FCC Part 22H & 24E
Measurement and Test Report

For

Cyrus Technology GmbH

Hergelsbendenstrasse 49, D-52080 Aachen, Germany

FCC ID: 2AI3KCM17SA2

FCC Rules:	FCC Part 22H, FCC Part 24E
Product Description:	Rugged Phone
Tested Model:	CM17SA
Report No.:	STR18108156I-1
Sample Receipt Date:	2018-10-18
Tested Date:	2018-10-18 to 2018-11-08
Issued Date:	2018-11-09
Tested By:	Jason Su / Engineer
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM Test Technology Co., Ltd.

TABLE OF CONTENTS

1. GENERAL INFORMATION 3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 3
1.2 TEST STANDARDS 5
1.3 TEST METHODOLOGY 5
1.4 TEST FACILITY 5
1.5 EUT SETUP AND TEST MODE 6
1.6 MEASUREMENT UNCERTAINTY 7
1.7 TEST EQUIPMENT LIST AND DETAILS 8
2. SUMMARY OF TEST RESULTS 10
3. RF EXPOSURE 11
3.1 STANDARD APPLICABLE 11
3.2 TEST RESULT 11
4. RF OUTPUT POWER 12
4.1 STANDARD APPLICABLE 12
4.2 TEST PROCEDURE 12
4.3 SUMMARY OF TEST RESULTS/PLOTS 12
5. PEAK-TO-AVERAGE RATIO (PAR) OF TRANSMITTER 17
5.1 STANDARD APPLICABLE 17
5.2 TEST PROCEDURE 17
5.3 SUMMARY OF TEST RESULTS 17
6. EMISSION BANDWIDTH 19
6.1 STANDARD APPLICABLE 19
6.2 TEST PROCEDURE 19
6.3 SUMMARY OF TEST RESULTS/PLOTS 19
7. OUT OF BAND EMISSIONS AT ANTENNA TERMINAL 34
7.1 STANDARD APPLICABLE 34
7.2 TEST PROCEDURE 34
7.3 SUMMARY OF TEST RESULTS/PLOTS 34
8. SPURIOUS RADIATED EMISSIONS 67
8.1 STANDARD APPLICABLE 67
8.2 TEST PROCEDURE 67
8.3 SUMMARY OF TEST RESULTS/PLOTS 67
9. FREQUENCY STABILITY 78
9.1 STANDARD APPLICABLE 78
9.2 TEST PROCEDURE 78
9.3 SUMMARY OF TEST RESULTS/PLOTS 78

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Cyrus Technology GmbH
Address of applicant: Hergelsbendenstrasse 49, D-52080 Aachen, Germany

Manufacturer: Cyrus Technology GmbH
Address of manufacturer: Hergelsbendenstrasse 49, D-52080 Aachen, Germany

General Description of EUT:	
Product Name:	Rugged Phone
Brand Name:	Cyrus
Model No.:	CM17SA
Adding Model(s):	/
Rated Voltage:	DC3.8V
Battery: /	
Adapter Model:	Model: JWS664-501000 Input:AC100-240V 50/60Hz 0.2A Output: DC5V 1000mA
Software Version:	CM17_V1.2
Hardware Version:	L819_MB
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT:	
2G	
Support Networks:	GSM, GPRS, EDGE
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS/EDGE 850: 824~849MHz GSM/GPRS/EDGE 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS/EDGE 850: 869~894MHz GSM/GPRS/EDGE 1900: 1930~1990MHz
Max RF Output Power:	GSM850: 32.12dBm, GSM1900: 30.74dBm EDGE850: 26.58dBm, EDGE1900: 26.45dBm
Type of Emission:	GSM850: 262KGXW, GSM1900: 255KGXW EDGE850: 248KG7W, EDGE1900: 251KG7W
Type of Modulation:	GMSK, 8PSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM850: -0.8dBi; GSM1900: 1.2dBi
GPRS/EDGE Class:	Class 12
3G	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band 2, WCDMA Band 5
Uplink Frequency:	WCDMA Band 2: 1850~1910MHz WCDMA Band 5: 824~849MHz
Downlink Frequency:	WCDMA Band 2: 1930~1990MHz WCDMA Band 5: 869~894MHz
RF Output Power:	WCDMA Band 2: 21.79dBm, WCDMA Band 5: 23.19dBm
Type of Emission:	WCDMA Band 2: 4M23F9W WCDMA Band 5: 4M23F9W
Type of Modulation:	BPSK,QPSK
Antenna Type:	Integral Antenna
Antenna Gain:	WCDMA Band 2: 1.2dBi, WCDMA Band 5: -0.8dBi

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	EDGE 850	Low, Middle, High Channels
TM4	GSM 1900	Low, Middle, High Channels
TM5	GPRS 1900	Low, Middle, High Channels
TM6	EDGE 1900	Low, Middle, High Channels
TM7	WCDMA Band 5	Low, Middle, High Channels
TM8	HSDPA Band 5	Low, Middle, High Channels
TM9	HSUPA Band 5	Low, Middle, High Channels
TM10	WCDMA Band 2	Low, Middle, High Channels
TM11	HSDPA Band 2	Low, Middle, High Channels
TM12	HSUPA Band 2	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency(MHz)	Channel Number
GSM 850	GSM/GPRS/EDGE	824.2	128
		836.6	190
		848.8	251
PCS 1900	GSM/GPRS/EDGE	1850.2	512
		1880.0	661
		1909.8	810
WCDMA Band 5	WCDMA/HSDPA/HSUPA	826.4	4132
		836.6	4183
		846.6	4233
WCDMA Band 2	WCDMA/HSDPA/HSUPA	1852.4	9262
		1880.0	9400
		1907.6	9538
Note: the transmitter has been tested on the communications mode of GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA 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
USB Cable	1.2	Unshielded	Without Ferrite
Earphone 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	2018-05-22	2019-05-21
SEMT-1063	GSM Tester	Rohde & Schwarz	CMU200	114403	2018-05-22	2019-05-21
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2018-05-22	2019-05-21
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2018-05-22	2019-05-21
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2018-05-22	2019-05-21
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2018-05-22	2019-05-21
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2018-05-22	2019-05-21
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2018-05-22	2019-05-21
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2018-05-22	2019-05-21
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2018-05-22	2019-05-21
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2018-05-22	2019-05-21
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2018-05-22	2019-05-21
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-08	2020-06-07
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2020-06-07
SEMT-1042	Horn Antenna	ETS	3117	00086197	2017-06-08	2020-06-07
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2017-06-08	2020-06-07
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2018-05-22	2019-05-21
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2018-05-22	2019-05-21
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2018-05-22	2019-05-21
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2018-03-19	2021-03-18
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2018-05-22	2019-05-21
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2018-05-22	2019-05-21
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2018-05-22	2019-05-21
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2018-03-19	2019-03-18
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2018-03-19	2019-03-18
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2018-03-19	2019-03-18
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2018-03-19	2019-03-18

SEMT-C005	Cable	Zheng DI	1M0RFC	/	2018-03-19	2019-03-18
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2018-03-19	2019-03-18

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 RF exposure, please see the SAR report.

4. RF Output Power

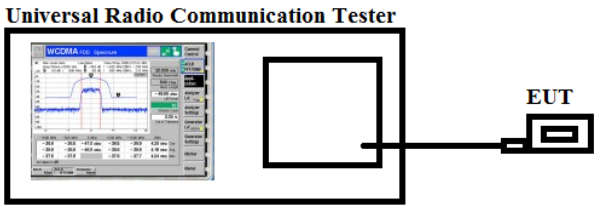
4.1 Standard Applicable

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	30.11	<38.45	Pass
		H	30.65		
	190	V	30.47		
		H	30.48		
	251	V	30.62		
		H	30.08		
GPRS850	128	V	30.17	<38.45	Pass
		H	30.12		
	190	V	30.32		
		H	30.11		
	251	V	30.28		
		H	30.55		
EGPRS850	128	V	24.02	<38.45	Pass
		H	24.05		
	190	V	24.32		
		H	24.08		
	251	V	24.31		
		H	24.11		

Mode	Channel	Antenna Polar	EIRP (dBm)	Limit (dBm)	Result
PCS1900	512	V	28.65	<33.00	Pass
		H	28.14		
	661	V	28.81		
		H	28.31		
	810	V	28.41		
		H	28.22		
GPRS1900	512	V	27.65	<33.00	Pass
		H	27.85		
	661	V	27.98		
		H	27.71		
	810	V	27.28		
		H	27.65		
EGPRS1900	512	V	24.21	<33.00	Pass
		H	24.25		
	661	V	24.01		
		H	24.32		
	810	V	24.05		
		H	24.32		

Mode	Channel	Antenna Polar	ERP	Limit (dBm)	Result
WCDMA Band V	4132	V	19.02	<38.45	Pass
		H	19.11		
	4183	V	19.32		
		H	19.14		
	4233	V	18.32		
		H	18.45		

Mode	Channel	Antenna Polar	EIRP	Limit (dBm)	Result
WCDMA Band II	9262	V	20.41	<33.00	Pass
		H	20.32		
	9400	V	20.35		
		H	20.39		
	9538	V	20.41		
		H	20.25		

Note: Pre-scan mode WCDMA/HSDPA/HSUPA find the worst case at WCDMA mode and recorded in the test report.

➢ **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	32.08	32.09	32.08	29.61	30.14	30.67
GPRS(1Slot)	32.09	32.11	32.12	29.63	30.15	30.74
EGPRS(1Slot)	26.58	26.26	25.91	26.45	26.40	25.74

Conducted Average power (dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4183	4233	9262	9400	9538
Frequency(MHz)	826.4	836.6	846.6	1852.4	1880.0	1907.6
RMC 12.2k	20.96	21.39	21.79	23.07	23.19	23.08
HSDPA Subtest-1	20.55	20.79	20.90	22.16	22.27	22.21
HSDPA Subtest-2	20.50	20.75	20.86	22.12	22.20	22.18
HSDPA Subtest-3	20.53	20.76	20.85	22.12	22.28	22.18
HSDPA Subtest-4	20.52	20.74	20.84	22.14	22.27	22.19
HSUPA Subtest-1	20.50	20.90	21.37	22.16	22.28	22.10
HSUPA Subtest-2	20.48	20.86	21.35	22.15	22.25	22.08
HSUPA Subtest-3	20.48	20.87	21.34	22.15	22.25	22.07
HSUPA Subtest-4	20.45	20.87	21.33	22.13	22.24	22.08
HSUPA Subtest-5	20.47	20.86	21.34	22.14	22.26	22.09

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

5.1 Standard Applicable

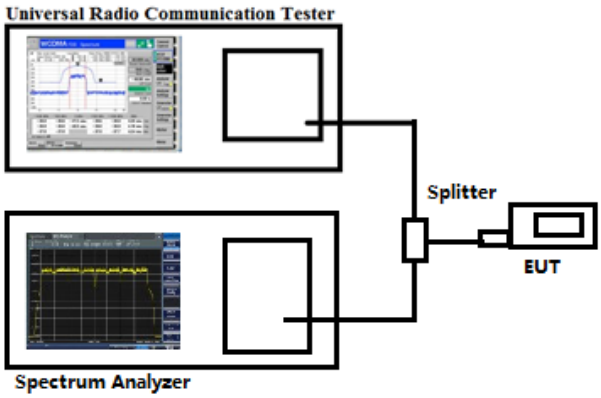
According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in 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	4.32	13
GPRS(1 Slot)	661	1850.2	4.58	13
EDGE(1 Slot)	661	1850.2	4.87	13

WCDMA Band II				
Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	9262	1852.4	5.02	13
	9400	1880.0	5.14	13
	9538	1907.6	4.17	13

Note: Only the worst case was selected to record.

6. Emission Bandwidth

6.1 Standard Applicable

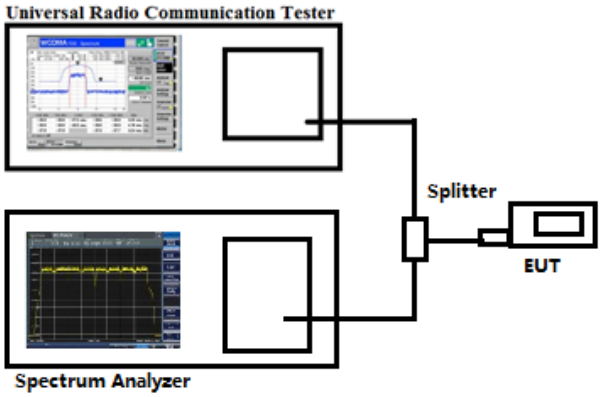
According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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.

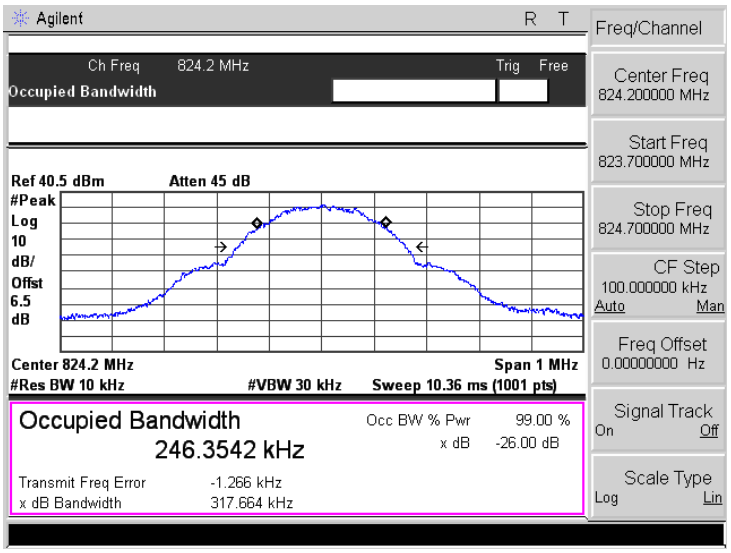
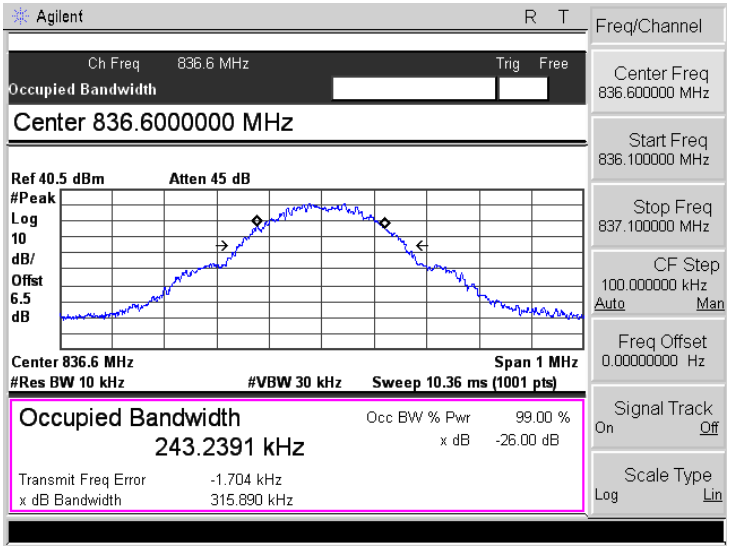
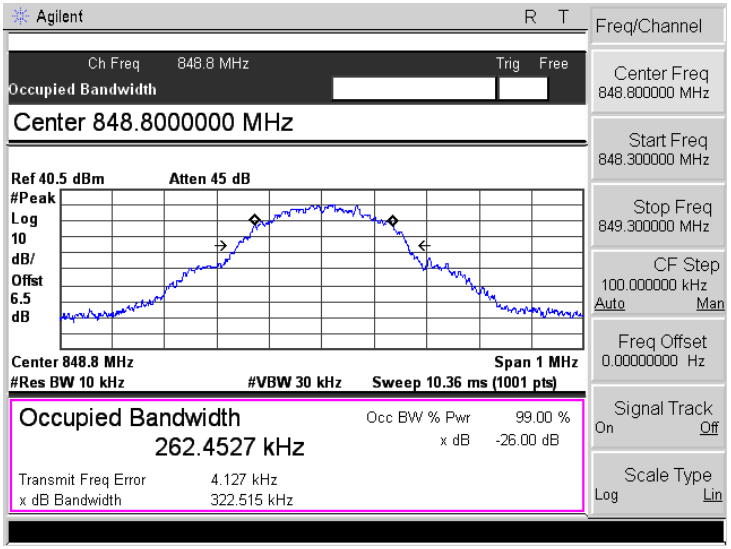
Test Configuration for the emission bandwidth testing:

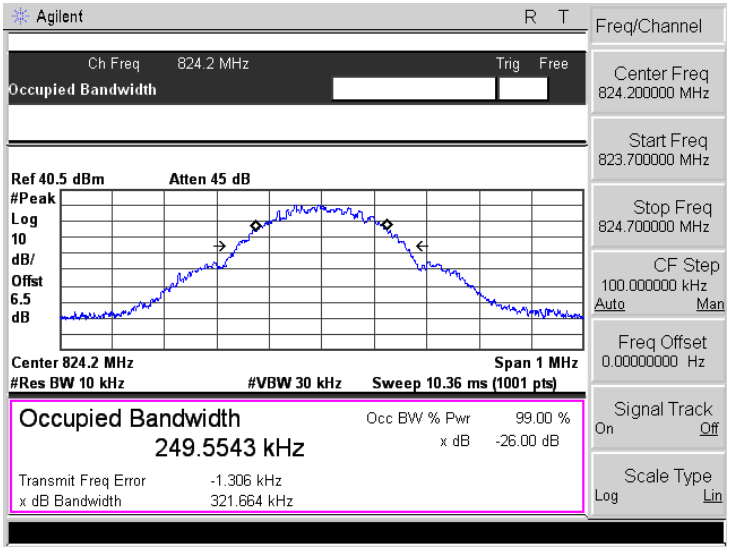
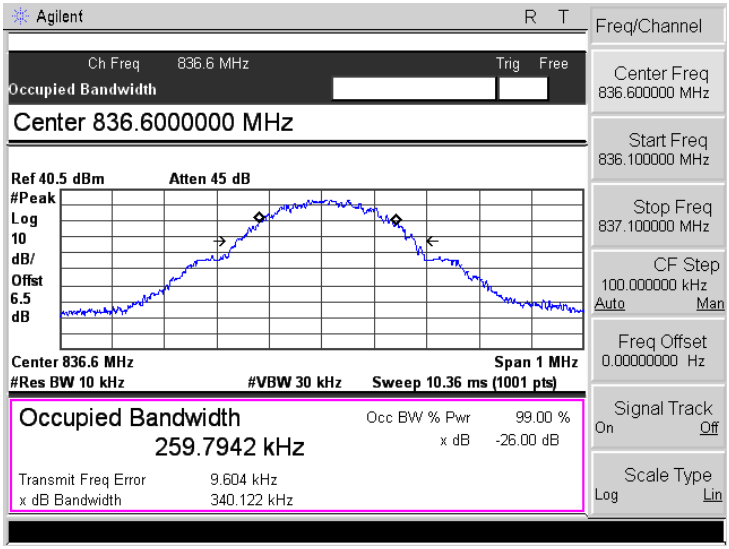
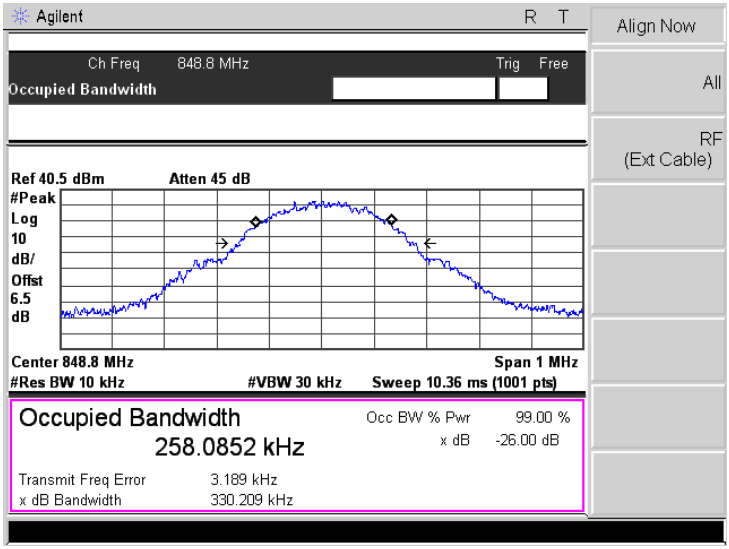


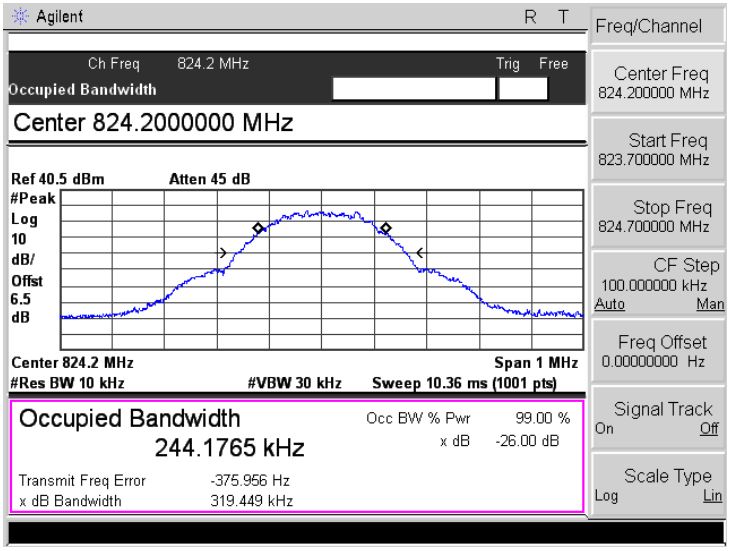
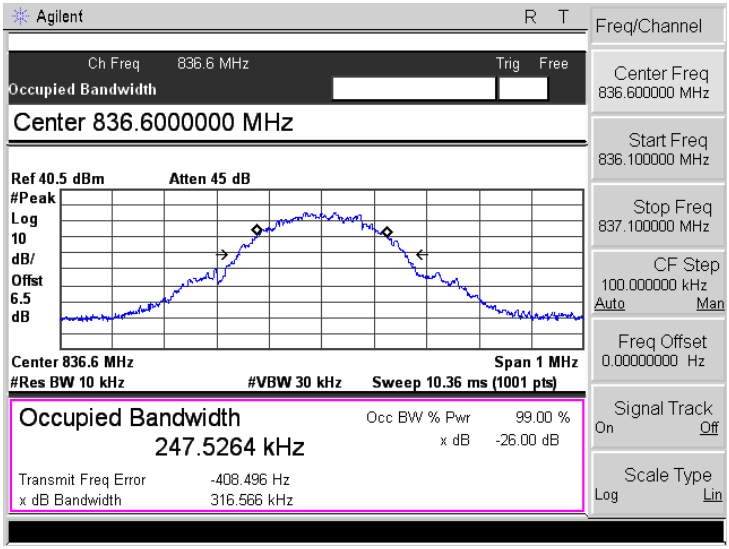
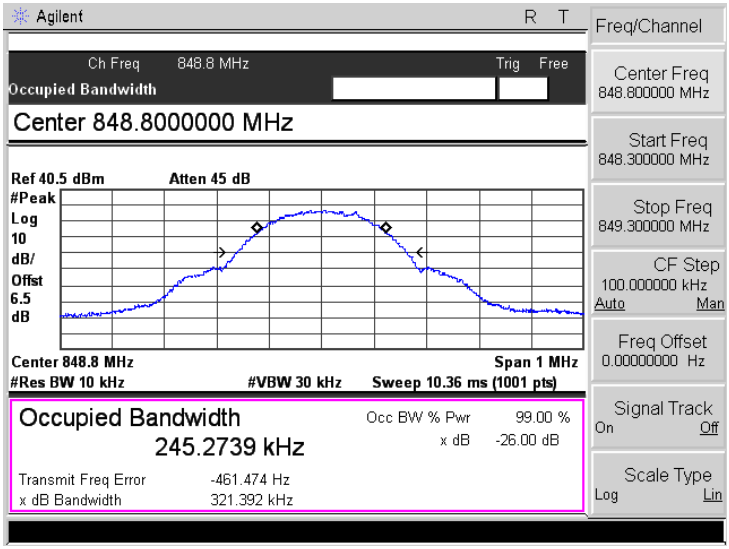
6.3 Summary of Test Results/Plots

