FCC Test Report

(PART 90S)

Report No.:	RF171130C26-4
FCC ID:	HD5-660W
Test Model:	SOM660W
Received Date:	Nov. 30, 2017
Test Date:	Dec. 27, 2017 ~ Jan. 24, 2018
Issued Date:	Jan. 26, 2018
Applicant:	Honeywell International Inc.
Address:	9680 Old Bailes Road, Fort Mill, SC 29707 USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C)
Test Location (1):	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.
FCC Registration / Designation Number:	788550 / TW0003

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF171130C26-4	Original Release	Jan. 26, 2018

1 Certificate of Conformity

Product:	HSOM660
Brand:	Honeywell
Test Model:	SOM660W
Sample Status:	Engineering Sample
Applicant:	Honeywell International Inc.
Test Date:	Dec. 27, 2017 ~ Jan. 24, 2018
Standards:	FCC Part 90, Subpart 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 : Vera Huang , **Date:** Jan. 26, 2018

Vera Huang / Specialist

Approved by : , **Date:** Jan. 26, 2018

Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 90 & Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 90.635 (b)	Effective Radiated Power	Pass	Meet the requirement of limit.
2.1055 90.213	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 90.209	Occupied Bandwidth (*)	Pass	Meet the requirement of limit.
2.1051 90.209	Emission Masks	Pass	Meet the requirement of limit.
2.1051 90.691	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 90.691	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -47.91 dB at 1641.00 MHz.

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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manaufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Feb. 17, 2017	Feb. 16, 2018
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	100115	Nov. 23, 2017	Nov. 22, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 12, 2017	Dec. 11, 2018
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 01, 2017	Nov. 30, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 23, 2017	Jun. 22, 2018
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Loop Antenna	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier EMCI	EMC001340	980201	Nov. 01, 2017	Oct. 30, 2018
Bluetooth Tester	CBT	100946	Jul. 29, 2016	Jul. 28, 2018
Preamplifier EMCI	EMC 012645	980115	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 184045	980116	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 330H	980112	Oct. 13, 2017	Oct. 12, 2018
Power Meter Anritsu	ML2495A	1012010	Aug. 15, 2017	Aug. 14, 2018
Power Sensor Anritsu	MA2411B	1315050	Aug. 15, 2017	Aug. 14, 2018
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8000&3000	140811+170717	Oct. 20, 2017	Oct. 19, 2018

Description & Manaufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 20, 2017	Oct. 19, 2018
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450F-10.

3 General Information

3.1 General Description of EUT

Product	HSOM660	
Brand	Honeywell	
Test Model	SOM660W	
Status of EUT	Engineering Sample	
HW Version	V2.0	
HW P/N	22	
SW Version	HON.01.004	
SW P/N	351D	
Power Supply Rating	3.85 Vdc (battery)	
Modulation Type	CDMA	QPSK, OQPSK, HPSK
	LTE	QPSK, 16QAM, 64QAM
Frequency Range	CDMA BC10	817.9 ~ 823.1 MHz
	LTE Band 26 (Channel Bandwidth: 1.4 MHz)	814.7 ~ 823.3 MHz
	LTE Band 26 (Channel Bandwidth: 3 MHz)	815.5 ~ 822.5 MHz
	LTE Band 26 (Channel Bandwidth: 5 MHz)	816.5 ~ 821.5 MHz
	LTE Band 26 (Channel Bandwidth: 10 MHz)	819 MHz
Emission Designator	CDMA BC10	1M28F9W
	LTE Band 26 (Channel Bandwidth: 1.4 MHz)	1M09W7D
	LTE Band 26 (Channel Bandwidth: 3 MHz)	2M70G7D
	LTE Band 26 (Channel Bandwidth: 5 MHz)	4M50W7D
	LTE Band 26 (Channel Bandwidth: 10 MHz)	8M99W7D
Max. ERP Power	CDMA BC10	331.13 mW
	LTE Band 26 (Channel Bandwidth: 1.4 MHz)	159.22 mW
	LTE Band 26 (Channel Bandwidth: 3 MHz)	172.19 mW
	LTE Band 26 (Channel Bandwidth: 5 MHz)	165.96 mW
	LTE Band 26 (Channel Bandwidth: 10 MHz)	171.79 mW
Antenna Type	PIFA Antenna	
Accessory Device	Refer to Note as below	
Data Cable Supplied	N/A	

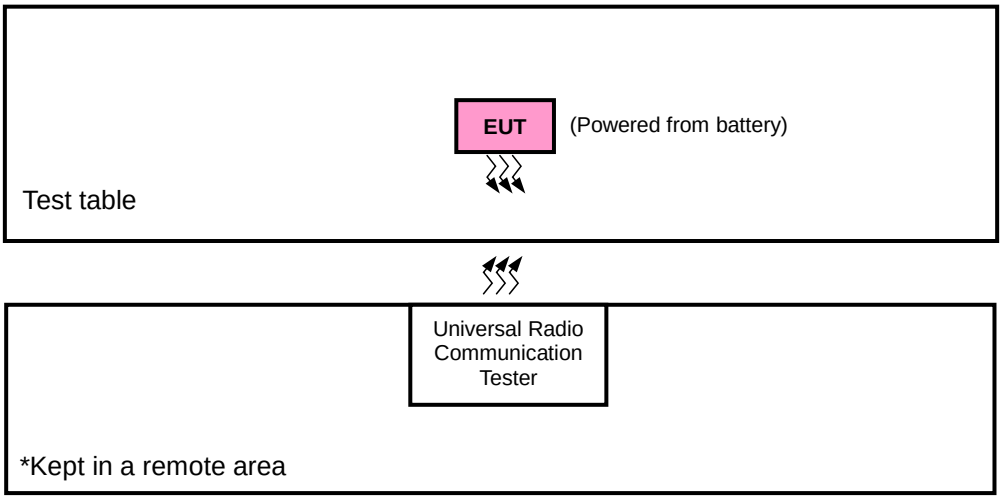
Note:

1. The EUT has been tested with following support unit.

Product	Brand	Model	Description
Battery	Inventus Power Inc.	CW-BAT	3.85 Vdc, 5800 mAh

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

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.

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	ERP	Radiated Emission
CDMA	Y-plane	X-axis
LTE Band 26	Z-plane	Z-axis

CDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	476 to 684	476, 580, 684	1xRTT
-	Frequency Stability	476 to 684	476, 684	1xRTT
-	Occupied Bandwidth	476 to 684	476, 580, 684	1xRTT
-	Emission Mask	476 to 684	476, 580, 684	1xRTT
-	Conducted Emission	476 to 684	476, 580, 684	1xRTT
-	Radiated Emission	476 to 684	476, 580, 684	1xRTT

LTE Band 26

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	26697 to 26783	26697, 26740, 26783	1.4 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26705 to 26775	26705, 26740, 26775	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26715 to 26765	26715, 26740, 26765	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		26740	26740	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Frequency Stability	26697 to 26783	26697, 26783	1.4 MHz	QPSK	1 RB / 0 RB Offset
		26705 to 26775	26705, 26775	3 MHz	QPSK	1 RB / 0 RB Offset
		26715 to 26765	26715, 26765	5 MHz	QPSK	1 RB / 0 RB Offset
		26740	26740	10 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	26697 to 26783	26697, 26740, 26783	1.4 MHz	QPSK, 16QAM, 64QAM	6 RB / 0 RB Offset
		26705 to 26775	26705, 26740, 26775	3 MHz	QPSK, 16QAM, 64QAM	15 RB / 0 RB Offset
		26715 to 26765	26715, 26740, 26765	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		26740	26740	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
-	Emission Mask	26697 to 26783	26697, 26740, 26783	1.4 MHz	QPSK, 16QAM, 64QAM	6 RB / 0 RB Offset
		26705 to 26775	26705, 26740, 26775	3 MHz	QPSK, 16QAM, 64QAM	15 RB / 0 RB Offset
		26715 to 26765	26715, 26740, 26765	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		26740	26740	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
-	Conducted Emission	26697 to 26783	26697, 26740, 26783	1.4 MHz	QPSK	1 RB / 0 RB Offset
		26705 to 26775	26705, 26740, 26775	3 MHz	QPSK	1 RB / 0 RB Offset
		26715 to 26765	26715, 26740, 26765	5 MHz	QPSK	1 RB / 0 RB Offset
		26740	26740	10 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	26740	26740	10 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	25 deg. C, 65 % RH	3.85 Vdc	Jisyong Wang / Getaz Yang
Frequency Stability	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Occupied Bandwidth	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Peak to Average Ratio	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Emission Mask	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Condcudeted Emission	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Radiated Emission	25 deg. C, 65 % RH	3.85 Vdc	Jisyong Wang / Getaz Yang

