Microtest
微测检测

Test Report

FCC ID: 2AGWQ-TT713ULTRA

Date of issue: Mar. 23, 2018

Report Number:	MTi180122E065
Sample Description:	TABLET
Model(s):	TT-713Ultra,TT-715,TT-706,TT-779,MID-700,MID-706, MID-713, MID-706K, MID-901,MID-913
Applicant:	Shenzhen Samtech Co., Ltd.
Address:	F1-3,No.3 building,DingfengFubilun Industrial Park Shubianken Road, Songgang,Baoan, Shenzhen, China
Date of Test:	Jan. 18, 2018 to Mar. 23, 2018

Shenzhen Microtest Co., Ltd.
http://www.mtitest.com

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1 General information

Applicant's name:	**Shenzhen Samtech Co., Ltd.**
Address:	F1-3,No.3 building,DingfengFubilun Industrial Park Shubianken Road, Songgang, Baoan, Shenzhen, China.
Manufacture's Name:	**Shenzhen Samtech Co., Ltd.**
Address:	F1-3,No.3 building,DingfengFubilun Industrial Park Shubianken Road, Songgang,Baoan, Shenzhen, China.
Product name:	TABLET
Model name:	TT-713 Ultra
Serial Model	TT-715,TT-706,TT-779,MID-700,MID-706,MID-713, MID-706K, MID-901,MID-913
Trademark:	SAMTECH, TIGERS
Standards:	FCC Part 22 Subpart H FCC Part 24 Subpart E
Test Procedure:	FCC Part 2 ANSI TIA-603-D: 2010 KDB 971168 D01 v02r02

This device described above has been tested by Shenzhen Microtest 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: Demi Mu

Demi Mu Mar. 23, 2018

Reviewed by: Blue. Zheng

Blue Zheng Mar. 23, 2018

Approved by: Smith Chen

Smith Chen Mar. 23, 2018

2 Summary of Test Result

Item	FCC Part No.	Description of Test	Result
1	2.1046, 22.913(a); 24.232(c)	Maximum output power	Pass
2	2.1046, 22.913(a); 24.232(c)	Peak to average power radio(PAPR)	Pass
3	2.1046, 22.913(a); 24.232(c)	Transmitter Radiated Power (EIRP/ERP)	Pass
4	2.1049; 22.917(b); 24.238(b)	Occupied Bandwidth	Pass
5	2.1051; 22.917(a); 24.238(a)	Conducted spurious emissions	Pass
6	2.1051; 22.917(b); 24.238(b)	Spurious emissions at band edge	Pass
7	2.1053; 22.917(a); 24.238(a)	Radiated spurious emissions	Pass
8	2.1055; 22.355; 24.235	Frequency Stability	Pass

3 General description

3.1 Feature of equipment under test (EUT)

Product name:	TABLET
Model name:	TT-713 Ultra
Operating frequency range:	GSM 850: TX: 824.2 MHz – 848.8 MHz; RX: 869.2 MHz – 893.8 MHz GSM 1900: TX: 1850.2 MHz – 1909.8 MHz; RX: 1930.2 MHz – 1989.8 MHz WCDMA/HSDPA/HSUPA Band 2: TX: 1850 - 1910 MHz RX:1930 - 1990 MHz WCDMA/HSDPA/HSUPA Band 5: TX: 824 - 849 MHz RX:869 - 894 MHz
Modulation type:	GMSK for GSM/GPRS WCDMA for QPSK HSDPA/HSUPA for QPSK and 16QAM
Power Class	GSM/GPRS 850: 4 GSM/GPRS 1900: 1 WCDMA/HSDPA/HSUPA Band 2: 3 WCDMA/HSDPA/HSUPA Band 4: 3 WCDMA/HSDPA/HSUPA Band 5: 3
GPRS Class	Multi-Class12 Only 4 timeslots are used for GPRS
Power supply:	DC 5V from AC Adapter 230V/50Hz
Battery:	DC3.7V 2800mAh
Adapter information:	Model:ST-00502001 Input:100-240V AC50/60Hz 03A Output: DC 5V 2A
Antenna type	PIFA Antenna (2dBi)
Hardware Version	V1.1
Software Version	V6.0

3.2 Test frequency channel

Frequency Band	Frequency	Channel	Frequency(MHz)
GSM 850	Low	128	824.2
	Middle	190	836.6
	High	251	848.8
GSM 1900	Low	512	1850.2
	Middle	661	1880
	High	810	1909.8
UMTS Band II	Low	9262	1852.4
	Middle	9400	1880

	High	9538	1907.6
UMTS Band V	Low	4132	826.4
	Middle	4183	836.6
	High	4233	846.6

3.3 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.

3.4 Test conditions

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

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

3.5 Testing site

Test Site	Shenzhen Microtest Co., Ltd.
Test Site Location	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China
FCC Registration No.:	448573

3.6 Ancillary equipment list

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

3.7 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 %

4 List of test equipment

Equipment No.	Equipment Name	Manufacturer	Model	Serial No.	Calibration date	Due date
MTI-E001	Spectrum Analyzer	Agilent	E4407B	MY41441082	2017/09/18	2018/09/17
MTI-E002	CMU 200 universal radio communication tester	Rohde&schwarz	CMU 200	114587	2017/09/18	2018/09/17
MTI-E004	EMI Test Receiver	Rohde&schwarz	ESPI	1000314	2017/09/18	2018/09/17
MTI-E006	Broadband antenna	schwarabeck	VULB9163	872	2017/09/18	2018/09/17
MTI-E007	Horn antenna	schwarabeck	BBHA9120D	1201	2017/09/18	2018/09/17
MTI-E014	amplifier	America	8447D	3113A06150	2017/09/18	2018/09/17
MTI-E015	Conduction Immunity Signal Generator	Schloder	CDG6000	126A1343/2015	2017/09/18	2018/09/17
MTI-E016	Coupled decoupling network	Schloder	CDA M2/M3	A2210332/2015	2017/09/18	2018/09/17
MTI-E032	Comprehensive test instrument	Rohde&schwarz	CMW500	124192	2017/04/13	2018/09/12
MTI-E034	amplifier	Agilent	8449B	3008A02400	2017/08/22	2018/08/21
MTI-E040	Spectrum analyzer	Agilent	N9020A	MY49100060	2017/03/04	2018/09/04
MTI-E041	Signal generator	Agilent	N5182A	MY49060455	2017/02/22	2018/09/22
MTI-E042	Analog signal generator	Agilent	E4421B	GB40051240	2017/02/22	2018/09/22
MTI-E043	Power probe	Dare Instruments	RPR3006W	16I00054SNO16	2017/02/28	2018/09/28
MTI-E047	10dB attenuator	Mini-Circuits	UNAT-10+	15542	2017/05/23	2018/09/23
MTI-E049	spectrum analyzer	Rohde&schwarz	FSP-38	100019	2017/09/18	2018/09/17
MTI-E050	PSG Signal generator	Agilent	E8257D	MY46520873	2017/04/24	2018/09/23
MTI-E051	Active Loop Antenna 9kHz - 30MHz	Schwarzbeek	FMZB 1519 B	00044	2017//2/26	2018/09/25
MTI-E052	18-40GHz amplifier	Chengdu step Micro Technology	ZLNA-18-40G-21	1608001	2017/09/18	2018/09/17
MTI-E053	15-40G Antenna	Schwarzbeek	BBHA9170	BBHA9170582	2017/09/18	2018/09/17

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

5 Test Result

5.1 Maximum output power and peak to average ratio

5.1.1 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.

5.1.2 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:

1.In many cases, the RF output power limits for licensed digital transmission devices is specified in terms of effective radiated power (ERP) or equivalent isotropic radiated power (EIRP). Typically, ERP is specified when the operating frequency is less than or equal to 1 GHz and EIRP is specified when the operating frequency is greater than 1 GHz. Both are determined by adding the transmit antenna gain to the conducted RF output power with the primary difference between the two being that when determining the ERP, the transmit antenna gain is referenced to a dipole antenna (i.e., dBd) whereas when determining the EIRP, the transmit antenna gain is referenced to an isotropic antenna (dBi).

2.The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

ERP/EIRP = P_{Meas} + GT − LC

where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

dBd (ERP)=dBi (EIRP) -2.15 dB

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

5.1.3 Test Result

For Conducted output power:

Output Power for GSM850

Mode	Frequency(MHz)	Maximum Burst average Power
GSM850	824.2	32.32
	836.6	32.26
	848.8	32.19
GPRS850 (1 Slot)	824.2	32.27
	836.6	32.25
	848.8	32.16
GPRS850 (2 Slot)	824.2	31.30
	836.6	31.17
	848.8	31.15
GPRS850 (3 Slot)	824.2	29.22
	836.6	29.19
	848.8	29.12
GPRS850 (4 Slot)	824.2	28.28
	836.6	28.21
	848.8	28.11

Output Power for PCS1900

Mode	Frequency(MHz)	Maximum conducted Power
GSM1900	1850.2	29.16
	1880	29.22
	1909.8	29.12
GPRS1900 (1 Slot)	1850.2	29.12
	1880	29.13
	1909.8	29.07
GPRS1900 (2 Slot)	1850.2	28.11
	1880	28.14
	1909.8	28.06
GPRS1900 (3 Slot)	1850.2	26.03
	1880	26.05
	1909.8	26.01
GPRS1900 (4 Slot)	1850.2	25.11
	1880	25.17
	1909.8	25.06

