FCC TEST REPORT

FCC ID: 2AXWG-AI-8-BOX

On Behalf of

Roadefend Intelligence Technology (Shanghai) Co., Ltd.

Proactive AI Safety System

Model No.: AI-8-BOX, AI-8-BOXB, AI-8-BOXP, AI-8-BOXPH

Prepared for	:	Roadefend Intelligence Technology (Shanghai) Co., Ltd.
Address	:	Room 01, level3, block B3, lane221, Huangxing Road Yangpu District, Shanghai, China

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A2207239-C01-R18
Date of Receipt	:	August 10, 2022
Date of Test	:	August 11, 2022-September 1, 2022
Date of Report	:	September 1, 2022
Version Number	:	V0

TABLE OF CONTENTS

TEST REPORT DECLARATION

Applicant	:	Roadefend Intelligence Technology (Shanghai) Co., Ltd.
Address	:	Room 01, level3, block B3, lane221, Huangxing Road Yangpu District, Shanghai, China
Manufacturer	:	Roadefend Intelligence Technology (Shanghai) Co., Ltd.
Address	:	Room 01, level3, block B3, lane221, Huangxing Road Yangpu District, Shanghai, China
EUT Description	:	Proactive AI Safety System
		(A) Model No. : AI-8-BOX, AI-8-BOXB, AI-8-BOXP, AI-8-BOXPH
		(B) Trademark : ROADEFEND 径卫视觉

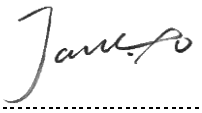
Measurement Standard Used:

FCC CFR Title 47 Part 2
FCC CFR Title 47 Part 22 Subpart H
FCC CFR Title 47 Part 24 Subpart E
FCC CFR Title 47 Part 27

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:	Lucas Pang Project Engineer	
Approved by (name + signature).....:	Jack Xu Project Manager	
Date of issue…… ……..:	September 1, 2022	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	September 1, 2022	Initial released Issue	Lucas Pang

1 Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093	Pass* (Please refer to MPE Report)
RF Output Power	Part 2.1046 Part 22.913 (a)(2) Part 24.232 (c)	Pass
Peak-to-Average Ratio	Part 2.1046 Part 24.232 (d)	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

Note: 1. Pass: The EUT complies with the essential requirements in the standard.

2. The conclusion of this test report is judged by actual test data without considering measurement uncertainty.

2 General Information

2.1 General Description of EUT

Description/PMN	:	Proactive AI Safety System
Model Number/HVIN(s)	:	AI-8-BOX, AI-8-BOXB, AI-8-BOXP, AI-8-BOXPH
Diff	:	There is no difference except the name of the model. All tests are made with the AI-8-BOX model.
Trademark	:	ROADEFEND 径卫视觉
Test Voltage	:	DC 9~36V from battery
Support Networks	:	GPRS, EGPRS, WCDMA
Support Bands	:	GSM850, PCS1900, WCDMA Band V, WCDMA Band IV, WCDMA Band II
TX Frequency	:	GSM850: 824.20MHz-848.80MHz PCS1900: 1850.20MHz-1909.80MHz WCDMA Band V: 826.40MHz -846.60MHz WCDMA Band II: 1852.40MHz -1907.60MHz WCDMA Band IV: 1710MHz -1755MHz
GPRS Class	:	12
EGPRS Class	:	12
Modulation type	:	GPRS: GMSK EGPRS: GMSK/8PSK WCDMA Band II/IV/V: QPSK
Antenna type	:	External antenna, Maximum Gain is 4.3dBi Antenna information is provided by applicant.
Software version	:	V1.0
Hardware version/FVIN	:	V1.2

Remark: 1.The worst-case simultaneous transmission configuration was evaluated with no non-compliance found. Results in this report are only for 2G and 3G function, and there is no other transmitter involved.

Operation Frequency List:

GSM 850		PCS1900		WCDMA Band V		WCDMA Band II	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20	4132	826.40	9262	1852.40
129	824.40	513	1850.40	4133	826.60	9263	1852.60
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
189	836.40	660	1879.80	4181	836.20	9399	1879.80
190	836.60	661	1880.00	4182	836.40	9400	1880.00
191	836.80	662	1880.20	4183	836.60	9401	1880.20
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
250	848.60	809	1909.60	4232	846.40	9537	1907.40
251	848.80	810	1909.80	4233	846.60	9538	1907.60

Regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Final test channel:

GSM 850		PCS1900		WCDMA Band V		WCDMA Band II	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20	4132	826.40	9262	1852.40
190	836.60	661	1880.00	4183	836.60	9400	1880.00
251	848.80	810	1909.80	4233	846.60	9538	1907.60

2.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is filing to comply with Section Part 22 subpart H and Part 24 subpart E of the FCC CFR 47 Rules.

2.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on TIA/EIA 603 and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057

2.4 Test Facility

Shenzhen Alpha Product Testing Co., Ltd
Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
Registration Number: 293961

July 25, 2017 Certificated by IC
Registration Number: CN0085

3 Test Instruments list

Equipment	Manufacture	Model No.	Firmware version	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	/	N/A	2022.05.17	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	2.3	102137	2022.08.22	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2022.08.22	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-102082-Wa	2022.08.22	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2022.08.22	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2021.08.30	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2021.08.30	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00059	2021.08.30	2Year
RF Cable	Resenberger	Cable 1	/	RE1	2022.08.22	1Year
RF Cable	Resenberger	Cable 2	/	RE2	2022.08.22	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2022.08.22	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2022.08.22	1Year
Pre-amplifier	Agilent	8449B	/	3008A02664	2022.08.22	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/	8126-466	2022.08.22	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	101043	2022.08.23	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	/	00946	2021.08.30	2 Year
Preamplifier	SKET	LNPA_1840-50	/	SK2018101801	2022.08.22	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2022.08.22	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2022.08.22	1 Year
Temp. & Humid. Chamber	Weihuang	WHTH-1000-40-880	/	100631	2022.08.22	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2022.08.22	1 Year
Adjustable attenuator	MWRFtest	N/A	/	N/A	N/A	N/A
10dB Attenuator	Mini-Circuits	DC-6G	/	N/A	N/A	N/A

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EZ-EMC	EZ	Alpha-3A1
CE	EZ-EMC	EZ	Alpha-3A1
RF-CE	MTS 8310	MW	V2.0.0.0

4 System test configuration

4.1 Test mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Test modes		
Band	Radiated	Conducted
GSM 850	■ GPRS 1 link ■ EPRS 1 link	■ GPRS 1 link ■ EGPRS 1 link
PCS 1900	■ GPRS 1 link ■ EGPRS 1 link	■ GPRS 1 link ■ EGPRS 1 link
WCDMA II	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link
WCDMA Band IV	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link
WCDMA Band V	■ RMC 12.2Kbps link	■ RMC 12.2Kbps link

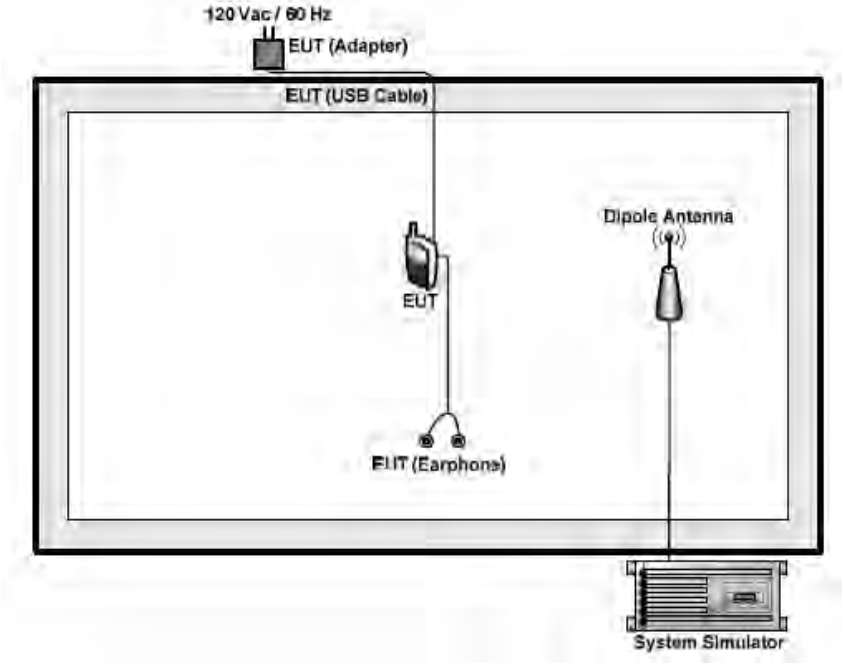
Note: The maximum power levels are GSM mode for GMSK link, GPRS multi-slot class 8 mode for GMSK link, EGPRS multi-slot class 8 mode for 8PSK link, RMC12.2Kbps mode for WCDMA Band V/II. only these modes were used for all tests.

