

FCC Test Report

(PART 24)

Report No.: RF200710D07

FCC ID: 2AK5B-I1

Test Model: INT1LFCNA1

Received Date: Jul. 10, 2020

Test Date: Jul. 23, 2020 ~ Jul. 27, 2020

Issued Date: Aug. 12, 2020

Applicant: Latchable, Inc.

Address: 508 West 26th Street Suite 6G New York, NY 10001 United States

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, Taiwan

**FCC Registration /
Designation Number:** 788550 / TW0003



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specifically mentioned, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Test Site and Instruments	7
3 General Information	8
3.1 General Description of EUT	8
3.2 Configuration of System under Test	9
3.2.1 Description of Support Units	9
3.3 Test Mode Applicability and Tested Channel Detail	10
3.4 EUT Operating Conditions	12
3.5 General Description of Applied Standards and references	12
4 Test Types and Results	13
4.1 Output Power Measurement	13
4.1.1 Limits of Output Power Measurement	13
4.1.2 Test Procedures	13
4.1.3 Test Setup	14
4.1.4 Test Results	15
4.2 Modulation Characteristics Measurement	19
4.2.1 Limits of Modulation Characteristics	19
4.2.2 Test Setup	19
4.2.3 Test Procedure	19
4.2.4 Test Results	19
4.3 Frequency Stability Measurement	20
4.3.1 Limits of Frequency Stability Measurement	20
4.3.2 Test Procedure	20
4.3.3 Test Setup	20
4.3.4 Test Results	21
4.4 Occupied Bandwidth Measurement	27
4.4.1 Test Procedure	27
4.4.2 Test Setup	27
4.4.3 Test Result	28
4.5 Band Edge Measurement	31
4.5.1 Limits of Band Edge Measurement	31
4.5.2 Test Setup	31
4.5.3 Test Procedures	31
4.5.4 Test Results	32
4.6 Peak to Average Ratio	38
4.6.1 Limits of Peak to Average Ratio Measurement	38
4.6.2 Test Setup	38
4.6.3 Test Procedures	38
4.6.4 Test Results	39
4.7 Conducted Spurious Emissions	42
4.7.1 Limits of Conducted Spurious Emissions Measurement	42
4.7.2 Test Setup	42
4.7.3 Test Procedure	42
4.7.4 Test Results	43
4.8 Radiated Emission Measurement	49
4.8.1 Limits of Radiated Emission Measurement	49
4.8.2 Test Procedure	49
4.8.3 Deviation from Test Standard	49
4.8.4 Test Setup	50
4.8.5 Test Results	51

5 Pictures of Test Arrangements.....	69
Appendix – Information of the Testing Laboratories	70

Release Control Record

Issue No.	Description	Date Issued
RF200710D07	Original Release	Aug. 12, 2020

1 Certificate of Conformity

Product: Apartment entry intercom device

Brand: Latch

Test Model: INT1LFCNA1

Sample Status: Engineering Sample


Applicant: Latchable, Inc.

Test Date: Jul. 23, 2020 ~ Jul. 27, 2020

Standards: FCC Part 24, Subpart E

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:** Aug. 12, 2020
Vera Huang / Specialist

Approved by : , **Date:** Aug. 12, 2020
Dylan Chiou / Senior Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Effective Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
24.232(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -18.74 dB at 5700.00 MHz.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 18, 2020	Mar. 17, 2021
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 12, 2019	Dec. 11, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 24, 2019	Nov. 23, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 08, 2019	Nov. 07, 2020
Fixed Attenuator WORKEN	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 25, 2019	Oct. 24, 2020
Loop Antenna	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier EMCI	EMC001340	980201	Oct. 14, 2019	Oct. 13, 2020
Preamplifier EMCI	EMC 012645	980115	Oct. 08, 2019	Oct. 07, 2020
Preamplifier EMCI	EMC 330H	980112	Oct. 08, 2019	Oct. 07, 2020
Power Meter Anritsu	ML2495A	1012010	Sep. 04, 2019	Sep. 03, 2020
Power Sensor Anritsu	MA2411B	1315050	Sep. 04, 2019	Sep. 03, 2020
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-800 0&3000	140811+170717	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM- 1000(140807)	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 08, 2019	Oct. 07, 2020
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 10.

