FCC Test Report

(PART 27)

Report No.:	RF180626C02-3
FCC ID:	2AJOTTA-1096
Test Model:	TA-1096
Received Date:	Jun. 26, 2018
Test Date:	Jul. 20, 2018
Issued Date:	Jul. 31, 2018
Applicant:	HMD Global Oy
Address:	Karaportti 2, 02610 Espoo, Finland
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 (1):	No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)
Test Location (2):	No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan, R.O.C
FCC Registration / Designation Number:	427177 / TW0011

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Release Control Record

Issue No.	Description	Date Issued
RF180626C02-3	Original Release	Jul. 31, 2018

1 Certificate of Conformity

Product:	Smart Phone
Brand:	NOKIA
Test Model:	TA-1096
Sample Status:	Engineering Sample
Applicant:	HMD Global Oy
Test Date:	Jul. 20, 2018
Standards:	FCC Part 27, Subpart C, M

This report is issued as a supplementary report to BV CPS report no.: RF180626C09-3. This report shall be used by combining with its original report.

Prepared by : _____ , **Date:** Jul. 31, 2018

Ivonne Wu / Supervisor

Approved by : _____ , **Date:** Jul. 31, 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)	Equivalent Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	N/A	Refer to Note
2.1055 27.54	Frequency Stability	N/A	Refer to Note
2.1049	Occupied Bandwidth	N/A	Refer to Note
--	Peak to Average Ratio	N/A	Refer to Note
2.1051 27.53(l)	Out-of-Band Emissions Measurements	N/A	Refer to Note
2.1051 27.53(m)	Conducted Spurious Emissions	N/A	Refer to Note
2.1053 27.53(m)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -4.96 dB at 10380.00 MHz.

Note: Only EIRP and radiated spurious emissions tests had been performed for the addendum. Refer to original report for other test data.

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	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna Schwarzbeck	BBHA 9120D	9120D-969	Dec. 12, 2017	Dec. 11, 2018
Fixed Attenuator Woken	00801A1GGAM02Y	NA	May 17, 2018	May 16, 2019
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Preamplifier Agilent	310N	187226	Jun. 19, 2018	Jun. 18, 2019
Preamplifier Agilent	83017A	MY39501357	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 19, 2018	Jun. 18, 2019
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 28, 2017	Dec. 27, 2018
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 08, 2017	Sep. 07, 2018
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 29, 2018	Jun. 28, 2019

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 HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450I-1.

3 General Information

3.1 General Description of EUT

Product	Smart Phone	
Brand	NOKIA	
Test Model	TA-1096	
Status of EUT	Engineering Sample	
Power Supply Rating	5.0 Vdc or 9 Vdc or 12 Vdc (adapter) 5.0 Vdc (host equipment) 3.85 Vdc (Li-ion battery)	
Modulation Type	QPSK, 16QAM	
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
	LTE Band 38 (Channel Bandwidth: 5 MHz)	2572.5 ~ 2617.5 MHz
	LTE Band 38 (Channel Bandwidth: 10 MHz)	2575.0 ~ 2615.0 MHz
	LTE Band 38 (Channel Bandwidth: 15 MHz)	2577.5 ~ 2612.5 MHz
	LTE Band 38 (Channel Bandwidth: 20 MHz)	2580.0 ~ 2610.0 MHz
Max. EIRP Power	LTE Band 38 (Channel Bandwidth: 20 MHz)	191.29 mW
Antenna Type	LTE Band 7: PIFA Antenna with -0.04 dBi gain LTE Band 38: PIFA Antenna with -0.26 dBi gain	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

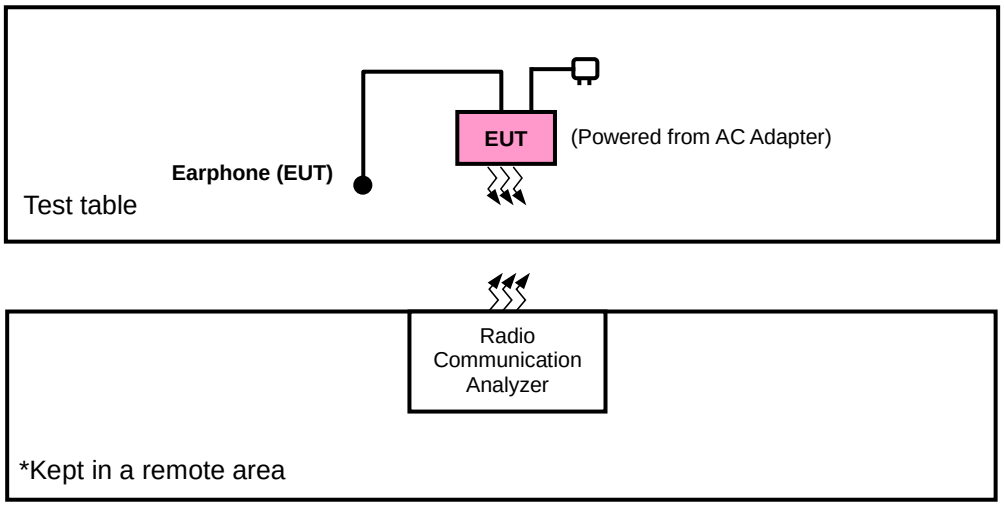
1. This report is issued as a supplementary report to BV CPS report no.: RF180626C09-3. The difference is listed as below. Only EIRP and radiated spurious emissions tests were verified in this report.

Report No.	FCC ID	Model	Difference
RF180626C09-3	2AJOTTA-1085	TA-1085	Dual SIM
RF180626C02-3	2AJOTTA-1096	TA-1096	Single SIM
* The models have the same layout, circuit, and components, but different SIM tray.			

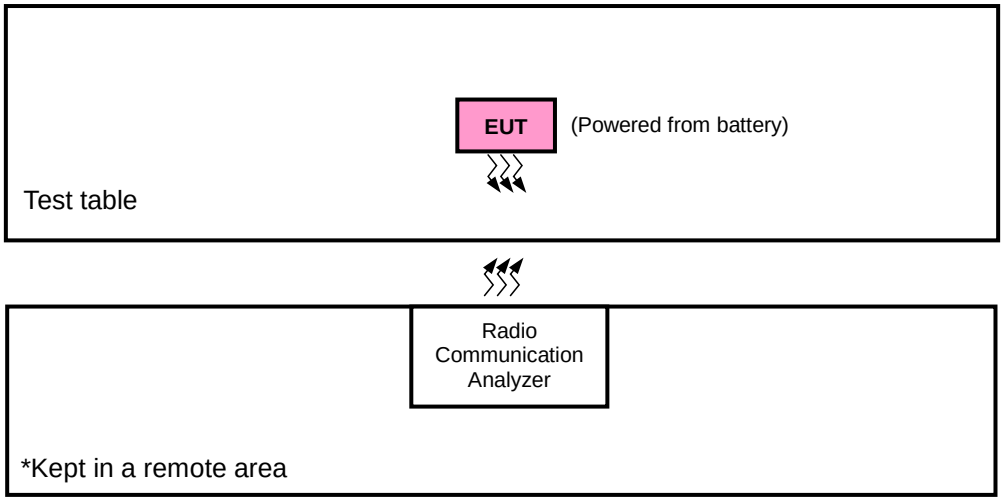
2. There're 2 configurations for the EUT listed as below.
   Main Sample: EUT + Battery 1
   2nd Sample: EUT + Battery 2
   ✧ Only the worst test data of main sample was presented in the report.
3. The EUT's accessories list refers to Ext. Pho.
4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



<E.I.R.P. Test>



3.2.1 Description of Support Units

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

3.3 Test Mode Applicability and Tested Channel Detail

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

EUT Configure Mode	Description
A	Main Sample
B	2nd Sample

SIM	Band	EIRP	Radiated Emission
1	**LTE Band 38**	X-plane	Z-axis

LTE Band 38

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	EIRP	37850 to 38150	37850, 38000, 38150	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	Radiated Emission	37850 to 38150	37850, 38000, 38150	20 MHz	QPSK	1 RB / 0 RB Offset

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25 deg. C, 65 % RH	3.85 Vdc	Karl Lee
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee / Harry Hsueh

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 “User stations are limited to 2 watts” 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.”

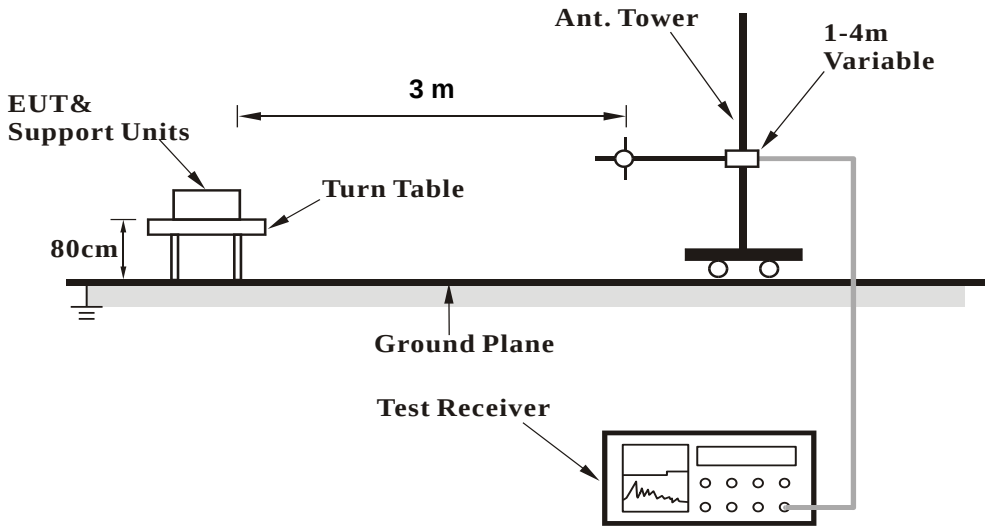
4.1.2 Test Procedures

EIRP Measurement:

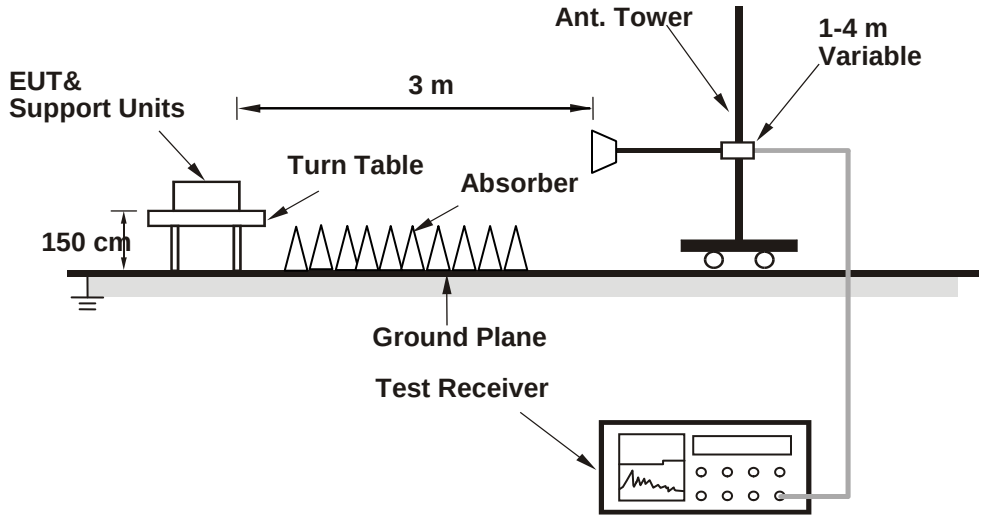
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table,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

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).

4.1.4 Test Results

EIRP Power (dBm)

Mode A

LTE Band 38							
Channel Bandwidth: 20 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
X	37850	2580.0	-22.01	44.16	22.15	164.06	H
	38000	2595.0	-21.85	44.20	22.35	171.67	
	38150	2610.0	-21.99	44.81	22.82	191.29	
	37850	2580.0	-24.12	44.78	20.66	116.41	V
	38000	2595.0	-23.85	44.09	20.24	105.63	
	38150	2610.0	-23.91	44.72	20.81	120.39	
Channel Bandwidth: 20 MHz / 16QAM							
X	37850	2580.0	-23.12	44.16	21.04	127.06	H
	38000	2595.0	-22.85	44.20	21.35	136.36	
	38150	2610.0	-23.21	44.81	21.60	144.44	
	37850	2580.0	-25.11	44.78	19.67	92.68	V
	38000	2595.0	-25.01	44.09	19.08	80.87	
	38150	2610.0	-24.95	44.72	19.77	94.84	

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

4.2 Radiated Emission Measurement

4.2.1 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 log10(P) dB. The limit of emission is equal to -25 dBm.

4.2.2 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.

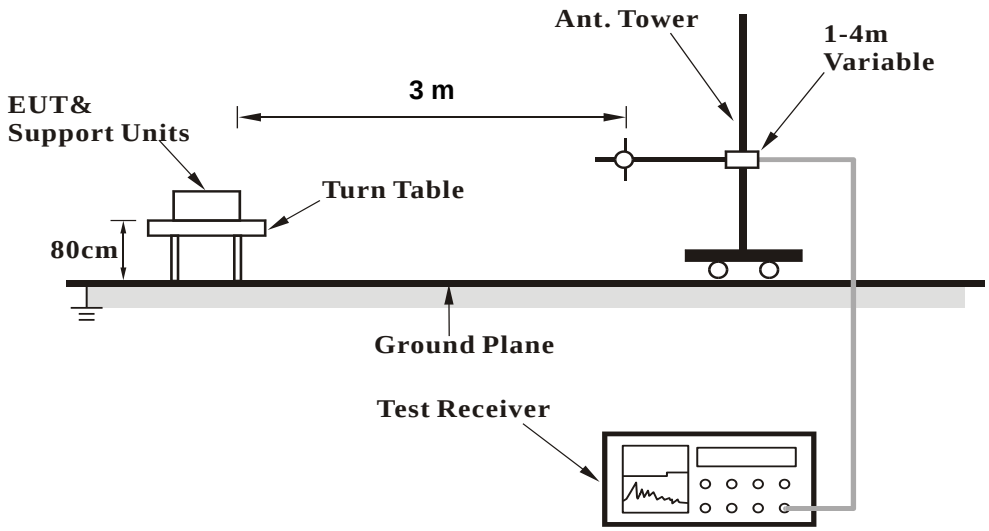
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.2.3 Deviation from Test Standard

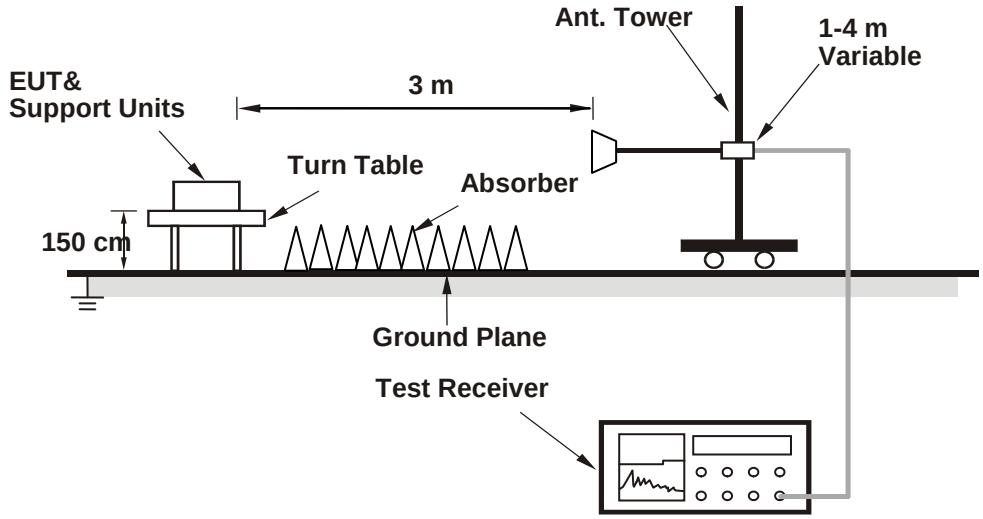
No deviation.

4.2.4 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).

4.2.5 Test Results

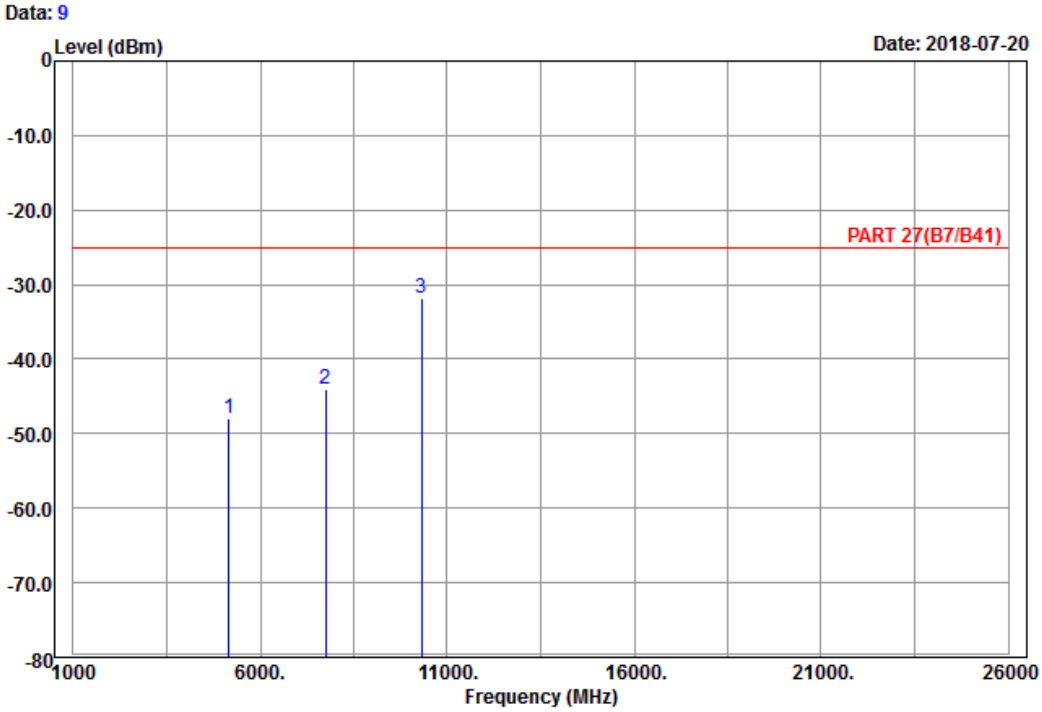
Mode A

LTE Band 38

Channel Bandwidth: 20 MHz / QPSK

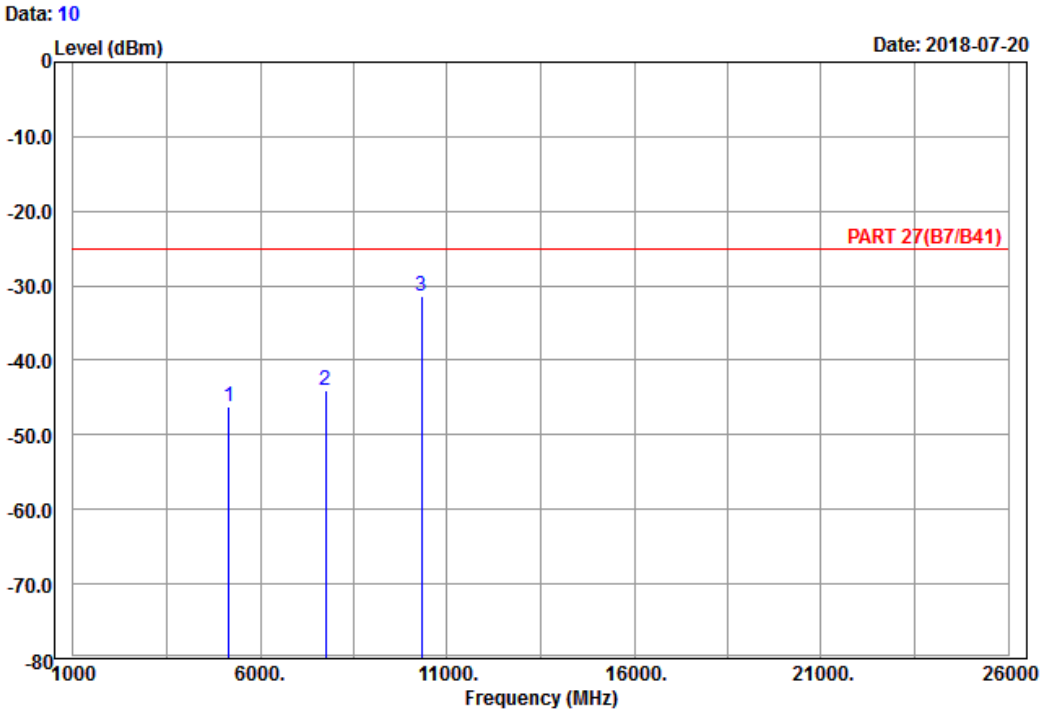
Low Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch




```
Site     : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark   : LTE_Band 38_Link_CH37850
Tested by: Karl Lee
```

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
		MHz	dBm	dBm	dBm	dB	dB	
1		5160.00	-47.88	-67.80	-25.00	-22.88	19.92	Peak
2		7740.00	-44.10	-67.33	-25.00	-19.10	23.23	Peak
3	pp	10320.00	-31.85	-58.52	-25.00	-6.85	26.67	Peak

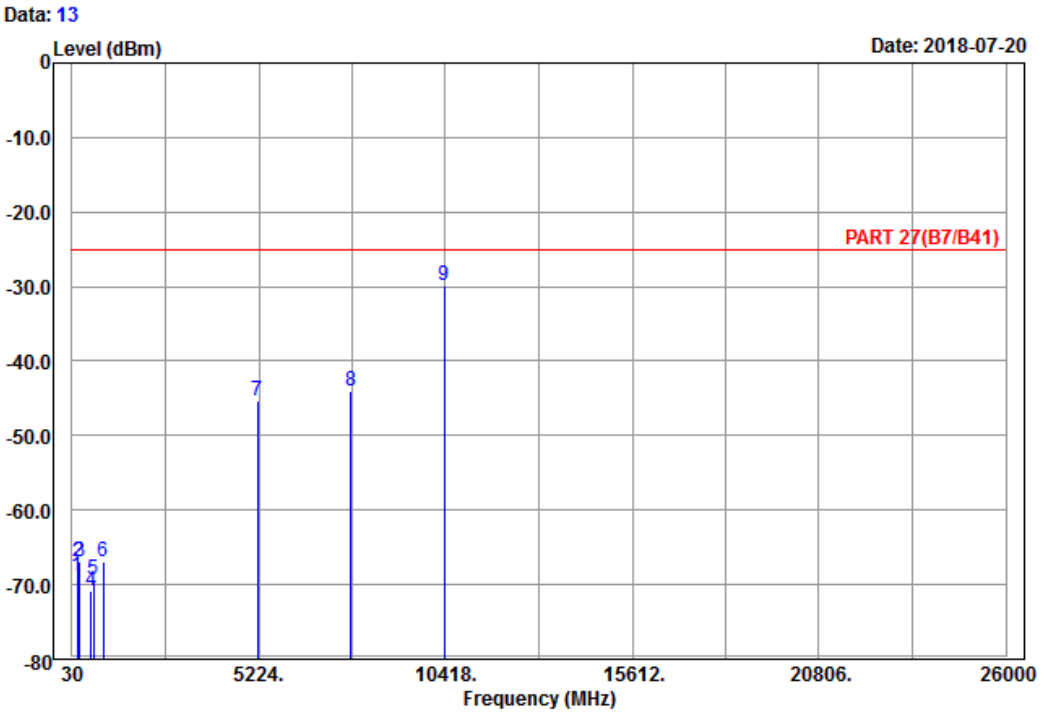


Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH37850
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5160.00	-46.22	-66.14	-25.00	-21.22	19.92	Peak
2	7740.00	-44.14	-67.37	-25.00	-19.14	23.23	Peak
3 pp	10320.00	-31.36	-58.03	-25.00	-6.36	26.67	Peak

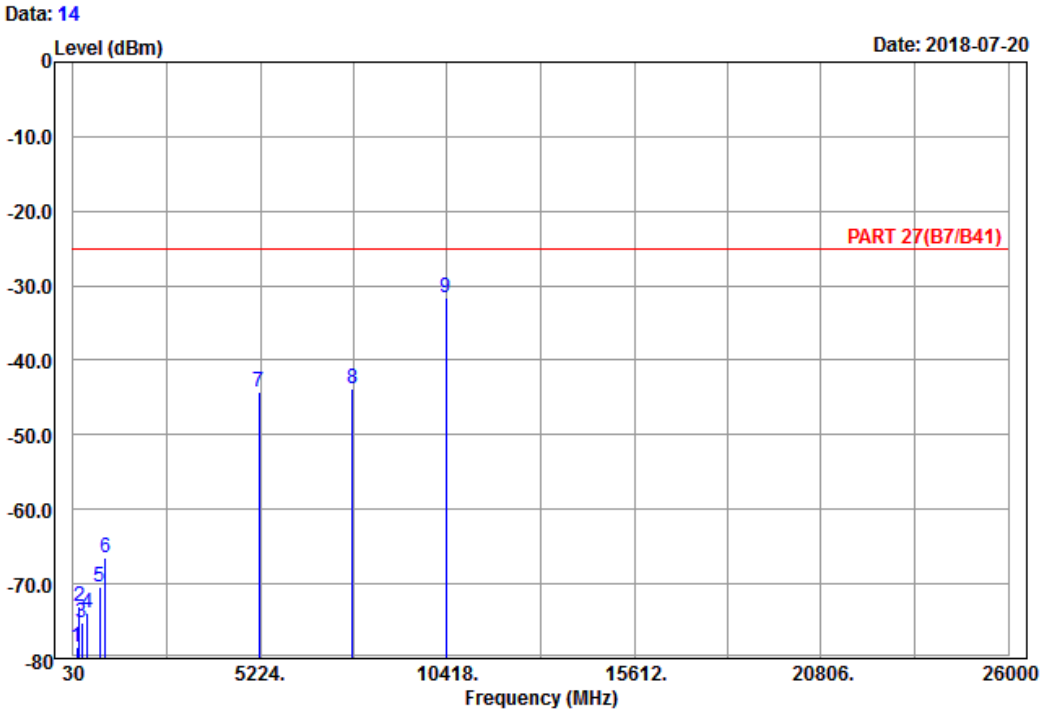
Middle Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 38_Link_CH38000
Tested by: Karl Lee

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
		MHz	dBm	dBm	dBm	dB	dB	
1		170.13	-68.96	-62.25	-25.00	-43.96	-6.71	Peak
2		207.66	-66.85	-60.77	-25.00	-41.85	-6.08	Peak
3		239.52	-66.85	-61.20	-25.00	-41.85	-5.65	Peak
4		568.80	-70.81	-69.91	-25.00	-45.81	-0.90	Peak
5		637.40	-69.38	-69.39	-25.00	-44.38	0.01	Peak
6		892.20	-66.84	-69.51	-25.00	-41.84	2.67	Peak
7		5190.00	-45.33	-65.45	-25.00	-20.33	20.12	Peak
8		7785.00	-44.14	-67.47	-25.00	-19.14	23.33	Peak
9	pp	10380.00	-29.96	-56.70	-25.00	-4.96	26.74	Peak

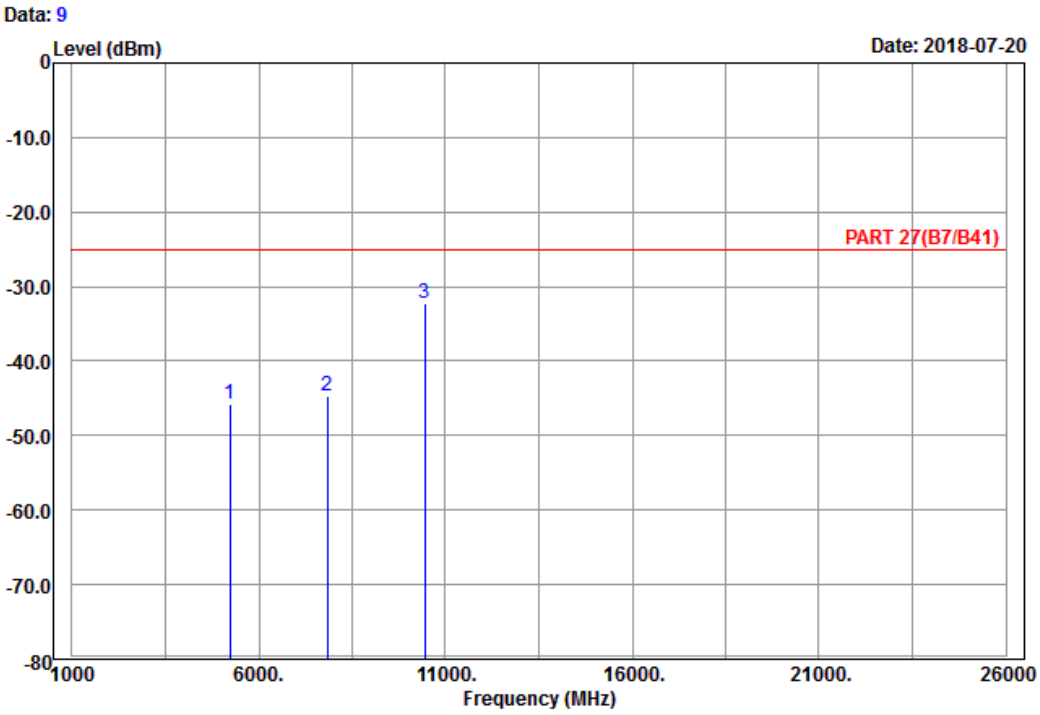


Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH38000
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	121.80	-78.45	-70.32	-25.00	-53.45	-8.13	Peak
2	200.10	-73.02	-66.84	-25.00	-48.02	-6.18	Peak
3	268.95	-75.12	-69.44	-25.00	-50.12	-5.68	Peak
4	435.80	-73.92	-70.39	-25.00	-48.92	-3.53	Peak
5	761.30	-70.39	-69.85	-25.00	-45.39	-0.54	Peak
6	918.80	-66.58	-70.29	-25.00	-41.58	3.71	Peak
7	5190.00	-44.32	-64.44	-25.00	-19.32	20.12	Peak
8	7785.00	-43.74	-67.07	-25.00	-18.74	23.33	Peak
9 pp	10380.00	-31.52	-58.26	-25.00	-6.52	26.74	Peak

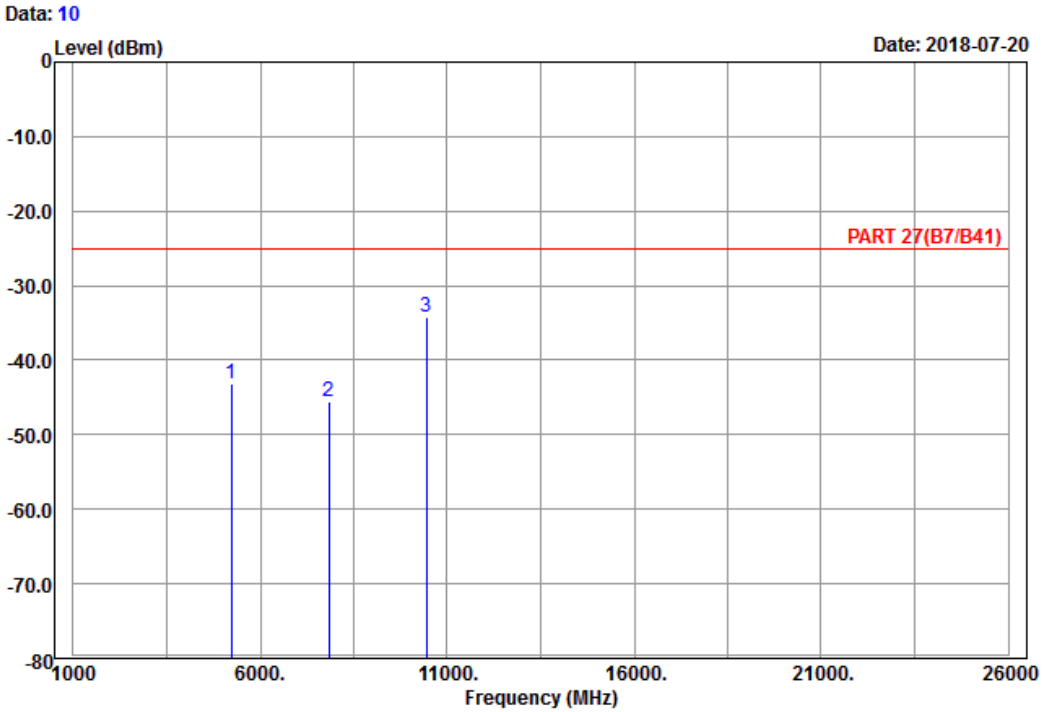
High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 38_Link_CH38150
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5220.00	-45.88	-66.02	-25.00	-20.88	20.14	Peak
2	7830.00	-44.58	-67.98	-25.00	-19.58	23.40	Peak
3 pp	10440.00	-32.25	-58.96	-25.00	-7.25	26.71	Peak



Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH38150
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5220.00	-43.25	-63.39	-25.00	-18.25	20.14	Peak
2	7830.00	-45.55	-68.95	-25.00	-20.55	23.40	Peak
3 pp	10440.00	-34.16	-60.87	-25.00	-9.16	26.71	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:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety
Tel: 886-3-3183232
Fax: 886-3-3270892

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.

--- END ---

Annex A – Test Report for TA-1085 (Dual SIM)

FCC Test Report

(PART 27)

Report No.:	RF180626C09-3
FCC ID:	2AJOTTA-1085
Test Model:	TA-1085
Received Date:	Jun. 26, 2018
Test Date:	Jul. 02, 2018 ~ Jul. 20, 2018
Issued Date:	Jul. 31, 2018
Applicant:	HMD Global Oy
Address:	Karaportti 2, 02610 Espoo, Finland
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 (1):	No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)
Test Location (2):	No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan, R.O.C
FCC Registration / Designation Number:	427177 / TW0011

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF180626C09-3	Original Release	Jul. 31, 2018

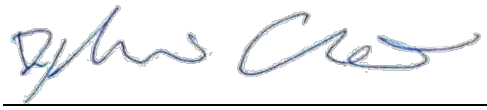
1 Certificate of Conformity

Product:	Smart Phone
Brand:	NOKIA
Test Model:	TA-1085
Sample Status:	Engineering Sample
Applicant:	HMD Global Oy
Test Date:	Jul. 02, 2018 ~ Jul. 20, 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:** Jul. 31, 2018

Ivonne Wu / Supervisor

Approved by :  , **Date:** Jul. 31, 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)	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	Occupied Bandwidth	Pass	Meet the requirement of limit.
--	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1051 27.53(l)	Out-of-Band Emissions Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(m)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(m)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -2.49 dB at 10380.00 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	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna Schwarzbeck	BBHA 9120D	9120D-969	Dec. 12, 2017	Dec. 11, 2018
Fixed Attenuator Woken	00801A1GGAM02Y	NA	May 17, 2018	May 16, 2019
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Preamplifier Agilent	310N	187226	Jun. 19, 2018	Jun. 18, 2019
Preamplifier Agilent	83017A	MY39501357	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 19, 2018	Jun. 18, 2019
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 28, 2017	Dec. 27, 2018
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 08, 2017	Sep. 07, 2018
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 29, 2018	Jun. 28, 2019

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 HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450I-1.

