FCC Test Report

(PART 27)

Report No.:	RF181008C16-3
FCC ID:	NKRUMC-9628FHN
Test Model:	UMC-9628FHN
Received Date:	Oct. 08, 2018
Test Date:	Oct. 24, 2018 ~ Oct. 27, 2018
Issued Date:	Nov. 14, 2018
Applicant:	Wistron NeWeb Corporation
Address:	20 Park Ave. II, Hsinchu Science Park,Hsinchu 308, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C)
Test Location:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF181008C16-3	Original Release	Nov. 14, 2018

1 Certificate of Conformity

Product:	LTE Module
Brand:	Wistron NeWeb Corp.
Test Model:	UMC-9628FHN
Sample Status:	Identical Prototype
Applicant:	Wistron NeWeb Corporation
Test Date:	Oct. 24, 2018 ~ Oct. 27, 2018
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. 14, 2018

Gina Liu / Specialist

Approved by : _____ , **Date:** Nov. 14, 2018

Dylan Chiou / 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.
2.1051 27.53(l)(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 -19.14 dB at 596.48 MHz.

2.1 Measurement Uncertainty

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

Measurement	**Frequency**	**Expended Uncertainty (k=2) (±)**
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 12, 2017	Dec. 11, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	148	Dec. 13, 2017	Dec. 12, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 06, 2017	Dec. 05, 2018
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 16, 2018	Apr. 15, 2019
MXG Vector signal generator Agilent	N5182B	MY53050162	Jan. 10, 2018	Jan. 09, 2019
Preamplifier EMCI	EMC 184045	980116	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 012645	980115	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 330H	980112	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8000&3000	140811+170717	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 12, 2018	Oct. 11, 2019
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Radio Communication Analyzer Anritsu	MT8820C	6201300640	Aug. 16, 2017	Aug. 15, 2019
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 05, 2018	Sep. 04, 2019
DC Power Supply Topward	33010D	807748	N/A	N/A

Note:
1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is 7450F-10.

3 General Information

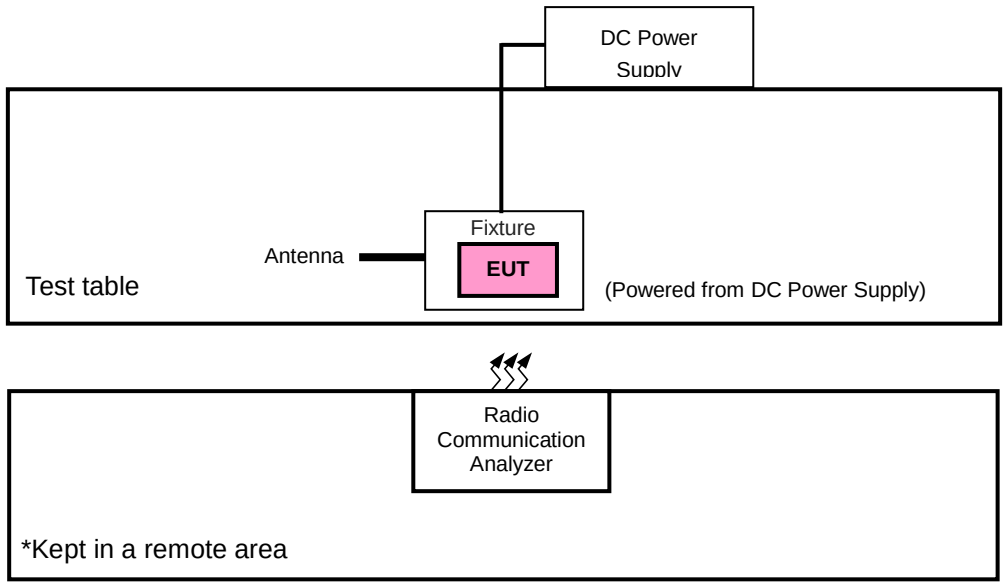
3.1 General Description of EUT

Product	LTE Module	
Brand	Wistron NeWeb Corp.	
Test Model	UMC-9628FHN	
Status of EUT	Identical Prototype	
Power Supply Rating	3.8 Vdc (DC Power Supply)	
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)	316.23 mW
	LTE Band 7 (Channel Bandwidth: 10 MHz)	331.89 mW
	LTE Band 7 (Channel Bandwidth: 15 MHz)	347.54 mW
	LTE Band 7 (Channel Bandwidth: 20 MHz)	475.34 mW
Emission Designator	LTE Band 7 (Channel Bandwidth: 5 MHz)	4M49W7D
	LTE Band 7 (Channel Bandwidth: 10 MHz)	8M96W7D
	LTE Band 7 (Channel Bandwidth: 15 MHz)	13M4G7D
	LTE Band 7 (Channel Bandwidth: 20 MHz)	17M9W7D
Antenna Type	Fixed External Antenna with 2.6 dBi gain	
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

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

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Radio Communication Analyzer	Anritsu	MT8820C	6201300640	N/A
2.	Antenna	N/A	N/A	N/A	N/A
3.	DC Power Supply	Topward	33010D	807748	

No.	Signal Cable Description Of The Above Support Units
1.	N/A
2.	N/A
3.	N/A

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as communication partner to transfer data.
3. Item 2 was provided by client.

3.3 Test Mode Applicability and Tested Channel Detail

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

Band	EIRP	Radiated Emission
LTE Band 7	Z-plane	Z-axis

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	20850 to 21350	21110	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Frequency Stability	20775 to 21425	20775, 21425	5 MHz	QPSK	1 RB / 0 RB Offset
		20800 to 21400	20800, 21400	10 MHz	QPSK	1 RB / 0 RB Offset
		20825 to 21375	20825, 21375	15 MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	20850, 21350	20 MHz	QPSK	1 RB / 0 RB Offset
-	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	25 RB / 0 RB Offset
		20800 to 21400	20800, 21400	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		20825 to 21375	20825, 21375	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		20850 to 21350	20850, 21350	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset

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

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	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: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25 deg. C, 65 % RH	3.8 Vdc	Thomas Wei
Modulation Characteristics	25 deg. C, 65 % RH	3.8 Vdc	Gavin Wu
Frequency Stability	25 deg. C, 65 % RH	3.8 Vdc	Gavin Wu
Occupied Bandwidth	25 deg. C, 65 % RH	3.8 Vdc	Gavin Wu
Out-of-Band Emissions	25 deg. C, 65 % RH	3.8 Vdc	Gavin Wu
Peak to Average Ratio	25 deg. C, 65 % RH	3.8 Vdc	Gavin Wu
Conducted Emission	25 deg. C, 65 % RH	3.8 Vdc	Gavin Wu
Radiated Emission	25 deg. C, 65 % RH	3.8 Vdc	Thomas Wei

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

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

FCC 47 CFR Part 2
FCC 47 CFR Part 27
KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA/EIA-603-E 2016
ANSI 63.26-2015

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

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.”

4.1.2 Test Procedures

EIRP Measurement:

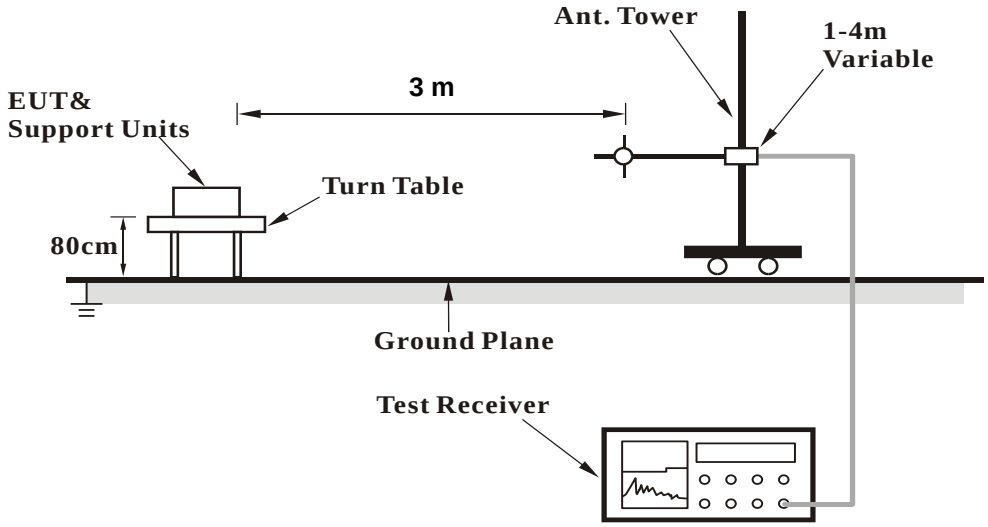
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value“ of step b. Record the power level of S.G.
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

Conducted Power Measurement:

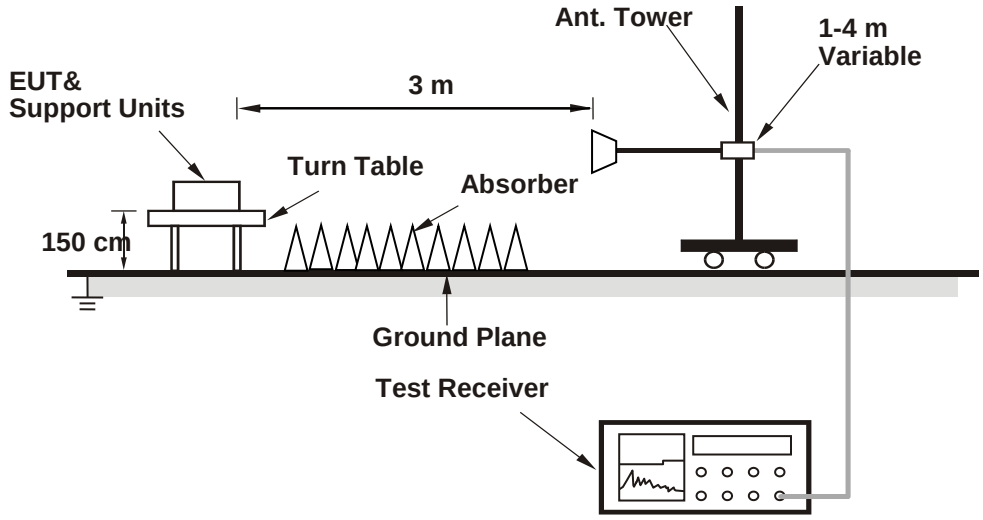
a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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 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	23.93	23.66	23.77	0	15M	QPSK	1	0	23.80	23.63	23.74	0
		1	50	23.78	23.60	23.65	0			1	37	23.70	23.49	23.54	0
		1	99	23.64	23.26	23.52	0			1	74	23.45	23.24	23.48	0
		50	0	22.85	22.50	22.66	1			36	0	22.75	22.46	22.56	1
		50	25	22.55	22.23	22.48	1			36	19	22.53	22.24	22.36	1
		50	50	22.51	22.23	22.38	1			36	39	22.39	22.20	22.32	1
		100	0	22.87	22.57	22.62	1			75	0	22.78	22.38	22.60	1
	16QAM	1	0	22.92	22.60	22.78	1		16QAM	1	0	22.82	22.46	22.60	1
		1	50	22.79	22.44	22.58	1			1	37	22.67	22.46	22.61	1
		1	99	22.51	22.27	22.36	1			1	74	22.55	22.27	22.39	1
		50	0	21.81	21.41	21.51	2			36	0	21.45	21.37	21.43	2
		50	25	21.54	21.22	21.46	2			36	19	21.47	21.27	21.31	2
		50	50	21.44	21.09	21.37	2			36	39	21.41	21.09	21.23	2
		100	0	21.72	21.34	21.64	2			75	0	21.70	21.44	21.53	2
	64QAM	1	0	21.75	21.64	21.66	2		64QAM	1	0	21.76	21.50	21.60	2
		1	50	21.64	21.55	21.57	2			1	37	21.64	21.37	21.65	2
		1	99	21.60	21.19	21.39	2			1	74	21.42	21.20	21.45	2
		50	0	20.59	20.34	20.43	3			36	0	20.40	20.14	20.53	3
		50	25	20.44	20.07	20.35	3			36	19	20.51	20.14	20.34	3
		50	50	20.40	20.04	20.30	3			36	39	20.50	20.22	20.38	3
		100	0	20.54	20.26	20.59	3			75	0	20.63	20.29	20.50	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	23.86	23.59	23.71	0	5M	QPSK	1	0	23.79	23.48	23.71	0
		1	24	23.62	23.40	23.53	0			1	12	23.74	23.40	23.50	0
		1	49	23.48	23.27	23.51	0			1	24	23.59	23.33	23.44	0
		25	0	22.75	22.43	22.58	1			12	0	22.58	22.32	22.54	1
		25	12	22.58	22.26	22.31	1			12	6	22.53	22.14	22.29	1
		25	25	22.38	22.13	22.36	1			12	13	22.39	22.03	22.29	1
		50	0	22.69	22.30	22.53	1			25	0	22.59	22.40	22.47	1
	16QAM	1	0	22.65	22.43	22.51	1		16QAM	1	0	22.46	22.22	22.28	1
		1	24	22.63	22.38	22.50	1			1	12	22.60	22.44	22.37	1
		1	49	22.47	22.28	22.40	1			1	24	22.40	22.24	22.29	1
		25	0	21.67	21.34	21.41	2			12	0	21.43	21.21	21.30	2
		25	12	21.52	21.21	21.39	2			12	6	21.37	21.07	21.20	2
		25	25	21.33	21.16	21.18	2			12	13	21.42	21.02	21.11	2
		50	0	21.69	21.30	21.60	2			25	0	21.48	21.21	21.43	2
	64QAM	1	0	21.77	21.48	21.49	2		64QAM	1	0	21.69	21.28	21.54	2
		1	24	21.68	21.36	21.42	2			1	12	21.55	21.28	21.37	2
		1	49	21.37	21.23	21.35	2			1	24	21.32	21.13	21.14	2
		25	0	20.37	20.12	20.24	3			12	0	20.62	20.14	20.21	3
		25	12	20.36	20.12	20.24	3			12	6	20.36	19.96	20.16	3
		25	25	20.26	20.15	20.22	3			12	13	20.24	20.07	20.15	3
		50	0	20.50	20.14	20.43	3			25	0	20.62	19.89	20.21	3

EIRP Power (dBm)

LTE Band 7							
Channel Bandwidth: 5 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	20775	2502.5	-18.48	38.52	20.04	100.93	H
	21100	2535.0	-17.96	38.36	20.40	109.65	
	21425	2567.5	-17.79	38.58	20.79	119.95	
	20775	2502.5	-14.20	38.92	24.72	296.48	V
	21100	2535.0	-14.47	39.26	24.79	301.30	
	21425	2567.5	-14.22	39.22	25.00	316.23	
Channel Bandwidth: 5 MHz / 16QAM							
Z	20775	2502.5	-19.53	38.52	18.99	79.25	H
	21100	2535.0	-19.00	38.36	19.36	86.30	
	21425	2567.5	-18.75	38.58	19.83	96.16	
	20775	2502.5	-15.19	38.92	23.73	236.05	V
	21100	2535.0	-15.43	39.26	23.83	241.55	
	21425	2567.5	-15.22	39.22	24.00	251.19	
Channel Bandwidth: 5 MHz / 64QAM							
Z	20775	2502.5	-20.55	38.52	17.97	62.66	H
	21100	2535.0	-20.07	38.36	18.29	67.45	
	21425	2567.5	-19.79	38.58	18.79	75.68	
	20775	2502.5	-16.25	38.92	22.67	184.93	V
	21100	2535.0	-16.52	39.26	22.74	187.93	
	21425	2567.5	-16.28	39.22	22.94	196.79	

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

LTE Band 7							
Channel Bandwidth: 10 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	20800	2505.0	-18.43	38.65	20.22	105.20	H
	21100	2535.0	-17.72	38.36	20.64	115.88	
	21400	2565.0	-17.39	38.49	21.10	128.82	
	20800	2505.0	-13.88	38.84	24.96	313.33	V
	21100	2535.0	-14.16	39.26	25.10	323.59	
	21400	2565.0	-13.89	39.10	25.21	331.89	
Channel Bandwidth: 10 MHz / 16QAM							
Z	20800	2505.0	-19.43	38.65	19.22	83.56	H
	21100	2535.0	-18.79	38.36	19.57	90.57	
	21400	2565.0	-18.36	38.49	20.13	103.04	
	20800	2505.0	-14.82	38.84	24.02	252.35	V
	21100	2535.0	-15.13	39.26	24.13	258.82	
	21400	2565.0	-14.89	39.10	24.21	263.63	
Channel Bandwidth: 10 MHz / 64QAM							
Z	20800	2505.0	-20.48	38.65	18.17	65.61	H
	21100	2535.0	-19.76	38.36	18.60	72.44	
	21400	2565.0	-19.40	38.49	19.09	81.10	
	20800	2505.0	-15.87	38.84	22.97	198.15	V
	21100	2535.0	-16.17	39.26	23.09	203.70	
	21400	2565.0	-15.85	39.10	23.25	211.35	

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

LTE Band 7							
Channel Bandwidth: 15 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	20825	2507.5	-18.01	38.52	20.51	112.46	H
	21100	2535.0	-17.55	38.36	20.81	120.50	
	21375	2562.5	-17.33	38.58	21.25	133.35	
	20825	2507.5	-13.73	38.92	25.19	330.37	V
	21100	2535.0	-13.94	39.26	25.32	340.41	
	21375	2562.5	-13.81	39.22	25.41	347.54	
Channel Bandwidth: 15 MHz / 16QAM							
Z	20825	2507.5	-19.01	38.52	19.51	89.33	H
	21100	2535.0	-18.48	38.36	19.88	97.27	
	21375	2562.5	-18.22	38.58	20.36	108.64	
	20825	2507.5	-14.71	38.92	24.21	263.63	V
	21100	2535.0	-14.91	39.26	24.35	272.27	
	21375	2562.5	-14.72	39.22	24.50	281.84	
Channel Bandwidth: 15 MHz / 64QAM							
Z	20825	2507.5	-20.09	38.52	18.43	69.66	H
	21100	2535.0	-19.51	38.36	18.85	76.74	
	21375	2562.5	-19.33	38.58	19.25	84.14	
	20825	2507.5	-15.69	38.92	23.23	210.38	V
	21100	2535.0	-16.03	39.26	23.23	210.38	
	21375	2562.5	-15.82	39.22	23.40	218.78	

