

## FCC Test Report (Part 22 – WCDMA B5, LTE B5/B26)

**Report No.:** RFBCKT-WTW-P22010886-3

**FCC ID:** HFSQTAD53N

**Test Model:** QTAD53

**Received Date:** Feb. 10, 2022

**Test Date:** Feb. 17 ~ Mar. 08, 2022

**Issued Date:** Mar. 30, 2022

**Applicant:** Quanta Computer Inc.

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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33383, TAIWAN

**FCC Registration /  
Designation Number:** 788550 / TW0003



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### Release Control Record

Issue No.	Description	Date Issued
RFBCKT-WTW-P22010886-3	Original release	Mar. 30, 2022

## 1 Certificate of Conformity

**Product:** 5G Hotspot

**Brand:** T-Mobile

**Test Model:** QTAD53

**Sample Status:** Engineering sample

**Applicant:** Quanta Computer Inc.

**Test Date:** Feb. 17 ~ Mar. 08, 2022

**Standards:** FCC Part 22, Subpart H

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 :**  , **Date:** Mar. 30, 2022  
Polly Chien / Specialist

**Approved by :**  , **Date:** Mar. 30, 2022  
Jeremy Lin / Project Engineer

## 2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective radiated power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement
22.913 (d)	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
22.917	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.36dB at 1688.00MHz.

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) ( $\pm$ )
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.59 dB
	200MHz ~ 1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

## 2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 09, 2021	Apr. 08, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 10, 2021	Jun. 09, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Oct. 28, 2021	Oct. 27, 2022
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Oct. 26, 2021	Oct. 25, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jun. 05, 2021	Jun. 04, 2022
Preamplifier Agilent (Above 1GHz)	8449B	3008A01962	Oct. 05, 2021	Oct. 04, 2022
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM800 0	CABLE-CH9-02 (248780+171006)	Jan. 15, 2022	Jan. 14, 2023
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/ 4)	Jan. 15, 2022	Jan. 14, 2023
RF signal cable Woken	8D-FB	Cable-CH9-01	Jun. 05, 2021	Jun. 04, 2022
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Standard Temperature And Humidity Chamber GIANT FORCE	GTH-120-40-CP-AR	MAA1306-019	Sep. 10, 2021	Sep. 09, 2022
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 02, 2021	Jun. 01, 2022
DC power supply Keysight	U8002A	MY56330015	NA	NA

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 HwaYa Chamber 9.

### 3 General Information

#### 3.1 General Description of EUT

Product	5G Hotspot				
Brand	T-Mobile				
Test Model	QTAD53				
Sample Status	Engineering sample				
Power Supply Rating	5Vdc / 9Vdc / 12Vdc (Adapter) 3.85Vdc (Battery)				
Modulation Type	WCDMA: BPSK, QPSK HSDPA: BPSK HSUPA: QPSK LTE: QPSK, 16QAM, 64QAM, 256QAM				
Operating Frequency	WCDMA Band 5	826.4MHz ~ 846.6MHz			
	LTE Band 5 (Channel Bandwidth 1.4MHz)	824.7MHz ~ 848.3MHz			
	LTE Band 5 (Channel Bandwidth 3MHz)	825.5MHz ~ 847.5MHz			
	LTE Band 5 (Channel Bandwidth 5MHz)	826.5MHz ~ 846.5MHz			
	LTE Band 5 (Channel Bandwidth 10MHz)	829.0MHz ~ 844.0MHz			
	LTE Band 26 (Channel Bandwidth 1.4MHz)	824.7MHz ~ 848.3MHz			
	LTE Band 26 (Channel Bandwidth 3MHz)	825.5MHz ~ 847.5MHz			
	LTE Band 26 (Channel Bandwidth 5MHz)	826.5MHz ~ 846.5MHz			
	LTE Band 26 (Channel Bandwidth 10MHz)	829.0MHz ~ 844.0MHz			
	LTE Band 26 (Channel Bandwidth 15MHz)	831.5MHz ~ 841.5MHz			
Max. ERP Power	WCDMA Band 5	147.571mW(21.69dBm)			
		QPSK	16QAM	64QAM	256QAM
	LTE Band 5 (Channel Bandwidth 1.4MHz)	148.594mW (21.72dBm)	124.451mW (20.95dBm)	93.972mW (19.73dBm)	45.814mW (16.61dBm)
	LTE Band 5 (Channel Bandwidth 3MHz)	149.279mW (21.74dBm)	124.738mW (20.96dBm)	93.325mW (19.70dBm)	46.132mW (16.64dBm)
	LTE Band 5 (Channel Bandwidth 5MHz)	148.936mW (21.73dBm)	126.183mW (21.01dBm)	93.972mW (19.73dBm)	46.026mW (16.63dBm)
	LTE Band 5 (Channel Bandwidth 10MHz)	150.314mW (21.77dBm)	127.057mW (21.04dBm)	94.624mW (19.76dBm)	46.559mW (16.68dBm)
	LTE Band 26 (Channel Bandwidth 1.4MHz)	161.808mW (22.09dBm)	126.765mW (21.03dBm)	101.158mW (20.05dBm)	62.951mW (17.99dBm)
	LTE Band 26 (Channel Bandwidth 3MHz)	158.489mW (22.00dBm)	127.644mW (21.06dBm)	99.541mW (19.98dBm)	50.699mW (17.05dBm)
	LTE Band 26 (Channel Bandwidth 5MHz)	159.588mW (22.03dBm)	127.644mW (21.06dBm)	100.000mW (20.00dBm)	51.050mW (17.08dBm)
	LTE Band 26 (Channel Bandwidth 10MHz)	159.221mW (22.02dBm)	127.057mW (21.04dBm)	99.541mW (19.98dBm)	51.050mW (17.08dBm)
LTE Band 26 (Channel Bandwidth 15MHz)	159.588mW (22.03dBm)	128.233mW (21.08dBm)	100.000mW (20.00dBm)	51.168mW (17.09dBm)	



Emission Designator	WCDMA Band 5	4M16F9W			
		QPSK	16QAM	64QAM	256QAM
	LTE Band 5 (Channel Bandwidth 1.4MHz)	1M09G7D	1M09D7W	1M09D7W	1M09D7W
	LTE Band 5 (Channel Bandwidth 3MHz)	2M70G7D	2M70D7W	2M70D7W	2M70D7W
	LTE Band 5 (Channel Bandwidth 5MHz)	4M49G7D	4M49D7W	4M50D7W	4M49D7W
	LTE Band 5 (Channel Bandwidth 10MHz)	8M97G7D	8M97D7W	8M97D7W	8M97D7W
	LTE Band 26 (Channel Bandwidth 1.4MHz)	1M09G7D	1M09D7W	1M09D7W	1M09D7W
	LTE Band 26 (Channel Bandwidth 3MHz)	2M70G7D	2M70D7W	2M70D7W	2M70D7W
	LTE Band 26 (Channel Bandwidth 5MHz)	4M49G7D	4M49D7W	4M49D7W	4M49D7W
	LTE Band 26 (Channel Bandwidth 10MHz)	8M97G7D	8M97D7W	8M97D7W	8M97D7W
LTE Band 26 (Channel Bandwidth 15MHz)	13M5G7D	13M5D7W	13M5D7W	13M5D7W	
Antenna Type	Refer to Note as below				
Antenna Connector	Refer to Note as below				
Accessory Device	Refer to Note as below				
Cable Supplied	Refer to Note as below				

Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter 1	TEN PAO INTERNATIONAL LTD.	S018BYU1200150	I/P: 100-240Vac, 50/60Hz, 600mA O/P: 5Vdc/9Vdc/12Vdc=3A/2A/1.5A
Adapter 2	Aohai Technology Co., Ltd	A138A-120150U-US2	I/P: 100-240V~50/60Hz, 0.5A O/P: 5Vdc, 2.5A/9Vdc, 2A/12Vdc, 1.5A
USB cable 1	Electronics Taiwai Ltd.	DDEMU110079	0.95m shielded USB cable without core
USB cable 2	IMEX INC	60-6382-520-FA	0.97m shielded USB cable without core
Battery	VEKEN	141033	3.85Vdc, 6460mAh, 24.87Wh

\* After pre-tested, adapter 2 and USB cable 1 were the worst case and chosen for final test.

2. There are two sources for EUT's memory. Only the supplier is different and the rest of the specifications are the same.

Sample	Item	Brand	Model
A	Memory - Main	Nanya Technology Corporation	NM4888KSPAXAI-3E
B	Memory - Second	Jeju Semiconductor Corp.	JSFDDQ5QHAFGD-405

\* After pre-tested, sample A was the worse and chosen for final test.

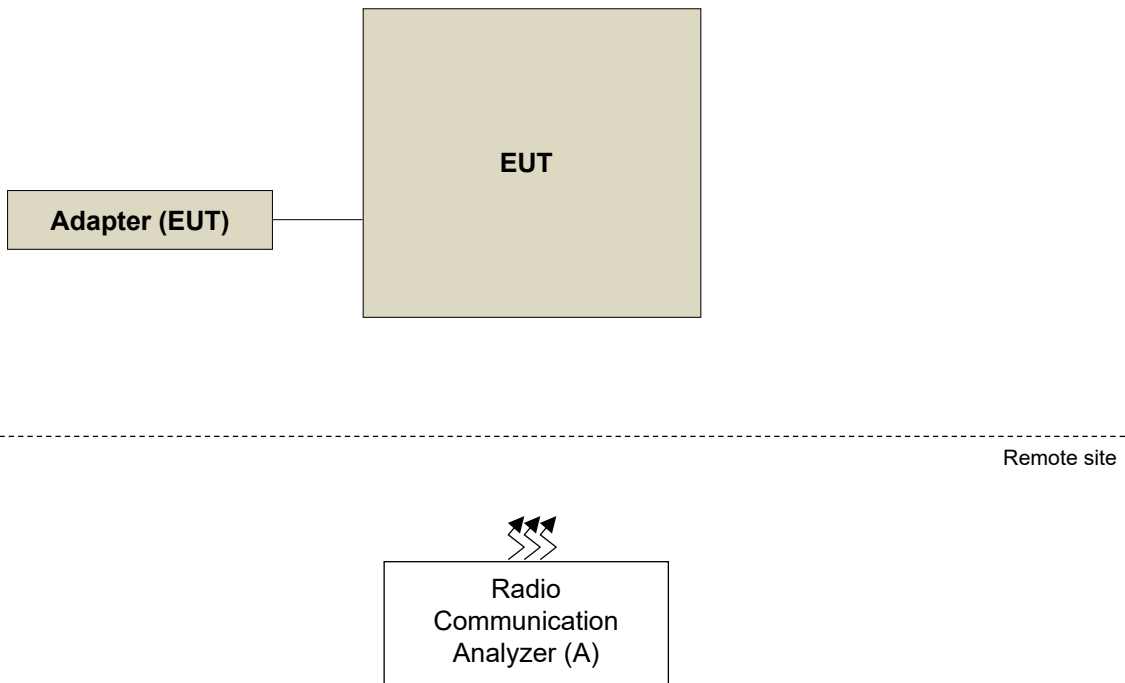
3. The following antennas were provided to the EUT.

2G / 3G Band					
Ant. No.	Type	Connector	Gain (dBi)		
			WCDMA B5	LTE B5	LTE B26
0	PIFA	MUR	0.345671	0.345671	0.702007
1	PIFA	IPEX	-	-	-
2	PIFA	IPEX	-	-	-
3	PIFA	MUR	-	-	-
4	PIFA	IPEX	-	-	-

\* There are diversity on WCDMA and LTE mode. ANT. No. 0 is chosen for final test.

\* 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.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	NA	-

Note:

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

### 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
WCDMA Band 5	X-plane
LTE Band 5	X-plane
LTE Band 26	X-plane

#### WCDMA Band 5

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Modulation Characteristics	4132 to 4233	4182 (836.4MHz)	WCDMA, HSDPA, HSUPA
-	Frequency Stability	4132 to 4233	4132 (826.4MHz), 4233 (846.6MHz)	WCDMA
-	Occupied Bandwidth	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Band Edge	4132 to 4233	4132 (826.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Peak To Average Ratio	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Conducted Emission	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Radiated Emission Below 1GHz	4132 to 4233	4182 (836.4MHz)	WCDMA
-	Radiated Emission Above 1GHz	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA

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

LTE Band 5

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 2 RB Offset 1 RB / 5 RB Offset 3 RB / 0 RB Offset 3 RB / 1 RB Offset 3 RB / 3 RB Offset 6 RB / 0 RB Offset
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 7 RB Offset 1 RB / 14 RB Offset 8 RB / 0 RB Offset 8 RB / 3 RB Offset 8 RB / 7 RB Offset 15 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 12 RB Offset 1 RB / 24 RB Offset 12 RB / 0 RB Offset 12 RB / 6 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 1 RB / 49 RB Offset 25 RB / 0 RB Offset 25 RB / 12 RB Offset 25 RB / 25 RB Offset 50 RB / 0 RB Offset
-	Modulation Characteristics	20450 to 20600	20525 (836.5MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	50 RB / 0 RB Offset
-	Frequency Stability	20407 to 20643	20407 (824.7MHz), 20643 (848.3MHz)	1.4MHz	QPSK	6 RB / 0 RB Offset
		20415 to 20635	20415 (825.5MHz), 20635 (847.5MHz)	3MHz	QPSK	15 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20625 (846.5MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20600 (844.0MHz)	10MHz	QPSK	50 RB / 0 RB Offset
-	Occupied Bandwidth	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	6 RB / 0RB Offset
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	15 RB / 0RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	25RB / 0RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	50RB / 0RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	20407 to 20643	20407 (824.7MHz), 20643 (848.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
		20415 to 20635	20415 (825.5MHz), 20635 (847.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20625 (846.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20600 (844.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
-	Peak to Average Ratio	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	3 RB / 1 RB Offset
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
-	Conducted Emission	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK	3 RB / 1 RB Offset
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	20450 to 20600	20600 (844.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK	3 RB / 1 RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

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 Section 6.6.3.1.4, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK, 16QAM, 64QAM and 256QAM, measured value of QPSK is higher than 16QAM, 64QAM and 256QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK, 16QAM, 64QAM and 256QAM modes, the other test items were performed under QPSK mode only.

LTE Band 26

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 2 RB Offset 1 RB / 5 RB Offset 3 RB / 0 RB Offset 3 RB / 1 RB Offset 3 RB / 3 RB Offset 6 RB / 0 RB Offset
		26805 to 27025	26805 (825.5MHz), 26915 (836.5MHz), 27025 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 7 RB Offset 1 RB / 14 RB Offset 8 RB / 0 RB Offset 8 RB / 3 RB Offset 8 RB / 7 RB Offset 15 RB / 0 RB Offset
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 12 RB Offset 1 RB / 24 RB Offset 12 RB / 0 RB Offset 12 RB / 6 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		26840 to 26990	26840 (829.0MHz), 26915 (836.5MHz), 26990 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 1 RB / 49 RB Offset 25 RB / 0 RB Offset 25 RB / 12 RB Offset 25 RB / 25 RB Offset 50 RB / 0 RB Offset
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 37 RB Offset 1 RB / 74 RB Offset 36 RB / 0 RB Offset 36 RB / 19 RB Offset 36 RB / 39 RB Offset 75 RB / 0 RB Offset
-	Modulation Characteristics	26865 to 26965	26915 (836.5MHz)	15MHz	QPSK / 16QAM / 64QAM / 256QAM	75 RB / 0 RB Offset
-	Frequency Stability	26797 to 27033	26797 (824.7MHz), 27033 (848.3MHz)	1.4MHz	QPSK	6 RB / 0 RB Offset
		26805 to 27025	26805 (825.5MHz), 27025 (847.5MHz)	3MHz	QPSK	15 RB / 0 RB Offset
		26815 to 27015	26815 (826.5MHz), 27015 (846.5MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		26840 to 26990	26840 (829.0MHz), 26990 (844.0MHz)	10MHz	QPSK	50 RB / 0 RB Offset
		26865 to 26965	26865 (831.5MHz), 26965 (841.5MHz)	15MHz	QPSK	75 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Occupied Bandwidth	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	6 RB / 0 RB Offset
		26805 to 27025	26805 (825.5MHz), 26915 (836.5MHz), 27025 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	15 RB / 0 RB Offset
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	25 RB / 0 RB Offset
		26840 to 26990	26840 (829.0MHz), 26915 (836.5MHz), 26990 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	50 RB / 0 RB Offset
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	QPSK / 16QAM / 64QAM / 256QAM	75 RB / 0 RB Offset
-	Band Edge	26797 to 27033	26797 (824.7MHz), 27033 (848.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
		26805 to 27025	26805 (825.5MHz), 27025 (847.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
		26815 to 27015	26815 (826.5MHz), 27015 (846.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		26840 to 26990	26840 (829.0MHz), 26990 (844.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
		26865 to 26965	26865 (831.5MHz), 26965 (841.5MHz)	15MHz	QPSK	1 RB / 0 RB Offset 1 RB / 74 RB Offset 75 RB / 0 RB Offset
-	Peak to Average Ratio	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	3 RB / 1 RB Offset
		26805 to 27025	26805 (825.5MHz), 26915 (836.5MHz), 27025 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
		26840 to 26990	26840 (829.0MHz), 26915 (836.5MHz), 26990 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset



EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Conducted Emission	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK	3 RB / 1 RB Offset
		26805 to 27025	26805 (825.5MHz), 26915 (836.5MHz), 27025 (847.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		26840 to 26990	26840 (829.0MHz), 26915 (836.5MHz), 26990 (844.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	26797 to 27033	27033 (848.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK	3 RB / 1 RB Offset
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	QPSK	1 RB / 0 RB Offset

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 Section 6.6.3.1.4, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK, 16QAM, 64QAM and 256QAM, measured value of QPSK is higher than 16QAM, 64QAM and 256QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK, 16QAM, 64QAM and 256QAM modes, the other test items were performed under QPSK mode only.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Modulation Characteristics	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Frequency Stability	25deg. C, 60%RH	3.85Vdc	James Yang
Occupied Bandwidth	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Band Edge	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Peak To Average Ratio	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Conducted Emission	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Radiated Emission	23deg. C, 65%RH, 22deg. C, 68%RH	120Vac, 60Hz	Jones Chang, Greg Lin

**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 22**

**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 7 watts e.r.p.

#### 4.1.2 Test Procedures

##### Conducted Power Measurement:

The EUT was set up for the maximum power with WCDMA, 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:

$$\text{EIRP} = P_{\text{Meas}} + G_{\text{T}}$$

$$\text{ERP} = P_{\text{Meas}} + G_{\text{T}} - 2.15$$

where

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

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

$G_{\text{T}}$  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	WCDMA V		
	4132	4182	4233
TX Channel	4132	4182	4233
Frequency	826.4	836.4	846.6
RMC 12.2K	<b>23.49</b>	23.39	23.36
HSDPA Subtest-1	22.12	22.16	22.11
HSDPA Subtest-2	22.10	22.10	22.05
HSDPA Subtest-3	21.66	21.63	21.67
HSDPA Subtest-4	21.62	21.63	21.61
DC-HSDPA Subtest-1	21.97	22.01	21.96
DC-HSDPA Subtest-2	21.95	21.95	21.90
DC-HSDPA Subtest-3	21.51	21.48	21.52
DC-HSDPA Subtest-4	21.47	21.48	21.46
HSUPA Subtest-1	23.10	23.00	22.80
HSUPA Subtest-2	20.54	20.51	20.54
HSUPA Subtest-3	21.57	21.57	21.43
HSUPA Subtest-4	19.96	20.16	20.13
HSUPA Subtest-5	23.15	23.07	22.86
HSPA+ Subtest-1	19.54	19.74	19.71

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	23.57	23.49	23.55
		1	24	23.56	23.48	23.53
		1	49	23.53	23.45	23.50
		25	0	22.89	22.81	22.86
		25	12	22.79	22.71	22.76
		25	25	22.59	22.51	22.56
		50	0	22.48	22.40	22.45
10M	16QAM	1	0	22.84	22.76	22.81
		1	24	22.75	22.67	22.72
		1	49	22.73	22.65	22.70
		25	0	21.72	21.64	21.69
		25	12	21.68	21.60	21.65
		25	25	21.63	21.55	21.60
		50	0	21.54	21.46	21.51
10M	64QAM	1	0	21.56	21.48	21.53
		1	24	21.53	21.45	21.50
		1	49	21.51	21.43	21.48
		25	0	20.27	20.19	20.24
		25	12	20.25	20.17	20.22
		25	25	20.23	20.15	20.20
		50	0	20.22	20.14	20.19
10M	256QAM	1	0	18.48	18.40	18.45
		1	24	18.46	18.38	18.43
		1	49	18.43	18.35	18.40
		25	0	18.42	18.34	18.39
		25	12	18.41	18.33	18.38
		25	25	18.38	18.30	18.35
		50	0	18.36	18.28	18.33

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	23.51	23.48	23.53
		1	12	23.50	23.38	23.48
		1	24	23.46	23.39	23.46
		12	0	22.79	22.78	22.82
		12	6	22.69	22.68	22.68
		12	13	22.53	22.44	22.56
		25	0	22.47	22.36	22.38
5M	16QAM	1	0	22.81	22.72	22.77
		1	12	22.72	22.67	22.71
		1	24	22.63	22.58	22.68
		12	0	21.72	21.56	21.59
		12	6	21.66	21.58	21.59
		12	13	21.53	21.51	21.56
		25	0	21.54	21.44	21.49
5M	64QAM	1	0	21.53	21.38	21.49
		1	12	21.50	21.44	21.47
		1	24	21.43	21.39	21.38
		12	0	20.24	20.10	20.16
		12	6	20.25	20.08	20.21
		12	13	20.19	20.12	20.10
		25	0	20.12	20.11	20.15
5M	256QAM	1	0	18.43	18.30	18.42
		1	12	18.42	18.28	18.37
		1	24	18.37	18.35	18.30
		12	0	18.40	18.26	18.39
		12	6	18.40	18.31	18.35
		12	13	18.33	18.29	18.35
		25	0	18.29	18.25	18.30

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	23.54	23.43	23.49
		1	7	23.49	23.45	23.51
		1	14	23.43	23.44	23.48
		8	0	22.89	22.81	22.77
		8	3	22.78	22.64	22.67
		8	7	22.54	22.46	22.46
		15	0	22.41	22.30	22.41
3M	16QAM	1	0	22.75	22.76	22.72
		1	7	22.73	22.59	22.65
		1	14	22.63	22.63	22.60
		8	0	21.69	21.54	21.68
		8	3	21.61	21.50	21.62
		8	7	21.60	21.51	21.51
		15	0	21.47	21.38	21.49
3M	64QAM	1	0	21.47	21.48	21.46
		1	7	21.46	21.44	21.48
		1	14	21.50	21.40	21.43
		8	0	20.26	20.09	20.24
		8	3	20.23	20.17	20.17
		8	7	20.13	20.05	20.17
		15	0	20.21	20.09	20.13
3M	256QAM	1	0	18.44	18.34	18.44
		1	7	18.44	18.28	18.39
		1	14	18.34	18.30	18.38
		8	0	18.42	18.30	18.35
		8	3	18.33	18.29	18.34
		8	7	18.31	18.24	18.31
		15	0	18.32	18.22	18.27

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	23.52	23.50	23.46
		1	2	23.51	23.43	23.46
		1	5	23.51	23.37	23.41
		3	0	23.38	23.36	23.32
		3	1	23.37	23.29	23.32
		3	3	23.37	23.23	23.27
		6	0	22.46	22.38	22.38
1.4M	16QAM	1	0	22.75	22.68	22.74
		1	2	22.70	22.60	22.62
		1	5	22.64	22.62	22.66
		3	0	22.36	22.34	22.30
		3	1	22.35	22.27	22.30
		3	3	22.35	22.21	22.25
		6	0	21.52	21.44	21.44
1.4M	64QAM	1	0	21.53	21.44	21.48
		1	2	21.46	21.43	21.41
		1	5	21.44	21.33	21.47
		3	0	21.32	21.30	21.26
		3	1	21.31	21.23	21.26
		3	3	21.31	21.17	21.21
		6	0	20.12	20.05	20.10
1.4M	256QAM	1	0	18.41	18.31	18.36
		1	2	18.40	18.29	18.39
		1	5	18.40	18.35	18.36
		3	0	18.35	18.30	18.29
		3	1	18.31	18.31	18.30
		3	3	18.37	18.24	18.29
		6	0	18.35	18.19	18.29



LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26865	26915	26965
		Frequency (MHz)		831.5	836.5	841.5
15M	QPSK	1	0	23.47	23.43	23.22
		1	37	23.46	23.41	23.48
		1	74	23.43	23.40	23.45
		36	0	22.61	22.57	22.63
		36	19	22.56	22.54	22.58
		36	39	22.52	22.51	22.54
		75	0	22.45	22.35	22.47
15M	16QAM	1	0	22.51	22.51	22.53
		1	37	22.50	22.44	22.52
		1	74	22.45	22.35	22.47
		36	0	21.46	21.41	21.48
		36	19	21.44	21.38	21.46
		36	39	21.41	21.41	21.43
		75	0	21.38	21.34	21.40
15M	64QAM	1	0	21.43	21.34	21.45
		1	37	21.40	21.40	21.42
		1	74	21.38	21.30	21.40
		36	0	20.60	20.52	20.62
		36	19	20.58	20.54	20.60
		36	39	20.49	20.49	20.51
		75	0	20.48	20.46	20.50
15M	256QAM	1	0	18.52	18.44	18.54
		1	37	18.50	18.40	18.52
		1	74	18.48	18.39	18.50
		36	0	18.45	18.39	18.47
		36	19	18.43	18.35	18.45
		36	39	18.40	18.34	18.42
		75	0	18.38	18.38	18.40

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26840	26915	26990
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	23.32	23.39	23.47
		1	24	23.35	23.36	23.45
		1	49	23.34	23.29	23.44
		25	0	22.47	22.51	22.61
		25	12	22.44	22.49	22.52
		25	25	22.40	22.44	22.48
		50	0	22.45	22.33	22.43
10M	16QAM	1	0	22.38	22.49	22.44
		1	24	22.44	22.39	22.45
		1	49	22.35	22.23	22.40
		25	0	21.39	21.34	21.46
		25	12	21.44	21.34	21.42
		25	25	21.33	21.29	21.38
		50	0	21.37	21.22	21.33
10M	64QAM	1	0	21.43	21.32	21.37
		1	24	21.25	21.37	21.42
		1	49	21.35	21.20	21.38
		25	0	20.59	20.37	20.52
		25	12	20.51	20.50	20.53
		25	25	20.46	20.45	20.44
		50	0	20.43	20.46	20.44
10M	256QAM	1	0	18.49	18.40	18.53
		1	24	18.39	18.26	18.47
		1	49	18.37	18.26	18.44
		25	0	18.35	18.29	18.47
		25	12	18.36	18.28	18.38
		25	25	18.27	18.25	18.32
		50	0	18.30	18.26	18.34

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26815	26915	27015
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	23.28	23.33	23.45
		1	12	23.30	23.25	23.48
		1	24	23.32	23.22	23.35
		12	0	22.40	22.43	22.60
		12	6	22.41	22.34	22.51
		12	13	22.35	22.32	22.48
		25	0	22.31	22.20	22.42
5M	16QAM	1	0	22.23	22.41	22.51
		1	12	22.29	22.25	22.49
		1	24	22.24	22.18	22.40
		12	0	21.29	21.26	21.45
		12	6	21.32	21.19	21.36
		12	13	21.33	21.14	21.33
		25	0	21.22	21.08	21.31
5M	64QAM	1	0	21.43	21.24	21.45
		1	12	21.11	21.35	21.37
		1	24	21.34	21.12	21.32
		12	0	20.59	20.29	20.59
		12	6	20.47	20.35	20.57
		12	13	20.46	20.43	20.48
		25	0	20.29	20.42	20.42
5M	256QAM	1	0	18.39	18.29	18.53
		1	12	18.36	18.19	18.49
		1	24	18.32	18.18	18.42
		12	0	18.22	18.27	18.41
		12	6	18.34	18.28	18.43
		12	13	18.26	18.23	18.39
		25	0	18.16	18.22	18.36

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26805	26915	27025
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	23.33	23.38	23.45
		1	7	23.32	23.33	23.44
		1	14	23.25	23.36	23.43
		8	0	22.51	22.46	22.61
		8	3	22.48	22.49	22.52
		8	7	22.33	22.41	22.50
		15	0	22.28	22.41	22.37
3M	16QAM	1	0	22.38	22.44	22.51
		1	7	22.34	22.42	22.43
		1	14	22.13	22.37	22.41
		8	0	21.33	21.32	21.45
		8	3	21.33	21.42	21.42
		8	7	21.29	21.25	21.40
		15	0	21.09	21.30	21.30
3M	64QAM	1	0	21.29	21.23	21.43
		1	7	21.30	21.27	21.38
		1	14	21.08	21.23	21.33
		8	0	20.30	20.44	20.62
		8	3	20.46	20.42	20.57
		8	7	20.38	20.43	20.46
		15	0	20.36	20.44	20.43
3M	256QAM	1	0	18.40	18.50	18.48
		1	7	18.21	18.46	18.48
		1	14	18.16	18.40	18.48
		8	0	18.25	18.42	18.42
		8	3	18.18	18.34	18.39
		8	7	18.16	18.21	18.36
		15	0	18.11	18.31	18.37

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26797	26915	27033
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	23.39	23.42	23.46
		1	2	23.29	23.33	23.41
		1	5	23.21	23.41	23.42
		3	0	23.37	23.54	23.33
		3	1	23.49	23.47	23.28
		3	3	23.35	23.47	23.29
		6	0	22.23	22.30	22.40
1.4M	16QAM	1	0	22.46	22.44	22.46
		1	2	22.35	22.32	22.48
		1	5	22.18	22.25	22.46
		3	0	22.25	22.32	22.31
		3	1	22.23	22.31	22.26
		3	3	22.27	22.33	22.27
		6	0	21.19	21.26	21.34
1.4M	64QAM	1	0	21.21	21.29	21.39
		1	2	21.25	21.33	21.41
		1	5	21.06	21.36	21.38
		3	0	21.23	21.50	21.27
		3	1	21.40	21.41	21.22
		3	3	21.38	21.34	21.23
		6	0	20.34	20.39	20.40
1.4M	256QAM	1	0	18.33	18.45	18.53
		1	2	18.22	18.43	18.47
		1	5	18.20	18.32	18.43
		3	0	19.23	19.44	18.42
		3	1	19.20	19.25	18.42
		3	3	19.16	19.27	18.33
		6	0	18.25	18.19	18.30

**ERP Power (dBm)**

Band	WCDMA V		
TX Channel	4132	4182	4233
Frequency	826.4	836.4	846.6
RMC 12.2K	<b>21.69</b>	21.59	21.56
HSDPA Subtest-1	20.32	20.36	20.31
HSDPA Subtest-2	20.30	20.30	20.25
HSDPA Subtest-3	19.86	19.83	19.87
HSDPA Subtest-4	19.82	19.83	19.81
DC-HSDPA Subtest-1	20.17	20.21	20.16
DC-HSDPA Subtest-2	20.15	20.15	20.10
DC-HSDPA Subtest-3	19.71	19.68	19.72
DC-HSDPA Subtest-4	19.67	19.68	19.66
HSUPA Subtest-1	21.30	21.20	21.00
HSUPA Subtest-2	18.74	18.71	18.74
HSUPA Subtest-3	19.77	19.77	19.63
HSUPA Subtest-4	18.16	18.36	18.33
HSUPA Subtest-5	21.35	21.27	21.06
HSPA+ Subtest-1	17.74	17.94	17.91

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	<b>21.77</b>	21.69	21.75
		1	24	21.76	21.68	21.73
		1	49	21.73	21.65	21.70
		25	0	21.09	21.01	21.06
		25	12	20.99	20.91	20.96
		25	25	20.79	20.71	20.76
		50	0	20.68	20.60	20.65
10M	16QAM	1	0	<b>21.04</b>	20.96	21.01
		1	24	20.95	20.87	20.92
		1	49	20.93	20.85	20.90
		25	0	19.92	19.84	19.89
		25	12	19.88	19.80	19.85
		25	25	19.83	19.75	19.80
		50	0	19.74	19.66	19.71
10M	64QAM	1	0	<b>19.76</b>	19.68	19.73
		1	24	19.73	19.65	19.70
		1	49	19.71	19.63	19.68
		25	0	18.47	18.39	18.44
		25	12	18.45	18.37	18.42
		25	25	18.43	18.35	18.40
		50	0	18.42	18.34	18.39
10M	256QAM	1	0	<b>16.68</b>	16.60	16.65
		1	24	16.66	16.58	16.63
		1	49	16.63	16.55	16.60
		25	0	16.62	16.54	16.59
		25	12	16.61	16.53	16.58
		25	25	16.58	16.50	16.55
		50	0	16.56	16.48	16.53

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	21.71	21.68	<b>21.73</b>
		1	12	21.70	21.58	21.68
		1	24	21.66	21.59	21.66
		12	0	20.99	20.98	21.02
		12	6	20.89	20.88	20.88
		12	13	20.73	20.64	20.76
		25	0	20.67	20.56	20.58
5M	16QAM	1	0	<b>21.01</b>	20.92	20.97
		1	12	20.92	20.87	20.91
		1	24	20.83	20.78	20.88
		12	0	19.92	19.76	19.79
		12	6	19.86	19.78	19.79
		12	13	19.73	19.71	19.76
		25	0	19.74	19.64	19.69
5M	64QAM	1	0	<b>19.73</b>	19.58	19.69
		1	12	19.70	19.64	19.67
		1	24	19.63	19.59	19.58
		12	0	18.44	18.30	18.36
		12	6	18.45	18.28	18.41
		12	13	18.39	18.32	18.30
		25	0	18.32	18.31	18.35
5M	256QAM	1	0	<b>16.63</b>	16.50	16.62
		1	12	16.62	16.48	16.57
		1	24	16.57	16.55	16.50
		12	0	16.60	16.46	16.59
		12	6	16.60	16.51	16.55
		12	13	16.53	16.49	16.55
		25	0	16.49	16.45	16.50



LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	<b>21.74</b>	21.63	21.69
		1	7	21.69	21.65	21.71
		1	14	21.63	21.64	21.68
		8	0	21.09	21.01	20.97
		8	3	20.98	20.84	20.87
		8	7	20.74	20.66	20.66
		15	0	20.61	20.50	20.61
3M	16QAM	1	0	20.95	<b>20.96</b>	20.92
		1	7	20.93	20.79	20.85
		1	14	20.83	20.83	20.80
		8	0	19.89	19.74	19.88
		8	3	19.81	19.70	19.82
		8	7	19.80	19.71	19.71
		15	0	19.67	19.58	19.69
3M	64QAM	1	0	19.67	19.68	19.66
		1	7	19.66	19.64	19.68
		1	14	<b>19.70</b>	19.60	19.63
		8	0	18.46	18.29	18.44
		8	3	18.43	18.37	18.37
		8	7	18.33	18.25	18.37
		15	0	18.41	18.29	18.33
3M	256QAM	1	0	<b>16.64</b>	16.54	16.64
		1	7	<b>16.64</b>	16.48	16.59
		1	14	16.54	16.50	16.58
		8	0	16.62	16.50	16.55
		8	3	16.53	16.49	16.54
		8	7	16.51	16.44	16.51
		15	0	16.52	16.42	16.47

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	<b>21.72</b>	21.70	21.66
		1	2	21.71	21.63	21.66
		1	5	21.71	21.57	21.61
		3	0	21.58	21.56	21.52
		3	1	21.57	21.49	21.52
		3	3	21.57	21.43	21.47
		6	0	20.66	20.58	20.58
1.4M	16QAM	1	0	<b>20.95</b>	20.88	20.94
		1	2	20.90	20.80	20.82
		1	5	20.84	20.82	20.86
		3	0	20.56	20.54	20.50
		3	1	20.55	20.47	20.50
		3	3	20.55	20.41	20.45
		6	0	19.72	19.64	19.64
1.4M	64QAM	1	0	<b>19.73</b>	19.64	19.68
		1	2	19.66	19.63	19.61
		1	5	19.64	19.53	19.67
		3	0	19.52	19.50	19.46
		3	1	19.51	19.43	19.46
		3	3	19.51	19.37	19.41
		6	0	18.32	18.25	18.30
1.4M	256QAM	1	0	<b>16.61</b>	16.51	16.56
		1	2	16.60	16.49	16.59
		1	5	16.60	16.55	16.56
		3	0	16.55	16.50	16.49
		3	1	16.51	16.51	16.50
		3	3	16.57	16.44	16.49
		6	0	16.55	16.39	16.49

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26865	26915	26965
		Frequency (MHz)		831.5	836.5	841.5
15M	QPSK	1	0	22.02	21.98	21.77
		1	37	22.01	21.96	<b>22.03</b>
		1	74	21.98	21.95	22.00
		36	0	21.16	21.12	21.18
		36	19	21.11	21.09	21.13
		36	39	21.07	21.06	21.09
		75	0	21.00	20.90	21.02
15M	16QAM	1	0	21.06	21.06	<b>21.08</b>
		1	37	21.05	20.99	21.07
		1	74	21.00	20.90	21.02
		36	0	20.01	19.96	20.03
		36	19	19.99	19.93	20.01
		36	39	19.96	19.96	19.98
		75	0	19.93	19.89	19.95
15M	64QAM	1	0	19.98	19.89	<b>20.00</b>
		1	37	19.95	19.95	19.97
		1	74	19.93	19.85	19.95
		36	0	19.15	19.07	19.17
		36	19	19.13	19.09	19.15
		36	39	19.04	19.04	19.06
		75	0	19.03	19.01	19.05
15M	256QAM	1	0	17.07	16.99	<b>17.09</b>
		1	37	17.05	16.95	17.07
		1	74	17.03	16.94	17.05
		36	0	17.00	16.94	17.02
		36	19	16.98	16.90	17.00
		36	39	16.95	16.89	16.97
		75	0	16.93	16.93	16.95

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26840	26915	26990
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	21.87	21.94	<b>22.02</b>
		1	24	21.90	21.91	22.00
		1	49	21.89	21.84	21.99
		25	0	21.02	21.06	21.16
		25	12	20.99	21.04	21.07
		25	25	20.95	20.99	21.03
		50	0	21.00	20.88	20.98
10M	16QAM	1	0	20.93	<b>21.04</b>	20.99
		1	24	20.99	20.94	21.00
		1	49	20.90	20.78	20.95
		25	0	19.94	19.89	20.01
		25	12	19.99	19.89	19.97
		25	25	19.88	19.84	19.93
		50	0	19.92	19.77	19.88
10M	64QAM	1	0	<b>19.98</b>	19.87	19.92
		1	24	19.80	19.92	19.97
		1	49	19.90	19.75	19.93
		25	0	19.14	18.92	19.07
		25	12	19.06	19.05	19.08
		25	25	19.01	19.00	18.99
		50	0	18.98	19.01	18.99
10M	256QAM	1	0	17.04	16.95	<b>17.08</b>
		1	24	16.94	16.81	17.02
		1	49	16.92	16.81	16.99
		25	0	16.90	16.84	17.02
		25	12	16.91	16.83	16.93
		25	25	16.82	16.80	16.87
		50	0	16.85	16.81	16.89

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26815	26915	27015
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	21.83	21.88	22.00
		1	12	21.85	21.80	<b>22.03</b>
		1	24	21.87	21.77	21.90
		12	0	20.95	20.98	21.15
		12	6	20.96	20.89	21.06
		12	13	20.90	20.87	21.03
		25	0	20.86	20.75	20.97
5M	16QAM	1	0	20.78	20.96	<b>21.06</b>
		1	12	20.84	20.80	21.04
		1	24	20.79	20.73	20.95
		12	0	19.84	19.81	20.00
		12	6	19.87	19.74	19.91
		12	13	19.88	19.69	19.88
		25	0	19.77	19.63	19.86
5M	64QAM	1	0	19.98	19.79	<b>20.00</b>
		1	12	19.66	19.90	19.92
		1	24	19.89	19.67	19.87
		12	0	19.14	18.84	19.14
		12	6	19.02	18.90	19.12
		12	13	19.01	18.98	19.03
		25	0	18.84	18.97	18.97
5M	256QAM	1	0	16.94	16.84	<b>17.08</b>
		1	12	16.91	16.74	17.04
		1	24	16.87	16.73	16.97
		12	0	16.77	16.82	16.96
		12	6	16.89	16.83	16.98
		12	13	16.81	16.78	16.94
		25	0	16.71	16.77	16.91

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26805	26915	27025
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	21.88	21.93	<b>22.00</b>
		1	7	21.87	21.88	21.99
		1	14	21.80	21.91	21.98
		8	0	21.06	21.01	21.16
		8	3	21.03	21.04	21.07
		8	7	20.88	20.96	21.05
		15	0	20.83	20.96	20.92
3M	16QAM	1	0	20.93	20.99	<b>21.06</b>
		1	7	20.89	20.97	20.98
		1	14	20.68	20.92	20.96
		8	0	19.88	19.87	20.00
		8	3	19.88	19.97	19.97
		8	7	19.84	19.80	19.95
		15	0	19.64	19.85	19.85
3M	64QAM	1	0	19.84	19.78	<b>19.98</b>
		1	7	19.85	19.82	19.93
		1	14	19.63	19.78	19.88
		8	0	18.85	18.99	19.17
		8	3	19.01	18.97	19.12
		8	7	18.93	18.98	19.01
		15	0	18.91	18.99	18.98
3M	256QAM	1	0	16.95	<b>17.05</b>	17.03
		1	7	16.76	17.01	17.03
		1	14	16.71	16.95	17.03
		8	0	16.80	16.97	16.97
		8	3	16.73	16.89	16.94
		8	7	16.71	16.76	16.91
		15	0	16.66	16.86	16.92

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26797	26915	27033
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	21.94	21.97	22.01
		1	2	21.84	21.88	21.96
		1	5	21.76	21.96	21.97
		3	0	21.92	<b>22.09</b>	21.88
		3	1	22.04	22.02	21.83
		3	3	21.90	22.02	21.84
		6	0	20.78	20.85	20.95
1.4M	16QAM	1	0	21.01	20.99	21.01
		1	2	20.90	20.87	<b>21.03</b>
		1	5	20.73	20.80	21.01
		3	0	20.80	20.87	20.86
		3	1	20.78	20.86	20.81
		3	3	20.82	20.88	20.82
		6	0	19.74	19.81	19.89
1.4M	64QAM	1	0	19.76	19.84	19.94
		1	2	19.80	19.88	19.96
		1	5	19.61	19.91	19.93
		3	0	19.78	<b>20.05</b>	19.82
		3	1	19.95	19.96	19.77
		3	3	19.93	19.89	19.78
		6	0	18.89	18.94	18.95
1.4M	256QAM	1	0	16.88	17.00	17.08
		1	2	16.77	16.98	17.02
		1	5	16.75	16.87	16.98
		3	0	17.78	<b>17.99</b>	16.97
		3	1	17.75	17.80	16.97
		3	3	17.71	17.82	16.88
		6	0	16.80	16.74	16.85

## 4.2 Modulation Characteristics Measurement

### 4.2.1 Limits of Modulation Characteristics

N/A

### 4.2.2 Test Procedure

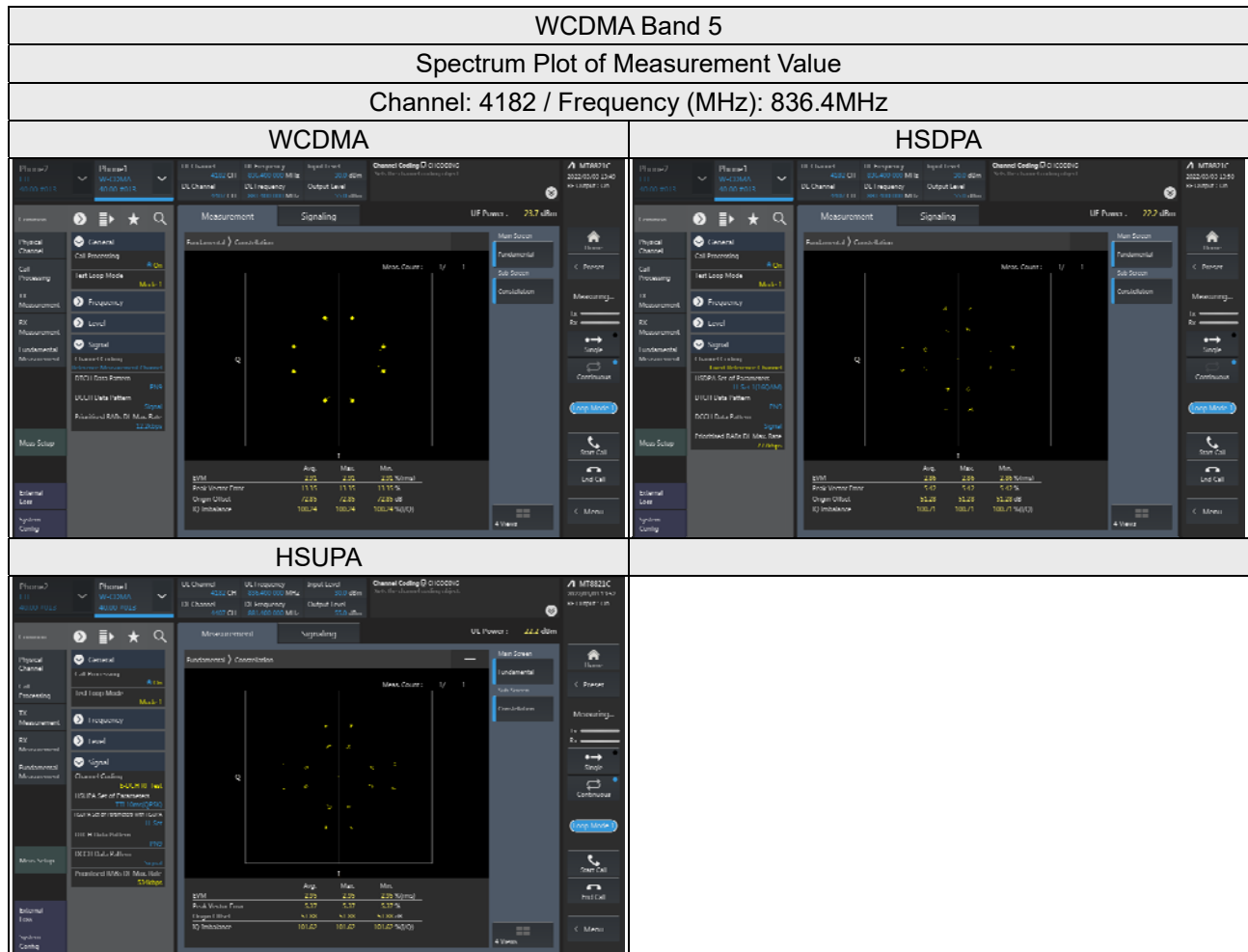
Connect the EUT to Communication Simulator via the antenna connector, The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