The conducted power tables are as follows:

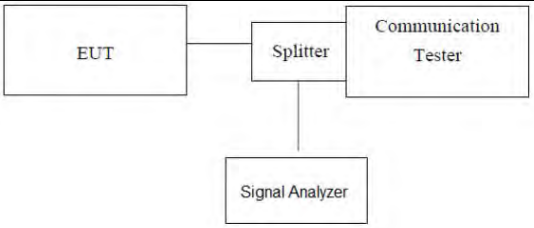
Conducted Power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency	824.20	836.60	848.80	1850.20	1880.00	1909.80
GPRS (GMSK, 1 TX slot)	32.65	33.36	32.23	29.36	29.35	28.15
GPRS (GMSK, 2 TX slot)	32.52	32.20	32.07	29.63	27.92	26.95
GPRS (GMSK, 3 TX slot)	30.31	29.09	29.68	27.12	25.72	25.81
GPRS (GMSK, 4 TX slot)	27.39	29.50	28.52	25.72	25.26	25.28
EGPRS (8PSK, 1 TX slot)	30.25	30.19	29.84	27.60	26.32	25.54
EGPRS (8PSK, 2 TX slot)	30.29	29.53	29.53	25.62	26.34	26.09
EGPRS (8PSK, 3 TX slot)	28.44	27.70	27.58	24.30	23.03	22.57
EGPRS (8PSK, 4 TX slot)	28.13	27.12	25.84	22.38	22.21	21.87

Conducted Power (dBm)						
Band	WCDMA Band II			WCDMA Band V		
Channel	9262	9400	9538	4132	4183	4233
Frequency	1852.4	1880.0	1907.6	826.4	836.6	846.6
RMC 12.2Kbps	22.95	22.03	23.14	22.40	22.53	23.16
HSDPA Subtest-1	20.90	21.22	22.32	21.03	21.97	21.89
HSDPA Subtest-2	22.32	21.85	22.57	21.66	21.40	22.13
HSDPA Subtest-3	21.27	21.25	21.86	20.84	21.42	21.83
HSDPA Subtest-4	22.68	22.00	22.12	22.85	21.86	21.50
HSUPA Subtest-1	22.18	21.57	22.03	21.32	21.39	21.86
HSUPA Subtest-2	22.91	21.04	21.27	22.30	20.45	21.18
HSUPA Subtest-3	21.69	21.24	22.28	22.24	21.79	22.20
HSUPA Subtest-4	22.33	21.09	21.77	22.31	21.23	21.82
HSUPA Subtest-5	21.19	21.99	21.44	21.03	22.20	21.26
AMR	21.98	21.85	21.71	21.92	21.13	22.26

4.2 Configuration of Tested System



4.3 Conducted AV Output Power

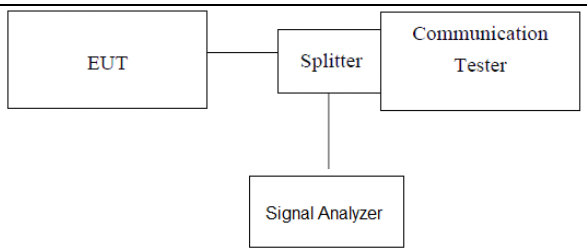
Test Requirement:	FCC part22.913(a) and FCC part24.232(b), FCC part 27.50 (d)(4)
Test Method:	FCC part2.1046
Limit:	GSM850, WCDMA Band V: 7W(38.45dbm) PCS1900, WCDMA Band II: 2W(33.01dbm) WCDMA Band IV: 1W(30.00dbm)
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
Test Procedure:	1. The transmitter output port was connected to base station. 2. The RF output of EUT was connected to the Signal Analyzer 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 Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Conducted Burst Power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency	824.20	836.60	848.80	1850.20	1880.00	1909.80
GPRS (GMSK, 1 TX slot)	32.24	**32.91**	32.28	29.84	29.69	28.16
GPRS (GMSK, 2 TX slot)	32.14	31.97	32.00	29.76	27.60	27.35
GPRS (GMSK, 3 TX slot)	30.59	29.90	29.34	27.04	27.84	27.55
GPRS (GMSK, 4 TX slot)	29.80	29.65	29.44	27.77	27.55	27.19
EGPRS (8PSK, 1 TX slot)	30.61	29.78	29.51	27.75	26.95	26.14
EGPRS (8PSK, 2 TX slot)	30.35	29.73	29.78	26.06	26.46	26.75
EGPRS (8PSK, 3 TX slot)	29.94	29.95	29.38	26.01	26.00	26.92
EGPRS (8PSK, 4 TX slot)	29.79	29.03	29.30	26.23	26.54	26.70

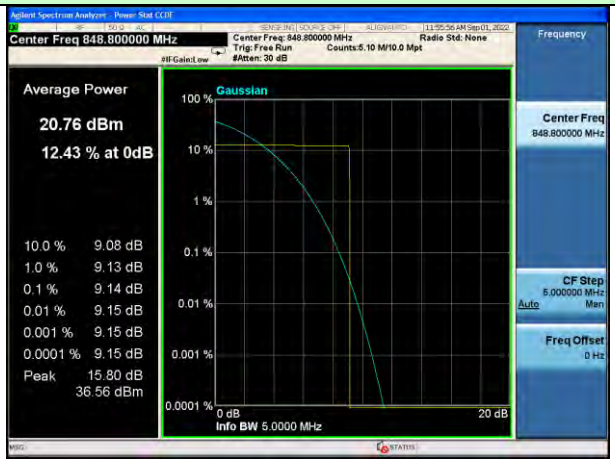
Burst Average Power (dBm)						
Band	WCDMA Band II			WCDMA Band V		
Channel	9262	9400	9538	4132	4183	4233
Frequency	1852.4	1880.0	1907.6	826.4	836.6	846.6
RMC 12.2Kbps	22.87	**23.90**	23.34	**23.13**	22.32	23.00
HSDPA Subtest-1	21.24	20.93	22.60	21.12	22.43	22.28
HSDPA Subtest-2	22.80	21.51	22.85	21.84	21.13	22.15
HSDPA Subtest-3	21.00	21.55	21.54	21.25	21.03	22.08
HSDPA Subtest-4	22.32	21.65	21.96	22.38	21.59	21.04
HSUPA Subtest-1	22.66	21.22	22.12	21.61	21.49	22.32
HSUPA Subtest-2	22.74	21.37	21.60	21.98	20.30	21.01
HSUPA Subtest-3	21.41	21.04	22.58	22.29	22.00	22.16
HSUPA Subtest-4	22.06	21.56	22.00	22.75	20.76	21.53
HSUPA Subtest-5	21.13	21.96	21.38	21.42	21.94	20.79

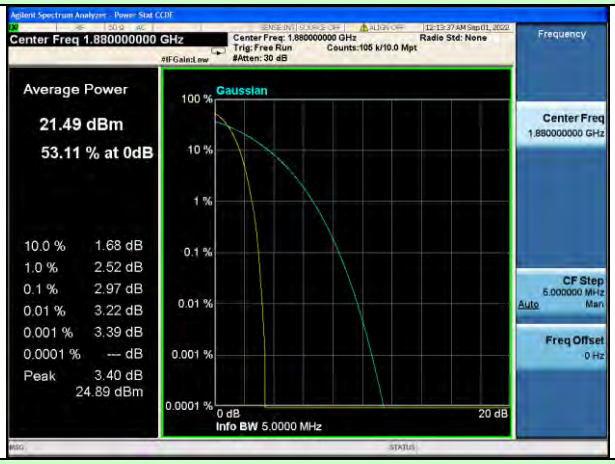
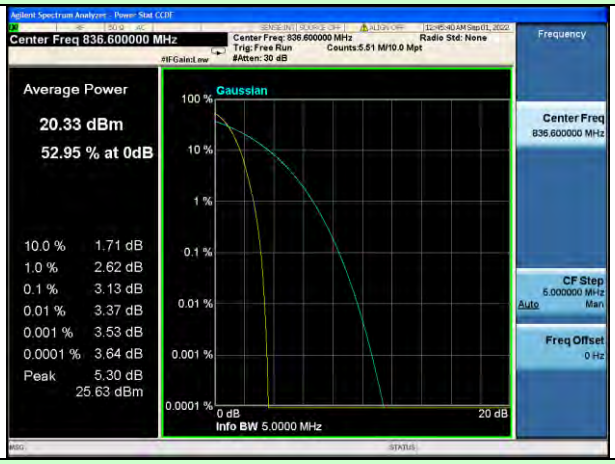
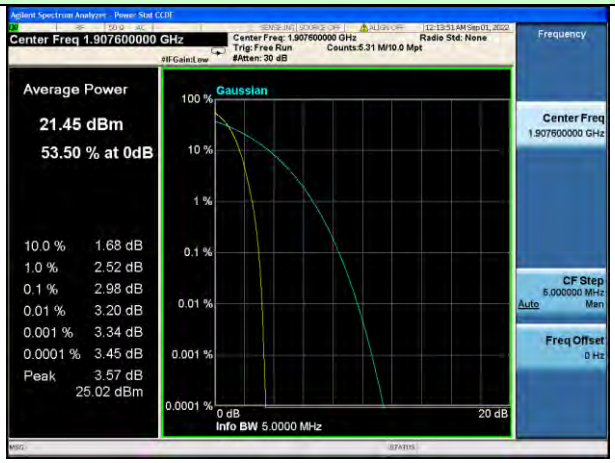
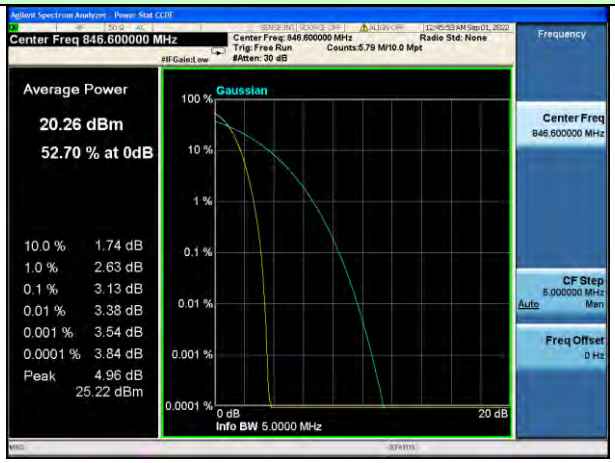
4.4 Peak-to-Average Ratio

