Test Report

FCC ID: XDQ-T2

Date of issue: Nov. 15, 2016

Sample Description:	POS terminal
Model(s):	T2
Applicant:	Shenzhen Xinguodu Technology Co., Ltd.
Address:	17B JinSong Mansion, Terra Industrial & Trade Park Chegongmiao, Futian District, Shenzhen, China
Date of Test:	Oct. 03, 2016 to Nov. 03, 2016

Shenzhen Microtest Co., Ltd.
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Test Result Certification	
Applicant's name:	**Shenzhen Xinguodu Technology Co., Ltd.**
Address:	17B JinSong Mansion, Terra Industrial & Trade Park Chegongmiao, Futian District, Shenzhen, China
Manufacture's Name:	**Shenzhen Xinguodu Technology Co., Ltd.**
Address:	17B JinSong Mansion, Terra Industrial & Trade Park Chegongmiao, Futian District, Shenzhen, China
Product name:	POS terminal
Trademark:	**NEXGO**
Model name:	T2
Standards:	FCC Part 22 Subpart H FCC Part 24 Subpart E
Test Procedure:	FCC Part 2 ANSI TIA-603-D: 2010

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

Tested by: David Chen

David Chen Nov. 15, 2016

Reviewed by: Leon Chen

Leon Chen Nov. 15, 2016

Approved by: Ares Liu

Ares Liu Nov. 15, 2016

Summary of Test Result

Item	FCC Part No.	Description of Test	Result
1	2.1046, 22.913(a); 24.232(c)	Maximum output power and peak to average radio	Pass
		Transmitter Radiated Power (EIRP/ERP)	
2	2.1049; 22.917(b); 24.238(b)	Occupied Bandwidth	Pass
3	2.1051; 22.917(a); 24.238(a)	Conducted spurious emissions	Pass
4	2.1051; 22.917(b); 24.238(b)	Spurious emissions at band edge	Pass
5	2.1053; 22.917(a); 24.238(a)	Radiated spurious emissions	Pass
6	2.1055; 22.355; 24.235	Frequency Stability	Pass

1 General description

1.1 Feature of equipment under test (EUT)

Product name:	POS terminal
Model name:	T2
Operating frequency range:	GSM 850: (TX: 824.2 – 848.8, RX: 869.2 – 893.8) GSM 1900: (TX: 1850.2 – 1909.8, RX: 1930.2 – 1989.8)
Modulation type:	GMSK for GPRS
GPRS / EGPRS Class	☒GPRS Class 10; ☐EGPRS
Power supply:	DC 8.5V form power adapter
Adapter information:	Model: HKA02108525-8A Input: 100-240V 50/60Hz 0.8A Output: 8.5V 2.5A
Antenna Designation	PIPA antenna (Antenna Gain: 2dBi)

1.2 Test frequency channel

Channel	GSM 850	GSM 1900
Low	824.2MHz	1850.2MHz
Middle	836.6MHz	1880MHz
High	848.8MHz	1909.8MHz

1.3 EUT operation mode

During testing, RF test program provided by the manufacture to control the Tx operation followed the test requirement. The EUT is configured to transmit continuously (duty cycle > 98 %) at the maximum power control level.

1.4 Test conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 20ºC~30ºC
- Humidity: 30%~70%
- Atmospheric pressure: 98kPa~101kPa

1.5 Testing site

Test Site	Shenzhen Toby Technology Co., Ltd.
Test Site Location	1 A/F., Bldg.6, Yusheng Industrial Zone The National Road No.107 Xixiang Section 467, Shenzhen, Guangdong, China
FCC Registration No.:	811562
CNAS Registration No.:	CNAS L5813

1.6 Ancillary equipment list

Equipment	Model	S/N	Manufacturer	Certificate type
/	/	/	/	/

1.7 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, U=2xUc(y)

RF frequency	1 x 10-7
RF power, conducted	± 1 dB
Conducted emission(150kHz~30MHz)	± 2.5 dB
Radiated emission(30MHz~1GHz)	± 4.2 dB
Radiated emission (above 1GHz)	± 4.3 dB
Temperature	±1 degree
Humidity	± 5 %

2 List of test equipment

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2016.12.11
Horn Antenna	Schwarzbeck	BBHA 9120D	631	2016.12.05
Horn Antenna	Schwarzbeck	BBHA 9170	373	2016.12.05
Test Cable	United Microwave	57793	1m	2016.12.05
Test Cable	United Microwave	A30A30-5006	10m	2016.12.05
Microwave Pre_amplifier	Agilent	8449B	3008A01714	2016.12.05
Pre-Amplifier	Anritsu	MH648A	M09961	2016.12.05
EMI Test Receiver	R&S	ESPI-7	101318	2016.12.05
Spctrum analyzer	Agient	E4470B	MY41441082	2017.06.01
Universal Radio Communication Tester	R&S	CMU200	160400005	2017.07.06
DC Power Supply	GW	GPR-6030D	/	2017.07.06
Temperature & Humitidy Chamber	GIANT FORCE	GTH-056P	GF-94454-1	2016.12.05

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

3 Test Result

3.1 Maximum output power and peak to average ratio

3.1.1 Limit

For FCC 22.913: The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

For FCC 24.234: Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

3.1.2 Test method

For Conducted output power:

1, Use a universal radio communication tester, the output power of EUT was measured at the antenna terminal. The path loss was calibrated and entered as an offset into the test equipment.

2, The EUT was configured to transmit on maximum power by the radio communication tester.

3, Measured the peak and average powers.

For EIRP & ERP:

The EUT was placed on a non-conductive rotating platform with 0.8 meter height. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW=3 MHz, VBW=3 MHz and peak detector settings.

(2) During the measurement, the EUT was enforced in maximum power and linked with the Base Station. The highest was recorded from analyzer power level (LVT) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.

