FCC Test Report

(PART 27)

Report No.:	RF200518C05-9
FCC ID:	B94HHF135P
Test Model:	TPC-F135P
Marketing Name:	HP Bridge
Received Date:	May 18, 2020
Test Date:	Jun. 17 ~ Sep. 01, 2020
Issued Date:	Oct. 08, 2020
Applicant:	HP Inc.
Address:	3390 East Harmony Road Fort Collins, Colorado 80528 United States
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

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Release Control Record

Issue No.	Description	Date Issued
RF200518C05-9	Original Release	Oct. 08, 2020

1 Certificate of Conformity

Product: HP tablet

Brand: HP

Test Model: TPC-F135P

Marketing Name: HP Bridge

Sample Status: Engineering Sample

Applicant: HP Inc.

Test Date: Jun. 17 ~ Sep. 01, 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 : _____ , **Date:** Oct. 08, 2020

Gina Liu / Specialist

Approved by : _____ , **Date:** Oct. 08, 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 -3.30 dB at 4620.00 MHz.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	3.86 dB
	200 MHz ~ 1000 MHz	3.87 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB
	18 GHz ~ 40 GHz	2.29 dB

2.2 Test Site And Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESR3	102579	Jun. 27, 2019	Jun. 26, 2020
			Jul. 07, 2020	Jul. 06, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jun. 09, 2020	Jun. 08, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSW43	101582	Mar. 31, 2020	Mar. 30, 2021
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
			Jul. 06, 2020	Jul. 05, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 11, 2019	Nov. 10, 2020
HORN Antenna SCHWARZBECK	9120D	209	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna ETS	3117	00034130	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 20, 2019	Aug. 19, 2020
			Aug. 16, 2020	Aug. 15, 2021
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 23, 2020	Mar. 22, 2021
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH3-01	Aug. 20, 2019	Aug. 19, 2020
			Aug. 16, 2020	Aug. 15, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 20, 2019	Aug. 19, 2020
			Aug. 16, 2020	Aug. 15, 2021
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-SM-80 00	Cable-CH3-03 (309224+170907)	Aug. 20, 2019	Aug. 19, 2020
			Aug. 16, 2020	Aug. 15, 2021
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Standard Temperature And Humidity Chamber GIANT FORCE	GTH-120-40-CP-AR	MAA1306-019	Sep. 10, 2019	Sep. 09, 2020
			Sep. 09, 2020	Sep. 08, 2021
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	Jun 06, 2020	Jun 05, 2021
DC power supply Keysight	U8002A	MY56330015	NA	NA
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 25, 2019	Dec. 24, 2020
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Jan. 18, 2020	Jan. 17, 2021
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2019	Nov. 24, 2020

Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.

3 General Information

3.1 General Description of EUT

Product	HP tablet	
Brand	HP	
Test Model	TPC-F135P	
Marketing Name	HP Bridge	
Status of EUT	Engineering Sample	
Power Supply Rating	3.8 Vdc (Li-ion battery) 5.0 / 9.0 / 12.0 Vdc (adapter)	
Modulation Type	QPSK, 16QAM, 64QAM	
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)	173.780 mW / 5MHz (22.40 dBm)
	LTE Band 30 (Channel Bandwidth: 10 MHz)	147.911 mW / 5MHz (21.70 dBm)
Emission Designator	LTE Band 30 (Channel Bandwidth: 5 MHz)	4M50D7W
	LTE Band 30 (Channel Bandwidth: 10 MHz)	8M96D7W
Antenna Type	PIFA Antenna with -2.48 dBi gain	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

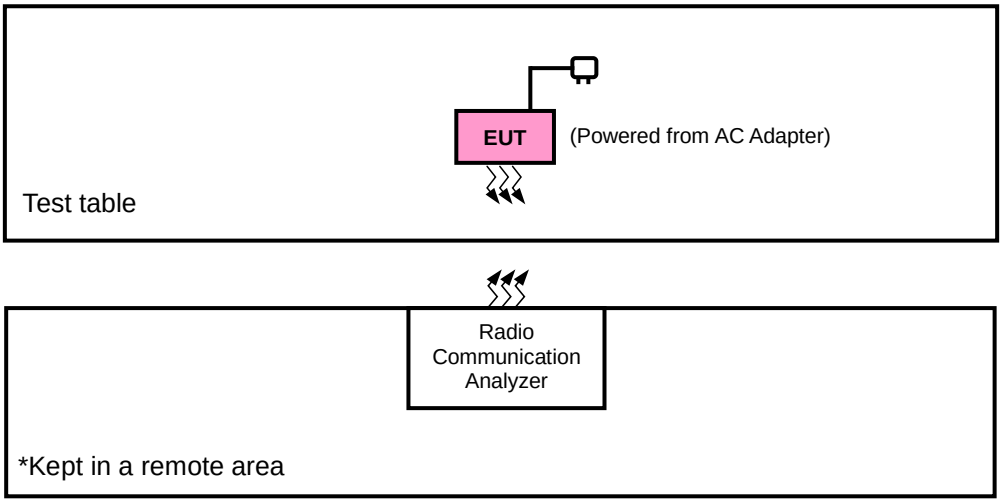
Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	HP	DSA-18QFE FUS A	I/P: 100-240 Vac, 50/60 Hz, 0.5 A O/P: 5.0 Vdc, 3 A, 15.0 W; +9.0 Vdc, 2.0 A ,18.0 W; 12.0 Vdc, 1.5A, 18 W
Battery	HP	HSP 1CP5/34/77	3.8 Vdc, 1500 mAh, 5.7 Wh
BT/WLAN Module	Qualcomm	SDM660-3	--
USB Cable	HP	WU-0093-00	1.47 m shielded cable w/o core
Holster	HP	HP Bridge Holster	HP holster Marketing Name: HP Bridge Holster

2. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
3. 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.

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 X-plane for EIRP and X-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, 64QAM	1 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	27710	27710	10 MHz	QPSK, 16QAM, 64QAM	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, 64QAM	25 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
-	Band Edge	27685 to 27735	27685, 27710, 27735	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		27710	27710	10 MHz	QPSK, 16QAM, 64QAM	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, 64QAM 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 for final testing.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25 deg. C, 65 % RH	120 Vac, 60 Hz	Adair Peng
Modulation Characteristics	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu, Getaz Yang
Frequency Stability	25 deg. C, 65 % RH	3.8Vdc	Gavin Wu, Getaz Yang
Occupied Bandwidth	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu, Getaz Yang
Band Edge	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu, Getaz Yang
Conducted Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu, Getaz Yang
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Luis Lee, Adair Peng

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
3GPP TS 36.521-1 V16.3.0 (2019-12)

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:

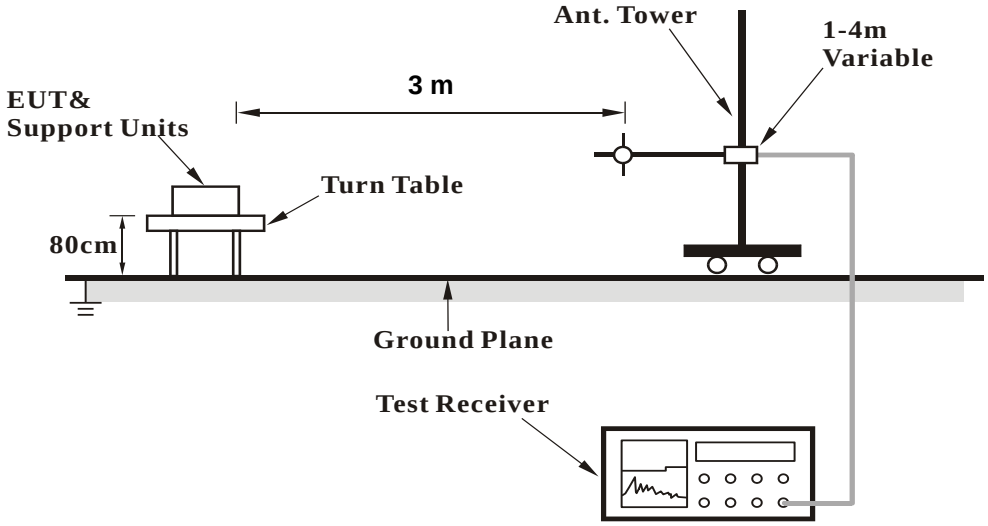
a. All measurements were done at low, middle and high operational frequency range. RBW is 5 MHz and VBW is 15 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn 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.

Conducted Power Measurement:

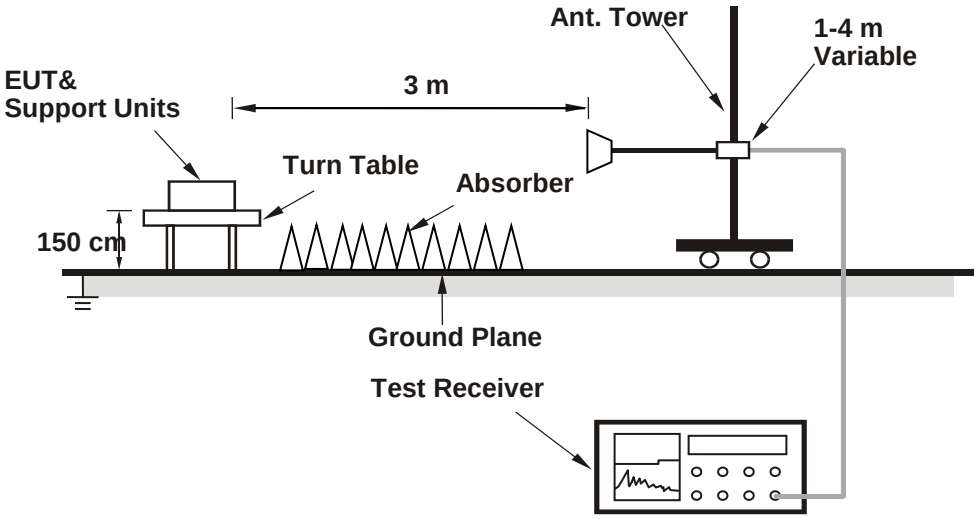
a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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		22.97		0	5M	QPSK	1	0	22.91	22.96	22.95	0
		1	24		22.95		0			1	12	22.78	22.89	22.70	0
		1	49		22.88		0			1	24	22.73	22.74	22.65	0
		25	0		22.22		1			12	0	22.11	22.10	22.15	1
		25	12		22.13		1			12	6	21.91	21.96	22.02	1
		25	25		22.02		1			12	13	21.86	21.94	21.97	1
		50	0		22.07		1			25	0	21.94	21.90	21.87	1
	16QAM	1	0		22.30		1		16QAM	1	0	22.12	22.15	22.17	1
		1	24		22.17		1			1	12	22.10	22.08	22.06	1
		1	49		22.04		1			1	24	21.75	21.81	21.90	1
		25	0		21.13		2			12	0	20.95	20.99	20.90	2
		25	12		21.07		2			12	6	20.89	20.94	20.90	2
		25	25		21.04		2			12	13	20.80	20.82	20.91	2
		50	0		21.09		2			25	0	20.81	20.94	21.04	2
	64QAM	1	0		21.24		2		64QAM	1	0	21.04	21.10	21.11	2
		1	24		21.08		2			1	12	21.03	21.06	21.05	2
		1	49		21.01		2			1	24	20.75	20.73	20.86	2
		25	0		20.11		3			12	0	19.89	19.91	19.81	3
		25	12		20.06		3			12	6	19.86	19.93	19.84	3
		25	25		20.01		3			12	13	19.70	19.81	19.81	3
		50	0		20.07		3			25	0	19.71	19.93	20.00	3

