FCC TEST REPORT

For

General Procurement, Inc

Hyundai Koral_7M4

Model No.: Koral_7M4

Prepared For	:	General Procurement, Inc
Address	:	800 E Dyer Road , Santa Ana, California, United States 92705
Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
Address	:	1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102 Tel: (86) 755-26066440 Fax: (86) 755-26014772
Report Number	:	SZAWW181107001-04
Date of Receipt	:	Nov. 07, 2018
Date of Test	:	Nov. 07~Dec. 12, 2018
Date of Report	:	Dec. 13, 2018

Contents

TEST REPORT

Applicant	:	General Procurement, Inc
Manufacturer	:	Shen Zhen Cheng Fong Digital-Tech Limited
Product Name	:	Hyundai Koral_7M4
Model No.	:	Koral_7M4
Trade Mark	:	Hyundai
Rating(s)	:	Input: DC 5V, 2A(Via adapter Input: AC 100~240V, 50/60Hz, Max: 0.35A; with DC 3.7V, 2800mAh Battery inside)

Test Standard(s)	**:**	**FCC PART 2, FCC Part 22(H) :2018, FCC Part 24(E):2018**
Test Method(s)	**:**	**ANSI/TIAC603 D: 2010，KDB971168 D01 v03**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 22/FCC Part 24 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : : Nov. 07~Dec. 12, 2018

Prepared by : Oliay Yang

(Engineer / Oliay Yang)

Reviewer : : Snowy Meng

(Supervisor / Snowy Meng)

Approved & Authorized Signer : : Sally Zhang

(Manager / Sally Zhang)

1. General Information

1.1. Client Information

Applicant	:	General Procurement, Inc
Address	:	800 E Dyer Road , Santa Ana, California, United States 92705
Manufacturer	:	Shen Zhen Cheng Fong Digital-Tech Limited
Address	:	Building A, ChengFong Industrial Area, Huaxing road, Dalang, Longhua, Shen Zhen, China
Factory	:	Shen Zhen Cheng Fong Digital-Tech Limited
Address	:	Building A, ChengFong Industrial Area, Huaxing road, Dalang, Longhua, Shen Zhen, China

1.2. Description of Device (EUT)

Product Name	:	Hyundai Koral_7M4	
Model No.	:	Koral_7M4	
Trade Mark	:	Hyundai	
Test Sample NO.	:	S1	
Test Power Supply		AC 240V, 60Hz for adapter/ AC 120V, 60Hz for adapter/ DC 3.7V Battery inside	
Product Description	:	Operation Frequency:	GSM/GPRS 850 TX:824.2~848.8 MHz; RX:869.2~893.8 MHz PCS/GPRS 1900 TX:1850.2~1909.8 MHz; RX:1930.2~1989.8 MHz UMTS-FDD Band 5 TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz UMTS-FDD Band 2 TX:1852.4~1907.6 MHz; RX: 1932.4~1987.6 MHz
		GPRS Class	8/10/12
		Modulation Type:	GSM/GPRS: GMSK WCDMA: BPSK, 16QAM;
		Antenna Type:	PIFA Antenna
		Antenna Gain(Peak):	GSM 850: 2.5 dBi PCS 1900: 2.5 dBi UMTS-FDD Band 2: 2.5 dBi UMTS-FDD Band 5: 2.5 dBi
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2) This report is for GSM&WCDMA module.			

1.3. Auxiliary Equipment Used During Test

Adapter	:	Manufacturer: Shenzhen Jihongda Power Co., Ltd.
		M/N: JHD-AP013U-050200BB-B Input: 100-240V~ 50/60Hz, 0.35A Output: DC 5V, 2000mA

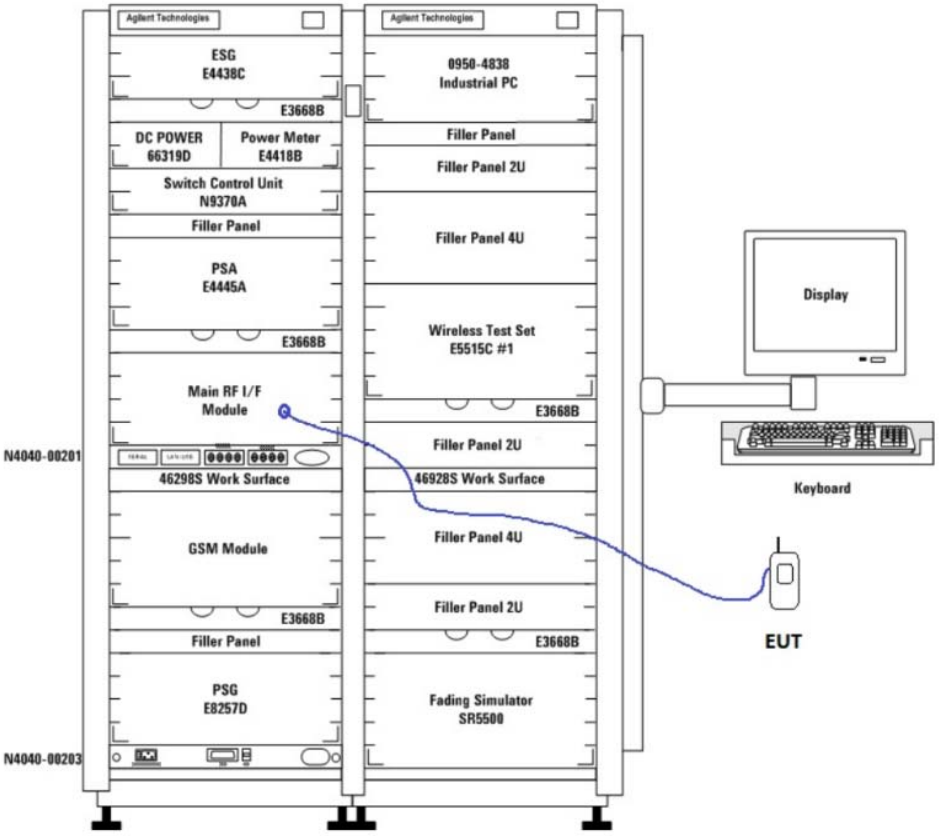
1.4. Description of Test Modes

The following is the description of how the EUT is exercised during testing.

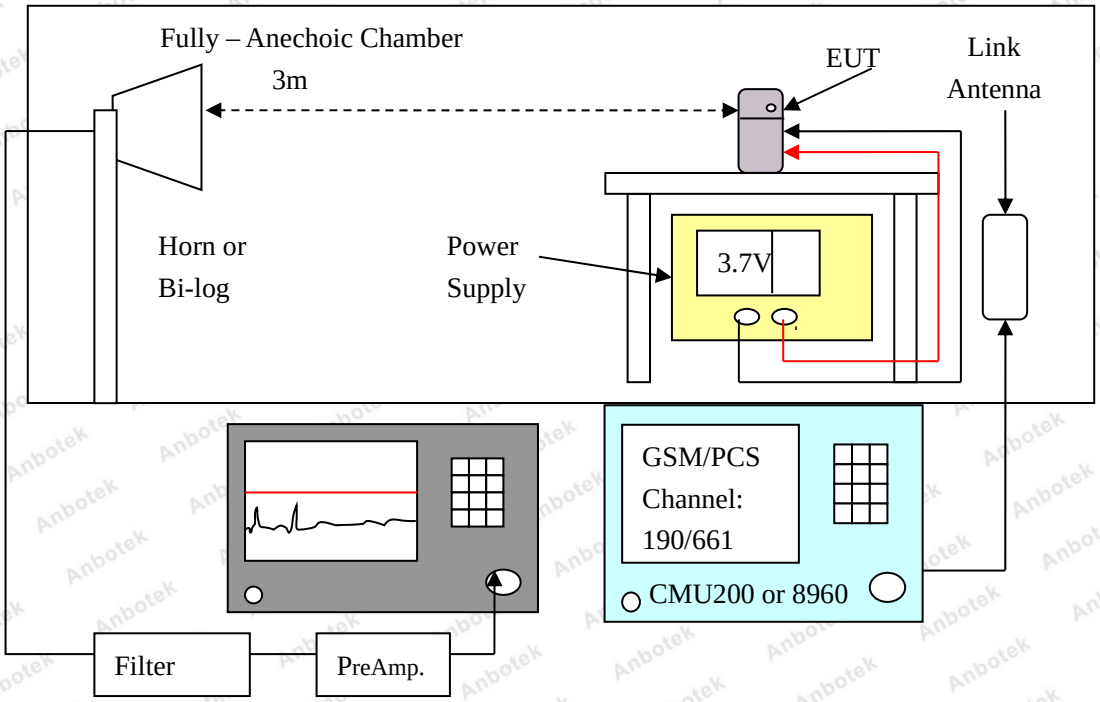
Test	Description Of Operation
Emissions Testing	The EUT was communicating with base station.
Others Testing	The EUT was communicating with base station.

1.5. Description Of Test Setup

1.5.1 Conducted Test Setup



1.5.2 Radiated Test Setup



1.6. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Nov. 05, 2018	1 Year
2.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Nov. 05, 2018	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI3	101604	Nov. 05, 2018	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 19, 2018	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 19, 2018	1 Year
6.	Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	01109	Nov. 20, 2018	1 Year
7.	Pre-amplifier	SONOMA	310N	186860	Nov. 05, 2018	1 Year
8.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
9.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 05, 2018	1 Year
10.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Nov. 05, 2018	1 Year
11.	DC Power Supply	IVYTECH	IV3605	1804D360510	Apr. 02, 2018	1 Year
12.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Nov. 01, 2018	1 Year
13.	Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	117888	Nov. 05, 2018	1 Year
14.	Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	104209	Nov. 05, 2018	1 Year
15.	High-Pass Filter	CDKMV	ZHPF-BM1100-4000-0730	B2015094550	Nov. 08, 2018	1 Year
16.	High-Pass Filter	CDKMV	ZHPF-M3.5-18G-3834	1307006523	Nov. 05, 2018	1 Year
17.	4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063507	Nov. 05, 2018	1 Year
18.	4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063513	Nov. 05, 2018	1 Year

1.7. Measurement Uncertainty

Maximum measurement uncertainty

Parameter	Uncertainty
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±1 ℃
Humidity	±5 %
DC and low frequency voltages	±3 %
Time	±5 %
Confidence interval：95%. Confidence factor:k=2	

1.8. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

Test Location

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

2. Summary of Test

2.1. Summary of test result

FCC Rules	Description of Test	Result
§2.1046; § 22.913(a); § 24.232(c);	RF Output Power	Compliance
§ 24.232 (d);	Peak-Average Ratio	Compliance
§ 2.1047	Modulation Characteristics	N/A
§ 2.1049; § 22.905; § 22.917; § 24.238;	99% & -26 dB Occupied Bandwidth	Compliance
§ 2.1051; § 22.917(a); § 24.238(a);	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917(a); § 24.238(a);	Field Strength of Spurious Radiation	Compliance
§ 22.917(a); § 24.238(a);	Out of band emission, Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235;	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

2.2. Test mode

During all testing, EUT is in link mode with base station emulator at maximum power level in each test mode and channel as below:

Temperature range	21-25℃
Humidity range	40-75%
Pressure range	86-106kPa

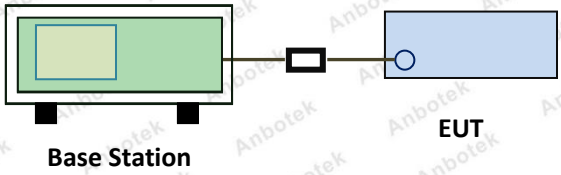
Mode	Channel	Frequency(MHz)
GSM 850	128	824.2
	190	836.6
	251	848.8
PCS 1900	512	1850.2
	661	1880.0
	810	1909.8
UMTS BAND V	4132	826.4
	4182	836.4
	4233	846.6
UMTS BAND II	9262	1852.4
	9400	1880.0
	9538	1907.6

3. RF Output Power Test

3.1. Test Standard and Limit

Spec	Item	Requirement
§22.913 (a)	a)	ERP:38.5dBm
§24.232 (c)	b)	EIRP:33dBm

3.2. Test Setup



3.3. Test Procedure

For Conducted Power:

The transmitter output port was connected to base station.