Output Power for UMTS BAND II

Mode	Frequency(MHz)	Maximum Average Output Power
WCDMA 1900 RMC	1852.4	22.23
	1880	22.66
	1907.6	22.52
WCDMA 1900 AMR	1852.4	22.21
	1880	22.12
	1907.6	22.43
HSDPA Subtest 1	1852.4	22.15
	1880	22.17
	1907.6	22.05
HSDPA Subtest 2	1852.4	22.11
	1880	22.15
	1907.6	21.97
HSDPA Subtest 3	1852.4	22.08
	1880	22.14
	1907.6	21.91
HSDPA Subtest 4	1852.4	22.05
	1880	22.12
	1907.6	21.87
HSUPA Subtest 1	1852.4	22.09
	1880	22.11
	1907.6	22.06
HSUPA Subtest 2	1852.4	22.07
	1880	22.02
	1907.6	22.05
HSUPA Subtest 3	1852.4	22.07
	1880	21.98
	1907.6	22.03
HSUPA Subtest 4	1852.4	22.05
	1880	21.90
	1907.6	21.93
HSUPA Subtest 5	1852.4	21.96
	1880	21.82
	1907.6	21.97

Output Power for UMTS BAND V

Mode	Frequency(MHz)	Maximum Average Output Power
WCDMA 850 RMC	826.4	22.06
	836.6	22.35
	846.6	22.34
WCDMA 850 AMR	826.4	22.02
	836.6	22.27
	846.6	22.27
HSDPA Subtest 1	826.4	22.02
	836.6	22.1
	846.6	22.18
HSDPA Subtest 2	826.4	22.14
	836.6	22.09
	846.6	22.10
HSDPA Subtest 3	826.4	22.08
	836.6	22.04
	846.6	22.04
HSDPA Subtest 4	826.4	21.99
	836.6	21.96
	846.6	22.04
HSUPA Subtest 1	826.4	22.09
	836.6	22.06
	846.6	22.19
HSUPA Subtest 2	826.4	22.08
	836.6	22.01
	846.6	22.19
HSUPA Subtest 3	826.4	22.08
	836.6	21.99
	846.6	22.16
HSUPA Subtest 4	826.4	21.99
	836.6	21.93
	846.6	22.16
HSUPA Subtest 5	826.4	21.94
	836.6	21.85
	846.6	22.20

For ERP:

Note: EIRP = Conducted power + antenna gain

Mode	Frequency(MHz)	Maximum conducted Power(dBm)	Antenna gain (dBd)	ERP(dBm)	Limit(dBm)	Margin(dBm)	Result
GSM850	836.6	32.26	2	32.11	38.45	-6.34	Pass
GPRS850	836.6	32.25	2	32.10	38.45	-6.35	Pass
WCDMA 850 RMC	826.4	22.06	2	21.91	38.45	-16.54	Pass
	836.6	22.35	2	22.20	38.45	-16.25	Pass
	846.6	22.34	2	22.19	38.45	-16.26	Pass

For EIRP:

Mode	Frequency(MHz)	Maximum conducted Power(dBm)	Antenna gain (dBi)	EIRP(dBm)	Limit(dBm)	Margin(dBm)	Result
GSM1900	1880	29.22	2	31.22	33	-1.78	Pass
GPRS1900	1800	29.13	2	31.13	33	-1.87	Pass
WCDMA 1900 RMC	1852.4	22.23	2	24.23	33	-8.77	Pass
	1880	22.66	2	24.66	33	-8.34	Pass
	1907.6	22.52	2	24.52	33	-8.48	Pass

5.2 Peak to average power ratio(PAPR)

5.2.1 Limit

Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

5.2.2 Test method

According to KDB 971168 D01 v02r02 section 5.7.2, using the alternate procedure to measurement PAPR, the test procedure as below:

(1) Setting the SA as below and measurement the total peak power

a) Set the RBW ≥ OBW.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 2 × RBW .
d) Sweep time = auto couple.
e) Detector = peak.
f) Ensure that the number of measurement points ≥ span/RBW.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the peak amplitude level.

(2) Record the total peak power as P_{Pk}

(3) Setting the SA as below and measurement the total average power.

a) Set span to at least 1.5 times the OBW.
b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
c) Set VBW ≥ 3 × RBW.
d) Set number of points in sweep ≥ 2 × span / RBW.
e) Sweep time = auto-couple.
f) Detector = RMS (power averaging).
g) If the EUT can be configured to transmit continuously (i.e., burst duty cycle ≥ 98%), then set the trigger to free run.
h) If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98 %), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Ensure that the sweep time is less than or equal to the transmission burst duration.
i) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

(4) Record the total peak power as $P_{Avg.}$

(5) Determine the PAPR from:

$$PAPR\ (dB) = P_{Pk}\ (dBm) - P_{Avg}\ (dBm).$$

5.2.3 Test Result

Note: PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm)

Mode	Channel	P_{Pk} (dBm)	P_{Avg} (dBm)	PAPR (dB)	Limit (dBm)	Result
GSM850	190	32.28	32.26	0.02	13	Pass
GSM1900	661	29.23	29.22	0.01	13	Pass
WCDMA Band 5	9400	24.84	22.66	2.18	13	Pass
WCDMA Band 2	4183	24.36	22.35	2.01	13	Pass

5.3 Occupied bandwidth

5.3.1 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.

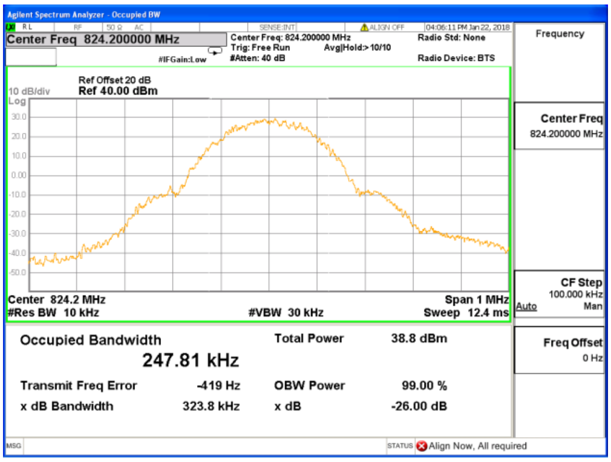
4. Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak; make a line whose value is 26dB lower than the peak; mark two points which the line intersected the waveform at; finally record the delta of the two points as the occupied bandwidth and the plot.

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

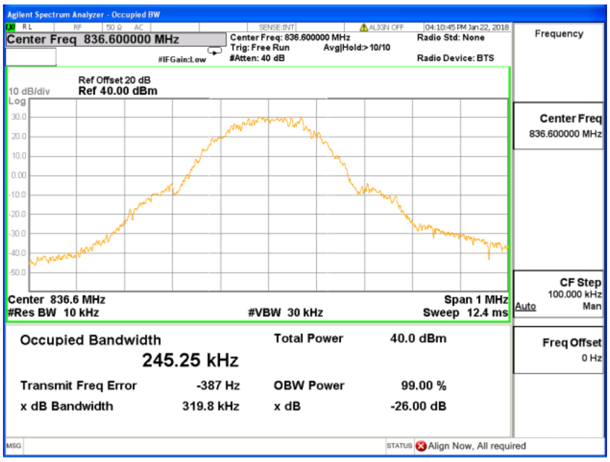
5.3.2 **Test result**

Channel	Channel Frequency (MHz)	26dB emission bandwidth (MHz)	99% occupied bandwidth (MHz)
GSM 850			
128	824.2	0.328	0.248
190	836.6	0.320	0.245
251	848.8	0.319	0.245
GSM 1900			
512	1850.2	0.314	0.247
661	1880	0.320	0.245
810	1909.8	0.314	0.244
UMTS Band V			
4132	826.4	4.689	4.143
4183	836.4	4.697	4.150
4233	846.6	4.678	4.146
UMTS Band II			
9262	1852.4	4.708	4.156
9400	1880.0	4.748	4.167
9538	1907.6	4.717	4.157