EIRP Power

Modulation Type: QPSK

LTE Band 30, Channel Bandwidth: 5MHz

MODE	TX channel 227685, 27710, 27735						
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2307.5	-19.90	21.00	0.70	21.70	24.00	-2.30
2	2310.0	-19.80	21.10	0.70	21.80	24.00	-2.20
3	2312.5	-19.20	21.70	0.70	22.40	24.00	-1.60
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2307.5	-23.70	18.40	0.70	19.10	24.00	-4.90
2	2310.0	-23.80	18.30	0.70	19.00	24.00	-5.00
3	2312.5	-23.50	18.70	0.70	19.40	24.00	-4.60

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

LTE Band 30, Channel Bandwidth: 10MHz

MODE	TX channel 27710						
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.0	-19.90	21.00	0.70	21.70	24.00	-2.30
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.0	-24.90	17.20	0.70	17.90	24.00	-6.10

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Modulation Type: 16QAM

LTE Band 30, Channel Bandwidth: 5MHz

MODE		TX channel 227685, 27710, 27735					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2307.5	-20.50	20.40	0.70	21.10	24.00	-2.90
2	2310.0	-20.00	20.90	0.70	21.60	24.00	-2.40
3	2312.5	-20.50	20.40	0.70	21.10	24.00	-2.90
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2307.5	-24.20	17.90	0.70	18.60	24.00	-5.40
2	2310.0	-24.70	17.40	0.70	18.10	24.00	-5.90
3	2312.5	-24.30	17.90	0.70	18.60	24.00	-5.40

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

LTE Band 30, Channel Bandwidth: 10MHz

MODE		TX channel 27710					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.0	-20.50	20.40	0.70	21.10	24.00	-2.90
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.0	-24.80	17.30	0.70	18.00	24.00	-6.00

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Modulation Type: 64QAM

LTE Band 30, Channel Bandwidth: 5MHz

MODE		TX channel 227685, 27710, 27735					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2307.5	-21.40	19.50	0.70	20.20	24.00	-3.80
2	2310.0	-20.80	20.10	0.70	20.80	24.00	-3.20
3	2312.5	-21.30	19.60	0.70	20.30	24.00	-3.70
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2307.5	-24.80	17.30	0.70	18.00	24.00	-6.00
2	2310.0	-25.20	16.90	0.70	17.60	24.00	-6.40
3	2312.5	-24.70	17.50	0.70	18.20	24.00	-5.80

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

LTE Band 30, Channel Bandwidth: 10MHz

MODE		TX channel 27710					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.0	-20.90	20.00	0.70	20.70	24.00	-3.30
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm/5MHz)	Limit (dBm/5MHz)	Margin (dB)
1	2310.0	-25.30	16.80	0.70	17.50	24.00	-6.50

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

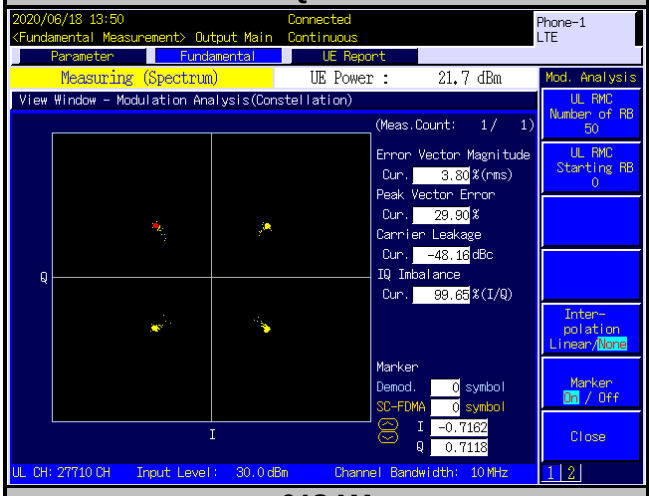
4.2.2 Test Setup

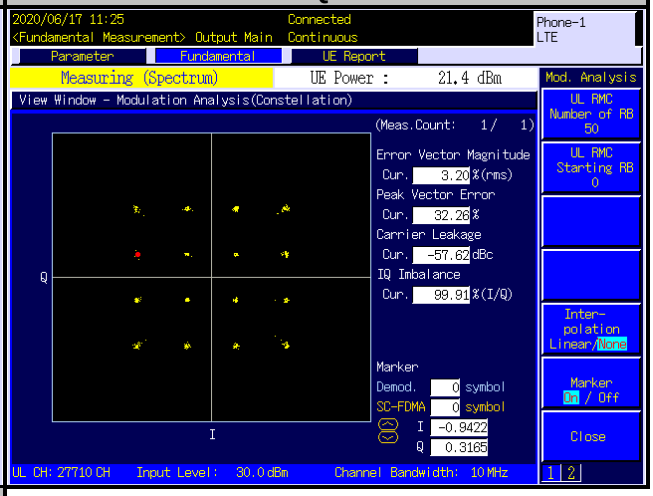
4.2.3 Test Procedure

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.

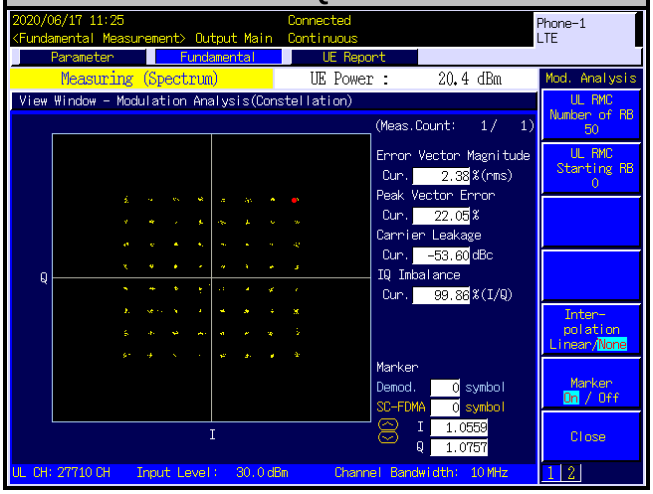
4.2.4 Test Results

Spectrum Plot of Measurement	
LTE Band 30	
Channel 27710	
QPSK	16QAM





64QAM



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

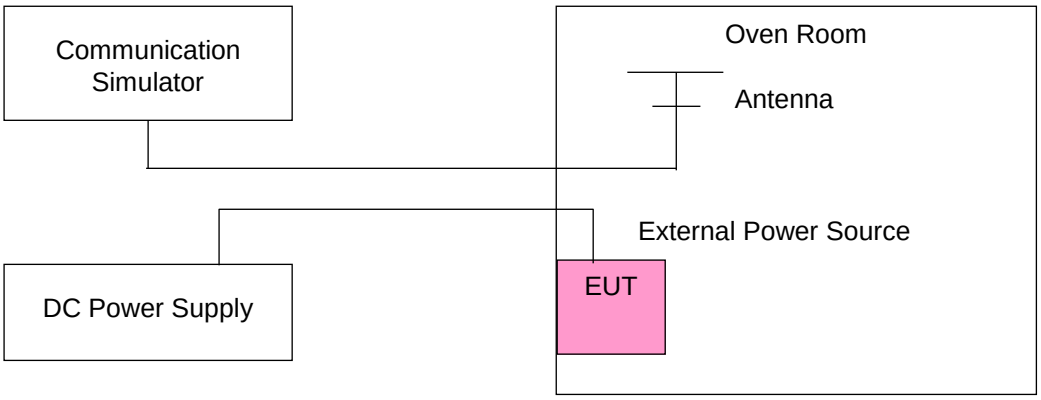
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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)
3.8	2307.500001	0.001	2312.500001	0.001
3.23	2307.500002	0.001	2312.500002	0.001
4.37	2307.500003	0.001	2312.500004	0.002

Note: The applicant defined the normal working voltage is from 3.23 Vdc to 4.37 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	2307.500003	0.001	2312.500003	0.001
-20	2307.500003	0.001	2312.500004	0.002
-10	2307.500002	0.001	2312.500001	0.001
0	2307.499996	-0.002	2312.499999	-0.001
10	2307.499998	-0.001	2312.499996	-0.002
20	2307.499998	-0.001	2312.499998	-0.001
30	2307.499998	-0.001	2312.499999	-0.001
40	2307.499997	-0.001	2312.499997	-0.001
50	2307.499997	-0.001	2312.499999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 30	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
3.8	2310.000003	0.001
3.23	2310.000004	0.002
4.37	2310.000004	0.002

Note: The applicant defined the normal working voltage is from 3.23 Vdc to 4.37 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 30	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-30	2310.000001	0.001
-20	2310.000001	0.001
-10	2310.000004	0.002
0	2309.999998	-0.001
10	2309.999998	-0.001
20	2309.999999	0.000
30	2309.999998	-0.001
40	2309.999997	-0.001
50	2309.999997	-0.001

4.4 Occupied Bandwidth Measurement

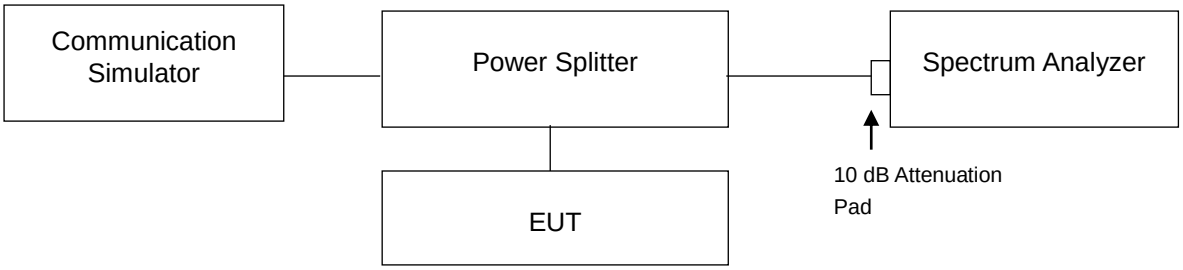
4.4.1 Limits of Occupied Bandwidth Measurement

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

4.4.2 Test Procedure

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.

