FCC Test Report

(Part 27)

Report No.:	RFBGTL-WTW-P22070227-9
FCC ID:	APYHRO00316
Received Date:	Feb. 19, 2022
Test Date:	Jul. 26 ~ Aug. 16, 2022
Issued Date:	Aug. 25, 2022
Applicant:	SHARP Corporation Mobile Communication BU
Address:	2-13-1 Iida Hachihonmatsu Higashi-hiroshima City, Hiroshima 730-0192, Japan
Manufacturer:	Sharp Corporation
Address:	1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location (1):	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
Test Location (2):	No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan
FCC Registration / Designation Number:	788550 / TW0003 281270 / TW0032

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFBGTL-WTW-P22070227-9	Original Release	Aug. 25, 2022

1 Certificate of Conformity

Product:	Smart Phone
Brand:	SHARP
Sample Status:	Engineering Sample
Applicant:	SHARP Corporation Mobile Communication BU
Test Date:	Jul. 26 ~ Aug. 16, 2022
Standards:	FCC Part 27, Subpart C, M

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 : Lena Wang , **Date:** Aug. 25, 2022

Lena Wang / Specialist

Approved by : Jeremy Lin , **Date:** Aug. 25, 2022

Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 27.50(h)(2)	Equivalent Isotropically radiated power	Pass	Meet the requirement of limit.
2.1047	Modulation characteristics	Pass	Meet the requirement.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Channel Edge / Out of Band Emission Measurements	Pass	Meet the requirement of limit.
--	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(m)(4)(6)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -19.19 dB at 5135.00 MHz.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~1000MHz	2.92 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver Rohde & Schwarz	ESR3	102579	Jul. 01, 2022	Jun. 30, 2023
Spectrum Analyzer KEYSIGHT	N9020B	MY60110462	Dec. 21, 2021	Dec. 20, 2022
BILOG Antenna SCHWARZBECK	VULB9168	995	Oct. 28, 2021	Oct. 27, 2022
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	995	Nov. 14, 2021	Nov. 13, 2022
Loop Antenna EMCI	EM-6879	269	Sep. 16, 2021	Sep. 15, 2022
Preamplifier EMCI	EMC330N	980783	Jan. 17, 2022	Jan. 16, 2023
Preamplifier EMCI	EMC118A45SE	980810	Dec. 30, 2021	Dec. 29, 2022
Preamplifier EMCI	EMC184045SE	980787	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC104-SM-SM-(9000+2000+1000)	201230+ 201242+ 210101	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMCCFD400-NM-NM-(9000+300+500)	201252+ 201250+ 201245	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201261+201258+ 201249	Jan. 17, 2022	Jan. 16, 2023
Software BV CPS	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Turn Table Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208675	NA	NA
Antenna Tower KaiTuo	NA	NA	NA	NA
Antenna Tower Controller KaiTuo	KT-2000	NA	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	Jul. 13, 2022	Jul. 12, 2023
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Feb. 16, 2022	Feb. 15, 2023

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in WM Chamber 7.

3 General Information

3.1 General Description of EUT

Product	Smart Phone			
Brand	SHARP			
Status of EUT	Engineering Sample			
Power Supply Rating	5.0Vdc (from adapter) 3.87Vdc (Battery)			
Modulation Type	QPSK, 16QAM, 64QAM			
Frequency Range	LTE Band 7 (Channel Bandwidth: 5 MHz)	2502.5 ~ 2567.5 MHz		
	LTE Band 7 (Channel Bandwidth: 10 MHz)	2505 ~ 2565 MHz		
	LTE Band 7 (Channel Bandwidth: 15 MHz)	2507.5 ~ 2562.5 MHz		
	LTE Band 7 (Channel Bandwidth: 20 MHz)	2510 ~ 2560 MHz		
Max. EIRP Power		QPSK	16QAM	64QAM
	LTE Band 7 (Channel Bandwidth: 5 MHz)	96.605 mW (19.85dBm)	79.250 mW (18.99dBm)	60.814 mW (17.84dBm)
	LTE Band 7 (Channel Bandwidth: 10 MHz)	101.391 mW (20.06dBm)	79.616 mW (19.01dBm)	61.518 mW (17.89dBm)
	LTE Band 7 (Channel Bandwidth: 15 MHz)	98.628 mW (19.94dBm)	81.470 mW (19.11dBm)	60.954 mW (17.85dBm)
	LTE Band 7 (Channel Bandwidth: 20 MHz)	102.329 mW (20.10dBm)	80.168 mW (19.04dBm)	61.235 mW (17.87dBm)
Emission Designator	LTE Band 7 (Channel Bandwidth: 5 MHz)	4M50D7W		
	LTE Band 7 (Channel Bandwidth: 10 MHz)	8M99G7D		
	LTE Band 7 (Channel Bandwidth: 15 MHz)	13M5D7W		
	LTE Band 7 (Channel Bandwidth: 20 MHz)	18M0G7D		
Antenna Type	Refer to note			
Accessory Device	NA			
Data Cable Supplied	NA			

Note:

1. There are differences between FCC ID: APYHRO00314 & FCC ID: APYHRO00316:

FCC ID	APYHRO00314	APYHRO00316
FM Radio	Supports	Doesn't support

2. The EUT contains following support units.

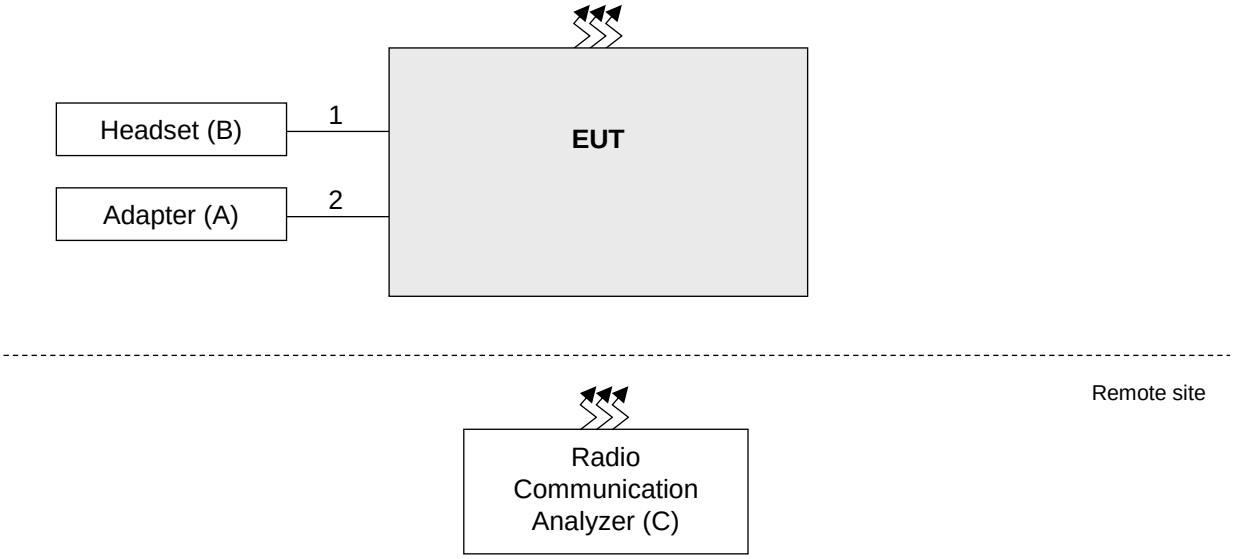
Product	Brand	Model	Description
Adapter (Support unit)	Salom	XN-2QC25	Input: 100-240Vac, 50/60Hz, 0.2A Output: 5.0Vdc, 800mA
Battery	-	-	3.87Vdc, Rated 4870mAh (18.9Wh), Typ. 5000mAh (19.4Wh)
Headset (Support unit)	Ambibio	AB-HI02JS	-
USB cable (Support unit)	Luxshare-ICT	L6KU2007-CS-H	0.95m shielded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

3. The antenna information is listed as below.

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

* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

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
1.	Adapter	Salom	XN-2QC25	N/A	N/A	Provided by client
2.	Headset	Ambibio	AB-HI02JS	N/A	N/A	Provided by client
3.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	NA	-

Note:

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

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

3.3 Test Mode Applicability and Tested Channel Detail

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

Band	Radiated Emission
LTE Band 7	Z-plane

LTE Band 7

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	RB #
-	EIRP	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM, 64QAM	1 Half Full
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM, 64QAM	1 Half Full
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM, 64QAM	1 Half Full
		20850 to 21350	20850, 21100, 21350	20 MHz	QPSK, 16QAM, 64QAM	1 Half Full
-	Modulation Characteristics	20850 to 21350	21100	20 MHz	QPSK, 16QAM, 64QAM	Full
-	Frequency Stability	20775 to 21425	20775, 21425	5 MHz	QPSK	Full
		20800 to 21400	20800, 21400	10 MHz	QPSK	Full
		20825 to 21375	20825, 21375	15 MHz	QPSK	Full
		20850 to 21350	20850, 21350	20 MHz	QPSK	Full
-	Occupied Bandwidth	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM, 64QAM	Full
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM, 64QAM	Full
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM, 64QAM	Full
		20850 to 21350	20850, 21100, 21350	20 MHz	QPSK, 16QAM, 64QAM	Full
-	Peak to Average Ratio	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM, 64QAM	1
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM, 64QAM	1
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM, 64QAM	1
		20850 to 21350	20850, 21100, 21350	20 MHz	QPSK, 16QAM, 64QAM	1
-	Out-of-Band Emissions	20775 to 21425	20775, 21425	5 MHz	QPSK, 16QAM, 64QAM	1 Half Full
		20800 to 21400	20800, 21400	10 MHz	QPSK, 16QAM, 64QAM	1 Half Full
		20825 to 21375	20825, 21375	15 MHz	QPSK, 16QAM, 64QAM	1 Half Full
		20850 to 21350	20850, 21350	20 MHz	QPSK, 16QAM, 64QAM	1 Half Full

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	RB #
-	Conducted Emission	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK	1
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK	1
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK	1
		20850 to 21350	20850, 21100 21350	20 MHz	QPSK	1
-	Radiated Emission	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK	1
		20850 to 21350	20850, 21100, 21350	20 MHz	QPSK	1

Note:

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

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25 deg. C, 65 % RH	3.87Vdc	Willy Cheng
Modulation Characteristics	23 deg. C, 68 % RH	3.87Vdc	Noah Chang
Frequency Stability	23 deg. C, 68 % RH	3.87Vdc	Noah Chang
Occupied Bandwidth	23 deg. C, 68 % RH	3.87Vdc	Noah Chang
Out-of-Band Emissions	23 deg. C, 68 % RH	3.87Vdc	Noah Chang
Peak to Average Ratio	23 deg. C, 68 % RH	3.87Vdc	Noah Chang
Conducted Emission	23 deg. C, 68 % RH	3.87Vdc	Noah Chang
Radiated Emission	22deg. C, 67%RH	120Vac, 60Hz	Edison Lee, Wade Huang

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

3.1 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 and references:

Test Standard:
FCC 47 CFR Part 2
FCC 47 CFR Part 27
ANSI 63.26-2015

Note: 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
ANSI/TIA/EIA-603-E 2016

Note: 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

Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

4.1.2 Test Procedures

Conducted Power Measurement:

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

Maximum EIRP / ERP

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

$EIRP = P_{Meas} + G_T$

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

where

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

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

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

4.1.3 Test Setup

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

LTE Band 7						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20850	21100	21350
		Frequency (MHz)		2510	2535	2560
20M	QPSK	1	0	21.71	21.90	21.69
		1	50	21.61	21.52	21.48
		1	99	21.43	21.51	21.36
		50	0	20.57	20.73	20.63
		50	25	20.49	20.52	20.46
		50	50	20.54	20.52	20.41
		100	0	20.65	20.59	20.52
20M	16QAM	1	0	20.83	20.84	20.74
		1	50	20.84	20.67	20.63
		1	99	20.64	20.73	20.74
		50	0	19.63	19.57	19.62
		50	25	19.64	19.67	19.54
		50	50	19.72	19.67	19.52
		100	0	19.63	19.63	19.66
20M	64QAM	1	0	19.67	19.58	19.56
		1	50	19.55	19.59	19.40
		1	99	19.41	19.38	19.40
		50	0	18.67	18.74	18.60
		50	25	18.55	18.63	18.56
		50	50	18.51	18.60	18.47
		100	0	18.56	18.55	18.54

LTE Band 7						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20825	21100	21375
		Frequency (MHz)		2507.5	2535	2562.5
15M	QPSK	1	0	21.63	21.74	21.66
		1	37	21.49	21.49	21.39
		1	74	21.40	21.44	21.37
		36	0	20.56	20.61	20.67
		36	19	20.36	20.59	20.49
		36	39	20.51	20.45	20.33
		75	0	20.56	20.62	20.47
15M	16QAM	1	0	20.91	20.86	20.77
		1	37	20.75	20.63	20.54
		1	74	20.53	20.67	20.55
		36	0	19.60	19.58	19.53
		36	19	19.70	19.67	19.48
		36	39	19.57	19.55	19.46
		75	0	19.51	19.52	19.55
15M	64QAM	1	0	19.53	19.65	19.57
		1	37	19.51	19.52	19.36
		1	74	19.42	19.42	19.27
		36	0	18.63	18.69	18.70
		36	19	18.60	18.47	18.50
		36	39	18.47	18.48	18.37
		75	0	18.56	18.46	18.45

LTE Band 7						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20800	21100	21400
		Frequency (MHz)		2505	2535	2565
10M	QPSK	1	0	21.60	21.86	21.56
		1	24	21.56	21.58	21.51
		1	49	21.53	21.49	21.38
		25	0	20.59	20.63	20.61
		25	12	20.41	20.52	20.39
		25	25	20.51	20.50	20.40
		50	0	20.57	20.62	20.44
10M	16QAM	1	0	20.81	20.76	20.75
		1	24	20.67	20.71	20.65
		1	49	20.59	20.55	20.61
		25	0	19.52	19.64	19.54
		25	12	19.65	19.65	19.47
		25	25	19.64	19.47	19.38
		50	0	19.54	19.53	19.51
10M	64QAM	1	0	19.68	19.69	19.58
		1	24	19.45	19.43	19.42
		1	49	19.37	19.45	19.36
		25	0	18.63	18.65	18.69
		25	12	18.56	18.52	18.53
		25	25	18.40	18.58	18.29
		50	0	18.44	18.49	18.56

LTE Band 7						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20775	21100	21425
		Frequency (MHz)		2502.5	2535	2567.5
5M	QPSK	1	0	21.64	21.65	21.57
		1	12	21.51	21.61	21.54
		1	24	21.52	21.38	21.35
		12	0	20.59	20.69	20.64
		12	6	20.48	20.53	20.41
		12	13	20.58	20.50	20.39
		25	0	20.63	20.48	20.33
5M	16QAM	1	0	20.76	20.79	20.73
		1	12	20.75	20.68	20.60
		1	24	20.67	20.64	20.66
		12	0	19.57	19.61	19.57
		12	6	19.61	19.74	19.57
		12	13	19.68	19.53	19.50
		25	0	19.60	19.57	19.53
5M	64QAM	1	0	19.51	19.64	19.45
		1	12	19.47	19.49	19.44
		1	24	19.46	19.35	19.36
		12	0	18.73	18.62	18.59
		12	6	18.59	18.57	18.40
		12	13	18.56	18.60	18.40
		25	0	18.49	18.44	18.51

EIRP Power(dBm)

LTE Band 7						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20850	21100	21350
		Frequency (MHz)		2510	2535	2560
20M	QPSK	1	0	19.91	**20.10**	19.89
		1	50	19.81	19.72	19.68
		1	99	19.63	19.71	19.56
		50	0	18.77	18.93	18.83
		50	25	18.69	18.72	18.66
		50	50	18.74	18.72	18.61
		100	0	18.85	18.79	18.72
20M	16QAM	1	0	19.03	**19.04**	18.94
		1	50	**19.04**	18.87	18.83
		1	99	18.84	18.93	18.94
		50	0	17.83	17.77	17.82
		50	25	17.84	17.87	17.74
		50	50	17.92	17.87	17.72
		100	0	17.83	17.83	17.86
20M	64QAM	1	0	**17.87**	17.78	17.76
		1	50	17.75	17.79	17.60
		1	99	17.61	17.58	17.60
		50	0	16.87	16.94	16.80
		50	25	16.75	16.83	16.76
		50	50	16.71	16.80	16.67
		100	0	16.76	16.75	16.74

*EIRP = Conducted + antenna gain (-1.80dBi)

LTE Band 7						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20825	21100	21375
		Frequency (MHz)		2507.5	2535	2562.5
15M	QPSK	1	0	19.83	**19.94**	19.86
		1	37	19.69	19.69	19.59
		1	74	19.60	19.64	19.57
		36	0	18.76	18.81	18.87
		36	19	18.56	18.79	18.69
		36	39	18.71	18.65	18.53
		75	0	18.76	18.82	18.67
15M	16QAM	1	0	**19.11**	19.06	18.97
		1	37	18.95	18.83	18.74
		1	74	18.73	18.87	18.75
		36	0	17.80	17.78	17.73
		36	19	17.90	17.87	17.68
		36	39	17.77	17.75	17.66
		75	0	17.71	17.72	17.75
15M	64QAM	1	0	17.73	**17.85**	17.77
		1	37	17.71	17.72	17.56
		1	74	17.62	17.62	17.47
		36	0	16.83	16.89	16.90
		36	19	16.80	16.67	16.70
		36	39	16.67	16.68	16.57
		75	0	16.76	16.66	16.65

*EIRP = Conducted + antenna gain (-1.80dBi)

LTE Band 7						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20800	21100	21400
		Frequency (MHz)		2505	2535	2565
10M	QPSK	1	0	19.80	**20.06**	19.76
		1	24	19.76	19.78	19.71
		1	49	19.73	19.69	19.58
		25	0	18.79	18.83	18.81
		25	12	18.61	18.72	18.59
		25	25	18.71	18.70	18.60
		50	0	18.77	18.82	18.64
10M	16QAM	1	0	**19.01**	18.96	18.95
		1	24	18.87	18.91	18.85
		1	49	18.79	18.75	18.81
		25	0	17.72	17.84	17.74
		25	12	17.85	17.85	17.67
		25	25	17.84	17.67	17.58
		50	0	17.74	17.73	17.71
10M	64QAM	1	0	17.88	**17.89**	17.78
		1	24	17.65	17.63	17.62
		1	49	17.57	17.65	17.56
		25	0	16.83	16.85	16.89
		25	12	16.76	16.72	16.73
		25	25	16.60	16.78	16.49
		50	0	16.64	16.69	16.76

*EIRP = Conducted + antenna gain (-1.80dBi)

LTE Band 7						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20775	21100	21425
		Frequency (MHz)		2502.5	2535	2567.5
5M	QPSK	1	0	19.84	**19.85**	19.77
		1	12	19.71	19.81	19.74
		1	24	19.72	19.58	19.55
		12	0	18.79	18.89	18.84
		12	6	18.68	18.73	18.61
		12	13	18.78	18.70	18.59
		25	0	18.83	18.68	18.53
5M	16QAM	1	0	18.96	**18.99**	18.93
		1	12	18.95	18.88	18.80
		1	24	18.87	18.84	18.86
		12	0	17.77	17.81	17.77
		12	6	17.81	17.94	17.77
		12	13	17.88	17.73	17.70
		25	0	17.80	17.77	17.73
5M	64QAM	1	0	17.71	**17.84**	17.65
		1	12	17.67	17.69	17.64
		1	24	17.66	17.55	17.56
		12	0	16.93	16.82	16.79
		12	6	16.79	16.77	16.60
		12	13	16.76	16.80	16.60
		25	0	16.69	16.64	16.71

*EIRP = Conducted + antenna gain (-1.80dBi)

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

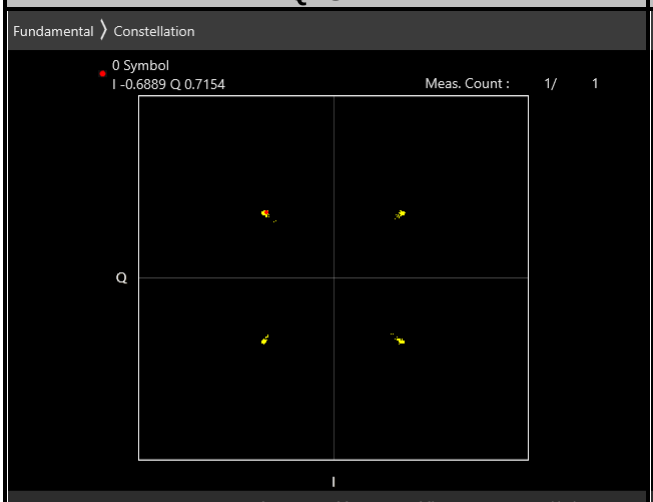
4.2.2 Test Setup

4.2.3 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.

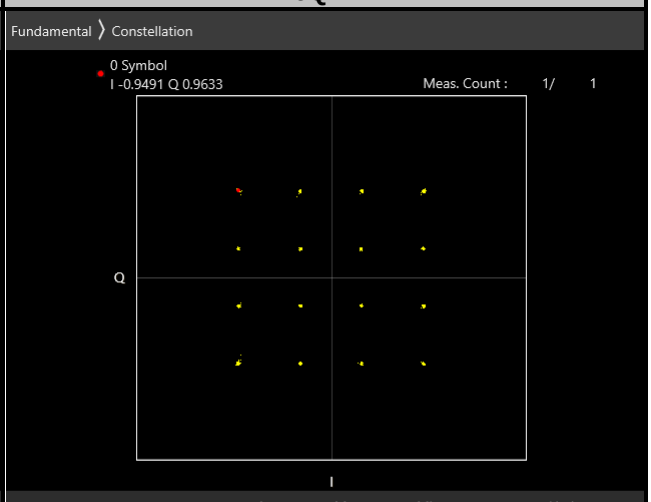
4.2.4 Test Results

Spectrum Plot of Measurement			
LTE Band 7			
Channel 21100			
QPSK			



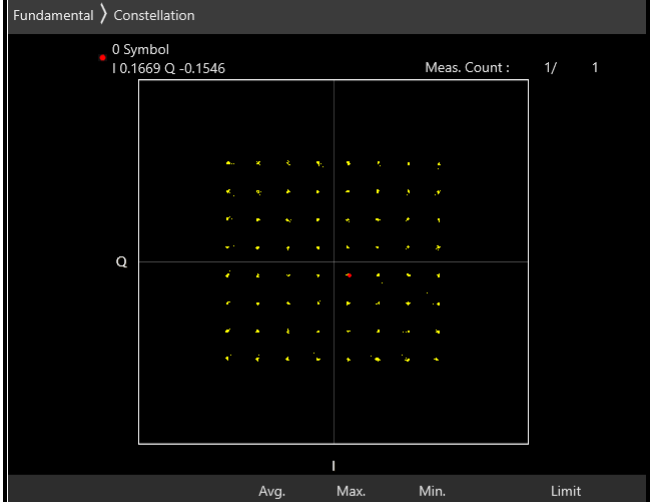
	Avg.	Max.	Min.	Limit
EVM	1.94	1.94	1.94 %(rms)	≤ 17.5 %(rms)
Peak Vector Error	28.04	28.04	28.04 %	
Carrier Leakage	-43.66	-43.66	-43.66 dBc	
IQ Imbalance	100.07	100.07	100.07 %(I/Q)	