Set EUT at maximum power through base station.

Select lowest, middle, and highest channels for each band and different test mode.

For ERP/EIRP:

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

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 Log10 (power out in Watts.

3.4. Test Data

Please to see the following pages

Conducted Power:

Band	Channel	PCL	Power(dBm)	Limit(dBm)	Verdict
GSM850	128	5	30.12	38.5	PASS
GSM850	190	5	30.29	38.5	PASS
GSM850	251	5	30.45	38.5	PASS
GSM1900	512	0	29.15	33	PASS
GSM1900	661	0	29.34	33	PASS
GSM1900	810	0	29.86	33	PASS

Band	Channel	PCL	Slot	Power(dBm)	Limit(dBm)	Verdict
GPRS850	128	3	1	30.14	38.5	PASS
GPRS850	128	3	2	29.76	38.5	PASS
GPRS850	128	3	3	29.55	38.5	PASS
GPRS850	128	3	4	29.32	38.5	PASS
GPRS850	190	3	1	30.33	38.5	PASS
GPRS850	190	3	2	30.00	38.5	PASS
GPRS850	190	3	3	29.78	38.5	PASS
GPRS850	190	3	4	29.56	38.5	PASS
GPRS850	251	3	1	30.42	38.5	PASS
GPRS850	251	3	2	30.07	38.5	PASS
GPRS850	251	3	3	29.89	38.5	PASS
GPRS850	251	3	4	29.69	38.5	PASS
GPRS1900	512	3	1	29.16	33	PASS
GPRS1900	512	3	2	28.60	33	PASS
GPRS1900	512	3	3	28.46	33	PASS
GPRS1900	512	3	4	28.15	33	PASS
GPRS1900	661	3	1	29.37	33	PASS
GPRS1900	661	3	2	28.79	33	PASS
GPRS1900	661	3	3	28.60	33	PASS
GPRS1900	661	3	4	28.52	33	PASS
GPRS1900	810	3	1	29.75	33	PASS
GPRS1900	810	3	2	29.43	33	PASS
GPRS1900	810	3	3	29.29	33	PASS
GPRS1900	810	3	4	29.54	33	PASS

Band	Channel	Power(dBm)	Limit(dBm)	Verdict
Band II	9262	23.34	33	PASS
Band II	9400	23.17	33	PASS
Band II	9538	23.53	33	PASS
Band V	4132	20.72	38.5	PASS
Band V	4182	20.73	38.5	PASS
Band V	4233	20.89	38.5	PASS

Band	Channel	SubTest	Power(dBm)	Limit(dBm)	Verdict
Band II	9262	HSDPA_Sub1	22.27	33	PASS
Band II	9262	HSDPA_Sub2	21.75	33	PASS
Band II	9262	HSDPA_Sub3	21.77	33	PASS
Band II	9262	HSDPA_Sub4	21.80	33	PASS
Band II	9400	HSDPA_Sub1	22.33	33	PASS
Band II	9400	HSDPA_Sub2	21.84	33	PASS
Band II	9400	HSDPA_Sub3	21.87	33	PASS
Band II	9400	HSDPA_Sub4	21.90	33	PASS
Band II	9538	HSDPA_Sub1	22.59	33	PASS
Band II	9538	HSDPA_Sub2	22.13	33	PASS
Band II	9538	HSDPA_Sub3	22.06	33	PASS
Band II	9538	HSDPA_Sub4	21.86	33	PASS
Band V	4132	HSDPA_Sub1	21.85	38.5	PASS
Band V	4132	HSDPA_Sub2	21.09	38.5	PASS
Band V	4132	HSDPA_Sub3	21.06	38.5	PASS
Band V	4132	HSDPA_Sub4	21.09	38.5	PASS
Band V	4182	HSDPA_Sub1	22.23	38.5	PASS
Band V	4182	HSDPA_Sub2	21.41	38.5	PASS
Band V	4182	HSDPA_Sub3	21.37	38.5	PASS
Band V	4182	HSDPA_Sub4	21.41	38.5	PASS
Band V	4233	HSDPA_Sub1	22.23	38.5	PASS
Band V	4233	HSDPA_Sub2	21.56	38.5	PASS
Band V	4233	HSDPA_Sub3	21.69	38.5	PASS
Band V	4233	HSDPA_Sub4	21.48	38.5	PASS

Band	Channel	SubTest	Power(dBm)	Limit(dBm)	Verdict
Band II	9262	HSUPA_Sub1	20.75	33	PASS
Band II	9262	HSUPA_Sub2	21.90	33	PASS
Band II	9262	HSUPA_Sub3	20.39	33	PASS
Band II	9262	HSUPA_Sub4	21.21	33	PASS
Band II	9262	HSUPA_Sub5	21.31	33	PASS
Band II	9400	HSUPA_Sub1	21.94	33	PASS
Band II	9400	HSUPA_Sub2	22.01	33	PASS
Band II	9400	HSUPA_Sub3	21.78	33	PASS
Band II	9400	HSUPA_Sub4	21.39	33	PASS
Band II	9400	HSUPA_Sub5	21.34	33	PASS
Band II	9538	HSUPA_Sub1	20.88	33	PASS
Band II	9538	HSUPA_Sub2	20.90	33	PASS
Band II	9538	HSUPA_Sub3	20.50	33	PASS
Band II	9538	HSUPA_Sub4	20.60	33	PASS
Band II	9538	HSUPA_Sub5	20.84	33	PASS
Band V	4132	HSUPA_Sub1	21.56	38.5	PASS
Band V	4132	HSUPA_Sub2	20.34	38.5	PASS
Band V	4132	HSUPA_Sub3	20.55	38.5	PASS
Band V	4132	HSUPA_Sub4	21.47	38.5	PASS
Band V	4132	HSUPA_Sub5	20.24	38.5	PASS
Band V	4182	HSUPA_Sub1	21.27	38.5	PASS
Band V	4182	HSUPA_Sub2	20.86	38.5	PASS
Band V	4182	HSUPA_Sub3	20.49	38.5	PASS
Band V	4182	HSUPA_Sub4	21.42	38.5	PASS
Band V	4182	HSUPA_Sub5	20.57	38.5	PASS
Band V	4233	HSUPA_Sub1	21.38	38.5	PASS
Band V	4233	HSUPA_Sub2	20.81	38.5	PASS
Band V	4233	HSUPA_Sub3	21.01	38.5	PASS
Band V	4233	HSUPA_Sub4	21.37	38.5	PASS
Band V	4233	HSUPA_Sub5	20.53	38.5	PASS

Radiated Output power:

ERP & EIRP

ERP for Cellular Band (Part 22H)

GSM Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
824.2	90.71	23.68	V	6.8	0.53	29.95	38.45
824.2	90.52	23.42	H	6.8	0.53	29.69	38.45
836.6	89.79	22.76	V	6.8	0.53	29.03	38.45
836.6	90.34	23.24	H	6.8	0.53	29.51	38.45
848.8	89.72	22.69	V	6.9	0.53	29.06	38.45
848.8	89.25	22.15	H	6.9	0.53	28.52	38.45

GPRS Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
824.2	89.80	22.77	V	6.8	0.53	29.04	38.45
824.2	90.54	23.44	H	6.8	0.53	29.71	38.45
836.6	89.43	22.40	V	6.8	0.53	28.67	38.45
836.6	89.04	21.94	H	6.8	0.53	28.21	38.45
848.8	89.02	21.99	V	6.9	0.53	28.36	38.45
848.8	89.57	22.47	H	6.9	0.53	28.84	38.45

ERP for UMTS-FDD Band Ⅴ (Part 22H)

WCDMA Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
826.4	80.54	13.51	V	6.8	0.53	19.78	38.45
826.4	82.12	15.02	H	6.8	0.53	21.29	38.45
836.4	81.39	14.36	V	6.8	0.53	20.63	38.45
836.4	80.71	13.61	H	6.8	0.53	19.88	38.45
846.6	80.65	13.62	V	6.9	0.53	19.99	38.45
846.6	81.22	14.12	H	6.9	0.53	20.49	38.45

HSDPA Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
826.4	81.42	14.39	V	6.8	0.53	20.66	38.45
826.4	80.81	13.71	H	6.8	0.53	19.98	38.45
836.4	81.08	14.05	V	6.8	0.53	20.32	38.45
836.4	81.15	14.05	H	6.8	0.53	20.32	38.45
846.6	80.88	13.85	V	6.9	0.53	20.22	38.45
846.6	81.13	14.03	H	6.9	0.53	20.40	38.45

HSUPA Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
826.4	80.85	13.82	V	6.8	0.53	20.09	38.45
826.4	81.31	14.21	H	6.8	0.53	20.48	38.45
836.4	81.42	14.39	V	6.8	0.53	20.66	38.45
836.4	80.73	13.63	H	6.8	0.53	19.90	38.45
846.6	81.17	14.14	V	6.9	0.53	20.51	38.45
846.6	81.43	14.33	H	6.9	0.53	20.70	38.45

EIRP for PCS Band (Part 24E)

GSM Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1850.2	95.30	21.33	V	7.88	0.85	28.36	33
1850.2	94.79	21.51	H	7.88	0.85	28.54	33
1880	95.15	21.18	V	7.88	0.85	28.21	33
1880	94.84	21.56	H	7.88	0.85	28.59	33
1909.8	94.81	20.84	V	7.86	0.85	27.85	33
1909.8	95.03	21.75	H	7.86	0.85	28.76	33

GPRS Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1850.2	93.94	19.97	V	7.88	0.85	27.00	33
1850.2	93.69	20.41	H	7.88	0.85	27.44	33
1880	94.42	20.45	V	7.88	0.85	27.48	33
1880	93.76	20.48	H	7.88	0.85	27.51	33
1909.8	93.78	19.81	V	7.86	0.85	26.82	33
1909.8	93.48	20.20	H	7.86	0.85	27.21	33

EIRP for UMTS-FDD Band Ⅱ (Part 24E)

WCDMA Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1852.4	88.15	14.18	V	7.88	0.85	21.21	33
1852.4	86.39	13.11	H	7.88	0.85	20.14	33
1880	88.29	14.32	V	7.88	0.85	21.35	33
1880	87.44	14.16	H	7.88	0.85	21.19	33
1907.6	88.04	14.07	V	7.86	0.85	21.08	33
1907.6	88.12	14.84	H	7.86	0.85	21.85	33

