


<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>15069615 001</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	<b>154031076</b>	<b>Seite 1 von 48</b> <i>Page 1 of 48</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	<b>405064</b>	<b>Auftragsdatum:</b> <i>Order date:</i>	<b>15.07.2013</b>	
<b>Auftraggeber:</b> <i>Client:</i>	<b>Shanghai Huace Navigation Technology Ltd.</b> Floor 5, Building 35 No. 680 Guiping Road Shanghai 200223 P.R. China			
<b>Prüfgegenstand:</b> <i>Test item:</i>	<b>Handheld GPS receiver</b>			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	<b>LT400XY</b> FCC ID :SY4-B01003			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	<b>Complete test</b>			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	<b>47 CFR Part 2</b> 47 CFR Part 22 Subpart H 47 CFR Part 24 Subpart E ANSI C63.4-2009 ANSI/TIA/EIA-603-C-2004			
<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>	<b>19.07.2013</b>			
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	<b>A02 and B02</b>			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	<b>09.08.2013 – 01.03.2014</b>			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	<b>QuieTek</b> Technology(Suzhou)Co., Ltd.			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	<b>TÜV Rheinland (Shanghai)</b> Co., Ltd.			
<b>Prüfresultat*:</b> <i>Test result*:</i>	<b>Pass</b>			
<b>geprüft von / tested by:</b>	<b>Adrian Shi</b>	<b>kontrolliert von / reviewed by:</b>	<b>Sam Lin</b>	
<b>31.03.2014</b>	<b>Adrian Shi / Project Engineer</b>	<b>31.03.2014</b>	<b>Sam Lin / Technical Certifier</b>	
<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>
				<b>Unterschrift</b> <i>Signature</i>
<b>Sonstiges / Other:</b>				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		<b>Prüfmuster vollständig und unbeschädigt</b> <i>Test item complete and undamaged</i>		
<p>* Legende: 1 = sehr gut      2 = gut      3 = befriedigend      4 = ausreichend      5 = mangelhaft  P(ass) = entspricht o.g. Prüfgrundlage(n)      F(ail) = entspricht nicht o.g. Prüfgrundlage(n)      N/A = nicht anwendbar      N/T = nicht getestet</p> <p>Legend: 1 = very good      2 = good      3 = satisfactory      4 = sufficient      5 = poor  P(ass) = passed a.m. test specification(s)      F(ail) = failed a.m. test specification(s)      N/A = not applicable      N/T = not tested</p>				
<p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b>  <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

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## TEST SUMMARY

**5.1.1 CONDUCTED OUTPUT POWER, FCC 2.1046, FCC 24.232(D)**

*RESULT: PASS*

**5.1.2 OCCUPIED BANDWIDTH, FCC 2.1049, FCC 22.917(A), FCC 24.238(A)**

**5.1.3 FREQUENCY STABILITY, FCC 2.1055, FCC 22.355, FCC 24.235**

*RESULT: PASS*

**5.1.4 CONDUCTED EMISSION, FCC 2.1051, FCC 22.917(A), FCC 24.238(A)**

*RESULT: PASS*

**5.1.5 BAND EDGE , FCC 2.1051, FCC 22.917(A), FCC 24.238(A)**

*RESULT: PASS*

**6.1.1 TRANSMITTER RADIATED POWER (EIRP/ERP), FCC 22.913(A)(2), FCC 24.232(C)**

*RESULT: PASS*

**6.1.2 FIELD STRENGTH OF SPURIOUS RADIATION, FCC 2.1053, FCC 22.917(A), FCC 24.238(A)**

*RESULT: PASS*

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## **1. General Remarks**

### **1.1 Complementary Materials**

All attachments are integral parts of this test report.

## **2. Test Sites**

### **2.1 Test Facilities**

QuieTek Technology(Suzhou)Co.,Ltd.  
No.99 Hongye RD.Suzhou Industnal Park Loufeng Hi-Tech Development  
Zone.,Suzhou,China

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facility, and has found these test facilities to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 800392.

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## 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**

Equipment	Model	Serial no.	Cal. due date
EMI Test Receiver	ESCI	100573	2014.04.18
Radio Communication Analyzer	MT8820C	6201026550	2014.04.19
PSA Series Spectrum Analyzer	E4440A	US42512082	2014.04.19
Power Splitter	11667A	/	2014.04.19
Spectrum Analyzer	N9010A	MY48030494	2014.04.18
System Simulator	CMU200	122449	2014.10.24
Bilog Antenna	CBL6112D	27611	2014.10.15
DRG Horn	ETS-Lindgren	3117	2015.01.21
Preamplifier	NSP1800-25	1364185	2014.05.04
Coaxial Cable	SUCOFLEX 106	AC2-C	2015.03.02
Temperature/Humidity Meter	ZC1-2	AC2-TH	2015.01.10
Spectrum Analyzer	FSP30	100192	2014.07.21
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	2015.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	2015.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	2015.03.01

## 2.3 Measurement Uncertainty

**Table 2: Emission Measurement Uncertainty**

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	±0.39dB
	> 1GHz	±0.68dB
Radiated Emission	30MHz - 1GHz	±5.34dB
	> 1GHz	±5.40dB

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### 3. General Product Information

#### 3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is Handheld GPS receiver.  
The Applicant declares that the model LT400XY ,Model LT400XY, X is variable, it indicated A-Z or 0-9, Y is variable, it indicated A-Z, 0-9 or blank.due to sales purpose in different countries or regions. The internal PCB design are no difference, but only distinct in colours and model names.The test model name is LT400H.

#### 3.2 System Details

Radio standard:	Cellular & PCS
Max output power:	Cellular: 32.60dBm PCS: 28.64dBm
Antenna gain:	-5.22dBi
Antenna type:	PIFA antenna
Antenna cable length:	N/A
Frequency range:	GPRS/EDGE 850: Tx: 824.20 - 848.80MHz (at intervals of 200kHz); Rx: 869.20 - 893.80MHz (at intervals of 200kHz) GPRS/EDGE 1900: Tx: 1850.20 - 1909.80MHz (at intervals of 200kHz); Rx: 1930.20 - 1989.80MHz (at intervals of 200kHz)
Modulation type:	GMSK, 8PSK
Type Emission:	Cellular: GMSK:242KGXW,8PSK:245KG7W PCS:GMSK:242KGXW,8PSK: 245KG7W
EUT Stage	Production Unit
Low test temperature:	-20°C
Normal test temperature:	24°C
High test temperature:	55°C
Low test voltage:	DC 3.6V
Normal test voltage:	DC 3.7V
High test voltage:	DC 4.2V

Remark:

The above EUT's information was declared by manufacturer. Please refer to the specifications or user manual for more detailed description.

### 3.3 Independent Operation Modes

The EUT was tested on a stand-alone basis (only attached to the test jig) and the test system was configured in a typical fashion (as a customer would normally use it). The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4.

Testing was performed at the lowest operating frequency, at the operating frequency in the middle of the specified frequency band and at the highest operating frequency with different modulation types.

CELLULAR TEST MODE			
TX Mode		RX Mode	
A: Low	824.2MHz	A: Low	869.2MHz
B: Middle	836.6MHz	B: Middle	881.6MHz
C: High	848.8MHz	C: High	893.8MHz
PCS TEST MODE			
TX Mode		RX Mode	
A: Low	1850.2MHz	A: Low	1930.2MHz
B: Middle	1880.0MHz	B: Middle	1960.0MHz
C: High	1909.8MHz	C: High	1989.8MHz

Each mode basic operation in GPRS/EDGE :

- A. EUT transmits (TX mode), with full power, at lowest channel, a continuous modulated signal streaming with 100% duty cycle.
- B. EUT transmits (TX mode), with full power, at middle channel, a continuous modulated signal streaming with 100% duty cycle.
- C. EUT transmits (TX mode), with full power, at highest channel, a continuous modulated signal streaming with 100% duty cycle.
- D. EUT receives (RX mode), at lowest channel, continuously.
- E. EUT receives (RX mode), at middle channel, continuously.
- F. EUT receives (RX mode), at highest channel, continuously.

Full test was applied on all test modes, but only worst case was shown.

## **4. Test Set-up and Operation Modes**

### **4.1 Test Methodology**

The test methodology used is based on the requirements of 47 CFR Part 2, 22H, 24E . The test methods, which have been used, are based on ANSI C63.4-2009.

For details, see under each test item.

### **4.2 Physical Configuration for Testing**

One test sample was available. Both for antennas conducted measurements and for radiated measurements.

For antenna conducted measurements, the antenna was replaced by a 50Ω antenna connector.

For more details, refer to section: Photographs of the Test Set-Up.

### **4.3 Test Operation**

During all testing, EUT is in link mode with base station emulator 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 is as follows:

1. 30 MHz to the 10<sup>th</sup> harmonic of the fundamental frequency for Cellular.
2. 30 MHz to the 10<sup>th</sup> harmonic of the fundamental frequency for PCS.

### **4.4 Special Accessories and Auxiliary Equipment**

N/A

### **4.5 Countermeasures to achieve EMC Compliance**

No additional measures were employed to achieve compliance.



## 5. Test Results of Conducted Measurements at Antenna Port

### 5.1 Transmitter Parameters

#### 5.1.1 Conducted Output Power, FCC 2.1046, FCC 24.232(d)

**RESULT:**

**PASS**

Date of testing: 2013-09-26

Ambient temperature: 22°C

Relative humidity: 45%

Atmospheric pressure: 101.5hPa

Requirements:

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

Test procedure:

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.

The maximum peak output power (conducted) was measured at the antenna connector with a spectrum analyzer. The analyzer resolution bandwidth was set to 1MHz and the video bandwidth to 3MHz. The final measurement takes into account the loss generated by all the involved cables.

Peak-to-Average Ratio per KDB 971168 D01 Power Meas License Digital Systems v02r01

The final measurement takes into account the loss generated by all the involved cables.

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**Table 3: Conducted Output Power**

Mode	Channel	Frequency [MHz]	Conducted Power [dBm]	Conducted Power [mW]
GPRS850	128(Low)	824.2	32.48	1770.11
	190(Mid)	836.6	32.14	1636.82
	251(High)	848.8	32.60	1819.70
EDGE850	128(Low)	824.2	29.38	866.96
	190(Mid)	836.6	29.64	920.45
	251(High)	848.8	29.26	843.33

Mode	Channel	Frequency [MHz]	Conducted Power [dBm]	Conducted Power [mW]
GPRS1900	512(Low)	1850.2	28.64	731.14
	661(Mid)	1880.0	28.34	682.34
	810(High)	1909.8	28.62	727.78
EDGE1900	512(Low)	1850.2	27.79	601.17
	661(Mid)	1880.0	27.52	564.94
	810(High)	1909.8	27.74	594.29

**Table 4: Peak-to-Average Ratio**

Mode	Channel	Measured [dB]	Limit [dB]	Verdict
GPRS850	128(Low)	5.45	13	PASS
	190(Mid)	5.76	13	PASS
	251(High)	5.37	13	PASS
EDGE850	128(Low)	5.36	13	PASS
	190(Mid)	5.52	13	PASS
	251(High)	5.23	13	PASS

Mode	Channel	Measured [dB]	Limit [dB]	Verdict
GPRS1900	512(Low)	5.74	13	PASS
	661(Mid)	5.63	13	PASS
	810(High)	5.49	13	PASS
EDGE1900	512(Low)	5.62	13	PASS
	661(Mid)	5.58	13	PASS
	810(High)	5.41	13	PASS

