FCC Test Report
(Part 24 – GSM, WCDMA B2, LTE B2)

Report No.:	RFBGTL-WTW-P22020475-7
FCC ID:	APYHRO00314
Received Date:	Feb. 19, 2022
Test Date:	Apr. 25 ~ Apr. 29, 2022
Issued Date:	May 30, 2022
Applicant:	SHARP Corporation Mobile Communication BU
Address:	2-13-1 Iida Hachihonmatsu Higashi-hiroshima City, Hiroshima 730-0192, Japan
Manufacturer:	Sharp Corporation
Address:	1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location (1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN
FCC Registration / Designation Number:	788550 / TW0003
Test Location (2):	No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
FCC Registration / Designation Number:	281270 / TW0032

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Release Control Record

Issue No.	Description	Date Issued
RFBGTL-WTW-P22020475-7	Original release	May 30, 2022

1 Certificate of Conformity

Product:	Smart Phone
Brand:	SHARP
Sample Status:	Engineering sample
Applicant:	SHARP Corporation Mobile Communication BU
Manufacturer:	Sharp Corporation
Test Date:	Apr. 25 ~ Apr. 29, 2022
Standards:	FCC Part 24, Subpart E

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Celine Chou , **Date:** May 30, 2022

Celine Chou / Senior Specialist

Approved by : Jeremy Lin , **Date:** May 30, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Effective Isotropically Radiated Power	Pass	Meet the requirement of limit.
2.1046 24.232 (d)	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -33.90dB at 3760.00MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~1000MHz	2.93 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038B	MY60180018	Feb. 18, 2022	Feb. 17, 2023
Spectrum Analyzer KEYSIGHT	N9020B	MY60110513	Dec. 24, 2021	Dec. 23, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-1214	Oct. 27, 2021	Oct. 26, 2022
HORN Antenna RF SPIN	DRH18-E	210101A18E	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	9170-1049	Nov. 14, 2021	Nov. 13, 2022
Loop Antenna EMCI	EM-6879	269	Sep. 16, 2021	Sep. 15, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier EMCI	EMC330N	980798	Jan. 17, 2022	Jan. 16, 2023
Preamplifier EMCI	EMC118A45SE	980809	Dec. 30, 2021	Dec. 29, 2022
Preamplifier EMCI	EMC184045SE	980786	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC104-SM-SM-(9000+3000+1000)	201244+ 201232+ 210103	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMCCFD400-NM-NM-(9000+3000+500)	201251+ 201249+ 201248	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201261+201258+201255	Jan. 17, 2022	Jan. 16, 2023
Software BV ADT	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower Max-Full	MFA-515BSN	NA	NA	NA
Turn Table Max-Full	MFT-201SS	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208676	NA	NA
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Jan. 03, 2022	Jan. 02, 2023
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 02, 2021	Jun. 01, 2022
DC power supply Keysight	U8002A	MY56330015	NA	NA
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Feb. 16, 2022	Feb. 15, 2023

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in WM Chamber 9.

3 General Information

3.1 General Description of EUT

Product	Smart Phone			
Brand	SHARP			
Sample Status	Engineering sample			
Power Supply Rating	3.87Vdc (Battery) 5Vdc (Adapter)			
Modulation Type	GSM, GPRS: GMSK WCDMA: BPSK, QPSK HSDPA: BPSK HSUPA: QPSK LTE: QPSK, 16QAM, 64QAM			
Operating Frequency	GSM, GPRS	1850.2MHz ~ 1909.8MHz		
	WCDMA Band 2	1852.4MHz ~ 1907.6MHz		
	LTE Band 2 (Channel Bandwidth 1.4MHz)	1850.7MHz ~ 1909.3MHz		
	LTE Band 2 (Channel Bandwidth 3MHz)	1851.5MHz ~ 1908.5MHz		
	LTE Band 2 (Channel Bandwidth 5MHz)	1852.5MHz ~ 1907.5MHz		
	LTE Band 2 (Channel Bandwidth 10MHz)	1855.0MHz ~ 1905.0MHz		
	LTE Band 2 (Channel Bandwidth 15MHz)	1857.5MHz ~ 1902.5MHz		
	LTE Band 2 (Channel Bandwidth 20MHz)	1860.0MHz ~ 1900.0MHz		
Max. EIRP Power	GSM	522.396mW (27.18dBm)		
	GPRS	527.230mW (27.22dBm)		
	WCDMA Band 2	107.399mW (20.31dBm)		
		QPSK	16QAM	64QAM
	LTE Band 2 (Channel Bandwidth 1.4MHz)	77.446mW (18.89dBm)	61.944mW (17.92dBm)	48.865mW (16.89dBm)
	LTE Band 2 (Channel Bandwidth 3MHz)	80.353mW (19.05dBm)	62.951mW (17.99dBm)	49.545mW (16.95dBm)
	LTE Band 2 (Channel Bandwidth 5MHz)	79.433mW (19.00dBm)	63.241mW (18.01dBm)	49.091mW (16.91dBm)
	LTE Band 2 (Channel Bandwidth 10MHz)	79.616mW (19.01dBm)	63.241mW (18.01dBm)	49.091mW (16.91dBm)
	LTE Band 2 (Channel Bandwidth 15MHz)	79.068mW (18.98dBm)	64.269mW (18.08dBm)	49.317mW (16.93dBm)
	LTE Band 2 (Channel Bandwidth 20MHz)	103.753mW (20.16dBm)	82.794mW (19.18dBm)	64.269mW (18.08dBm)

Emission Designator	GSM	245KGXW		
	GPRS	246KGXW		
	WCDMA Band 2	4M18F9W		
		QPSK	16QAM	64QAM
	LTE Band 2 (Channel Bandwidth 1.4MHz)	1M09G7D	1M09D7W	1M09D7W
	LTE Band 2 (Channel Bandwidth 3MHz)	2M70G7D	2M70D7W	2M70D7W
	LTE Band 2 (Channel Bandwidth 5MHz)	4M50G7D	4M50D7W	4M50D7W
	LTE Band 2 (Channel Bandwidth 10MHz)	8M99G7D	8M99D7W	8M99D7W
	LTE Band 2 (Channel Bandwidth 15MHz)	13M5G7D	13M5D7W	13M5D7W
	LTE Band 2 (Channel Bandwidth 20MHz)	18M0G7D	18M0D7W	18M0D7W
Antenna Type	Refer to note			
Antenna Connector	Refer to note			
Accessory Device	Refer to note			
Cable Supplied	NA			

Note:

1. The EUT uses following devices.

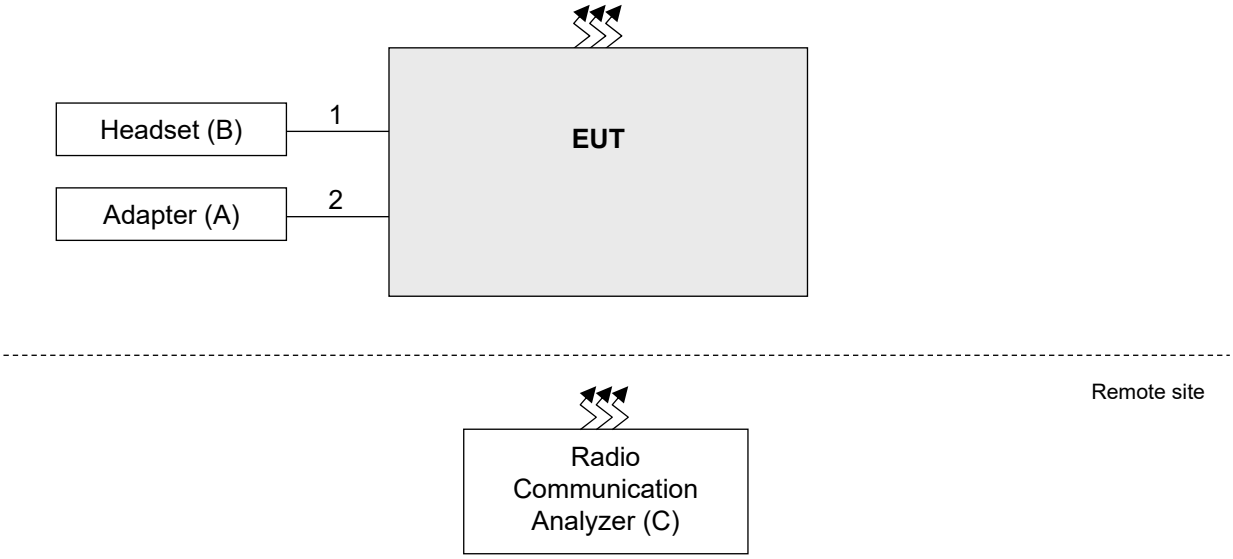
Product	Brand	Model	Description
Adapter (Support unit)	Salom	XN-2QC25	Input: 100-240Vac, 50/60Hz, 0.2A Output: 5.0Vdc, 800mA
Battery	-	-	3.87Vdc, Rated 4870mAh (18.9Wh), Typ. 5000mAh (19.4Wh)
Headset (Support unit)	Ambibio	AB-HI02JS	-
USB cable (Support unit)	Luxshare-ICT	L6KU2007-CS-H	0.95m shielded cable without core

2. The antenna information is listed as below.

Ant. No.	Type	Connector	Gain (dBi)										
			GSM 850	GSM 1900	WCDMA B2 / LTE B2	WCDMA B4 / LTE B4	WCDMA B5 / LTE B5	LTE B7	LTE B12	LTE B13	LTE B17	LTE B38	LTE B41
1	PIFA	IPEX	-	-2.9	-2.9	-4.9	-	-1.8	-	-	-	-1.9	-1.9
3	PIFA	IPEX	-4.8	-	-	-	-4.8	-	-5.6	-5.3	-5.6	-	-

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Adapter	Salom	XN-2QC25	N/A	N/A	Provided by client
B.	Headset	Ambibio	AB-HI02JS	N/A	N/A	Provided by client
C.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item C acted as a communication partner to transfer data.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Earphone Cable	1	1.1	N	0	Provided by client
2.	USB Cable	1	1	Y	0	Provided by client

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	Radiated Emission
GSM	Z-plane
WCDMA Band 2	Z-plane
LTE Band 2	Z-plane

GSM Mode

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Modulation
-	EIRP	512 to 810	512 (1850.2MHz), 661 (1880.0MHz), 810 (1909.8MHz)	GSM, GPRS
-	Modulation Characteristics	512 to 810	661 (1880.0MHz)	GSM, GPRS
-	Frequency Stability	512 to 810	512 (1850.2MHz), 810 (1909.8MHz)	GSM
-	Occupied Bandwidth	512 to 810	512 (1850.2MHz), 661 (1880.0MHz), 810 (1909.8MHz)	GSM, GPRS
-	Band Edge	512 to 810	512(1850.2MHz), 810(1909.8MHz)	GSM, GPRS
-	Peak To Average Ratio	512 to 810	512 (1850.2MHz), 661 (1880.0MHz), 810 (1909.8MHz)	GSM, GPRS
-	Conducted Emission	512 to 810	512 (1850.2MHz), 661 (1880.0MHz), 810 (1909.8MHz)	GSM, GPRS
-	Radiated Emission	512 to 810	512 (1850.2MHz), 661 (1880.0MHz), 810 (1909.8MHz)	GSM

Note: For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.

WCDMA Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	9262 to 9538	9262 (1852.4MHz), 9400 (1880.0MHz), 9538 (1907.6MHz)	WCDMA, HSDPA, HSUPA
-	Modulation Characteristics	9262 to 9538	9400 (1880.0MHz)	WCDMA, HSDPA, HSUPA
-	Frequency Stability	9262 to 9538	9262 (1852.4MHz), 9538 (1907.6MHz)	WCDMA
-	Occupied Bandwidth	9262 to 9538	9262 (1852.4MHz), 9400 (1880.0MHz), 9538 (1907.6MHz)	WCDMA, HSDPA, HSUPA
-	Band Edge	9262 to 9538	9262 (1852.4MHz), 9538 (1907.6MHz)	WCDMA, HSDPA, HSUPA
-	Peak To Average Ratio	9262 to 9538	9262 (1852.4MHz), 9400 (1880.0MHz), 9538 (1907.6MHz)	WCDMA, HSDPA, HSUPA
-	Conducted Emission	9262 to 9538	9262 (1852.4MHz), 9400 (1880.0MHz), 9538 (1907.6MHz)	WCDMA, HSDPA, HSUPA
-	Radiated Emission	9262 to 9538	9262 (1852.4MHz), 9400 (1880.0MHz), 9538 (1907.6MHz)	WCDMA

Note: For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.

LTE Band 2

EUT Configure Mode	Test item	Available channel	Tested Channel	Channel Bandwidth	Modulation	RB #
-	EIRP	18607 to 19193	18607 (1850.7MHz), 18900 (1880.0MHz), 19193 (1909.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18615 to 19185	18615 (1851.5MHz), 18900 (1880.0MHz), 19185 (1908.5MHz)	3MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18625 to 19175	18625 (1852.5MHz), 18900 (1880.0MHz), 19175 (1907.5MHz)	5MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18650 to 19150	18650 (1855.0MHz), 18900 (1880.0MHz), 19150 (1905.0MHz)	10MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18675 to 19125	18675 (1857.5MHz), 18900 (1880.0MHz), 19125 (1902.5MHz)	15MHz	QPSK / 16QAM / 64QAM	1 Half Full
		18700 to 19100	18700 (1860.0MHz), 18900 (1880.0MHz), 19100 (1900.0MHz)	20MHz	QPSK / 16QAM / 64QAM	1 Half Full
-	Modulation Characteristics	18700 to 19100	18900 (1880.0MHz)	20MHz	QPSK / 16QAM / 64QAM	Full
-	Frequency Stability	18607 to 19193	18607 (1850.7MHz), 19193 (1909.3MHz)	1.4MHz	QPSK	Full
		18615 to 19185	18615 (1851.5MHz), 19185 (1908.5MHz)	3MHz	QPSK	Full
		18625 to 19175	18625 (1852.5MHz), 19175 (1907.5MHz)	5MHz	QPSK	Full
		18650 to 19150	18650 (1855.0MHz), 19150 (1905.0MHz)	10MHz	QPSK	Full
		18675 to 19125	18675 (1857.5MHz), 19125 (1902.5MHz)	15MHz	QPSK	Full
		18700 to 19100	18700 (1860.0MHz), 19100 (1900.0MHz)	20MHz	QPSK	Full
-	Occupied Bandwidth	18607 to 19193	18607 (1850.7MHz), 18900 (1880.0MHz), 19193 (1909.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	Full
		18615 to 19185	18615 (1851.5MHz), 18900 (1880.0MHz), 19185 (1908.5MHz)	3MHz	QPSK / 16QAM / 64QAM	Full
		18625 to 19175	18625 (1852.5MHz), 18900 (1880.0MHz), 19175 (1907.5MHz)	5MHz	QPSK / 16QAM / 64QAM	Full
		18650 to 19150	18650 (1855.0MHz), 18900 (1880.0MHz), 19150 (1905.0MHz)	10MHz	QPSK / 16QAM / 64QAM	Full
		18675 to 19125	18675 (1857.5MHz), 18900 (1880.0MHz), 19125 (1902.5MHz)	15MHz	QPSK / 16QAM / 64QAM	Full
		18700 to 19100	18700 (1860.0MHz), 18900 (1880.0MHz), 19100 (1900.0MHz)	20MHz	QPSK / 16QAM / 64QAM	Full

EUT Configure Mode	Test item	Available channel	Tested Channel	Channel Bandwidth	Modulation	RB #
-	Band Edge	18607 to 19193	18607 (1850.7MHz), 19193 (1909.3MHz)	1.4MHz	QPSK	1 Half Full
		18615 to 19185	18615 (1851.5MHz), 19185 (1908.5MHz)	3MHz	QPSK	1 Half Full
		18625 to 19175	18625 (1852.5MHz), 19175 (1907.5MHz)	5MHz	QPSK	1 Half Full
		18650 to 19150	18650 (1855.0MHz), 19150 (1905.0MHz)	10MHz	QPSK	1 Half Full
		18675 to 19125	18675 (1857.5MHz), 19125 (1902.5MHz)	15MHz	QPSK	1 Half Full
		18700 to 19100	18700 (1860.0MHz), 19100 (1900.0MHz)	20MHz	QPSK	1 Half Full
-	Peak to Average Ratio	18607 to 19193	18607 (1850.7MHz), 18900 (1880.0MHz), 19193 (1909.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	1
		18615 to 19185	18615 (1851.5MHz), 18900 (1880.0MHz), 19185 (1908.5MHz)	3MHz	QPSK / 16QAM / 64QAM	1
		18625 to 19175	18625 (1852.5MHz), 18900 (1880.0MHz), 19175 (1907.5MHz)	5MHz	QPSK / 16QAM / 64QAM	1
		18650 to 19150	18650 (1855.0MHz), 18900 (1880.0MHz), 19150 (1905.0MHz)	10MHz	QPSK / 16QAM / 64QAM	1
		18675 to 19125	18675 (1857.5MHz), 18900 (1880.0MHz), 19125 (1902.5MHz)	15MHz	QPSK / 16QAM / 64QAM	1
		18700 to 19100	18700 (1860.0MHz), 18900 (1880.0MHz), 19100 (1900.0MHz)	20MHz	QPSK / 16QAM / 64QAM	1

EUT Configure Mode	Test item	Available channel	Tested Channel	Channel Bandwidth	Modulation	RB #
-	Conducted Emission	18607 to 19193	18607 (1850.7MHz), 18900 (1880.0MHz), 19193 (1909.3MHz)	1.4MHz	QPSK	1
		18615 to 19185	18615 (1851.5MHz), 18900 (1880.0MHz), 19185 (1908.5MHz)	3MHz	QPSK	1
		18625 to 19175	18625 (1852.5MHz), 18900 (1880.0MHz), 19175 (1907.5MHz)	5MHz	QPSK	1
		18650 to 19150	18650 (1855.0MHz), 18900 (1880.0MHz), 19150 (1905.0MHz)	10MHz	QPSK	1
		18675 to 19125	18675 (1857.5MHz), 18900 (1880.0MHz), 19125 (1902.5MHz)	15MHz	QPSK	1
		18700 to 19100	18700 (1860.0MHz), 18900 (1880.0MHz), 19100 (1900.0MHz)	20MHz	QPSK	1
-	Radiated Emission	18607 to 19193	18607 (1850.7MHz), 18900 (1880.0MHz), 19193 (1909.3MHz)	1.4MHz	QPSK	1
		18625 to 19175	18625 (1852.5MHz), 18900 (1880.0MHz), 19175 (1907.5MHz)	5MHz	QPSK	1
		18700 to 19100	18700 (1860.0MHz), 18900 (1880.0MHz), 19100 (1900.0MHz)	20MHz	QPSK	1

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521-1 Section 6.6.3.1.4.1, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK, 16QAM and 64QAM, measured value of QPSK is higher than 16QAM, and 64QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK, 16QAM and 64QAM modes, the other test items were performed under worse mode according to the maximum output power.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25deg. C, 60%RH	3.87Vdc	Willy Cheng
Modulation Characteristics	25deg. C, 60%RH	3.87Vdc	Willy Cheng
Frequency Stability	25deg. C, 60%RH	3.87Vdc	Willy Cheng
Occupied Bandwidth	25deg. C, 60%RH	3.87Vdc	Willy Cheng
Band Edge	25deg. C, 60%RH	3.87Vdc	Willy Cheng
Peak To Average Ratio	25deg. C, 60%RH	3.87Vdc	Willy Cheng
Conducted Emission	25deg. C, 60%RH	3.87Vdc	Willy Cheng
Radiated Emission	27deg. C, 66%RH	120Vac, 60Hz	Tim Chen

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 24

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, WCDMA and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Maximum EIRP / ERP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$EIRP = P_{Meas} + G_T$

$ERP = P_{Meas} + G_T - 2.15$

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_T gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

4.1.3 Test Setup

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

Band	GSM 1900		
Channel	512	661	810
Frequency	1850.2	1880	1909.8
GSM	30.02	30.08	30.03
GPRS 1Tx Slot	30.11	30.12	30.01
GPRS 2Tx Slot	27.98	28.07	28.02
GPRS 3Tx Slot	26.57	26.66	26.56
GPRS 4Tx Slot	25.68	25.76	25.61

Band	WCDMA II		
TX Channel	9262	9400	9538
Rx Channel	9662	9800	9938
Frequency	1852.4	1880	1907.6
RMC 12.2K	23.15	23.21	23.14
HSDPA Subtest-1	22.06	22.29	22.12
HSDPA Subtest-2	20.85	21.13	21.31
HSDPA Subtest-3	20.38	20.63	20.80
HSDPA Subtest-4	20.37	20.58	20.83
HSUPA Subtest-1	20.85	21.08	21.32
HSUPA Subtest-2	18.85	19.10	19.32
HSUPA Subtest-3	19.82	20.11	20.27
HSUPA Subtest-4	18.90	19.13	19.31
HSUPA Subtest-5	20.80	21.10	21.30

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	22.89	23.06	22.95
		1	50	22.72	22.89	22.78
		1	99	22.64	22.81	22.70
		50	0	21.76	21.93	21.82
		50	25	21.74	21.91	21.80
		50	50	21.72	21.89	21.78
		100	0	21.86	22.03	21.92
20M	16QAM	1	0	21.91	22.08	21.97
		1	50	21.84	22.01	21.90
		1	99	21.79	21.96	21.85
		50	0	20.85	21.02	20.91
		50	25	20.76	20.93	20.82
		50	50	20.73	20.90	20.79
		100	0	20.80	20.97	20.86
20M	64QAM	1	0	20.81	20.98	20.87
		1	50	20.77	20.94	20.83
		1	99	20.74	20.91	20.80
		50	0	19.85	20.02	19.91
		50	25	19.80	19.97	19.86
		50	50	19.74	19.91	19.80
		100	0	19.92	20.09	19.98

