FCC Radio Test Report

FCC ID: QISY560-L23

This report concerns (check one): ☒**Original Grant** ☐**Class II Change**

Project No.	:	1505C241
Equipment	:	Smart Phone
Model Name	:	HUAWEI Y560-L23, Y560-L23
Applicant	:	Huawei Technologies Co., Ltd.
Address	:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen,518129, P.R.C

Date of Receipt	:	May 22, 2015
Date of Test	:	May 22, 2015~Jun.18, 2015
Issued Date	:	Jun.19, 2015
Tested by	:	BTL Inc.

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Declaration

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-FCCP-5-1505C241	Original Issue.	Jun.19, 2015

1. CERTIFICATION

Equipment	:	Smart Phone
Brand Name	:	HUAWEI
Model Name	:	HUAWEI Y560-L23, Y560-L23
Applicant	:	Huawei Technologies Co., Ltd.
Manufacturer	:	Huawei Technologies Co., Ltd
Address	:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen,518129, P.R.C
Date of Test	:	May 22, 2015~Jun.18, 2015
Test Sample	:	ENGINEERING SAMPLE
Standard(s)	:	47 CFR FCC Part 24 Subpart E & ANSI C63.4 : 2009 47 CFR FCC Part 2 & ANSI/TIA-603-C-2004

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-5-1505C241) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

Test result included in this report is only for the GSM 1900MHz approval part of the product.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 24 Subpart E & Part 2			
Standard(s) Section FCC	Test Item	Judgment	Remark
2.1047(d)	Modulation Characteristics	PASS	
2.1046 24.232(c)	Radiated RF Output	PASS	
2.1049 24.238(a)	99% Occupied Bandwidth	PASS	
2.1051 24.238(a)	Spurious Emissions at Antenna Terminal	PASS	
2.1053 24.238(a)	Spurious Radiated Emissions	PASS	
24.238(a)	Band Edge Emissions	PASS	
2.1055 24.235	Frequency Stability	PASS	
24.232(d)	Peak to Average Ratio	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this test report

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3,Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.
BTL's test firm number for FCC: 319330

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

The reported uncertainty of measurement **y** ± **U**, where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95** % ◦

A. Radiated Measurement :

Test Site	Parameter	Uncertainty
DG-CB12	All e issions, radiated	±6 dB

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Smart Phone	
Brand Name	HUAWEI	
Model Name	HUAWEI Y560-L23, Y560-L23	
Model Difference	Only differ in model name.	
Product Description	Operation Frequency:	TX:1850.2MHz~1909.8MHz RX:1930.2MHz~1989.8MHz
	Modulation Type:	GMSK;8-PSK
	EIRP Output Power	29.99 dBm
Power Source	#1 DC Voltage supplied from AC/DC adapter. Brand/Model: HUAWEI / HW-050100U01(US) Brand/Model: HUAWEI / HW-050100E01(EU) #2 Supplied from battery. Brand/Model: HUAWEI / HB474284RBC	
Power Rating	#1 I/P: 100-240V~ 50/60H 0.2A O/P: DC 5V 1A #2 DC 3.8V 2000mAh	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. Channel List:

Band	Channel	Frequency (MHz)	
1850.2MHz~1909.8MHz	512	Low	1850.20
	661	Mid	1880.00
	810	High	1909.80

3. Table for Filed Antenna @GSM1900:

Ant.	Manufacture	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	-3.5

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Items	Worst TX Mode	Channel
Radiated RF Output	GSM/EDGE	512/661/810
Spurious Radiated Emissions	GSM/EDGE	512/661/810
Band Edge Emissions	GSM/GPRS/EDGE	512/810
Frequency Stability	GSM/EDGE	661
99% Occupied Bandwidth	GSM/GPRS/EDGE	512/661/810
Spurious Emissions at Antenna Terminal	GSM	512/661/810
Peak to Average Ratio	GSM/EDGE	661

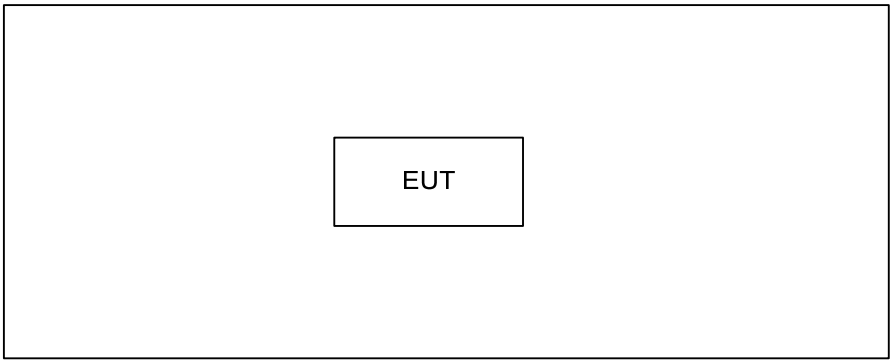
Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

(3) Both adapter and battery are evaluated, operated the battery is the worst and recorded as below test data

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
-	-	-	-	-	-	

Item	Shielded Type	Ferrite Core	Length	Note
-	-	-	-	

4. TEST RESULT

4.1 RADIATED RF OUTPUT POWER MEASUREMENT

4.1.1 LIMIT

The Radiated Peak Output Power shall be according to the specific rule Part 24.232(b) that "Mobile/Portable station are limited to 2 watts e.i.r.p." and 24.232(c) specifed that "Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.

4.1.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

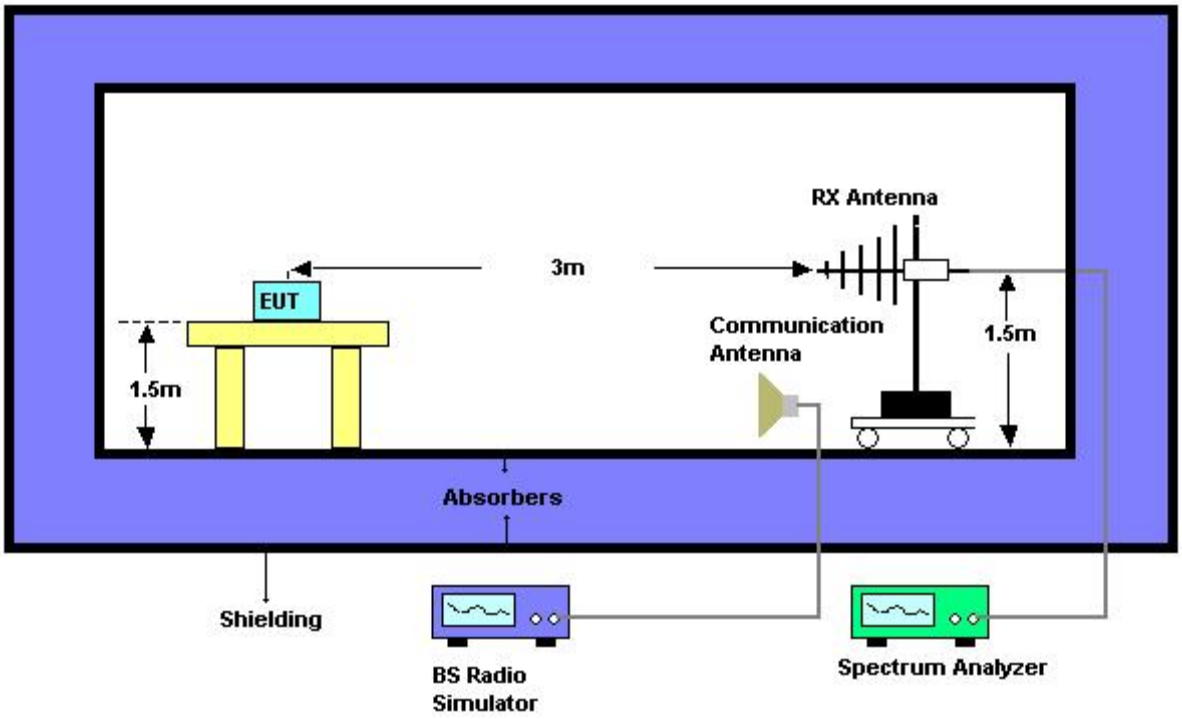
Spectrum Parameters	Setting
Attenuation	Auto
Center Frequency	Low / middle / high channels
Span Frequency	10MHz
RB / VB	3MHz / 3MHz for Peak

4.1.3 TEST PROCEDURE

1. The EUT was set up for the maximum peak power with GSM link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 (low, middle and high operational frequency range).
2. The conducted peak output power used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. The path loss included the splitter loss, cable loss and 20dB pad loss. The spectrum set RB/VB 3MHz,then read peak power value and record to the test. (All transmitted path loss shall be considered in the test report data)
3. E.I.R.P peak power measurement. In the fully anechoic chamber, EUT placed on the 1.5m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
4. The substitution horn antenna is substituted for EUT at the same position, and signal generator export the CW signal to the calibration antenna. Rotated the Turn Table to find the maximum radiation power. "Raw" is the spectrum reading value, "SG" is signal generator export power, "TX Gain" is calibration antenna isotropic gain value, "TX cable" is the transmitted cable loss between the calibration antenna and signal generator. The "Factor" means that the transmission path loss is equal to "SG" - "TX cable" + "TX Gain" – "Raw".
5. Actually the real E.I.R.P peak power is equal to "Read Value" + "Factor"

4.1.4 TEST SETUP LAYOUT

EIRP Power Measurement



4.1.5 TEST DEVIATION

There is no deviation with the original standard.

4.1.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

4.1.7 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage:DC 3.8V

4.1.8 TEST RESULTS

Please refer to the Attachment A.

4.2 99% OCCUPIED BANDWIDTH MEASUREMENT

4.2.1 LIMIT

According to FCC 2.1049(h) specified that emission 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.

4.2.2 MEASURING INSTRUMENTS AND SETTING

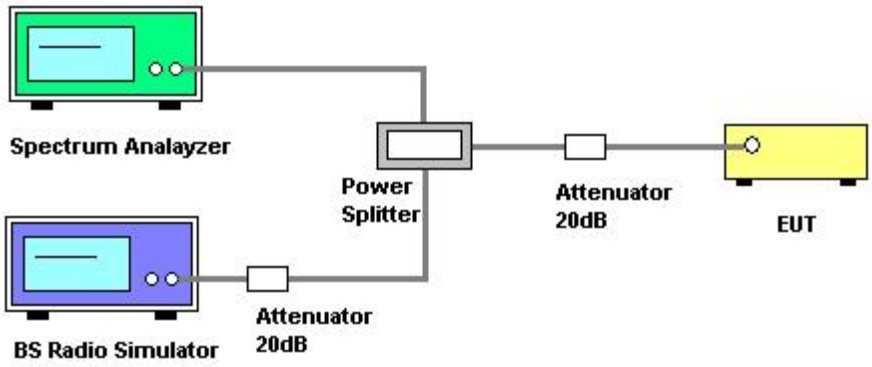
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	30 kHz
VB	100 kHz
Trace	Max Hold

4.2.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Used measurement function of spectrum to measure the 99% occupied bandwidth..

4.2.4 TEST SETUP LAYOUT



4.2.5 TEST DEVIATION

There is no deviation with the original standard.

4.2.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

4.2.7 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: DC 3.8V

4.2.8 TEST RESULTS

Please refer to the Attachment B.

4.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS MEASUREMENT

4.3.1 LIMIT

In the FCC 22.917(a), on any frequency outside a licensee's frequency block within GSM spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB. The limit translates in the relevant power range (2 to 0.003W). At 2W(Power Control Level 5) the specified minimum attenuation becomes 43dB and the limit of emission equal to –13dBm

4.3.2 MEASURING INSTRUMENTS AND SETTING

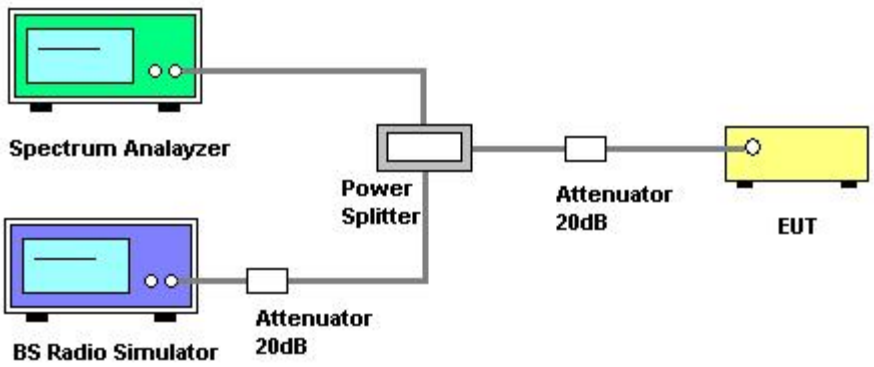
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Start Frequency	30MHz
Stop Frequency	10th carrier harmonic
RB / VB	1 MHz / 1MHz for Peak

4.3.3 TEST PROCEDURES

1. The EUT was set up for the maximum peak power with **GSM/EDGE** link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810(low, middle and high operational frequency range.)
2. The conducted spurious emission used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss 4dB in the transmitted path track.
3. When the spectrum scanned from 30MHz to 3GHz, it shall be connected to the band reject filter attenuated the carried frequency. The spectrum set RB/VB 1MHz.
4. When the spectrum scanned from 3GHz to 10GHz, it shall be connected to the high pass filter attenuated the carried frequency. The spectrum set RB/VB 1MHz.