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

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

FCC 47 CFR Part 2
FCC 47 CFR Part 90
ANSI/TIA/EIA-603-E 2016
ANSI 63.26-2015

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 100 watts e.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

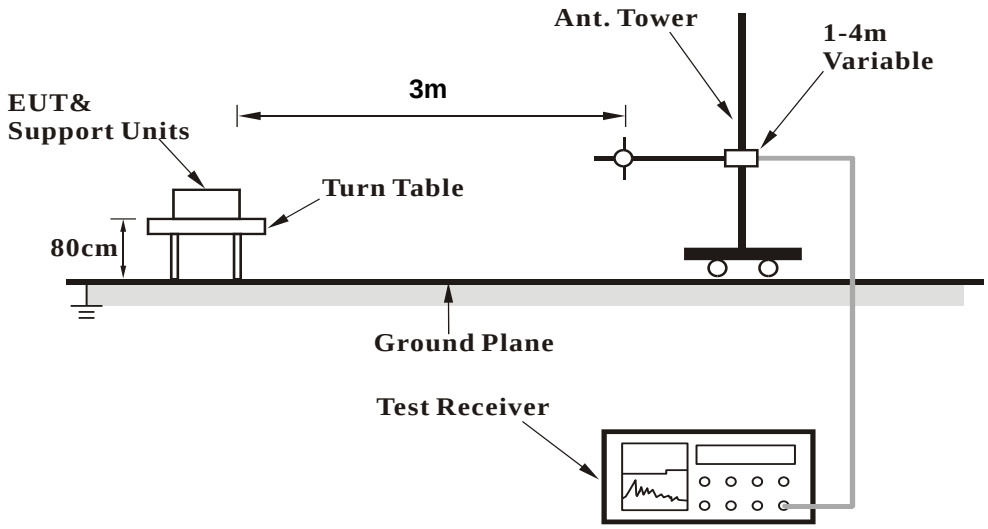
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5 MHz for CDMA and 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height 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 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G.
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15 dBi.

Conducted Power Measurement:

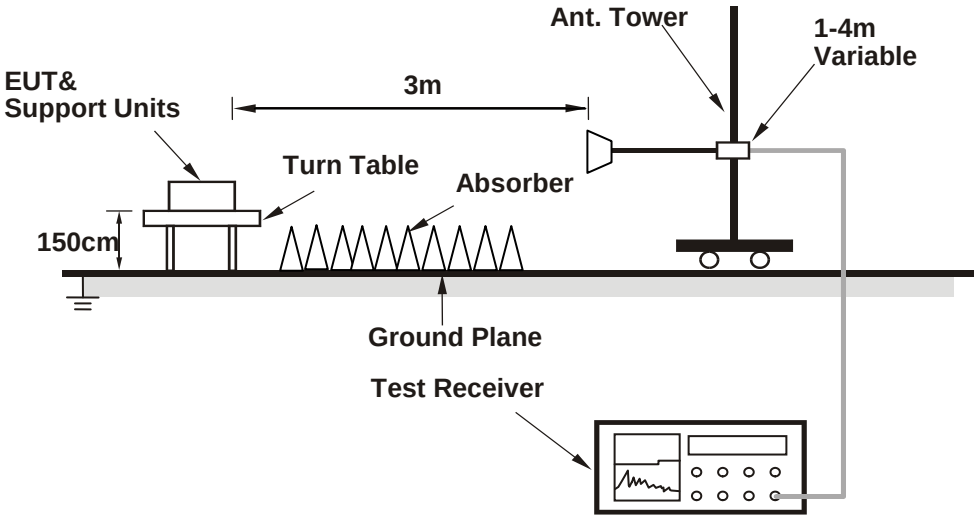
a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 Test Setup

EIRP / ERP Measurement:
<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).

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

Band	CDMA		
Channel	476	580	684
Frequency (MHz)	817.9	820.5	823.1
RC1+SO55	23.96	23.85	23.94
RC3+SO55	24.07	23.96	24.05
RC3+SO32(+ F-SCH)	24.09	23.98	24.07
RC3+SO32(+SCH)	23.95	23.84	23.93
RTAP 153.6	23.93	23.82	23.91
RETAP 4096	23.72	23.61	23.70

LTE Band 26

BW	MCS Index	RB Size	RB Offset		Mid		3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel			26740					Channel		26715	26740	26765	
		Frequency (MHz)			819.0					Frequency (MHz)		816.5	819.0	821.5	
10M	QPSK	1	0		23.48		0	5M	QPSK	1	0	23.40	23.78	23.77	0
		1	24		23.39		0			1	12	23.31	23.82	23.84	0
		1	49		23.59		0			1	24	23.51	23.78	23.77	0
		25	0		22.52		1			12	0	22.44	22.79	22.79	1
		25	12		22.49		1			12	6	22.41	22.93	22.93	1
		25	25		22.61		1			12	13	22.53	22.91	22.81	1
		50	0		22.46		1			25	0	22.38	22.86	22.81	1
	16QAM	1	0		22.42		1		16QAM	1	0	22.34	23.10	23.05	1
		1	24		22.33		1			1	12	22.25	23.44	23.15	1
		1	49		22.53		1			1	24	22.45	23.30	23.03	1
		25	0		21.46		2			12	0	21.38	21.78	21.89	2
		25	12		21.43		2			12	6	21.35	21.77	22.00	2
		25	25		21.55		2			12	13	21.47	21.67	21.89	2
		50	0		21.40		2			25	0	21.32	21.78	21.90	2
	64QAM	1	0		21.35		2		64QAM	1	0	21.27	21.67	21.66	2
		1	24		21.26		2			1	12	21.18	21.71	21.73	2
		1	49		21.46		2			1	24	21.38	21.67	21.66	2
		25	0		20.39		3			12	0	20.31	20.68	20.68	3
		25	12		20.36		3			12	6	20.28	20.82	20.82	3
		25	25		20.48		3			12	13	20.40	20.80	20.70	3
		50	0		20.33		3			25	0	20.25	20.75	20.70	3

BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		26705	26740	26775				Channel		26697	26740	26783	
		Frequency (MHz)		815.5	819.0	822.5				Frequency (MHz)		814.7	819.0	823.3	
3M	QPSK	1	0	23.33	23.73	23.72	0	1.4M	QPSK	1	0	23.20	23.65	23.64	0
		1	7	23.24	23.77	23.79	0			1	2	23.11	23.69	23.71	0
		1	14	23.44	23.73	23.72	0			1	5	23.31	23.65	23.64	0
		8	0	22.37	22.74	22.74	1			3	0	23.14	23.66	23.66	0
		8	3	22.34	22.88	22.88	1			3	1	23.11	23.80	23.80	0
		8	7	22.46	22.86	22.76	1			3	3	23.23	23.78	23.68	0
		15	0	22.31	22.81	22.76	1			6	0	22.18	22.73	22.68	1
	16QAM	1	0	22.27	23.04	22.97	1		16QAM	1	0	22.14	23.00	22.93	1
		1	7	22.18	23.38	23.07	1			1	2	22.05	23.34	23.03	1
		1	14	22.38	23.24	22.95	1			1	5	22.25	23.20	22.91	1
		8	0	21.31	21.72	21.81	2			3	0	22.08	22.68	22.77	1
		8	3	21.28	21.71	21.92	2			3	1	22.05	22.67	22.88	1
		8	7	21.40	21.61	21.81	2			3	3	22.17	22.57	22.77	1
		15	0	21.25	21.72	21.82	2			6	0	21.12	21.68	21.78	2
	64QAM	1	0	21.20	21.62	21.61	2		64QAM	1	0	21.07	21.57	21.56	2
		1	7	21.11	21.66	21.68	2			1	2	20.98	21.03	21.63	2
		1	14	21.31	21.62	21.61	2			1	5	21.18	21.57	21.56	2
		8	0	20.24	20.63	20.63	3			3	0	21.01	21.58	21.58	2
		8	3	20.21	20.77	20.77	3			3	1	20.98	21.72	21.72	2
		8	7	20.33	20.75	20.65	3			3	3	21.10	21.70	21.60	2
		15	0	20.18	20.70	20.65	3			6	0	20.05	20.65	20.60	3

ERP Power (dBm)