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	21.72	21.88	21.81
		1	37	21.57	21.69	21.58
		1	74	21.50	21.70	21.50
		36	0	20.56	20.73	20.67
		36	19	20.58	20.76	20.66
		36	39	20.61	20.75	20.63
		75	0	20.68	20.85	20.78
15M	16QAM	1	0	20.77	20.98	20.85
		1	37	20.65	20.85	20.71
		1	74	20.60	20.84	20.71
		36	0	19.70	19.85	19.76
		36	19	19.61	19.81	19.67
		36	39	19.55	19.79	19.67
		75	0	19.62	19.80	19.71
15M	64QAM	1	0	19.70	19.83	19.77
		1	37	19.60	19.75	19.71
		1	74	19.54	19.75	19.70
		36	0	18.68	18.82	18.80
		36	19	18.62	18.82	18.66
		36	39	18.61	18.74	18.69
		75	0	18.82	18.92	18.78

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	21.72	21.91	21.79
		1	24	21.54	21.75	21.58
		1	49	21.44	21.61	21.56
		25	0	20.61	20.78	20.67
		25	12	20.59	20.78	20.63
		25	25	20.61	20.70	20.61
		50	0	20.71	20.87	20.72
10M	16QAM	1	0	20.72	20.91	20.79
		1	24	20.74	20.89	20.75
		1	49	20.69	20.83	20.72
		25	0	19.68	19.84	19.80
		25	12	19.59	19.78	19.70
		25	25	19.61	19.73	19.69
		50	0	19.60	19.84	19.75
10M	64QAM	1	0	19.68	19.81	19.72
		1	24	19.62	19.76	19.63
		1	49	19.61	19.77	19.60
		25	0	18.70	18.82	18.80
		25	12	18.67	18.82	18.76
		25	25	18.54	18.75	18.68
		50	0	18.77	18.91	18.79

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	21.75	21.90	21.75
		1	12	21.58	21.69	21.65
		1	24	21.51	21.61	21.54
		12	0	20.63	20.79	20.67
		12	6	20.55	20.71	20.62
		12	13	20.58	20.71	20.66
		25	0	20.68	20.90	20.75
5M	16QAM	1	0	20.71	20.91	20.80
		1	12	20.64	20.89	20.74
		1	24	20.65	20.81	20.73
		12	0	19.75	19.87	19.71
		12	6	19.60	19.80	19.67
		12	13	19.60	19.73	19.62
		25	0	19.67	19.87	19.75
5M	64QAM	1	0	19.64	19.78	19.69
		1	12	19.58	19.81	19.68
		1	24	19.64	19.77	19.60
		12	0	18.74	18.88	18.81
		12	6	18.66	18.82	18.68
		12	13	18.59	18.77	18.66
		25	0	18.82	18.95	18.84

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
3M	QPSK	1	0	21.70	21.95	21.75
		1	7	21.53	21.77	21.62
		1	14	21.47	21.69	21.54
		8	0	20.62	20.81	20.65
		8	3	20.59	20.72	20.70
		8	7	20.60	20.78	20.65
		15	0	20.76	20.86	20.73
3M	16QAM	1	0	20.71	20.89	20.83
		1	7	20.69	20.83	20.71
		1	14	20.63	20.80	20.71
		8	0	19.68	19.90	19.74
		8	3	19.64	19.78	19.71
		8	7	19.59	19.73	19.67
		15	0	19.70	19.78	19.69
3M	64QAM	1	0	19.69	19.85	19.68
		1	7	19.59	19.82	19.68
		1	14	19.60	19.76	19.64
		8	0	18.70	18.92	18.74
		8	3	18.70	18.79	18.73
		8	7	18.54	18.77	18.66
		15	0	18.81	18.95	18.81

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18607	18900	19193
		Frequency (MHz)		1850.7	1880	1909.3
1.4M	QPSK	1	0	21.62	21.79	21.67
		1	2	21.48	21.64	21.54
		1	5	21.34	21.59	21.55
		3	0	21.53	21.75	21.62
		3	1	21.46	21.64	21.64
		3	3	21.54	21.69	21.58
		6	0	20.54	20.74	20.71
1.4M	16QAM	1	0	20.73	20.81	20.75
		1	2	20.63	20.78	20.71
		1	5	20.44	20.70	20.66
		3	0	20.61	20.82	20.67
		3	1	20.46	20.68	20.48
		3	3	20.48	20.78	20.58
		6	0	19.57	19.67	19.67
1.4M	64QAM	1	0	19.52	19.78	19.59
		1	2	19.49	19.68	19.50
		1	5	19.42	19.72	19.50
		3	0	19.55	19.79	19.61
		3	1	19.48	19.72	19.53
		3	3	19.52	19.70	19.48
		6	0	18.66	18.93	18.80

EIRP Power (dBm)

Band	GSM 1900		
Channel	512	661	810
Frequency	1850.2	1880	1909.8
GSM	27.12	27.18	27.13
GPRS 1Tx Slot	27.21	27.22	27.11
GPRS 2Tx Slot	25.08	25.17	25.12
GPRS 3Tx Slot	23.67	23.76	23.66
GPRS 4Tx Slot	22.78	22.86	22.71

*EIRP = Conducted + antenna gain (-2.90dBi)

Band	WCDMA II		
TX Channel	9262	9400	9538
Rx Channel	9662	9800	9938
Frequency	1852.4	1880	1907.6
RMC 12.2K	20.25	20.31	20.24
HSDPA Subtest-1	19.16	19.39	19.22
HSDPA Subtest-2	17.95	18.23	18.41
HSDPA Subtest-3	17.48	17.73	17.90
HSDPA Subtest-4	17.47	17.68	17.93
HSUPA Subtest-1	17.95	18.18	18.42
HSUPA Subtest-2	15.95	16.20	16.42
HSUPA Subtest-3	16.92	17.21	17.37
HSUPA Subtest-4	16.00	16.23	16.41
HSUPA Subtest-5	17.90	18.20	18.40

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	19.99	20.16	20.05
		1	50	19.82	19.99	19.88
		1	99	19.74	19.91	19.80
		50	0	18.86	19.03	18.92
		50	25	18.84	19.01	18.90
		50	50	18.82	18.99	18.88
		100	0	18.96	19.13	19.02
20M	16QAM	1	0	19.01	19.18	19.07
		1	50	18.94	19.11	19.00
		1	99	18.89	19.06	18.95
		50	0	17.95	18.12	18.01
		50	25	17.86	18.03	17.92
		50	50	17.83	18.00	17.89
		100	0	17.90	18.07	17.96
20M	64QAM	1	0	17.91	18.08	17.97
		1	50	17.87	18.04	17.93
		1	99	17.84	18.01	17.90
		50	0	16.95	17.12	17.01
		50	25	16.90	17.07	16.96
		50	50	16.84	17.01	16.90
		100	0	17.02	17.19	17.08

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	18.82	18.98	18.91
		1	37	18.67	18.79	18.68
		1	74	18.60	18.80	18.60
		36	0	17.66	17.83	17.77
		36	19	17.68	17.86	17.76
		36	39	17.71	17.85	17.73
		75	0	17.78	17.95	17.88
15M	16QAM	1	0	17.87	18.08	17.95
		1	37	17.75	17.95	17.81
		1	74	17.70	17.94	17.81
		36	0	16.80	16.95	16.86
		36	19	16.71	16.91	16.77
		36	39	16.65	16.89	16.77
		75	0	16.72	16.90	16.81
15M	64QAM	1	0	16.80	16.93	16.87
		1	37	16.70	16.85	16.81
		1	74	16.64	16.85	16.80
		36	0	15.78	15.92	15.90
		36	19	15.72	15.92	15.76
		36	39	15.71	15.84	15.79
		75	0	15.92	16.02	15.88

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	18.82	19.01	18.89
		1	24	18.64	18.85	18.68
		1	49	18.54	18.71	18.66
		25	0	17.71	17.88	17.77
		25	12	17.69	17.88	17.73
		25	25	17.71	17.80	17.71
		50	0	17.81	17.97	17.82
10M	16QAM	1	0	17.82	18.01	17.89
		1	24	17.84	17.99	17.85
		1	49	17.79	17.93	17.82
		25	0	16.78	16.94	16.90
		25	12	16.69	16.88	16.80
		25	25	16.71	16.83	16.79
		50	0	16.70	16.94	16.85
10M	64QAM	1	0	16.78	16.91	16.82
		1	24	16.72	16.86	16.73
		1	49	16.71	16.87	16.70
		25	0	15.80	15.92	15.90
		25	12	15.77	15.92	15.86
		25	25	15.64	15.85	15.78
		50	0	15.87	16.01	15.89

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	18.85	19.00	18.85
		1	12	18.68	18.79	18.75
		1	24	18.61	18.71	18.64
		12	0	17.73	17.89	17.77
		12	6	17.65	17.81	17.72
		12	13	17.68	17.81	17.76
		25	0	17.78	18.00	17.85
5M	16QAM	1	0	17.81	18.01	17.90
		1	12	17.74	17.99	17.84
		1	24	17.75	17.91	17.83
		12	0	16.85	16.97	16.81
		12	6	16.70	16.90	16.77
		12	13	16.70	16.83	16.72
		25	0	16.77	16.97	16.85
5M	64QAM	1	0	16.74	16.88	16.79
		1	12	16.68	16.91	16.78
		1	24	16.74	16.87	16.70
		12	0	15.84	15.98	15.91
		12	6	15.76	15.92	15.78
		12	13	15.69	15.87	15.76
		25	0	15.92	16.05	15.94

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
3M	QPSK	1	0	18.80	19.05	18.85
		1	7	18.63	18.87	18.72
		1	14	18.57	18.79	18.64
		8	0	17.72	17.91	17.75
		8	3	17.69	17.82	17.80
		8	7	17.70	17.88	17.75
		15	0	17.86	17.96	17.83
3M	16QAM	1	0	17.81	17.99	17.93
		1	7	17.79	17.93	17.81
		1	14	17.73	17.90	17.81
		8	0	16.78	17.00	16.84
		8	3	16.74	16.88	16.81
		8	7	16.69	16.83	16.77
		15	0	16.80	16.88	16.79
3M	64QAM	1	0	16.79	16.95	16.78
		1	7	16.69	16.92	16.78
		1	14	16.70	16.86	16.74
		8	0	15.80	16.02	15.84
		8	3	15.80	15.89	15.83
		8	7	15.64	15.87	15.76
		15	0	15.91	16.05	15.91

*EIRP = Conducted + antenna gain (-2.90dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18607	18900	19193
		Frequency (MHz)		1850.7	1880	1909.3
1.4M	QPSK	1	0	18.72	18.89	18.77
		1	2	18.58	18.74	18.64
		1	5	18.44	18.69	18.65
		3	0	18.63	18.85	18.72
		3	1	18.56	18.74	18.74
		3	3	18.64	18.79	18.68
		6	0	17.64	17.84	17.81
1.4M	16QAM	1	0	17.83	17.91	17.85
		1	2	17.73	17.88	17.81
		1	5	17.54	17.80	17.76
		3	0	17.71	17.92	17.77
		3	1	17.56	17.78	17.58
		3	3	17.58	17.88	17.68
		6	0	16.67	16.77	16.77
1.4M	64QAM	1	0	16.62	16.88	16.69
		1	2	16.59	16.78	16.60
		1	5	16.52	16.82	16.60
		3	0	16.65	16.89	16.71
		3	1	16.58	16.82	16.63
		3	3	16.62	16.80	16.58
		6	0	15.76	16.03	15.90

*EIRP = Conducted + antenna gain (-2.90dBi)

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

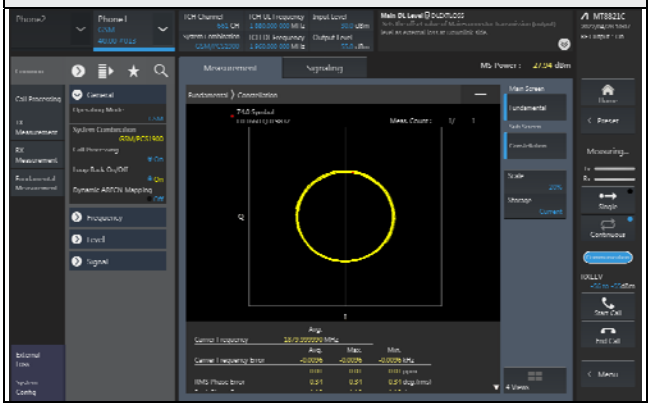
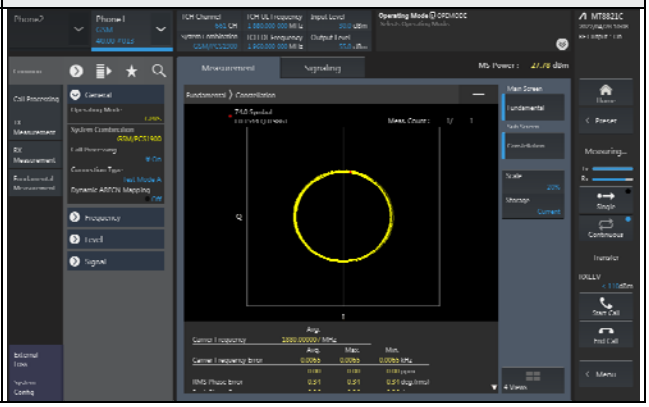
4.2.2 Test Procedure

Connect the EUT to Communication Simulator via the antenna connector, The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

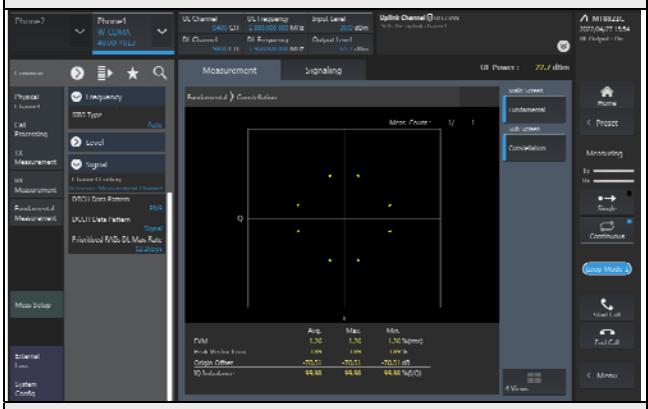
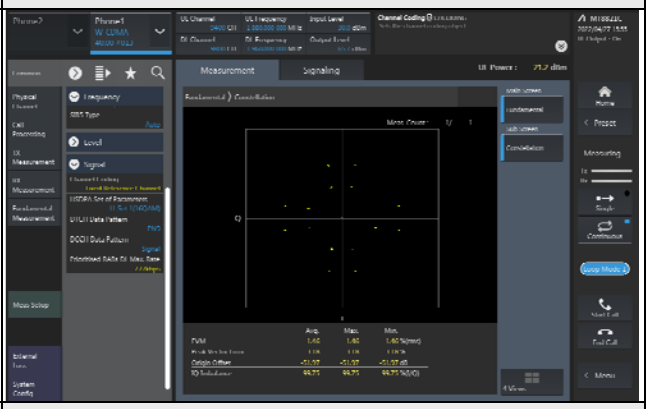
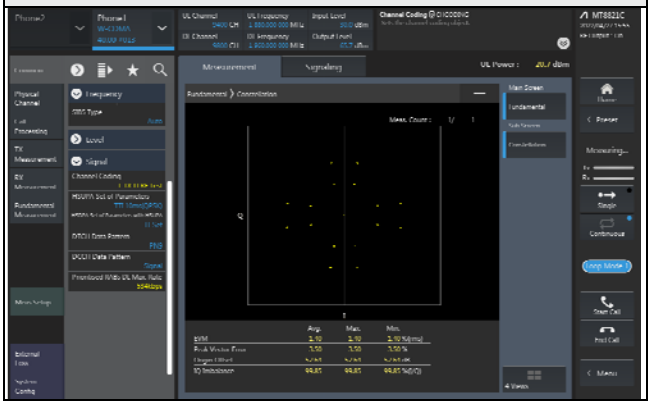
4.2.3 Test Setup

4.2.4 Test Results

GSM

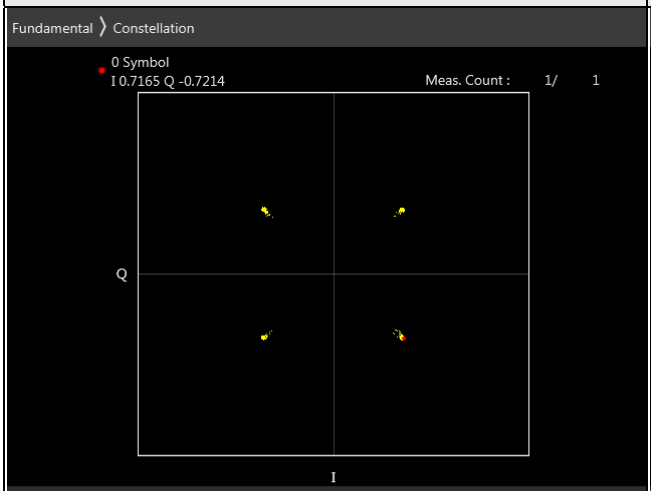
Spectrum Plot of Measurement Value	
Channel: 661 / Frequency (MHz): 1880.0MHz	
GSM	GPRS
	

WCDMA

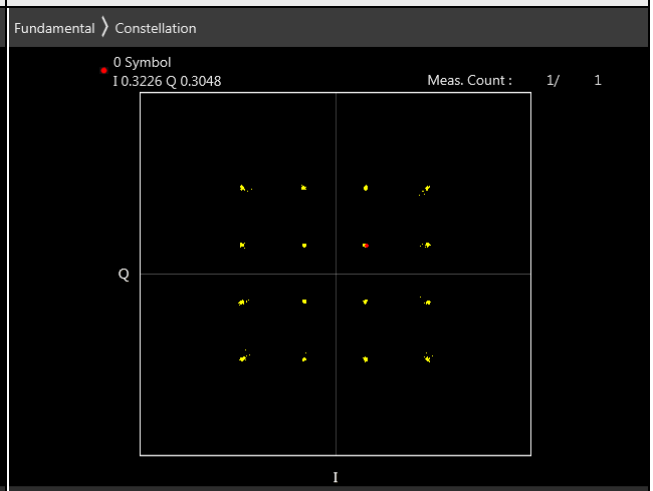
Spectrum Plot of Measurement Value	
Channel: 9400 / Frequency (MHz): 1880.0MHz	
WCDMA	HSDPA
	
HSUPA	
	

LTE Band 2

Spectrum Plot of Measurement Value	
Channel: 18900 / Frequency (MHz): 1880.0MHz	
QPSK	16QAM

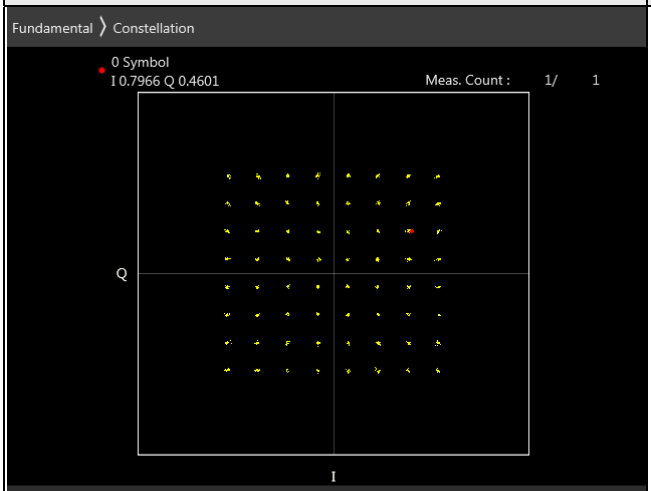


	Avg.	Max.	Min.	Limit
EVM	2.04	2.04	2.04 %(rms)	≤ 17.5 %(rms)
Peak Vector Error	25.03	25.03	25.03 %	
Carrier Leakage	-49.32	-49.32	-49.32 dBc	
IQ Imbalance	100.00	100.00	100.00 %(I/Q)	



	Avg.	Max.	Min.	Limit
EVM	1.67	1.67	1.67 %(rms)	≤ 12.5 %(rms)
Peak Vector Error	25.85	25.85	25.85 %	
Carrier Leakage	-48.82	-48.82	-48.82 dBc	
IQ Imbalance	100.04	100.04	100.04 %(I/Q)	

64QAM	



	Avg.	Max.	Min.	Limit
EVM	1.62	1.62	1.62 %(rms)	≤ 8.0 %(rms)
Peak Vector Error	17.97	17.97	17.97 %	
Carrier Leakage	-47.75	-47.75	-47.75 dBc	
IQ Imbalance	99.87	99.87	99.87 %(I/Q)	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stabiliity Measurement

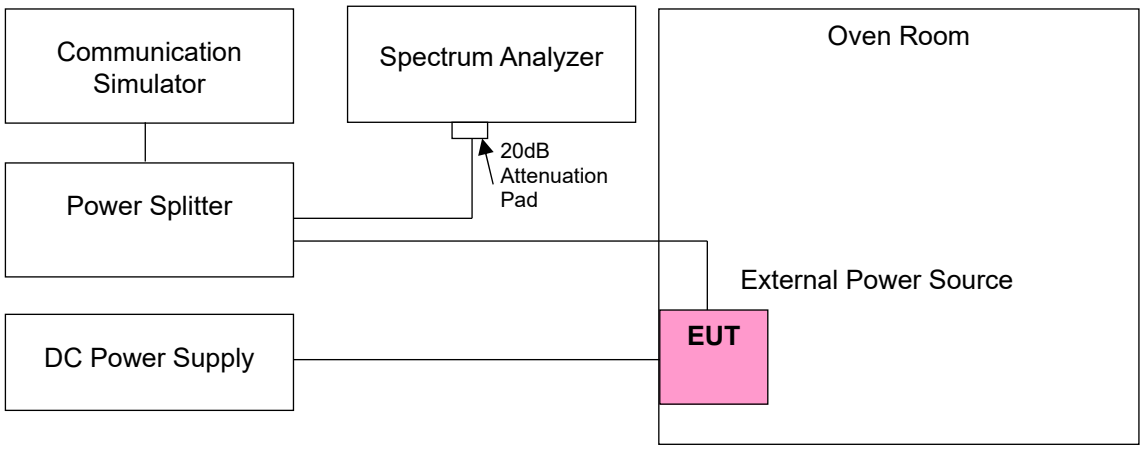
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.3.2 Test Procedure

a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Conducted Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Vdc)	GSM			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	1850.200002	0.001	1909.800002	0.001
3.87	1850.200002	0.001	1909.800004	0.002
4.45	1850.200004	0.002	1909.800002	0.001

