Shenzhen Asia Test Technology Co., Ltd.

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FCC RADIO TEST REPORT
FCC ID: 2AEWXBUDIU-GPS

Product： budiu smart GPS chips

Trade Name： budiu

Model Number： Budiu 2.0 GPS

Serial Model： N/A

Prepared for

Beijing ANDL Technology Co., Ltd.

Room 202 BIFTPARK,No.2 East Yinghua Road, Chaoyang District,Beijing,China

Prepared by

Shenzhen Asia Test Technology Co.,Ltd.

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TEST RESULT CERTIFICATION

Applicant's name	Beijing ANDL Technology Co., Ltd.
Address	Room 202 BIFTPARK,No.2 East Yinghua Road, Chaoyang District,Beijing,China
Manufacture's Name	Beijing ANDL Technology Co., Ltd.
Address	Room 202 BIFTPARK,No.2 East Yinghua Road, Chaoyang District,Beijing,China
Product name	budiu smart GPS chips
Model and/or type reference	Budiu 2.0 GPS
Serial Model:	N/A
Standards	FCC Part 22H and 24E
Test procedure	ANSI C63.4-2003, TIA/EIA 603

This device described above has been tested by ATT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test	
Date (s) of performance of tests.....	May 06, 2015 ~ May 13, 2015
Date of Issue	May 13, 2015
Test Result	**Pass**

Eric Wang	Reviewed by: Jerry You	Approved by: Jack yu
Project Leader	Laboratory Supervisor	Technical Director

Contents

1. TEST STANDARDS ANDTEST DESCRIPTION

1.1. Test Standards

The tests were performed according to following standards:

FCC Part 22(10-1-13 Edition): PRIVATE LAND MOBILE RADIO SERVICES.
FCC Part 24(10-1-13 Edition): PUBLIC MOBILE SERVICES
TIA/EIA 603 D June 2010: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
47 CFR FCC Part 15 Subpart B: - Unintentional Radiators
FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
KDB971168 D01:2013-06-07Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems
ANSI C63.4:2014 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

1.2. Test Description

Test Item	Section in CFR 47	Result
AC Power Conducted Emission	Part 15.207	Pass
RF Output Power	Part 2.1046 Part 22.913 (a)(2) Part 24.232 (c)	Pass
Modulation Characteristics	Part 2.1047	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 22.917 Part 24.238	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 22.917 (a) Part 24.238 (a)	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 22.917 (a) Part 24.238 (a)	Pass
Out of band emission, Band Edge	Part 22.917 (a) Part 24.238 (a)	Pass
Frequency stability vs. temperature	Part 2.1055(a)(1)(b)	Pass
Frequency stability vs. voltage	Part 2.1055(d)(1)(2)	Pass

Remark: The measurement uncertainty is not included in the test result.

2. SUMMARY

2.1. Client Information

Applicant:	Beijing ANDL Technology Co., Ltd.
Address:	Room 202 BIFTPARK,No.2 East Yinghua Road, Chaoyang District,Beijing,China
Manufacturer:	Beijing ANDL Technology Co., Ltd.
Address:	Room 202 BIFTPARK,No.2 East Yinghua Road, Chaoyang District,Beijing,China

2.2. Product Description

Name of EUT	budiu smart GPS chips
Model No.:	Budiu 2.0 GPS
List Model:	N/A
Power supply:	DC 3.7V for lithium battery
Adapter information:	N/A
2G:	
Support Network:	GPRS
Support Band:	GSM850, DCS1900
Modulation:	GMSK
Transmit Frequency:	GPRS850: 824.20MHz-848.80MHz GPRS1900: 1850.20MHz-1909.80MHz
Receive Frequency:	GPRS850: 869.20MHz-893.80MHz GPRS 1900: 1930.20MHz-1989.80MHz
GPRS Class:	12
Antenna type:	FPC Antenna
Antenna gain:	0dBi
Software version:	T10_V2.0
Hardware version:	V2.0

Test Frequency:

GPRS 850		GPRS 1900	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20
190	836.60	661	1880.00
251	848.80	810	1909.80

2.3. EUT operation mode

The EUT has been tested under typical operating condition. The Applicant provides software to control the EUT for staying in continuous transmitting and receiving mode for testing.

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/
○	temporary antenna connector	Manufacturer :	DOKMA
		Model No. :	KYS-0944(Impedance=50ohm cable loss=0.9db)

Note : A temporary antenna connector was soldered to EUT to perform the conducted measurements.

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Asia Institute Technology (DongGuan) Limited
No. 22,JinQianLing Street 3, JiTiGang Village, Huang-Jiang Town, DongGuan, Guangdong, 523757 China
FCC Registration No.: 248337;
Environmental conditions
During the measurement the environmental conditions were within the listed ranges:

Normal Temperature/Tnor:	15~35°C
lative Humidity	30~60 %
Air Pressure	950-1050 hPa

3.2. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01"Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1"and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the STT Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	MeasurementUncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-12.75 GHz	1.60 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emissio 1~18GHz	5.16 dB	(1)
Radiated Emissio 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)
Emission Mask	---------	(1)
Modulation Characteristic	---------	(1)
Transmitter Frequency Behavior	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3.3. Equipments Used during the Test

AC Power Conducted Emission						
No.	Equipment	Manufacturer	Model No.	SerialNo.	Last Cal.	Next cal. Date
1	L.I.S.N.#1	Kyoritsu	KNW-242	8-837-4	2014/10/26	2015/10/25
	L.I.S.N.#2	Kyoritsu	KNW-407	8-1789-4	2014/10/26	2015/10/25
2	EMI Measuring Receiver	R&S	ESCI	100124	2014/06/26	2015/06/26
3	Coaxial Switch	Anritsu	MP59B	6200264416	2014/10/26	2015/10/25
4	EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/	N/
5	UNIVERSAL RADIO COMMUNICATIO N	Rohde&Schwarz	CMU200	112064	2014/10/26	2015/10/25
6	Cable 0.009-30MHz	R&S	C01	201309C006	2014/10/26	2015/10/25

Output Power(Conducted) &Occupied Bandwidth&Emission Bandwidth&Band Edge Compliance&Conducted Spurious Emission						
No.	Equipment	Manufacturer	Model No.	SerialNo.	Last Cal.	Next cal. Date
1	UNIVERSAL RADIO COMMUNICATIO N	Rohde&Schwarz	CMU200	112064	2014/10/26	2015/10/25
2	Spectrum Analyzer	Rohde&Schwarz	FSU26	201154	2014/10/26	2015/10/25
3	Splitter	Mini-Circuit	ZAPD-4	400037	2014/10/26	2015/10/25
4	Power Meter	Anritsu	ML2490	S4410054	2014/10/25	2015/10/24
5	Power Sensor	Anritsu	ML2480	S2710011	2014/10/25	2015/10/24
6	Spectrum Analyzer	Agilent	E4407B	MY45108040	2014/07/06	2015/07/05
7	RF Cable (1-26.5g)	R&S	RF01	201409RF001	2014/06/08	2015/06/07

Frequency Stability						
No.	Equipment	Manufacturer	Model No.	SerialNo.	Last Cal.	Next cal. Date
1	UNIVERSAL RADIO COMMUNICATIO N	Rohde&Schwarz	CMU200	112012	2014/10/26	2015/10/25
2	Spectrum Analyzer	Rohde&Schwarz	FSU26	201141	2014/10/26	2015/10/25
3	Climate Chamber	ESPEC	EL-10KA	05107008	2014/10/26	2015/10/25
4	Splitter	Mini-Circuit	ZAPD-4	400059	2014/10/26	2015/10/25

No.	Equipment	Manufacturer	Model No.	SerialNo.	Last Cal.	Next cal. Date
1	UNIVERSAL RADIO COMMUNICATION	Rohde&Schwarz	CMU200	112012	2014/10/26	2015/10/25
2	Spectrum Analyzer	Rohde&Schwarz	FSU26	201141	2014/10/26	2015/10/25
3	HORNANTENNA	ShwarzBeck	9120D	1012	2014/10/26	2015/10/25
4	HORNANTENNA	ShwarzBeck	9120D	1011	2014/10/26	2015/10/25
5	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2014/10/26	2015/10/25
6	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2014/10/26	2015/10/25
7	TURNTABLE	MATURO	TT2.0	----	N/A	N/A
8	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A	N/A
9	EMI Test Software	Audix	E3	N/A	N/A	N/A
10	EMI Test Receiver	Rohde&Schwarz	ESIB 26	100009	2014/10/26	2015/10/25
11	RF Test Panel	Rohde&Schwarz	TS / RSP	335015/ 0017	N/A	N/A
12	High pass filter	Compliance Direction systems	BSU-6	34202	2014/10/26	2015/10/25
13	Splitter	Mini-Circuit	ZAPD-4	400059	2014/10/26	2015/10/25
14	Horn Antenna	SCHWARZBECK	BBHA9170	25841	2014/10/26	2015/10/25
15	Horn Antenna	SCHWARZBECK	BBHA9170	25842	2014/10/26	2015/10/25
16	Preamplifier	ShwarzBeck	BBV 9718	BBV 9718	2014/10/26	2015/10/25
17	Broadband Preamplifier	ShwarzBeck	BBV743	9743-0079	2014/10/26	2015/10/25
18	Signal Generator	Rohde&Schwarz	SMF100A	101932	2014/10/26	2015/10/25
19	Amplifer	Compliance Direction systems	PAP1-4060	120	2014/10/26	2015/10/25
20	TURNTABLE	ETS	2088	2149	N/A	N/A
21	ANTENNA MAST	ETS	2075	2346	N/A	N/A
22	HORNANTENNA	Rohde&Schwarz	HF906	100068	2014/10/26	2015/10/25
23	HORNANTENNA	Rohde&Schwarz	HF906	100039	2014/10/26	2015/10/25
24	RF Cable (1-26.5g)	R&S	RF02	201409RF002	2014/06/08	2015/06/07
25	RF Cable (30-1000mMHz)	R&S	RF03	201409RF003	2014/06/08	2015/06/07

The calibration interval was one year.

