FCC Part 22H & 24E
Measurement and Test Report

For

Shenzhen Concox Information Techology Co., Ltd

Floor 4th, Building B, Gaoxinqi Industrial Park, Liuxian 1st Road, District

67, Bao'an, Shenzhen, China

FCC ID: X7I-AT4H

FCC Rules:	FCC Part 22H, FCC Part 24E
Product Description:	Asset GPS Tracker
Tested Model:	AT4H
Report No.:	WTX19X06037126W-1
Sample Receipt Date:	2019-06-06
Tested Date:	2019-06-06 to 2019-07-02
Issued Date:	2019-07-02
Tested By:	Jason Su / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager

Prepared By:

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TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Shenzhen Concox Information Techology Co., Ltd
Address of applicant:	Floor 4th, Building B, Gaoxinqi Industrial Park, Liuxian 1st Road, District 67, Bao'an, Shenzhen, China
Manufacturer:	Shenzhen Concox Information Techology Co., Ltd
Address of manufacturer:	Floor 4th, Building B, Gaoxinqi Industrial Park, Liuxian 1st Road, District 67, Bao'an, Shenzhen, China

General Description of EUT:	
Product Name:	Asset GPS Tracker
Brand Name:	CONCOX
Model No.:	AT4H
Adding Model(s):	/
Rated Voltage:	DC3.7V
Cattery capacity	10000mAh
Adapter Model:	HJ-0502000W2-US Input: 100-240V 50/60Hz 0.3A Output: 5V2000mA
Software Version:	/
Hardware Version:	NT971-MB-V1.1
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT:	
2G	
Support Networks:	GSM, GPRS
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS 850: 824~849MHz GSM/GPRS 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS 850: 869~894MHz GSM/GPRS 1900: 1930~1990MHz
Max RF Output Power:	GSM850: 32.54dBm, GSM1900: 30.16dBm
Type of Emission:	GSM850: 251KGXW, GSM1900: 248KGXW
Type of Modulation:	GMSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM850: -2.0dBi; GSM1900: 0dBi
GPRS Class:	Class 12

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
FCC Rules Part 22: PRIVATE LAND MOBILE RADIO SERVICES.
FCC Rules Part 24: PUBLIC MOBILE SERVICES
TIA/EIA 603 E March 2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 D01 Power Meas License Digital Systems v03r01: MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

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 E/ KDB 971168/ ANSI C63.26
The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Test Facility

FCC – Registration No.: 125990
Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A
The 3m Semi-anechoic chamber of Shenzhen SEM Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

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	GPRS 850	Low, Middle, High Channels
TM3	GSM 1900	Low, Middle, High Channels
TM4	GPRS 1900	Low, Middle, High Channels

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

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	50~55 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC Cable	1.0	Unshielded	Without Ferrite

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

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

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Frequency Stability	Conducted	2.3%
Transmitter Spurious Emissions	Conducted	±0.42dB
Transmitter Spurious Emissions	Radiated	30-200MHz ±4.52dB
		0.2-1GHz ±5.56dB
		1-6GHz ±3.84dB
		6-18GHz ±3.92dB

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT-1075	Communication Tester	Rohde & Schwarz	CMW500	148650	2019-04-30	2020-04-29
SEMT-1063	GSM Tester	Rohde & Schwarz	CMU200	114403	2019-04-30	2020-04-29
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2019-04-30	2020-04-29
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2019-04-30	2020-04-29
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2019-04-30	2020-04-29
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2019-04-30	2020-04-29
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2019-04-30	2020-04-29
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2019-04-30	2020-04-29
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2019-04-30	2020-04-29
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2019-04-30	2020-04-29
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2019-04-30	2020-04-29
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2019-04-30	2020-04-29
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
SEMT-1042	Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2019-05-05	2021-05-04
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2019-04-30	2020-04-29
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2019-04-30	2020-04-29
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2019-04-30	2020-04-29
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2019-05-05	2021-05-04
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2019-04-30	2020-04-29
SEMT-1055	RF Limiter	ATTEN	AT-BSF-0820~0920	/	2019-04-30	2020-04-29
SEMT-1056	RF Limiter	ATTEN	AT-BSF-1710~1910	/	2019-04-30	2020-04-29
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2019-04-30	2020-04-29
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2019-03-18	2020-03-17
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2019-03-18	2020-03-17
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2019-03-18	2020-03-17

SEMT-C004	Cable	Zheng DI	2M0RFC	/	2019-03-18	2020-03-17
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17

Software List			
Description	**Manufacturer**	**Model**	**Version**
EMI Test Software (Radiated Emission)*	CCS	EZ-EMC	V1.0
EMI Test Software (Conducted Emission)*	CCS	EZ-EMC	V1.0

*Remark: indicates software version used in the compliance certification testing

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
§24.51	Peak-to-average Ratio (PAR) of Transmitter	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

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 SAR exposure, please see the SAR report.

4. RF Output Power

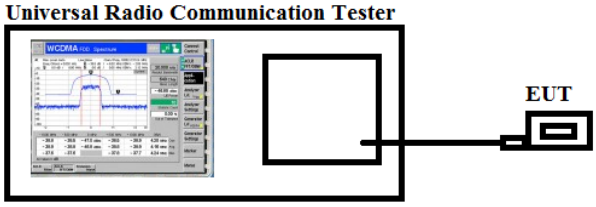
4.1 Standard Applicable

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

According to §24.232 (c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

4.2 Test Procedure

- Conducted output power test method:



- Radiated power test method:

1. The setup of EUT is according with per ANSI/TIA Standard 603E and ANSI C63.26 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.

4.3 Summary of Test Results/Plots

➢ **Max. Radiated Power**

Mode	Channel	Antenna Polar	ERP (dBm)	Limit (dBm)	Result
GSM850	128	V	30.15	<38.45	Pass
		H	24.32		
	190	V	29.45		
		H	24.64		
	251	V	30.36		
		H	24.52		
GPRS850	128	V	30.11	<38.45	Pass
		H	24.52		
	190	V	30.62		
		H	23.28		
	251	V	30.74		
		H	24.05		

Mode	Channel	Antenna Polar	EIRP (dBm)	Limit (dBm)	Result
PCS1900	512	V	27.65	<33.00	Pass
		H	22.15		
	661	V	28.87		
		H	22.36		
	810	V	28.74		
		H	22.61		
GPRS1900	512	V	27.42	<33.00	Pass
		H	22.63		
	661	V	27.85		
		H	22.36		
	810	V	27.41		
		H	22.74		

➢ **Max. Conducted Power (Average power)**

Conducted Average power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency(MHz)	824.20	836.60	848.80	1850.20	1880.00	1909.80
GSM	32.54	32.46	32.46	30.16	30.00	30.03
GPRS(1Slot)	32.24	32.27	32.37	30.16	29.94	30.01

5. Peak-to-average Ratio (PAR) of Transmitter

5.1 Standard Applicable

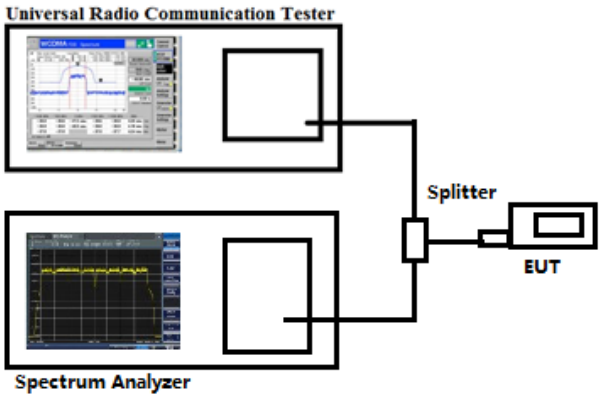
According to §24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51, in measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

5.2 Test Procedure

According with KDB 971168

1. The signal analyzer' s CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal " RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the " on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Configuration for the emission bandwidth testing:



5.3 Summary of Test Results

PCS1900				
Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GSM	661	1850.2	7.52	13
GPRS(1 Slot)	661	1850.2	6.10	13

Note: Only the worst case was selected to record.

6. Emission Bandwidth

6.1 Standard Applicable

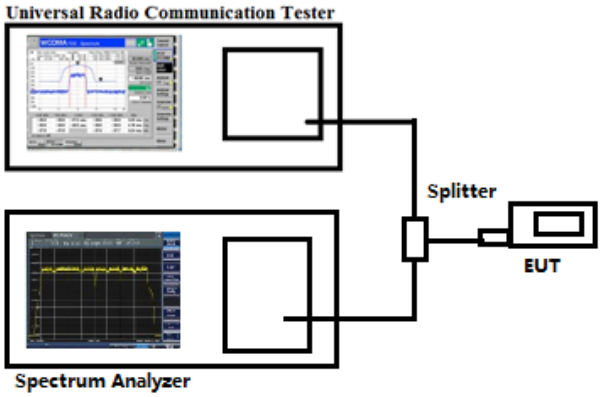
According to §22.917(b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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.

6.2 Test Procedure

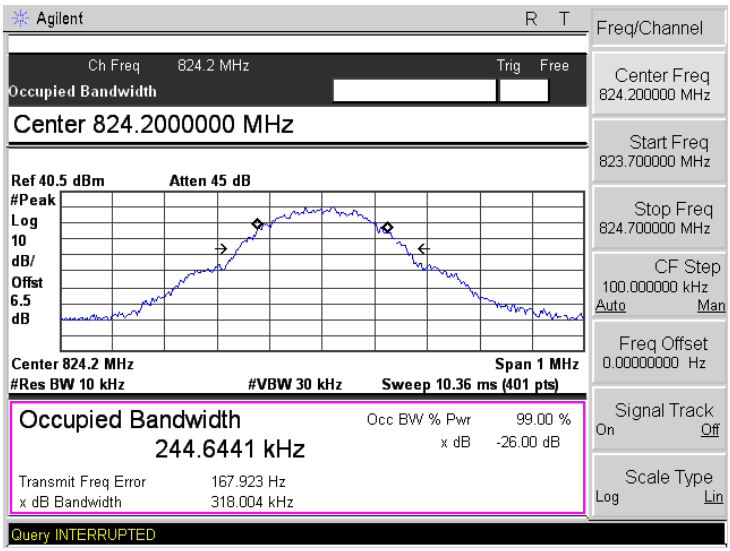
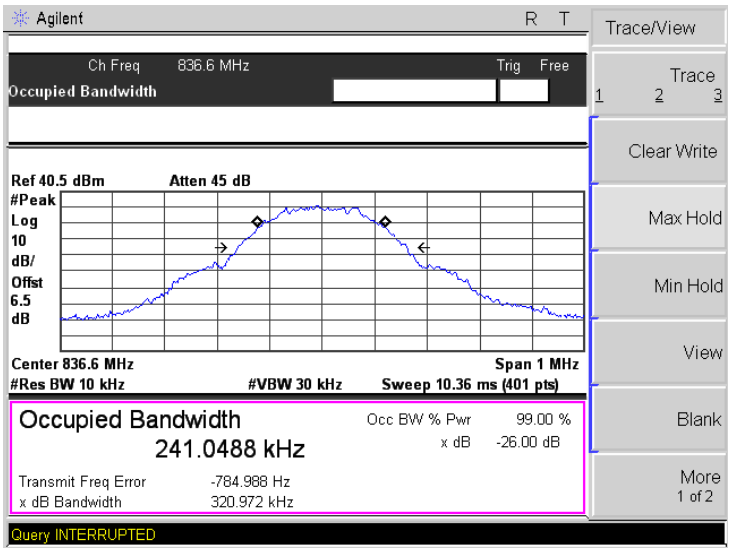
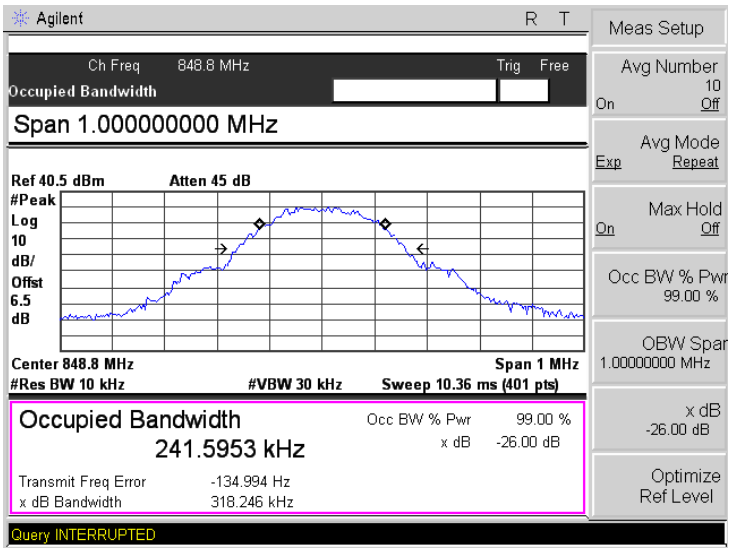
The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, and the 26dB bandwidth was recorded.