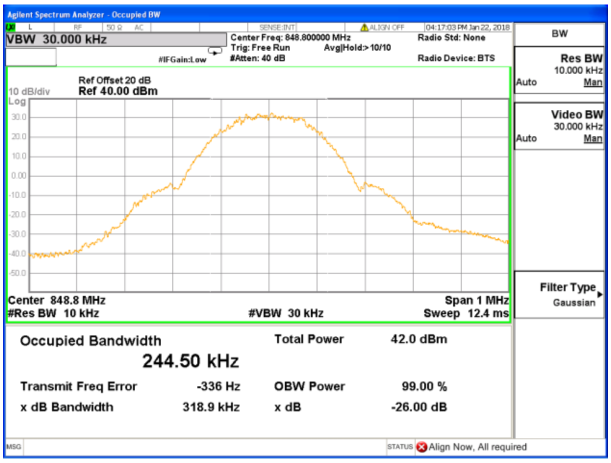
GSM 850 – 824.2MHz



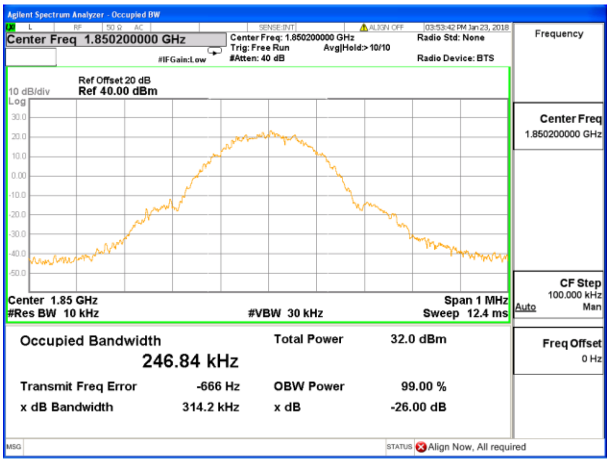
GSM 850 – 836.6MHz



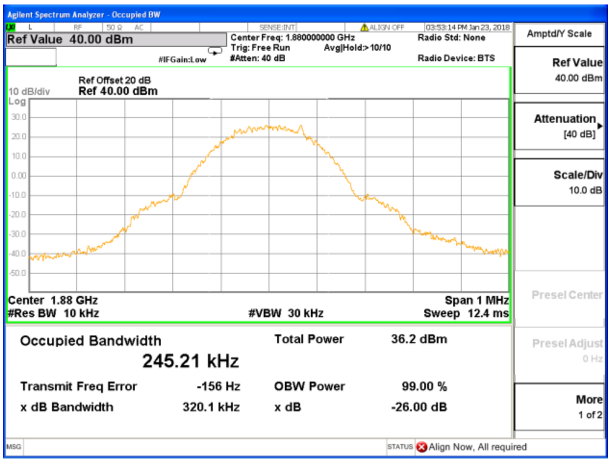
GSM 850 – 848.8MHz



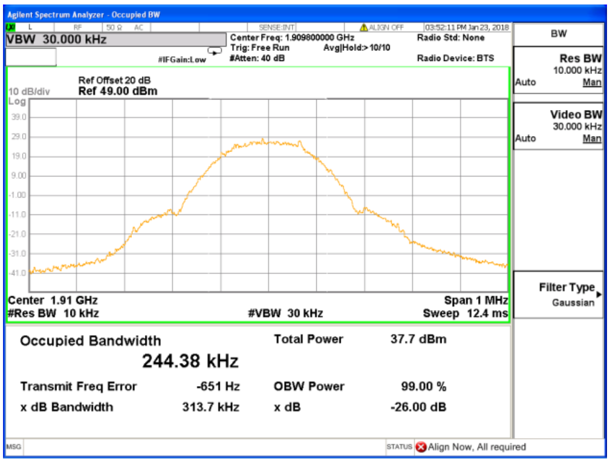
GSM 1900 - 1850.2MHz

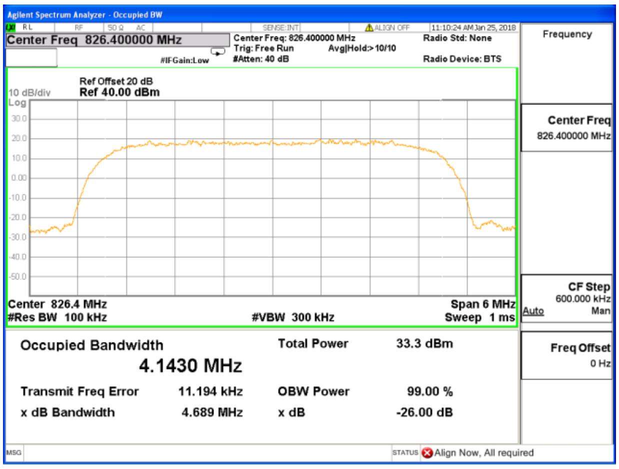
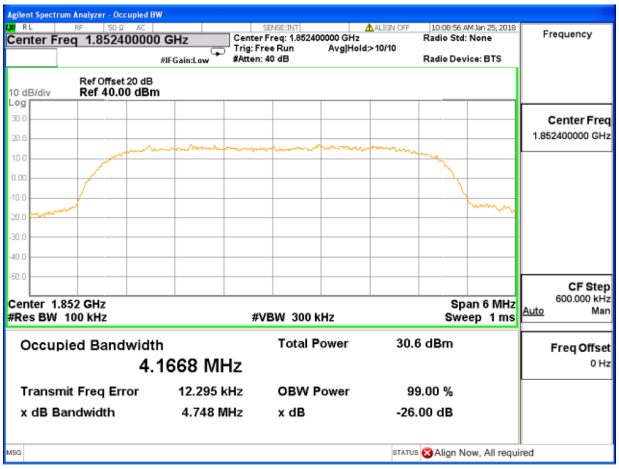


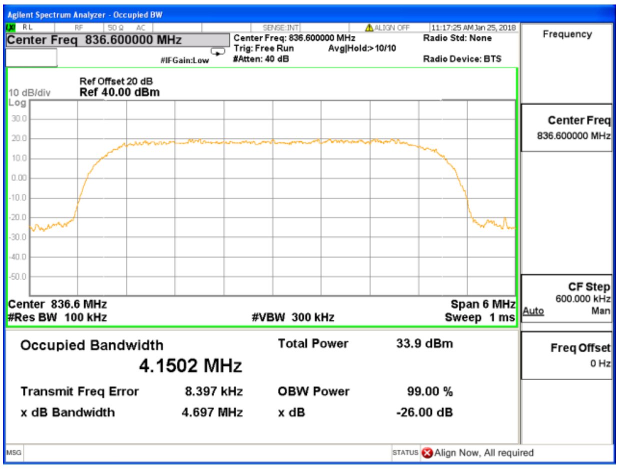
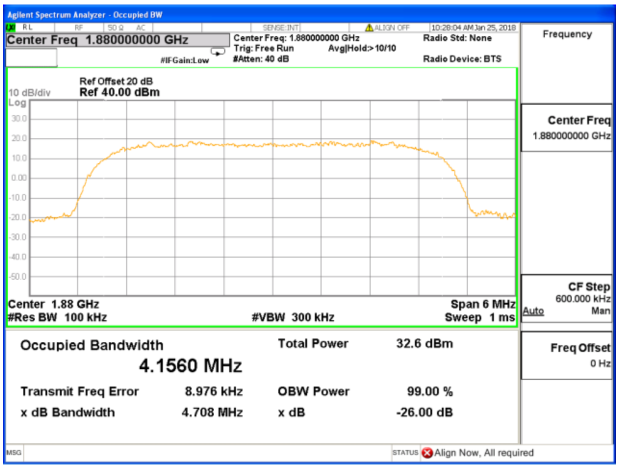
GSM 1900 - 1880MHz

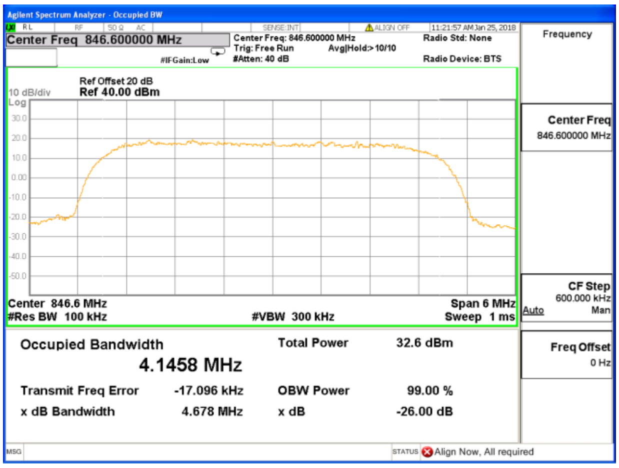
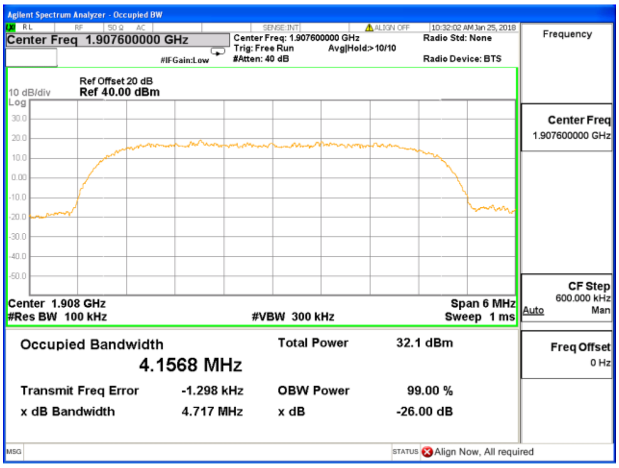


GSM 1900 - 1909.8MHz



UMTS Band V – 826.4MHz	UMTS Band II – 1852.4MHz
	

UMTS Band V – 836.6MHz	UMTS Band II - 1880MHz
	

UMTS Band V – 846.6MHz	UMTS Band II – 1907.6MHz
	

5.4 Conducted spurious emissions

5.4.1 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

5.4.2 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:

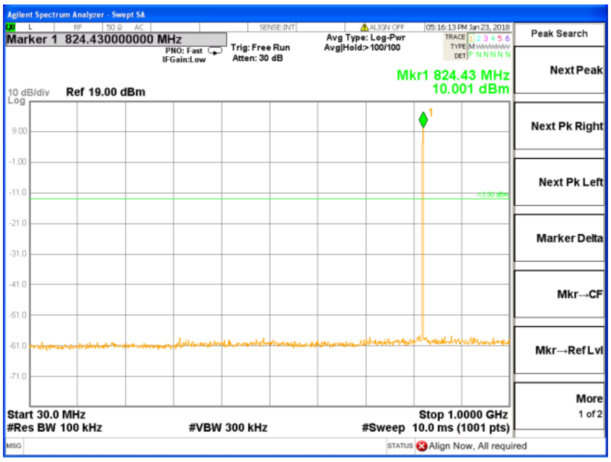
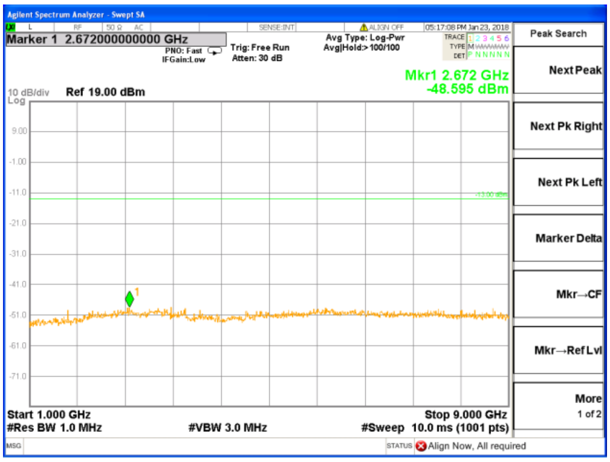
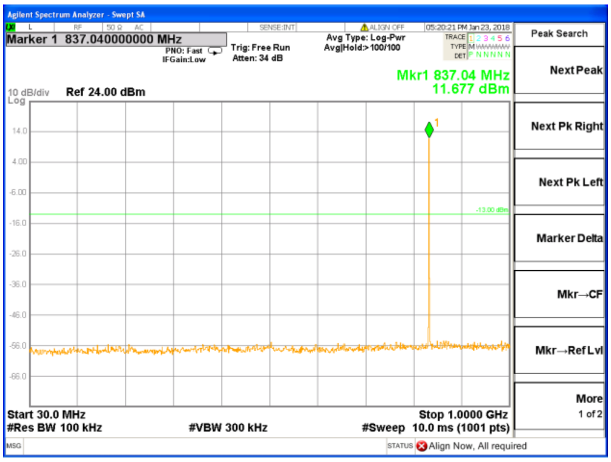
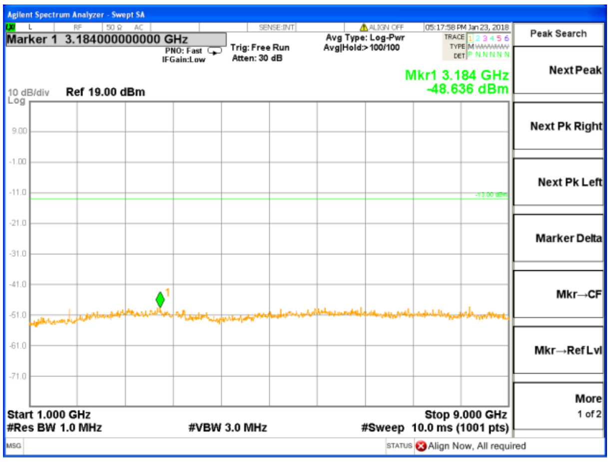
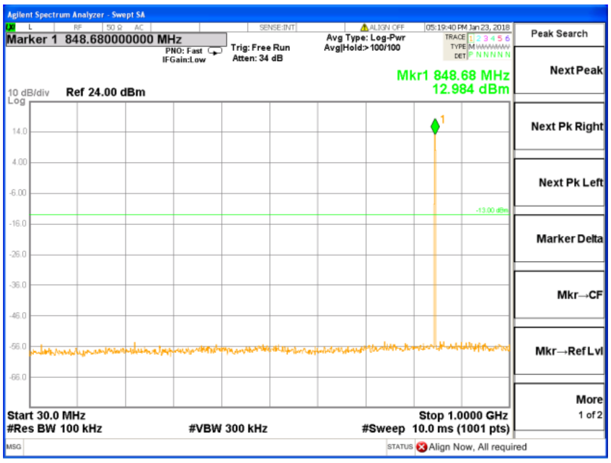
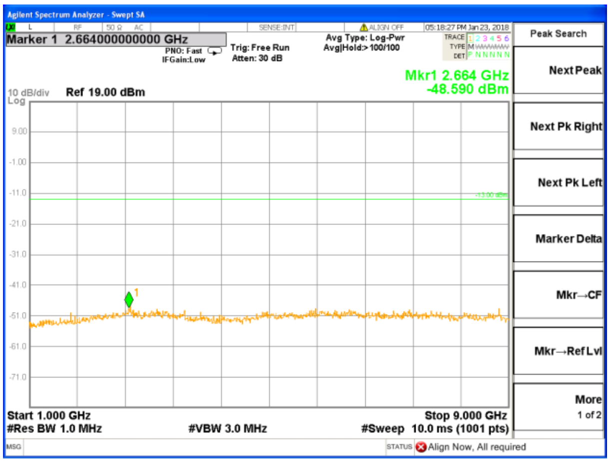
Frequency bellow 1 GHz: RBW=100 kHz, VBW=300 kHz.

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 10^{th} Harmonic were measured by Spectrum analyzer.

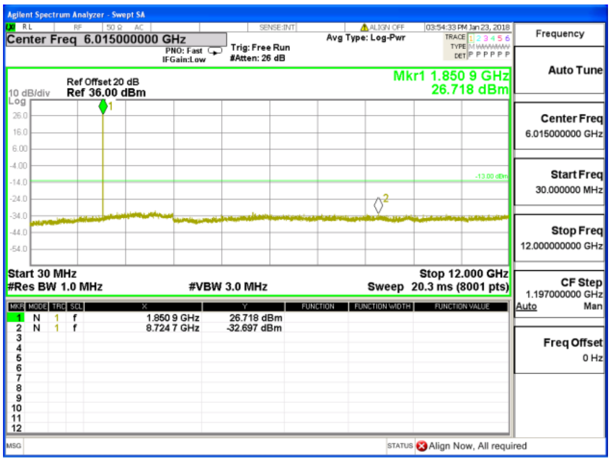
5.4.3 Test result

GSM 850

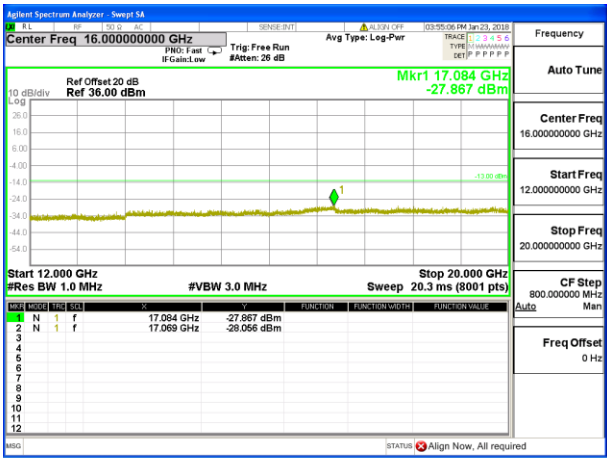
Low Channel – 30MHz-1GHz	Low Channel –1GHz - 9GHz
	
