

EMC Test Report

Project Number: 4011580

Report Number: 4011580EMC01

Revision Level: 0

Client: Queclink Wireless Solutions Co. Ltd

Equipment Under Test: GSM/GPRS/GPS Tracker

Model: GV304N

FCC ID: YQD-GV304N

FCC Rule Parts: Part 2, Part 22(H), Part 24(E)

Report issued on: 09 August 2016

Test Result: Compliant

Tested by:



Fabian Nica, Senior Technician

Reviewed by:



Jeremy Pickens, Senior EMC Engineer

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.

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1 Summary of Test Results

Reference Sections	Test Description	Test Limit	Test Condition	Test Result
2.1046	Conducted Output Power	N/A	Conducted	Reported
24.232(d)	Peak-to-Average Ratio	<13 dB		Pass
2.1049 22.917(a) 24.238(a)	Occupied Bandwidth	N/A		Reported
2.1051 22.917(a) 24.238(a)	Band Edge / Conducted Spurious Emissions	$< 43 + 10\log_{10}(P_{\text{Watts}})$ at band edge and for all out of band emissions		Pass
22.913(a)(2)	Effective Radiated Power	< 7 Watts max ERP	Radiated	Pass
24.232(c)	Equivalent Isotropically Radiated Power	< 2 Watts max EIRP		Pass
2.1053 22.917(a) 24.238(a)	Radiated Spurious Emissions	$< 43 + 10\log_{10}(P_{\text{Watts}})$ at band edge and for all out of band emissions		Pass
2.1055 22.917(a) 24.238(a)	Frequency Stability	<2.5 ppm		Pass

1.1 Modifications Required to Compliance

None

2 General Information

2.1 Client Information

Name: QUECLINK WIRELESS SOLUTIONS CO.,LTD.
Address: OFFICE 501 BUILDING 9 NO 99
TIANZHOU RD
City, State, Zip, Country: SHANGHAI, 200233, CHINA

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

2.3 General Information of EUT

Type of Product: GSM/GPRS/GPS Tracker
Model Number: GV304N
Serial Number: Not Labeled
FCC ID: YQD-GV304N

IMEI Number: 862170019025129 (Conducted)
862170019025130 (Radiated)
Rated Voltage: 8.0 - 32.0 Vdc
Test Voltage: 12 Vdc
Tx Frequency Range: 824.2– 848.8 MHz (GSM850)
1850.2– 1909.8 MHz (GSM1900)
GPRS, 2 uplink slots max
FCC Classification: PCS Licensed Transmitter PCB
Type: Pre Production

Sample Received Date: 29 July 2016
Dates of testing: 03 - 09 August 2016

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	Basic Standards	Test Result
RF Output Power	FCC Part 2.1046	Reported

3.2 Test Method

A radio link was established between EUT and Radio Communication Tester. The output power of the EUT was set to maximum value by using the maximum power setting on the Radio Communications Tester. Power measurements were recorded using the methods defined in KDB document 971168 D01 Power Meas License Digital Systems v02r02, Clause 5.1.1.

The measurements were conducted at the low, middle, and high channel and with 1 and 2 downlink slots.

3.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.6 °C
Relative Humidity: 52.4%
Atmospheric Pressure: 97.9 kPa

3.4 Test Equipment

Test Date: 3-Aug-2016

Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2017
RF CABLE	141	HUBER & SUHNER	B095585	26-Jul-2017
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the FSV is on a 2 year calibration cycle, and the CMW-500 is on a 3 year calibration cycle.

3.5 Test Data

Band	UpLink Channel	UL Frequency (MHz)	Mode	Slots	Measured Power (dBm)	Cable Loss (dB)	Conducted Power (dBm)
850	128	824.2	GPRS	1	22.63	10.3	32.93
850	128	824.2	GPRS	2	21.82	10.3	32.12
850	190	836.6	GPRS	1	22.51	10.3	32.81
850	190	836.6	GPRS	2	21.7	10.3	32
850	251	848.8	GPRS	1	22.57	10.3	32.87
850	251	848.8	GPRS	2	21.75	10.3	32.05
1900	512	1850.2	GPRS	1	16.89	10.5	27.39
1900	512	1850.2	GPRS	2	16.85	10.5	27.35
1900	661	1880	GPRS	1	16.75	10.5	27.25
1900	661	1880	GPRS	2	16.71	10.5	27.21
1900	810	1909.8	GPRS	1	16.46	10.5	26.96
1900	810	1909.8	GPRS	2	16.43	10.5	26.93

GSM850 Max: 32.93dBm (1.963W)

GSM1900 Max: 27.39dBm (0.548W)

4 Peak to Average Ratio

4.1 Test Result

Test Description	Basic Standards	Test Result
Peak to Average Ratio	FCC 24.232(d)	Pass

4.2 Test Method

KDB document 971168 D01 Power Meas License Digital Systems v02r02 was used to determine peak-to-average ratio. For the 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 at the highest power.

Limit:

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

4.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.6 °C
Relative Humidity: 52.4%
Atmospheric Pressure: 97.9 kPa

4.4 Test Equipment

Test Date: 3-Aug-2016

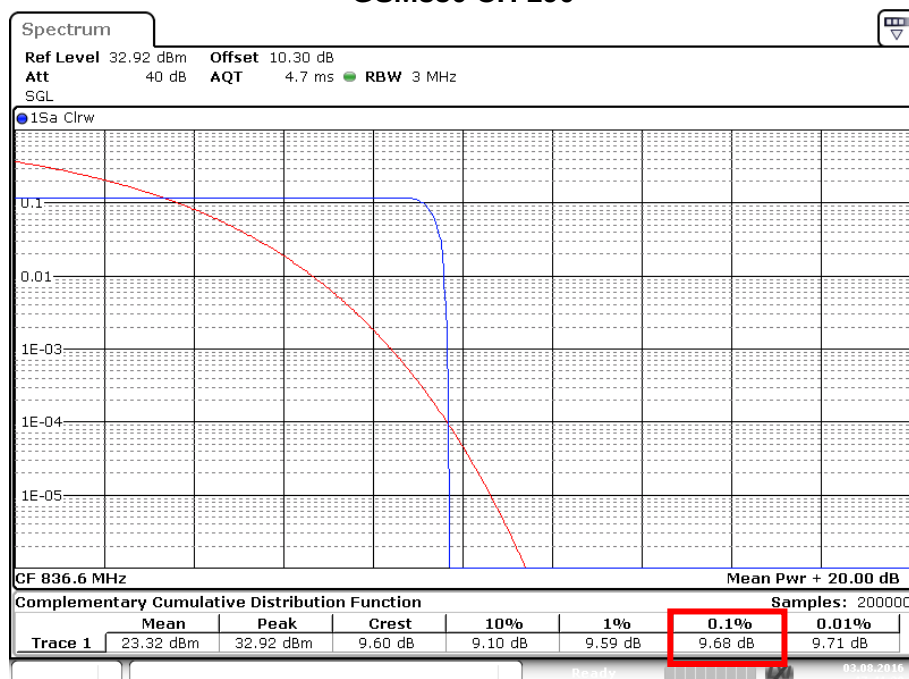
Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2017
RF CABLE	141	HUBER & SUHNER	B095585	26-Jul-2017
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the FSV is on a 2 year calibration cycle, and the CMW-500 is on a 3 year calibration cycle.

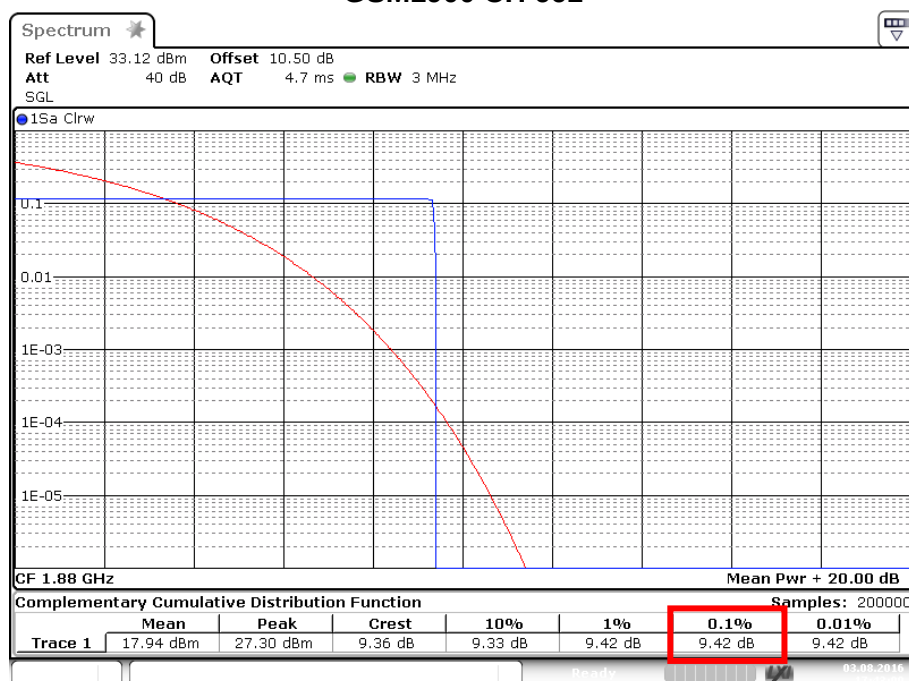
4.5 Test Data

GSM850 CH 190



Date: 3.AUG.2016 17:41:30

GSM1900 CH 661



Date: 3.AUG.2016 17:43:09

5 Occupied Bandwidth

5.1 Test Result

Test Description	Basic Standards	Test Result
Occupied Bandwidth	FCC Part 2.1049 FCC Part 22.917(a) FCC Part 24.238(a)	Reported

5.2 Test Method

KDB document 971168 D01 Power Meas License Digital Systems v02r02, Clause 4 was used to determine the occupied measurement.

The 99% measurement function of the spectrum analyzer was used.

The measurement was conducted at the center channel of each band.

5.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 23.6 °C
Relative Humidity: 52.4%
Atmospheric Pressure: 97.9 kPa

5.4 Test Equipment

Test Date: 3-Aug-2016

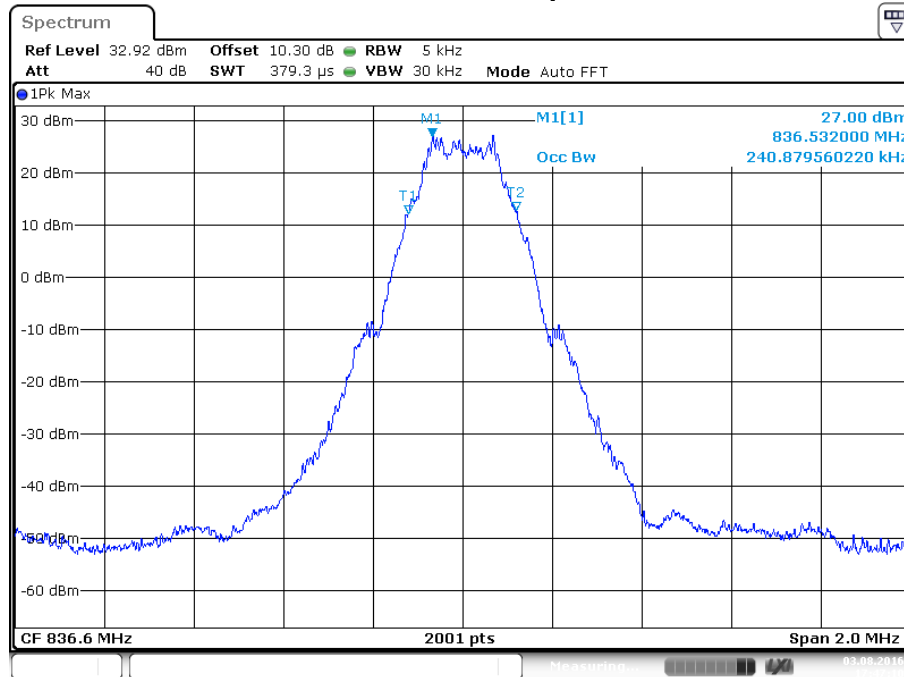
Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2017
RF CABLE	141	HUBER & SUHNER	B095585	26-Jul-2017
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017

- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the FSV is on a 2 year calibration cycle, and the CMW-500 is on a 3 year calibration cycle.