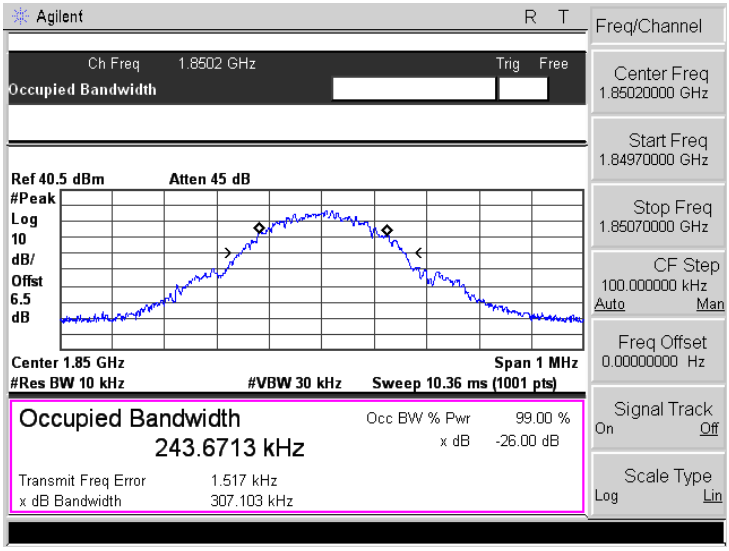
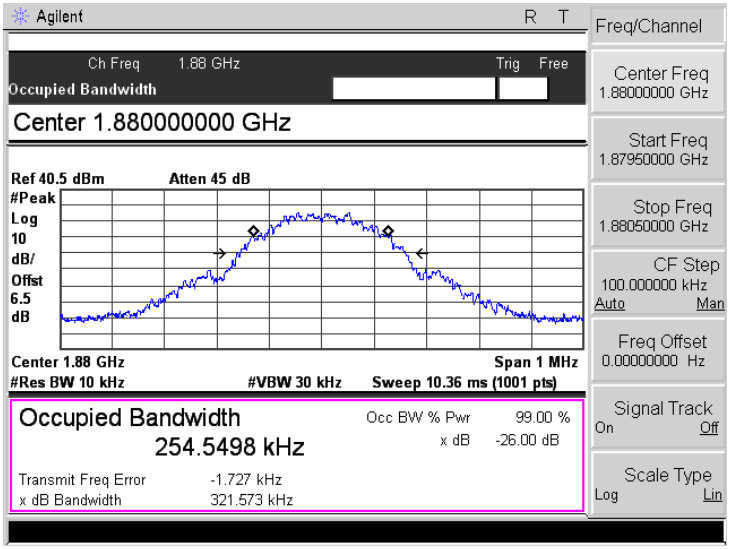
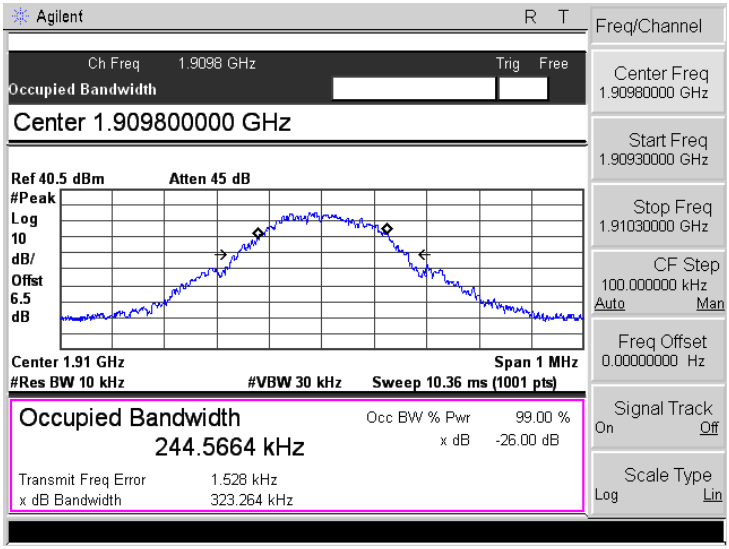
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (kHz)	-26dB bandwidth (kHz)
GSM 850 (GMSK)	128	824.20	246.3542	317.664
	190	836.60	243.2391	315.890
	251	848.80	262.4527	322.515
GPRS850 (GMSK,1Slot)	128	824.20	249.5543	321.664
	190	836.60	259.7942	340.122
	251	848.80	258.0852	330.209
EGPRS850 (8PSK,1Slot)	128	824.20	244.1765	319.449
	190	836.60	247.5264	316.566
	251	848.80	245.2739	321.392
PCS1900 (GMSK)	512	1850.20	243.6713	307.103
	661	1880.00	254.5498	321.573
	810	1909.80	244.5664	323.264
GPRS1900 (GMSK,1Slot)	512	1850.20	248.2905	316.128
	661	1880.00	249.3993	318.704
	810	1909.80	247.5001	312.411
EGPRS1900 (8PSK,1Slot)	512	1850.20	251.4708	313.605
	661	1880.00	250.4509	319.474
	810	1909.80	245.8661	321.930

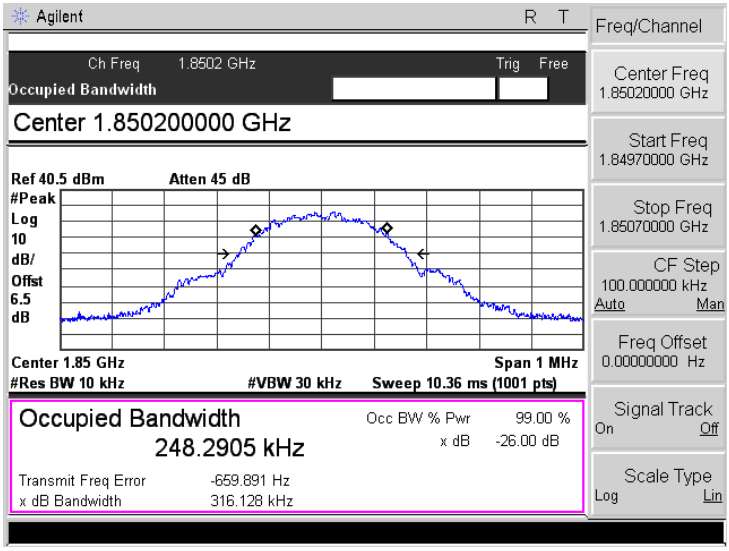
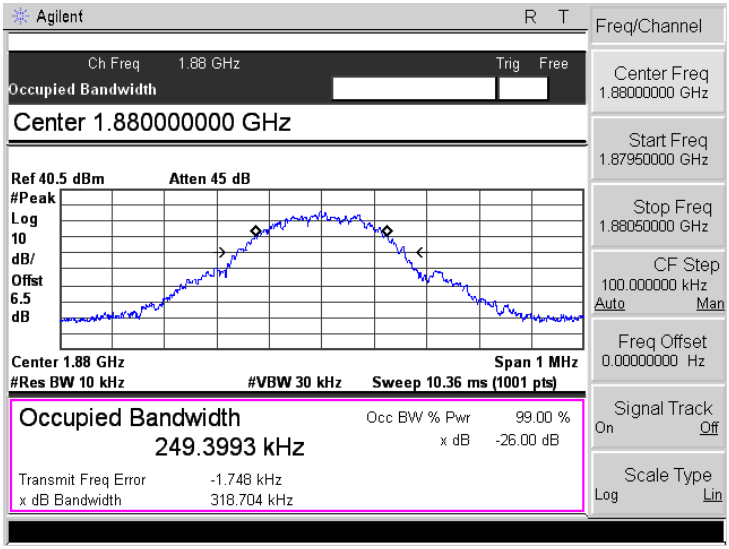
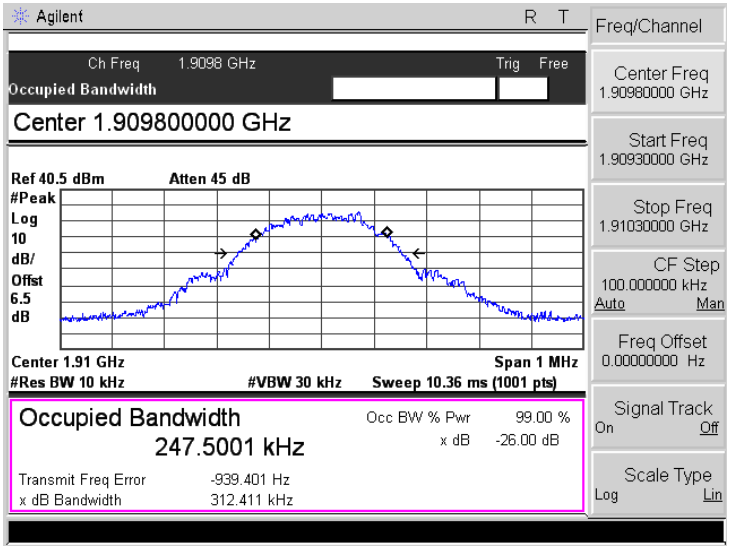
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (kHz)	-26dB bandwidth (kHz)
WCDMA Band V	4132	826.40	4213.1	4813
	4183	836.60	4208.3	4854
	4233	846.60	4214.5	4868
HSDPA	4132	826.40	4230.6	4899
	4183	836.60	4222.6	4843
	4233	846.60	4217.0	4893
HSUPA	4132	826.40	4215.0	4846
	4183	836.60	4218.6	4858
	4233	846.60	4216.5	4872
WCDMA Band II	9262	1852.40	4205.5	4879
	9400	1880.00	4214.6	4842
	9538	1907.60	4213.1	4848
HSDPA	9262	1852.40	4204.0	4853
	9400	1880.00	4214.3	4858
	9538	1907.60	4205.4	4829
HSUPA	9262	1852.40	4224.3	4845
	9400	1880.00	4229.3	4867
	9538	1907.60	4220.3	4849

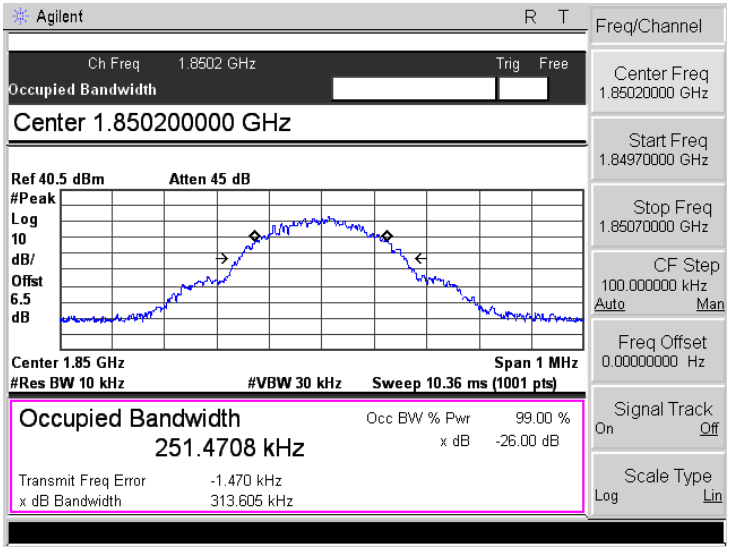
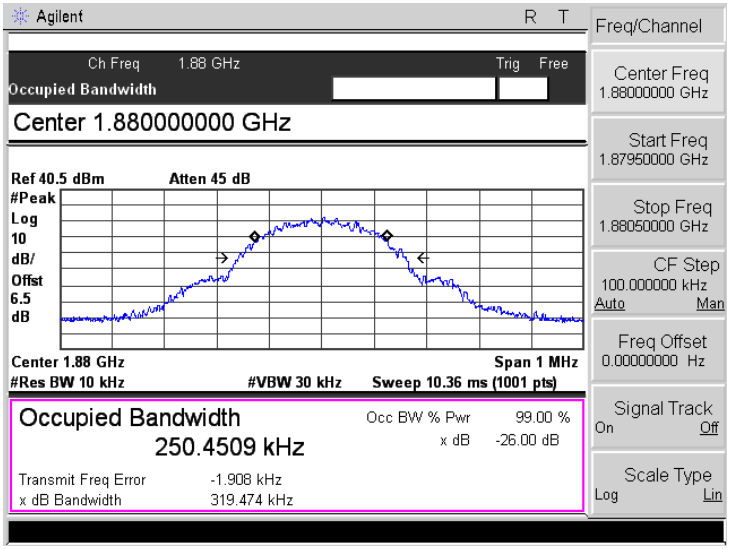
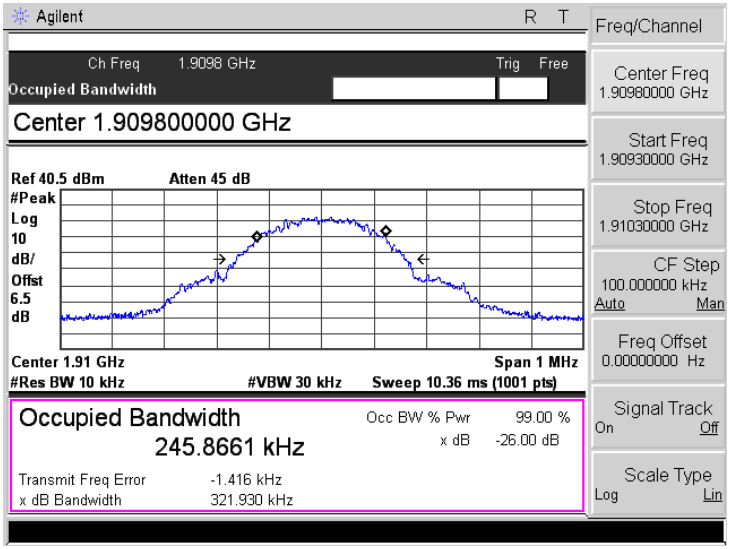
GSM850	
Low Channel	
Middle Channel	
High Channel	

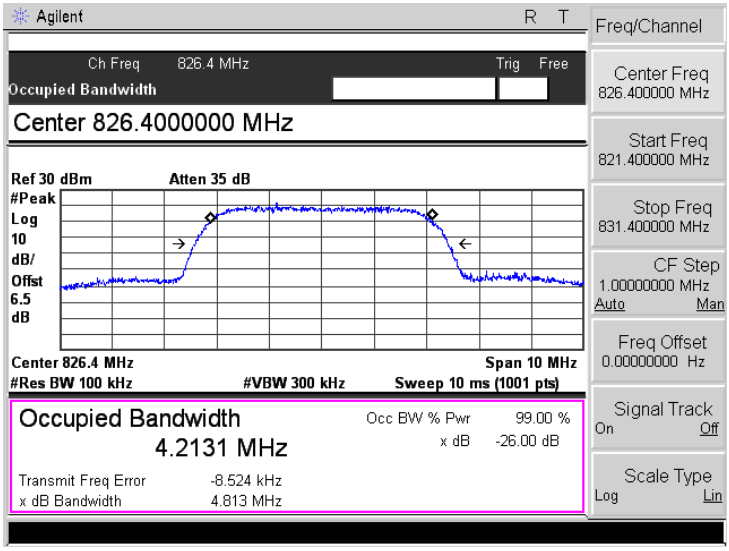
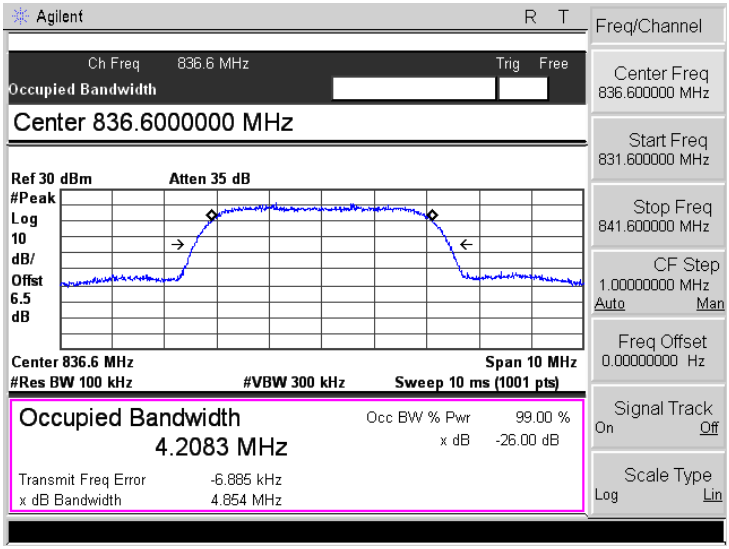
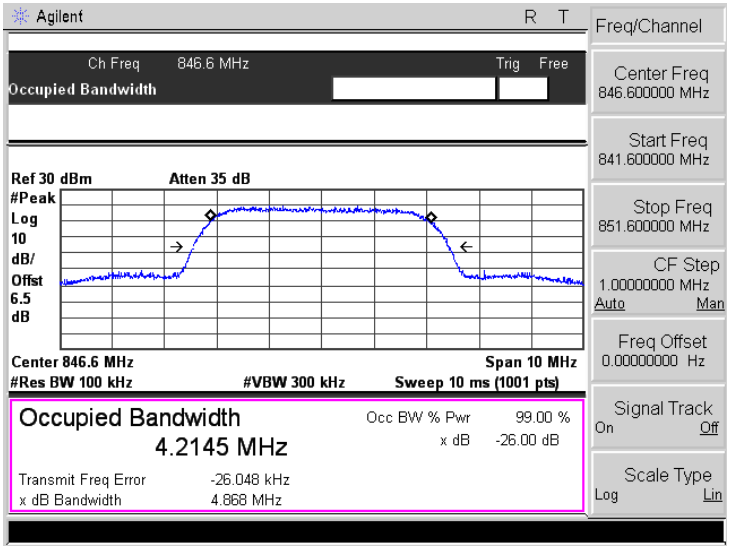
GPRS850	
Low Channel	
Middle Channel	
High Channel	

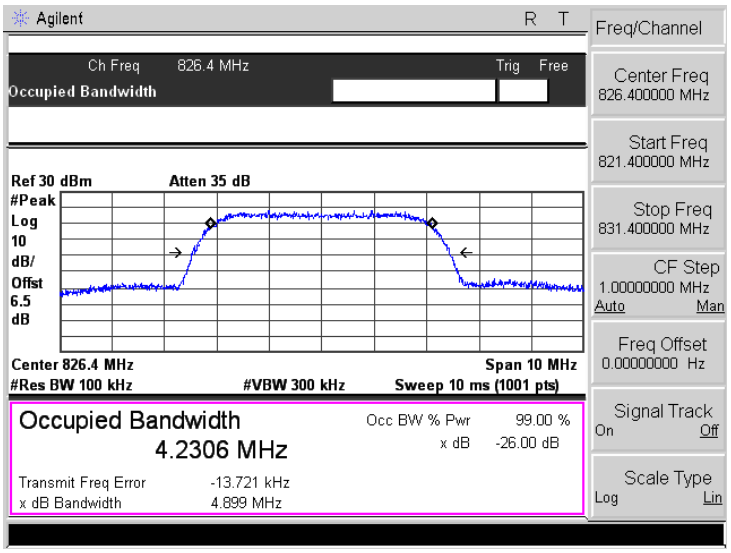
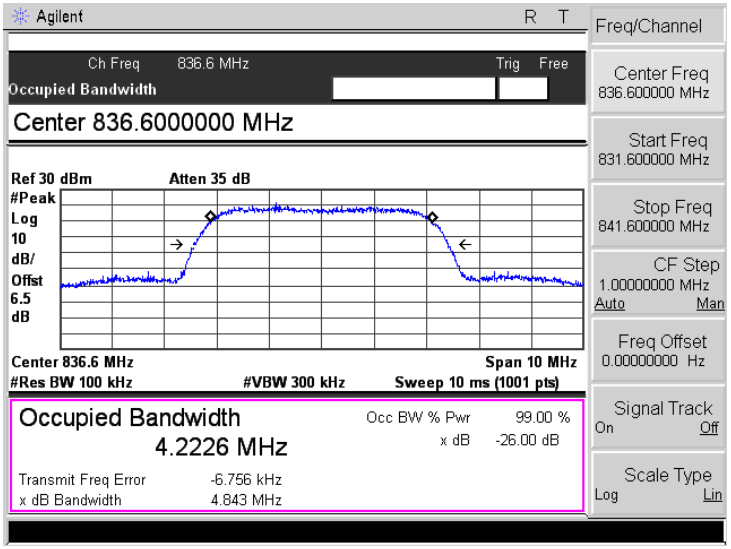
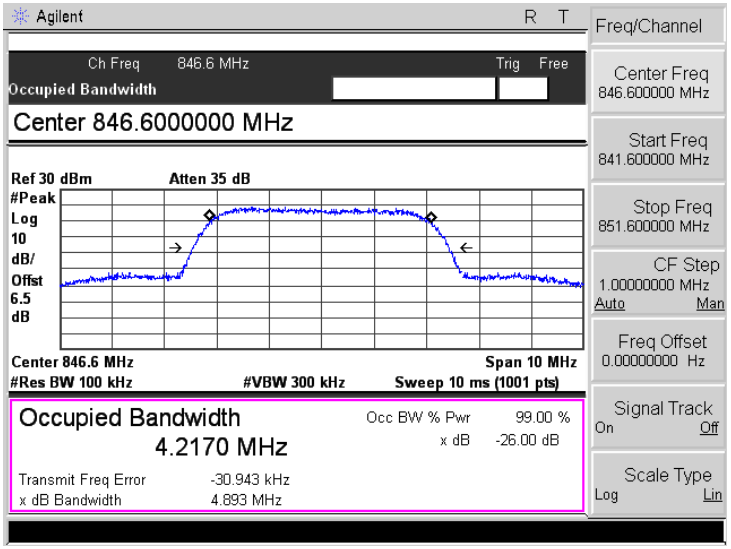
EGPRS850	
Low Channel	
Middle Channel	
High Channel	

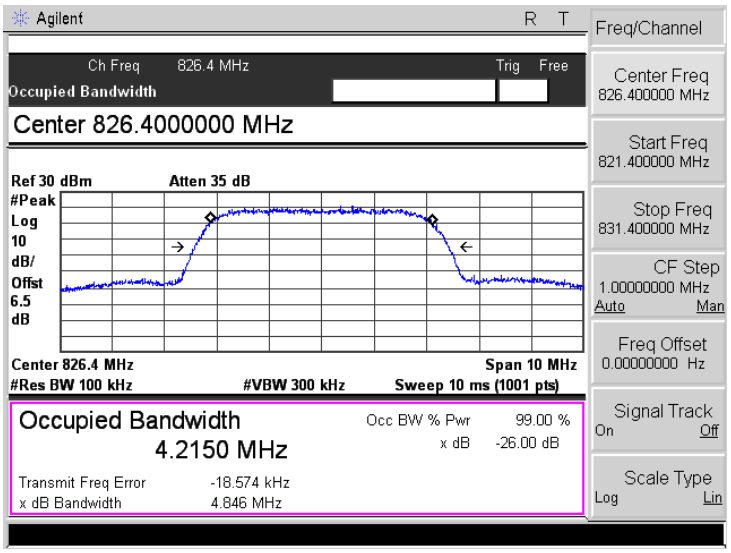
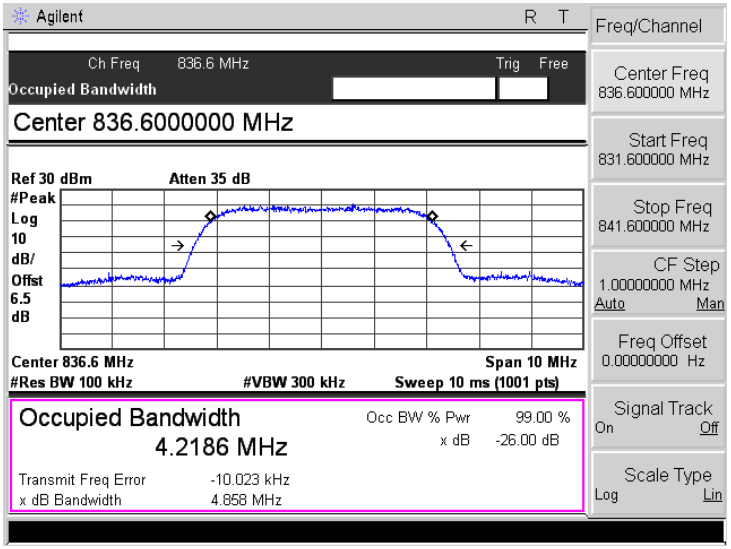
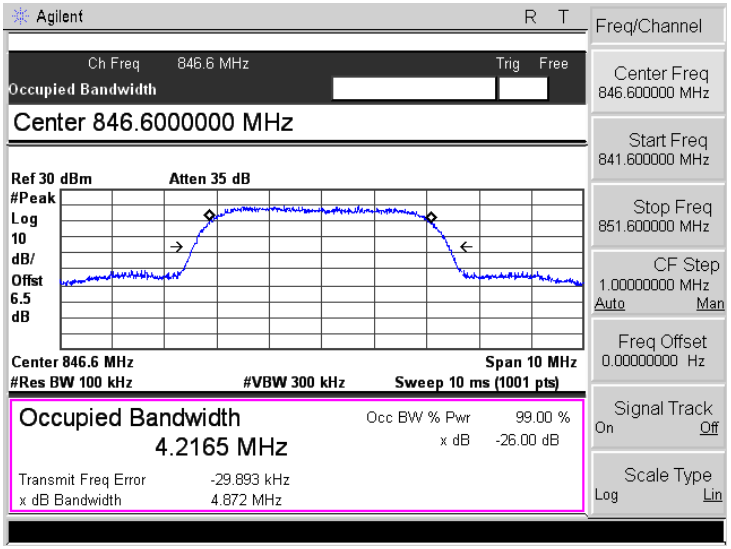
PCS1900	
Low Channel	
Middle Channel	
High Channel	