Middle Channel– 30MHz-1GHz	Middle Channel–1GHz - 9GHz
	
High Channel– 30MHz-1GHz	High Channel–1GHz - 9GHz
	

GSM 1900

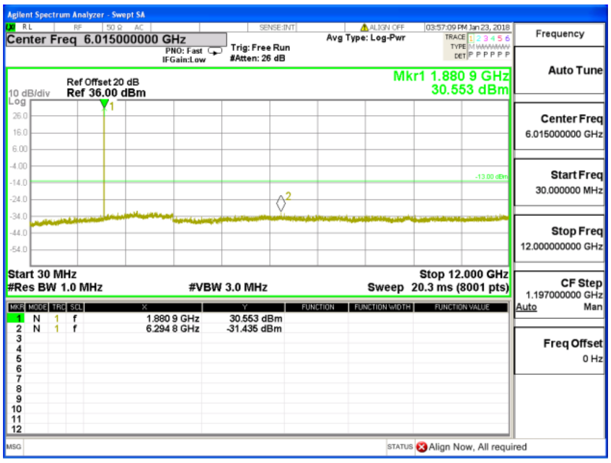
Low Channel – 30MHz-12GHz



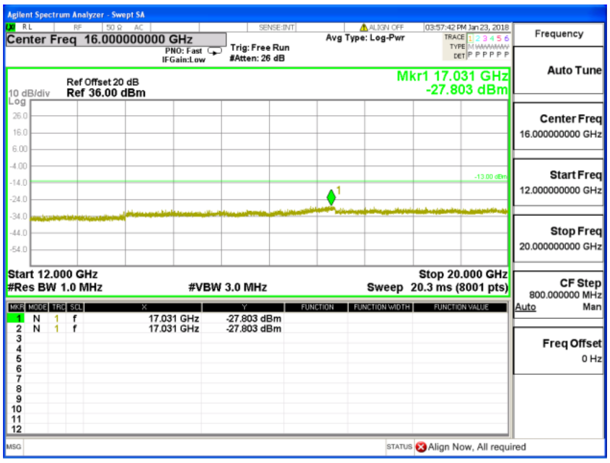
Low Channel –12GHz - 20GHz



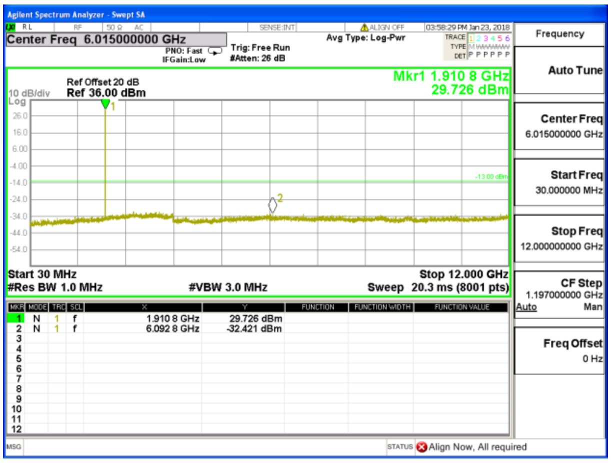
Middle Channel– 30MHz-12GHz



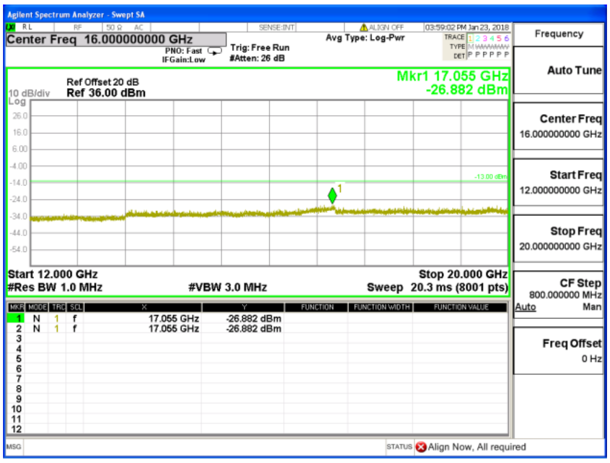
Middle Channel–12GHz - 20GHz



High Channel– 30MHz-12GHz

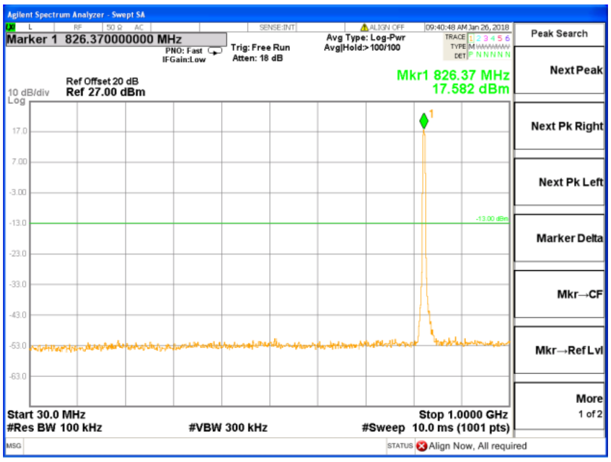


High Channel–12GHz - 20GHz

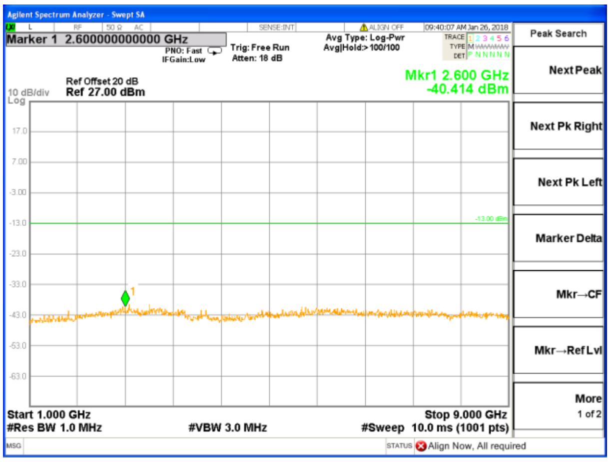


UMTS Band V

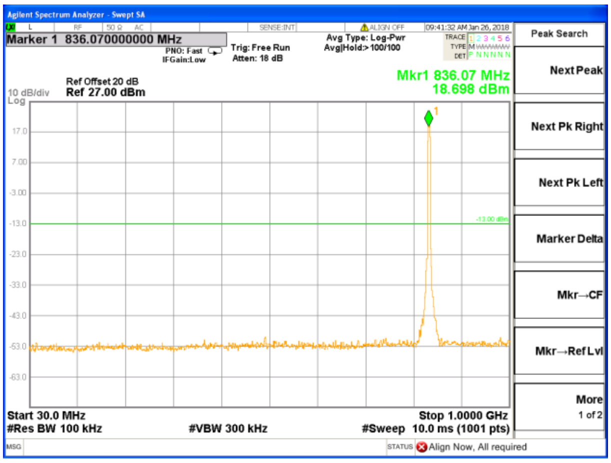
Low Channel – 30MHz-1GHz



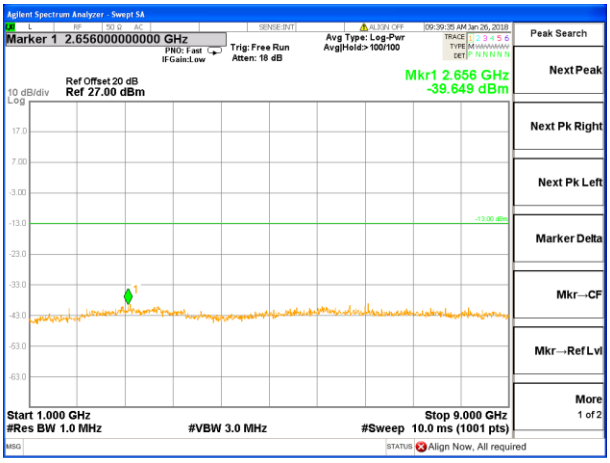
Low Channel –1GHz - 9GHz



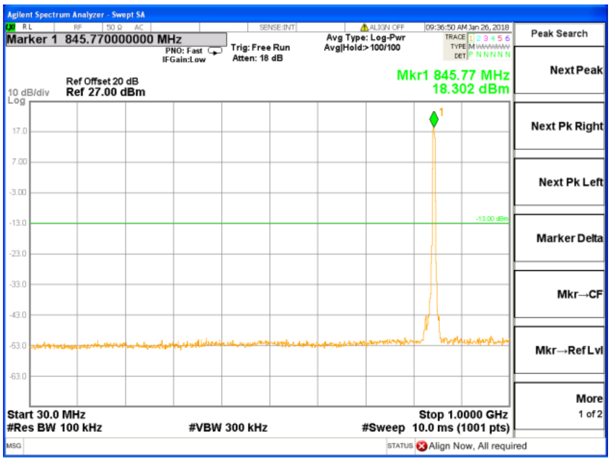
Middle Channel–30MHz-1GHz



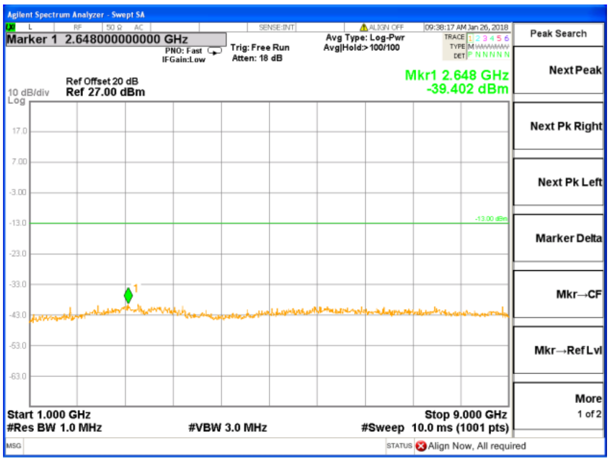
Middle Channel–1GHz - 9GHz



High Channel–30MHz-1GHz

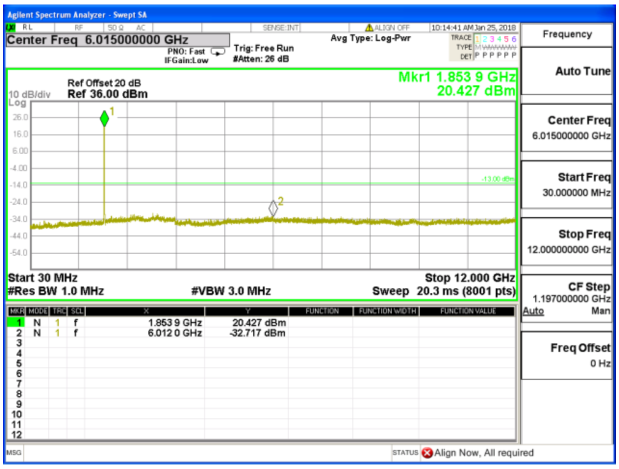