Note: The applicant defined the normal working voltage is from 3.60Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	GSM			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.200004	0.002	1909.800004	0.002
-20	1850.200004	0.002	1909.800003	0.002
-10	1850.200001	0.001	1909.800001	0.001
0	1850.200003	0.002	1909.800001	0.001
10	1850.199996	-0.002	1909.799999	-0.001
20	1850.199997	-0.002	1909.799996	-0.002
30	1850.199996	-0.002	1909.799997	-0.002
40	1850.199998	-0.001	1909.799999	-0.001
50	1850.199999	-0.001	1909.799999	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	1852.400001	0.001	1907.600001	0.001
3.87	1852.400002	0.001	1907.600002	0.001
4.45	1852.400002	0.001	1907.600004	0.002

Note: The applicant defined the normal working voltage is from 3.60Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.400003	0.002	1907.600001	0.001
-20	1852.400004	0.002	1907.600003	0.002
-10	1852.400004	0.002	1907.600002	0.001
0	1852.400002	0.001	1907.600003	0.002
10	1852.399999	-0.001	1907.599999	-0.001
20	1852.399997	-0.002	1907.599997	-0.002
30	1852.399999	-0.001	1907.599999	-0.001
40	1852.399996	-0.002	1907.599999	-0.001
50	1852.399996	-0.002	1907.599999	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 2			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	1850.700001	0.001	1909.300000	0.002
3.87	1850.700003	0.002	1909.300002	0.001
4.45	1850.700004	0.002	1909.300003	0.002

Note: The applicant defined the normal working voltage is from 3.60Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700001	0.001	1909.300004	0.002
-20	1850.700001	0.001	1909.300003	0.002
-10	1850.700003	0.002	1909.300002	0.001
0	1850.700004	0.002	1909.300002	0.001
10	1850.699999	-0.001	1909.299996	-0.002
20	1850.699996	-0.002	1909.299996	-0.002
30	1850.699996	-0.002	1909.299997	-0.002
40	1850.699997	-0.002	1909.299997	-0.002
50	1850.699997	-0.002	1909.299997	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 2			
	Channel Bandwidth 3MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	1851.500001	0.001	1908.500002	0.001
3.87	1851.500002	0.001	1908.500001	0.001
4.45	1851.500001	0.001	1908.500002	0.001

Note: The applicant defined the normal working voltage is from 3.60Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth 3MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1851.500004	0.002	1908.500001	0.001
-20	1851.500004	0.002	1908.500004	0.002
-10	1851.500003	0.002	1908.500001	0.001
0	1851.500001	0.001	1908.500001	0.001
10	1851.499996	-0.002	1908.499997	-0.002
20	1851.499996	-0.002	1908.499998	-0.001
30	1851.499997	-0.002	1908.499996	-0.002
40	1851.499998	-0.001	1908.499996	-0.002
50	1851.499996	-0.002	1908.499996	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 2			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	1852.500001	0.001	1907.500004	0.002
3.87	1852.500003	0.002	1907.500004	0.002
4.45	1852.500001	0.001	1907.500004	0.002

Note: The applicant defined the normal working voltage is from 3.60Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.500002	0.001	1907.500001	0.001
-20	1852.500003	0.002	1907.500004	0.002
-10	1852.500004	0.002	1907.500002	0.001
0	1852.500002	0.001	1907.500003	0.002
10	1852.499999	-0.001	1907.499999	-0.001
20	1852.499996	-0.002	1907.499996	-0.002
30	1852.499997	-0.002	1907.499999	-0.001
40	1852.499999	-0.001	1907.499997	-0.002
50	1852.499997	-0.002	1907.499999	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 2			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	1855.000004	0.002	1905.000004	0.002
3.87	1855.000003	0.002	1905.000003	0.002
4.45	1855.000001	0.001	1905.000003	0.002

Note: The applicant defined the normal working voltage is from 3.60Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1855.000004	0.002	1905.000004	0.002
-20	1855.000001	0.001	1905.000001	0.001
-10	1855.000003	0.002	1905.000002	0.001
0	1855.000004	0.002	1905.000003	0.002
10	1854.999996	-0.002	1904.999996	-0.002
20	1854.999998	-0.001	1904.999996	-0.002
30	1854.999997	-0.002	1904.999998	-0.001
40	1854.999998	-0.001	1904.999998	-0.001
50	1854.999997	-0.002	1904.999996	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 2			
	Channel Bandwidth 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	1857.500001	0.001	1902.500003	0.002
3.87	1857.500004	0.002	1902.500003	0.002
4.45	1857.500002	0.001	1902.500004	0.002

Note: The applicant defined the normal working voltage is from 3.60Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1857.500003	0.002	1902.500001	0.001
-20	1857.500002	0.001	1902.500004	0.002
-10	1857.500001	0.001	1902.500002	0.001
0	1857.500003	0.002	1902.500001	0.001
10	1857.499997	-0.002	1902.499999	-0.001
20	1857.499998	-0.001	1902.499997	-0.002
30	1857.499998	-0.001	1902.499996	-0.002
40	1857.499998	-0.001	1902.499997	-0.002
50	1857.499998	-0.001	1902.499996	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 2			
	Channel Bandwidth 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	1860.000004	0.002	1900.000004	0.002
3.87	1860.000002	0.001	1900.000003	0.002
4.45	1860.000003	0.002	1900.000001	0.001

Note: The applicant defined the normal working voltage is from 3.60Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2			
	Channel Bandwidth 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1860.000003	0.002	1900.000001	0.001
-20	1860.000002	0.001	1900.000003	0.002
-10	1860.000003	0.002	1900.000001	0.001
0	1860.000003	0.002	1900.000003	0.002
10	1859.999998	-0.001	1899.999997	-0.002
20	1859.999997	-0.002	1899.999996	-0.002
30	1859.999996	-0.002	1899.999996	-0.002
40	1859.999998	-0.001	1899.999996	-0.002
50	1859.999999	-0.001	1899.999996	-0.002

4.4 Occupied Bandwidth Measurement

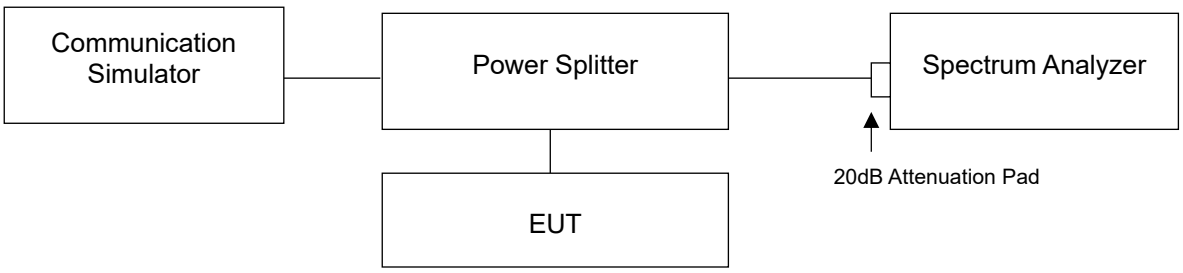
4.4.1 Test Procedure

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
f) Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
h) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
i) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

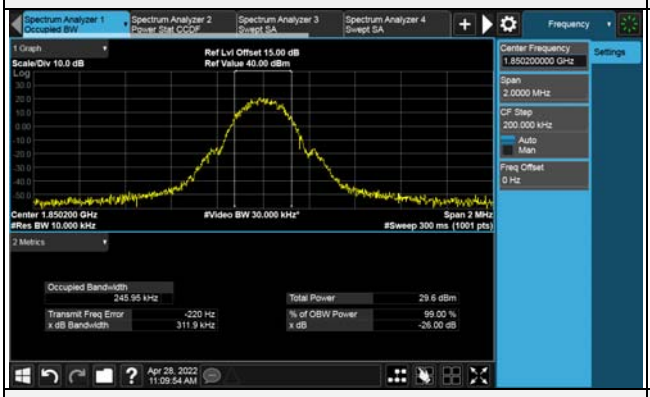
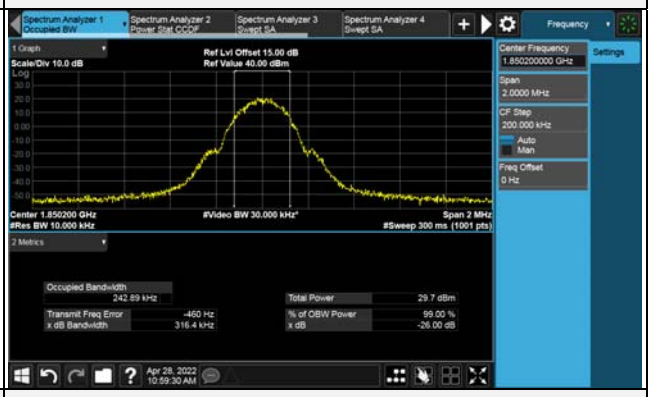
4.4.2 Test Setup



4.4.3 Test Result

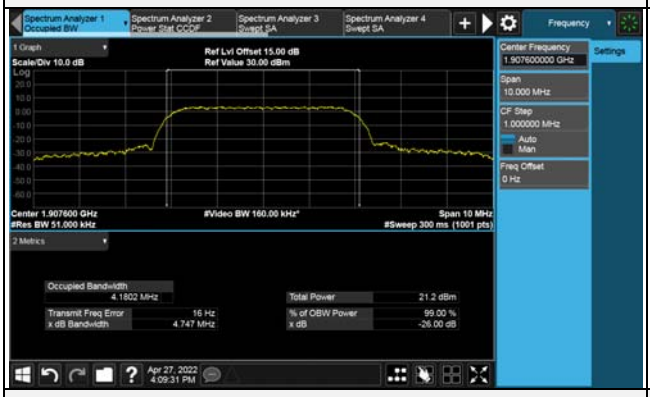
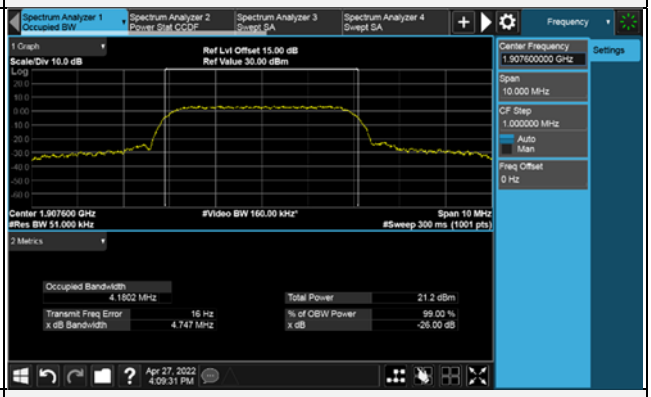
GSM

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (kHz)	26dB Bandwidth (kHz)
GSM	512	1850.2	242.89	316.40
GSM	661	1880	244.82	316.40
GSM	810	1909.8	243.60	307.80
GPRS	512	1850.2	245.95	311.90
GPRS	661	1880	243.87	311.80
GPRS	810	1909.8	245.89	313.70

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
GPRS CH 512 (1850.2MHz)	GSM CH 512 (1850.2MHz)

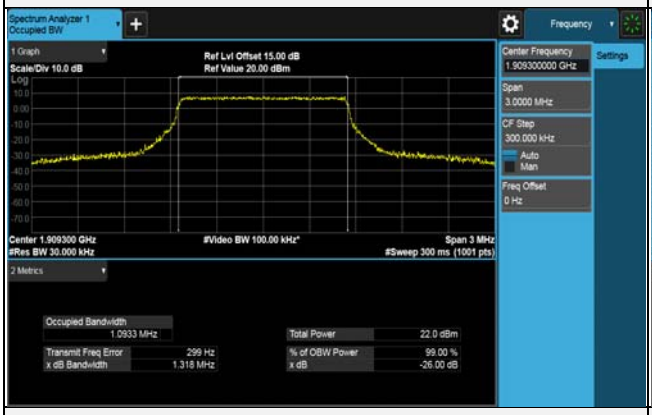
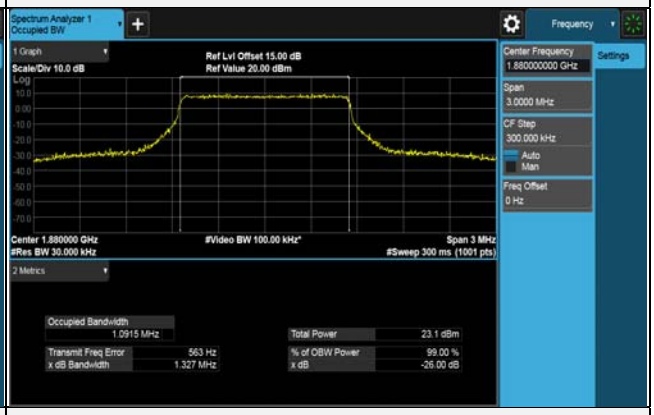
WCDMA

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
WCDMA	9262	1852.4	4.16	4.72
WCDMA	9400	1880.0	4.16	4.72
WCDMA	9538	1907.6	4.16	4.72
HSDPA	9262	1852.4	4.16	4.71
HSDPA	9400	1880.0	4.16	4.72
HSDPA	9538	1907.6	4.18	4.75
HSUPA	9262	1852.4	4.17	4.72
HSUPA	9400	1880.0	4.16	4.71
HSUPA	9538	1907.6	4.16	4.72

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
HSDPA CH 9538 (1907.6MHz)	HSDPA CH 9538 (1907.6MHz)

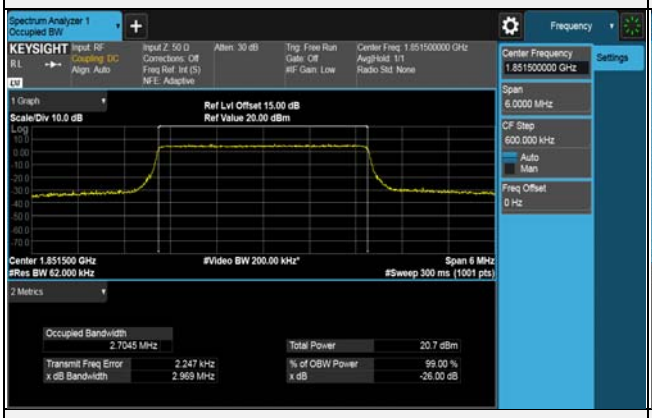
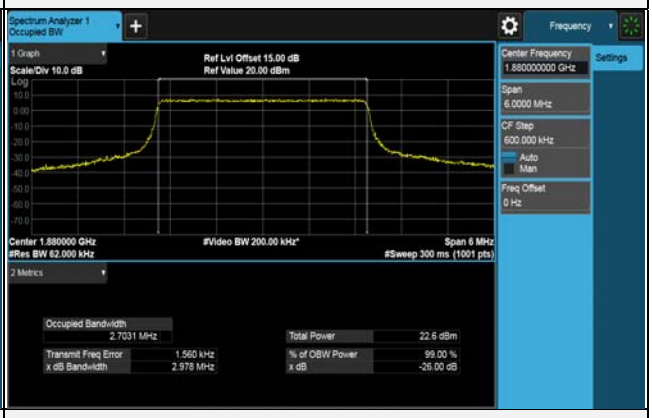
LTE Band 2 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18607	1850.7	1.0916	1.292
QPSK	18900	1880	1.0915	1.327
QPSK	19193	1909.3	1.0900	1.293
16QAM	18607	1850.7	1.0925	1.317
16QAM	18900	1880	1.0904	1.311
16QAM	19193	1909.3	1.0933	1.318
64QAM	18607	1850.7	1.0908	1.308
64QAM	18900	1880	1.0928	1.296
64QAM	19193	1909.3	1.0895	1.298

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
16QAM CH 19193 (1909.3MHz)	QPSK CH 18900 (1880MHz)

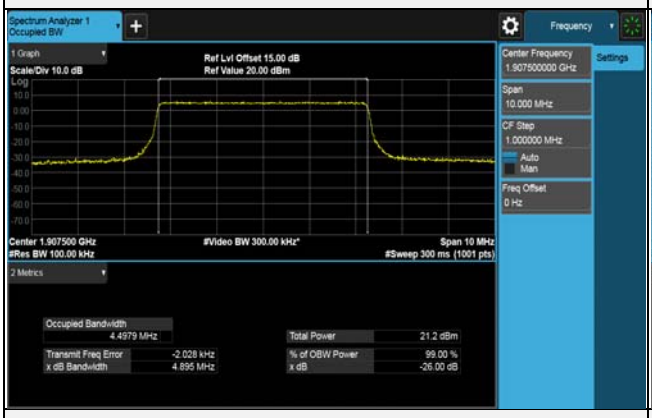
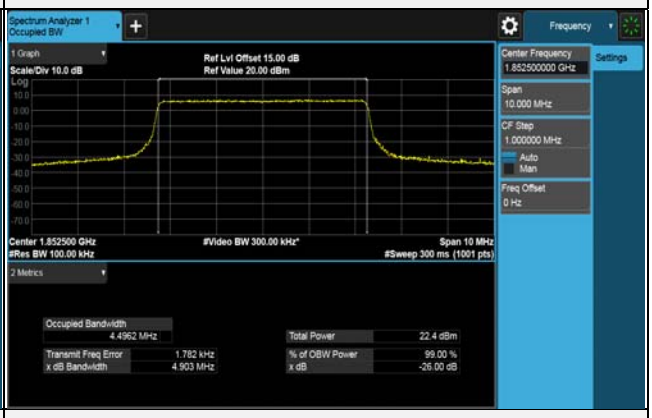
LTE Band 2 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18615	1851.5	2.6958	2.845
QPSK	18900	1880	2.7031	2.978
QPSK	19185	1908.5	2.7030	2.945
16QAM	18615	1851.5	2.6769	2.873
16QAM	18900	1880	2.7006	2.970
16QAM	19185	1908.5	2.7033	2.965
64QAM	18615	1851.5	2.7045	2.969
64QAM	18900	1880	2.7014	2.973
64QAM	19185	1908.5	2.7029	2.962

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
64QAM CH 18615 (1851.5MHz)	QPSK CH 18900 (1880MHz)

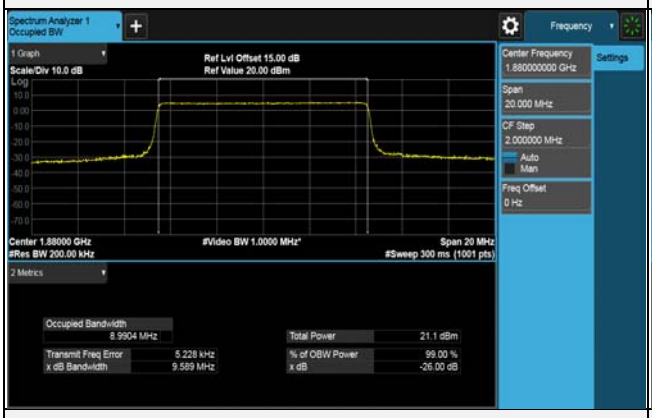
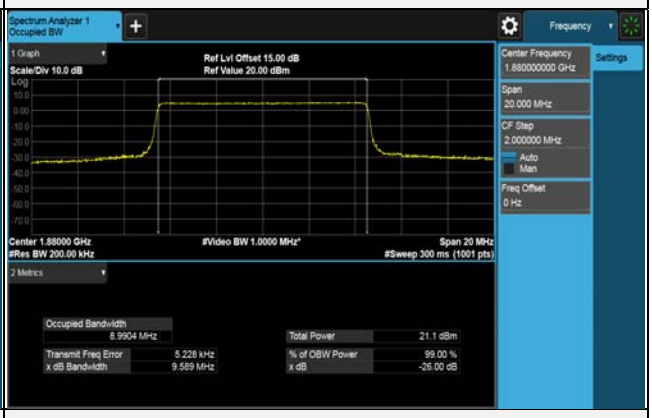
LTE Band 2 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18625	1852.5	4.4962	4.903
QPSK	18900	1880	4.4936	4.864
QPSK	19175	1907.5	4.4963	4.858
16QAM	18625	1852.5	4.4953	4.879
16QAM	18900	1880	4.4953	4.876
16QAM	19175	1907.5	4.4979	4.895
64QAM	18625	1852.5	4.4964	4.843
64QAM	18900	1880	4.4967	4.870
64QAM	19175	1907.5	4.4946	4.872

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
16QAM CH 19175 (1907.5MHz)	QPSK CH 18625 (1852.5MHz)