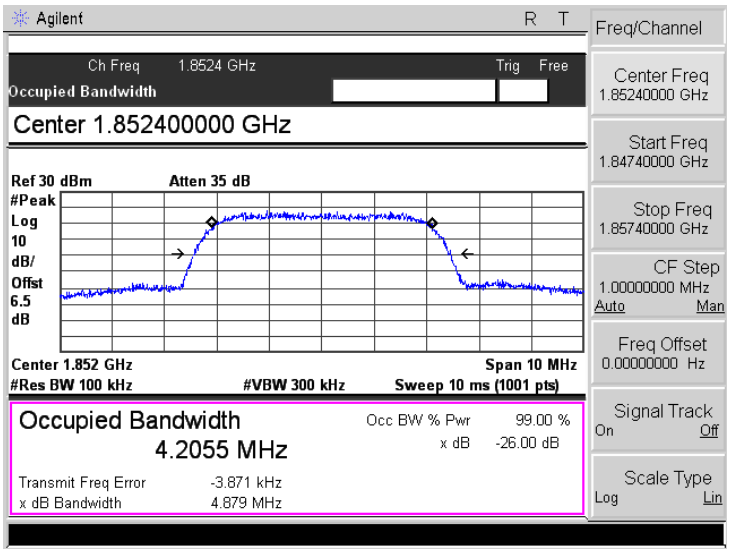
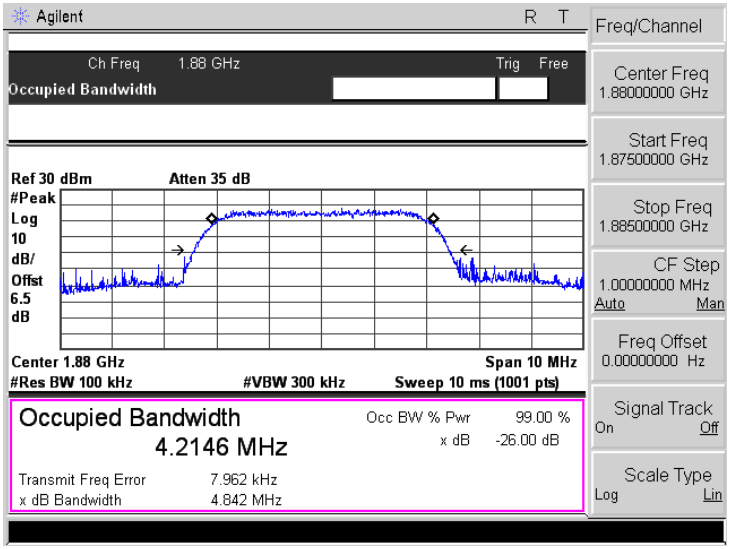
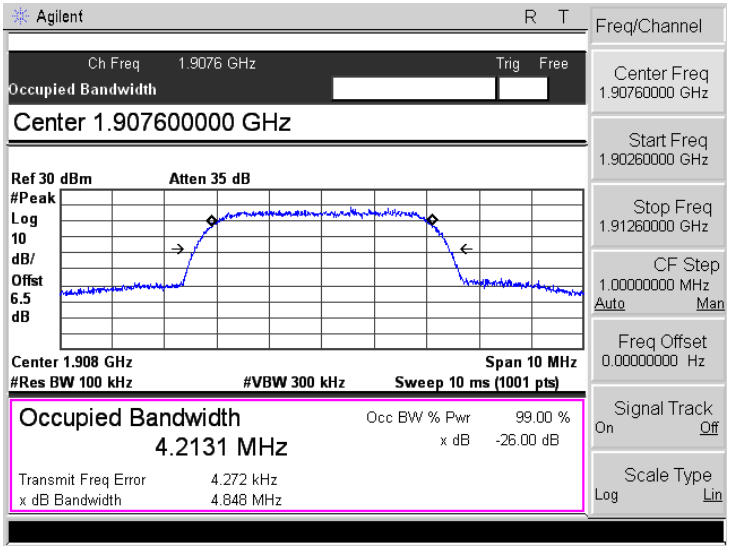
GPRS1900	
Low Channel	
Middle Channel	
High Channel	

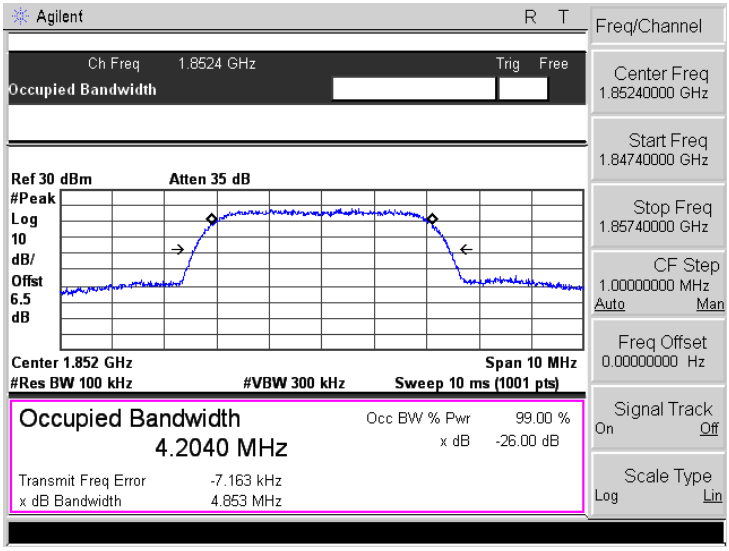
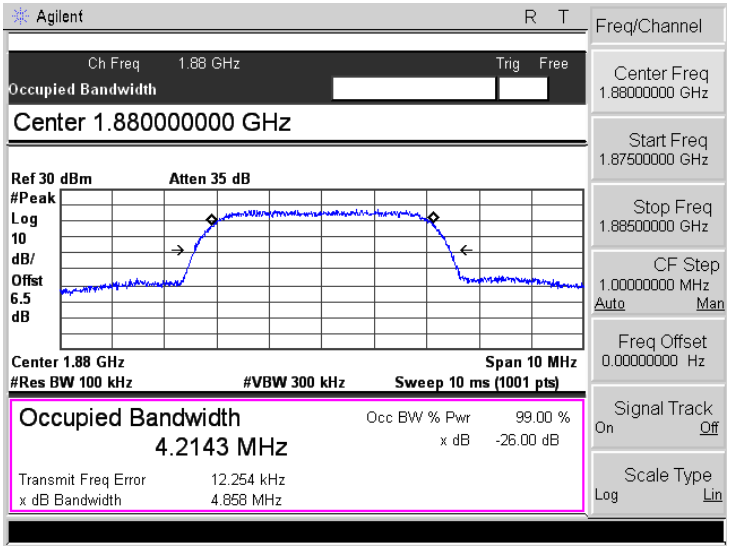
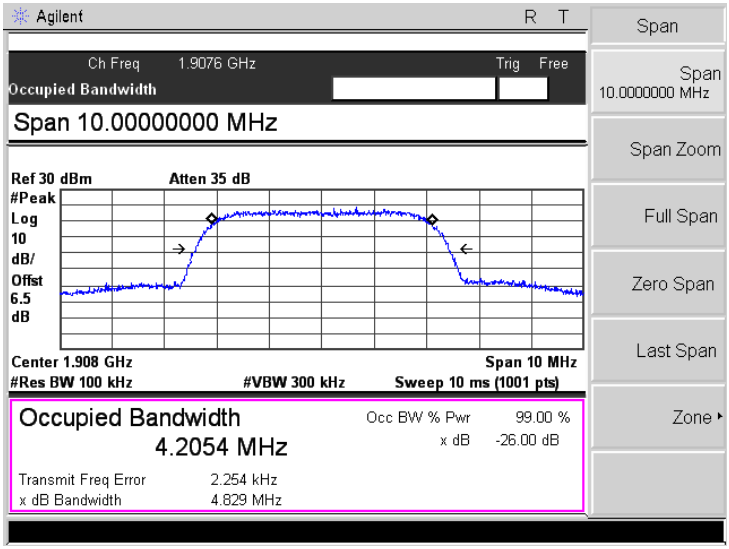
EGPRS1900	
Low Channel	
Middle Channel	
High Channel	

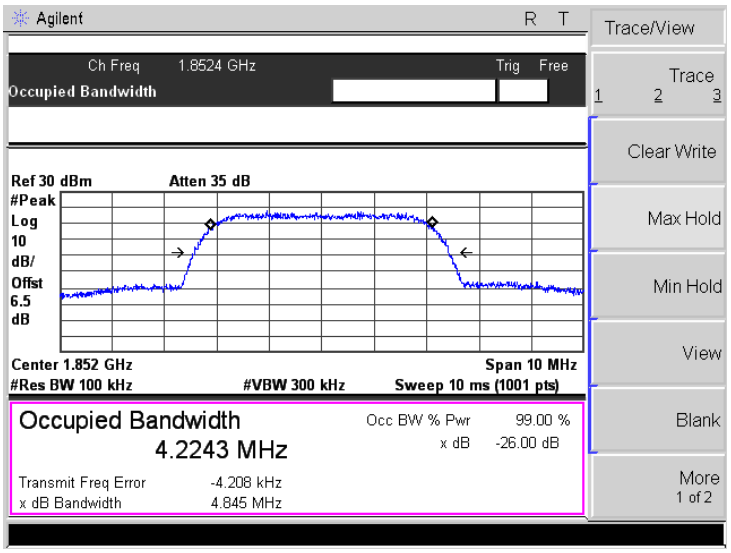
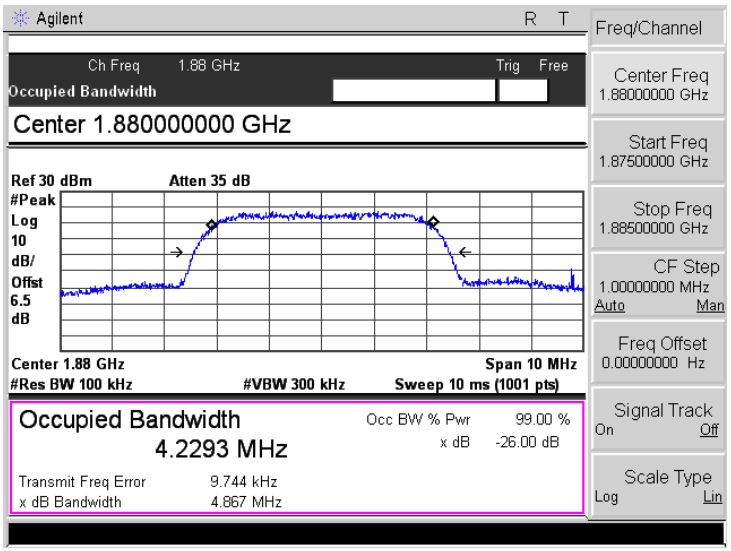
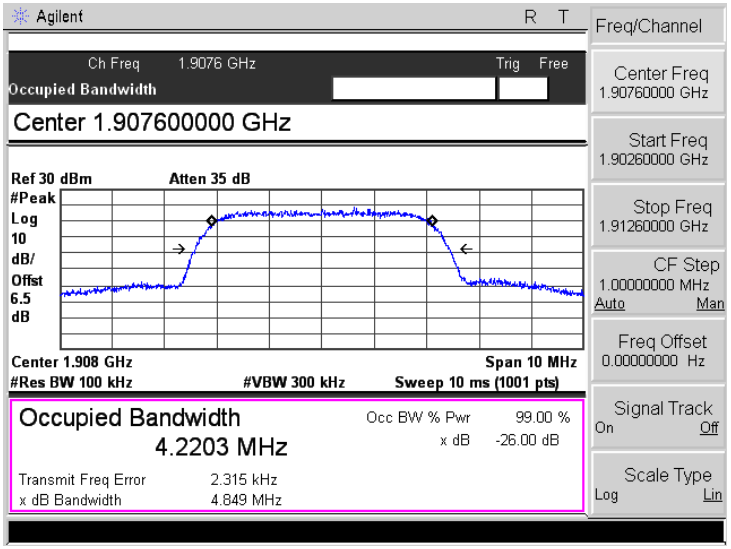
WCDMA Band V	
Low Channel	
Middle Channel	
High Channel	

WCDMA Band V- HSDPA	
Low Channel	
Middle Channel	
High Channel	

WCDMA Band V- HSUPA	
Low Channel	
Middle Channel	
High Channel	

WCDMA Band II	
Low Channel	
Middle Channel	
High Channel	

WCDMA Band II- HSDPA	
Low Channel	
Middle Channel	
High Channel	

WCDMA Band II- HSUPA	
Low Channel	
Middle Channel	
High Channel	

7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

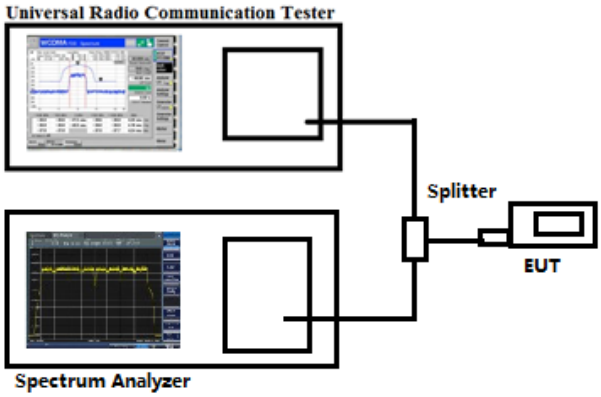
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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:

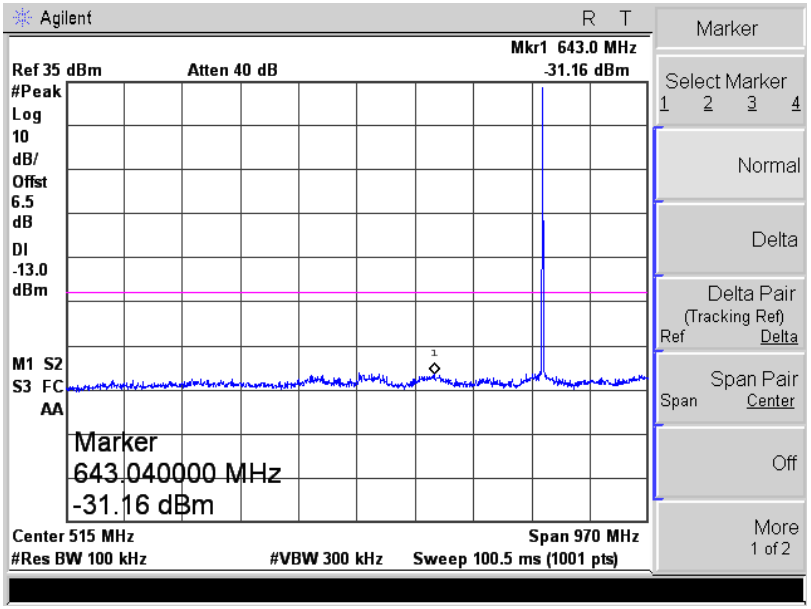
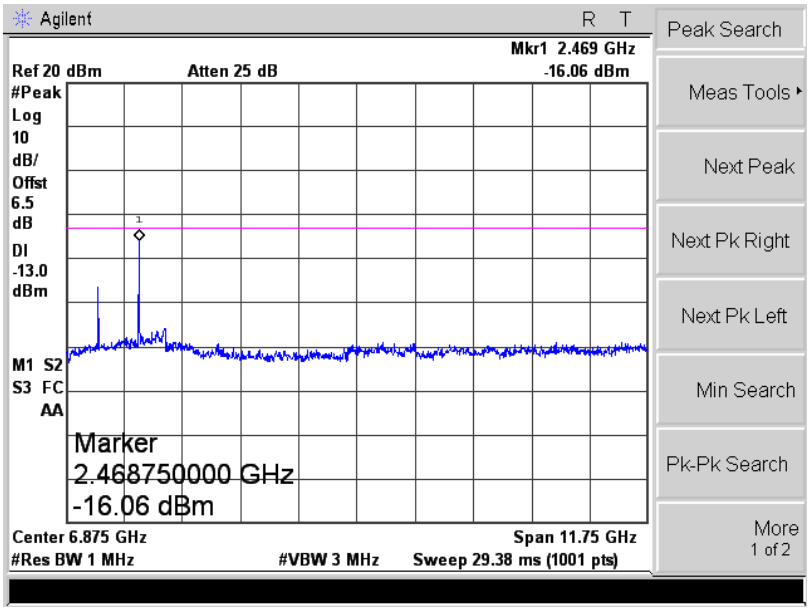


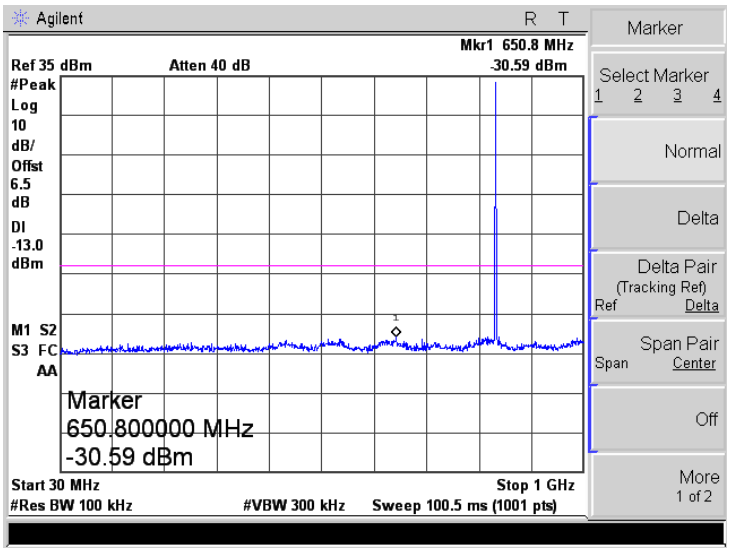
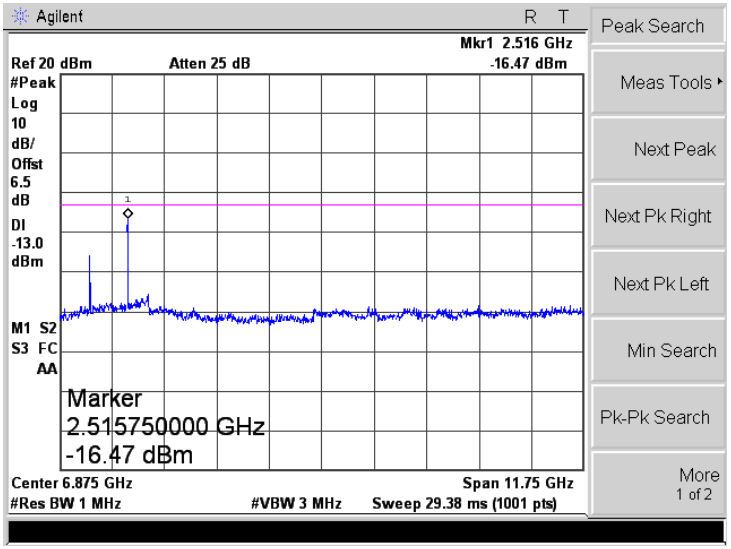
7.3 Summary of Test Results/Plots

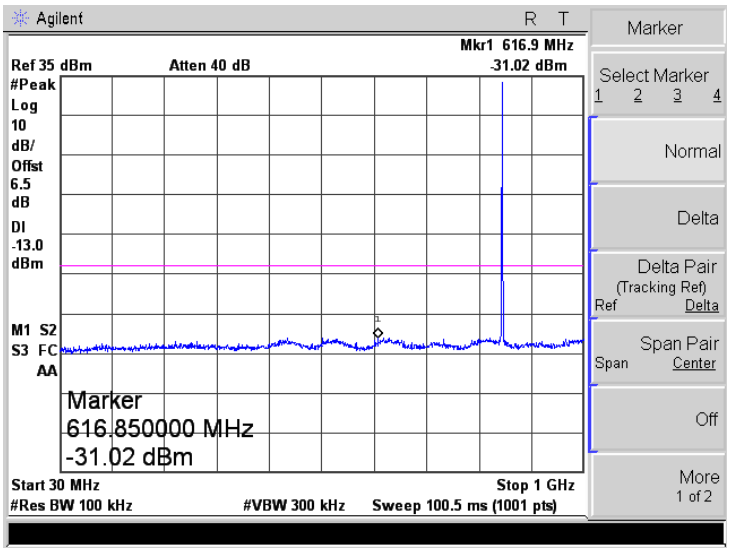
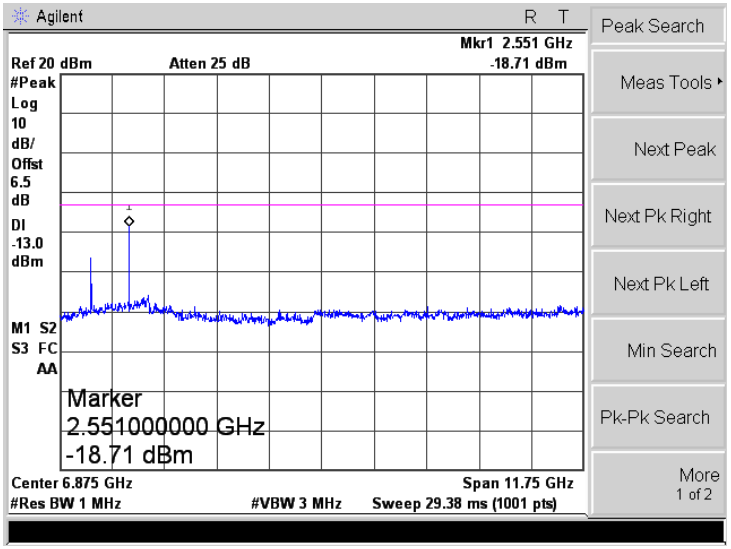
Note: Pre-scan mode WCDMA/HSDPA/HSUPA find the worst case at WCDMA mode and recorded in the test report.