16QAM			



	Avg.	Max.	Min.	Limit
EVM	1.59	1.59	1.59 %(rms)	≤ 12.5 %(rms)
Peak Vector Error	21.42	21.42	21.42 %	
Carrier Leakage	-42.57	-42.57	-42.57 dBc	
IQ Imbalance	99.90	99.90	99.90 %(I/Q)	

64QAM



	Avg.	Max.	Min.	Limit
EVM	1.64	1.64	1.64 %(rms)	≤ 8.0 %(rms)
Peak Vector Error	18.67	18.67	18.67 %	
Carrier Leakage	-42.10	-42.10	-42.10 dBc	
IQ Imbalance	100.07	100.07	100.07 %(I/Q)	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

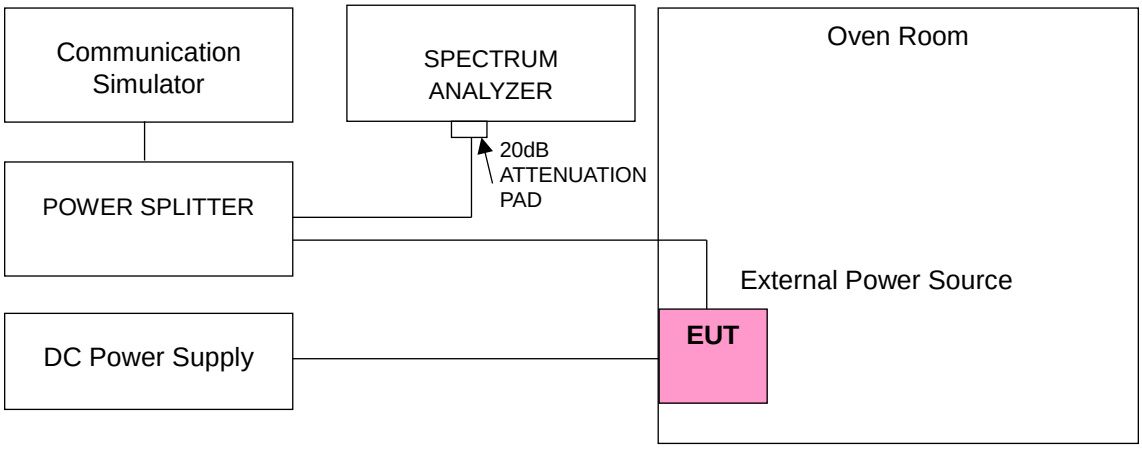
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT -30℃~ 50℃.

4.3.2 Test Procedure

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

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

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	2502.499997	-0.001	2567.500002	0.001
3.87	2502.500002	0.001	2567.500001	0.000
4.45	2502.499999	0.000	2567.499999	0.000

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2502.500002	0.001	2567.500002	0.001
-20	2502.499999	0.000	2567.499996	-0.001
-10	2502.499999	0.000	2567.500004	0.001
0	2502.500002	0.001	2567.500001	0.000
10	2502.500001	0.000	2567.500001	0.000
20	2502.500002	0.001	2567.499999	0.000
30	2502.499999	-0.001	2567.499999	-0.001
40	2502.500003	0.001	2567.499996	-0.001
50	2502.500002	0.001	2567.499996	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	2505.000001	0.000	2565.000001	0.000
3.87	2505.000001	0.000	2565.000002	0.001
4.45	2504.999998	-0.001	2565.000001	0.000

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2504.999999	0.000	2564.999997	-0.001
-20	2505.000002	0.001	2565.000003	0.001
-10	2504.999997	-0.001	2564.999999	0.000
0	2505.000001	0.000	2564.999998	-0.001
10	2504.999998	-0.001	2565.000002	0.001
20	2505.000004	0.001	2565.000002	0.001
30	2505.000001	0.000	2564.999998	-0.001
40	2505.000003	0.001	2565.000003	0.001
50	2504.999997	-0.001	2564.999998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	2507.499996	-0.002	2562.500001	0.001
3.87	2507.500002	0.001	2562.500003	0.001
4.45	2507.500002	0.001	2562.499998	-0.001

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2507.500001	0.000	2562.500003	0.001
-20	2507.500003	0.001	2562.500004	0.002
-10	2507.500003	0.001	2562.499997	-0.001
0	2507.499997	-0.001	2562.500003	0.001
10	2507.500001	0.000	2562.500002	0.001
20	2507.499998	-0.001	2562.499997	-0.001
30	2507.500003	0.001	2562.500001	0.001
40	2507.500003	0.001	2562.500003	0.001
50	2507.499999	-0.001	2562.500004	0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.60	2510.000004	0.002	2559.999998	-0.001
3.87	2509.999998	-0.001	2560.000003	0.001
4.45	2510.000001	0.000	2559.999998	-0.001

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2509.999997	-0.001	2559.999997	-0.001
-20	2510.000001	0.001	2560.000003	0.001
-10	2509.999999	0.000	2560.000001	0.000
0	2509.999997	-0.001	2560.000001	0.000
10	2510.000002	0.001	2560.000003	0.001
20	2510.000004	0.002	2559.999997	-0.001
30	2509.999999	0.000	2559.999999	0.000
40	2509.999998	-0.001	2559.999997	-0.001
50	2509.999998	-0.001	2560.000002	0.001

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

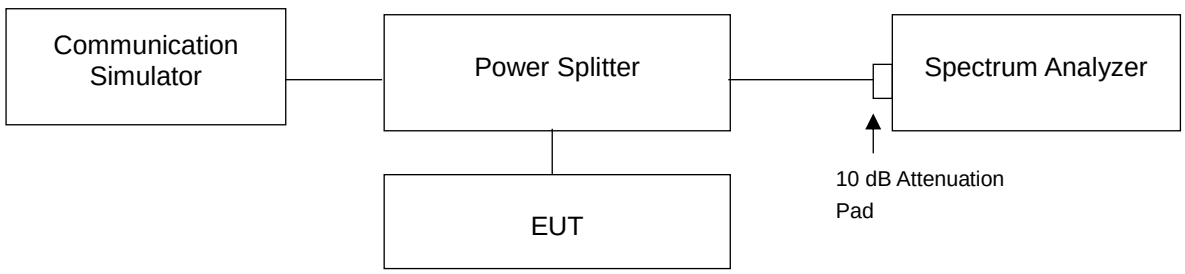
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

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

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

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

4.4.3 Test Setup

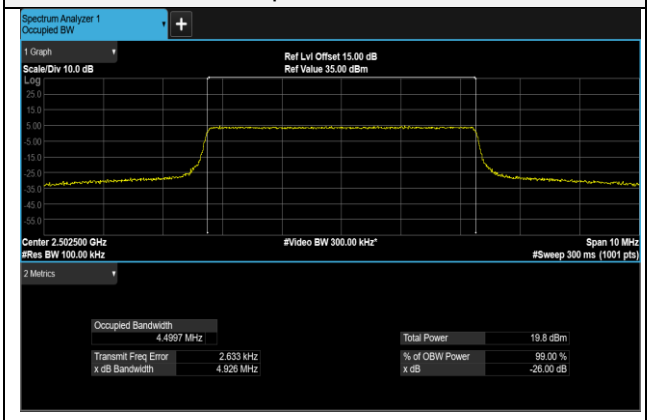
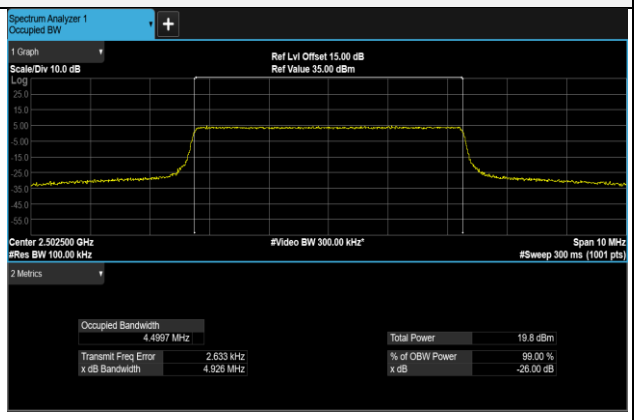


4.4.4 Test Results

Channel Bandwidth: 5 MHz

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20775	2502.5	4.4987	4.852
QPSK	21100	2535	4.4985	4.875
QPSK	21425	2567.5	4.4982	4.907
16QAM	20775	2502.5	4.4941	4.884
16QAM	21100	2535	4.4952	4.872
16QAM	21425	2567.5	4.4956	4.874
64QAM	20775	2502.5	4.4997	4.926
64QAM	21100	2535	4.4976	4.874
64QAM	21425	2567.5	4.4984	4.905

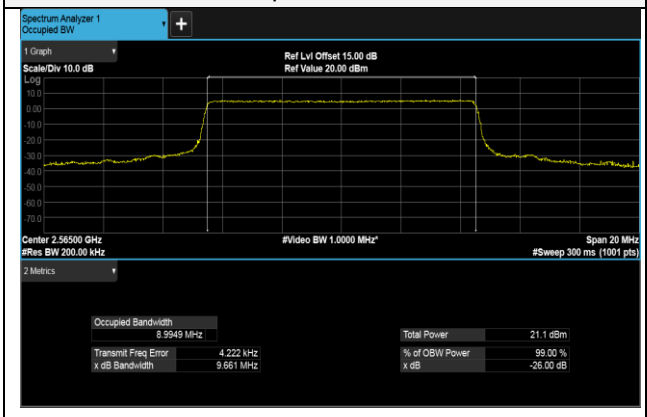
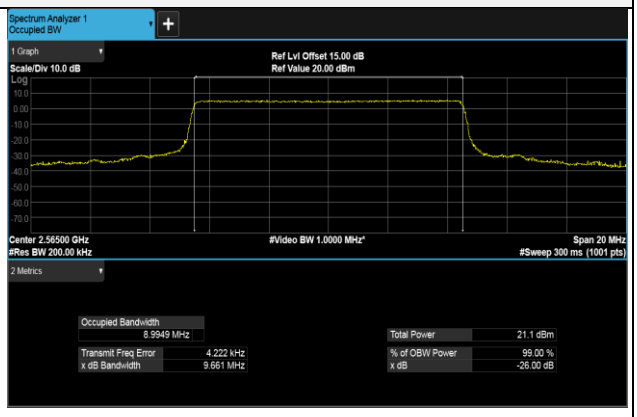
NOTE: For the test plots please refer to the below pages.

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
64QAM CH 20775 (2502.5MHz)	64QAM CH 20775 (2502.5MHz)

Channel Bandwidth: 10 MHz

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20800	2505	8.9894	9.567
QPSK	21100	2535	8.9903	9.542
QPSK	21400	2565	8.9949	9.661
16QAM	20800	2505	8.9875	9.598
16QAM	21100	2535	8.9870	9.568
16QAM	21400	2565	8.9862	9.562
64QAM	20800	2505	8.9865	9.567
64QAM	21100	2535	8.9880	9.583
64QAM	21400	2565	8.9929	9.586

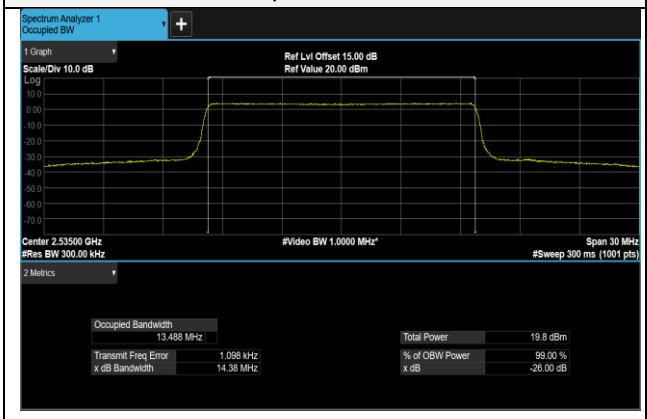
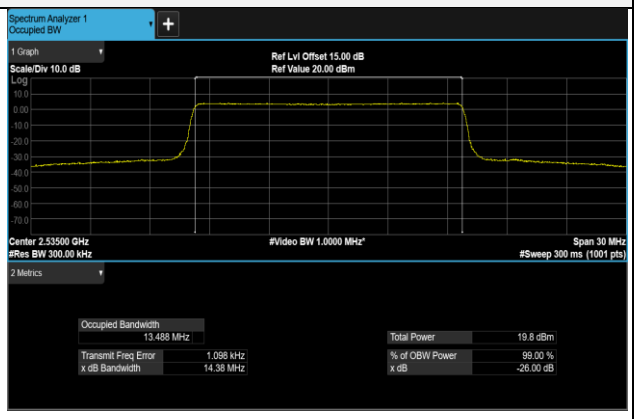
NOTE: For the test plots please refer to the below pages.