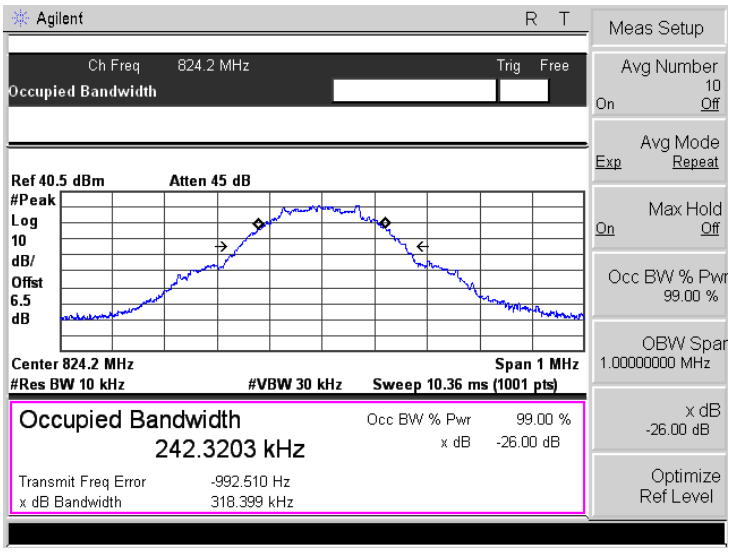
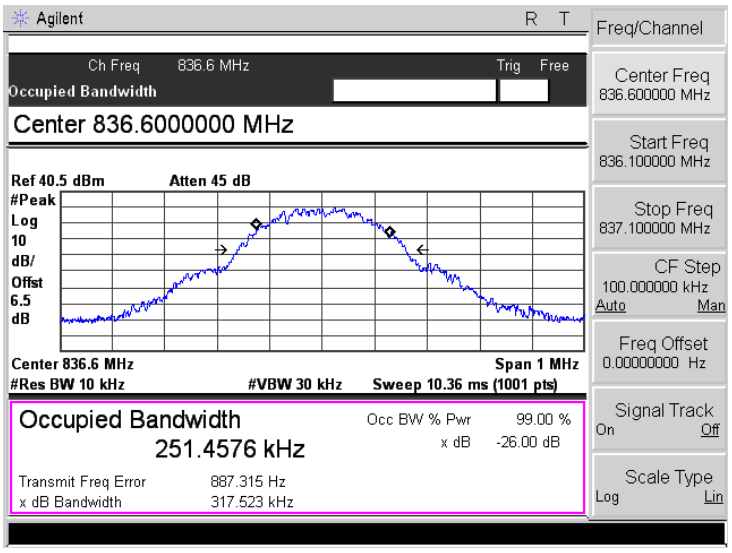
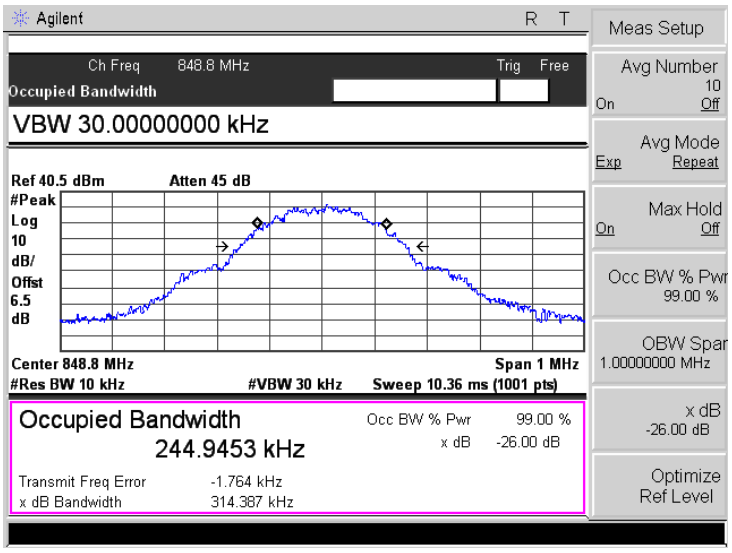
Test Configuration for the emission bandwidth testing:

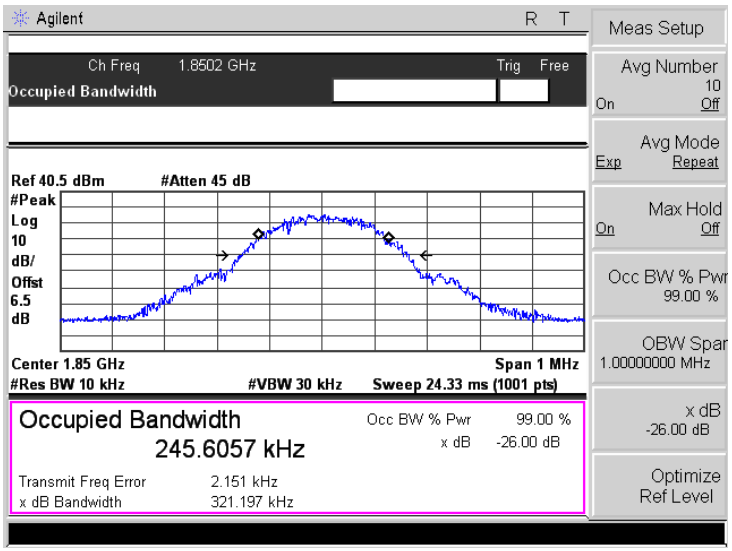
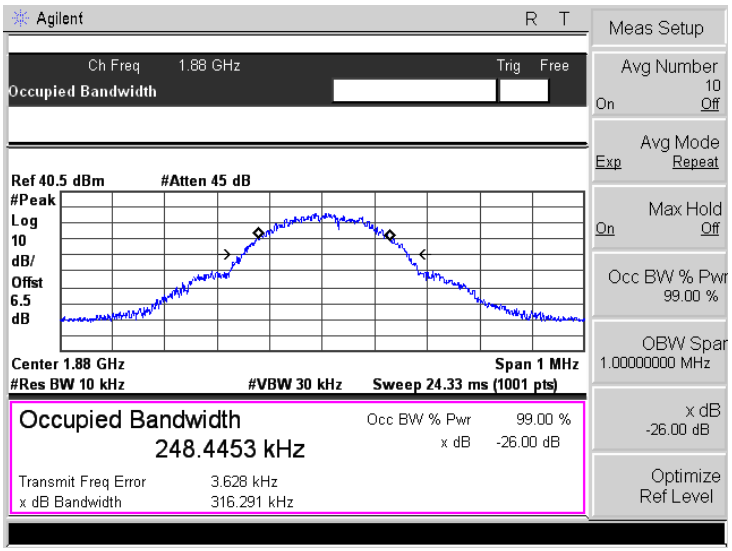
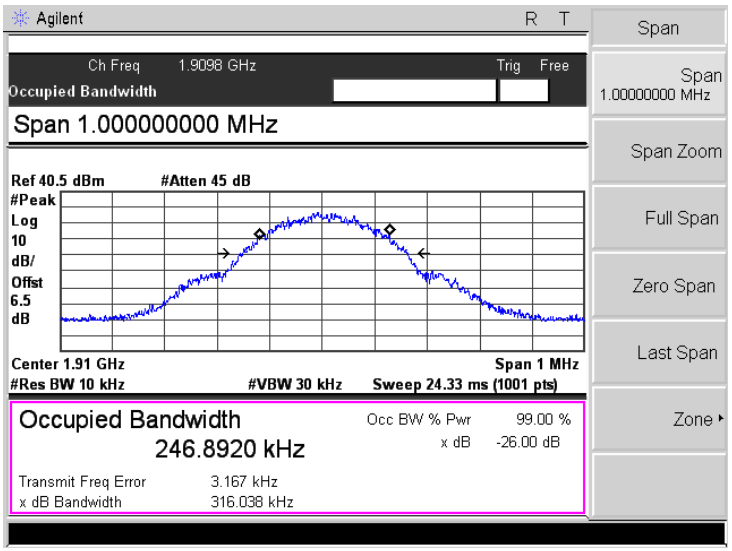


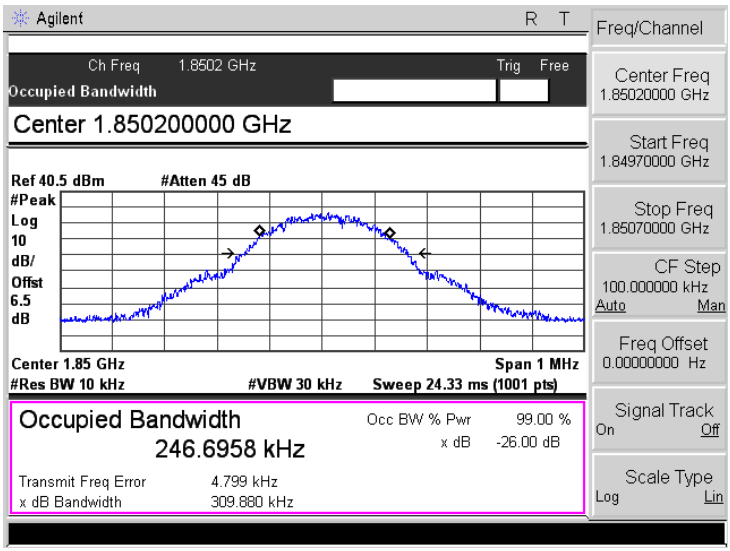
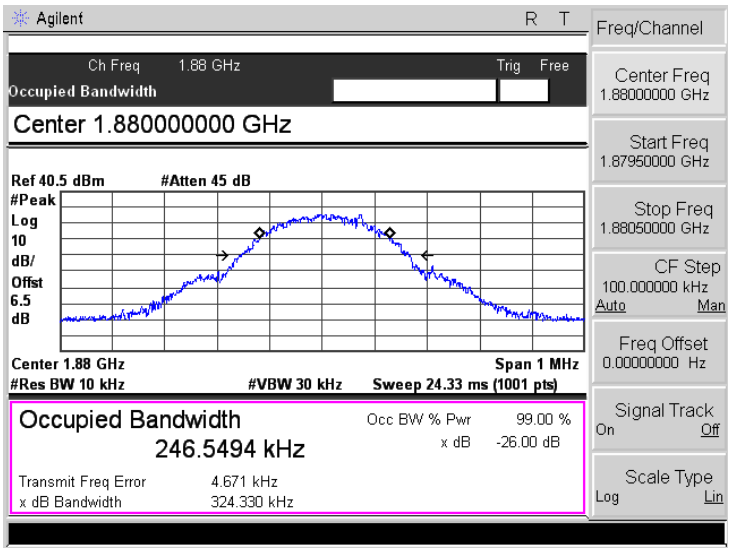
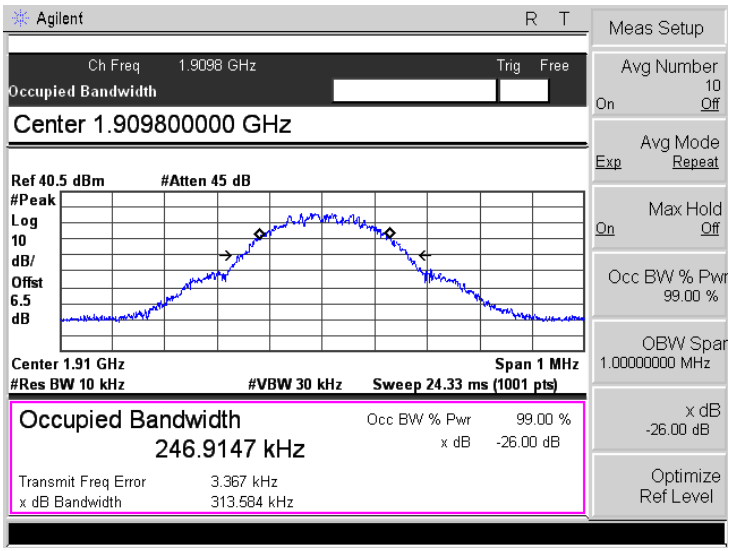
6.3 Summary of Test Results/Plots

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (kHz)	-26dB bandwidth (kHz)
GSM 850 (GMSK)	128	824.20	244.6441	318.004
	190	836.60	241.0488	320.972
	251	848.80	241.5953	318.246
GPRS850 (GMSK,1Slot)	128	824.20	242.3203	318.399
	190	836.60	251.4576	317.523
	251	848.80	244.9453	314.387
PCS1900 (GMSK)	512	1850.20	245.6057	321.197
	661	1880.00	248.4453	316.291
	810	1909.80	246.8920	316.038
GPRS1900 (GMSK,1Slot)	512	1850.20	246.6958	309.880
	661	1880.00	246.5494	324.330
	810	1909.80	246.9147	313.584

GSM850	
Low Channel	
Middle Channel	
High Channel	

GPRS850	
Low Channel	
Middle Channel	
High Channel	

PCS1900	
Low Channel	
Middle Channel	
High Channel	

GPRS1900	
Low Channel	
Middle Channel	
High Channel	

7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

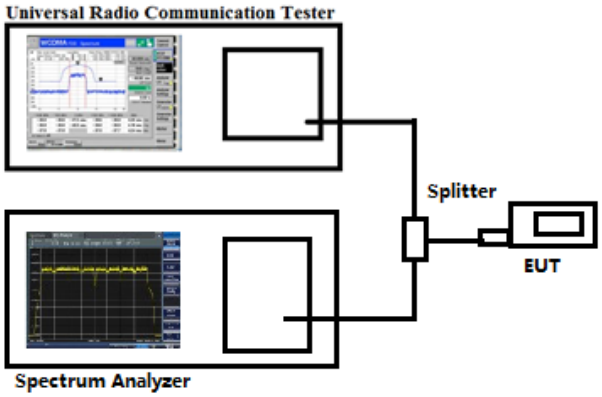
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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.

