FCC Radio Test Report

FCC ID: ZBZFL-2000G

Report No.	:	TB-FCC110435
Applicant	:	ShenZhen C2S Technology Co.,Ltd.
Equipment Under Test (EUT)		
EUT Name	:	Vehicle GPS Tracking Terminal
Model No.	:	FL-2000G
Serial No.	:	FL-2000N, FL-2000F, FL-2000L
Brand Name	:	C2STEK
Receipt Date	:	2011-02-09
Test Date	:	2010-02-10 to 2010-03-01
Issue Date	:	2011-03-04
Standards	:	FCC Part 2 FCC Part 22 Subpart H FCC Part 24 Subpart E
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 : 

Approved& Authorized : 

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.

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Contents

1. General Information about EUT

1.1 Client Information

Applicant	:	ShenZhen C2S Technology Co.,Ltd.
Address	:	E2008,Eastern Tower of Nanshan Software Park, Nanshan District, Shenzhen,China
Manufacturer	:	ShenZhen C2S Technology Co.,Ltd.
Address	:	E2008,Eastern Tower of Nanshan Software Park, Nanshan District, Shenzhen,China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Vehicle GPS Tracking Terminal	
Model No.	:	FL-2000G, FL-2000N, FL-2000F, FL-2000L	
Model Difference	:	The different models are identical in schematic, structure and critical components, the only different is the different accessories.	
Product Description	:	Operation Frequency: GSM/GPRS 850/900/1800/1900	
		GSM 850 Power :	Cond:31.67 dBm ERP:31.52 dBm
		GPRS 850 Power:	Cond:31.13 dBm ERP:30.98 dBm
		GSM 1900 Power :	Cond:29.08 dBm EIRP:31.08 dBm
		GPRS 1900 Power:	Cond:28.71 dBm EIRP:30.71 dBm
		Antenna Gain:	2 dBi Note(2)
		Modulation Type:	GMSK
FCC Operating Frequency	:	824.2 MHz~848.8 MHz 1850.2 MHz~1909.8 MHz	
Power Supply	:	DC Voltage supplied from DC Supply DC Voltage supplied from Li-ion batter	
Power Rating	:	DC 12V from DC Supply DC 3.7V from Li-ion battery	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

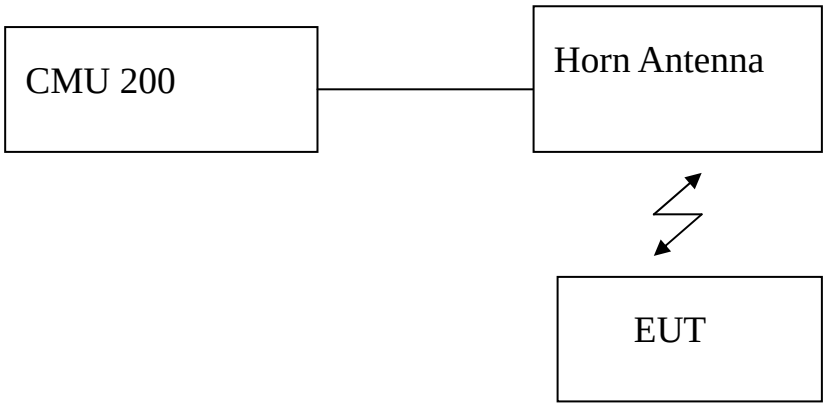
Note:

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

(2) Antenna Description:

Ant	Brand	Model Name	Antenna Type	Gain (dBi)
01	GAOKE ZHONGSHI	GKZS-GSM-SMAZ5	External Ant	2

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.

Operating Mode		
Mode	**Channel**	**Frequency(MHz)**
GSM 850	128	824.2
	190	836.6
	251	848.8
PCS 1900	512	1850.2
	661	1880.0
	810	1909.8

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 functions, and after pre-testing, GSM function is the worst case for all the emission tests.

1.6 Test Facility

The tests were perform at:
Bontek Compliance Testing Laboratory Ltd
1/F., Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, 518055 China
Tel: 86-755-86337020 Fax: 86-755-86337028

At the time of testing, the Laboratory is accredited. It is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 338263.

The test report was fulfilled by Shenzhen Meihua Electronic Co., Ltd. Shenzhen Meihua Electronic Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements results.

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
2.1049; 22.917; 24.238	20 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. 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

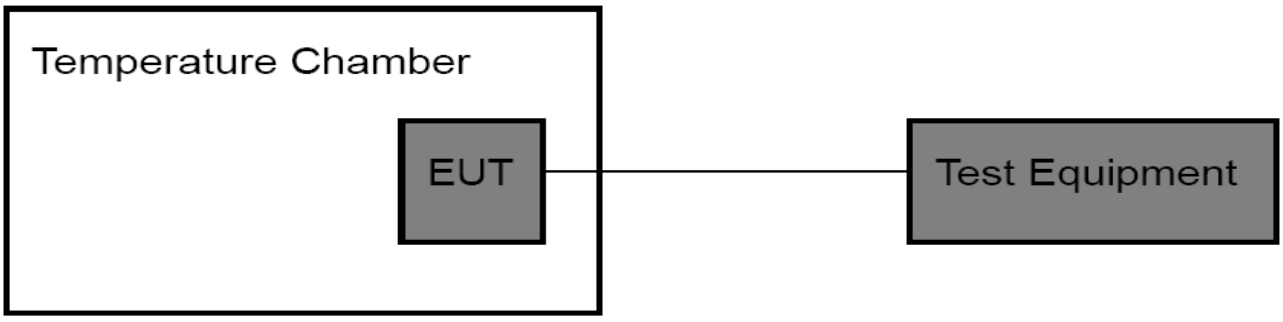
According to FCC section 22.355 and FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(1) Temperature:
The temperature is varied from -30℃ to +50℃ at intervals of not more than 10℃.

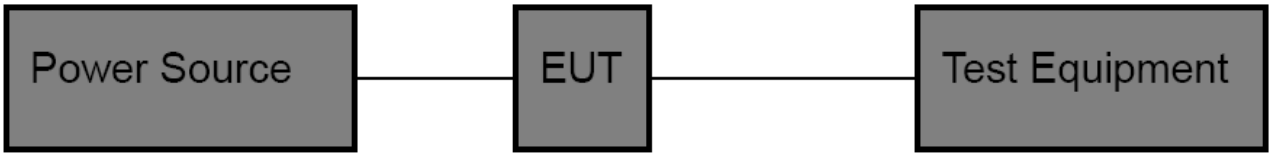
(2) Primary Supply Voltage:
For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at input to the cable normally provide with the equipment, or at the power 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 can not 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) The power supply voltage to the EUT was varied from 15V to 9V.

(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.

4.5 Test Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2010-08-12	2011-08-11
Attenuator	Agilent	8504B	M368574	2010-07-21	2011-07-20
Attenuator	Agilent	8504B	M368575	2010-07-21	2011-07-20
Power Splitter	Anritsu	K240C	06872	2010-08-12	2011-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2010-08-12	2011-08-11
Base Station	ROHDE& SCHWARZ	CMU200	109038	2010-07-21	2011-07-20
Signal Generator	HP	HP84657A	2479S63205	2010-07-21	2011-07-20
Temperature Chamber	WUHUAN	HTP204	20040012	2010-06-30	2011-06-29
DC power	Good Will	G020654	EF363502	2010-07-21	2011-07-20

4.6 Test Data

EUT: Vehicle GPS Tracking Terminal	Model: FL-2000G
Temperature:25℃	Humidity: 55%
Power Supply: 9V~15V	Test Engineer: Jason

Frequency Error (Voltage)			
Mode	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
GSM 850 CH 190 836.6 MHz	15	27	0.032273
	14	24	0.028688
	13	20	0.023906
	12	14	0.016734
	11	18	0.021516
	10	22	0.026927
	9	23	0.027492
PCS 1900 CH 661 1880.0 MHz	15	26	0.013829
	14	24	0.012765
	13	20	0.010638
	12	16	0.008510
	11	21	0.011170
	10	23	0.012234
	9	28	0.012893

EUT: Vehicle GPS Tracking Terminal	Model: FL-2000G
Temperature:-30℃~55℃	Humidity: 55%
Power Supply: 12V	Test Engineer: Jason

Frequency Error (Temperature)			
Mode	Temperature (℃)	Frequency Error (Hz)	Frequency Error (ppm)
GSM 850 CH 190 836.6 MHz	-30	28	0.033468
	-20	25	0.029882
	-10	22	0.026296
	0	21	0.025101
	10	20	0.023906
	20	20	0.023906
	30	18	0.027492
	40	18	0.021515
	50	16	0.019125
	55	16	0.019125
PCS 1900 CH 661 1880.0 MHz	-30	27	0.014361
	-20	24	0.012765
	-10	22	0.011702
	0	20	0.010638
	10	19	0.010106
	20	19	0.010106
	30	18	0.009574
	40	16	0.008510
	50	15	0.007978
	55	16	0.008510

4. Conducted RF Output Power

5.1 Test Standard and Limit

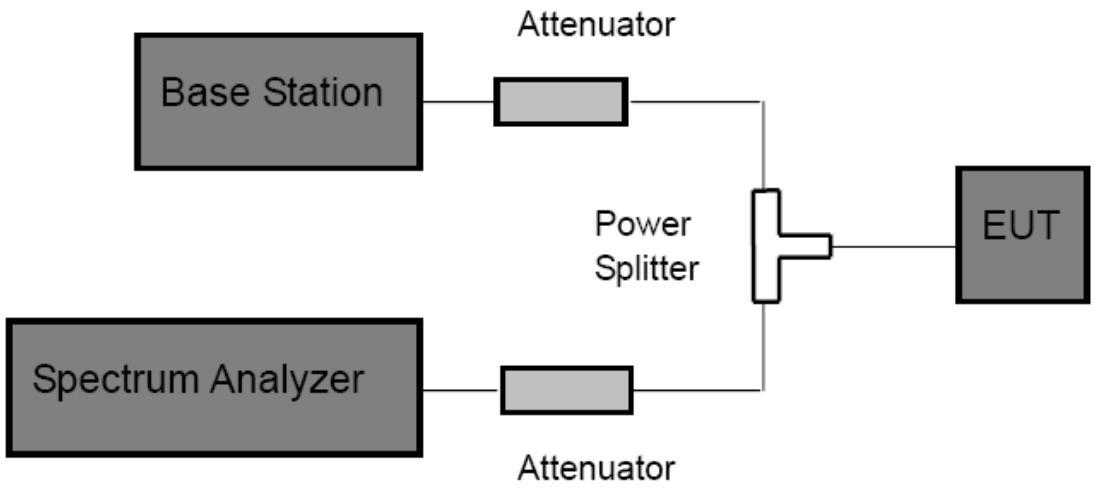
5.1.1 Test Standard

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

5.1.2 Test Limit

Cellular Telephone 850 MHz	PCS 1900 MHz
38.5 dBm (ERP)	33 dBm (EIRP)

5.2 Test Setup



5.3 Test Procedure

(1) The EUT is coupled to the Spectrum Analyzer and the Base Station with the suitable Attenuators through the Power Splitter, 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) Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak and mark it; finally record the peak and the plot.

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 Test Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2010-08-12	2011-08-11
Attenuator	Agilent	8504B	M368574	2010-07-21	2011-07-20
Attenuator	Agilent	8504B	M368575	2010-07-21	2011-07-20
Power Splitter	Anritsu	K240C	06872	2010-08-12	2011-08-11
Amplifier	Agilent	8447F	3113A06717	2010-08-12	2011-08-11
Amplifier	Agilent	8447D	3444D07855	2010-08-12	2011-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2010-08-12	2011-08-11
Base Station	ROHDE& SCHWARZ	CMU200	109038	2010-07-21	2011-07-20
Signal Generator	HP	HP84657A	2479S63205	2010-07-21	2011-07-20

5.6 Test Data

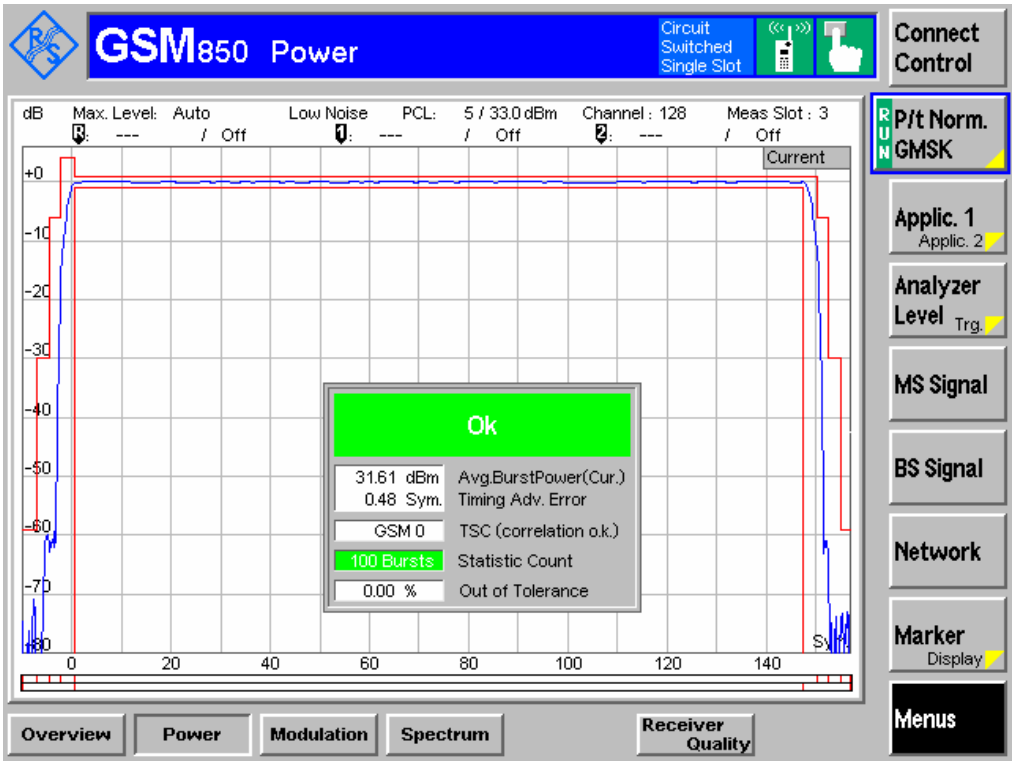
EUT: Vehicle GPS Tracking Terminal	Model: FL-2000G
Temperature: 24	Humidity: 55%
Power Supply: DC 12V	Test Engineer: Jason

Mode	Channel	PK Output Power(dBm)	ERP (dBm)	EIRP (dBm)	Limit	
					ERP(dBm)	EIRP(dBm)
GSM 850	128	31.61	31.46	/	38.5	/
	190	31.62	31.47	/	38.5	/
	251	31.67	31.52	/	38.5	/
GPRS 850 Slot1	128	31.06	30.91	/	38.5	/
	190	31.11	30.96	/	38.5	/
	251	31.13	30.98	/	38.5	/
GPRS 850 Slot2	128	30.58	30.43	/	38.5	/
	190	30.47	30.32	/	38.5	/
	251	30.39	30.24	/	38.5	/
GPRS 850 Slot3	128	29.08	28.93	/	38.5	/
	190	29.09	28.94	/	38.5	/
	251	29.02	28.87	/	38.5	/
GPRS 850 Slot4	128	28.34	28.19	/	38.5	/
	190	28.30	28.15	/	38.5	/
	251	28.21	28.06	/	38.5	/

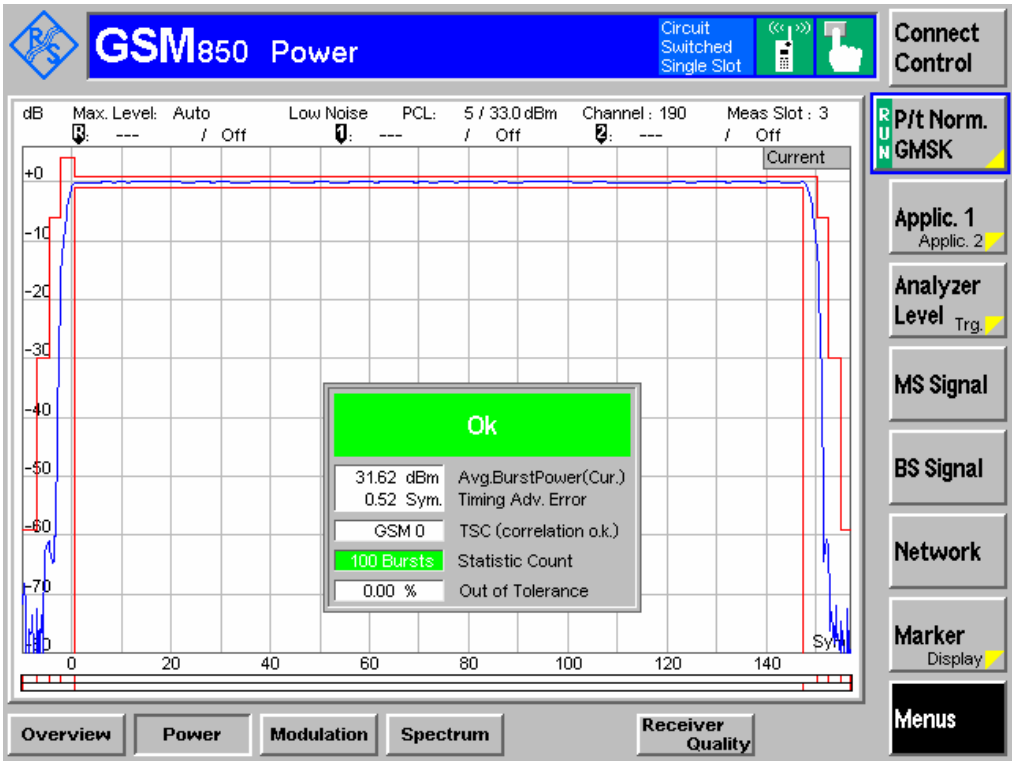
Note: EIRP=PK output power + Antenna Gain(2 dBi)
ERP= PK output power + Antenna Gain(2 dBi)-2.15

Please refer the following plots:

