

7 Effective Radiated Power

7.1.1 Test Result

Test Description	Basic Standards	Test Result
Effective Radiated Power	22.913(a)(2) 27.50 RSS-130 (4.4)	Pass
Effective Isotropic Radiated Power	24.232(c) 27.50(d)(4) RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.4)	Pass

7.1.2 Test Method

Because the CASAN device is provided with a coaxial port but no antenna, ERP/EIRP measurements were taken by measuring the conducted output power and defining the maximum gain antenna that may be used while maintaining compliance with the applicable limits.

7.2 Test Site

SGS EMC Laboratory, Suwanee, GA

7.3 Test Equipment

None

7.4 Test Data

Mode	Band	Max Power dBm	Antenna Gain dBd/dBi	Cable Loss, dB	ERP/EIRP (dBm)	ERP/EIRP Limit, dBm		Result	
						FCC	IC	FCC	IC
LTE	Band 2	23.99	6.1	1	29.09	33	33	PASS	PASS
LTE	Band 4	23.72	6.1	1	28.82	30	30	PASS	PASS
LTE	Band 5	23.7	6.1	1	28.8	38.5	38.5	PASS	PASS
LTE	Band 17	24.09	6.1	1	29.19	34.8	37	PASS	PASS

Note: Antenna gain was determined from maximum gain while still meeting the RF exposure requirements.

8 Radiated Spurious Emissions

8.1 Test Result

Test Description	Basic Standards		Test Result
Radiated Spurious Emissions	2.1053 22.917(a) 24.238(a) 27.53(c)(2) 27.53(h) ANSI/TIA-603-C-2004	RSS-GEN (6.13) RSS-130 (4.6) RSS-132 (5.5) RSS-133 (6.5.1) RSS-139 (6.5.1)	Pass

8.2 Test Method

The levels are measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. Compliance is based on the use of a spectrum analyzer employing a resolution bandwidth of 1 MHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of a least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emissions 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.

The EUT was manipulated through each of its three orthogonal axes with the measurement oriented in both vertical and horizontal polarizations.

A radio link was established between EUT and Radio Communications Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester.

The measurements were performed at the low, middle, and high channels.

8.3 Test Site

SGS 3m Chamber, Suwanee, GA (validated to ANS C63.4: 2009 below and above 1GHz)

Environmental Conditions

Temperature: 24.2 °C
Relative Humidity: 43.2 %
Atmospheric Pressure: 98.1 kPa

8.4 Test Equipment

Test Start Date: 21-Aug-2015

Test End Date: 24-Aug-2015

Tester: KWS

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	4-Aug-2016
ANTENNA, BILOG	JB6	SUNOL	B079689	3-Sep-2015
DRG HORN (MEDIUM)	3117	ETS-LINDGREN	B079699	14-Apr-2016
PREAMPLIFIER-ANTENNA SYS	TS-PR18	ROHDE & SCHWARZ	B094463	13-Feb-2016
17 FT N TYPE COAX CABLE	HS 84133232	HUBER&SUHNER	B079661	4-Aug-2016
RF CABLE - 7000MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079716	4-Aug-2016
RF CABLE - 7500MM (10KHZ - 18GHZ)	SF106	HUBER&SUHNER	B079713	4-Aug-2016

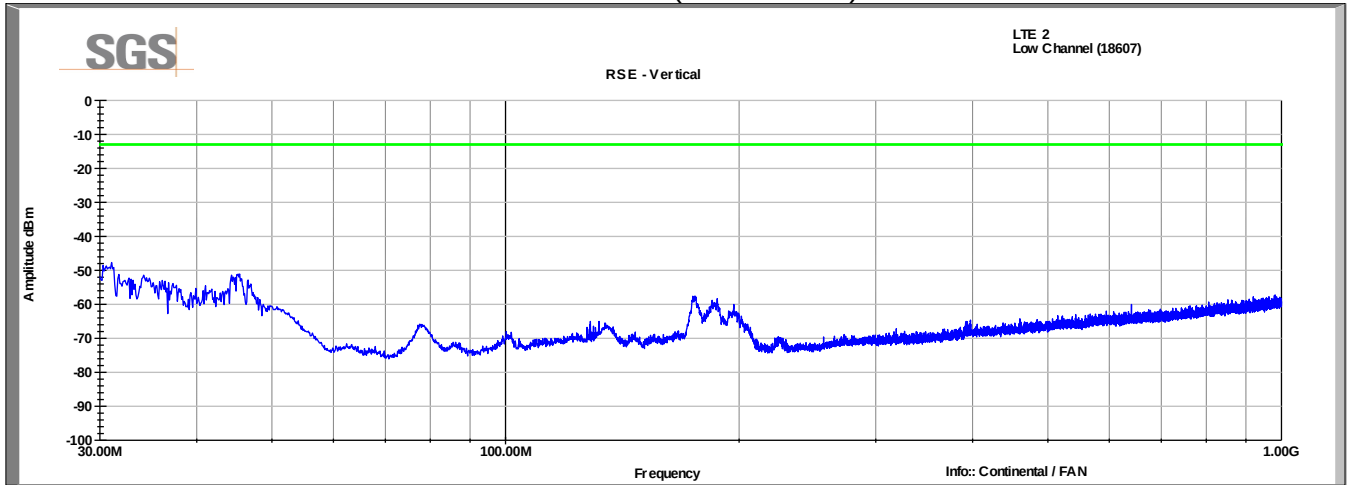
- Unless otherwise noted, equipment is on a 1 year calibration cycle.

8.5 Test Data

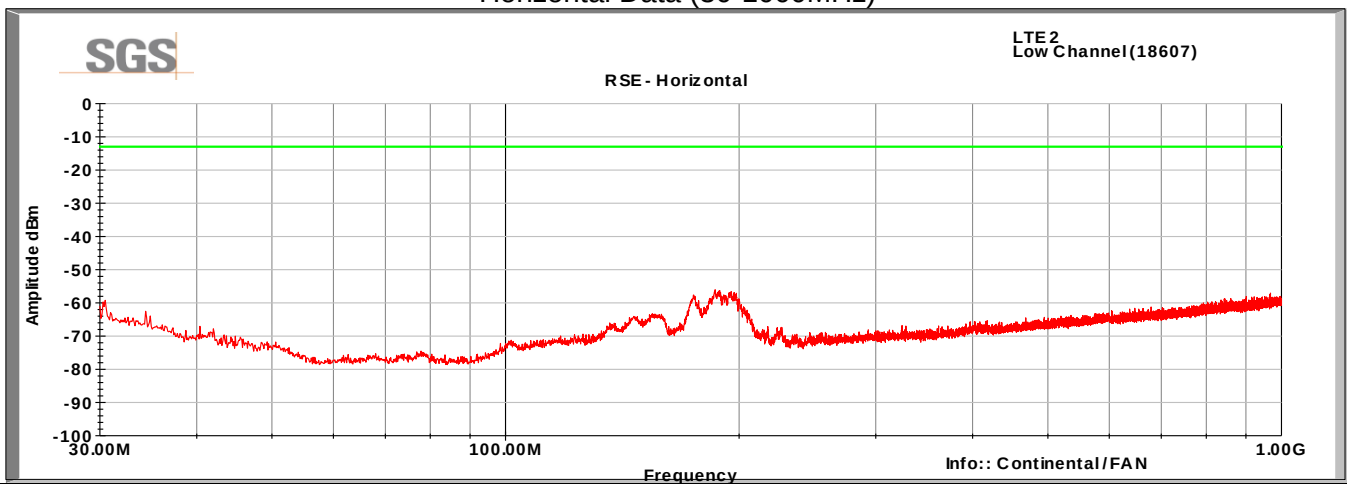
LTE Band 2, QPSK modulation, 1.4MHz

Low Channel (18607), 1 RB (Pos 0)

Vertical Data (30-1000MHz)



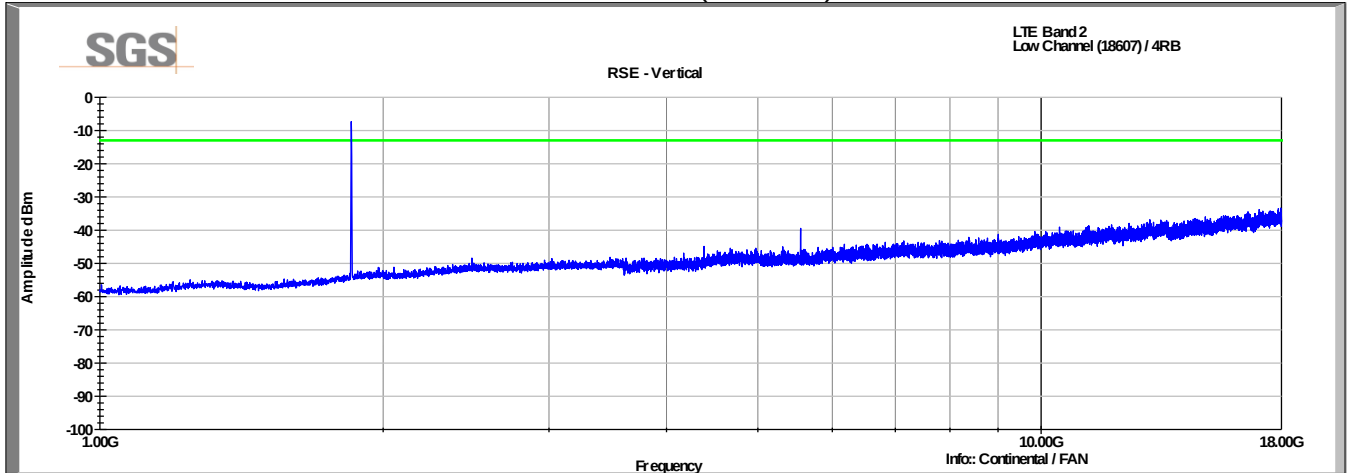
Horizontal Data (30-1000MHz)



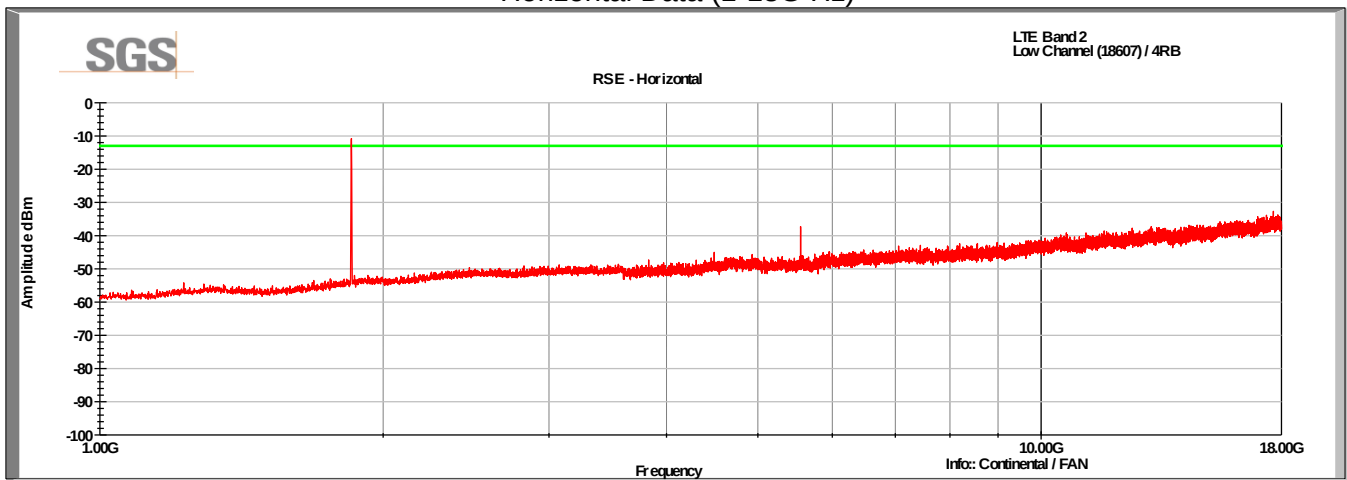
LTE Band 2, QPSK modulation, 1.4MHz

Low Channel (18607), 1 RB (Pos 0)

Vertical Data (1-18GHz)



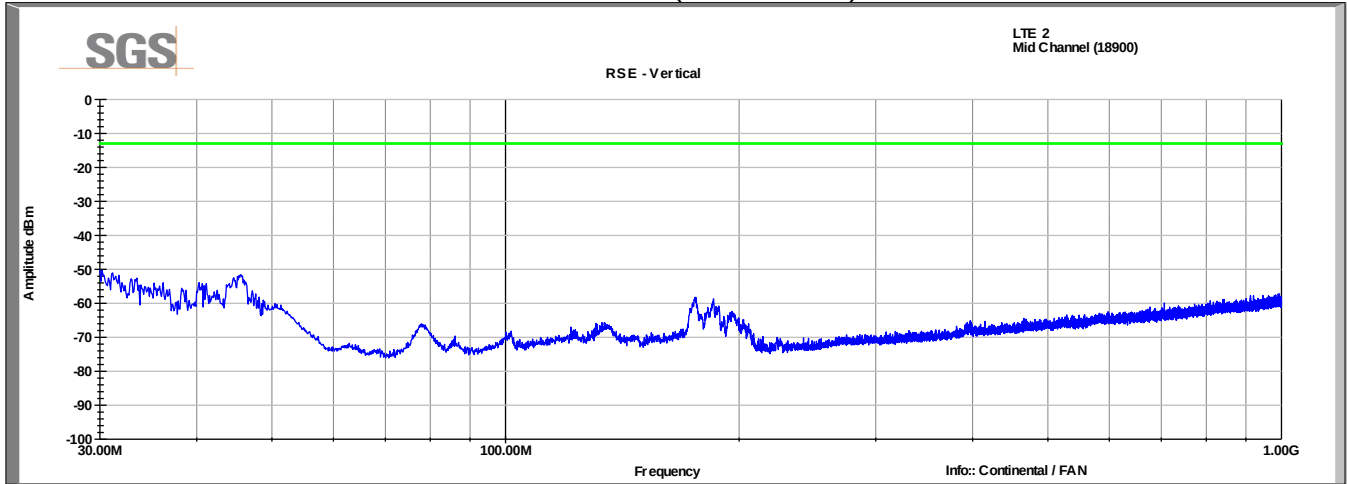
Horizontal Data (1-18G Hz)



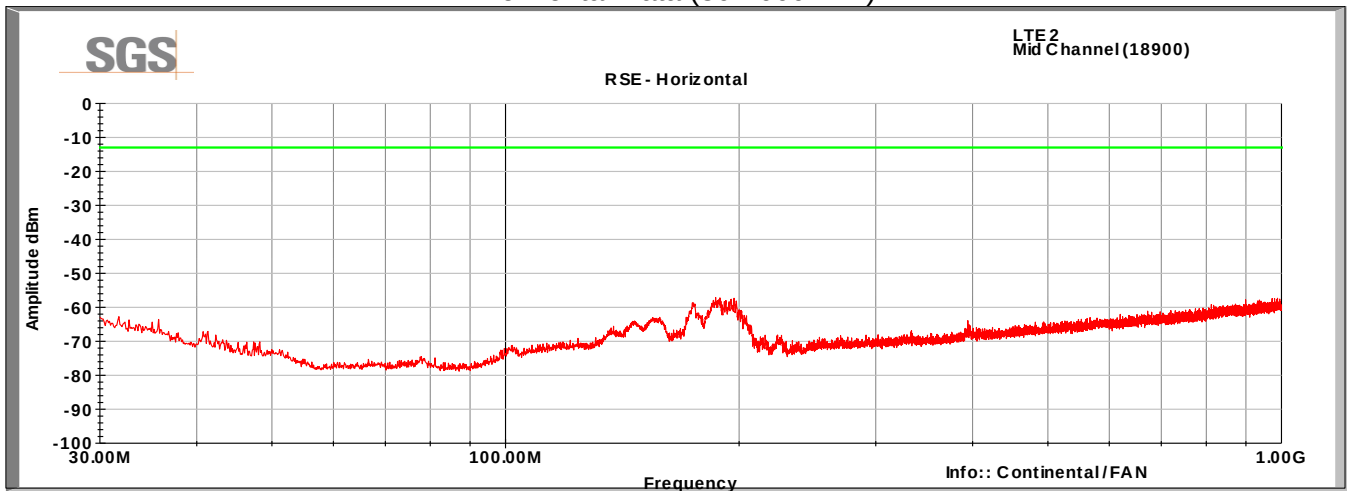
LTE Band 2, QPSK modulation, 1.4MHz

Mid Channel (18900), 1 RB (Pos 3)

