FCC Test Report

(PART 27)

Report No.:	RFBGSN-WTW-P20070580-4
FCC ID:	2AX8C-3544
Test Model:	FL44TE
Received Date:	Jul. 29, 2020
Test Date:	Aug. 06, 2020 ~ Nov. 17, 2020
Issued Date:	Nov. 30, 2020
Applicant:	Amazon.com Services LLC
Address:	410 Terry Ave N Seattle, WA 98109 650 694 8333
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RFBGSN-WTW-P20070580-4	Original Release	Nov. 30, 2020

1 Certificate of Conformity

Product:	Fleet Edge
Brand:	N/A
Test Model:	FL44TE
Sample Status:	Engineering Sample
Applicant:	Amazon.com Services LLC
Test Date:	Aug. 06, 2020 ~ Nov. 17, 2020
Standards:	FCC Part 27, Subpart C, D

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:** Nov. 30, 2020

Vera Huang / Specialist

Approved by : , **Date:** Nov. 30, 2020

Dylan Chiou / Senior Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 27.50(a)(3)	Equivalent Isotropic 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 27.53(a)(5)	Occupied Bandwidth	Pass	Meet the requirement of limit.
2.1051 27.53(a)(4)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(a)(4)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(a)(4)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -3.38 dB at 146.40 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	9 kHz ~ 30 MHz	3.04 dB
	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 & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 18, 2020	Mar. 17, 2021
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 12, 2019	Dec. 11, 2020
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 24, 2019	Nov. 23, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 08, 2019	Nov. 07, 2020
			Nov. 06, 2020	Nov. 05, 2021
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-160	Nov. 07, 2019	Nov. 06, 2020
			Nov. 06, 2020	Nov. 05, 2021
HORN Antenna SCHWARZBECK	9120D	9120D-1169	Nov. 24, 2019	Nov. 23, 2020
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2019	Nov. 24, 2020
Preamplifier EMCI	EMC001340	980201	Oct. 14, 2019	Oct. 13, 2020
			Oct. 21, 2020	Oct. 20, 2021
Preamplifier EMCI	EMC 012645	980115	Oct. 08, 2019	Oct. 07, 2020
			Oct. 07, 2020	Oct. 06, 2021
Preamplifier EMCI	EMC 330H	980112	Oct. 08, 2019	Oct. 07, 2020
			Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable EMCI	EMC104-SM-SM-8000	180409	Jan. 18, 2020	Jan. 17, 2021
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 08, 2019	Oct. 07, 2020
			Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 08, 2019	Oct. 07, 2020
			Oct. 07, 2020	Oct. 06, 2021
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
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
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Feb. 13, 2020	Feb. 12, 2021
Radio Communication Analyzer Anritsu	MT8820C	6201300640	Aug. 19, 2019	Aug. 18, 2021
Temperature & Humidity Chamber GIANT FORCE	GTH-120-40-CP-AR	MAA1306-019	Sep. 09, 2020	Sep. 08, 2021
DC power supply Keysight	U8002A	MY56330015	NA	NA
Digital Multimeter Fluke	87-III	70360742	Jun. 23, 2020	Jun. 22, 2021

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 General Information

3.1 General Description of EUT

Product	Fleet Edge	
Brand	N/A	
Test Model	FL44TE	
Status of EUT	Engineering Sample	
Power Supply Rating	12 Vdc (Power Supply)	
Modulation Type	QPSK, 16QAM	
Frequency Range	LTE Band 30 (Channel Bandwidth: 5 MHz)	2307.5 ~ 2312.5 MHz
	LTE Band 30 (Channel Bandwidth: 10 MHz)	2310 MHz
Max. EIRP Power	LTE Band 30 (Channel Bandwidth: 5 MHz)	117.76 mW / 5MHz
	LTE Band 30 (Channel Bandwidth: 10 MHz)	119.67 mW / 5MHz
Emission Designator	LTE Band 30 (Channel Bandwidth: 5 MHz)	4M49D7W
	LTE Band 30 (Channel Bandwidth: 10 MHz)	8M98G7D
Antenna Type	Refer to Note as below	
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

1. The information of module collocated in this EUT is listed as below.

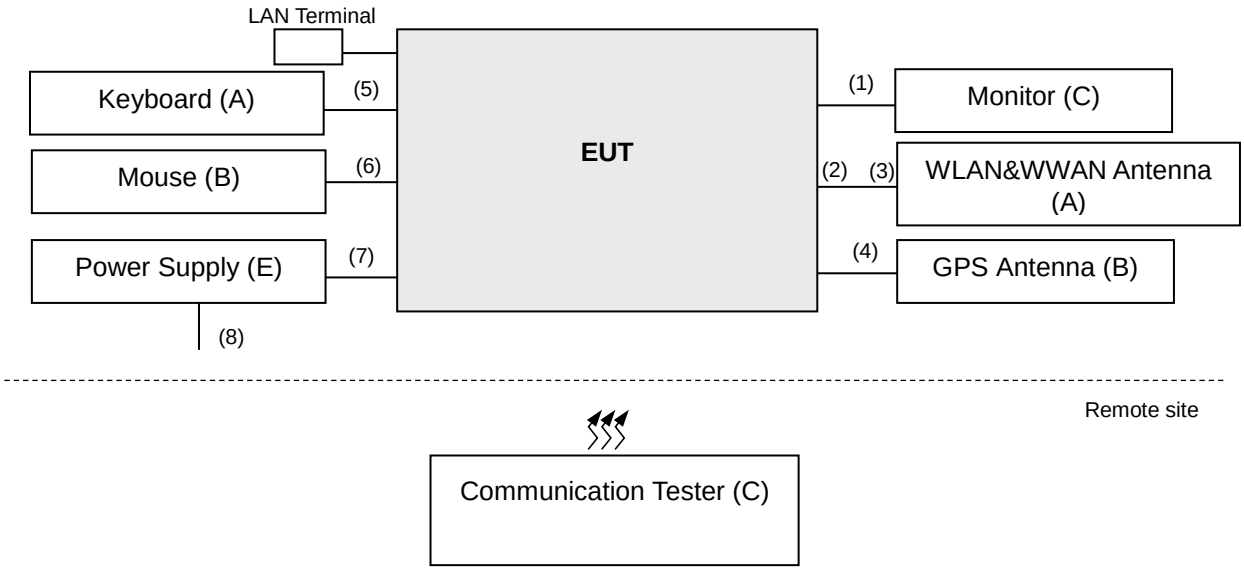
Product	Brand	Model
BT/WLAN Module	Intel	9560NGW
WWAN Module	Quectel	EM06-A

2. The antenna information is listed as below.

Ant.	Brand	Model	Antenna Type	Antenna Gain (dBi)	Remark
				LTE 30	
1	TAOGLAS	MA491.A.BICG.005.gb	Multiband Antennas	-2.6	Main Antenna
2	TAOGLAS	MA491.A.BICG.005.gb	Multiband Antennas	-1.9	Diversity Antenna

3. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
4. The above EUT information is declared by manufacturer and for more detailed features description, please refers 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. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Keyboard	DELL	RT7D50	CN-0J4624-37172-44T-000M	FCC DOC Approved	--
B	Mouse	DELL	MS111-L	N/A	N/A	--
C	Monitor	ViewSonic	VX2457-MHD	UG0182942333	N/A	--
D	Communication Tester	R&S	CMU200	123295	N/A	For WCDMA
		ANRITSU	MT8821C	6201502978	NA	For LTE
E	Power Supply	NA	NA	NA	NA	--
F	WLAN&WWAN Antenna	TAOGLAS	MA491.A.BICG.005.gb	NA	NA	Provided by client
G	GPS Antenna	NA	NA	NA	NA	Provided by client

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	HDMI Cable	1	2	N	0	-
2.	RF Cable	1	0.5	N	0	-
3.	RF Cable	1	0.5	N	0	-
4.	RF Cable	1	0.5	N	0	-
5.	USB Cable	1	2.4	N	0	-
6.	USB Cable	1	2.2	N	0	-
7.	DC power Cable	1	1.2	N	0	-
8.	Power Cord	1	1.8	N	0	-

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 on Z-plane for EIRP and Y-plane for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	27710	27710	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Frequency Stability	27685 to 27735	27685, 27735	5 MHz	QPSK	25 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK	50 RB / 0 RB Offset
-	Occupied Bandwidth	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Band Edge	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Conducted Emission	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK	1 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK	1 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK	1 RB / 0 RB Offset

Note:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation. Therefore, only EIRP, modulation characteristics, occupied bandwidth and band edge items had been tested under QPSK, 16QAM mode, the other items were performed under QPSK mode only.
2. For radiated emission above 1 GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.
3. For radiated emissions below 1 GHz, select the worst radiated emission channel (above 1GHz) for final testing.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25 deg. C, 65 % RH	12 Vdc	Cyril Chen / Getaz Yang
Modulation Characteristics	25 deg. C, 65 % RH	12 Vdc	Getaz Yang
Frequency Stability	25 deg. C, 65 % RH	12 Vdc	Getaz Yang
Occupied Bandwidth	25 deg. C, 65 % RH	12 Vdc	Getaz Yang
Band Edge	25 deg. C, 65 % RH	12 Vdc	Getaz Yang
Conducted Emission	25 deg. C, 65 % RH	12 Vdc	Getaz Yang
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Cyril Chen / 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 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 and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

4.1.2 Test Procedures

EIRP Measurement:

