FCC TEST REPORT
FCC ID: 2AG6FV10

Product	:	POS System
Model Name	:	V10,V6,V7,V8,V9
Brand	:	CITAQ
Report No.	:	PT800231151222E-FC01

Prepared for

CITAQ CO., LTD.

9th Floor, Chuangye Building, 6 Keji Middle Road,

New Hi-Tech Zone, Shantou, Guangdong China

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name	:	CITAQ CO., LTD.
Address	:	9th Floor, Chuangye Building, 6 Keji Middle Road, New Hi-Tech Zone, Shantou, Guangdong China
Manufacture's name	:	CITAQ CO., LTD.
Address	:	9th Floor, Chuangye Building, 6 Keji Middle Road, New Hi-Tech Zone, Shantou, Guangdong China
Product name	:	POS System
Model name	:	V10,V6,V7,V8,V9
Standards	:	FCC CFR47 Part 22 Subpart H:2014 FCC CFR47 Part 24 Subpart E:2014
Test procedure	:	TIA/EIA-603-D:2010
Test Date	:	Dec. 25, 2015 ~ Jan.4, 2016
Date of Issue	:	Jan.4, 2016
Test Result	:	Pass

This device described above has been tested by PTS, 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.

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Testing Engineer

August Qiu

Technical Manager

Hack Ye

Authorized Signatory

Chris Du

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2 Test Summary

Test Items	Test Requirement	Result
RF Output Power	2.1046 22.913 (a) 24.232 (c)	PASS
Bandwidth	2.1049 22.905 22.917 24.238	PASS
Spurious Emissions at Antenna Terminal	2.1051 22.917 (a) 24.238 (a)	PASS
Field Strength of Spurious Radiation	2.1053 22.917 (a) 24.238 (a)	PASS
Out of band emission, Band Edge	22.917 (a) 24.238 (a)	PASS
Frequency Stability	2.1055 22.355 24.235	PASS

Remark:

N/A: Not Applicable

3 General Information

3.1 General Description of E.U.T.

Product Name	:	POS System
Model Name	:	V10,V6,V7,V8,V9
Model Description	:	Only the model names are different
GSM Band(s)	:	GSM 850/1900
GPRS/EGPRS Class	:	12
WCDMA Band(s)	:	FDD Band II/V
Bluetooth Version	:	V4.0(with BLE)
Operating frequency	:	GSM/GPRS/EDGE 850: 824~849MHz PCS/GPRS/EDGE 1900: 1850~1910MHz WCDMA/UPA/DPA Band V: 824~849MHz WCDMA/UPA/DPA Band II: 1850~1910MHz Bluetooth: 2402-2480MHz WIFI 802.11b/g/n HT20:2412-2462MHz 802.11n HT40:2422-2452MHz
Max. RF output power	:	GSM 850: 32.35dBm PCS 1900: 29.18dBm WCDMA Band V: 22.66dBm WCDMA Band II: 22.47dBm Bluetooth: 2.04dBm WIFI: 9.42dBm
Type of Modulation	:	GSM,GPRS: GMSK EDGE: 8PSK WCDMA: QPSK Bluetooth: GFSK, Pi/4 DQPSK,8DPSK WIFI: CCK, OFDM
Antenna installation:	:	GSM/WCDMA: internal permanent antenna WIFI/Bluetooth: internal permanent antenna
Antenna Gain:	:	GSM 850/ WCDMA Band V: -0.5dBi PCS 1900/ WCDMA Band II: 1.2dBi WIFI: 0dBi Bluetooth: 0dBi
Power supply	:	DC 24V 2.71A Power by AC adapter
Adapter	:	Input:100-240V ~50/60Hz 1.7A max Output: DC 24V 2.71A

3.2 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Support Band	Test Mode	Channel Frequency	Channel Number
GSM 850	GSM/GPRS/EDGE	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GSM/GPRS/EDGE	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
WCDMA Band II	WCDMA/HSUPA/HSDPA	1852.4 MHz	9262
		1880.0 MHz	9400
		1907.6 MHz	9538
WCDMA Band V	WCDMA/HSUPA/HSDPA	826.4 MHz	4132
		836.6 MHz	4183
		846.6 MHz	4233
Remark: All mode(s) were tested and the worst data was recorded.			

4 Equipment During Test

4.1 Equipments List

RF Conducted Test							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	Aug.04, 2015	Aug.03, 2016	1 year
2	EXA Signal Analyzer	Keysight	N9010A	MY50520207526B25MPBW7X	Aug.04, 2015	Aug.03, 2016	1 year
3	EMI Test Receiver	R&S	ESCI	101155	July 15, 2015	July 14, 2016	1 year
4	Universal Radio Communication Tester	R&S	CMU200	106891	July 15, 2015	July 14, 2016	1 year
Radiated Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	Rohde&Schwarz	ESCI	101417	July 15, 2015	July 14, 2016	1 year
2	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	Aug.04, 2015	Aug.03, 2016	1 year
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3355	July 15, 2015	July 14, 2016	1 year
4	Amplifier	EM	EM-30180	060538	July 15, 2015	July 14, 2016	1 year
5	Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1246	July 15, 2015	July 14, 2016	1 year
6	Coaxial Cable(below 1GHz)	LARGE	CALB1	-	July 15, 2015	July 14, 2016	1 year
7	Coaxial Cable(above 1GHz)	LARGE	CALB2	-	July 15, 2015	July 14, 2016	1 year

4.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	$\pm 1 \times 10^{-6}$
Bandwidth	$\pm 1.5 \times 10^{-6}$
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

5 RF Output Power

Test Requirement:	FCC Part 2.1046,22.913 (a),24.232 (c)
Test Method:	ANSI C63.4:2014, TIA/EIA-603-D:2010
Test Mode:	Transmitting

5.1 EUT Operation

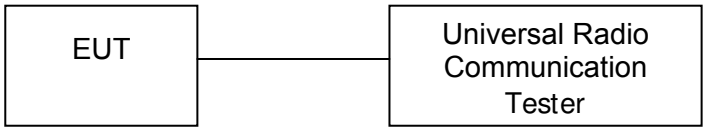
Operating Environment **:**

Temperature:	22.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.2kPa

5.2 Test Procedure

Conducted method:

The RF output of the transmitter was connected to the wireless test set and the spectrum analyzer through sufficient attenuation.



Radiated method:

1. The setup of EUT is according with per TIA/EIA Standard 603D:2010 and ANSI C63.4-2003 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. 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.

5.3 Test Result

Conducted Power						
GSM - Burst Average Power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880	1909.8
GSM	32.35	32.33	32.32	28.99	29.07	28.75
GPRS (1 slot)	32.16	32.12	31.99	29.18	29.09	28.86
GPRS (2 slots)	31.59	31.57	31.54	28.32	27.85	27.58
GPRS (3 slots)	29.75	29.90	29.94	26.48	26.27	26.59
GPRS (4 slots)	28.62	28.75	28.74	25.59	25.61	25.43
WCDMA - Average Power (dBm)						
Band	WCDMA Band II			WCDMA Band V		
Channel	9262	9400	9538	4132	4183	4233
Frequency (MHz)	1852.4	1880	1907.6	826.4	836.6	846.6
RMC 12.2k	22.28	22.15	22.47	22.51	22.53	22.66
HSDPA Subtest-1	21.42	21.13	21.28	21.62	21.73	21.62
HSDPA Subtest-2	21.50	20.89	21.11	21.59	21.41	21.75
HSDPA Subtest-3	21.82	20.67	21.55	21.46	22.02	22.13
HSDPA Subtest-4	20.90	20.74	21.79	21.44	21.89	21.92
HSUPA Subtest-1	21.05	21.02	21.32	21.46	21.59	21.64
HSUPA Subtest-2	21.26	21.49	21.37	21.14	20.88	21.66
HSUPA Subtest-3	20.95	20.46	20.82	20.83	21.30	21.49
HSUPA Subtest-4	21.52	20.62	20.61	22.05	21.60	21.65
HSUPA Subtest-5	20.89	21.66	21.00	20.89	20.92	21.45

Radiated Power (Measured at max. conducted power channel)										
ERP for Cellular Band (Part 22H)										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Part 22H	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
GSM 850 Channel 128										
824.2	96.61	278	1.4	H	29.6	0.20	0.00	29.38	38.45	-9.07
824.2	86.71	33	1.1	V	19.6	0.20	0.00	19.41	38.45	-19.04
GPRS Channel 128										
824.2	96.39	29	1.8	H	29.4	0.20	0.00	29.16	38.45	-9.29
824.2	86.49	249	1.2	V	19.4	0.20	0.00	19.19	38.45	-19.26
WCDMA Band V Channel 4233										
836.6	84.90	203	1.5	H	17.9	0.20	0.00	17.67	38.45	-20.78
836.6	74.99	158	1.5	V	7.9	0.20	0.00	7.69	38.45	-30.76
WCDMA Band V HSDPA Channel 4183										
846.6	84.40	104	1.9	H	17.4	0.20	0.00	17.17	38.45	-21.28
846.6	74.49	123	1.7	V	7.4	0.20	0.00	7.19	38.45	-31.26
WCDMA Band V HSUPA Channel 4233										
846.6	84.31	323	1.3	H	17.3	0.20	0.00	17.08	38.45	-21.37
846.6	74.42	348	1.1	V	7.3	0.20	0.00	7.12	38.45	-31.33

EIRP for Cellular Band (Part 24E)										
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Part 24E	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
PCS 1900 Channel 661										
1880.0	89.97	257	1.3	H	16.2	2.72	12.63	26.11	33	-6.89
1880.0	79.25	89	1.9	V	6.2	2.72	12.63	16.15	33	-16.85
GPRS Channel 512										
1850.2	90.08	233	1.6	H	16.3	2.72	12.63	26.22	33	-6.78
1850.2	79.36	103	1.3	V	6.3	2.72	12.63	16.26	33	-16.74
WCDMA Band II Channel 9538										
1852.4	80.71	97	1.0	H	6.9	2.72	12.63	16.85	33	-16.15
1852.4	69.98	115	2.0	V	-3.0	2.72	12.63	6.88	33	-26.12
WCDMA Band II HSDPA Channel 9262										
1880.0	80.81	42	1.5	H	7.0	2.72	12.63	16.95	33	-16.05
1880.0	70.09	57	1.9	V	-2.9	2.72	12.63	6.99	33	-26.01
WCDMA Band II HSUPA Channel 9400										
1852.4	80.81	250	1.6	H	7.0	2.72	12.63	16.69	33	-16.31
1852.4	70.09	74	2.0	V	-2.9	2.72	12.63	6.72	33	-26.28

6 Peak-to-Average Ratio

Test Requirement:	24.232 (d)
Test Method:	N/A
Test Mode:	Transmitting

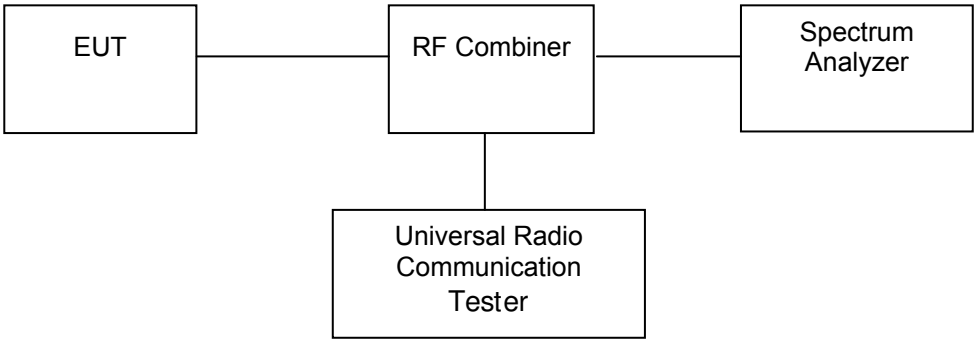
6.1 EUT Operation

Operating Environment **:**

Temperature:	22.5 °C
Humidity:	52.3% RH
Atmospheric Pressure:	101.2kPa

6.2 Test Procedure

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. Set EUT to transmit at maximum output power.
3. When the duty cycle is less than 98%, then signal gating will be implemented on the spectrum analyzer by triggering from the system simulator.
4. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer. Record the maximum PAPR level associated with a probability of 0.1%.



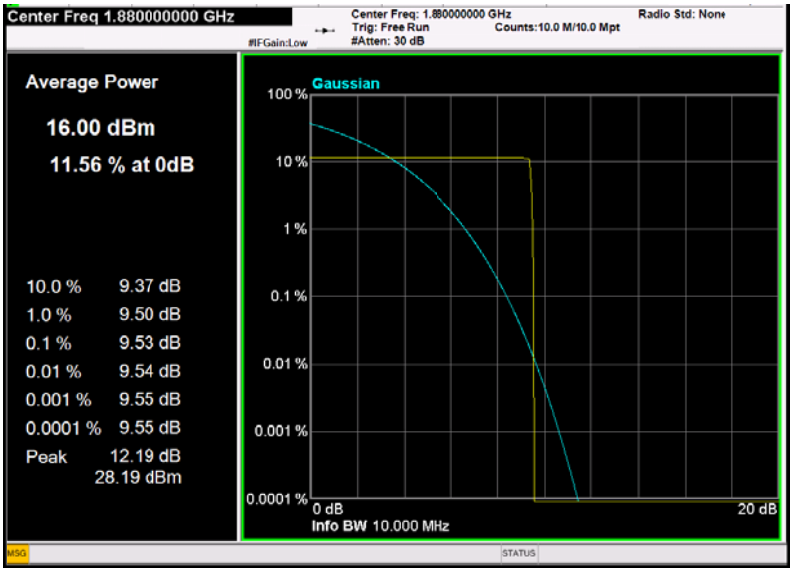
6.3 Test Result

Cellular Band (Part 24E)

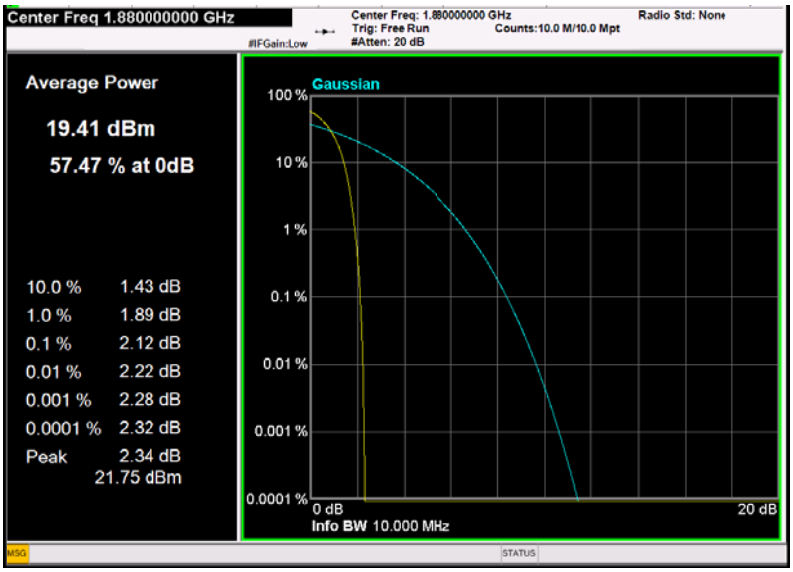
Mode	PCS 1900			WCDMA Band II			Limit (dB)
Channel	512	661	810	9262	9400	9538	
Frequency (MHz)	1850.2	1880.0	1909.8	1852.4	1880.0	1907.6	
Peak-to-Average Ratio (dB)	9.46	9.53	9.62	2.01	2.12	2.35	13

Test Plots (Part 24E)

PCS1900 Middle Channel



WCDMA Band II Middle Channel



7 Band Width

Test Requirement:	FCC Part 2.1049,22.917,22.905,24.238
Test Method:	ANSI C63.4:2014, TIA/EIA-603-D:2010
Test Mode:	Transmitting

7.1 EUT Operation

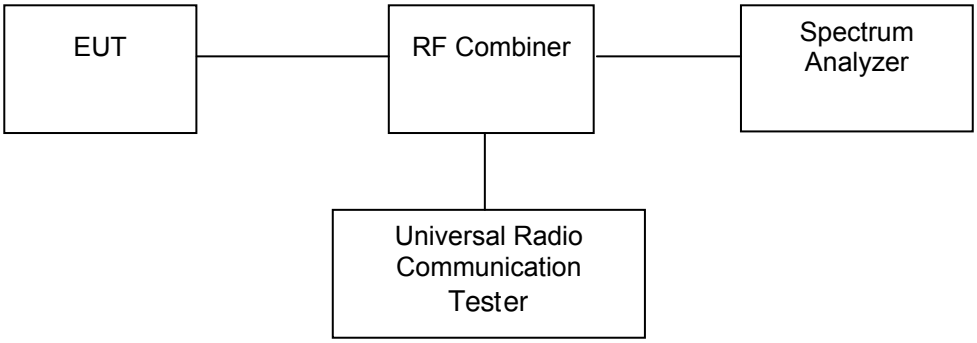
Operating Environment **:**

Temperature:	22.5 °C
Humidity:	52.3% RH
Atmospheric Pressure:	101.2kPa

7.2 Test Procedure

The RF output of the transmitter was connected to the wireless test set and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 3 kHz (Cellular /PCS) and the 26 dB & 99%bandwidth was recorded.