4.4.3 Test Setup

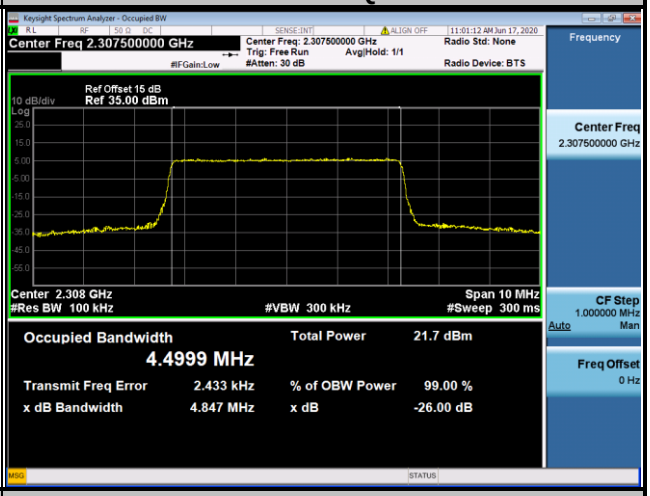


4.4.4 Test Result

LTE Band 30							
Channel Bandwidth: 5 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
27685	2307.5	4.4907	4.4919	4.4999	4.81	4.80	4.85
27710	2310.0	4.4910	4.4912	4.4984	4.84	4.82	4.84
27735	2312.5	4.4948	4.4951	4.4999	4.85	4.82	4.82
Channel Bandwidth: 10 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
27710	2310.0	8.9605	8.9588	8.9619	9.534	9.514	9.508

Spectrum Plot of Worst Value

99 % Occupied Bandwidth	26 dB Bandwidth
5 MHz / 64QAM	5 MHz / 64QAM



10 MHz / 64QAM | **10 MHz / QPSK**

4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

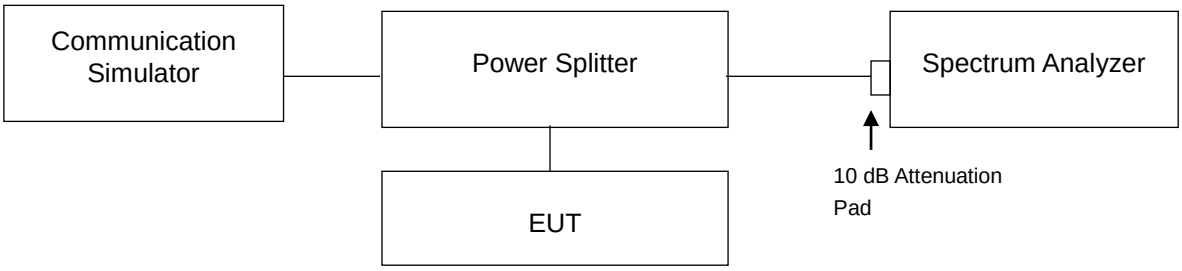
According to FCC 27.53(a) (4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(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. Measurement method refer to FCC 27.53 (a) (5).

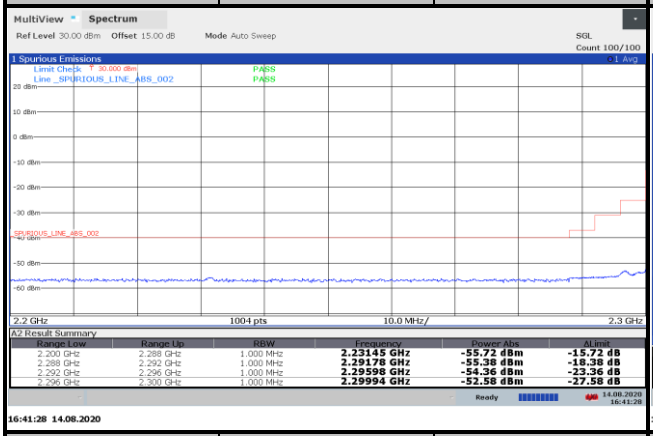
d. The LTE Band operates in the 5 MHz channel BW mode (CH27685 1 RB). By using the 100 kHz bandwidth on the spectrum analyzer, the 1% range is extended from 2M to 5M, and the correction factor is further increased by 10 log(1000/100) = 10dB, and add the correction factor on the spectrum offset.

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

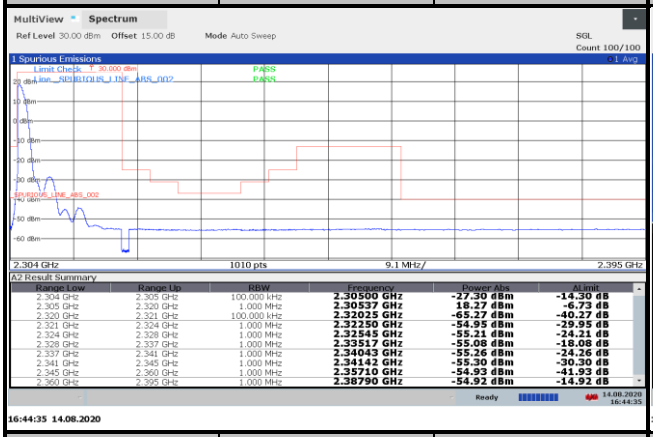
f.

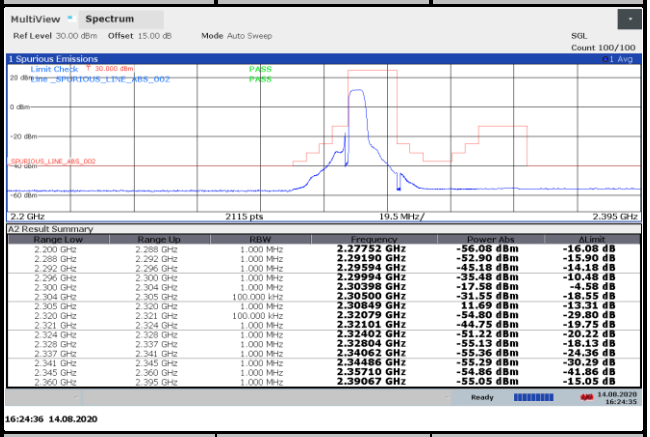
4.5.4 Test Results

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

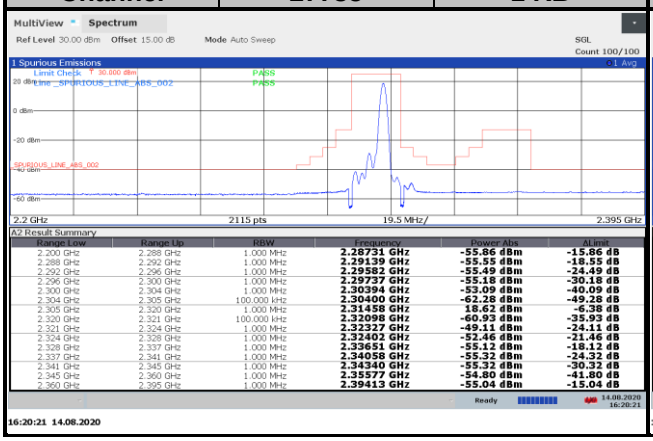


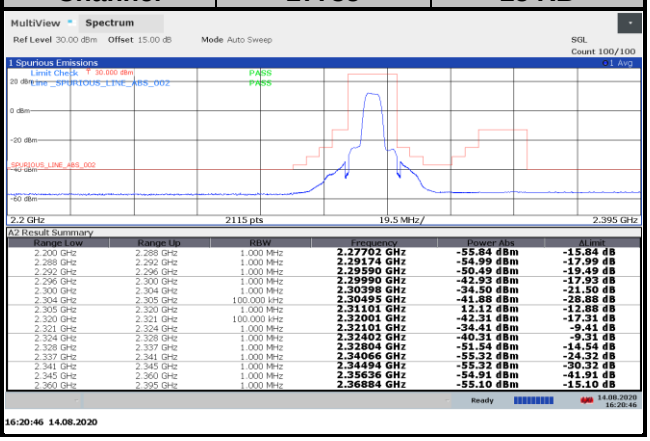
Channel	27685	1 RB	Channel	27685	25 RB





Channel	27735	1 RB	Channel	27735	25 RB



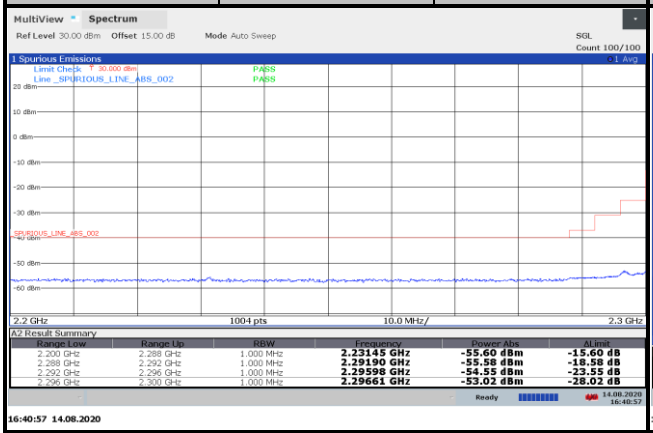


LTE Band 30

<Adjacent Channel Band Edge>

Channel Bandwidth: 5 MHz / 16QAM

Channel	27685	1 RB



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	2.23145 GHz	-55.60 dBm	-15.60 dB
2.288 GHz	2.292 GHz	1.000 MHz	2.29190 GHz	-55.58 dBm	-18.58 dB
2.292 GHz	2.296 GHz	1.000 MHz	2.29598 GHz	-54.55 dBm	-23.55 dB
2.296 GHz	2.300 GHz	1.000 MHz	2.29661 GHz	-53.02 dBm	-28.02 dB

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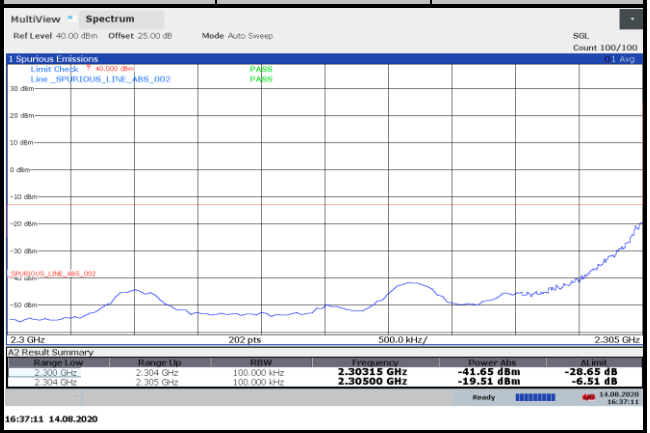
Channel	27685	1 RB



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.300 GHz	2.304 GHz	100.000 kHz	2.30315 GHz	-41.65 dBm	-28.65 dB
2.304 GHz	2.305 GHz	100.000 kHz	2.30500 GHz	-19.51 dBm	-6.51 dB