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 21400 (2565MHz)	QPSK CH 21400 (2565MHz)

Channel Bandwidth: 15 MHz

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20825	2507.5	13.4725	14.280
QPSK	21100	2535	13.4683	14.285
QPSK	21375	2562.5	13.4753	14.317
16QAM	20825	2507.5	13.4702	14.286
16QAM	21100	2535	13.4688	14.274
16QAM	21375	2562.5	13.4766	14.267
64QAM	20825	2507.5	13.4743	14.291
64QAM	21100	2535	13.4878	14.382
64QAM	21375	2562.5	13.4787	14.272

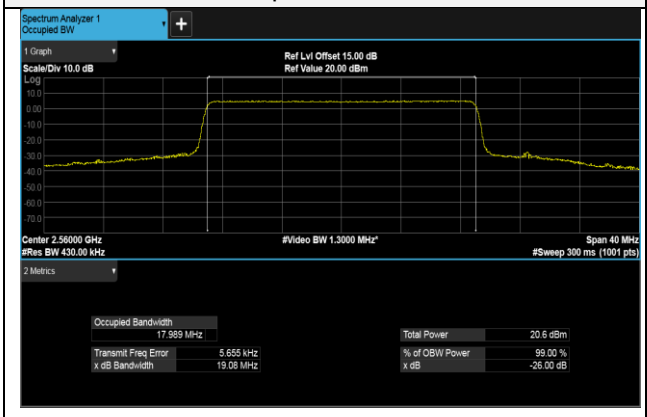
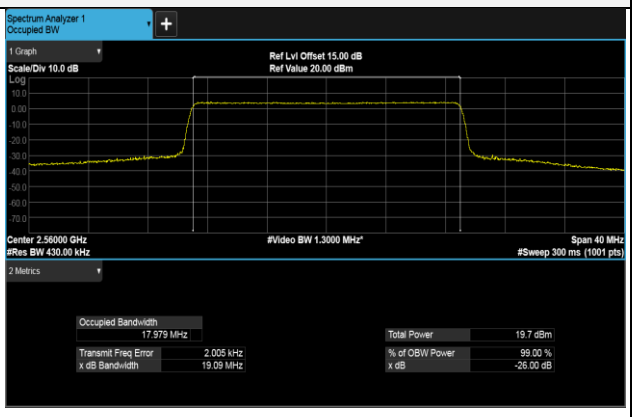
NOTE: For the test plots please refer to the below pages.

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
64QAM CH 21100 (2535MHz)	64QAM CH 21100 (2535MHz)

Channel Bandwidth: 20 MHz

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20850	2510	17.9725	19.051
QPSK	21100	2535	17.9724	19.050
QPSK	21350	2560	17.9885	19.079
16QAM	20850	2510	17.9729	19.049
16QAM	21100	2535	17.9655	19.047
16QAM	21350	2560	17.9792	19.086
64QAM	20850	2510	17.9679	19.040
64QAM	21100	2535	17.9811	19.054
64QAM	21350	2560	17.9778	19.075

NOTE: For the test plots please refer to the below pages.

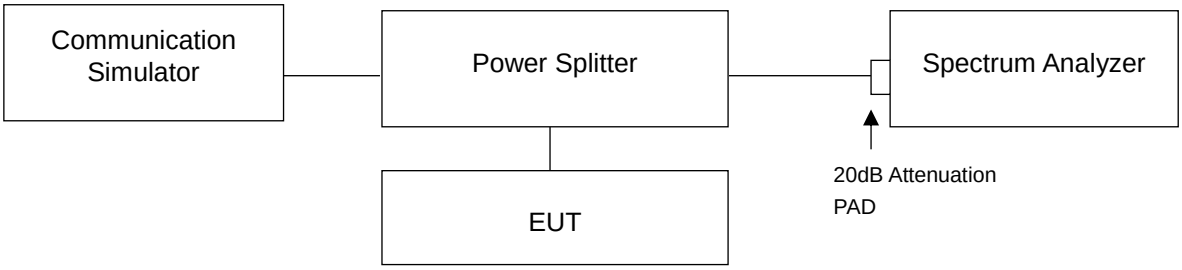
Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 21350 (2560MHz)	16QAM CH 21350 (2560MHz)

4.5 Out-of-Band Emissions Measurement

4.5.1 Limits of Out-of-Band Emissions Measurement

According to FCC 27.53(m)(4)&(6) specified that power of any emission outside of the channel edge must be attenuated below the transmitting power (P) by a factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed.

4.5.2 Test Setup

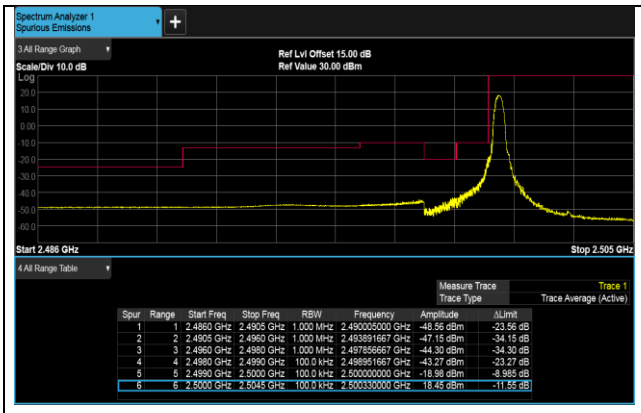


4.5.3 Test Procedures

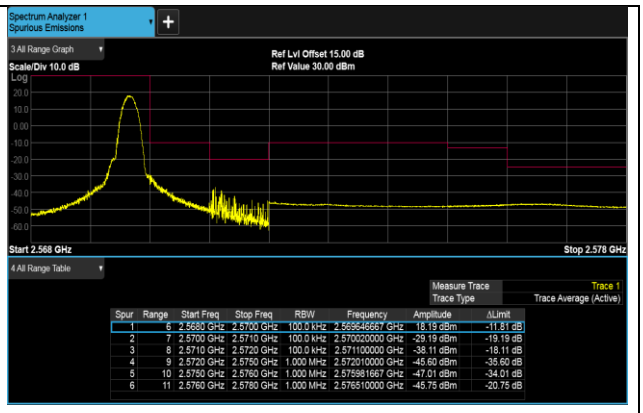
a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
b. The out-of-band emissions measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
c. Record the max. trace plot into the test report.

Test Results

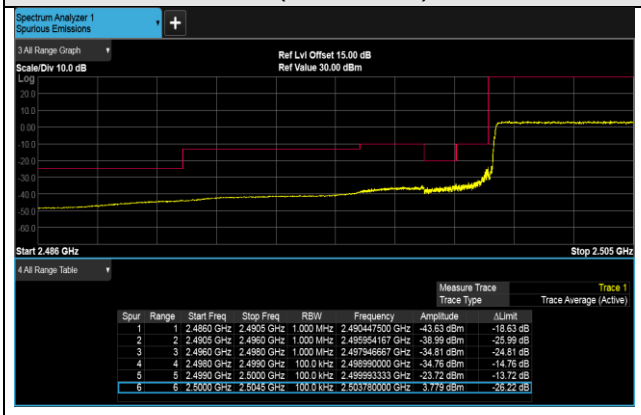
LTE Band 7
Channel Bandwidth: 5 MHz



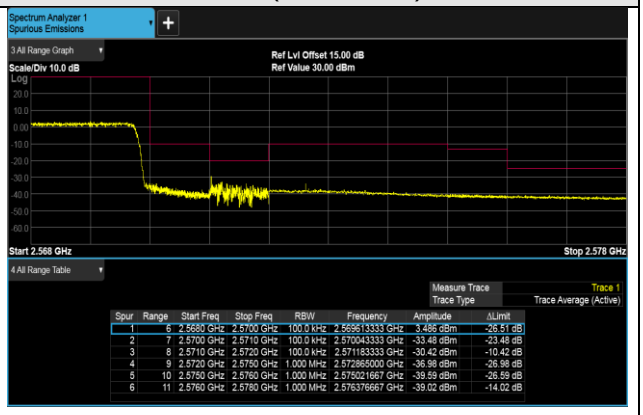
1RB (2502.5MHz)



1RB (2567.5MHz)

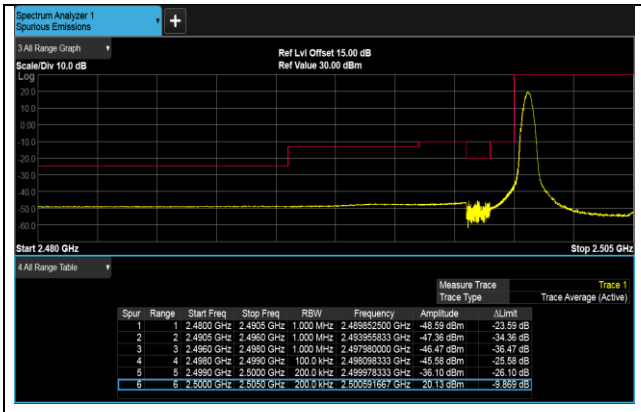
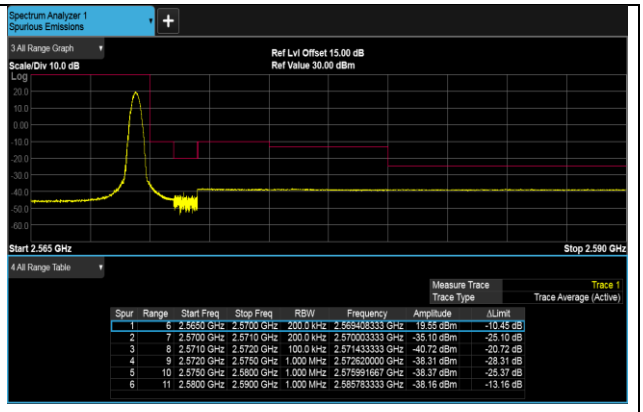
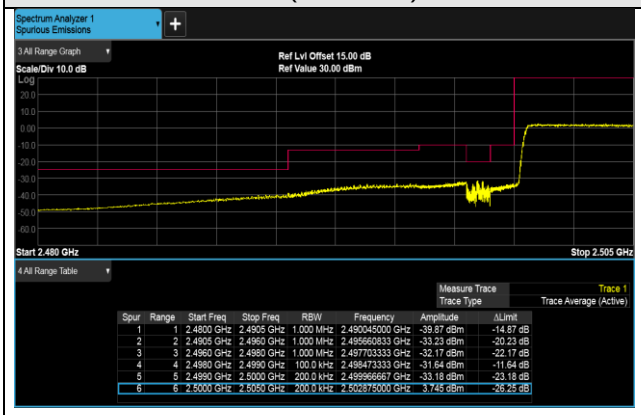
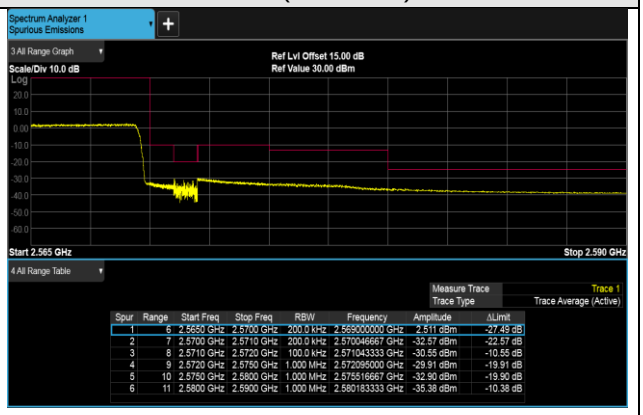