4. TEST CONDITIONS AND RESULTS

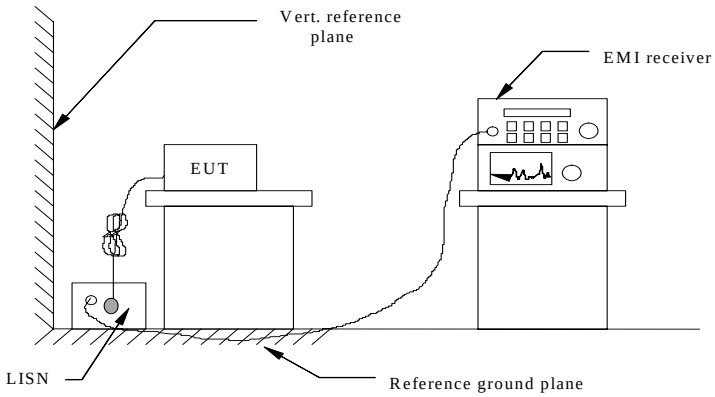
4.1. Conducted Emissions Test

LIMIT:

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreasing linearly with the logarithm of the frequency

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4-2009.

2 Support equipment, if needed, was placed as per ANSI C63.4-2009.

3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2009.

4 If a EUT received DC power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.

5 All support equipments received AC power from a second LISN, if any.

6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.

7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

8 During the above scans, the emissions were maximized by cable manipulation.

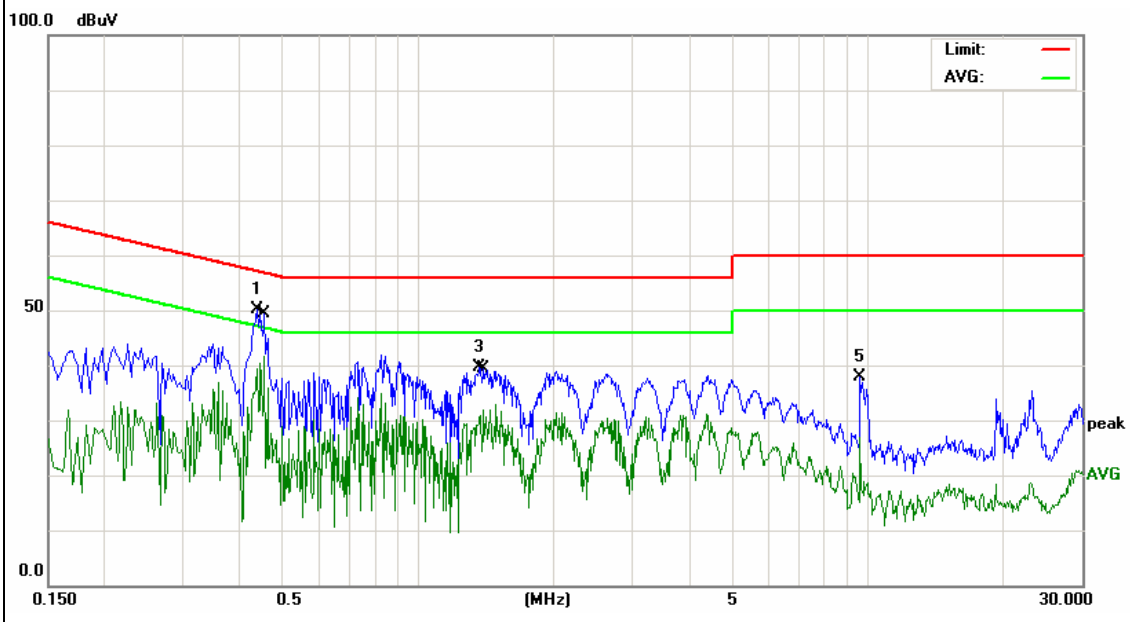
TEST RESULTS

Note: We tested all modes and recorded the worst case at GPRS850

EUT:	budiu smart GPS chips	Model Name. :	Budiu 2.0 GPS
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	2015-05-09
Test Mode:	GPRS 850	Phase :	L
Test Voltage :	DC 5V from PC AC 120V/60Hz		

Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
0.4380	40.09	10.08	50.17	57.10	-6.93	QP
*0.4540	31.46	10.06	41.52	46.80	-5.28	AVG
1.3700	29.70	9.96	39.66	56.00	-16.34	QP
1.4020	21.98	9.96	31.94	46.00	-14.06	AVG
9.6260	36.68	1.15	37.83	60.00	-22.17	QP
9.6260	25.83	1.15	26.98	50.00	-23.02	AVG

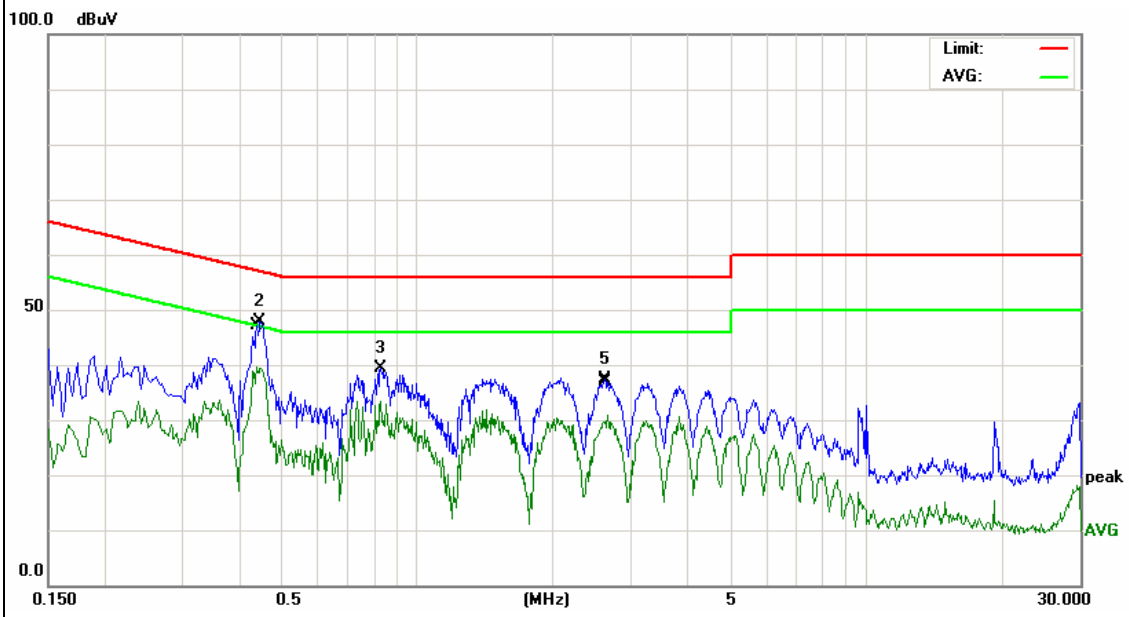
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit



EUT:	budiu smart GPS chips	Model Name. :	Budiu 2.0 GPS
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	2015-05-09
Test Mode:	GPRS 850	Phase :	N
Test Voltage :	DC 5V from PC AC 120V/60Hz		

Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
0.4460	37.83	10.07	47.90	56.95	-9.05	QP
*0.4380	29.54	10.08	39.62	47.10	-7.48	AVG
0.8300	29.36	9.95	39.31	56.00	-16.69	AVG
0.8300	23.31	9.95	33.26	46.00	-12.74	QP
2.6220	27.40	10.01	37.41	56.00	-18.59	QP
2.6619	20.91	10.02	30.93	46.00	-15.07	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. N/A means All Data have pass Limit



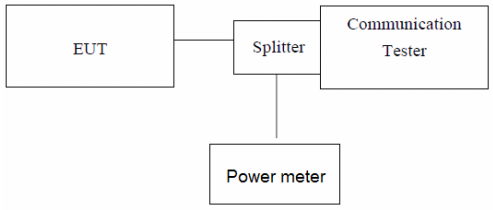
4.2. Conducted Peak Output Power

LIMIT:

GPRS850/WCDMA Band V: 7W

PCS1900/WCDMA Band II: 2W

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

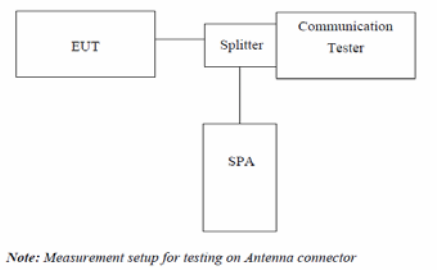
1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum burst average power.