3 General Information

3.1 General Description of EUT

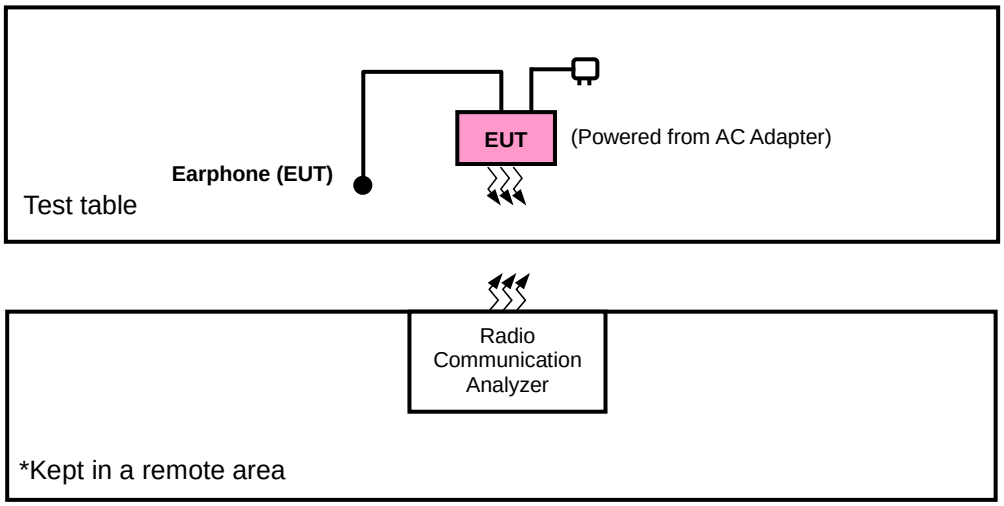
Product	Smart Phone	
Brand	NOKIA	
Test Model	TA-1085	
Status of EUT	Engineering Sample	
Power Supply Rating	5.0 Vdc or 9 Vdc or 12 Vdc (adapter) 5.0 Vdc (host equipment) 3.85 Vdc (Li-ion battery)	
Modulation Type	QPSK, 16QAM	
Frequency Range	LTE Band 7 (Channel Bandwidth: 5 MHz)	2502.5 ~ 2567.5 MHz
	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
	LTE Band 38 (Channel Bandwidth: 5 MHz)	2572.5 ~ 2617.5 MHz
	LTE Band 38 (Channel Bandwidth: 10 MHz)	2575.0 ~ 2615.0 MHz
	LTE Band 38 (Channel Bandwidth: 15 MHz)	2577.5 ~ 2612.5 MHz
	LTE Band 38 (Channel Bandwidth: 20 MHz)	2580.0 ~ 2610.0 MHz
Max. EIRP Power	LTE Band 7 (Channel Bandwidth: 5 MHz)	179.35 mW
	LTE Band 7 (Channel Bandwidth: 10 MHz)	180.59 mW
	LTE Band 7 (Channel Bandwidth: 15 MHz)	181.84 mW
	LTE Band 7 (Channel Bandwidth: 20 MHz)	183.53 mW
	LTE Band 38 (Channel Bandwidth: 5 MHz)	199.43 mW
	LTE Band 38 (Channel Bandwidth: 10 MHz)	200.96 mW
	LTE Band 38 (Channel Bandwidth: 15 MHz)	202.67 mW
	LTE Band 38 (Channel Bandwidth: 20 MHz)	204.17 mW
Emission Designator	LTE Band 7 (Channel Bandwidth: 5 MHz)	4M50W7D
	LTE Band 7 (Channel Bandwidth: 10 MHz)	8M97W7D
	LTE Band 7 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 7 (Channel Bandwidth: 20 MHz)	17M9W7D
	LTE Band 38 (Channel Bandwidth: 5 MHz)	4M49W7D
	LTE Band 38 (Channel Bandwidth: 10 MHz)	8M97W7D
	LTE Band 38 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 38 (Channel Bandwidth: 20 MHz)	17M9G7D
Antenna Type	LTE Band 7: PIFA Antenna with -0.04 dBi gain LTE Band 38: PIFA Antenna with -0.26 dBi gain	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

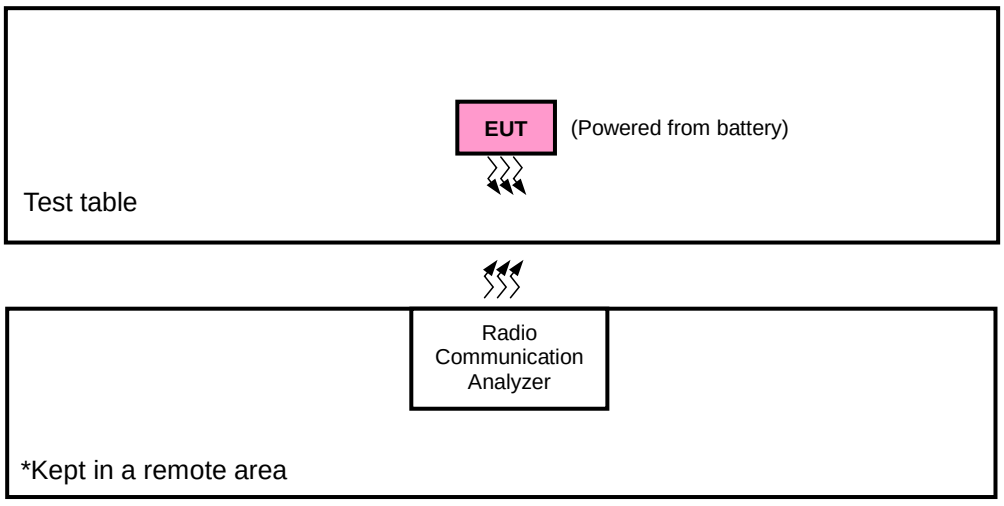
1. There're 2 configurations for the EUT listed as below.
   Main Sample: EUT + Battery 1
   2nd Sample: EUT + Battery 2
   ✧ Only the worst test data was presented in the report.
2. The EUT's accessories list refers to Ext. Pho.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



<E.I.R.P. Test>



3.2.1 Description of Support Units

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

3.3 Test Mode Applicability and Tested Channel Detail

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

EUT Configure Mode	Description
A	Main Sample
B	2nd Sample

SIM	Band	EIRP	Radiated Emission
1	LTE Band 7	Z-plane	Z-axis
	LTE Band 38	X-plane	Z-axis

LTE Band 7

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	EIRP	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100 21350	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	Modulation Characteristics	20850 to 21350	21100	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
A	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
A	Occupied Bandwidth	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		20850 to 21350	20850, 21100 21350	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
A	Peak to Average Ratio	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100 21350	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	Out-of-Band Emissions	20775 to 21425	20775, 21425	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		20800 to 21400	20800, 21400	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		20825 to 21375	20825, 21375	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		20850 to 21350	20850, 21350	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
A	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
A	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.

LTE Band 38

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	EIRP	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
B		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	Modulation Characteristics	37850 to 38150	38000	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
A	Frequency Stability	37775 to 38225	37775, 38225	5 MHz	QPSK	1 RB / 0 RB Offset
		37800 to 38200	37800, 38200	10 MHz	QPSK	1 RB / 0 RB Offset
		37825 to 38175	37825, 38175	15 MHz	QPSK	1 RB / 0 RB Offset
		37850 to 38150	37850, 38150	20 MHz	QPSK	1 RB / 0 RB Offset
A	Occupied Bandwidth	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
A	Peak to Average Ratio	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	Out-of-Band Emissions	37775 to 38225	37775, 38225	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		37800 to 38200	37800, 38200	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		37825 to 38175	37825, 38175	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		37850 to 38150	37850, 38150	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
A	Conducted Emission	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK	1 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10 MHz	QPSK	1 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15 MHz	QPSK	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK	1 RB / 0 RB Offset
A	Radiated Emission	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK	1 RB / 0 RB Offset
B		37850 to 38150	37850, 38000, 38150	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	3.85 Vdc	Karl Lee
Modulation Characteristics	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Frequency Stability	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Occupied Bandwidth	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Out-of-Band Emissions	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Peak to Average Ratio	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Conducted Emission	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee / Harry Hsueh

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 “User stations are limited to 2 watts” 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:

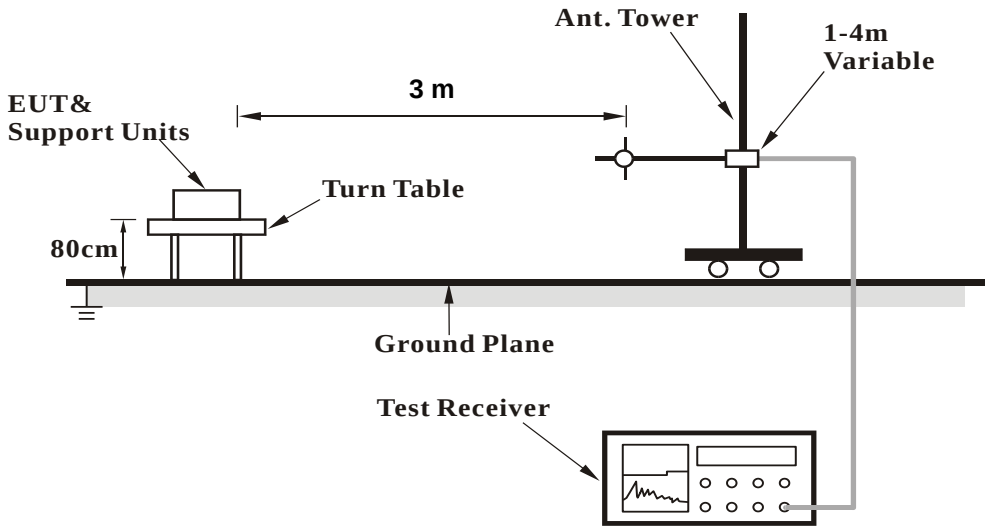
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table,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

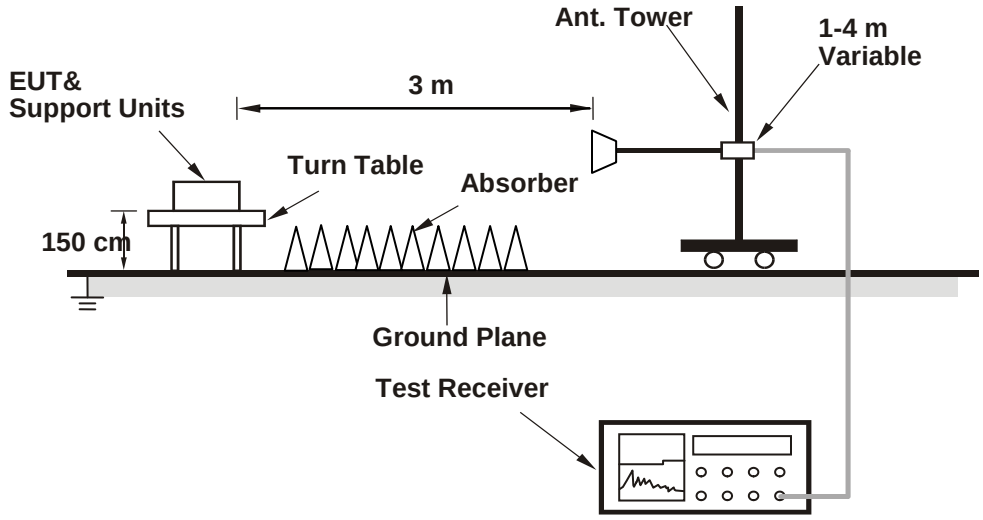
a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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	22.54	22.58	22.41	0	15M	QPSK	1	0	22.42	22.46	22.29	0
		1	50	22.47	22.51	22.34	0			1	37	22.35	22.39	22.22	0
		1	99	22.45	22.49	22.32	0			1	74	22.33	22.37	22.20	0
		50	0	21.62	21.66	21.49	1			36	0	21.50	21.54	21.37	1
		50	25	21.61	21.65	21.48	1			36	19	21.49	21.53	21.36	1
		50	50	21.59	21.63	21.46	1			36	39	21.47	21.51	21.34	1
		100	0	21.60	21.64	21.47	1			75	0	21.48	21.52	21.35	1
	16QAM	1	0	21.48	21.52	21.35	1		16QAM	1	0	21.36	21.40	21.23	1
		1	50	21.41	21.45	21.28	1			1	37	21.29	21.33	21.16	1
		1	99	21.39	21.43	21.26	1			1	74	21.27	21.31	21.14	1
		50	0	20.56	20.60	20.43	2			36	0	20.44	20.48	20.31	2
		50	25	20.55	20.59	20.42	2			36	19	20.43	20.47	20.30	2
		50	50	20.53	20.57	20.40	2			36	39	20.41	20.45	20.28	2
		100	0	20.54	20.58	20.41	2			75	0	20.42	20.46	20.29	2
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	22.33	22.37	22.20	0	5M	QPSK	1	0	22.19	22.23	22.06	0
		1	24	22.26	22.30	22.13	0			1	12	22.12	22.16	21.99	0
		1	49	22.24	22.28	22.11	0			1	24	22.10	22.14	21.97	0
		25	0	21.41	21.45	21.28	1			12	0	21.27	21.31	21.14	1
		25	12	21.40	21.44	21.27	1			12	6	21.26	21.30	21.13	1
		25	25	21.38	21.42	21.25	1			12	13	21.24	21.28	21.11	1
		50	0	21.39	21.43	21.26	1			25	0	21.25	21.29	21.12	1
	16QAM	1	0	21.27	21.31	21.14	1		16QAM	1	0	21.13	21.17	21.00	1
		1	24	21.20	21.24	21.07	1			1	12	21.06	21.10	20.93	1
		1	49	21.18	21.22	21.05	1			1	24	21.04	21.08	20.91	1
		25	0	20.35	20.39	20.22	2			12	0	20.21	20.25	20.08	2
		25	12	20.34	20.38	20.21	2			12	6	20.20	20.24	20.07	2
		25	25	20.32	20.36	20.19	2			12	13	20.18	20.22	20.05	2
		50	0	20.33	20.37	20.20	2			25	0	20.19	20.23	20.06	2

LTE Band 38

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		37850	38000	38150				Channel		37825	38000	38175	
		Frequency (MHz)		2580.0	2595.0	2610.0				Frequency (MHz)		2577.5	2595.0	2612.5	
20M	QPSK	1	0	22.21	22.19	22.09	0	15M	QPSK	1	0	22.08	22.06	21.96	0
		1	50	22.18	22.16	22.06	0			1	37	22.05	22.03	21.93	0
		1	99	22.14	22.12	22.02	0			1	74	22.01	21.99	21.89	0
		50	0	21.20	21.18	21.08	1			36	0	21.07	21.05	20.95	1
		50	25	21.17	21.15	21.05	1			36	19	21.04	21.02	20.92	1
		50	50	21.15	21.13	21.03	1			36	39	21.02	21.00	20.90	1
		100	0	21.13	21.11	21.01	1			75	0	21.00	20.98	20.88	1
	16QAM	1	0	21.19	21.17	21.07	1		16QAM	1	0	21.06	21.04	20.94	1
		1	50	21.16	21.14	21.04	1			1	37	21.03	21.01	20.91	1
		1	99	21.12	21.10	21.00	1			1	74	20.99	20.97	20.87	1
		50	0	20.18	20.16	20.06	2			36	0	20.05	20.03	19.93	2
		50	25	20.15	20.13	20.03	2			36	19	20.02	20.00	19.90	2
		50	50	20.13	20.11	20.01	2			36	39	20.00	19.98	19.88	2
		100	0	20.11	20.09	19.99	2			75	0	19.98	19.96	19.86	2
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		37800	38000	38200				Channel		37775	38000	38225	
		Frequency (MHz)		2575.0	2595.0	2615.0				Frequency (MHz)		2572.5	2595.0	2617.5	
10M	QPSK	1	0	22.00	21.98	21.88	0	5M	QPSK	1	0	21.88	21.86	21.76	0
		1	24	21.97	21.95	21.85	0			1	12	21.85	21.83	21.73	0
		1	49	21.93	21.91	21.81	0			1	24	21.81	21.79	21.69	0
		25	0	20.99	20.97	20.87	1			12	0	20.87	20.85	20.75	1
		25	12	20.96	20.94	20.84	1			12	6	20.84	20.82	20.72	1
		25	25	20.94	20.92	20.82	1			12	13	20.82	20.80	20.70	1
		50	0	20.92	20.90	20.80	1			25	0	20.80	20.78	20.68	1
	16QAM	1	0	20.98	20.96	20.86	1		16QAM	1	0	20.86	20.84	20.74	1
		1	24	20.95	20.93	20.83	1			1	12	20.83	20.81	20.71	1
		1	49	20.91	20.89	20.79	1			1	24	20.79	20.77	20.67	1
		25	0	19.97	19.95	19.85	2			12	0	19.85	19.83	19.73	2
		25	12	19.94	19.92	19.82	2			12	6	19.82	19.80	19.70	2
		25	25	19.92	19.90	19.80	2			12	13	19.80	19.78	19.68	2
		50	0	19.90	19.88	19.78	2			25	0	19.78	19.76	19.66	2

EIRP Power (dBm)
Mode A

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	-21.77	44.24	22.47	176.52	H
	21100	2535.0	-21.66	44.20	22.54	179.35	
	21425	2567.5	-22.30	44.80	22.50	177.87	
	20775	2502.5	-27.71	44.19	16.48	44.47	V
	21100	2535.0	-27.57	44.09	16.52	44.85	
	21425	2567.5	-28.01	44.50	16.49	44.56	
Channel Bandwidth: 5 MHz / 16QAM							
Z	20775	2502.5	-22.78	44.24	21.46	139.89	H
	21100	2535.0	-22.67	44.20	21.53	142.13	
	21425	2567.5	-23.31	44.80	21.49	140.96	
	20775	2502.5	-28.71	44.19	15.48	35.33	V
	21100	2535.0	-28.59	44.09	15.50	35.47	
	21425	2567.5	-29.02	44.50	15.48	35.31	

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	-21.85	44.34	22.49	177.46	H
	21100	2535.0	-21.63	44.20	22.57	180.59	
	21400	2565.0	-22.24	44.72	22.48	177.13	
	20800	2505.0	-27.72	44.23	16.51	44.73	V
	21100	2535.0	-27.55	44.09	16.54	45.06	
	21400	2565.0	-27.93	44.41	16.48	44.42	
Channel Bandwidth: 10 MHz / 16QAM							
Z	20800	2505.0	-22.86	44.34	21.48	140.64	H
	21100	2535.0	-22.64	44.20	21.56	143.12	
	21400	2565.0	-23.26	44.72	21.46	140.06	
	20800	2505.0	-28.73	44.23	15.50	35.45	V
	21100	2535.0	-28.56	44.09	15.53	35.71	
	21400	2565.0	-28.95	44.41	15.46	35.12	

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	-21.79	44.32	22.53	178.98	H
	21100	2535.0	-21.60	44.20	22.60	181.84	
	21375	2562.5	-22.34	44.85	22.51	178.16	
	20825	2507.5	-27.44	43.99	16.55	45.21	V
	21100	2535.0	-27.51	44.09	16.58	45.48	
	21375	2562.5	-27.99	44.51	16.52	44.87	
Channel Bandwidth: 15 MHz / 16QAM							
Z	20825	2507.5	-22.80	44.32	21.52	141.84	H
	21100	2535.0	-22.60	44.20	21.60	144.44	
	21375	2562.5	-23.36	44.85	21.49	140.86	
	20825	2507.5	-28.45	43.99	15.54	35.83	V
	21100	2535.0	-28.52	44.09	15.57	36.04	
	21375	2562.5	-29.00	44.51	15.51	35.56	

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	-21.60	44.16	22.56	180.30	H
	21100.0	2535.0	-21.56	44.20	22.64	183.53	
	21350.0	2560.0	-22.26	44.81	22.55	179.76	
	20850.0	2510.0	-28.20	44.78	16.58	45.50	V
	21100.0	2535.0	-27.48	44.09	16.61	45.79	
	21350.0	2560.0	-28.16	44.72	16.56	45.29	
Channel Bandwidth: 20 MHz / 16QAM							
Z	20850.0	2510.0	-22.61	44.16	21.55	142.89	H
	21100.0	2535.0	-22.56	44.20	21.64	145.78	
	21350.0	2560.0	-23.27	44.81	21.54	142.46	
	20850.0	2510.0	-29.21	44.78	15.57	36.06	V
	21100.0	2535.0	-28.49	44.09	15.60	36.29	
	21350.0	2560.0	-29.17	44.72	15.55	35.89	

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

LTE Band 38							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	37775	2572.5	-21.24	44.24	23.00	199.43	H
	38000	2595.0	-21.24	44.20	22.96	197.56	
	38225	2617.5	-21.88	44.80	22.92	195.93	
	37775	2572.5	-23.20	44.19	20.99	125.63	V
	38000	2595.0	-23.15	44.09	20.94	124.11	
	38225	2617.5	-23.59	44.50	20.91	123.28	
Channel Bandwidth: 5 MHz / 16QAM							
X	37775	2572.5	-22.26	44.24	21.98	157.69	H
	38000	2595.0	-22.24	44.20	21.96	156.93	
	38225	2617.5	-22.90	44.80	21.90	154.92	
	37775	2572.5	-24.21	44.19	19.98	99.56	V
	38000	2595.0	-24.16	44.09	19.93	98.36	
	38225	2617.5	-24.60	44.50	19.90	97.70	

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

LTE Band 38							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	37800	2575.0	-21.31	44.34	23.03	200.96	H
	38000	2595.0	-21.21	44.20	22.99	198.93	
	38200	2615.0	-21.78	44.72	22.94	196.92	
	37800	2575.0	-23.21	44.23	21.02	126.36	V
	38000	2595.0	-23.12	44.09	20.97	124.97	
	38200	2615.0	-23.47	44.41	20.94	124.05	
Channel Bandwidth: 10 MHz / 16QAM							
X	37800	2575.0	-22.31	44.34	22.03	159.62	H
	38000	2595.0	-22.22	44.20	21.98	157.65	
	38200	2615.0	-22.79	44.72	21.93	156.06	
	37800	2575.0	-24.23	44.23	20.00	99.91	V
	38000	2595.0	-24.14	44.09	19.95	98.81	
	38200	2615.0	-24.48	44.41	19.93	98.31	

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

LTE Band 38							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	37825	2577.5	-21.25	44.32	23.07	202.67	H
	38000	2595.0	-21.18	44.20	23.02	200.31	
	38175	2612.5	-21.88	44.85	22.97	198.06	
	37825	2577.5	-22.93	43.99	21.06	127.70	V
	38000	2595.0	-23.09	44.09	21.00	125.83	
	38175	2612.5	-23.54	44.51	20.97	125.03	
Channel Bandwidth: 15 MHz / 16QAM							
X	37825	2577.5	-22.26	44.32	22.06	160.62	H
	38000	2595.0	-22.19	44.20	22.01	158.74	
	38175	2612.5	-22.88	44.85	21.97	157.33	
	37825	2577.5	-23.94	43.99	20.05	101.20	V
	38000	2595.0	-24.10	44.09	19.99	99.72	
	38175	2612.5	-24.55	44.51	19.96	99.08	

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

LTE Band 38							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	37850	2580.0	-21.06	44.16	23.10	204.17	H
	38000	2595.0	-21.15	44.20	23.05	201.70	
	38150	2610.0	-21.79	44.81	23.02	200.31	
	37850	2580.0	-23.70	44.78	21.08	128.23	V
	38000	2595.0	-23.05	44.09	21.04	127.00	
	38150	2610.0	-23.71	44.72	21.01	126.18	
Channel Bandwidth: 20 MHz / 16QAM							
X	37850	2580.0	-22.07	44.16	22.09	161.81	H
	38000	2595.0	-22.15	44.20	22.05	160.21	
	38150	2610.0	-22.80	44.81	22.01	158.74	
	37850	2580.0	-24.71	44.78	20.07	101.62	V
	38000	2595.0	-24.05	44.09	20.04	100.88	
	38150	2610.0	-24.72	44.72	20.00	100.00	

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

Mode B

LTE Band 38							
Channel Bandwidth: 20 MHz / QPSK							
Plane	**Channel**	**Frequency (MHz)**	**Reading (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (mW)**	**Polarization (H/V)**
X	37850	2580.0	-21.89	44.16	22.27	168.66	H
	38000	2595.0	-21.91	44.20	22.29	169.32	
	38150	2610.0	-22.51	44.81	22.30	169.71	
	37850	2580.0	-24.12	44.78	20.66	116.41	V
	38000	2595.0	-23.86	44.09	20.23	105.39	
	38150	2610.0	-23.91	44.72	20.81	120.50	
Channel Bandwidth: 20 MHz / 16QAM							
X	37850	2580.0	-22.89	44.16	21.27	133.97	H
	38000	2595.0	-22.87	44.20	21.33	135.74	
	38150	2610.0	-23.75	44.81	21.06	127.56	
	37850	2580.0	-25.21	44.78	19.57	90.57	V
	38000	2595.0	-24.96	44.09	19.13	81.81	
	38150	2610.0	-25.01	44.72	19.71	93.54	

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

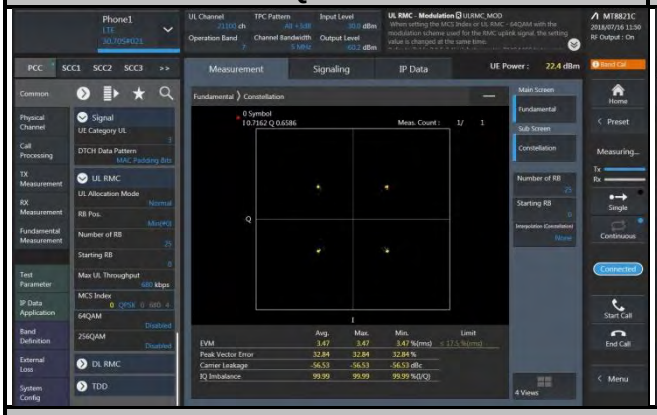
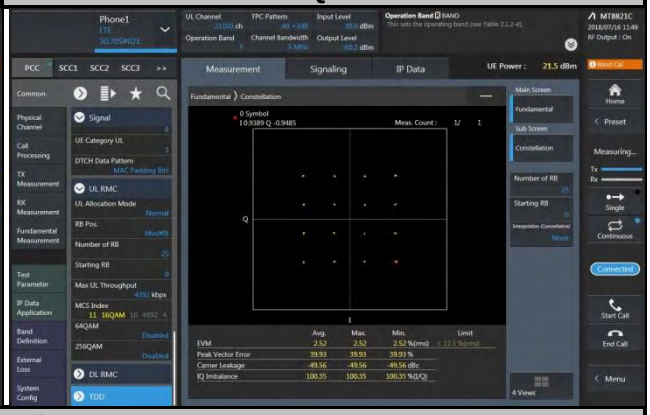
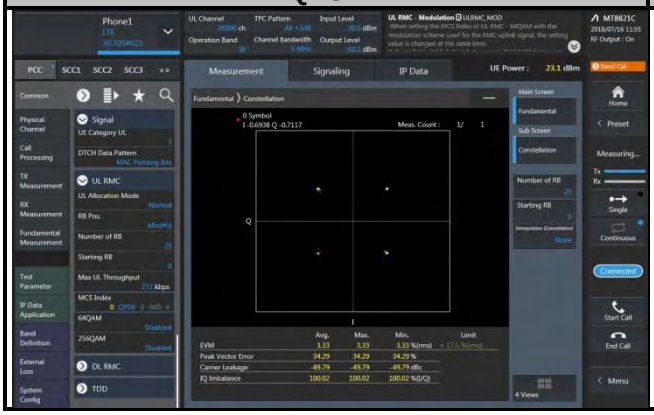
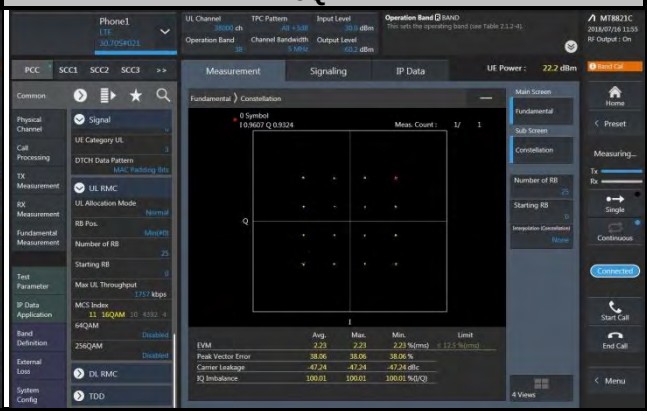
N/A

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 21100	
QPSK	16QAM
	
LTE Band 38	
Channel 38000	
QPSK	16QAM
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

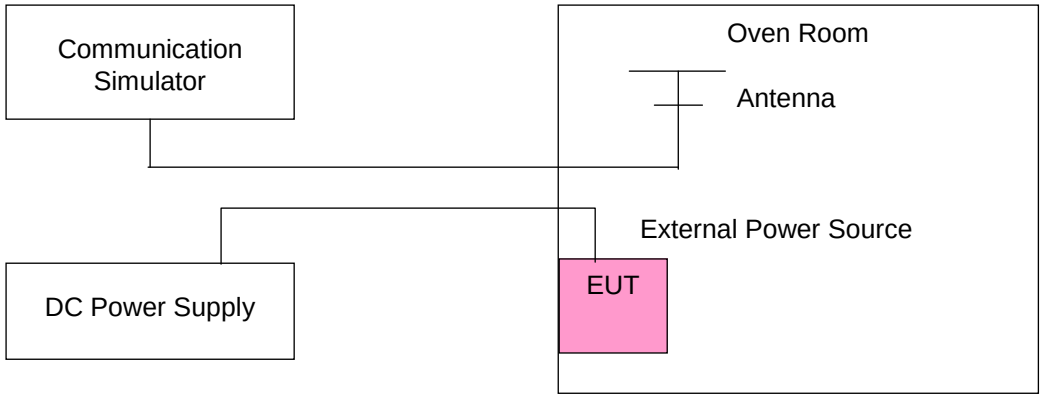
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary 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)	
3.85	2502.500002	0.0008	2567.500003	0.0010	2.5
3.27	2502.500001	0.0005	2567.500001	0.0005	2.5
4.42	2502.500002	0.0008	2567.500002	0.0007	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 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	2502.500003	0.0011	2567.500002	0.0006	2.5
-20	2502.500002	0.0007	2567.500003	0.0011	2.5
-10	2502.500004	0.0014	2567.500002	0.0009	2.5
0	2502.500003	0.0010	2567.500001	0.0004	2.5
10	2502.500002	0.0008	2567.500002	0.0007	2.5
20	2502.499999	-0.0005	2567.499996	-0.0015	2.5
30	2502.499998	-0.0010	2567.499999	-0.0005	2.5
40	2502.499998	-0.0007	2567.499999	-0.0004	2.5
50	2502.499997	-0.0012	2567.499998	-0.0007	2.5
55	2502.499997	-0.0013	2567.499997	-0.0013	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)	
3.85	2505.000002	0.0008	2565.000003	0.0012	2.5
3.27	2505.000002	0.0009	2565.000001	0.0005	2.5
4.42	2505.000002	0.0008	2565.000001	0.0005	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 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	2505.000004	0.0014	2565.000002	0.0006	2.5
-20	2505.000002	0.0008	2565.000001	0.0004	2.5
-10	2505.000004	0.0015	2565.000004	0.0015	2.5
0	2505.000001	0.0004	2565.000001	0.0005	2.5
10	2505.000002	0.0007	2565.000004	0.0015	2.5
20	2504.999996	-0.0015	2564.999998	-0.0007	2.5
30	2504.999997	-0.0010	2564.999999	-0.0004	2.5
40	2504.999997	-0.0010	2564.999997	-0.0013	2.5
50	2504.999996	-0.0016	2564.999998	-0.0008	2.5
55	2504.999997	-0.0013	2564.999998	-0.0008	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)	
3.85	2507.500004	0.0015	2562.500002	0.0006	2.5
3.27	2507.500001	0.0004	2562.500002	0.0009	2.5
4.42	2507.500002	0.0008	2562.500001	0.0005	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 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	0.0008	2562.500003	0.0011	2.5
-20	2507.500003	0.0012	2562.500003	0.0013	2.5
-10	2507.500003	0.0010	2562.500003	0.0012	2.5
0	2507.500002	0.0007	2562.500003	0.0011	2.5
10	2507.500002	0.0009	2562.500002	0.0007	2.5
20	2507.499997	-0.0011	2562.499998	-0.0006	2.5
30	2507.499996	-0.0016	2562.499999	-0.0005	2.5
40	2507.499997	-0.0013	2562.499996	-0.0016	2.5
50	2507.499999	-0.0006	2562.499997	-0.0012	2.5
55	2507.499996	-0.0014	2562.499998	-0.0007	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)	
3.85	2510.000003	0.0012	2560.000003	0.0010	2.5
3.27	2510.000003	0.0012	2560.000001	0.0004	2.5
4.42	2510.000004	0.0015	2560.000002	0.0007	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 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	2510.000001	0.0005	2560.000001	0.0005	2.5
-20	2510.000002	0.0009	2560.000001	0.0004	2.5
-10	2510.000003	0.0013	2560.000003	0.0012	2.5
0	2510.000003	0.0012	2560.000003	0.0010	2.5
10	2510.000002	0.0007	2560.000001	0.0005	2.5
20	2509.999999	-0.0004	2559.999997	-0.0010	2.5
30	2509.999997	-0.0014	2559.999996	-0.0015	2.5
40	2509.999997	-0.0011	2559.999999	-0.0005	2.5
50	2509.999997	-0.0014	2559.999998	-0.0010	2.5
55	2509.999998	-0.0006	2559.999996	-0.0016	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2572.500004	0.0014	2617.500002	0.0008	2.5
3.27	2572.500004	0.0014	2617.500003	0.0011	2.5
4.42	2572.500003	0.0012	2617.500002	0.0008	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2572.500001	0.0005	2617.500002	0.0006	2.5
-20	2572.500001	0.0005	2617.500001	0.0005	2.5
-10	2572.500004	0.0014	2617.500002	0.0006	2.5
0	2572.500004	0.0015	2617.500004	0.0015	2.5
10	2572.500002	0.0008	2617.500004	0.0014	2.5
20	2572.499996	-0.0014	2617.499998	-0.0008	2.5
30	2572.499997	-0.0012	2617.499998	-0.0006	2.5
40	2572.499997	-0.0012	2617.499997	-0.0010	2.5
50	2572.499997	-0.0012	2617.499997	-0.0013	2.5
55	2572.499999	-0.0005	2617.499998	-0.0009	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2575.000001	0.0005	2615.000002	0.0008	2.5
3.27	2575.000002	0.0009	2615.000002	0.0009	2.5
4.42	2575.000003	0.0012	2615.000003	0.0011	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2575.000002	0.0007	2615.000003	0.0012	2.5
-20	2575.000002	0.0008	2615.000003	0.0010	2.5
-10	2575.000002	0.0007	2615.000004	0.0014	2.5
0	2575.000003	0.0013	2615.000004	0.0014	2.5
10	2575.000002	0.0007	2615.000002	0.0007	2.5
20	2574.999999	-0.0005	2614.999997	-0.0013	2.5
30	2574.999997	-0.0013	2614.999997	-0.0013	2.5
40	2574.999998	-0.0010	2614.999997	-0.0010	2.5
50	2574.999999	-0.0005	2614.999997	-0.0012	2.5
55	2574.999997	-0.0010	2614.999999	-0.0005	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2577.500003	0.0011	2612.500003	0.0010	2.5
3.27	2577.500004	0.0015	2612.500003	0.0011	2.5
4.42	2577.500001	0.0005	2612.500002	0.0009	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2577.500004	0.0014	2612.500001	0.0005	2.5
-20	2577.500001	0.0004	2612.500004	0.0014	2.5
-10	2577.500004	0.0014	2612.500004	0.0015	2.5
0	2577.500002	0.0007	2612.500003	0.0012	2.5
10	2577.500003	0.0013	2612.500004	0.0014	2.5
20	2577.499997	-0.0011	2612.499997	-0.0013	2.5
30	2577.499998	-0.0008	2612.499998	-0.0009	2.5
40	2577.499999	-0.0005	2612.499998	-0.0007	2.5
50	2577.499997	-0.0013	2612.499998	-0.0010	2.5
55	2577.499997	-0.0013	2612.499998	-0.0006	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2580.000004	0.0015	2610.000003	0.0011	2.5
3.27	2580.000003	0.0011	2610.000002	0.0007	2.5
4.42	2580.000003	0.0010	2610.000003	0.0011	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.27 Vdc to 4.42 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2580.000001	0.0004	2610.000003	0.0013	2.5
-20	2580.000003	0.0012	2610.000002	0.0008	2.5
-10	2580.000002	0.0009	2610.000004	0.0014	2.5
0	2580.000002	0.0008	2610.000002	0.0009	2.5
10	2580.000002	0.0007	2610.000004	0.0015	2.5
20	2579.999998	-0.0006	2609.999996	-0.0014	2.5
30	2579.999996	-0.0016	2609.999997	-0.0011	2.5
40	2579.999998	-0.0008	2609.999998	-0.0007	2.5
50	2579.999999	-0.0005	2609.999997	-0.0010	2.5
55	2579.999997	-0.0011	2609.999996	-0.0014	2.5

4.4 Occupied Bandwidth Measurement

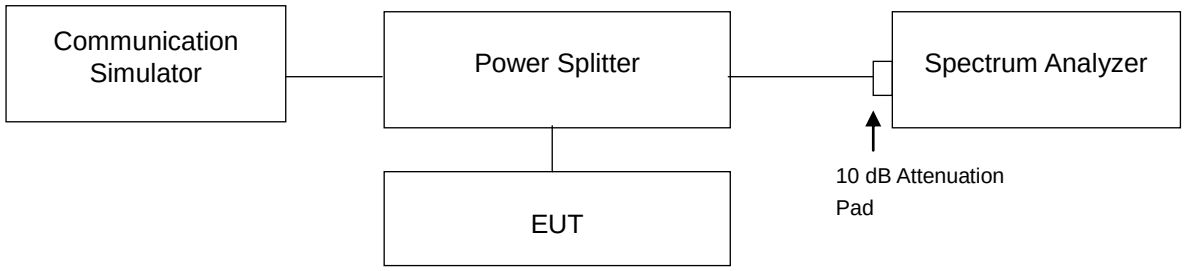
4.4.1 Limits of Occupied Bandwidth Measurement

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

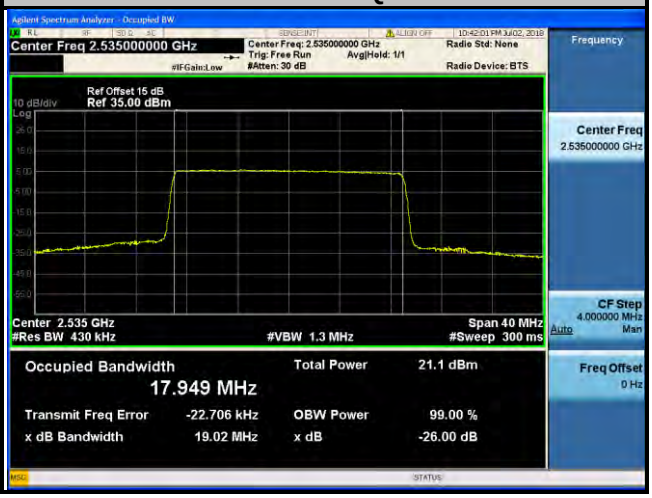


4.4.4 Test Results

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			QPSK	16QAM
20775	2502.5	4.4923	4.4956	20800	2505.0	8.9616	8.9689
21100	2535.0	4.4939	4.4944	21100	2535.0	8.9669	8.9711
21425	2567.5	4.4926	4.4933	21400	2565.0	8.9628	8.9650

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

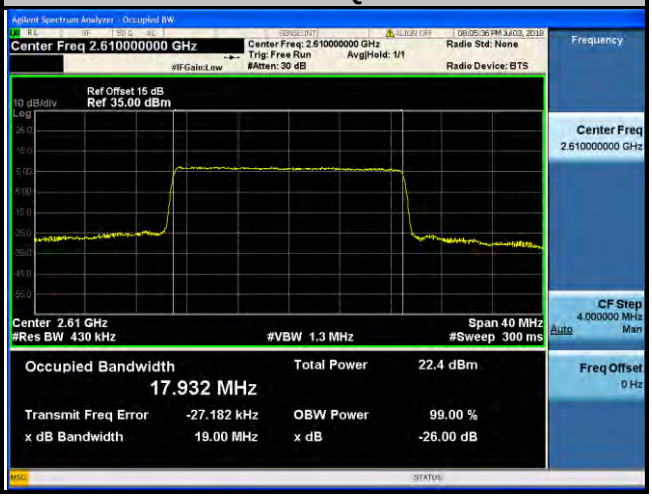
LTE Band 7							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20825	2507.5	13.443	13.438	20850	2510.0	17.908	17.919
21100	2535.0	13.450	13.439	21100	2535.0	17.914	17.949
21375	2562.5	13.447	13.438	21350	2560.0	17.900	17.918

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

LTE Band 38							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
37775	2572.5	4.4902	4.4859	37800	2575.0	8.9522	8.9640
38000	2595.0	4.4911	4.4879	38000	2595.0	8.9555	8.9591
38225	2617.5	4.4926	4.4929	38200	2615.0	8.9607	8.9718

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

LTE Band 38							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
37825	2577.5	13.433	13.426	37850	2580.0	17.883	17.878
38000	2595.0	13.439	13.429	38000	2595.0	17.894	17.890
38175	2612.5	13.458	13.450	38150	2610.0	17.932	17.924

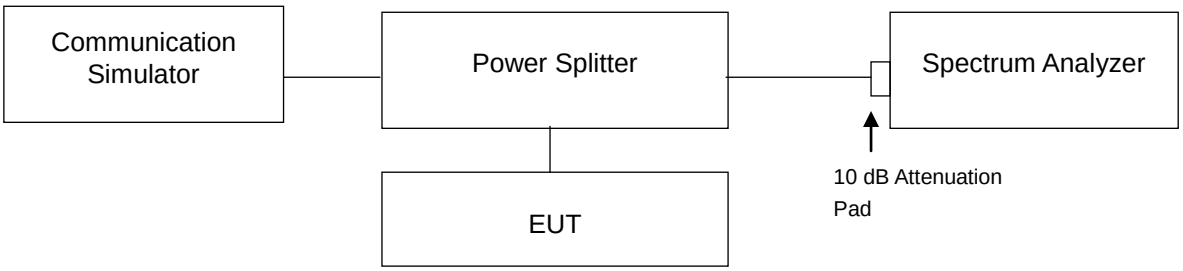
Spectrum Plot of Worst Value	
15 MHz / QPSK	20 MHz / QPSK
	

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.