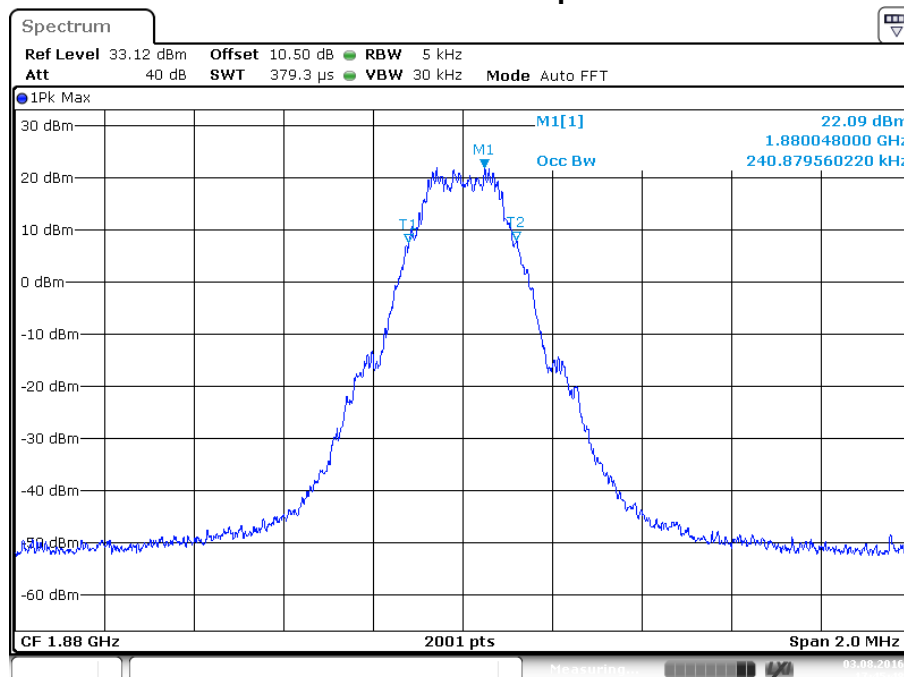
5.5 Test Data

GSM850 CH 190 - 99% Occupied Bandwidth



Date: 3.AUG.2016 17:47:11

GSM1900 CH 661 - 99% Occupied Bandwidth



Date: 3.AUG.2016 17:45:48

6 Band Edge and Conducted Spurious Emissions

6.1 Test Result

Test Description	Basic Standards	Test Result
Conducted spurious emissions and Band Edge	2.1051 22.917(a) 24.238(a)	Pass

6.2 Test Method

KDB document 971168 D01 Power Meas License Digital Systems v02r02, Clause 6 was used to measure spurious emissions at the antenna terminals.

6.3 Test Site

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature: 24.3 °C
Relative Humidity: 47.6 %
Atmospheric Pressure: 98.1 kPa

Test Date: 3-Aug-2016

Tester: JOP

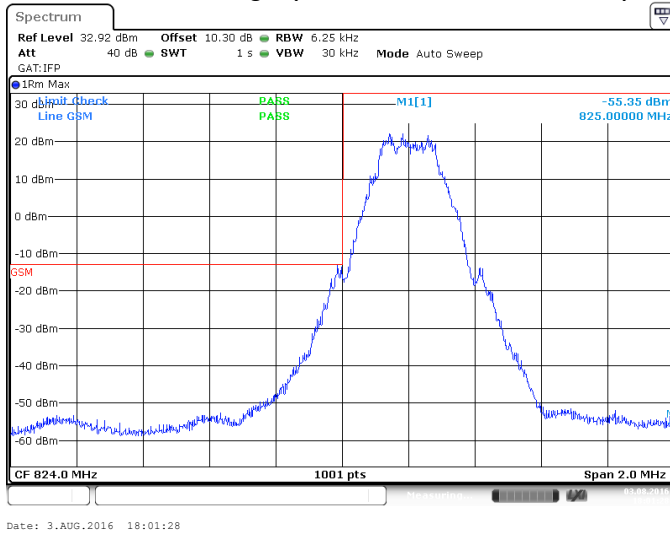
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2018
RF CABLE	141	HUBER & SUHNER	B095585	26-Jul-2017
SIGNAL ANALYZER	FSV30	ROHDE & SCHWARZ	B085749	8-Oct-2017
RF CABLE	1134	GORE	B094785	26-Jul-2017
ATTENUATOR, 10DB	10DB	ROHDE & SCHWARZ	B095594	27-Jul-2017

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

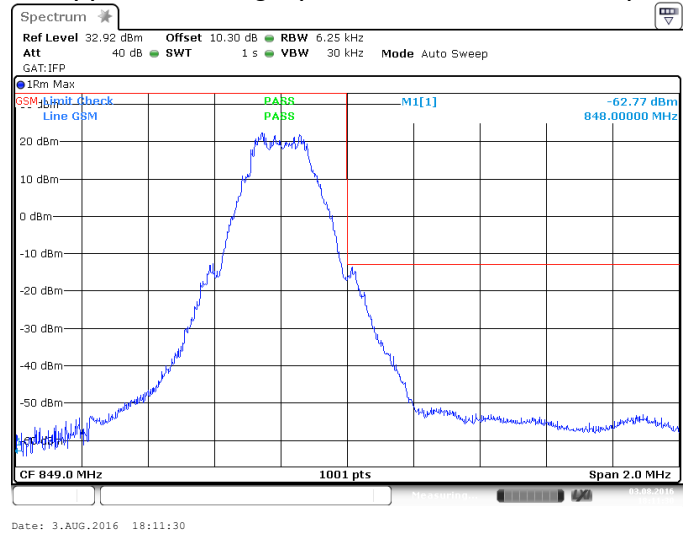
6.4 Test Data

GSM850

Lower Band Edge (Channel 128, 824.2 MHz)

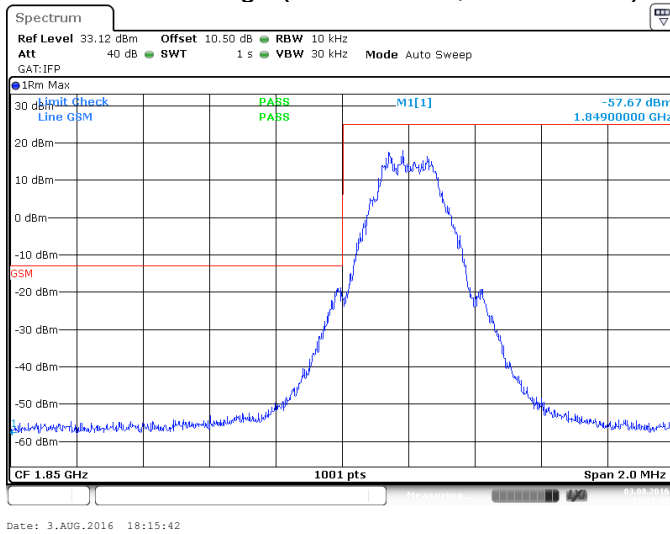


Upper Band Edge (Channel 251, 848.8 MHz)

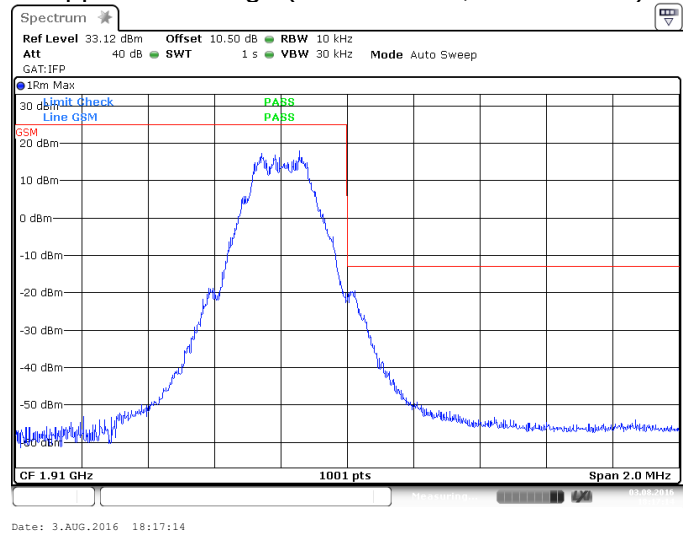


GSM1900

Lower Band Edge (Channel 512, 1850.2 MHz)

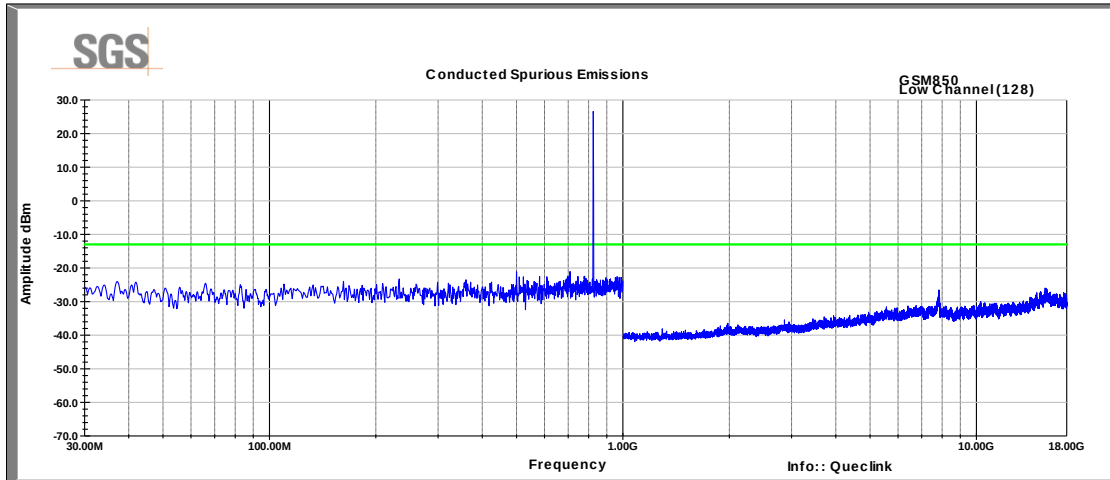


Upper Band Edge (Channel 810, 1909.8 MHz)