HSDPA Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1852.4	86.06	12.09	V	7.88	0.85	19.12	33
1852.4	85.70	12.42	H	7.88	0.85	19.45	33
1880	85.92	11.95	V	7.88	0.85	18.98	33
1880	85.47	12.19	H	7.88	0.85	19.22	33
1907.6	86.78	12.81	V	7.86	0.85	19.82	33
1907.6	86.11	12.83	H	7.86	0.85	19.84	33

HSUPA Mode

Frequency (MHz)	Receiver Reading（dBuV）	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1852.4	86.74	12.77	V	7.88	0.85	19.80	33
1852.4	85.67	12.39	H	7.88	0.85	19.42	33
1880	86.57	12.60	V	7.88	0.85	19.63	33
1880	85.56	12.28	H	7.88	0.85	19.31	33
1907.6	85.75	11.78	V	7.86	0.85	18.79	33
1907.6	85.81	12.53	H	7.86	0.85	19.54	33

Note：

Absolute level=Substituted Level-Cable loss+Antenna Gain

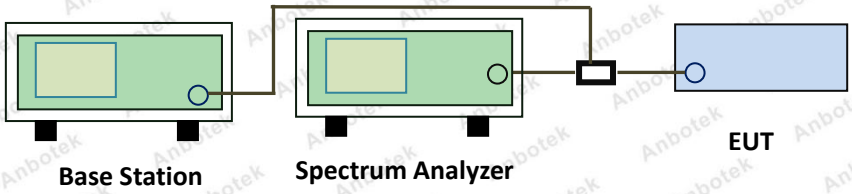
Margin=Limit -Absolute Level

4. Peak-Average Ratio

4.1. Test Standard and Limit

In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.2. Test Setup



4.3. Test Procedure

According with KDB 971168

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

4.4. Test Data

Band	Channel	Peak-to-Average Ratio(dB)	Limit(dBm)	Verdict
GSM850	128	0.32	13	PASS
GSM850	190	0.33	13	PASS
GSM850	251	0.36	13	PASS
GPRS850	128	0.33	13	PASS
GPRS850	190	0.32	13	PASS
GPRS850	251	0.34	13	PASS
GSM1900	512	0.63	13	PASS
GSM1900	661	0.50	13	PASS
GSM1900	810	0.39	13	PASS
GPRS1900	512	0.63	13	PASS
GPRS1900	661	0.50	13	PASS
GPRS1900	810	0.37	13	PASS

Band	Channel	Peak-to-Average Ratio(dB)	Limit(dBm)	Verdict
Band II	9262	2.97	13	PASS
Band II	9400	2.99	13	PASS
Band II	9538	2.88	13	PASS
Band V	4132	3.04	13	PASS
Band V	4182	3.14	13	PASS
Band V	4233	3.09	13	PASS

5. Modulation Characteristic

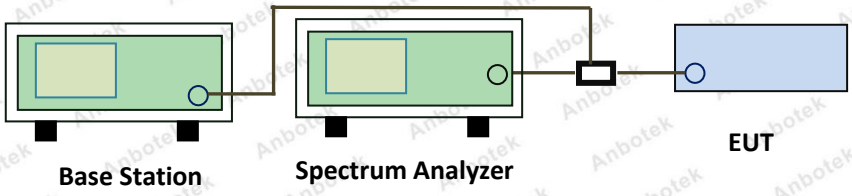
According to FCC § 2.1047(d), Part 22H, 24E there is no specific requirement for digital modulation, thereforemodulation characteristic is not presented.

6. Occupied Bandwidth

6.1. Test Standard and Limit

Spec	Item	Requirement
§2.1049, §22.917, §22.905 §24.238 §27.53(a)	a)	99% Occupied Bandwidth(kHz)
	b)	26 dB Bandwidth(kHz)

6.2. Test Setup



6.3. Test Procedure

1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBWwas 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 isthe delta frequency between the two points where the display line intersects the signal trace.

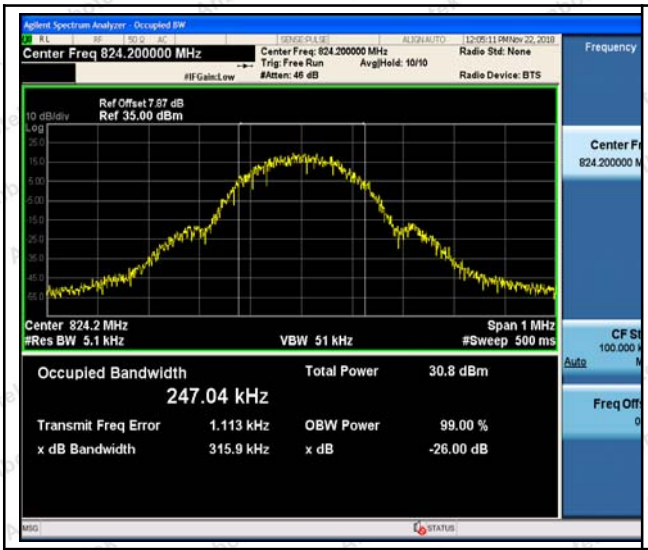
6.4. Test Data

Cellular Band (Part 22H) result/PCS Band (Part 24E) result:

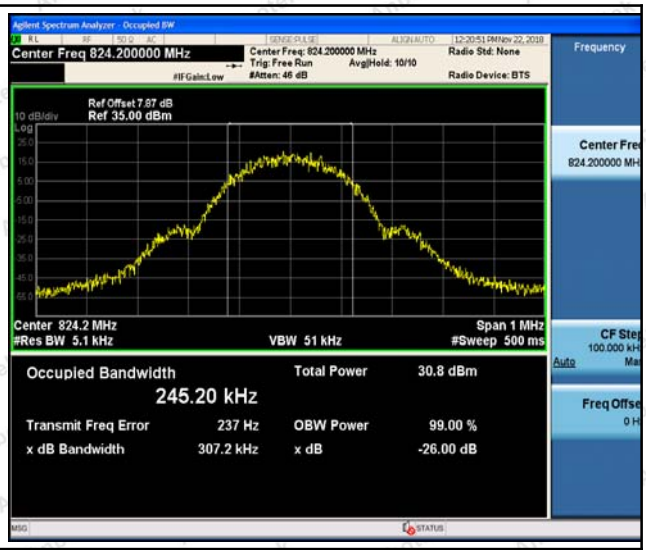
Band	Channel	Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)	Verdict
GSM850	128	247.0	316	PASS
GSM850	190	244.4	311	PASS
GSM850	251	247.8	314	PASS
GPRS850	128	245.2	307	PASS
GPRS850	190	249.5	316	PASS
GPRS850	251	245.7	315	PASS
GSM1900	512	247.0	312	PASS
GSM1900	661	247.2	312	PASS
GSM1900	810	246.4	314	PASS
GPRS1900	512	244.8	310	PASS
GPRS1900	661	249.0	314	PASS
GPRS1900	810	247.7	318	PASS

Band	Channel	Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)	Verdict
Band II	9262	4146.2	4737	PASS
Band II	9400	4143.6	4710	PASS
Band II	9538	4149.6	4755	PASS
Band V	4132	4152.1	4722	PASS
Band V	4182	4128.6	4691	PASS
Band V	4233	4123.3	4696	PASS

