

## FCC Test Report (Part 90 – CDMA BC10, LTE B14/B26)

**Report No.:** RFBFLF-WTW-P21010278-12

**FCC ID:** MSQI007D

**Test Model:** ASUS\_I007D

**Received Date:** Jan. 04, 2021

**Test Date:** Jan. 04 ~ Apr. 01, 2021

**Issued Date:** Apr. 01, 2021

**Applicant:** ASUSTeK COMPUTER INC.

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City  
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**FCC Registration /  
Designation Number:** 788550 / TW0003



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### Release Control Record

Issue No.	Description	Date Issued
RFBFLF-WTW-P21010278-12	Original release	Apr. 01, 2021

## 1 Certificate of Conformity

**Product:** EXP21 Smartphone

**Brand:** ASUS

**Test Model:** ASUS\_I007D

**Sample Status:** Engineering sample

**Applicant:** ASUSTeK COMPUTER INC.

**Test Date:** Jan. 04 ~ Apr. 01, 2021

**Standards:** FCC Part 90, Subpart I, R, S

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

**Prepared by :** Celine Chou , **Date:** Apr. 01, 2021  
Celine Chou / Senior Specialist

**Approved by :** Bruce Chen , **Date:** Apr. 01, 2021  
Bruce Chen / Senior Project Engineer

## 2 Summary of Test Results

Applied Standard: FCC Part 90 & Part 2					
FCC Clause			Test Item	Result	Remarks
CDMA	LTE B14	LTE B26			
2.1046 90.635 (b)	2.1046 90.542 (a)(7)	2.1046 90.635 (b)	Effective Radiated Power	Pass	Meet the requirement of limit.
2.1047	2.1047	2.1047	Modulation Characteristics	Pass	Meet the requirement of limit.
2.1055 90.213	2.1055 90.539 (e)	2.1055 90.213	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 90.209	2.1049	2.1049 90.209	Occupied Bandwidth	Pass	Meet the requirement of limit.
2.1051 90.691	-	2.1051 90.691	Emission Masks	Pass	Meet the requirement of limit.
-	2.1053 90.543 (e)(2)(3)	-	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 90.691	2.1051 90.543 (e)(3)	2.1051 90.691	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 90.691	2.1053 90.543 (e)(f)	2.1053 90.691	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -10.64dB at 1586.00MHz.

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

### 2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 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. 16, 2020	Apr. 15, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2020	Jun. 11, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSW43	101866	Dec. 14, 2020	Dec. 13, 2021
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2020	Nov. 24, 2021
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Jan. 18, 2020	Jan. 17, 2021
			Jan. 22, 2021	Jan. 21, 2022
Universal Radio Communication Tester R&S	CMU200	101095	Nov. 18, 2020	Nov. 17, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 06, 2020	Nov. 05, 2021
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 22, 2020	Nov. 21, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jun. 08, 2020	Jun. 07, 2021
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 18, 2020	Feb. 17, 2021
			Feb. 17, 2021	Feb. 16, 2022
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM80 00	CABLE-CH9-02 (248780+171006)	Jan. 18, 2020	Jan. 17, 2021
			Jan. 16, 2021	Jan. 15, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jan. 18, 2020	Jan. 17, 2021
			Jan. 16, 2021	Jan. 15, 2022
RF signal cable Woken	8D-FB	Cable-CH9-01	Jun. 08, 2020	Jun. 07, 2021
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	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-A R	MAA1306-019	Sep. 10, 2020	Sep. 09, 2021

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 06, 2020	Jun. 05, 2021
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	EXP21 Smartphone				
Brand	ASUS				
Test Model	ASUS_I007D				
Sample Status	Engineering sample				
Power Supply Rating	7.74 Vdc (Battery) 5 Vdc / 9 Vdc / 12 Vdc / 15Vdc / 20Vdc (Adapter)				
Modulation Type	CDMA BC10: CDMA, EVDO, 1xEVDO LTE: QPSK, 16QAM, 64QAM, 256QAM				
Operating Frequency	CDMA BC10	817.9MHz ~ 823.1MHz			
	LTE Band 14 (Channel Bandwidth 5MHz)	790.5MHz ~ 795.5MHz			
	LTE Band 14 (Channel Bandwidth 10MHz)	793.0MHz			
	LTE Band 26 (Channel Bandwidth 1.4MHz)	814.7MHz ~ 823.3MHz			
	LTE Band 26 (Channel Bandwidth 3MHz)	815.5MHz ~ 822.5MHz			
	LTE Band 26 (Channel Bandwidth 5MHz)	816.5MHz ~ 821.5MHz			
	LTE Band 26 (Channel Bandwidth 10MHz)	819.0MHz			
Max. ERP Power	CDMA BC10	97.499mW (19.89dBm)			
		QPSK	16QAM	64QAM	256QAM
	LTE Band 14 (Channel Bandwidth 5MHz)	69.823mW (18.44dBm)	55.081mW (17.41dBm)	38.994mW (15.91dBm)	20.370mW (13.09dBm)
	LTE Band 14 (Channel Bandwidth 10MHz)	70.307mW (18.47dBm)	55.590mW (17.45dBm)	39.719mW (15.99dBm)	20.989mW (13.22dBm)
	LTE Band 26 (Channel Bandwidth 1.4MHz)	98.401mW (19.93dBm)	77.804mW (18.91dBm)	61.518mW (17.89dBm)	33.963mW (15.31dBm)
	LTE Band 26 (Channel Bandwidth 3MHz)	97.724mW (19.90dBm)	76.033mW (18.81dBm)	59.841mW (17.77dBm)	28.576mW (14.56dBm)
	LTE Band 26 (Channel Bandwidth 5MHz)	98.401mW (19.93dBm)	76.913mW (18.86dBm)	61.094mW (17.86dBm)	29.174mW (14.65dBm)
	LTE Band 26 (Channel Bandwidth 10MHz)	97.499mW (19.89dBm)	76.033mW (18.81dBm)	60.814mW (17.84dBm)	29.174mW (14.65dBm)
Emission Designator	CDMA BC10	1M29F9W			
		QPSK	16QAM	64QAM	256QAM
	LTE Band 14 (Channel Bandwidth 5MHz)	4M49G7D	4M49D7W	4M50D7W	4M49D7W
	LTE Band 14 (Channel Bandwidth 10MHz)	8M96G7D	8M96D7W	8M96D7W	8M96D7W
	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)	8M95G7D	8M95D7W	8M95D7W	8M95D7W	
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
Battery	SCUD	C21P2002	Rating: 7.74Vdc, 15.2Wh
Adapter	AOHAI	A320Q-200325C-US	I/P: 100-240Vac, 50/60Hz, 1.5A O/P: 5Vdc, 3A; 9Vdc, 3A; 12Vdc, 3A; 15Vdc, 3A; 20Vdc, 3.25A
Type A to Type C USB Cable	Luxshare	LA9U2026-CS-R	0.5m
Type C to Type C Cable	Luxshare	LA9UC006-CS-R	1.2m
Bluetooth Earphone	Bang & Olufsen	EQ Earbud R	FCC ID: TTUBEOPLAYEQR IC: 3775B-BEOPLAYEQR
		EQ Earbud L	FCC ID: TTUBEOPLAYEQL IC: 3775B-BEOPLAYEQL
Bluetooth Earphone Charging Case	Bang & Olufsen	EQ Charging case	I/P: 5Vdc/500mA O/P: 5Vdc/ R170mA; L170mA

2. The following antennas were provided to the EUT.

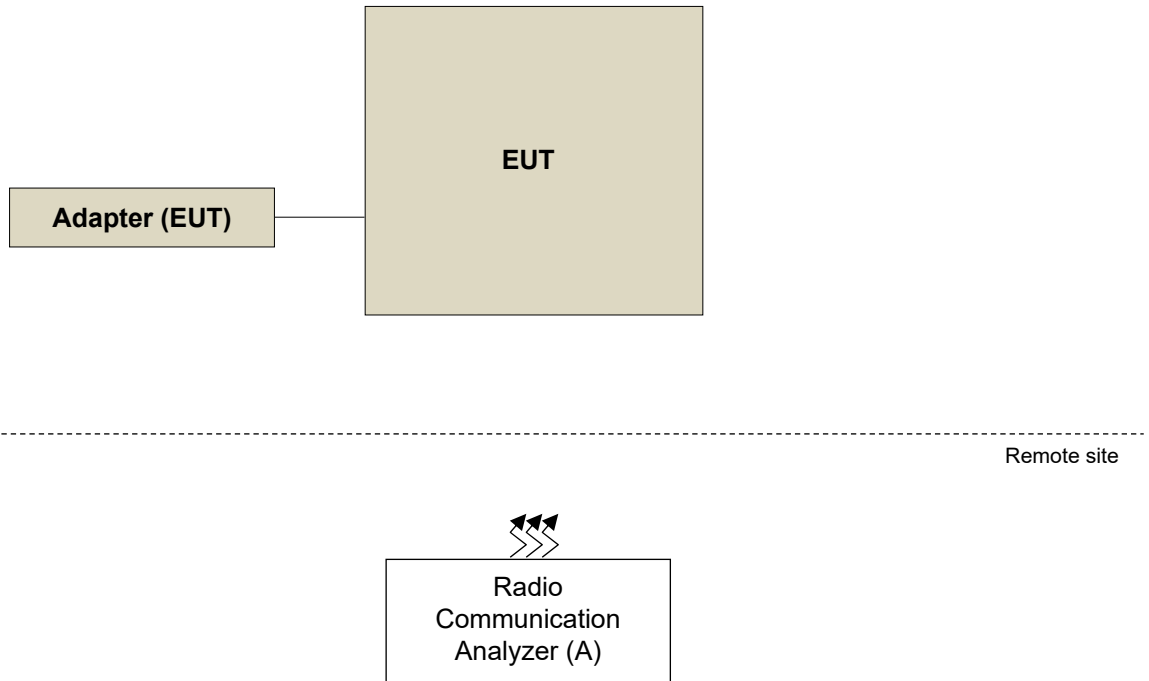
Ant. No.	Brand	Model	Ant. Type	Connecter	Frequency Range
Ant 0	ASUS	ZS675KW	PIFA	LCP+lpex	610-960MHz, 1710-2690MHz
Ant 1	ASUS	ZS675KW	PIFA	LCP+lpex	1427-1510MHz, 1710-2690MHz
Ant 2	ASUS	ZS675KW	PIFA	LCP+lpex	610-960MHz, 1427-1510MHz, 1710-2690MHz
Ant 3	INPAQ	ZS675KW	PIFA	lpex	1575-1610MHz, 2400-2500MHz, 5150-5850MHz, 5925-7125MHz
Ant 4	INPAQ	ZS675KW	PIFA	lpex	1176±10MHz, 2400-2500MHz, 5150-5850MHz, 5925-7125MHz
Ant 5	INPAQ	ZS675KW	PIFA	LCP+lpex	3300-4000MHz, 4400-5000MHz
Ant 6	INPAQ	ZS675KW	PIFA	lpex	1427-1510MHz, 2400-2500MHz, 5150-5850MHz, 5925-7125MHz
Ant 7	INPAQ	ZS675KW	PIFA	LCP+lpex	3300-4000MHz, 4400-5000MHz
Ant 8	ASUS	ZS675KW	PIFA	LCP+lpex	1427-1510MHz, 1710-2690MHz
Ant 9	ASUS	ZS675KW	PIFA	LCP+lpex	1710-2690MHz
Ant 10	INPAQ	ZS675KW	PIFA	lpex	3300-4000MHz, 4400-5000MHz
Ant 11	INPAQ	ZS675KW	PIFA	lpex	3300-4000MHz, 4400-5000MHz

