FCC Part 22H & 24E
Measurement and Test Report

For

SMARTBEL LTD.

10 Cheyne Walk, Northampton, NN1 5PT, UK

FCC ID: PRN76278235

FCC Rules:	FCC Part 22H, FCC Part 24E
Product Description:	SMARTBEL
Tested Model:	76278235
Report No.:	STR1208016-1
Tested Date:	2012-08-26 to 2012-09-10
Issued Date:	2012-09-12
Tested By:	Susan Su / Engineer
Reviewed By:	Lahm Peng / EMC Manager
Approved & Authorized By:	Jandy so / PSQ Manager

Prepared By:

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	SMARTBEL LTD.
Address of applicant:	10 Cheyne Walk, Northampton, NN1 5PT, UK
Manufacturer:	SMARTBEL LTD.
Address of manufacturer:	THE AREA OF ADMI OF LIANBE CHANGPING DONGGUAN GUANGDONG CHINA

General Description of EUT	
Product Name:	SMARTBEL
Trade Name:	/
Model No.:	76278235
Adding Model(s):	/
Rated Voltage:	DC 3.7V Li-ion Battery
Power Adapter Model:	KSUFB0500080W1UK (Input: 100-240V, 50/60Hz 0.15A, Output: DC 5V 0.8A)
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Cellular Network Protocol:	GSM
Hardware Version:	/
Software Version:	/
Frequency Range:	GSM/GPRS 850: 824~849MHz GSM/GPRS 1900: 1850~1910MHz
Max. RF Power(Conducted):	GSM850: 32.75dBm; PCS1900: 30.09 dBm
Max. RF Power(ERP/EIRP):	GSM850: 31.85 dBm; PCS1900: 29.19 dBm
Type of Modulation:	GMSK
Type of Emission:	GSM(GSM850): 264KGXW GSM(PCS1900): 260KGXW
Type of Antenna:	MMCX Antenna
Antenna Gain:	1.5dBi
Device Category:	Fixed Device

1.2 Test Standards

The following report is prepared on behalf of the SMARTBEL LTD. in accordance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with TIA/EIA 603-C: 2004 and ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

- **FCC – Registration No.: 994117**
  SEM.Test Compliance Services Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**
  The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**
  Shenzhen SEM.Test Electronics Service Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 3/F, Jinbao Commerce Building, Xin’an Fanshen Road, Bao’an District, Shenzhen, P.R.C (518101)

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	GSM 850	Low, Middle, High Channels
TM2	GSM 1900	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GSM	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GSM	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
Note: the transmitter has been tested on the communications mode of GSM and GPRS, compliance test and record the worst case.			

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
USB Cable	3	Unshielded	Without Ferrite
RJ12	4.8	Unshielded	Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 1.1307, § 2.1093	RF Exposure	Compliant
§ 22.913 (a), § 24.232 (c)	RF Output Power	Compliant
§ 22.917 (b), § 24.238 (b)	Emission Bandwidth	Compliant
§ 22.917 (a), § 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliant
§ 22.917 (a), § 24.238 (a)	Spurious Radiation Emissions	Compliant
§ 22.917 (a), § 24.238 (a)	Out of Band Emissions	Compliant
§ 22.355, § 24.235	Frequency Stability	Compliant
§15.107 (a)	Conducted Emission	Compliant
§15.109(a)	Radiated Emission	Compliant

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the MPE report.

4. RF Output Power

4.1 Standard Applicable

According to §22.913(a)(2), The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

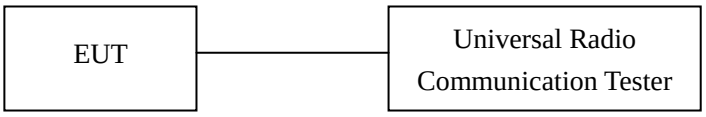
According to §24.232 (c), no any case may the peak output power of mobile or portable station transmitter exceed 2 Watt EIRP.

4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	112012	2012-03-28	2013-03-27
Signal Generator	R&S	SMR20	100047	2012-03-28	2013-03-27

4.3 Test Procedure

Conducted output power test method:



Radiated power test method:

1.The setup of EUT is according with per TIA/EIA Standard 603C and ANSI C63.4-2003 measurement procedure.

2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.

4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

4.4 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

4.5 Summary of Test Results/Plots

Radiated Power

ERP For GSM Mode GSM850

Frequency	Substitude SG	Height	Table	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	33.35	1.5	0	H	1.5	0	31.85	38.45
824.2	30.10	1.5	0	V	1.5	0	28.60	38.45
Middle Channel								
836.6	33.30	1.5	0	H	1.5	0	31.80	38.45
836.6	30.11	1.5	0	V	1.5	0	28.61	38.45
High Channel								
848.8	33.17	1.5	0	H	1.5	0	31.67	38.45
848.8	30.46	1.5	0	V	1.5	0	28.96	38.45

EIRP For GSM Mode PCS1900

Frequency	Substitude SG	Height	Table	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1850.2	23.39	1.5	0	H	1.9	7.7	29.19	33
1850.2	20.70	1.5	0	V	1.9	7.7	26.50	33
Middle Channel								
1880.0	23.52	1.5	0	H	1.9	7.7	29.32	33
1880.0	20.92	1.5	0	V	1.9	7.7	26.72	33
High Channel								
1909.8	23.20	1.5	0	H	1.9	7.7	29.00	33
1909.8	20.07	1.5	0	V	1.9	7.7	25.87	33

Max. Conducted Output Power

For Cellular Band (GSM850)

Test Mode	Channel	Frequency (MHz)	Output Power (dBm)	FCC Part 22.913 Limit (dBm)
GSM	Low Channel	824.2	32.69	38.45
	Middle Channel	836.6	32.71	38.45
	High Channel	848.8	32.75	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Output Power (dBm)	FCC Part 24.232 Limit (dBm)
GSM	Low Channel	1850.2	30.09	33
	Middle Channel	1880.0	30.06	33
	High Channel	1909.8	29.67	33

5. Emission Bandwidth

5.1 Standard Applicable

According to §22.917(b), The 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.

According to §24.238(b), The 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.

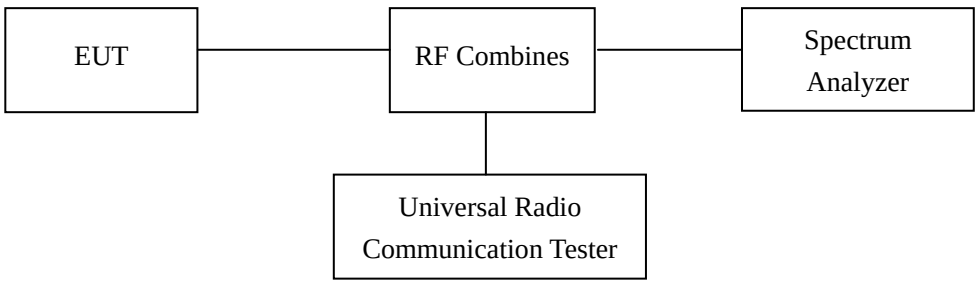
5.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2012-03-28	2013-03-27
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112012	2012-03-28	2013-03-27

5.3 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



5.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

For Cellular Band

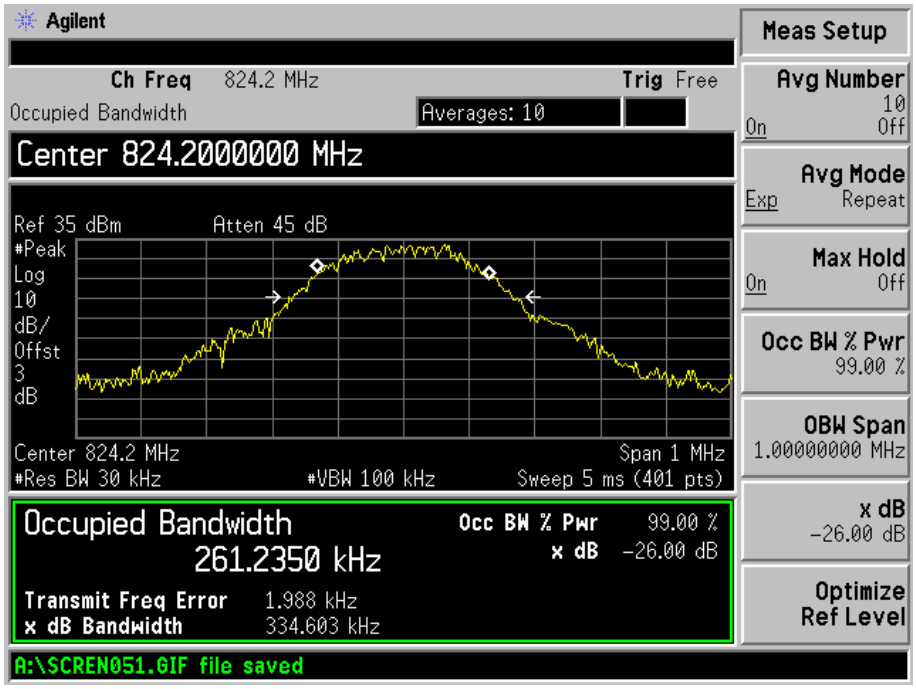
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	128	824.2	261.2350	334.603
	190	836.6	263.8517	344.210
	251	848.8	256.8885	348.182

For PCS Band

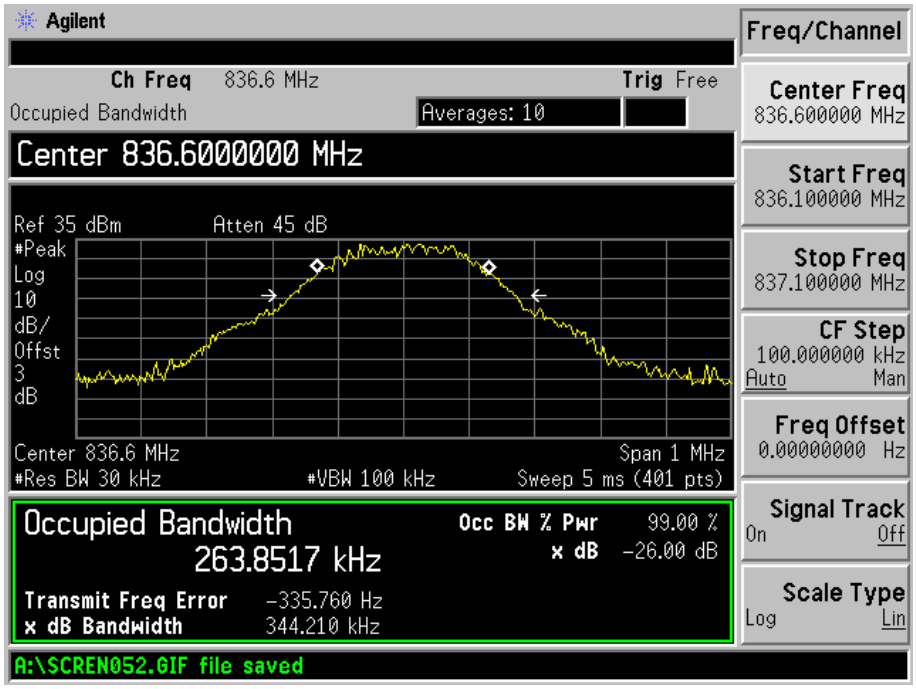
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	512	1850.2	257.2348	336.931
	661	1880.0	260.4588	333.757
	810	1909.8	258.2711	342.177

Please refer to the following test plots:

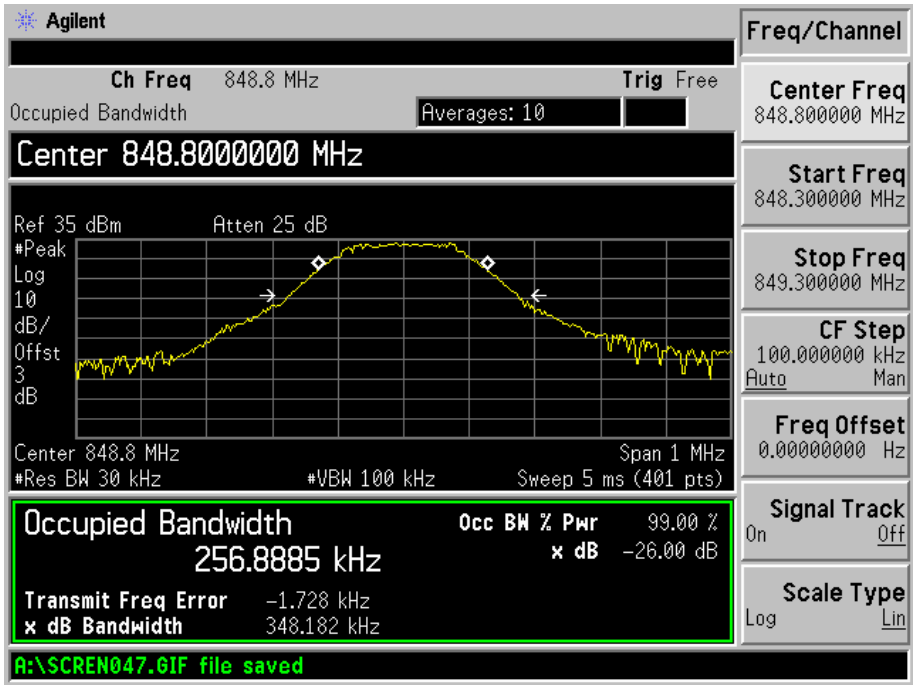
For Cellular Band:
GSM Low Channel



GSM Middle Channel

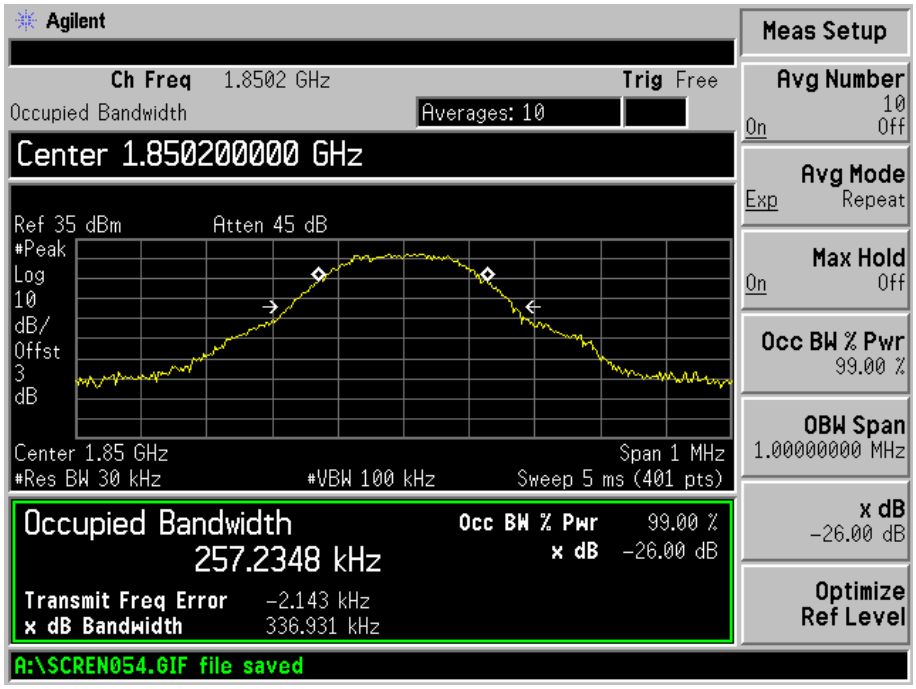


GSM High channel

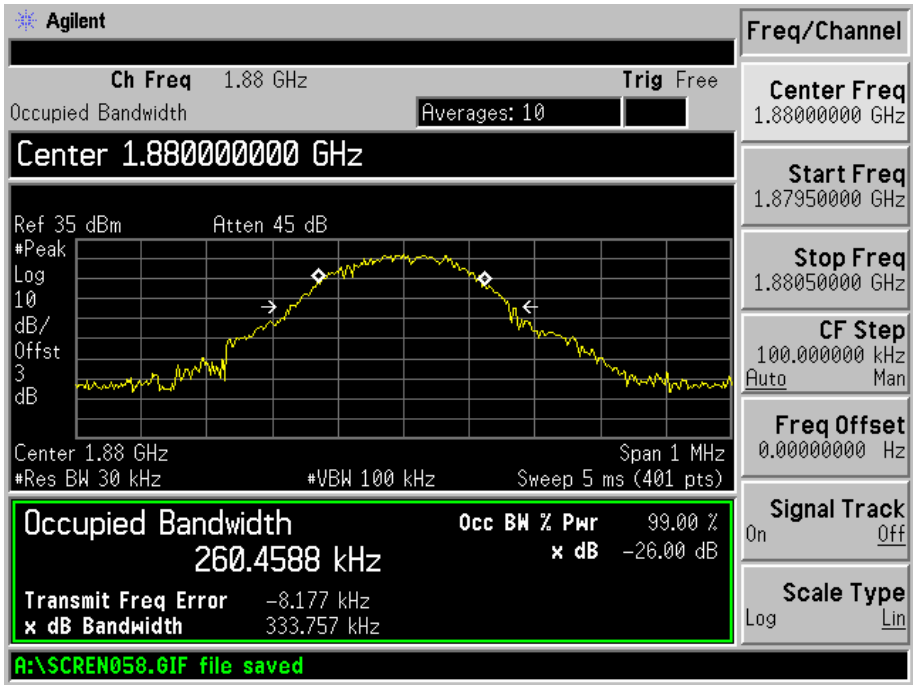


For PCS Band:

