

EMC Test Report

Project Number: 4274013

Report Number: 4274013EMC01

Revision Level: 0

Client: Integrated M2M Technologies LLC

Equipment Under Test: iLocate GPS AutoTracker

Model: AT850218

FCC ID: 2AO7F2733AT

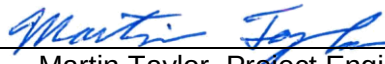
FCC Rule Parts: Part 2, Part 27

Standard: ANSI C63.26

Report issued on: 16 May 2018

Test Result: Compliant

Tested by:


Martin Taylor, Project Engineer

Reviewed by:


David Schramm, Operations Manager

Remarks: This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Table of Contents

1	SUMMARY OF TEST RESULTS.....	4
1.1	MODIFICATIONS REQUIRED TO COMPLIANCE	4
2	GENERAL INFORMATION.....	5
2.1	CLIENT INFORMATION	5
2.2	TEST LABORATORY	5
2.3	GENERAL INFORMATION OF EUT	5
2.4	OPERATING MODES AND CONDITIONS	5
3	RF OUTPUT POWER.....	6
3.1	TEST RESULT.....	6
3.2	TEST METHOD.....	6
3.3	TEST SITE	6
3.4	TEST EQUIPMENT	6
3.6	TEST DATA - LTE BAND 4.....	7
3.7	TEST DATA - LTE BAND 13.....	7
4	PEAK TO AVERAGE RATIO	8
4.1	TEST RESULT.....	8
4.2	TEST METHOD.....	8
4.3	TEST SITE	8
4.4	TEST EQUIPMENT	8
4.5	TEST DATA.....	9
5	OCCUPIED BANDWIDTH	10
5.1	TEST RESULT.....	10
5.2	TEST METHOD.....	10
5.3	TEST SITE	10
5.4	TEST EQUIPMENT	10
5.5	TEST DATA.....	11
6	BAND EDGE AND CONDUCTED SPURIOUS EMISSIONS.....	12
6.1	TEST RESULT.....	12
6.2	TEST METHOD.....	12
6.3	TEST SITE	12
6.4	TEST EQUIPMENT	12
6.5	TEST DATA - BAND EDGE.....	13
6.6	TEST DATA - CONDUCTED SPURIOUS EMISSIONS	14
7	EFFECTIVE RADIATED POWER.....	16
7.2	TEST SITE	16
7.3	TEST EQUIPMENT	16
7.4	TEST DATA.....	16
8	RADIATED SPURIOUS EMISSIONS.....	17
8.1	TEST RESULT.....	17
8.2	TEST METHOD.....	17
8.3	TEST SITE	17
8.4	TEST EQUIPMENT	18
8.5	TEST DATA.....	19
9	FREQUENCY STABILITY	34
9.1	TEST RESULT.....	34
9.2	TEST METHOD.....	34



9.3	TEST SITE	34
9.4	TEST EQUIPMENT	34
9.5	TEST DATA.....	35
10	REVISION HISTORY	37

1 Summary of Test Results

FCC Reference Sections	Test Description	Test Limit	Test Condition	Test Result
2.1046	Conducted Output Power	N/A	Conducted	Pass
27.50(d)(5)	Peak-to-Average Ratio	<13 dB		Pass
2.1049	Occupied Bandwidth	N/A		Reported
2.1051 27.53(c)(2) 27.53(h)	Band Edge / Conducted Spurious Emissions	$< 43 + 10\log_{10}(P_{\text{Watts}})$ at band edge and for all out of band emissions		Pass
27.50(b)(10)	Effective Radiated Power	< 3 Watts max ERP	Radiated	Pass
27.50(d)(4)	Effective Isotropic Radiated Power	< 1 Watts max EIRP		Pass
2.1053 27.53(c)(2) 27.53(h)	Radiated Spurious Emissions	$< 43 + 10\log_{10}(P_{\text{Watts}})$ at band edge and for all out of band emissions		Pass
2.1055 27.5(b) 27.5(h) 27.54	Frequency Stability	<2.5 ppm	Conducted	Pass

1.1 Modifications Required to Compliance

None

2 General Information

2.1 Client Information

Name: Integrated M2M Technologies LLC
Address: 3773 Howard Hughes Pwky, Suite 500S
City, State, Zip, Country: Las Vegas, NV 89169, USA

2.2 Test Laboratory

Name: SGS North America, Inc.
Address: 620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country: Suwanee, GA 30024, USA

Accrediting Body: A2LA
Type of lab: Testing Laboratory
Certificate Number: 3212.01

2.3 General Information of EUT

Type of Product: iLocate GPS AutoTracker
Model Number: AT850218
Serial Number: Not labeled
FCC ID: 2AO7F2733AT

IMEI Number: 004401082218344 (conducted test sample)
004401082218302 (radiated test sample)

Rated Voltage: 8 – 20 Vdc
Test Voltage: 9 Vdc
Tx Frequency Range: 1710 – 1755 MHz (LTE Band 4)
777 – 787 MHz (LTE Band 13)

FCC Classification: PCS Licensed Transmitter (PCB)
Type: Pre-Production

Sample Received Date: 16 February 2018
Dates of testing: 26 February to 07 March 2018

2.4 Operating Modes and Conditions

The EUT was exercised by connecting a CMW communications tester to the device. The CMW was used to control signaling and channel during testing.

3 RF Output Power

3.1 Test Result

Test Description	Rule Part(s)	Test Result
RF Output Power	2.1046	Pass

3.2 Test Method

The EUT was connected to a Radio Communication Tester (CMW 500) and a Spectrum Analyzer by way of an RF power splitter. A radio link was established between the EUT and the CMW 500. The output power of the EUT was set to maximum value by using the maximum power setting on the CMW. The output power was measured using the Spectrum Analyzer.

Note: A link could not be established with only one Resource Block (RB), so two RBs was the minimum used for the power measurements.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.6 °C
Relative Humidity: 43.7%
Atmospheric Pressure: 97.8 kPa

3.4 Test Equipment

Test End Date: 28-Feb-2018

Tester: MT

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	25-Jan-2020
POWER SPLITTER	ZFRSC-123-S+	MINI-CIRCUITS	B085748	27-Jul-2018
RF CABLE	SF102	HUBER & SUHNER	B079824	26-Jul-2018
RF CABLE	141	HUBER & SUHNER	B095588	26-Jul-2018
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	1608522I	24-Jul-2018

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW 500 is on a 2 year calibration cycle.

3.6 Test Data - LTE Band 4

Max Power: 24.27dBm / 0.267W

UpLink Channel	UL Frequency (MHz)	BW (MHz)	# RB	Position	Measured Power (dBm)	Path Loss (dB)	Conducted Power (dBm)
19957	1710.7	1.4	2	(RB_Pos:0)	13.05	10.5	23.55
19957	1710.7	1.4	2	(RB_Pos:4)	13.01	10.5	23.51
19957	1710.7	1.4	4	(RB_Pos:0)	13.46	10.5	23.96
19957	1710.7	1.4	4	(RB_Pos:2)	13.45	10.5	23.95
19957	1710.7	1.4	6	(RB_Pos:0)	11.79	10.5	22.29
20175	1732.5	1.4	2	(RB_Pos:0)	11.80	10.5	22.30
20175	1732.5	1.4	2	(RB_Pos:4)	11.86	10.5	22.36
20175	1732.5	1.4	4	(RB_Pos:0)	13.13	10.5	23.63
20175	1732.5	1.4	4	(RB_Pos:2)	13.14	10.5	23.64
20175	1732.5	1.4	6	(RB_Pos:0)	11.98	10.5	22.48
20393	1754.3	1.4	2	(RB_Pos:0)	13.77	10.5	24.27
20393	1754.3	1.4	2	(RB_Pos:4)	13.69	10.5	24.19
20393	1754.3	1.4	4	(RB_Pos:0)	12.97	10.5	23.47
20393	1754.3	1.4	4	(RB_Pos:2)	12.95	10.5	23.45
20393	1754.3	1.4	6	(RB_Pos:0)	12.54	10.5	23.04

3.7 Test Data - LTE Band 13

Max Power: 23.63dBm / 0.231W

UpLink Channel	UL Frequency (MHz)	BW (MHz)	# RB	Position	Measured Power (dBm)	Path Loss (dB)	Conducted Power (dBm)
23187	777.7	1.4	2	(RB_Pos:0)	13.35	10.2	23.55
23187	777.7	1.4	2	(RB_Pos:4)	13.32	10.2	23.52
23187	777.7	1.4	4	(RB_Pos:0)	13.33	10.2	23.53
23187	777.7	1.4	4	(RB_Pos:2)	13.42	10.2	23.62
23187	777.7	1.4	6	(RB_Pos:0)	12.28	10.2	22.48
23230	782	1.4	2	(RB_Pos:0)	13.34	10.2	23.54
23230	782	1.4	2	(RB_Pos:4)	13.30	10.2	23.50
23230	782	1.4	4	(RB_Pos:0)	13.38	10.2	23.58
23230	782	1.4	4	(RB_Pos:2)	13.43	10.2	23.63
23230	782	1.4	6	(RB_Pos:0)	12.25	10.2	22.45
23273	786.3	1.4	2	(RB_Pos:0)	13.33	10.2	23.53
23273	786.3	1.4	2	(RB_Pos:4)	13.33	10.2	23.53
23273	786.3	1.4	4	(RB_Pos:0)	13.38	10.2	23.58
23273	786.3	1.4	4	(RB_Pos:2)	13.38	10.2	23.58
23273	786.3	1.4	6	(RB_Pos:0)	12.33	10.2	22.53

4 Peak to Average Ratio

4.1 Test Result

Test Description	Rule Part(s)	Test Result
Peak to Average Ratio	27.50(d)(5)	Pass

4.2 Test Method

KDB document 971168 D01 Power Meas License Digital Systems v03 was used to determine peak-to-average ratio. For the LTE measurements, Clause 5.7.1 was used which defined the measurement method using the CCDF function of the spectrum analyzer. Measurements were recorded at the mid channels with 1.4 MHz bandwidth and QPSK modulation.

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.2 °C
Relative Humidity: 43.5%
Atmospheric Pressure: 98.4 kPa

4.4 Test Equipment

Test End Date: 26-Feb-2018

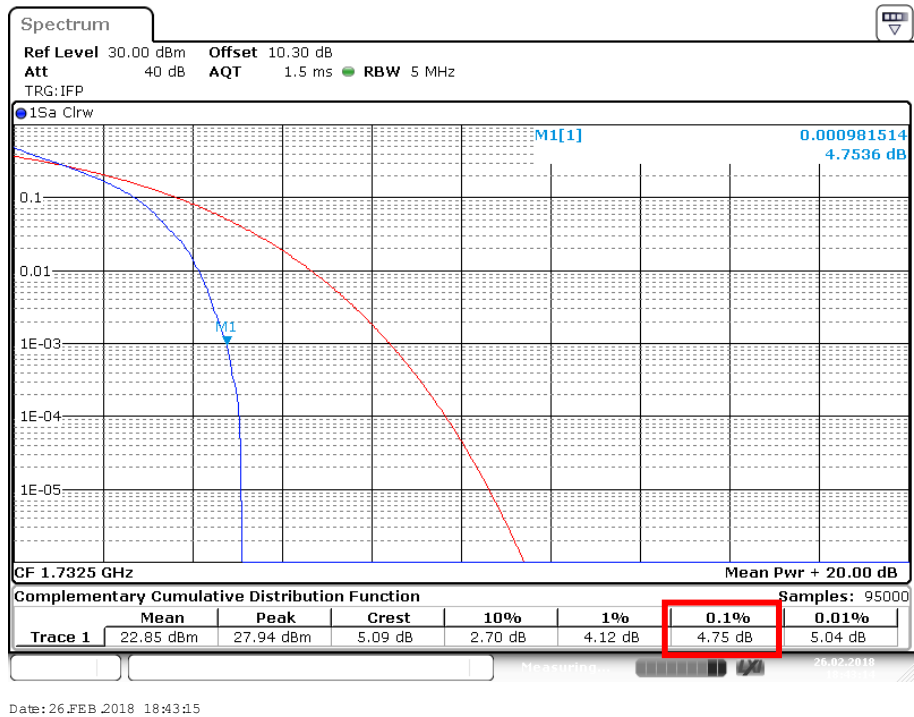
Tester: MT

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	25-Jan-2020
POWER SPLITTER	ZFRSC-123-S+	MINI-CIRCUITS	B085748	27-Jul-2018
RF CABLE	SF102	HUBER & SUHNER	B079824	26-Jul-2018
RF CABLE	141	HUBER & SUHNER	B095588	26-Jul-2018
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	1608522I	24-Jul-2018

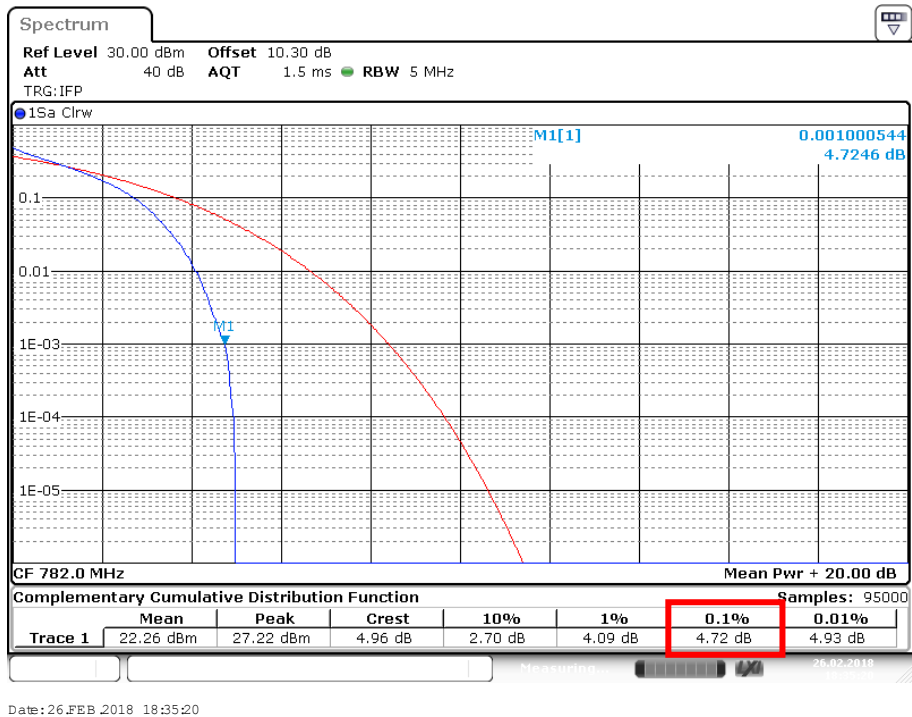
- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW 500 is on a 2 year calibration cycle.

4.5 Test Data

LTE Band 4



LTE Band 13



5 Occupied Bandwidth

5.1 Test Result

Test Description	Rule Part(s)	Test Result
Occupied Bandwidth	2.1049	Reported

5.2 Test Method

The occupied bandwidth is the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power by a given emission. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted.

