FCC Test Report

(PART 27)

Report No.: RF200605C24-9 R1

FCC ID: V65E7110

Test Model: E7110

Received Date: Jun. 29, 2020

Test Date: Jul. 27 ~ Aug. 11, 2020

Issued Date: Nov. 17, 2020

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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FCC Registration / Designation Number: 788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RF200605C24-9	Original Release	Oct. 16, 2020
RF200605C24-9 R1	Revise applicant and accessory information	Nov. 17, 2020

1 Certificate of Conformity

Product: Smart Phone

Brand: Kyocera

Test Model: E7110

Sample Status: Identical Prototype

Applicant: Kyocera Corporation ％ Kyocera International, Inc.

Test Date: Jul. 27 ~ Aug. 11, 2020

Standards: FCC Part 27, Subpart C, M

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Nov. 17, 2020

Gina Liu / Specialist

Approved by : _____ , **Date:** Nov. 17, 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(h)(2)	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(m)(6)	Occupied Bandwidth	Pass	Meet the requirement of limit.
--	Peak to Average Ratio	Pass	Meet the requirement of limit.
27.53(m)(4)(6)	Out-of-Band Emissions Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(m)(4)(6)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -22.30 dB at 5070.00 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	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. 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
BILOG Antenna SCHWARZBECK	VULB9168	9168-161	Nov. 08, 2019	Nov. 07, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 20, 2019	Aug. 19, 2020
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
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-SM- 8000	Cable-CH3-03 (309224+170907)	Aug. 20, 2019	Aug. 19, 2020
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
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.

2.3 General Information

2.4 General Description of EUT

Product	Smart Phone	
Brand	Kyocera	
Test Model	E7110	
Status of EUT	Identical Prototype	
Power Supply Rating	3.85 Vdc (Battery) 5 Vdc / 9 Vdc / 12 Vdc (Adapter)	
Modulation Type	QPSK, 16QAM, 64QAM	
Frequency Range	LTE Band 7 (Channel Bandwidth: 5 MHz)	2502.5 ~ 2567.5 MHz
	LTE Band 7 (Channel Bandwidth: 10 MHz)	2505 ~ 2565 MHz
	LTE Band 7 (Channel Bandwidth: 15 MHz)	2507.5 ~ 2562.5 MHz
	LTE Band 7 (Channel Bandwidth: 20 MHz)	2510 ~ 2560 MHz
Max. EIRP Power	LTE Band 7 (Channel Bandwidth: 5 MHz)	245.471 mW (23.9 dBm)
	LTE Band 7 (Channel Bandwidth: 10 MHz)	234.423 mW (23.7 dBm)
	LTE Band 7 (Channel Bandwidth: 15 MHz)	245.471 mW (23.9 dBm)
	LTE Band 7 (Channel Bandwidth: 20 MHz)	263.027 mW (24.2 dBm)
Emission Designator	LTE Band 7 (Channel Bandwidth: 5 MHz)	4M49D7W
	LTE Band 7 (Channel Bandwidth: 10 MHz)	8M95D7W
	LTE Band 7 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 7 (Channel Bandwidth: 20 MHz)	18M0D7W
Antenna Type	Monopole Antenna with -0.7 dBi gain	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

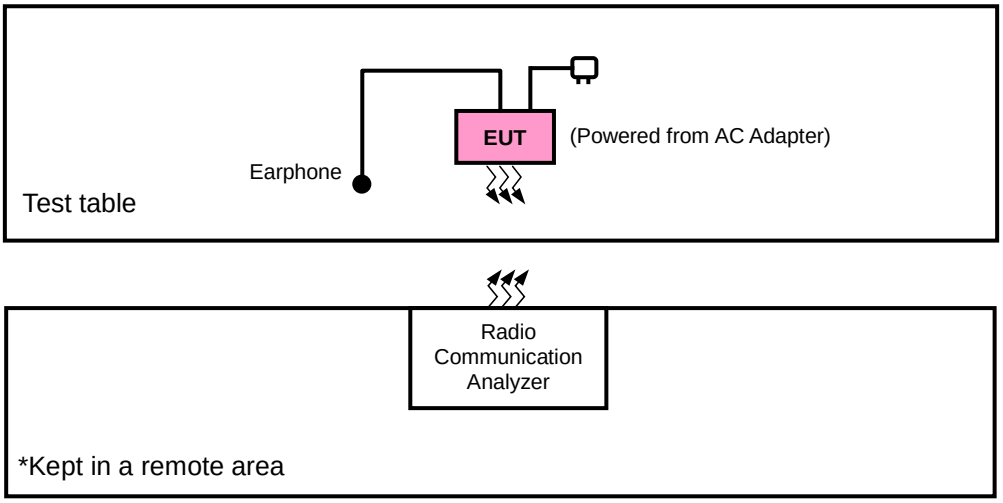
Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	Kyocera	SCP-53ADT	I/P: 100-240 Vac, 50/60 Hz, 0.6 A O/P: 5 Vdc, 3 A; 9 Vdc, 3 A; 15 Vdc, 1.8 A; 20 Vdc, 1.35 A
USB Cable	Kyocera	SCP-27SDC	-

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.

2.5 Configuration of System under Test



2.5.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

2.6 Test Mode Applicability and Tested Channel Detail

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

Band	EIRP	Radiated Emission
LTE Band 7	X-plane	X-plane

LTE Band 7

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	20800 to 21400	21100	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
-	Frequency Stability	20775 to 21425	20775, 21425	5 MHz	QPSK	25 RB / 0 RB Offset
		20800 to 21400	20800, 21400	10 MHz	QPSK	50 RB / 0 RB Offset
		20825 to 21375	20825, 21375	15 MHz	QPSK	75 RB / 0 RB Offset
		20850 to 21350	20850, 21350	20 MHz	QPSK	100 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Occupied Bandwidth	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Out-of-Band Emissions	20775 to 21425	20775, 21425	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		20800 to 21400	20800, 21400	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
		20825 to 21375	20825, 21375	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset 1 RB / 74 RB Offset 75 RB / 0 RB Offset
		20850 to 21350	20850, 21350	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset 1 RB / 99 RB Offset 100 RB / 0 RB Offset
-	Conducted Emission	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK	1 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100 21350	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20 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, out-of-band emissions and peak to average ratio 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	Noah Chang
Modulation Characteristics	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin
Frequency Stability	25 deg. C, 65 % RH	3.85Vdc	Wayne Lin
Occupied Bandwidth	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin
Out-of-Band Emissions	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin
Peak to Average Ratio	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin
Conducted Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Noah Chang, Titan Hsu

2.7 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

2.1 General Description of Applied Standards and references

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

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

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

References Test Guidance:
KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA/EIA-603-E 2016
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.

3 Test Types and Results

3.1 Output Power Measurement

3.1.1 Limits of Output Power Measurement

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2 watts transmitter output power” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

3.1.2 Test Procedures

EIRP Measurement:

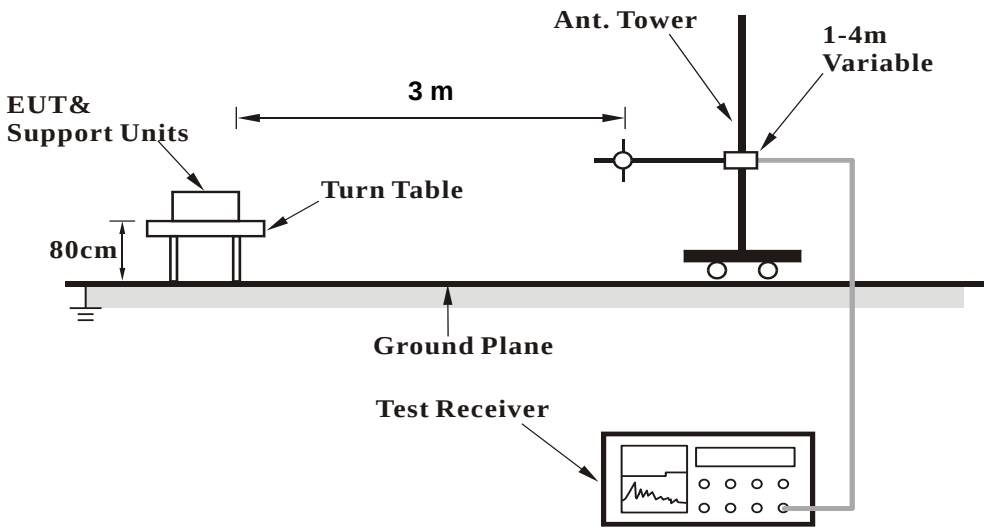
a. All measurements were done at low, middle and high operational frequency range. RBW is 5 MHz、10 MHz、15 MHz、20 MHz for LTE mode, VBW ≥ 3 x RBW.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 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:

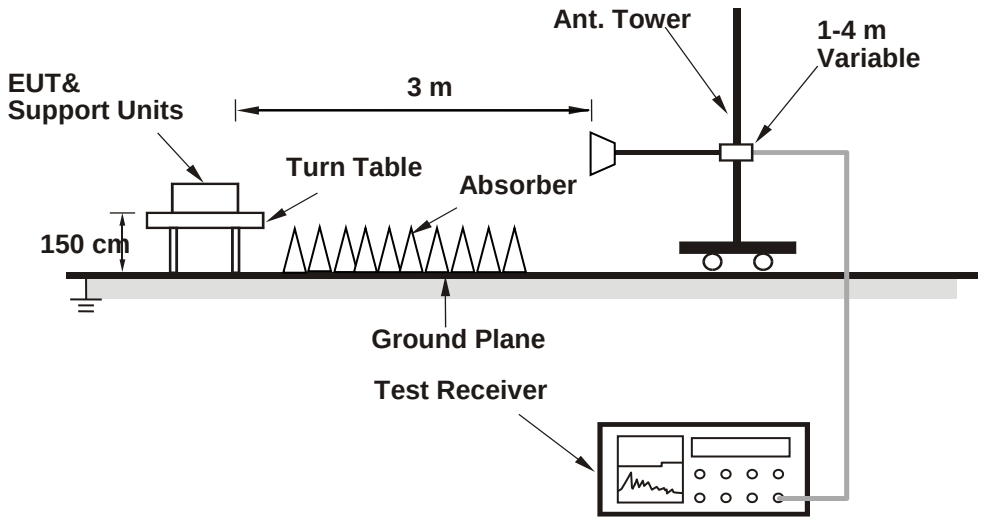
a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.1.3 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:

3.1.4 Test Results

Conducted Output Power (dBm)

LTE Band 7															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20850	21100	21350				Channel		20825	21100	21375	
		Frequency (MHz)		2510.0	2535.0	2560.0				Frequency (MHz)		2507.5	2535.0	2562.5	
20M	QPSK	1	0	24.19	24.15	24.13	0	15M	QPSK	1	0	24.16	24.05	24.13	0
		1	50	24.15	24.09	24.04	0			1	37	24.14	24.01	24.12	0
		1	99	24.08	24.14	24.08	0			1	74	23.98	24.14	24.01	0
		50	0	23.20	23.14	23.13	1			36	0	23.12	23.11	23.04	1
		50	25	23.18	23.18	23.12	1			36	19	23.15	23.11	23.12	1
		50	50	23.11	23.04	23.00	1			36	39	23.06	23.03	22.98	1
		100	0	23.17	23.14	23.13	1			75	0	23.15	23.05	23.03	1
	16QAM	1	0	23.19	23.11	23.12	1		16QAM	1	0	23.05	23.10	23.07	1
		1	50	23.12	23.08	23.14	1			1	37	23.03	22.99	23.08	1
		1	99	23.03	23.09	23.04	1			1	74	22.95	23.03	23.00	1
		50	0	22.19	22.12	22.05	2			36	0	22.06	22.01	21.99	2
		50	25	22.13	22.09	22.10	2			36	19	22.07	21.99	22.08	2
		50	50	22.02	21.97	21.93	2			36	39	22.07	21.89	21.96	2
		100	0	22.10	22.13	22.08	2			75	0	22.12	22.06	21.99	2
	64QAM	1	0	22.14	22.09	22.06	2		64QAM	1	0	22.16	22.06	22.09	2
		1	50	22.15	22.03	22.05	2			1	37	22.07	21.94	21.98	2
		1	99	22.00	22.11	22.04	2			1	74	22.00	21.99	22.00	2
		50	0	21.14	21.06	21.10	3			36	0	21.03	20.96	21.05	3
		50	25	21.10	21.16	21.06	3			36	19	21.00	21.09	21.02	3
		50	50	21.10	20.94	20.98	3			36	39	21.01	20.90	20.86	3
		100	0	21.14	21.10	21.11	3			75	0	21.11	20.99	21.07	3
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
		Channel		20800	21100	21400				Channel		20775	21100	21425	
		Frequency (MHz)		2505.0	2535.0	2565.0				Frequency (MHz)		2502.5	2535.0	2567.5	
10M	QPSK	1	0	24.13	24.07	23.99	0	5M	QPSK	1	0	24.02	24.00	23.97	0
		1	24	24.05	23.93	24.00	0			1	12	24.10	24.04	23.89	0
		1	49	23.84	24.04	23.95	0			1	24	23.99	23.93	23.86	0
		25	0	23.00	23.02	22.96	1			12	0	23.12	23.12	22.91	1
		25	12	23.09	23.08	22.97	1			12	6	23.07	23.07	22.87	1
		25	25	23.04	22.97	22.86	1			12	13	23.02	22.93	22.84	1
		50	0	22.96	22.95	23.02	1			25	0	23.02	22.99	23.00	1
	16QAM	1	0	22.97	22.92	22.88	1		16QAM	1	0	23.12	23.00	23.07	1
		1	24	22.95	22.87	22.92	1			1	12	22.84	22.86	22.91	1
		1	49	22.90	22.96	22.93	1			1	24	22.82	22.96	22.84	1
		25	0	21.97	21.93	21.96	2			12	0	22.03	21.98	21.93	2
		25	12	22.08	21.94	21.92	2			12	6	22.04	21.94	21.87	2
		25	25	22.00	21.82	21.75	2			12	13	21.88	21.94	21.85	2
		50	0	21.97	22.05	21.91	2			25	0	22.00	21.93	22.05	2
	64QAM	1	0	21.90	22.03	21.95	2		64QAM	1	0	22.07	22.01	22.02	2
		1	24	21.93	21.94	21.95	2			1	12	22.00	21.89	22.00	2
		1	49	21.96	21.91	21.87	2			1	24	21.88	21.99	21.90	2
		25	0	21.01	20.90	20.95	3			12	0	20.98	21.02	20.94	3
		25	12	20.97	21.07	20.92	3			12	6	21.05	21.06	20.85	3
		25	25	20.87	20.96	20.82	3			12	13	20.93	20.78	20.84	3
		50	0	20.90	20.93	20.99	3			25	0	20.96	20.80	20.87	3

EIRP Power (dBm)

Modulation Type: QPSK

LTE Band 7, Channel Bandwidth: 5MHz

MODE	TX channel 20775, 21100, 21425						
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	2502.5	-19.4	23.1	0.7	23.8	33.0	-9.2
2	2535.0	-20.0	22.6	0.7	23.3	33.0	-9.7
3	2567.5	-19.5	23.1	0.8	23.9	33.0	-9.1
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	2502.5	-24.8	17.8	0.7	18.5	33.0	-14.5
2	2535.0	-24.7	18.2	0.7	18.9	33.0	-14.1
3	2567.5	-25.0	18.0	0.8	18.8	33.0	-14.2

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

LTE Band 7, Channel Bandwidth: 10MHz

MODE	TX channel 20800, 21100, 21400						
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	2505.0	-19.5	23.0	0.7	23.7	33.0	-9.3
2	2535.0	-19.9	22.7	0.7	23.4	33.0	-9.6
3	2565.0	-19.9	22.7	0.8	23.5	33.0	-9.5
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	2505.0	-24.9	17.7	0.7	18.4	33.0	-14.6
2	2535.0	-25.1	17.8	0.7	18.5	33.0	-14.5
3	2565.0	-25.0	18.0	0.8	18.8	33.0	-14.2

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

LTE Band 7, Channel Bandwidth: 15MHz

MODE	TX channel 20825, 21100, 21375						
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	2507.5	-19.9	22.6	0.7	23.3	33.0	-9.7
2	2535.0	-19.5	23.1	0.7	23.8	33.0	-9.2
3	2562.5	-19.5	23.1	0.8	23.9	33.0	-9.1
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	2507.5	-25.1	17.5	0.7	18.2	33.0	-14.8
2	2535.0	-25.1	17.8	0.7	18.5	33.0	-14.5
3	2562.5	-25.4	17.6	0.8	18.4	33.0	-14.6

