FCC Radio Test Report

FCC ID: 2AIIJ-U9

Original Grant

Report No.	:	TB-FCC148058
Applicant	:	Shenzhen SAME SONG Electronics Co.,Ltd.
Equipment Under Test (EUT)		
EUT Name	:	Second-generation Smart Watch
Model No.	:	U9
Series No.	:	U8
Brand Name	:	N/A
Receipt Date	:	2016-05-10
Test Date	:	2016-05-11 to 2016-05-25
Issue Date	:	2016-05-26
Standards	:	FCC Part 2 FCC Part 22 Subpart H, FCC Part 24 Subpart E, 2015 ANSI C63.26: 2015
Conclusions	:	**PASS** In the configuration tested, the EUT complied with the standards specified above, The EUT technically complies with the FCC requirements
Test/Witness Engineer	:	IVAN SU
Approved& Authorized	:	Ray Li

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, China
Tel: +86 75526509301 Fax: +86 75526509195

Contents

CONTENTS....2
1. GENERAL INFORMATION ABOUT EUT....4
1.1 Client Information....4
1.2 General Description of EUT (Equipment Under Test)....4
1.3 Block Diagram Showing the Configuration of System Tested....5
1.4 Description of Support Units....5
1.5 Description of Test Mode....5
1.6 Measurement Uncertainty....6
1.7 Test Facility....7
2. TEST SUMMARY....8
3. TEST EQUIPMENT....9
4. FREQUENCY STABILITY....10
4.1 Test Standard and Requirement....10
4.2 Test Setup....10
4.3 Test Procedure....11
4.4 EUT Operating Condition....11
5. CONDUCTED RF OUTPUT POWER....14
5.1 Test Standard and Limit....14
5.2 Test Setup....14
5.3 Test Procedure....14
5.4 EUT Operating Condition....14
5.5 EUT Operating Condition....14
6. PEAK-AVERAGE RATIO....17
6.1 Test Standard and Limit....17
6.2 Test Setup....17
6.3 Test Procedure....17
6.4 EUT Operating Condition....17
6.5 Test Data....18
7. RADIATED OUTPUT POWER....20
7.1 Test Standard and Limit....20
7.2 Test Setup....20
7.3 Test Procedure....20
7.4 EUT Operating Condition....21
7.5 Test Data....21
8. OCCUPIED BANDWIDTH....24
8.1 Test Standard and Limit....24
8.2 Test Setup....24

8.3 Test Procedure 24
8.4 EUT Operating Condition 25
8.5 Test Data 25
9. CONDUCTED OUT OF BAND EMISSIONS 39
9.1 Test Standard and Limit 39
9.2 Test Setup 39
9.3 Test Procedure 39
9.4 EUT Operating Condition 39
9.5 Test Data 40
Please refer following plots: 40
10. BAND EDGE TEST 52
10.1 Test Standard and Limit 52
10.2 Test Setup 52
10.3 Test Procedure 52
10.4 EUT Operating Condition 52
10.5 Test Data 53
11. RADIATED OUT BAND OF EMISSIONS 59
11.1 Test Standard and Limit 59
11.2 Test Setup 59
11.3 Test Procedure 59
11.4 EUT Operating Condition 60
11.5 Test Data 60

1. General Information about EUT

1.1 Client Information

Applicant	:	Shenzhen SAME SONG Electronics Co.,Ltd.
Address	:	13F, Nantongbang High-Tech Industrial Park Building B, Dabutou Road, Guanlan Street,Longhua New District, Shenzhen, China
Manufacturer	:	Shenzhen SAME SONG Electronics Co.,Ltd.
Address	:	13F, Nantongbang High-Tech Industrial Park Building B, Dabutou Road, Guanlan Street,Longhua New District, Shenzhen, China

1.2 General Description of EUT (Equipment Under Test)

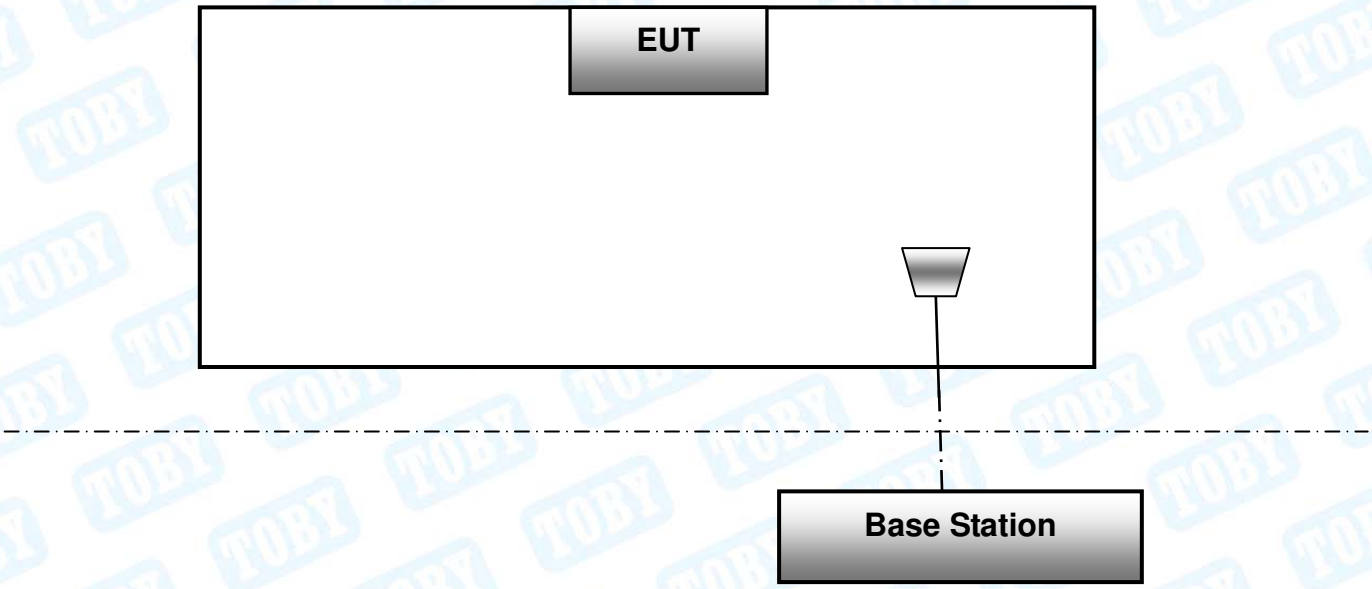
EUT Name	:	Second-generation Smart Watch	
Models No.	:	U9 ,U8	
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is model name for commercial.	
Product Description	:	Frequency Bands: GSM850; PCS1900	
		GSM 850 Power :	Cond:33.08 dBm ERP:30.85 dBm
		PCS 1900 Power :	Cond:29.21 dBm EIRP:28.95 dBm
		Antenna Gain:	GSM 850:2.03 dBi PCS 1900: 2.57 dBi
		Modulation Type:	GSM/GPRS:GMSK EDGE: 8PSK
FCC Operating Frequency	:	GSM 850: 824.20MHz-848.80MHz PCS1900: 1850.20MHz-1909.80MHz	
Emission Designator	:	GSM 850: 248KGXW, PCS 1900: 245KGXW GPRS 850: 248KG7W, GPRS 1900: 245KG7W EGPRS 850: 250KG7W, EGPRS 1900: 247KG7W	
Power Supply	:	DC Voltage supplied from Host System by USB cable. DC power by Li-ion Battery.	
Power Rating	:	DC 5.0V by USB cable. DC 3.7V by 230mAh Li-ion Battery.	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

Note:

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. The EUT has also been tested and complied the FCC 15C for Bluetooth function, and recorded in the separate test report.

(2) This test report only product for PCS Licensed Transmitter (PCB).

1.3 Block Diagram Showing the Configuration of System Tested



The above block diagram of setup is the normal mode. And more detail please refer to the test setup of each test item of bellow.

1.4 Description of Support Units

The EUT has been tested as an independent unit.

1.5 Description of Test Mode

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

During all testing, EUT is link mode with base station at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range. Frequency range investigated for radiated emission as below：

1. 9kHz~10GHz for GSM850.
2. 9kHz~20GHz for PCS1900.

Test Channel		
Mode	**Channel**	**Frequency(MHz)**
GSM 850	128	824.20
	190	836.60
	251	848.80

PCS 1900	512	1850.20
	661	1880.00
	810	1909.80

Pre-scanning test Mode	Description
GSM 850	highest , middle, lowest channels
GPRS 850	highest , middle, lowest channels
GSM 1900	highest , middle, lowest channels
GPRS 1900	highest , middle, lowest channels
Final test Mode	**Description**
GSM 850	highest , middle, lowest channels
GSM 1900	highest , middle, lowest channels

Note:

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

(2) During the testing procedure, the EUT is in link mode with base station emulator at maximum power level in each test mode.

(3) The EUT has GSM, GPRS, EDGE functions, and after pre-testing, GSM function is the worst case for all the emission tests.

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

1.6 Measurement Uncertainty

Test Item	Parameters	Expanded Uncertainty (U_{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	 ±3.42 dB ±3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB

1.7 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at: 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.
At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)
The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)
The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)
The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

2. Test Summary

Test Standards and Test Results			
Standard	**Document Title**		
FCC Part 2 (10-1-05 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations		
FCC Part 22 (10-1-05 Edition)	Public Mobile Services		
FCC Part 24 (10-1-05 Edition)	Personal Communications Services		
Standard Section	**Test Item**	**Judgment**	**Remark**
2.1046	Conducted RF Output Power	PASS	N/A
24.232(d)	Peak-Average Ratio	PASS	N/A
2.1049; 22.917; 24.238	99% & -26 dB Occupied Bandwidth	PASS	N/A
2.1055; 22.355; 24.235	Frequency Stability	PASS	N/A
2.1051; 2.1057; 22.917; 24.238	Conducted Out of Band Emissions	PASS	N/A
2.1051; 2.1057; 22.917; 24.238	Band Edge	PASS	N/A
22.913; 24.238	Transmitter Radiated Power (EIRP/ERP)	PASS	N/A
2.1053; 2.1057; 22.917; 24.238	Radiated Out of Band Emissions	PASS	N/A
Note: N/A is an abbreviation for Not Applicable.			

3. Test Equipment

AC Main Conducted Emission					
Description	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Due Date**
EMI Test Receiver	ROHDE& SCHWARZ	ESCI	100321	Aug. 07, 2015	Aug. 06, 2016
50ΩCoaxial Switch	Anritsu	MP59B	X10321	Aug. 07, 2015	Aug. 06, 2016
L.I.S.N	Rohde & Schwarz	ENV216	101131	Aug. 07, 2015	Aug. 06, 2016
L.I.S.N	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 08, 2015	Aug. 07, 2016
Radiation Spurious Emission					
Description	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Due Date**
Spectrum Analyzer	Agilent	E4407B	MY45106456	Aug. 29, 2015	Aug. 28, 2016
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Aug. 07, 2015	Aug. 06, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 26, 2016	Mar. 25, 2017
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 26, 2016	Mar. 25, 2017
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 26, 2016	Mar. 25, 2017
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 26, 2016	Mar. 25, 2017
Pre-amplifier	Sonoma	310N	185903	Mar. 26, 2016	Mar. 25, 2017
Pre-amplifier	HP	8447B	3008A00849	Mar. 26, 2016	Mar. 25, 2017
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 26, 2016	Mar. 25, 2017
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Mar. 26, 2016	Mar. 25, 2017
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Universal Radio Communication Tester	Rohde&Schwarz	CMU200	103903	Jun.24, 2015	Jun.23, 2016
Antenna Conducted Emission					
Description	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Due Date**
Spectrum Analyzer	Agilent	E4407B	MY45106456	Aug. 29, 2015	Aug. 28, 2016
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Aug. 07, 2015	Aug. 06, 2016
Universal Radio Communication Tester	Rohde&Schwarz	CMU200	103903	Jun.24, 2015	Jun.23, 2016

4. Frequency Stability

4.1 Test Standard and Requirement

4.1.1 Test Standard

FCC Part 2.1055
FCC Part 22.355
FCC Part 24.235

4.1.2 Requirement

According to FCC section 22.355 and FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(1) Temperature:

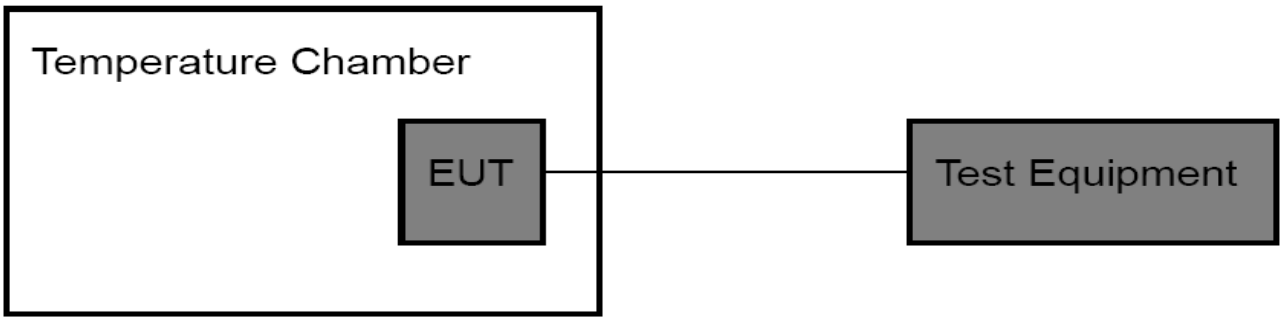
The temperature is varied from -30℃ to +50℃ at intervals of not more than 10℃.

(2) Primary Supply Voltage:

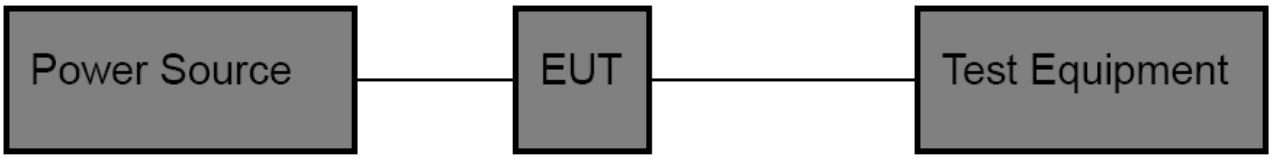
For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at input to the cable normally provide with the equipment, or at the power supply terminals if cables are not normally provided.

4.2 Test Setup

For Temperature Test:



For Voltage Test:



4.3 Test Procedure

Test Procedures for Temperature Variation:

(1) The EUT was set up in the thermal chamber and connected with the base station.

(2) With power off, the temperature was decreased to -30℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.

(3) With power off, the temperature was raised in 10℃ set up to 50℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.

(4) If the EUT cannot be turned on at -30℃, the testing lowest temperature will be raised in 10℃ step until the EUT can be turned on.

Test Procedures for Voltage Variation:

(1) The EUT was placed in a temperature chamber at 25±5℃ and connected with the base station.

(2) Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

(3) The variation in frequency was measured for the worst case.

4.4 EUT Operating Condition

The Equipment Under Test was set to Communication with the Base Station.

3.5 Test Data

Please refer the following pages.

Temperature Variation

Temperature Variation GSM 850 (CH190)						
Temperature (℃)	GSM		GPRS		EDGE	
	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)
-30	-9	-0.011	-14	-0.017	-18	-0.022
-20	-8	-0.010	-12	-0.014	-16	-0.019
-10	-10	-0.012	-9	-0.011	-19	-0.023
0	-9	-0.011	-11	-0.013	-13	-0.016
10	-12	-0.014	-16	-0.019	-20	-0.024
20	-11	-0.013	-13	-0.016	-17	-0.020
30	-9	-0.011	-14	-0.017	-19	-0.023
40	-13	-0.016	-15	-0.018	-20	-0.024
50	-12	-0.014	-9	-0.011	-17	-0.020
60	-11	-0.013	-11	-0.013	-21	-0.025
Limit	2.5 (ppm)					
Result	PASS					

Temperature Variation GSM 1900 (CH661)						
Temperature (℃)	GSM		GPRS		EDGE	
	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)
-30	-25	-0.038	-20	-0.030	-31	-0.047
-20	-26	-0.039	-22	-0.033	-34	-0.051
-10	-21	-0.032	-19	-0.029	-29	-0.044
0	-28	-0.042	-25	-0.038	-32	-0.048
10	-30	-0.045	-18	-0.027	-28	-0.042
20	-27	-0.041	-21	-0.032	-31	-0.047
30	-24	-0.036	-27	-0.041	-26	-0.039
40	-25	-0.038	-25	-0.038	-33	-0.050
50	-29	-0.044	-23	-0.035	-30	-0.045
60	-23	-0.035	-20	-0.030	-29	-0.044
Limit	2.5 (ppm)					
Result	PASS					

Voltage Variation

Voltage Variation GSM 850 (CH190)						
Voltage (V)	GSM		GPRS		EDGE	
	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)
3.15	-13	-0.016	-16	-0.019	-13	-0.016
3.70	-10	-0.012	-13	-0.016	-17	-0.020
4.26	-12	-0.014	-18	-0.022	-15	-0.018
Limit	2.5 (ppm)					
Result	PASS					

Voltage Variation GSM 1900 (CH661)						
Voltage (V)	GSM		GPRS		EDGE	
	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)	Freq. Dev. (Hz)	Deviation (ppm)
3.15	-22	-0.033	-23	-0.035	-32	-0.048
3.70	-20	-0.030	-20	-0.030	-29	-0.044
4.26	-19	-0.029	-19	-0.029	-34	-0.051
Limit	**2.5 (ppm)**					
Result	**PASS**					

5. Conducted RF Output Power

5.1 Test Standard and Limit

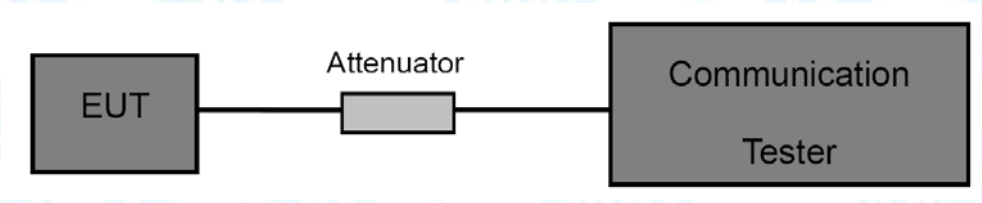
5.1.1 Test Standard

FCC Part 2: 2.1046
FCC Part 22H : 22.913 (a)
FCC Part 24E: 24.232 (c)

5.1.2 Test Limit

GSM850	PCS 1900
38.5 dBm (ERP)	33 dBm (EIRP)

5.2 Test Setup



5.3 Test Procedure

(1) The EUT is coupled to the Base Station with the suitable Attenuator, the path loss is calibrated to correct the reading.
(2) A call is set up by the Base Station to the generic call set up procedure.
(3) Set EUT at maximum power level through base station by power level command.
(4) Then read record the power value from the Base Station in dBm.