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 occupied bandwidth was measured using spectrum analyzer's occupied bandwidth measurement.

The bandwidth of 99% power can be read on spectrum analyzer.

The measurement was conducted at the center channel of each band. All resource blocks were explored. Worst-case results are reported.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.8 °C

Relative Humidity: 42.3 %

Atmospheric Pressure: 98.8 kPa

5.4 Test Equipment

Test End Date: 27-Feb-2018

Tester: MT

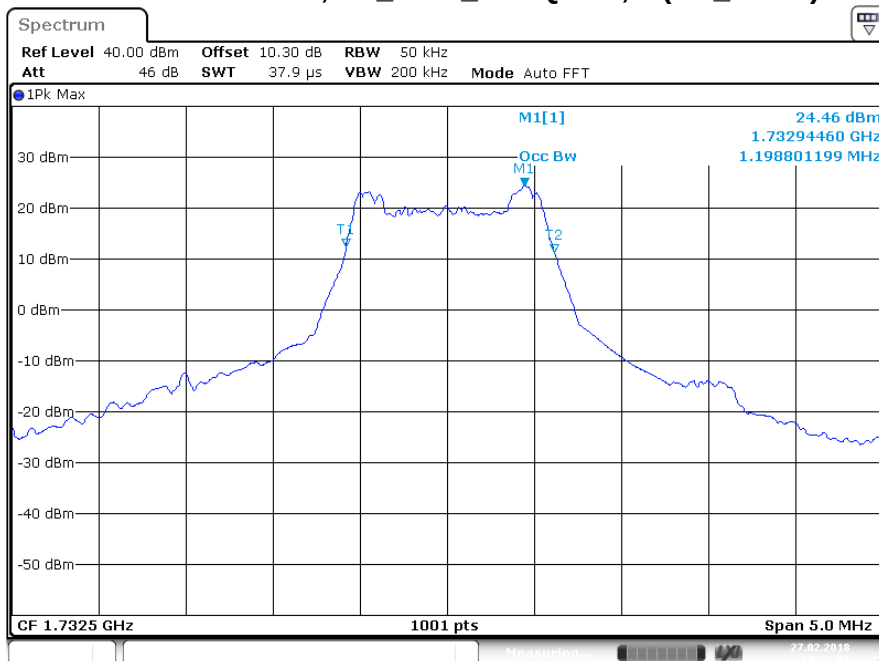
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	25-Jan-2020
POWER SPLITTER	ZFRSC-123-S+	MINI-CIRCUITS	B085748	27-Jul-2018
RF CABLE	SF102	HUBER & SUHNER	B079824	26-Jul-2018
RF CABLE	141	HUBER & SUHNER	B095588	26-Jul-2018
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	1608522I	24-Jul-2018

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW 500 is on a 2 year calibration cycle.

5.5 Test Data

LTE Band 4

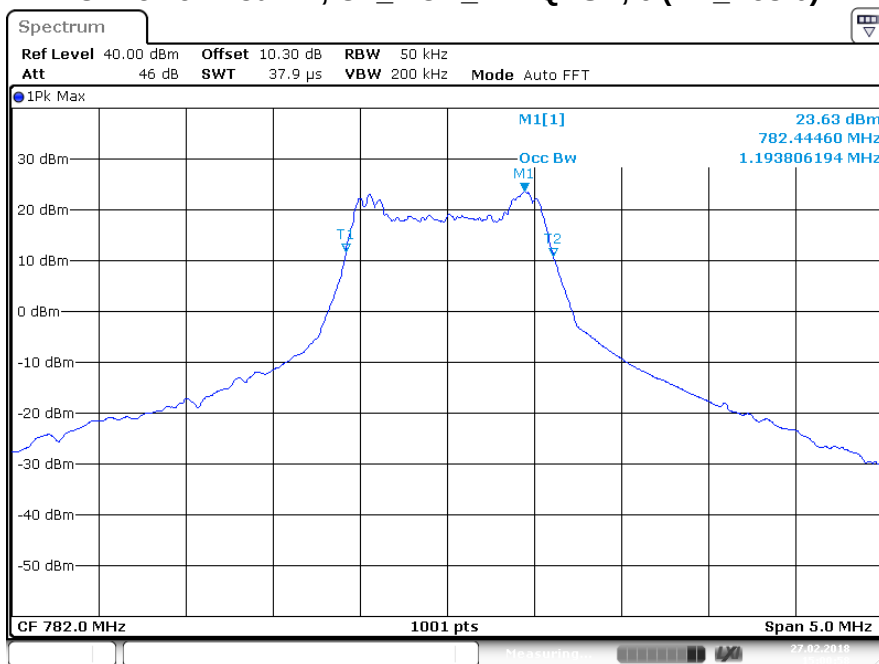
Occupied Bandwidth: @ULCH: 20175, BW: 1.4 MHz,
 ULPower: 23dBm; UL_MOD_RB: QPSK, 6 (RB_Pos:0)



Date: 27.FEB.2018 14:21:08

LTE Band 13

Occupied Bandwidth: @ULCH: 23230, BW: 1.4 MHz,
 ULPower: 23dBm; UL_MOD_RB: QPSK, 6 (RB_Pos:0)



Date: 27.FEB.2018 15:00:58

6 Band Edge and Conducted Spurious Emissions

6.1 Test Result

Test Description	Rule Part(s)	Test Result
Conducted Spurious Emissions and Band Edge	2.1051 27.53(c)(2) 27.53(h)	Pass

6.2 Test Method

The levels of the carrier and the various conducted spurious and harmonics frequencies are measured by means of a calibrated spectrum analyzer. The emissions spectrum emanating from the EUT transmit antenna port 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.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 22.8 – 23.5 °C
Relative Humidity: 43.0 – 50.1 %
Atmospheric Pressure: 97.1 – 97.7 kPa

6.4 Test Equipment

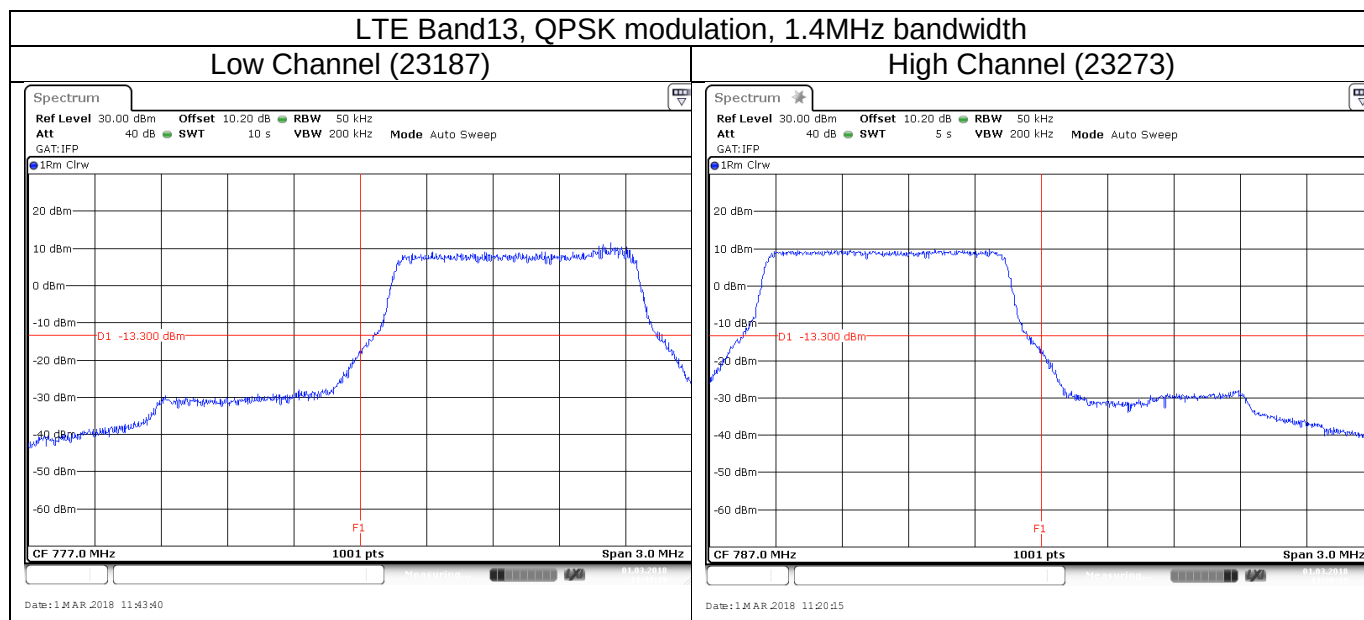
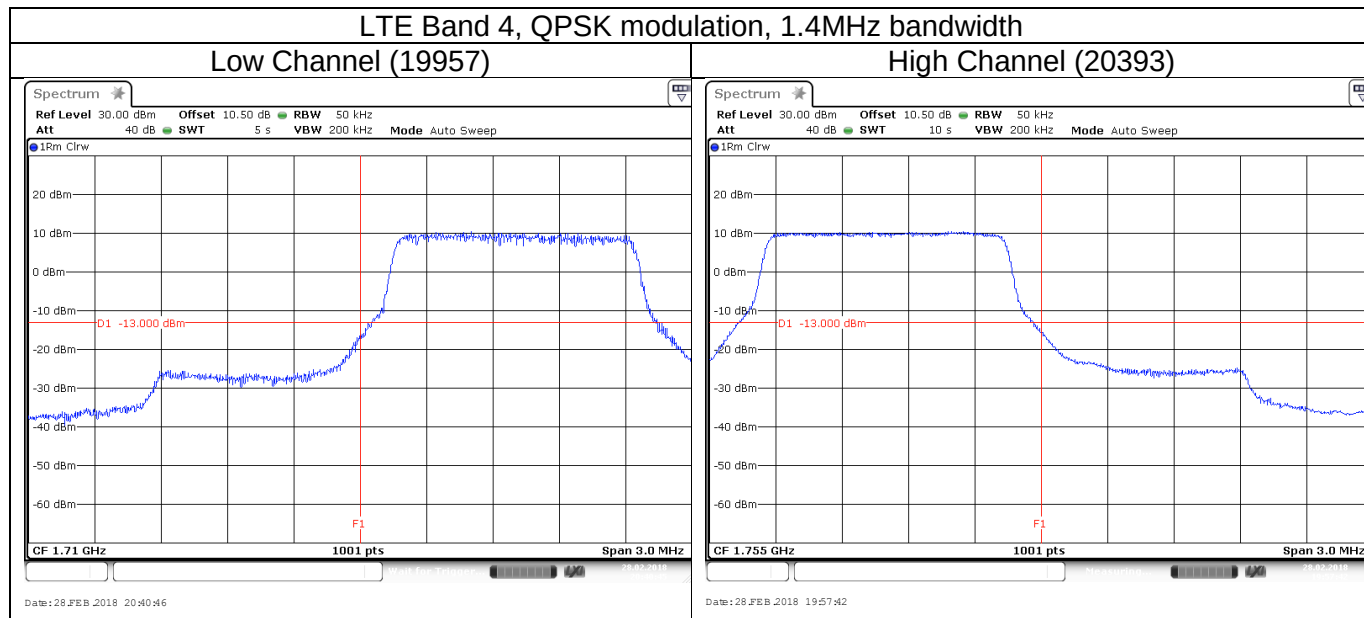
Test End Date: 1-Mar-2018

Tester: MT

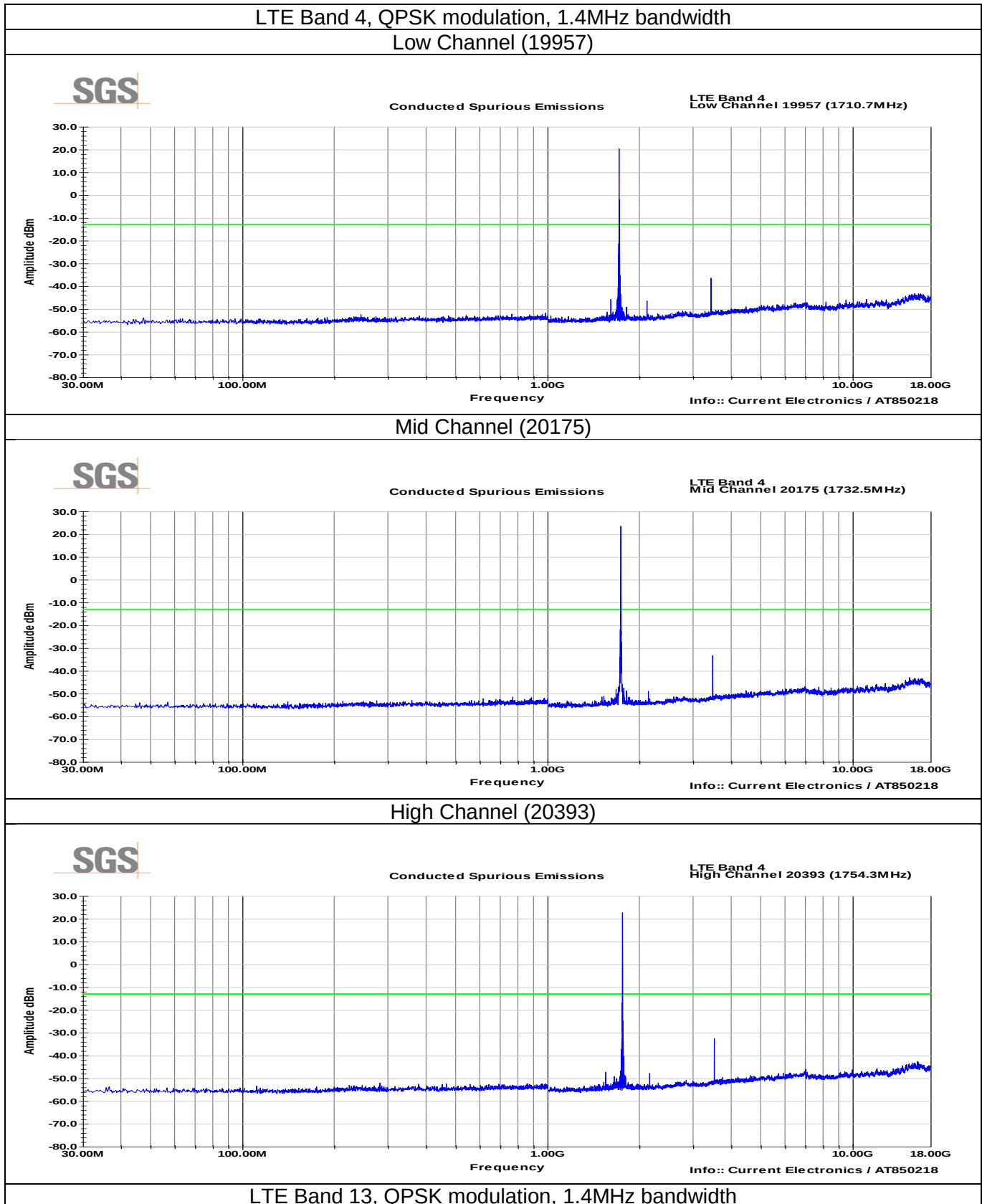
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	25-Jan-2020
POWER SPLITTER	ZFRSC-123-S+	MINI-CIRCUITS	B085748	27-Jul-2018
POWER SPLITTER	ZFRSC-183-S+	MINI-CIRCUITS	B101741	27-Jul-2018
RF CABLE	SF102	HUBER & SUHNER	B079824	26-Jul-2018
RF CABLE	141	HUBER & SUHNER	B095588	26-Jul-2018
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	1608522I	24-Jul-2018

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW 500 is on a 2 year calibration cycle.