3 General Information

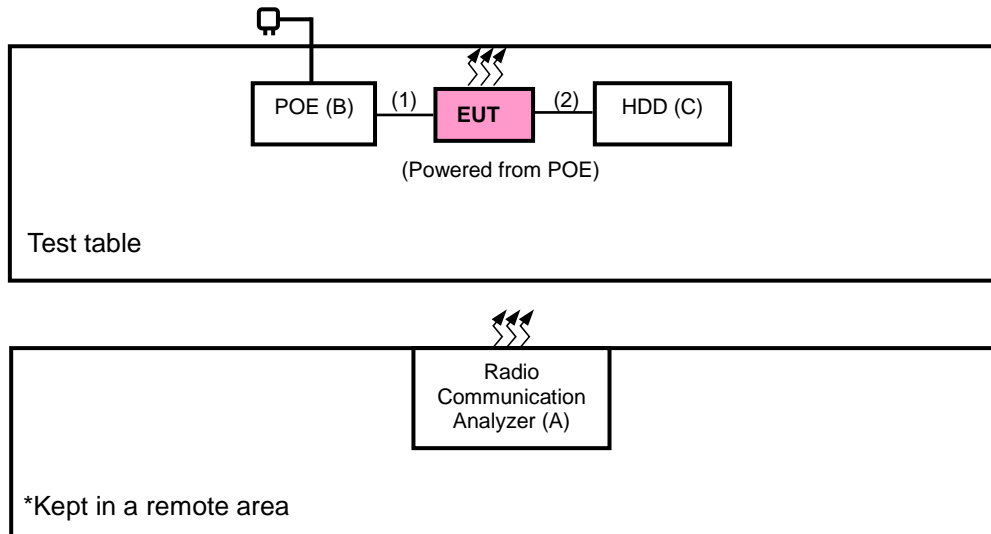
3.1 General Description of EUT

Product	Apartment entry intercom device	
Brand	Latch	
Test Model	INT1LFCNA1	
Status of EUT	Engineering Sample	
Power Supply Rating	12Vdc-24Vdc from Adapter or 54 Vdc from POE Adapter	
Modulation Type	LTE	QPSK, 16QAM
Frequency Range	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
Max. EIRP Power	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	440.55 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	467.74 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	494.31 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	524.81 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	555.90 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	586.14 mW
Emission Designator	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09D7W
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M70G7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M50G7D
	LTE Band 2 (Channel Bandwidth: 10 MHz)	8M96G7D
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	17M9G7D
Antenna Type	PIFA Antenna with 3.735 dBi gain	
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

1. 16QAM only support 25RB.
2. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

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

No.	Product	Brand	Model No.	Serial No.	FCC ID
A	Radio Communication Analyzer	Anritsu	MT8820C	6201300640	N/A
B	POE	N/A	N/A	N/A	N/A
C	HDD	TOSHIBA	DTB305	45TGCN0IT3ZB	N/A

Note: Item A acted as communication partner to transfer data.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN Cable	1	1.5	N	0	--
2.	USB Cable	1	0.5	N	0	--

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, and antenna ports.

The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	EIRP	Radiated Emission
LTE Band 2	X-plane	X-plane

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Modulation Characteristics	18700 to 19100	18900	20 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
-	Frequency Stability	18607 to 19193	18607, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18615, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Occupied Bandwidth	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	50 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	75 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	100 RB / 0 RB Offset
-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode		
-	Band Edge	18607 to 19193	18607	1.4 MHz	QPSK	1 RB / 0 RB Offset 6 RB / 0 RB Offset		
			19193	1.4 MHz	QPSK	1 RB / 5 RB Offset 6 RB / 0 RB Offset		
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 0 RB Offset 15 RB / 0 RB Offset		
			19185	3 MHz	QPSK	1 RB / 14 RB Offset 15 RB / 0 RB Offset		
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset 25 RB / 0 RB Offset		
			19175	5 MHz	QPSK	1 RB / 24 RB Offset 25 RB / 0 RB Offset		
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 0 RB Offset 50 RB / 0 RB Offset		
			19150	10 MHz	QPSK	1 RB / 49 RB Offset 50 RB / 0 RB Offset		
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset 75 RB / 0 RB Offset		
			19125	15 MHz	QPSK	1 RB / 74 RB Offset 75 RB / 0 RB Offset		
		18700 to 19100	18700	20 MHz	QPSK	1 RB / 0 RB Offset 100 RB / 0 RB Offset		
			19100	20 MHz	QPSK	1 RB / 99 RB Offset 100 RB / 0 RB Offset		
		-	Conducted Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
				18615 to 19185	18615, 18900, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
				18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
				18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
18675 to 19125	18675, 18900, 19125			15 MHz	QPSK	1 RB / 0 RB Offset		
18700 to 19100	18700, 18900, 19100			20 MHz	QPSK	1 RB / 0 RB Offset		
-	Radiated Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset		
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset		
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset		