4.3.4 TEST SETUP LAYOUT



4.3.5 TEST DEVIATION

There is no deviation with the original standard.

4.3.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

4.3.7 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage:DC 3.8V

4.3.8 TEST RESULTS

Please refer to the Attachment C.

4.4 SPURIOUS RADIATED EMISSIONS MEASUREMENT

4.4.1 LIMIT

Out of band emissions, The power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside the frequency block. The spurious emissions of limit equal to –13dBm.

4.4.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Start Frequency	30 MHz
Stop Frequency	10th carrier harmonic
Detector	Positive Peak
Span	100 MHz
Sweep Time	1s
RB / VB	1 MHz / 1MHz
Attenuation	Positive Peak

4.4.3 TEST PROCEDURES

1. The EUT was placed on the top of the turntable in fully anechoic chamber.
2. The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. This measurement shall be repeated with the transmitter in standby mode where applicable.
4. For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable. For 1~10th carrier harmonic measurement, the receiving Horn antenna was placed 1.5 meters far away from the turntable.
5. The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded suspected value is indicated as Read Level (Raw).
6. Replace the EUT by standard antenna and feed the RF port by signal generator.
7. Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
8. Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
9. The level of the spurious emission is the power level of (8) plus the gain of the standard antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.

4.4.4 TEST SETUP LAYOUT

This test setup layout is the same as that shown in section 4.2.4.

4.4.5 TEST DEVIATION

There is no deviation with the original standard.

4.4.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

4.4.7 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: DC 3.8V

4.4.8 TEST RESULTS

Please refer to the Attachment D.

4.5 BAND EDGE MEASUREMENT

4.5.1 LIMIT

According to FCC 22.917(a) specified that power of any emission outside of the authorized operating frequency rangesmust be attenuated below the transmitting power (P) by a factor of at least 43 +10 log(P) dB . In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. Then we measure that the bandwidth is about 300kHz and the resolution bandwidth is 3kHz.

4.5.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	5 MHz
RB / VB	10 kHz /30 kHz
Trace	Sample
Sweep Time	Auto

4.5.3 TEST PROCEDURES

1. The EUT was set up for the maximum peak power with **GSM/EDGE** link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 512 and 810(low and high operational frequency range.)
2. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. The splitter loss and cable loss are the worst loss 4dB in the transmitted path track.
3. The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 10kHz and VB of the spectrum is 30KHz.
4. Record the Sample trace plot into the test report.

4.5.4 TEST SETUP LAYOUT

This test setup layout is the same as that shown in section 4.2.4.

4.5.5 TEST DEVIATION

There is no deviation with the original standard.

4.5.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

4.5.7 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: DC 3.8V

4.5.8 TEST RESULTS

Please refer to the Attachment E.

4.6 FREQUENCY STABILITY MEASUREMENT

4.6.1 LIMIT

According to the FCC part 22.355 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The frequency error rate is according to the JTC standard that the frequency error rate shall be accurate to within 2.5 ppm of the received frequency from the base station. The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with the 2.1055(a)(1) –30℃~50℃.

4.6.2 MEASURING INSTRUMENTS AND SETTING

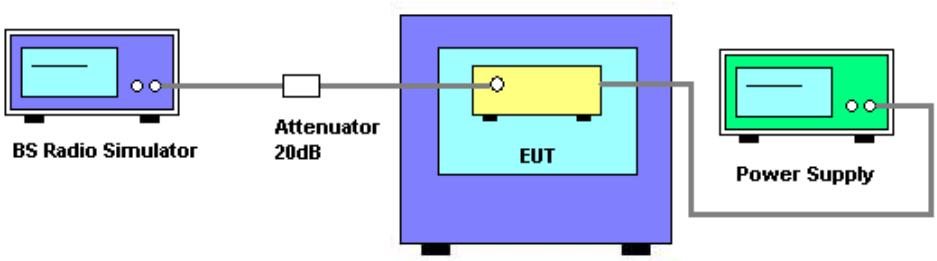
Please refer to section 5 in this report. The following table is the setting of the BS Simulator.

Spectrum Parameters	Setting
Frequency Error	The maximum of transmit frequency error

4.6.3 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the BS Simulator.
2. The BS simulator was used to set the TX channel and power level and modulate the TX signal with different bit patterns.
3. BS simulator used the frequency error function and measured the peak frequency error. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.
   The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.
4. EUT is connected the external power supply to control the DC input power. The various Volts from the minimum 3.1 Volts to 4.3 Volts. Each step shall be record the frequency error rate.
5. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
6. Extreme temperature rule is 0°C~40°C.

4.6.4 TEST SETUP LAYOUT



4.6.5 TEST DEVIATION

There is no deviation with the original standard.

4.6.6 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

4.6.7 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage: DC 3.8V

4.6.8 TEST RESULTS

Please refer to the Attachment F.

4.7 PEAK TO AVERAGE RATIO

4.7.1 LIMIT

In the FCC 24.232 (d) & &RSS-133 section 6.4
Peak transmit power shall be measured over any interval of continuous transmission using instrumen-tation calibrated in terms of rms-equivalent voltage.
The measurement results shall be properly adjusted for any instrument limitations, such as detector re-sponse times, limited resolution bandwidth capability when compared to the emission bandwidth, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.
To measure transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission shall not exceed 13 dB.

4.7.2 TEST PROCEDURES

1. Set resolution/measurement bandwidth ⩾ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;

4.7.3 TEST SETUP LAYOUT

Please refer to section 3.4 in this report.

4.7.4 TEST DEVIATION

There is no deviation with the original standard.

4.7.5 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

4.7.6 EUT TEST CONDITIONS

Temperature: 25°C
Relative Humidity: 55%
Test Voltage:DC 3.8V

4.7.7 TEST RESULTS

Please refer to the Attachment G.

5. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Mar. 28, 2016
2	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC012645B	980221	Oct. 22, 2015
3	Amplifier	Agilent	8449B	3008A02274	Nov. 02, 2015
4	Double Ridged Guide Antenna	ETS·LINDGREN	3115	00075846	Mar. 28, 2016
5	Antenna	SCHWARZBECK	VULB 9160	9160-3231	Mar. 28, 2016
6	Test Cable	N/A	CL-CB12-001	N/A	Oct. 22, 2015
7	Test Cable	N/A	CL-CB12-004	N/A	Oct. 22, 2015
8	Test Cable	N/A	CL-CB12-006	N/A	Oct. 22, 2015
9	Controller	CT	SC100	N/A	N/A
10	Wireless Communication Test SET	（8960 Series ） Agilent	E5515C	MY48364183	Mar. 15, 2016
11	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 1710/1785-1690 /1805-60/12SS	38	Mar. 04, 2016
12	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 824/849-810/86 3-60/9SS	7	Mar. 04, 2016
13	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 880/915-860/93 5-60/9SS	14	Mar. 04, 2016
14	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 1850/1910-1830 /1930-60/10SS	17	Mar. 04, 2016

Antenna Conducted Spurious Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015
2	Wireless Communication Test SET	(8960 Series)Agilent	E5515C	MY48364183	Mar. 28, 2016

Band Edge Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015
2	Wireless Communication Test SET	(8960 Series)Agilent	E5515C	MY48364183	Mar. 28, 2016

99% Occupied Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015
2	Wireless Communication Test SET	(8960 Series)Agilent	E5515C	MY48364183	Mar. 28, 2016

Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov. 02, 2015
2	Wireless Communication Test SET	(8960 Series)Agilent	E5515C	MY48364183	Mar. 28, 2016

Remark: ”N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

ATTACHMENT A - RADIATED RF OUTPUT POWER

Test Mode :	TX CH 512/661/810-GSM

GSM 1900		EIRP Power(dBm)			Max. Limit (dBm)	Result
		Channel 512	Channel 661	Channel 810		
GSM	V	21.27	20.54	19.91	33	Complies
	H	29.48	29.78	29.99	33	Complies
EDGE	V	14.90	15.61	17.97	33	Complies
	H	25.70	25.34	26.48	33	Complies

GSM 850		Conducted Power(dBm)		
		Channel 512	Channel 661	Channel 810
GSM (CS)		30.28	30.29	30.31
GPRS (GMSK)	1 Tx Slot	30.05	30.35	30.36
	2 Tx Slot	27.48	27.61	27.64
	3 Tx Slot	26.02	26.19	26.28
	4 Tx Slot	23.86	23.83	24.30
EDGE (GMSK)	1 Tx Slot	30.09	30.27	30.30
	2 Tx Slot	27.56	27.96	27.93
	3 Tx Slot	26.11	26.63	26.64
	4 Tx Slot	23.85	23.92	25.05
EDGE (8PSK)	1 Tx Slot	27.60	27.20	27.40
	2 Tx Slot	24.66	24.85	24.80
	3 Tx Slot	23.10	23.27	23.32
	4 Tx Slot	21.40	21.23	21.28

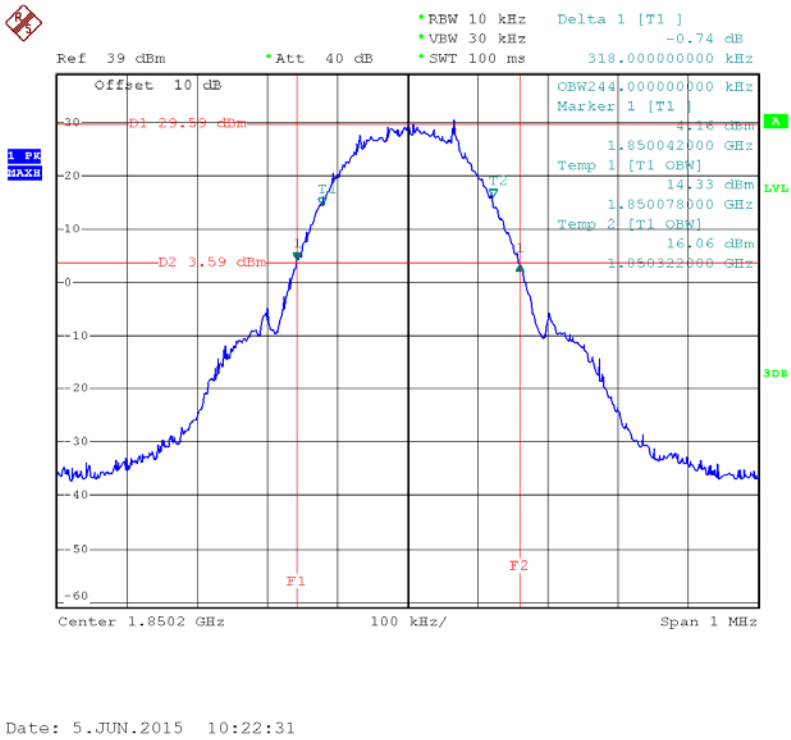
REMARKS:

1. Radiated Output Power(dBm)=Raw Value(dBm) + Correction Factor(dB) +Ant Gain(dBi)
2. Correction Factor(dB) = Power Splitter Loss(dB) + Cable Loss(dB)
3. The EUT does employ a power control function by which the output power is controlled from +28dBm to +19dBm (nominal) by 2dB steps. Consequently the EUT meets the requirement of Part24.232(c).
4. The antenna gain is -3.5dBi

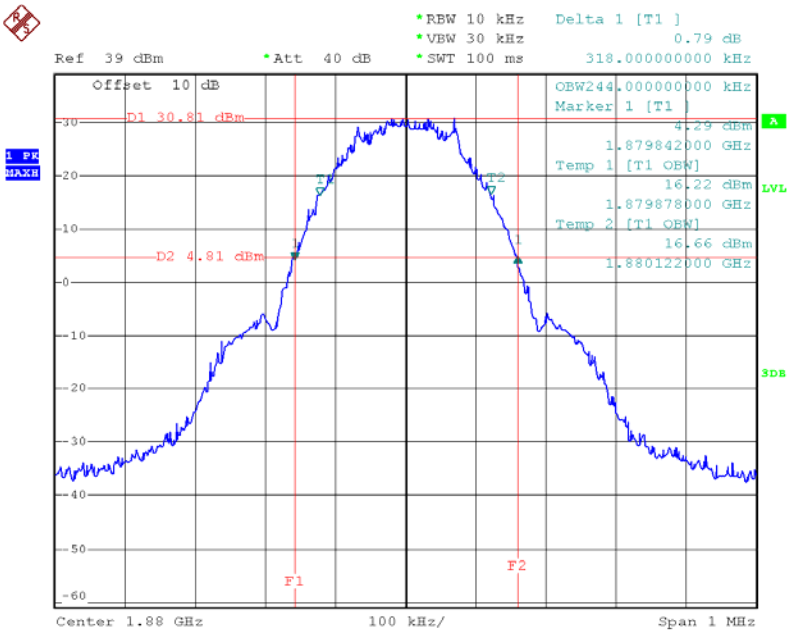
ATTACHMENT B - 99% OCCUPIED BANDWIDTH

Test Mode : TX Mode Configuration GSM				
Channel	**Frequency**	**99% OBW (MHz)**	**-26dBc Bandwidth(MHz)**	**Result**
512	1850.20MHz	0.244	0.318	**Complies**
661	1880.00 MHz	0.244	0.318	**Complies**
810	1909.80 MHz	0.244	0.318	**Complies**

