TEST REPORT

APPLICANT	:	HAJEN Co., Ltd
PRODUCT NAME	:	HAJEN_SPRINT AI Speaker
MODEL NAME	:	FIXTA
BRAND NAME	:	HAJEN CO
FCC ID	:	2ACFTRT1505NN
STANDARD(S)	:	47 CFR Part 2 47 CFR Part 90, Subpart S
RECEIPT DATE	:	2019-12-30
TEST DATE	:	2020-03-05 to 2020-06-13
ISSUE DATE	:	2020-07-22

Edited by: He Dekuan (Rapporteur)

Approved by: Peng Huarui (Supervisor)

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DIRECTORY

Change History		
Version	**Date**	**Reason for change**
1.0	2020-07-22	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	HAJEN Co., Ltd
Applicant Address:	D-304 Digital Empire Bldg,. 16, Deogyeong-daero 1556beon-gil, Yeongtonggu, Suwon-si, South Korea
Manufacturer:	HAJEN Co.,LTD.
ManufacturerAddress:	D-304 Digital Empire Bldg,. 16, Deogyeong-daero 1556beon-gil, Yeongtonggu, Suwon-si, South Korea

1.2. Equipment Under Test (EUT) Description

Product Name:	HAJEN_SPRINT AI Speaker		
Hardware Version:	V03		
Software Version:	3.6.138365.0		
Modulation Type:	QPSK, 16QAM		
Operation Band:	Band 26		
Frequency Range:	LTE Band 26	Tx: 814MHz – 824MHz	
		Rx: 859MHz – 869MHz	
Channel Bandwidth	LTE Band 26	1.4MHz, 3 MHz, 5 MHz, 10MHz	
Antenna Type:	Internal FPC Antenna		
Antenna Gain:	LTE Band 26	0.23 dBi	
Accessory Information:	Battery		
	Brand Name:	A&S Power Technology Co., Ltd.	
	Model No.:	AS-853450-1500-122	
	Capacity:	3000mAh	
	Rated Voltage:	3.70V	
	Charge Limit:	4.20V	

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Maxium ERP/EIRP and Emission Designator

LTE Band26	Maximum ERP/EIRP（W）		Emission Designator (99%OBW)	
BW(MHz)	QPSK	16QAM	QPSK	16QAM
10	0.067	0.043	8M91G7D	8M90W7D
5	0.068	0.048	4M46G7D	4M45W7D
3	0.067	0.047	2M68G7D	2M68W7D
1.4	0.068	0.048	1M09G7D	1M08W7D

1.4. Test Standards and Results

The objective of the report is to perform testing according to Part 2 and Part 90 for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 90	Miscellaneous Wireless Communications Services

Test detailed items/section required by FCC rules and results are as below:

Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
2.1046, 90.635(b)	Transmitter Conducted Output Power and ERP/EIRP	June 1 to 8, 2020	Chen Hao	PASS	No deviation
90.209	Occupied Bandwidth	Apr 23, 2020	He Dekuan	PASS	No deviation
2.1055, 90.213	Frequency Stability	Mar 26 to Apr 3, 2020	He Dekuan	PASS	No deviation
2.1051,90.691	Conducted Spurious Emissions	Apr 24, 2020	He Dekuan	PASS	No deviation
2.1051,90.691	Band Edge	Apr 24, 2020	He Dekuan	PASS	No deviation
2.1051, 90.691	Radiated Spurious Emissions	Mar 23 to May 14, 2020	Peng Xuewei	PASS	No deviation
Note 1: The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03 and ANSI/TIA-603-E-2016. **Note 2:** The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 26.5dB contains two parts that cable loss 16.5dB and Attenuator 10dB.					

1.5. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

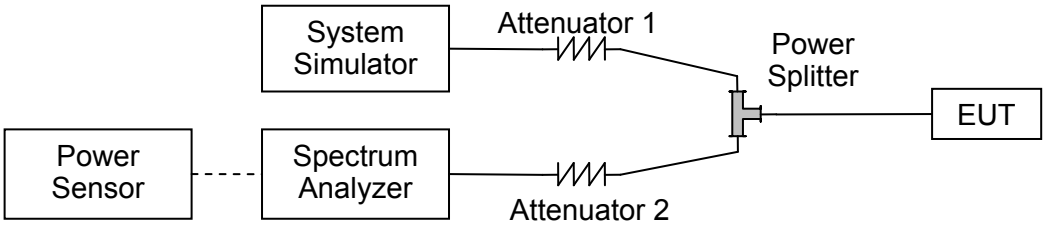
2. 47 CFR Part 2, Part 90S Requirements

2.1. Transmitter Conducted Output Power And ERP/EIRP

2.1.1. Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

2.1.2. Test Description



The EUTis coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

2.1.3. Test procedure

KDB 971168 D01v03 Section 5.2 and ANSI/TIA-603-E-2016.

EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)
ERP (dBm) = EIPR (dBm) - 2.15

2.1.4. Result

Conducted Output Power:

LTE Band26						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				/	26740	/
Frequency (MHz)				/	819.0	/
10	QPSK	1	0	/	20.21	/
10	QPSK	1	25	/	19.94	/
10	QPSK	1	49	/	19.36	/
10	QPSK	25	0	/	18.42	/
10	QPSK	25	12	/	18.28	/
10	QPSK	25	25	/	18.23	/
10	QPSK	50	0	/	18.31	/
10	16QAM	1	0	/	18.24	/
10	16QAM	1	25	/	18.12	/
10	16QAM	1	49	/	18.29	/
10	16QAM	25	0	/	17.54	/
10	16QAM	25	12	/	17.13	/
10	16QAM	25	25	/	17.24	/
10	16QAM	50	0	/	17.33	/

LTE Band26						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				26715	26740	26765
Frequency (MHz)				816.5	819.0	821.5
5	QPSK	1	0	20.26	20.13	20.23
5	QPSK	1	12	19.88	19.87	19.93
5	QPSK	1	24	19.91	20.15	19.91
5	QPSK	12	0	18.63	18.54	18.67
5	QPSK	12	7	18.24	18.27	18.29
5	QPSK	12	13	18.37	18.36	18.62
5	QPSK	25	0	18.59	18.49	18.39
5	16QAM	1	0	18.42	18.44	18.24
5	16QAM	1	12	18.52	18.53	18.77
5	16QAM	1	24	18.62	18.74	18.57
5	16QAM	12	0	17.64	17.51	17.62
5	16QAM	12	7	17.23	17.18	17.42
5	16QAM	12	13	17.34	17.24	17.31
5	16QAM	25	0	17.58	17.38	17.29

LTE Band26						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				26705	26740	26775
Frequency (MHz)				815.5	819.0	822.5
3	QPSK	1	0	20.12	20.21	20.19
3	QPSK	1	8	19.98	19.89	20.14
3	QPSK	1	14	20.12	19.92	19.93
3	QPSK	8	0	18.61	18.57	18.63
3	QPSK	8	4	18.31	18.31	18.24
3	QPSK	8	7	18.39	18.37	18.43
3	QPSK	15	0	18.61	18.51	18.42
3	16QAM	1	0	18.51	18.62	18.54
3	16QAM	1	8	18.55	18.54	18.08
3	16QAM	1	14	18.62	18.46	18.21
3	16QAM	8	0	17.62	17.56	17.65
3	16QAM	8	4	17.26	17.19	17.35
3	16QAM	8	7	17.38	17.44	17.34
3	16QAM	15	0	17.44	17.32	17.37

LTE Band26						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				26697	26740	26783
Frequency (MHz)				814.7	819.0	823.3
1.4	QPSK	1	0	20.27	20.18	20.09
1.4	QPSK	1	3	20.12	20.12	20.03
1.4	QPSK	1	5	20.12	19.87	20.02
1.4	QPSK	3	0	20.12	19.87	19.95
1.4	QPSK	3	1	20.11	19.66	19.92
1.4	QPSK	3	3	19.98	20.14	20.14
1.4	QPSK	6	0	18.55	18.51	18.61
1.4	16QAM	1	0	18.25	18.25	18.52
1.4	16QAM	1	3	18.42	18.59	18.56
1.4	16QAM	1	5	18.74	18.51	18.61
1.4	16QAM	3	0	18.34	18.37	18.21
1.4	16QAM	3	1	18.24	18.26	18.29
1.4	16QAM	3	3	18.43	18.29	18.37
1.4	16QAM	6	0	17.54	17.42	17.61

Effective Radiated Power and Effective Isotropic Radiated Power:

LTE Band26				Measured ERP			
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.	Middle Ch. / Freq.		High Ch. / Freq.
Channel				/	26740		/
Frequency (MHz)				/	819		/
				/	dbm	W	/
10	QPSK	1	0	/	18.29	0.067	/
10	QPSK	1	25	/	18.02	0.063	/
10	QPSK	1	49	/	17.44	0.055	/
10	QPSK	25	0	/	16.50	0.045	/
10	QPSK	25	12	/	16.36	0.043	/
10	QPSK	25	25	/	16.31	0.043	/
10	QPSK	50	0	/	16.39	0.044	/
10	16QAM	1	0	/	16.32	0.043	/
10	16QAM	1	25	/	16.20	0.042	/
10	16QAM	1	49	/	16.37	0.043	/
10	16QAM	25	0	/	15.62	0.036	/
10	16QAM	25	12	/	15.21	0.033	/
10	16QAM	25	25	/	15.32	0.034	/
10	16QAM	50	0	/	15.41	0.035	/
10	64QAM	1	0	/	18.29	0.067	/
10	64QAM	1	25	/	18.02	0.063	/
10	64QAM	1	49	/	17.44	0.055	/
10	64QAM	25	0	/	16.50	0.045	/
10	64QAM	25	12	/	16.36	0.043	/
10	64QAM	25	25	/	16.31	0.043	/
10	64QAM	50	0	/	16.39	0.044	/

LTE Band26				Measured ERP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				26715		26740		26765	
Frequency (MHz)				816.5		819.0		821.5	
				dbm	W	dbm	W	dbm	W
5	QPSK	1	0	18.34	0.068	18.21	0.066	18.31	0.068
5	QPSK	1	12	17.96	0.063	17.95	0.062	18.01	0.063
5	QPSK	1	24	17.99	0.063	18.23	0.067	17.99	0.063
5	QPSK	12	0	16.71	0.047	16.62	0.046	16.75	0.047
5	QPSK	12	7	16.32	0.043	16.35	0.043	16.37	0.043
5	QPSK	12	13	16.45	0.044	16.44	0.044	16.70	0.047
5	QPSK	25	0	16.67	0.046	16.57	0.045	16.47	0.044
5	16QAM	1	0	16.50	0.045	16.52	0.045	16.32	0.043
5	16QAM	1	12	16.60	0.046	16.61	0.046	16.85	0.048
5	16QAM	1	24	16.70	0.047	16.82	0.048	16.65	0.046
5	16QAM	12	0	15.72	0.037	15.59	0.036	15.70	0.037
5	16QAM	12	7	15.31	0.034	15.26	0.034	15.50	0.035
5	16QAM	12	13	15.42	0.035	15.32	0.034	15.39	0.035
5	16QAM	25	0	15.66	0.037	15.46	0.035	15.37	0.034

LTE Band26				Measured EIRP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				26705		26740		26775	
Frequency (MHz)				815.5		819.0		822.5	
				dbm	W	dbm	W	dbm	W
3	QPSK	1	0	18.20	0.066	18.29	0.067	18.27	0.067
3	QPSK	1	8	18.06	0.064	17.97	0.063	18.22	0.066
3	QPSK	1	14	18.20	0.066	18.00	0.063	18.01	0.063
3	QPSK	8	0	16.69	0.047	16.65	0.046	16.71	0.047
3	QPSK	8	4	16.39	0.044	16.39	0.044	16.32	0.043
3	QPSK	8	7	16.47	0.044	16.45	0.044	16.51	0.045
3	QPSK	15	0	16.69	0.047	16.59	0.046	16.50	0.045
3	16QAM	1	0	16.59	0.046	16.70	0.047	16.62	0.046
3	16QAM	1	8	16.63	0.046	16.62	0.046	16.16	0.041
3	16QAM	1	14	16.70	0.047	16.54	0.045	16.29	0.043
3	16QAM	8	0	15.70	0.037	15.64	0.037	15.73	0.037
3	16QAM	8	4	15.34	0.034	15.27	0.034	15.43	0.035
3	16QAM	8	7	15.46	0.035	15.52	0.036	15.42	0.035
3	16QAM	15	0	15.52	0.036	15.40	0.035	15.45	0.035