7.3 Test Result

Cellular Band (Part 22H)

Test Mode		Channel	Frequency (MHz)	99% Occupied Bandwidth(kHz)	26 dB Emission Bandwidth(kHz)
GSM 850		128	824.2	247.56	316.68
		190	836.6	247.61	316.70
		251	848.8	247.57	316.66
GPRS		128	824.2	243.55	314.45
		190	836.6	243.56	314.50
		251	848.8	243.55	314.47
WCDMA Band V	RMC12.2k	4132	826.4	4.14	4.66
		4183	836.6	4.17	4.71
		4233	846.6	4.17	4.69
	HSDPA(16QAM)	4132	826.4	4.15	4.64
		4183	836.6	4.16	4.69
		4233	846.6	4.15	4.66
	HSUPA(BPSK)	4132	826.4	4.16	4.65
		4183	836.6	4.16	4.68
		4233	846.6	4.13	4.66

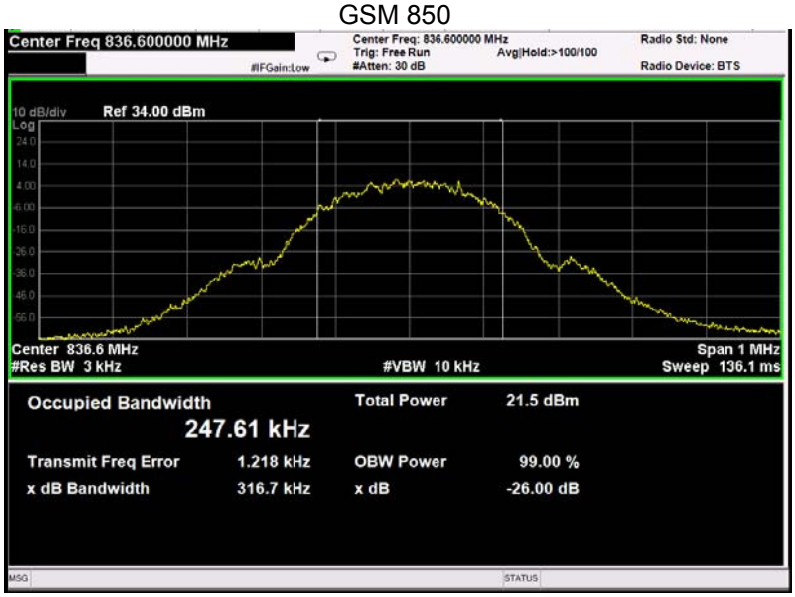
Cellular Band (Part 24E)

Test Mode		Channel	Frequency (MHz)	99% Occupied Bandwidth(kHz)	26 dB Emission Bandwidth(kHz)
PCS 1900		512	1850.20	246.00	316.99
		661	1880.00	246.00	317.00
		810	1909.80	245.97	316.97
GPRS		512	1850.20	246.65	316.76
		661	1880.00	246.68	316.80
		810	1909.80	246.64	316.76
WCDMA Band II	RMC12.2k	9262	1852.40	4.12	4.64
		9400	1880.00	4.15	4.67
		9538	1907.60	4.11	4.63
	HSDPA(16QAM)	9262	1852.40	4.12	4.60
		9400	1880.00	4.13	4.64
		9538	1907.60	4.11	4.62
	HSUPA(BPSK)	9262	1852.40	4.09	4.59
		9400	1880.00	4.13	4.64
		9538	1907.60	4.10	4.63

Test Plots

Cellular Band (Part 22H)

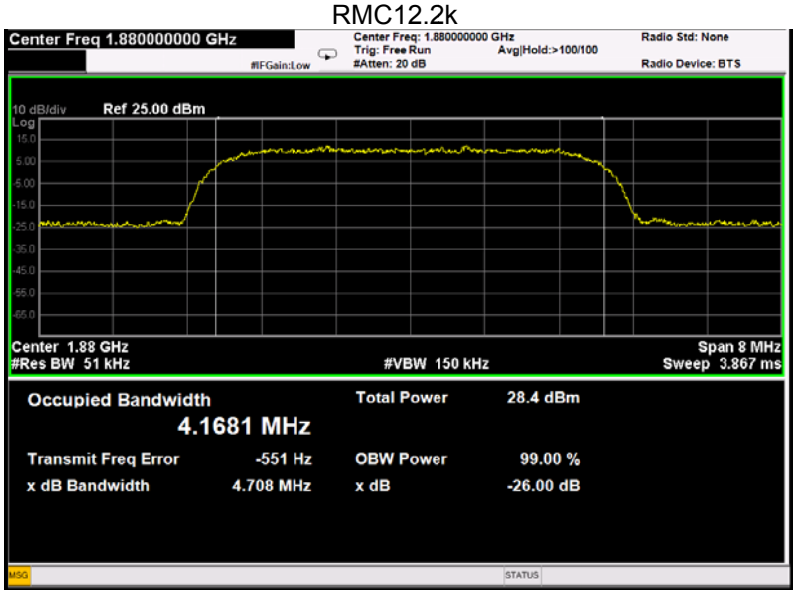
GSM 850



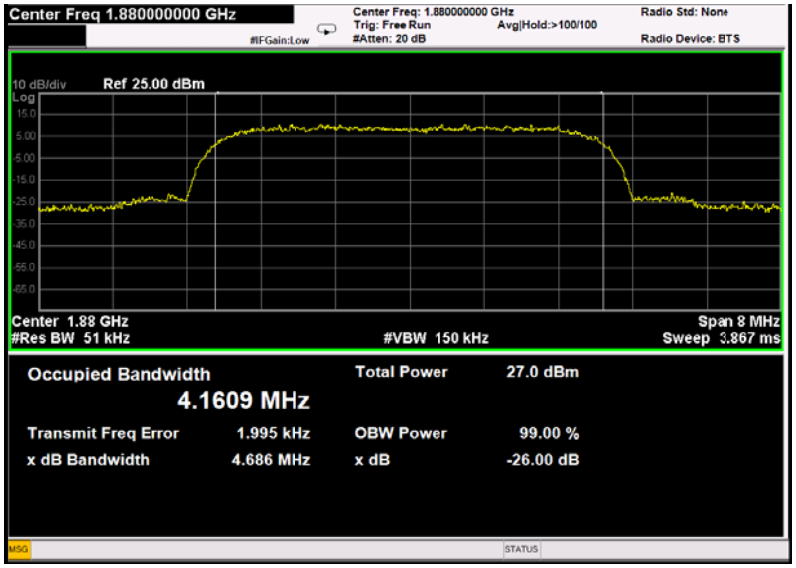
GPRS

WCDMA band V

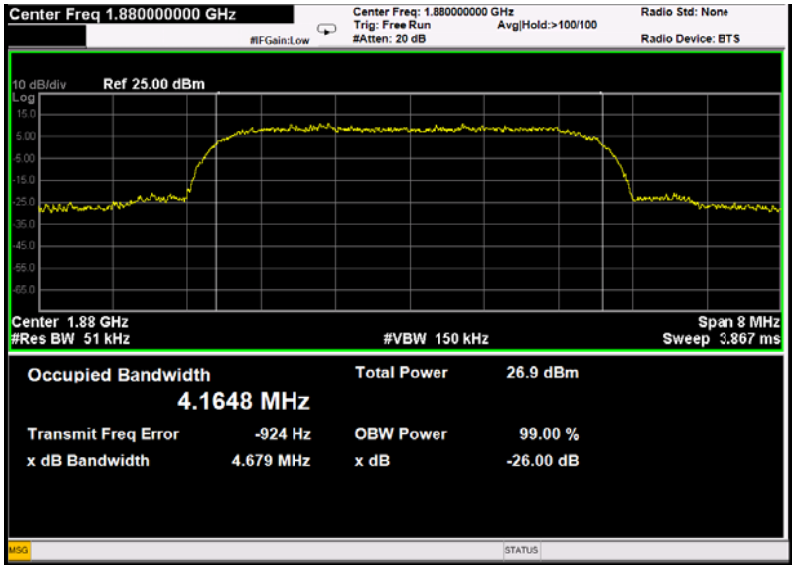
RMC12.2k



HSDPA

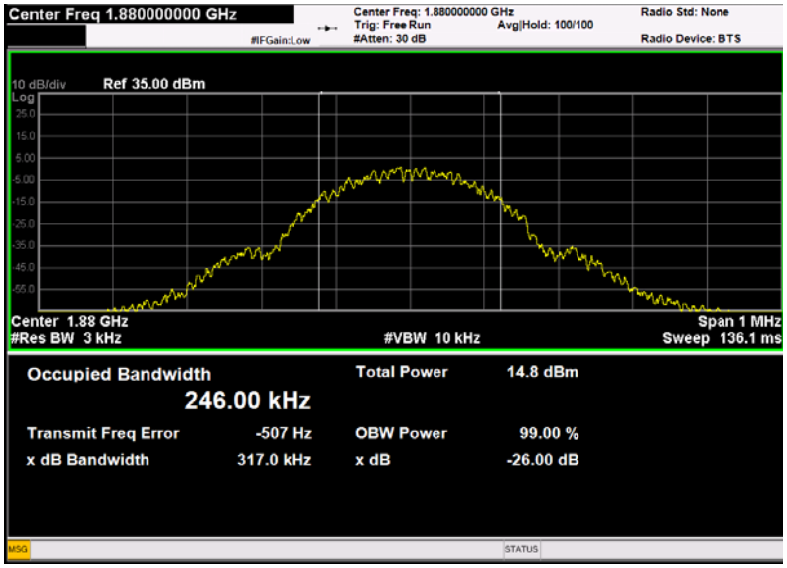


HSUPA

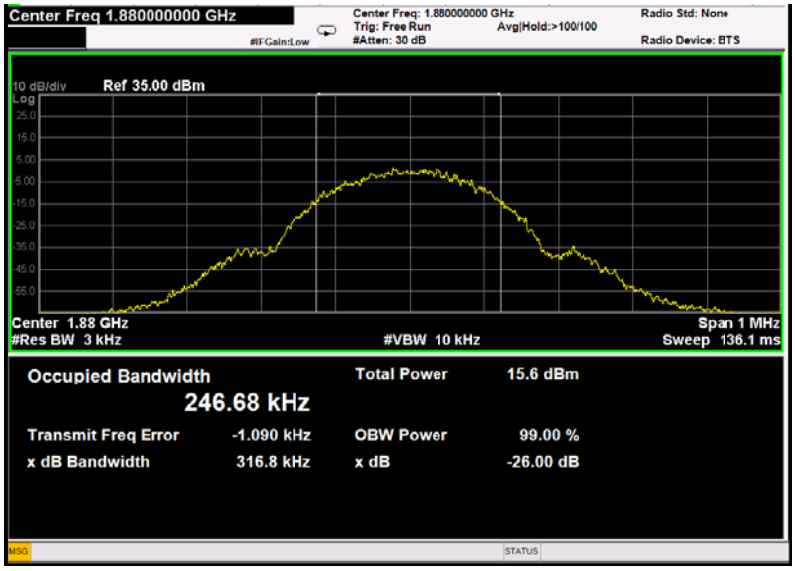


Cellular Band (Part 24E)