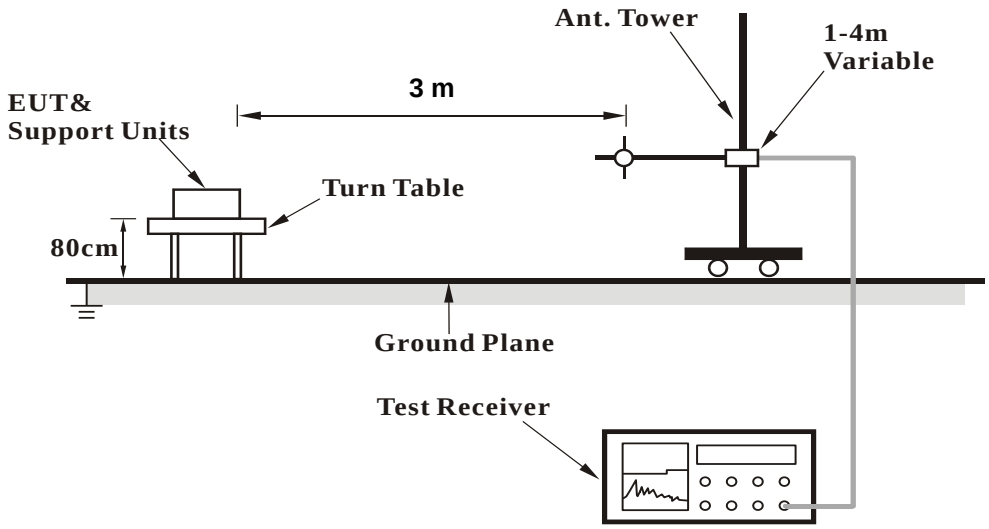
a. All measurements were done at low, middle and high operational frequency range. RBW is 5 MHz and VBW is 15 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn 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. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
d. Correction Factor (includes EIRP and ERP unit conversion factor) = Antenna gain of substitution horn. – Tx cable loss. Measurement method refers to ANSI C63.26 section 5.2.7 & 5.2.4.

Conducted Power Measurement:

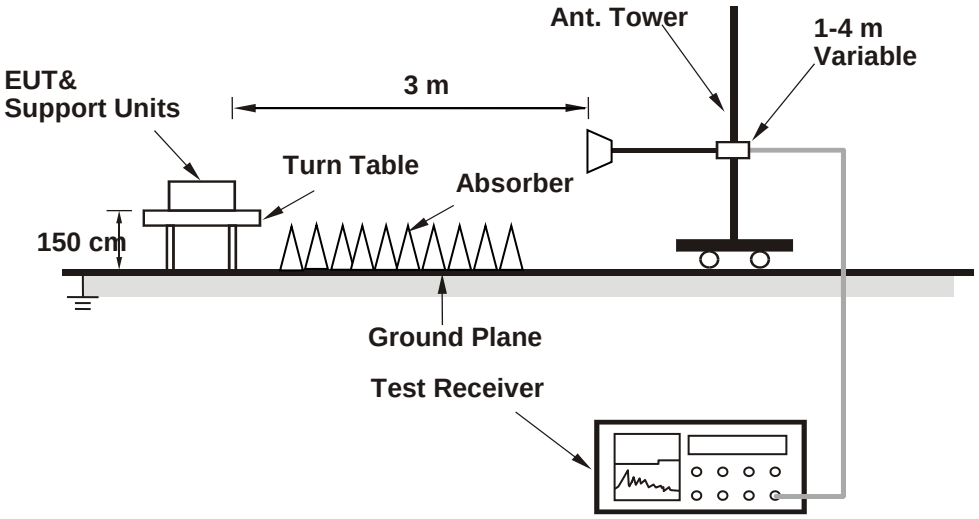
a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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)

LTE Band 30																
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			27710					Channel		27685	27710	27735	
		Frequency (MHz)			2310.0					Frequency (MHz)		2307.5	2310.0	2312.5	
10M	QPSK	1	0		23.22		0	5M	QPSK	1	0	22.98	23.18	22.90	0
		1	24		23.08		0			1	12	22.82	23.06	22.73	0
		1	49		22.98		0			1	24	22.58	22.78	22.67	0
		25	0		22.07		1			12	0	21.83	22.07	21.77	1
		25	12		21.91		1			12	6	21.64	21.86	21.52	1
		25	25		21.74		1			12	13	21.60	21.68	21.45	1
		50	0		21.99		1			25	0	21.77	22.03	21.75	1
	16QAM	1	0		22.14		1		16QAM	1	0	21.92	22.15	21.84	1
		1	24		22.00		1			1	12	21.77	22.05	21.68	1
		1	49		21.95		1			1	24	21.56	21.77	21.60	1
		25	0		20.89		2			12	0	20.73	21.03	20.75	2
		25	12		20.87		2			12	6	20.61	20.78	20.44	2
		25	25		20.71		2			12	13	20.56	20.61	20.43	2
		50	0		20.93		2			25	0	20.69	20.94	20.59	2

EIRP Power

LTE Band 30							
Channel Bandwidth: 5 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm/5MHz)**	**Correction Factor (dB)**	**EIRP Power Density (dBm/5MHz)**	**EIRP Power Density (mW/5MHz)**	**Polarization (H/V)**
Z	27685	2307.5	-18.41	38.99	20.58	114.29	H
	27710	2310.0	-17.46	38.17	20.71	117.76	
	27735	2312.5	-18.19	38.55	20.36	108.64	
	27685	2307.5	-23.12	39.27	16.15	41.21	V
	27710	2310.0	-22.38	38.68	16.30	42.66	
	27735	2312.5	-22.54	38.55	16.01	39.90	
Channel Bandwidth: 5 MHz / 16QAM							
Z	27685	2307.5	-19.48	38.99	19.51	89.33	H
	27710	2310.0	-18.49	38.17	19.68	92.90	
	27735	2312.5	-19.18	38.55	19.37	86.50	
	27685	2307.5	-24.15	39.27	15.12	32.51	V
	27710	2310.0	-23.40	38.68	15.28	33.73	
	27735	2312.5	-23.55	38.55	15.00	31.62	

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

LTE Band 30							
Channel Bandwidth: 10 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm/5MHz)**	**Correction Factor (dB)**	**EIRP Power Density (dBm/5MHz)**	**EIRP Power Density (mW/5MHz)**	**Polarization (H/V)**
Z	27710	2310.0	-17.39	38.17	20.78	119.67	H
	27710	2310.0	-22.31	38.68	16.37	43.35	V
Channel Bandwidth: 10 MHz / 16QAM							
Z	27710	2310.0	-18.42	38.17	19.75	94.41	H
	27710	2310.0	-23.32	38.68	15.36	34.36	V

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

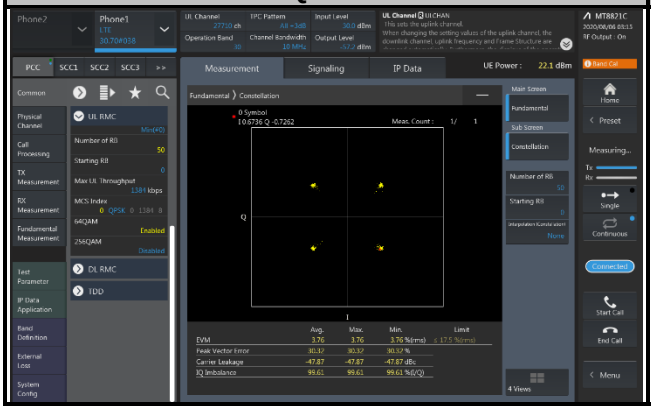
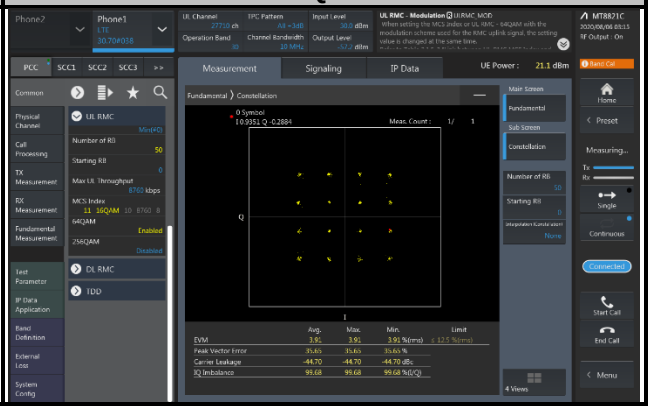
N/A

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 30	
Channel 27710	
QPSK	16QAM
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

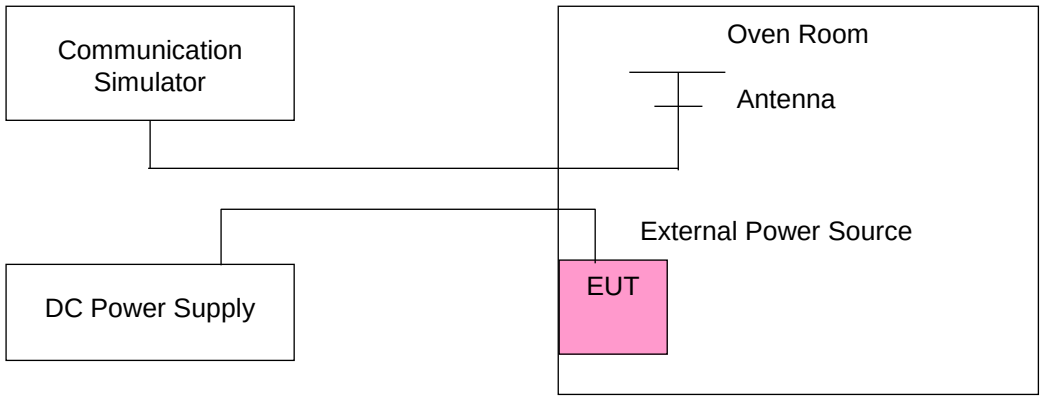
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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 30			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
12	2307.500002	0.000867	2312.499997	-0.001427
10.2	2307.500004	0.001517	2312.499998	-0.000692
13.8	2307.500003	0.001473	2312.499997	-0.001211

Note: The applicant defined the normal working voltage of the battery is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 30			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2307.500001	0.000520	2312.500003	0.001081
-20	2307.500002	0.000910	2312.500002	0.000649
-10	2307.500003	0.001083	2312.500002	0.000822
0	2307.500003	0.001343	2312.500003	0.001211
10	2307.499997	-0.001127	2312.500001	0.000476
20	2307.499998	-0.000823	2312.500002	0.000951
30	2307.499997	-0.001213	2312.500004	0.001643
40	2307.499997	-0.001170	2312.499998	-0.000692
50	2307.499998	-0.001040	2312.499997	-0.001124
60	2307.499997	-0.001127	2312.499997	-0.001254
70	2307.499997	-0.001343	2312.499997	-0.001254
80	2307.499998	-0.000997	2312.499998	-0.000908

Note:

1. The applicant declared that the normal operating temperature of the EUT is from -30˚C to 80˚C.
2. The EUT would shut down automatically as below -30˚C.