2G / 3G Band													
Band	Freq. Range (MHz)	Gain (dBi)											
		Ant. 0	Ant. 1	Ant. 2	Ant. 3	Ant. 4	Ant. 5	Ant. 6	Ant. 7	Ant. 8	Ant. 9	Ant. 10	Ant. 11
GSM-850	824 ~ 849	-1.891		-4.526									
GSM-1900	1850 ~ 1910		-1.887	-1.394						-2.89579			
WCDMA B2	1850 ~ 1910		-1.887	-1.394						-2.89579			
WCDMA B4	1710 ~ 1755		-2.884	-3.228						-3.13552			
WCDMA B5	824 ~ 849	-1.891		-4.526									
CDMA BC0	815 ~ 849	-1.891		-4.526									
CDMA BC1	1850 ~ 1910		-1.887	-1.394						-2.89579			
CDMA BC10	806 ~ 901	-1.891		-4.526									

LTE Band													
Band	Freq. Range (MHz)	Gain (dBi)											
		Ant. 0	Ant. 1	Ant. 2	Ant. 3	Ant. 4	Ant. 5	Ant. 6	Ant. 7	Ant. 8	Ant. 9	Ant. 10	Ant. 11
LTE B2	1850 ~ 1910		-1.887	-1.394						-2.89579	-1.804		
LTE B4	1710 ~ 1755		-2.884	-3.228						-3.13552	-1.706		
LTE B5	824 ~ 849	-1.891		-4.526									
LTE B7	2500 ~ 2570		0.185	-0.657						-0.50837	-1.117		
LTE B12	698 ~ 716	-2.135		-4.343									
LTE B13	777 ~ 787	-4.37		-8.13									
LTE B14	788 ~ 798	-4.37		-7.931									
LTE B17	704 ~ 716	-2.135		-4.343									
LTE B25	1850 ~ 1915		-1.887	-1.394						-2.89579			
LTE B26	814 ~ 849	-1.891		-4.526									
LTE B30	2305 ~ 2315		-1.326	-2.669						-1.28433			
LTE B66	1710 ~ 1780		-2.884	-2.478						-3.0668	-1.685		
LTE B71	663 ~ 698	-5.741		-7.388									
T-LTE B38	2570 ~ 2620		0.724	-0.912						-0.59557			
T-LTE B40	2300 ~ 2400		-1.326	-2.669						-1.28433			
T-LTE B41	2496 ~ 2690		1.143	-0.657						-0.59557			
T-LTE B42	3400 ~ 3600						0.313		0.5277			-2.493	-0.35195
T-LTE B43	3600 ~ 3800						-0.434		0.5277			-0.477	-0.161
T-LTE B48	3550 ~ 3700						-0.434		0.5277			-0.477	-0.161
5G FR1 Band													
Band	Freq. Range (MHz)	Gain (dBi)											
		Ant. 0	Ant. 1	Ant. 2	Ant. 3	Ant. 4	Ant. 5	Ant. 6	Ant. 7	Ant. 8	Ant. 9	Ant. 10	Ant. 11
n2	1850 ~ 1910		-1.887	-1.394						-2.89579	-1.804		
n5	824 ~ 849	-1.891		-4.526									
n7	2500 ~ 2570		0.185	-0.657						-0.50837	-1.117		
n12	699 ~ 716	-2.135		-4.343									
n13	777 ~ 787	-4.37		-8.13									
n14	788 ~ 798	-4.37		-7.931									
n25	1850 ~ 1915		-1.887	-1.394						-2.89579	-1.627		
n26	814 ~ 849	-1.891		-4.526									
n30	2305 ~ 2315		-1.326	-2.669						-1.28433			
n38	2570 ~ 2620		0.724	-0.912						-0.59557	-1.3		
n41	2496 ~ 2690		1.143	-0.657						-0.59557	-0.076		
n66	1710 ~ 1780		-2.884	-2.478						-3.0668	-1.685		
n71	663 ~ 698	-5.741		-7.388									
n77	3300 ~ 4200						0.313		0.5277			2.017	0.19902
n78	3300 ~ 3800						0.313		0.5277			2.017	-0.161

\* 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	For GSM, WCDMA, LTE
		R&S	CMU200	101095		For CMDA

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
CDMA	Y-plane
LTE Band 14	Y-plane
LTE Band 26	Y-plane

#### CDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	476 to 684	476 (817.9MHz), 580 (820.5MHz), 684 (823.1MHz)	CDMA
-	Modulation Characteristics	476 to 684	580 (820.5MHz)	CDMA
-	Frequency Stability	476 to 684	476 (817.9MHz), 684 (823.1MHz)	CDMA
-	Occupied Bandwidth	476 to 684	476 (817.9MHz), 580 (820.5MHz), 684 (823.1MHz)	CDMA
-	Emission Mask	476 to 684	476 (817.9MHz), 580 (820.5MHz), 684 (823.1MHz)	CDMA
-	Conducted Emission	476 to 684	476 (817.9MHz), 580 (820.5MHz), 684 (823.1MHz)	CDMA
-	Radiated Emission Below 1GHz	476 to 684	580 (820.5MHz)	CDMA
-	Radiated Emission Above 1GHz	476 to 684	476 (817.9MHz), 580 (820.5MHz), 684 (823.1MHz)	CDMA

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

LTE Band 14

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	23305 to 23355	23305 (790.5MHz), 23330 (793.0MHz), 23355 (795.5MHz)	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
		23330	23330 (793.0MHz)	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	23330	23330 (793.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	50 RB / 0 RB Offset
-	Frequency Stability	23305 to 23355	23305 (790.5MHz), 23355 (795.5MHz)	5MHz	QPSK	25RB / 0RB Offset
		23330	23330 (793.0MHz)	10MHz	QPSK	50RB / 0RB Offset
-	Occupied Bandwidth	23305 to 23355	23305 (790.5MHz), 23330 (793.0MHz), 23355 (795.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	25RB / 0RB Offset
		23330	23330 (793.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	50RB / 0RB Offset
-	Emission Mask	23305 to 23355	23305 (790.5MHz), 23330 (793.0MHz), 23355 (795.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25RB / 0RB Offset
		23330	23330 (793.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50RB / 0RB Offset
-	Conducted Emission	23305 to 23355	23305 (790.5MHz), 23330 (793.0MHz), 23355 (795.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23330	23330 (793.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission below 1GHz	23330	23330 (793.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission above 1GHz	23305 to 23355	23305 (790.5MHz), 23330 (793.0MHz), 23355 (795.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23330	23330 (793.0MHz)	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 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 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	26697 to 26783	26697 (814.7MHz), 26740 (819.0MHz), 26783 (823.3MHz)	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
		26705 to 26775	26705 (815.5MHz), 26740 (819.0MHz), 26775 (822.5MHz)	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
		26715 to 26765	26715 (816.5MHz), 26740 (819.0MHz), 26765 (821.5MHz)	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
		26740	26740 (819.0MHz)	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	26740	26740 (819.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	50 RB / 0 RB Offset
-	Frequency Stability	26697 to 26783	26697 (814.7MHz), 26783 (823.3MHz)	1.4MHz	QPSK	6 RB / 0 RB Offset
		26705 to 26775	26705 (815.5MHz), 26775 (822.5MHz)	3MHz	QPSK	15 RB / 0 RB Offset
		26715 to 26765	26715 (816.5MHz), 26765 (821.5MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		26740	26740 (819.0MHz)	10MHz	QPSK	50 RB / 0 RB Offset
-	Occupied Bandwidth	26697 to 26783	26697 (814.7MHz), 26740 (819.0MHz), 26783 (823.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	6 RB / 0 RB Offset
		26705 to 26775	26705 (815.5MHz), 26740 (819.0MHz), 26775 (822.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	15 RB / 0 RB Offset
		26715 to 26765	26715 (816.5MHz), 26740 (819.0MHz), 26765 (821.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	25 RB / 0 RB Offset
		26740	26740 (819.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	50 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Emission Masks	26697 to 26783	26697 (814.7MHz), 26783 (823.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
		26705 to 26775	26705 (815.5MHz), 26775 (822.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
		26715 to 26765	26715 (816.5MHz), 26765 (821.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		26740	26740 (819.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
-	Conducted Emission	26697 to 26783	26697 (814.7MHz), 26740 (819.0MHz), 26783 (823.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		26705 to 26775	26705 (815.5MHz), 26740 (819.0MHz), 26775 (822.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset
		26715 to 26765	26715 (816.5MHz), 26740 (819.0MHz), 26765 (821.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		26740	26740 (819.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	26740	26740 (819.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	26697 to 26783	26697 (814.7MHz), 26740 (819.0MHz), 26783 (823.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		26715 to 26765	26715 (816.5MHz), 26740 (819.0MHz), 26765 (821.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		26740	26740 (819.0MHz)	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 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	Willy Cheng
Modulation characteristics	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Frequency Stability	25deg. C, 60%RH	7.74Vdc	Willy Cheng
Occupied Bandwidth	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Emission Mask	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Conducted Emission	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Radiated Emission	22deg. C, 66%RH	120Vac, 60Hz	Rex Wang

**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 90**

**ANSI/TIA/EIA-603-E 2016**

ANSI 63.26-2015

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

**References Test Guidance:**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

**KDB 971168 D02 Misc Rev Approv License Devices v02r01**

All test items have been performed as a reference to the above KDB test guidance.

## 4 Test Types and Results

### 4.1 Output Power Measurement

#### 4.1.1 Limits of Output Power Measurement

For CDMA BC10 and LTE Band 26:

The output power shall be according to the specific rule Part 90.635 that “Mobile station are limited to 100 watts e.r.p”.

For LTE Band 14:

Control stations and mobile stations transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 30 watts ERP. Portable stations (hand-held devices) transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 3 watts ERP.

#### 4.1.2 Test Procedures

##### Conducted Power Measurement:

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

$$\text{EIRP} = P_{\text{Meas}} + G_T$$

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

where

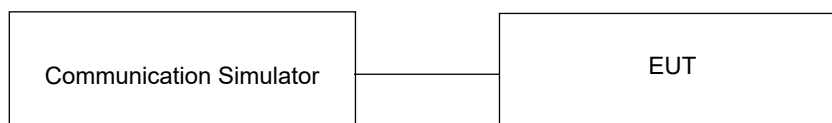
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively  
(expressed in the same units as  $P_{\text{Meas}}$ , e.g., dBm or dBW)

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

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

#### 4.1.3 Test Setup

Conducted Power Measurement:



#### 4.1.4 Test Results

##### Conducted Output Power (dBm)

Band	CDMA2000 BC10		
	476	580	684
Channel	476	580	684
Frequency	817.9	820.5	823.1
RC1+SO55	23.87	23.86	23.91
RC3+SO55	23.85	23.84	23.93
RC3+SO32(+ F-SCH)	23.81	23.80	23.87
RC3+SO32(+SCH)	23.83	23.82	23.89
RC1+SO3, 1/8 Rate	23.82	23.81	23.88
RTAP 153.6	23.85	23.84	23.91
RETAP 4096	23.78	23.77	23.84

LTE Band 14				
BW	MCS Index	RB Size	RB Offset	Mid
		Channel		23330
		Frequency (MHz)		793
10M	QPSK	1	0	24.99
		1	24	24.50
		1	49	24.29
		25	0	23.79
		25	12	23.18
		25	25	22.71
		50	0	23.46
10M	16QAM	1	0	23.97
		1	24	23.51
		1	49	23.40
		25	0	22.79
		25	12	22.36
		25	25	21.95
		50	0	22.50
10M	64QAM	1	0	22.51
		1	24	21.76
		1	49	21.73
		25	0	21.19
		25	12	20.45
		25	25	20.42
		50	0	20.64
10M	256QAM	1	0	19.74
		1	24	18.99
		1	49	18.71
		25	0	18.22
		25	12	18.17
		25	25	18.01
		50	0	18.04