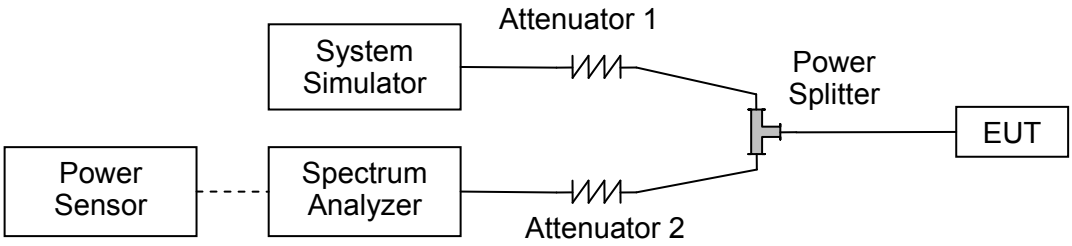
LTE Band26				Measured EIRP					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				26697		26740		26783	
Frequency (MHz)				814.7		819.0		823.3	
				dbm	W	dbm	W	dbm	W
1.4	QPSK	1	0	18.35	0.068	18.26	0.067	18.17	0.066
1.4	QPSK	1	3	18.20	0.066	18.20	0.066	18.11	0.065
1.4	QPSK	1	5	18.20	0.066	17.95	0.062	18.10	0.065
1.4	QPSK	3	0	18.20	0.066	17.95	0.062	18.03	0.064
1.4	QPSK	3	1	18.19	0.066	17.74	0.059	18.00	0.063
1.4	QPSK	3	3	18.06	0.064	18.22	0.066	18.22	0.066
1.4	QPSK	6	0	16.63	0.046	16.59	0.046	16.69	0.047
1.4	16QAM	1	0	16.33	0.043	16.33	0.043	16.60	0.046
1.4	16QAM	1	3	16.50	0.045	16.67	0.046	16.64	0.046
1.4	16QAM	1	5	16.82	0.048	16.59	0.046	16.69	0.047
1.4	16QAM	3	0	16.42	0.044	16.45	0.044	16.29	0.043
1.4	16QAM	3	1	16.32	0.043	16.34	0.043	16.37	0.043
1.4	16QAM	3	3	16.51	0.045	16.37	0.043	16.45	0.044
1.4	16QAM	6	0	15.62	0.036	15.50	0.035	15.69	0.037

2.2. Occupied Bandwidth

2.2.1. Requirement

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.Occupied bandwidth is also known as the 99% emission bandwidth.

2.2.2. Test Description



The EUTis coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

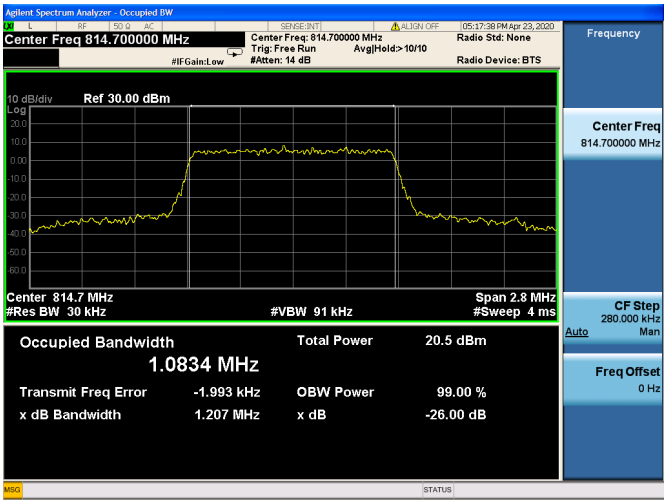
2.2.3. Test procedure

KDB 971168 D01v03 Section 4.1 and ANSI/TIA-603-E-2016.

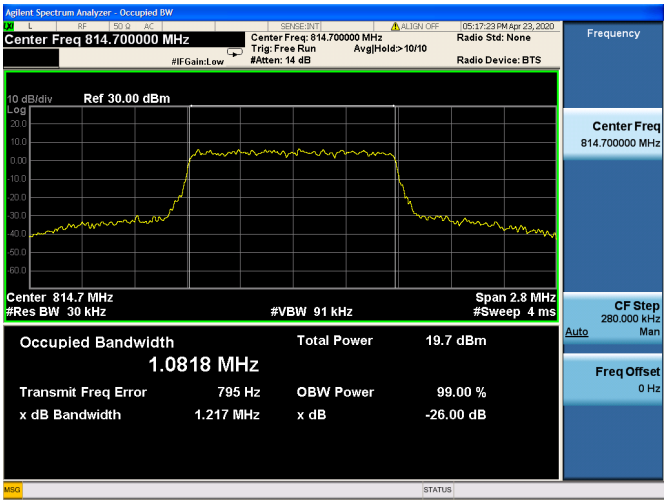
2.2.4. Test Result

LTE Band26				
BW(MHz)	**Channel Level**	**Modulation**	**99% BW(MHz)**	**26dB BW(MHz)**
1.4	Low	QPSK	1.08	1.21
	Low	16QAM	1.08	1.22
	Mid	QPSK	1.08	1.19
	Mid	16QAM	1.08	1.18
	High	QPSK	1.09	1.18
	High	16QAM	1.08	1.22
3	Low	QPSK	2.67	2.86
	Low	16QAM	2.67	2.89
	Mid	QPSK	2.68	2.85
	Mid	16QAM	2.68	2.88
	High	QPSK	2.68	2.86
	High	16QAM	2.68	2.86
5	Low	QPSK	4.46	4.74
	Low	16QAM	4.45	4.71
	Mid	QPSK	4.46	4.71
	Mid	16QAM	4.45	4.70
	High	QPSK	4.45	4.67
	High	16QAM	4.45	4.69
10	Mid	QPSK	8.91	9.25
	Mid	16QAM	8.90	9.24