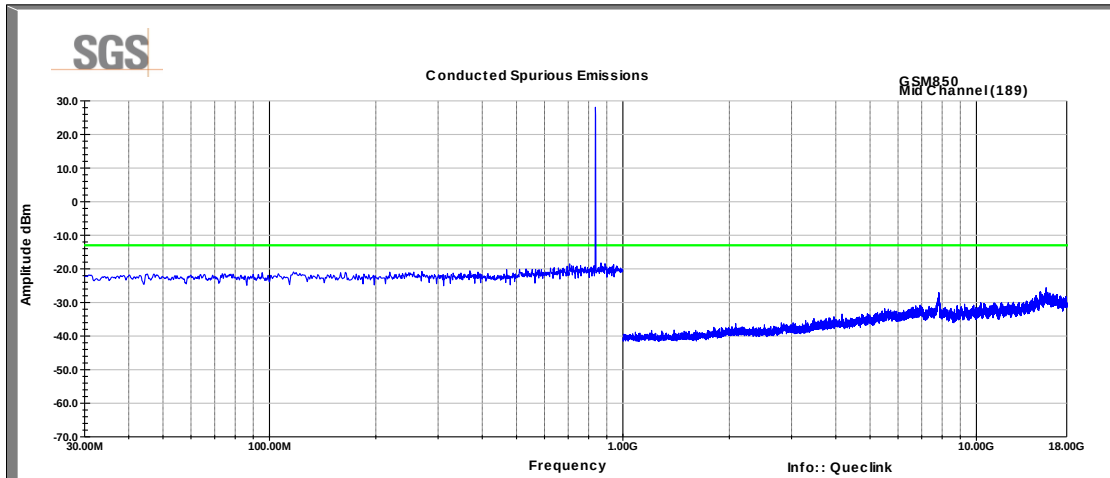


6.5 Conducted Spurious Emissions Plot

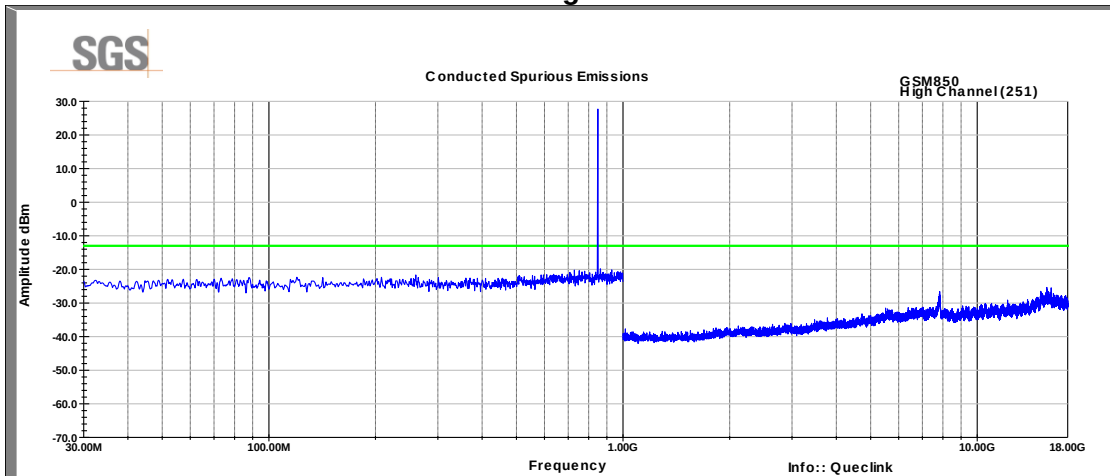
GSM850 Low Channel



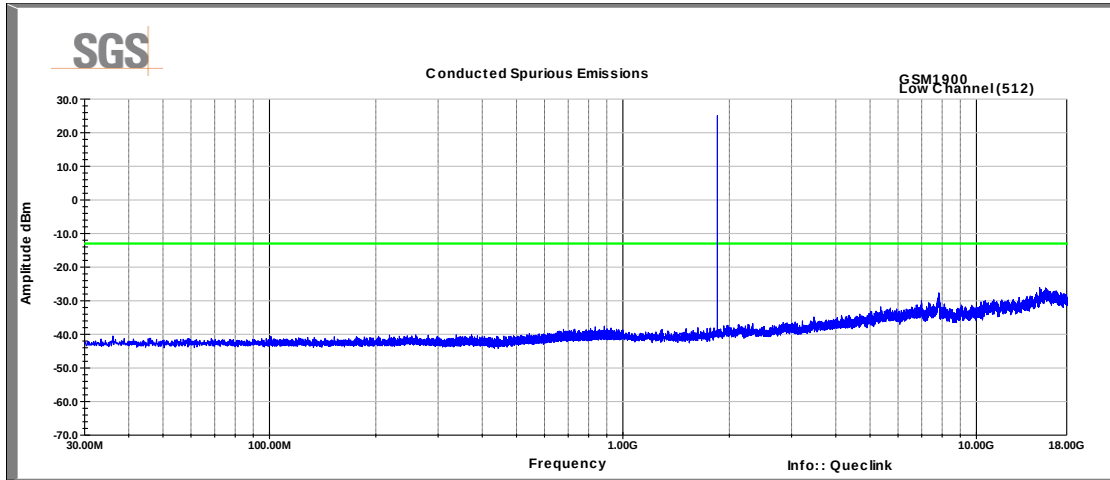
GSM850 Mid Channel



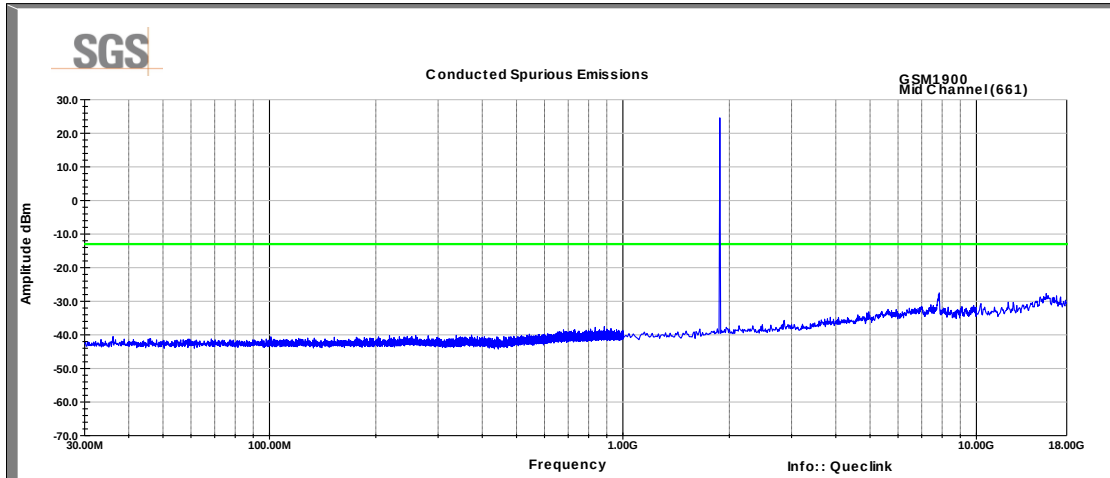
GSM850 High Channel



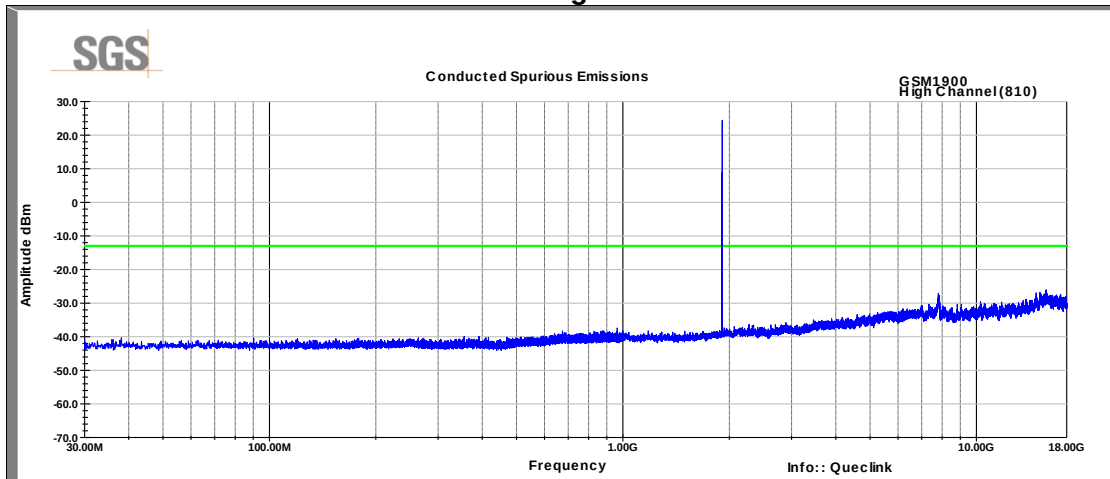
GSM1900 Low Channel



GSM1900 Mid Channel



GSM1900 High Channel



7 Effective Radiated Power

7.1.1 Test Result

Test Description	Basic Standards	Test Result
Effective Radiated Power	FCC Part 22.913(a)(2)	Pass
Effective Isotropic Radiated Power	24.232(c)	Pass

7.1.2 Test Method

The device has two cellular ports that connect to the antenna. For ERP/EIRP calculations, the highest gain between the ports was used for each band.

7.2 Test Site

SGS EMC Laboratory, Suwanee, GA

7.3 Test Equipment

None

7.4 Test Data

Band	Max Power dBm	Antenna Gain dBd/dBi	Cable Loss, dB	ERP/EIRP (dBm)	ERP/EIRP Limit, dBm	Result
GSM850 / 824.2	32.93	0.6	0	33.53	38.5	PASS
GSM850 / 836.6	32.8	0.6	0	33.4	38.5	PASS
GSM850 / 848.8	32.87	0.6	0	33.47	38.5	PASS
GSM1900 / 1850.2	27.39	1.5	0	28.89	33	PASS
GSM1900 / 1880	27.25	1.5	0	28.75	33	PASS
GSM1900 / 1909.8	26.96	1.5	0	28.46	33	PASS

8 Radiated Spurious Emissions

8.1 Test Result

Test Description	Basic Standards	Test Result
Radiated Spurious Emissions	FCC Part 2.1053 FCC Part 22.917(a) FCC Part 24.238(a) ANSI/TIA-603-C-2004	Pass

8.2 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 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 conducted at the low, middle, and high channels in RC3/SO55 which was determined to be the worst case operating mode.

The frequency range 26MHz to 20GHz was investigated. Graphical results are shown for 30MHz to 18GHz. No emissions were detected in the ranges 26 to 30MHz or 18 to 20GHz.

8.3 Test Equipment

Test Date: 5-Aug-2016

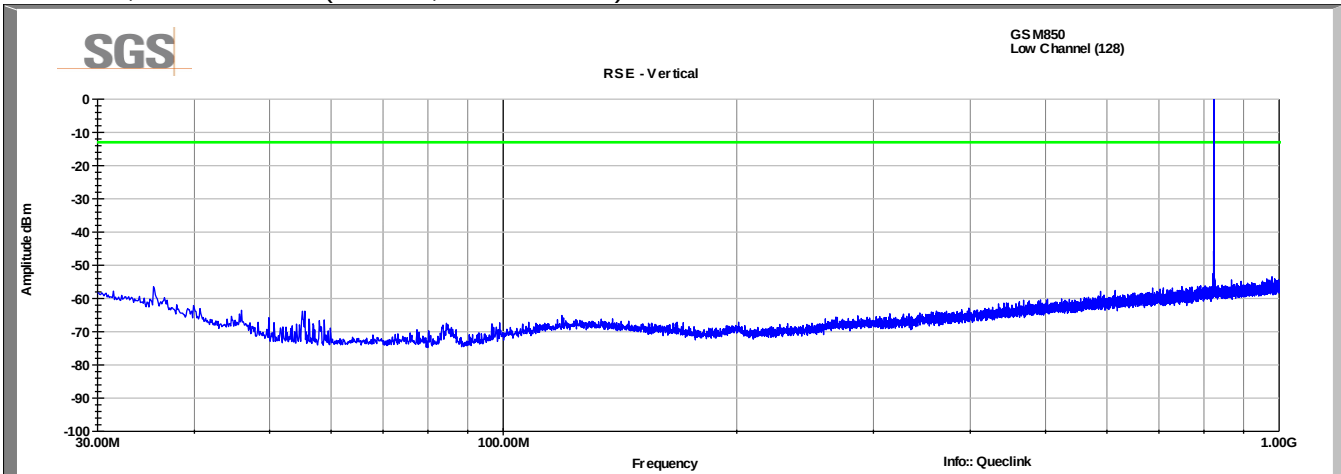
Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2018
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	20-Jun-2017
ANTENNA, BILOG	JB6	SUNOL	B079690	21-Oct-2016
RF CABLE	SF106	HUBER & SUHNER	B079713	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079716	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B085892	27-Jul-2017
RF CABLE	SUCOFLEX 100	HUBER & SUHNER	B108523	4-Aug-2017
DRG HORN (MEDIUM)	3117	ETS Lindgren	B079691	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079712	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079713	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	16-Feb-2017
FILTER, BAND REJECT	BRC50720	MICRO-TRONICS	B079784	28-Jul-2017
FILTER, HIGH PASS	HPM50108	MICRO-TRONICS	B079802	28-Jul-2017