CDMA							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (mW)**	**Polarization (H/V)**
Y	476	817.9	-5.49	31.208	23.56	227.20	H
	580	820.5	-4.68	31.3	24.47	280.03	
	684	823.1	-3.87	31.222	25.20	331.13	
	476	817.9	-9.37	31.504	19.98	99.63	V
	580	820.5	-8.05	31.117	20.92	123.65	
	684	823.1	-8.09	31.922	21.68	147.23	

LTE Band 26							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (mW)**	**Polarization (H/V)**
Z	26697	814.7	-12.92	32.01	16.94	49.43	H
	26740	819.0	-12.68	32.11	17.28	53.46	
	26783	823.3	-12.65	32.32	17.52	56.49	
	26697	814.7	-8.84	32.54	21.55	142.89	V
	26740	819.0	-8.66	32.51	21.70	147.91	
	26783	823.3	-8.34	32.51	22.02	159.22	
Channel Bandwidth: 1.4 MHz / 16QAM							
Z	26697	814.7	-13.84	32.01	16.02	39.99	H
	26740	819.0	-13.74	32.11	16.22	41.88	
	26783	823.3	-13.68	32.32	16.49	44.57	
	26697	814.7	-9.85	32.54	20.54	113.24	V
	26740	819.0	-9.65	32.51	20.71	117.76	
	26783	823.3	-9.39	32.51	20.97	125.03	
Channel Bandwidth: 1.4 MHz / 64QAM							
Z	26697	814.7	-14.93	32.01	14.93	31.12	H
	26740	819.0	-14.82	32.11	15.14	32.66	
	26783	823.3	-14.72	32.32	15.45	35.08	
	26697	814.7	-10.91	32.54	19.48	88.72	V
	26740	819.0	-10.68	32.51	19.68	92.90	
	26783	823.3	-10.47	32.51	19.89	97.50	

LTE Band 26							
Channel Bandwidth: 3 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (mW)**	**Polarization (H/V)**
Z	26705	815.5	-12.49	32.02	17.38	54.70	H
	26740	819.0	-12.45	32.11	17.51	56.36	
	26775	822.5	-12.26	32.18	17.77	59.84	
	26705	815.5	-8.43	32.5	21.92	155.60	V
	26740	819.0	-8.38	32.51	21.98	157.76	
	26775	822.5	-7.96	32.47	22.36	172.19	
Channel Bandwidth: 3 MHz / 16QAM							
Z	26705	815.5	-13.51	32.02	16.36	43.25	H
	26740	819.0	-13.53	32.11	16.43	43.95	
	26775	822.5	-13.30	32.18	16.73	47.10	
	26705	815.5	-9.49	32.5	20.86	121.90	V
	26740	819.0	-9.42	32.51	20.94	124.17	
	26775	822.5	-8.97	32.47	21.35	136.46	
Channel Bandwidth: 3 MHz / 64QAM							
Z	26705	815.5	-14.59	32.02	15.28	33.73	H
	26740	819.0	-14.58	32.11	15.38	34.51	
	26775	822.5	-14.36	32.18	15.67	36.90	
	26705	815.5	-10.58	32.5	19.77	94.84	V
	26740	819.0	-10.46	32.51	19.90	97.72	
	26775	822.5	-10.03	32.47	20.29	106.91	

LTE Band 26							
Channel Bandwidth: 5 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (mW)**	**Polarization (H/V)**
Z	26715	816.5	-12.36	32.04	17.53	56.62	H
	26740	819.0	-12.23	32.11	17.73	59.29	
	26765	821.5	-12.00	31.79	17.64	58.08	
	26715	816.5	-8.28	32.52	22.09	161.81	V
	26740	819.0	-8.16	32.51	22.20	165.96	
	26765	821.5	-7.92	32.17	22.10	162.18	
Channel Bandwidth: 5 MHz / 16QAM							
Z	26715	816.5	-13.38	32.04	16.51	44.77	H
	26740	819.0	-13.27	32.11	16.69	46.67	
	26765	821.5	-13.08	31.79	16.56	45.29	
	26715	816.5	-9.32	32.52	21.05	127.35	V
	26740	819.0	-9.21	32.51	21.15	130.32	
	26765	821.5	-8.99	32.17	21.03	126.77	
Channel Bandwidth: 5 MHz / 64QAM							
Z	26715	816.5	-14.39	32.04	15.50	35.48	H
	26740	819.0	-14.32	32.11	15.64	36.64	
	26765	821.5	-14.16	31.79	15.48	35.32	
	26715	816.5	-10.35	32.52	20.02	100.46	V
	26740	819.0	-10.26	32.51	20.10	102.33	
	26765	821.5	-10.01	32.17	20.01	100.23	

LTE Band 26							
Channel Bandwidth: 10 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (mW)**	**Polarization (H/V)**
Z	26740	819.0	-12.10	32.11	17.86	61.09	H
	26740	819.0	-8.01	32.51	22.35	171.79	V
Channel Bandwidth: 10 MHz / 16QAM							
Z	26740	819.0	-13.12	32.11	16.84	48.31	H
	26740	819.0	-9.04	32.51	21.32	135.52	V
Channel Bandwidth: 10 MHz / 64QAM							
Z	26740	819.0	-14.18	32.11	15.78	37.84	H
	26740	819.0	-10.08	32.51	20.28	106.66	V

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stabiliity Measurement

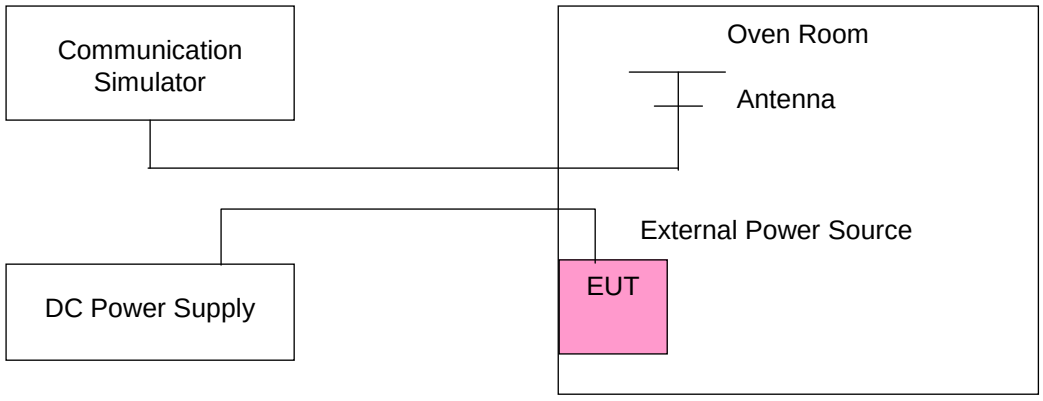
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.2.2 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.

4.2.3 Test Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	CDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	817.900002	0.003	823.100003	0.003	2.5
2.8	817.900004	0.004	823.100003	0.003	2.5
4.38	817.900003	0.004	823.100004	0.004	2.5