LTE Band 14						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23305	23330	23355
		Frequency (MHz)		790.5	793	795.5
5M	QPSK	1	0	24.86	24.96	24.83
		1	12	24.33	24.41	24.40
		1	24	24.21	24.24	24.17
		12	0	23.70	23.78	23.68
		12	6	23.08	23.10	23.05
		12	13	22.54	22.64	22.53
		25	0	23.38	23.41	23.38
5M	16QAM	1	0	23.82	23.93	23.83
		1	12	23.46	23.51	23.37
		1	24	23.24	23.34	23.27
		12	0	22.73	22.79	22.69
		12	6	22.18	22.29	22.22
		12	13	21.87	21.90	21.87
		25	0	22.43	22.43	22.36
5M	64QAM	1	0	22.40	22.43	22.30
		1	12	21.60	21.70	21.61
		1	24	21.67	21.64	21.62
		12	0	21.06	21.12	21.05
		12	6	20.35	20.45	20.31
		12	13	20.32	20.41	20.33
		25	0	20.54	20.60	20.49
5M	256QAM	1	0	19.34	19.44	19.61
		1	12	18.94	18.87	18.96
		1	24	18.90	19.00	18.83
		12	0	18.51	18.38	18.30
		12	6	18.01	18.12	18.09
		12	13	18.09	18.18	18.25
		25	0	18.29	18.20	18.17

LTE Band 26				
BW	MCS Index	RB Size	RB Offset	Mid
		Channel		26740
		Frequency (MHz)		819
10M	QPSK	1	0	23.93
		1	24	23.92
		1	49	23.87
		25	0	22.95
		25	12	22.86
		25	25	22.90
		50	0	22.93
10M	16QAM	1	0	22.84
		1	24	22.85
		1	49	22.85
		25	0	21.99
		25	12	21.88
		25	25	21.91
		50	0	21.89
10M	64QAM	1	0	21.88
		1	24	21.63
		1	49	21.50
		25	0	20.93
		25	12	20.60
		25	25	20.17
		50	0	20.30
10M	256QAM	1	0	18.69
		1	24	18.54
		1	49	18.63
		25	0	18.44
		25	12	18.26
		25	25	18.23
		50	0	18.31

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26715	26740	26765
		Frequency (MHz)		816.5	819	821.5
5M	QPSK	1	0	23.77	23.93	23.97
		1	12	23.83	23.92	23.96
		1	24	23.77	23.87	23.87
		12	0	22.74	22.95	22.96
		12	6	22.89	22.86	22.95
		12	13	22.69	22.90	22.91
		25	0	22.90	22.93	22.94
5M	16QAM	1	0	22.84	22.84	22.90
		1	12	22.80	22.85	22.87
		1	24	22.81	22.85	22.86
		12	0	21.99	21.99	22.00
		12	6	21.87	21.88	21.95
		12	13	21.86	21.91	21.92
		25	0	21.79	21.89	21.96
5M	64QAM	1	0	21.70	21.88	21.90
		1	12	21.59	21.63	21.64
		1	24	21.32	21.50	21.53
		12	0	20.83	20.93	20.93
		12	6	20.58	20.60	20.64
		12	13	20.20	20.17	20.24
		25	0	20.32	20.30	20.34
5M	256QAM	1	0	18.18	18.69	18.51
		1	12	18.40	18.54	18.48
		1	24	18.37	18.63	18.46
		12	0	18.26	18.44	18.36
		12	6	18.32	18.26	18.40
		12	13	18.05	18.23	18.43
		25	0	18.15	18.31	18.56

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26705	26740	26775
		Frequency (MHz)		815.5	819	822.5
3M	QPSK	1	0	23.88	23.88	23.94
		1	7	23.87	23.90	23.85
		1	14	23.76	23.78	23.79
		8	0	22.74	22.82	22.96
		8	3	22.78	22.78	22.93
		8	7	22.73	22.80	22.78
		15	0	22.75	22.91	22.80
3M	16QAM	1	0	22.80	22.72	22.85
		1	7	22.80	22.74	22.77
		1	14	22.72	22.79	22.80
		8	0	21.90	21.85	21.98
		8	3	21.73	21.87	21.82
		8	7	21.68	21.79	21.91
		15	0	21.85	21.75	21.96
3M	64QAM	1	0	21.69	21.73	21.81
		1	7	21.58	21.56	21.59
		1	14	21.37	21.43	21.47
		8	0	20.79	20.79	20.85
		8	3	20.58	20.57	20.61
		8	7	20.12	20.05	20.15
		15	0	20.24	20.23	20.28
3M	256QAM	1	0	18.43	18.60	18.38
		1	7	18.46	18.48	18.33
		1	14	18.47	18.54	18.36
		8	0	18.17	18.29	18.25
		8	3	18.57	18.24	18.34
		8	7	18.16	18.17	18.37
		15	0	18.23	18.27	18.47



LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26697	26740	26783
		Frequency (MHz)		814.7	819	823.3
1.4M	QPSK	1	0	23.83	23.89	23.97
		1	2	23.77	23.81	23.94
		1	5	23.78	23.83	23.78
		3	0	23.89	23.92	23.91
		3	1	23.91	23.72	23.89
		3	3	23.73	23.81	23.85
		6	0	22.70	22.89	22.91
1.4M	16QAM	1	0	22.86	22.79	22.84
		1	2	22.73	22.81	22.84
		1	5	22.75	22.85	22.72
		3	0	22.88	22.95	22.87
		3	1	22.70	22.83	22.88
		3	3	22.74	22.88	22.90
		6	0	21.91	21.87	21.94
1.4M	64QAM	1	0	21.73	21.82	21.82
		1	2	21.47	21.63	21.54
		1	5	21.39	21.47	21.48
		3	0	21.84	21.92	21.93
		3	1	21.56	21.50	21.52
		3	3	21.20	21.16	21.22
		6	0	20.24	20.15	20.34
1.4M	256QAM	1	0	18.50	18.55	18.49
		1	2	18.39	18.40	18.46
		1	5	18.33	18.60	18.38
		3	0	18.36	19.34	19.28
		3	1	18.65	19.14	19.35
		3	3	18.56	19.14	19.30
		6	0	18.15	18.20	18.45

**ERP Power (dBm)**

Band	CDMA2000 BC10		
	476	580	684
Channel	817.9	820.5	823.1
Frequency	19.83	19.82	19.87
RC1+SO55	19.81	19.80	19.89
RC3+SO55	19.77	19.76	19.83
RC3+SO32(+ F-SCH)	19.79	19.78	19.85
RC3+SO32(+SCH)	19.78	19.77	19.84
RC1+SO3, 1/8 Rate	19.81	19.80	19.87
RTAP 153.6	19.74	19.73	19.80
RETAP 4096			

LTE Band 14				
BW	MCS Index	RB Size	RB Offset	Mid
		Channel		23330
		Frequency (MHz)		793
10M	QPSK	1	0	18.47
		1	24	17.98
		1	49	17.77
		25	0	17.27
		25	12	16.66
		25	25	16.19
		50	0	16.94
10M	16QAM	1	0	17.45
		1	24	16.99
		1	49	16.88
		25	0	16.27
		25	12	15.84
		25	25	15.43
		50	0	15.98
10M	64QAM	1	0	15.99
		1	24	15.24
		1	49	15.21
		25	0	14.67
		25	12	13.93
		25	25	13.90
		50	0	14.12
10M	256QAM	1	0	13.22
		1	24	12.47
		1	49	12.19
		25	0	11.70
		25	12	11.65
		25	25	11.49
		50	0	11.52

LTE Band 14						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23305	23330	23355
		Frequency (MHz)		790.5	793	795.5
5M	QPSK	1	0	18.34	18.44	18.31
		1	12	17.81	17.89	17.88
		1	24	17.69	17.72	17.65
		12	0	17.18	17.26	17.16
		12	6	16.56	16.58	16.53
		12	13	16.02	16.12	16.01
		25	0	16.86	16.89	16.86
5M	16QAM	1	0	17.30	17.41	17.31
		1	12	16.94	16.99	16.85
		1	24	16.72	16.82	16.75
		12	0	16.21	16.27	16.17
		12	6	15.66	15.77	15.70
		12	13	15.35	15.38	15.35
		25	0	15.91	15.91	15.84
5M	64QAM	1	0	15.88	15.91	15.78
		1	12	15.08	15.18	15.09
		1	24	15.15	15.12	15.10
		12	0	14.54	14.60	14.53
		12	6	13.83	13.93	13.79
		12	13	13.80	13.89	13.81
		25	0	14.02	14.08	13.97
5M	256QAM	1	0	12.82	12.92	13.09
		1	12	12.42	12.35	12.44
		1	24	12.38	12.48	12.31
		12	0	11.99	11.86	11.78
		12	6	11.49	11.60	11.57
		12	13	11.57	11.66	11.73
		25	0	11.77	11.68	11.65

LTE Band 26				
BW	MCS Index	RB Size	RB Offset	Mid
		Channel		26740
		Frequency (MHz)		819
10M	QPSK	1	0	19.89
		1	24	19.88
		1	49	19.83
		25	0	18.91
		25	12	18.82
		25	25	18.86
		50	0	18.89
10M	16QAM	1	0	18.80
		1	24	18.81
		1	49	18.81
		25	0	17.95
		25	12	17.84
		25	25	17.87
		50	0	17.85
10M	64QAM	1	0	17.84
		1	24	17.59
		1	49	17.46
		25	0	16.89
		25	12	16.56
		25	25	16.13
		50	0	16.26
10M	256QAM	1	0	14.65
		1	24	14.50
		1	49	14.59
		25	0	14.40
		25	12	14.22
		25	25	14.19
		50	0	14.27

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26715	26740	26765
		Frequency (MHz)		816.5	819	821.5
5M	QPSK	1	0	19.73	19.89	19.93
		1	12	19.79	19.88	19.92
		1	24	19.73	19.83	19.83
		12	0	18.70	18.91	18.92
		12	6	18.85	18.82	18.91
		12	13	18.65	18.86	18.87
		25	0	18.86	18.89	18.90
5M	16QAM	1	0	18.80	18.80	18.86
		1	12	18.76	18.81	18.83
		1	24	18.77	18.81	18.82
		12	0	17.95	17.95	17.96
		12	6	17.83	17.84	17.91
		12	13	17.82	17.87	17.88
		25	0	17.75	17.85	17.92
5M	64QAM	1	0	17.66	17.84	17.86
		1	12	17.55	17.59	17.60
		1	24	17.28	17.46	17.49
		12	0	16.79	16.89	16.89
		12	6	16.54	16.56	16.60
		12	13	16.16	16.13	16.20
		25	0	16.28	16.26	16.30
5M	256QAM	1	0	14.14	14.65	14.47
		1	12	14.36	14.50	14.44
		1	24	14.33	14.59	14.42
		12	0	14.22	14.40	14.32
		12	6	14.28	14.22	14.36
		12	13	14.01	14.19	14.39
		25	0	14.11	14.27	14.52

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26705	26740	26775
		Frequency (MHz)		815.5	819	822.5
3M	QPSK	1	0	19.84	19.84	19.90
		1	7	19.83	19.86	19.81
		1	14	19.72	19.74	19.75
		8	0	18.70	18.78	18.92
		8	3	18.74	18.74	18.89
		8	7	18.69	18.76	18.74
		15	0	18.71	18.87	18.76
3M	16QAM	1	0	18.76	18.68	18.81
		1	7	18.76	18.70	18.73
		1	14	18.68	18.75	18.76
		8	0	17.86	17.81	17.94
		8	3	17.69	17.83	17.78
		8	7	17.64	17.75	17.87
		15	0	17.81	17.71	17.92
3M	64QAM	1	0	17.65	17.69	17.77
		1	7	17.54	17.52	17.55
		1	14	17.33	17.39	17.43
		8	0	16.75	16.75	16.81
		8	3	16.54	16.53	16.57
		8	7	16.08	16.01	16.11
		15	0	16.20	16.19	16.24
3M	256QAM	1	0	14.39	14.56	14.34
		1	7	14.42	14.44	14.29
		1	14	14.43	14.50	14.32
		8	0	14.13	14.25	14.21
		8	3	14.53	14.20	14.30
		8	7	14.12	14.13	14.33
		15	0	14.19	14.23	14.43