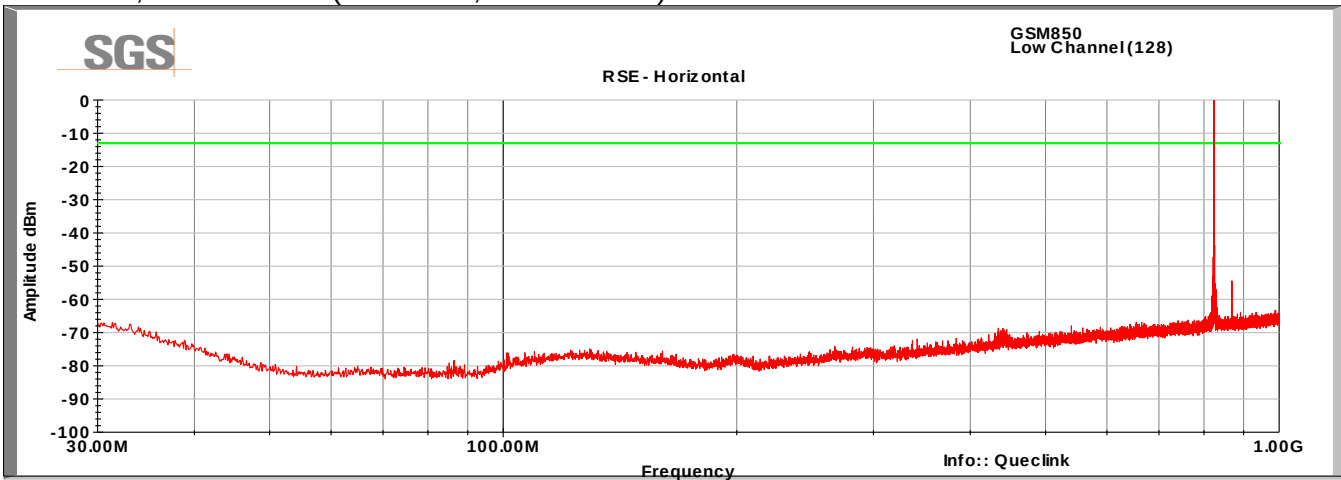
- Unless otherwise noted, equipment is on a 1 year calibration cycle.
- Based on manufacturer's specifications, the CMW-500 is on a 2 year calibration cycle.

8.4 Test Data

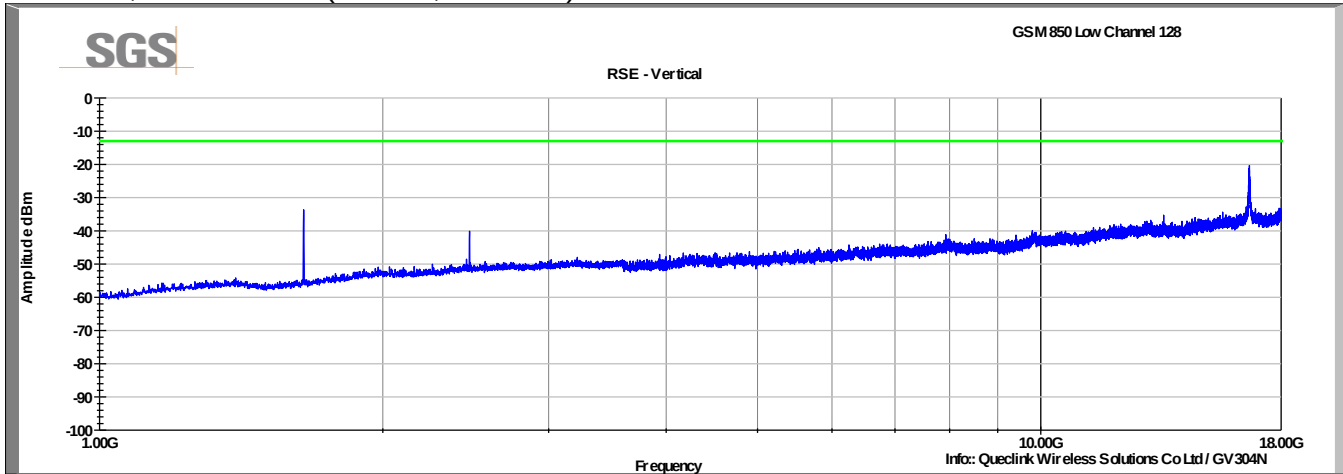
GSM 850, Low Channel (Vertical, 30-1000MHz)



GSM 850 , Low Channel (Horizontal, 30-1000MHz)



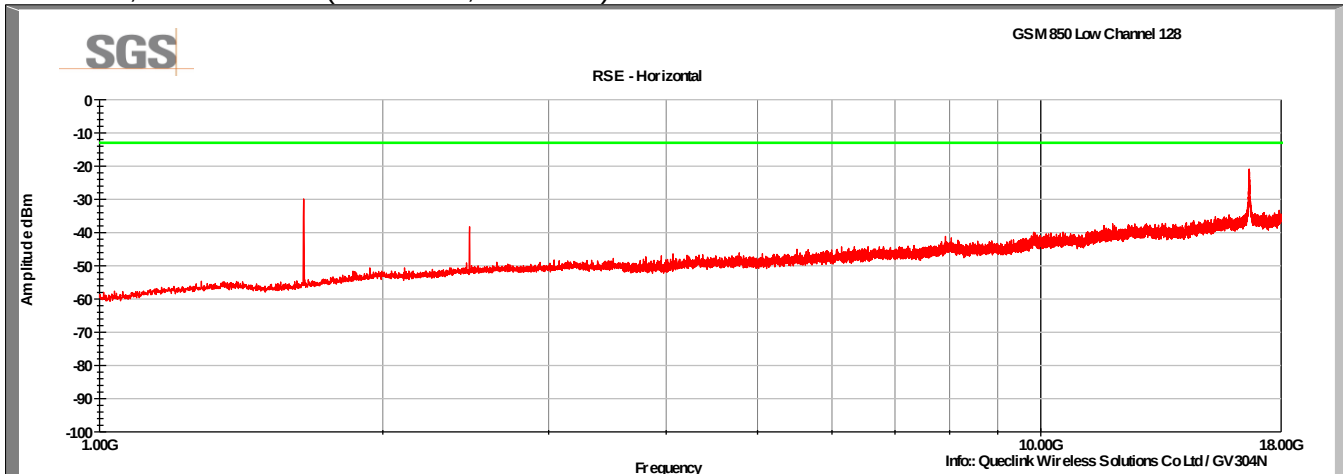
GSM 850, Low Channel (Vertical, 1-18GHz)



1.6477GHz, -33.7dBm

16.657GHz, -20.4dBm

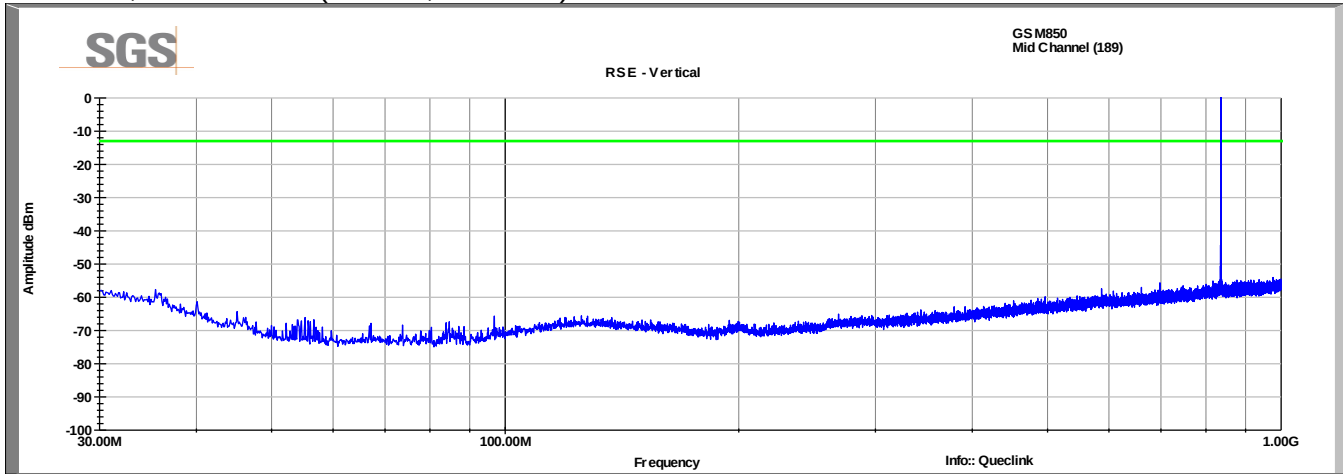
GSM 850, Low Channel (Horizontal, 1-18GHz)



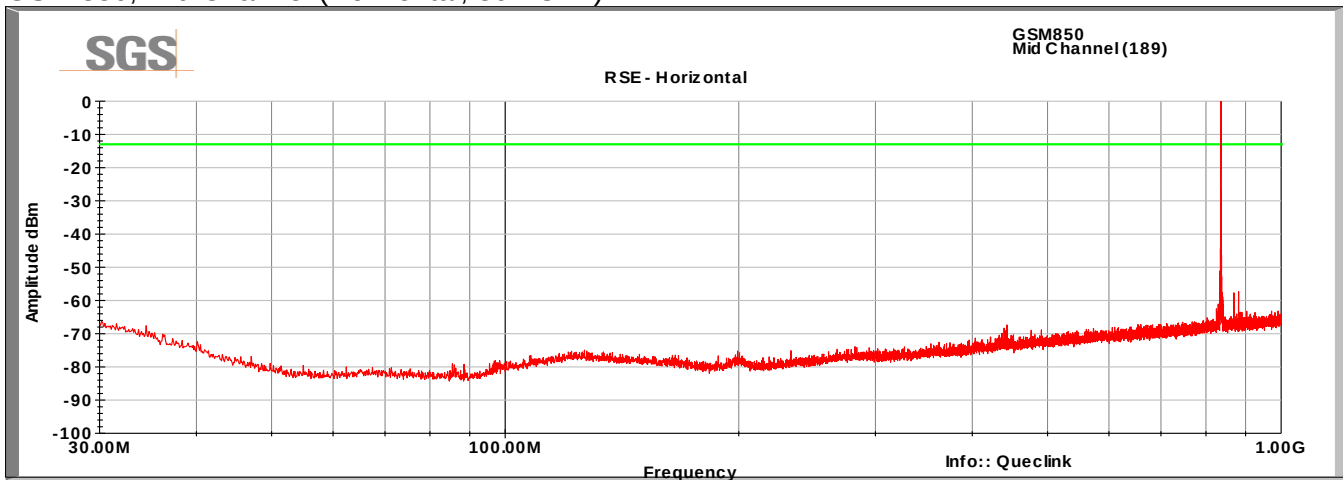
1.6477GHz, -29.9dBm

16.657GHz, -20.9dBm

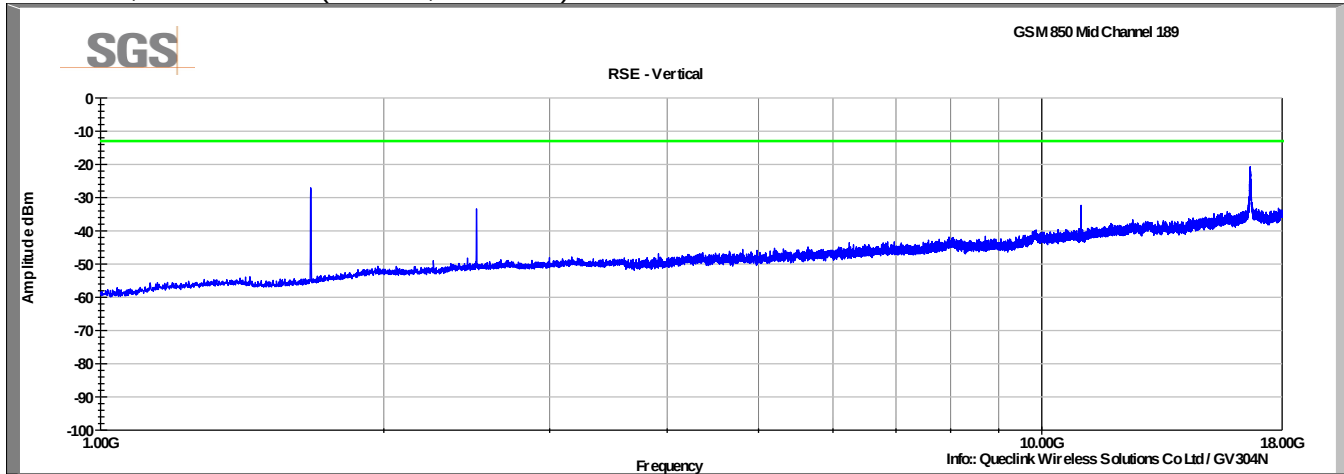
GSM 850, Mid Channel (Vertical, 30-1GHz)