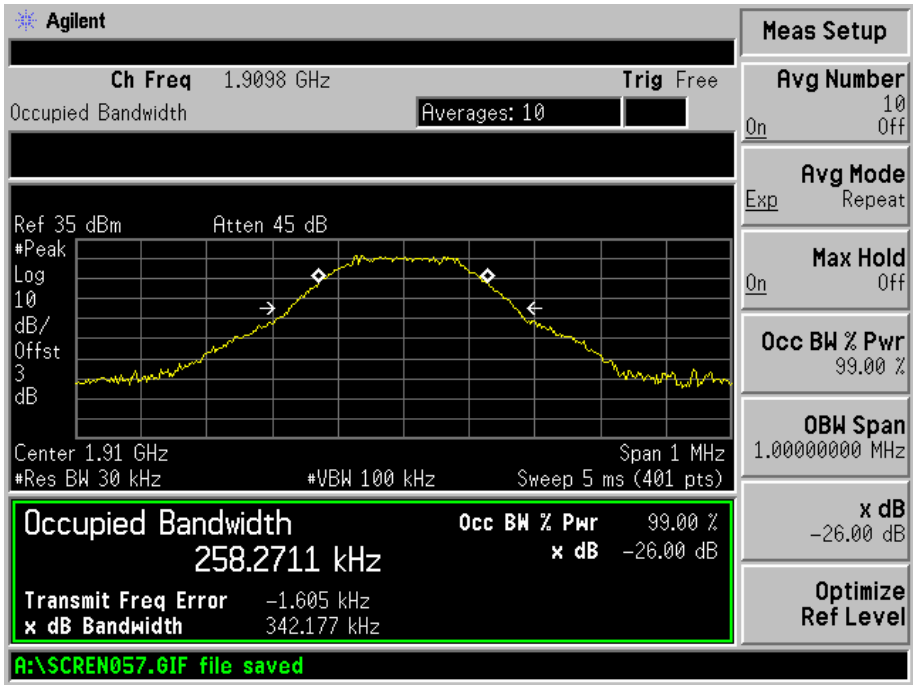
GSM Low Channel



GSM Middle Channel



GSM High channel



6. Out of Band Emissions at Antenna Terminal

6.1 Standard Applicable

According to §22.917(a), 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.

According to §24.238(a), 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.

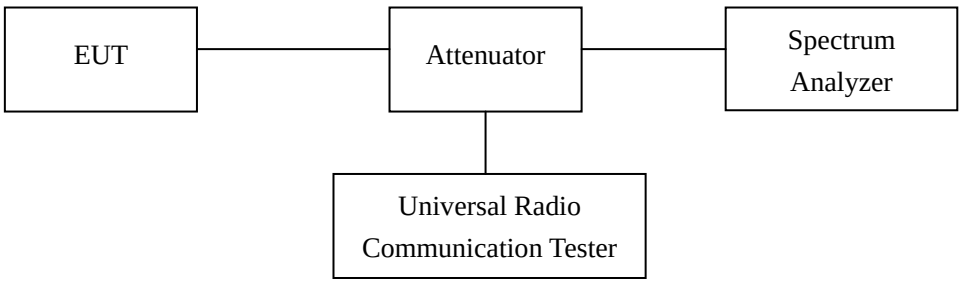
6.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2012-03-28	2013-03-27
Rohde & Schwarz	Spectrum Analyzer	FSP	836079/035	2012-03-28	2013-03-27
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112012	2012-03-28	2013-03-27

6.3 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

Test Configuration for the out of band emissions testing:



6.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

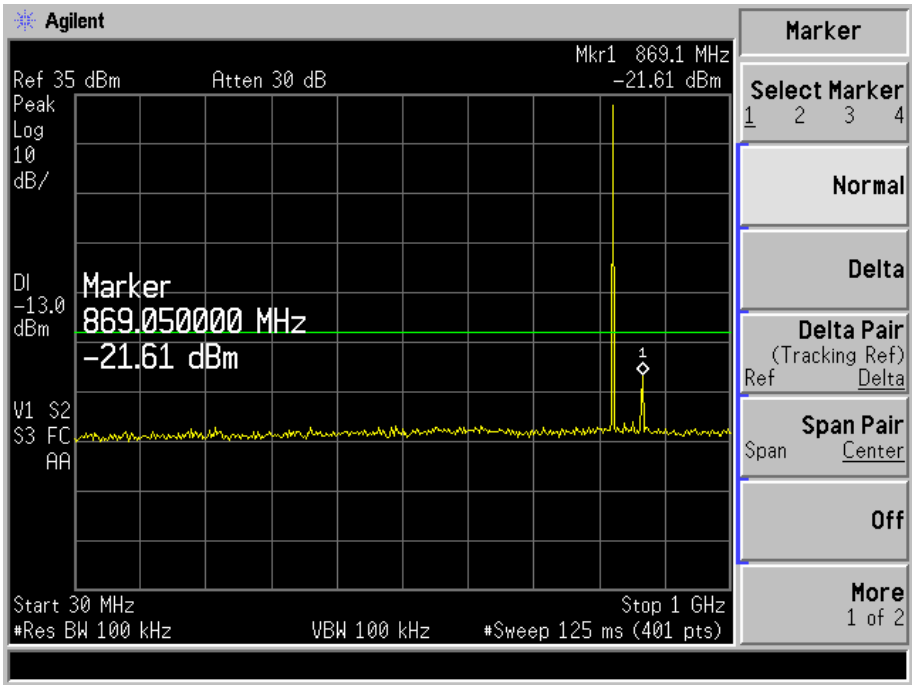
6.5 Summary of Test Results/Plots

Please refer to the following test plots

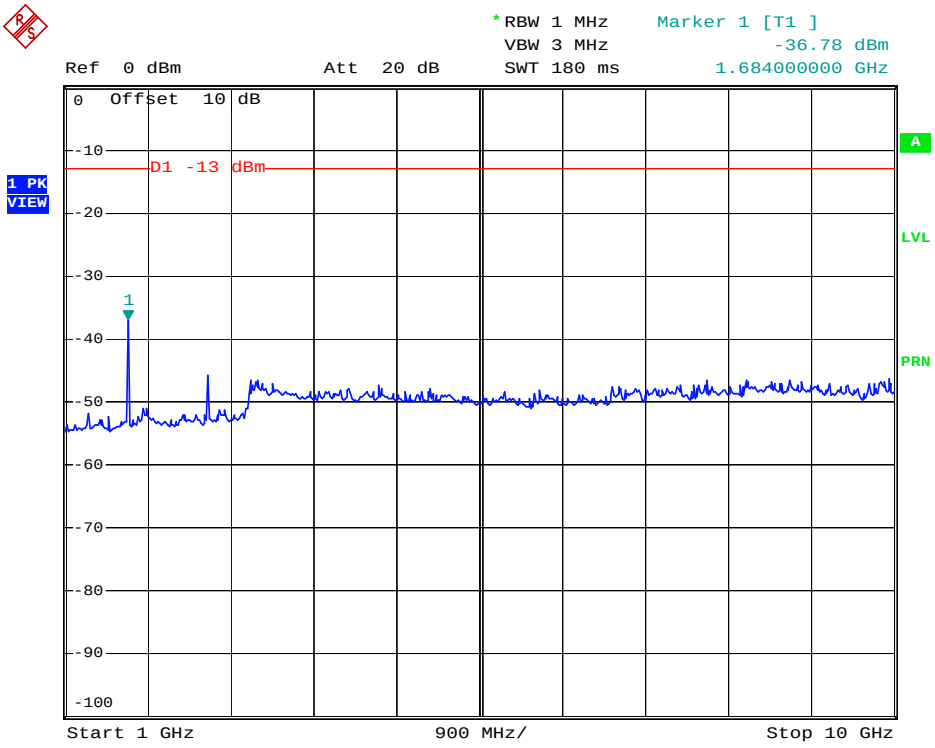
For Cellular Band:

GSM Low Channel

30MHz to 1GHz

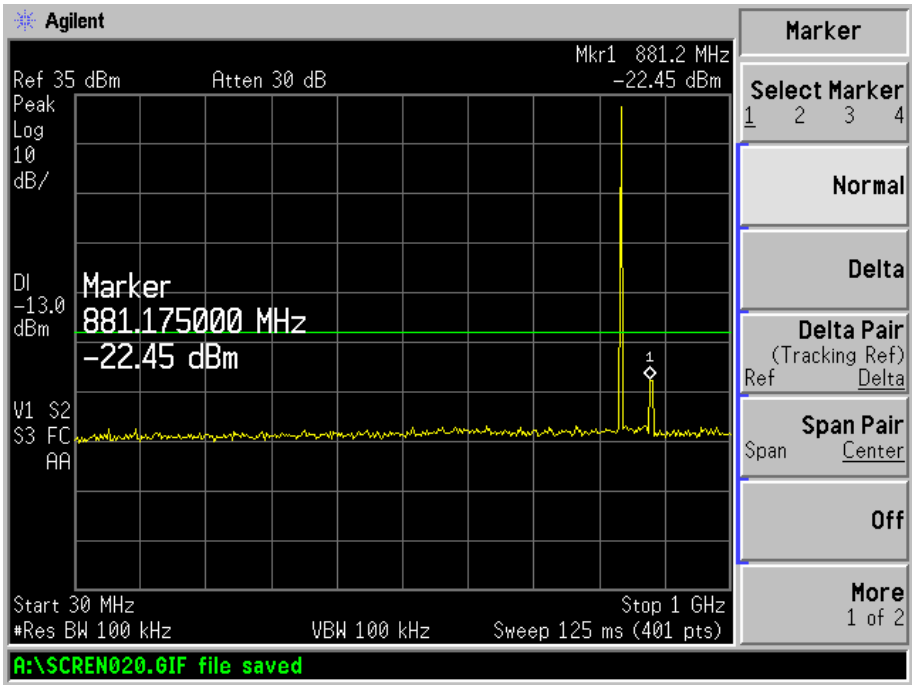


Above 1GHz

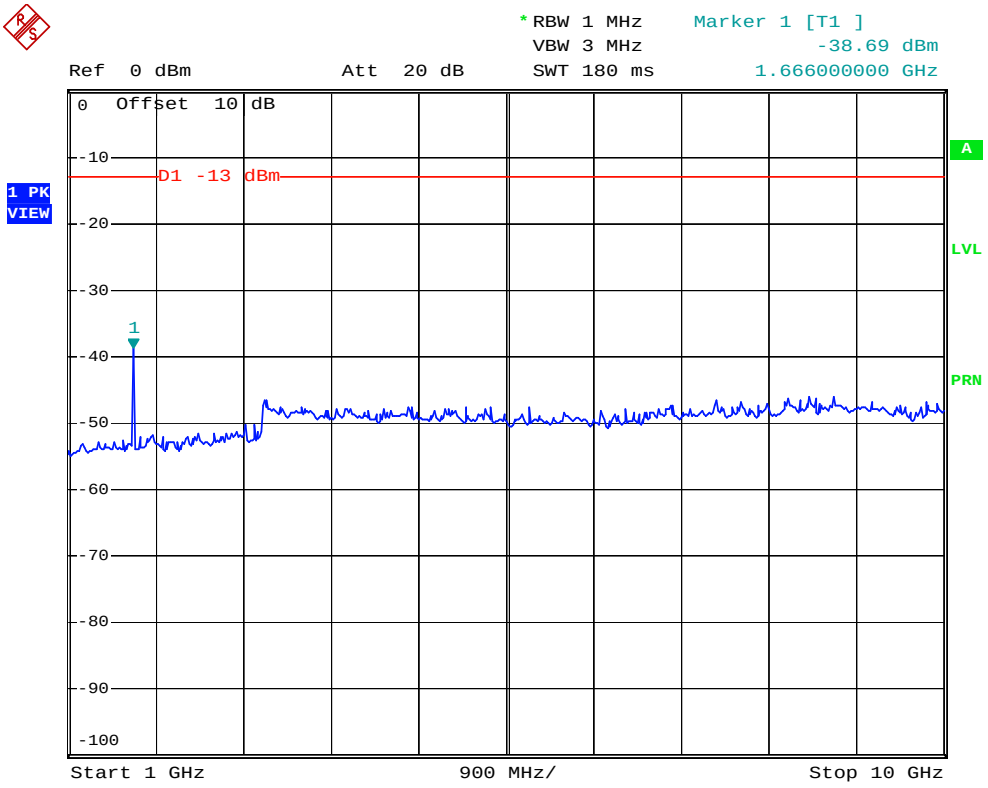


GSM Middle Channel

30MHz to 1GHz

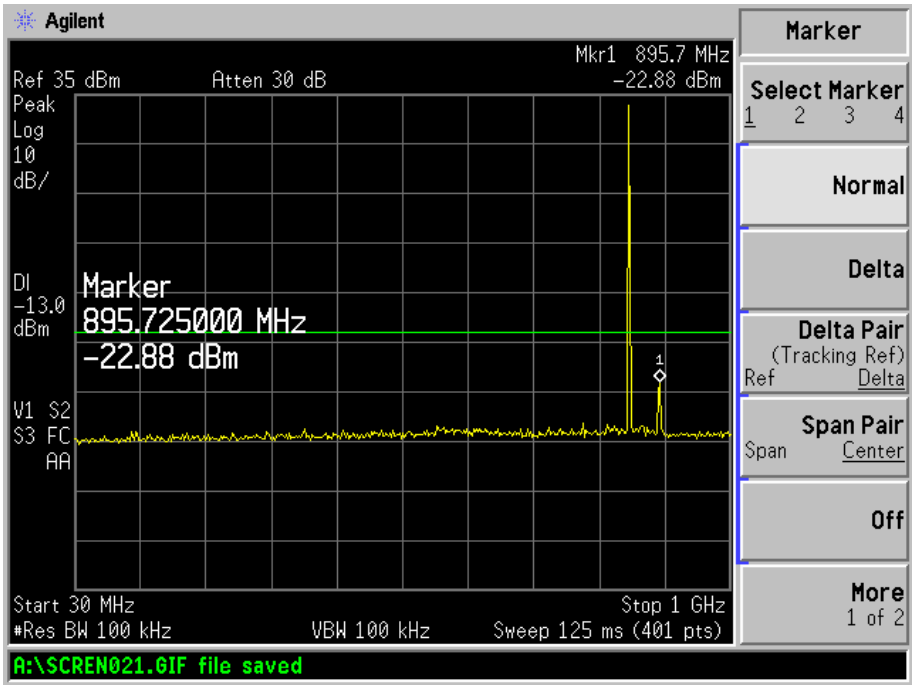


Above 1GHz

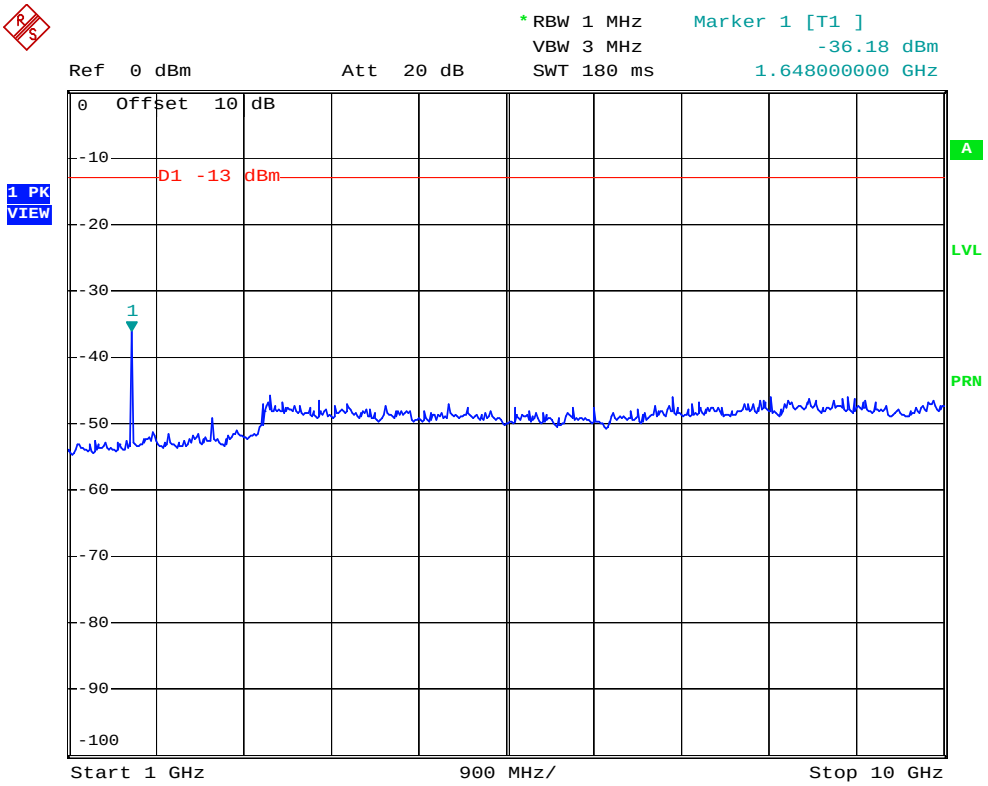


GSM High Channel

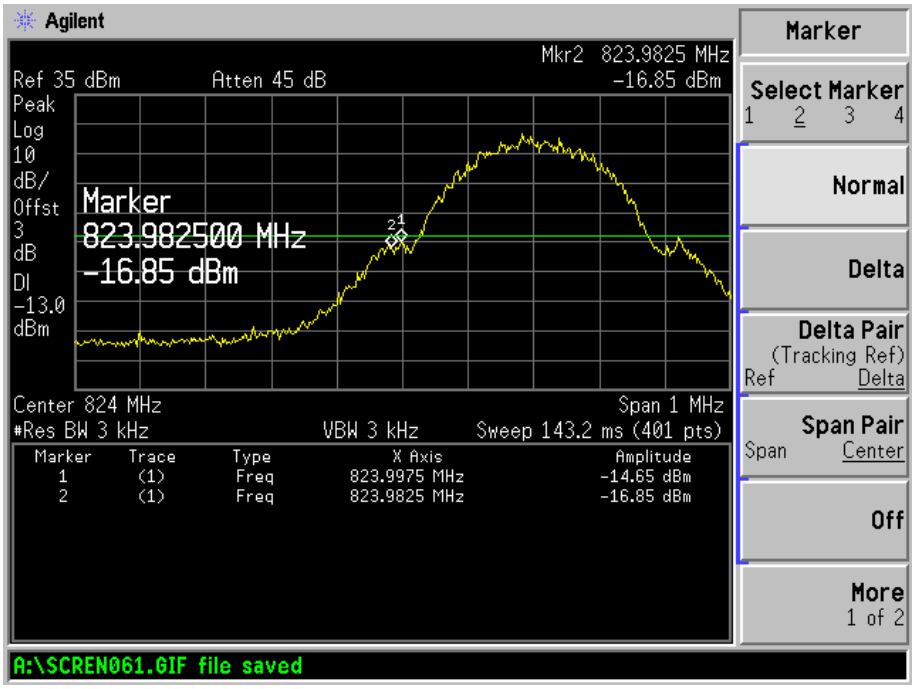
30MHz to 1GHz



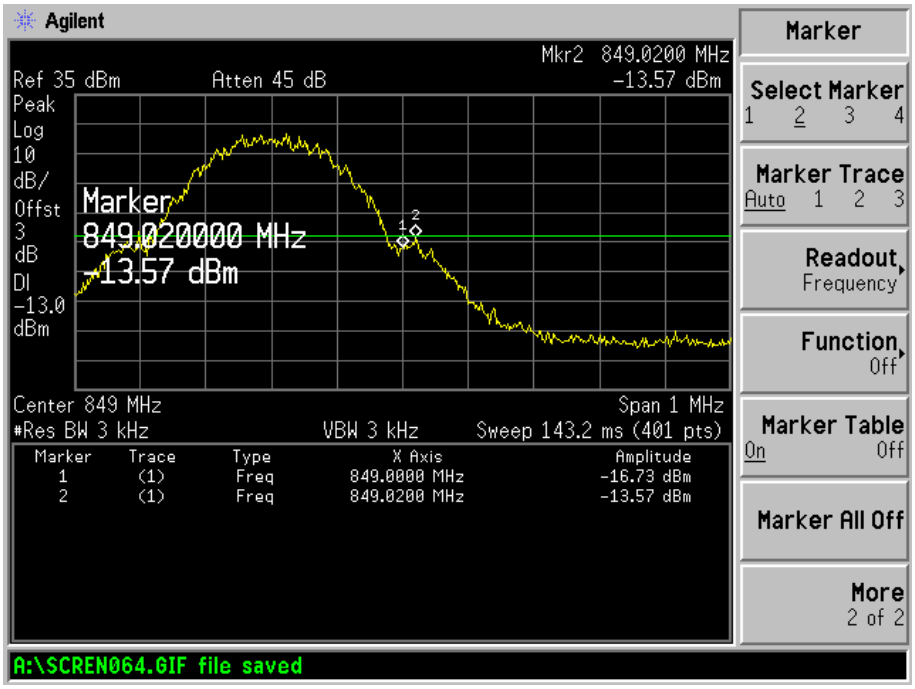
Above 1GHz



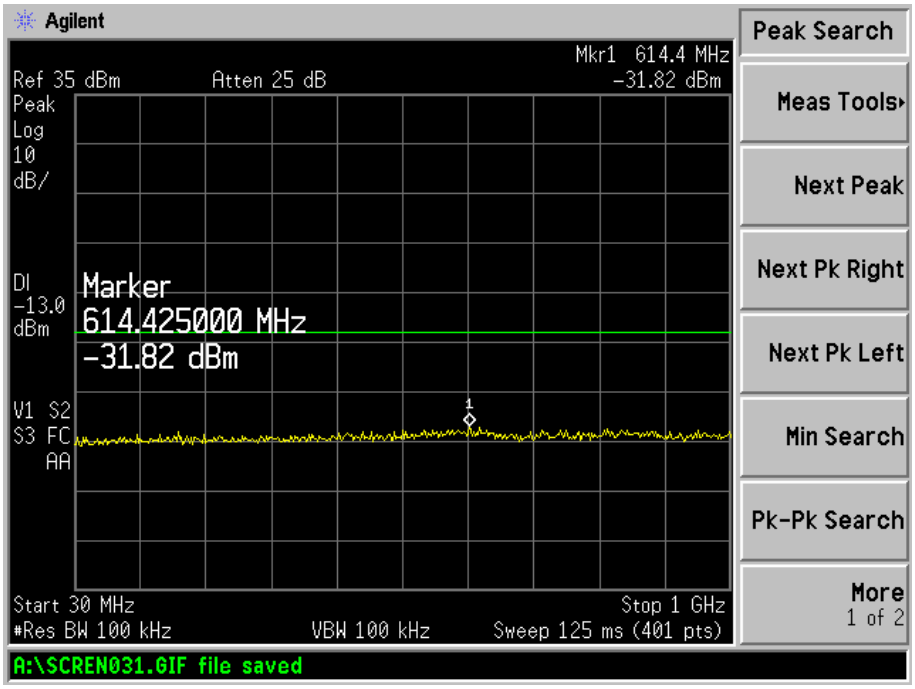
GSM Low Band Emission



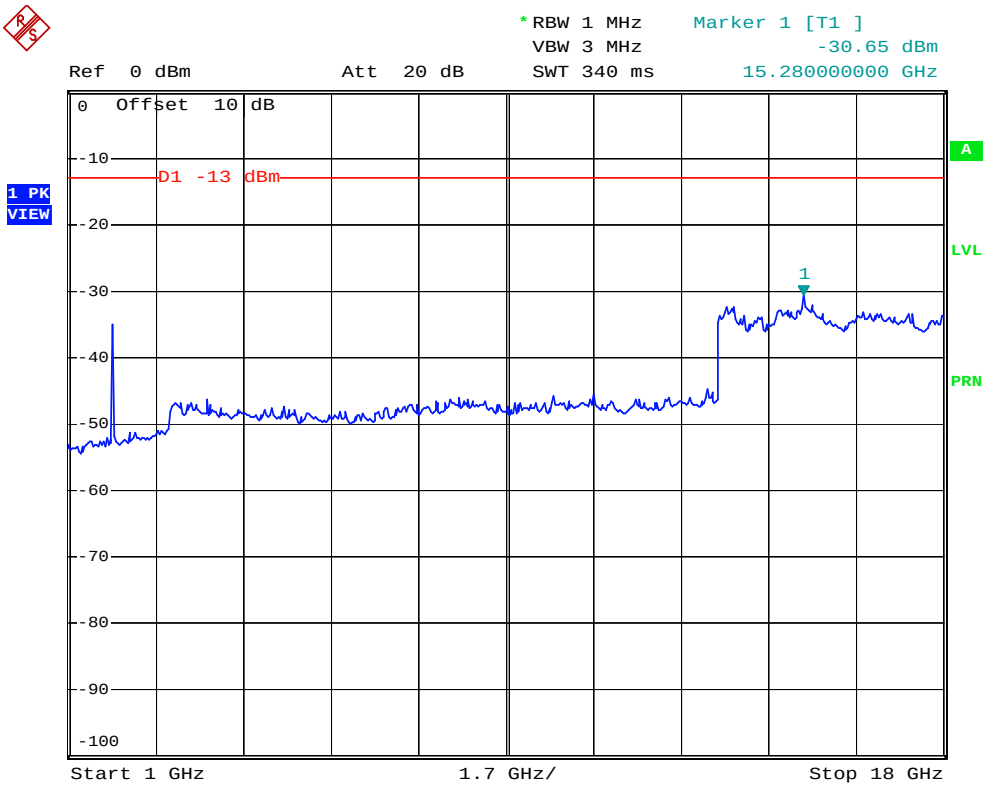
GSM High Band Emission



For PCS Band:
GSM Low Channel
30MHz to 1GHz

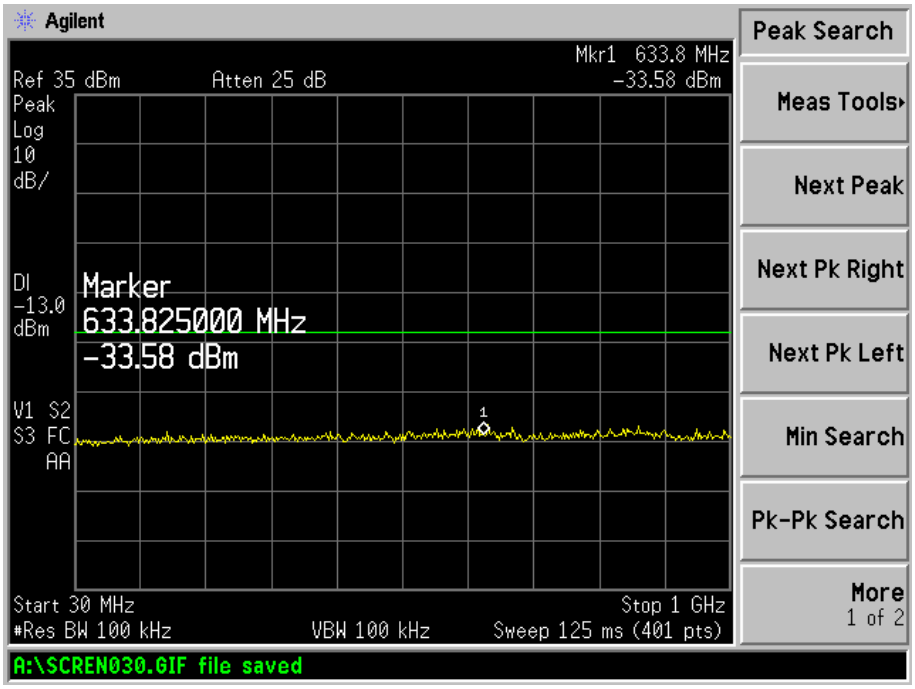


Above 1GHz

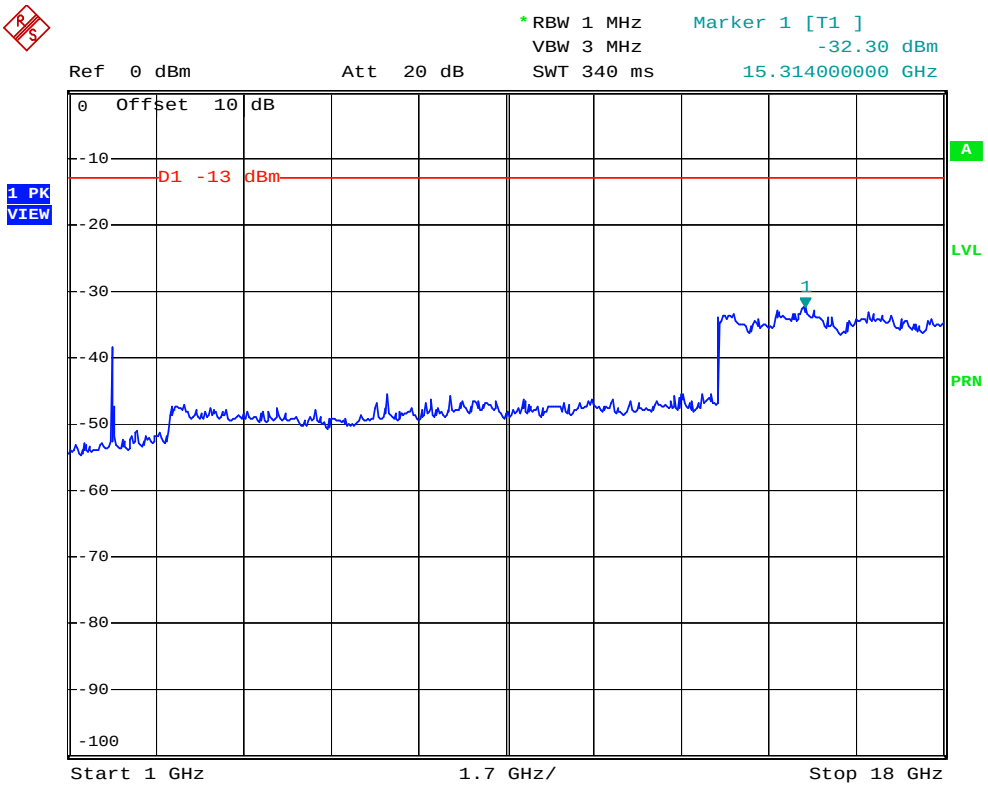


GSM Middle Channel

30MHz to 1GHz

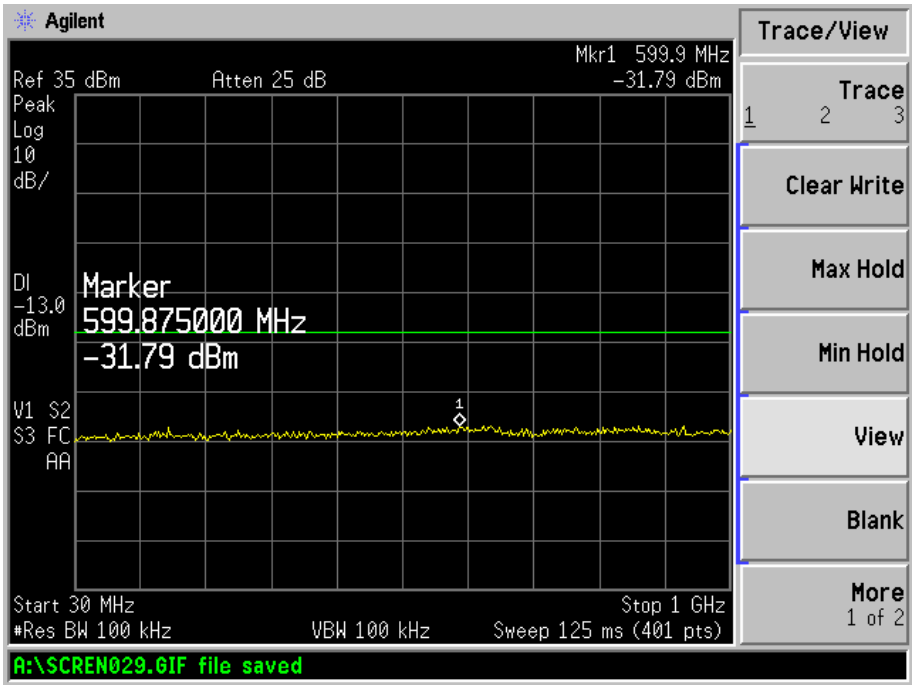


Above 1GHz

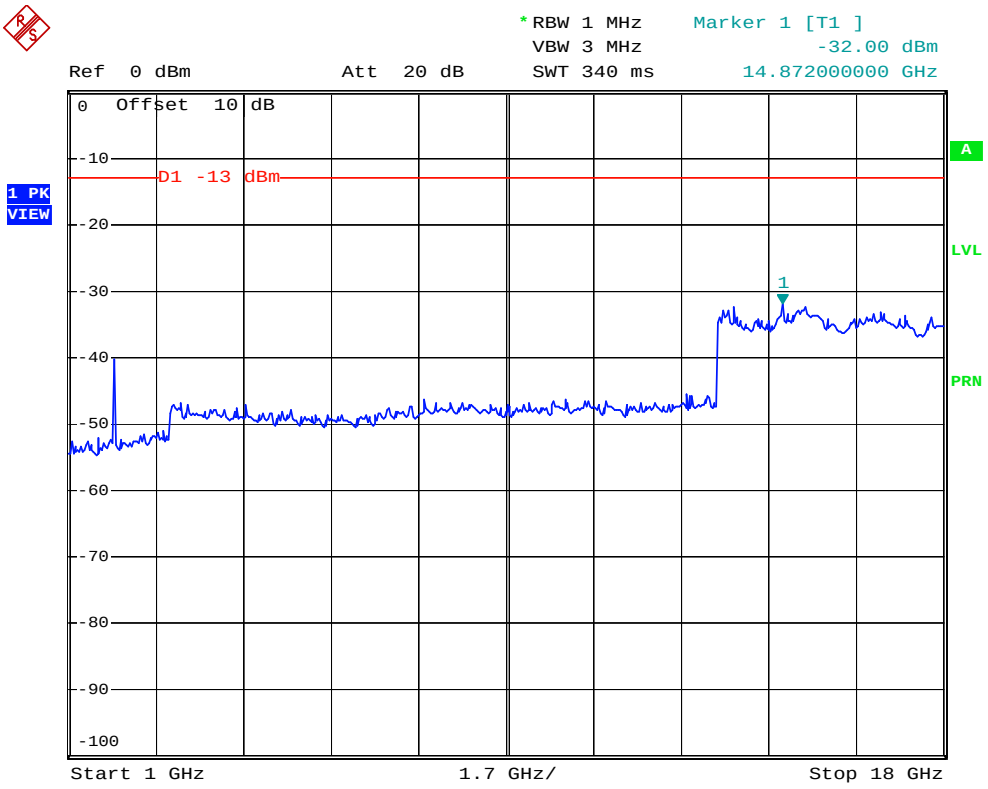


GSM High Channel

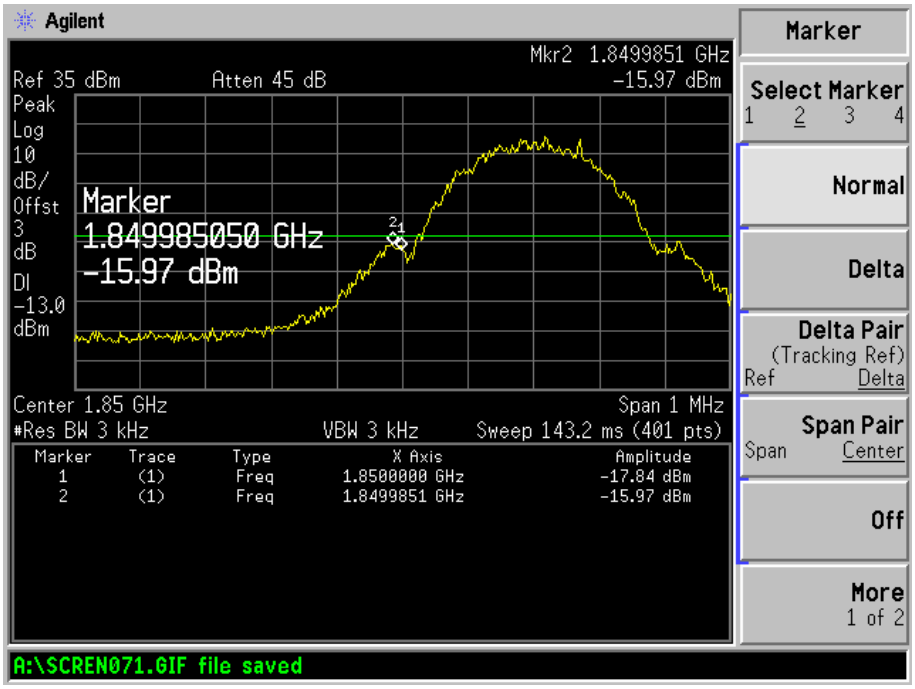
30MHz to 1GHz



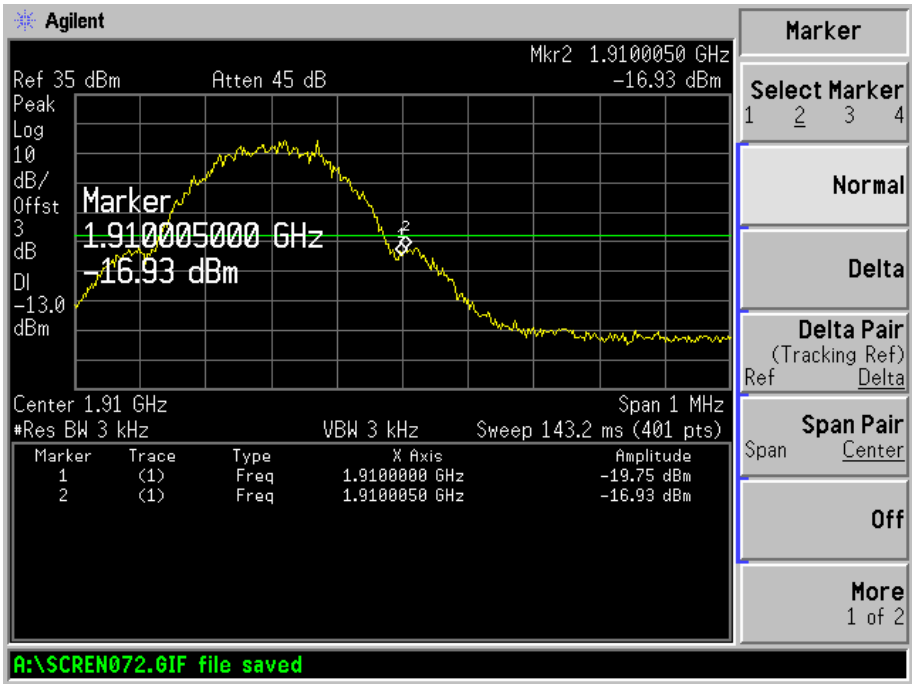
Above 1GHz



GSM Low Band Emission



GSM High Band Emission