Figure 1: Output Peak Power, GPRS850, Mode A

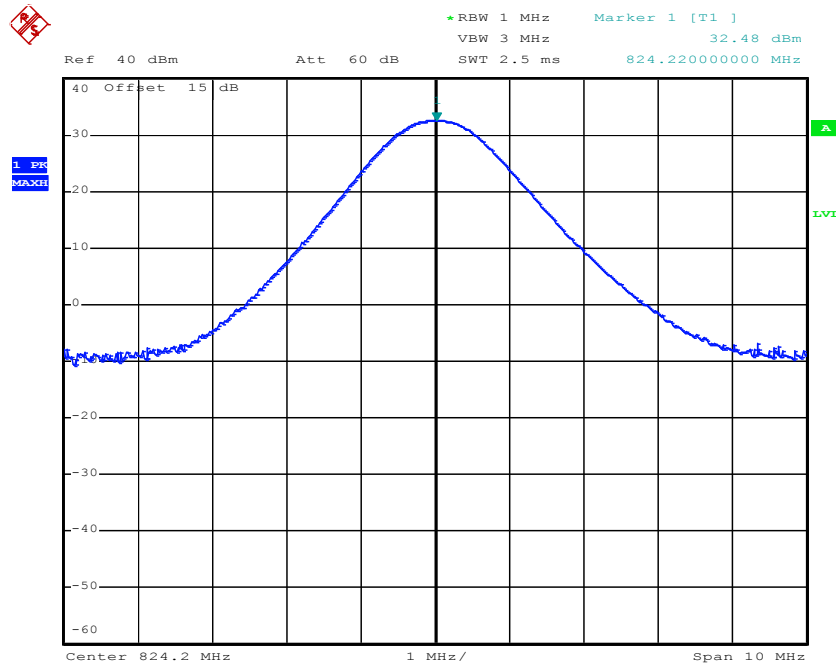


Figure 2: Output Peak Power, GPRS850, Mode B

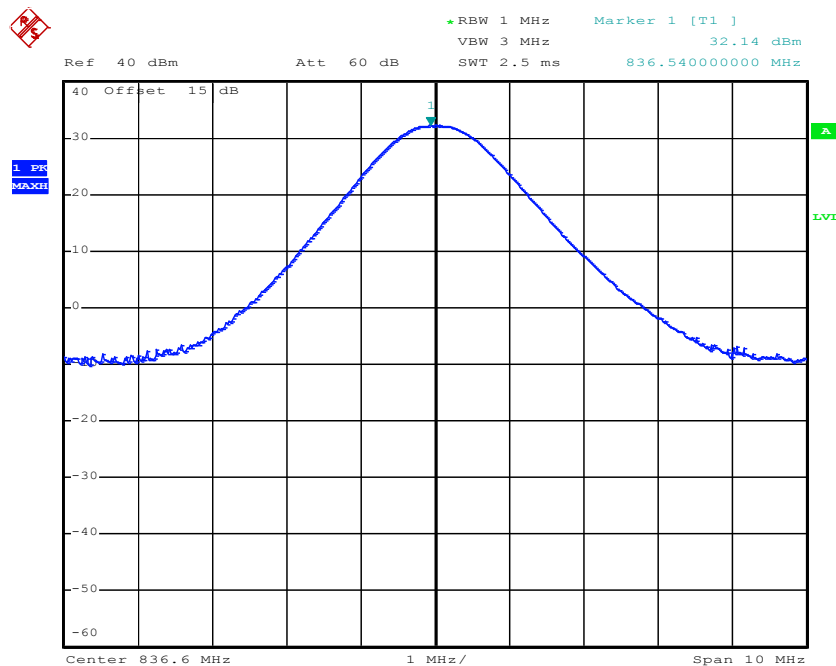


Figure 3: Output Peak Power, GPRS850, Mode C

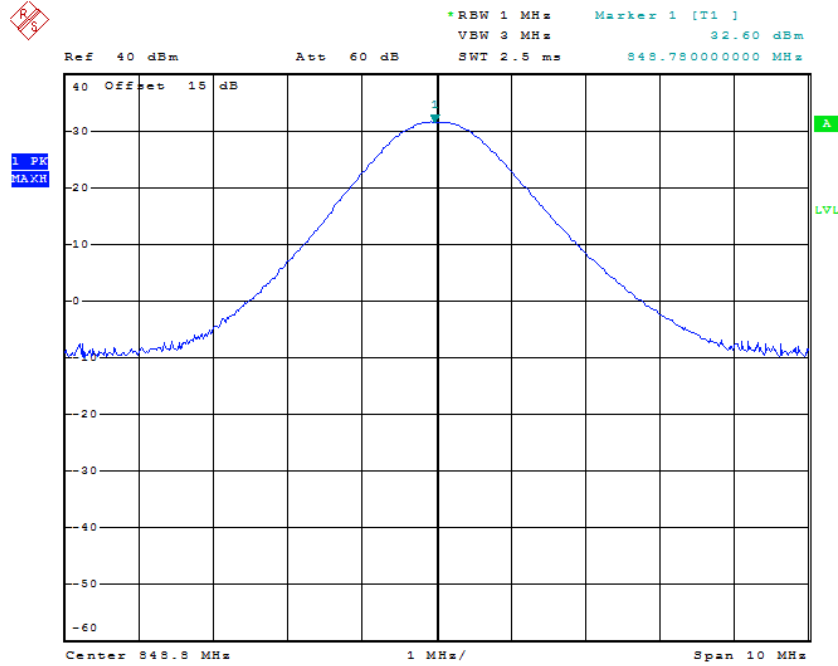


Figure 4: Output Peak Power, EDGE850, Mode A

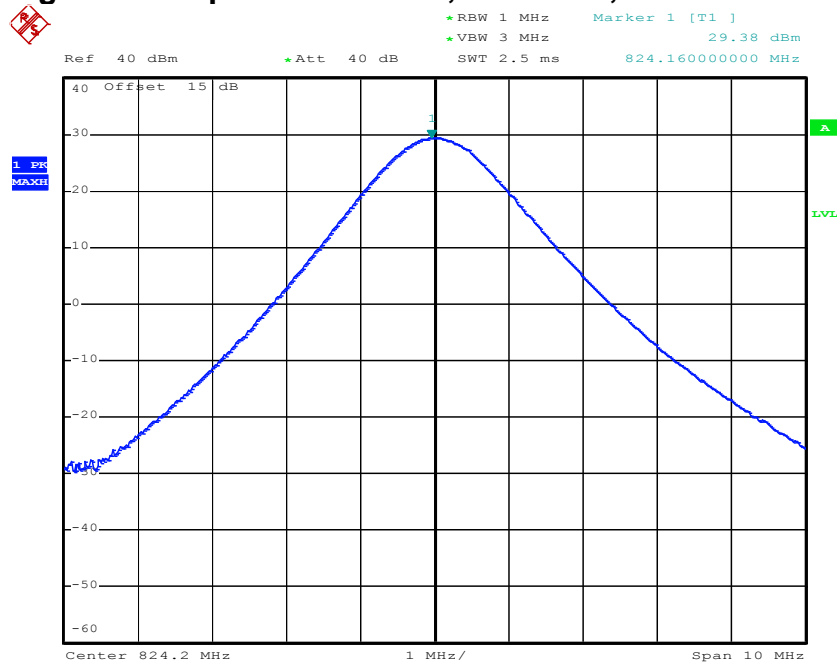


Figure 5: Output Peak Power, EDGE850, Mode B

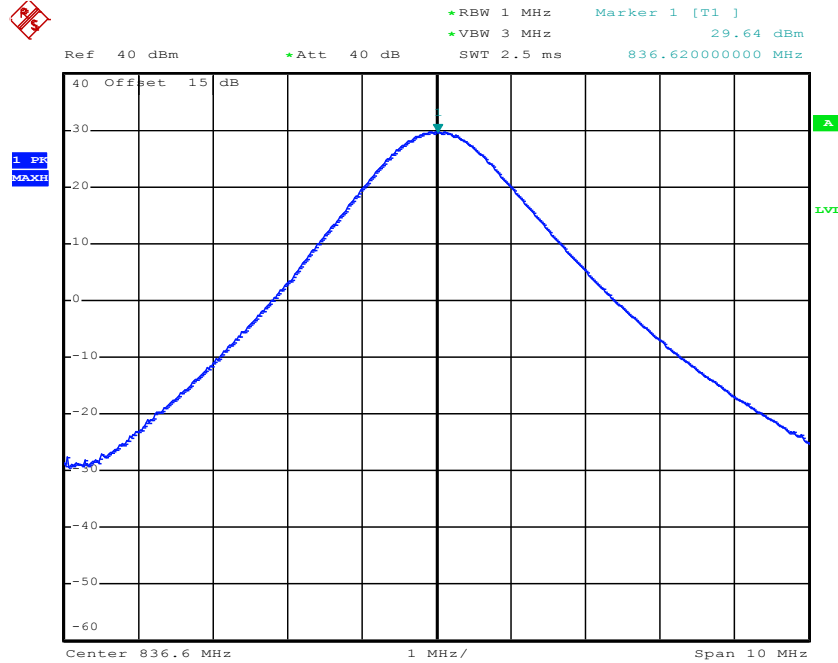


Figure 6: Output Peak Power, EDGE850, Mode C

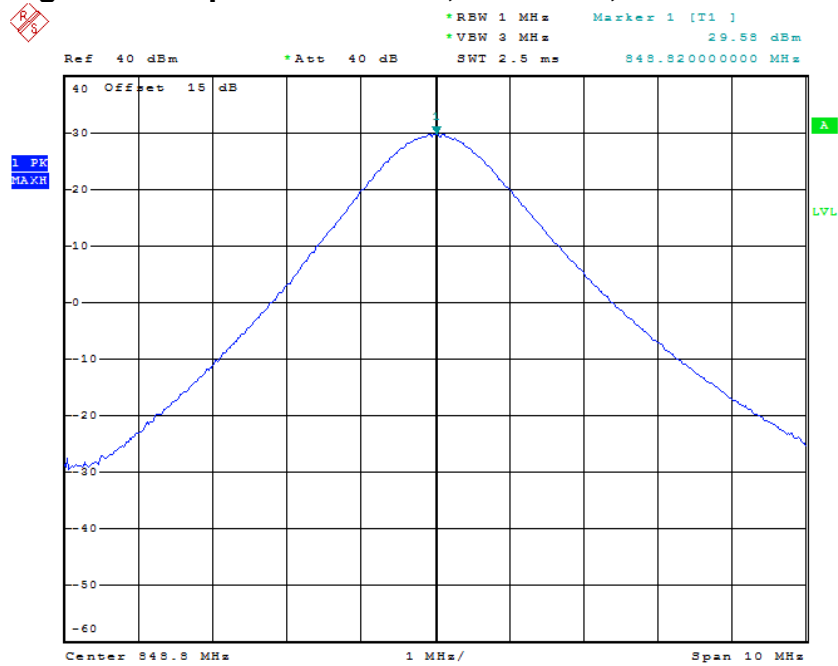


Figure 7: Output Peak Power, GPRS1900, Mode A

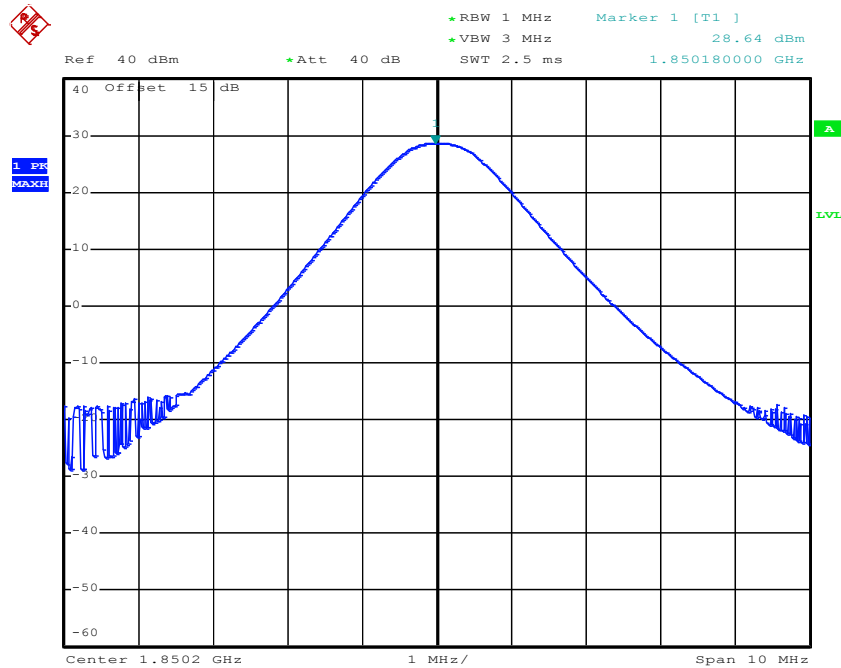


Figure 8: Output Peak Power, GPRS1900, Mode B

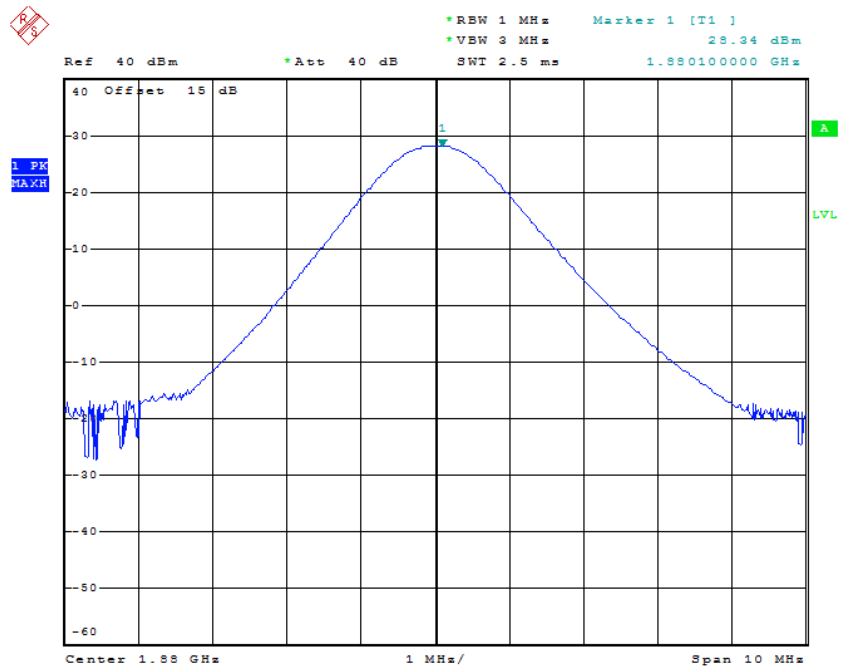


Figure 9: Output Peak Power, GPRS1900, Mode C

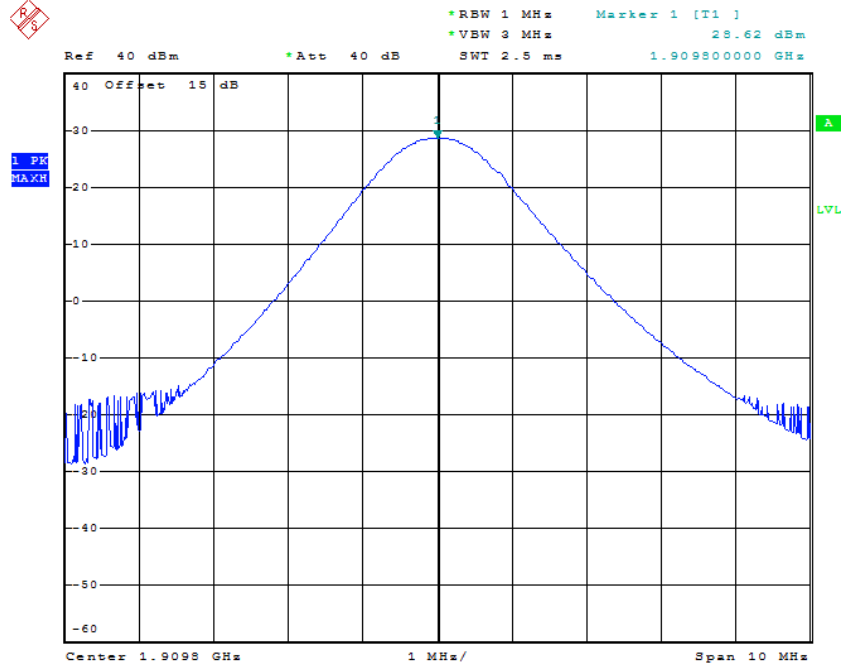


Figure 10: Output Peak Power, EDGE1900, Mode A

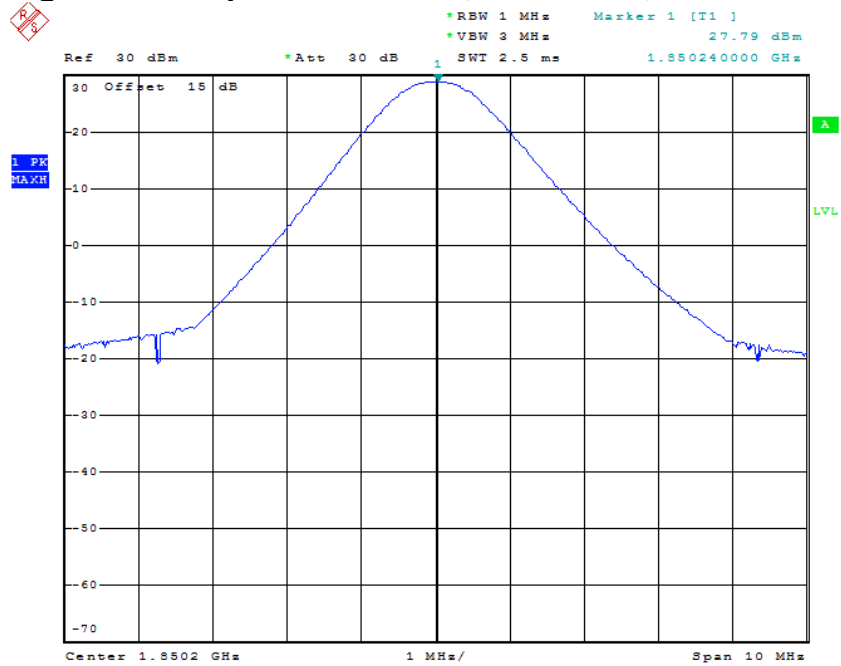


Figure 11: Output Peak Power, EDGE1900, Mode B

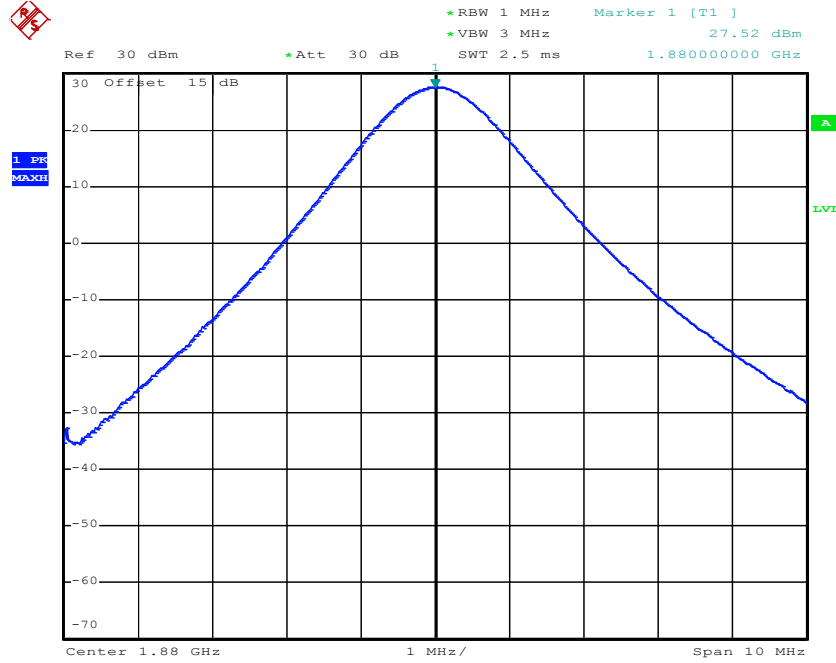
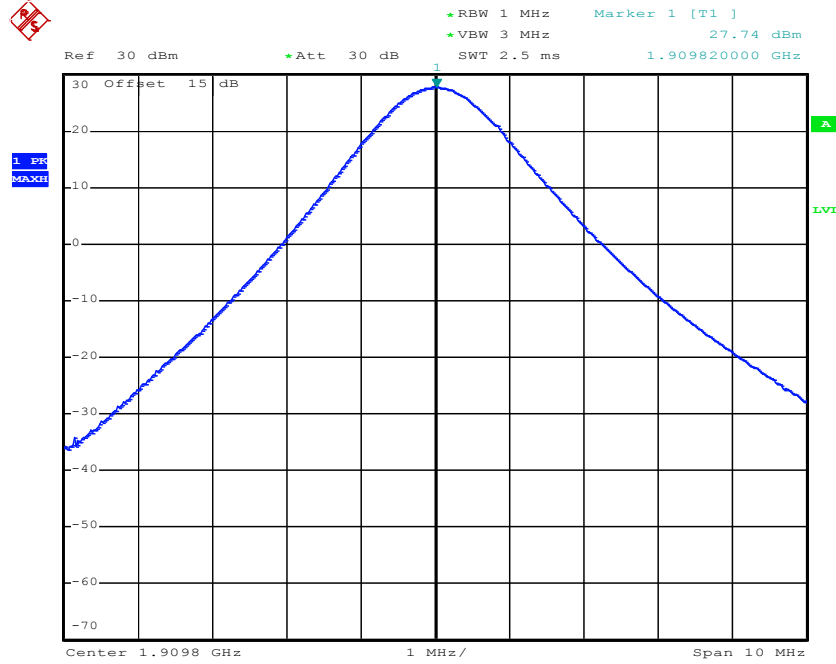


Figure 12: Output Peak Power, EDGE1900, Mode C





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### **5.1.2 Occupied Bandwidth, FCC 2.1049, FCC 22.917(a), FCC 24.238(a)**