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 30	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
12	2310.000002	0.000649
10.2	2310.000003	0.001212
13.8	2310.000003	0.001212

Note: The applicant defined the normal working voltage of the battery is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 30	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-30	2310.000001	0.000606
-20	2310.000002	0.000736
-10	2310.000003	0.001472
0	2310.000002	0.000952
10	2309.999998	-0.001039
20	2309.999998	-0.000823
30	2309.999999	-0.000606
40	2309.999998	-0.000736
50	2309.999999	-0.000649
60	2309.999997	-0.001299
70	2309.999998	-0.001082
80	2309.999998	-0.000909

Note:

1. The applicant declared that the normal operating temperature of the EUT is from -30˚C to 80˚C.
2. The EUT would shut down automatically as below -30˚C.

4.4 Occupied Bandwidth Measurement

4.4.1 Limits of Occupied Bandwidth Measurement

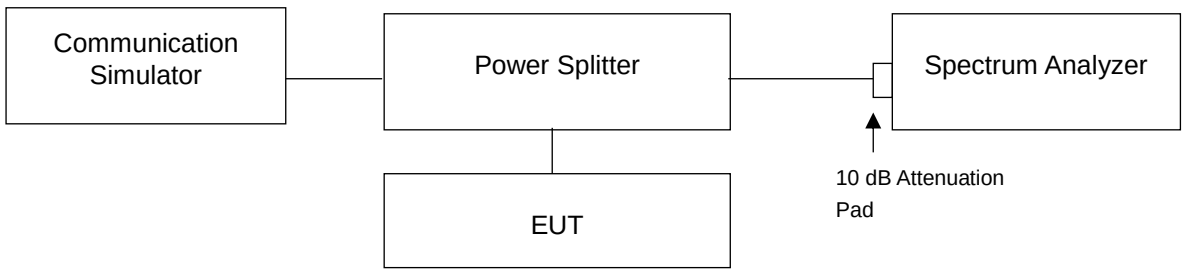
The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.4.2 Test Procedure

a. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth. Measurement method, please refer to section 5.4.4 of ANSI C63.26.

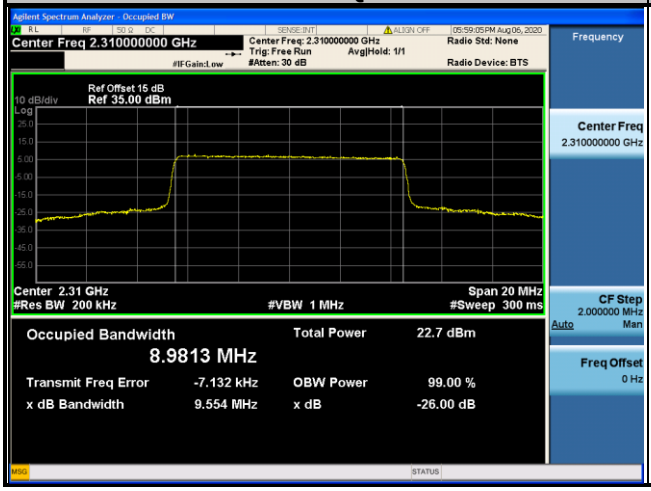
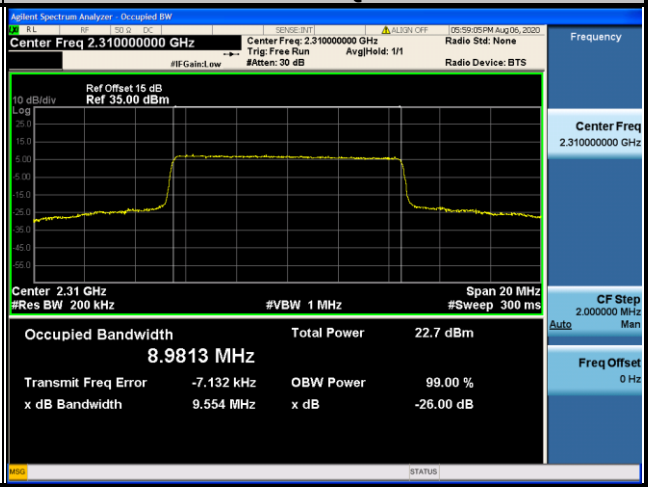
For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

4.4.3 Test Setup



4.4.4 Test Result

LTE Band 30					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
27685	2307.5	4.49	4.49	4.87	4.82
27710	2310.0	4.49	4.49	4.82	4.84
27735	2312.5	4.49	4.49	4.82	4.82
Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
27710	2310.0	8.98	8.97	9.55	9.55

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
5 MHz / 16QAM	5 MHz / QPSK
	
10 MHz / QPSK	10 MHz / QPSK
	

4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

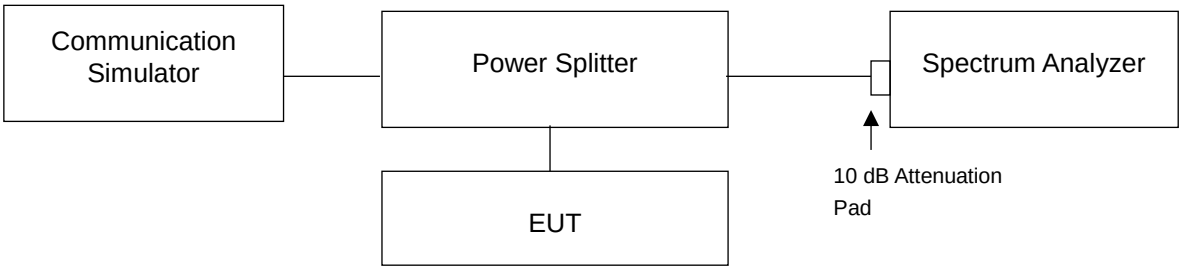
According to FCC 27.53(a) (4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

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).

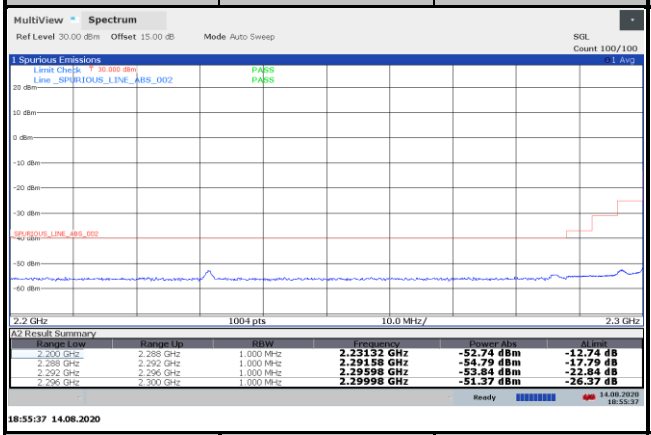
b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

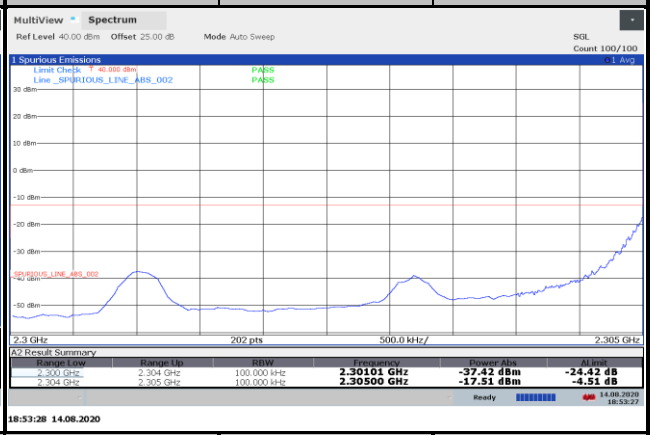
c. Measuring frequency range is from 2200 MHz to 2395 MHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.

d. Record the max trace plot into the test report.