(3) Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-D. The EUT was replaced by dipole antenna (for frequency below 1 GHz) or Horn antenna (for frequency above 1 GHz) at same location with same polarize of receiver antenna and then a known power of each measure frequency from S.G. was applied into the dipole antenna or Horn antenna through a TX cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna.

The EUT's EIRP and ERP was calculated with the correction factor:

ERP=S.G. Level + Antenna Gain Cord.(dBd)-Cable Loss(dB)

EIRP=S.G. Level + Antenna Gain Cord.(dBi)-Cable Loss(dB)

3.1.3 Test Result

Conducted power and peak to average ratio

Channel	Peak power (dBm)		Average power (dBm)		Peak to average ratio (dB)		Limit (dBm)
	1 up slot	2 up slots	1 up slot	2 up slots	1 up slot	2 up slots	
GSM 850							
824.2MHz	32.79	32.68	32.64	32.46	0.15	0.22	38.5
836.6MHz	32.80	32.75	32.57	32.49	0.23	0.26	38.5
848.8MHz	32.87	32.73	32.7	32.49	0.17	0.24	38.5
GSM 1900							
1850.2MHz	30.42	29.66	30.18	29.35	0.24	0.31	33
1880MHz	30.36	29.59	30.2	29.31	0.16	0.28	33
1909.8MHz	29.88	29.80	29.69	29.54	0.19	0.26	33

Note: For the band GSM 1900, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

EIRP&ERP

Channel (MHz)	Measurement (dBm)	Limits (dBm)	Result
GSM 850			
824.2MHz	32.74	38.5	Pass
836.6MHz	31.51	38.5	
848.8MHz	31.18	38.5	
GSM 1900			
1850.2MHz	30.15	33	Pass
1880MHz	29.75	33	
1909.8MHz	29.31	33	

Note: the ERP for GSM 850 is tested, the EIRP for GSM 1900 is tested.

3.2 Occupied bandwidth

3.2.1 Test method

1, The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.

2, The resolution bandwidth of the Spectrum Analyzer is set to at least 1% of the occupied bandwidth.

3, The low, middle and the high channels are selected to perform tests respectively.

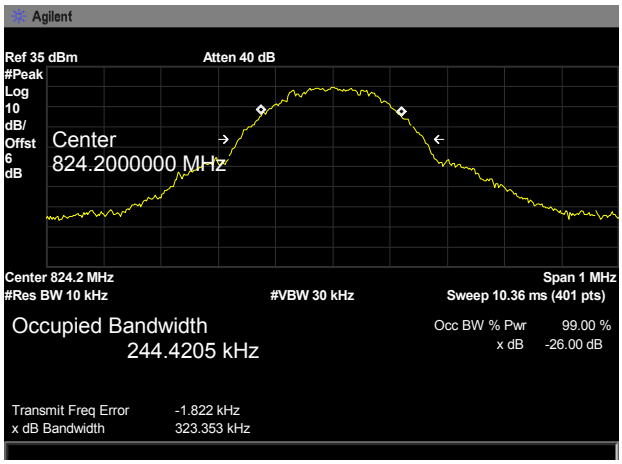
4, Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak; make a line whose value is 26dB lower than the peak; mark two points which the line intersected the waveform at; finally record the delta of the two points as the occupied bandwidth and the plot.

4, Set the Spectrum Analyzer Occupied bandwidth function to measure the 99% occupied bandwidth.

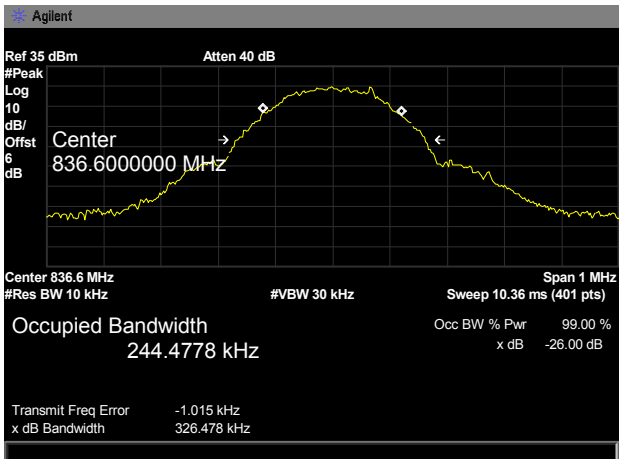
3.2.2 Test result

Channel	26dB emission bandwidth (MHz)	99% occupied bandwidth (MHz)
GSM 850		
824.2MHz	0.323	0.244
836.6MHz	0.326	0.244
848.8MHz	0.326	0.246
GSM 1900		
1850.2MHz	0.330	0.248
1880MHz	0.320	0.246
1909.8MHz	0.315	0.247