TEST RESULTS

EUT Mode	Channel	Frequency (MHz)	PK Power (dBm)	AVG Power (dBm)	Limit (dBm)	Result
GPRS850 (GMSK,1Slot)	128	824.20	32.34	32.26	38.45	Pass
	190	836.60	32.28	32.15		
	251	848.80	32.21	32.10		
GPRS1900 (GMSK,1Slot)	512	1850.20	30.55	30.49	33.01	Pass
	661	1880.00	30.37	30.32		
	810	1909.80	30.29	30.13		

4.3. Occupy Bandwidth

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

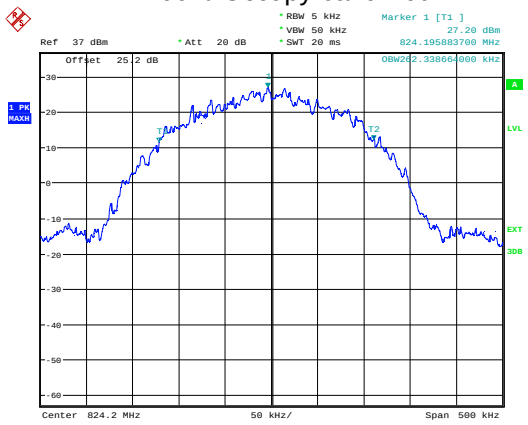
1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBW was set to about 1% of emission BW, VBW= 3 times RBW.
3. -26dBc display line was placed on the screen (or 99% bandwidth); the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

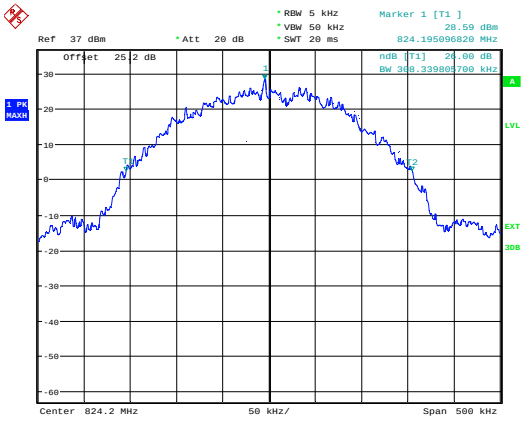
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
GPRS850 (GMSK,1Slot)	128	824.20	262.339	308.340
	190	836.60	265.669	305.884
	251	848.80	272.227	310.458
GPRS1900 (GMSK,1Slot)	512	1850.20	243.897	308.867
	661	1880.00	246.338	305.359
	810	1909.80	253.833	315.267