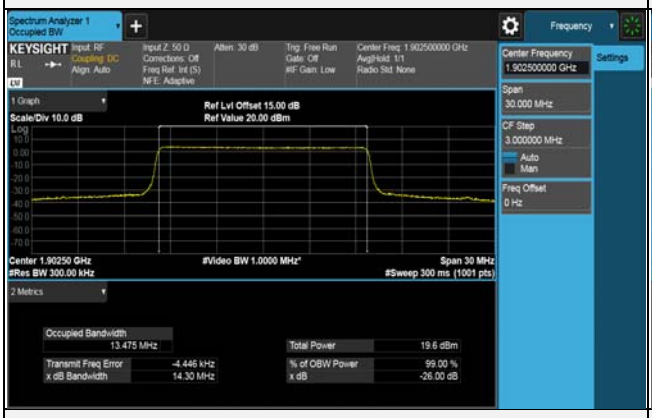
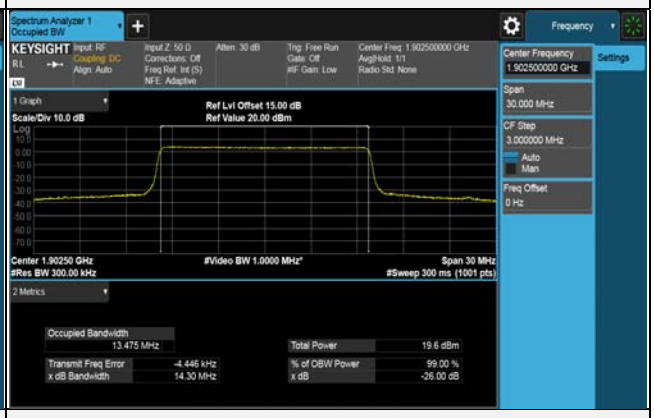
LTE Band 2 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18650	1855	8.8033	9.359
QPSK	18900	1880	8.9859	9.579
QPSK	19150	1905	8.9855	9.577
16QAM	18650	1855	8.9847	9.580
16QAM	18900	1880	8.9904	9.589
16QAM	19150	1905	8.9869	9.552
64QAM	18650	1855	8.9742	9.565
64QAM	18900	1880	8.9876	9.557
64QAM	19150	1905	8.9887	9.573

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
16QAM CH 18900 (1880MHz)	16QAM CH 18900 (1880MHz)

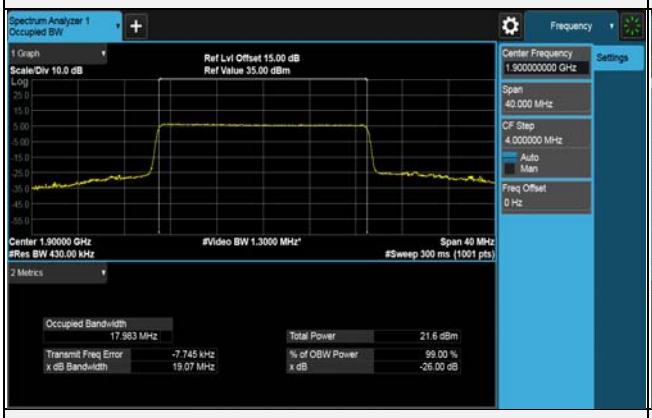
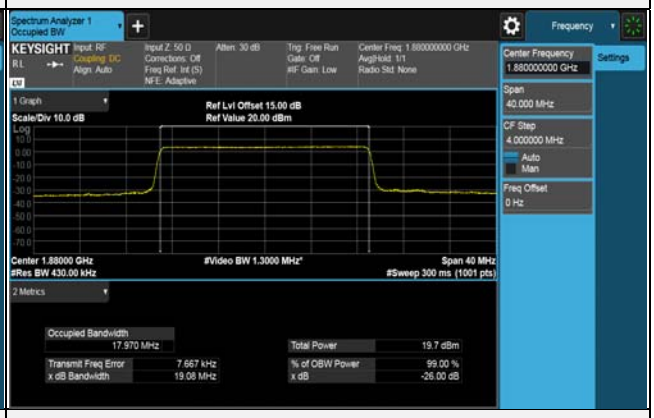
LTE Band 2 (Channel Bandwidth 15MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18675	1857.5	13.460	14.28
QPSK	18900	1880	13.473	14.28
QPSK	19125	1902.5	13.475	14.29
16QAM	18675	1857.5	13.455	14.26
16QAM	18900	1880	13.472	14.29
16QAM	19125	1902.5	13.474	14.29
64QAM	18675	1857.5	13.461	14.27
64QAM	18900	1880	13.472	14.27
64QAM	19125	1902.5	13.475	14.30

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
64QAM CH 19125 (1902.5MHz)	64QAM CH 19125 (1902.5MHz)

LTE Band 2 (Channel Bandwidth 20MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	18700	1860	17.946	19.03
QPSK	18900	1880	17.974	19.08
QPSK	19100	1900	17.983	19.07
16QAM	18700	1860	17.964	19.04
16QAM	18900	1880	17.967	19.07
16QAM	19100	1900	17.969	19.04
64QAM	18700	1860	17.941	19.03
64QAM	18900	1880	17.970	19.08
64QAM	19100	1900	17.973	19.05

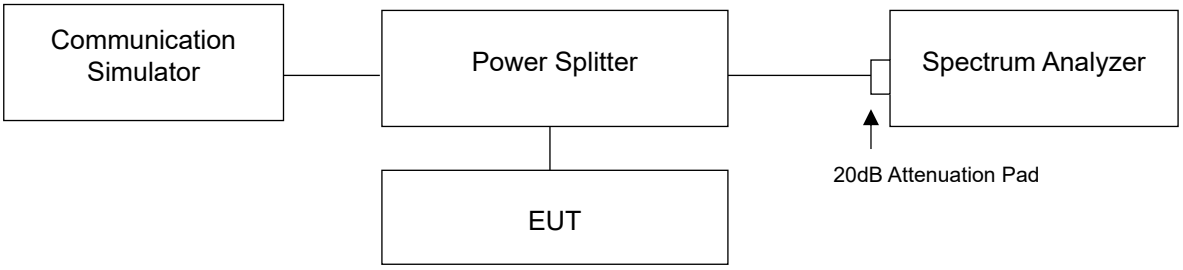
Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
QPSK CH 19100 (1900MHz)	64QAM CH 18900 (1880MHz)

4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

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 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4.5.2 Test Setup

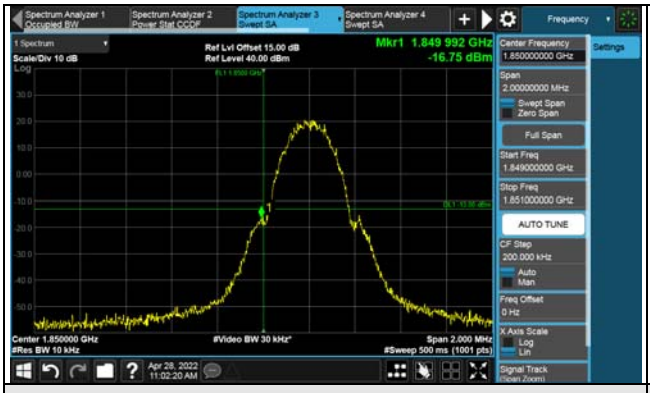
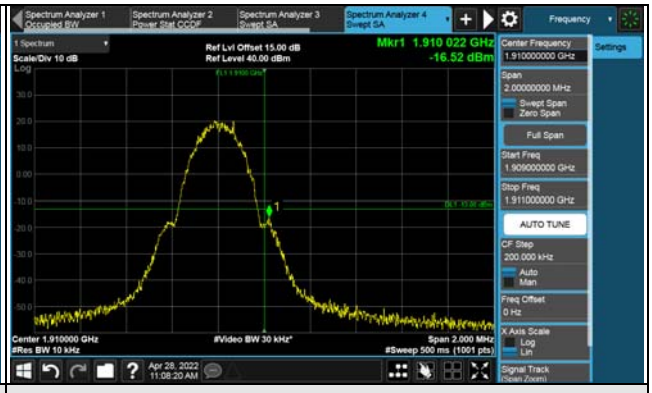


4.5.3 Test Procedures

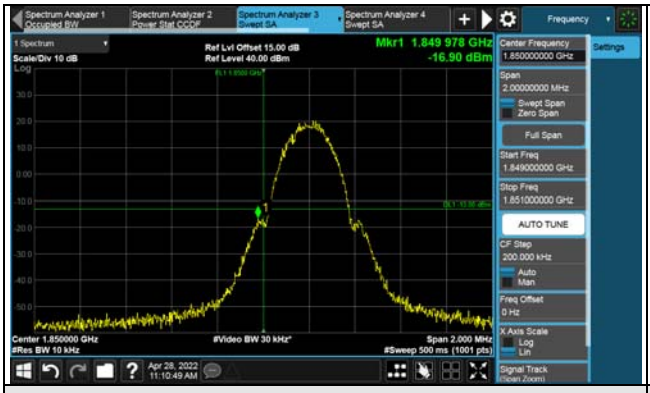
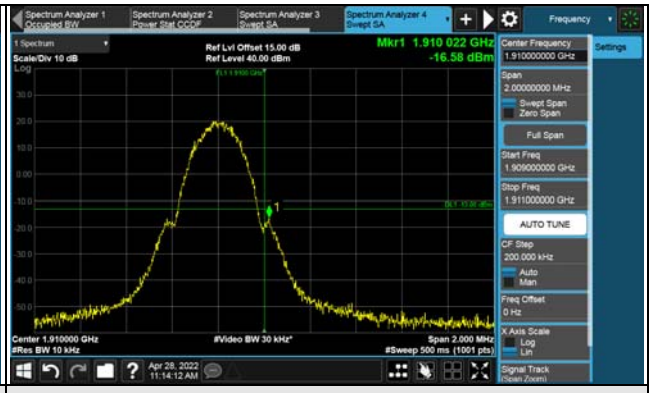
a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 10kHz and VB of the spectrum is 30kHz (GSM / GPRS).
c. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (WCDMA / HSDPA / HSUPA).
d. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 15kHz and VB of the spectrum is 51kHz (LTE Channel Bandwidth 1.4MHz).
e. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 30kHz and VB of the spectrum is 100kHz (LTE Channel Bandwidth 3MHz).
f. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (LTE Channel Bandwidth 5MHz).
g. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Channel Bandwidth 10MHz).
h. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (LTE Channel Bandwidth 15MHz).
i. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 200kHz and VB of the spectrum is 1MHz (LTE Channel Bandwidth 20MHz).
j. Record the max trace plot into the test report.

4.5.4 Test Results

GSM

	
1850.2MHz	1909.8MHz

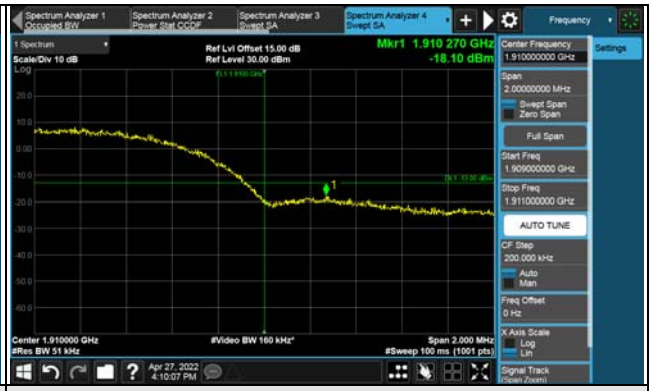
GPRS

	
1850.2MHz	1909.8MHz

WCDMA

	
1852.4MHz	1907.6MHz

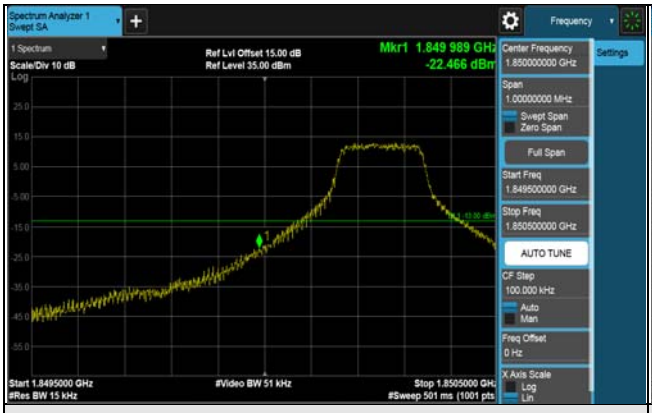
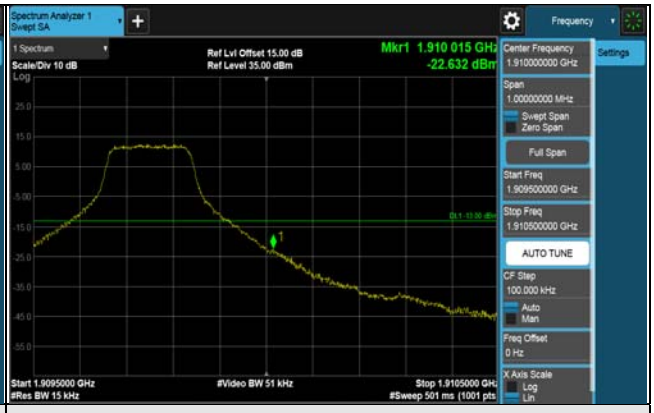
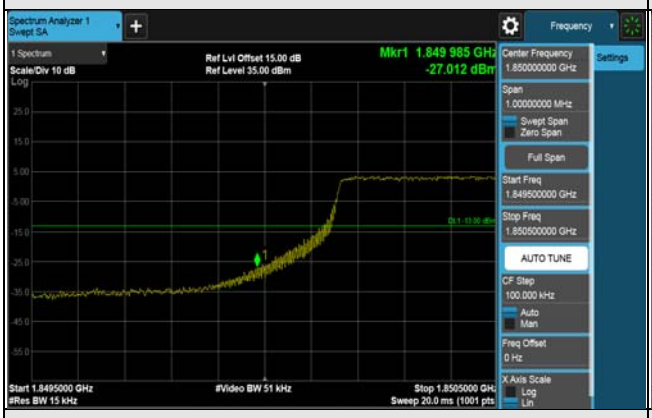
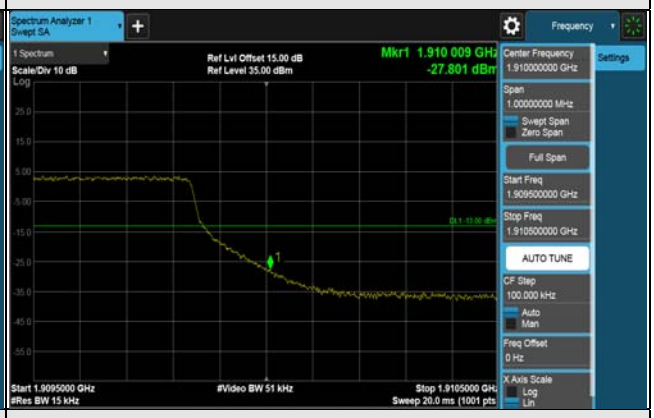
HSDPA

	
1852.4MHz	1907.6MHz

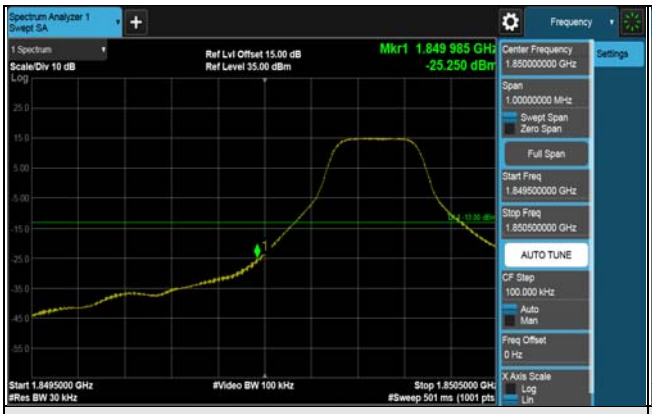
HSUPA

	
1852.4MHz	1907.6MHz

LTE Band 2 (Channel Bandwidth 1.4MHz)

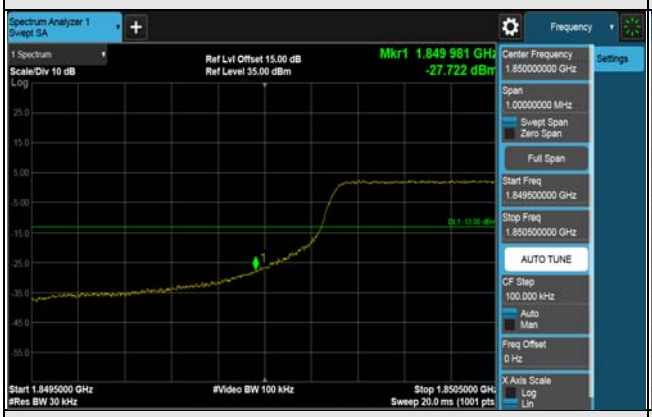
	
VRB (1850.7MHz)	VRB (1909.3MHz)
	
FULL (1850.7MHz)	FULL (1909.3MHz)

LTE Band 2 (Channel Bandwidth 3MHz)

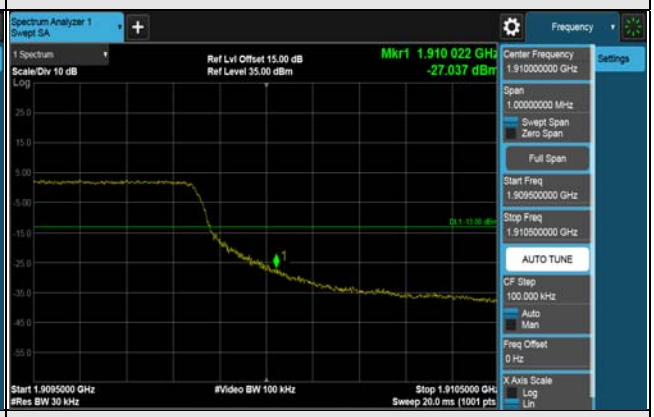


VRB (1851.5MHz)

VRB (1908.5MHz)



FULL (1851.5MHz)

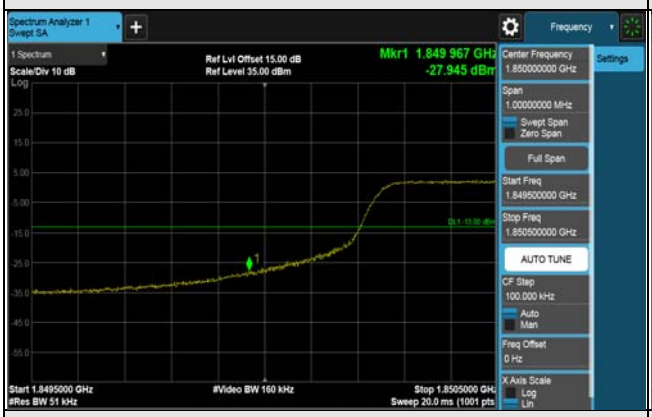


FULL (1908.5MHz)

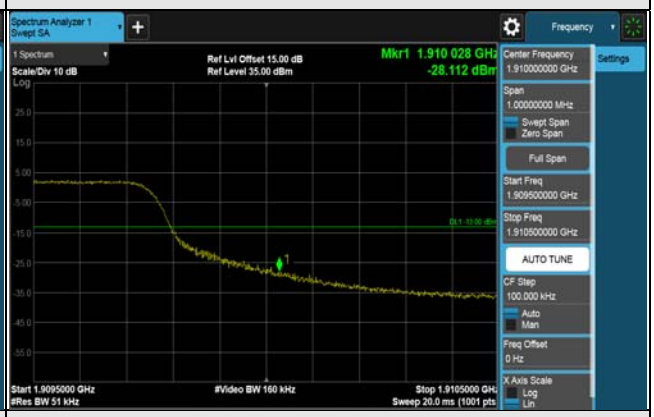
LTE Band 2 (Channel Bandwidth 5MHz)

VRB (1852.5MHz)

VRB (1907.5MHz)



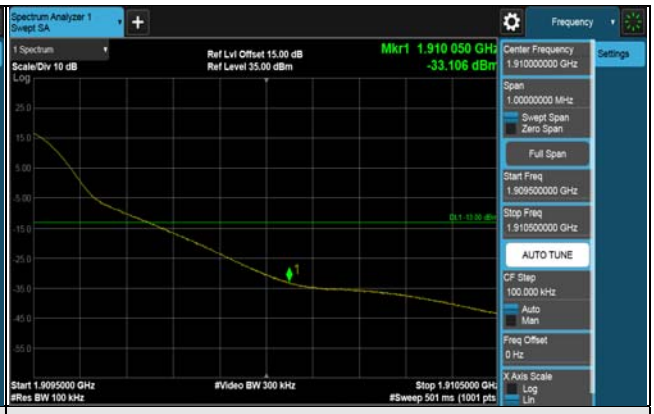
FULL (1852.5MHz)



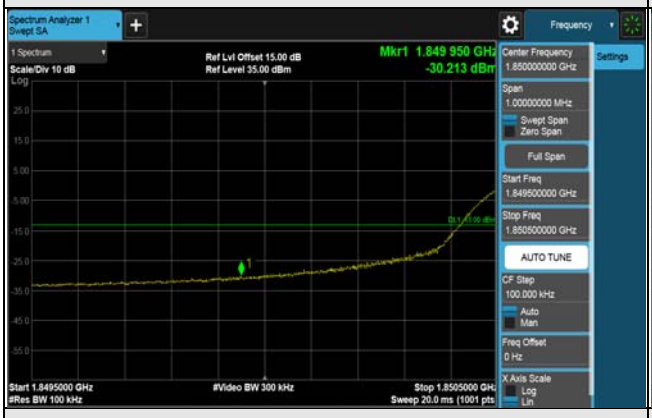
FULL (1907.5MHz)

LTE Band 2 (Channel Bandwidth 10MHz)

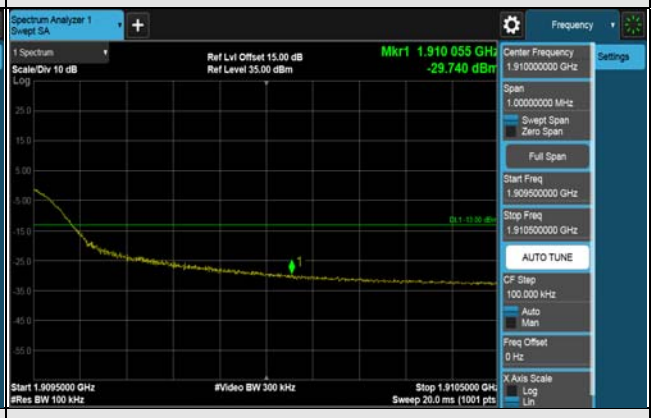
VRB (1855MHz)