High Channel–1GHz - 9GHz

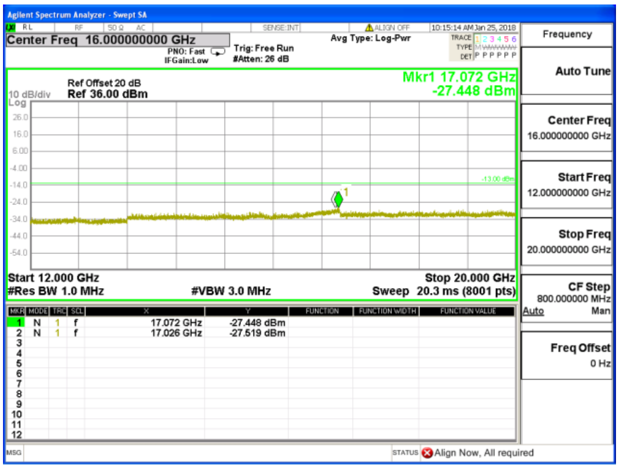


UMTS Band II

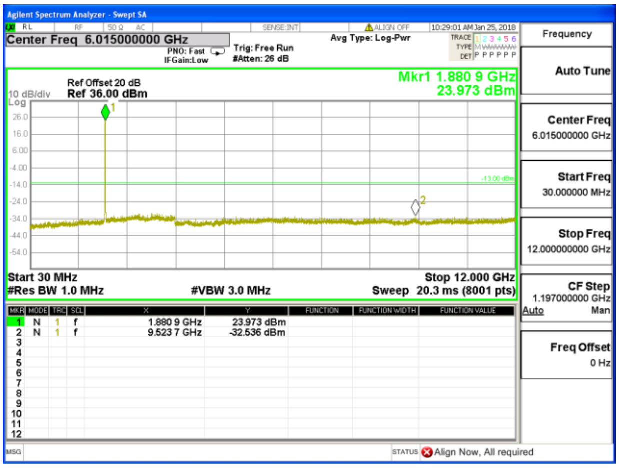
Low Channel – 30MHz-12GHz



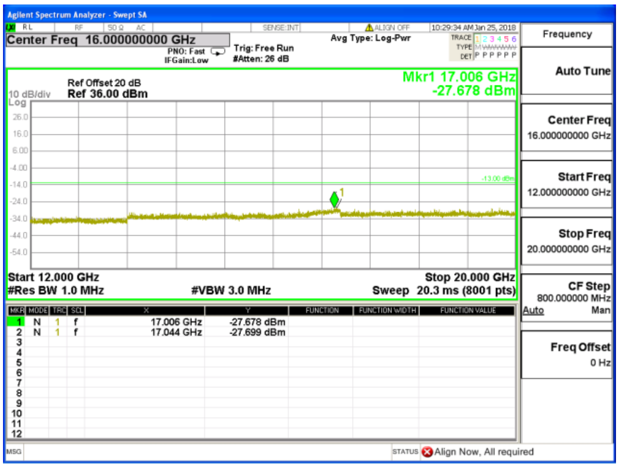
Low Channel –12GHz - 20GHz



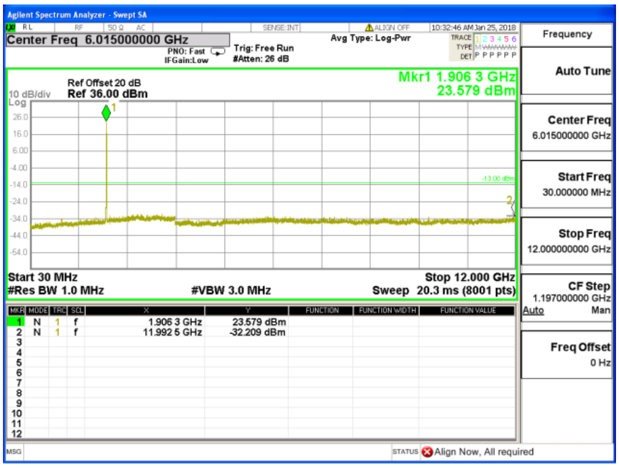
Middle Channel– 30MHz-12GHz



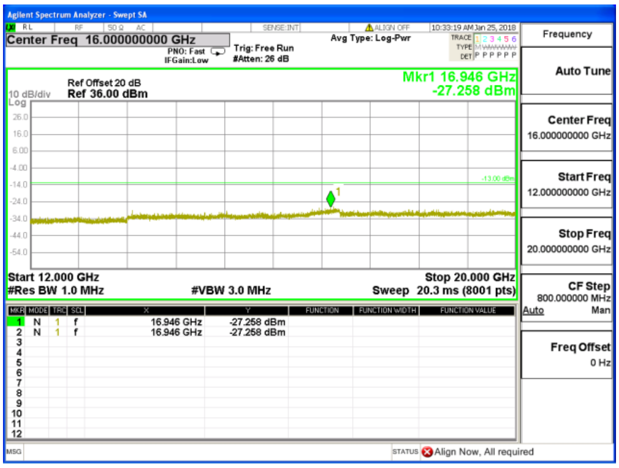
Middle Channel–12GHz - 20GHz



High Channel– 30MHz-12GHz



High Channel–12GHz - 20GHz



5.5 Band edge

5.5.1 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, for all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm

5.5.2 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:

For GSM system:

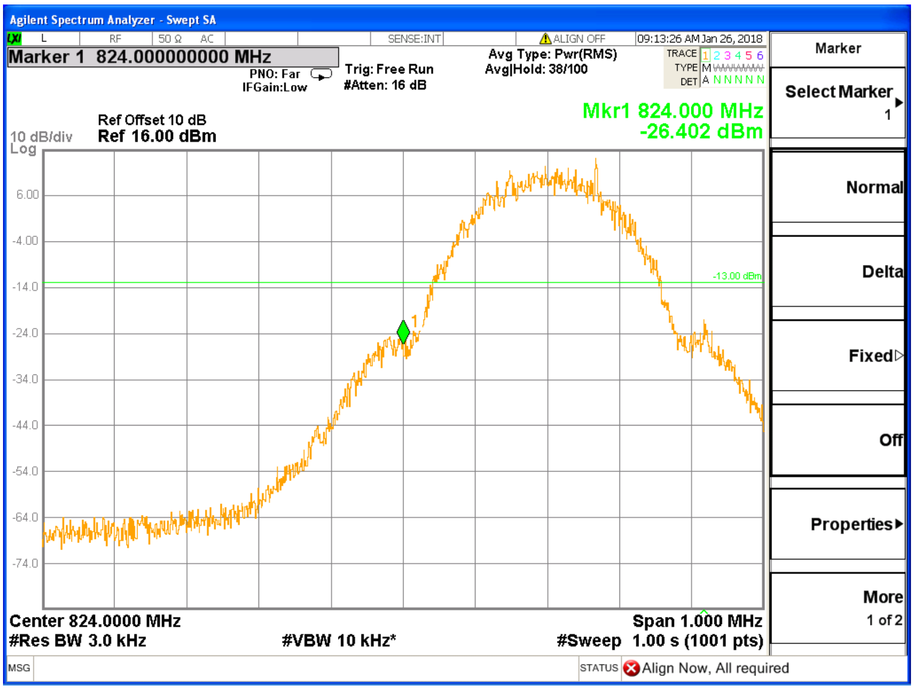
RBW=3 kHz
VBW=10 kHz
Span 1 MHz
Detector: Peak Mode

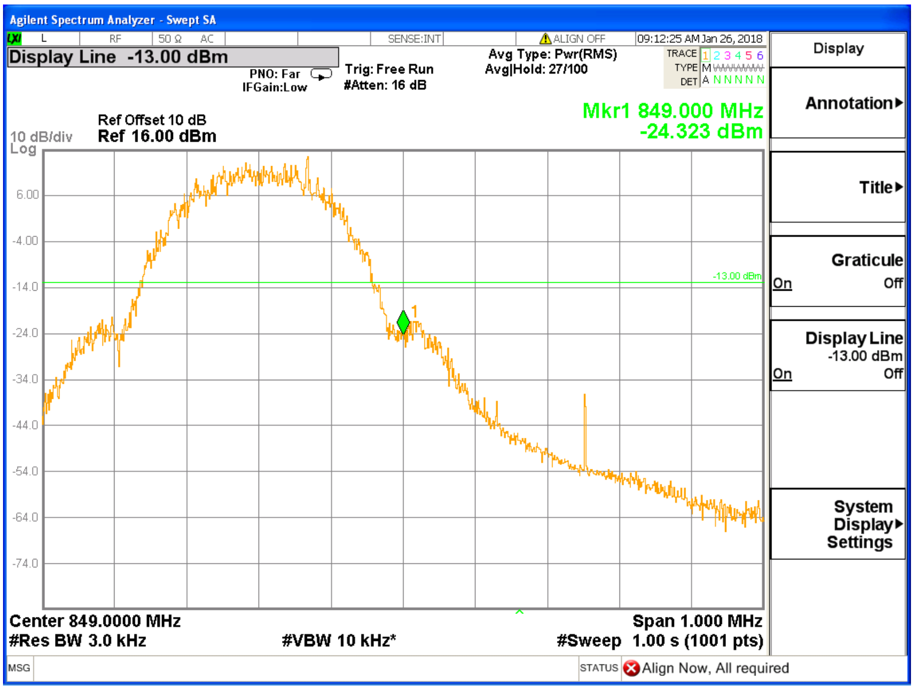
For WCDMA:

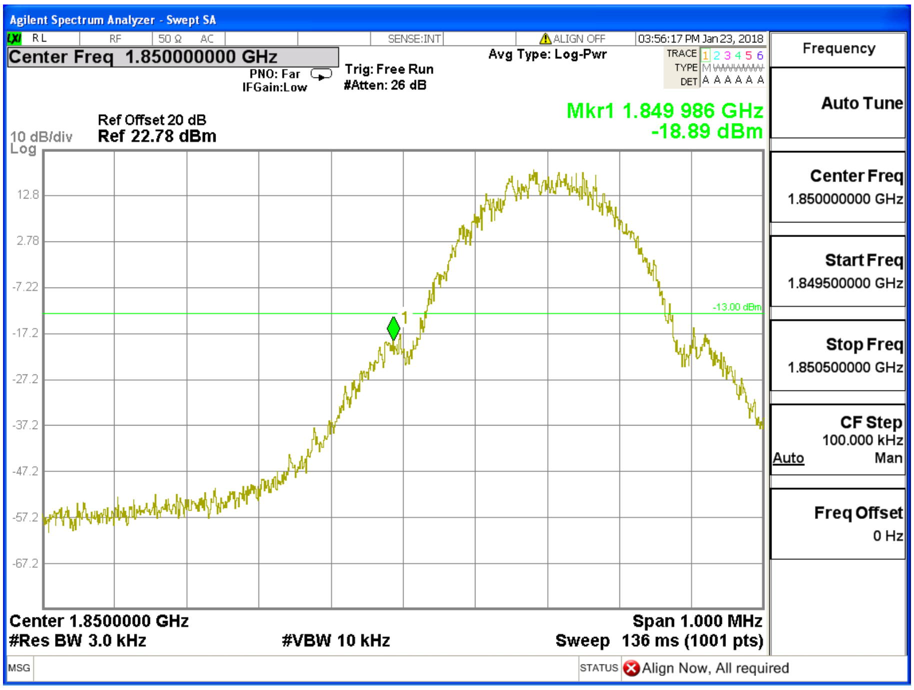
RBW=100 kHz
VBW=300 kHz
Span 5 MHz
Detector: Peak Mode