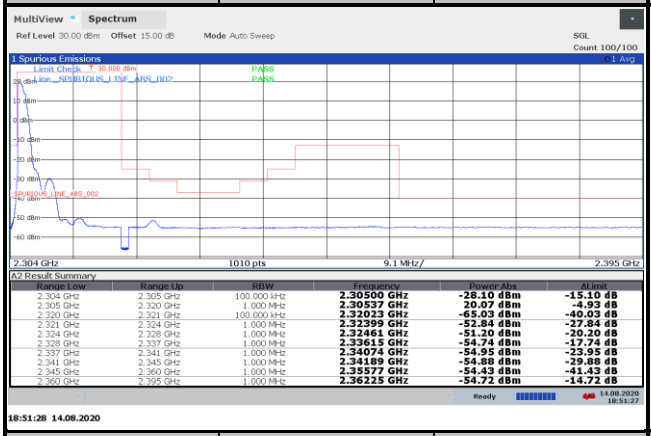
4.5.4 Test Results

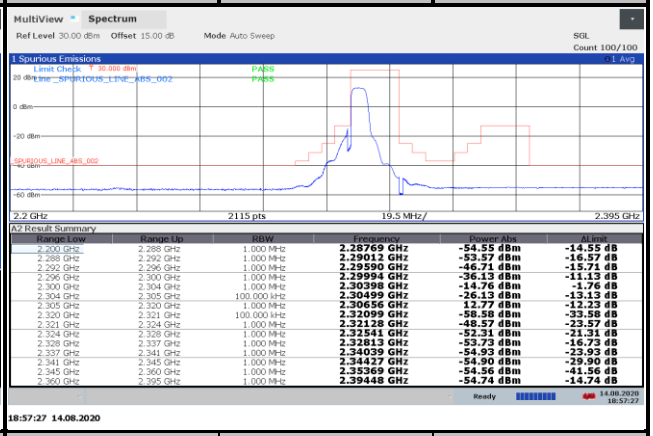
LTE Band 30					
<Adjacent Channel Band Edge>					
Channel Bandwidth: 5 MHz / QPSK					
Channel	27685	1 RB	Channel	27685	1 RB



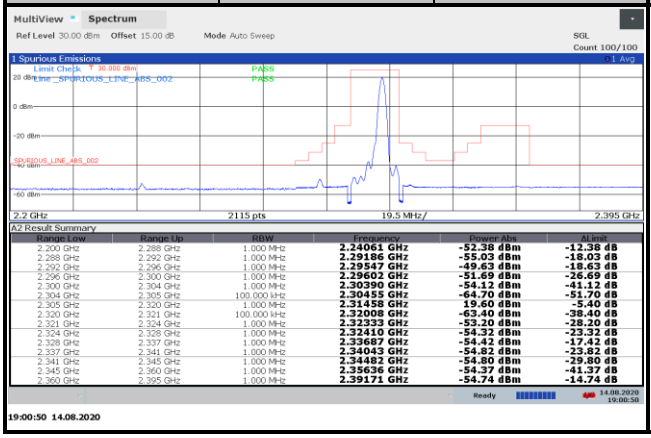


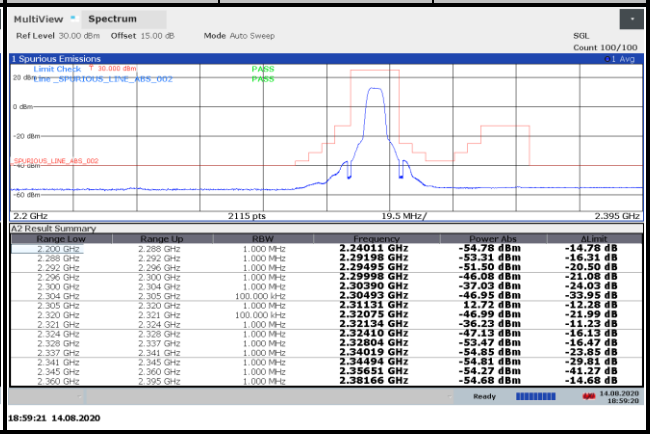
Channel	27685	1 RB	Channel	27685	25 RB





Channel	27735	1 RB	Channel	27735	25 RB



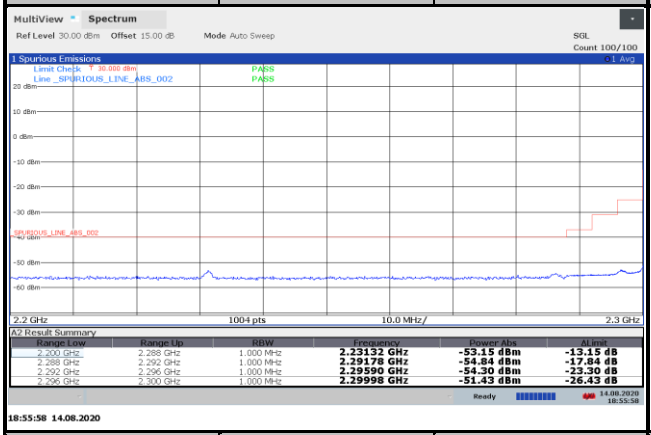


LTE Band 30

<Adjacent Channel Band Edge>

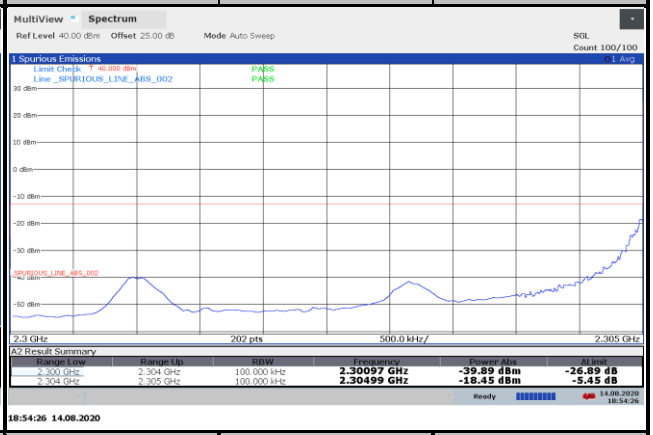
Channel Bandwidth: 5 MHz / 16QAM

Channel	27685	1 RB



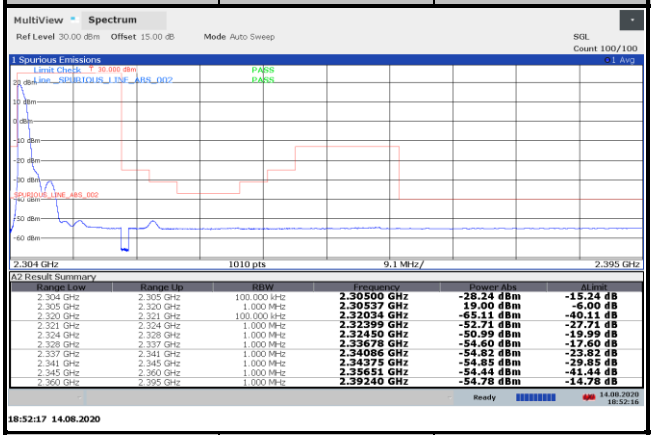
18:55:58 14.08.2020

Channel	27685	1 RB



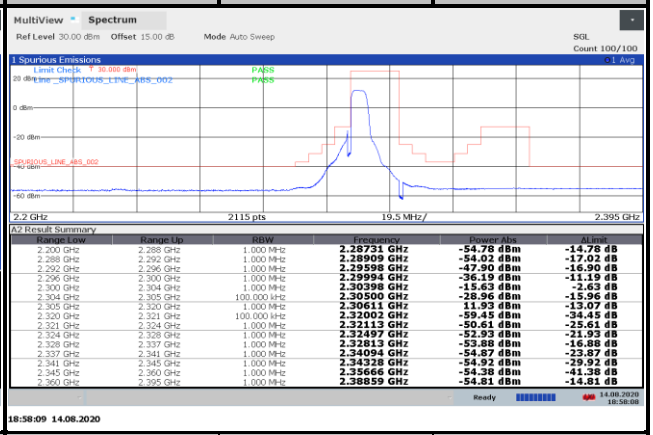
18:54:26 14.08.2020

Channel	27685	1 RB



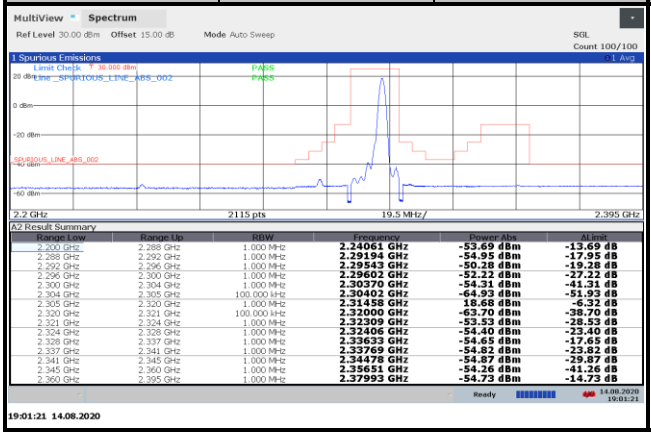
18:52:17 14.08.2020

Channel	27685	25 RB



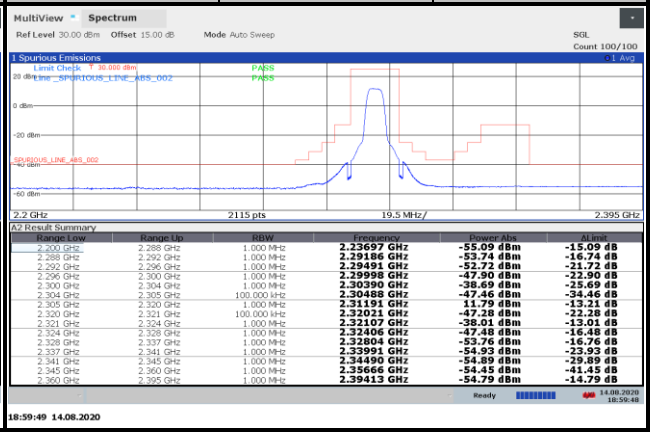
18:58:09 14.08.2020

Channel	27735	1 RB



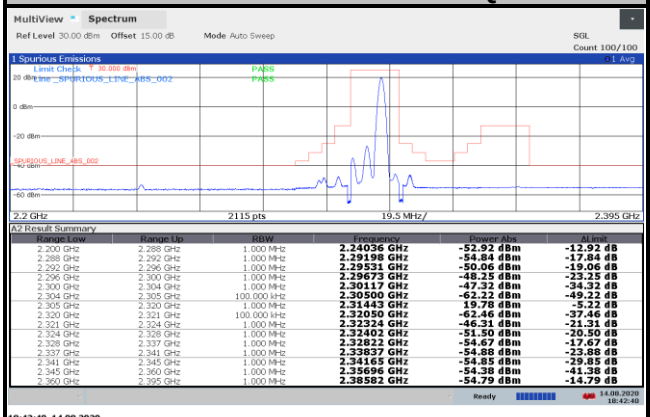
19:01:21 14.08.2020

Channel	27735	25 RB

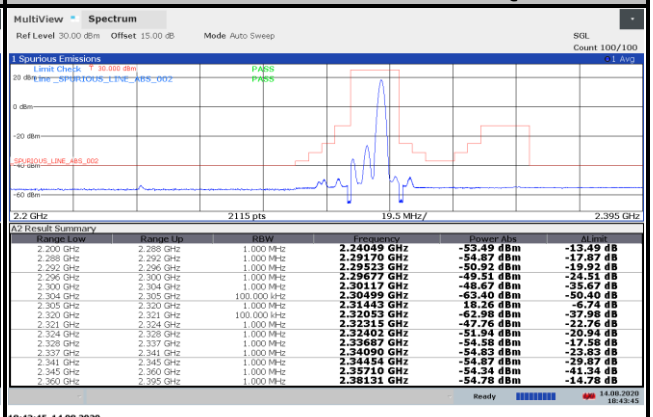


18:59:49 14.08.2020

LTE Band 30		
Channel	**27710**	**1 RB**
Channel Bandwidth: 10 MHz / QPSK		**Channel Bandwidth: 10 MHz / 16QAM**