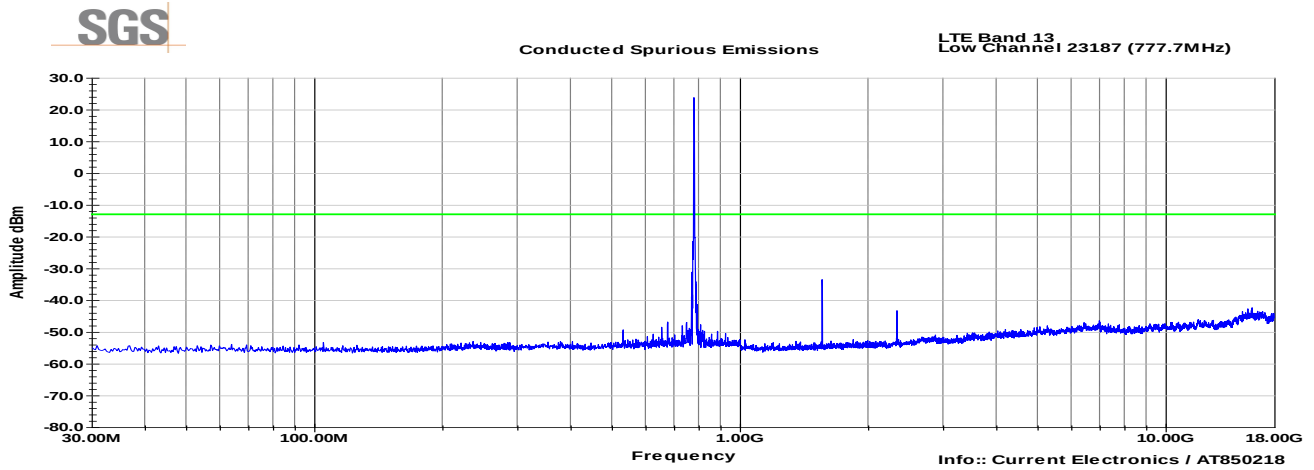
6.5 Test Data - Band Edge



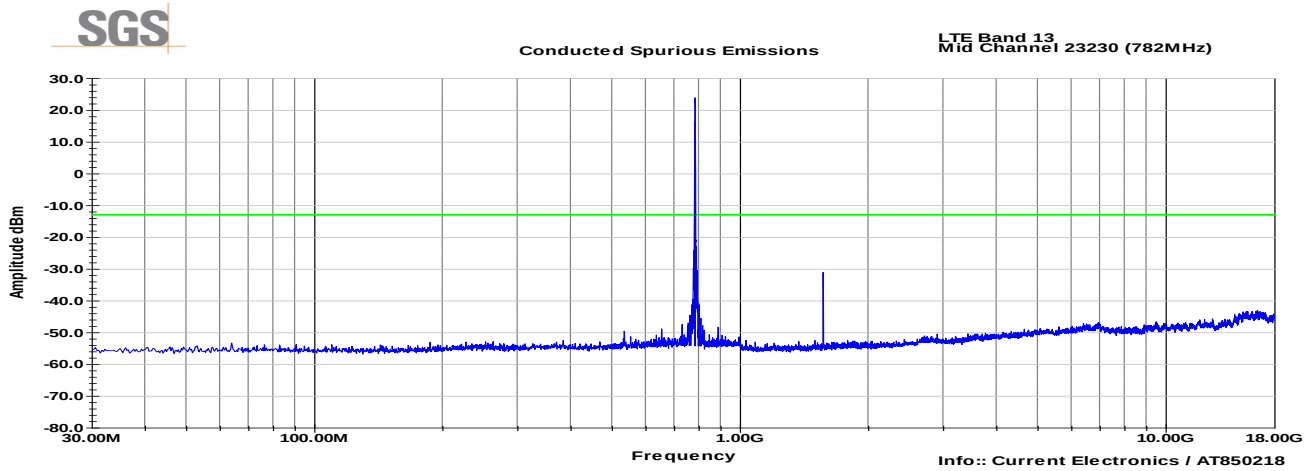
6.6 Test Data - Conducted Spurious Emissions



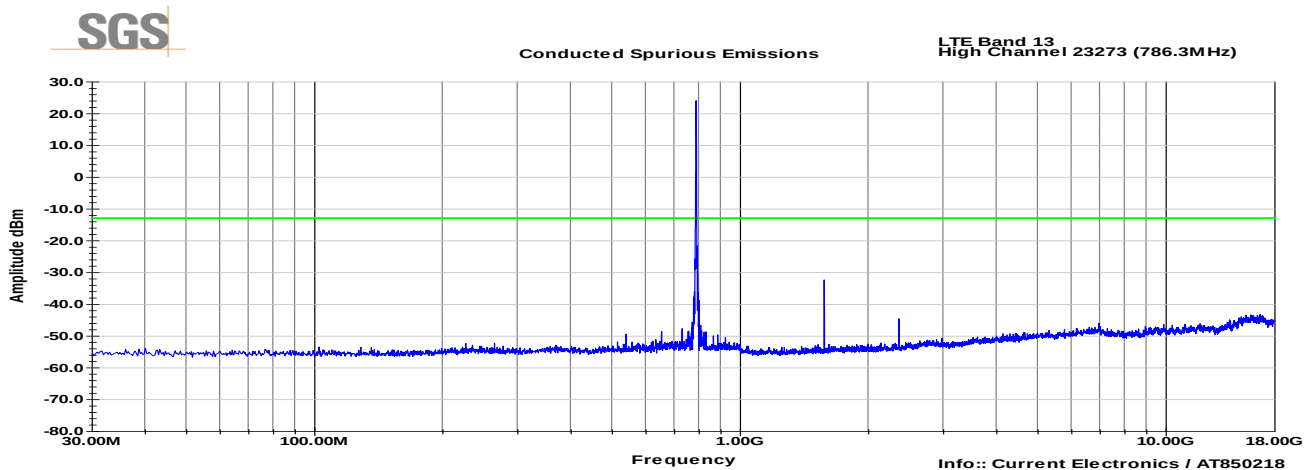
Low Channel (23187)



Mid Channel (23230)



High Channel (23273)



7 Effective Radiated Power

7.1.1 Test Result

Test Description	Rule Part(s)	Test Result
Effective Radiated Power	27.50(b)(10)	Pass
Effective Isotropic Radiated Power	27.50(d)(4)	Pass

7.1.2 Test Method

For ERP/EIRP calculations, the peak antenna gains obtained from the antenna datasheet were used for each band.

7.2 Test Site

SGS EMC Laboratory, Suwanee, GA

7.3 Test Equipment

None

7.4 Test Data

Band of Operation		Conducted Power w/tolerance dBm	Antenna Gain	Cable Loss	Average EIRP	
Type	MHz				dBm	mW
LTE Band 4	1710-1755	24.3	3.8	0.0	28.1	641
LTE Band 13	777-787	23.6	0.2	0.0	23.8	242

8 Radiated Spurious Emissions

8.1 Test Result

Test Description	Rule Part(s) / Standard(s)	Test Result
Radiated Spurious Emissions	2.1053 27.53(c)(2) 27.53(h) ANSI/TIA-603-D-2010	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.

A radio link was established over-the-air between the EUT and the 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 EUT was manipulated through each of its three orthogonal axes with the measurement oriented in both vertical and horizontal polarizations.

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

8.3 Test Site

SGS Chamber, Suwanee, GA (validated to ANSI C63.4: 2014 below and above 1GHz)

Environmental Conditions	30-1000MHz, 1-3GHz (B4)	1-10GHz (B13), 3-18GHz (B4)
Enclosure:	10m Chamber	3m Chamber
Temperature:	22.4 – 23.7 °C	23.7 – 24.9 °C
Relative Humidity:	26.3 – 33.4 %	28.2 – 29.3 %
Atmospheric Pressure:	98.3 – 98.4 kPa	97.6 – 97.8 kPa

8.4 Test Equipment

30-1000MHz, 1-3GHz (Band 4)

Test End Date: 2-Mar-2018

Tester: MT

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079690	29-Nov-2018
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2018
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	16-May-2018
RF CABLE	SF106	HUBER & SUHNER	B079661	25-Jul-2018
RF CABLE	SF106	HUBER & SUHNER	B079713	24-Jul-2018
RF CABLE	UC-N-MM-78	MAURY MICROWAVE	17017	25-Jul-2018
RF CABLE	104PE	HUBER & SUHNER	B079793	24-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	28-Jul-2018
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-Apr-2018
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	25-Jan-2020

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW 500 is on a 2 year calibration cycle.

1-10GHz (Band 13), 3-18GHz (Band 4)

Test End Date: 5-Mar-2018

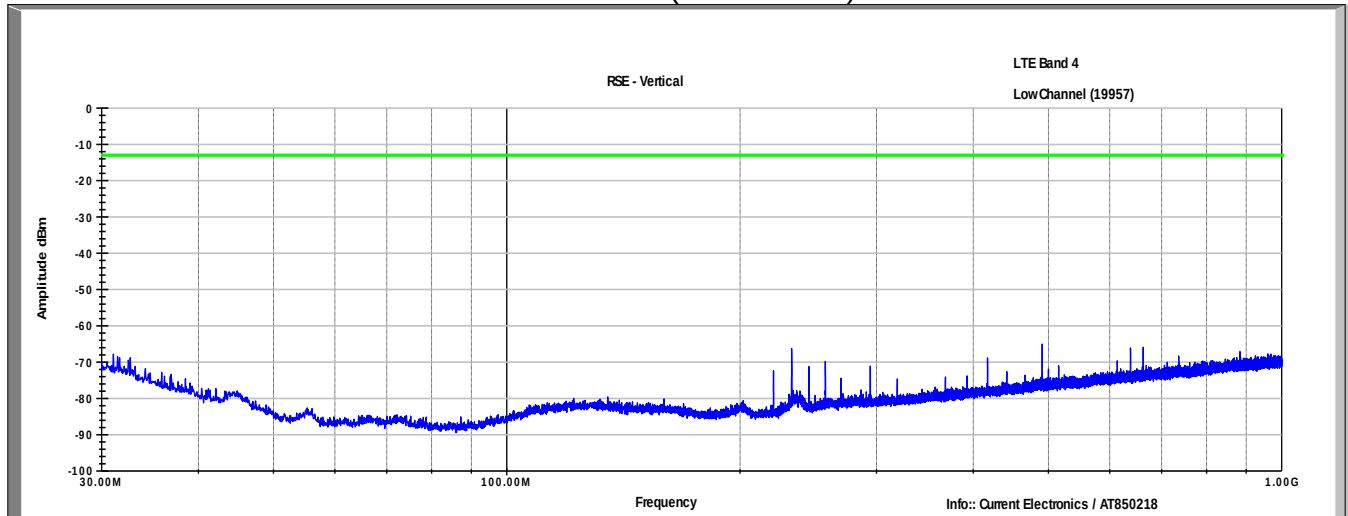
Tester: MT

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079691	27-Jul-2018
ANTENNA, DRG HORN (MEDIUM)	3117	ETS LINDGREN	B079699	16-May-2018
RF CABLE	SF106	HUBER & SUHNER	B079712	24-Jul-2018
RF CABLE	104PE	HUBER & SUHNER	B079793	24-Jul-2018
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	15003	28-Jul-2018
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	25-Apr-2018
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	25-Jan-2020

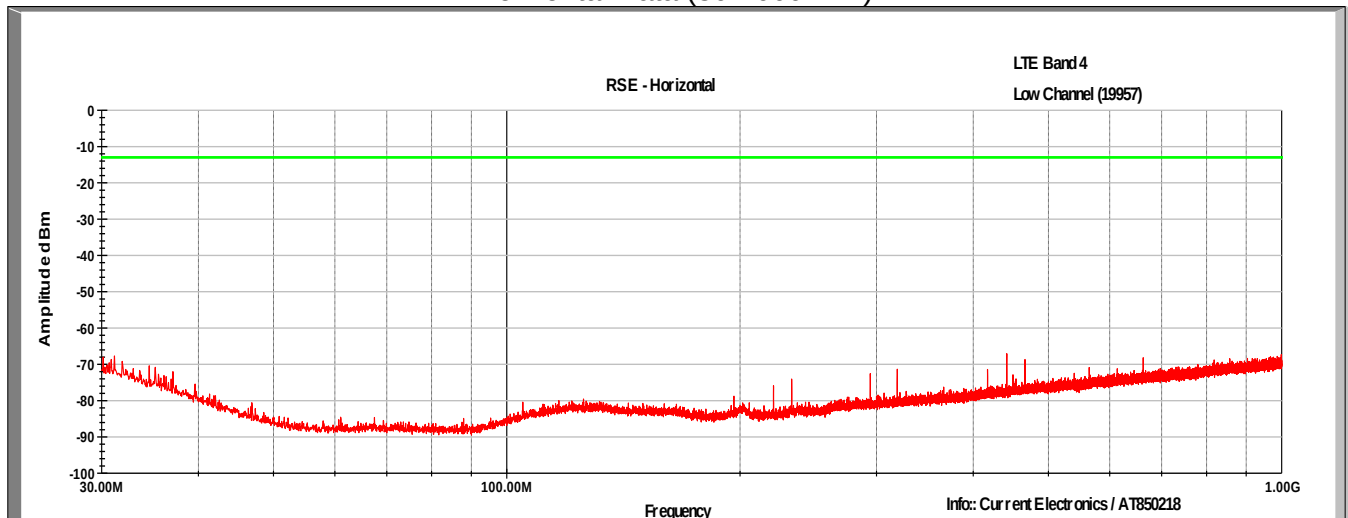
- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW 500 is on a 2 year calibration cycle.