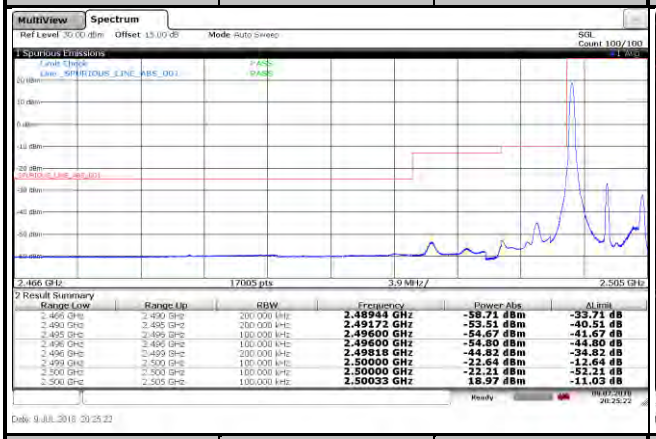
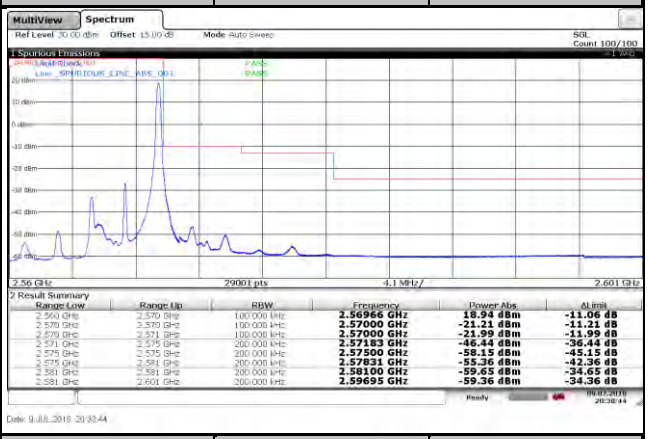
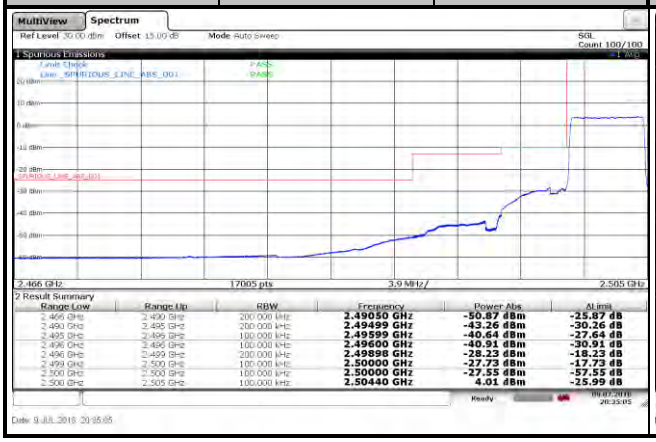
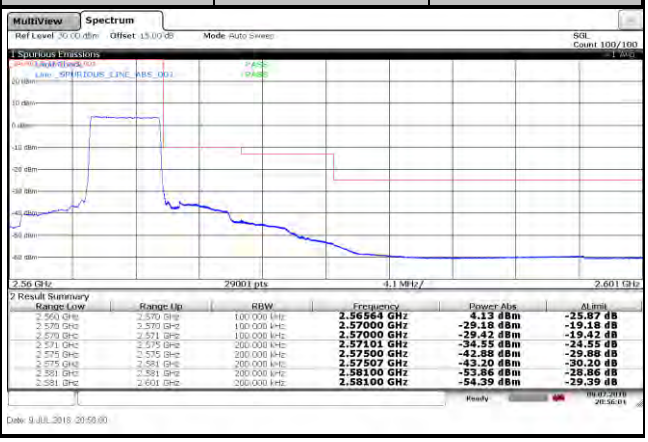
4.5.2 Test Setup

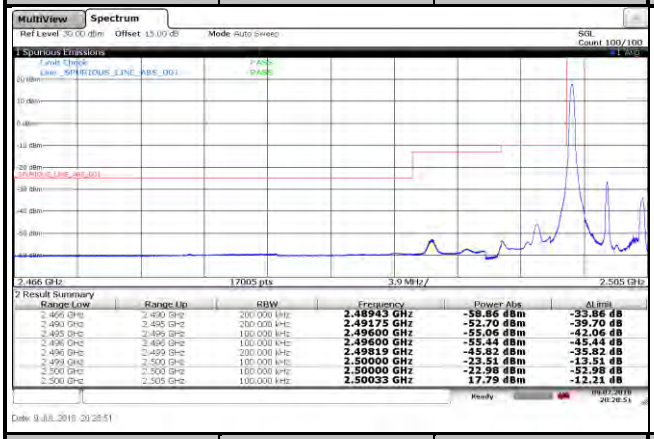
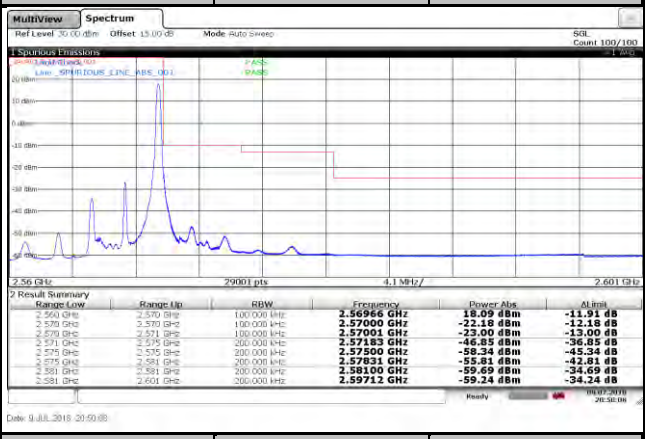
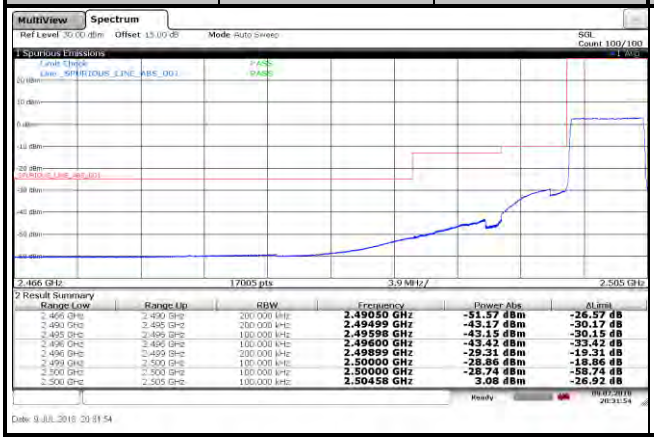
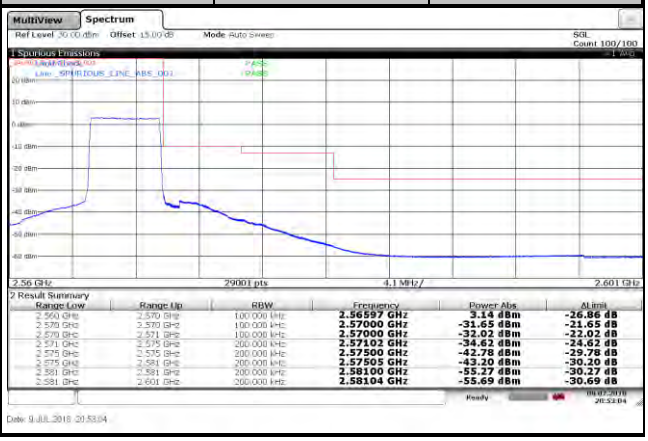


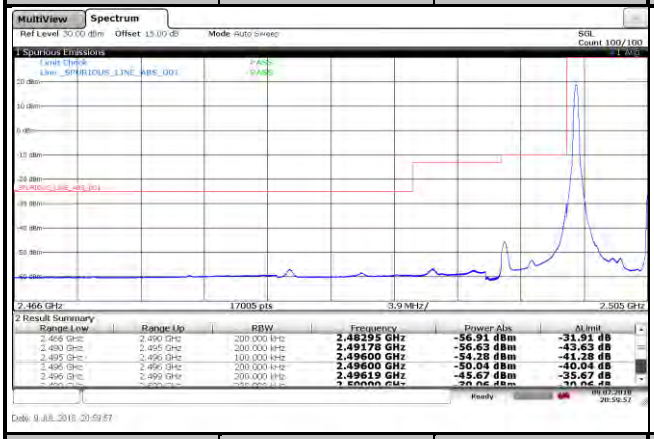
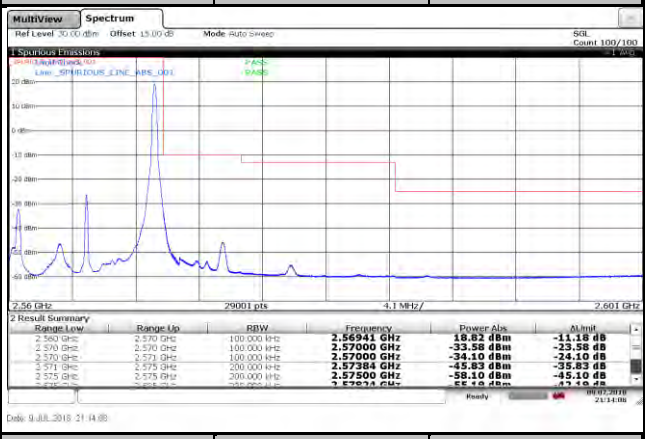
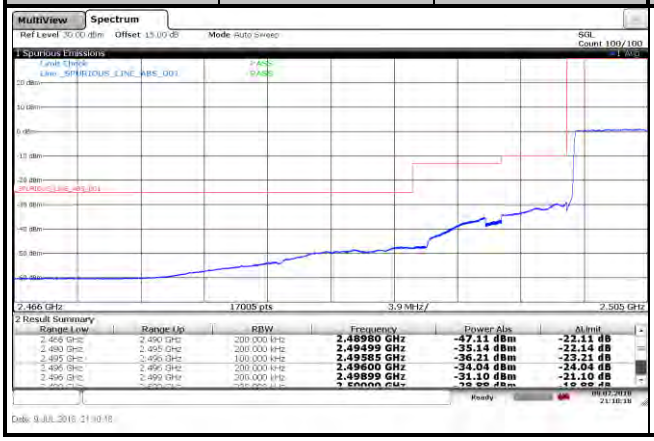
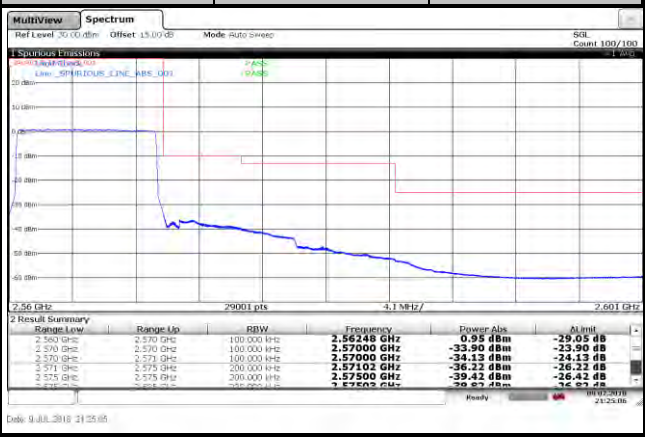
4.5.3 Test Procedures

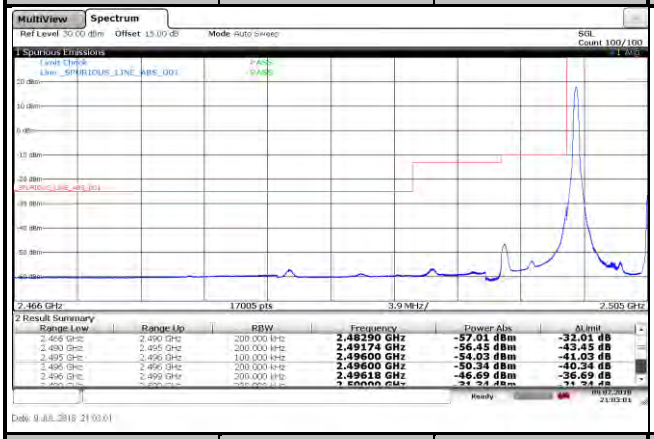
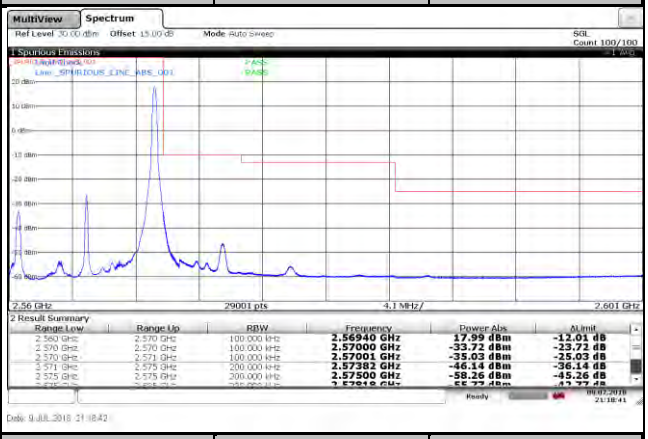
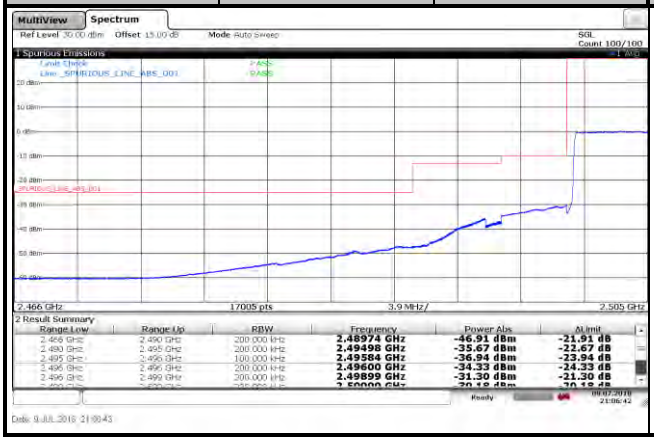
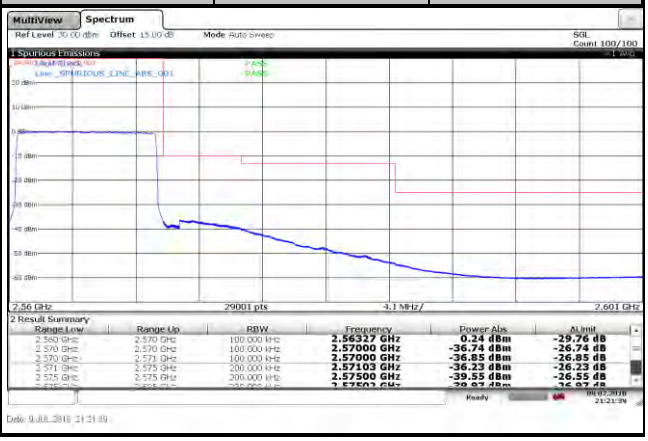
a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
b. The out-of-band emissions measurement used the power splitter via EUT RF power connector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

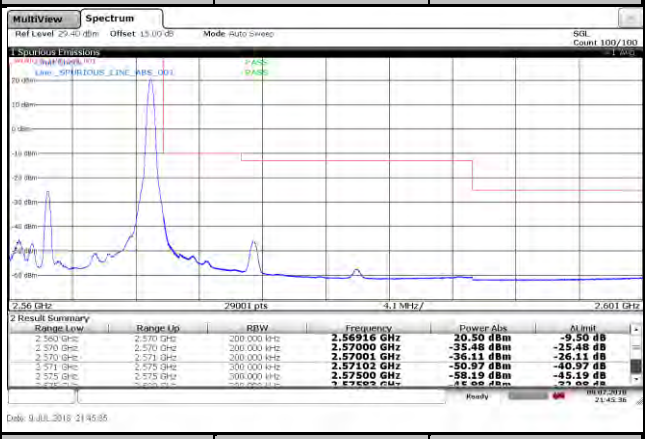
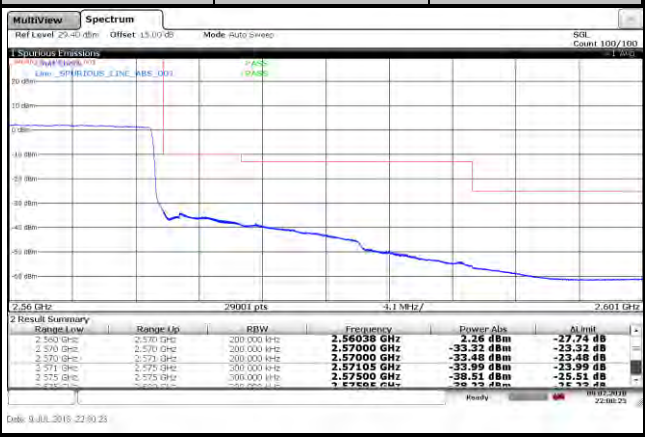
4.5.4 Test Results

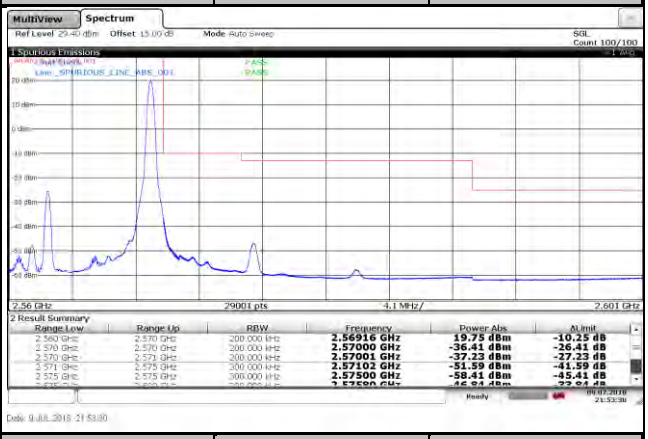
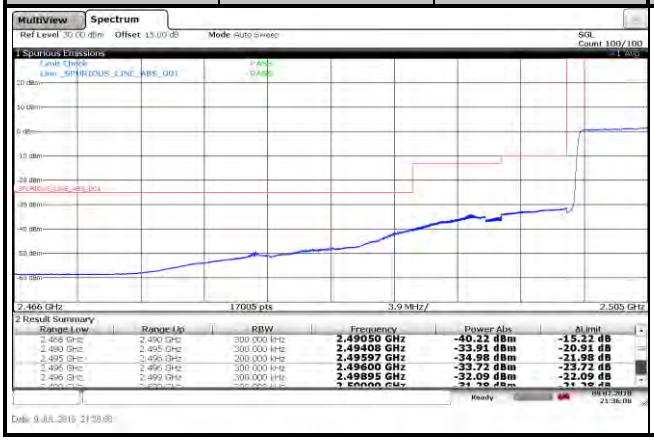
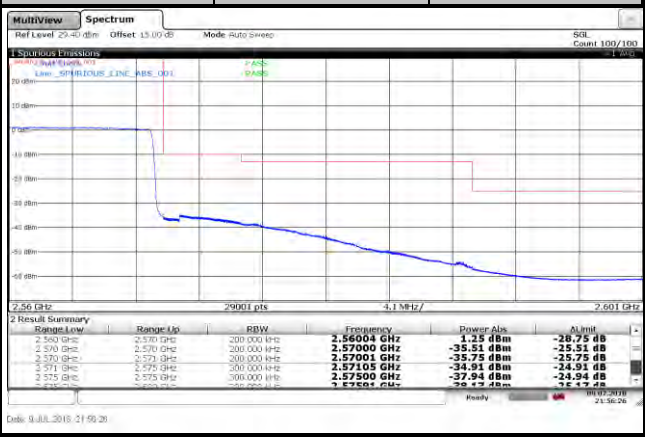
LTE Band 7					
Channel Bandwidth: 5 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20775	1 RB	Channel	21425	1 RB
					
Channel	20775	25 RB	Channel	21425	25 RB
					

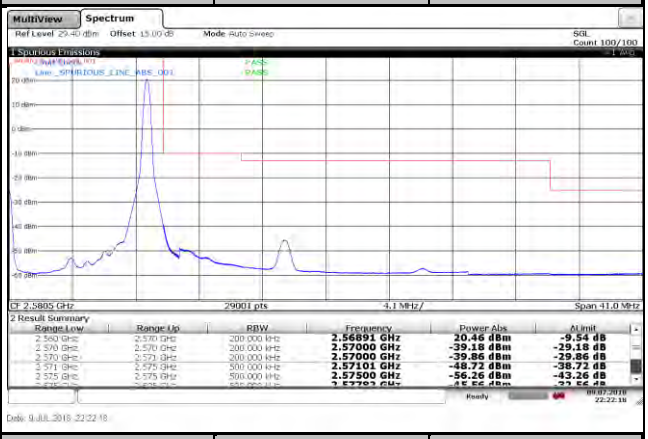
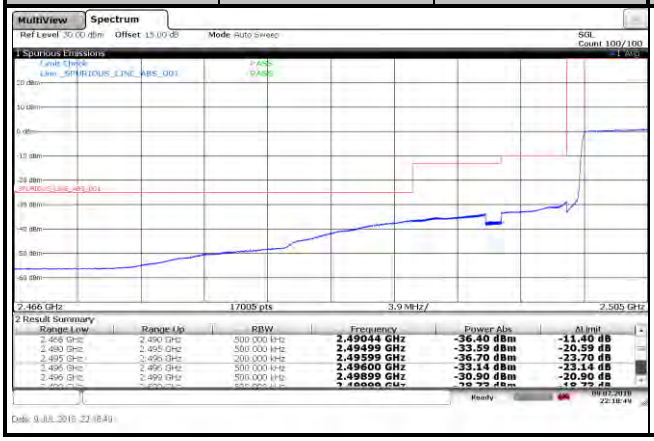
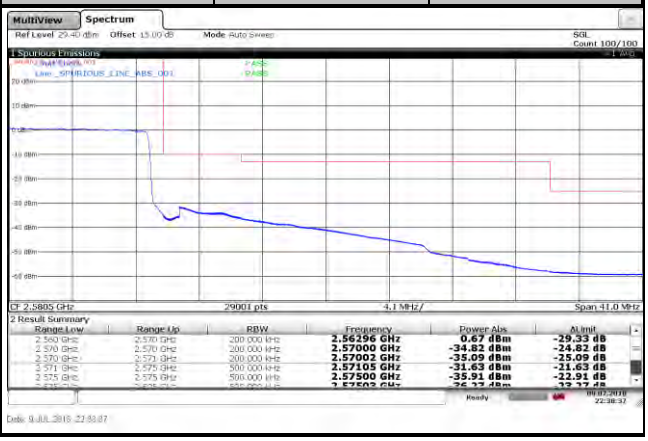
LTE Band 7					
Channel Bandwidth: 5 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	20775	1 RB	Channel	21425	1 RB
					
Channel	20775	25 RB	Channel	21425	25 RB
					

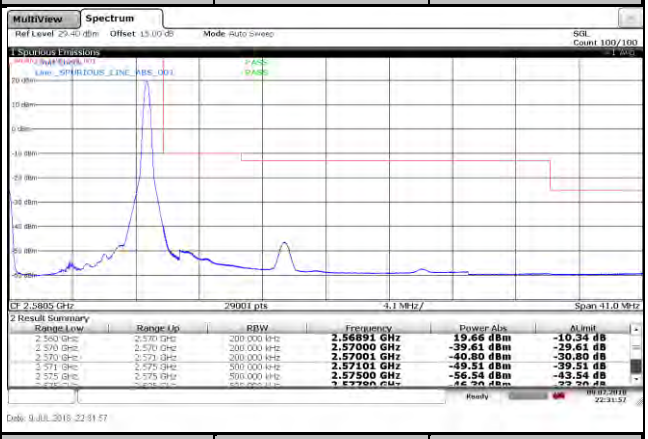
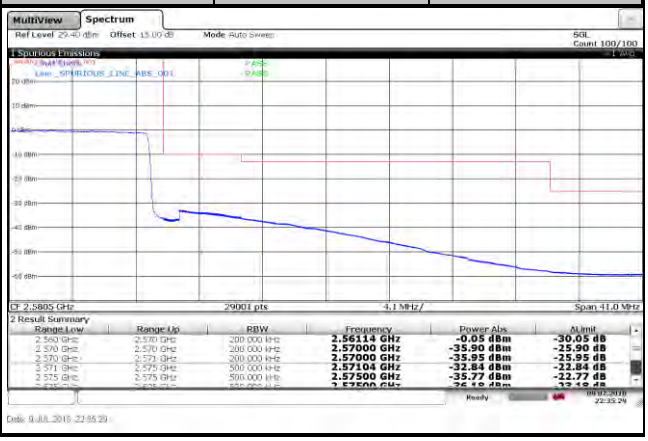
LTE Band 7					
Channel Bandwidth: 10 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20800	1 RB	Channel	21400	1 RB
					
Channel	20800	50 RB	Channel	21400	50 RB
					

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
					

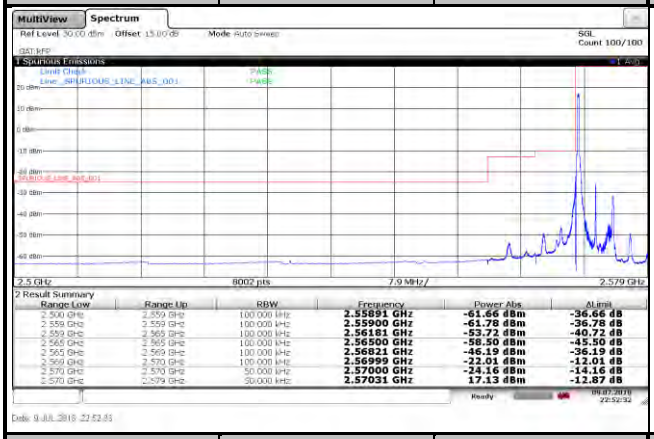
LTE Band 7					
Channel Bandwidth: 15 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	20825	1 RB	Channel	21375	1 RB
					
Channel	20825	75 RB	Channel	21375	75 RB
					

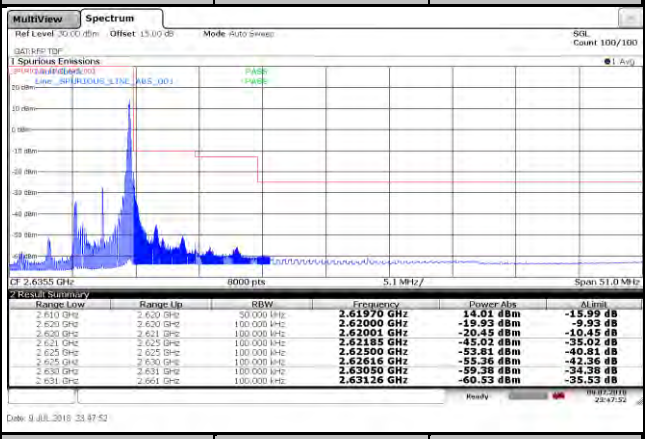
LTE Band 7					
Channel Bandwidth: 15 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	20825	1 RB	Channel	21375	1 RB
					
Channel	20825	75 RB	Channel	21375	75 RB
					

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

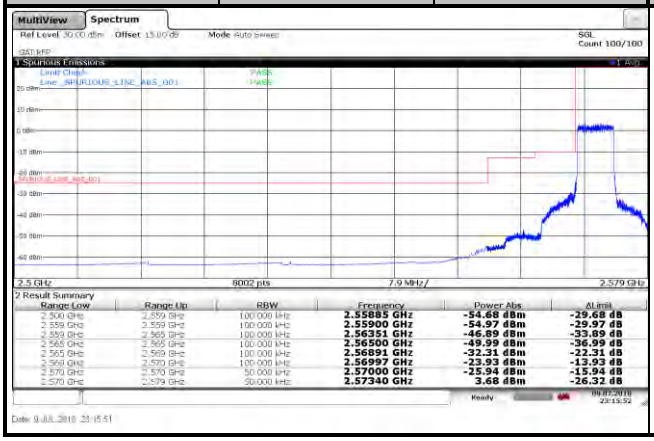
LTE Band 7					
Channel Bandwidth: 20 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	20850	1 RB	Channel	21350	1 RB
					
Channel	20850	100 RB	Channel	21350	100 RB
					

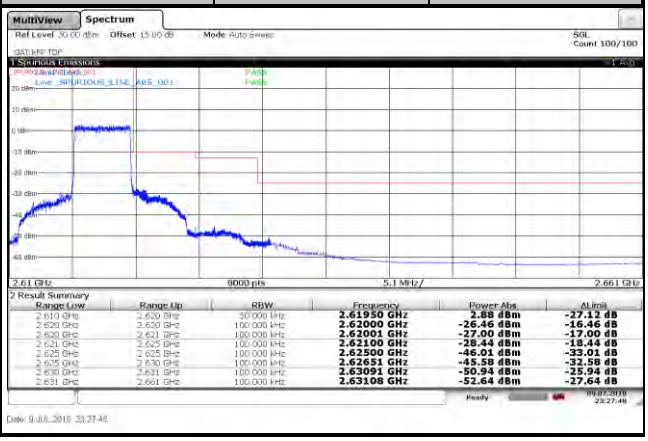
LTE Band 38					
Channel Bandwidth: 5 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	37775	1 RB	Channel	38225	1 RB

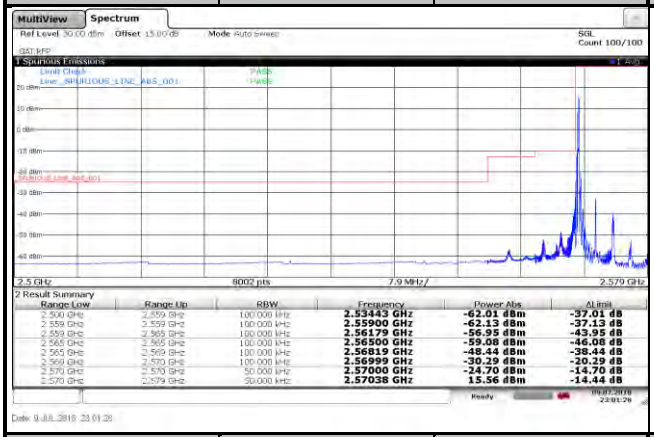
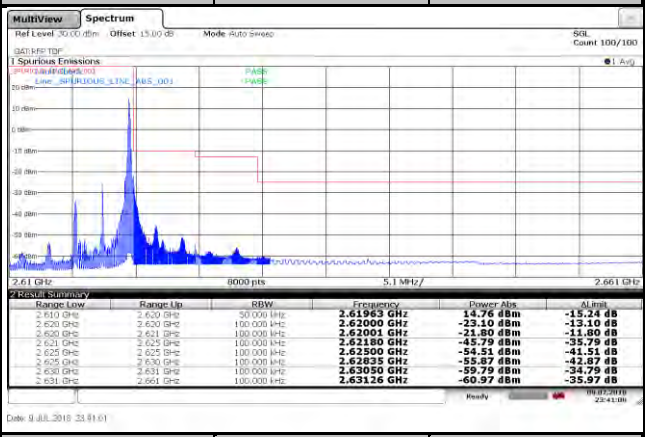
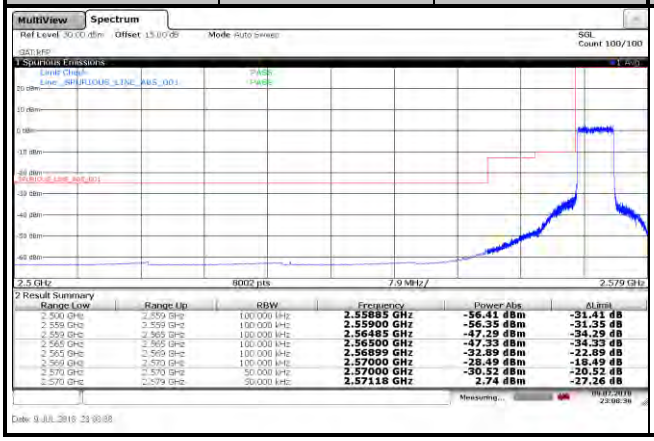
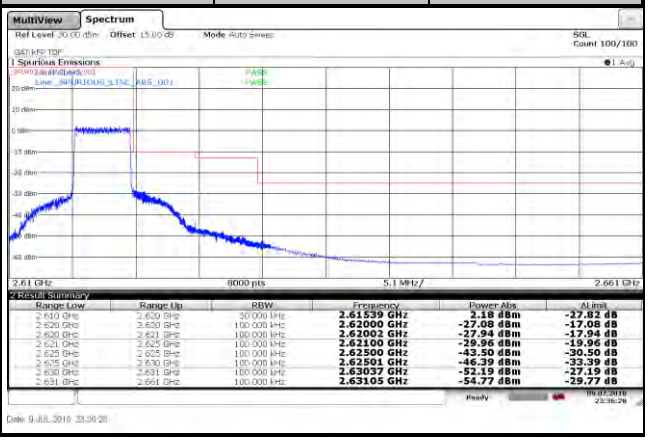