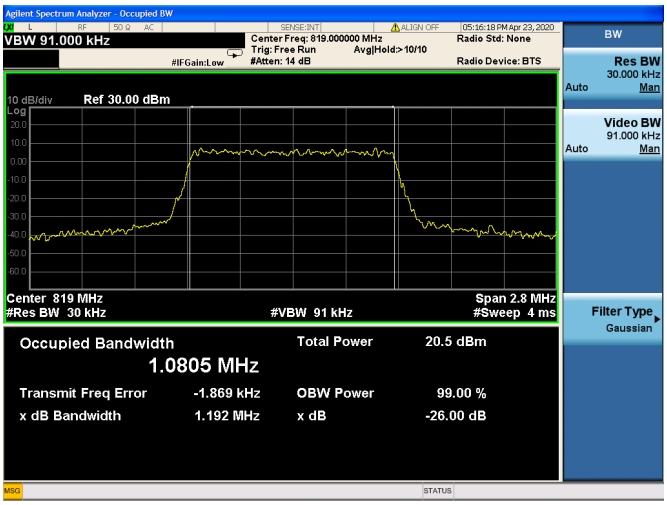
Band 26 / 1.4MHz BW / Low CH QPSK



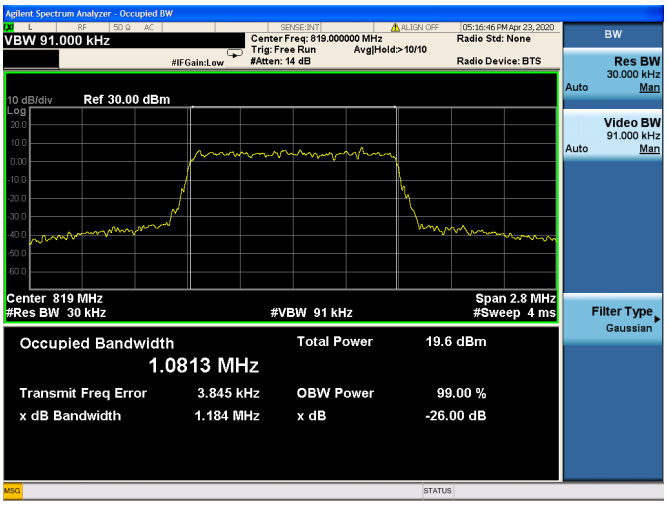
Band 26 / 1.4MHz BW / Low CH / 16QAM



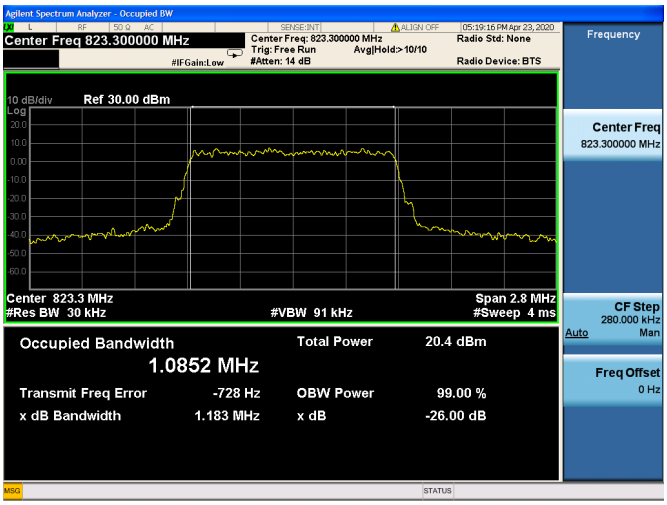
Band 26 / 1.4MHz BW / Mid CH QPSK



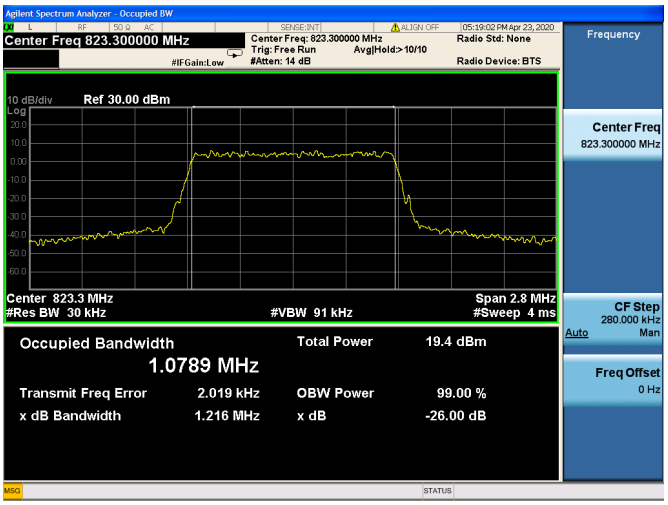
Band 26 / 1.4MHz BW / Mid CH / 16QAM



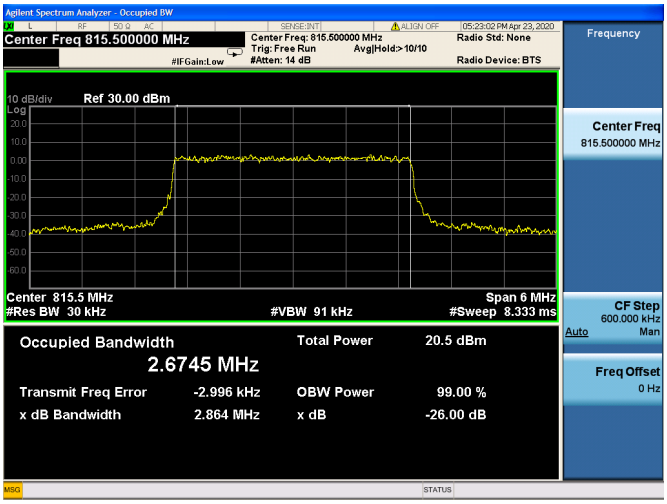
Band 26 / 1.4MHz BW / High CH QPSK



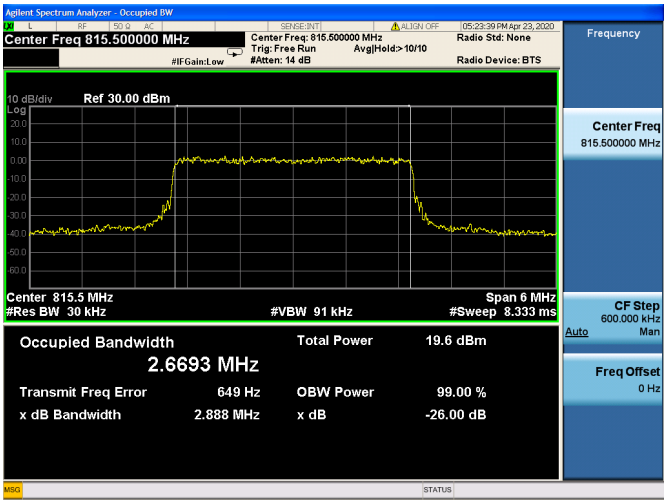
Band 26 / 1.4MHz BW / High CH / 16QAM



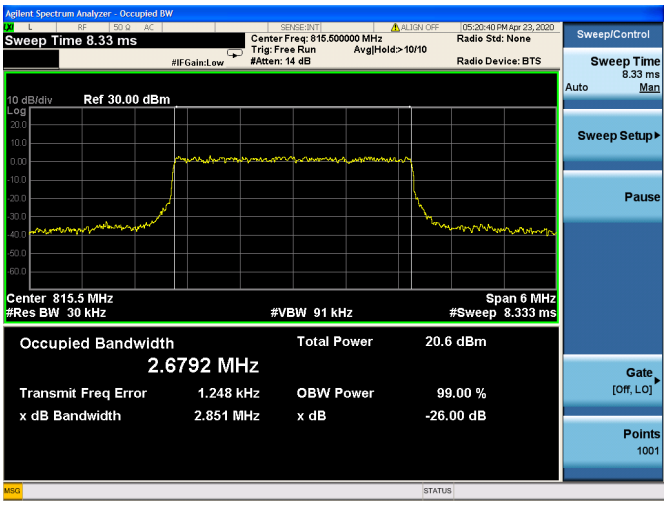
Band 26 / 3MHz BW / Low CH QPSK



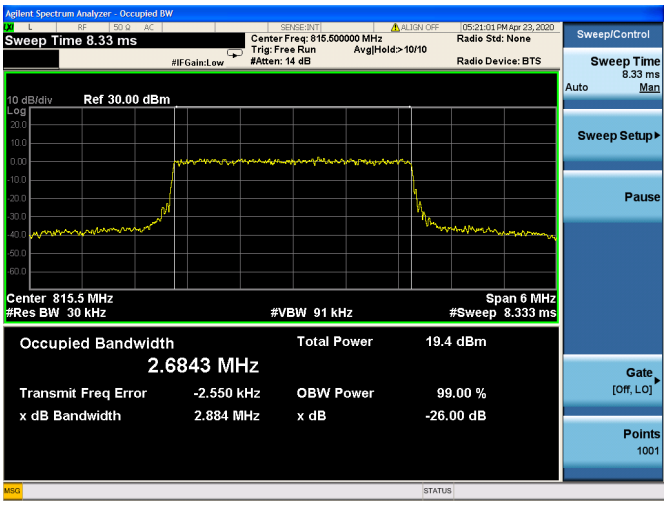
Band 26 / 3MHz BW / Low CH / 16QAM



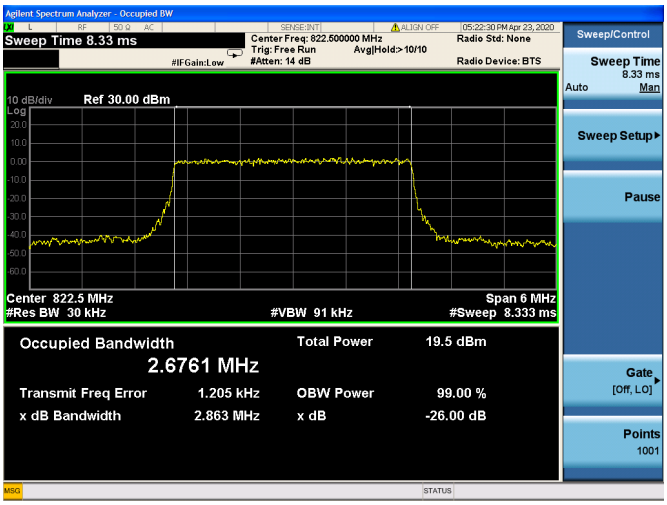
Band 26 / 3MHz BW / Mid CH QPSK



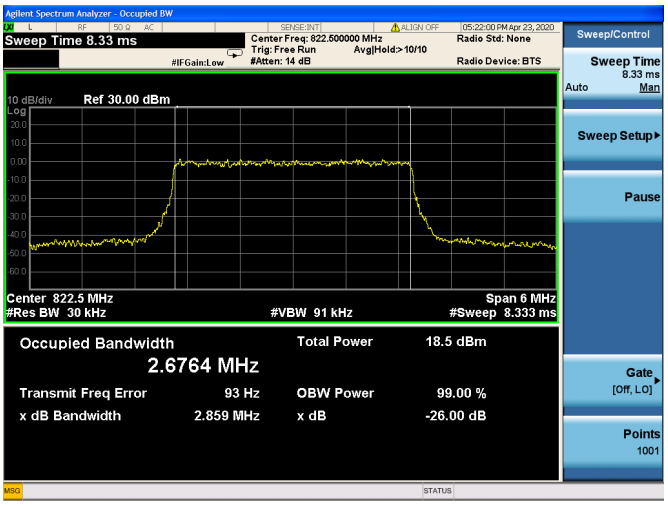
Band 26 / 3MHz BW / Mid CH / 16QAM



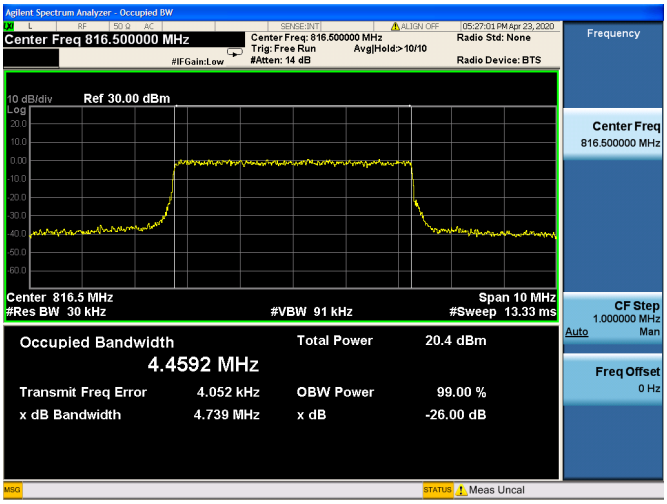
Band 26 / 3MHz BW / High CH QPSK



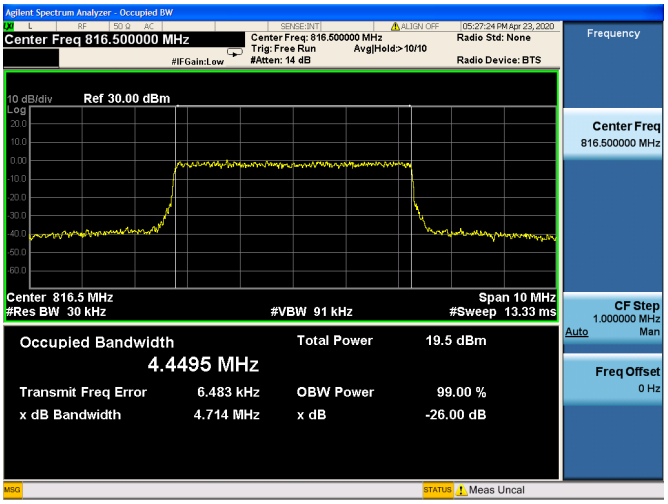
Band 26 / 3MHz BW / High CH / 16QAM



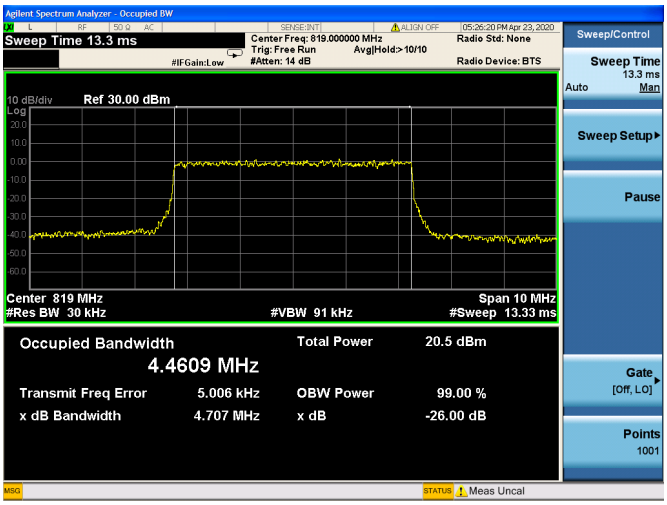
Band 26 / 5MHz BW / Low CH QPSK



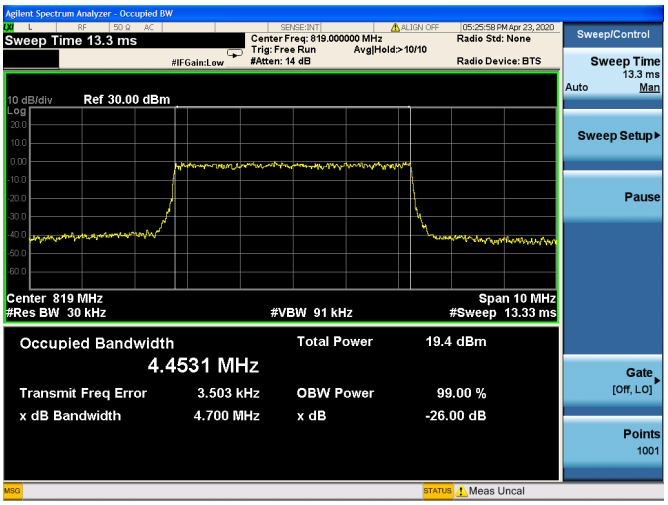
Band 26 / 5MHz BW / Low CH / 16QAM



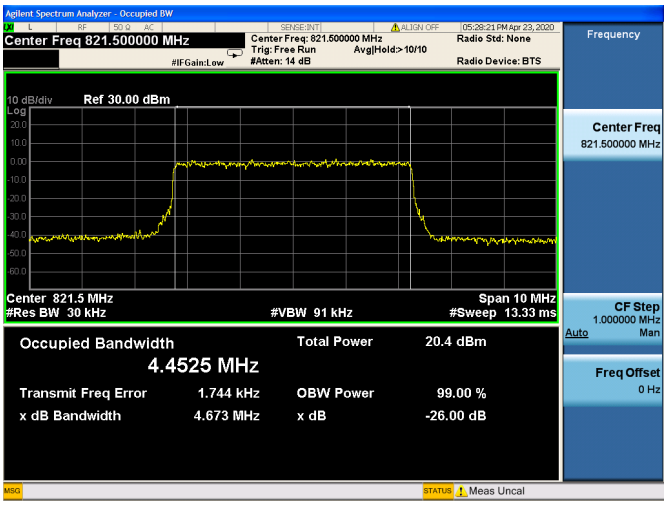
Band 26 / 5MHz BW / Mid CH QPSK



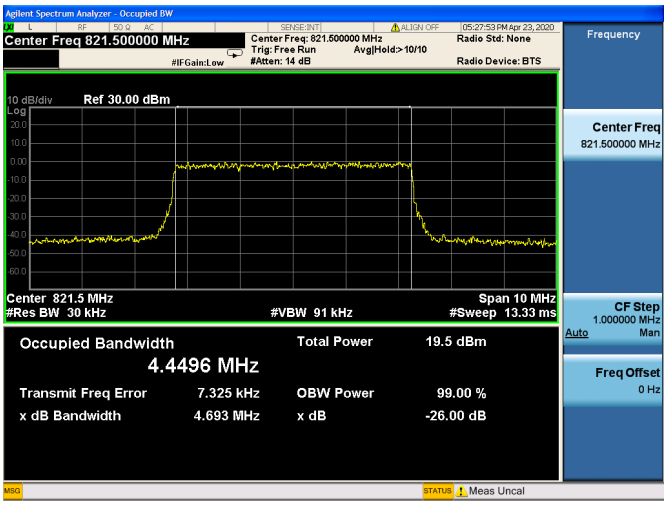
Band 26 / 5MHz BW / Mid CH / 16QAM

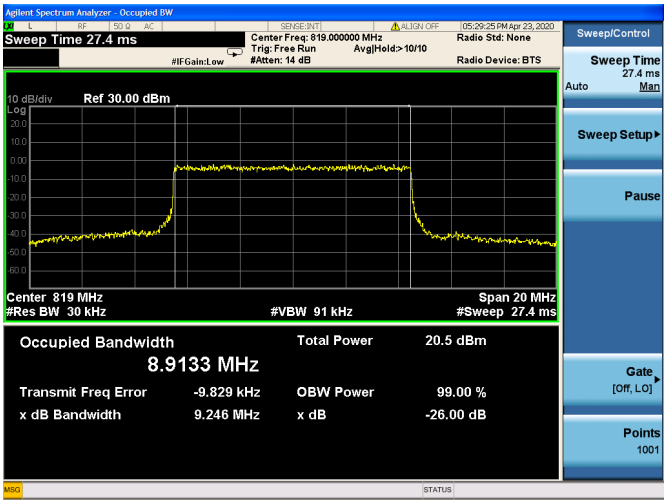
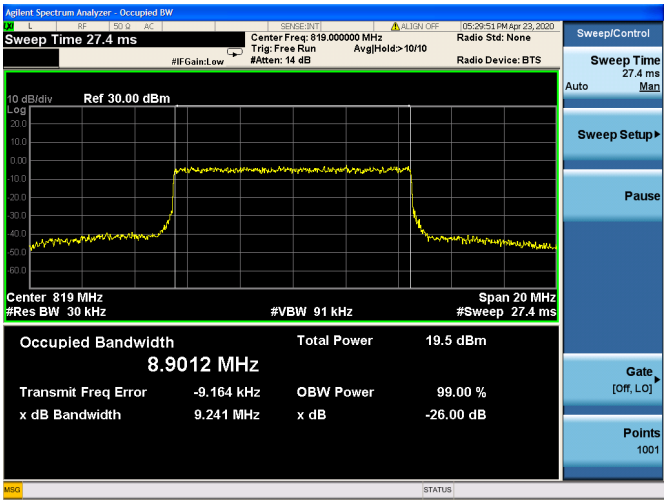


Band 26 / 5MHz BW / High CH QPSK



Band 26 / 5MHz BW / High CH / 16QAM



Band 26 / 10MHz BW / Mid CH QPSK	Band 26 / 10MHz BW / Mid CH / 16QAM
	

2.3. Frequency Stability

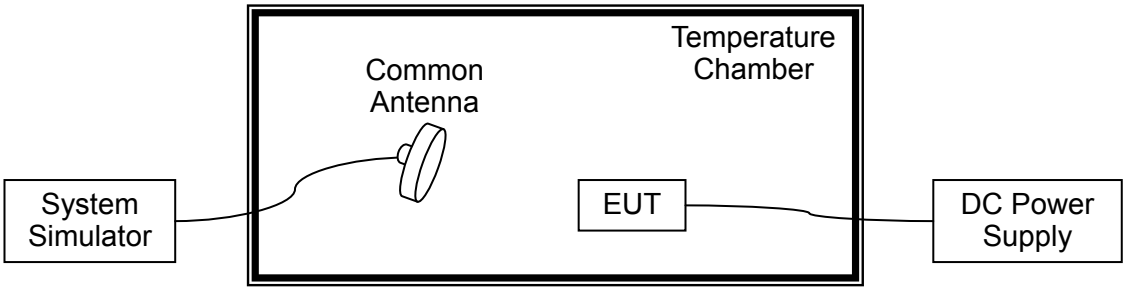
2.3.1. Requirement

According to FCC section 2.1055 & 90.213, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(a) The temperature is varied from -10°C to +60°C at intervals of not more than 10°C.

(b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

2.3.2. Test Description



The EUT which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power. A call is established between the EUT and the SS via a Common Antenna.

2.3.3. Test procedure