Note:

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

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	120 Vac, 60 Hz	Cyril Chen
Modulation Characteristics	26 deg. C, 58 % RH	120 Vac, 60 Hz	Getac Yang
Frequency Stability	26 deg. C, 58 % RH	120 Vac, 60 Hz	Getac Yang
Occupied Bandwidth	26 deg. C, 58 % RH	120 Vac, 60 Hz	Getac Yang
Band Edge	26 deg. C, 58 % RH	120 Vac, 60 Hz	Getac Yang
Peak to Average Ratio	26 deg. C, 58 % RH	120 Vac, 60 Hz	Getac Yang
Conducted Emission	26 deg. C, 58 % RH	120 Vac, 60 Hz	Getac Yang
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Cyril Chen

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards and references

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

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 24

ANSI 63.26-2015

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

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-E 2016

NOTE: All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 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. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$.

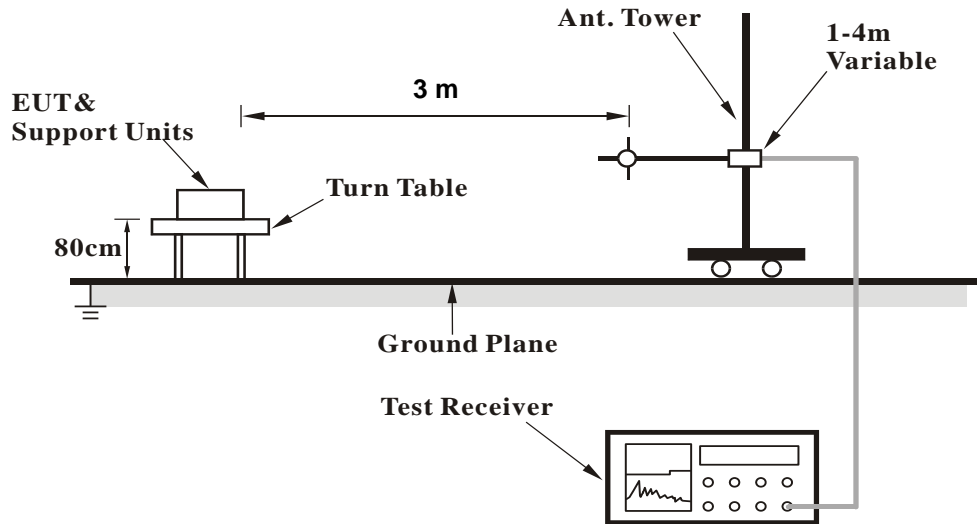
Conducted Power Measurement:

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

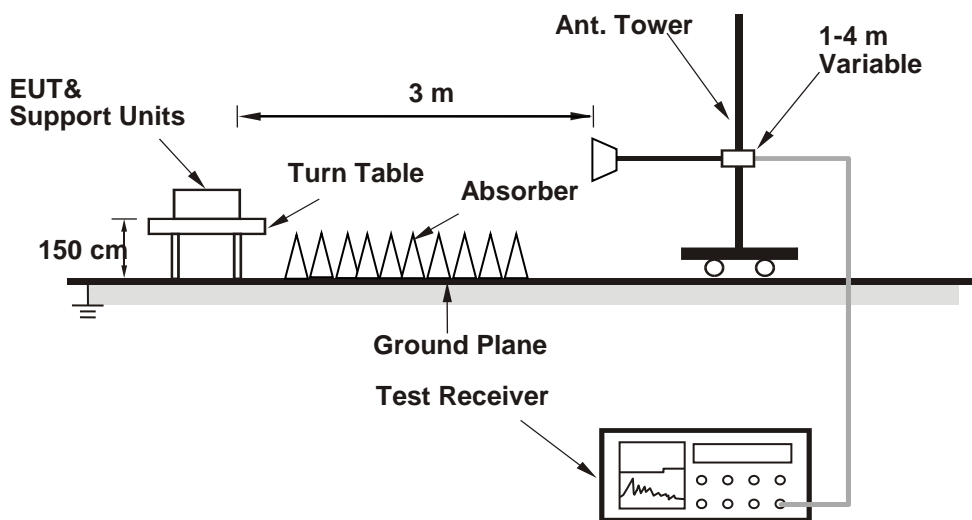
4.1.3 Test Setup

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

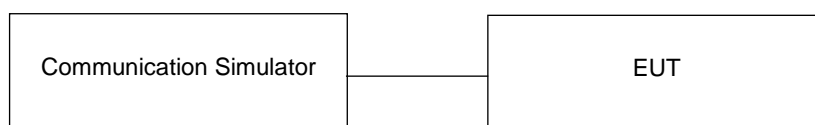


<Radiated Emission above 1 GHz>



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 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)
				18700	18900	19100						18675	18900	19125	
				Channel	1860.0	1880.0						1900.0	Channel	1857.5	
		Frequency (MHz)									Frequency (MHz)				
20M	QPSK	1	0	24.02	23.61	23.72	0	15M	QPSK	1	0	23.97	23.55	23.68	0
		1	50	23.89	23.52	23.60	0			1	37	23.89	23.44	23.56	0
		1	99	23.67	23.24	23.47	0			1	74	23.76	23.18	23.32	0
		50	0	22.93	22.48	22.59	1			36	0	22.87	22.44	22.52	1
		50	25	22.75	22.28	22.42	1			36	19	22.67	22.30	22.38	1
		50	50	22.66	22.18	22.30	1			36	39	22.57	22.17	22.29	1
		100	0	22.88	22.45	22.57	1			75	0	22.82	22.43	22.48	1
	16QAM	1	0	x	x	x	1		16QAM	1	0	x	x	x	1
		1	50	x	x	x	1			1	37	x	x	x	1
		1	99	x	x	x	1			1	74	x	x	x	1
		50	0	x	x	x	2			36	0	x	x	x	2
		50	25	x	x	x	2			36	19	x	x	x	2
		50	50	x	x	x	2			36	39	x	x	x	2
		100	0	x	x	x	2			75	0	x	x	x	2
10M	QPSK	1	0	23.93	23.51	23.63	0	5M	QPSK	1	0	23.83	23.37	23.51	0
		1	24	23.80	23.39	23.45	0			1	12	23.71	23.34	23.39	0
		1	49	23.60	23.21	23.27	0			1	24	23.52	23.21	23.22	0
		25	0	22.74	22.39	22.53	1			12	0	22.74	22.27	22.37	1
		25	12	22.54	22.21	22.30	1			12	6	22.55	22.10	22.24	1
		25	25	22.36	22.14	22.19	1			12	13	22.43	22.00	22.11	1
		50	0	22.73	22.33	22.44	1			25	0	22.72	22.27	22.36	1
	16QAM	1	0	x	x	x	1		16QAM	1	0	22.77	22.31	22.42	1
		1	24	x	x	x	1			1	12	22.66	22.31	22.31	1
		1	49	x	x	x	1			1	24	22.45	22.18	22.18	1
		25	0	x	x	x	2			12	0	21.72	21.06	21.23	2
		25	12	x	x	x	2			12	6	21.47	21.09	21.19	2
		25	25	x	x	x	2			12	13	21.34	20.95	21.05	2
		50	0	x	x	x	2			25	0	21.67	21.08	21.23	2
3M	QPSK	1	0	23.75	23.37	23.45	0	1.4M	QPSK	1	0	23.73	23.40	23.42	0
		1	7	23.62	23.18	23.43	0			1	2	23.68	23.36	23.36	0
		1	14	23.62	23.10	23.14	0			1	5	23.61	23.29	23.29	0
		8	0	22.67	22.26	22.33	1			3	0	23.56	23.26	23.22	0
		8	3	22.51	22.05	22.22	1			3	1	23.49	23.22	23.18	0
		8	7	22.36	21.99	22.06	1			3	3	23.46	23.19	23.11	0
		15	0	22.56	22.15	22.45	1			6	0	22.59	22.16	22.27	1
	16QAM	1	0	22.73	22.31	22.43	1		16QAM	1	0	22.65	22.39	22.38	1
		1	7	22.58	22.15	22.35	1			1	2	22.67	22.33	22.31	1
		1	14	22.55	22.07	22.13	1			1	5	22.55	22.26	22.22	1
		8	0	21.53	21.15	21.16	2			3	0	22.47	22.23	22.14	1
		8	3	21.48	21.00	21.15	2			3	1	22.48	22.17	22.10	1
		8	7	21.27	20.92	21.05	2			3	3	22.42	22.18	22.04	1
		15	0	21.36	21.05	21.39	2			6	0	21.54	21.15	21.22	2