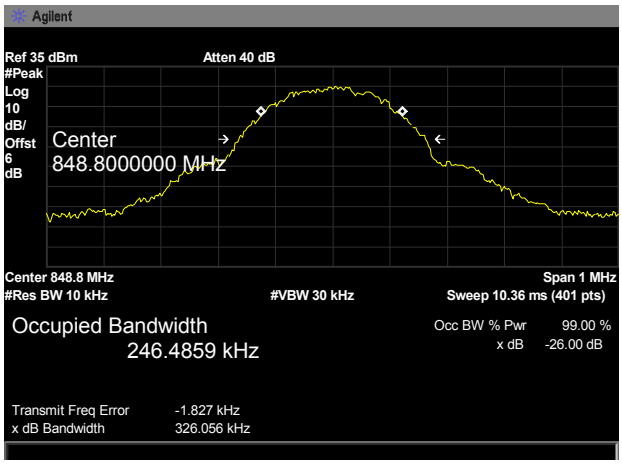
GSM 850 – 824.2MHz



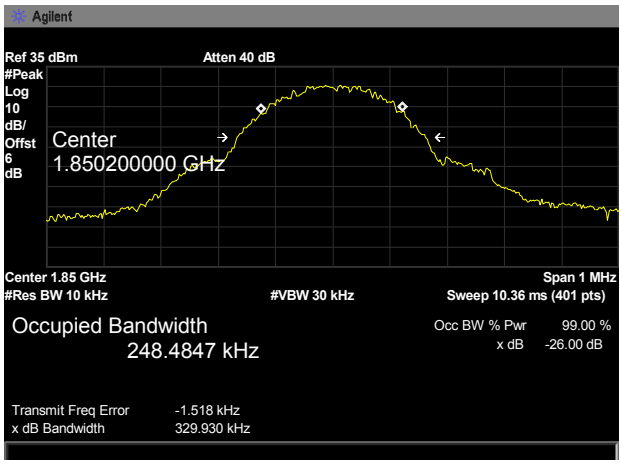
GSM 850 – 836.6MHz



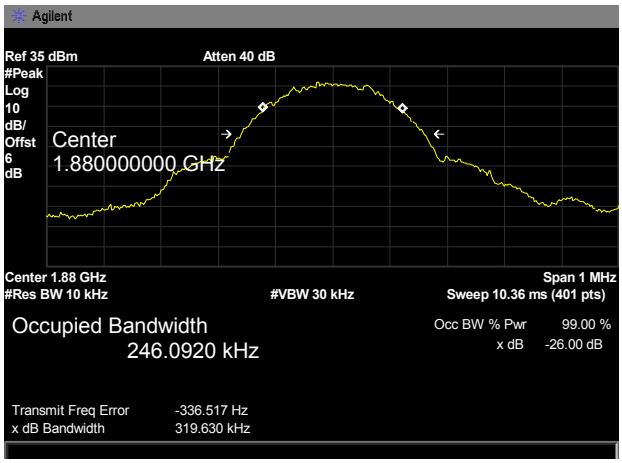
GSM 850 – 848.8MHz



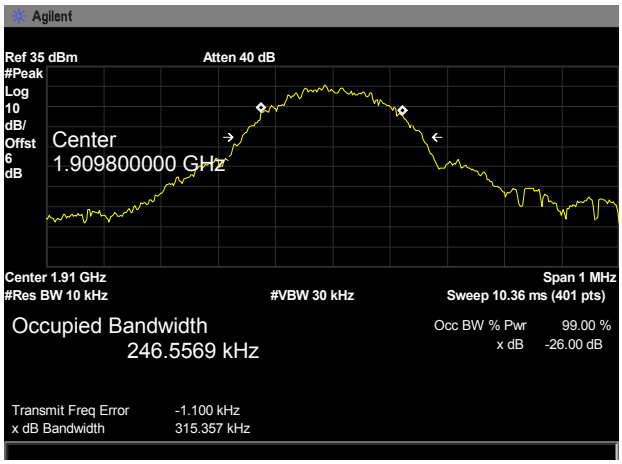
GSM 1900 - 1850.2MHz



GSM 1900 - 1880MHz



GSM 1900 - 1909.8MHz



3.3 Conducted spurious emissions

3.3.1 Limits

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log (P) dB

3.3.2 Test method

1, The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.

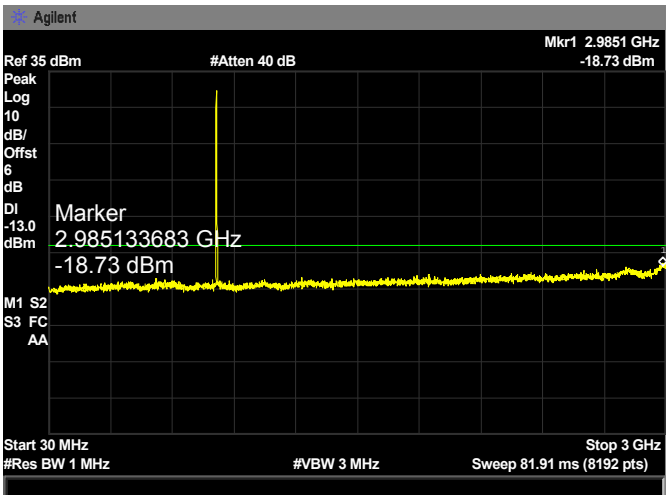
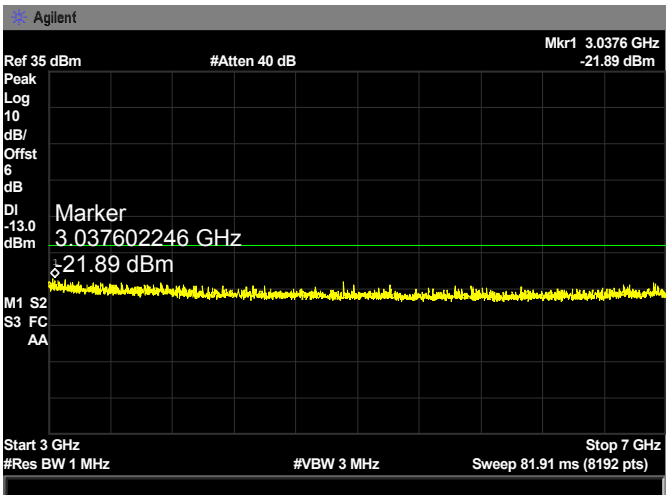
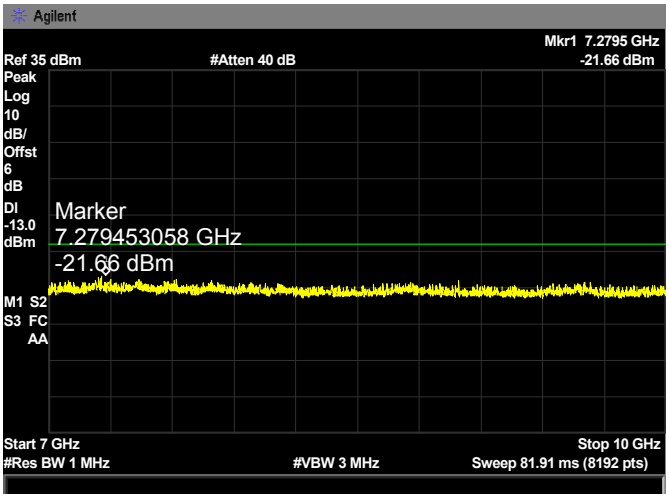
2, Spectrum Setting:

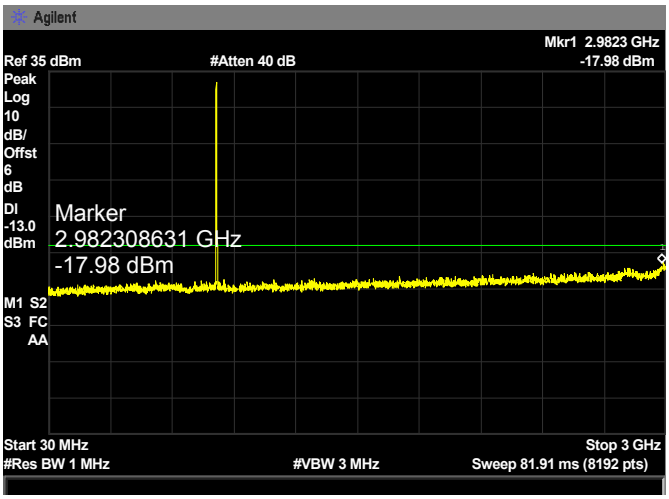
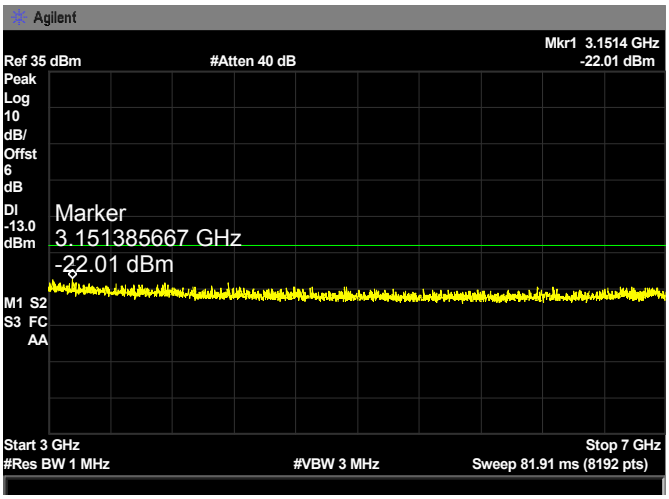
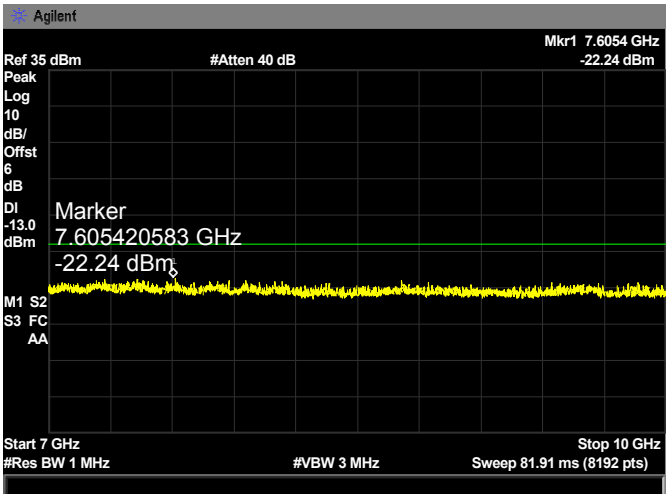
Frequency bellow 1 GHz: RBW=100 kHz, VBW=300 kHz.

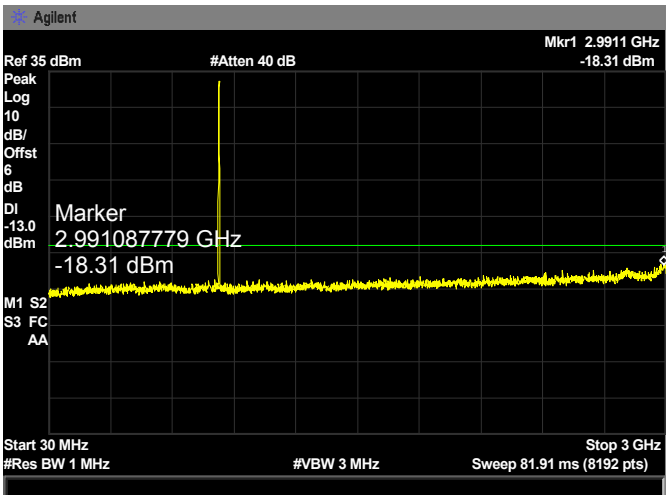
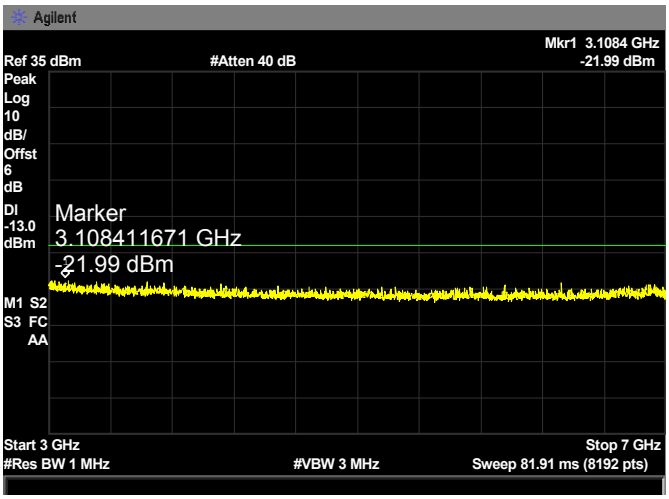
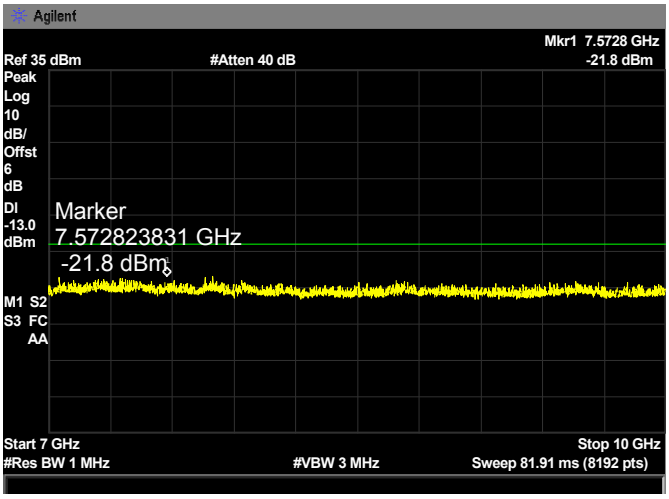
Frequency above 1 GHz: RBW=1 MHz, VBW=3 MHz.