Vertical Data (30-1000MHz)



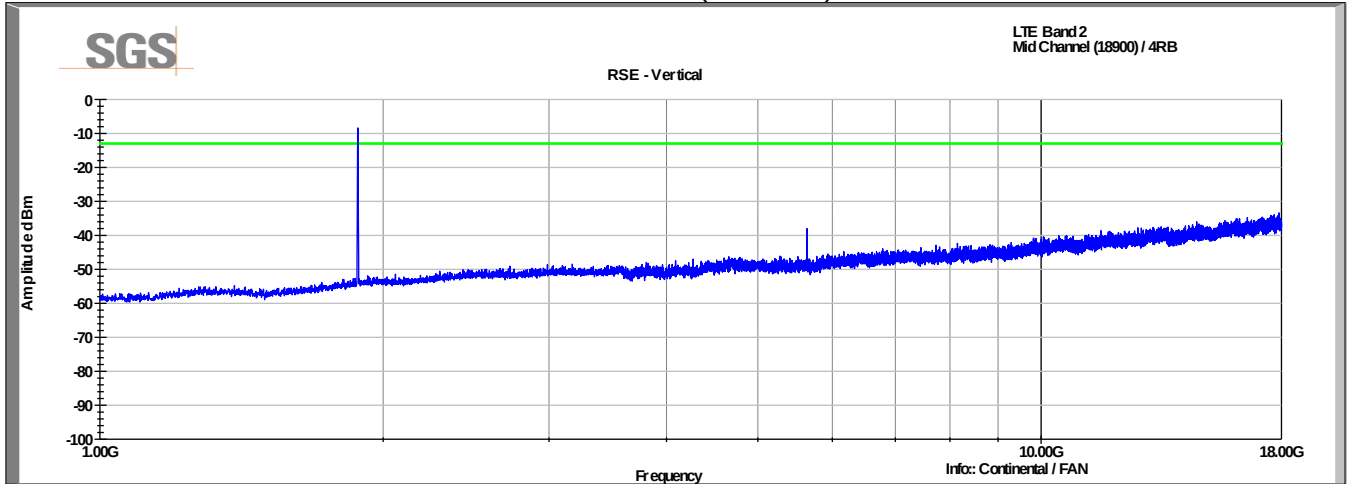
Horizontal Data (30-1000MHz)



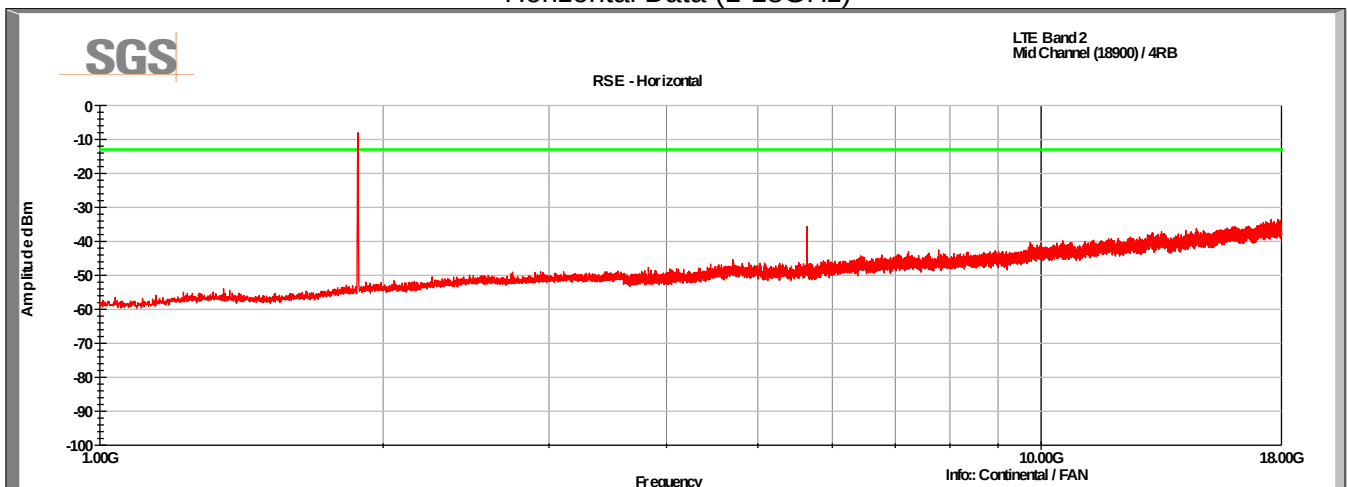
LTE Band 2, QPSK modulation, 1.4MHz

Mid Channel (18900), 1 RB (Pos 3)

Vertical Data (1-18GHz)



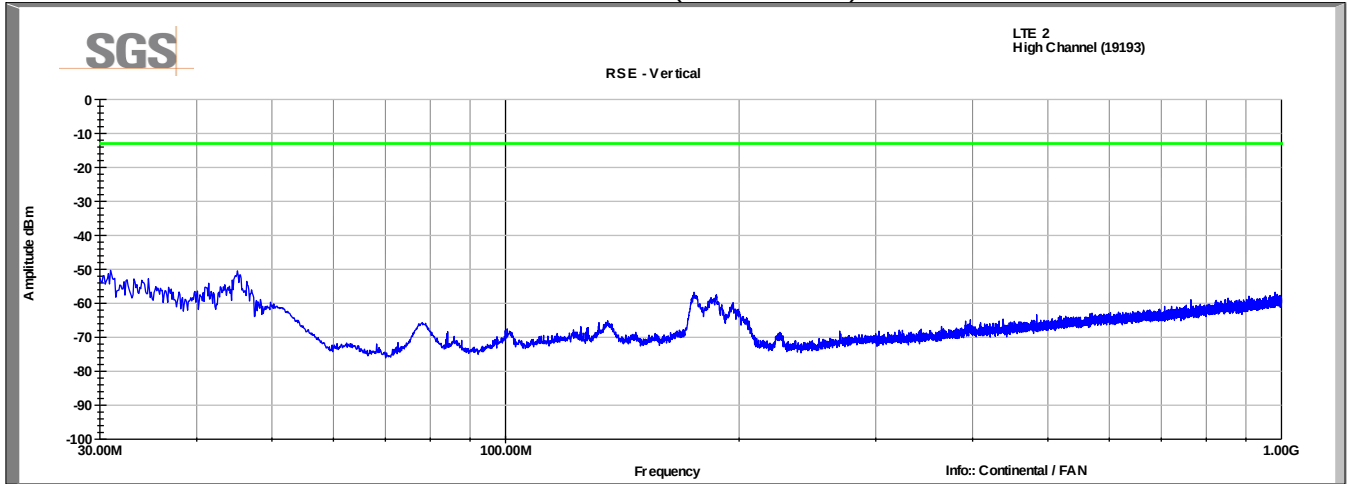
Horizontal Data (1-18GHz)



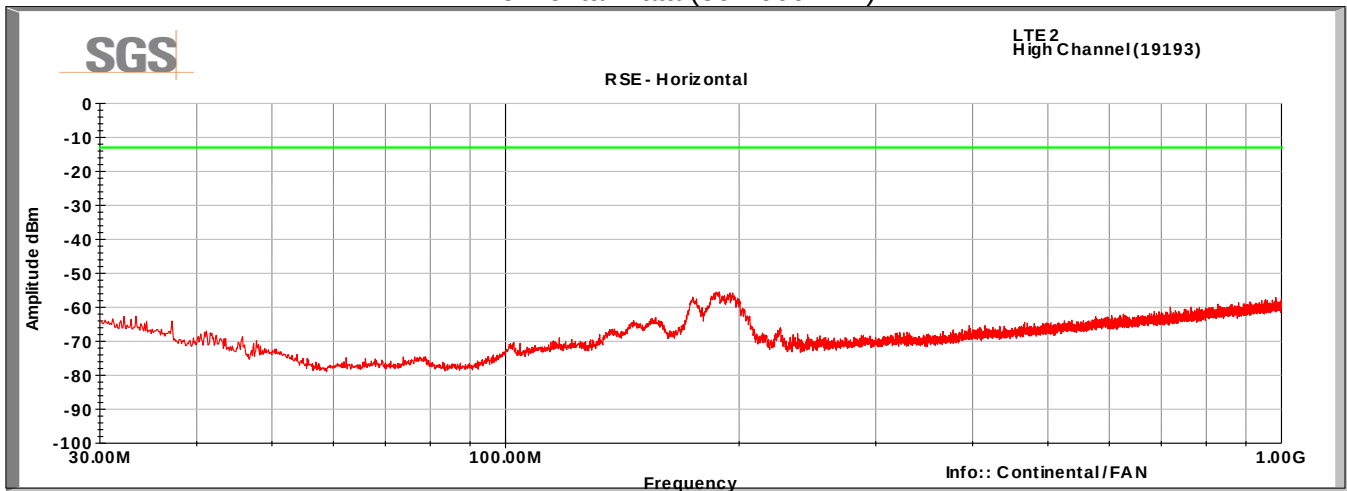
LTE Band 2, QPSK modulation, 1.4MHz

High Channel (19193), 1 RB (Pos 5)

Vertical Data (30-1000MHz)



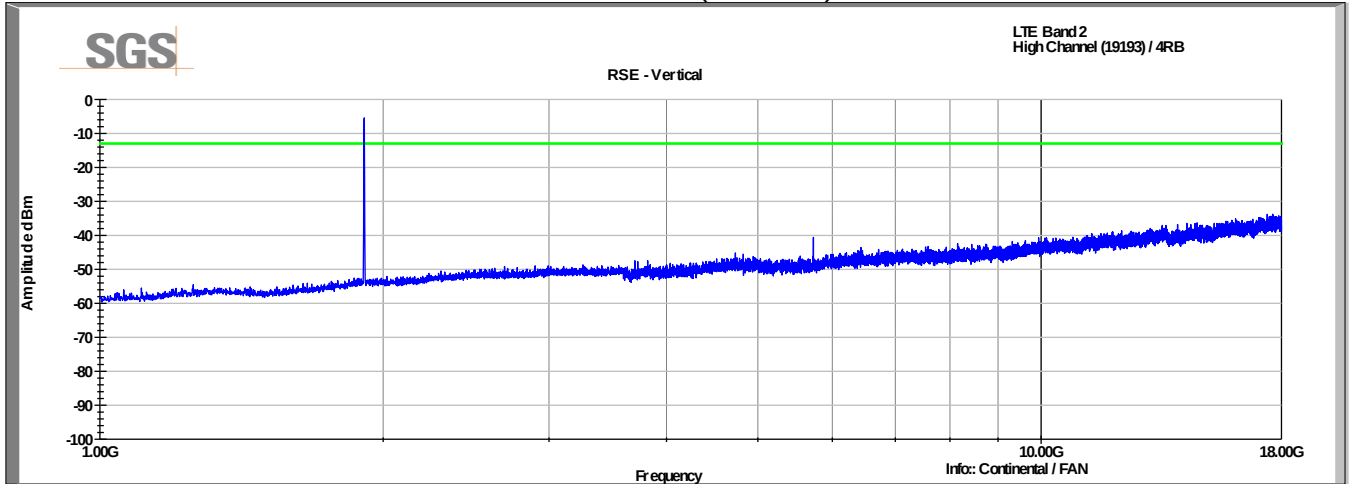
Horizontal Data (30-1000MHz)



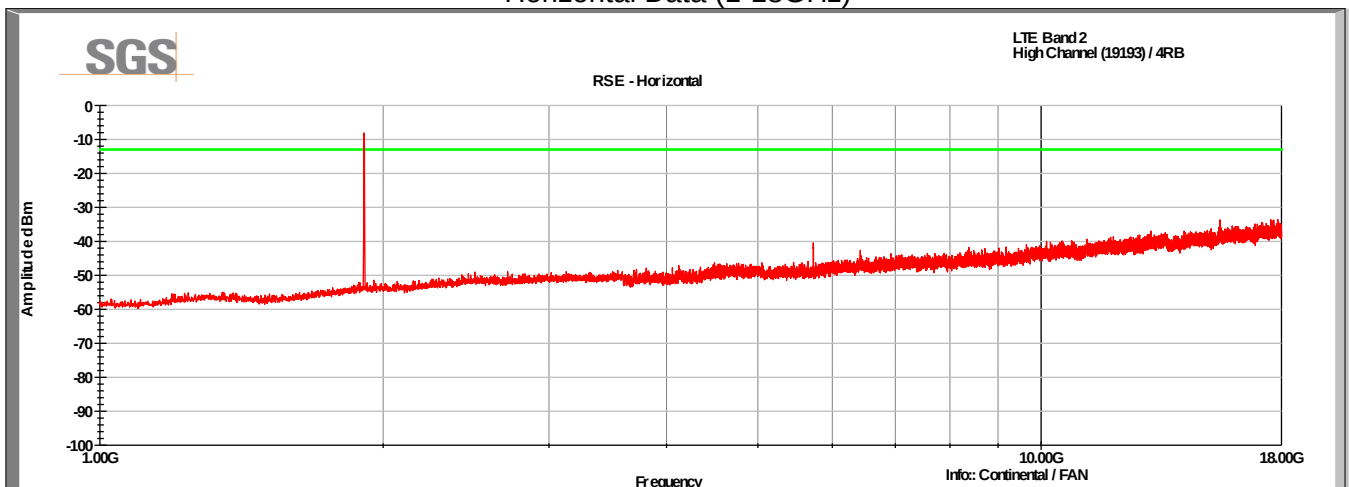
LTE Band 2, QPSK modulation, 1.4MHz

High Channel (19193), 1 RB (Pos 5)

Vertical Data (1-18GHz)



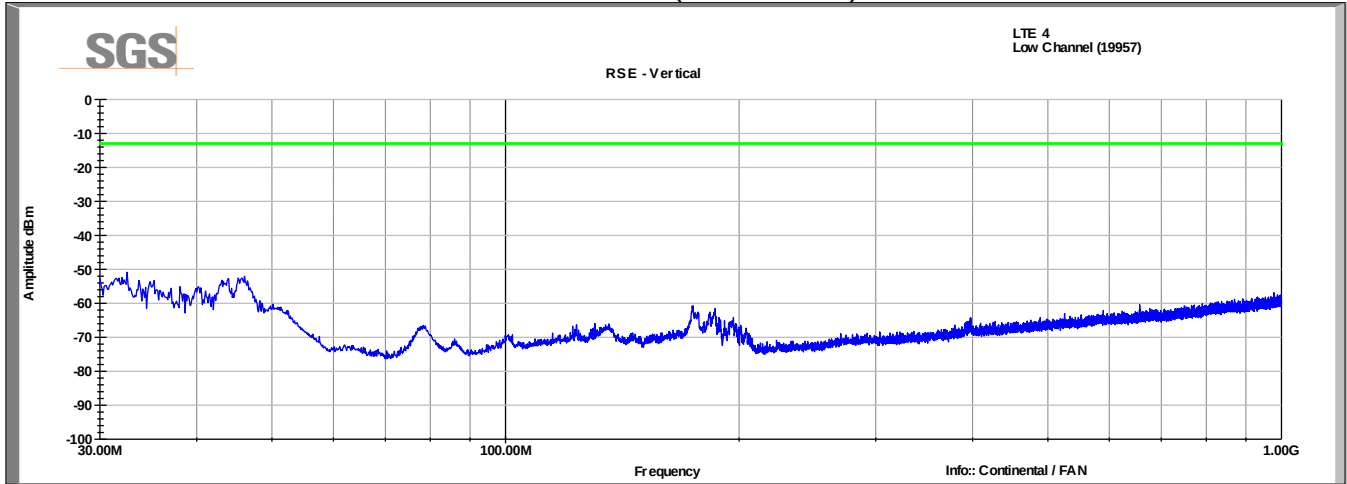
Horizontal Data (1-18GHz)