GSM 850, Mid Channel (Horizontal, 30-1GHz)



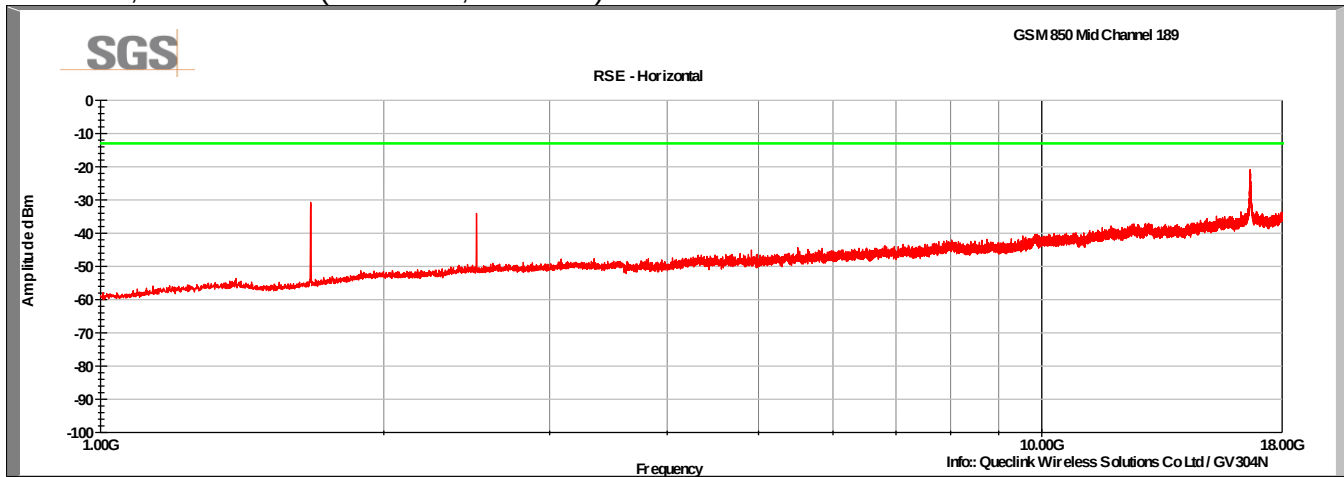
GSM 850, Mid Channel (Vertical, 1-18GHz)



1.67235GHz, -27.1

16.657GHz, -20.8

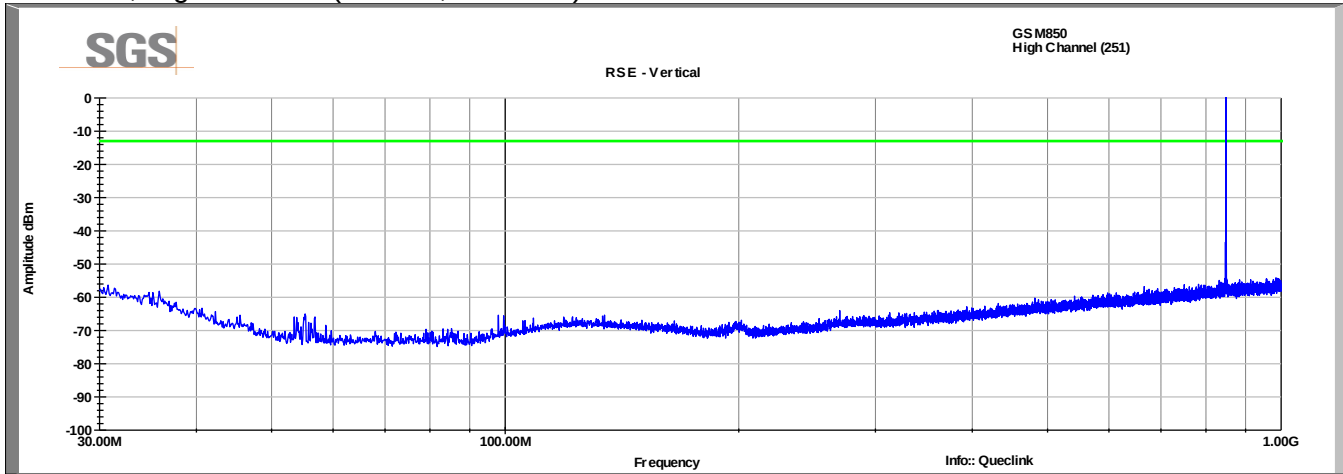
GSM 850, Mid Channel (Horizontal, 1-18GHz)



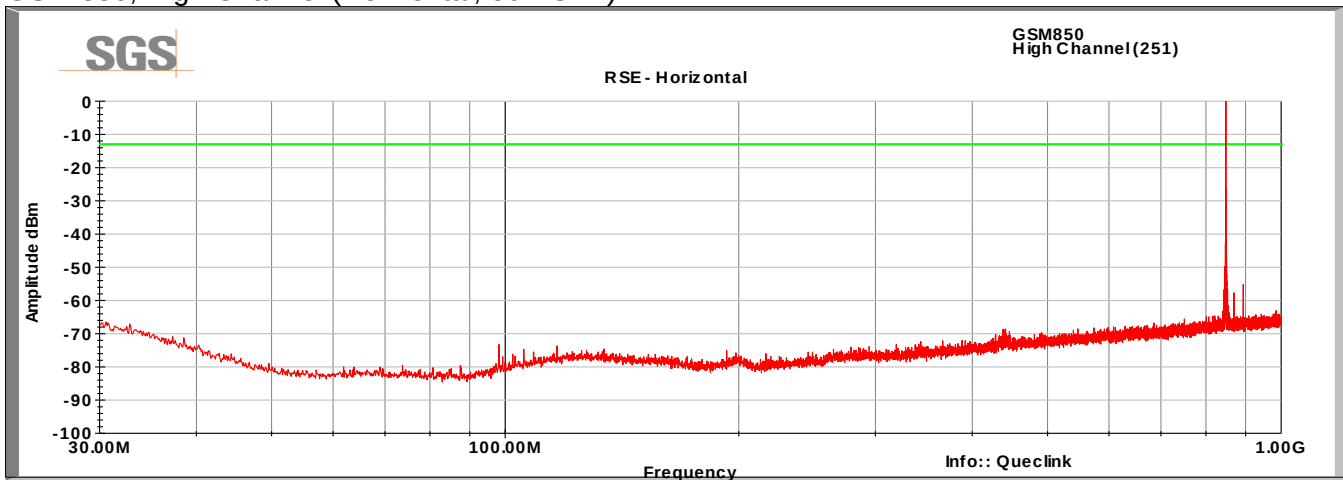
1.67235GHz, -30.7

16.657GHz, -20.9

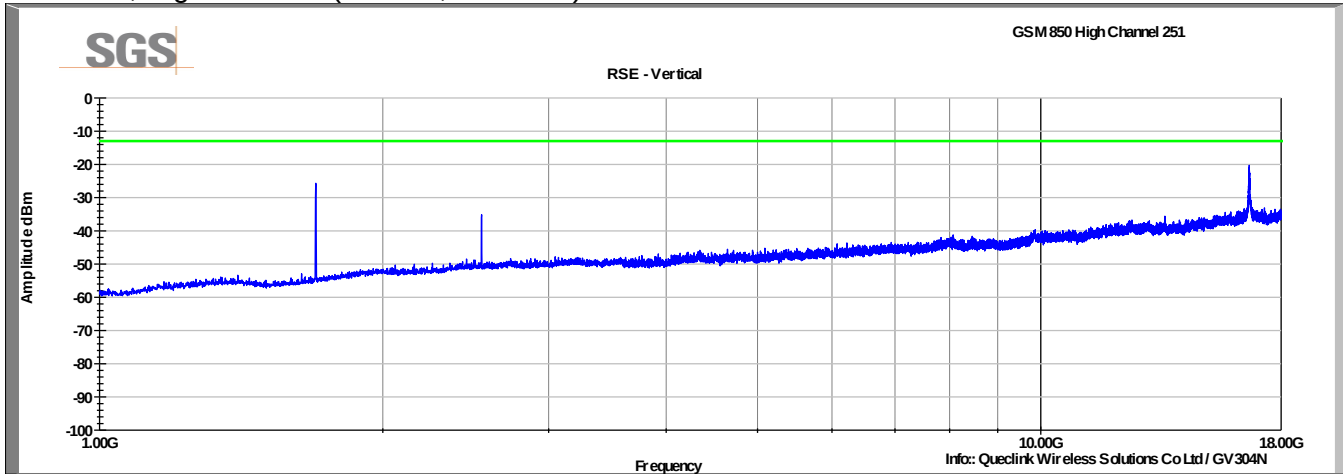
GSM 850, High Channel (Vertical, 30-1GHz)



GSM 850, High Channel (Horizontal, 30-1GHz)



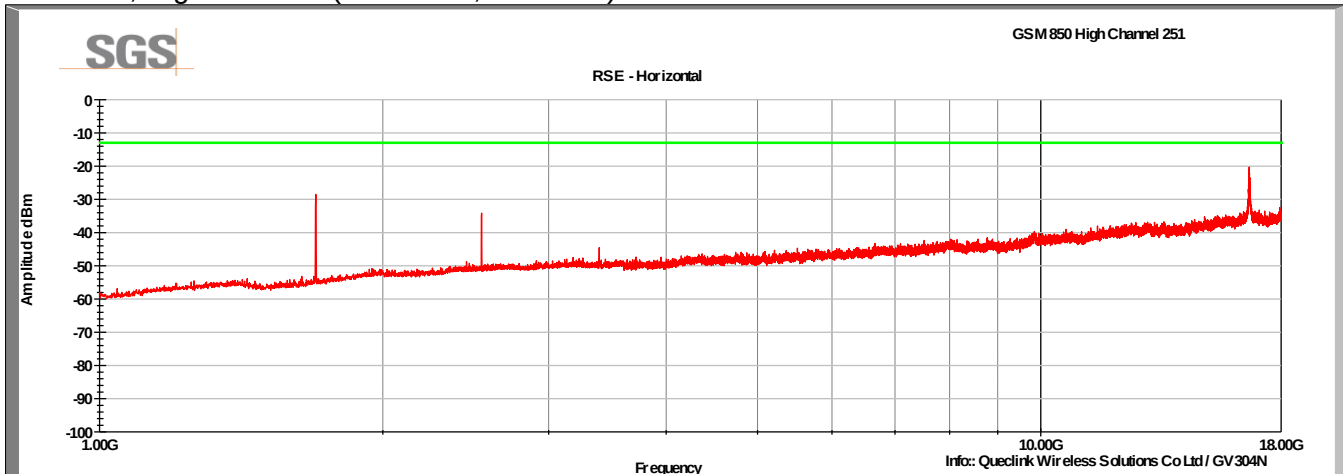
GSM 850, High Channel (Vertical, 1-18GHz)