5.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

5.5 EUT Operating Condition

GSM 850				
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)
GSM 850	128	824.2	31.84	1.528
	190	836.6	32.57	1.807
	251	848.8	33.08	2.032
GPRS 850 (1 Slot)	128	824.2	31.01	1.262
	190	836.6	31.73	1.489
	251	848.8	32.24	1.675
GPRS 850 (2 Slot)	128	824.2	30.85	1.216
	190	836.6	31.63	1.455
	251	848.8	32.17	1.648
GPRS 850 (3 Slot)	128	824.2	30.98	1.253
	190	836.6	31.05	1.274
	251	848.8	32.13	1.633
GPRS 850 (4 Slot)	128	824.2	31.04	1.271
	190	836.6	30.89	1.227
	251	848.8	32.11	1.626
EDGE 850 (1 Slot)	128	824.2	31.07	1.279
	190	836.6	31.81	1.517
	251	848.8	32.26	1.683
EDGE 850 (2 Slot)	128	824.2	31.32	1.355
	190	836.6	31.14	1.300
	251	848.8	32.41	1.742
EDGE 850 (3 Slot)	128	824.2	30.78	1.197
	190	836.6	31.08	1.282
	251	848.8	32.23	1.671
EDGE 850 (4 Slot)	128	824.2	30.34	1.081
	190	836.6	31.32	1.355
	251	848.8	31.97	1.574

PCS 1900				
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)
GSM 1900	512	1850.2	29.21	0.834
	661	1880.0	29.06	0.805
	810	1909.8	29.07	0.807
GPRS 1900 (1 Slot)	512	1850.2	29.18	0.828
	661	1880.0	29.05	0.804
	810	1909.8	29.07	0.807
GPRS 1900 (2 Slot)	512	1850.2	29.12	0.817
	661	1880.0	29.03	0.800
	810	1909.8	29.06	0.805
GPRS 1900 (3 Slot)	512	1850.2	29.12	0.817
	661	1880.0	29.08	0.809
	810	1909.8	29.14	0.820
GPRS 1900 (4 Slot)	512	1850.2	29.05	0.804
	661	1880.0	29.02	0.798
	810	1909.8	29.18	0.828
EDGE 1900 (1 Slot)	512	1850.2	29.19	0.830
	661	1880.0	29.05	0.804
	810	1909.8	29.07	0.807
EDGE 1900 (2 Slot)	512	1850.2	29.13	0.818
	661	1880.0	29.04	0.802
	810	1909.8	29.11	0.815
EDGE 1900 (3 Slot)	512	1850.2	29.06	0.805
	661	1880.0	29.18	0.828
	810	1909.8	29.09	0.811
EDGE 1900 (4 Slot)	512	1850.2	29.16	0.824
	661	1880.0	29.11	0.815
	810	1909.8	29.07	0.807

6. Peak-Average Ratio

6.1 Test Standard and Limit

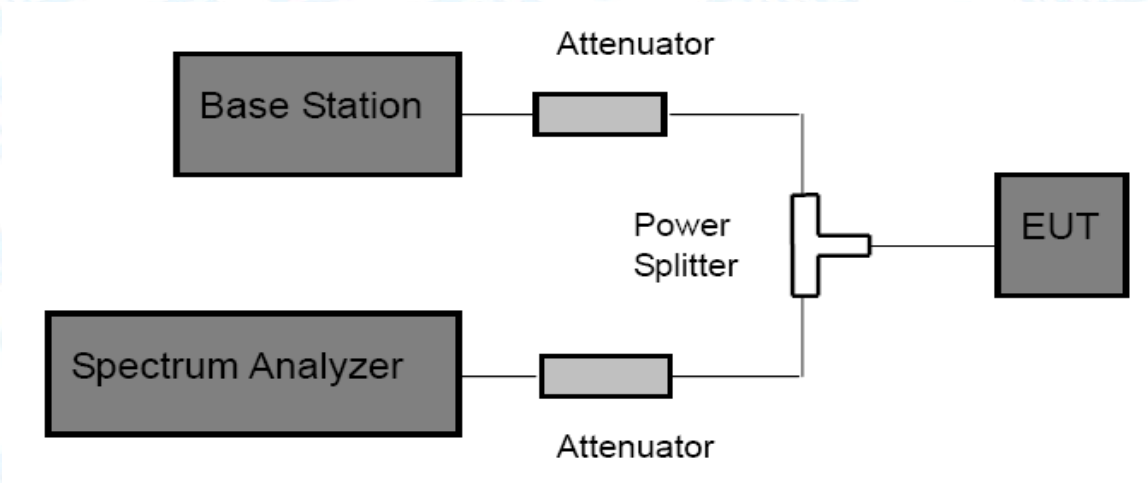
6.1.1 Test Standard

FCC Part 24E: 24.232 (d)

6.1.2 Test Limit

PCS 1900
The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

6.2 Test Setup



6.3 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 of the transmitter is operating at maximum power.
(6) Measured and recorded the 0.1% as PAPR level.

6.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power

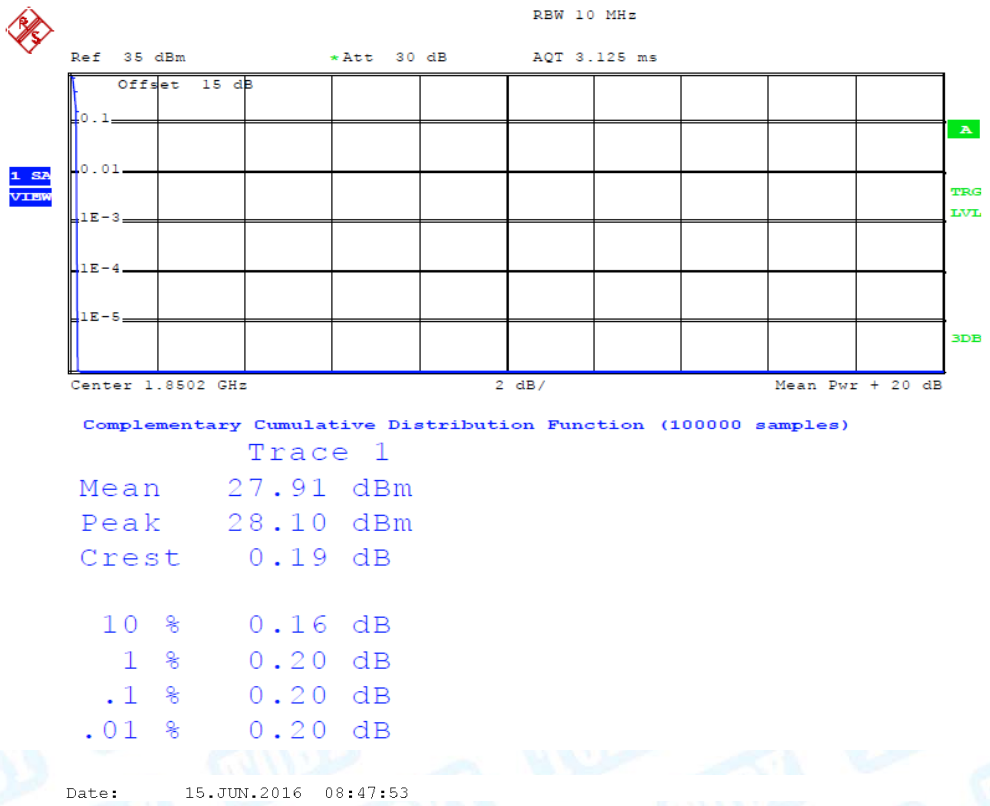
during the test.

6.5 Test Data

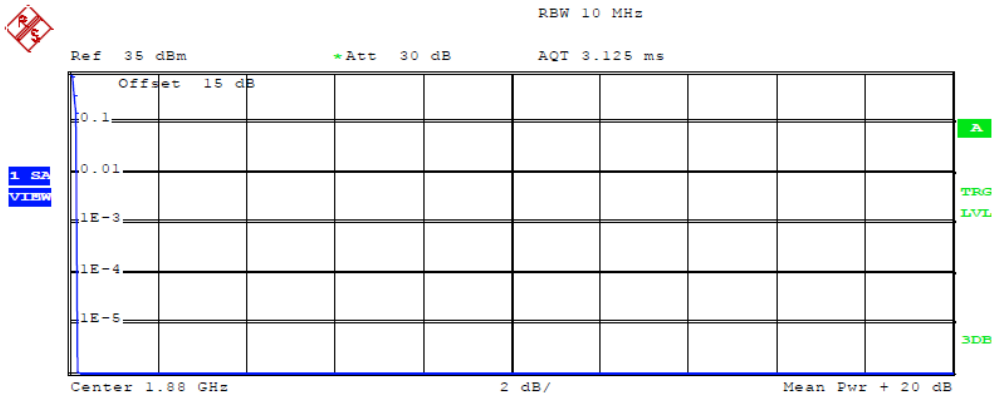
PCS 1900					
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)		Peak-Average Ratio (PAR)
			Peak	Average	
PCS 1900	512	1850.2	28.10	27.91	0.2
	661	1880.0	27.96	27.76	0.2
	810	1909.8	28.03	27.79	0.2

PCS 1900

CH 512



CH 661

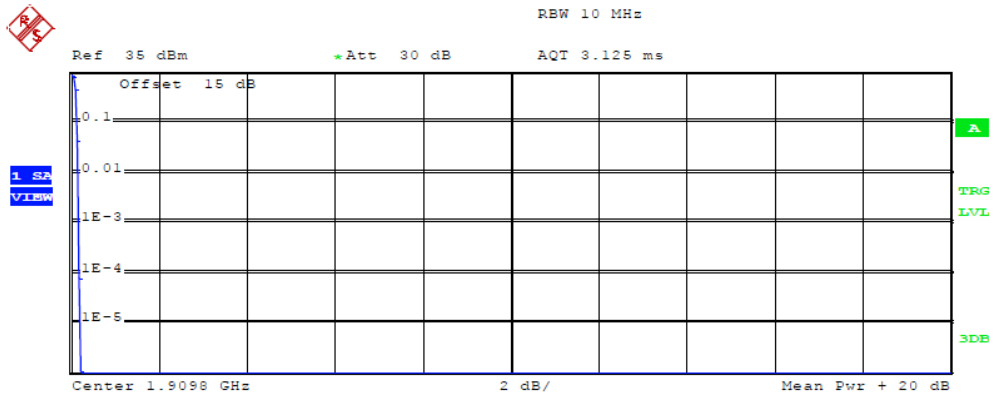


Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	27.76 dBm
Peak	27.96 dBm
Crest	0.20 dB
10 %	0.16 dB
1 %	0.20 dB
.1 %	0.20 dB
.01 %	0.20 dB

Date: 15.JUN.2016 08:48:51

CH 810



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	27.79 dBm
Peak	28.03 dBm
Crest	0.23 dB
10 %	0.16 dB
1 %	0.20 dB
.1 %	0.20 dB
.01 %	0.20 dB

Date: 15.JUN.2016 08:50:08

7. Radiated Output Power

7.1 Test Standard and Limit

7.1.1 Test Standard

FCC Part 22H : 22.913 (a)

FCC Part 24E: 24.232 (c)

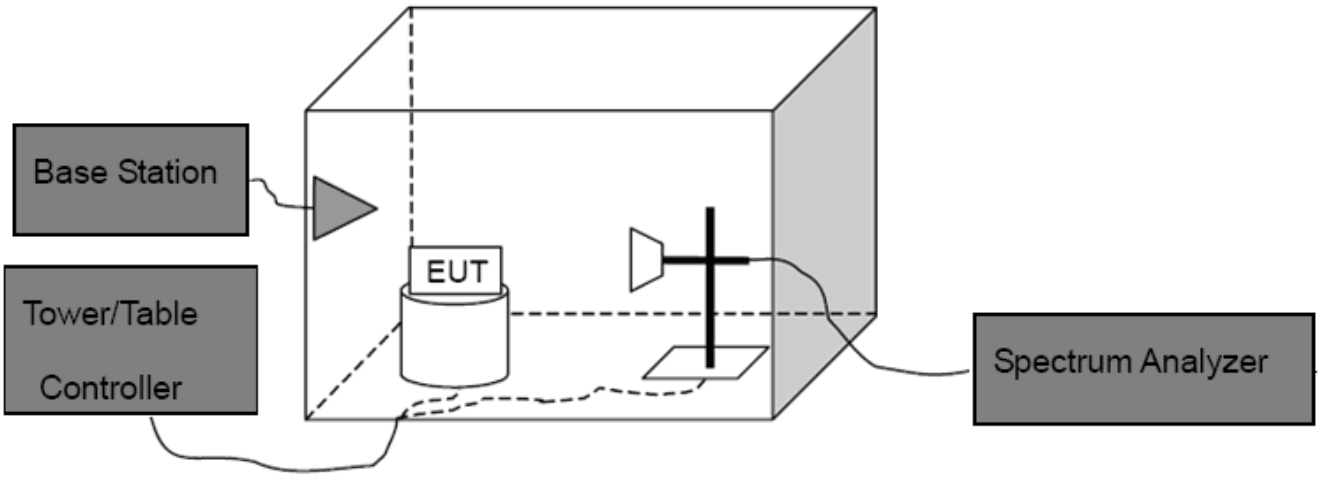
7.1.2 Test Limit

According to FCC Part 22.913 (a), the ERP of Cellular mobile transmitters must not exceed 7 Watts(38.5 dBm).

According to FCC Part 24.232 (c), the Mobile/portable stations are limited to 2 Watts(33 dBm) EIRP peak power.

Cellular Band	PCS Band
GSM850	PCS 1900
38.5 dBm (ERP)	33 dBm (EIRP)

7.2 Test Setup



7.3 Test Procedure

(1) The EUT was placed on an non-conductive rotating platform with 0.8 meter height in an anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW=3 MHz, VBW=3 MHz and peak detector settings.

(2) During the measurement, the EUT was enforced in maximum power and linked with the Base

Station. The highest was recorded from analyzer power level (LVT) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.

(3) Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-D. The EUT was replaced by dipole antenna (for frequency below 1 GHz) or Horn antenna (for frequency above 1 GHz) at same location with same polarize of receiver antenna and then a known power of each measure frequency from S.G. was applied into the dipole antenna or Horn antenna through a TX cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna.
Then the EUT's EIRP and ERP was calculated with the correction factor:
ERP=S.G.Level +Antenna Gain Cord.(dBd)-Cable Loss(dB)
EIRP=S.G.Level+Antenna Gain Cord.(dBi)-Cable Loss(dB)

7.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

7.5 Test Data

Measurement Data (worst case)

GSM 850								
Mode	Channel	Frequency (MHz)	Antenna (H&V)	SG Level (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	ERP Power (dBm)	ERP Power (W)
GSM 850	128	824.2	H	28.04	3.46	1.26	30.24	1.057
			V	28.58	3.46	1.26	30.78	1.197
	190	836.6	H	28.29	3.82	1.26	30.85	1.216
			V	27.59	3.82	1.26	30.15	1.035
	251	848.8	H	25.46	4.16	1.26	28.36	0.685
			V	27.42	4.16	1.26	30.32	1.076
GPRS 850 (1 Slot)	128	824.2	H	27.27	3.46	1.26	29.47	0.885
			V	25.93	3.46	1.26	28.13	0.650
	190	836.6	H	26.89	3.82	1.26	29.45	0.881
			V	25.78	3.82	1.26	28.34	0.682
	251	848.8	H	27.11	4.16	1.26	30.01	1.002
			V	26.06	4.16	1.26	28.96	0.787
EDGE 850 (1 Slot)	128	824.2	H	27.14	3.46	1.26	29.34	0.859
			V	25.76	3.46	1.26	27.96	0.625
	190	836.6	H	26.60	3.82	1.26	29.16	0.824
			V	25.88	3.82	1.26	28.44	0.698
	251	848.8	H	26.97	4.16	1.26	29.87	0.971
			V	24.79	4.16	1.26	27.69	0.587
Limit						38.5		7

PCS 1900								
Mode	Channel	Frequency (MHz)	Antenna (H&V)	SG Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	EIRP Power (dBm)	EIRP Power (W)
GSM 1900	512	1850.2	H	26.25	5.01	2.59	28.67	0.736
			V	26.53	5.01	2.59	28.95	0.785
	661	1880.0	H	26.53	4.82	2.59	28.76	0.752
			V	26.12	4.82	2.59	28.35	0.684
	810	1909.8	H	25.46	4.45	2.59	27.32	0.540
			V	24.12	4.45	2.59	25.98	0.396
GPRS 1900 (1 Slot)	512	1850.2	H	25.83	5.01	2.59	28.25	0.668
			V	24.16	5.01	2.59	26.58	0.455
	661	1880.0	H	25.12	4.82	2.59	27.35	0.543
			V	23.73	4.82	2.59	25.96	0.394
	810	1909.8	H	25.50	4.45	2.59	27.36	0.545
			V	24.56	4.45	2.59	26.42	0.439
EDGE 1900 (1 Slot)	512	1850.2	H	24.56	5.01	2.59	26.98	0.499
			V	25.92	5.01	2.59	28.34	0.682
	661	1880.0	H	25.46	4.82	2.59	27.69	0.587
			V	24.22	4.82	2.59	26.45	0.442
	810	1909.8	H	25.49	4.45	2.59	27.35	0.543
			V	23.82	4.45	2.59	25.68	0.370
Limit						33		2

8. Occupied Bandwidth

8.1 Test Standard and Limit

8.1.1 Test Standard

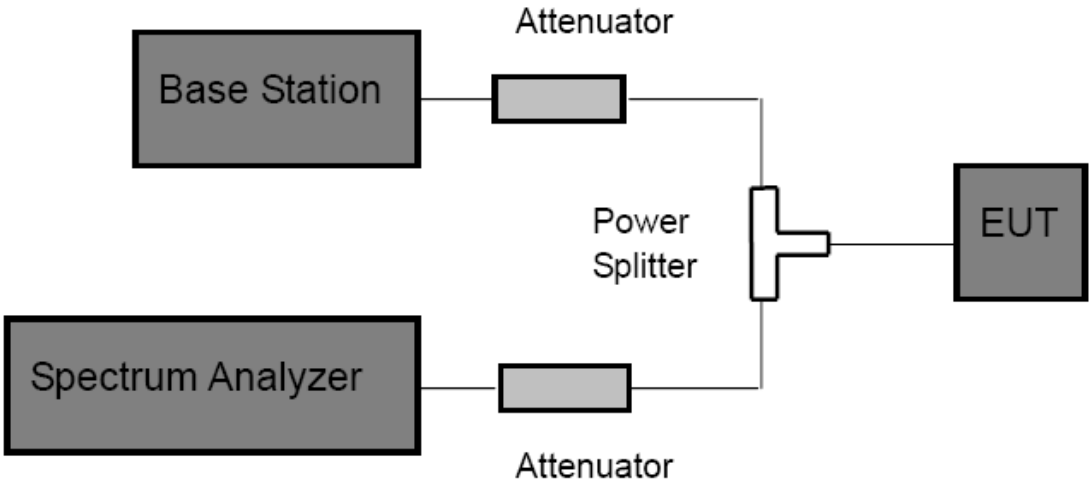
FCC Part 2: 2.1049
FCC Part 22H : 22.913 (a)
FCC Part 24E: 24.232 (c)

8.1.2 Test Requirement

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as 99% power and -26dBC occupied bandwidths.

8.2 Test Setup



8.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
(2) The resolution bandwidth of the Spectrum Analyzer is set to at least 1% of the occupied bandwidth.
(3) The low, middle and the high channels are selected to perform tests respectively.
(4) Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak; make a line whose value is 26dB lower than the peak; mark two points which the line intersected the waveform at; finally record the delta of the two points as the occupied bandwidth and the plot.
(5) Set the Spectrum Analyzer Occupied bandwidth function to measure the 99% occupied bandwidth.

8.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

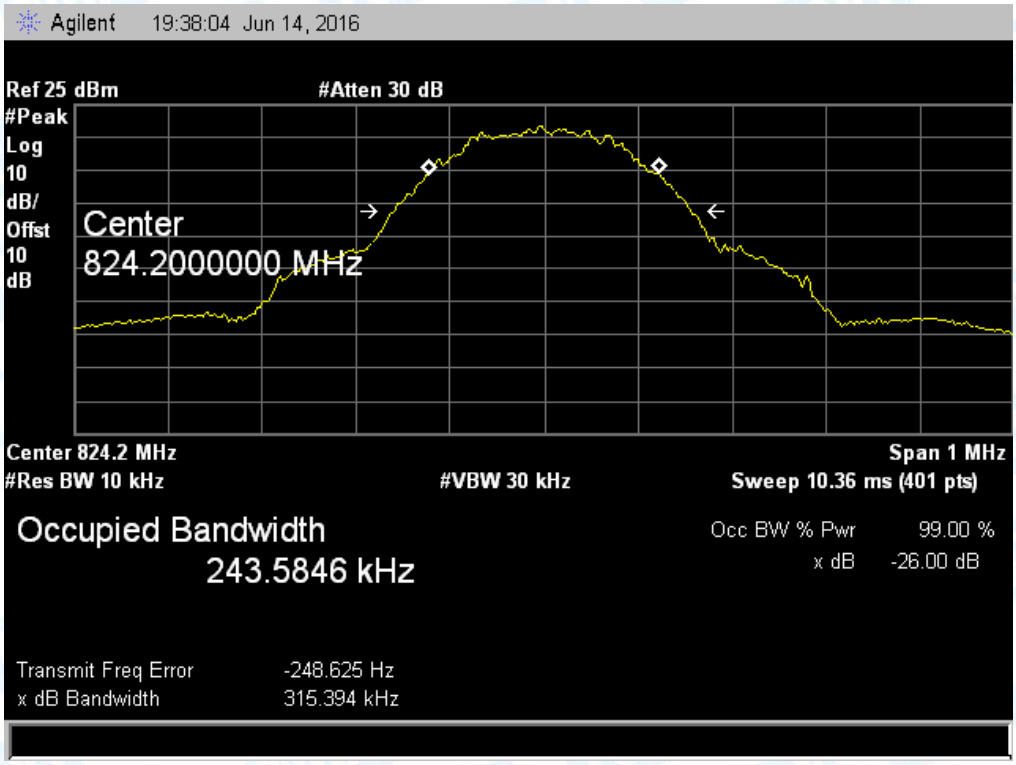
8.5 Test Data

Please refer following pages.