8.5 Test Data

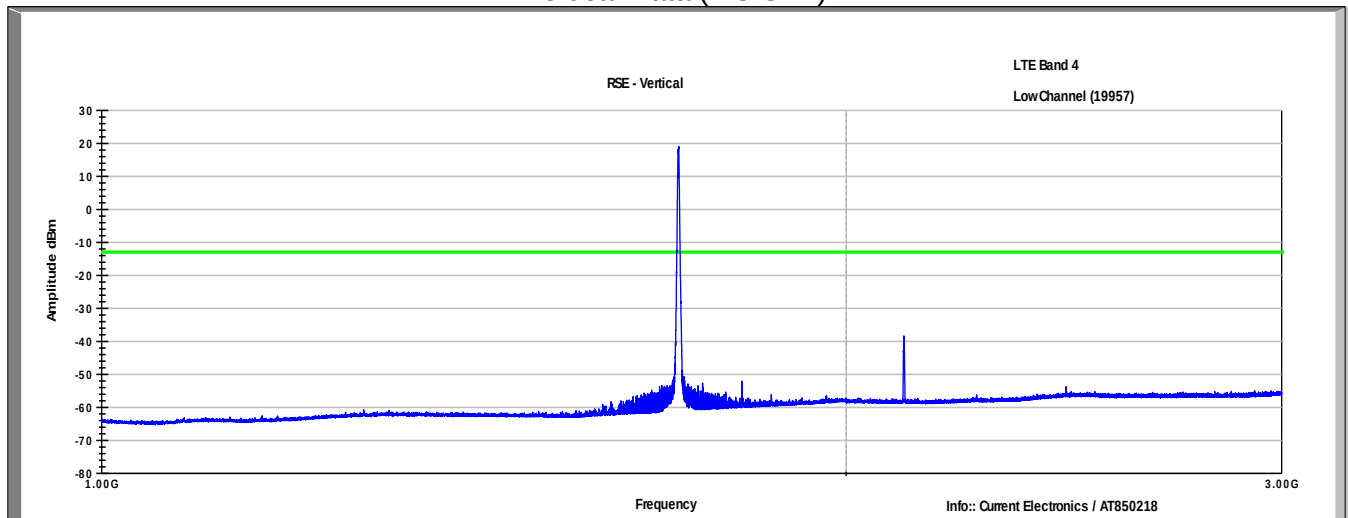
LTE Band 4, QPSK modulation, 1.4MHz bandwidth
Low Channel (19957)
Vertical Data (30-1000MHz)



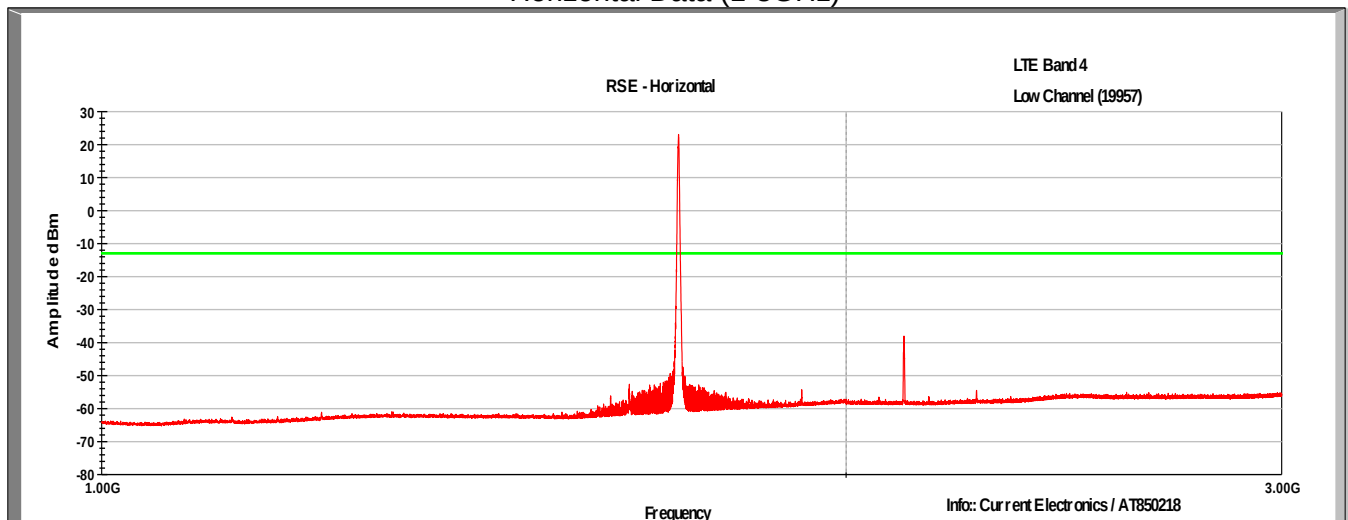
Horizontal Data (30-1000MHz)



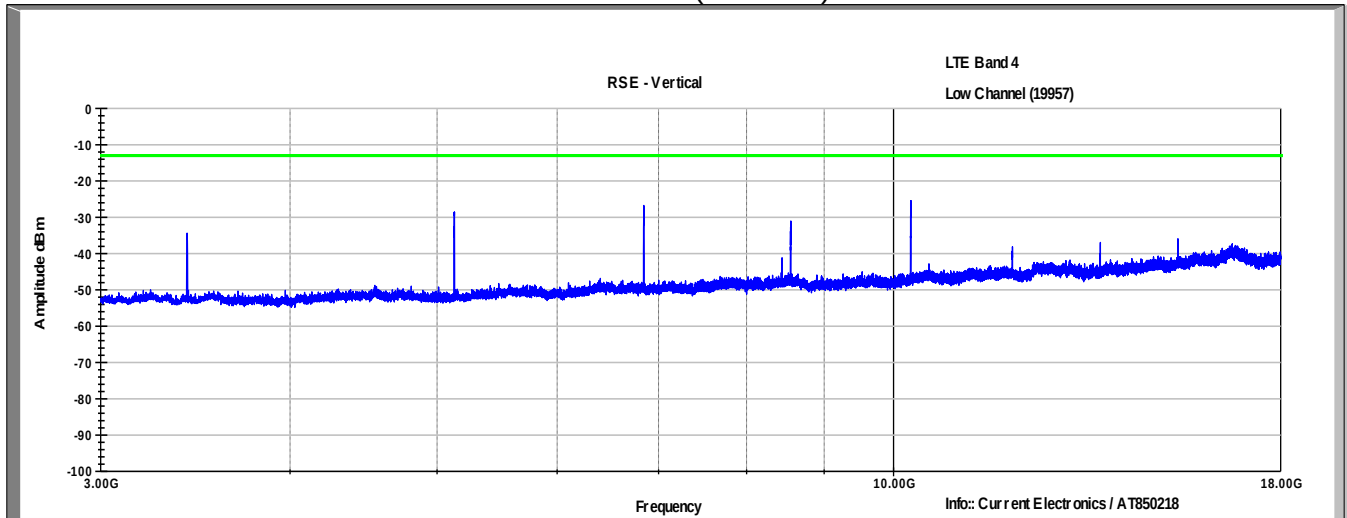
LTE Band 4, QPSK modulation, 1.4MHz bandwidth
Low Channel (19957)
Vertical Data (1-3 GHz)



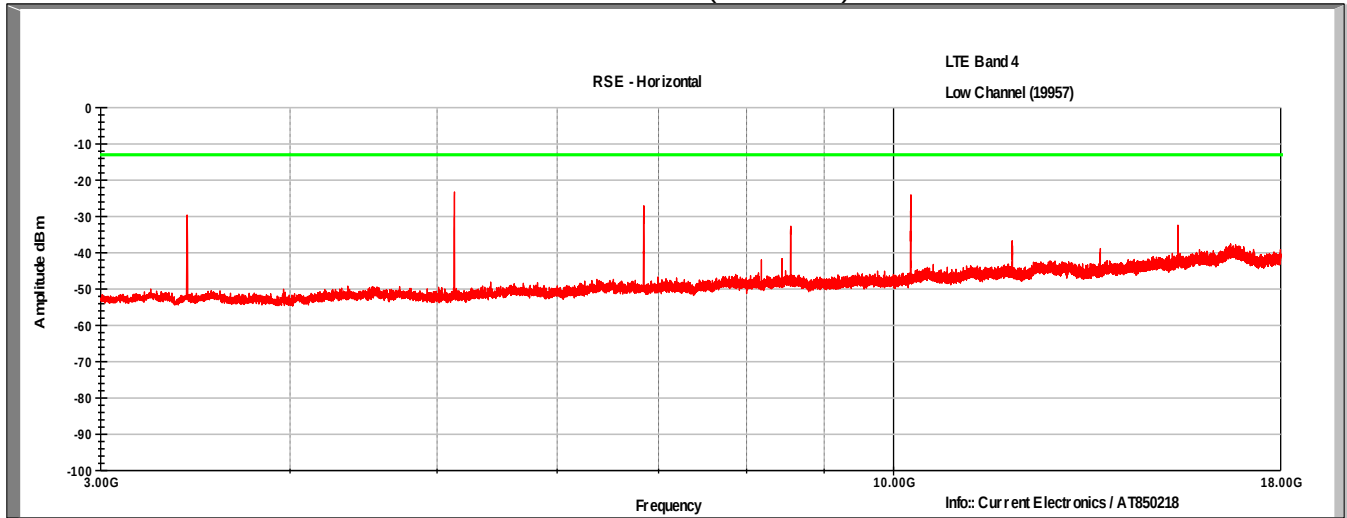
Horizontal Data (1-3GHz)



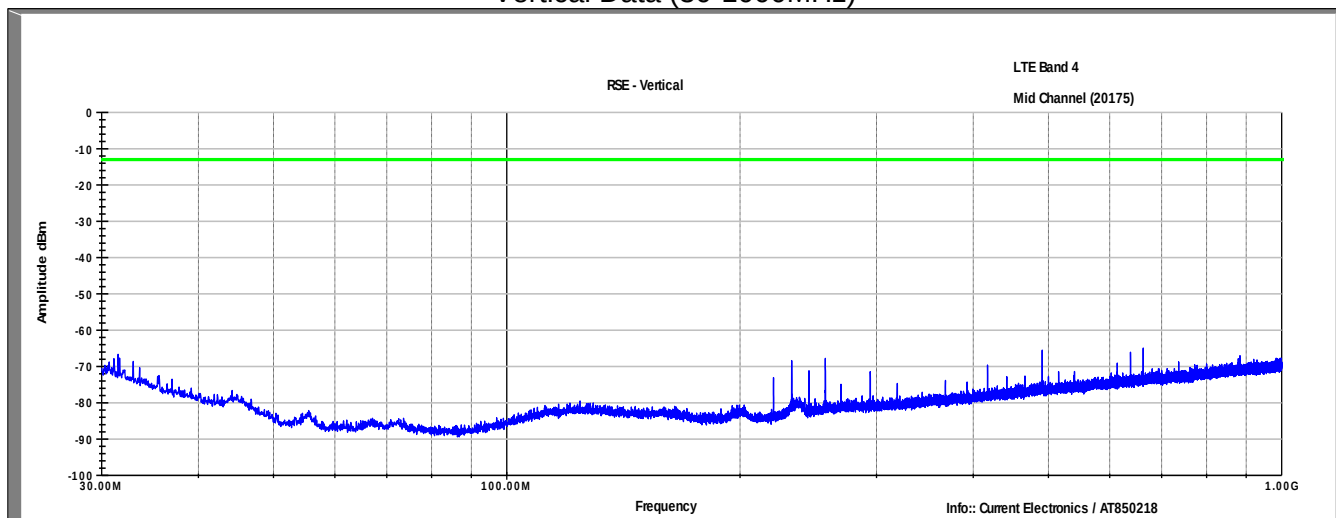
LTE Band 4, QPSK modulation, 1.4MHz bandwidth
Low Channel (19957)
Vertical Data (3-18GHz)



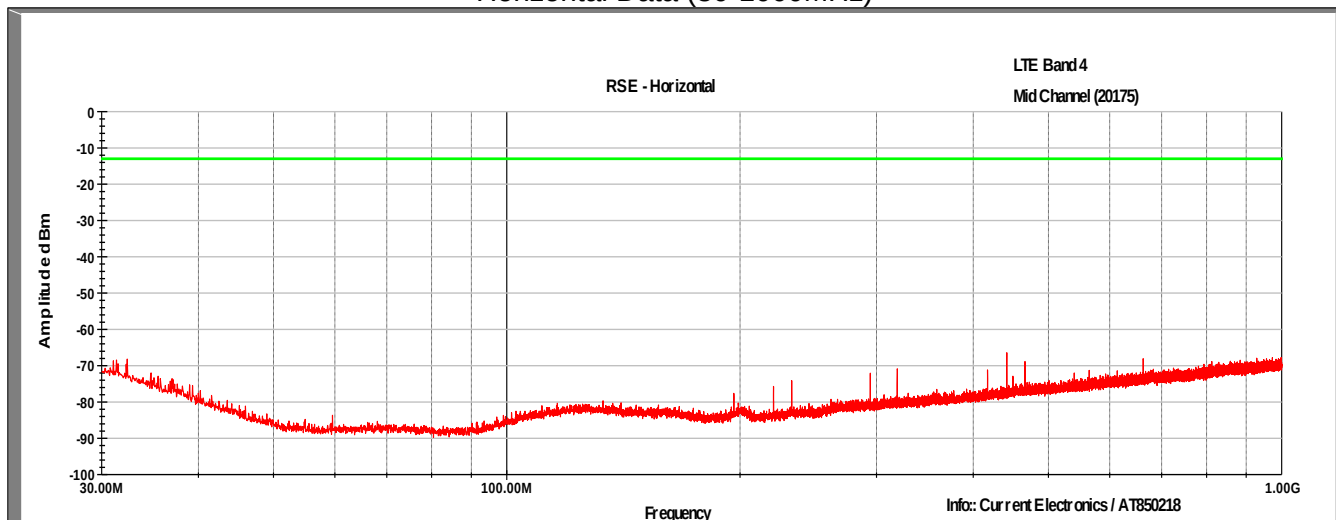
Horizontal Data (3-18G Hz)



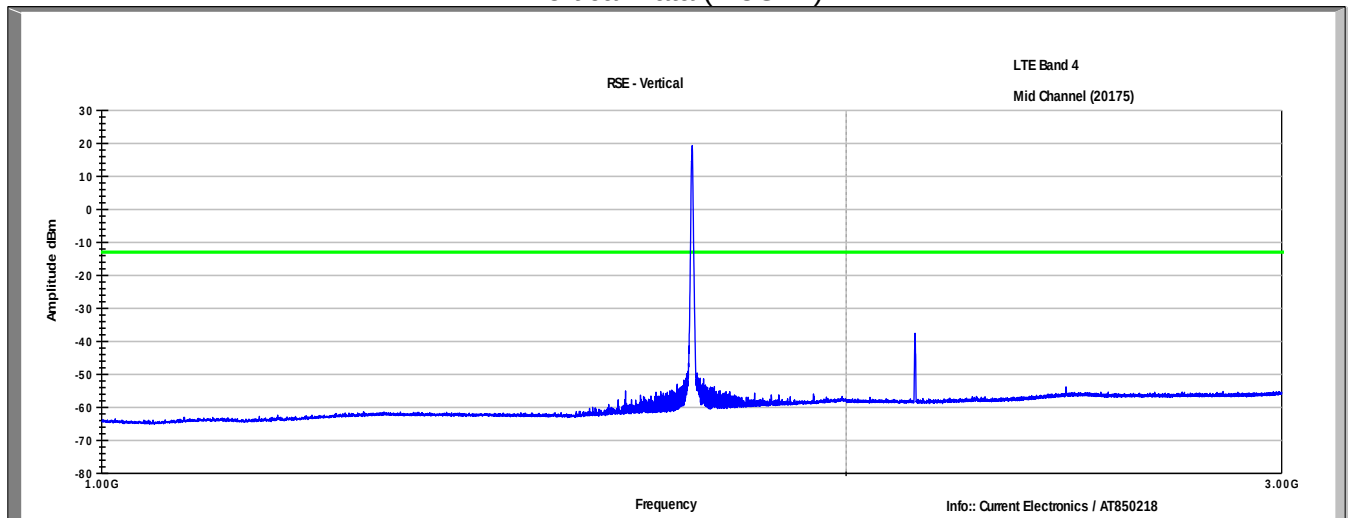
LTE Band 4, QPSK modulation, 1.4MHz bandwidth
Mid Channel (20175)
Vertical Data (30-1000MHz)