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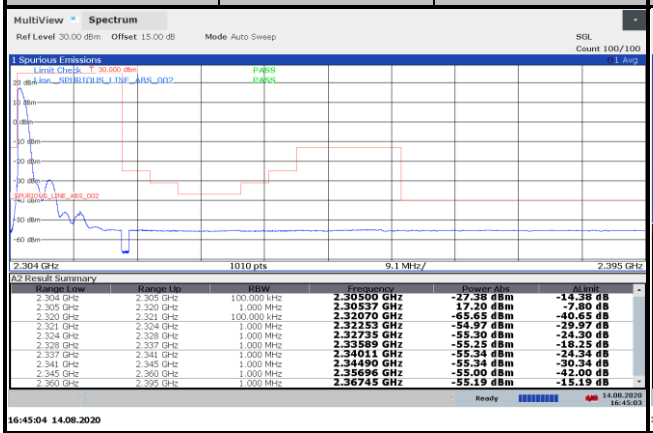
Channel	27685	1 RB



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.304 GHz	2.305 GHz	100.000 kHz	2.30500 GHz	-27.38 dBm	-14.38 dB
2.305 GHz	2.320 GHz	1.000 MHz	2.30537 GHz	17.20 dBm	-7.80 dB
2.320 GHz	2.321 GHz	100.000 kHz	2.32070 GHz	-65.65 dBm	-40.65 dB
2.321 GHz	2.324 GHz	1.000 MHz	2.32253 GHz	-54.97 dBm	-29.97 dB
2.324 GHz	2.328 GHz	1.000 MHz	2.32735 GHz	-55.30 dBm	-24.30 dB
2.328 GHz	2.337 GHz	1.000 MHz	2.33589 GHz	-55.25 dBm	-18.25 dB
2.337 GHz	2.341 GHz	1.000 MHz	2.34011 GHz	-55.34 dBm	-24.34 dB
2.341 GHz	2.345 GHz	1.000 MHz	2.34490 GHz	-55.34 dBm	-30.34 dB
2.345 GHz	2.360 GHz	1.000 MHz	2.35696 GHz	-55.00 dBm	-42.00 dB
2.360 GHz	2.395 GHz	1.000 MHz	2.36745 GHz	-55.19 dBm	-15.19 dB

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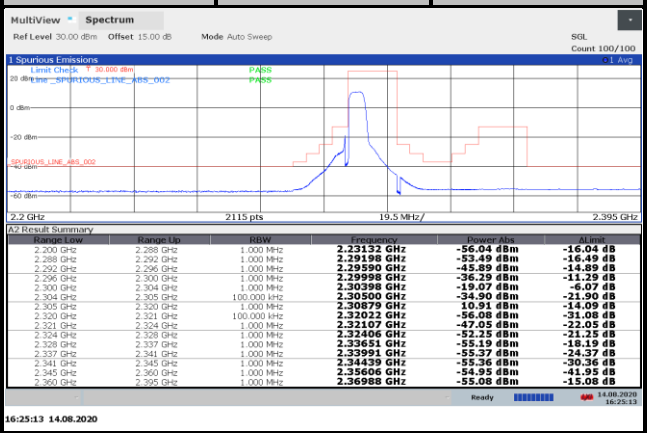
Channel	27685	25 RB



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	2.23132 GHz	-56.04 dBm	-16.04 dB
2.288 GHz	2.292 GHz	1.000 MHz	2.29198 GHz	-53.49 dBm	-16.49 dB
2.292 GHz	2.296 GHz	1.000 MHz	2.29590 GHz	-45.89 dBm	-14.89 dB
2.296 GHz	2.300 GHz	1.000 MHz	2.29998 GHz	-36.29 dBm	-11.29 dB
2.300 GHz	2.304 GHz	1.000 MHz	2.30398 GHz	-19.07 dBm	-6.07 dB
2.304 GHz	2.305 GHz	100.000 kHz	2.30500 GHz	-34.90 dBm	-21.90 dB
2.305 GHz	2.320 GHz	1.000 MHz	2.30879 GHz	10.91 dBm	-14.09 dB
2.320 GHz	2.321 GHz	100.000 kHz	2.32022 GHz	-56.08 dBm	-31.08 dB
2.321 GHz	2.324 GHz	1.000 MHz	2.32107 GHz	-47.05 dBm	-22.05 dB
2.324 GHz	2.328 GHz	1.000 MHz	2.32406 GHz	-52.25 dBm	-21.25 dB
2.328 GHz	2.337 GHz	1.000 MHz	2.33651 GHz	-55.19 dBm	-18.19 dB
2.337 GHz	2.341 GHz	1.000 MHz	2.33991 GHz	-55.37 dBm	-24.37 dB
2.341 GHz	2.345 GHz	1.000 MHz	2.34439 GHz	-55.36 dBm	-30.36 dB
2.345 GHz	2.360 GHz	1.000 MHz	2.35606 GHz	-54.95 dBm	-41.95 dB
2.360 GHz	2.395 GHz	1.000 MHz	2.36988 GHz	-55.08 dBm	-15.08 dB

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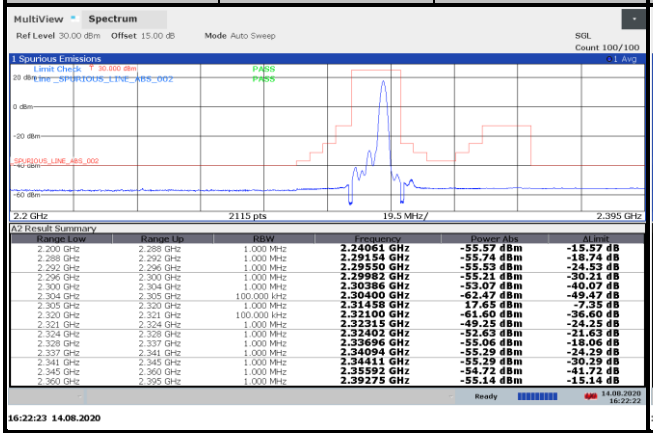
Channel	27735	1 RB



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	2.24061 GHz	-55.57 dBm	-15.57 dB
2.288 GHz	2.292 GHz	1.000 MHz	2.29154 GHz	-55.74 dBm	-18.74 dB
2.292 GHz	2.296 GHz	1.000 MHz	2.29550 GHz	-55.53 dBm	-21.53 dB
2.296 GHz	2.300 GHz	1.000 MHz	2.29982 GHz	-55.21 dBm	-30.21 dB
2.300 GHz	2.304 GHz	1.000 MHz	2.30386 GHz	-53.07 dBm	-40.07 dB
2.304 GHz	2.305 GHz	100.000 kHz	2.30400 GHz	-62.47 dBm	-49.47 dB
2.305 GHz	2.320 GHz	1.000 MHz	2.31458 GHz	17.65 dBm	-7.35 dB
2.320 GHz	2.321 GHz	100.000 kHz	2.32100 GHz	-61.60 dBm	-36.60 dB
2.321 GHz	2.324 GHz	1.000 MHz	2.32315 GHz	-49.25 dBm	-24.25 dB
2.324 GHz	2.328 GHz	1.000 MHz	2.32402 GHz	-52.63 dBm	-21.63 dB
2.328 GHz	2.337 GHz	1.000 MHz	2.33696 GHz	-55.06 dBm	-18.06 dB
2.337 GHz	2.341 GHz	1.000 MHz	2.34094 GHz	-55.29 dBm	-24.29 dB
2.341 GHz	2.345 GHz	1.000 MHz	2.34411 GHz	-55.29 dBm	-30.29 dB
2.345 GHz	2.360 GHz	1.000 MHz	2.35592 GHz	-54.72 dBm	-41.72 dB
2.360 GHz	2.395 GHz	1.000 MHz	2.39275 GHz	-55.14 dBm	-15.14 dB

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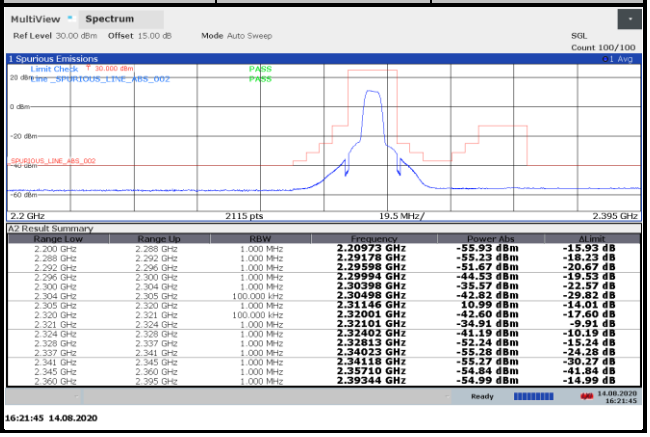
Channel	27735	25 RB



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	2.20973 GHz	-55.93 dBm	-15.93 dB
2.288 GHz	2.292 GHz	1.000 MHz	2.29178 GHz	-55.23 dBm	-18.23 dB
2.292 GHz	2.296 GHz	1.000 MHz	2.29598 GHz	-51.67 dBm	-20.67 dB
2.296 GHz	2.300 GHz	1.000 MHz	2.29994 GHz	-44.53 dBm	-19.53 dB
2.300 GHz	2.304 GHz	1.000 MHz	2.30398 GHz	-35.57 dBm	-22.57 dB
2.304 GHz	2.305 GHz	100.000 kHz	2.30498 GHz	-42.82 dBm	-29.82 dB
2.305 GHz	2.320 GHz	1.000 MHz	2.31146 GHz	10.99 dBm	-14.01 dB
2.320 GHz	2.321 GHz	100.000 kHz	2.32001 GHz	-42.60 dBm	-17.60 dB
2.321 GHz	2.324 GHz	1.000 MHz	2.32101 GHz	-34.91 dBm	-9.91 dB
2.324 GHz	2.328 GHz	1.000 MHz	2.32402 GHz	-41.19 dBm	-10.19 dB
2.328 GHz	2.337 GHz	1.000 MHz	2.32813 GHz	-52.24 dBm	-15.24 dB
2.337 GHz	2.341 GHz	1.000 MHz	2.34023 GHz	-55.28 dBm	-24.28 dB
2.341 GHz	2.345 GHz	1.000 MHz	2.34118 GHz	-55.27 dBm	-30.27 dB
2.345 GHz	2.360 GHz	1.000 MHz	2.35710 GHz	-54.84 dBm	-41.84 dB
2.360 GHz	2.395 GHz	1.000 MHz	2.39344 GHz	-54.99 dBm	-14.99 dB