VRB (1905MHz)

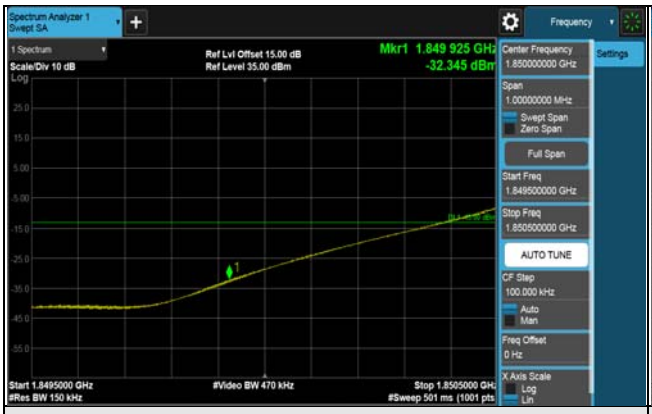


FULL (1855MHz)



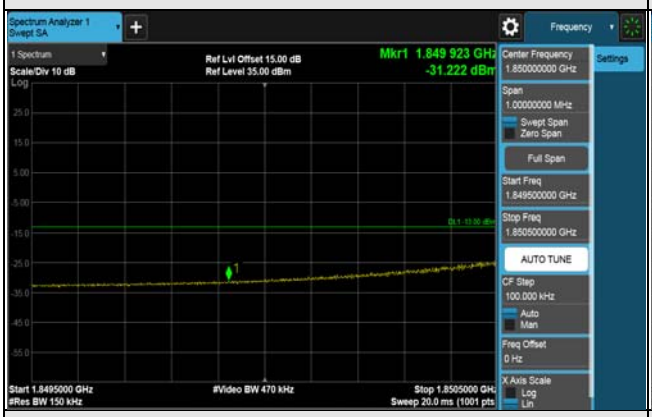
FULL (1905MHz)

LTE Band 2 (Channel Bandwidth 15MHz)

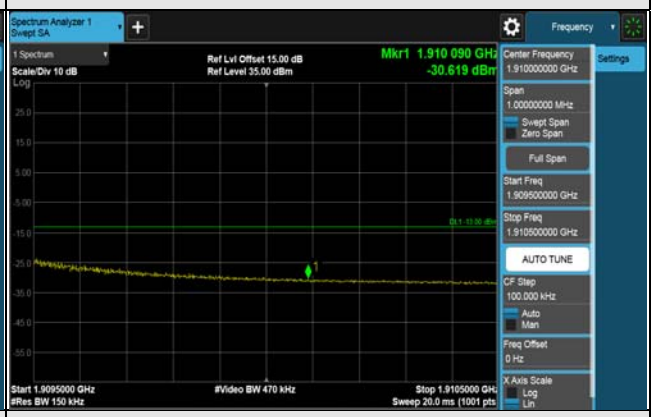


VRB (1857.5MHz)

VRB (1902.5MHz)

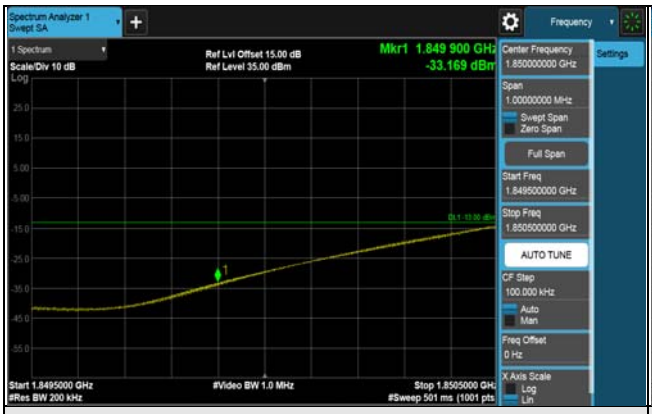


FULL (1857.5MHz)



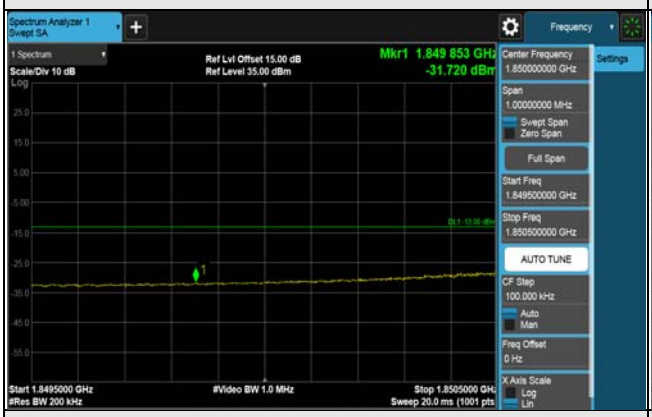
FULL (1902.5MHz)

LTE Band 2 (Channel Bandwidth 20MHz)

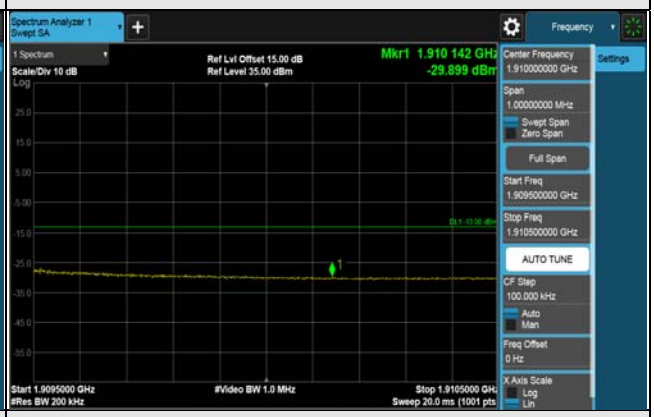


VRB (1860MHz)

VRB (1900MHz)



FULL (1860MHz)



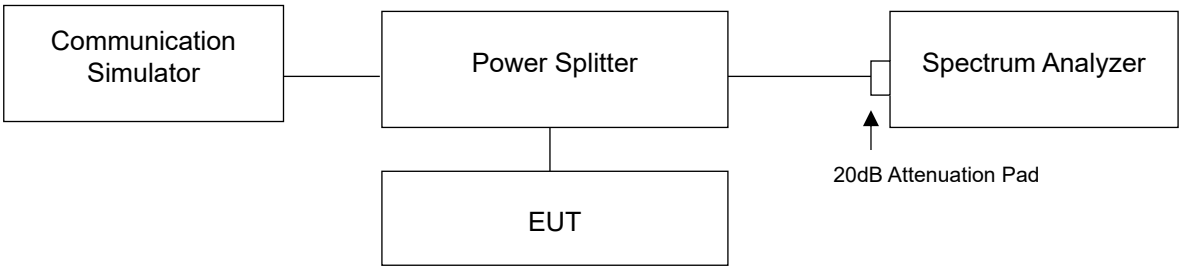
FULL (1900MHz)

4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

4.6.2 Test Setup



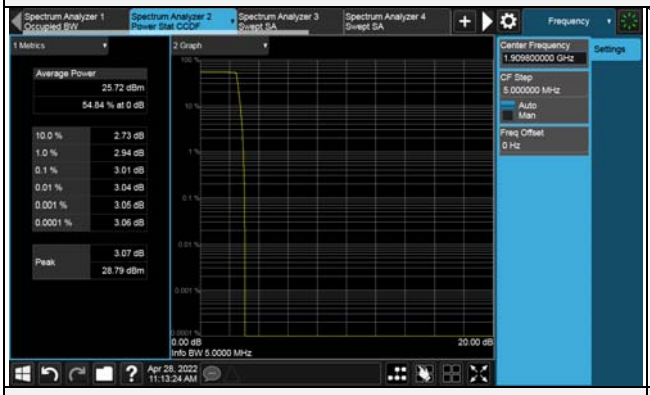
4.6.3 Test Procedures

a. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
b. Set the number of counts to a value that stabilizes the measured CCDF curve;
c. Record the maximum PAPR level associated with a probability of 0.1%.

4.6.4 Test Results

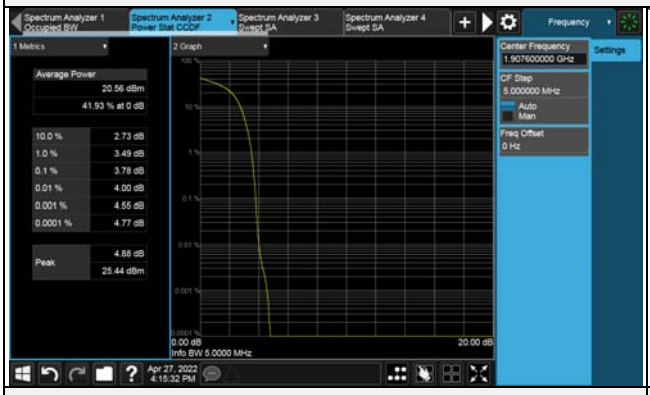
GSM

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
GSM	512	1850.2	2.99	13	Pass
GSM	661	1880	3.00	13	Pass
GSM	810	1909.8	3.01	13	Pass
GPRS	512	1850.2	2.99	13	Pass
GPRS	661	1880	3.00	13	Pass
GPRS	810	1909.8	3.01	13	Pass

Spectrum Plot of Worst Value	
	
GPRS CH 810 (1909.8MHz)	

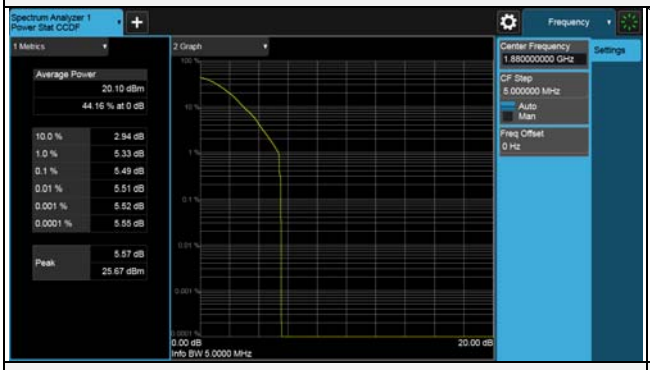
WCDMA

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
WCDMA	9262	1852.4	2.91	13	Pass
WCDMA	9400	1880.0	2.87	13	Pass
WCDMA	9538	1907.6	2.88	13	Pass
HSDPA	9262	1852.4	3.73	13	Pass
HSDPA	9400	1880.0	3.61	13	Pass
HSDPA	9538	1907.6	3.32	13	Pass
HSUPA	9262	1852.4	3.76	13	Pass
HSUPA	9400	1880.0	3.76	13	Pass
HSUPA	9538	1907.6	3.78	13	Pass

Spectrum Plot of Worst Value	
	
HSUPA CH 9538 (1907.6MHz)	

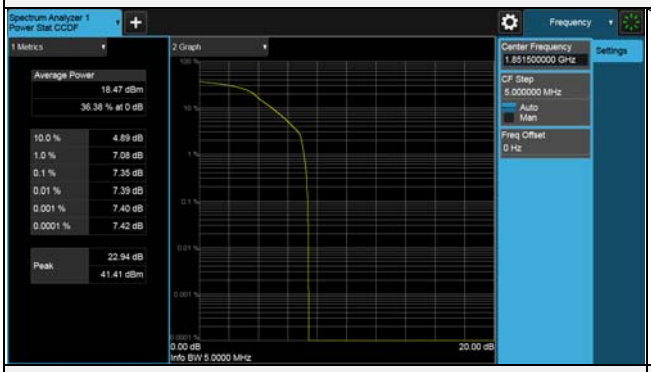
LTE Band 2 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
QPSK	18607	1850.7	3.69	13	Pass
QPSK	18900	1880	3.48	13	Pass
QPSK	19193	1909.3	3.49	13	Pass
16QAM	18607	1850.7	4.47	13	Pass
16QAM	18900	1880	4.44	13	Pass
16QAM	19193	1909.3	4.44	13	Pass
64QAM	18607	1850.7	4.85	13	Pass
64QAM	18900	1880	5.49	13	Pass
64QAM	19193	1909.3	5.42	13	Pass

Spectrum Plot of Worst Value	
	
64QAM CH 18900 (1880MHz)	

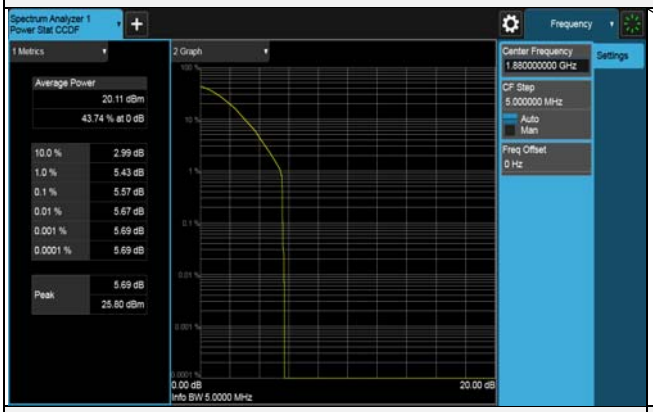
LTE Band 2 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
QPSK	18615	1851.5	7.35	13	Pass
QPSK	18900	1880	3.54	13	Pass
QPSK	19185	1908.5	3.55	13	Pass
16QAM	18615	1851.5	4.76	13	Pass
16QAM	18900	1880	4.48	13	Pass
16QAM	19185	1908.5	4.45	13	Pass
64QAM	18615	1851.5	5.40	13	Pass
64QAM	18900	1880	5.67	13	Pass
64QAM	19185	1908.5	5.44	13	Pass

Spectrum Plot of Worst Value	
	
QPSK CH 18615 (1851.5MHz)	

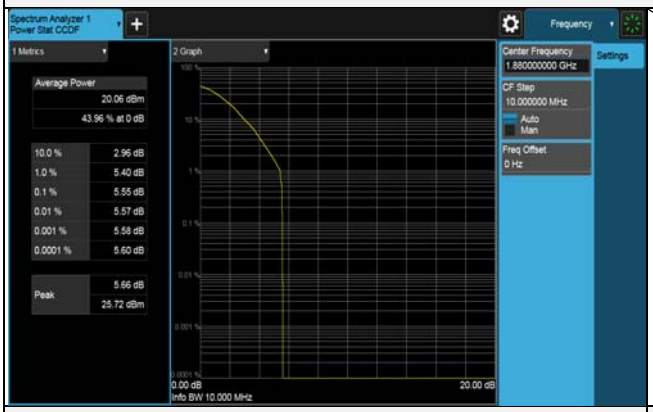
LTE Band 2 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
QPSK	18625	1852.5	3.60	13	Pass
QPSK	18900	1880	3.55	13	Pass
QPSK	19175	1907.5	3.55	13	Pass
16QAM	18625	1852.5	4.56	13	Pass
16QAM	18900	1880	4.40	13	Pass
16QAM	19175	1907.5	4.39	13	Pass
64QAM	18625	1852.5	5.30	13	Pass
64QAM	18900	1880	5.57	13	Pass
64QAM	19175	1907.5	5.36	13	Pass

Spectrum Plot of Worst Value	
	
64QAM CH 18900 (1880MHz)	

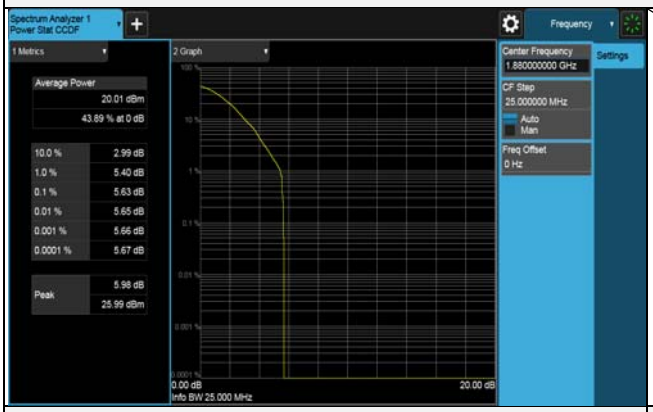
LTE Band 2 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
QPSK	18650	1855	3.82	13	Pass
QPSK	18900	1880	3.62	13	Pass
QPSK	19150	1905	3.68	13	Pass
16QAM	18650	1855	4.69	13	Pass
16QAM	18900	1880	4.56	13	Pass
16QAM	19150	1905	4.48	13	Pass
64QAM	18650	1855	5.51	13	Pass
64QAM	18900	1880	5.55	13	Pass
64QAM	19150	1905	5.43	13	Pass

Spectrum Plot of Worst Value	
	
64QAM CH 18900 (1880MHz)	

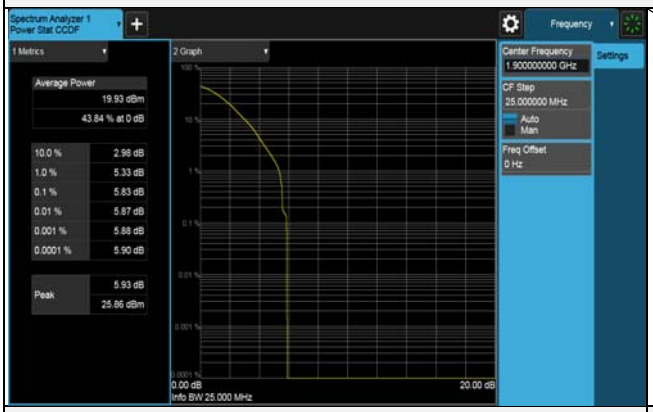
LTE Band 2 (Channel Bandwidth 15MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
QPSK	18675	1857.5	3.95	13	Pass
QPSK	18900	1880	3.66	13	Pass
QPSK	19125	1902.5	4.09	13	Pass
16QAM	18675	1857.5	4.57	13	Pass
16QAM	18900	1880	4.63	13	Pass
16QAM	19125	1902.5	4.75	13	Pass
64QAM	18675	1857.5	5.51	13	Pass
64QAM	18900	1880	5.63	13	Pass
64QAM	19125	1902.5	5.63	13	Pass

Spectrum Plot of Worst Value	
	
64QAM CH 18900 (1880MHz)	

LTE Band 2 (Channel Bandwidth 20MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
QPSK	18700	1860	3.92	13	Pass
QPSK	18900	1880	3.82	13	Pass
QPSK	19100	1900	3.85	13	Pass
16QAM	18700	1860	4.79	13	Pass
16QAM	18900	1880	4.52	13	Pass
16QAM	19100	1900	4.82	13	Pass
64QAM	18700	1860	5.57	13	Pass
64QAM	18900	1880	5.64	13	Pass
64QAM	19100	1900	5.83	13	Pass

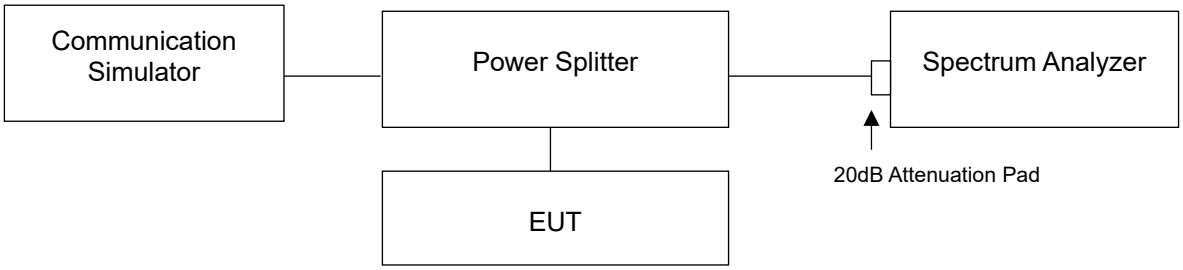
Spectrum Plot of Worst Value	
	
64QAM CH 19100 (1900MHz)	

4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

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 + 10 log(P) dB. The emission limit equal to –13dBm.

4.7.2 Test Setup



4.7.3 Test Procedure

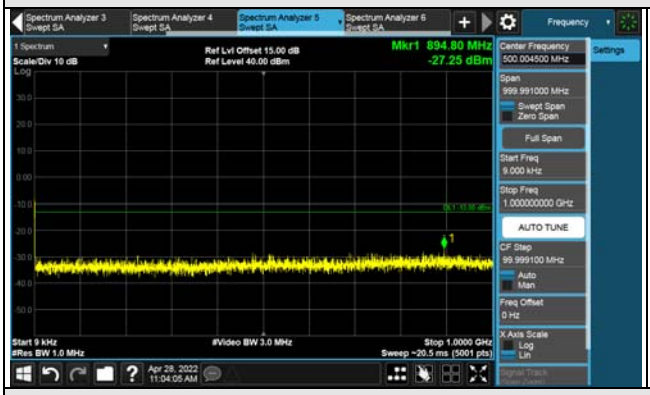
a. All measurements were done at low, middle and high channels operational frequency range.