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26697	26740	26783
		Frequency (MHz)		814.7	819	823.3
1.4M	QPSK	1	0	19.79	19.85	19.93
		1	2	19.73	19.77	19.90
		1	5	19.74	19.79	19.74
		3	0	19.85	19.88	19.87
		3	1	19.87	19.68	19.85
		3	3	19.69	19.77	19.81
		6	0	18.66	18.85	18.87
1.4M	16QAM	1	0	18.82	18.75	18.80
		1	2	18.69	18.77	18.80
		1	5	18.71	18.81	18.68
		3	0	18.84	18.91	18.83
		3	1	18.66	18.79	18.84
		3	3	18.70	18.84	18.86
		6	0	17.87	17.83	17.90
1.4M	64QAM	1	0	17.69	17.78	17.78
		1	2	17.43	17.59	17.50
		1	5	17.35	17.43	17.44
		3	0	17.80	17.88	17.89
		3	1	17.52	17.46	17.48
		3	3	17.16	17.12	17.18
		6	0	16.20	16.11	16.30
1.4M	256QAM	1	0	14.46	14.51	14.45
		1	2	14.35	14.36	14.42
		1	5	14.29	14.56	14.34
		3	0	14.32	15.30	15.24
		3	1	14.61	15.10	15.31
		3	3	14.52	15.10	15.26
		6	0	14.11	14.16	14.41



## 4.2 Modulation Characteristics Measurement

### 4.2.1 Limits of Modulation Characteristics

N/A

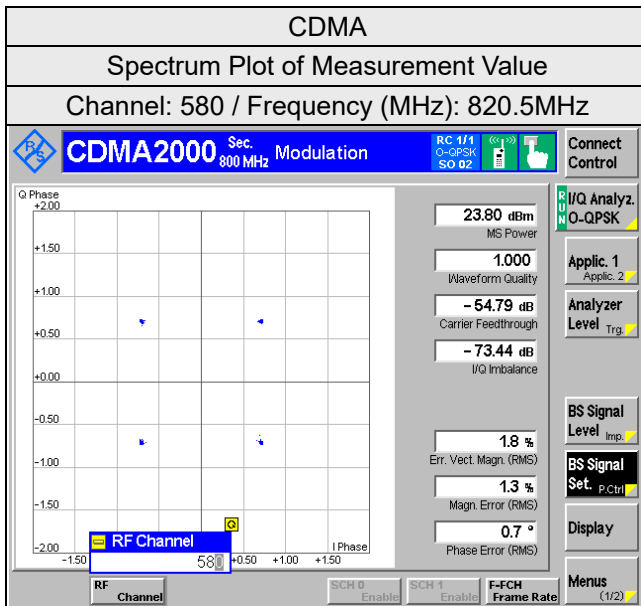
### 4.2.2 Test Procedure

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

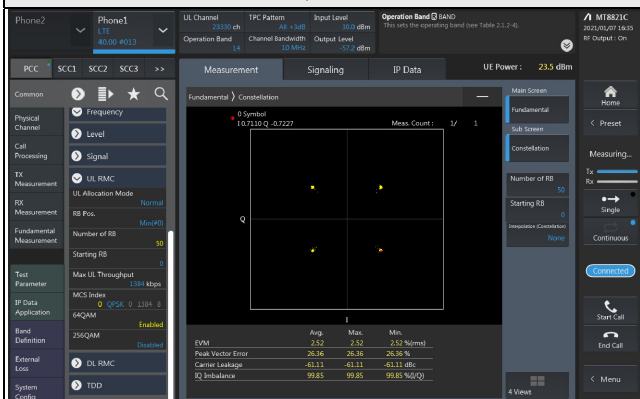


## LTE Band 14

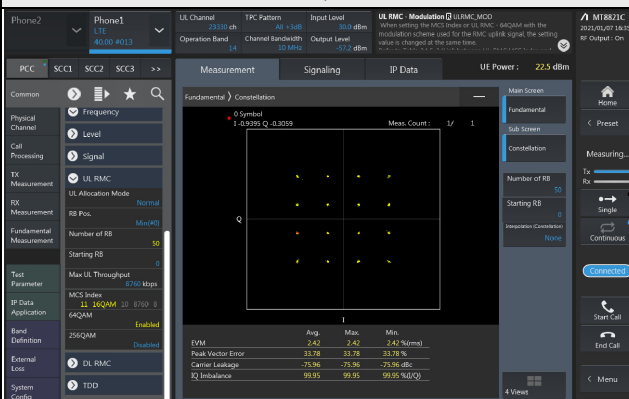
### Spectrum Plot of Measurement Value

Channel: 23330 / Frequency (MHz): 793.0MHz

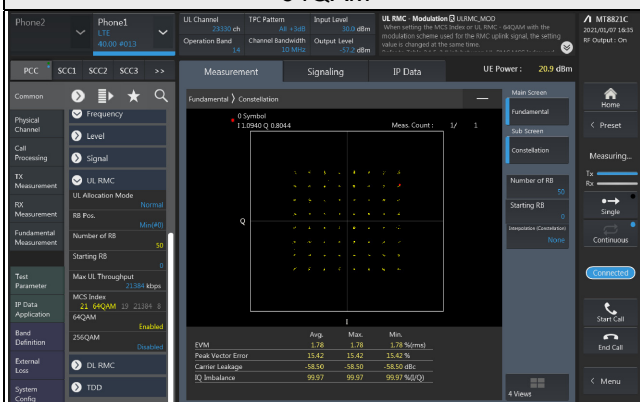
#### QPSK



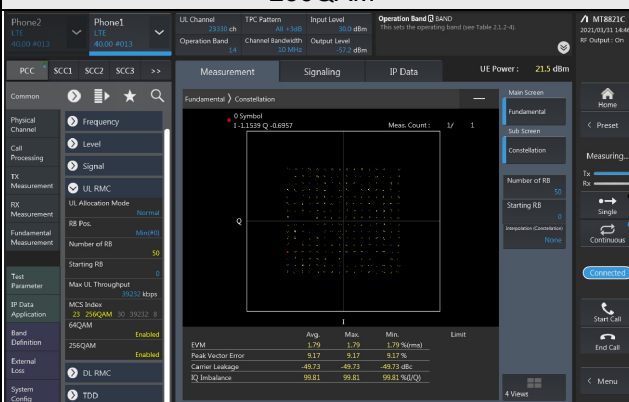
#### 16QAM



#### 64QAM



#### 256QAM

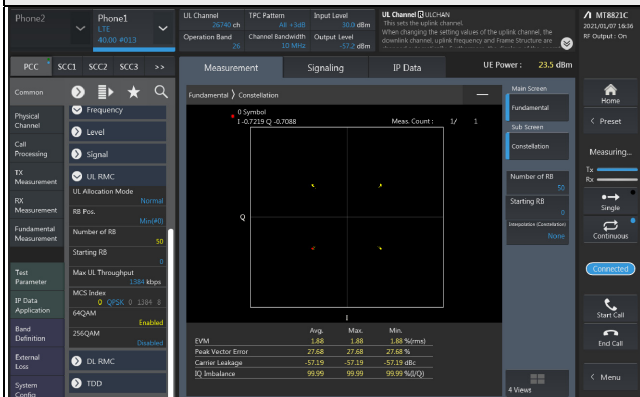


## LTE Band 26

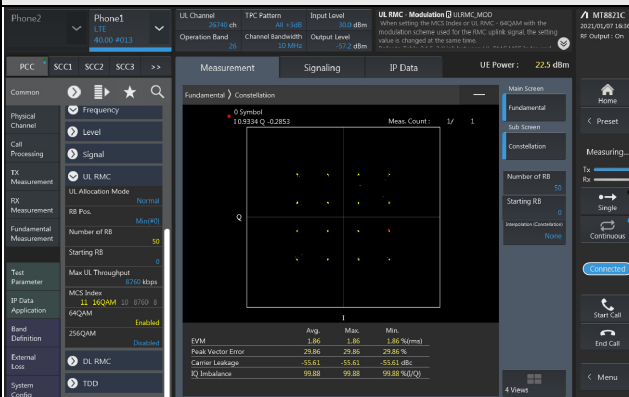
### Spectrum Plot of Measurement Value

Channel: 26740 / Frequency (MHz): 819.0MHz

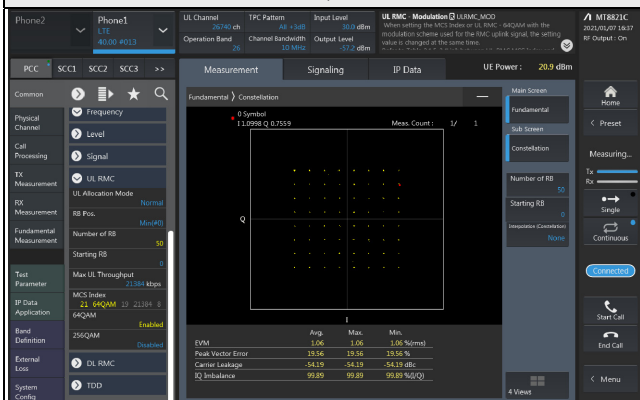
#### QPSK



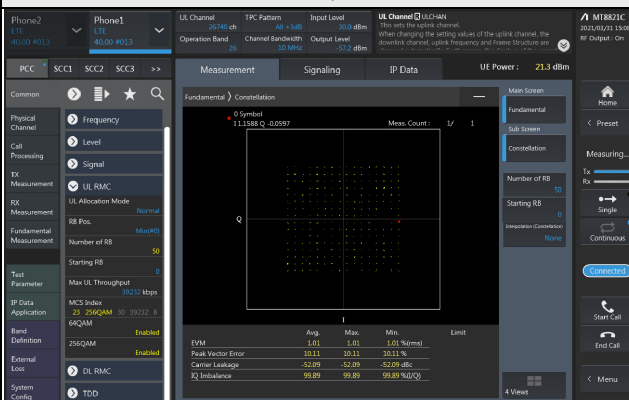
#### 16QAM



#### 64QAM



#### 256QAM



### 4.3 Frequency Stability Measurement

#### 4.3.1 Limits of Frequency Stability Measurement

For LTE Band 14:

The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

For CDMA BC10 and LTE Band 26:

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

#### 4.3.2 Test Procedure

- a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5$  °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.

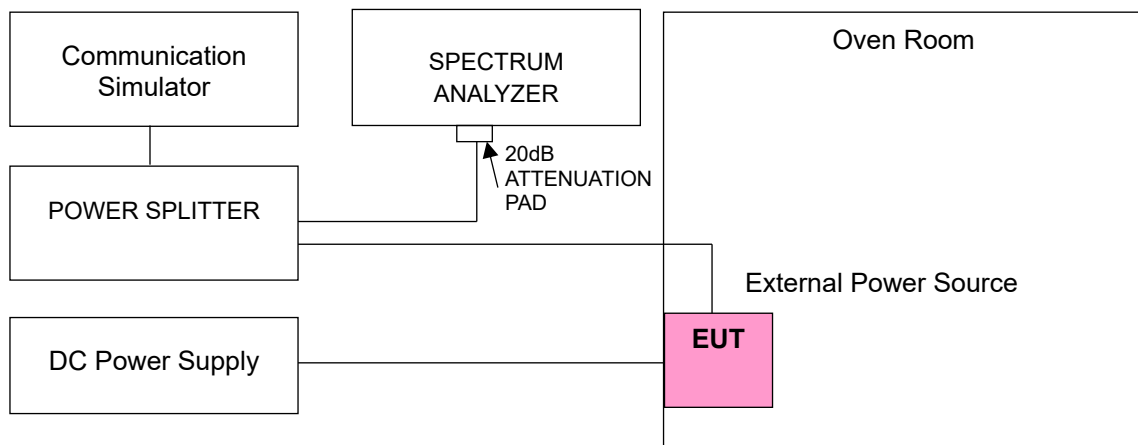
Note: The frequency error was recorded frequency error from the communication simulator.

