FCC TEST REPORT
For
Shandong USR IOT Technology Limited

Serial to GPRS Module
Model No.: USR-GM3, USR-GM3s, USR-GPRS232-7S3, USR-GPRS232-730, USR-GPRS232-702, USR-GPRS232-703, USR-GPRS232-704, USR-GPRS232-705, USR-GPRS232-732, USR-GPRS232-734

Prepared for	:	Shandong USR IOT Technology Limited
Address	:	Floor 11, Building 1, No. 1166 Xinluo Street, Gaoxin Qu, 250101, Jinan, Shandong, China

Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
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Report Number	:	R0116051023I
Date of Test	:	Jun. 02~ Sept. 27, 2016
Date of Report	:	Sept. 29, 2016

TABLE OF CONTENT

Description

Page

Test Report

TEST REPORT

Applicant	:	Shandong USR IOT Technology Limited
Manufacturer	:	Shandong USR IOT Technology Limited
EUT	:	Serial to GPRS Module
Model No.	:	USR-GM3, USR-GM3s, USR-GPRS232-7S3, USR-GPRS232-730, USR-GPRS232-702, USR-GPRS232-703, USR-GPRS232-704, USR-GPRS232-705, USR-GPRS232-732, USR-GPRS232-734
Serial No.	:	N.A.
Trade Mark	:	
Rating	:	DC 3.8V, 750mA

Measurement Procedure Used:

FCC Part 2, FCC Part 22 Subpart H, FCC Part 24 Subpart E, ANSI/TIA 603-D (2010)

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(H):2015; FCC Part 24(E):2015 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 : Jun. 02~ Sept. 27, 2016

Prepared by : (Tested Engineer / Baron Wen)

Reviewer : (Project Manager / Amy Ding)

Approved & Authorized Signer : (Manager/Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Serial to GPRS Module
Model Number	:	USR-GM3, USR-GM3s, USR-GPRS232-7S3, USR-GPRS232-730, USR-GPRS232-702, USR-GPRS232-703, USR-GPRS232-704, USR-GPRS232-705, USR-GPRS232-732, USR-GPRS232-734 (Note: All samples are the same except the model number and colour, so we prepare "USR-GM3" for test only.)
Test Voltage	:	AC 120V, 60Hz for adapter/ AC 240V, 60Hz for adapter
Adapter	:	Model No.: DQS151-120100-VC Input: AC 100-240V, 50/60Hz, 0.4A Max Output: DC 12.0V, 1.0A
Frequency	:	GSM850 TX: 824.2~848.8MHz; RX: 869.2~893.8MHz PCS1900 TX: 1850.2~1909.8MHz; RX: 1930.2~1989.8MHz
Number of Channels:	:	GSM 850: 124CH PCS1900: 299CH
Modulation Type	:	GSM/GPRS:GFSK
Antenna Gain	:	GSM: GSM 850: 2.5dBi PCS 1900: 2.5dBi
Applicant	:	Shandong USR IOT Technology Limited
Address	:	Floor 11, Building 1, No. 1166 Xinluo Street, Gaoxin Qu, 250101, Jinan, Shandong, China
Manufacturer	:	Shandong USR IOT Technology Limited
Address	:	Floor 11, Building 1, No. 1166 Xinluo Street, Gaoxin Qu, 250101, Jinan, Shandong, China
Factory	:	Shandong USR IOT Technology Limited
Address	:	Floor 11, Building 1, No. 1166 Xinluo Street, Gaoxin Qu, 250101, Jinan, Shandong, China
Date of receipt	:	Jun. 02, 2016
Date of Test	:	Jun. 02~ Sept. 27, 2016

1.2. Auxiliary Equipment Used during Test

N/A

1.3. Description of Test Facility

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

FCC-Registration No.: 752021
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 752021, July 06, 2016.

IC-Registration No.: 8058A-1
Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, Jun. 13, 2016.

Test Location
All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

1.4. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal) Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

2. Technical test

2.1. Summary of Test Results

No Deviations from the technical specification(s) were ascertained in the course of the tests Performed	
Final Verdict: (only “Pass” if all single measurements are “Pass”)	Pass

2.2. Test Report

The EUT has been tested according to the following specifications:
The radiated emission testing was performed according to the procedures of ANSI/TIA-603-D:2010,KDB 971168 D01 v02r02 and KDB 648474 D03 v01r04

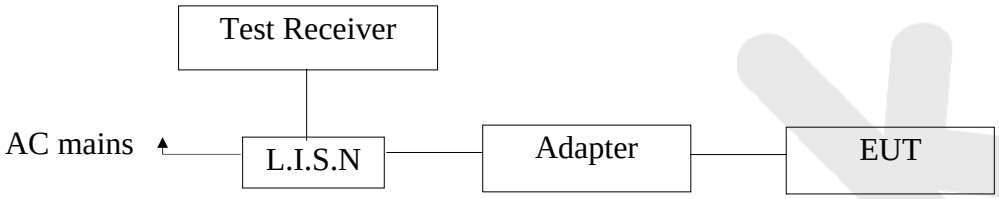
Standard	Test Type	Result	Notes
2.1046	Conducted emission	Pass	
1.1307 2.1093	RF Exposure (SAR)	Pass	Note 1
2.1046 22.913(a) 24.232(c) 27.50(c.10)	RF Output Power	Pass	Complies
24.232 (d)	Peak-Average Ratio	Pass	Complies
2.1049 22.905 22.917 24.238	99% & -26 dB Occupied Bandwidth	Pass	Complies
2.1051 22.917(a) 24.238(a)	Spurious Emissions at Antenna Terminal	Pass	Complies
22.917(a) 24.238(a)	Out of band emission, Band Edge	Pass	Complies
2.1053 22.917(a) 24.238(a)	Band edge test	Pass	Complies
2.1055 22.355 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Pass	Complies

Note1: Please refer to RF SAR Report.

3. Conducted Emission

3.1 Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



3.2 Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.3 Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4 Operating Condition of EUT

3.4.1. Setup the EUT and simulator as shown as Section 3.1.

3.4.2. Turn on the power of all equipment.

3.4.3. Let the EUT work in test mode (On) and measure it.

3.5 Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI/TIA-603-D:2010 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test results are reported on Section 3.6.

Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 16, 2016	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 16, 2016	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 16, 2016	1 Year

3.6 Power Line Conducted Emission Measurement Results

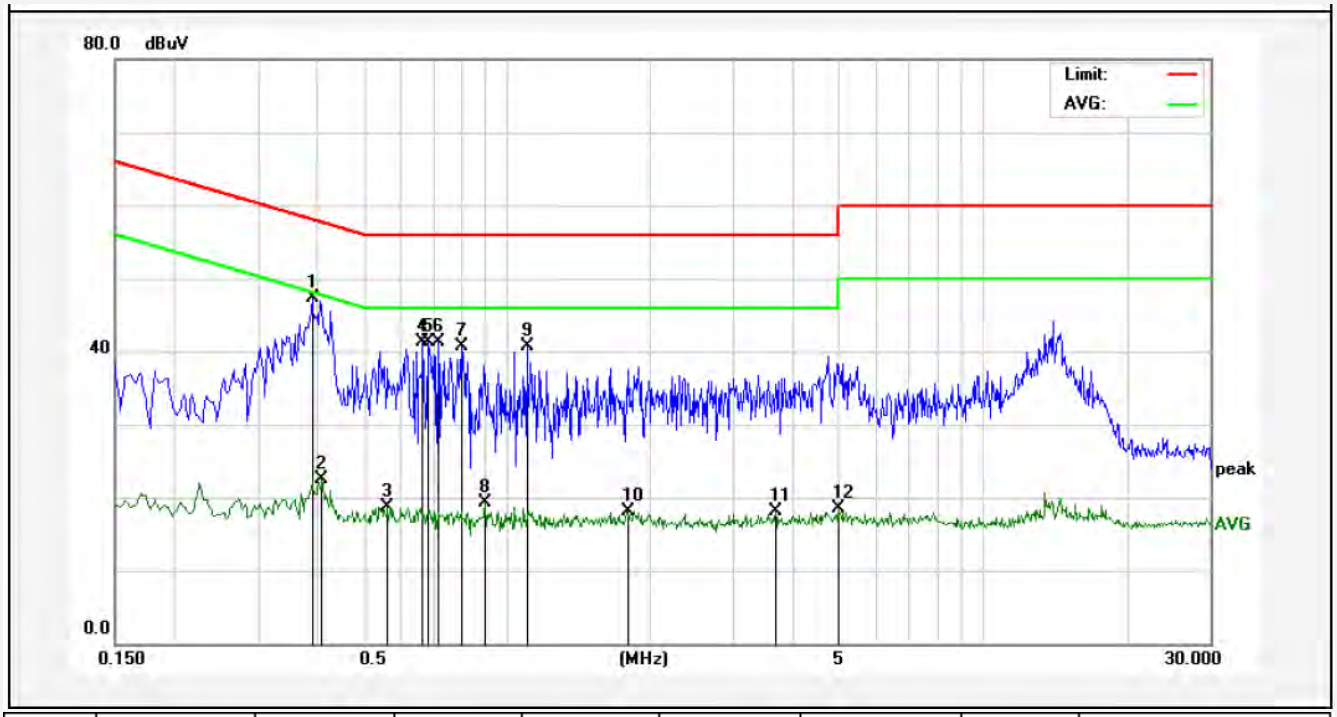
PASS.

The frequency range from 150KHz to 30 MHz is investigated.

Please refer the following pages.