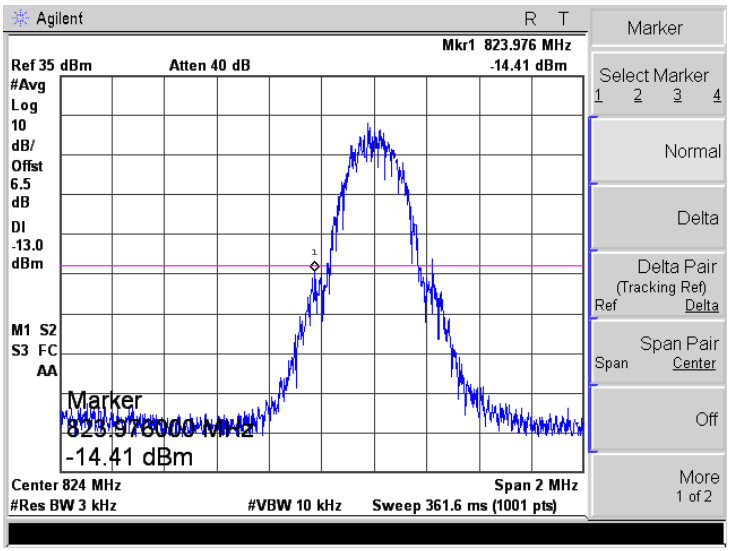
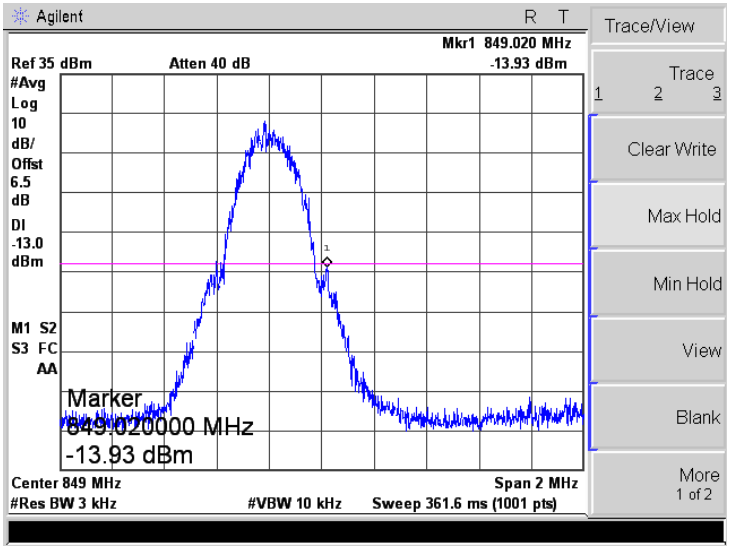
Please refer to the following test plots

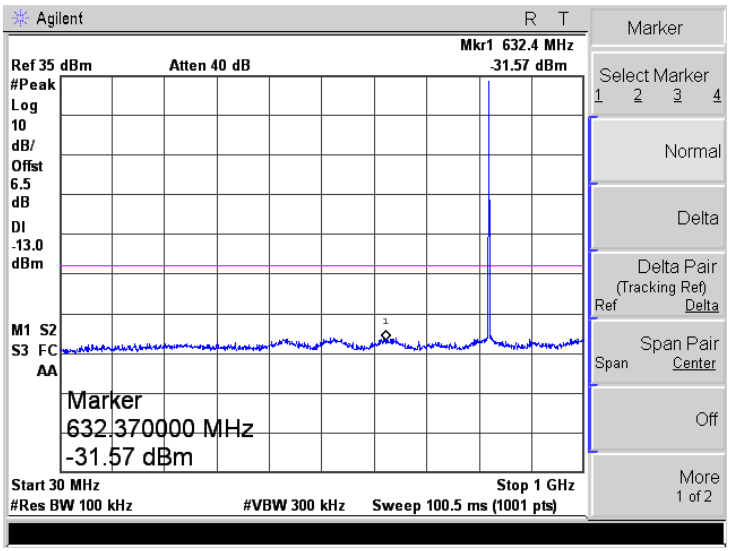
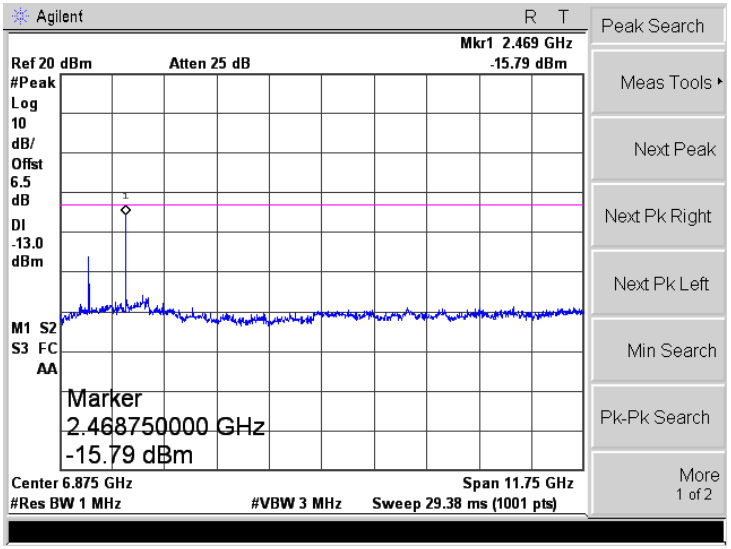
GSM850

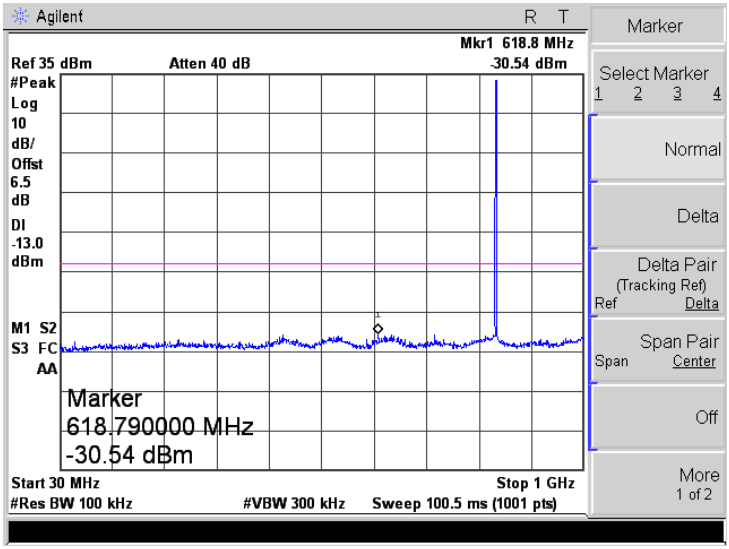
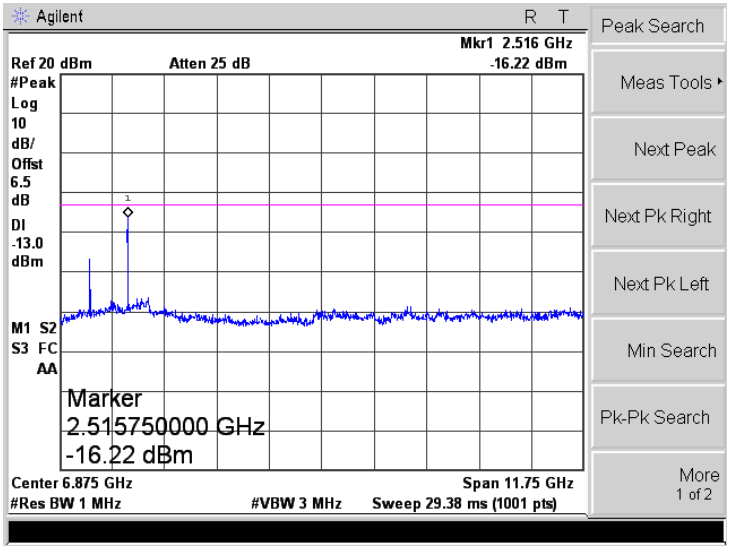
Low Channel	 Agilent R T Mkr1 643.0 MHz Ref 35 dBm Atten 40 dB -31.16 dBm #Peak Log 10 dB/ Offst 6.5 dB Dl -13.0 dBm M1 S2 S3 FC AA Marker 643.040000 MHz -31.16 dBm Center 515 MHz Span 970 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 100.5 ms (1001 pts) Marker Select Marker 1 2 3 4 Normal Delta Delta Pair (Tracking Ref) Ref Delta Span Pair Span Center Off More 1 of 2
	 Agilent R T Mkr1 2.469 GHz Ref 20 dBm Atten 25 dB -16.06 dBm #Peak Log 10 dB/ Offst 6.5 dB Dl -13.0 dBm M1 S2 S3 FC AA Marker 2.468750000 GHz -16.06 dBm Center 6.875 GHz Span 11.75 GHz #Res BW 1 MHz #VBW 3 MHz Sweep 29.38 ms (1001 pts) Peak Search Meas Tools Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2

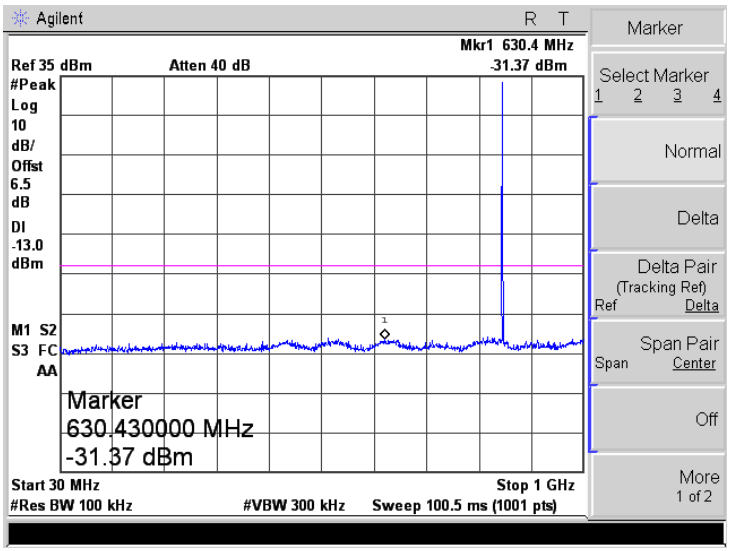
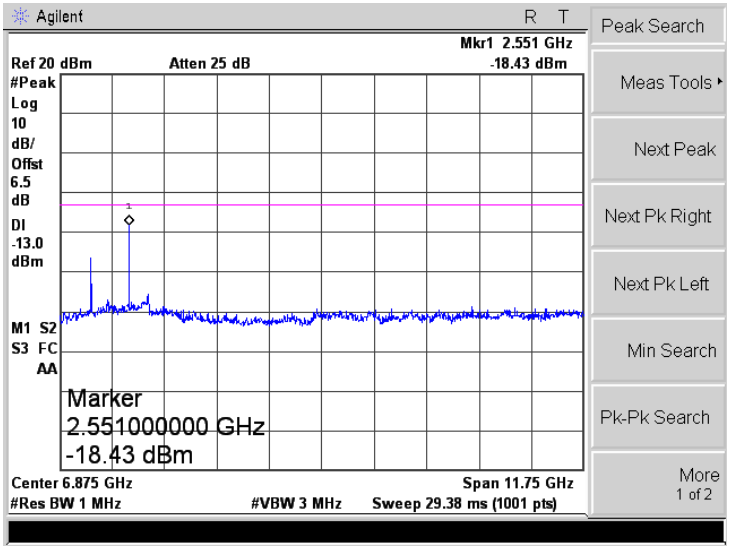
GSM850	
Middle Channel	
	

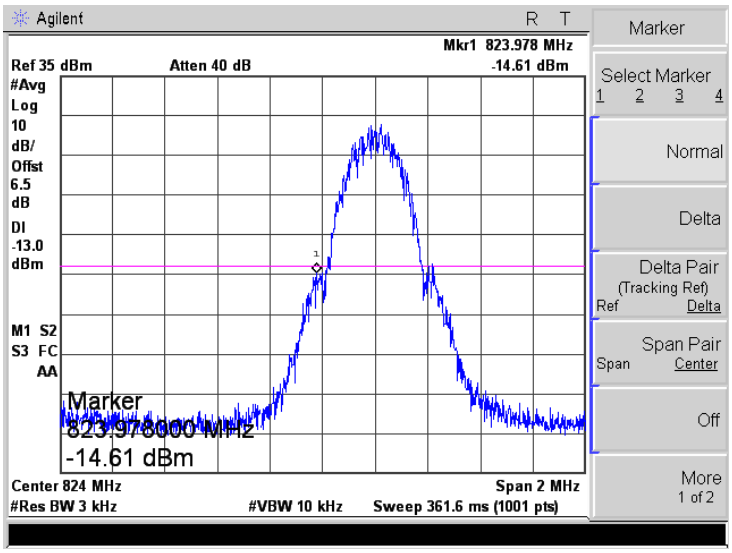
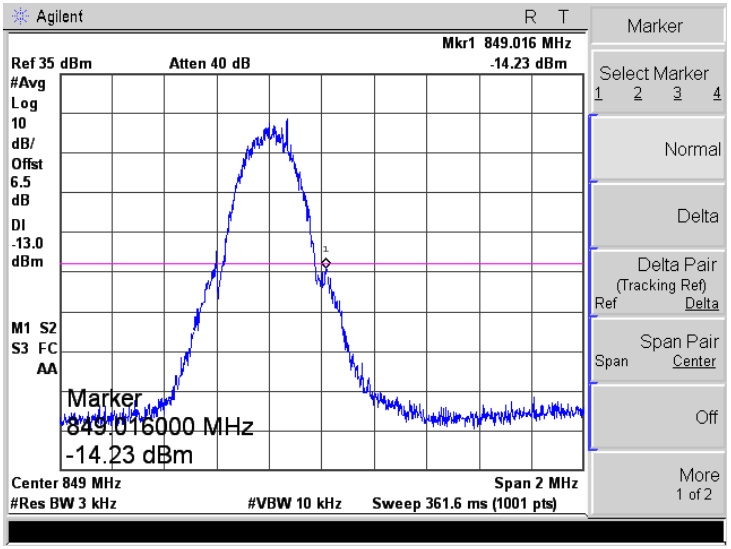
GSM850	
High Channel	
	

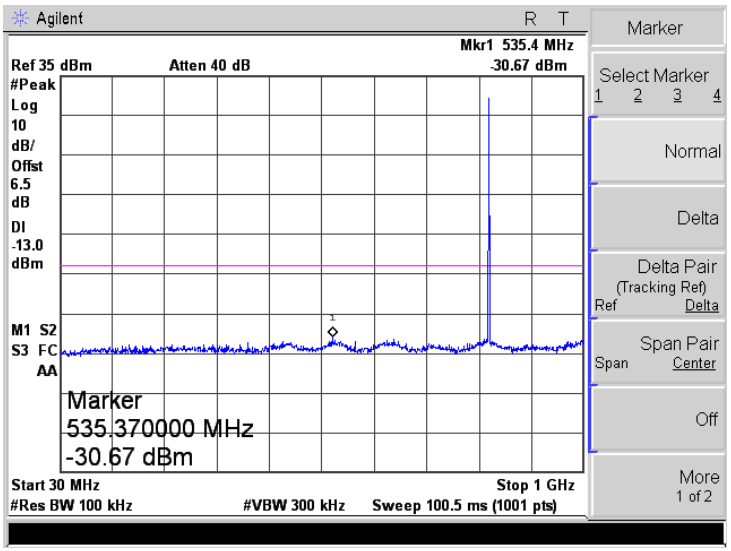
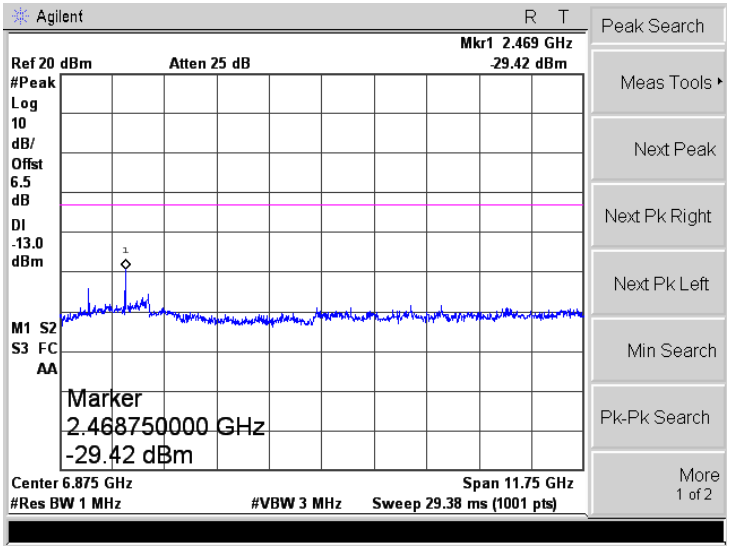
GSM850	
Low Band Emission	
High Band Emission	

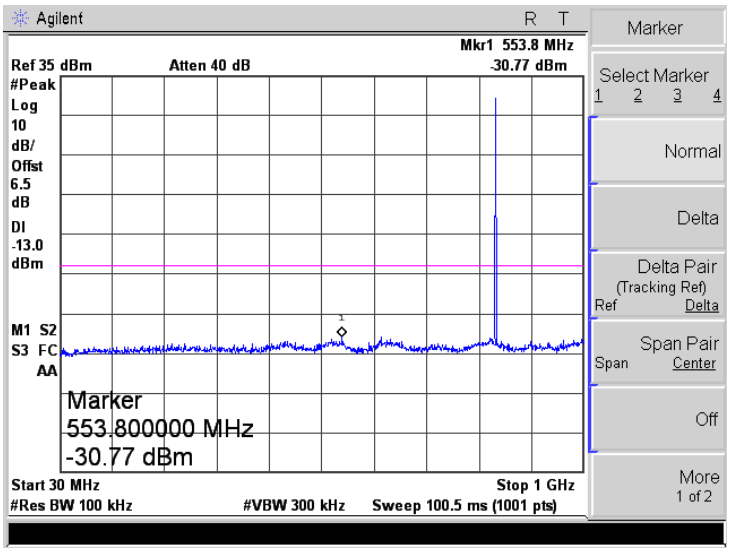
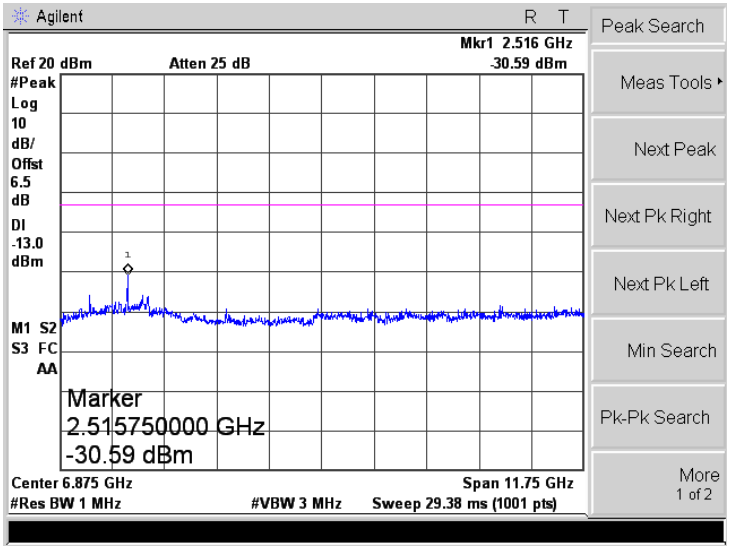
For Cellular Band	
GPRS Low Channel	
	

GPRS850	
Middle Channel	
	

GPRS850	
High Channel	
	

GPRS850	
Low Band Emission	
High Band Emission	

EGPRS850	
Low Channel	
	

EGPRS850	
Middle Channel	
	

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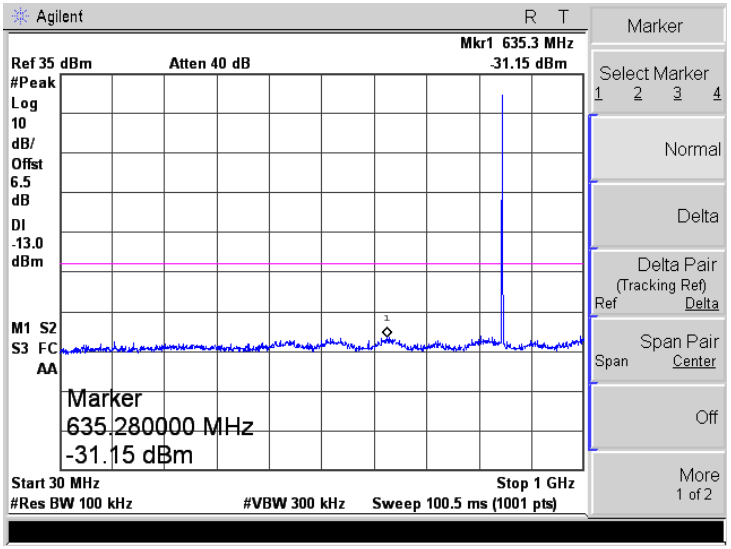
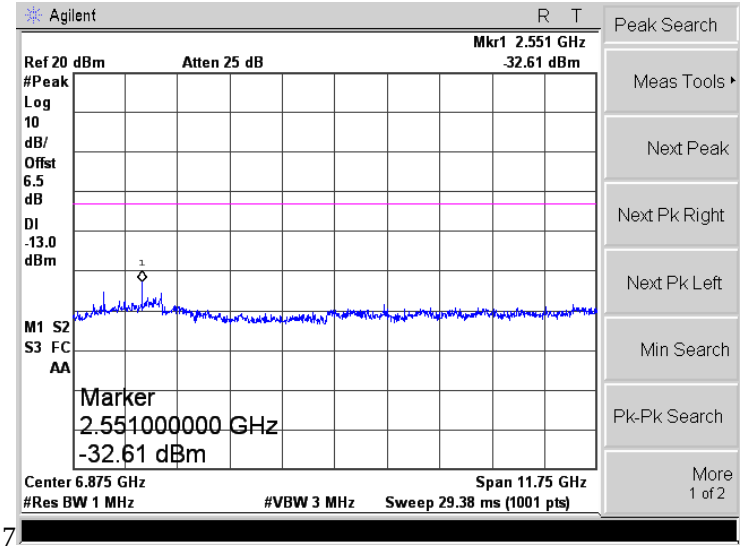
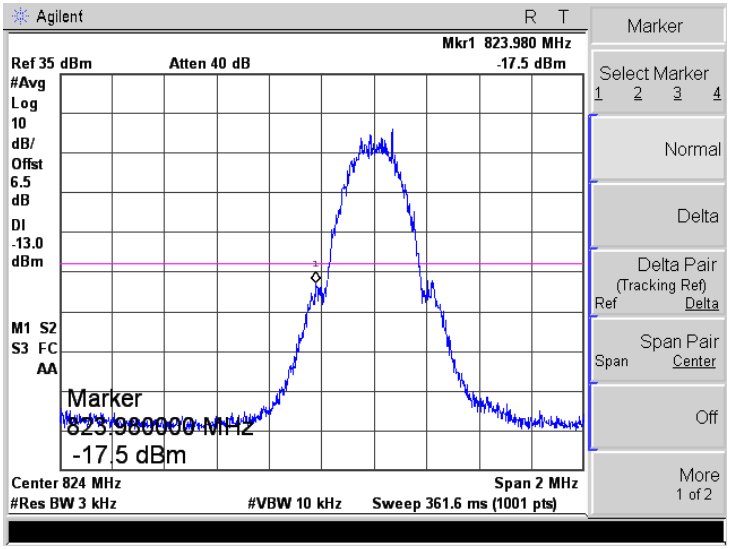
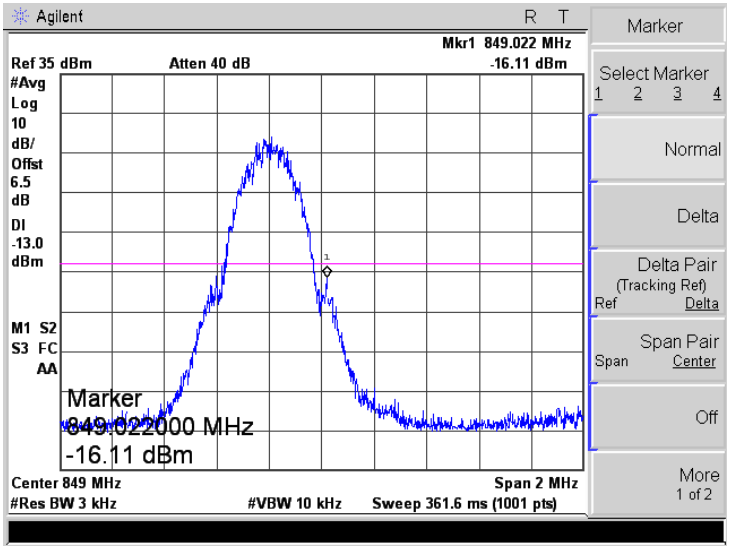
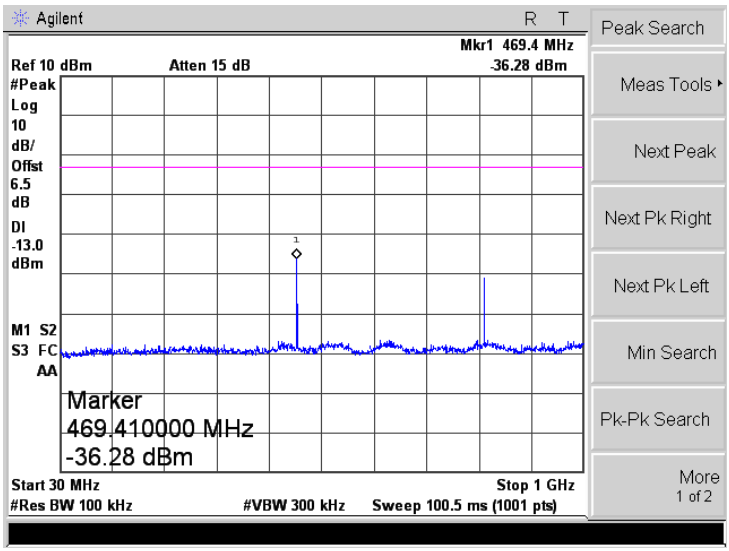
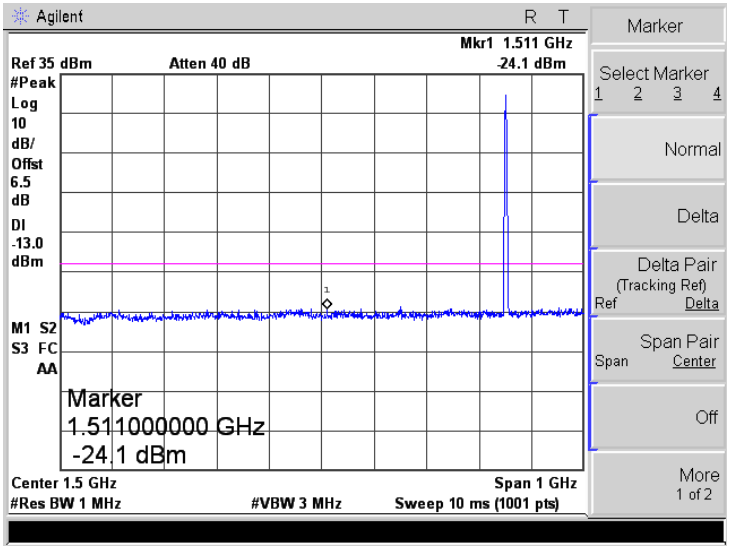
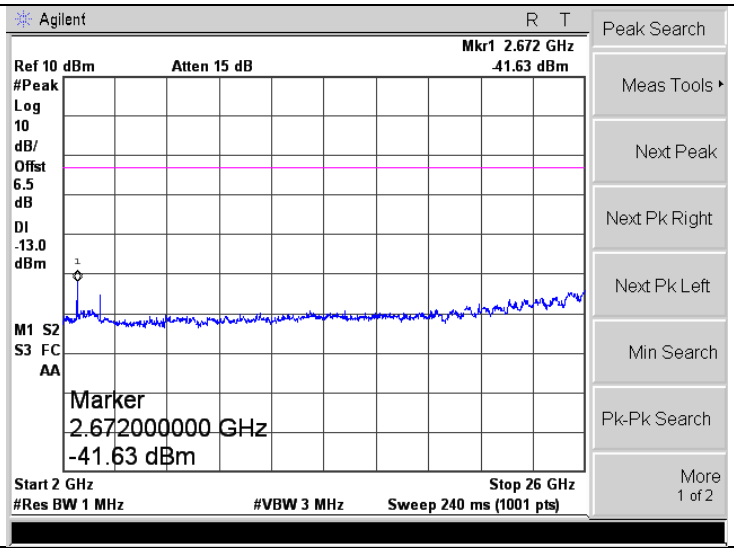
High Channel	
	