7. Spurious Radiated Emissions

7.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±5.20 dB.

7.2 Standard Applicable

According to §22.917(a), 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.

According to §24.238(a), 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.

7.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	112012	2012-03-28	2013-03-27
Signal Generator	R&S	SMR20	100047	2012-03-28	2013-03-27

7.4 Test Procedure

1. The setup of EUT is according with per TIA/EIA Standard 603C and ANSI C63.4-2003 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB =43+10 Log_{10} (power out in Watts)

7.5 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

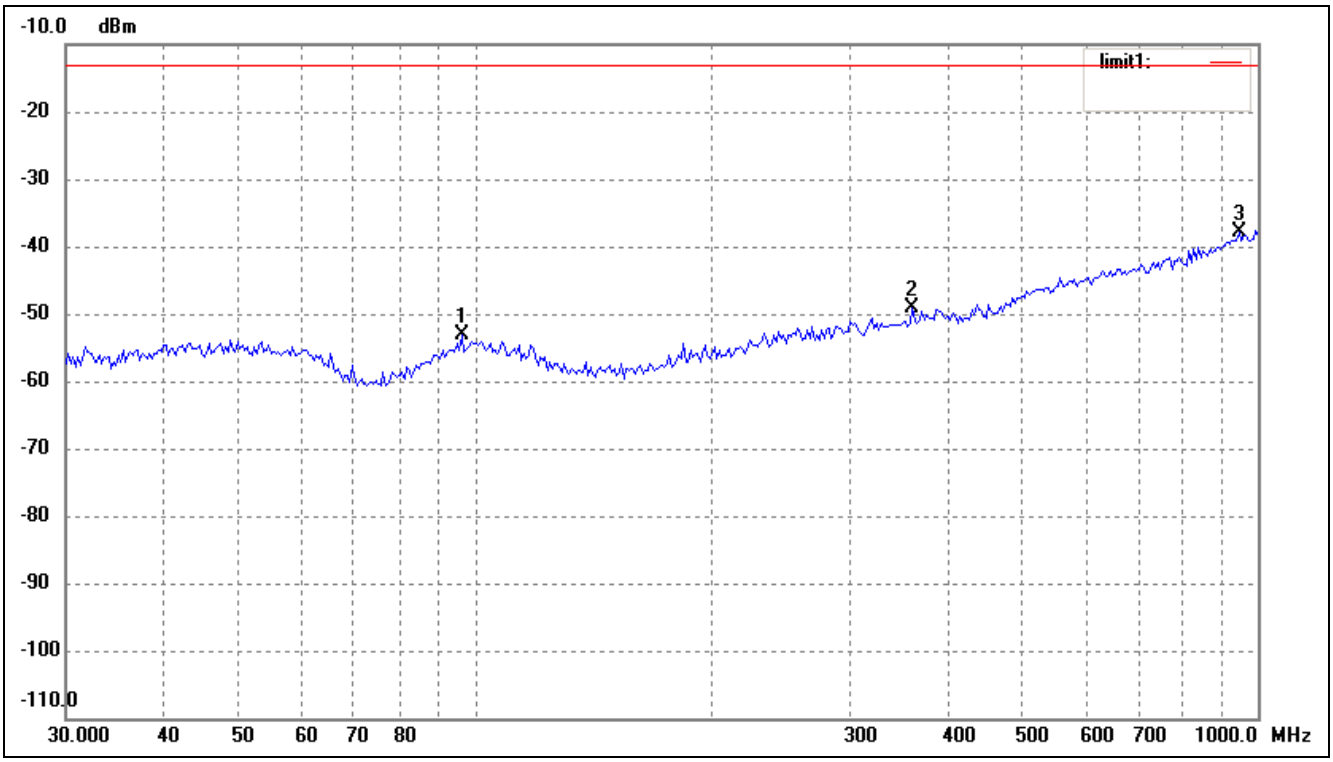
7.6 Summary of Test Results/Plots

According to the data below, the FCC Part 22.917 and 24.238 standards, and had the worst margin of:

-19.7 at **919.2866 MHz** in the **Vertical** polarization for **Cellular Band GSM Mode Middle channel**, **30MHz to 18 GHz.**