1.697GHz, -25.7

16.657GHz, -20.4

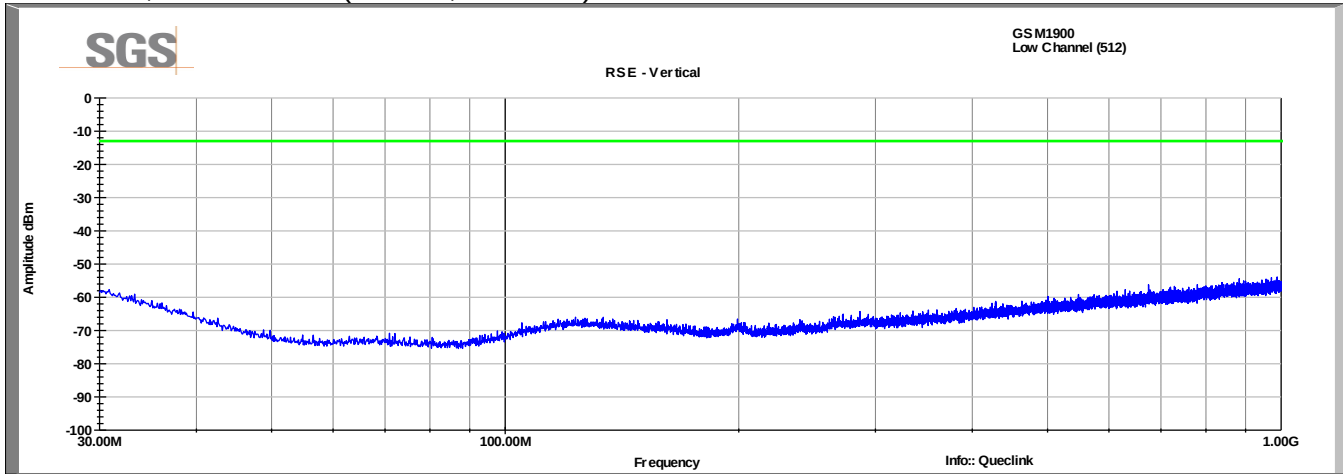
GSM 850, High Channel (Horizontal, 1-18GHz)



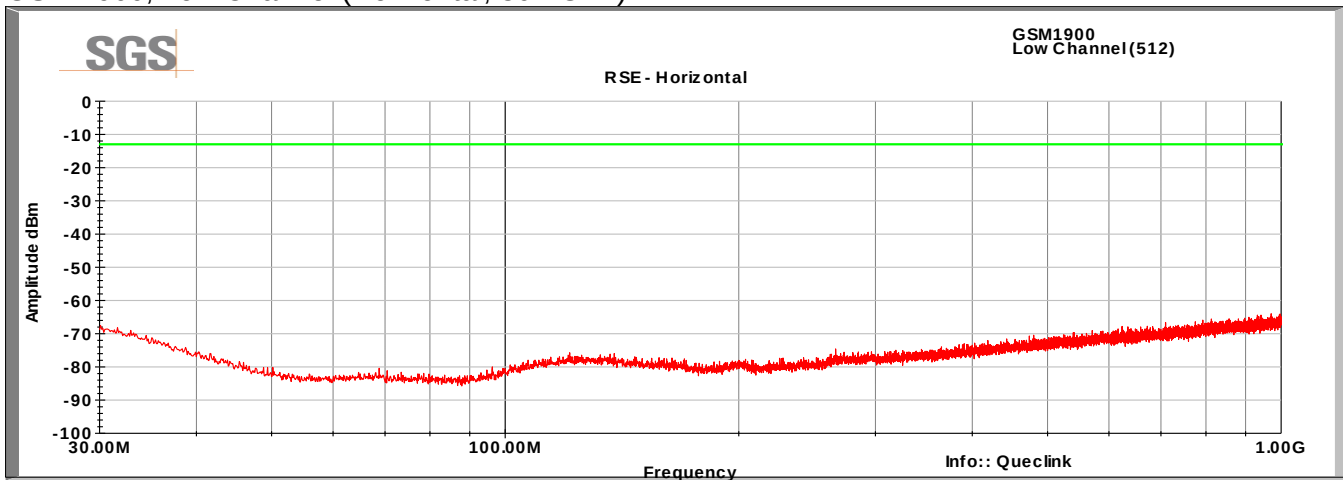
1.697GHz, -28.5

16.657GHz, -20.4

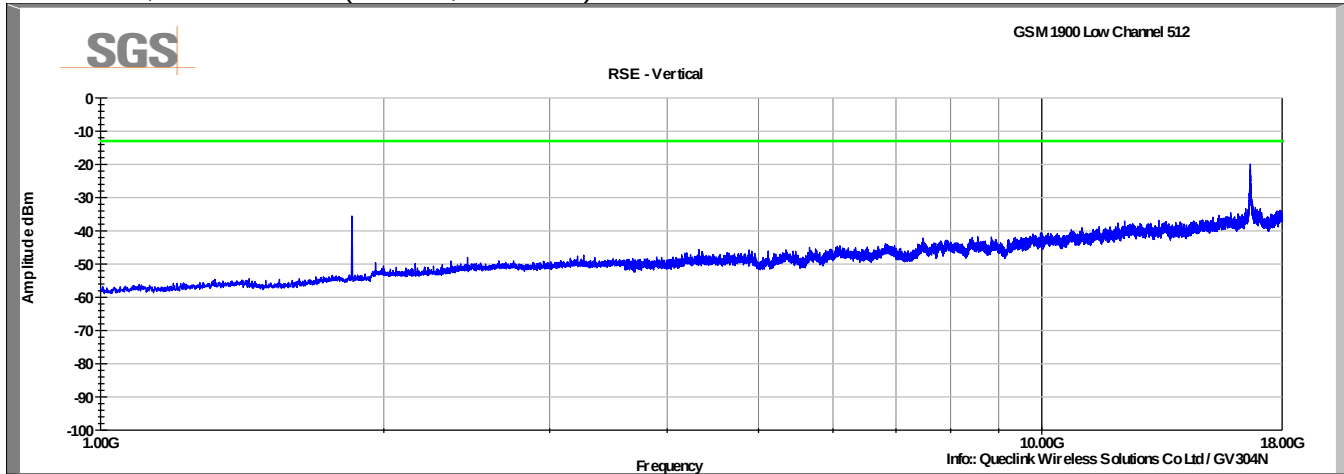
GSM 1900, Low Channel (Vertical, 30-1GHz)



GSM 1900, Low Channel (Horizontal, 30-1GHz)

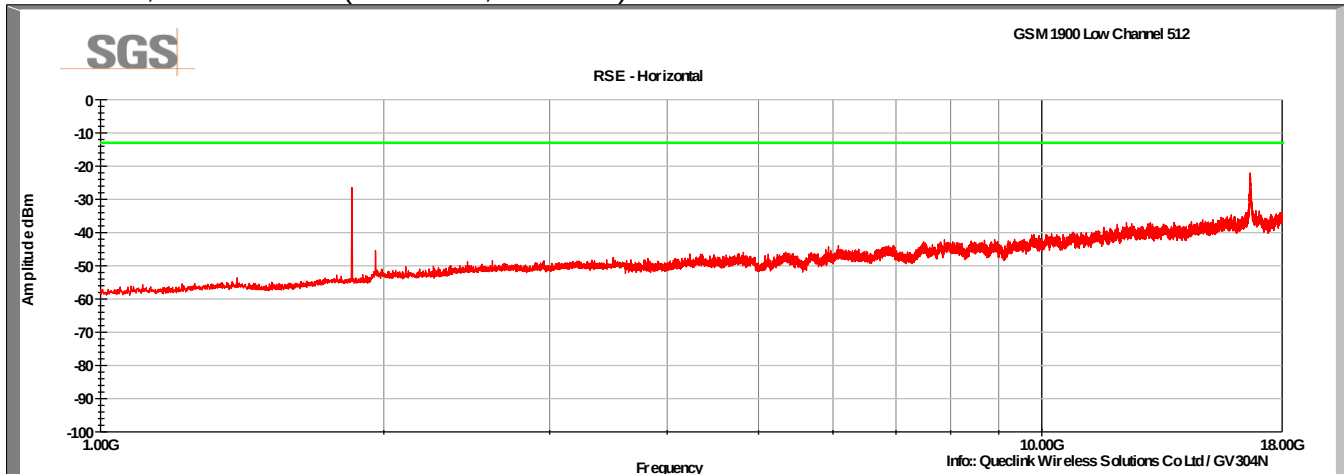


GSM 1900, Low Channel (Vertical, 1-18GHz)



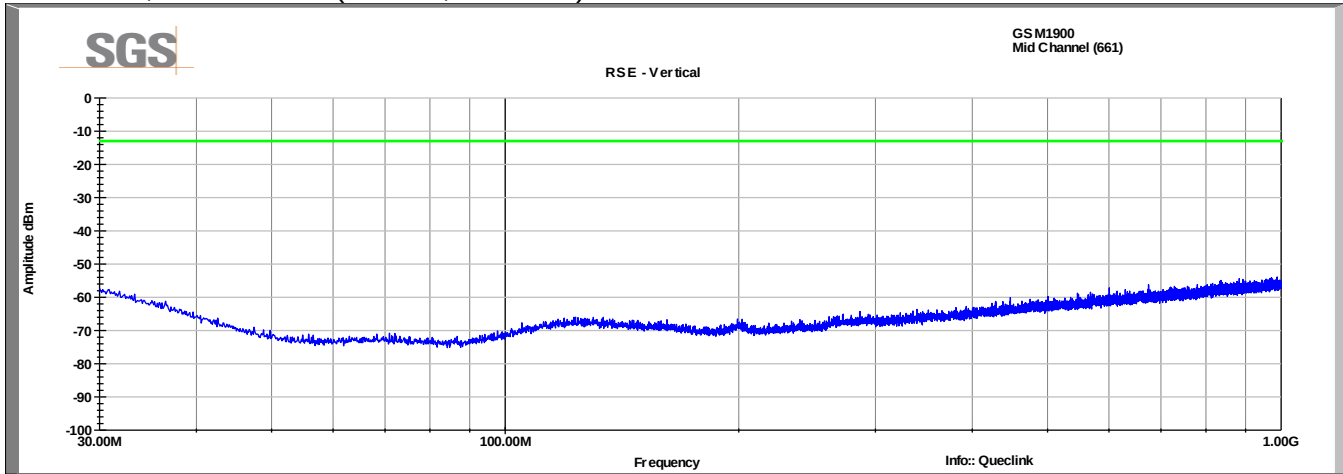
16.657GHz, -19.9

GSM 1900, Low Channel (Horizontal, 1-18GHz)