EGPRS850	
Low Band Emission	
High Band Emission	

PCS1900		
Low Channel		
		
		

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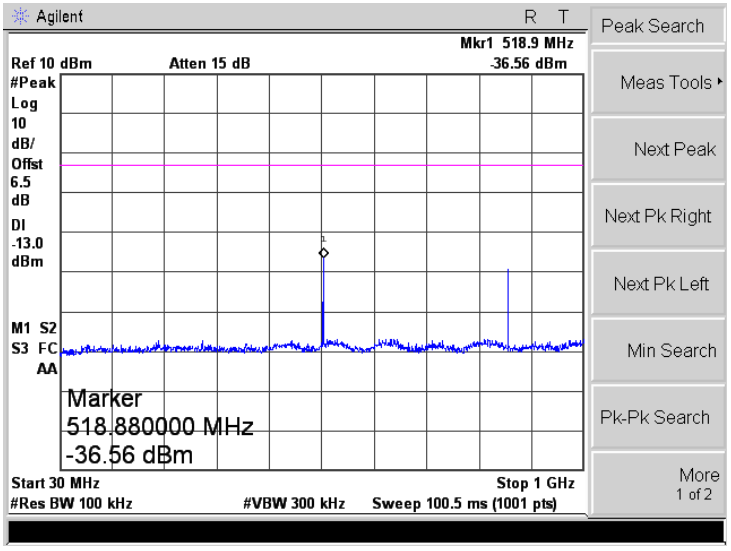
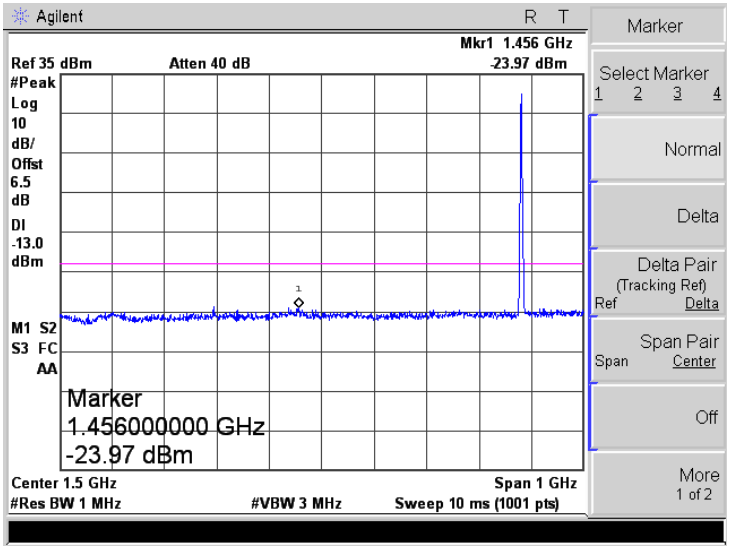
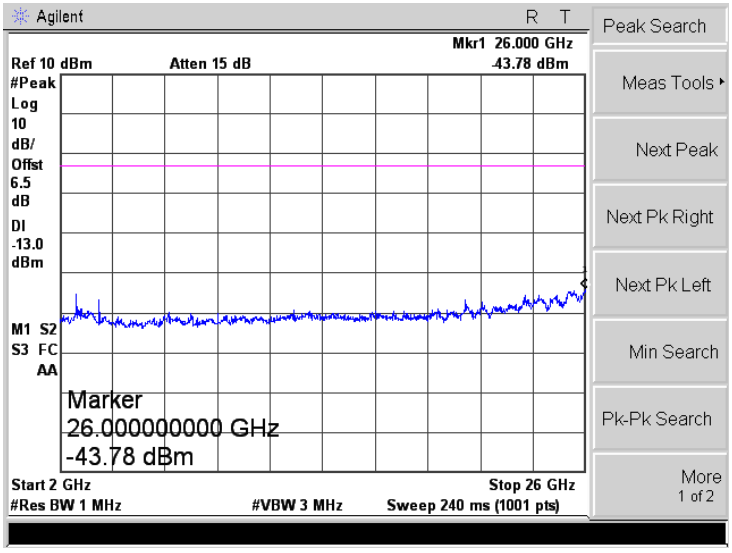
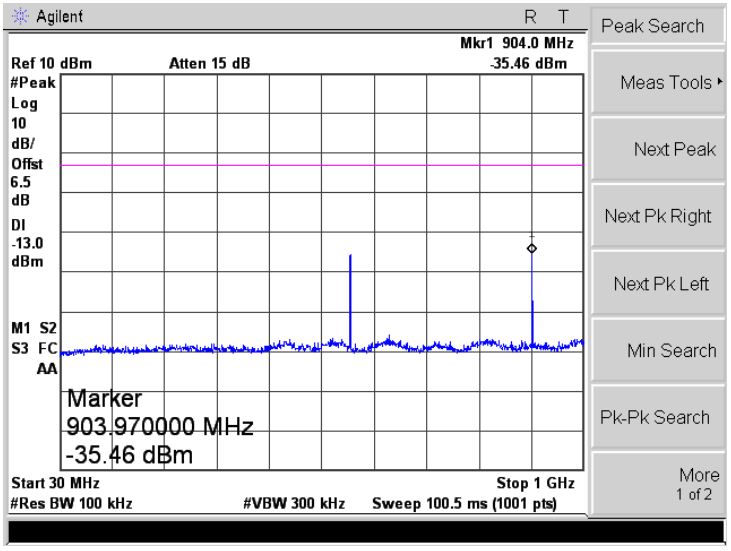
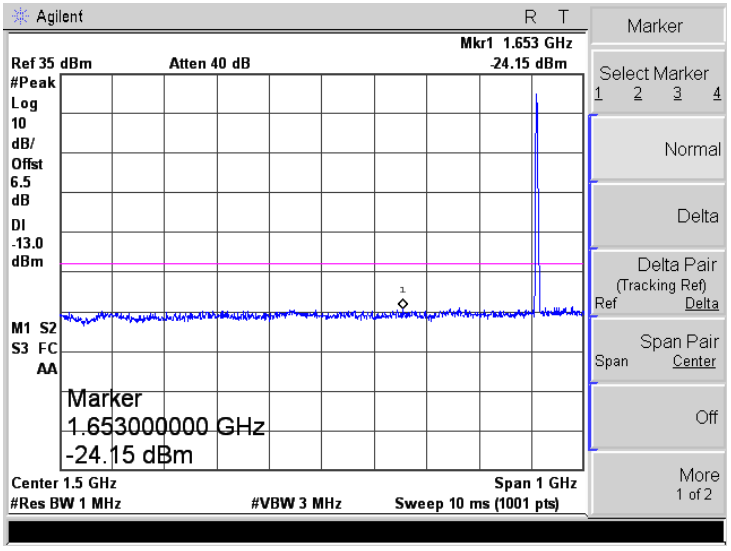
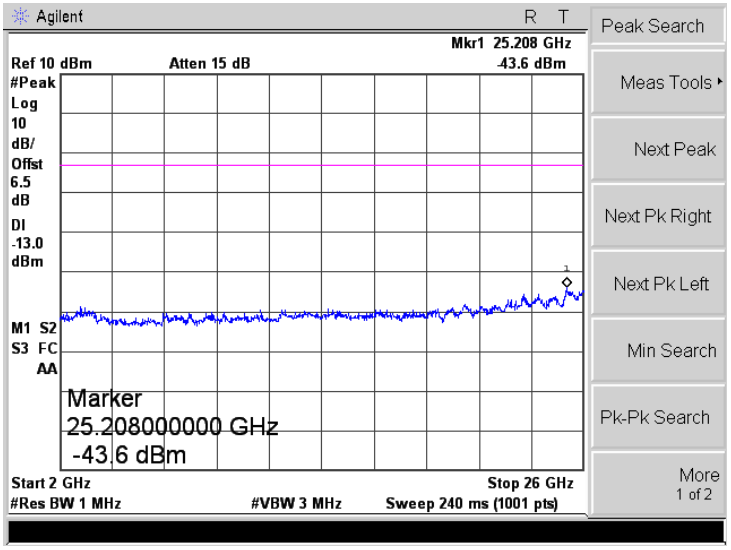
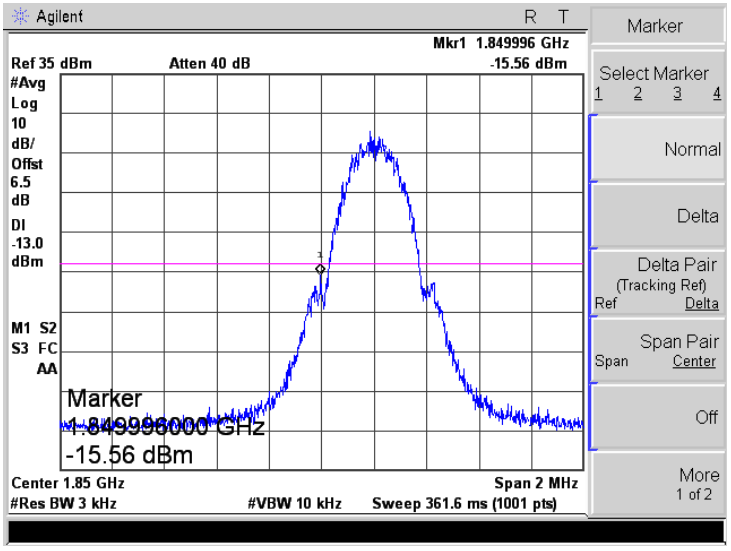
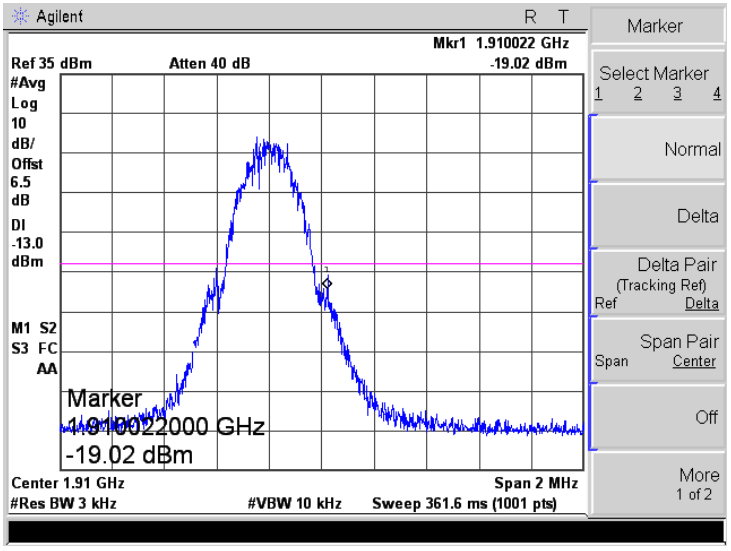
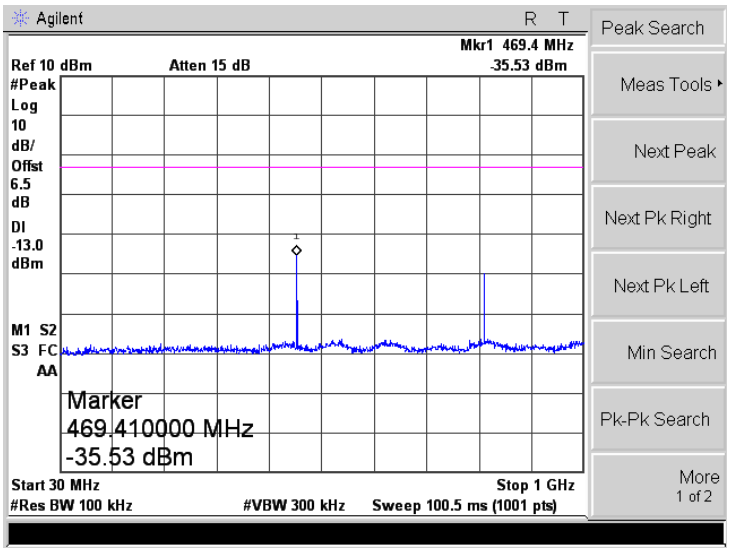
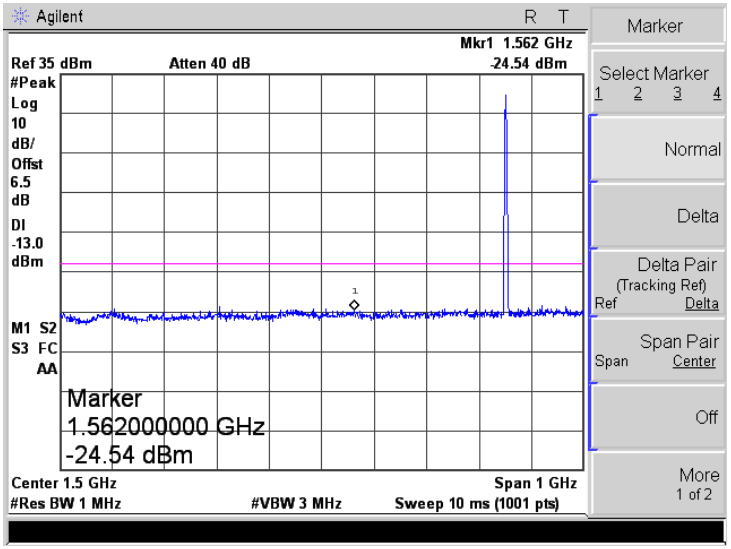
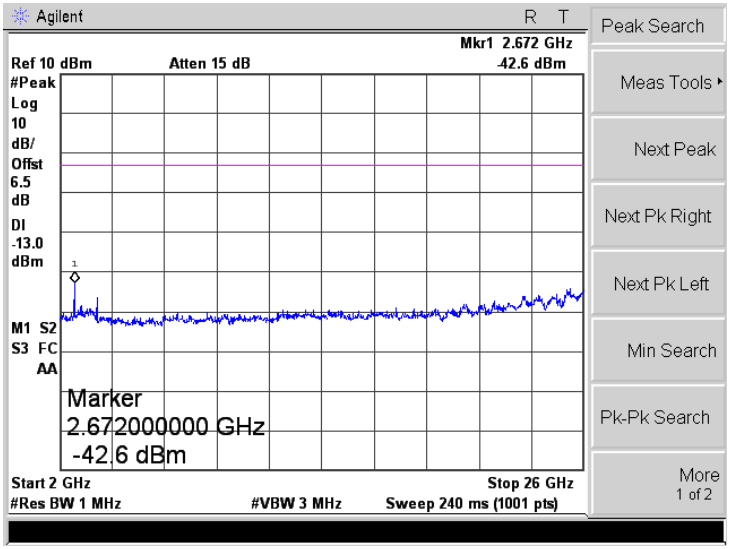
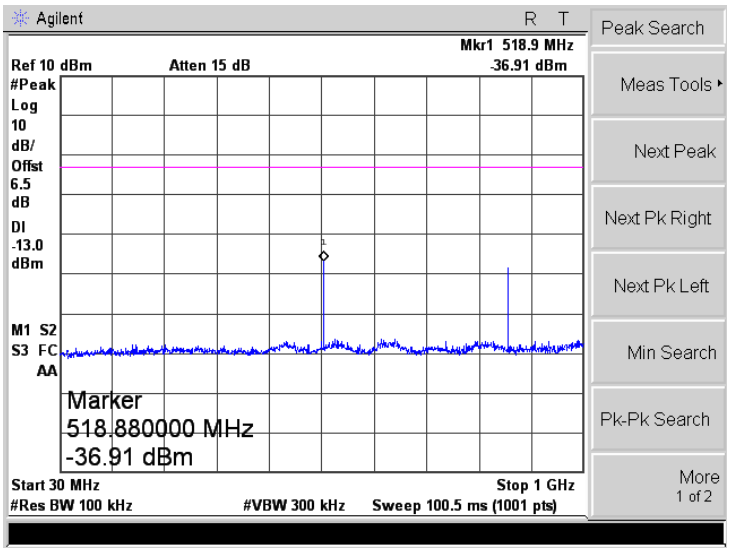
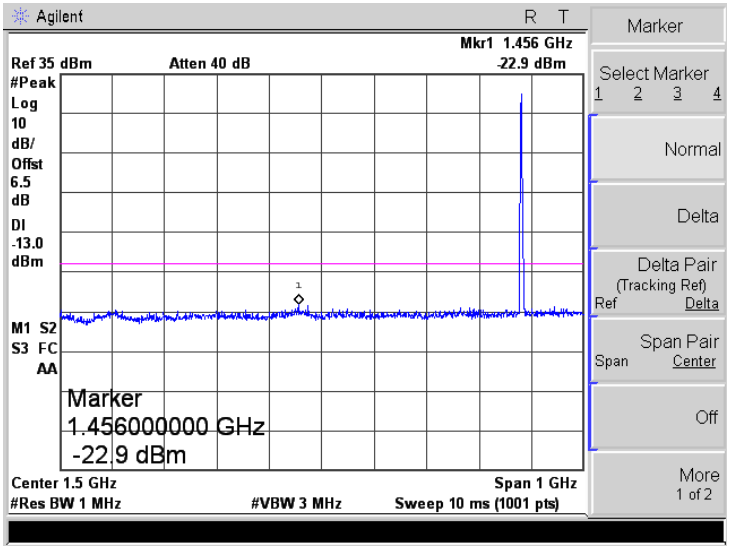
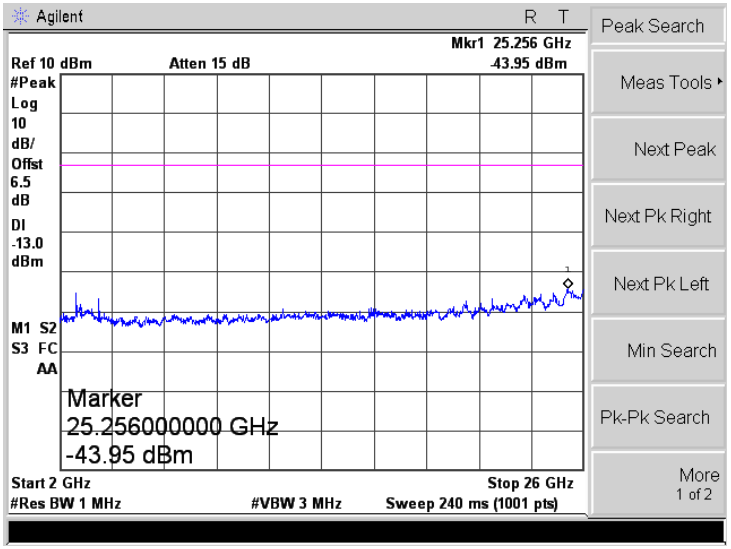
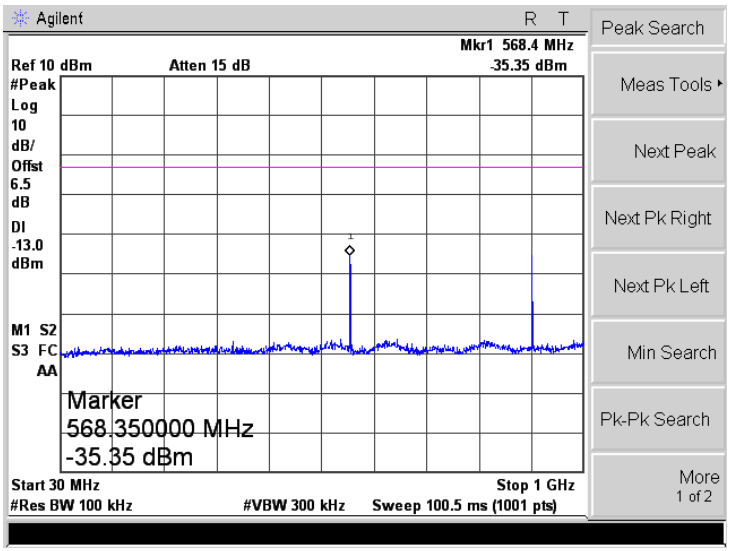
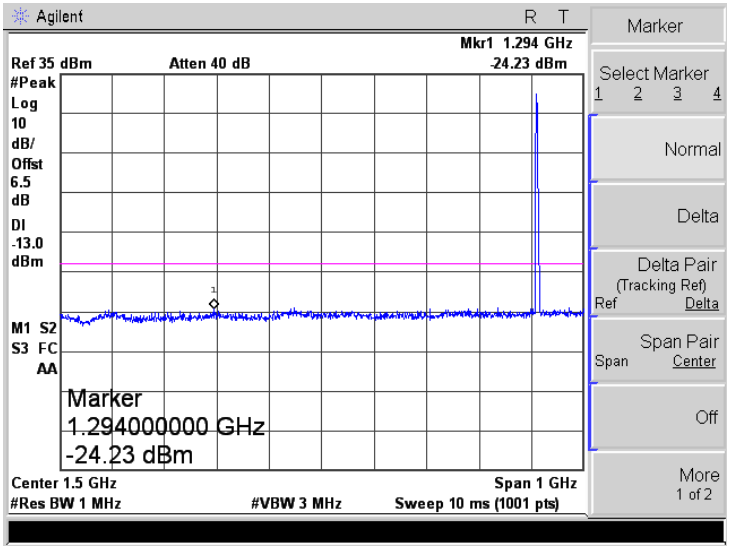
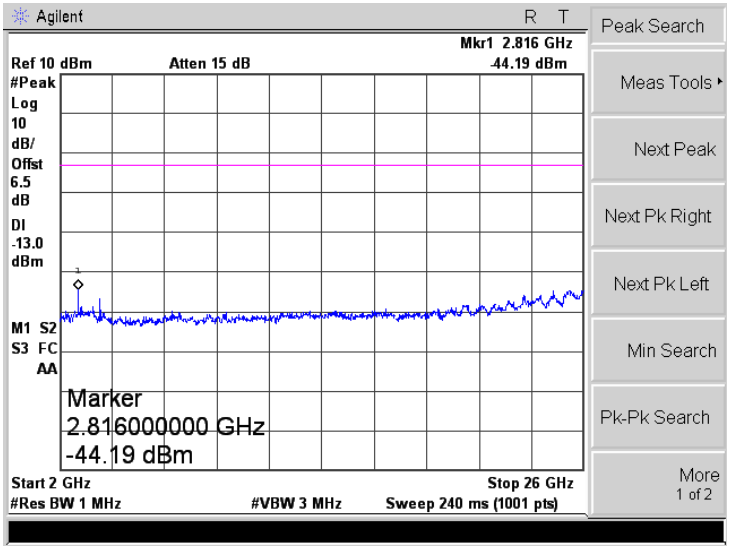
Middle Channel	
	
	

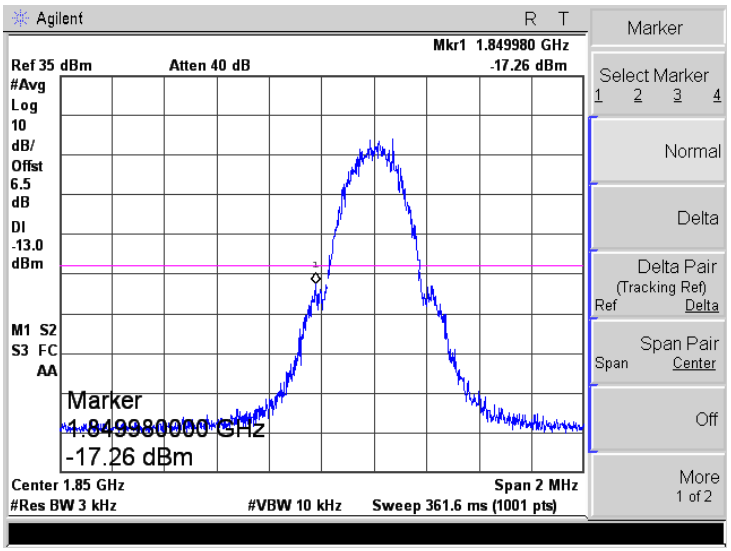
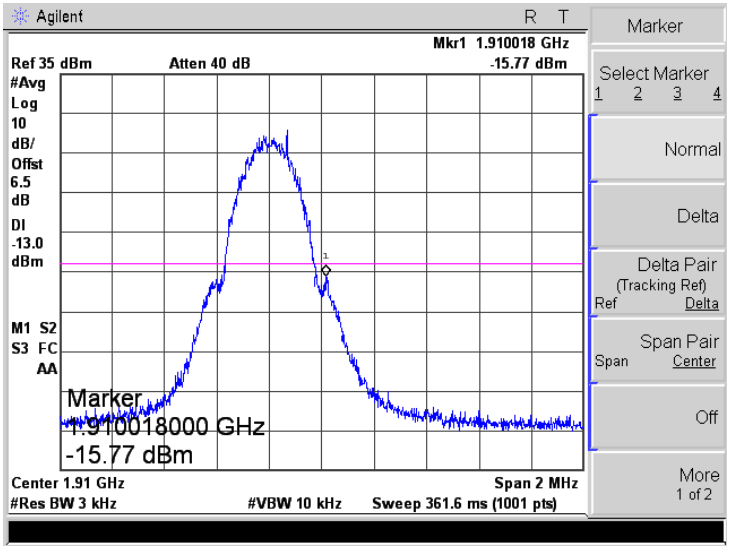
PCS1900	
High Channel	
	