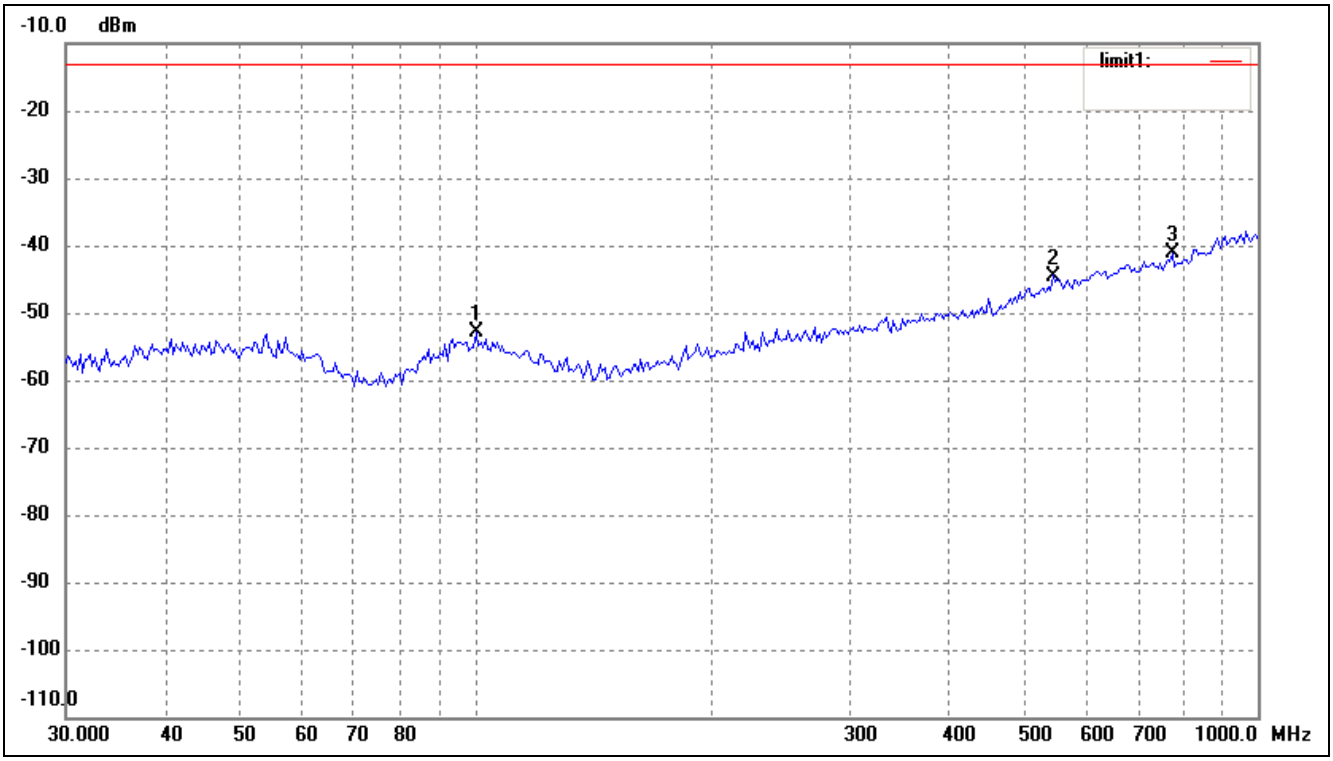
Spurious Emission From 30MHz to 1GHz
For Cellular Band_GSM Mode Low channel

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	96.0986	-73.15	19.94	-53.21	-13.00	-40.21	ERP
2	361.7139	-71.87	22.71	-49.16	-13.00	-36.16	ERP
3	945.4399	-71.50	33.53	-37.97	-13.00	-24.97	ERP

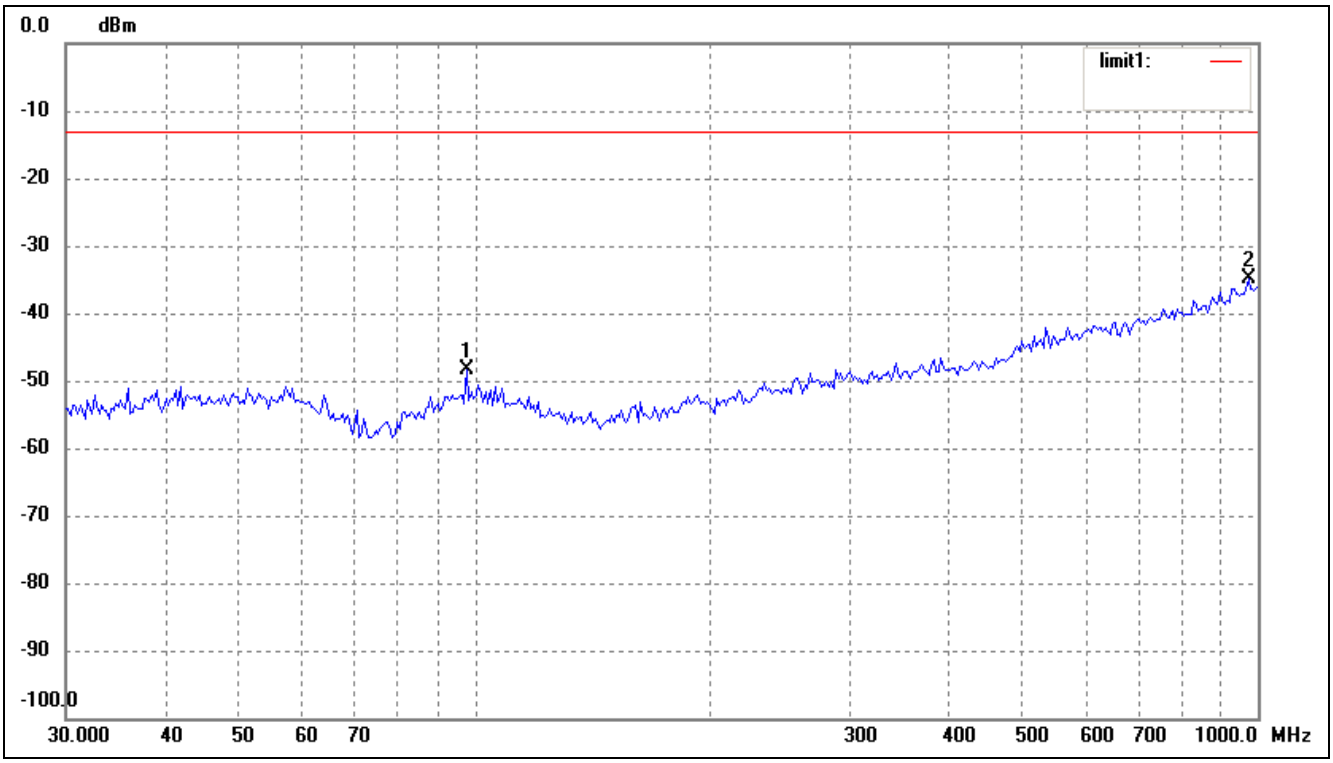
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	100.2286	-73.13	20.21	-52.92	-13.00	-39.92	ERP
2	547.0977	-71.78	27.28	-44.50	-13.00	-31.50	ERP
3	776.8778	-71.53	30.46	-41.07	-13.00	-28.07	ERP

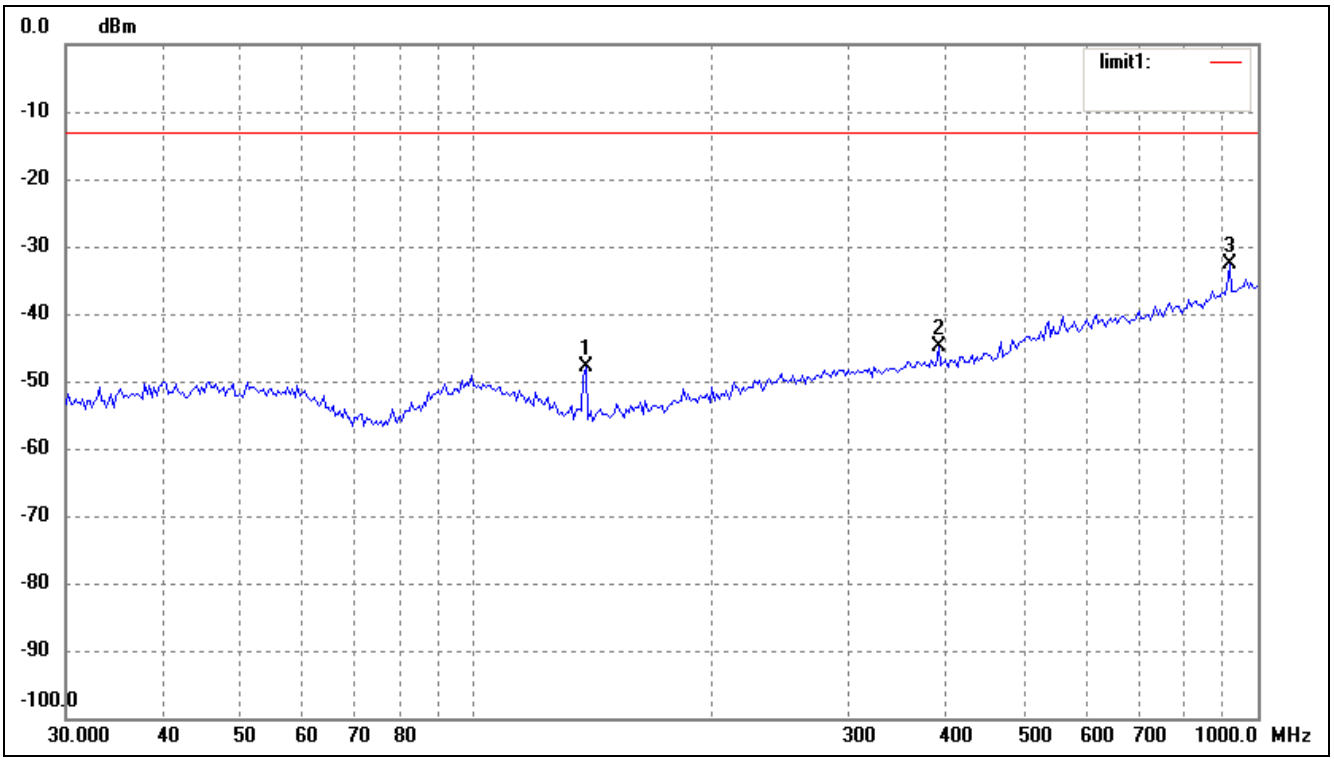
For Cellular Band_GSM Mode Middle channel

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	97.4560	-68.43	20.03	-48.40	-13.00	-35.40	ERP
2	972.3374	-68.82	34.03	-34.79	-13.00	-21.79	ERP

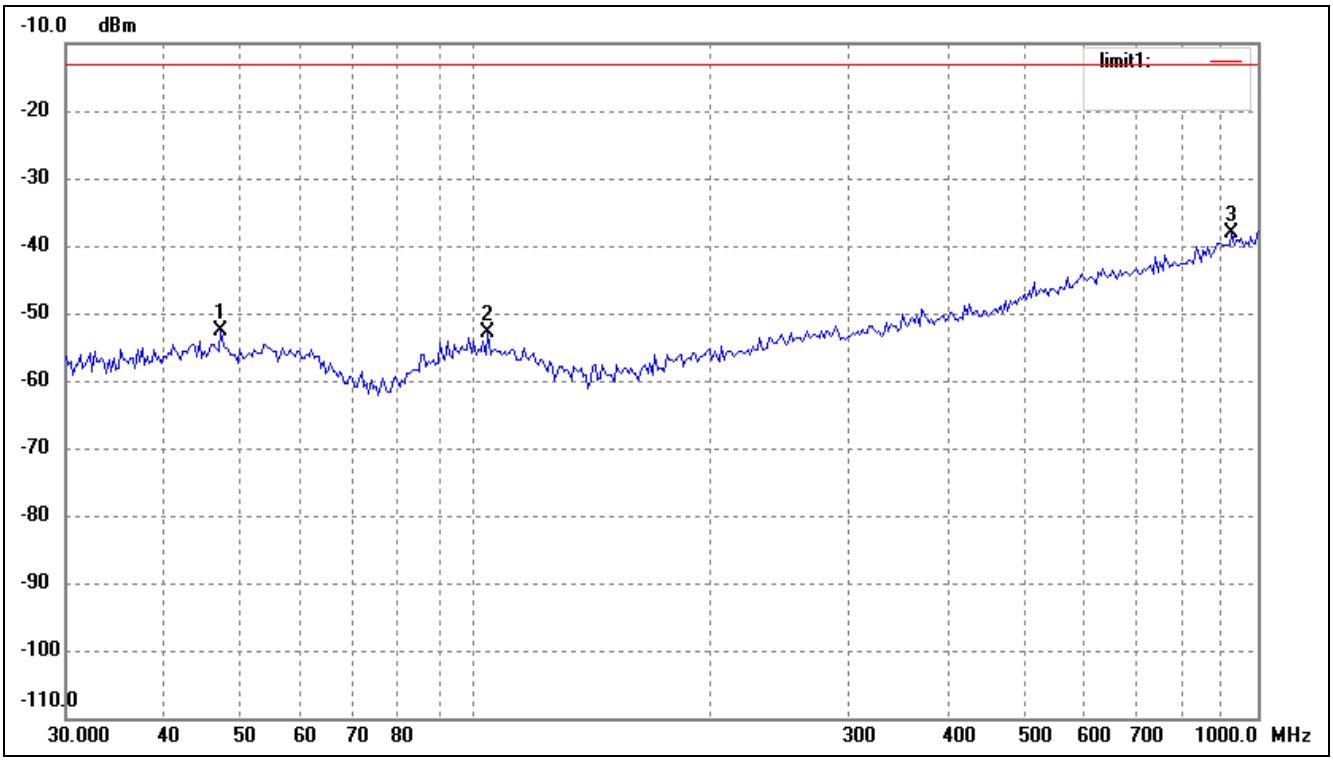
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	138.3873	-63.72	15.86	-47.86	-13.00	-34.86	ERP
2	390.7226	-67.98	23.11	-44.87	-13.00	-31.87	ERP
3	919.2866	-65.76	33.06	-32.70	-13.00	-19.70	ERP

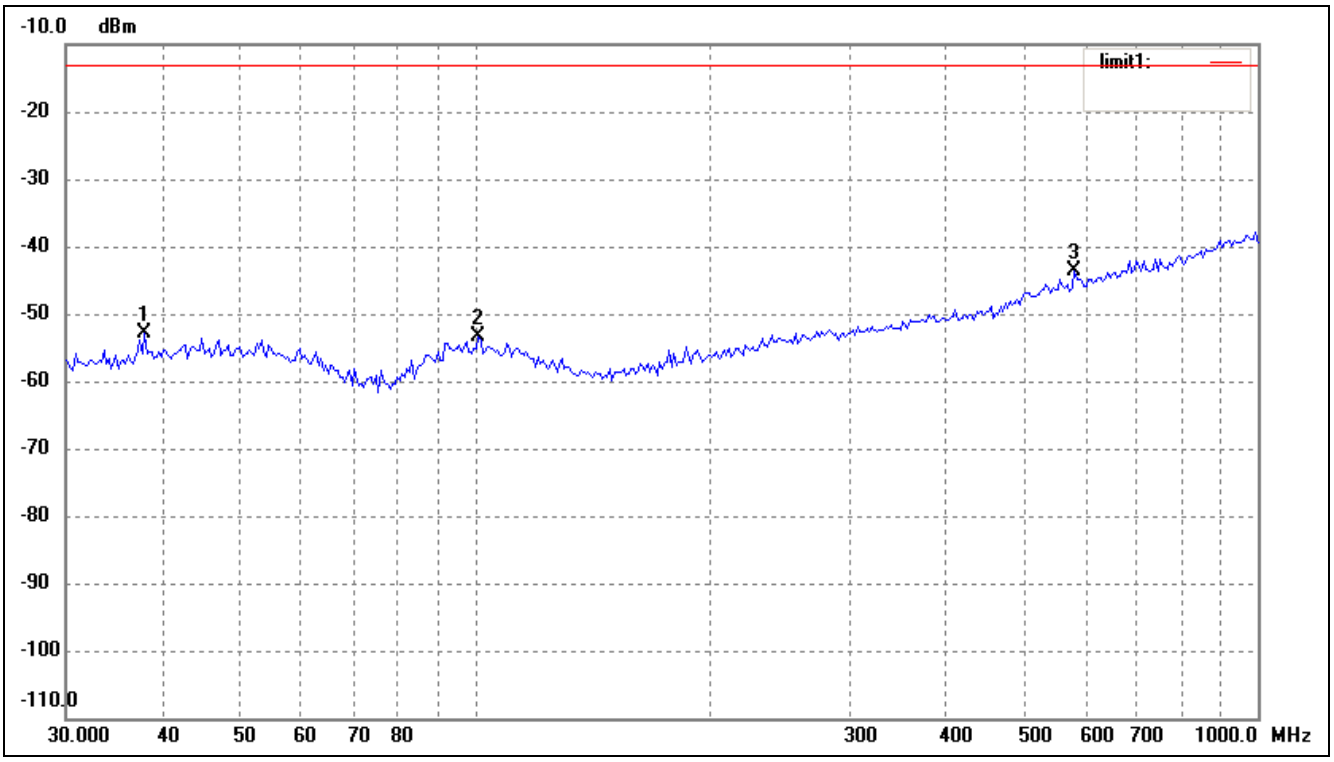
For Cellular Band_GSM Mode High channel

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	47.3255	-72.43	19.91	-52.52	-13.00	-39.52	ERP
2	103.8055	-72.68	19.91	-52.77	-13.00	-39.77	ERP
3	925.7563	-71.32	33.18	-38.14	-13.00	-25.14	ERP