CONDUCTED EMISSION TEST DATA

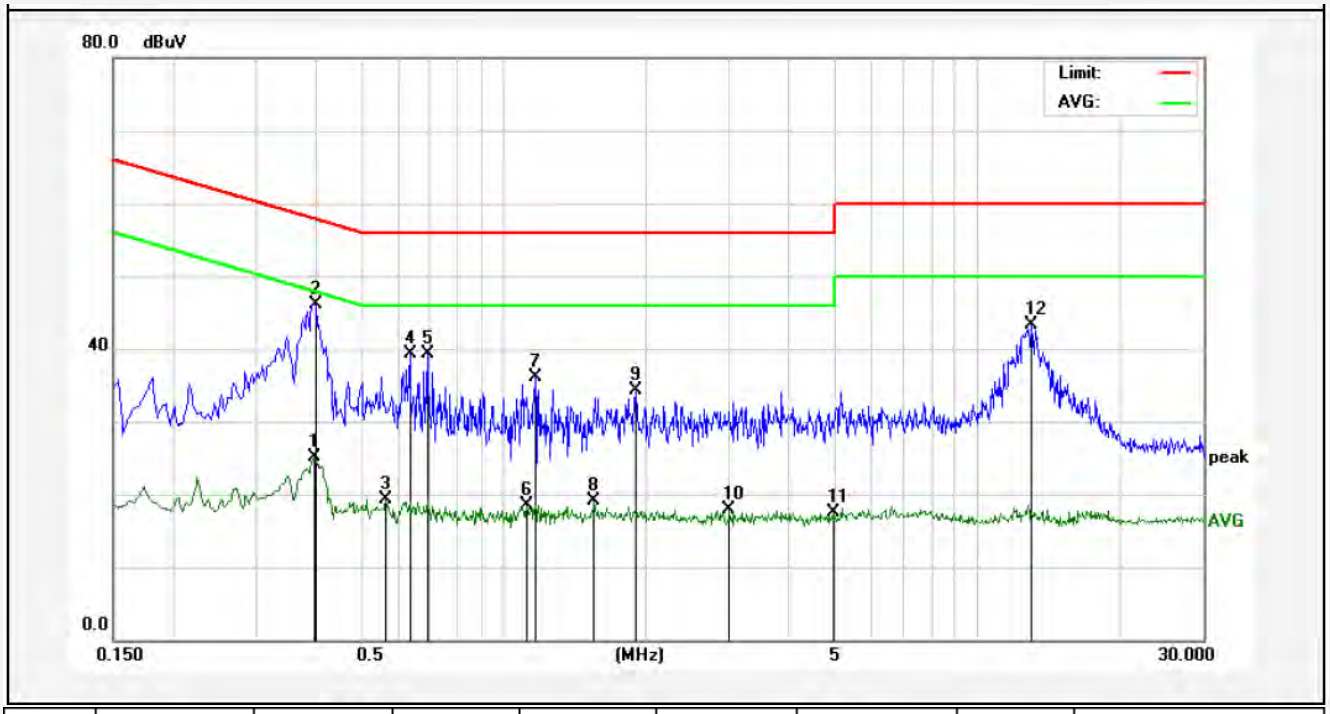
Test Site: 1# Shielded Room
Operating Condition: ON
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.3899	27.26	19.92	47.18	58.06	-10.88	QP	
2	0.4100	2.41	19.94	22.35	47.65	-25.30	AVG	
3	0.5620	-1.31	19.99	18.68	46.00	-27.32	AVG	
4	0.6660	21.24	20.02	41.26	56.00	-14.74	QP	
5	0.6860	21.22	20.03	41.25	56.00	-14.75	QP	
6	0.7180	21.30	20.04	41.34	56.00	-14.66	QP	
7	0.8020	20.63	20.05	40.68	56.00	-15.32	QP	
8	0.9020	-0.67	20.06	19.39	46.00	-26.61	AVG	
9	1.1019	20.72	20.12	40.84	56.00	-15.16	QP	
10	1.8020	-1.85	20.14	18.29	46.00	-27.71	AVG	
11	3.6740	-1.96	20.16	18.20	46.00	-27.80	AVG	
12	4.9660	-1.52	20.21	18.69	46.00	-27.31	AVG	

CONDUCTED EMISSION TEST DATA

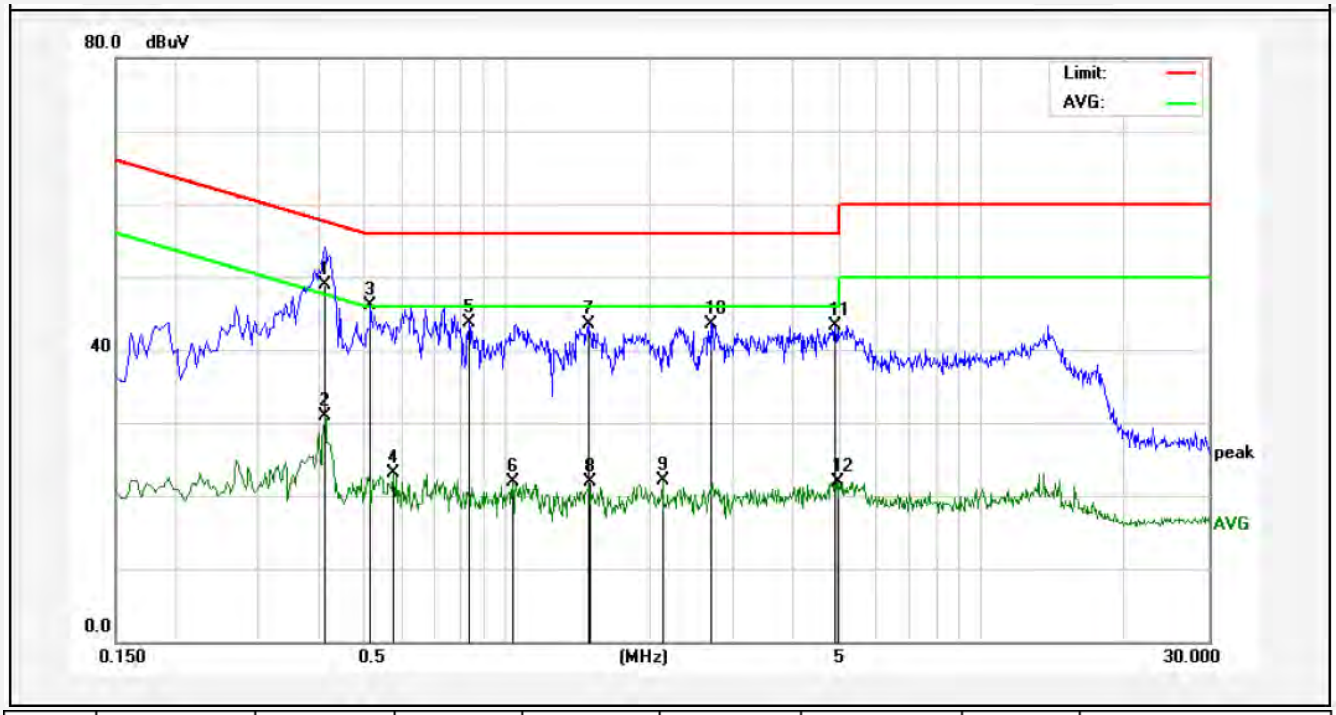
Test Site:	1# Shielded Room
Operating Condition:	ON
Test Specification:	AC 120V, 60Hz for adapter
Comment:	Neutral Line
	Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.3980	5.18	19.93	25.11	47.89	-22.78	AVG	
2	0.4020	26.17	19.94	46.11	57.81	-11.70	QP	
3	0.5660	-0.66	19.99	19.33	46.00	-26.67	AVG	
4	0.6340	19.36	20.02	39.38	56.00	-16.62	QP	
5	0.6900	19.35	20.03	39.38	56.00	-16.62	QP	
6	1.1180	-1.44	20.12	18.68	46.00	-27.32	AVG	
7	1.1660	16.02	20.12	36.14	56.00	-19.86	QP	
8	1.5540	-0.90	20.13	19.23	46.00	-26.77	AVG	
9	1.9060	14.29	20.14	34.43	56.00	-21.57	QP	
10	3.0020	-2.05	20.16	18.11	46.00	-27.89	AVG	
11	4.9540	-2.57	20.19	17.62	46.00	-28.38	AVG	
12	12.9980	23.33	20.32	43.65	60.00	-16.35	QP	

CONDUCTED EMISSION TEST DATA

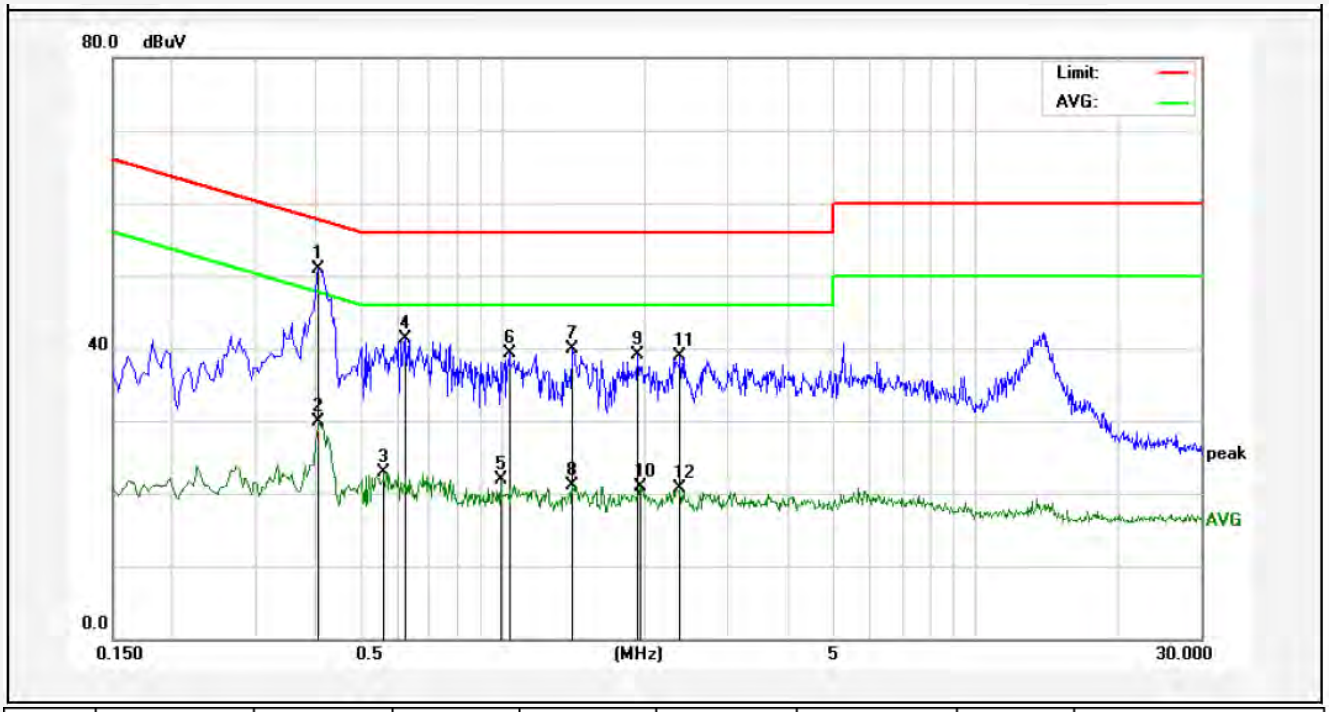
Test Site: 1# Shielded Room
Operating Condition: ON
Test Specification: AC 240V, 60Hz for adapter
Comment: Live Line
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.4140	28.94	19.94	48.88	57.57	-8.69	QP	
2	0.4140	10.94	19.94	30.88	47.57	-16.69	AVG	
3	0.5180	26.07	19.98	46.05	56.00	-9.95	QP	
4	0.5780	3.01	19.99	23.00	46.00	-23.00	AVG	
5	0.8340	23.67	20.06	43.73	56.00	-12.27	QP	
6	1.0300	1.87	20.12	21.99	46.00	-24.01	AVG	
7	1.4819	23.42	20.13	43.55	56.00	-12.45	QP	
8	1.4900	1.96	20.13	22.09	46.00	-23.91	AVG	
9	2.1220	2.11	20.14	22.25	46.00	-23.75	AVG	
10	2.7020	23.60	20.15	43.75	56.00	-12.25	QP	
11	4.9100	23.32	20.19	43.51	56.00	-12.49	QP	
12	4.9380	1.88	20.19	22.07	46.00	-23.93	AVG	

CONDUCTED EMISSION TEST DATA

Test Site:	1# Shielded Room
Operating Condition:	ON
Test Specification:	AC 240V, 60Hz for adapter
Comment:	Neutral Line
	Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.4100	30.81	19.94	50.75	57.65	-6.90	QP	
2	0.4100	9.93	19.94	29.87	47.65	-17.78	AVG	
3	0.5620	2.83	19.99	22.82	46.00	-23.18	AVG	
4	0.6260	21.36	20.02	41.38	56.00	-14.62	QP	
5	0.9900	1.93	20.07	22.00	46.00	-24.00	AVG	
6	1.0339	19.23	20.12	39.35	56.00	-16.65	QP	
7	1.4060	19.81	20.13	39.94	56.00	-16.06	QP	
8	1.4060	1.10	20.13	21.23	46.00	-24.77	AVG	
9	1.9340	19.14	20.05	39.19	56.00	-16.81	QP	
10	1.9500	0.89	20.12	21.01	46.00	-24.99	AVG	
11	2.3780	18.93	20.13	39.06	56.00	-16.94	QP	
12	2.3780	0.71	20.13	20.84	46.00	-25.16	AVG	

4. RF Output Power

4.1 Applicable Standard

According to FCC PART 22.913 (a), Max EIRP: 38.45dBm;FCC PART 24.232 (c),Max EIRP: 33.00dBm

4.2 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.