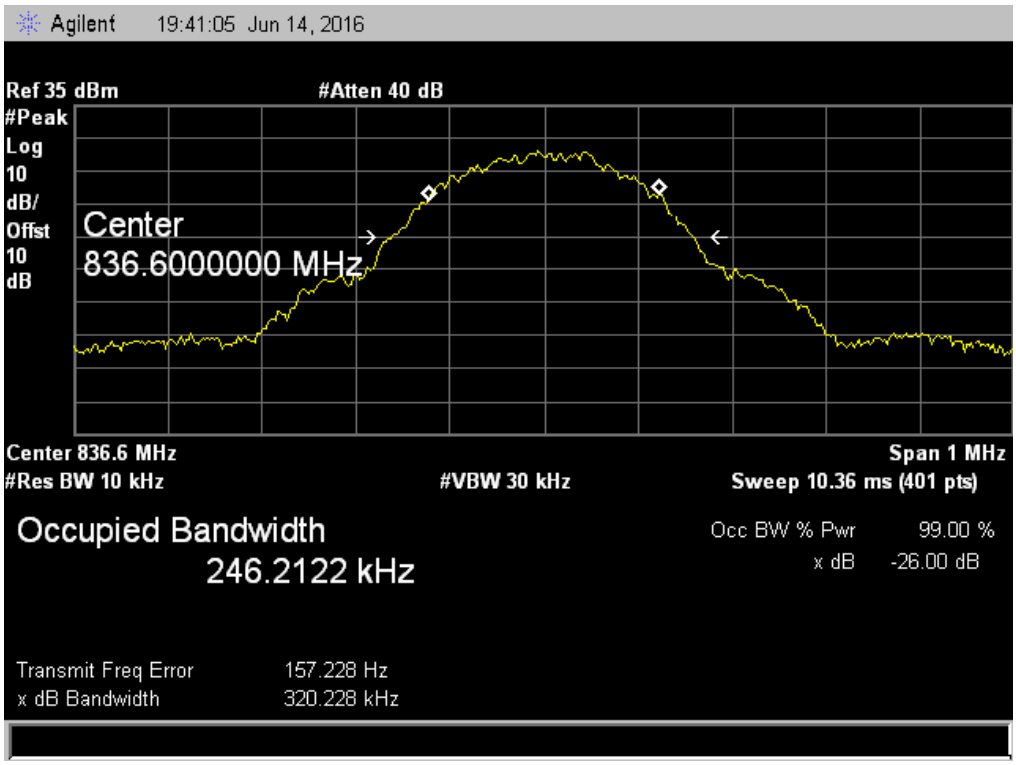
GSM 850				
Mode	**Channel**	**Frequency (MHz)**	**99% OBW (KHz)**	**-26dB Bandwidth (kHz)**
GSM 850	128	824.2	243.5846	315.394
	190	836.6	246.2122	320.228
	251	848.8	248.3301	317.934
GPRS 850 (1 Slot)	128	824.2	248.2198	320.196
	190	836.6	242.0534	315.364
	251	848.8	246.3215	317.573
EDGE 850 (1 Slot)	128	824.2	243.5846	315.394
	190	836.6	249.7256	322.329
	251	848.8	241.9258	319.160

PCS 1900				
Mode	**Channel**	**Frequency (MHz)**	**99% OBW (KHz)**	**-26dB Bandwidth (kHz)**
GSM 1900	512	1850.2	239.4147	308.899
	661	1880.0	241.9741	317.744
	810	1909.8	245.3190	319.700
GPRS 1900 (1 Slot)	512	1850.2	241.1472	312.180
	661	1880.0	245.5805	325.049
	810	1909.8	243.7115	319.906
EDGE 1900 (1 Slot)	512	1850.2	245.5392	317.025
	661	1880.0	246.7041	319.324
	810	1909.8	243.2940	319.036

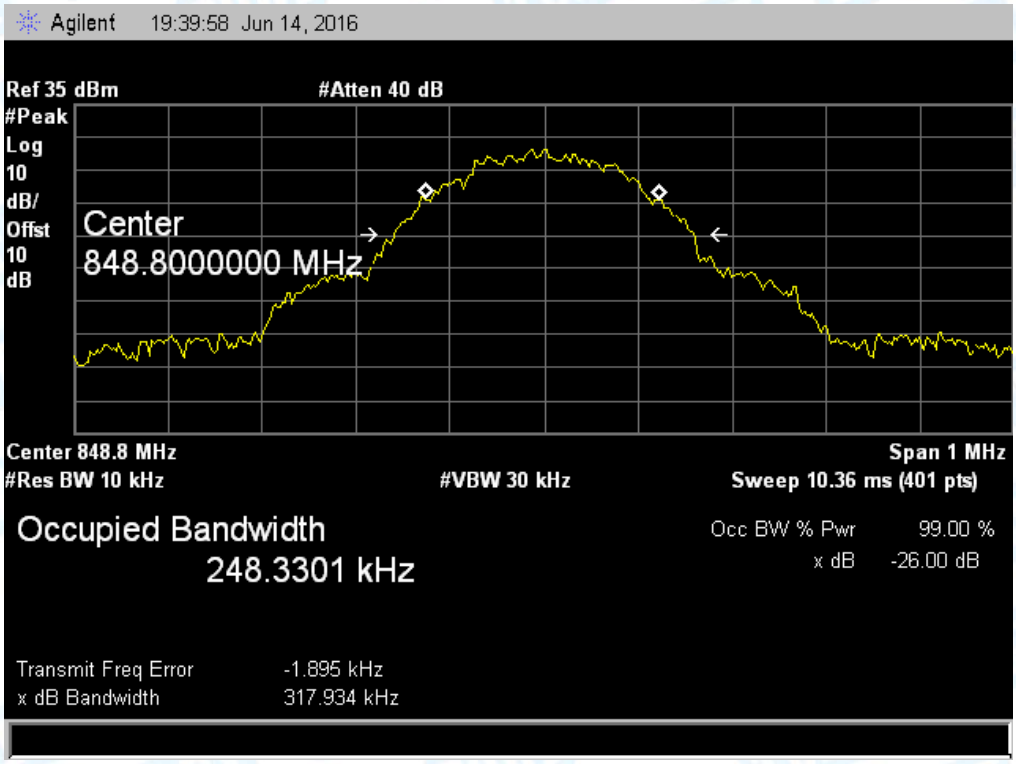
GSM850
CH 128



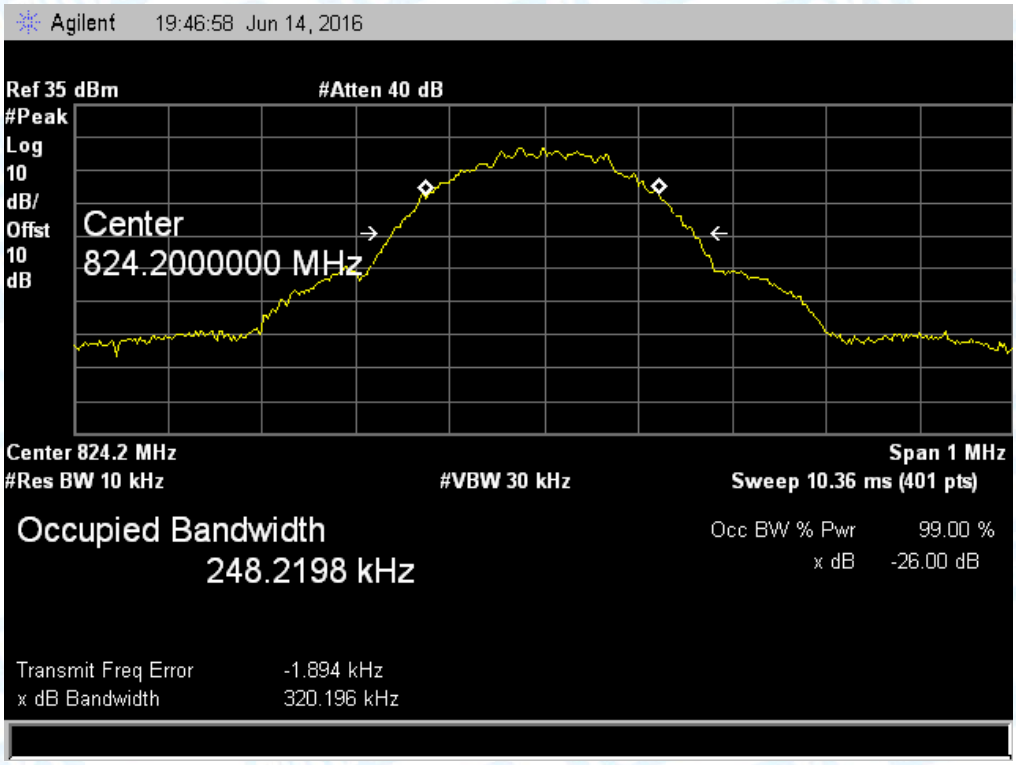
CH 190



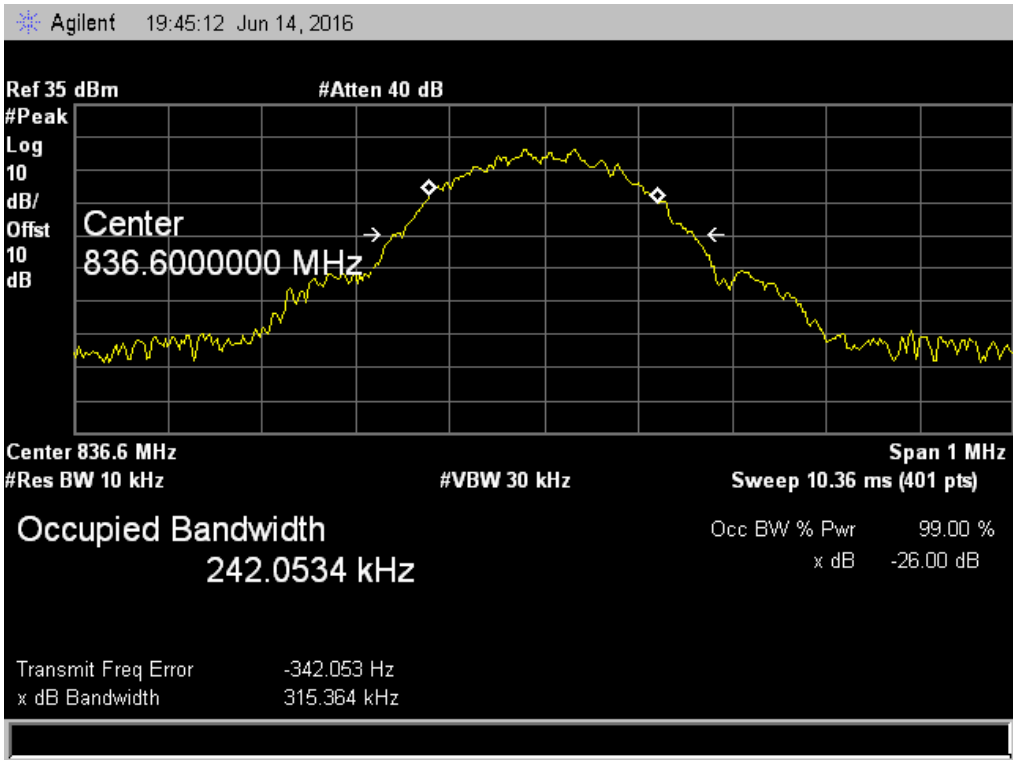
CH 251


Agilent 19:39:58 Jun 14, 2016
Ref 35 dBm
#Atten 40 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
848.8000000 MHz
Center 848.8 MHz
Span 1 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 10.36 ms (401 pts)
Occupied Bandwidth
248.3301 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -1.895 kHz
x dB Bandwidth 317.934 kHz

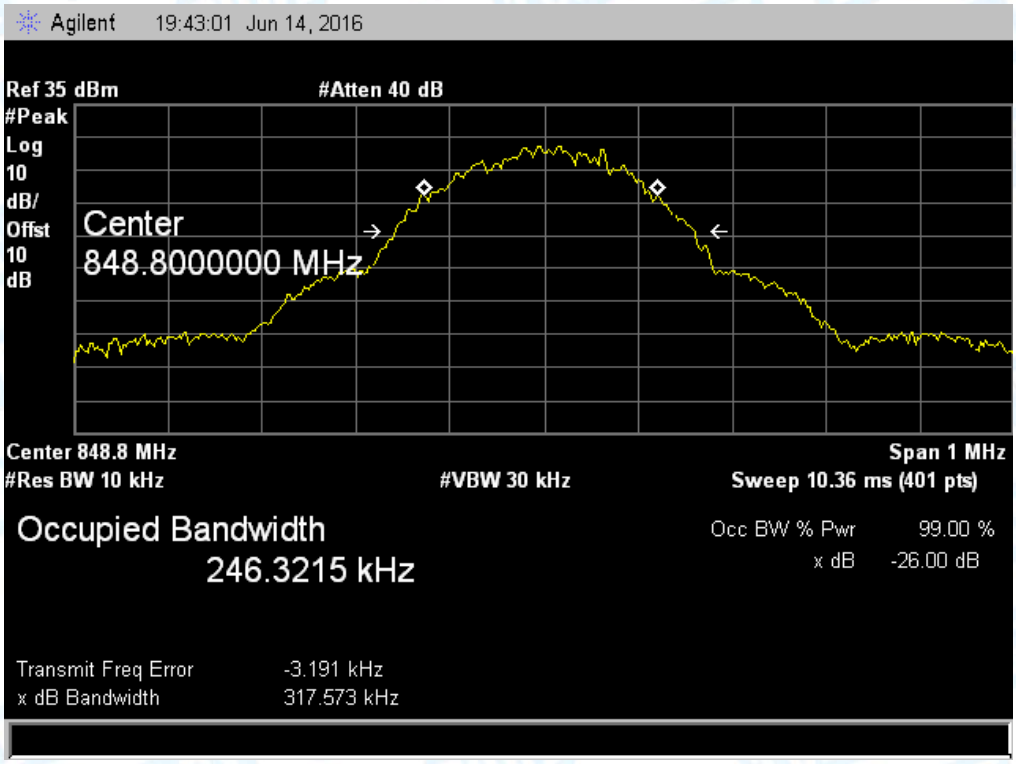
GPRS 850
CH 128



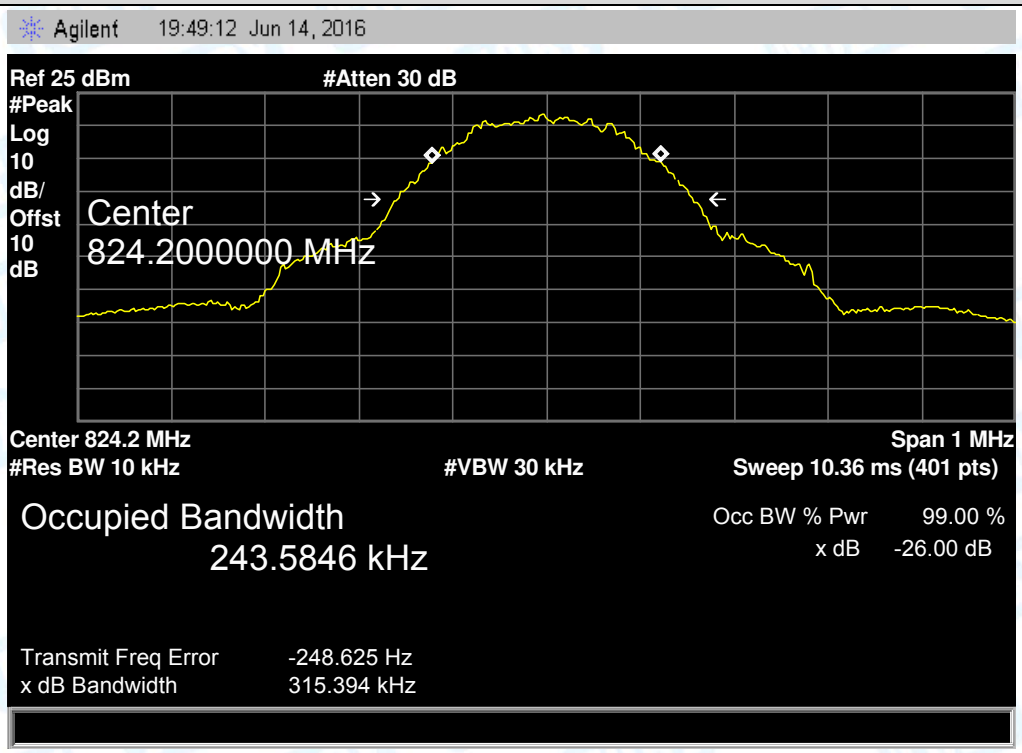
CH 190



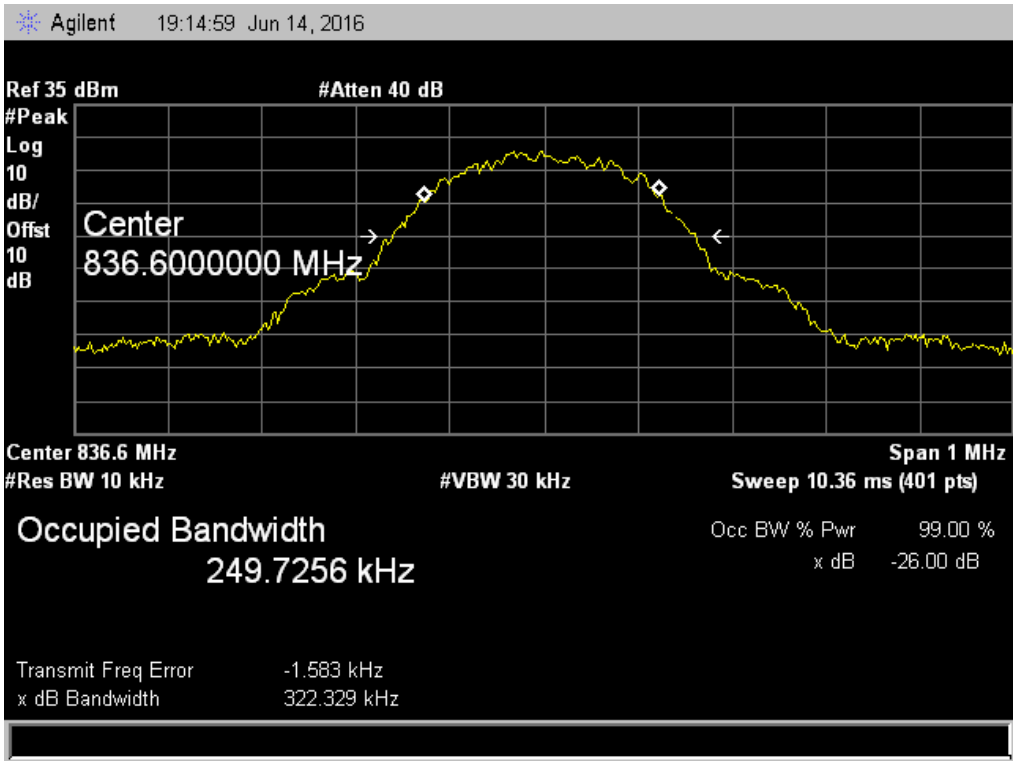
CH 251


Agilent 19:43:01 Jun 14, 2016
Ref 35 dBm
#Atten 40 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
848.8000000 MHz
Center 848.8 MHz
Span 1 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 10.36 ms (401 pts)
Occupied Bandwidth
246.3215 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -3.191 kHz
x dB Bandwidth 317.573 kHz