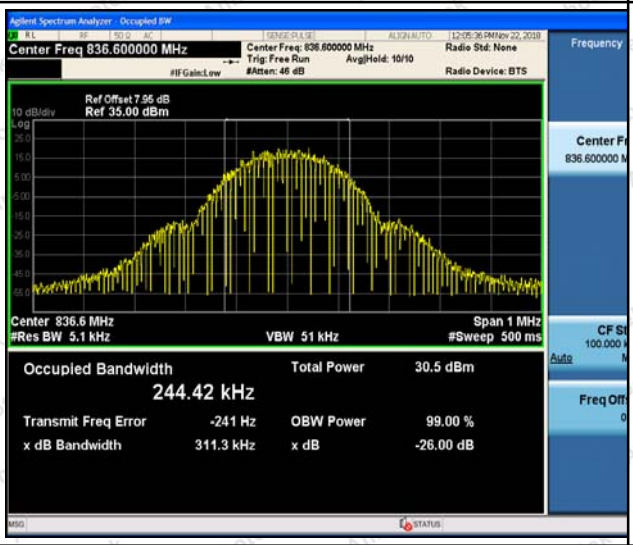
Test Plots



GSM 850 BW - Low CH 824.2MHz

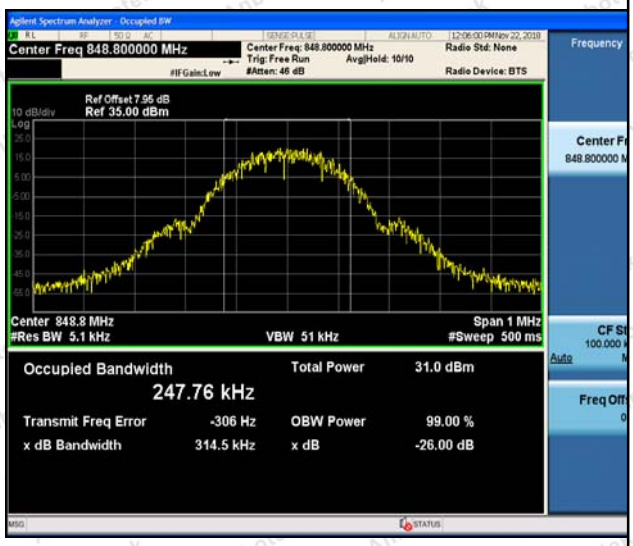


GPRS 850 BW - Low CH 824.2MHz



GSM 850 BW - Mid CH 836.6MHz

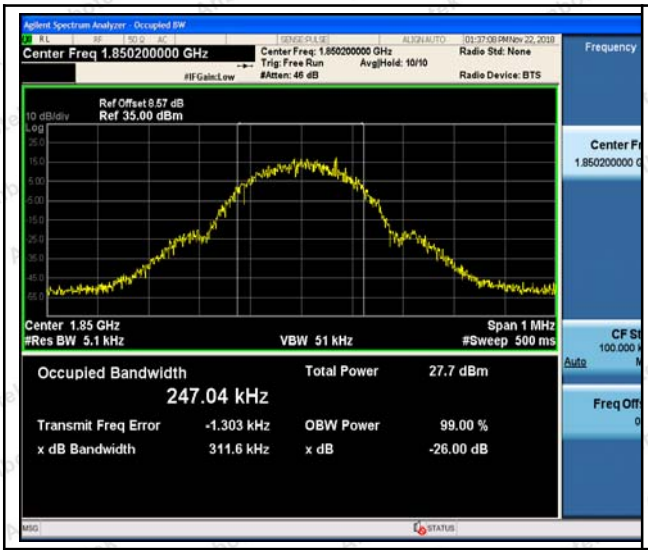
GPRS 850 BW - Mid CH 836.6MHz



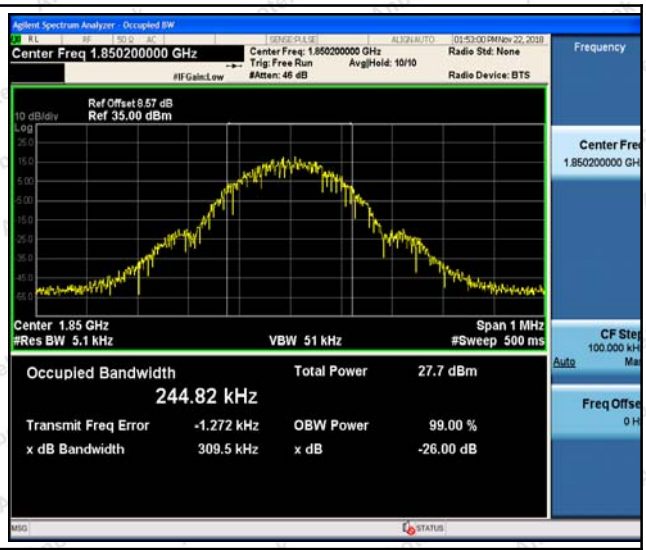
GSM 850 BW - High CH 848.8MHz

GPRS 850 BW - High CH 848.8MHz

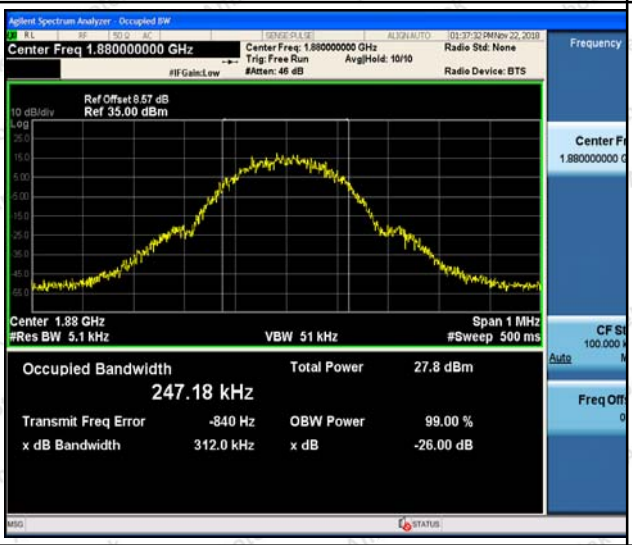
Test Plots



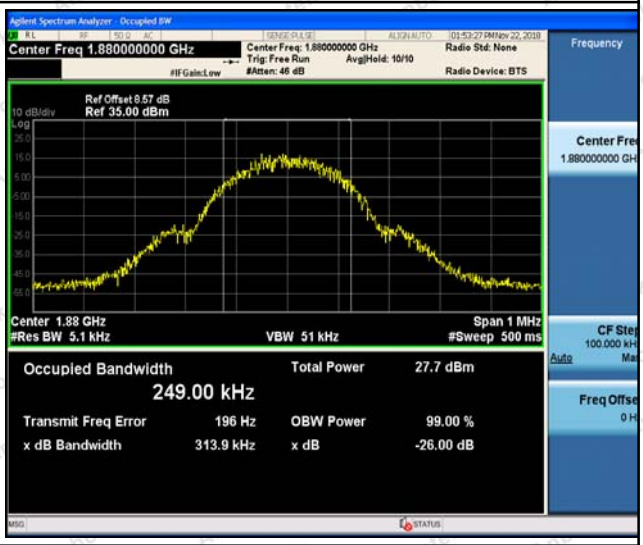
GSM 1900 BW - Low CH 1850.2MHz



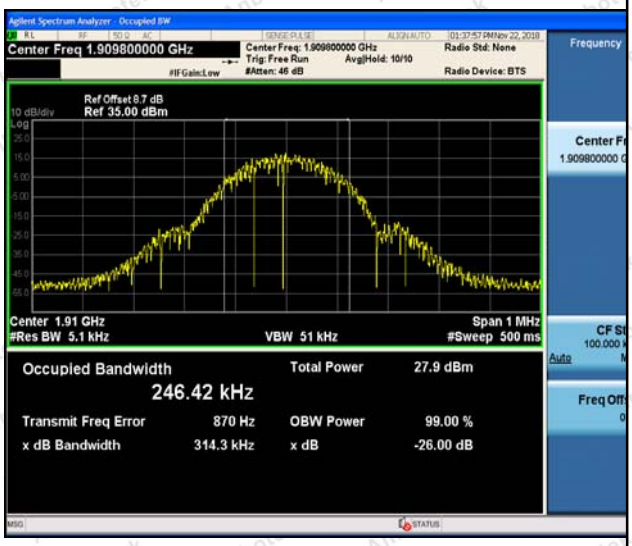
GPRS 1900 BW - Low CH 1850.2MHz



GSM 1900 BW - Mid CH 1880.0MHz



GPRS 1900 BW - Mid CH 1880.0MHz

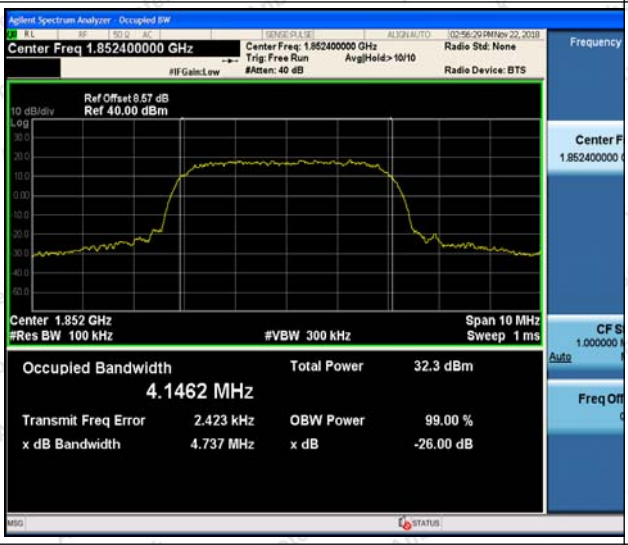


GSM 1900 BW - High CH 1909.8MHz

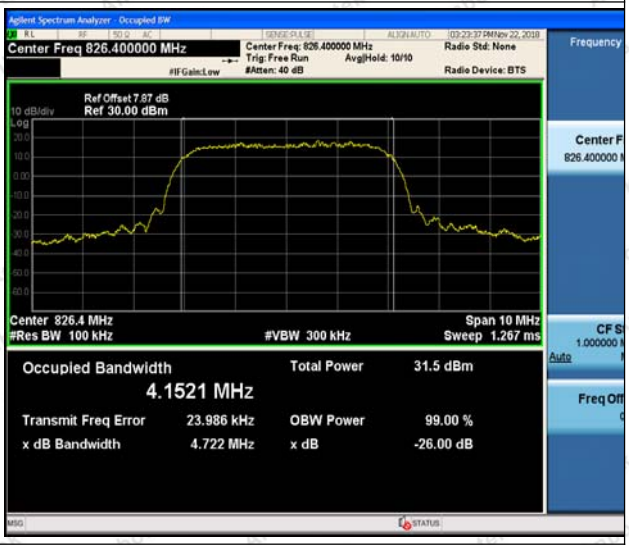
GPRS 1900 BW - High CH 1909.8MHz

Test Plots

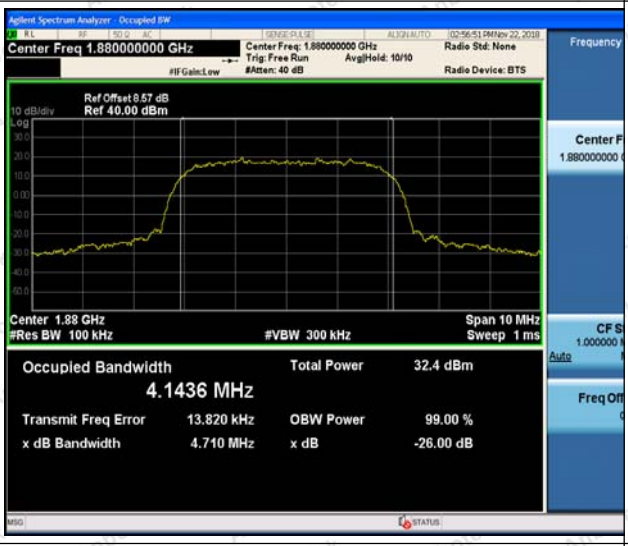
Band II_9262



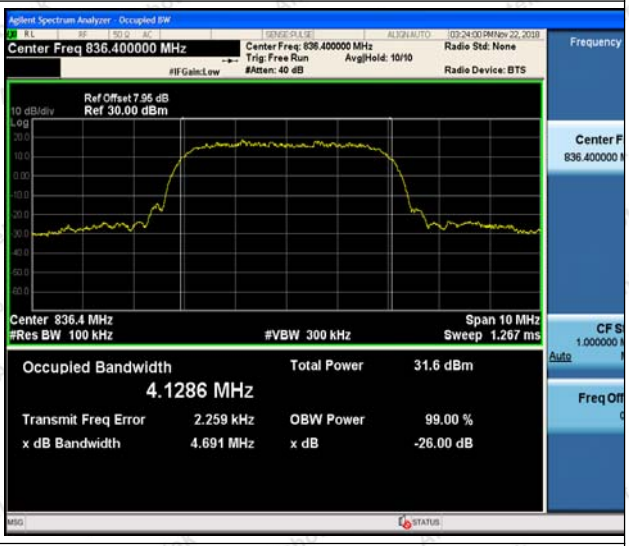
Band V_4132



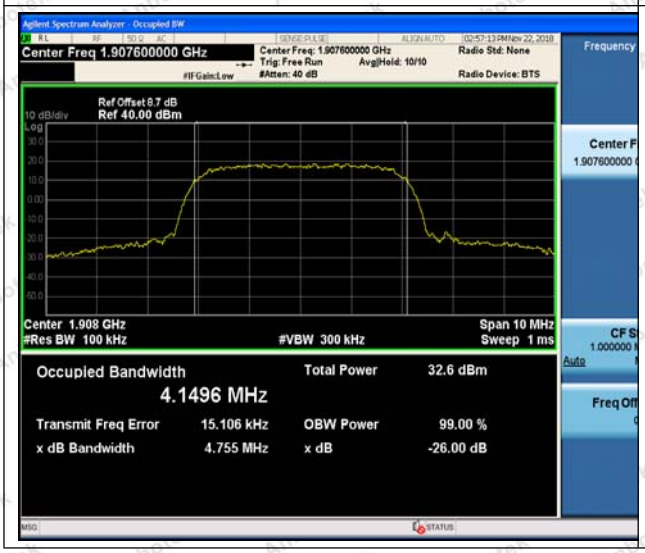
Band II_9400



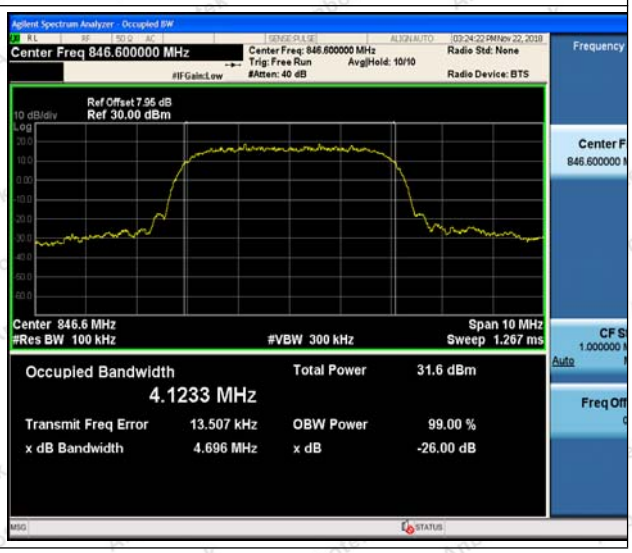
Band V_4182



Band II_9538



Band V_4233

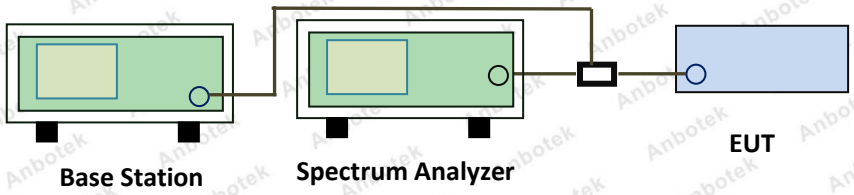


7. Spurious Emissions at Antenna Terminals

7.1. Test Standard and Limit

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least (43 + 10 log P) dB, in this case, -13dBm.

