
KDB 662911 D01 v02r01 – Section E)1) In-Band Power Measurements
ANSI C63.26-2015 – Section 5.2.4.4.1

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

1. Conducted power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 ~ 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Span = 2 ~ 3 x OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger Settings is set to "RF Power" for signals with non-continuous operation with the sweep times set to "auto". Refer test note 3 for details.
8. Trace mode = Trace-Averaging (RMS) set to average over 100 sweeps
9. The trace was allowed to stabilize

Test Setup

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

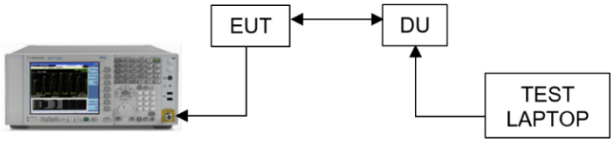


Figure 10-1. Test Instrument & Measurement Setup

Limit

N/A

Note

1. Result for reference maximum average power level of Band 5& Band 13 is under section 8.3.

2. MIMO Calculations are done considering output channel power for all ports and respective margins are calculated according to procedures in section 6.4 of ANSI C63.26 and section D of KDB 971168 D01 v03r01.

3. Consider the following factors for MIMO Power:
   Conducted power for each port is measured in dBm.
   Powers are summed up in linear using the measure-and-sum technique defined in KDB 971168 D01 v03r01- Section D.
   Conducted power per port (dBm) is converted to a linear value (mW). A summation of linear powers for all ports gives us the total MIMO conducted power in milliWatts (mW).

4. Sample Calculation:
   Let us assume the following numbers:
   c) Total MIMO Conducted Power as 78581.44 milliWatts
   d)

Factors		Value	Unit
Summed MIMO Conducted Power (linear sum)		78581.44	mW
Summed MIMO Conducted Power (dBm)	= 10 * log (78581.44) =	48.95	dBm

Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	42.96	42.82	42.87	42.83
	1	42.89	42.80	42.82	42.87
	2	42.92	42.93	42.97	42.95
	3	42.96	43.04	42.92	42.94
Total MIMO Conducted Power (mW)		78581.44	77968.01	77910.50	77954.00
Total MIMO Conducted Power (dBm)		48.95	48.92	48.92	48.92
Mid Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	42.84	42.80	42.64	42.82
	1	42.88	42.78	42.69	43.01
	2	42.96	43.01	42.84	42.97
	3	42.96	42.95	42.81	42.94
Total MIMO Conducted Power (mW)		78179.17	77744.51	75272.88	78635.31
Total MIMO Conducted Power (dBm)		48.93	48.91	48.77	48.96
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	42.83	42.90	43.00	42.94
	1	42.86	42.83	42.90	42.83
	2	42.95	42.90	43.07	43.02
	3	42.86	42.92	43.01	43.03
Total MIMO Conducted Power (mW)		77550.28	77772.03	79726.52	79001.20
Total MIMO Conducted Power (dBm)		48.90	48.91	49.02	48.98

Table 10-1. Conducted Average Output Power Table (n13_1C_5M)

Mid Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	45.89	46.01	45.89	46.02
	1	45.99	46.01	45.92	45.95
	2	45.98	46.03	45.87	46.00
	3	45.98	46.04	45.92	46.03
Total MIMO Conducted Power (mW)		157789.80	160070.73	155619.91	159246.87
Total MIMO Conducted Power (dBm)		51.98	52.04	51.92	52.02

Table 10-2. Conducted Average Output Power Table (n13_1C_10M)

Mid Channel	Port	QPSK	16QAM
Conducted Average Power (dBm)	0	45.95	45.96
	1	45.94	45.91
	2	45.96	45.99
	3	45.93	45.89
Total MIMO Conducted Power (mW)		157239.42	156974.12
Total MIMO Conducted Power (dBm)		51.97	51.96

Table 10-3. Conducted Average Output Power Table (n13_2C_5M+5M)

Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	46.33	46.36	46.55	46.46
	1	46.65	46.64	46.93	46.85
	2	46.22	46.23	46.28	46.26
	3	45.89	45.77	46.04	46.05
Total MIMO Conducted Power (mW)		169886.14	169116.26	177144.01	175214.64
Total MIMO Conducted Power (dBm)		52.30	52.28	52.48	52.44
Mid Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	46.46	46.45	46.54	46.36
	1	46.74	46.81	46.85	46.70
	2	46.16	46.24	46.31	46.04
	3	46.13	45.67	45.71	45.73
Total MIMO Conducted Power (mW)		173790.30	171100.81	173494.37	167615.04
Total MIMO Conducted Power (dBm)		52.40	52.33	52.39	52.24
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	46.37	46.36	46.38	46.28
	1	46.57	46.67	46.69	46.73
	2	45.99	45.91	46.05	46.03
	3	45.80	46.03	45.96	46.06
Total MIMO Conducted Power (mW)		166483.34	168783.78	169834.39	170010.90
Total MIMO Conducted Power (dBm)		52.21	52.27	52.30	52.30

Table 10-4. Conducted Average Output Power Table (B5_1C_5M)

Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	46.26	46.29	46.33	46.12
	1	46.77	46.72	46.48	46.53
	2	46.17	46.27	46.18	46.04
	3	46.00	46.11	45.89	45.82
Total MIMO Conducted Power (mW)		171011.07	172745.49	167727.21	164277.56
Total MIMO Conducted Power (dBm)		52.33	52.37	52.25	52.16
Mid Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	46.60	46.28	46.37	46.52
	1	46.96	46.73	46.87	46.92
	2	46.21	46.25	46.26	46.37
	3	46.06	45.73	46.01	46.02
Total MIMO Conducted Power (mW)		177515.63	169140.40	174161.16	177424.06
Total MIMO Conducted Power (dBm)		52.49	52.28	52.41	52.49
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	46.36	46.40	46.26	46.36
	1	46.80	46.78	46.66	46.63
	2	46.20	46.31	46.03	46.20
	3	46.00	46.18	46.10	46.12
Total MIMO Conducted Power (mW)		172612.05	175546.37	169436.25	171890.04
Total MIMO Conducted Power (dBm)		52.37	52.44	52.29	52.35

Table 10-5. Conducted Average Output Power Table (n5_1C_5M)

Low Channel	Port	QPSK	16QAM
Conducted Average Power (dBm)	0	45.91	45.92
	1	46.26	46.08
	2	46.21	46.23
	3	46.14	46.15
Total MIMO Conducted Power (mW)		164159.07	162820.59
Total MIMO Conducted Power (dBm)		52.15	52.12
Mid Channel	Port	QPSK	16QAM
Conducted Average Power (dBm)	0	46.13	46.19
	1	46.07	46.11
	2	46.25	46.33
	3	46.23	46.33
Total MIMO Conducted Power (mW)		165623.55	168330.29
Total MIMO Conducted Power (dBm)		52.19	52.26
High Channel	Port	QPSK	16QAM
Conducted Average Power (dBm)	0	46.07	46.07
	1	46.08	46.18
	2	46.26	46.20
	3	46.24	46.24
Total MIMO Conducted Power (mW)		165347.97	165712.59
Total MIMO Conducted Power (dBm)		52.18	52.19

Table 10-6. Conducted Average Output Power Table (n5_3C_5M+5M+5M)