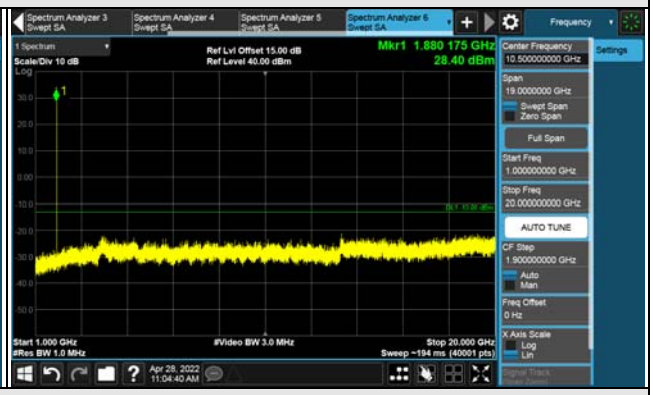
b. Measuring frequency range is from 9kHz to 20GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

4.7.4 Test Results

GSM

CH 512 (1850.2MHz)





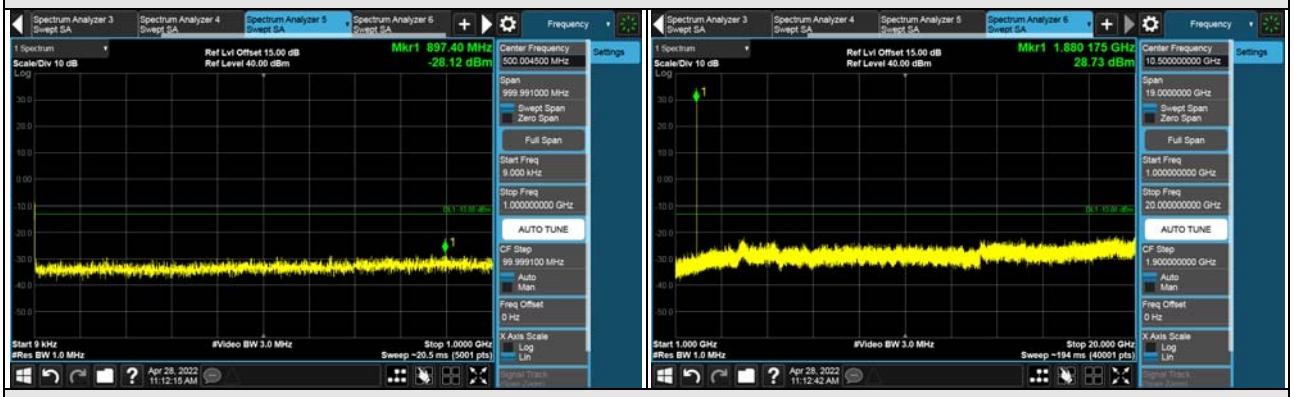
CH 661 (1880MHz)

CH 810 (1909.8MHz)

*The 9kHz signal over the limit is from Spectrum.

GPRS

CH 512 (1850.2MHz)

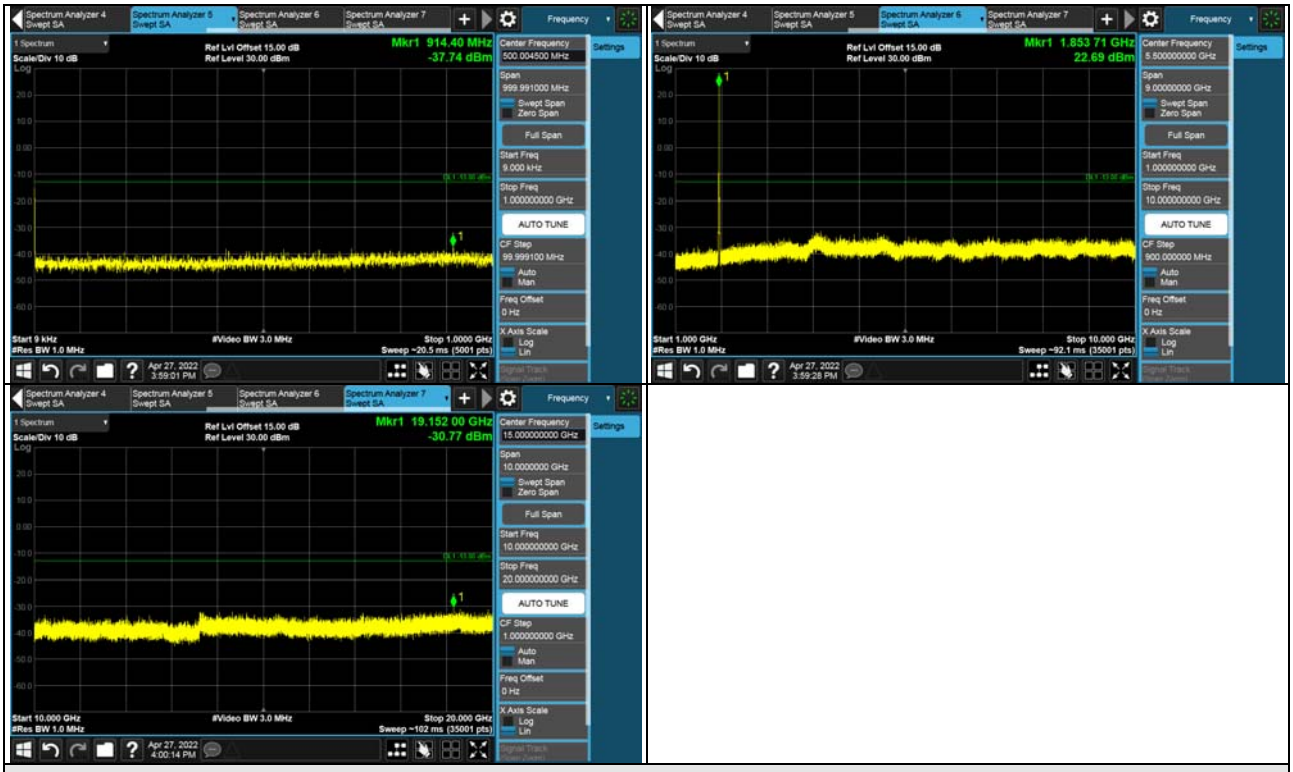


CH 661 (1880MHz)

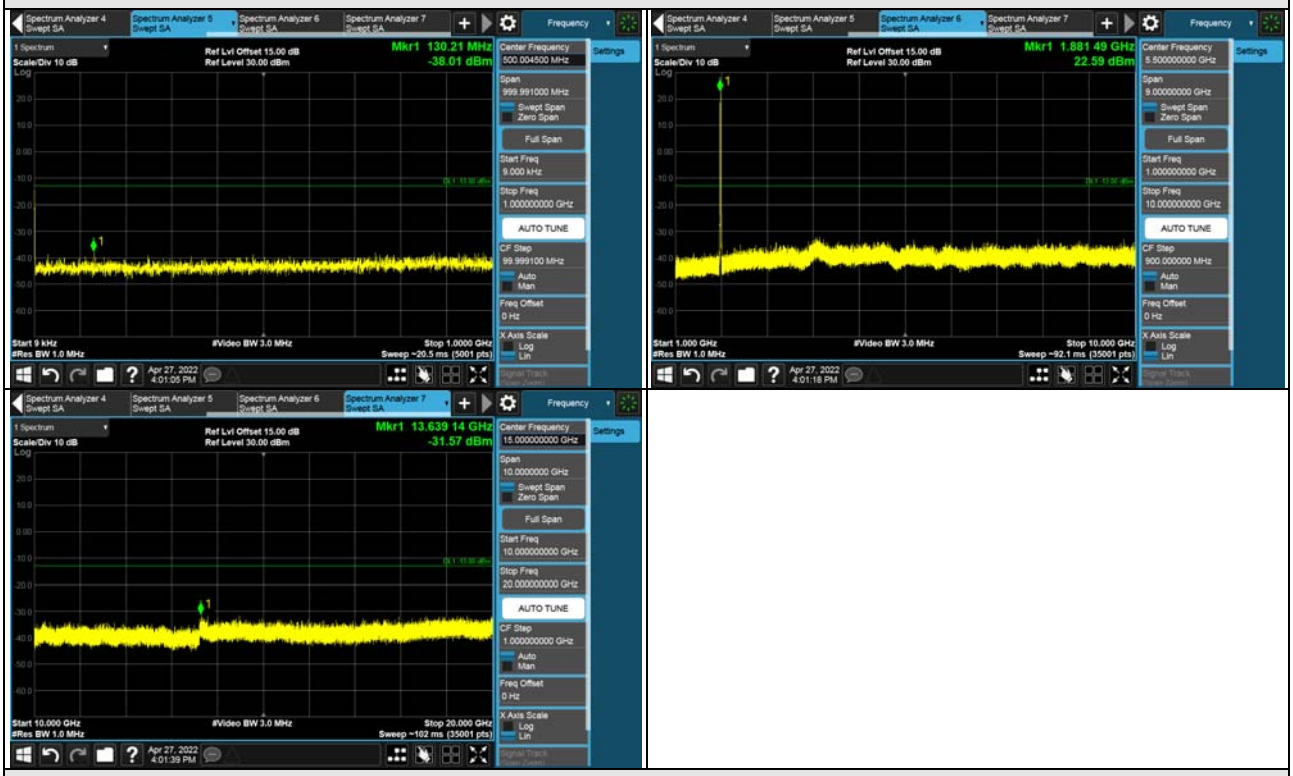
CH 810 (1909.8MHz)

*The 9kHz signal over the limit is from Spectrum.

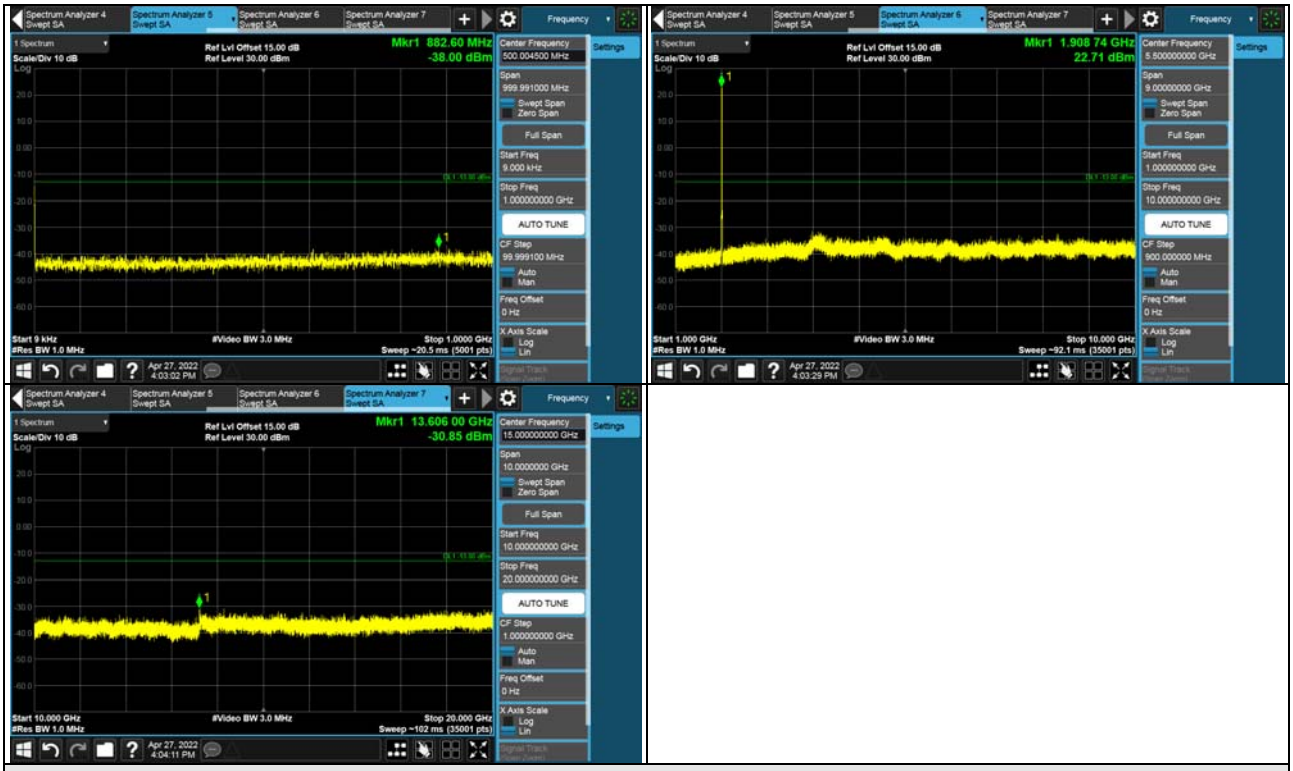
WCDMA



CH 9262 (1852.4MHz)



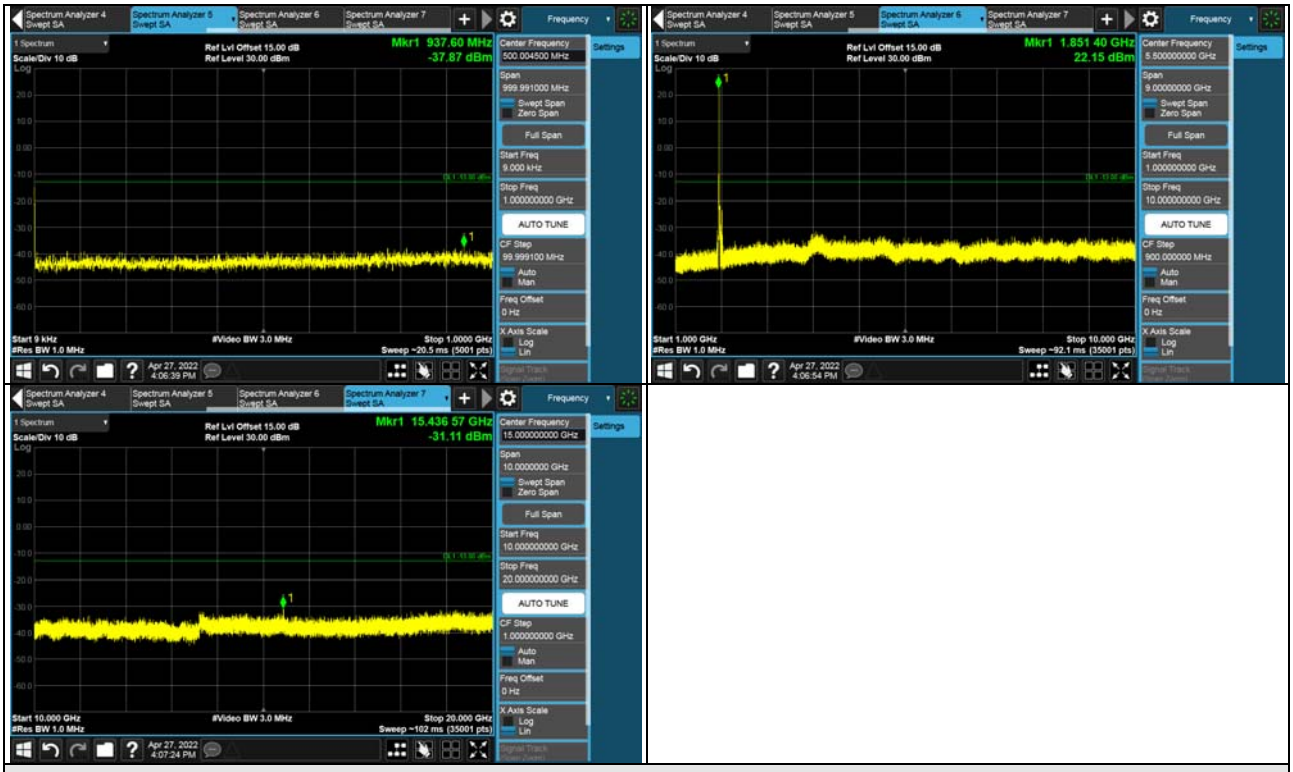
CH 9400 (1880.0MHz)



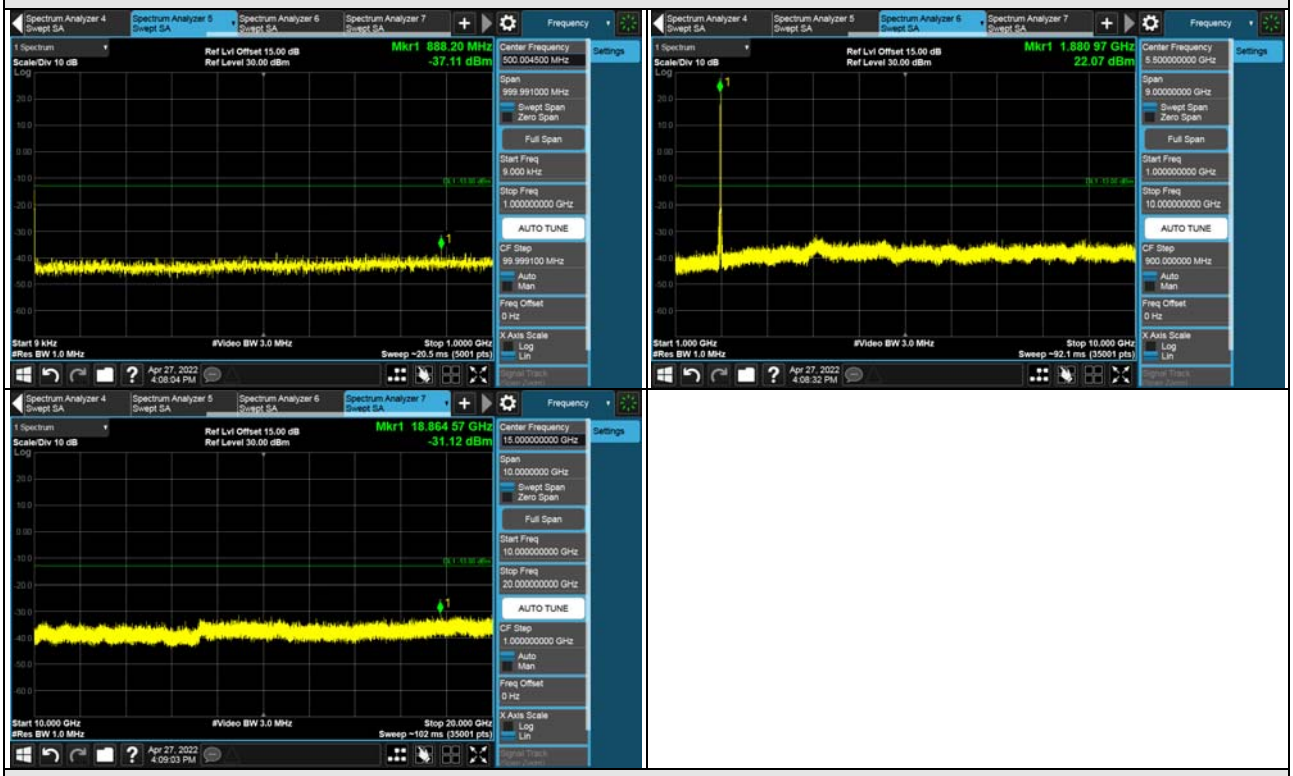
CH 9538 (1907.6MHz)

*The 9kHz signal over the limit is from Spectrum.