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

LTE Band 7, Channel Bandwidth: 20MHz

MODE	TX channel 20850, 21100, 21350						
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	2510.0	-20.0	22.5	0.7	23.2	33.0	-9.8
2	2535.0	-19.7	22.9	0.7	23.6	33.0	-9.4
3	2560.0	-19.1	23.4	0.8	24.2	33.0	-8.8
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	2510.0	-25.0	17.7	0.7	18.4	33.0	-14.6
2	2535.0	-25.0	17.9	0.7	18.6	33.0	-14.4
3	2560.0	-25.7	17.3	0.8	18.1	33.0	-14.9

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

Modulation Type: 16QAM

LTE Band 7, Channel Bandwidth: 5MHz

MODE		TX channel 20775, 21100, 21425					
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	2502.5	-20.3	22.2	0.7	22.9	33.0	-10.1
2	2535.0	-20.9	21.7	0.7	22.4	33.0	-10.6
3	2567.5	-20.7	21.9	0.8	22.7	33.0	-10.3
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	2502.5	-25.7	16.9	0.7	17.6	33.0	-15.4
2	2535.0	-25.6	17.3	0.7	18.0	33.0	-15.0
3	2567.5	-26.0	17.0	0.8	17.8	33.0	-15.2

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

LTE Band 7, Channel Bandwidth: 10MHz

MODE		TX channel 20800, 21100, 21400					
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	2505.0	-20.5	22.0	0.7	22.7	33.0	-10.3
2	2535.0	-20.8	21.8	0.7	22.5	33.0	-10.5
3	2565.0	-20.7	21.9	0.8	22.7	33.0	-10.3
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	2505.0	-25.8	16.8	0.7	17.5	33.0	-15.5
2	2535.0	-26.2	16.7	0.7	17.4	33.0	-15.6
3	2565.0	-26.0	17.0	0.8	17.8	33.0	-15.2

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

LTE Band 7, Channel Bandwidth: 15MHz

MODE	TX channel 20825, 21100, 21375						
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	2507.5	-20.8	21.7	0.7	22.4	33.0	-10.6
2	2535.0	-20.6	22.0	0.7	22.7	33.0	-10.3
3	2562.5	-20.5	22.1	0.8	22.9	33.0	-10.1
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	2507.5	-26.2	16.4	0.7	17.1	33.0	-15.9
2	2535.0	-26.1	16.8	0.7	17.5	33.0	-15.5
3	2562.5	-26.4	16.6	0.8	17.4	33.0	-15.6

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

LTE Band 7, Channel Bandwidth: 20MHz

MODE	TX channel 20850, 21100, 21350						
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	2510.0	-21.0	21.5	0.7	22.2	33.0	-10.8
2	2535.0	-20.8	21.8	0.7	22.5	33.0	-10.5
3	2560.0	-20.5	22.0	0.8	22.8	33.0	-10.2
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	2510.0	-25.8	16.9	0.7	17.6	33.0	-15.4
2	2535.0	-26.1	16.8	0.7	17.5	33.0	-15.5
3	2560.0	-26.6	16.4	0.8	17.2	33.0	-15.8

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

Modulation Type: 64QAM

LTE Band 7, Channel Bandwidth: 5MHz

MODE	TX channel 20775, 21100, 21425						
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	2502.5	-21.2	21.3	0.7	22.0	33.0	-11.0
2	2535.0	-21.8	20.8	0.7	21.5	33.0	-11.5
3	2567.5	-21.7	20.9	0.8	21.7	33.0	-11.3
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	2502.5	-26.7	15.9	0.7	16.6	33.0	-16.4
2	2535.0	-26.6	16.3	0.7	17.0	33.0	-16.0
3	2567.5	-26.9	16.1	0.8	16.9	33.0	-16.1

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

LTE Band 7, Channel Bandwidth: 10MHz

MODE	TX channel 20800, 21100, 21400						
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	2505.0	-21.4	21.1	0.7	21.8	33.0	-11.2
2	2535.0	-21.7	20.9	0.7	21.6	33.0	-11.4
3	2565.0	-21.7	20.9	0.8	21.7	33.0	-11.3
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	2505.0	-26.7	15.9	0.7	16.6	33.0	-16.4
2	2535.0	-26.9	16.0	0.7	16.7	33.0	-16.3
3	2565.0	-26.9	16.1	0.8	16.9	33.0	-16.1

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

LTE Band 7, Channel Bandwidth: 15MHz

MODE	TX channel 20825, 21100, 21375						
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	2507.5	-21.6	20.9	0.7	21.6	33.0	-11.4
2	2535.0	-21.6	21.0	0.7	21.7	33.0	-11.3
3	2562.5	-21.7	20.9	0.8	21.7	33.0	-11.3
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	2507.5	-27.1	15.5	0.7	16.2	33.0	-16.8
2	2535.0	-27.1	15.8	0.7	16.5	33.0	-16.5
3	2562.5	-27.5	15.5	0.8	16.3	33.0	-16.7

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

LTE Band 7, Channel Bandwidth: 20MHz

MODE	TX channel 20850, 21100, 21350						
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	2510.0	-21.8	20.7	0.7	21.4	33.0	-11.6
2	2535.0	-22.0	20.6	0.7	21.3	33.0	-11.7
3	2560.0	-21.8	20.7	0.8	21.5	33.0	-11.5
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	2510.0	-26.7	16.0	0.7	16.7	33.0	-16.3
2	2535.0	-27.1	15.8	0.7	16.5	33.0	-16.5
3	2560.0	-27.5	15.5	0.8	16.3	33.0	-16.7

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

3.2 Modulation Characteristics Measurement

3.2.1 Limits of Modulation Characteristics

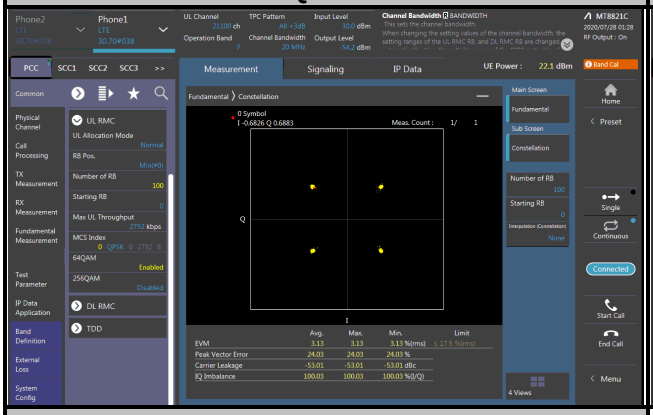
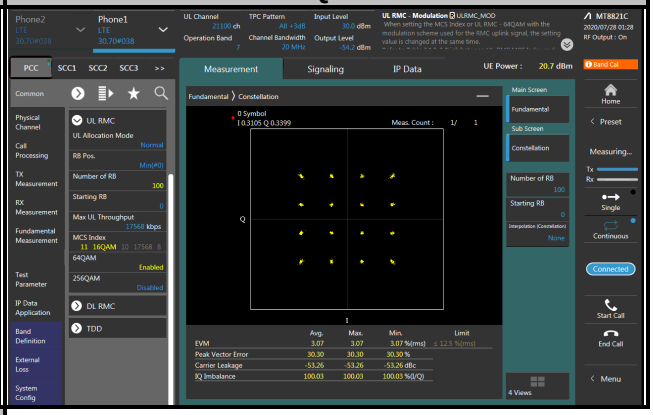
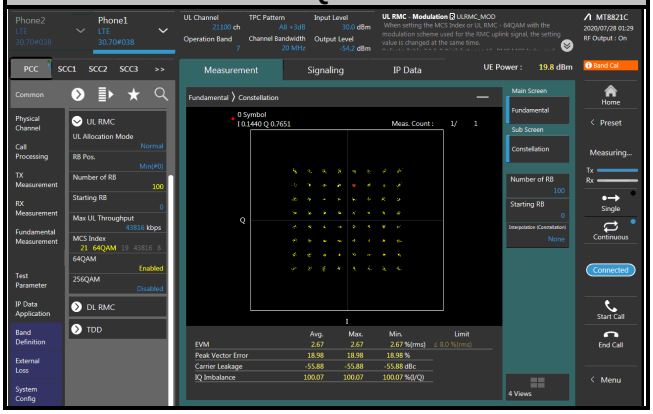
N/A

3.2.2 Test Setup

3.2.3 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.

3.2.4 Test Results

Spectrum Plot of Measurement	
LTE Band 7	
Channel 21100	
QPSK	16QAM
	
64QAM	
	

3.3 Frequency Stability Measurement

3.3.1 Limits of Frequency Stability Measurement

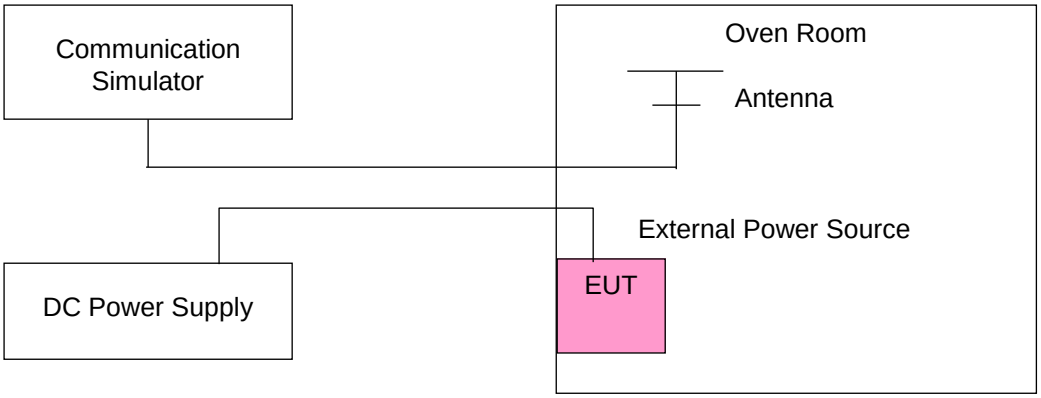
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary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

3.3.2 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.

3.3.3 Test Setup



3.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.8	2502.500002	0.001	2567.499996	-0.001
3.2	2502.500003	0.001	2567.499999	0.000
4.2	2502.500002	0.001	2567.499998	-0.001

Note: The applicant defined the normal working voltage is from 3.2 Vdc to 4.2 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-20	2502.500002	0.001	2567.500002	0.001
-10	2502.499998	-0.001	2567.500004	0.001
0	2502.499998	-0.001	2567.500001	0.001
10	2502.499997	-0.001	2567.500002	0.001
20	2502.499998	-0.001	2567.499999	-0.001
30	2502.499997	-0.001	2567.499996	-0.001
40	2502.499997	-0.001	2567.499997	-0.001
50	2502.499997	-0.001	2567.499999	-0.001
60	2502.499998	-0.001	2567.499997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.8	2505.000002	0.001	2564.999998	-0.001
3.2	2505.000002	0.001	2564.999997	-0.001
4.2	2505.000003	0.001	2564.999997	-0.001

Note: The applicant defined the normal working voltage is from 3.2 Vdc to 4.2 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-20	2505.000002	0.001	2565.000002	0.001
-10	2504.999997	-0.001	2565.000002	0.001
0	2504.999999	-0.001	2565.000001	0.000
10	2504.999996	-0.001	2565.000002	0.001
20	2504.999997	-0.001	2564.999997	-0.001
30	2504.999999	-0.001	2564.999998	-0.001
40	2504.999997	-0.001	2564.999998	-0.001
50	2504.999998	-0.001	2564.999997	-0.001
60	2504.999998	-0.001	2564.999997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.8	2507.500002	0.001	2562.499996	-0.001
3.2	2507.500001	0.001	2562.499999	-0.001
4.2	2507.500003	0.001	2562.499998	-0.001

Note: The applicant defined the normal working voltage is from 3.2 Vdc to 4.2 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-20	2507.500004	0.002	2562.500001	0.001
-10	2507.499997	-0.001	2562.500001	0.000
0	2507.499997	-0.001	2562.500003	0.001
10	2507.499998	-0.001	2562.500004	0.001
20	2507.499999	-0.001	2562.499998	-0.001
30	2507.499996	-0.001	2562.499999	0.000
40	2507.499997	-0.001	2562.499996	-0.001
50	2507.499998	-0.001	2562.499999	0.000
60	2507.499999	0.000	2562.499996	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.8	2510.000002	0.001	2559.999996	-0.001
3.2	2510.000003	0.001	2559.999999	-0.001
4.2	2510.000003	0.001	2559.999998	-0.001

Note: The applicant defined the normal working voltage is from 3.2 Vdc to 4.2 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-20	2510.000004	0.002	2560.000003	0.001
-10	2509.999998	-0.001	2560.000002	0.001
0	2509.999998	-0.001	2560.000001	0.001
10	2509.999997	-0.001	2560.000003	0.001
20	2509.999998	-0.001	2559.999999	0.000
30	2509.999998	-0.001	2559.999997	-0.001
40	2509.999999	0.000	2559.999996	-0.001
50	2509.999998	-0.001	2559.999997	-0.001
60	2509.999998	-0.001	2559.999999	-0.001

3.4 Occupied Bandwidth Measurement

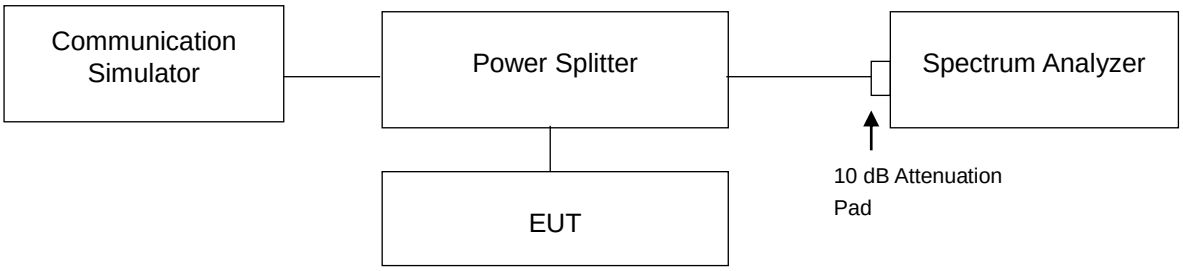
3.4.1 Limits of Occupied Bandwidth Measurement

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.

3.4.2 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.