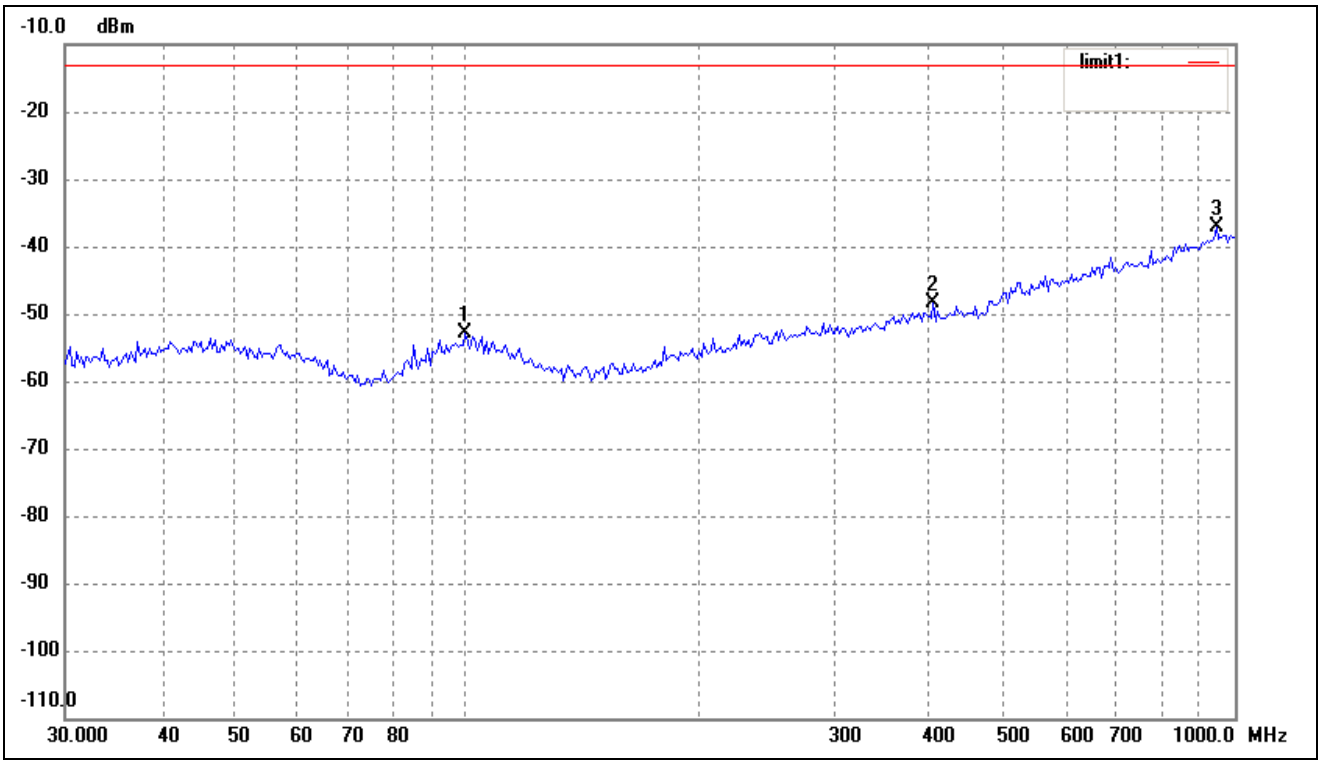
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	37.8121	-72.27	19.34	-52.93	-13.00	-39.93	ERP
2	100.9340	-73.60	20.14	-53.46	-13.00	-40.46	ERP
3	582.7425	-71.71	28.08	-43.63	-13.00	-30.63	ERP

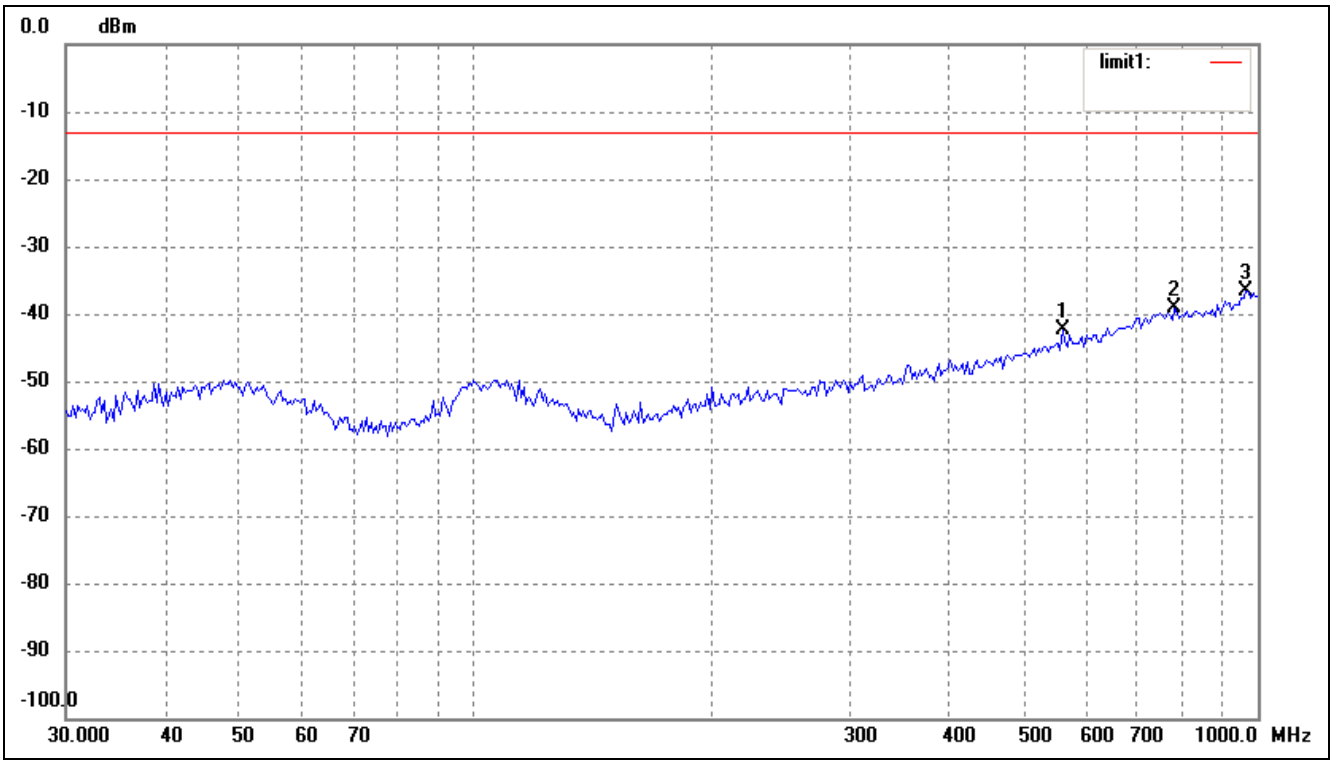
For PCS Band_GSM Mode Low channel

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	99.5281	-73.00	20.20	-52.80	-13.00	-39.80	ERP
2	404.6665	-71.52	23.20	-48.32	-13.00	-35.32	ERP
3	945.4399	-70.76	33.53	-37.23	-13.00	-24.23	ERP

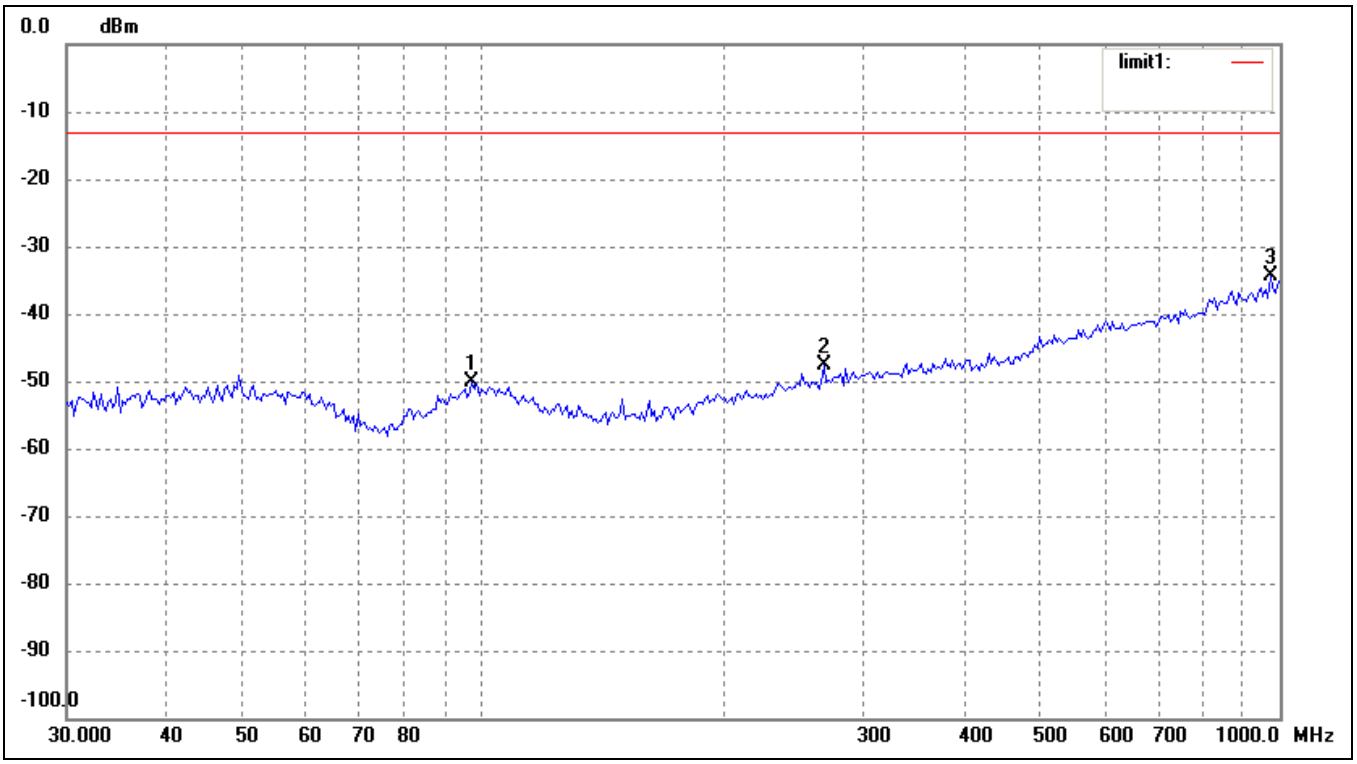
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	562.6624	-70.04	27.63	-42.41	-13.00	-29.41	ERP
2	782.3452	-69.70	30.54	-39.16	-13.00	-26.16	ERP
3	965.5421	-70.58	33.90	-36.68	-13.00	-23.68	ERP

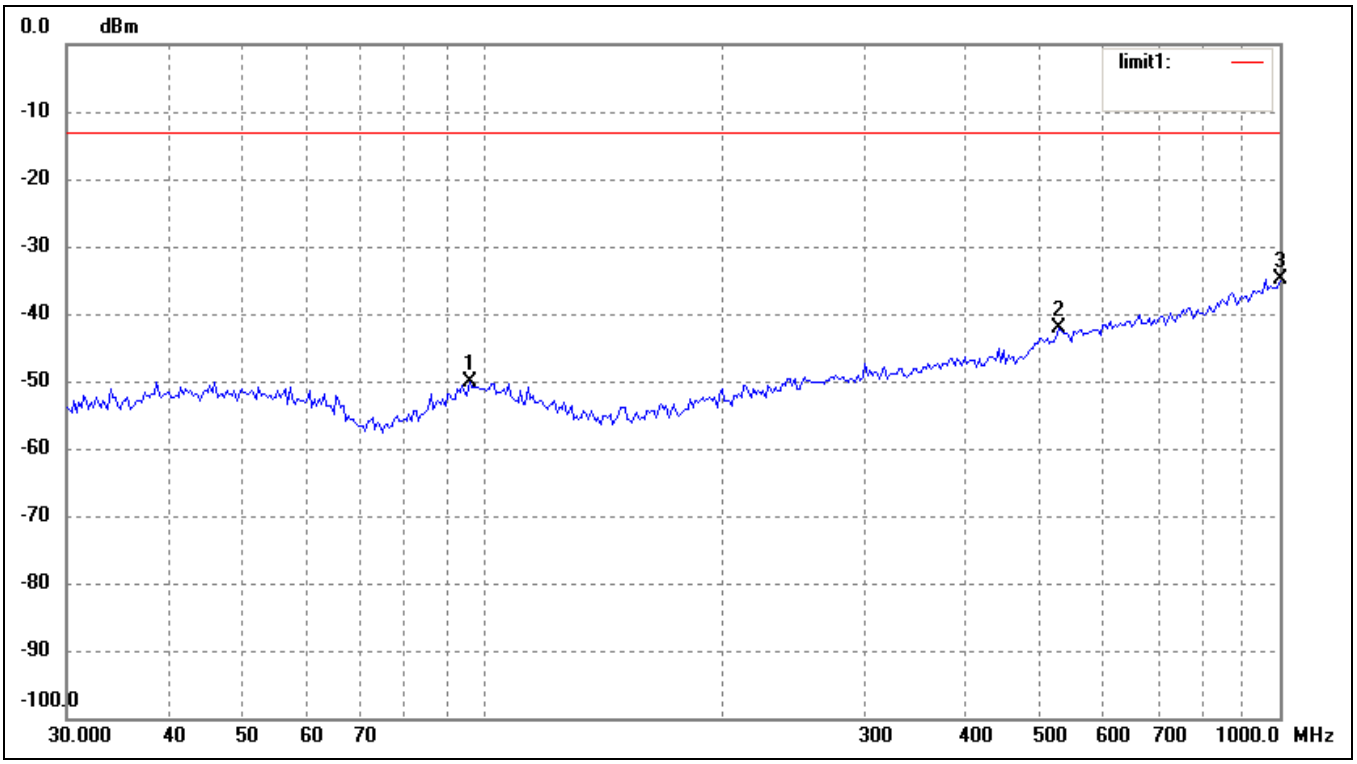
For PCS Band_GSM Mode Middle channel

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	96.7749	-70.04	19.99	-50.05	-13.00	-37.05	ERP
2	267.5455	-68.68	20.97	-47.71	-13.00	-34.71	ERP
3	972.3374	-68.46	34.03	-34.43	-13.00	-21.43	ERP