KDB 971168 D01v03 Section 9.0 and ANSI/TIA-603-E-2016.

2.3.4. Test Result

The nominal, highest and lowest extreme voltages are separately 5.00VDC, 5.75VDC and 4.25VDC, which are specified by the applicant; the normal temperature here used is 20°C.

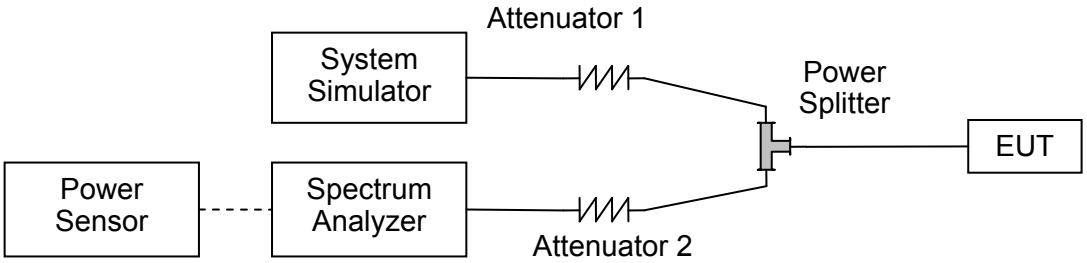
LTE Band 25, QPSK, Channel 26740, Frequency 819MHz Limit =Within Authorized Band					
Voltage(%)	**Power (VDC)**	**Temp(°C)**	**Fre. Dev.(Hz)**	**Deviation (ppm)**	**Result**
100	5.00	+20（Ref）	21	0.025	PASS
100		-10	-32	-0.038	
100		0	-15	-0.018	
100		+10	-36	-0.043	
100		+20	-37	-0.018	
100		+30	73	0.035	
100		+40	47	0.022	
100		+50	-28	-0.034	
100		+60	-36	-0.043	
115	5.75	+20	65	0.078	
85	4.25	+20	53	0.064	

2.4. Peak to Average Radio

2.4.1. Requirement

2.4.2. Test Description

A. Test Set:



The EUTis coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

2.4.3. Test procedure

KDB 971168 D01v03 Section 5.7 and ANSI/TIA-603-E-2016.

2.4.4. Test Result

Record the maximum PAPR level associated with a probability of 0.1%.

Note: PART 90 sections are none of the result

2.5. Conducted Spurious Emissions

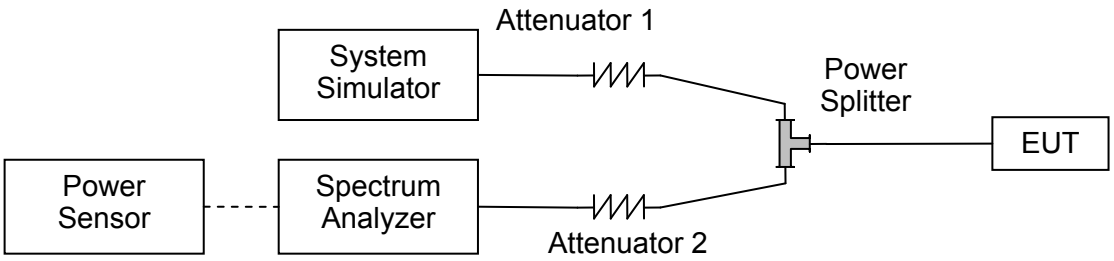
2.5.1. Requirement

According to FCC section 2.1051, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

Additional requirement for LTE Band 7/38/41:
The power of any emission outside of the authorized operating frequency ranges must beattenuated below the transmitting power (P) by a factor of at least 55 + 10 log(P) dB. This calculated to be -25dBm.

Additional requirement for LTE Band 30/40:
The power of any emission outside of the authorized operating frequency ranges must be attenuatedbelow the transmitter power (P) by a factor of at least 70 + 10 log (P) dB.This calculated to be -40dBm.

2.5.2. Test Description



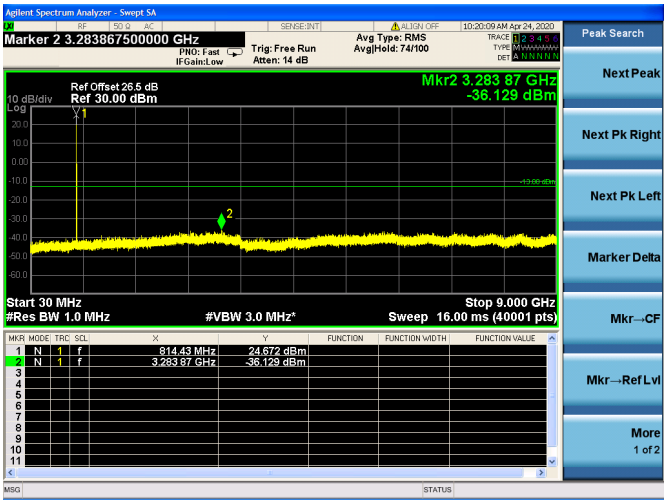
The EUTis coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

2.5.3. Test procedure

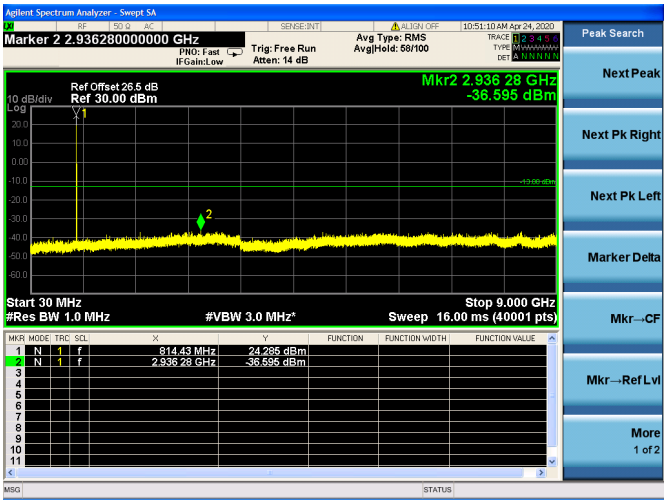
KDB 971168 D01v03 Section 6.0 and ANSI/TIA-603-E-2016.