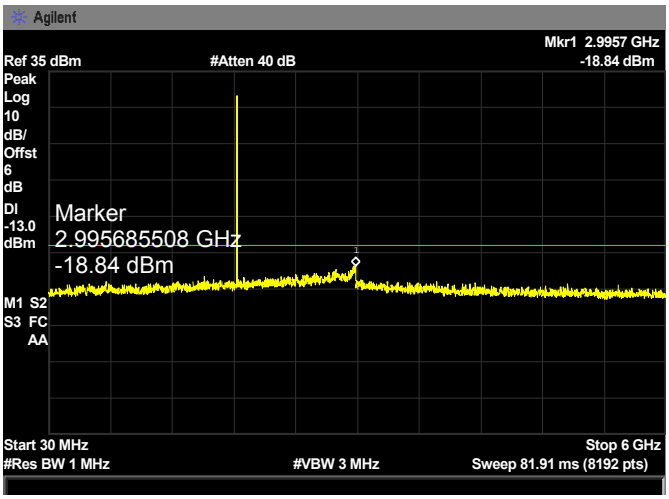
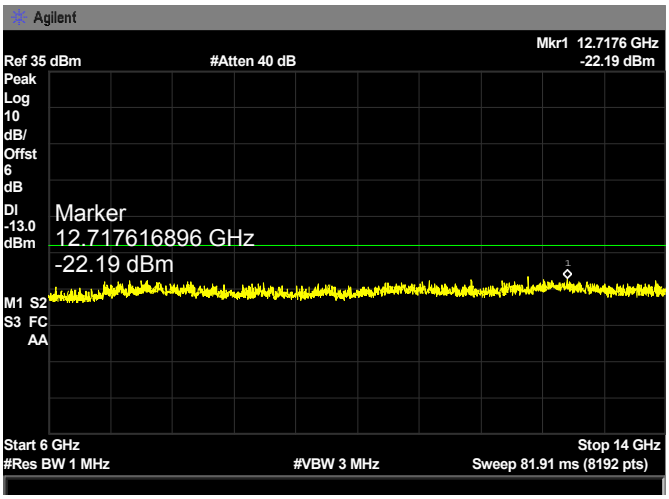
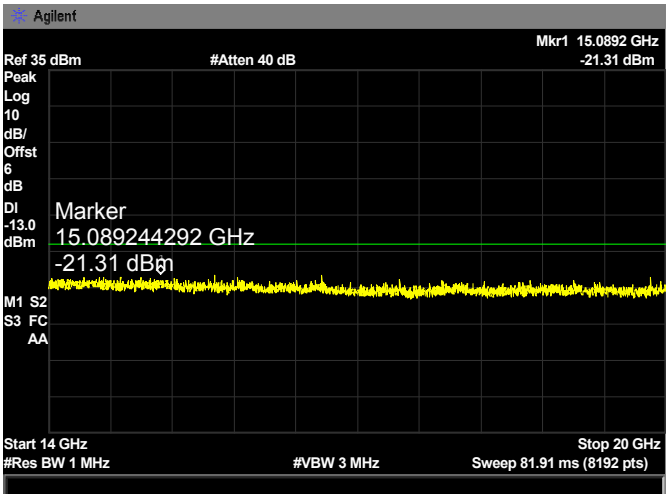
3, The low, middle and high channels of each band and mode's spurious emissions for 30 MHz to 10th Harmonic were measured by Spectrum analyzer.