Note: The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	CDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	817.900003	0.004	823.100004	0.005	2.5
-20	817.900004	0.005	823.100002	0.003	2.5
-10	817.900002	0.002	823.100001	0.002	2.5
0	817.900001	0.002	823.100001	0.002	2.5
10	817.900003	0.004	823.100002	0.003	2.5
20	817.899997	-0.004	823.099997	-0.004	2.5
30	817.899999	-0.001	823.099997	-0.003	2.5
40	817.899997	-0.004	823.099996	-0.004	2.5
50	817.899998	-0.002	823.099996	-0.004	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 26				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	814.700001	0.001	823.300003	0.003	2.5
2.8	814.700002	0.002	823.300003	0.003	2.5
4.38	814.700003	0.003	823.300002	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 26				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	814.700003	0.003	823.300002	0.003	2.5
-20	814.700003	0.003	823.300004	0.005	2.5
-10	814.700004	0.005	823.300004	0.005	2.5
0	814.700002	0.002	823.300001	0.002	2.5
10	814.700001	0.002	823.300004	0.005	2.5
20	814.699997	-0.004	823.299997	-0.003	2.5
30	814.699997	-0.003	823.299998	-0.002	2.5
40	814.699999	-0.002	823.299998	-0.002	2.5
50	814.699999	-0.001	823.299998	-0.003	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 26				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	815.500001	0.001	822.500003	0.003	2.5
2.8	815.500003	0.004	822.500003	0.004	2.5
4.38	815.500004	0.005	822.500002	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 26				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	815.500003	0.004	822.500001	0.001	2.5
-20	815.500002	0.002	822.500003	0.004	2.5
-10	815.500001	0.001	822.500004	0.005	2.5
0	815.500003	0.004	822.500003	0.003	2.5
10	815.500003	0.004	822.500003	0.004	2.5
20	815.499998	-0.003	822.499997	-0.004	2.5
30	815.499998	-0.003	822.499997	-0.004	2.5
40	815.499997	-0.004	822.499997	-0.004	2.5
50	815.499999	-0.001	822.499999	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 26				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	816.500002	0.002	821.500001	0.002	2.5
2.8	816.500003	0.003	821.500004	0.004	2.5
4.38	816.500002	0.003	821.500001	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 26				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	816.500003	0.003	821.500004	0.005	2.5
-20	816.500004	0.005	821.500004	0.005	2.5
-10	816.500004	0.004	821.500003	0.003	2.5
0	816.500003	0.004	821.500002	0.002	2.5
10	816.500002	0.002	821.500002	0.002	2.5
20	816.499997	-0.004	821.499997	-0.003	2.5
30	816.499999	-0.001	821.499997	-0.004	2.5
40	816.499996	-0.005	821.499998	-0.003	2.5
50	816.499997	-0.003	821.499998	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 26		Limit (ppm)
	Channel Bandwidth: 10 MHz		
	Frequency (MHz)	Frequency Error (ppm)	
3.85	819.000003	0.004	2.5
2.8	819.000003	0.004	2.5
4.38	819.000002	0.003	2.5

Note: The applicant defined the normal working voltage of the battery is from 2.8 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

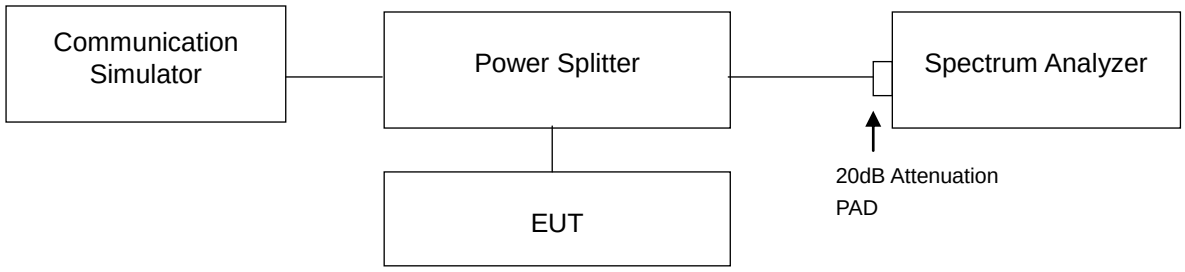
Temp. (℃)	LTE Band 26		Limit (ppm)
	Channel Bandwidth: 10 MHz		
	Frequency (MHz)	Frequency Error (ppm)	
-30	819.000003	0.004	2.5
-20	819.000002	0.002	2.5
-10	819.000003	0.004	2.5
0	819.000003	0.003	2.5
10	819.000003	0.004	2.5
20	818.999998	-0.002	2.5
30	818.999998	-0.002	2.5
40	818.999997	-0.004	2.5
50	818.999999	-0.002	2.5

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

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

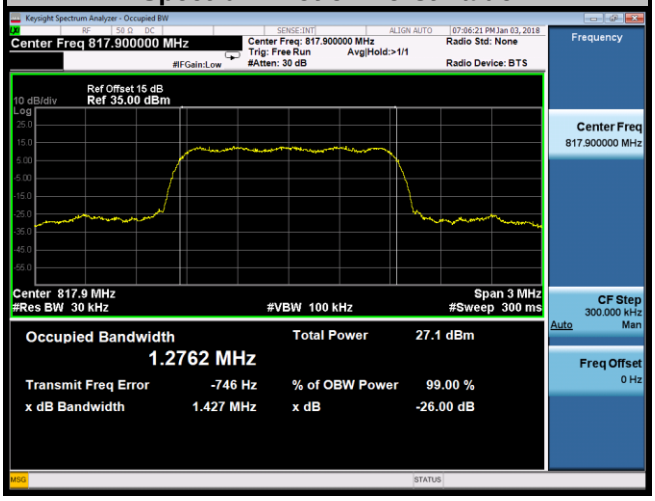
4.3.2 Test Setup



4.3.3 Test Result

CDMA		
Channel	**Frequency (MHz)**	**99 % Occupied Bandwidth (MHz)**
476	817.9	1.2762
580	820.5	1.2749
684	823.1	1.2750

Spectrum Plot of Worst Value



LTE Band 26									
Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
26697	814.7	1.0859	1.0890	1.0891	26705	815.5	2.7022	2.6972	2.6984
26740	819.0	1.0876	1.0909	1.0894	26740	819.0	2.7031	2.6984	2.6983
26783	823.3	1.0881	1.0889	1.0877	26775	822.5	2.7010	2.6985	2.6978

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / QPSK
	

LTE Band 26									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
26715	816.5	4.4945	4.4960	4.4953	26740	819.0	8.9780	8.9850	8.9753
26740	819.0	4.4955	4.4989	4.4995					
26765	821.5	4.4919	4.4960	4.4929					

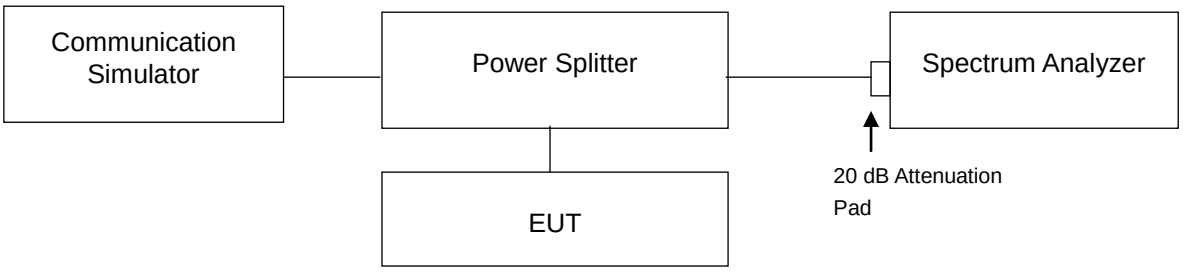
Spectrum Plot of Worst Value	
5 MHz / 64QAM	10 MHz / 16QAM
	

4.4 Emission Mask Measurement

4.4.1 Limits of Band Edge Measurement

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 Log10(f/6.1) decibels or 50+10Log10(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.