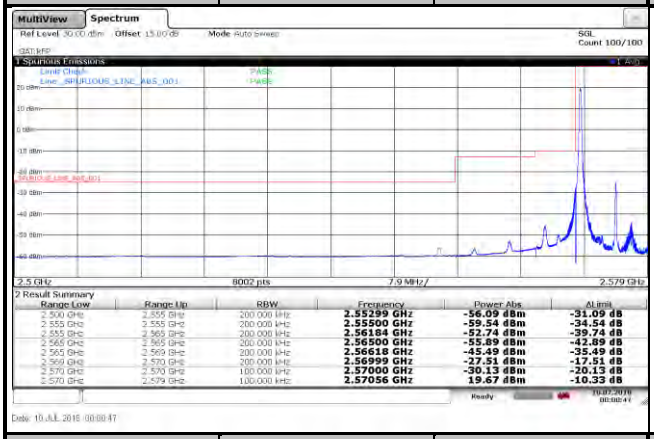
Channel	37775	25 RB	Channel	38225	25 RB

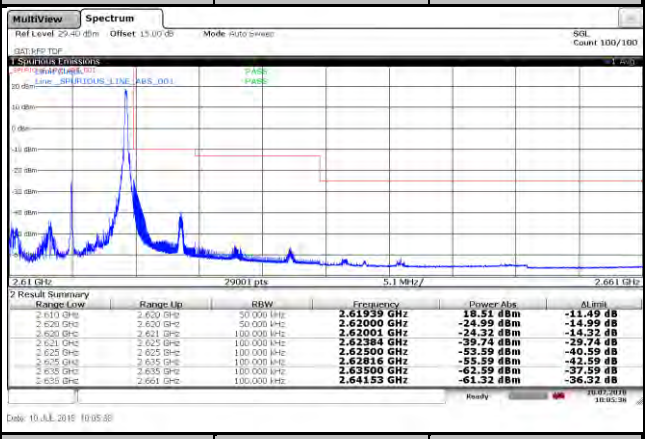




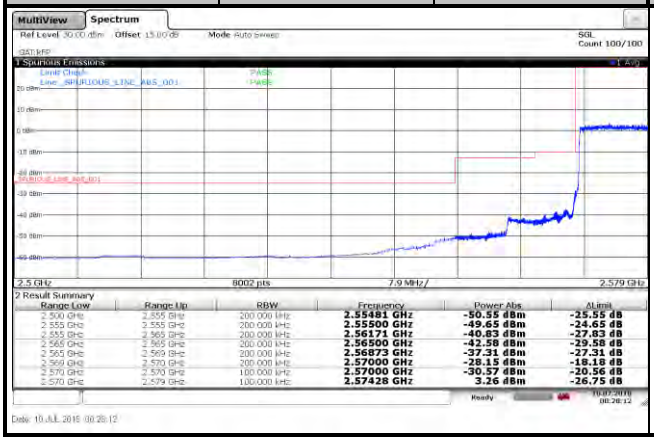
LTE Band 38					
Channel Bandwidth: 5 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	37775	1 RB	Channel	38225	1 RB
					
Channel	37775	25 RB	Channel	38225	25 RB
					

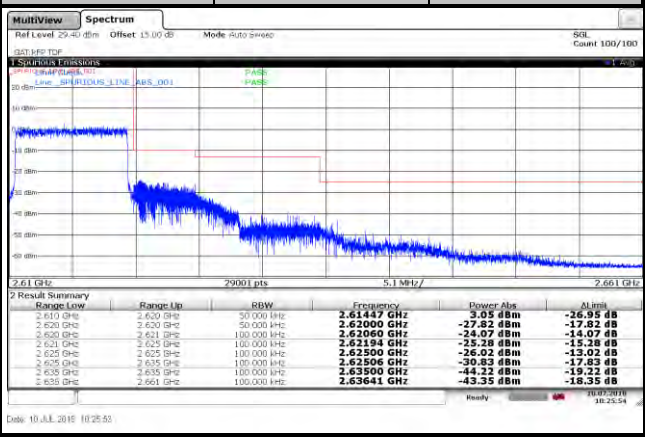
LTE Band 38					
Channel Bandwidth: 10 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	37800	1 RB	Channel	38200	1 RB

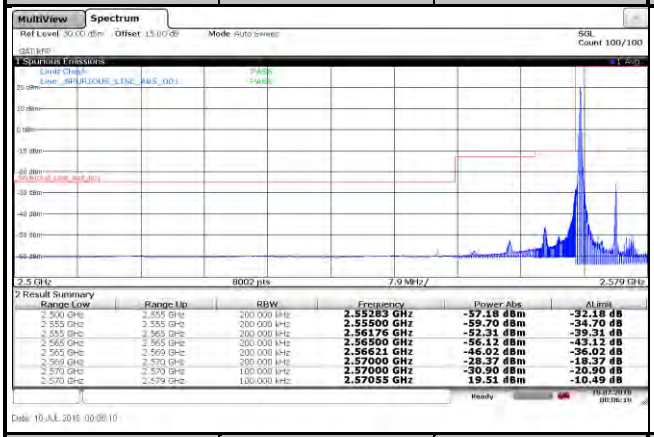
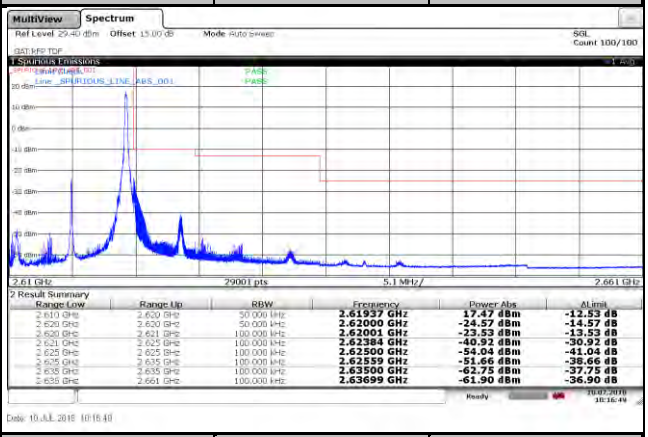
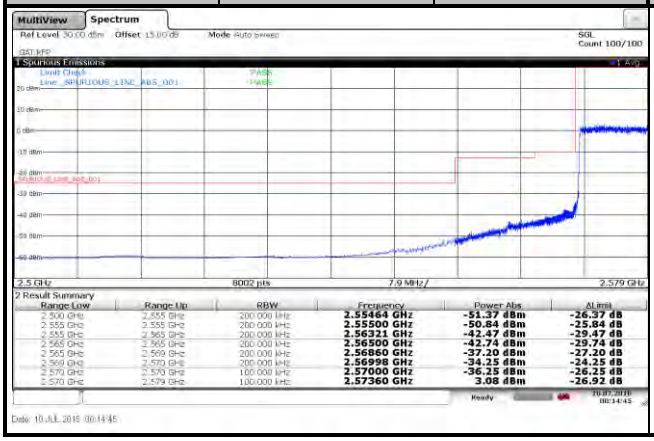
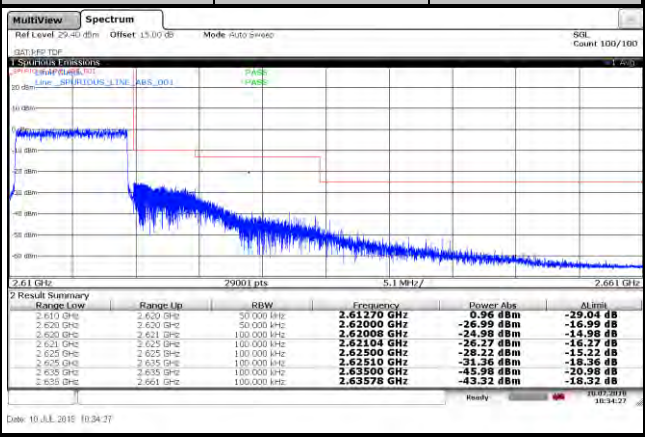


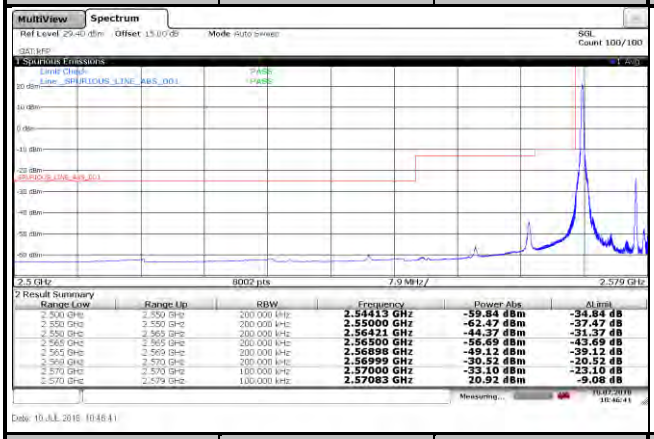
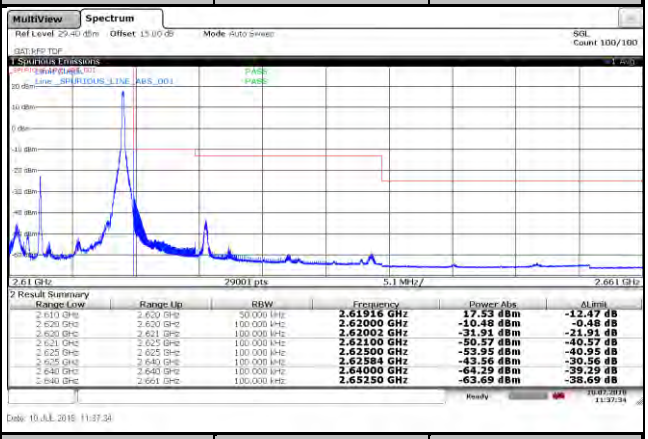
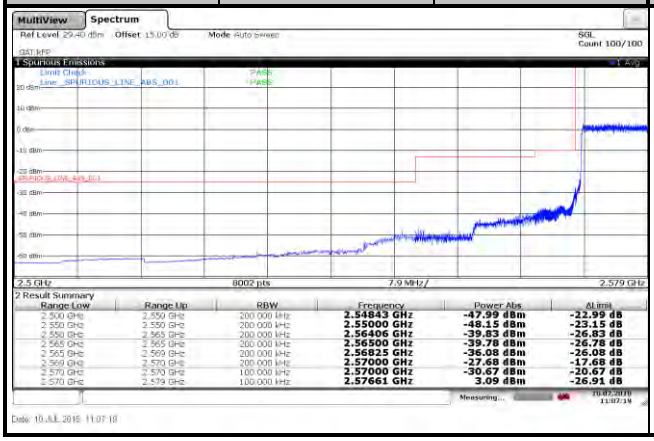
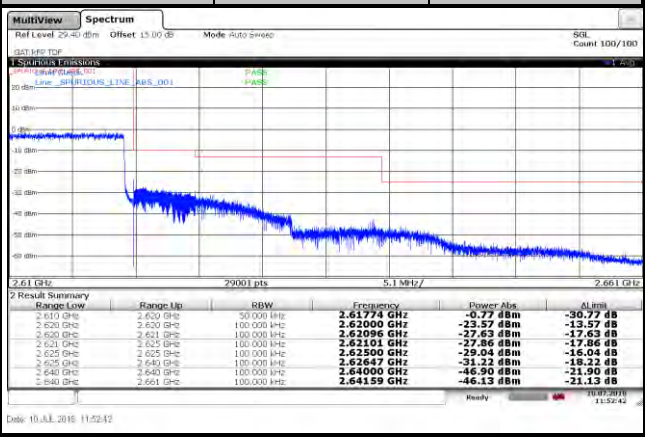


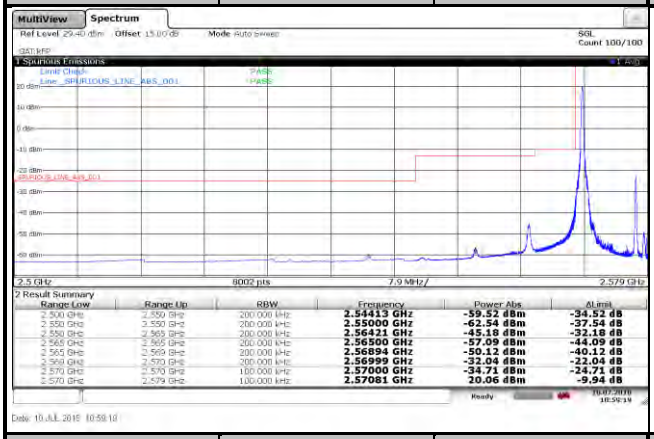
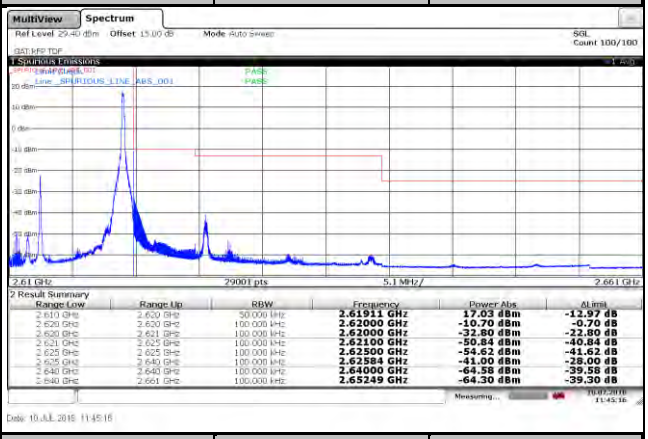
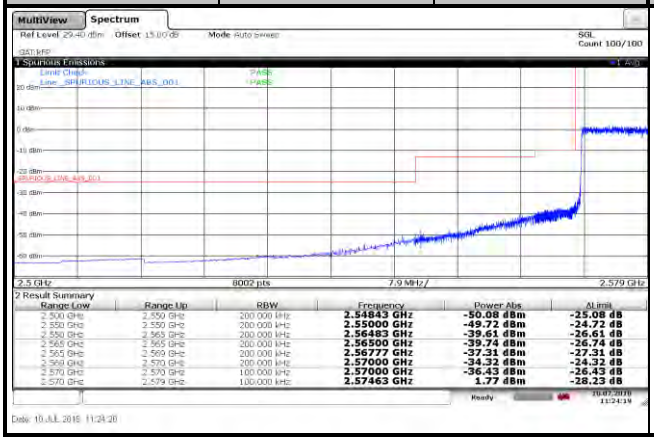
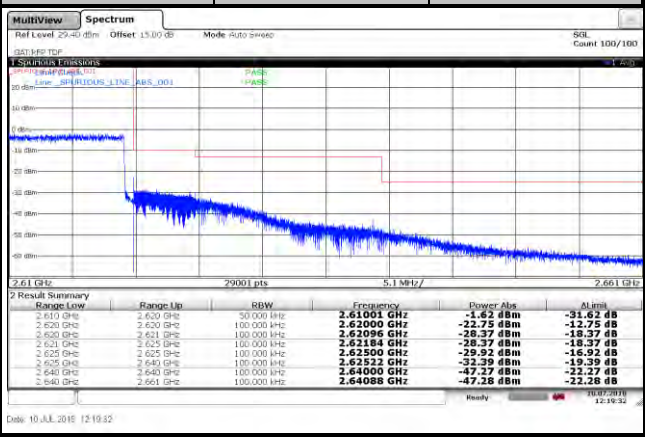
Channel	37800	50 RB	Channel	38200	50 RB

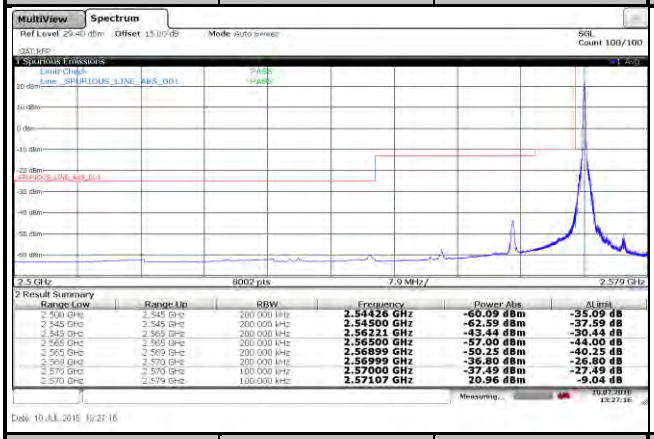
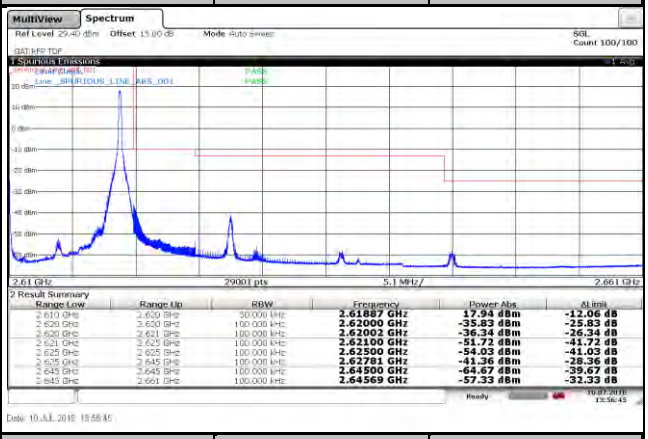
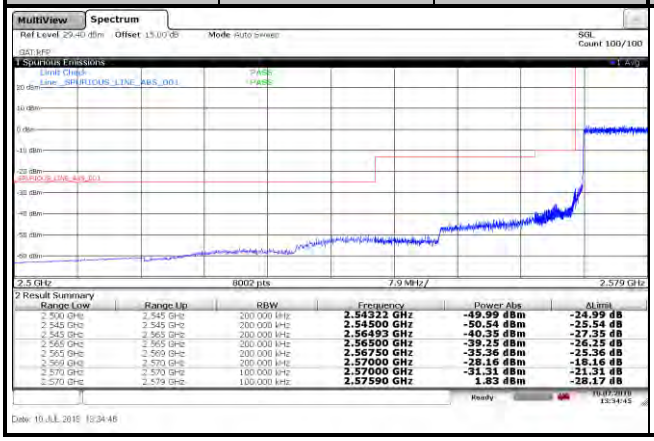
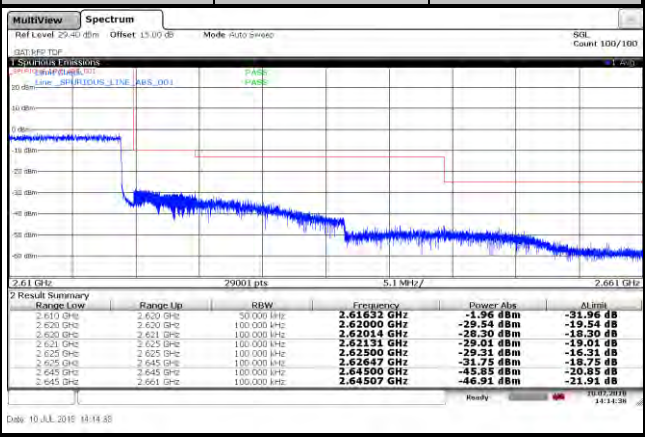


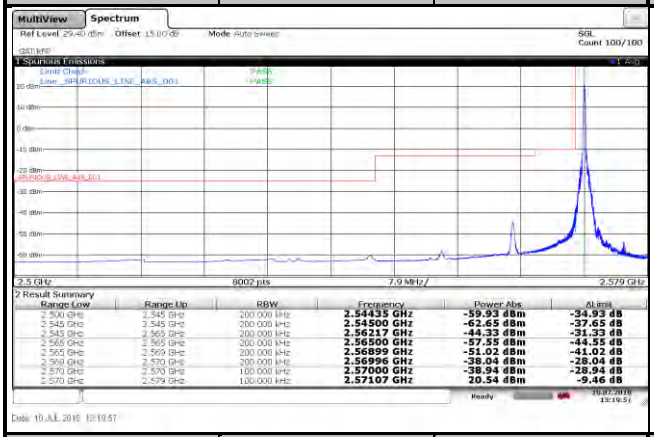
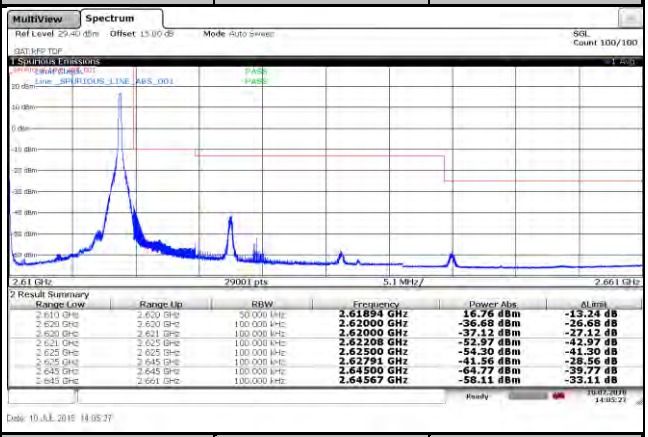
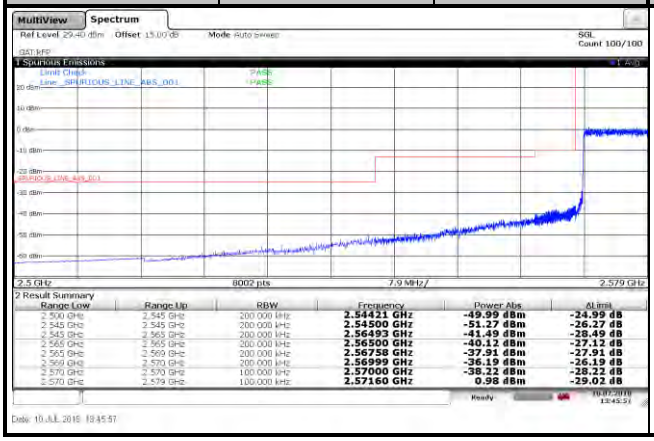
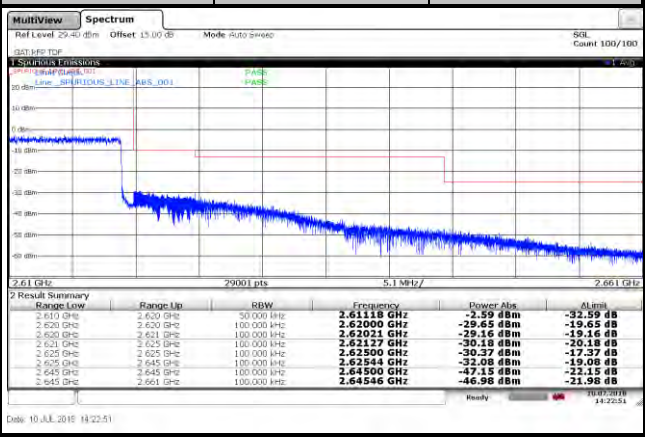


LTE Band 38					
Channel Bandwidth: 10 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	37800	1 RB	Channel	38200	1 RB
					
Channel	37800	50 RB	Channel	38200	50 RB
					

LTE Band 38					
Channel Bandwidth: 15 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	37825	1 RB	Channel	38175	1 RB
					
Channel	37825	75 RB	Channel	38175	75 RB
					

LTE Band 38					
Channel Bandwidth: 15 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	37825	1 RB	Channel	38175	1 RB
					
Channel	37825	75 RB	Channel	38175	75 RB
					

LTE Band 38					
Channel Bandwidth: 20 MHz / QPSK					
<Out-of-Band Emissions>					
Channel	37850	1 RB	Channel	38150	1 RB
					
Channel	37850	100 RB	Channel	38150	100 RB
					

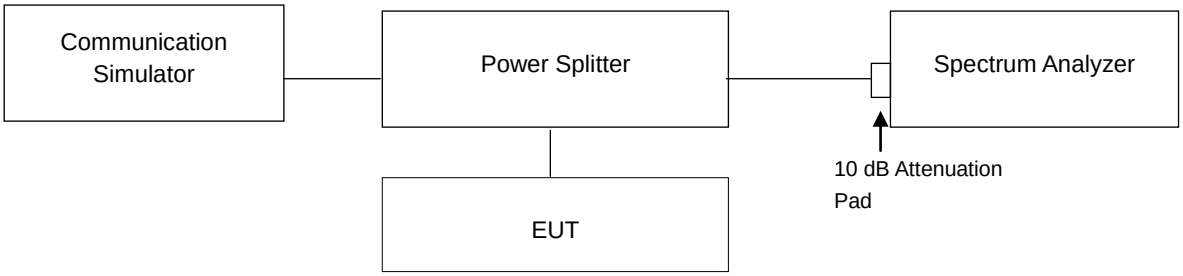
LTE Band 38					
Channel Bandwidth: 20 MHz / 16QAM					
<Out-of-Band Emissions>					
Channel	37850	1 RB	Channel	38150	1 RB
					
Channel	37850	100 RB	Channel	38150	100 RB
					

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

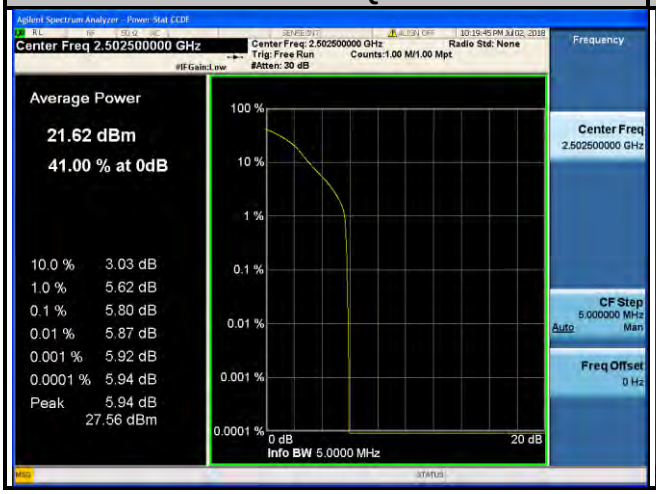
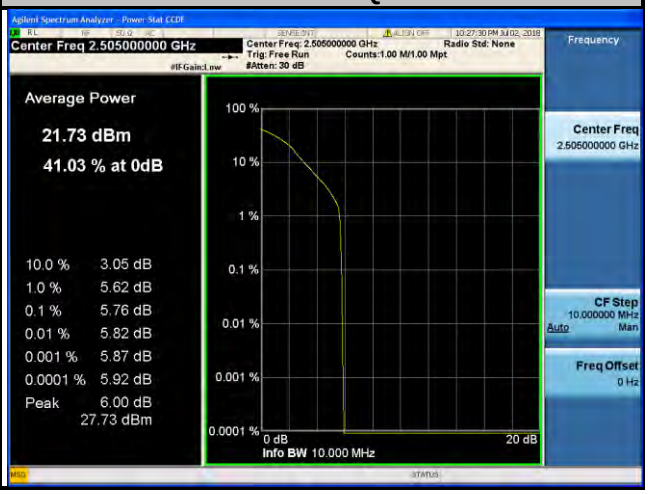


4.6.3 Test Procedures

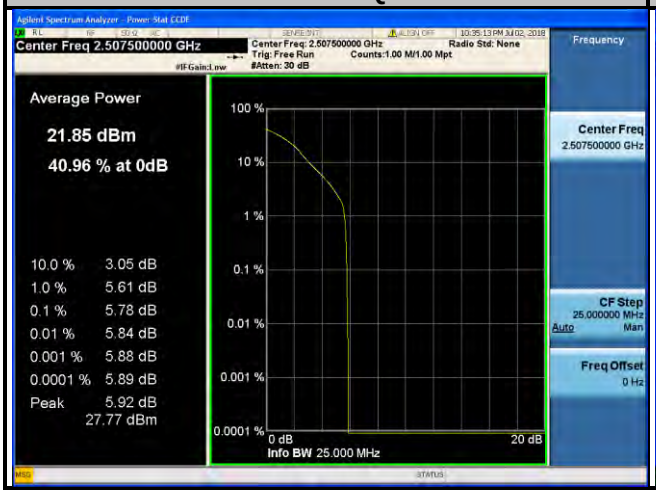
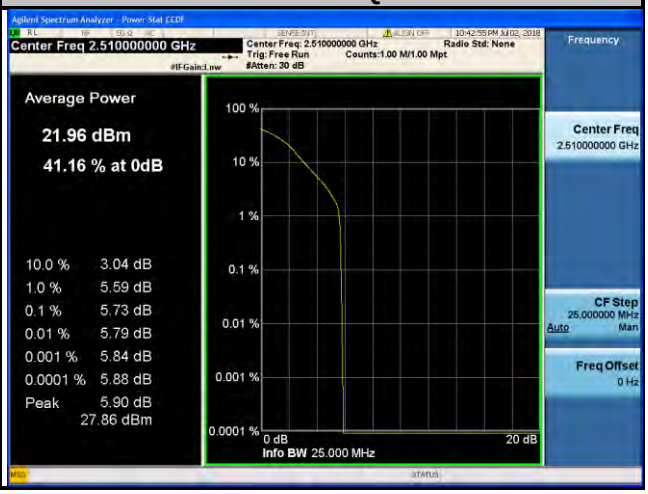
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.6.4 Test Results

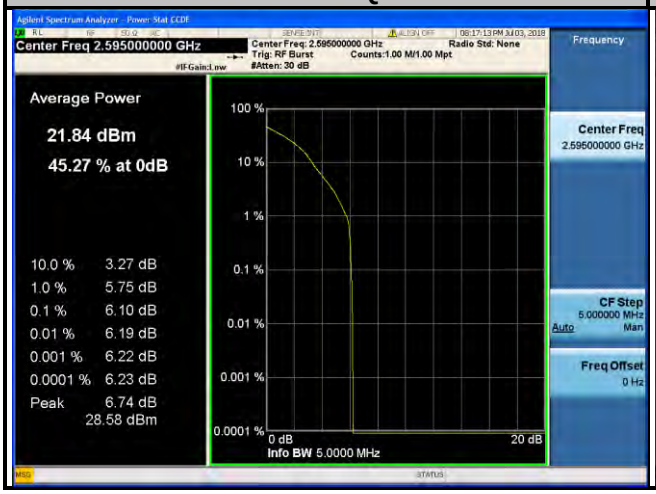
LTE Band 7							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20775	2502.5	4.04	5.80	20800	2505.0	4.00	5.76
21100	2535.0	3.80	5.58	21100	2535.0	3.59	5.37
21425	2567.5	3.73	5.44	21400	2565.0	3.66	5.34

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

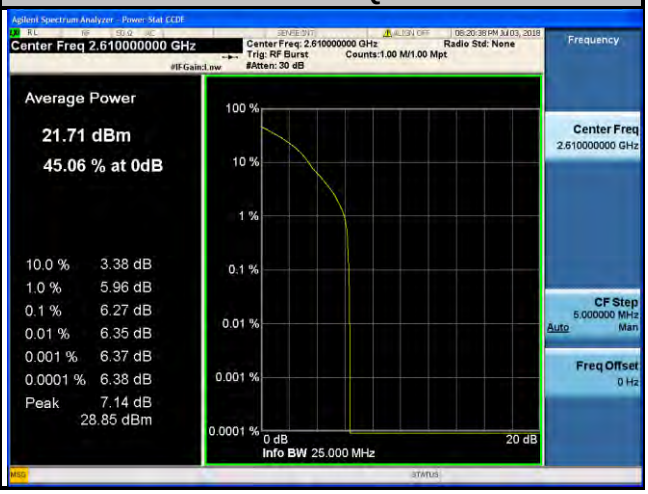
LTE Band 7							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20825	2507.5	3.98	5.78	20850	2510.0	3.96	5.73
21100	2535.0	3.56	5.22	21100	2535.0	3.49	5.24
21375	2562.5	3.80	5.59	21350	2560.0	3.92	5.64

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

LTE Band 38							
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			QPSK	16QAM
37775	2572.5	3.78	5.23	37800	2575.0	4.41	5.59
38000	2595.0	3.97	6.10	38000	2595.0	4.77	5.92
38225	2617.5	4.44	5.98	38200	2615.0	5.06	6.24

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

LTE Band 38							
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			QPSK	16QAM
37825	2577.5	3.42	4.68	37850	2580.0	3.48	5.92
38000	2595.0	3.58	6.10	38000	2595.0	3.53	6.13
38175	2612.5	4.56	6.51	38150	2610.0	4.14	6.27

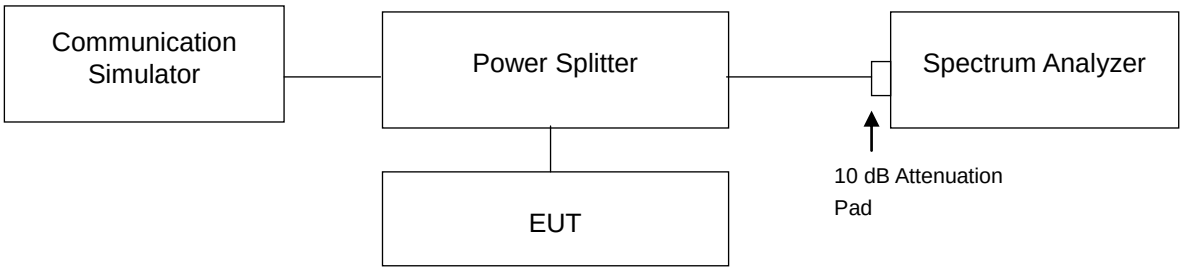
Spectrum Plot of Worst Value	
15 MHz / 16QAM	20 MHz / 16QAM
	

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 log10(P) dB. The limit of emission is equal to -25 dBm.