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

LTE Band 7							
Channel Bandwidth: 20 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
Z	20850.0	2510.0	-16.60	38.52	21.92	155.60	H
	21100.0	2535.0	-16.11	38.36	22.25	167.88	
	21350.0	2560.0	-15.88	38.58	22.70	186.21	
	20850.0	2510.0	-12.33	38.92	26.59	456.04	V
	21100.0	2535.0	-12.56	39.26	26.70	467.74	
	21350.0	2560.0	-12.45	39.22	26.77	475.34	
Channel Bandwidth: 20 MHz / 16QAM							
Z	20850.0	2510.0	-18.79	38.52	19.73	93.97	H
	21100.0	2535.0	-18.29	38.36	20.07	101.62	
	21350.0	2560.0	-18.02	38.58	20.56	113.76	
	20850.0	2510.0	-14.46	38.92	24.46	279.25	V
	21100.0	2535.0	-14.68	39.26	24.58	287.08	
	21350.0	2560.0	-14.53	39.22	24.69	294.44	
Channel Bandwidth: 20 MHz / 64QAM							
Z	20850.0	2510.0	-19.78	38.52	18.74	74.82	H
	21100.0	2535.0	-19.34	38.36	19.02	79.80	
	21350.0	2560.0	-19.03	38.58	19.55	90.16	
	20850.0	2510.0	-15.44	38.92	23.48	222.84	V
	21100.0	2535.0	-15.71	39.26	23.55	226.46	
	21350.0	2560.0	-15.54	39.22	23.68	233.35	

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

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

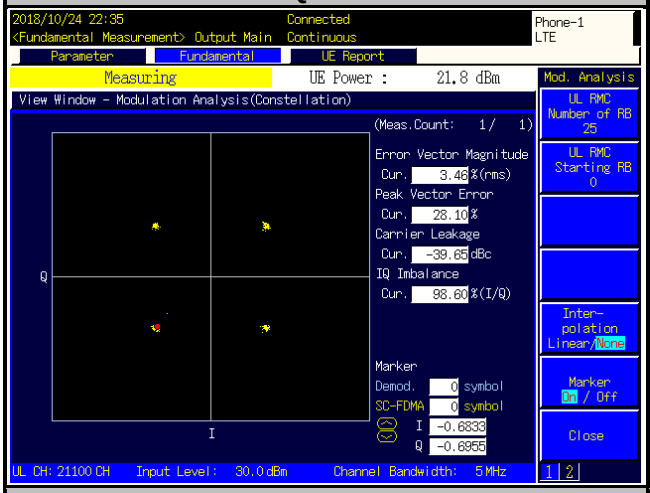
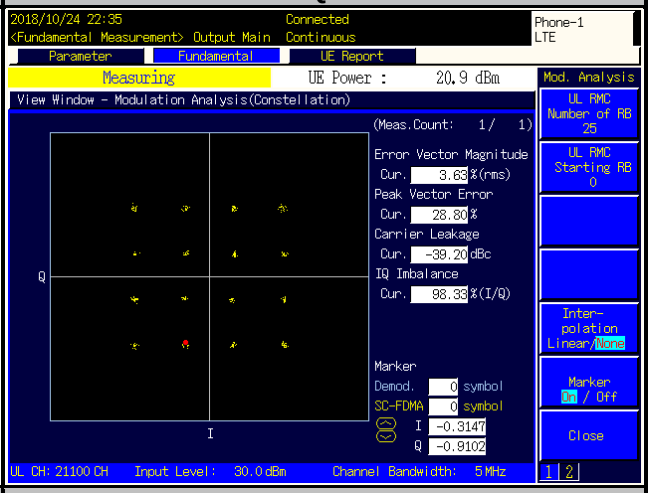
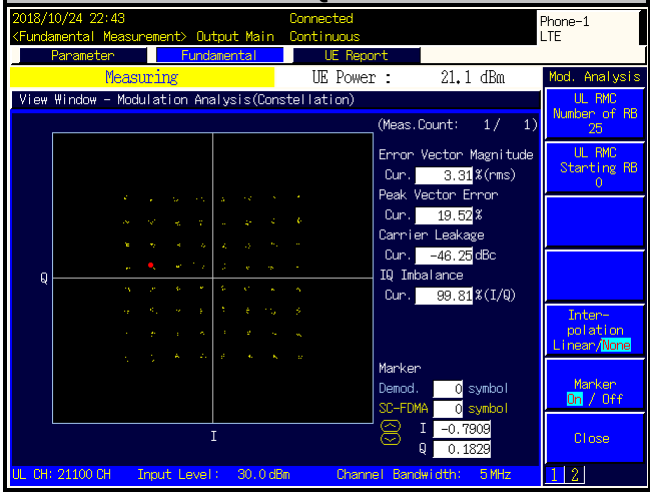
N/A

4.2.2 Test Setup

4.2.3 Test Procedure

Connect the EUT to Communication Simulator via the antenna connector. The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.2.4 Test Results

Spectrum Plot of Measurement	
LTE Band 7	
Channel 21110	
QPSK	16QAM
	
64QAM	
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

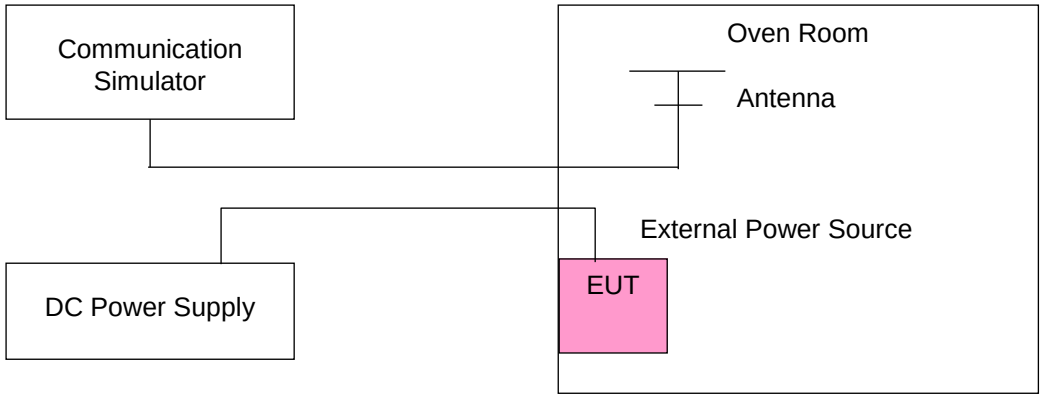
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary 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℃.

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 7				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	2502.500001	0.000	2567.500002	0.001	2.5
3.23	2502.500003	0.001	2567.500001	0.001	2.5
4.37	2502.500002	0.001	2567.500002	0.001	2.5

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2502.500004	0.001	2567.500003	0.001	2.5
-20	2502.500004	0.002	2567.500002	0.001	2.5
-10	2502.500001	0.000	2567.500002	0.001	2.5
0	2502.500001	0.000	2567.500002	0.001	2.5
10	2502.500004	0.001	2567.500004	0.001	2.5
20	2502.499999	0.000	2567.499998	-0.001	2.5
30	2502.499999	0.000	2567.499998	-0.001	2.5
40	2502.499997	-0.001	2567.499998	-0.001	2.5
50	2502.499996	-0.002	2567.499997	-0.001	2.5
60	2502.499996	-0.002	2567.499998	-0.001	2.5
70	2502.499997	-0.001	2567.499996	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	2505.000002	0.001	2565.000002	0.001	2.5
3.23	2505.000002	0.001	2565.000001	0.000	2.5
4.37	2505.000002	0.001	2565.000004	0.001	2.5

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2505.000003	0.001	2565.000003	0.001	2.5
-20	2505.000002	0.001	2565.000003	0.001	2.5
-10	2505.000004	0.001	2565.000004	0.001	2.5
0	2505.000003	0.001	2565.000003	0.001	2.5
10	2505.000001	0.001	2565.000002	0.001	2.5
20	2504.999997	-0.001	2564.999999	0.000	2.5
30	2504.999999	-0.001	2564.999999	0.000	2.5
40	2504.999997	-0.001	2564.999996	-0.002	2.5
50	2504.999997	-0.001	2564.999998	-0.001	2.5
60	2504.999999	0.000	2564.999997	-0.001	2.5
70	2504.999998	-0.001	2564.999997	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	2507.500003	0.001	2562.500002	0.001	2.5
3.23	2507.500001	0.000	2562.500002	0.001	2.5
4.37	2507.500004	0.002	2562.500003	0.001	2.5

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2507.500002	0.001	2562.500003	0.001	2.5
-20	2507.500004	0.002	2562.500002	0.001	2.5
-10	2507.500004	0.002	2562.500004	0.001	2.5
0	2507.500004	0.002	2562.500002	0.001	2.5
10	2507.500002	0.001	2562.500001	0.000	2.5
20	2507.499997	-0.001	2562.499997	-0.001	2.5
30	2507.499997	-0.001	2562.499997	-0.001	2.5
40	2507.499999	-0.001	2562.499997	-0.001	2.5
50	2507.499997	-0.001	2562.499998	-0.001	2.5
60	2507.499997	-0.001	2562.499998	-0.001	2.5
70	2507.499998	-0.001	2562.499997	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	2510.000003	0.001	2560.000003	0.001	2.5
3.23	2510.000002	0.001	2560.000001	0.000	2.5
4.37	2510.000003	0.001	2560.000002	0.001	2.5

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

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2510.000003	0.001	2560.000002	0.001	2.5
-20	2510.000004	0.001	2560.000001	0.000	2.5
-10	2510.000002	0.001	2560.000002	0.001	2.5
0	2510.000004	0.001	2560.000001	0.000	2.5
10	2510.000001	0.001	2560.000003	0.001	2.5
20	2509.999998	-0.001	2559.999997	-0.001	2.5
30	2509.999998	-0.001	2559.999997	-0.001	2.5
40	2509.999997	-0.001	2559.999997	-0.001	2.5
50	2509.999996	-0.001	2559.999997	-0.001	2.5
60	2509.999996	-0.002	2559.999998	-0.001	2.5
70	2509.999998	-0.001	2559.999996	-0.002	2.5

4.4 Occupied Bandwidth Measurement

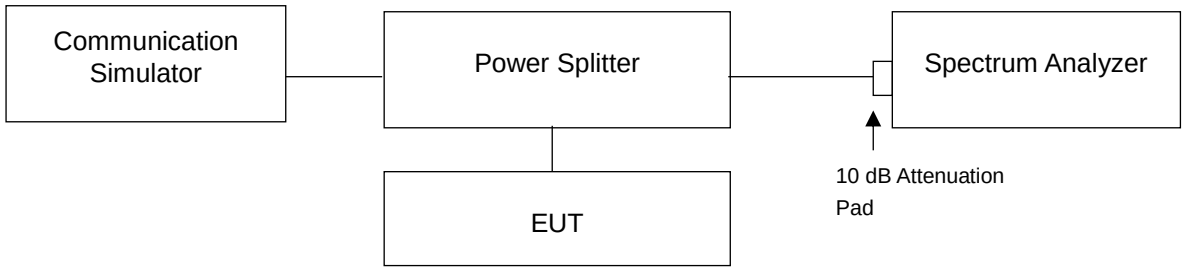
4.4.1 Limits of Occupied Bandwidth Measurement

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

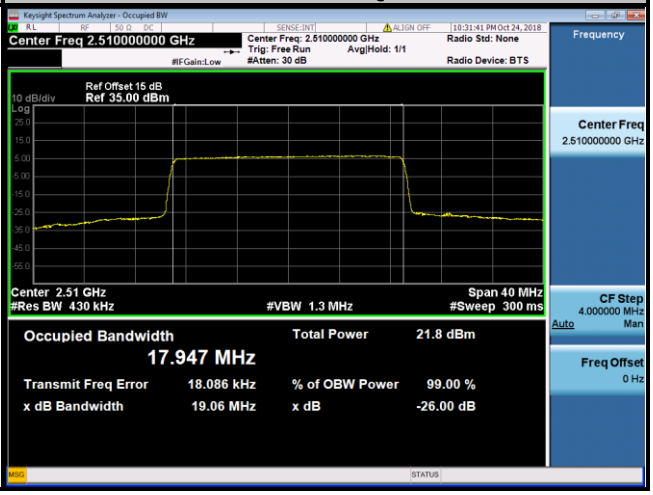


4.4.4 Test Results

LTE Band 7									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20775	2502.5	4.4923	4.4911	4.4923	20800	2505.0	8.9522	8.9601	8.9536
21100	2535.0	4.4919	4.4933	4.4963	21100	2535.0	8.9569	8.9562	8.9556
21425	2567.5	4.4895	4.4878	4.4934	21400	2565.0	8.9435	8.9439	8.9427

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

LTE Band 7									
Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20825	2507.5	13.448	13.447	13.442	20850	2510.0	17.916	17.942	17.947
21100	2535.0	13.450	13.439	13.432	21100	2535.0	17.889	17.926	17.919
21375	2562.5	13.429	13.414	13.409	21350	2560.0	17.863	17.885	17.888

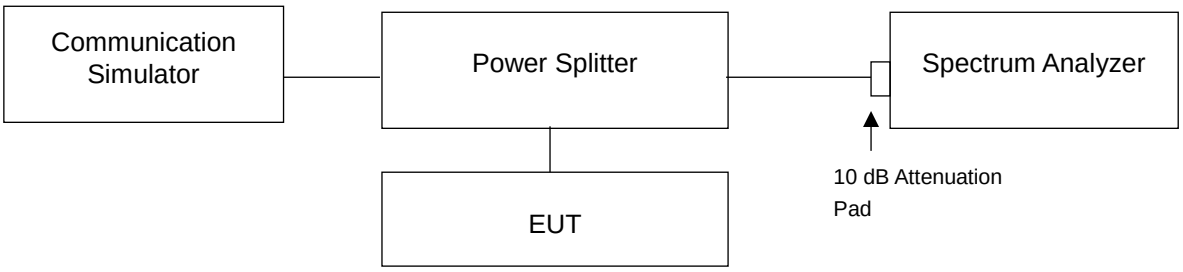
Spectrum Plot of Worst Value	
15 MHz / QPSK	20 MHz / 64QAM
	

4.5 Out-of-Band Emissions Measurement

4.5.1 Limits of Out-of-Band Emissions Measurement

According to FCC 27.53(l)(4) 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.

4.5.2 Test Setup

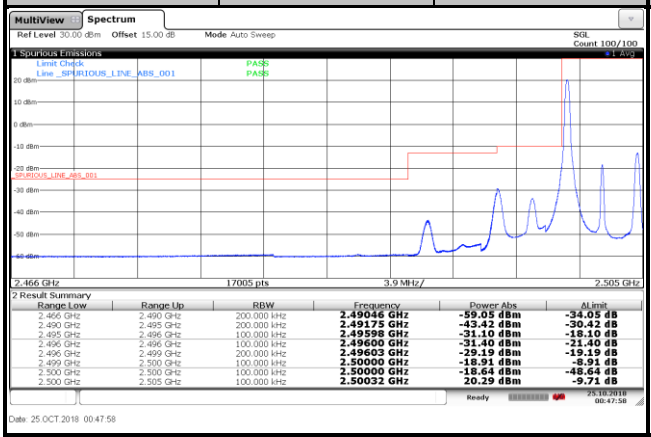


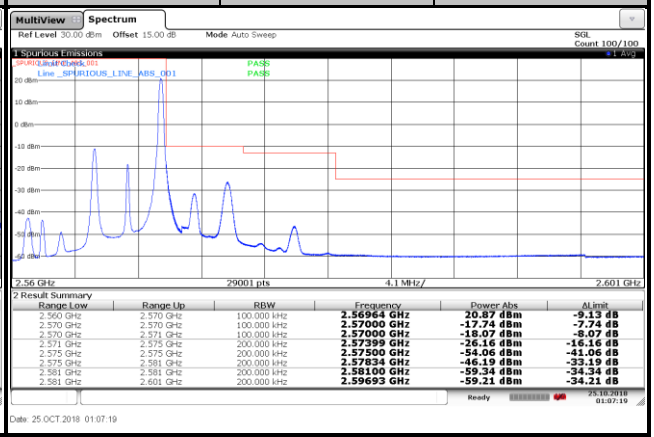
4.5.3 Test Procedures

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 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.

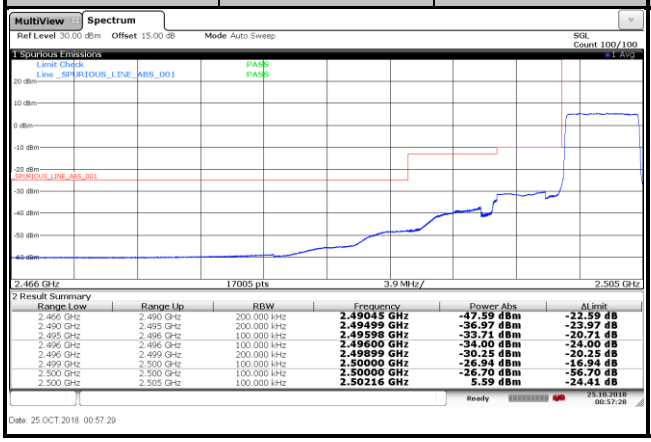
4.5.4 Test Results

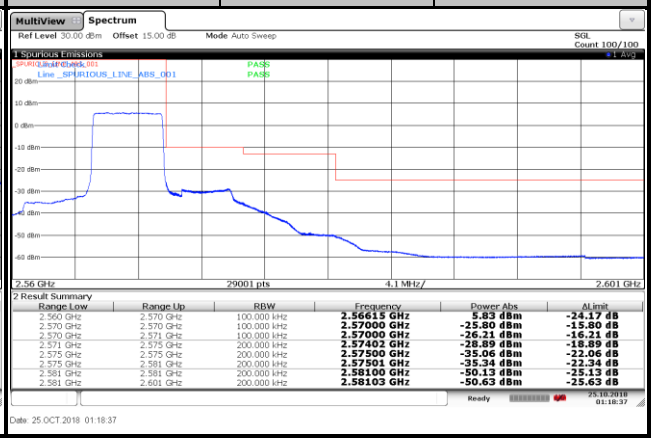
LTE Band 7					
Channel Bandwidth: 5 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20775	1 RB	Channel	21425	1 RB