Date of testing: 2013-09-27

Ambient temperature: 22°C

Relative humidity: 45%

Atmospheric pressure: 101.5hPa

#### Requirements:

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 the 99% emission bandwidth, or 26dB bandwidth taking the total RF output power as reference.

#### Test procedure:

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers were measured.

The final measurement takes into account the loss generated by all the involved cables.

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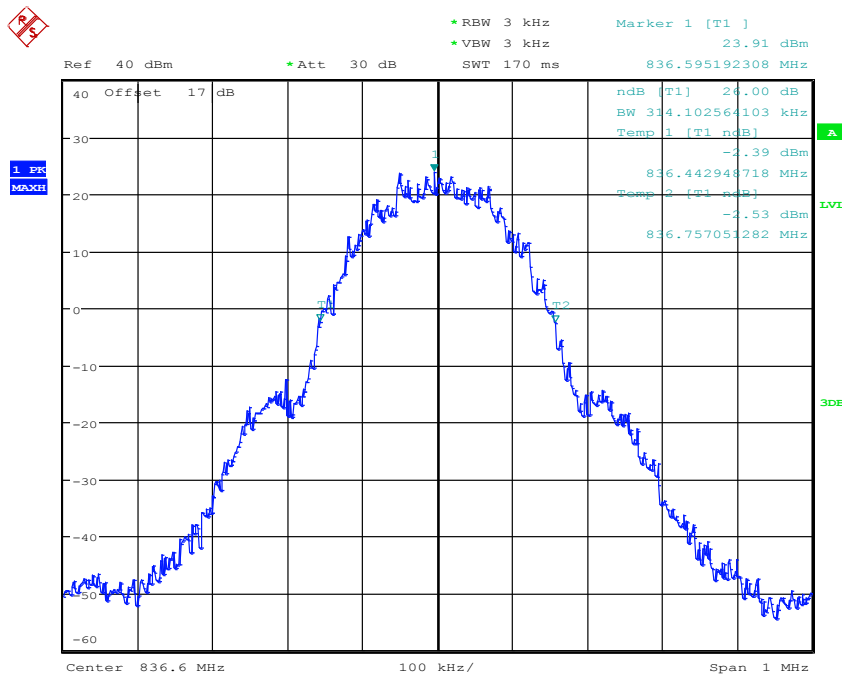
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**Table 5: Occupied Bandwidth**

Mode	Channel	Frequency [MHz]	26dB Occupied Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
GPRS850	190(Mid)	836.6	314.10	241.99
EDGE850	190(Mid)	836.6	306.09	245.19
GPRS1900	661(Mid)	1880.0	309.29	241.99
EDGE1900	661(Mid)	1880.0	304.49	245.19

**Figure 13: 26dB & 99% Occupied Bandwidth, GPRS850, Mode B**



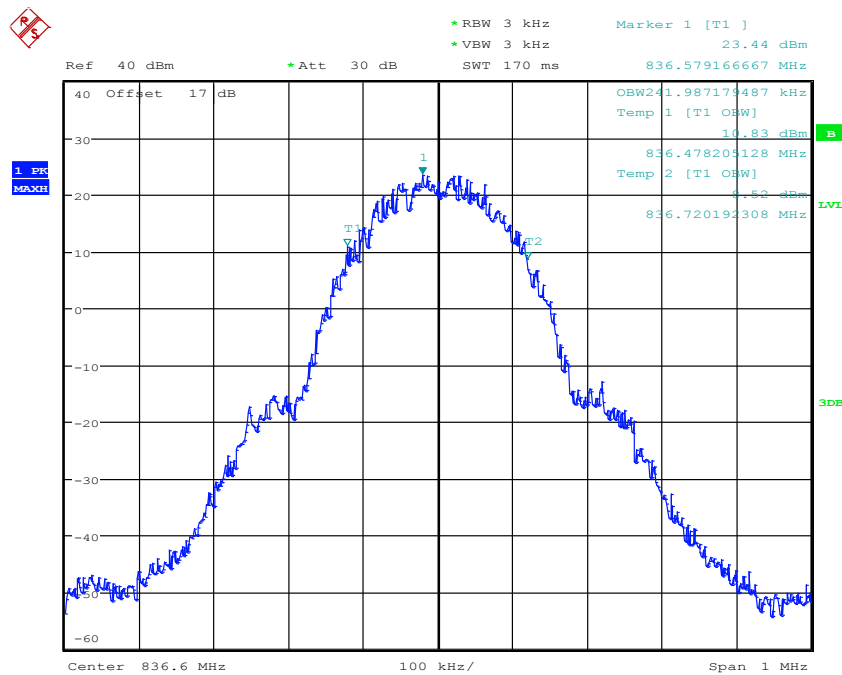
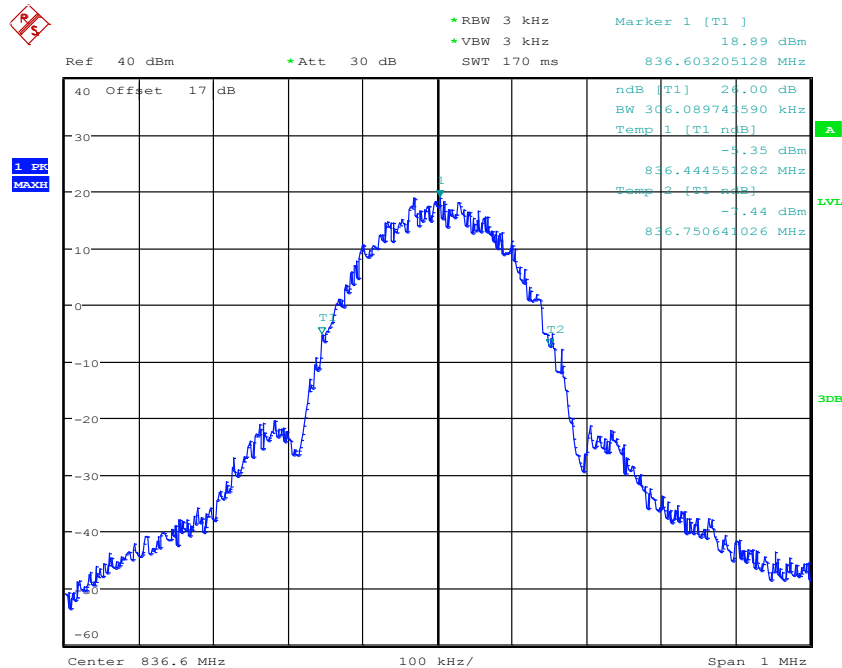


Figure 14: 26dB & 99% Occupied Bandwidth, EDGE850, Mode B



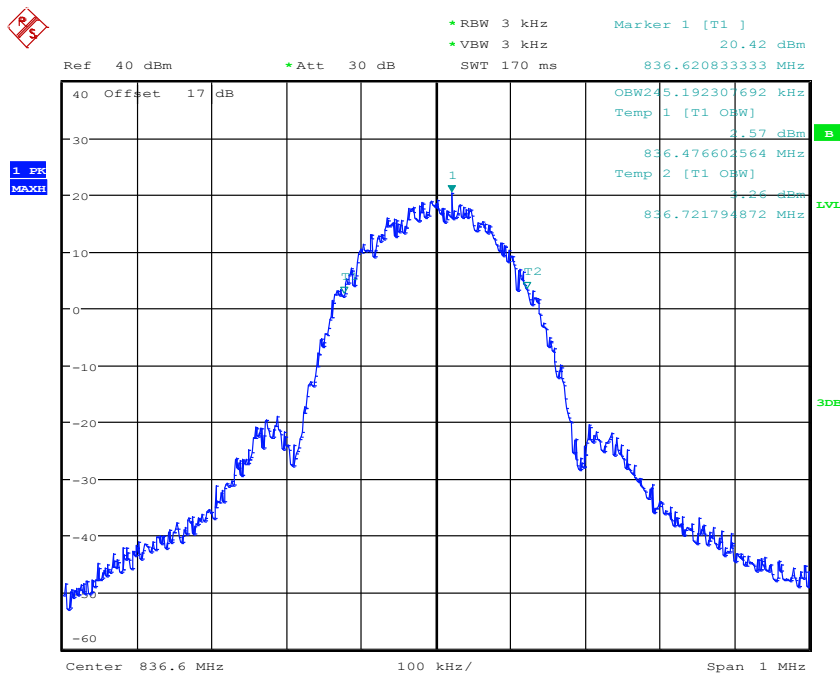
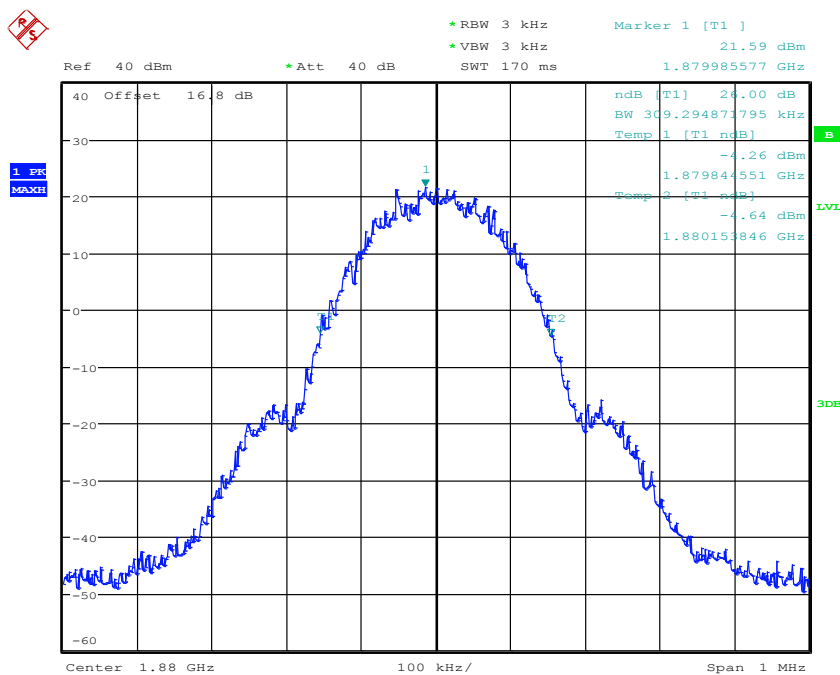