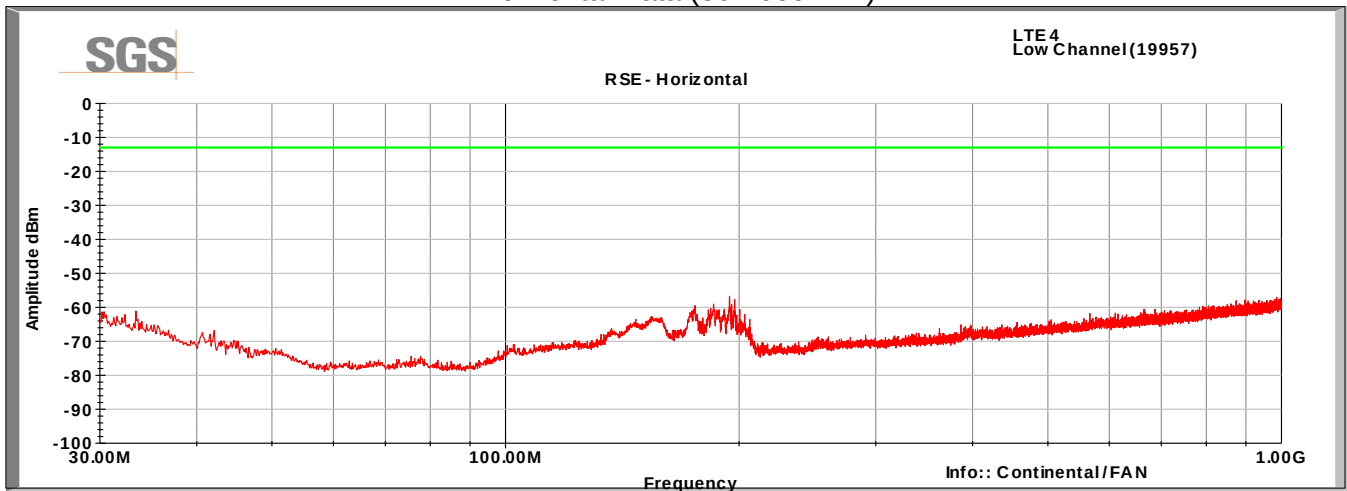
LTE Band 4, QPSK modulation, 1.4MHz

Low Channel (19957), 1 RB (Pos 0)

Vertical Data (30-1000MHz)



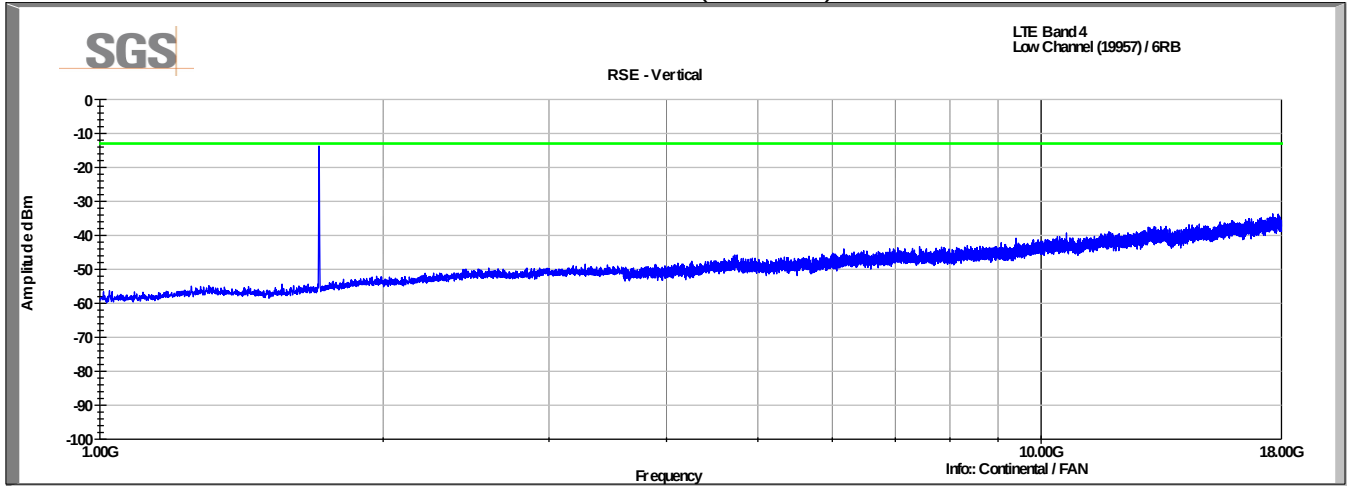
Horizontal Data (30-1000MHz)



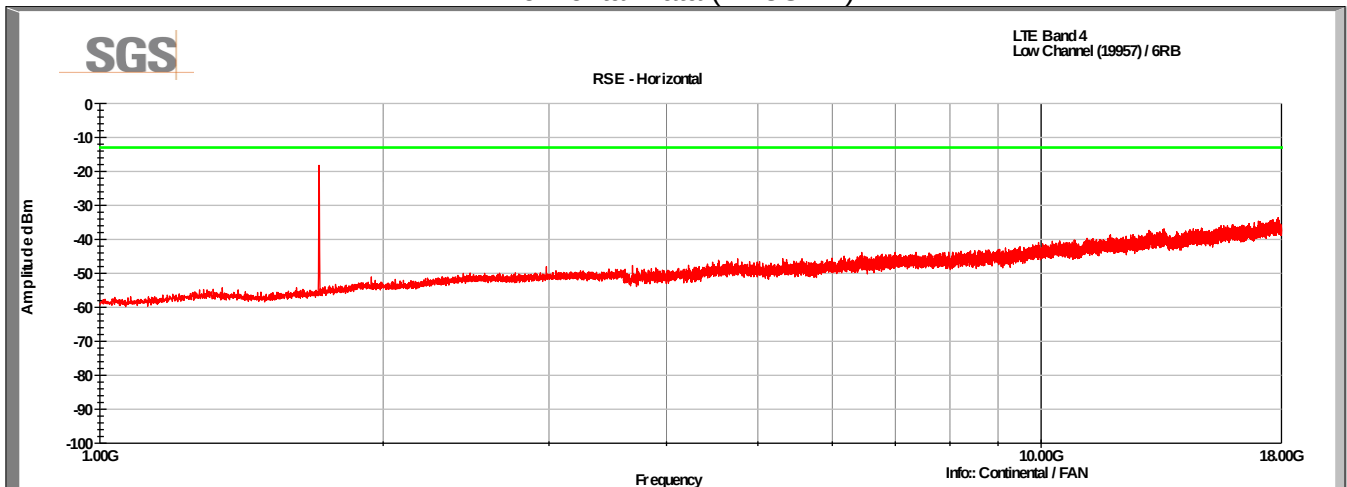
LTE Band 4, QPSK modulation, 1.4MHz

Low Channel (19957), 1 RB (Pos 0)

Vertical Data (1-18GHz)



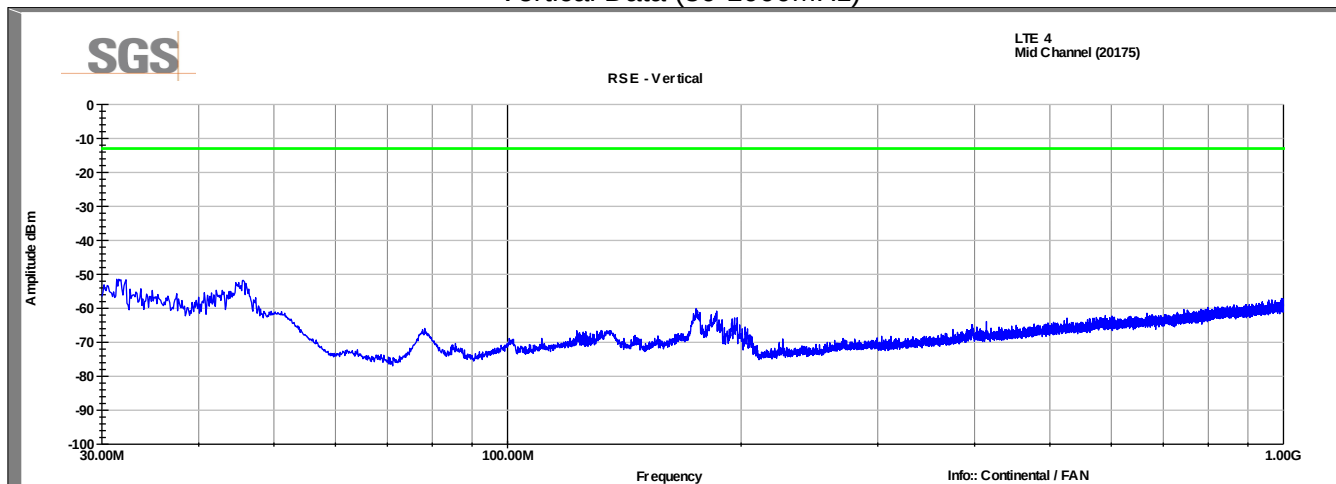
Horizontal Data (1-18G Hz)



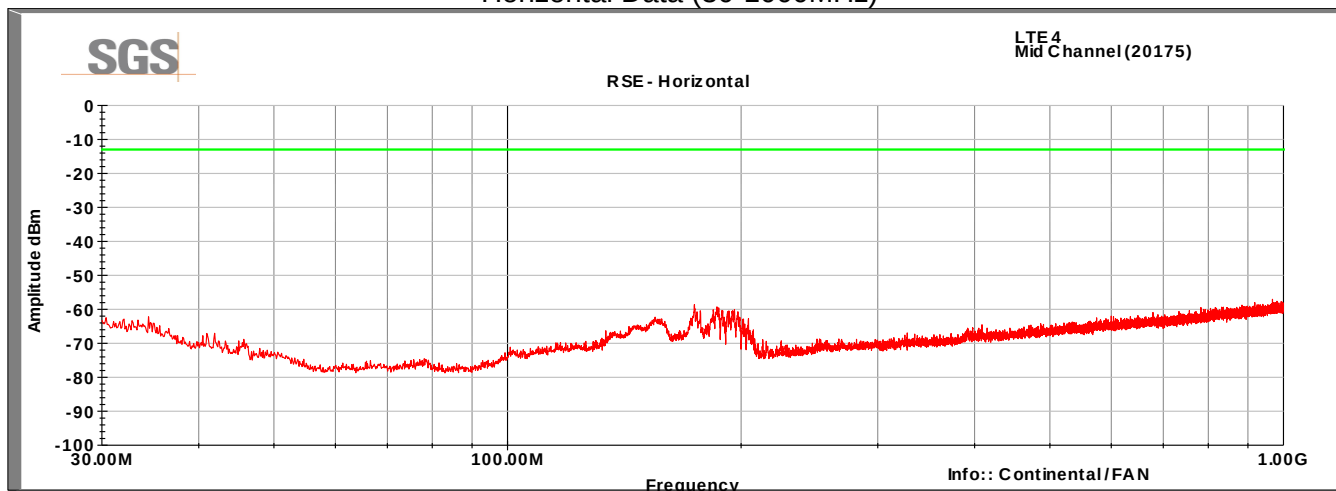
LTE Band 4, QPSK modulation, 1.4MHz

Mid Channel (20175), 1 RB (Pos 3)

Vertical Data (30-1000MHz)



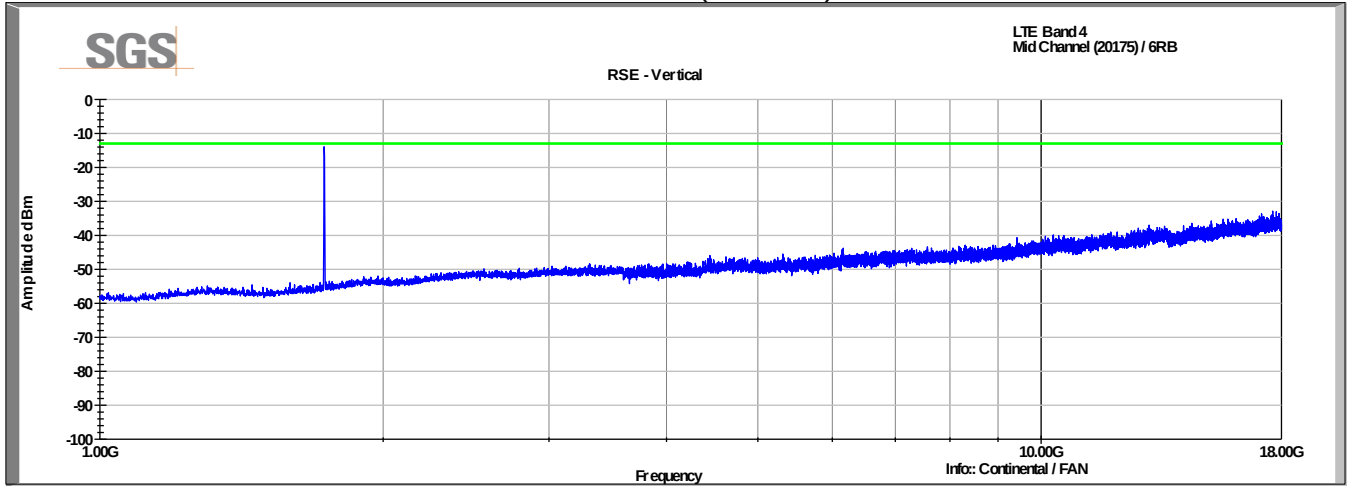
Horizontal Data (30-1000MHz)



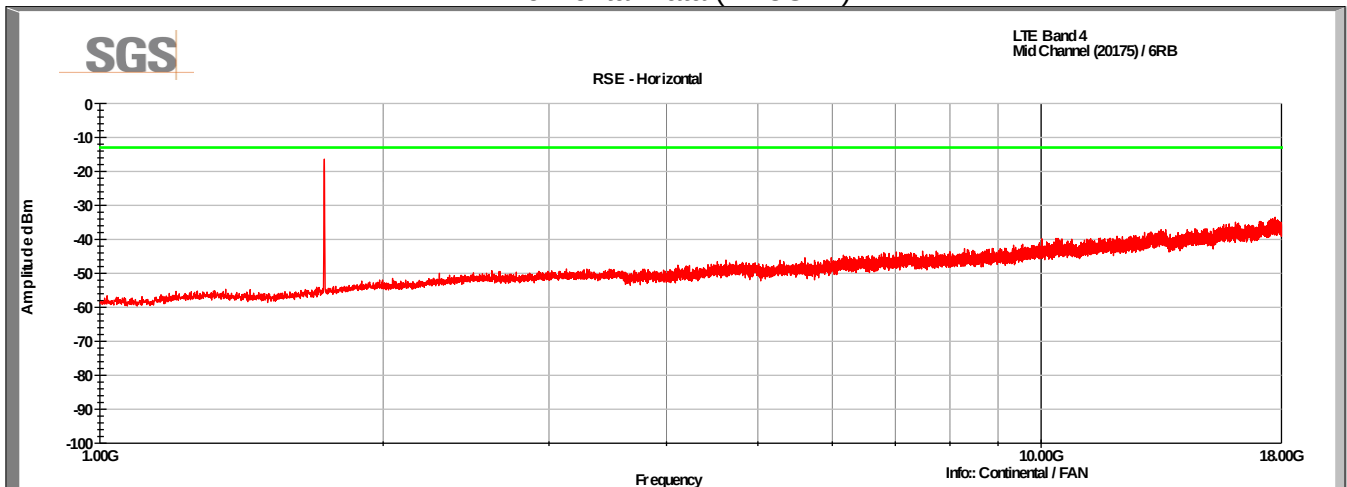
LTE Band 4, QPSK modulation, 1.4MHz

Mid Channel (20175), 1 RB (Pos 3)

Vertical Data (1-18GHz)