	

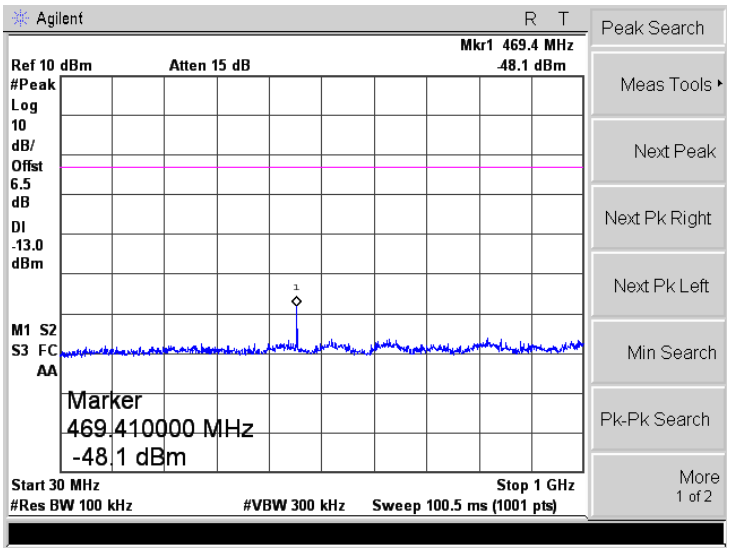
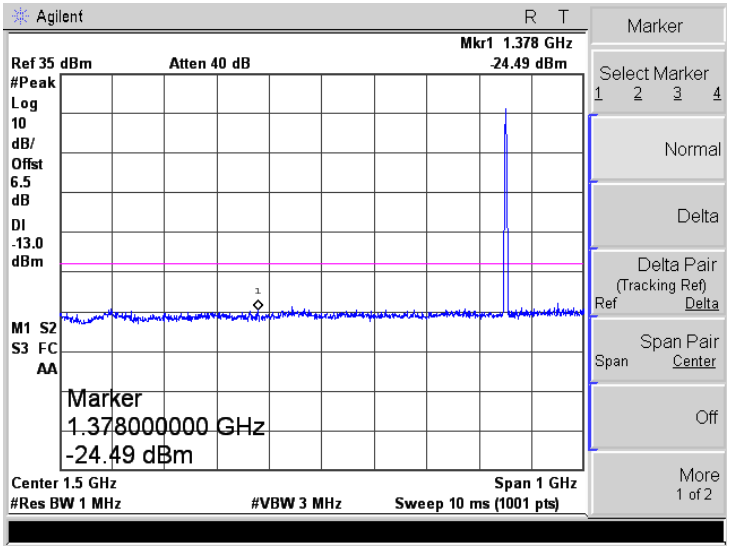
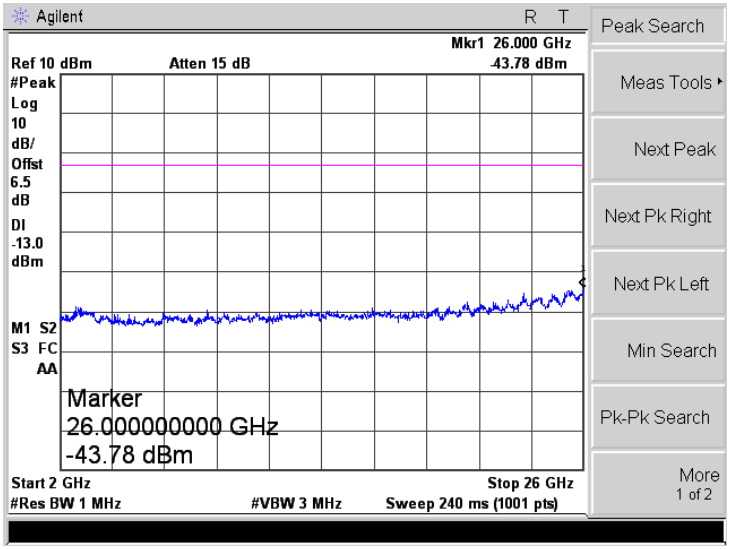
PCS1900	
Low Band Emission	
High Band Emission	

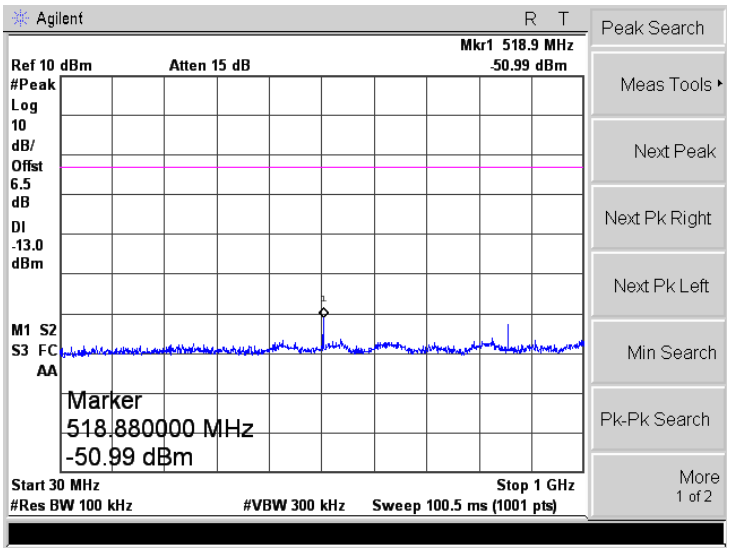
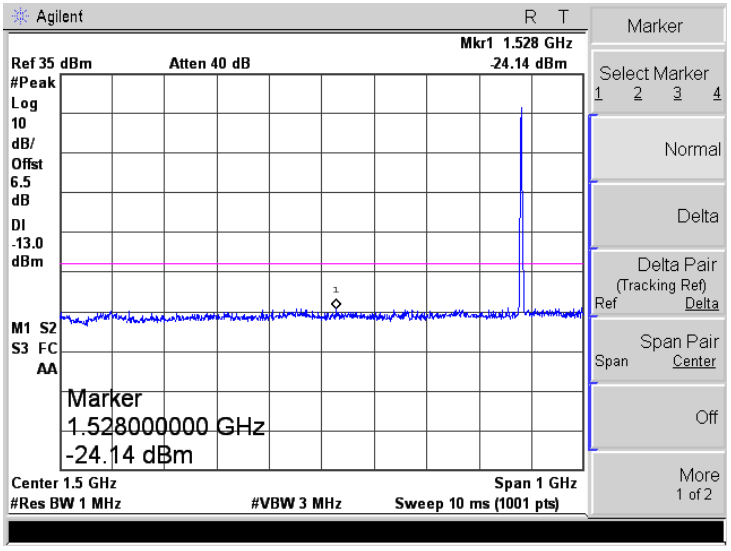
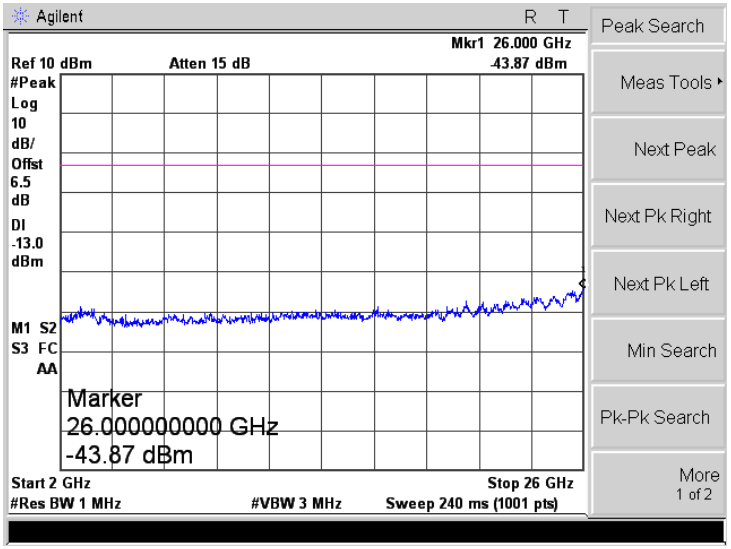
GPRS1900	
Low Channel	
	
	

GPRS1900	
Middle Channel	
	
	

GPRS1900	
High Channel	
	
	

GPRS1900	
Low Band Emission	
High Band Emission	

EGPRS1900	
Low Channel	
	
	

EGPRS1900	
Middle Channel	 
	

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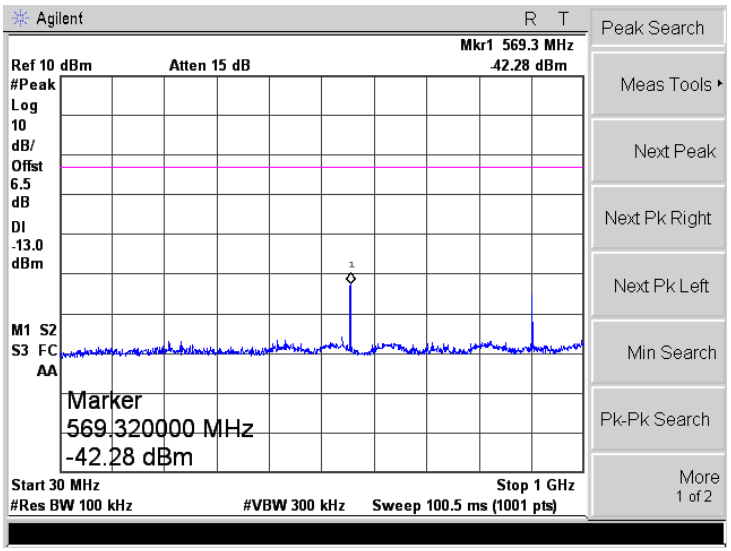
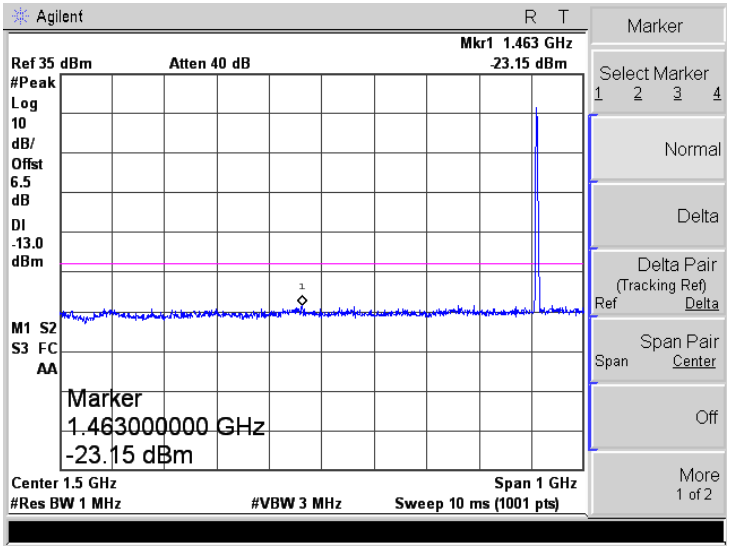
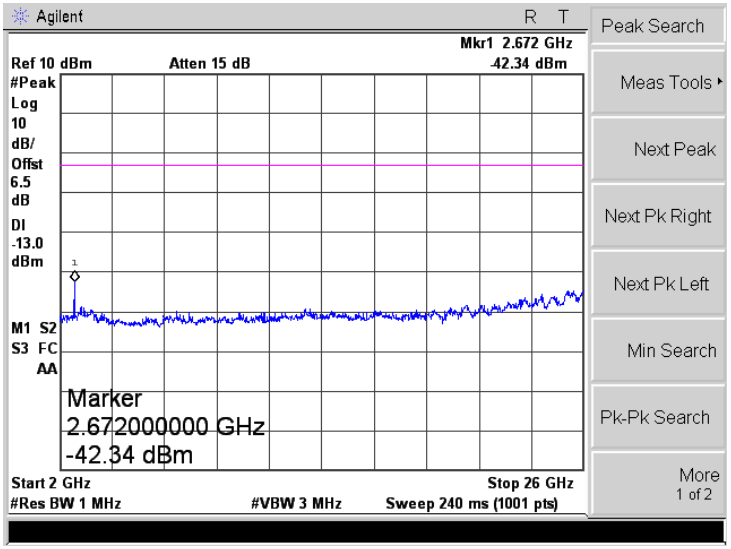
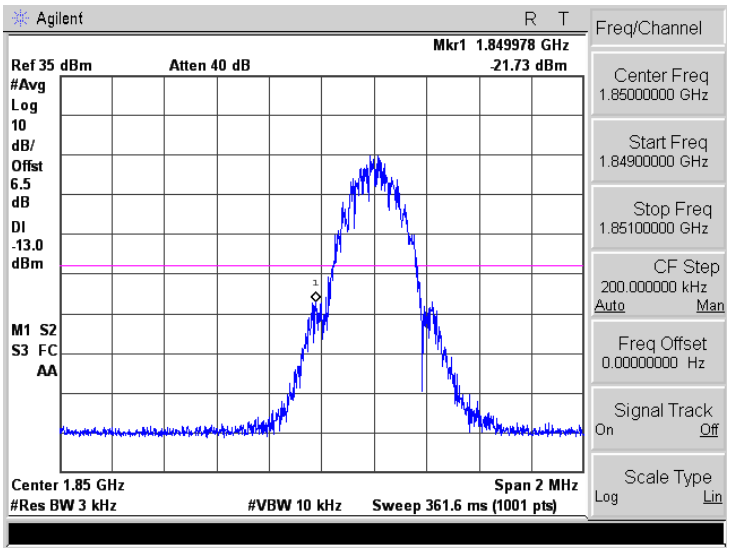
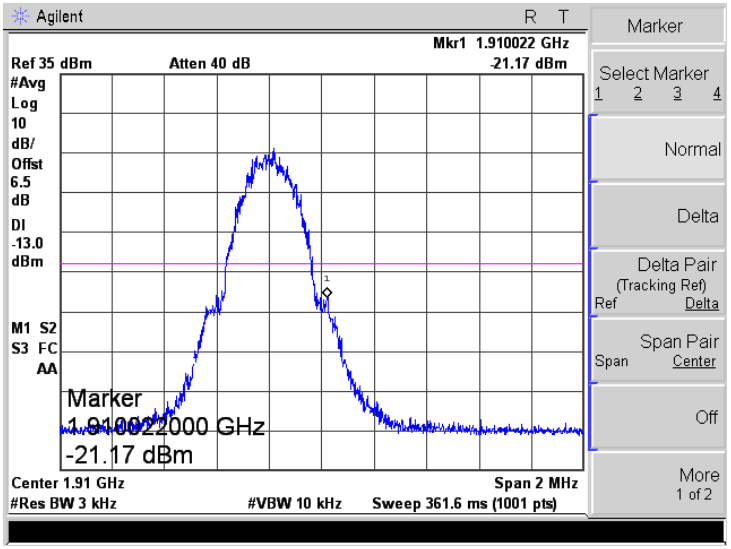
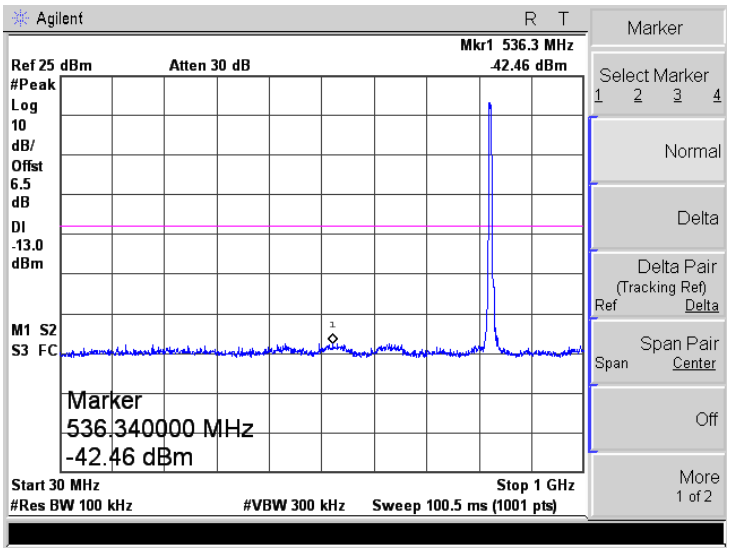
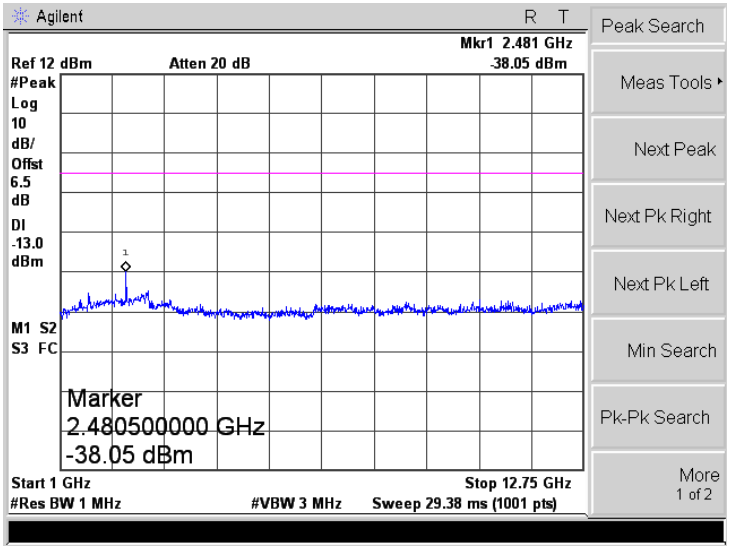
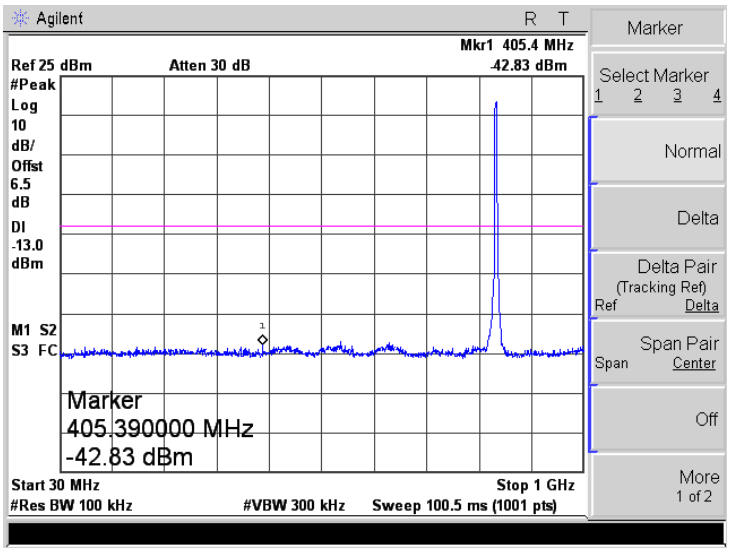
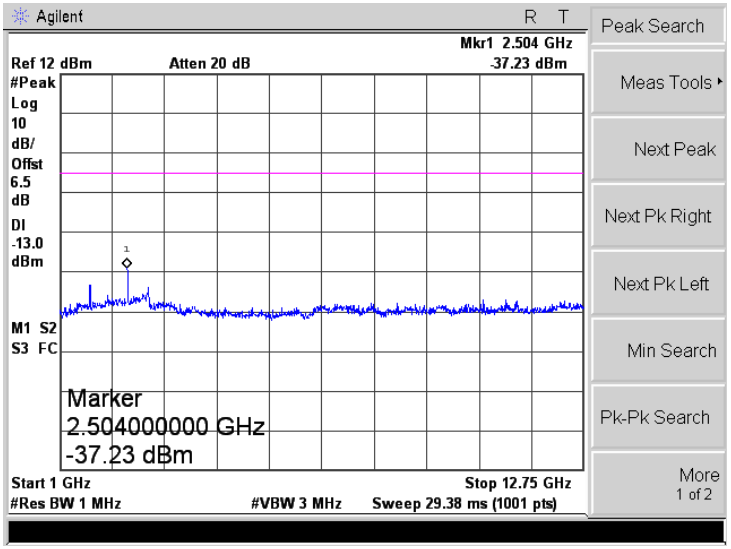
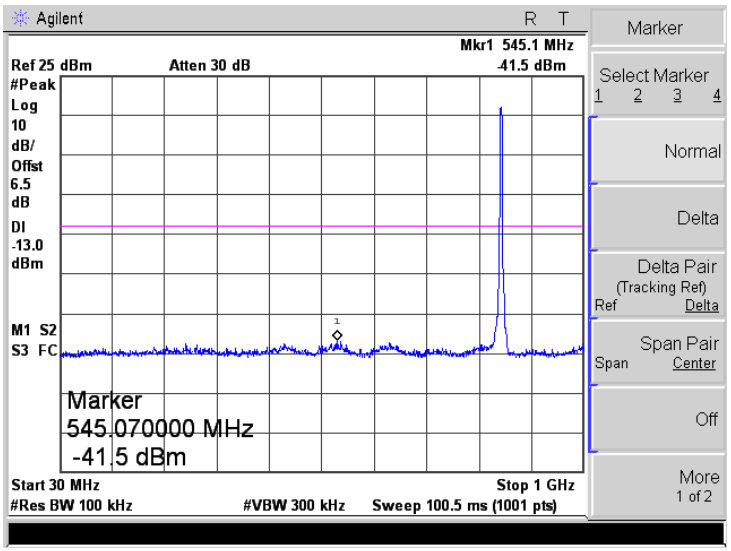
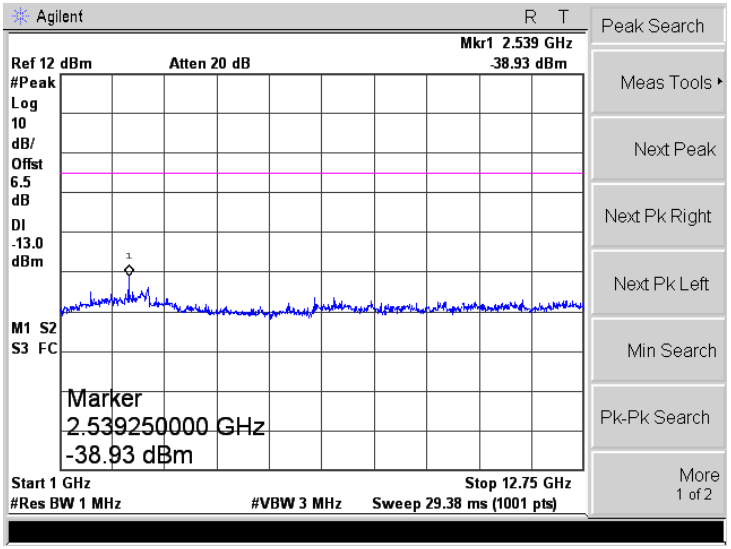
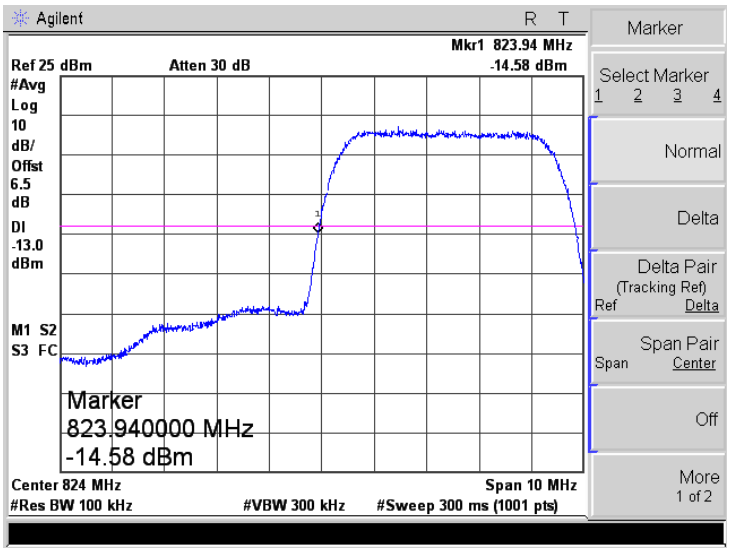
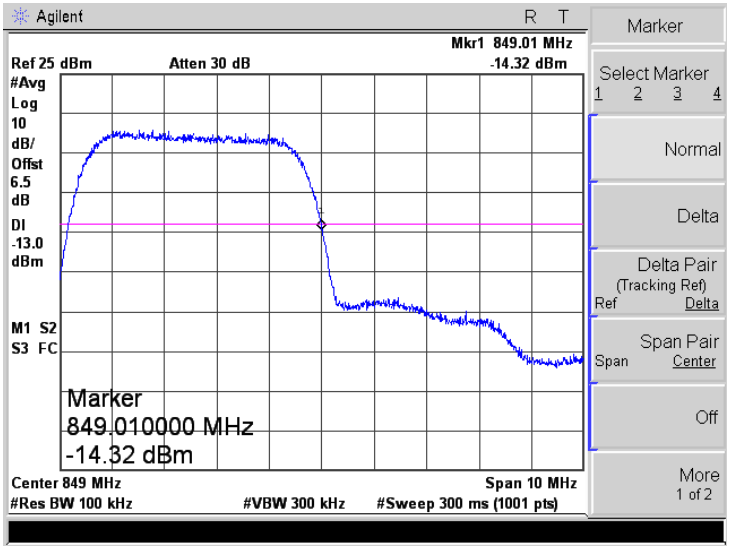
High Channel	
	