### 4.2.3 Test Setup





## 4.2.4 Test Results



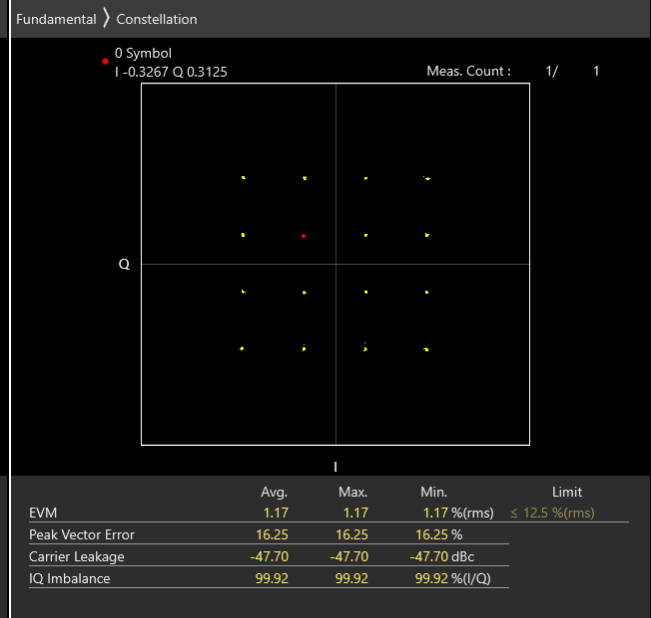
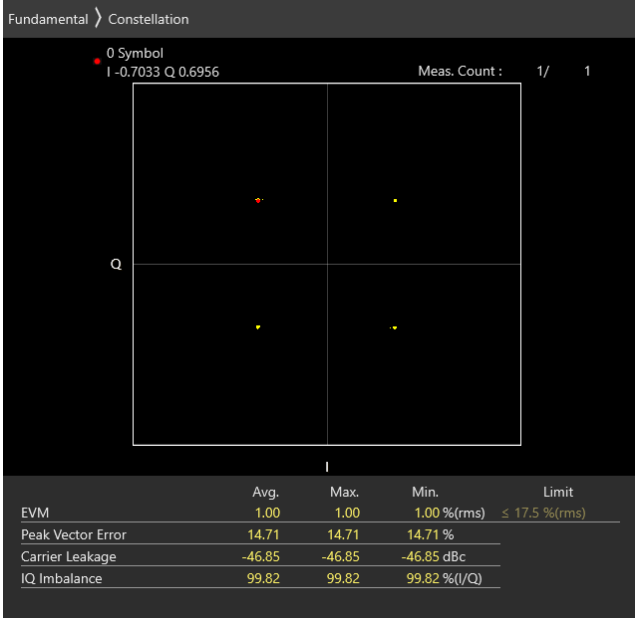
LTE Band 5

Spectrum Plot of Measurement Value

Channel: 20525 / Frequency (MHz): 836.5MHz

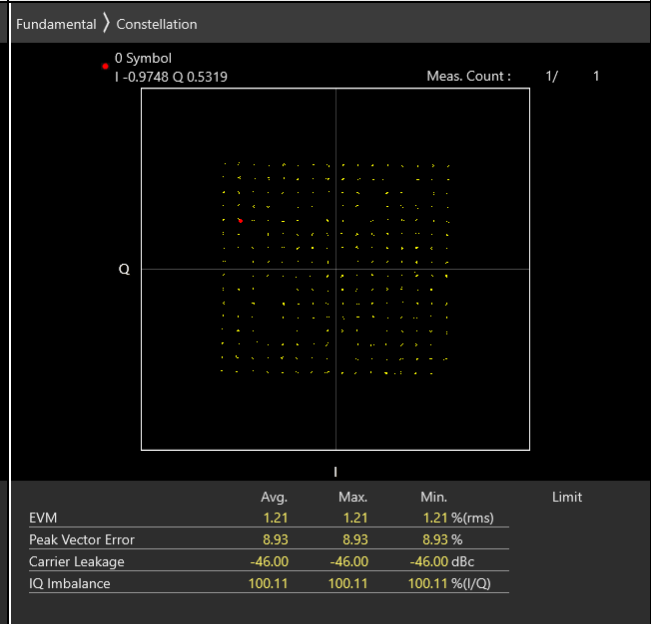
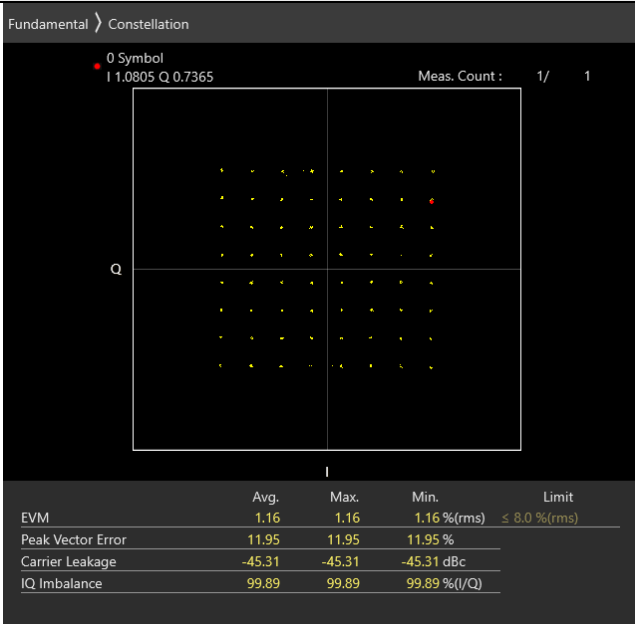
QPSK

16QAM



64QAM

256QAM



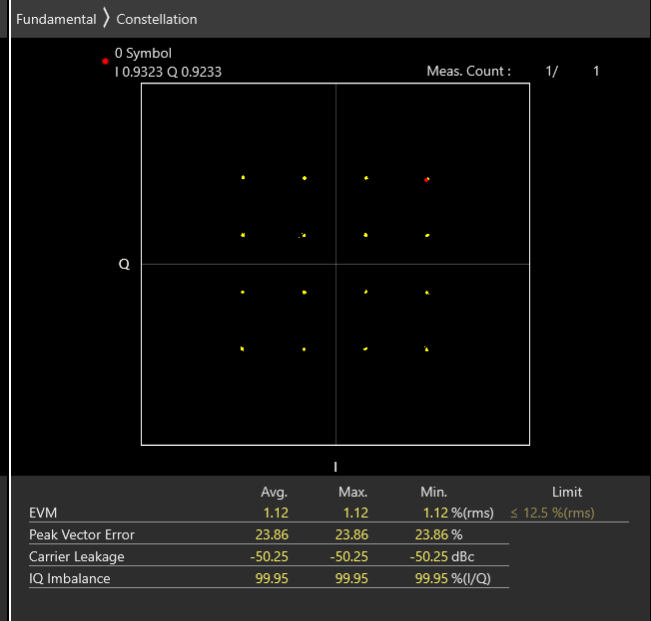
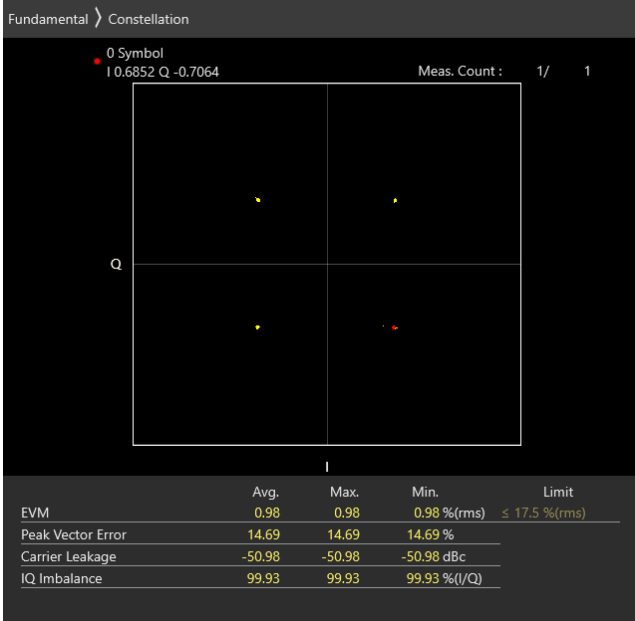
LTE Band 26

Spectrum Plot of Measurement Value

Channel: 26915 / Frequency (MHz): 836.5MHz

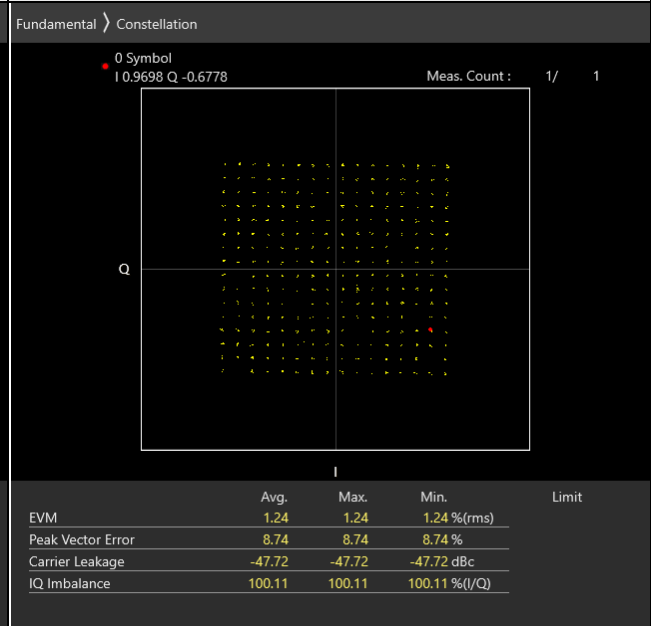
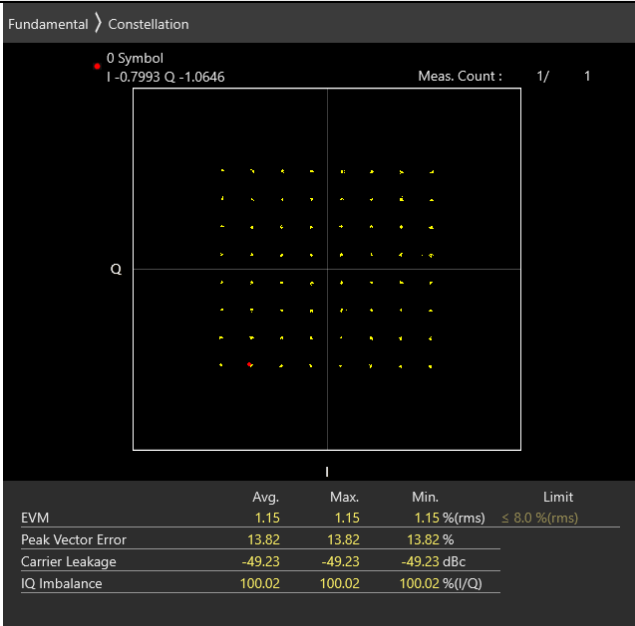
QPSK

16QAM



64QAM

256QAM



### 4.3 Frequency Stability Measurement

#### 4.3.1 Limits of Frequency Stability Measurement

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

#### 4.3.2 Test Procedure

- 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.
- 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.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5$  °C 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.

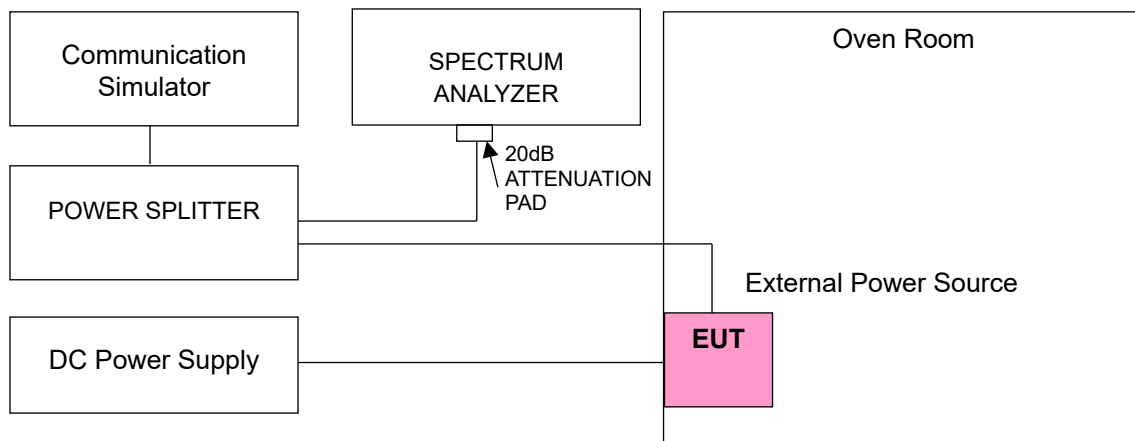
Note: The frequency error was recorded frequency error from the communication simulator.

#### 4.3.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Feb. 16, 2022	Feb. 15, 2023
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Jan. 03, 2022	Jan. 02, 2023
Digital Multimeter Fluke	87-III	70360742	Jun. 24, 2021	Jun. 23, 2022
DC Power Supply Topward	6306A	727263	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.3.4 Test Setup



#### 4.3.5 Test Results

##### Frequency Error vs. Voltage

Voltage (Vdc)	WCDMA Band 5			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	826.400001	0.001	846.599997	-0.004
3.85	826.399998	-0.002	846.599998	-0.002
3.28	826.400002	0.002	846.599998	-0.002

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

##### Frequency Error vs. Temperature

Temp. (°C)	WCDMA Band 5			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	826.399999	-0.001	846.599998	-0.002
-20	826.400001	0.001	846.600002	0.002
-10	826.399999	-0.001	846.600004	0.005
0	826.399996	-0.005	846.599999	-0.001
10	826.400003	0.004	846.599997	-0.004
20	826.400004	0.005	846.600001	0.001
30	826.399998	-0.002	846.599998	-0.002
40	826.399997	-0.004	846.600003	0.004
50	826.400002	0.002	846.599998	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	824.700002	0.002	848.300004	0.005
3.85	824.700001	0.001	848.299997	-0.004
3.28	824.700003	0.004	848.299999	-0.001

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 5			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	824.699997	-0.004	848.299997	-0.004
-20	824.700004	0.005	848.300003	0.004
-10	824.700004	0.005	848.300002	0.002
0	824.699998	-0.002	848.300003	0.004
10	824.700003	0.004	848.300003	0.004
20	824.700002	0.002	848.299998	-0.002
30	824.700001	0.001	848.299996	-0.005
40	824.700002	0.002	848.299997	-0.004
50	824.699996	-0.005	848.299996	-0.005

### Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	825.500004	0.005	847.499999	-0.001
3.85	825.500002	0.002	847.500004	0.005
3.28	825.499997	-0.004	847.500002	0.002

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 5			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	825.500004	0.005	847.499998	-0.002
-20	825.499998	-0.002	847.499998	-0.002
-10	825.500003	0.004	847.500004	0.005
0	825.499996	-0.005	847.500001	0.001
10	825.500002	0.002	847.500004	0.005
20	825.500004	0.005	847.500004	0.005
30	825.499996	-0.005	847.500003	0.004
40	825.500001	0.001	847.499996	-0.005
50	825.500002	0.002	847.500004	0.005

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	826.499996	-0.005	846.500002	0.002
3.85	826.500004	0.005	846.499999	-0.001
3.28	826.499998	-0.002	846.500003	0.004

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 5			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	826.499998	-0.002	846.499998	-0.002
-20	826.499997	-0.004	846.499999	-0.001
-10	826.500004	0.005	846.499998	-0.002
0	826.499996	-0.005	846.499997	-0.004
10	826.500002	0.002	846.499998	-0.002
20	826.500003	0.004	846.499999	-0.001
30	826.499997	-0.004	846.500003	0.004
40	826.499998	-0.002	846.500001	0.001
50	826.500002	0.002	846.500003	0.004



### Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	828.999998	-0.002	843.999998	-0.002
3.85	828.999998	-0.002	844.000002	0.002
3.28	828.999998	-0.002	843.999998	-0.002

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 5			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	829.000004	0.005	844.000001	0.001
-20	828.999998	-0.002	844.000001	0.001
-10	829.000004	0.005	843.999998	-0.002
0	828.999996	-0.005	844.000004	0.005
10	828.999996	-0.005	843.999996	-0.005
20	828.999999	-0.001	843.999999	-0.001
30	828.999996	-0.005	844.000003	0.004
40	828.999997	-0.004	844.000003	0.004
50	828.999997	-0.004	844.000003	0.004

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	824.699998	-0.002	848.300004	0.005
3.85	824.700003	0.004	848.299999	-0.001
3.28	824.699999	-0.001	848.299998	-0.002

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	824.699997	-0.004	848.300003	0.004
-20	824.700001	0.001	848.299996	-0.005
-10	824.699997	-0.004	848.300001	0.001
0	824.700004	0.005	848.300004	0.005
10	824.700001	0.001	848.300003	0.004
20	824.700002	0.002	848.300003	0.004
30	824.700004	0.005	848.300003	0.004
40	824.700002	0.002	848.299997	-0.004
50	824.699997	-0.004	848.300002	0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	825.499997	-0.004	847.499999	-0.001
3.85	825.500001	0.001	847.500001	0.001
3.28	825.499999	-0.001	847.499998	-0.002

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	825.500002	0.002	847.499998	-0.002
-20	825.499999	-0.001	847.500002	0.002
-10	825.499998	-0.002	847.499999	-0.001
0	825.499996	-0.005	847.499996	-0.005
10	825.500003	0.004	847.500003	0.004
20	825.500004	0.005	847.500002	0.002
30	825.500002	0.002	847.500001	0.001
40	825.500004	0.005	847.499999	-0.001
50	825.500004	0.005	847.499996	-0.005

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	826.499998	-0.002	846.499999	-0.001
3.85	826.500002	0.002	846.500004	0.005
3.28	826.500002	0.002	846.499998	-0.002

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	826.500002	0.002	846.499999	-0.001
-20	826.500003	0.004	846.500004	0.005
-10	826.500003	0.004	846.500002	0.002
0	826.499996	-0.005	846.499997	-0.004
10	826.500002	0.002	846.499998	-0.002
20	826.500001	0.001	846.499998	-0.002
30	826.500001	0.001	846.500001	0.001
40	826.499996	-0.005	846.499996	-0.005
50	826.500003	0.004	846.500002	0.002

### Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	828.999998	-0.002	844.000001	0.001
3.85	829.000003	0.004	844.000001	0.001
3.28	829.000001	0.001	843.999997	-0.004

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	828.999998	-0.002	843.999996	-0.005
-20	828.999996	-0.005	843.999999	-0.001
-10	829.000002	0.002	843.999997	-0.004
0	828.999999	-0.001	844.000003	0.004
10	829.000001	0.001	843.999997	-0.004
20	828.999996	-0.005	844.000001	0.001
30	828.999998	-0.002	844.000002	0.002
40	829.000001	0.001	843.999997	-0.004
50	828.999998	-0.002	843.999997	-0.004

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.43	831.499999	-0.001	841.500003	0.004
3.85	831.500001	0.001	841.499998	-0.002
3.28	831.499998	-0.002	841.499997	-0.004

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.43Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	831.500004	0.005	841.499997	-0.004
-20	831.499996	-0.005	841.499996	-0.005
-10	831.500004	0.005	841.500002	0.002
0	831.499997	-0.004	841.500001	0.001
10	831.500002	0.002	841.500003	0.004
20	831.500003	0.004	841.500003	0.004
30	831.499999	-0.001	841.500002	0.002
40	831.499998	-0.002	841.499998	-0.002
50	831.499997	-0.004	841.499997	-0.004

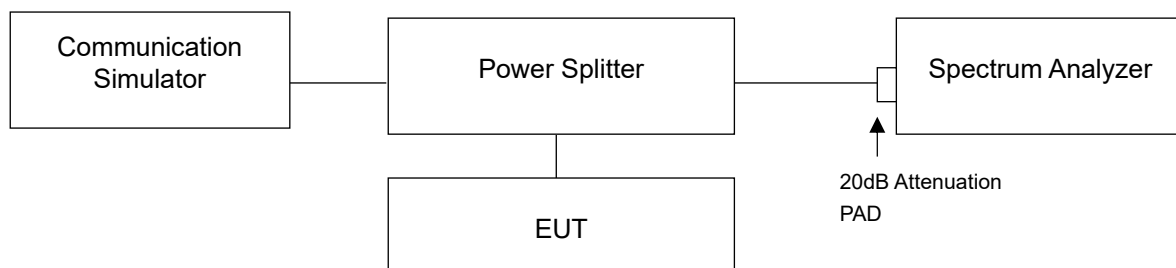
## 4.4 Occupied Bandwidth Measurement

### 4.4.1 Test Procedure

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Measurement method, please refer to section 5.4.4 of ANSI C63.26. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

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

### 4.4.2 Test Setup



### 4.4.3 Test Result

#### Occupied Bandwidth

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		
		WCDMA	HSDPA	HSUPA
4132	826.4	4.16	4.16	4.16
4182	836.4	4.16	4.15	4.16
4233	846.6	4.14	4.14	4.14

#### Spectrum Plot of Worst Value



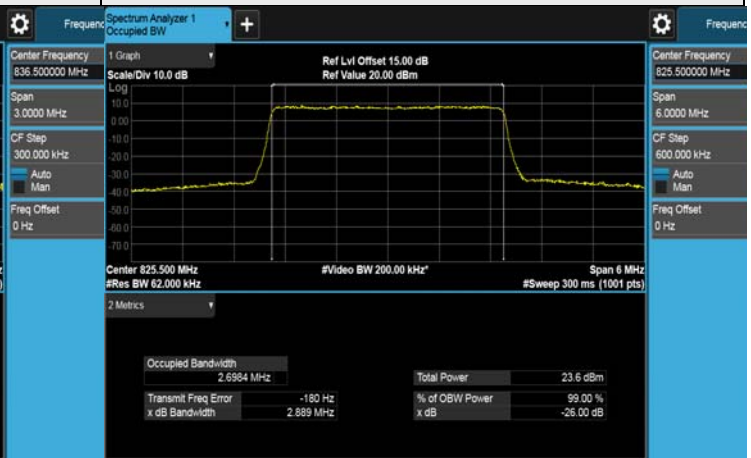
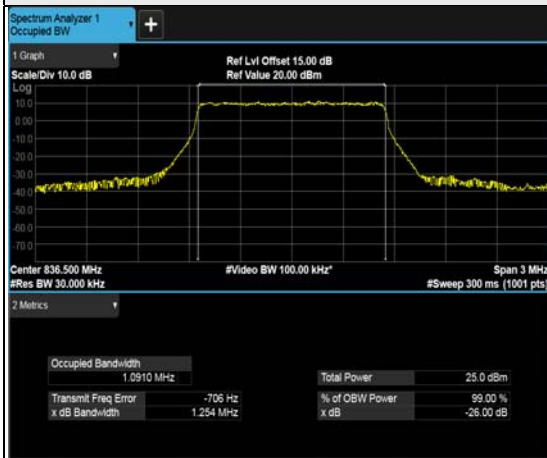


LTE Band 5, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20407	824.7	1.0861	1.0878	1.0899	1.0850
20525	836.5	1.0910	1.0873	1.0886	1.0850
20643	848.3	1.0903	1.0862	1.0873	1.0835
LTE Band 5, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20415	825.5	2.6943	2.6984	2.6962	2.6969
20525	836.5	2.6958	2.6964	2.6949	2.6967
20635	847.5	2.6939	2.6942	2.6908	2.6933
LTE Band 5, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20425	826.5	4.4938	4.4902	4.4957	4.4875
20525	836.5	4.4911	4.4878	4.4933	4.4875
20625	846.5	4.4845	4.4842	4.4879	4.4808
LTE Band 5, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20450	829.0	8.9733	8.9732	8.9761	8.9700
20525	836.5	8.9738	8.9691	8.9737	8.9619
20600	844.0	8.9624	8.9638	8.9690	8.9575

### Spectrum Plot of Worst Value

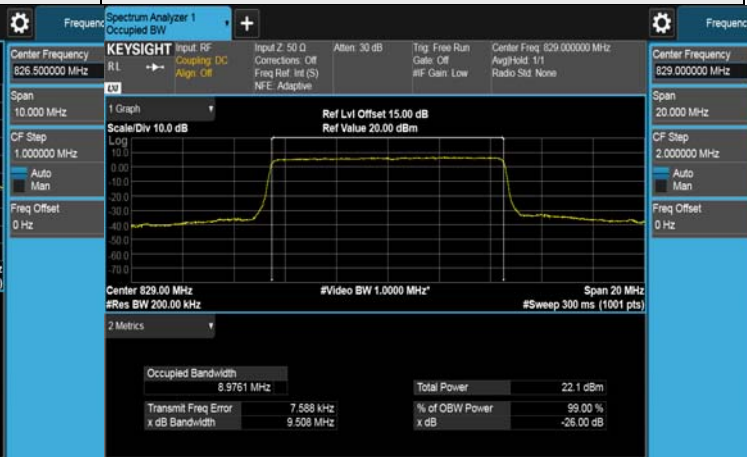
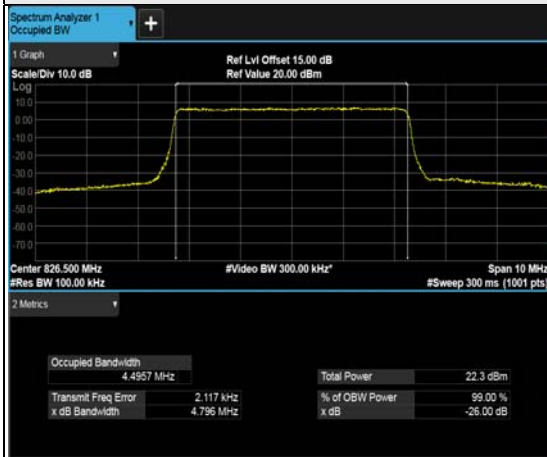
1.4MHz / QPSK