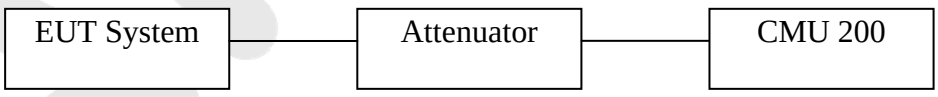
The frequency range up to tenth harmonic of the fundamental frequency was investigated.

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.

4.3 Test Setup



4.4 Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 16, 2016	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 16, 2016	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 16, 2016	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 19, 2016	1 Year
5.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 19, 2016	1 Year
6.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 19, 2016	1 Year
7.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 19, 2016	1 Year
8.	Pre-amplifier	SONOMA	310N	186860	Apr. 16, 2016	1 Year
9.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Jun 30, 2016	1 Year
10.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Jun. 30, 2016	1 Year
11.	DC Power supply	IV	IV-8080	YQSB0096	Jun. 30, 2016	1 Year
12.	Temp & Humidity programmable Chamber	Longan	LA-H005F	L0407008	Dec. 20, 2015	1 Year
13.	Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	114196	Jun. 30, 2016	1 Year
14.	Universal Radio Communication Tester	Rohde & Schwarz	CMU 500	114196	Jun. 30, 2016	1 Year
15.	Filter	COM-MW	ZHPF-BM1100-6000-0730	1307006523	Jun. 25, 2016	1 Year
16.	Filter	COM-MW	COM-MW/ZHPF-M3.5-18G-3834	B2015094550	Jun. 25, 2016	1 Year

3.5 Test Results

Pass

Test Data as following:

Conducted Power

Burst Average Power (dBm)								
Band	GSM850				PCS1900			
Channel	128	190	251	Tune up Power tolerant	512	661	810	Tune up Power tolerant
Frequency (MHz)	824.2	836.6	848.8	/	1850.2	1880	1909.8	/
GSM Voice (1 uplink),GMSK	31.56	**31.67**	31.52	30.7±1	28.75	**28.84**	28.29	29±1
GPRS Multi-Slot Class 8 (1 uplink),GMSK	31.25	31.31	31.14	30.5±1	28.29	28.30	28.11	28±1
GPRS Multi-Slot Class 10 (2 uplink) GMSK	29.67	29.81	29.72	30±1	26.37	26.53	26.28	27±1
GPRS Multi-Slot Class 12 (4 uplink) GMSK (4 uplink),GMSK	27.58	27.73	27.19	27±1	24.75	24.89	24.86	24±1
Remark : GPRS, CS1 coding scheme. Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 5 working link Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 5 working link								

Note: Since GSM mode has higher power, so the test items below were not performed to GPRS and EGPRS mode.

ERP & EIRPERP for Cellular Band (Part 22H) GSM						
Frequency(MHz)	Substituted level(dBm)	Antenna Polarization	Antenna Gain correction(dBi)	Cable Loss(dB)	Absolute Level(dBm)	Limit(dBm)
824.2	20.13	V	7.1	0.55	26.68	38.45
824.2	19.42	H	7.1	0.55	25.97	38.45
836.6	19.92	V	7.1	0.57	26.45	38.45
836.6	18.58	H	7.1	0.57	25.11	38.45
848.8	20.24	V	7.2	0.57	26.87	38.45
848.8	19.71	H	7.2	0.57	26.34	38.45
GPRS						
824.2	20.21	V	7.1	0.55	26.76	33
824.2	19.32	H	7.1	0.55	25.87	33
836.6	20.20	V	7.1	0.57	26.73	33
836.6	19.09	H	7.1	0.57	25.62	33
848.8	19.87	V	7.2	0.57	26.50	33
848.8	18.94	H	7.2	0.57	25.57	33

ERP & EIRPERP for Cellular Band (Part 24H)GSM						
Frequency(MHz)	Substituted level(dBm)	Antenna Polarization	Antenna Gain correction(dBi)	Cable Loss(dB)	Absolute Level(dBm)	Limit(dBm)
1850.2	16.95	V	10.3	1.02	26.23	33
1850.2	14.84	H	10.3	1.02	24.12	33
1880	16.78	V	10.3	1.10	25.98	33
1880	14.96	H	10.3	1.10	24.16	33
1909.8	16.91	V	10.3	1.15	26.06	33
1909.8	14.82	H	10.3	1.15	23.97	33
GPRS						
1850.2	16.42	V	10.3	1.02	25.70	33
1850.2	14.37	H	10.3	1.02	23.65	33
1880	16.57	V	10.3	1.10	25.77	33
1880	14.62	H	10.3	1.10	23.82	33
1909.8	16.39	V	10.3	1.15	25.54	33
1909.8	14.22	H	10.3	1.15	23.37	33

5. Peak-Average Ratio

5.1 Applicable Standard

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

5.2 Test Procedure

1. The signal analyzer's CCDF measurement profile is enabled

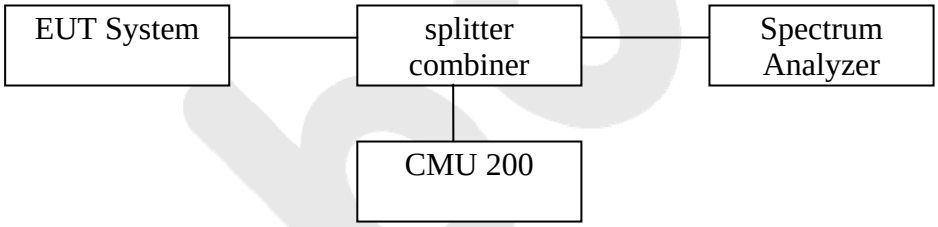
2. Frequency = carrier center frequency

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

5.3 Test Setup



5.4 Test Equipment

Same as the equipment listed in section 4.4

5.5 Test Results

Pass

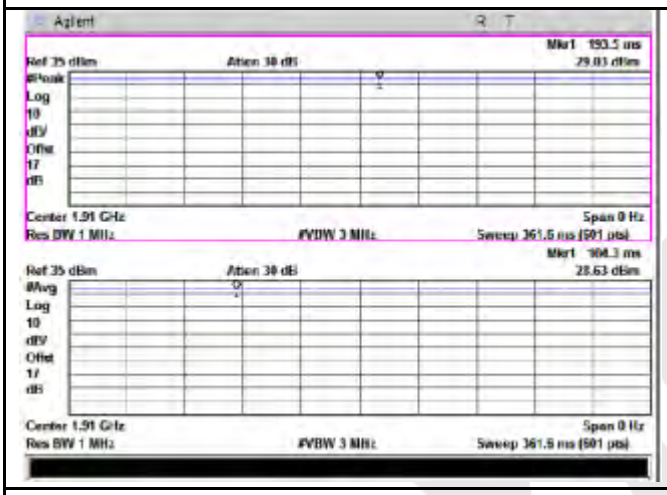
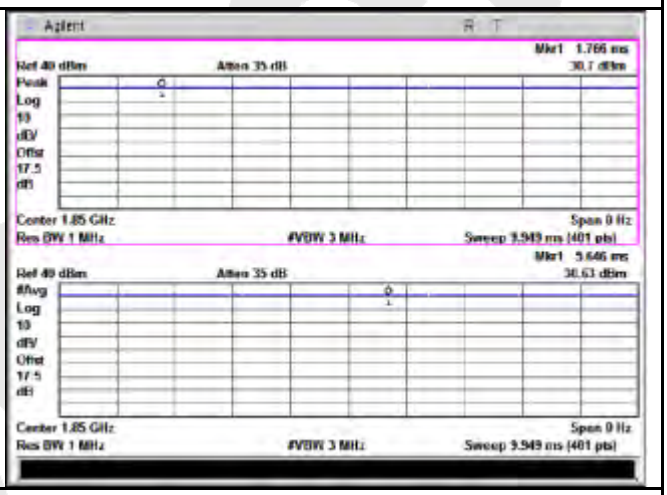
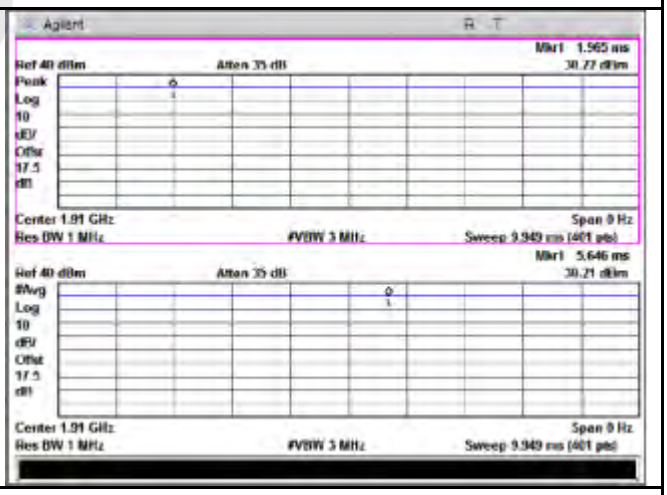
Test Data as following:

PCS1900
GSM

Frequency (MHz)	Conducted power (dBm)		Peak-Average Ratio (PAR)
	Peak	Average	
1850.2	28.63	27.18	0.02
1880	28.75	27.25	0.01
1909.8	28.34	27.16	0.40

GPRS

Frequency (MHz)	Conducted power (dBm)		Peak-Average Ratio (PAR)
	Peak	Average	
1850.2	28.22	27.17	0.07
1880	28.34	27.34	0.01
1909.8	28.15	27.16	0.01

	
PCS 1900 BW - Low CH 1850.2MHz	PCS 1900 BW - Mid CH 1880MHz
	
PCS 1900 BW - High CH 1909.8MHz	PCS 1900 BW - Low CH 1850.2MHz
	
PCS 1900 BW - Mid CH 1880MHz	PCS 1900 BW - High CH 1909.8MHz

6. Occupied Bandwidth

6.1 Applicable Standard

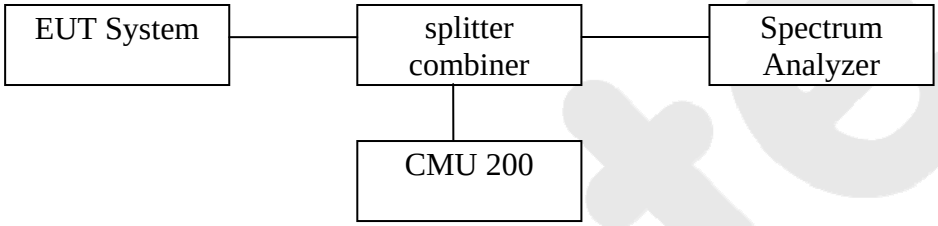
According to FCC PART 2.1049, PART 22.917,PART 22.905, PART 24.238;99% Occupied Bandwidth(kHz)

6.2 Test Procedure

The EUT was connected to Spectrum Analyzer and Base Station via power divider.

The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers.

6.3 Test Setup



6.4 Test Equipment

Same as the equipment listed in section 4.4.