7.2 Test Procedure

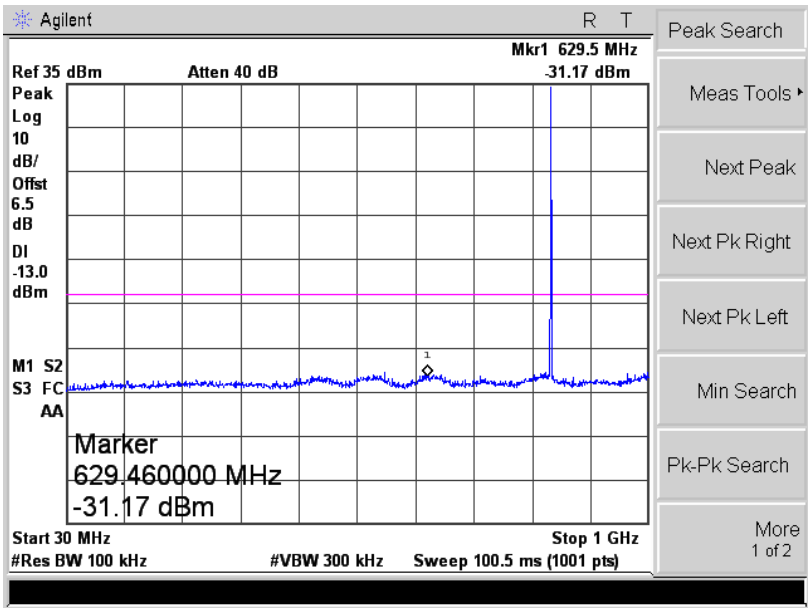
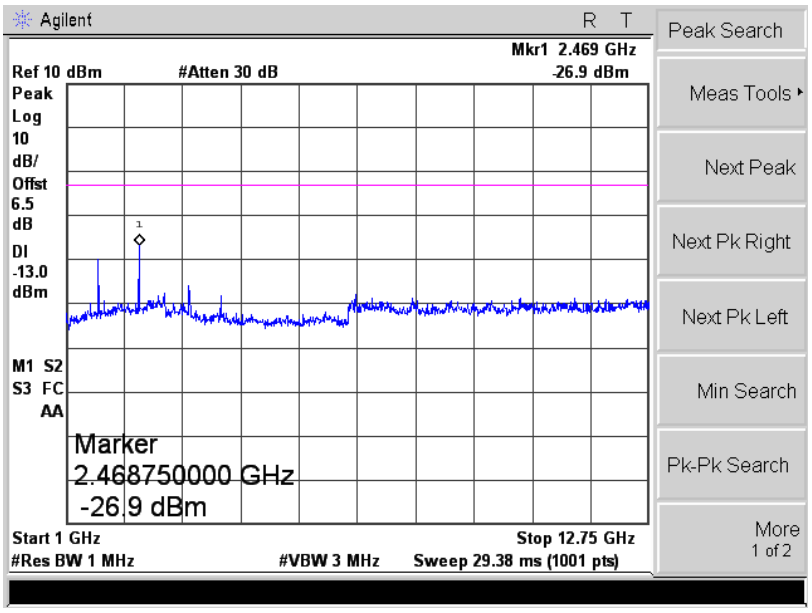
The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

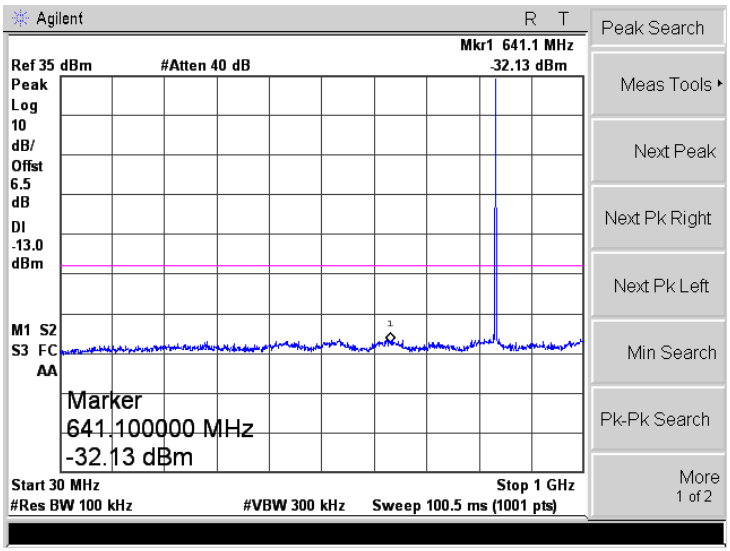
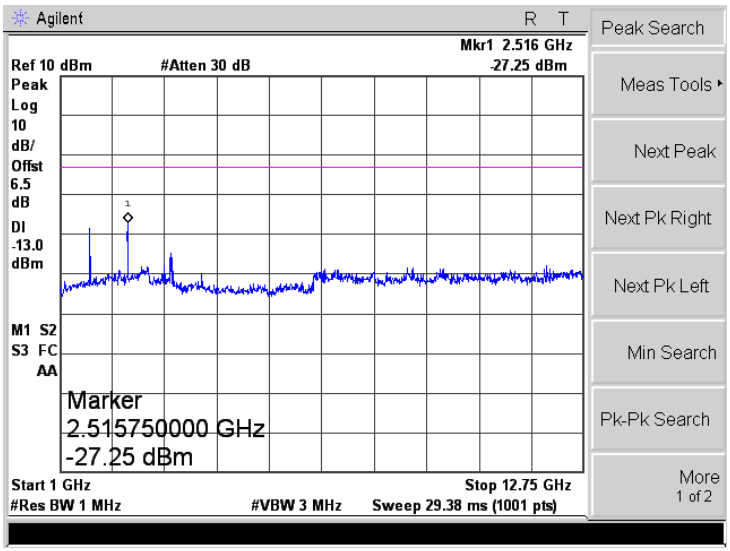
Test Configuration for the out of band emissions testing:

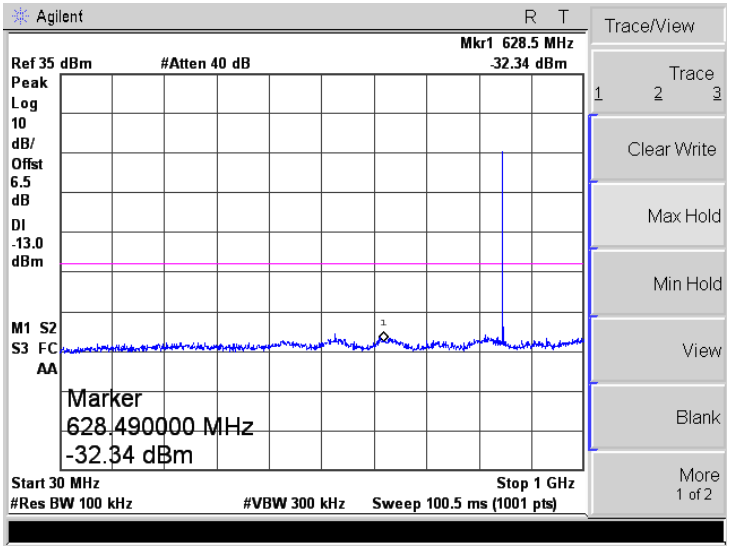
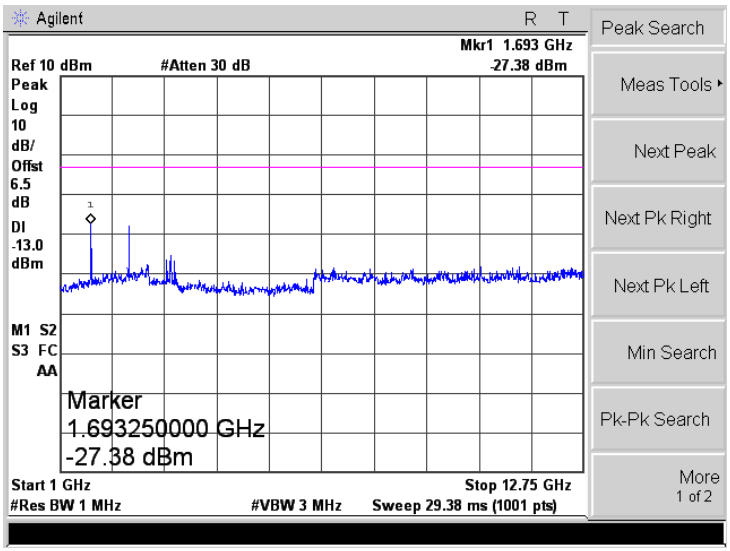


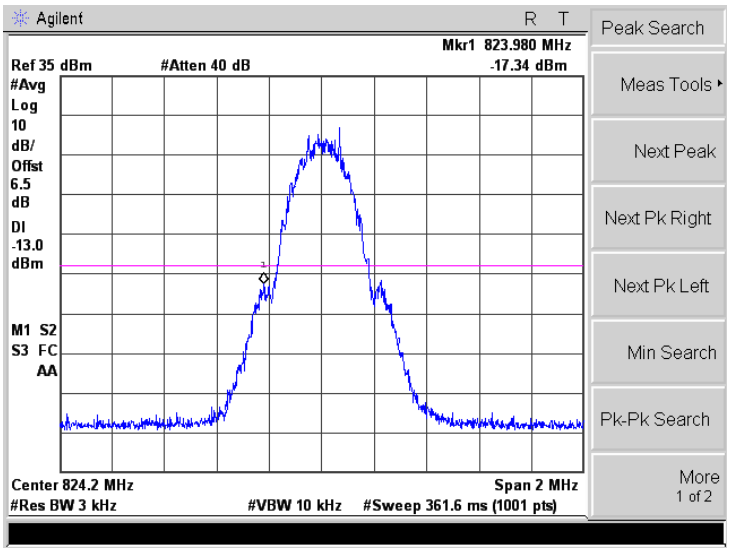
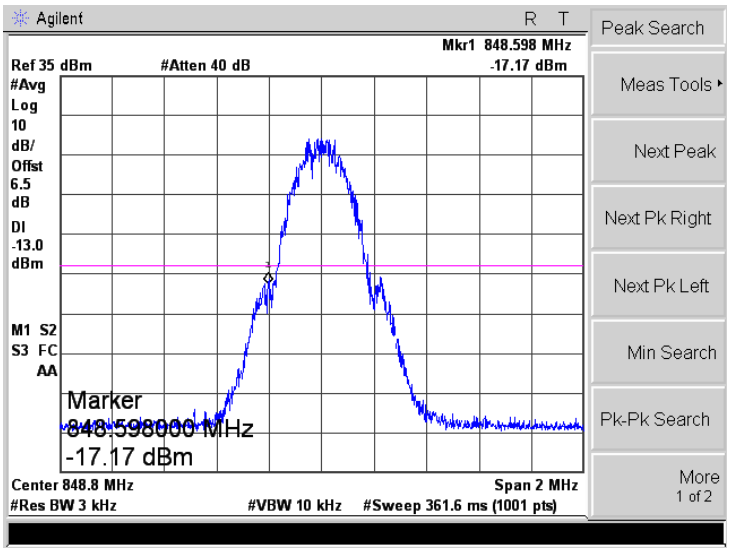
7.3 Summary of Test Results/Plots