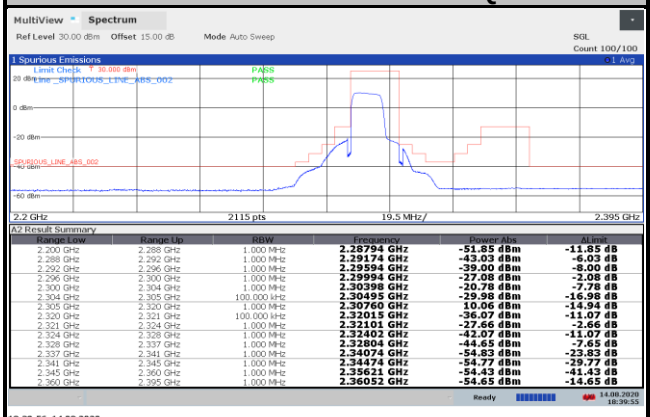


18:42:40 14.08.2020

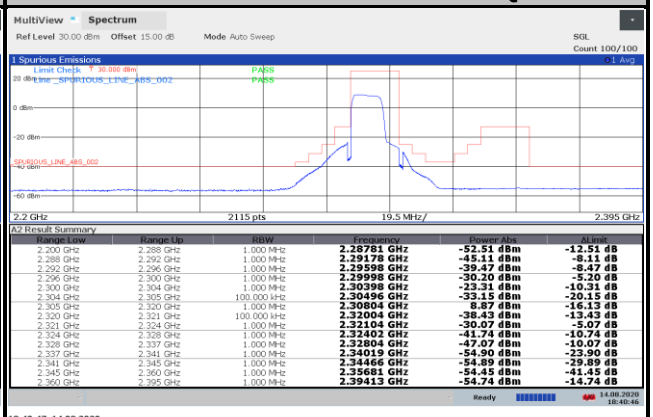


18:43:45 14.08.2020

Channel	**27710**	**50 RB**
Channel Bandwidth: 10 MHz / QPSK		**Channel Bandwidth: 10 MHz / 16QAM**



18:39:56 14.08.2020



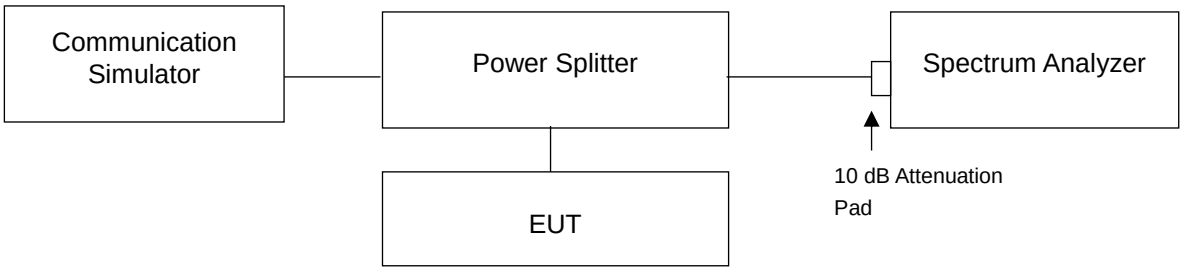
18:40:47 14.08.2020

4.6 Conducted Spurious Emissions

4.6.1 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 70 +10 log (P) dB. The limit of emission is equal to -40 dBm.

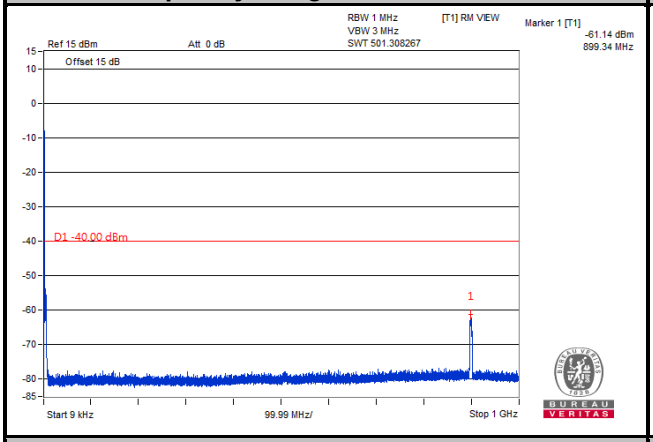
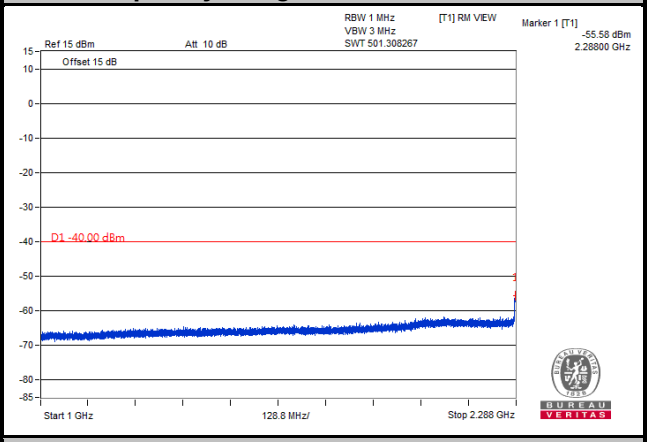
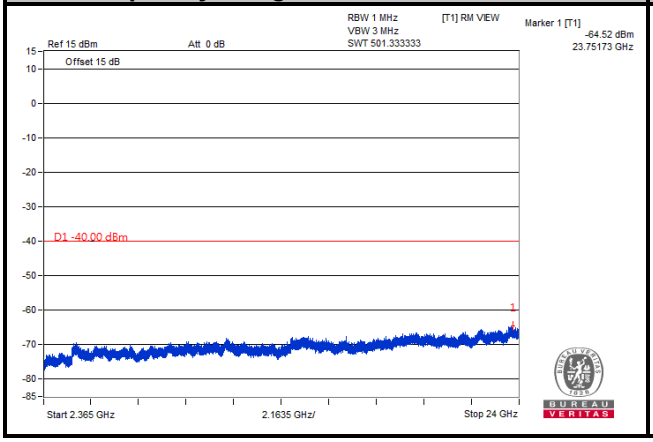
4.6.2 Test Setup



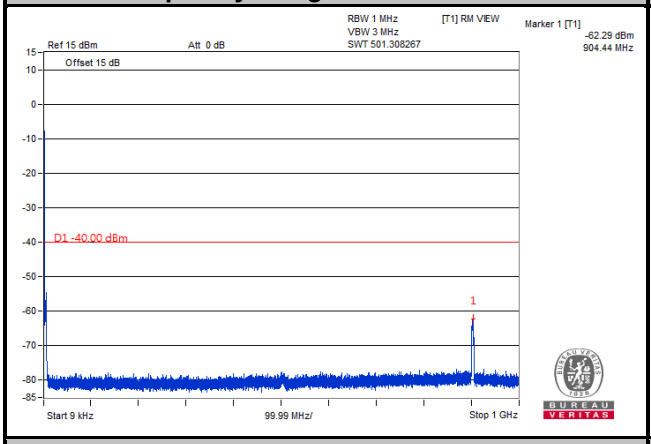
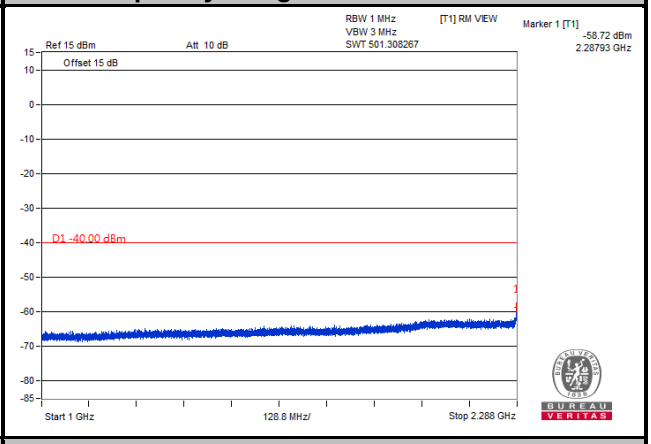
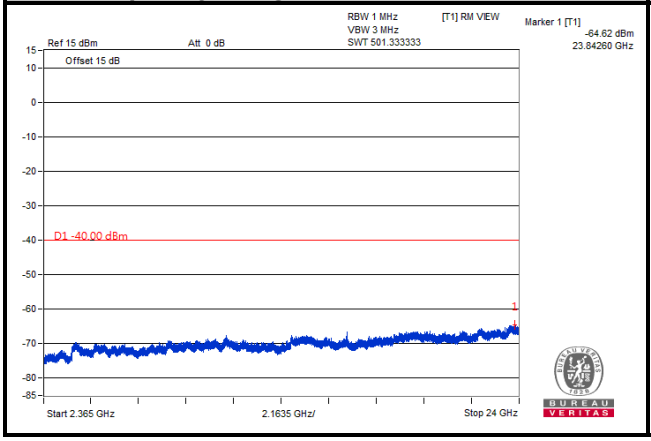
4.6.3 Test Procedure

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 1 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.
c. Measuring frequency range is from 1 GHz to 24 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.