FULL (2502.5MHz)

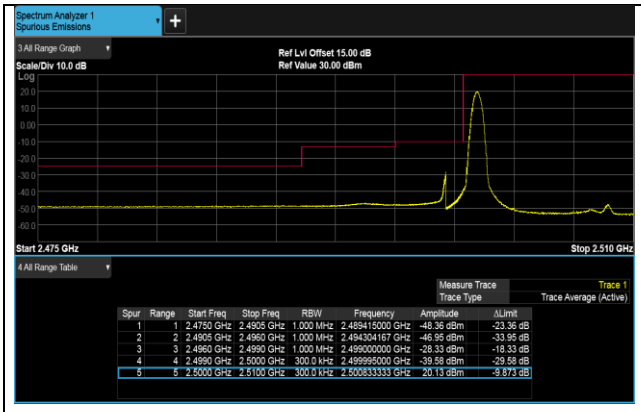


FULL (2567.5MHz)

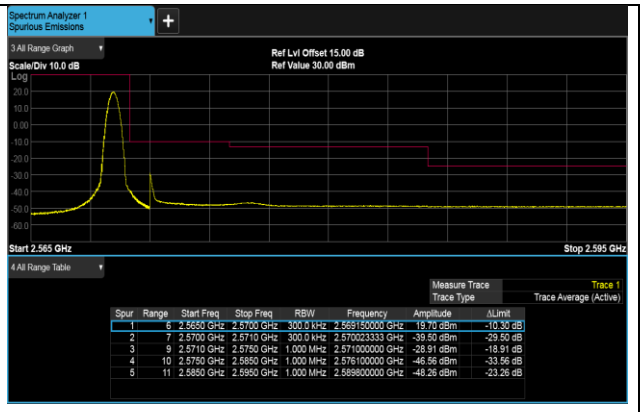
Channel Bandwidth: 10 MHz

	
1RB (2505MHz)	1RB (2565MHz)
	
FULL (2505MHz)	FULL (2565MHz)

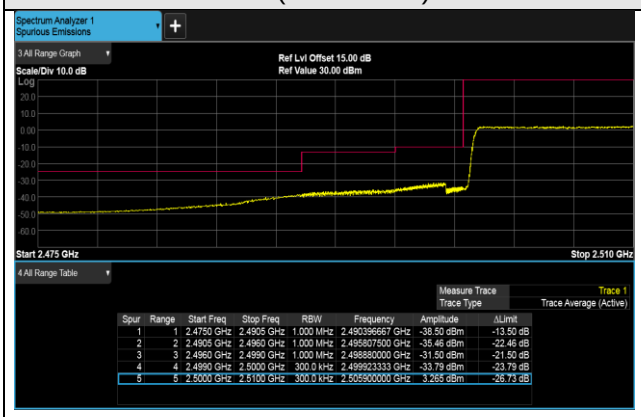
Channel Bandwidth: 15 MHz



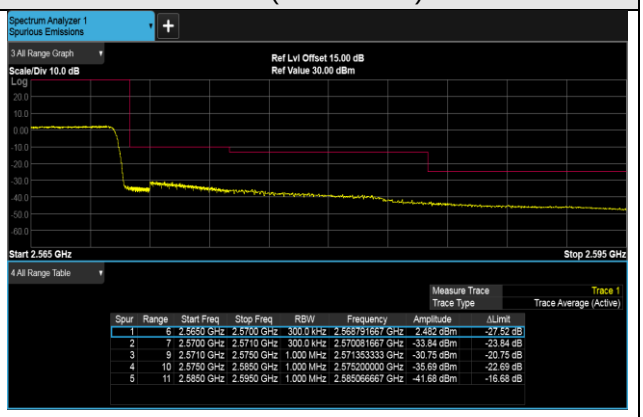
1RB (2507.5MHz)



1RB (2562.5MHz)

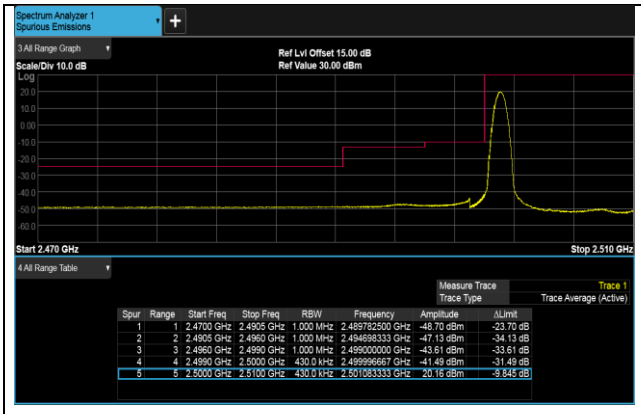


FULL (2507.5MHz)

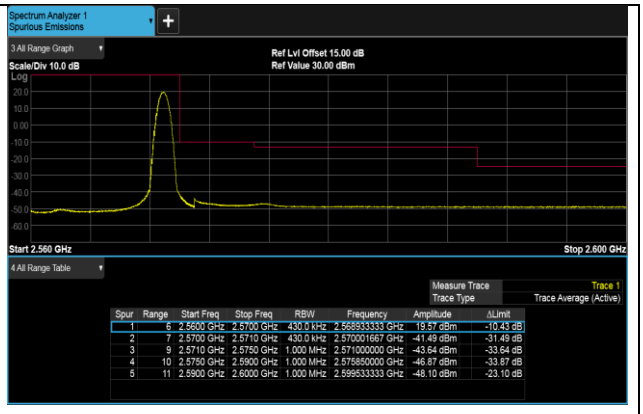


FULL (2562.5MHz)

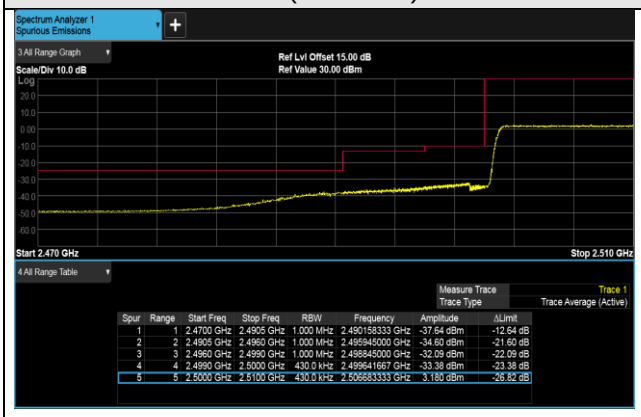
Channel Bandwidth: 20 MHz



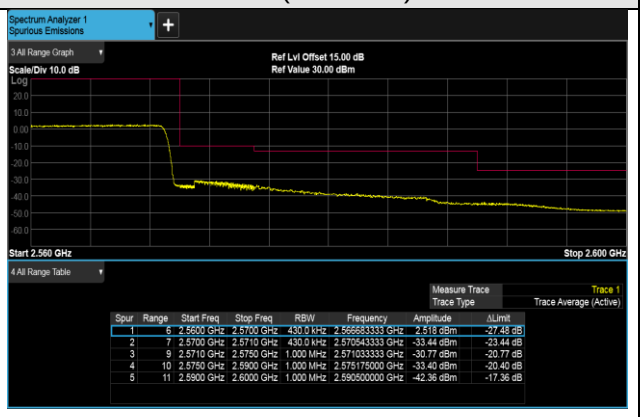
1RB (2510MHz)



1RB (2560MHz)



FULL (2510MHz)



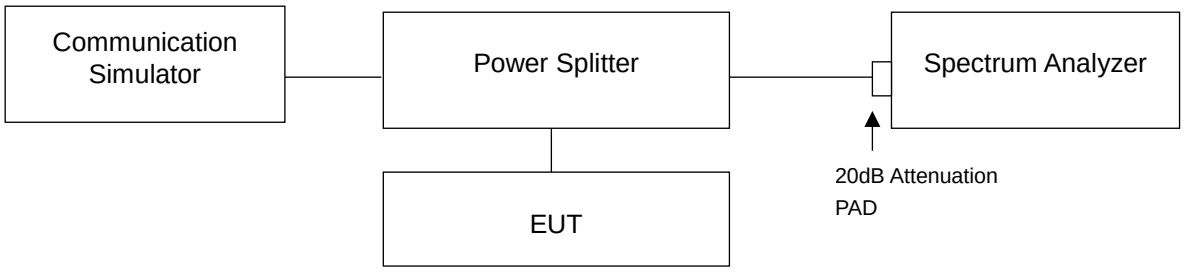
FULL (2560MHz)

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

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

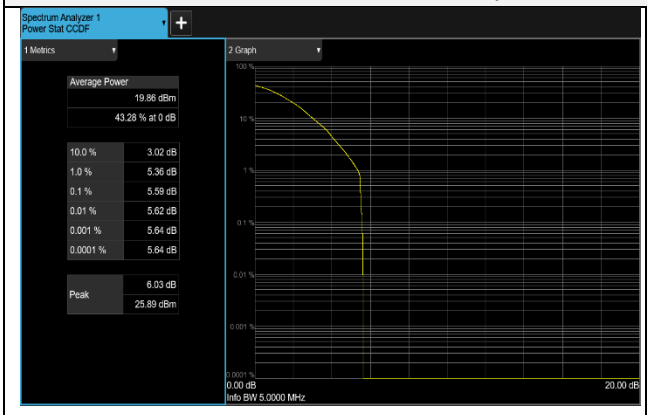
4.6.4 Test Results

LTE Band 7

Channel Bandwidth: 5 MHz

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	20775	2502.5	3.57	13	PASS
QPSK	21100	2535	3.46	13	PASS
QPSK	21425	2567.5	3.51	13	PASS
16QAM	20775	2502.5	4.49	13	PASS
16QAM	21100	2535	4.44	13	PASS
16QAM	21425	2567.5	4.49	13	PASS
64QAM	20775	2502.5	5.21	13	PASS
64QAM	21100	2535	5.59	13	PASS
64QAM	21425	2567.5	5.53	13	PASS

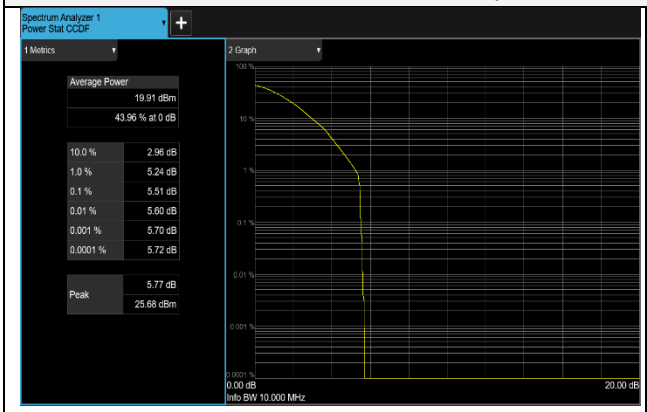
NOTE: For the test plots please refer to the below pages.