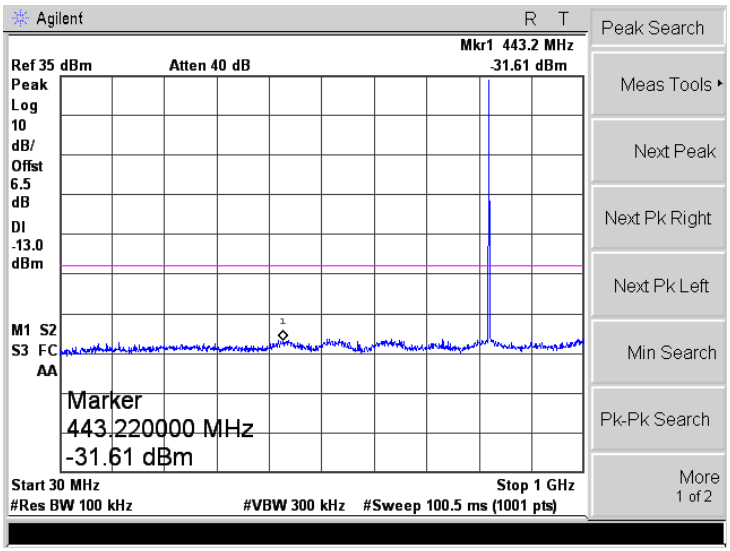
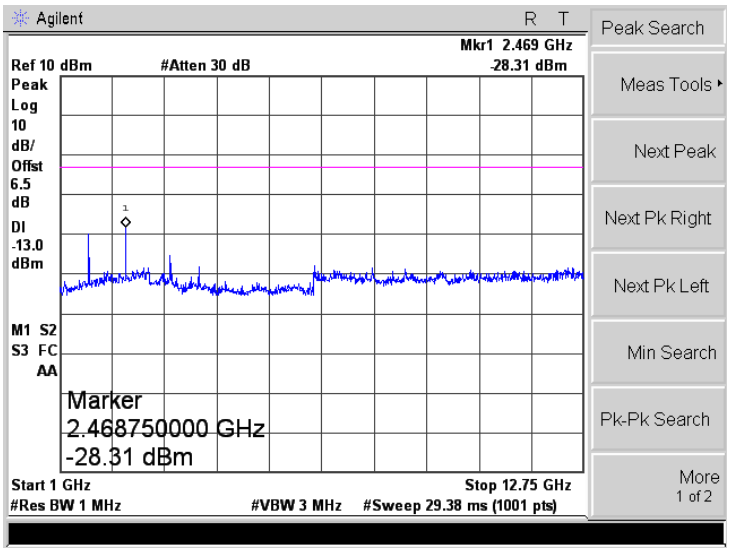
Please refer to the following test plots

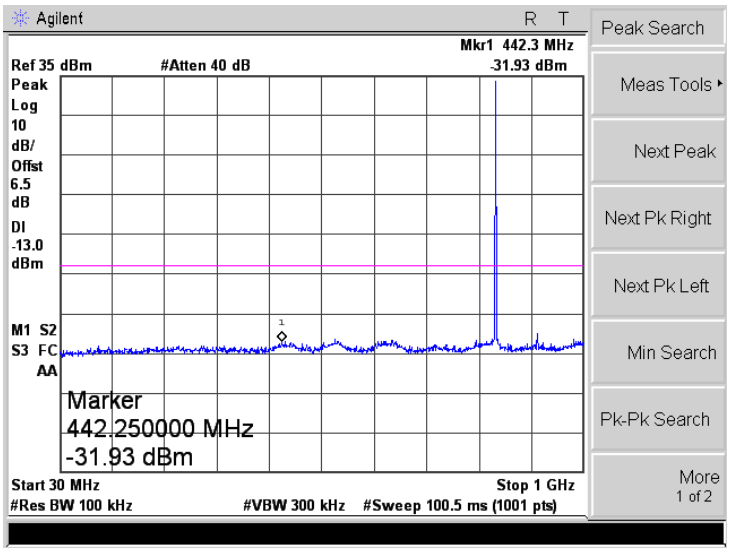
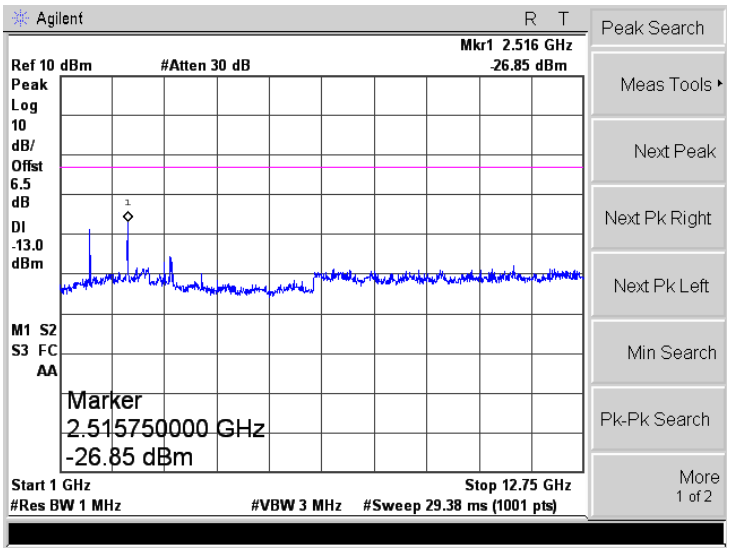
GSM850	
Low Channel	 

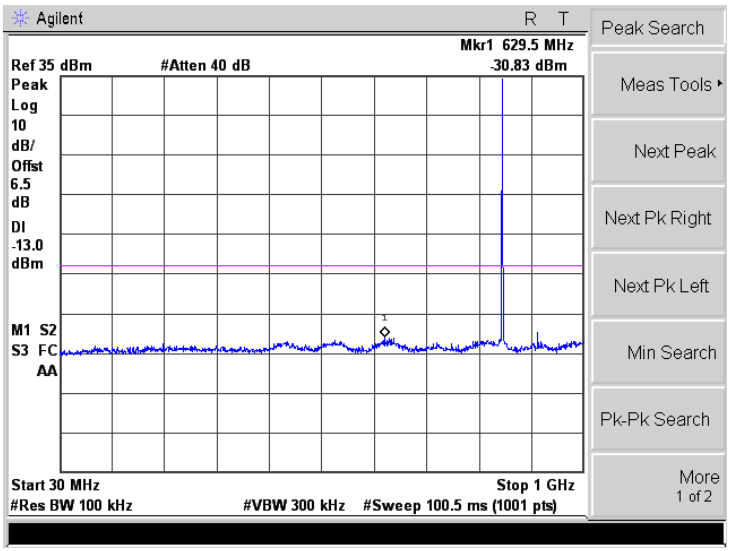
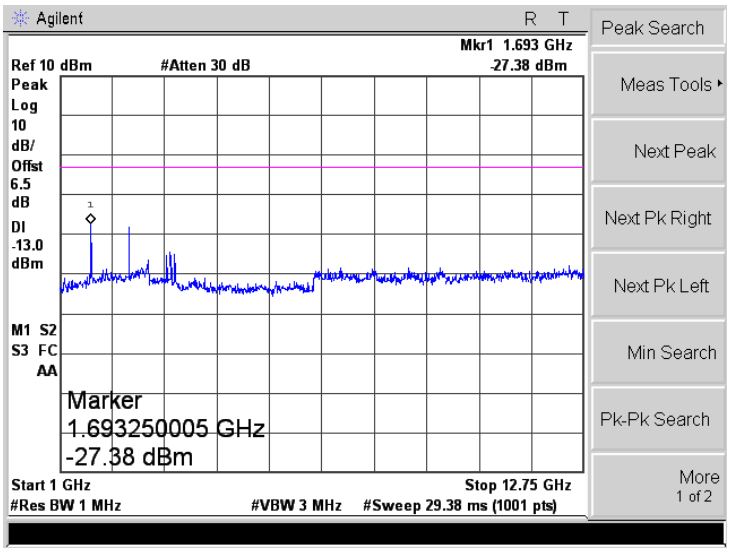
GSM850	
Middle Channel	
	

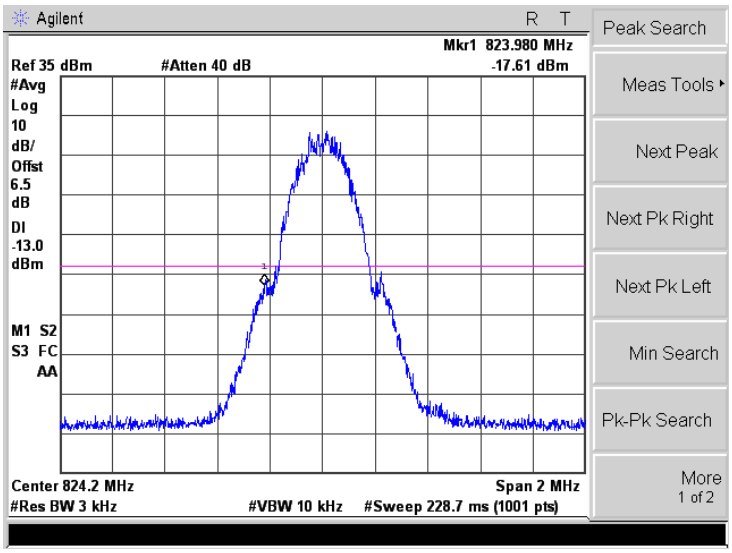
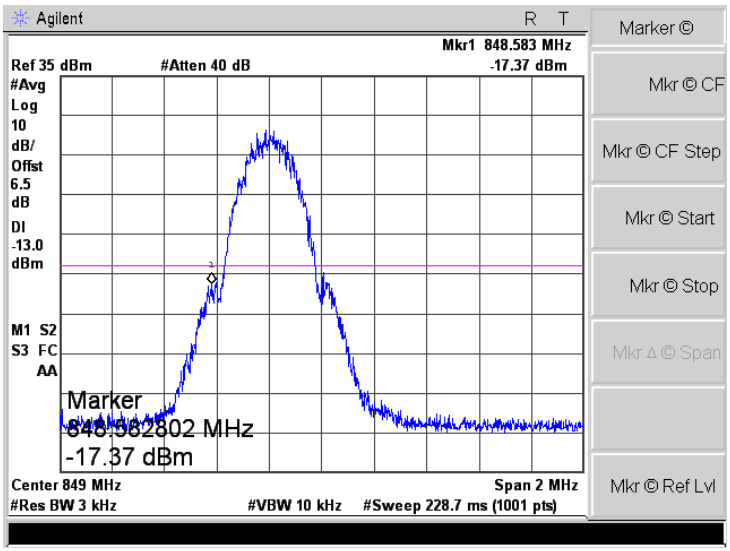
GSM850	
High Channel	
	

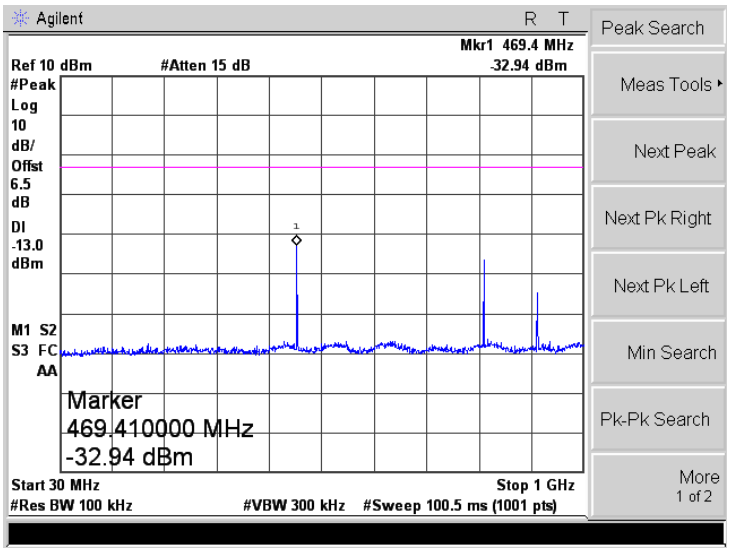
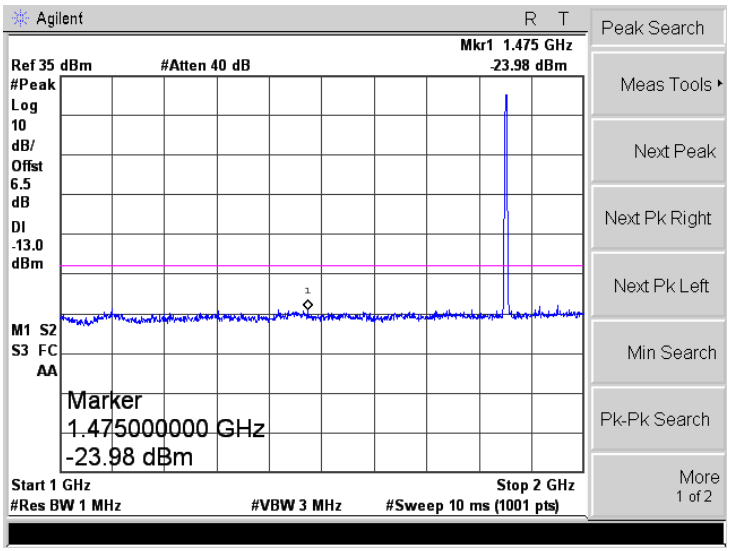
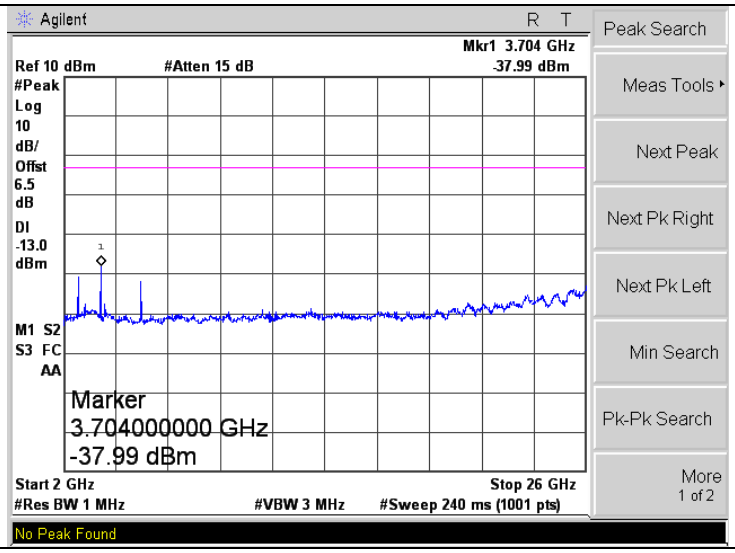
GSM850	
Low Band Emission	
High Band Emission	