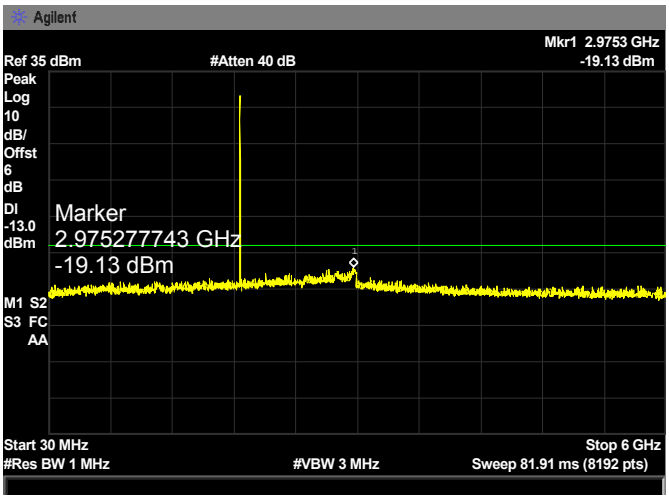
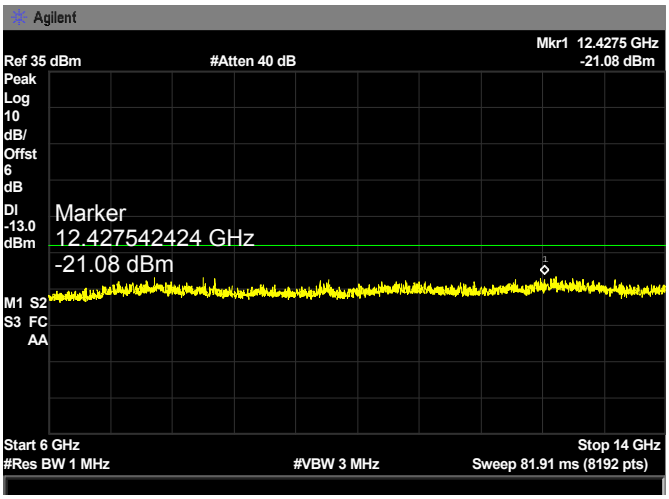
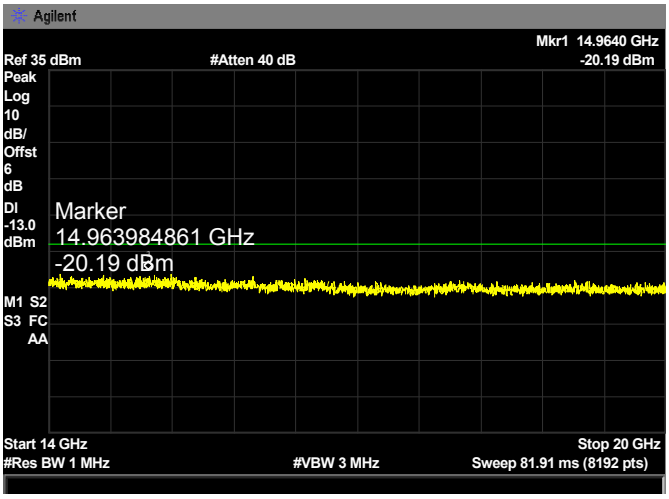
3.3.3 Test result

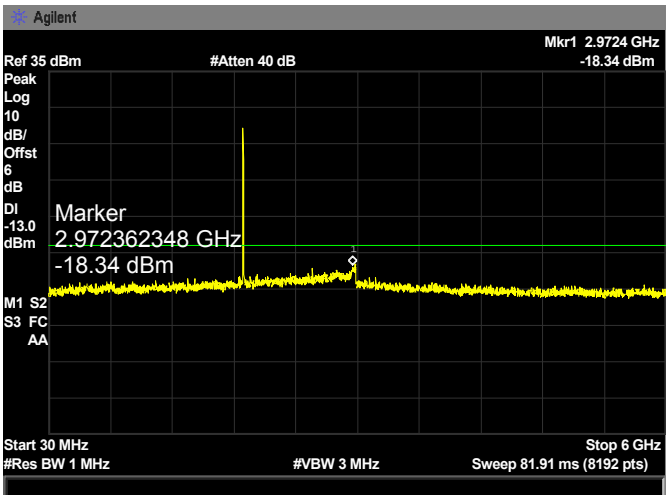
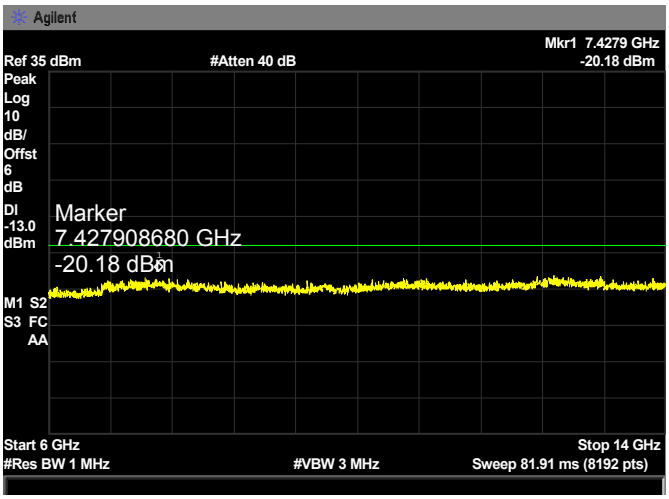
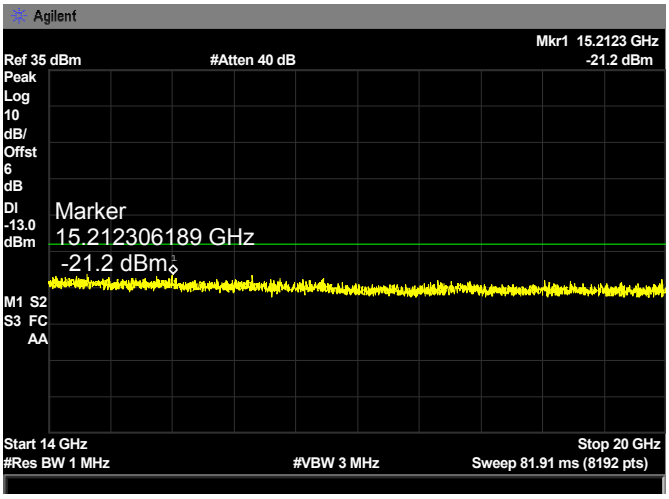
GSM 850 - 824.2MHz