7.2. Test Setup



7.3. Test Procedure

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

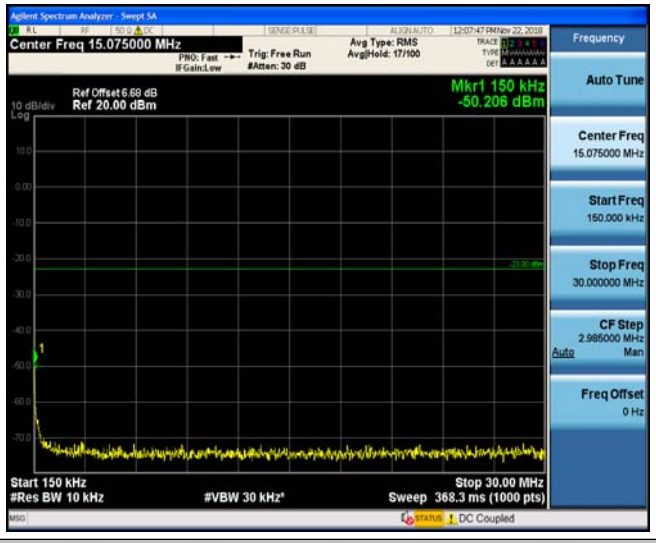
7.4. Test Data

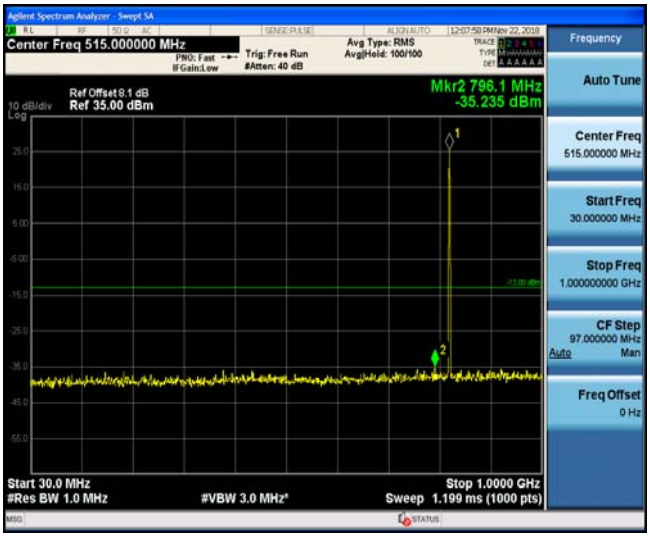
Band	Channel	Frequency Rang(Mhz)	Value(dBm)	Limit(dBm)	Verdict
GSM850	128	0.009~0.15	-45.36	-33	PASS
GSM850	128	0.15~30	-50.21	-23	PASS
GSM850	128	30~1000	-35.23	-13	PASS
GSM850	128	1000~9000	-26.89	-13	PASS
GSM850	190	0.009~0.15	-45.47	-33	PASS
GSM850	190	0.15~30	-51.03	-23	PASS
GSM850	190	30~1000	-35.28	-13	PASS
GSM850	190	1000~9000	-28.04	-13	PASS
GSM850	251	0.009~0.15	-44.88	-33	PASS
GSM850	251	0.15~30	-50.22	-23	PASS
GSM850	251	30~1000	-35.65	-13	PASS
GSM850	251	1000~9000	-26.76	-13	PASS
GPRS850	128	0.009~0.15	-45.50	-43	PASS
GPRS850	128	0.15~30	-51.71	-33	PASS
GPRS850	128	30~1000	-35.90	-13	PASS
GPRS850	128	1000~9000	-27.16	-13	PASS
GPRS850	190	0.009~0.15	-43.95	-43	PASS
GPRS850	190	0.15~30	-52.01	-33	PASS
GPRS850	190	30~1000	-35.19	-13	PASS
GPRS850	190	1000~9000	-27.33	-13	PASS
GPRS850	251	0.009~0.15	-45.45	-43	PASS
GPRS850	251	0.15~30	-51.89	-33	PASS

GPRS850	251	30~1000	-34.90	-13	PASS
GPRS850	251	1000~9000	-27.22	-13	PASS
GSM1900	512	0.009~0.15	-45.55	-43	PASS
GSM1900	512	0.15~30	-51.25	-33	PASS
GSM1900	512	30~1000	-34.96	-13	PASS
GSM1900	512	1000~7000	-27.52	-13	PASS
GSM1900	512	7000~13600	-30.69	-13	PASS
GSM1900	512	13600~20000	-26.17	-13	PASS
GSM1900	661	0.009~0.15	-46.52	-43	PASS
GSM1900	661	0.15~30	-51.46	-33	PASS
GSM1900	661	30~1000	-35.42	-13	PASS
GSM1900	661	1000~7000	-27.82	-13	PASS
GSM1900	661	7000~13600	-30.74	-13	PASS
GSM1900	661	13600~20000	-26.82	-13	PASS
GSM1900	810	0.009~0.15	-46.31	-43	PASS
GSM1900	810	0.15~30	-50.54	-33	PASS
GSM1900	810	30~1000	-35.02	-13	PASS
GSM1900	810	1000~7000	-27.98	-13	PASS
GSM1900	810	7000~13600	-30.46	-13	PASS
GSM1900	810	13600~20000	-26.58	-13	PASS
GPRS1900	512	0.009~0.15	-44.60	-43	PASS
GPRS1900	512	0.15~30	-52.44	-33	PASS
GPRS1900	512	30~1000	-35.45	-13	PASS
GPRS1900	512	1000~7000	-27.60	-13	PASS
GPRS1900	512	7000~13600	-31.32	-13	PASS
GPRS1900	512	13600~20000	-26.10	-13	PASS
GPRS1900	661	0.009~0.15	-45.94	-43	PASS
GPRS1900	661	0.15~30	-51.07	-33	PASS
GPRS1900	661	30~1000	-35.09	-13	PASS
GPRS1900	661	1000~7000	-27.24	-13	PASS
GPRS1900	661	7000~13600	-31.07	-13	PASS
GPRS1900	661	13600~20000	-26.98	-13	PASS
GPRS1900	810	0.009~0.15	-45.75	-43	PASS
GPRS1900	810	0.15~30	-52.23	-33	PASS
GPRS1900	810	30~1000	-35.53	-13	PASS
GPRS1900	810	1000~7000	-27.20	-13	PASS
GPRS1900	810	7000~13600	-31.04	-13	PASS
GPRS1900	810	13600~20000	-26.14	-13	PASS

Band	Channel	Frequency Rang(Mhz)	Value(dBm)	Limit(dBm)	Verdict
Band II	9262	0.009~0.15	-46.47	-43	PASS
Band II	9262	0.15~30	-41.33	-33	PASS
Band II	9262	30~1000	-44.29	-13	PASS
Band II	9262	1000~7000	-27.16	-13	PASS
Band II	9262	7000~13600	-41.18	-13	PASS
Band II	9262	13600~20000	-37.01	-13	PASS
Band II	9400	0.009~0.15	-45.09	-43	PASS
Band II	9400	0.15~30	-42.48	-33	PASS
Band II	9400	30~1000	-44.01	-13	PASS
Band II	9400	1000~7000	-27.81	-13	PASS
Band II	9400	7000~13600	-39.88	-13	PASS
Band II	9400	13600~20000	-36.72	-13	PASS
Band II	9538	0.009~0.15	-44.27	-43	PASS
Band II	9538	0.15~30	-42.00	-33	PASS
Band II	9538	30~1000	-43.15	-13	PASS
Band II	9538	1000~7000	-27.26	-13	PASS
Band II	9538	7000~13600	-41.01	-13	PASS
Band II	9538	13600~20000	-37.44	-13	PASS
Band V	4132	0.009~0.15	-47.28	-33	PASS
Band V	4132	0.15~30	-40.95	-23	PASS
Band V	4132	30~1000	-43.67	-13	PASS
Band V	4132	1000~9000	-28.82	-13	PASS
Band V	4182	0.009~0.15	-46.63	-33	PASS
Band V	4182	0.15~30	-42.23	-23	PASS
Band V	4182	30~1000	-44.36	-13	PASS
Band V	4182	1000~9000	-28.74	-13	PASS
Band V	4233	0.009~0.15	-46.71	-33	PASS
Band V	4233	0.15~30	-42.22	-23	PASS
Band V	4233	30~1000	-41.62	-13	PASS
Band V	4233	1000~9000	-28.28	-13	PASS