Spectrum Plot of Worst Value	
	
64QAM CH 21100 (2535MHz)	

Channel Bandwidth: 10 MHz

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	20800	2505	3.63	13	PASS
QPSK	21100	2535	3.59	13	PASS
QPSK	21400	2565	3.62	13	PASS
16QAM	20800	2505	4.64	13	PASS
16QAM	21100	2535	4.65	13	PASS
16QAM	21400	2565	4.75	13	PASS
64QAM	20800	2505	5.22	13	PASS
64QAM	21100	2535	5.51	13	PASS
64QAM	21400	2565	5.39	13	PASS

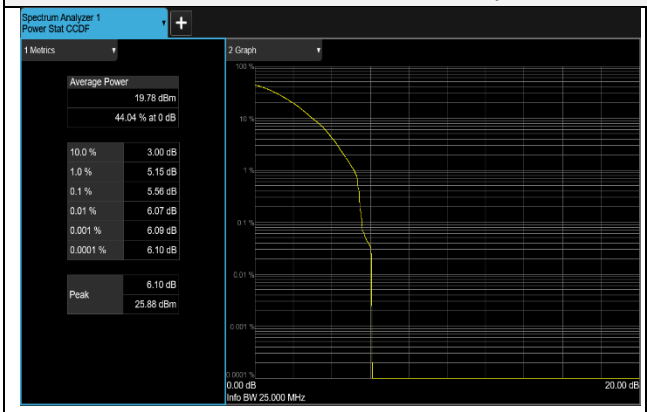
NOTE: For the test plots please refer to the below pages.

Spectrum Plot of Worst Value	
	
64QAM CH 21100 (2535MHz)	

Channel Bandwidth: 15 MHz

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	20825	2507.5	3.71	13	PASS
QPSK	21100	2535	3.58	13	PASS
QPSK	21375	2562.5	3.74	13	PASS
16QAM	20825	2507.5	4.67	13	PASS
16QAM	21100	2535	4.72	13	PASS
16QAM	21375	2562.5	4.51	13	PASS
64QAM	20825	2507.5	5.48	13	PASS
64QAM	21100	2535	5.56	13	PASS
64QAM	21375	2562.5	5.39	13	PASS

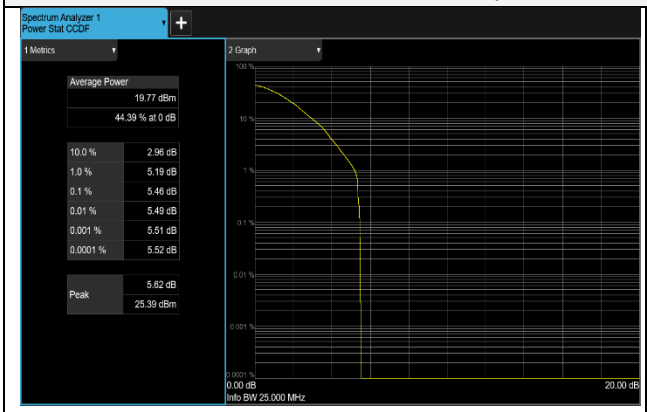
NOTE: For the test plots please refer to the below pages.

Spectrum Plot of Worst Value	
	
64QAM CH 21100 (2535MHz)	

Channel Bandwidth: 20 MHz

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	20850	2510	3.57	13	PASS
QPSK	21100	2535	3.66	13	PASS
QPSK	21350	2560	3.68	13	PASS
16QAM	20850	2510	4.44	13	PASS
16QAM	21100	2535	4.68	13	PASS
16QAM	21350	2560	4.69	13	PASS
64QAM	20850	2510	5.41	13	PASS
64QAM	21100	2535	5.39	13	PASS
64QAM	21350	2560	5.46	13	PASS

NOTE: For the test plots please refer to the below pages.

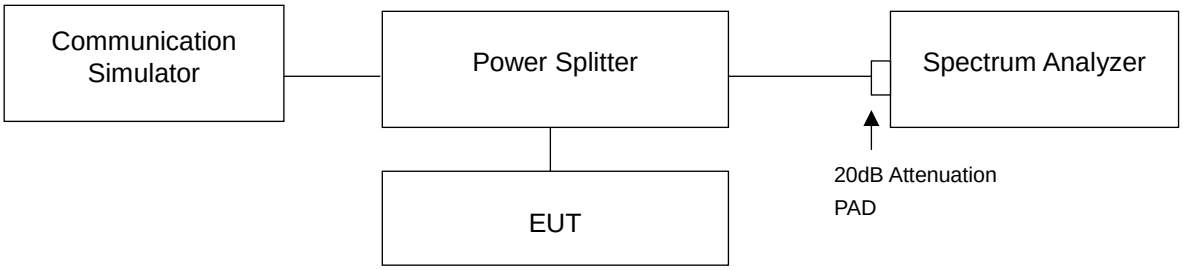
Spectrum Plot of Worst Value	
	
64QAM CH 21350 (2560MHz)	

4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

According to FCC 27.53(m)(4), on any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least 55 + 10 log (P) dB. The emission limit equal to –25dBm.

4.7.2 Test Setup



4.7.3 Test Procedure

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.

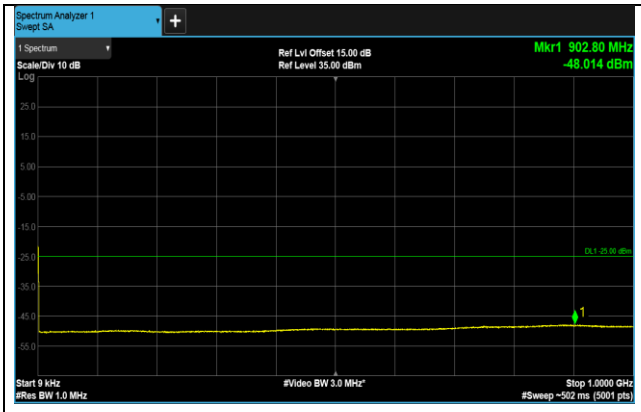
b. Measuring frequency range is from 9 kHz to 26 GHz. 20 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.

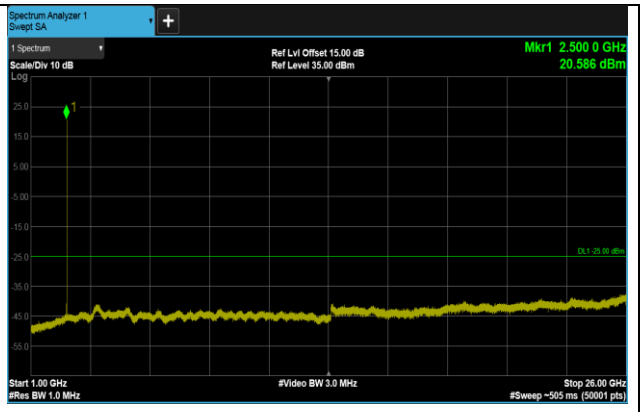
c. Spectrum RBW settings are referenced to ANSI C63.26 section 5.7.2.

4.7.4 Test Results

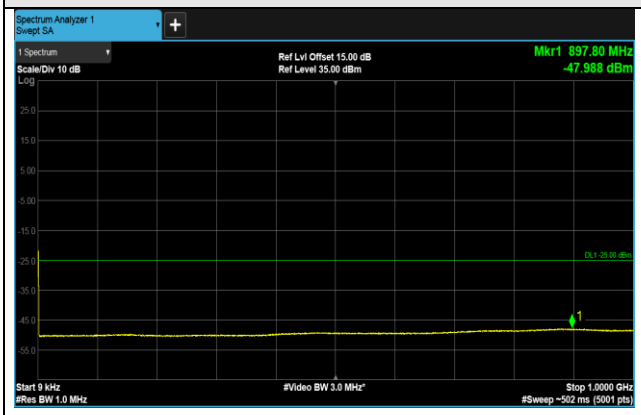
LTE Band 7

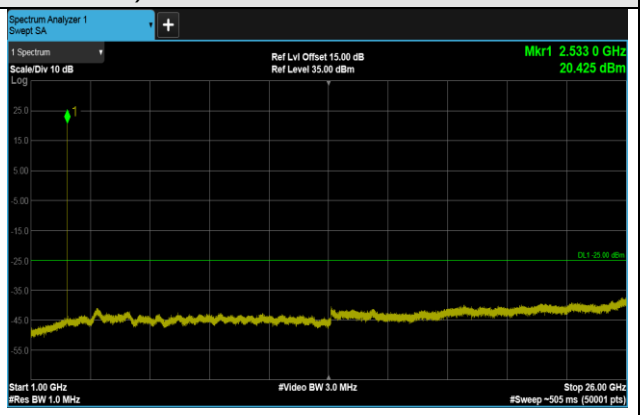
Channel Bandwidth: 5 MHz



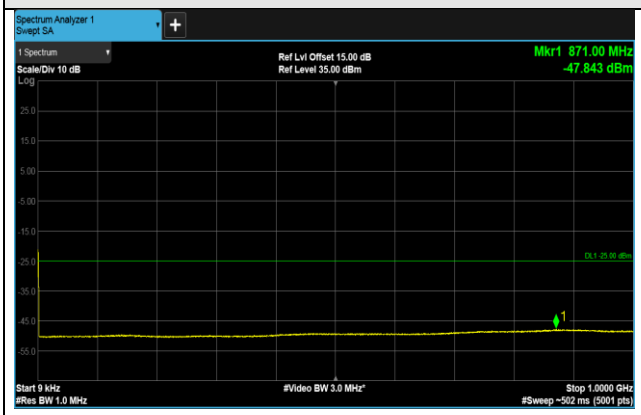


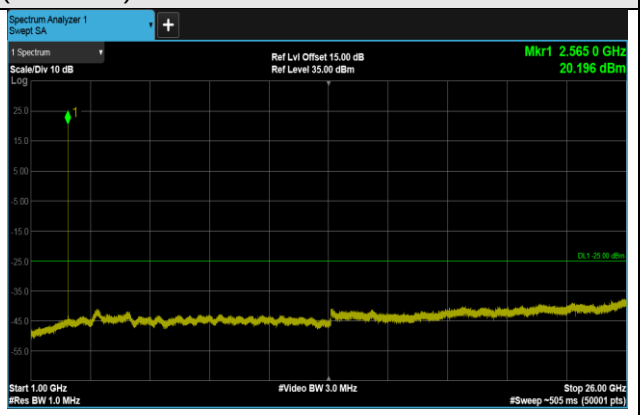
CH 20775 (2502.5MHz)





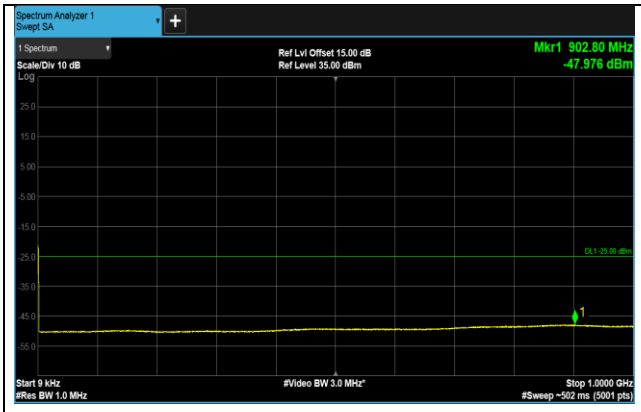
CH 21100 (2535MHz)