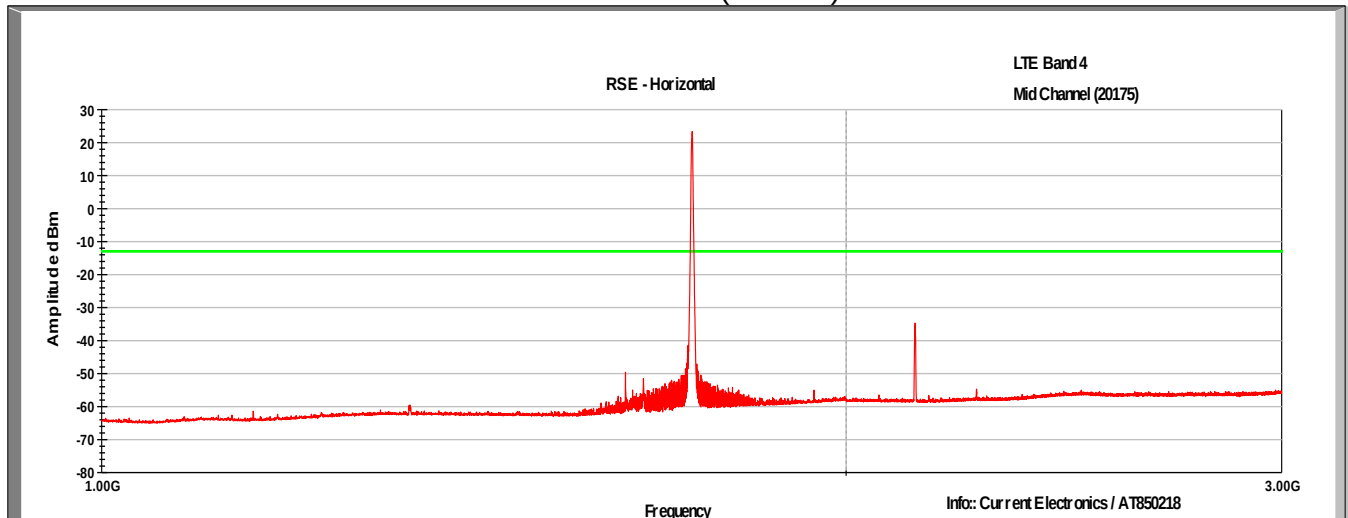
Horizontal Data (30-1000MHz)



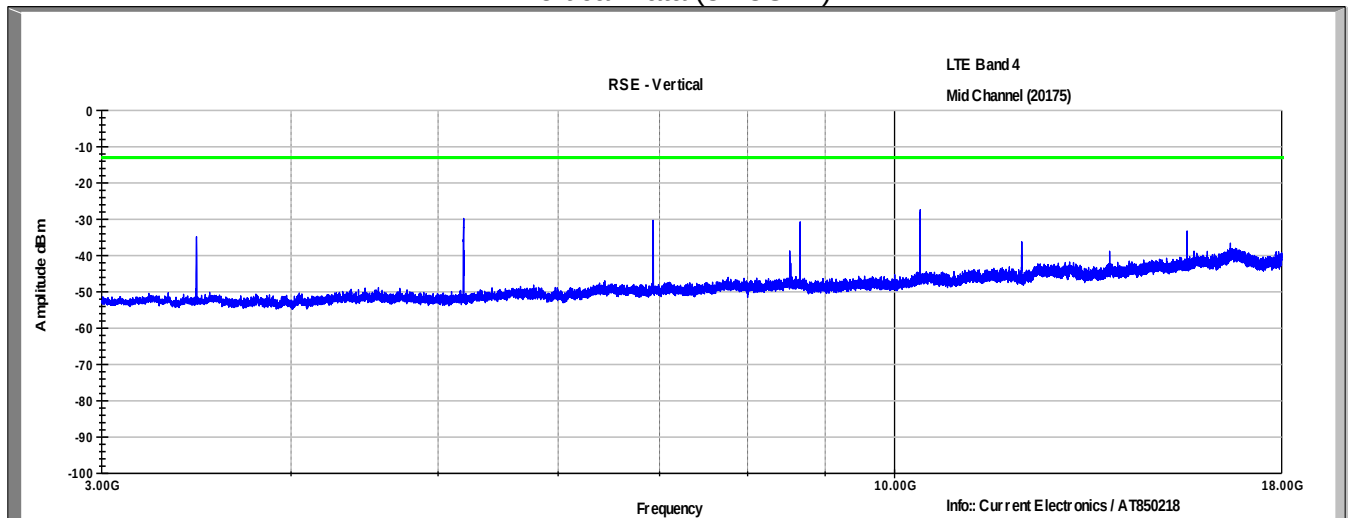
LTE Band 4, QPSK modulation, 1.4MHz bandwidth
 Mid Channel (20175)
 Vertical Data (1-3GHz)



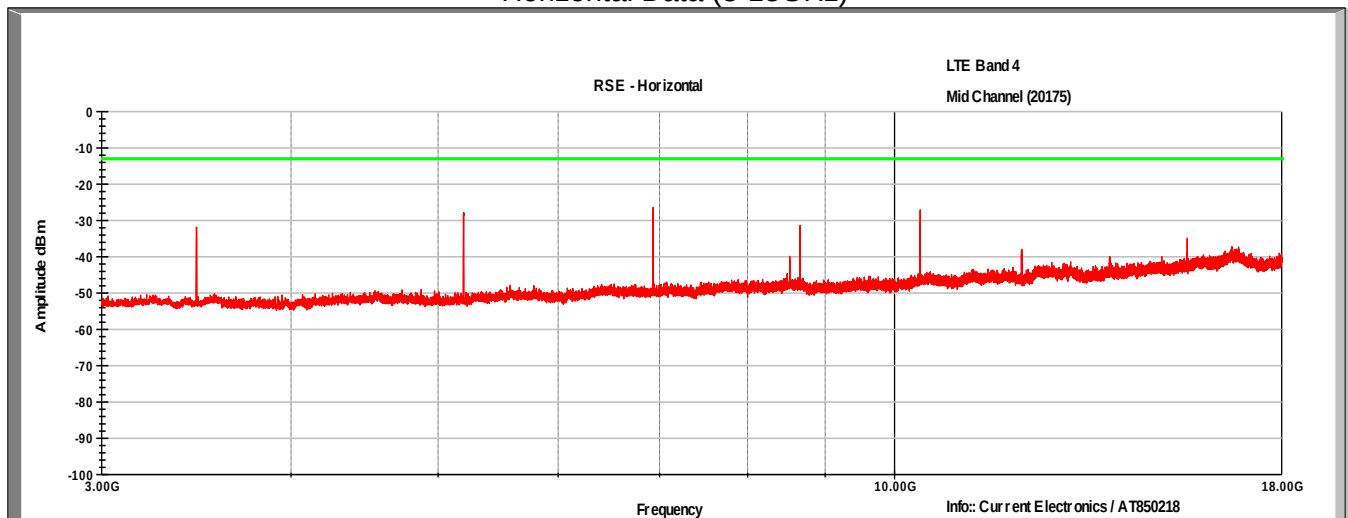
Horizontal Data (1-3GHz)



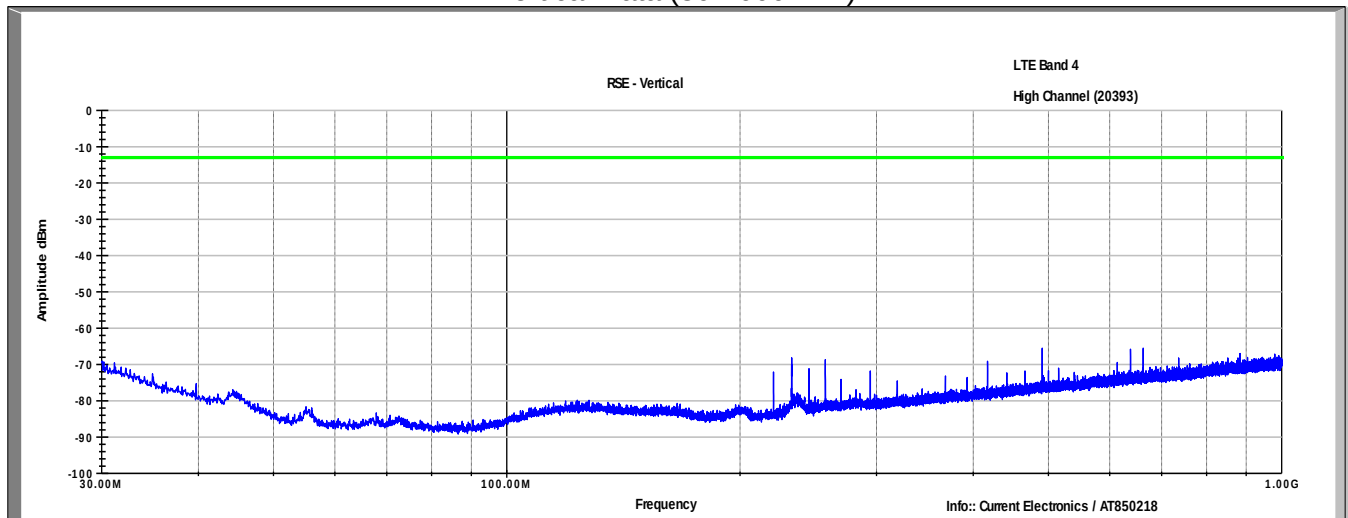
LTE Band 4, QPSK modulation, 1.4MHz bandwidth
Mid Channel (20175)
Vertical Data (3-18GHz)



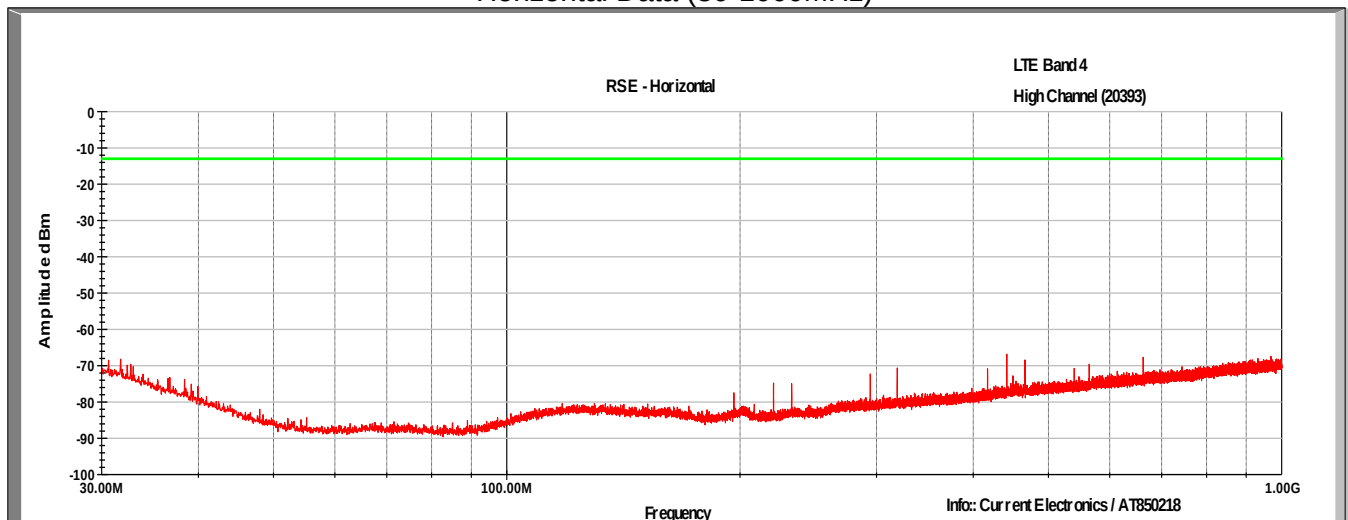
Horizontal Data (3-18GHz)



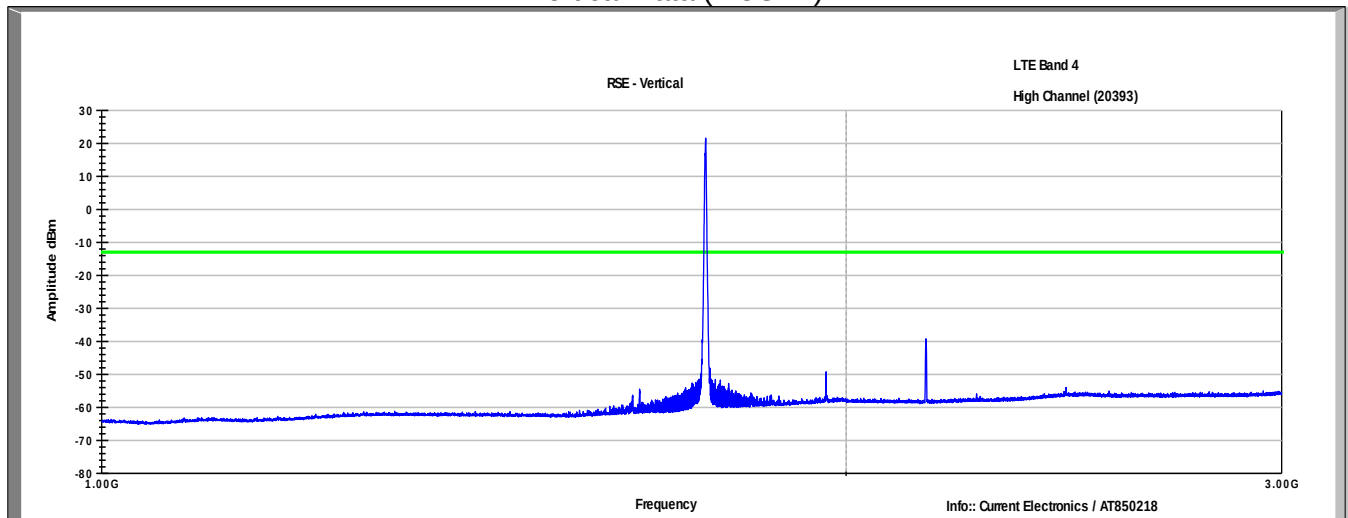
LTE Band 4, QPSK modulation, 1.4MHz bandwidth
High Channel (20393)
Vertical Data (30-1000MHz)