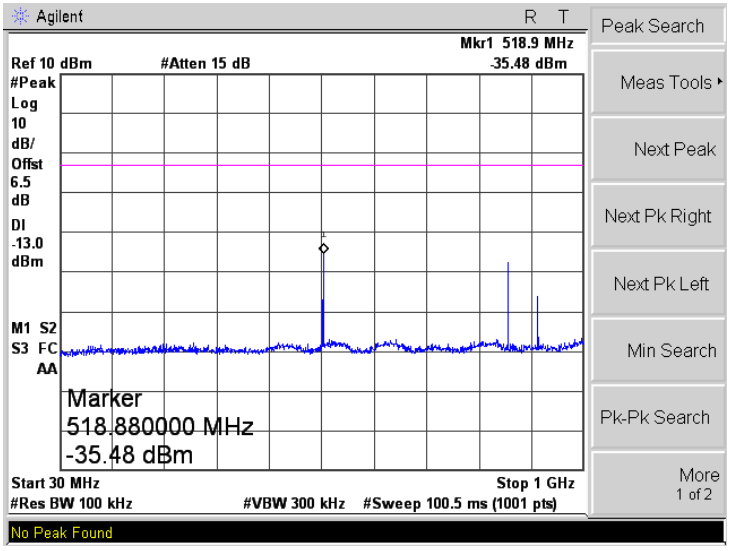
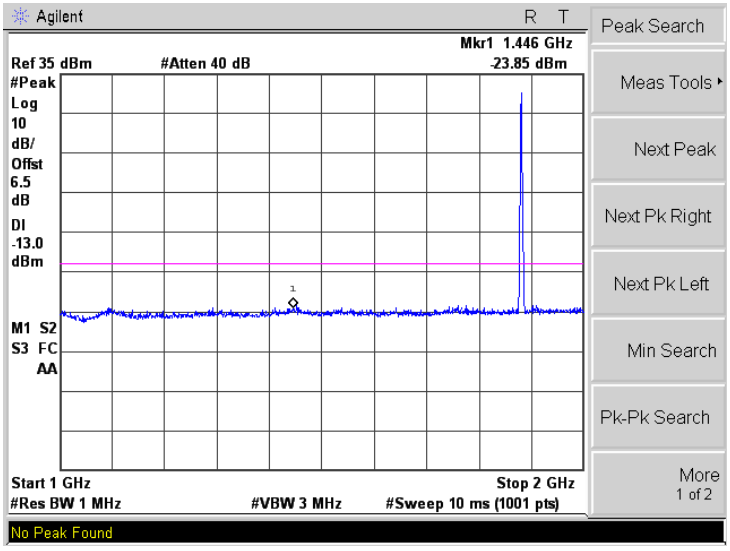
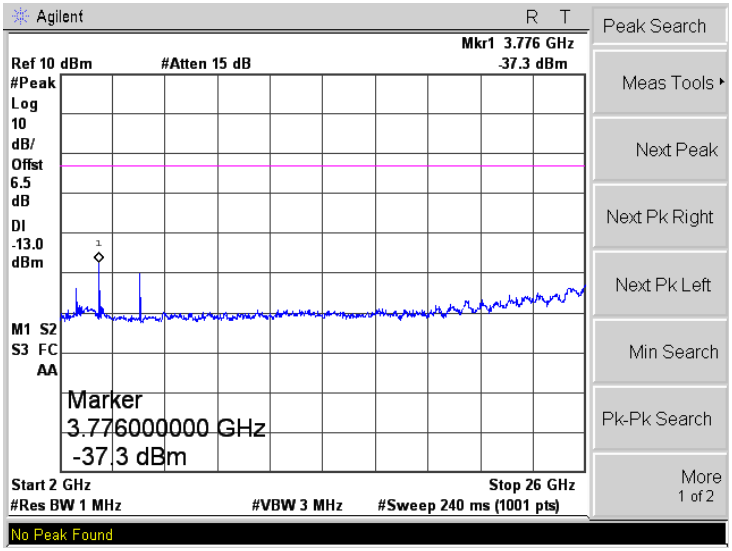
For Cellular Band	
GPRS Low Channel	
	

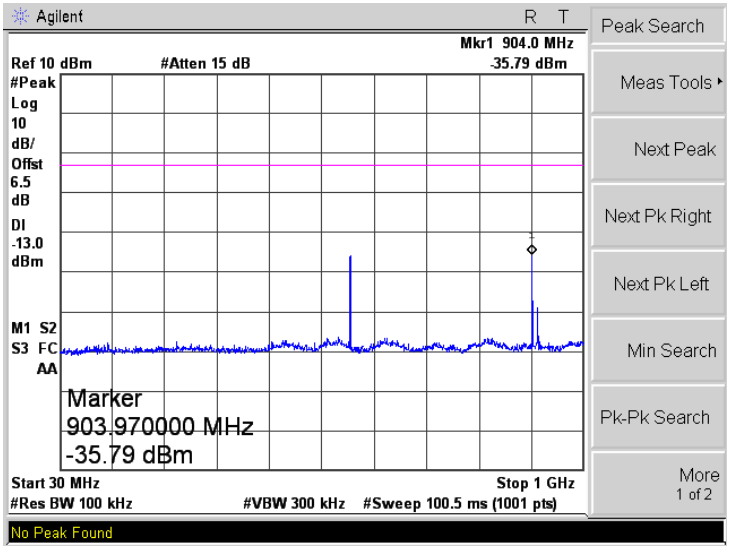
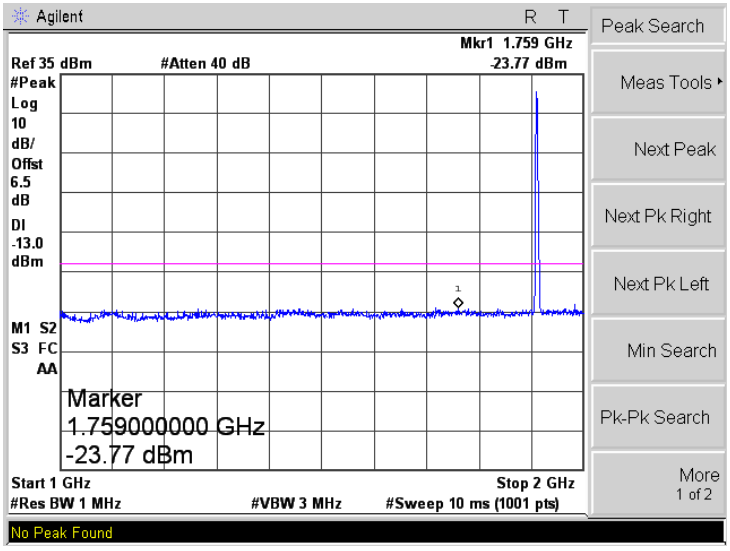
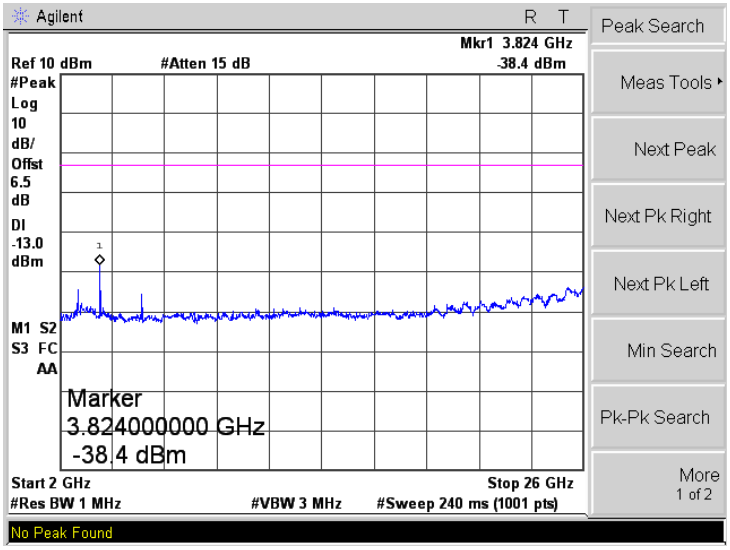
GPRS850	
Middle Channel	
	

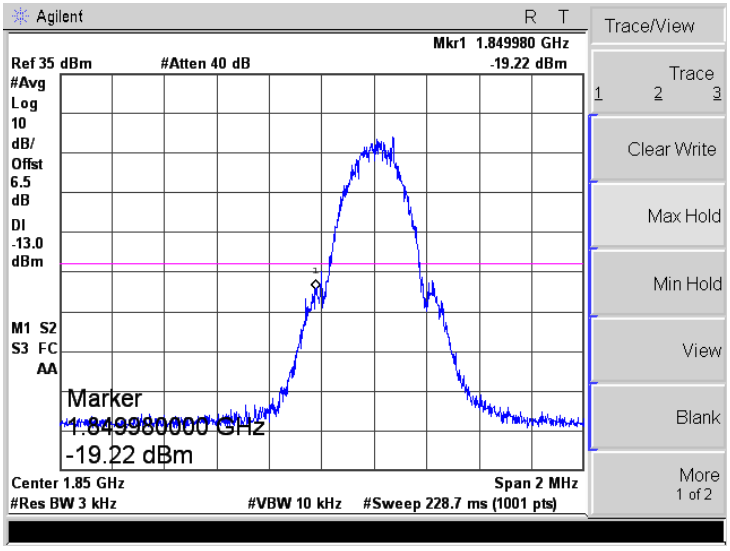
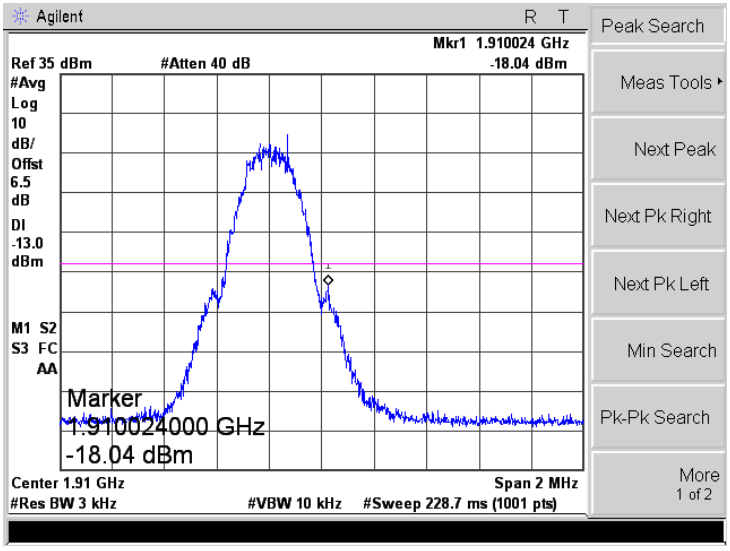
GPRS850	
High Channel	
	