PCS 1900

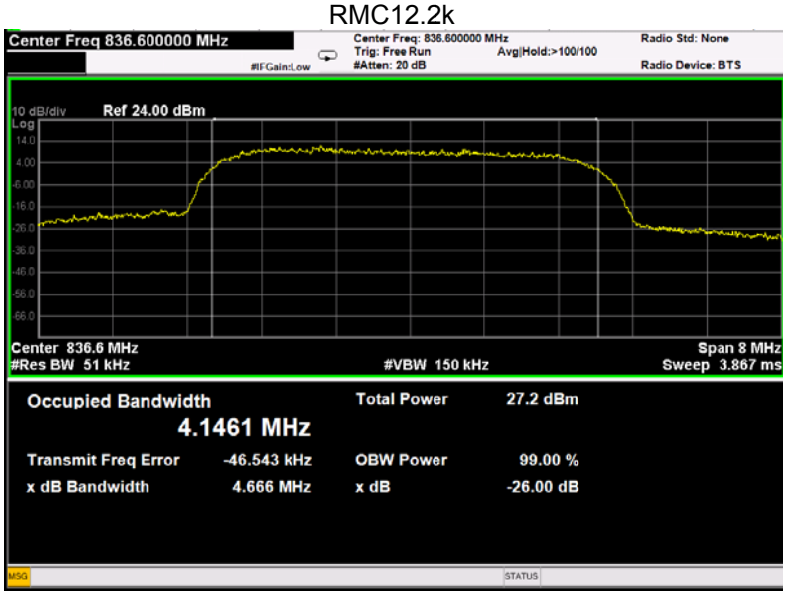


GPRS

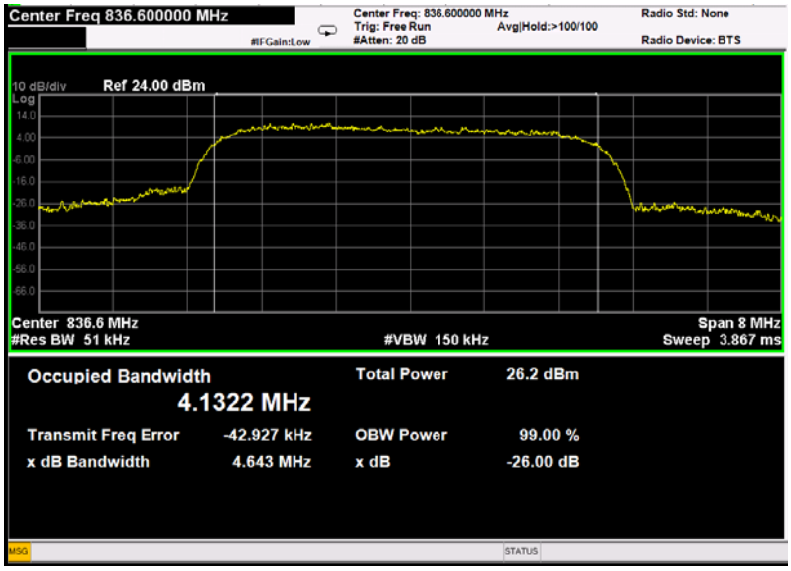


WCDMA band II

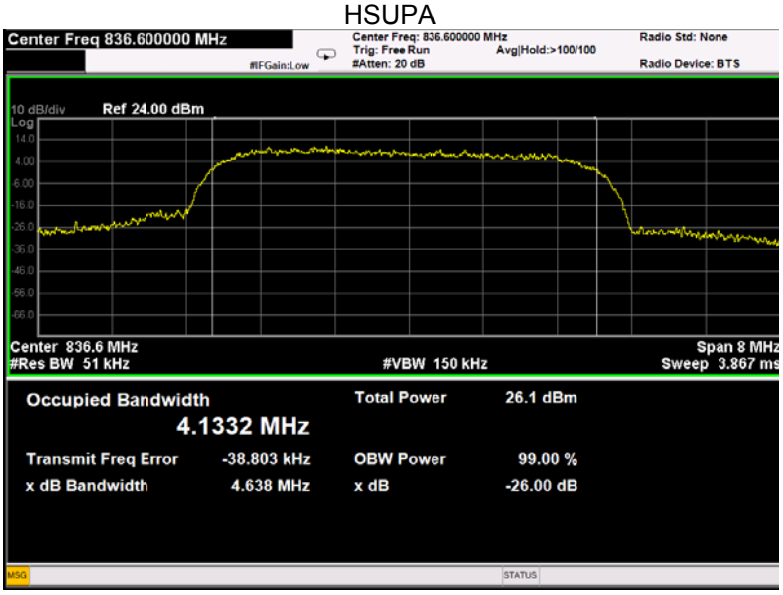
RMC12.2k



HSDPA


Center Freq 836.600000 MHz
Center Freq: 836.600000 MHz
Trig: Free Run
Avg|Hold:>100/100
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
10 dB/div
Ref 24.00 dBm
Log
Center 836.6 MHz
#Res BW 51 kHz
#VBW 150 kHz
Span 8 MHz
Sweep 3.867 ms
Occupied Bandwidth
4.1322 MHz
Total Power 26.2 dBm
Transmit Freq Error -42.927 kHz
OBW Power 99.00 %
x dB Bandwidth 4.643 MHz
x dB -26.00 dB
MSG
STATUS

HSUPA


Center Freq 836.600000 MHz
Center Freq: 836.600000 MHz
Trig: Free Run
Avg|Hold:>100/100
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
10 dB/div
Ref 24.00 dBm
Log
Center 836.6 MHz
#Res BW 51 kHz
#VBW 150 kHz
Span 8 MHz
Sweep 3.867 ms
Occupied Bandwidth
4.1332 MHz
Total Power 26.1 dBm
Transmit Freq Error -38.803 kHz
OBW Power 99.00 %
x dB Bandwidth 4.638 MHz
x dB -26.00 dB
MSG
STATUS

8 Spurious Emissions at Antenna Terminals

Test Requirement:	FCC Part 2.1051,22.917(a),24.238(a)
Test Method:	ANSI C63.4:2014, TIA/EIA-603-D:2010
Test Mode:	Transmitting

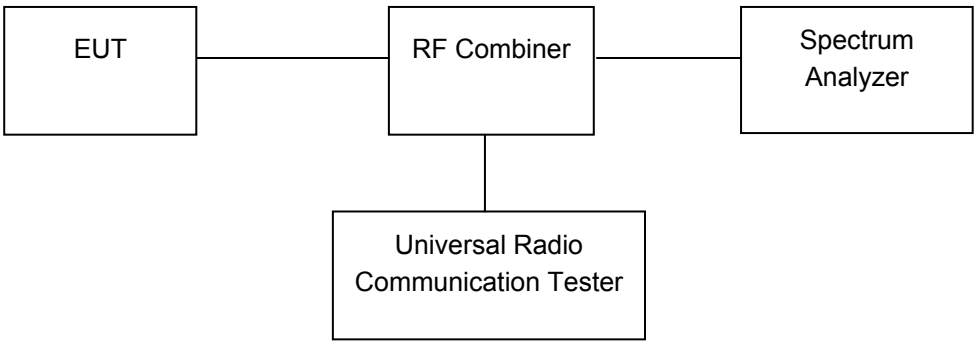
8.1 EUT Operation

Operating Environment **:**

Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.3kPa

8.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.

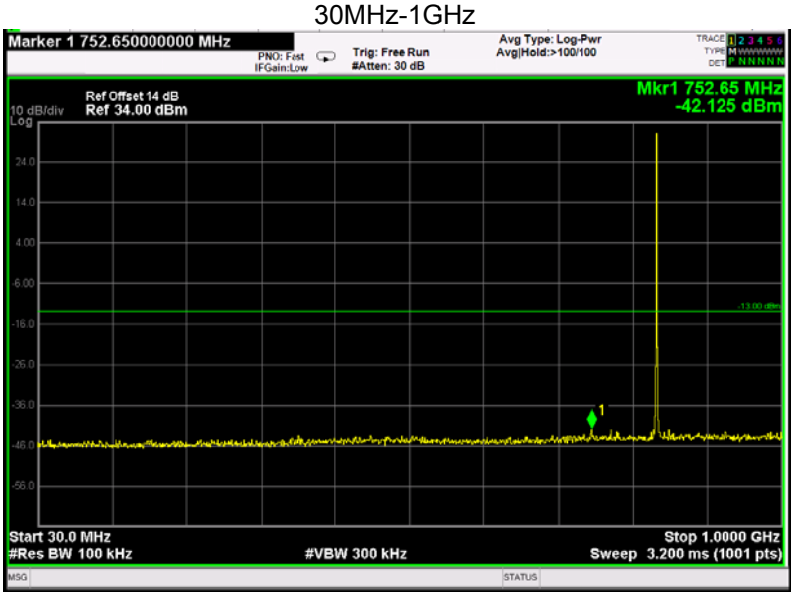


8.3 Test Result

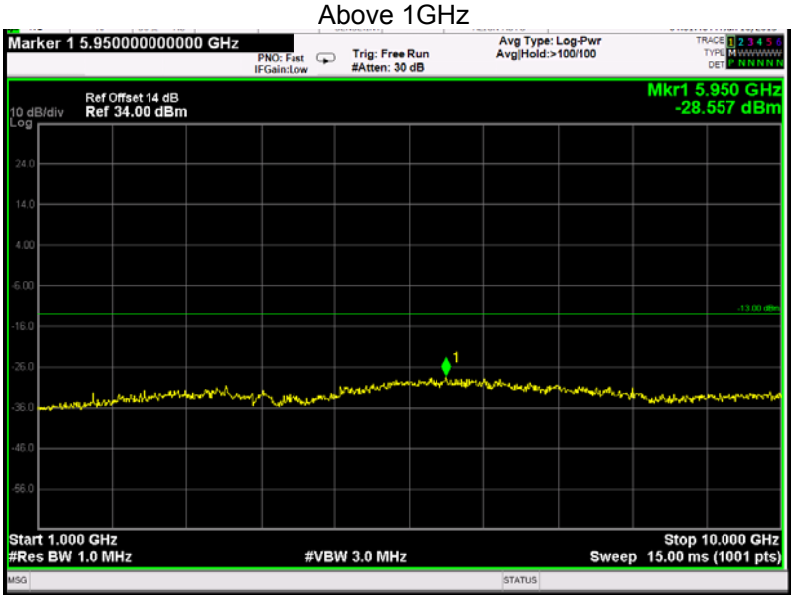
Cellular Band (Part 22H)