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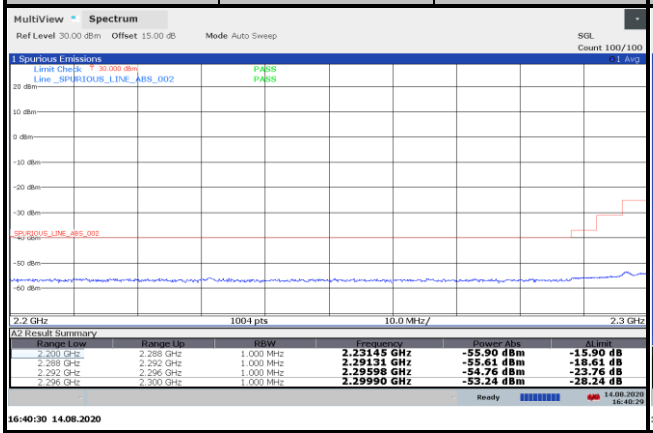
LTE Band 30

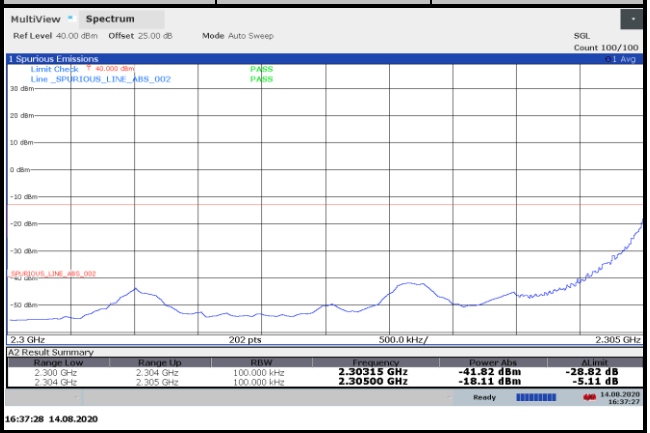
<Adjacent Channel Band Edge>

Channel Bandwidth: 5 MHz / 64QAM

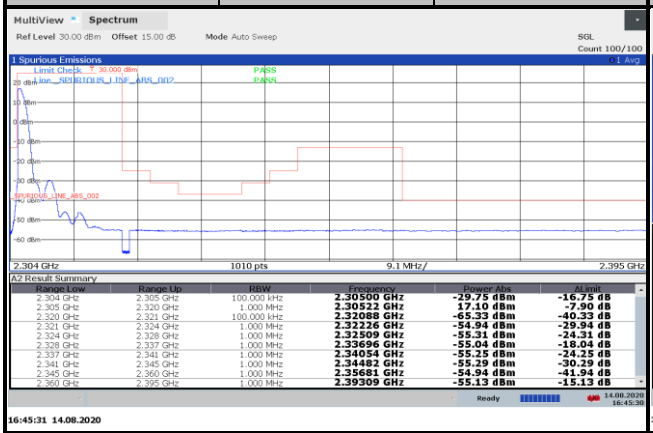
Channel	27685	1 RB



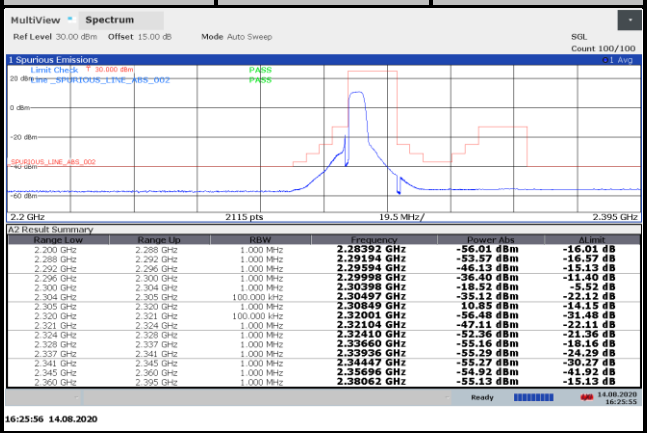
Channel	27685	1 RB



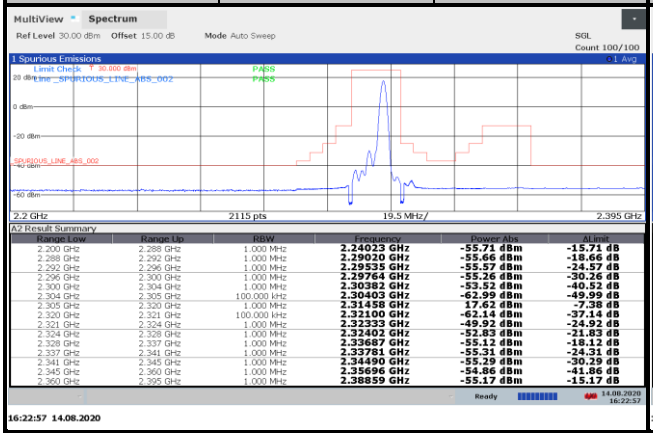
Channel	27685	1 RB



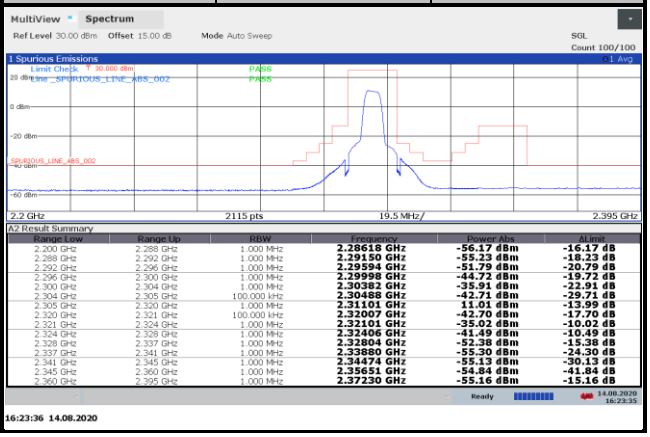
Channel	27685	25 RB



Channel	27735	1 RB

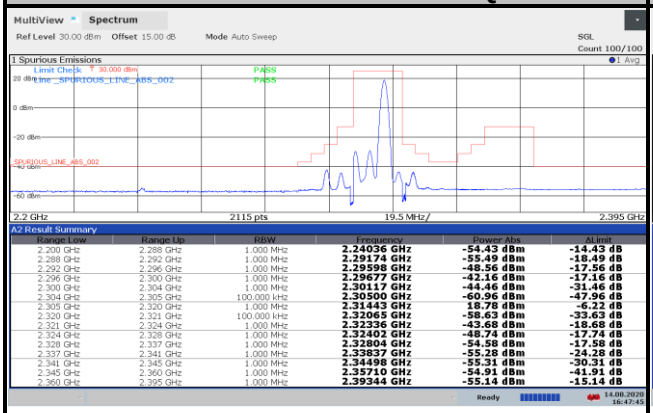


Channel	27735	25 RB



LTE Band 30		
Channel	**27710**	**1 RB**

Channel Bandwidth: 10 MHz / QPSK



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	2.24036 GHz	-54.43 dBm	-14.43 dB
2.288 GHz	2.292 GHz	1.000 MHz	2.29174 GHz	-55.49 dBm	-18.49 dB
2.292 GHz	2.296 GHz	1.000 MHz	2.29598 GHz	-48.56 dBm	-17.56 dB
2.296 GHz	2.300 GHz	1.000 MHz	2.29677 GHz	-42.16 dBm	-17.16 dB
2.300 GHz	2.304 GHz	1.000 MHz	2.30117 GHz	-44.46 dBm	-31.46 dB
2.304 GHz	2.305 GHz	100.000 kHz	2.30500 GHz	-60.96 dBm	-47.96 dB
2.305 GHz	2.320 GHz	1.000 MHz	2.31443 GHz	18.78 dBm	-6.22 dB
2.320 GHz	2.321 GHz	100.000 kHz	2.32065 GHz	-58.63 dBm	-33.63 dB
2.321 GHz	2.324 GHz	1.000 MHz	2.32336 GHz	-43.68 dBm	-18.68 dB
2.324 GHz	2.328 GHz	1.000 MHz	2.32402 GHz	-48.74 dBm	-17.74 dB
2.328 GHz	2.337 GHz	1.000 MHz	2.32804 GHz	-54.58 dBm	-17.58 dB
2.337 GHz	2.341 GHz	1.000 MHz	2.33837 GHz	-55.28 dBm	-24.28 dB
2.341 GHz	2.345 GHz	1.000 MHz	2.34498 GHz	-55.31 dBm	-30.31 dB
2.345 GHz	2.360 GHz	1.000 MHz	2.35710 GHz	-54.91 dBm	-41.91 dB
2.360 GHz	2.395 GHz	1.000 MHz	2.39344 GHz	-55.14 dBm	-15.14 dB

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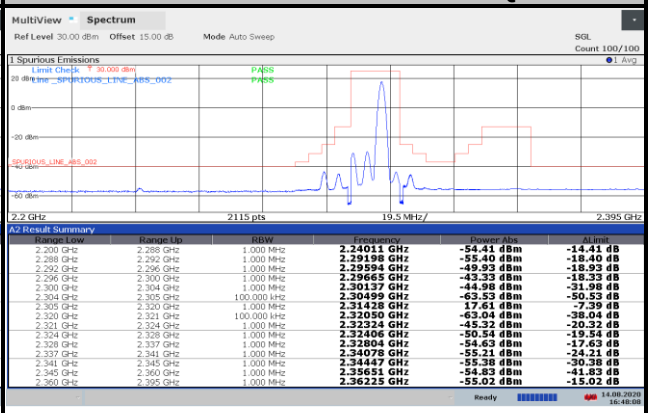
Channel Bandwidth: 10 MHz / 16QAM



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	2.24011 GHz	-54.41 dBm	-14.41 dB
2.288 GHz	2.292 GHz	1.000 MHz	2.29198 GHz	-55.40 dBm	-18.40 dB
2.292 GHz	2.296 GHz	1.000 MHz	2.29594 GHz	-49.93 dBm	-18.93 dB
2.296 GHz	2.300 GHz	1.000 MHz	2.29665 GHz	-43.33 dBm	-18.33 dB
2.300 GHz	2.304 GHz	1.000 MHz	2.30137 GHz	-44.98 dBm	-31.98 dB
2.304 GHz	2.305 GHz	100.000 kHz	2.30499 GHz	-63.53 dBm	-50.53 dB
2.305 GHz	2.320 GHz	1.000 MHz	2.31428 GHz	17.61 dBm	-7.39 dB
2.320 GHz	2.321 GHz	100.000 kHz	2.32050 GHz	-63.04 dBm	-38.04 dB
2.321 GHz	2.324 GHz	1.000 MHz	2.32324 GHz	-45.32 dBm	-20.32 dB
2.324 GHz	2.328 GHz	1.000 MHz	2.32406 GHz	-50.54 dBm	-19.54 dB
2.328 GHz	2.337 GHz	1.000 MHz	2.32804 GHz	-54.63 dBm	-17.63 dB
2.337 GHz	2.341 GHz	1.000 MHz	2.34078 GHz	-55.21 dBm	-24.21 dB
2.341 GHz	2.345 GHz	1.000 MHz	2.34447 GHz	-55.38 dBm	-30.38 dB
2.345 GHz	2.360 GHz	1.000 MHz	2.35651 GHz	-54.83 dBm	-41.83 dB
2.360 GHz	2.395 GHz	1.000 MHz	2.36225 GHz	-55.02 dBm	-15.02 dB