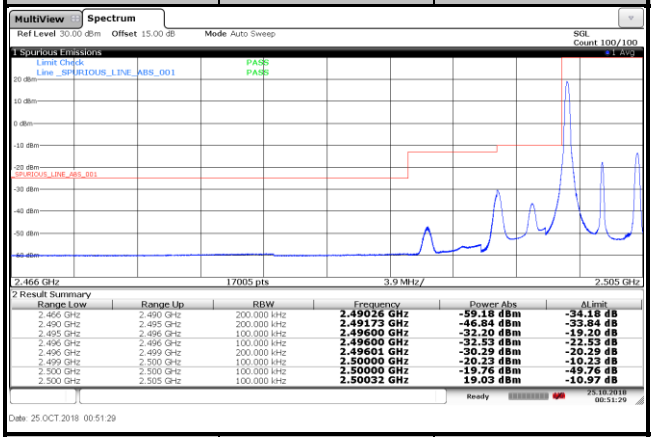


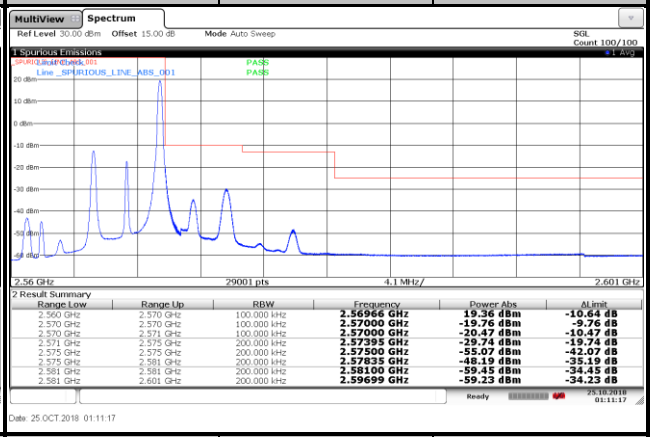
Channel	20775	25 RB	Channel	21425	25 RB



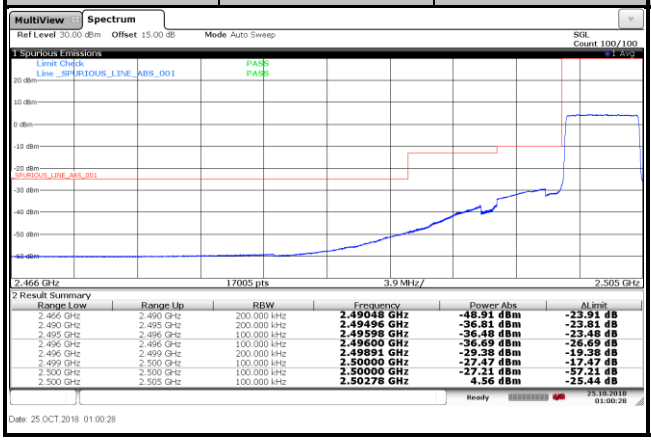


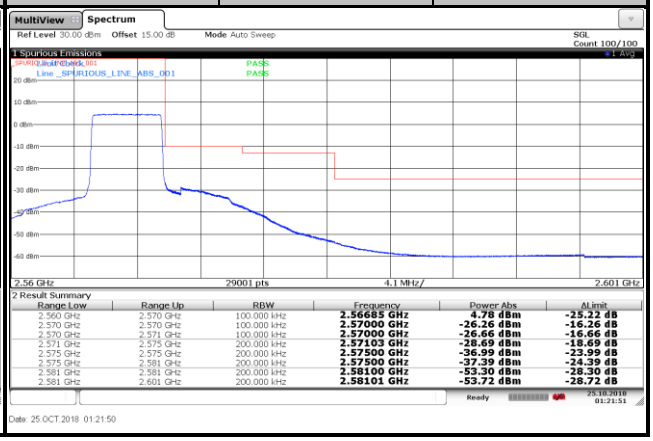
LTE Band 7					
Channel Bandwidth: 5 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	20775	1 RB	Channel	21425	1 RB



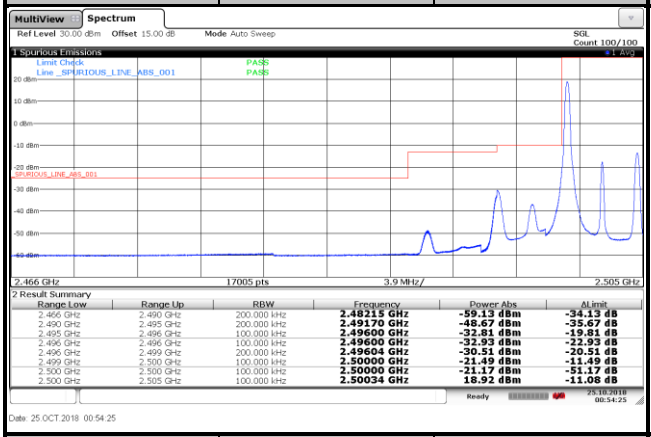


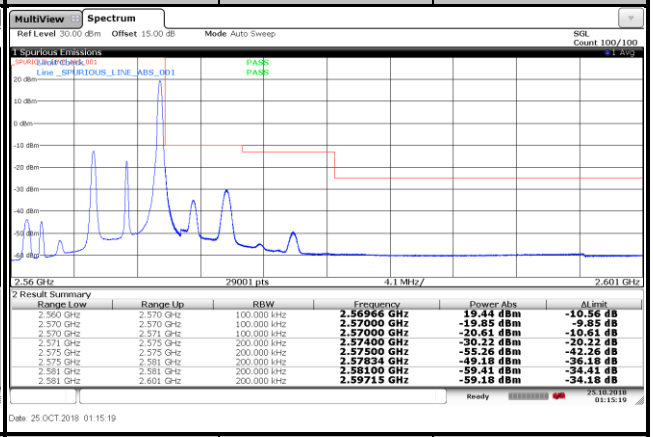
Channel	20775	25 RB	Channel	21425	25 RB



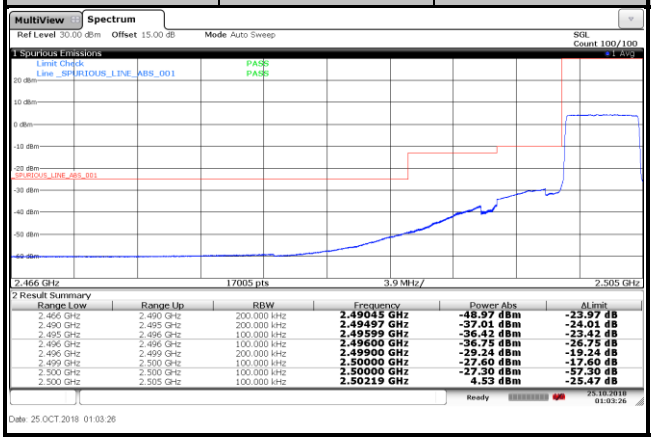


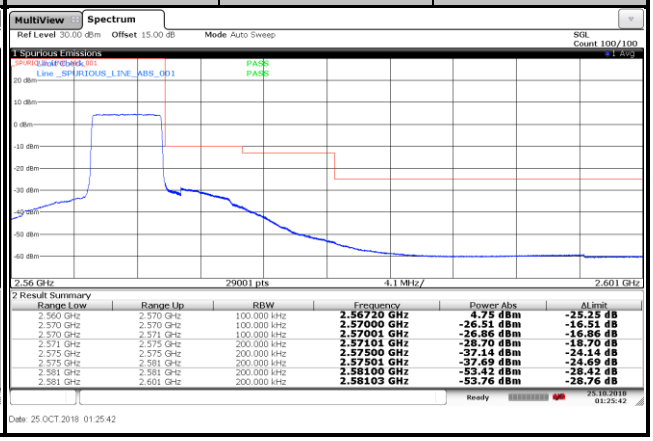
LTE Band 7					
Channel Bandwidth: 5 MHz / 64QAM					
<Out-of-Band Emissions>					
Channel	20775	1 RB	Channel	21425	1 RB



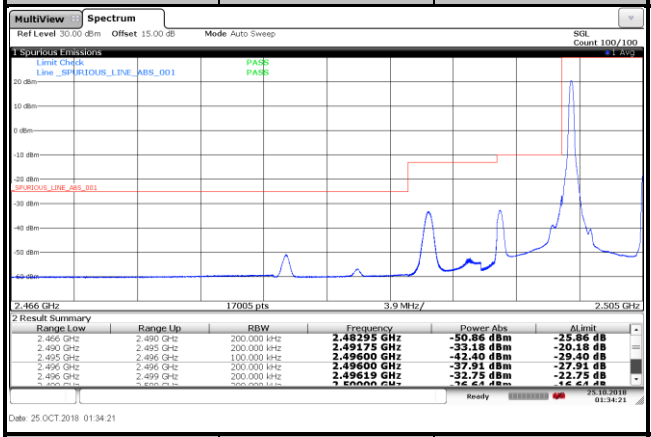


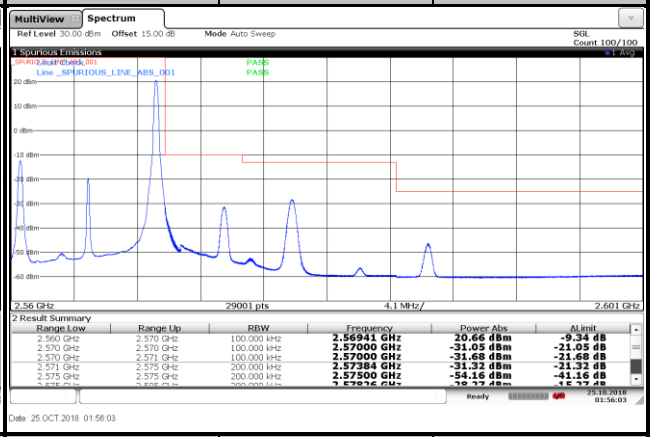
Channel	20775	25 RB	Channel	21425	25 RB

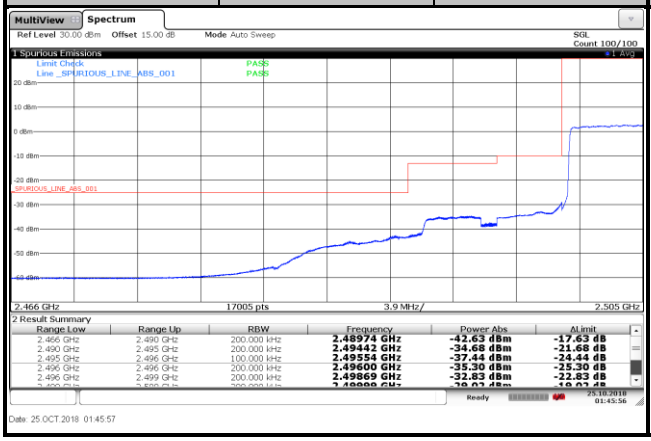


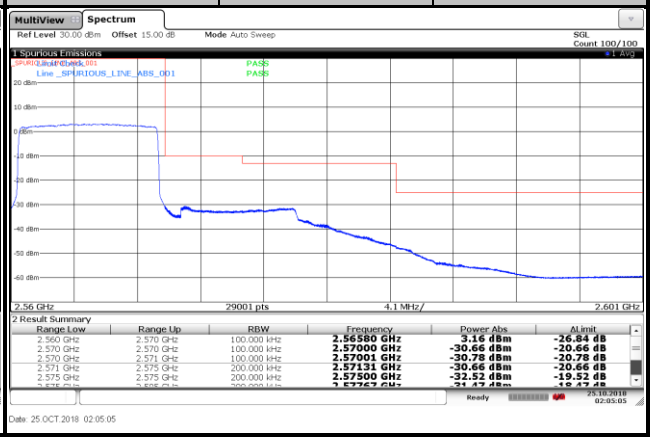


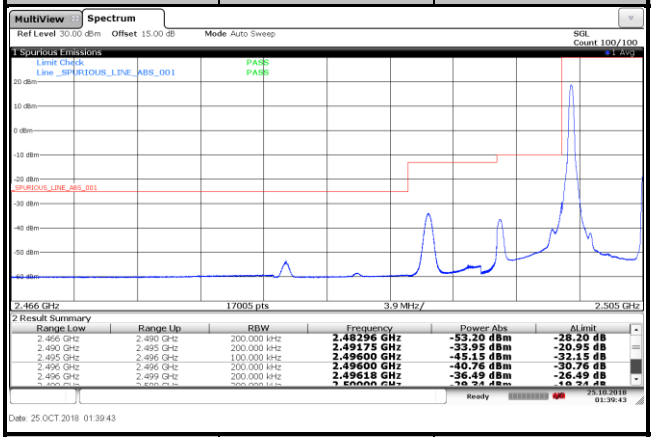
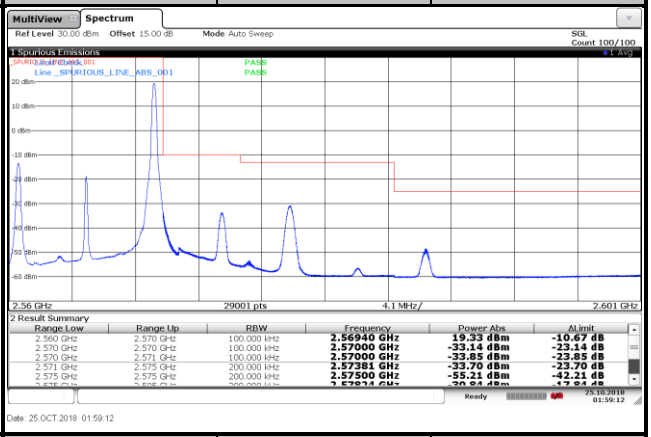
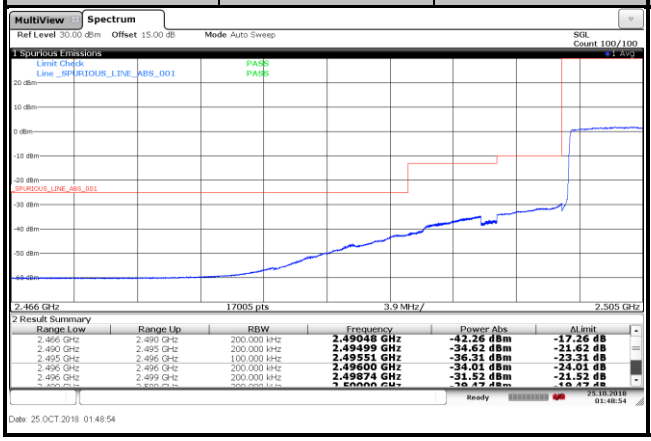
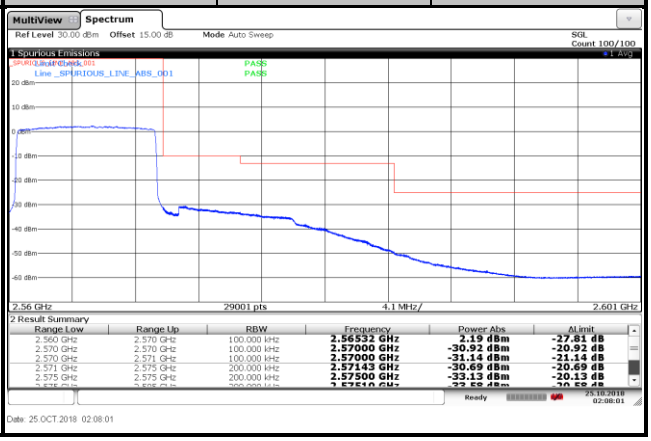
LTE Band 7					
Channel Bandwidth: 10 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20800	1 RB	Channel	21400	1 RB
Channel	20800	50 RB	Channel	21400	50 RB



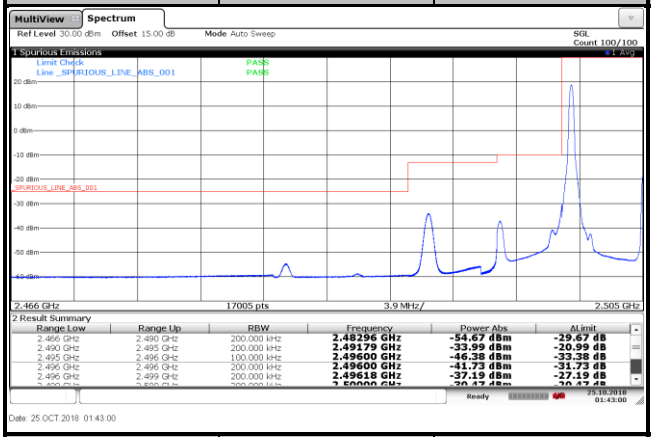


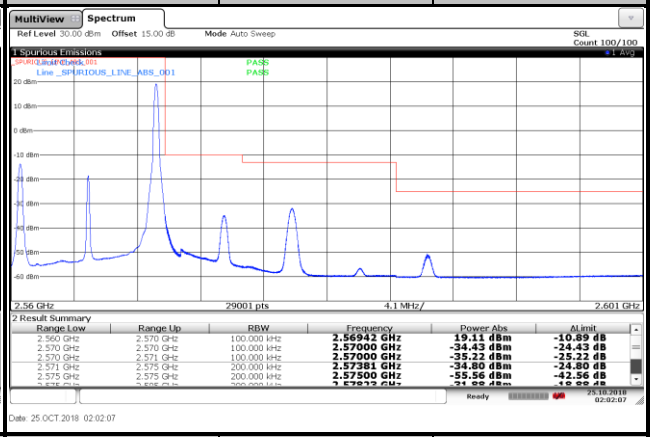


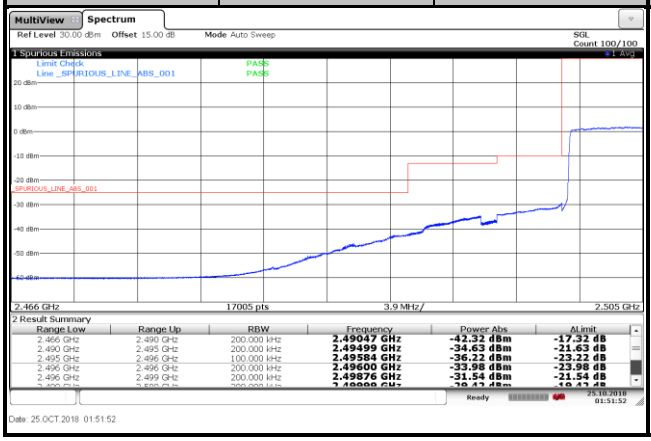


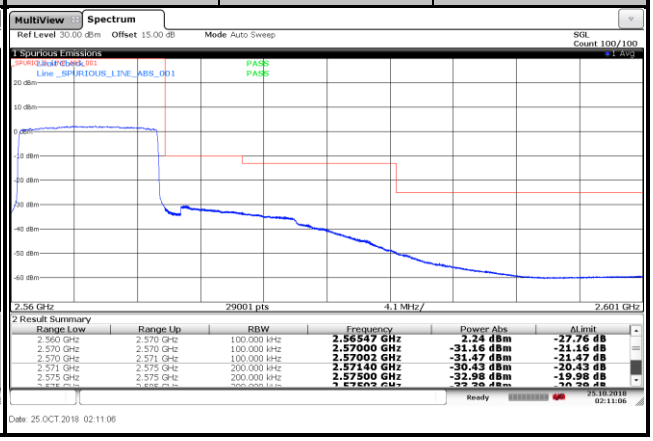
LTE Band 7					
Channel Bandwidth: 10 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	20800	1 RB	Channel	21400	1 RB
					