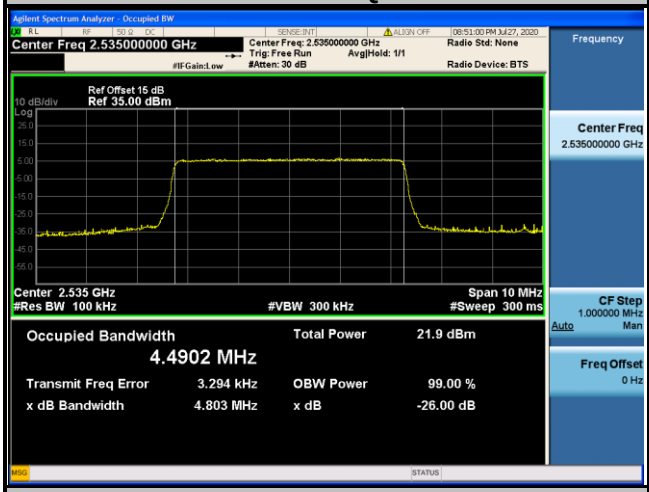
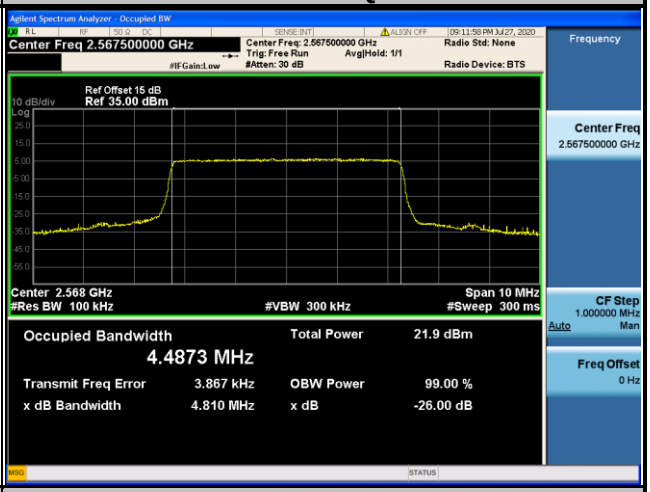
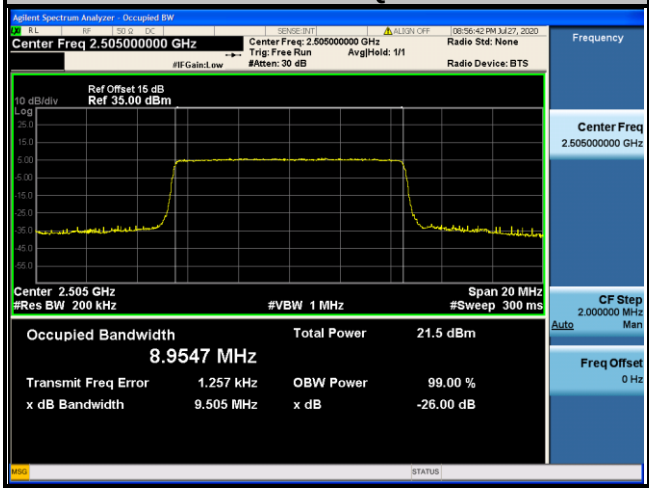
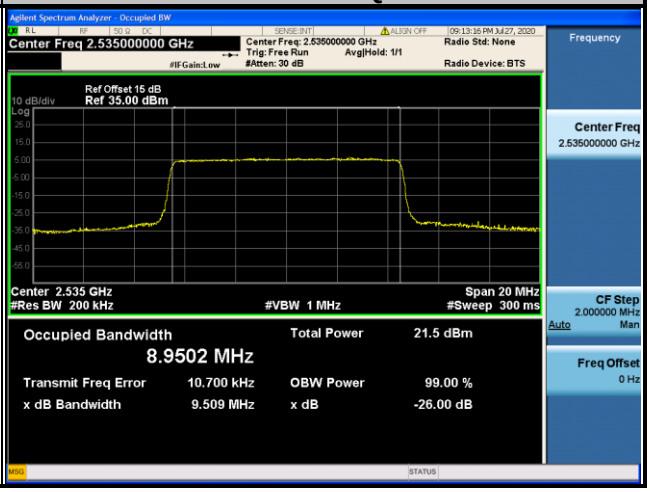
3.4.3 Test Setup



3.4.4 Test Results

LTE Band 7							
Channel Bandwidth: 5 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20775	2502.5	4.4876	4.4872	4.4890	4.777	4.789	4.805
21100	2535.0	4.4876	4.4902	4.4870	4.788	4.803	4.801
21425	2567.5	4.4843	4.4854	4.4873	4.784	4.795	4.810
Channel Bandwidth: 10 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20800	2505.0	8.9543	8.9547	8.9528	9.495	9.505	9.503
21100	2535.0	8.9490	8.9539	8.9502	9.500	9.504	9.509
21400	2565.0	8.9488	8.9489	8.9438	9.508	9.498	9.493

Spectrum Plot of Worst Value

99 % Occupied Bandwidth	26 dB Bandwidth
5 MHz / 16QAM	**5 MHz / 64QAM**
	
10 MHz / 16QAM	**10 MHz / 64QAM**
	

LTE Band 7							
Channel Bandwidth: 15 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20825	2507.5	13.449	13.436	13.432	14.23	14.24	14.23
21100	2535.0	13.447	13.435	13.434	14.25	14.25	14.23
21375	2562.5	13.460	13.449	13.443	14.25	14.24	14.22
Channel Bandwidth: 20 MHz							
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			26 dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20850	2510.0	17.906	17.919	17.921	19.01	19.02	19.03
21100	2535.0	17.899	17.922	17.921	19.02	19.02	19.03
21350	2560.0	17.947	17.964	17.961	19.06	19.05	19.05

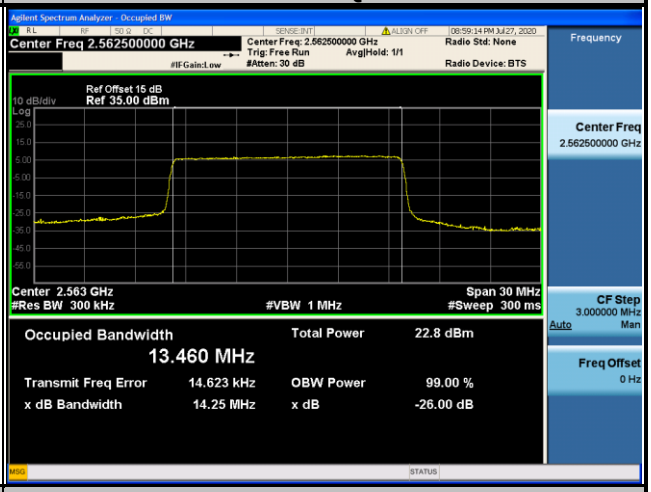
Spectrum Plot of Worst Value

99 % Occupied Bandwidth

15 MHz / QPSK

26 dB Bandwidth

15 MHz / QPSK



20 MHz / 16QAM

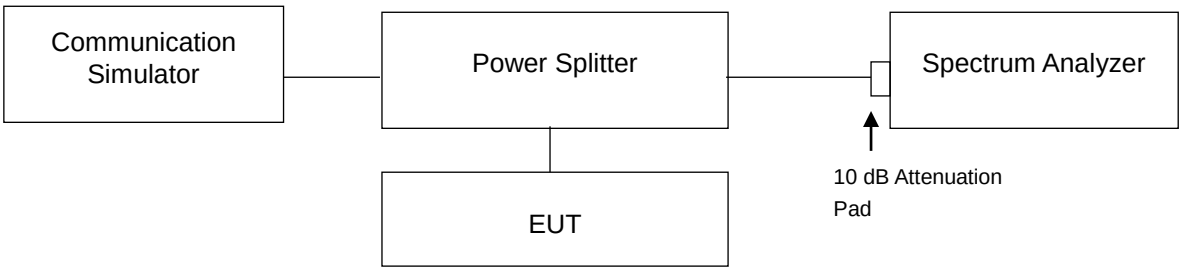
20 MHz / QPSK

3.5 Out-of-Band Emissions Measurement

3.5.1 Limits of Out-of-Band Emissions Measurement

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

3.5.2 Test Setup

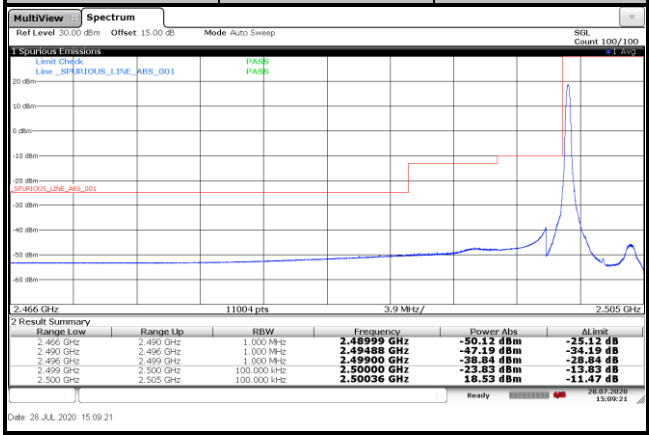


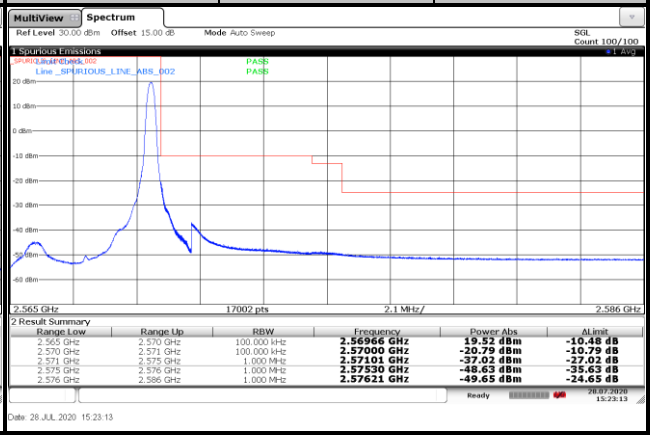
3.5.3 Test Procedures

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

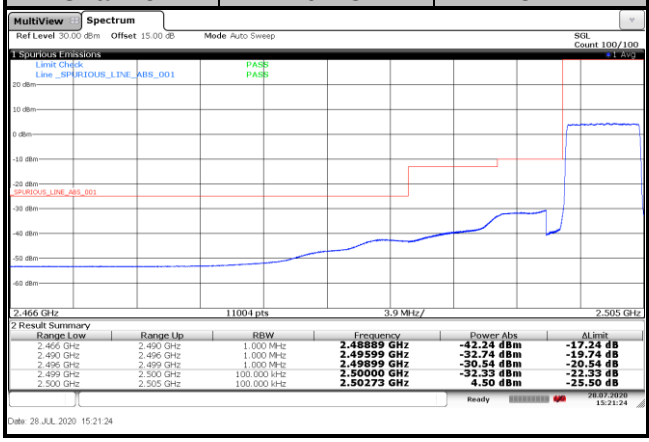
3.5.4 Test Results

LTE Band 7					
Channel Bandwidth: 5 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20775	1 RB	Channel	21425	1 RB

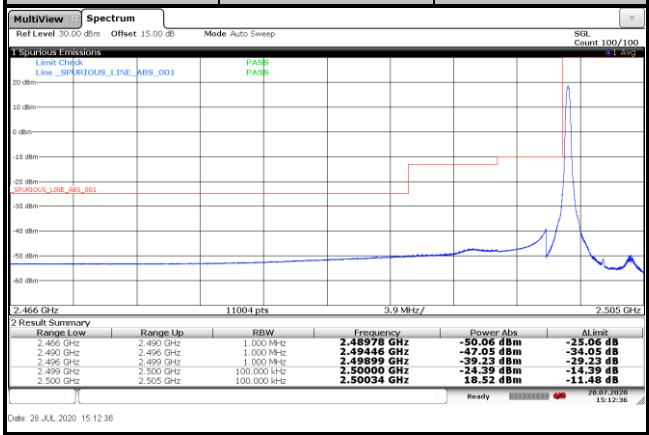


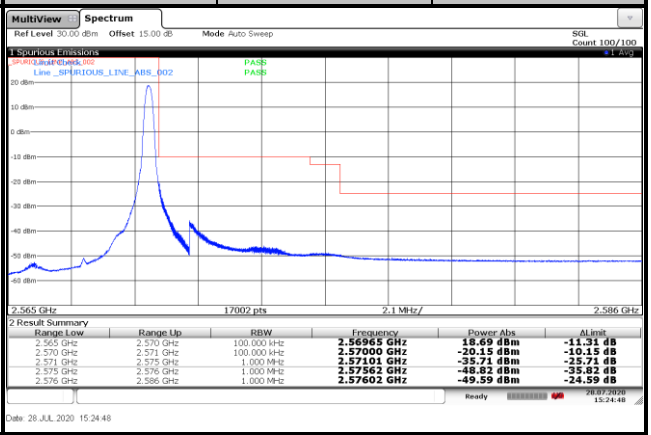


Channel	20775	25 RB	Channel	21425	25 RB

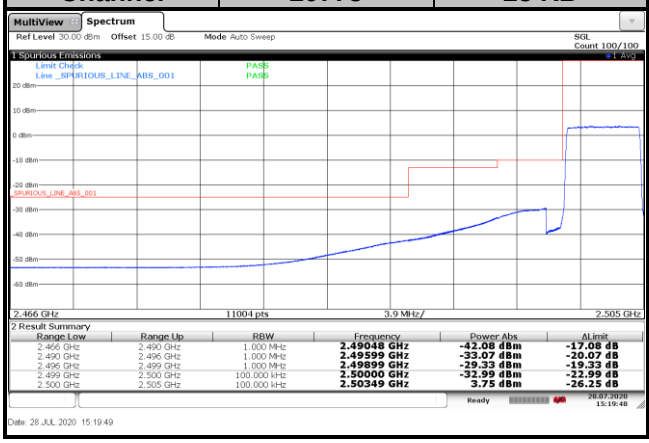


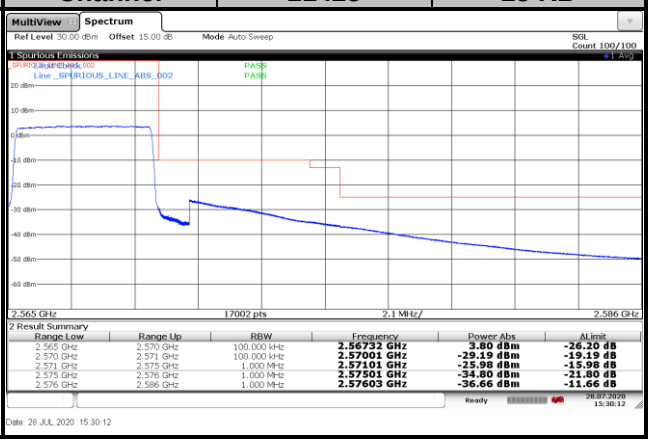
LTE Band 7					
Channel Bandwidth: 5 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	20775	1 RB	Channel	21425	1 RB



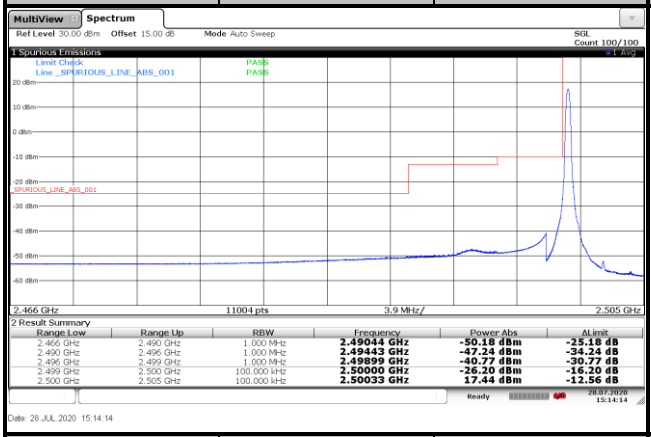


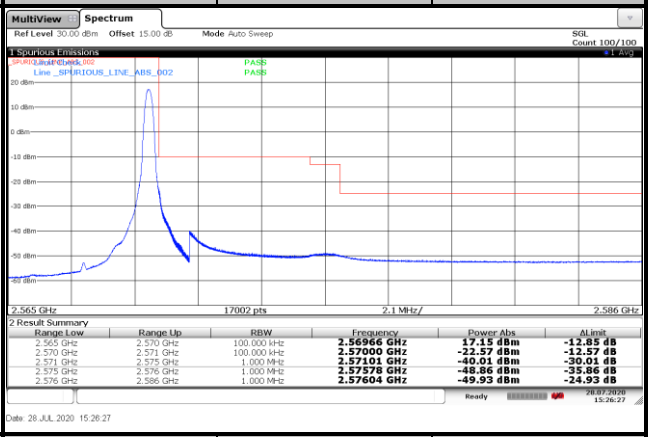
Channel	20775	25 RB	Channel	21425	25 RB



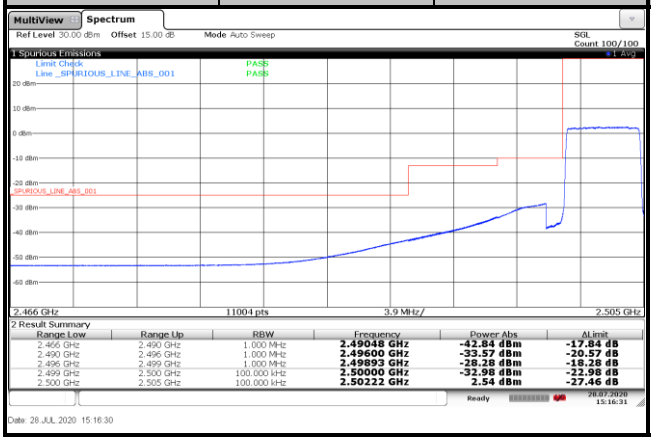


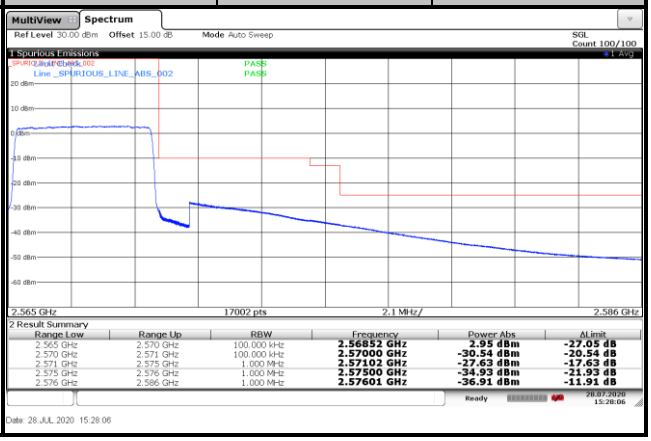
LTE Band 7					
Channel Bandwidth: 5 MHz / 64QAM					
<Out-of-Band Emissions>					
Channel	20775	1 RB	Channel	21425	1 RB