GSM 850 - 836.6MHz




GSM 850 - 848.8MHz




GSM 1900 - 1850.2MHz




GSM 1900 - 1880MHz




GSM 1900 - 1909.8MHz




3.4 Spurious emission at band edge

3.4.1 Limits

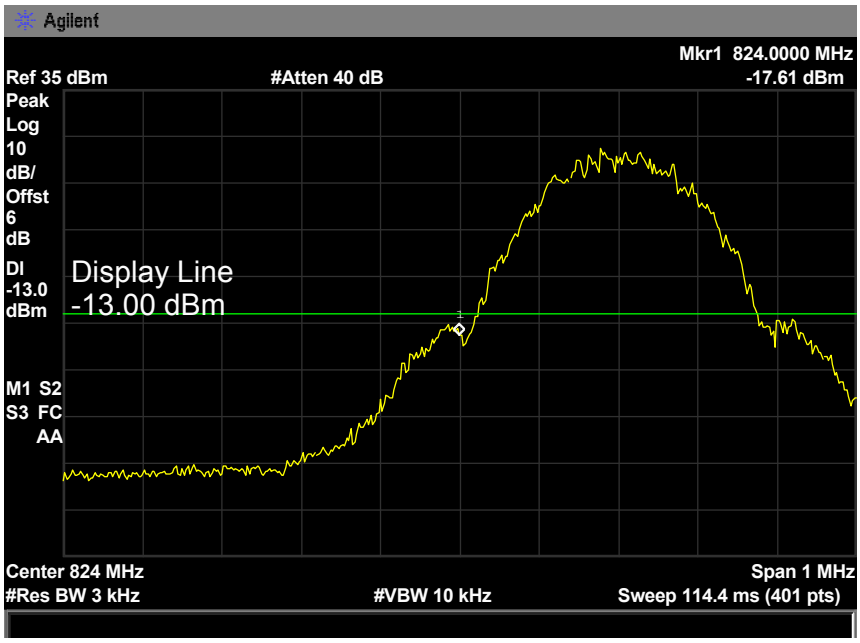
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log (P) dB

3.4.2 Test method

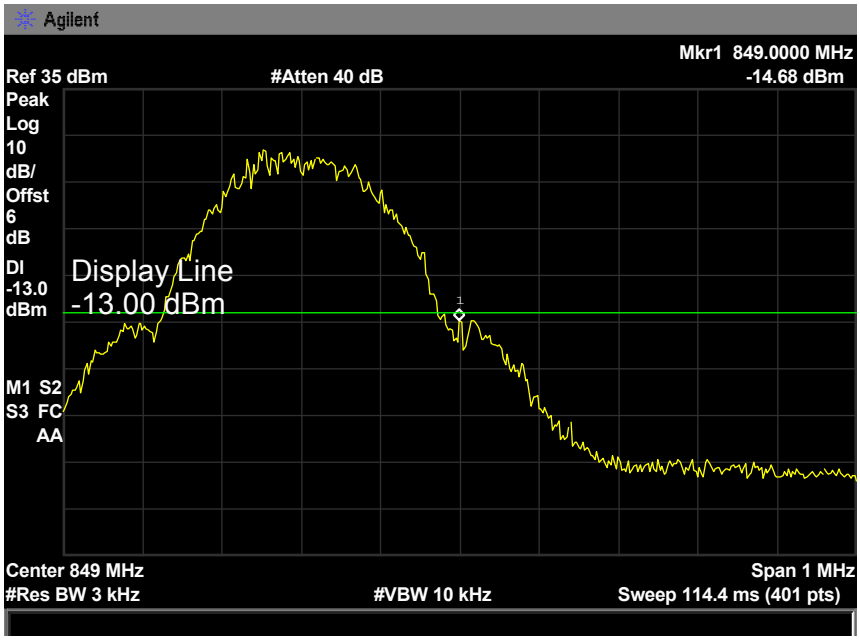
1, The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
2, Spectrum Setting:
GSM and PCS: RBW=3 kHz, VBW=10 kHz, Span 1 MHz, Detector: Peak Mode.
WCDMA: RBW=100 kHz, VBW=300 kHz, Span 5 MHz, Detector: Peak Mode.
3, The band edges of low and high channels for the highest RF powers were measured.