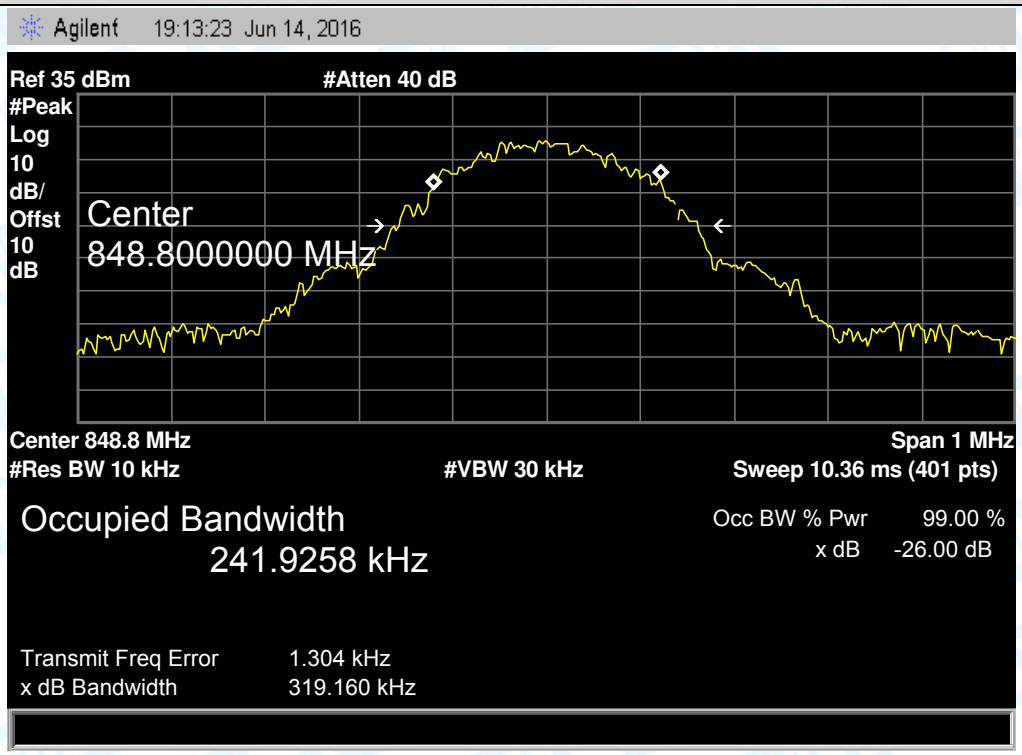
EDGE 850
CH 128



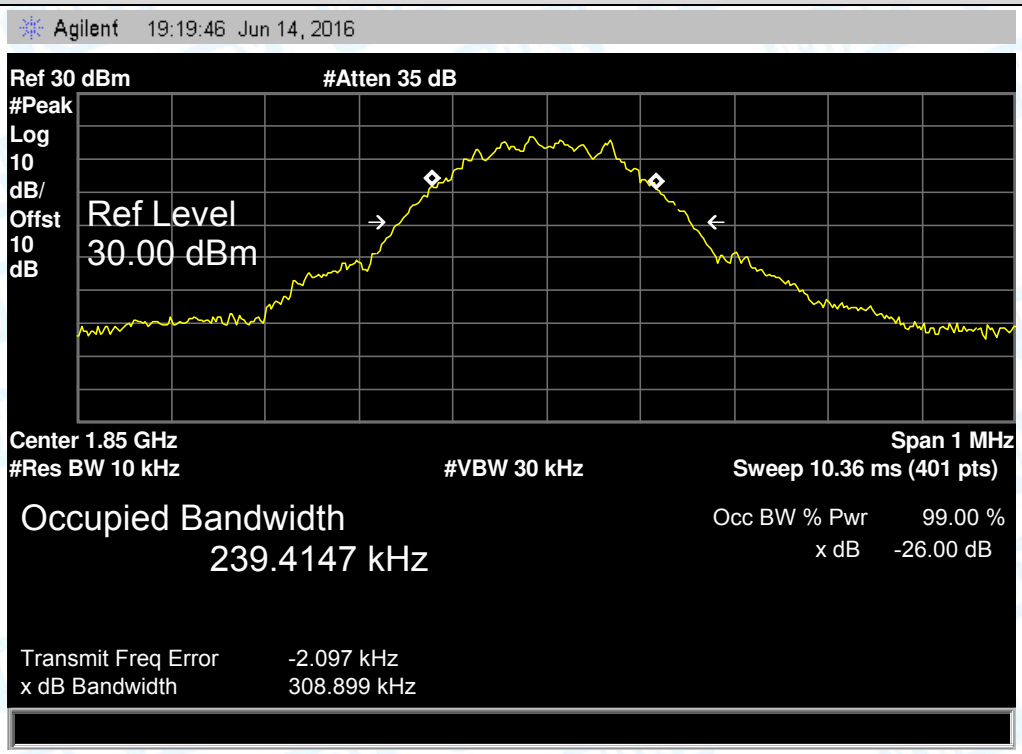
CH 190



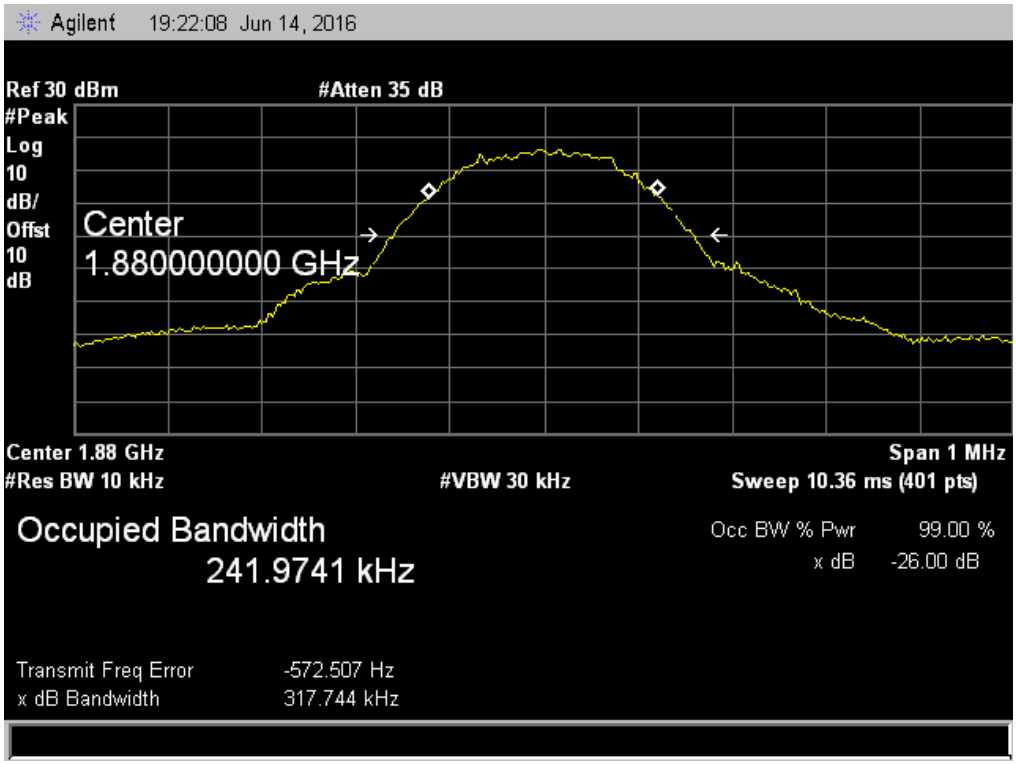
CH 251


Agilent 19:13:23 Jun 14, 2016
Ref 35 dBm
#Atten 40 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
848.8000000 MHz
Center 848.8 MHz
Span 1 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 10.36 ms (401 pts)
Occupied Bandwidth
241.9258 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 1.304 kHz
x dB Bandwidth 319.160 kHz

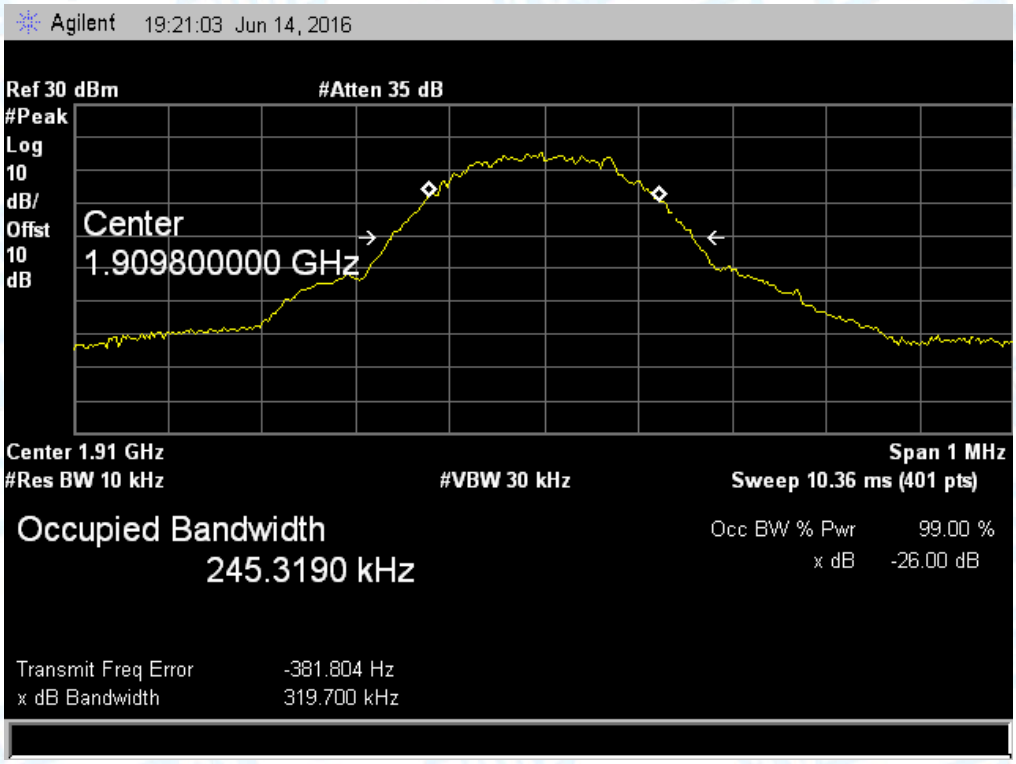
PCS 1900
CH 512



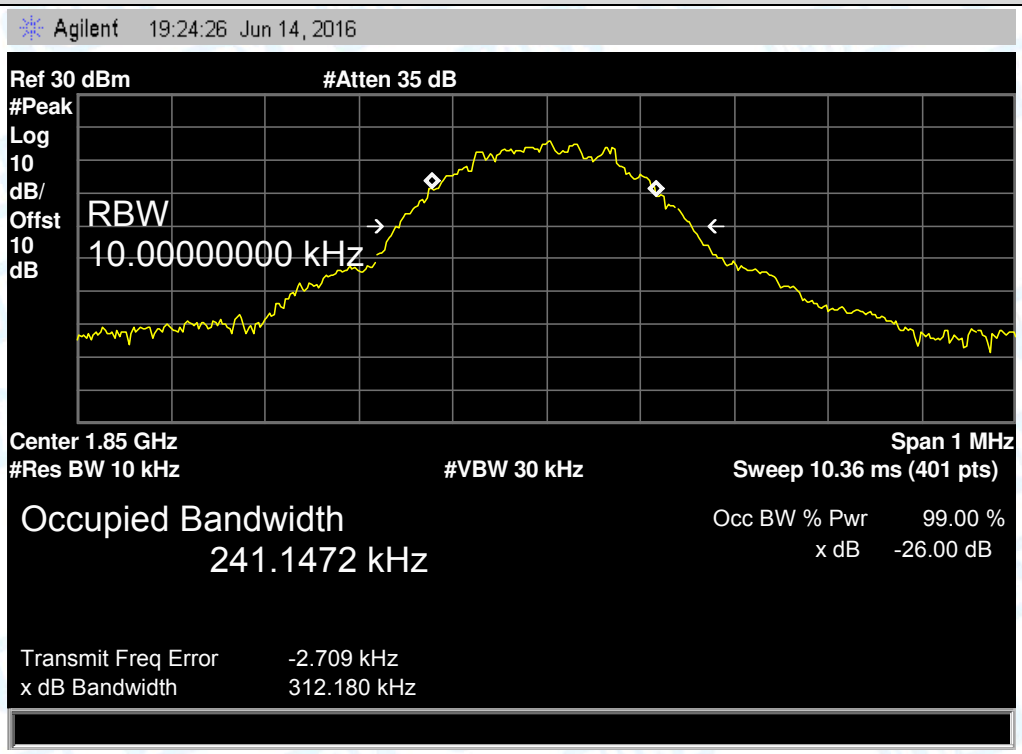
CH 661



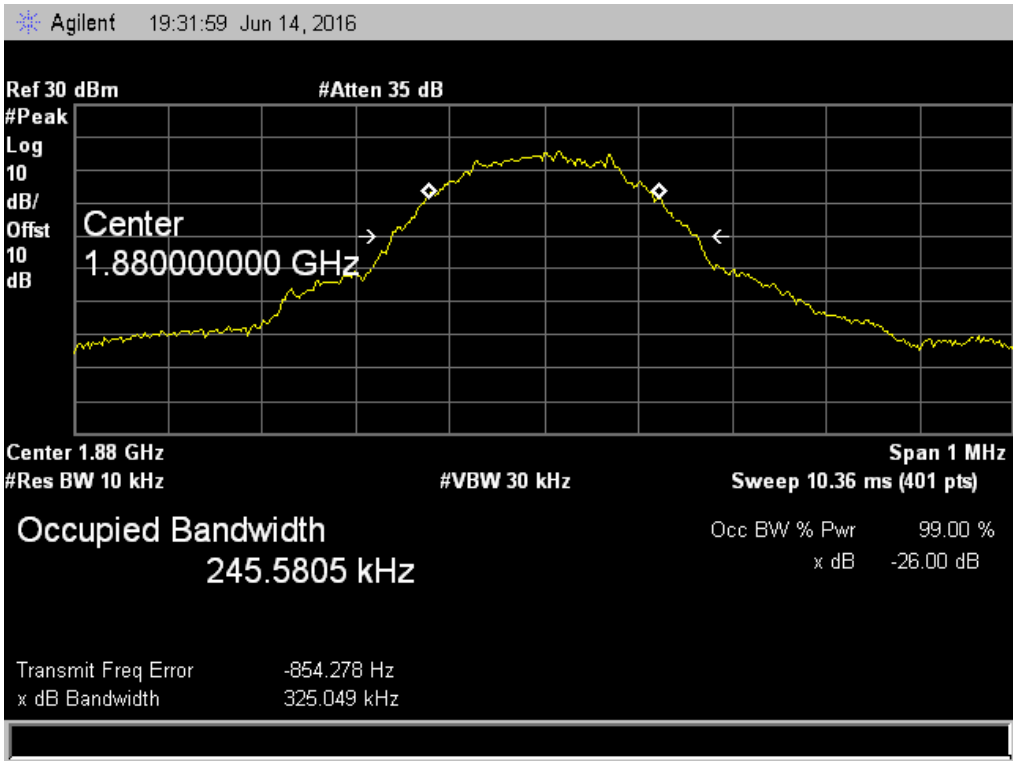
CH 810


Agilent 19:21:03 Jun 14, 2016
Ref 30 dBm
#Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
1.909800000 GHz
Center 1.91 GHz
Span 1 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 10.36 ms (401 pts)
Occupied Bandwidth
245.3190 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -381.804 Hz
x dB Bandwidth 319.700 kHz