3. The band edges of low and high channels for the highest RF powers were measured.

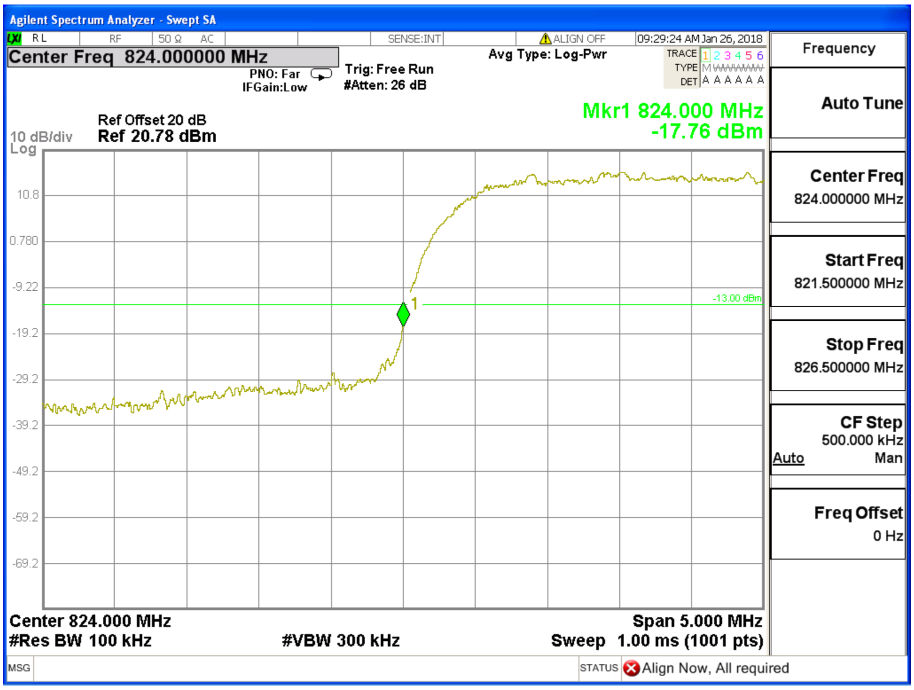
5.5.3 Test result

GSM 850 – Left band


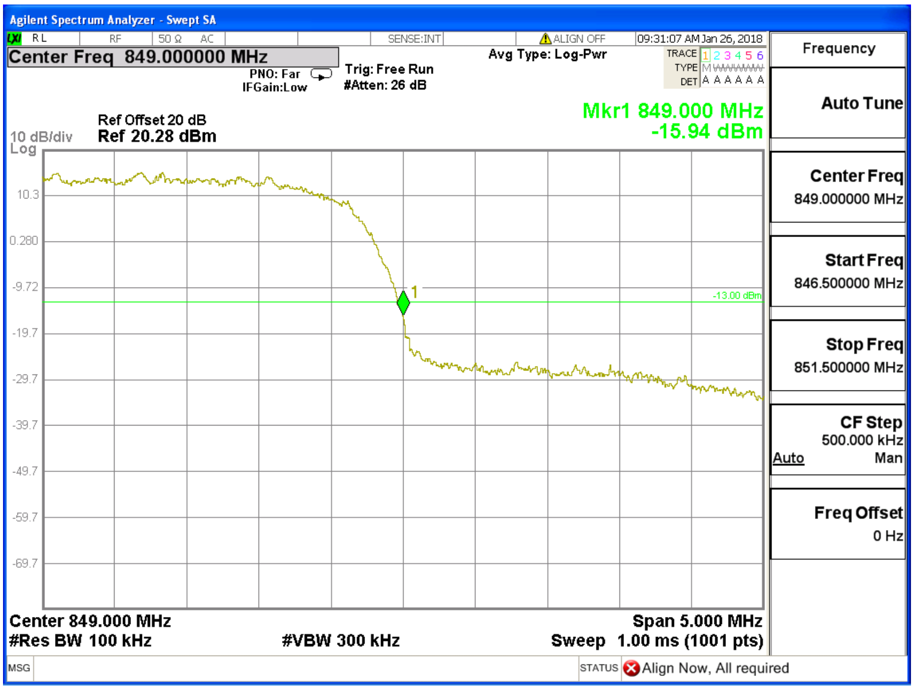
GSM 850 – Right band


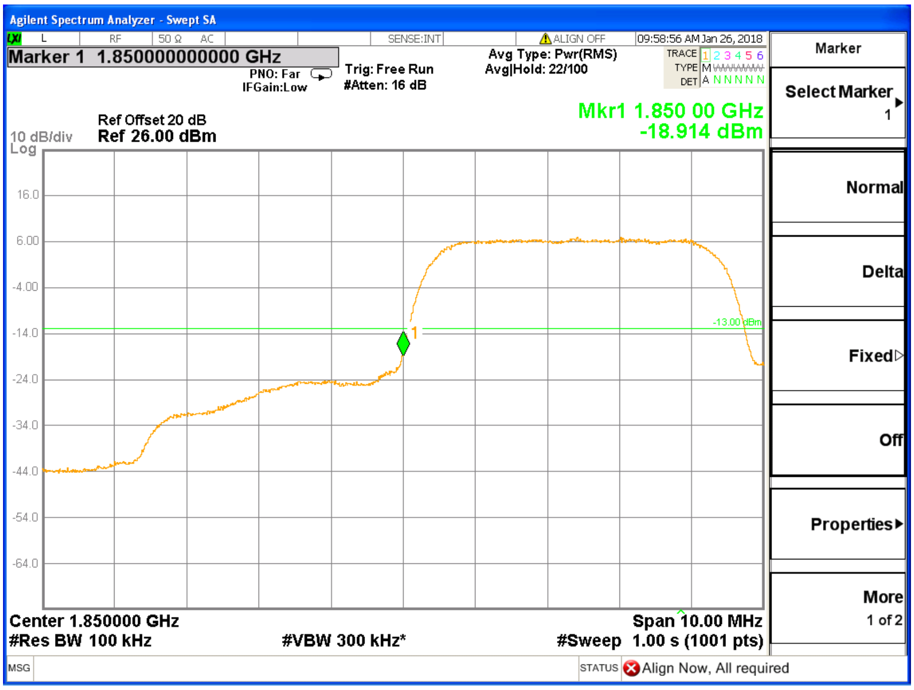
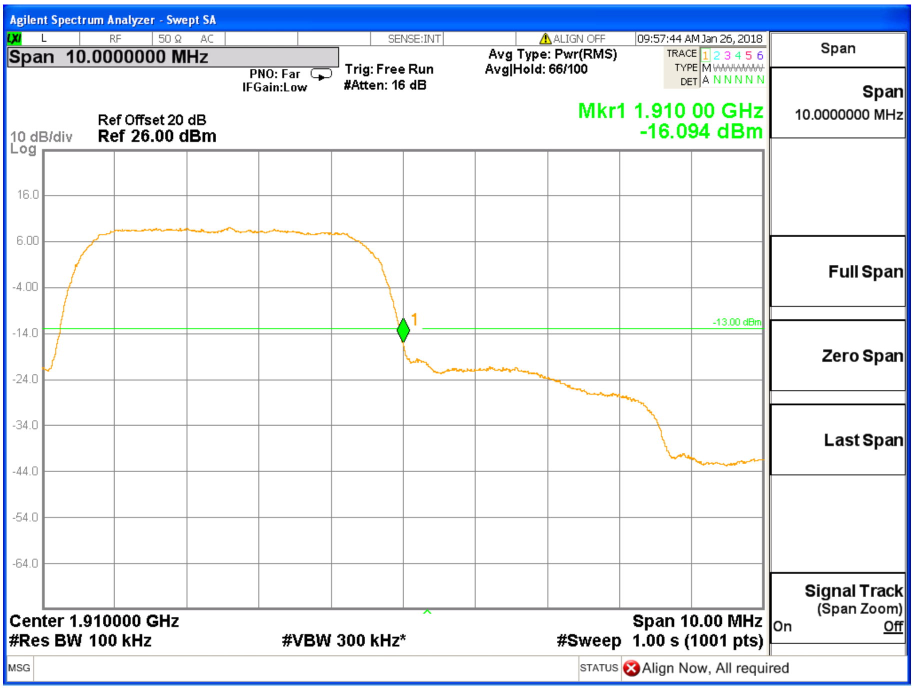
GSM 1900 – Left band

GSM 1900 – Right band


UMTS Band V – Left band



UMTS Band V – Right band



UMTS Band II – Left band

UMTS Band II – Right band


5.6 Radiated spurious emission

5.6.1 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

5.6.2 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).