99% Occupied Bandwidth channel 512

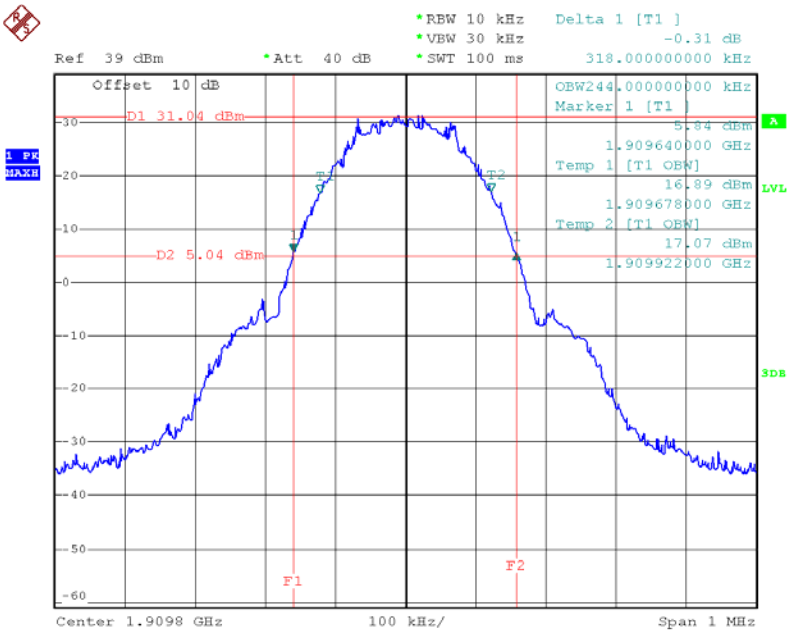


99% Occupied Bandwidth channel 661



Date: 5.JUN.2015 11:50:08

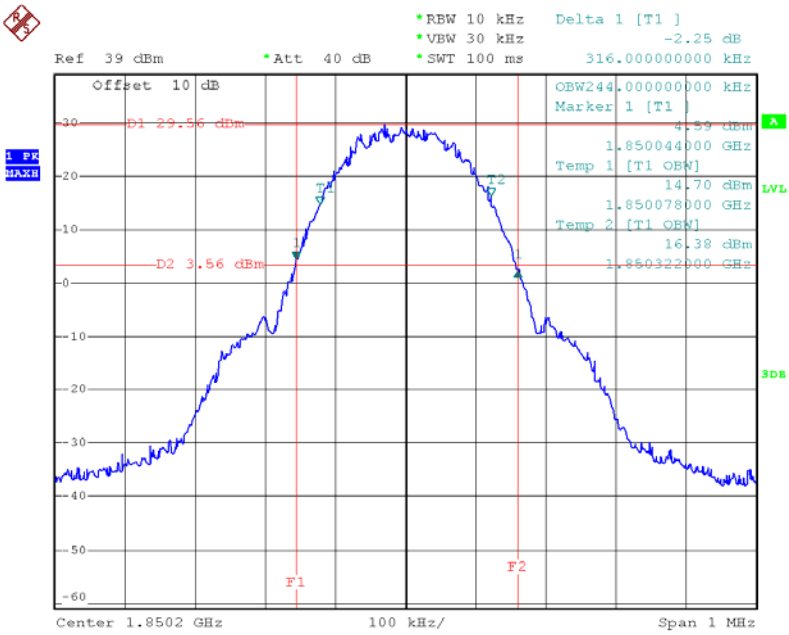
99% Occupied Bandwidth channel 810



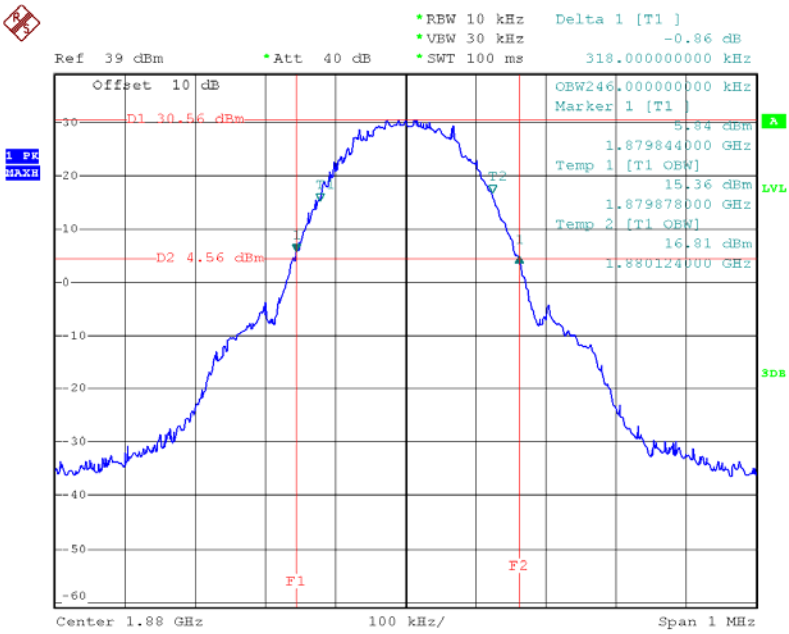
Date: 5.JUN.2015 11:57:47

Test Mode : TX Mode Configuration GPRS				
Channel	**Frequency**	**99% OBW (MHz)**	**-26dBc Bandwidth(MHz)**	**Result**
512	1850.20MHz	0.244	0.316	**Complies**
661	1880.00 MHz	0.246	0.318	**Complies**
810	1909.80 MHz	0.242	0.324	**Complies**

99% Occupied Bandwidth channel 512

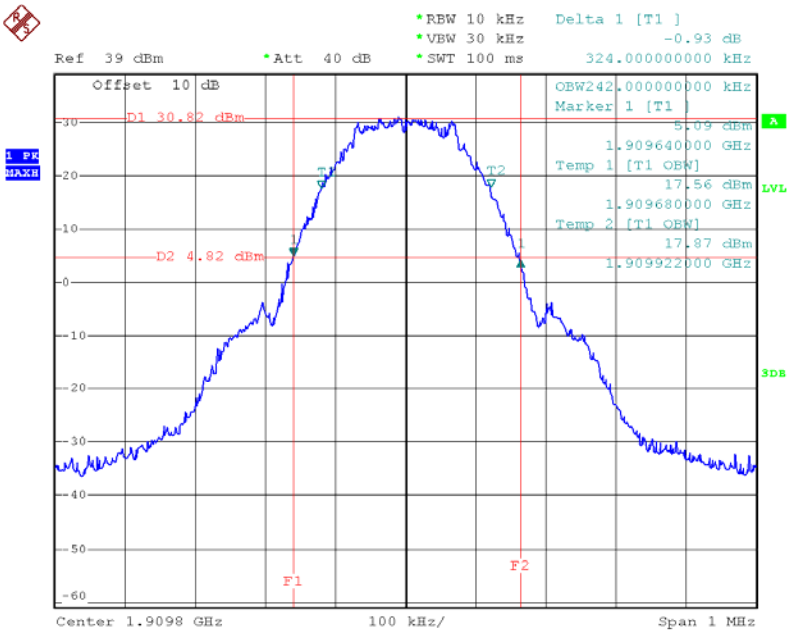


99% Occupied Bandwidth channel 661



Date: 5.JUN.2015 11:52:22

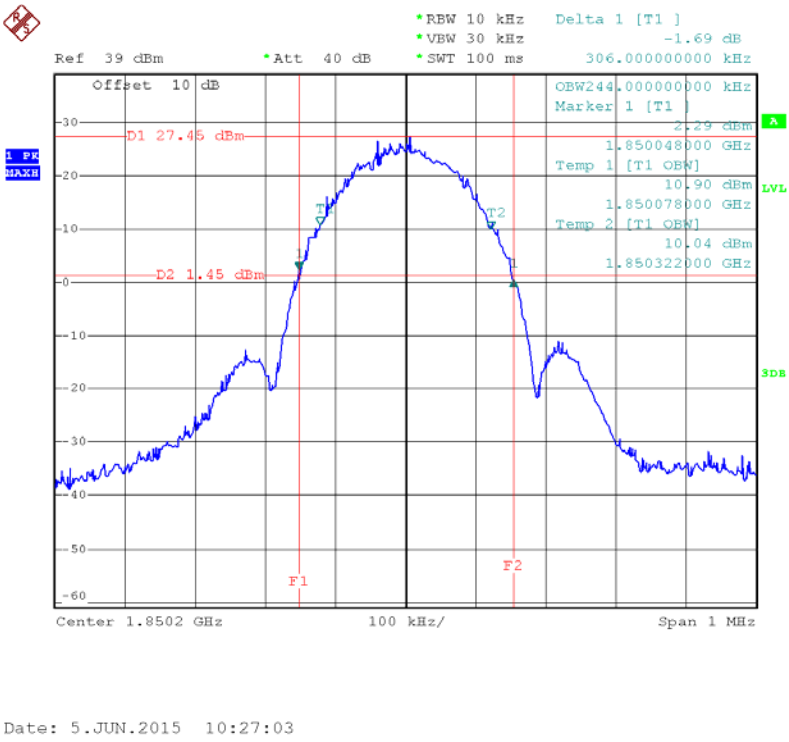
99% Occupied Bandwidth channel 810



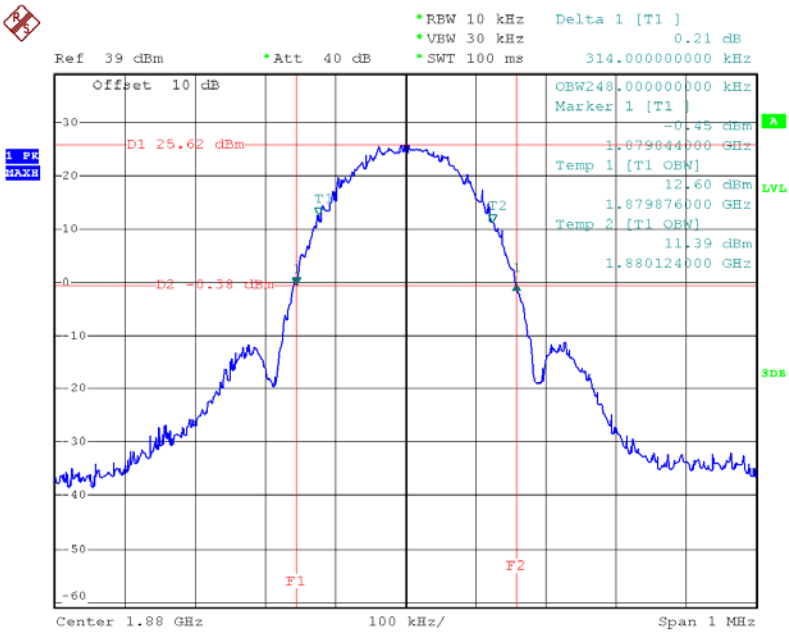
Date: 5.JUN.2015 12:00:28

Test Mode : TX Mode Configuration EDGE				
Channel	**Frequency**	**99% OBW (MHz)**	**-26dBc Bandwidth(MHz)**	**Result**
512	1850.20MHz	0.244	0.306	**Complies**
661	1880.00 MHz	0.248	0.314	**Complies**
810	1909.80 MHz	0.246	0.308	**Complies**