#### 4.3.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 28, 2020	Dec. 27, 2021
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Dec. 24, 2020	Dec. 23, 2021
Digital Multimeter Fluke	87-III	70360742	Jun. 23, 2020	Jun. 22, 2021
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)	CDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.74	817.900001	0.001	823.100005	0.006
6.58	817.900004	0.005	823.100004	0.005
8.90	817.900004	0.005	823.100002	0.002

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

##### Frequency Error vs. Temperature

Temp. (°C)	CDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	817.900005	0.006	823.100003	0.004
-20	817.900001	0.001	823.100002	0.002
-10	817.900001	0.001	823.100003	0.004
0	817.900003	0.004	823.100004	0.005
10	817.900002	0.002	823.100002	0.002
20	817.899997	-0.004	823.099995	-0.006
30	817.899997	-0.004	823.099998	-0.002
40	817.899997	-0.004	823.099997	-0.004
50	817.899997	-0.004	823.099997	-0.004

### Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 14			
	Channel Bandwidth: 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.74	790.500002	0.003	795.500003	0.004
6.58	790.500005	0.006	795.500004	0.005
8.90	790.500001	0.001	795.500001	0.001

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 14			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	790.500001	0.001	795.500001	0.001
-20	790.500004	0.005	795.500003	0.004
-10	790.500001	0.001	795.500003	0.004
0	790.500003	0.004	795.500004	0.005
10	790.500004	0.005	795.500005	0.006
20	790.499998	-0.003	795.499999	-0.001
30	790.499997	-0.004	795.499997	-0.004
40	790.499999	-0.001	795.499999	-0.001
50	790.499997	-0.004	795.499995	-0.006



**Frequency Error vs. Voltage**

Voltage (Vdc)	LTE Band 14	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
7.74	793.000002	0.003
6.58	793.000003	0.004
8.90	793.000002	0.003

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

**Frequency Error vs. Temperature**

Temp. (°C)	LTE Band 14	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-30	793.000003	0.004
-20	793.000003	0.004
-10	793.000005	0.006
0	793.000002	0.003
10	793.000002	0.003
20	792.999997	-0.004
30	792.999998	-0.003
40	792.999995	-0.006
50	792.999996	-0.005

### 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)
7.74	814.700001	0.001	823.300002	0.002
6.58	814.700001	0.001	823.300002	0.002
8.90	814.700001	0.001	823.300005	0.006

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

### 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	814.700001	0.001	823.300004	0.005
-20	814.700003	0.004	823.300002	0.002
-10	814.700003	0.004	823.300002	0.002
0	814.700002	0.002	823.300005	0.006
10	814.700002	0.002	823.300005	0.006
20	814.699999	-0.001	823.299998	-0.002
30	814.699999	-0.001	823.299996	-0.005
40	814.699999	-0.001	823.299999	-0.001
50	814.699998	-0.002	823.299996	-0.005

### Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 3MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.74	815.500001	0.001	822.500004	0.005
6.58	815.500004	0.005	822.500002	0.002
8.90	815.500004	0.005	822.500001	0.001

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 3MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	815.500003	0.004	822.500001	0.001
-20	815.500005	0.006	822.500001	0.001
-10	815.500003	0.004	822.500002	0.002
0	815.500004	0.005	822.500004	0.005
10	815.500004	0.005	822.500001	0.001
20	815.499995	-0.006	822.499999	-0.001
30	815.499996	-0.005	822.499997	-0.004
40	815.499997	-0.004	822.499996	-0.005
50	815.499996	-0.005	822.499997	-0.004

### Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
7.74	816.500002	0.002	821.500005	0.006
6.58	816.500002	0.002	821.500004	0.005
8.90	816.500004	0.005	821.500005	0.006

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

### Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	816.500003	0.004	821.500003	0.004
-20	816.500004	0.005	821.500001	0.001
-10	816.500001	0.001	821.500005	0.006
0	816.500003	0.004	821.500005	0.006
10	816.500001	0.001	821.500001	0.001
20	816.499998	-0.002	821.499998	-0.002
30	816.499999	-0.001	821.499999	-0.001
40	816.499995	-0.006	821.499997	-0.004
50	816.499999	-0.001	821.499995	-0.006

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
7.74	819.000005	0.006
6.58	819.000005	0.006
8.90	819.000005	0.006

Note: The applicant defined the normal working voltage is from 6.58Vdc to 8.90Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-30	819.000001	0.001
-20	819.000001	0.001
-10	819.000005	0.006
0	819.000003	0.004
10	819.000005	0.006
20	818.999999	-0.001
30	818.999995	-0.006
40	818.999999	-0.001
50	818.999998	-0.002

## 4.4 Occupied Bandwidth Measurement

### 4.4.1 Limits of Occupied Bandwidth Measurement

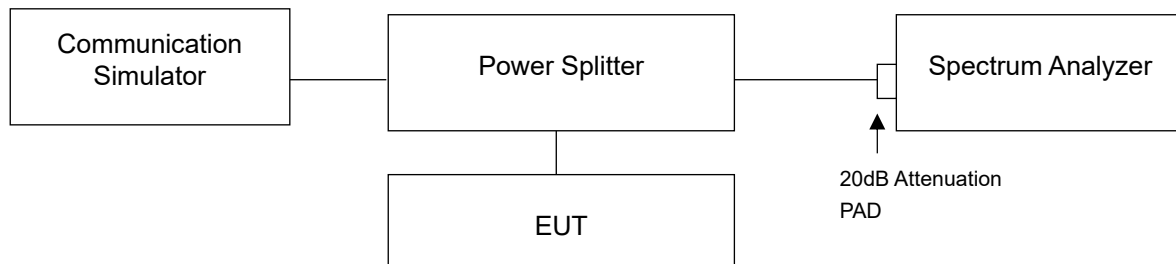
The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

### 4.4.2 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.

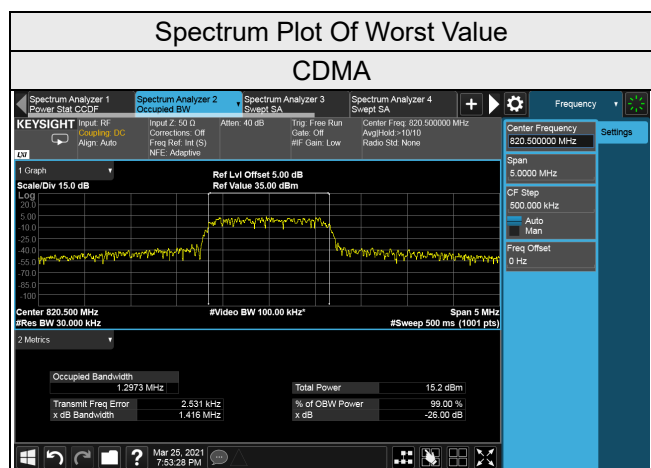
### 4.4.3 Test Setup



#### 4.4.4 Test Result

##### Occupied Bandwidth

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
		CDMA
476	817.9	1.29
580	820.5	1.29
684	823.1	1.26



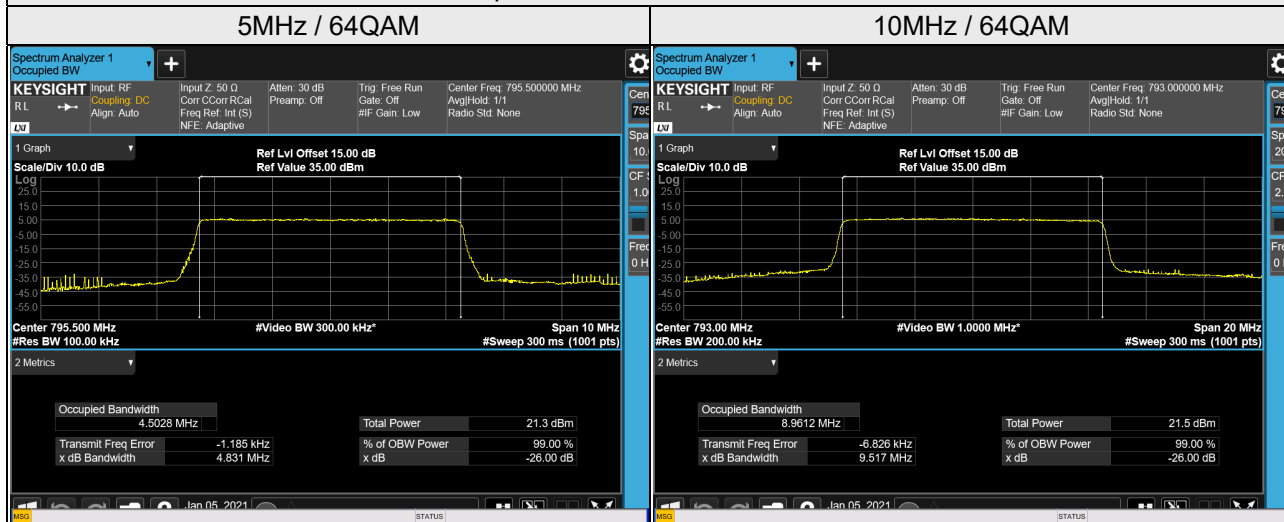
LTE Band 14, Channel Bandwidth 5MHz

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23305	790.5	4.48	4.49	4.49	4.48
23330	793.0	4.49	4.49	4.50	4.49
23355	795.5	4.49	4.49	4.50	4.49

LTE Band 14, Channel Bandwidth 10MHz

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23330	793.0	8.96	8.96	8.96	8.96

Spectrum Plot of Worst Value

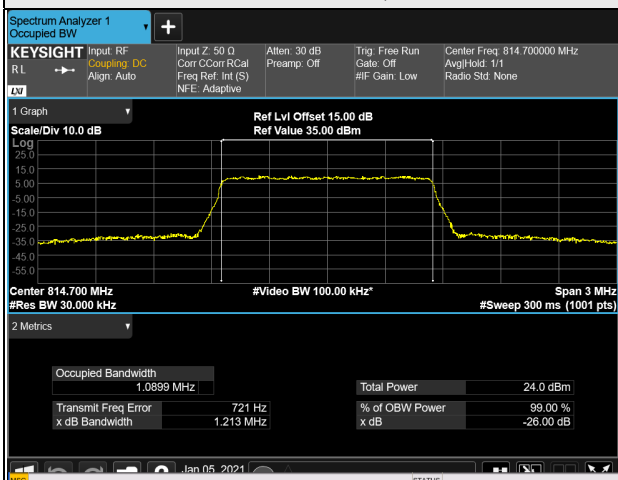




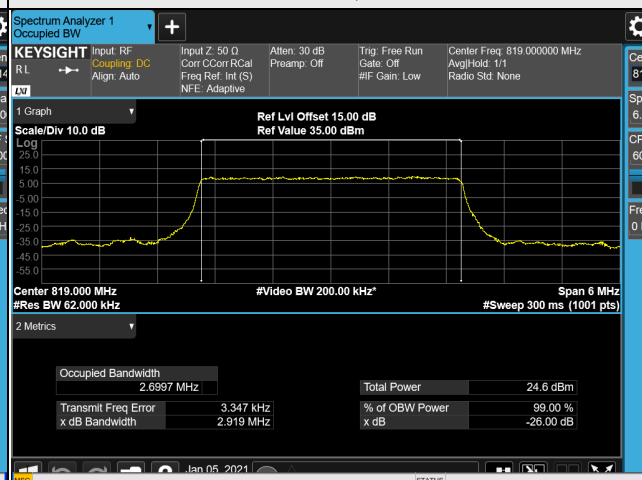
LTE Band 26, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26697	814.7	1.09	1.09	1.09	1.08
26740	819.0	1.09	1.09	1.09	1.09
26783	823.3	1.09	1.09	1.09	1.09
LTE Band 26, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26705	815.5	2.70	2.70	2.70	2.70
26740	819.0	2.70	2.69	2.69	2.70
26775	822.5	2.70	2.70	2.69	2.69
LTE Band 26, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26715	816.5	4.49	4.49	4.49	4.49
26740	819.0	4.48	4.49	4.49	4.48
26765	821.5	4.49	4.49	4.49	4.48
LTE Band 26, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26740	819.0	8.95	8.95	8.95	8.95