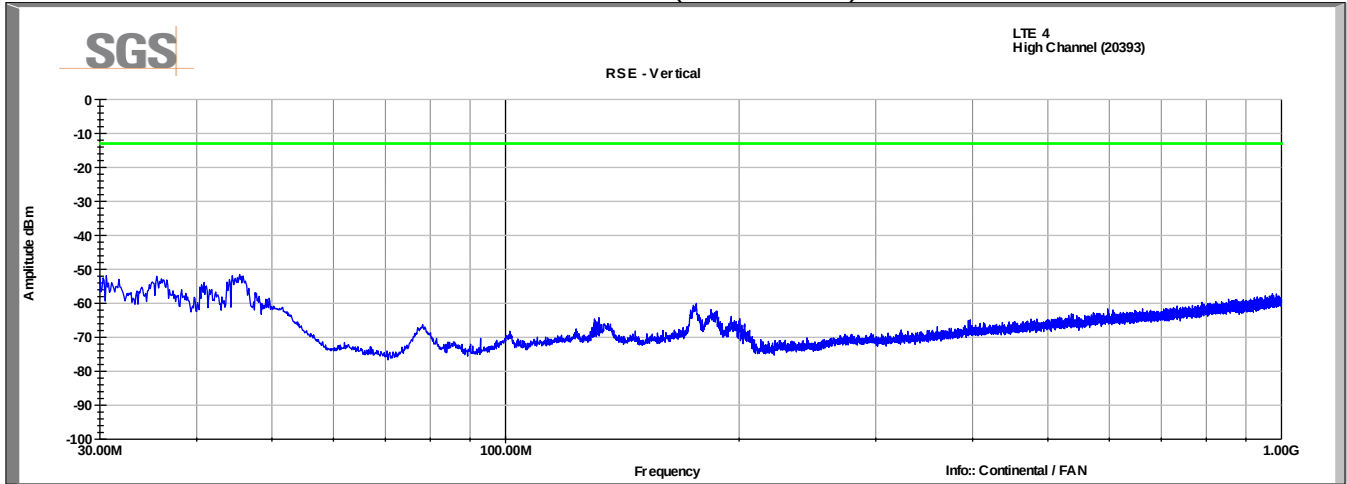
Horizontal Data (1-18GHz)



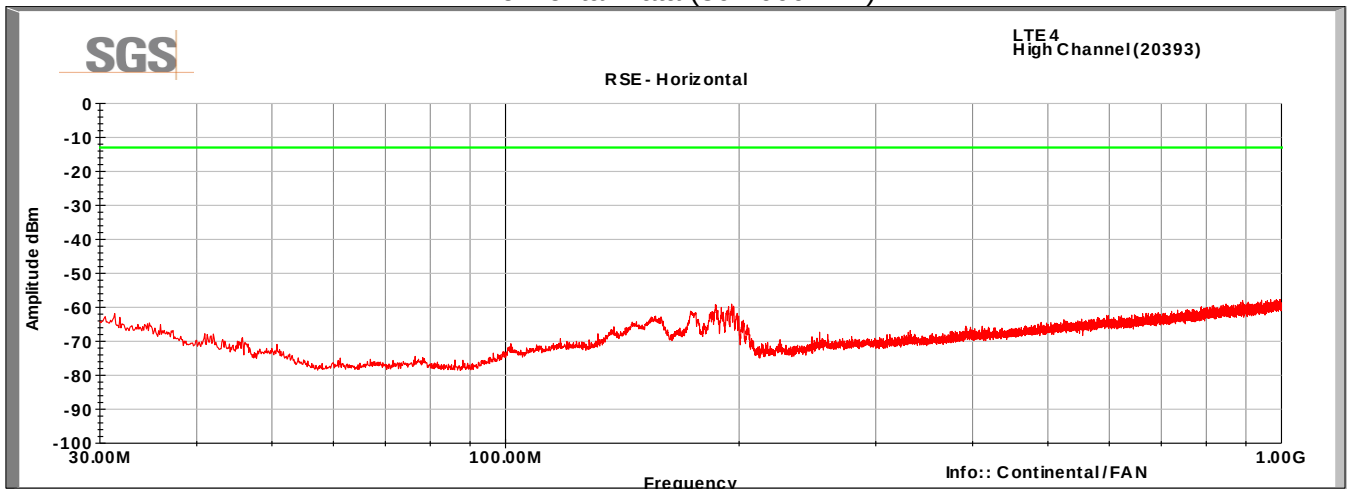
LTE Band 4, QPSK modulation, 1.4MHz

High Channel (20393), 1 RB (Pos 5)

Vertical Data (30-1000MHz)



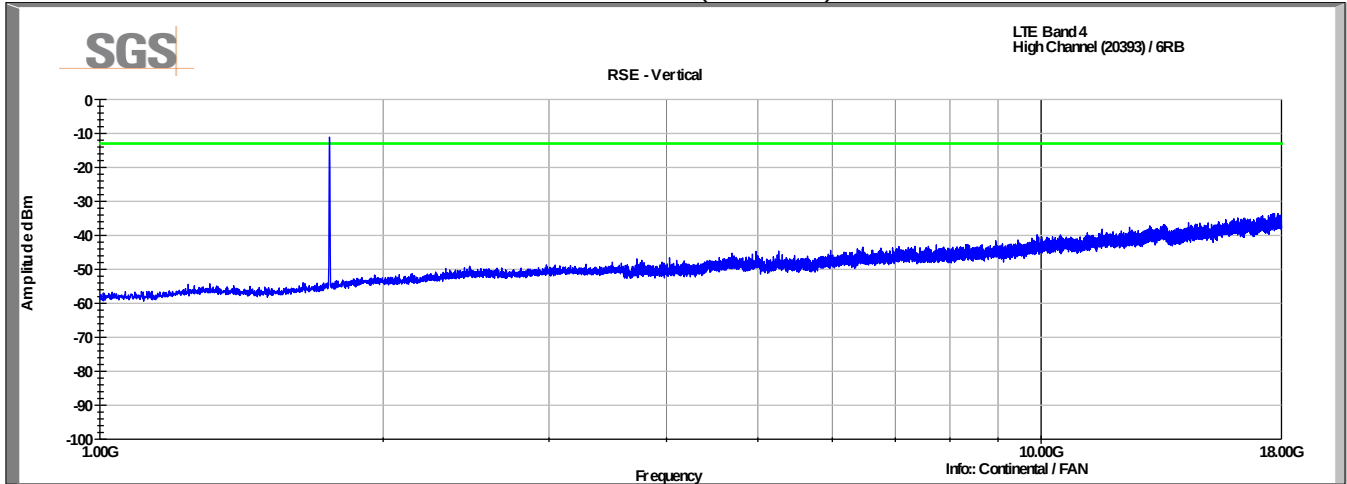
Horizontal Data (30-1000MHz)



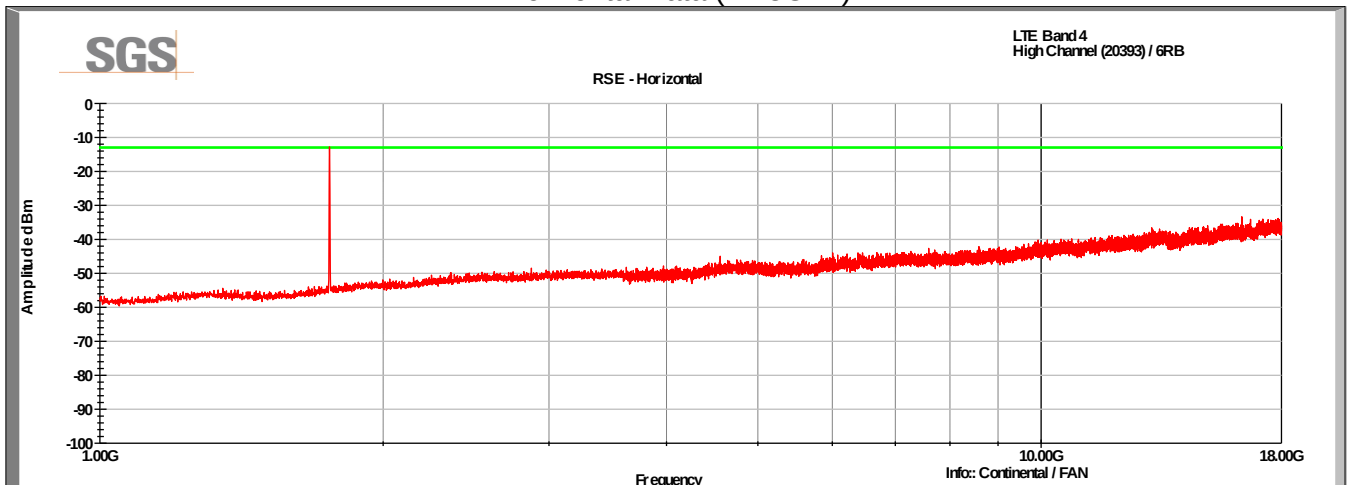
LTE Band 4, QPSK modulation, 1.4MHz

High Channel (20393), 1 RB (Pos 5)

Vertical Data (1-18GHz)



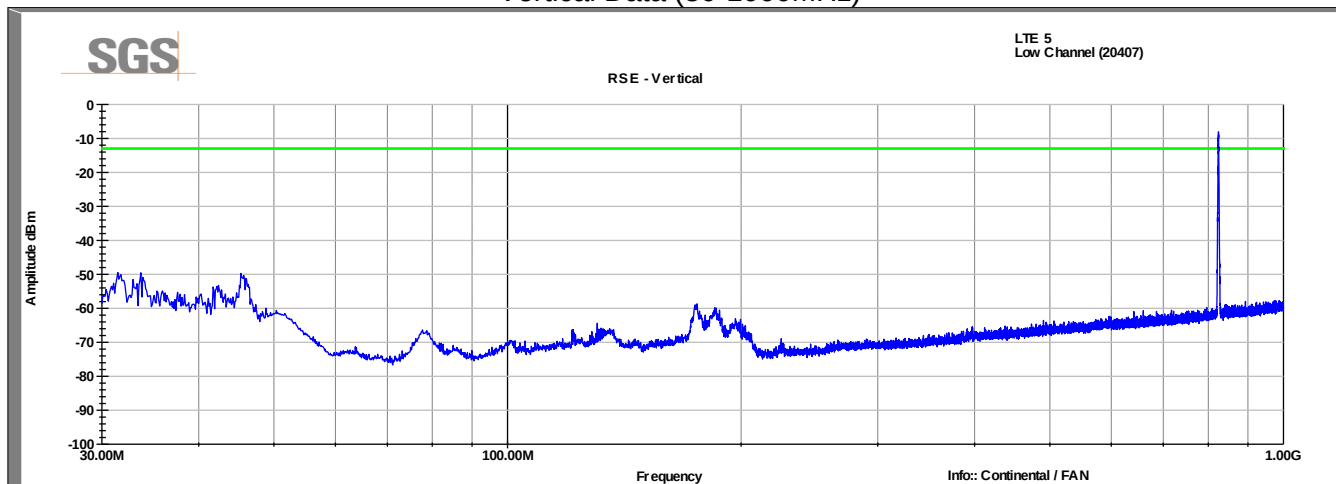
Horizontal Data (1-18GHz)



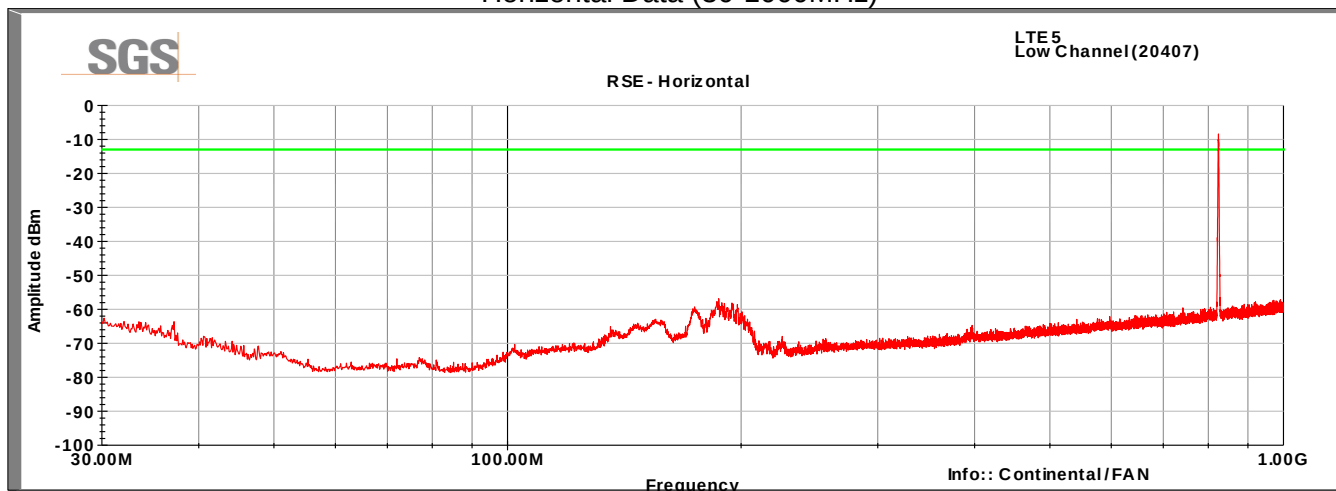
LTE Band 5, QPSK modulation, 1.4MHz

Low Channel (20407), 1 RB (Pos 0)

Vertical Data (30-1000MHz)



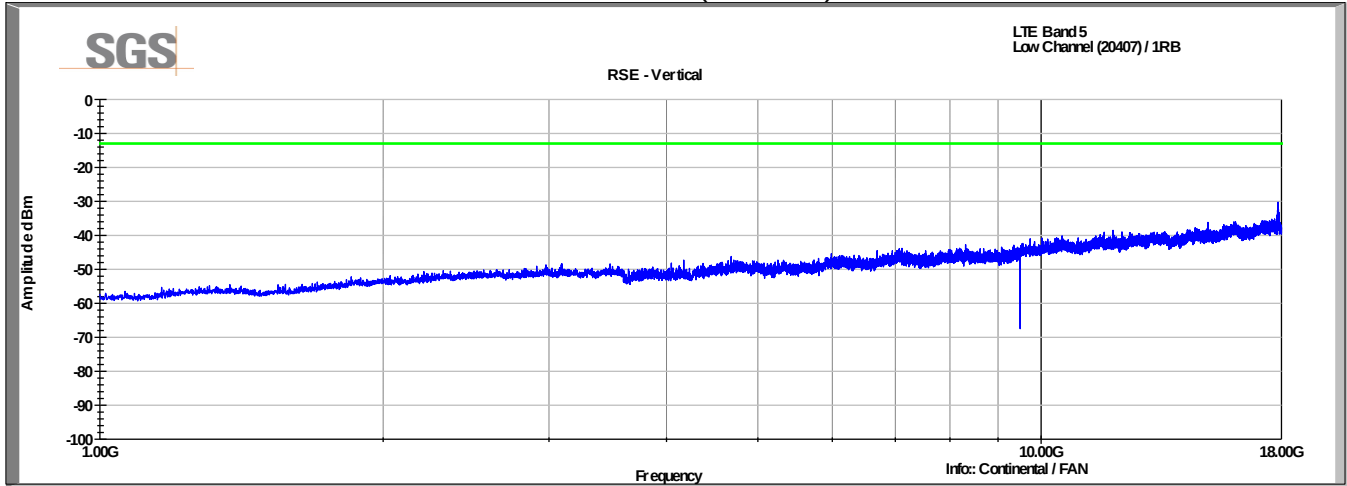
Horizontal Data (30-1000MHz)