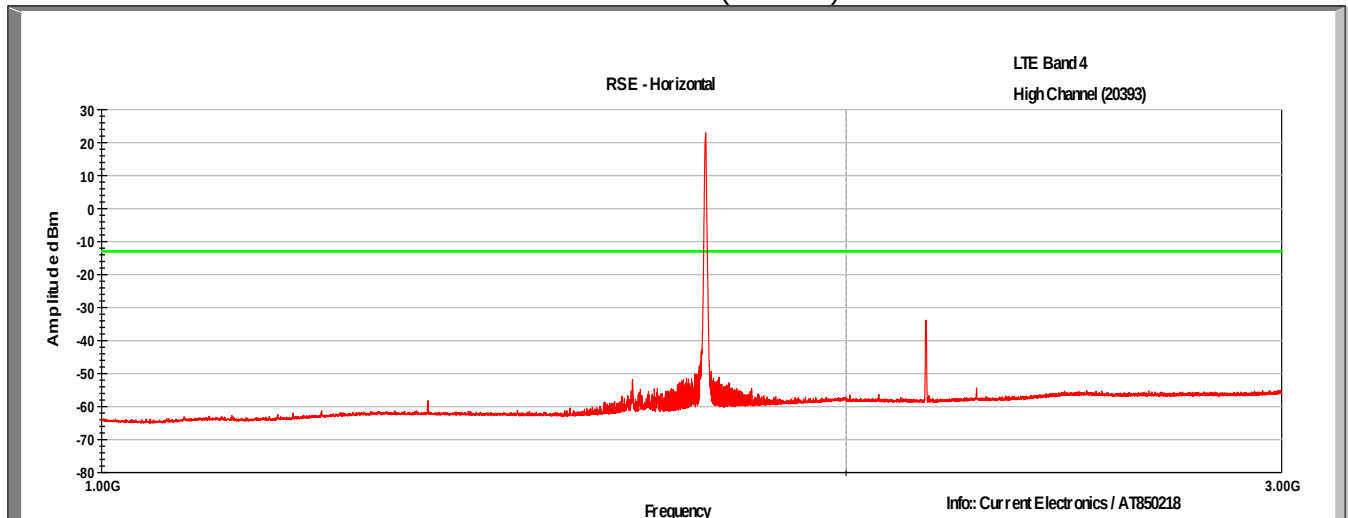
Horizontal Data (30-1000MHz)



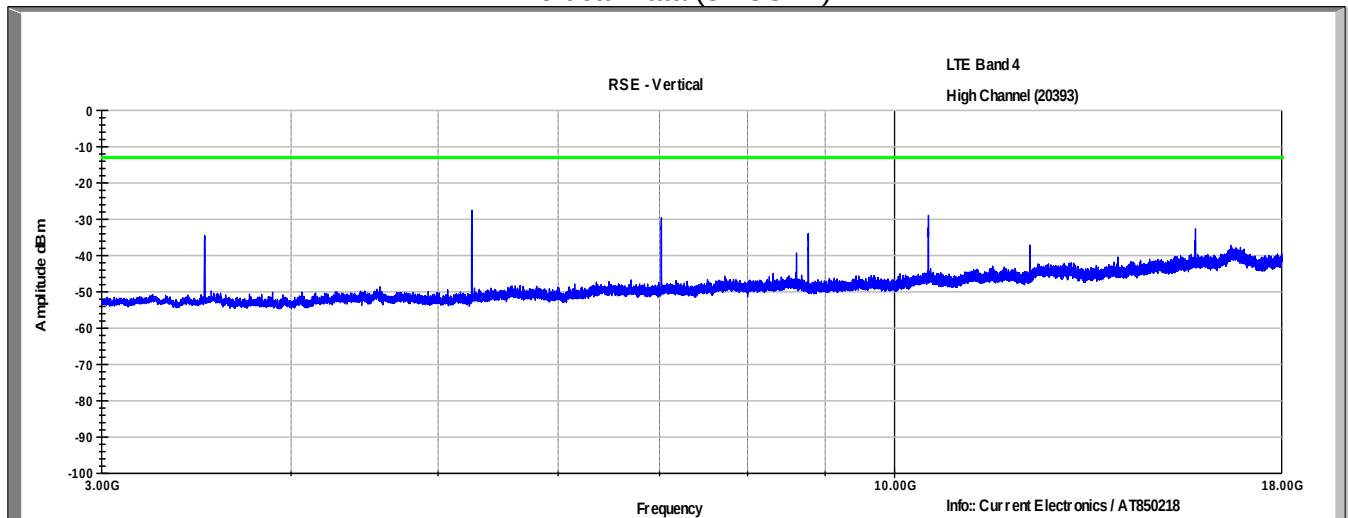
LTE Band 4, QPSK modulation, 1.4MHz bandwidth
High Channel (20393)
Vertical Data (1-3GHz)



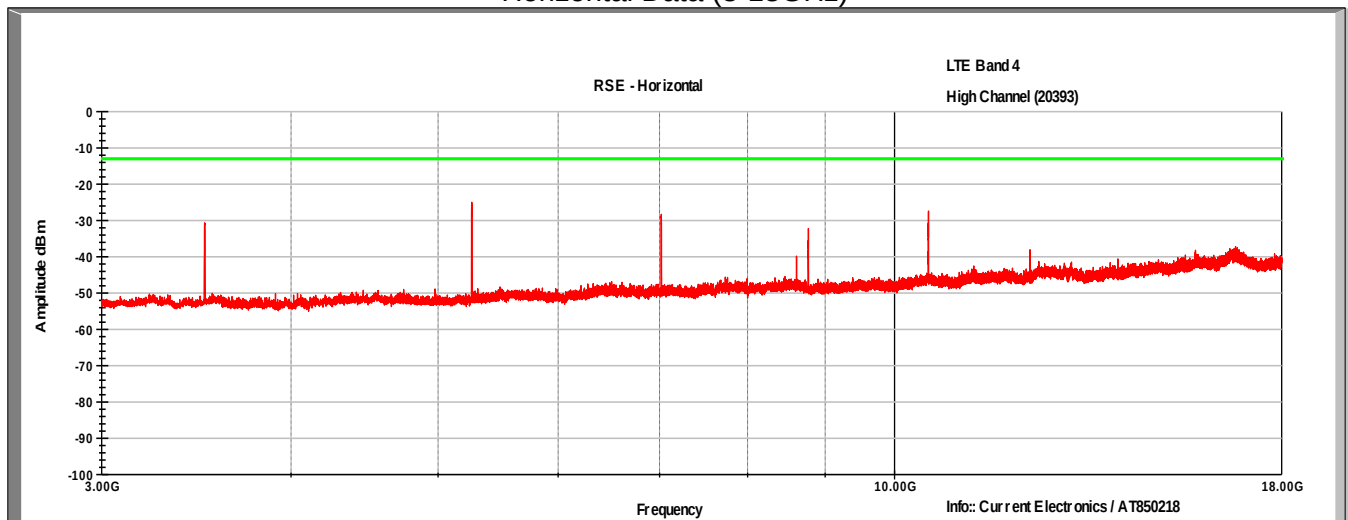
Horizontal Data (1-3GHz)



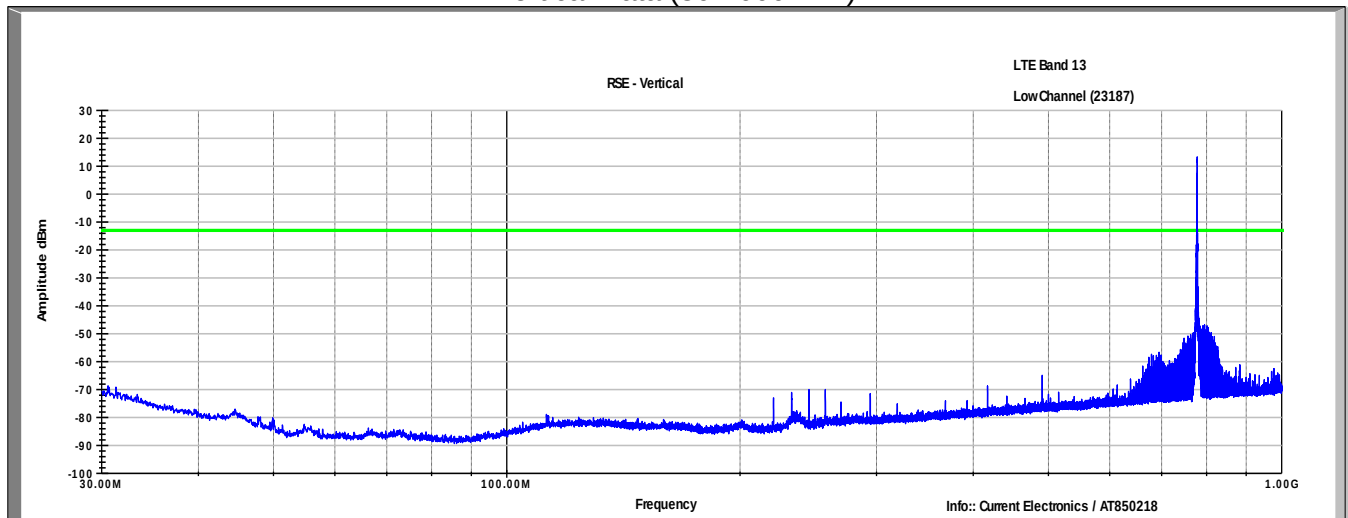
LTE Band 4, QPSK modulation, 1.4MHz bandwidth
 High Channel (20393)
 Vertical Data (3-18GHz)



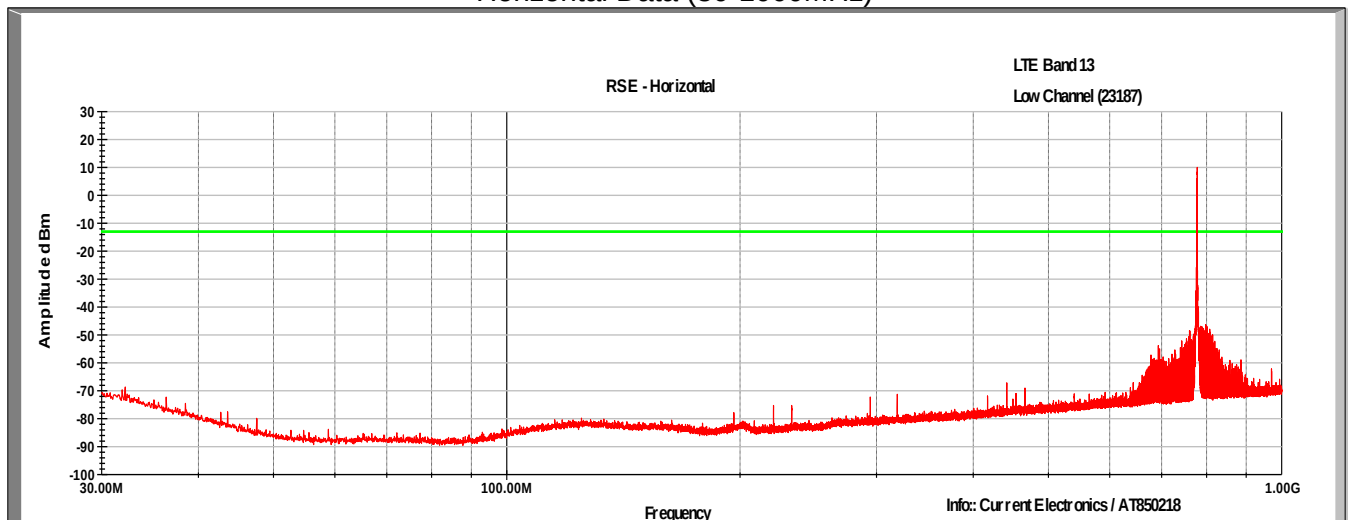
Horizontal Data (3-18GHz)



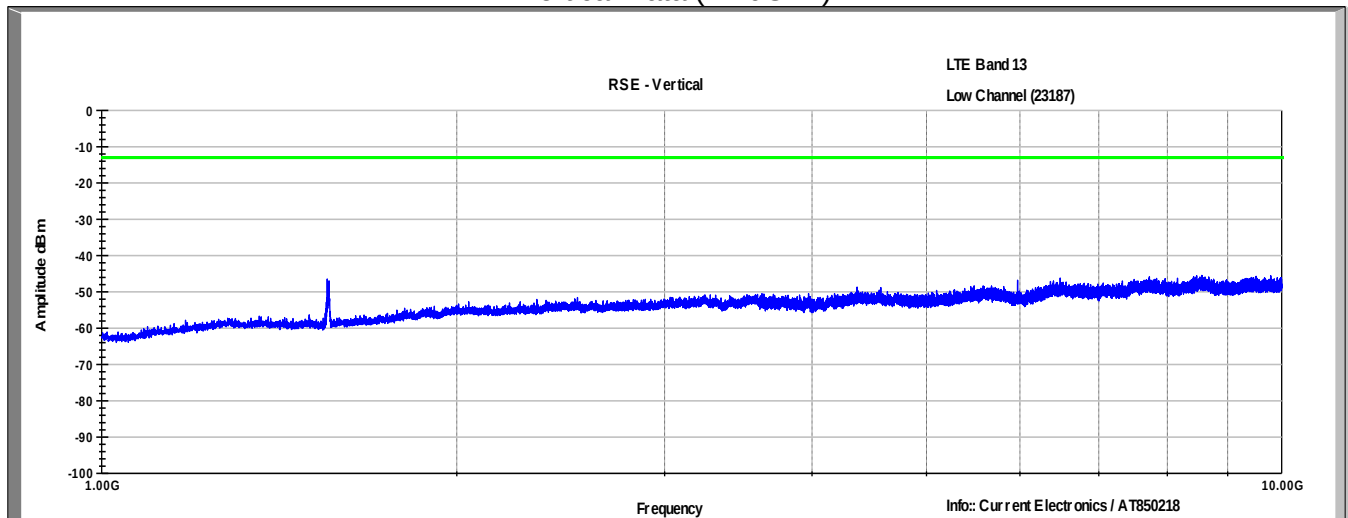
LTE Band 13, QPSK modulation, 1.4MHz bandwidth
Low Channel (23187)
Vertical Data (30-1000MHz)