### Spectrum Plot of Worst Value

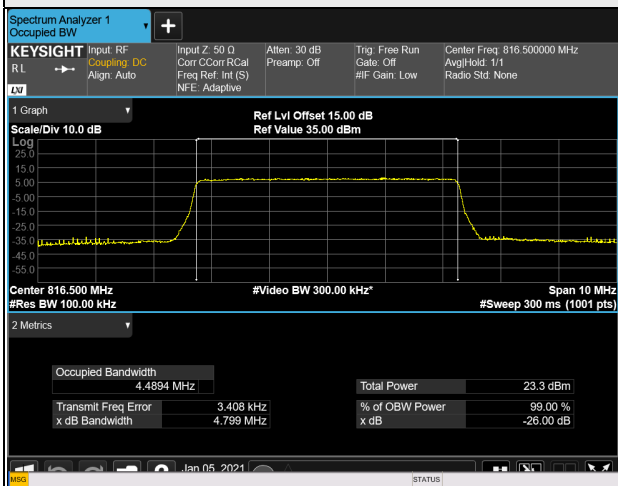
1.4MHz / 16QAM



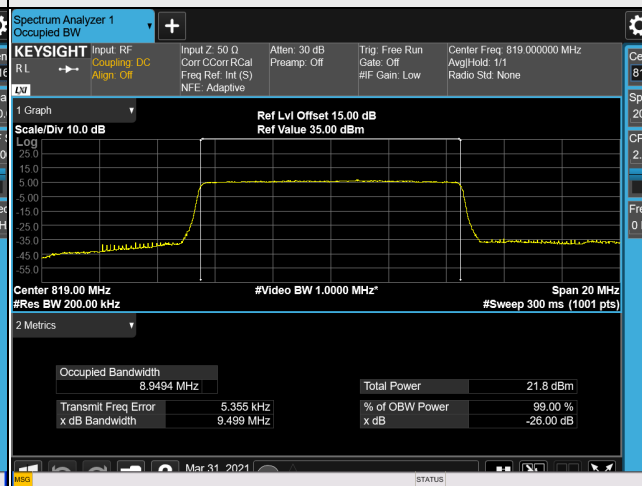
3MHz / QPSK



5MHz / 64QAM

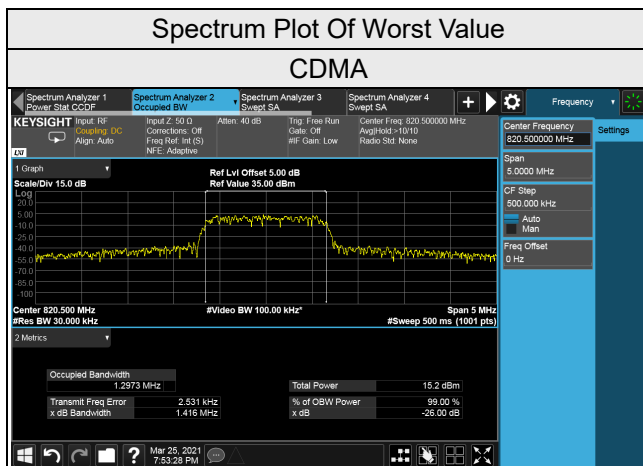


10MHz / 256QAM



### 26dB Bandwidth

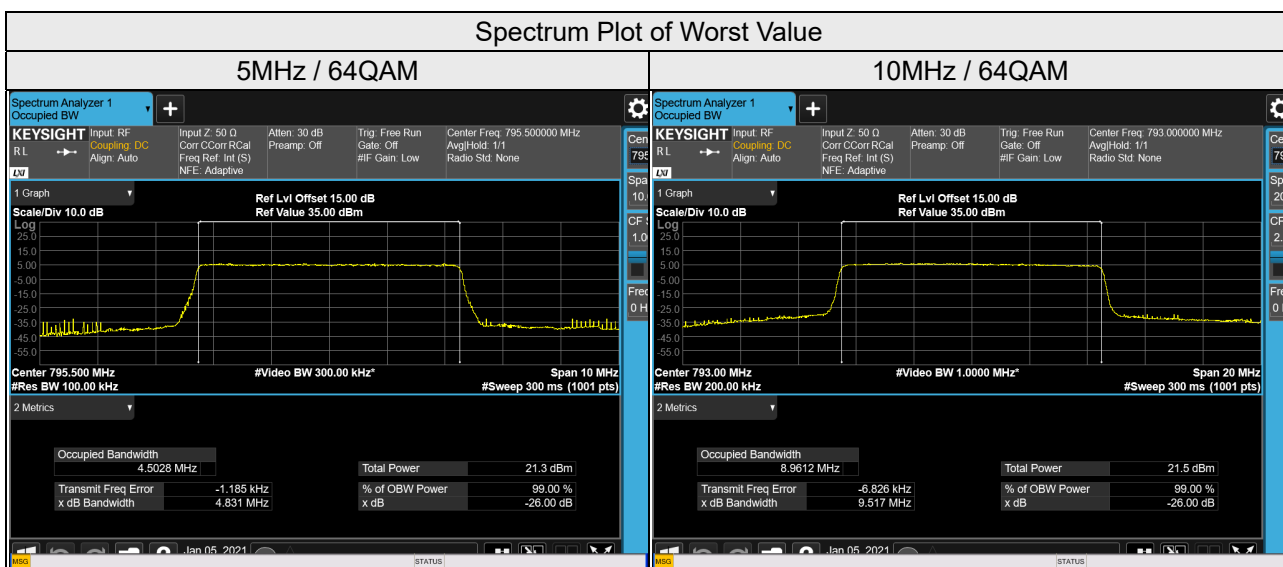
Channel	Frequency (MHz)	26dB Bandwidth (MHz)
		CDMA
476	817.9	1.40
580	820.5	1.41
684	823.1	1.39



LTE Band 14, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23305	790.5	4.80	4.79	4.82	4.81
23330	793.0	4.79	4.80	4.82	4.80
23355	795.5	4.81	4.82	4.83	4.81

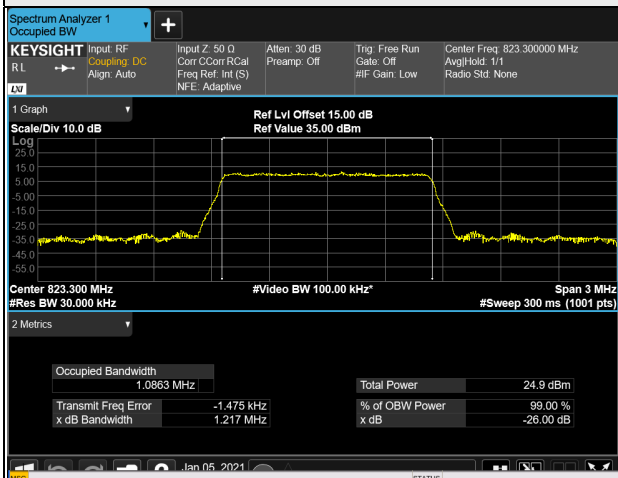
LTE Band 14, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
23330	793.0	9.51	9.51	9.52	9.51



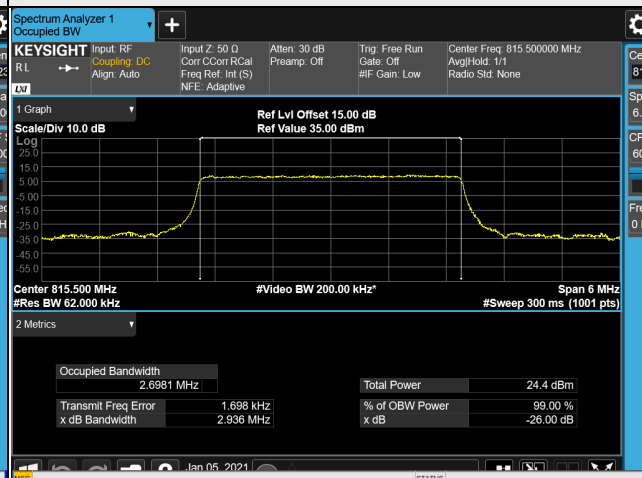
LTE Band 26, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26697	814.7	1.21	1.21	1.22	1.21
26740	819.0	1.21	1.21	1.21	1.21
26783	823.3	1.22	1.22	1.21	1.21
LTE Band 26, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26705	815.5	2.94	2.93	2.93	2.92
26740	819.0	2.92	2.91	2.92	2.92
26775	822.5	2.92	2.92	2.93	2.92
LTE Band 26, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26715	816.5	4.81	4.80	4.80	4.80
26740	819.0	4.79	4.80	4.80	4.79
26765	821.5	4.79	4.80	4.80	4.80
LTE Band 26, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
26740	819.0	9.49	9.51	9.49	9.50

### Spectrum Plot of Worst Value

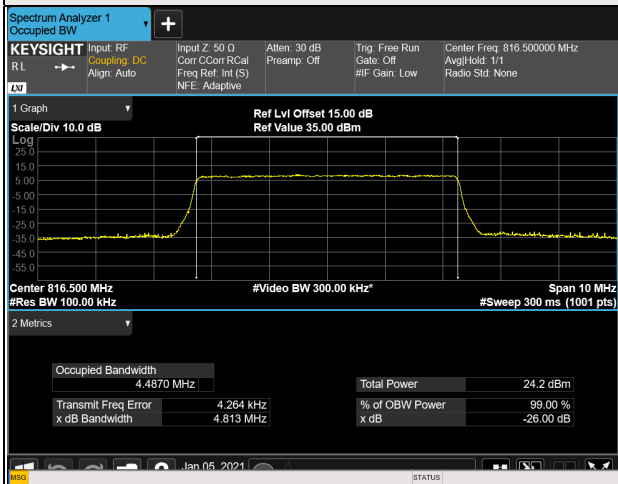
#### 1.4MHz / QPSK



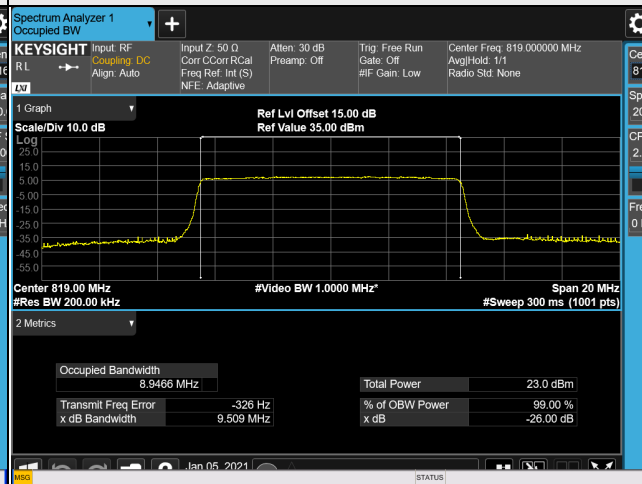
#### 3MHz / QPSK



#### 5MHz / QPSK



#### 10MHz / 16QAM



## 4.5 Emission Mask Measurement

### 4.5.1 Limits of Emission Mask Measurement

For LTE Band 14:

According to FCC part 90.543 (e), For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations.
- (2) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least  $43 + 10 \log (P)$  dB.

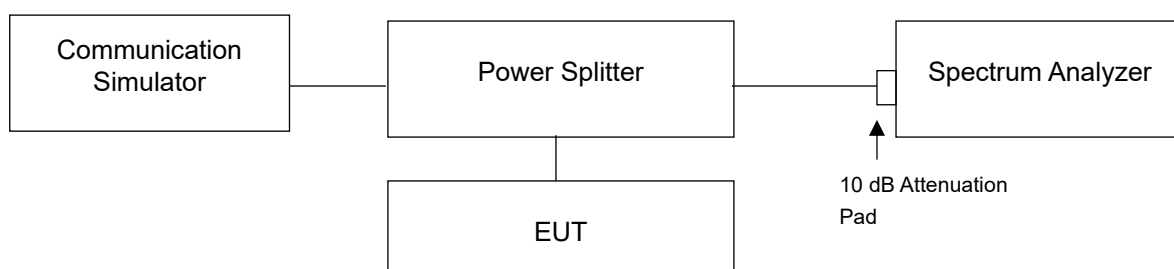
For CDMA BC10 and LTE Band 26:

According to FCC part 90.691 shall be tested the emission mask. For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

For § 90.691(a), RBW=300 Hz for offset less than 37.5 kHz from channel edge and RBW=100 kHz for offsets greater than 37.5 kHz is allowed, tested in accordance with FCC KDB 971168 D02 section VIII.