	

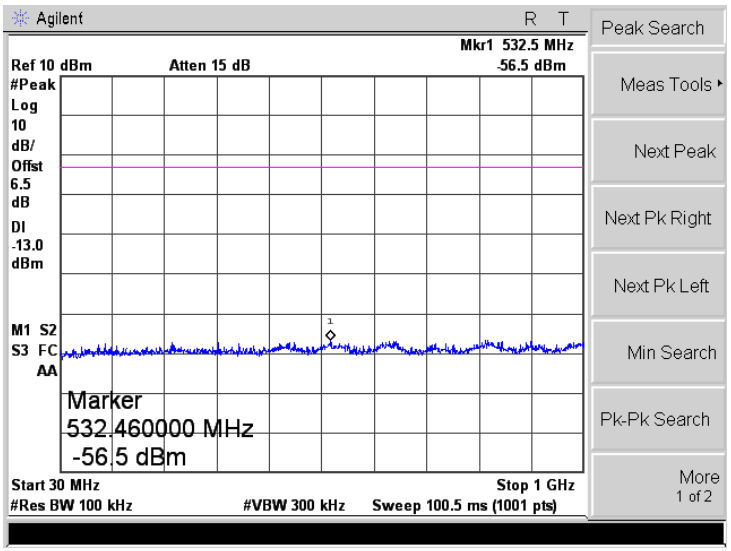
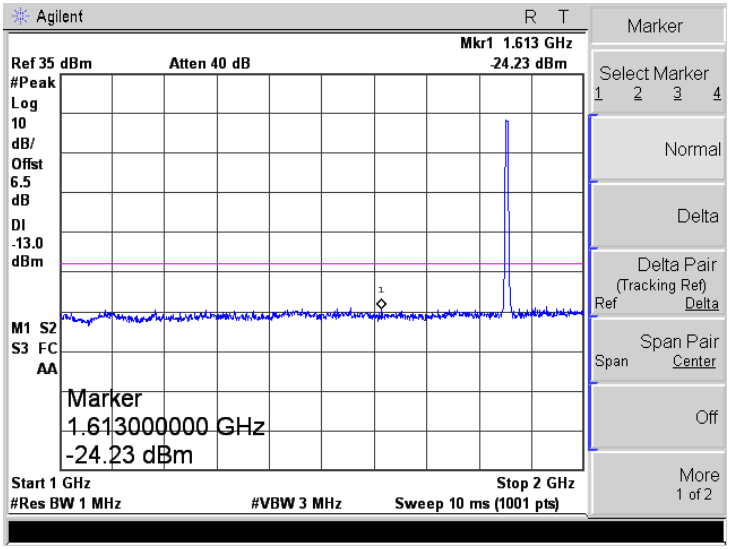
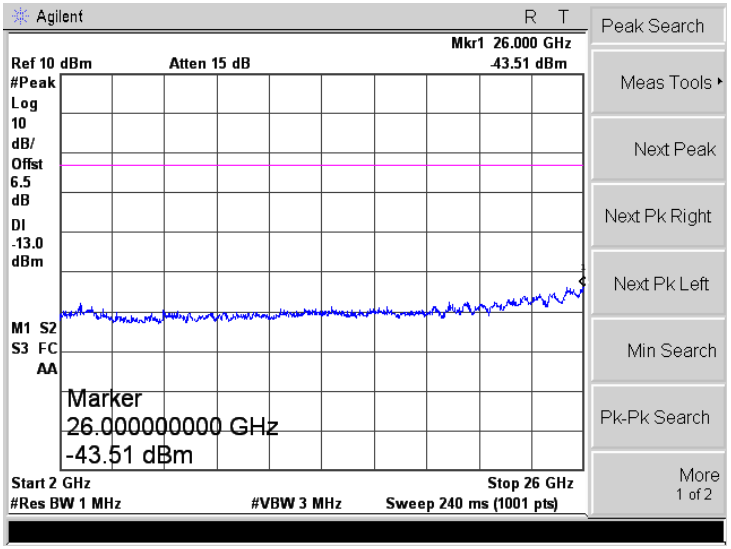
EGPRS1900	
Low Band Emission	
High Band Emission	

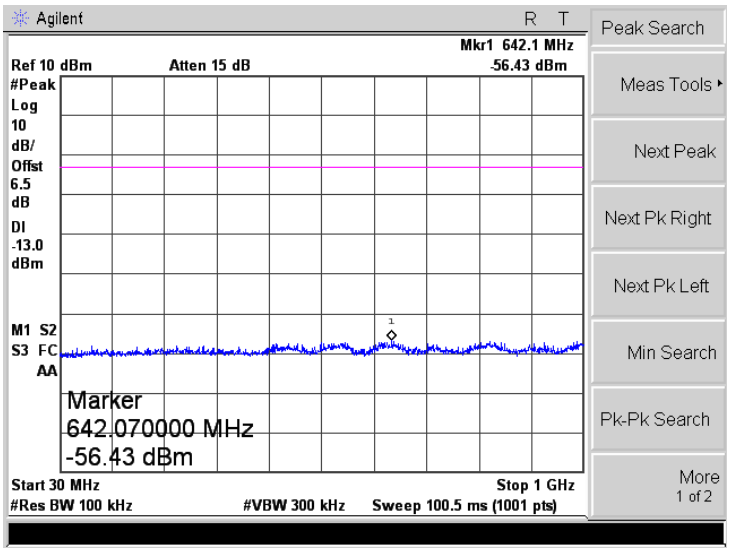
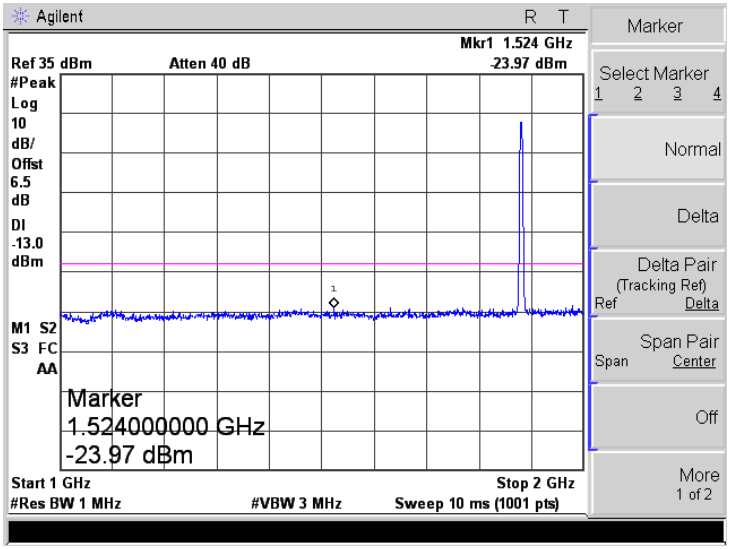
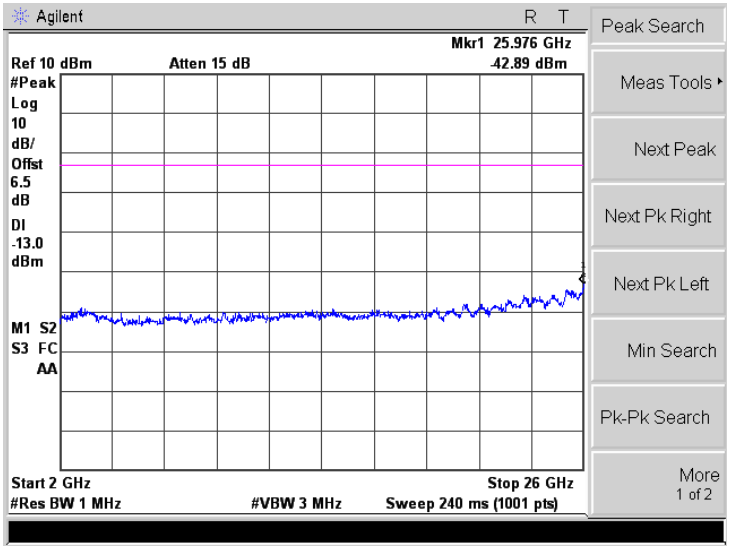
WCDMA Band V	
Low Channel	
	

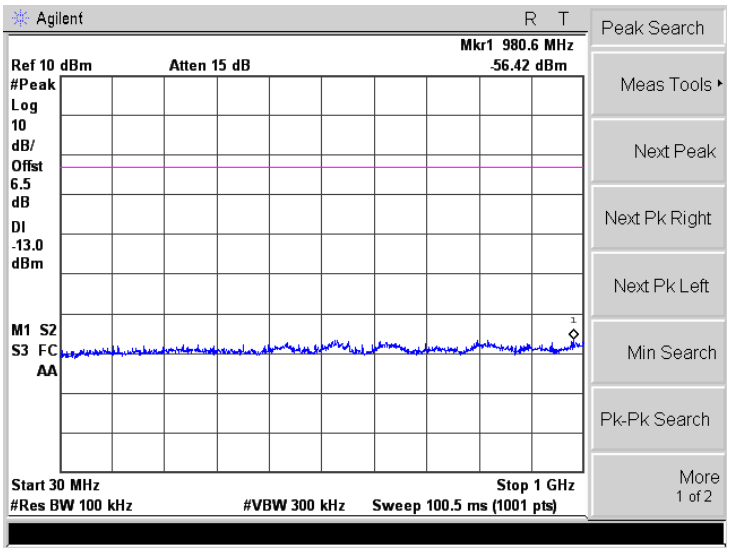
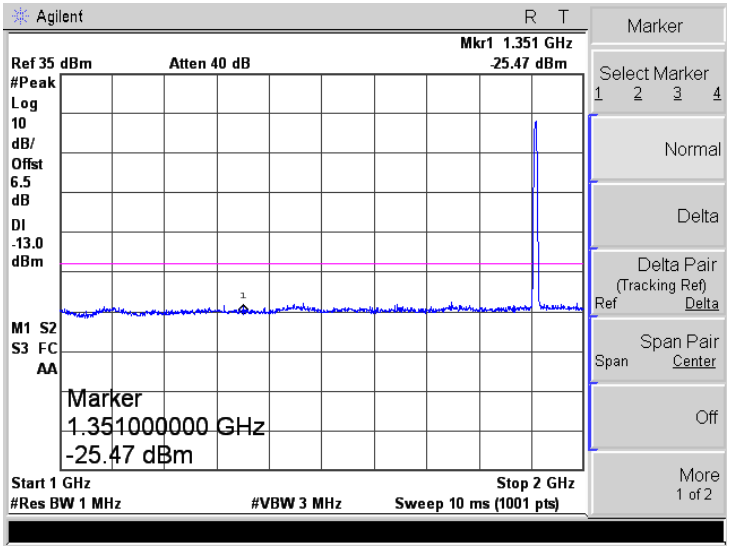
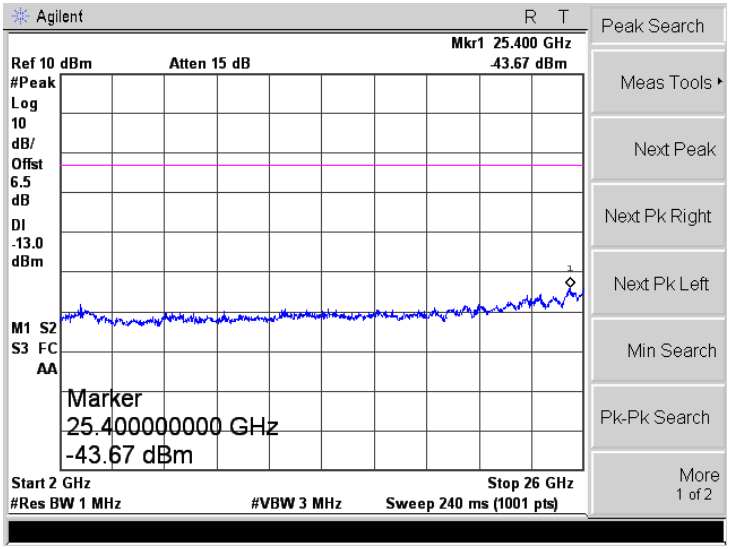
WCDMA Band V	
Middle Channel	
	

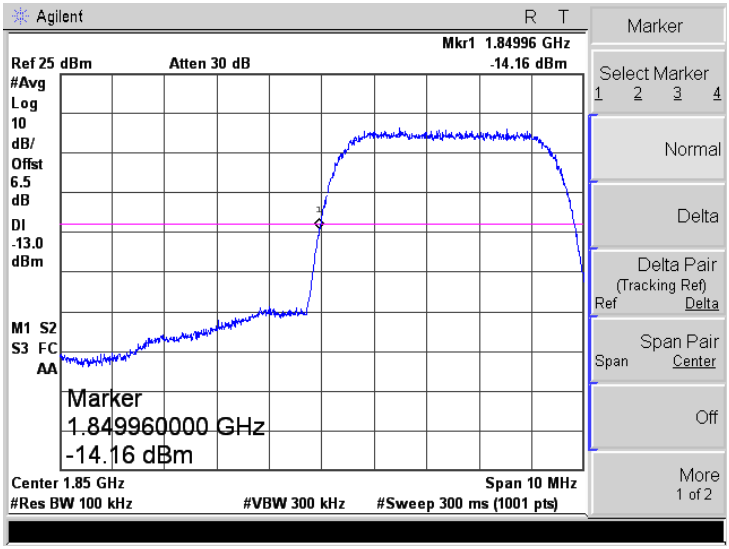
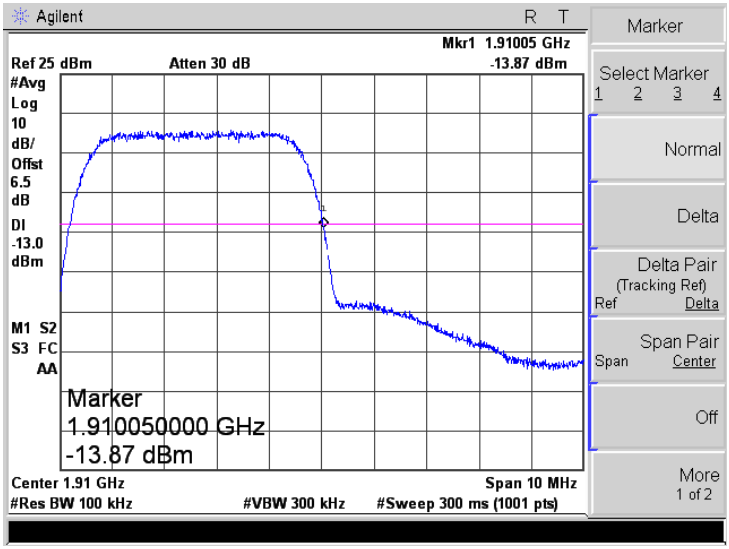
WCDMA Band V	
High Channel	
	

WCDMA Band V	
Low Band Emission	
High Band Emission	

WCDMA Band II	
Low Channel	
	
	

WCDMA Band II	
Middle Channel	
	
	

WCDMA Band II	
High Channel	
	
	

WCDMA Band II	
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.

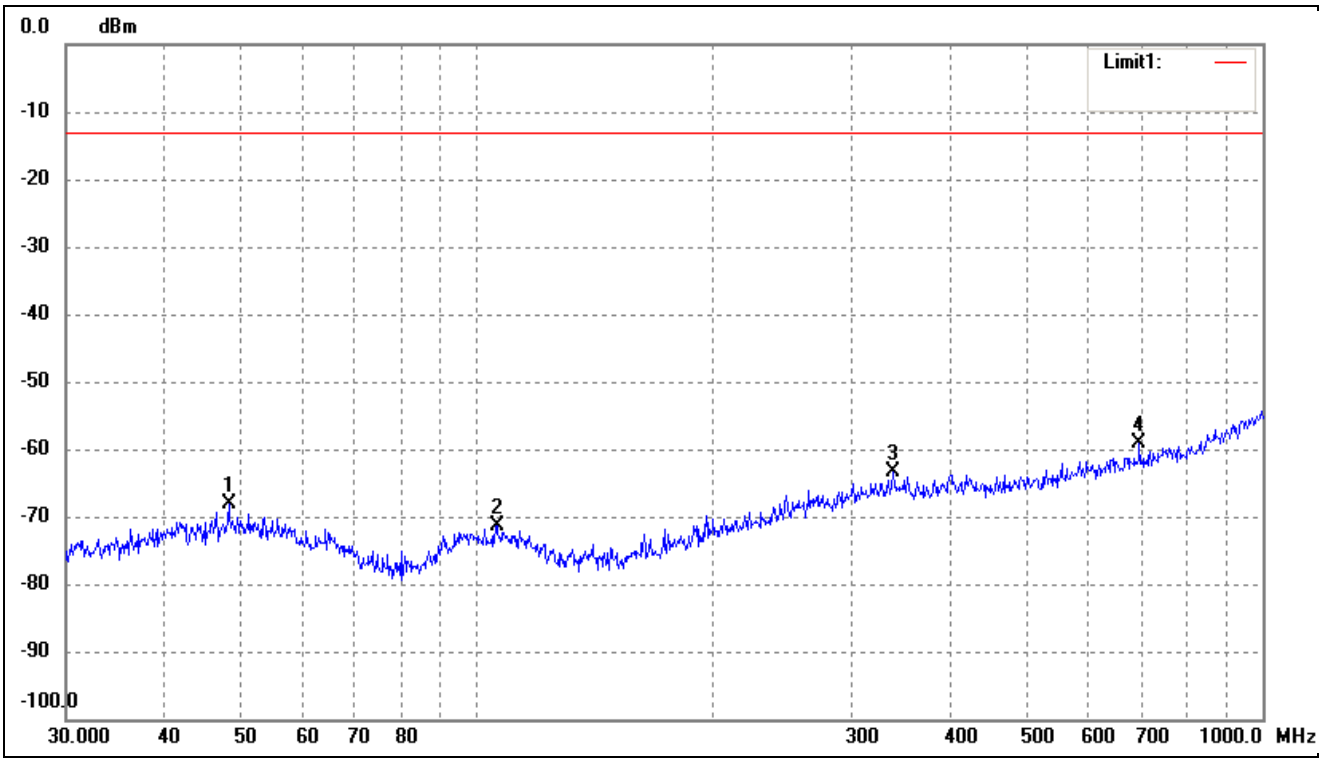
Spurious attenuation limit in dB =43+10 Log_{10} (power out in Watts)

8.3 Summary of Test Results/Plots

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

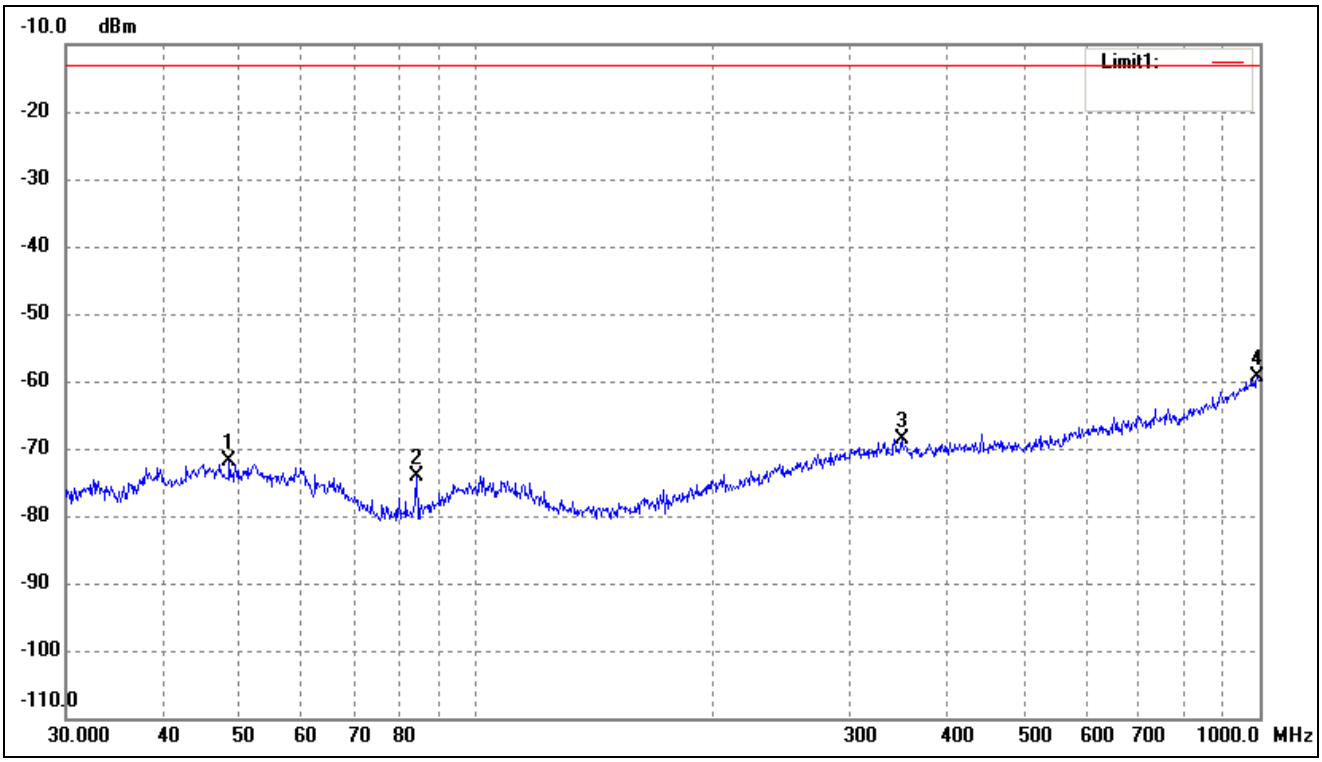
➢ Spurious Emissions Below 1GHz

For Cellular Band			
Test Channel	GSM850	Polarity:	Horizontal



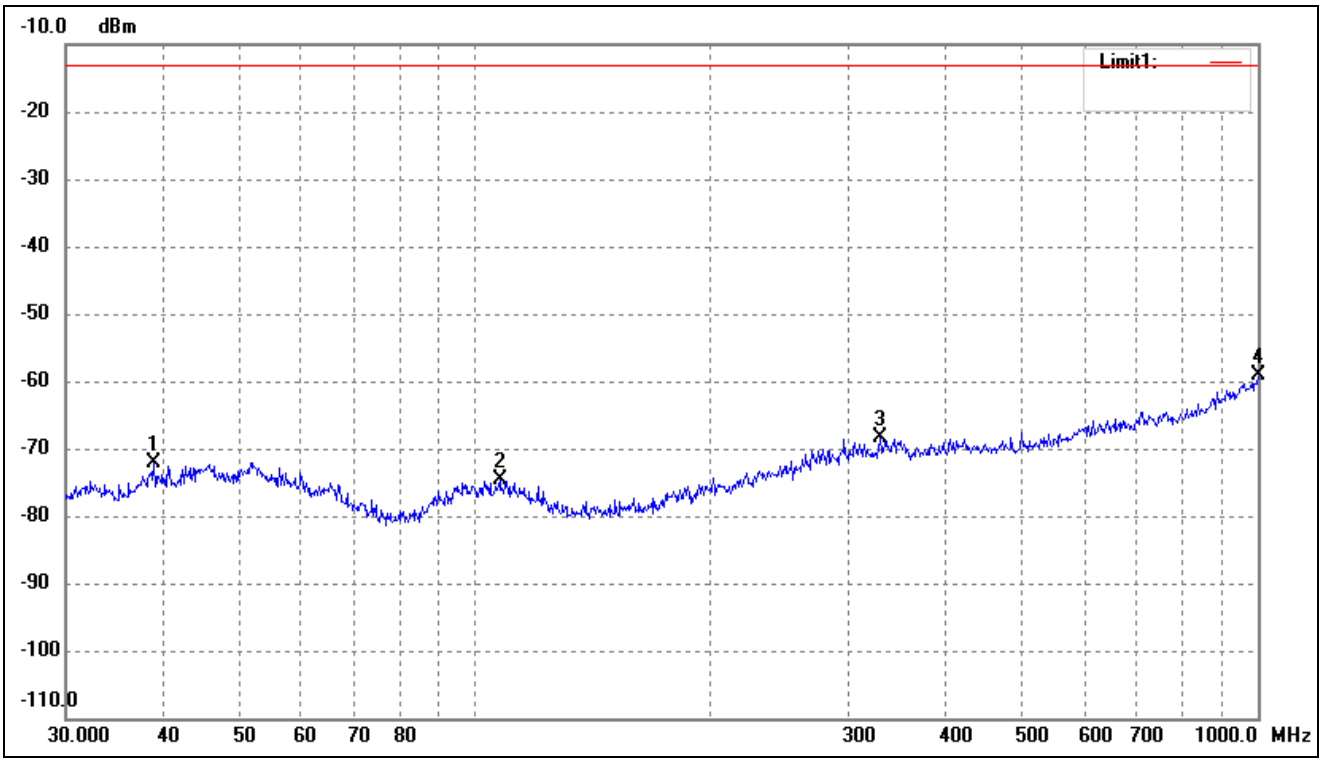
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	48.3318	-67.15	-0.99	-68.14	-13.00	-55.14	204	100	peak
2	106.0126	-69.13	-2.21	-71.34	-13.00	-58.34	100	100	peak
3	338.4001	-68.54	5.24	-63.30	-13.00	-50.30	120	100	peak
4	696.8567	-68.23	9.14	-59.09	-13.00	-46.09	91	100	peak