2.5.4. Test Result

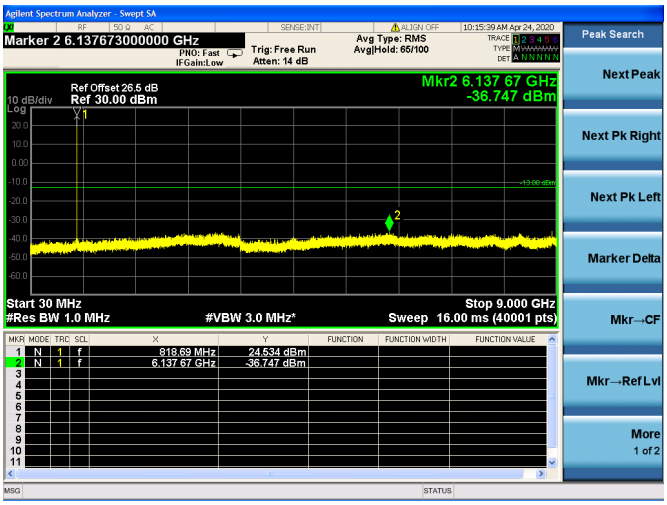
Band 26 / 1.4MHz BW / Low CH QPSK



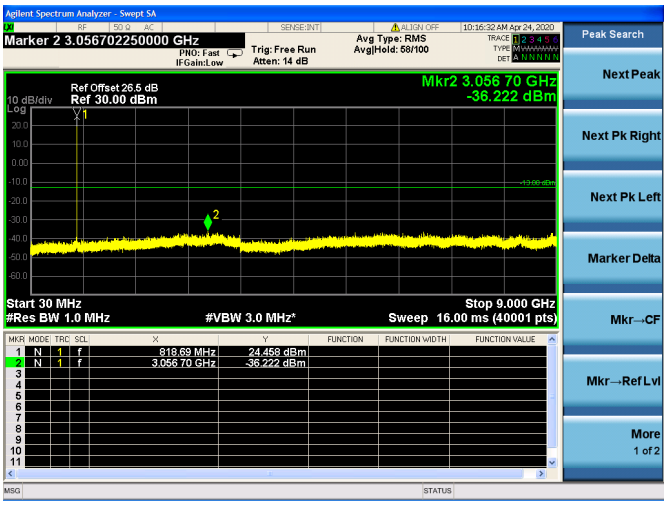
Band 26 / 1.4MHz BW / Low CH / 16QAM



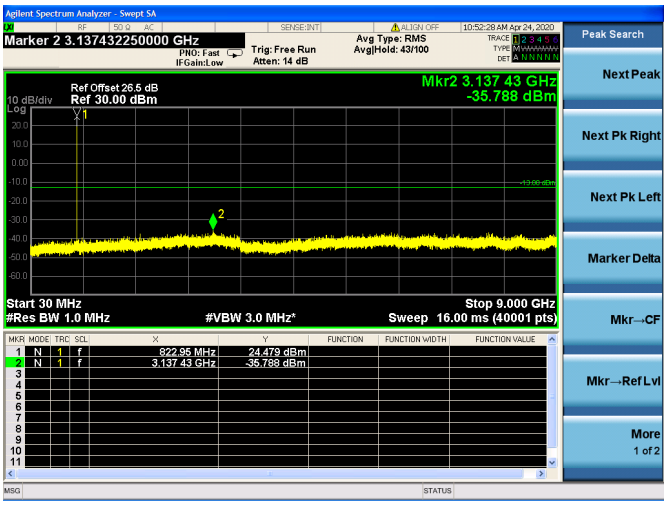
Band 26 / 1.4MHz BW / Mid CH QPSK



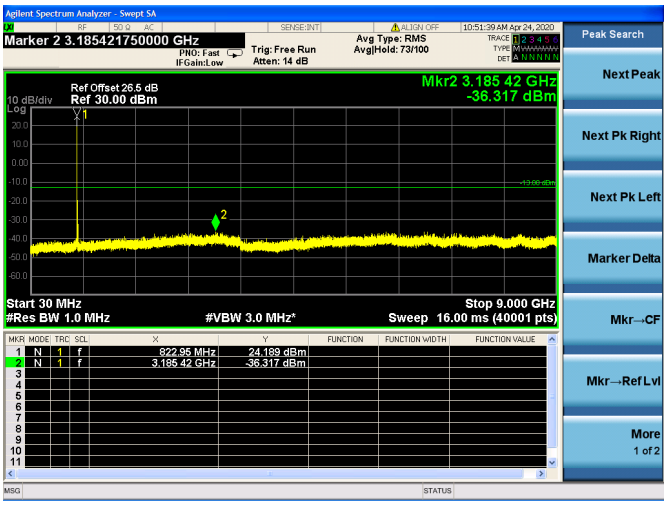
Band 26 / 1.4MHz BW / Mid CH / 16QAM



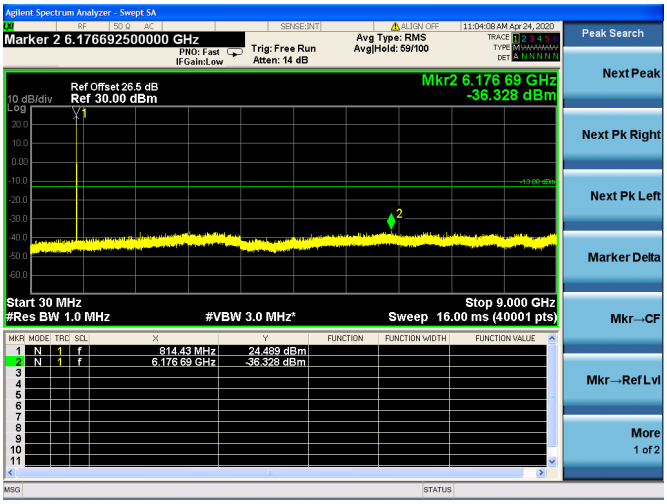
Band 26 / 1.4MHz BW / High CH QPSK



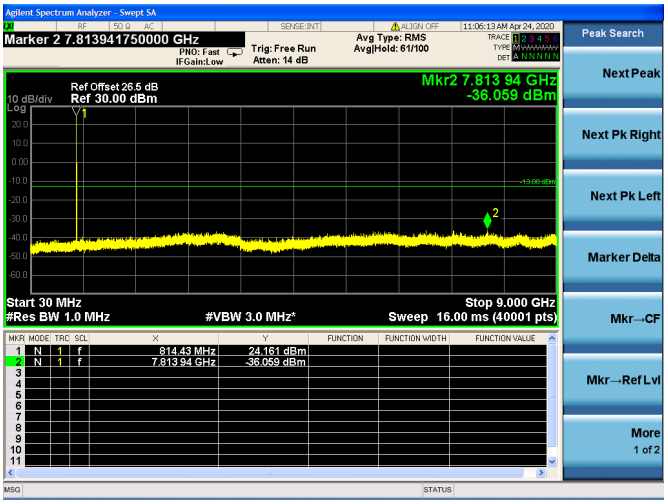
Band 26 / 1.4MHz BW / High CH / 16QAM



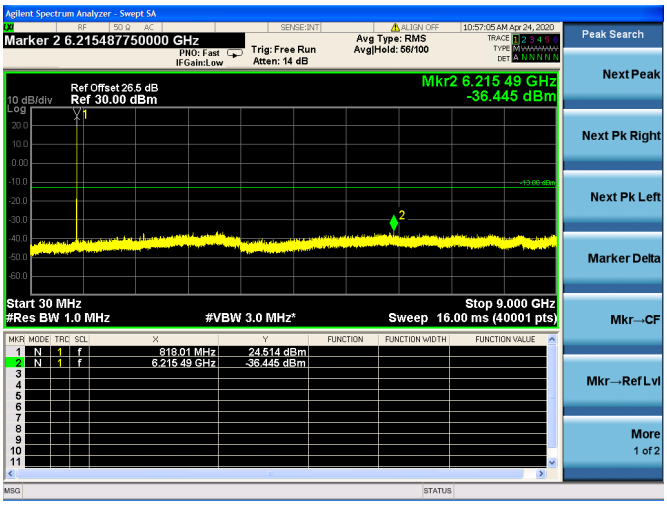
Band 26 / 3MHz BW / Low CH QPSK



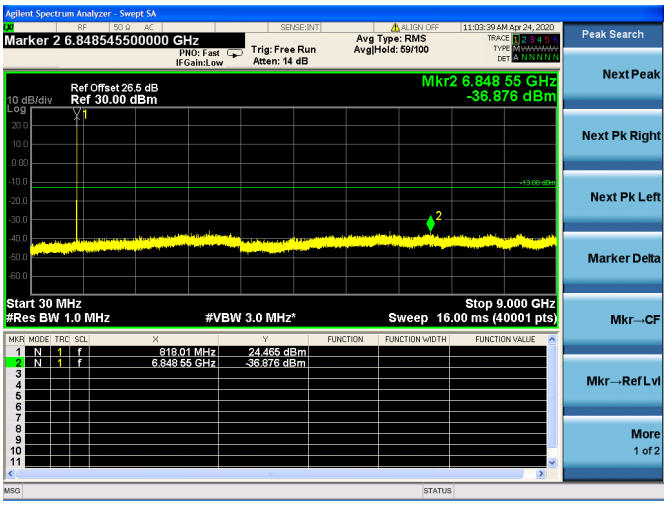
Band 26 / 3MHz BW / Low CH / 16QAM



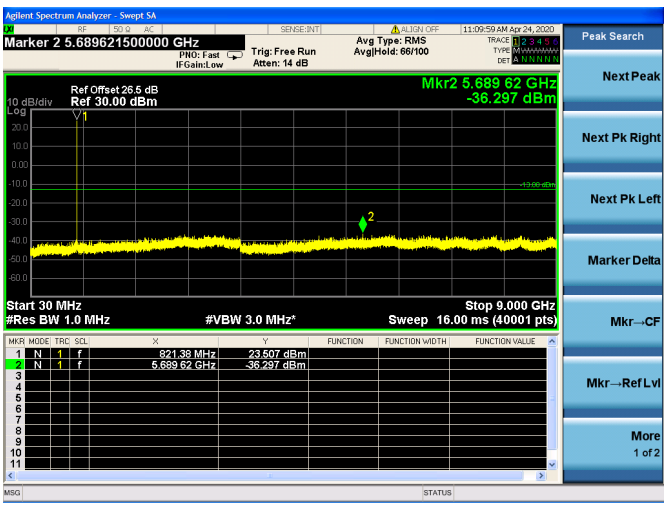
Band 26 / 3MHz BW / Mid CH QPSK



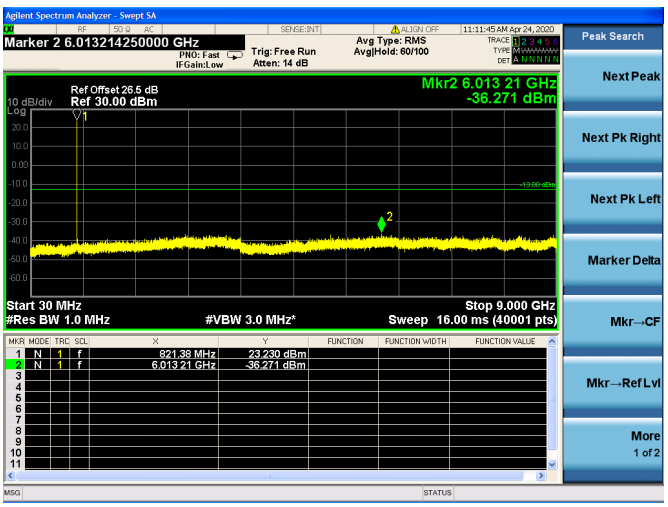
Band 26 / 3MHz BW / Mid CH / 16QAM



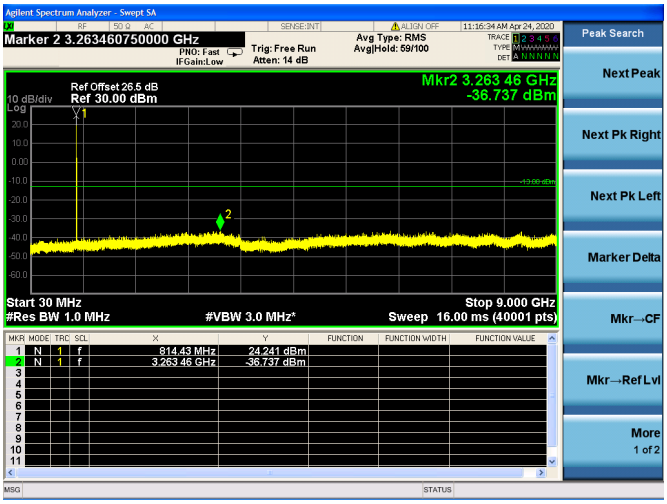
Band 26 / 3MHz BW / High CH QPSK



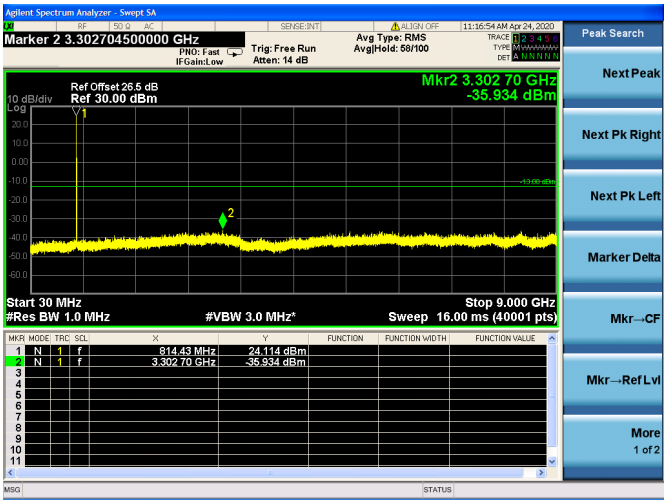
Band 26 / 3MHz BW / High CH / 16QAM



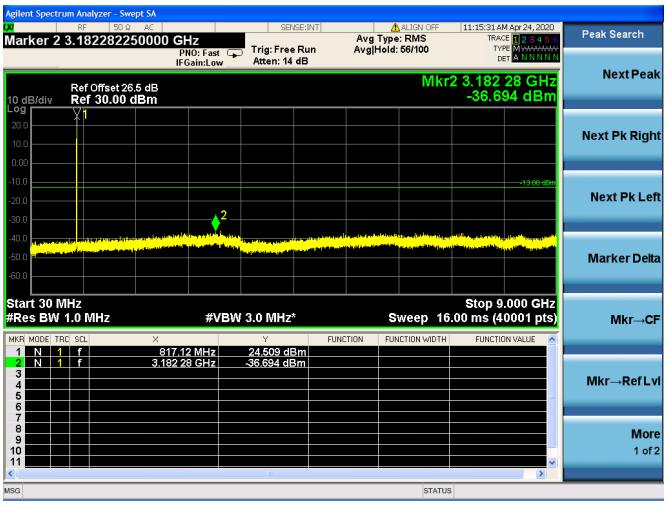
Band 26 / 5MHz BW / Low CH QPSK



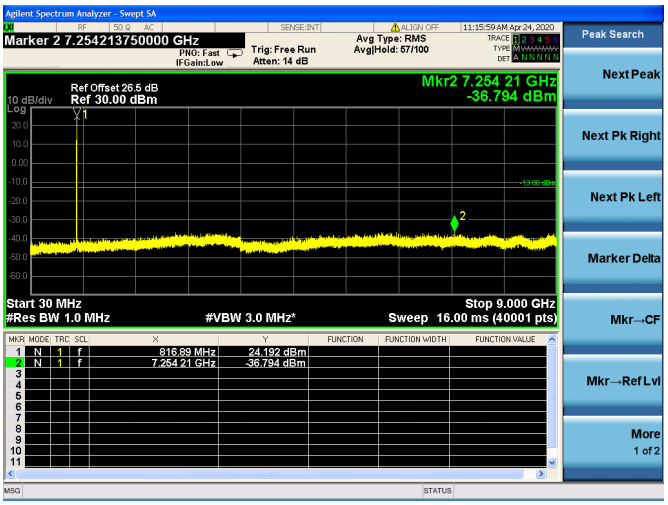
Band 26 / 5MHz BW / Low CH / 16QAM



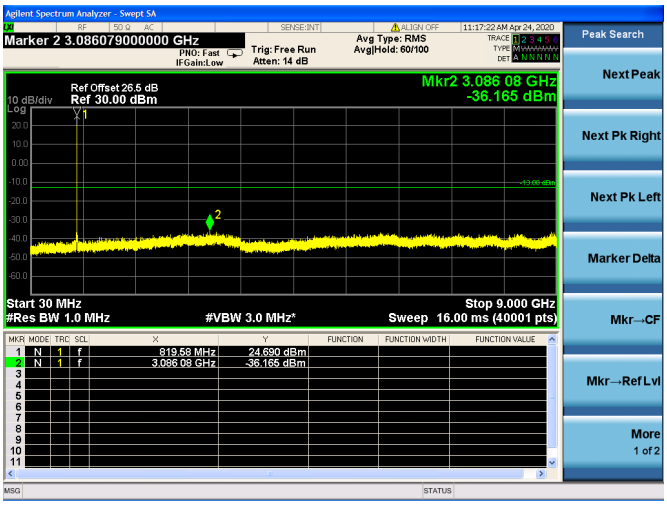
Band 26 / 5MHz BW / Mid CH QPSK



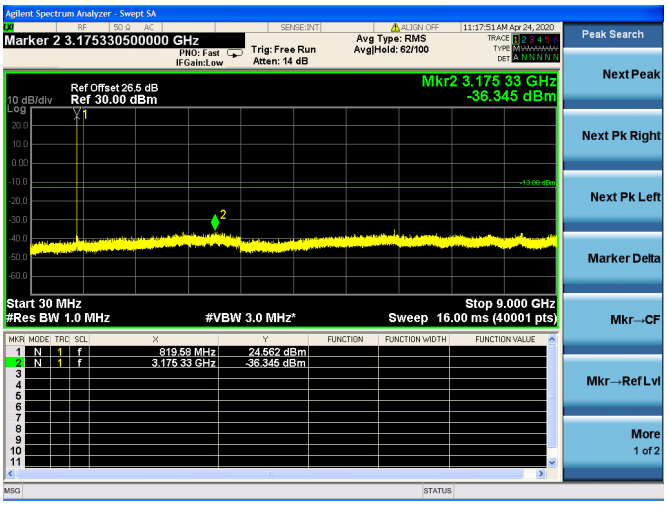
Band 26 / 5MHz BW / Mid CH / 16QAM

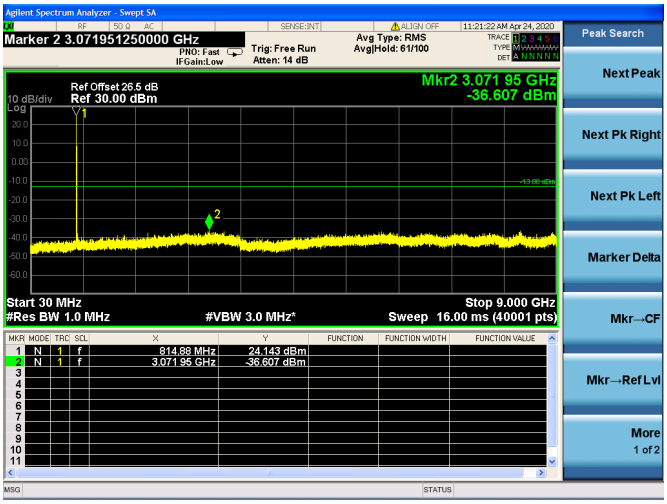
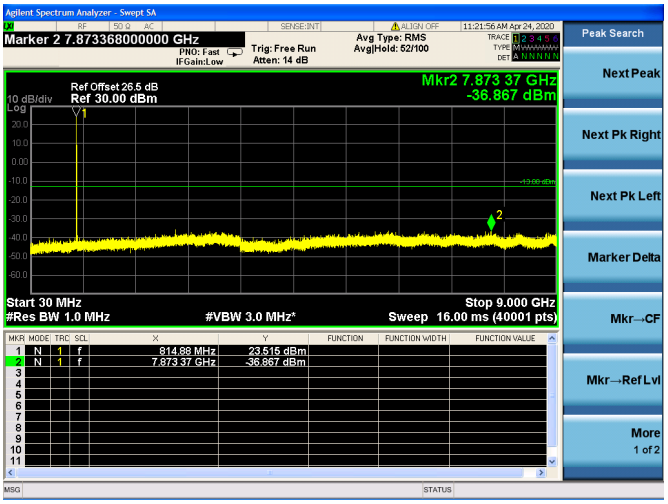