Figure 15: 26dB & 99% Occupied Bandwidth, GPRS1900, Mode B



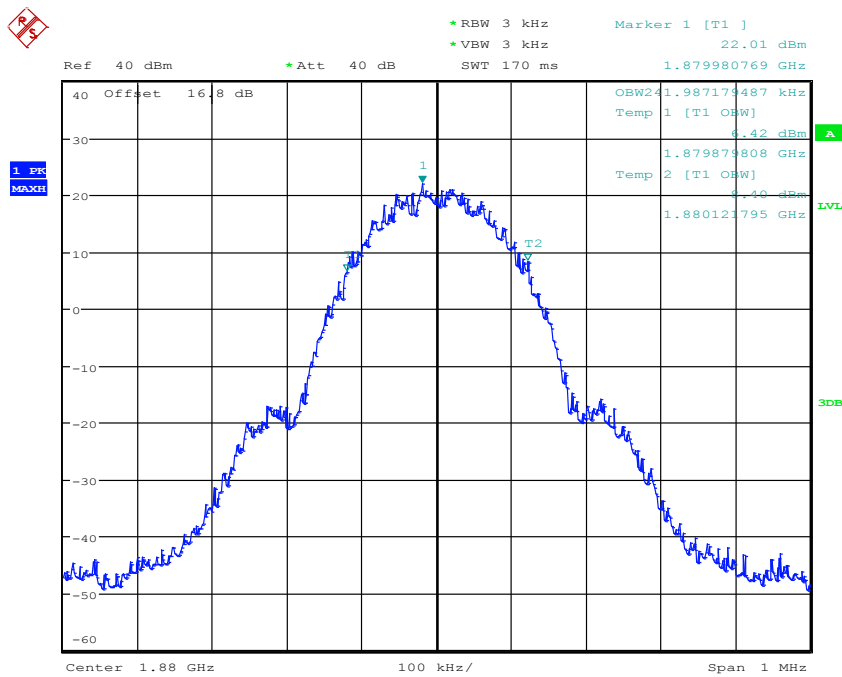
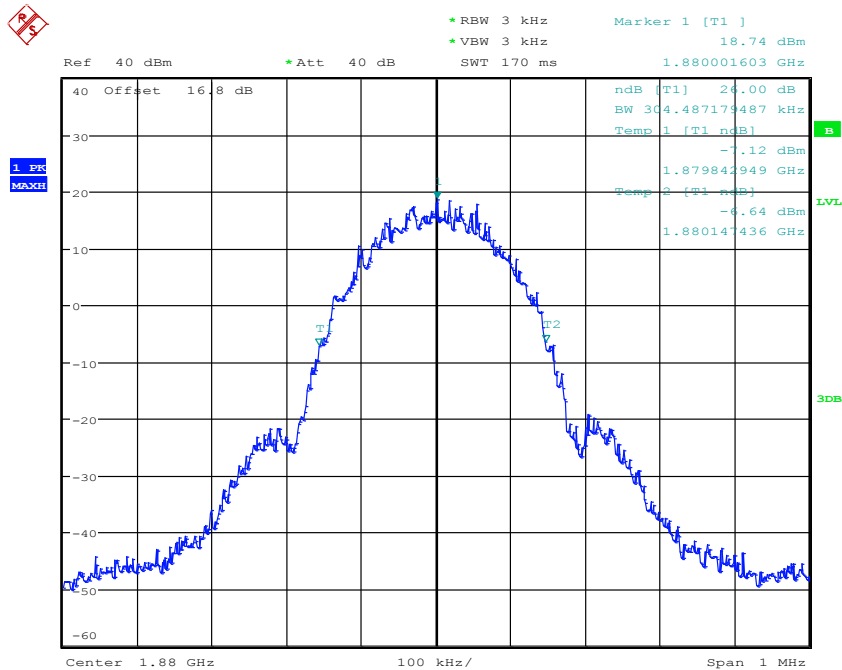
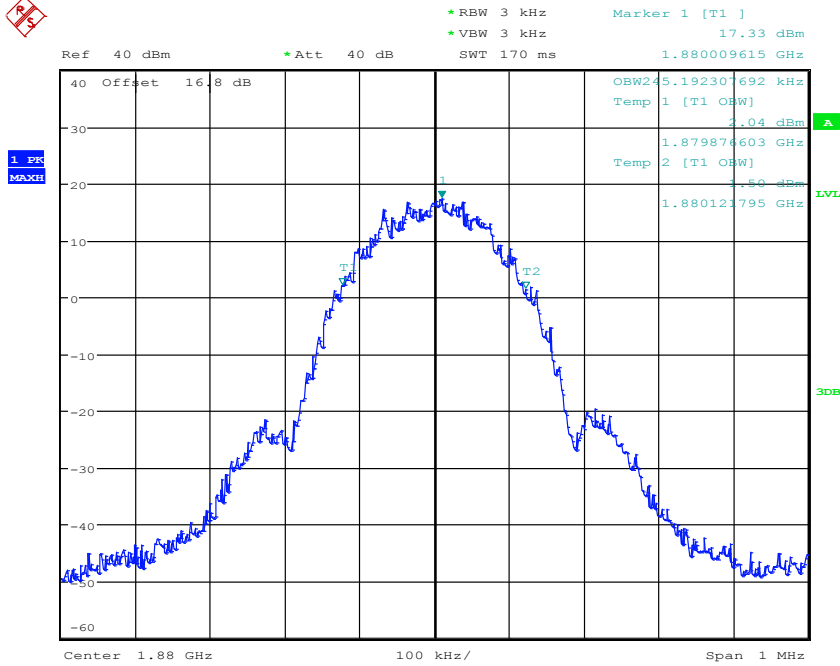


Figure 16: 26dB & 99% Occupied Bandwidth, EDGE1900, Mode B



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### 5.1.3 Frequency Stability, FCC 2.1055, FCC 22.355, FCC 24.235

**RESULT:**

**PASS**

Date of testing: 2013-09-27

Ambient temperature: 22°C

Relative humidity: 45%

Atmospheric pressure: 101.5hPa

Requirements:

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:

- (a) The temperature is varied from -30°C to +50°C at intervals of not more than 10°C.
- (b) 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 the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

Test procedure:

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°C 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°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT can not be turned on at -30°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on. The final measurement takes into account the loss generated by all the involved cables.

For Voltage Variation

1. The EUT was placed in a temperature chamber at 25° C and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

The final measurement takes into account the loss generated by all the involved cables.

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**Table 6: Frequency Stability**

Mode	Test Conditions		Frequency Deviation		Limit [ppm]
	Power [Volt]	Temperature [°C]	Middle Channel		
			Dev. Freq. [Hz]	Deviation [ppm]	
GPRS850	3.7	-30	--	--	±2.5ppm
		-20	48	0.056	
		-10	-44	-0.052	
		0	53	0.062	
		+10	45	0.053	
		+20	-51	-0.060	
		+30	60	0.071	
		+40	-47	-0.055	
	+50	46	0.054		
	4.2	+25	55	0.065	
BEP	+25	46	0.054		
EDGE850	3.7	-30	--	--	±2.5ppm
		-20	38	0.045	
		-10	-39	-0.046	
		0	-42	-0.049	
		+10	50	0.059	
		+20	-57	-0.067	
		+30	60	0.071	
		+40	63	0.074	
	+50	-46	-0.054		
	4.2	+25	47	0.055	
BEP	+25	-57	-0.067		

Note:

1. The EUT stops transmitting at temperatures -30°C.
2. The manufacturer declared that the EUT could work properly between temperatures -20°C~60°C.
3. Normal Voltage = 3.7 V; Fully Charged Battery = 4.2 V; Battery End Point (BEP) =3.6 V.



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Mode	Test Conditions		Frequency Deviation		Limit [ppm]
	Power [Volt]	Temperature [°C]	Middle Channel		
			Dev. Freq. [Hz]	Deviation [ppm]	
GPRS1900	3.7	-30	--	--	±2.5ppm
		-20	65	0.034	
		-10	44	0.023	
		0	49	0.026	
		+10	-45	-0.024	
		+20	-63	-0.033	
		+30	-52	-0.027	
		+40	-45	-0.024	
	+50	-60	-0.032		
	4.2	+25	58	0.031	
BEP	+25	47	0.025		
EDGE1900	3.7	-30	--	--	±2.5ppm
		-20	53	0.028	
		-10	-42	-0.022	
		0	-52	-0.027	
		+10	-75	-0.039	
		+20	41	0.022	
		+30	-63	-0.033	
		+40	-57	-0.030	
	+50	-66	-0.035		
	4.2	+25	65	0.034	
BEP	+25	51	0.027		

Note:

1. The EUT stops transmitting at temperatures -30°C.
2. The manufacturer declared that the EUT could work properly between temperatures -20°C~60°C.
3. Normal Voltage = 3.7 V; Fully Charged Battery = 4.2 V; Battery End Point (BEP) =3.6 V.

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#### **5.1.4 Conducted Emission, FCC 2.1051, FCC 22.917(a), FCC 24.238(a)**

**RESULT:**

**PASS**

Date of testing: 2013-10-06

Ambient temperature: 20°C

Relative humidity: 39.6%

Atmospheric pressure: 101.5hPa

Requirements:

According to FCC section 22.917(a) and FCC section 24.238(a), the power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

Test procedure:

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The middle channel for the highest RF power within the transmitting frequency was measured.
3. The conducted spurious emission for the whole frequency range was taken.

The final measurement takes into account the loss generated by all the involved cables.

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**Table 7: Conducted Emission**

Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]
GPRS850	128(Low)	2714	-23.97	-13	10.97
	190(Mid)	8083	-24.23	-13	11.23
	251(High)	4520	-23.96	-13	10.96

Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]
EDGE850	128(Low)	4392	-23.62	-13	10.62
	190(Mid)	3593	-24.21	-13	11.21
	251(High)	3098	-24.32	-13	11.32

Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]
GPRS1900	512(Low)	16128	-23.37	-13	10.37
	661(Mid)	17312	-23.46	-13	10.46
	810(High)	16672	-23.86	-13	10.86

Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]
EDGE1900	512(Low)	15456	-23.64	-13	10.64
	661(Mid)	15968	-23.37	-13	10.37
	810(High)	16128	-23.78	-13	10.78

Figure 17: Conducted Emission, GPRS850, Mode A

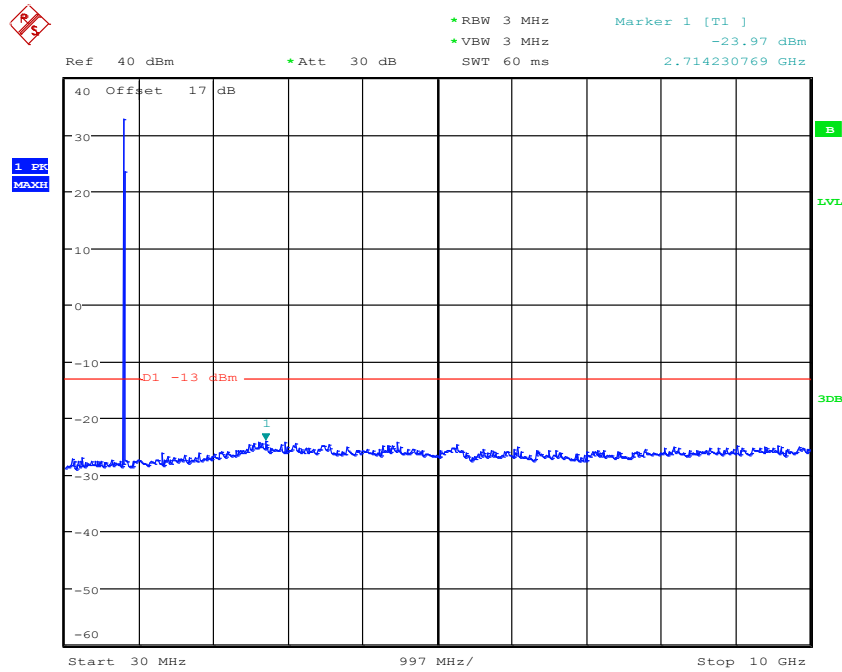
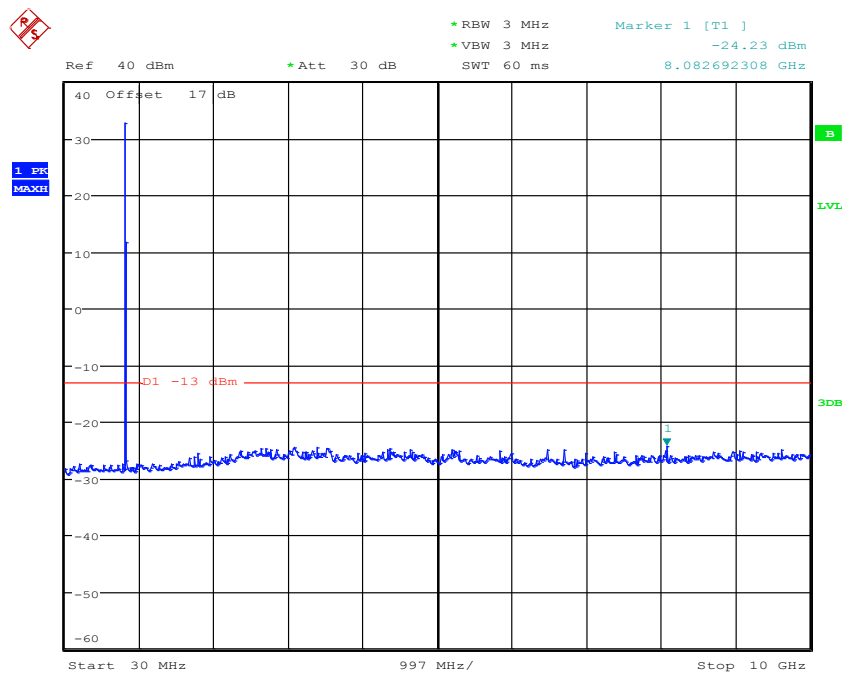
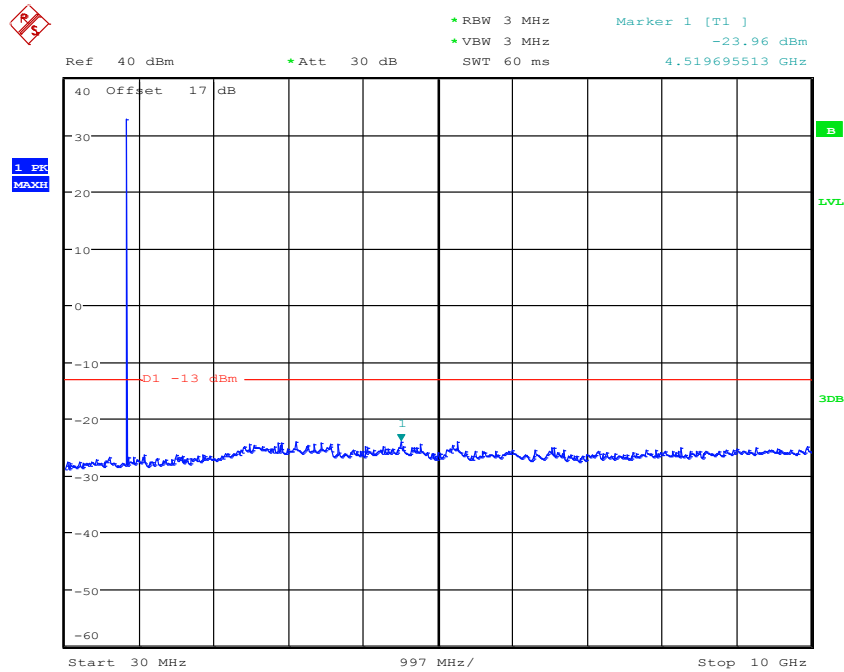