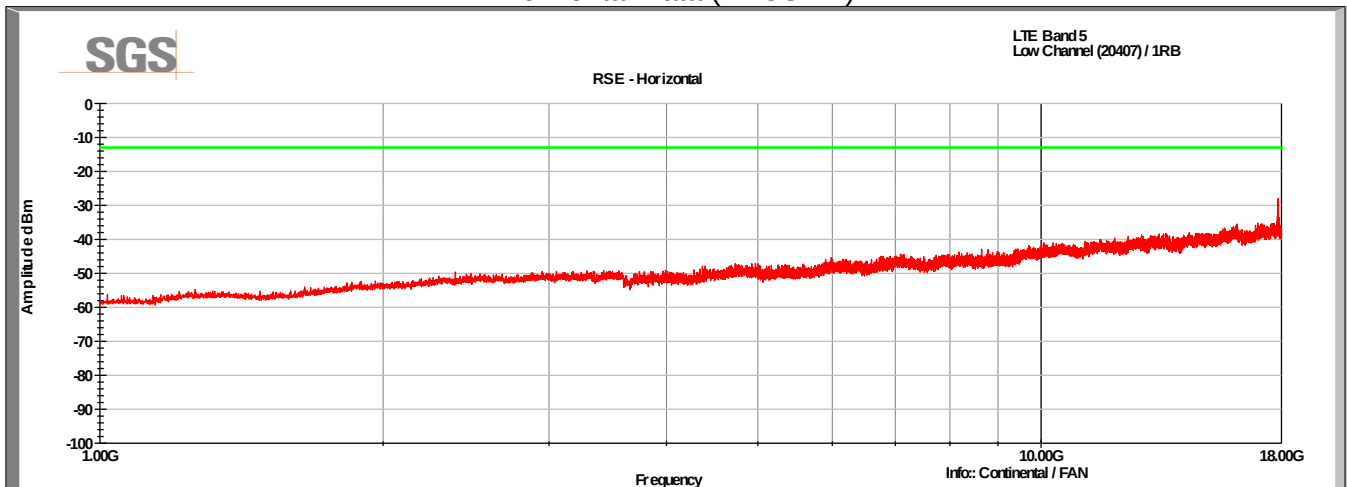
LTE Band 5, QPSK modulation, 1.4MHz

Low Channel (20407), 1 RB (Pos 0)

Vertical Data (1-18GHz)



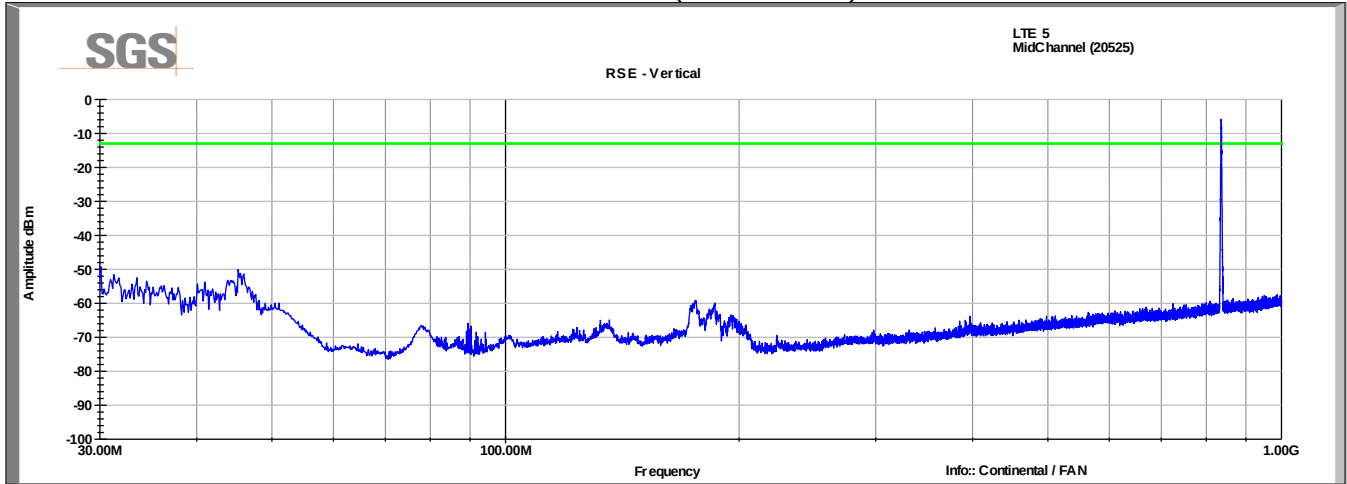
Horizontal Data (1-18G Hz)



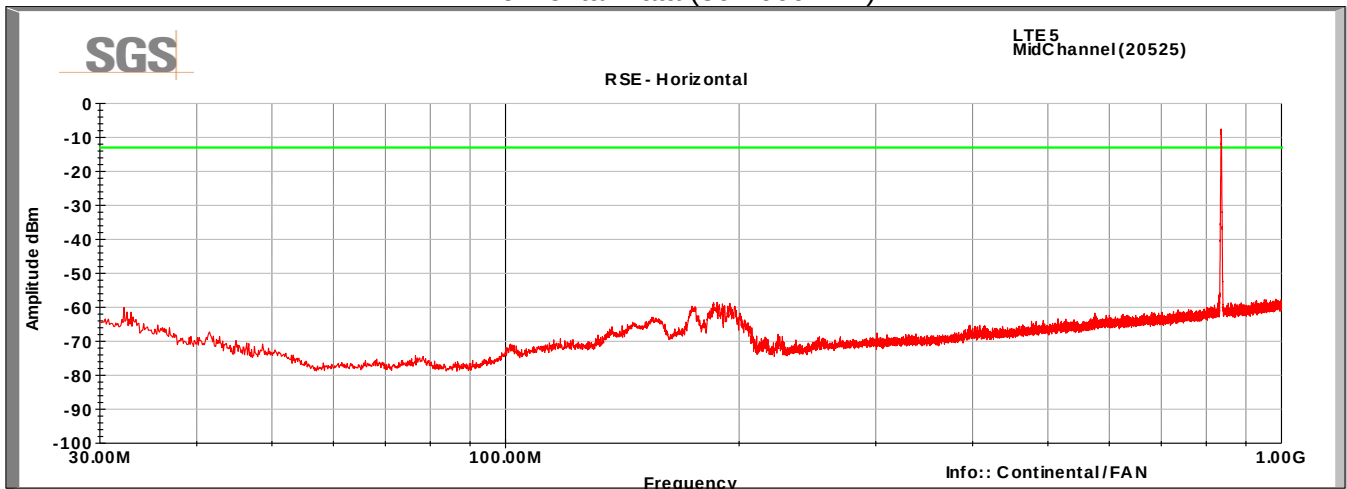
LTE Band 5, QPSK modulation, 1.4MHz

Mid Channel (20525), 1 RB (Pos 3)

Vertical Data (30-1000MHz)



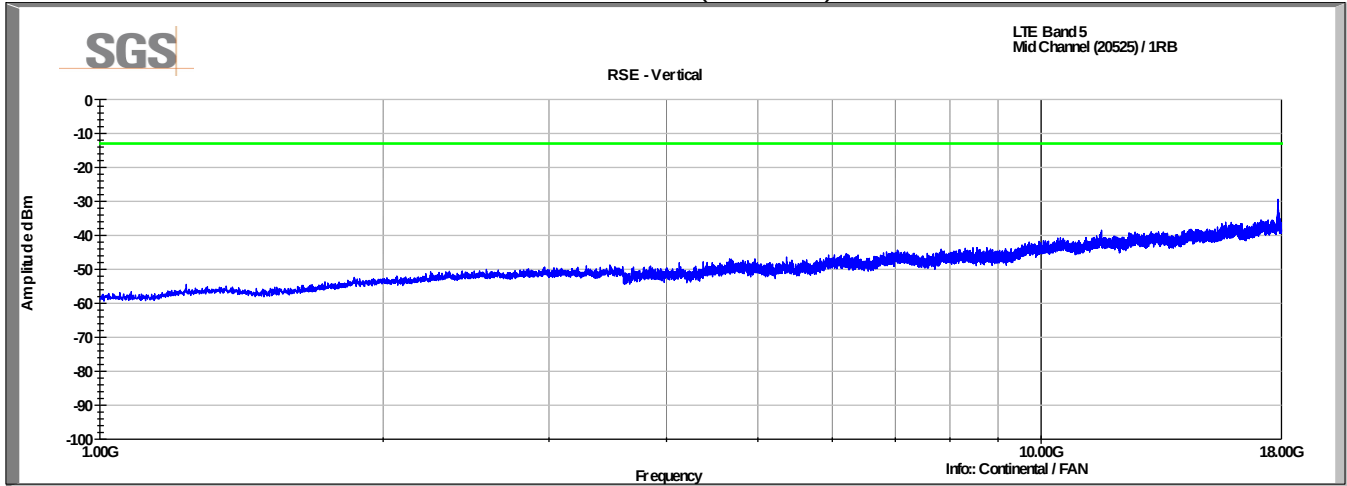
Horizontal Data (30-1000MHz)



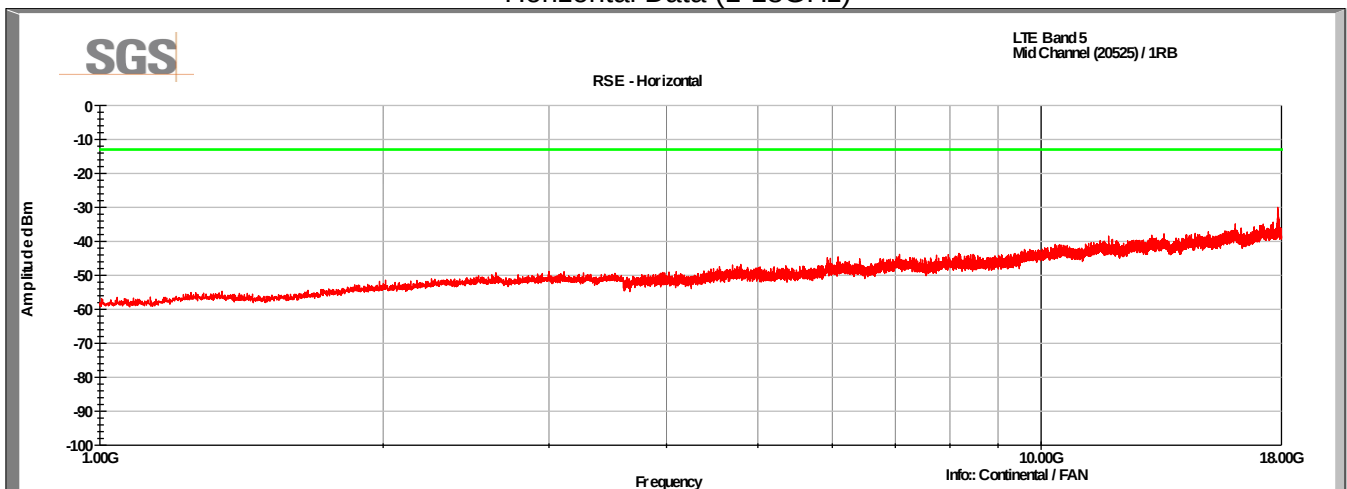
LTE Band 5, QPSK modulation, 1.4MHz

Mid Channel (20525), 1 RB (Pos 3)

Vertical Data (1-18GHz)



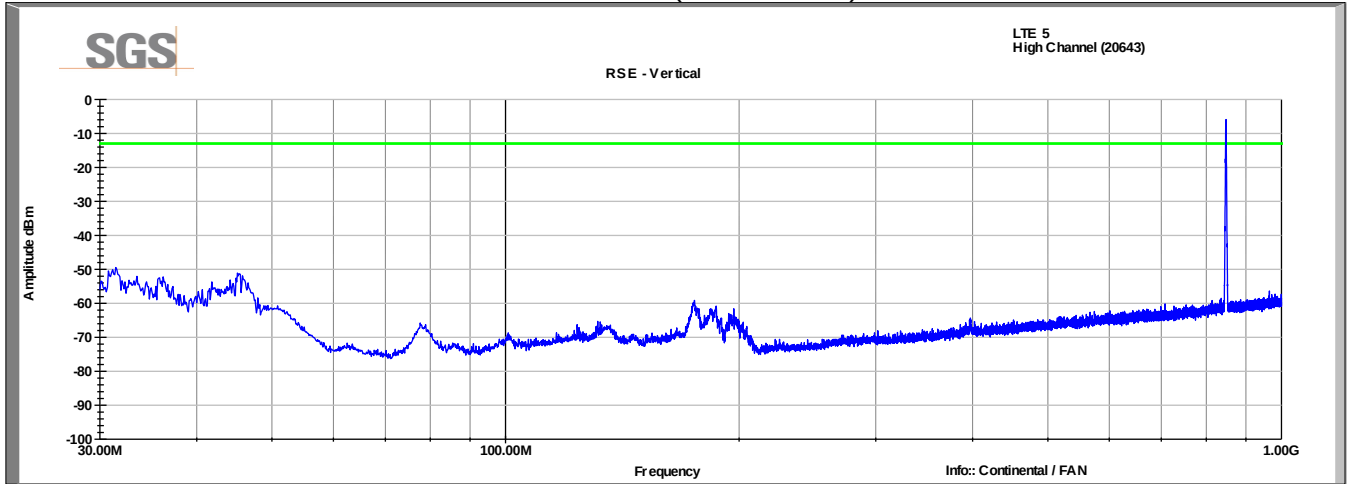
Horizontal Data (1-18GHz)



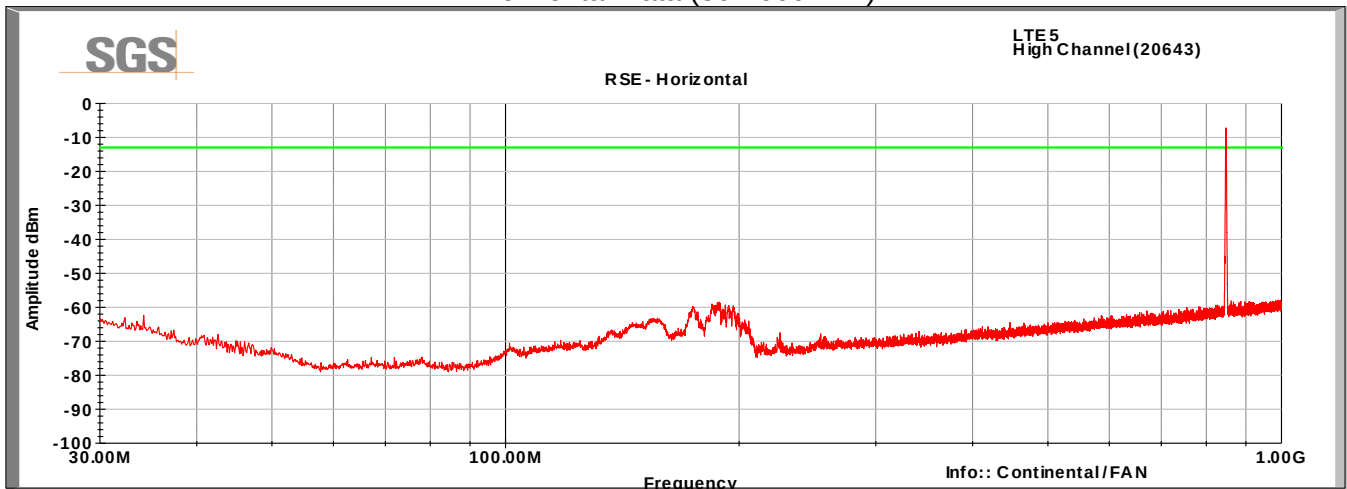
LTE Band 5, QPSK modulation, 1.4MHz

High Channel (20643), 1 RB (Pos 5)

Vertical Data (30-1000MHz)



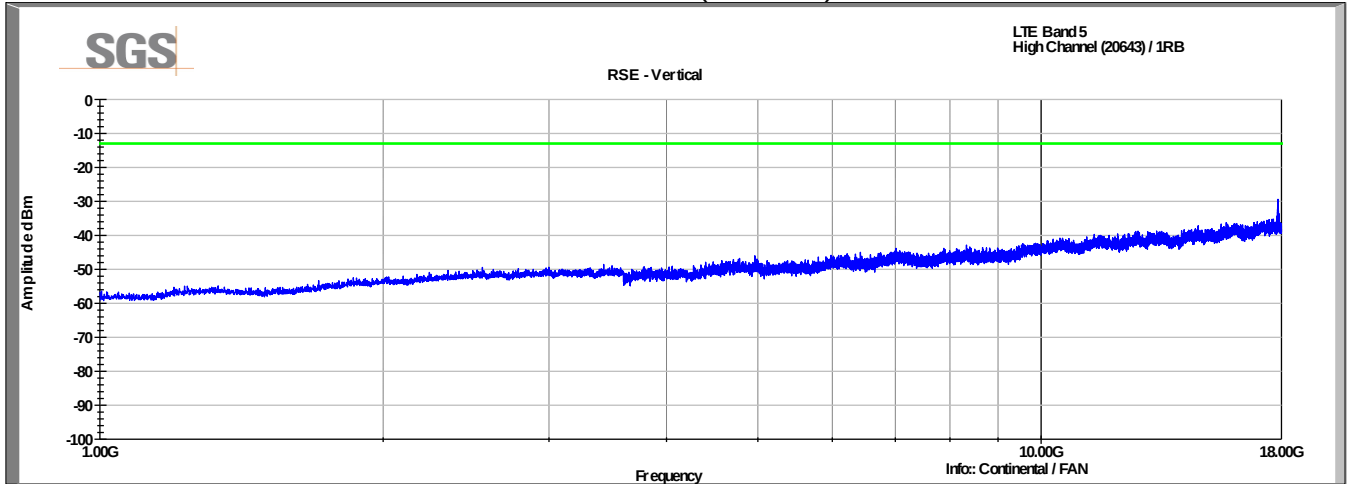
Horizontal Data (30-1000MHz)