Band 26 / 5MHz BW / High CH QPSK



Band 26 / 5MHz BW / High CH / 16QAM



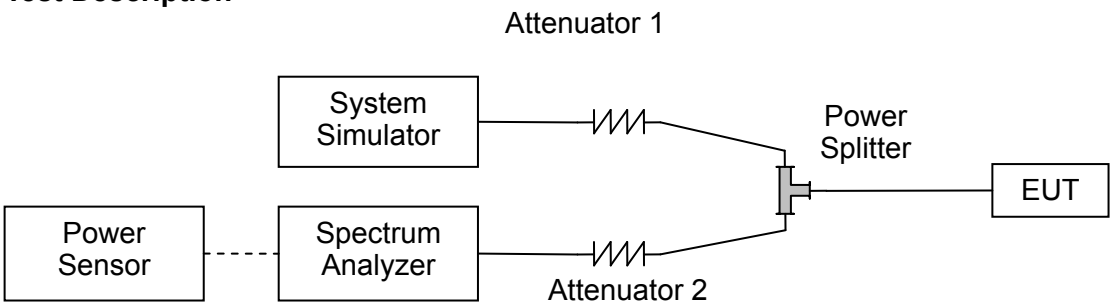
Band 26 / 10MHz BW / Mid CH QPSK	Band 26 / 10MHz BW / Mid CH / 16QAM
	

2.6. Band Edge

2.6.1. Requirement

According to FCC section 90.961, The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

2.6.2. Test Description



The EUTis coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

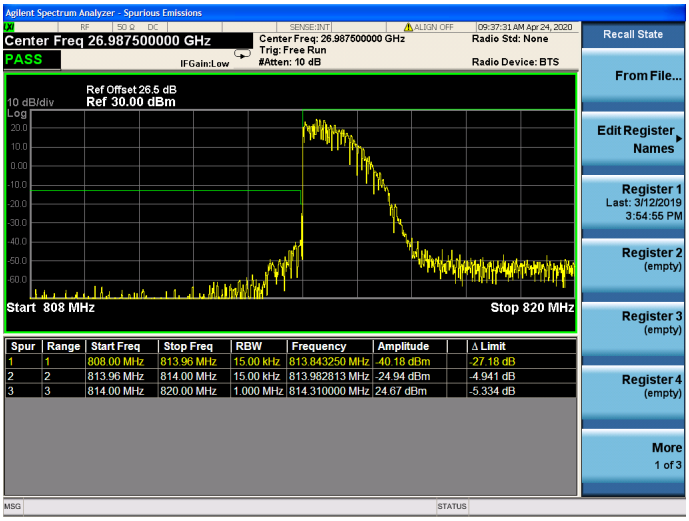
2.6.3. Test procedure

KDB 971168 D01v03 Section 6.0 and ANSI/TIA-603-E-2016.

2.6.4. Test Result

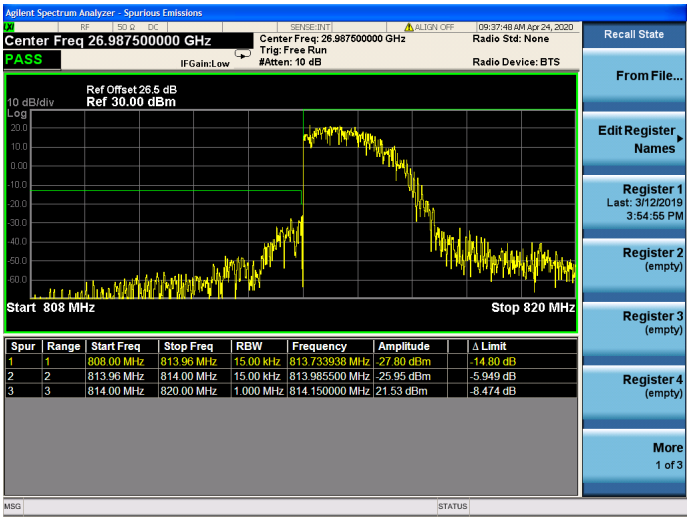
The center frequency of spectrum is the band edge frequency and span is 2MHz, Record the max trace into the test report.

Band 26 / 1.4MHz BW / QPSK / 1RB



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	808.00 MHz	813.96 MHz	15.00 kHz	813.843250 MHz	-40.18 dBm	-27.18 dB
2	2	813.96 MHz	814.00 MHz	15.00 kHz	813.982813 MHz	-24.94 dBm	-4.941 dB
3	3	814.00 MHz	820.00 MHz	1.000 MHz	814.310000 MHz	24.67 dBm	-5.334 dB

Band 26 / 1.4MHz BW / QPSK / Full RB

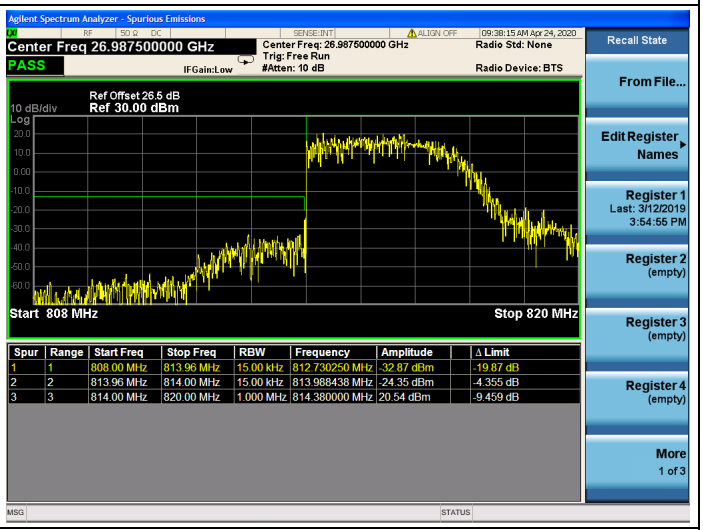


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	808.00 MHz	813.96 MHz	15.00 kHz	813.733938 MHz	-27.80 dBm	-14.80 dB
2	2	813.96 MHz	814.00 MHz	15.00 kHz	813.985500 MHz	-25.95 dBm	-5.949 dB
3	3	814.00 MHz	820.00 MHz	1.000 MHz	814.150000 MHz	21.53 dBm	-8.474 dB