3.4.3 Test result

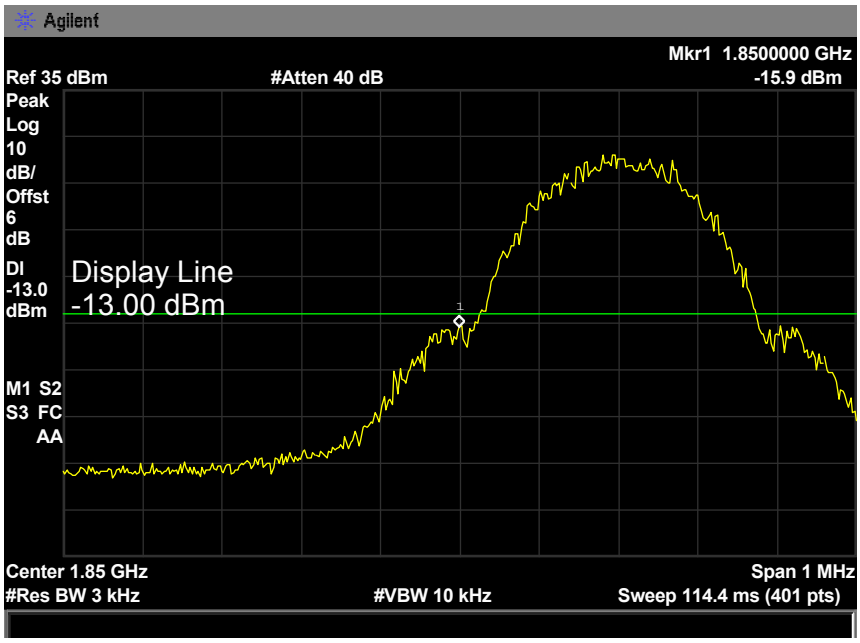
GSM 850 – Left band



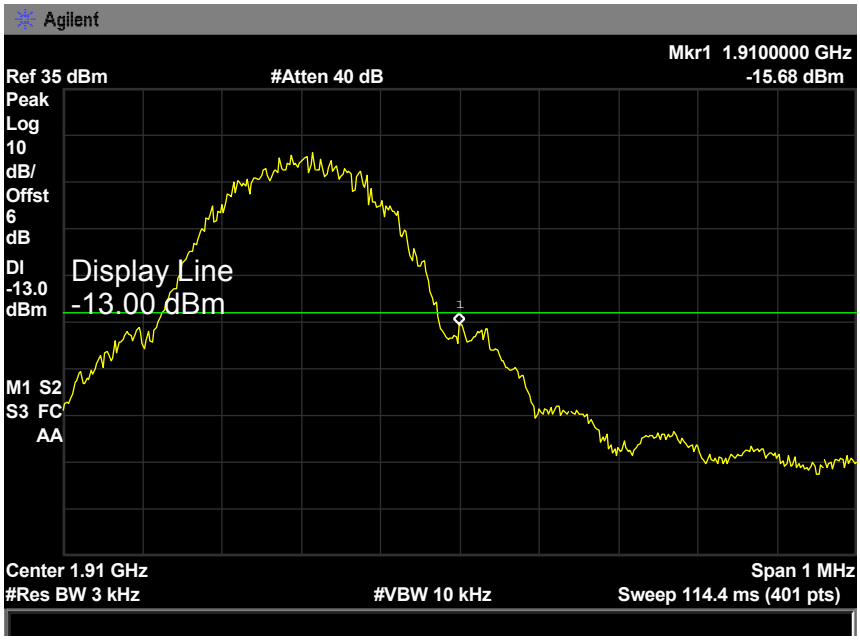
GSM 850 – Right band



GSM 1900 – Left band



GSM 1900 – Right band



3.5 Radiated spurious emission

3.5.1 Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log (P) dB

3.5.2 Test method

1. The test system setup as show in the block diagram above.
2, The EUT was placed on an non-conductive rotating platform in an anechoic chamber. The radiated spurious emissions from 30MHz to 10th harmonious of fundamental frequency were measured at 3 m with a test antenna and a spectrum analyzer with RBW=1 MHz, VBW=1 MHz, peak detector settings.
3, During the measurement, the EUT was enforced in maximum power and linked with a base station. All the spurious emissions at 3m were measured by rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
4, When found the maximum level of emissions from the EUT. 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 log(power out in Watts).

3.5.3 Test Result

GSM 850

Frequency	Ant. Polarization	Measurement	Limits	Result
(MHz)	H / V	(dBm)	(dBm)	
TX: 824.2MHz				
367	H	-58.5	-13	Pass
367	V	-56.3	-13	
1648.4	H	-46.7	-13	
1648.4	V	-41.1	-13	
2472.6	H	-57.2	-13	
2472.6	V	-54.7	-13	
TX: 836.6MHz				
367	H	-58.6	-13	Pass
367	V	-57.2	-13	
1674	H	-45.8	-13	
1674	V	-42.2	-13	
2511	H	-58.0	-13	
2511	V	-53.4	-13	
TX: 848.8MHz				
367	H	-57.1	-13	Pass
367	V	-57.4	-13	
979.6	H	-47.2	-13	
979.6	V	-40.9	-13	
1469.4	H	-57.0	-13	
1469.4	V	-55.1	-13	

GSM 1900

Frequency	Ant. Polarization	Measurement	Limits	Result
(MHz)	H / V	(dBm)	(dBm)	
TX: 1850.2MHz				
367	H	-55.9	-13	Pass
367	V	-56.8	-13	
3700.4	H	-57.0	-13	
3700.4	V	-56.4	-13	
TX: 1880MHz				
367	H	-55.9	-13	Pass
367	V	-57.1	-13	
3760	H	-58.8	-13	
3760	V	-55.3	-13	
TX: 1909.8MHz				
367	H	-56.9	-13	Pass
367	V	-57.3	-13	
3819.6	H	-57.7	-13	
3819.6	V	-56.5	-13	

3.6 Frequency stability

3.6.1 Limit

For FCC part 22.355: the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances 2.5ppm for mobile ≤ 3W condition.

For FCC part 24.235: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

3.6.2 Test method

Test Procedures for Temperature Variation:

1, The EUT was set up in the thermal chamber and connected with the base station.
2, With power off, the temperature was decreased to -30℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3, With power off, the temperature was raised in 10℃ set up to 50℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
4, measure the carrier frequency error.

Test Procedures for Voltage Variation:

1, The EUT was placed in a temperature chamber at 25±5℃ and connected with the base station.
2, Reduce the primary supply voltage to the battery operating end point.
3, measure the carrier frequency error.

3.6.3 Test Result

GSM 850 - TX: 836.6MHz

Temperature (℃)	Voltage (V_{AC})	Carrier frequency deviation (Hz)	Deviation (ppm)
-30	120	-27	-0.032
-20		-27	-0.032
-10		-36	-0.043
0		-31	-0.037
10		-36	-0.043
20		-32	-0.038
30		-32	-0.038
40		-36	-0.043
50		-34	-0.041
60		-36	-0.043
25	138	-27	-0.032
25	102	-34	-0.041
Limit		**2.5 (ppm)**	
Result		**PASS**	

GSM 1900 – TX: 1880MHz

Temperature (℃)	Voltage (V_{AC})	Carrier frequency deviation (Hz)	Deviation (ppm)
-30	120	-37	-0.020
-20		-35	-0.019
-10		-11	-0.006
0		-14	-0.007
10		-47	-0.025
20		-19	-0.010
30		-25	-0.013
40		-58	-0.031
50		-47	-0.025
60		-48	-0.026
25	138	-46	-0.024
25	102	-22	-0.012
Limit		**/**	
Result		**PASS**	

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