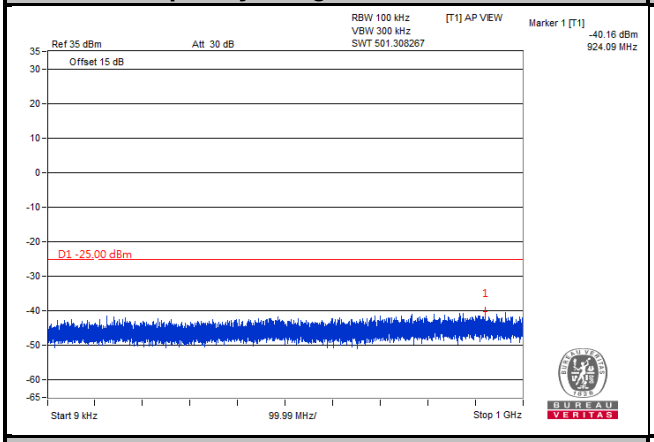
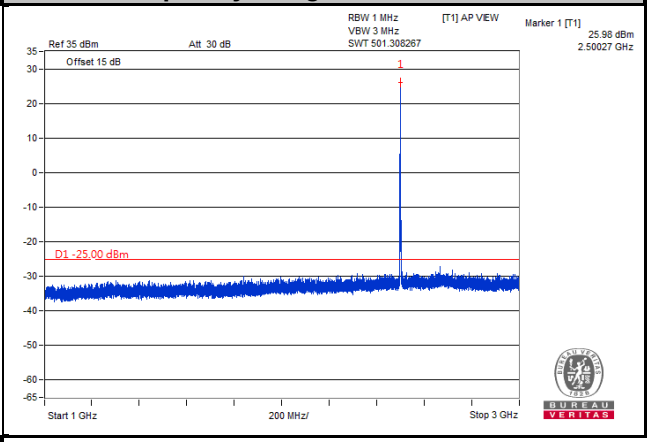
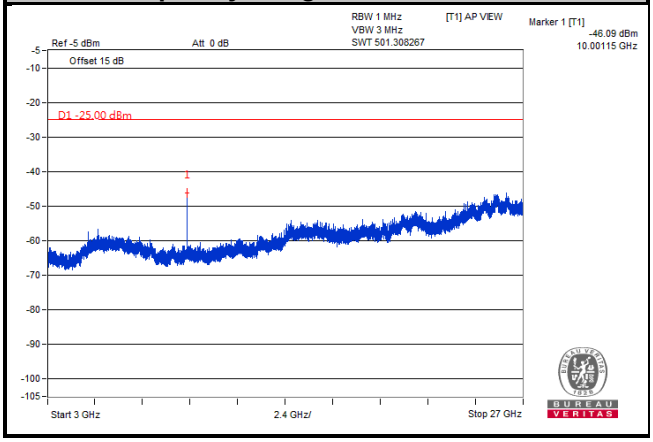
4.7.2 Test Setup

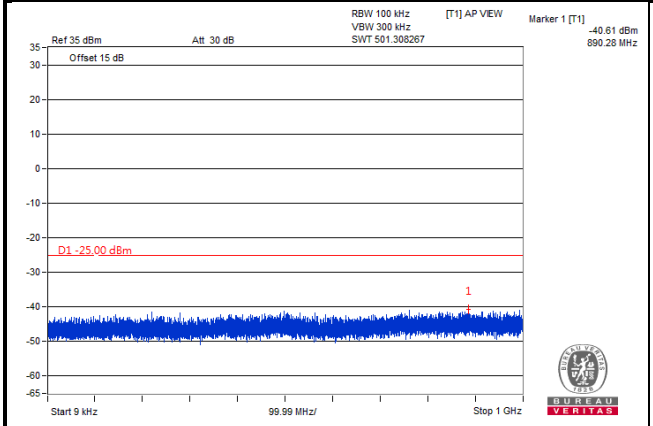
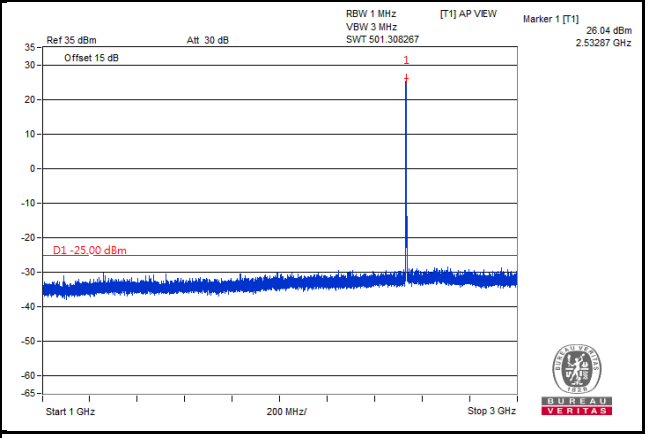
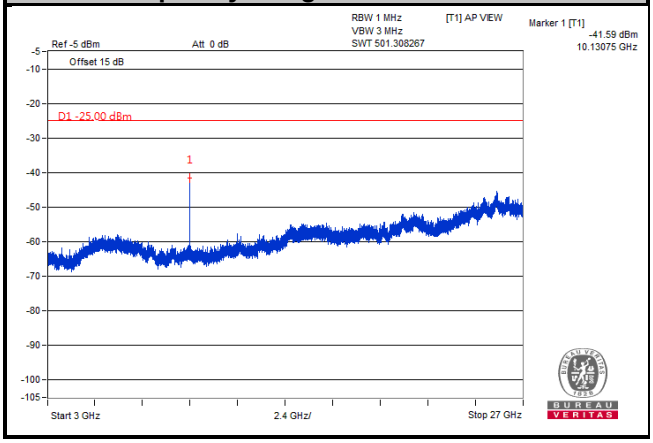


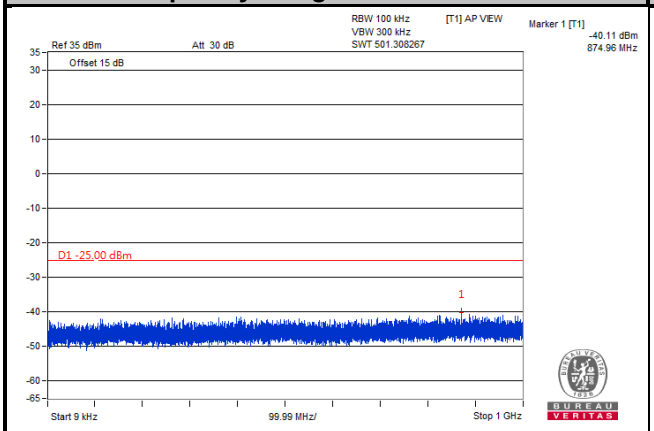
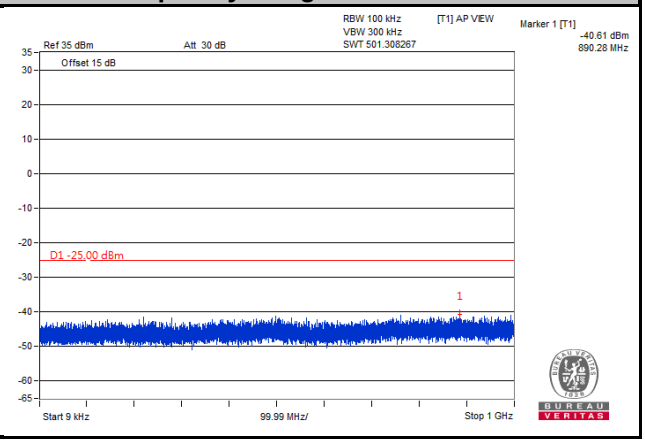
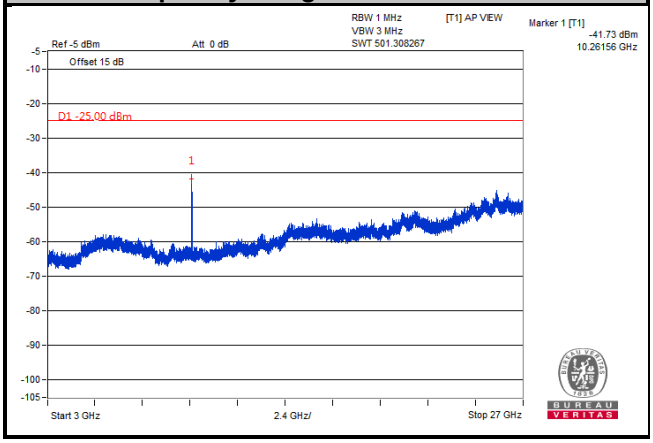
4.7.3 Test Procedure

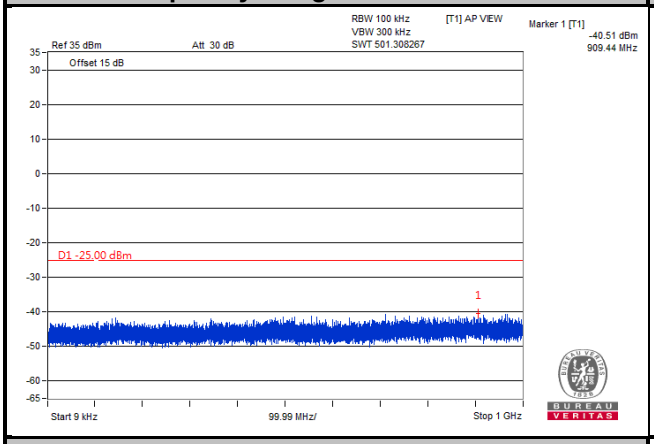
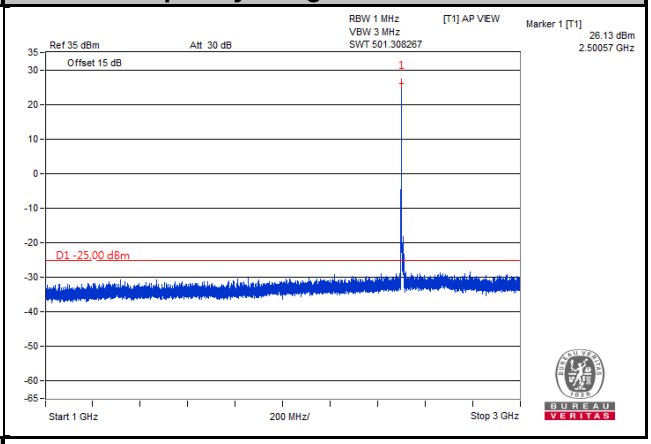
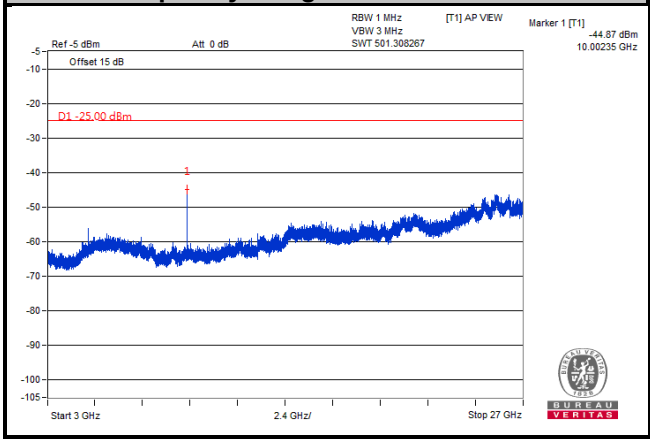
a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
b. Measuring frequency range from 9 kHz to 1 GHz, 10 dB attenuation pad is connected with spectrum. RBW = 100 kHz and VBW = 300 kHz are used for conducted emission measurement.
c. Measuring frequency range 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.

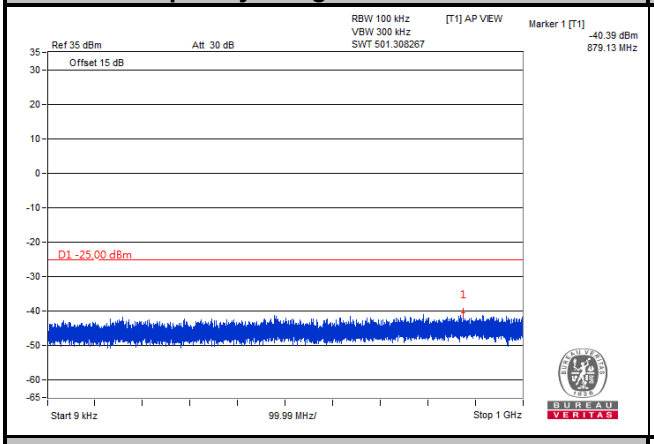
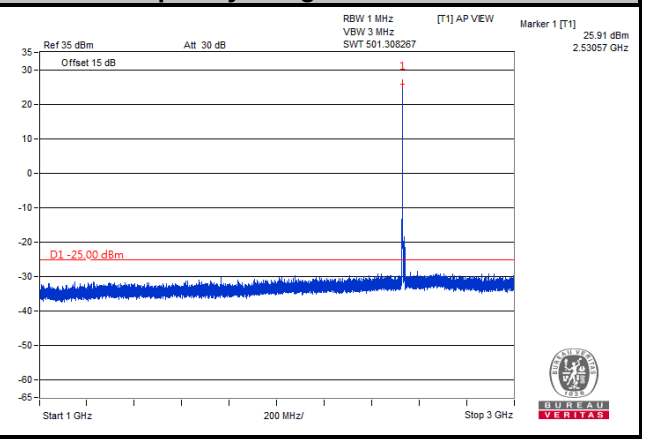
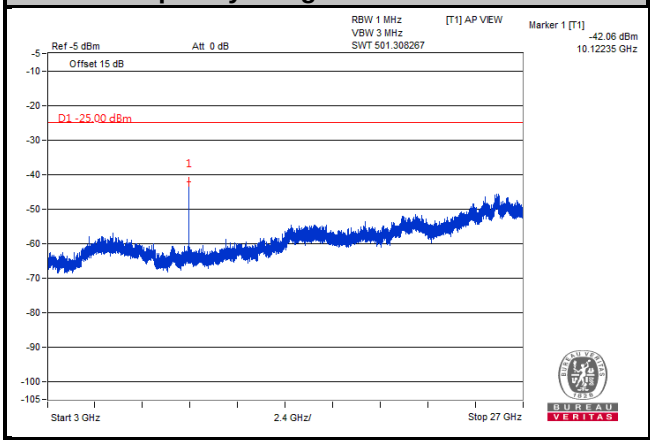
4.7.4 Test Results

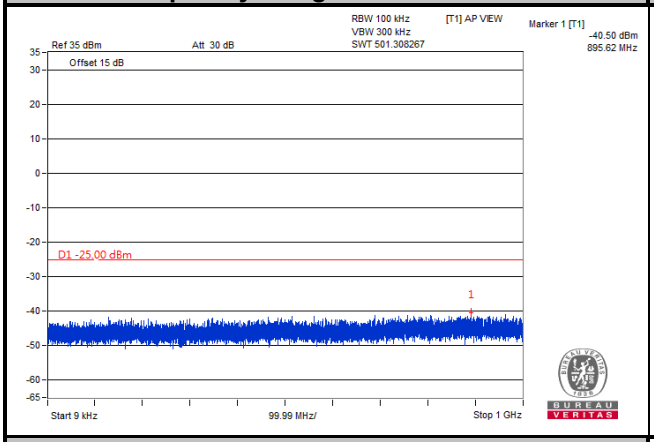
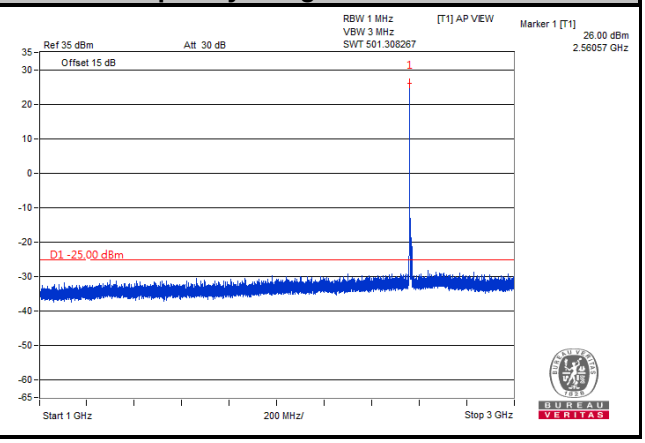
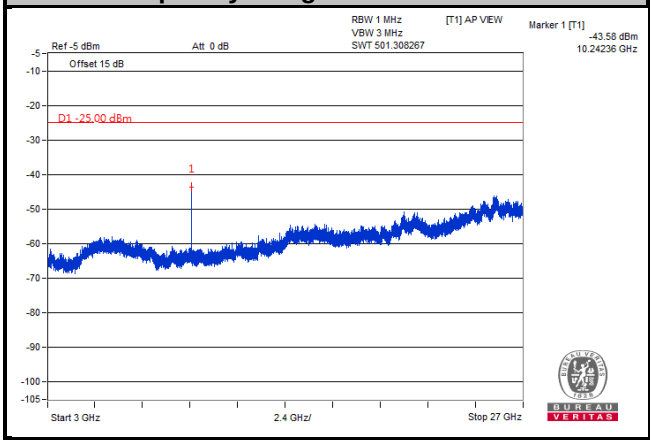
LTE Band 7	
Channel Bandwidth: 5 MHz	
Channel 20775	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

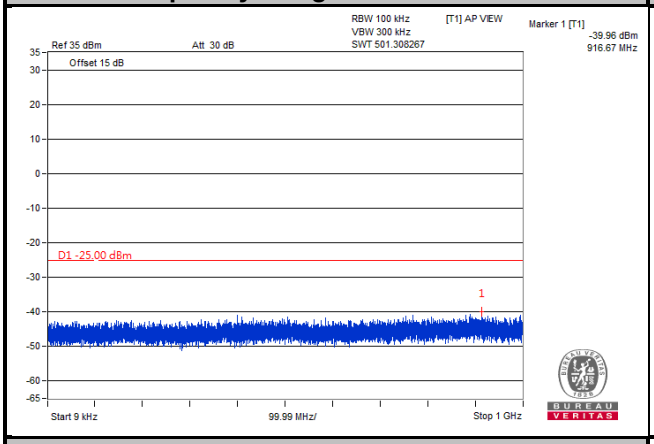
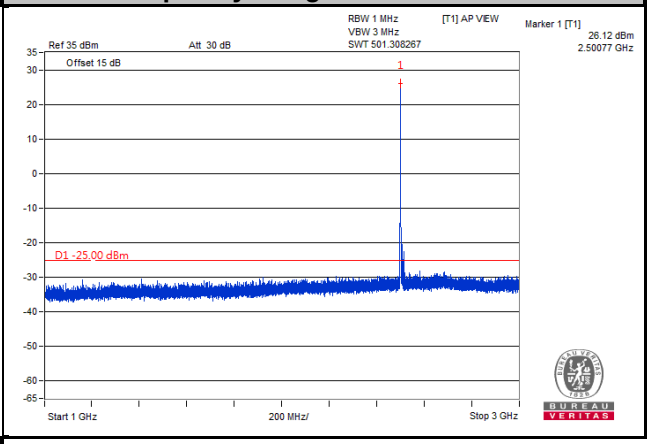
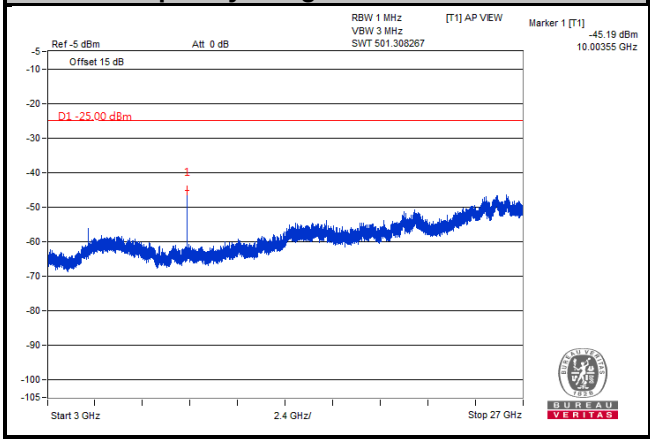
LTE Band 7	
Channel Bandwidth: 5 MHz	
Channel 21100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

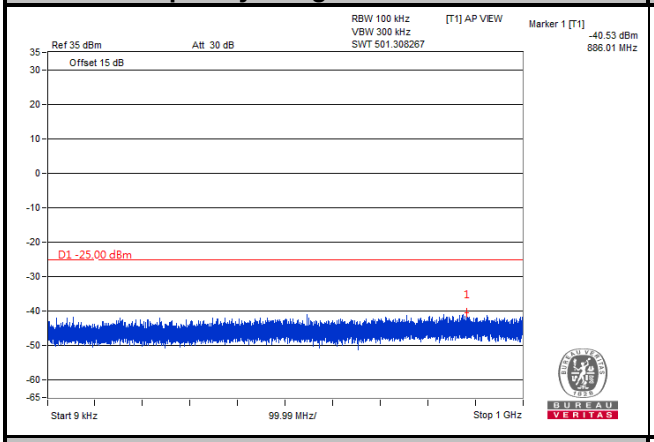
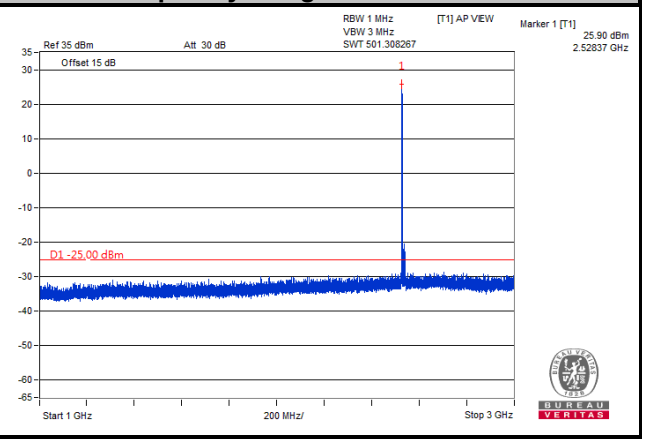
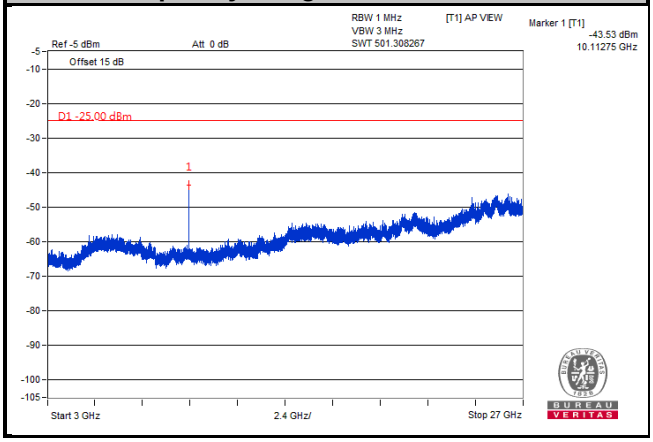
LTE Band 7	
Channel Bandwidth: 5 MHz	
Channel 21425	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

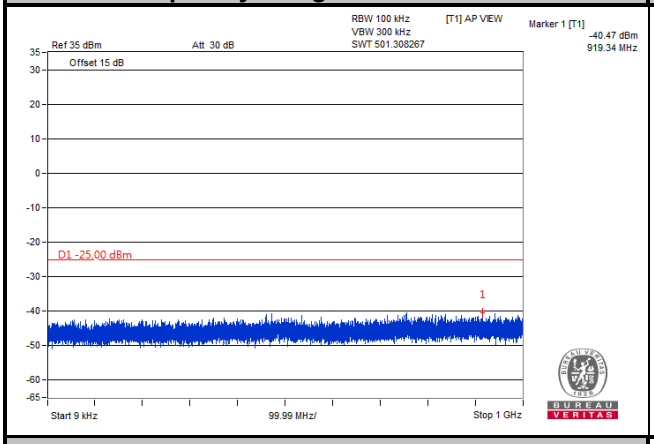
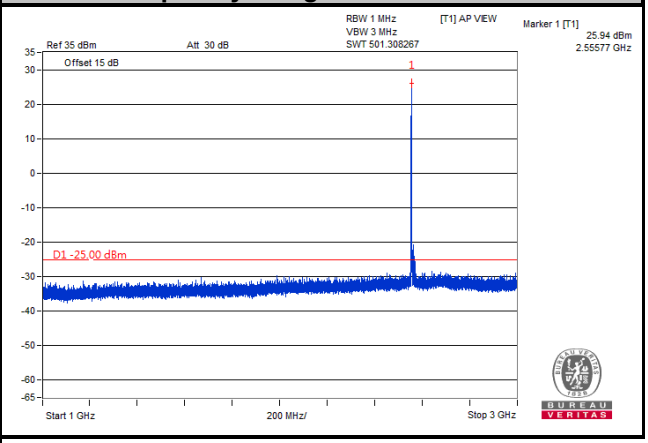
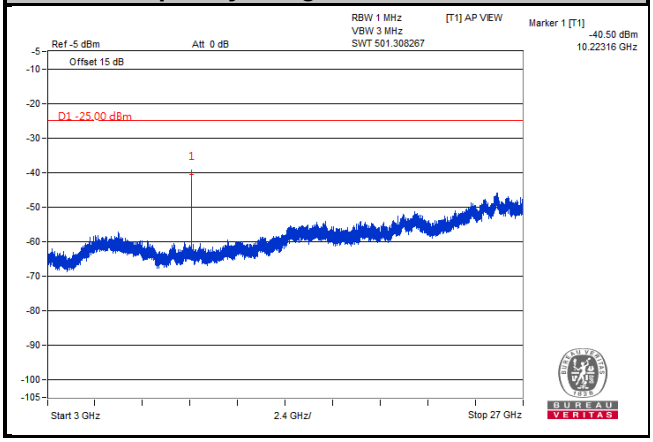
LTE Band 7	
Channel Bandwidth: 10 MHz	
Channel 20800	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

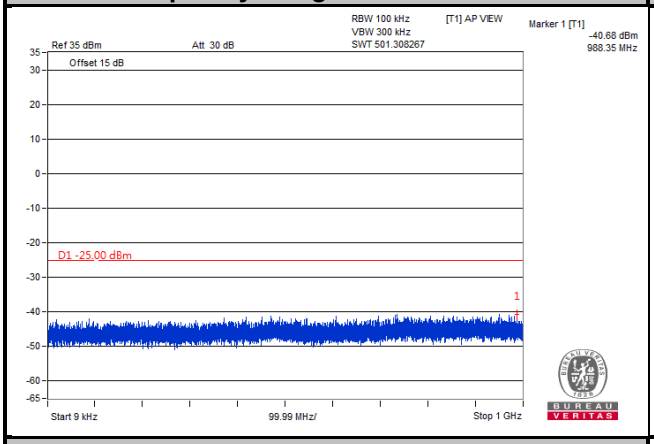
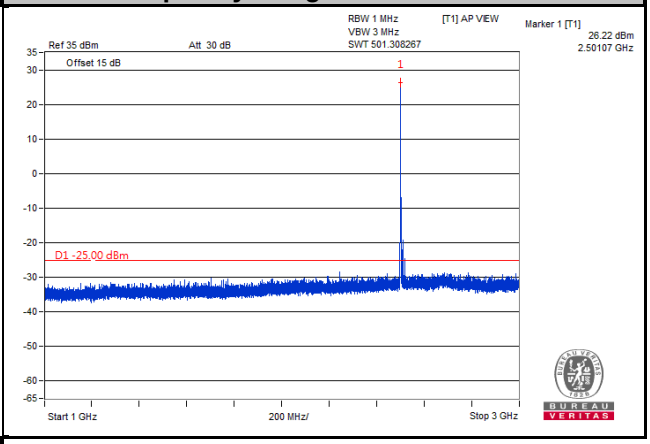
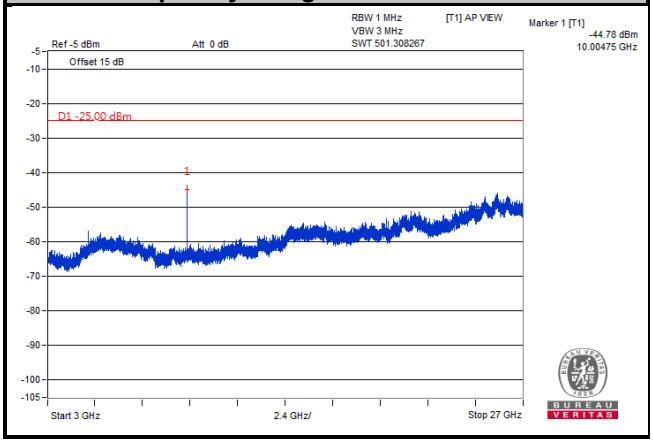
LTE Band 7	
Channel Bandwidth: 10 MHz	
Channel 21100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

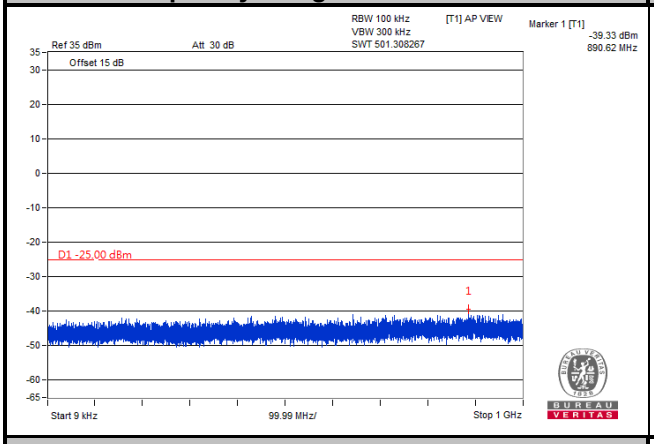
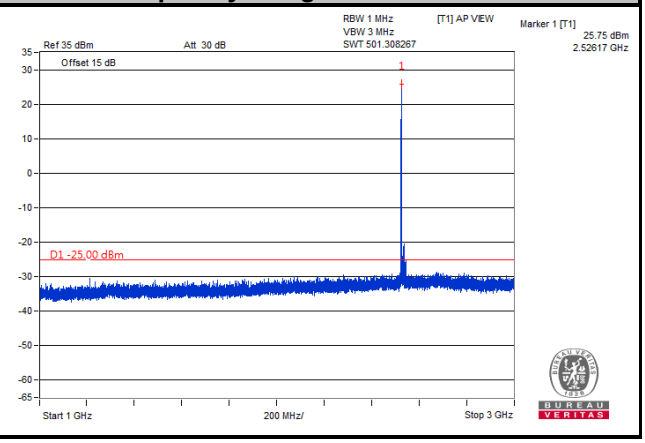
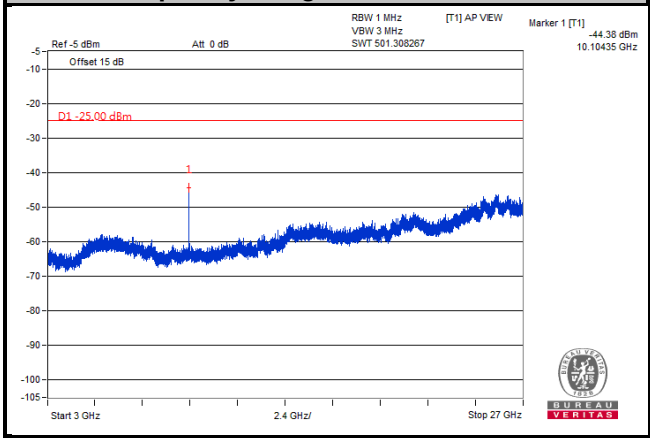
LTE Band 7	
Channel Bandwidth: 10 MHz	
Channel 21400	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

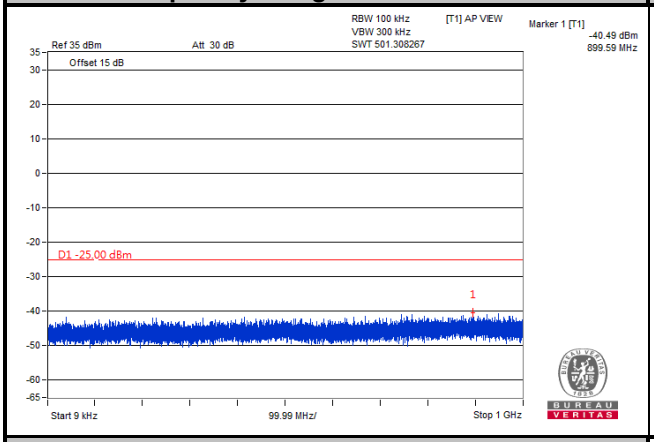
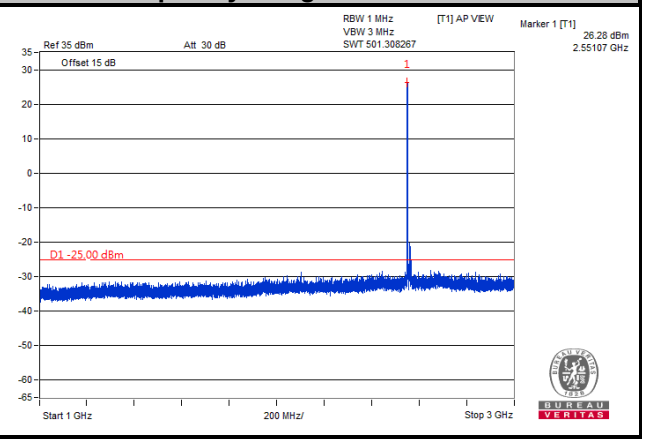
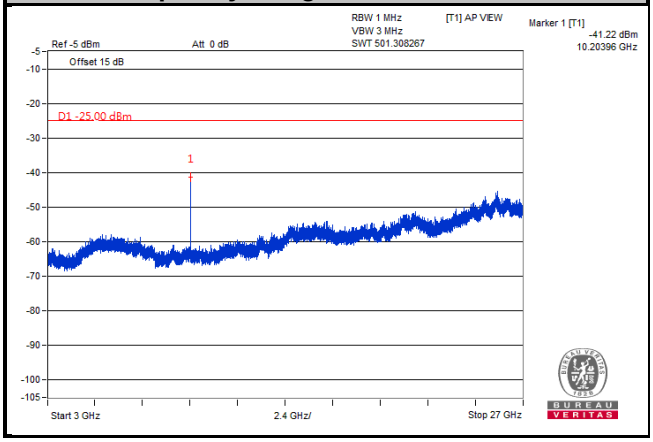
LTE Band 7	
Channel Bandwidth: 15 MHz	
Channel 20825	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

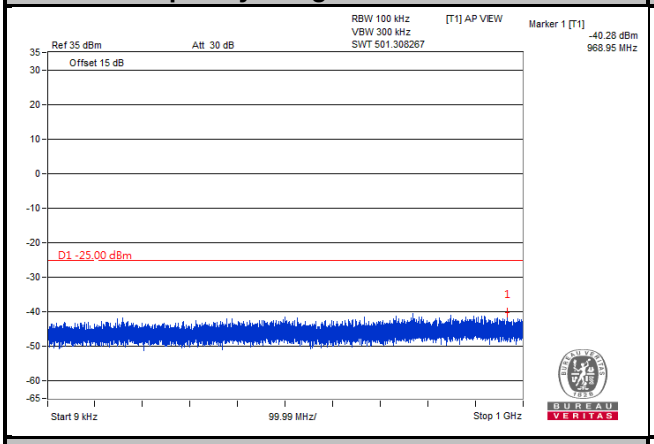
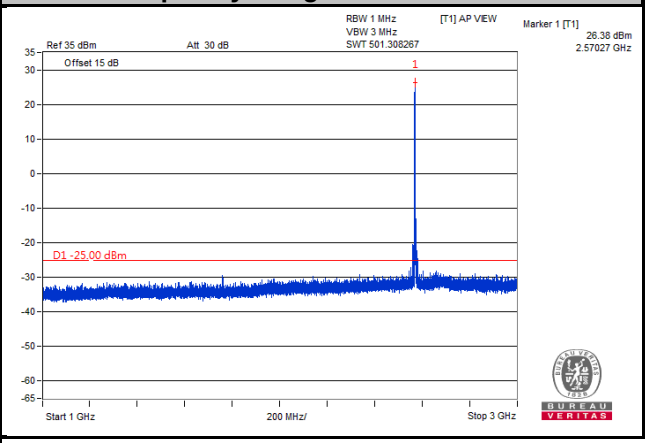
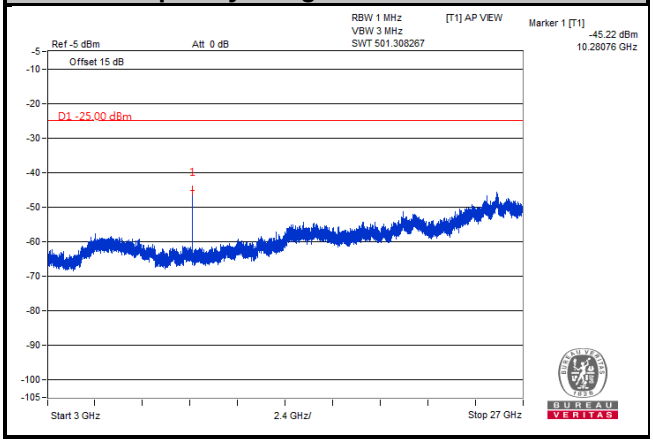
LTE Band 7	
Channel Bandwidth: 15 MHz	
Channel 21100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

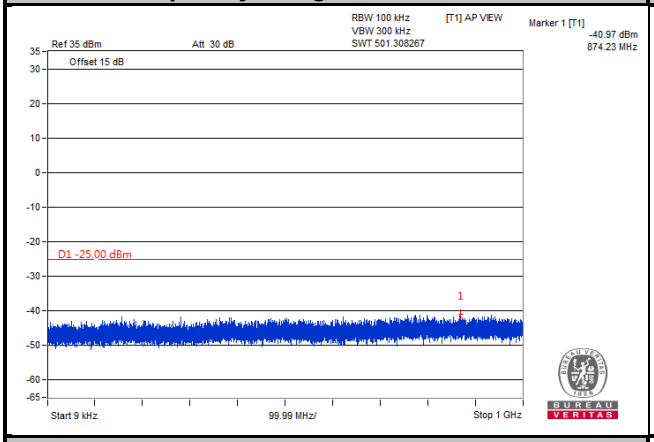
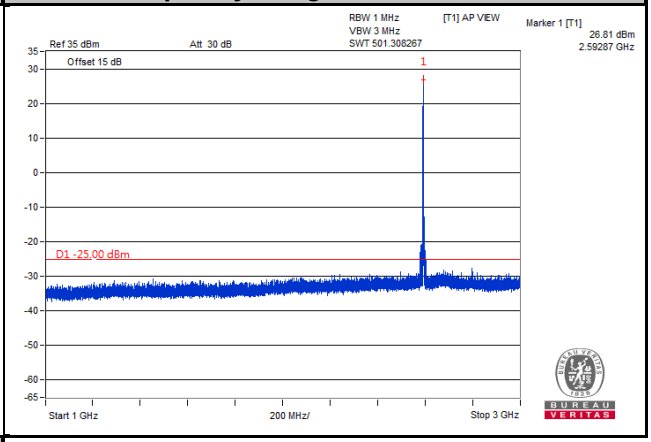
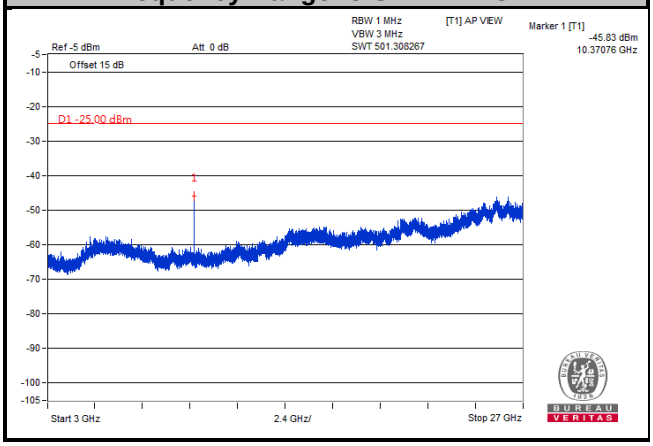
LTE Band 7	
Channel Bandwidth: 15 MHz	
Channel 21375	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

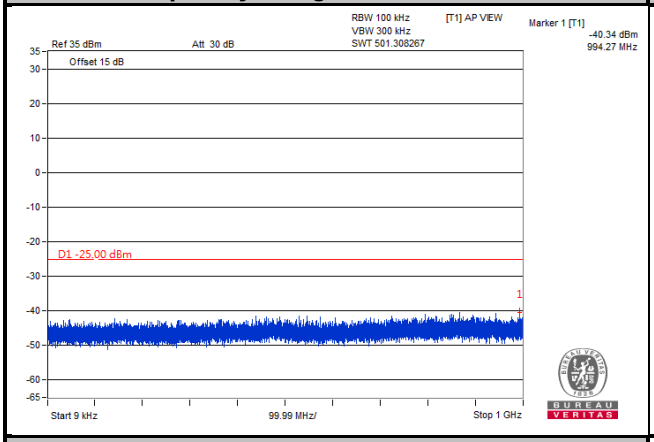
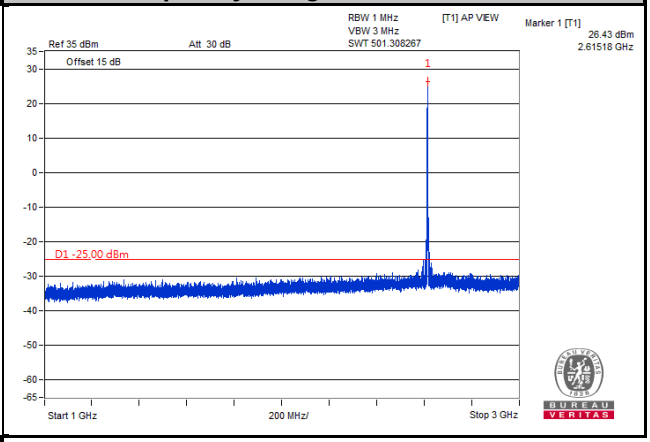
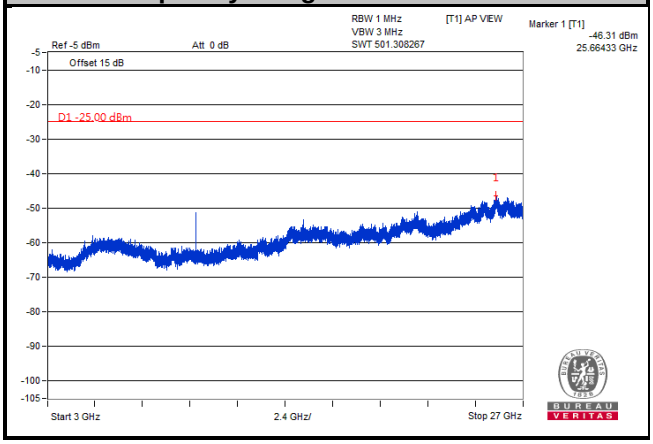
LTE Band 7	
Channel Bandwidth: 20 MHz	
Channel 20850	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