Test Requirement:	FCC part24.232(d)
Test Method:	FCC part2.1046
Limit:	13db
Test setup:	 *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 Signal Analyzer 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. 6. Record the maximum peak-to-average ratio value.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

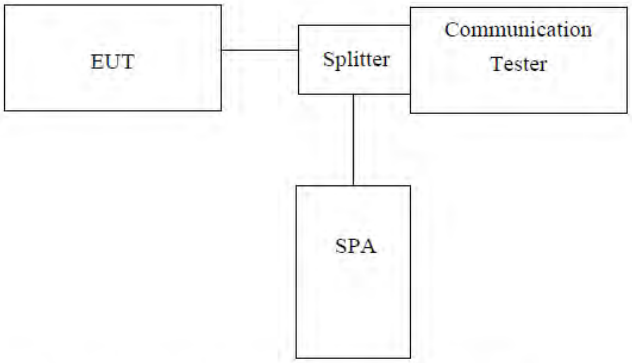
Measurement data

Test mode	Peak to Average Ratio（dB）			Limit（dB）	Result
	Low Ch.	Middle Ch.	High Ch.		
GSM/TM1/GSM850	9.85	9.37	9.14	13	PASS
GSM/TM1/GSM1900	9.26	9.76	9.09	13	PASS
WCDMA Band II	3.07	2.97	2.98	13	PASS
WCDMA Band V	3.12	3.13	3.13	13	PASS

Test Mode: GSM/TM1/GSM850 Low Ch.	Test Mode: GSM/TM1/GSM1900 Low Ch.
	
Middle Ch.	Middle Ch.
	
High Ch.	High Ch.
	

Test Mode: WCDMA Band II Low Ch.	Test Mode: WCDMA Band V Low Ch.
	
Middle Ch.	Middle Ch.
	
High Ch.	High Ch.
	

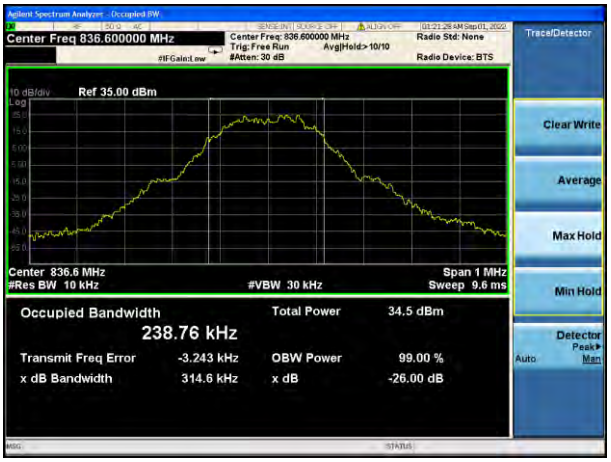
4.5 Occupy Bandwidth

Test Requirement:	FCC part22.913(a) and FCC part24.232(b)
Test Method:	FCC part2.1049
Test setup:	 *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 Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

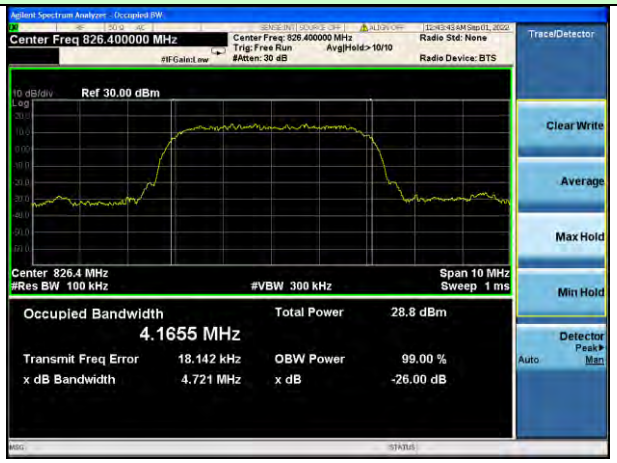
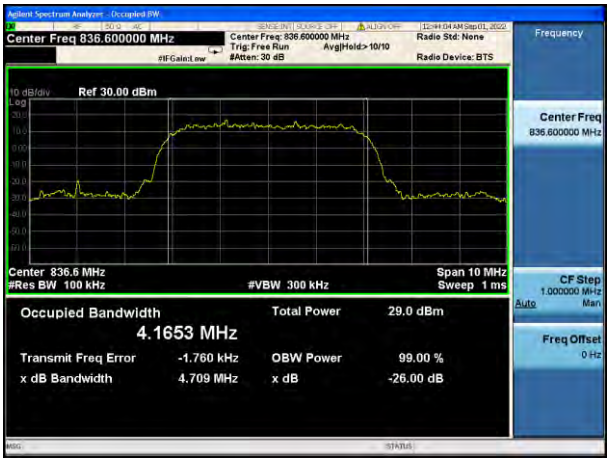
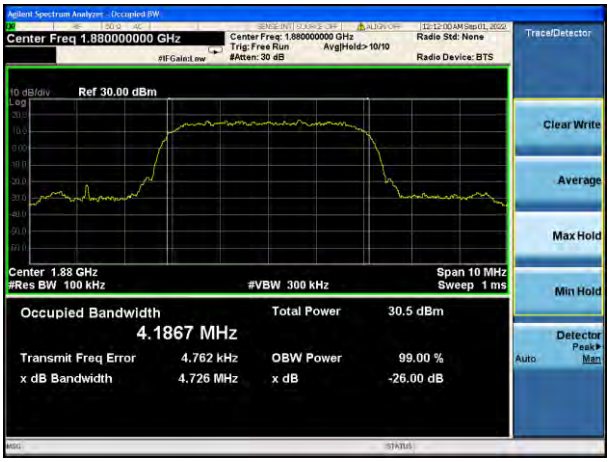
Measurement Data

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
GSM 850 (GPRS 1 link)	128	824.20	237.91	315.9
	190	836.60	238.76	314.6
	251	848.80	240.72	318.9
GSM 850 (EGPRS 1 link)	128	824.20	240.42	317.3
	190	836.60	244.90	307.5
	251	848.80	239.18	315.2
PCS 1900 (GPRS 1 link)	512	1850.20	236.02	301.6
	661	1880.00	236.02	306.8
	810	1909.80	235.00	317.8
PCS 1900 (EGPRS 1 link)	512	1850.20	237.35	307.9
	661	1880.00	235.32	304.3
	810	1909.80	235.52	318.2
WCDMA Band V (RMC 12.2Kbps link)	4132	826.40	4165.5	4721.0
	4183	836.60	4165.3	4709.0
	4233	846.60	4165.4	4737.0
WCDMA Band II (RMC 12.2Kbps link)	9262	1852.4	4145.9	4725.0
	9400	1880.0	4186.7	4726.0
	9538	1907.6	4167.3	4725.0

Test plot as follows:

GSM 850 (GPRS 1 link)	GSM 850 (EGPRS 1 link)
	
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
Highest channel	Highest channel

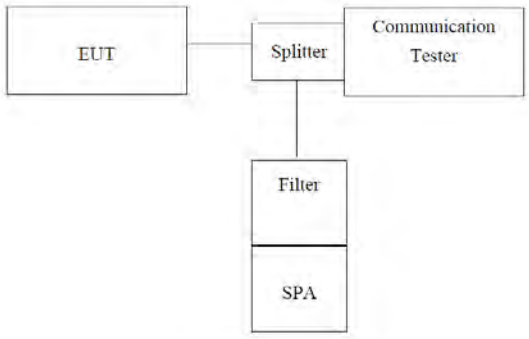
PCS 1900 (GPRS 1 link)	PCS 1900 (EGPRS 1 link)
	
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
Highest channel	Highest channel

WCDMA Band V (RMC 12.2Kbps link)	WCDMA Band II (RMC 12.2Kbps link)
	