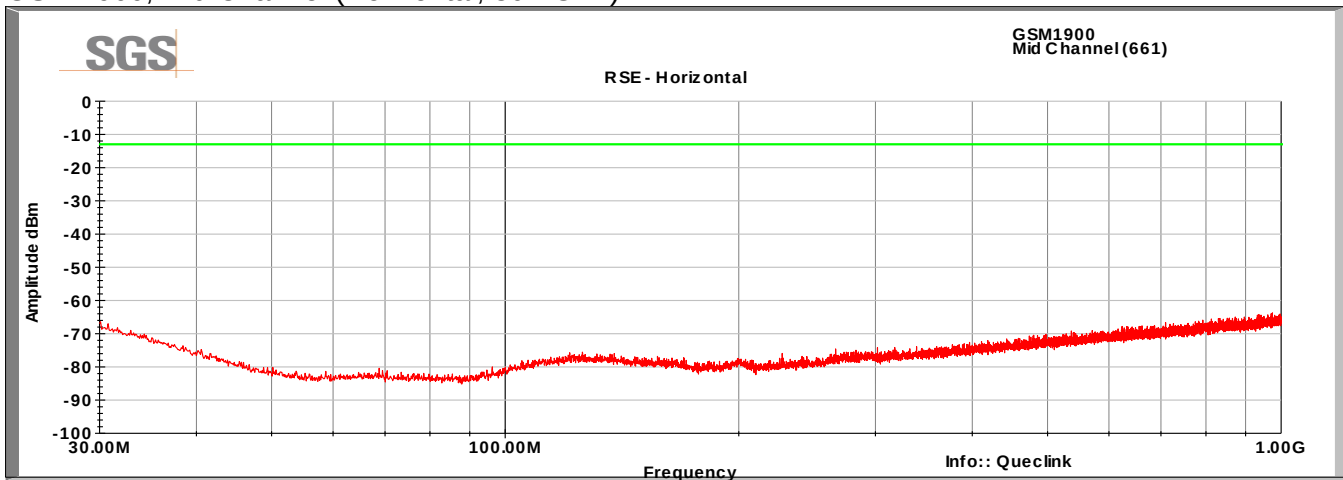


16.657GHz, -22.0

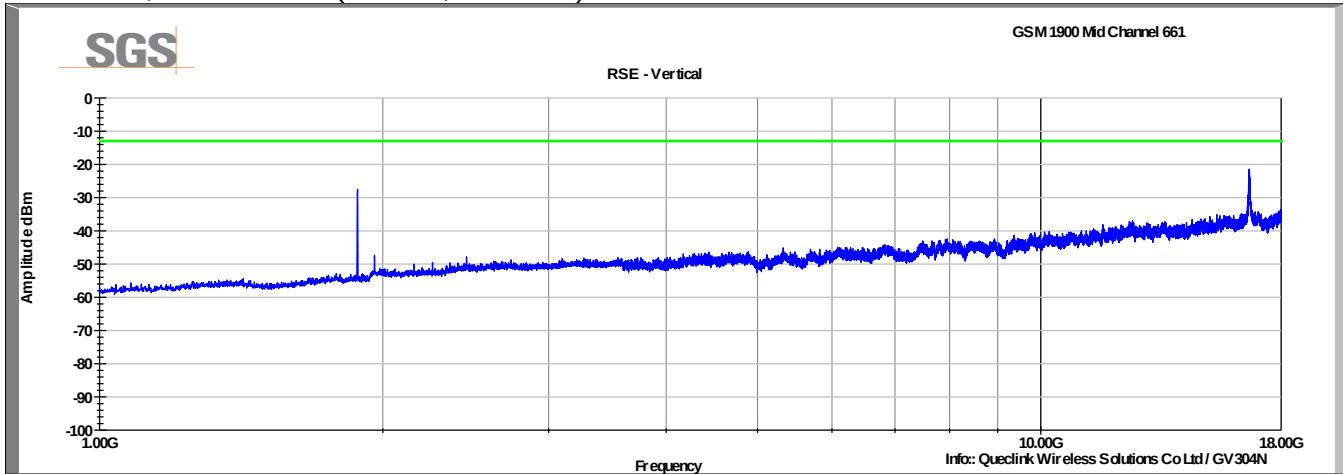
GSM 1900, Mid Channel (Vertical, 30-1GHz)



GSM 1900, Mid Channel (Horizontal, 30-1GHz)

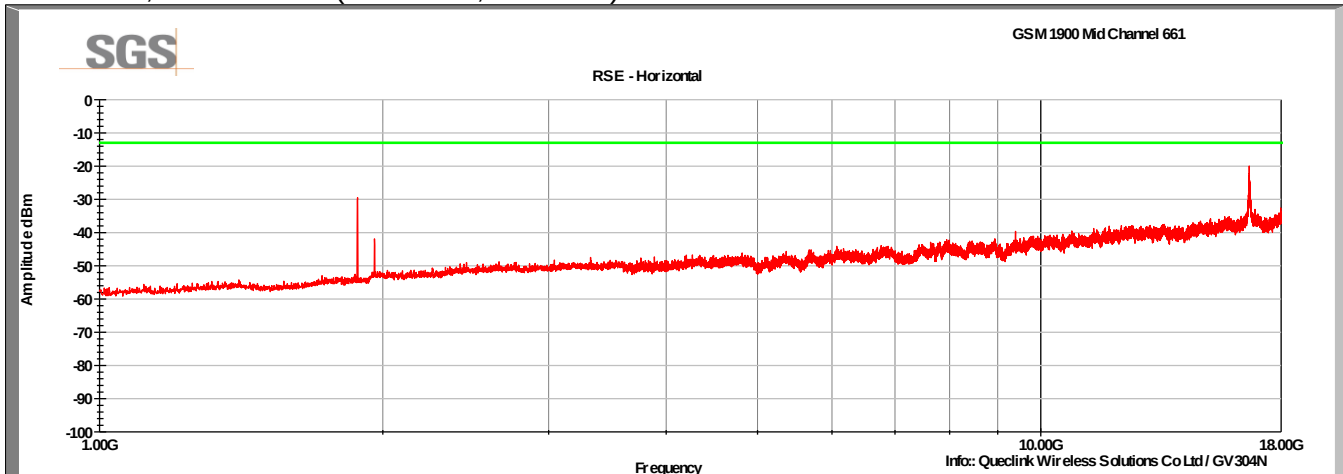


GSM 1900, Mid Channel (Vertical, 1-18GHz)



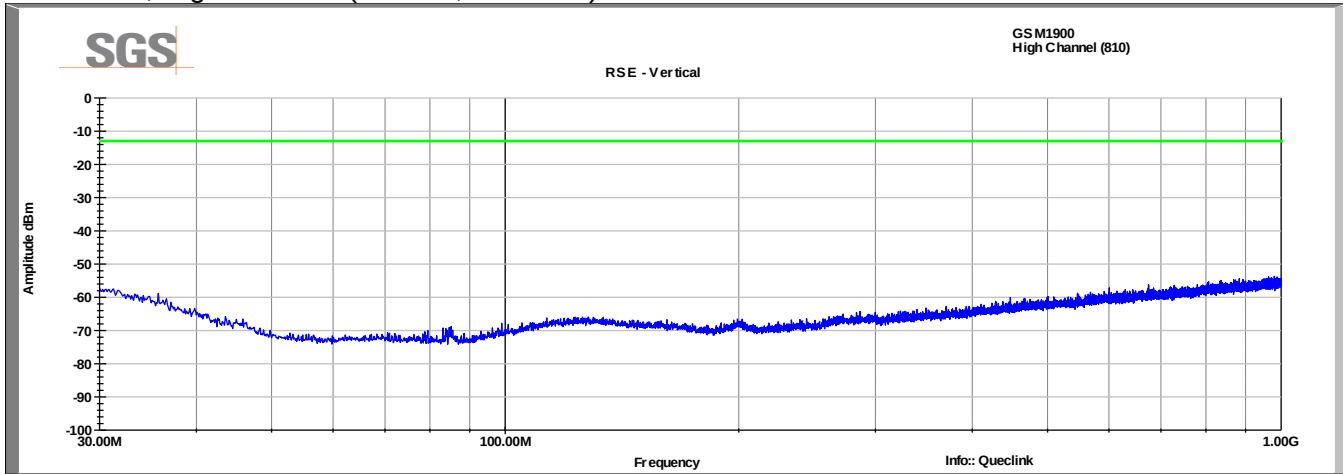
16.657GHz, -21.5

GSM 1900, Mid Channel (Horizontal, 1-18GHz)

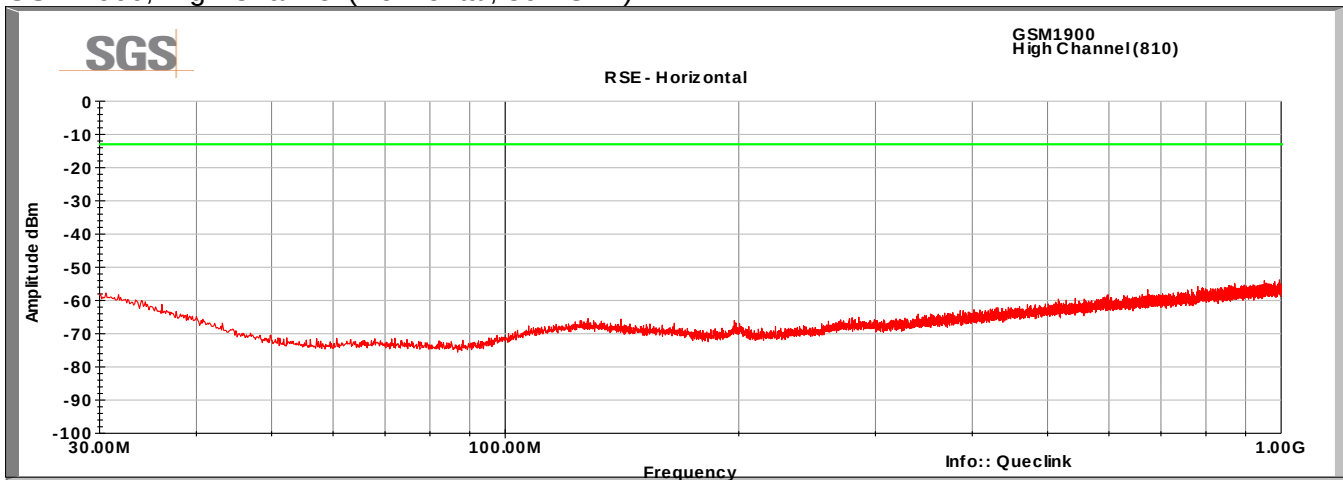


16.657GHz, -20.0

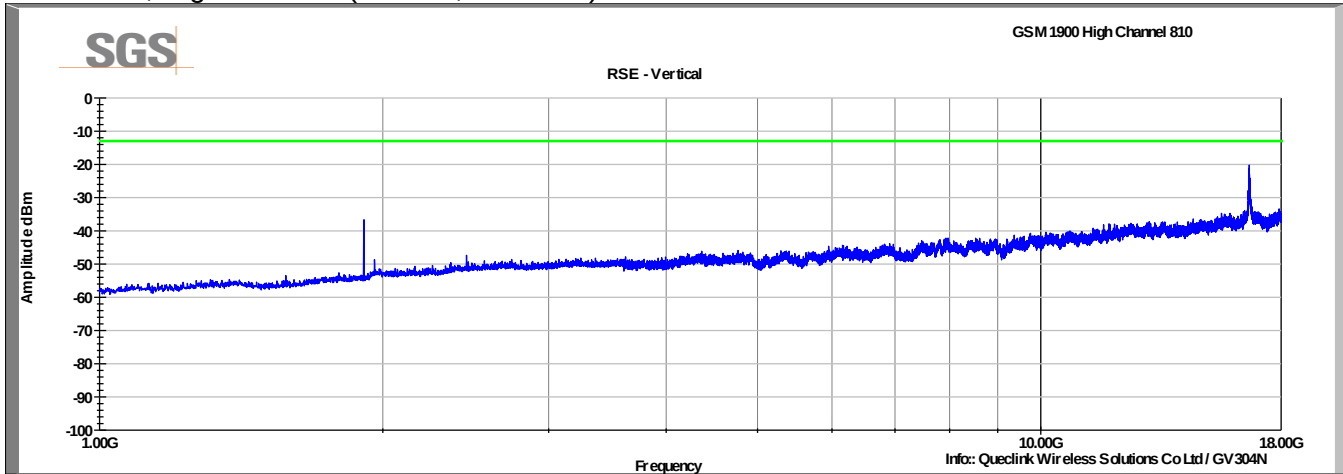
GSM 1900, High Channel (Vertical, 30-1GHz)