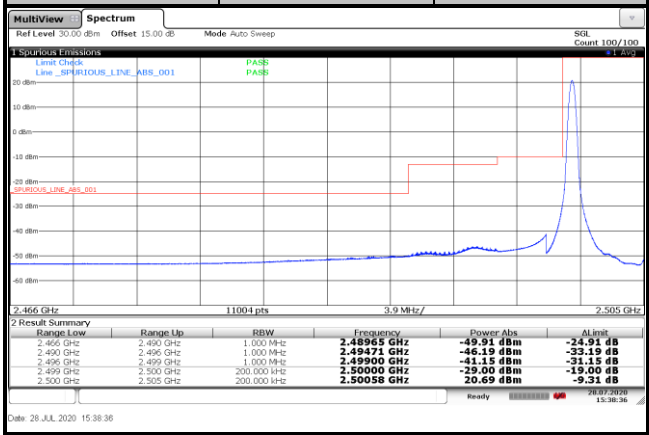


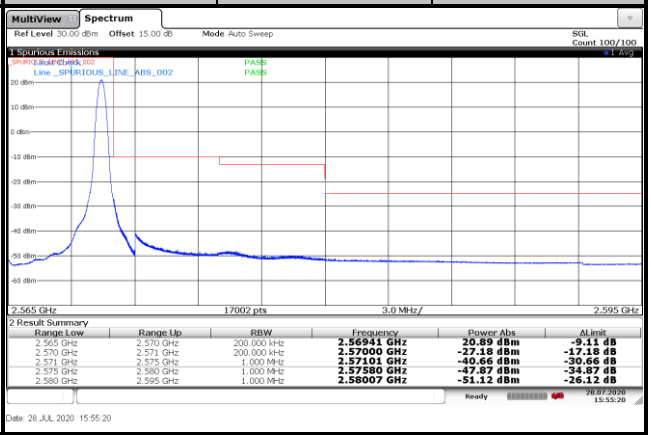
Channel	20775	25 RB	Channel	21425	25 RB



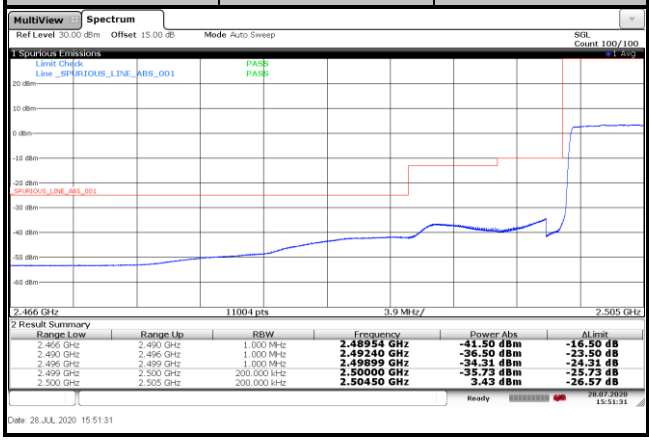


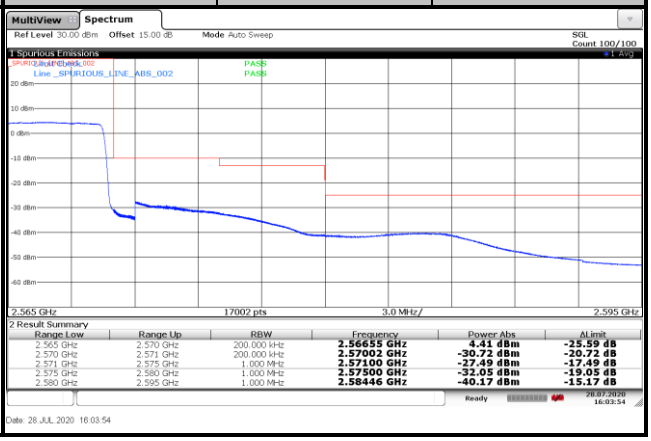
LTE Band 7					
Channel Bandwidth: 10 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20800	1 RB	Channel	21400	1 RB

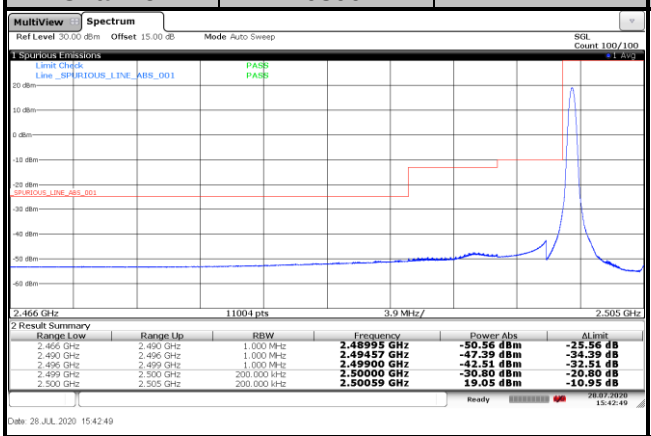
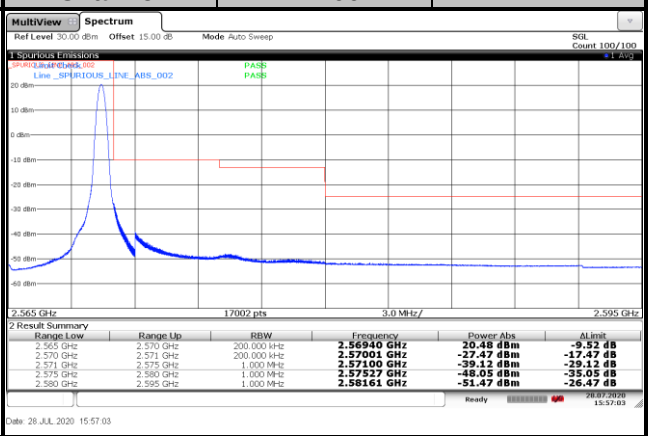
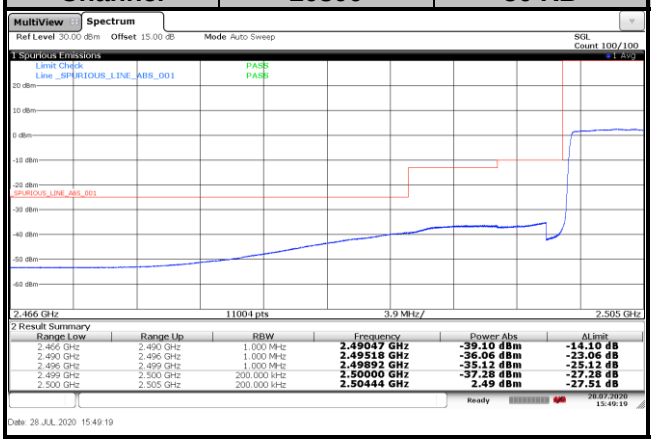
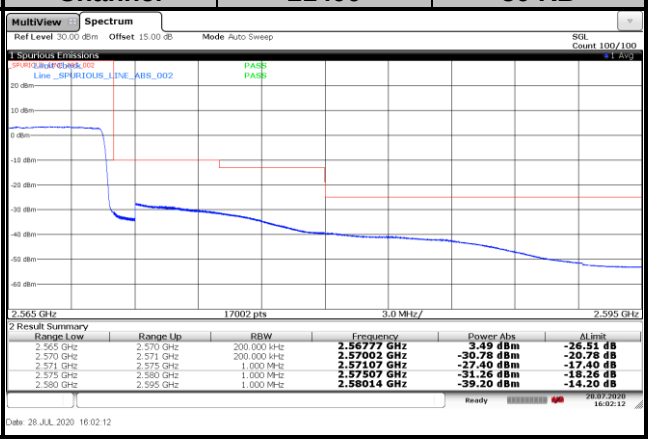




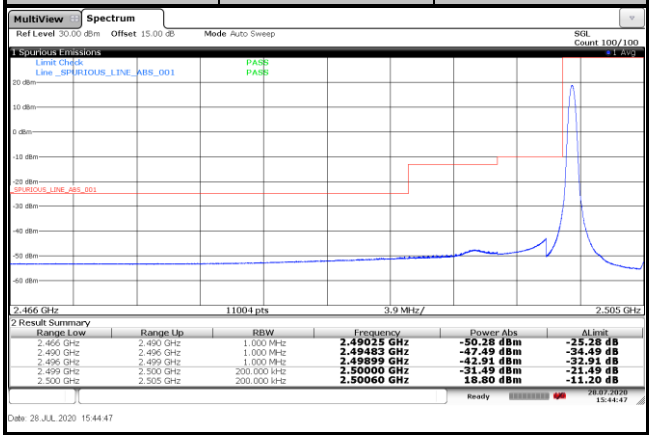
Channel	20800	50 RB	Channel	21400	50 RB

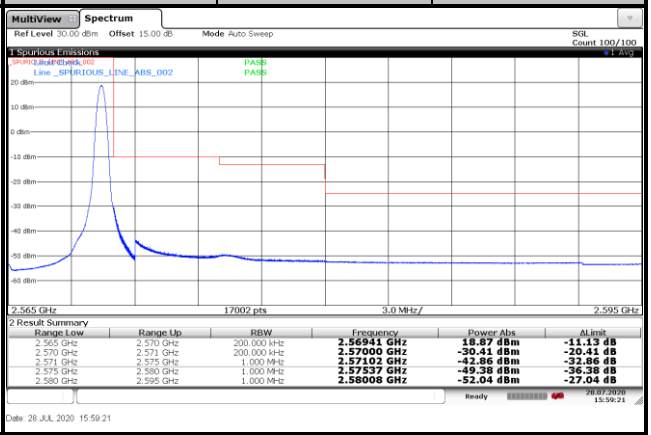




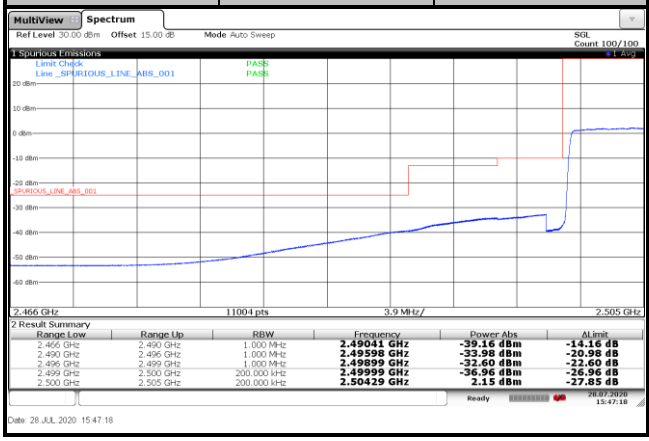
LTE Band 7					
Channel Bandwidth: 10 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	**20800**	**1 RB**	**Channel**	**21400**	**1 RB**
					
Channel	**20800**	**50 RB**	**Channel**	**21400**	**50 RB**
					

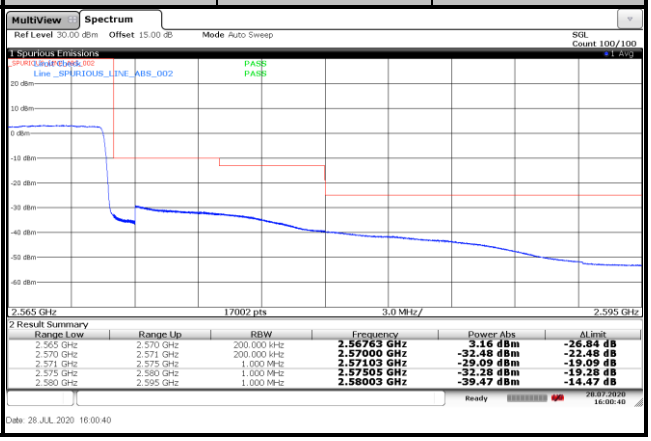
LTE Band 7					
Channel Bandwidth: 10 MHz / 64QAM					
<Out-of-Band Emissions>					
Channel	20800	1 RB	Channel	21400	1 RB



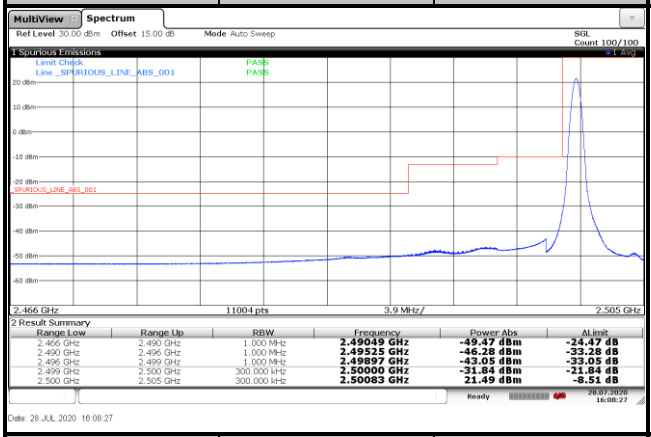


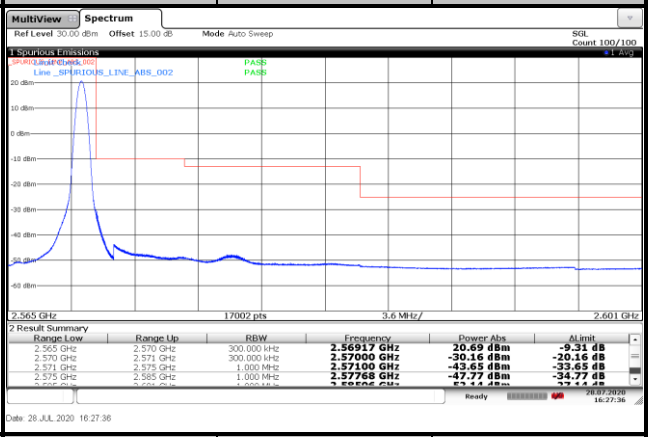
Channel	20800	50 RB	Channel	21400	50 RB



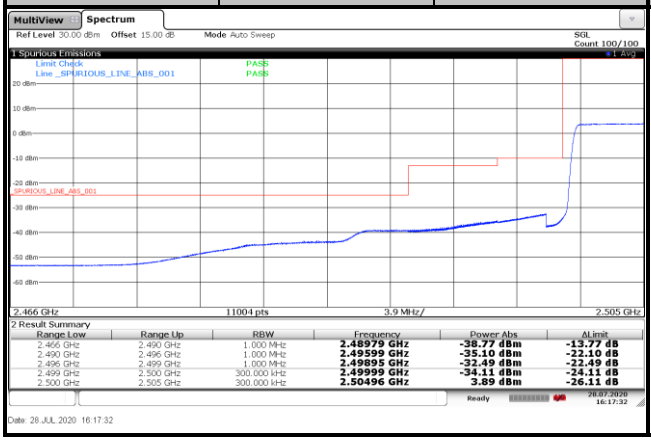


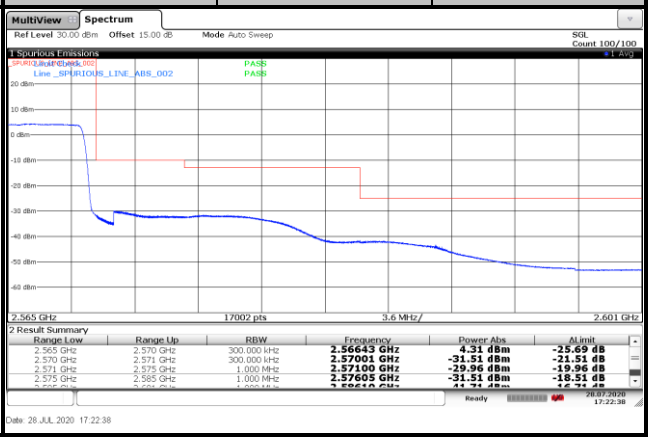
LTE Band 7					
Channel Bandwidth: 15 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20825	1 RB	Channel	21375	1 RB