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
Highest channel	Highest channel

4.6 MODULATION CHARACTERISTIC

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

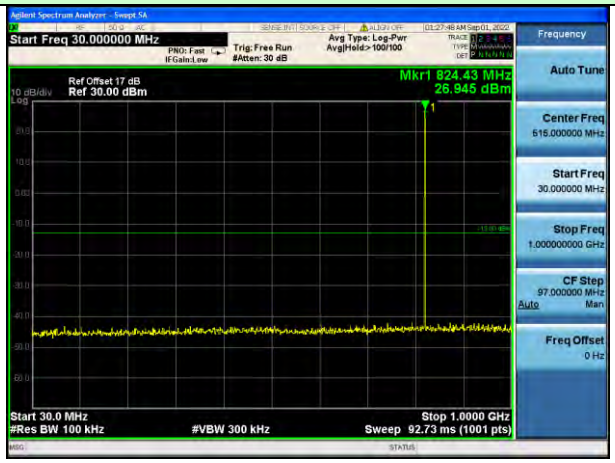
4.7 Out of band emission at antenna terminals

Test Requirement:	FCC part22.917(a) and FCC part24.238(a)
Test Method:	FCC part2.1051
Limit:	-13dBm
Test setup:	 *Note: Measurement setup for testing on Antenna connector*
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. 4 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

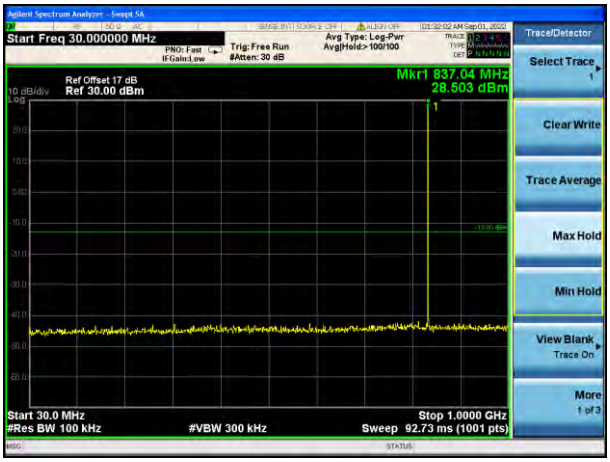
Test plot as follows:

Note: During the conducted spurious emission test, a band filter was used. The information of the filter is reported at section 6.0 (refer to item 24, 25).

Test Mode: Traffic mode	GSM 850 (GPRS 1 link)



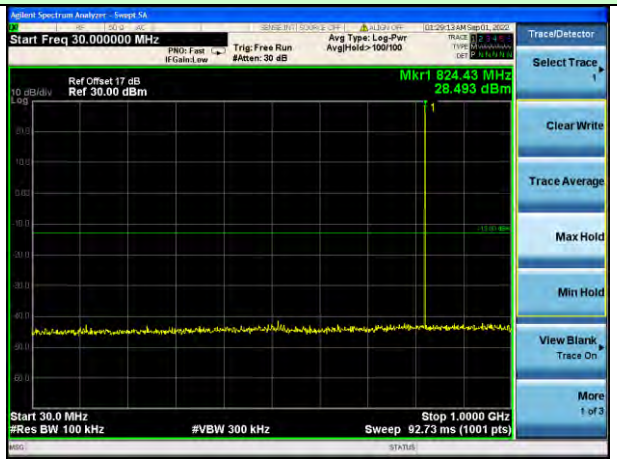
Lowest channel



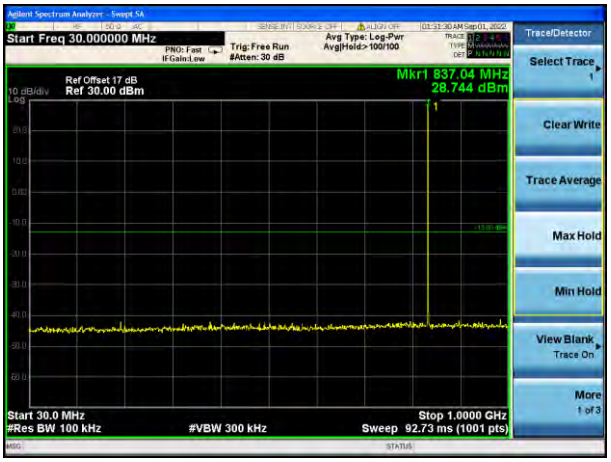
Middle channel

Highest channel

Test Mode: Traffic mode	GSM 850 (EGPRS 1 link)



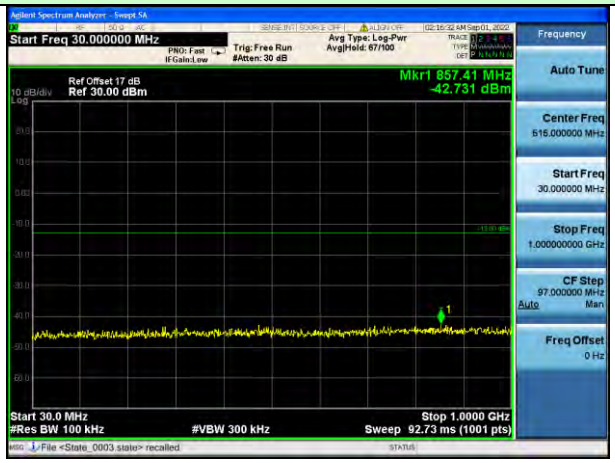
Lowest channel



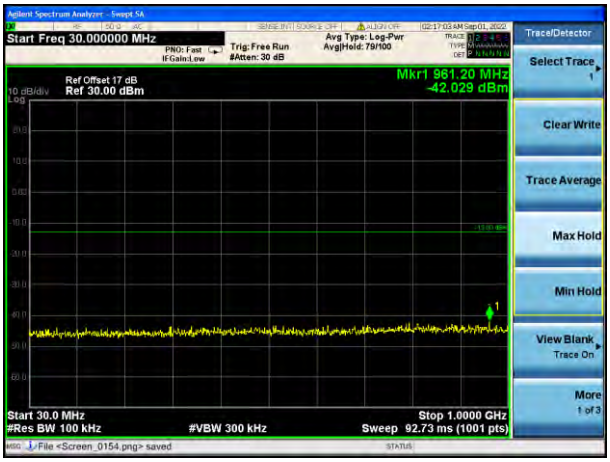
Middle channel

Highest channel

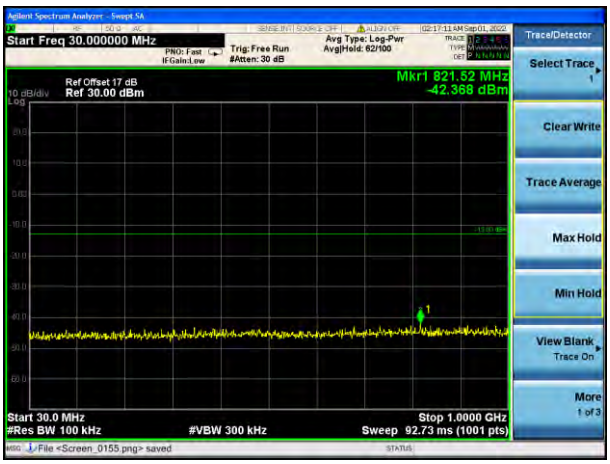
Test Mode: Traffic mode	PCS1900 (GPRS 1 link)



Lowest channel

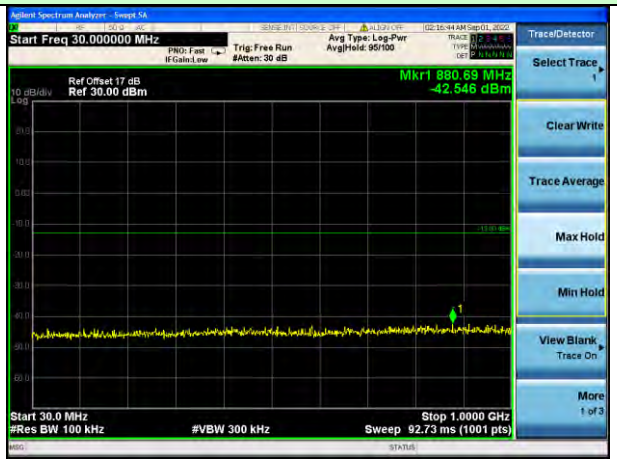


Middle channel

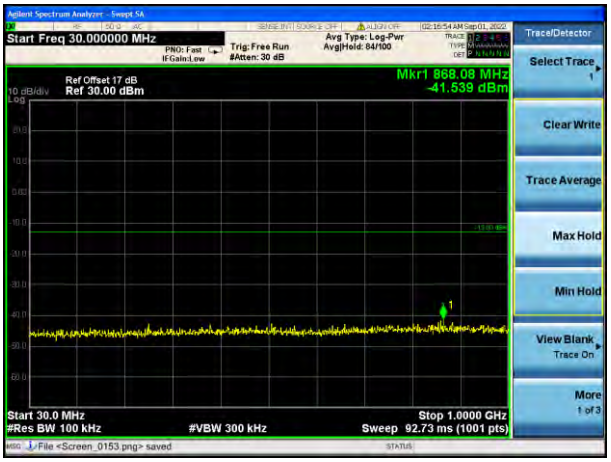


Highest channel

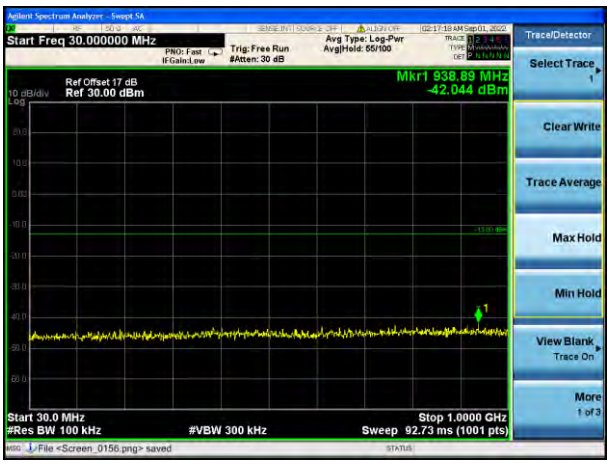
Test Mode: Traffic mode	PCS1900 (EGPRS 1 link)