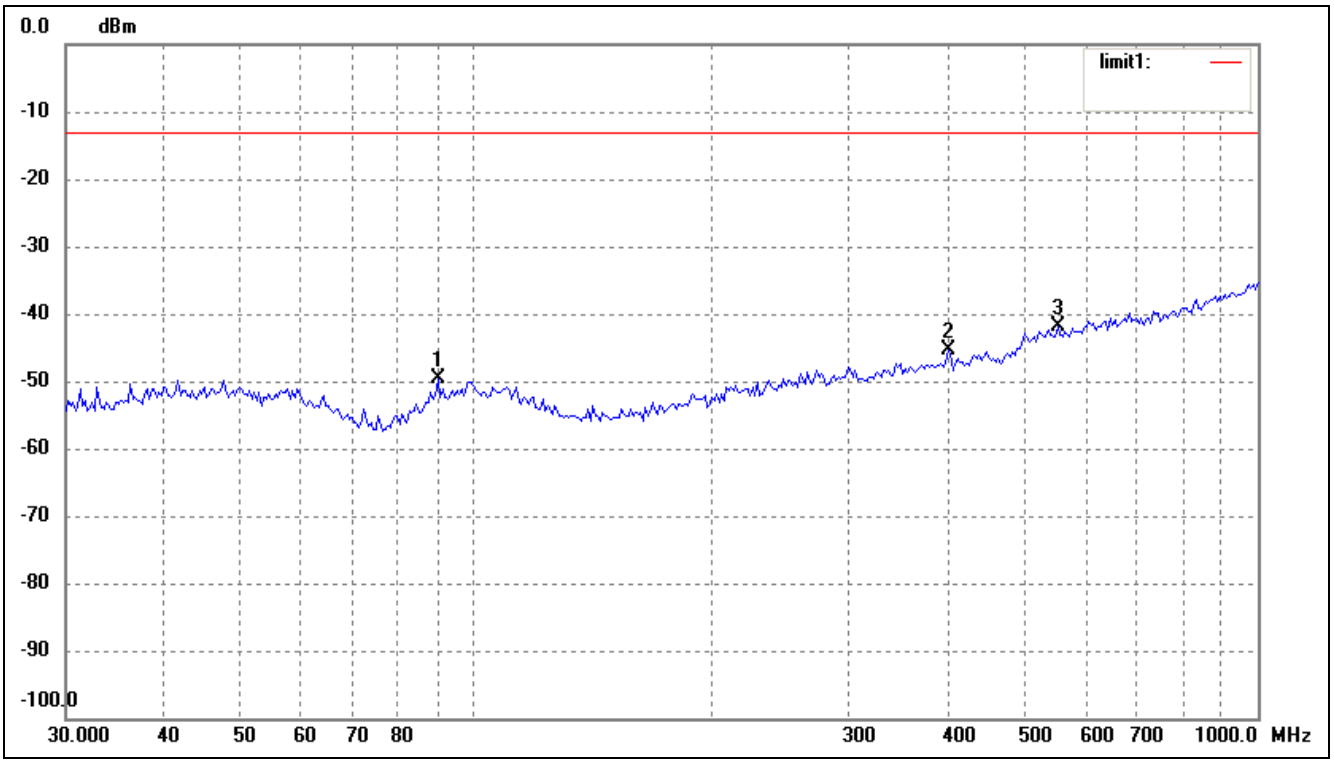
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	96.0986	-70.13	19.94	-50.19	-13.00	-37.19	ERP
2	528.2458	-68.98	26.86	-42.12	-13.00	-29.12	ERP
3	1000.0000	-69.34	34.54	-34.80	-13.00	-21.80	ERP

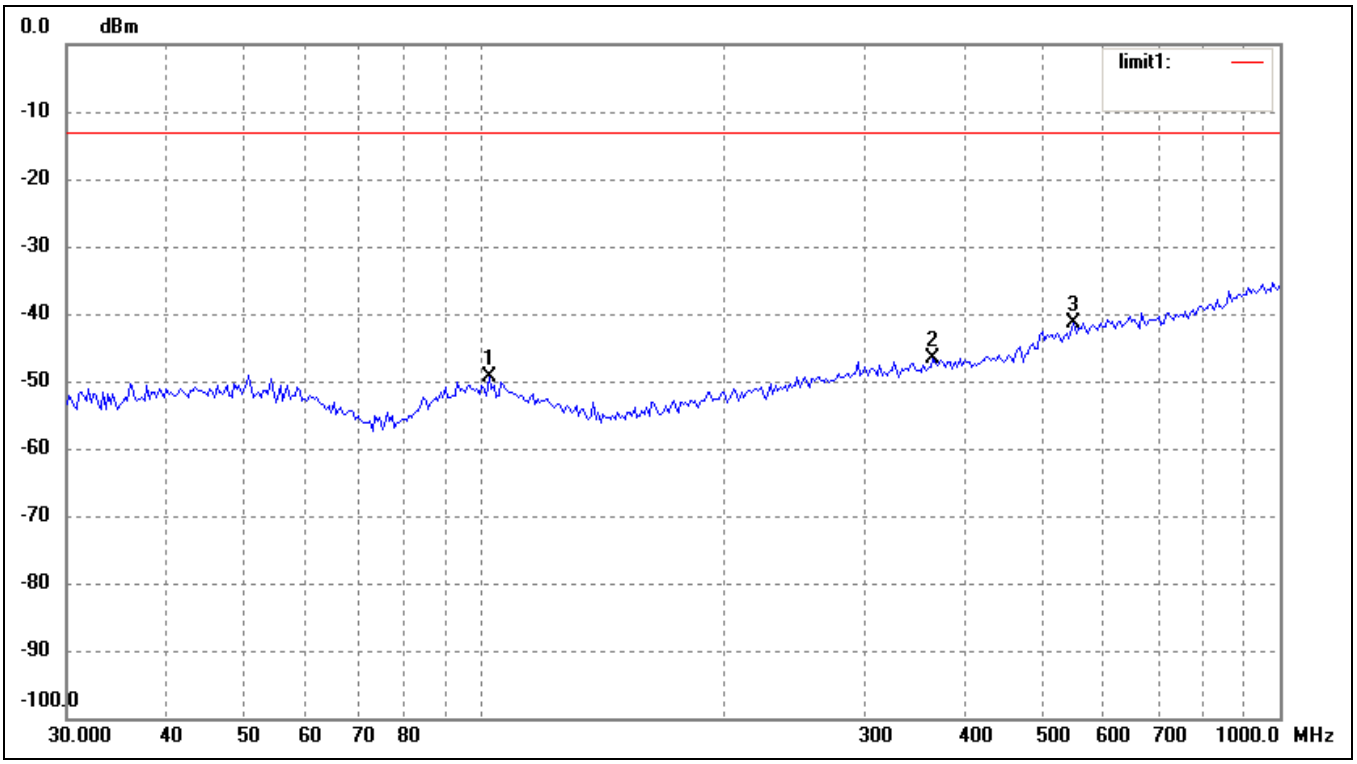
For PCS Band_GSM Mode High channel

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	89.5900	-68.46	18.75	-49.71	-13.00	-36.71	ERP
2	401.8385	-68.66	23.20	-45.46	-13.00	-32.46	ERP
3	554.8254	-69.43	27.45	-41.98	-13.00	-28.98	ERP

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	101.6443	-69.58	20.09	-49.49	-13.00	-36.49	ERP
2	366.8231	-69.48	22.79	-46.69	-13.00	-33.69	ERP
3	550.9480	-68.64	27.37	-41.27	-13.00	-28.27	ERP

Spurious Emissions Above 1GHz

For Cellular Band_GSM Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (824.2MHz)						
1648.4	-41.8	5.8	-36.0	-13	-23.0	H
2472.6	-45.8	4.5	-40.3	-13	-27.3	H
1648.4	-44.2	5.8	-38.4	-13	-25.4	V
2472.6	-46.8	4.5	-41.3	-13	-28.3	V
Middle Channel (836.6MHz)						
1673.2	-42.2	5.7	-36.5	-13	-23.5	H
2509.8	-45.9	5.4	-40.5	-13	-27.5	H
1673.2	-44.5	5.7	-38.8	-13	-25.8	V
2509.8	-47.5	5.4	-42.1	-13	-29.1	V
High Channel (848.8MHz)						
1697.6	-42.1	5.6	-36.5	-13	-23.5	H
2546.4	-45.8	5.3	-40.5	-13	-27.5	H
1697.6	-43.2	5.6	-37.6	-13	-24.6	V
2546.4	-47.1	5.3	-41.8	-13	-28.8	V

For PCS Band_GSM Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1850.2MHz)						
3700.4	-42.1	5.4	-36.7	-13	-23.7	H
5550.6	-47.2	4.9	-42.3	-13	-29.3	H
3700.4	-43.9	5.4	-38.5	-13	-25.5	V
5550.6	-47.9	4.9	-43.0	-13	-30.0	V
Middle Channel (1880MHz)						
3760.0	-42.0	5.5	-36.5	-13	-23.5	H
5640.0	-46.0	4.9	-41.0	-13	-28.0	H
3760.0	-44.2	5.5	-38.7	-13	-25.7	V
5640.0	-47.3	4.9	-42.3	-13	-29.3	V
High Channel (1909.8MHz)						
3819.6	-41.0	4.5	-35.5	-13	-22.5	H
5729.4	-44.8	5.0	-39.8	-13	-26.8	H
3819.6	-43.7	4.5	-38.2	-13	-25.2	V
5729.4	-45.5	5.0	-40.5	-13	-27.5	V

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 10th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

8. Frequency Stability

8.1 Standard Applicable

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Cellular Band

Frequency range (MHz)	Base, fixed (ppm)	Mobile ≤3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

8.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B-ESA	US41192821	2012-03-28	2013-03-27
Rohde & Schwarz	Universal Radio Communication	CMU200	112012	2012-03-28	2013-03-27
GONGWEN	Moisture Test Chamber	GDS-150	SEMT-0013	2012-03-28	2013-03-27

8.3 Test Procedure

According to §2.1055, the following test procedure was performed.
The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.
The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

Temperature:	Supply Voltage
20°C	85-115% of declared nominal voltage
-30°C to +50°C	Normal

8.4 Environmental Conditions

Temperature:	20°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

8.5 Summary of Test Results/Plots

For Cellular Band GSM Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-33	-0.0394
40	3.7	-26	-0.0311
30	3.7	20	0.0239
20	3.7	-20	-0.0239
10	3.7	-22	-0.0263
0	3.7	-25	-0.0299
-10	3.7	25	0.0299
-20	3.7	32	0.0383
-30	3.7	40	0.0478

For PCS Band GSM Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-37	-0.0197
40	3.7	-33	-0.0176
30	3.7	-27	-0.0144
20	3.7	-26	-0.0138
10	3.7	-34	-0.0181
0	3.7	-38	-0.0202
-10	3.7	-48	-0.0255
-20	3.7	-48	-0.0255
-30	3.7	-52	-0.0277

So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): GSM 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-18	-0.0215
	3.7	-20	-0.0239
	4.2	-20	-0.0239
Reference Frequency(Middle Channel): GSM 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-35	-0.0186
	3.7	-26	-0.0138
	4.2	-33	-0.0176

9. §15.107 (a) CONDUCTED EMISSIONS

9.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

9.2 Test Equipment List and Details

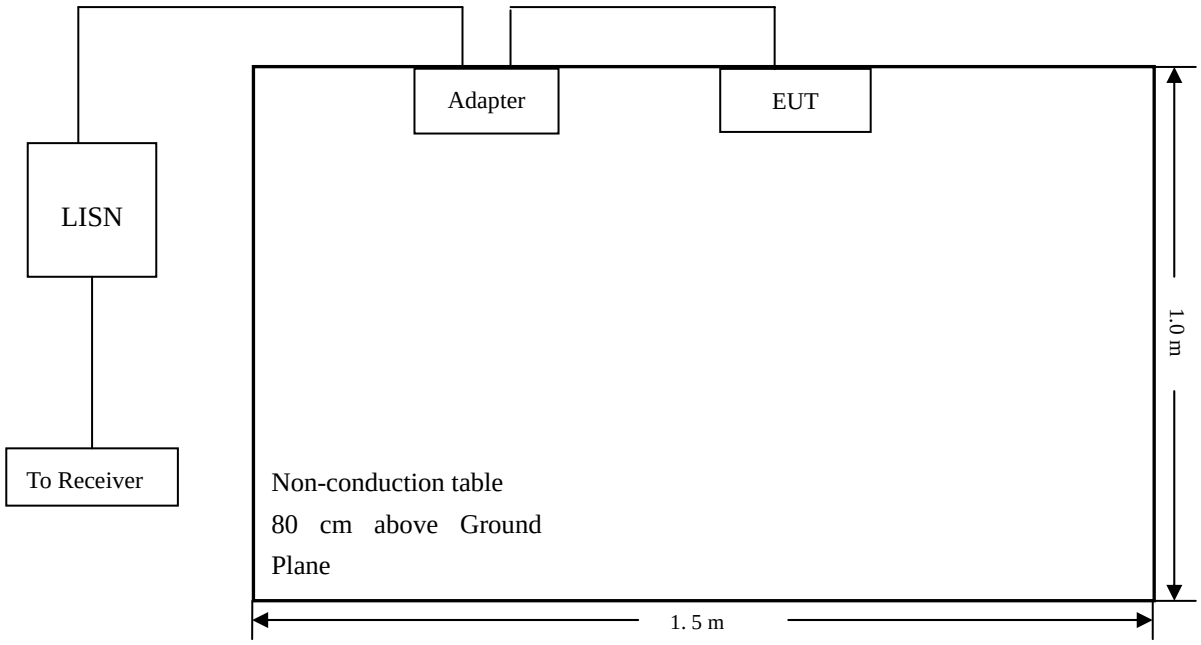
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2012-03-28	2013-03-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2012-03-28	2013-03-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2012-03-28	2013-03-27

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

9.3 Test Procedure

Test is conducting under the description of ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