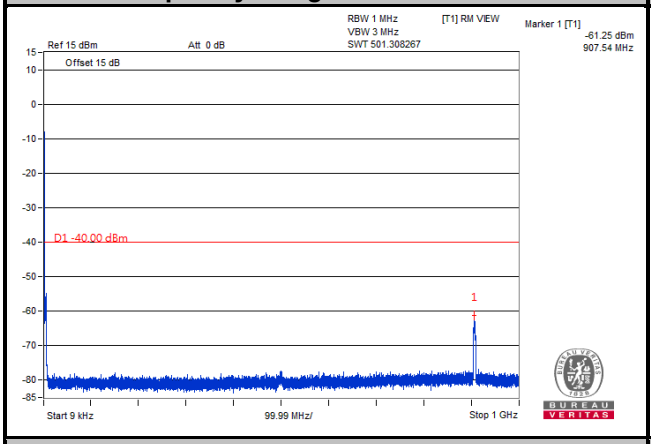
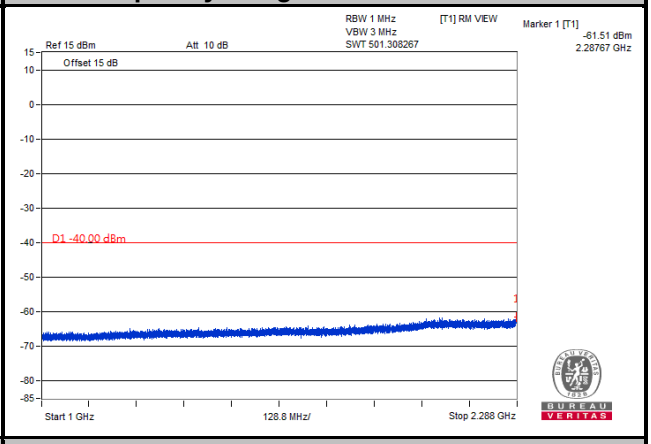
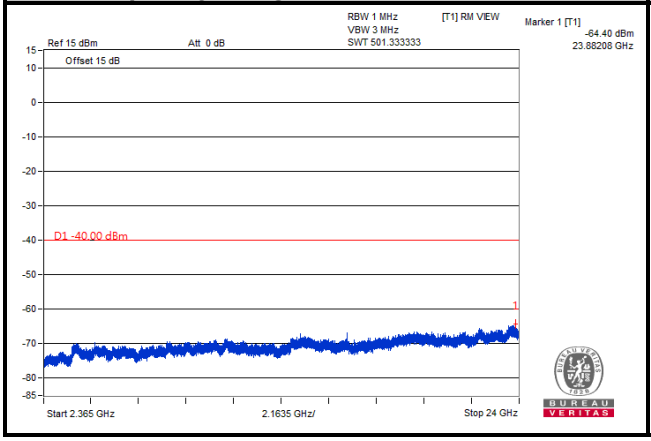
4.6.4 Test Results

LTE Band 30	
Channel Bandwidth: 5 MHz	
Channel 27685	
Frequency Range : 9 kHz ~ 1 GHz	Frequency Range : 1 GHz ~ 2.288 GHz
	
Frequency Range : 2.365 GHz ~ 24 GHz	
	

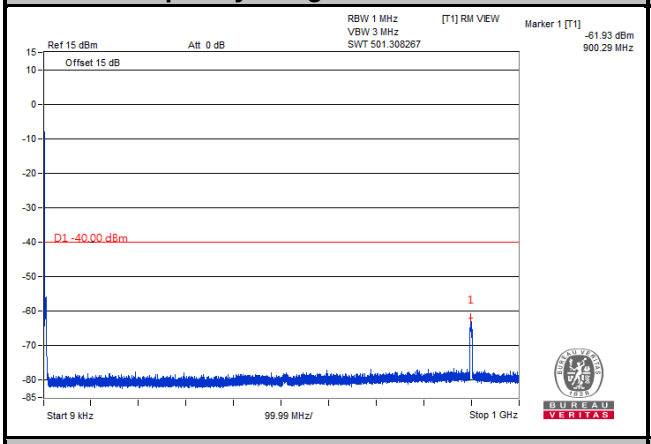
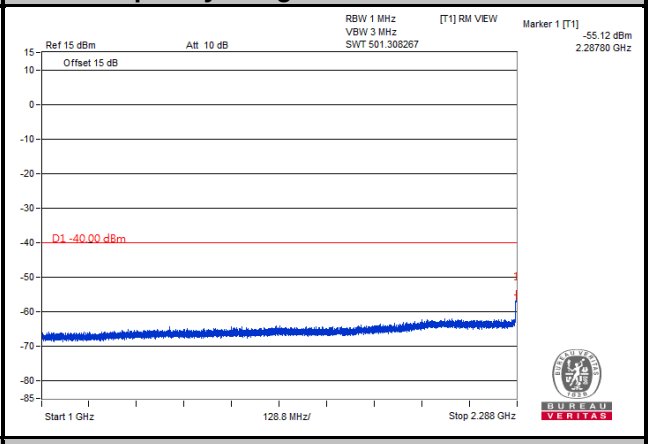
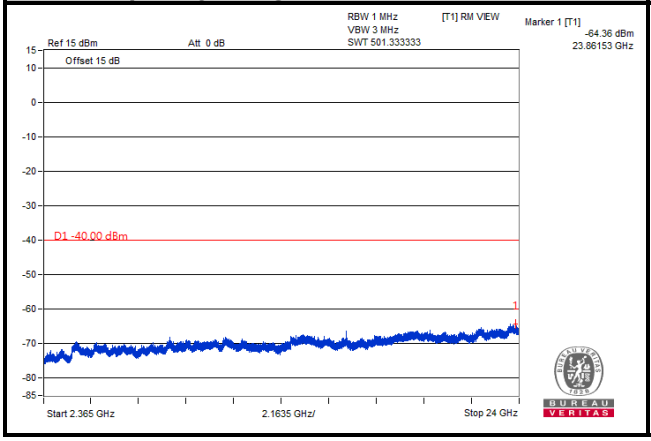
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 30	
Channel Bandwidth: 5 MHz	
Channel 27710	
Frequency Range : 9 kHz ~ 1 GHz	Frequency Range : 1 GHz ~ 2.288 GHz
	
Frequency Range : 2.365 GHz ~ 24 GHz	
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 30	
Channel Bandwidth: 5 MHz	
Channel 27735	
Frequency Range : 9 kHz ~ 1 GHz	Frequency Range : 1 GHz ~ 2.288 GHz
	
Frequency Range : 2.365 GHz ~ 24 GHz	
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 30	
Channel Bandwidth: 10 MHz	
Channel 27710	
Frequency Range : 9 kHz ~ 1 GHz	Frequency Range : 1 GHz ~ 2.288 GHz
	
Frequency Range : 2.365 GHz ~ 24 GHz	
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.

4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 70 +10 log (P) dB. The limit of emission is equal to -40 dBm.

4.7.2 Test Procedure

a. 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.
b. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn. Correction Factor (includes EIRP and ERP unit conversion factor) = Antenna gain of substitution horn. – Tx cable loss. Measurement method refers to ANSI C63.26 section 5.5.3.2.
c. 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.R.P power - 2.15 dB.

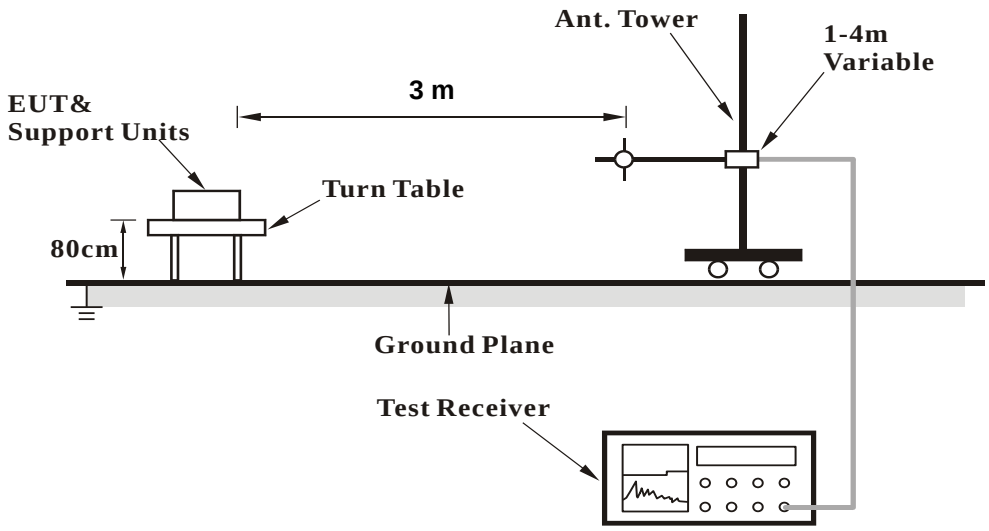
Note: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.7.3 Deviation from Test Standard