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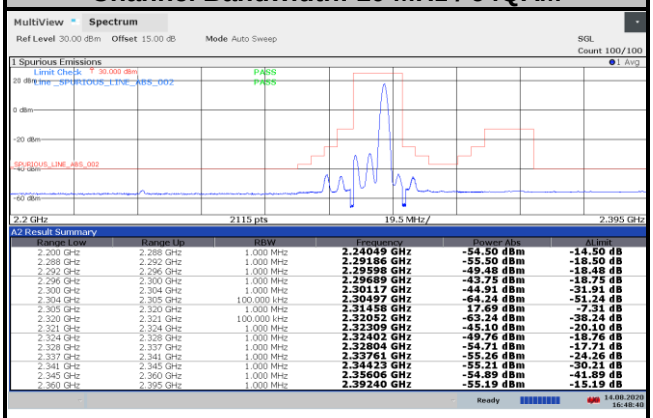
Channel Bandwidth: 10 MHz / 64QAM



Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	2.24049 GHz	-54.50 dBm	-14.50 dB
2.288 GHz	2.292 GHz	1.000 MHz	2.29186 GHz	-55.50 dBm	-18.50 dB
2.292 GHz	2.296 GHz	1.000 MHz	2.29598 GHz	-49.48 dBm	-18.48 dB
2.296 GHz	2.300 GHz	1.000 MHz	2.29689 GHz	-43.75 dBm	-18.75 dB
2.300 GHz	2.304 GHz	1.000 MHz	2.30117 GHz	-44.91 dBm	-31.91 dB
2.304 GHz	2.305 GHz	100.000 kHz	2.30497 GHz	-64.24 dBm	-51.24 dB
2.305 GHz	2.320 GHz	1.000 MHz	2.31458 GHz	17.69 dBm	-7.31 dB
2.320 GHz	2.321 GHz	100.000 kHz	2.32052 GHz	-63.24 dBm	-38.24 dB
2.321 GHz	2.324 GHz	1.000 MHz	2.32309 GHz	-45.10 dBm	-20.10 dB
2.324 GHz	2.328 GHz	1.000 MHz	2.32402 GHz	-49.76 dBm	-18.76 dB
2.328 GHz	2.337 GHz	1.000 MHz	2.32804 GHz	-54.71 dBm	-17.71 dB
2.337 GHz	2.341 GHz	1.000 MHz	2.33761 GHz	-55.26 dBm	-24.26 dB
2.341 GHz	2.345 GHz	1.000 MHz	2.34423 GHz	-55.21 dBm	-30.21 dB
2.345 GHz	2.360 GHz	1.000 MHz	2.35606 GHz	-54.89 dBm	-41.89 dB
2.360 GHz	2.395 GHz	1.000 MHz	2.39240 GHz	-55.19 dBm	-15.19 dB

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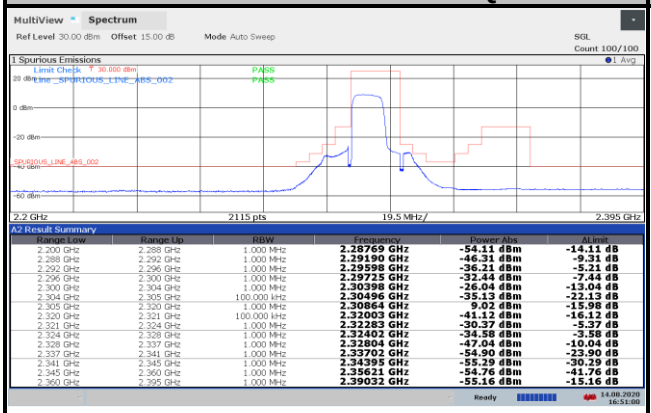
LTE Band 30		
Channel	**27710**	**50 RB**

Channel Bandwidth: 10 MHz / QPSK



A2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	**2.28769 GHz**	**-54.11 dBm**	**-14.11 dB**
2.288 GHz	2.292 GHz	1.000 MHz	**2.29190 GHz**	**-46.31 dBm**	**-9.31 dB**
2.292 GHz	2.296 GHz	1.000 MHz	**2.29598 GHz**	**-36.21 dBm**	**-5.21 dB**
2.296 GHz	2.300 GHz	1.000 MHz	**2.29725 GHz**	**-32.44 dBm**	**-7.44 dB**
2.300 GHz	2.304 GHz	1.000 MHz	**2.30398 GHz**	**-26.04 dBm**	**-13.04 dB**
2.304 GHz	2.305 GHz	100.000 kHz	**2.30496 GHz**	**-35.13 dBm**	**-22.13 dB**
2.305 GHz	2.320 GHz	1.000 MHz	**2.30864 GHz**	**9.02 dBm**	**-15.98 dB**
2.320 GHz	2.321 GHz	100.000 kHz	**2.32003 GHz**	**-41.12 dBm**	**-16.12 dB**
2.321 GHz	2.324 GHz	1.000 MHz	**2.32283 GHz**	**-30.37 dBm**	**-5.37 dB**
2.324 GHz	2.328 GHz	1.000 MHz	**2.32402 GHz**	**-34.58 dBm**	**-3.58 dB**
2.328 GHz	2.337 GHz	1.000 MHz	**2.32804 GHz**	**-47.04 dBm**	**-10.04 dB**
2.337 GHz	2.341 GHz	1.000 MHz	**2.33702 GHz**	**-54.90 dBm**	**-23.90 dB**
2.341 GHz	2.345 GHz	1.000 MHz	**2.34395 GHz**	**-55.29 dBm**	**-30.29 dB**
2.345 GHz	2.360 GHz	1.000 MHz	**2.35621 GHz**	**-54.76 dBm**	**-41.76 dB**
2.360 GHz	2.395 GHz	1.000 MHz	**2.39032 GHz**	**-55.16 dBm**	**-15.16 dB**

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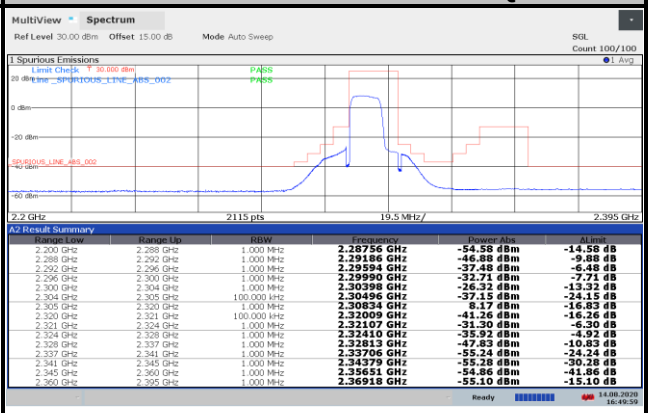
Channel Bandwidth: 10 MHz / 16QAM



A2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	**2.28756 GHz**	**-54.58 dBm**	**-14.58 dB**
2.288 GHz	2.292 GHz	1.000 MHz	**2.29186 GHz**	**-46.88 dBm**	**-9.88 dB**
2.292 GHz	2.296 GHz	1.000 MHz	**2.29594 GHz**	**-37.48 dBm**	**-6.48 dB**
2.296 GHz	2.300 GHz	1.000 MHz	**2.29990 GHz**	**-32.71 dBm**	**-7.71 dB**
2.300 GHz	2.304 GHz	1.000 MHz	**2.30398 GHz**	**-26.32 dBm**	**-13.32 dB**
2.304 GHz	2.305 GHz	100.000 kHz	**2.30496 GHz**	**-37.15 dBm**	**-24.15 dB**
2.305 GHz	2.320 GHz	1.000 MHz	**2.30834 GHz**	**8.17 dBm**	**-16.83 dB**
2.320 GHz	2.321 GHz	100.000 kHz	**2.32009 GHz**	**-41.26 dBm**	**-16.26 dB**
2.321 GHz	2.324 GHz	1.000 MHz	**2.32107 GHz**	**-31.30 dBm**	**-6.30 dB**
2.324 GHz	2.328 GHz	1.000 MHz	**2.32410 GHz**	**-35.92 dBm**	**-4.92 dB**
2.328 GHz	2.337 GHz	1.000 MHz	**2.32813 GHz**	**-47.83 dBm**	**-10.83 dB**
2.337 GHz	2.341 GHz	1.000 MHz	**2.33706 GHz**	**-55.24 dBm**	**-24.24 dB**
2.341 GHz	2.345 GHz	1.000 MHz	**2.34379 GHz**	**-55.28 dBm**	**-30.28 dB**
2.345 GHz	2.360 GHz	1.000 MHz	**2.35651 GHz**	**-54.86 dBm**	**-41.86 dB**
2.360 GHz	2.395 GHz	1.000 MHz	**2.36918 GHz**	**-55.10 dBm**	**-15.10 dB**

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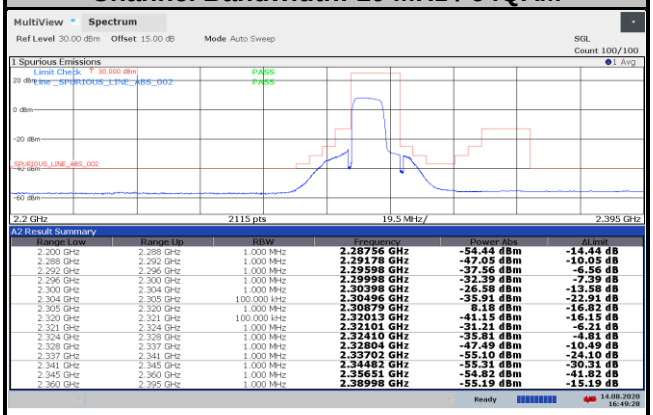
Channel Bandwidth: 10 MHz / 64QAM