6.5 Test Results

Pass

Test Data as following

Cellular Band (Part 22H) Result

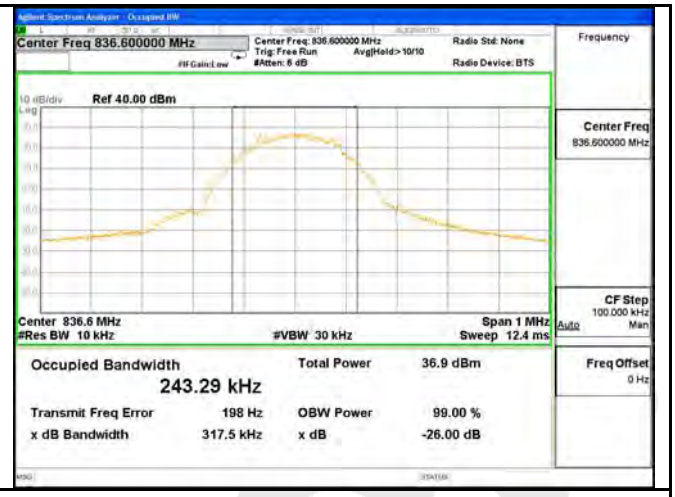
GSM			
Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	244.17	313.3
190	836.6	243.29	317.5
251	848.8	243.38	319.7
GPRS			
Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	244.38	315.2
190	836.6	245.27	317.7
251	848.8	248.07	318.2

PCS Band (Part 24E) Result

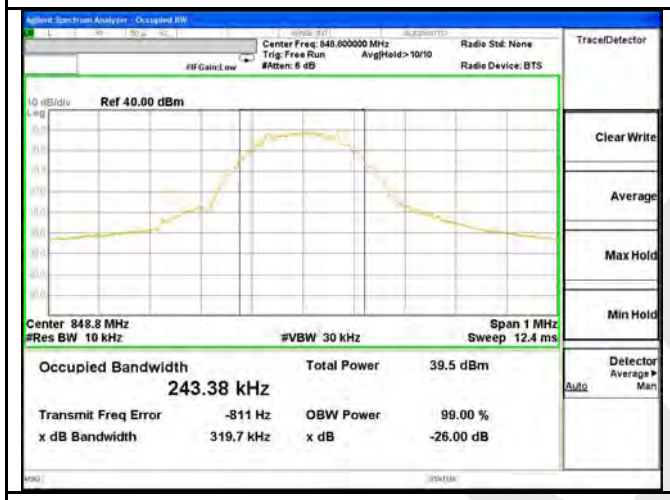
GSM			
Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850.2	246.48	316.4
661	1880.0	245.06	321.6
810	1909.8	248.85	319.3
GPRS			
Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850.2	247.11	314.0
661	1880.0	246.89	317.4
810	1909.8	243.50	315.2

Test Plots

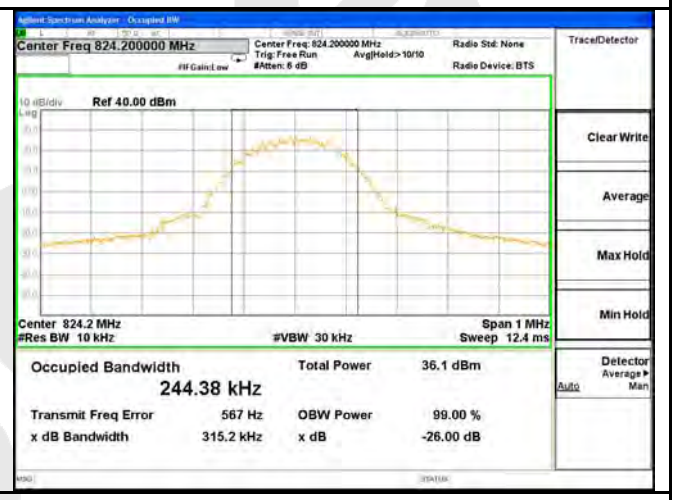
GSM 850 BW - Low CH 824.2MHz



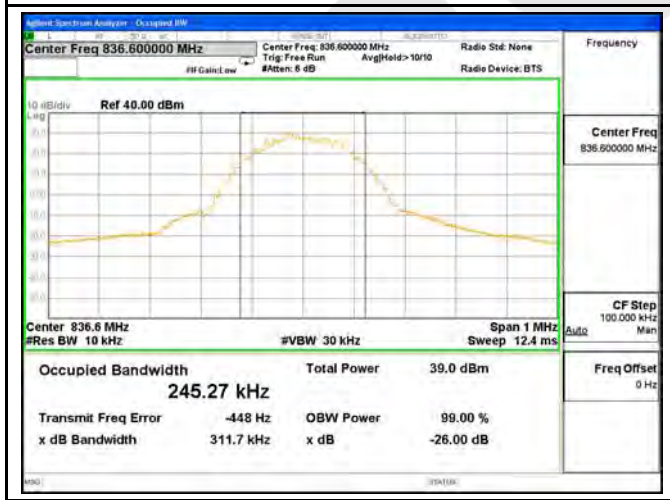
GSM 850 BW - Mid CH 836.6MHz



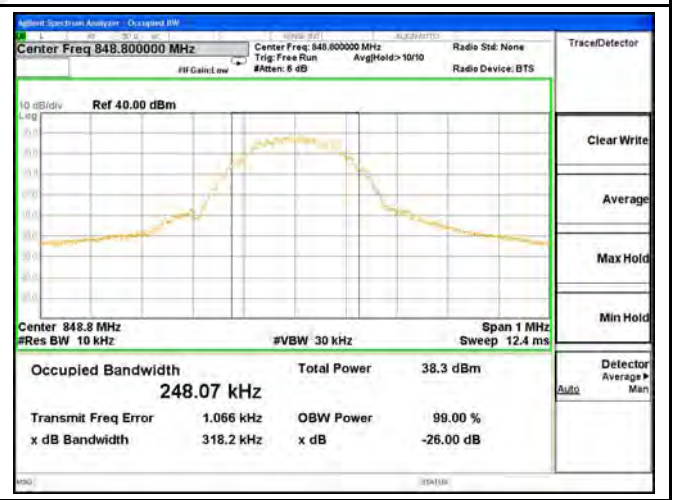
GSM 850 BW - High CH 848.8MHz



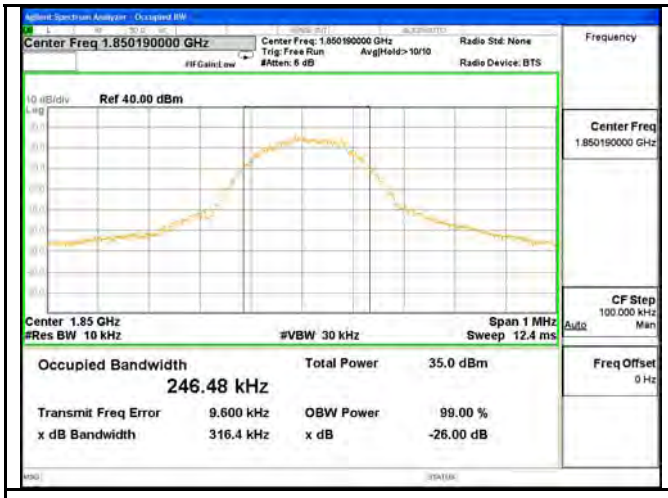
GPRS 850 BW - Low CH 824.2MHz



GPRS 850 BW - Mid CH 836.6MHz

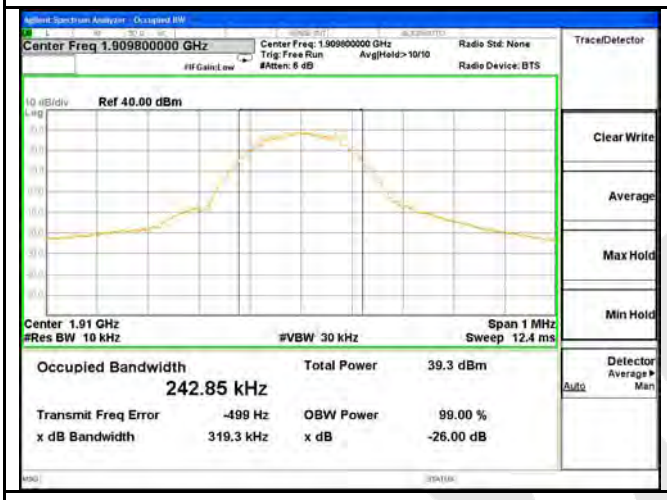


GPRS 850 BW - High CH 848.8MHz

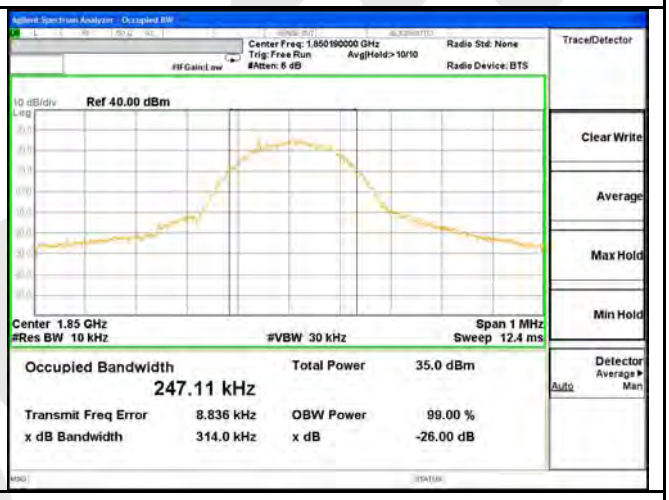


PCS 1900 BW - Low CH 1850.2MHz

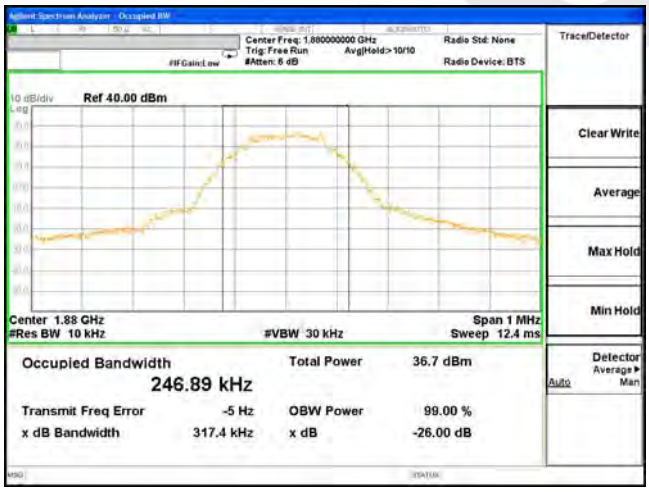
PCS 1900 BW - Mid CH 1880MHz



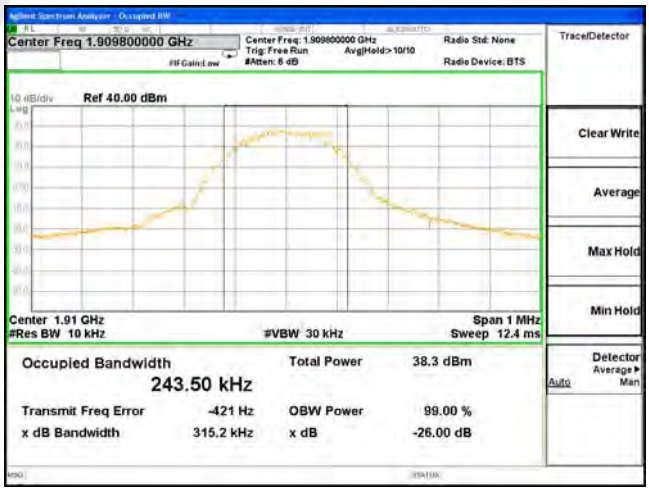
PCS 1900 BW - High CH 1909.8MHz



GPRS 1900 BW - Low CH 1850.2MHz



GPRS 1900 BW - Mid CH 1880MHz



GPRS 1900 BW - High CH 1909.8MHz

7. Spurious Emissions at Antenna Terminals

7.1 Applicable Standard

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

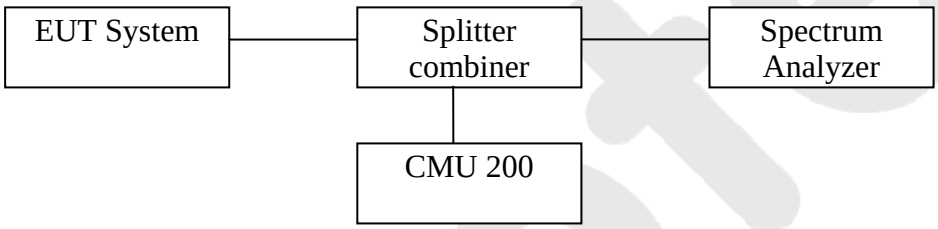
7.2 Test Procedure

The EUT was connected to Spectrum Analyzer and Base Station via power divider.