GSM 850 Low channel

30MHz-1GHz

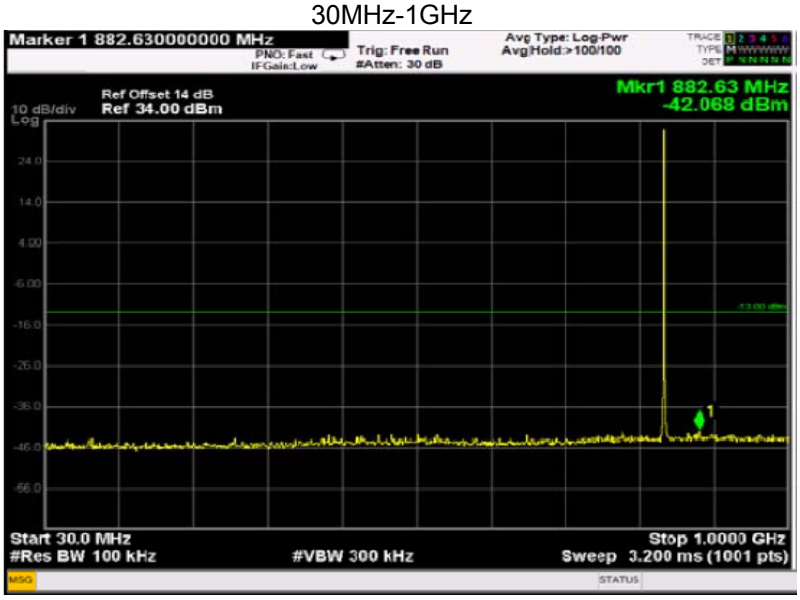


Above 1GHz

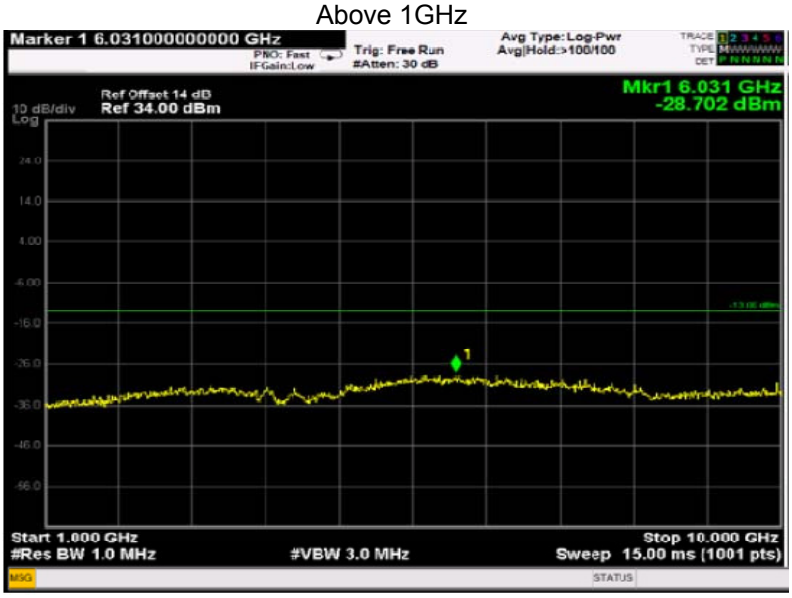


GSM 850 Middle channel

30MHz-1GHz

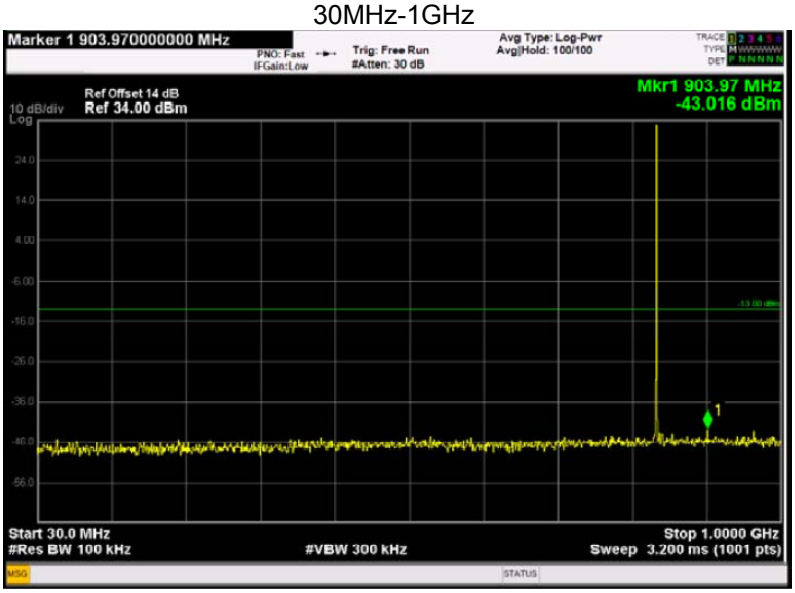


Above 1GHz

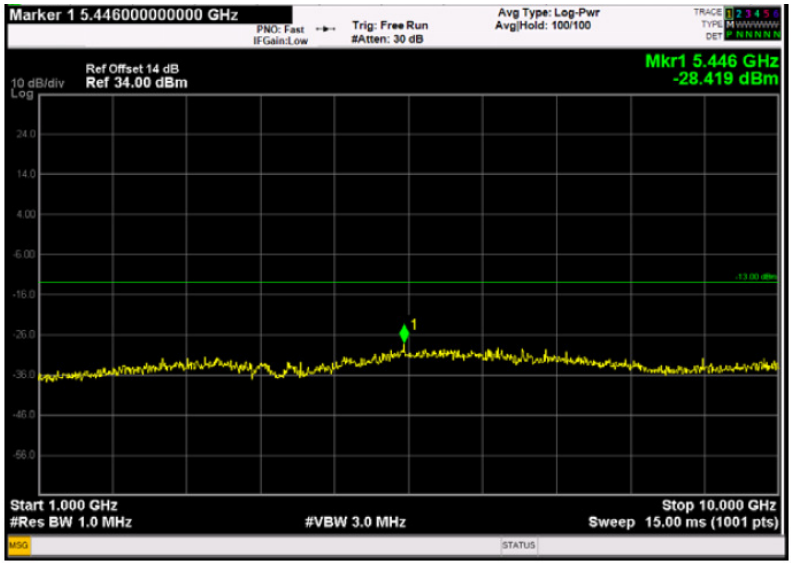


GSM 850 High channel

30MHz-1GHz

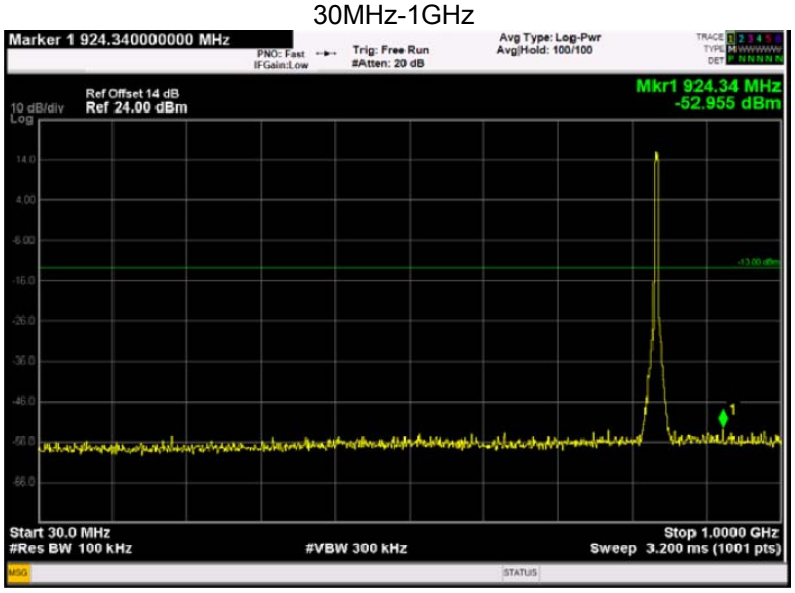


Above 1GHz

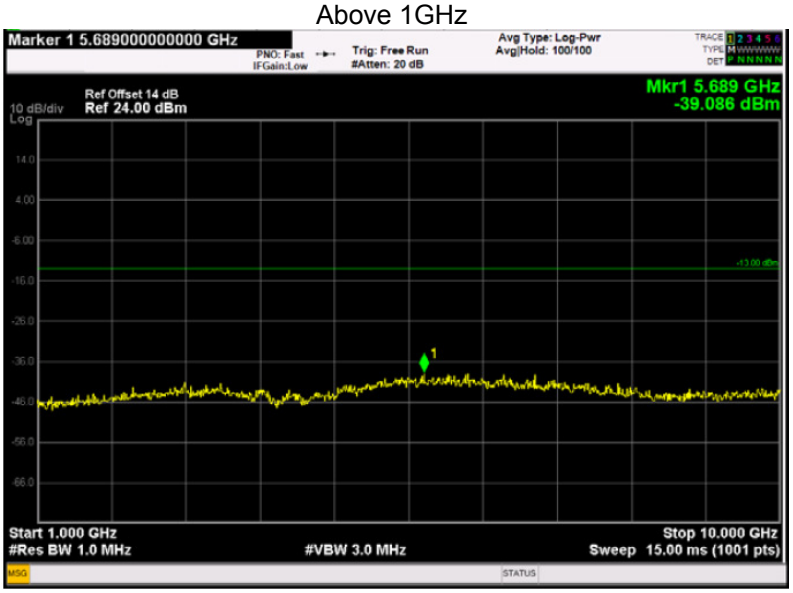


WCDMA band V Low channel

30MHz-1GHz

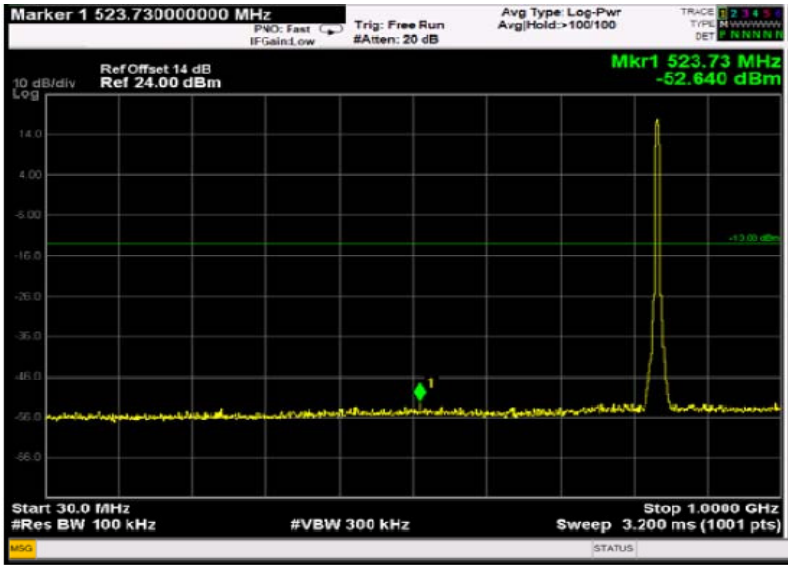


Above 1GHz

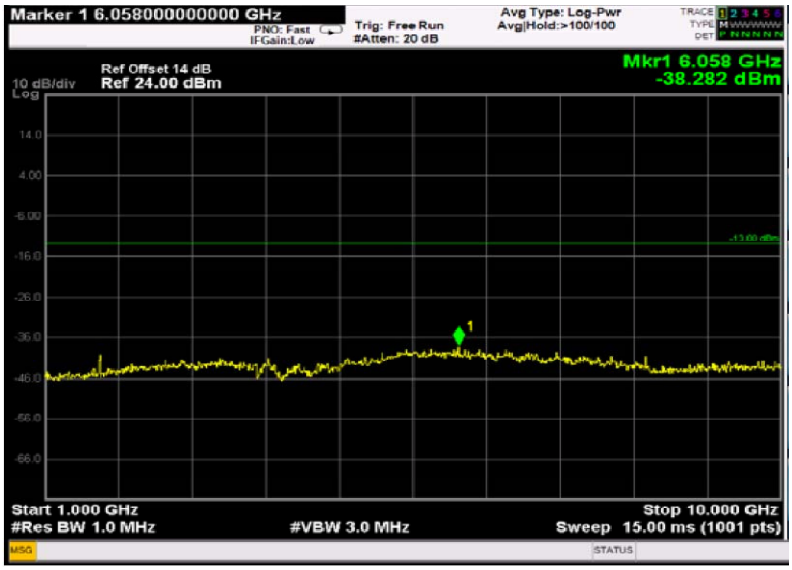


WCDMA band V Middle channel

30MHz-1GHz

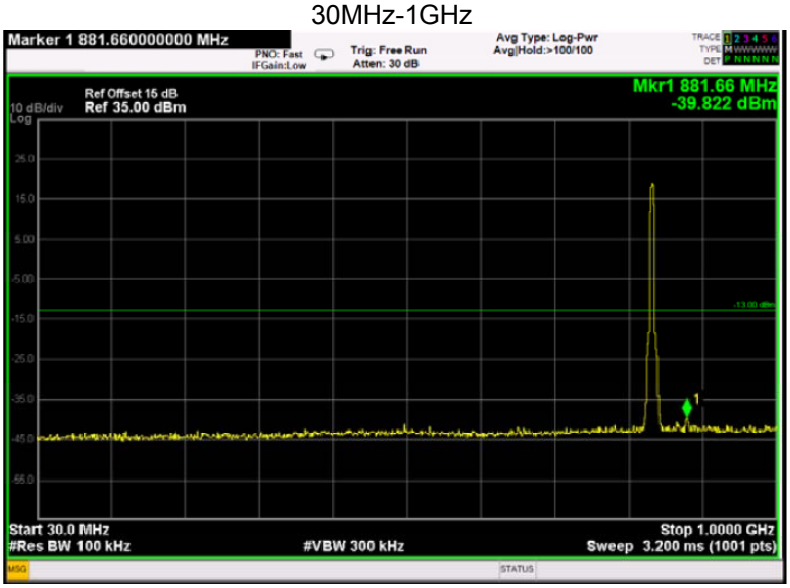


Above 1GHz

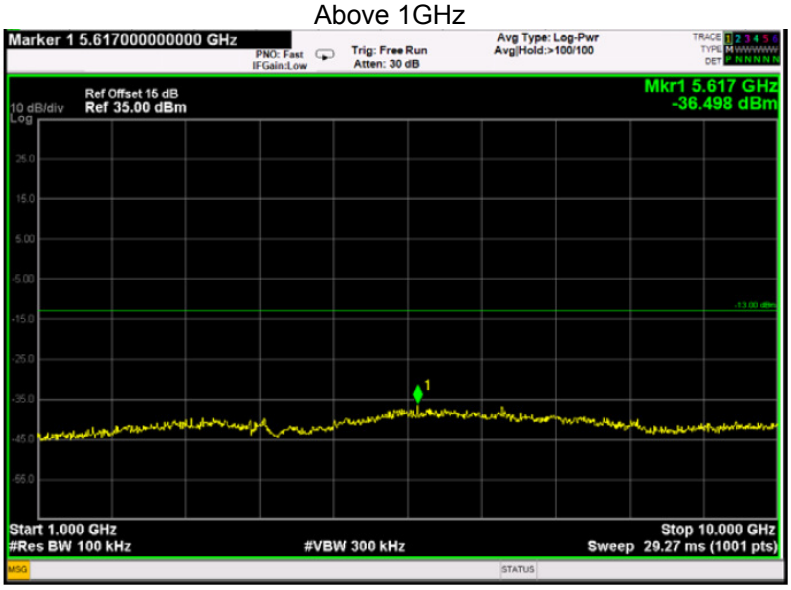


WCDMA band V High channel

30MHz-1GHz



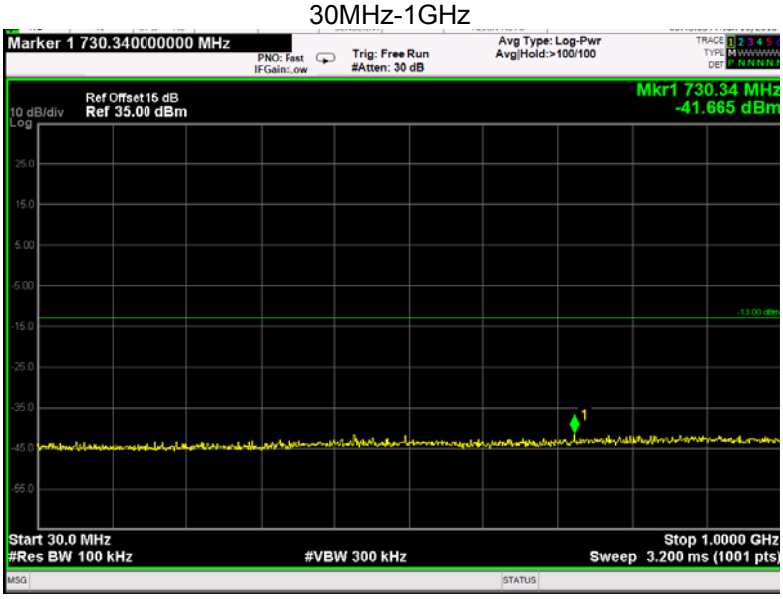
Above 1GHz



Cellular Band (Part 24E)