Band 26 / 3MHz BW / QPSK / 1RB

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	808.00 MHz	813.96 MHz	15.00 kHz	813.883000 MHz	-32.04 dBm	-19.04 dB
2	2	813.96 MHz	814.00 MHz	15.00 kHz	813.991375 MHz	-20.52 dBm	-0.519 dB
3	3	814.00 MHz	820.00 MHz	1.000 MHz	814.100000 MHz	24.49 dBm	-5.509 dB

Band 26 / 3MHz BW / QPSK / Full RB

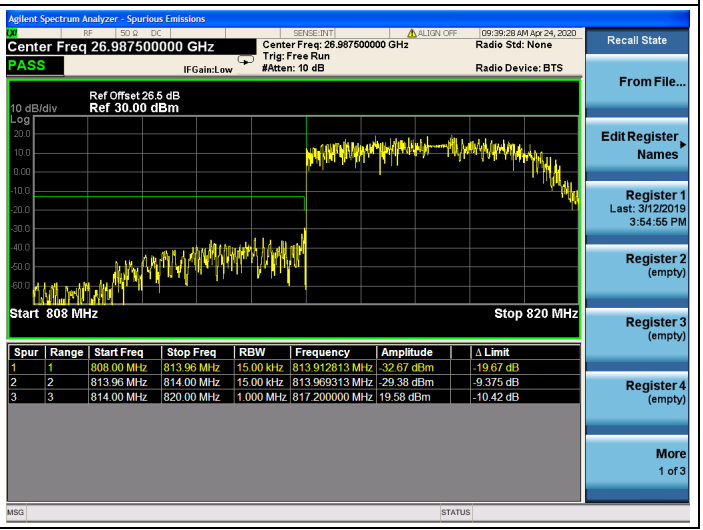


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	808.00 MHz	813.96 MHz	15.00 kHz	812.730250 MHz	-32.87 dBm	-19.87 dB
2	2	813.96 MHz	814.00 MHz	15.00 kHz	813.988438 MHz	-24.35 dBm	-4.355 dB
3	3	814.00 MHz	820.00 MHz	1.000 MHz	814.380000 MHz	20.54 dBm	-9.459 dB

Band 26 / 5MHz BW / QPSK / 1RB

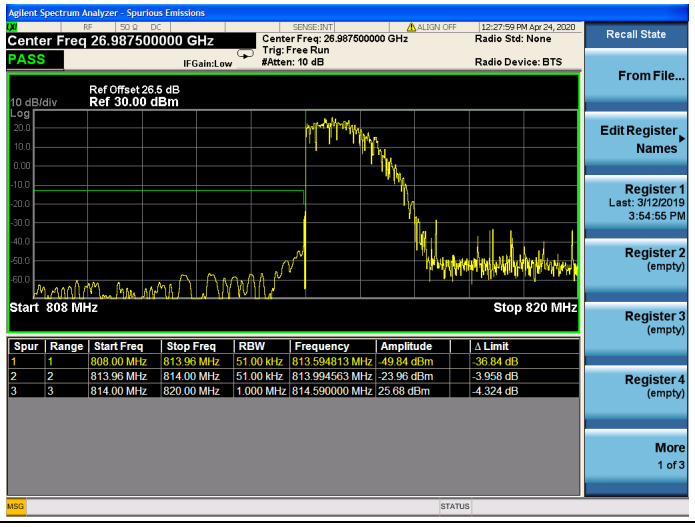
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	808.00 MHz	813.96 MHz	15.00 kHz	813.922750 MHz	-38.20 dBm	-25.20 dB
2	2	813.96 MHz	814.00 MHz	15.00 kHz	813.986375 MHz	-23.52 dBm	-3.524 dB
3	3	814.00 MHz	820.00 MHz	1.000 MHz	814.220000 MHz	24.45 dBm	-5.549 dB

Band 26 / 5MHz BW / QPSK / Full RB

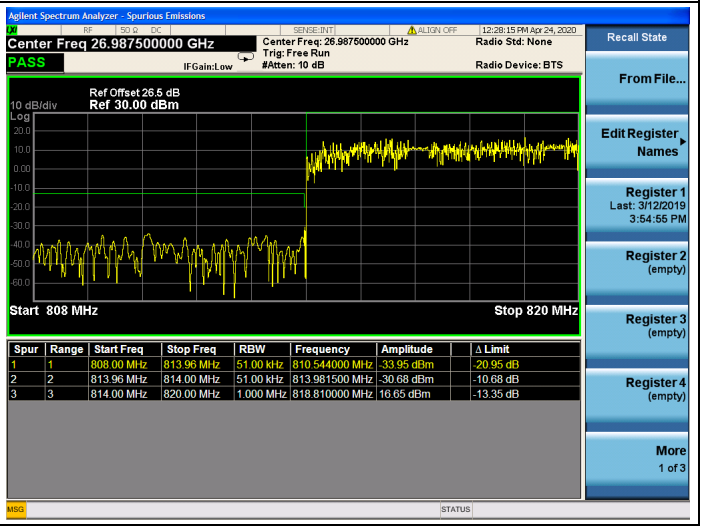


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	808.00 MHz	813.96 MHz	15.00 kHz	813.912813 MHz	-32.67 dBm	-19.67 dB
2	2	813.96 MHz	814.00 MHz	15.00 kHz	813.969313 MHz	-29.38 dBm	-9.375 dB
3	3	814.00 MHz	820.00 MHz	1.000 MHz	817.200000 MHz	19.58 dBm	-10.42 dB

Band 26 / 10MHz BW / QPSK / 1RB	Band 26 / 10MHz BW / QPSK / Full RB



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	808.00 MHz	813.96 MHz	51.00 kHz	813.594813 MHz	-49.84 dBm	-36.84 dB
2	2	813.96 MHz	814.00 MHz	51.00 kHz	813.994563 MHz	-23.96 dBm	-3.958 dB
3	3	814.00 MHz	820.00 MHz	1.000 MHz	814.590000 MHz	25.68 dBm	-4.324 dB



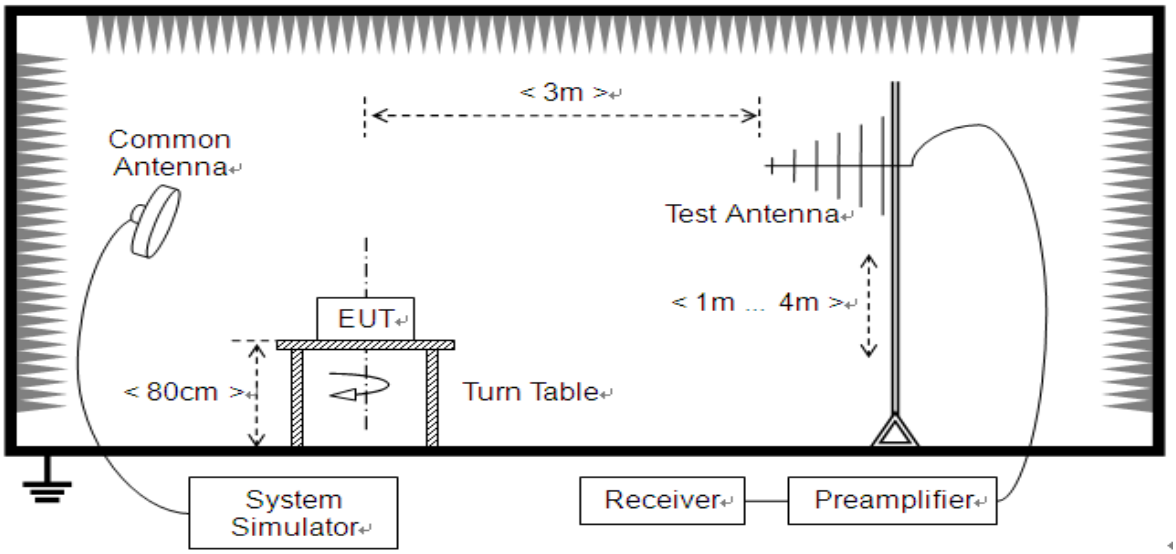
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	808.00 MHz	813.96 MHz	51.00 kHz	810.544000 MHz	-33.95 dBm	-20.95 dB
2	2	813.96 MHz	814.00 MHz	51.00 kHz	813.981500 MHz	-30.68 dBm	-10.68 dB
3	3	814.00 MHz	820.00 MHz	1.000 MHz	818.810000 MHz	16.65 dBm	-13.35 dB

2.7. Radiated Spurious Emissions

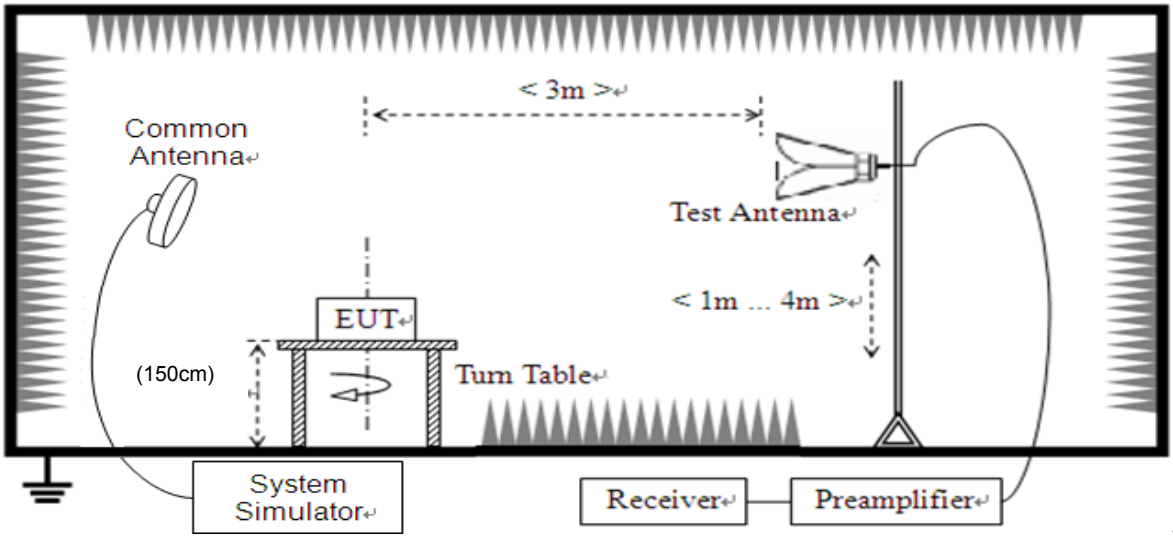
2.7.1. Requirement

According to FCC section 2.1051, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

2.7.2. Test Description



(For the test frequency from 30MHz to1GHz)



(For the test frequency above 1GHz)

The EUT is located in a 3m Full-Anechoic Chamber, the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.
A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power, and only the test result of the maximum output power was recorded.
In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground and the Turn Table is actuated to turn from 0° to 360°to determine the maximum value of the radiated power. The emission levels at both horizontal and vertical polarizations should be tested. The Filters consists of Notch Filters and High Pass Filter.

Note: when doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna during horizontal antenna.

2.7.3. Test procedure

KDB 971168 D01v03 Section 5.8 and ANSI/TIA-603-E-2016.

2.7.4. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. Test Antenna height is varied from 1m to 4m above the ground, and the Turn Table is actuated to turn from 0° to 360°, both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The substitution corrections are obtained as described below:

$A_{SUBST} = P_{SUBST\_TX} - P_{SUBST\_RX} - L_{SUBST\_CABLES} + G_{SUBST\_TX\_ANT}$

$A_{TOT} = L_{CABLES} + A_{SUBST}$

Where A_{SUBST} is the final substitution correction including receive antenna gain.

P_{SUBST_TX} is signal generator level,

P_{SUBST_RX} is receiver level,

L_{SUBST_CABLES} is cable losses including TX cable,

$G_{SUBST\_TX\_ANT}$ is substitution antenna gain.