HSDPA



CH 9262 (1852.4MHz)



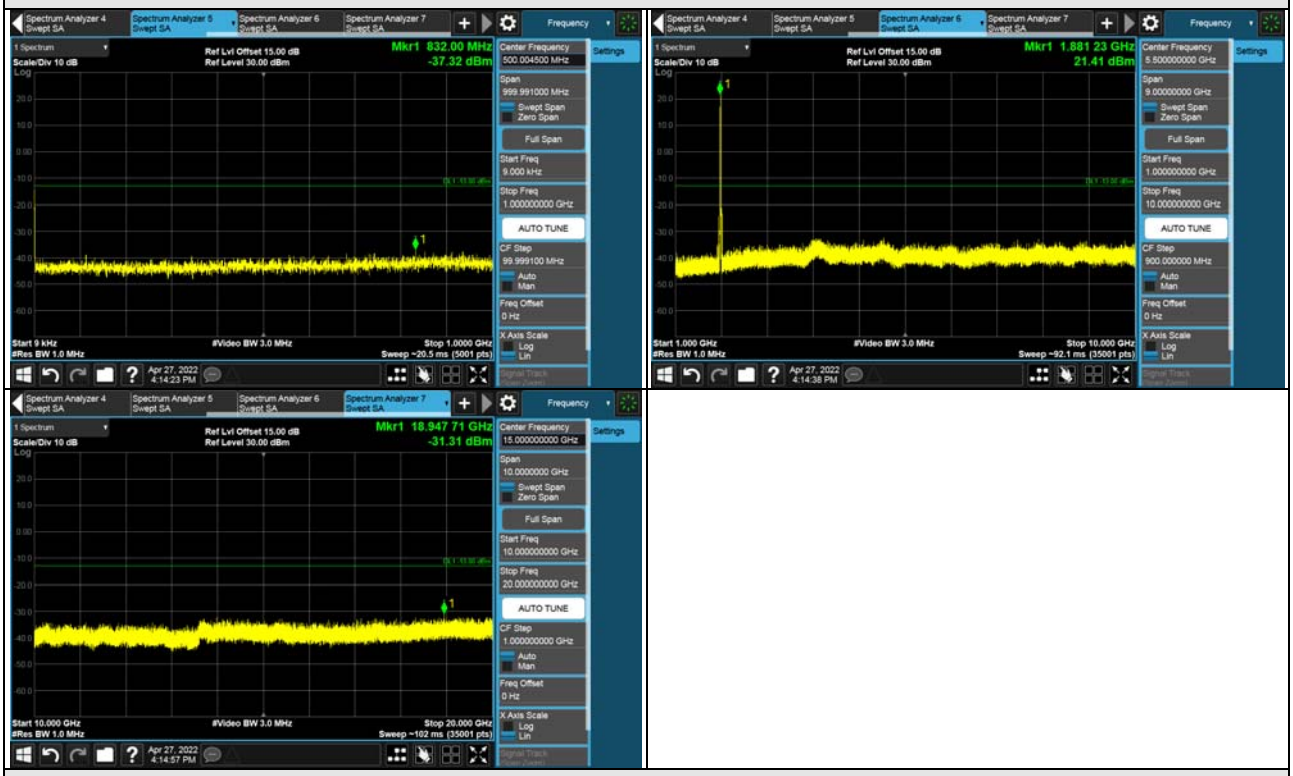
CH 9400 (1880.0MHz)

CH 9538 (1907.6MHz)

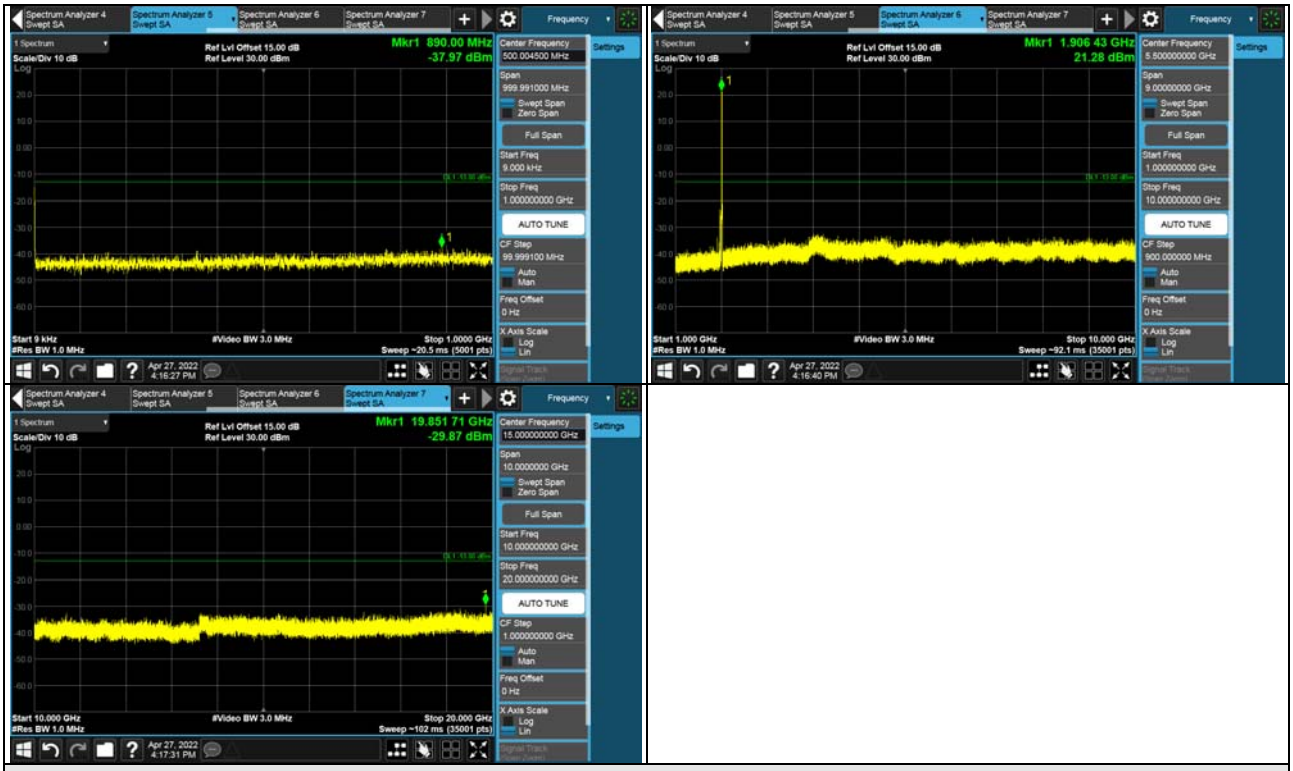
*The 9kHz signal over the limit is from Spectrum.

HSUPA

CH 9262 (1852.4MHz)



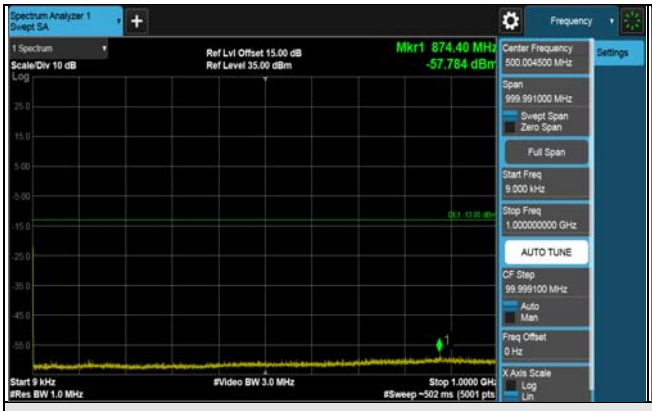
CH 9400 (1880.0MHz)

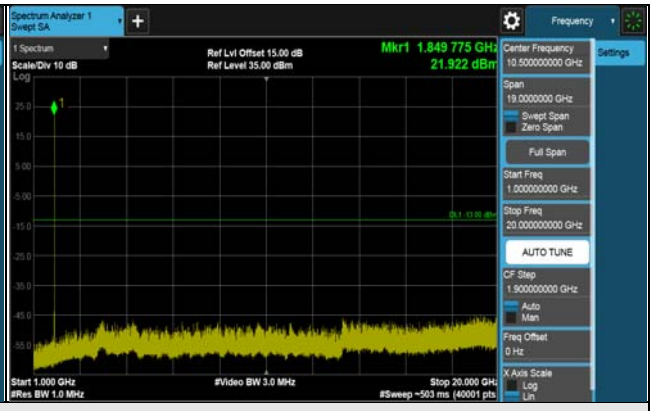


CH 9538 (1907.6MHz)

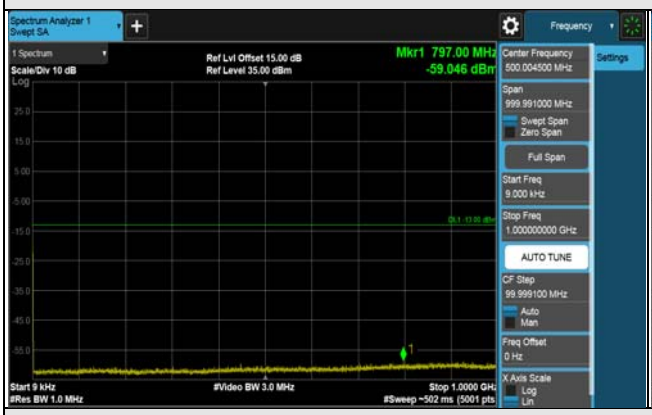
*The 9kHz signal over the limit is from Spectrum.

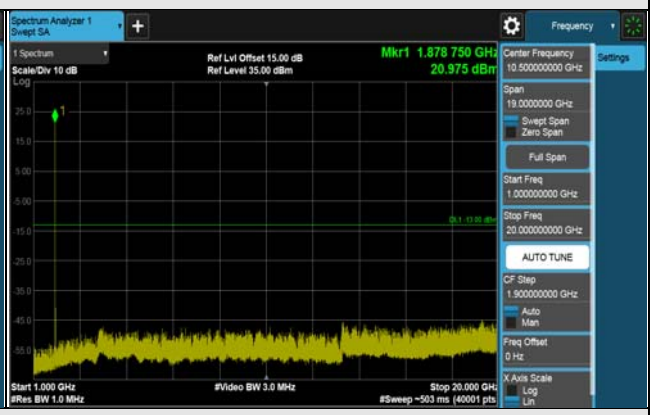
LTE Band 2 (Channel Bandwidth 1.4MHz)



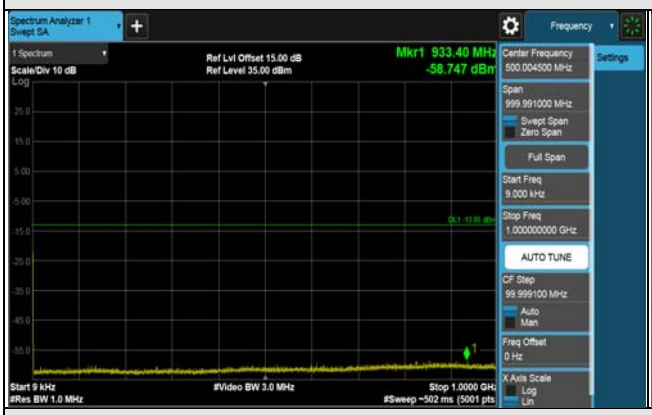


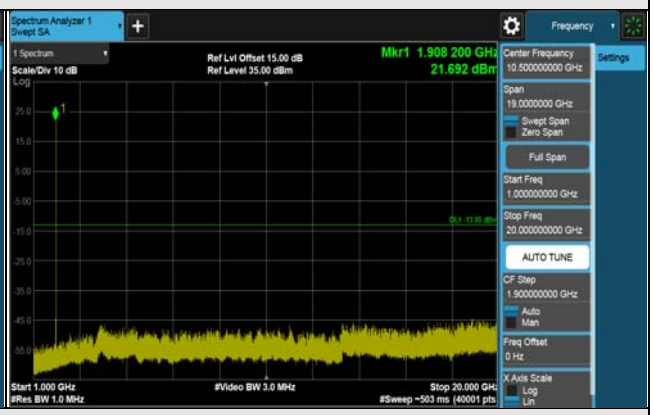
CH 18607 (1850.7MHz)





CH 18900 (1880MHz)

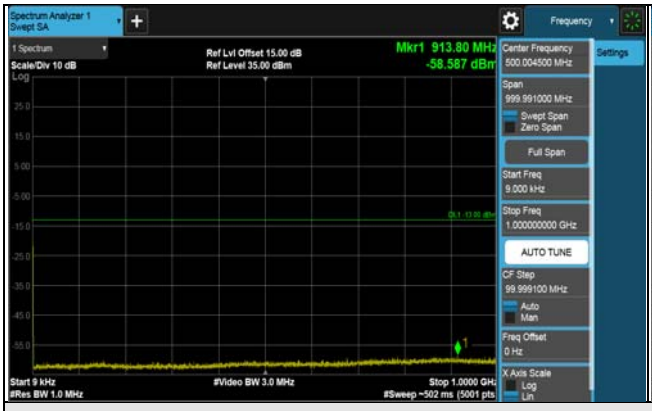


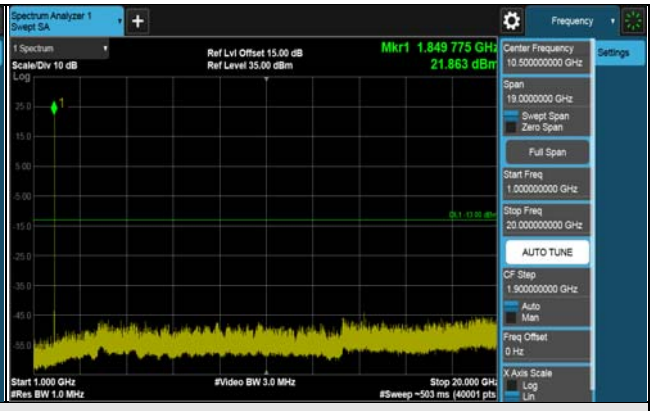


CH 19193 (1909.3MHz)

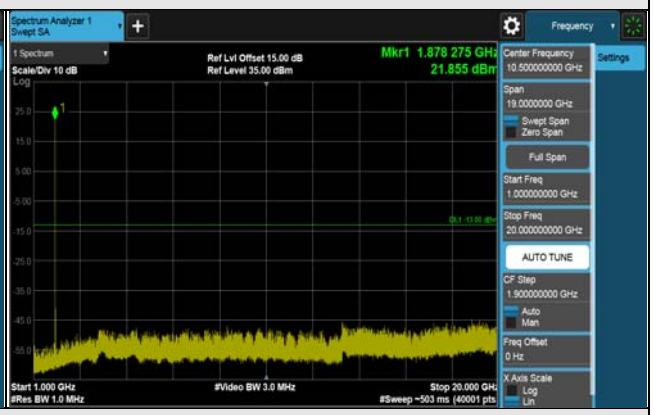
*The 9kHz signal over the limit is from Spectrum.

LTE Band 2 (Channel Bandwidth 3MHz)

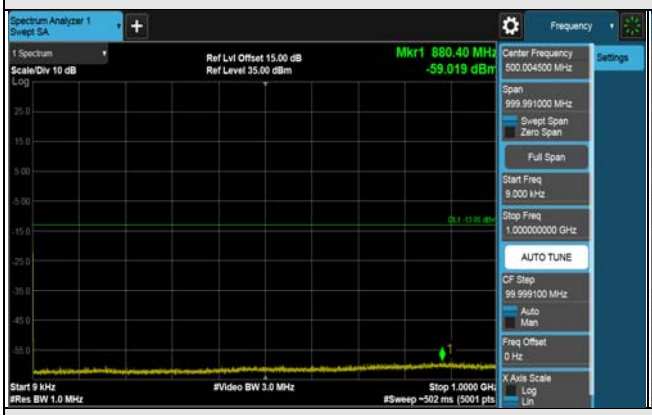


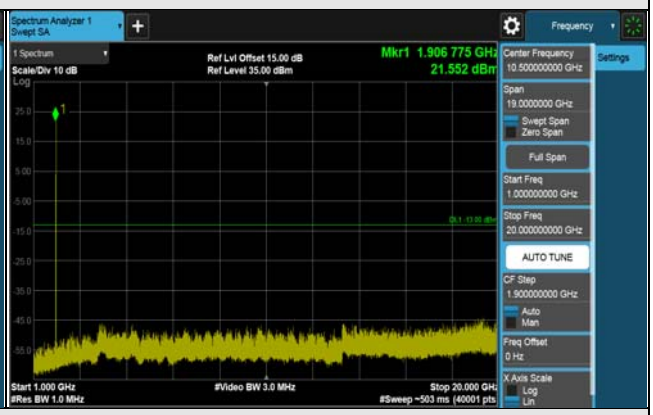


CH 18615 (1851.5MHz)



CH 18900 (1880MHz)

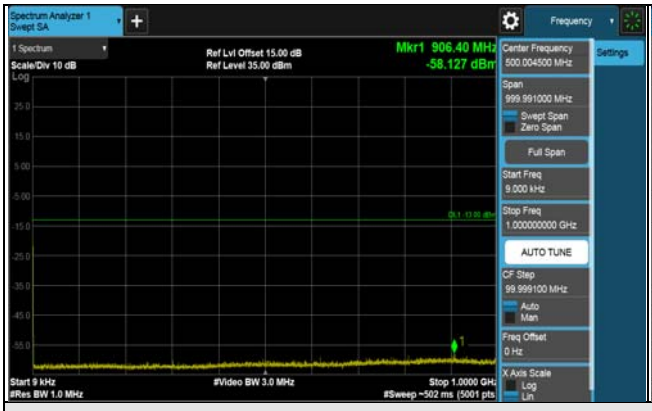


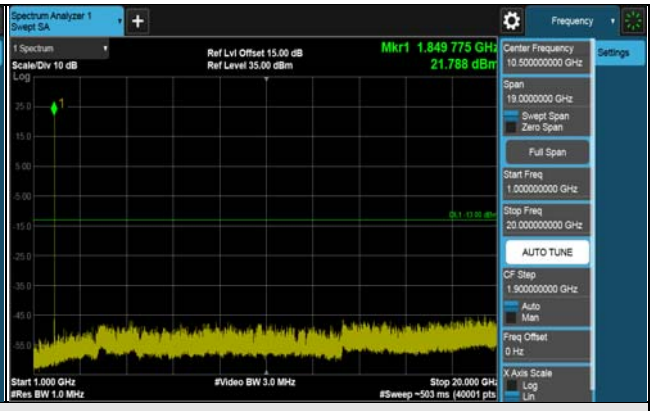


CH 19185 (1908.5MHz)

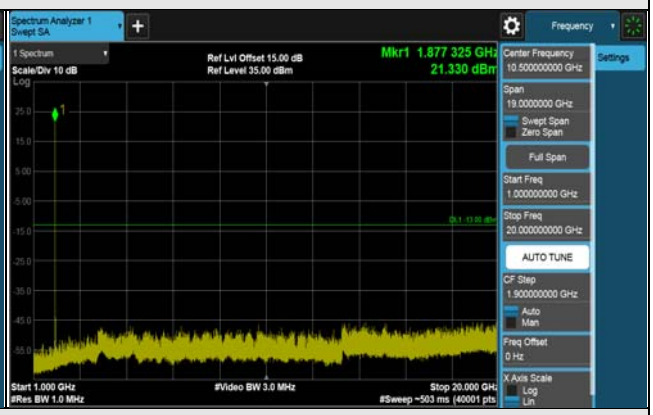
*The 9kHz signal over the limit is from Spectrum.

LTE Band 2 (Channel Bandwidth 5MHz)

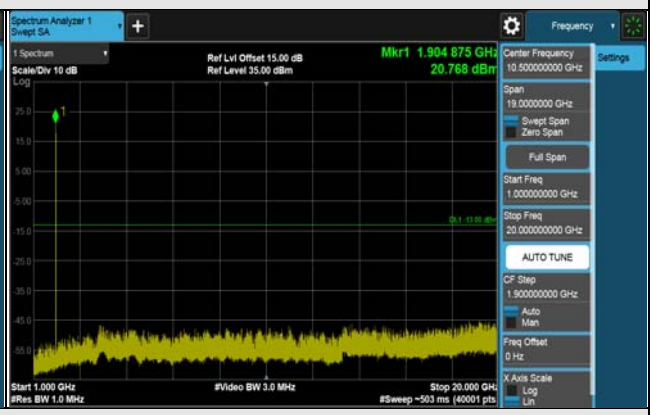




CH 18625 (1852.5MHz)



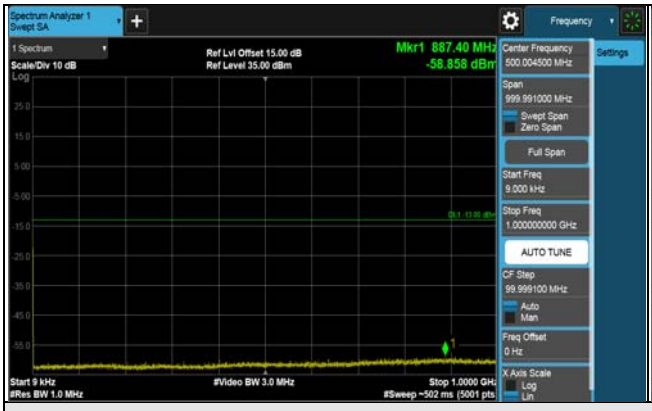
CH 18900 (1880MHz)

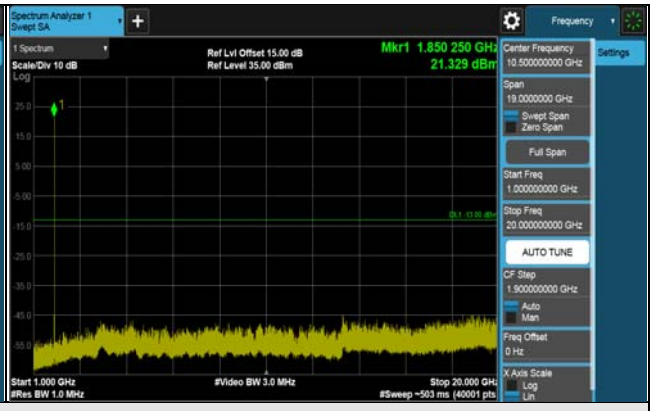


CH 19175 (1907.5MHz)

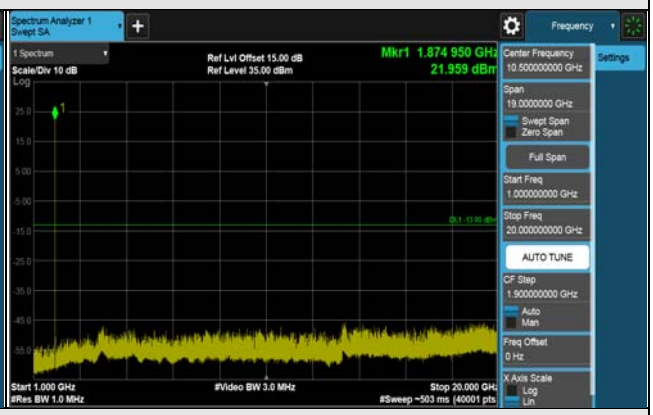
*The 9kHz signal over the limit is from Spectrum.