PCS 1900 Low channel

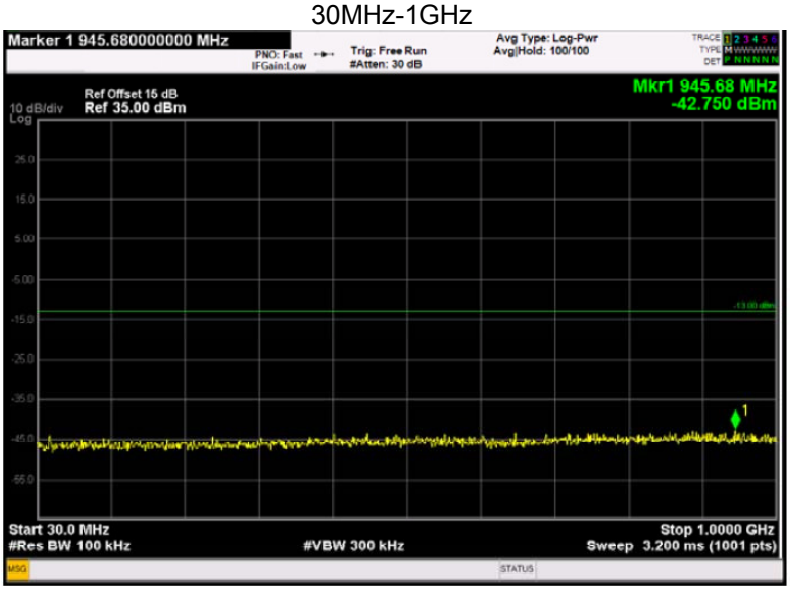
30MHz-1GHz



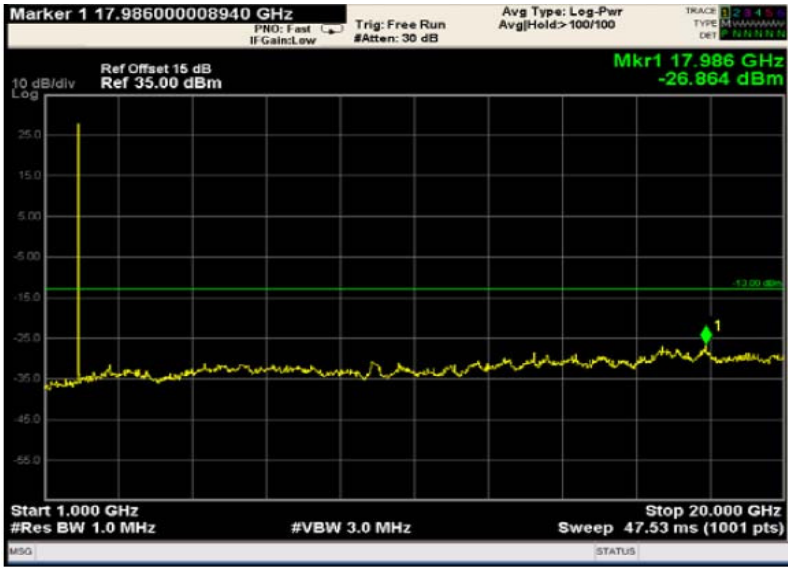
Above 1GHz

PCS 1900 Middle channel

30MHz-1GHz

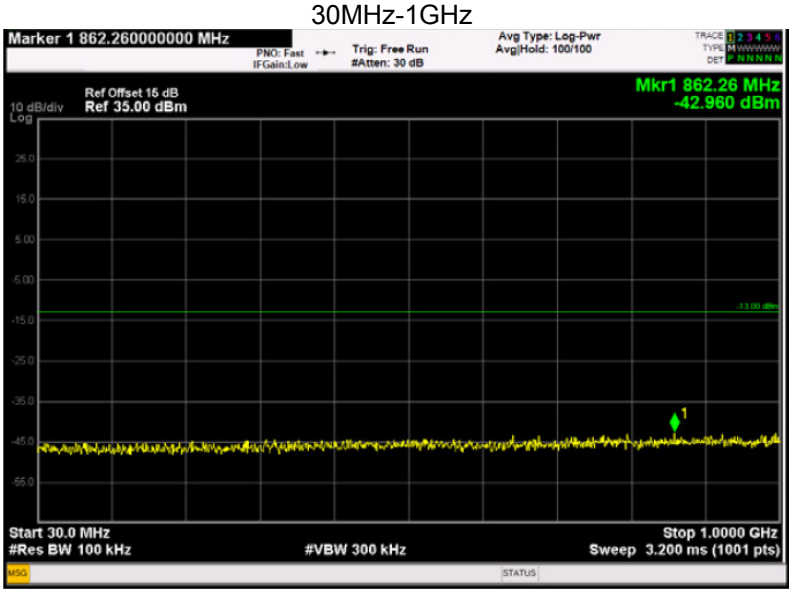


Above 1GHz

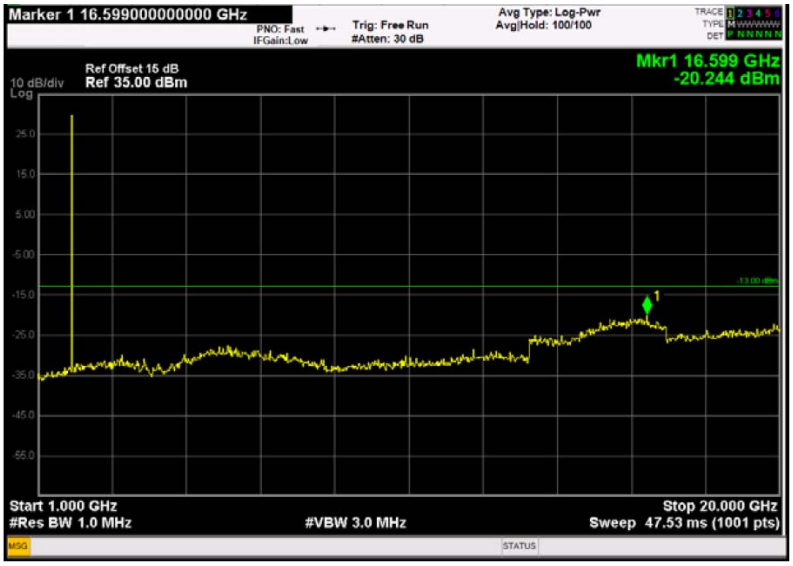


PCS 1900 High channel

30MHz-1GHz

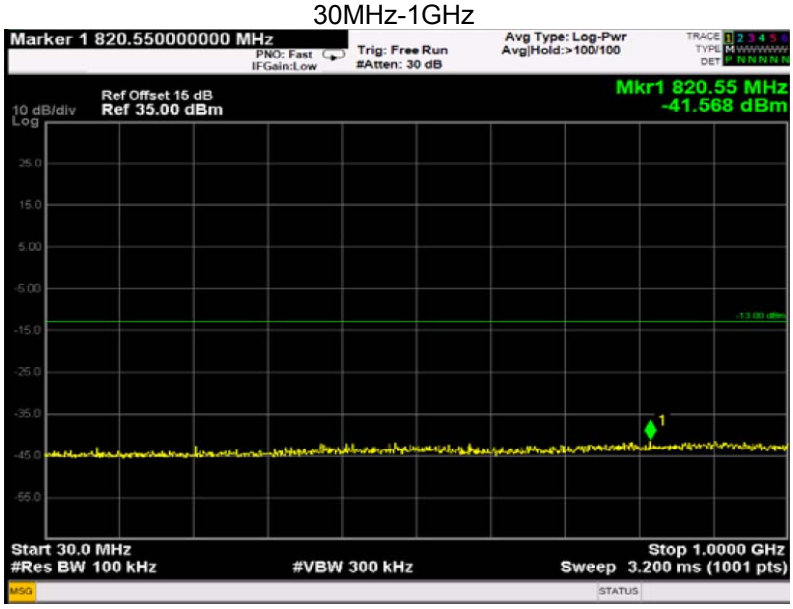


Above 1GHz

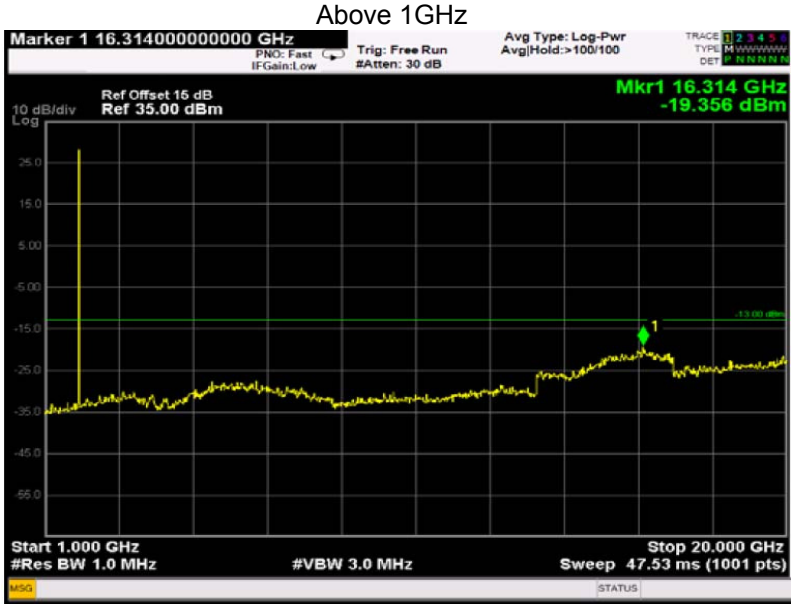


WCDMA band II Low channel

30MHz-1GHz

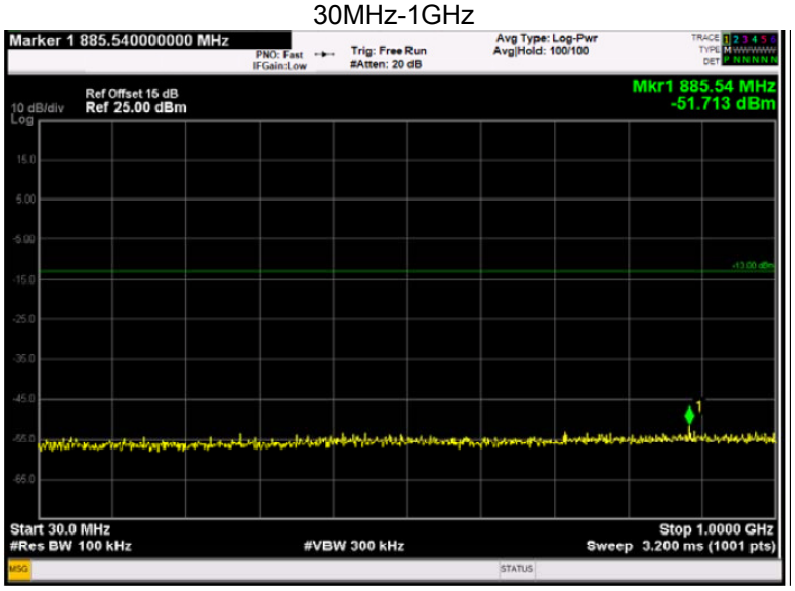


Above 1GHz

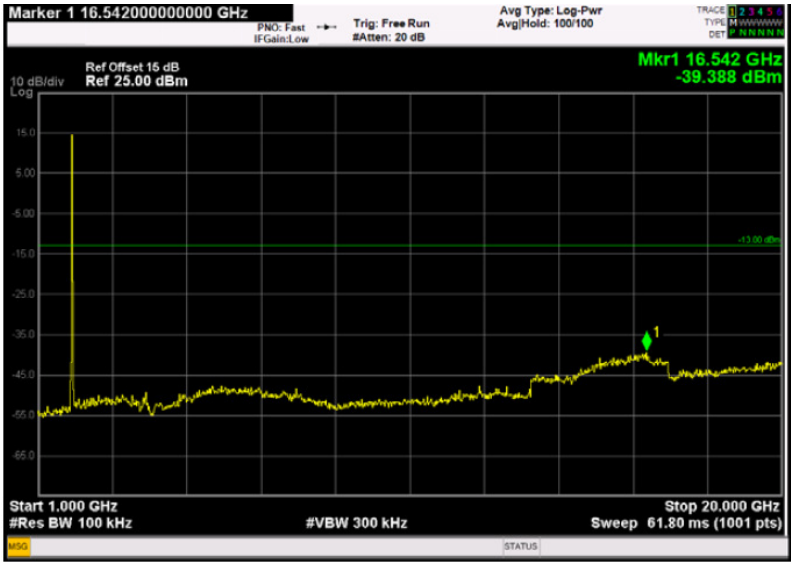


WCDMA band II Middle channel

30MHz-1GHz

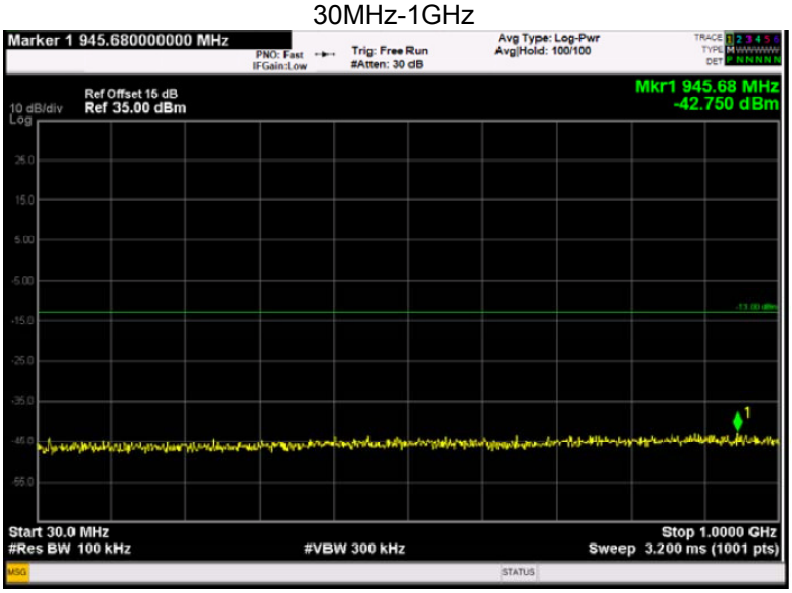


Above 1GHz

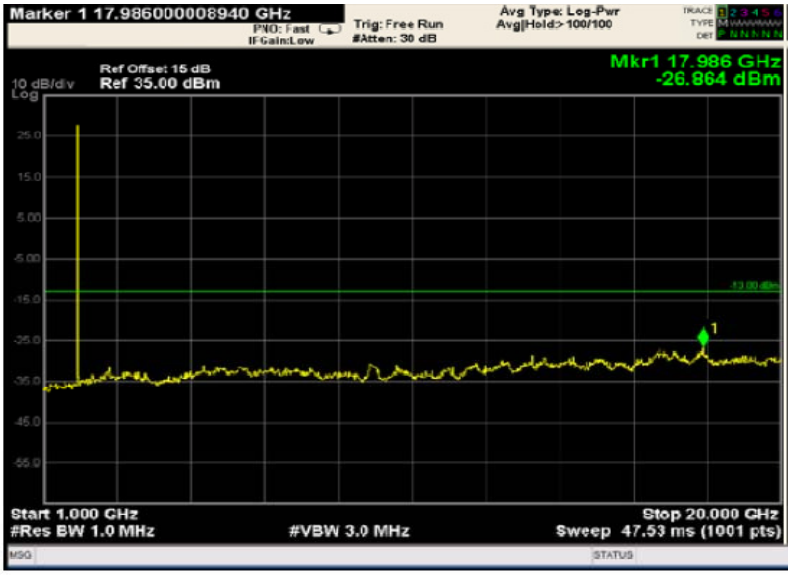


WCDMA band II High channel

30MHz-1GHz



Above 1GHz



9 Spurious Radiated Emissions

Test Requirement:	FCC Part 2.1053, 22.917, 24.238.
Test Method:	TIA/EIA-603-D:2010
Test Mode:	Transmitting

9.1 EUT Operation

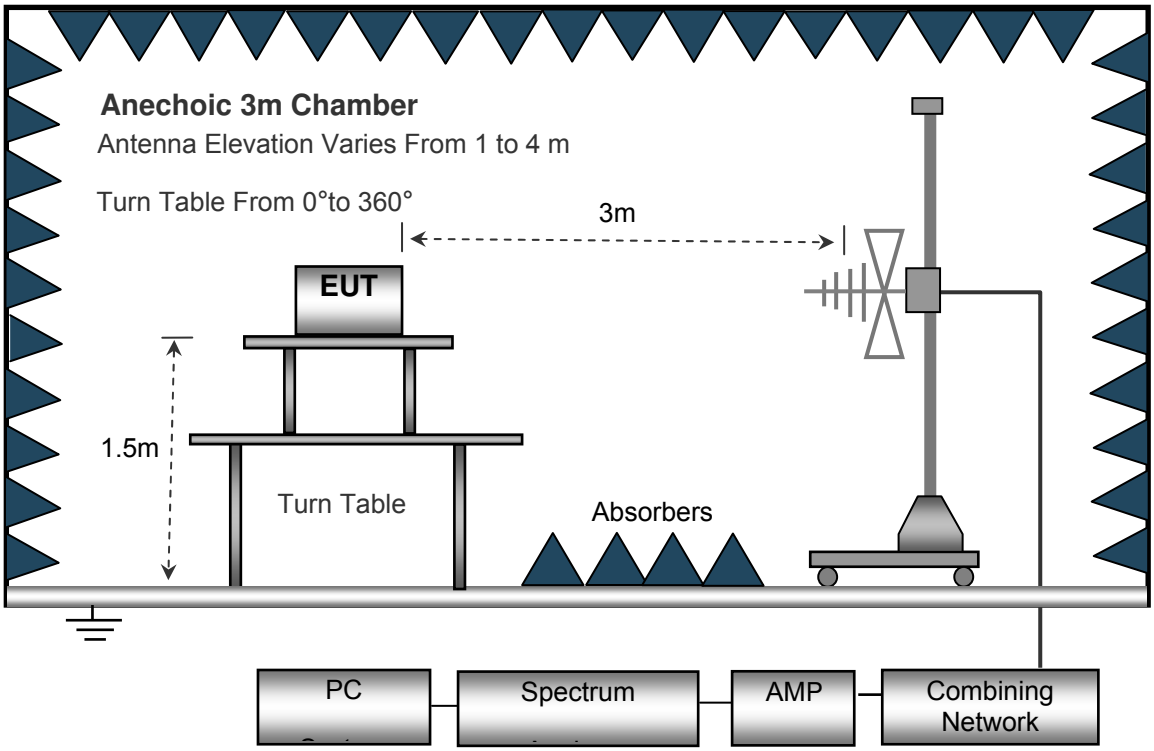
Operating Environment **:**

Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.2kPa

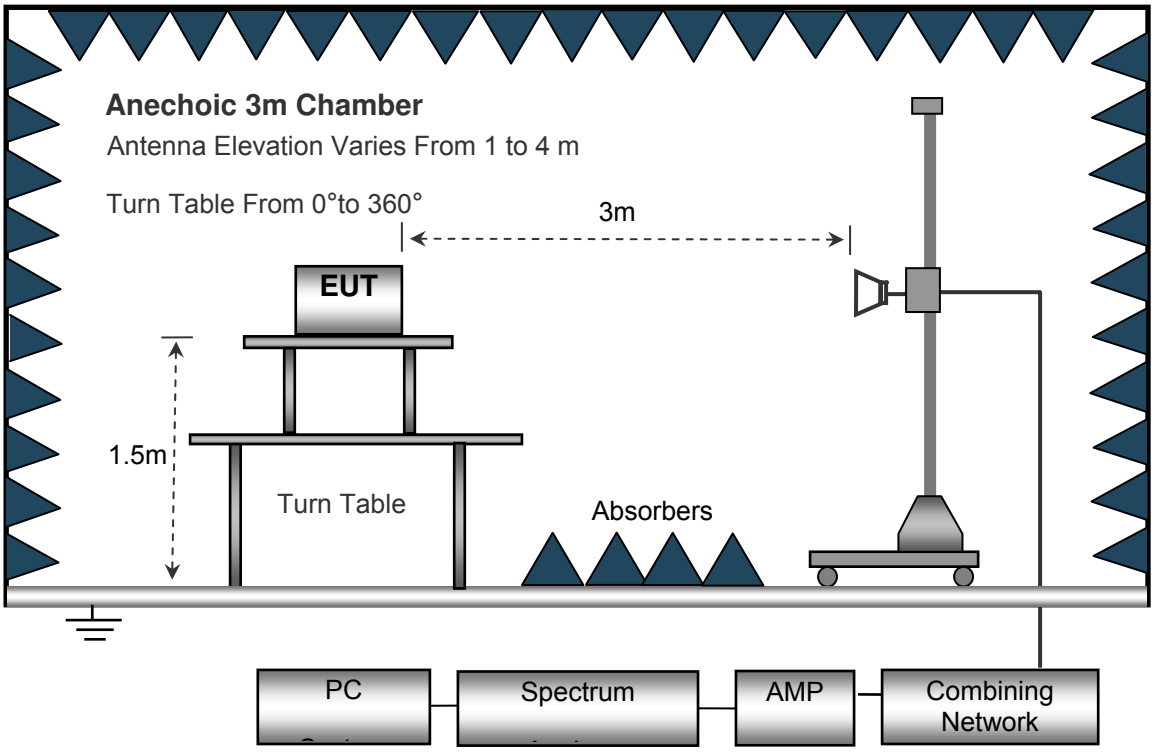
9.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

30MHz ~ 1GHz

Sweep Speed..... Auto
Detector.....PK
Resolution Bandwidth 100kHz
Video Bandwidth 300kHz

Above 1GHz

Sweep Speed..... Auto
Detector.....PK
Resolution Bandwidth 1MHz
Video Bandwidth 3MHz
Detector.....Ave.
Resolution Bandwidth 1MHz
Video Bandwidth 10Hz

9.4 Test Procedure

1. The EUT is placed on a turntable, which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from 30MHz up to the tenth harmonic of the highest fundamental frequency.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.
7. 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 lg (TXpwr in Watts/0.001) – the absolute level
   Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts)
8. Repeat above procedures until the measurements for all frequencies are completed.