GPRS850 For GMSK Moudlation

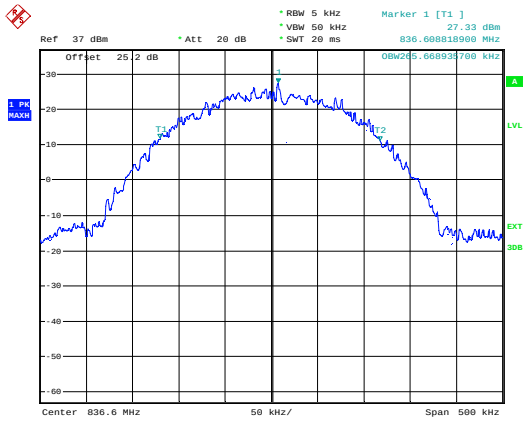
99% Occupy bandwidth



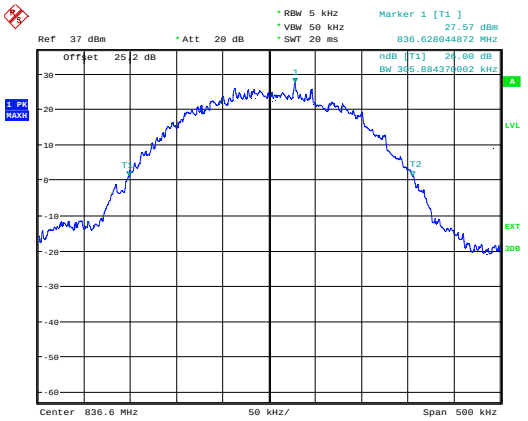
-26dB bandwidth



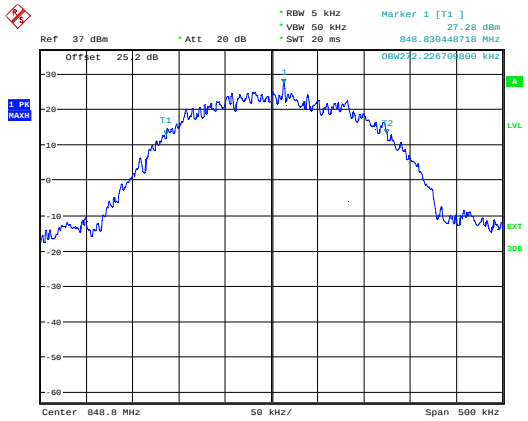
Channel 128



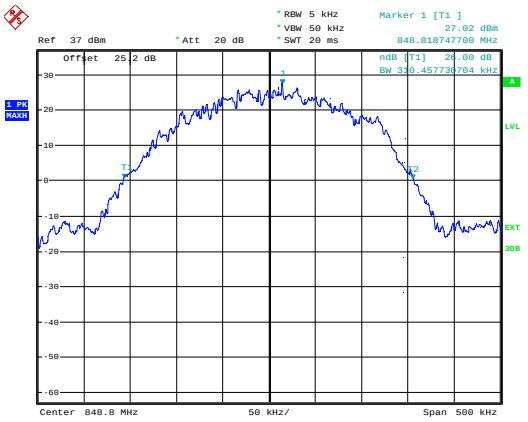
Channel 128



Channel 190



Channel 190

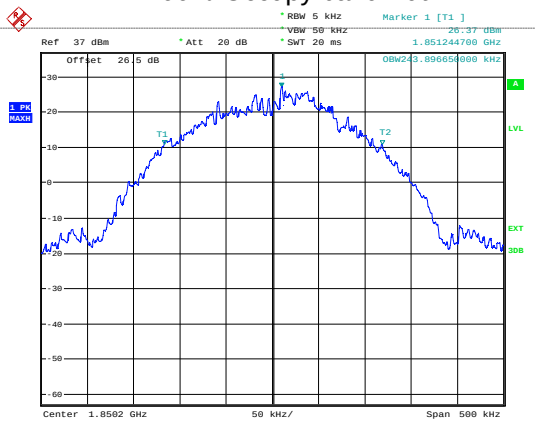


Channel 251

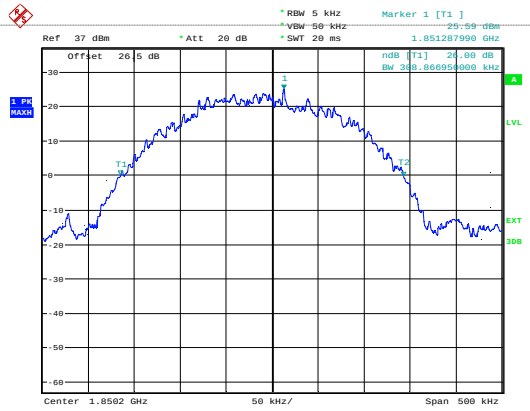
Channel 251

GPRS1900 For GMSK Moudlation

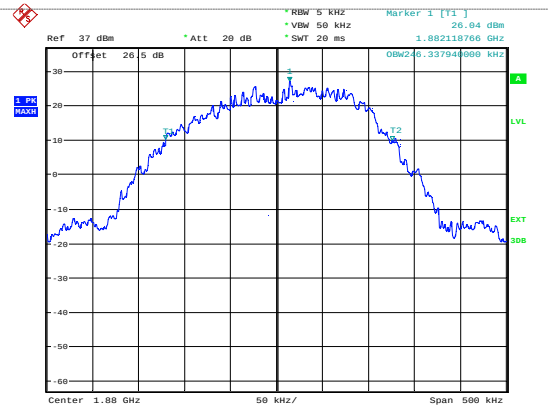
99% Occupy bandwidth



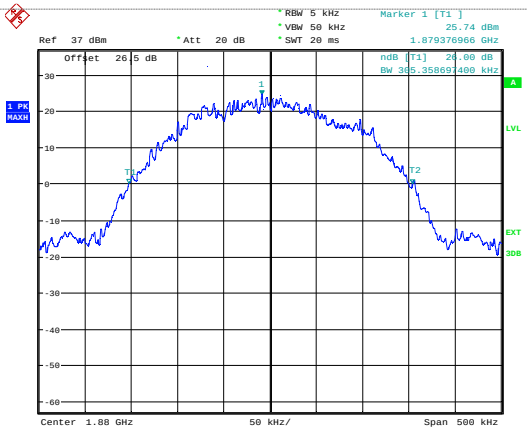
-26dB bandwidth



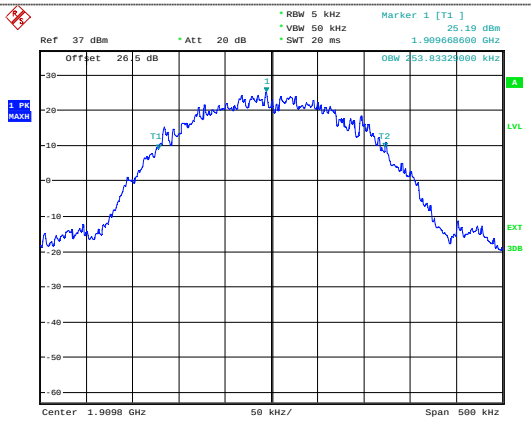
Channel 512



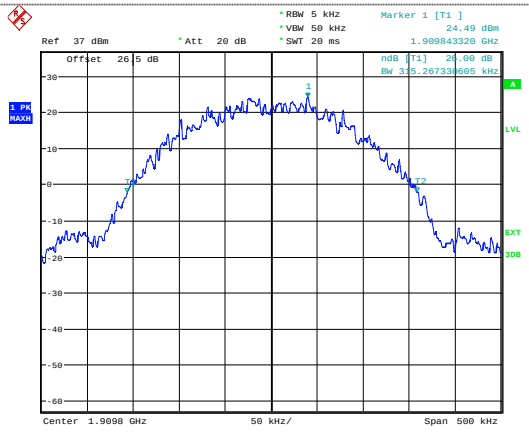
Channel 512



Channel 661



Channel 661



Channel 810

Channel 810

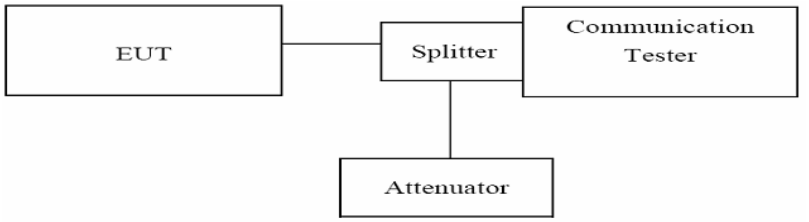
4.4. Out of band emission at antenna terminals

LIMIT

Part 24.238 and Part 22.917 specify that 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 log (P) dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

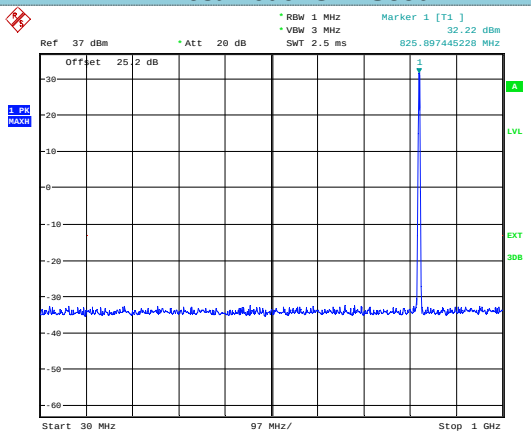
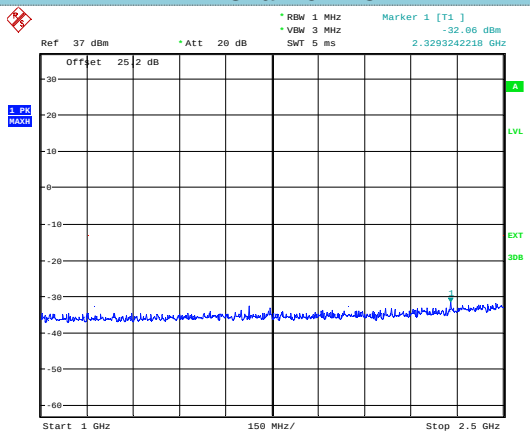
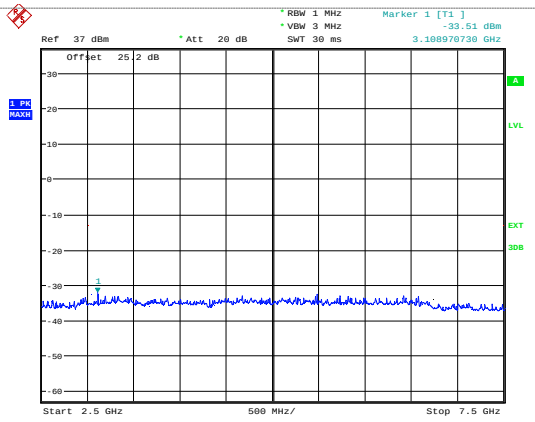
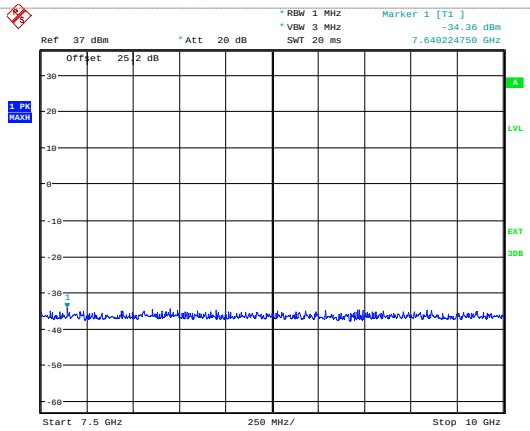
TEST CONFIGURATION

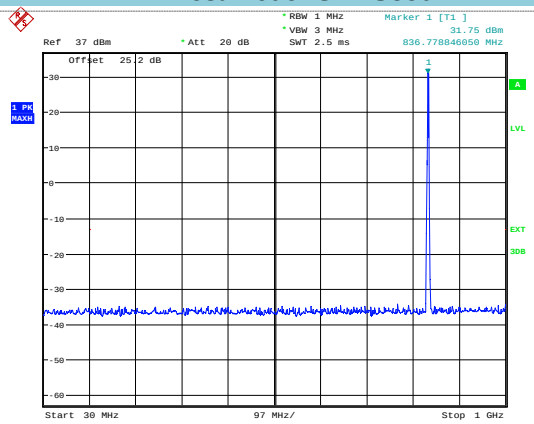
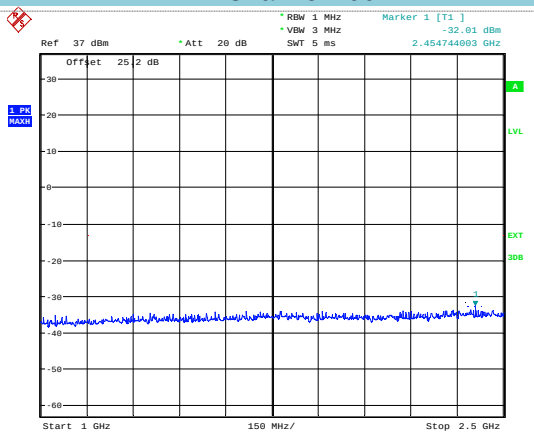
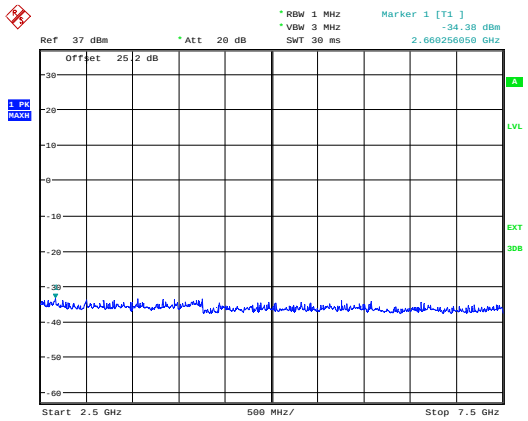
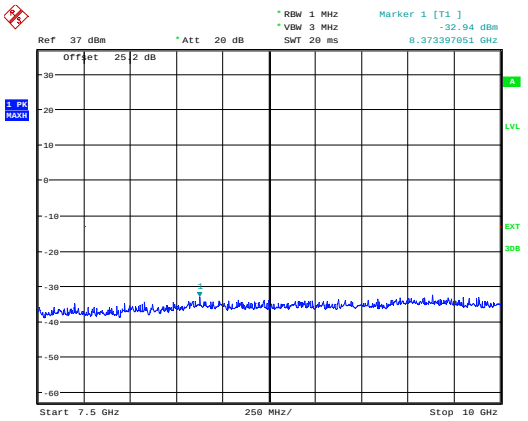


TEST PROCEDURE

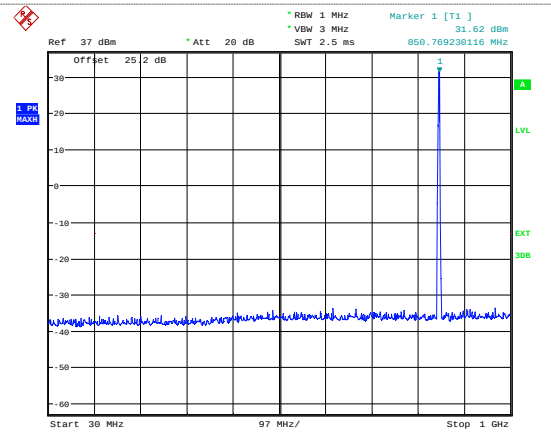
1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10th harmonic.