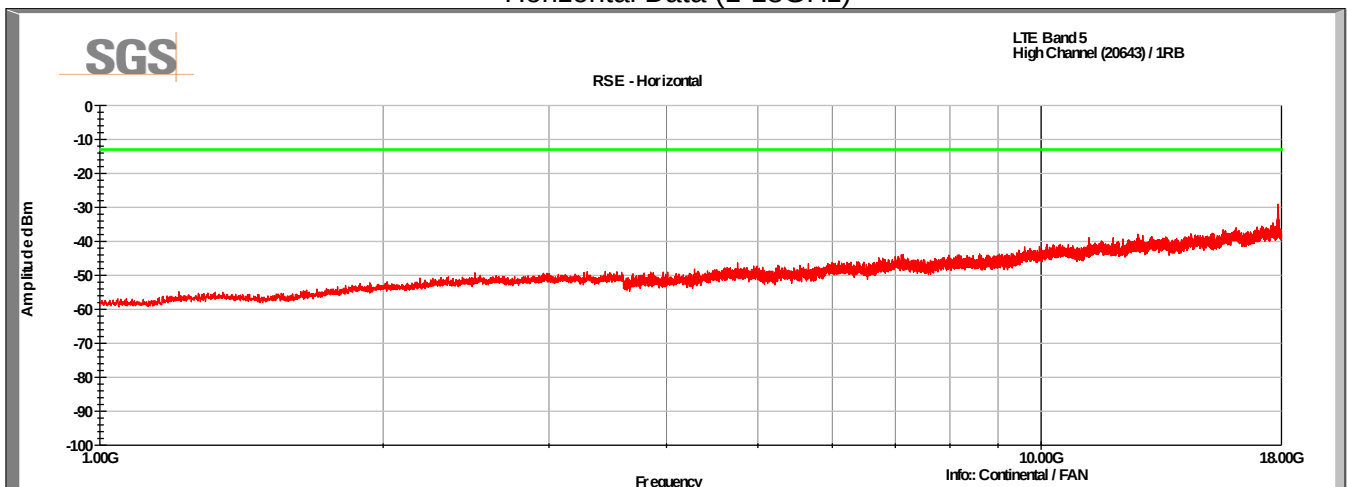
LTE Band 5, QPSK modulation, 1.4MHz

High Channel (20643), 1 RB (Pos 5)

Vertical Data (1-18GHz)



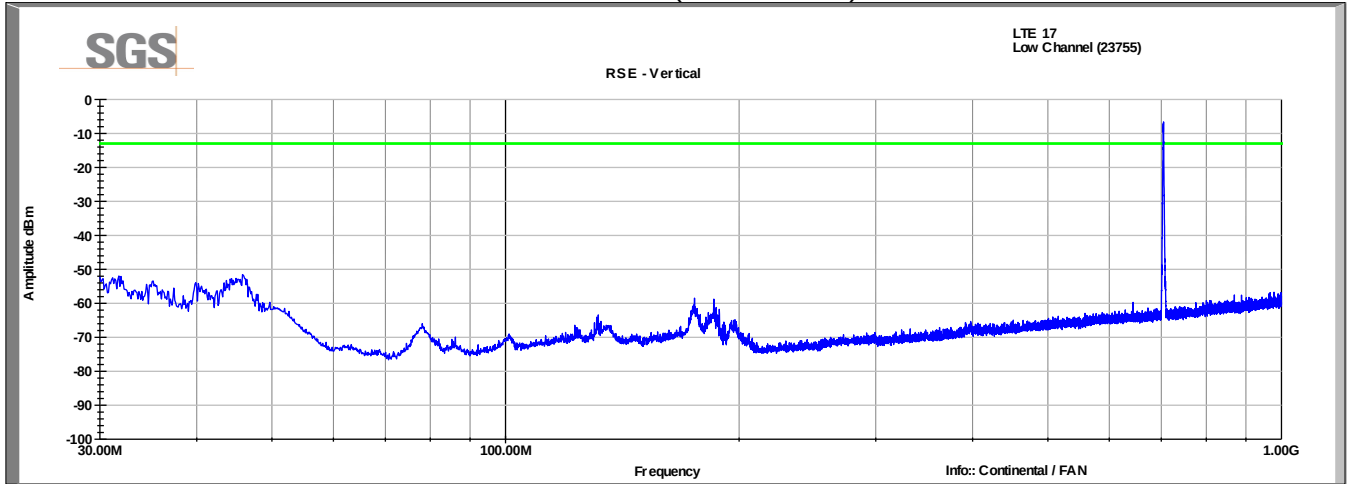
Horizontal Data (1-18GHz)



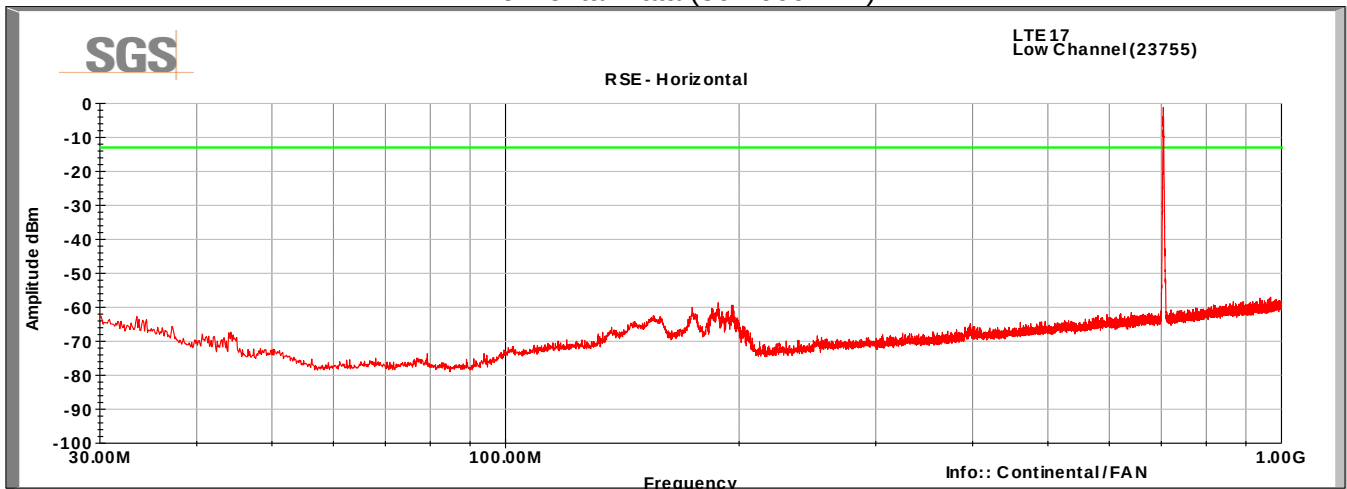
LTE Band 17, QPSK modulation, 5MHz

Low Channel (23755), 1 RB (Pos 0)

Vertical Data (30-1000MHz)



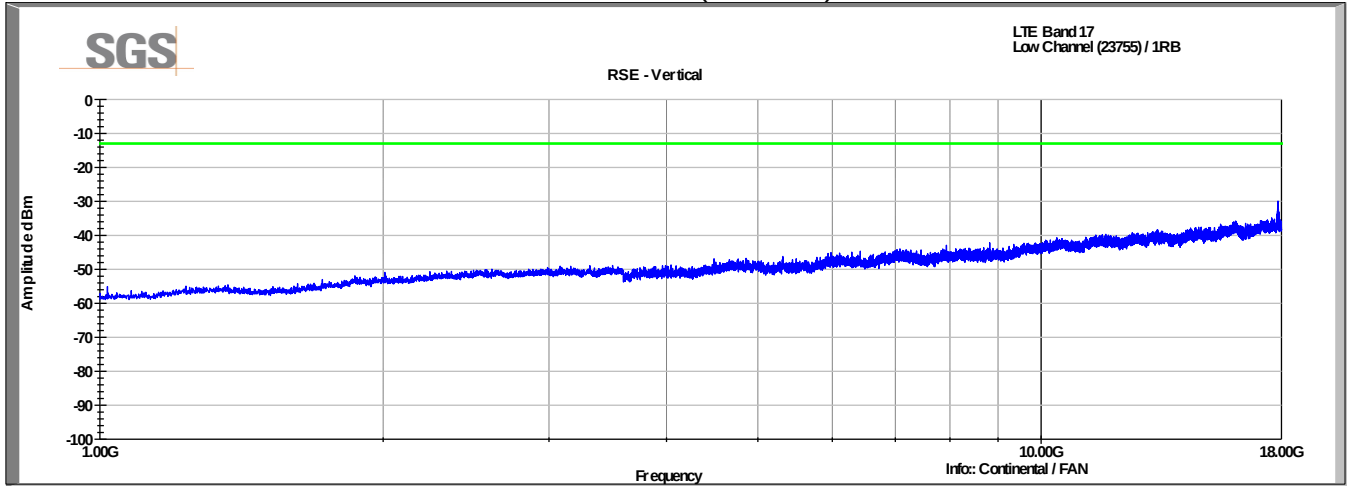
Horizontal Data (30-1000MHz)



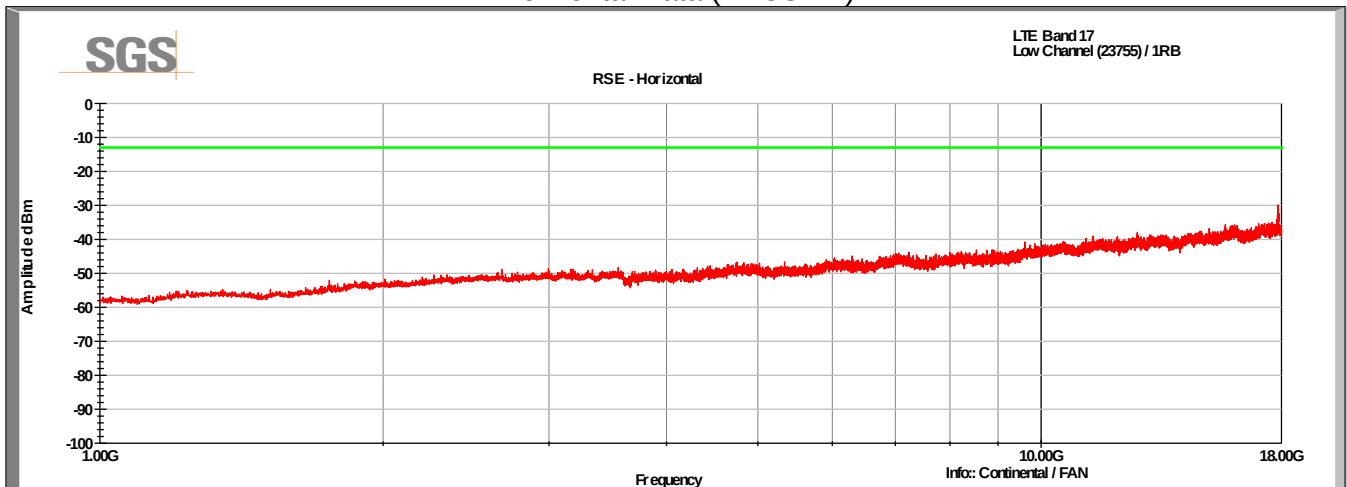
LTE Band 17, QPSK modulation, 5MHz

Low Channel (23755), 1 RB (Pos 0)

Vertical Data (1-18GHz)



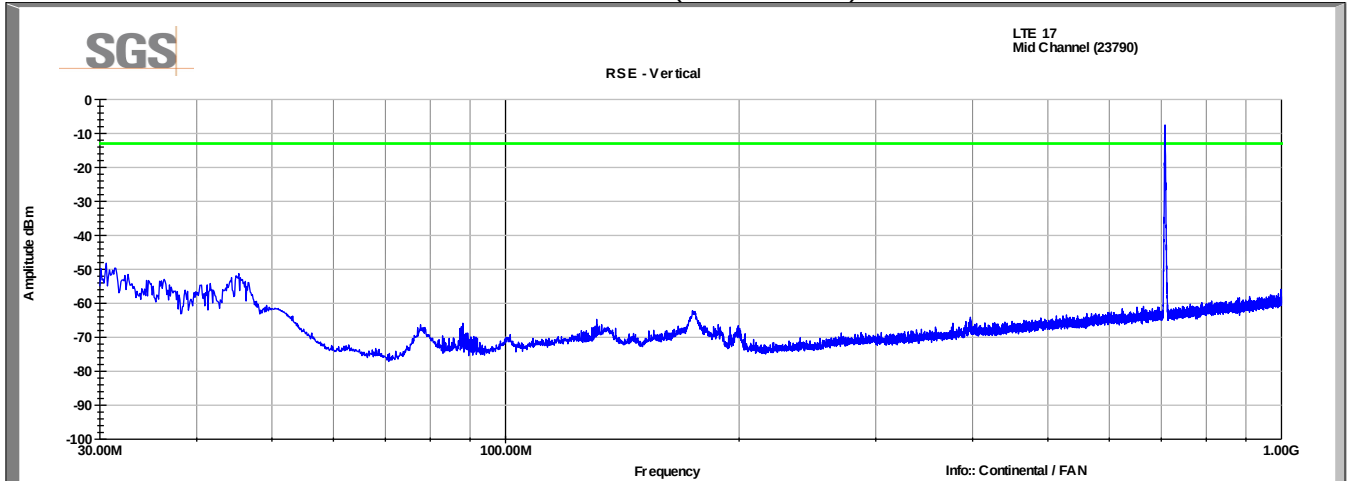
Horizontal Data (1-18G Hz)



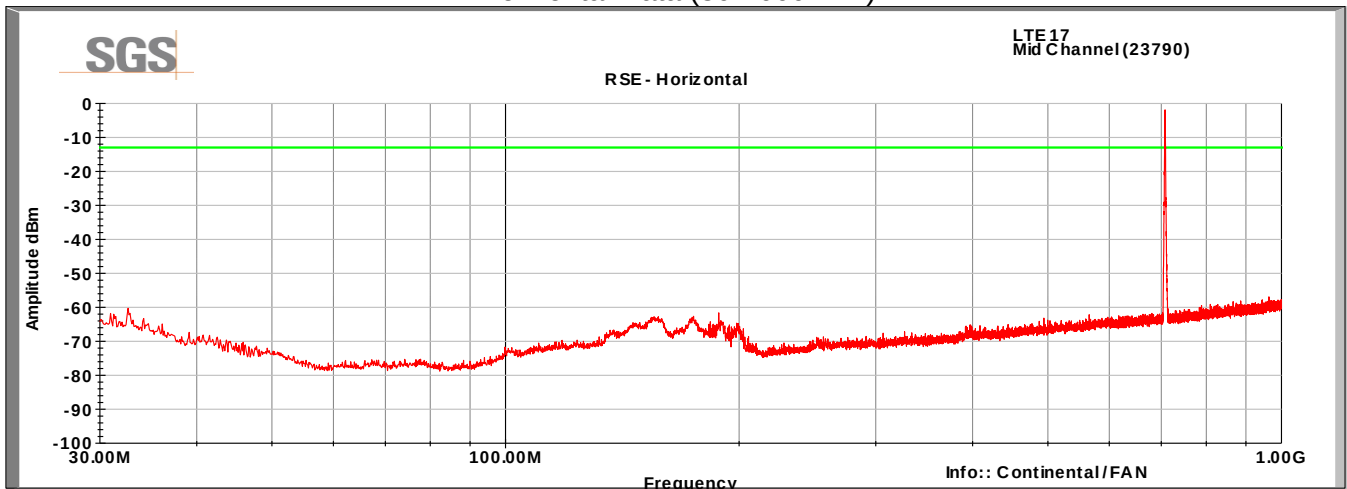
LTE Band 17, QPSK modulation, 5MHz

Mid Channel (23790), 1 RB (Pos 12)