The Band Edges of low and high channels for the highest RF powers were measured.

Setting RBW as roughly BW/100.

7.3 Test Setup



7.4 Test Equipment

Same as the equipment listed in section 4.4.

7.5 Test Results

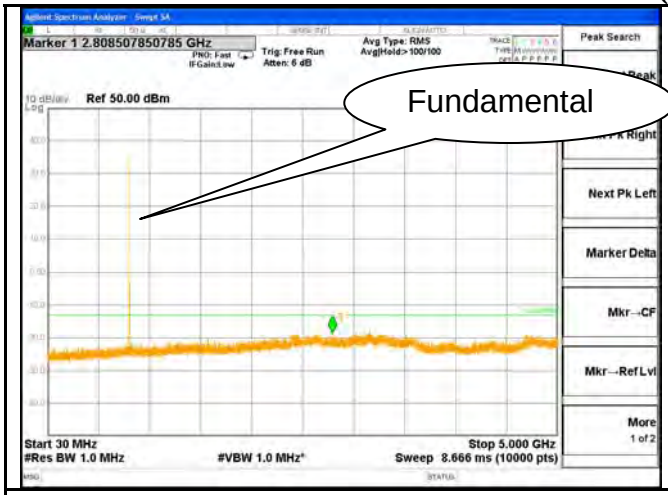
Pass

Test Data as following:

The EUT was tested on (GSM Mode, GPRS Mode) modes, only the worst data of (GSM Mode) is attached in the following pages.

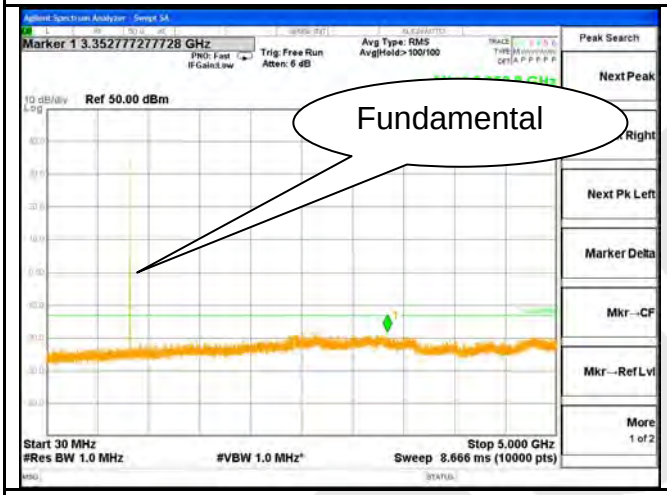
Test Plots

Cellular Band (Part 22H) Result



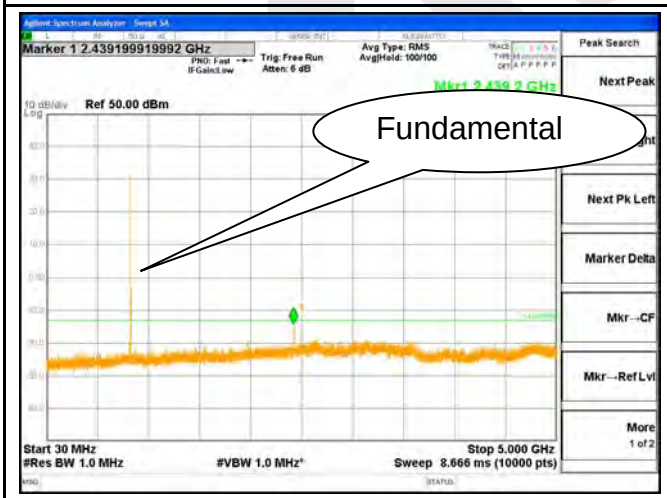
GSM 850 - Low Channel-1

GSM 850 - Low Channel-2



GSM 850 Middle Channel-1

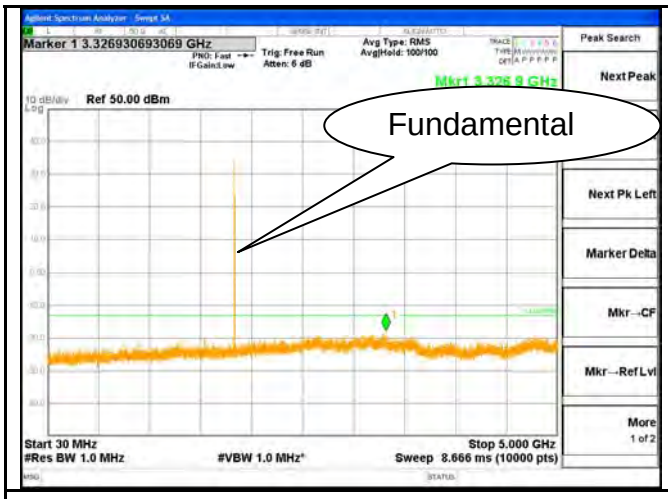
GSM 850 Middle Channel-2



GSM 850 - High Channel-1

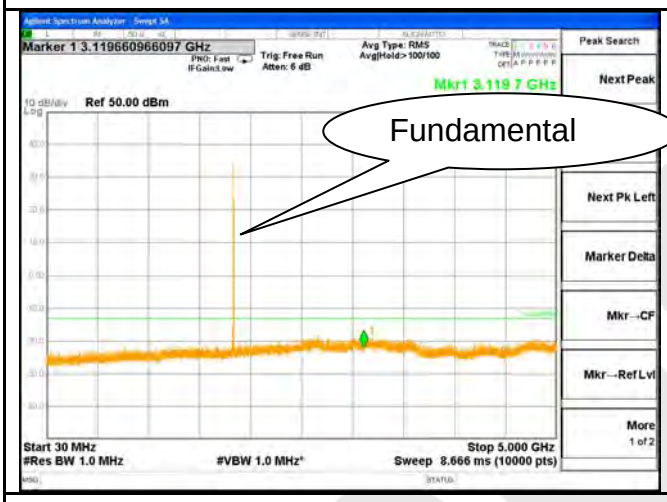
GSM 850 - High Channel-2

PCS Band (Part24E) Result

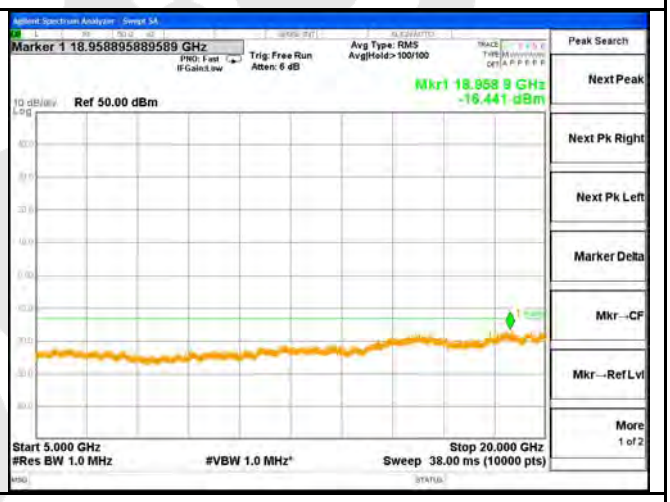


PCS1900 - Low Channel-1

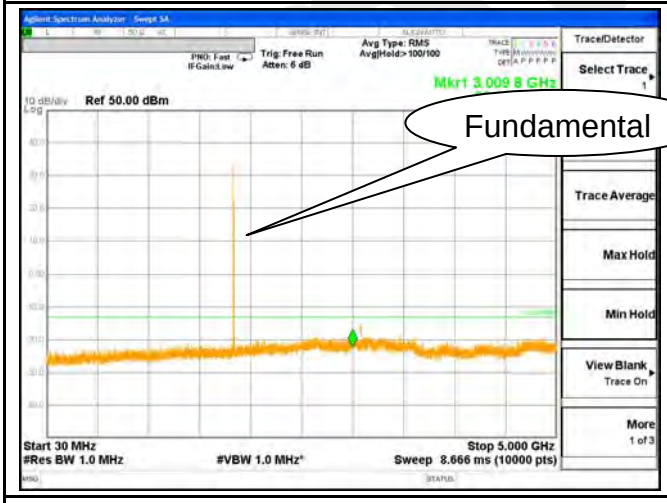
PCS 1900 - Low Channel-2



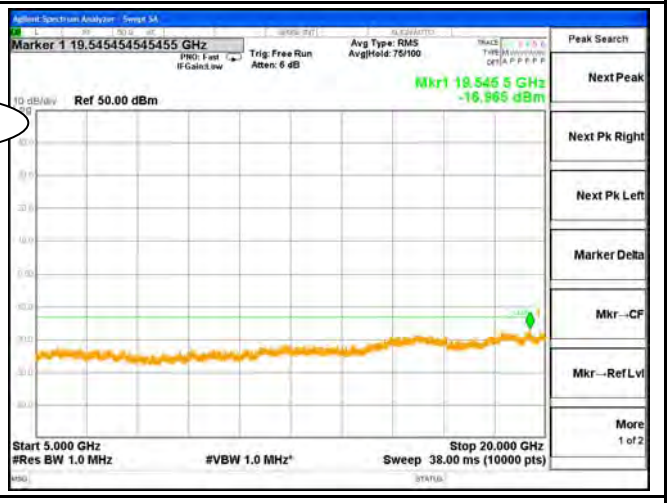
PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2