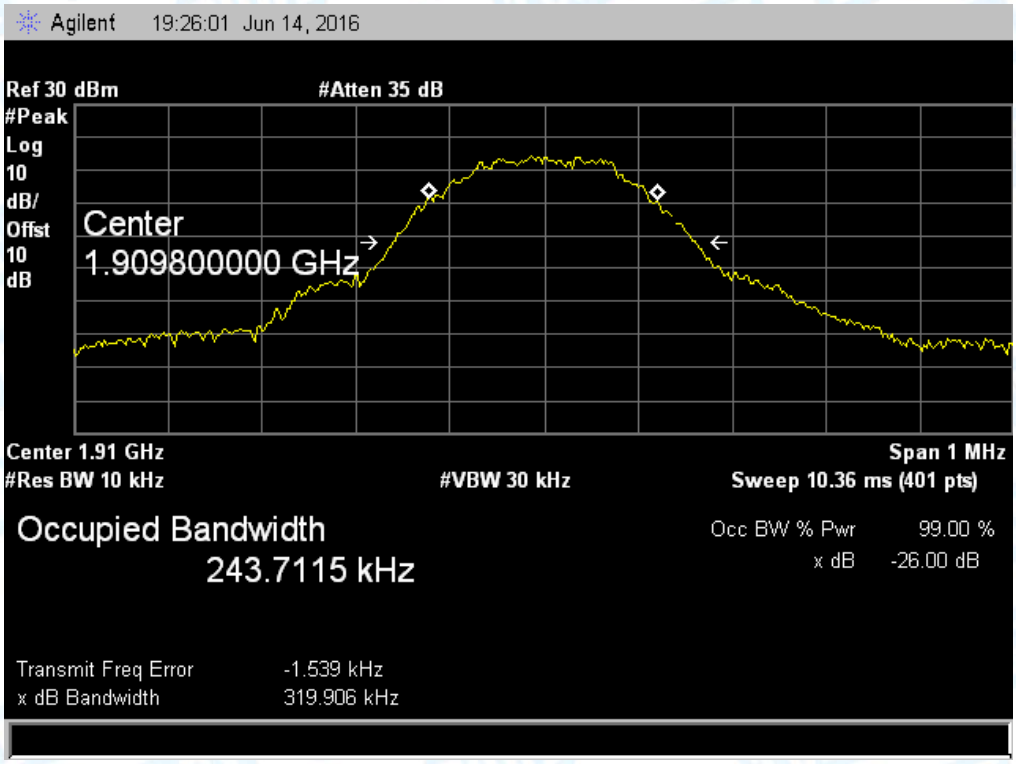
GPRS 1900
CH 512



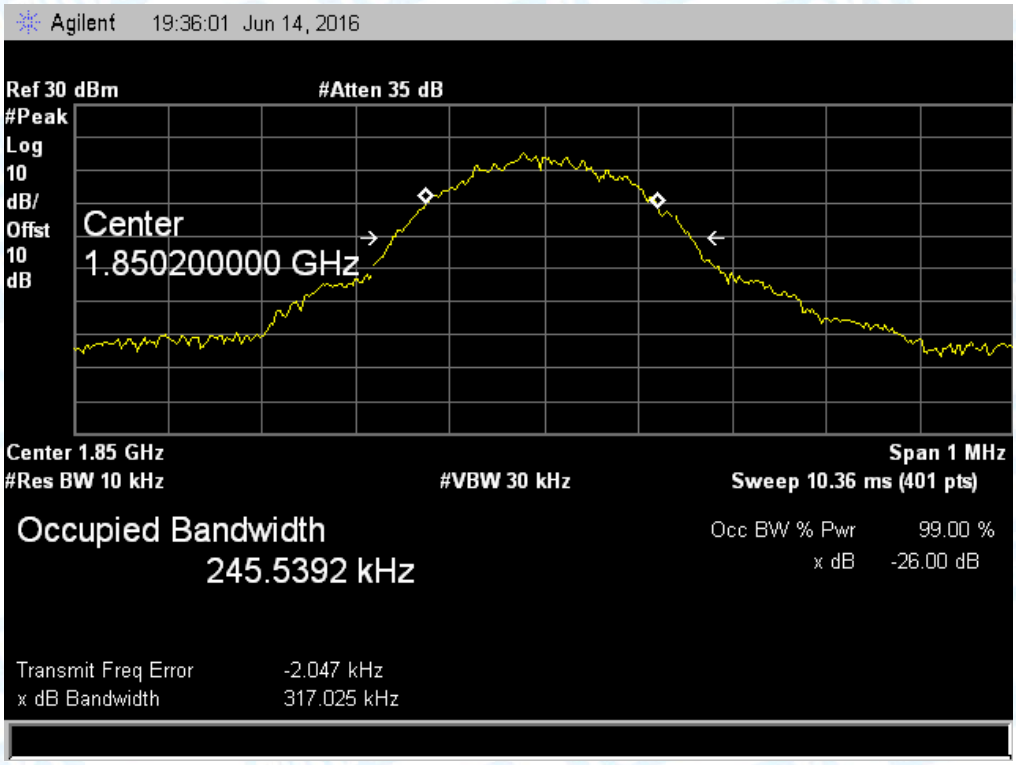
CH 661



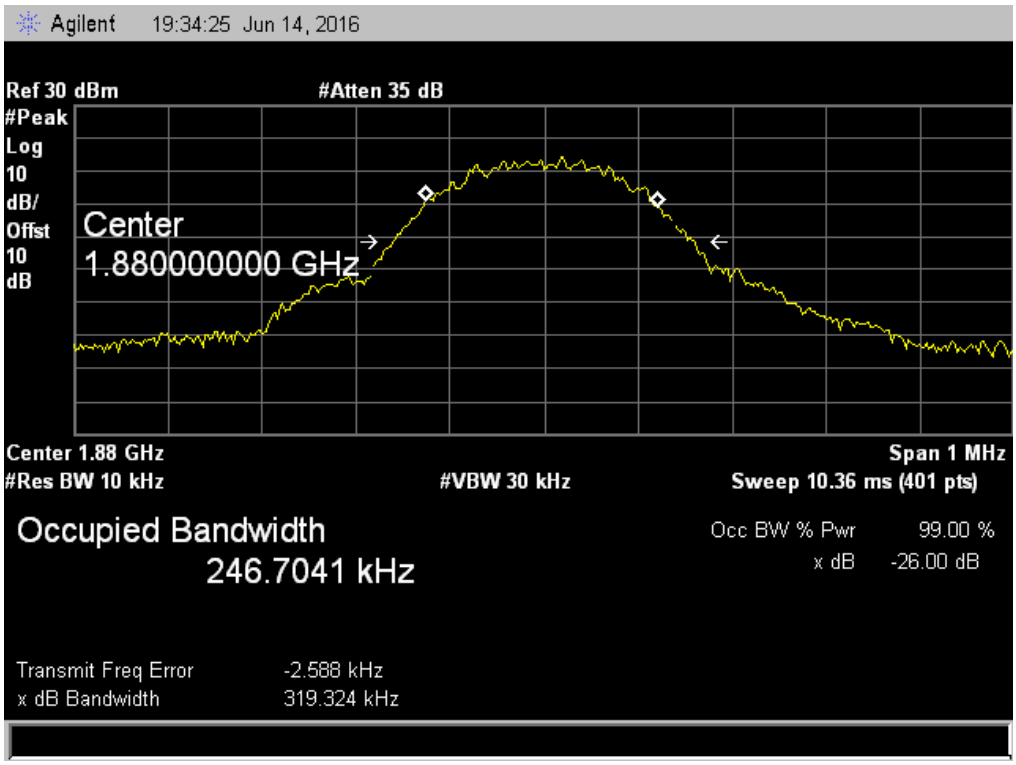
CH 810


Agilent 19:26:01 Jun 14, 2016
Ref 30 dBm
#Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
1.909800000 GHz
Center 1.91 GHz
Span 1 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 10.36 ms (401 pts)
Occupied Bandwidth
243.7115 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -1.539 kHz
x dB Bandwidth 319.906 kHz

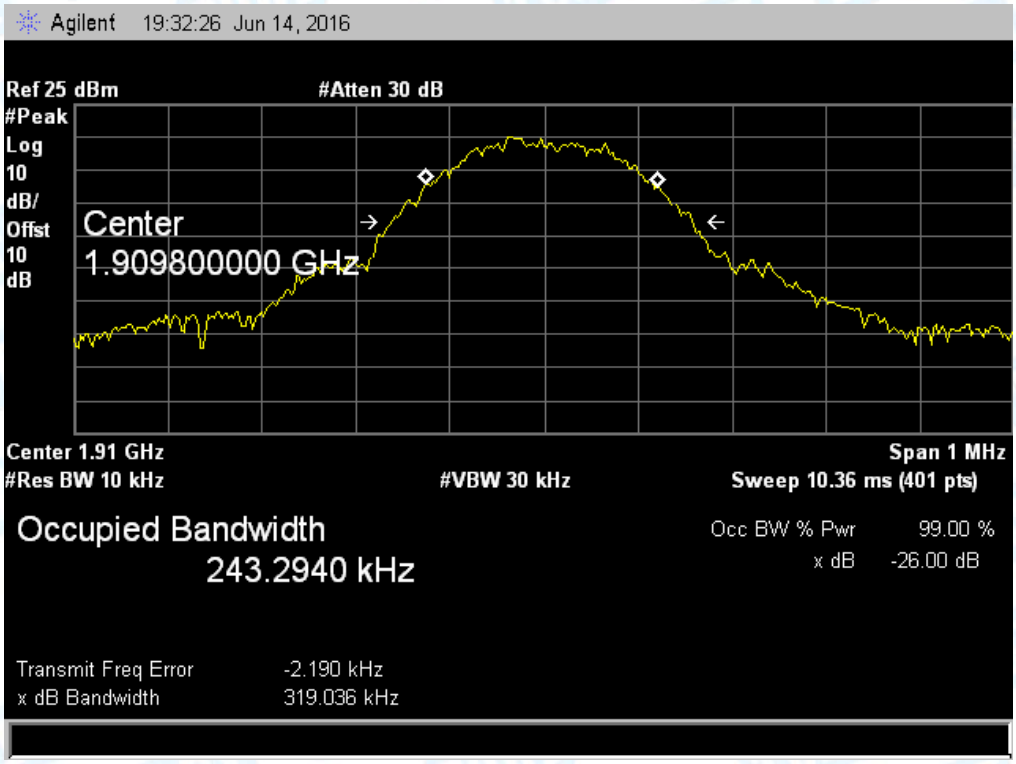
EDGE 1900
CH 512



CH 661



CH 810


Agilent 19:32:26 Jun 14, 2016
Ref 25 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
1.909800000 GHz
Center 1.91 GHz
Span 1 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 10.36 ms (401 pts)
Occupied Bandwidth
243.2940 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -2.190 kHz
x dB Bandwidth 319.036 kHz

9. Conducted Out of Band Emissions

9.1 Test Standard and Limit

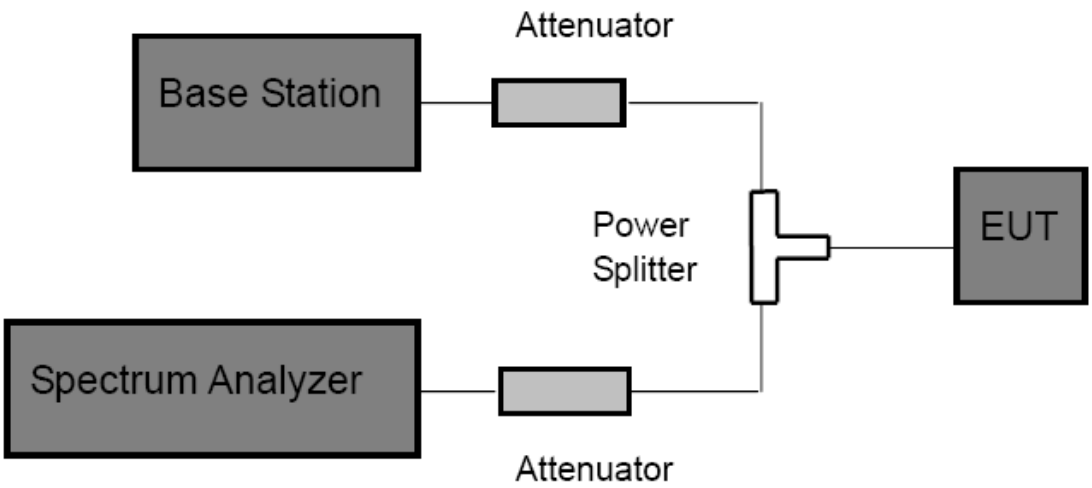
9.1.1 Test Standard

FCC Part 2: 2.1051, 2.1057
FCC Part 22H: 22.917(a)
FCC Part 24E: 24.238(a)

9.1.2 Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power(P) by a factor of at least 43+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

9.2 Test Setup



9.3 Test Procedure

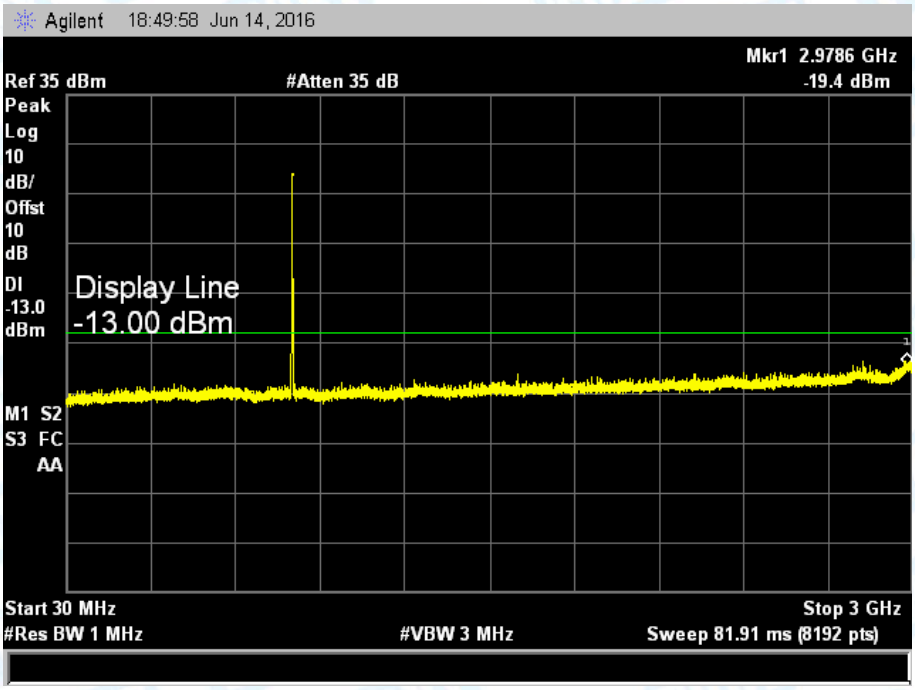
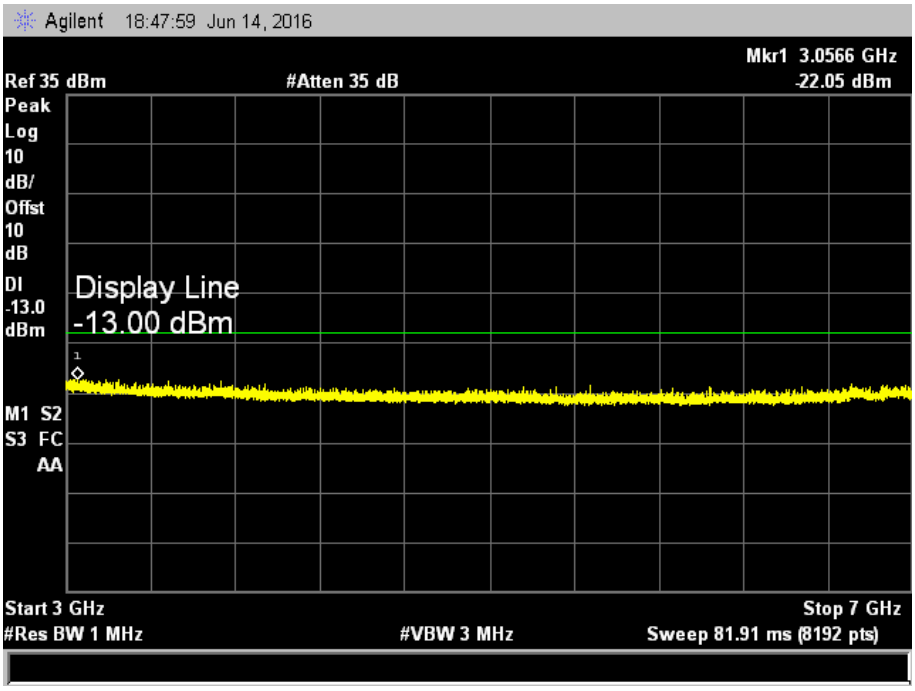
(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
(2) Spectrum Setting:
Frequency bellow 1 GHz: RBW=100 kHz, VBW=300 kHz.
Frequency above 1 GHz: RBW=1 MHz, VBW=3 MHz.
(3) The low, middle and high channels of each band and mode's spurious emissions for 30 MHz to 10th Harmonic were measured by Spectrum analyzer.

9.4 EUT Operating Condition

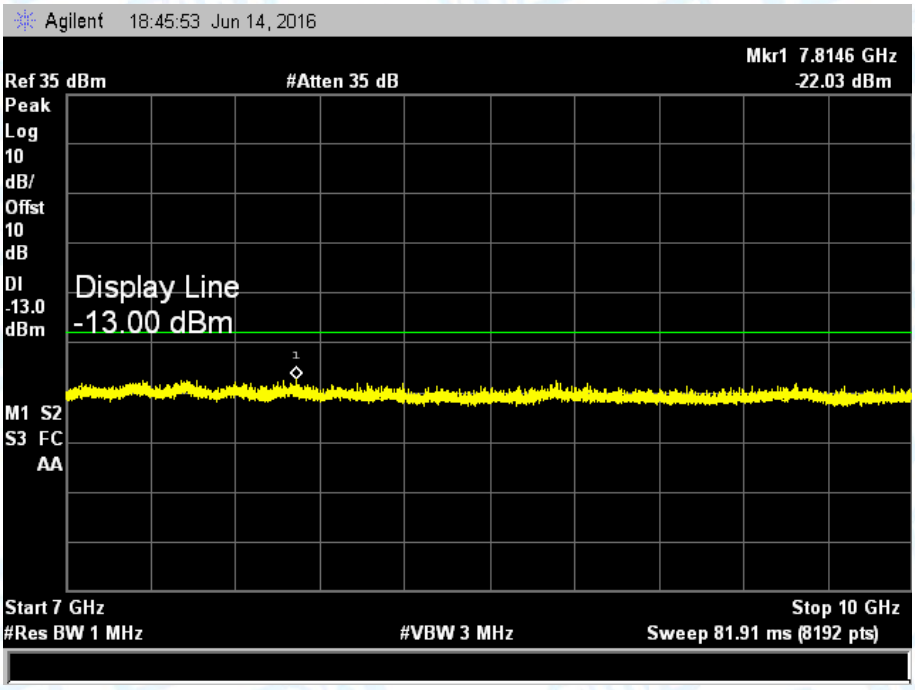
The EUT was continuously connected with the Base station and transmitting in the max power during the test.

9.5 Test Data

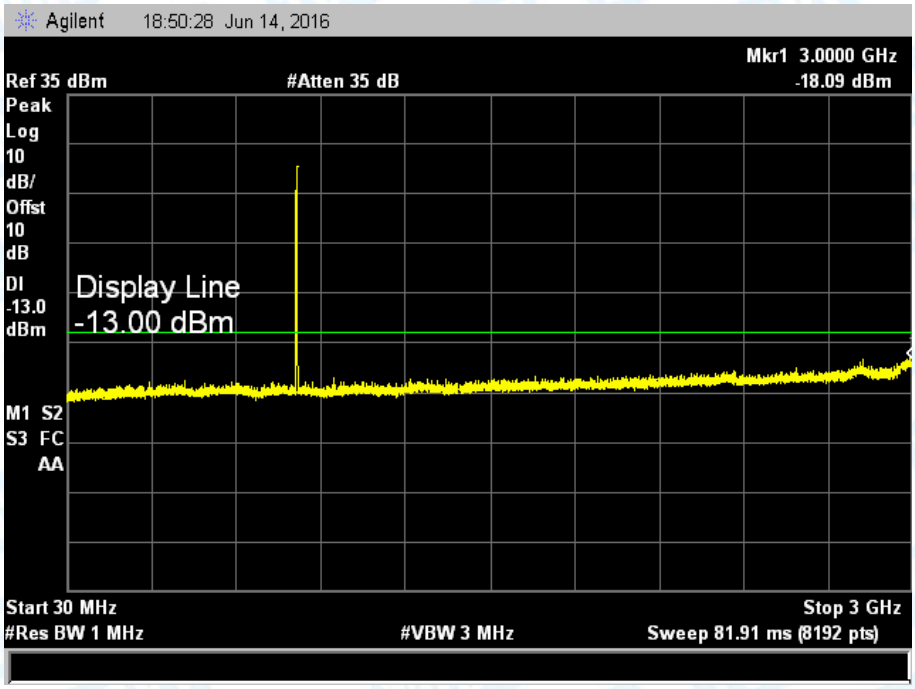
Please refer following plots:

GSM850 CH 128
30 MHz~ 3 GHz

3 GHz~7 GHz


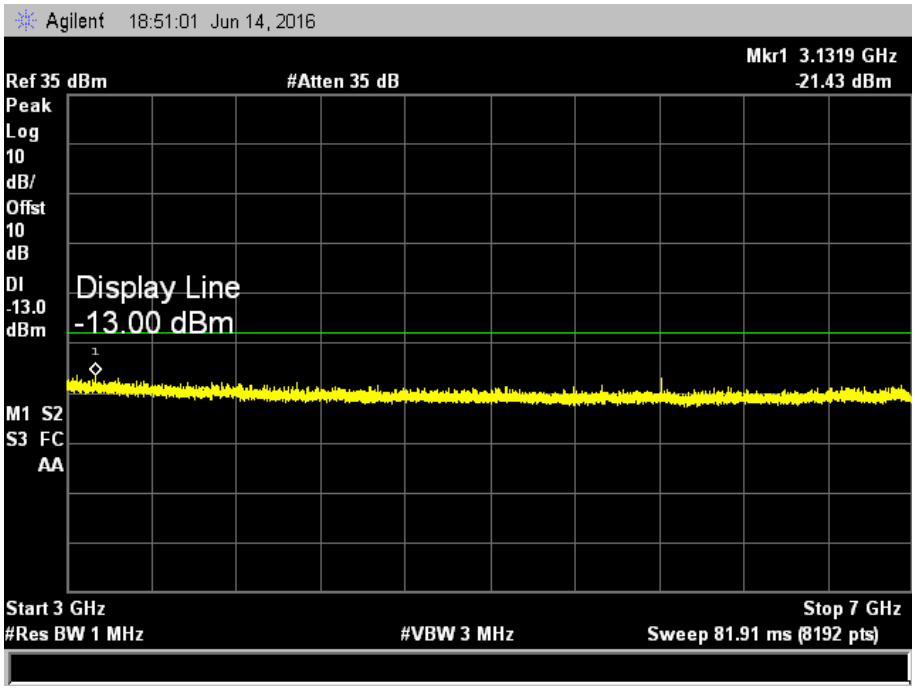
7 GHz~10 GHz


Agilent 18:45:53 Jun 14, 2016
Mkr1 7.8146 GHz
Ref 35 dBm
#Atten 35 dB
-22.03 dBm
Peak
Log
10
dB/
Offst
10
dB
DI
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 7 GHz
Stop 10 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