TEST RESULTS

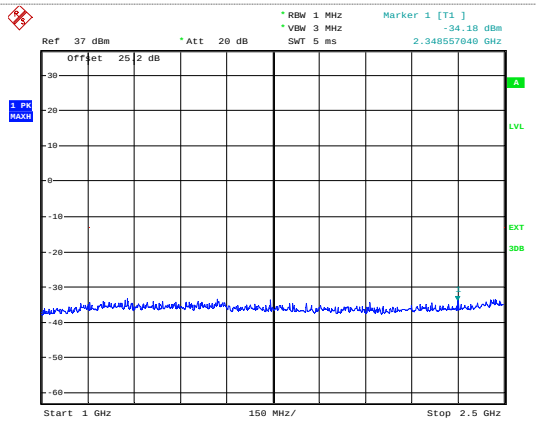
Test mode: GPRS850	*Channel 128*
	
30MHz~1GHz	*1GHz~2.5GHz*
	
2.5GHz~7.5GHz	*7.5GHz~10GHz*

Test mode: GPRS850	*Channel 190*
	
30MHz~1GHz	*1GHz~2.5GHz*
	
2.5GHz~7.5GHz	*7.5GHz~10GHz*

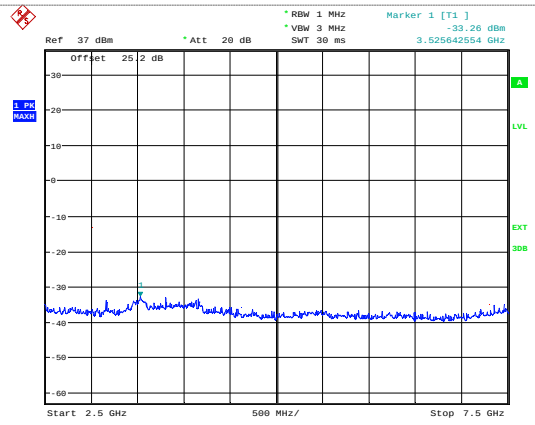
Test mode: GPRS850	*Channel 251*



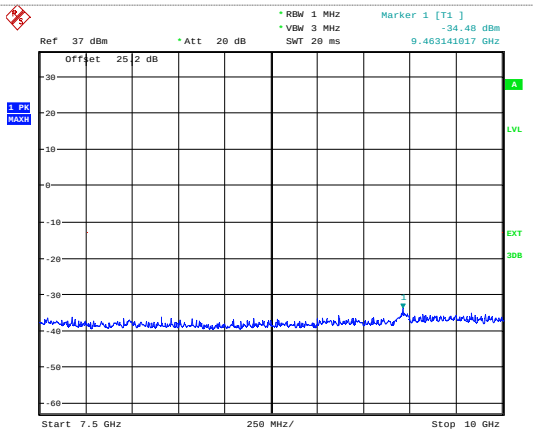
30MHz~1GHz



1GHz~2.5GHz



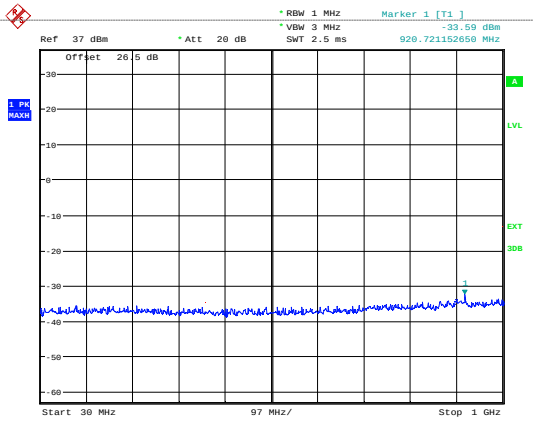
2.5GHz~7.5GHz



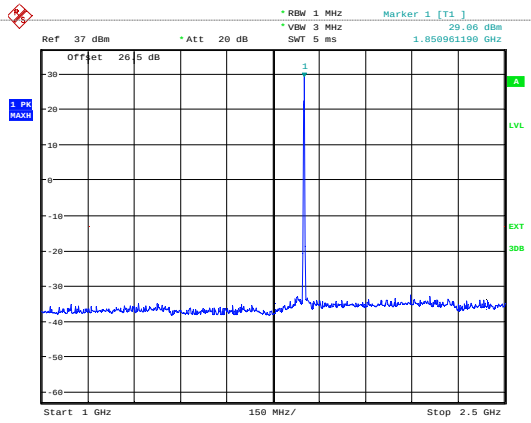
7.5GHz~10GHz

Test mode: GPRS1900	*Channel 512*

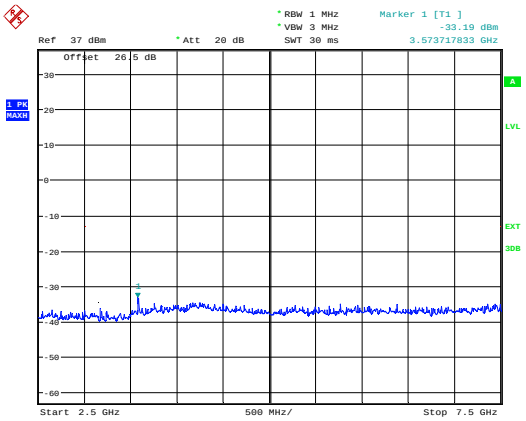
30MHz~1GHz



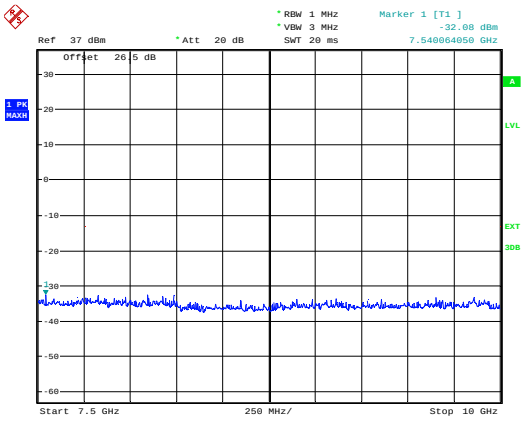
1GHz~2.5GHz



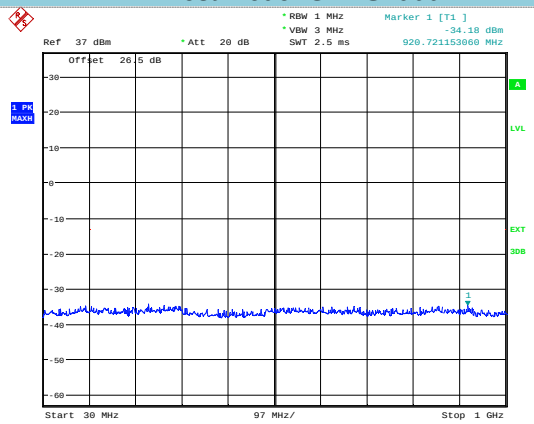
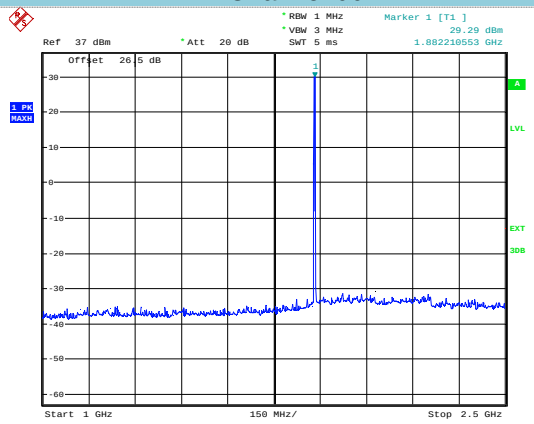
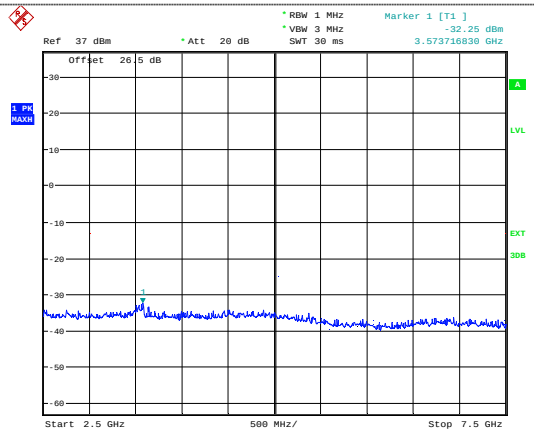
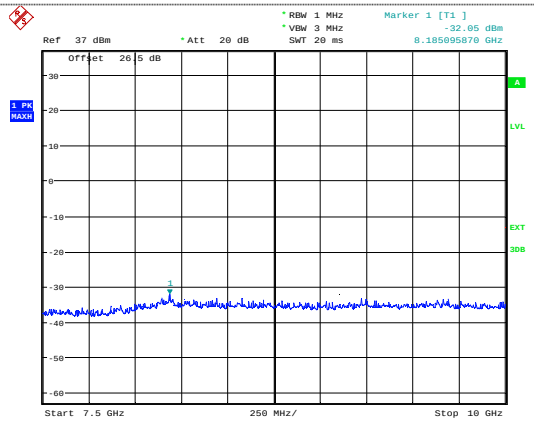
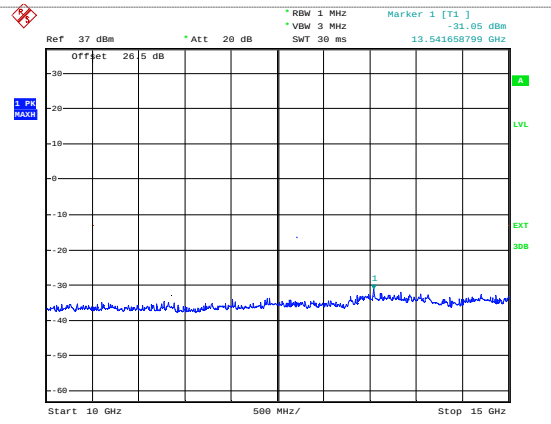
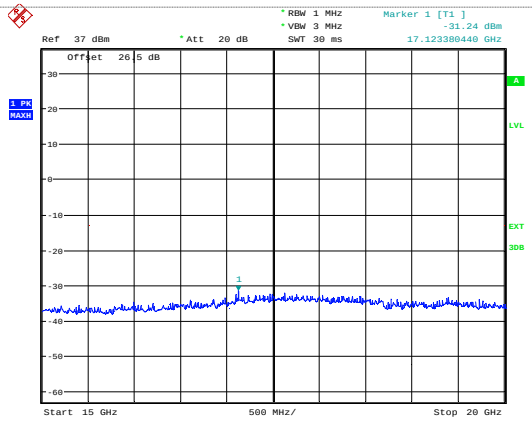