3MHz / 16QAM



5MHz / 64QAM

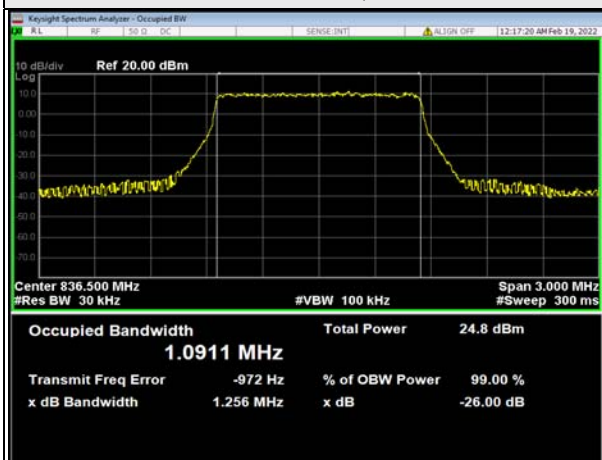
10MHz / 64QAM



LTE Band 26, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26797	824.7	1.0890	1.0878	1.0888	1.0852
26915	836.5	1.0911	1.0872	1.0878	1.0844
27033	848.3	1.0895	1.0872	1.0873	1.0843
LTE Band 26, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26805	825.5	2.6963	2.6970	2.6942	2.6974
26915	836.5	2.6946	2.6963	2.6929	2.6971
27025	847.5	2.6926	2.6931	2.6924	2.6919
LTE Band 26, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26815	826.5	4.4893	4.4882	4.4948	4.4886
26915	836.5	4.4931	4.4892	4.4899	4.4865
27015	846.5	4.4838	4.4825	4.4840	4.4787
LTE Band 26, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26840	829.0	8.9685	8.9710	8.9670	8.9672
26915	836.5	8.9732	8.9731	8.9727	8.9700
26990	844.0	8.9613	8.9592	8.9611	8.9567
LTE Band 26, Channel Bandwidth 15MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26865	831.5	13.4311	13.4230	13.4173	13.4197
26915	836.5	13.4582	13.4496	13.4442	13.4471
26965	841.5	13.4658	13.4460	13.4445	13.4548

### Spectrum Plot of Worst Value

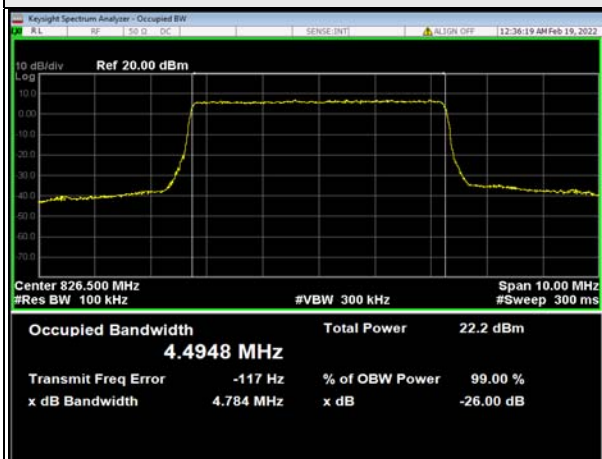
1.4MHz / QPSK



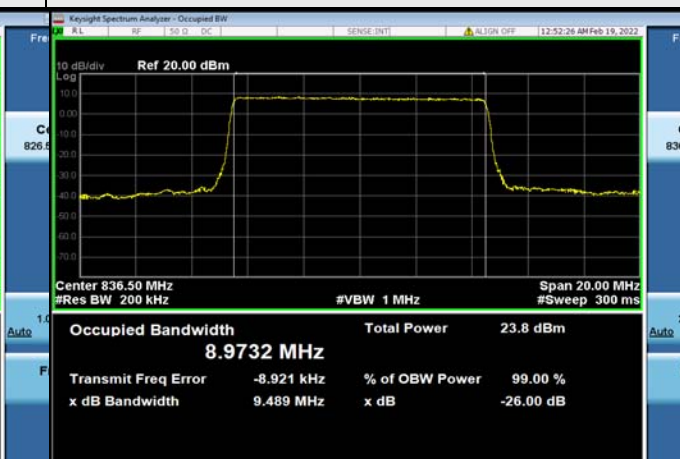
3MHz / 256QAM



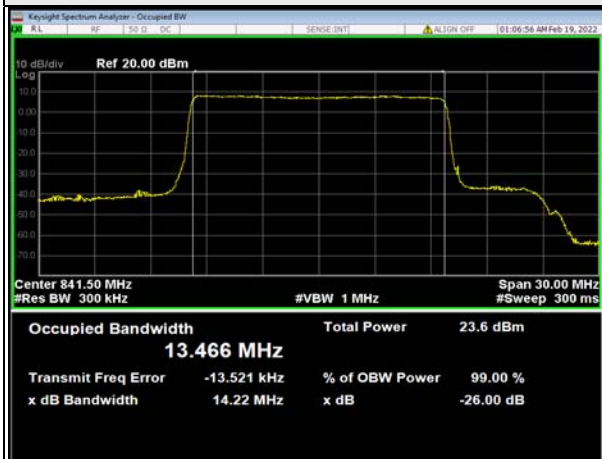
5MHz / 64QAM



10MHz / QPSK



15MHz / QPSK



### 26dB Bandwidth

Channel	Frequency (MHz)	26dB Bandwidth (MHz)		
		WCDMA	HSDPA	HSUPA
4132	826.4	4.69	4.69	4.70
4182	836.4	4.70	4.70	4.69
4233	846.6	4.69	4.69	4.69

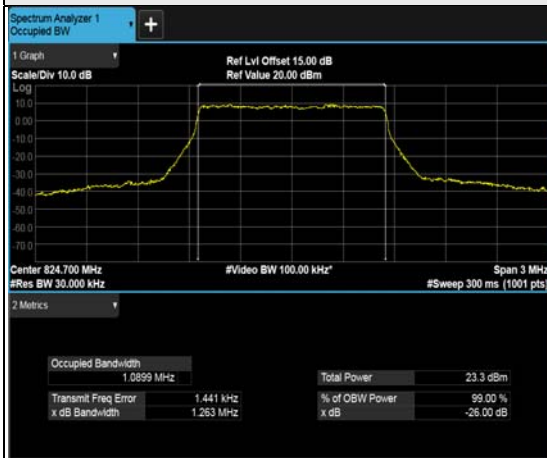
### Spectrum Plot of Worst Value



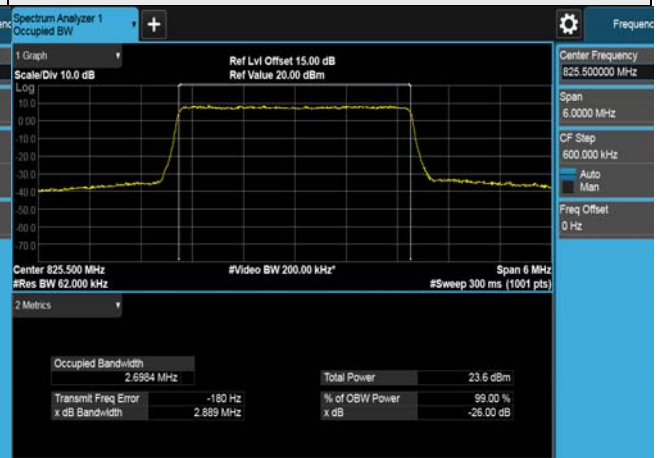
LTE Band 5, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20407	824.7	1.240	1.249	1.263	1.223
20525	836.5	1.254	1.250	1.255	1.234
20643	848.3	1.258	1.242	1.252	1.225
LTE Band 5, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20415	825.5	2.877	2.889	2.872	2.880
20525	836.5	2.883	2.881	2.874	2.883
20635	847.5	2.871	2.879	2.867	2.875
LTE Band 5, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20425	826.5	4.783	4.783	4.796	4.777
20525	836.5	4.775	4.775	4.784	4.784
20625	846.5	4.765	4.773	4.786	4.769
LTE Band 5, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20450	829.0	9.489	9.494	9.508	9.499
20525	836.5	9.503	9.493	9.506	9.501
20600	844.0	9.496	9.496	9.492	9.508

### Spectrum Plot of Worst Value

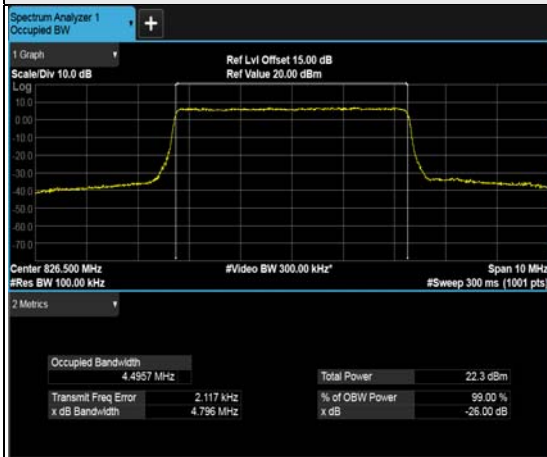
1.4MHz / 64QAM



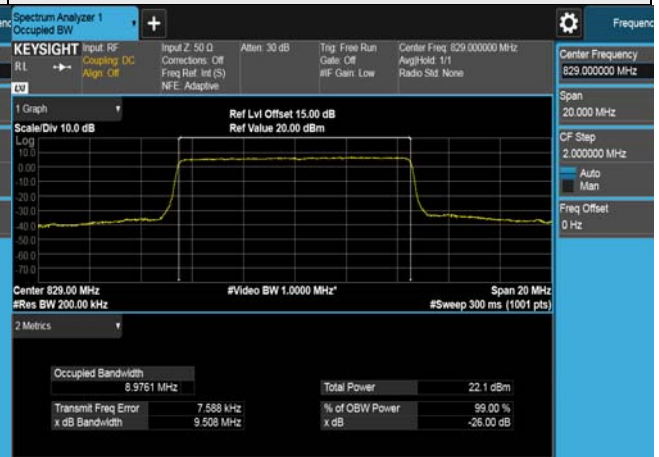
3MHz / 16QAM



5MHz / 64QAM



10MHz / 64QAM



LTE Band 26, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26797	824.7	1.251	1.248	1.252	1.233
26915	836.5	1.256	1.253	1.254	1.236
27033	848.3	1.259	1.244	1.250	1.228
LTE Band 26, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26805	825.5	2.869	2.889	2.874	2.880
26915	836.5	2.882	2.885	2.867	2.872
27025	847.5	2.878	2.880	2.867	2.870
LTE Band 26, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26815	826.5	4.782	4.774	4.784	4.781
26915	836.5	4.788	4.772	4.771	4.770
27015	846.5	4.772	4.765	4.762	4.773
LTE Band 26, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26840	829.0	9.499	9.491	9.504	9.496
26915	836.5	9.489	9.489	9.510	9.510
26990	844.0	9.492	9.488	9.497	9.492
LTE Band 26, Channel Bandwidth 15MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26865	831.5	14.212	14.213	14.218	14.220
26915	836.5	14.212	14.213	14.220	14.222
26965	841.5	14.219	14.224	14.227	14.239

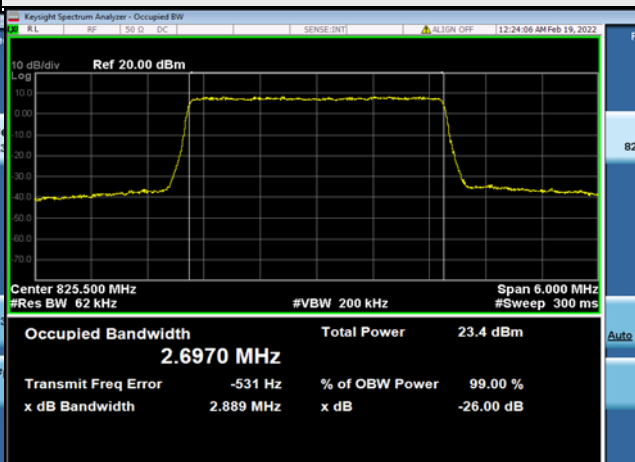


### Spectrum Plot of Worst Value

1.4MHz / QPSK



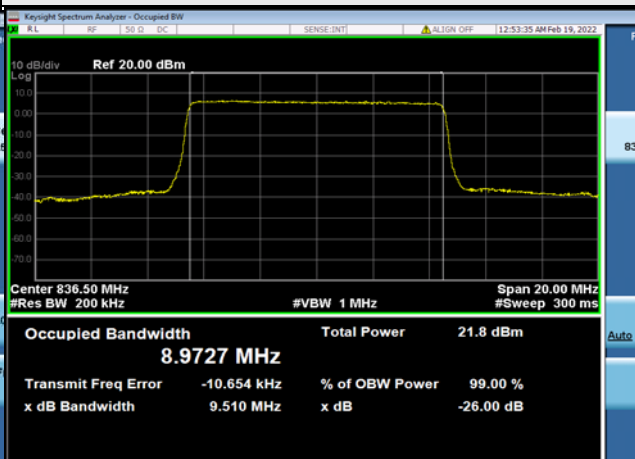
3MHz / 16QAM



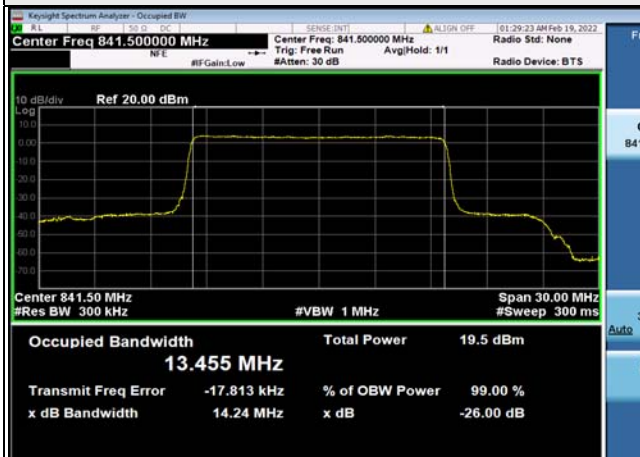
5MHz / QPSK



10MHz / 64QAM



15MHz / 256QAM

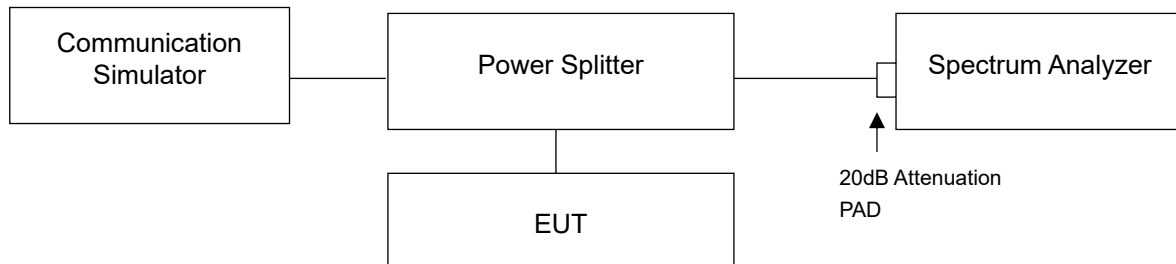


## 4.5 Band Edge Measurement

### 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.

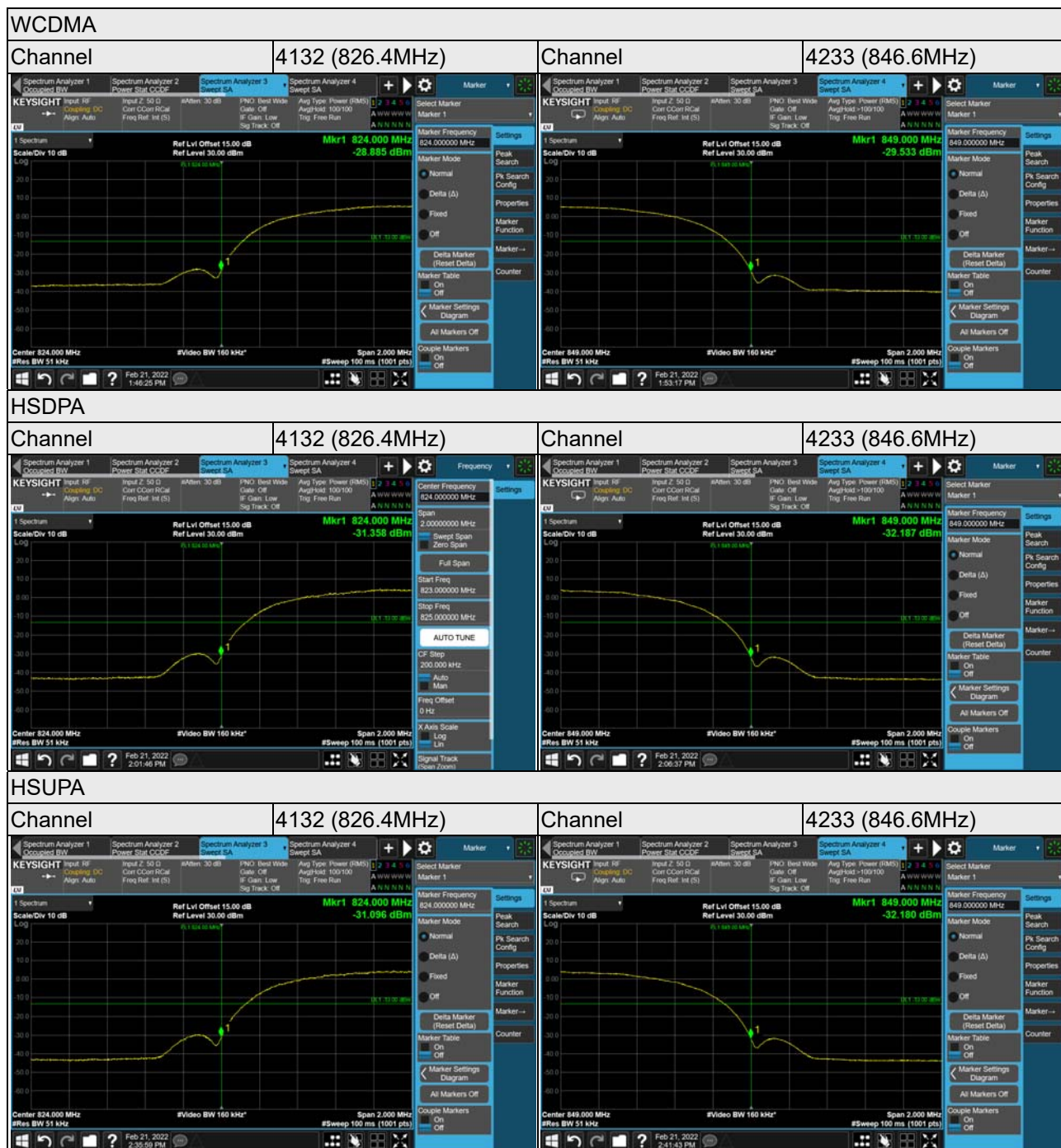
### 4.5.2 Test Setup



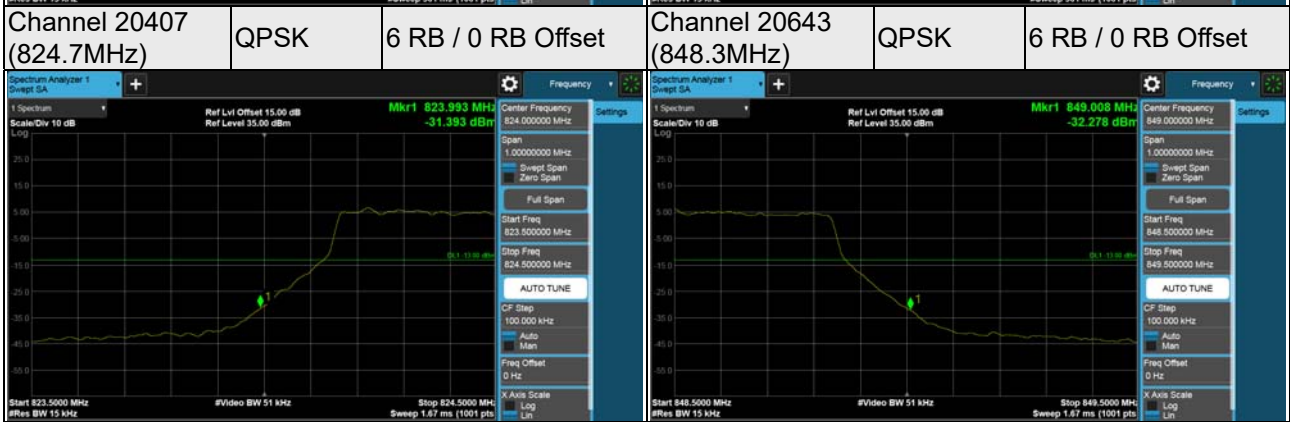
### 4.5.3 Test Procedures

- 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 51kHz and VB of the spectrum is 160kHz (WCDMA / HSDPA / HSUPA).
- c. 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).
- d. 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).
- e. 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).
- f. 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).
- g. 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).
- h. Record the max trace plot into the test report.