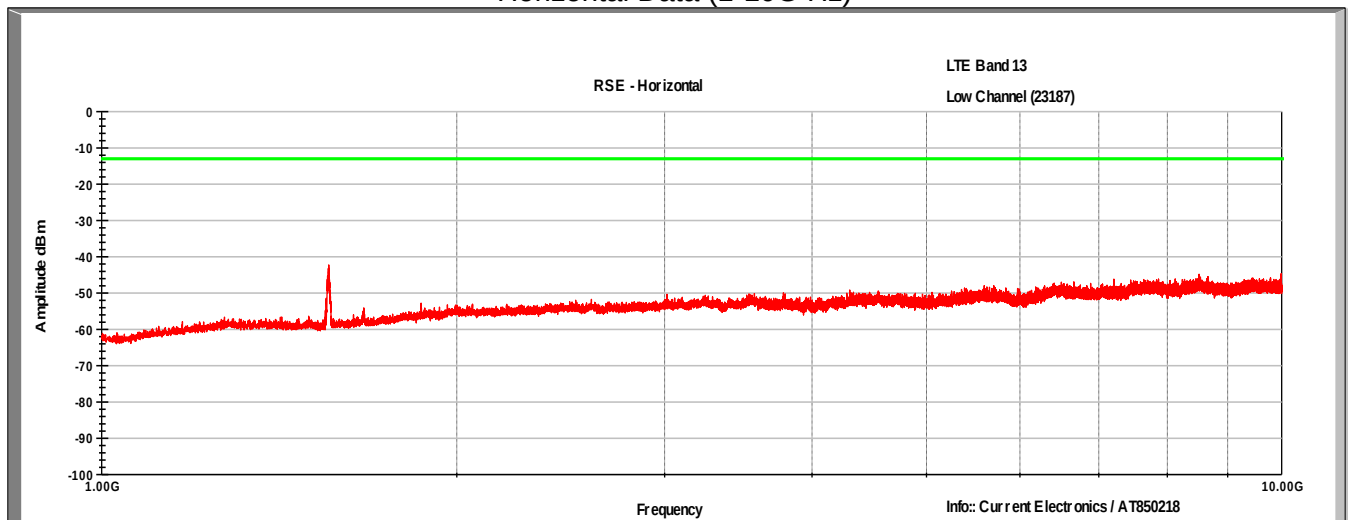
Horizontal Data (30-1000MHz)



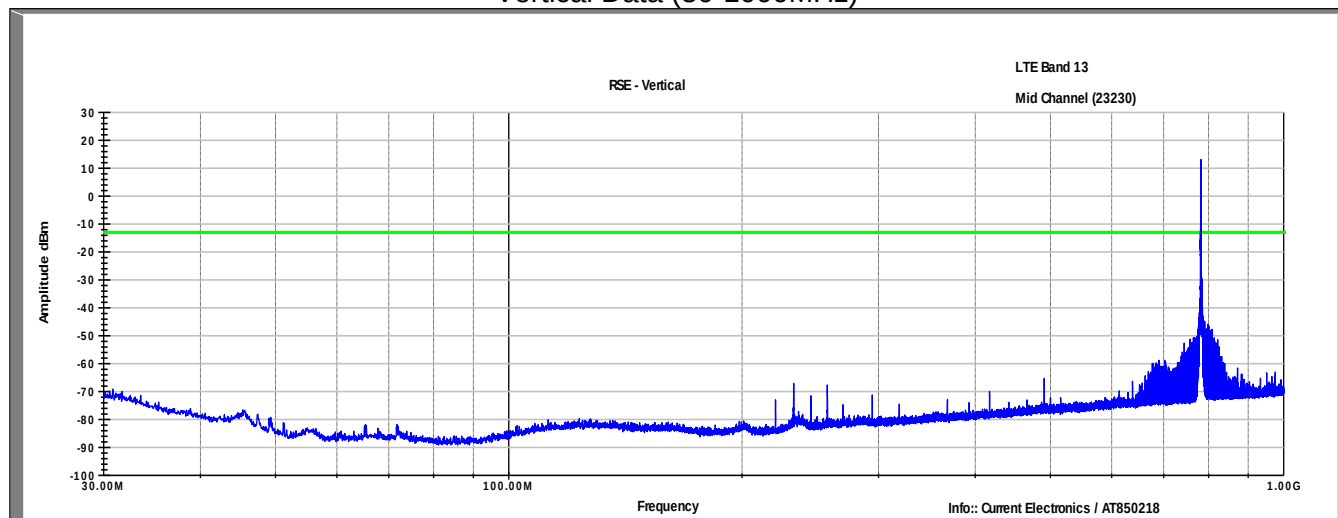
LTE Band 13, QPSK modulation, 1.4MHz bandwidth
Low Channel (23187)
Vertical Data (1-10GHz)



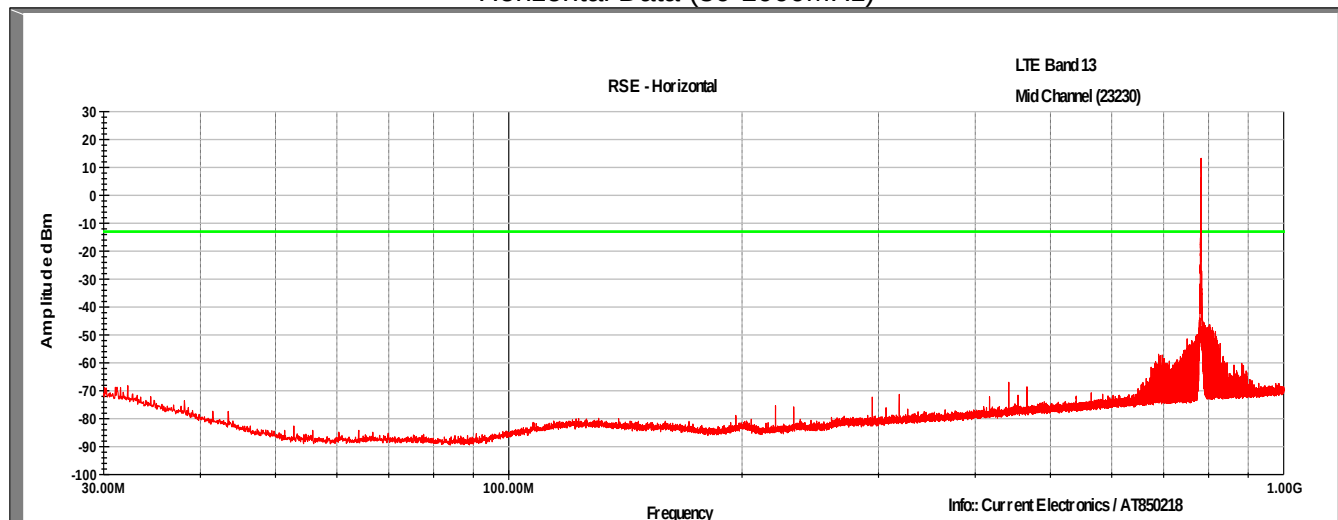
Horizontal Data (1-10G Hz)



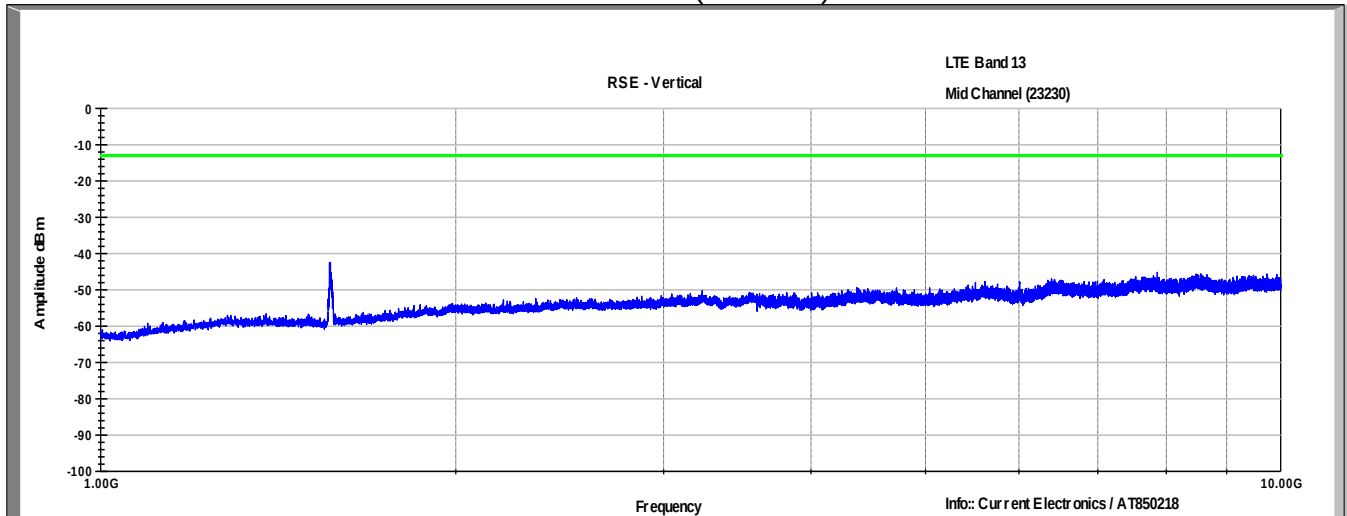
LTE Band 13, QPSK modulation, 1.4MHz bandwidth
Mid Channel (23230)
Vertical Data (30-1000MHz)



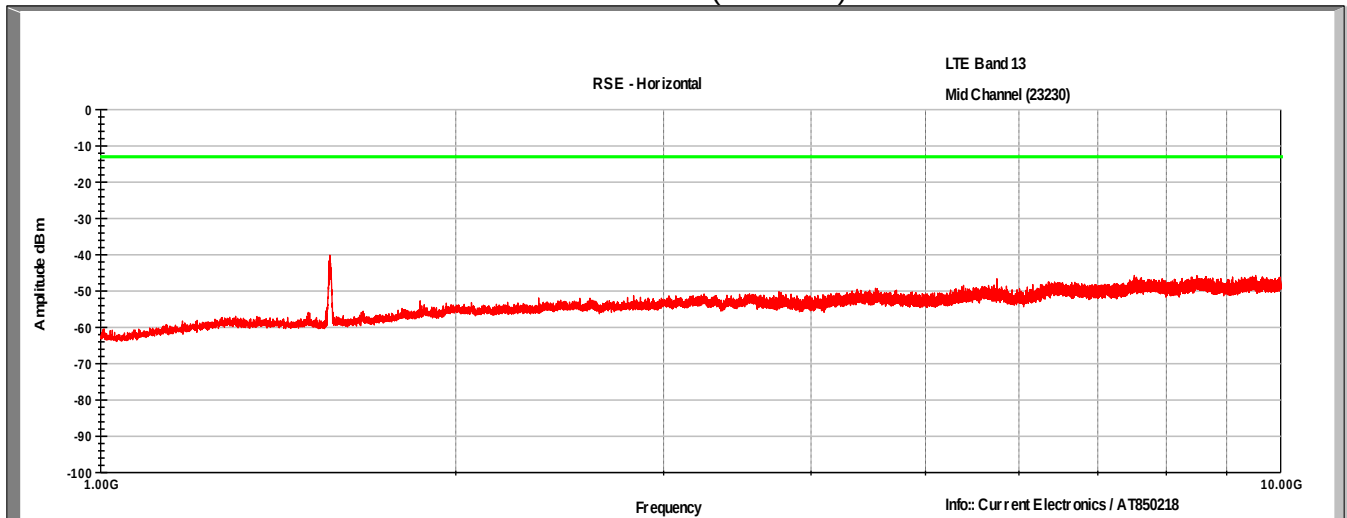
Horizontal Data (30-1000MHz)



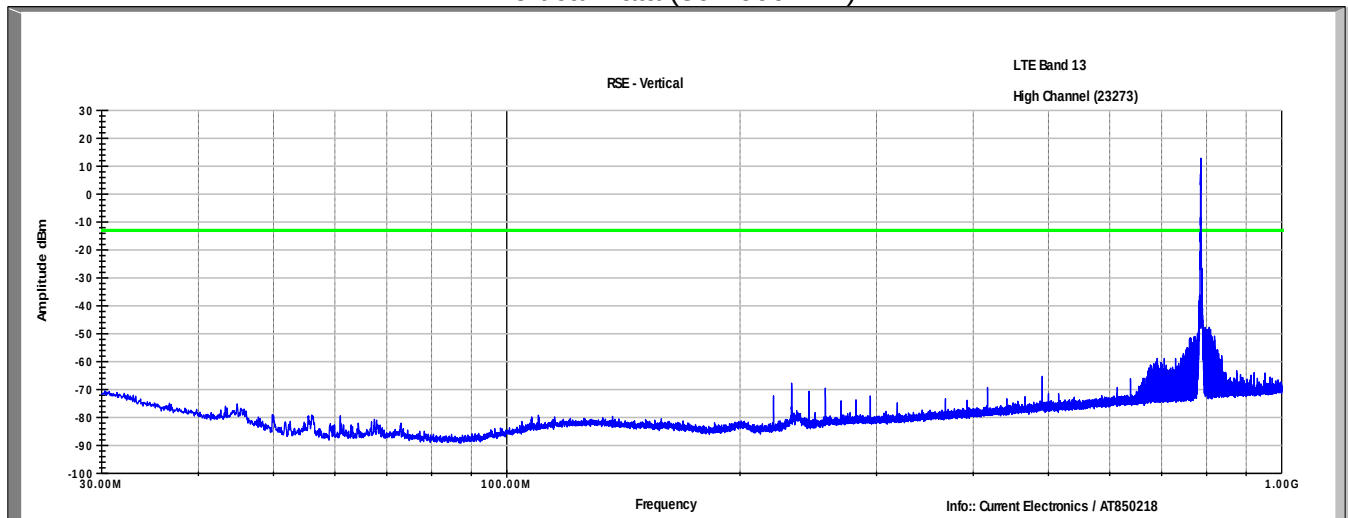
LTE Band 13, QPSK modulation, 1.4MHz bandwidth
Mid Channel (23230)
Vertical Data (1-10GHz)



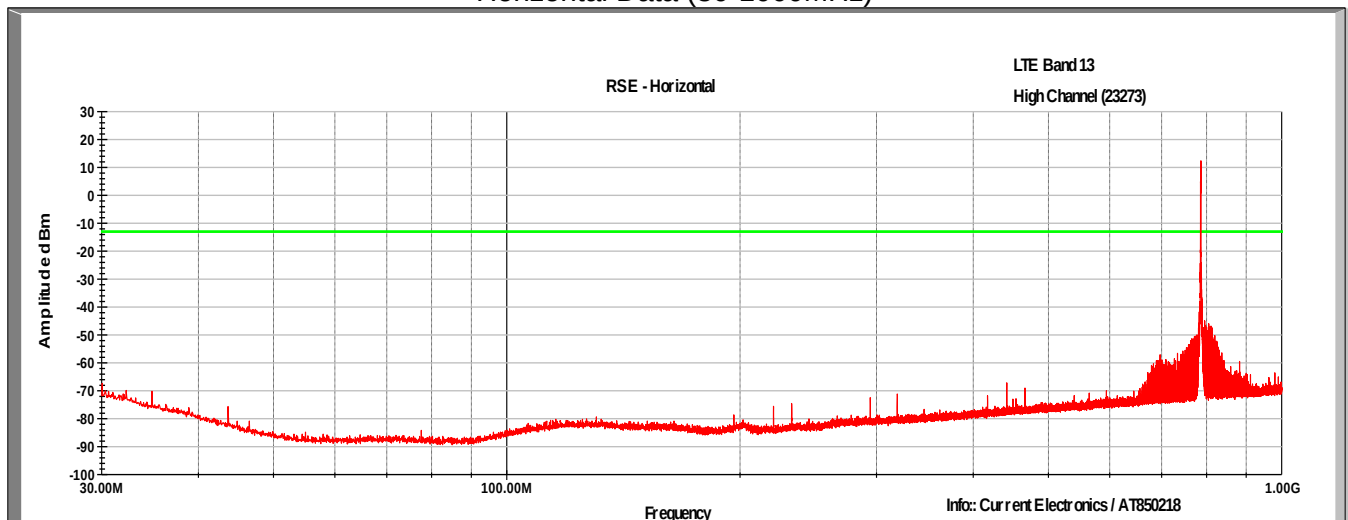
Horizontal Data (1-10GHz)