Figure 18: Conducted Emission, GPRS850, Mode B



**Figure 19: Conducted Emission, GPRS850, Mode C**



**Figure 20: Conducted Emission, EDGE850, Mode A**

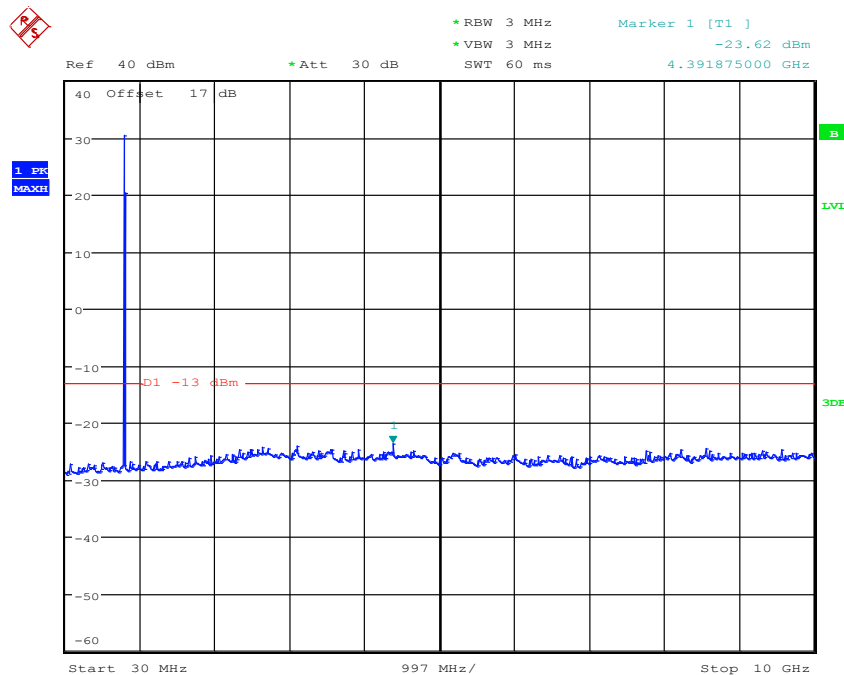


Figure 21: Conducted Emission, EDGE850, Mode B

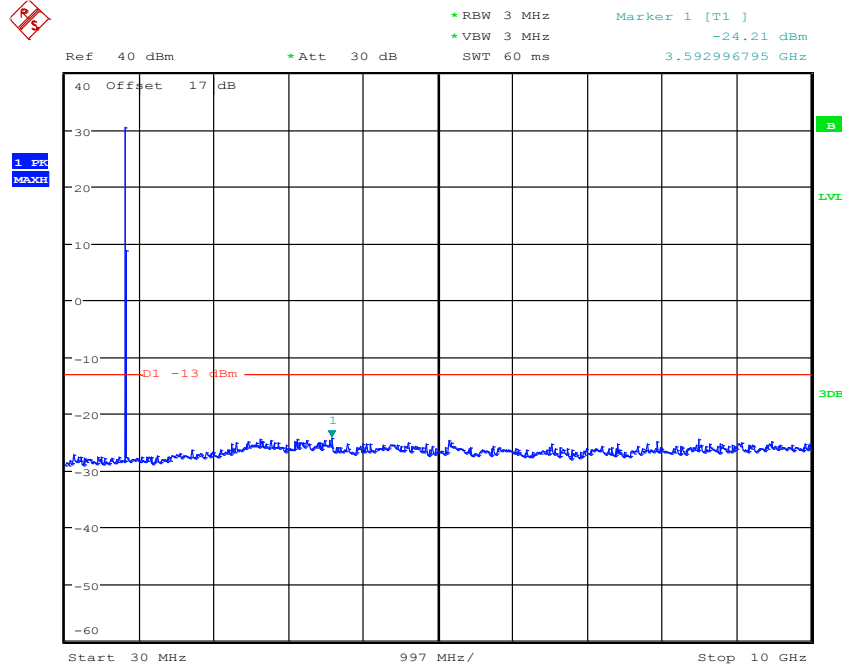


Figure 22: Conducted Emission, EDGE850, Mode C

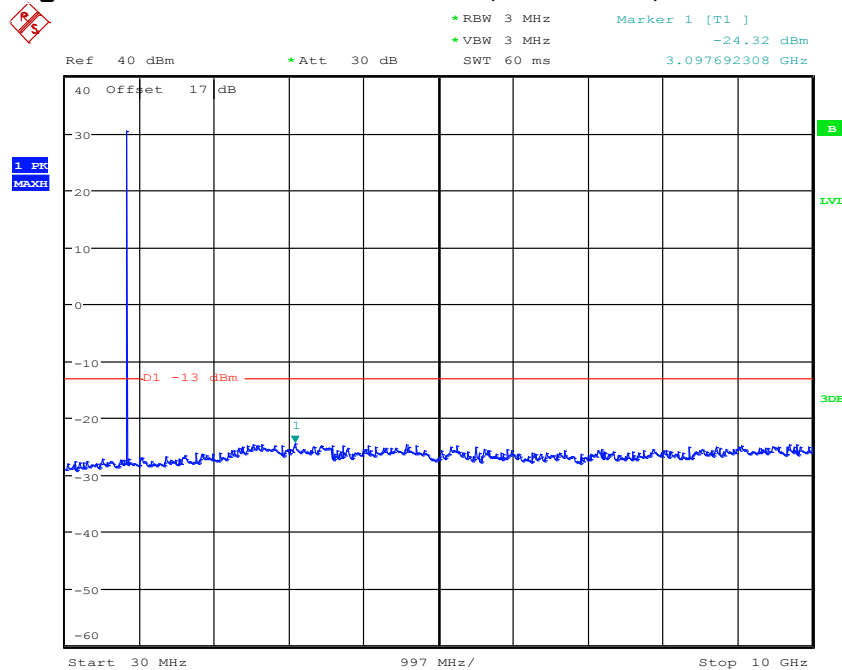


Figure 23: Conducted Emission, GPRS1900, Mode A

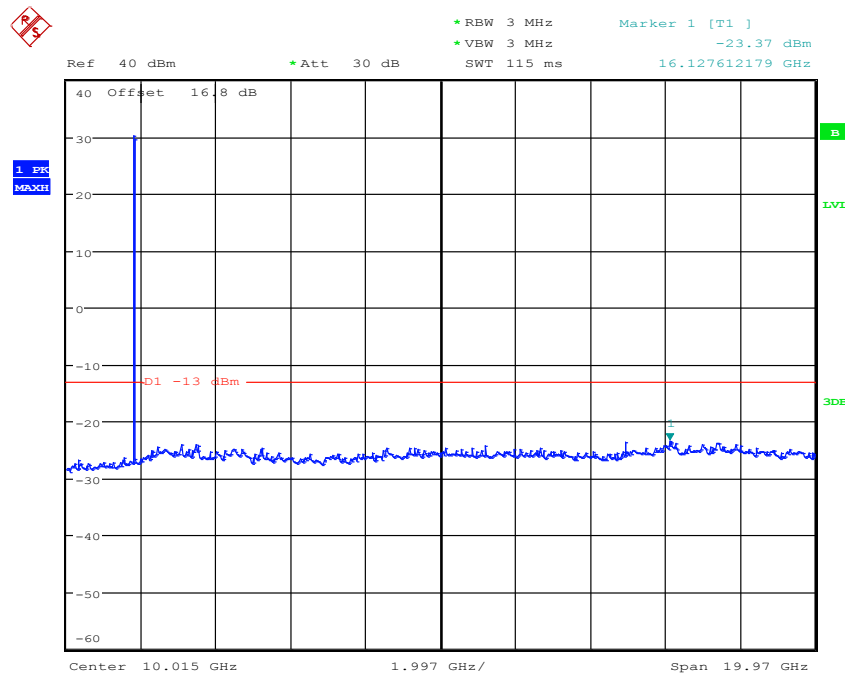
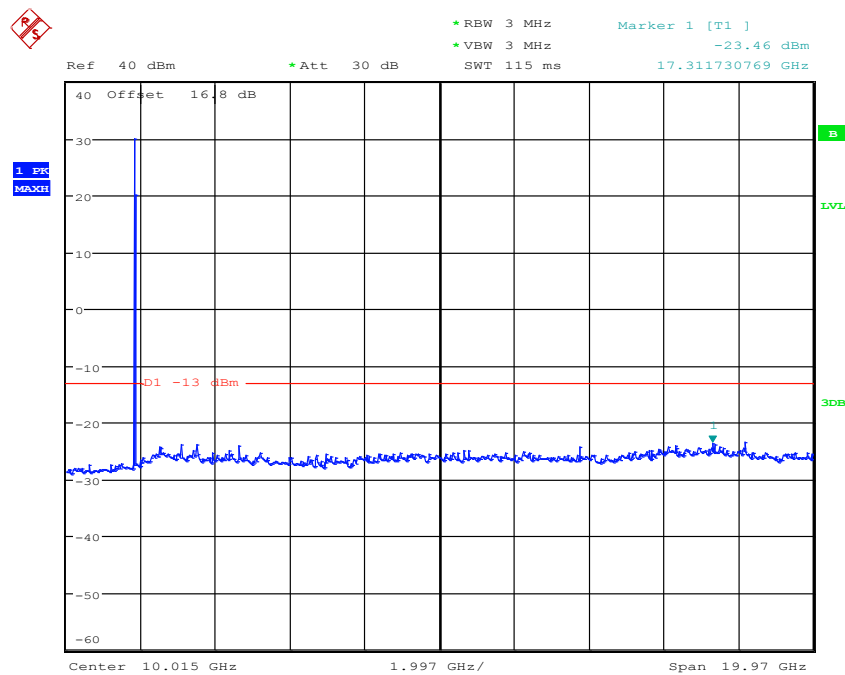
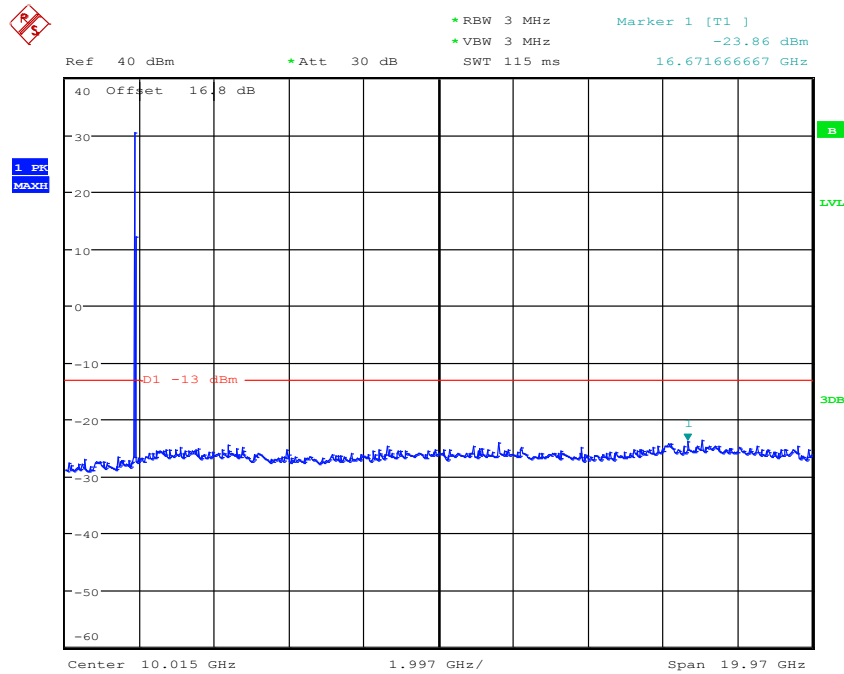