### 4.5.4 Test Results



LTE Band 5, Channel Bandwidth 1.4MHz



LTE Band 5, Channel Bandwidth 3MHz

Channel 20415  
(825.5MHz)

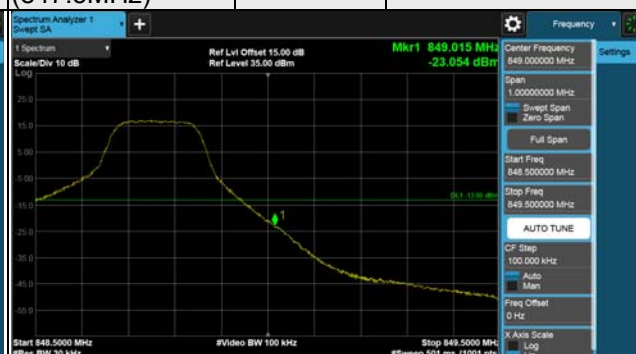
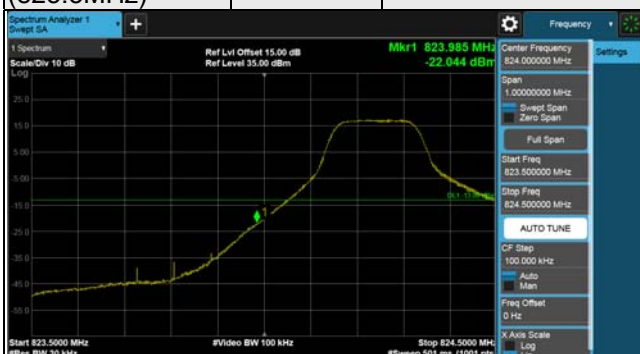
QPSK

1 RB / 0 RB Offset

Channel 20635  
(847.5MHz)

QPSK

1 RB / 14 RB Offset



Channel 20415  
(825.5MHz)

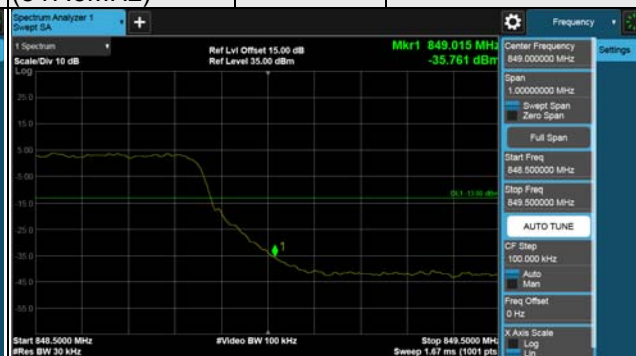
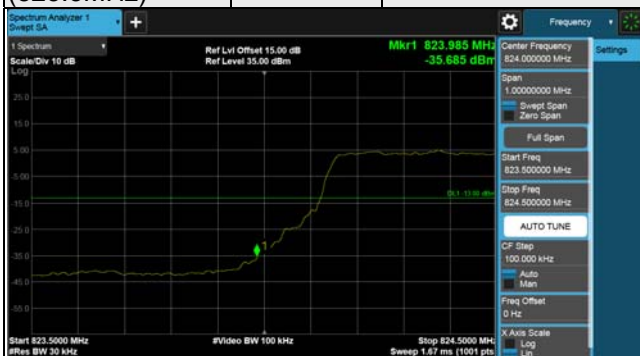
QPSK

15 RB / 0 RB Offset

Channel 20635  
(847.5MHz)

QPSK

15 RB / 0 RB Offset





LTE Band 5, Channel Bandwidth 5MHz



LTE Band 5, Channel Bandwidth 10MHz

Channel 20450  
(829.0MHz)

QPSK

1 RB / 0 RB Offset

Channel 20600  
(844.0MHz)

QPSK

1 RB / 49 RB Offset



Channel 20450  
(829.0MHz)

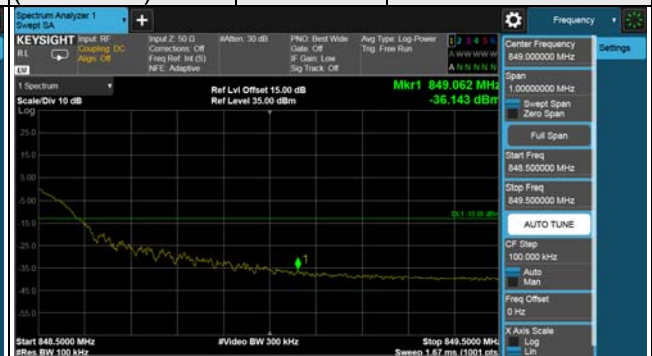
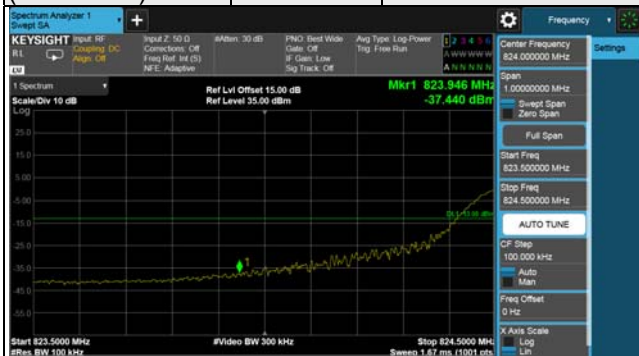
QPSK

50 RB / 0 RB Offset

Channel 20600  
(844.0MHz)

QPSK

50 RB / 0 RB Offset



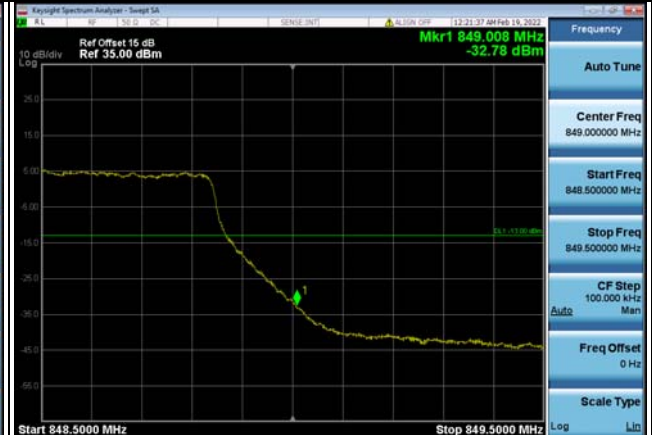
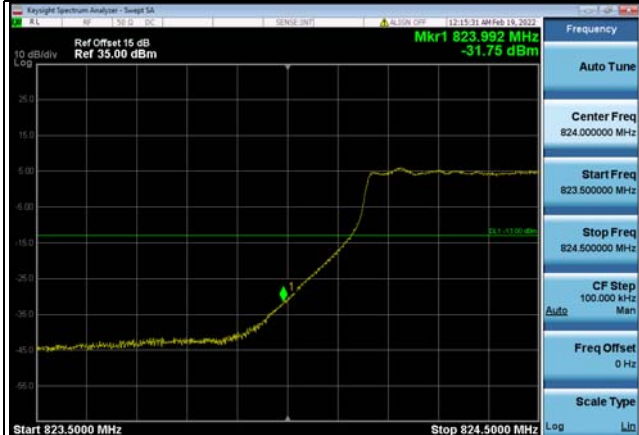
LTE Band 26, Channel Bandwidth 1.4MHz

Channel 26797 (824.7MHz)	QPSK	1 RB / 0 RB Offset	Channel 27033 (848.3MHz)	QPSK	1 RB / 5 RB Offset
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Channel 26797 (824.7MHz)	QPSK	6 RB / 0 RB Offset
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Channel 27033 (848.3MHz)	QPSK	6 RB / 0 RB Offset
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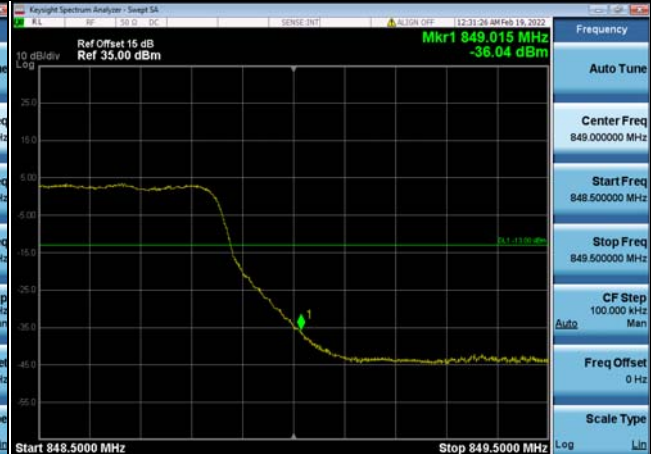
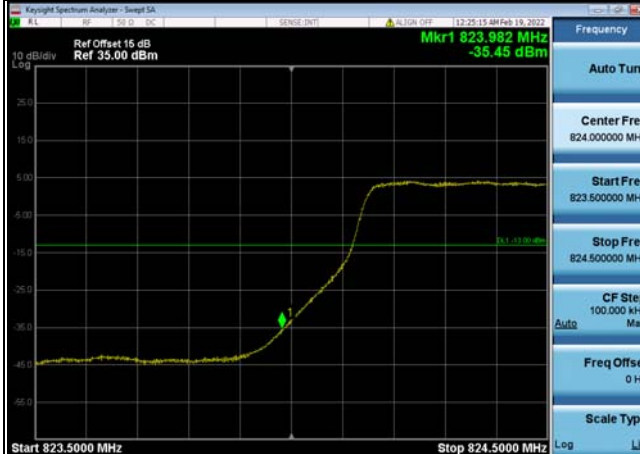


LTE Band 26, Channel Bandwidth 3MHz

Channel 26805 (825.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 27025 (847.5MHz)	QPSK	1 RB / 14 RB Offset
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Channel 26805 (825.5MHz)	QPSK	15 RB / 0 RB Offset	Channel 27025 (847.5MHz)	QPSK	15 RB / 0 RB Offset
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LTE Band 26, Channel Bandwidth 5MHz

Channel 26815  
(826.5MHz)

QPSK

1 RB / 0 RB Offset

Channel 27015  
(846.5MHz)

QPSK

1 RB / 24 RB Offset



Channel 26815  
(826.5MHz)

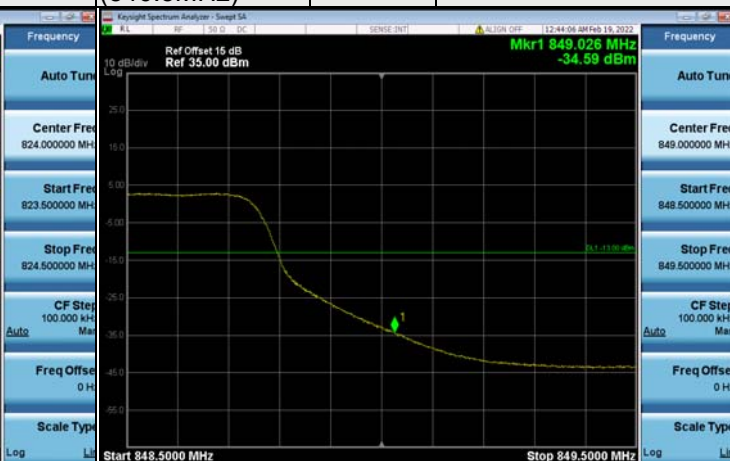
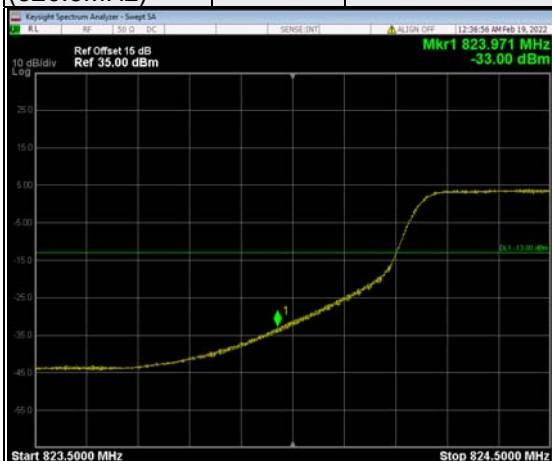
QPSK

25 RB / 0 RB Offset

Channel 27015  
(846.5MHz)

QPSK

25 RB / 0 RB Offset



LTE Band 26, Channel Bandwidth 10MHz

Channel 26840 (829.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 26990 (844.0MHz)	QPSK	1 RB / 49 RB Offset
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Channel 26840 (829.0MHz)	QPSK	50 RB / 0 RB Offset	Channel 26990 (844.0MHz)	QPSK	50 RB / 0 RB Offset
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LTE Band 26, Channel Bandwidth 15MHz

Channel 26865  
(831.5MHz)

QPSK

1 RB / 0 RB Offset

Channel 26965  
(841.5MHz)

QPSK

1 RB / 74 RB Offset



Channel 26865  
(831.5MHz)

QPSK

75 RB / 0 RB Offset

Channel 26965  
(841.5MHz)

QPSK

75 RB / 0 RB Offset

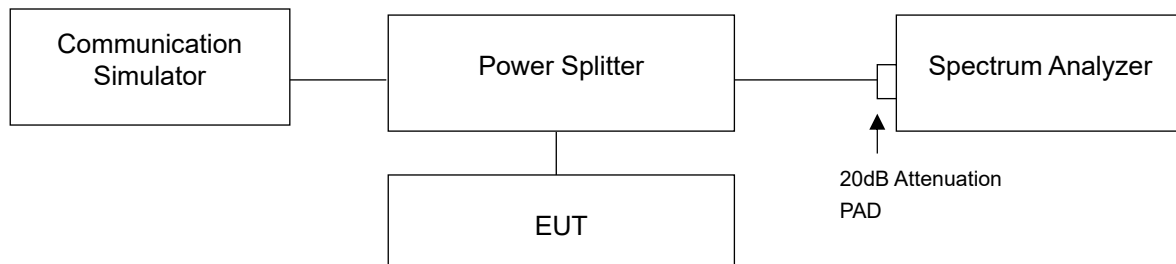


## 4.6 Peak to Average Ratio

### 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



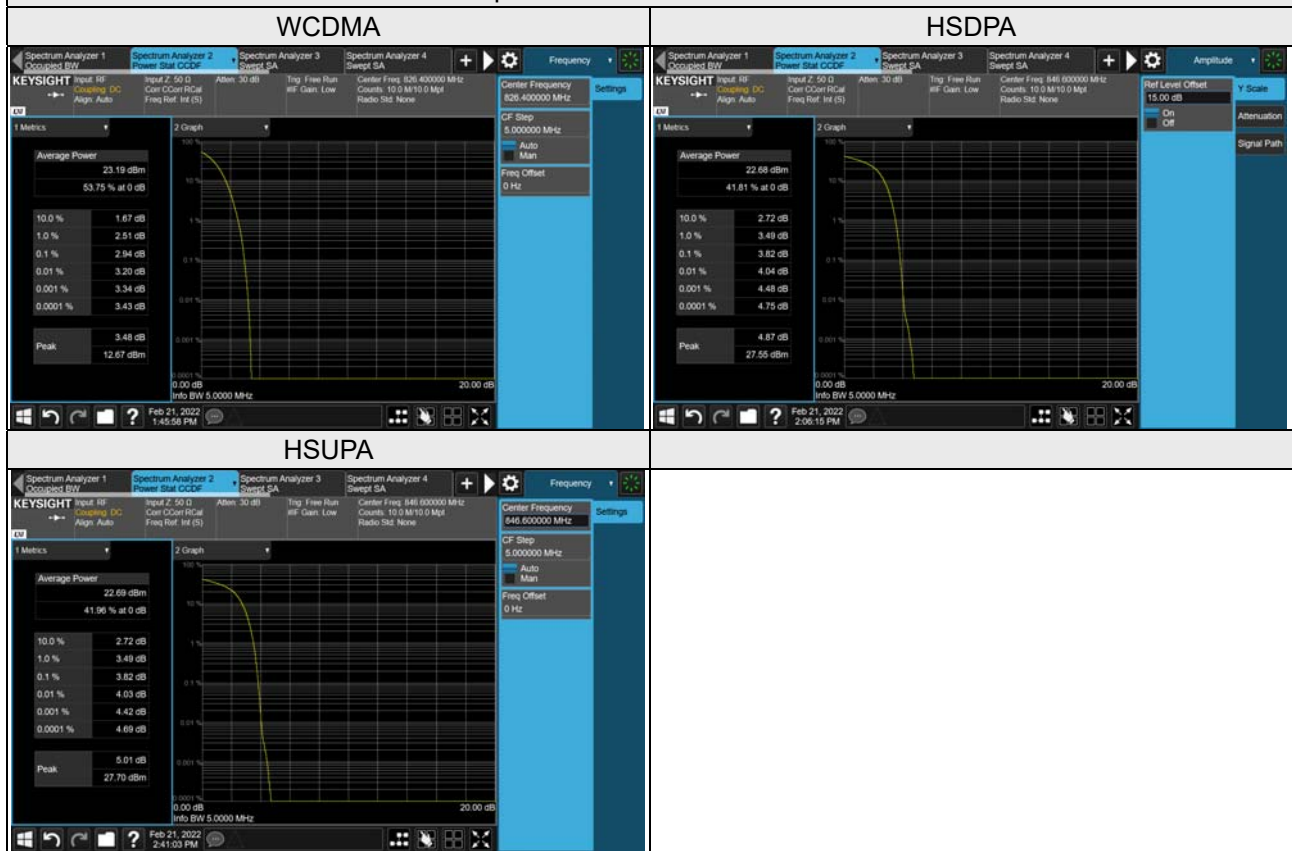
### 4.6.3 Test Procedures

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

#### 4.6.4 Test Results

Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		WCDMA	HSDPA	HSUPA
4132	826.4	2.94	3.79	3.81
4182	836.4	2.84	3.72	3.74
4233	846.6	2.87	3.82	3.82

#### Spectrum Plot of Worst Value



LTE Band 5, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
20407	824.7	5.17	6.07	6.39	6.86
20525	836.5	4.82	5.94	6.32	6.66
20643	848.3	4.86	6.00	6.26	6.69
LTE Band 5, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
20415	825.5	4.98	6.07	6.30	6.69
20525	836.5	4.80	5.81	6.25	6.87
20635	847.5	4.88	5.92	6.33	6.75
LTE Band 5, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
20425	826.5	4.96	6.02	6.31	6.68
20525	836.5	4.82	5.90	6.21	6.51
20625	846.5	4.97	6.15	6.45	6.96
LTE Band 5, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
20450	829.0	4.98	6.23	6.33	6.67
20525	836.5	4.85	5.79	6.31	6.73
20600	844.0	5.04	6.05	6.43	6.63



### Spectrum Plot of Worst Value

1.4MHz / 256QAM

3MHz / 256QAM



5MHz / 256QAM

10MHz / 256QAM

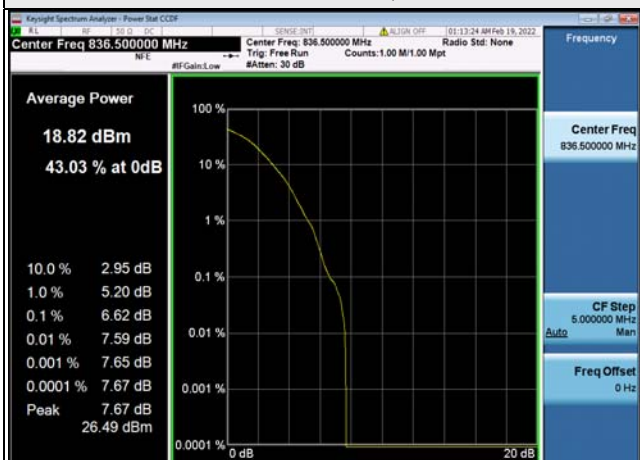




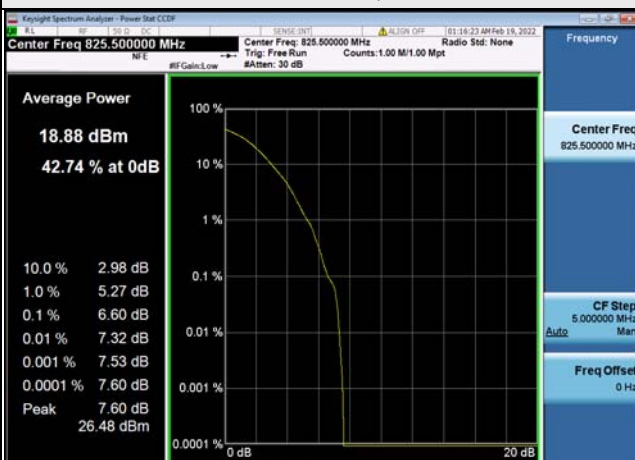
LTE Band 26, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
26797	824.7	5.03	6.17	6.25	6.57
26915	836.5	4.80	5.78	6.23	6.62
27033	848.3	4.91	6.00	6.17	6.54
LTE Band 26, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
26805	825.5	4.97	6.15	6.24	6.60
26915	836.5	4.77	5.85	6.22	6.54
27025	847.5	4.86	5.79	6.19	6.59
LTE Band 26, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
26815	826.5	4.97	6.15	6.19	6.84
26915	836.5	4.70	5.82	6.17	6.49
27015	846.5	5.00	6.00	6.30	6.78
LTE Band 26, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
26840	829.0	5.00	6.19	6.21	6.57
26915	836.5	4.80	5.88	6.19	6.47
26990	844.0	5.05	6.29	6.25	6.90
LTE Band 26, Channel Bandwidth 15MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
26865	831.5	4.98	6.09	6.34	6.53
26915	836.5	4.84	6.66	6.25	6.70
26965	841.5	4.78	5.81	6.15	6.81

### Spectrum Plot of Worst Value

1.4MHz / 256QAM



3MHz / 256QAM



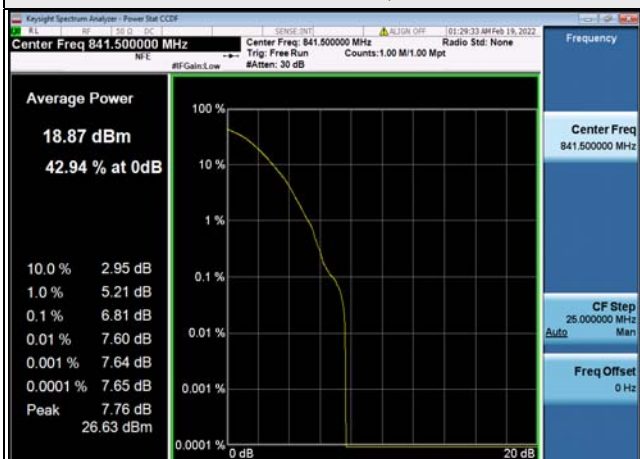
5MHz / 256QAM



10MHz / 256QAM



15MHz / 256QAM

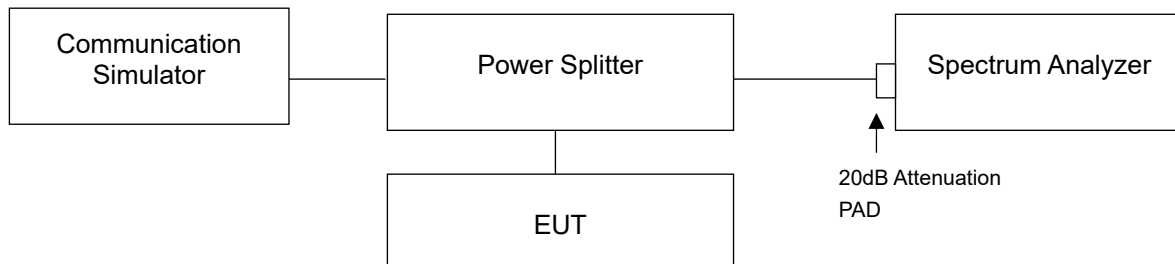


## 4.7 Conducted Spurious Emissions

### 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  $-13\text{dBm}$ .

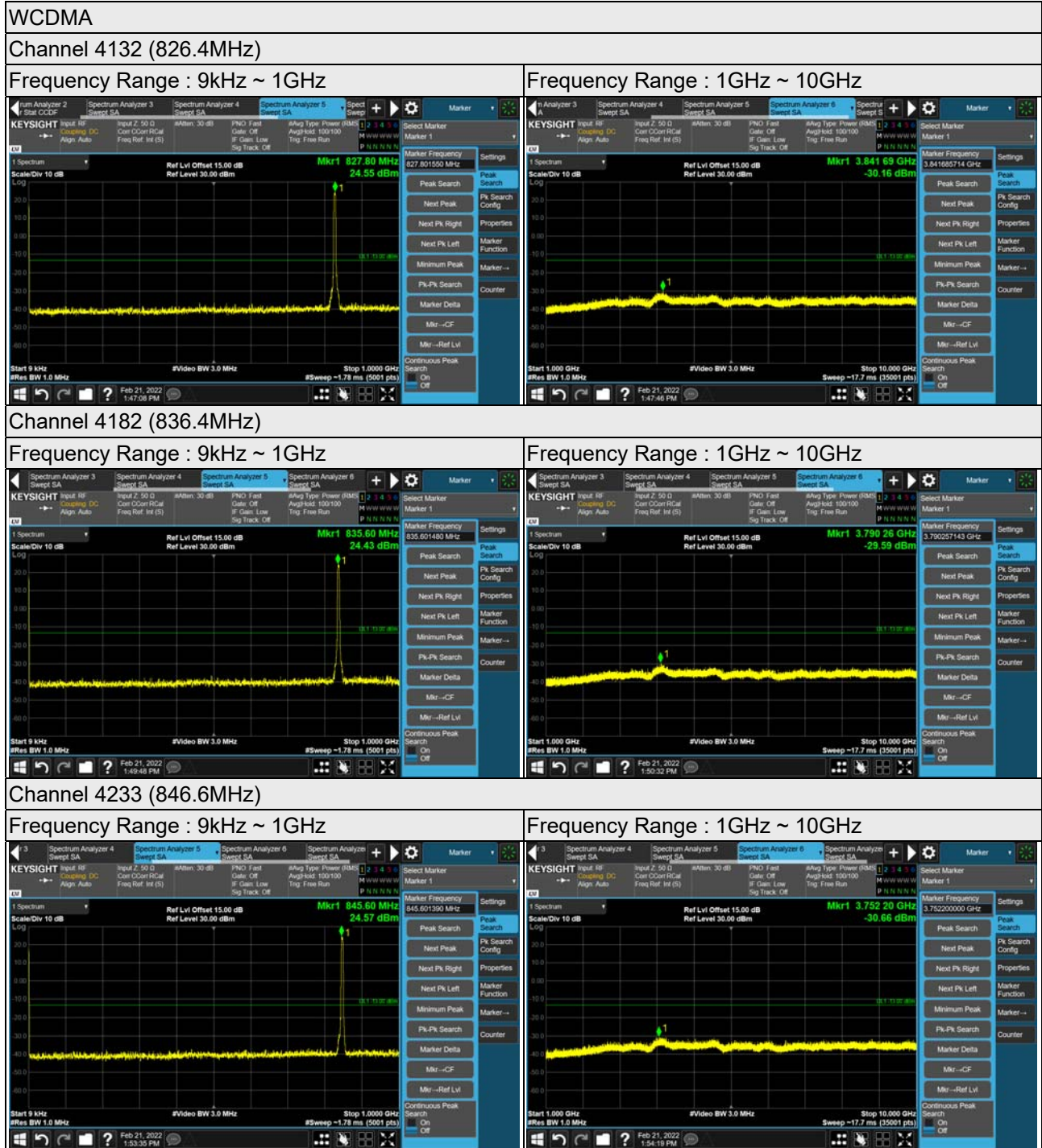
### 4.7.2 Test Setup



### 4.7.3 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9kHz to 9GHz /10GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