Lowest channel

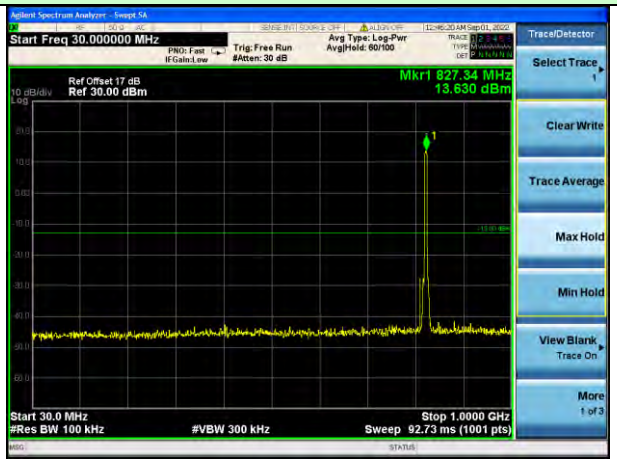


Middle channel

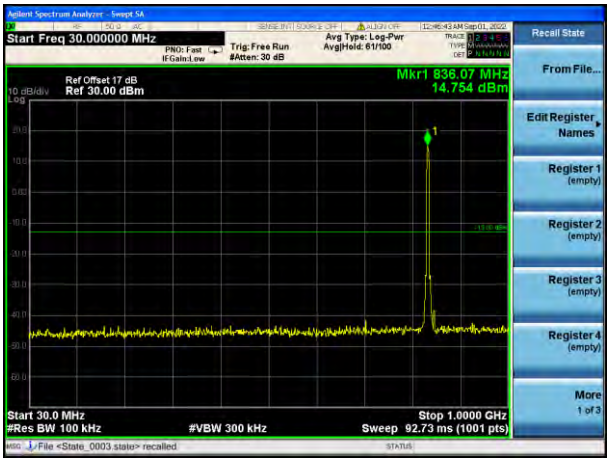


Highest channel

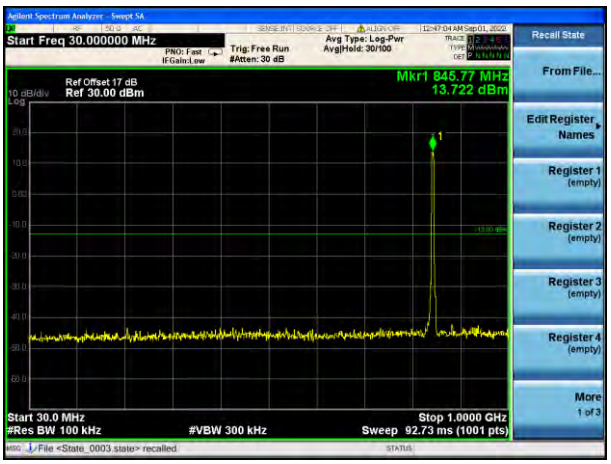
Test Mode: Traffic mode	WCDMA Band V (RMC 12.2Kbps link)



Lowest channel

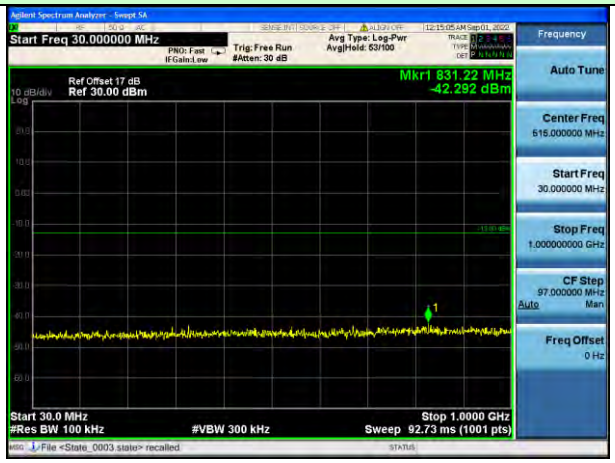


Middle channel

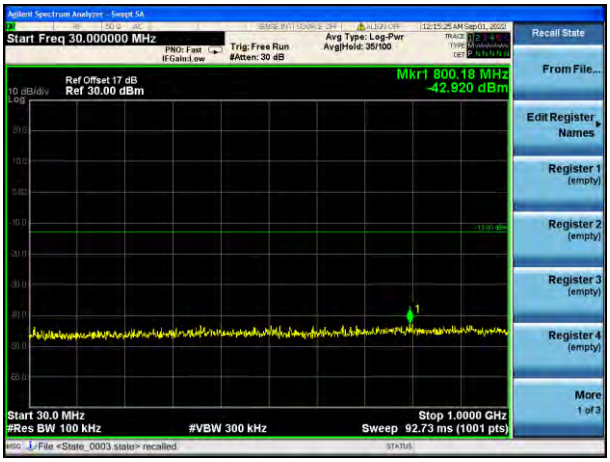


Highest channel

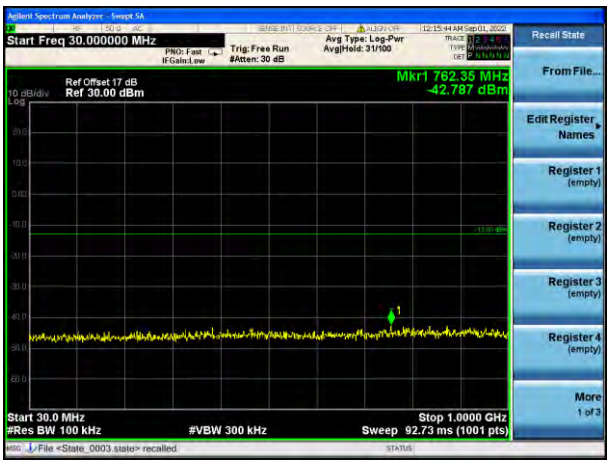
Test Mode: Traffic mode	WCDMA Band II (RMC 12.2Kbps link)



Lowest channel



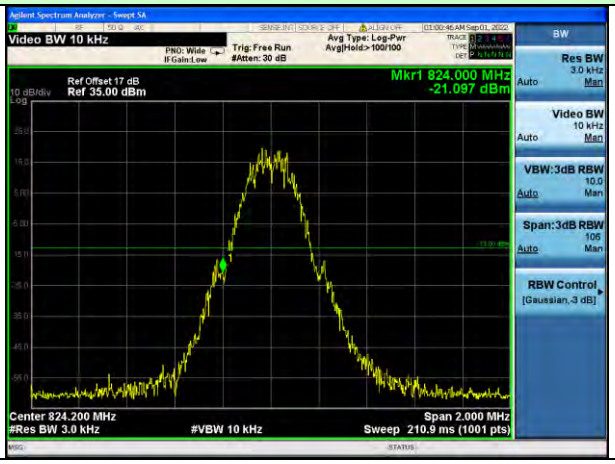
Middle channel



Highest channel

Band Edge:

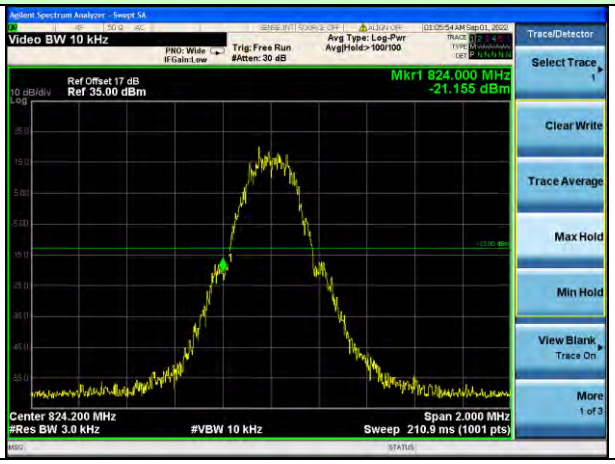
Test Mode: Traffic mode	GSM850 (GPRS 1 link)