99% Occupied Bandwidth channel 512



99% Occupied Bandwidth channel 661



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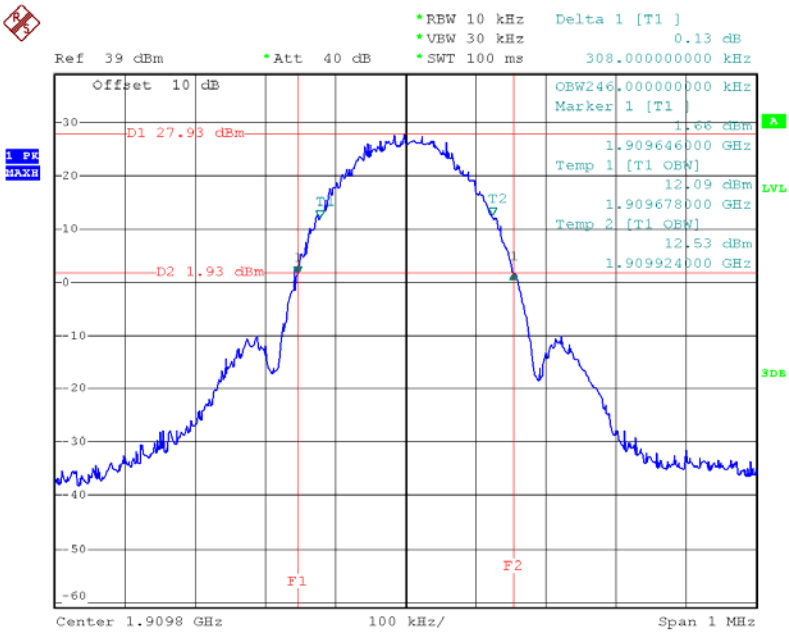
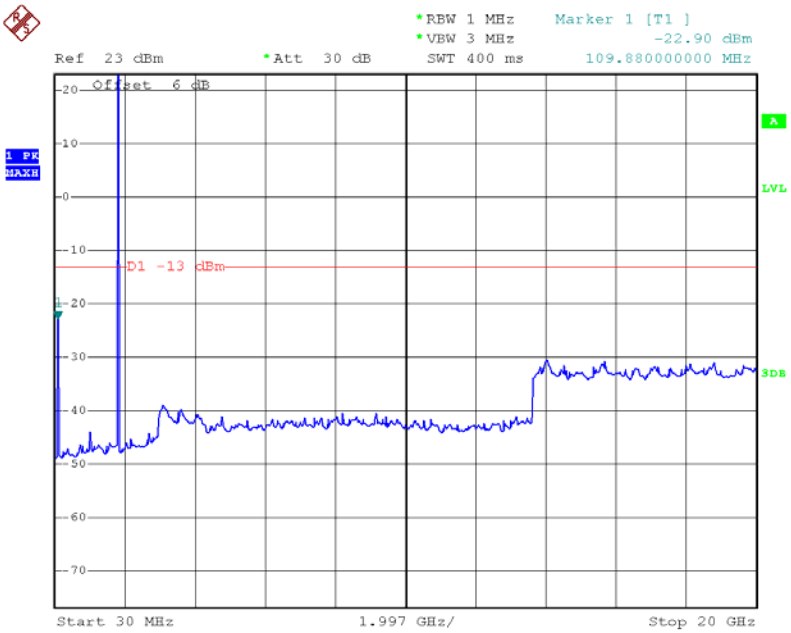
99% Occupied Bandwidth channel 810



Date: 5.JUN.2015 12:02:00

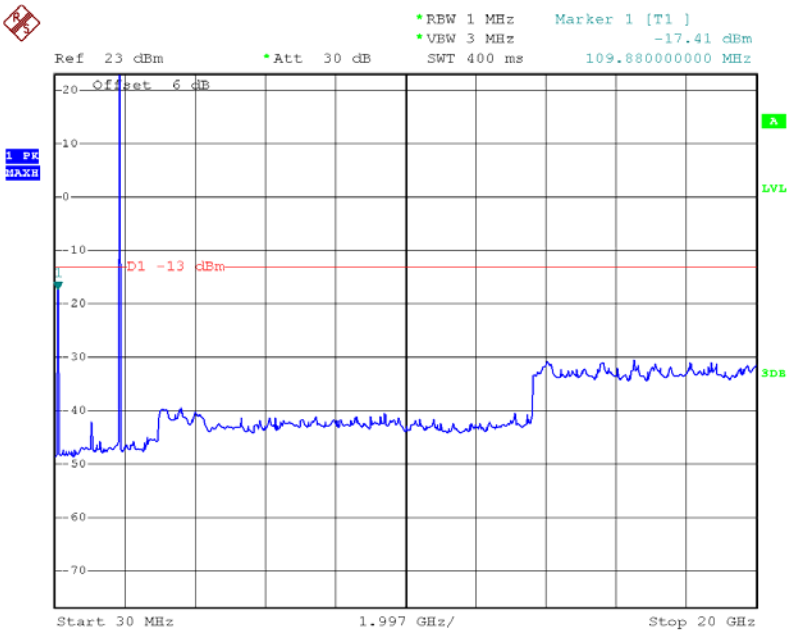
ATTACHMENT C - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Conducted Spurious of Configuration- GSM channel 512



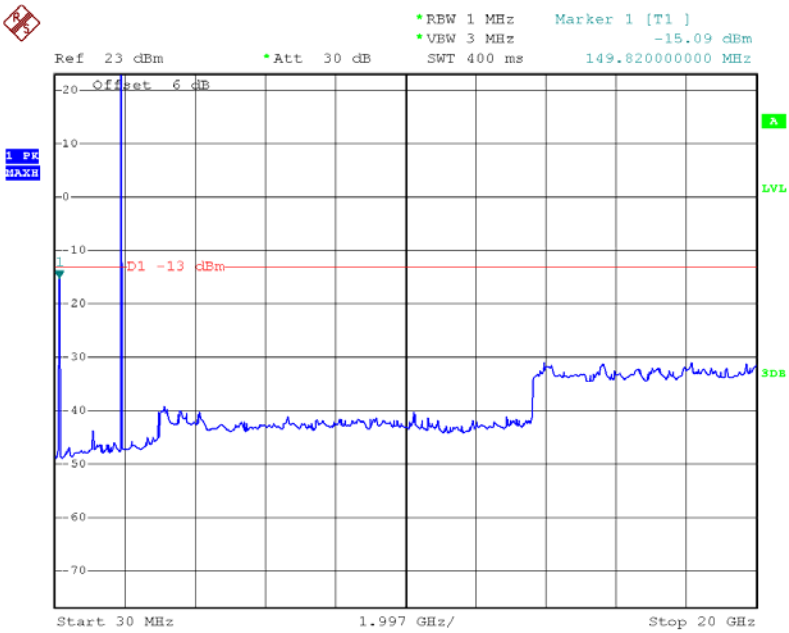
Date: 5.JUN.2015 14:45:28

Conducted Spurious of Configuration- GSM channel 661



Date: 5.JUN.2015 14:47:01

Conducted Spurious of Configuration- GSM channel 810

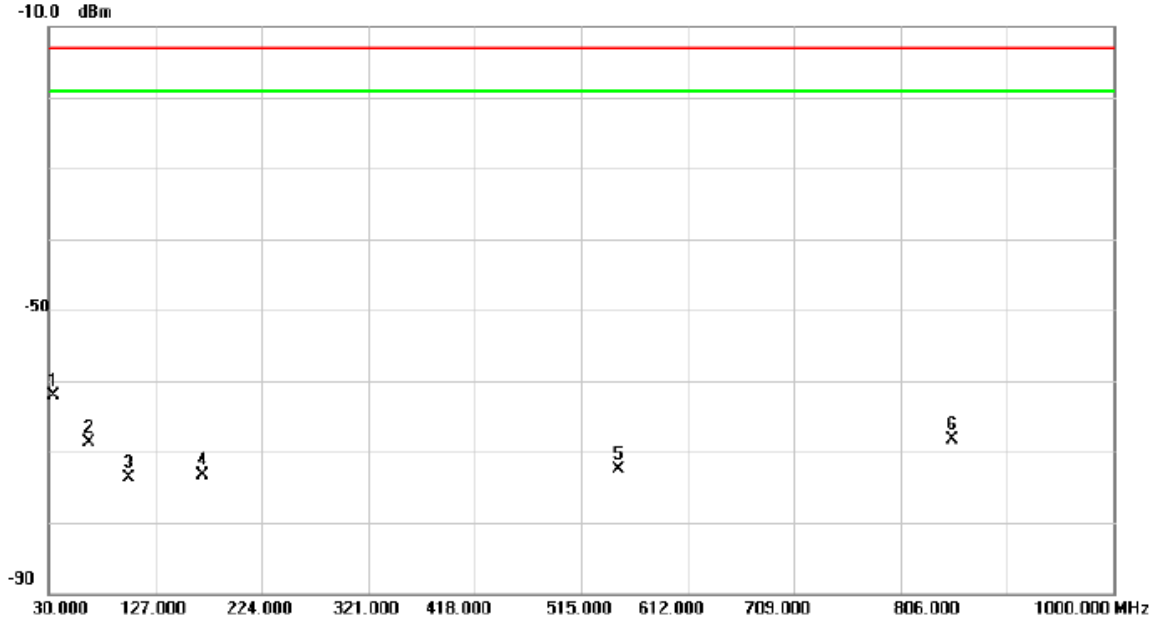


Date: 5.JUN.2015 14:48:41

ATTACHMENT D - SPURIOUS RADIATED EMISSION

Test Mode :	TX CH661 GSM

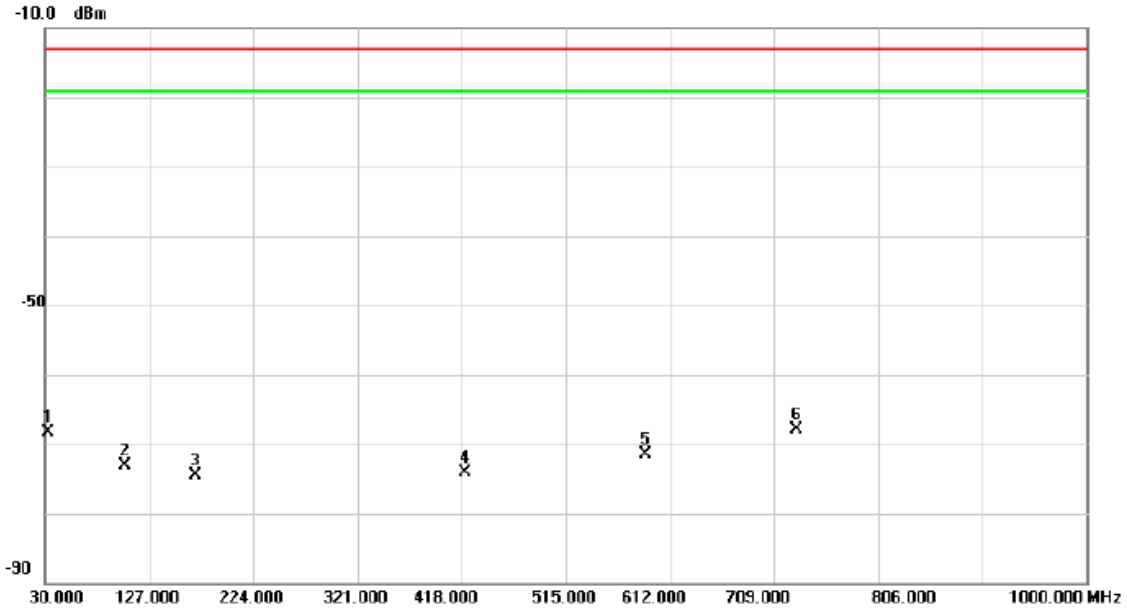
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	33.8800	-60.85	-1.20	-62.05	-13.0	-49.05	peak	
2		66.8600	-69.44	0.65	-68.79	-13.0	-55.79	peak	
3		102.7500	-72.35	-1.28	-73.63	-13.0	-60.63	peak	
4		169.6800	-73.36	-0.01	-73.37	-13.0	-60.37	peak	
5		548.9500	-80.00	7.45	-72.55	-13.0	-59.55	peak	
6		852.5600	-82.59	14.39	-68.20	-13.0	-55.20	peak	

Test Mode :	TX CH661 GSM

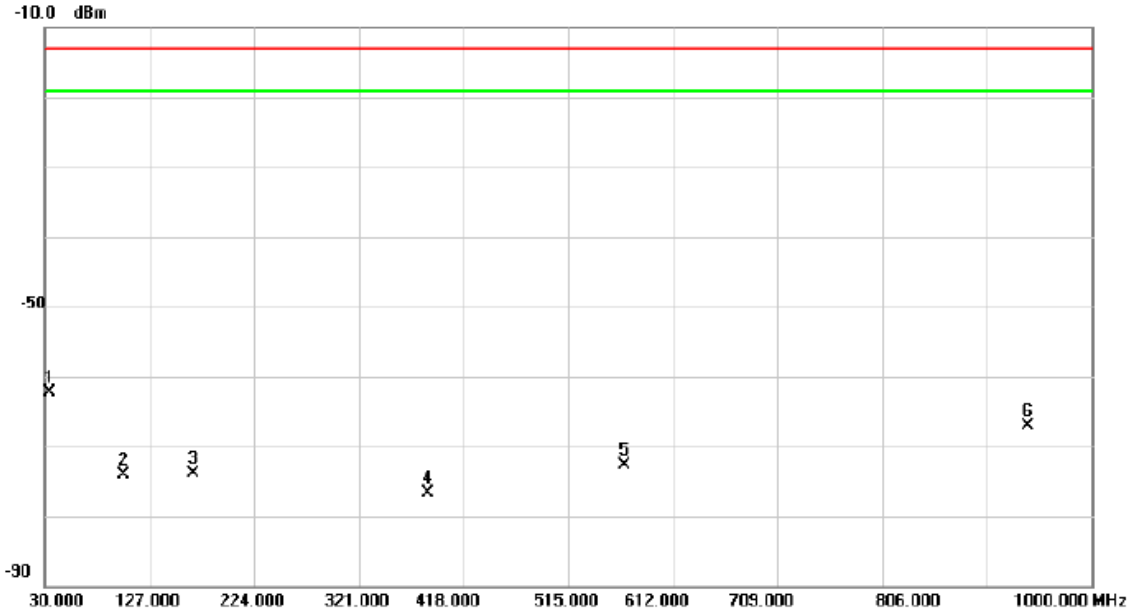
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		32.9100	-69.23	0.96	-68.27	-13.0	-55.27	peak	
2		103.7200	-69.86	-3.33	-73.19	-13.0	-60.19	peak	
3		169.6800	-73.12	-1.28	-74.40	-13.0	-61.40	peak	
4		420.9100	-80.85	6.78	-74.07	-13.0	-61.07	peak	
5		588.7200	-80.37	8.90	-71.47	-13.0	-58.47	peak	
6	*	730.3400	-81.13	13.25	-67.88	-13.0	-54.88	peak	