GSM 1900, High Channel (Horizontal, 30-1GHz)

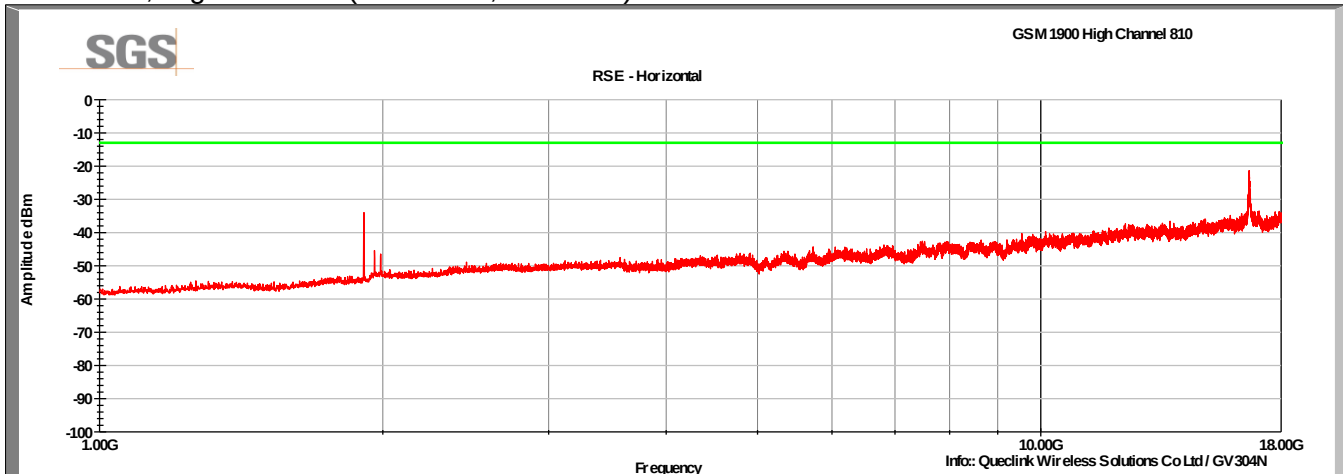


GSM 1900, High Channel (Vertical, 1-18GHz)



16.657GHz, -20.2

GSM 1900, High Channel (Horizontal, 1-18GHz)



16.657GHz, -21.6

9 Frequency Stability

9.1 Test Result

Test Description	Basic Standards	Test Result
Frequency Stability	FCC Part 2.1055 FCC Part 22.917(a) FCC Part 24.238(a)	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 GSM850 channel 190 and GSM1900 channel 661.

9.3 Test Site

SGS EMC Laboratory, Suwanee, GA

9.4 Test Equipment

Test Date: 8-Aug-2016

Tester: JOP

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE & SCHWARZ	B094874	19-Jan-2017
ENVIRONMENTAL TEST CHAMBER	T2RC	TENNEY ENVIRONMENTAL	B094877	CNR
HANDHELD MULTIMETER	87V	FLUKE	B079675	29-Jul-2017

- 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.

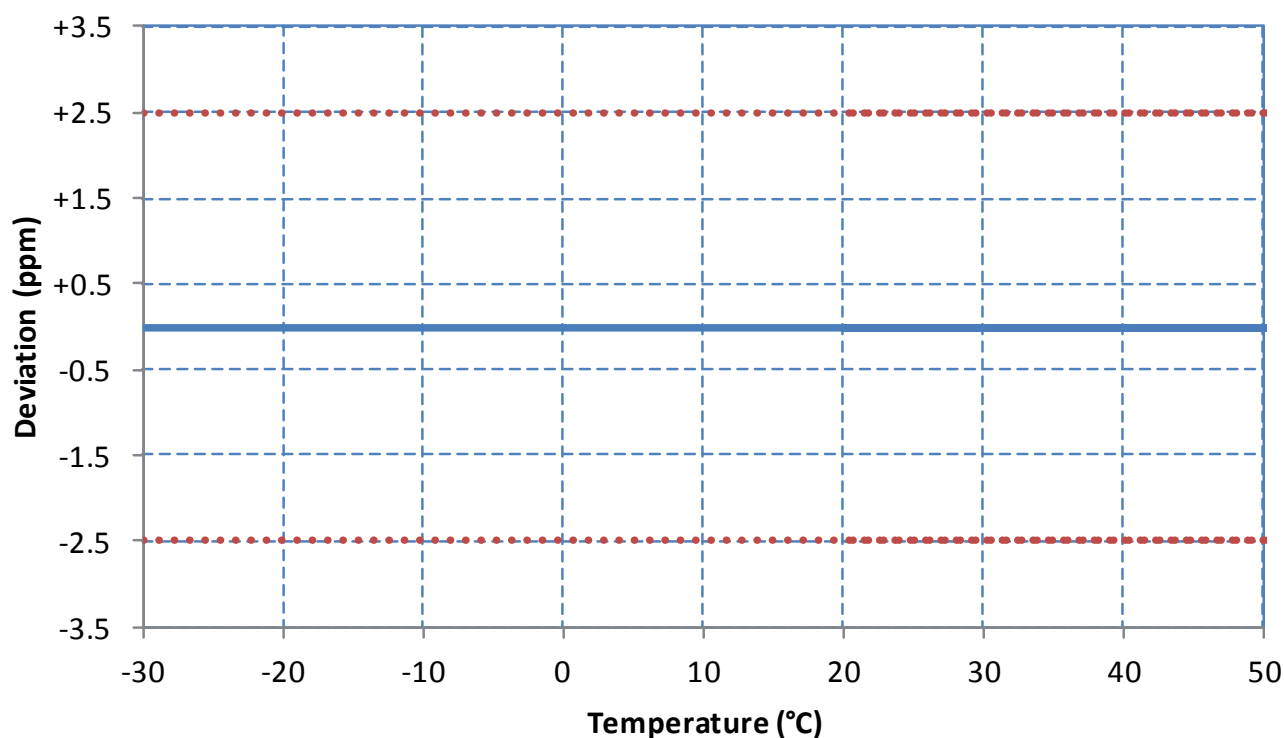
9.5 Test Data

Test Date: 08 August 2016

GSM 850, Channel 190 (836.6MHz)

Voltage %	Power V _{DC}	Temp °C	Frequency Hz	Freq Dev Hz	Freq Dev ppm	Deviation %
100%	12.00	+20 (Ref)	836,599,986	-15	-0.02	-0.000002
100%	12.00	-30	836,599,993	-7	-0.01	-0.000001
100%	12.00	-20	836,599,992	-8	-0.01	-0.000001
100%	12.00	-10	836,599,991	-9	-0.01	-0.000001
100%	12.00	0	836,599,989	-11	-0.01	-0.000001
100%	12.00	+10	836,599,988	-12	-0.01	-0.000001
100%	12.00	+20	836,599,986	-15	-0.02	-0.000002
100%	12.00	+30	836,599,983	-17	-0.02	-0.000002
100%	12.00	+40	836,599,984	-16	-0.02	-0.000002
100%	12.00	+50	836,599,984	-16	-0.02	-0.000002
100%	12.00	+55	836,599,981	-19	-0.02	-0.000002
115%	13.80	+20	836,599,987	-13	-0.02	-0.000002
85%	10.20	+20	836,599,988	-12	-0.01	-0.000001

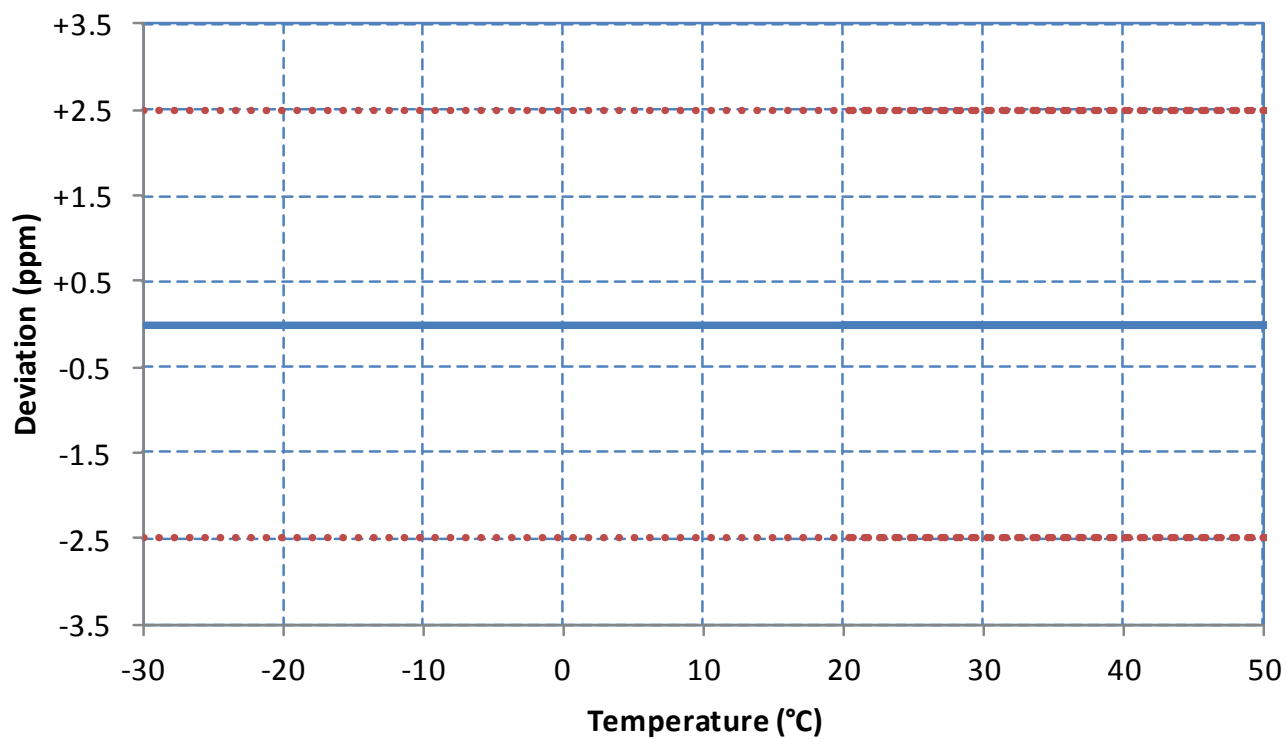
Frequency Stability



GSM 1900, Channel 661 (1880MHz)

Voltage %	Power V_{DC}	Temp °C	Frequency Hz	Freq Dev Hz	Freq Dev ppm	Deviation %
100%	12.00	+20 (Ref)	1,879,999,962	-38	-0.02	-0.000002
100%	12.00	-30	1,879,999,971	-29	-0.02	-0.000002
100%	12.00	-20	1,879,999,968	-32	-0.02	-0.000002
100%	12.00	-10	1,879,999,968	-32	-0.02	-0.000002
100%	12.00	0	1,879,999,966	-34	-0.02	-0.000002
100%	12.00	+10	1,879,999,962	-38	-0.02	-0.000002
100%	12.00	+20	1,879,999,962	-38	-0.02	-0.000002
100%	12.00	+30	1,879,999,958	-42	-0.02	-0.000002
100%	12.00	+40	1,879,999,962	-38	-0.02	-0.000002
100%	12.00	+50	1,879,999,963	-37	-0.02	-0.000002
100%	12.00	+55	1,879,999,962	-38	-0.02	-0.000002
115%	13.80	+20	1,879,999,954	-46	-0.02	-0.000002
85%	10.20	+20	1,879,999,951	-49	-0.03	-0.000003

Frequency Stability



10 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	09 August 2016
	-	