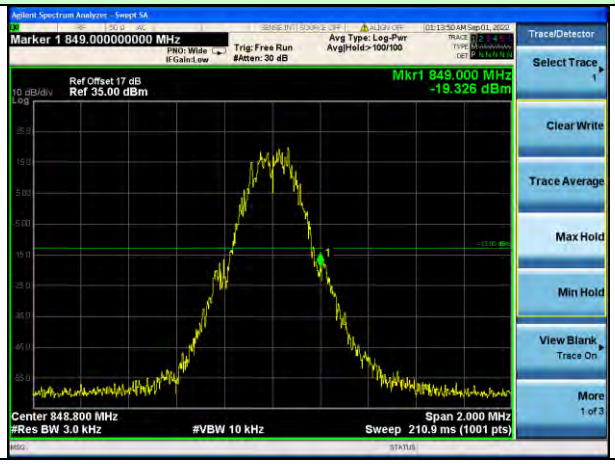
Lowest channel

Highest channel

Test Mode: Traffic mode	GSM850 (EGPRS 1 link)



Lowest channel



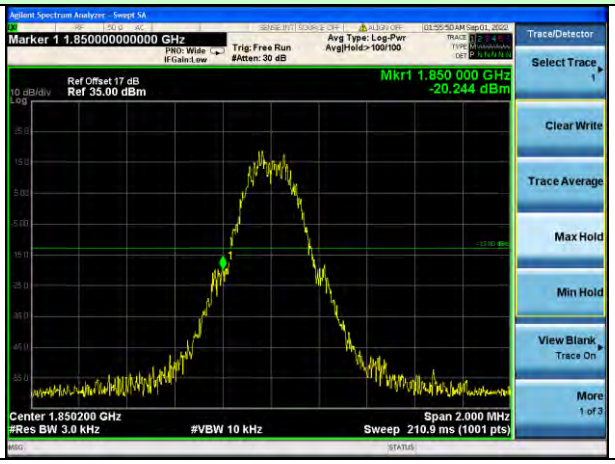
Highest channel

Test Mode: Traffic mode	PCS1900 (GPRS 1 link)

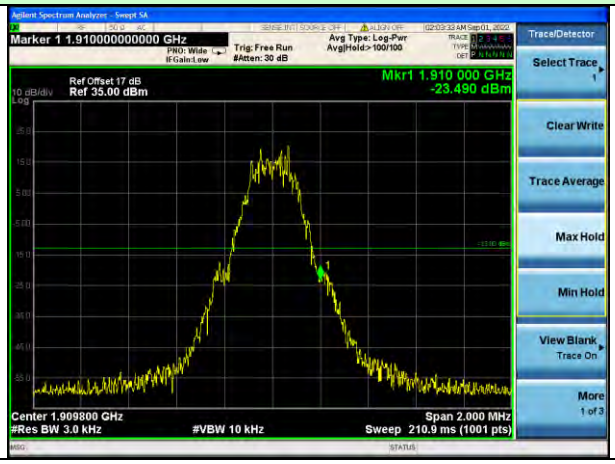
Lowest channel

Highest channel

Test Mode: Traffic mode	PCS1900 (EGPRS 1 link)



Lowest channel



Highest channel

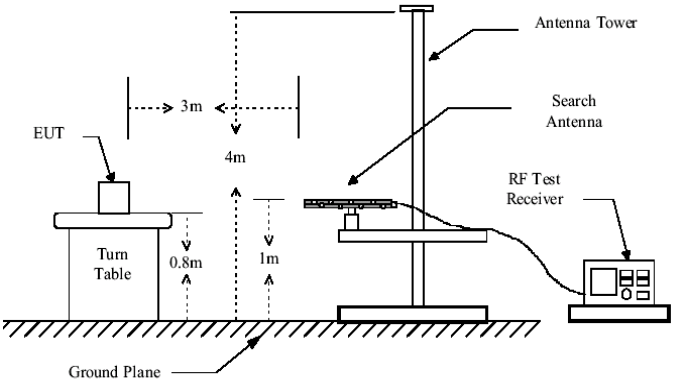
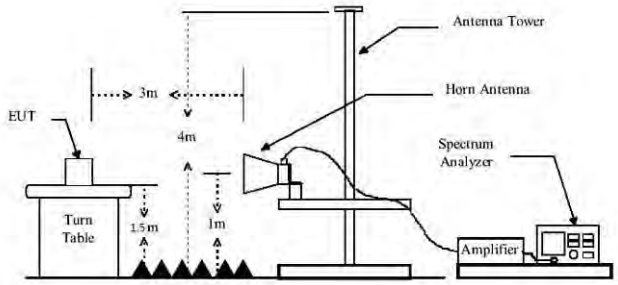
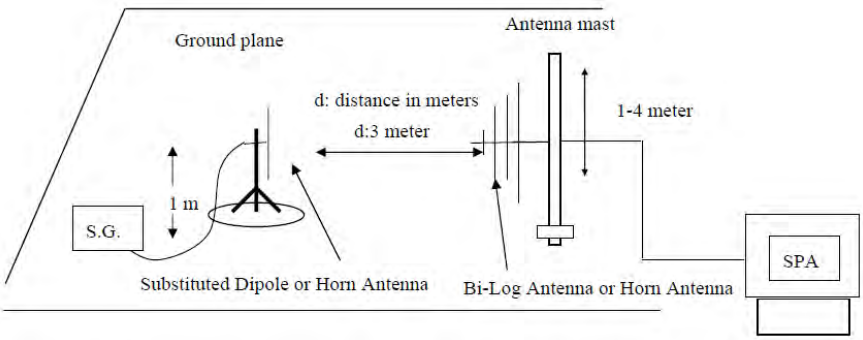
Test Mode: Traffic mode	WCDMA Band V (RMC 12.2Kbps link)

Lowest channel Highest channel

Test Mode: Traffic mode	WCDMA Band II (RMC 12.2Kbps link)

Lowest channel Highest channel

4.8 ERP, EIRP Measurement

Test Requirement:	FCC part22.913(a) and FCC part24.232(b)
Test Method:	FCC part2.1046
Limit:	GSM850, WCDMA Band V: 7W PCS1900, WCDMA Band II: 2W WCDMA Band IV: 1W
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 

Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated. 3. ERP in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated asfollows: ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB) 4. EIRP in frequency band 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows: EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB)
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
GSM850 (GPRS 1 link)	Lowest	H	V	32.52	38.45	Pass
			H	30.30		
		E1	V	32.62		
			H	30.01		
		E2	V	32.40		
			H	30.82		
	Middle	H	V	32.65	38.45	Pass
			H	30.08		
		E1	V	32.94		
			H	30.87		
		E2	V	32.00		
			H	30.44		
	Highest	H	V	32.41	38.45	Pass
			H	30.54		
		E1	V	32.88		
			H	29.56		
		E2	V	32.88		
			H	30.49		

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
GSM850 (EGPRS 1 link)	Lowest	H	V	32.47	38.45	Pass
			H	30.58		
		E1	V	32.68		
			H	29.93		
		E2	V	31.81		
			H	31.08		
	Middle	H	V	32.22	38.45	Pass
			H	30.32		
		E1	V	32.52		
			H	30.14		
		E2	V	32.27		
			H	30.37		
	Highest	H	V	32.11	38.45	Pass
			H	30.91		
		E1	V	31.98		
			H	29.83		
		E2	V	32.77		
			H	30.11		