### 4.7.4 Test Results



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

### HSDPA

Channel 4132 (826.4MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



Channel 4182 (836.4MHz)

Frequency Range : 9kHz ~ 1GHz

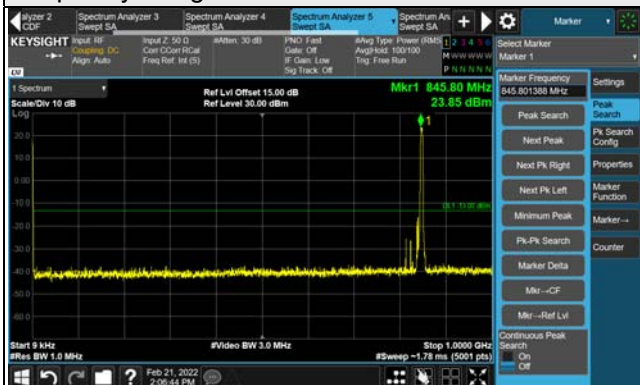


Frequency Range : 1GHz ~ 10GHz



Channel 4233 (846.6MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 10GHz



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



**HSUPA**

**Channel 4132 (826.4MHz)**

**Frequency Range : 9kHz ~ 1GHz**



**Frequency Range : 1GHz ~ 10GHz**



**Channel 4182 (836.4MHz)**

**Frequency Range : 9kHz ~ 1GHz**



**Frequency Range : 1GHz ~ 10GHz**



**Channel 4233 (846.6MHz)**

**Frequency Range : 9kHz ~ 1GHz**



**Frequency Range : 1GHz ~ 10GHz**

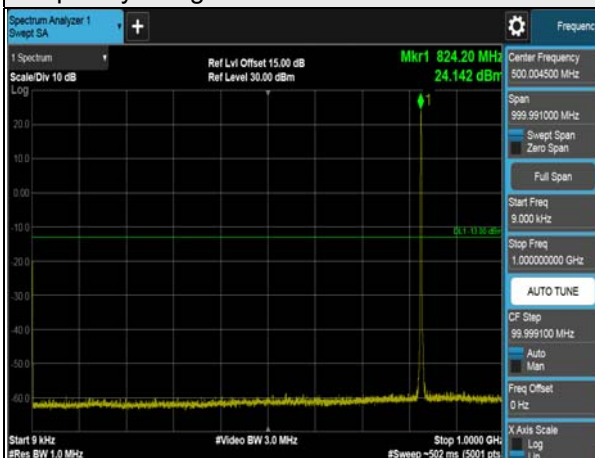


\*The 9kHz signal over the limit is from Spectrum.

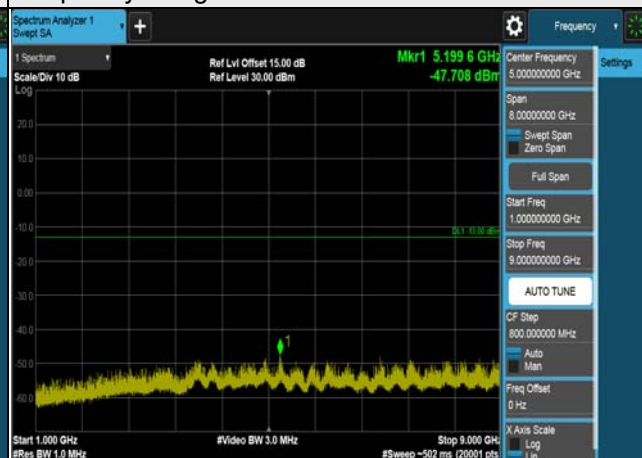
LTE Band 5, Channel Bandwidth 1.4MHz

Channel 20407 (824.7MHz)

Frequency Range : 9kHz ~ 1GHz

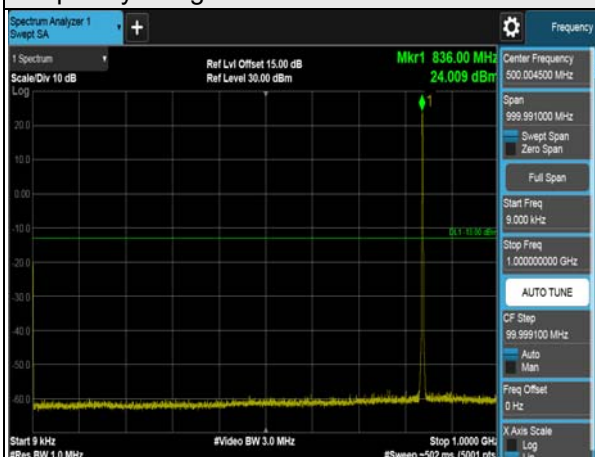


Frequency Range : 1GHz ~ 9GHz



Channel 20525 (836.5MHz)

Frequency Range : 9kHz ~ 1GHz

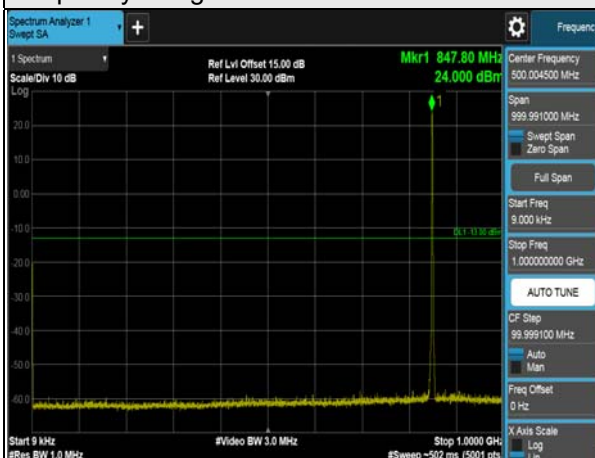


Frequency Range : 1GHz ~ 9GHz

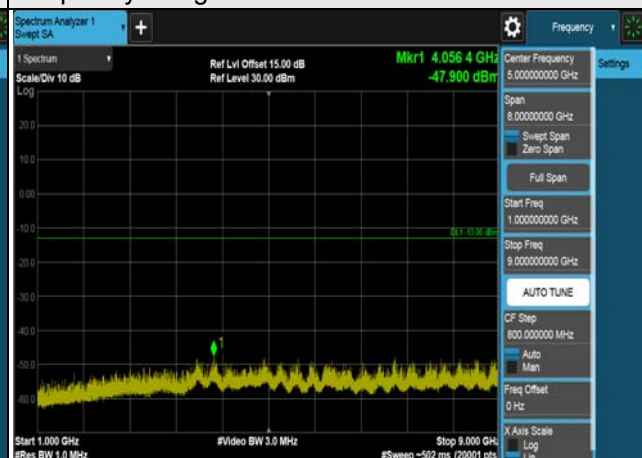


Channel 20643 (848.3MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz

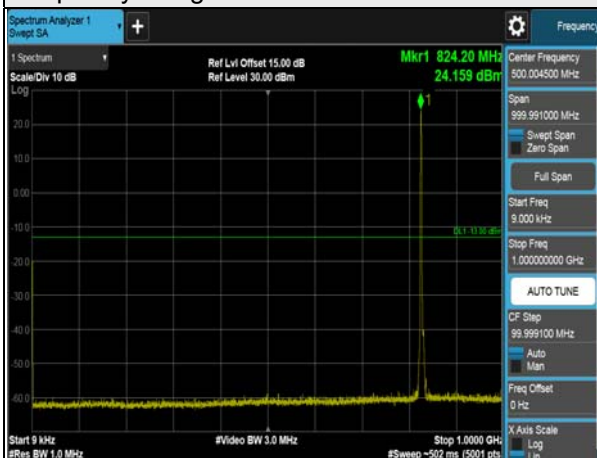


\*The 9kHz signal over the limit is from Spectrum.

LTE Band 5, Channel Bandwidth 3MHz

Channel 20415 (825.5MHz)

Frequency Range : 9kHz ~ 1GHz

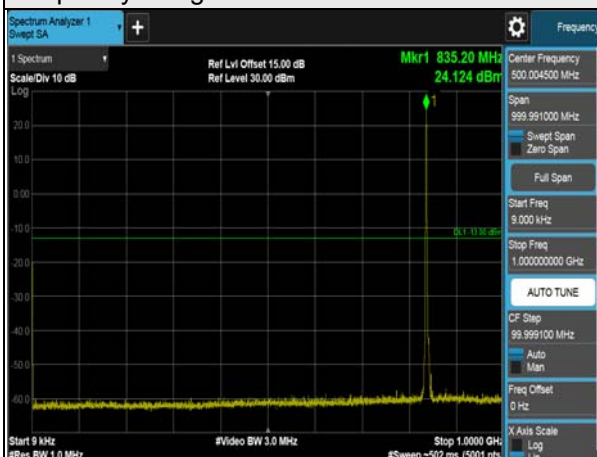


Frequency Range : 1GHz ~ 9GHz

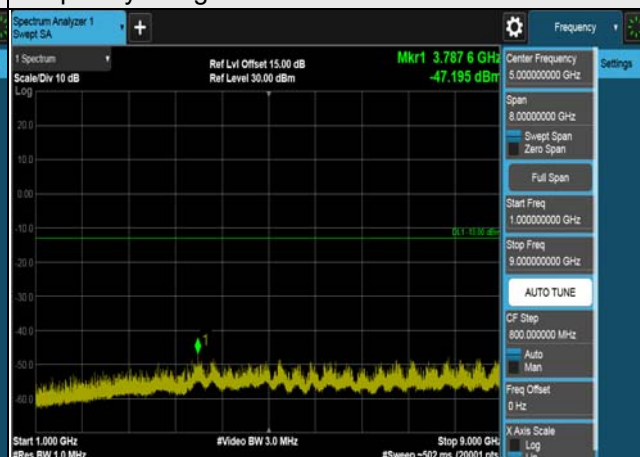


Channel 20525 (836.5MHz)

Frequency Range : 9kHz ~ 1GHz

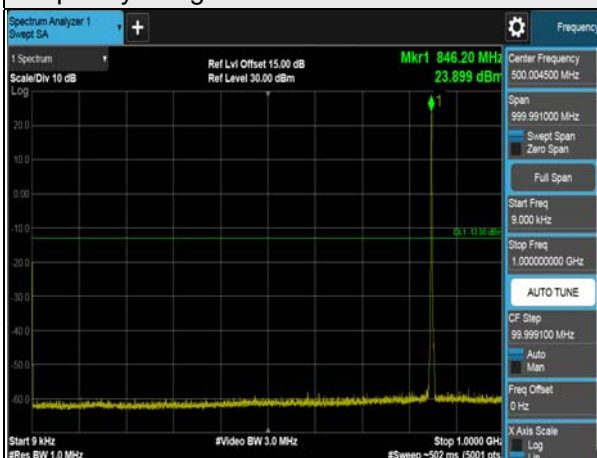


Frequency Range : 1GHz ~ 9GHz

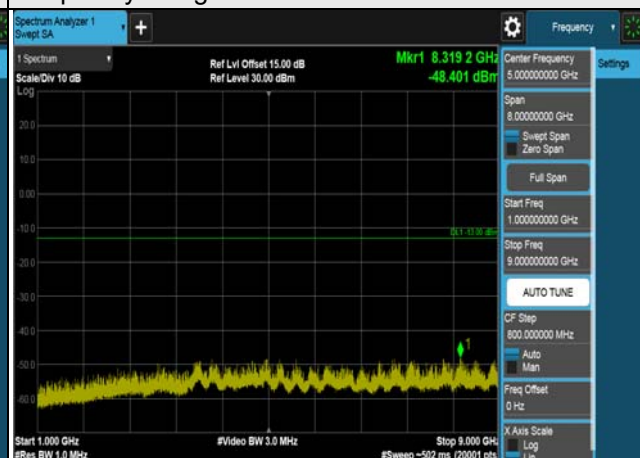


Channel 20635 (847.5MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz



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



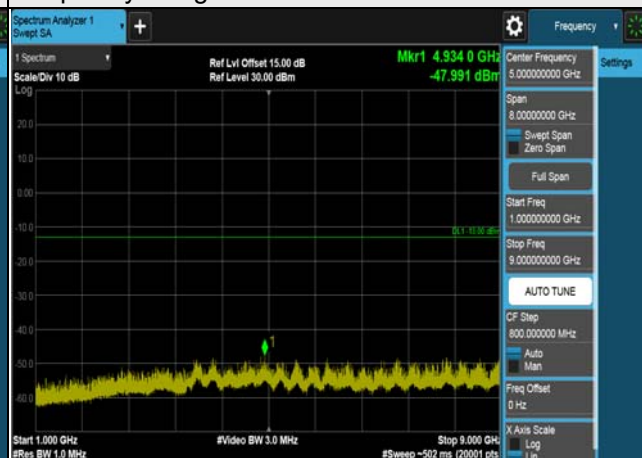
LTE Band 5, Channel Bandwidth 5MHz

Channel 20425 (826.5MHz)

Frequency Range : 9kHz ~ 1GHz

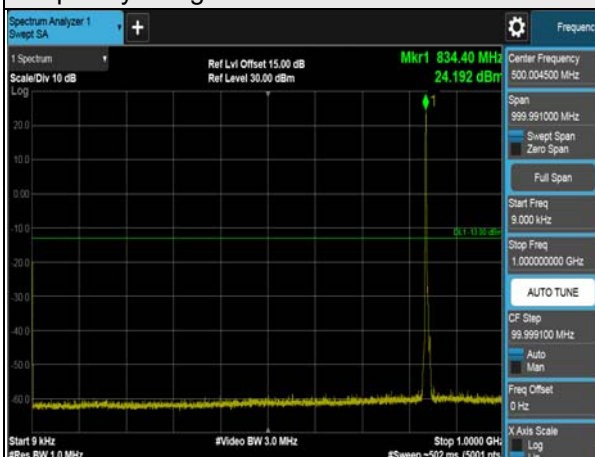


Frequency Range : 1GHz ~ 9GHz

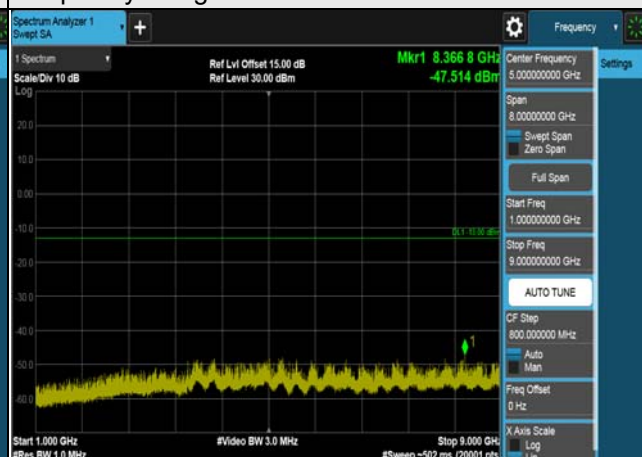


Channel 20525 (836.5MHz)

Frequency Range : 9kHz ~ 1GHz

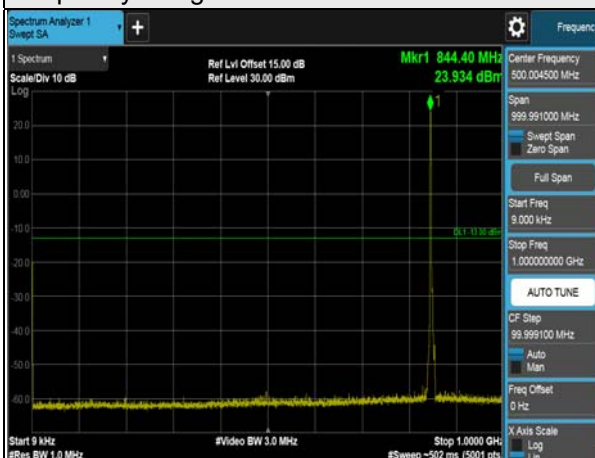


Frequency Range : 1GHz ~ 9GHz

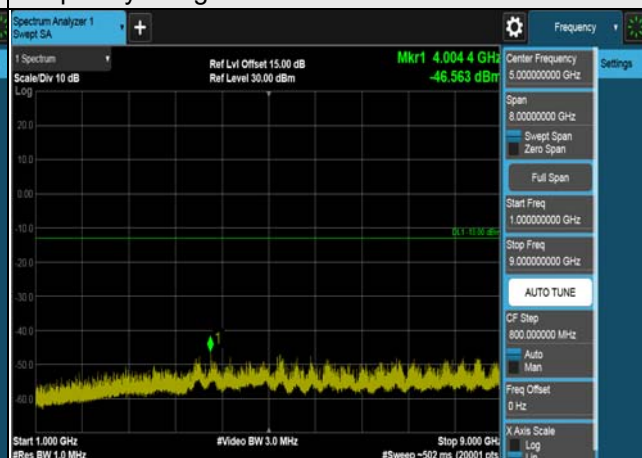


Channel 20625 (846.5MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz



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

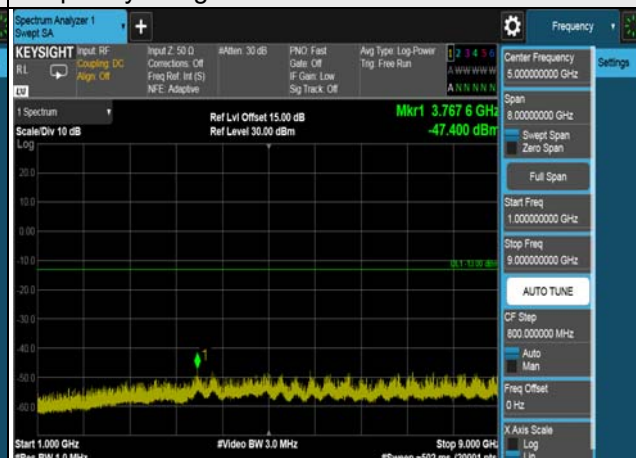
LTE Band 5, Channel Bandwidth 10MHz

Channel 20450 (829.0MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz

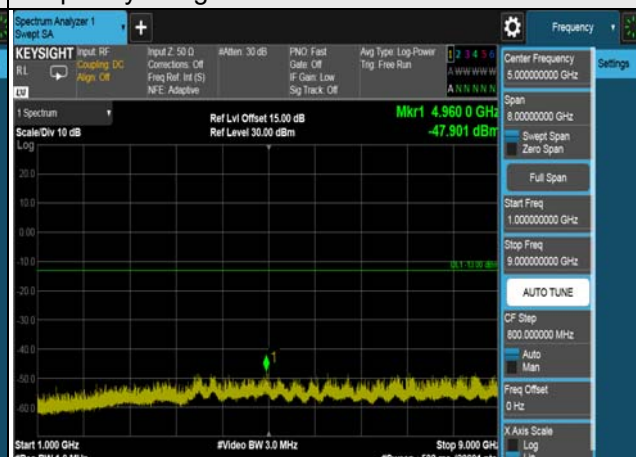


Channel 20525 (836.5MHz)

Frequency Range : 9kHz ~ 1GHz

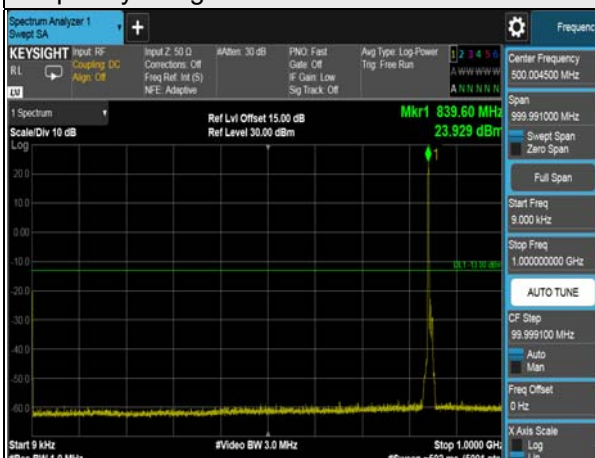


Frequency Range : 1GHz ~ 9GHz

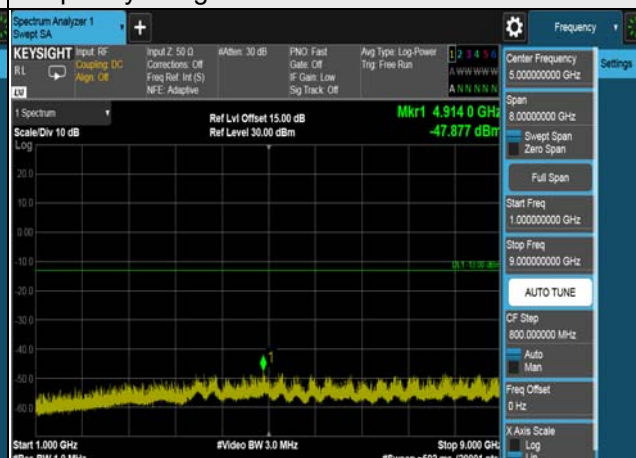


Channel 20600 (844.0MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz

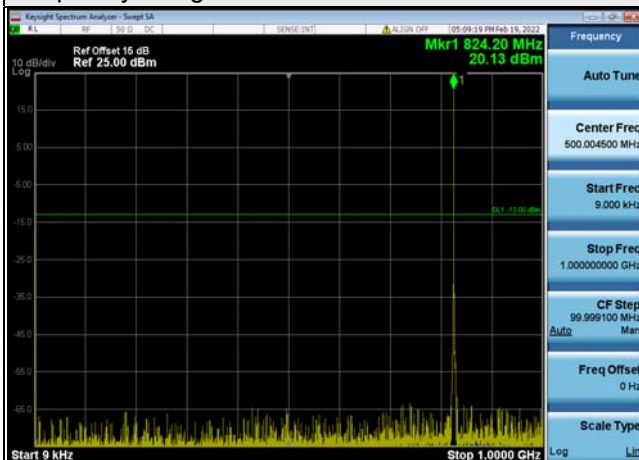


\*The 9kHz signal over the limit is from Spectrum.