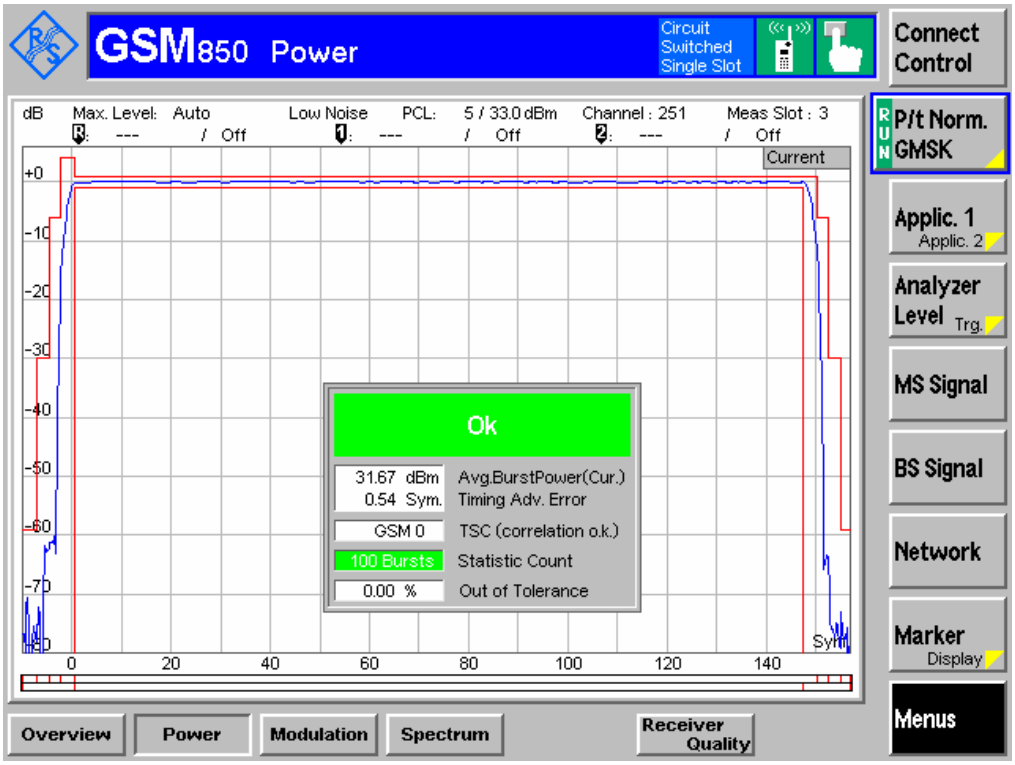
GSM 850 CH 128



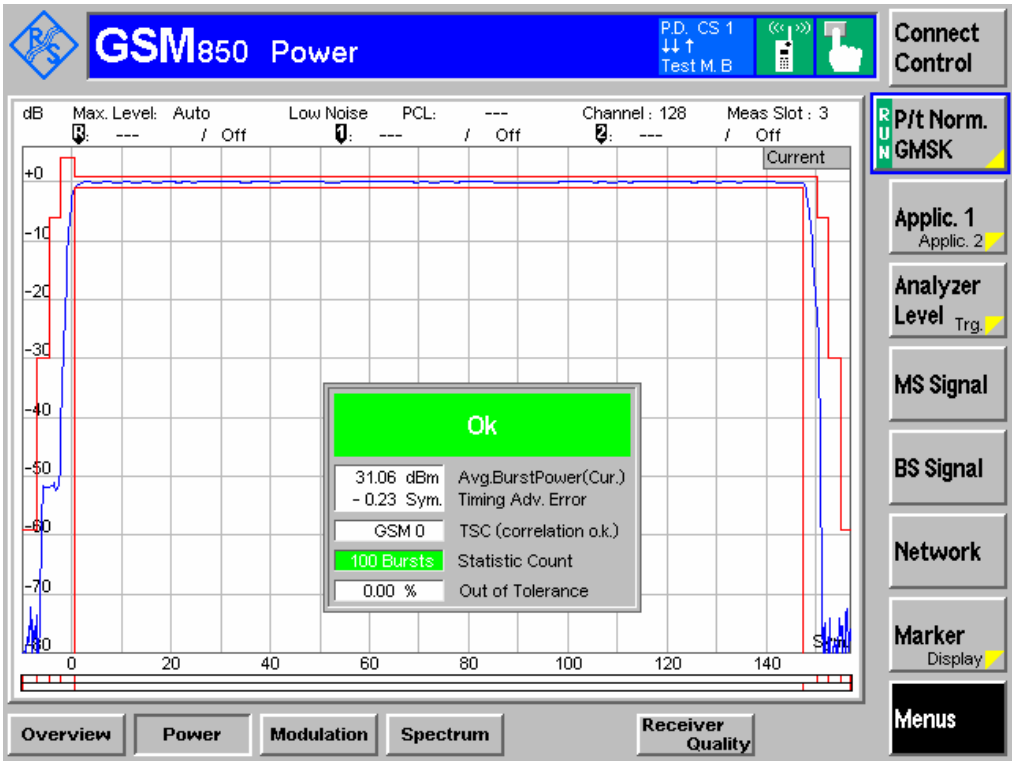
GSM 850 CH 190



GSM 850 CH 251



GPRS 850 Slot 1 CH 128



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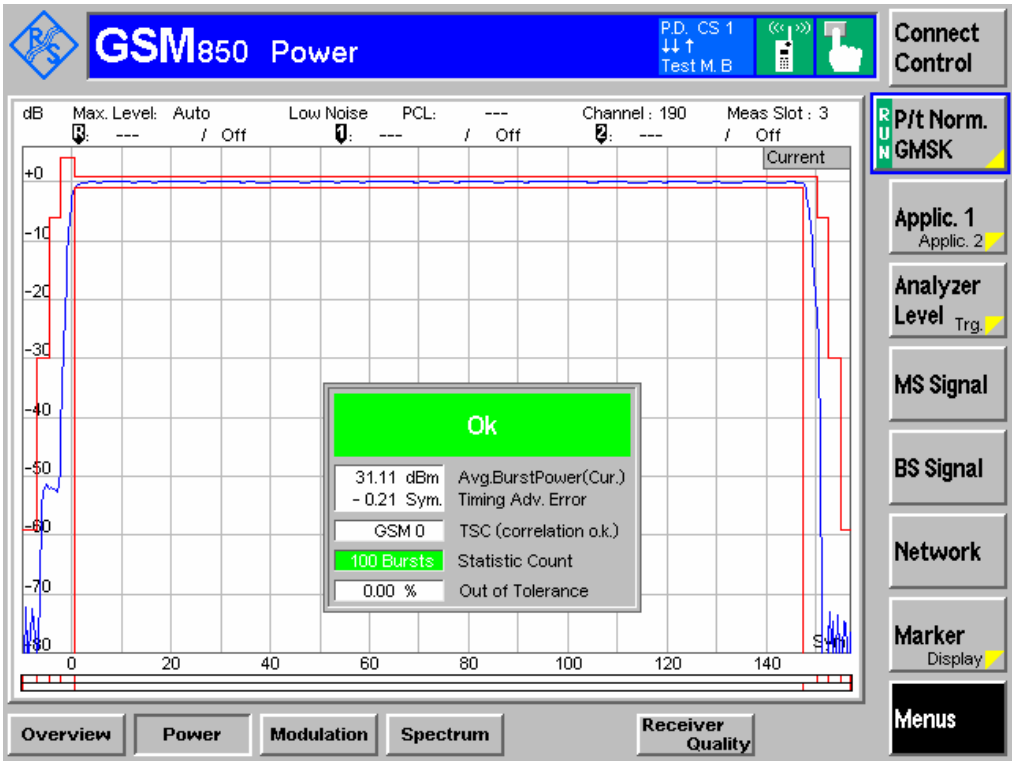

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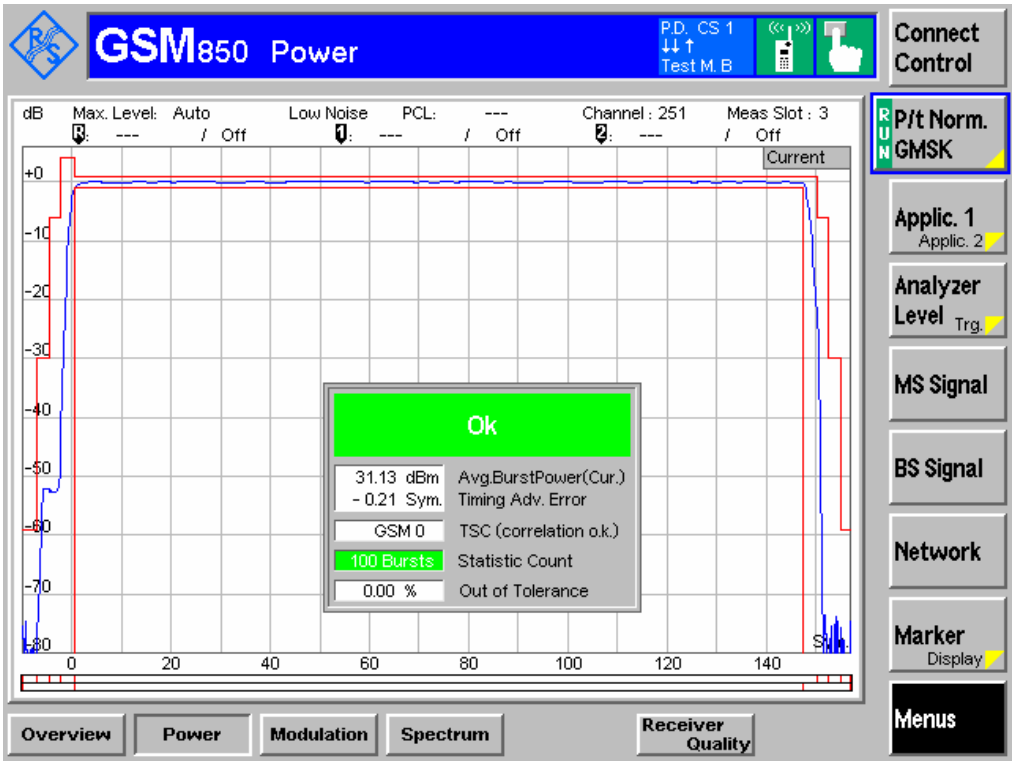
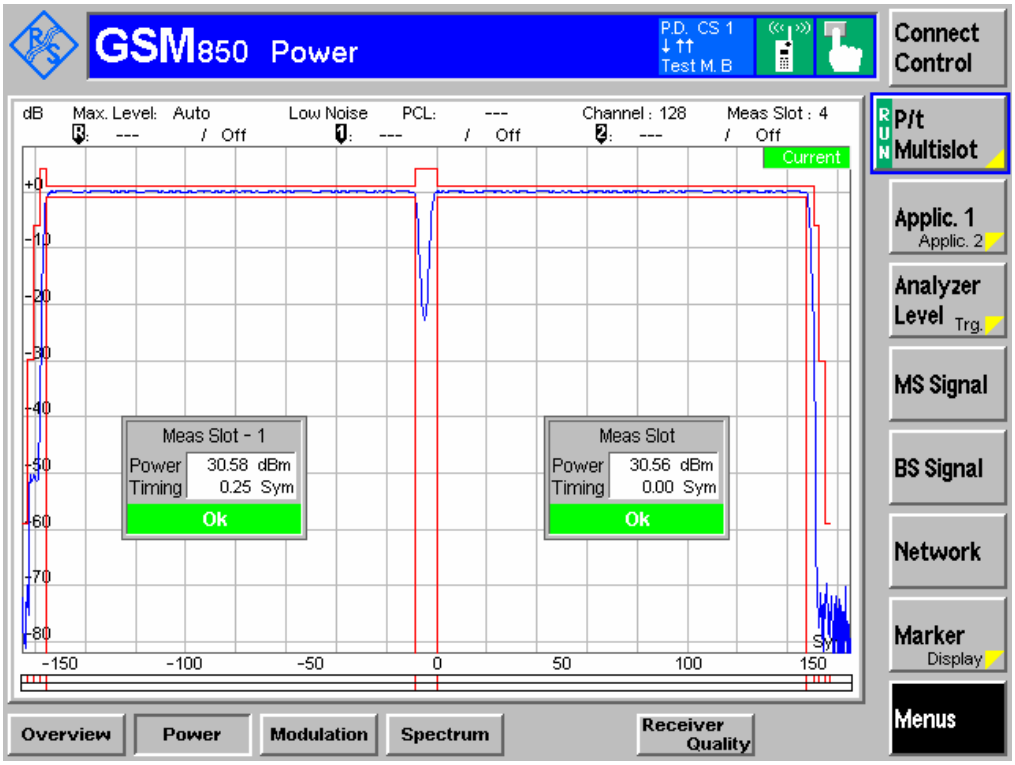


GPRS 850 Slot 2 CH 128



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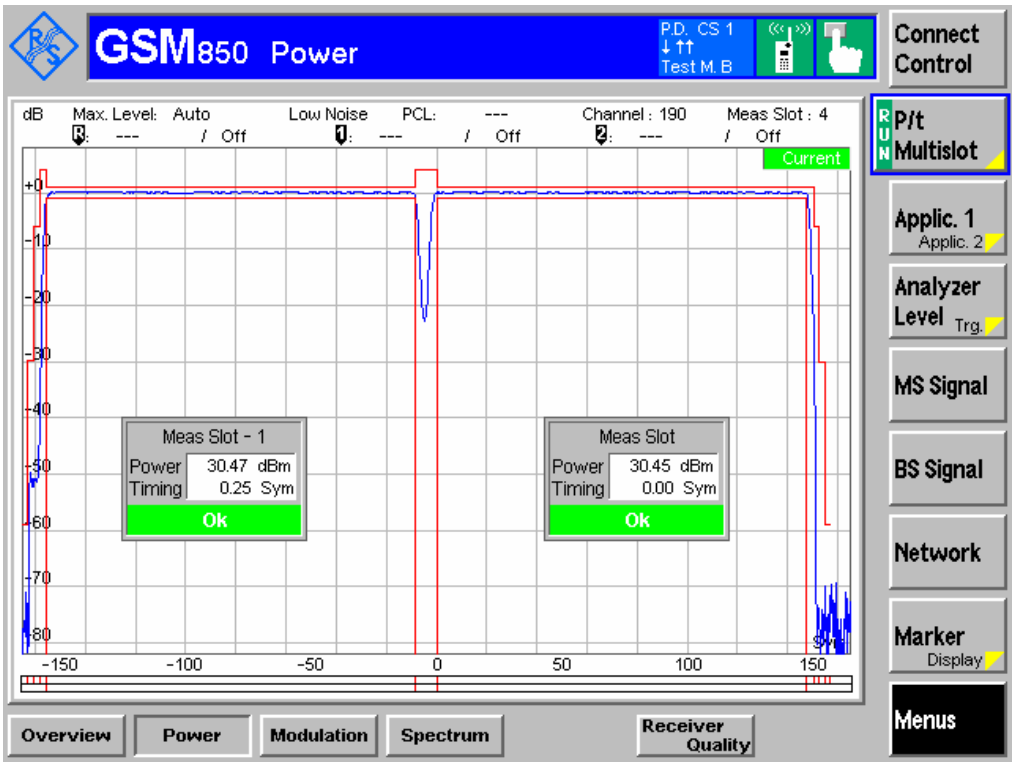

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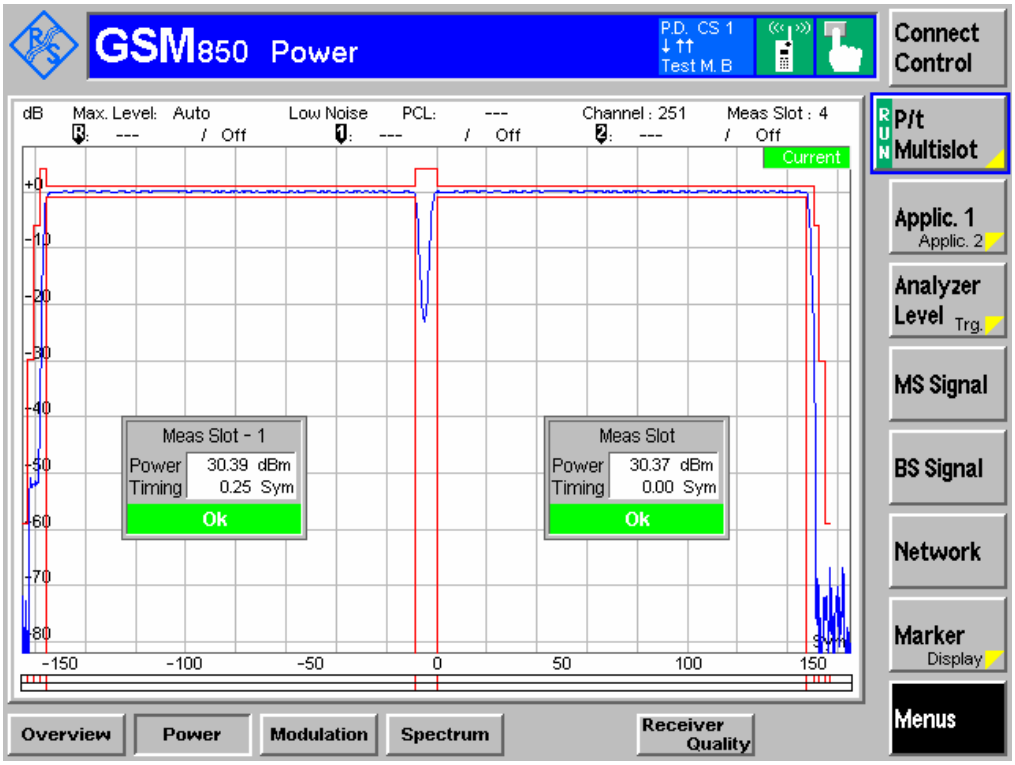
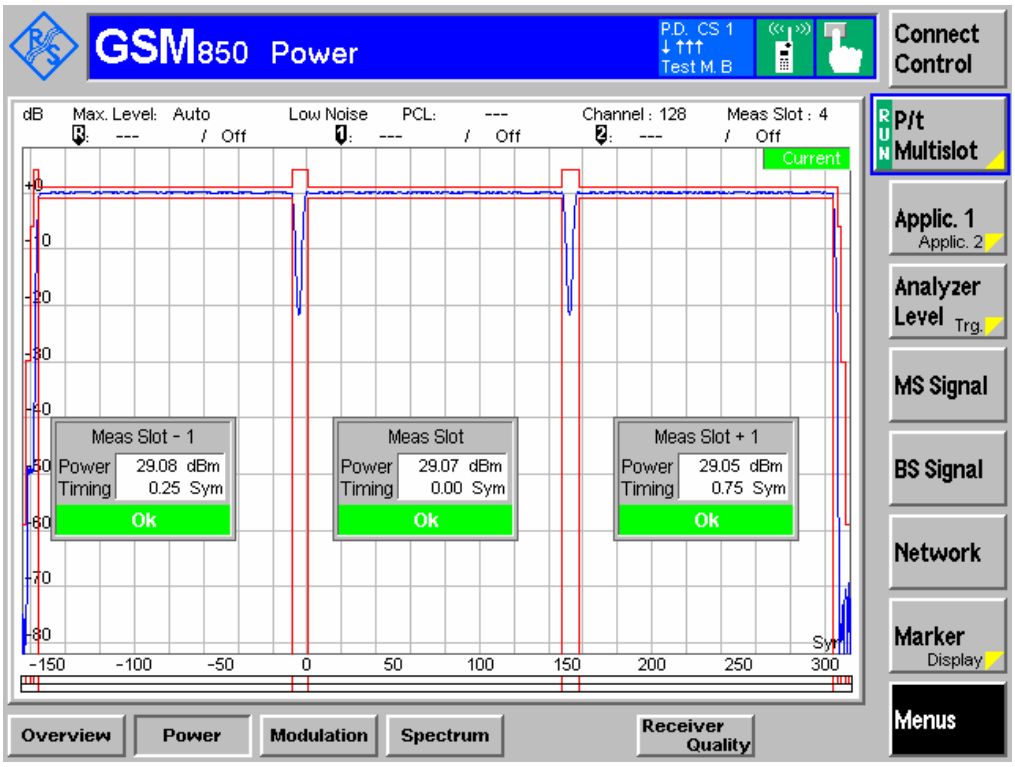


GPRS 850 Slot 3 CH 128



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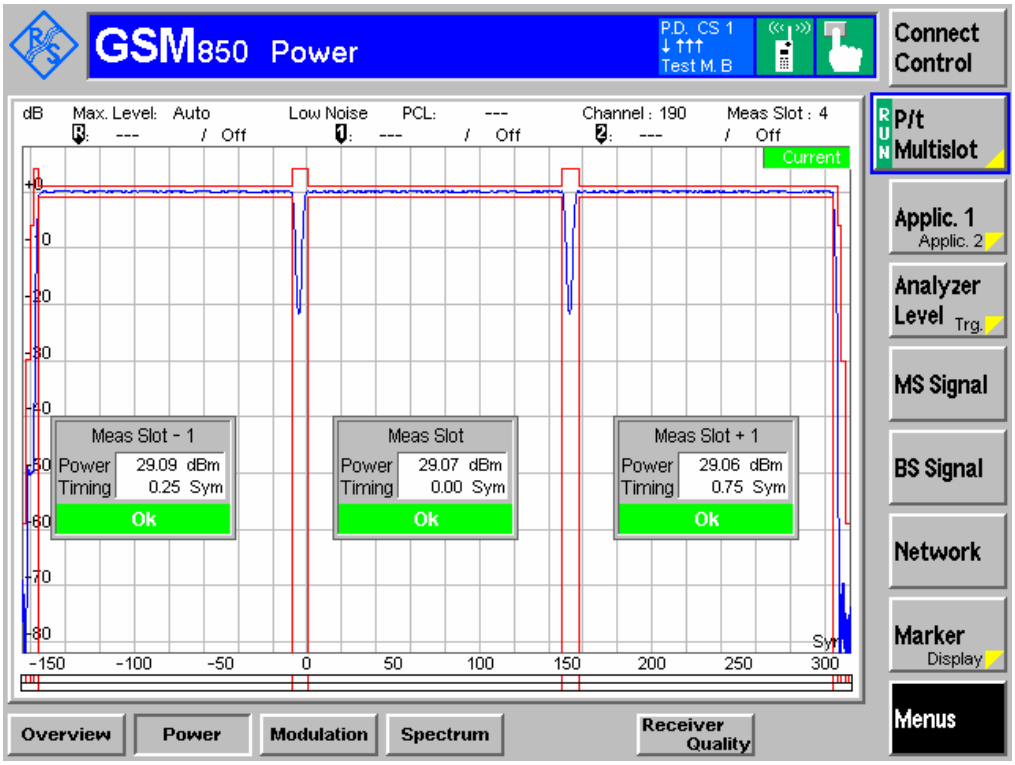