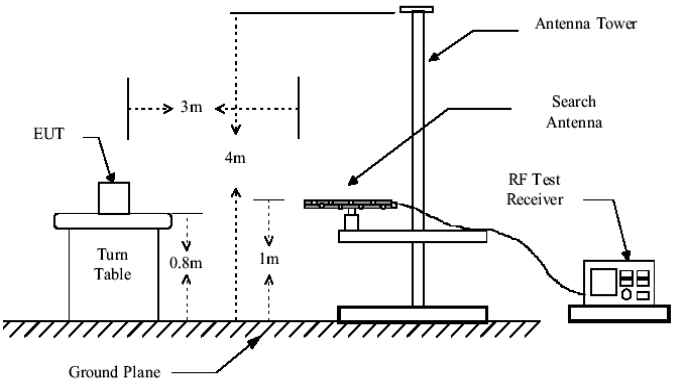
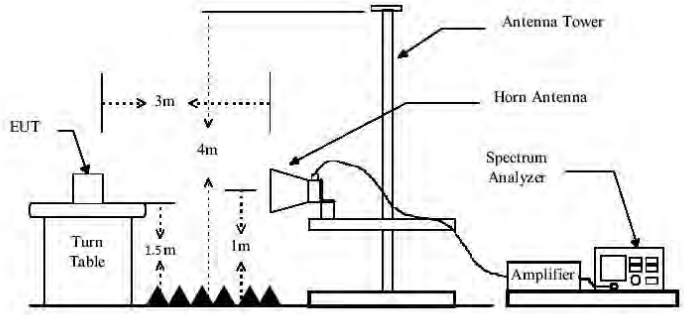
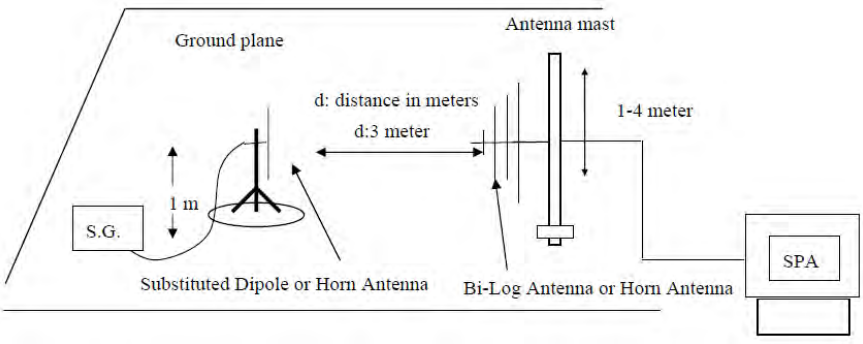
EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP (dBm)	Limit (dBm)	Result
PCS1900 (GPRS 1 link)	Lowest	H	V	32.00	33.01	Pass
			H	30.50		
		E1	V	32.54		
			H	30.43		
		E2	V	32.36		
			H	30.63		
	Middle	H	V	32.47	33.01	Pass
			H	30.50		
		E1	V	32.74		
			H	30.31		
		E2	V	31.84		
			H	30.11		
	Highest	H	V	32.68	33.01	Pass
			H	30.54		
		E1	V	32.46		
			H	30.15		
		E2	V	32.83		
			H	30.29		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP (dBm)	Limit (dBm)	Result
PCS1900 (EGPRS 1 link)	Lowest	H	V	32.19	33.01	Pass
			H	30.67		
		E1	V	32.72		
			H	30.30		
		E2	V	32.39		
			H	30.15		
	Middle	H	V	32.76	33.01	Pass
			H	30.78		
		E1	V	32.58		
			H	30.01		
		E2	V	31.83		
			H	29.81		
	Highest	H	V	32.68	33.01	Pass
			H	30.97		
		E1	V	32.63		
			H	30.02		
		E2	V	32.35		
			H	30.57		

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
WCDMA Band V	Lowest	H	V	24.18	38.45	Pass
			H	23.42		
		E1	V	23.61		
			H	23.22		
		E2	V	24.38		
			H	23.10		
	Middle	H	V	24.59	38.45	Pass
			H	23.47		
		E1	V	24.67		
			H	23.55		
		E2	V	23.91		
			H	23.59		
	Highest	H	V	24.18	38.45	Pass
			H	24.34		
		E1	V	23.84		
			H	23.31		
		E2	V	24.19		
			H	24.13		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
WCDMA Band II	Lowest	H	V	24.59	33.01	Pass
			H	24.06		
		E1	V	24.18		
			H	23.82		
		E2	V	24.14		
			H	23.15		
	Middle	H	V	24.53	33.01	Pass
			H	24.04		
		E1	V	24.76		
			H	23.95		
		E2	V	23.87		
			H	23.67		
	Highest	H	V	24.36	33.01	Pass
			H	24.00		
		E1	V	24.52		
			H	24.15		
		E2	V	23.76		
			H	24.10		

4.9 Field strength of spurious radiation measurement

Test Requirement:	FCC part22.917(a) and FCC part24.238(a)
Test Method:	FCC part2.1053
Limit:	-13dBm
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 

Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method. 4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB)
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Test mode:	GSM850		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-36.66	-13.00	Pass
2472.60	V	-39.90		
3296.80	V	-38.16		
4121.00	V	-43.26		
4945.20	V	---		
1648.40	Horizontal	-38.63	-13.00	Pass
2472.60	H	-42.10		
3296.80	H	-44.62		
4121.00	H	-46.21		
4945.20	H	---		
Test mode:	**GSM850**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-36.74	-13.00	Pass
2509.80	V	-39.51		
3346.40	V	-38.26		
4183.00	V	-43.05		
5019.60	V	---		
1673.20	Horizontal	-39.14	-13.00	Pass
2509.80	H	-42.96		
3346.40	H	-45.07		
4183.00	H	-45.98		
5019.60	H	---		
Test mode:	**GSM850**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-36.56	-13.00	Pass
2546.40	V	-39.69		
3395.20	V	-38.49		
4244.00	V	-42.95		
5092.80	V	---		
1697.60	Horizontal	-39.41	-13.00	Pass
2546.40	H	-42.32		
3395.20	H	-44.59		
4244.00	H	-45.66		
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.

Test mode:	PCS1900		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-37.09	-13.00	Pass
5550.60	V	-39.79		
7400.80	V	-38.04		
9251.00	V	-43.76		
11101.20	V	---		
3700.40	Horizontal	-39.47	-13.00	Pass
5550.60	H	-42.46		
7400.80	H	-45.22		
9251.00	H	-45.89		
11101.20	H	---		
Test mode:	**PCS1900**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-36.40	-13.00	Pass
5640.00	V	-39.24		
7520.00	V	-37.64		
9400.00	V	-42.94		
11280.00	V	---		
3760.00	Horizontal	-38.93	-13.00	Pass
5640.00	H	-42.10		
7520.00	H	-44.86		
9400.00	H	-46.30		
11280.00	H	---		
Test mode:	**PCS1900**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-36.86	-13.00	Pass
5729.40	V	-39.01		
7639.20	V	-37.81		
9549.00	V	-43.04		
11458.80	V	---		
3819.60	Horizontal	-39.02	-13.00	Pass
5729.40	H	-43.06		
7639.20	H	-45.07		
9549.00	H	-45.83		
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.

Test mode:	WCDMA Band V		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1652.80	Vertical	-36.71	-13.00	Pass
2479.20	V	-39.27		
3305.60	V	-38.27		
4132.00	V	-42.82		
4958.40	V	---		
1652.80	Horizontal	-39.20	-13.00	Pass
2479.20	H	-42.22		
3305.60	H	-44.64		
4132.00	H	-46.25		
4958.40	H	---		
Test mode:	**WCDMA Band V**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1672.80	Vertical	-37.08	-13.00	Pass
2509.20	V	-39.71		
3345.60	V	-37.68		
4182.00	V	-42.91		
5018.40	V	---		
1672.80	Horizontal	-39.10	-13.00	Pass
2509.20	H	-42.39		
3345.60	H	-45.33		
4182.00	H	-46.38		
5018.40	H	---		
Test mode:	**WCDMA Band V**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1693.20	Vertical	-37.15	-13.00	Pass
2539.80	V	-39.14		
3386.40	V	-38.14		
4233.00	V	-43.54		
5079.60	V	---		
1693.20	Horizontal	-39.12	-13.00	Pass
2539.80	H	-42.93		
3386.40	H	-45.26		
4233.00	H	-46.39		
5079.60	H	---		

Remark：

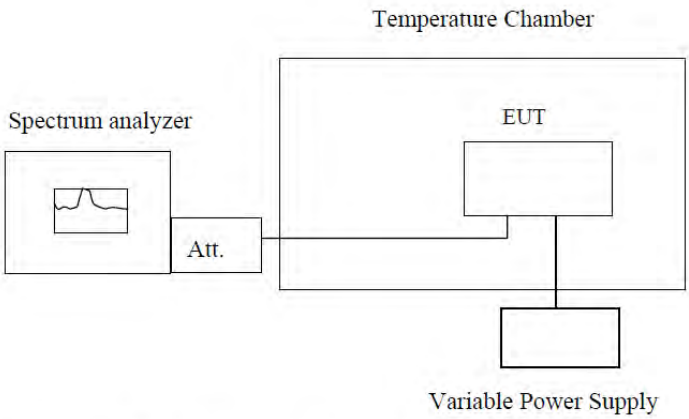
1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	WCDMA Band II		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3704.80	Vertical	-36.42	-13.00	Pass
5557.20	V	-39.77		
7409.60	V	-38.34		
9262.00	V	-43.51		
11114.40	V	---		
3704.80	Horizontal	-39.49	-13.00	Pass
5557.20	H	-42.17		
7409.60	H	-45.07		
9262.00	H	-46.30		
11114.40	H	---		
Test mode:	**WCDMA Band II**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-36.93	-13.00	Pass
5640.00	V	-39.75		
7520.00	V	-37.80		
9400.00	V	-42.86		
11280.00	V	---		
3760.00	Horizontal	-39.09	-13.00	Pass
5640.00	H	-42.32		
7520.00	H	-44.39		
9400.00	H	-45.58		
11280.00	H	---		
Test mode:	**WCDMA Band II**		**Test channel:**	**Highest**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3815.20	Vertical	-36.30	-13.00	Pass
5722.80	V	-39.40		
7630.40	V	-38.27		
9538.00	V	-43.69		
11445.60	V	---		
3815.20	Horizontal	-38.90	-13.00	Pass
5722.80	H	-43.06		
7630.40	H	-44.64		
9538.00	H	-45.72		
11445.60	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.