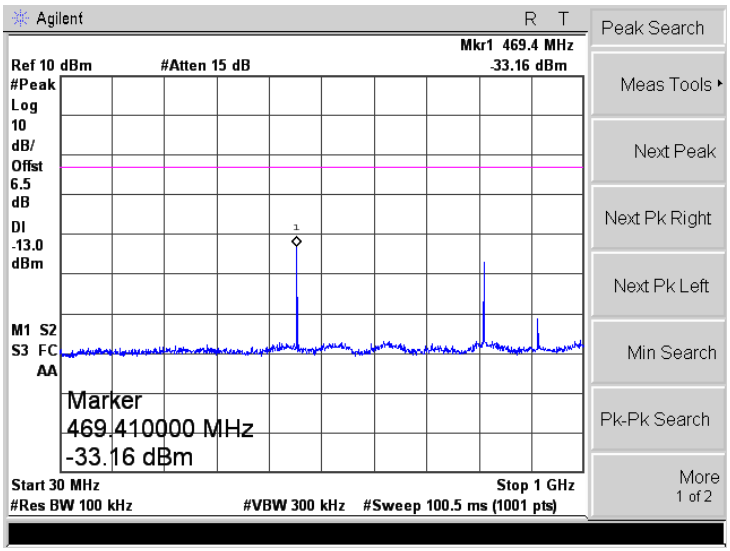
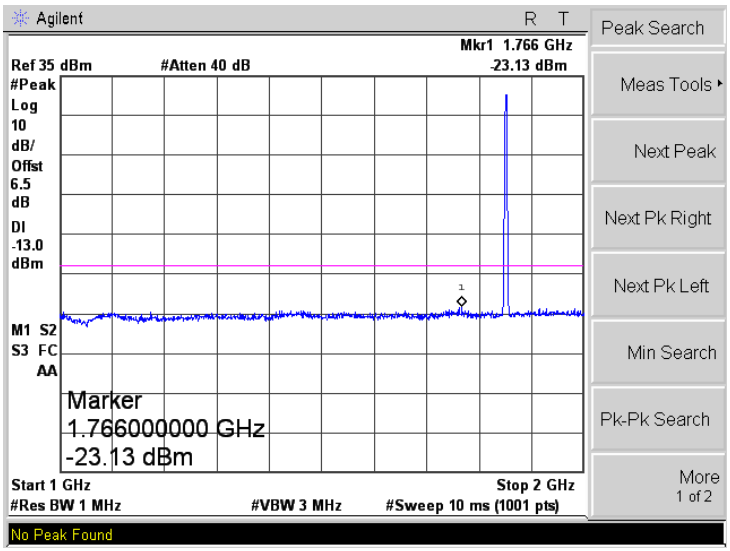
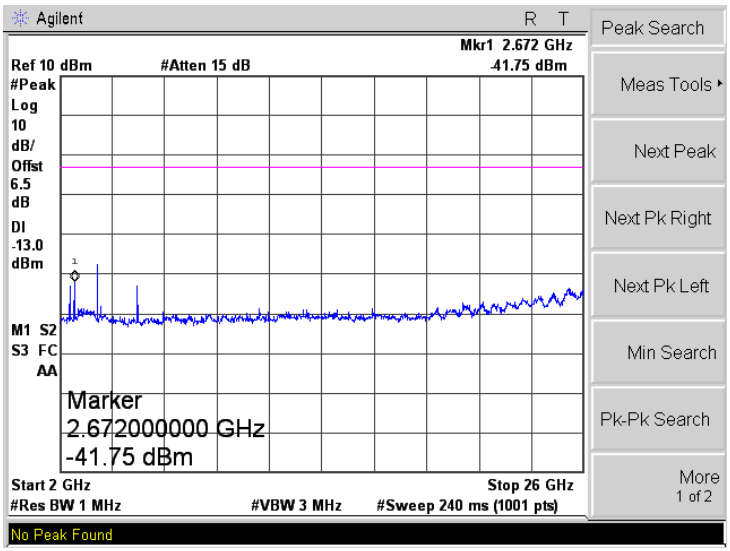
GPRS850	
Low Band Emission	
High Band Emission	

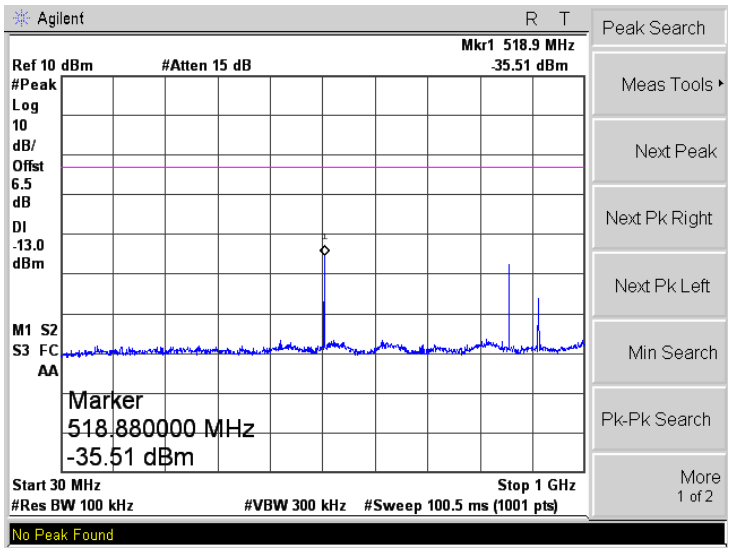
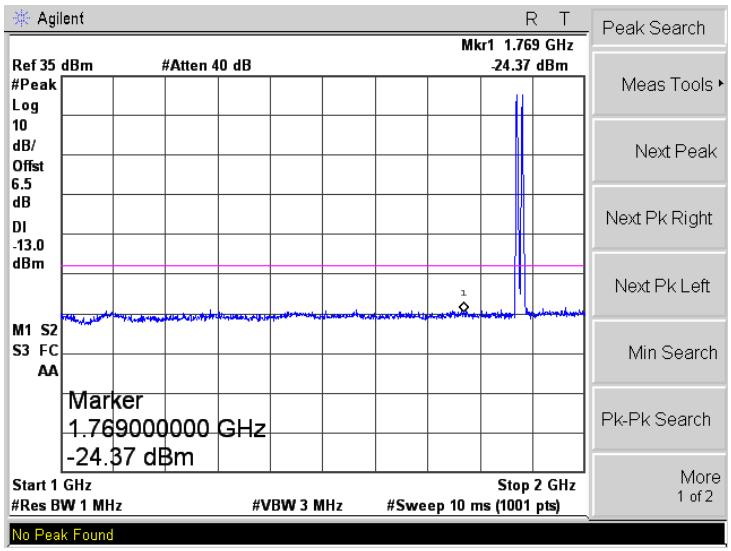
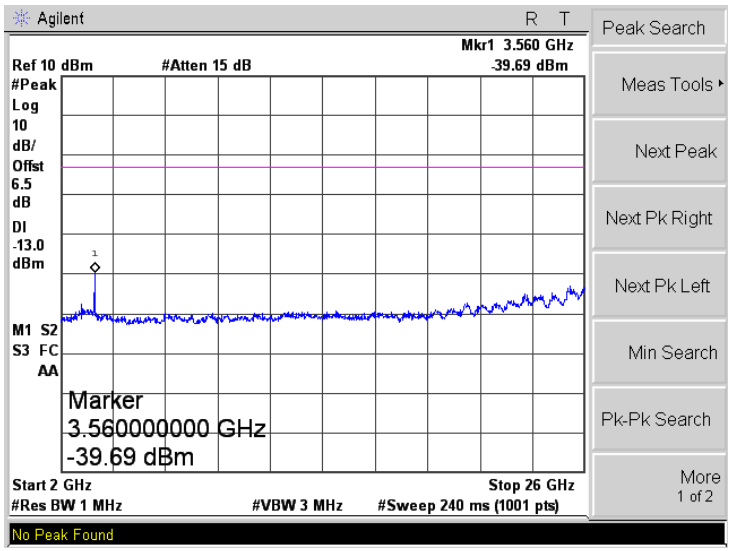
PCS1900	
Low Channel	
	
	

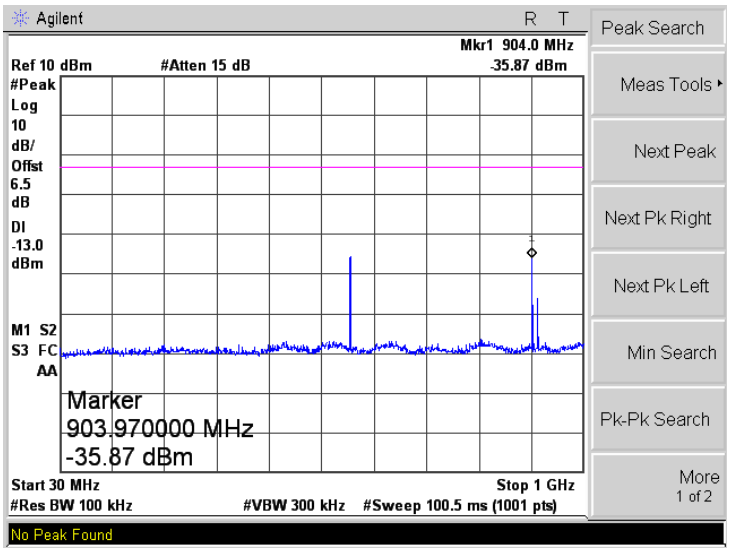
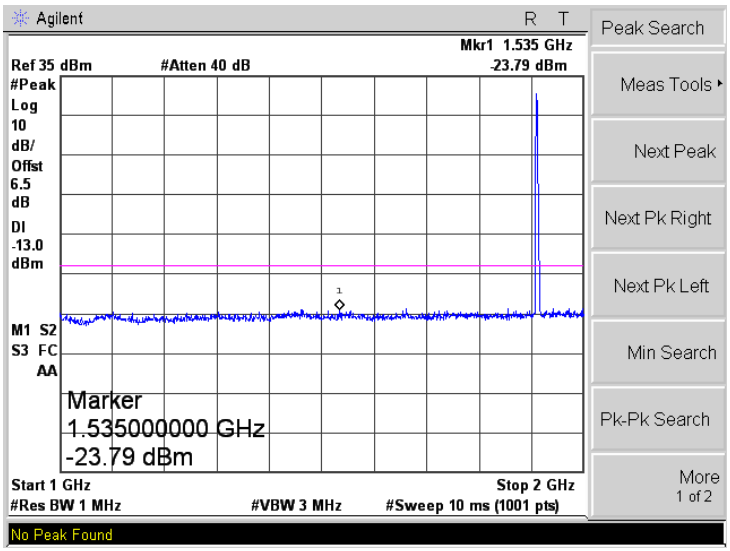
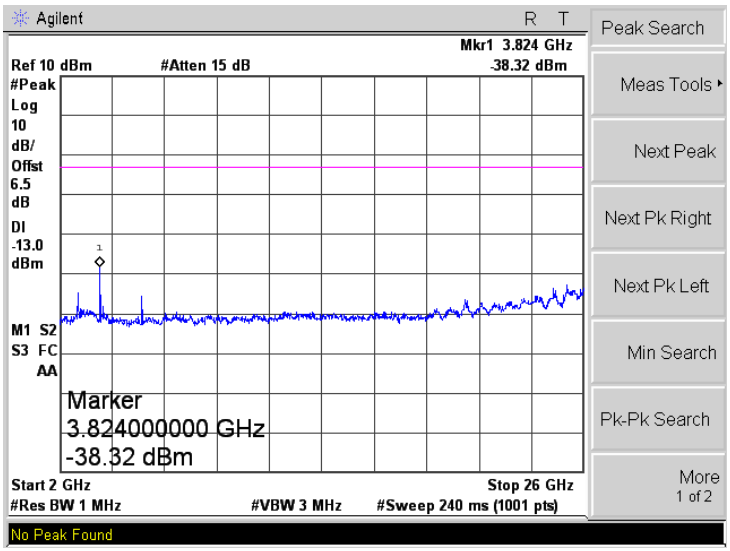
PCS1900	
Middle Channel	  

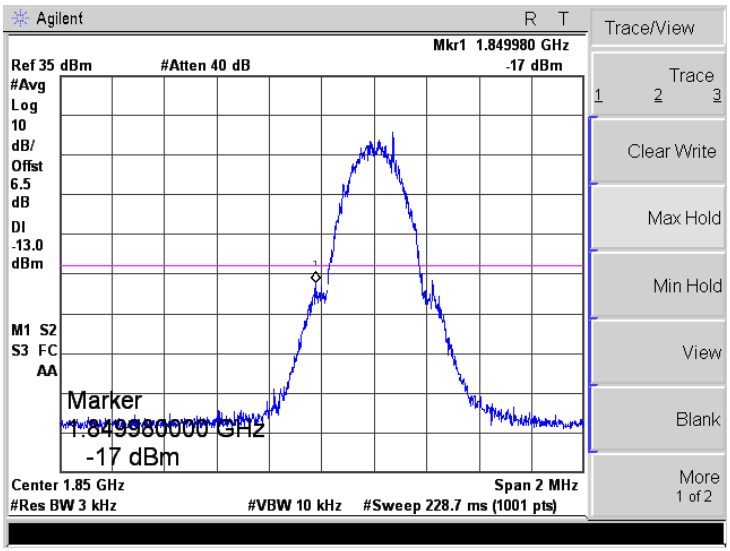
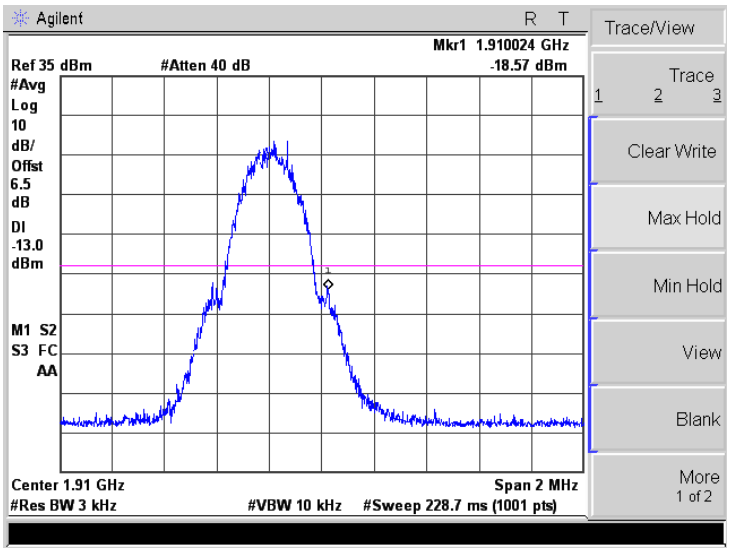
PCS1900		
High Channel		
		
		

PCS1900	
Low Band Emission	
High Band Emission	

GPRS1900	
Low Channel	
	
	

GPRS1900	
Middle Channel	
	
	

GPRS1900	
High Channel	
	
	

GPRS1900	
Low Band Emission	
High Band Emission	

8. Spurious Radiated Emissions

8.1 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.