A_{TOT} is total correction factor including cable loss and substitution correction

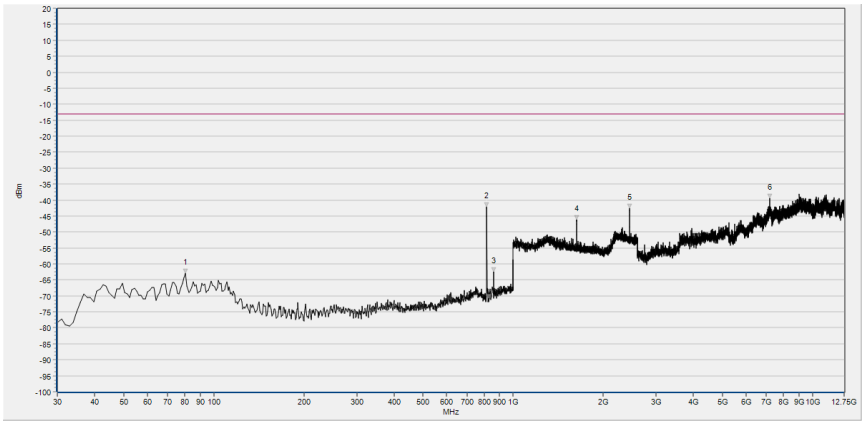
During the test, the data of A_{TOT} was added in the Test Spectrum Analyze, so Spectrum Analyze reading is the final values which contain the data of A_{TOT}.

Note1: The power of the EUT transmitting frequency should be ignored.

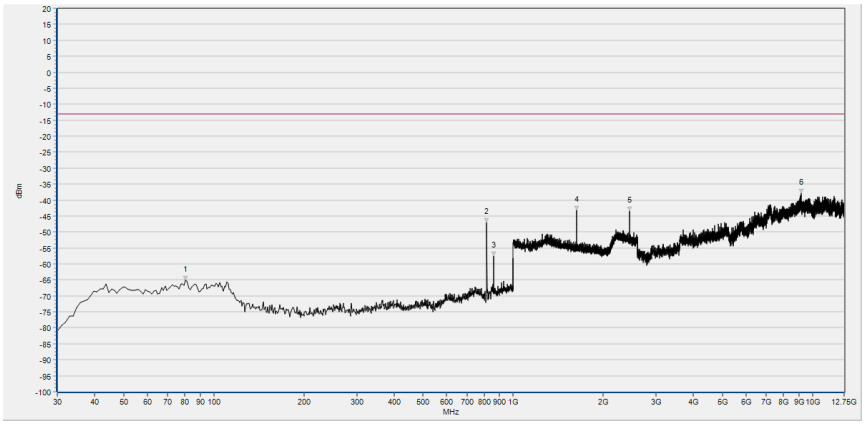
Note2: All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note3: All bandwidth and modulationwere considered and evaluated respectively by performing full test for each band, only the worst cases (Max Bandwidth and QPSK mode) were recorded in this test report.

LTE Band 26 15MHz BW, Low Channel, QPSK

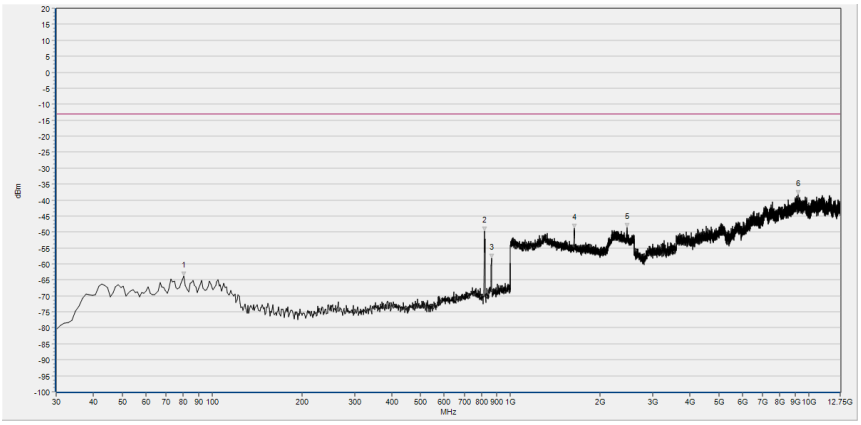


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	80.440	-62.96	-13.00	Horizontal	PASS
2	814.730	-42.08	-13.00	Horizontal	NA
3	859.350	-62.47	-13.00	Horizontal	NA
4	1629.372	-46.18	-13.00	Horizontal	PASS
5	2443.778	-42.58	-13.00	Horizontal	PASS
6	7199.709	-39.52	-13.00	Horizontal	PASS

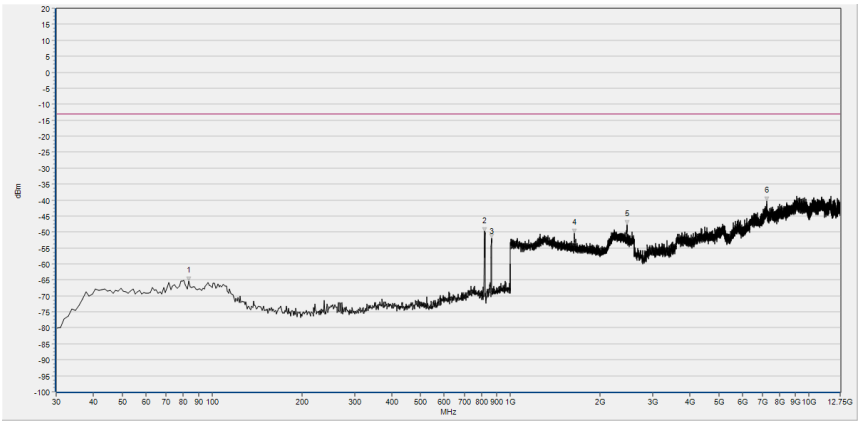


No.	Freq(MHz)	Peak	limit PK	Antenna	Verdict
1	80.440	-65.19	-13.00	Vertical	PASS
2	814.730	-47.15	-13.00	Vertical	NA
3	859.350	-57.44	-13.00	Vertical	NA
4	1629.372	-43.23	-13.00	Vertical	PASS
5	2443.778	-43.58	-13.00	Vertical	PASS
6	9143.326	-37.79	-13.00	Vertical	PASS

LTE Band 26 15MHz BW, Mid Channel, QPSK

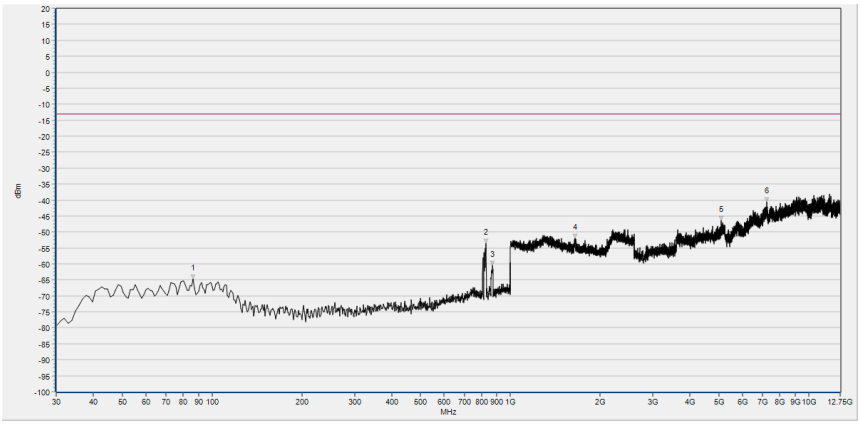


No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	80.440	-63.74	-13.00	Horizontal	PASS
2	817.640	-49.73	-13.00	Horizontal	NA
3	864.200	-58.14	-13.00	Horizontal	NA
4	1637.695	-48.81	-13.00	Horizontal	PASS
5	2461.064	-48.55	-13.00	Horizontal	PASS
6	9213.466	-38.34	-13.00	Horizontal	PASS

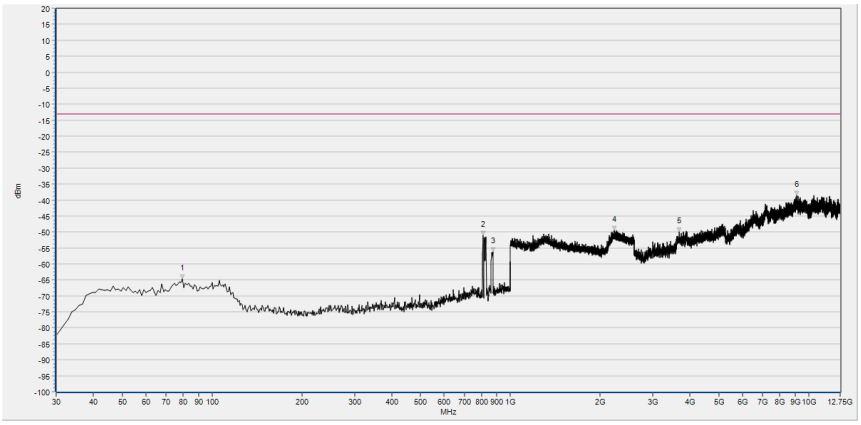


No.	Freq(MHz)	Peak	limit PK	Antenna	Verdict
1	83.350	-65.36	-13.00	Vertical	PASS
2	816.670	-50.01	-13.00	Vertical	NA
3	866.140	-52.02	-13.00	Vertical	NA
4	1637.695	-50.35	-13.00	Vertical	PASS
5	2457.223	-47.65	-13.00	Vertical	PASS
6	7232.933	-40.24	-13.00	Vertical	PASS

LTE Band 26 15MHz BW, High Channel, QPSK



No.	Fre. (MHz)	Peak	Limit(PK)	Antenna	Verdict
1	86.260	-64.66	-13.00	Horizontal	PASS
2	828.310	-53.58	-13.00	Horizontal	NA
3	870.990	-60.43	-13.00	Horizontal	NA
4	1644.738	-52.00	-13.00	Horizontal	PASS
5	5080.742	-46.31	-13.00	Horizontal	PASS
6	7231.087	-40.58	-13.00	Horizontal	PASS



No.	Freq(MHz)	Peak	limit PK	Antenna	Verdict
1	79.470	-64.80	-13.00	Vertical	PASS
2	808.910	-50.96	-13.00	Vertical	NA
3	872.930	-56.18	-13.00	Vertical	NA
4	2225.450	-49.43	-13.00	Vertical	PASS
5	3685.325	-49.84	-13.00	Vertical	PASS
6	9113.793	-38.56	-13.00	Vertical	PASS

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Output Power	±2.22 dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77 dB
Band Edge	±2.77 dB
Equivalent Isotropic Radiated Power	±2.22 dB
Radiated Spurious Emissions	±6 dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
Power Splitter	NW521	1506A	Weinschel	2020.04.15	2021.04.14
Attenuator 1	(N/A.)	10dB	Resnet	2020.04.15	2021.04.14
Attenuator 2	(N/A.)	3dB	Resnet	2020.04.15	2021.04.14
EXA Signal Analzyer	MY51511149	N9020A	Agilent	2019.07.29	2020.07.28
USB Power Sensor	MY54210011	U2021XA	Agilent	2020.04.15	2021.04.14
System Simulator	6200995016	MT8820C	Anritsu	2020.01.13	2021.01.12
RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial cable	CB02	RF02	Morlab	N/A	N/A
SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Temperature Chamber	(N/A)	HUT705P	CHONGQING HANBA EXPERIMENTAL EQUIPMENT CO.,LTD	2020.03.25	2021.03.24
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.2 Radiated Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal.Due
System Simulator	152038	CMW500	R&S	2020.01.13	2021.01.12
Receiver	MY54130016	N9038A	Agilent	2019.07.29	2020.07.28
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2019.05.24	2022.05.23
Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial cable(N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	S020180L3203	N/A	Dongsheng	2019.07.29	2020.07.28
18-26.5GHz pre-Amplifier	S10M100L3802	N/A	Dongsheng	2019.07.29	2020.07.28
Notch Filter	N/A	WRCGV -LTE B2	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B4	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B5	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B7	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B12	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B17	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B19	Wainwright	2019.12.01	2020.11.30

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal.Due
Notch Filter	N/A	WRCGV -LTE B25	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B26	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B30	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE 38	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B40	Wainwright	2019.12.01	2020.11.30
Notch Filter	N/A	WRCGV -LTE B41	Wainwright	2019.12.01	2020.11.30
Anechoic Chamber	N/A	9m*6m*6m	CRT	2019.07.13	2022.07.12

END OF REPORT