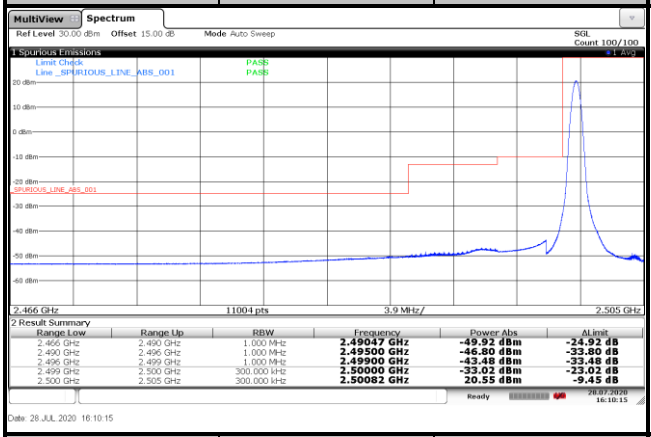


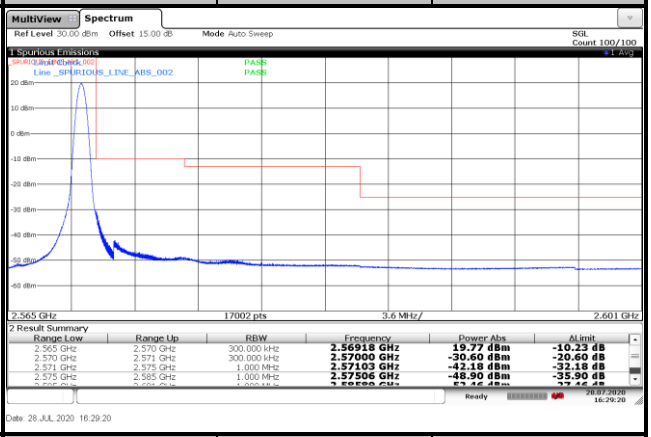
Channel	20825	75 RB	Channel	21375	75 RB



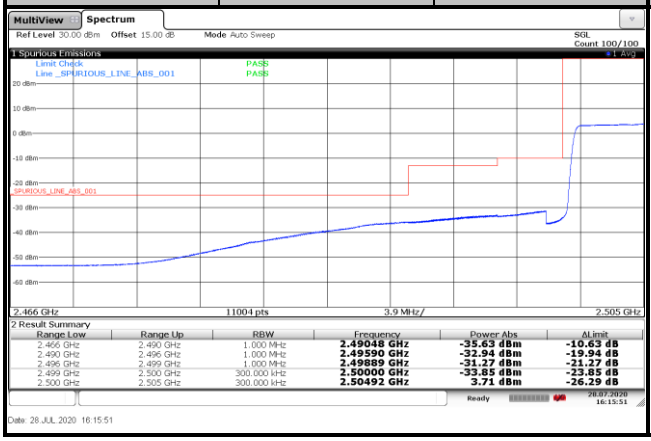


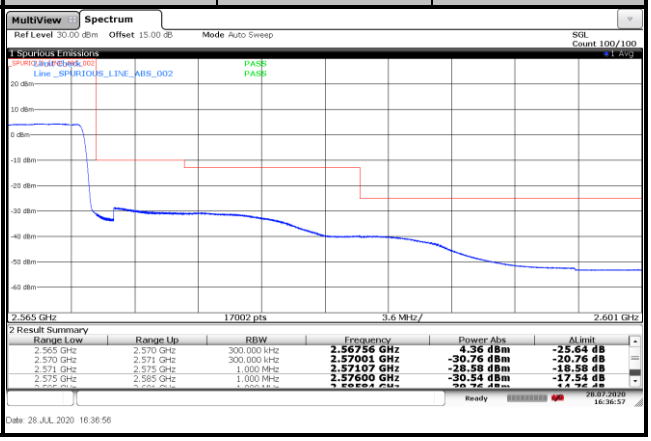
LTE Band 7					
Channel Bandwidth: 15 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	20825	1 RB	Channel	21375	1 RB



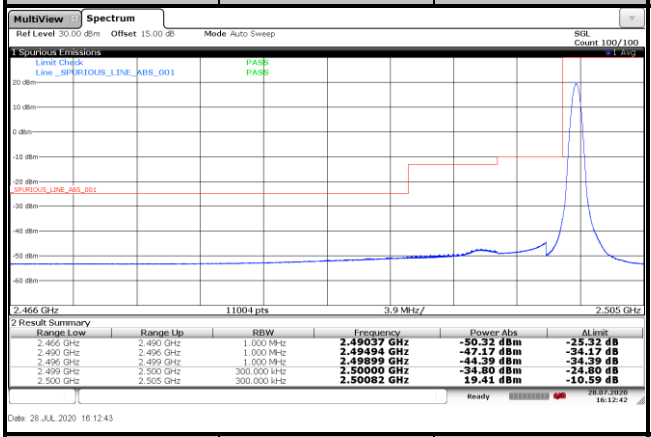


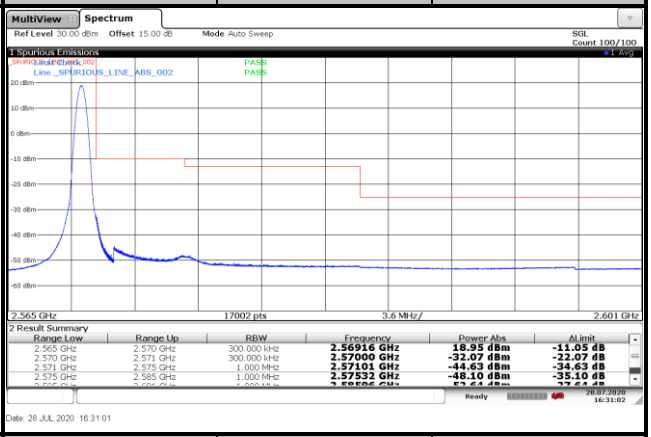
Channel	20825	75 RB	Channel	21375	75 RB



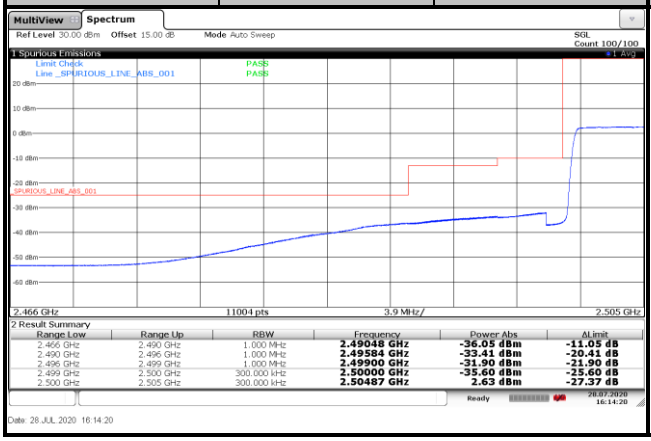


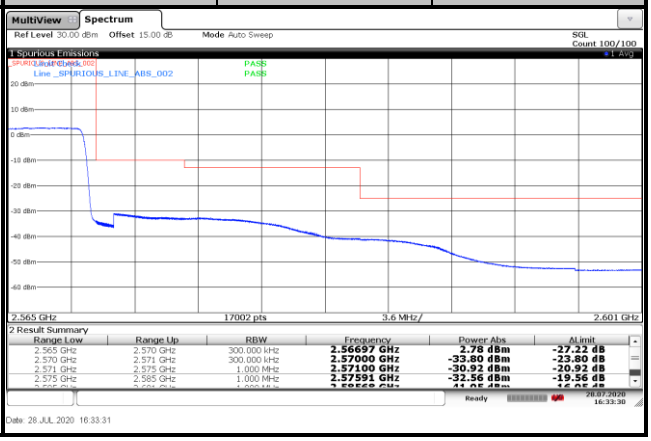
LTE Band 7					
Channel Bandwidth: 15 MHz / 64QAM					
<Out-of-Band Emissions>					
Channel	20825	1 RB	Channel	21375	1 RB



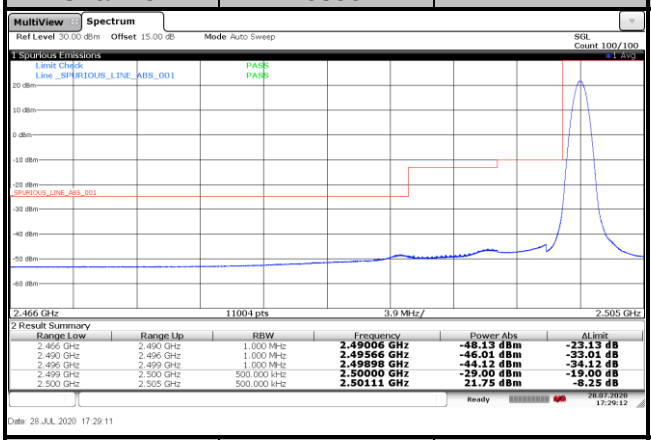


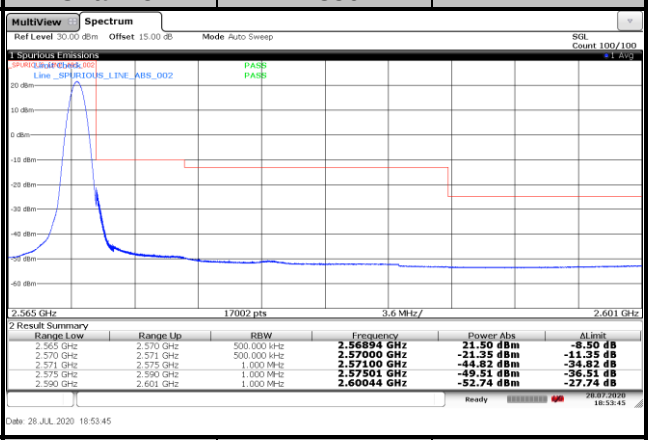
Channel	20825	75 RB	Channel	21375	75 RB



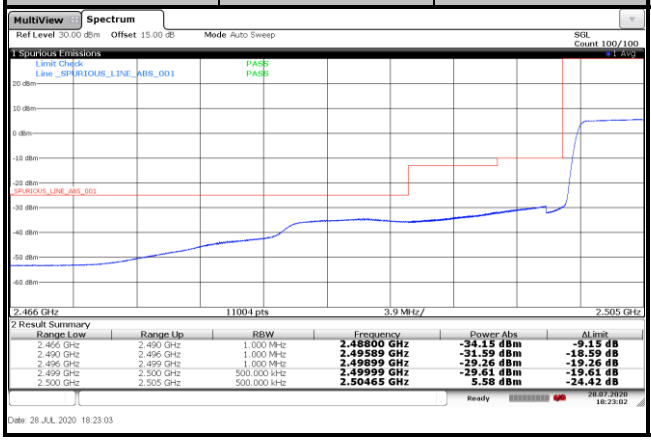


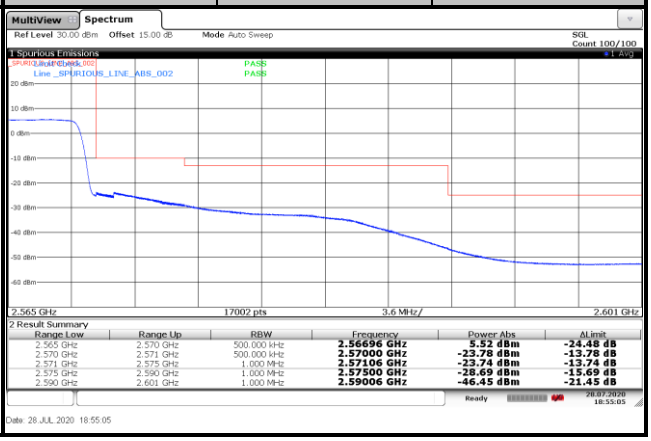
LTE Band 7					
Channel Bandwidth: 20 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20850	1 RB	Channel	21350	1 RB



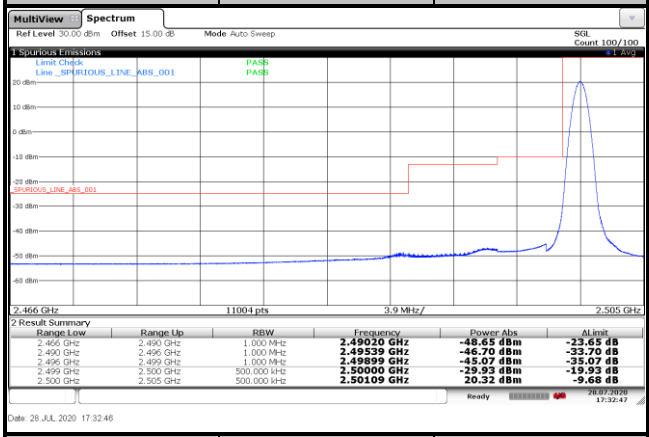


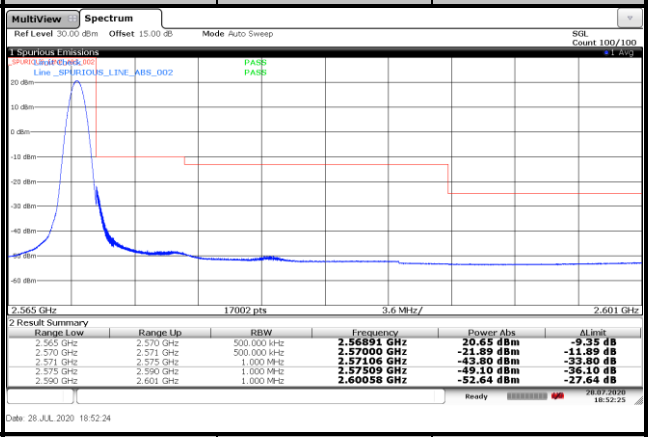
Channel	20850	100 RB	Channel	21350	100 RB



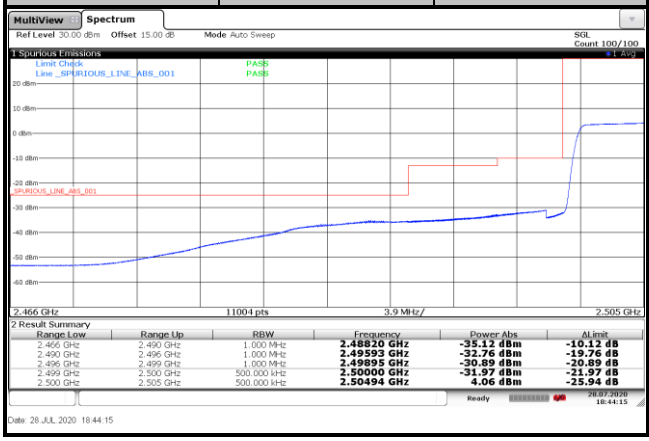


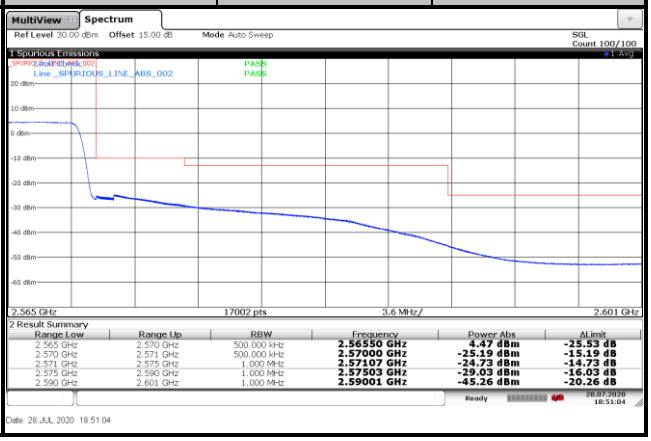
LTE Band 7					
Channel Bandwidth: 20 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	20850	1 RB	Channel	21350	1 RB



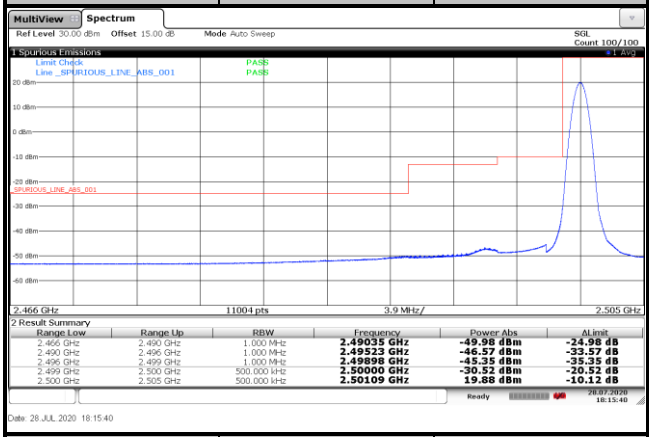


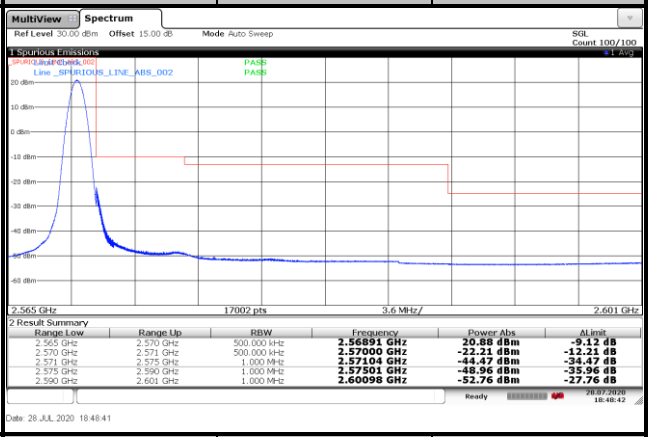
Channel	20850	100 RB	Channel	21350	100 RB