2.5GHz~7.5GHz

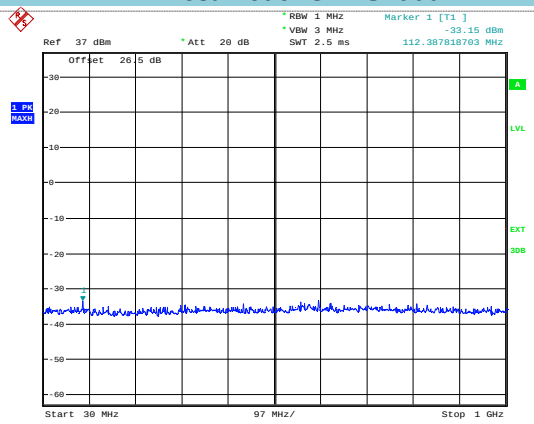
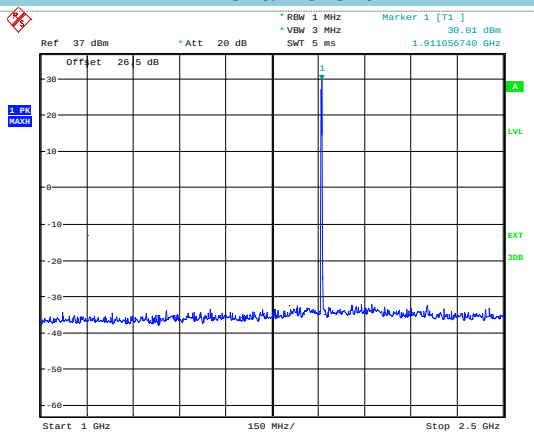
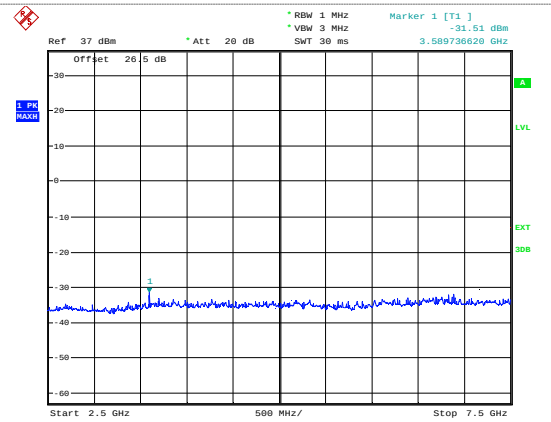
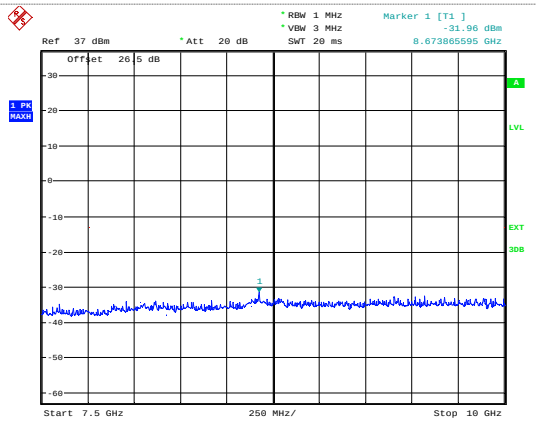
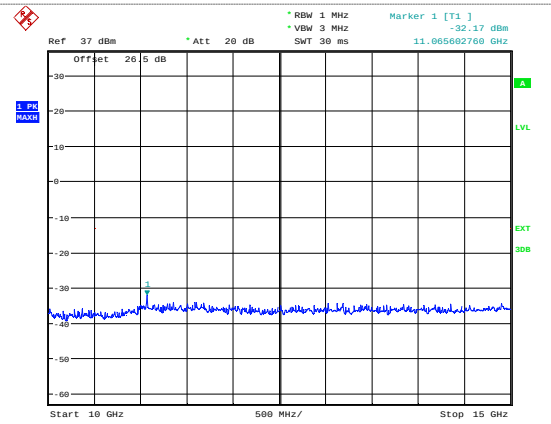
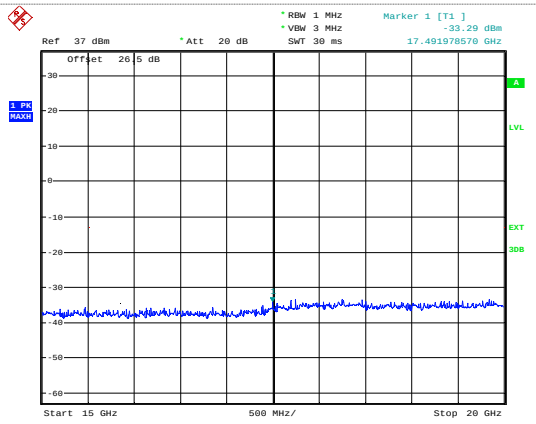


7.5GHz~10GHz



10GHz~15GHz	*15GHz~20GHz*

Test mode: GPRS1900	*Channel 661*
	
30MHz~1GHz	*1GHz~2.5GHz*
	
2.5GHz~7.5GHz	*7.5GHz~10GHz*
	
10GHz~15GHz	*15GHz~20GHz*

Test mode: GPRS1900	*Channel 810*
	
30MHz~1GHz	*1GHz~2.5GHz*
	
2.5GHz~7.5GHz	*7.5GHz~10GHz*
	
10GHz~15GHz	*15GHz~20GHz*

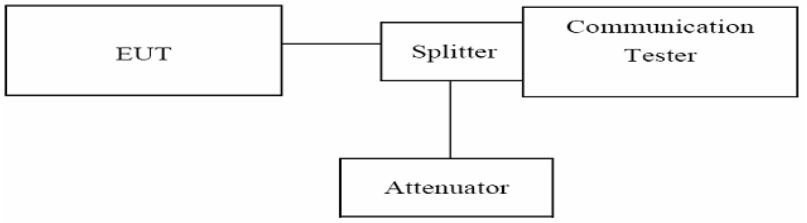
4.5. Band Edge compliance

LIMIT

Part 24.238 and Part 22.917 specify that 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 log (P) dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

TEST CONFIGURATION



TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.