Vertical Data (30-1000MHz)



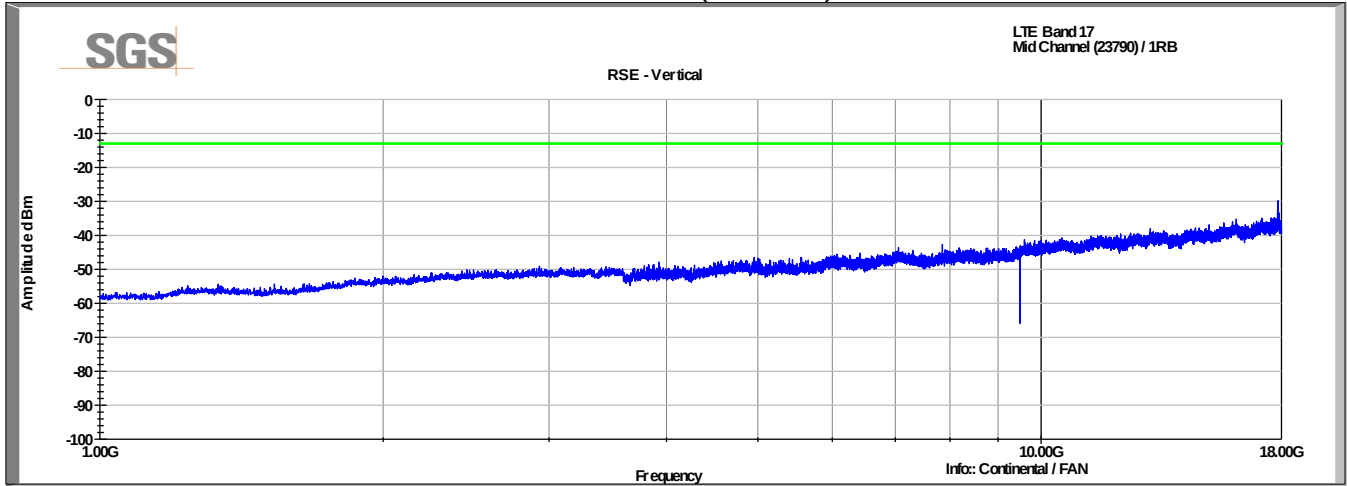
Horizontal Data (30-1000MHz)



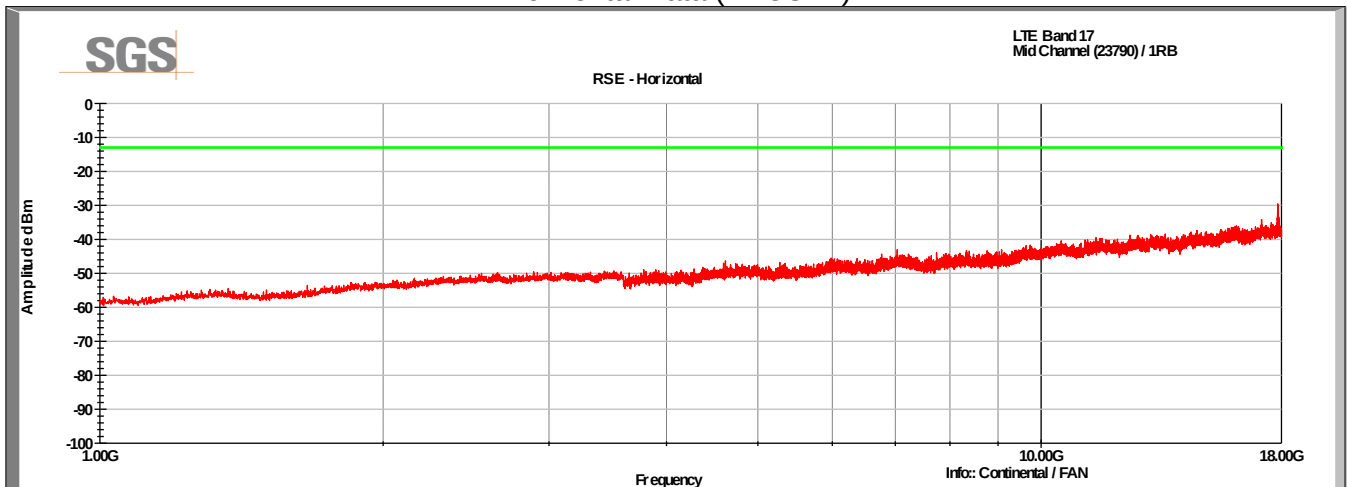
LTE Band 17, QPSK modulation, 5MHz

Mid Channel (23790), 1 RB (Pos 12)

Vertical Data (1-18GHz)



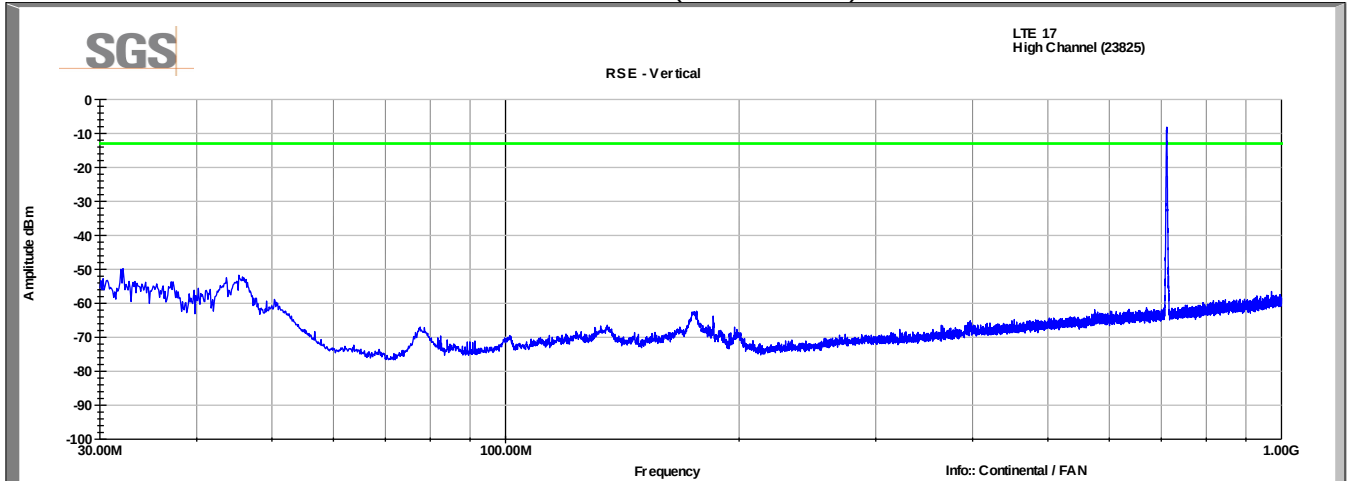
Horizontal Data (1-18GHz)



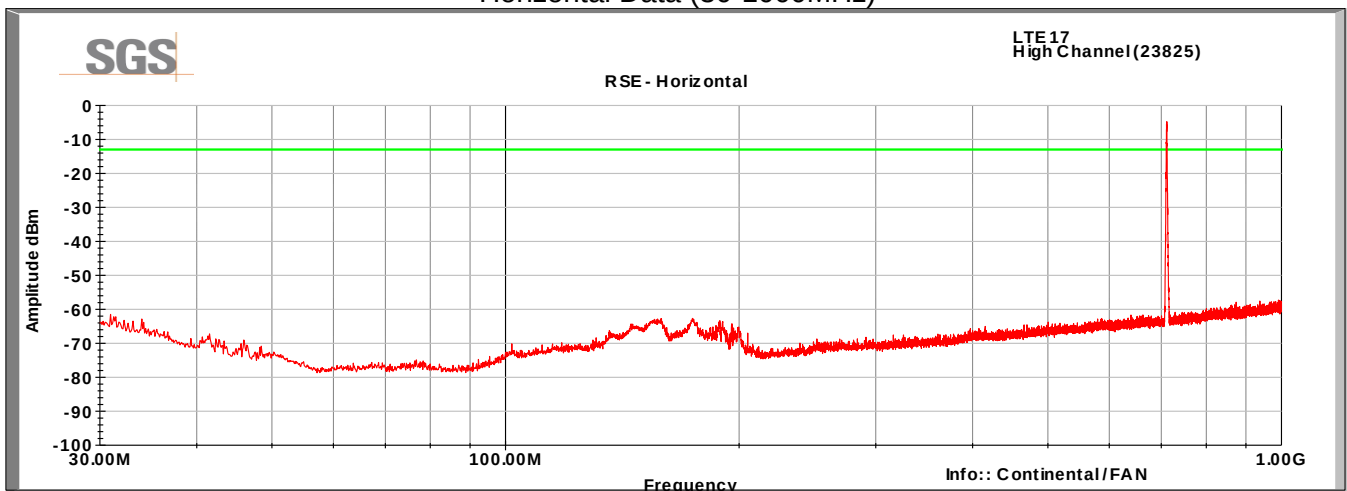
LTE Band 17, QPSK modulation, 5MHz

High Channel (23825), 1 RB (Pos 24)

Vertical Data (30-1000MHz)



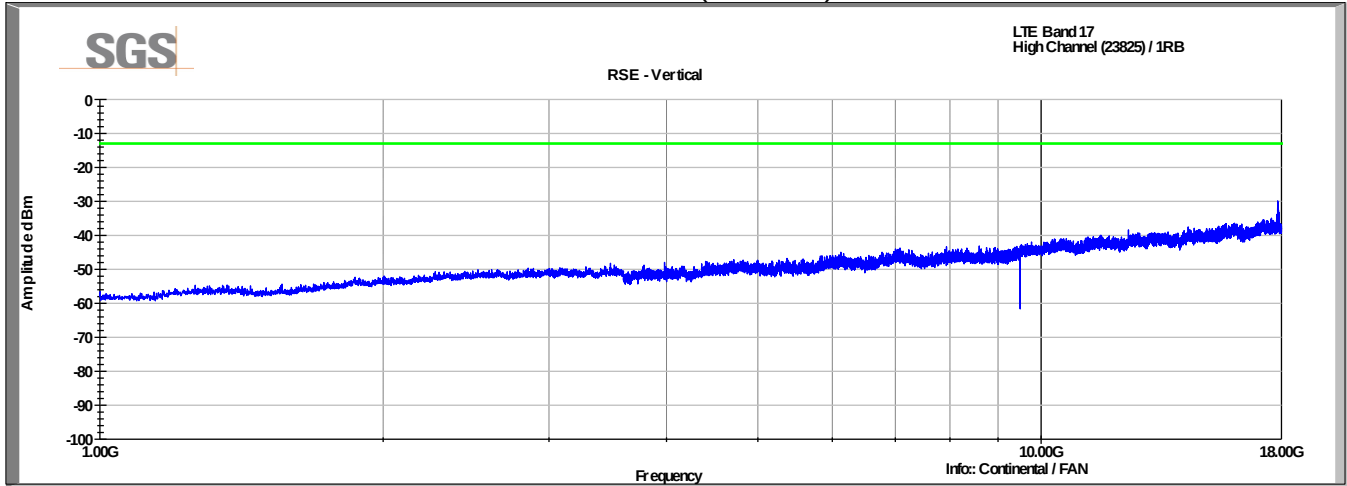
Horizontal Data (30-1000MHz)



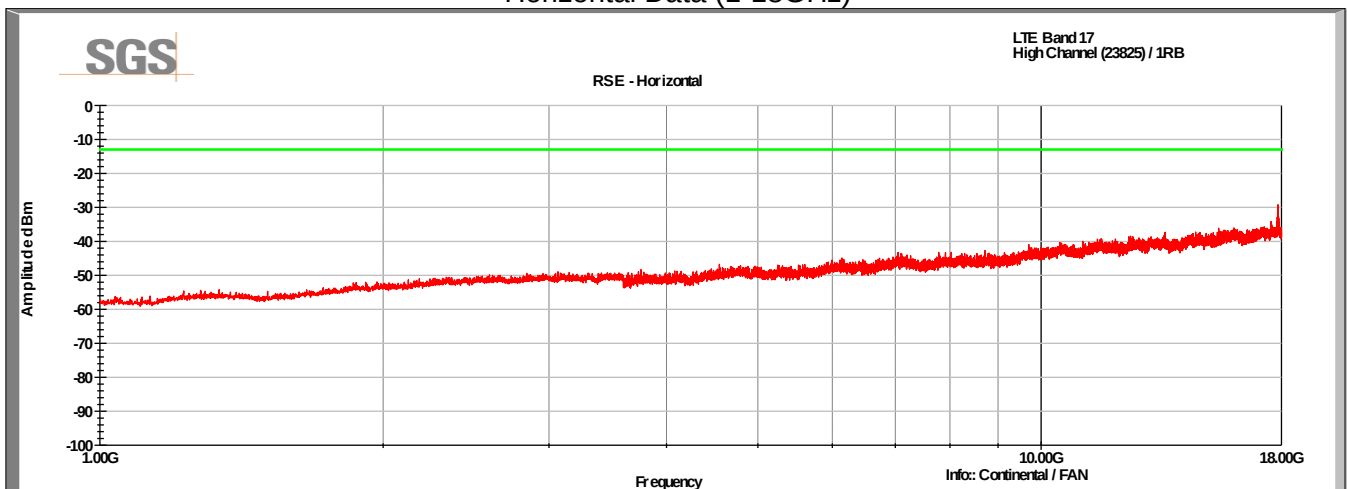
LTE Band 17, QPSK modulation, 5MHz

High Channel (23825), 1 RB (Pos 24)

Vertical Data (1-18GHz)



Horizontal Data (1-18GHz)



9 Frequency Stability

9.1 Test Result

Test Description	Basic Standards	Test Result
Frequency Stability	2.1055 22.917(a) 24.238(a) 27.5(b) 27.5(h) 27.54 RSS-GEN (6.11) RSS-130 (4.3) RSS-132 (5.3) RSS-133 (6.3) RSS-139 (6.3)	Compliant

9.2 Test Method

The EUT was placed inside the Environmental Chamber and was left inside chamber to stabilize to set temperature for minimum of thirty minutes before any measurements were made. The EUT was tested at Band 4 channel 20175 and Band 13 channel 23230.