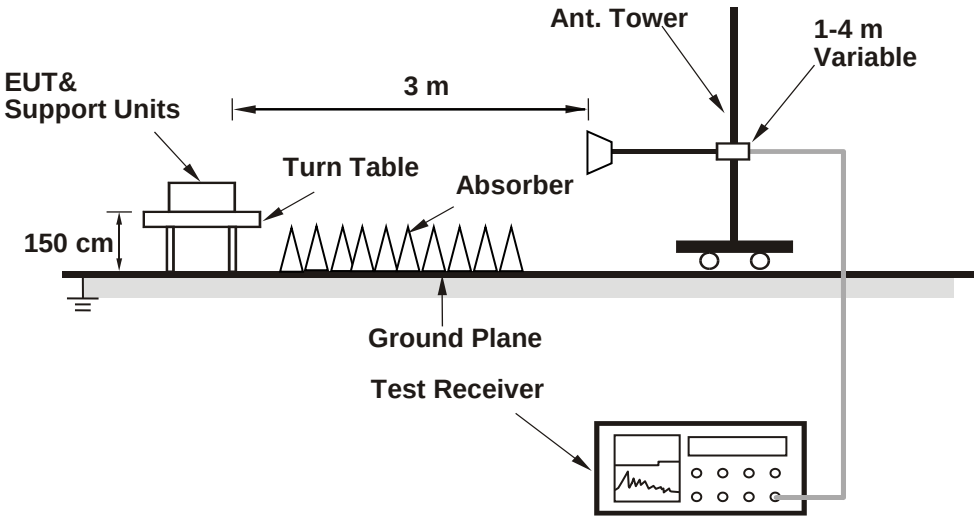
No deviation.

4.7.4 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).

4.7.5 Test Results

LTE Band 30

Channel Bandwidth: 5 MHz / QPSK

Low Channel

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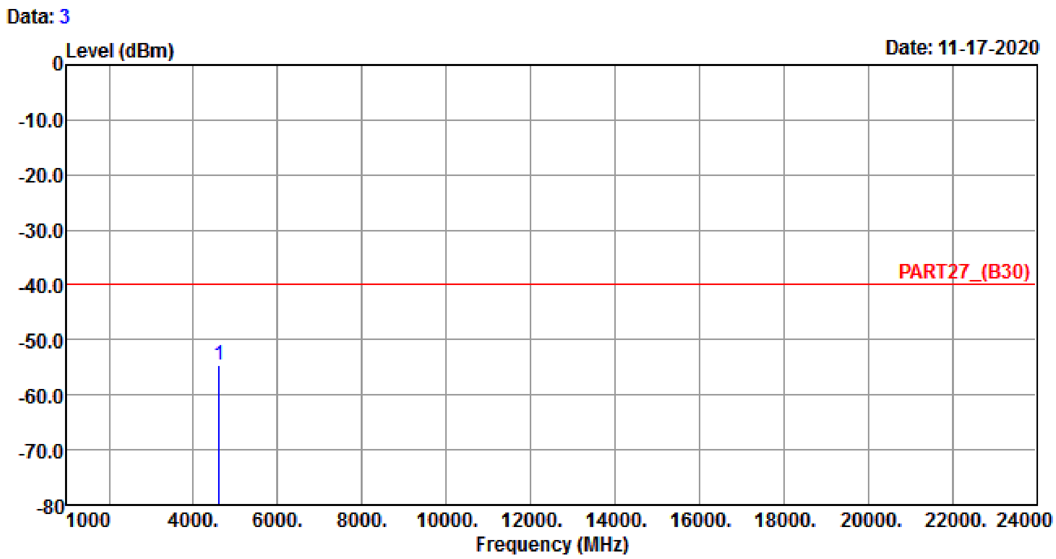
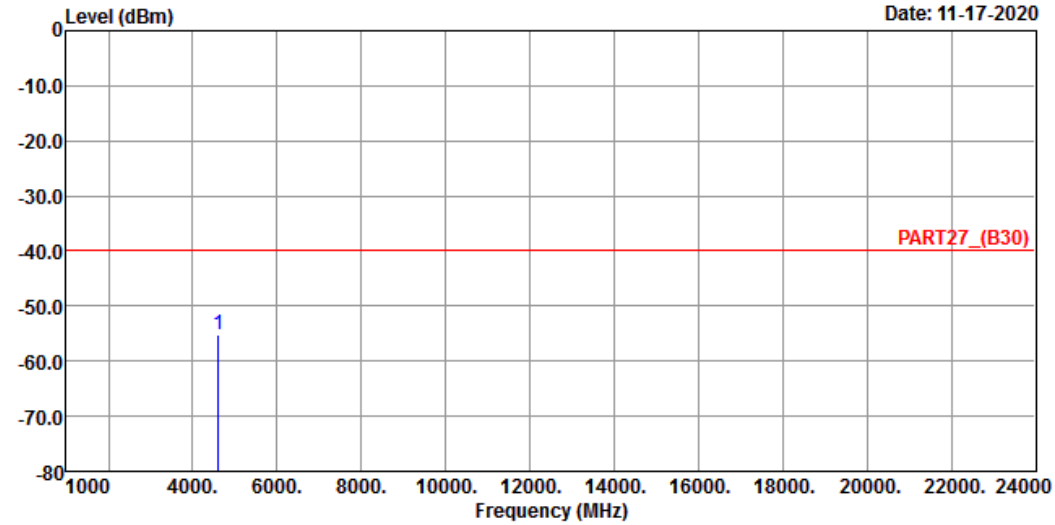


Site : 966 Chamber 5
Condition: PART27_(B30) HORIZONTAL
Remak : LTE Band 30 QPSK_5M Link_M-CH
Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	4615.00	-54.52	-50.87	-40.00	-3.65	-14.52	Peak

Data: 4



Site : 966 Chamber 5
Condition: PART27_(B30) VERTICAL
Remak : LTE Band 30 QPSK_5M Link_M-CH
Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	4615.00	-55.25	-51.60	-40.00	-3.65	-15.25	Peak

Middle Channel

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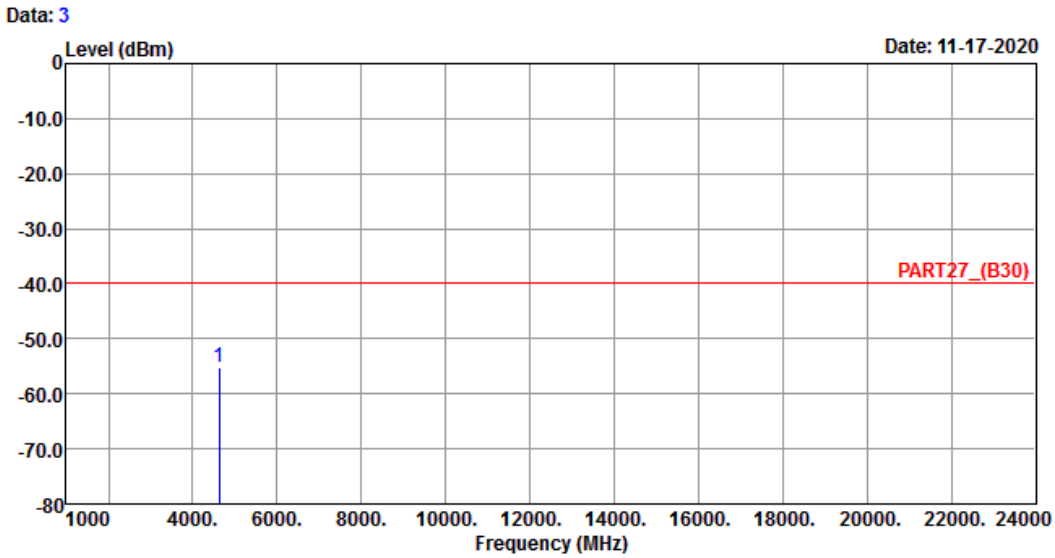
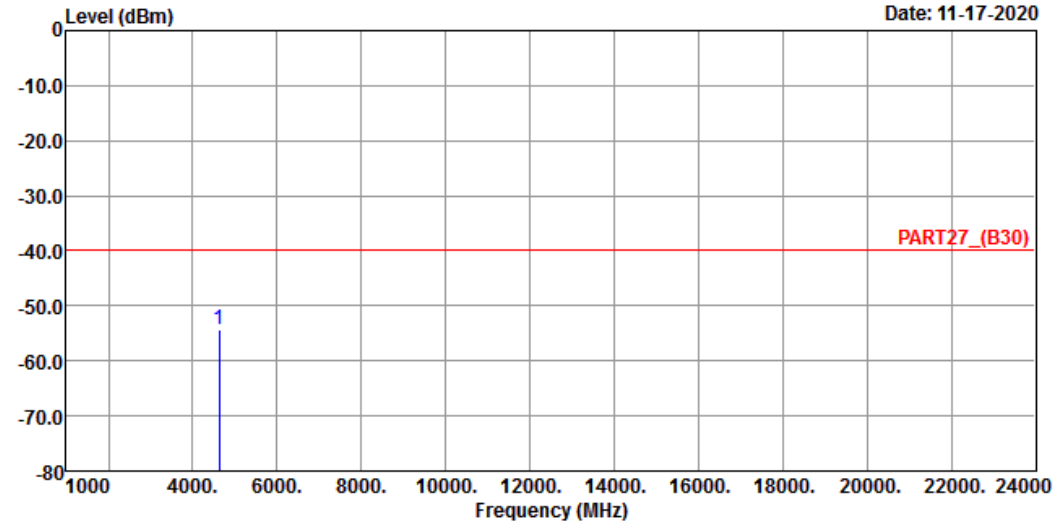


Site : 966 Chamber 5
Condition: PART27_(B30) HORIZONTAL
Remak : LTE Band 30 QPSK_5M Link_M-CH
Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	4620.00	-55.28	-51.60	-40.00	-3.68	-15.28	Peak