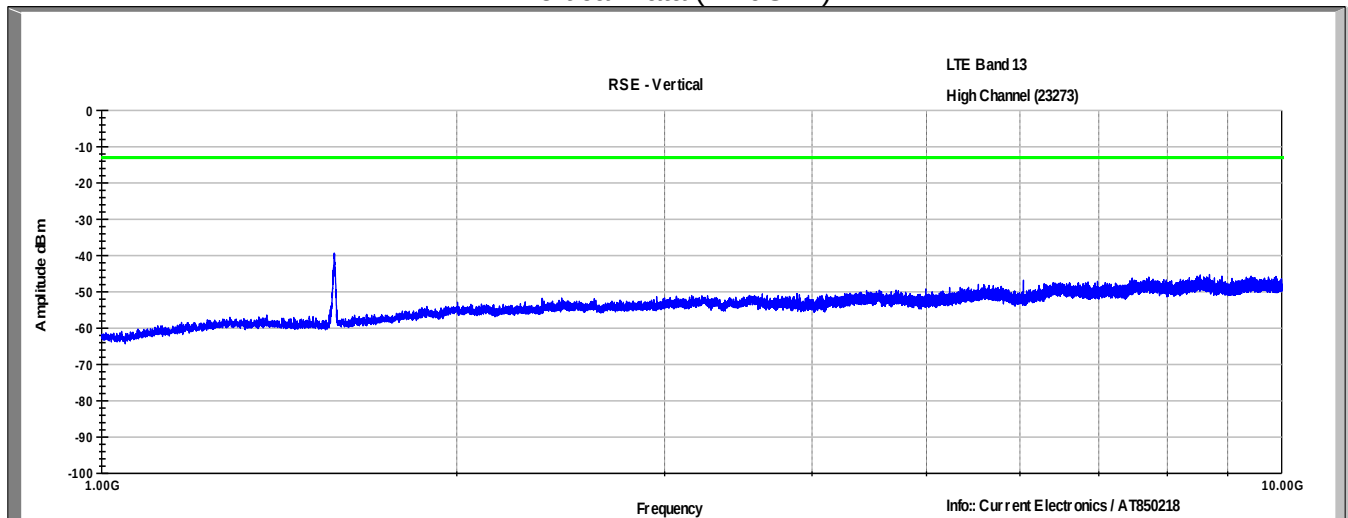
LTE Band 13, QPSK modulation, 1.4MHz bandwidth
High Channel (23273)
Vertical Data (30-1000MHz)



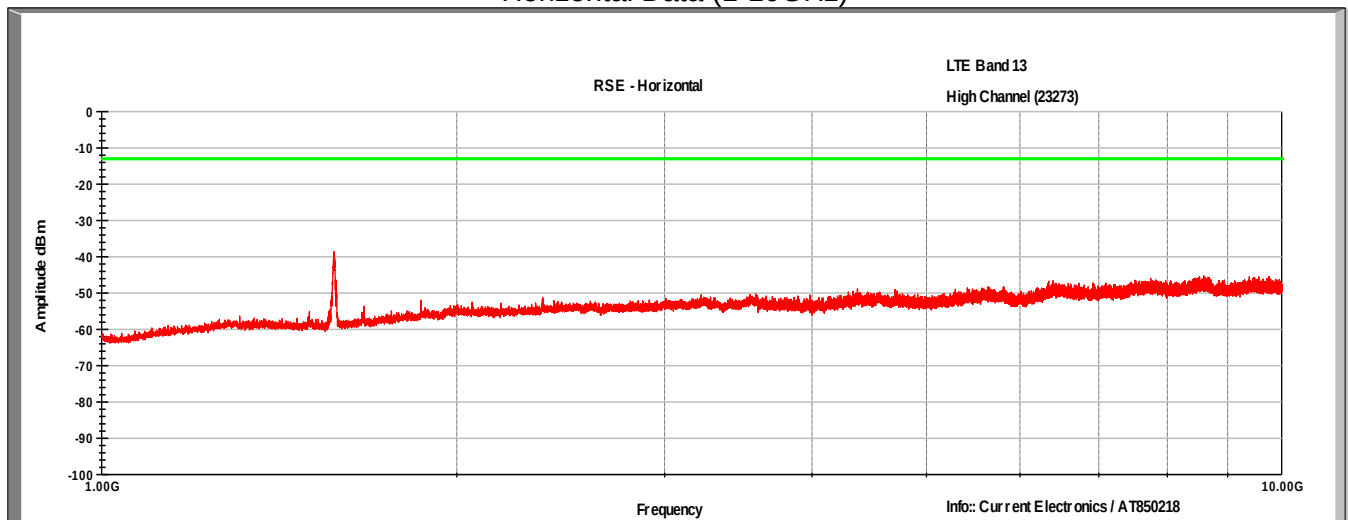
Horizontal Data (30-1000MHz)



LTE Band 13, QPSK modulation, 1.4MHz bandwidth
High Channel (23273)
Vertical Data (1-10GHz)



Horizontal Data (1-10GHz)



9 Frequency Stability

9.1 Test Result

Test Description	Basic Standards	Test Result
Frequency Stability	2.1055 27.5(b) 27.5(h) 27.54	Pass

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 the middle channel of Bands 4 and 13.

9.3 Test Site

SGS EMC Laboratory, Suwanee, GA

9.4 Test Equipment

Test End Date: 7-Mar-2018

Tester: MT

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ENVIRONMENTAL TEST CHAMBER	T2RC	TENNEY ENVIRONMENTAL	B094877	CNR
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	25-Jan-2020
RF CABLE	141	HUBER & SUHNER	B095588	26-Jul-2018
ATTENUATOR, 10DB	BW-S10W2	MINI-CIRCUITS	15034	CNR
MULTIMETER	87V	FLUKE	B079675	29-Jul-2018

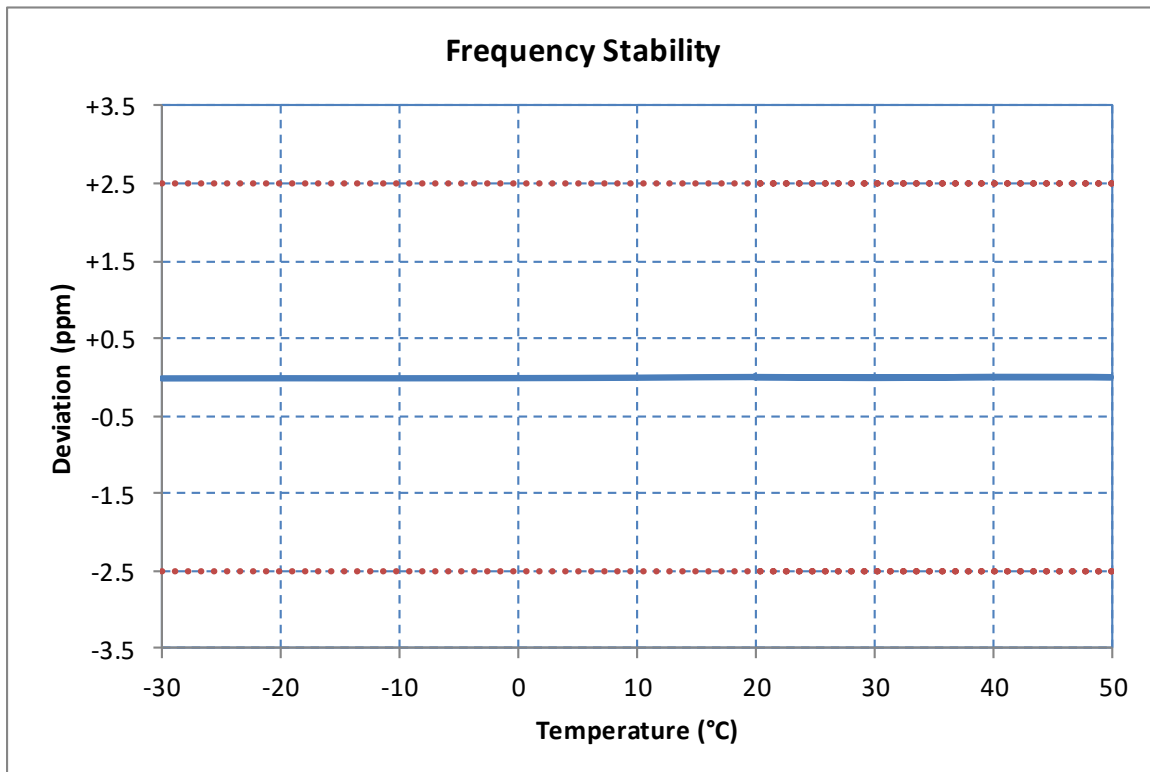
- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW 500 is on a 2 year calibration cycle.

9.5 Test Data

Band 4, Channel 20175

Nominal Rated Voltage V_{DC} : 12.0
Minimum Rated Voltage V_{DC} : 8.0
Maximum Rated Voltage V_{DC} : 20.0

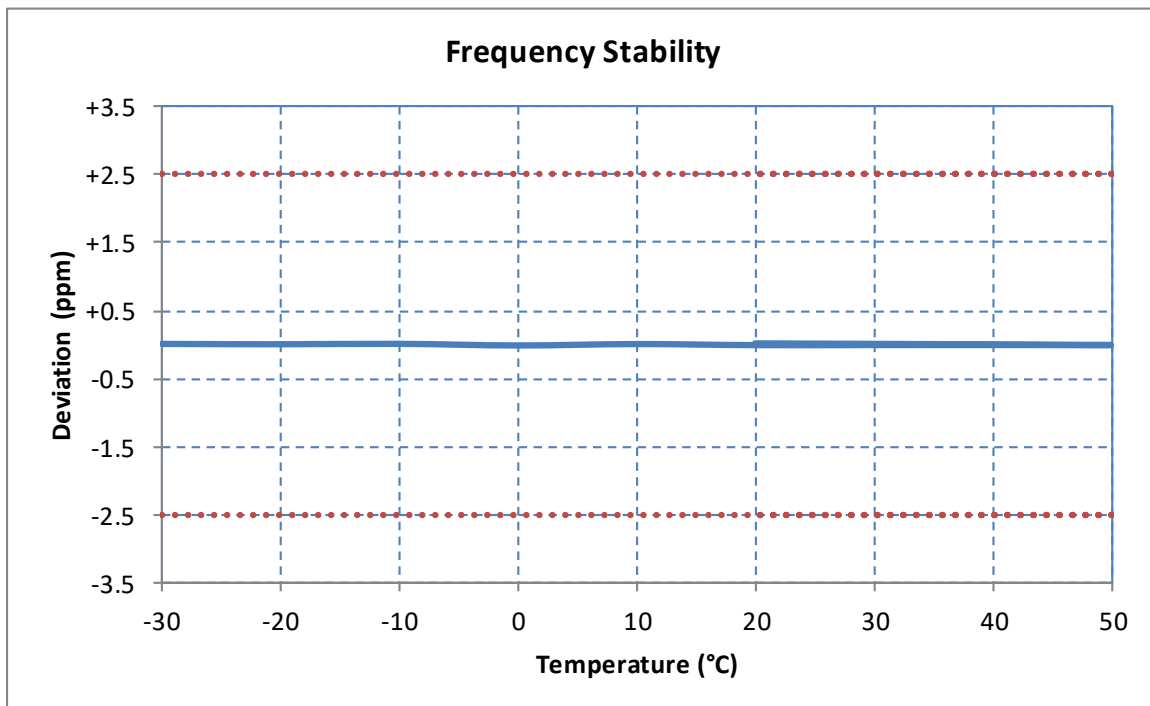
Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev Hz	Freq Dev ppm	Deviation %
Nominal	12.00	+20 (Ref)	1,732,500,008	+8	+0.00	+0.000000
Nominal	12.00	-30	1,732,500,005	+5	+0.00	+0.000000
Nominal	12.00	-20	1,732,500,005	+5	+0.00	+0.000000
Nominal	12.00	-10	1,732,500,005	+5	+0.00	+0.000000
Nominal	12.00	0	1,732,500,005	+5	+0.00	+0.000000
Nominal	12.00	+10	1,732,500,006	+6	+0.00	+0.000000
Nominal	12.00	+20	1,732,500,008	+8	+0.00	+0.000000
Nominal	12.00	+30	1,732,500,006	+6	+0.00	+0.000000
Nominal	12.00	+40	1,732,500,008	+8	+0.00	+0.000000
Nominal	12.00	+50	1,732,500,007	+7	+0.00	+0.000000
115%	23.00	+20	1,732,500,007	+7	+0.00	+0.000000
85%	6.80	+20	1,732,500,009	+9	+0.01	+0.000001



Band 13, Channel 23230

Nominal Rated Voltage V_{DC} : 12.0
Minimum Rated Voltage V_{DC} : 8.0
Maximum Rated Voltage V_{DC} : 20.0

Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev Hz	Freq Dev ppm	Deviation %
Nominal	12.00	+20 (Ref)	782,000,002	+2	+0.00	+0.000000
Nominal	12.00	-30	782,000,005	+5	+0.01	+0.000001
Nominal	12.00	-20	782,000,004	+4	+0.00	+0.000000
Nominal	12.00	-10	782,000,005	+5	+0.01	+0.000001
Nominal	12.00	0	782,000,002	+2	+0.00	+0.000000
Nominal	12.00	+10	782,000,004	+4	+0.01	+0.000001
Nominal	12.00	+20	782,000,002	+2	+0.00	+0.000000
Nominal	12.00	+30	782,000,002	+2	+0.00	+0.000000
Nominal	12.00	+40	782,000,002	+2	+0.00	+0.000000
Nominal	12.00	+50	782,000,002	+2	+0.00	+0.000000
115%	23.00	+20	782,000,006	+6	+0.01	+0.000001
85%	6.80	+20	782,000,004	+4	+0.01	+0.000001



10 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	16 May 2018