### 4.5.2 Test Setup

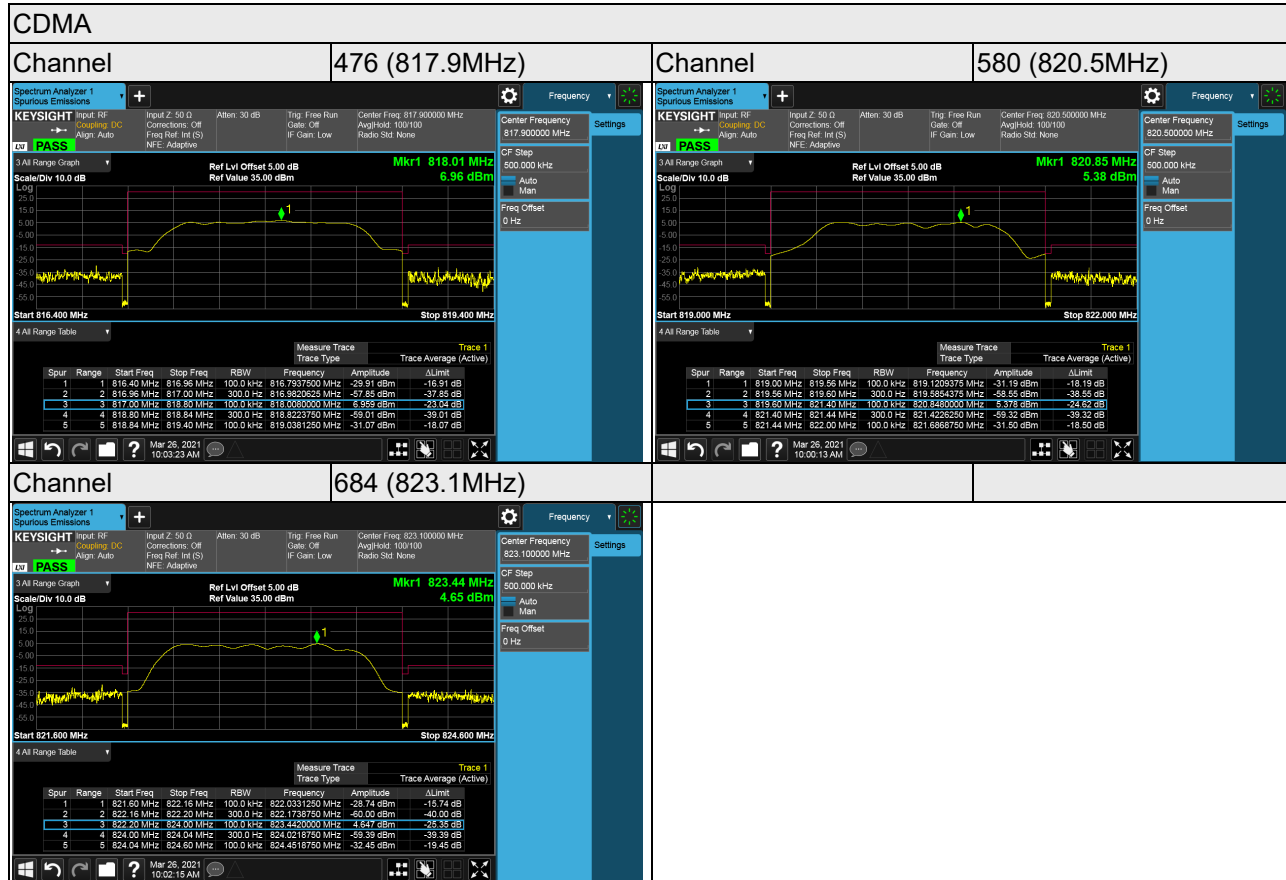


### 4.5.3 Test Procedures

- a. The measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- b. Record the test plot.

## 4.5.4 Test Results

### Emission Mask

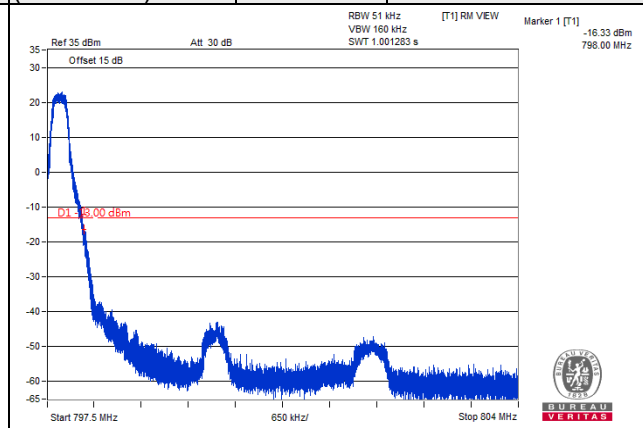
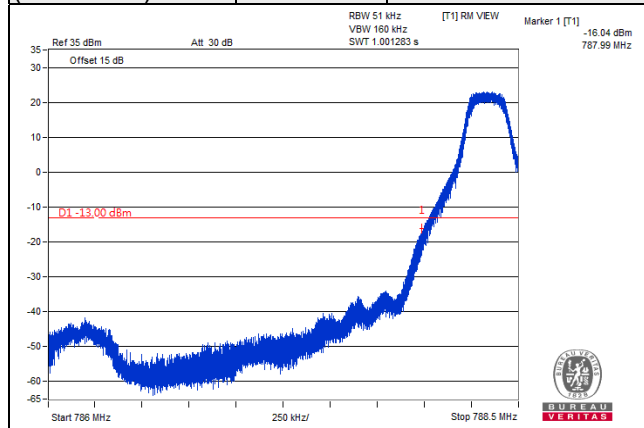




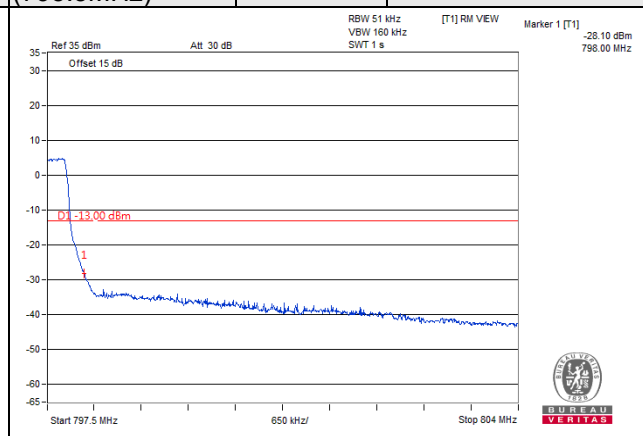
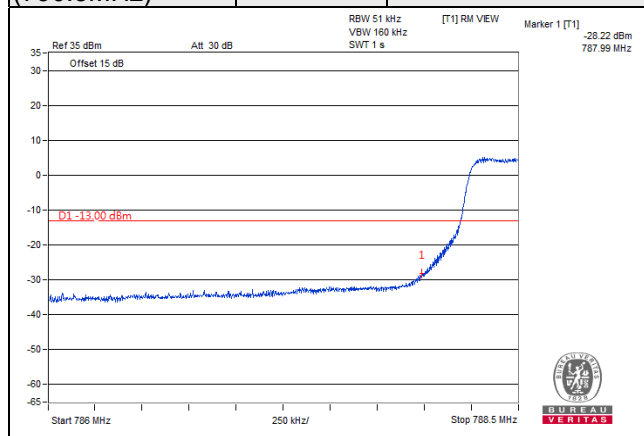
### Band Edge

LTE Band 14, Channel Bandwidth 5MHz

Channel 23305 (790.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 23355 (795.5MHz)	QPSK	1 RB / 24 RB Offset
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Channel 23305 (790.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 23355 (795.5MHz)	QPSK	25 RB / 0 RB Offset
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LTE Band 14, Channel Bandwidth 10MHz

Channel 23330  
(793.0MHz)

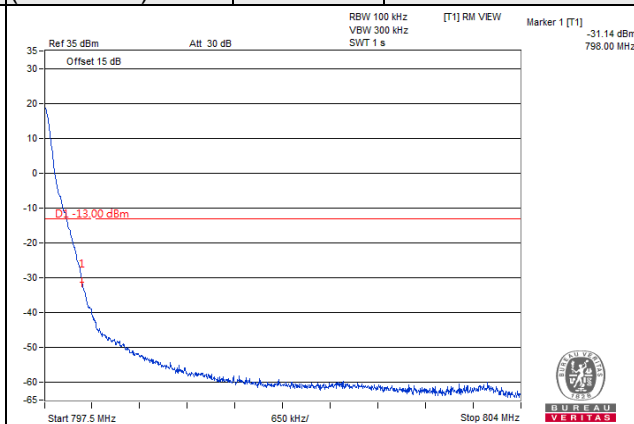
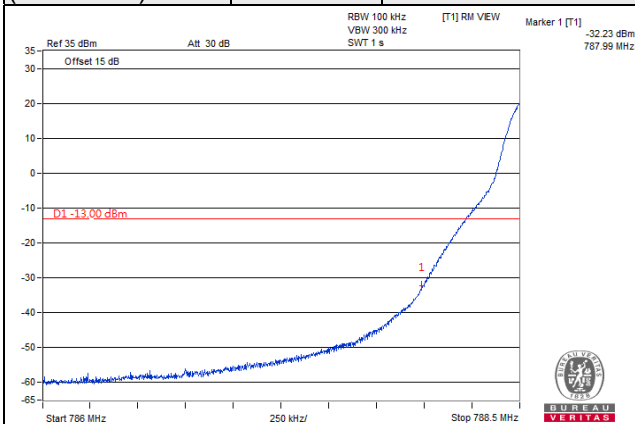
QPSK

1 RB / 0 RB Offset

Channel 23330  
(793.0MHz)

QPSK

1 RB / 49 RB Offset



Channel 23330  
(793.0MHz)

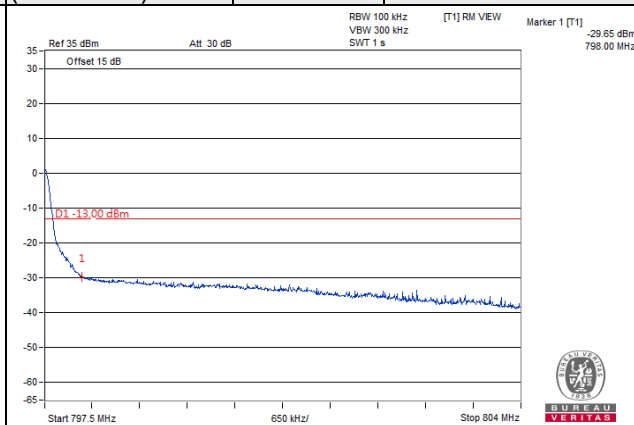
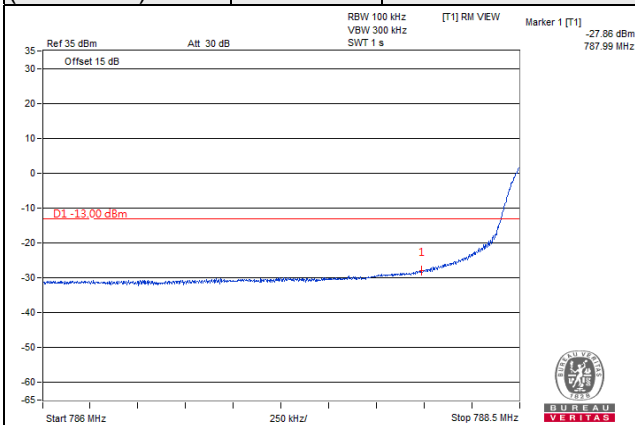
QPSK

50 RB / 0 RB Offset

Channel 23330  
(793.0MHz)