A2 Result Summary

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.288 GHz	1.000 MHz	**2.28756 GHz**	**-54.44 dBm**	**-14.44 dB**
2.288 GHz	2.292 GHz	1.000 MHz	**2.29178 GHz**	**-47.05 dBm**	**-10.05 dB**
2.292 GHz	2.296 GHz	1.000 MHz	**2.29598 GHz**	**-37.56 dBm**	**-6.56 dB**
2.296 GHz	2.300 GHz	1.000 MHz	**2.29998 GHz**	**-32.39 dBm**	**-7.39 dB**
2.300 GHz	2.304 GHz	1.000 MHz	**2.30398 GHz**	**-26.58 dBm**	**-13.58 dB**
2.304 GHz	2.305 GHz	100.000 kHz	**2.30496 GHz**	**-35.91 dBm**	**-22.91 dB**
2.305 GHz	2.320 GHz	1.000 MHz	**2.30879 GHz**	**8.18 dBm**	**-16.82 dB**
2.320 GHz	2.321 GHz	100.000 kHz	**2.32013 GHz**	**-41.15 dBm**	**-16.15 dB**
2.321 GHz	2.324 GHz	1.000 MHz	**2.32101 GHz**	**-31.21 dBm**	**-6.21 dB**
2.324 GHz	2.328 GHz	1.000 MHz	**2.32410 GHz**	**-35.81 dBm**	**-4.81 dB**
2.328 GHz	2.337 GHz	1.000 MHz	**2.32804 GHz**	**-47.49 dBm**	**-10.49 dB**
2.337 GHz	2.341 GHz	1.000 MHz	**2.33702 GHz**	**-55.10 dBm**	**-24.10 dB**
2.341 GHz	2.345 GHz	1.000 MHz	**2.34482 GHz**	**-55.31 dBm**	**-30.31 dB**
2.345 GHz	2.360 GHz	1.000 MHz	**2.35651 GHz**	**-54.82 dBm**	**-41.82 dB**
2.360 GHz	2.395 GHz	1.000 MHz	**2.38998 GHz**	**-55.19 dBm**	**-15.19 dB**

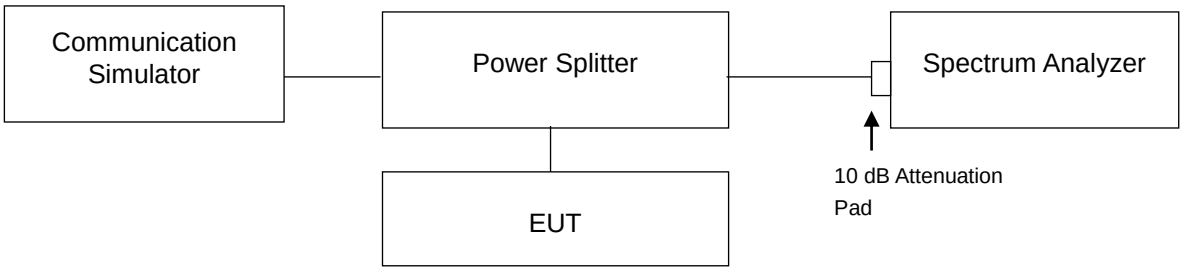
16:49:28 14.08.2020

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.

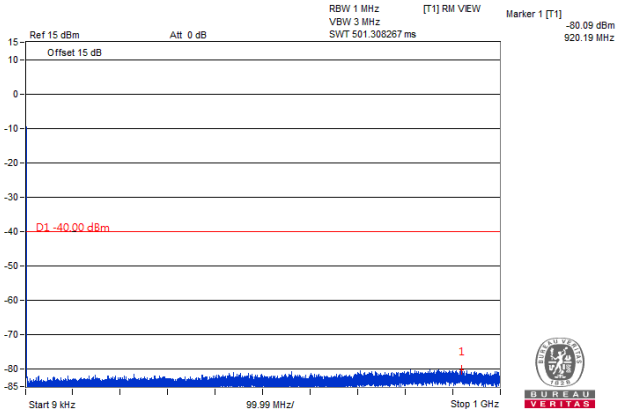
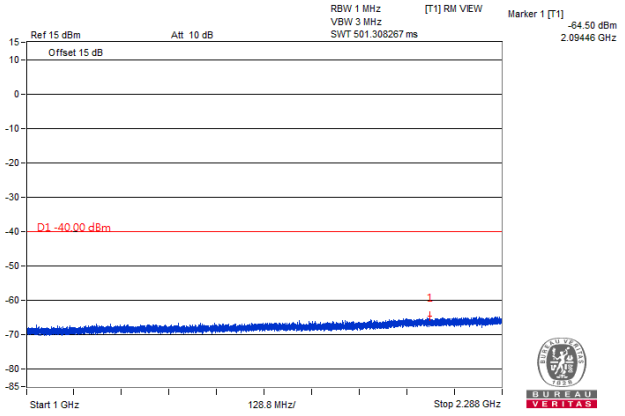
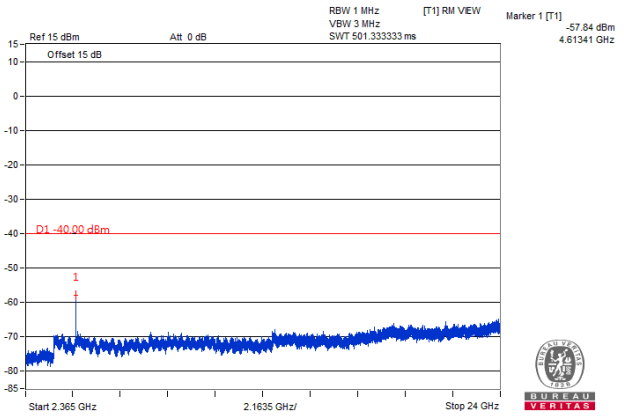
4.6.2 Test Setup



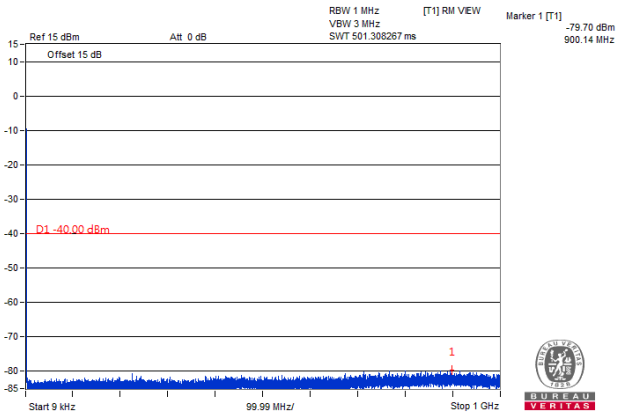
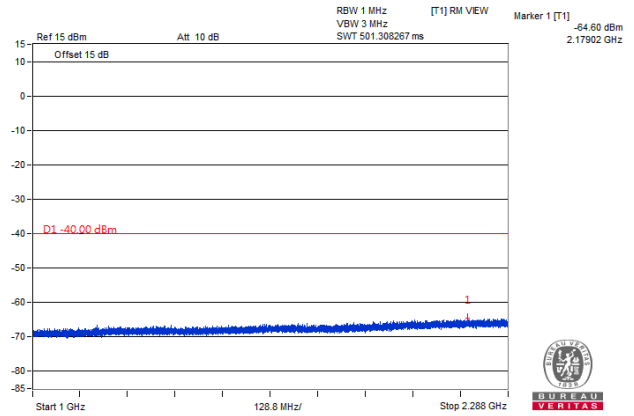
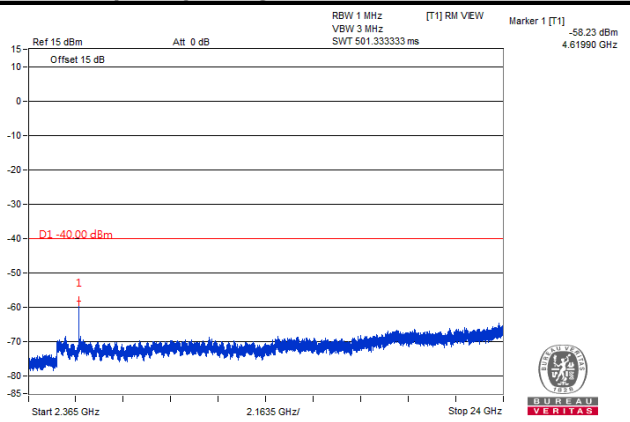
4.6.3 Test Procedure

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.

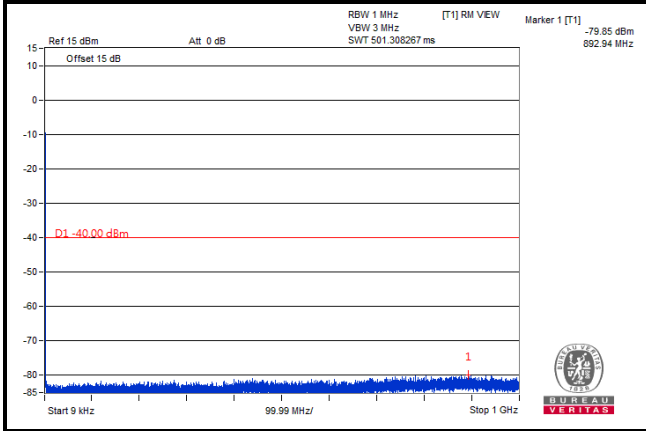
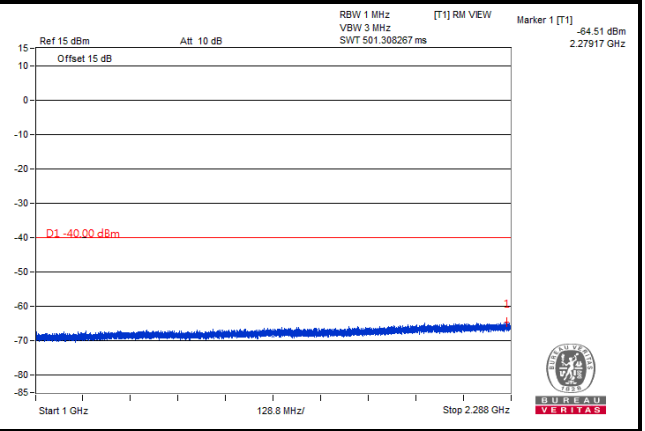
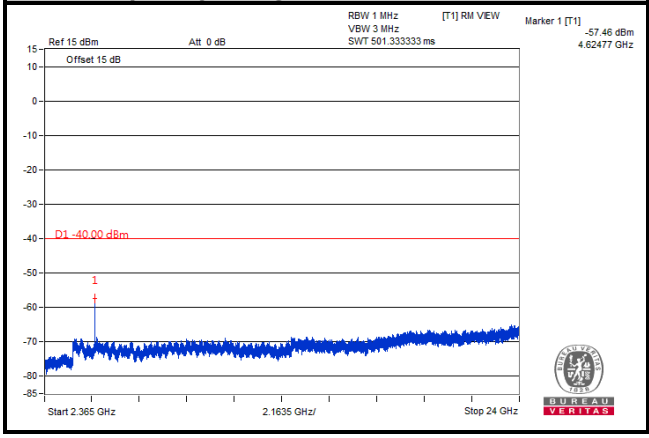
4.6.4 Test Results