2. For the band edge: 2G:Set the RBW=3KHz , VBW = 10KHz,Span=1MHz Sweep time= Auto

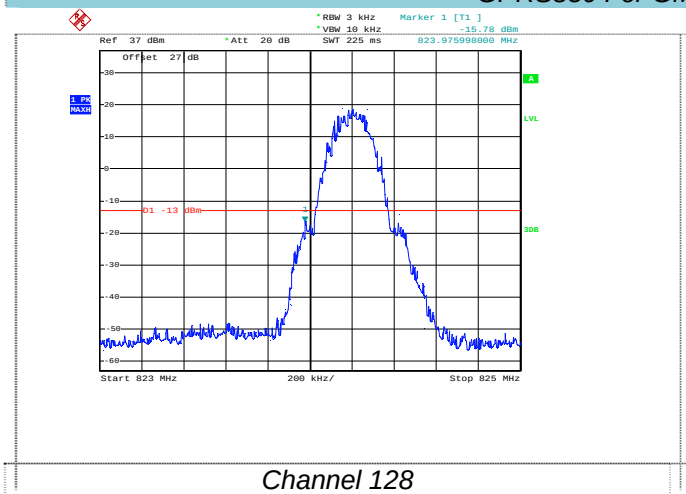
3G: Set the RBW=5KHz, VBW = 50KHz, Span=5MHz Sweep time= Auto

TEST RESULTS

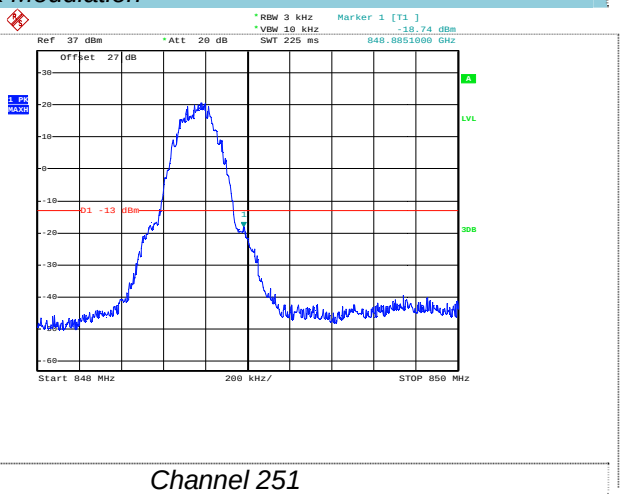
GPRS850					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency(MHz)	Values(dBm)		
128	824.20	824.00	-15.78	-13.00	Pass
251	848.80	849.00	-18.74	-13.00	Pass

GPRS1900					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency(MHz)	Values(dBm)		
512	1850.20	1849.96	-15.11	-13.00	Pass
810	1909.80	1910.00	-17.37	-13.00	Pass

GPRS850 For GMSK Moudlation

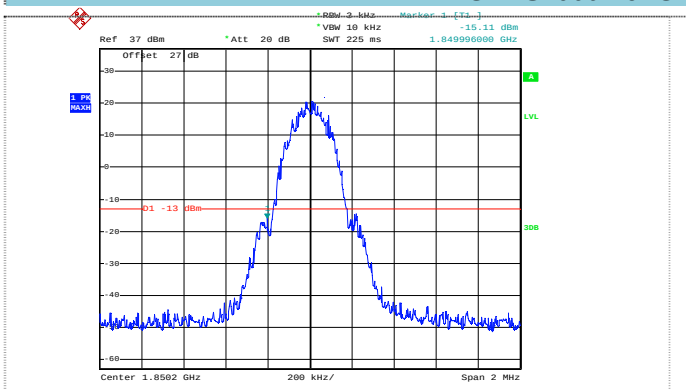


Channel 128

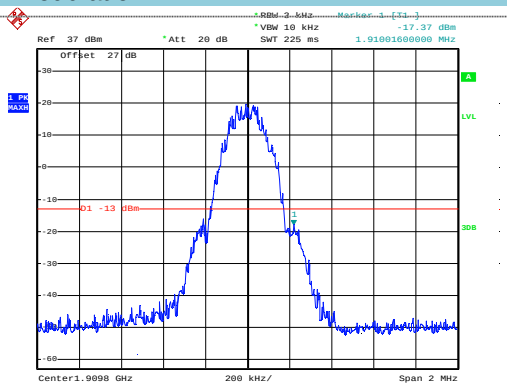


Channel 251

GPRS1900 For GMSK Moudlation



Channel 512



Channel 810

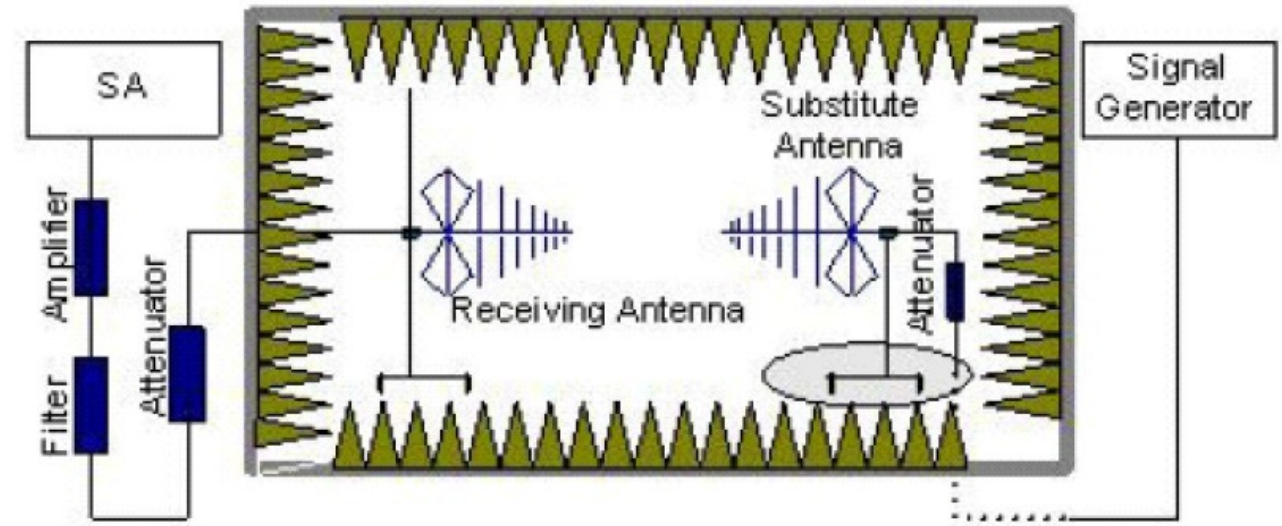
4.6. Radiated Power Measurement

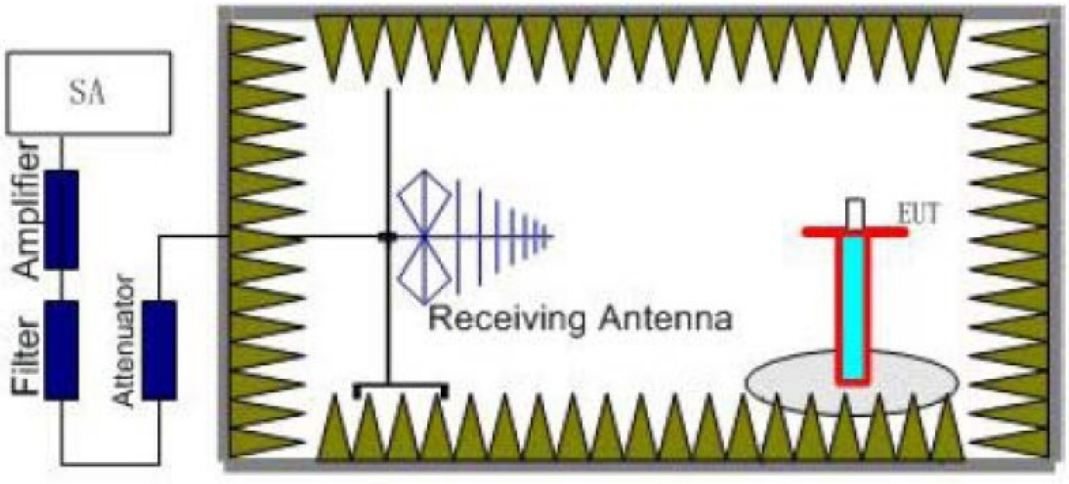
LIMIT

GPRS850/WCDMA Band V: 7W ERP

PCS1900/WCDMA Band II: 2W EIRP

TEST CONFIGURATION





TEST PROCEDURE

1. EUT was placed on a 1.50 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 1.50m. 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. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, a 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 (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
   Power(EIRP)=PMea- PAg - Pcl + Ga
   We used SMF100A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power(EIRP)=PMea- Pcl + Ga
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
   ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST RESULTS