4.4.2 Test Setup

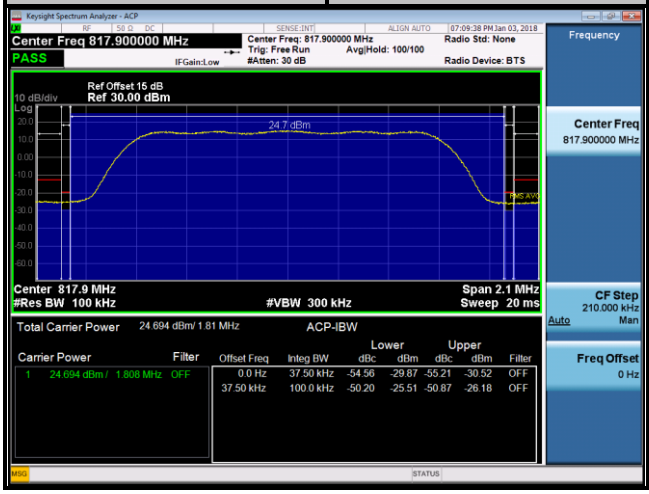


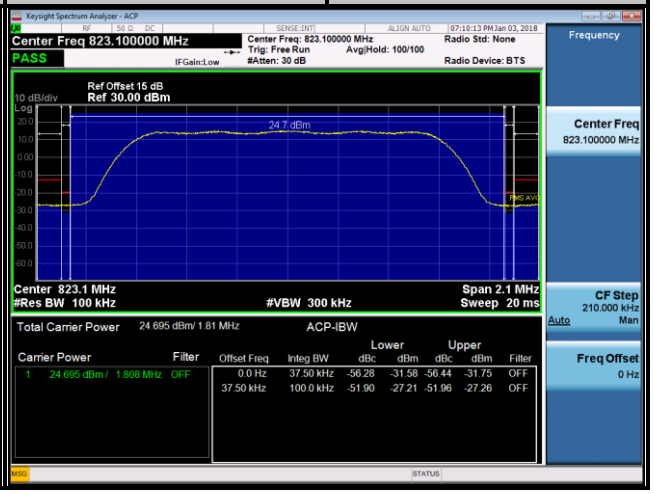
4.4.3 Test Procedures

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

4.4.4 Test Results

CDMA			
Channel	**476**	**Channel**	**684**

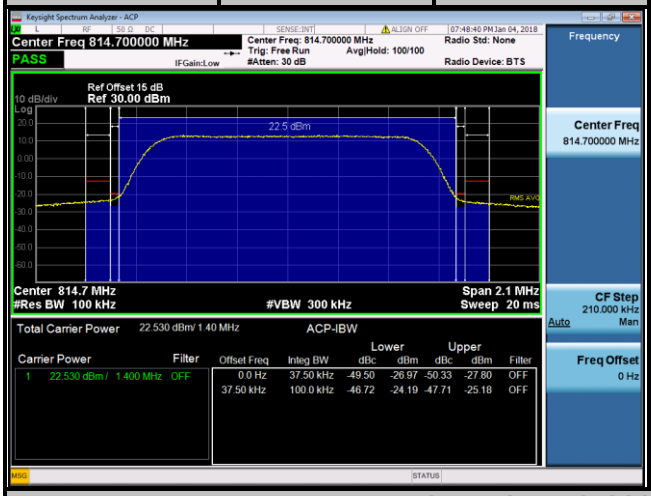




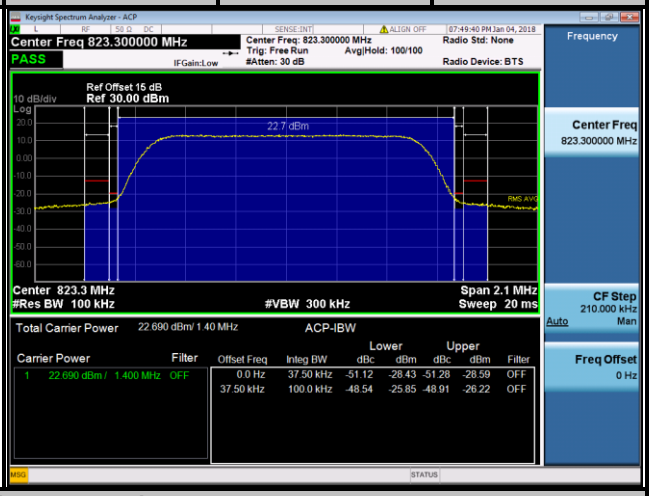
LTE Band 26

Channel Bandwidth: 1.4 MHz / QPSK

Channel	26697	6 RB

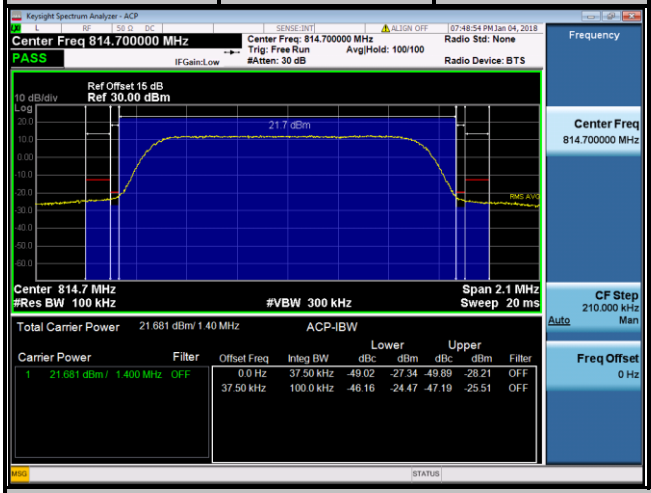


Channel	26783	6 RB

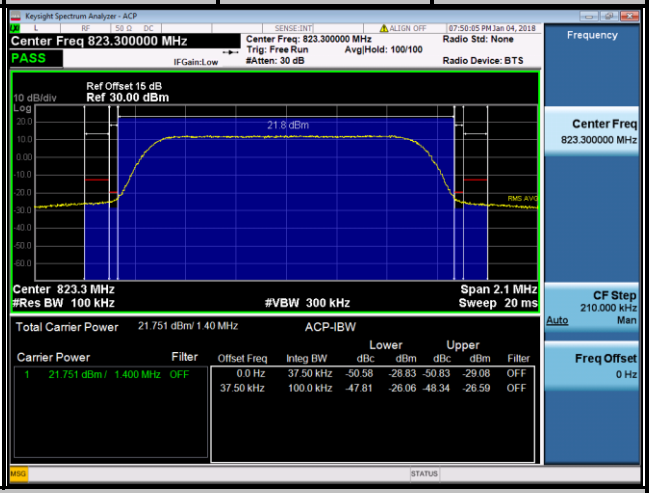


Channel Bandwidth: 1.4 MHz / 16QAM

Channel	26697	6 RB

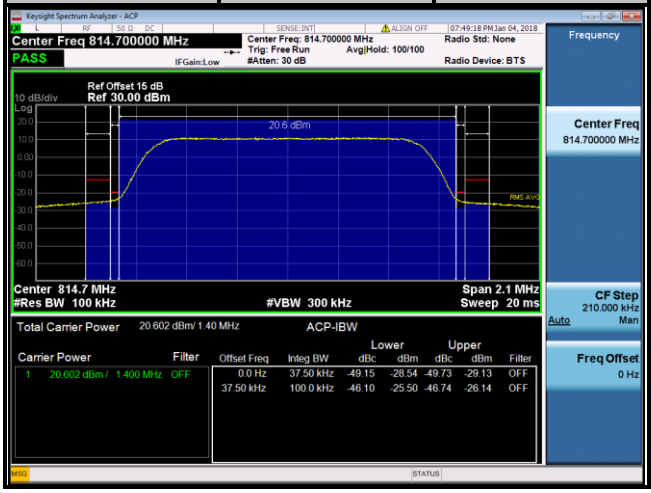


Channel	26783	6 RB



Channel Bandwidth: 1.4 MHz / 64QAM

Channel	26697	6 RB