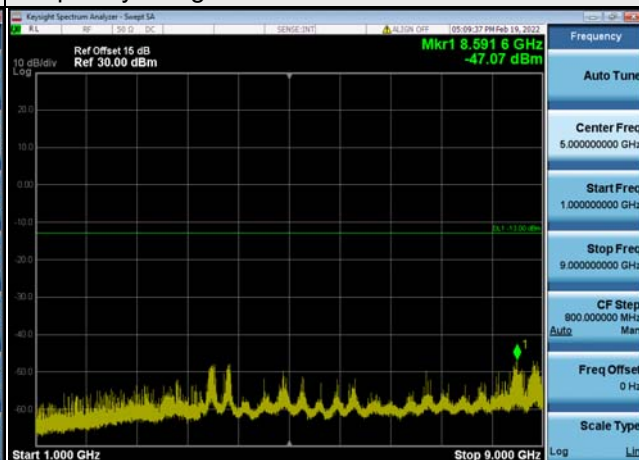
LTE Band 26, Channel Bandwidth 1.4MHz

Channel 26797 (824.7MHz)

Frequency Range : 9kHz ~ 1GHz

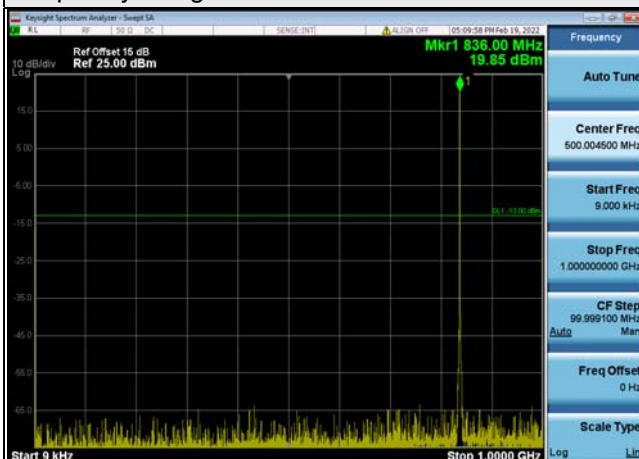


Frequency Range : 1GHz ~ 9GHz

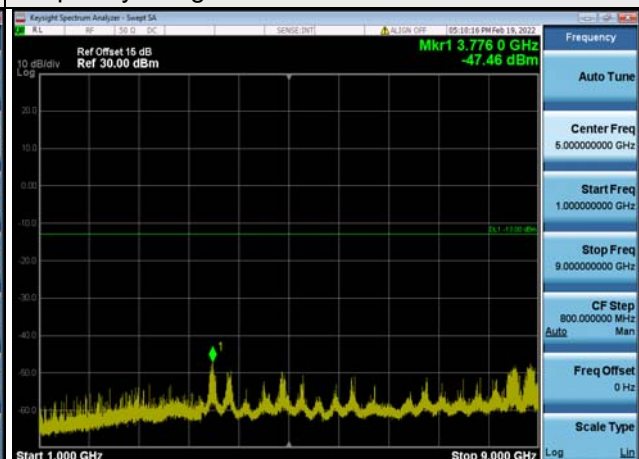


Channel 26915 (836.5MHz)

Frequency Range : 9kHz ~ 1GHz

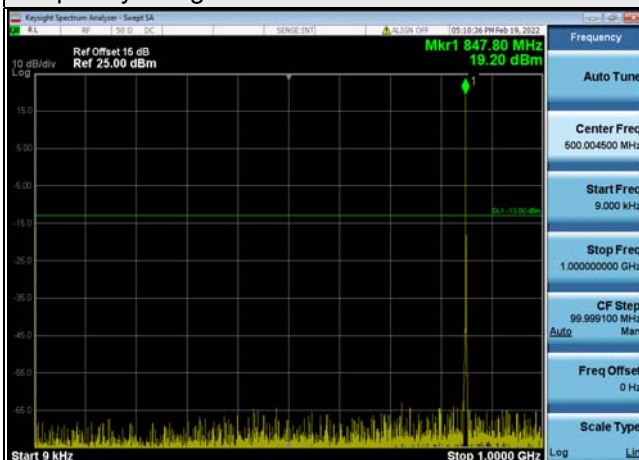


Frequency Range : 1GHz ~ 9GHz

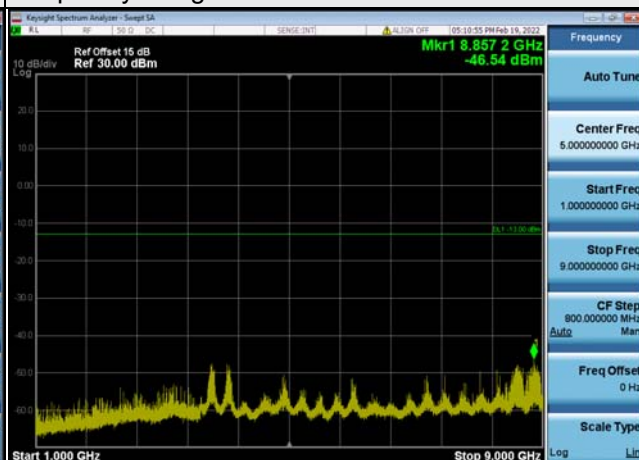


Channel 27033 (848.3MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz



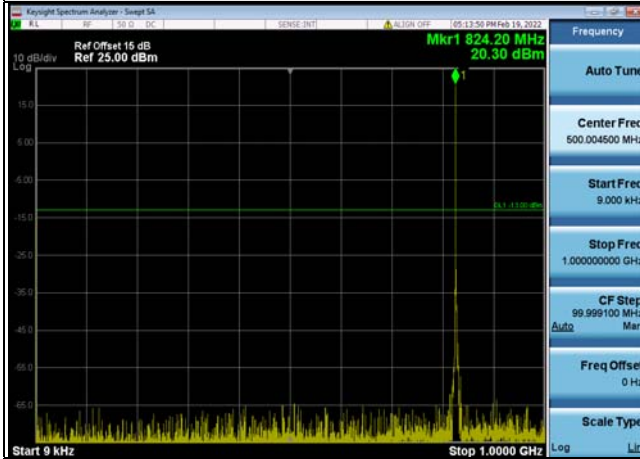
\*The 9kHz signal over the limit is from Spectrum.



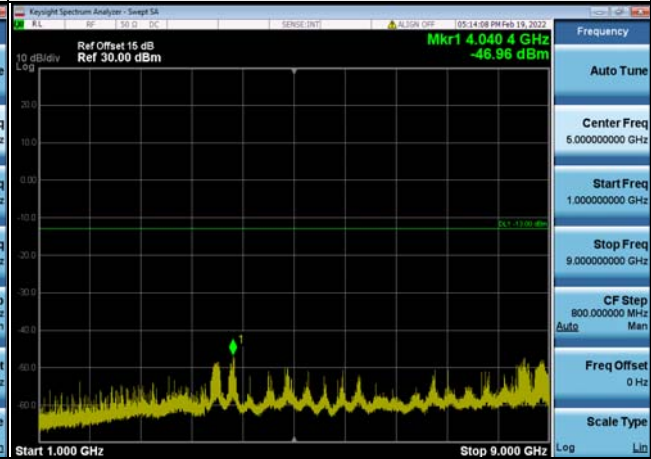
LTE Band 26, Channel Bandwidth 3MHz

Channel 26805 (825.5MHz)

Frequency Range : 9kHz ~ 1GHz

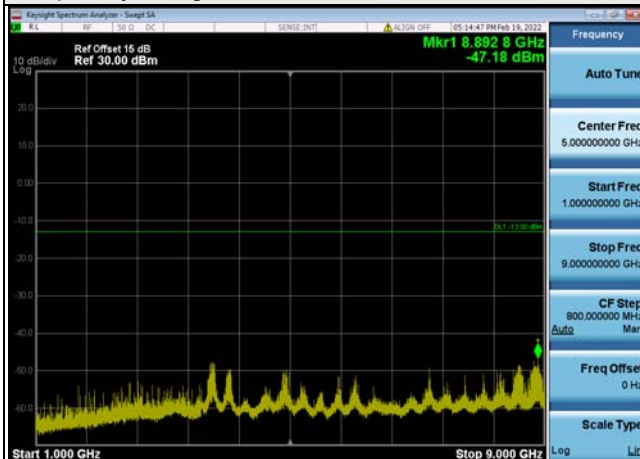


Frequency Range : 1GHz ~ 9GHz

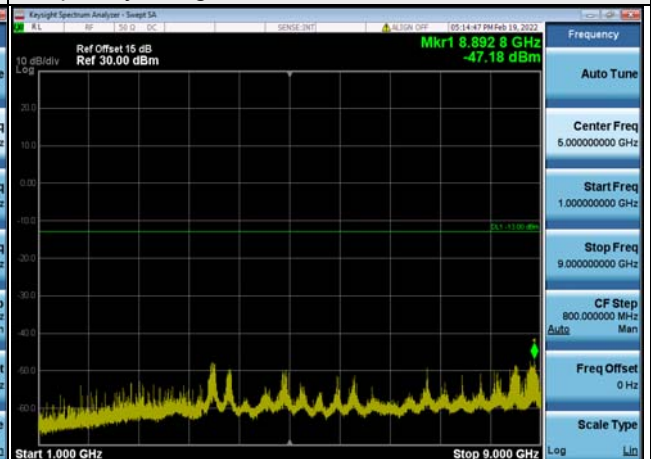


Channel 26915 (836.5MHz)

Frequency Range : 9kHz ~ 1GHz

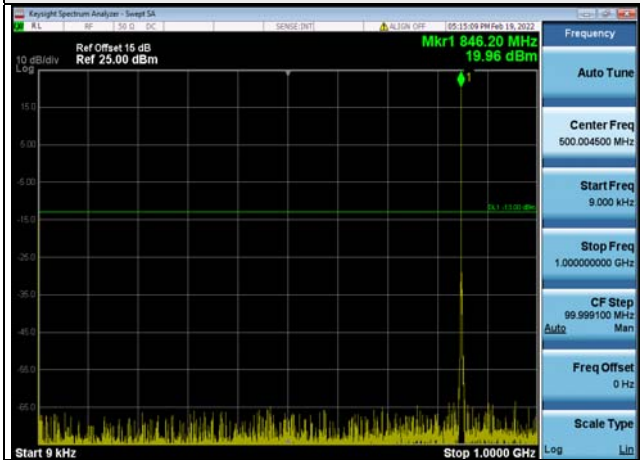


Frequency Range : 1GHz ~ 9GHz

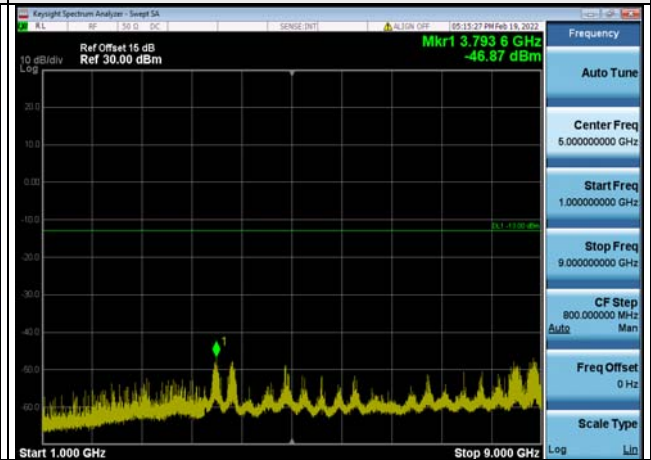


Channel 27025 (847.5MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz

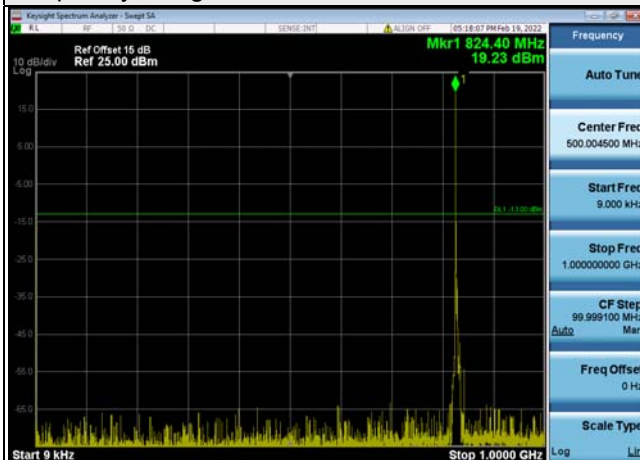


\*The 9kHz signal over the limit is from Spectrum.

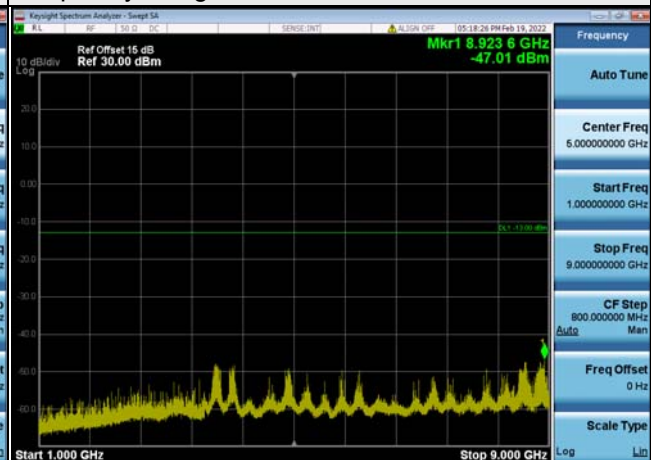
LTE Band 26, Channel Bandwidth 5MHz

Channel 26815 (826.5MHz)

Frequency Range : 9kHz ~ 1GHz

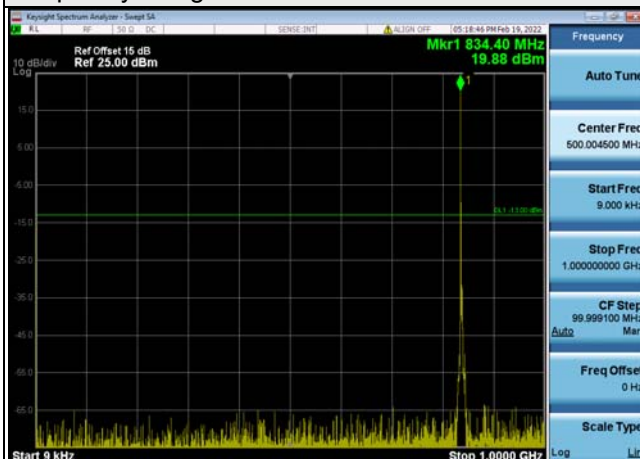


Frequency Range : 1GHz ~ 9GHz

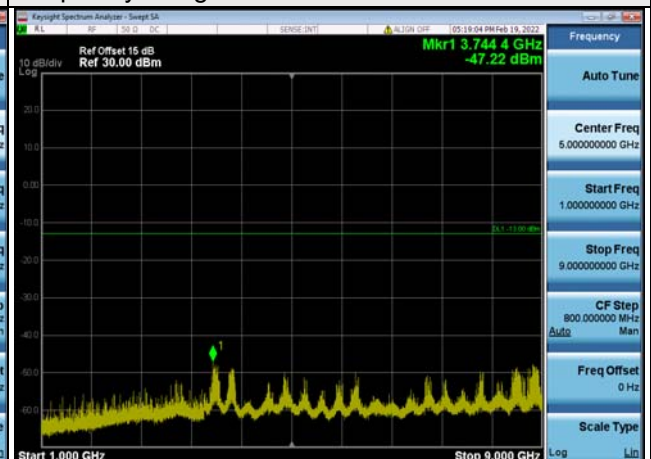


Channel 26915 (836.5MHz)

Frequency Range : 9kHz ~ 1GHz

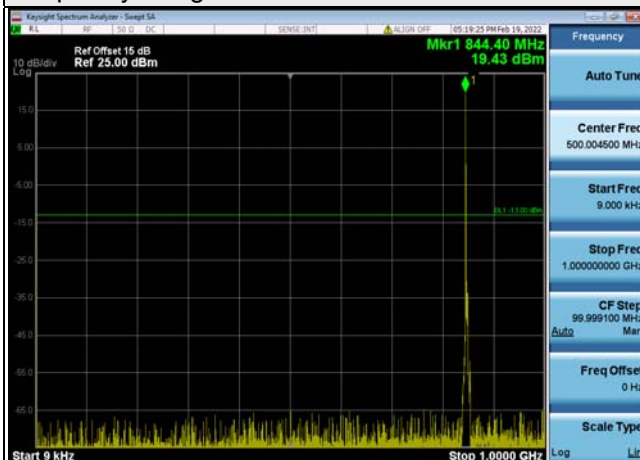


Frequency Range : 1GHz ~ 9GHz

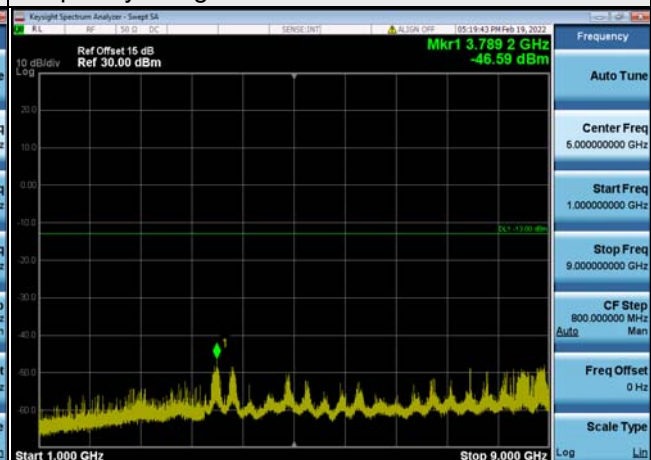


Channel 27015 (846.5MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz

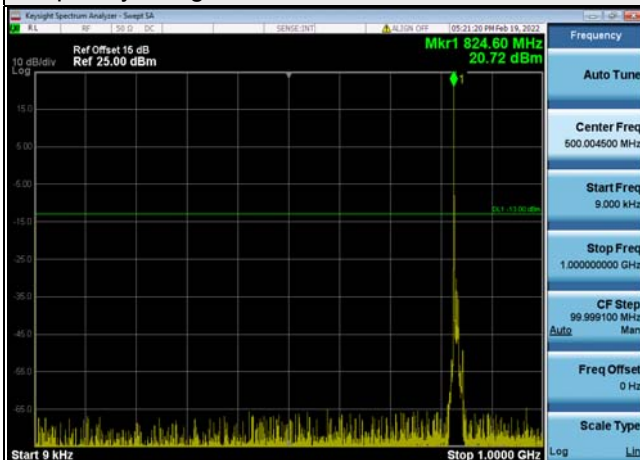


\*The 9kHz signal over the limit is from Spectrum.

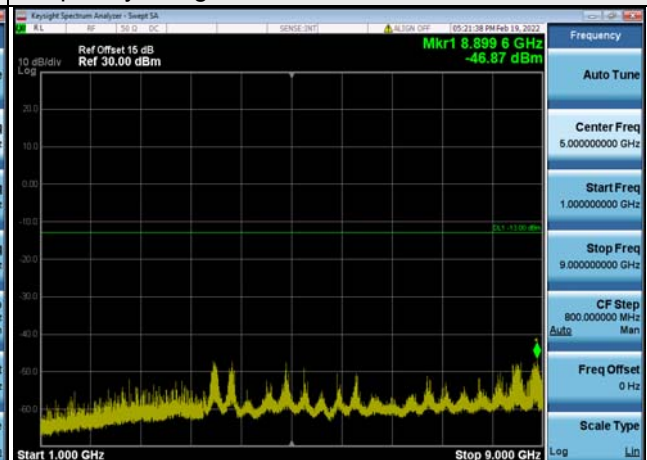
LTE Band 26, Channel Bandwidth 10MHz

Channel 26840 (829.0MHz)

Frequency Range : 9kHz ~ 1GHz

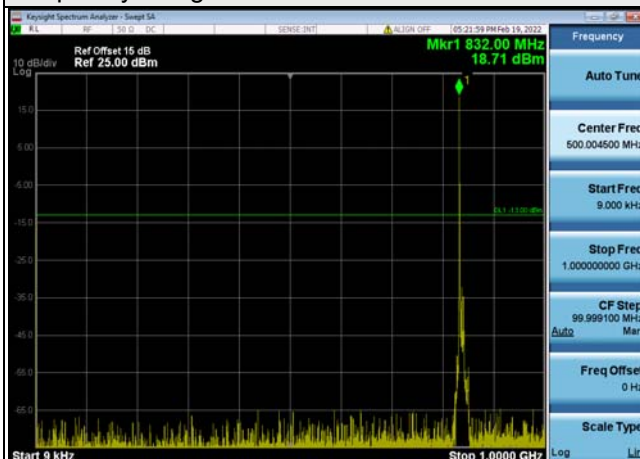


Frequency Range : 1GHz ~ 9GHz

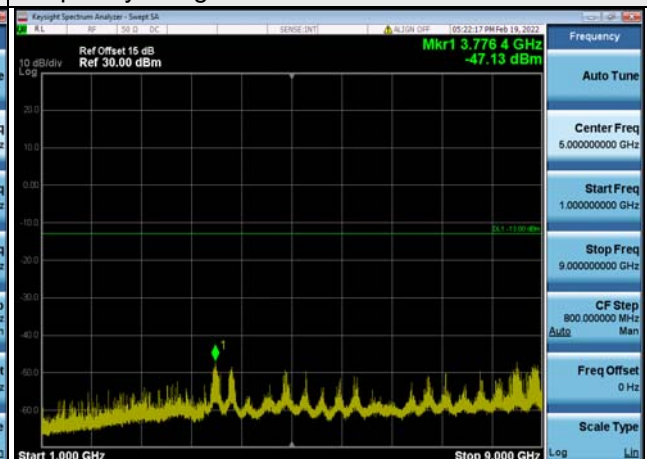


Channel 26915 (836.5MHz)

Frequency Range : 9kHz ~ 1GHz

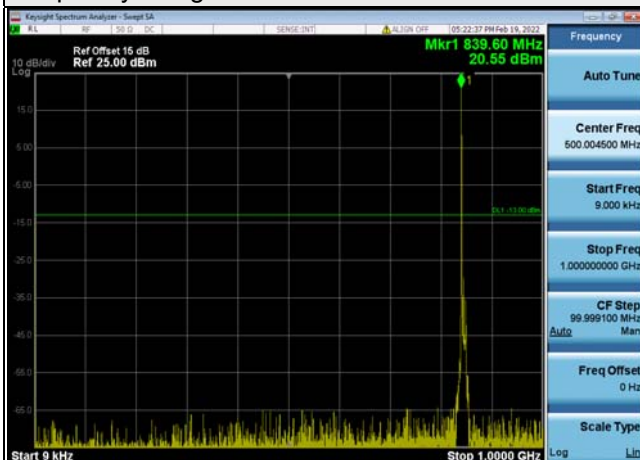


Frequency Range : 1GHz ~ 9GHz

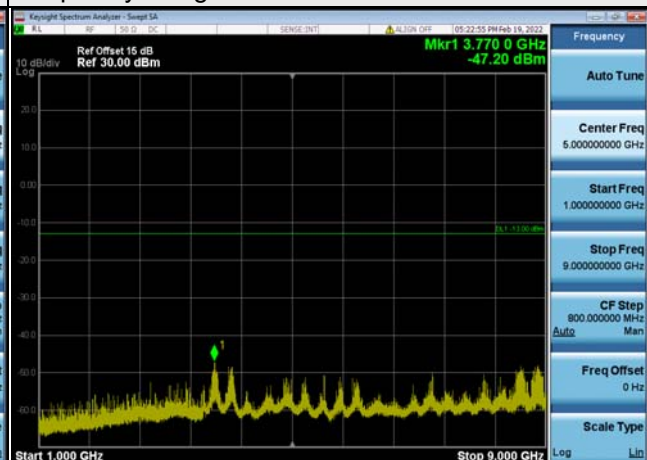


Channel 26990 (844.0MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz



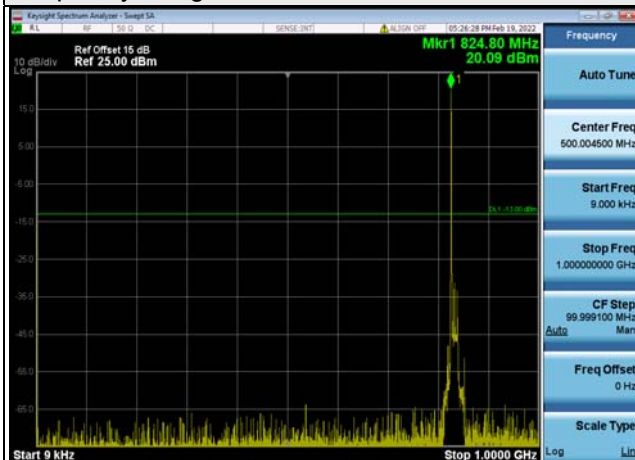
\*The 9kHz signal over the limit is from Spectrum.