9.3 Test Site

SGS EMC Laboratory, Suwanee, GA

9.4 Test Equipment

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
CMW500 WIDEBAND RADIO COMMUNICATIONS TESTER	CMW500	ROHDE & SCHWARZ	B094874	6-Dec-2015
ENVIRONMENTAL CHAMBER	T2RC	TENNEY	B094877	CNR
HANDHELD MULTIMETER	87V	FLUKE	B079676	4-Aug-2016

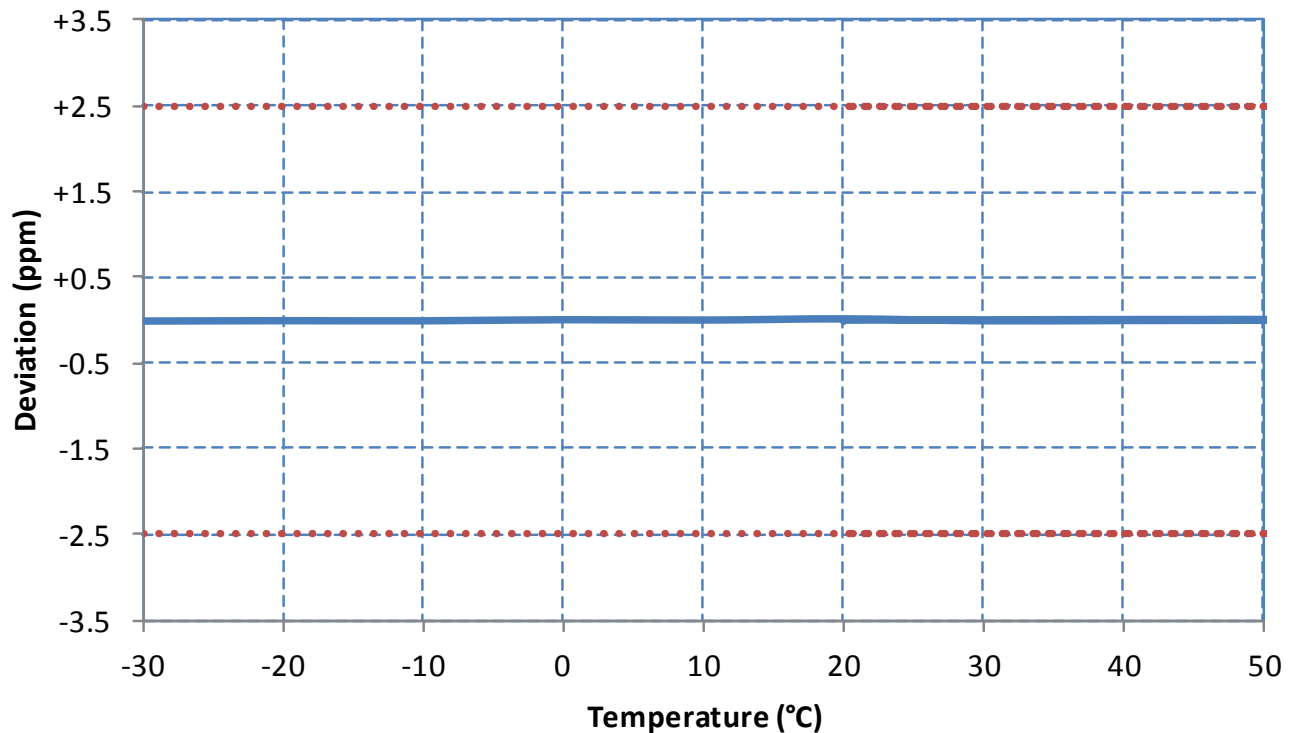
- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW-500 is on a 3 year calibration cycle.

9.5 Test Data

Band 2, Channel 18900

Voltage %	Power V _{DC}	Temp °C	Frequency Hz	Freq Dev Hz	Freq Dev ppm	Deviation %
100%	12.00	+20 (Ref)	1,880,000,001	+1	+0.00	+0.000000
100%	12.00	-30	1,879,999,991	-9	-0.00	-0.000000
100%	12.00	-20	1,879,999,993	-7	-0.00	-0.000000
100%	12.00	-10	1,879,999,992	-8	-0.00	-0.000000
100%	12.00	0	1,879,999,997	-3	-0.00	-0.000000
100%	12.00	+10	1,879,999,996	-4	-0.00	-0.000000
100%	12.00	+20	1,880,000,001	+1	+0.00	+0.000000
100%	12.00	+30	1,879,999,992	-8	-0.00	-0.000000
100%	12.00	+40	1,879,999,994	-7	-0.00	-0.000000
100%	12.00	+50	1,879,999,995	-5	-0.00	-0.000000
100%	12.00	+55	1,879,999,999	-1	-0.00	-0.000000
115%	13.80	+20	1,879,999,995	-5	-0.00	-0.000000
85%	10.20	+20	1,879,999,990	-10	-0.01	-0.000001

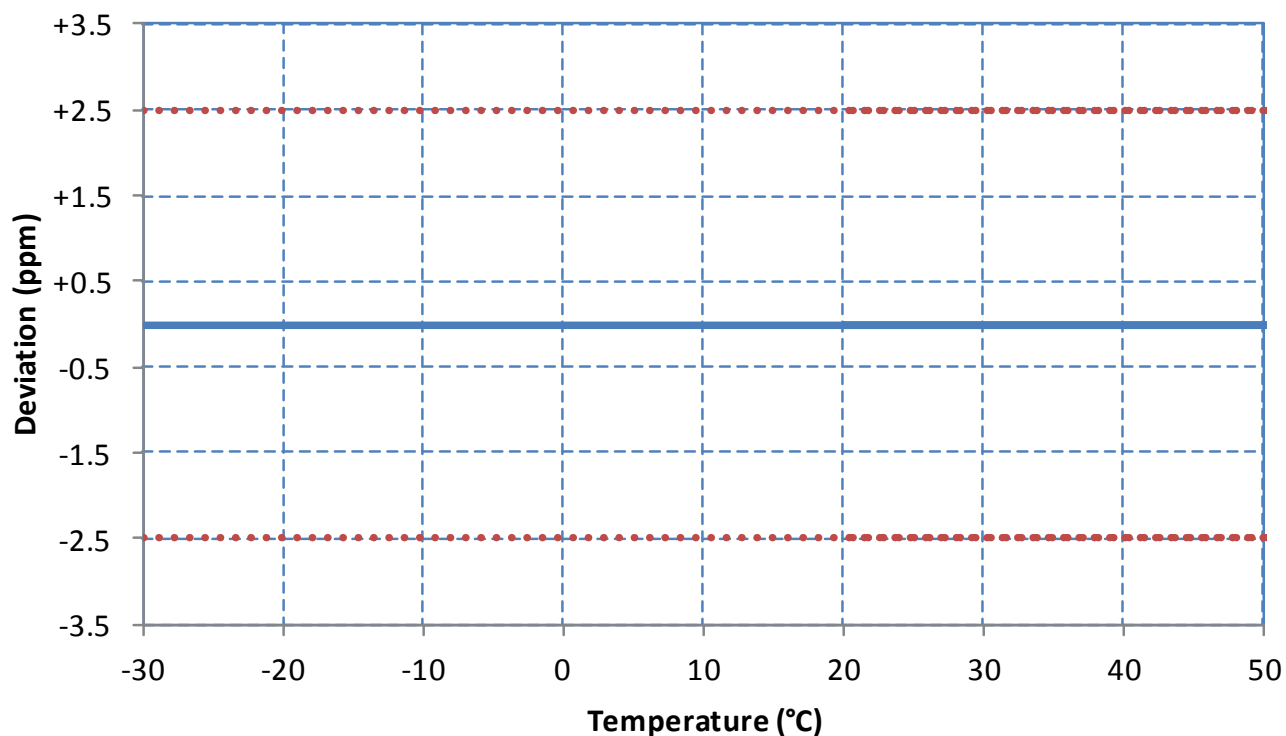
Frequency Stability



Band 4, Channel 20175

Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev Hz	Freq Dev ppm	Deviation %
100%	12.00	+20 (Ref)	1,732,499,991	-9	-0.01	-0.000001
100%	12.00	-30	1,732,499,996	-4	-0.00	-0.000000
100%	12.00	-20	1,732,499,996	-4	-0.00	-0.000000
100%	12.00	-10	1,732,499,997	-3	-0.00	-0.000000
100%	12.00	0	1,732,499,996	-5	-0.00	-0.000000
100%	12.00	+10	1,732,499,997	-3	-0.00	-0.000000
100%	12.00	+20	1,732,499,991	-9	-0.01	-0.000001
100%	12.00	+30	1,732,499,997	-3	-0.00	-0.000000
100%	12.00	+40	1,732,499,996	-4	-0.00	-0.000000
100%	12.00	+50	1,732,499,995	-5	-0.00	-0.000000
100%	12.00	+55	1,732,499,996	-4	-0.00	-0.000000
115%	13.80	+20	1,732,499,989	-11	-0.01	-0.000001
85%	10.20	+20	1,732,499,991	-9	-0.00	-0.000000

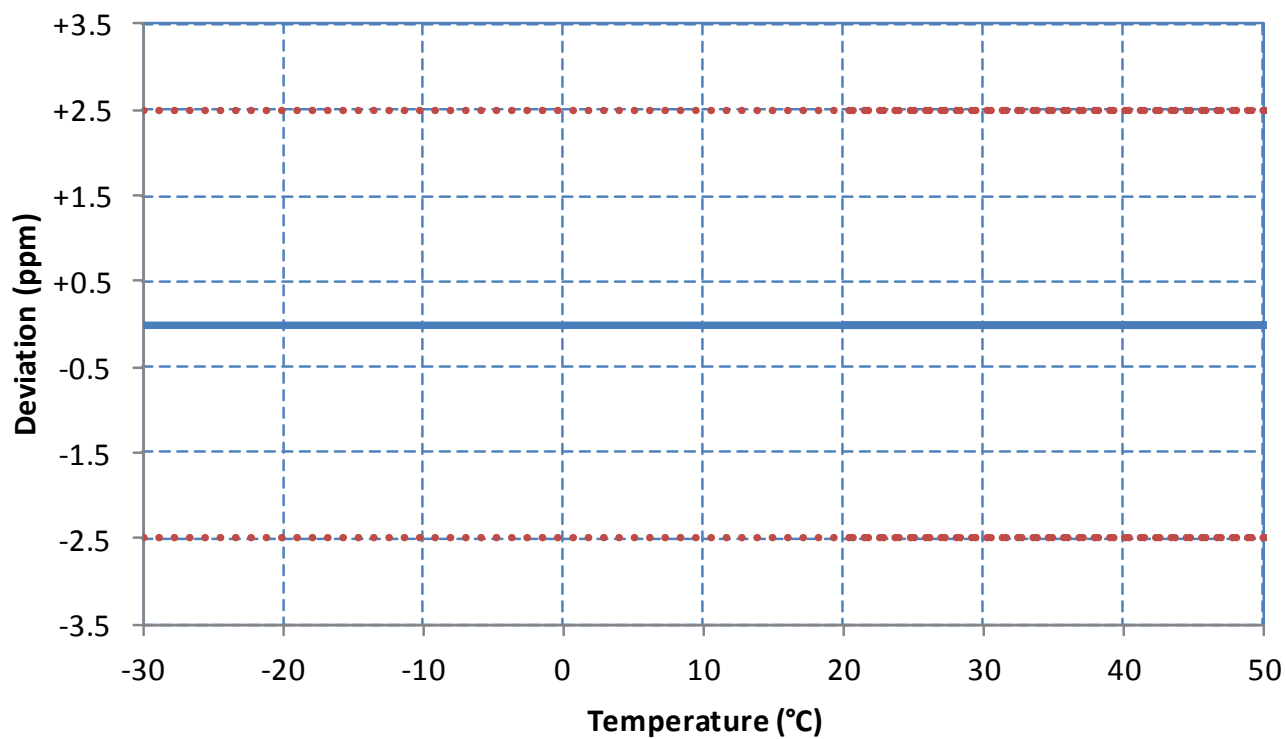
Frequency Stability



Band 5, Channel 20525

Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev Hz	Freq Dev ppm	Deviation %
100%	12.00	+20 (Ref)	836,499,996	-4	-0.00	-0.000000
100%	12.00	-30	836,499,998	-2	-0.00	-0.000000
100%	12.00	-20	836,499,997	-4	-0.00	-0.000000
100%	12.00	-10	836,499,997	-3	-0.00	-0.000000
100%	12.00	0	836,500,000	-0	-0.00	-0.000000
100%	12.00	+10	836,499,997	-3	-0.00	-0.000000
100%	12.00	+20	836,499,996	-4	-0.00	-0.000000
100%	12.00	+30	836,499,996	-4	-0.00	-0.000000
100%	12.00	+40	836,499,999	-1	-0.00	-0.000000
100%	12.00	+50	836,499,999	-1	-0.00	-0.000000
100%	12.00	+55	836,499,997	-3	-0.00	-0.000000
115%	13.80	+20	836,499,997	-3	-0.00	-0.000000
85%	10.20	+20	836,499,998	-2	-0.00	-0.000000

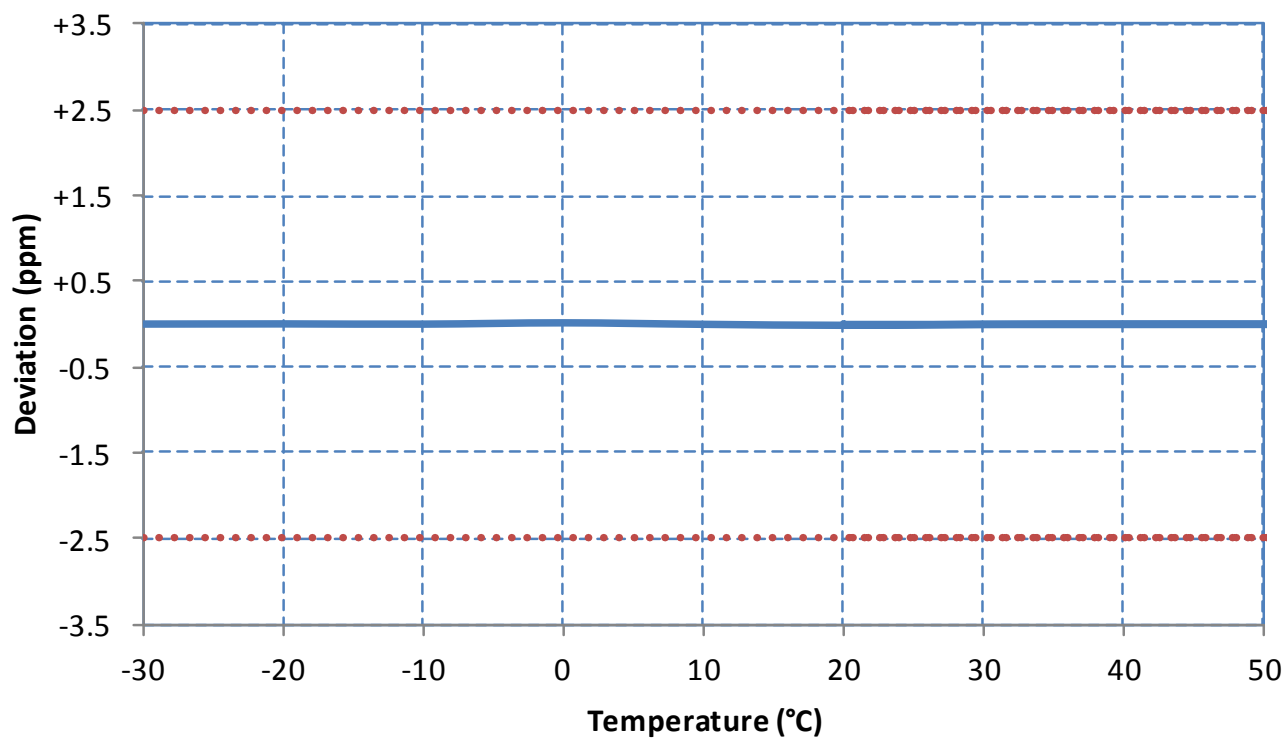
Frequency Stability



Band 17, Channel 23790

Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev Hz	Freq Dev ppm	Deviation %
100%	12.00	+20 (Ref)	709,999,997	-3	-0.00	-0.000000
100%	12.00	-30	709,999,999	-1	-0.00	-0.000000
100%	12.00	-20	709,999,999	-1	-0.00	-0.000000
100%	12.00	-10	709,999,999	-1	-0.00	-0.000000
100%	12.00	0	710,000,001	+1	+0.00	+0.000000
100%	12.00	+10	709,999,998	-2	-0.00	-0.000000
100%	12.00	+20	709,999,997	-3	-0.00	-0.000000
100%	12.00	+30	709,999,998	-2	-0.00	-0.000000
100%	12.00	+40	709,999,999	-1	-0.00	-0.000000
100%	12.00	+50	709,999,999	-2	-0.00	-0.000000
100%	12.00	+55	709,999,998	-2	-0.00	-0.000000
115%	13.80	+20	709,999,998	-2	-0.00	-0.000000
85%	10.20	+20	709,999,999	-1	-0.00	-0.000000

Frequency Stability



10 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	8 September 2015
1	- IC ID added to Page 5 - Added Part 22 and 24 references to the cover page and each test section as appropriate	15 September 2015
2	- Added RSS-GEN references to the cover page and each test section as appropriate	25 September 2015