9.5 Summary of Test Results

Remark: Test performed from 30MHz to 10th harmonics with low/middle/high channels

Cellular Band (Part 22H)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
GSM 850 Channel 128										
365.9	41.52	43	1.1	H	-57.31	0.20	0.00	-57.51	-13	-44.51
365.9	49.79	107	1.9	V	-50.04	0.20	0.00	-50.24	-13	-37.24
1648.4	70.80	306	1.8	H	-43.17	2.58	9.40	-36.35	-13	-23.35
1648.4	61.10	211	1.3	V	-52.43	2.58	9.40	-45.61	-13	-32.61
2472.6	58.22	238	2.0	H	-55.78	2.86	10.60	-48.04	-13	-35.04
2472.6	48.02	344	1.1	V	-62.26	2.86	10.60	-54.52	-13	-41.52
GSM 850 Channel 190										
365.9	46.67	212	1.9	H	-52.0	0.20	0.00	-52.16	-13	-39.16
365.9	41.56	232	1.4	V	-58.1	0.20	0.00	-58.27	-13	-45.27
1673.2	62.15	268	1.5	H	-45.4	2.64	9.40	-38.61	-13	-25.61
1673.2	51.33	67	1.4	V	-55.5	2.64	9.42	-48.75	-13	-35.73
2509.8	55.15	309	1.8	H	-51.6	2.90	10.60	-43.80	-13	-30.86
2509.8	47.32	84	1.9	V	-61.0	2.90	10.60	-53.30	-13	-40.26
GSM 850 Channel 251										
365.9	40.63	239	2.0	H	-58.20	0.20	0.00	-58.40	-13	-45.40
365.9	49.14	251	1.0	V	-50.69	0.20	0.00	-50.89	-13	-37.89
1697.6	62.51	68	2.1	H	-51.46	2.68	9.40	-44.74	-13	-31.74
1697.6	52.47	229	1.9	V	-61.06	2.68	9.40	-54.34	-13	-41.34
2546.4	48.64	116	1.7	H	-65.36	2.92	10.60	-57.68	-13	-44.68
2546.4	38.81	301	1.8	V	-71.47	2.92	10.60	-63.79	-13	-50.79
Remark	1) Absolute Level = SG Level - Cable loss + Antenna Gain									
	2) Margin = Limit- Absolute Level									

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
WCDMA Band V Channel 4132										
365.9	43.03	91	1.2	H	-55.80	0.20	0.00	-56.00	-13	-43.00
365.9	49.92	357	1.8	V	-49.91	0.20	0.00	-50.11	-13	-37.11
1652.8	72.00	350	1.4	H	-41.97	2.58	9.40	-35.15	-13	-22.15
1652.8	61.24	250	2.1	V	-52.29	2.58	9.40	-45.47	-13	-32.47
2479.2	56.28	298	1.5	H	-57.72	2.86	10.60	-49.98	-13	-36.98
2479.2	50.97	343	1.6	V	-59.31	2.86	10.60	-51.57	-13	-38.57
WCDMA Band V Channel 4183										
365.9	46.88	79	1.8	H	-51.8	0.20	0.00	-51.95	-13	-38.95
365.9	41.76	345	1.4	V	-57.9	0.20	0.00	-58.07	-13	-45.07
1673.2	64.05	198	1.2	H	-41.6	2.64	9.40	-34.82	-13	-21.82
1673.2	52.52	278	1.4	V	-54.3	2.64	9.42	-47.53	-13	-34.51
2509.8	55.67	80	1.5	H	-51.1	2.90	10.60	-43.37	-13	-30.37
2509.8	48.43	262	1.5	V	-57.5	2.90	10.60	-49.83	-13	-36.79
WCDMA Band V Channel 4233										
365.9	43.89	12	1.3	H	-54.94	0.20	0.00	-55.14	-13	-42.14
365.9	49.20	111	2.0	V	-50.63	0.20	0.00	-50.83	-13	-37.83
1693.2	62.32	331	1.2	H	-51.65	2.68	9.40	-44.93	-13	-31.93
1693.2	52.35	314	1.1	V	-61.18	2.68	9.40	-54.46	-13	-41.46
2539.8	46.80	90	2.0	H	-67.20	2.92	10.60	-59.52	-13	-46.52
2539.8	41.21	275	1.9	V	-69.07	2.92	10.60	-61.39	-13	-48.39
Remark	1) Absolute Level = SG Level - Cable loss + Antenna Gain									
	2) Margin = Limit- Absolute Level									

Cellular Band (Part 24E)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
PCS 1900 Channel 512										
365.9	47.51	247	1.5	H	-51.32	0.20	0.00	-51.52	-13	-38.52
365.9	42.70	114	1.5	V	-57.13	0.20	0.00	-57.33	-13	-44.33
3700.4	65.95	257	1.7	H	-45.59	3.14	12.50	-36.23	-13	-23.23
3700.4	59.98	129	1.6	V	-49.83	3.14	12.50	-40.47	-13	-27.47
5550.6	53.58	251	2.0	H	-56.03	3.41	12.90	-46.54	-13	-33.54
5550.6	44.73	279	1.2	V	-64.15	3.41	12.90	-54.66	-13	-41.66
PCS 1900 Channel 661										
365.9	48.63	315	1.1	H	-50.0	0.20	0.00	-50.20	-13	-37.20
365.9	41.69	164	1.5	V	-57.9	0.20	0.00	-58.10	-13	-45.10
3760.0	61.95	346	1.6	H	-43.7	3.16	12.50	-34.36	-13	-21.36
3760.0	52.22	220	1.9	V	-54.6	3.16	12.52	-45.24	-13	-32.24
5640.0	56.39	79	1.2	H	-50.3	3.44	12.90	-40.84	-13	-27.84
5640.0	49.20	75	1.9	V	-56.8	3.44	12.90	-47.24	-13	-34.34
PCS 1900 Channel 810										
365.9	48.67	20	1.9	H	-50.16	0.15	0.00	-50.31	-13	-37.31
365.9	41.53	341	1.7	V	-58.30	0.15	0.00	-58.45	-13	-45.45
3819.6	58.00	261	2.0	H	-53.54	2.16	12.50	-43.20	-13	-30.20
3819.6	52.33	113	1.3	V	-57.48	3.16	12.50	-48.14	-13	-35.14
5729.4	46.27	168	1.4	H	-63.34	3.48	12.90	-53.92	-13	-40.92
5729.4	37.15	178	2.0	V	-71.73	3.48	12.90	-62.31	-13	-49.31
Remark	1) Absolute Level = SG Level - Cable loss + Antenna Gain									
	2) Margin = Limit- Absolute Level									

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
WCDMA Band II Channel 9262										
365.9	48.48	354	1.9	H	-50.35	0.20	0.00	-50.55	-13	-37.55
365.9	40.84	318	1.6	V	-58.99	0.20	0.00	-59.19	-13	-46.19
3704.8	65.95	37	1.7	H	-45.59	3.14	12.50	-36.23	-13	-23.23
3704.8	59.98	39	1.6	V	-49.83	3.14	12.50	-40.47	-13	-27.47
5557.2	53.58	322	1.2	H	-56.03	3.41	12.90	-46.54	-13	-33.54
5557.2	44.73	61	1.4	V	-64.15	3.41	12.90	-54.66	-13	-41.66
WCDMA Band II Channel 9400										
365.9	46.39	315	1.1	H	-52.44	0.2	0	-52.64	-13	-39.64
365.9	39.75	164	1.5	V	-60.08	0.2	0	-60.28	-13	-47.28
3760.0	58.69	346	1.6	H	-52.85	3.16	12.52	-43.49	-13	-30.49
3760.0	53.50	220	1.9	V	-56.31	3.16	12.52	-46.95	-13	-33.95
5640.0	45.74	79	1.2	H	-63.87	3.44	12.96	-54.35	-13	-41.35
5640.0	37.28	75	1.9	V	-71.60	3.44	12.96	-62.08	-13	-49.08
WCDMA Band II Channel 9538										
365.9	46.39	8	1.3	H	-52.44	0.20	0.00	-52.64	-13	-39.64
365.9	39.75	307	2.0	V	-60.08	0.20	0.00	-60.28	-13	-47.28
3815.2	58.69	96	1.3	H	-52.85	2.16	12.50	-42.51	-13	-29.51
3815.2	53.50	356	1.7	V	-56.31	3.16	12.50	-46.97	-13	-33.97
5722.8	45.74	212	1.4	H	-63.87	3.48	12.90	-54.45	-13	-41.45
5722.8	37.28	311	1.0	V	-71.60	3.48	12.90	-62.18	-13	-49.18
Remark	1) Absolute Level = SG Level - Cable loss + Antenna Gain									
	2) Margin = Limit- Absolute Level									

10 Band Edge Measurement

Test Requirement:	FCC Part 2.1051,22.917(a),24.238(a)
Test Method:	ANSI C63.4:2014, TIA/EIA-603-D:2010
Test Mode:	Transmitting

10.1 EUT Operation

Operating Environment **:**

Temperature:	23.5 °C
Humidity:	52.3 % RH
Atmospheric Pressure:	101.3kPa

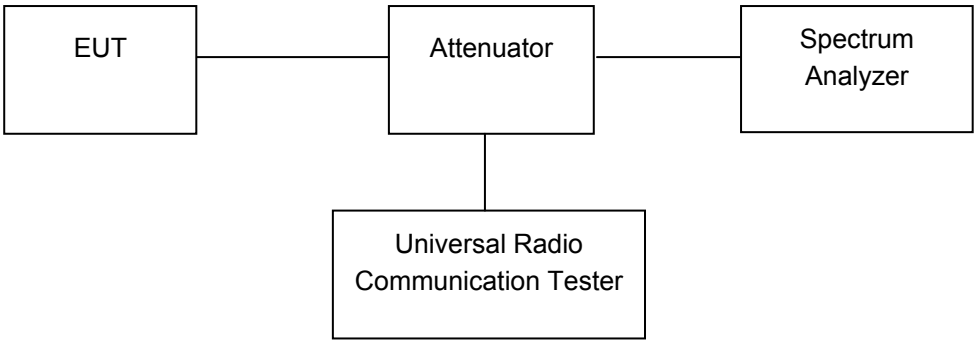
10.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

According to FCC Part 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to FCC Part 24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

The center of the spectrum analyzer was set to block edge frequency

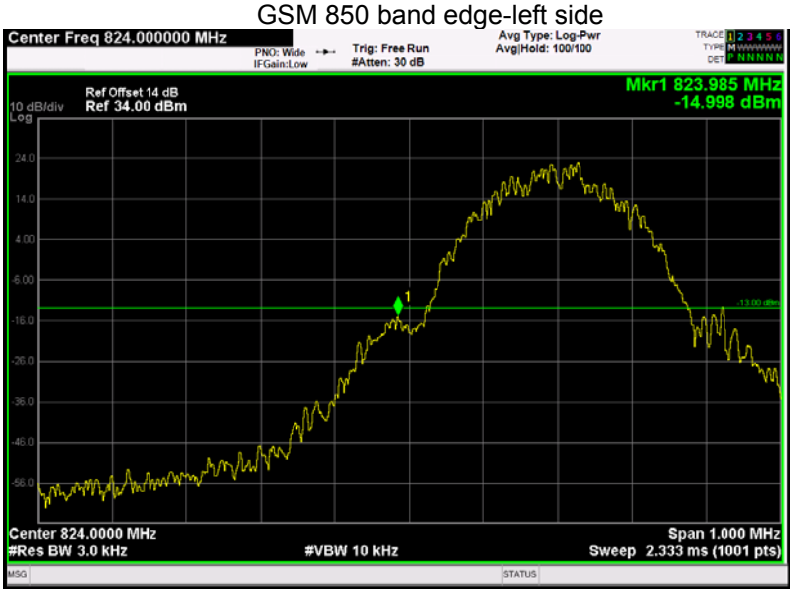


10.3 Test Result

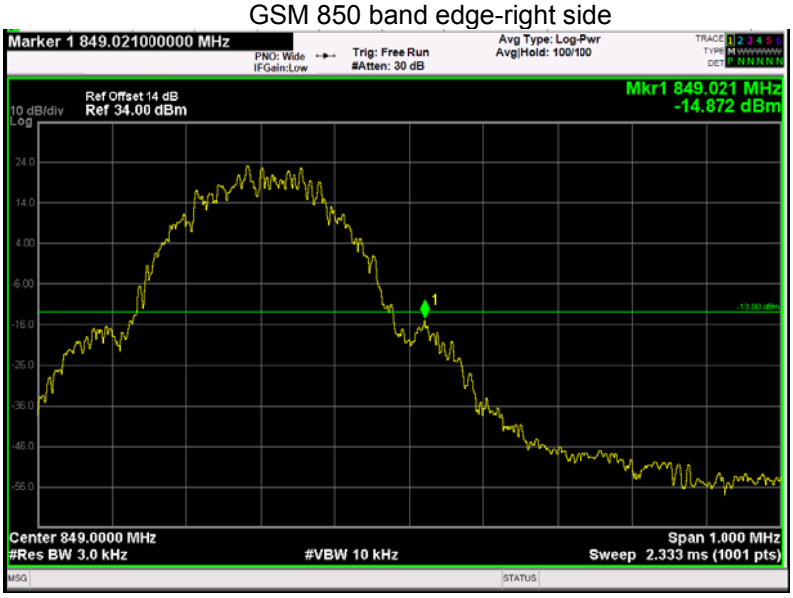
Test plots

Cellular Band (Part 22H)