PCS1900 - High Channel-1



PCS 1900 - High Channel-2

8. Spurious Radiated Emissions

8.1 Definition and Requirement

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

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

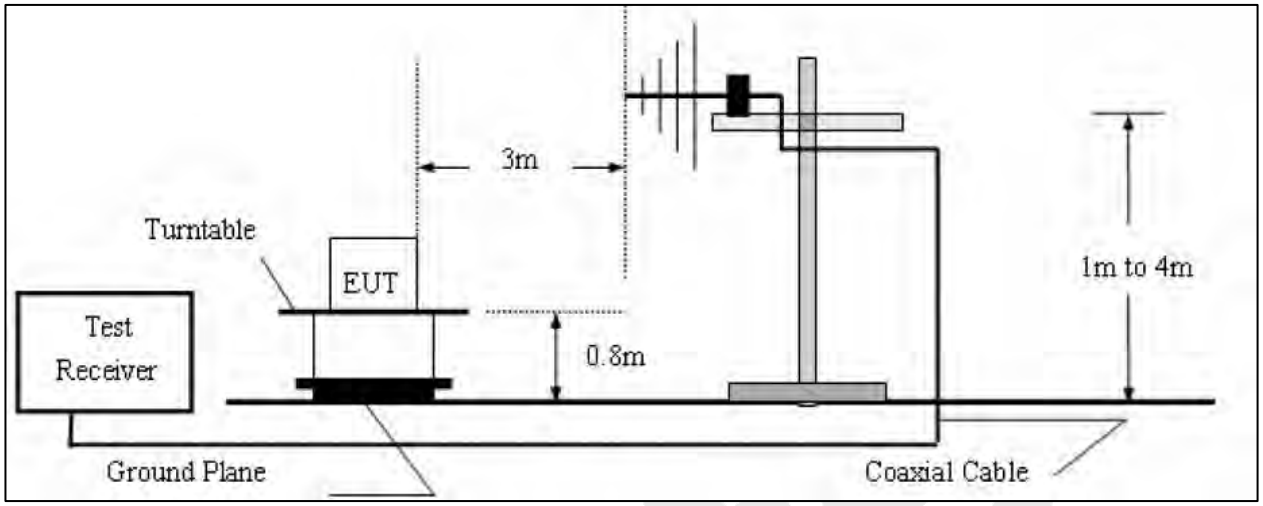
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

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.

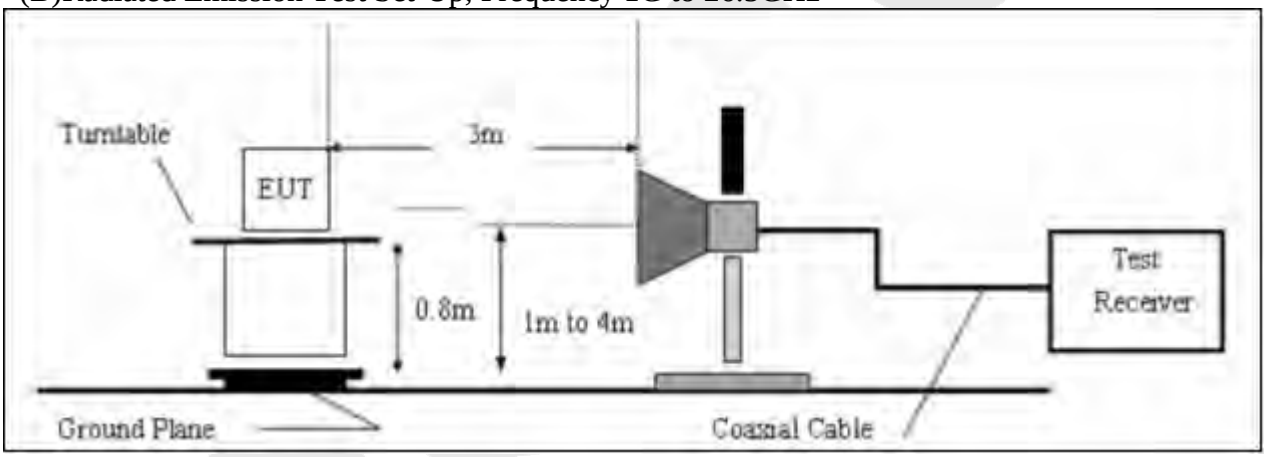
Sample Calculation:

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

(A)Radiated Emission Test Set-Up, Frequency 30-1000MHz



(B)Radiated Emission Test Set-Up, Frequency 1G to 26.5GHz



8.3 Test Equipment

Same as the equipment listed in section 4.4.

8.4 Test Results

Pass.

Test Data as following:

The EUT was tested on (GSM Mode, GPRS Mode) modes, only the worst data of (GSM Mode) is attached in the following pages.

Cellular Band (Part 22H) Result

Low channel

Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	AntennaGain Correction (dB)	Cable Loss(dB)	Corrected Reading (dBm)	Limit(dBm)	Margin (dB)
1648.4	-41.39	V	7.95	0.78	-34.22	-13	-21.22
1648.4	-36.08	H	7.95	0.78	-28.91	-13	-15.91
318.843	-46.34	V	6.5	0.3	-40.14	-13	-27.14
755.929	-48.25	H	6.8	0.41	-41.86	-13	-28.86

Middle channel

Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	AntennaGain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1673.2	-46.95	V	7.95	0.78	-39.78	-13	-26.78
1673.2	-37.26	H	7.95	0.78	-30.09	-13	-17.09
317.288	-54.63	V	6.5	0.3	-48.43	-13	-35.43
706.168	-46.57	H	6.8	0.41	-40.18	-13	-27.18

High channel

Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	AntennaGain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1697.6	-45.56	V	7.95	0.78	-38.39	-13	-25.39
1697.6	-37.82	H	7.95	0.78	-30.65	-13	-17.65
376.856	-46.92	V	6.5	0.3	-40.72	-13	-27.72
752.281	-51.94	H	6.8	0.41	-45.55	-13	-32.55

Cellular Band (Part 24E)

Low channel

Frequency (MHz)	Substituted level(dBm)	Polarity(H/V)	AntennaGain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3704.8	-49.87	V	7.95	0.78	-42.70	-13	-29.70
3704.8	-39.54	H	7.95	0.78	-32.37	-13	-19.37
343.621	-51.97	V	6.5	0.3	-45.77	-13	-32.77
725.852	-46.49	H	6.8	0.41	-40.10	-13	-27.10

Middle channel

Frequency (MHz)	Substituted level(dBm)	Polarity(H/V)	AntennaGain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-39.37	V	7.95	0.78	-32.20	-13	-19.20
3760	-40.51	H	7.95	0.78	-33.34	-13	-20.34
285.488	-52.90	V	6.5	0.3	-46.70	-13	-33.70
652.351	-52.31	H	6.8	0.41	-45.92	-13	-32.92

High channel

Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	AntennaGain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3815.2	-42.29	V	7.95	0.78	-35.12	-13	-22.12
3815.2	-35.24	H	7.95	0.78	-28.07	-13	-15.07
422.015	-50.67	V	6.5	0.3	-44.47	-13	-31.47
613.827	-45.26	H	6.8	0.41	-38.87	-13	-25.87

9. Band Edge

9.1 Standard Application

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.

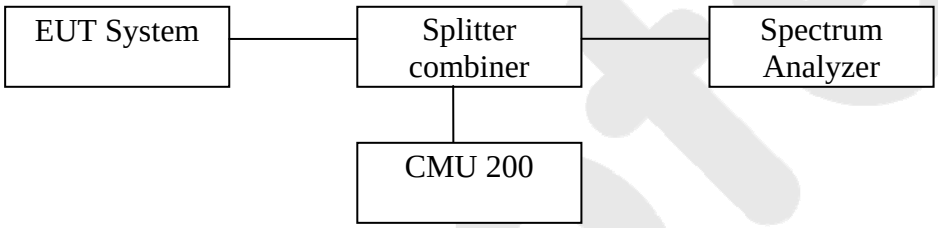
9.2 Test Procedure

The EUT was connected to Spectrum Analyzer and Base Station via power divider.

The Band Edges of low and high channels for the highest RF powers were measured.

Setting RBW as roughly BW/100.

9.3 Test Setup



9.4 Test Equipment

Same as the equipment listed in section 4.4.

9.5 Test Results

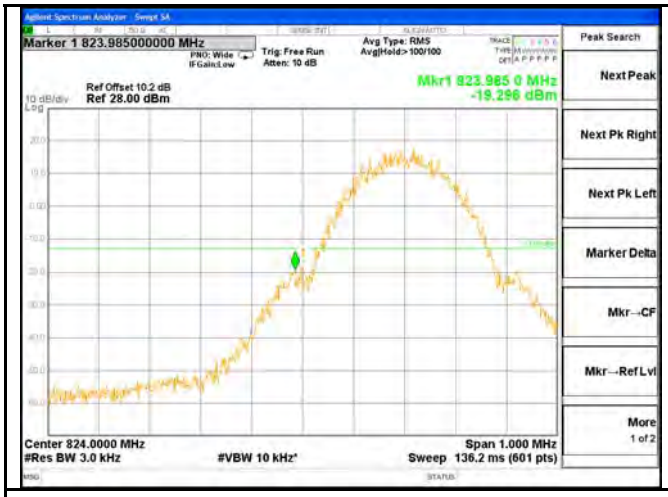
Pass

Test Data as following:

Cellular Band (Part 22H) Result

GSM 850		
Frequency (MHz)	**Emission (dBm)**	**Limit (dBm)**
823.9850	-19.296	-13
849.0200	-18.935	-13
GPRS 850		
Frequency (MHz)	**Emission (dBm)**	**Limit (dBm)**
823.9767	-18.866	-13
849.0167	-19.716	-13

Test Plots

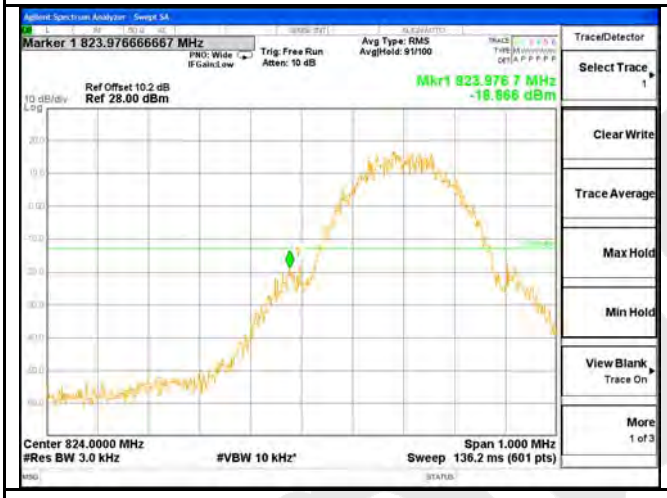


GSM 850 - Low Channel

Note: Offset=Cable loss (10.0) + 10log (3.18/3)=10.0+0.3=10.3 dB

GSM 850 - High Channel

Note: Offset=Cable loss (10.0) + 10log (3.18/3)=10.0+0.3=10.3 dB



GPRS 850 - Low Channel

Note: Offset=Cable loss (10.0) + 10log (3.18/3)=10.0+0.3=10.3 dB

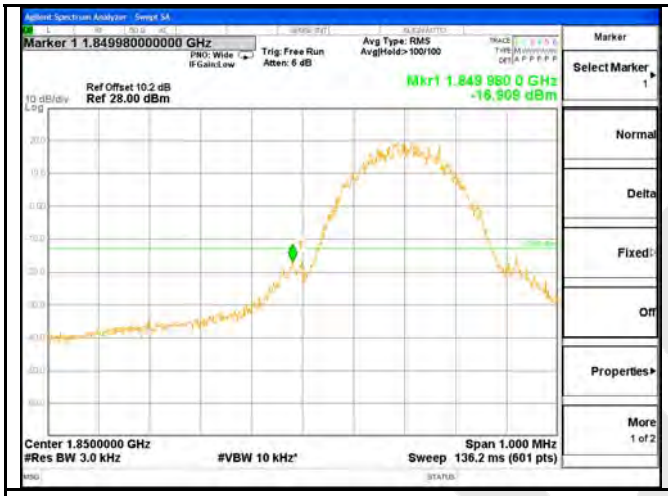
GPRS 850 - High Channel

Note: Offset=Cable loss (10.0) + 10log (3.13/3)=10.0+0.2=10.2 dB

PCS Band (Part24E) Result

PCS 1900		
Frequency (MHz)	**Emission (dBm)**	**Limit (dBm)**
1849.9800	-16.909	-13
1910.1830	-15.269	-13
GPRS 1900		
Frequency (MHz)	**Emission (dBm)**	**Limit (dBm)**
1849.9983	-15.579	-13
1910.0217	-15.856	-13