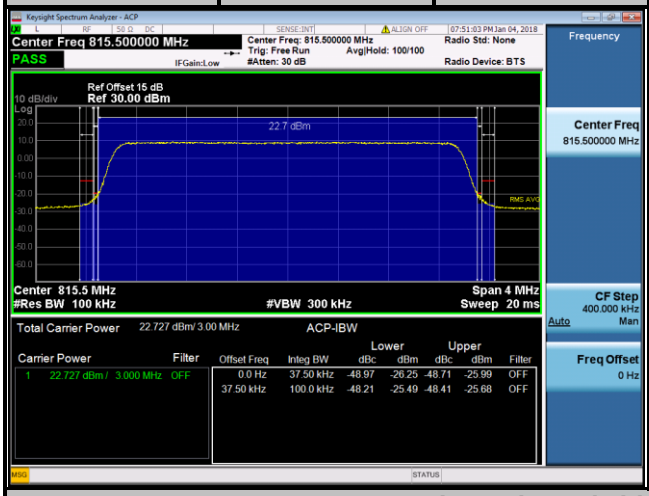


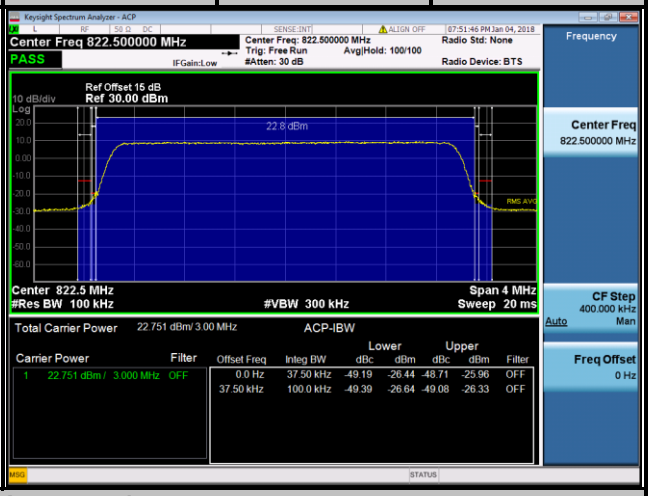
Channel	26783	6 RB

LTE Band 26

Channel Bandwidth: 3 MHz / QPSK

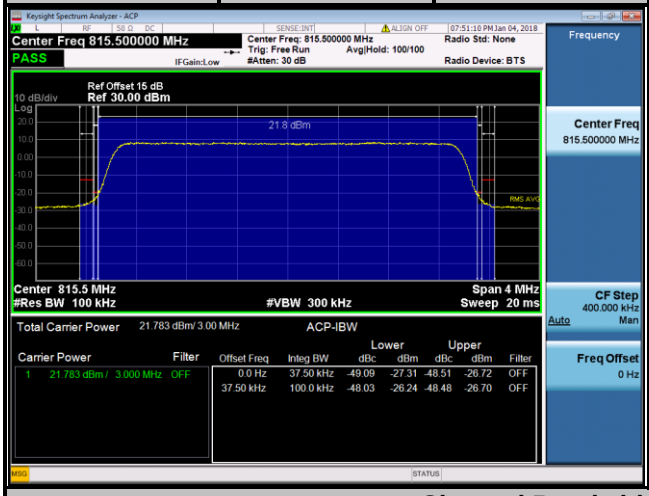
Channel	26705	15 RB	Channel	26775	15 RB

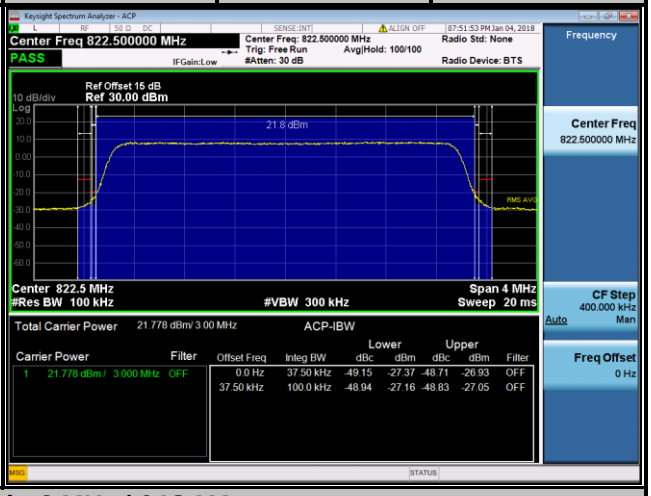




Channel Bandwidth: 3 MHz / 16QAM

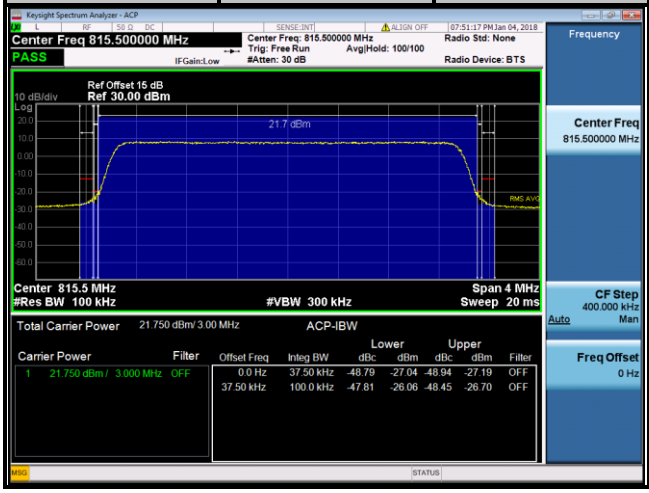
Channel	26705	15 RB	Channel	26775	15 RB

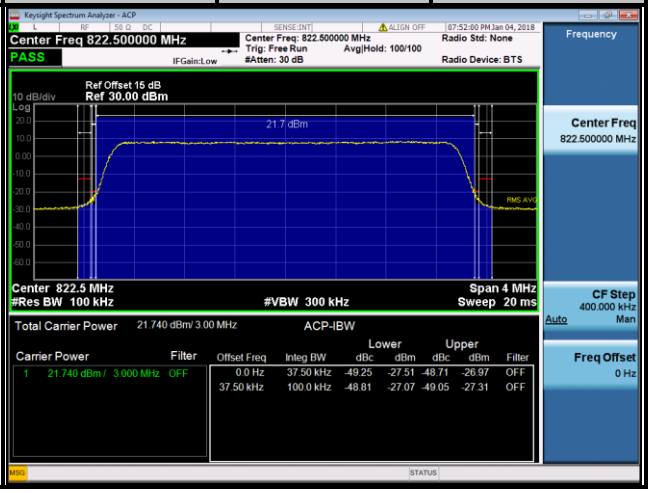


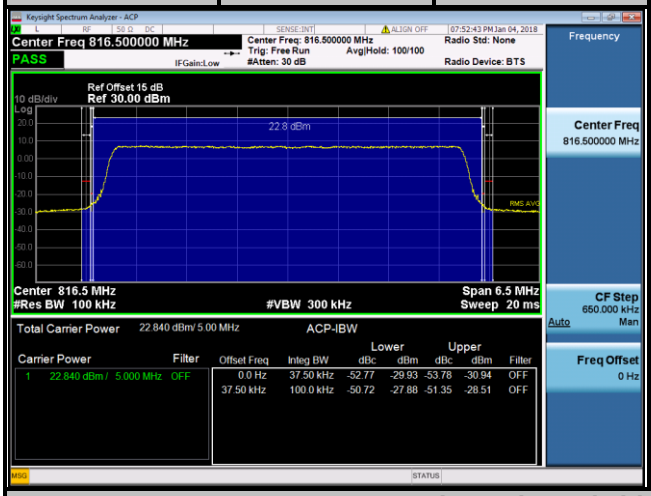
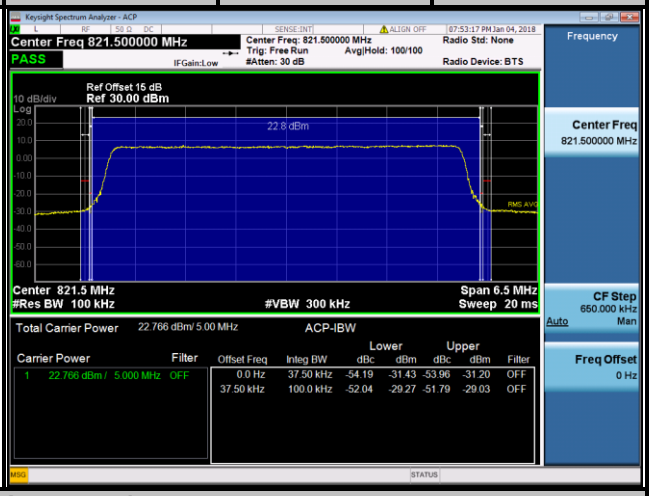
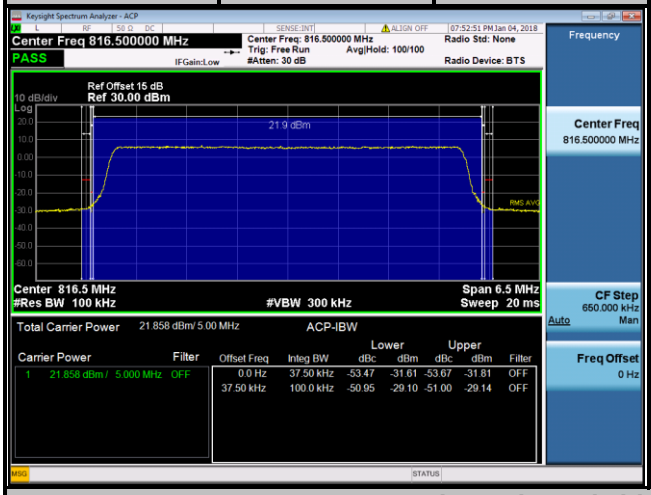
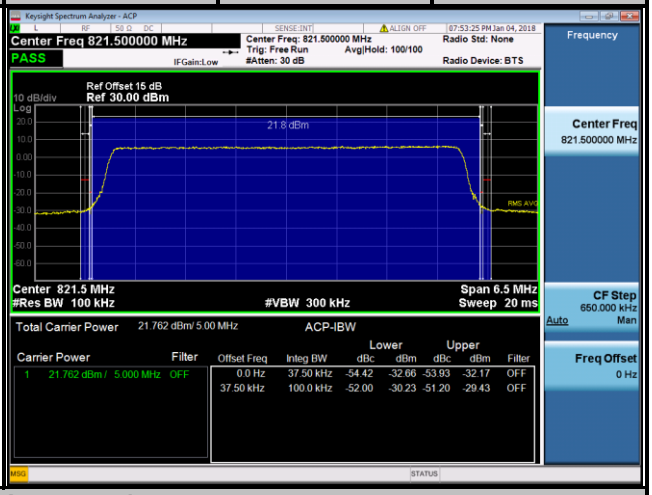
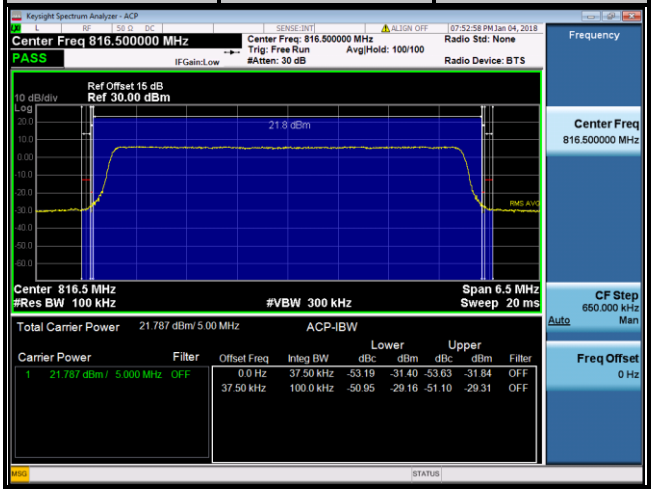
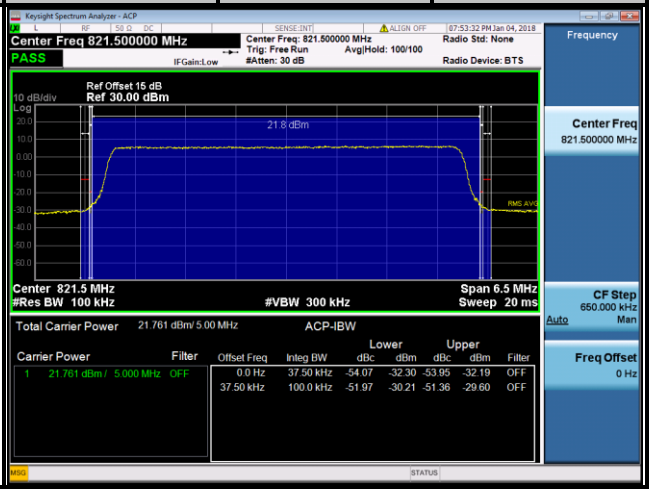