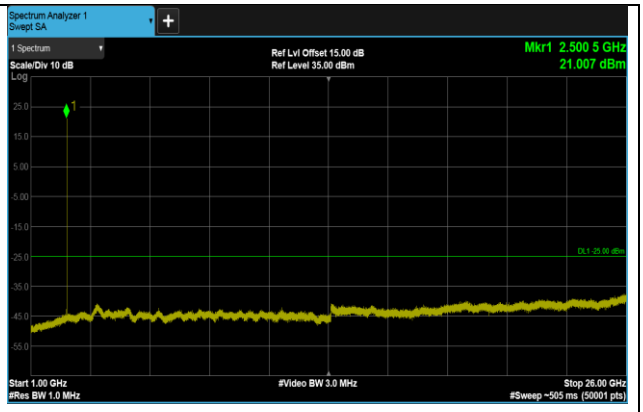




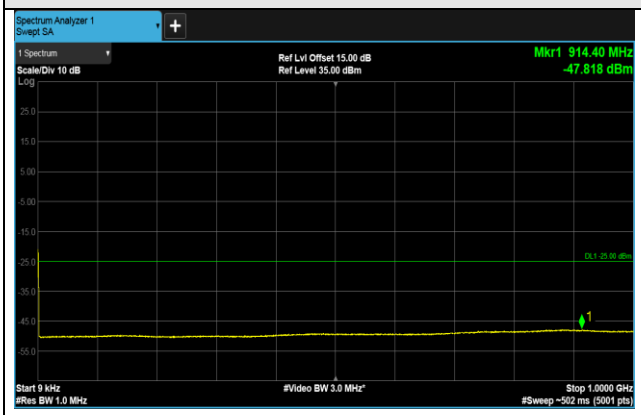
CH 21425 (2567.5MHz)

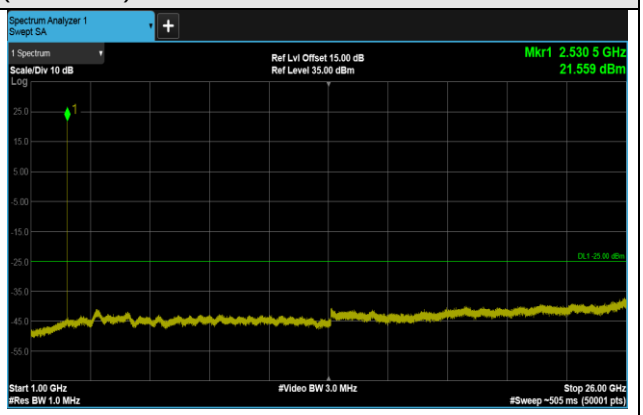
Channel Bandwidth: 10 MHz



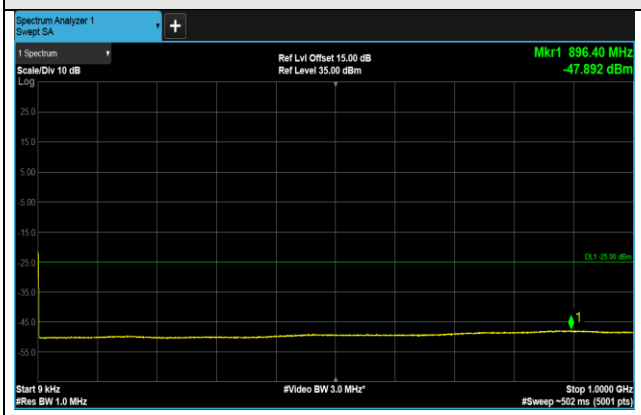


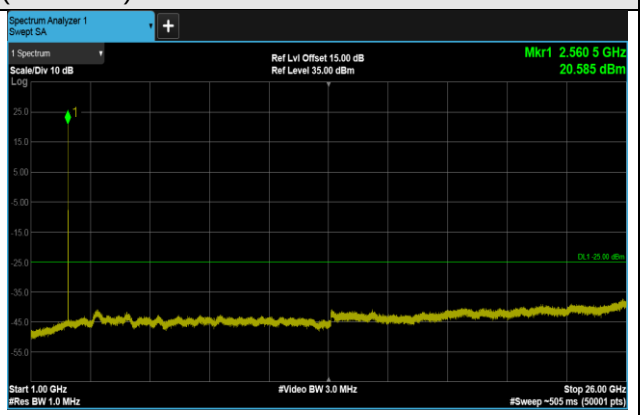
CH 20800 (2505MHz)





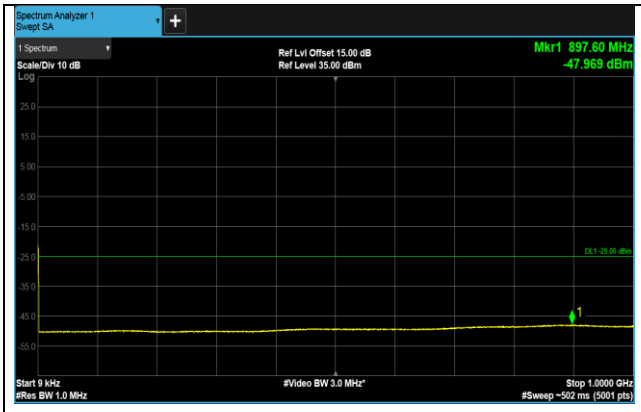
CH 21100 (2535MHz)

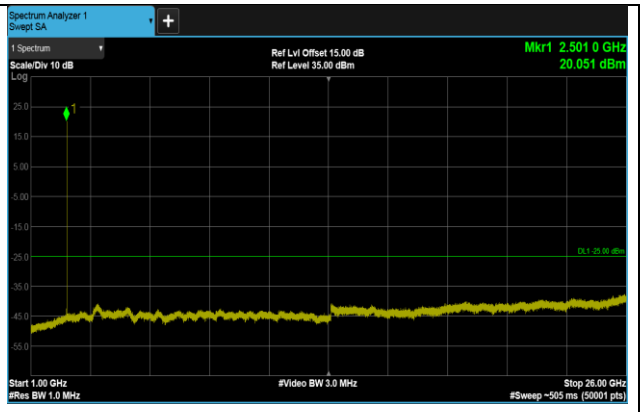




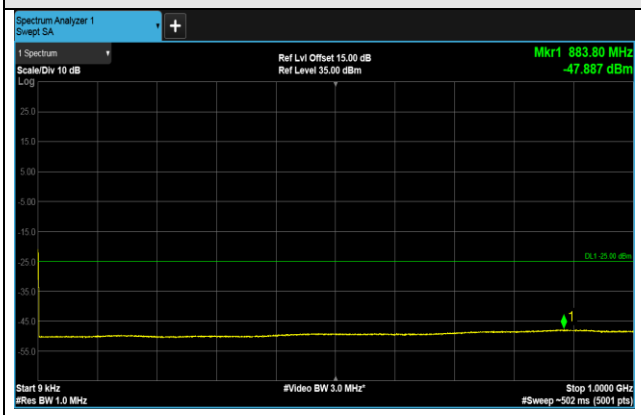
CH 21400 (2565MHz)

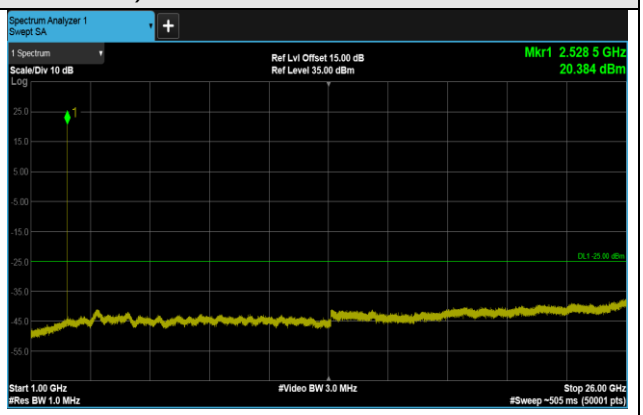
Channel Bandwidth: 15 MHz



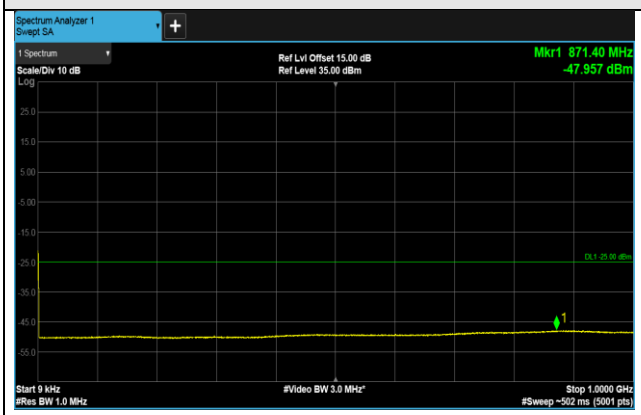


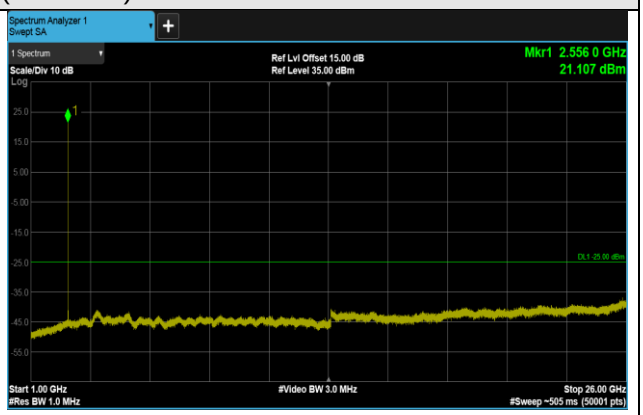
CH 20825 (2507.5MHz)





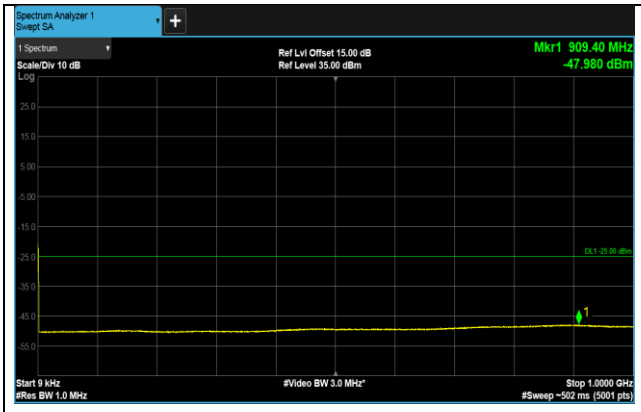
CH 21100 (2535MHz)

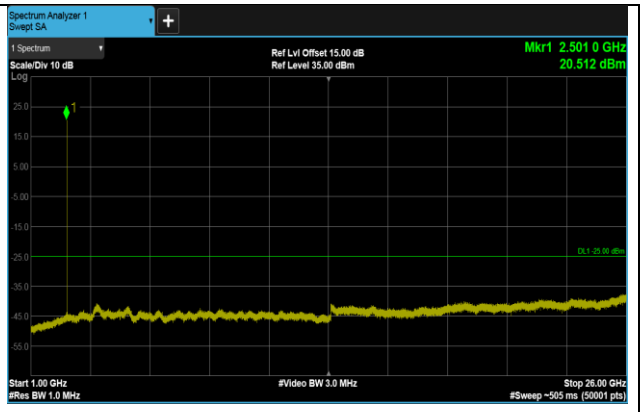




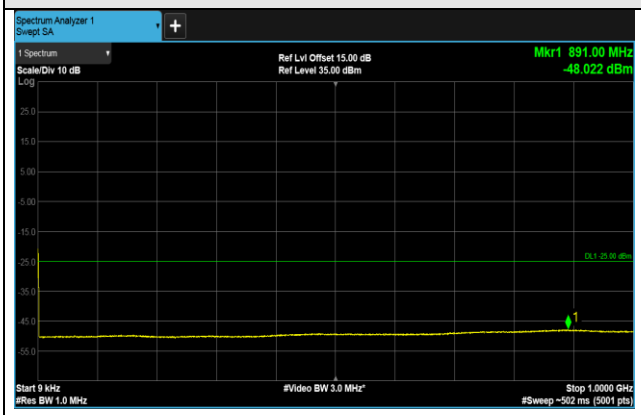
CH 21375 (2562.5MHz)