Data: 4

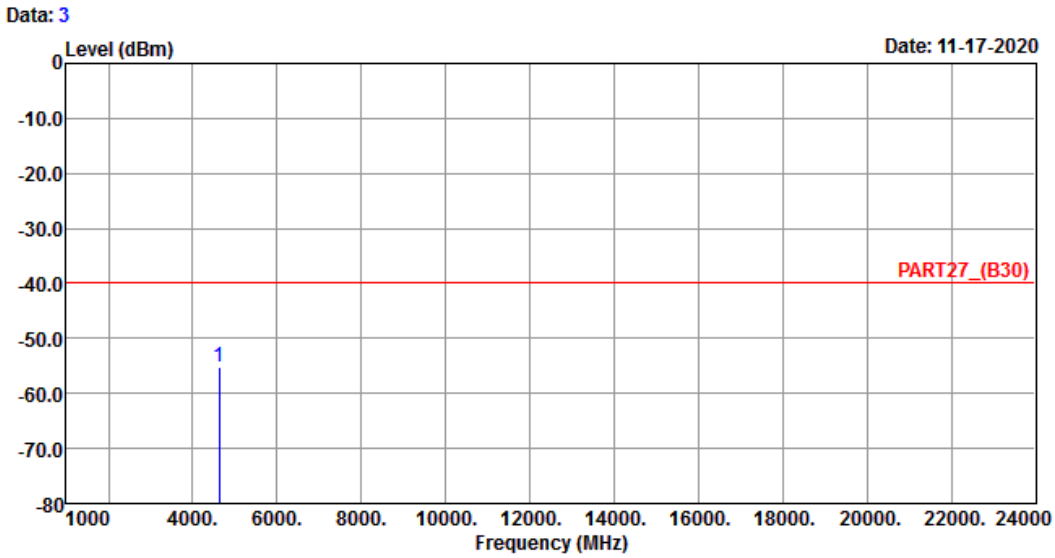


Site : 966 Chamber 5
Condition: PART27_(B30) VERTICAL
Remak : LTE Band 30 QPSK_5M Link_M-CH
Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	4620.00	-54.18	-50.50	-40.00	-3.68	-14.18	Peak

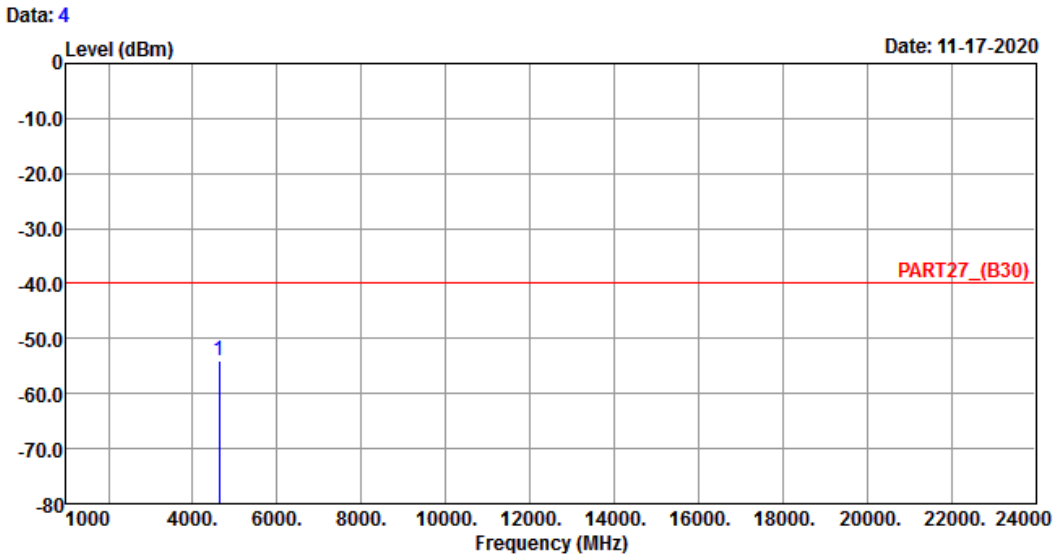
High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART27_(B30) HORIZONTAL
Remak : LTE Band 30 QPSK_5M Link_H-CH
Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	4625.00	-55.20	-51.52	-40.00	-3.68	-15.20	Peak

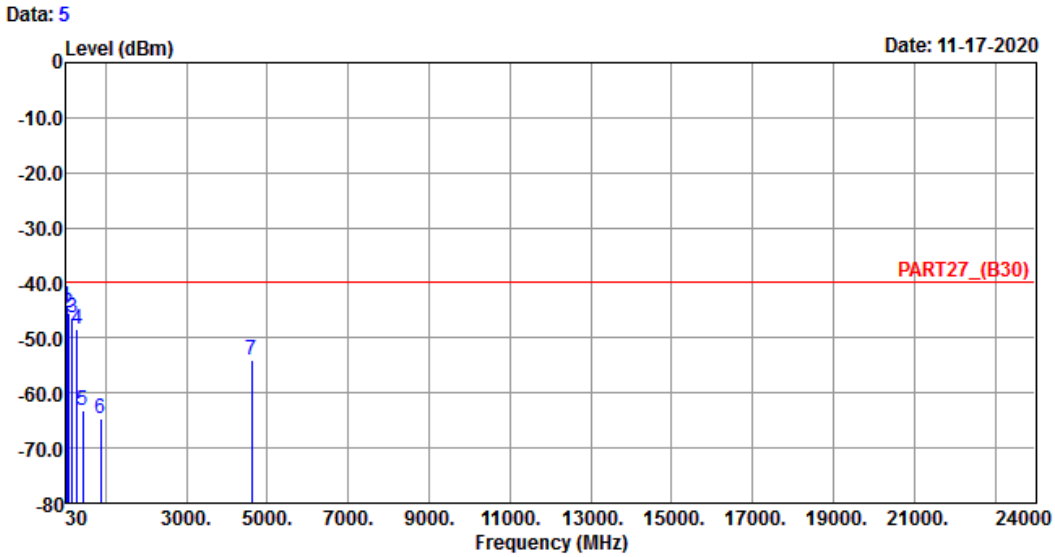


Site : 966 Chamber 5
Condition: PART27_(B30) VERTICAL
Remak : LTE Band 30 QPSK_5M Link_H-CH
Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	4625.00	-54.05	-50.37	-40.00	-3.68	-14.05	Peak

Channel Bandwidth: 10 MHz / QPSK
Middle Channel

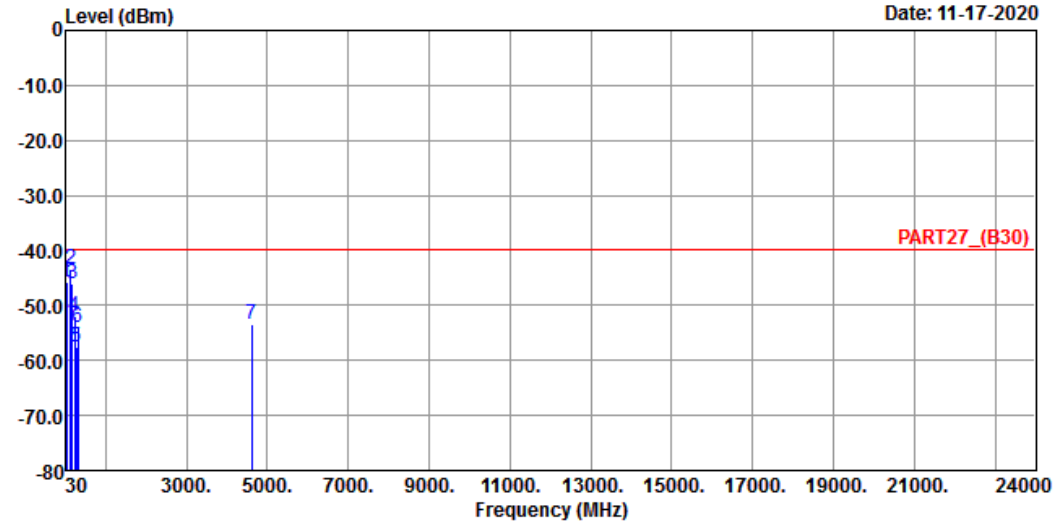
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART27_(B30) HORIZONTAL
Remak : LTE Band 30 QPSK_10M Link_M-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	40.67	-44.32	-44.44	-40.00	0.12	-4.32	Peak
2	69.77	-45.45	-37.05	-40.00	-8.40	-5.45	Peak
3	173.56	-46.39	-40.18	-40.00	-6.21	-6.39	Peak
4	288.99	-48.35	-41.56	-40.00	-6.79	-8.35	Peak
5	436.43	-63.07	-57.41	-40.00	-5.66	-23.07	Peak
6	874.87	-64.71	-65.14	-40.00	0.43	-24.71	Peak
7	4620.00	-54.12	-50.44	-40.00	-3.68	-14.12	Peak

Data: 6



Site : 966 Chamber 5
Condition: PART27_(B30) VERTICAL
Remak : LTE Band 30 QPSK_10M Link_M-CH
Tested by: Getaz Yang

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	43.58	-45.63	-44.16	-40.00	-1.47	-5.63	Peak
2 pp	146.40	-43.38	-35.41	-40.00	-7.97	-3.38	Peak
3	175.50	-45.94	-39.39	-40.00	-6.55	-5.94	Peak
4	244.37	-52.08	-45.85	-40.00	-6.23	-12.08	Peak
5	276.38	-57.67	-51.14	-40.00	-6.53	-17.67	Peak
6	324.88	-53.97	-47.34	-40.00	-6.63	-13.97	Peak
7	4620.00	-53.51	-49.83	-40.00	-3.68	-13.51	Peak

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:

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Web Site: www.bureauveritas-adt.com

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

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