Channel Bandwidth: 3 MHz / 64QAM

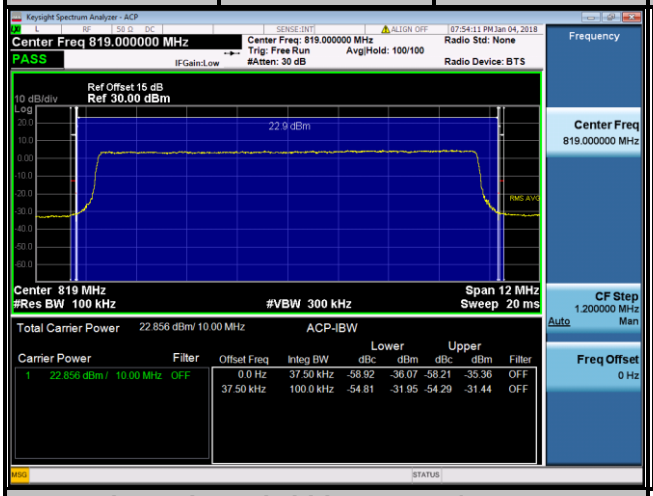
Channel	26705	15 RB	Channel	26775	15 RB



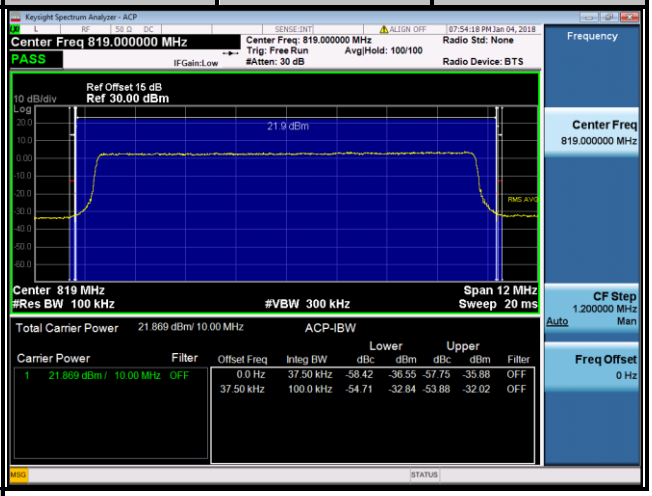


LTE Band 26					
Channel Bandwidth: 5 MHz / QPSK					
Channel	**267151**	**25 RB**	**Channel**	**26765**	**25 RB**
					
Channel Bandwidth: 5 MHz / 16QAM					
Channel	**267151**	**25 RB**	**Channel**	**26765**	**25 RB**
					
Channel Bandwidth: 5 MHz / 64QAM					
Channel	**267151**	**25 RB**	**Channel**	**26765**	**25 RB**
					

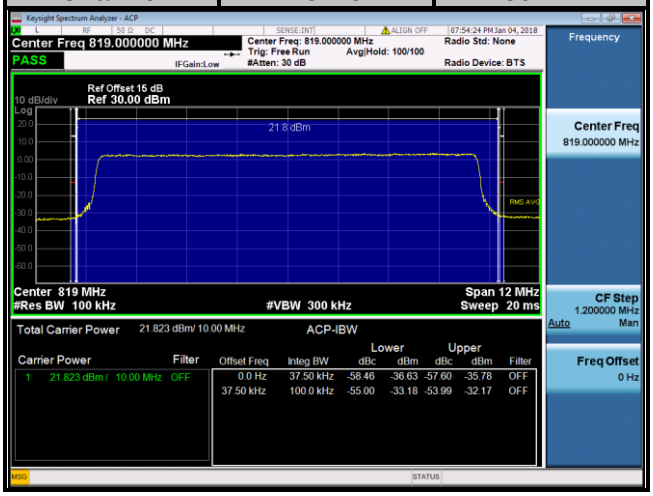
LTE Band 26		
Channel Bandwidth: 10 MHz / QPSK		
Channel	**26740**	**50 RB**



Channel Bandwidth: 10 MHz / 16QAM		
Channel	**26740**	**50 RB**



Channel Bandwidth: 10 MHz / 64QAM		
Channel	**26740**	**50 RB**

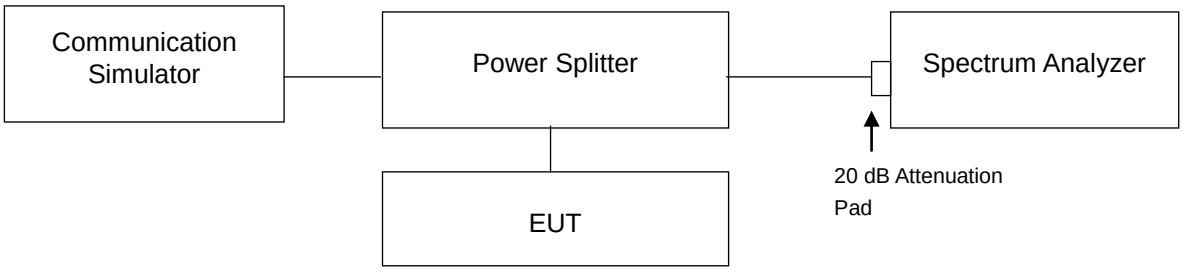


4.5 Conducted Spurious Emissions

4.5.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission is equal to -13 dBm.