Figure 24: Conducted Emission, GPRS1900, Mode B



**Figure 25: Conducted Emission, GPRS1900, Mode C**



**Figure 26: Conducted Emission, EDGE1900, Mode A**

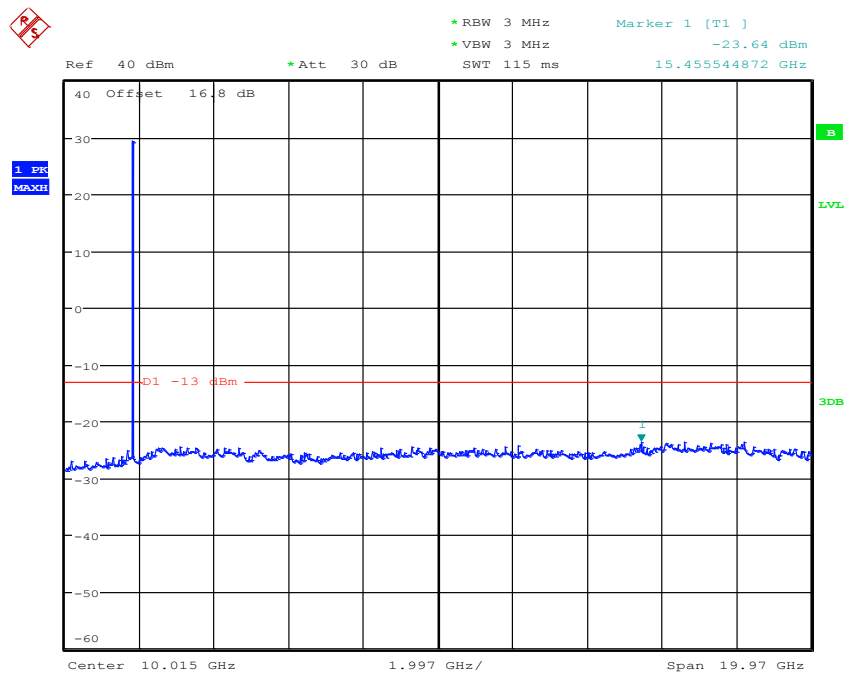




Figure 27: Conducted Emission, EDGE1900, Mode B

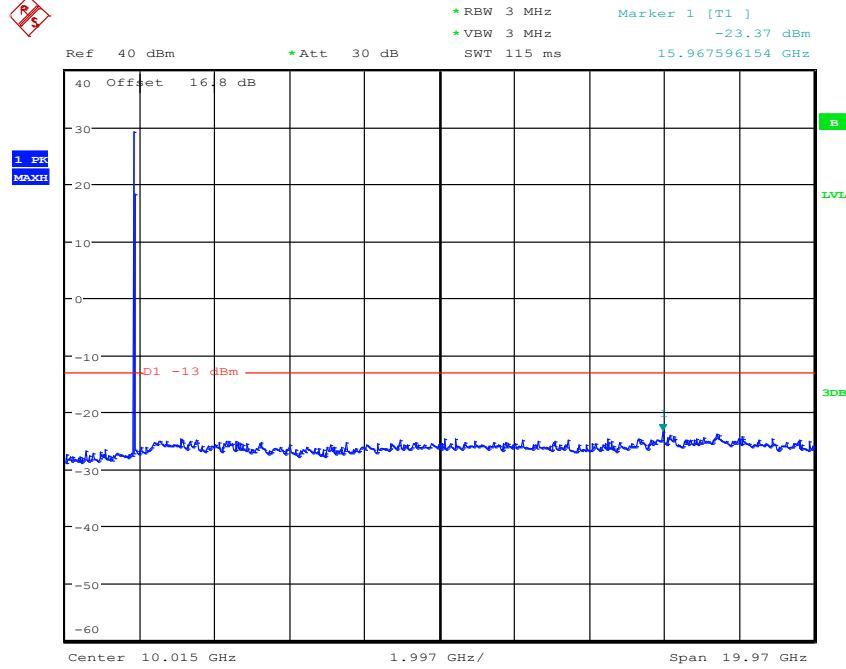
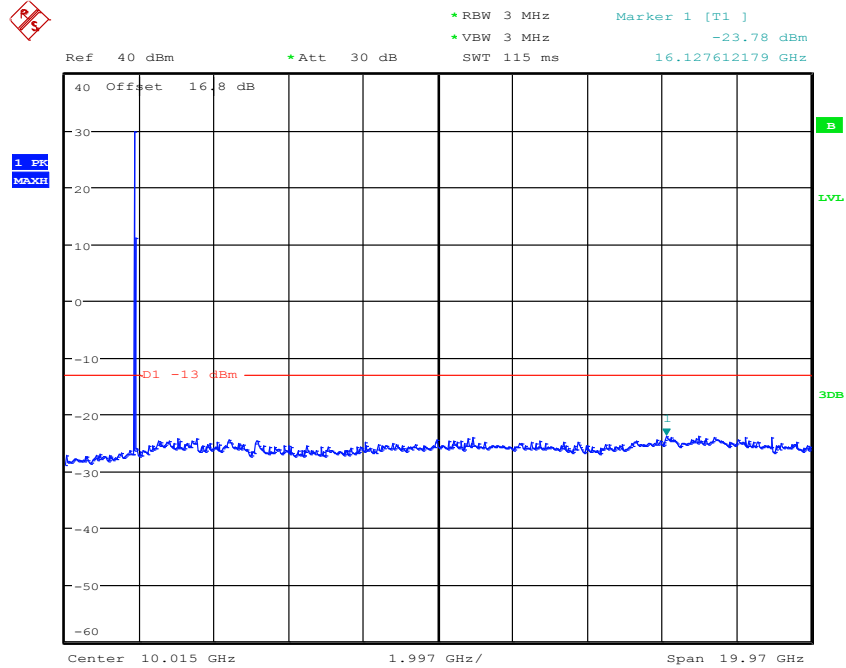


Figure 28: Conducted Emission, EDGE1900, Mode C



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### 5.1.5 Band Edge , FCC 2.1051, FCC 22.917(a), FCC 24.238(a)

**RESULT:**

**PASS**

Date of testing: 2013-10-06

Ambient temperature: 20°C

Relative humidity: 39.6%

Atmospheric pressure: 101.5hPa

Requirements:

According to FCC section 22.917(b) and FCC section 24.238(b), in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

Test procedure:

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.

The final measurement takes into account the loss generated by all the involved cables.

**Table 8: Band Edge**

Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]
GPRS850	128(Low)	823.98	-13.93	-13	0.93
	251(High)	849.02	-13.13	-13	0.13

Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]
EDGE850	128(Low)	824.00	-22.72	-13	9.72
	251(High)	849.00	-25.77	-13	12.77

Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]
GPRS1900	128(Low)	1849.997	-16.27	-13	3.27
	251(High)	1910.003	-15.21	-13	2.21

Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]
EDGE1900	128(Low)	1849.989	-21.25	-13	8.25
	251(High)	1910.022	-19.08	-13	6.08