4.10 Frequency stability V.S. Temperature measurement

Test Requirement:	FCC Part2.1055(a)(1)(b)
Test Method:	FCC Part2.1055(a)(1)(b)
Limit:	2.5ppm
Test setup:	 **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 –20℃ . 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 Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

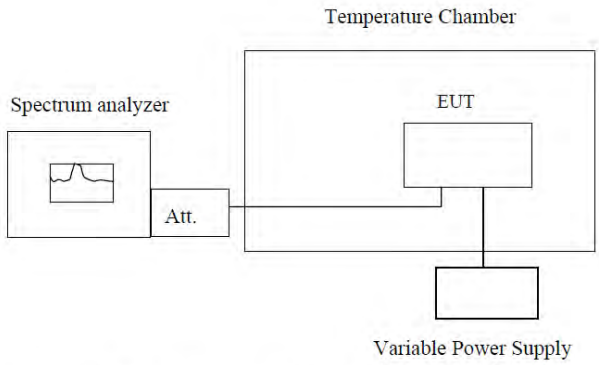
Measurement Data

Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
24	-20	58	0.0694	2.5	Pass
	-10	23	0.0275		
	0	69	0.0820		
	10	34	0.0406		
	20	30	0.0360		
	30	20	0.0233		
	40	28	0.0339		
	50	34	0.0407		
	60	32	0.0386		
Reference Frequency: GSM850 (EGPRS 1 link) Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
24	-20	56	0.0672	2.5	Pass
	-10	23	0.0275		
	0	66	0.0789		
	10	32	0.0382		
	20	32	0.0377		
	30	23	0.0277		
	40	34	0.0401		
	50	34	0.0401		
	60	32	0.0378		

Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error			Result
		Hz	ppm		
24	-20	55	0.0291	2.5	Pass
	-10	23	0.0122		
	0	67	0.0356		
	10	32	0.0170		
	20	28	0.0150		
	30	19	0.0102		
	40	31	0.0165		
	50	30	0.0159		
	60	36	0.0190		
Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error			Result
		Hz	ppm		
24	-20	54	0.0289	2.5	Pass
	-10	23	0.0122		
	0	68	0.0362		
	10	34	0.0179		
	20	28	0.0147		
	30	24	0.0126		
	40	34	0.0179		
	50	31	0.0164		
	60	30	0.0161		

Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
24	-20	54	0.0648	2.5	Pass
	-10	23	0.0275		
	0	69	0.0824		
	10	30	0.0361		
	20	29	0.0347		
	30	25	0.0294		
	40	32	0.0382		
	50	34	0.0412		
	60	34	0.0408		
Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880.0MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
24	-20	56	0.0297	2.5	Pass
	-10	23	0.0122		
	0	71	0.0377		
	10	30	0.0160		
	20	27	0.0144		
	30	22	0.0117		
	40	28	0.0150		
	50	31	0.0166		
	60	31	0.0167		

4.11 Frequency stability V.S. Voltage measurement

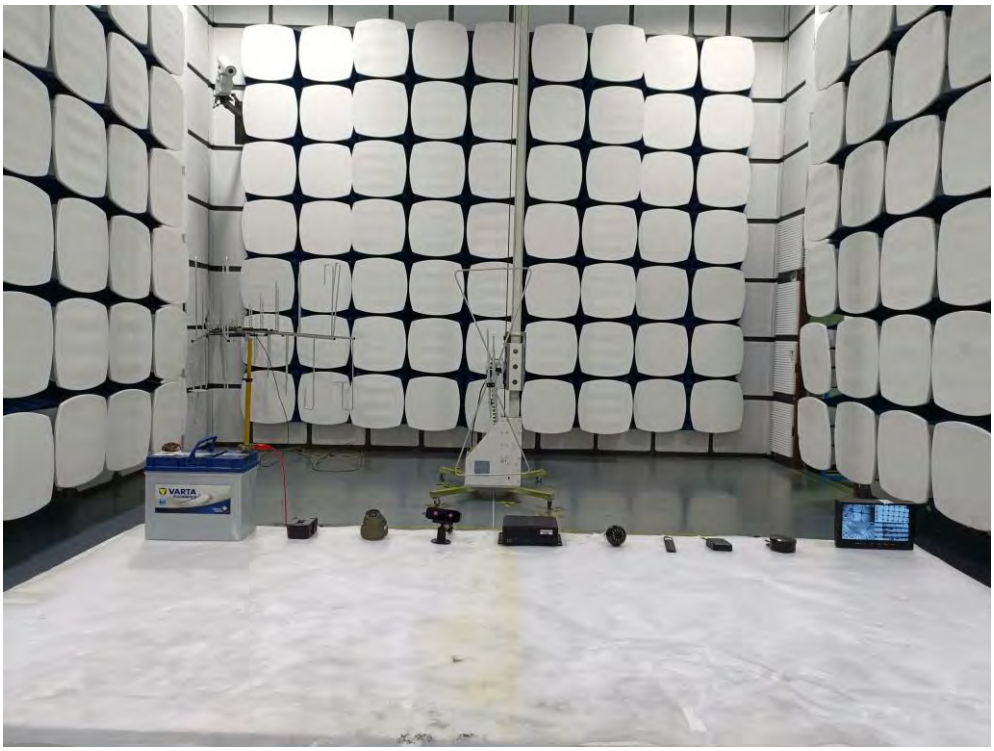
Test Requirement:	FCC Part2.1055(d)(1)(2)
Test Method:	FCC Part2.1055(d)(1)(2)
Limit:	2.5ppm
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test procedure:	1. Set chamber temperature to 25℃ . Use a variable DC power source to power the EUT and set the voltage to rated voltage. 2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. 3. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 5.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

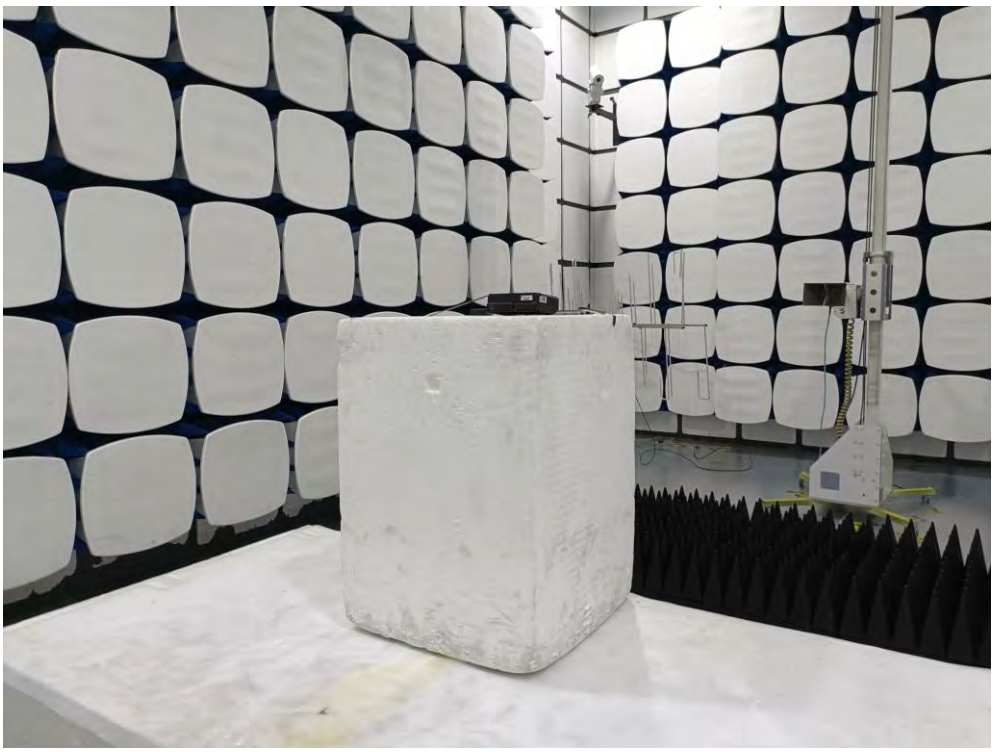
Measurement Data

Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	9	58	0.0692	2.5	Pass
	24	23	0.0275		
	36	68	0.0817		
Reference Frequency: GSM850 (EGPRS 1 link) Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	9	29	0.0345	2.5	Pass
	24	33	0.0393		
	36	33	0.0391		
Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	9	57	0.0304	2.5	Pass
	24	23	0.0122		
	36	67	0.0356		
Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	9	31	0.0165	2.5	Pass
	24	22	0.0115		
	36	29	0.0154		
Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	9	56	0.0668	2.5	Pass
	24	23	0.0275		
	36	70	0.0842		
Reference Frequency: WCDMA Band II Middle channel=940 channel=1880.0MHz					
Temperature (℃)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	9	57	0.0302	2.5	Pass
	24	23	0.0122		
	36	70	0.0372		

5 Test Setup Photo

Radiated Emission





-------END OF REPORT-------