5.6.3 Test Result

GSM850_ Low Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
1648.4	-42.3	5.98	3	9.11	-39.17	-13	-26.17	H
2472.6	-47.28	6.84	3	9.56	-44.56	-13	-31.56	H
1648.4	-37.95	5.98	3	9.11	-34.82	-13	-21.82	V
2472.6	-42.71	6.84	3	9.56	-39.99	-13	-26.99	V
GSM850_ Middle Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
1673.2	-39.79	5.98	3	9.11	-36.66	-13	-23.66	H
2509.8	-43	6.84	3	9.56	-40.28	-13	-27.28	H
1673.2	-35.46	5.98	3	9.11	-32.33	-13	-19.33	V
2509.8	-38.29	6.84	3	9.56	-35.57	-13	-22.57	V
GSM850_ High Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
1697.6	-46.21	5.98	3	9.11	-43.08	-13	-30.08	H
2546.4	-50.46	6.84	3	9.56	-47.74	-13	-34.74	H
1697.6	-41.92	5.98	3	9.11	-38.79	-13	-25.79	V
2546.4	-46.15	6.84	3	9.56	-43.43	-13	-30.43	V

GSM1900_ Low Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
3700.4	-43.5	5.26	3	9.88	-38.88	-13	-25.88	H
5550.6	-47.5	6.11	3	11.36	-42.25	-13	-29.25	H
3700.4	-45.76	5.26	3	9.88	-41.14	-13	-28.14	V
5550.6	-49.72	6.11	3	11.36	-44.47	-13	-31.47	V
GSM1900_ Middle Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
3760	-40.4	5.32	3	10.03	-35.69	-13	-22.69	H
5640	-45.19	6.19	3	11.41	-39.97	-13	-26.97	H
3760	-43.71	5.32	3	10.03	-39	-13	-26	V
5640	-47.88	6.19	3	11.41	-42.66	-13	-29.66	V
GSM1900_ High Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
3819.6	-47.42	5.36	3	9.62	-43.16	-13	-30.16	H
5729.4	-52.19	6.24	3	11.46	-46.97	-13	-33.97	H
3819.6	-50.14	5.36	3	9.62	-45.88	-13	-32.88	V
5729.4	-55.47	6.24	3	11.46	-50.25	-13	-37.25	V

WCDMA Band II _ Low Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
3704.8	-45.78	5.26	3	9.88	-41.16	-13	-28.16	H
5557.2	-49.59	6.11	3	11.36	-44.34	-13	-31.34	H
3704.8	-50.47	5.26	3	9.88	-45.85	-13	-32.85	V
5557.2	-56.47	6.11	3	11.36	-51.22	-13	-38.22	V
WCDMA Band II _ Middle Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
3760	-39.77	5.32	3	10.03	-35.06	-13	-22.06	H
5640	-48.61	6.19	3	11.41	-43.39	-13	-30.39	H
3760	-46.98	5.32	3	10.03	-42.27	-13	-29.27	V
5640	-55.03	6.19	3	11.41	-49.81	-13	-36.81	V
WCDMA Band II _ High Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
3815.2	-49.59	5.36	3	9.62	-45.33	-13	-32.33	H

5722.8	-54.86	6.24	3	11.46	-49.64	-13	-36.64	H
3815.2	-54.37	5.36	3	9.62	-50.11	-13	-37.11	V
5722.8	-58.25	6.24	3	11.46	-53.03	-13	-40.03	V

WCDMA Band V _ Low Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
1652.8	-46.9	3.86	3	8.56	-42.2	-13	-29.2	H
2479.2	-48.45	4.29	3	6.98	-45.76	-13	-32.76	H
1652.8	-42.88	3.86	3	8.56	-38.18	-13	-25.18	V
2479.2	-43.01	4.29	3	6.98	-40.32	-13	-27.32	V
WCDMA Band V _ Middle Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)		(dB)	(dBm)	(dBm)	(dB)	
1672.8	-44.57	3.9	3	8.58	-39.89	-13	-26.89	H
2509.2	-45.82	4.32	3	6.8	-43.34	-13	-30.34	H
1672.8	-39.23	3.9	3	8.58	-34.55	-13	-21.55	V
2509.2	-43.16	4.32	3	6.8	-40.68	-13	-27.68	V
WCDMA Band V _ High Channel								
Frequency	SG Level	Cable Loss	Diatance	Antenna Gain	Absolute Level	Limit	Margin	Polarization
(MHz)	(dBm)	(dB)	/	(dB)	(dBm)	(dBm)	(dB)	/
1693.2	-48.18	3.91	3	9.06	-43.03	-13	-30.03	H
2539.8	-48.84	4.32	3	6.65	-46.51	-13	-33.51	H
1693.2	-44.42	3.91	3	9.06	-39.27	-13	-26.27	V
2539.8	-45.46	4.32	3	6.65	-43.13	-13	-30.13	V

5.7 Frequency stability

5.7.1 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.

5.7.2 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.

5.7.3 Test Result

Band	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
GSM 850	3.5	25	0.0299
	3.7	19	0.0227
	4.2	34	0.0406

Band	Temperature (℃)	Frequency Error (Hz)	Frequency Error (ppm)
GSM 850	-30	33	0.0394
	-20	29	0.0347
	-10	24	0.0287
	0	34	0.0406
	10	31	0.0371
	20	49	0.0586
	30	41	0.0490
	40	29	0.0347
	50	35	0.0418

Band	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
GSM 1900	3.5	36	0.0191
	3.7	30	0.0160
	4.2	27	0.0144

Band	Temperature (℃)	Frequency Error (Hz)	Frequency Error (ppm)
GSM 1900	-30	28	0.0149
	-20	27	0.0144
	-10	35	0.0186
	0	36	0.0191
	10	30	0.0160
	20	26	0.0138
	30	41	0.0218
	40	38	0.0202
	50	39	0.0207

Band	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
UMTS Band 2	3.5	26	0.0138
	3.7	42	0.0223
	4.2	39	0.0207

Band	Temperature (℃)	Frequency Error (Hz)	Frequency Error (ppm)
UMTS Band 2	-30	37	0.0197
	-20	15	0.0080
	-10	34	0.0181
	0	29	0.0154
	10	30	0.0160
	20	36	0.0191
	30	22	0.0117
	40	28	0.0149
	50	21	0.0112

Band	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
UMTS Band 5	3.5	30	0.0359
	3.7	36	0.0430
	4.2	26	0.0311

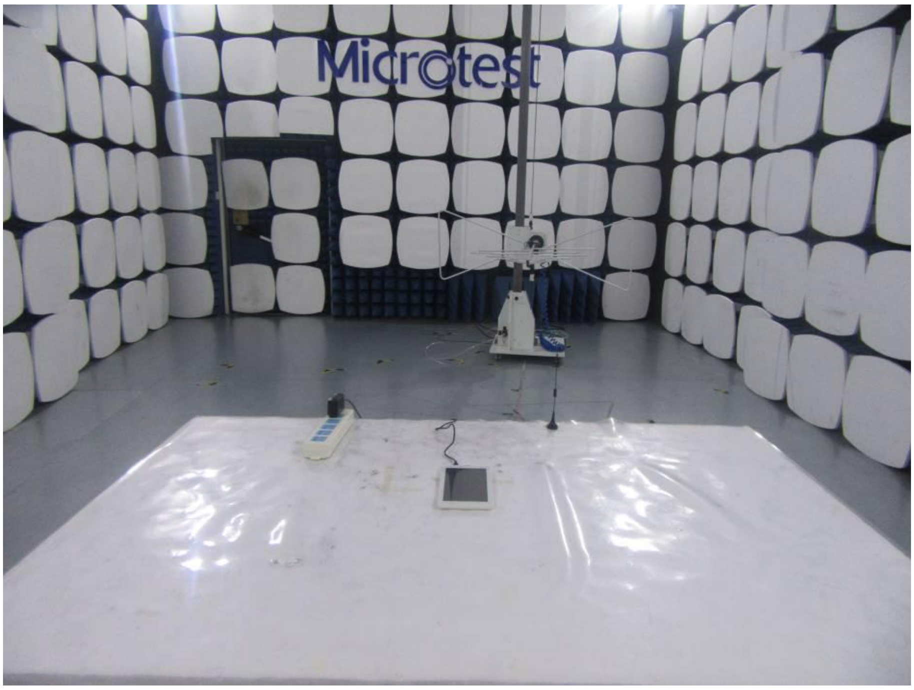
Band	Temperature (℃)	Frequency Error (Hz)	Frequency Error (ppm)
UMTS Band 5	-30	33	0.0395
	-20	31	0.0371
	-10	25	0.0299
	0	36	0.0430
	10	24	0.0287
	20	18	0.0215
	30	26	0.0311
	40	32	0.0383
	50	34	0.0407

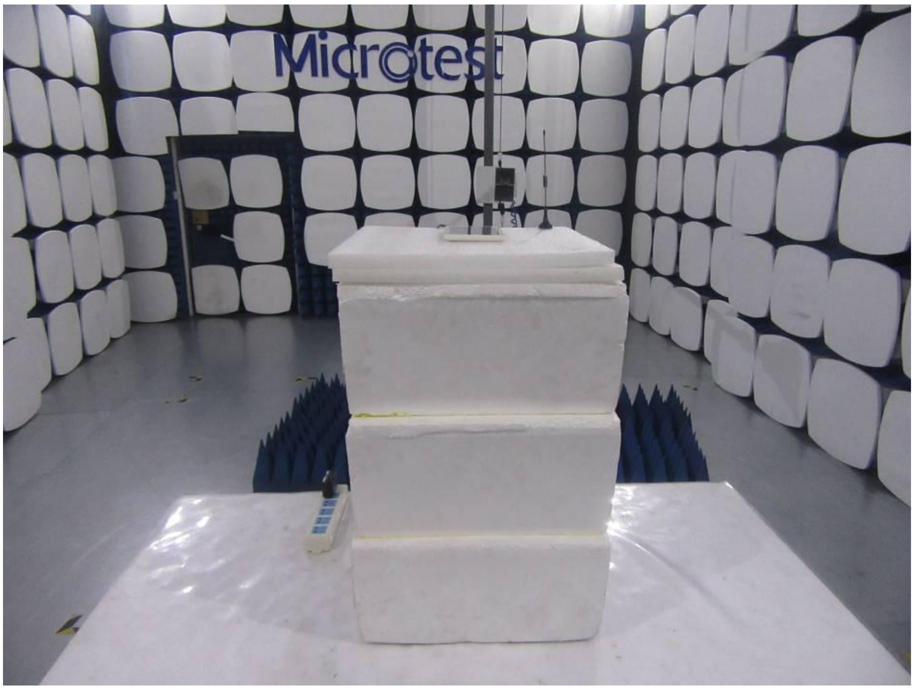
Note:

1. Normal Voltage = 3.7V; Battery End Point (BEP) = 3.5V; Maximum Voltage =4.2V

5.8 EUT test photo

Radiated Measurement Photos





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