8.2 Test Procedure

1. The setup of EUT is according with per ANSI/TIA Standard 603E and ANSI C63.26 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.

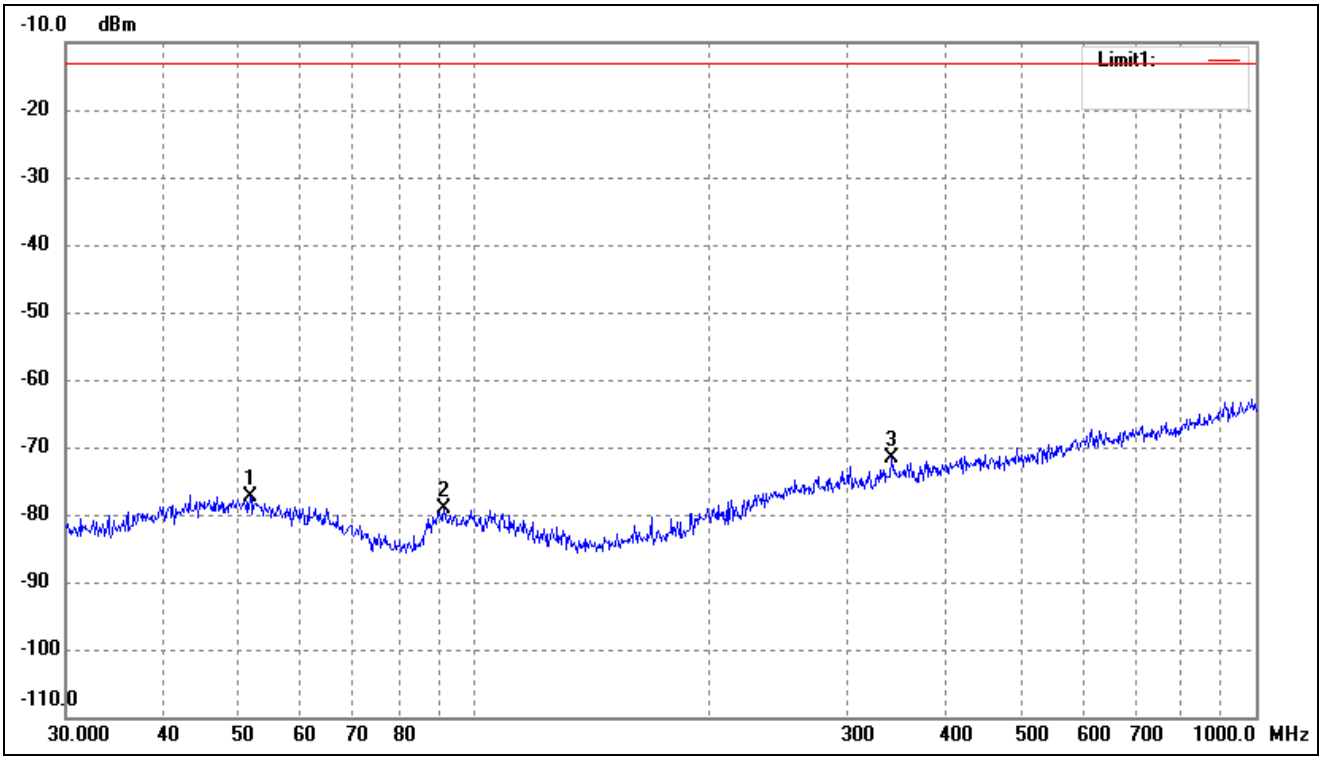
Spurious attenuation limit in dB =43+10 Log_{10} (power out in Watts)

8.3 Summary of Test Results/Plots

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

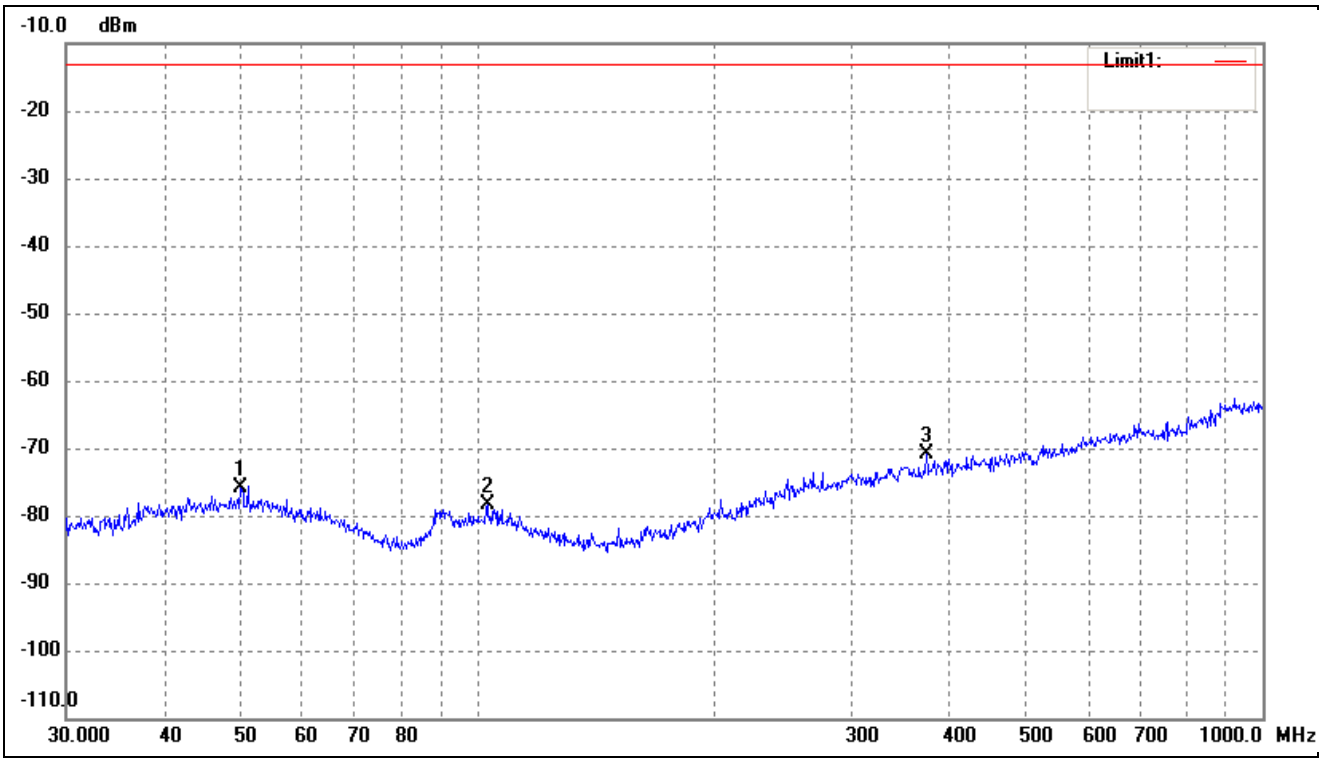
➢ Spurious Emissions Below 1GHz

For Cellular Band			
Test Channel	GSM850	Polarity:	Horizontal



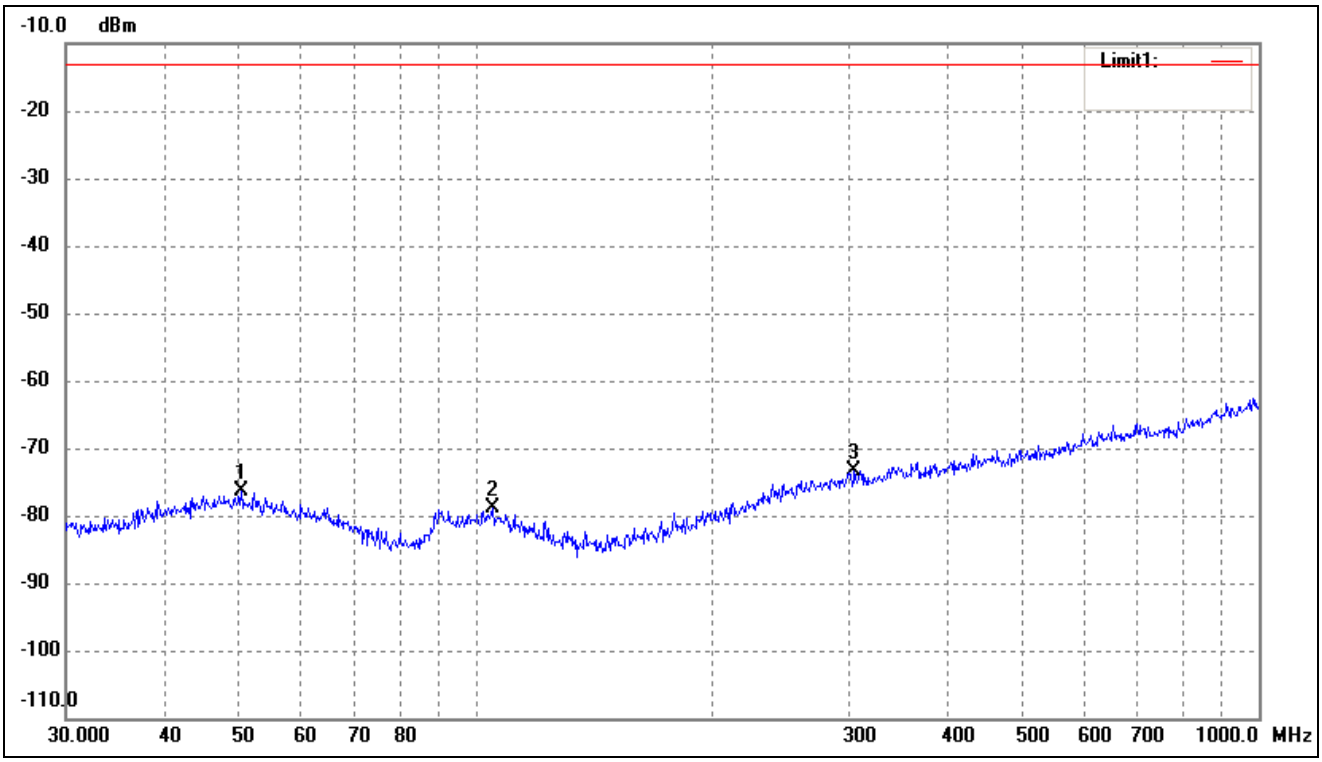
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	51.6616	-77.48	0.21	-77.27	-13.00	-64.27	254	100	peak
2	91.4949	-77.12	-1.90	-79.02	-13.00	-66.02	92	100	peak
3	341.9787	-76.21	4.58	-71.63	-13.00	-58.63	161	100	peak