4.5.2 Test Setup



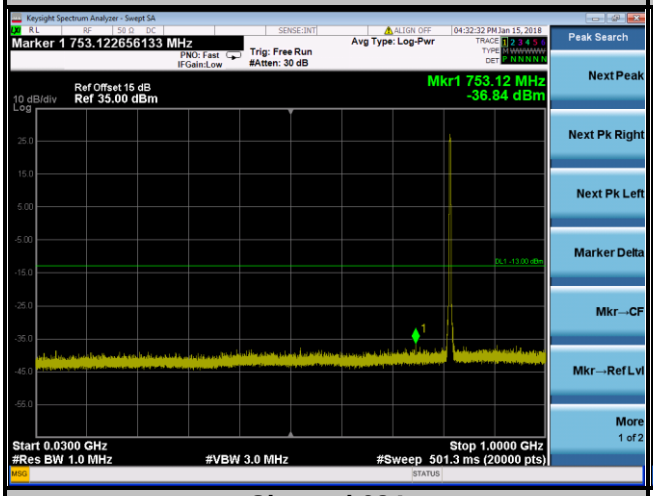
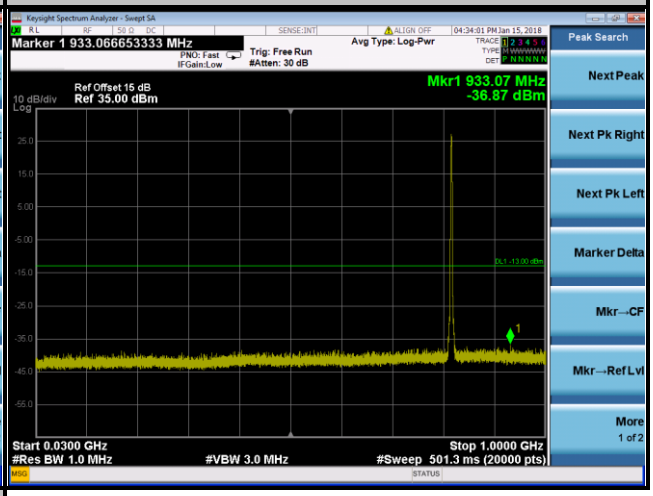
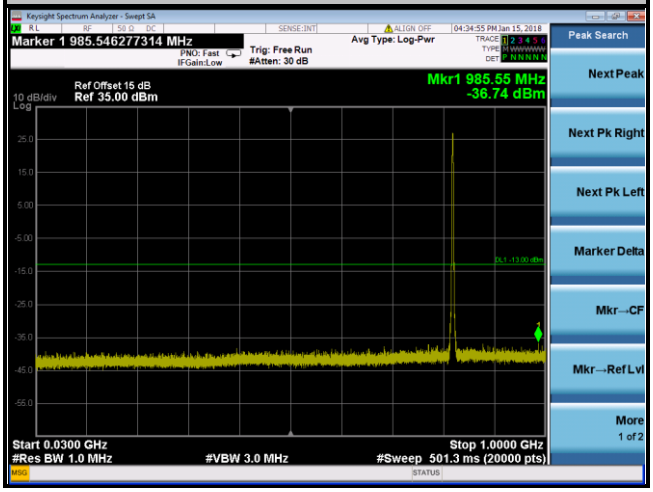
4.5.3 Test Procedure

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 30 MHz to 1 GHz and 1 GHz to 10 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 100 kHz and VBW = 300 kHz are used for conducted emission measurement.

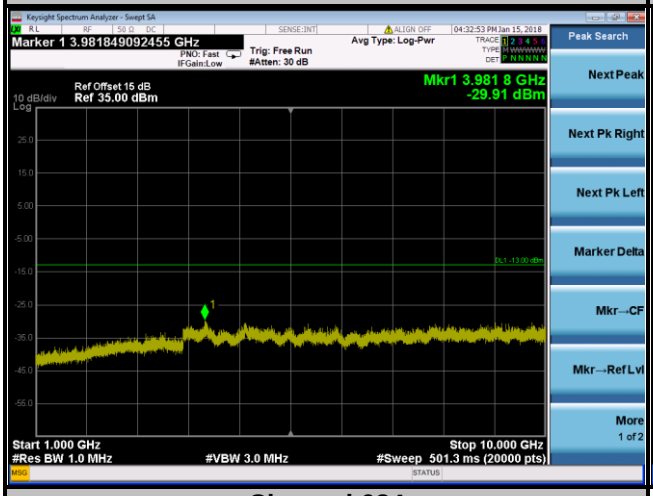
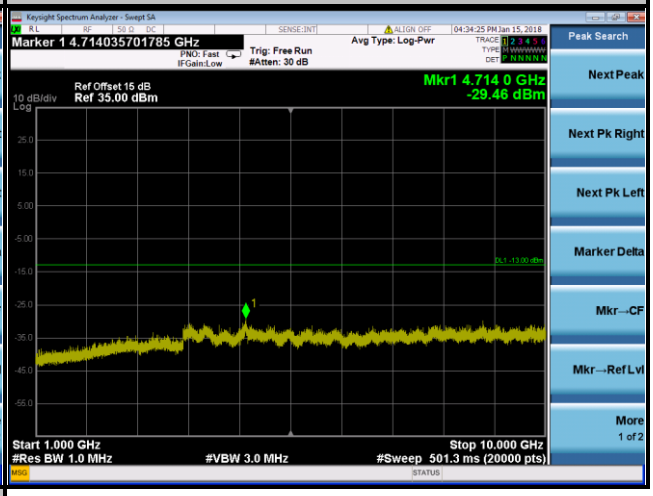
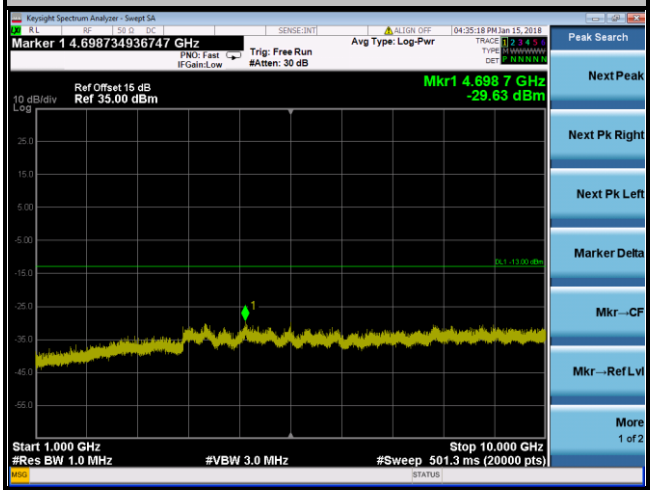
4.5.4 Test Results

CDMA

30MHz ~ 1GHz

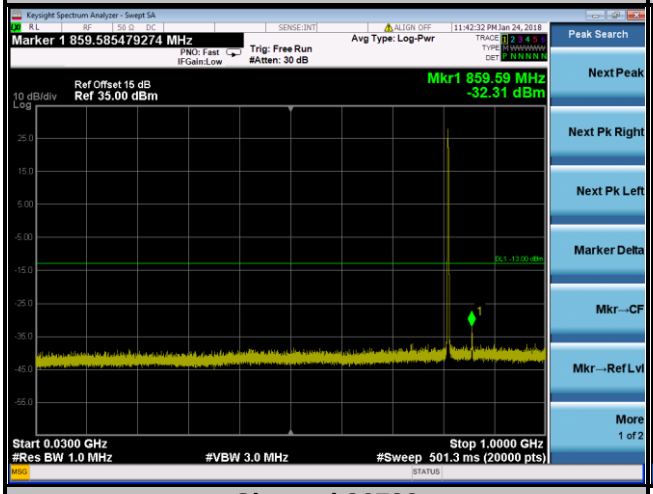
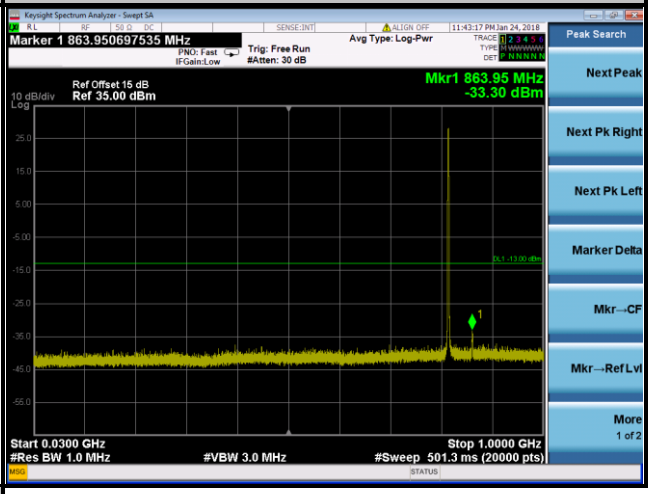
CDMA	
Channel 476	Channel 580
	
Channel 684	
	

1GHz ~ 10GHz

CDMA	
Channel 476	Channel 580
	
Channel 684	
	

LTE26

30MHz ~ 1GHz

LTE Band 26	
Channel Bandwidth: 1.4 MHz	
Channel 26697	Channel 26740
	
Channel 26783