Channel	20800	50 RB	Channel	21400	50 RB
					

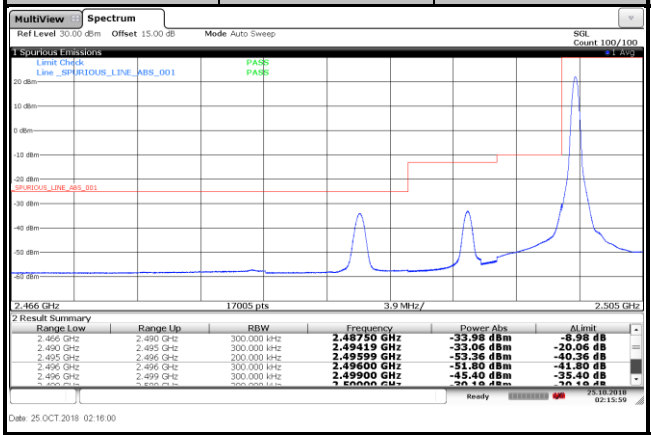
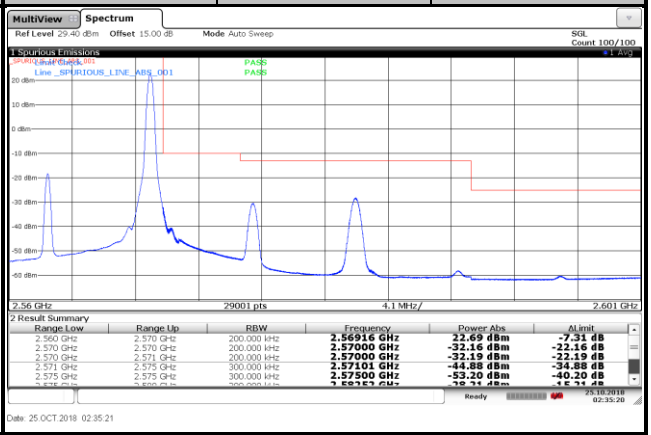
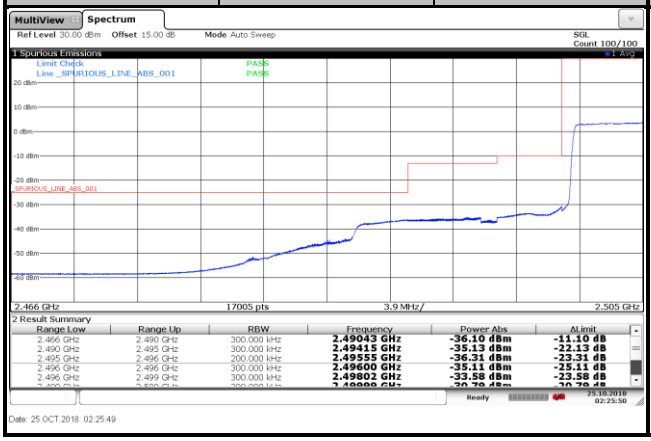
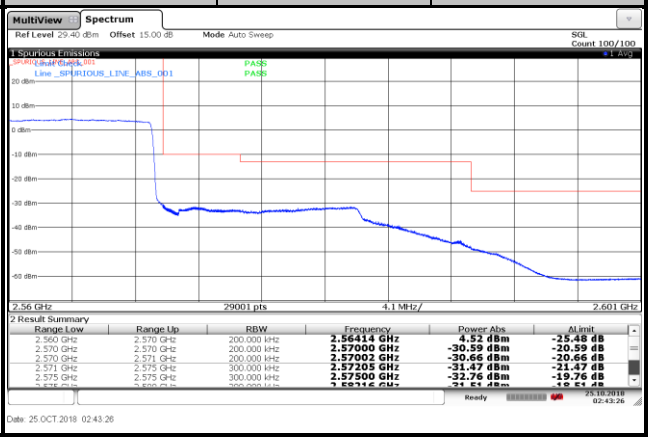
LTE Band 7					
Channel Bandwidth: 10 MHz / 64QAM					
<Out-of-Band Emissions>					
Channel	20800	1 RB	Channel	21400	1 RB
Channel	20800	50 RB	Channel	21400	50 RB

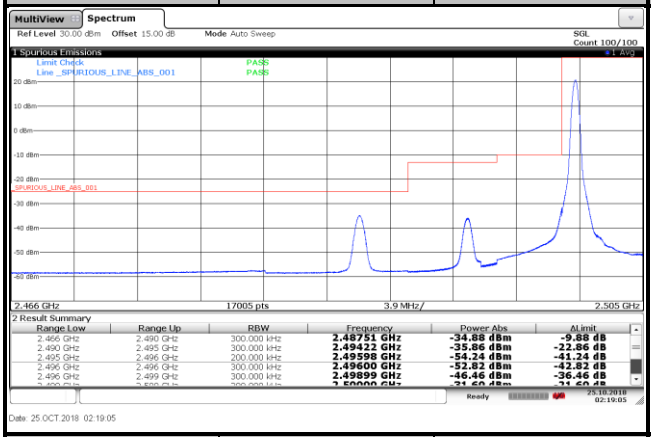
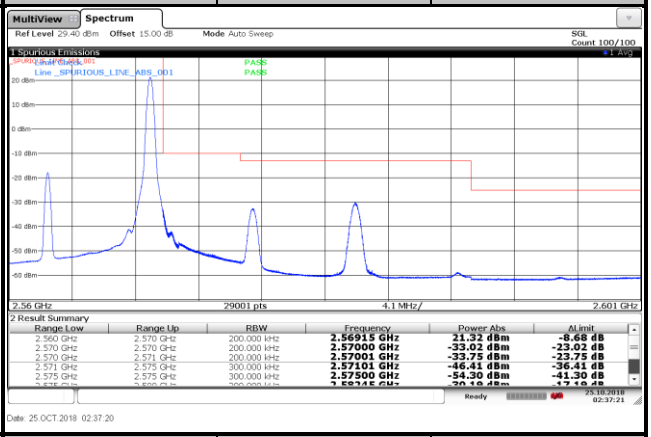
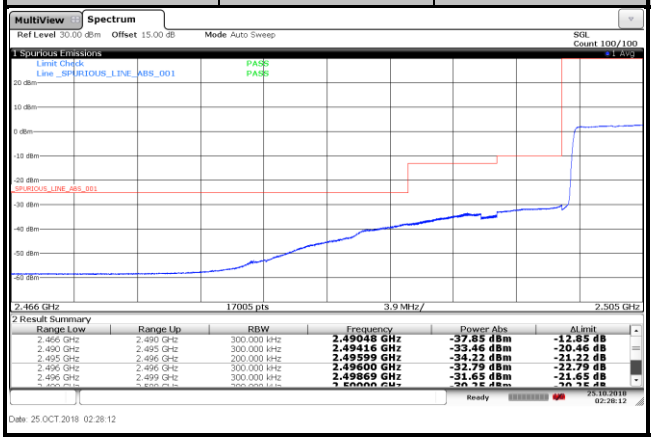
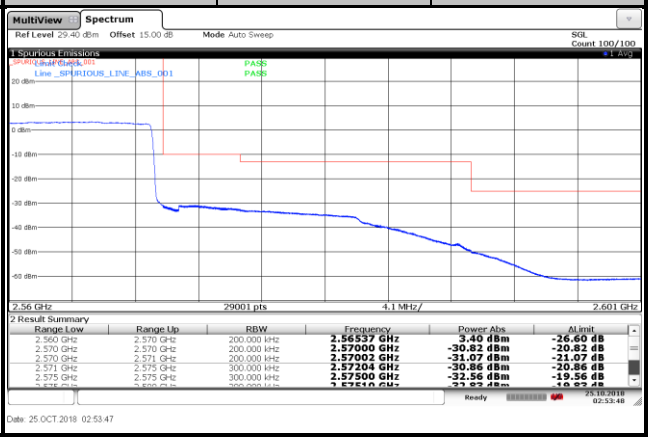


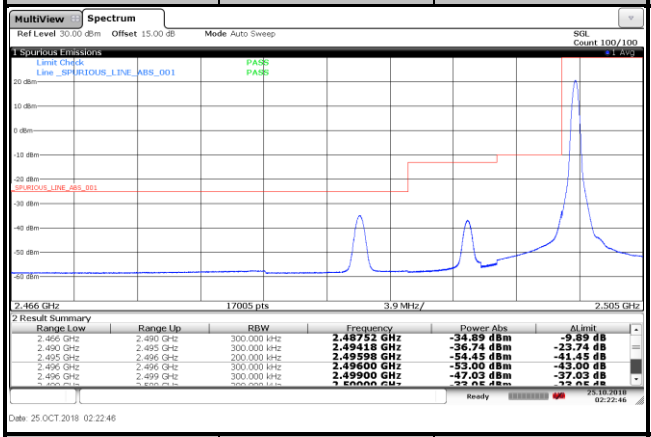
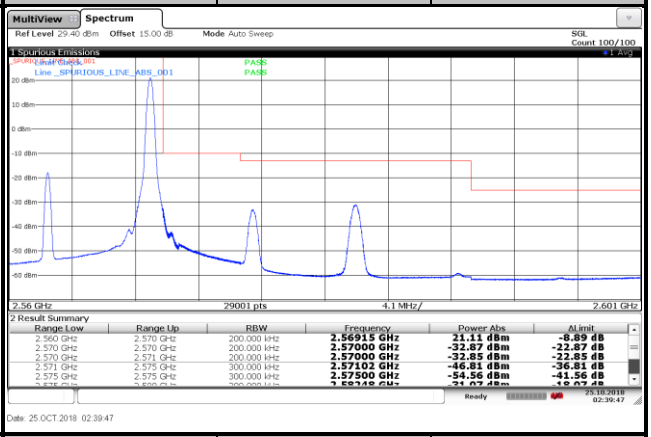
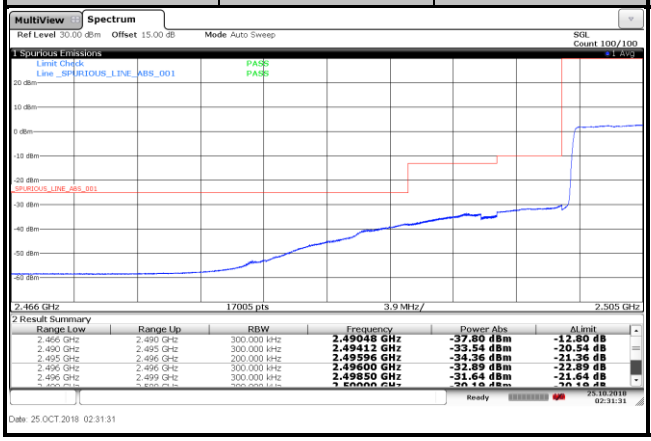
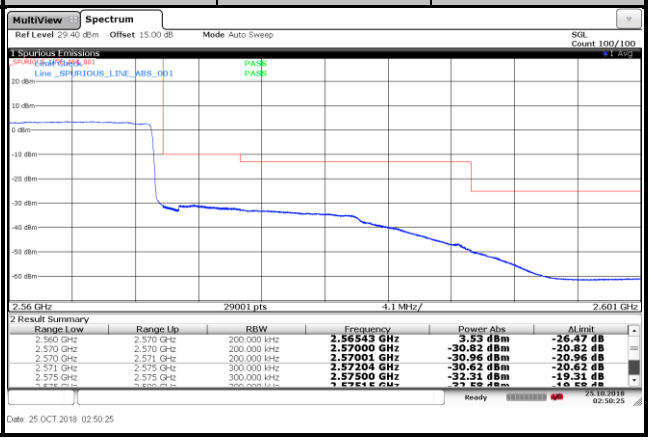


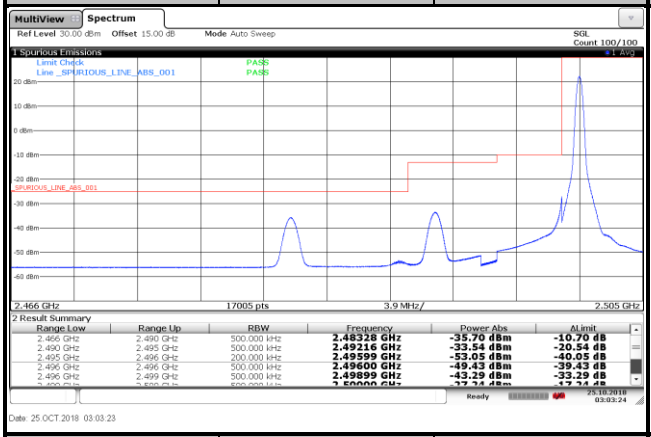
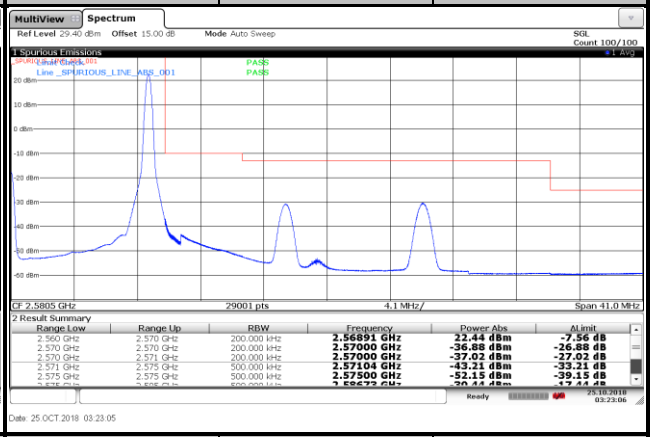
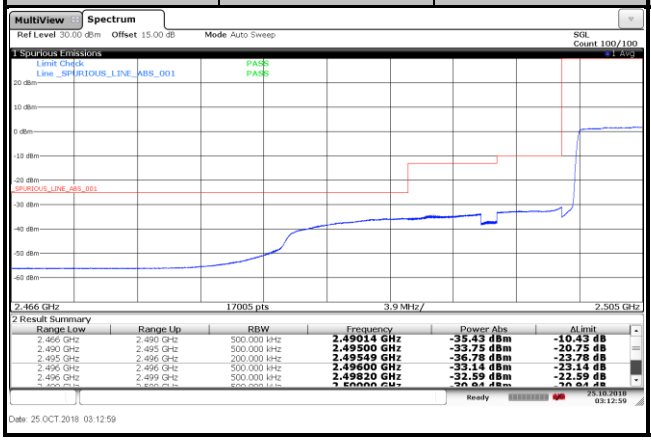
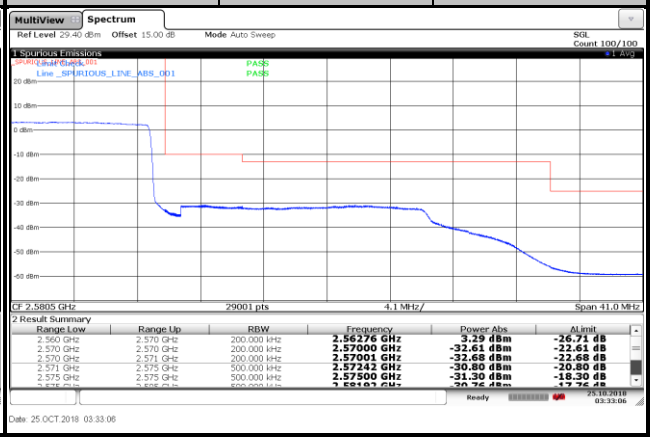


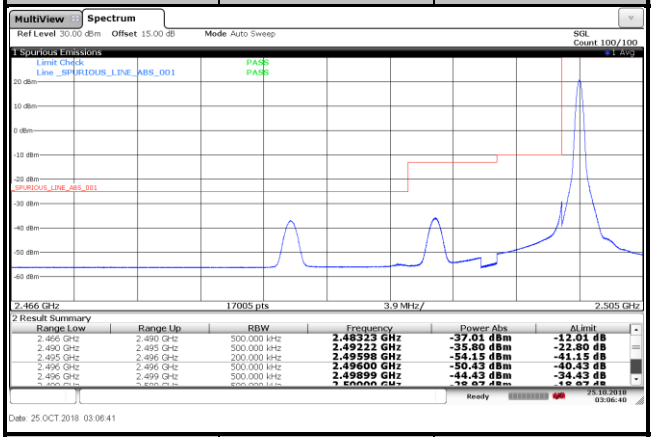
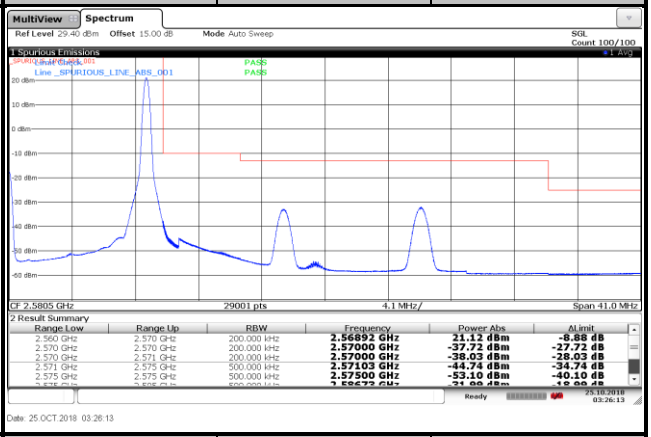
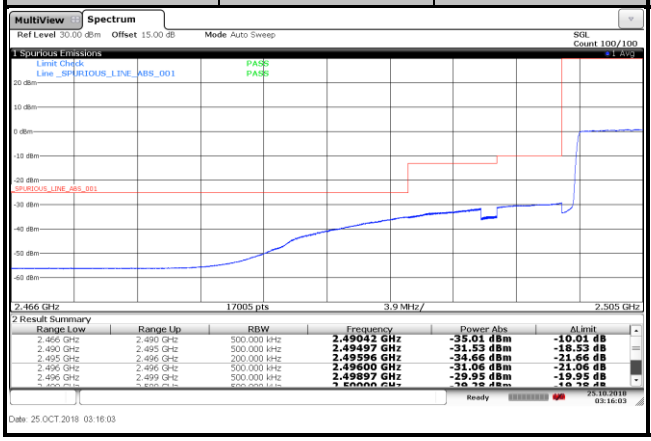
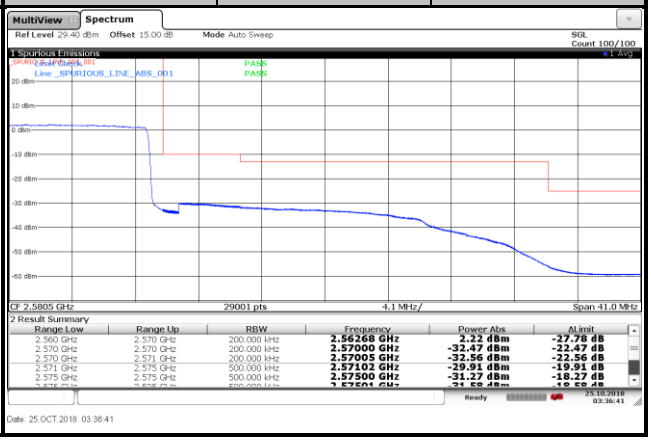