For Cellular Band			
Test Channel	GSM850	Polarity:	Vertical



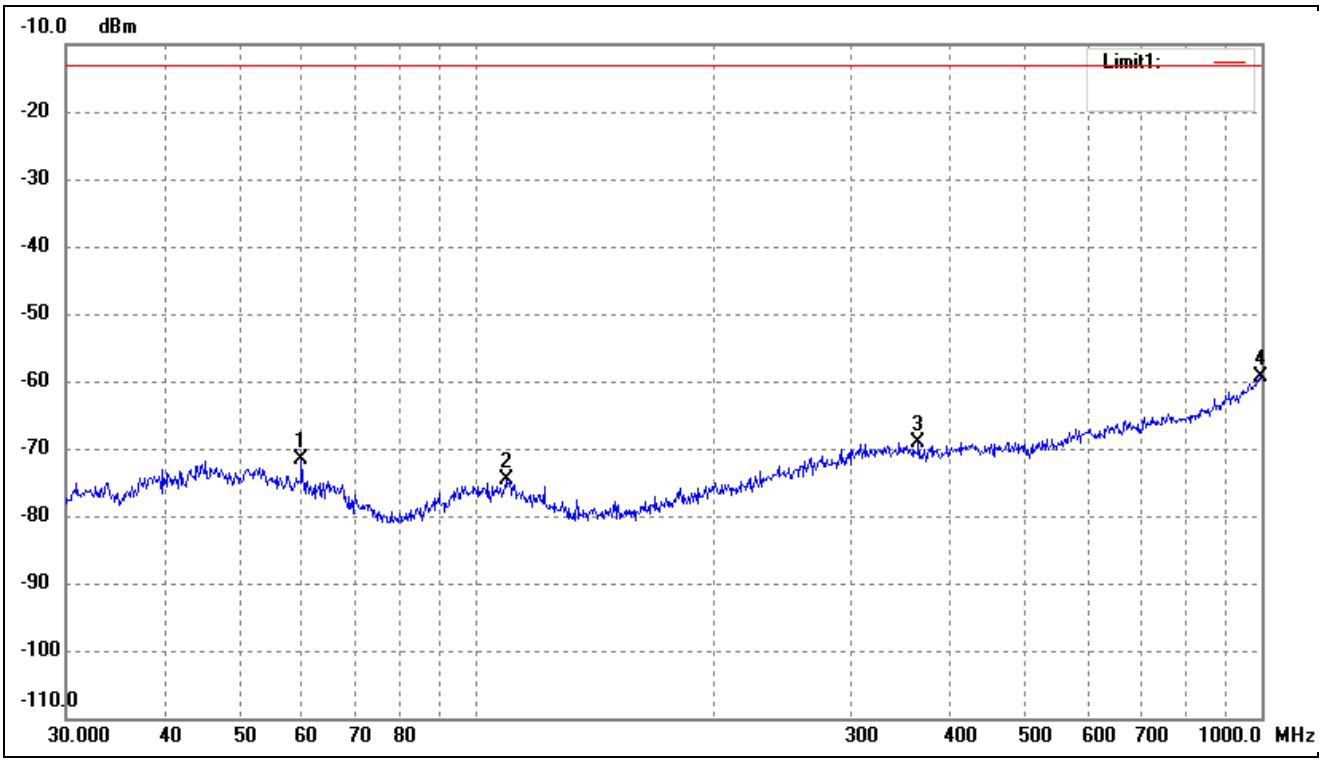
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	48.5016	-70.91	-1.01	-71.92	-13.00	-58.92	293	100	peak
2	84.1100	-67.49	-6.56	-74.05	-13.00	-61.05	97	100	peak
3	349.2500	-73.89	5.32	-68.57	-13.00	-55.57	305	100	peak
4	993.0114	-75.07	15.73	-59.34	-13.00	-46.34	120	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	38.8879	-69.64	-2.47	-72.11	-13.00	-59.11	56	100	peak
2	107.5101	-72.50	-2.17	-74.67	-13.00	-61.67	293	100	peak
3	329.0390	-73.29	4.99	-68.30	-13.00	-55.30	60	100	peak
4	1000.0000	-74.96	15.84	-59.12	-13.00	-46.12	184	100	peak

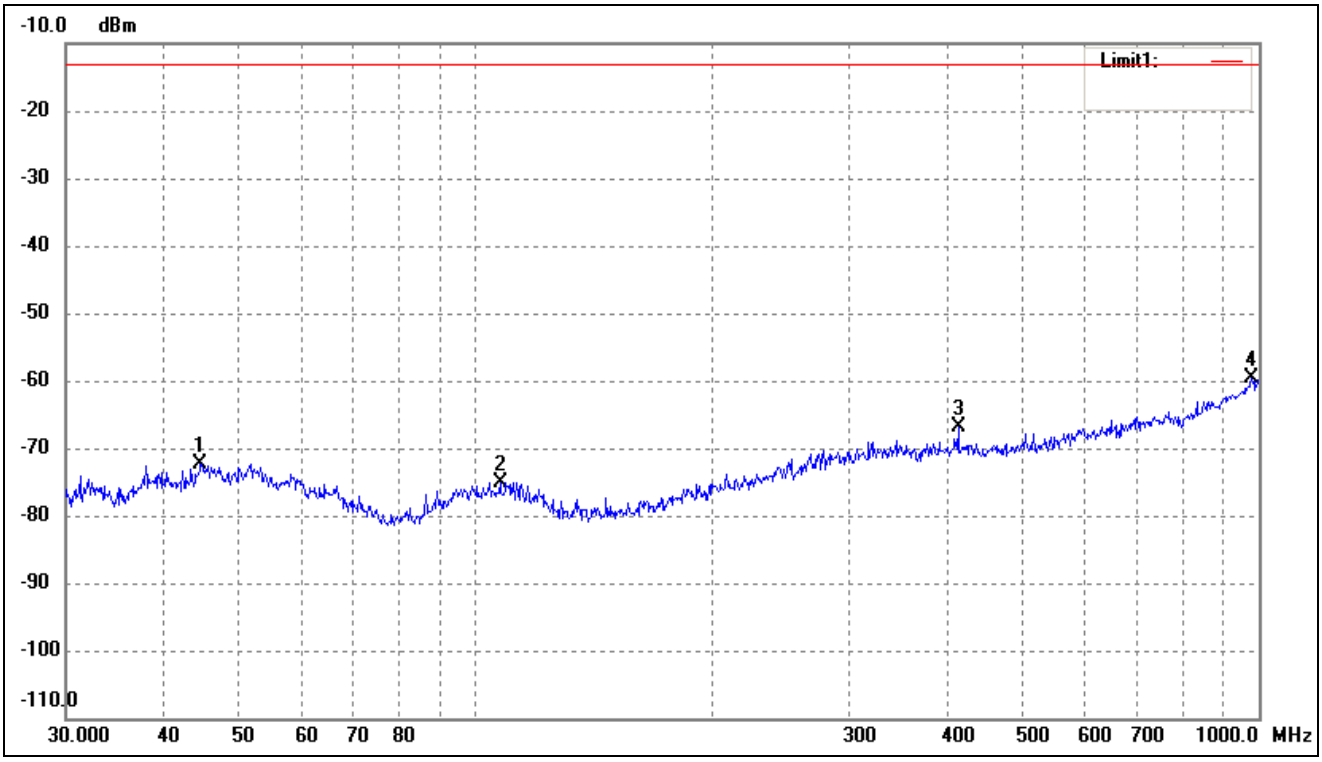
For Cellular Band			
Test Channel	GSM1900	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	59.8588	-68.88	-2.77	-71.65	-13.00	-58.65	56	100	peak
2	109.0286	-72.50	-2.14	-74.64	-13.00	-61.64	293	100	peak
3	365.5391	-73.87	4.86	-69.01	-13.00	-56.01	60	100	peak
4	996.4996	-75.21	15.78	-59.43	-13.00	-46.43	184	100	peak

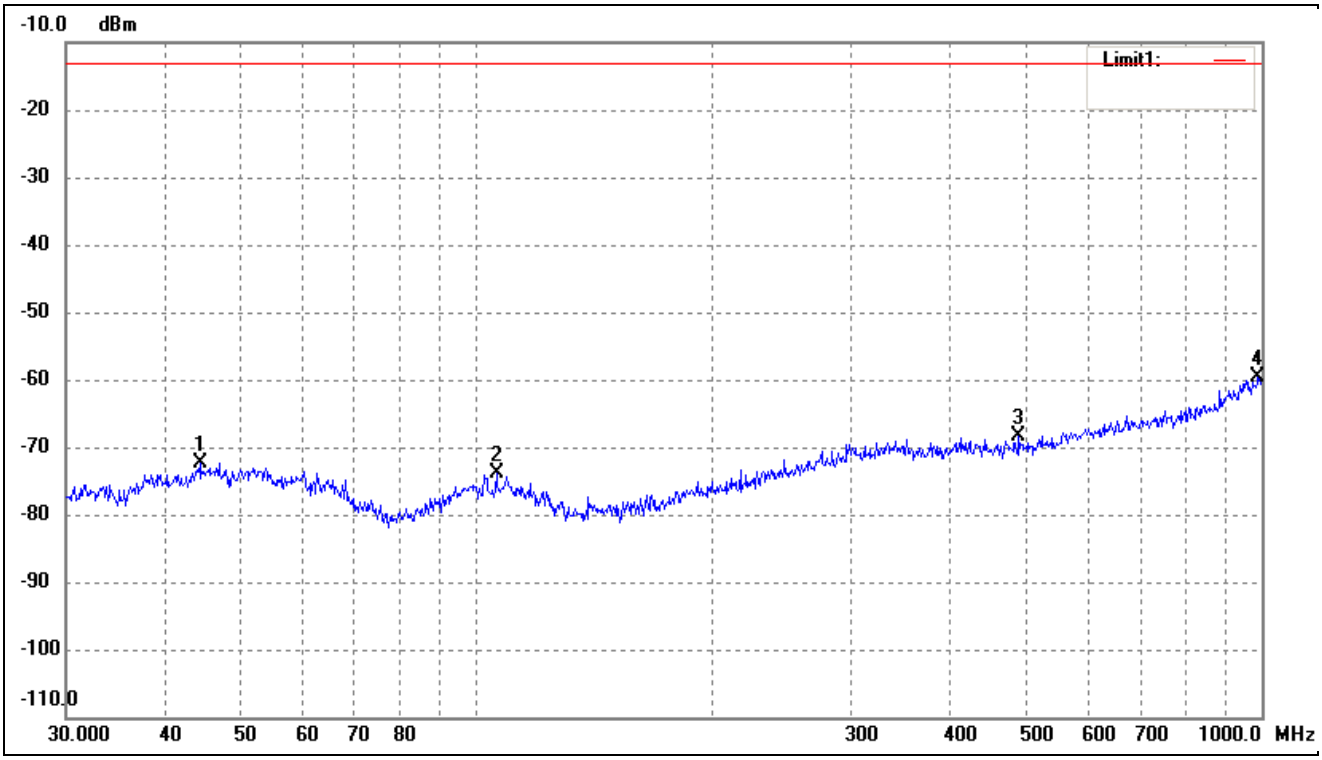
Note: Margin= (Reading+ Correct)- Limit

Test Channel	band 5	Polarity:	Horizontal



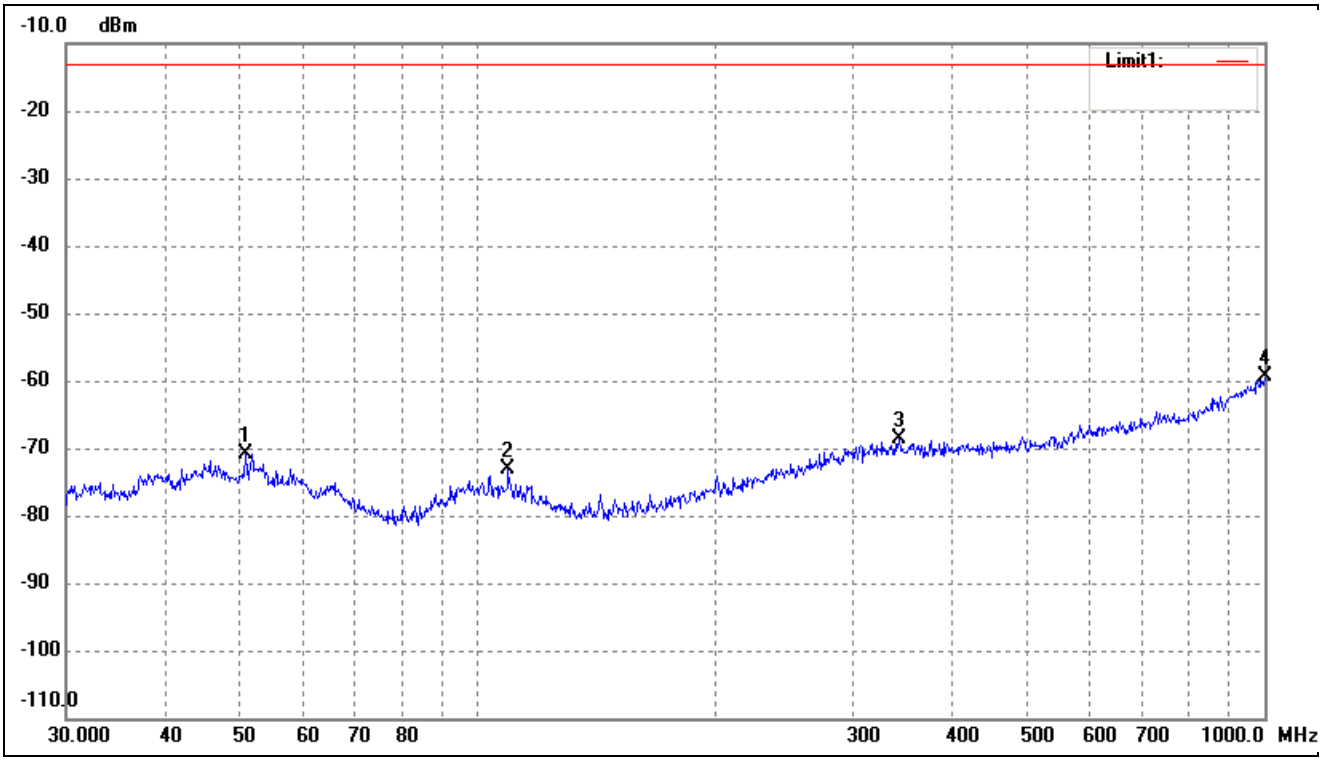
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	44.5868	-71.10	-1.20	-72.30	-13.00	-59.30	187	100	peak
2	107.5101	-72.84	-2.17	-75.01	-13.00	-62.01	146	100	peak
3	413.2706	-72.49	5.58	-66.91	-13.00	-53.91	129	100	peak
4	979.1804	-75.11	15.49	-59.62	-13.00	-46.62	137	100	peak

Test Channel	band 5	Polarity:	Vertical



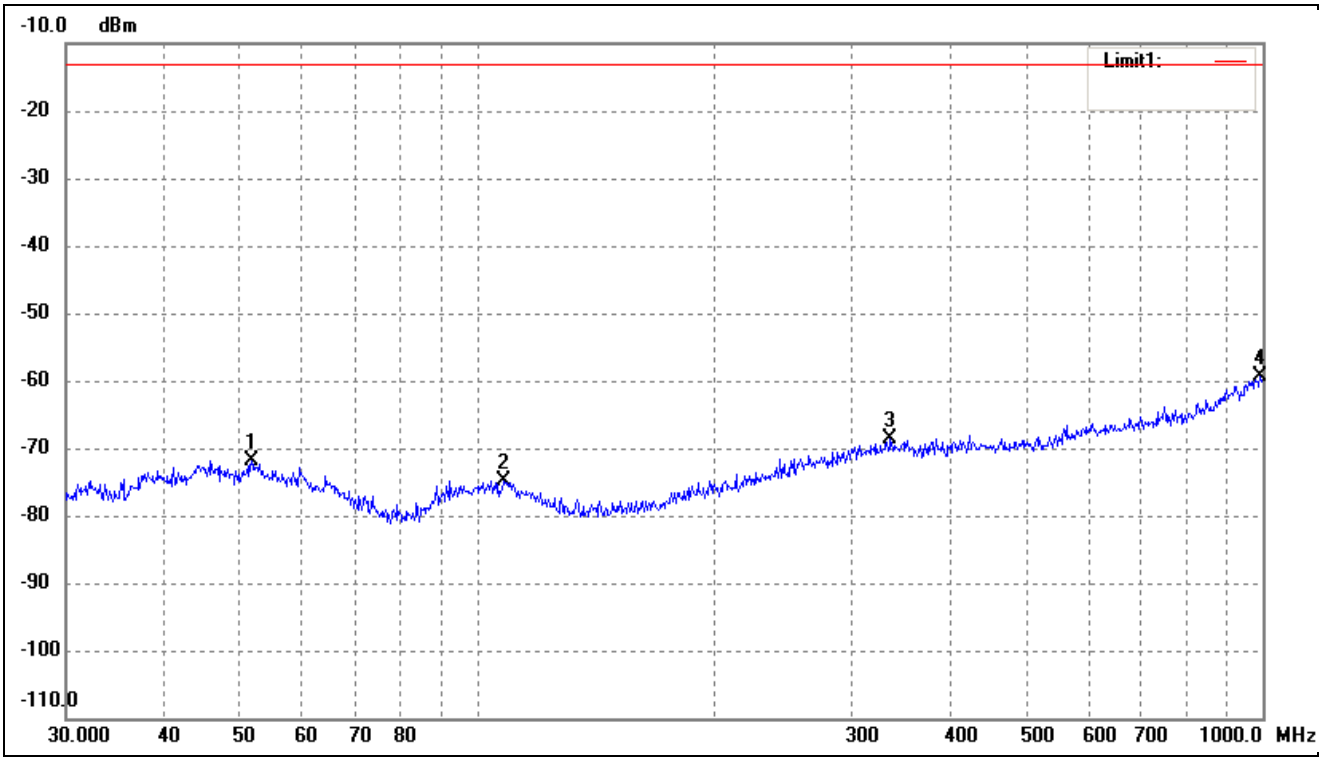
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	44.4308	-71.10	-1.21	-72.31	-13.00	-59.31	62	100	peak
2	106.0126	-71.70	-2.21	-73.91	-13.00	-60.91	136	100	peak
3	490.7447	-74.14	5.84	-68.30	-13.00	-55.30	76	100	peak
4	989.5355	-75.31	15.68	-59.63	-13.00	-46.63	123	100	peak

Test Channel	band 2	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	50.7637	-69.81	-1.08	-70.89	-13.00	-57.89	191	100	peak
2	109.4116	-71.06	-2.13	-73.19	-13.00	-60.19	115	100	peak
3	343.1800	-73.95	5.29	-68.66	-13.00	-55.66	126	100	peak
4	1000.0000	-75.15	15.84	-59.31	-13.00	-46.31	119	100	peak

Test Channel	band 2	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	( )	(cm)	
1	51.6616	-70.87	-1.02	-71.89	-13.00	-58.89	75	100	peak
2	108.2667	-72.61	-2.16	-74.77	-13.00	-61.77	198	100	peak
3	336.0352	-73.74	5.18	-68.56	-13.00	-55.56	92	100	peak
4	993.0114	-75.00	15.73	-59.27	-13.00	-46.27	122	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	-36.06	4.94	-31.12	-13	-18.12	H
2472.6	-44.48	8.46	-36.02	-13	-23.02	H
1648.4	-36.3	4.94	-31.36	-13	-18.36	V
2472.6	-44.88	8.46	-36.42	-13	-23.42	V
Middle Channel (836.6MHz)						
1673.2	-37.21	5.11	-32.1	-13	-19.1	H
2509.8	-43.01	8.54	-34.47	-13	-21.47	H
1673.2	-35.3	5.11	-30.19	-13	-17.19	V
2509.8	-43.77	8.54	-35.23	-13	-22.23	V
High Channel (848.8MHz)						
1697.6	-35.22	5.25	-29.97	-13	-16.97	H
2546.4	-42.39	8.57	-33.82	-13	-20.82	H
1697.6	-36.01	5.25	-30.76	-13	-17.76	V
2546.4	-42.67	8.57	-34.1	-13	-21.1	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	-39.96	10.54	-29.42	-13	-16.42	H
5550.6	-49.52	13.37	-36.15	-13	-23.15	H
3700.4	-39.12	10.54	-28.58	-13	-15.58	V
5550.6	-46.62	13.37	-33.25	-13	-20.25	V
Middle Channel (1880MHz)						
3760.0	-42.09	10.64	-31.45	-13	-18.45	H
5640.0	-48.84	13.54	-35.3	-13	-22.3	H
3760.0	-41.33	10.64	-30.69	-13	-17.69	V
5640.0	-47.42	13.54	-33.88	-13	-20.88	V
High Channel (1909.8MHz)						
3819.6	-40.12	10.74	-29.38	-13	-16.38	H
5729.4	-49.51	13.71	-35.8	-13	-22.8	H
3819.6	-39.16	10.74	-28.42	-13	-15.42	V
5729.4	-48.33	13.71	-34.62	-13	-21.62	V

➢ For WCDMA Band V Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (826.4MHz)						
1652.8	-35.34	4.94	-30.4	-13	-17.4	H
2479.2	-44.52	8.46	-36.06	-13	-23.06	H
1652.8	-37.59	4.94	-32.65	-13	-19.65	V
2479.2	-42.85	8.46	-34.39	-13	-21.39	V
Middle Channel (836.6MHz)						
1672.8	-34.87	5.11	-29.76	-13	-16.76	H
2509.2	-44.52	8.54	-35.98	-13	-22.98	H
1672.8	-37.18	5.11	-32.07	-13	-19.07	V
2509.2	-42.64	8.54	-34.1	-13	-21.1	V
High Channel (846.6MHz)						
1693.2	-36.37	5.25	-31.12	-13	-18.12	H
2539.8	-42.4	8.57	-33.83	-13	-20.83	H
1693.2	-36.07	5.25	-30.82	-13	-17.82	V
2539.8	-41.22	8.57	-32.65	-13	-19.65	V

➢ For WCDMA Band II Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1852.4MHz)						
3704.8	-37.01	10.17	-26.84	-13	-13.84	H
5557.2	-43	14.69	-28.31	-13	-15.31	H
3704.8	-37.23	10.17	-27.06	-13	-14.06	V
5557.2	-41.87	14.69	-27.18	-13	-14.18	V
Middle Channel (1880MHz)						
3760.8	-36.25	10.26	-25.99	-13	-12.99	H
5640.0	-44.17	14.78	-29.39	-13	-16.39	H
3760.8	-34.47	10.26	-24.21	-13	-11.21	V
5640.0	-44.14	14.78	-29.36	-13	-16.36	V
High Channel (1907.6MHz)						
3815.2	-37.73	10.59	-27.14	-13	-14.14	H
5722.8	-42.54	15.03	-27.51	-13	-14.51	H
3815.2	-36.28	10.59	-25.69	-13	-12.69	V
5722.8	-47.92	15.03	-32.89	-13	-19.89	H

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/WCDMA B2/B5 middle channel
2. Normal Voltage NV=DC3.8V; Low Voltage LV=DC3.6V;High Voltage HV=DC4.35V

➢ 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	174	0.2080	2.50	Pass
	-20	156	0.1865		
	-10	167	0.1996		
	0	178	0.2128		
	10	183	0.2187		
	20	169	0.2020		
	30	177	0.2116		
	40	173	0.2068		
	50	185	0.2211		

Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	147	0.0782	2.50	Pass
	-20	165	0.0878		
	-10	152	0.0809		
	0	156	0.0830		
	10	157	0.0835		
	20	149	0.0793		
	30	161	0.0856		
	40	168	0.0894		
	50	156	0.0830		

Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	147	0.1757	2.50	Pass
	-20	162	0.1936		
	-10	155	0.1853		
	0	142	0.1697		
	10	162	0.1936		
	20	135	0.1614		
	30	145	0.1733		
	40	165	0.1972		
	50	147	0.1757		

Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	152	0.0809	2.50	Pass
	-20	162	0.0862		
	-10	141	0.0750		
	0	151	0.0803		
	10	156	0.0830		
	20	136	0.0723		
	30	145	0.0771		
	40	156	0.0830		
	50	165	0.0878		

➢ 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	145	0.1733	2.50	Pass
	NV	156	0.1865		
	LV	144	0.1721		
Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	142	0.0755	2.50	Pass
	NV	156	0.0830		
	LV	135	0.0718		
Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm) Result	
		Hz	ppm		
25	HV	155	0.1853	2.50	Pass
	NV	148	0.1769		
	LV	160	0.1913		
Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	146	0.0777	2.50	Pass
	NV	154	0.0819		
	LV	162	0.0862		

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