GSM850_128

GSM850_128

GSM850_128

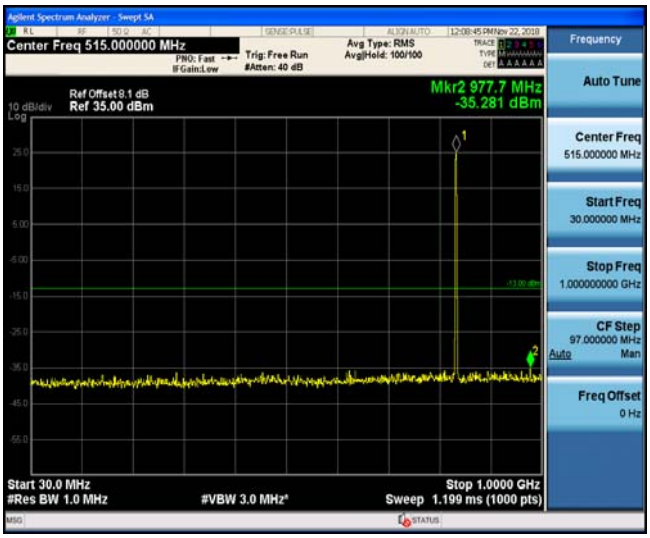


GSM850_128

GSM850_190

GSM850_190

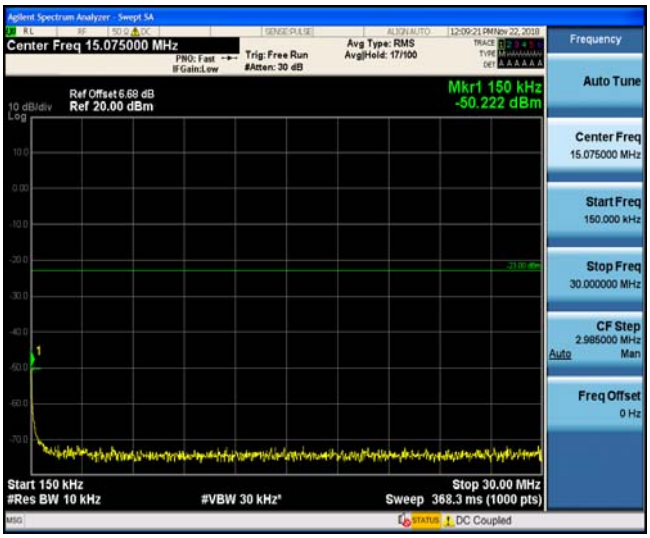
GSM850_190



GSM850_190

GSM850_251

GSM850_251



GSM850_251

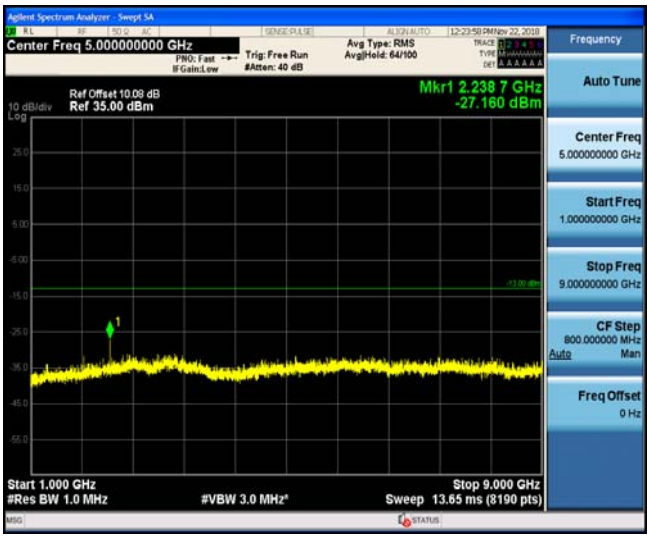
GSM850_251

GPRS850_128

GPRS850_128

GPRS850_128

GPRS850_128

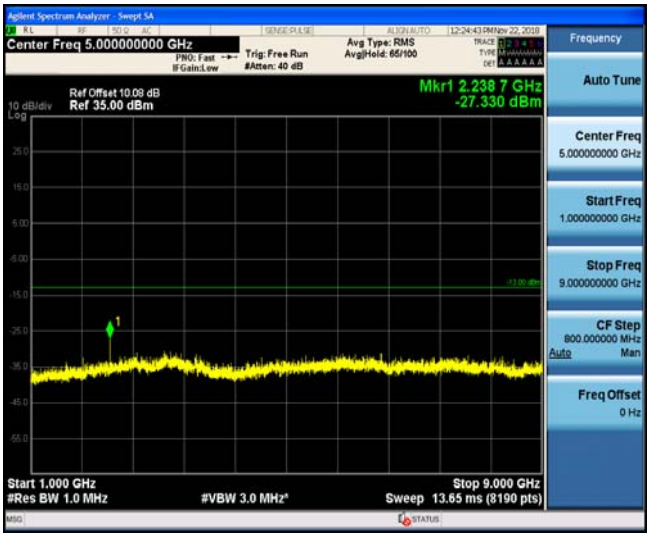


GPRS850_190

GPRS850_190

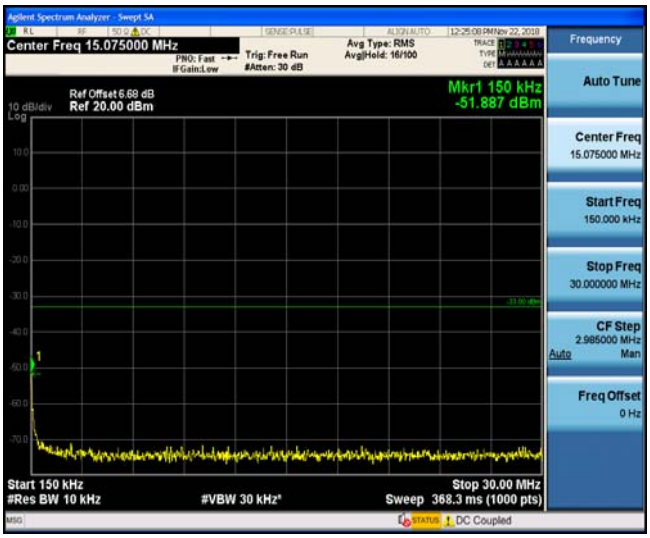
GPRS850_190

GPRS850_190



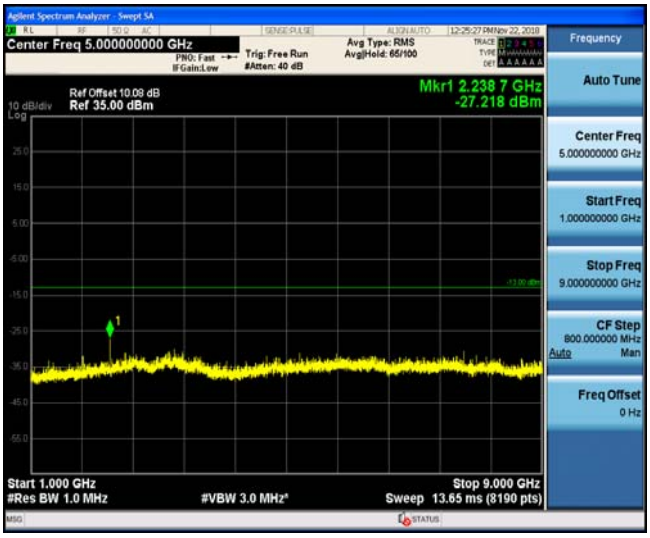
GPRS850_251

GPRS850_251



GPRS850_251

GPRS850_251



GSM1900_512

GSM1900_512

GSM1900_512

GSM1900_512

GSM1900_512

GSM1900_512

GSM1900_661

GSM1900_661

GSM1900_661

GSM1900_661

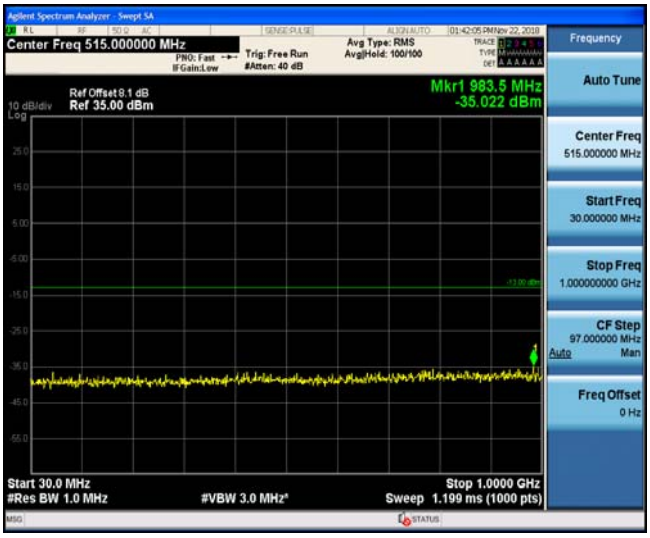
GSM1900_661

GSM1900_661

GSM1900_810

GSM1900_810

GSM1900_810



GSM1900_810

GSM1900_810

GSM1900_810

GPRS1900_512

GPRS1900_512

GPRS1900_512

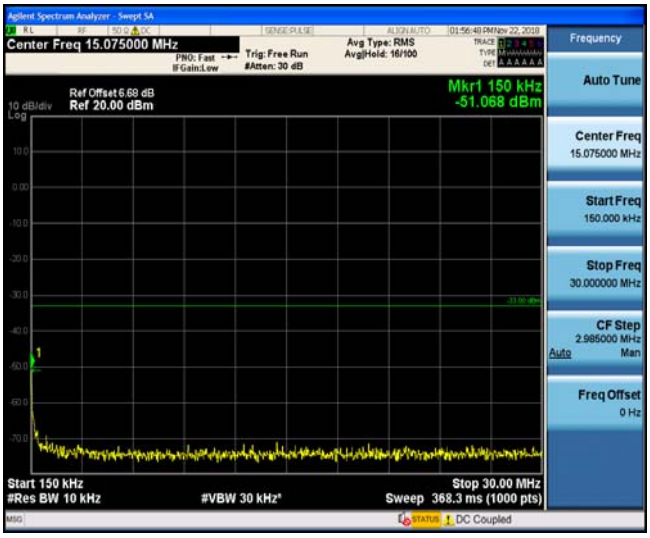
GPRS1900_512

GPRS1900_512

GPRS1900_512

GPRS1900_661

GPRS1900_661



GPRS1900_661

GPRS1900_661

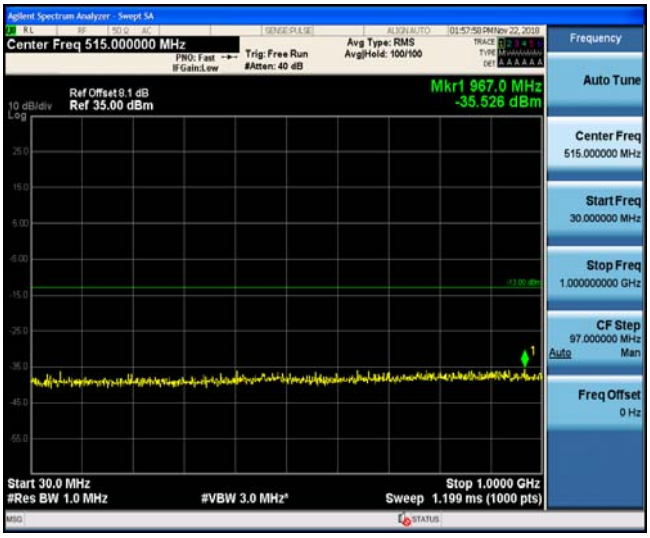
GPRS1900_661

GPRS1900_661

GPRS1900_810

GPRS1900_810

GPRS1900_810



GPRS1900_810

GPRS1900_810

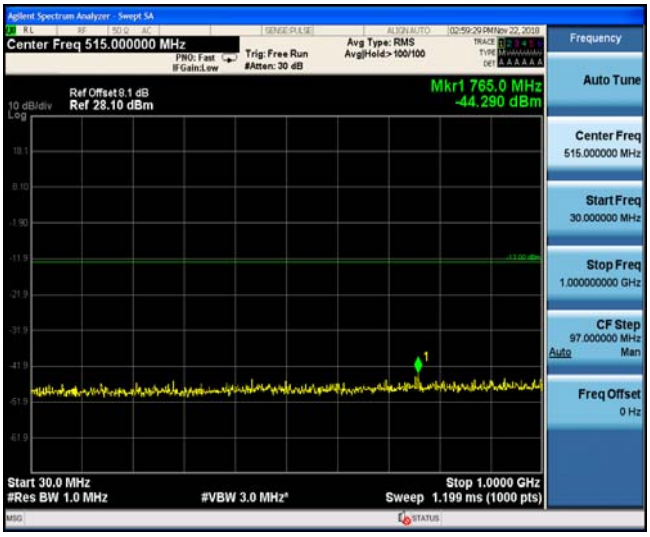
GPRS1900_810


Agilent Spectrum Analyzer - Swept SA
Center Freq 16.800000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 62/100
Ref Offset 10.09 dB
10 dB/div
Ref 35.00 dBm
Log
Mkr1 16.816 5 GHz
-26.136 dBm
Start 13.600 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 20.000 GHz
Sweep 16.21 ms (6400 pts)
Frequency
Auto Tune
Center Freq
16.800000000 GHz
Start Freq
13.600000000 GHz
Stop Freq
20.000000000 GHz
CF Step
640.000000 MHz
Auto
Man
Freq Offset
0 Hz