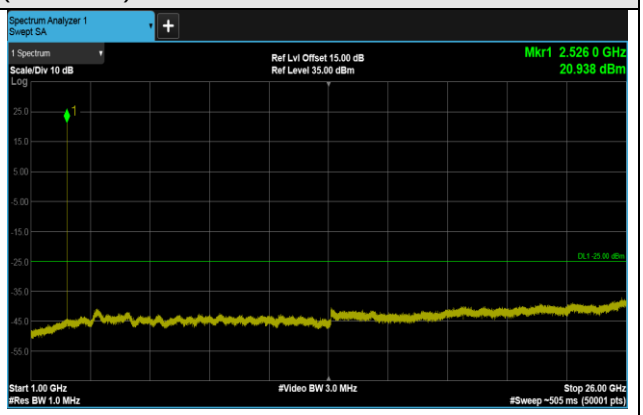
Channel Bandwidth: 20 MHz



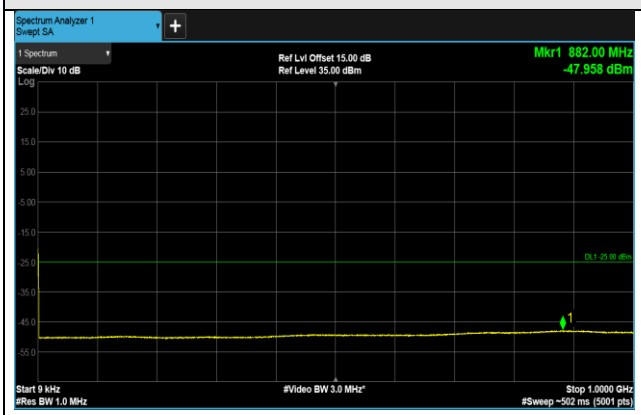


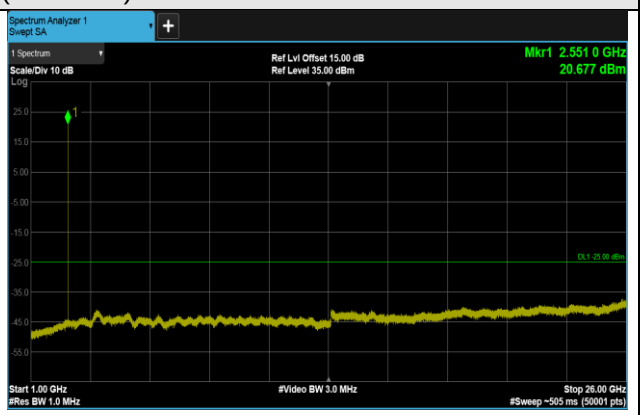
CH 20850 (2510MHz)





CH 21100 (2535MHz)





CH 21350 (2560MHz)

4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

According to FCC 27.53(m)(4),on any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least 55 + 10 log (P) dB. The emission limit equal to –25dBm.

4.8.2 Test Procedure

a. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
d. Following C63.26 section 5.5 and 5.2.7
   EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.
   ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:

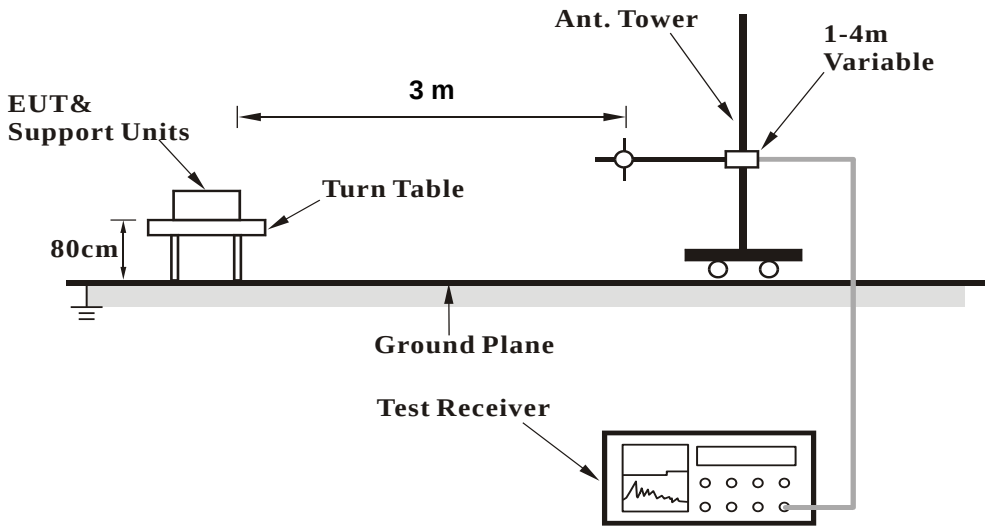
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.8.3 Deviation from Test Standard

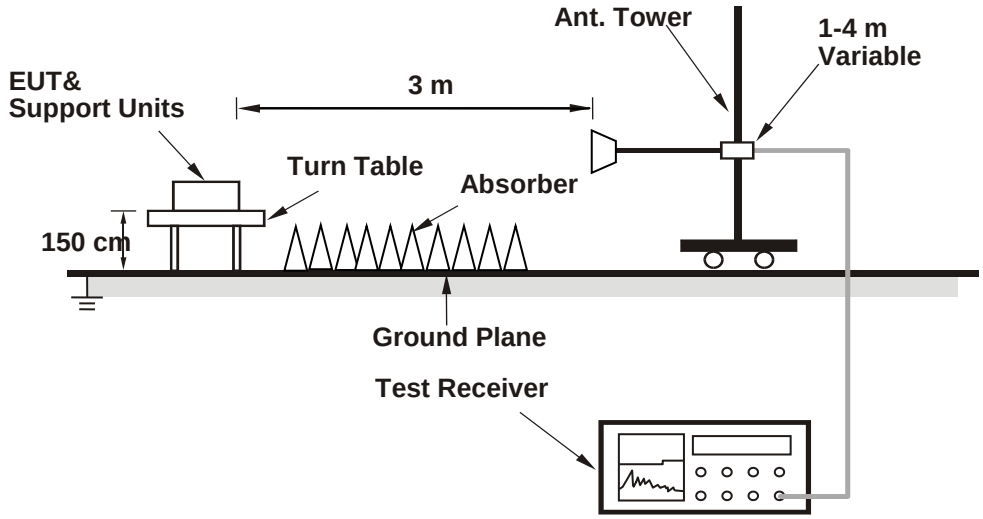
No deviation.

4.8.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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

4.8.5 Test Results

Below 1GHz

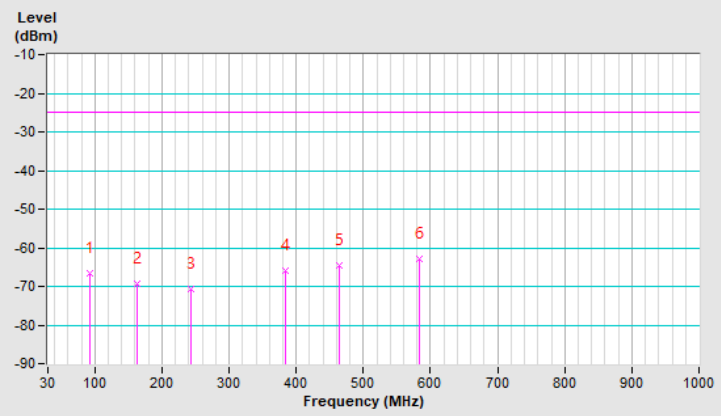
LTE Band 7 (Channel Bandwidth 5MHz)

RF Mode	TX LTE Band 7-5MHz	Channel	CH 21425：2567.5 MHz
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	92.08	-66.63	-25.00	-41.63	1.00 H	190	47.53	-114.16
2	163.86	-69.39	-25.00	-44.39	1.50 H	69	39.35	-108.74
3	243.40	-70.84	-25.00	-45.84	1.00 H	187	39.36	-110.20
4	384.05	-65.86	-25.00	-40.86	2.00 H	28	40.17	-106.03
5	463.59	-64.49	-25.00	-39.49	1.00 H	112	39.61	-104.10
6	582.90	-62.72	-25.00	-37.72	1.00 H	18	38.90	-101.62

Remarks:

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

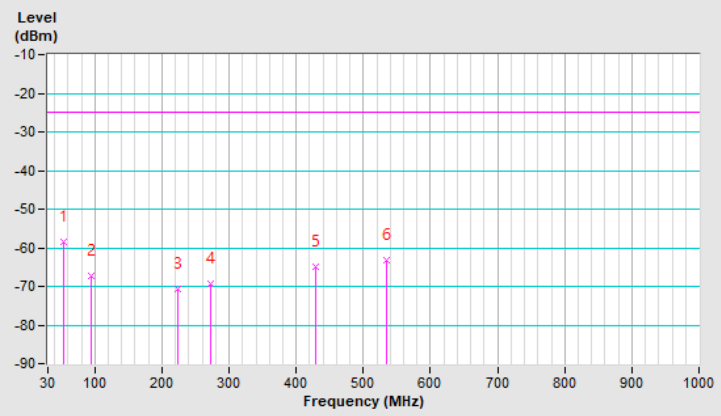


RF Mode	TX LTE Band 7-5MHz	Channel	CH 21425：2567.5 MHz
Frequency Range	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	53.28	-58.48	-25.00	-33.48	1.50 V	2	50.14	-108.62
2	94.99	-67.29	-25.00	-42.29	1.00 V	54	46.56	-113.85
3	223.03	-70.75	-25.00	-45.75	1.00 V	218	41.36	-112.11
4	272.50	-69.42	-25.00	-44.42	2.00 V	271	39.58	-109.00
5	428.67	-64.88	-25.00	-39.88	1.00 V	47	40.02	-104.90
6	534.40	-63.29	-25.00	-38.29	2.00 V	274	39.53	-102.82

Remarks:

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



LTE Band 7 (Channel Bandwidth 5MHz)

RF Mode	TX LTE Band 7-5MHz	Channel	CH 20775：2502.5 MHz
Frequency Range	1GHz ~ 27GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5005.00	-45.51	-25.00	-20.51	1.59 H	151	37.95	-83.46
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5005.00	-45.20	-25.00	-20.20	1.65 V	133	38.26	-83.46

Remarks:

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

RF Mode	TX LTE Band 7-5MHz	Channel	CH 21100：2535 MHz
Frequency Range	1GHz ~ 27GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5070.00	-45.38	-25.00	-20.38	2.56 H	133	37.29	-82.67
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5070.00	-44.72	-25.00	-19.72	1.31 V	309	37.95	-82.67

Remarks:

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

RF Mode	TX LTE Band 7-5MHz	Channel	CH 21425：2567.5 MHz
Frequency Range	1GHz ~ 27GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5135.00	-44.19	-25.00	-19.19	1.30 H	166	38.31	-82.50
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5135.00	-44.57	-25.00	-19.57	2.00 V	251	37.93	-82.50

Remarks:

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

LTE Band 7 (Channel Bandwidth 20MHz)

RF Mode	TX LTE Band 7-20MHz	Channel	CH 20850：2510 MHz
Frequency Range	1GHz ~ 27GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5020.00	-45.19	-25.00	-20.19	2.45 H	200	38.10	-83.29
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5020.00	-45.40	-25.00	-20.40	1.35 V	45	37.89	-83.29

Remarks:

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

RF Mode	TX LTE Band 7-20MHz	Channel	CH 21100：2535 MHz
Frequency Range	1GHz ~ 27GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5070.00	-47.72	-25.00	-22.72	1.98 H	144	45.98	-93.70
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5070.00	-48.02	-25.00	-23.02	1.57 V	103	45.68	-93.70

Remarks:

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

RF Mode	TX LTE Band 7-20MHz	Channel	CH 21350：2560 MHz
Frequency Range	1GHz ~ 27GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5120.00	-44.57	-25.00	-19.57	1.00 H	315	37.85	-82.42
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5120.00	-44.90	-25.00	-19.90	1.33 V	352	37.52	-82.42

Remarks:

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

5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

--- END ---