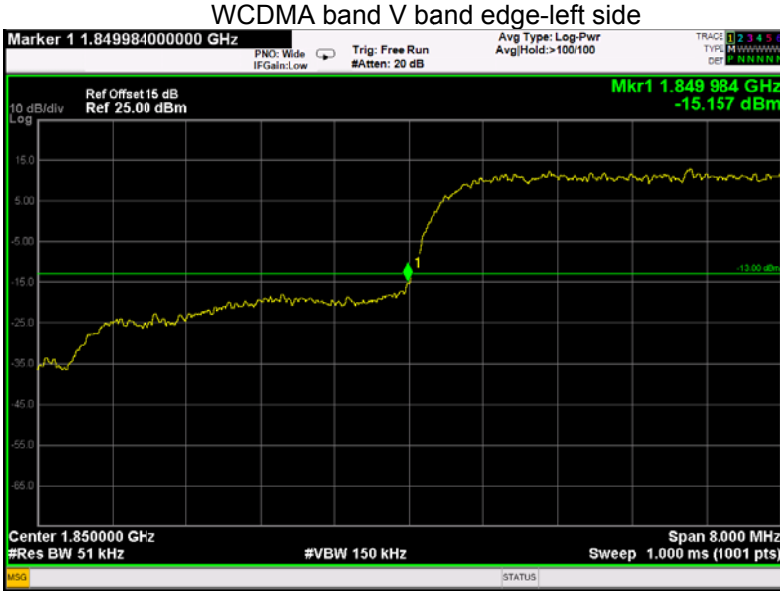
GSM 850 band edge-left side



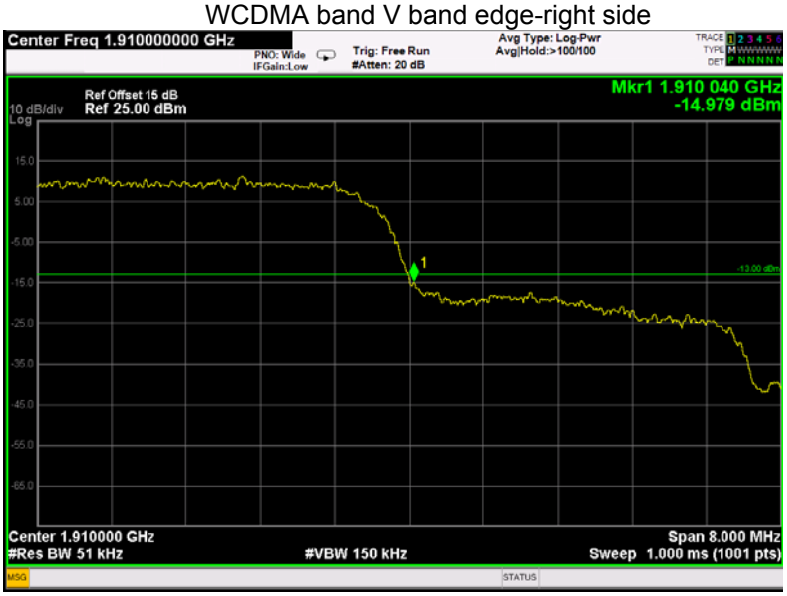
GSM 850 band edge-right side



WCDMA band V band edge-left side

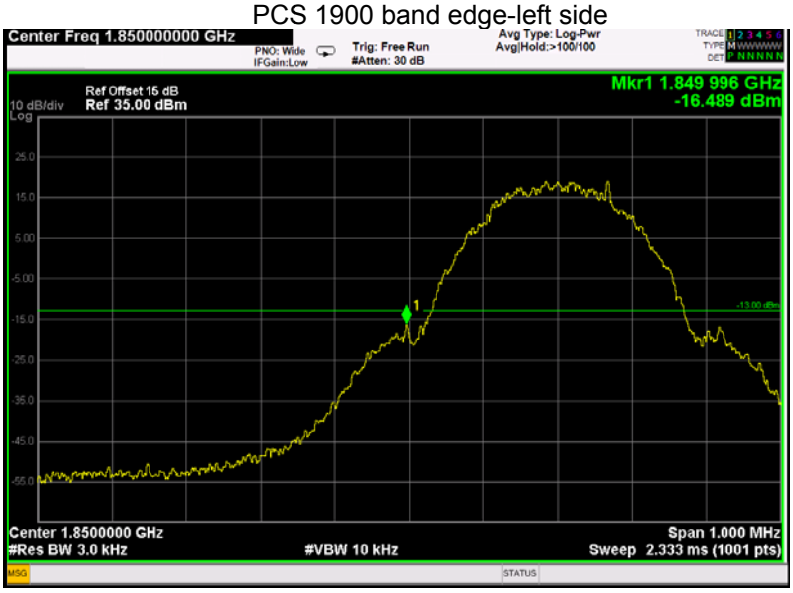


WCDMA band V band edge-right side

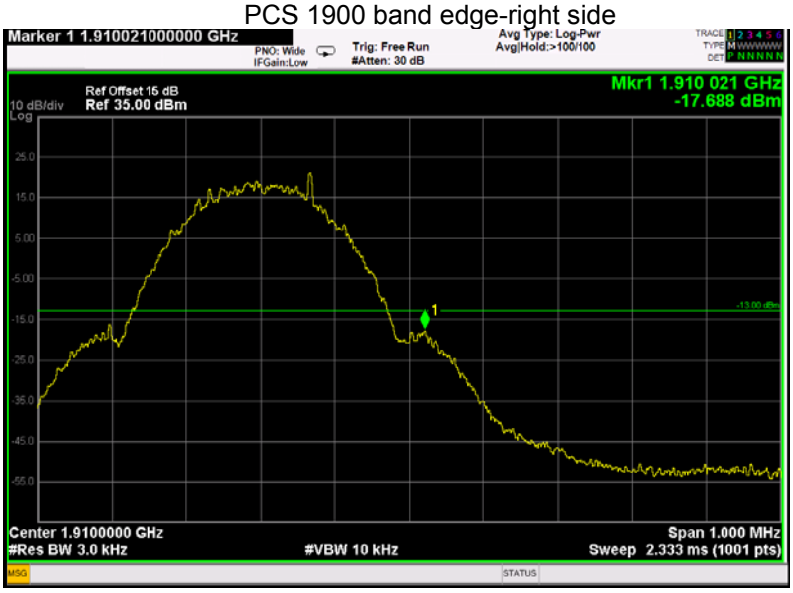


Cellular Band (Part 24E)

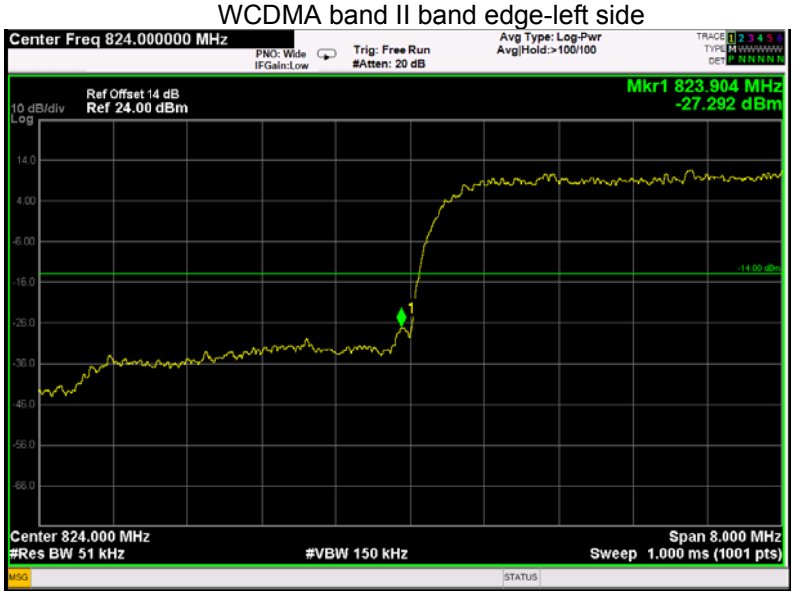
PCS 1900 band edge-left side



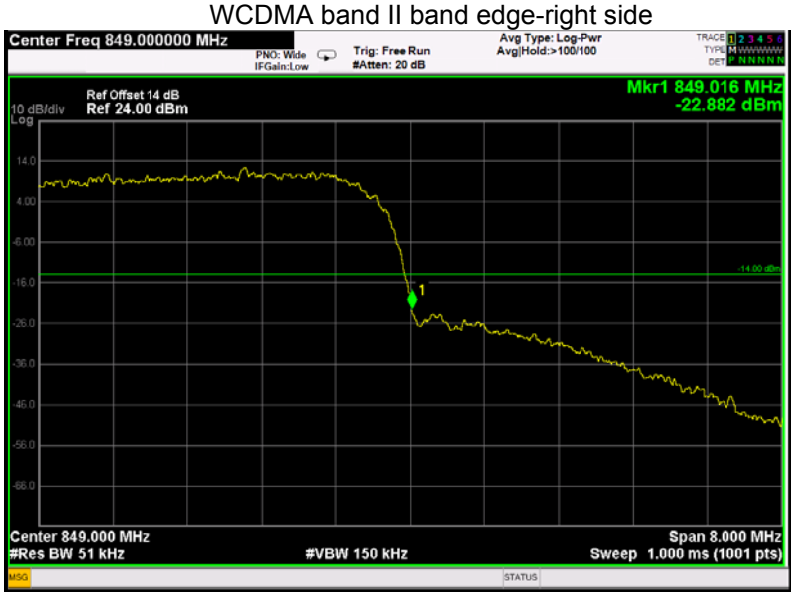
PCS 1900 band edge-right side



WCDMA band II band edge-left side



WCDMA band II band edge-right side



11 Frequency Stability

Test Requirement:	FCC Part 2.1055,22.355,24.235
Test Method:	TIA/EIA-603-D:2010
Test Mode:	Transmitting

11.1 EUT Operation

Operating Environment **:**

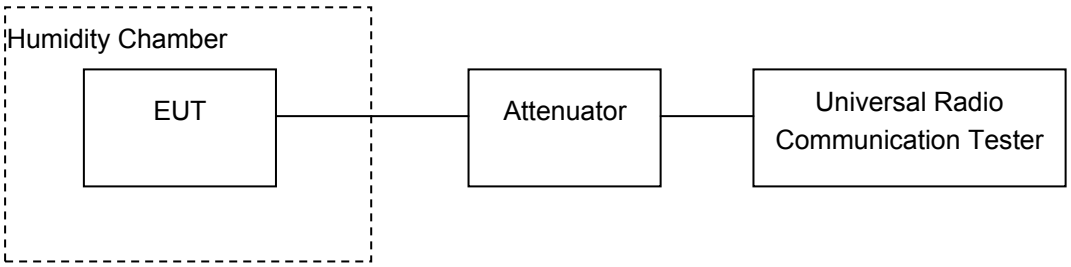
Temperature:	22.9 °C
Humidity:	52.0 % RH
Atmospheric Pressure:	101.3kPa

11.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



11.3 Test Result

Cellular Band (Part 22H)

GSM 850 Test Frequency:836.6MHz				
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.7	-4	-0.0048	2.5
40		-5	-0.0058	2.5
30		-5	-0.0062	2.5
20		-6	-0.0072	2.5
10		-7	-0.0083	2.5
0		-8	-0.0093	2.5
-10		-9	-0.0102	2.5
-20		-9	-0.0110	2.5
-30		-9	-0.0112	2.5
20	3.3	-10	-0.0120	2.5
20	4.2	-11	-0.0133	2.5

GPRS 850 Test Frequency:836.6MHz				
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.7	-8	-0.0096	2.5
40		-8	-0.0099	2.5
30		-9	-0.0109	2.5
20		-9	-0.0112	2.5
10		-10	-0.0119	2.5
0		-11	-0.0128	2.5
-10		-12	-0.0141	2.5
-20		-13	-0.0152	2.5
-30		-14	-0.0164	2.5
20	3.3	-14	-0.0164	2.5
20	4.2	-14	-0.0170	2.5

WCDMA Band V Test Frequency:836.6MHz				
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.7 3.3	3	0.0036	2.5
40		4	0.0045	2.5
30		4	0.0051	2.5
20		5	0.0054	2.5
10		5	0.0056	2.5
0		6	0.0069	2.5
-10		6	0.0072	2.5
-20		7	0.0083	2.5
20		7	0.0087	2.5
20	4.2	8	0.0097	2.5

PCS Band (Part 24E)

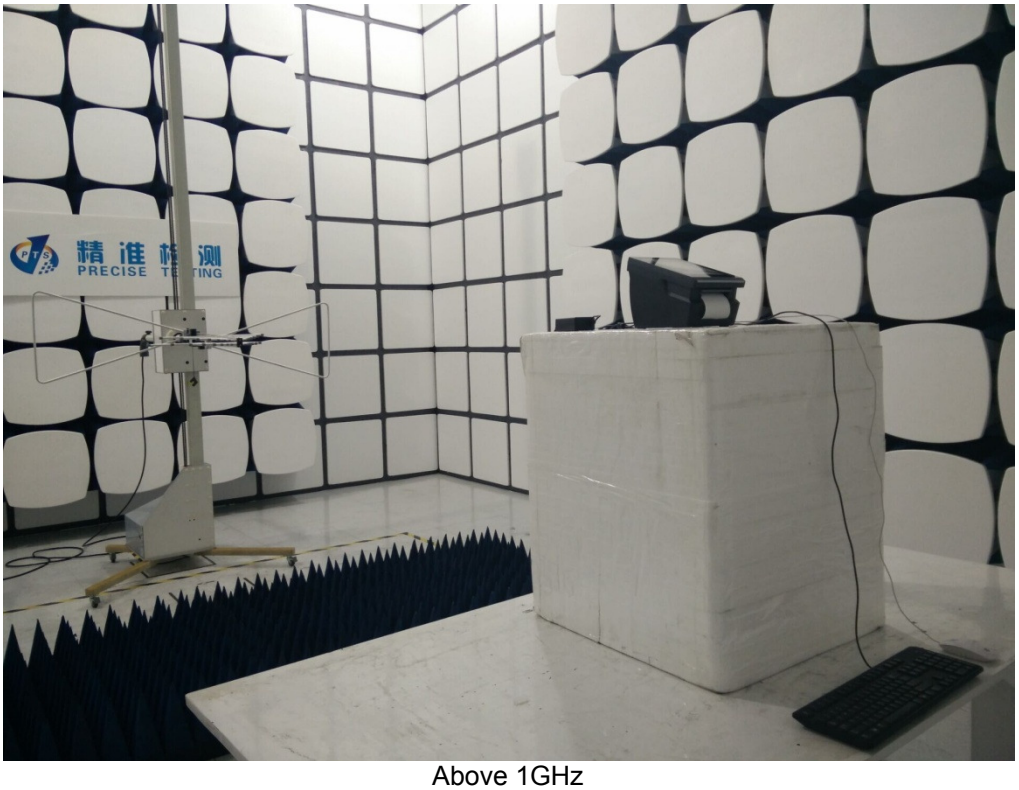
PCS 1900 Test Frequency:1880.0MHz				
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.7	-20	-0.0106	2.5
40		-20	-0.0106	2.5
30		-19	-0.0101	2.5
20		-18	-0.0097	2.5
10		-18	-0.0095	2.5
0		-17	-0.0090	2.5
-10		-17	-0.0089	2.5
-20		-16	-0.0085	2.5
-30		-15	-0.0080	2.5
20	3.3	-14	-0.0076	2.5
20	4.2	-14	-0.0075	2.5