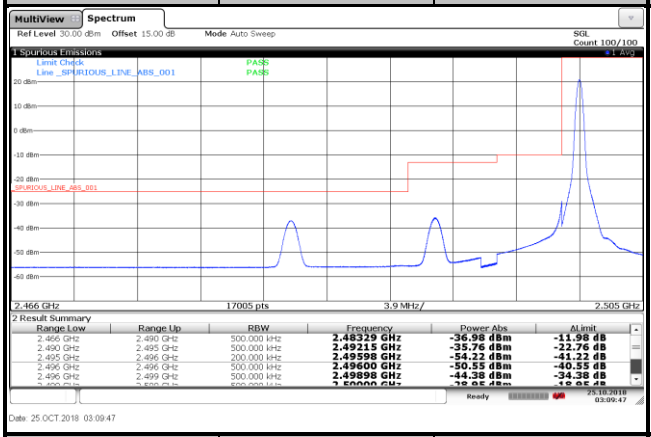
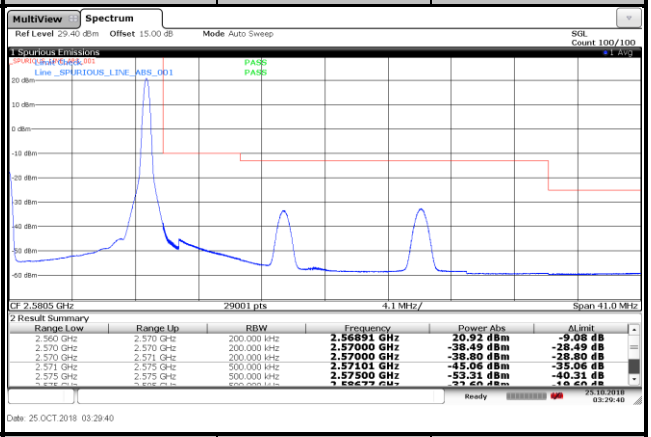
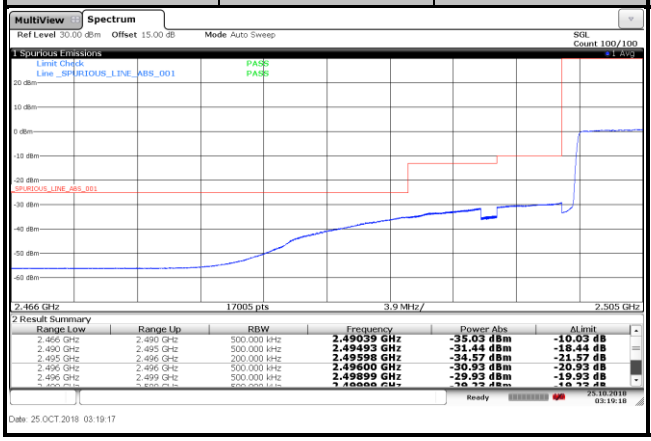
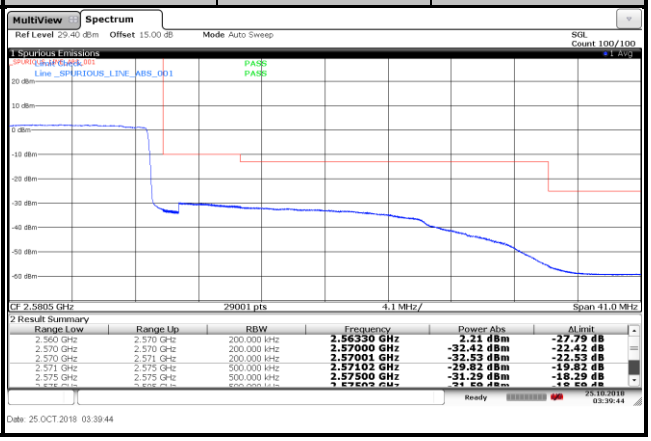
LTE Band 7					
Channel Bandwidth: 15 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20825	1 RB	Channel	21375	1 RB
					
Channel	20825	75 RB	Channel	21375	75 RB
					

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
					

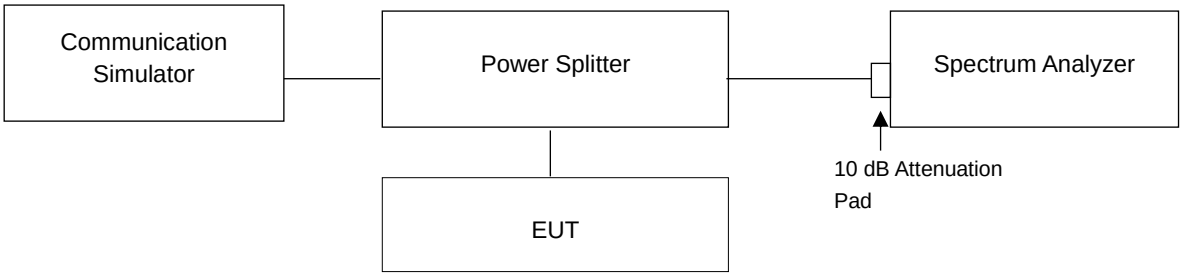
LTE Band 7					
Channel Bandwidth: 20 MHz / 64QAM					
<Out-of-Band Emissions>					
Channel	20850	1 RB	Channel	21350	1 RB
					
Channel	20850	100 RB	Channel	21350	100 RB
					

4.6 Peak to Average Ratio

4.6.1 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.

4.6.2 Test Setup



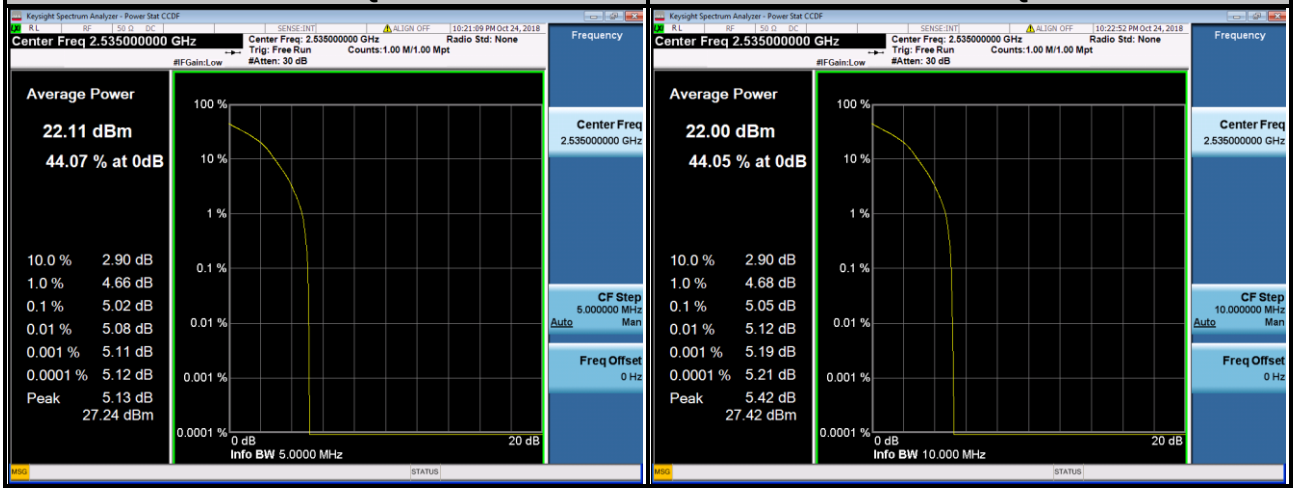
4.6.3 Test Procedures

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 %.

4.6.4 Test Results

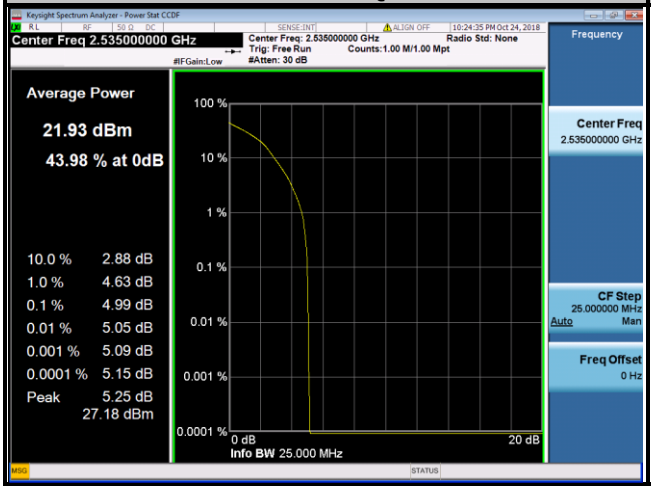
LTE Band 7									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20775	2502.5	3.62	4.64	4.82	20800	2505.0	3.59	4.80	4.82
21100	2535.0	3.96	4.96	5.02	21100	2535.0	3.77	4.82	5.05
21425	2567.5	3.45	4.57	4.55	21400	2565.0	3.55	4.61	4.69

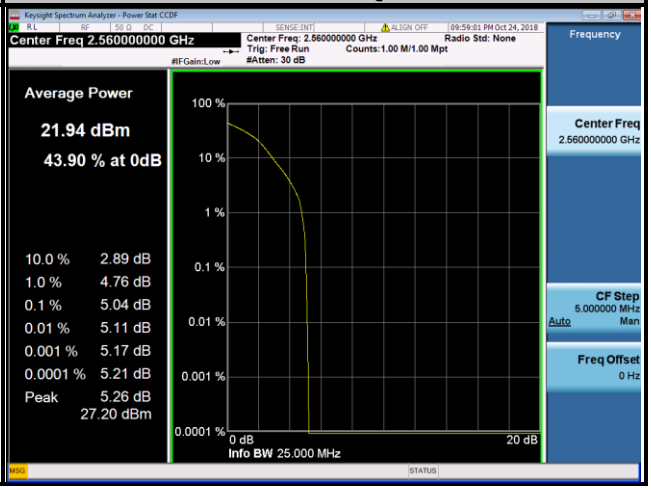
Spectrum Plot of Worst Value	
5 MHz / 64QAM	10 MHz / 64QAM



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	3.52	4.64	4.72	20850	2510.0	3.56	4.78	4.82
21100	2535.0	3.95	4.76	4.99	21100	2535.0	3.96	4.80	4.96
21375	2562.5	3.66	4.70	4.64	21350	2560.0	3.69	5.04	5.02

Spectrum Plot of Worst Value	
15 MHz / 64QAM	20 MHz / 16QAM



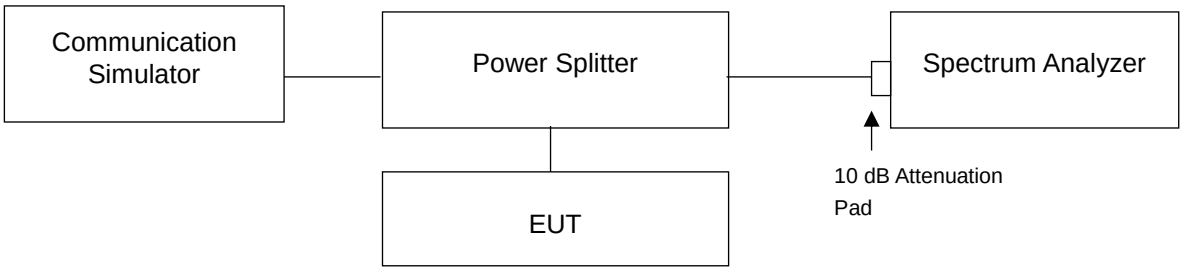


4.7 Conducted Spurious Emissions

4.7.1 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.

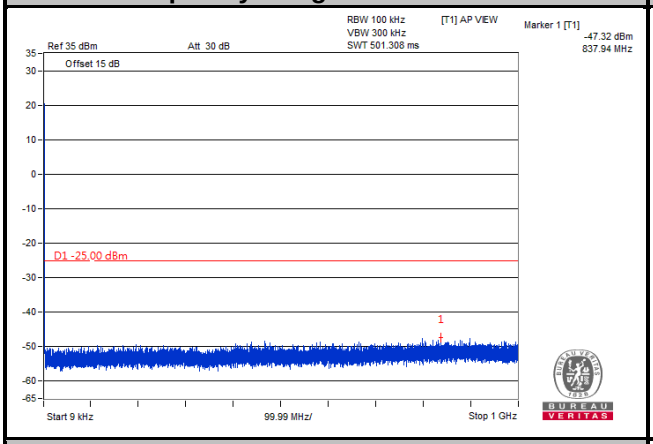
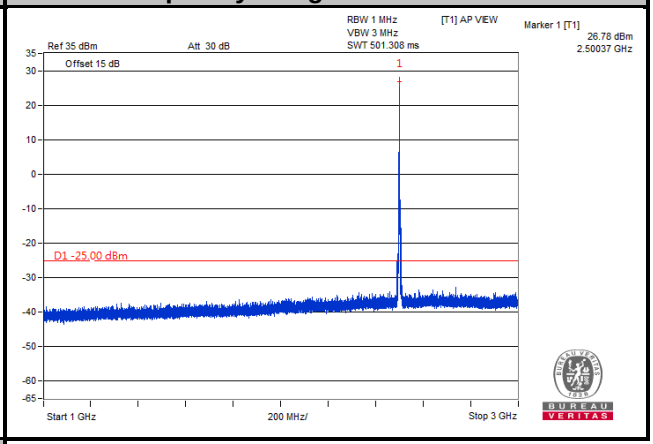
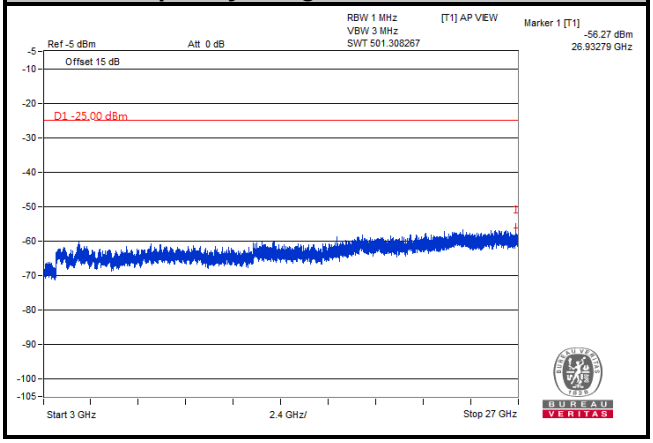
4.7.2 Test Setup



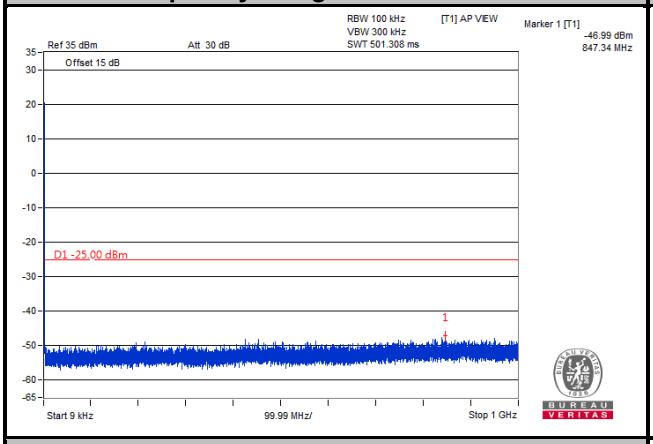
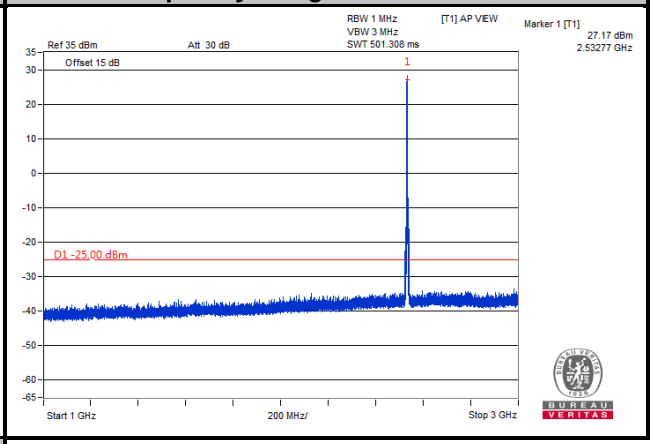
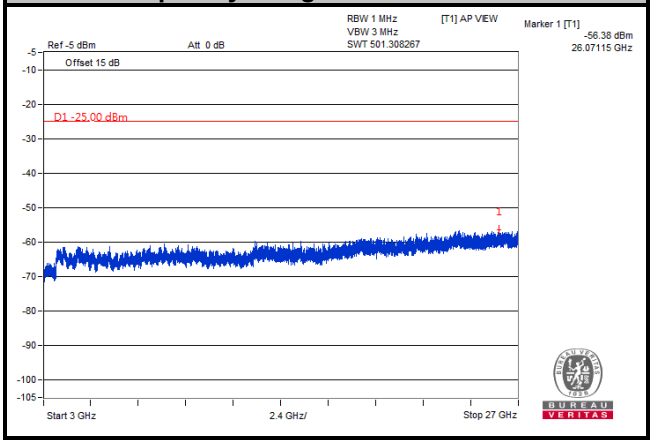
4.7.3 Test Procedure

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 = 100 kHz and VBW = 300 kHz are used for conducted emission measurement.
c. Measuring frequency range is from 1 GHz to 27 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.