Figure 29: Lower Band Edge, GPRS850, Mode A

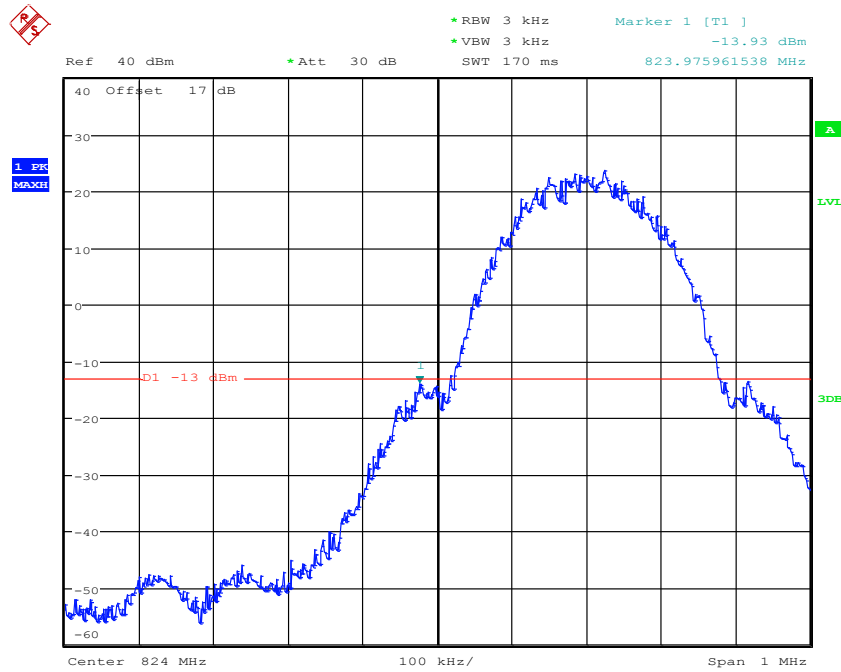


Figure 30: Upper Band Edge, GPRS850, Mode C

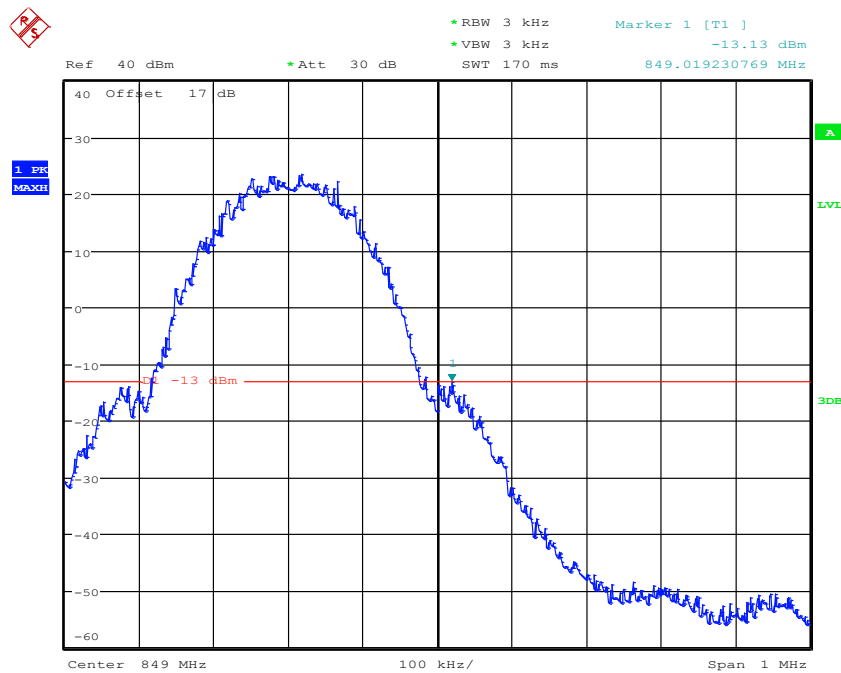


Figure 31: Lower Band Edge, EDGE850, Mode A

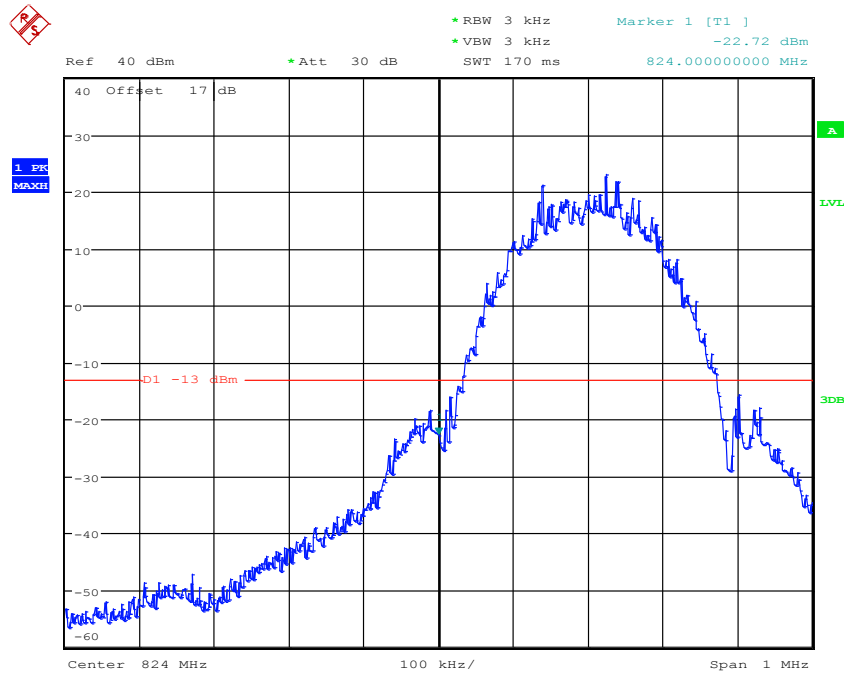


Figure 32: Upper Band Edge, EDGE850, Mode C

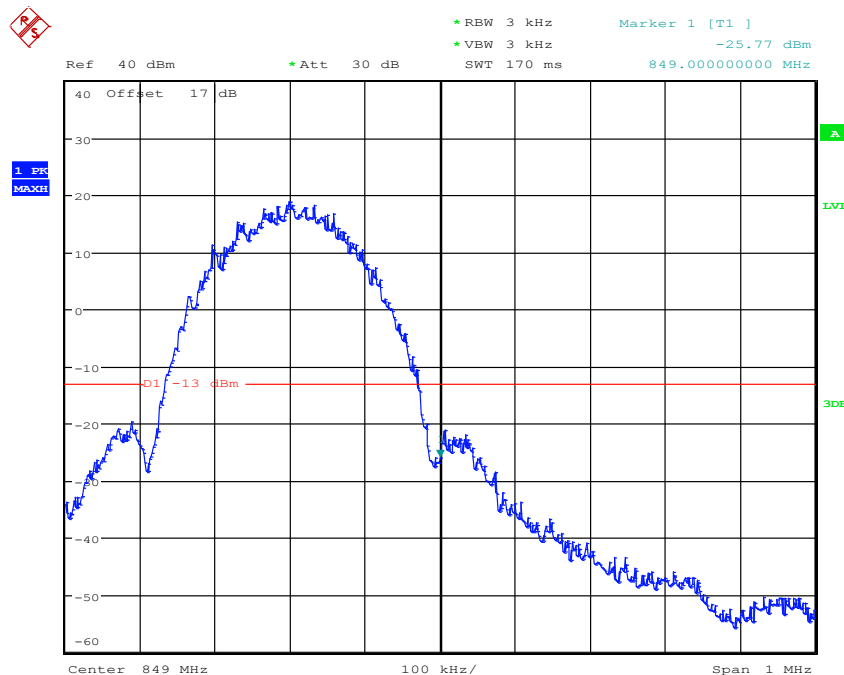


Figure 33: Lower Band Edge, GPRS1900, Mode A

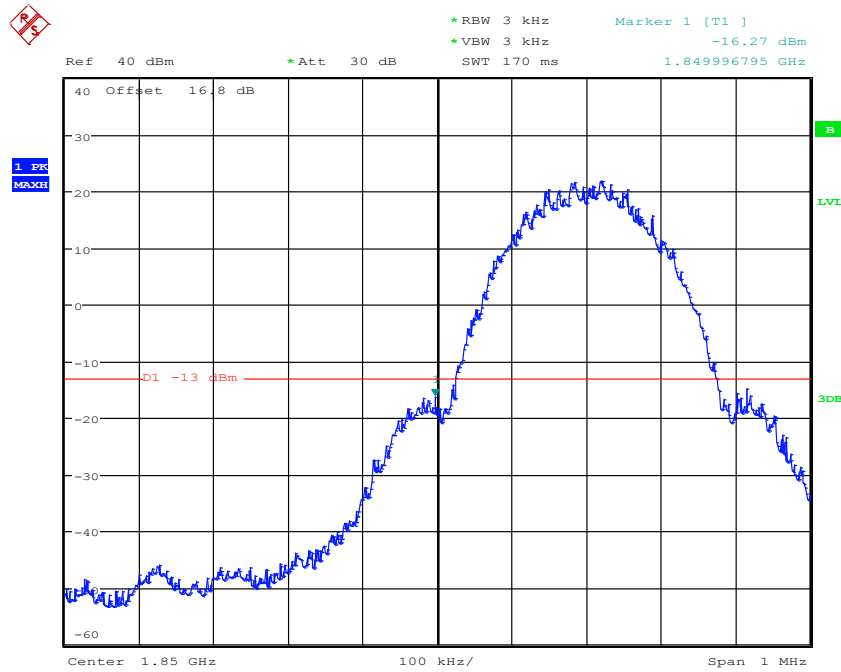


Figure 34: Upper Band Edge, GPRS1900, Mode C

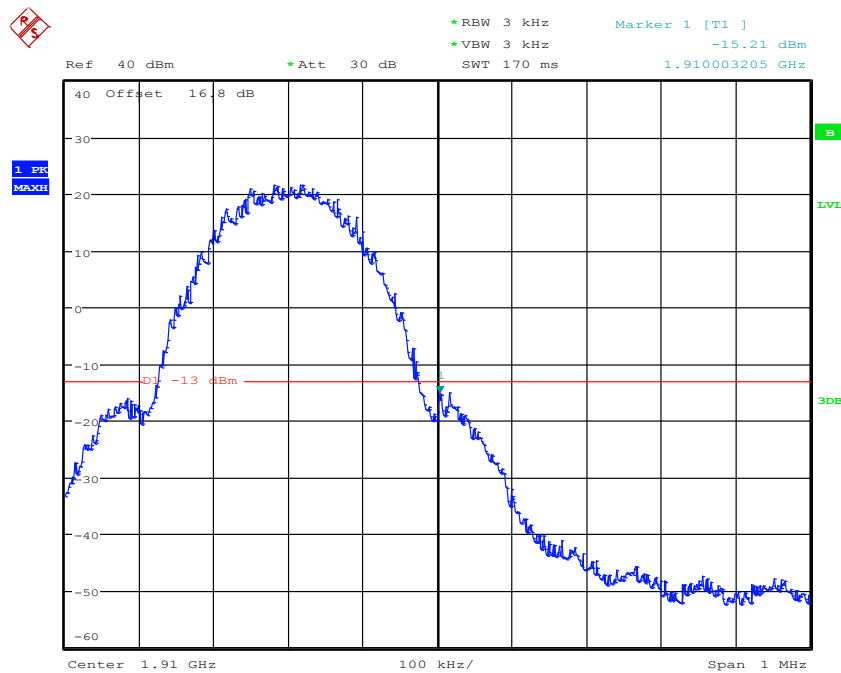


Figure 35: Lower Band Edge, EDGE1900, Mode A

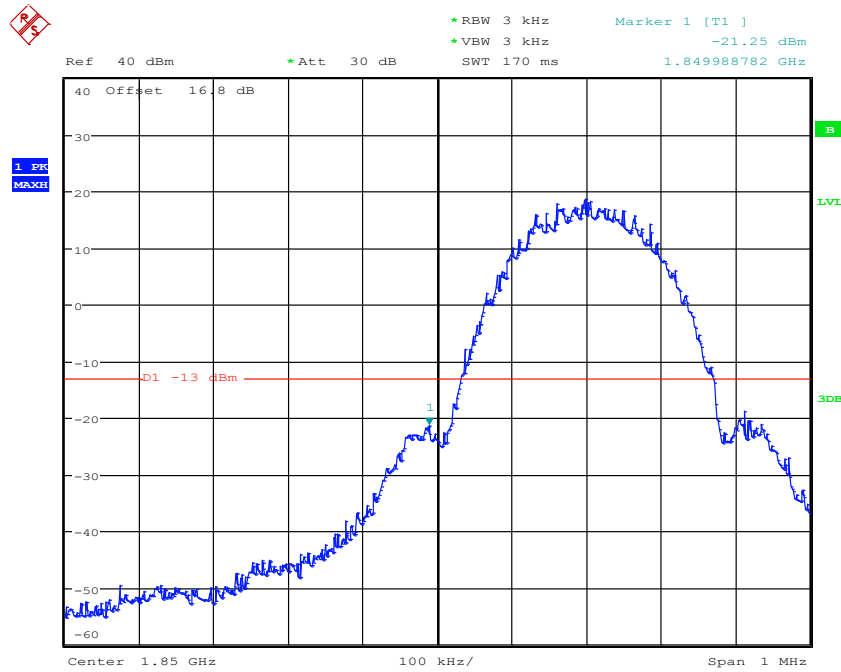
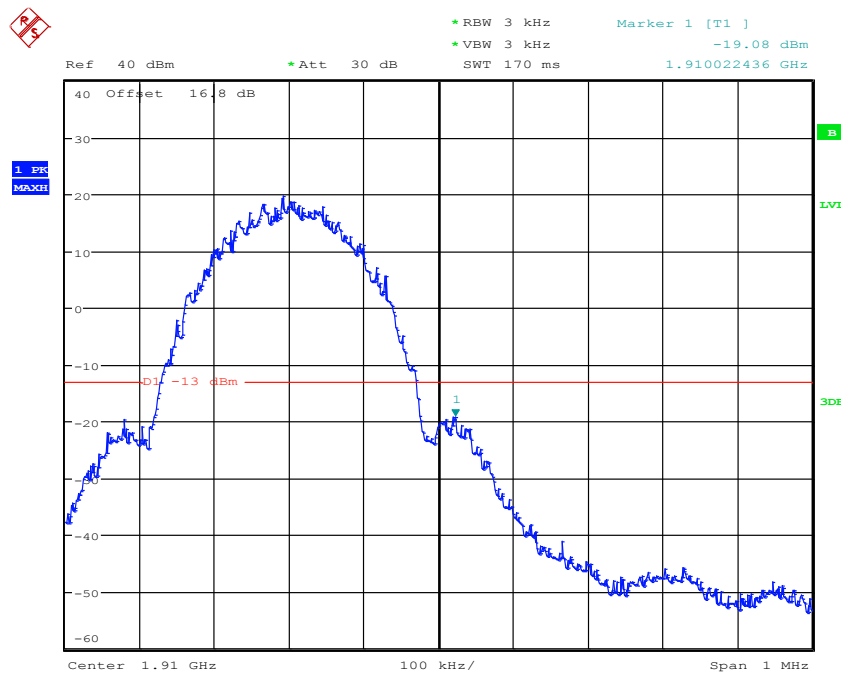


Figure 36: Upper Band Edge, EDGE1900, Mode C



## 6. Test Results of Radiated Measurements

### 6.1 Transmitter Parameters

#### 6.1.1 Transmitter Radiated Power (EIRP/ERP), FCC 22.913(a)(2), FCC 24.232(c)

**RESULT:** **PAss**

Date of testing: 2013-11-19

Ambient temperature: 23.5°C

Relative humidity: 45%

Atmospheric pressure: 101.5hPa

Measurement distance: 3m

Kind of test site: Semi Anechoic Chamber

#### Requirements:

ERP/EIRP is measured by substitution method according to ANSI / TIA / EIA-603-C-2004. According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCC section 24.232, the broadband PCS mobile station is limited to 2Watts e.i.r.p. peak power.

#### Test procedure:

The measurements procedures in TIA-603C-2004 are used.

1. EUT was placed on a 1.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.8m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as ( $P_r$ ).

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3. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ( $P_{Mea}$ ) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded ( $P_r$ ). The power of signal source ( $P_{Mea}$ ) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
4. The cable loss ( $P_{cl}$ ) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain ( $G_a$ ) should be recorded after test. The measurement results are obtained as described below:  
$$\text{Power(EIRP)} = P_{Mea} - P_{cl} + G_a$$
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .



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**Table 9: Effective Radiated Power**

Mode	Channel	ERP [dBm]	P <sub>cl</sub> [dB]	G <sub>a</sub> [dB]	Correction [dBm]	P <sub>Mea</sub> [dBm]	Polarization
GPRS850	128(Low)	20.86	0.03	5.02	2.15	18.02	Horizontal
	190(Mid)	20.54	0.04	5.03	2.15	17.70	Horizontal
	251(High)	20.77	0.05	5.08	2.15	17.89	Horizontal
GPRS850	128(Low)	19.65	0.03	5.02	2.15	16.81	Vertical
	190(Mid)	19.46	0.04	5.03	2.15	16.62	Vertical
	251(High)	19.79	0.05	5.08	2.15	16.91	Vertical

Mode	Channel	ERP [dBm]	P <sub>cl</sub> [dB]	G <sub>a</sub> [dB]	Correction [dBm]	P <sub>Mea</sub> [dBm]	Polarization
EDGE850	128(Low)	18.49	0.03	5.02	2.15	15.65	Horizontal
	190(Mid)	18.37	0.04	5.03	2.15	15.53	Horizontal
	251(High)	18.44	0.05	5.08	2.15	15.56	Horizontal
EDGE850	128(Low)	18.32	0.03	5.02	2.15	15.48	Vertical
	190(Mid)	18.13	0.04	5.03	2.15	15.29	Vertical
	251(High)	18.24	0.05	5.08	2.15	15.36	Vertical

Remark:

$$\text{ERP (dBm)} = P_{\text{Mea}} - P_{\text{cl}} + G_a - 2.15$$

**Table 10: Effective Isotropic Radiated Power**

Mode	Channel	EIRP [dBm]	P <sub>cl</sub> [dB]	G <sub>a</sub> [dB]	P <sub>Mea</sub> [dBm]	Polarization
GPRS1900	512(Low)	18.24	2.05	5.52	14.77	Horizontal
	661(Mid)	18.13	2.08	5.64	14.57	Horizontal
	810(High)	18.08	2.11	5.61	14.58	Horizontal
GPRS1900	512(Low)	17.43	2.05	5.52	13.96	Vertical
	661(Mid)	17.37	2.08	5.64	13.81	Vertical
	810(High)	17.25	2.11	5.61	13.75	Vertical

Mode	Channel	EIRP [dBm]	P <sub>cl</sub> [dB]	G <sub>a</sub> [dB]	P <sub>Mea</sub> [dBm]	Polarization
EDGE1900	512(Low)	16.56	2.05	5.52	13.09	Horizontal
	661(Mid)	16.41	2.08	5.64	12.85	Horizontal
	810(High)	16.46	2.11	5.61	12.96	Horizontal
EDGE1900	512(Low)	16.27	2.05	5.52	12.80	Vertical
	661(Mid)	16.19	2.08	5.64	12.63	Vertical
	810(High)	16.04	2.11	5.61	12.54	Vertical

Remark:

$$\text{EIRP (dBm)} = P_{\text{Mea}} - P_{\text{cl}} + G_a$$

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### 6.1.2 Field Strength of Spurious Radiation, FCC 2.1053, FCC 22.917(a), FCC 24.238(a)

**RESULT:**

**PASS**

Date of testing:	2013-12-19
Ambient temperature:	23.5°C
Relative humidity:	45%
Atmospheric pressure:	101.5hPa
Frequency range:	30MHz – 25GHz
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber

Requirements:

According to FCC section 22.917(a) and section 24.238(a), 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  $43+10\cdot\log(P)$ dB. This calculated to be -13dBm. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

Test procedure:

1. Make a limit line whose value is -13dBm on the Spectrum Analyzer, and set the RBW of the Spectrum Analyzer to 1MHz.
2. The lowest and the highest channel were selected to perform tests respectively.
3. Employ the bi-log Test Antenna as the test system receiving antenna and set the frequency range of the Spectrum Analyzer from 30MHz to 3GHz.
4. The measurement is performed with the Test Antenna at both horizontal and vertical polarization respectively. Set the polarization of the Test Antenna to be horizontal.
5. Actuate the Turn Table to turn from 0 degrees to 360 degrees to find the maximum reading via the Spectrum Analyzer, mark the fundamental frequency and the harmonics thereof, after then record the harmonics and the plot.
6. Set the polarization of the Test Antenna to be vertical, then repeat step 5.
7. Employ the horn Test Antenna as the test system receiving antenna and set the frequency range of the Spectrum Analyzer from 3GHz to 10th harmonic of the fundamental frequency, then repeat step 4 to 6.
8. 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.