GPRS 1900 Test Frequency:1880.0MHz				
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.7	-26	-0.0138	2.5
40		-26	-0.0137	2.5
30		-25	-0.0134	2.5
20		-24	-0.0130	2.5
10		-24	-0.0126	2.5
0		-23	-0.0121	2.5
-10		-23	-0.0121	2.5
-20		-23	-0.0120	2.5
-30		-23	-0.0120	2.5
20	3.3	-22	-0.0115	2.5
20	4.2	-21	-0.0111	2.5

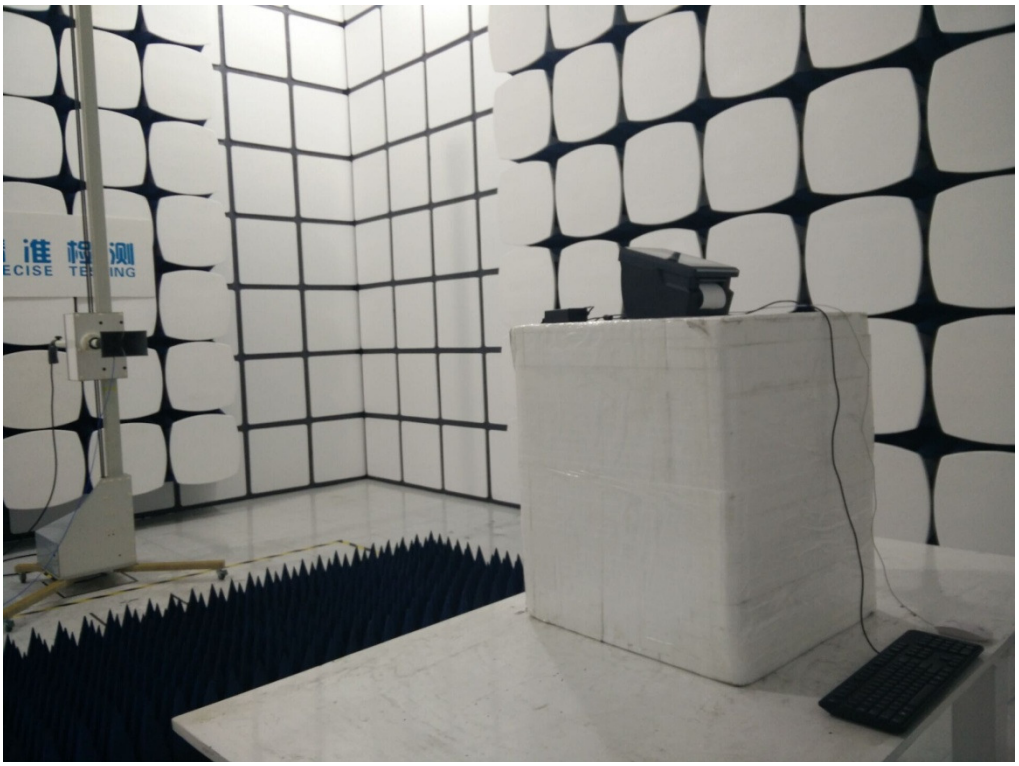
WCDMA Band II Test Frequency:1880.0MHz				
Temperature (℃)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
50	3.7	6	0.0032	2.5
40		6	0.0031	2.5
30		5	0.0027	2.5
20		5	0.0026	2.5
10		5	0.0024	2.5
0		4	0.0021	2.5
-10		4	0.0019	2.5
-20		4	0.0019	2.5
-30		3	0.0016	2.5
20	3.3	2	0.0013	2.5
20	4.2	2	0.0011	2.5

12 Test Setup

Radiated Spurious Emissions
From 30MHz-1000MHz



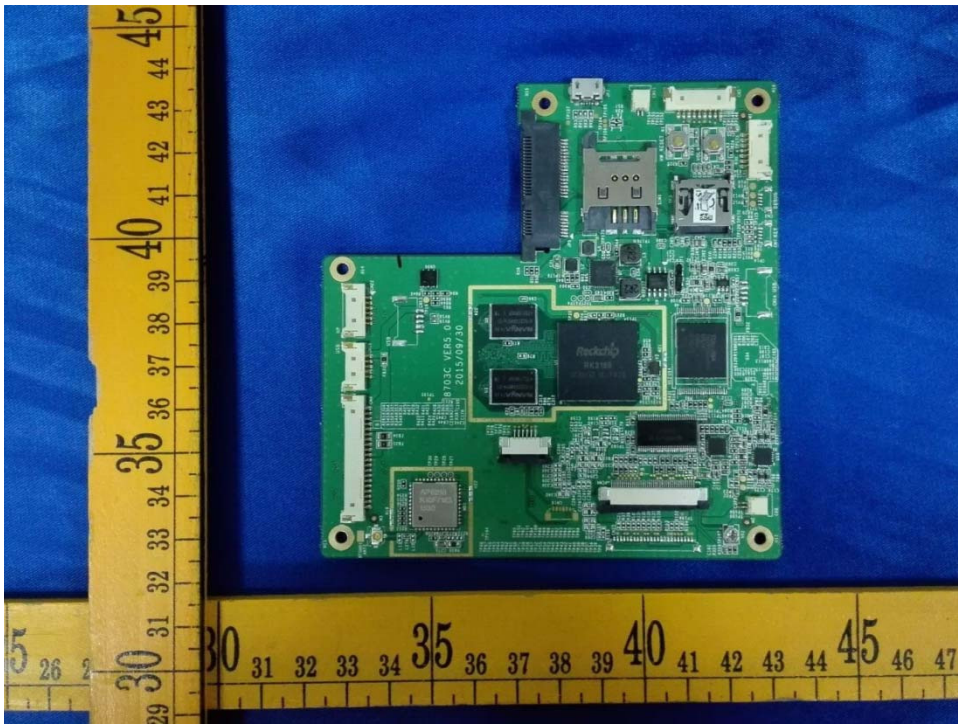
Above 1GHz

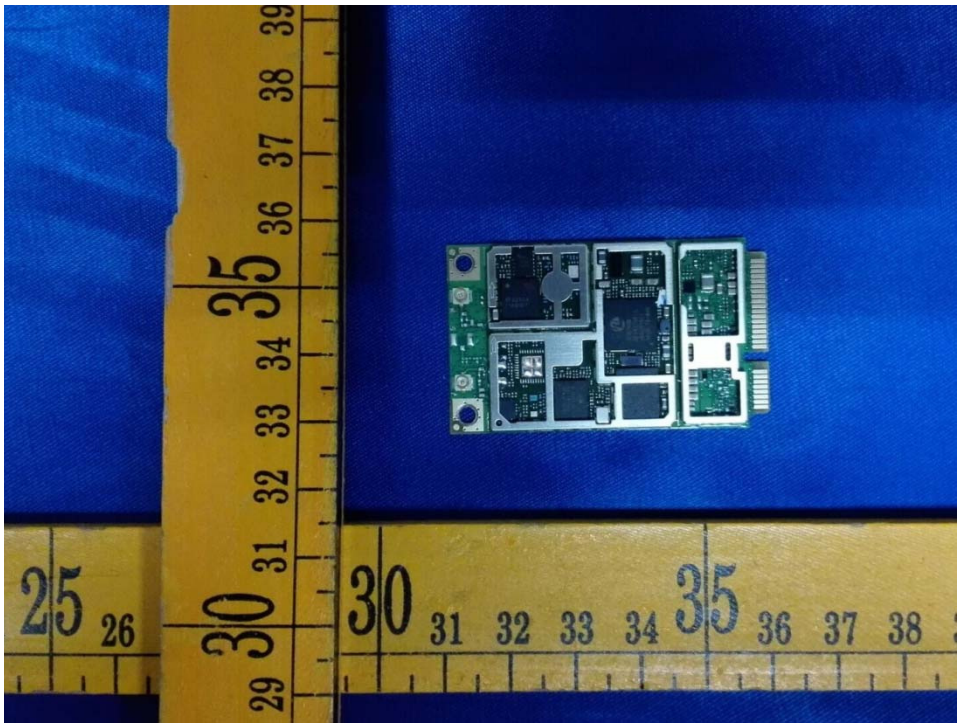


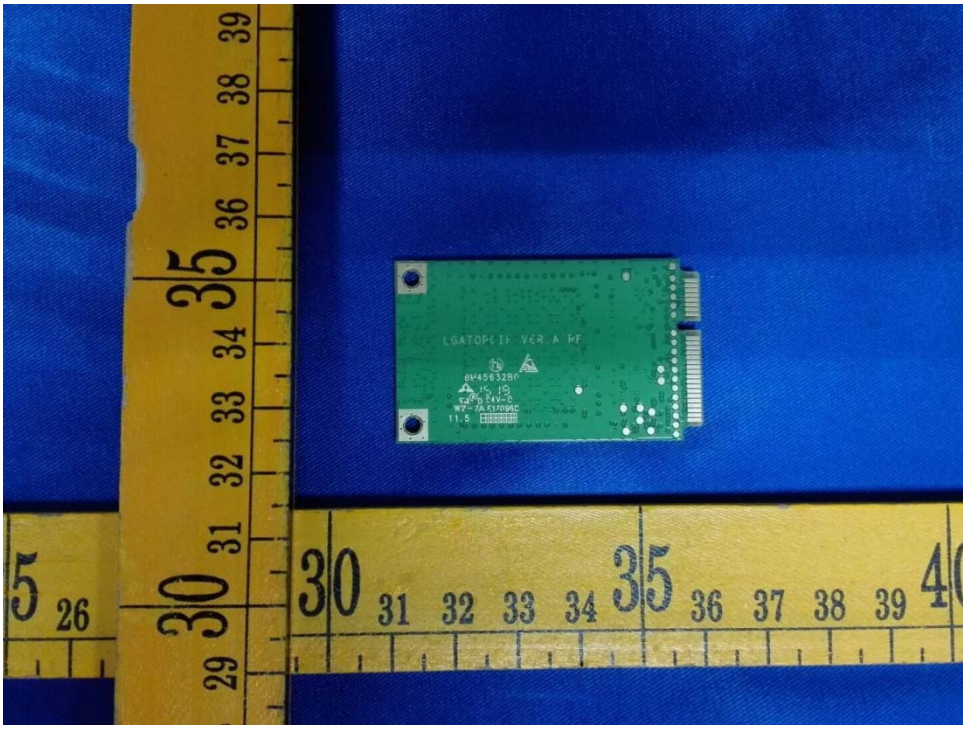
13 EUT Photos

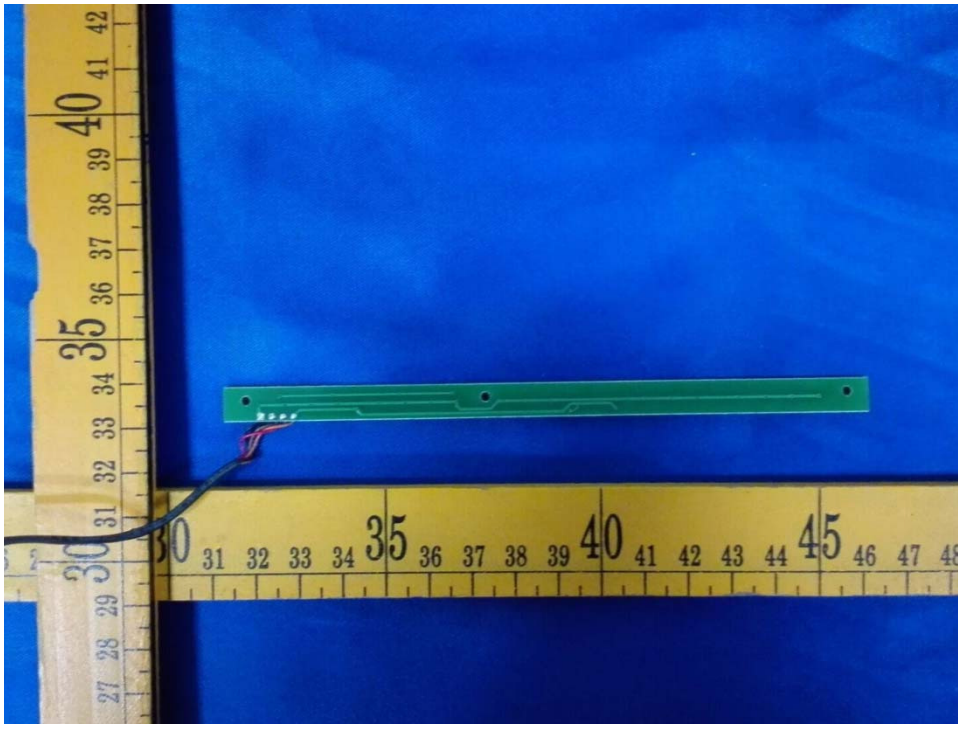
External Photos

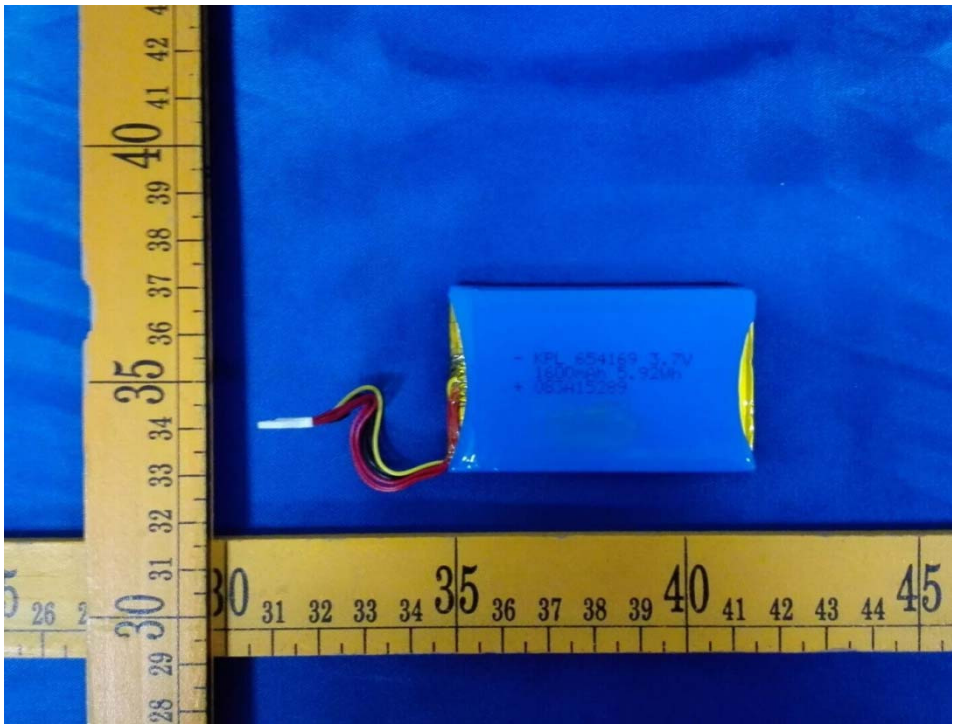
Internal Photos











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