Test Plots

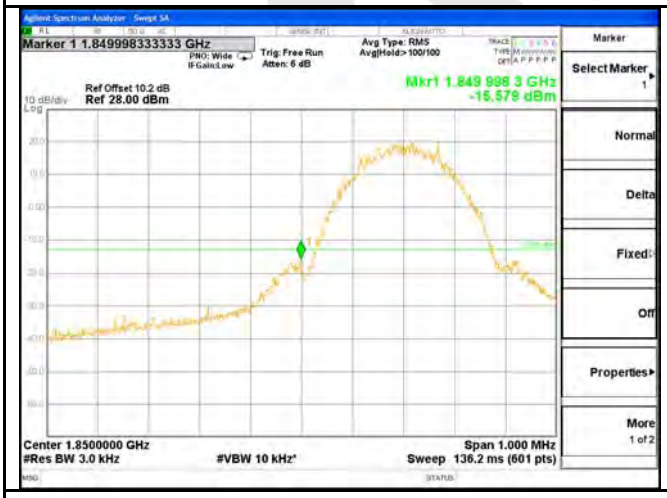


PCS 1900 - Low Channel

Note: Offset=Cable loss (10.0) + 10log (3.16/3)=10.0+0.2=10.2 dB

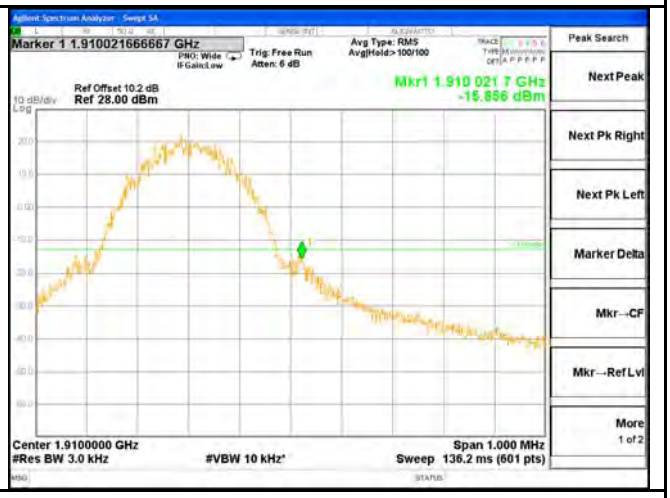
PCS 1900 - High Channel

Note: Offset=Cable loss (10.0) + 10log (3.19/3)=10.0+0.3=10.3 dB



GPRS 1900 - Low Channel

Note: Offset=Cable loss (10.0) + 10log (3.14/3)=10.0+0.2=10.2 dB



GPRS 1900 - High Channel

Note: Offset=Cable loss (10.0) + 10log (3.15/3)=10.0+0.2=10.2 dB

10. Frequency Stability

10.1 Standard Application

According to FCC PART 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

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

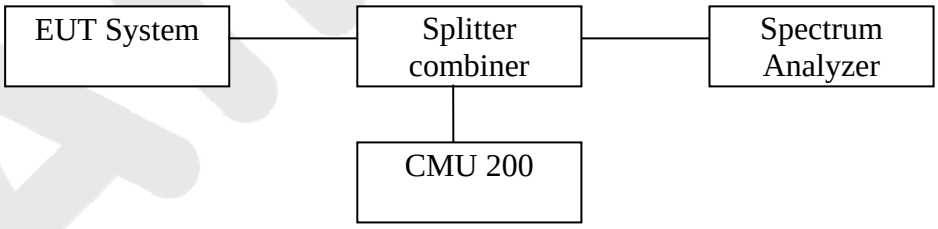
Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

10.2 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.

10.3 Test Setup



10.4 Test Equipment

Same as the equipment listed in section 4.4

10.5 Test Results

Pass. Test Data as following:

Cellular Band (Part 22H) Result

GSM 850				
Middle Channel, fo = 836.6 MHz				
Temperature(℃)	Power Supplied (Vdc)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	16	0.019	2.5
0		25	0.030	2.5
10		14	0.017	2.5
20		12	0.014	2.5
30		11	0.013	2.5
40		25	0.030	2.5
50		23	0.027	2.5
55		14	0.017	2.5
25	4.2	19	0.023	2.5
	3.5	13	0.016	2.5

GPRS 850				
Middle Channel, fo = 836.6 MHz				
Temperature(℃)	Power Supplied (Vdc)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	24	0.029	2.5
0		21	0.025	2.5
10		15	0.018	2.5
20		8	0.010	2.5
30		14	0.017	2.5
40		13	0.016	2.5
50		17	0.020	2.5
55		16	0.019	2.5
25	4.2	22	0.026	2.5
	3.5	27	0.032	2.5

PCS Band (Part 24E) Result

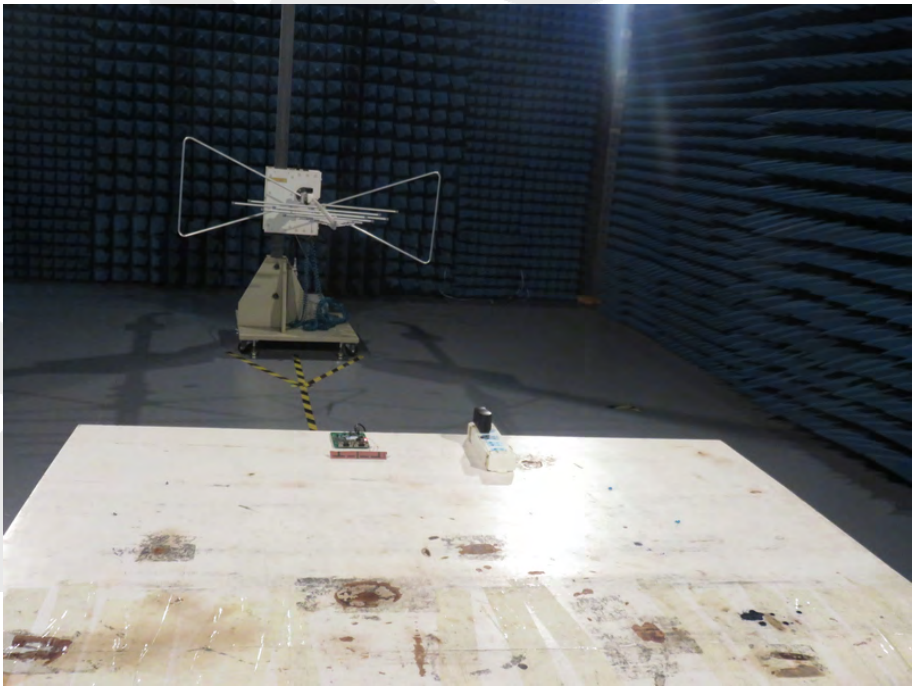
PCS 1900				
Middle Channel, fo =1880 MHz				
Temperature(℃)	Power Supplied (Vdc)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	32	0.017	2.5
0		24	0.013	2.5
10		33	0.018	2.5
20		25	0.013	2.5
30		16	0.009	2.5
40		35	0.019	2.5
50		19	0.010	2.5
55		24	0.013	2.5
25	4.2	27	0.014	2.5
	3.5	36	0.019	2.5

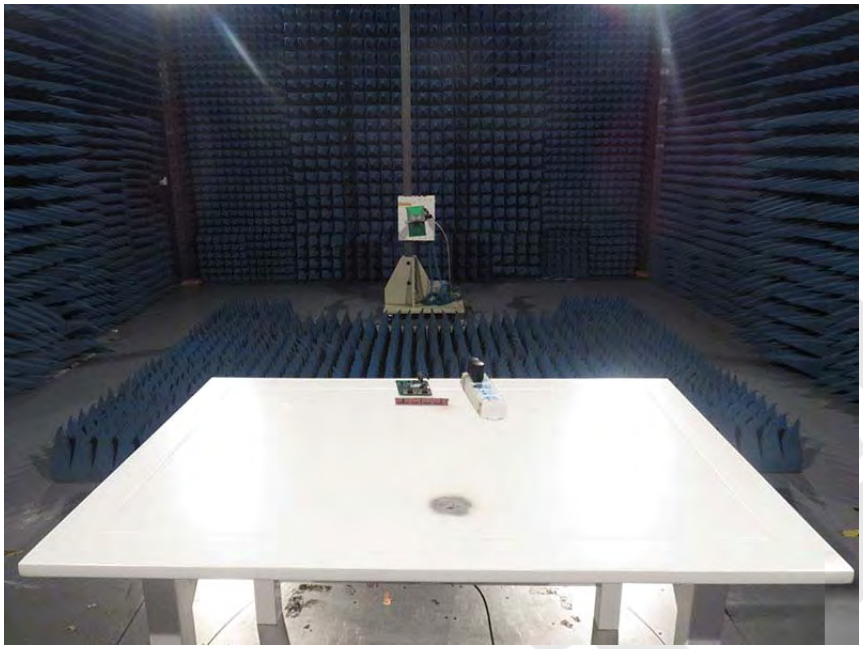
GPRS 1900				
Middle Channel, fo =1880 MHz				
Temperature(℃)	Power Supplied (Vdc)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	35	0.019	2.5
0		33	0.018	2.5
10		39	0.021	2.5
20		12	0.006	2.5
30		17	0.009	2.5
40		26	0.014	2.5
50		34	0.018	2.5
55		23	0.012	2.5
25	4.2	27	0.014	2.5
	3.5	29	0.015	2.5

APPENDIX I (TEST PHOTOGRAPHS)