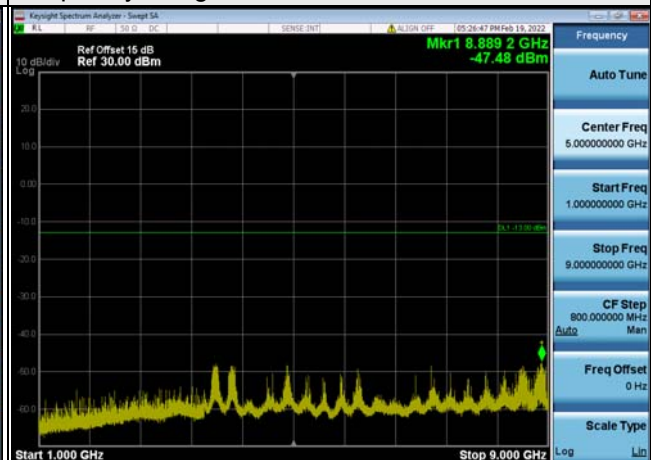
LTE Band 26, Channel Bandwidth 15MHz

Channel 26865 (831.5MHz)

Frequency Range : 9kHz ~ 1GHz

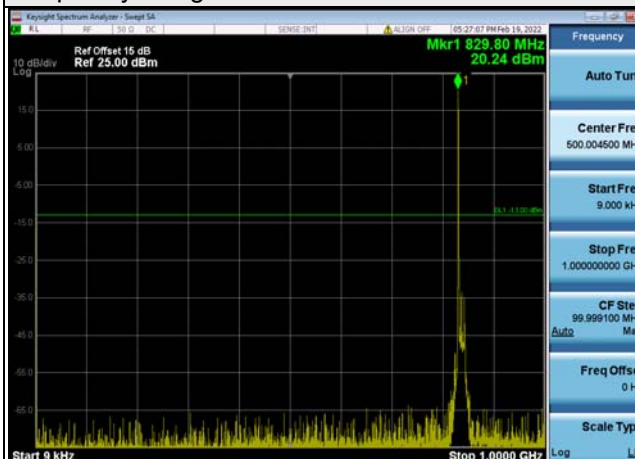


Frequency Range : 1GHz ~ 9GHz

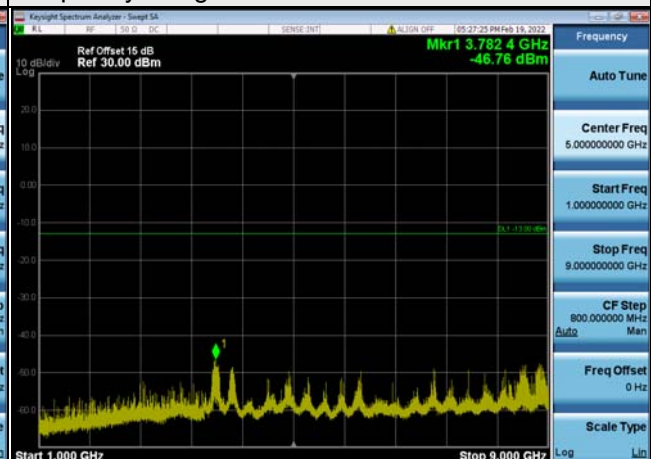


Channel 26915 (836.5MHz)

Frequency Range : 9kHz ~ 1GHz

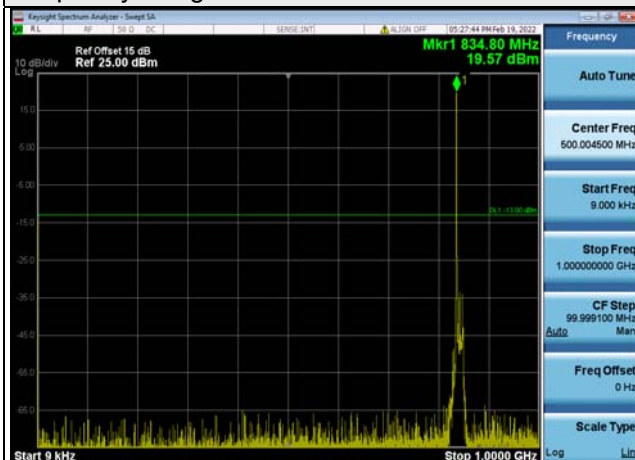


Frequency Range : 1GHz ~ 9GHz

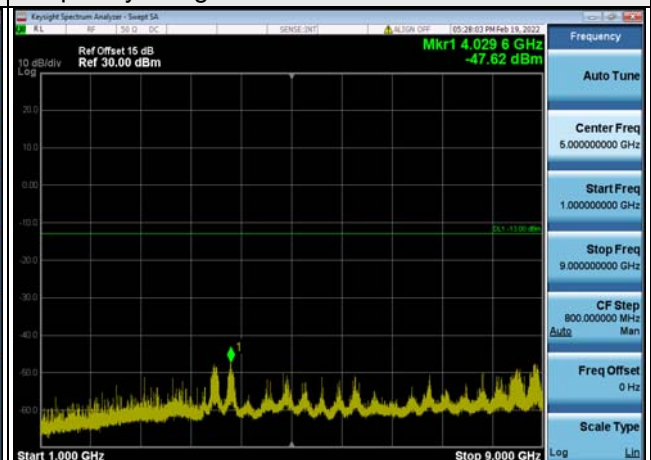


Channel 26965 (841.5MHz)

Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 9GHz



\*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  $-13\text{dBm}$ .

### 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
  - $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m.
  - $\text{ERP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8 - 2.15$ ; 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.

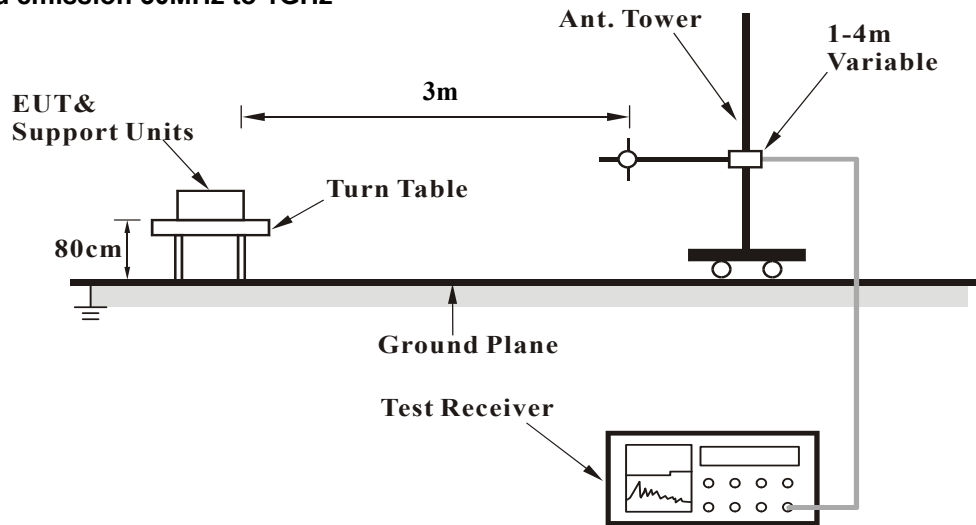
### 4.8.3 Deviation from Test Standard

No deviation.

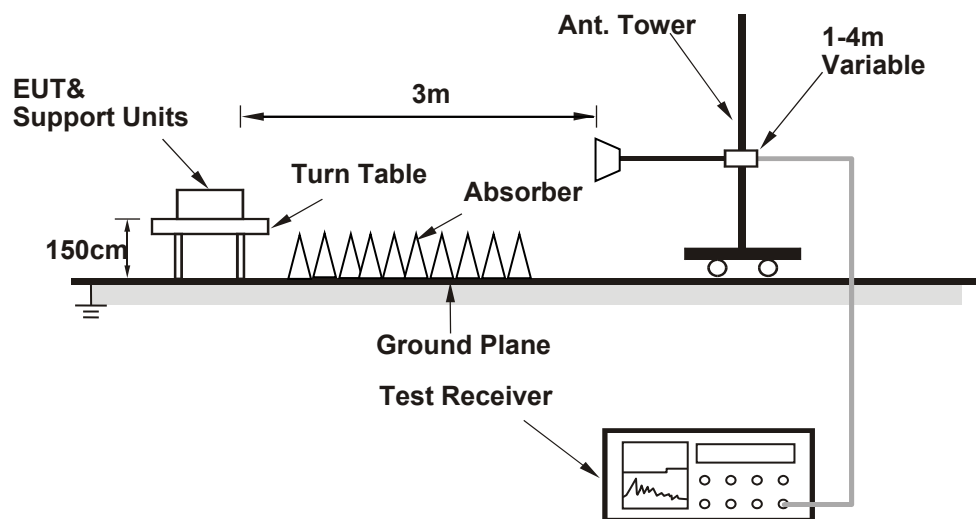


#### 4.8.4 Test Setup

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

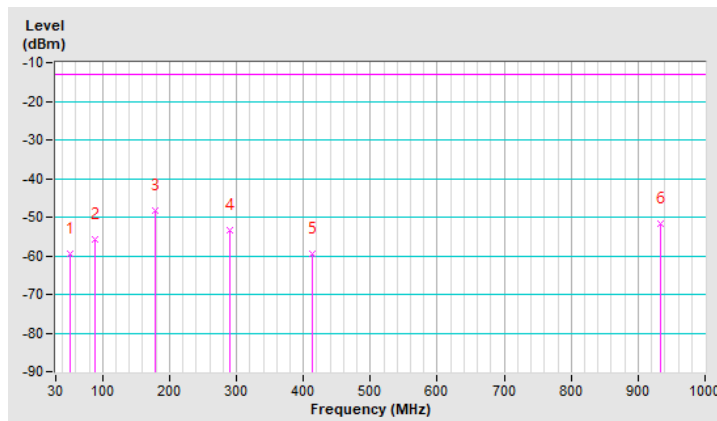
WCDMA Band 5

Mode	TX channel 4182 (836.4MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Jones Chang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	51.34	-59.63	-13.00	-46.63	1.00 H	165	46.30	-105.93
2	88.20	-55.63	-13.00	-42.63	1.00 H	141	56.10	-111.73
3	179.38	-48.34	-13.00	-35.34	1.50 H	292	59.28	-107.62
4	289.96	-53.38	-13.00	-40.38	1.50 H	341	51.85	-105.23
5	414.12	-59.63	-13.00	-46.63	1.00 H	259	43.49	-103.12
6	934.04	-51.64	-13.00	-38.64	1.50 H	302	40.50	-92.14

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.

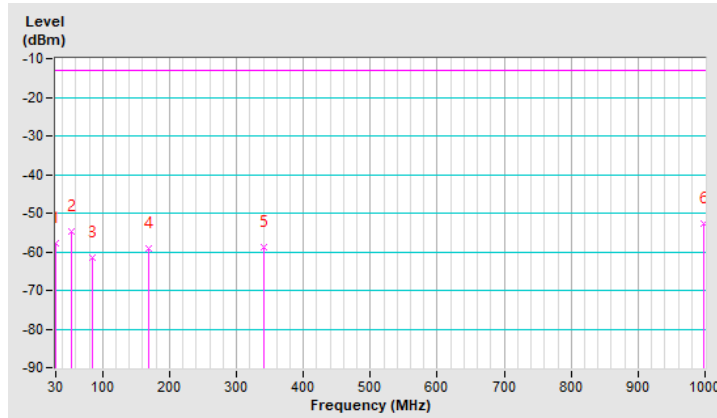


Mode	TX channel 4182 (836.4MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Jones Chang		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	-57.84	-13.00	-44.84	1.50 V	235	49.77	-107.61
2	53.28	-54.66	-13.00	-41.66	1.50 V	6	51.39	-106.05
3	84.32	-61.52	-13.00	-48.52	1.50 V	306	49.91	-111.43
4	169.68	-59.04	-13.00	-46.04	1.50 V	49	47.54	-106.58
5	340.40	-58.87	-13.00	-45.87	1.50 V	349	45.43	-104.30
6	998.06	-52.55	-13.00	-39.55	1.50 V	248	38.28	-90.83

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.



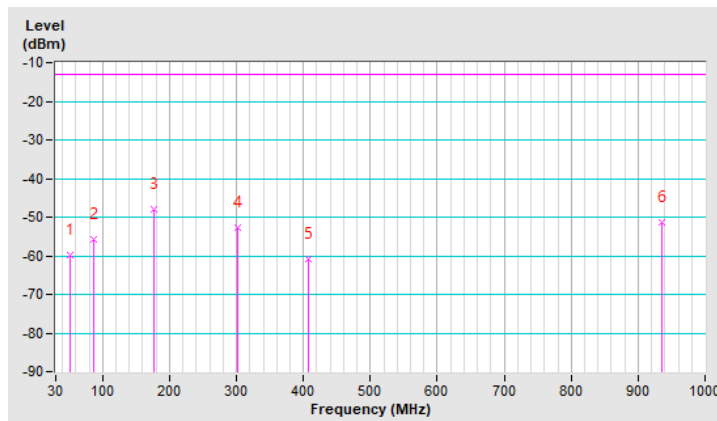
LTE Band 5, Channel Bandwidth 10MHz

Mode	TX channel 20600 (844.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	51.34	-59.87	-13.00	-46.87	1.00 H	147	46.06	-105.93
2	86.26	-55.63	-13.00	-42.63	1.00 H	141	56.08	-111.71
3	177.44	-47.91	-13.00	-34.91	1.50 H	298	59.48	-107.39
4	301.60	-52.76	-13.00	-39.76	1.50 H	169	52.12	-104.88
5	408.30	-60.77	-13.00	-47.77	1.00 H	242	42.49	-103.26
6	935.98	-51.34	-13.00	-38.34	1.50 H	308	40.68	-92.02

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

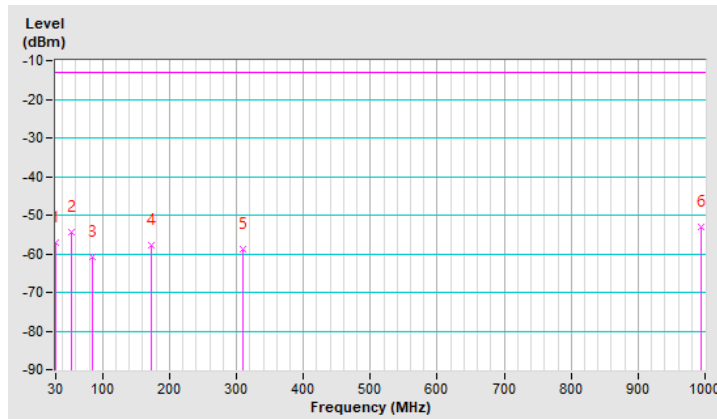


Mode	TX channel 20600 (844.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	-57.23	-13.00	-44.23	1.00 V	314	50.38	-107.61
2	53.28	-54.44	-13.00	-41.44	1.00 V	10	51.61	-106.05
3	84.32	-60.70	-13.00	-47.70	1.50 V	293	50.73	-111.43
4	173.56	-57.92	-13.00	-44.92	1.50 V	185	48.98	-106.90
5	309.36	-58.76	-13.00	-45.76	1.50 V	341	46.01	-104.77
6	994.18	-52.96	-13.00	-39.96	1.00 V	58	37.98	-90.94

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.



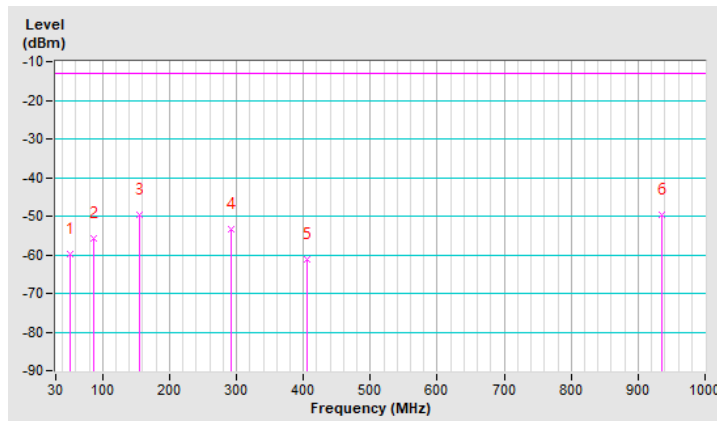
LTE Band 26, Channel Bandwidth 1.4MHz

Mode	TX channel 27033 (848.3MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Jones Chang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	51.34	-59.84	-13.00	-46.84	1.00 H	121	46.09	-105.93
2	86.26	-55.70	-13.00	-42.70	1.00 H	154	56.01	-111.71
3	156.10	-49.61	-13.00	-36.61	1.50 H	306	56.50	-106.11
4	291.90	-53.34	-13.00	-40.34	1.50 H	175	51.85	-105.19
5	406.36	-61.10	-13.00	-48.10	1.50 H	261	42.20	-103.30
6	935.98	-49.56	-13.00	-36.56	1.00 H	0	42.46	-92.02

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.

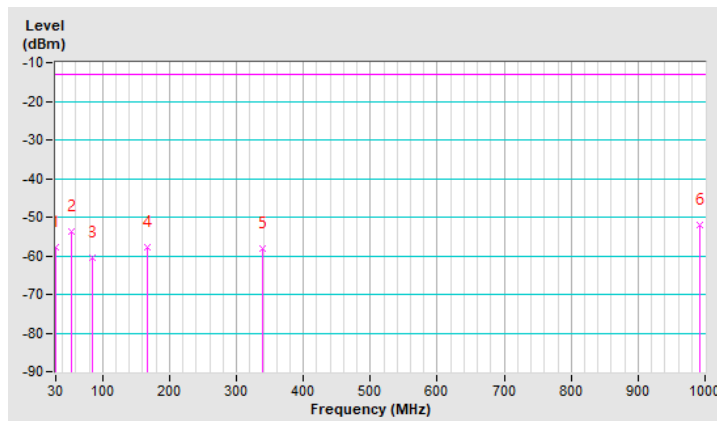


Mode	TX channel 27033 (848.3MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Jones Chang		

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	-57.71	-13.00	-44.71	1.00 V	261	49.90	-107.61
2	53.28	-53.69	-13.00	-40.69	1.00 V	81	52.36	-106.05
3	84.32	-60.52	-13.00	-47.52	1.50 V	300	50.91	-111.43
4	167.74	-57.72	-13.00	-44.72	1.50 V	27	48.69	-106.41
5	338.46	-58.10	-13.00	-45.10	1.50 V	5	46.18	-104.28
6	992.24	-52.10	-13.00	-39.10	1.00 V	39	38.98	-91.08

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



Above 1GHz  
WCDMA Band 5

Mode	TX channel 4132 (826.4MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Jones Chang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1652.80	-52.49	-13.00	-39.49	1.54 H	330	50.01	-102.50
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1652.80	-53.58	-13.00	-40.58	1.19 V	239	48.92	-102.50

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 4182 (836.4MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Jones Chang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1672.80	-49.47	-13.00	-36.47	1.49 H	339	53.02	-102.49
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1672.80	-52.65	-13.00	-39.65	1.22 V	235	49.84	-102.49

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



Mode	TX channel 4233 (846.6MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Jones Chang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1693.20	-51.08	-13.00	-38.08	1.52 H	345	51.40	-102.48
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1693.20	-53.03	-13.00	-40.03	1.12 V	245	49.45	-102.48

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.

LTE Band 5, Channel Bandwidth 1.4MHz

Mode	TX channel 20407 (824.7MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1649.40	-25.49	-13.00	-12.49	1.41 H	149	77.01	-102.50
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1649.40	-30.13	-13.00	-17.13	3.85 V	56	72.37	-102.50

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 20525 (836.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-25.78	-13.00	-12.78	1.47 H	145	76.71	-102.49
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-30.18	-13.00	-17.18	3.82 V	57	72.31	-102.49

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 20643 (848.3MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1696.60	-25.53	-13.00	-12.53	1.14 H	147	76.95	-102.48
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1696.60	-30.07	-13.00	-17.07	3.95 V	55	72.41	-102.48

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.

LTE Band 5, Channel Bandwidth 5MHz

Mode	TX channel 20425 (826.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1653.00	-25.65	-13.00	-12.65	1.43 H	147	76.85	-102.50
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1653.00	-30.36	-13.00	-17.36	3.92 V	53	72.14	-102.50

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 20525 (836.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-25.53	-13.00	-12.53	1.44 H	142	76.96	-102.49
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-30.40	-13.00	-17.40	3.95 V	55	72.09	-102.49

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 20625 (846.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1693.00	-25.49	-13.00	-12.49	1.42 H	143	76.99	-102.48
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1693.00	-30.11	-13.00	-17.11	3.89 V	53	72.37	-102.48

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.

LTE Band 5, Channel Bandwidth 10MHz

Mode	TX channel 20450 (829.0MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1658.00	-25.44	-13.00	-12.44	1.48 H	146	77.06	-102.50
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1658.00	-30.18	-13.00	-17.18	3.94 V	54	72.32	-102.50

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 20525 (836.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-25.72	-13.00	-12.72	1.43 H	142	76.77	-102.49
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-30.25	-13.00	-17.25	3.93 V	56	72.24	-102.49

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 20600 (844.0MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1688.00	-25.36	-13.00	-12.36	1.46 H	146	77.12	-102.48
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1688.00	-30.16	-13.00	-17.16	3.92 V	58	72.32	-102.48

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.

LTE Band 26, Channel Bandwidth 1.4MHz

Mode	TX channel 26797 (824.7MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1649.40	-29.81	-13.00	-16.81	3.49 H	59	72.69	-102.50
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1649.40	-33.54	-13.00	-20.54	2.69 V	118	68.96	-102.50

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 26915 (836.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-29.91	-13.00	-16.91	3.52 H	59	72.58	-102.49
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-33.75	-13.00	-20.75	2.74 V	122	68.74	-102.49

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.



Mode	TX channel 27033 (848.3MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1696.60	-29.58	-13.00	-16.58	3.49 H	58	72.90	-102.48
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1696.60	-33.93	-13.00	-20.93	2.69 V	117	68.55	-102.48

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.

LTE Band 26, Channel Bandwidth 5MHz

Mode	TX channel 26815 (826.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1653.00	-30.07	-13.00	-17.07	3.46 H	64	72.43	-102.50
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1653.00	-34.21	-13.00	-21.21	2.74 V	123	68.29	-102.50

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 26915 (836.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-30.07	-13.00	-17.07	3.49 H	60	72.42	-102.49
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-33.76	-13.00	-20.76	2.65 V	121	68.73	-102.49

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 27015 (846.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1693.00	-29.96	-13.00	-16.96	3.47 H	63	72.52	-102.48
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1693.00	-33.59	-13.00	-20.59	2.66 V	123	68.89	-102.48

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP levels were very low against the limit.

LTE Band 26, Channel Bandwidth 15MHz

Mode	TX channel 26865 (831.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1663.00	-30.05	-13.00	-17.05	3.46 H	59	72.44	-102.49
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1663.00	-33.87	-13.00	-20.87	2.73 V	121	68.62	-102.49

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 26915 (836.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-30.06	-13.00	-17.06	3.55 H	63	72.43	-102.49
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1673.00	-33.82	-13.00	-20.82	2.65 V	124	68.67	-102.49

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3. Margin value = ERP – Limit value
4. The other ERP levels were very low against the limit.

Mode	TX channel 26965 (841.5MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1683.00	-29.99	-13.00	-16.99	3.47 H	57	72.49	-102.48
Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1683.00	-34.09	-13.00	-21.09	2.74 V	126	68.39	-102.48

Remarks:

1.  $ERP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8 - 2.15$
3.  $Margin\ value = ERP - Limit\ value$
4. The other ERP 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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