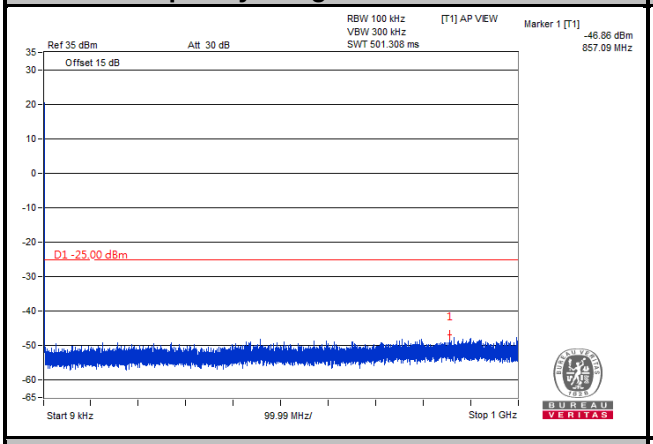
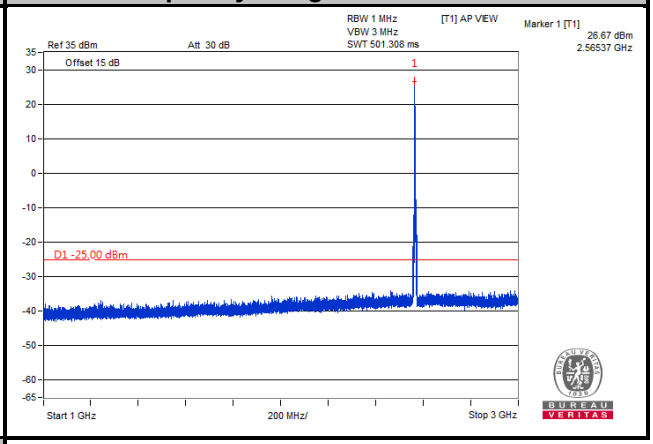
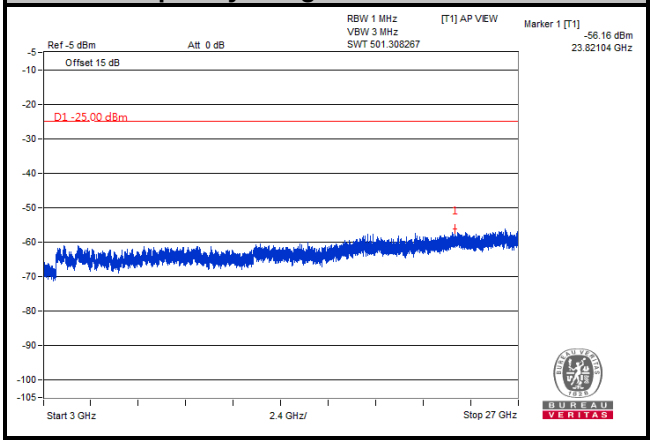
4.7.4 Test Results

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 ~ 27 GHz	
	

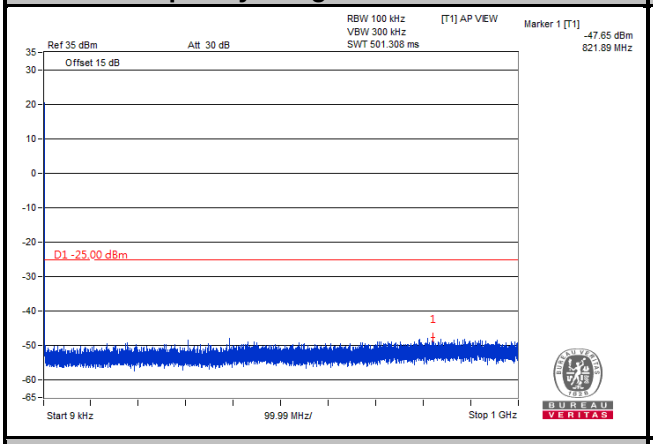
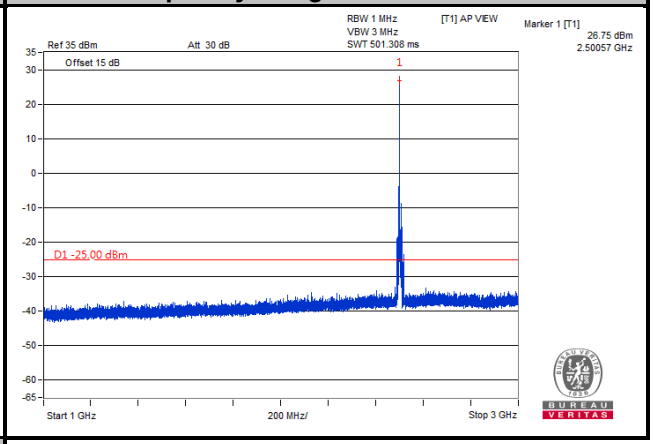
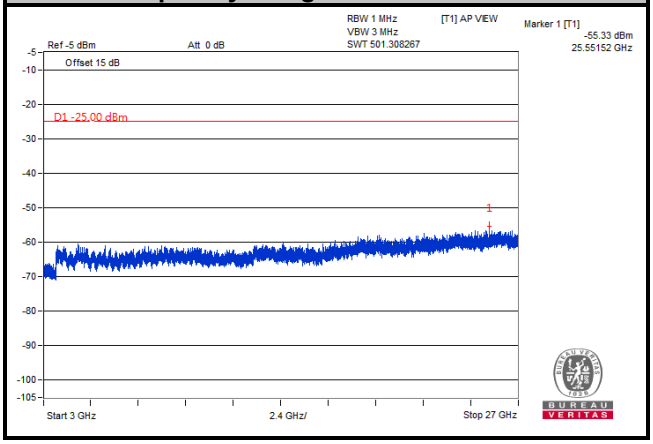
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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 ~ 27 GHz	
	

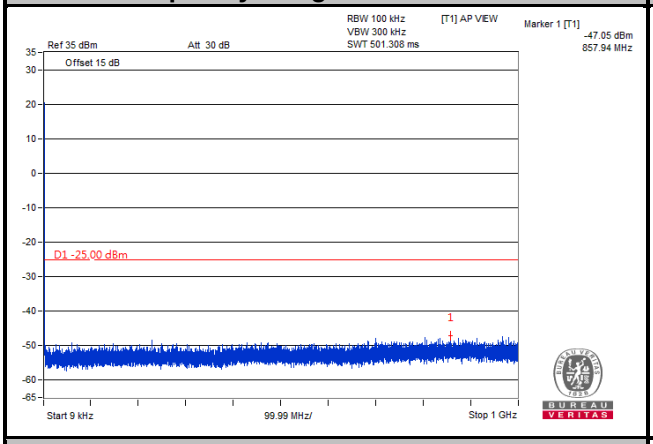
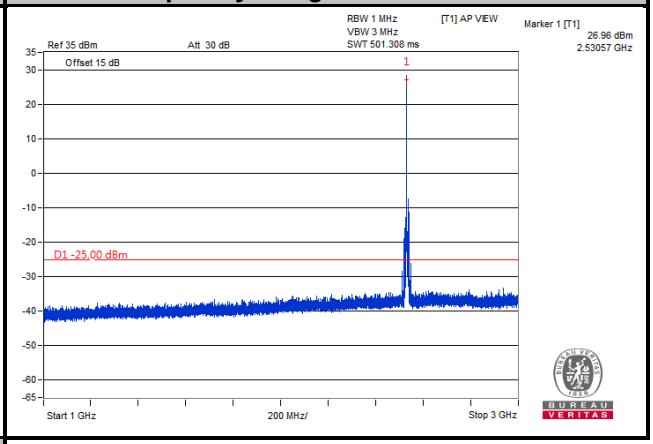
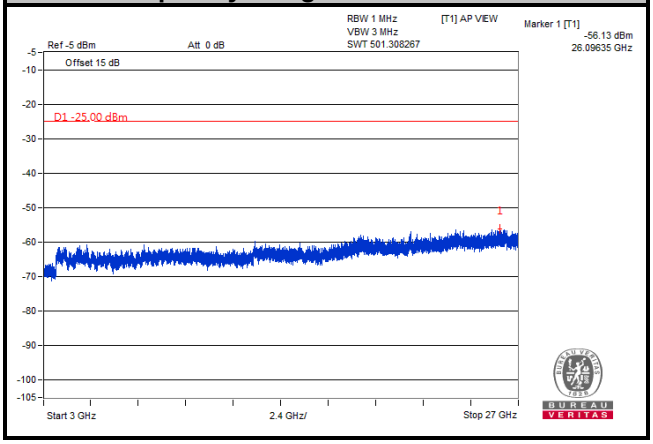
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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 ~ 27 GHz	
	

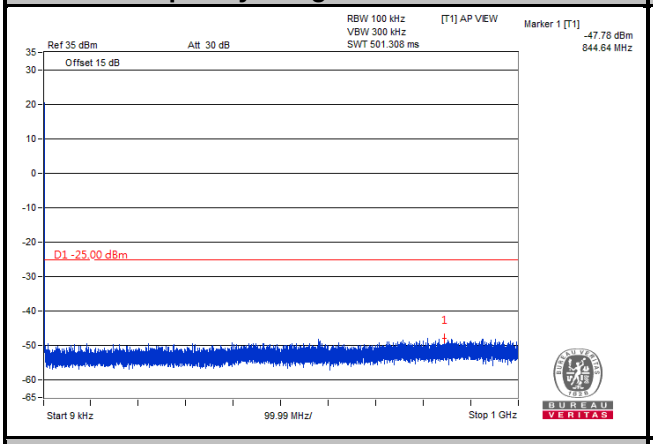
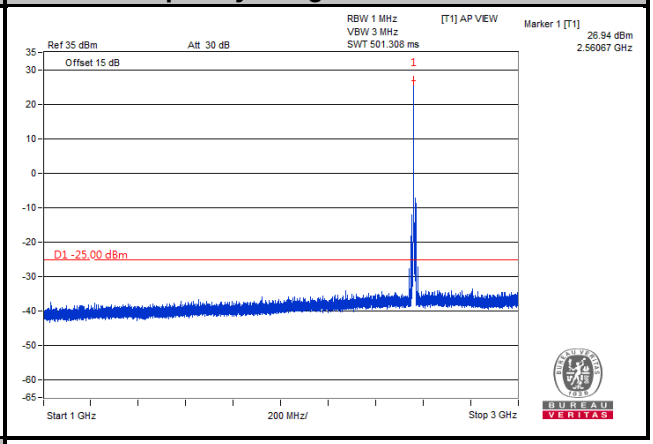
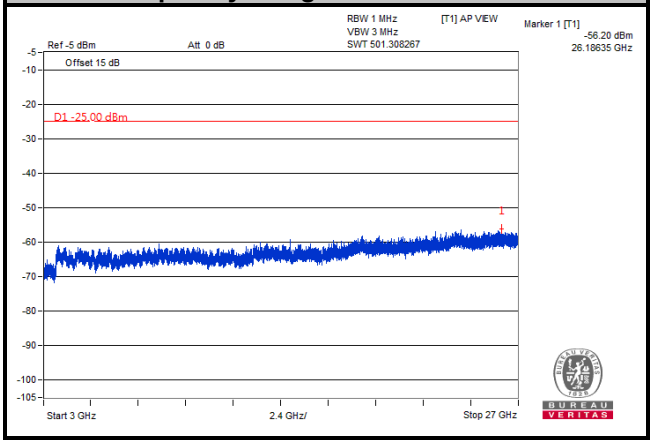
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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 ~ 27 GHz	
	

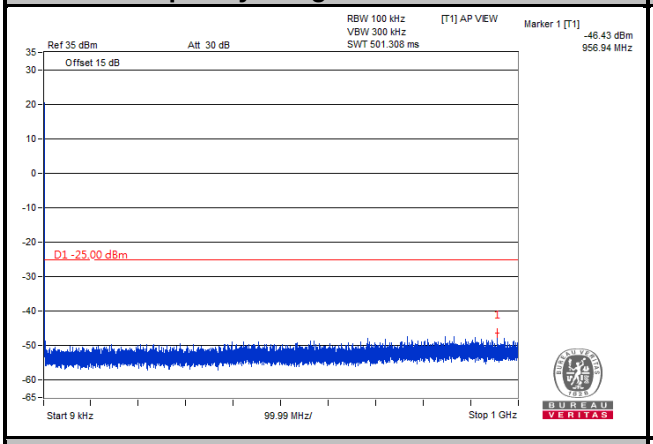
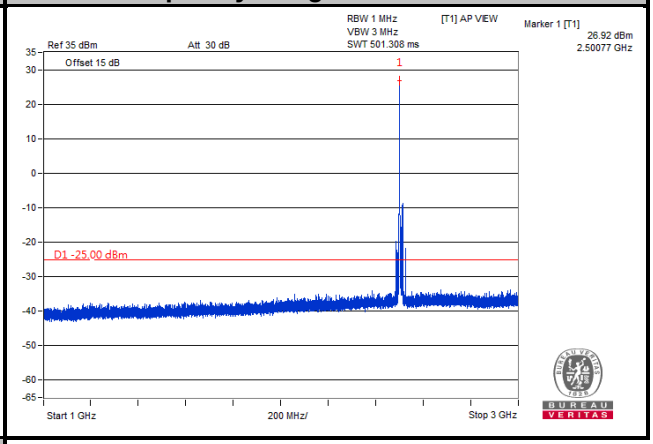
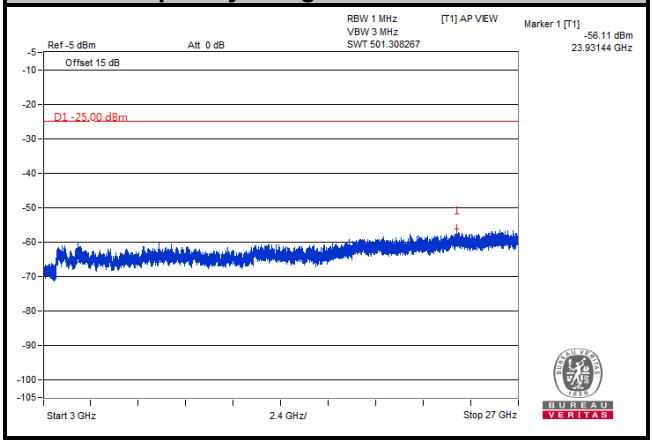
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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 ~ 27 GHz	
	

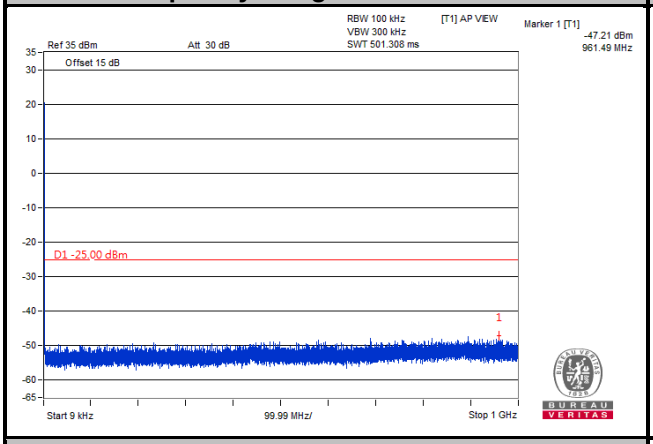
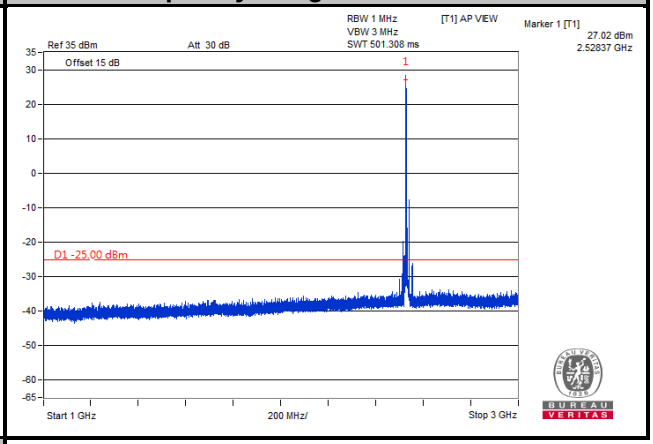
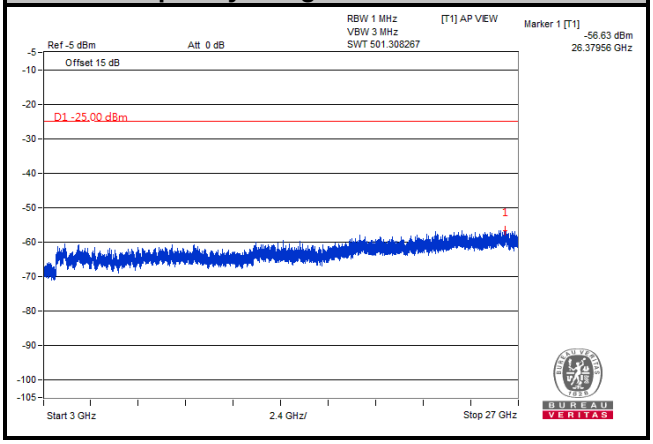
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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 ~ 27 GHz	
	

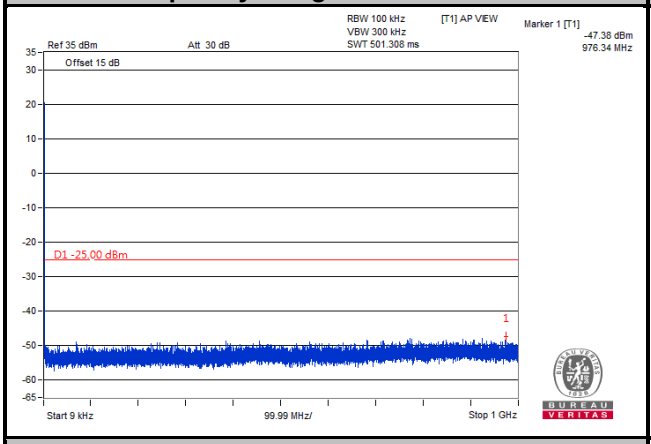
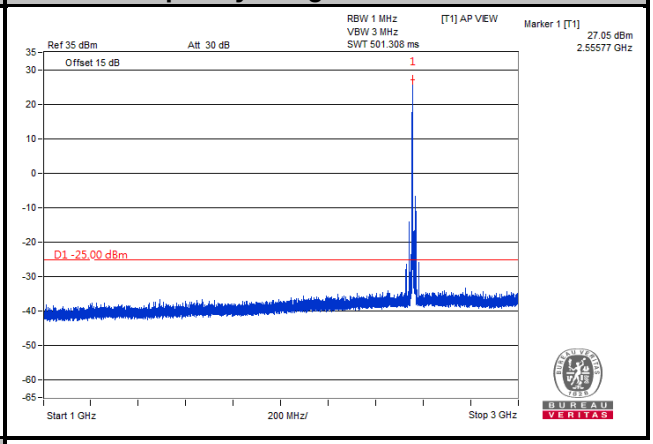
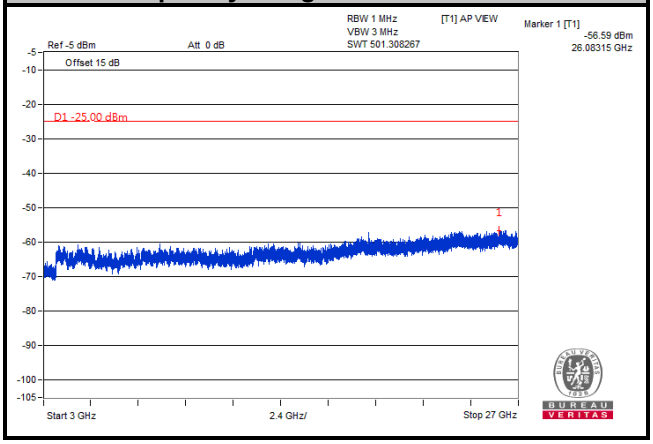
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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 ~ 27 GHz	
	