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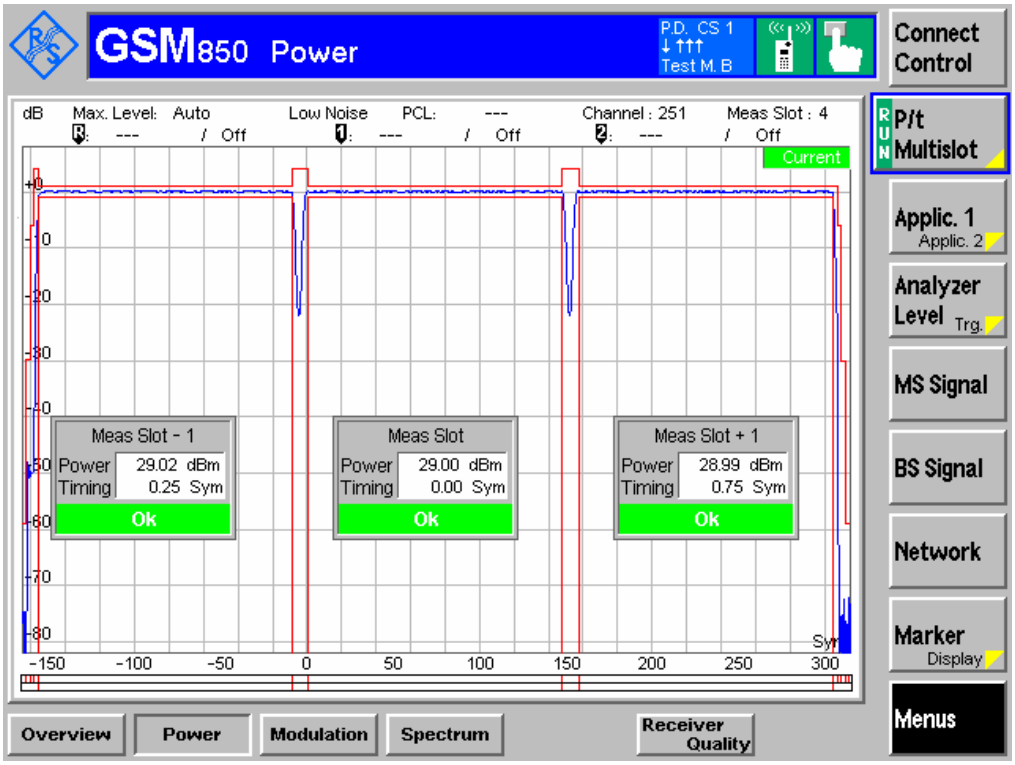
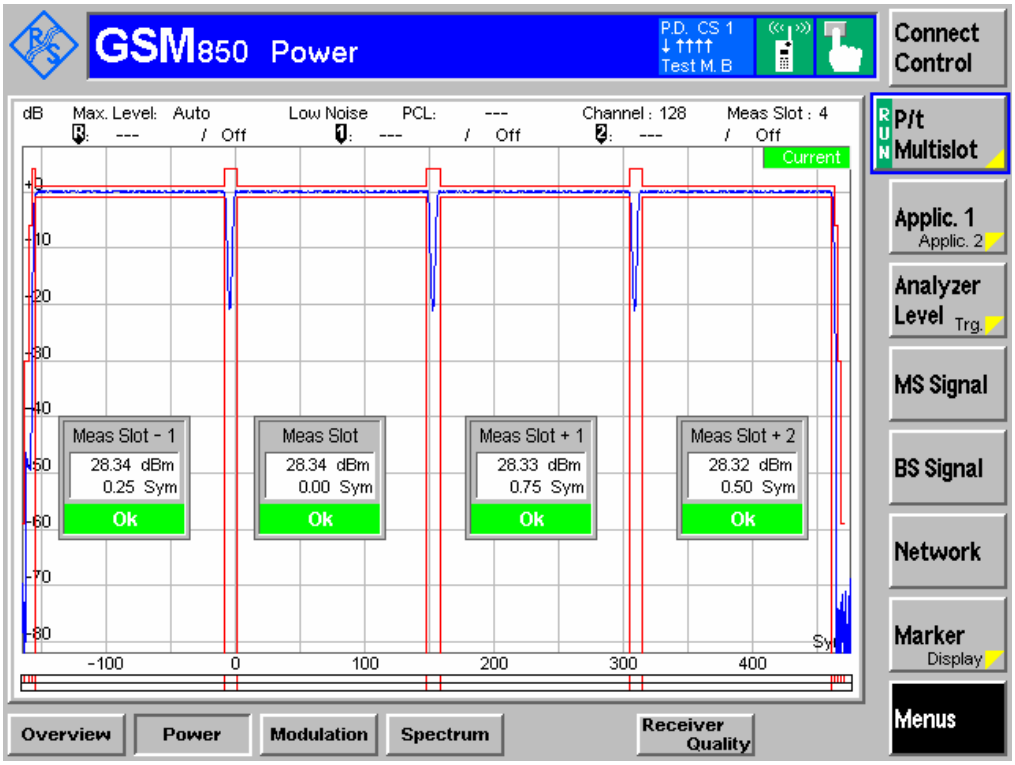
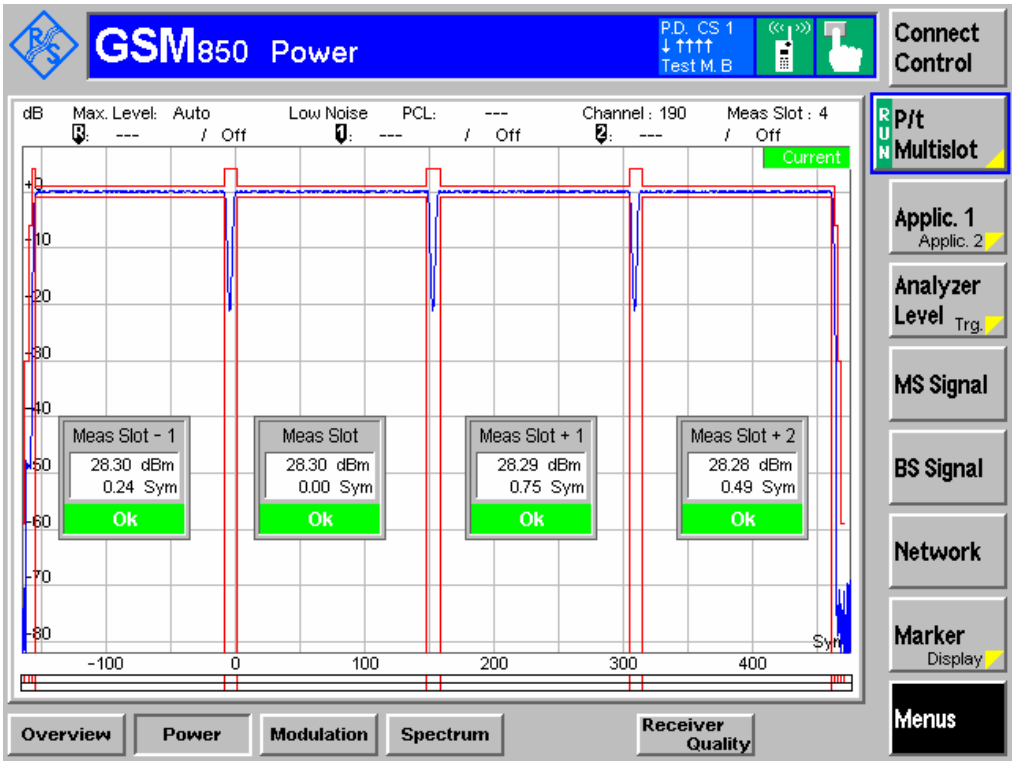


GPRS 850 Slot 4 CH 128



GPRS 850 Slot 4 CH 190



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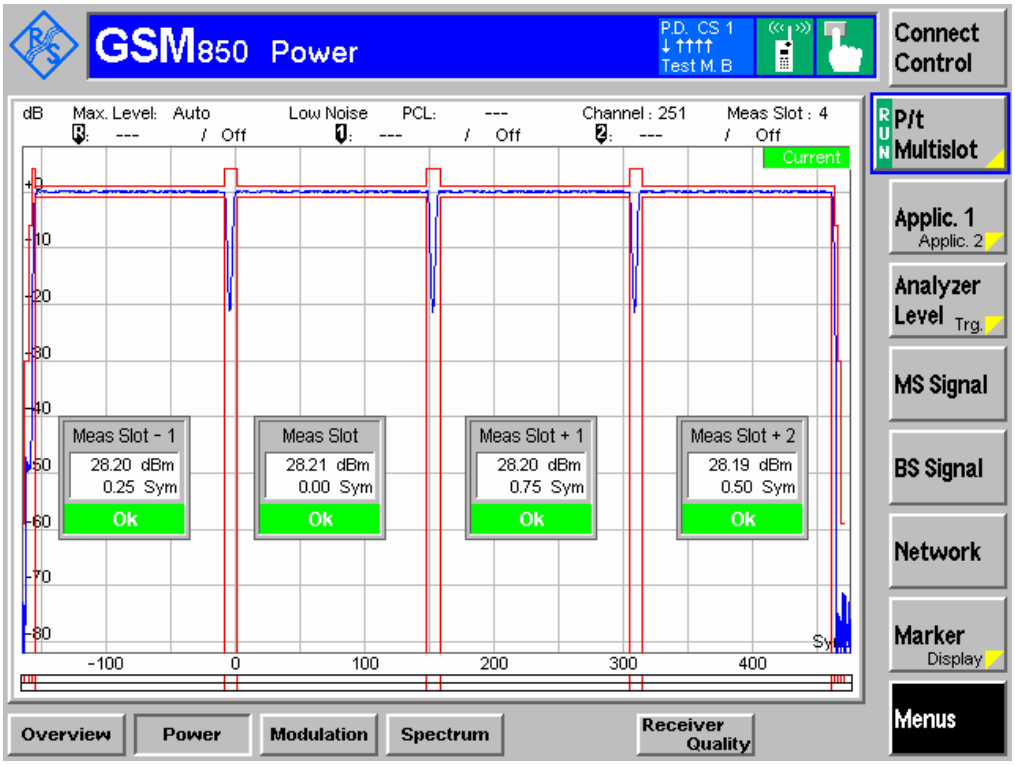
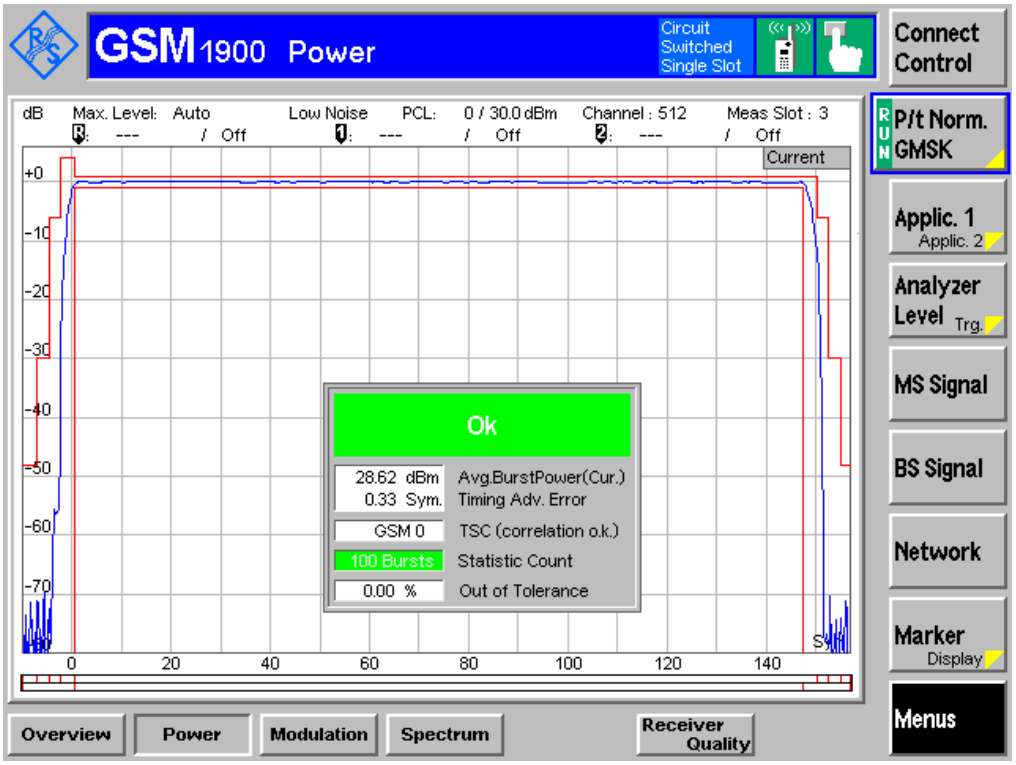


EUT: Vehicle GPS Tracking Terminal	Model: FL-2000G
Temperature: 24	Humidity: 55%
Power Supply: DC 12V	Test Engineer: Allen

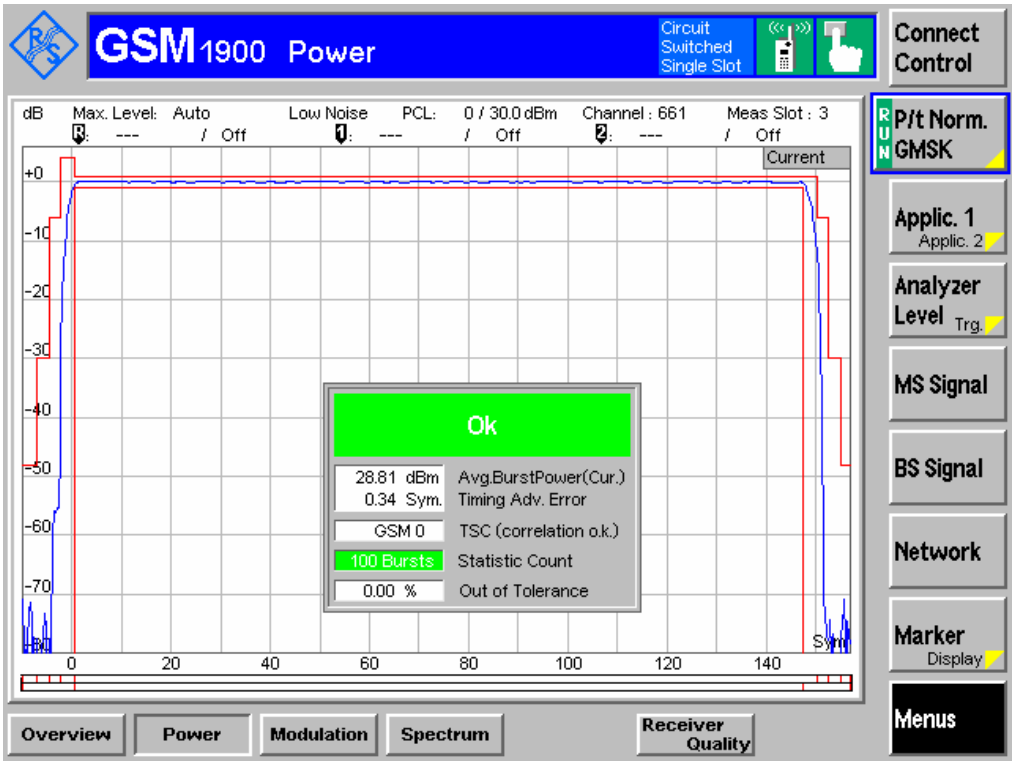
Mode	Channel	PK Output Power(dBm)	ERP (dBm)	EIRP (dBm)	Limit	
					ERP(dBm)	EIRP(dBm)
PCS 1900	512	28.62	/	30.62	/	33
	661	28.81	/	30.81	/	33
	810	29.08	/	31.08	/	33
GPRS 1900 Slot1	512	28.71	/	30.71	/	33
	661	28.37	/	30.37	/	33
	810	28.16	/	30.16	/	33
GPRS 1900 Slot2	512	28.33	/	30.33	/	33
	661	27.89	/	29.89	/	33
	810	27.59	/	29.59	/	33

Note: EIRP=PK output power + Antenna Gain(2 dBi)
ERP= PK output power + Antenna Gain(2 dBi)-2.15