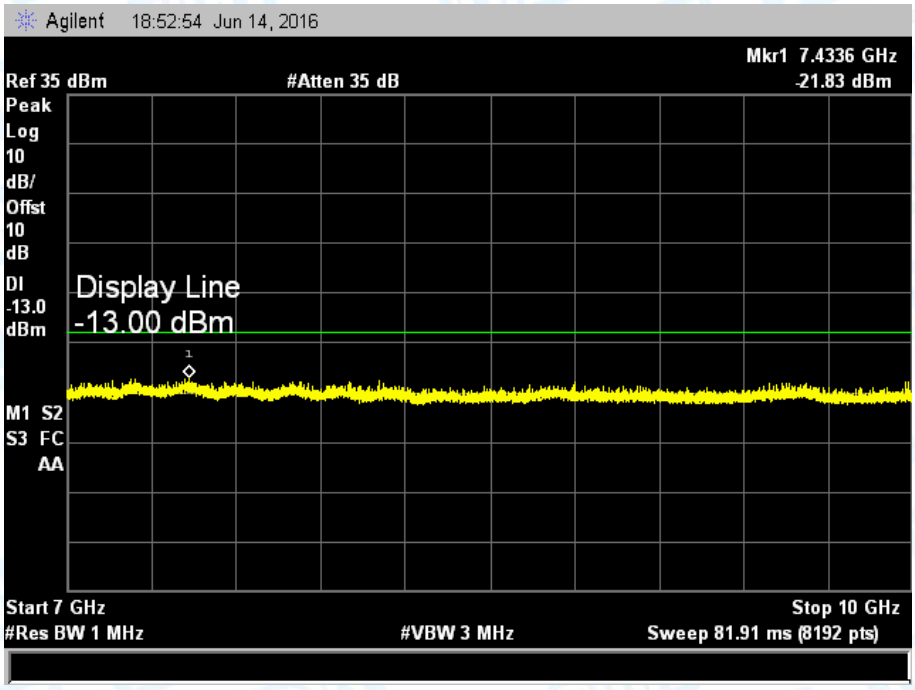
GSM850 CH 190
30 MHz~ 3 GHz



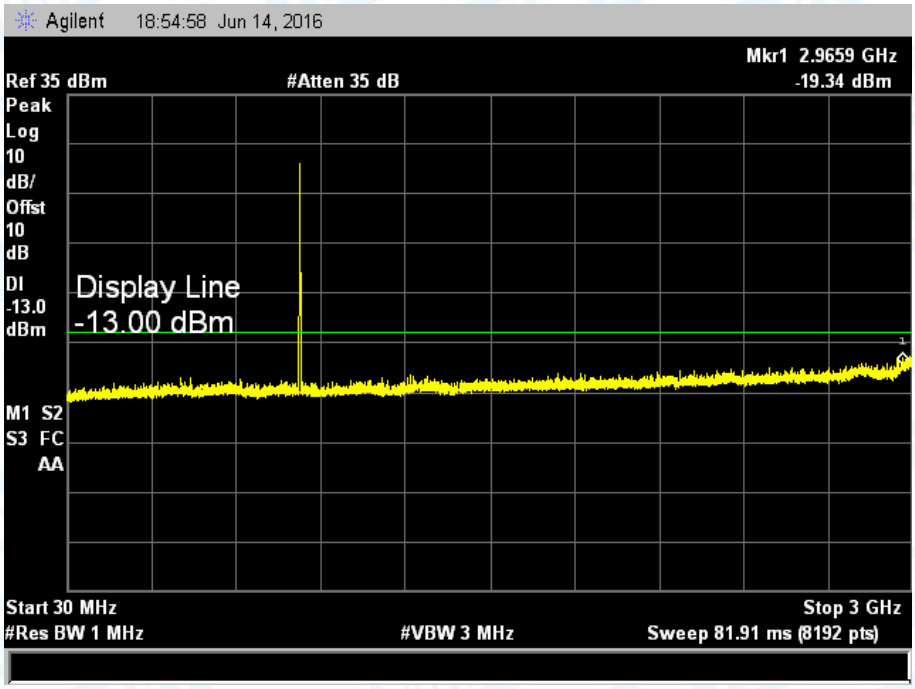
3 GHz~7 GHz



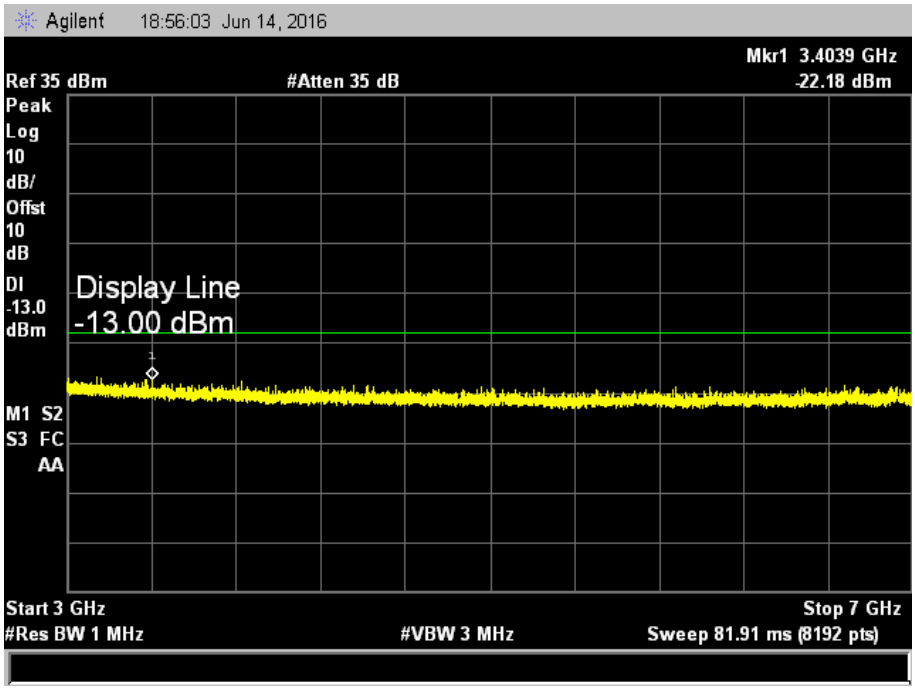
7 GHz~10 GHz


Agilent 18:52:54 Jun 14, 2016
Mkr1 7.4336 GHz
Ref 35 dBm
#Atten 35 dB
-21.83 dBm
Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 7 GHz
Stop 10 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

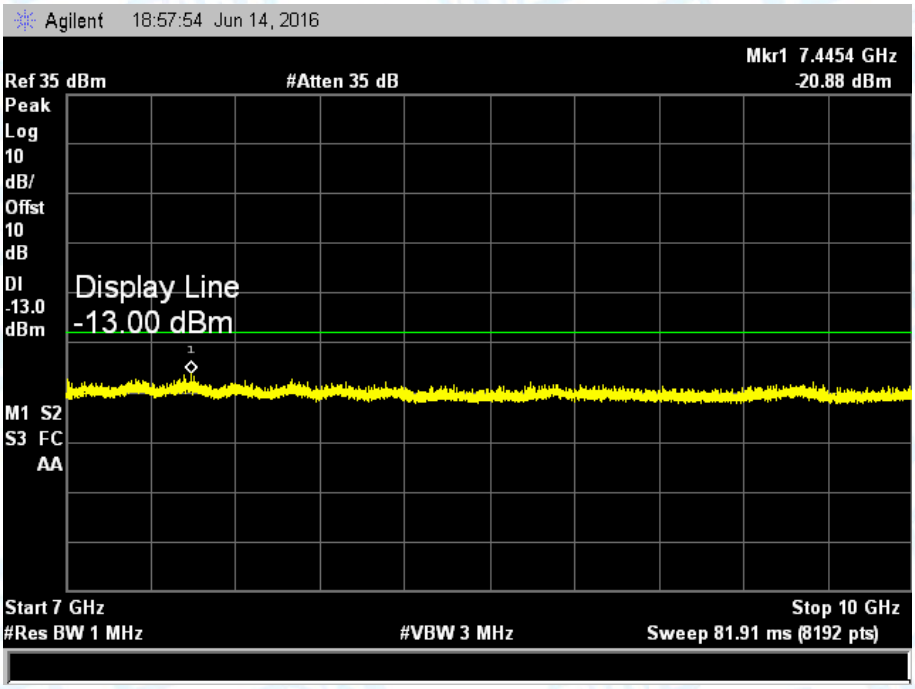
GSM850 CH 251
30 MHz~ 3 GHz



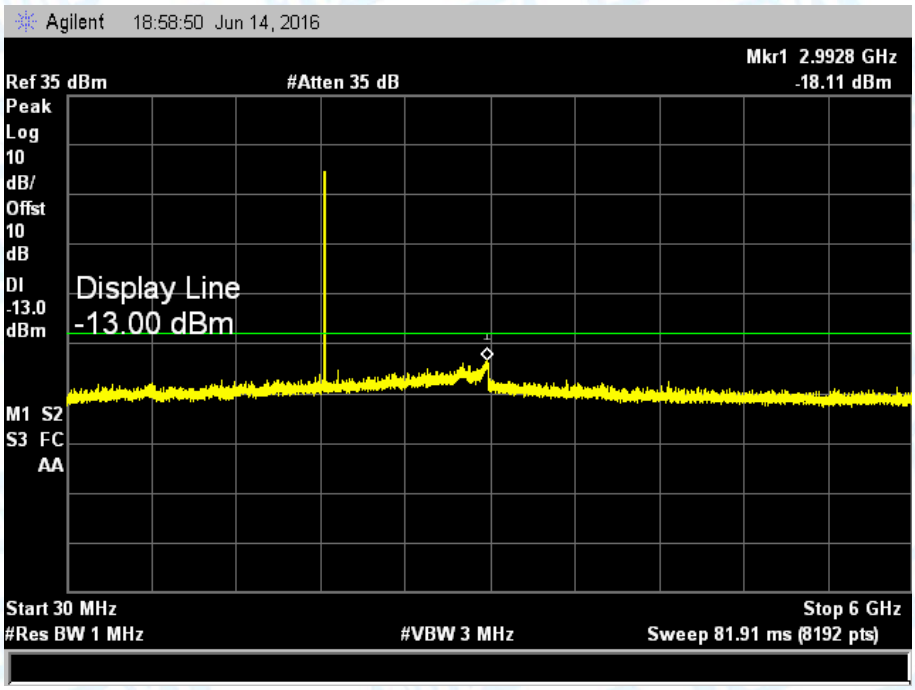
3 GHz~7 GHz



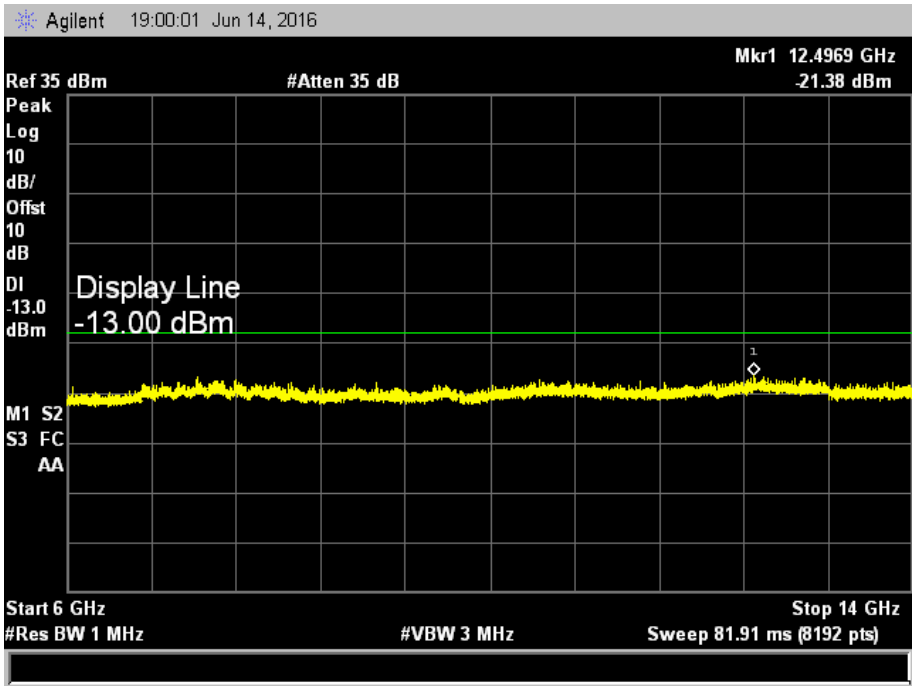
7 GHz~10 GHz


Agilent 18:57:54 Jun 14, 2016
Mkr1 7.4454 GHz
-20.88 dBm
Ref 35 dBm
#Atten 35 dB
Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 7 GHz
Stop 10 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

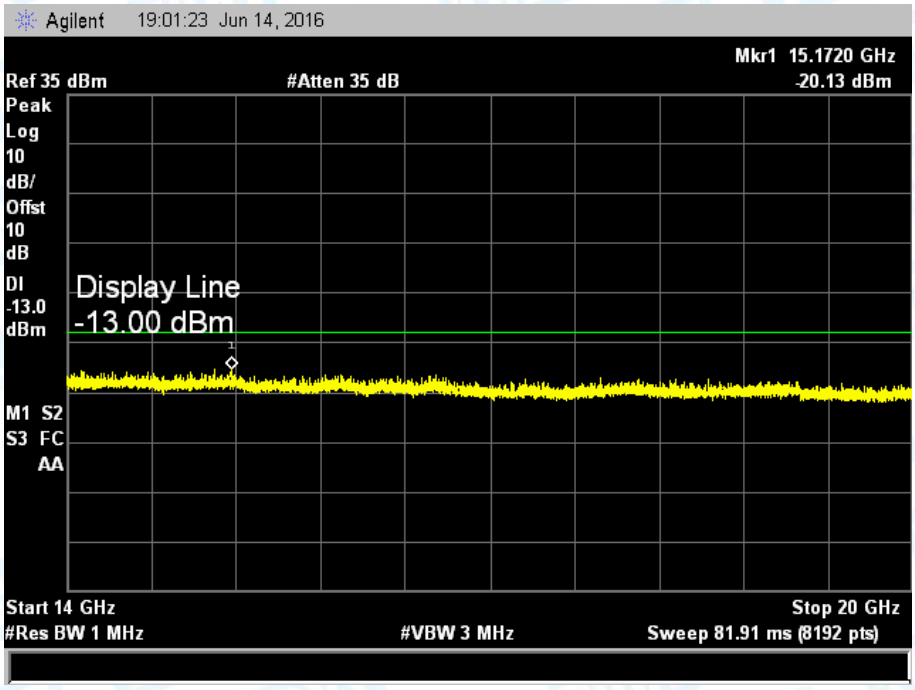
PCS 1900 CH 512
30 MHz~ 6 GHz



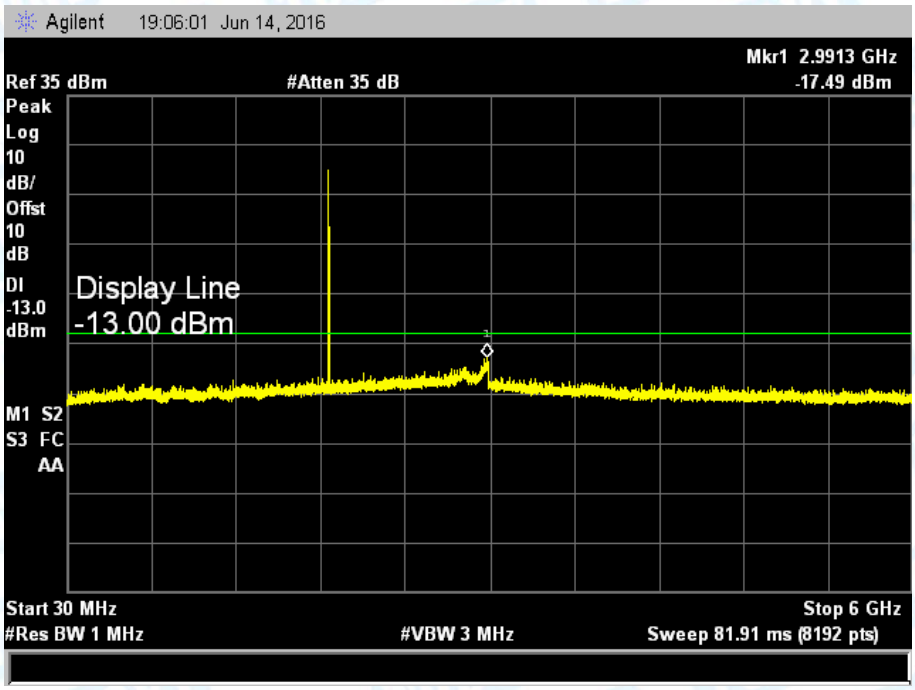
6 GHz~14 GHz



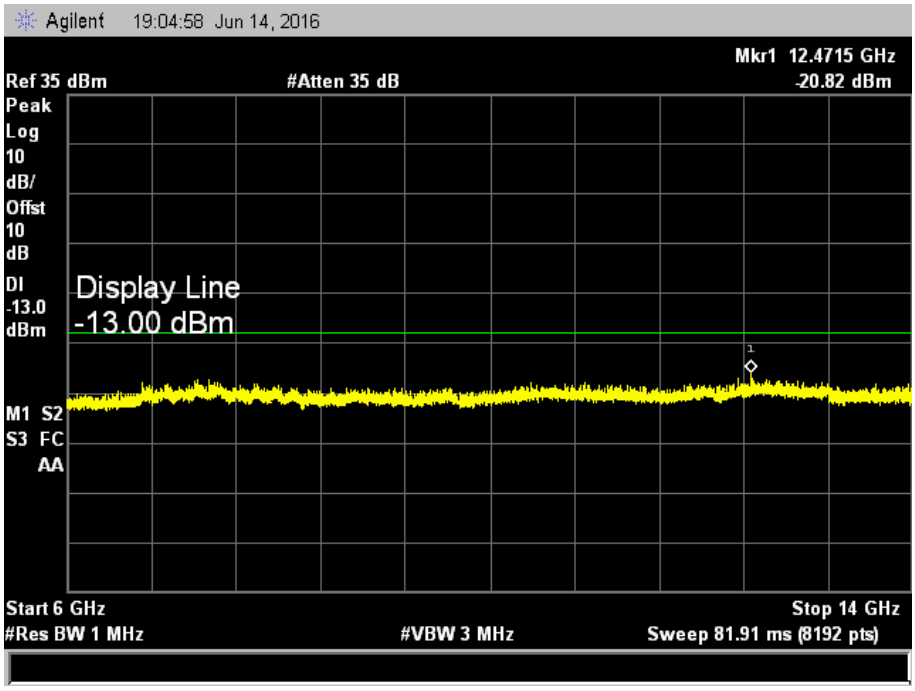
14 GHz~20 GHz


Agilent 19:01:23 Jun 14, 2016
Mkr1 15.1720 GHz
-20.13 dBm
Ref 35 dBm
#Atten 35 dB
Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 14 GHz
Stop 20 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