9.4 Basic Test Setup Block Diagram



9.5 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

9.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

-9.89 dBμV at **2.022 MHz** in the **Line**, **Peak** detector, 0.15-30MHz

9.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

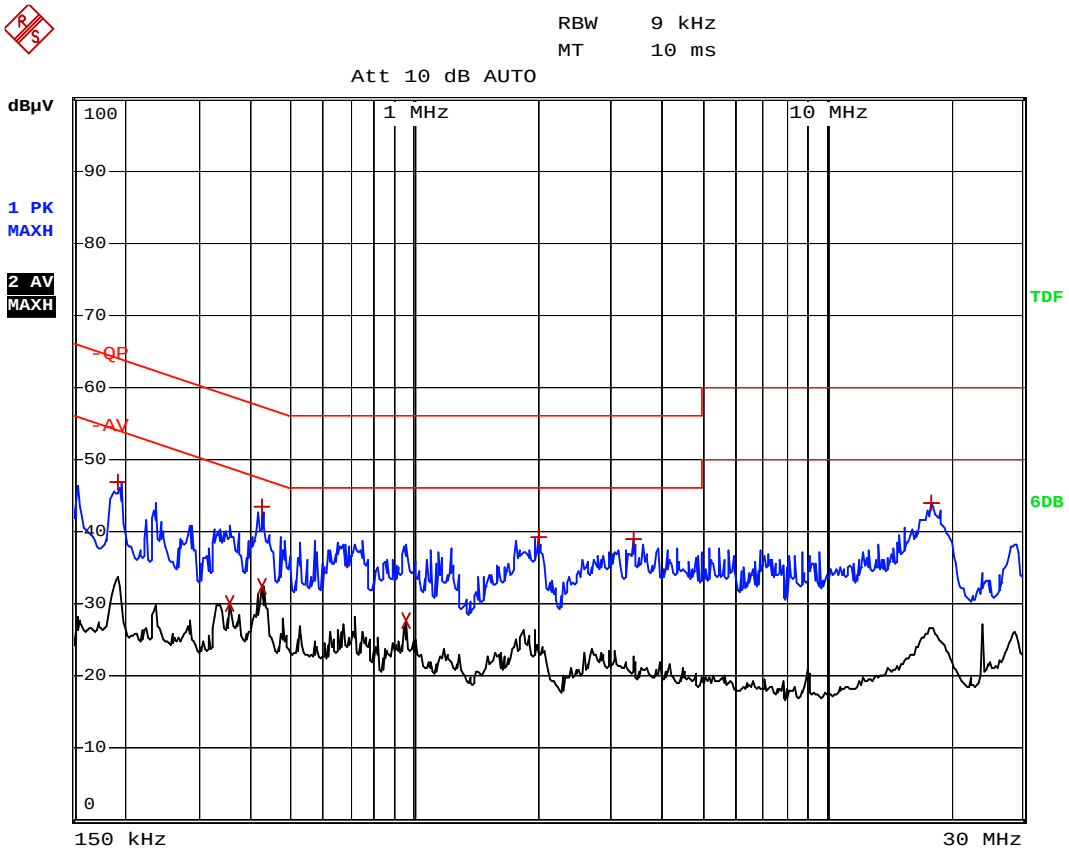
EUT: *SMARTBEL*

Tested Model: *76278235*

Operating Condition: *Charging & Operating*

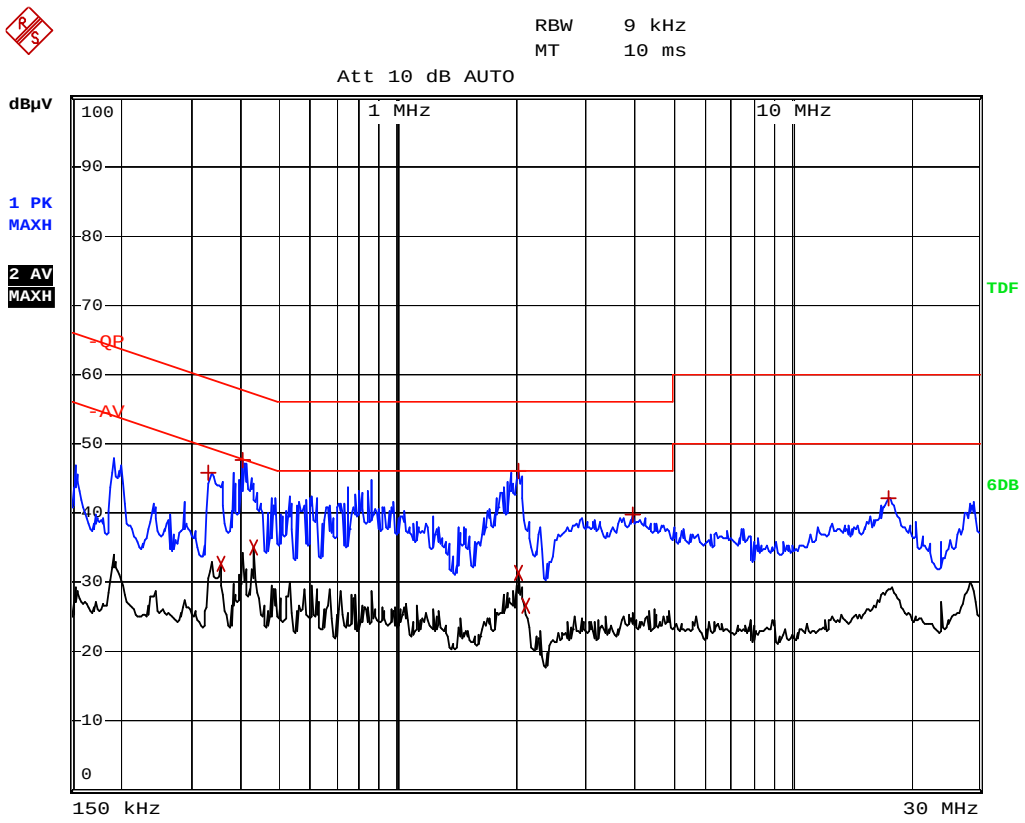
Comment: *AC 120V/60Hz; adapter DC 5V*

Test Specification: *Neutral*



EDIT PEAK LIST (Prescan Results)			
Trace1:	-QP		
Trace2:	-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Max Peak	194 kHz	46.93	-16.93
2 Average	354 kHz	30.01	-18.85
1 Max Peak	426 kHz	43.33	-13.99
2 Average	426 kHz	32.50	-14.82
2 Average	950 kHz	27.64	-18.36
1 Max Peak	2.002 MHz	39.12	-16.87
1 Max Peak	3.414 MHz	38.85	-17.14
1 Max Peak	18.13 MHz	43.92	-16.07

Test Specification: *Line*



EDIT PEAK LIST (Prescan Results)

Trace1:	-QP
Trace2:	-AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Max Peak	334 kHz	45.81	-13.54
2 Average	354 kHz	32.77	-16.09
1 Max Peak	402 kHz	47.67	-10.14
2 Average	430 kHz	35.16	-12.08
1 Max Peak	2.022 MHz	46.10	-9.89
2 Average	2.022 MHz	31.28	-14.72
2 Average	2.122 MHz	26.71	-19.28
1 Max Peak	3.97 MHz	39.64	-16.35
1 Max Peak	17.742 MHz	42.18	-17.81

10. §15.109(a)- RADIATED EMISSION

10.1 Measurement Uncertainty

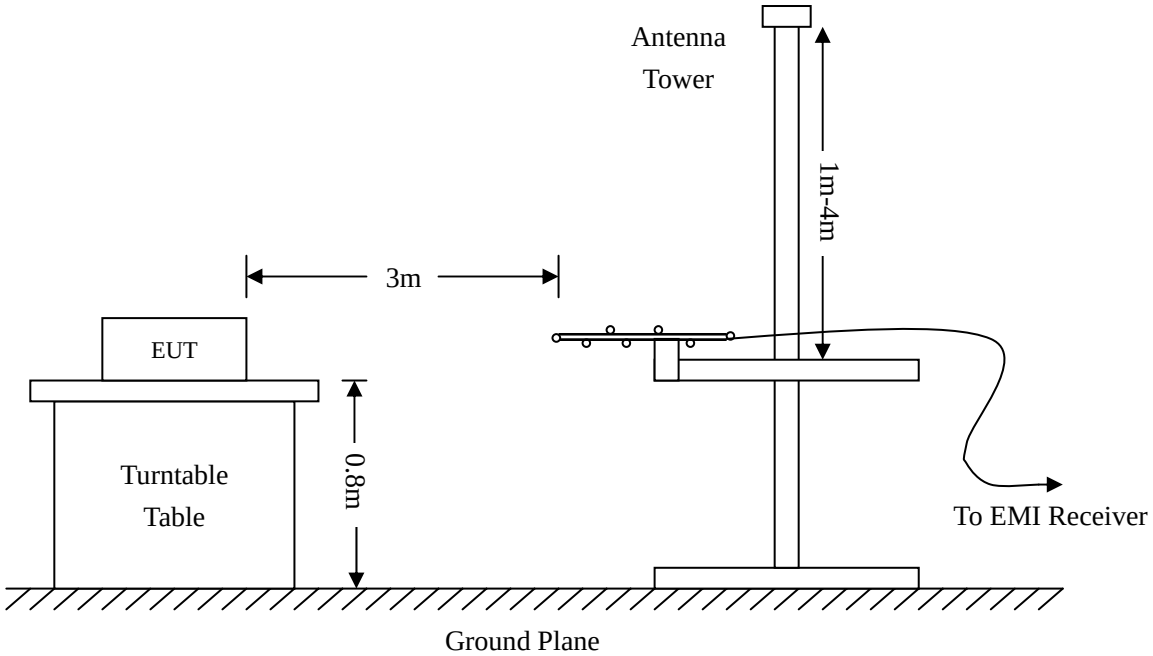
Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 5.10 dB.

10.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2012-03-28	2013-03-27
EMI Test Receiver	R&S	ESVB	825471/005	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24

10.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.109 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.



10.4 Test Receiver Setup

During the radiated emission test for above 1GHz, the test receiver was set with the following configurations:

For peak detector:
RBW = 1000kHz, VBW = 3000kHz, Sweep Time = Auto

For average detector:
RBW = 1000kHz, VBW = 10Hz, Sweep Time = Auto

10.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading – Corr. Factor

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for a Class B device. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15.109(a) Limit

10.6 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	1011 mbar

10.7 Summary of Test Results/Plots

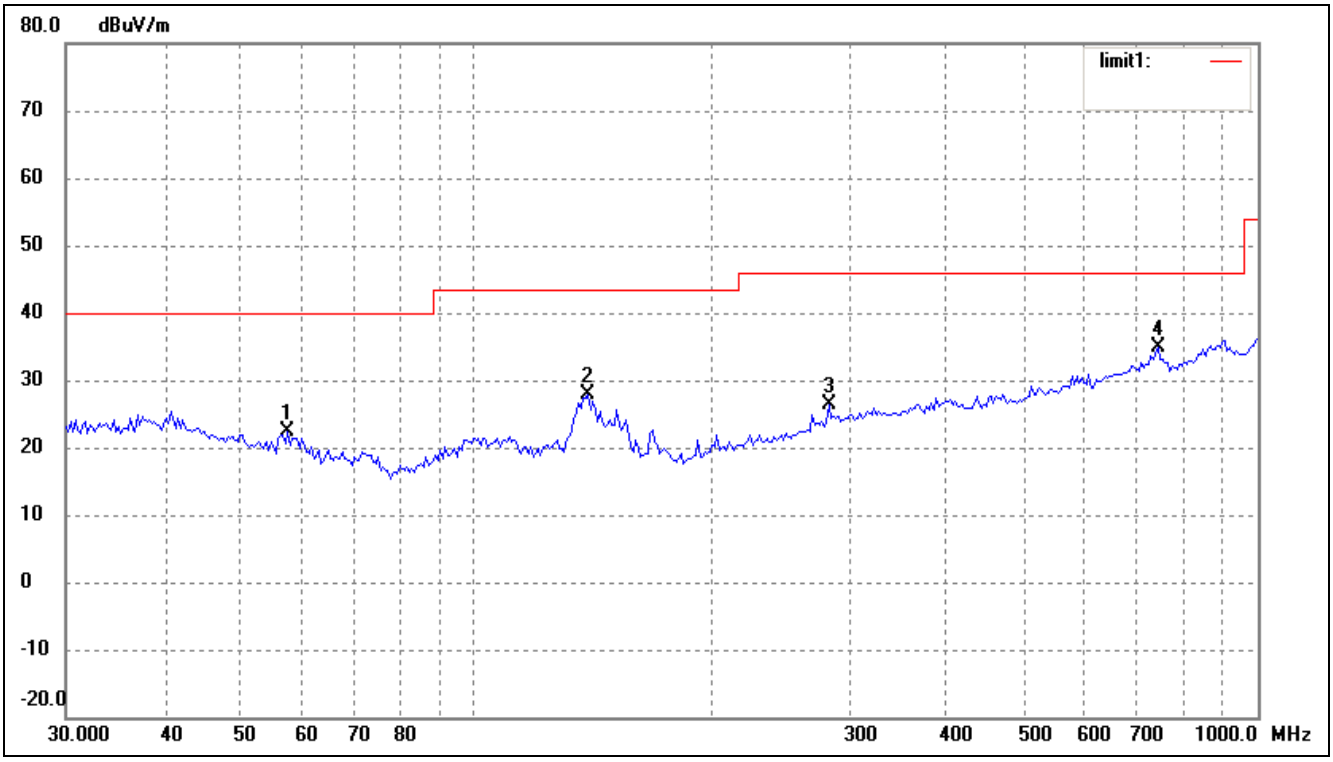
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

-6.48 dBμV at **36.7662 MHz** in the **Vertical** polarization, **30 MHz** to **1 GHz**, **3Meters**

Plot of Radiated Emissions Test Data

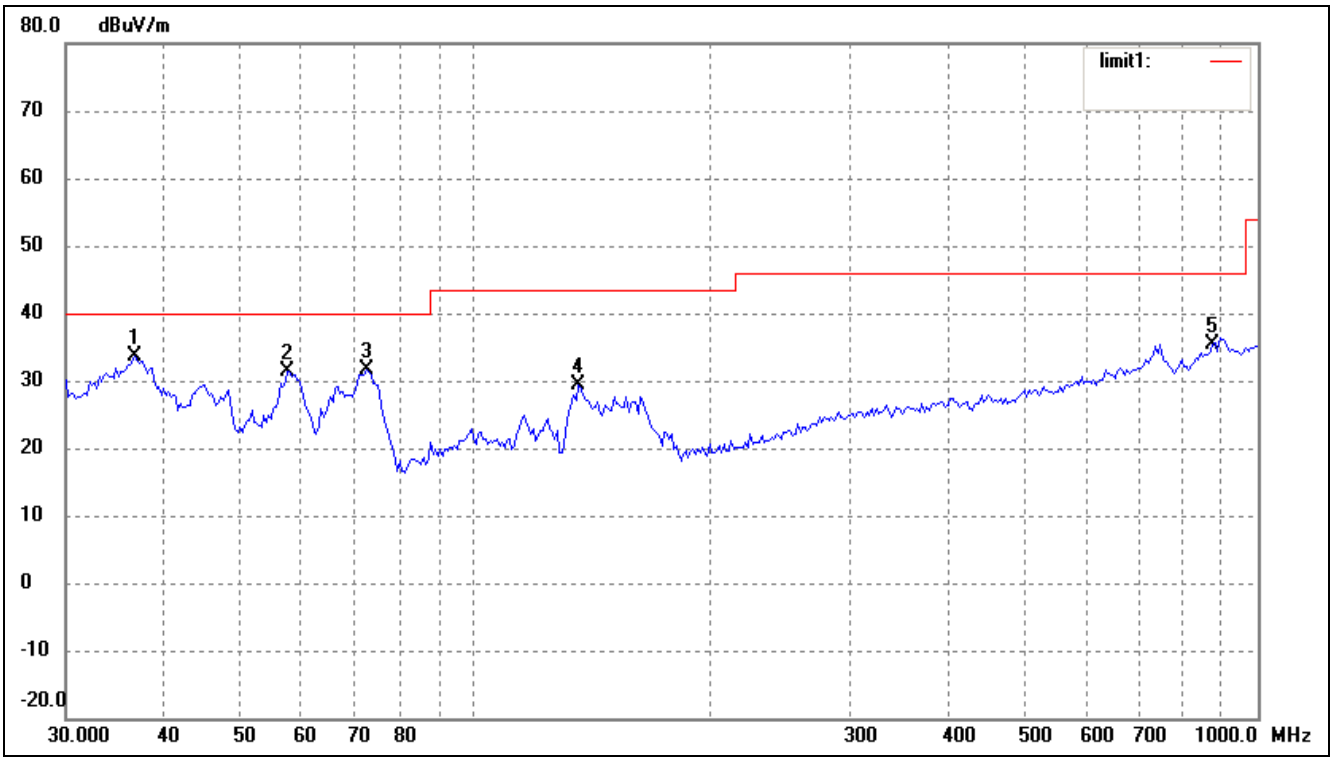
EUT: *SMARTBEL*
Tested Model: *76278235*
Operating Condition: *Charging & Operating*
Comment: *AC 120V/60Hz; adapter DC 5V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	57.5939	16.56	5.91	22.47	40.00	-17.53	125	100	peak
2	139.3613	24.42	3.44	27.86	43.50	-15.64	47	100	peak
3	282.9852	16.94	9.38	26.32	46.00	-19.68	306	100	peak
4	744.8661	16.82	17.94	34.76	46.00	-11.24	57	100	peak

Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	36.7662	24.36	9.16	33.52	40.00	-6.48	330	100	peak
2	57.5939	25.45	5.91	31.36	40.00	-8.64	218	100	peak
3	72.5917	29.35	2.22	31.57	40.00	-8.43	64	100	peak
4	135.5062	25.71	3.72	29.43	43.50	-14.07	157	100	peak
5	875.2470	16.59	18.80	35.39	46.00	-10.61	66	100	peak

******* END OF REPORT *******