Test Mode :	TX CH661 EDGE

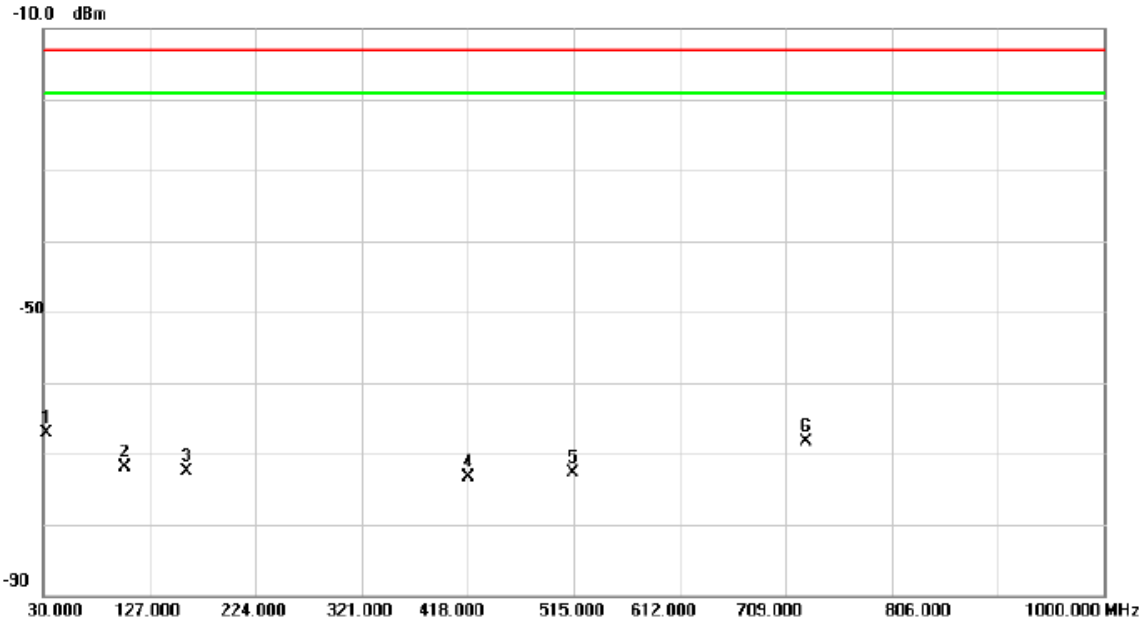
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	34.8500	-60.77	-1.43	-62.20	-13.0	-49.20	peak	
2		102.7500	-72.84	-1.28	-74.12	-13.0	-61.12	peak	
3		167.7400	-74.53	0.63	-73.90	-13.0	-60.90	peak	
4		385.0200	-80.66	3.90	-76.76	-13.0	-63.76	peak	
5		567.3800	-80.54	7.88	-72.66	-13.0	-59.66	peak	
6		940.8300	-81.34	14.24	-67.10	-13.0	-54.10	peak	

Test Mode :	TX CH661 EDGE

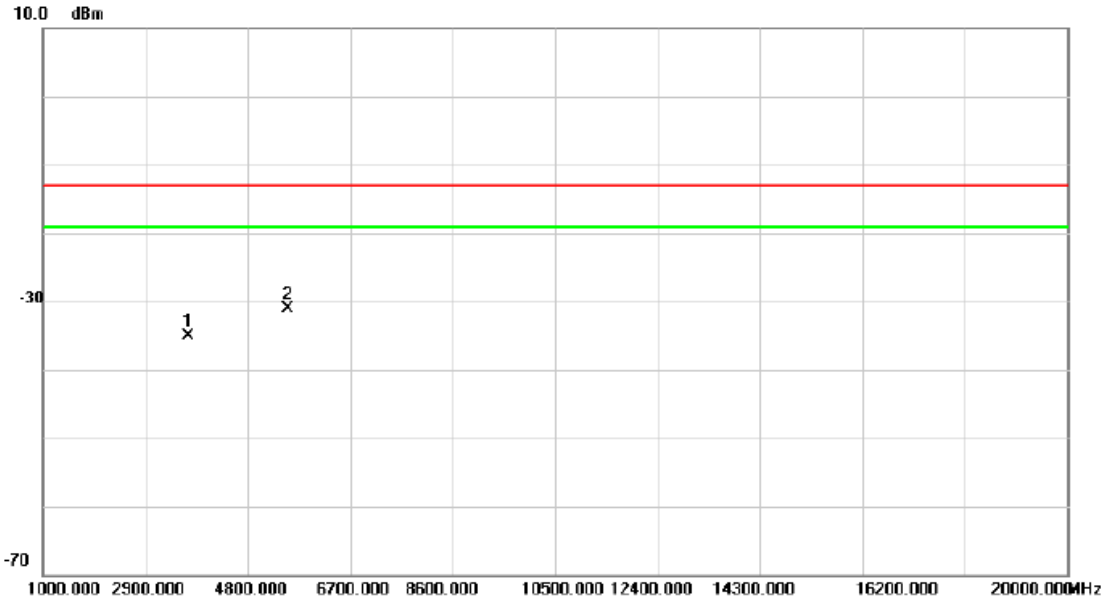
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	32.9100	-68.14	0.96	-67.18	-13.0	-54.18	peak	
2		103.7200	-68.65	-3.33	-71.98	-13.0	-58.98	peak	
3		160.9500	-74.92	2.35	-72.57	-13.0	-59.57	peak	
4		418.0000	-80.17	6.78	-73.39	-13.0	-60.39	peak	
5		514.0300	-80.68	8.07	-72.61	-13.0	-59.61	peak	
6		727.4300	-81.53	13.32	-68.21	-13.0	-55.21	peak	

Test Mode :	TXCH512 GSM

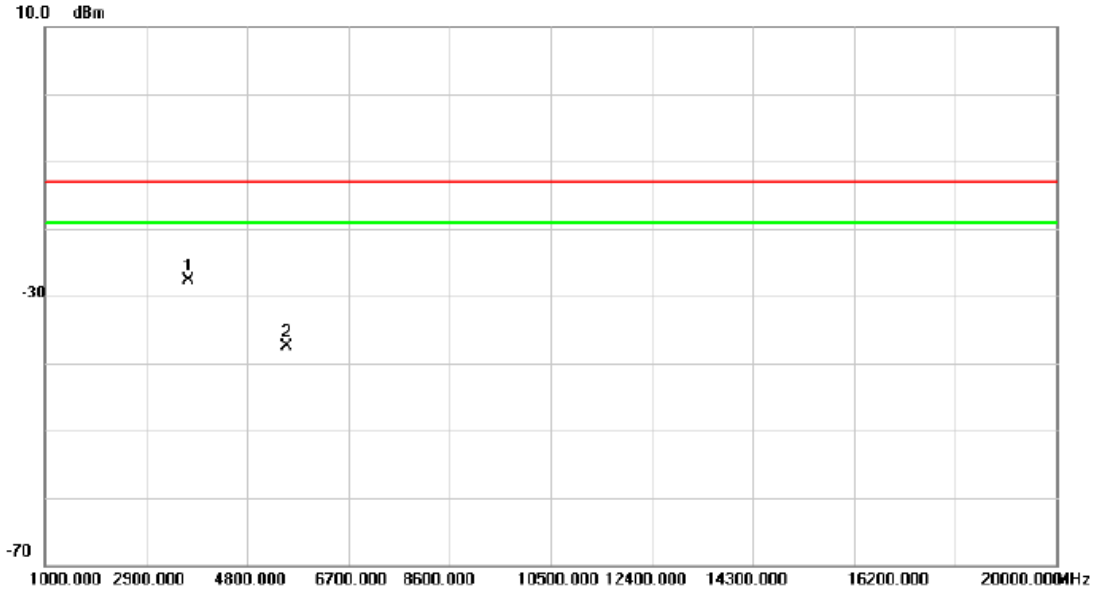
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		3700.120	-41.01	5.94	-35.07	-13.0	-22.07	peak	
2	*	5550.660	-44.11	13.00	-31.11	-13.0	-18.11	peak	

Test Mode :	TXCH512 GSM

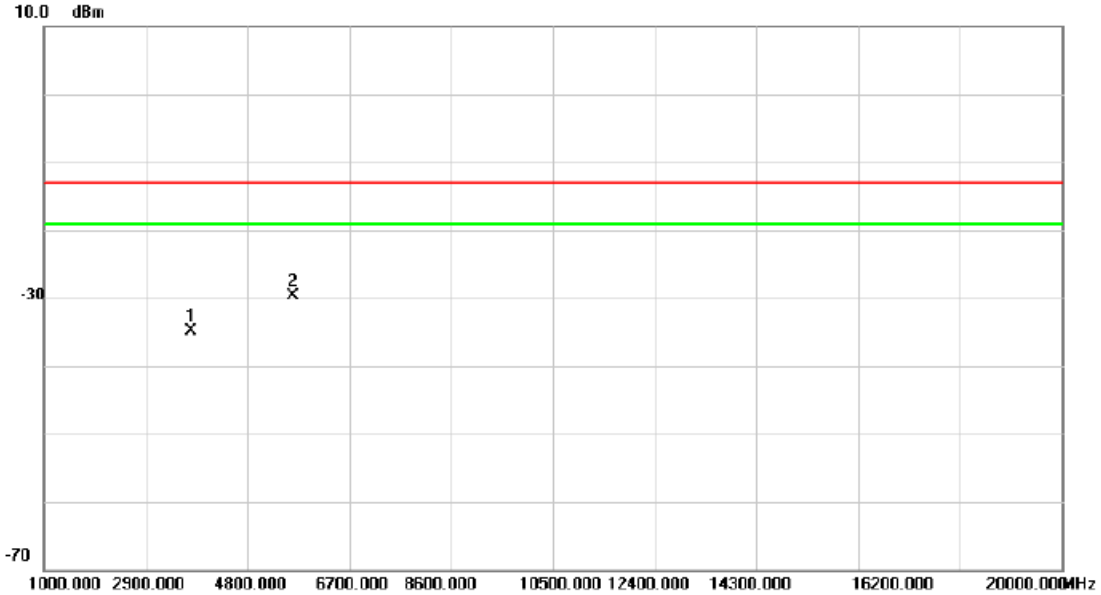
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	3700.460	-35.16	7.49	-27.67	-13.0	-14.67	peak	
2		5550.640	-46.18	8.59	-37.59	-13.0	-24.59	peak	

Test Mode :	TX CH661 GSM

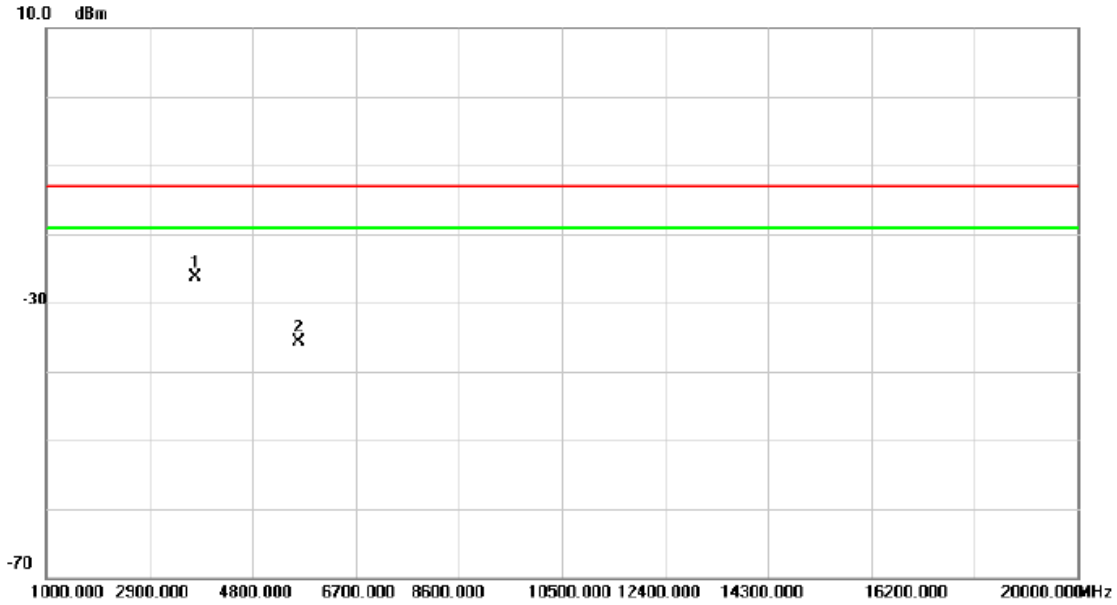
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		3759.960	-41.14	6.24	-34.90	-13.0	-21.90	peak	
2	*	5639.800	-42.91	13.22	-29.69	-13.0	-16.69	peak	