LTE Band 2 (Channel Bandwidth 10MHz)

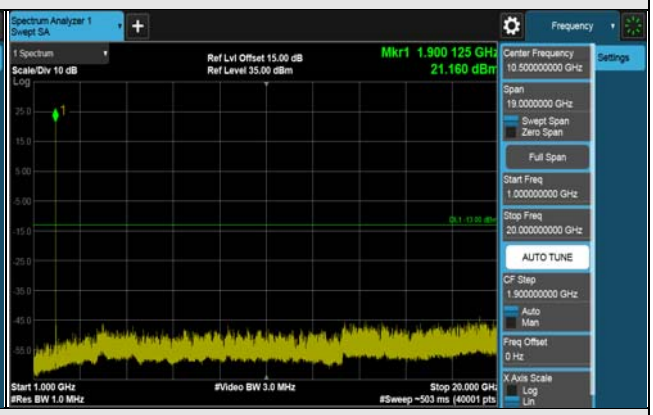




CH 18650 (1855MHz)



CH 18900 (1880MHz)

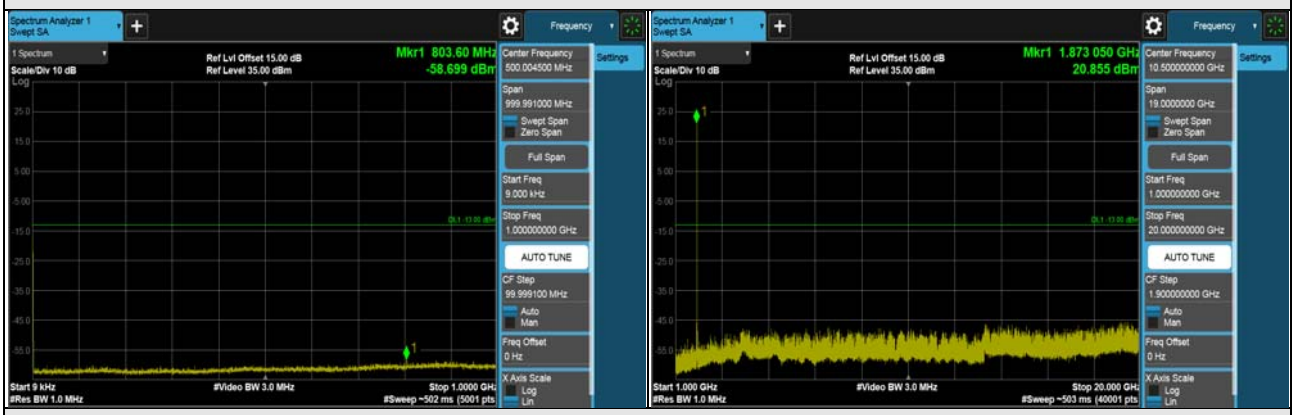


CH 19150 (1905MHz)

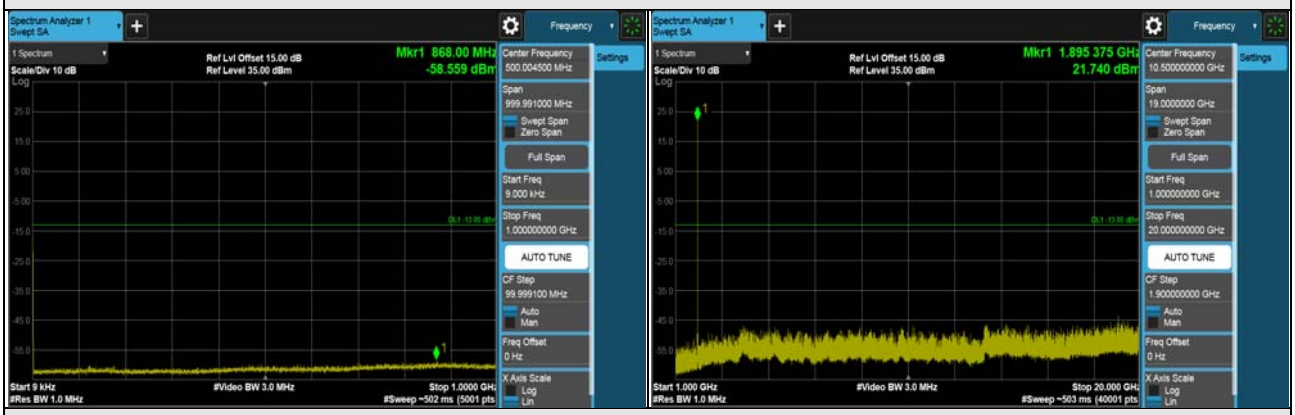
*The 9kHz signal over the limit is from Spectrum.

LTE Band 2 (Channel Bandwidth 15MHz)

CH 18675 (1857.5MHz)



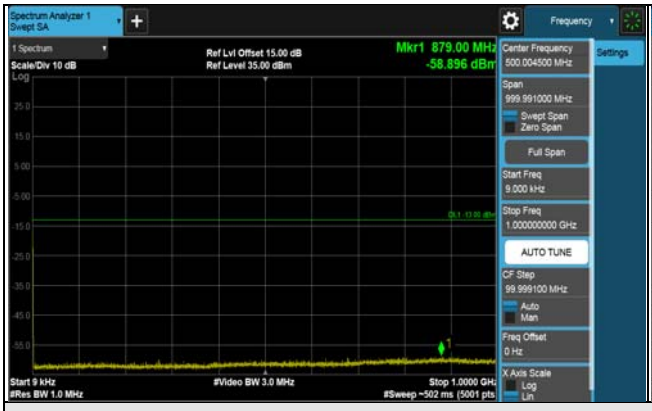
CH 18900 (1880MHz)



CH 19125 (1902.5MHz)

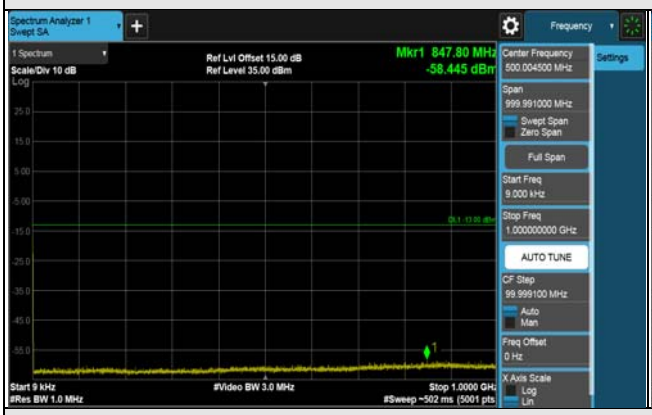
*The 9kHz signal over the limit is from Spectrum.

LTE Band 2 (Channel Bandwidth 20MHz)



CH 18700 (1860MHz)

CH 18900 (1880MHz)



CH 19100 (1900MHz)

*The 9kHz signal over the limit is from Spectrum.

4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

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 + 10 log(P) dB. The emission limit equal to –13dBm.

4.8.2 Test Procedure

a. In the semi-anechoic chamber, EUT placed on the 0.8m (below or equal 1GHz) and/or 1.5m (above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.

d. Following C63.26 section 5.5 and 5.2.7
   - EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.
   - ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

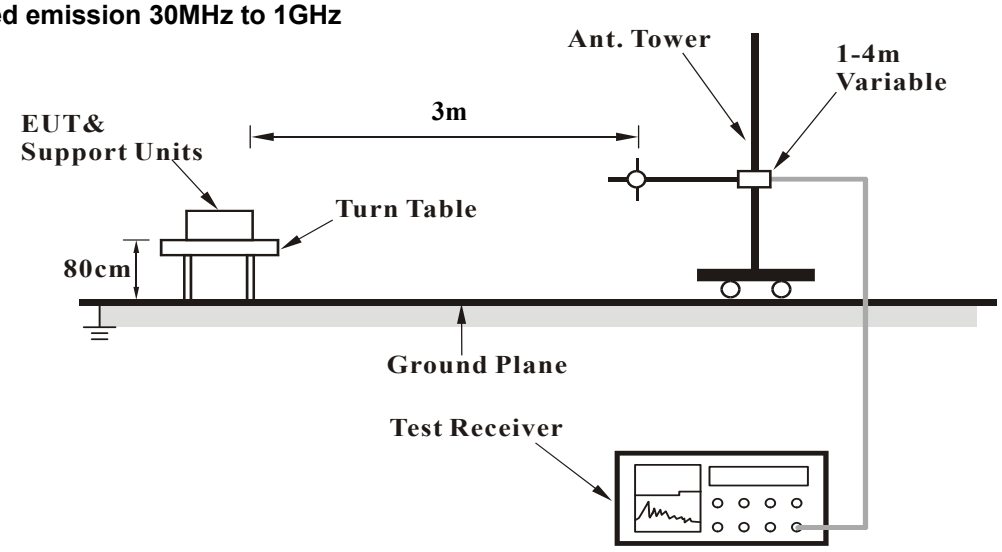
Note:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.8.3 Deviation from Test Standard

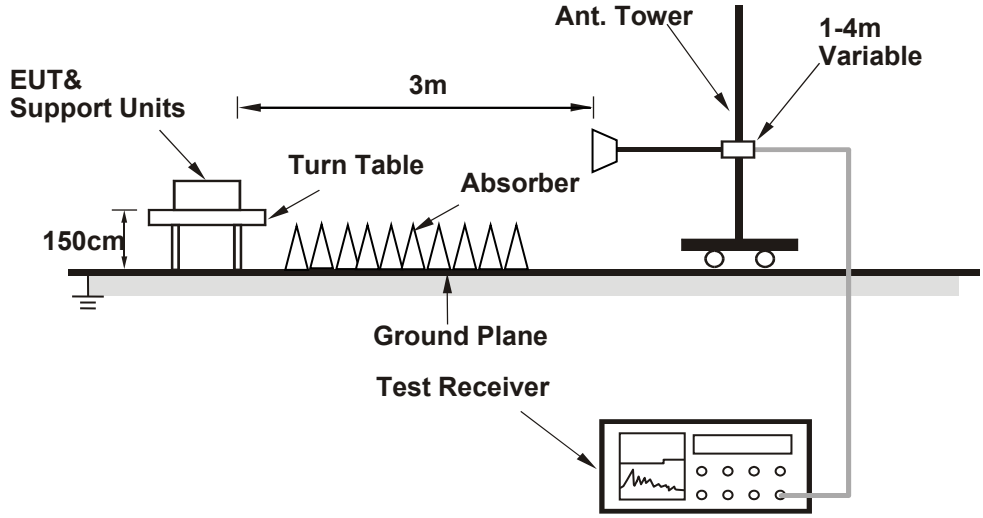
No deviation.

4.8.4 Test Setup

For radiated emission 30MHz to 1GHz



For radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.8.5 Test Results

Below 1GHz

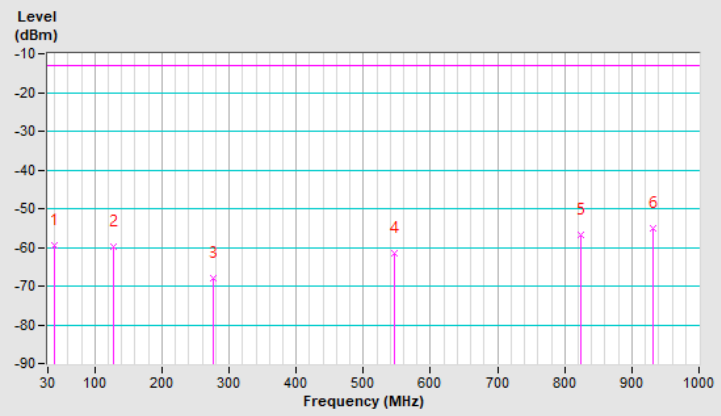
GSM

Mode	TX channel 661 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.67	-59.47	-13.00	-46.47	2.49 H	126	49.31	-108.78
2	127.00	-59.99	-13.00	-46.99	1.50 H	271	49.99	-109.98
3	276.38	-67.85	-13.00	-54.85	1.50 H	17	40.41	-108.26
4	547.01	-61.46	-13.00	-48.46	2.49 H	0	40.84	-102.30
5	823.46	-56.89	-13.00	-43.89	2.49 H	0	40.73	-97.62
6	932.10	-54.97	-13.00	-41.97	1.50 H	25	41.02	-95.99

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

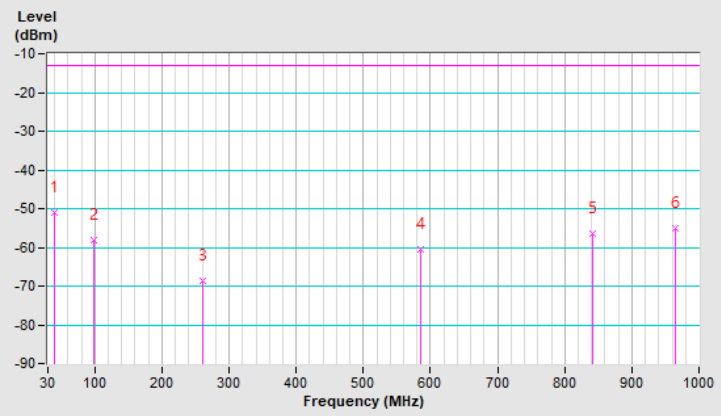


Mode	TX channel 661 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.67	-50.95	-13.00	-37.95	1.51 V	121	57.83	-108.78
2	98.87	-58.00	-13.00	-45.00	1.51 V	294	55.07	-113.07
3	259.89	-68.55	-13.00	-55.55	1.51 V	65	40.59	-109.14
4	585.81	-60.55	-13.00	-47.55	1.51 V	2	40.56	-101.11
5	841.89	-56.43	-13.00	-43.43	2.50 V	15	40.91	-97.34
6	965.08	-54.94	-13.00	-41.94	2.50 V	148	40.60	-95.54

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.



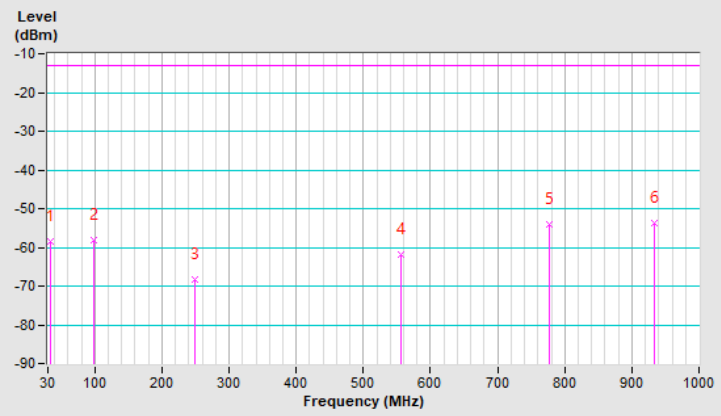
WCDMA

Mode	TX channel 9400 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	33.88	-58.31	-13.00	-45.31	1.50 H	97	51.28	-109.59
2	98.87	-57.97	-13.00	-44.97	1.50 H	311	55.10	-113.07
3	248.25	-68.28	-13.00	-55.28	1.50 H	156	41.23	-109.51
4	556.71	-61.78	-13.00	-48.78	2.49 H	191	40.26	-102.04
5	777.87	-54.05	-13.00	-41.05	2.49 H	168	44.14	-98.19
6	934.04	-53.67	-13.00	-40.67	2.49 H	30	42.27	-95.94

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

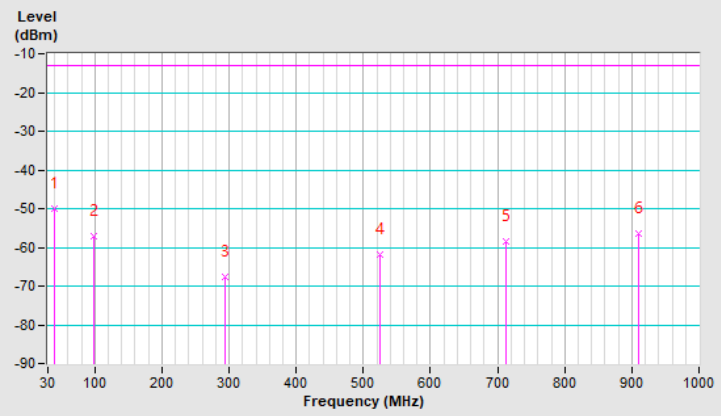


Mode	TX channel 9400 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.67	-50.06	-13.00	-37.06	1.51 V	107	58.72	-108.78
2	98.87	-57.24	-13.00	-44.24	1.51 V	274	55.83	-113.07
3	293.84	-67.46	-13.00	-54.46	1.51 V	323	40.41	-107.87
4	525.67	-61.81	-13.00	-48.81	2.50 V	121	40.72	-102.53
5	711.91	-58.53	-13.00	-45.53	1.51 V	245	40.59	-99.12
6	909.79	-56.57	-13.00	-43.57	2.50 V	18	39.87	-96.44

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.



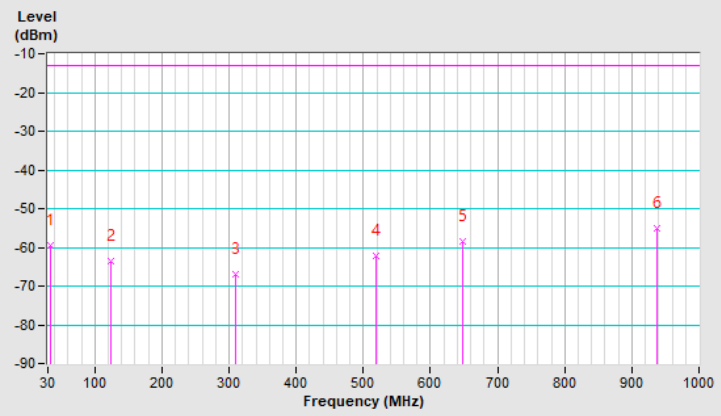
LTE Band 2 (Channel Bandwidth 20MHz)

Mode	TX channel 18900 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	33.88	-59.50	-13.00	-46.50	2.49 H	117	50.10	-109.60
2	124.09	-63.60	-13.00	-50.60	1.50 H	122	46.60	-110.20
3	309.36	-66.80	-13.00	-53.80	2.49 H	355	40.80	-107.60
4	519.85	-62.30	-13.00	-49.30	1.50 H	28	40.40	-102.70
5	647.89	-58.40	-13.00	-45.40	2.49 H	92	41.50	-99.90
6	937.92	-55.00	-13.00	-42.00	1.50 H	56	40.90	-95.90

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

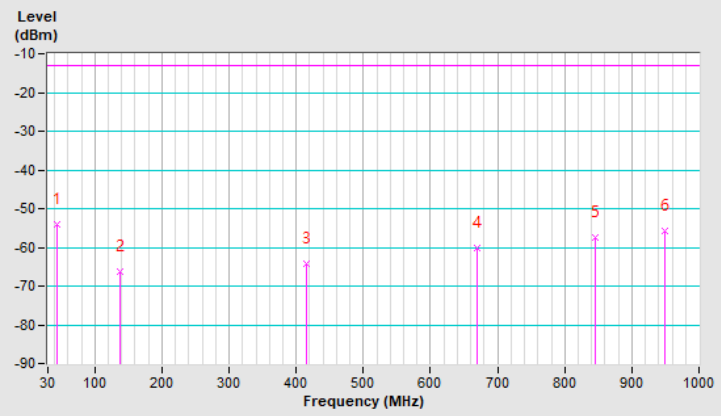


Mode	TX channel 18900 (1880.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	44.55	-54.10	-13.00	-41.10	1.51 V	18	54.40	-108.50
2	136.70	-66.20	-13.00	-53.20	1.51 V	317	42.80	-109.00
3	415.09	-64.40	-13.00	-51.40	1.51 V	322	40.70	-105.10
4	669.23	-60.20	-13.00	-47.20	2.50 V	40	39.60	-99.80
5	844.80	-57.50	-13.00	-44.50	2.50 V	296	39.90	-97.40
6	948.59	-55.70	-13.00	-42.70	1.51 V	18	40.10	-95.80

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.



Above 1GHz

GSM

Mode	TX channel 512 (1850.2MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3700.40	-51.90	-13.00	-38.90	2.49 H	21	43.90	-95.80
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3700.40	-50.20	-13.00	-37.20	1.51 V	163	45.60	-95.80

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 661 (1880.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-51.10	-13.00	-38.10	2.42 H	43	44.30	-95.40
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-49.20	-13.00	-36.20	1.63 V	171	46.20	-95.40

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 810 (1909.8MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3819.60	-51.50	-13.00	-38.50	2.36 H	54	43.50	-95.00
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3819.60	-49.70	-13.00	-36.70	1.48 V	166	45.30	-95.00

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

WCDMA Band 2

Mode	TX channel 9262 (1852.4MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3704.80	-49.50	-13.00	-36.50	1.99 H	93	46.30	-95.80
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3704.80	-47.70	-13.00	-34.70	2.03 V	264	48.10	-95.80

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 9400 (1880.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-48.90	-13.00	-35.90	1.82 H	111	46.50	-95.40
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	**3760.00**	**-46.90**	**-13.00**	**-33.90**	**1.54 V**	**277**	**48.50**	**-95.40**

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 9538 (1907.6MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3815.20	-49.00	-13.00	-36.00	1.84 H	102	46.10	-95.10
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3815.20	-47.30	-13.00	-34.30	2.01 V	222	47.80	-95.10

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

LTE Band 2 (Channel Bandwidth 1.4MHz)

Mode	TX channel 18607 (1850.7MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3701.40	-49.30	-13.00	-36.30	1.54 H	11	46.50	-95.80
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3701.40	-48.70	-13.00	-35.70	1.62 V	296	47.10	-95.80

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 18900 (1880.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-48.90	-13.00	-35.90	1.52 H	17	46.50	-95.40
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-48.30	-13.00	-35.30	1.69 V	295	47.10	-95.40

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 19193 (1909.3MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3818.60	-48.60	-13.00	-35.60	1.47 H	8	46.40	-95.00
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3818.60	-47.90	-13.00	-34.90	1.71 V	292	47.10	-95.00

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

LTE Band 2 (Channel Bandwidth 5MHz)

Mode	TX channel 18625 (1852.5MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3705.00	-49.20	-13.00	-36.20	1.47 H	15	46.60	-95.80
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3705.00	-48.60	-13.00	-35.60	1.66 V	293	47.20	-95.80

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 18900 (1880.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-48.70	-13.00	-35.70	1.55 H	12	46.70	-95.40
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-48.10	-13.00	-35.10	1.69 V	294	47.30	-95.40

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 19175 (1907.5MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3815.00	-48.50	-13.00	-35.50	1.54 H	19	46.60	-95.10
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3815.00	-47.80	-13.00	-34.80	1.64 V	290	47.30	-95.10

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

LTE Band 2 (Channel Bandwidth 20MHz)

Mode	TX channel 18700 (1860.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3720.00	-49.30	-13.00	-36.30	1.48 H	21	46.50	-95.80
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3720.00	-48.60	-13.00	-35.60	1.73 V	284	47.20	-95.80

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 18900 (1880.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-48.50	-13.00	-35.50	1.52 H	14	46.90	-95.40
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3760.00	-48.00	-13.00	-35.00	1.68 V	291	47.40	-95.40

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

Mode	TX channel 19100 (1900.0MHz)	Frequency Range	1GHz ~ 20GHz
Environmental Conditions	27deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Tim Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3800.00	-48.80	-13.00	-35.80	1.51 H	18	46.30	-95.10
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	3800.00	-47.90	-13.00	-34.90	1.66 V	293	47.20	-95.10

Remarks:

1. EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) – 104.8
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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