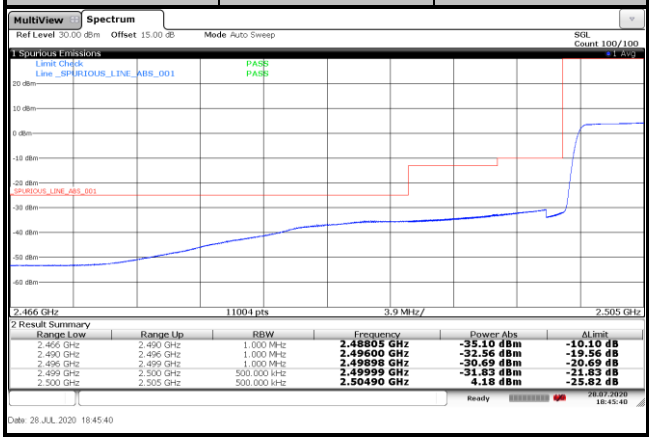


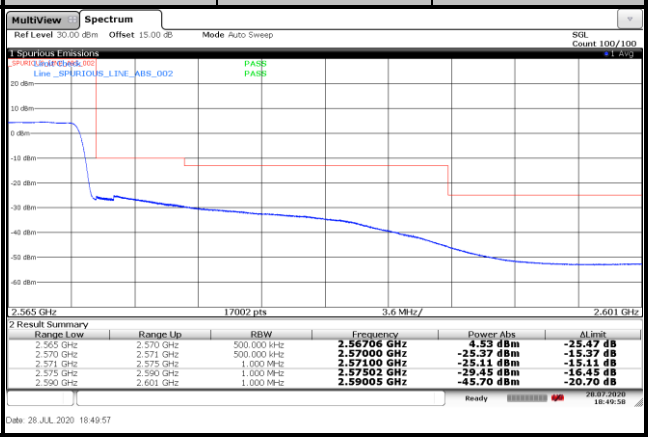
LTE Band 7					
Channel Bandwidth: 20 MHz / 64QAM					
<Out-of-Band Emissions>					
Channel	20850	1 RB	Channel	21350	1 RB





Channel	20850	100 RB	Channel	21350	100 RB



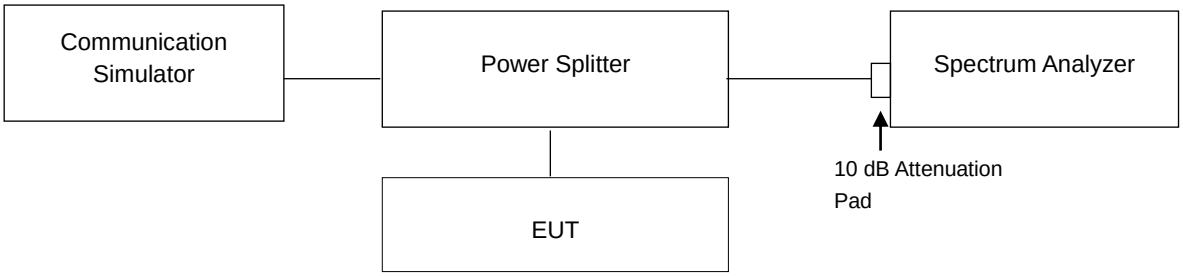


3.6 Peak to Average Ratio

3.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.6.2 Test Setup



3.6.3 Test Procedures

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

3.6.4 Test Results

LTE Band 7									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20775	2502.5	3.68	5.46	5.54	20800	2505.0	3.81	5.52	5.72
21100	2535.0	3.67	5.41	5.51	21100	2535.0	3.86	5.53	5.57
21425	2567.5	3.74	5.51	5.58	21400	2565.0	3.82	5.08	5.06

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

LTE Band 7									
Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20825	2507.5	3.84	5.26	5.48	20850	2510.0	3.85	5.33	5.55
21100	2535.0	3.62	5.34	5.46	21100	2535.0	3.50	5.21	5.33
21375	2562.5	3.37	4.01	4.13	21350	2560.0	3.31	3.95	4.13

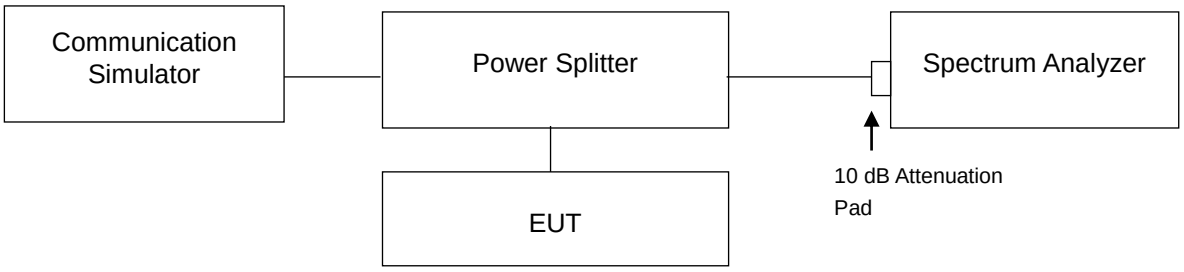
Spectrum Plot of Worst Value	
15 MHz / 64QAM	20 MHz / 64QAM

3.7 Conducted Spurious Emissions

3.7.1 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 55 + 10 log (P) dB. The limit of emission is equal to -25 dBm.

3.7.2 Test Setup



3.7.3 Test Procedure

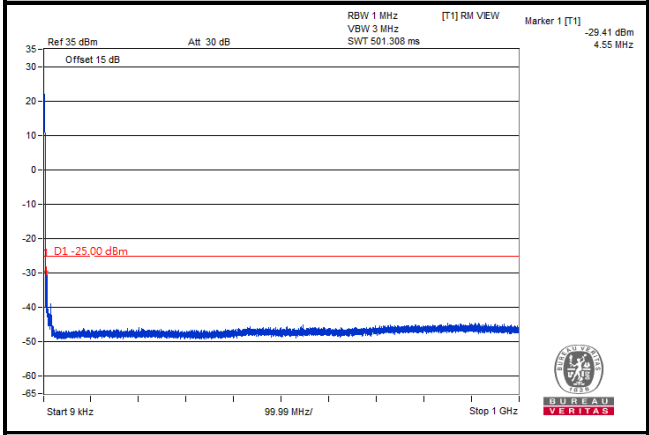
a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.

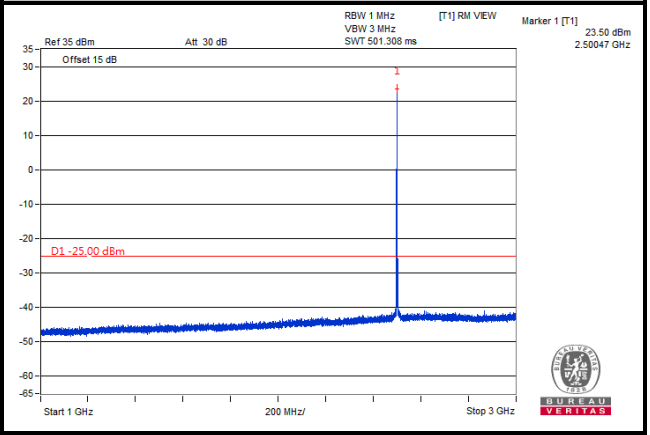
b. Measuring frequency range is from 9 kHz to 1 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.

c. Measuring frequency range is from 1 GHz to 26 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.

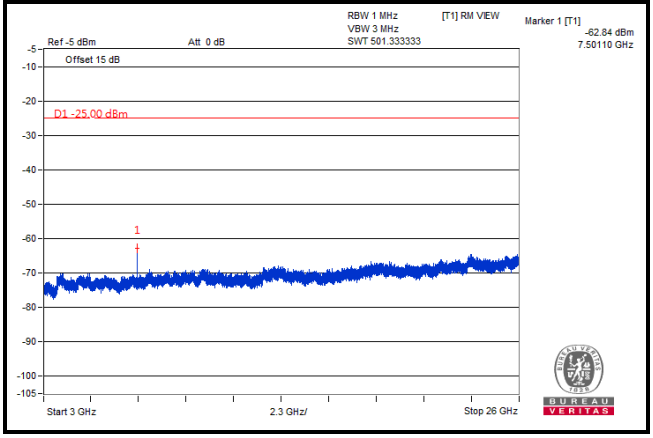
3.7.4 Test Results

LTE Band 7	
Channel Bandwidth: 5 MHz	
Channel 20775	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz

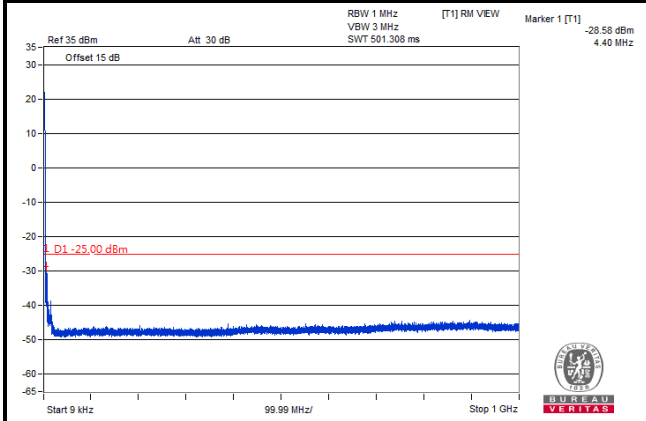
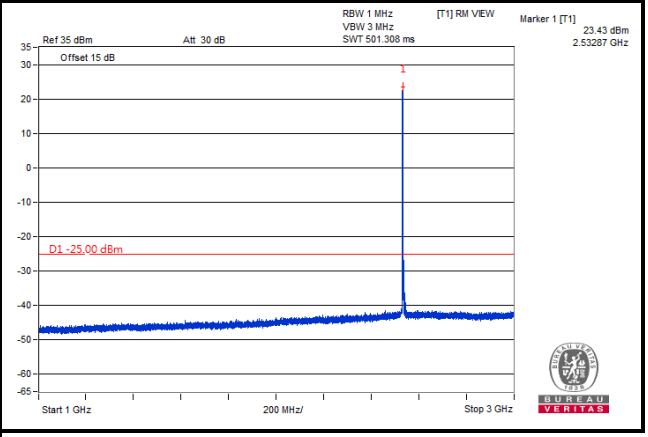
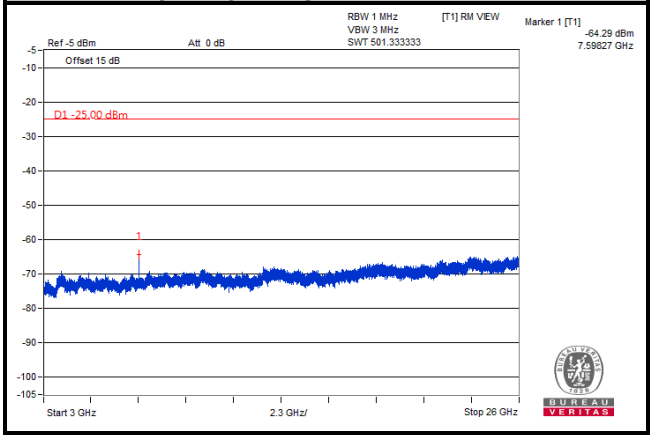




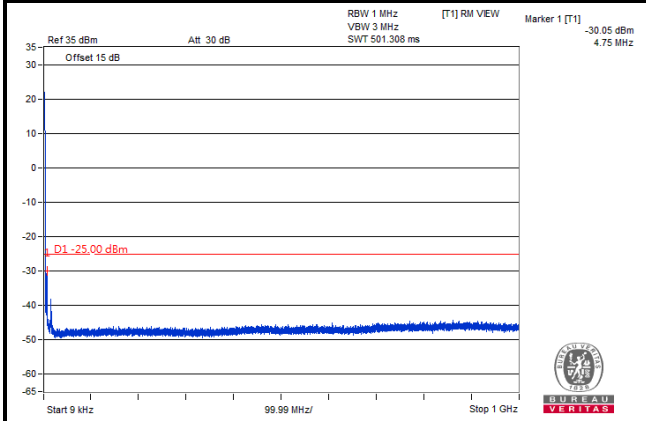
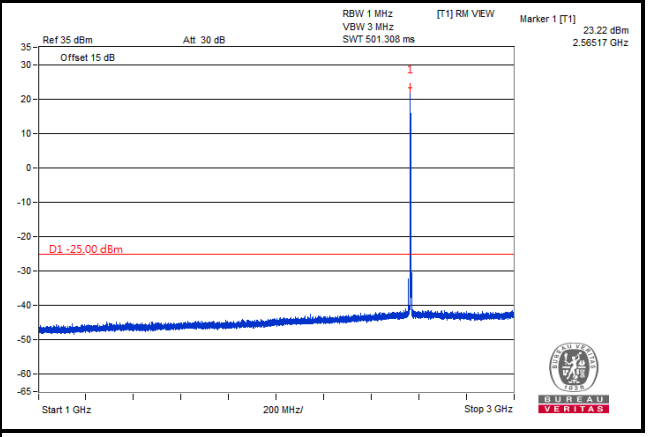
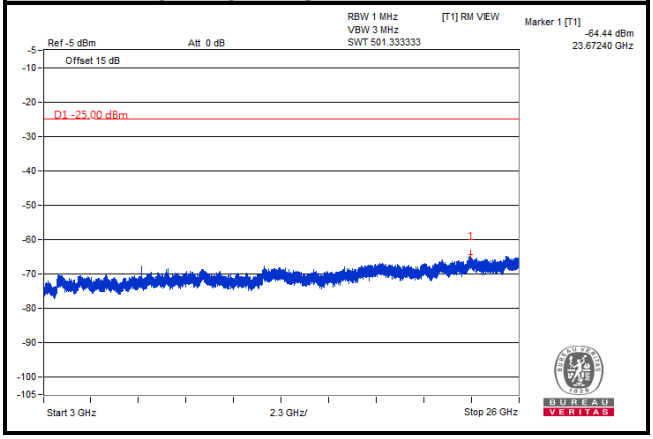
Frequency Range: 3 GHz ~ 26 GHz



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

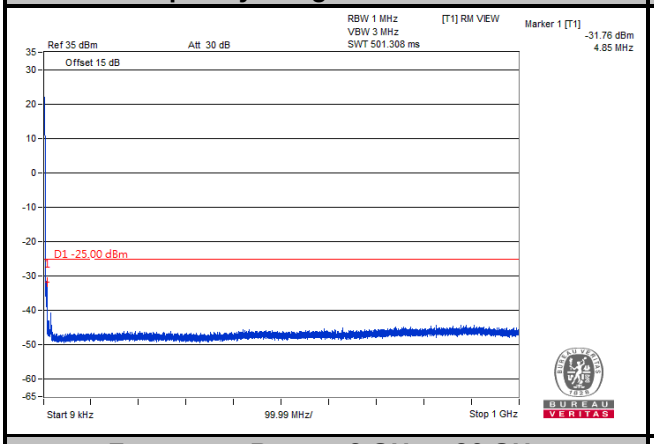
LTE Band 7	
Channel Bandwidth: 5 MHz	
Channel 21100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 26 GHz	
	

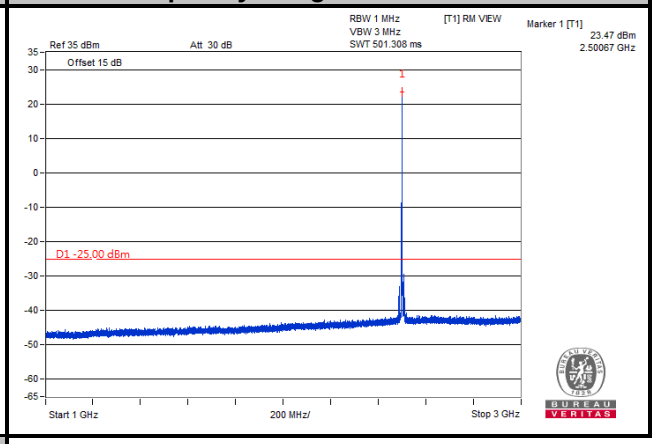
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 5 MHz	
Channel 21425	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 26 GHz	
	