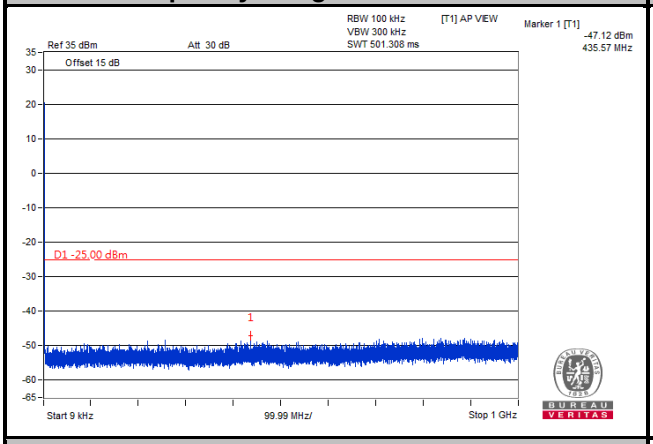
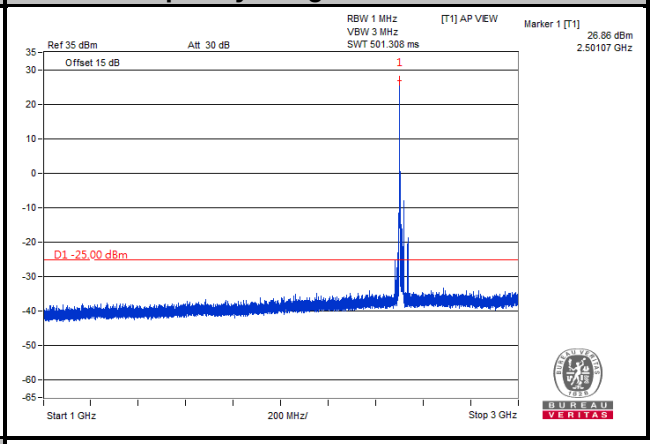
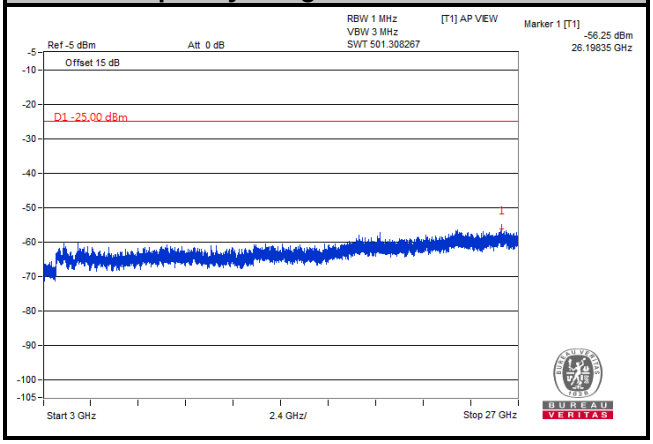
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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 ~ 27 GHz	
	

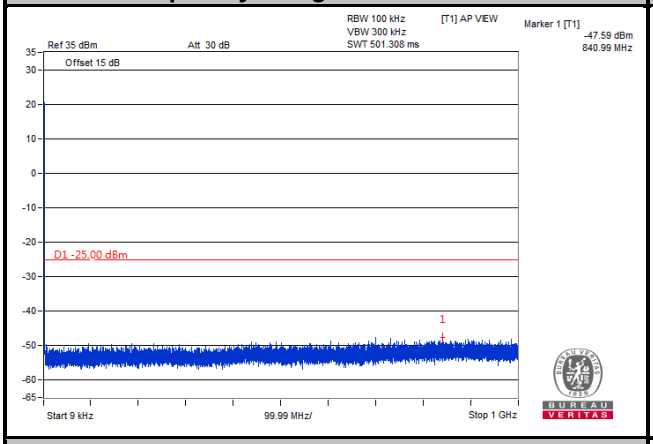
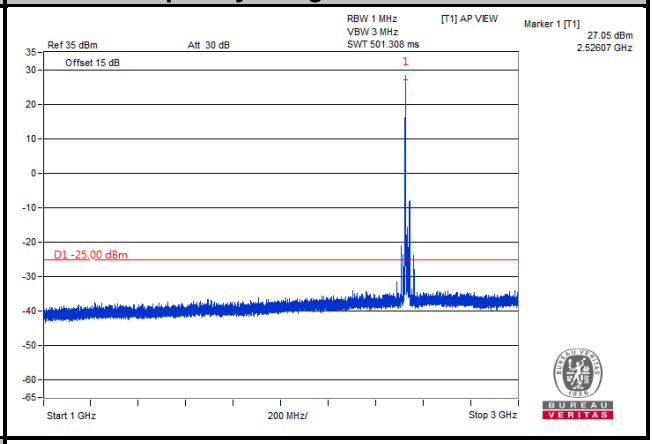
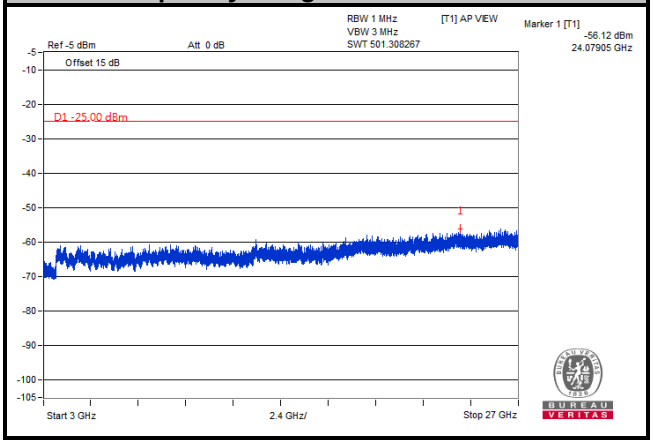
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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 ~ 27 GHz	
	

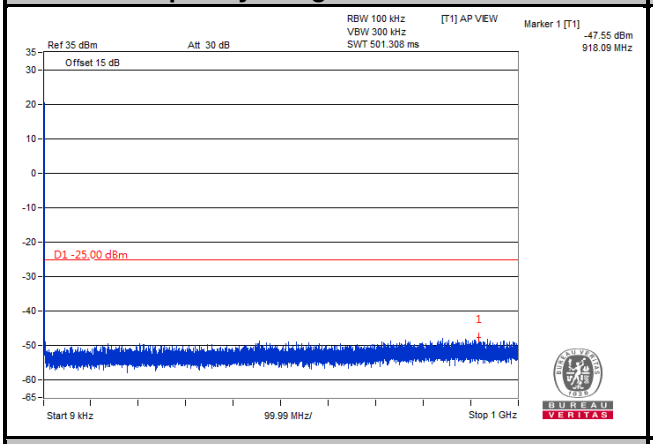
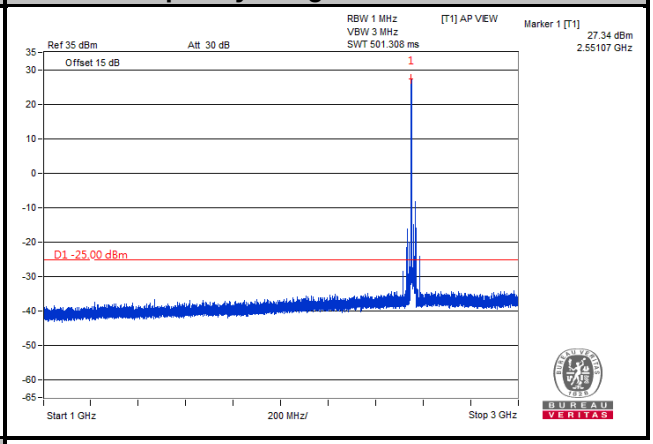
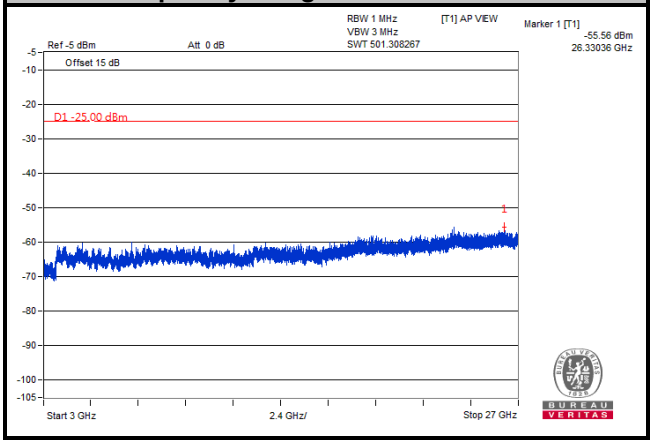
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

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 ~ 27 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 ~ 27 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 ~ 27 GHz	
	

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

4.8 Radiated Emission Measurement

4.8.1 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.

4.8.2 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. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G.
c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15 dB.

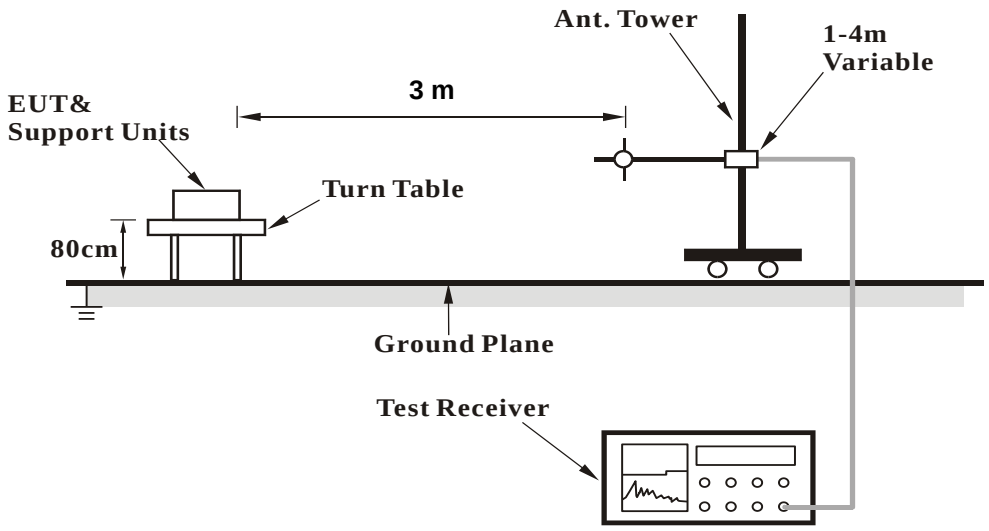
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.8.3 Deviation from Test Standard

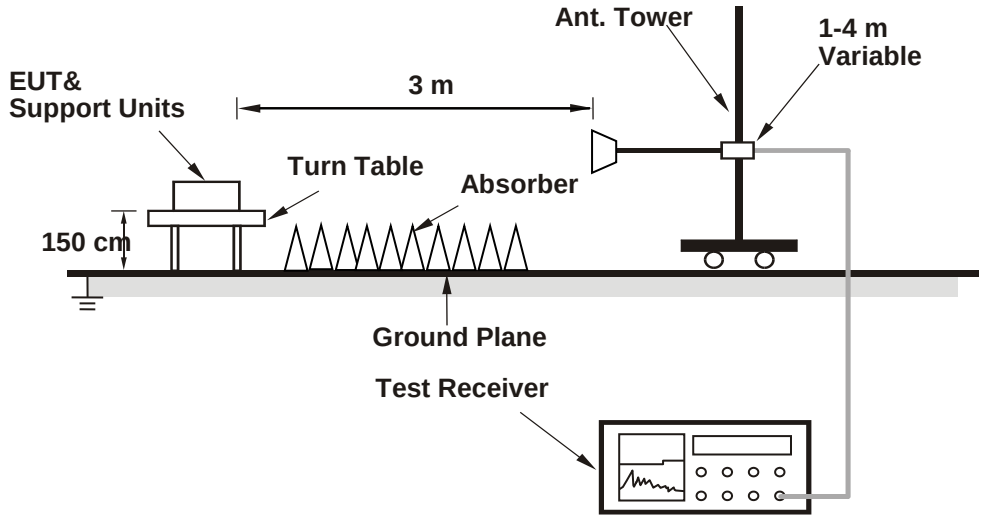
No deviation.

4.8.4 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).

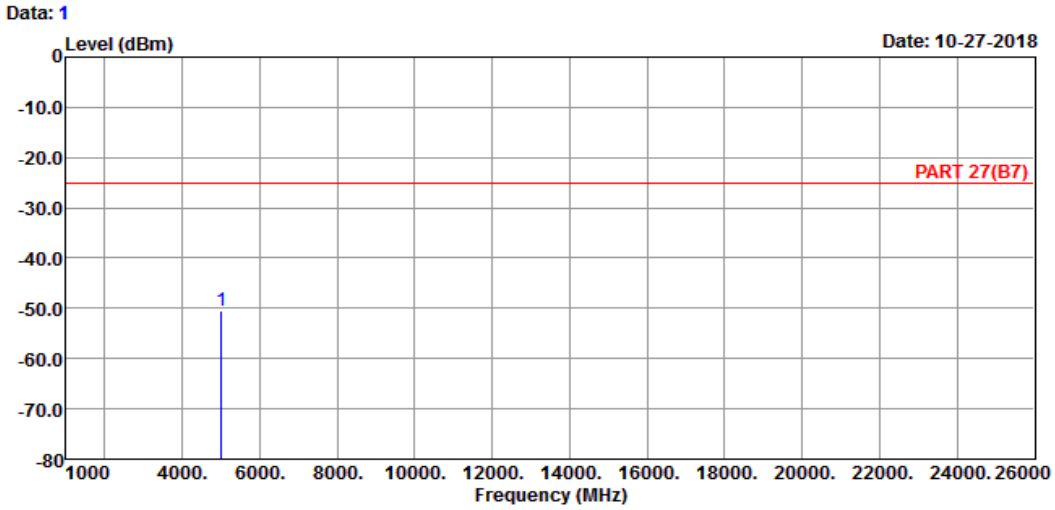
4.8.5 Test Results

LTE Band 7

Channel Bandwidth: 5 MHz / QPSK

Low Channel

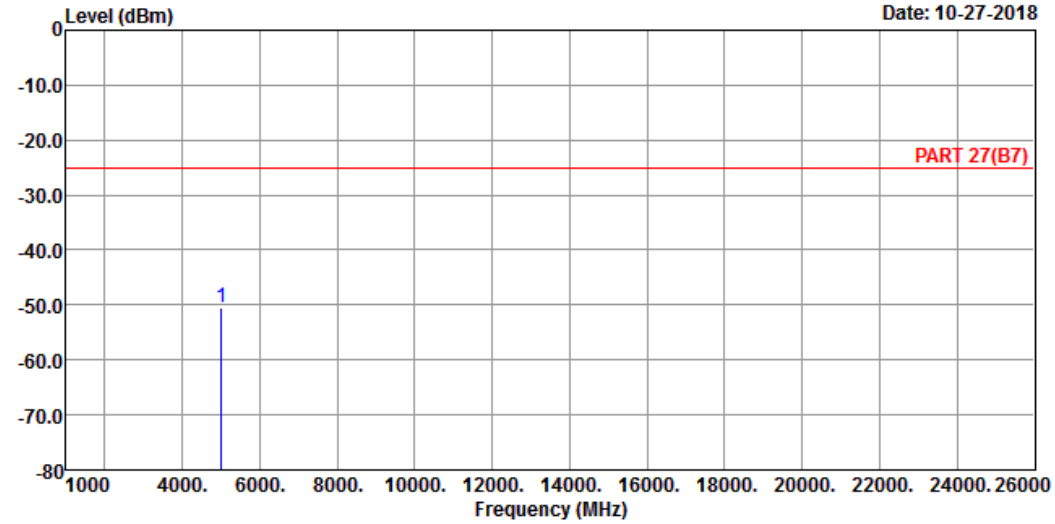
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART 27(B7) HORIZONTAL
Remak : LTE Band 7 QPSK_5M Link_L-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5005.00	-50.52	-48.06	-25.00	-25.52	-2.46	Peak

Data: 2

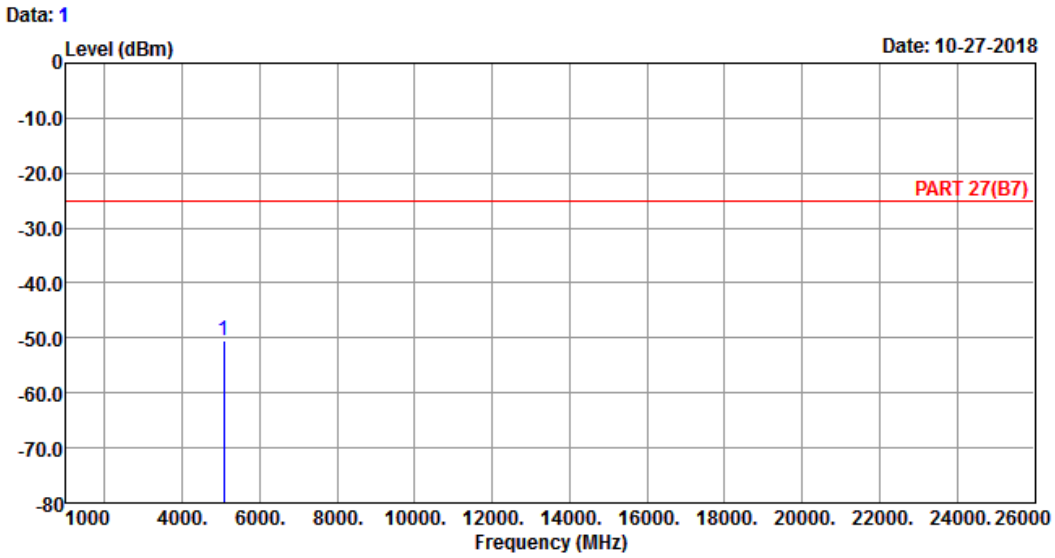


Site : 966 Chamber 5
Condition: PART 27(B7) VERTICAL
Remak : LTE Band 7 QPSK_5M Link_L-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5005.00	-50.44	-47.98	-25.00	-25.44	-2.46	Peak