For Cellular Band			
Test Channel	GSM850	Polarity:	Vertical



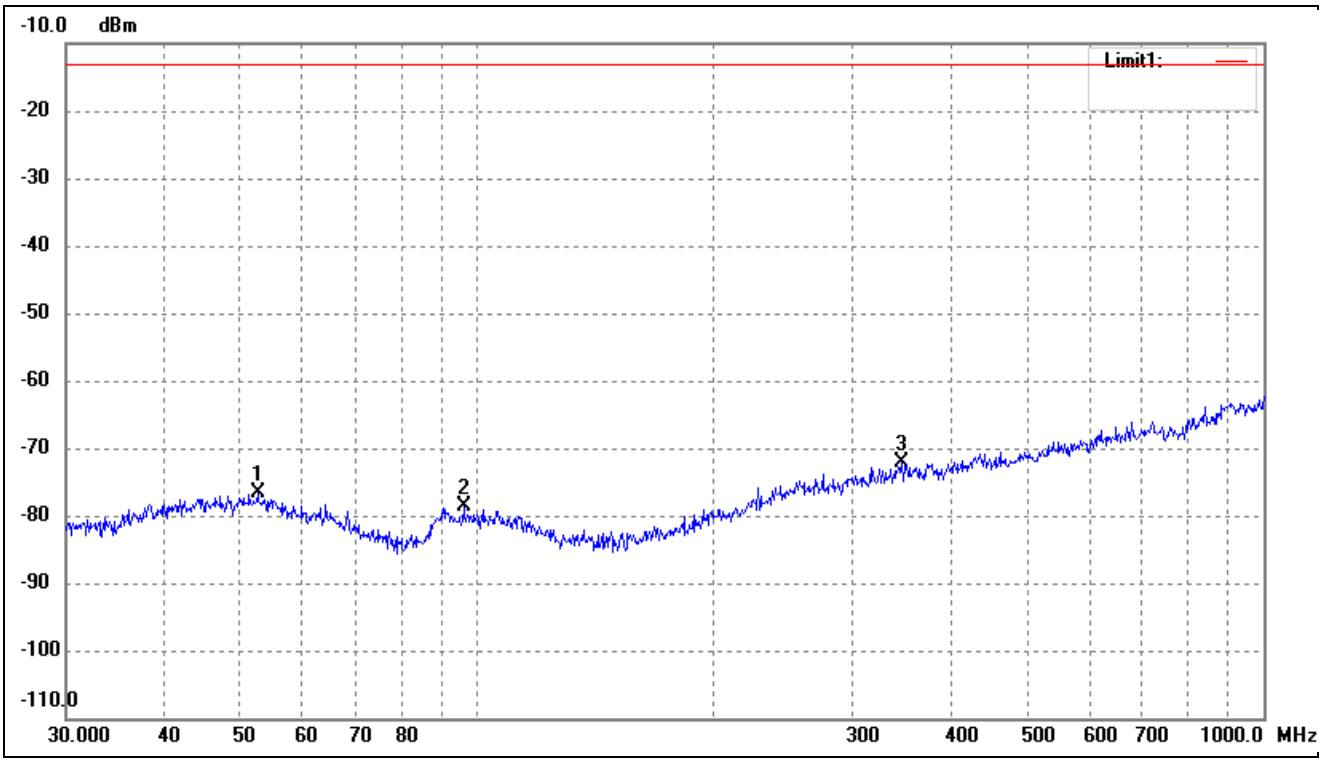
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	50.0566	-76.18	0.20	-75.98	-13.00	-62.98	287	100	peak
2	103.0800	-76.56	-1.74	-78.30	-13.00	-65.30	92	100	peak
3	373.3112	-75.37	4.55	-70.82	-13.00	-57.82	243	100	peak

For Cellular Band			
Test Channel	GSM1900	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	50.2325	-76.67	0.20	-76.47	-13.00	-63.47	314	100	peak
2	105.2718	-77.22	-1.61	-78.83	-13.00	-65.83	91	100	peak
3	304.6100	-76.84	3.57	-73.27	-13.00	-60.27	75	100	peak

For Cellular Band			
Test Channel	GSM1900	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	52.5753	-76.68	0.13	-76.55	-13.00	-63.55	212	100	peak
2	96.0986	-76.20	-2.47	-78.67	-13.00	-65.67	143	100	peak
3	346.8092	-76.90	4.79	-72.11	-13.00	-59.11	70	100	peak

Note: Margin= (Reading+ Correct)- Limit

- Spurious Emissions Above 1GHz
- For Cellular Band_GSM850 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (824.2MHz)						
1648.4	-37.29	4.94	-32.35	-13	-19.35	H
2472.6	-43.96	8.46	-35.5	-13	-22.5	H
1648.4	-37.78	4.94	-32.84	-13	-19.84	V
2472.6	-41.92	8.46	-33.46	-13	-20.46	V
Middle Channel (836.6MHz)						
1673.2	-36.51	5.11	-31.4	-13	-18.4	H
2509.8	-41.78	8.54	-33.24	-13	-20.24	H
1673.2	-34.14	5.11	-29.03	-13	-16.03	V
2509.8	-42.15	8.54	-33.61	-13	-20.61	V
High Channel (848.8MHz)						
1697.6	-34.54	5.25	-29.29	-13	-16.29	H
2546.4	-44.46	8.57	-35.89	-13	-22.89	H
1697.6	-37.86	5.25	-32.61	-13	-19.61	V
2546.4	-41.79	8.57	-33.22	-13	-20.22	V

- For PCS Band_GSM1900 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1850.2MHz)						
3700.4	-39.65	10.54	-29.11	-13	-16.11	H
5550.6	-48.47	13.37	-35.1	-13	-22.1	H
3700.4	-39.27	10.54	-28.73	-13	-15.73	V
5550.6	-49.69	13.37	-36.32	-13	-23.32	V
Middle Channel (1880MHz)						
3760.0	-39.11	10.64	-28.47	-13	-15.47	H
5640.0	-48.14	13.54	-34.6	-13	-21.6	H
3760.0	-41.05	10.64	-30.41	-13	-17.41	V
5640.0	-49.4	13.54	-35.86	-13	-22.86	V
High Channel (1909.8MHz)						
3819.6	-41.14	10.74	-30.4	-13	-17.4	H
5729.4	-48.7	13.71	-34.99	-13	-21.99	H
3819.6	-42.37	10.74	-31.63	-13	-18.63	V
5729.4	-47.47	13.71	-33.76	-13	-20.76	V

Note: Result=Reading+ Correct, Margin= Result- Limit

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

9. Frequency Stability

9.1 Standard Applicable

According to §22.355, §24.235 the limit is 2.5ppm.

9.2 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

9.3 Summary of Test Results/Plots

Note: 1. Worst case at GSM850/PCS1900 middle channel
2. Normal Voltage NV=DC3.7V; Low Voltage LV=DC3.5V;High Voltage HV=DC4.20V

➢ Frequency stability V.S. Temperature measurement

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	62	0.0745	2.50	Pass
	-20	50	0.0598		
	-10	41	0.0487		
	0	35	0.0414		
	10	28	0.0340		
	20	22	0.0257		
	30	25	0.0303		
	40	31	0.0368		
	50	38	0.0460		
Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	55	0.0291	2.50	Pass
	-20	50	0.0266		
	-10	38	0.0205		
	0	32	0.0168		
	10	25	0.0135		
	20	19	0.0102		
	30	25	0.0131		
	40	32	0.0168		
	50	39	0.0209		

➢ Frequency stability V.S. Voltage measurement

Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	27	0.0322	2.50	Pass
	NV	18	0.0211		
	LV	25	0.0294		
Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	42	0.0225	2.50	Pass
	NV	38	0.0200		
	LV	52	0.0278		

10. Modulation characteristics

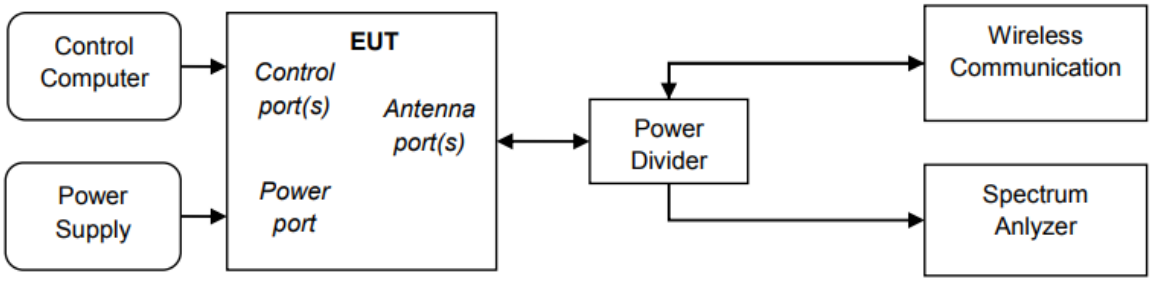
10.1 Standard Applicable

According to §2.1047, measurements required: Modulation characteristics is given below:

(a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
(b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.
(c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power. A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.
(d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

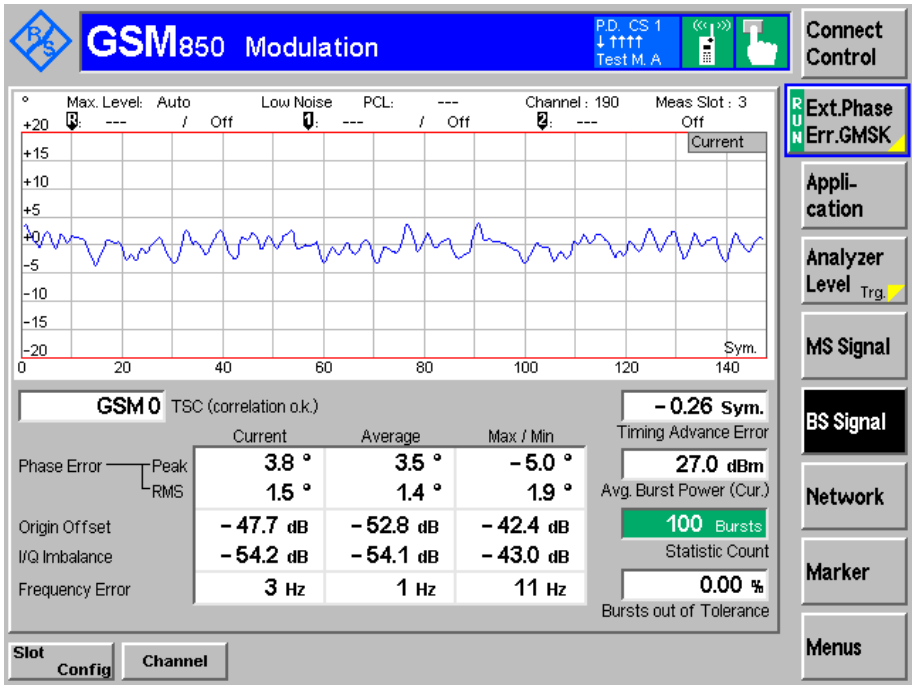
10.2 Test Procedure

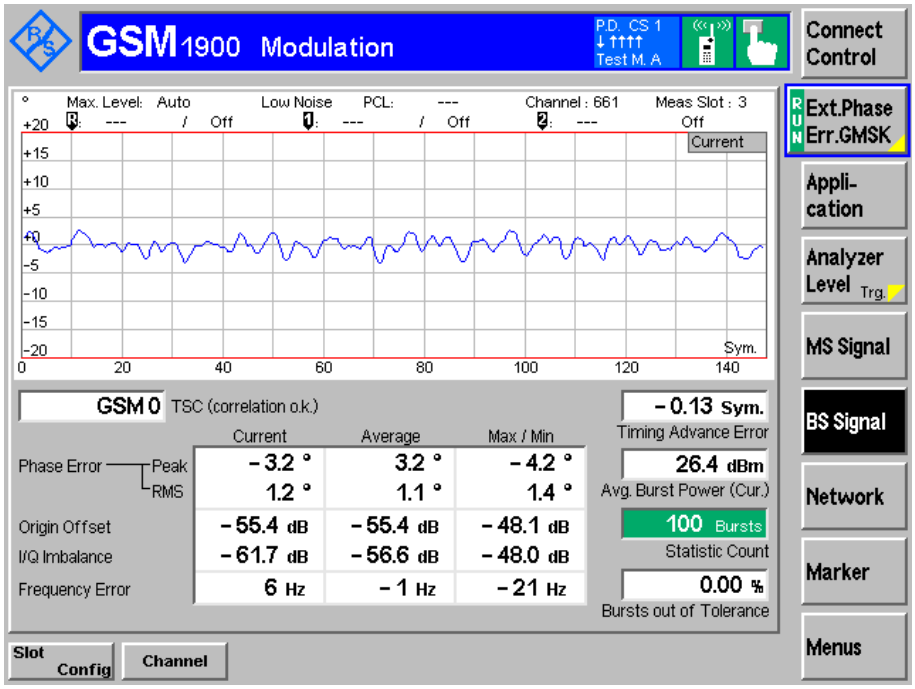
According to ANSI C63.26-2015 section 5.3.2, the following test setup was performed.



10.3 Summary of Test Results/Plots

Only the worst case was selected to record

GSM850	
Middle Channel-GMSK	

GSM1900	
Middle Channel-GMSK	

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