Test Plots

Band II_9262

Band II_9262



Band II_9262

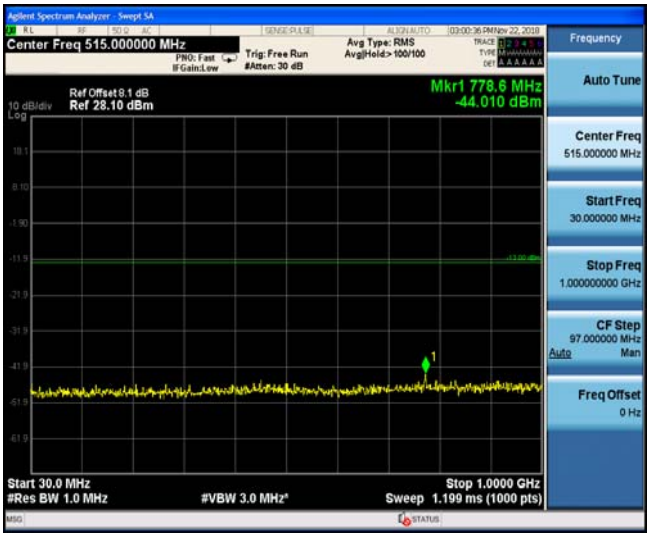
Band II_9262

Band II_9262

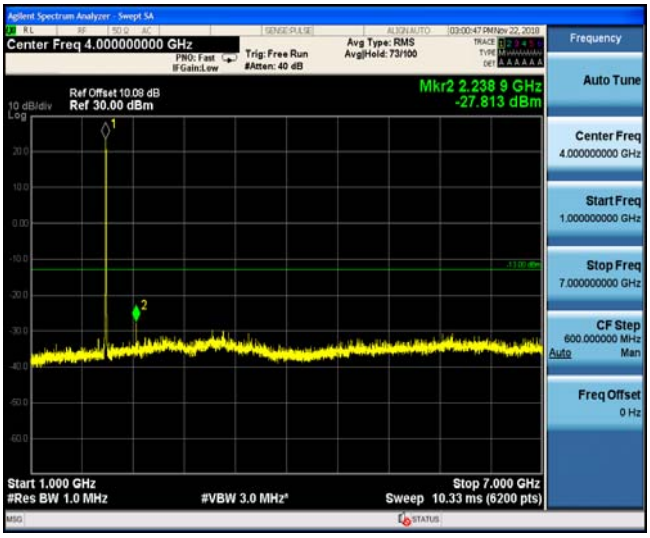
Band II_9262

Band II_9400

Band II_9400



Band II_9400

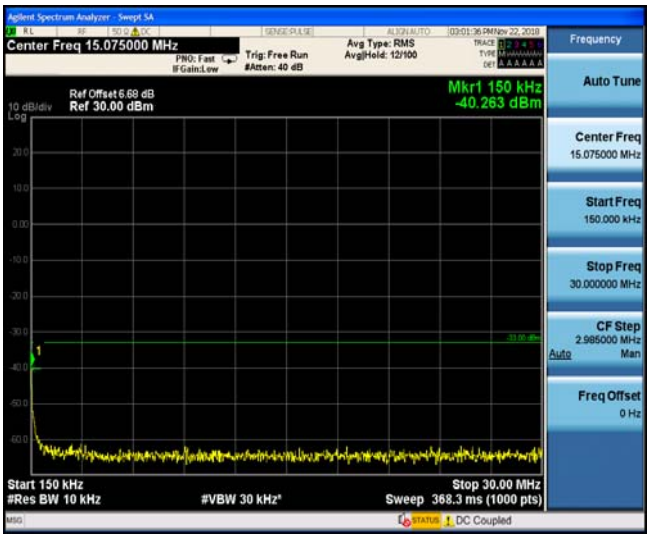


Band II_9400

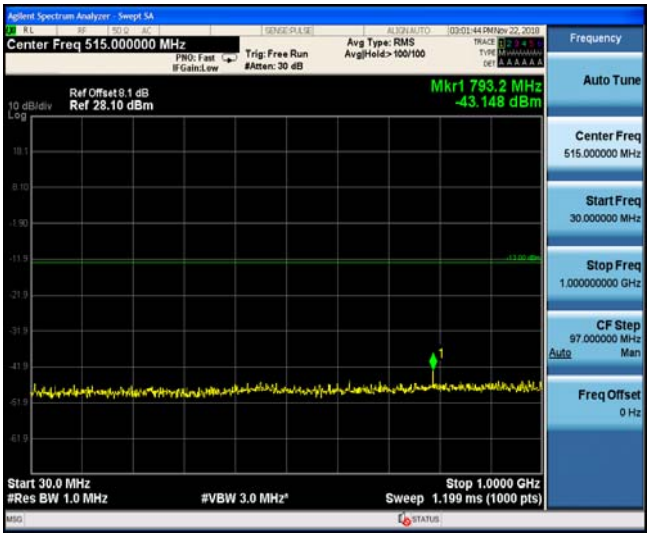
Band II_9400

Band II_9400

Band II_9538



Band II_9538



Band II_9538

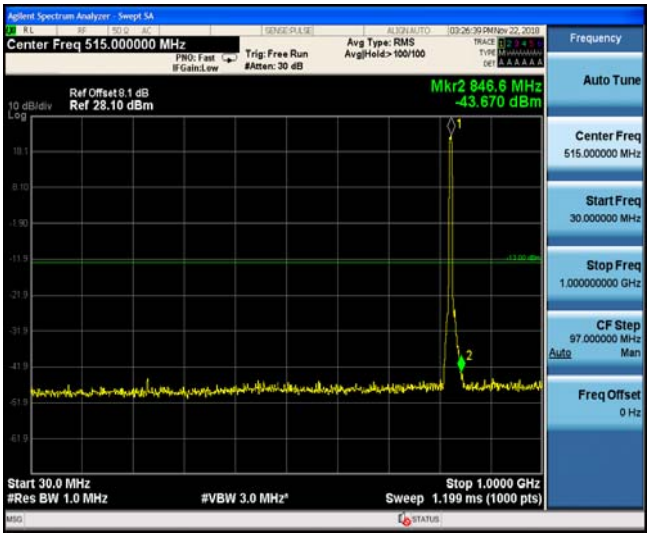
Band II_9538

Band II_9538

Band II_9538

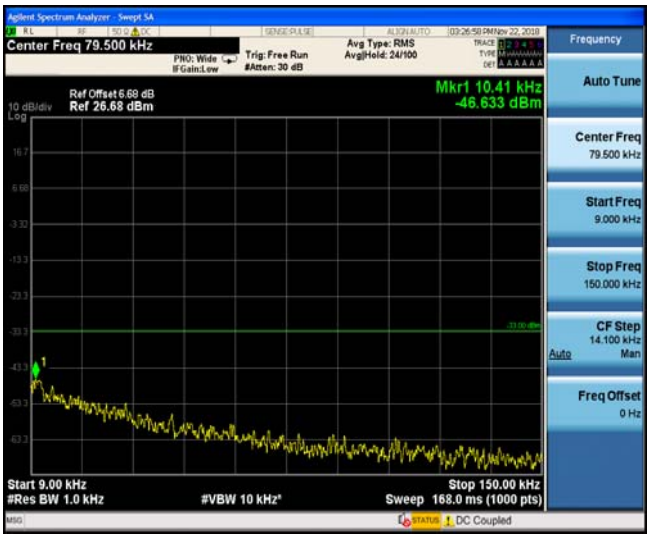
Band V_4132

Band V_4132



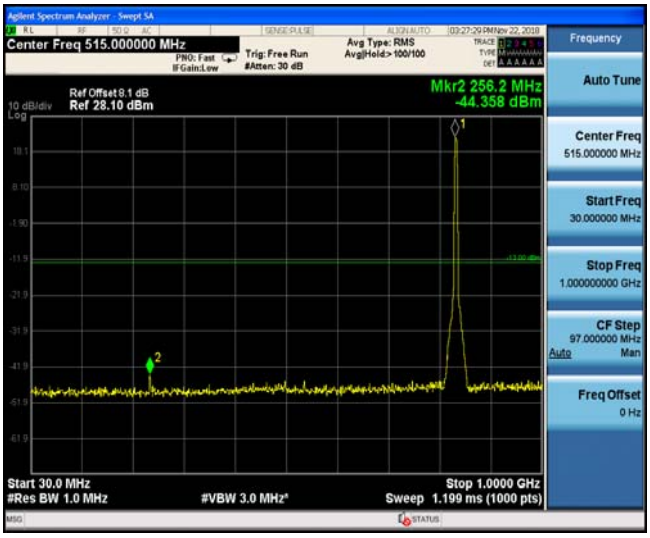
Band V_4132

Band V_4132



Band V_4182

Band V_4182



Band V_4182

Band V_4182

Band V_4233

Band V_4233

Band V_4233

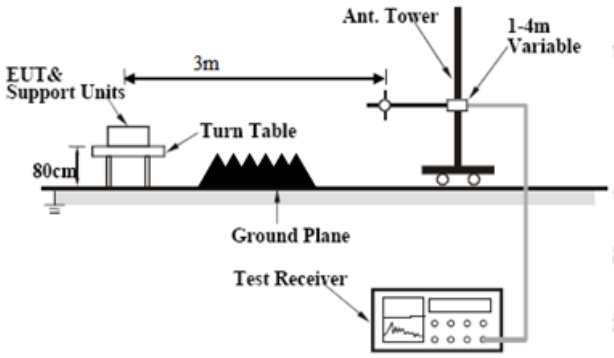
Band V_4233

8. Spurious Radiated Emissions

8.1. Test Standard and Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

8.2. Test Setup



8.3. Test Procedure

1.The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

2.The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

3.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.