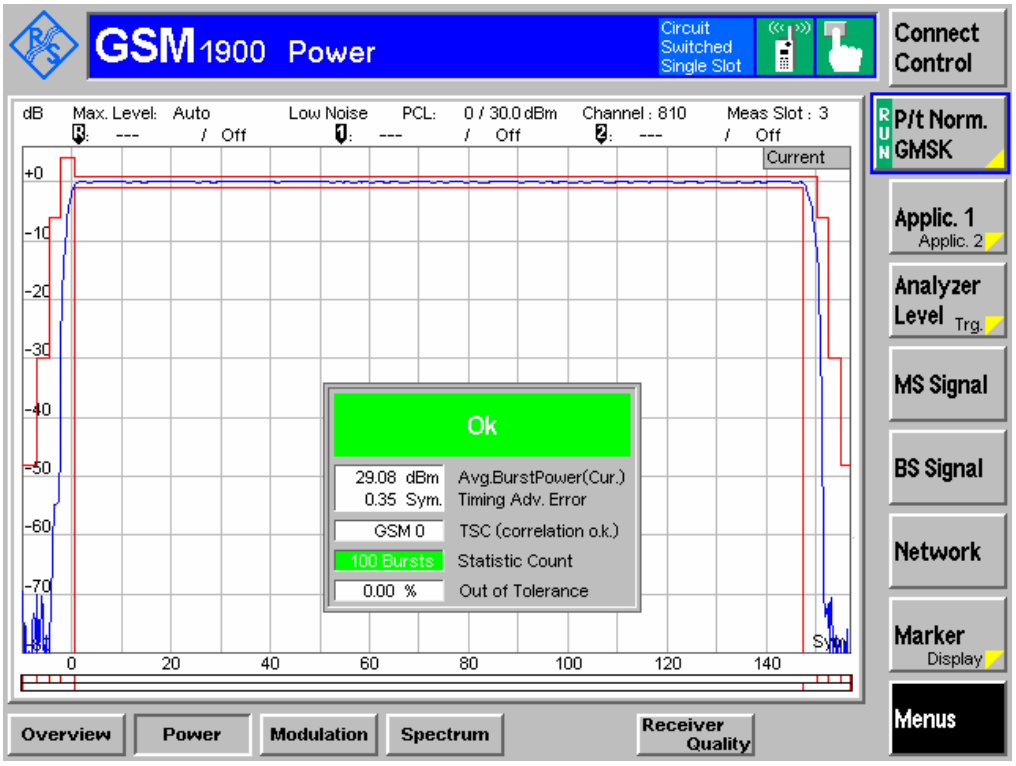
PCS 1900 CH 512



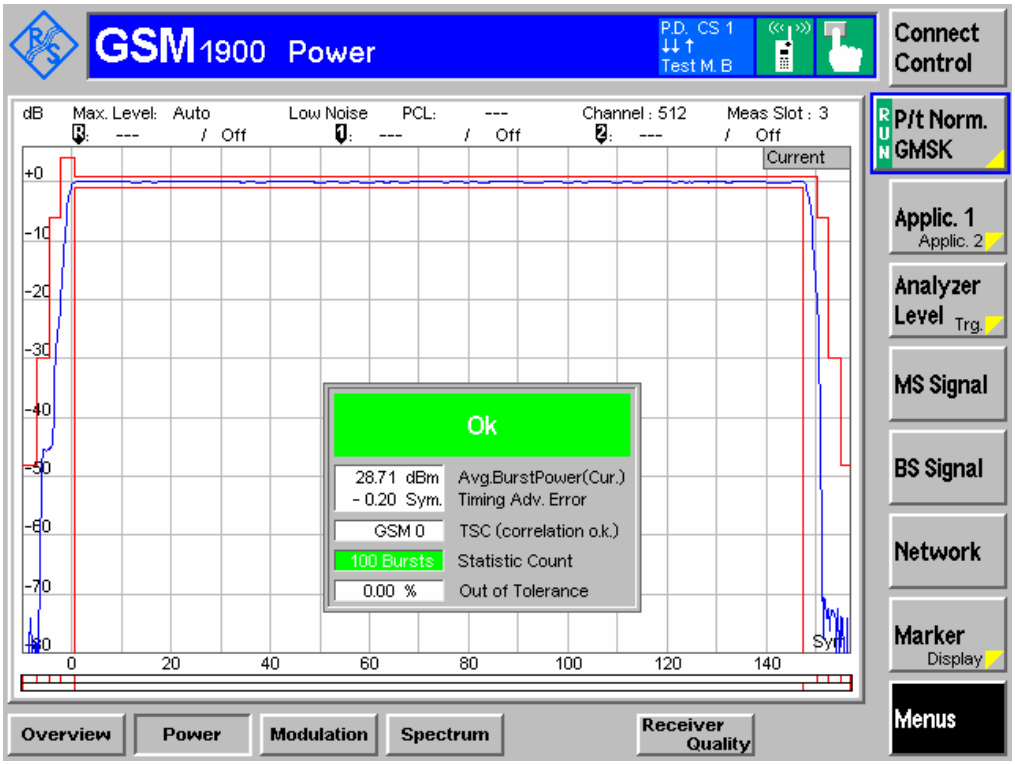
PCS 1900 CH 661



PCS 1900 CH 810



GPRS 1900 Slot 1 CH 512



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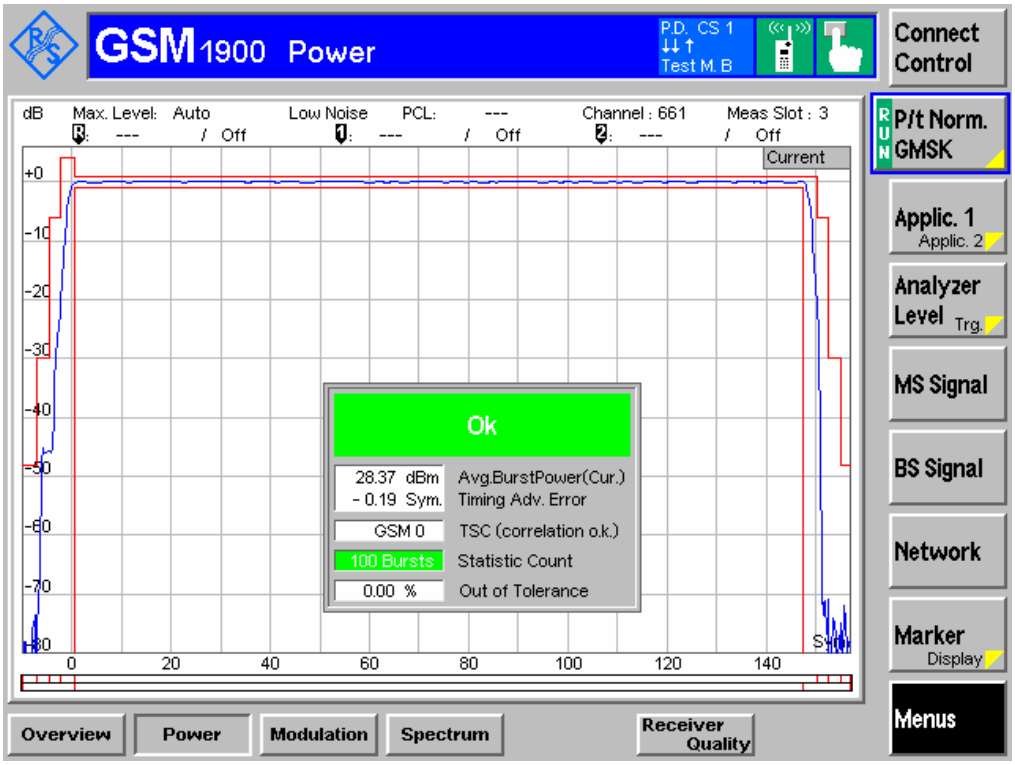
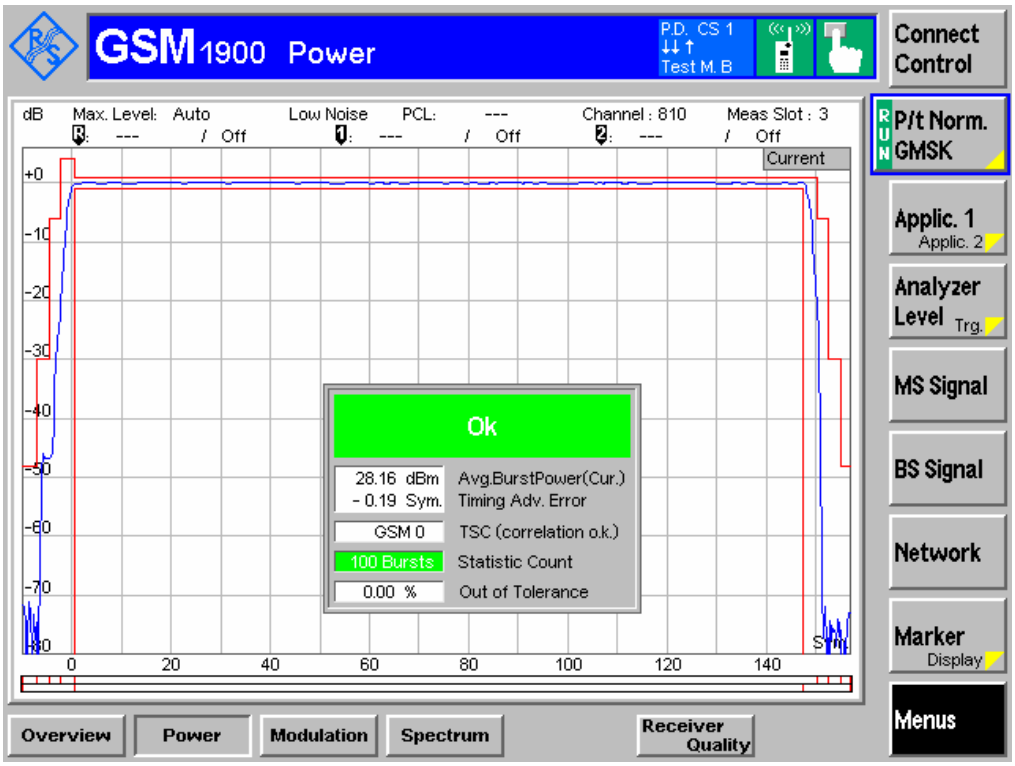
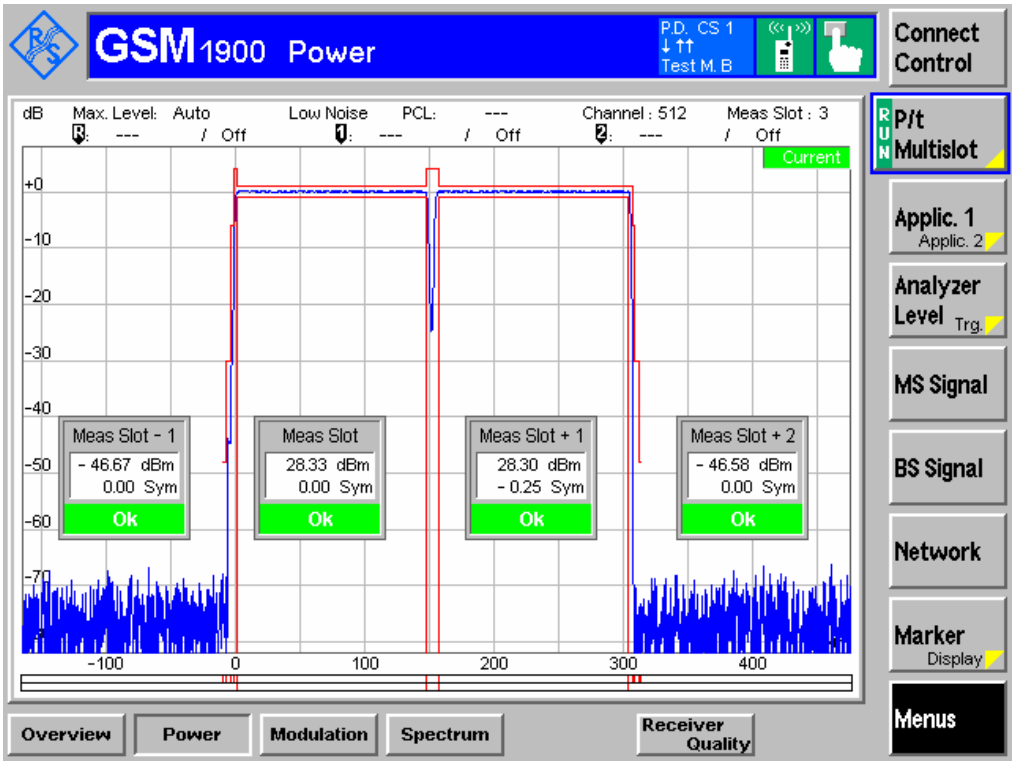


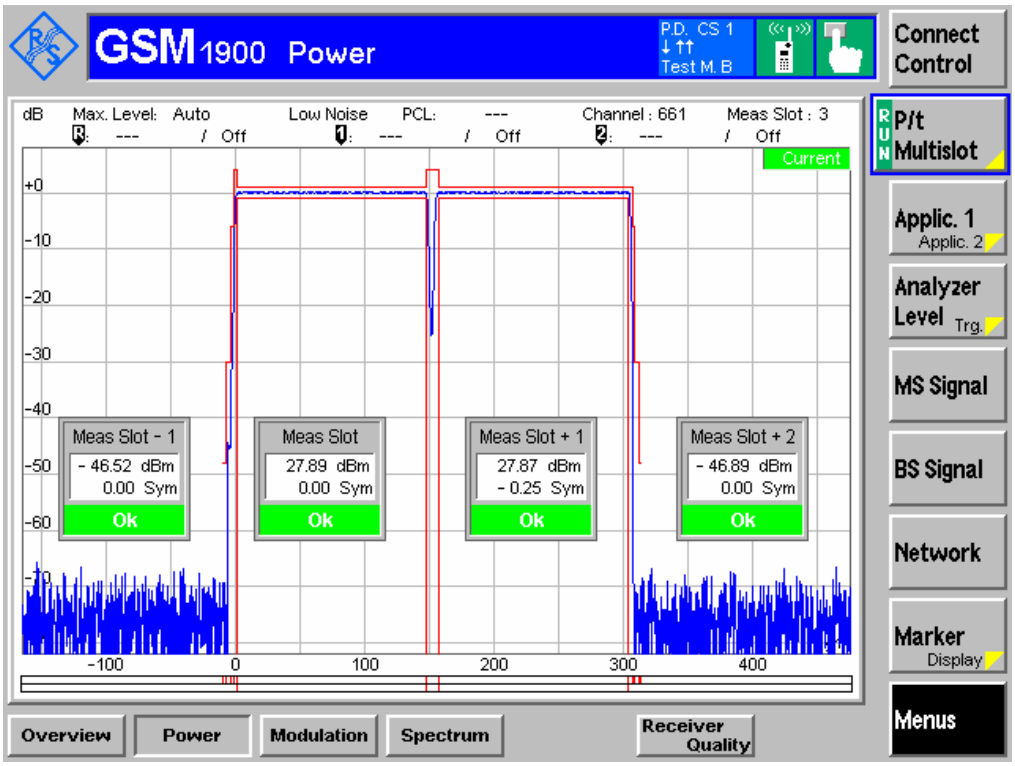
GPRS 1900 Slot 1 CH 810



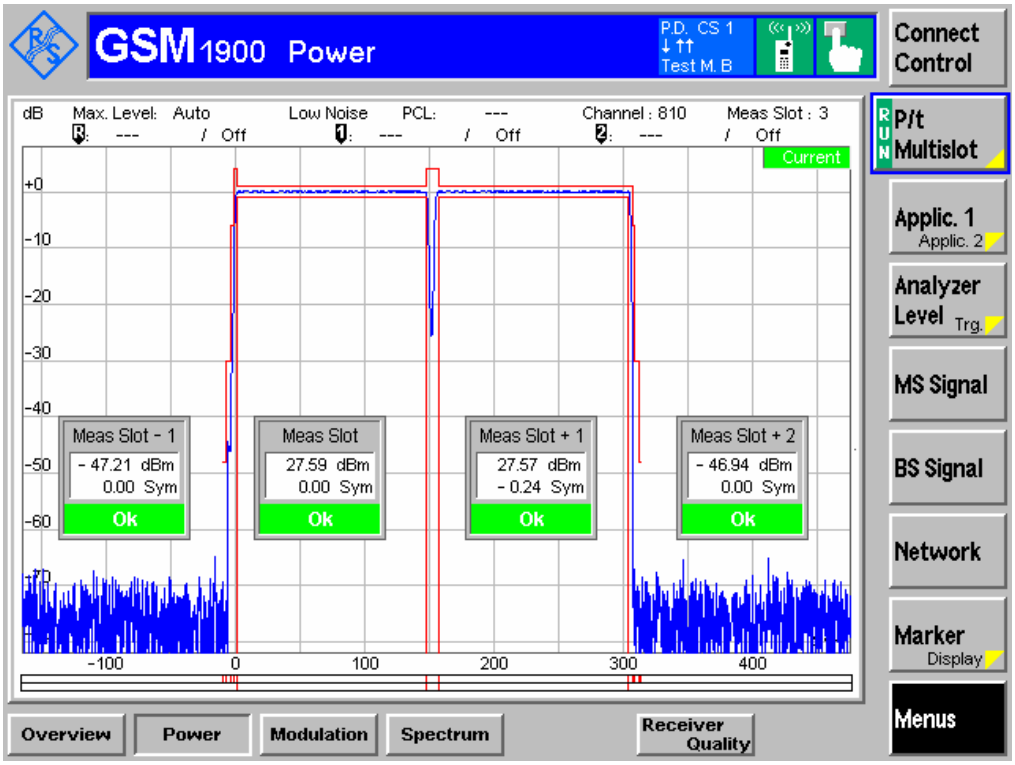
GPRS 1900 Slot 2 CH 512



GPRS 1900 Slot 2 CH 661



GPRS 1900 Slot 2 CH 810



5. Radiated Output Power

6.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 22H : 22.913 (a)

FCC Part 24E: 24.232 (c)

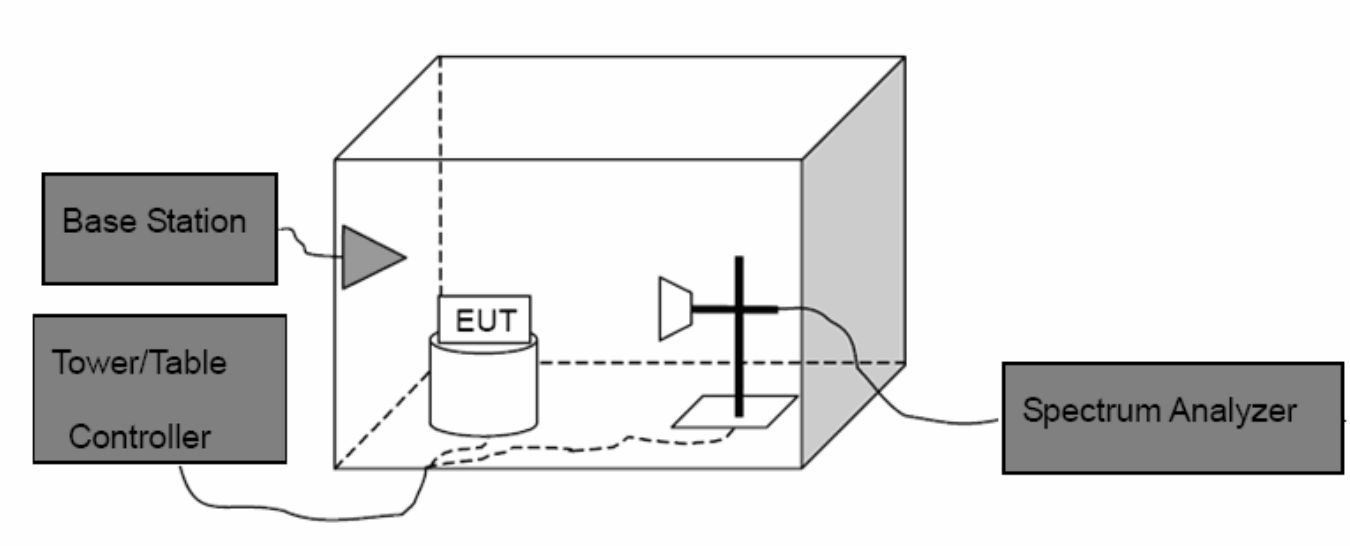
5.1.2 Test Limit

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 Telephone 850 MHz	PCS 1900 MHz
38.5 dBm (ERP)	33 dBm (EIRP)

6.2 Test Setup



6.3 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-C. 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)

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 Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2010-08-12	2011-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2010-08-12	2011-08-11
Sunol Sciences	Broadband Antenna	JB1	A05261	2010-08-12	2011-08-11
Sunol Sciences	Horn Antenna	KRH-118	A05247	2010-08-12	2011-08-11
Attenuator	Agilent	8504B	M368574	2010-07-21	2011-07-20
Attenuator	Agilent	8504B	M368575	2010-07-21	2011-07-20
Power Splitter	Anritsu	K240C	06872	2010-08-12	2011-08-11
Amplifier	Agilent	8447F	3113A06717	2010-08-12	2011-08-11
Amplifier	Agilent	8447D	3444D07855	2010-08-12	2011-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2010-08-12	2011-08-11
Horn Antenna	A.H. System	HF906	100013	2010-08-12	2011-08-11
Dipole Antenna	COM POWER	AD-100	05100	2010-08-12	2011-08-11
Base Station	ROHDE& SCHWARZ	CMU200	109038	2010-07-21	2011-07-20
Signal Generator	HP	HP84657A	2479S63205	2010-07-21	2011-07-20

6.6 Test Data

ERP Power Cellular Band (Part 22H)

Indicated		Table Angle Degree	Test Antenna		Substituted			Antenna Gain Correction (dBd)	Cable Loss (dB)	Absolute Level (dBm)	Part 22H
Frequency (MHz)	S.A. Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Polar (H/V)				Limit (dBm)
GSM 850 CH 128											
824.2	114.18	210	1.8	H	824.2	30.1	H	0	0.8	29.30	38.45
824.2	112.12	0	1.5	V	824.2	28.2	V	0	0.8	27.40	38.45
GSM 850 CH 190											
836.6	114.22	157	1.9	H	836.6	30.2	H	0	0.9	29.30	38.45
836.6	112.24	142	2.0	V	836.6	28.5	V	0	0.9	27.60	38.45
GSM 850 CH 251											
848.8	114.26	245	2.0	H	848.8	30.3	H	0	0.9	29.40	38.45
848.8	112.40	220	2.0	V	848.8	28.8	V	0	0.9	27.90	38.45

EIRP Power PCS Band (Part 24E)

Indicated		Table Angle Degree	Test Antenna		Substituted			Antenna Gain Correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Part 22H
Frequency (MHz)	S.A. Reading (dBμV)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Polar (H/V)				Limit (dBm)
PCS 1900 CH 512											
1850.2	95.01	45	1.4	H	1850.2	20.1	H	6.2	1.11	25.19	33
1850.2	92.32	156	1.5	V	1850.2	17.2	V	6.2	1.11	22.29	33
PCS 1900 CH 661											
1880.0	95.25	351	1.2	H	1880.0	20.4	H	6.2	1.11	25.49	33
1880.0	92.56	278	1.0	V	1880.0	17.5	V	6.2	1.11	22.59	33
PCS 1900 CH 810											
1909.8	95.49	320	1.9	H	1909.8	20.6	H	6.2	1.11	25.69	33
1909.8	92.91	82	1.1	V	1909.8	17.9	V	6.2	1.11	22.99	33

6. Occupied Bandwidth

7.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 2: 2.1049

FCC Part 22H : 22.913 (a)

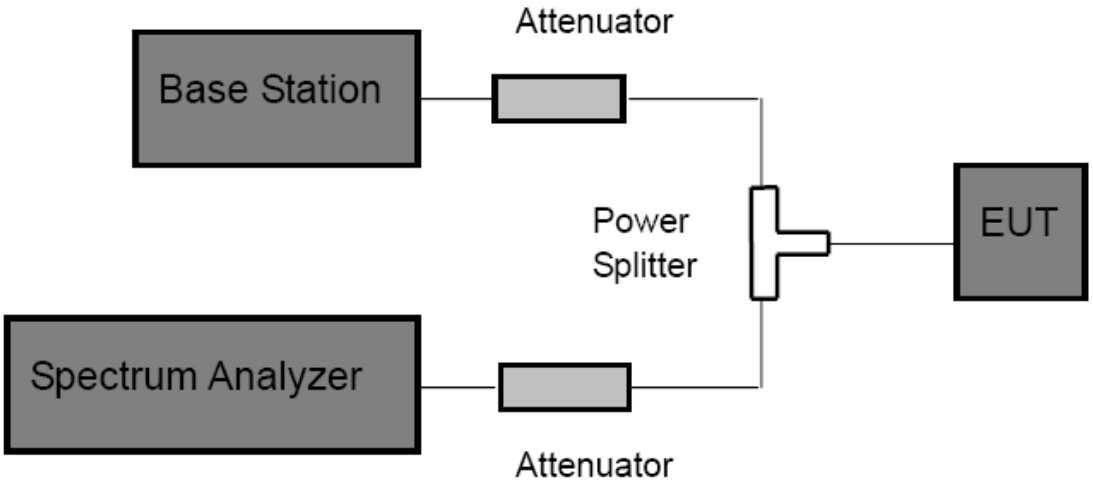
FCC Part 24E: 24.232 (c)

5.1.2 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.