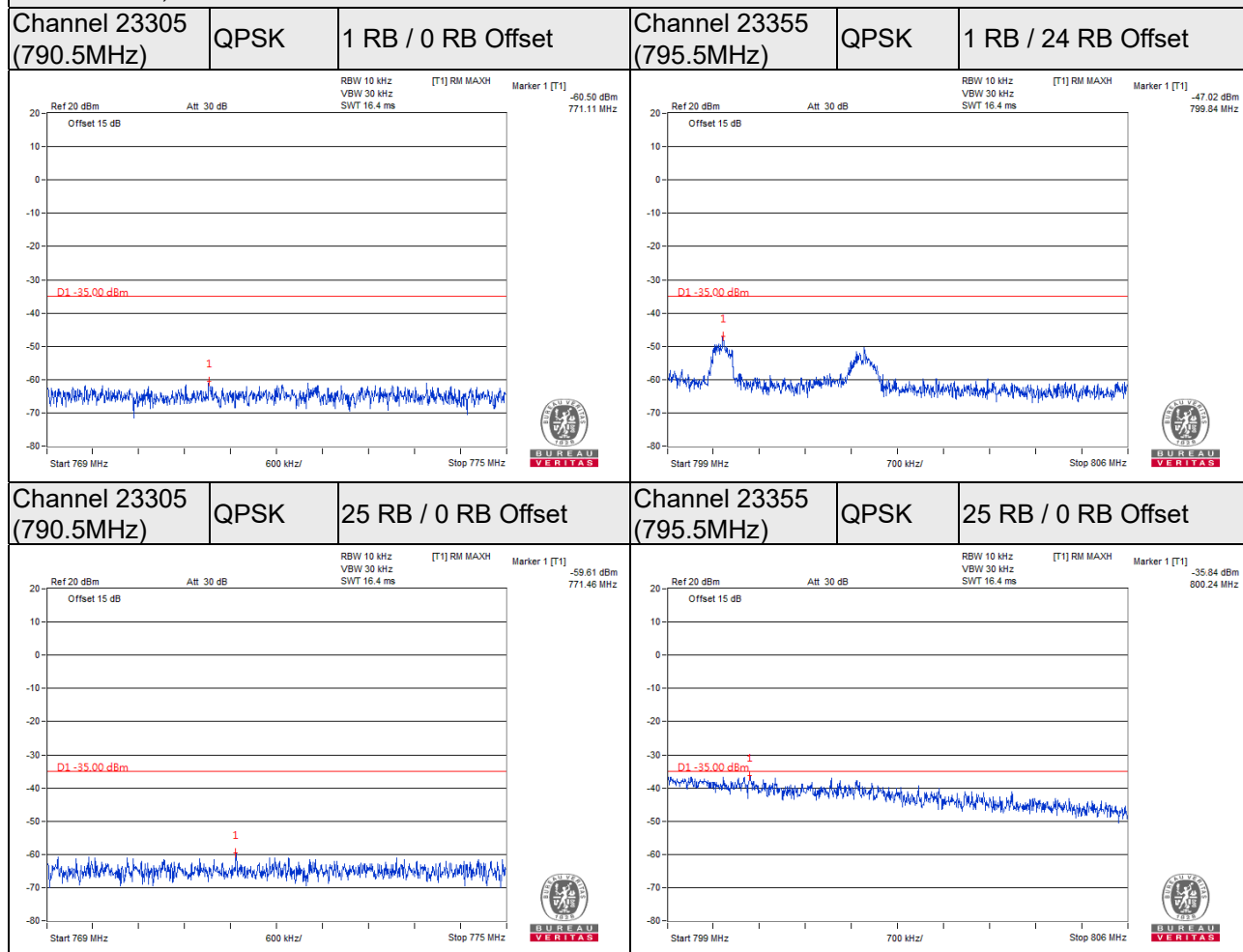
QPSK

50 RB / 0 RB Offset



### Out Of Band Emission

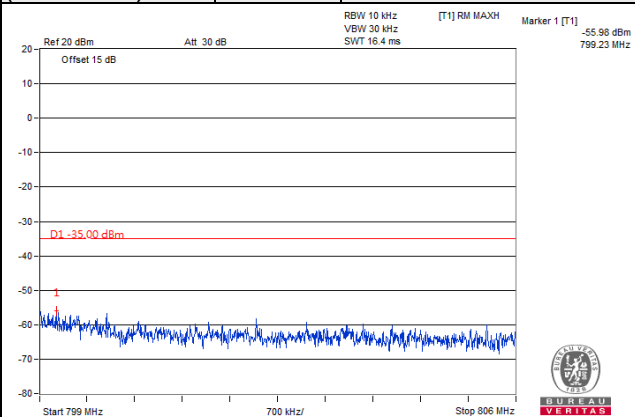
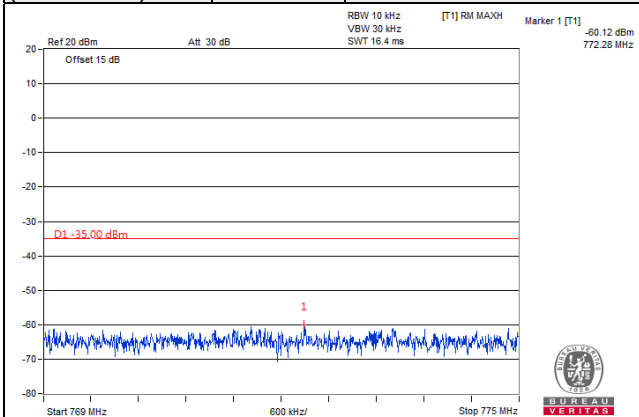
LTE Band 14, Channel Bandwidth 5MHz



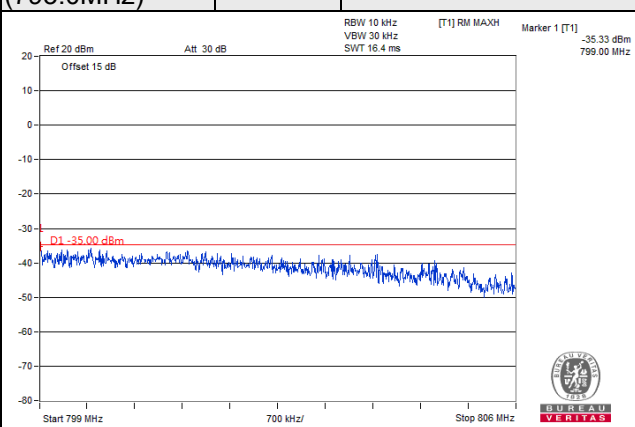
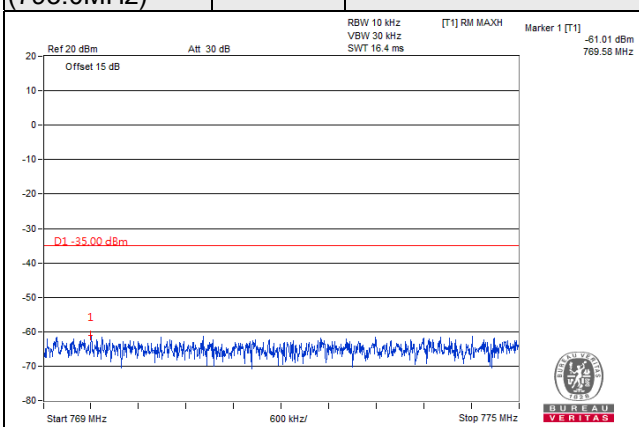
For the 769-775MHz and 799-805MHz band, the FCC limit is  $65+10\log(P[\text{watt}])$  in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance, and the correction factor is compensated at the spectrum. By using a 10 kHz bandwidth on the spectrum analyzer.

LTE Band 14, Channel Bandwidth 10MHz

Channel 23330 (793.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 23330 (793.0MHz)	QPSK	1 RB / 49 RB Offset
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Channel 23330 (793.0MHz)	QPSK	50 RB / 0 RB Offset	Channel 23330 (793.0MHz)	QPSK	50 RB / 0 RB Offset
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For the 769-775MHz and 799-805MHz band, the FCC limit is  $65+10\log(P[\text{watt}])$  in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance, and the correction factor is compensated at the spectrum. By using a 10 kHz bandwidth on the spectrum analyzer.

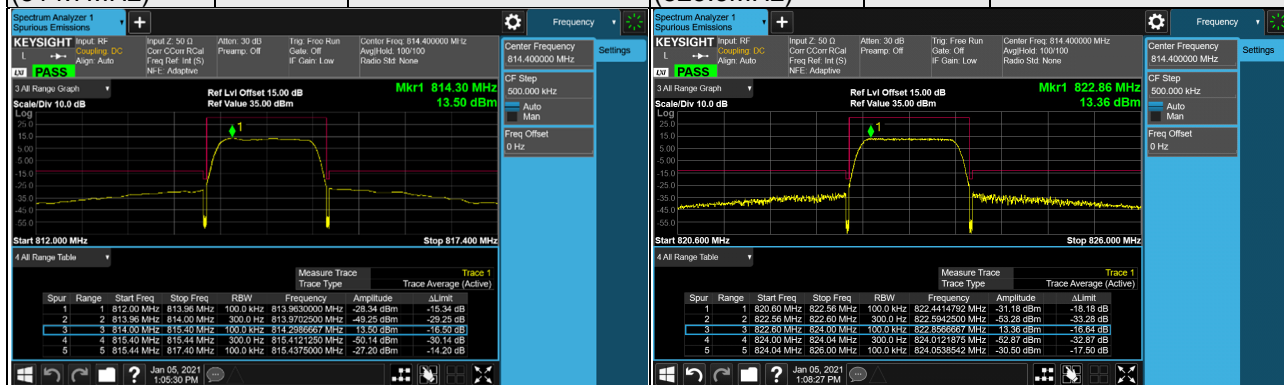
### Emission Mask

LTE Band 26, Channel Bandwidth 1.4MHz

Channel 26697 (814.7MHz)	QPSK	1 RB / 0 RB Offset	Channel 26783 (823.3MHz)	QPSK	1 RB / 5 RB Offset
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Channel 26697 (814.7MHz)	QPSK	6 RB / 0 RB Offset	Channel 26783 (823.3MHz)	QPSK	6 RB / 0 RB Offset
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### LTE Band 26, Channel Bandwidth 3MHz

Channel 26705  
(815.5MHz)

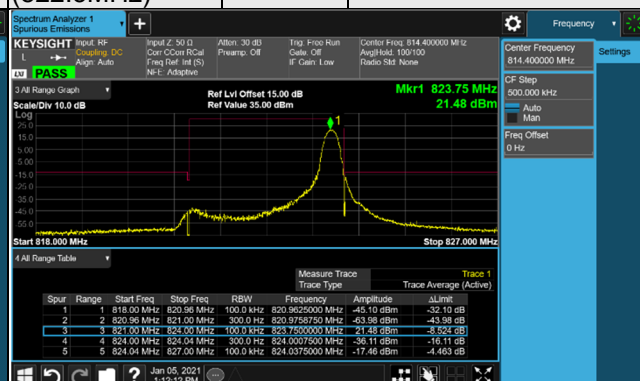
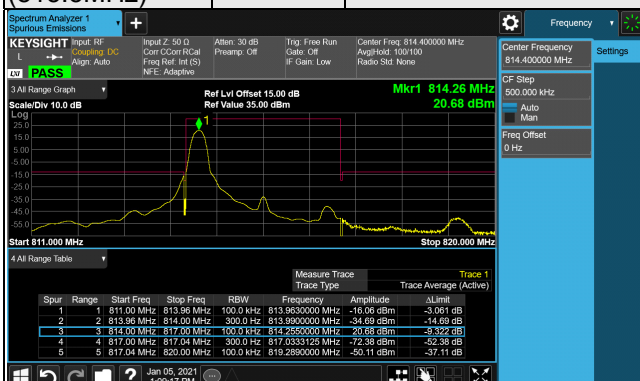
QPSK

1 RB / 0 RB Offset

Channel 26775  
(822.5MHz)

QPSK

1 RB / 14 RB Offset



Channel 26705  
(815.5MHz)

QPSK

15 RB / 0 RB Offset

Channel 26775  
(822.5MHz)

QPSK

15 RB / 0 RB Offset