Figure 37: Field Strength of Spurious Radiation, GPRS850, 30MHz ~ 3GHz, Mode B

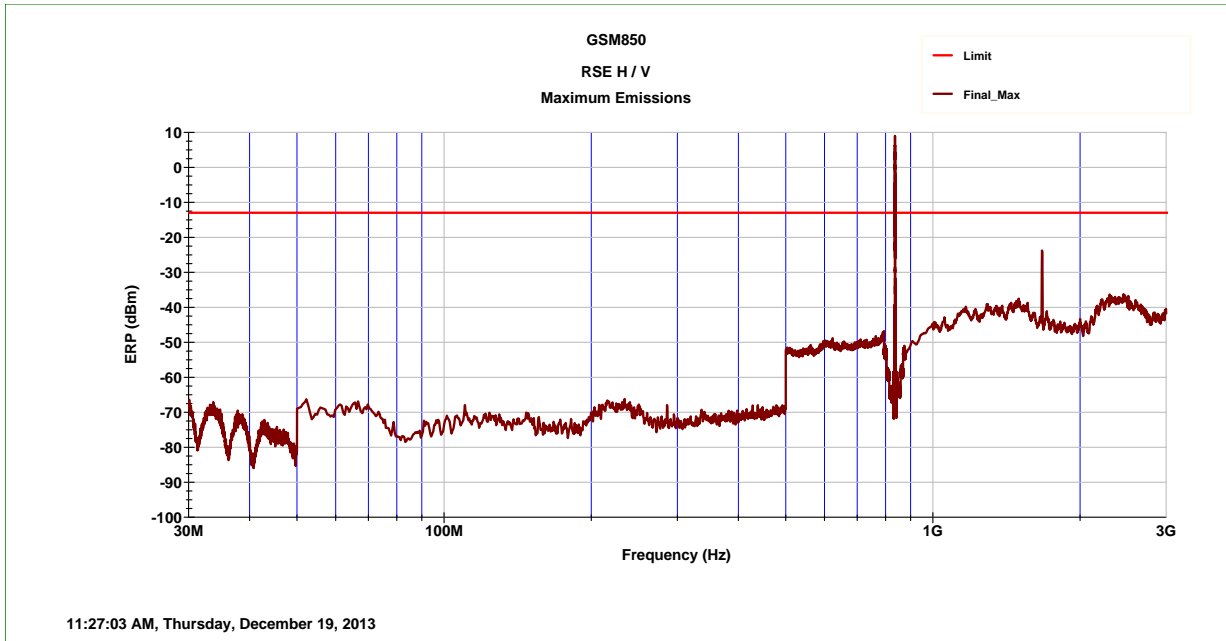


Figure 38: Field Strength of Spurious Radiation, GPRS850, 3GHz ~ 18GHz, Mode B

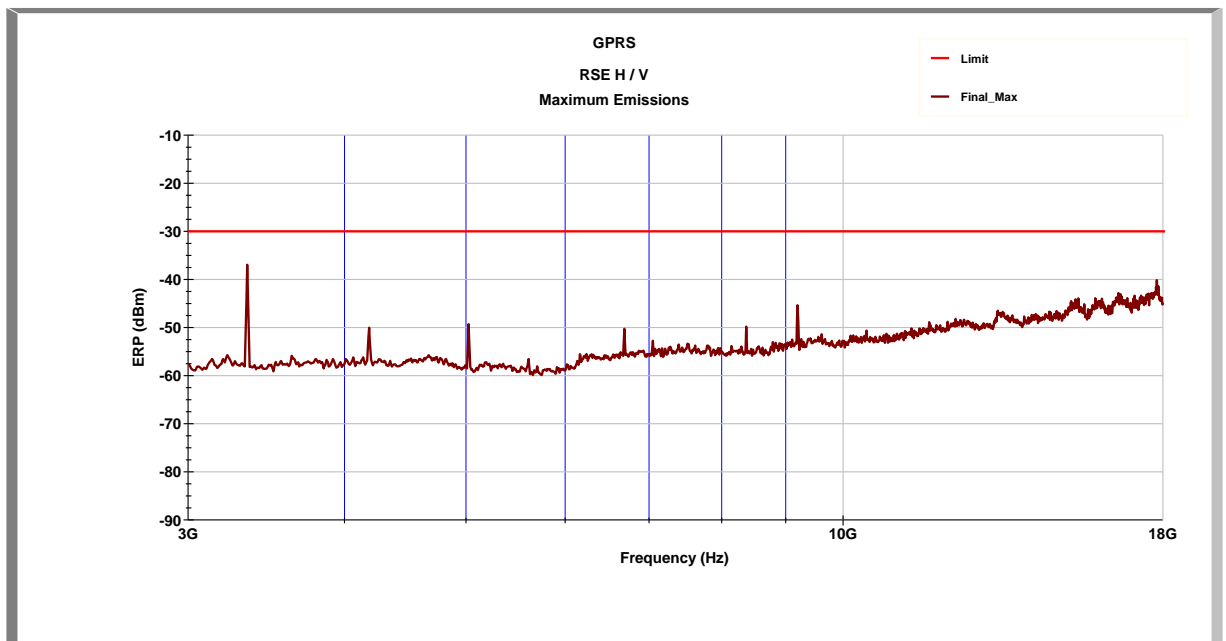


Figure 39: Field Strength of Spurious Radiation, GPRS1900, 30MHz ~ 3GHz, Mode B

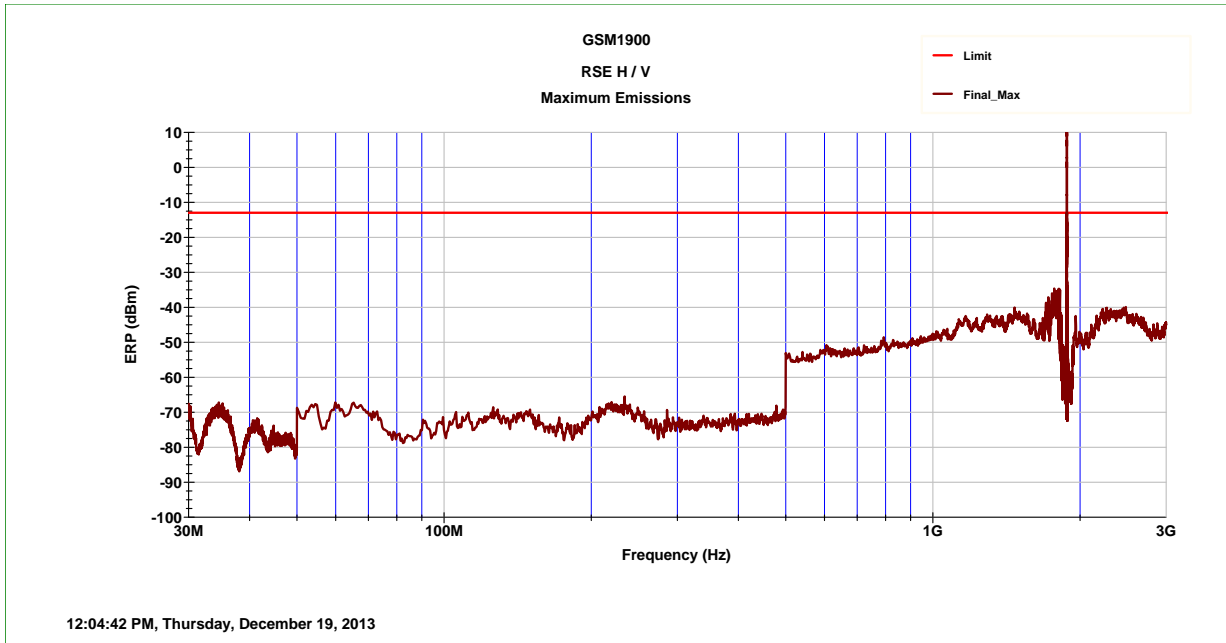
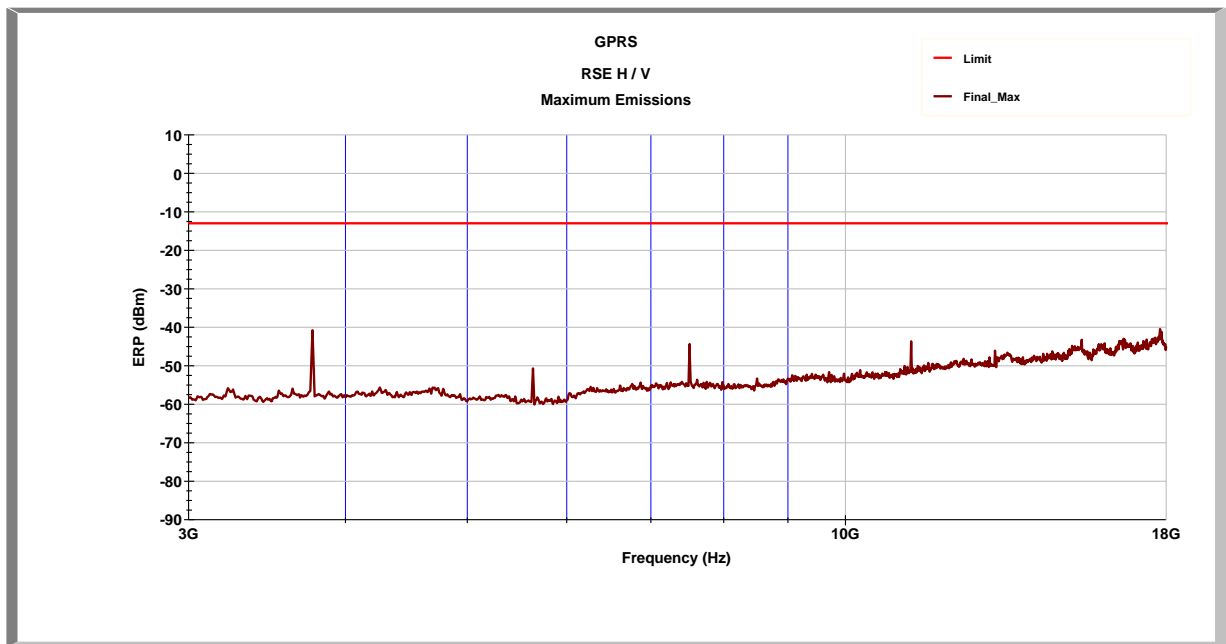


Figure 40: Field Strength of Spurious Radiation, GPRS1900, 3GHz ~ 18GHz, Mode B



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## 7. Photographs of the Test Setup

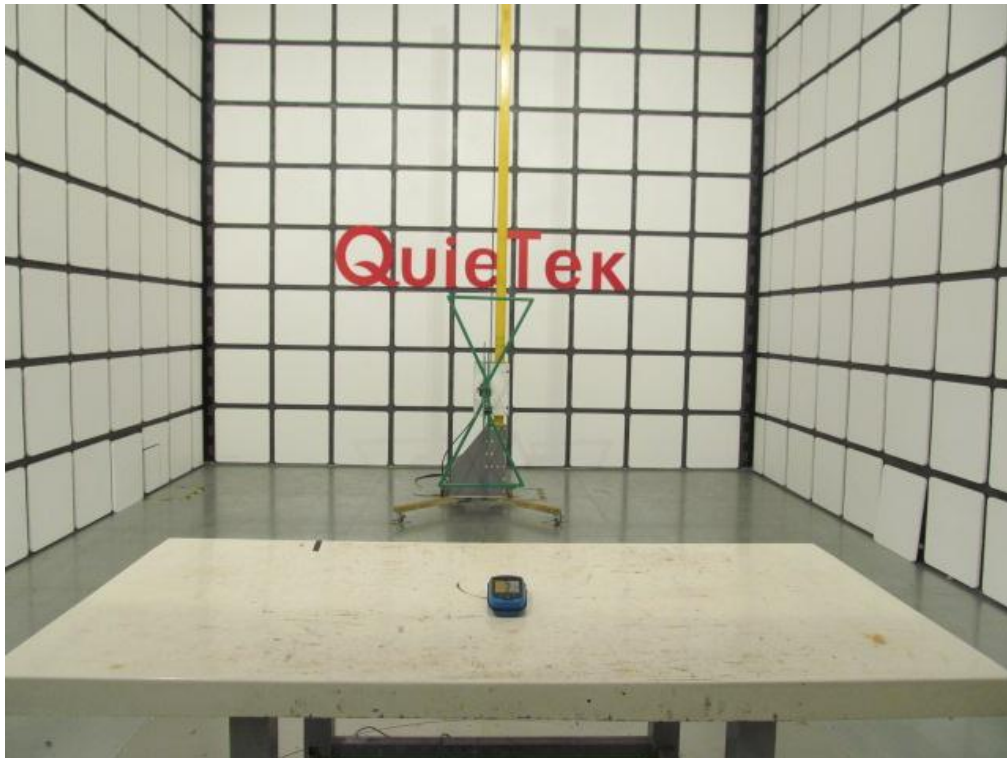
**Photograph 1: Set-up for Conducted output power at Antenna Port**



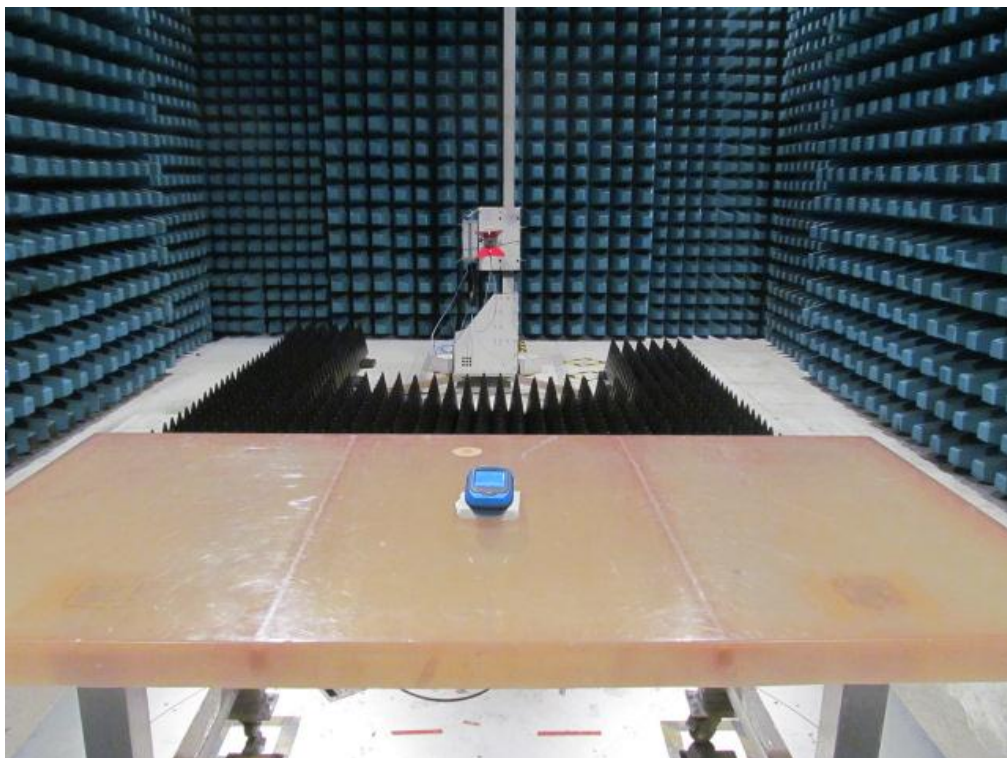
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