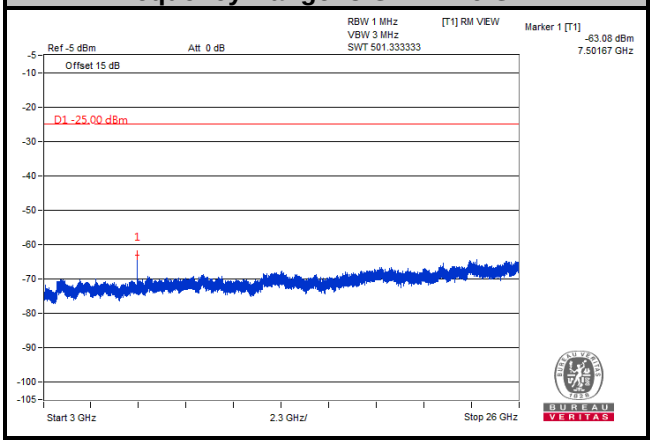
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 10 MHz	
Channel 20800	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz



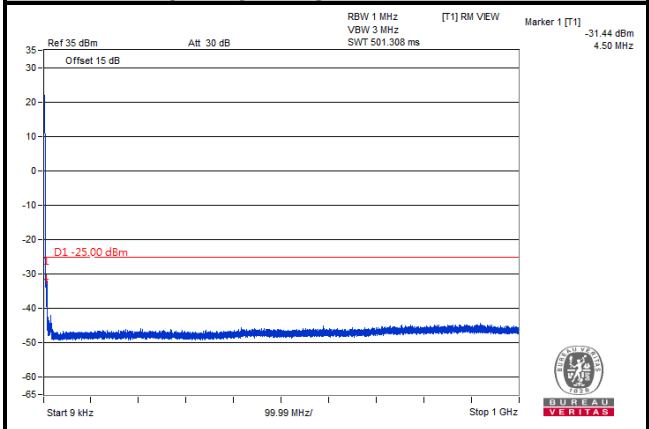


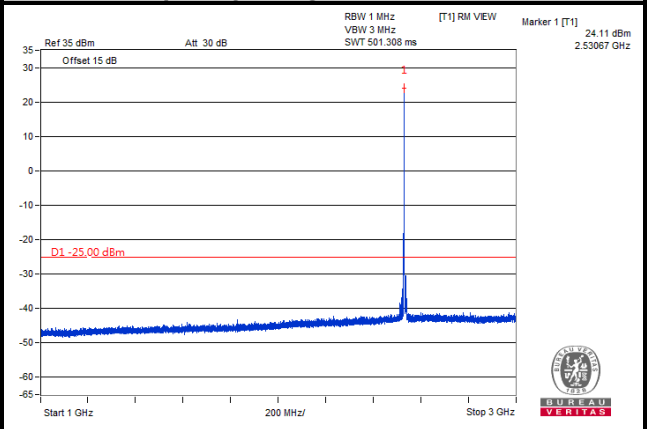
Frequency Range: 3 GHz ~ 26 GHz



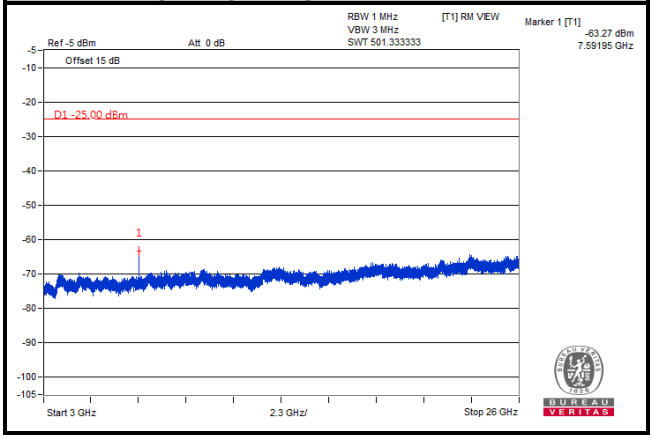
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 10 MHz	
Channel 21100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz



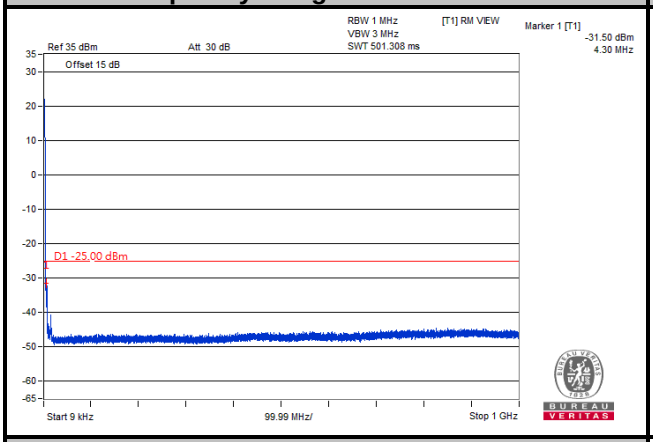


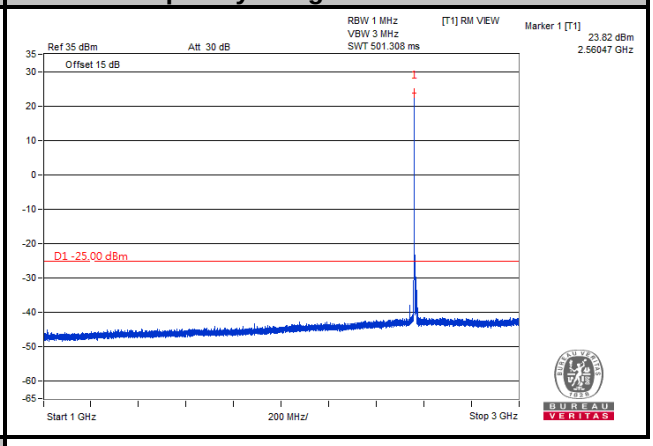
Frequency Range: 3 GHz ~ 26 GHz



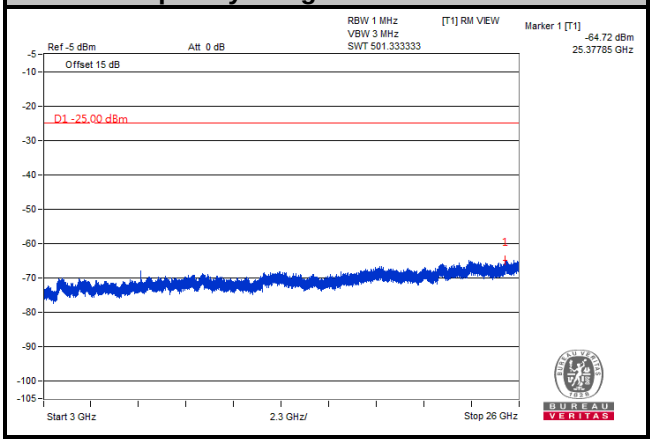
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 10 MHz	
Channel 21400	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz



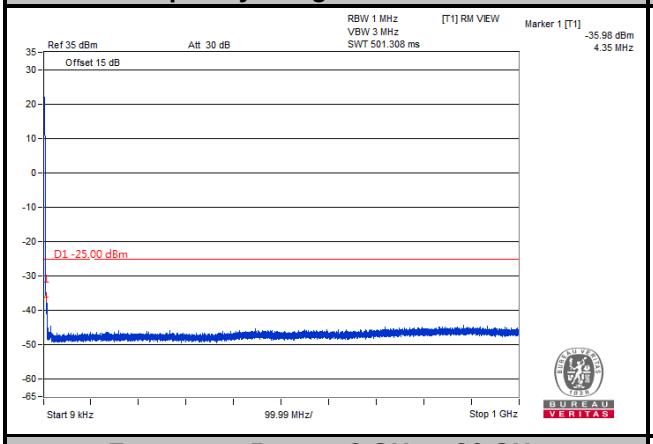


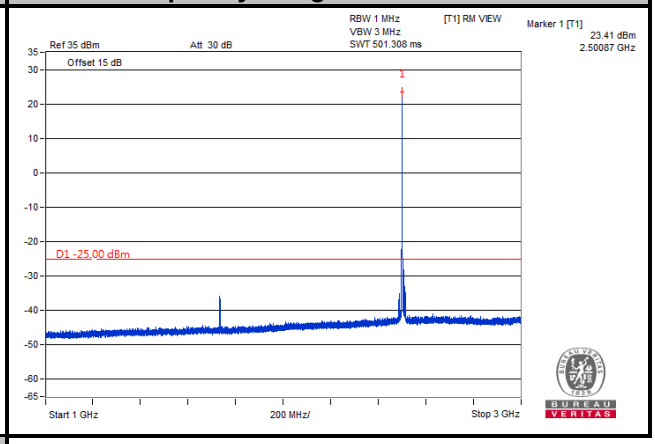
Frequency Range: 3 GHz ~ 26 GHz



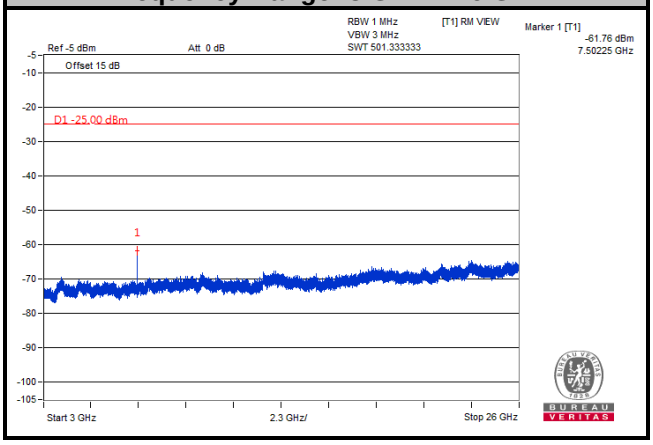
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 15 MHz	
Channel 20825	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz

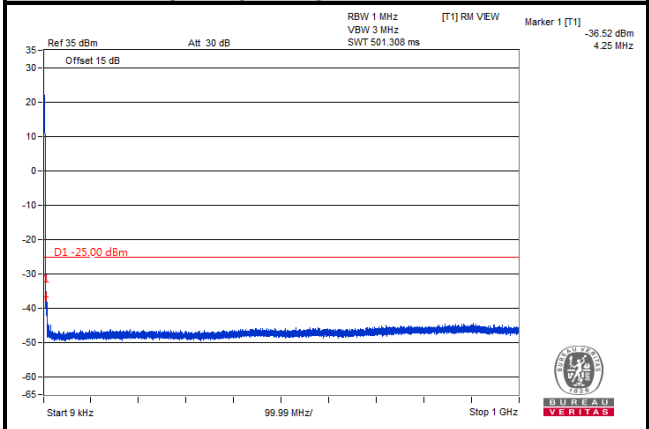
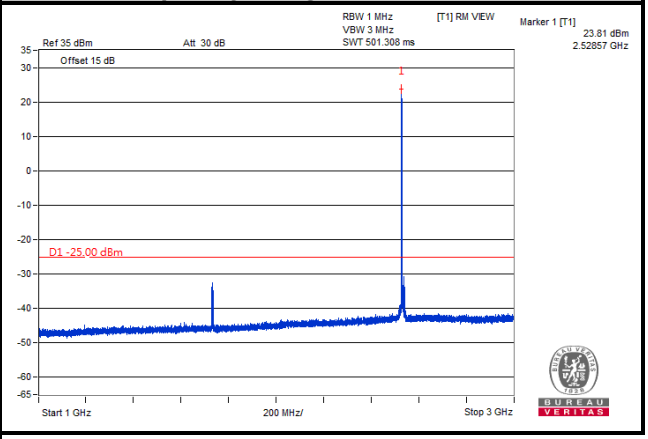
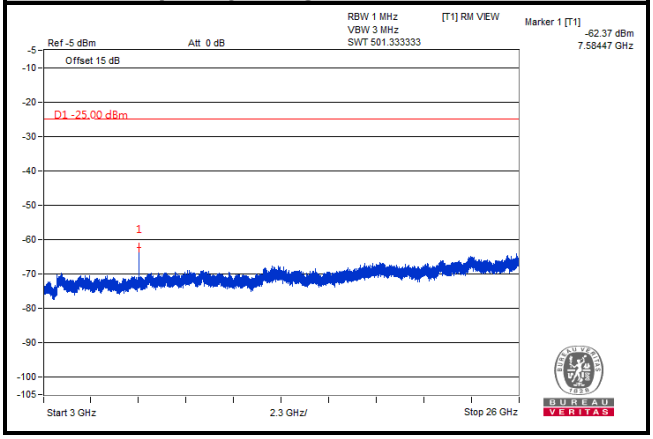




Frequency Range: 3 GHz ~ 26 GHz

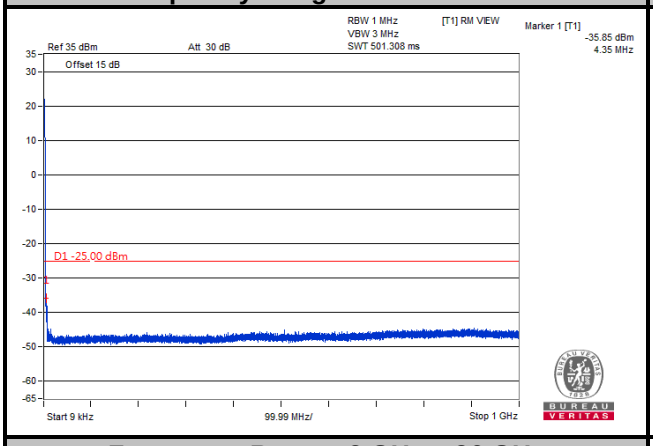


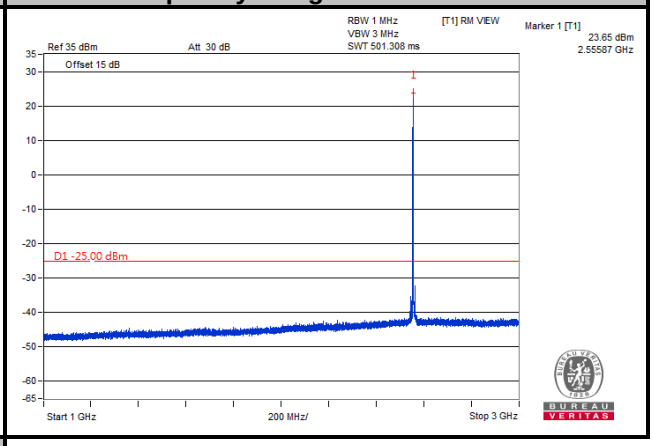
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 15 MHz	
Channel 21100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 26 GHz	
	

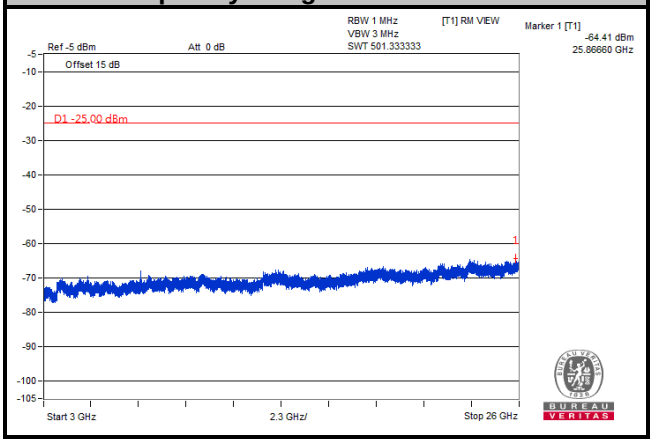
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 15 MHz	
Channel 21375	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz



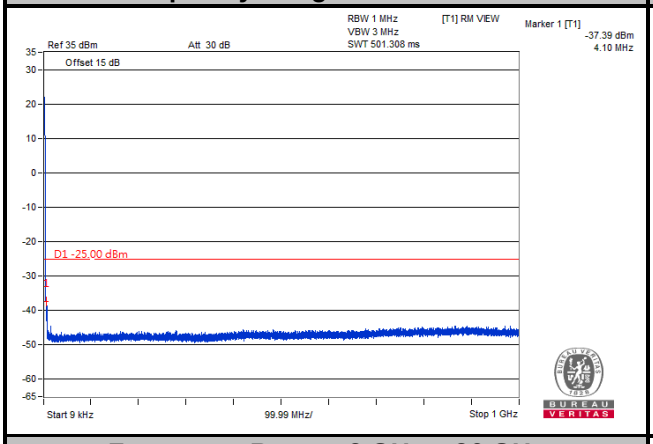


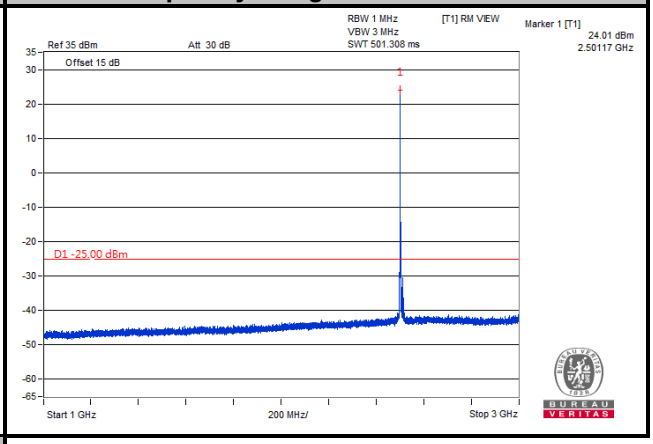
Frequency Range: 3 GHz ~ 26 GHz



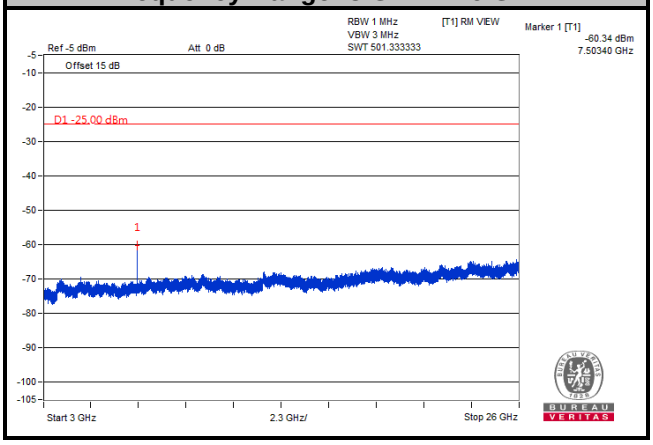
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 20 MHz	
Channel 20850	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz



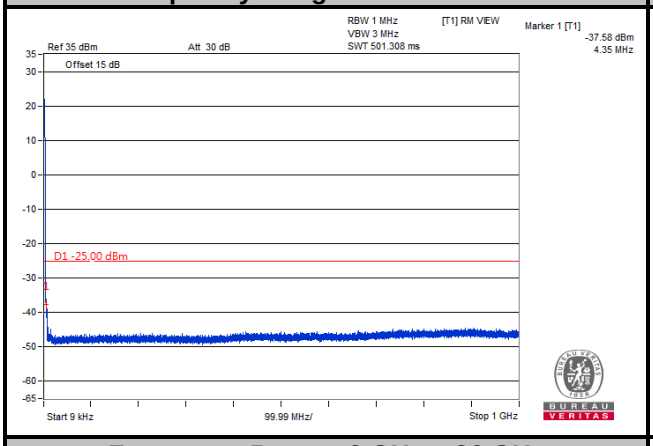


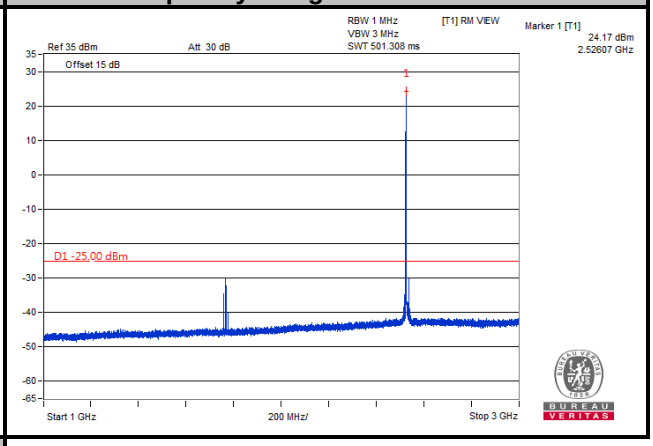
Frequency Range: 3 GHz ~ 26 GHz



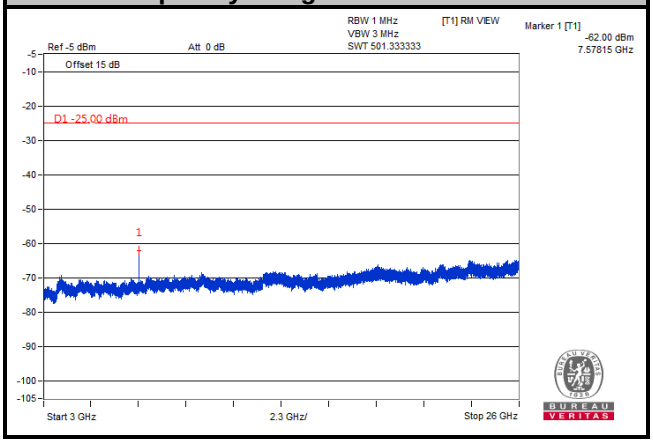
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 20 MHz	
Channel 21100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz



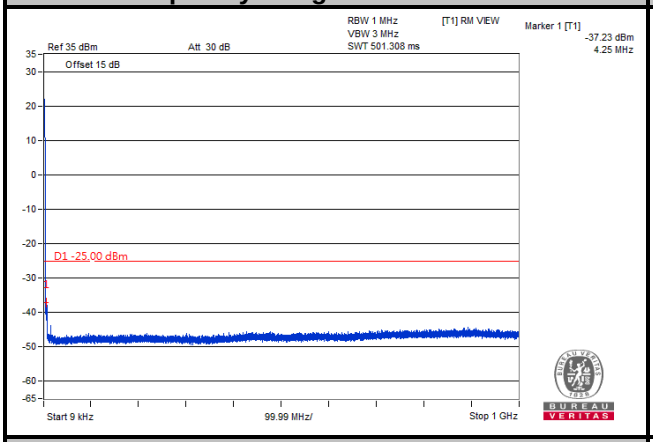


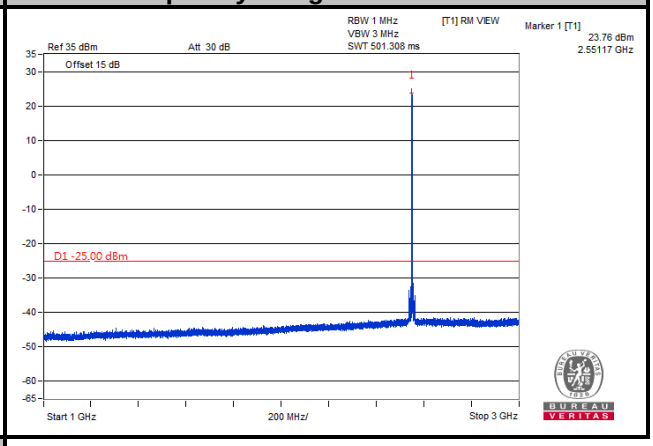
Frequency Range: 3 GHz ~ 26 GHz



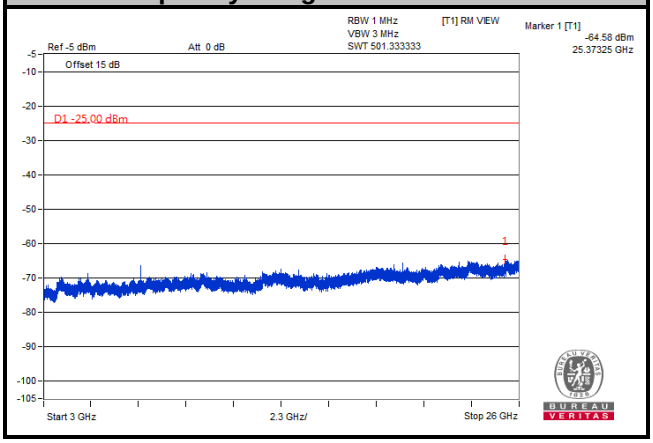
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 7	
Channel Bandwidth: 20 MHz	
Channel 21350	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz





Frequency Range: 3 GHz ~ 26 GHz



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

3.8 Radiated Emission Measurement

3.8.1 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 55 + 10 log (P) dB. The limit of emission is equal to -25 dBm.

3.8.2 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:

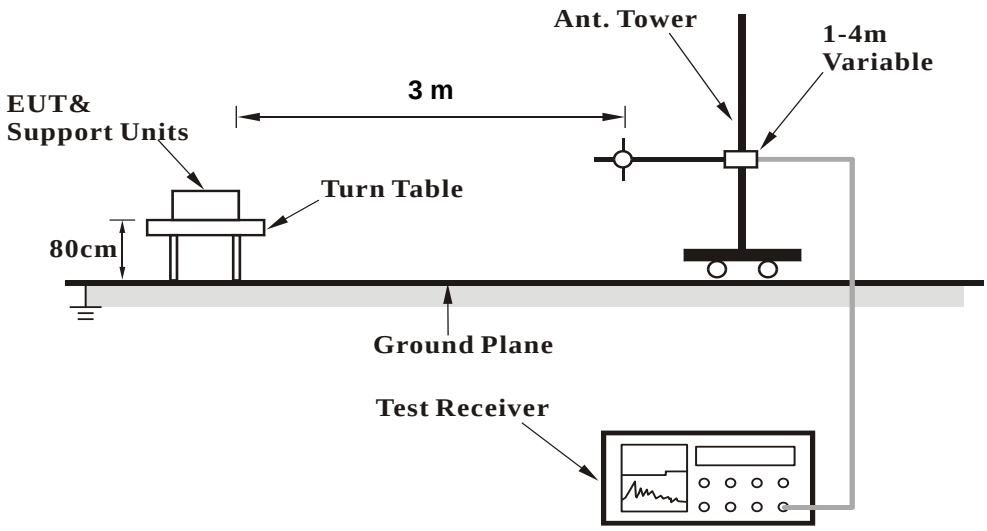
1. The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

3.8.3 Deviation from Test Standard

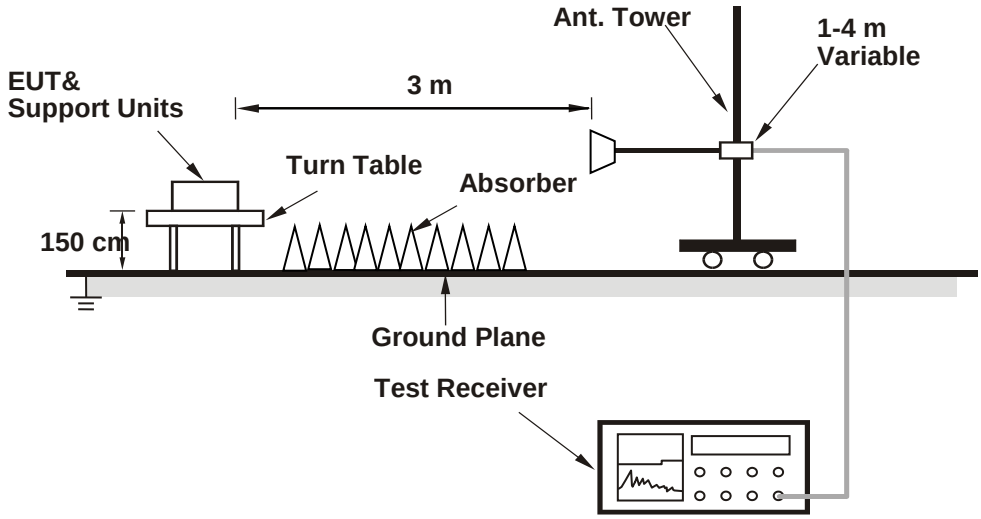
No deviation.

3.8.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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

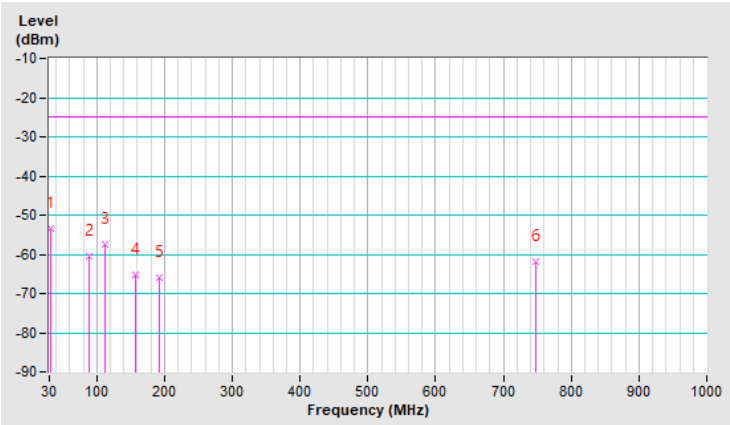
3.8.5 Test Results

Below 1GHz
LTE Band 7, Channel Bandwidth: 5MHz

Mode	TX channel 21100 (2535.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Titan Hsu		

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	32.81	-55.70	-41.50	-11.80	-53.30	-25.00	-28.30
2	89.04	-52.40	-61.50	0.90	-60.60	-25.00	-35.60
3	112.94	-49.30	-57.80	0.30	-57.50	-25.00	-32.50
4	156.52	-60.10	-65.40	0.20	-65.20	-25.00	-40.20
5	191.67	-57.60	-70.30	4.40	-65.90	-25.00	-40.90
6	746.96	-66.10	-66.60	4.70	-61.90	-25.00	-36.90

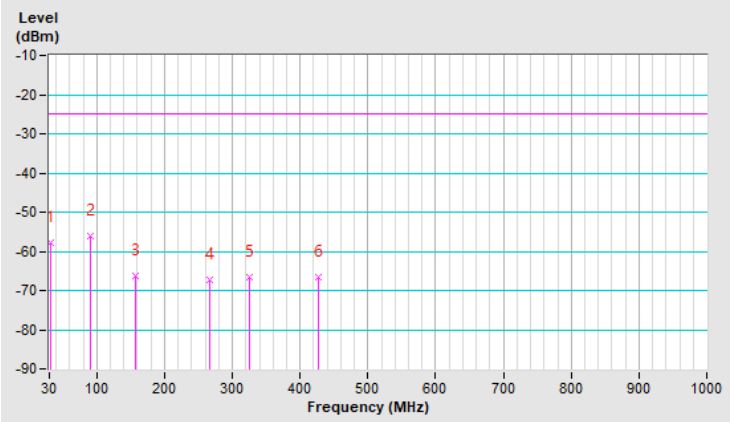
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) - Cable Loss (dB).



Mode	TX channel 21100 (2535.0MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	Titan Hsu		

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	32.81	-49.90	-46.10	-11.80	-57.90	-25.00	-32.90
2	90.45	-50.00	-57.30	1.10	-56.20	-25.00	-31.20
3	157.93	-64.20	-66.50	0.30	-66.20	-25.00	-41.20
4	267.58	-69.20	-72.70	5.30	-67.40	-25.00	-42.40
5	325.22	-66.80	-71.90	5.20	-66.70	-25.00	-41.70
6	427.84	-66.90	-71.90	5.20	-66.70	-25.00	-41.70

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 7, Channel Bandwidth: 5MHz

Mode	TX channel 20775 (2502.5MHz)	Frequency Range	1GHz ~ 27GHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	5005.00 (PK)	-65.50	-55.00	6.60	-48.40	-25.00	-23.40
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	5005.00 (PK)	-65.70	-55.00	6.60	-48.40	-25.00	-23.40

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 21100 (2535.0MHz)	Frequency Range	1GHz ~ 27GHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	5070.00 (PK)	-65.90	-54.60	6.60	-48.00	-25.00	-23.00
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	5070.00 (PK)	-65.90	-55.10	6.60	-48.50	-25.00	-23.50

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 21425 (2567.5MHz)	Frequency Range	1GHz ~ 27GHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	5135.00 (PK)	-67.20	-55.30	6.60	-48.70	-25.00	-23.70
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	5135.00 (PK)	-66.10	-55.50	6.60	-48.90	-25.00	-23.90

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

LTE Band 7, Channel Bandwidth: 20MHz

Mode	TX channel 20850 (2510.0MHz)	Frequency Range	1GHz ~ 27GHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	5020.00 (PK)	-65.50	-54.80	6.60	-48.20	-25.00	-23.20
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	5020.00 (PK)	-66.00	-55.30	6.60	-48.70	-25.00	-23.70

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 21100 (2535.0MHz)	Frequency Range	1GHz ~ 27GHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	**5070.00 (PK)**	**-65.20**	**-53.90**	**6.60**	**-47.30**	**-25.00**	**-22.30**
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	5070.00 (PK)	-65.50	-54.70	6.60	-48.10	-25.00	-23.10

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 21350 (2560.0MHz)	Frequency Range	1GHz ~ 27GHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	5120.00 (PK)	-65.80	-54.00	6.60	-47.40	-25.00	-22.40
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	5120.00 (PK)	-65.70	-55.00	6.60	-48.40	-25.00	-23.40

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

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

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

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