7.2 Test Setup



7.3 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. For testing, set RBW=30 kHz, VBW=100 kHz

(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.

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 Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2010-08-12	2011-08-11
Attenuator	Agilent	8504B	M368574	2010-07-21	2011-07-20
Attenuator	Agilent	8504B	M368575	2010-07-21	2011-07-20
Power Splitter	Anritsu	K240C	06872	2010-08-12	2011-08-11
Amplifier	Agilent	8447F	3113A06717	2010-08-12	2011-08-11
Amplifier	Agilent	8447D	3444D07855	2010-08-12	2011-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2010-08-12	2011-08-11
Base Station	ROHDE& SCHWARZ	CMU200	109038	2010-07-21	2011-07-20
Signal Generator	HP	HP84657A	2479S63205	2010-07-21	2011-07-20

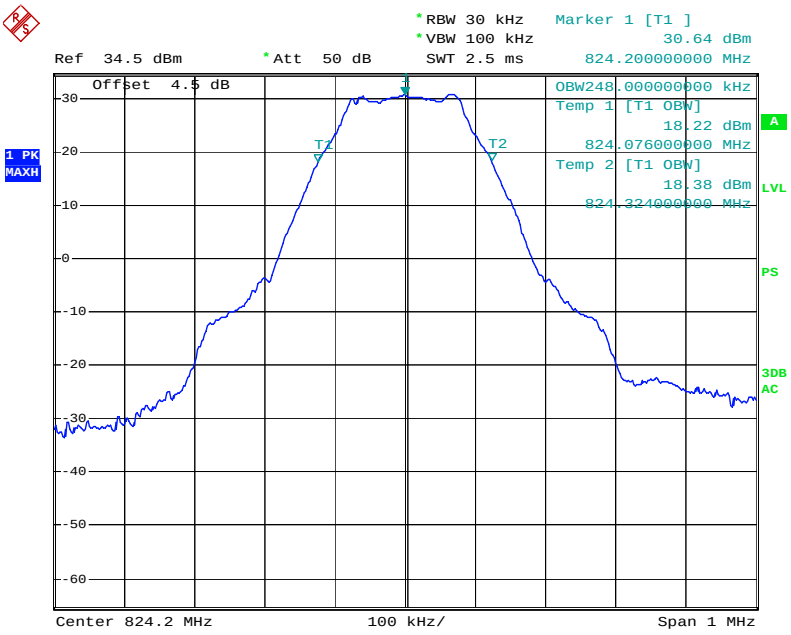
7.6 Test Data

EUT: Vehicle GPS Tracking Terminal			Model: FL-2000G	
Temperature: 24			Humidity: 55%	
Power Supply: DC 12V			Test Engineer: Allen	
Mode	**Channel**	**Frequency**	**99% Occupied Bandwidth (kHz)**	**-26dBc Bandwidth (kHz)**
GSM 850	128	824.2 MHz	248.000	334.000
	190	836.6 MHz	252.000	336.000
	251	848.8 MHz	248.000	334.000
PCS 1900	512	1850.2 MHz	248.000	336.000
	661	1880.0 MHz	252.000	332.000
	810	1909.8 MHz	248.000	334.000

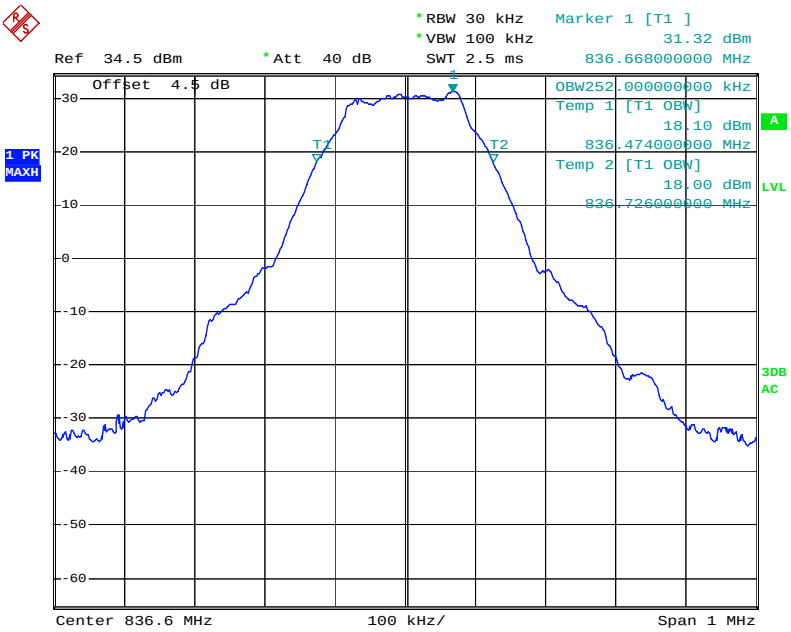
Please refer the follow plots:

GSM 850 CH 128

99% OBW

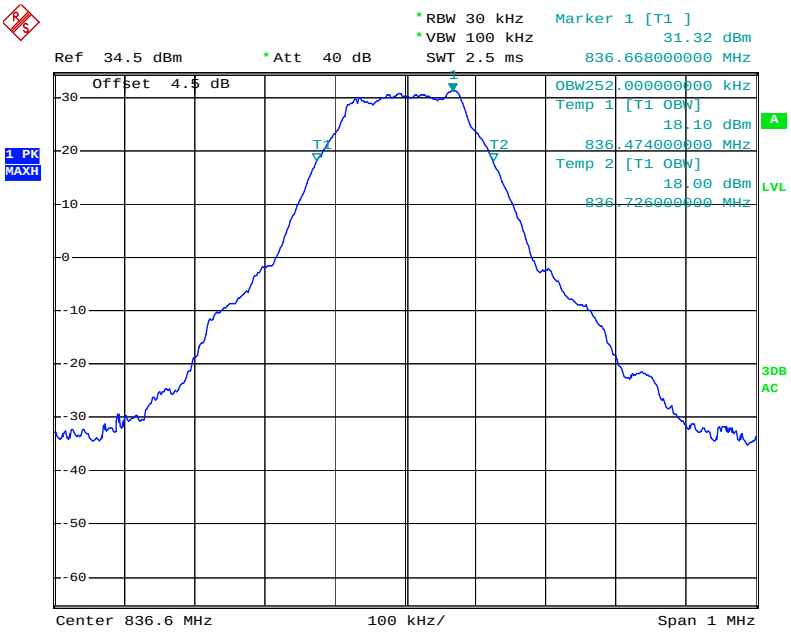


-26 dB Bandwidth

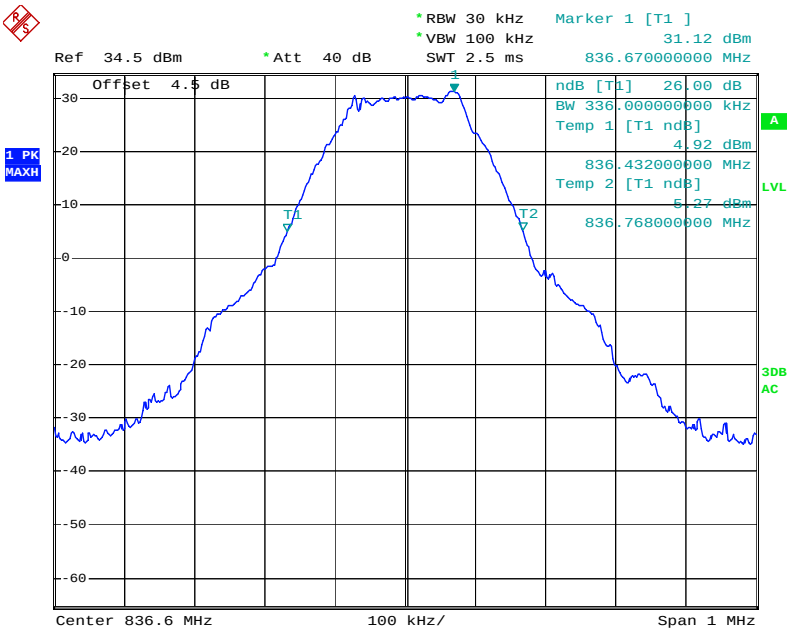


GSM 850 CH 190

99% OBW

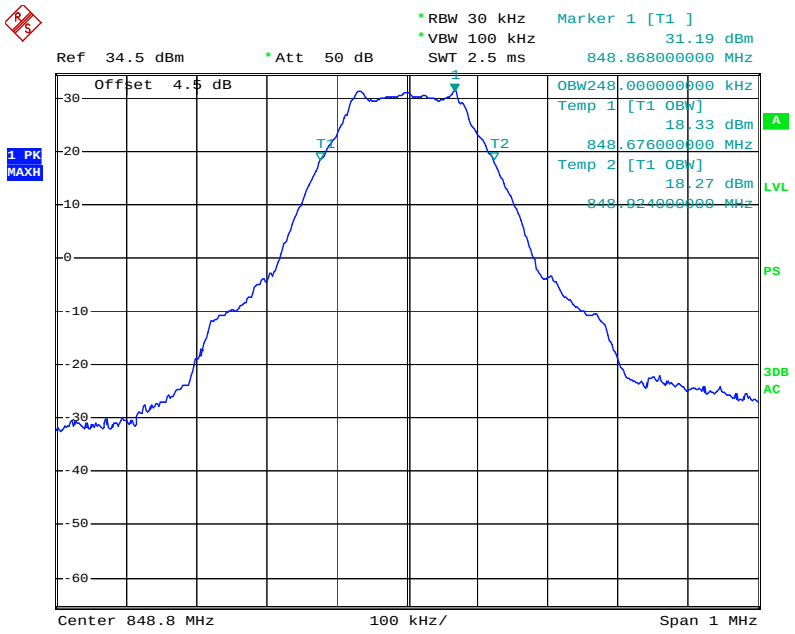


-26 dB Bandwidth

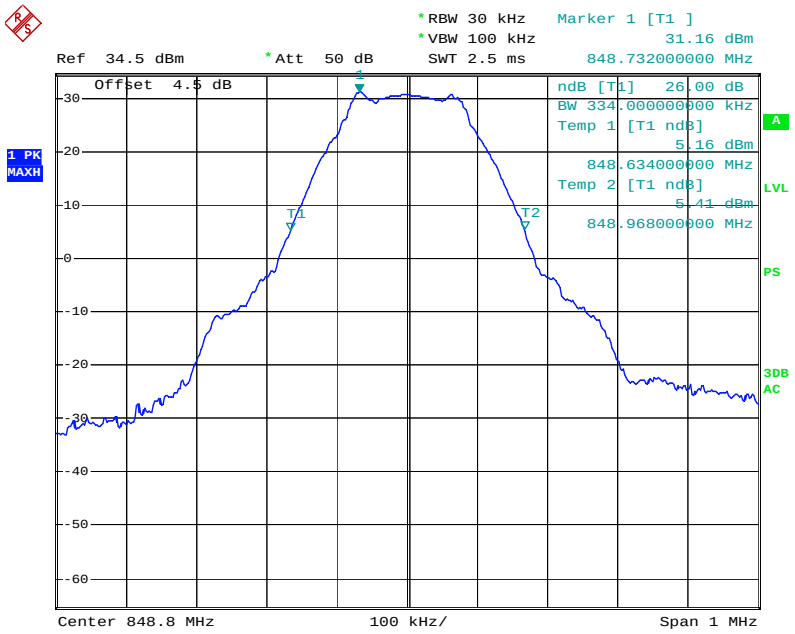


GSM 850 CH 251

99% OBW

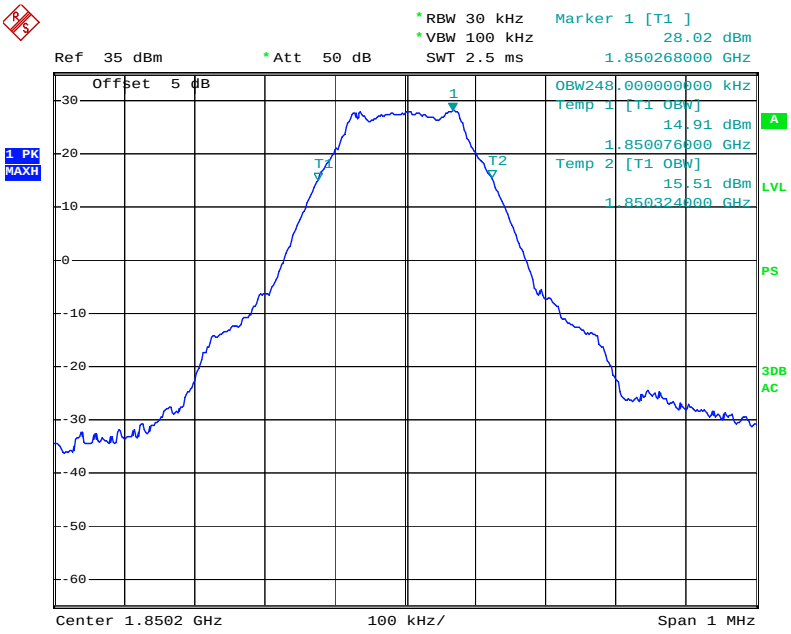


-26 dB Bandwidth

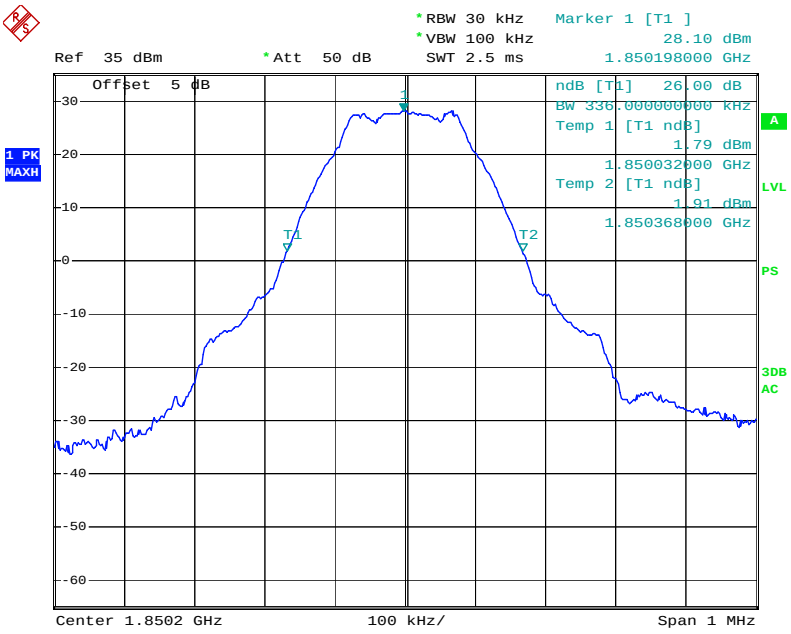


PCS 1900 CH 512

99% OBW

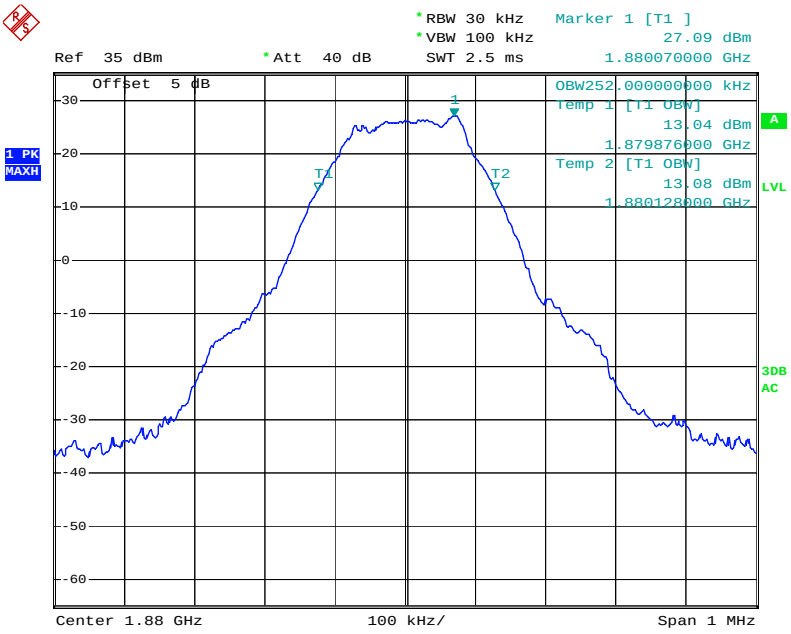


-26 dB Bandwidth

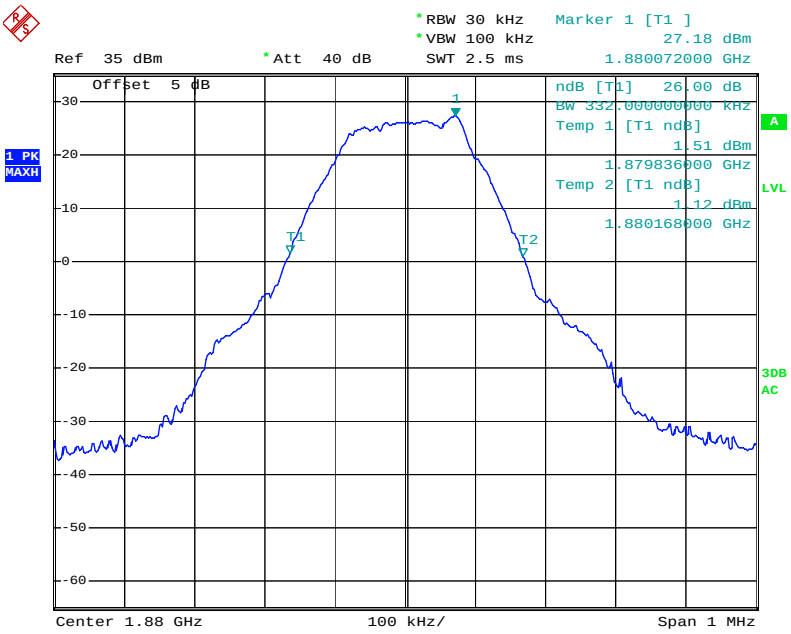


PCS 1900 CH 661

99% OBW

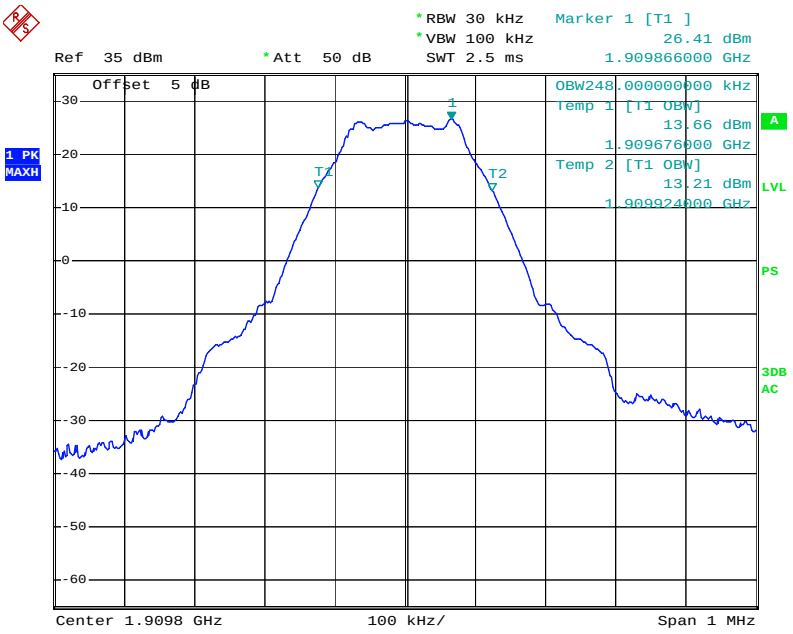


-26 dB Bandwidth

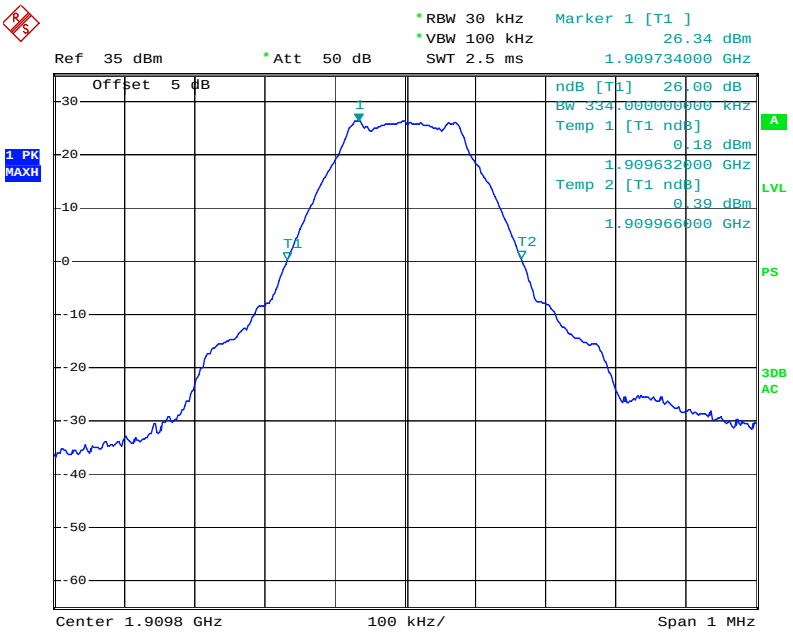


PCS 1900 CH 810

99% OBW



-26 dB Bandwidth



7. Conducted Out of Band Emissions

8.1 Test Standard and Limit

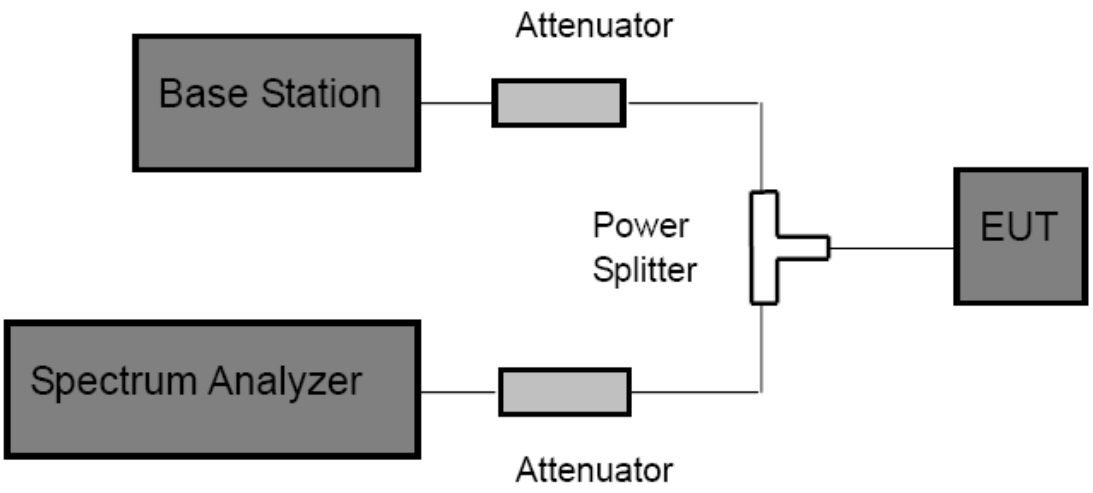
8.1.1 Test Standard

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

8.1.2 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.

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) 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.

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 Equipment

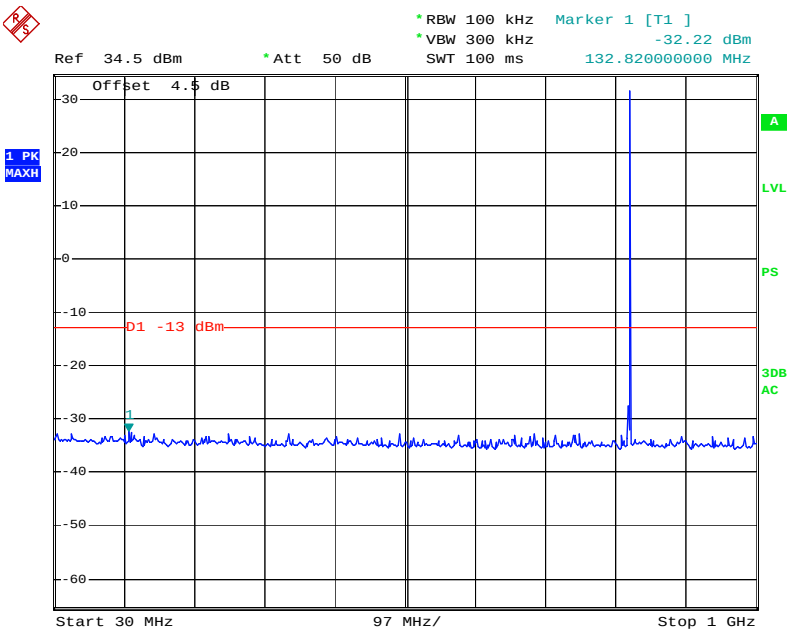
Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2010-08-12	2011-08-11
Attenuator	Agilent	8504B	M368574	2010-07-21	2011-07-20
Attenuator	Agilent	8504B	M368575	2010-07-21	2011-07-20
Power Splitter	Anritsu	K240C	06872	2010-08-12	2011-08-11
Amplifier	Agilent	8447F	3113A06717	2010-08-12	2011-08-11
Amplifier	Agilent	8447D	3444D07855	2010-08-12	2011-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2010-08-12	2011-08-11
Base Station	ROHDE& SCHWARZ	CMU200	109038	2010-07-21	2011-07-20
Signal Generator	HP	HP84657A	2479S63205	2010-07-21	2011-07-20

8.6 Test Data

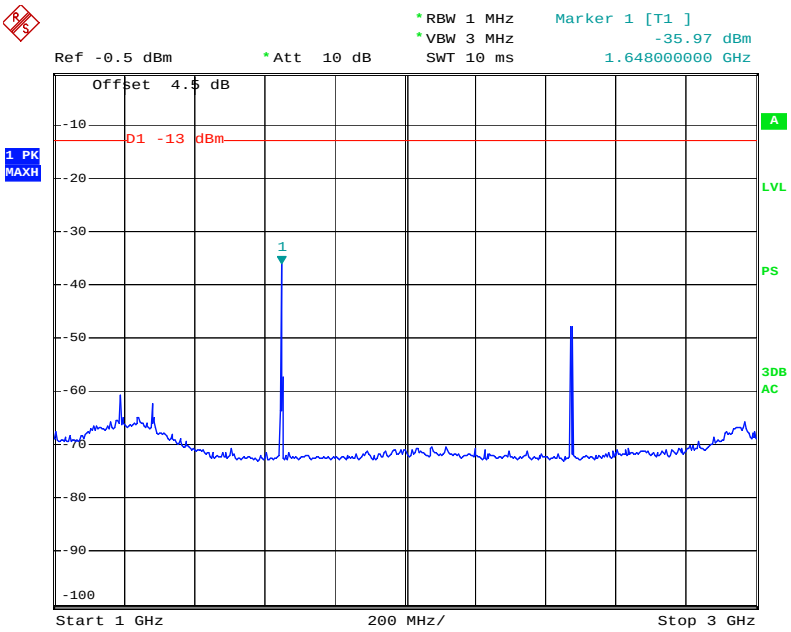
Please refer following plots:

GSM 850 CH 128

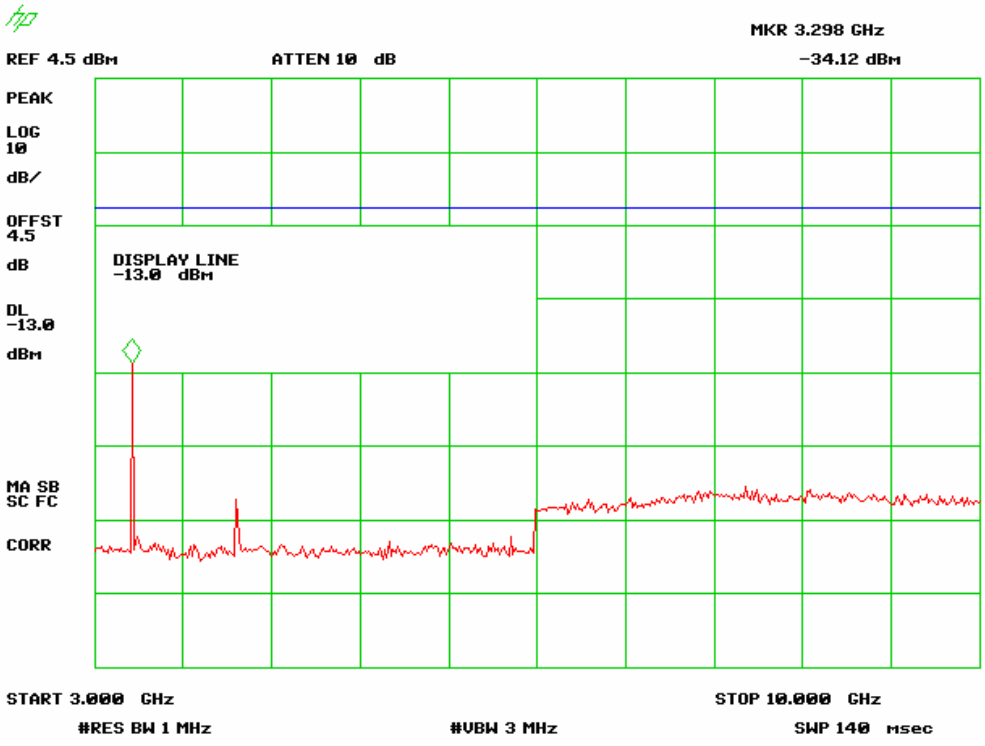
30MHz~1GHz



1 GHz~3 GHz

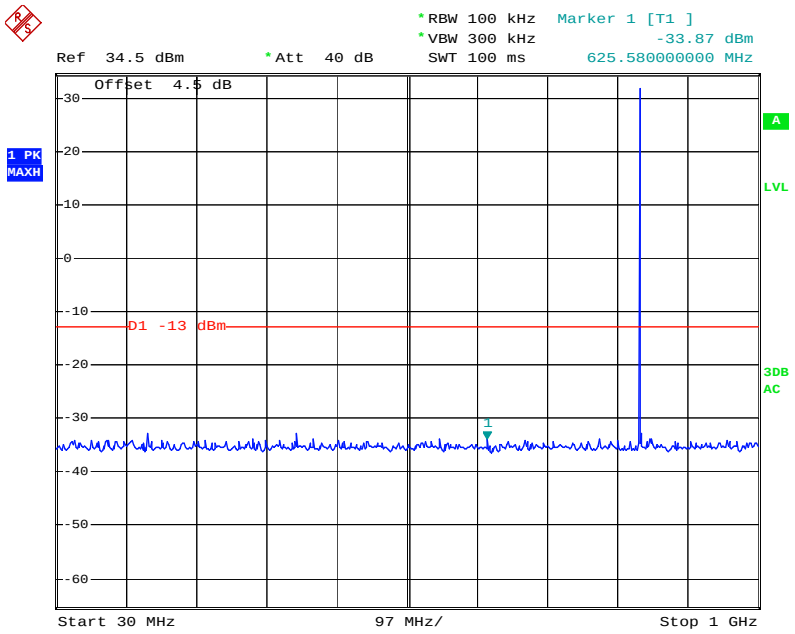


3 GHz~10 GHz

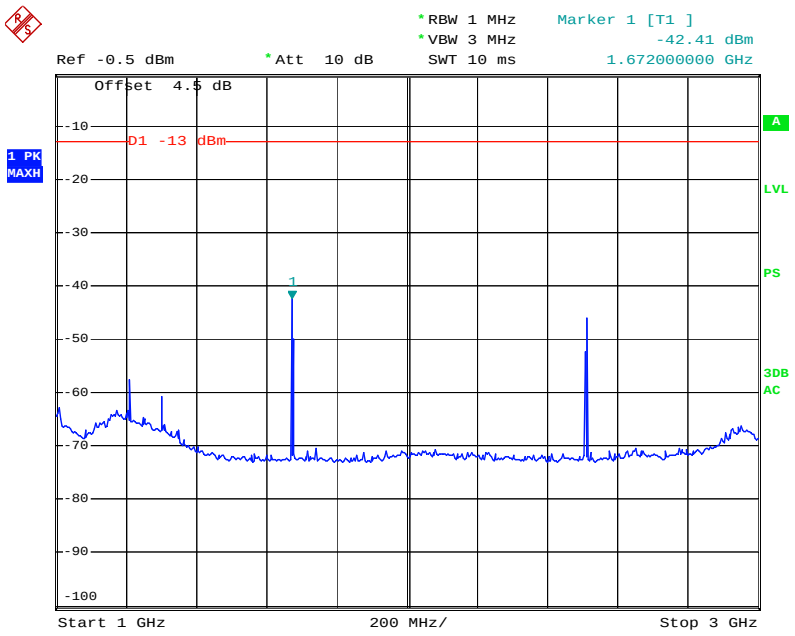


GSM 850 CH 190

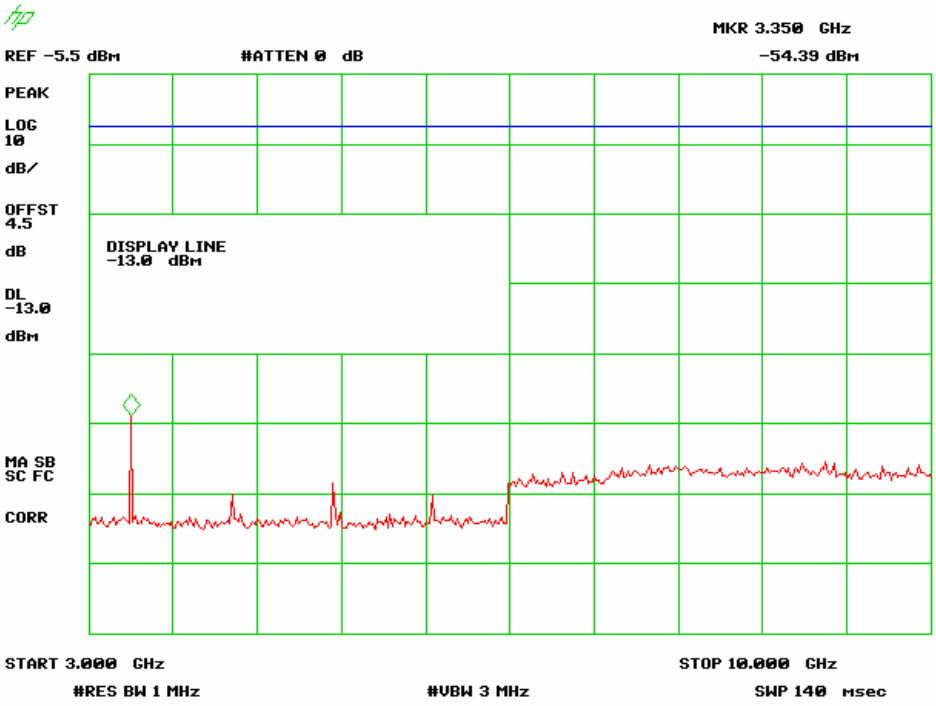
30MHz~1GHz



1 GHz~3 GHz

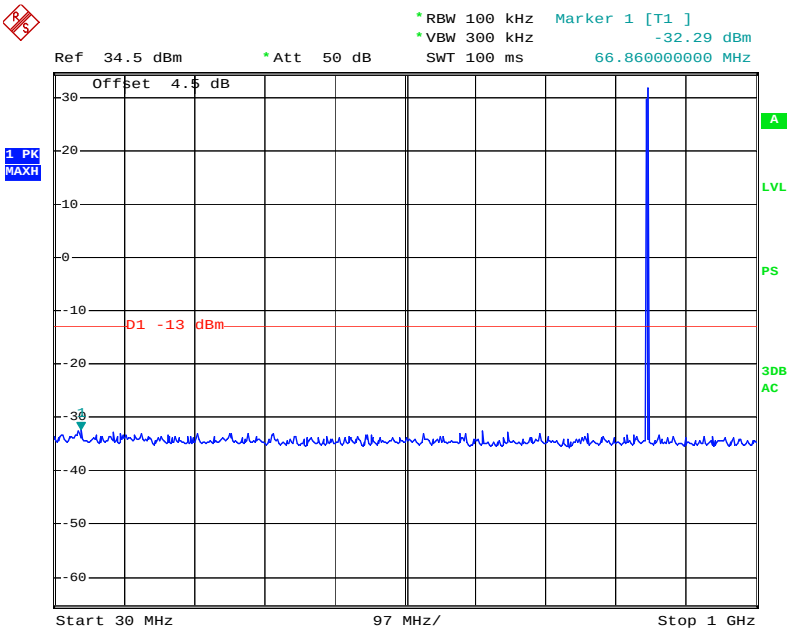


3 GHz~10 GHz

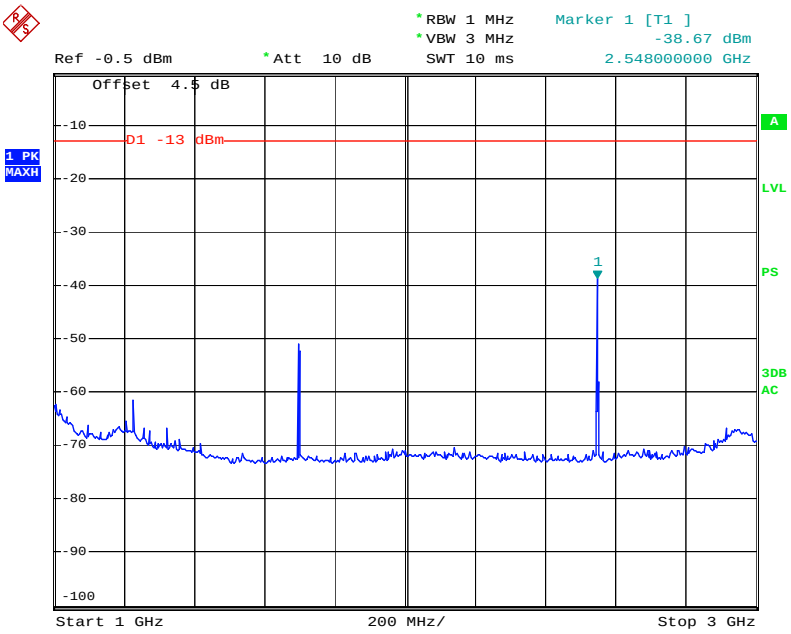


GSM 850 CH 251

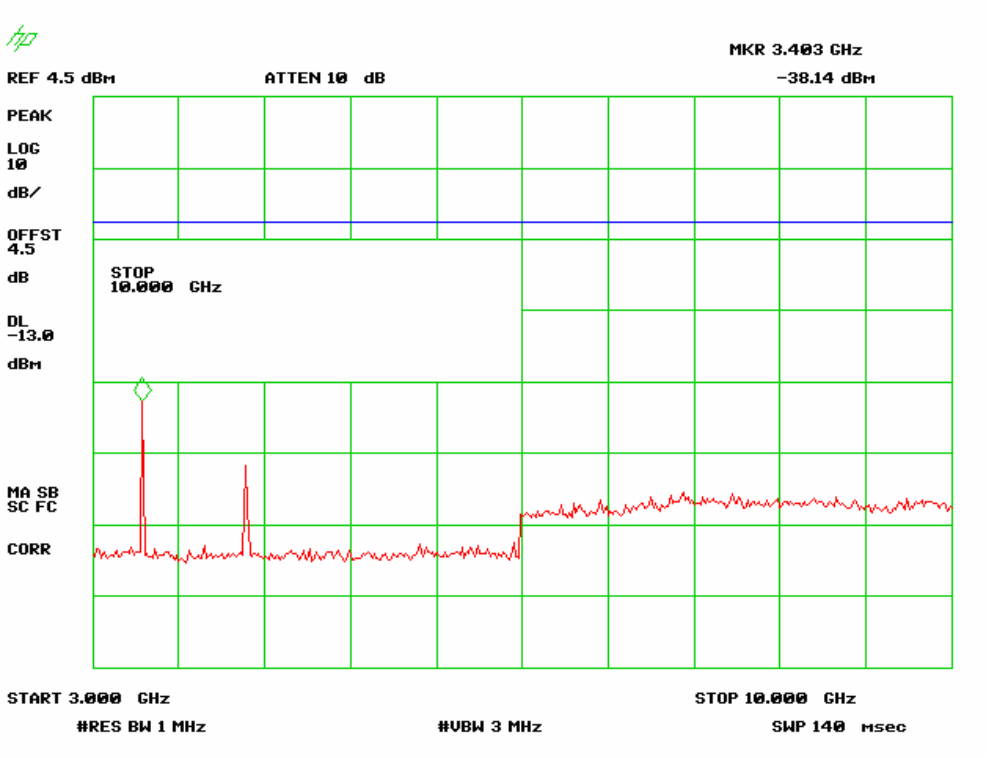
30MHz~1GHz



1 GHz~3 GHz

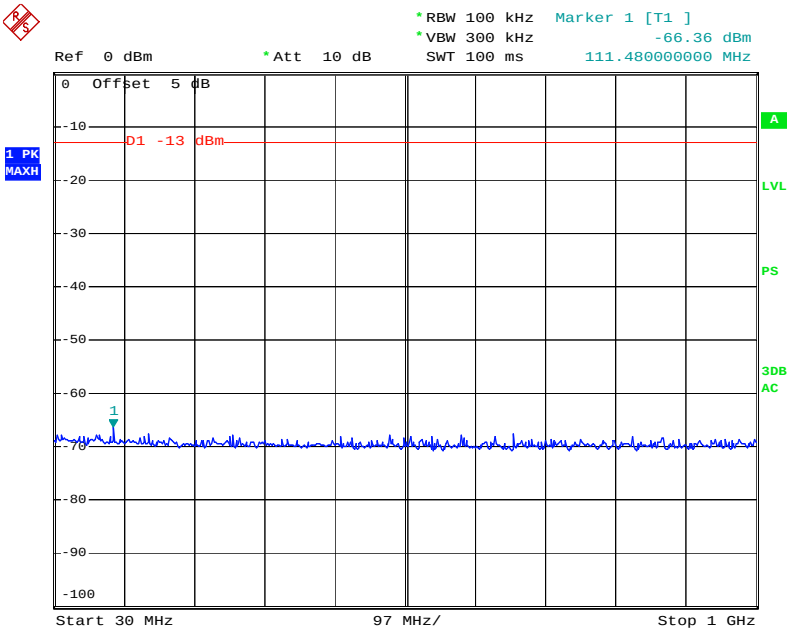


3 GHz~10 GHz

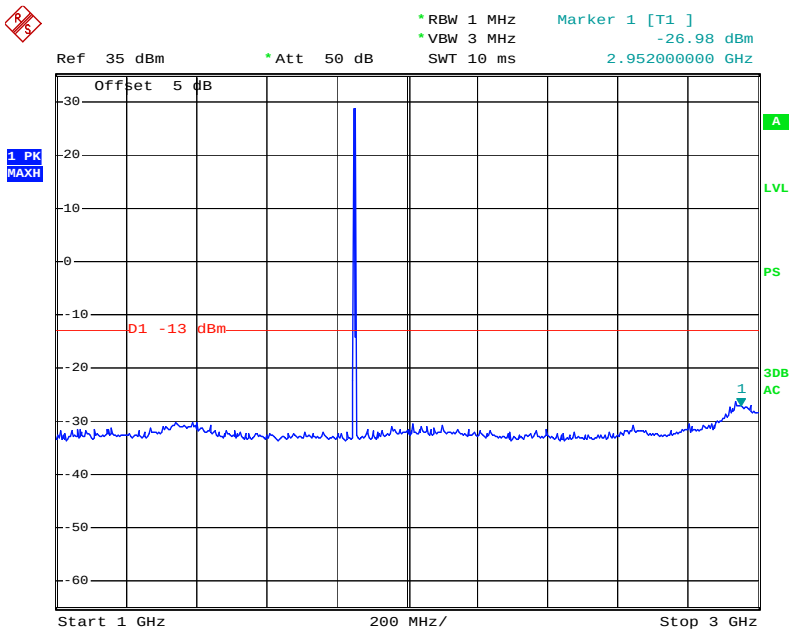


PCS 1900 CH 512

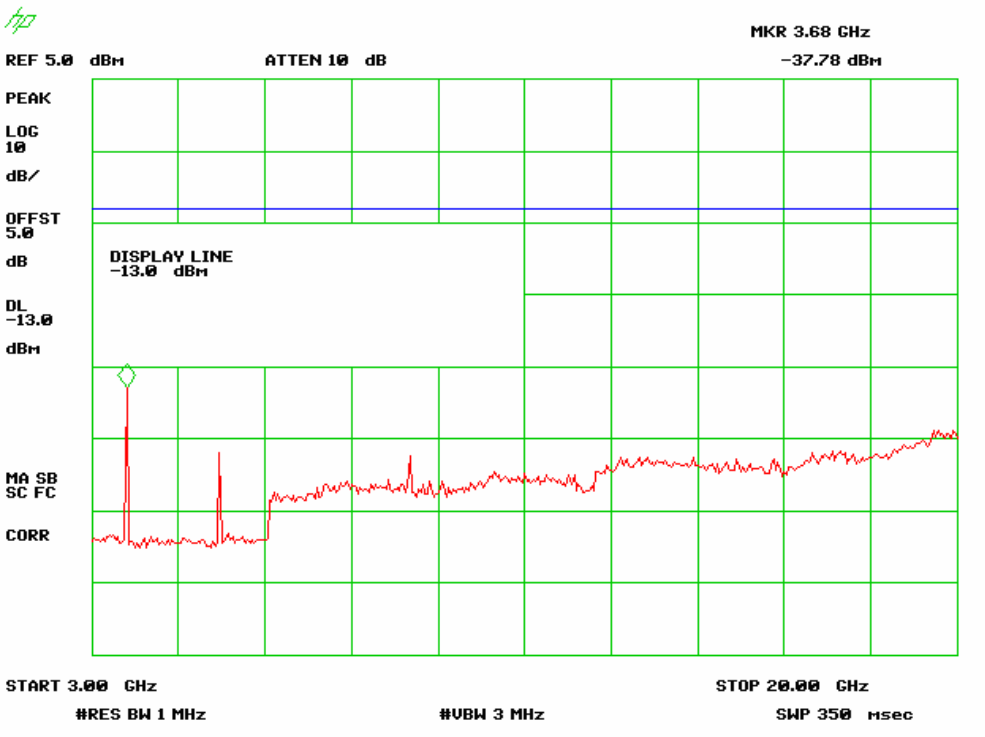
30M~1GHz



1 GHz~3 GHz

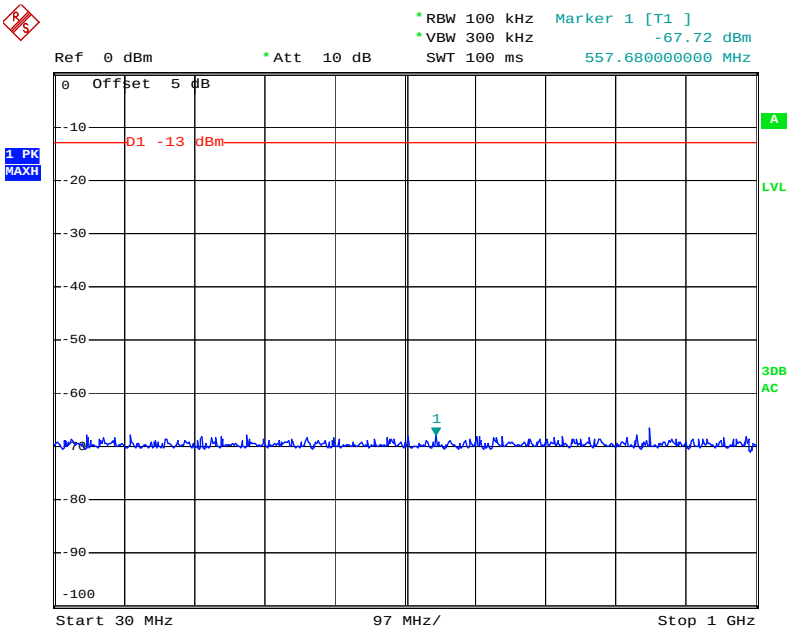


3 GHz~20 GHz

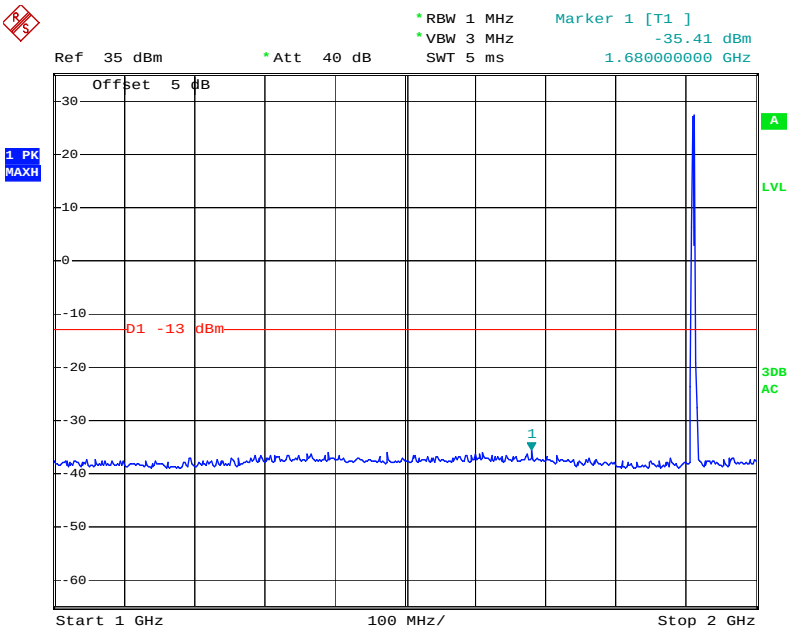


PCS 1900 CH 661

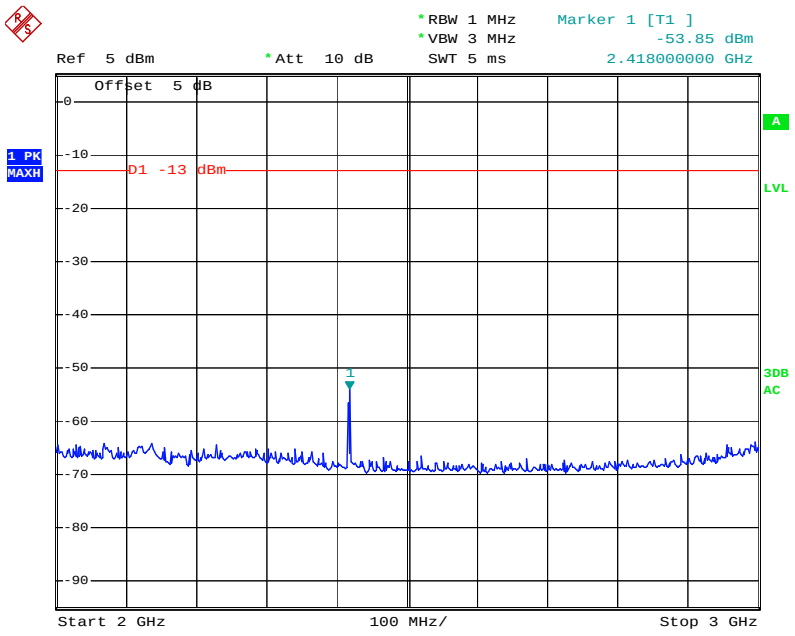
30MHz~1GHz



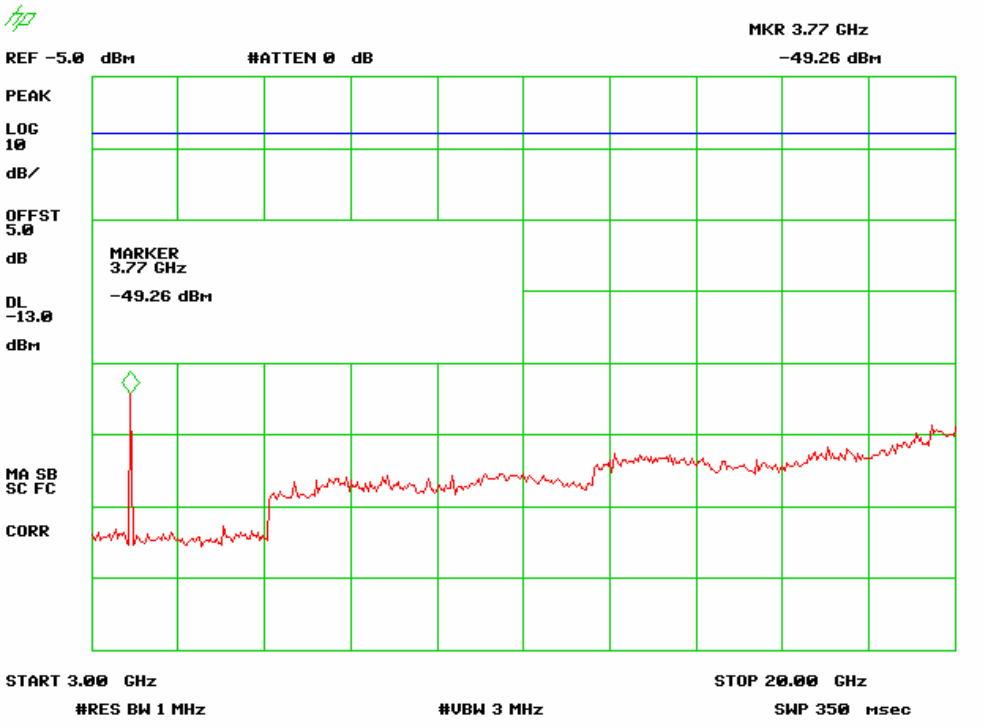
1GHz~2GHz



2GHz~3GHz

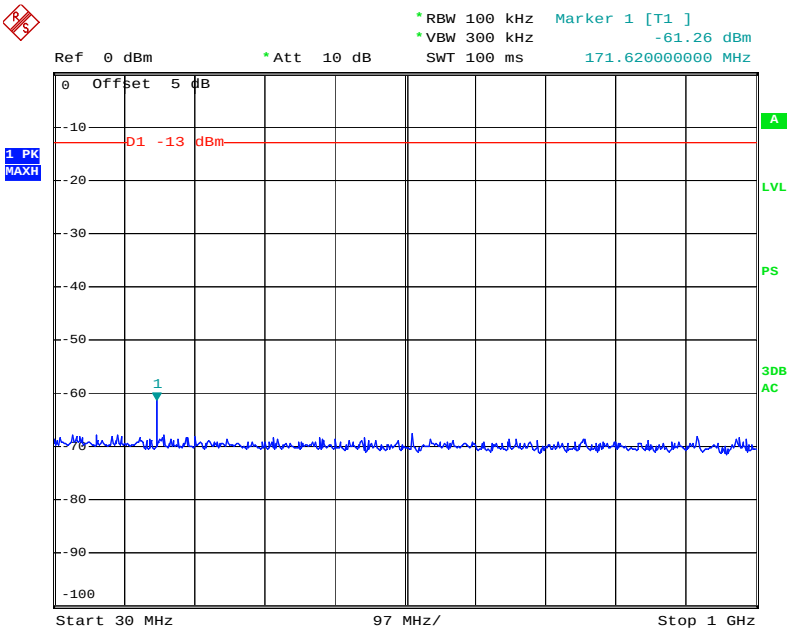


3GHz~20 GHz

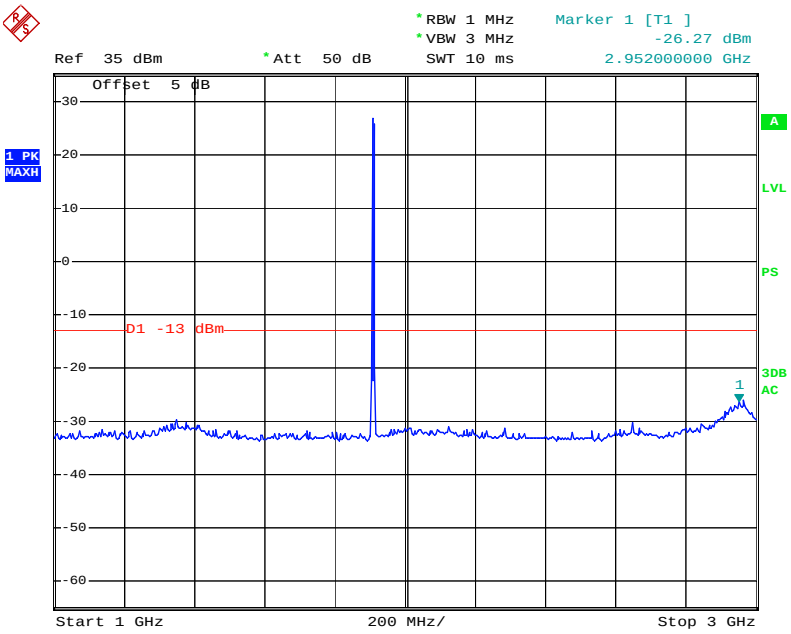


PCS 1900 CH 810

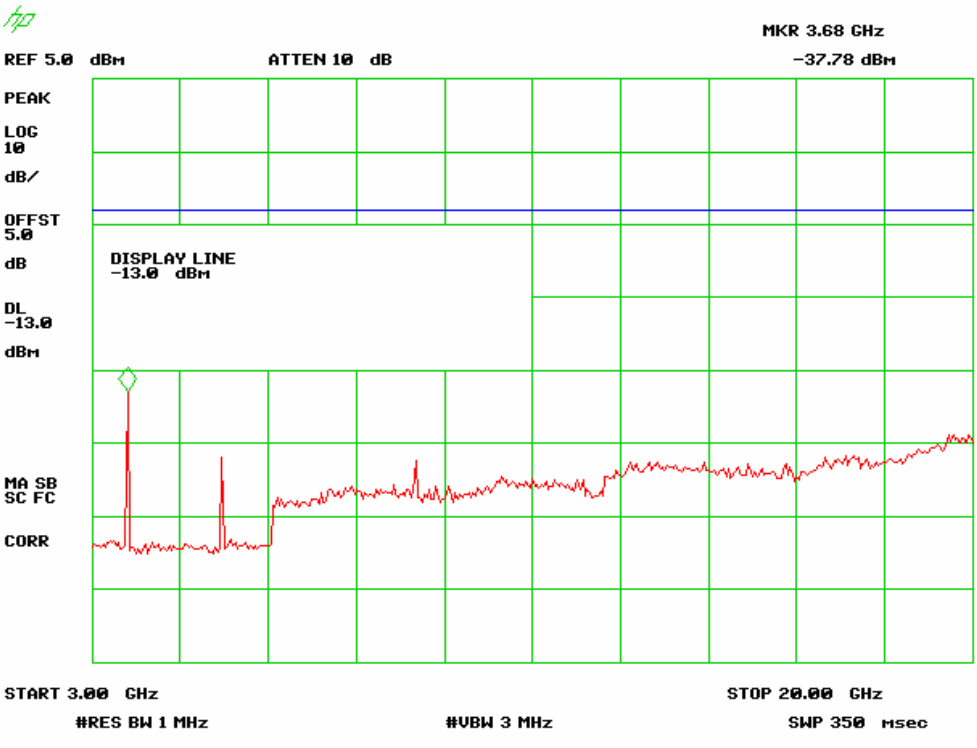
30MHz~1GHz



1 GHz~3 GHz



3 GHz~20 GHz


MKR 3.68 GHz
REF 5.0 dBm
ATTEN 10 dB
-37.78 dBm
PEAK
LOG
10
dB/
OFFST
5.0
dB
DISPLAY LINE
-13.0 dBm
DL
-13.0
dBm
MA SB
SC FC
CORR
START 3.00 GHz
STOP 20.00 GHz
#RES BW 1 MHz
#VBW 3 MHz
SWP 350 msec