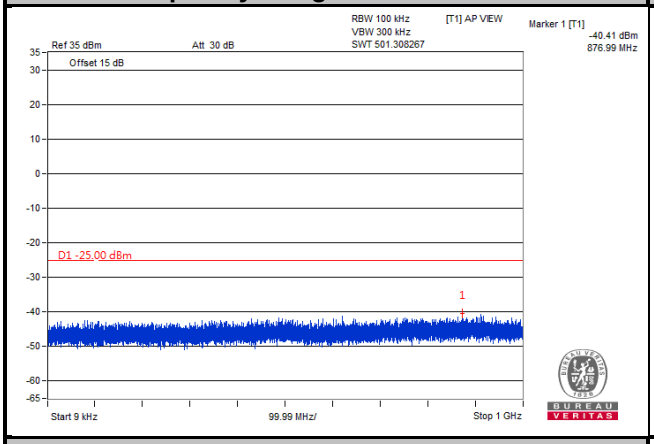
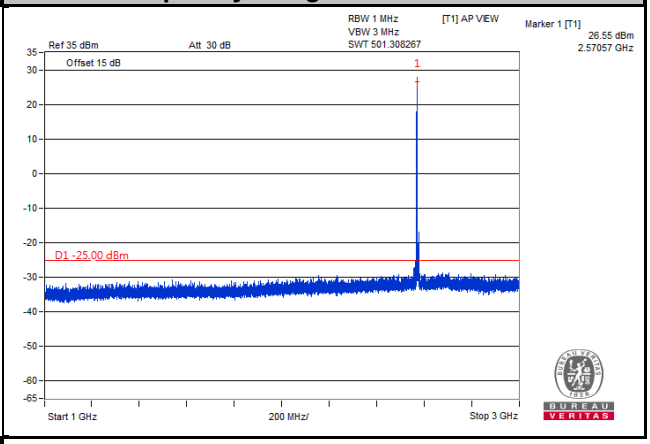
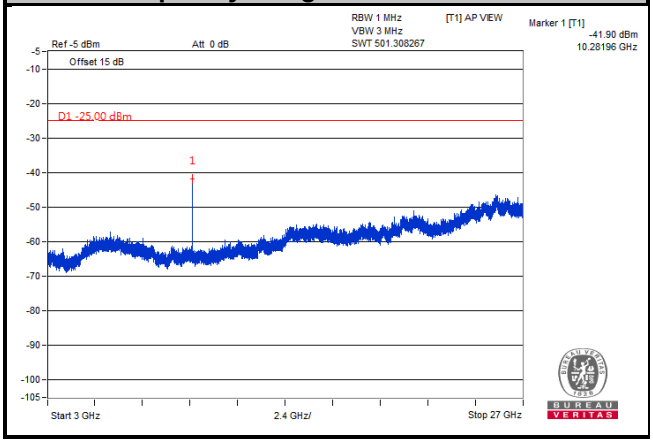
LTE Band 7	
Channel Bandwidth: 20 MHz	
Channel 21100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

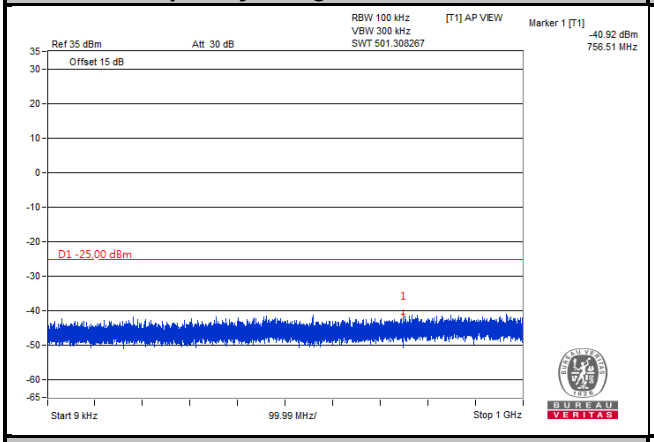
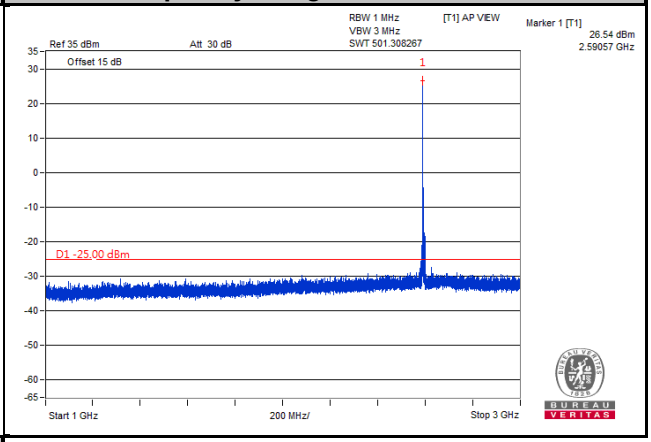
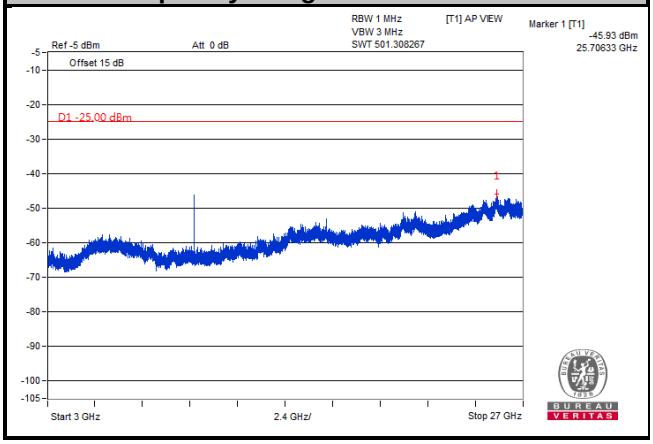
LTE Band 7	
Channel Bandwidth: 20 MHz	
Channel 21350	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

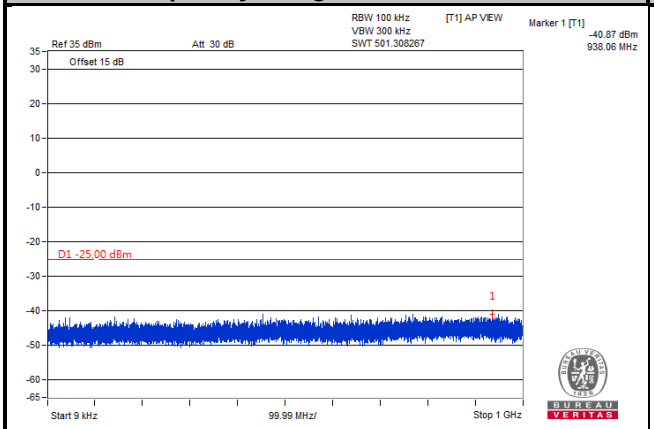
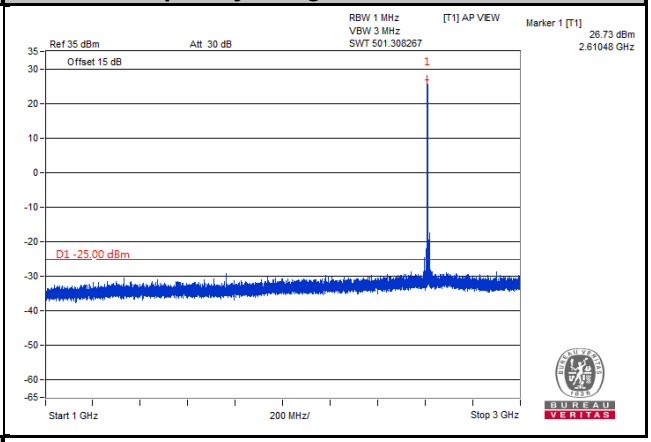
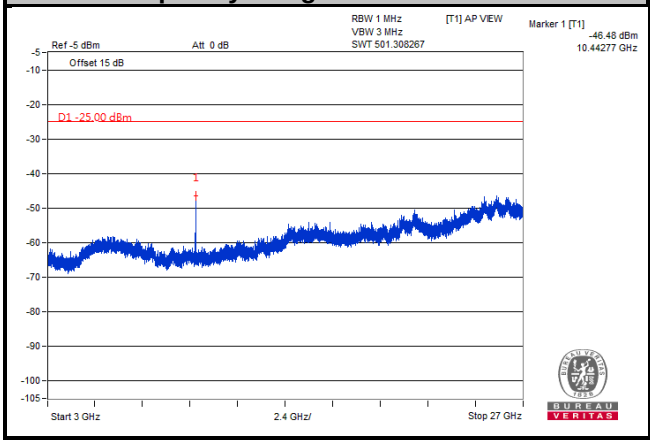
LTE Band 38	
Channel Bandwidth: 5 MHz	
Channel 37775	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

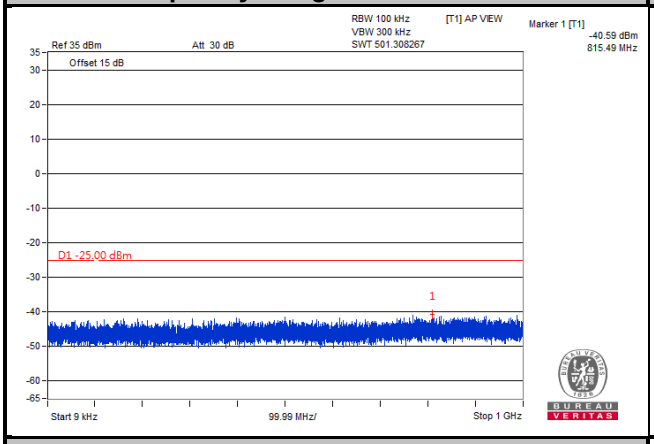
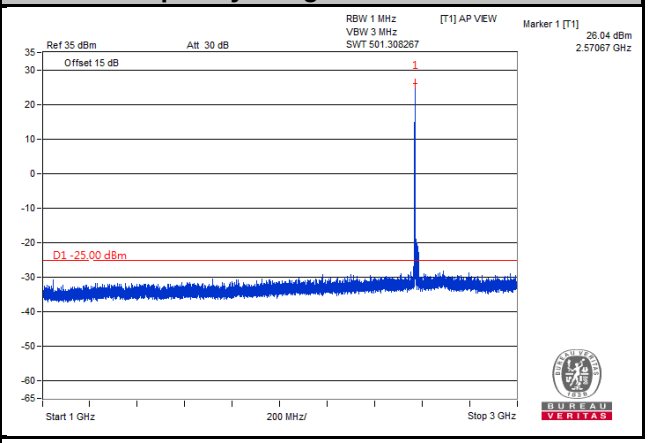
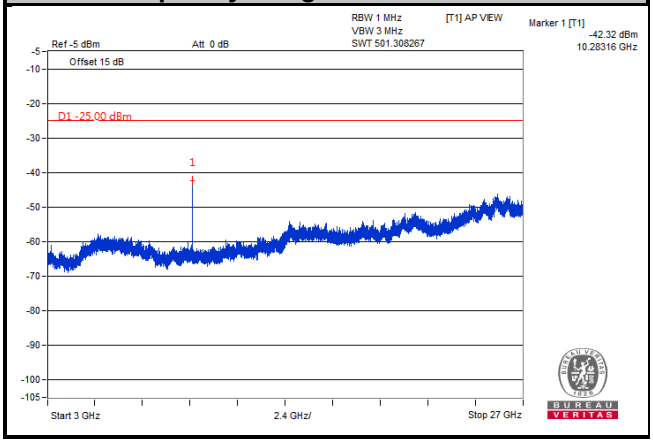
LTE Band 38	
Channel Bandwidth: 5 MHz	
Channel 38000	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

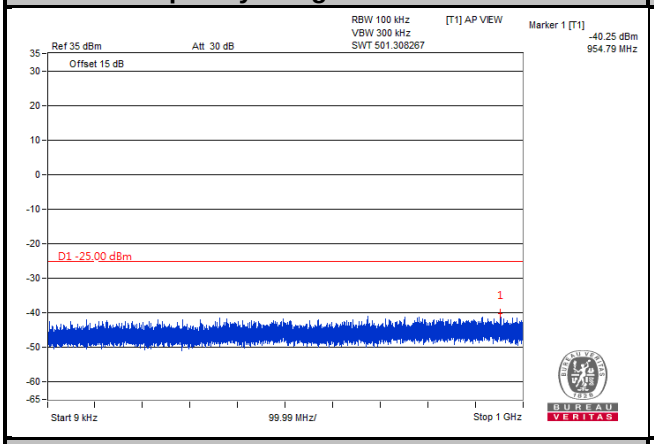
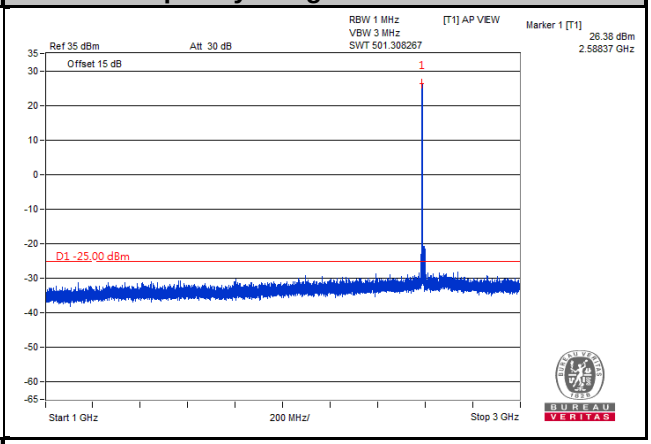
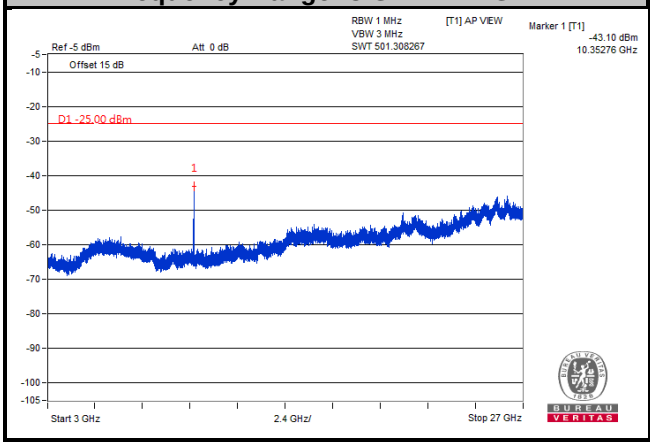
LTE Band 38	
Channel Bandwidth: 5 MHz	
Channel 38225	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

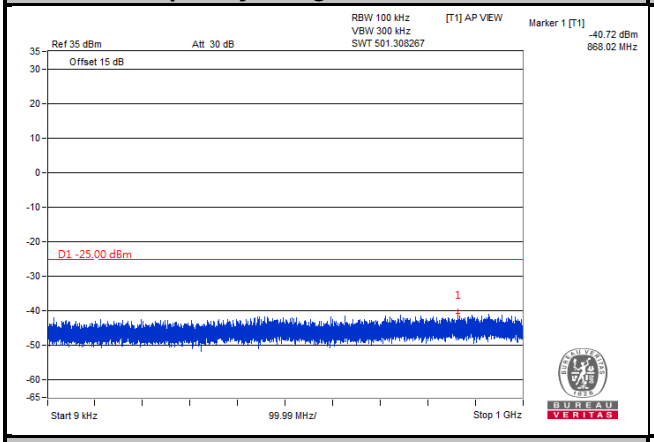
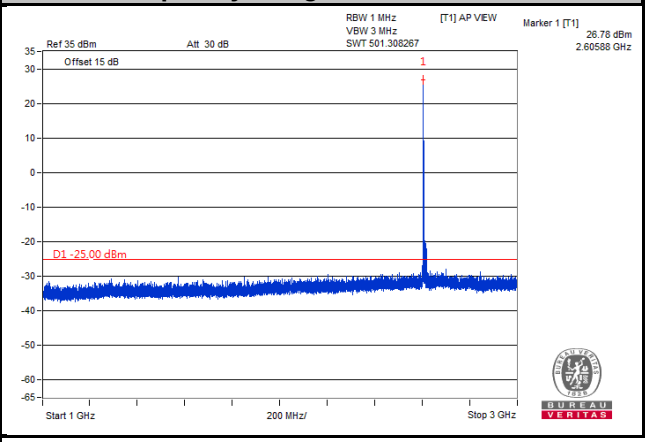
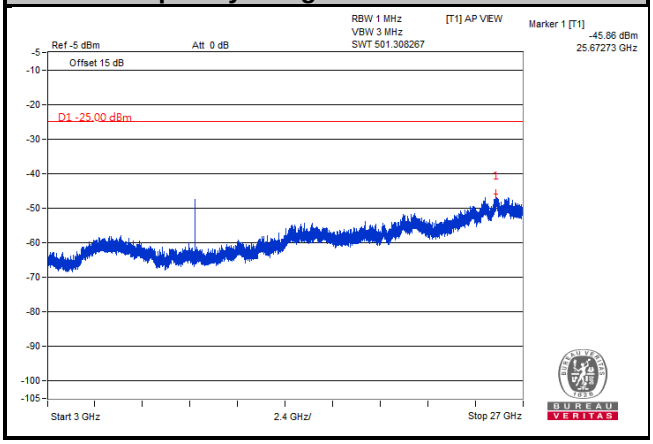
LTE Band 38	
Channel Bandwidth: 10 MHz	
Channel 37800	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

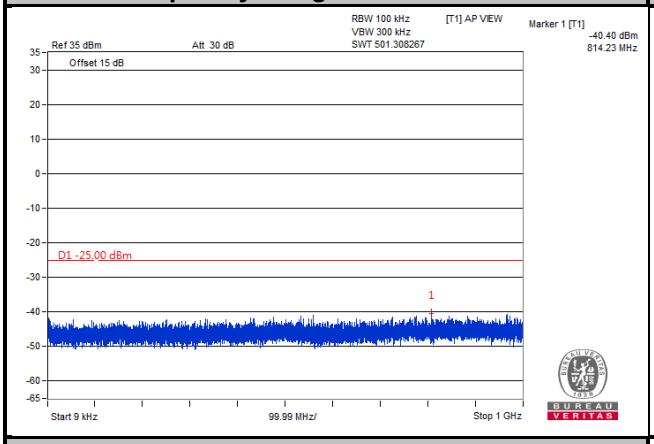
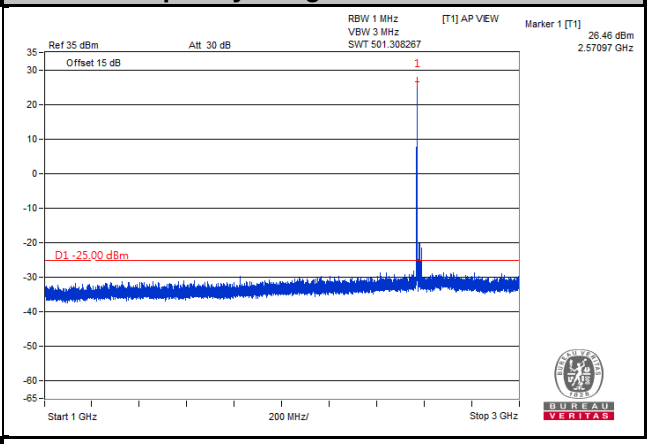
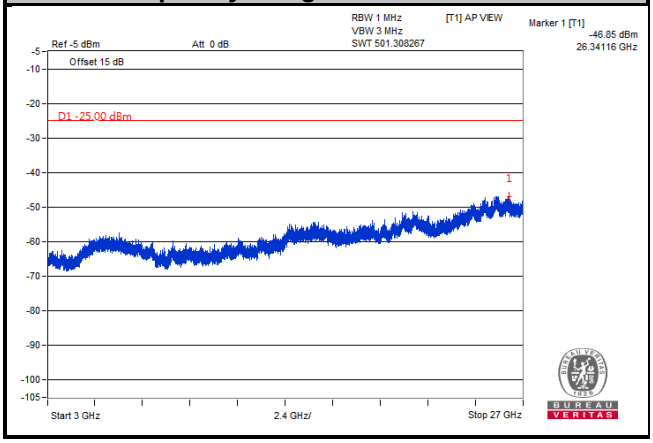
LTE Band 38	
Channel Bandwidth: 10 MHz	
Channel 38000	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

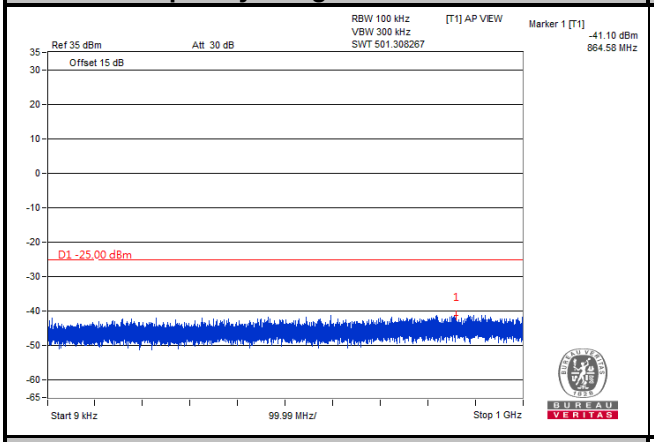
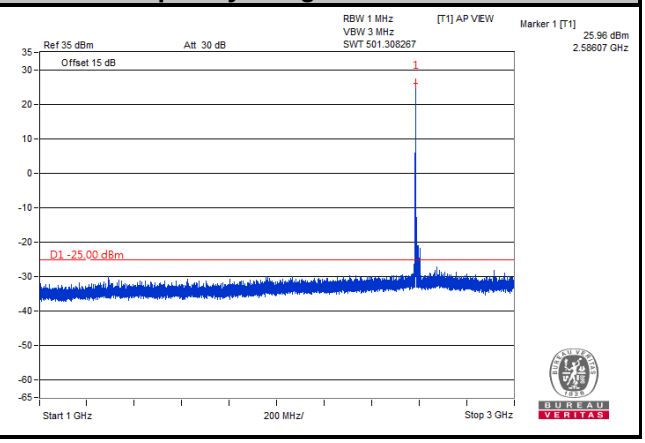
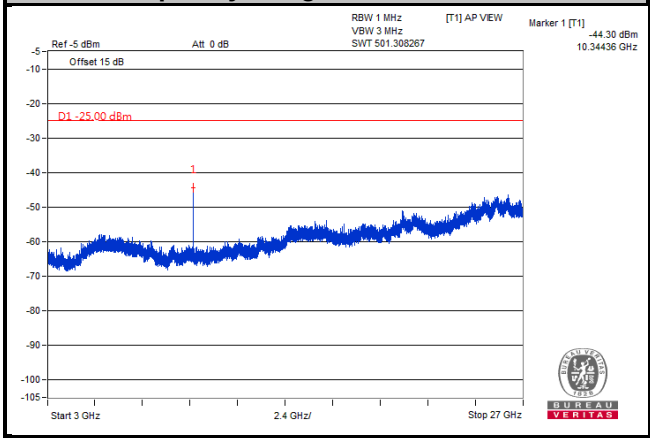
LTE Band 38	
Channel Bandwidth: 10 MHz	
Channel 38200	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

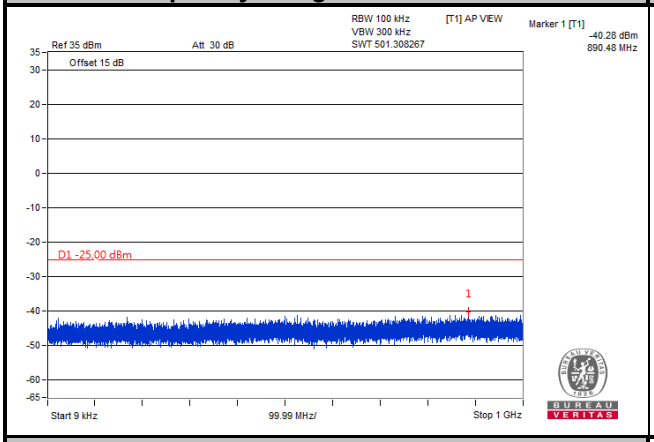
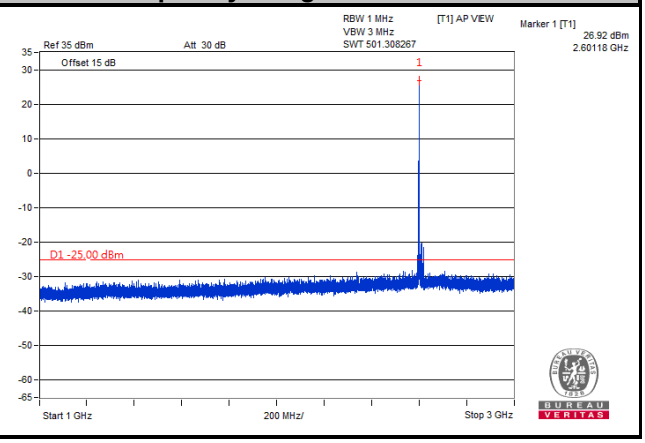
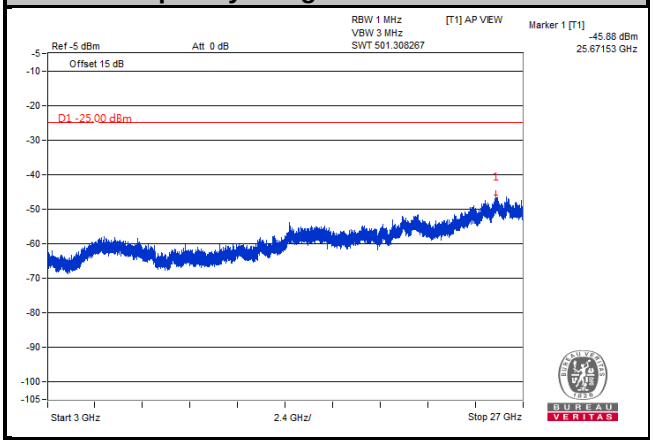
LTE Band 38	
Channel Bandwidth: 15 MHz	
Channel 37825	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

LTE Band 38	
Channel Bandwidth: 15 MHz	
Channel 38000	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

LTE Band 38	
Channel Bandwidth: 15 MHz	
Channel 38175	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

LTE Band 38	
Channel Bandwidth: 20 MHz	
Channel 37850	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

LTE Band 38	
Channel Bandwidth: 20 MHz	
Channel 38000	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

LTE Band 38	
Channel Bandwidth: 20 MHz	
Channel 38150	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 3 GHz
	
Frequency Range: 3 GHz ~ 27 GHz	
	

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 log10(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.

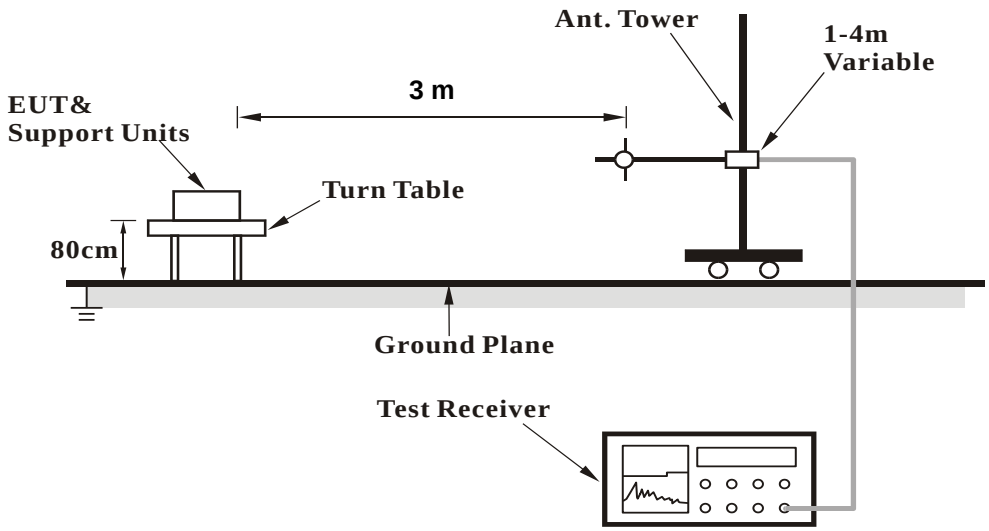
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.8.3 Deviation from Test Standard

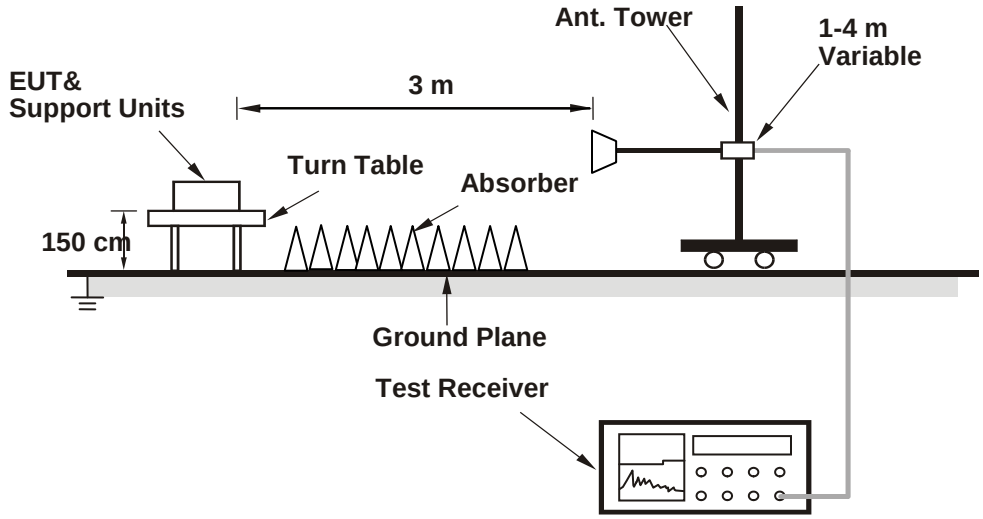
No deviation.

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

Mode A

LTE Band 7

Channel Bandwidth: 5 MHz / QPSK

Low Channel

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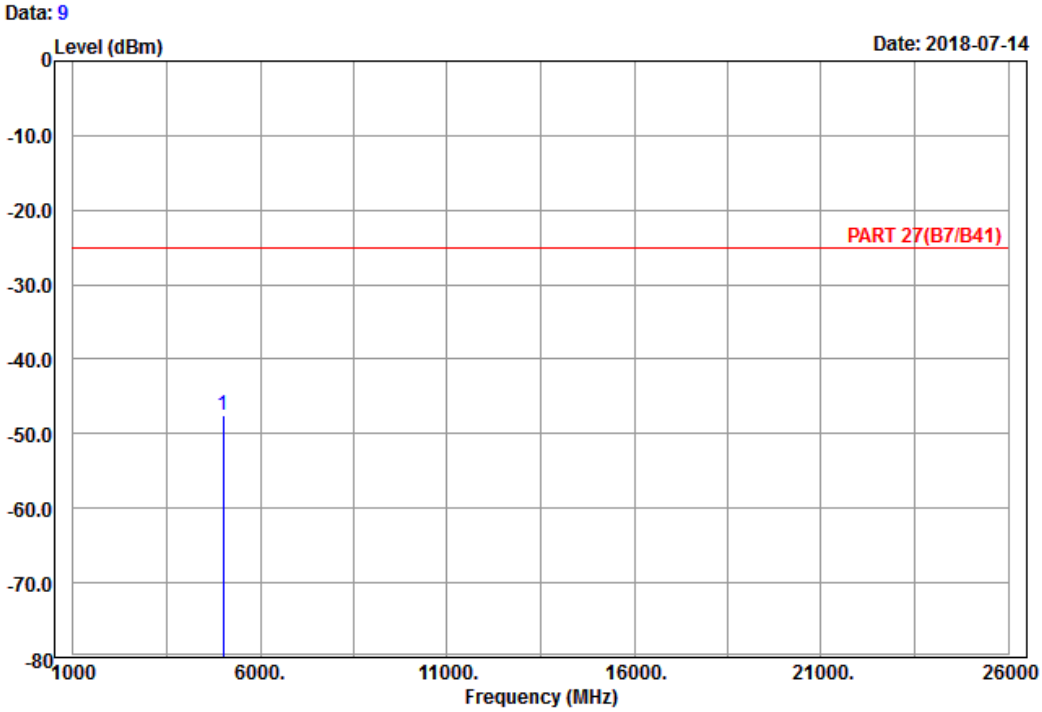
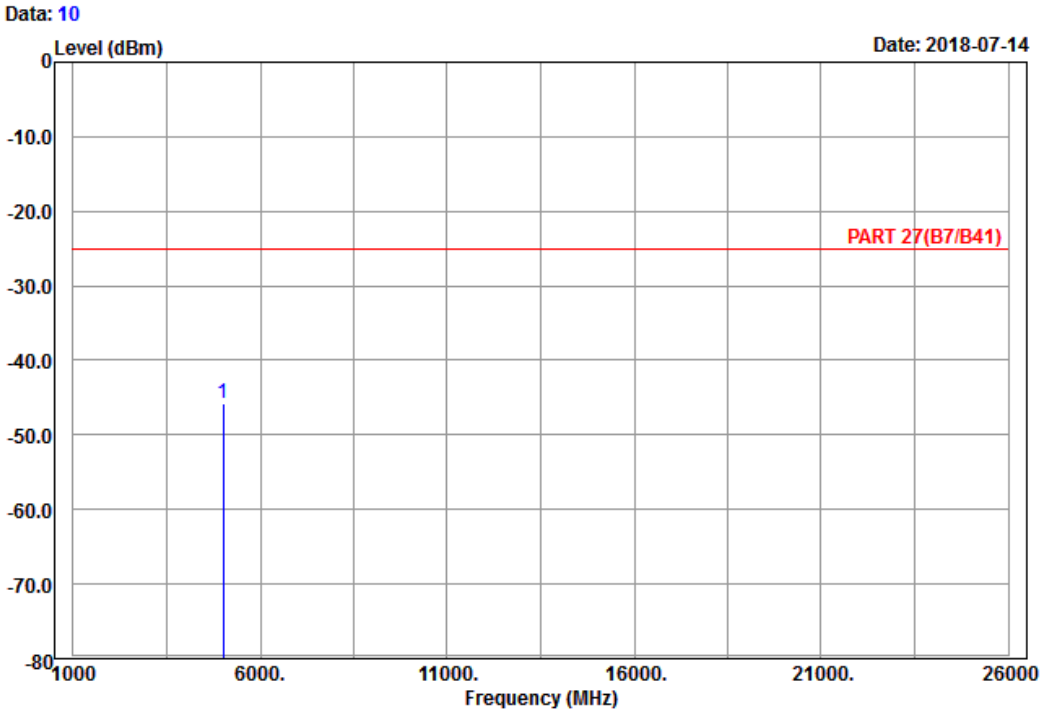


Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 7_Link_CH20775
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5005.00	-47.51	-67.09	-25.00	-22.51	19.58	Peak



Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 7_Link_CH20775
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5005.00	-45.78	-65.36	-25.00	-20.78	19.58	Peak

Middle Channel

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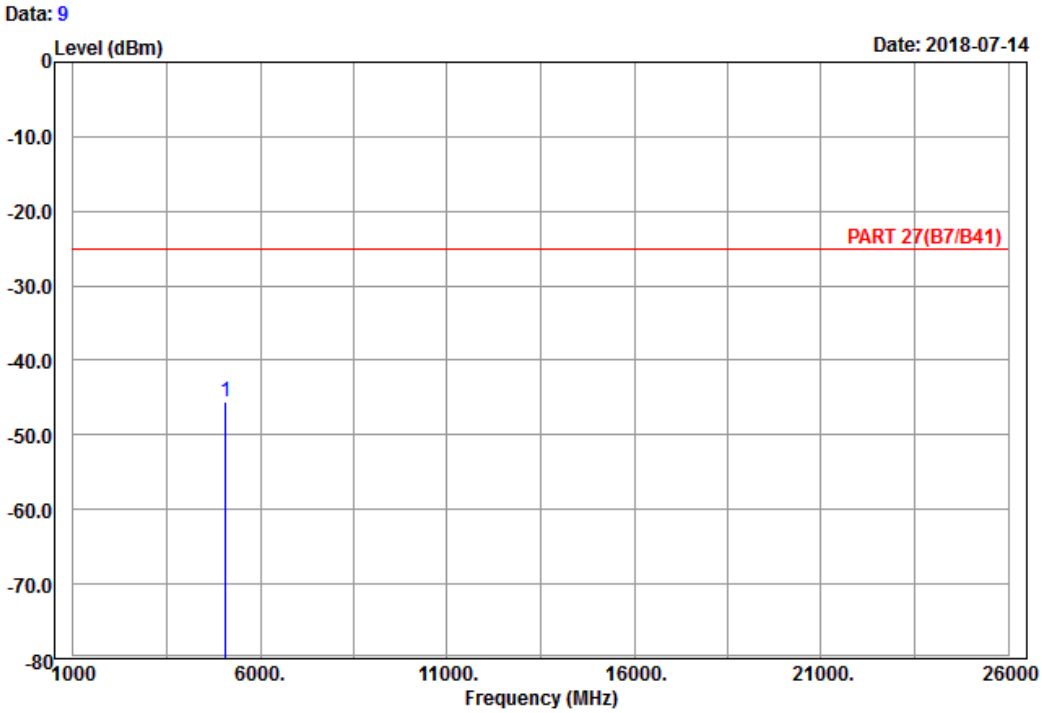
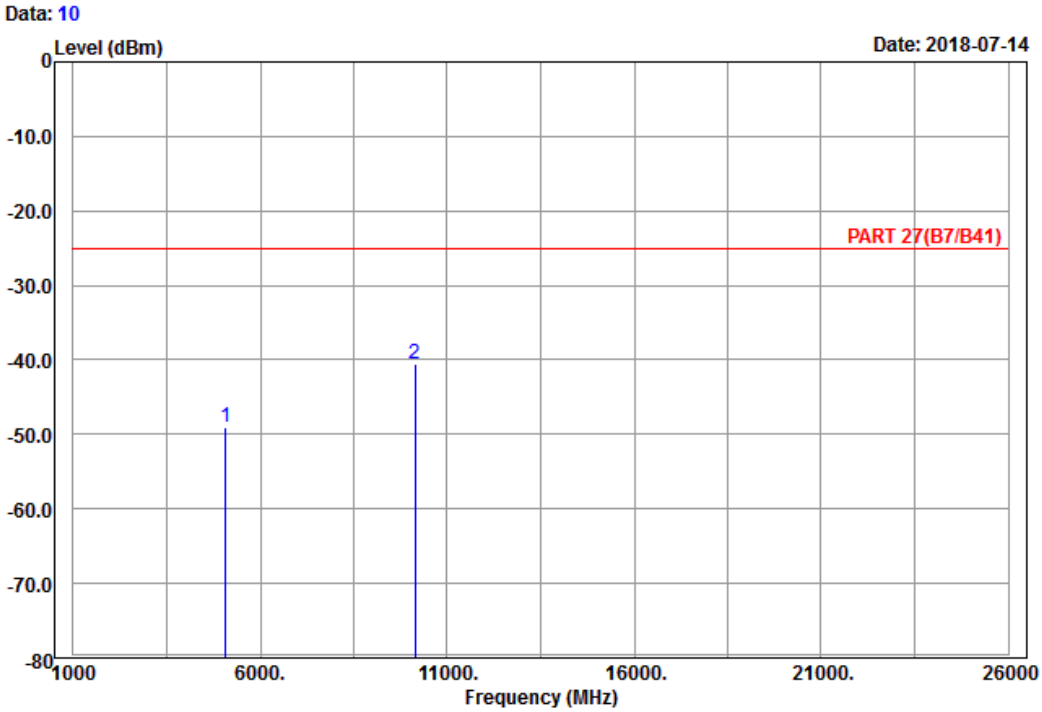


Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 7_Link_CH21100
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5070.00	-45.52	-64.91	-25.00	-20.52	19.39	Peak

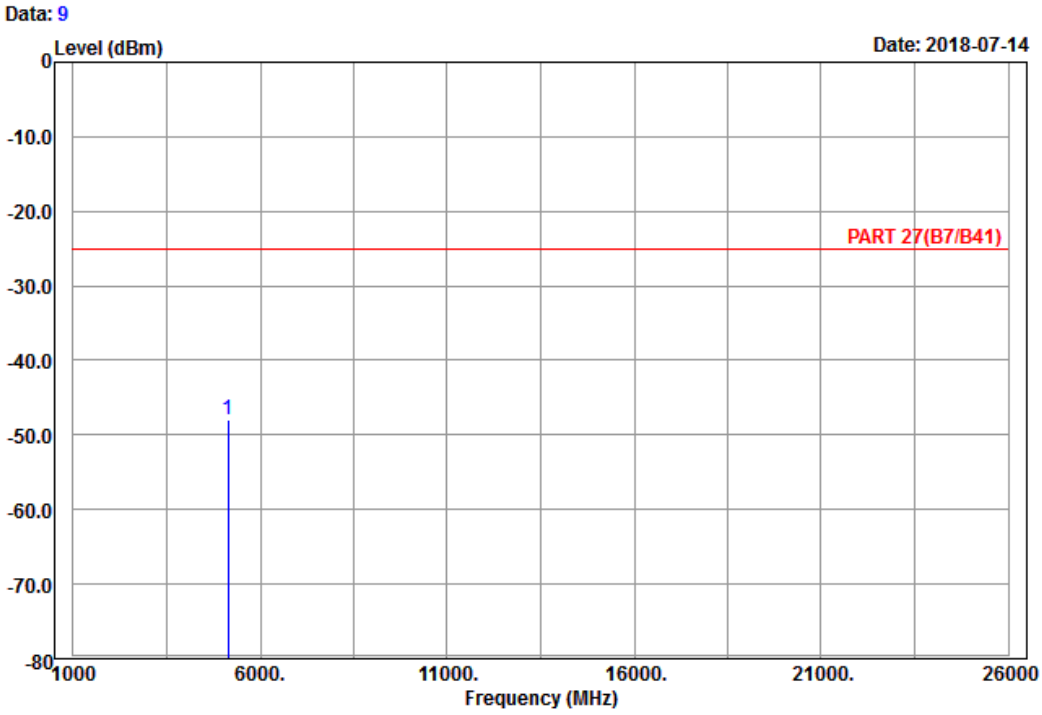


Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 7_Link_CH21100
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5070.00	-49.14	-68.53	-25.00	-24.14	19.39	Peak
2 pp	10140.00	-40.59	-67.01	-25.00	-15.59	26.42	Peak

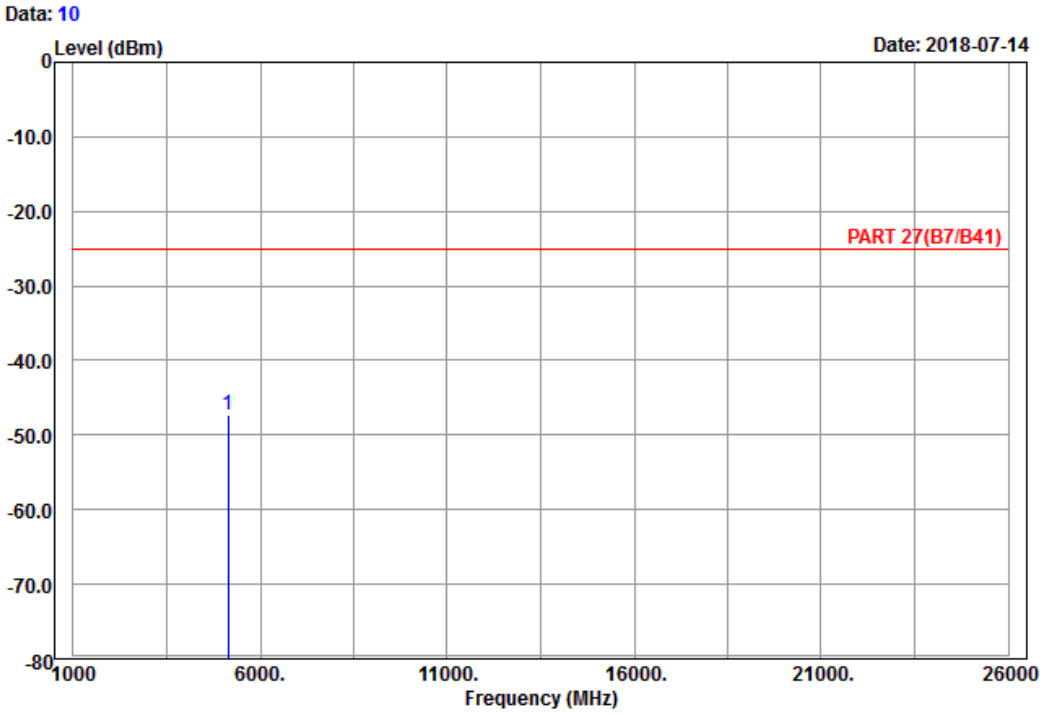
High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 7_Link_CH21425
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5135.00	-47.97	-67.78	-25.00	-22.97	19.81	Peak

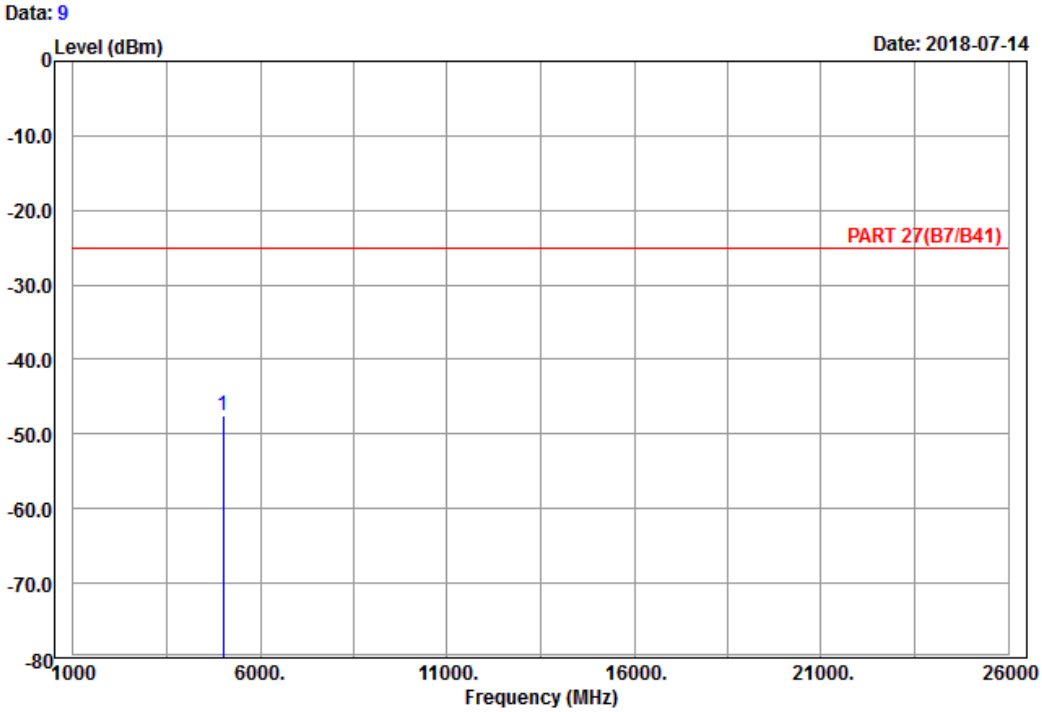


Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 7_Link_CH21425
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5135.00	-47.40	-67.21	-25.00	-22.40	19.81	Peak

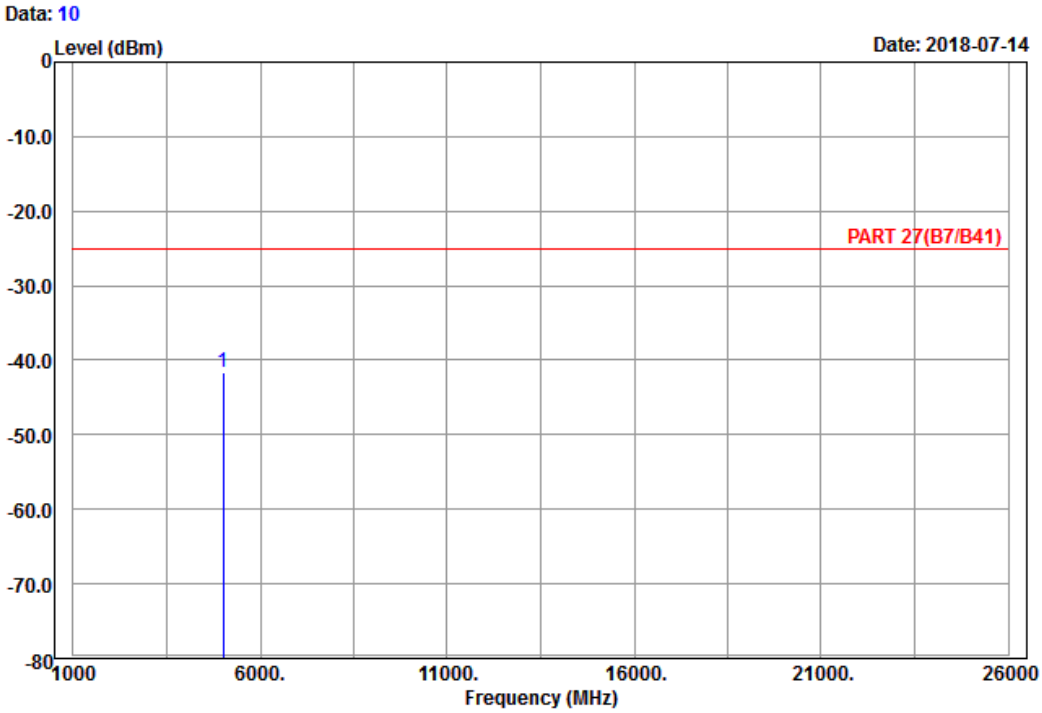
Channel Bandwidth: 20 MHz / QPSK
Low Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 7_Link_CH20850
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5020.00	-47.43	-66.51	-25.00	-22.43	19.08	Peak



Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 7_Link_CH20850
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	5020.00	-41.57	-60.65	-25.00	-16.57	19.08	Peak

Middle Channel

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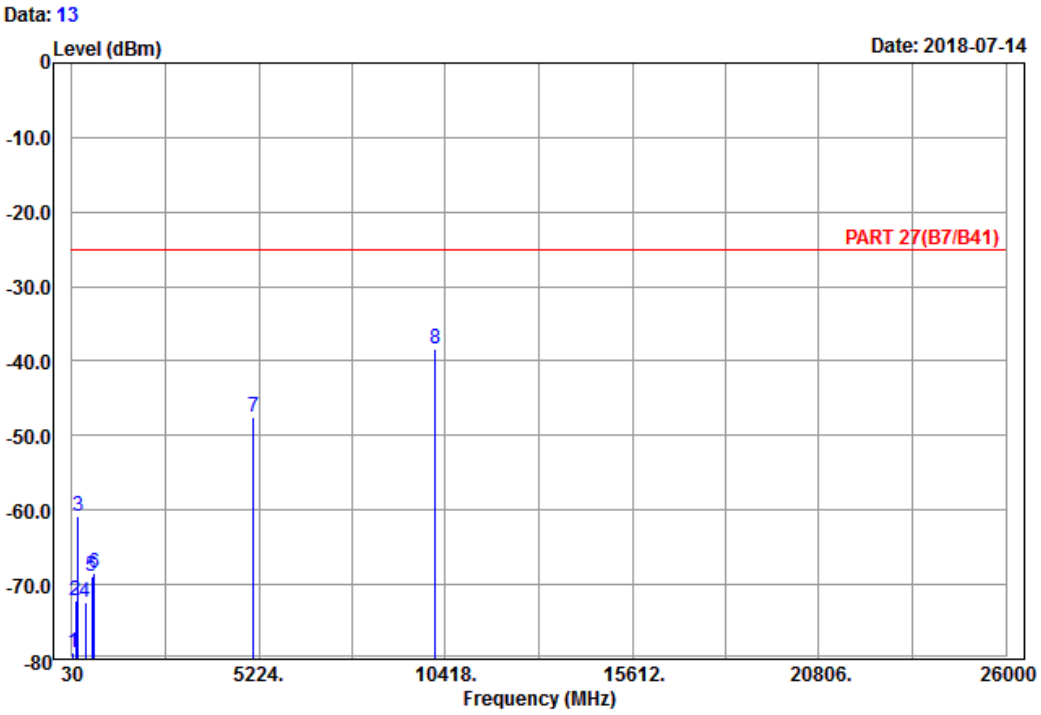
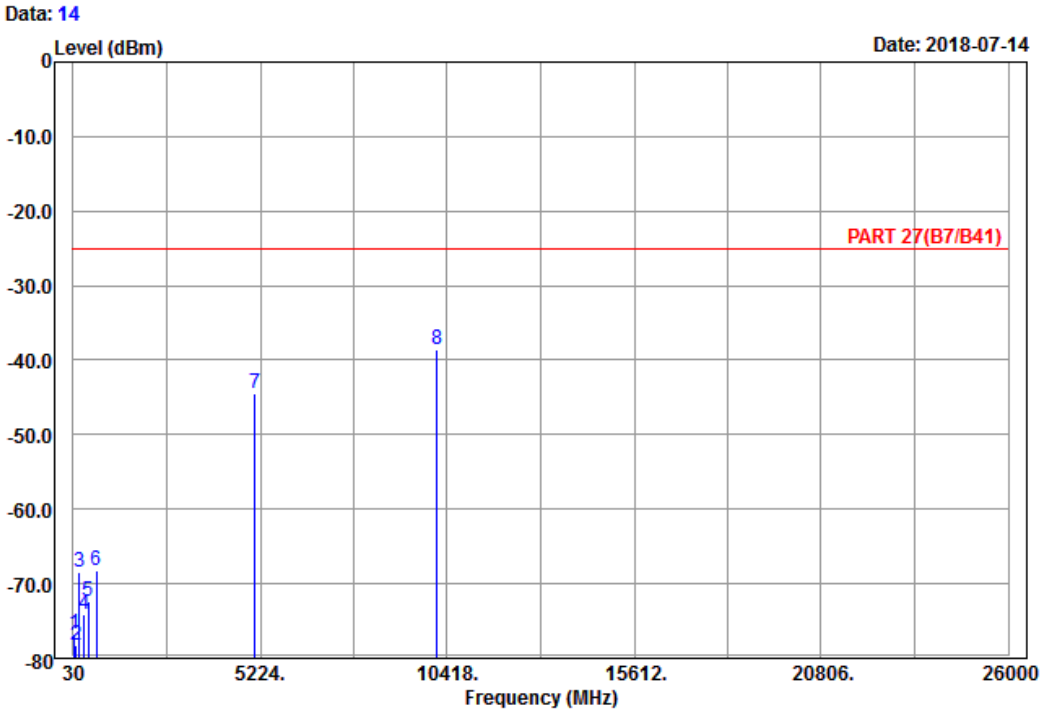


Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 7_Link_CH21100
Tested by: Harry Hsueh

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
		MHz	dBm	dBm	dBm	dB	dB	
1		55.11	-79.22	-65.16	-13.00	-66.22	-14.06	Peak
2		138.27	-72.20	-64.51	-13.00	-59.20	-7.69	Peak
3		197.13	-60.83	-54.78	-13.00	-47.83	-6.05	Peak
4		410.60	-72.33	-69.36	-13.00	-59.33	-2.97	Peak
5		586.30	-68.86	-68.72	-13.00	-55.86	-0.14	Peak
6		659.80	-68.38	-68.20	-13.00	-55.38	-0.18	Peak
7		5070.00	-47.56	-66.95	-25.00	-22.56	19.39	Peak
8	pp	10140.00	-38.34	-64.76	-25.00	-13.34	26.42	Peak



Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 7_Link_CH21100
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	70.77	-76.66	-64.06	-13.00	-63.66	-12.60	Peak
2	113.97	-78.21	-69.58	-13.00	-65.21	-8.63	Peak
3	189.30	-68.54	-62.82	-13.00	-55.54	-5.72	Peak
4	342.70	-74.21	-68.74	-13.00	-61.21	-5.47	Peak
5	453.30	-72.27	-68.34	-13.00	-59.27	-3.93	Peak
6	682.20	-68.21	-67.92	-13.00	-55.21	-0.29	Peak
7	5070.00	-44.37	-63.76	-25.00	-19.37	19.39	Peak
8 pp	10140.00	-38.62	-65.04	-25.00	-13.62	26.42	Peak

High Channel

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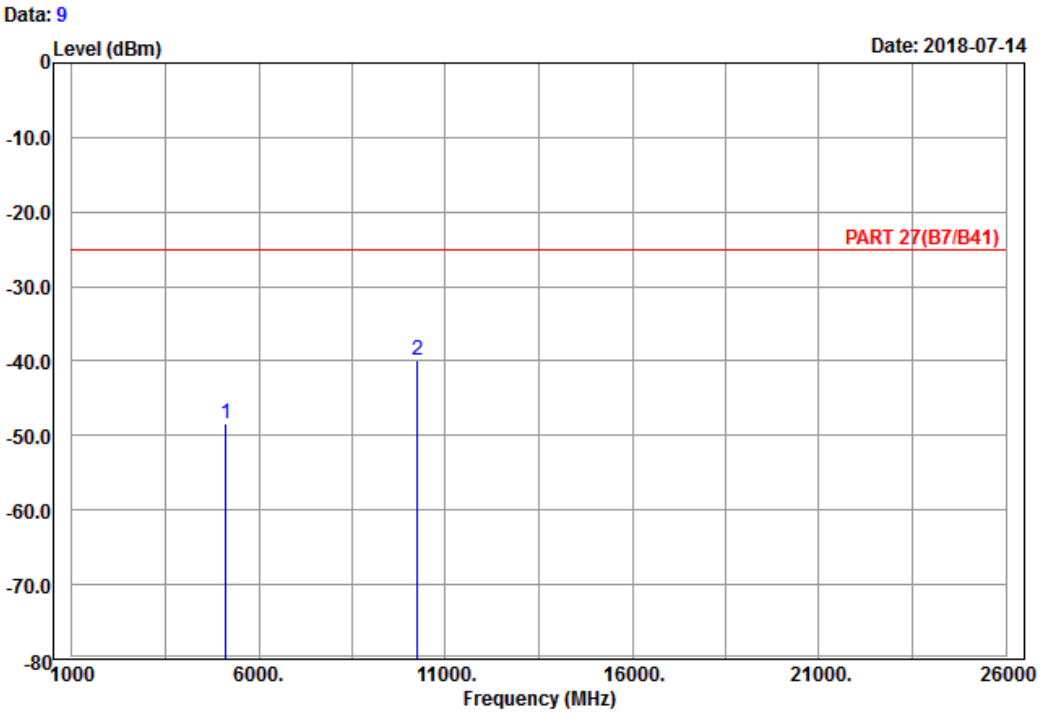
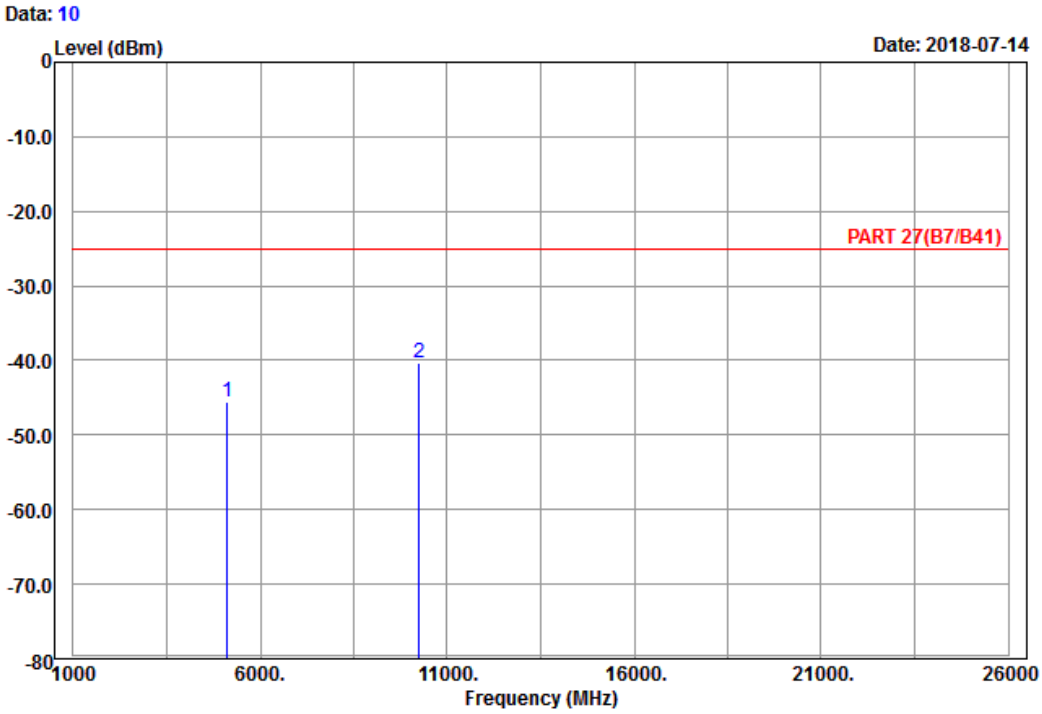


Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 7_Link_CH21350
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5120.00	-48.36	-68.07	-25.00	-23.36	19.71	Peak
2 pp	10240.00	-39.94	-66.48	-25.00	-14.94	26.54	Peak

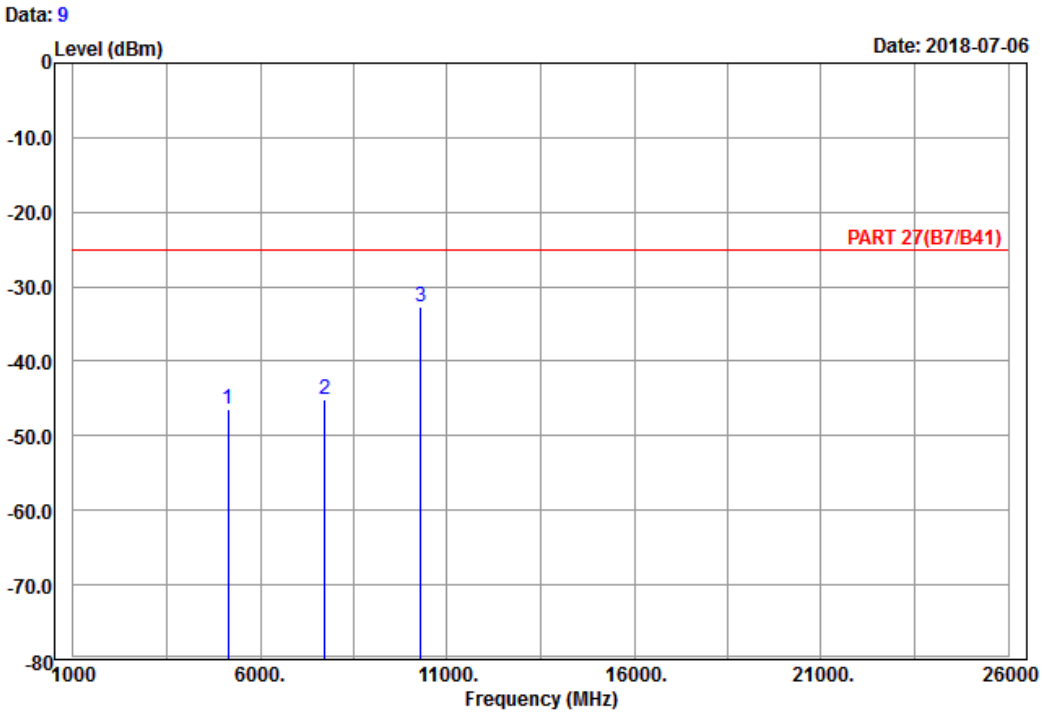


Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 7_Link_CH21350
Tested by: Harry Hsueh

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5120.00	-45.63	-65.34	-25.00	-20.63	19.71	Peak
2 pp	10240.00	-40.42	-66.96	-25.00	-15.42	26.54	Peak

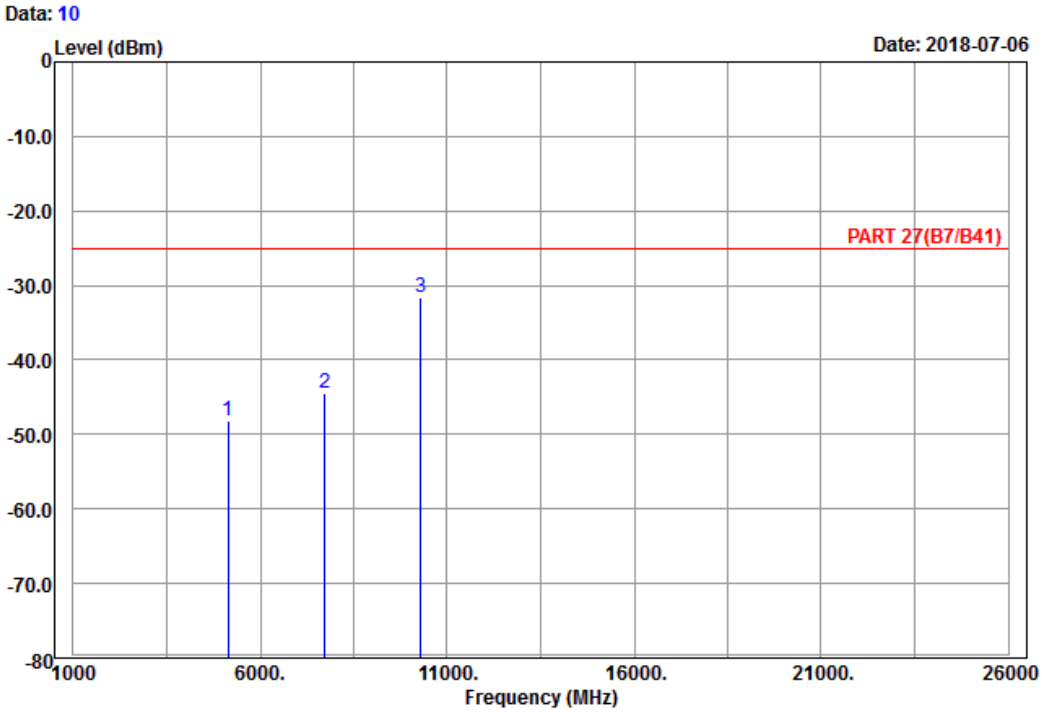
LTE Band 38
Channel Bandwidth: 5 MHz / QPSK
Low Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch




```
Site      : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark    : LTE_Band 38_Link_CH37775
Tested by: Karl Lee
```

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5145.00	-46.44	-66.25	-25.00	-21.44	19.81	Peak
2	7717.50	-45.14	-68.33	-25.00	-20.14	23.19	Peak
3 pp	10290.00	-32.61	-59.23	-25.00	-7.61	26.62	Peak



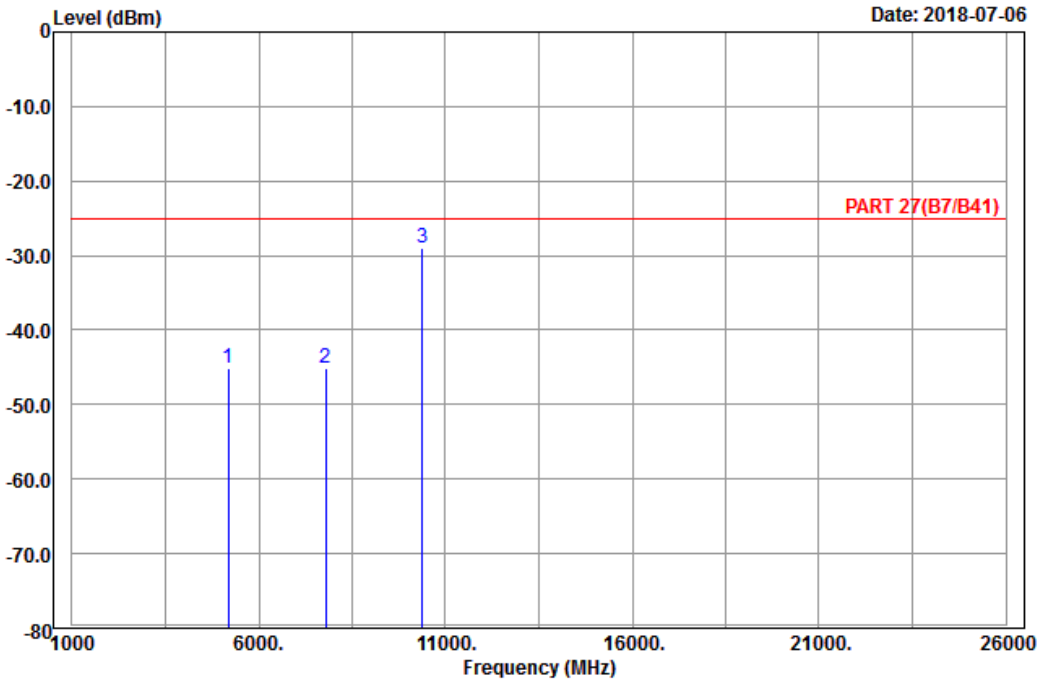
Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH37775
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5145.00	-48.11	-67.92	-25.00	-23.11	19.81	Peak
2	7717.50	-44.42	-67.61	-25.00	-19.42	23.19	Peak
3 pp	10290.00	-31.50	-58.12	-25.00	-6.50	26.62	Peak

Middle Channel

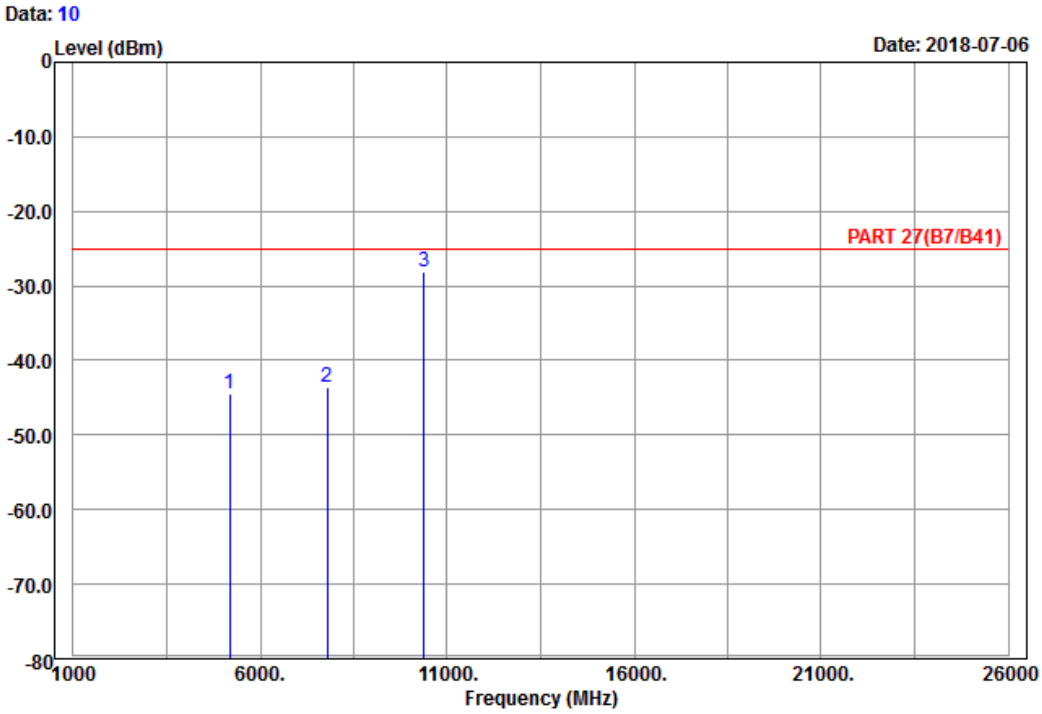
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

Data: 9



Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 38_Link_CH38000
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5190.00	-45.04	-65.16	-25.00	-20.04	20.12	Peak
2	7785.00	-45.16	-68.49	-25.00	-20.16	23.33	Peak
3 pp	10380.00	-29.07	-55.81	-25.00	-4.07	26.74	Peak



Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH38000
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5190.00	-44.36	-64.48	-25.00	-19.36	20.12	Peak
2	7785.00	-43.49	-66.82	-25.00	-18.49	23.33	Peak
3 pp	10380.00	-28.01	-54.75	-25.00	-3.01	26.74	Peak

High Channel

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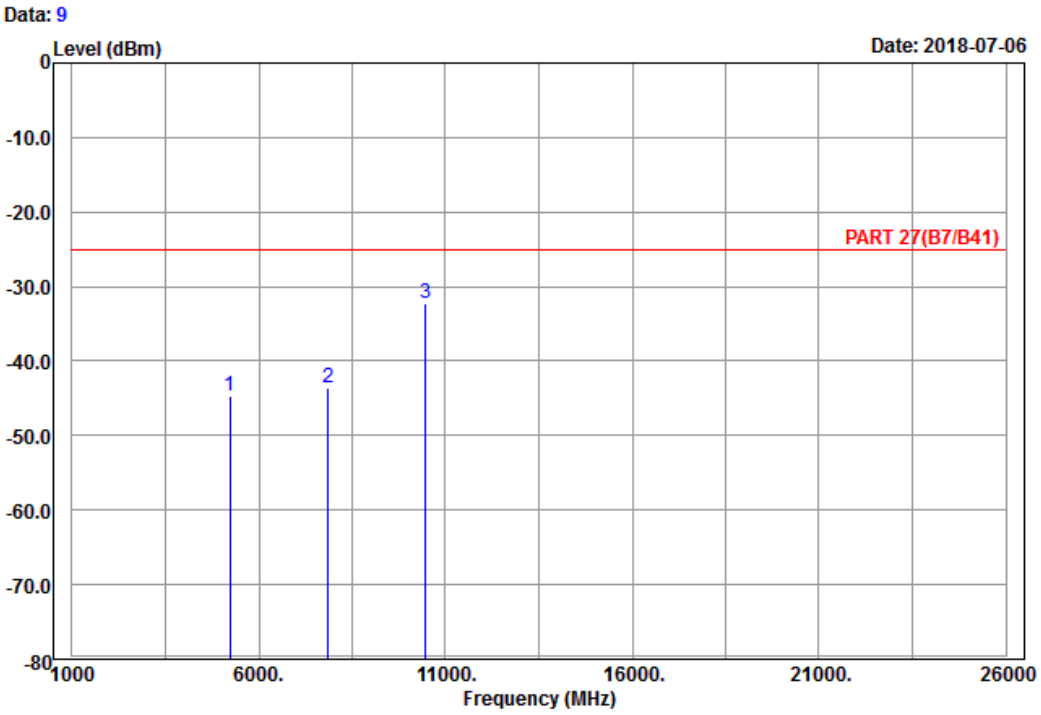
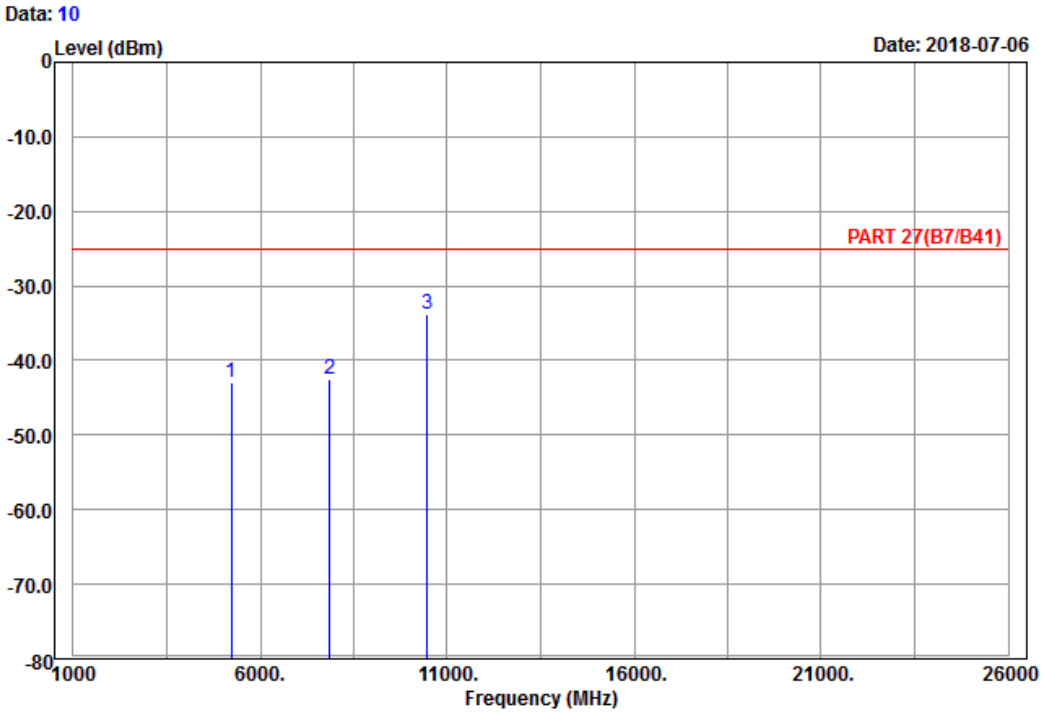


Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 38_Link_CH38225
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5235.00	-44.79	-64.95	-25.00	-19.79	20.16	Peak
2	7852.50	-43.58	-67.04	-25.00	-18.58	23.46	Peak
3 pp	10470.00	-32.35	-59.01	-25.00	-7.35	26.66	Peak



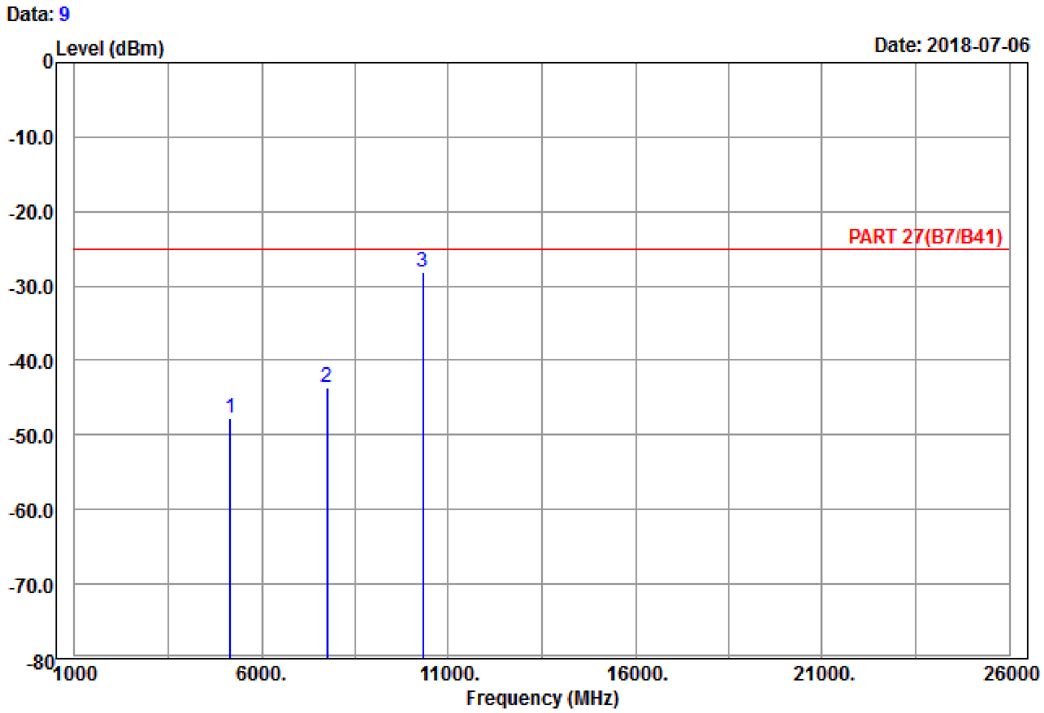
Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH38225
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5235.00	-43.04	-63.20	-25.00	-18.04	20.16	Peak
2	7852.50	-42.59	-66.05	-25.00	-17.59	23.46	Peak
3 pp	10470.00	-33.77	-60.43	-25.00	-8.77	26.66	Peak

Channel Bandwidth: 20 MHz / QPSK

Low Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



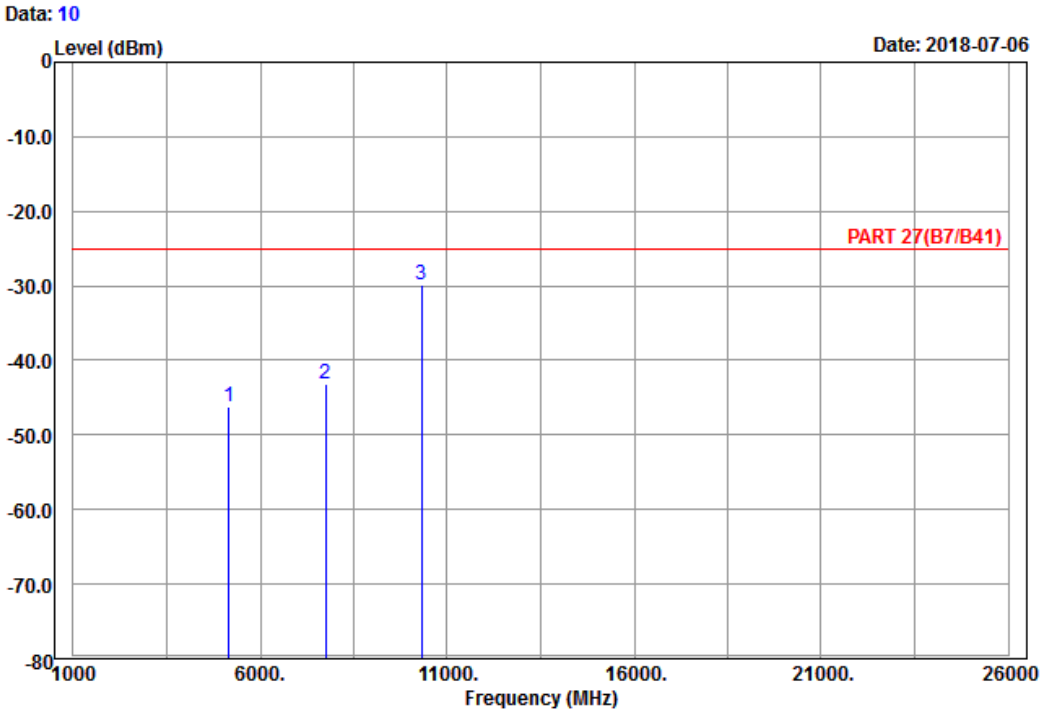
Site : 966 chamber 1

Condition: PART 27(B7/B41) Horizontal

Remark : LTE_Band 38_Link_CH37850

Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5160.00	-47.71	-67.63	-25.00	-22.71	19.92	Peak
2	7740.00	-43.63	-66.86	-25.00	-18.63	23.23	Peak
3 pp	10320.00	-28.11	-54.78	-25.00	-3.11	26.67	Peak



Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH37850
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5160.00	-46.10	-66.02	-25.00	-21.10	19.92	Peak
2	7740.00	-43.08	-66.31	-25.00	-18.08	23.23	Peak
3 pp	10320.00	-29.97	-56.64	-25.00	-4.97	26.67	Peak

Middle Channel

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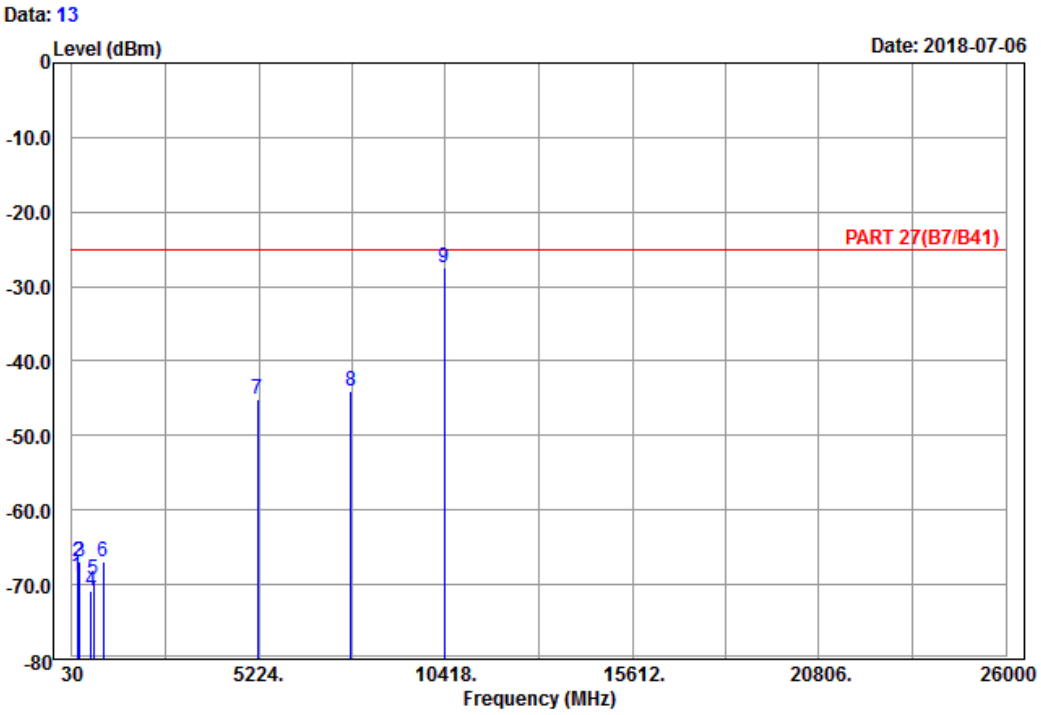
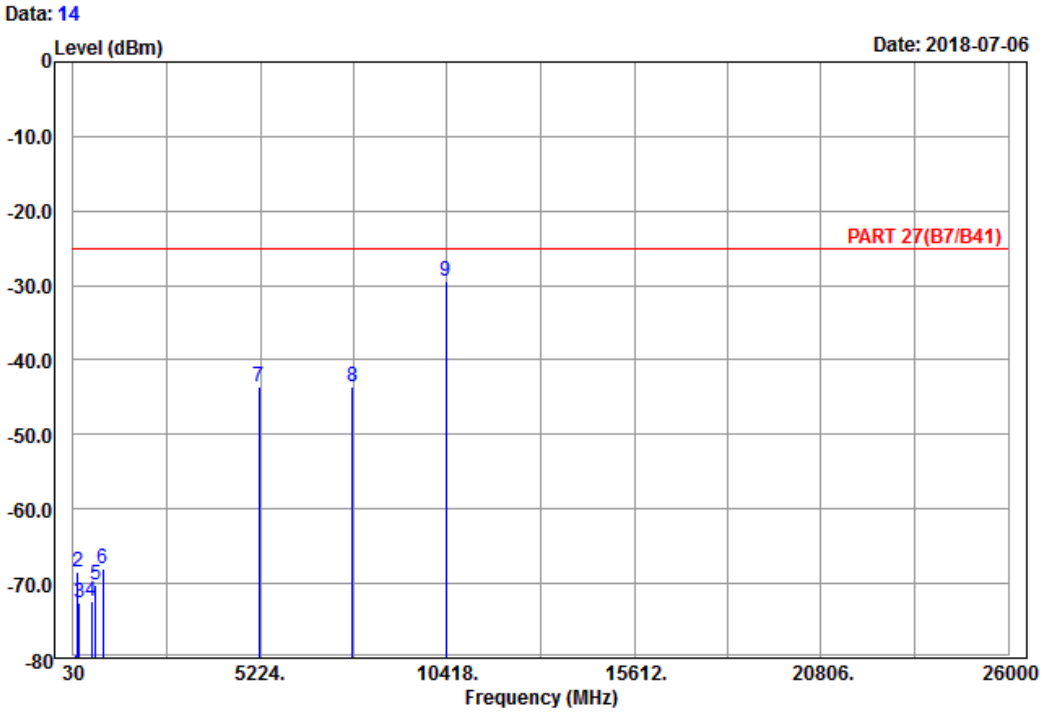


Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 38_Link_CH38000
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	170.13	-68.96	-62.25	-25.00	-43.96	-6.71	Peak
2	207.66	-66.85	-60.77	-25.00	-41.85	-6.08	Peak
3	239.52	-66.85	-61.20	-25.00	-41.85	-5.65	Peak
4	568.80	-70.81	-69.91	-25.00	-45.81	-0.90	Peak
5	637.40	-69.38	-69.39	-25.00	-44.38	0.01	Peak
6	892.20	-66.84	-69.51	-25.00	-41.84	2.67	Peak
7	5190.00	-45.16	-65.28	-25.00	-20.16	20.12	Peak
8	7785.00	-43.97	-67.30	-25.00	-18.97	23.33	Peak
9 pp	10380.00	-27.49	-54.23	-25.00	-2.49	26.74	Peak

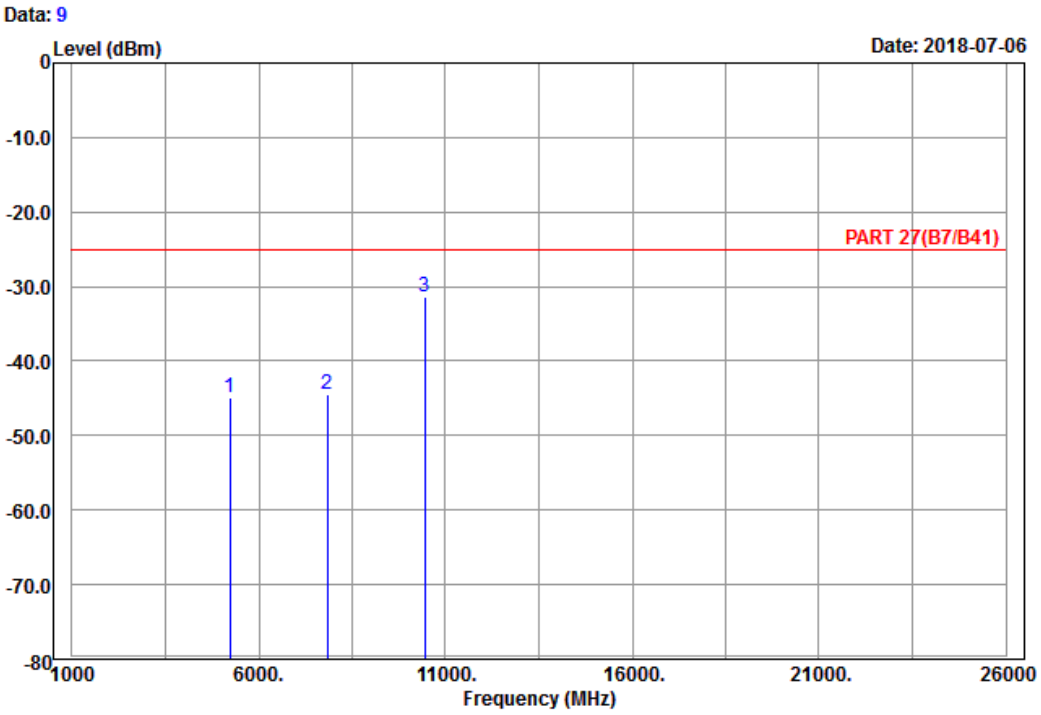


Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH38000
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	96.96	-82.48	-72.19	-25.00	-57.48	-10.29	Peak
2	159.60	-68.51	-60.84	-25.00	-43.51	-7.67	Peak
3	204.69	-72.49	-66.37	-25.00	-47.49	-6.12	Peak
4	534.50	-72.38	-69.58	-25.00	-47.38	-2.80	Peak
5	657.00	-70.21	-70.04	-25.00	-45.21	-0.17	Peak
6	860.00	-68.11	-69.86	-25.00	-43.11	1.75	Peak
7	5190.00	-43.55	-63.67	-25.00	-18.55	20.12	Peak
8	7785.00	-43.63	-66.96	-25.00	-18.63	23.33	Peak
9 pp	10380.00	-29.48	-56.22	-25.00	-4.48	26.74	Peak

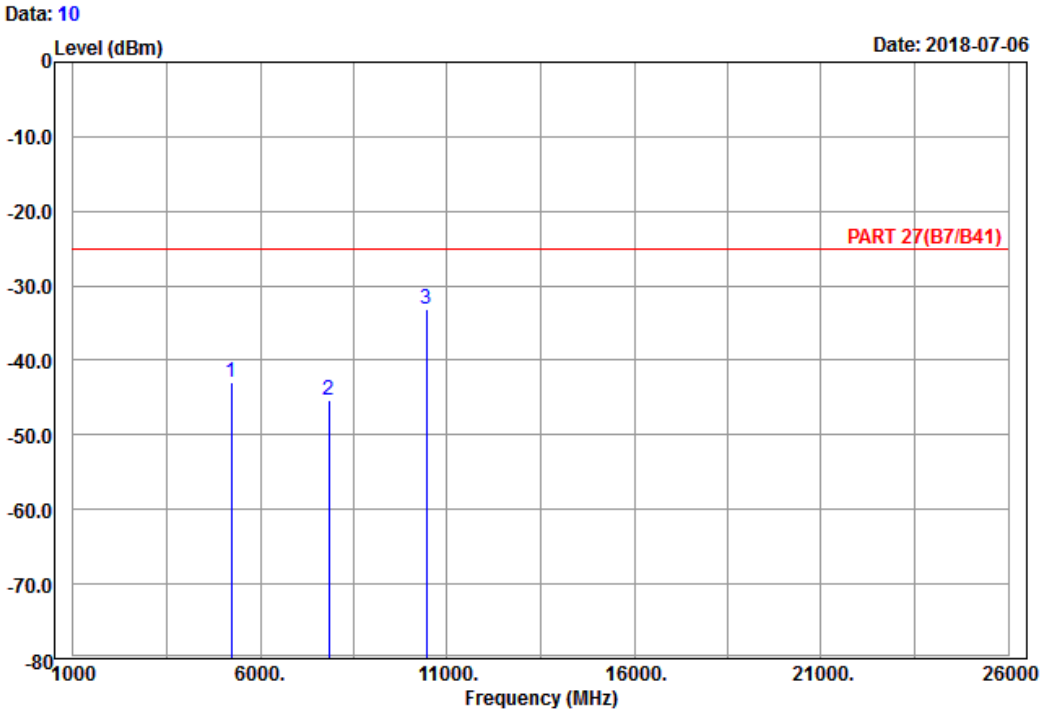
High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 38_Link_CH38150
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5220.00	-44.99	-65.13	-25.00	-19.99	20.14	Peak
2	7830.00	-44.40	-67.80	-25.00	-19.40	23.40	Peak
3 pp	10440.00	-31.41	-58.12	-25.00	-6.41	26.71	Peak

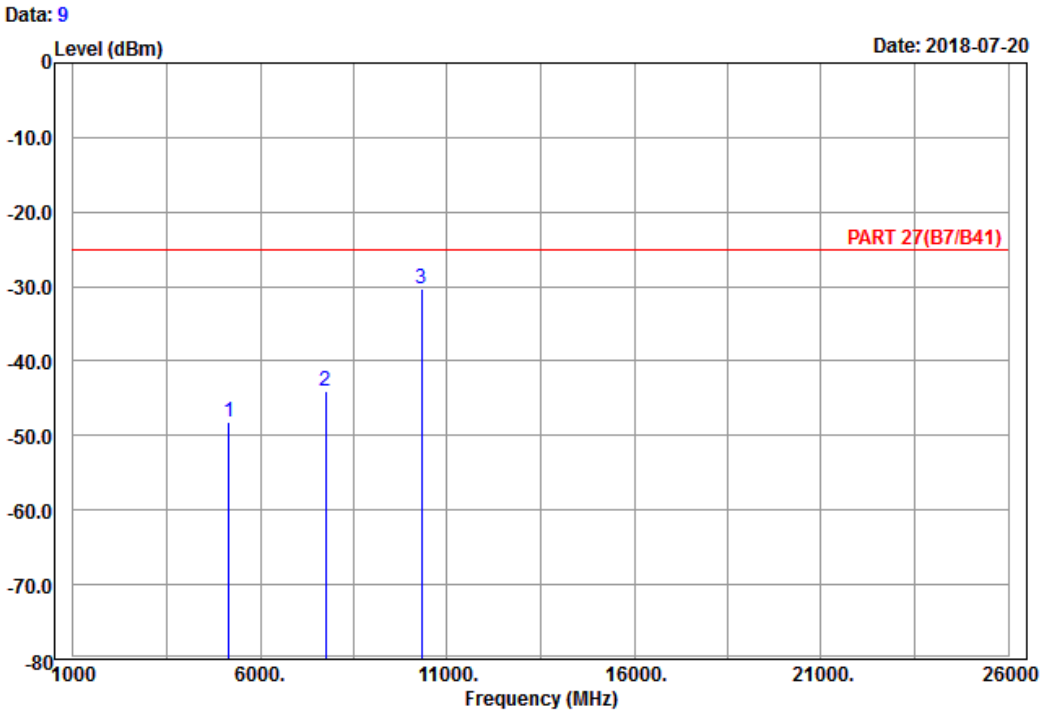


Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH38150
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5220.00	-42.89	-63.03	-25.00	-17.89	20.14	Peak
2	7830.00	-45.42	-68.82	-25.00	-20.42	23.40	Peak
3 pp	10440.00	-33.11	-59.82	-25.00	-8.11	26.71	Peak

Mode B
LTE Band 38
Channel Bandwidth: 20 MHz / QPSK
Low Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

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Site     : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark   : LTE_Band 38_Link_CH37850
Tested by: Karl Lee
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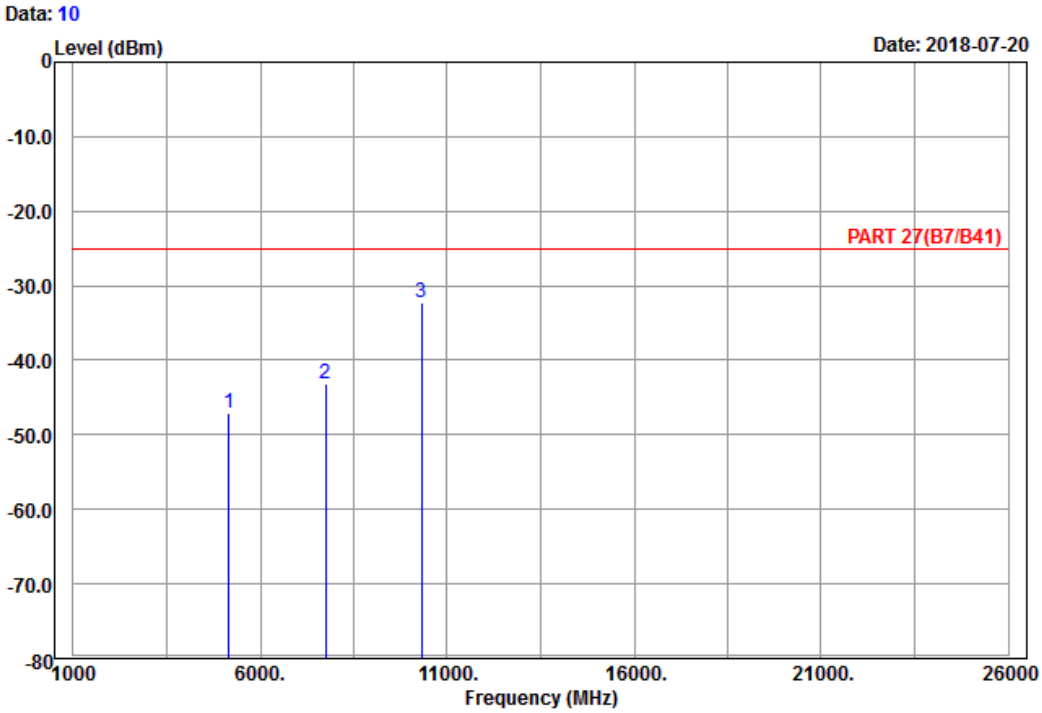
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5160.00	-48.21	-68.13	-25.00	-23.21	19.92	Peak
2	7740.00	-44.00	-67.23	-25.00	-19.00	23.23	Peak
3 pp	10320.00	-30.22	-56.89	-25.00	-5.22	26.67	Peak

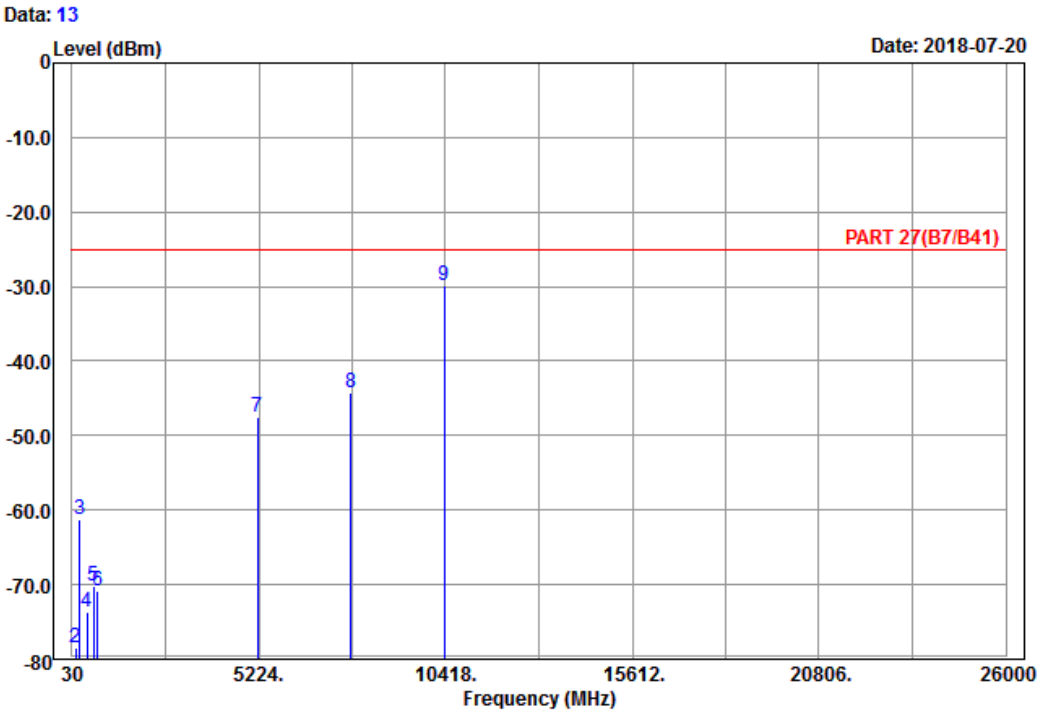


Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH37850
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5160.00	-47.15	-67.07	-25.00	-22.15	19.92	Peak
2	7740.00	-43.23	-66.46	-25.00	-18.23	23.23	Peak
3 pp	10320.00	-32.25	-58.92	-25.00	-7.25	26.67	Peak

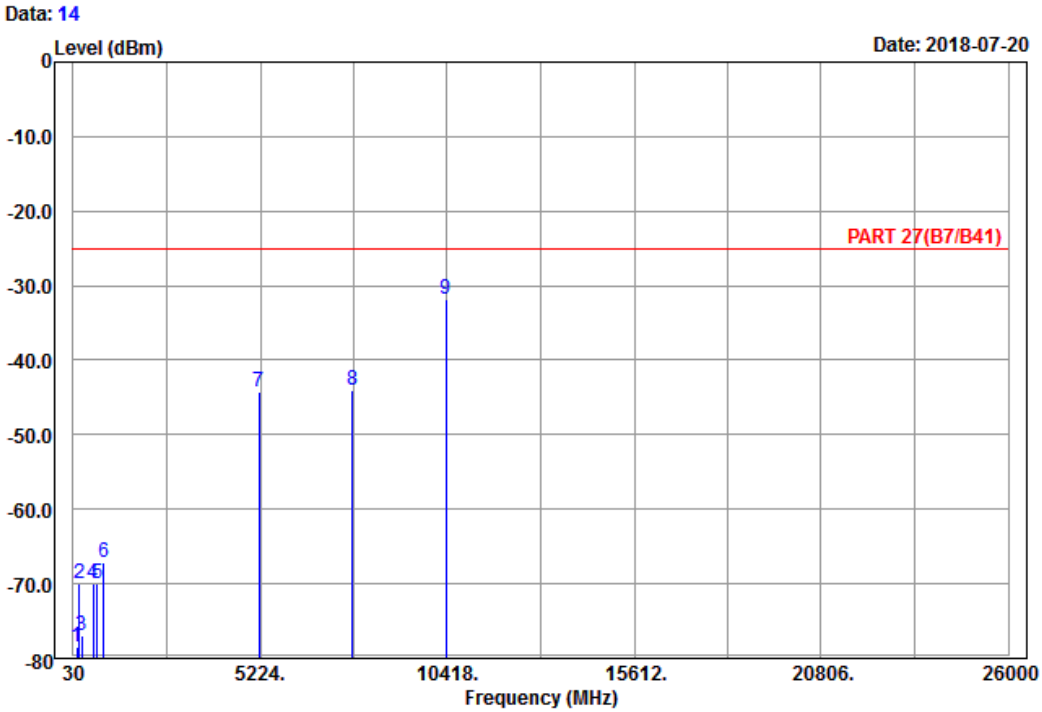
Middle Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 38_Link_CH38000
Tested by: Karl Lee

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
		MHz	dBm	dBm	dBm	dB	dB	
1		75.36	-83.91	-71.73	-25.00	-58.91	-12.18	Peak
2		127.47	-78.47	-70.64	-25.00	-53.47	-7.83	Peak
3		233.58	-61.33	-55.60	-25.00	-36.33	-5.73	Peak
4		437.20	-73.62	-70.05	-25.00	-48.62	-3.57	Peak
5		634.60	-70.28	-70.32	-25.00	-45.28	0.04	Peak
6		745.20	-70.93	-69.71	-25.00	-45.93	-1.22	Peak
7		5190.00	-47.58	-67.70	-25.00	-22.58	20.12	Peak
8		7785.00	-44.21	-67.54	-25.00	-19.21	23.33	Peak
9	pp	10380.00	-29.95	-56.69	-25.00	-4.95	26.74	Peak

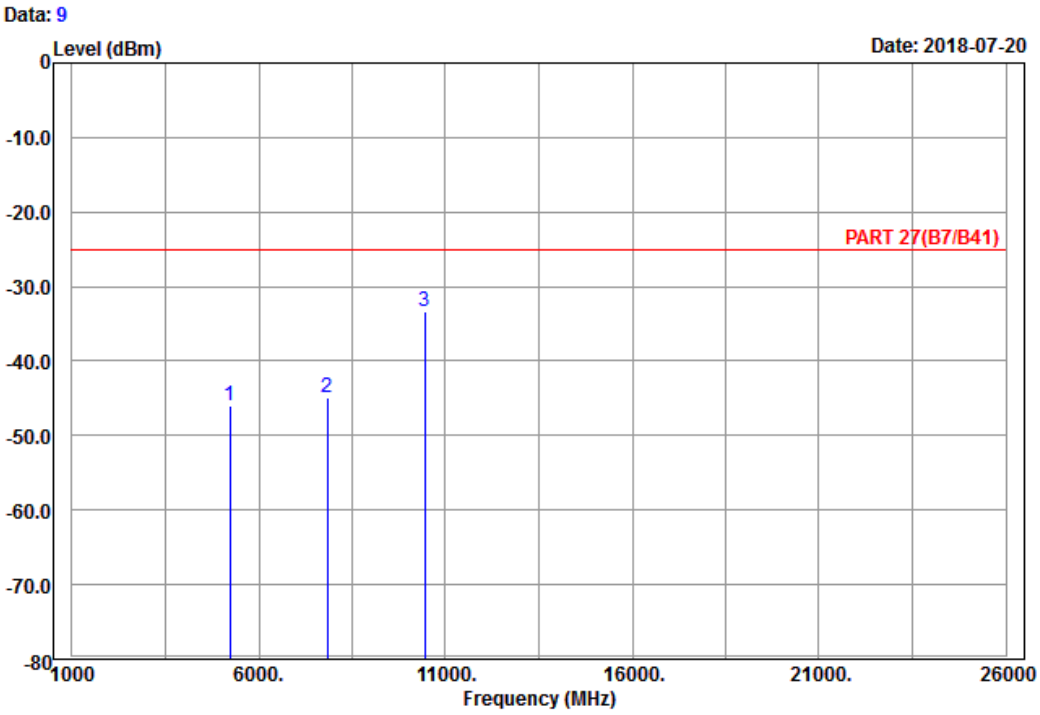


Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH38000
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	129.63	-78.42	-70.77	-25.00	-53.42	-7.65	Peak
2	196.05	-70.04	-64.04	-25.00	-45.04	-6.00	Peak
3	258.96	-76.93	-71.34	-25.00	-51.93	-5.59	Peak
4	591.20	-69.87	-69.94	-25.00	-44.87	0.07	Peak
5	697.60	-69.97	-69.61	-25.00	-44.97	-0.36	Peak
6	878.90	-67.15	-69.43	-25.00	-42.15	2.28	Peak
7	5190.00	-44.25	-64.37	-25.00	-19.25	20.12	Peak
8	7785.00	-43.99	-67.32	-25.00	-18.99	23.33	Peak
9 pp	10380.00	-31.78	-58.52	-25.00	-6.78	26.74	Peak

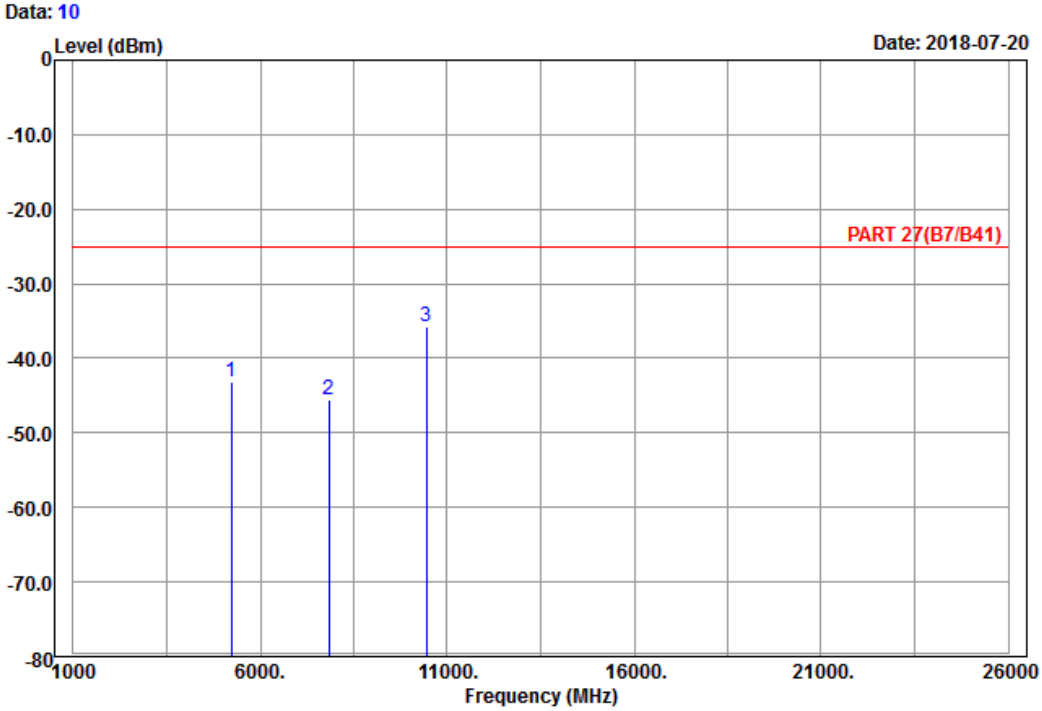
High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 chamber 1
Condition: PART 27(B7/B41) Horizontal
Remark : LTE_Band 38_Link_CH38150
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5220.00	-45.90	-66.04	-25.00	-20.90	20.14	Peak
2	7830.00	-45.00	-68.40	-25.00	-20.00	23.40	Peak
3 pp	10440.00	-33.25	-59.96	-25.00	-8.25	26.71	Peak



Site : 966 chamber 1
Condition: PART 27(B7/B41) Vertical
Remark : LTE_Band 38_Link_CH38150
Tested by: Karl Lee

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	5220.00	-43.21	-63.35	-25.00	-18.21	20.14	Peak
2	7830.00	-45.65	-69.05	-25.00	-20.65	23.40	Peak
3 pp	10440.00	-35.85	-62.56	-25.00	-10.85	26.71	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:

Linko EMC/RF Lab
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Fax: 886-2-26051924

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Tel: 886-3-6668565
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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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