Test Mode :	TX CH661 GSM

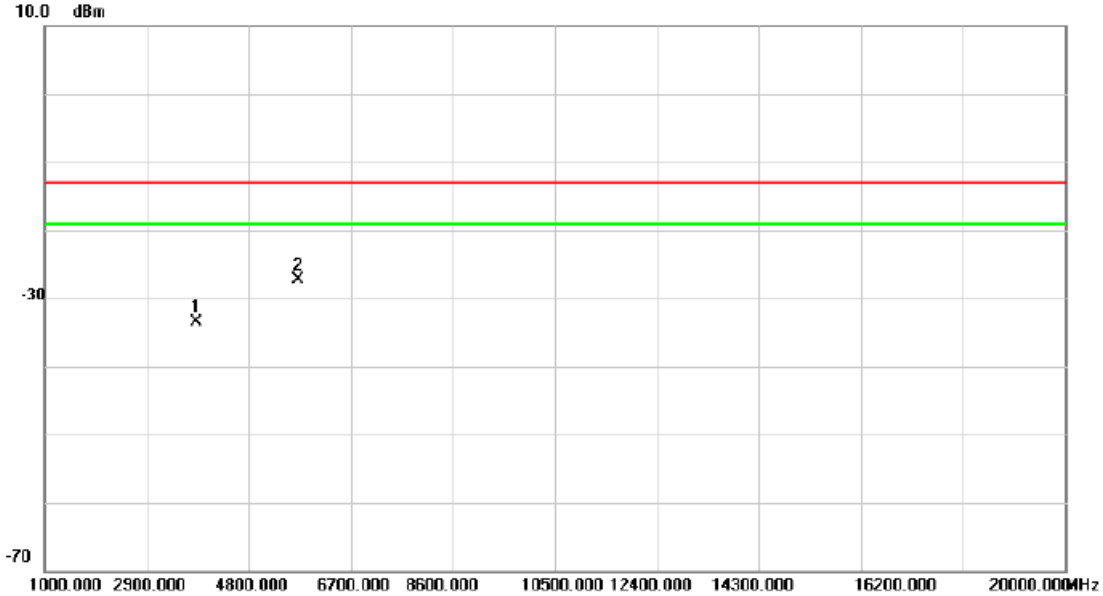
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	3760.120	-33.86	7.50	-26.36	-13.0	-13.36	peak	
2		5639.840	-44.45	8.72	-35.73	-13.0	-22.73	peak	

Test Mode :	TX CH810 GSM

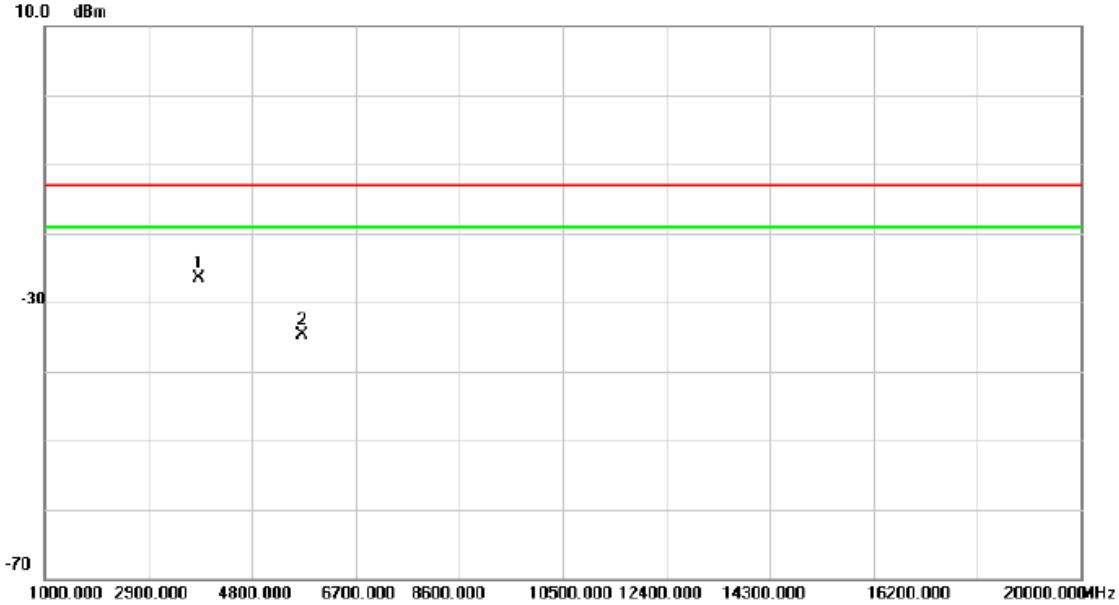
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		3819.740	-39.98	6.53	-33.45	-13.0	-20.45	peak	
2	*	5729.280	-40.72	13.43	-27.29	-13.0	-14.29	peak	

Test Mode :	TX CH810 GSM

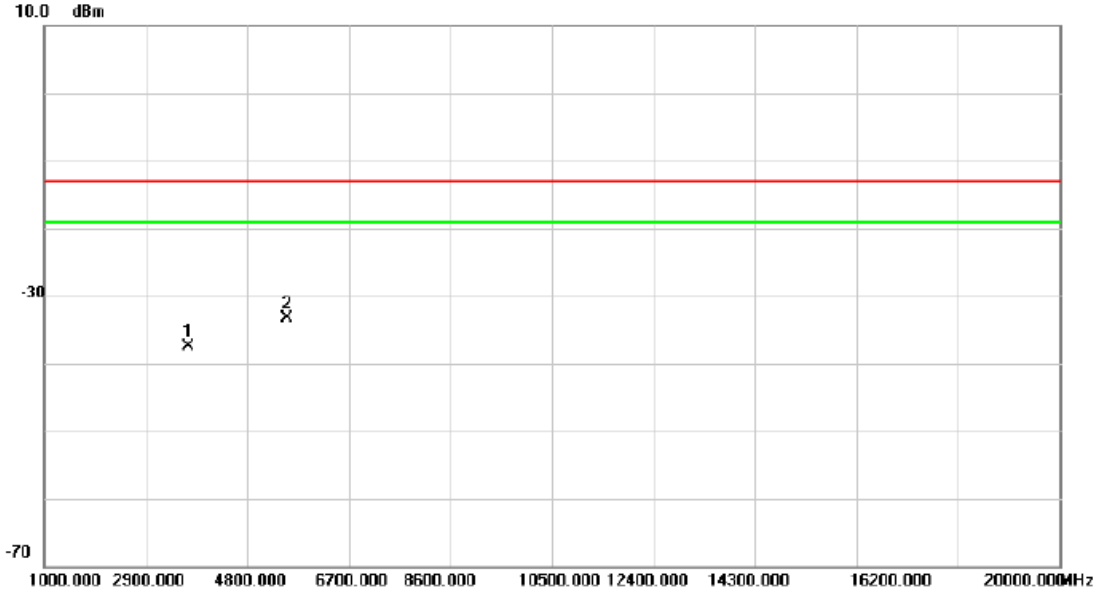
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	3819.560	-34.10	7.51	-26.59	-13.0	-13.59	peak	
2		5729.500	-43.55	8.86	-34.69	-13.0	-21.69	peak	

Test Mode :	TXCH512 EDGE

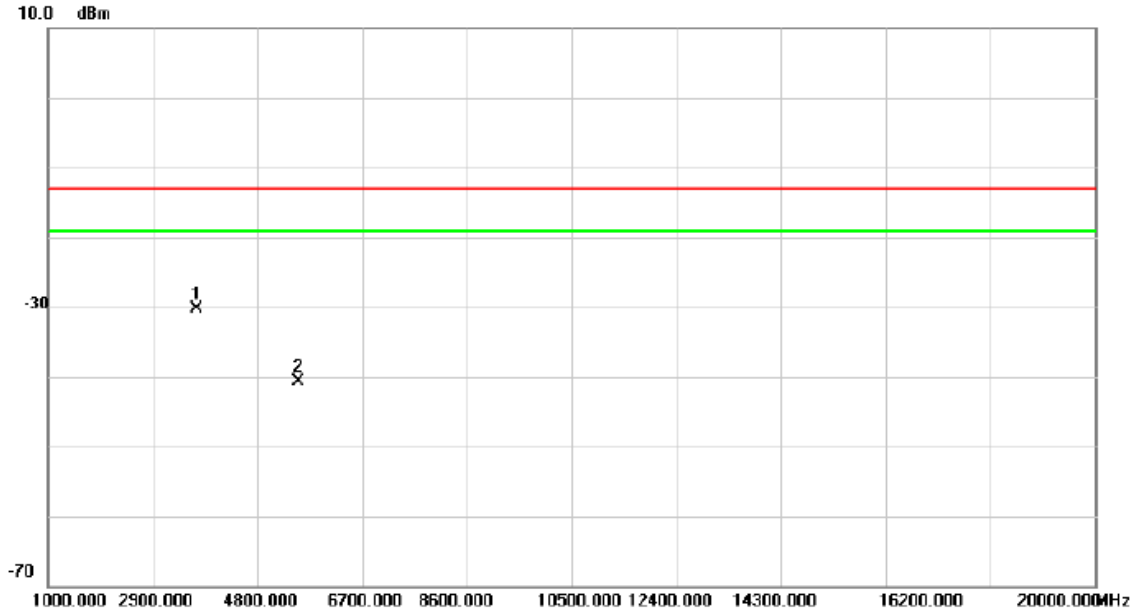
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		3700.460	-43.41	5.95	-37.46	-13.0	-24.46	peak	
2	*	5550.500	-46.32	13.00	-33.32	-13.0	-20.32	peak	

Test Mode :	TXCH512 EDGE

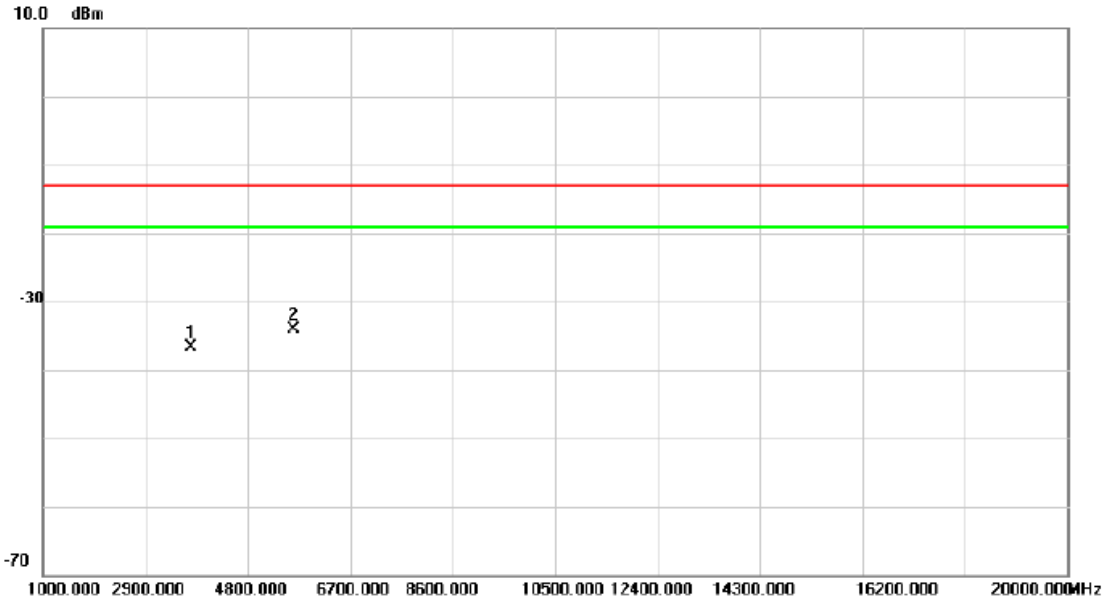
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	3700.360	-37.79	7.49	-30.30	-13.0	-17.30	peak	
2		5550.420	-49.36	8.59	-40.77	-13.0	-27.77	peak	