8. Band Edge Test

9.1 Test Standard and Limit

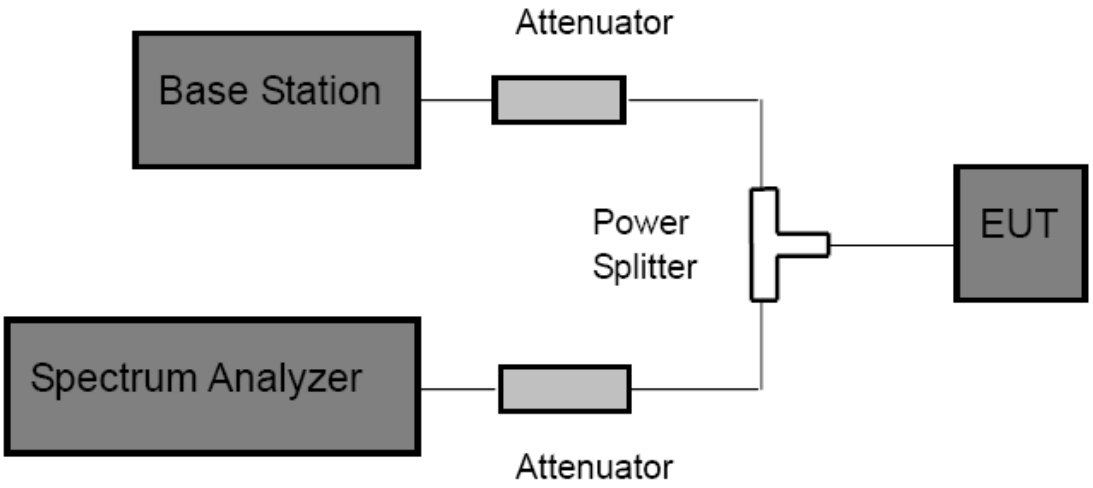
9.1.1 Test Standard

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:
RBW=3 kHz, VBW=10 kHz, Span 2 MHz, Detector: Peak Mode.
(3) The band edges of low and high channels for the highest RF powers were measured.

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 Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2010-08-12	2011-08-11
Attenuator	Agilent	8504B	M368574	2010-07-21	2011-07-20
Attenuator	Agilent	8504B	M368575	2010-07-21	2011-07-20
Power Splitter	Anritsu	K240C	06872	2010-08-12	2011-08-11
Amplifier	Agilent	8447F	3113A06717	2010-08-12	2011-08-11
Amplifier	Agilent	8447D	3444D07855	2010-08-12	2011-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2010-08-12	2011-08-11
Base Station	ROHDE& SCHWARZ	CMU200	109038	2010-07-21	2011-07-20
Signal Generator	HP	HP84657A	2479S63205	2010-07-21	2011-07-20

8.6 Test Data

EUT: Vehicle GPS Tracking Terminal	Model: FL-2000G
Temperature: 24	Humidity: 55%
Power Supply: DC 12V	Test Engineer: Allen

Band Edge Test

GSM 850

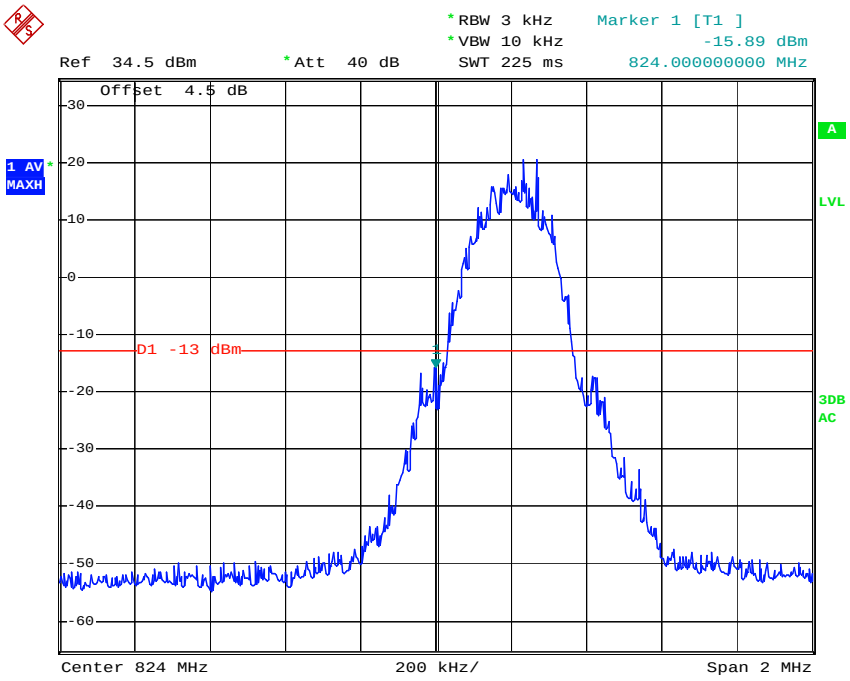
Frequency(MHz)	Emission	Limit(dBm)
824.0000	-15.89	-13
849.0160	-14.75	-13

PCS 1900

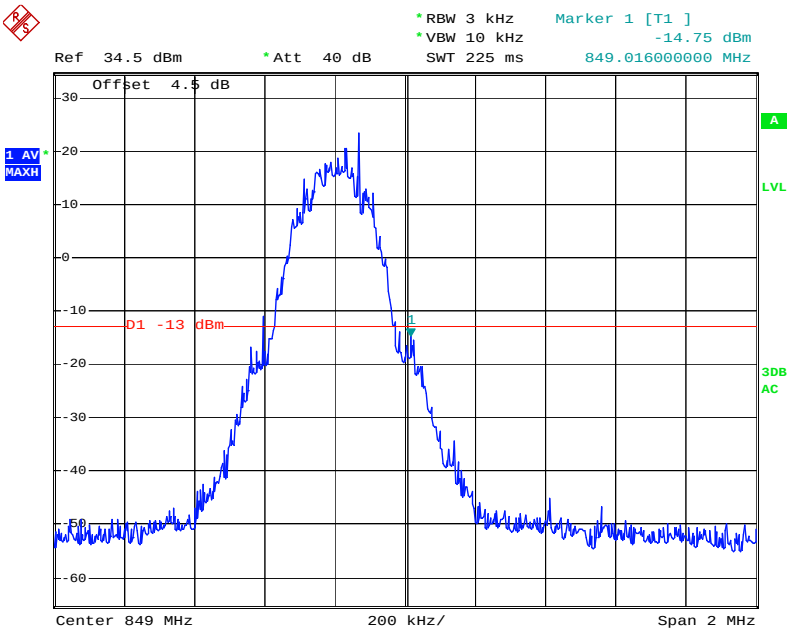
Frequency(MHz)	Emission	Limit(dBm)
1850.0000	-18.20	-13
1910.0200	-20.42	-13

Please refer the following plots:

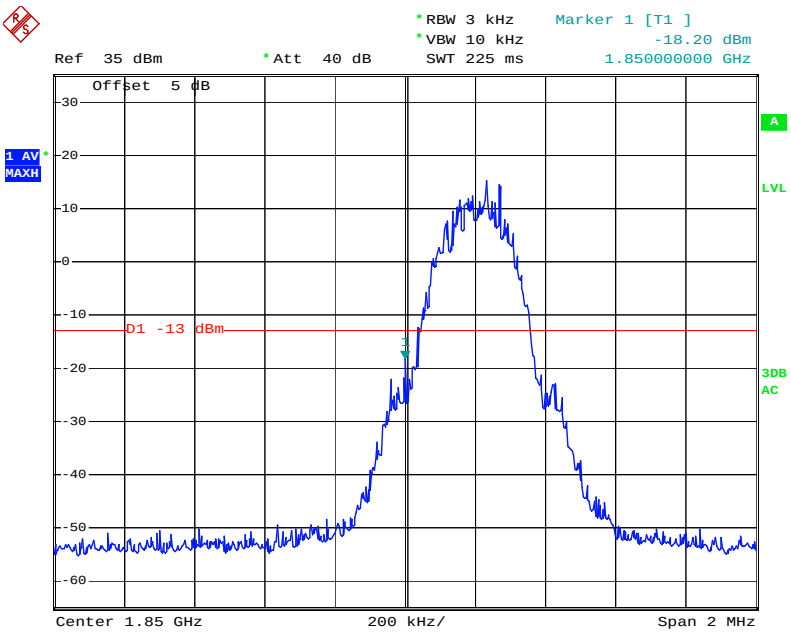
Plot 1: GSM 850 CH 128



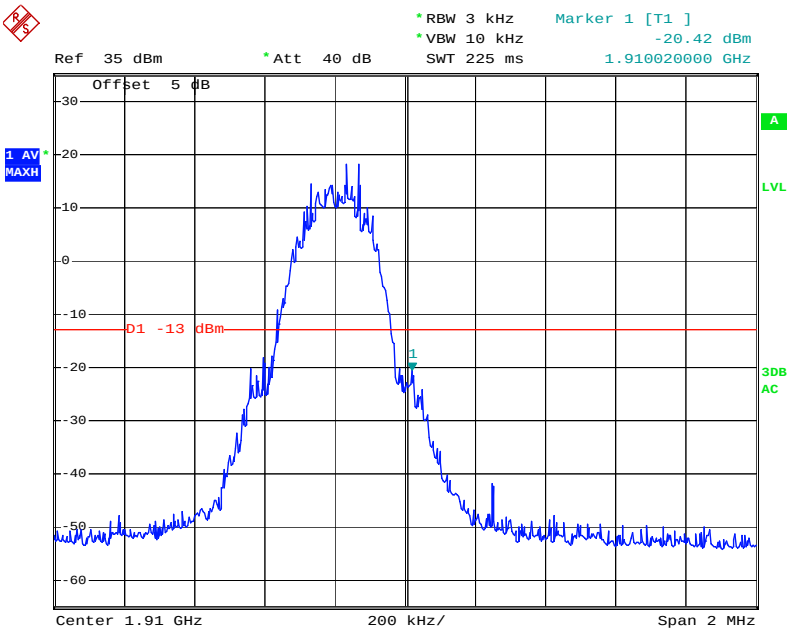
Plot 2: GSM 850 CH 251



Plot 3: PCS 1900 CH 512



Plot 4: PCS 1900 CH 810



9. Radiated Out Band of Emissions

10.1 Test Standard and Limit

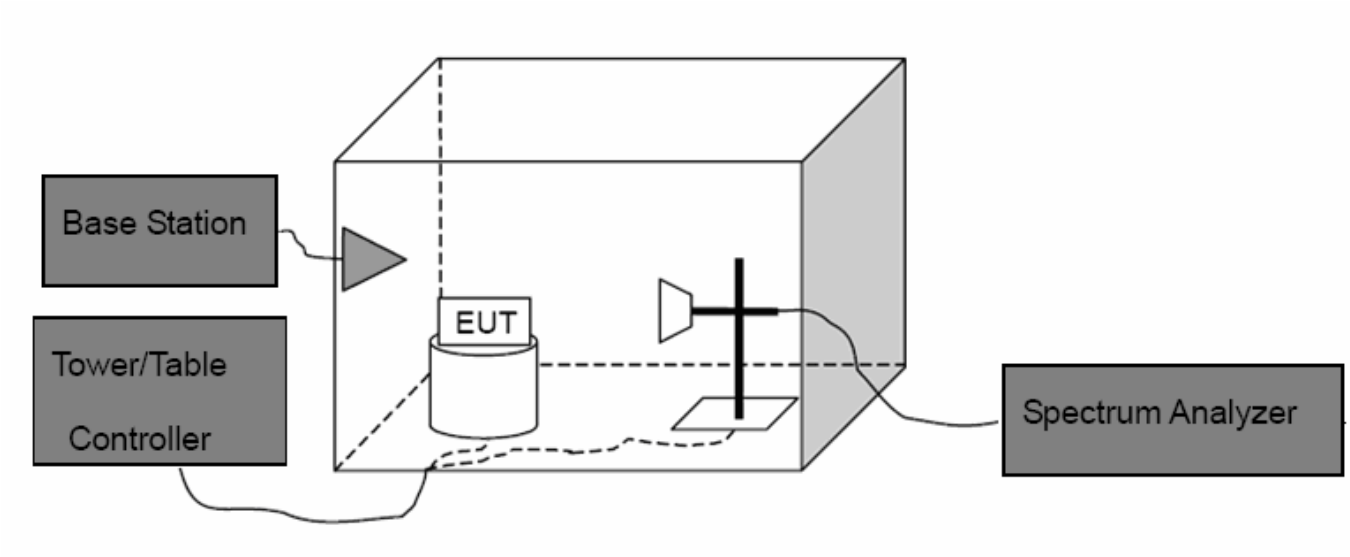
10.1.1 Test Standard

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

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 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)

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 Equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2010-08-12	2011-08-11
Sunol Sciences	Broadband Antenna	JB1	A05261	2010-08-12	2011-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2010-08-12	2011-08-11
Sunol Sciences	Horn Antenna	KRH-118	A05247	2010-08-12	2011-08-11
Attenuator	Agilent	8504B	M368574	2010-07-21	2011-07-20
Attenuator	Agilent	8504B	M368575	2010-07-21	2011-07-20
Power Splitter	Anritsu	K240C	06872	2010-08-12	2011-08-11
Amplifier	Agilent	8447F	3113A06717	2010-08-12	2011-08-11
Amplifier	Agilent	8447D	3444D07855	2010-08-12	2011-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2010-08-12	2011-08-11
Horn Antenna	A.H. System	HF906	100013	2010-08-12	2011-08-11
Dipole Antenna	COM POWER	AD-100	05100	2010-08-12	2011-08-11
Base Station	ROHDE& SCHWARZ	CMU200	109038	2010-07-21	2011-07-20
Signal Generator	HP	HP84657A	2479S63205	2010-07-21	2011-07-20

10.6 Test Data

Indicated		Table	Test Antenna		Substituted			Cable	Absolute	Limit	Margin
Frequency (MHz)	Amp. (dBuV)	Angle Degree	Height (M)	Polar H/V	Frequency (MHz)	Level (dBm)	Antenna Gain Correction	Loss (dB)	Level (dBm)	(dBm)	(dB)
GSM 850 Bellow 1G											
High Channel											
144.42	45.42	150	1.7	V	144.42	-51.2	0	0.68	-51.88	-13	38.88
790.56	44.80	220	1.6	V	790.56	-52.4	0	0.76	-53.16	-13	40.16
144.42	41.68	118	1.8	H	144.42	-55.3	0	0.68	-55.98	-13	42.98
790.56	40.95	145	1.9	H	790.56	-55.8	0	0.76	-56.56	-13	43.56
Low Channel											
790.56	43.85	148	1.8	V	790.56	-53.0	0	0.76	-53.76	-13	40.76
790.56	40.52	52	1.0	H	790.56	-56.2	0	0.76	-56.96	-13	43.96
Middle Channel											
790.56	43.24	8	1.7	V	790.56	-53.4	0	0.76	-54.16	-13	41.16
790.56	40.32	85	1.2	H	790.56	-56.7	0	0.76	-57.46	-13	44.46
GSM 850 Above 1G											
High Channel											
1697.6	53.09	232	2.0	H	1697.6	-43.5	6.2	0.94	-38.24	-13	25.24
1697.6	56.15	277	1.5	V	1697.6	-40.2	6.2	0.94	-34.94	-13	21.94
2546.4	50.32	120	1.8	H	2546.4	-46.4	7.3	1.19	-40.29	-13	27.29
2546.4	55.42	56	1.3	V	2546.4	-41.3	7.3	1.19	-35.19	-13	22.19
3395.2	50.21	176	1.7	H	3395.2	-46.7	6.7	1.38	-41.38	-13	28.38
3395.2	54.45	200	1.2	V	3395.2	-42.1	6.7	1.38	-36.78	-13	23.78
Low Channel											
1648.4	54.85	148	1.8	V	1648.4	-41.7	6.2	0.94	-42.64	-13	29.64
1648.4	50.52	52	1.0	H	1648.4	-46.2	6.2	0.94	-47.14	-13	34.14
Middle Channel											
1673.2	55.24	8	1.7	V	1673.2	-41.5	6.2	0.94	-42.44	-13	29.44
1673.2	50.32	85	1.2	H	1673.2	-46.4	6.2	0.94	-47.34	-13	34.34

Indicated		Table	Test Antenna		Substituted			Cable	Absolute	Limit	Margin
Frequency (MHz)	Amp. (dBuV)	Angle Degree	Height (M)	Polar H/V	Frequency (MHz)	Level (dBm)	Antenna Gain Correction	Loss (dB)	Level (dBm)	(dBm)	(dB)
PCS 1900 Bellow 1G											
High Channel											
704.78	44.79	0	1.2	V	705.52	-52.4	0	0.70	-53.10	-13	40.10
772.65	45.98	102	1.3	V	763.40	-50.8	0	0.76	-51.56	-13	38.56
704.78	41.56	158	1.8	H	709.25	-55.5	0	0.70	-56.20	-13	43.20
772.65	41.23	77	1.6	H	765.32	-55.9	0	0.76	-56.66	-13	43.66
Low Channel											
772.65	44.05	108	1.8	V	772.65	-52.7	0	0.76	-53.46	-13	40.46
772.65	40.12	32	1.0	H	772.65	-56.9	0	0.76	-57.66	-13	44.66
Middle Channel											
772.65	44.98	18	1.7	V	772.65	-51.7	0	0.76	-52.46	-13	39.46
772.65	40.58	55	1.2	H	772.65	-56.5	0	0.76	-57.26	-13	44.26
PCS 1900 Above 1G											
High Channel											
3819.6	51.21	221	2.0	H	3819.6	-45.2	6.9	1.47	-39.77	-13	26.77
3819.6	55.32	222	2.1	V	3819.6	-41.4	6.9	1.47	-35.97	-13	22.97
5729.4	55.65	251	1.6	H	5729.4	-41.1	8.3	1.76	-34.56	-13	21.56
5729.4	57.24	201	1.4	V	5729.4	-39.8	8.3	1.76	-33.26	-13	20.26
7639.2	55.57	173	2.1	H	7639.2	-41.2	7.6	2.09	-35.69	-13	22.69
7639.2	53.33	71	1.5	V	7639.2	-43.4	7.6	2.09	-37.89	-13	24.89
Low Channel											
3700.4	54.25	57	1.9	V	3700.4	-42.6	6.1	0.92	-43.52	-13	30.52
3700.4	50.45	145	1.1	H	3700.4	-46.1	6.1	0.92	-47.02	-13	34.02
Middle Channel											
3819.6	54.32	98	1.2	V	3819.6	-42.3	6.4	1.00	-43.3	-13	30.3
3819.6	50.64	54	1.5	H	3819.6	-45.9	6.4	1.00	-46.9	-13	33.9