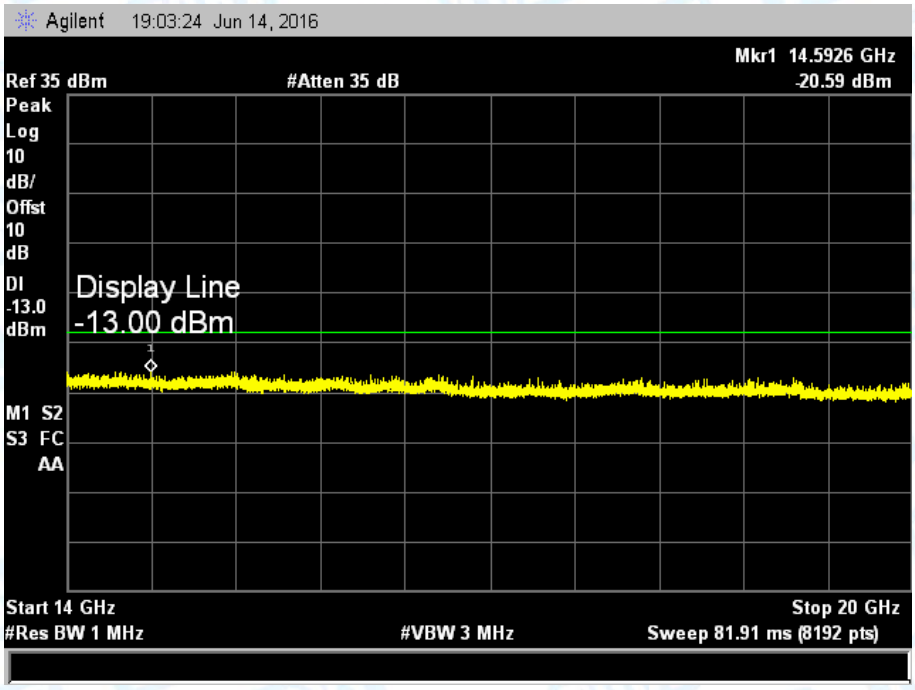
PCS 1900 CH 661
30 MHz~ 6 GHz



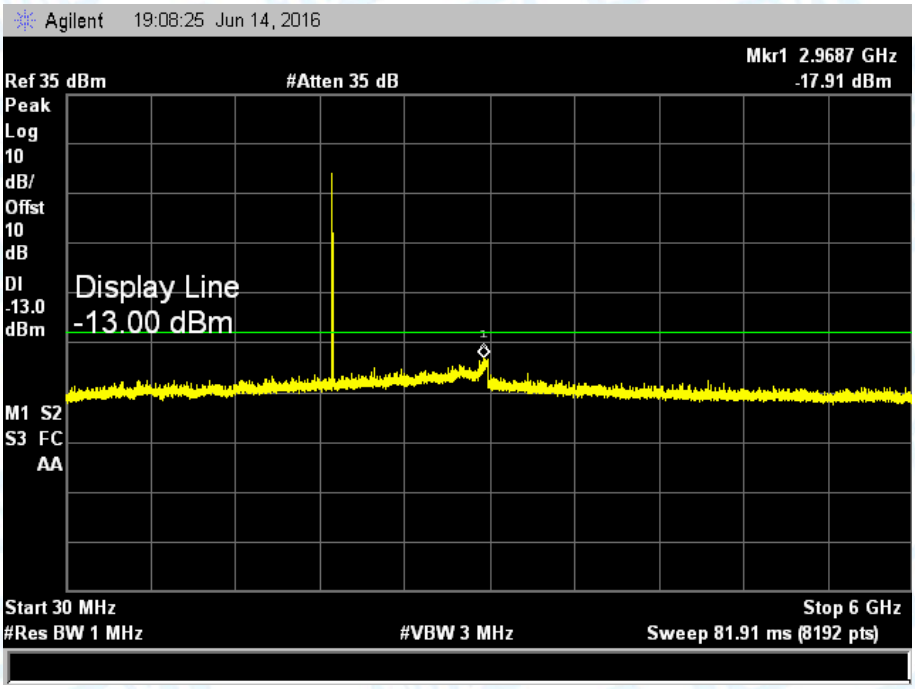
6 GHz~14 GHz



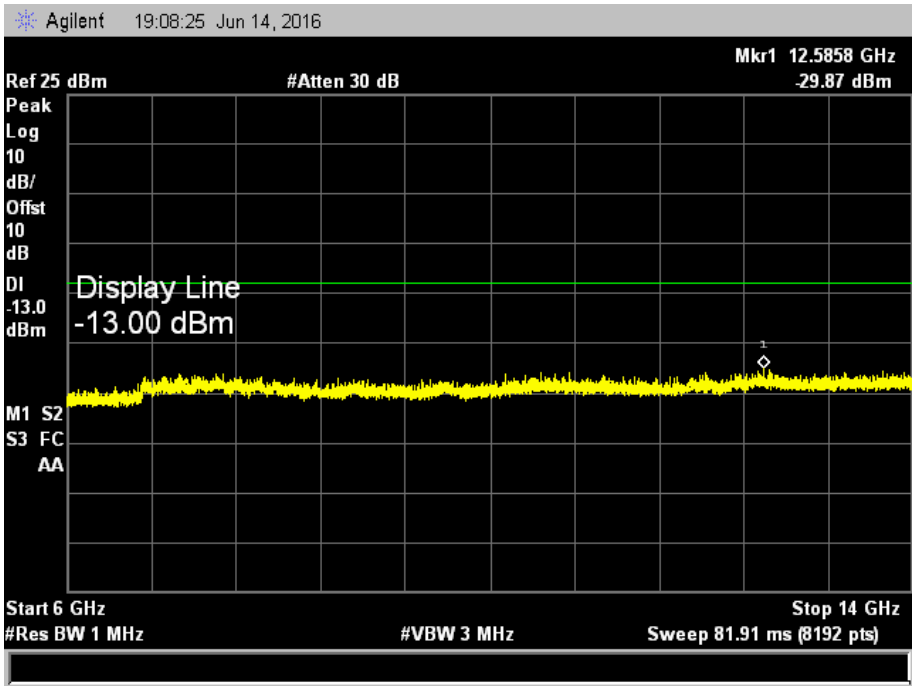
14 GHz~20 GHz


Agilent 19:03:24 Jun 14, 2016
Mkr1 14.5926 GHz
-20.59 dBm
Ref 35 dBm
#Atten 35 dB
Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 14 GHz
Stop 20 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

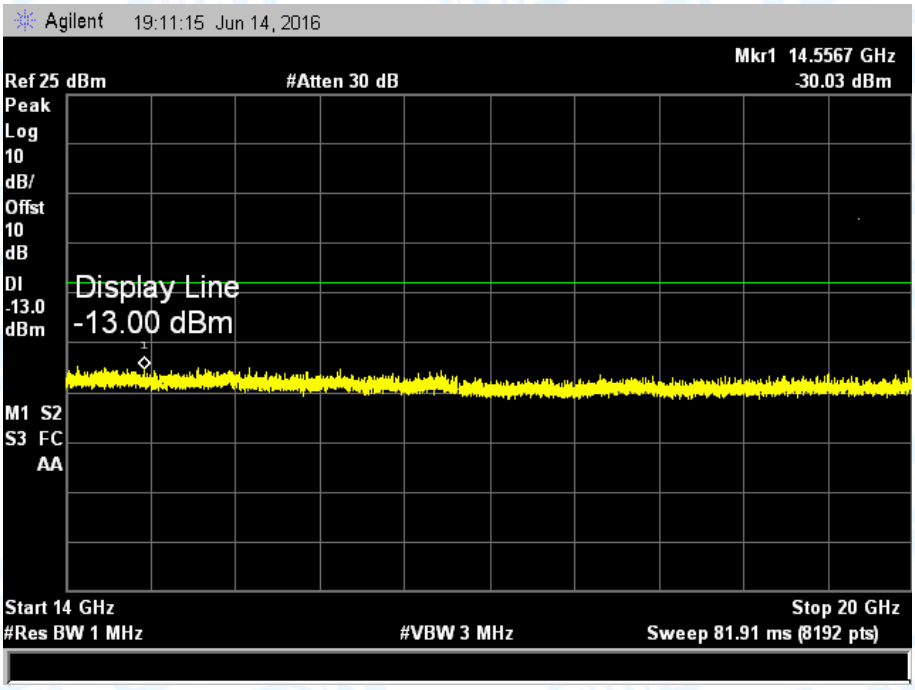
PCS 1900 CH 810
30 MHz~ 6 GHz



6 GHz~14 GHz



14 GHz~20 GHz


Agilent 19:11:15 Jun 14, 2016
Mkr1 14.5567 GHz
Ref 25 dBm
#Atten 30 dB
-30.03 dBm
Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 14 GHz
Stop 20 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

10. Band Edge Test

10.1 Test Standard and Limit

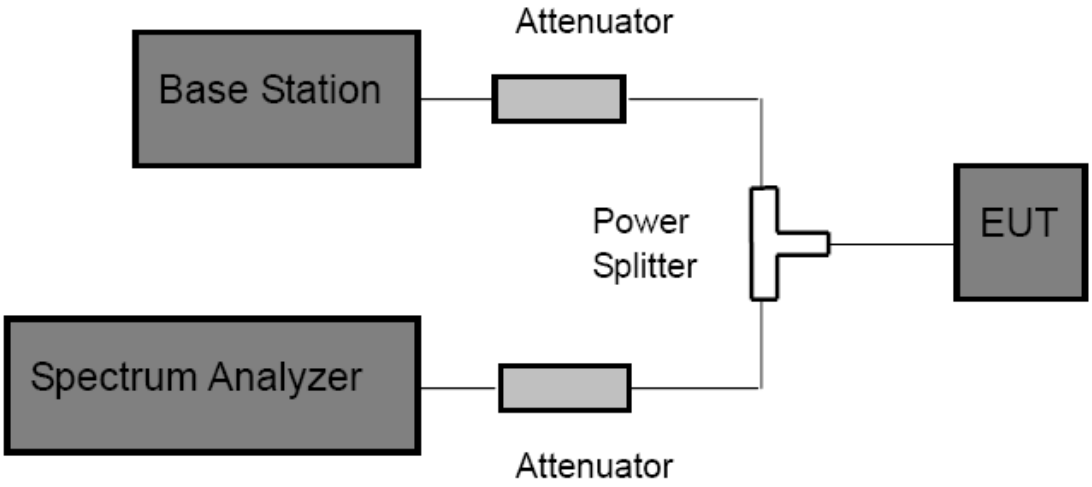
10.1.1 Test Standard

FCC Part 2: 2.1051, 2.1057
FCC Part 22H: 22.917(a)
FCC Part 24E: 24.238(a)

10.1.2 Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power(P) by a factor of at least 43+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

10.2 Test Setup



10.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
(2) Spectrum Setting:
GSM and PCS: RBW=3 kHz, VBW=10 kHz, Span 1 MHz, Detector: Peak Mode.
WCDMA: RBW=100 kHz, VBW=300 kHz, Span 5 MHz, Detector: Peak Mode.
(3) The band edges of low and high channels for the highest RF powers were measured.

10.4 EUT Operating Condition

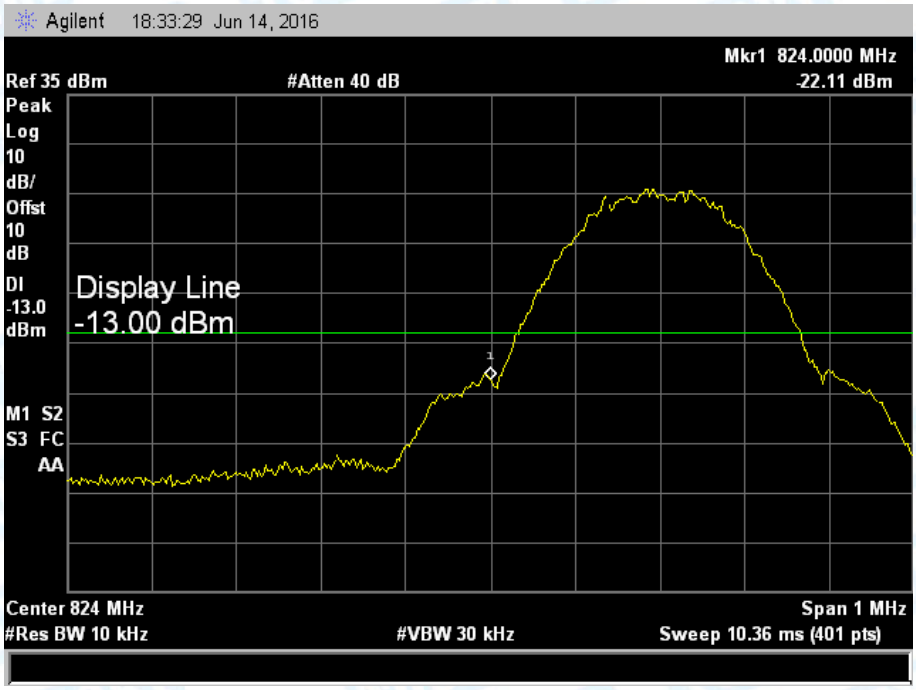
The EUT was continuously connected with the Base station and transmitting in the max power during the test.

10.5 Test Data

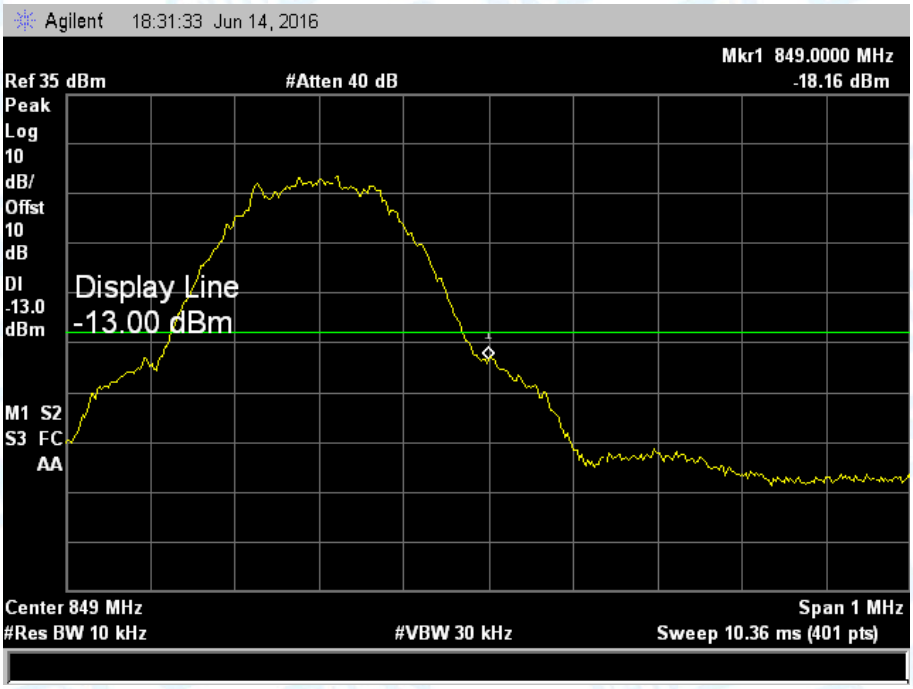
Please refer the following plots:

Band edge emission:

Test Mode:	GSM850

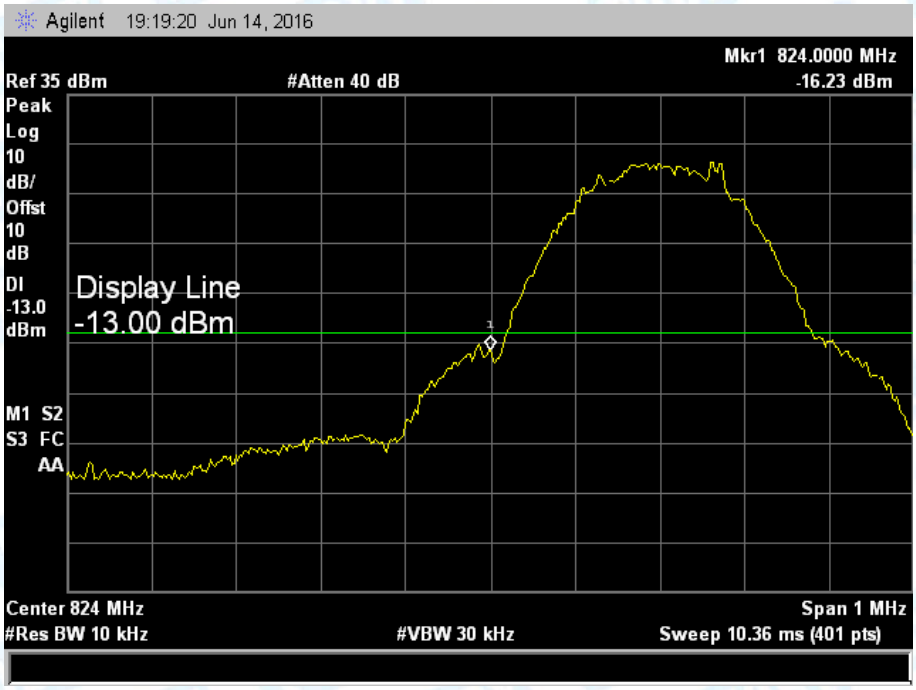


Lowest channel

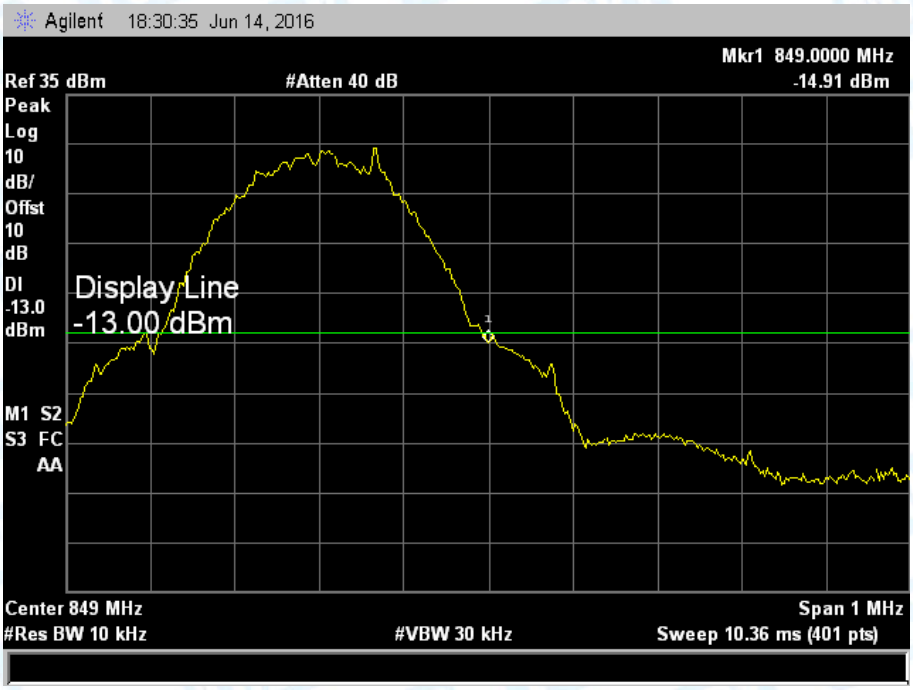


Highest channel

Test Mode:	GPRS850

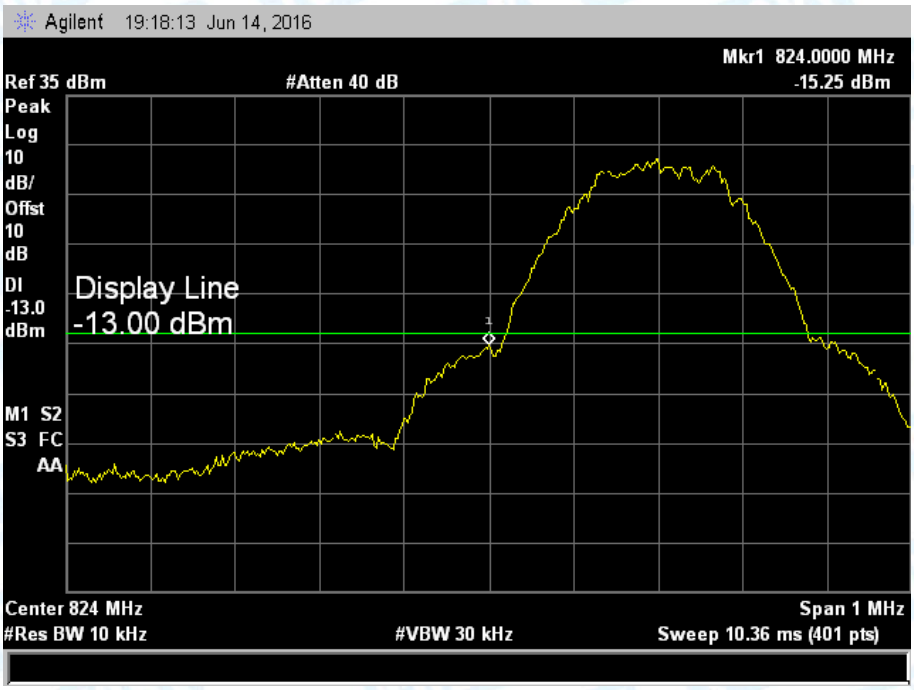


Lowest channel

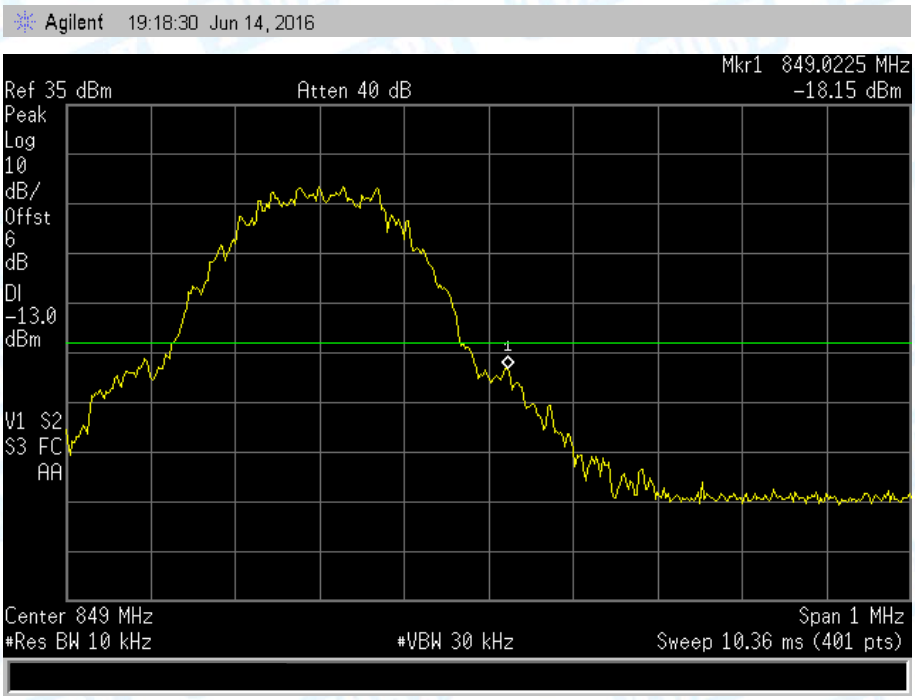


Highest channel

Test Mode:	EGPRS850

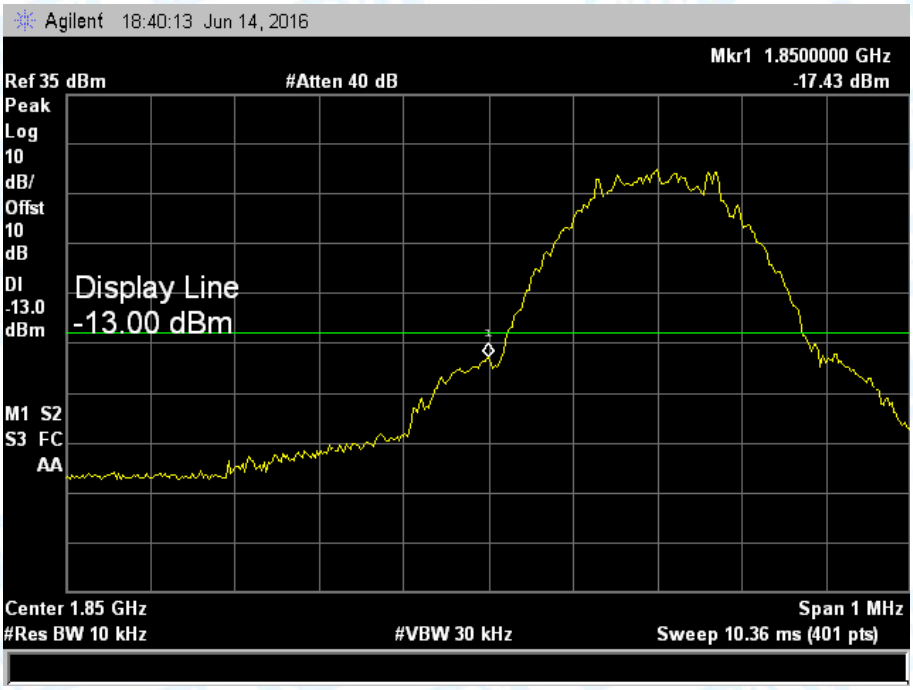


Lowest channel

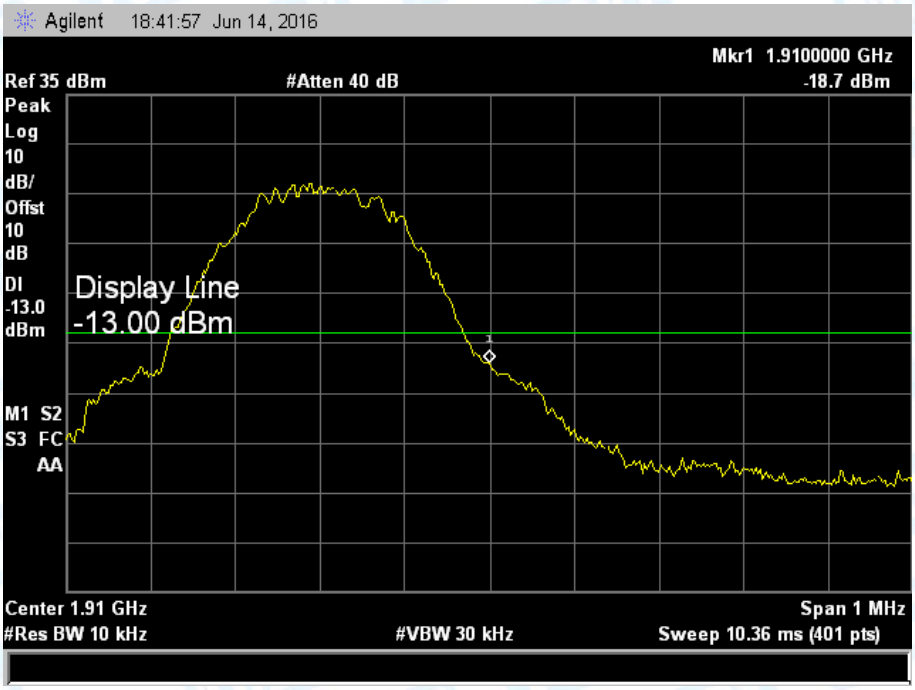


Highest channel

Test Mode:	PCS1900

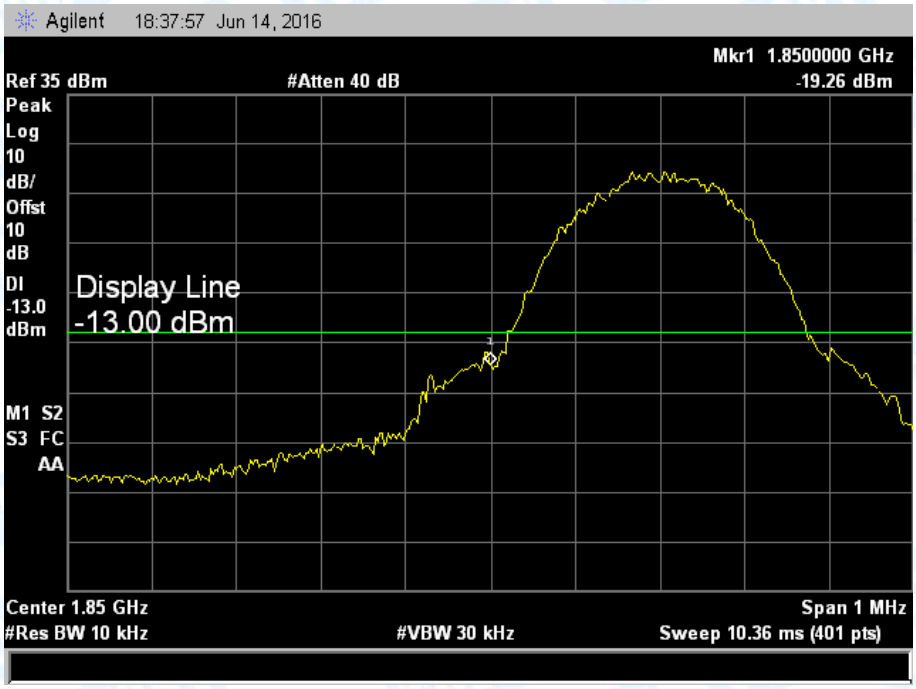


Lowest channel

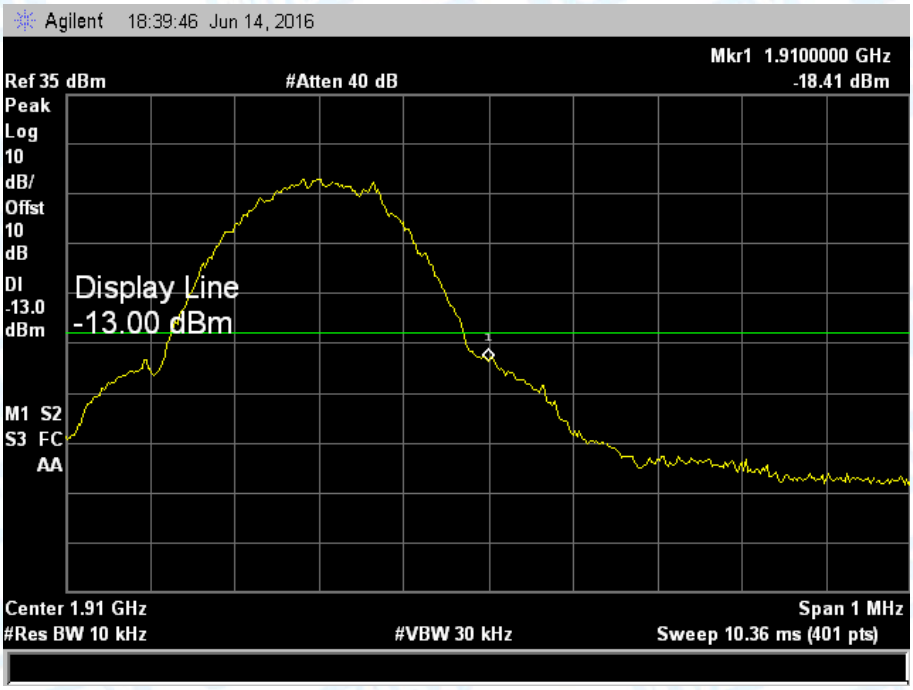


Highest channel

Test Mode:	GPRS1900

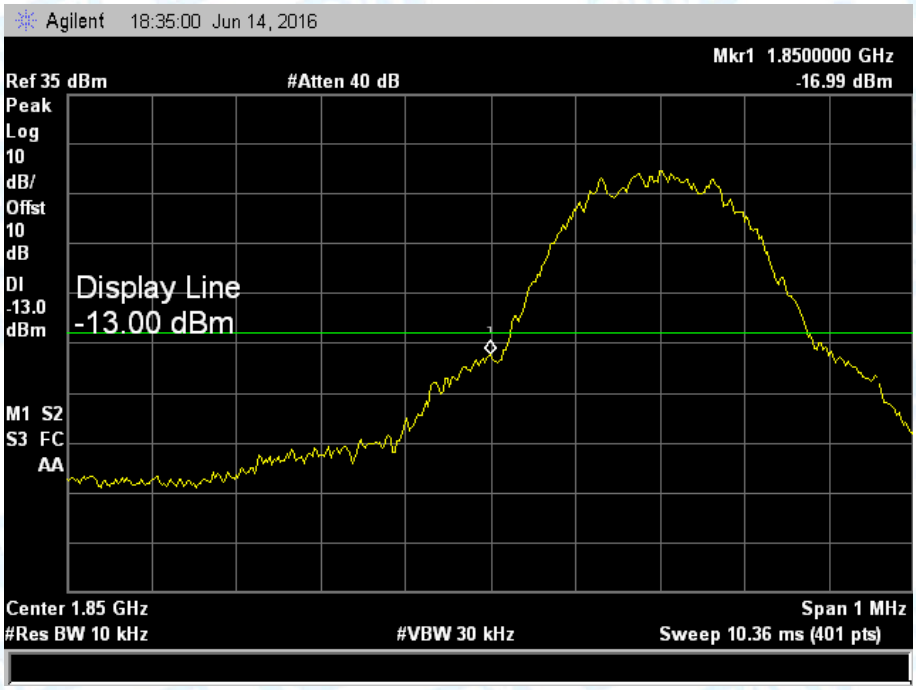


Lowest channel

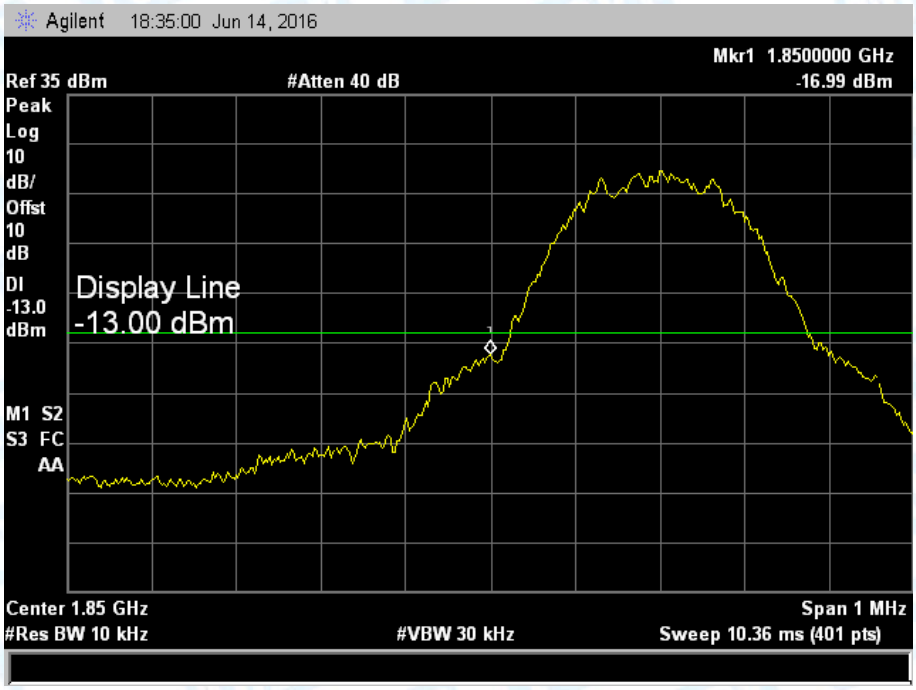


Highest channel

Test Mode:	EGPRS1900



Lowest channel



Highest channel

11. Radiated Out Band of Emissions

11.1 Test Standard and Limit

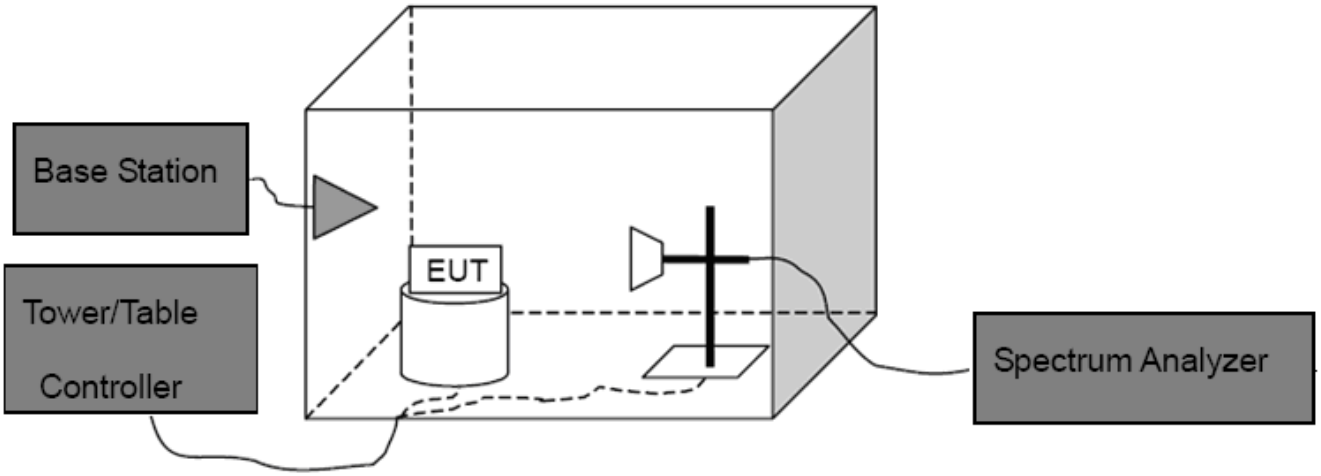
11.1.1 Test Standard

FCC Part 2: 2.1053, 2.1057
FCC Part 22H: 22.917
FCC Part 24E: 24.238

11.1.2 Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power(P) by a factor of at least 43+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

11.2 Test Setup



11.3 Test Procedure

(1) The test system setup as show in the block diagram above.
(2) The EUT was placed on an non-conductive rotating platform in an anechoic chamber. The radiated spurious emissions from 30MHz to 10th harmonious of fundamental frequency were measured at 3 m with a test antenna and a spectrum analyzer with RBW=1 MHz, VBW=1 MHz, peak detector settings.
(3) During the measurement, the EUT was enforced in maximum power and linked with a base station. All the spurious emissions at 3m were measured by rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
(4) When found the maximum level of emissions from the EUT. 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 emissions in dB=10 log(TX power in Watts/0.001)-the absolute level
Spurious attenuation limit in dB=43+10 log(power out in Watts)

11.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

11.5 Test Data

Please refer the following pages.

Measurement Data (worst case)

Test mode:	GSM850		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-32.47	-13.00	Pass
2509.80	V	-36.24		
3346.40	V	-40.21		
4183.00	V	---		
5019.60	V	---		
5856.20	V	---		
1673.20	Horizontal	-37.75	-13.00	Pass
2509.80	H	-42.24		
3346.40	H	-47.68		
4183.00	H	---		
5019.60	H	---		
5856.20	H	---		

Remark:
1. The testing has been conformed to 10*836.6MHz=8,366MHz
2. All other emissions more than 30 dB below the limit.

Test mode:	GPRS 850		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-34.61	-13.00	Pass
2509.80	V	-39.21		
3346.40	V	-42.05		
4183.00	V	---		
5019.60	V	---		
5856.20	V	---		
1673.20	Horizontal	-37.52	-13.00	Pass
2509.80	H	-44.63		
3346.40	H	-46.30		
4183.00	H	---		
5019.60	H	---		
5856.20	H	---		

Remark:
1. The testing has been conformed to 10*836.6MHz=8,366MHz.
2. All other emissions more than 30 dB below the limit.

Test mode:	EGPRS 850		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-35.85	-13.00	Pass
2509.80	V	-40.69		
3346.40	V	-44.21		
4183.00	V	---		
5019.60	V	---		
5856.20	V	---		
1673.20	Horizontal	-38.62	-13.00	Pass
2509.80	H	-46.56		
3346.40	H	-48.32		
4183.00	H	---		
5019.60	H	---		
5856.20	H	---		

Remark:
1. The testing has been conformed to 10*836.6MHz=8,366MHz.
2. All other emissions more than 30 dB below the limit.

Test mode:	PCS1900		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-30.77	-13.00	Pass
5640.00	V	-35.67		
7520.00	V	-41.52		
9400.00	V	---		
11280.00	V	---		
13160.00	V	---		
3760.00	Horizontal	-28.34	-13.00	Pass
5640.00	H	-30.35		
7520.00	H	-35.41		
9400.00	H	---		
11280.00	H	---		
13160.00	H	---		

Remark:
1. The testing has been conformed to 10*1880.0MHz=18,800MHz.
2. All other emissions more than 30 dB below the limit.

Test mode:	GPRS1900		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-32.60	-13.00	Pass
5640.00	V	-37.22		
7520.00	V	-43.05		
9400.00	V	---		
11280.00	V	---		
13160.00	V	---		
3760.00	Horizontal	-30.35	-13.00	Pass
5640.00	H	-32.41		
7520.00	H	-37.16		
9400.00	H	---		
11280.00	H	---		
13160.00	H	---		
Remark: 1. The testing has been conformed to 10*1880.0MHz=18,800MHz. 2. All other emissions more than 30 dB below the limit.				
Test mode:	**EGPRS1900**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-32.95	-13.00	Pass
5640.00	V	-38.06		
7520.00	V	-44.15		
9400.00	V	---		
11280.00	V	---		
13160.00	V	---		
3760.00	Horizontal	-31.06	-13.00	Pass
5640.00	H	-33.20		
7520.00	H	-37.98		
9400.00	H	---		
11280.00	H	---		
13160.00	H	---		
Remark: 1. The testing has been conformed to 10*1880.0MHz=18,800MHz. 2. All other emissions more than 30 dB below the limit.				

------End of Report------