Test Mode :	TX CH661 EDGE

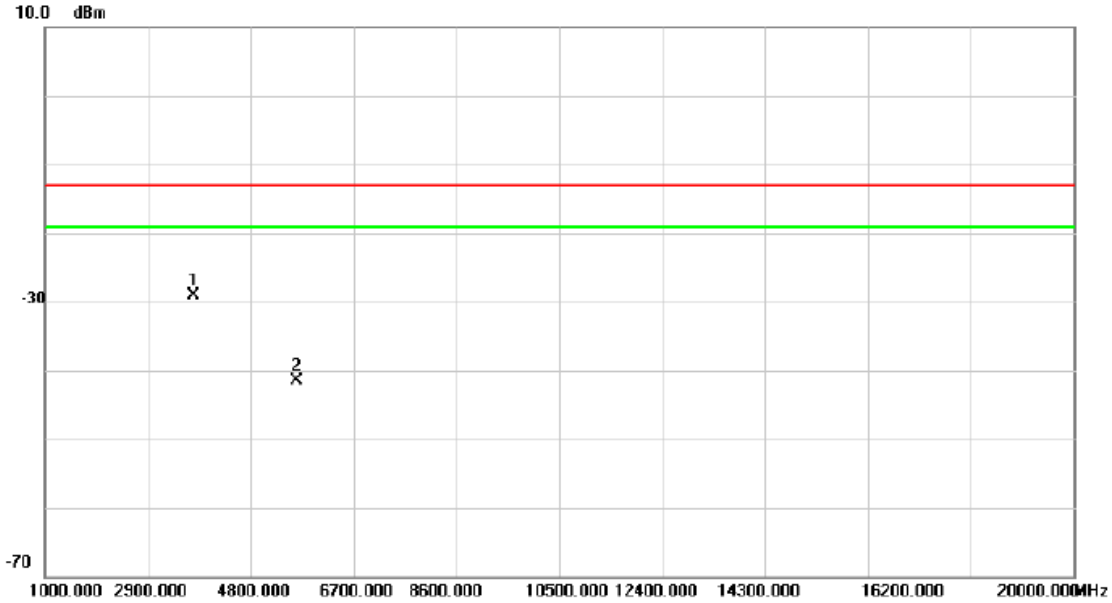
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		3759.960	-42.95	6.24	-36.71	-13.0	-23.71	peak	
2	*	5640.080	-47.22	13.22	-34.00	-13.0	-21.00	peak	

Test Mode :	TX CH661 EDGE

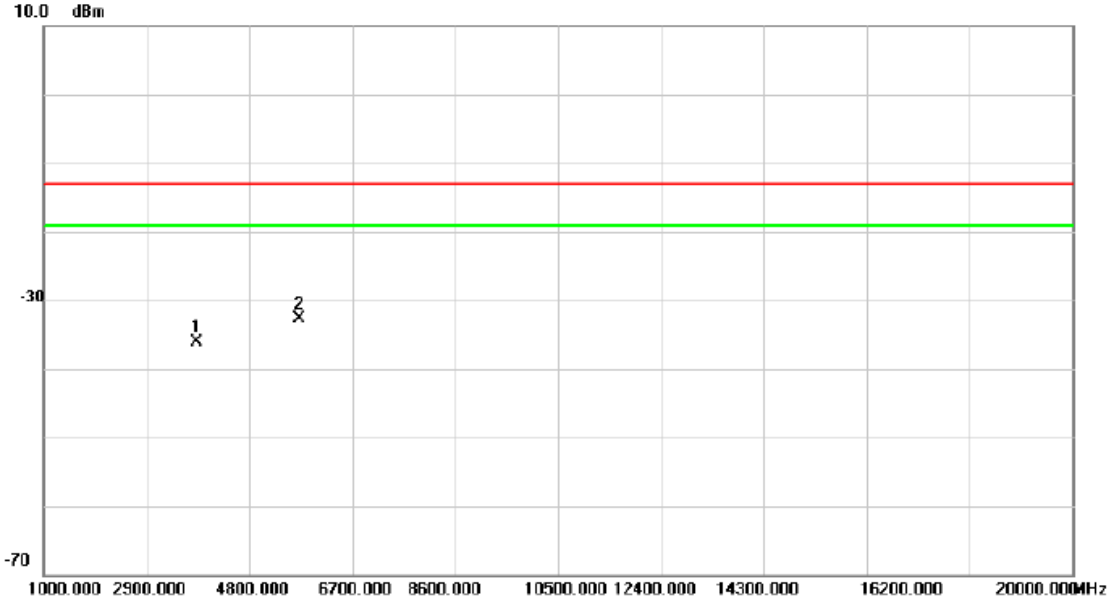
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	3759.940	-36.61	7.50	-29.11	-13.0	-16.11	peak	
2		5640.160	-50.27	8.72	-41.55	-13.0	-28.55	peak	

Test Mode :	TX CH810 EDGE

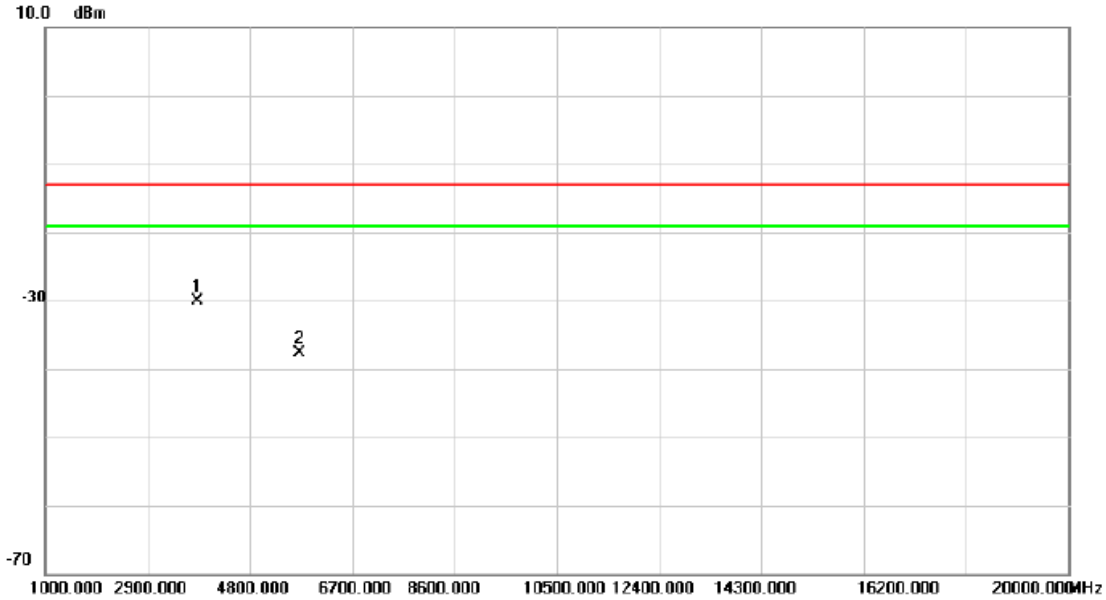
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		3819.520	-42.63	6.53	-36.10	-13.0	-23.10	peak	
2	*	5729.480	-46.03	13.43	-32.60	-13.0	-19.60	peak	

Test Mode :	TX CH810 EDGE

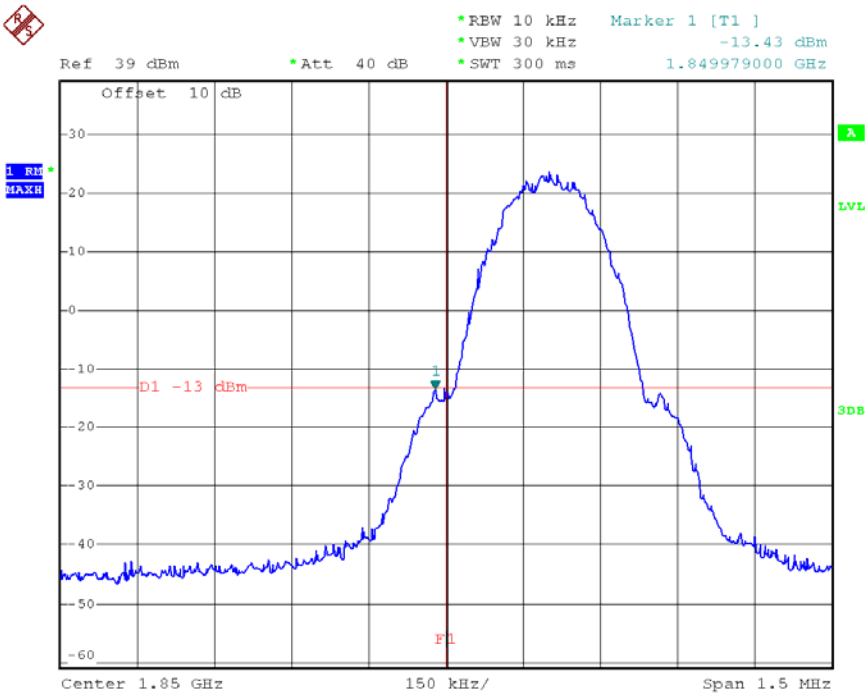
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	3819.440	-37.51	7.51	-30.00	-13.0	-17.00	peak	
2		5729.160	-46.48	8.86	-37.62	-13.0	-24.62	peak	