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	
	

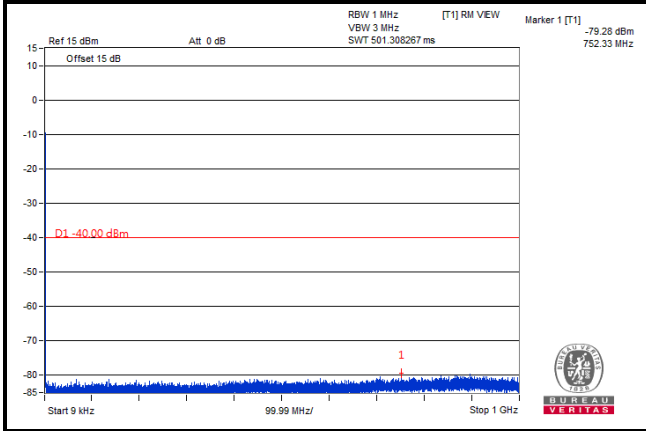
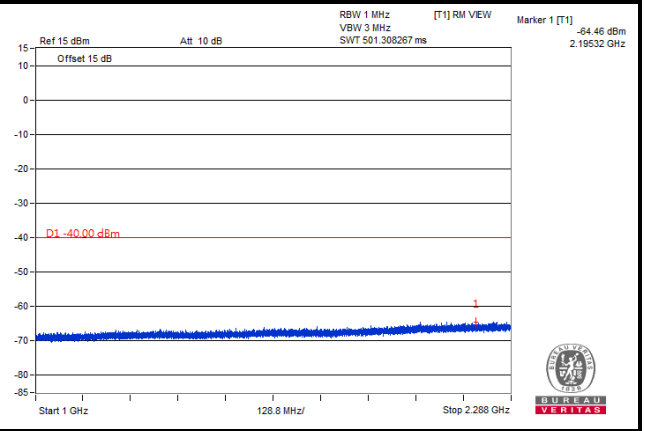
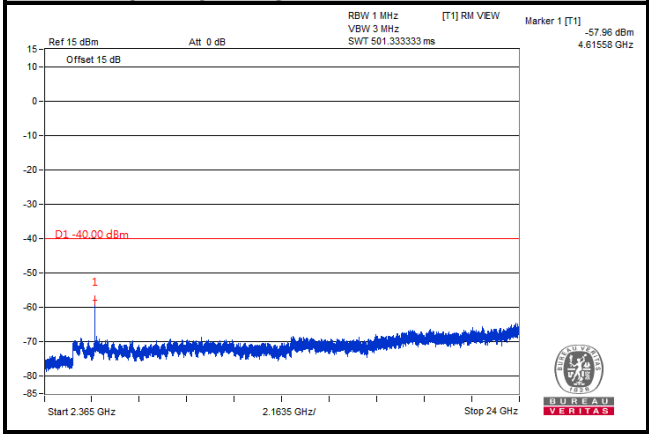
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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.
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:

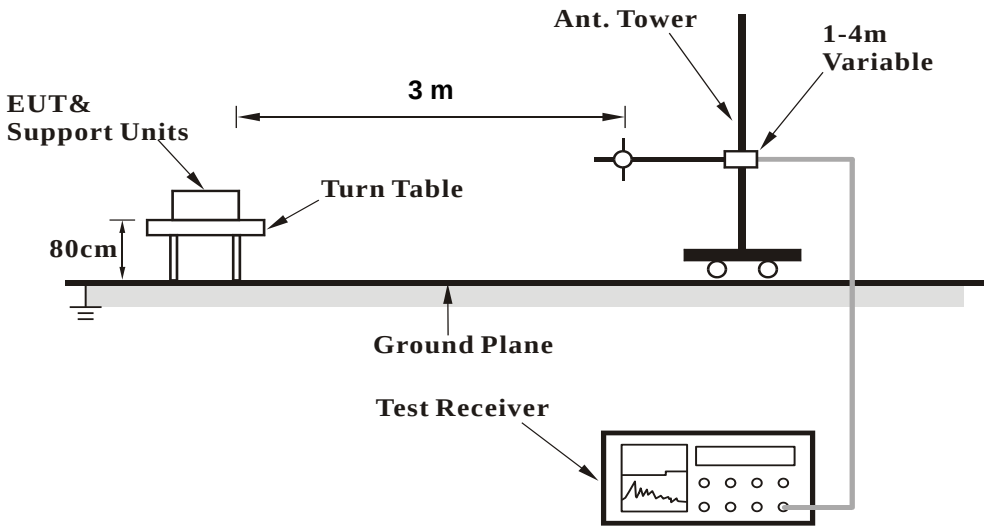
1. The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.7.3 Deviation from Test Standard

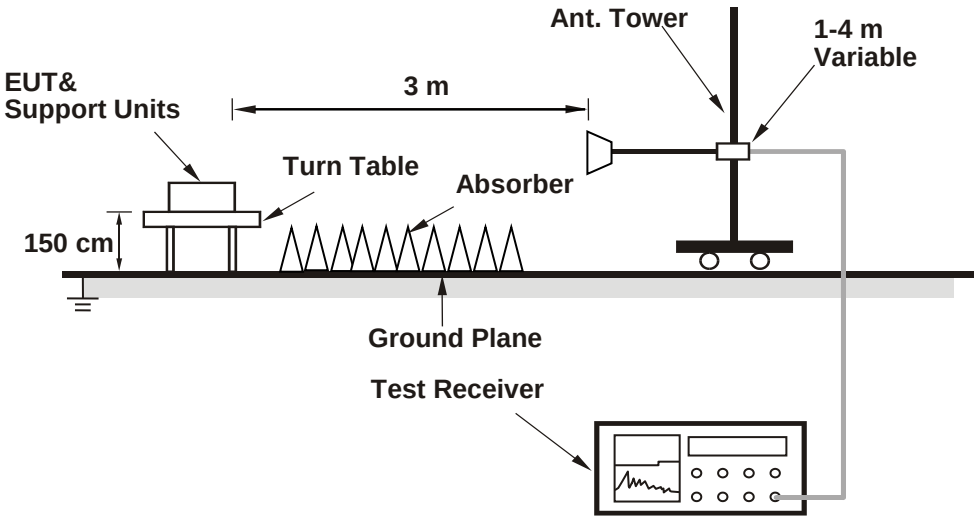
No deviation.

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).

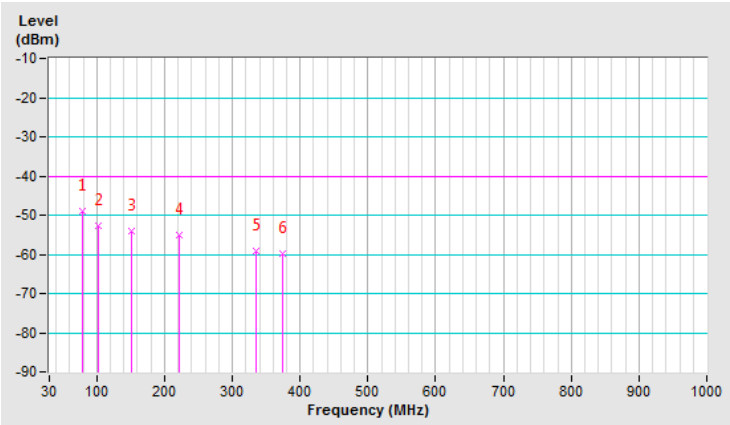
4.7.5 Test Results

Below 1GHz
LTE Band 30, Channel Bandwidth: 10MHz

Mode	TX channel 27710 (2310.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Luis Lee		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	78.50	-41.20	-46.90	-2.20	-49.10	-40.00	-9.10
2	101.78	-43.00	-53.60	0.80	-52.80	-40.00	-12.80
3	152.22	-47.50	-54.00	0.00	-54.00	-40.00	-14.00
4	222.06	-44.60	-60.40	5.40	-55.00	-40.00	-15.00
5	334.58	-53.60	-64.40	5.20	-59.20	-40.00	-19.20
6	373.38	-55.60	-65.00	5.30	-59.70	-40.00	-19.70

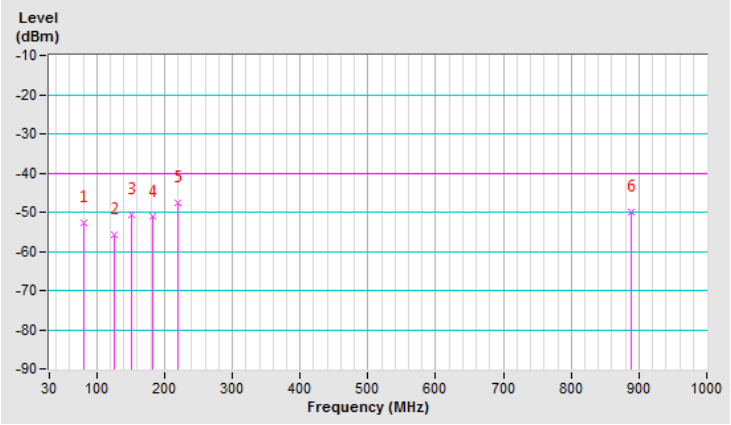
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) - Cable Loss (dB).



Mode	TX channel 27710 (2310.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Luis Lee		

Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	80.44	-47.00	-51.20	-1.60	-52.80	-40.00	-12.80
2	125.06	-47.90	-55.70	0.00	-55.70	-40.00	-15.70
3	152.22	-47.30	-50.80	0.00	-50.80	-40.00	-10.80
4	183.26	-47.20	-54.50	3.30	-51.20	-40.00	-11.20
5	220.12	-45.10	-53.00	5.40	-47.60	-40.00	-7.60
6	889.42	-54.50	-53.80	3.90	-49.90	-40.00	-9.90

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) - Cable Loss (dB).



Above 1GHz

LTE Band 30, Channel Bandwidth: 5MHz

Mode	TX channel 27685 (2307.5MHz)	Frequency Range	1GHz ~ 25GHz
Environmental Conditions	23deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Adair Peng		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4615.00	-60.30	-51.00	6.70	-44.30	-40.00	-4.30
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4615.00	-61.20	-53.40	6.70	-46.70	-40.00	-6.70

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) - Cable Loss (dB).

Mode	TX channel 27710 (2310.0MHz)	Frequency Range	1GHz ~ 25GHz
Environmental Conditions	23deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Adair Peng		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4620.00	-60.40	-51.00	6.70	-44.30	-40.00	-4.30
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4620.00	-61.00	-53.10	6.70	-46.40	-40.00	-6.40

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) - Cable Loss (dB).

Mode	TX channel 27735 (2312.5MHz)	Frequency Range	1GHz ~ 25GHz
Environmental Conditions	23deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Adair Peng		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4625.00	-60.00	-50.50	6.70	-43.80	-40.00	-3.80
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4625.00	-60.80	-52.80	6.70	-46.10	-40.00	-6.10

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) - Cable Loss (dB).

LTE Band 30, Channel Bandwidth: 10MHz

Mode	TX channel 27710 (2310.0MHz)	Frequency Range	1GHz ~ 25GHz
Environmental Conditions	23deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Adair Peng		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	**4620.00**	**-59.40**	**-50.00**	**6.70**	**-43.30**	**-40.00**	**-3.30**
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	4620.00	-60.20	-52.30	6.70	-45.60	-40.00	-5.60

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) - Cable Loss (dB).

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.

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

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