Sample Calculation:

EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)

8.4. Test Data

Please to see the following pages

GSM 850,Middle Channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
270.6	-50.53	V	5.40	0.24	-45.37	-13	-32.37
270.6	-50.53	H	5.40	0.24	-45.37	-13	-32.37
1673.2	-49.20	V	7.95	0.78	-42.03	-13	-29.03
1673.2	-48.82	H	7.95	0.78	-41.65	-13	-28.65
2509.8	-44.50	V	9.89	2.39	-37.00	-13	-24.00
2509.8	-44.26	H	9.89	2.39	-36.76	-13	-23.76

PCS 1900，Middle Channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
270.6	-49.80	V	5.4	0.24	-44.64	-13	-31.64
270.6	-49.99	H	5.4	0.24	-44.83	-13	-31.83
3760	-47.36	V	10.25	2.73	-39.84	-13	-26.84
3760	-48.40	H	10.25	2.73	-40.88	-13	-27.88

WCDMA Band V,Middle Channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
270.6	-50.13	V	5.40	0.24	-44.97	-13	-31.97
270.6	-49.74	H	5.40	0.24	-44.58	-13	-31.58
1673.2	-49.05	V	7.95	0.78	-41.88	-13	-28.88
1673.2	-48.90	H	7.95	0.78	-41.73	-13	-28.73
2509.8	-44.97	V	9.89	2.39	-37.47	-13	-24.47
2509.8	-44.51	H	9.89	2.39	-37.01	-13	-24.01

WCDMA Band II，Middle Channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
270.6	-50.52	V	5.4	0.24	-45.36	-13	-32.36
270.6	-49.97	H	5.4	0.24	-44.81	-13	-31.81
3760	-46.84	V	10.25	2.73	-39.32	-13	-26.32
3760	-48.46	H	10.25	2.73	-40.94	-13	-27.94

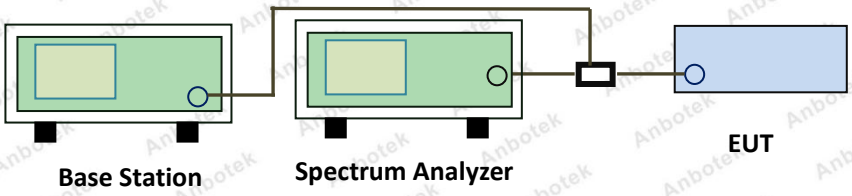
Note：The measurment have been performed for all mode, only report the worst case.

9. Band Edge Compliance

9.1. Test Standard and Limit

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.

9.2. Test Setup



9.3. Test Procedure

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriateattenuation. 2. For the bandedge: 2G:Set the RBW=5.1KHz, VBW = 10KHz, Sweep time= Auto

9.4. Test Data

Band	Channel	Value(dBm)	Limit(dBm)	Verdict
GSM850	128	-24.00	-13	PASS
GSM850	251	-22.08	-13	PASS
GPRS850	128	-23.61	-13	PASS
GPRS850	251	-23.90	-13	PASS
GSM1900	512	-23.01	-13	PASS
GSM1900	810	-25.54	-13	PASS
GPRS1900	512	-27.08	-13	PASS
GPRS1900	810	-25.86	-13	PASS

Band Edge only reflects the worst mode WCDMA data emissions.

Band	Channel	Value(dBm)	Limit(dBm)	Verdict
Band II	9262	-18.64	-13	PASS
Band II	9538	-16.64	-13	PASS
Band V	4132	-20.47	-13	PASS
Band V	4233	-19.60	-13	PASS

Test Plots

GSM850_128

GSM850_251

GPRS850_128


GPRS850_251

GSM1900_512

GSM1900_810

GPRS1900_512

GPRS1900_810

Band II_9262

Band II_9538

Band V_4132

Band V_4233

10. Frequency Stability

10.1. Test Standard and Limit

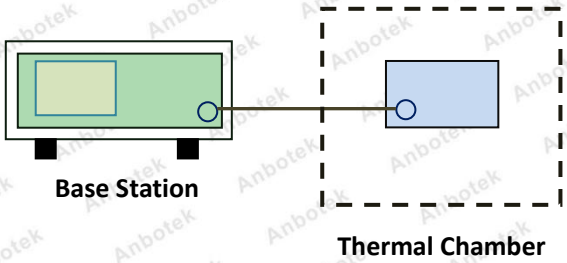
According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.

10.2. Test Setup



10.3. Test Procedure

A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage.

Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

10.4. Test Data

Cellular Band (Part 22H)

GSM 850 Test Frequency: 836.6MHz				
Temperature(℃)	Power Supply (V^{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-5	-0.0060	2.5
-20		-1	-0.0012	2.5
-10		3	0.0036	2.5
0		4	0.0048	2.5
10		2	0.0024	2.5
20		10	0.0120	2.5
30		-6	-0.0072	2.5
40		7	0.0084	2.5
50		6	0.0072	2.5
20	3.3	2	0.0024	2.5
20	4.2	4	0.0048	2.5

GPRS 850 Test Frequency: 836.6MHz				
Temperature(℃)	Power Supply (V^{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-4	-0.0048	2.5
-20		-3	-0.0036	2.5
-10		2	0.0024	2.5
0		5	0.0060	2.5
10		1	0.0012	2.5
20		8	0.0096	2.5
30		-5	-0.0060	2.5
40		7	0.0084	2.5
50		4	0.0048	2.5
20	3.3	1	0.0012	2.5
20	4.2	4	0.0048	2.5

WCDMA Band V Test Frequency: 836.6MHz				
Temperature(℃)	Power Supply (V^{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-4	-0.0048	2.5
-20		-1	-0.0012	2.5
-10		4	0.0048	2.5
0		4	0.0048	2.5
10		2	0.0024	2.5
20		9	0.0108	2.5
30		-6	-0.0072	2.5
40		8	0.0096	2.5
50		6	0.0072	2.5
20	3.3	2	0.0024	2.5
20	4.2	4	0.0048	2.5

PCS Band(Part 24E)

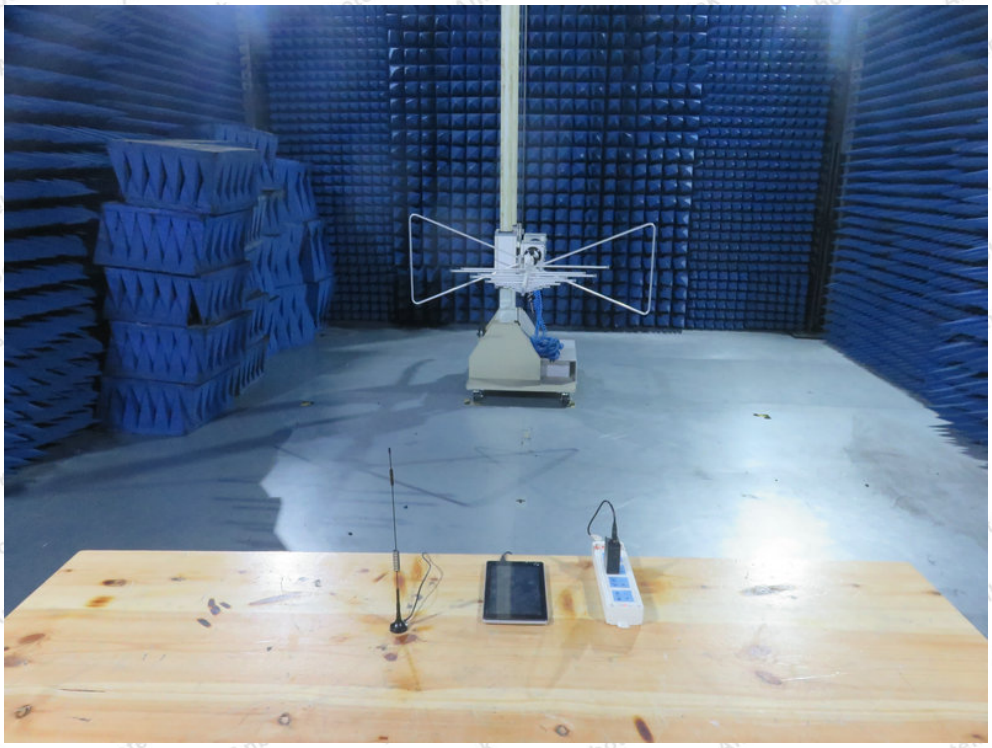
PCS 1900 Test Frequency： 1880MHz				
Temperature(℃)	Power Supply (V^{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-3	-0.0016	2.5
-20		-1	-0.0005	2.5
-10		4	0.0021	2.5
0		4	0.0021	2.5
10		2	0.0011	2.5
20		9	0.0048	2.5
30		-6	-0.0032	2.5
40		8	0.0043	2.5
50		6	0.0032	2.5
20	3.3	2	0.0011	2.5
20	4.2	4	0.0021	2.5

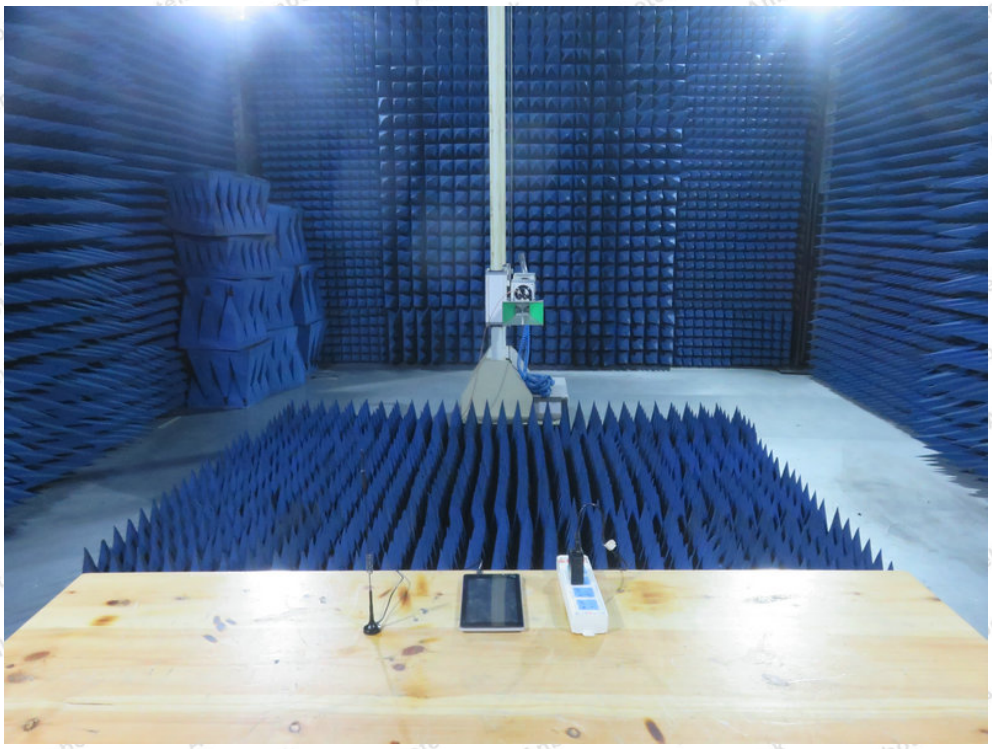
GPRS 1900 Test Frequency：1880MHz				
Temperature(℃)	Power Supply (V^{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-5	-0. 0027	2.5
-20		-2	-0. 0011	2.5
-10		1	0. 0005	2.5
0		5	0. 0027	2.5
10		1	0. 0005	2.5
20		7	0. 0037	2.5
30		-5	-0. 0027	2.5
40		5	0. 0027	2.5
50		4	0. 0021	2.5
20	3.3	2	0. 0011	2.5
20	4.2	3	0. 0016	2.5

WCDMA Band II Test Frequency：1880MHz				
Temperature(℃)	Power Supply (V^{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-5	-0.0027	2.5
-20		-1	-0.0005	2.5
-10		3	0.0016	2.5
0		2	0.0011	2.5
10		3	0.0021	2.5
20		9	0.0048	2.5
30		-6	-0.0016	2.5
40		7	0.0037	2.5
50		6	0.0032	2.5
20	3.3	2	0.0011	2.5
20	4.2	3	0.0016	2.5

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Radiation Emission Test





APPENDIX II -- PHOTOGRAPH

Reference to the test report SZAWW181107001-01

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