Photo of Conducted Emission Test

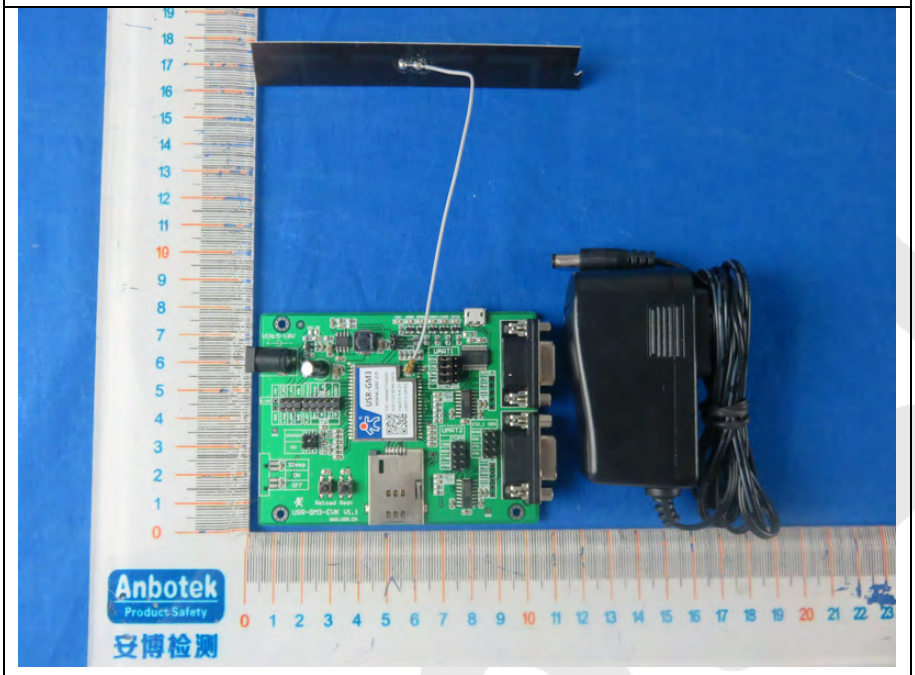
Photo of Radiated Emission Test



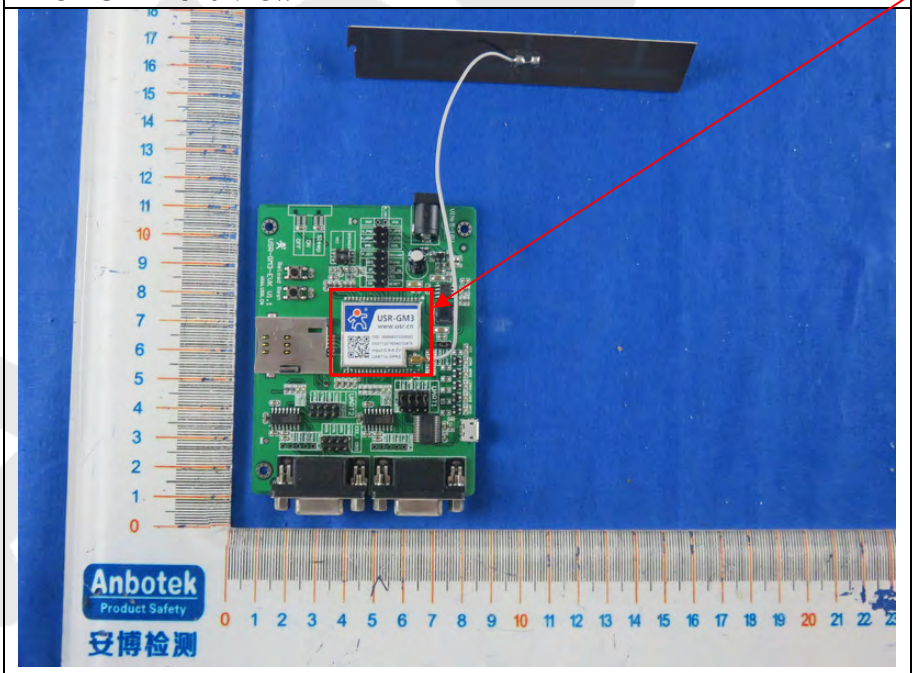


APPENDIX Ⅱ (EXTERNAL PHOTOS)

1. Figure
The EUT-Overall View

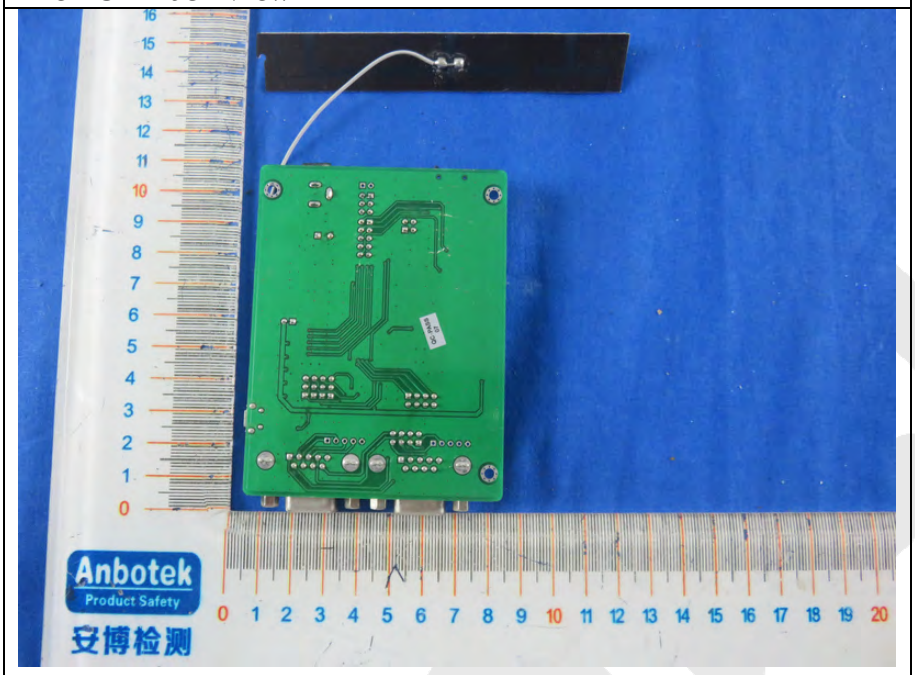


2. Figure
The EUT-Front View

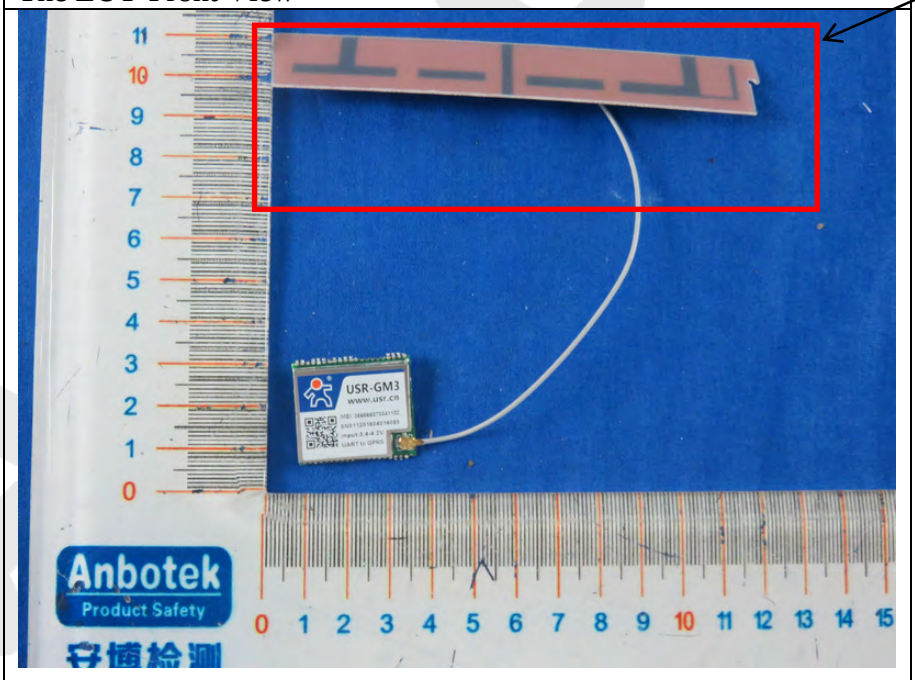


EUT is placed on the host

3. Figure
The EUT-Back View

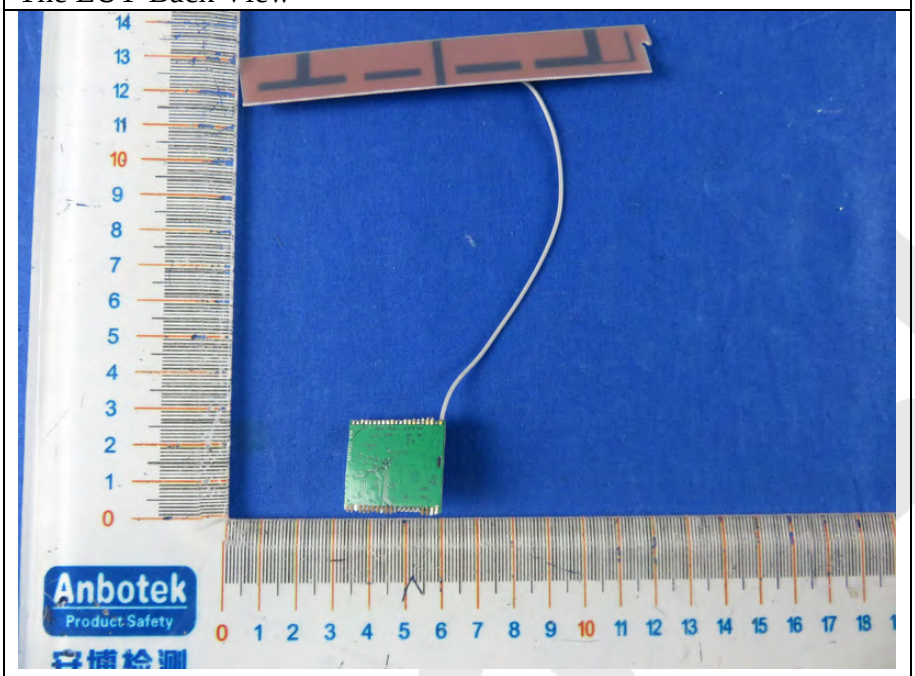


4. Figure
The EUT-Front View



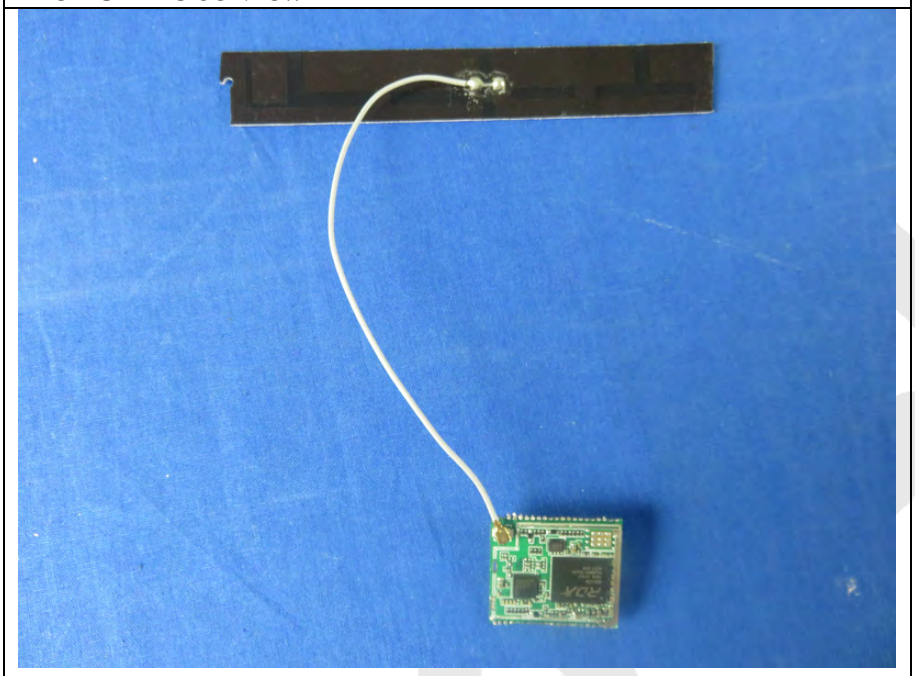
5. Figure

The EUT-Back View



APPENDIX Ⅲ (INTERNAL PHOTOS)

1. Figure
The EUT-Inside View



2. Figure
The EUT-Inside View