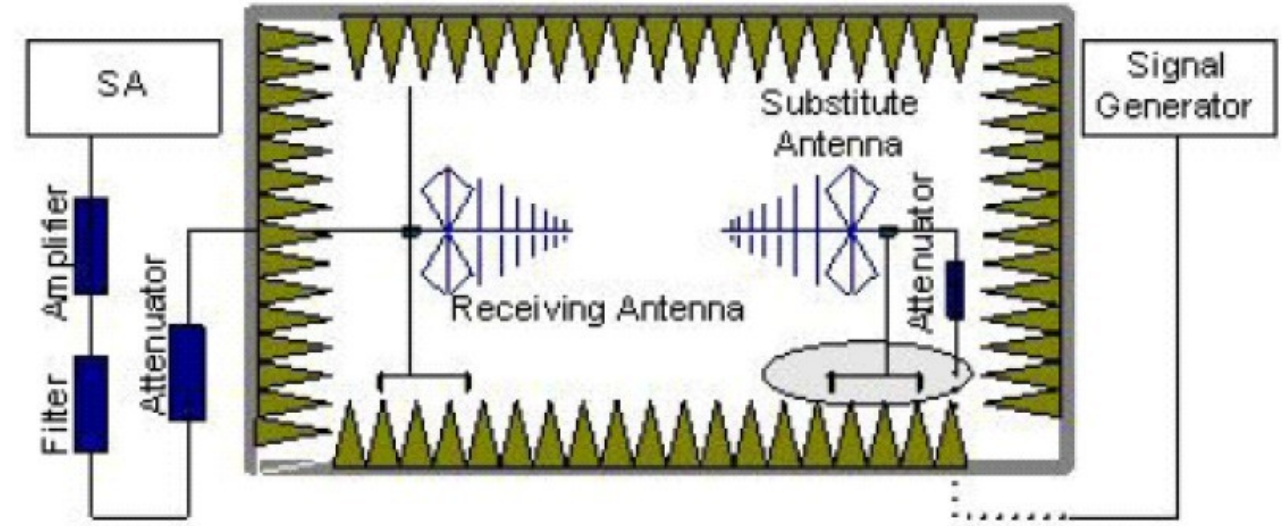
Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
GPRS850	128	V	31.38	38.45	Pass
		H	28.31		
	190	V	31.32		
		H	27.84		
	251	V	31.697		
		H	29.83		
GPRS1900	512	V	28.64	33.01	Pass
		H	26.77		
	661	V	29.85		
		H	28.52		
	810	V	29.85		
		H	28.48		

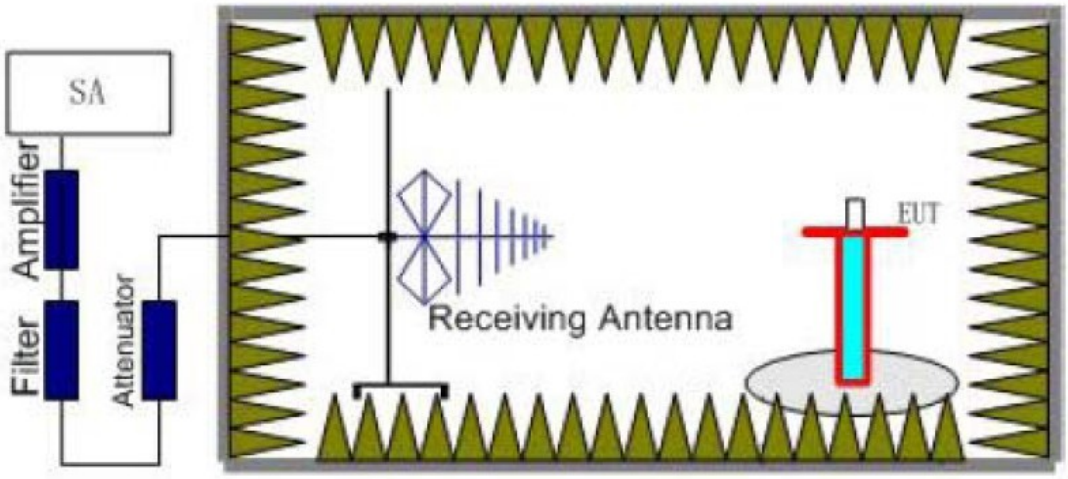
4.7. Radiated Spurious Emission

LIMIT

-13dBm

TEST CONFIGURATION





TEST RESULTS

1. EUT was placed on a 1.50 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 1.50m. 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. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, a 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 (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
   Power(EIRP)=PMea- PAg - Pcl + Ga
   We used SMF100A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power(EIRP)=PMea- Pcl + Ga
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
   ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST RESULTS

GPRS850					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
128	1648.40	V	-36.38	-13.00	Pass
	2472.60	V	-34.88		
	3296.80	V	-37.29		
	4121.00	V	-39.48		
	4945.20	V	---		
	1648.40	H	-37.58	-13.00	Pass
	2472.60	H	-40.17		
	3296.80	H	-42.53		
	4121.00	H	-42.97		
	4945.20	H	---		
190	1673.20	V	-36.48	-13.00	Pass
	2509.80	V	-37.18		
	3346.40	V	-38.64		
	4183.00	V	-40.73		
	5019.60	V	---		
	1673.20	H	-40.43	-13.00	Pass
	2509.80	H	-41.17		
	3346.40	H	-42.22		
	4183.00	H	-45.38		
	5019.60	H	---		
251	1697.60	V	-39.74	-13.00	Pass
	2546.40	V	-40.63		
	3395.20	V	-42.11		
	4244.00	V	-43.37		
	5092.80	V	---		
	1697.60	H	-39.99	-13.00	Pass
	2546.40	H	-41.51		
	3395.20	H	-42.63		
	4244.00	H	-43.28		
	5092.80	H	---		

Remark：

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

GPRS1900					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
512	3700.40	Vertical	-37.36	-13.00	Pass
	5550.60	V	-35.28		
	7400.80	V	-38.73		
	9251.00	V	-41.44		
	11101.20	V	---		
	3700.40	Horizontal	-39.64	-13.00	Pass
	5550.60	H	-41.83		
	7400.80	H	-43.66		
	9251.00	H	-44.25		
	11101.20	H	---		
661	3760.00	Vertical	-36.52	-13.00	Pass
	5640.00	V	-37.26		
	7520.00	V	-37.55		
	9400.00	V	-39.28		
	11280.00	V	---		
	3760.00	Horizontal	-37.62	-13.00	Pass
	5640.00	H	-38.26		
	7520.00	H	-40.16		
	9400.00	H	-42.62		
	11280.00	H	---		
810	3819.60	Vertical	-37.53	-13.00	Pass
	5729.40	V	-38.62		
	7639.20	V	-39.77		
	9549.00	V	-41.25		
	11458.80	V	---		
	3819.60	Horizontal	-36.38	-13.00	Pass
	5729.40	H	-37.55		
	7639.20	H	-41.18		
	9549.00	H	-43.62		
	11458.80	H	---		

Remark：

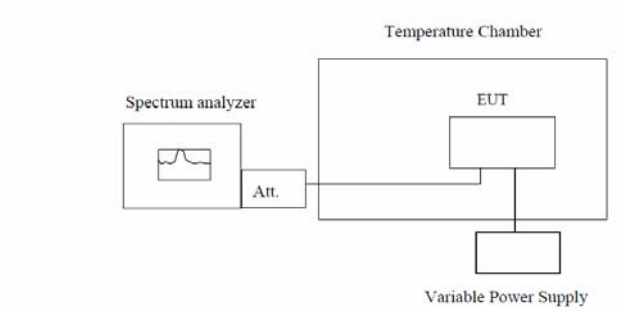
1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

4.8. Frequency stability V.S. Temperature measurement

LIMIT

2.5ppm

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

TEST RESULTS

Reference Frequency: GPRS850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	43	0.051	2.5	Pass
	-20	40	0.048		
	-10	40	0.048		
	0	37	0.044		
	10	39	0.047		
	20	33	0.039		
	30	37	0.044		
	40	33	0.039		
	50	35	0.051		

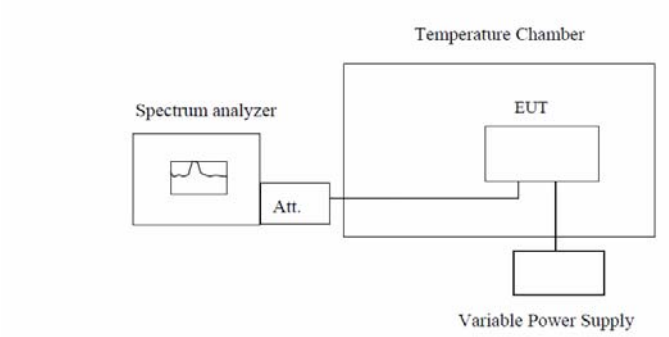
Reference Frequency: GPRS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	42	0.022	2.5	Pass
	-20	38	0.020		
	-10	36	0.019		
	0	33	0.018		
	10	32	0.017		
	20	35	0.019		
	30	34	0.018		
	40	38	0.020		
	50	36	0.019		

4.9. Frequency VS Voltage stability

LIMIT

2.5ppm

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. Set chamber temperature to 25℃. Use a variable DC power source topower the EUT and set the voltage to rated voltage.
2. Set the spectrum analyzer RBW lowenough to obtain the desired frequency resolution and recorded the frequency.
3. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, recordthe maximum frequency change.

TEST RESULTS

Reference Frequency: GPRS850 Middle channel=190 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	34	0.041	2.5	Pass
	3.70	37	0.044		
	3.40	34	0.041		
Reference Frequency: GPRS1900 Middle channel=661 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.25	44	0.053	2.5	Pass
	3.70	49	0.059		
	3.40	45	0.054		