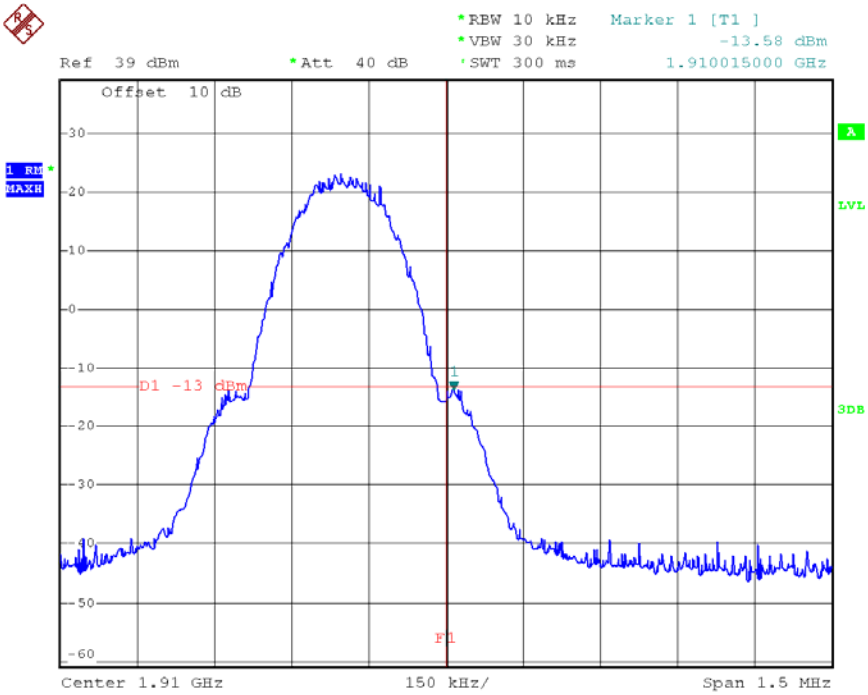
ATTACHMENT E - BAND EDGE

Band Edge on Configuration GSM / Channel 512-CONDUCTED MODE



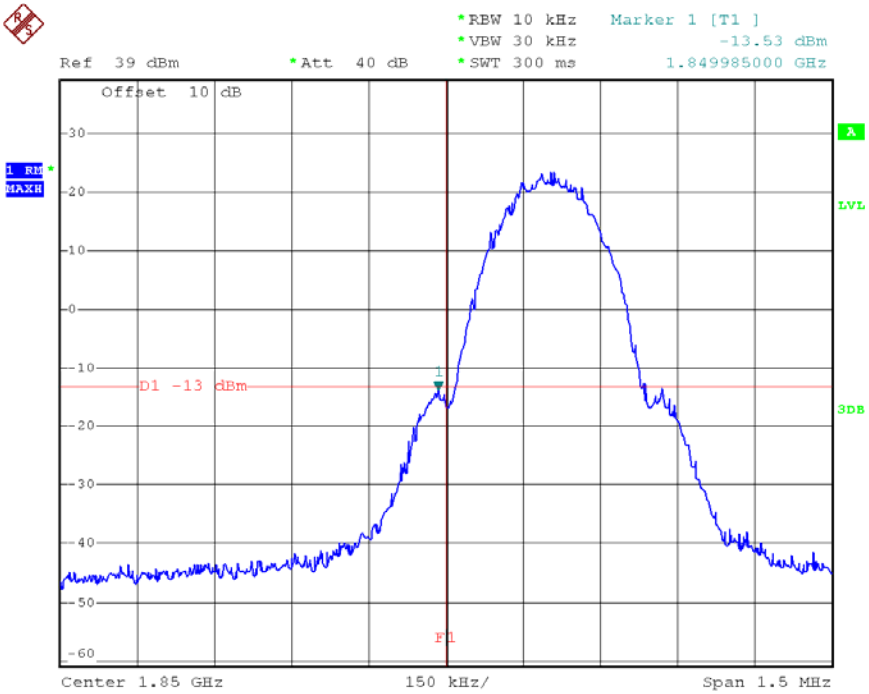
Date: 5.JUN.2015 14:06:15

Band Edge on Configuration GSM / Channel 810-CONDUCTED MODE



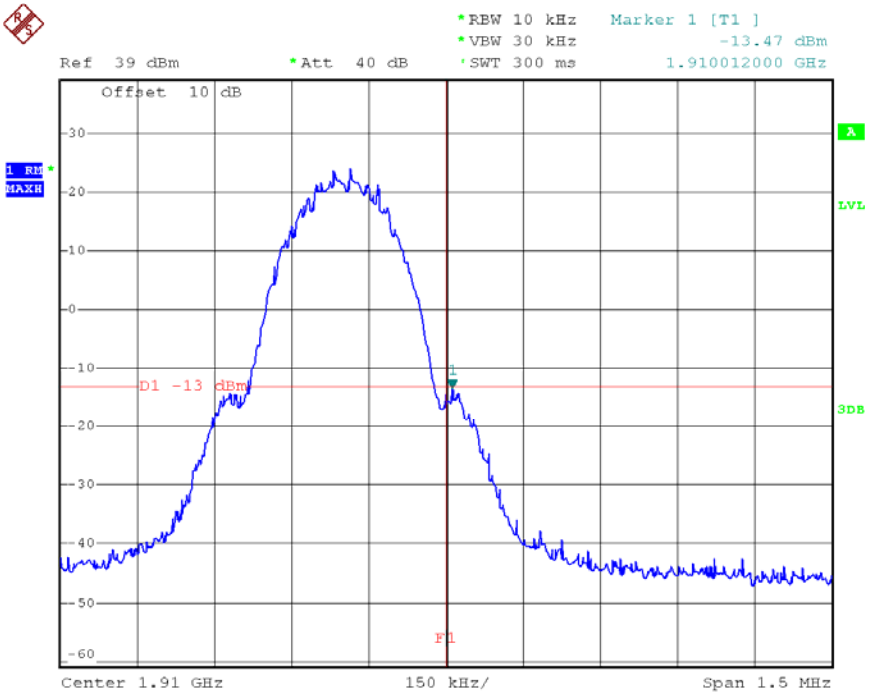
Date: 5.JUN.2015 14:56:13

Band Edge on Configuration GPRS / Channel 512-CONDUCTED MODE



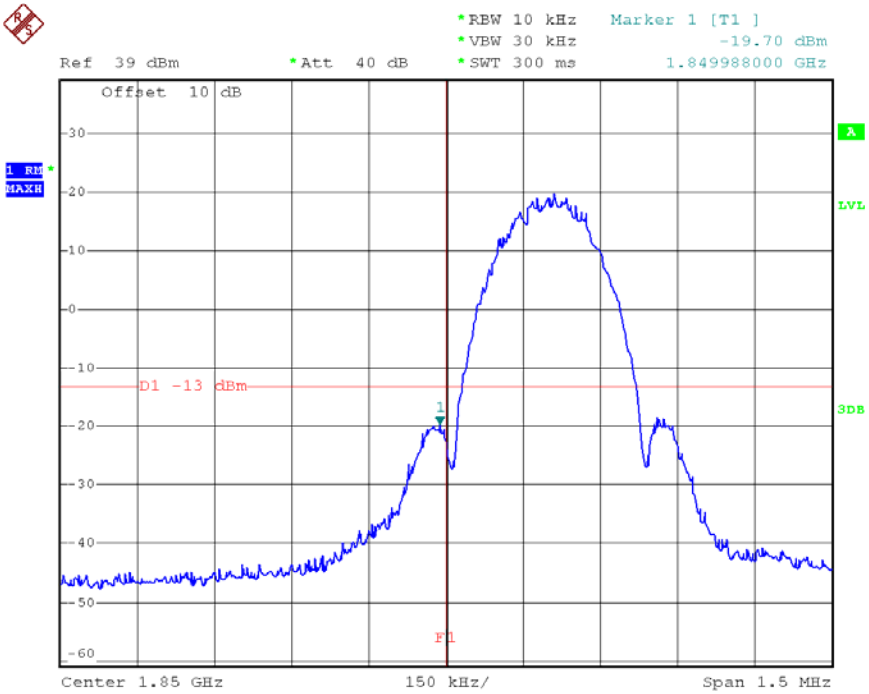
Date: 5.JUN.2015 14:07:35

Band Edge on Configuration GPRS / Channel 810-CONDUCTED MODE



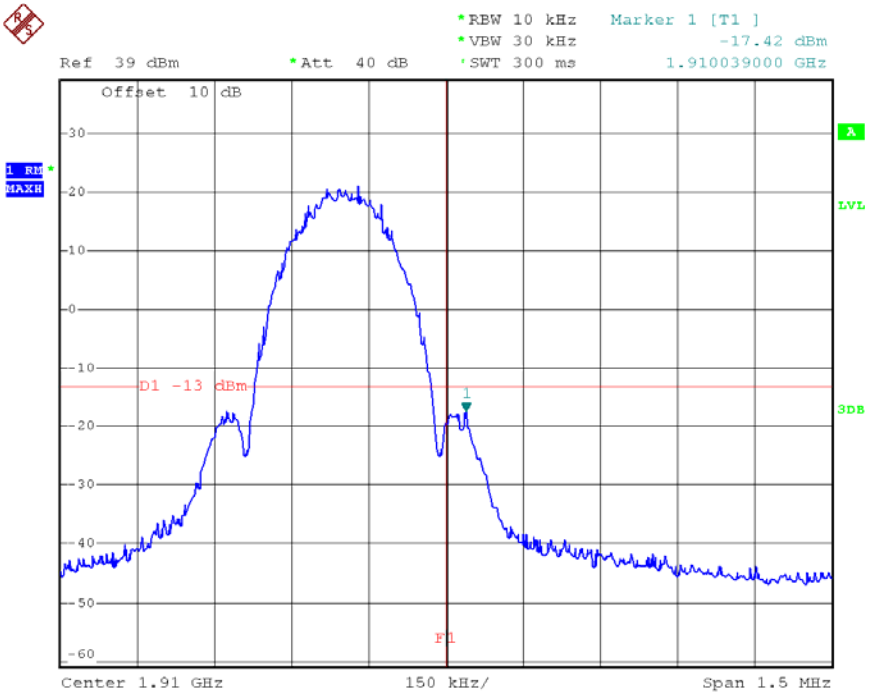
Date: 5.JUN.2015 14:58:20

Band Edge on Configuration EDGE / Channel 512-CONDUCTED MODE



Date: 5.JUN.2015 14:15:32

Band Edge on Configuration EDGE / Channel 810-CONDUCTED MODE



Date: 5.JUN.2015 15:03:12

ATTACHMENT F - FREQUENCY STABILITY

Test Mode :	GSM CH512

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
3.5	12	0.006485785	2.5
3.6	11	0.005945303	2.5
3.7	13	0.007026267	2.5
3.8	7	0.003783375	2.5
3.9	8	0.004323857	2.5
4.0	11	0.005945303	2.5
4.1	9	0.004864339	2.5
4.2	13	0.007026267	2.5
Max. Deviation (ppm)	**13**	**0.007026267**	2.5

Temperature vs. Frequency Stability

Temperature(℃)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
45	8	0.004323857	2.5
30	9	0.004864339	2.5
20	11	0.005945303	2.5
10	10	0.005404821	2.5
0	14	0.00756675	2.5
Max. Deviation (ppm)	**14**	**0.00756675**	2.5

Test Mode :	EDGE CH512

Voltage vs. Frequency Stability

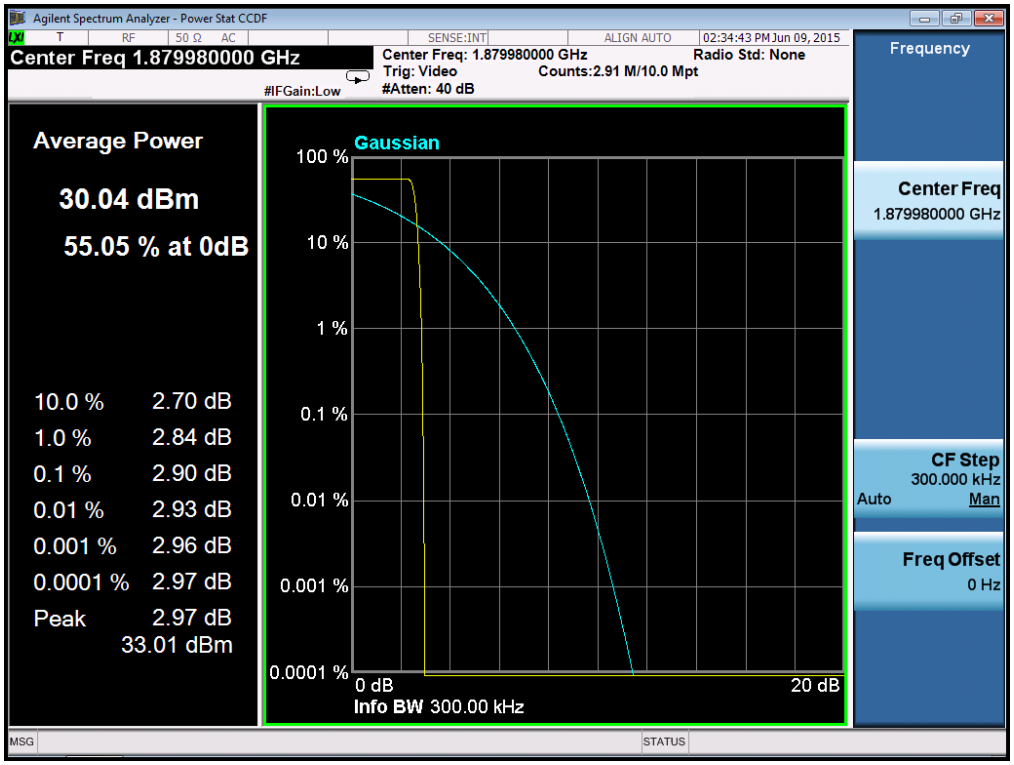
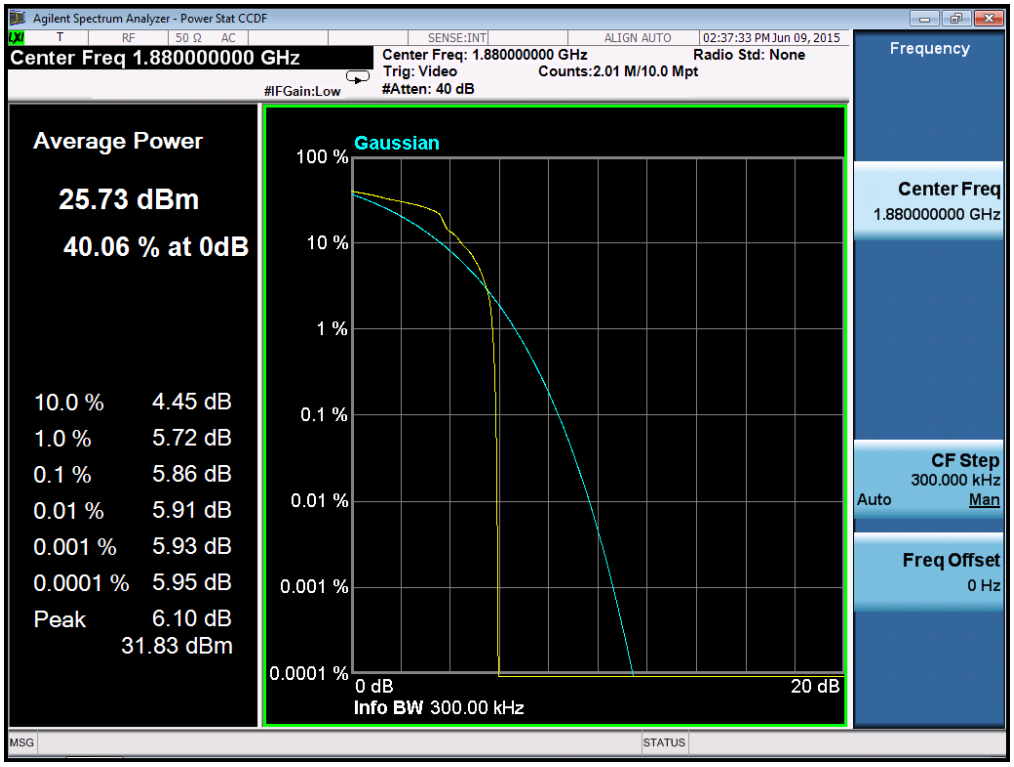
Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
3.5	11	0.005945303	2.5
3.6	14	0.00756675	2.5
3.7	13	0.007026267	2.5
3.8	12	0.006485785	2.5
3.9	11	0.005945303	2.5
4.0	14	0.00756675	2.5
4.1	7	0.003783375	2.5
4.2	9	0.004864339	2.5
Max. Deviation (ppm)	**14**	**0.00756675**	2.5

Temperature vs. Frequency Stability

Temperature(℃)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
45	12	0.006485785	2.5
30	11	0.005945303	2.5
20	9	0.004864339	2.5
10	13	0.007026267	2.5
0	12	0.006485785	2.5
Max. Deviation (ppm)	**13**	**0.007026267**	2.5

ATTACHMENT G - PEAK TO AVERAGE RATIO

Peak to Average Ratio of Configuration- GSM channel 661



Peak to Average Ratio of Configuration- EDGE channel 661