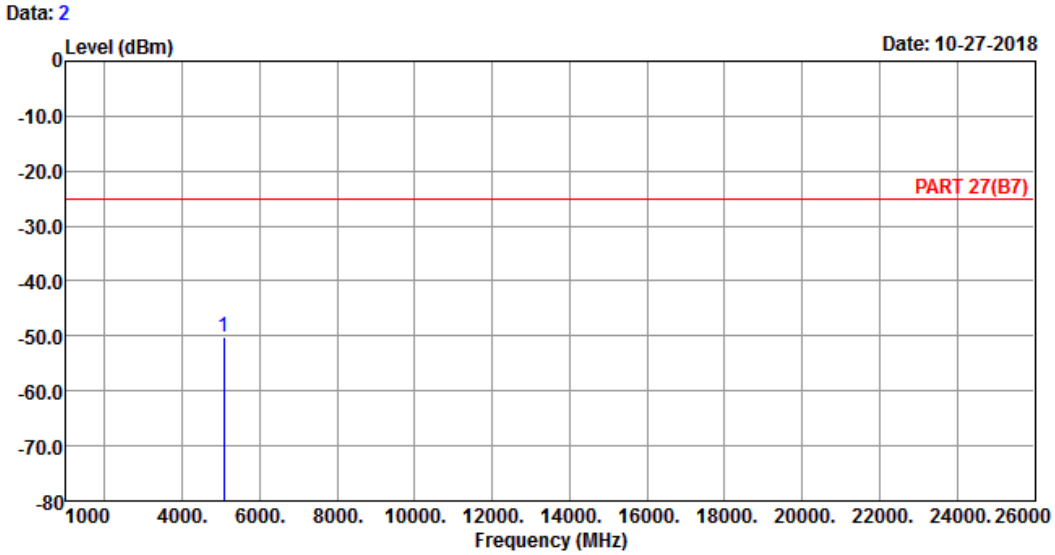
Middle Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART 27(B7) HORIZONTAL
Remak : LTE Band 7 QPSK_5M Link_M-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5070.00	-50.38	-48.51	-25.00	-25.38	-1.87	Peak

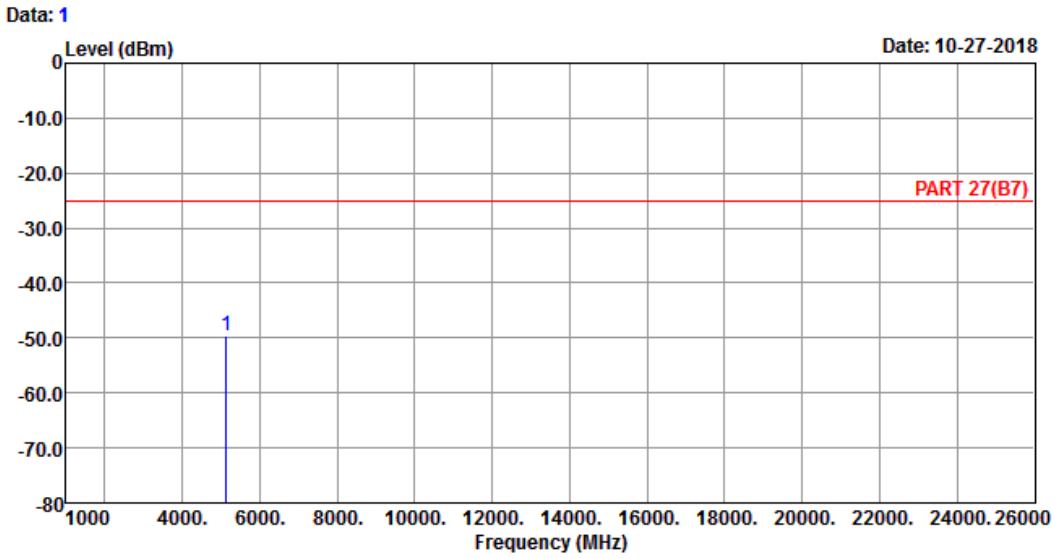


Site : 966 Chamber 5
Condition: PART 27(B7) VERTICAL
Remak : LTE Band 7 QPSK_5M Link_M-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5070.00	-50.30	-48.43	-25.00	-25.30	-1.87	Peak

High Channel

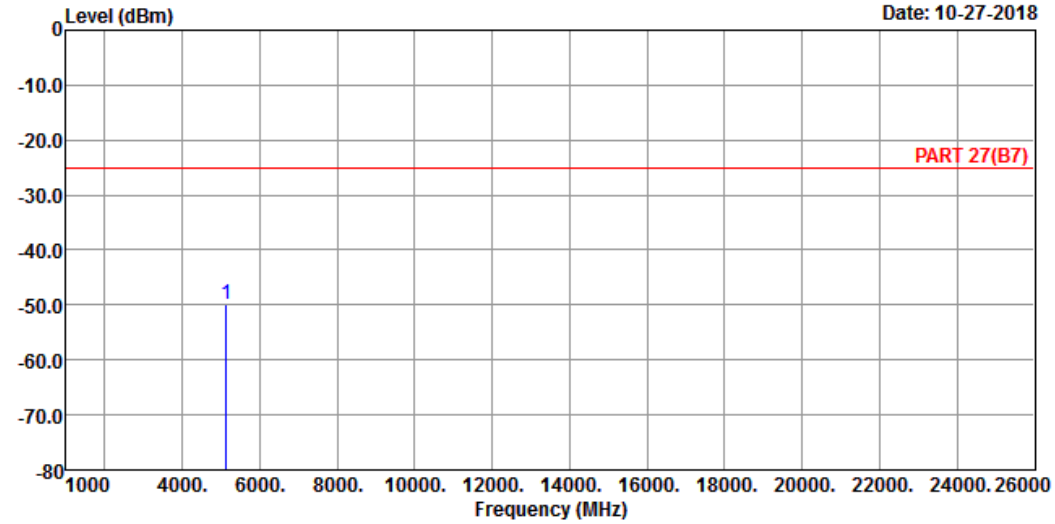
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART 27(B7) HORIZONTAL
Remak : LTE Band 7 QPSK_5M Link_H-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5135.00	-49.51	-47.77	-25.00	-24.51	-1.74	Peak

Data: 2

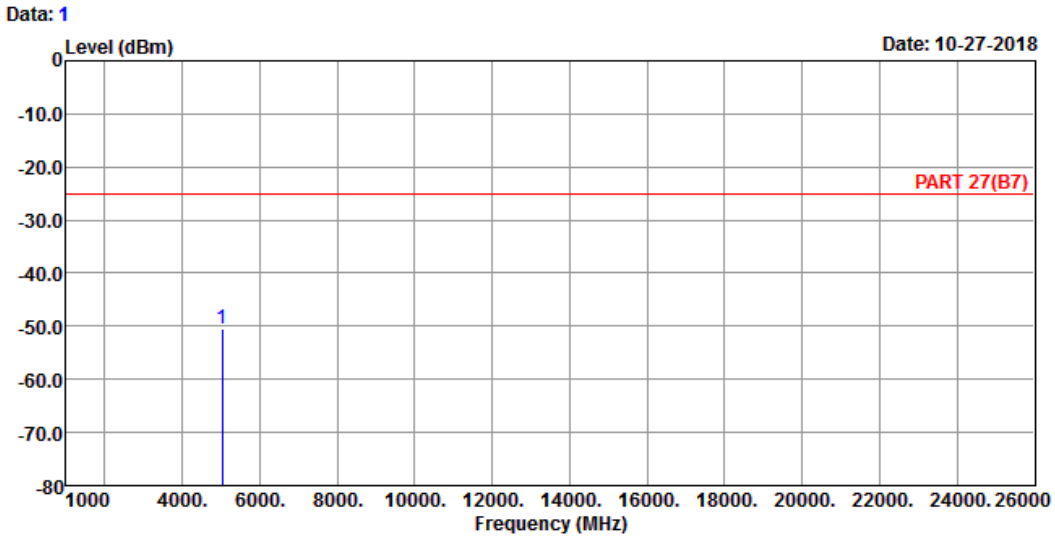


Site : 966 Chamber 5
Condition: PART 27(B7) VERTICAL
Remak : LTE Band 7 QPSK_5M Link_H-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5135.00	-49.77	-48.03	-25.00	-24.77	-1.74	Peak

Channel Bandwidth: 20 MHz / QPSK
Low Channel

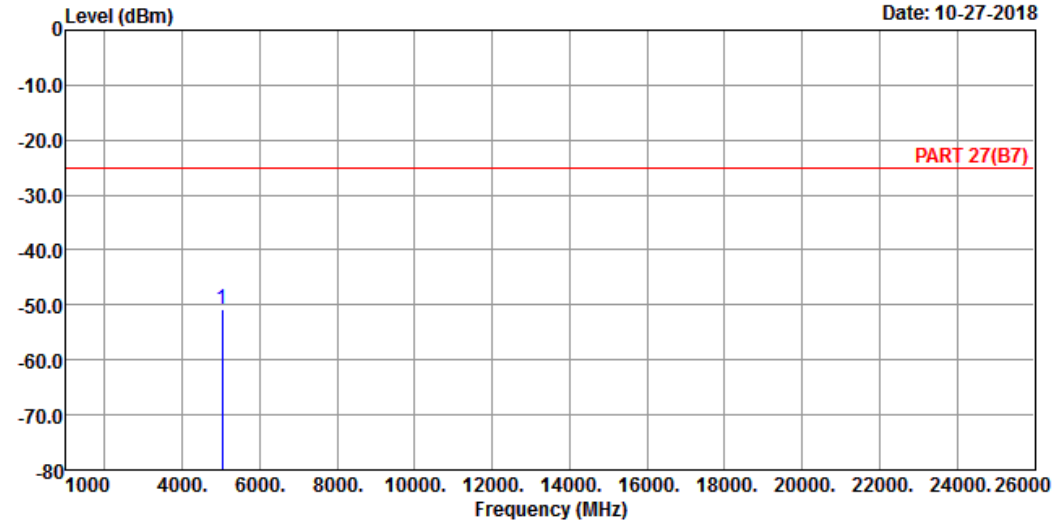
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART 27(B7) HORIZONTAL
Remak : LTE Band 7 QPSK_20M Link_L-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5020.00	-50.43	-48.11	-25.00	-25.43	-2.32	Peak

Data: 2

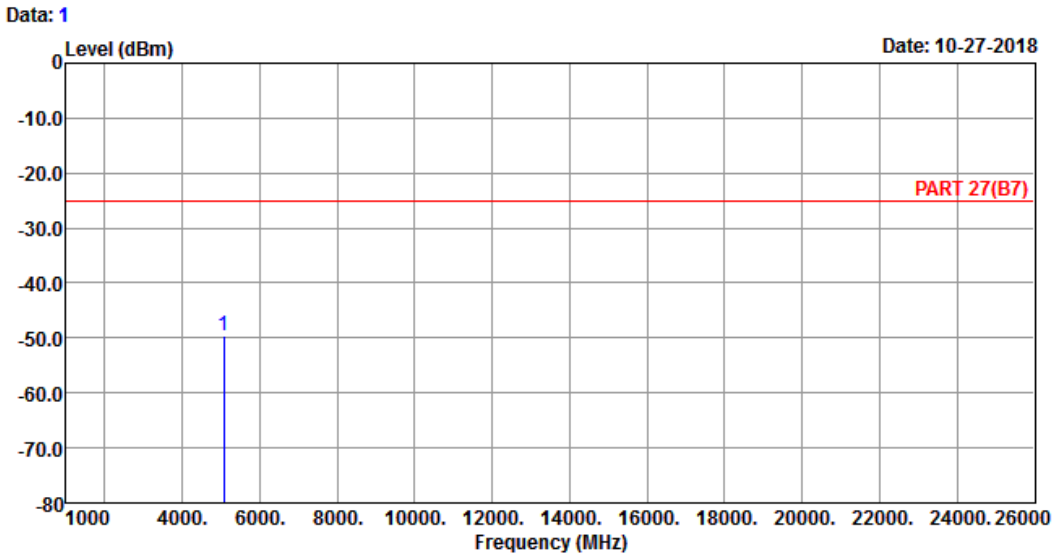


Site : 966 Chamber 5
Condition: PART 27(B7) VERTICAL
Remak : LTE Band 7 QPSK_20M Link_L-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5020.00	-50.71	-48.39	-25.00	-25.71	-2.32	Peak

Middle Channel

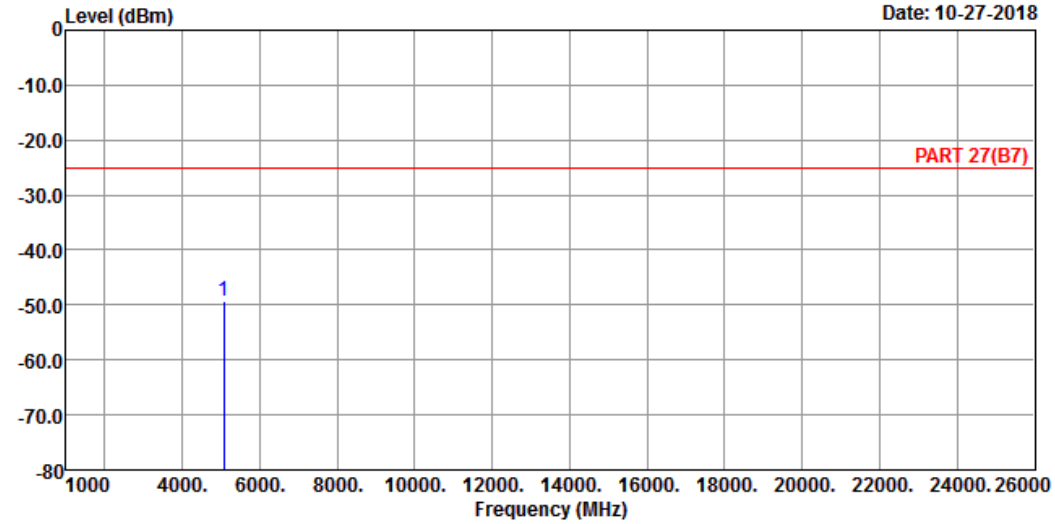
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART 27(B7) HORIZONTAL
Remak : LTE Band 7 QPSK_20M Link_M-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5070.00	-49.49	-47.62	-25.00	-24.49	-1.87	Peak

Data: 2

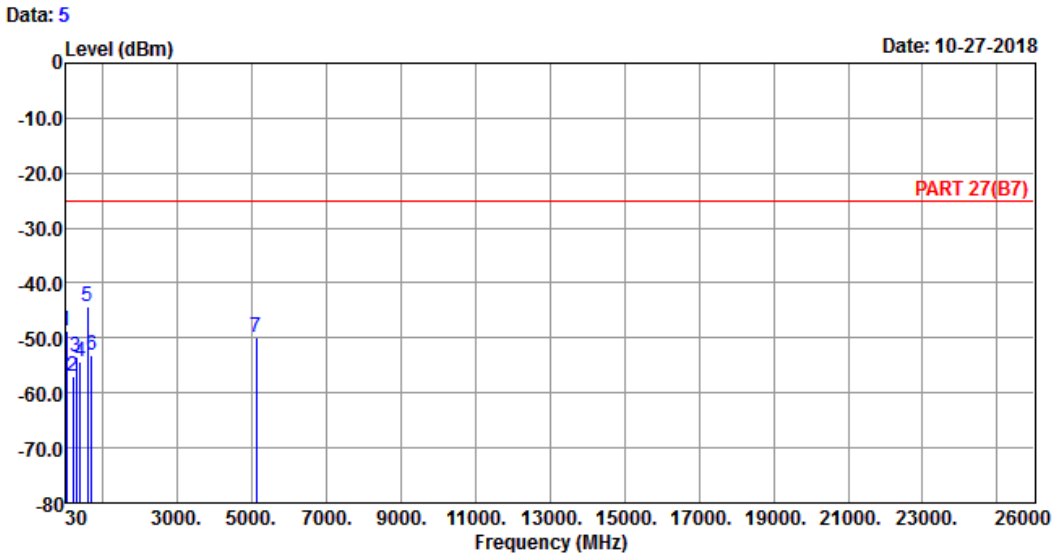


Site : 966 Chamber 5
Condition: PART 27(B7) VERTICAL
Remak : LTE Band 7 QPSK_20M Link_M-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5070.00	-49.39	-47.52	-25.00	-24.39	-1.87	Peak

High Channel

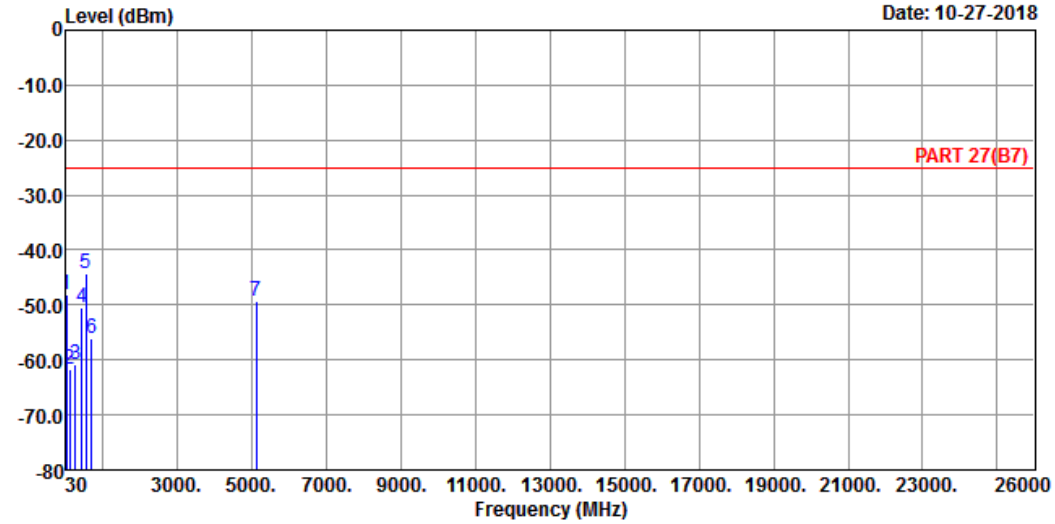
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART 27(B7) HORIZONTAL
Remak : LTE Band 7 QPSK_20M Link_H-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	43.58	-48.79	-47.32	-25.00	-23.79	-1.47	Peak
2	210.42	-57.04	-49.45	-25.00	-32.04	-7.59	Peak
3	290.93	-53.34	-46.51	-25.00	-28.34	-6.83	Peak
4	396.66	-54.21	-48.24	-25.00	-29.21	-5.97	Peak
5 pp	596.48	-44.14	-43.23	-25.00	-19.14	-0.91	Peak
6	710.94	-53.15	-53.26	-25.00	-28.15	0.11	Peak
7	5120.00	-49.77	-48.11	-25.00	-24.77	-1.66	Peak

Data: 6



Site : 966 Chamber 5
Condition: PART 27(B7) VERTICAL
Remak : LTE Band 7 QPSK_20M Link_H-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	44.55	-48.18	-46.19	-25.00	-23.18	-1.99	Peak
2	113.42	-61.78	-51.63	-25.00	-36.78	-10.15	Peak
3	273.47	-60.74	-54.27	-25.00	-35.74	-6.47	Peak
4	441.28	-50.45	-44.83	-25.00	-25.45	-5.62	Peak
5 pp	565.44	-44.42	-42.22	-25.00	-19.42	-2.20	Peak
6	709.00	-56.13	-56.20	-25.00	-31.13	0.07	Peak
7	5120.00	-49.23	-47.57	-25.00	-24.23	-1.66	Peak

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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

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