EIRP Power (dBm)

LTE Band 2							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18607	1850.7	-20.96	36.57	15.61	36.39	H
	18900	1880.0	-21.76	37.22	15.46	35.16	
	19193	1909.3	-21.64	37.18	15.54	35.81	
	18607	1850.7	-11.21	37.65	26.44	440.55	V
	18900	1880.0	-11.25	37.58	26.33	429.54	
	19193	1909.3	-11.12	37.48	26.36	432.51	
Channel Bandwidth: 1.4 MHz / 16QAM							
X	18607	1850.7	-21.93	36.57	14.64	29.11	H
	18900	1880.0	-22.73	37.22	14.49	28.12	
	19193	1909.3	-22.61	37.18	14.57	28.64	
	18607	1850.7	-12.18	37.65	25.47	352.37	V
	18900	1880.0	-12.22	37.58	25.36	343.56	
	19193	1909.3	-12.09	37.48	25.39	345.94	

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

LTE Band 2							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18615	1851.5	-20.70	36.57	15.87	38.64	H
	18900	1880.0	-21.50	37.22	15.72	37.33	
	19185	1908.5	-21.38	37.18	15.80	38.02	
	18615	1851.5	-10.95	37.65	26.70	467.74	V
	18900	1880.0	-10.99	37.58	26.59	456.04	
	19185	1908.5	-10.86	37.48	26.62	459.20	
Channel Bandwidth: 3 MHz / 16QAM							
X	18615	1851.5	-21.68	36.57	14.89	30.83	H
	18900	1880.0	-22.48	37.22	14.74	29.79	
	19185	1908.5	-22.36	37.18	14.82	30.34	
	18615	1851.5	-11.93	37.65	25.72	373.25	V
	18900	1880.0	-11.97	37.58	25.61	363.92	
	19185	1908.5	-11.84	37.48	25.64	366.44	

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

LTE Band 2							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18625	1852.5	-20.46	36.57	16.11	40.83	H
	18900	1880.0	-21.26	37.22	15.96	39.45	
	19175	1907.5	-21.14	37.18	16.04	40.18	
	18625	1852.5	-10.71	37.65	26.94	494.31	V
	18900	1880.0	-10.75	37.58	26.83	481.95	
	19175	1907.5	-10.62	37.48	26.86	485.29	
Channel Bandwidth: 5 MHz / 16QAM							
X	18625	1852.5	-21.45	36.57	15.12	32.51	H
	18900	1880.0	-22.25	37.22	14.97	31.41	
	19175	1907.5	-22.13	37.18	15.05	31.99	
	18625	1852.5	-11.70	37.65	25.95	393.55	V
	18900	1880.0	-11.74	37.58	25.84	383.71	
	19175	1907.5	-11.61	37.48	25.87	386.37	

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

LTE Band 2							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18650	1855.0	-20.20	36.57	16.37	43.35	H
	18900	1880.0	-21.00	37.22	16.22	41.88	
	19150	1905.0	-20.88	37.18	16.30	42.66	
	18650	1855.0	-10.45	37.65	27.20	524.81	V
	18900	1880.0	-10.49	37.58	27.09	511.68	
	19150	1905.0	-10.36	37.48	27.12	515.23	

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

LTE Band 2							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18675	1857.5	-19.95	36.57	16.62	45.92	H
	18900	1880.0	-20.75	37.22	16.47	44.36	
	19125	1902.5	-20.63	37.18	16.55	45.19	
	18675	1857.5	-10.20	37.65	27.45	555.90	V
	18900	1880.0	-10.24	37.58	27.34	542.00	
	19125	1902.5	-10.11	37.48	27.37	545.76	

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

LTE Band 2							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	18700	1860.0	-19.72	36.57	16.85	48.42	H
	18900	1880.0	-20.52	37.22	16.70	46.77	
	19100	1900.0	-20.40	37.18	16.78	47.64	
	18700	1860.0	-9.97	37.65	27.68	586.14	V
	18900	1880.0	-10.01	37.58	27.57	571.48	
	19100	1900.0	-9.88	37.48	27.60	575.44	

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

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

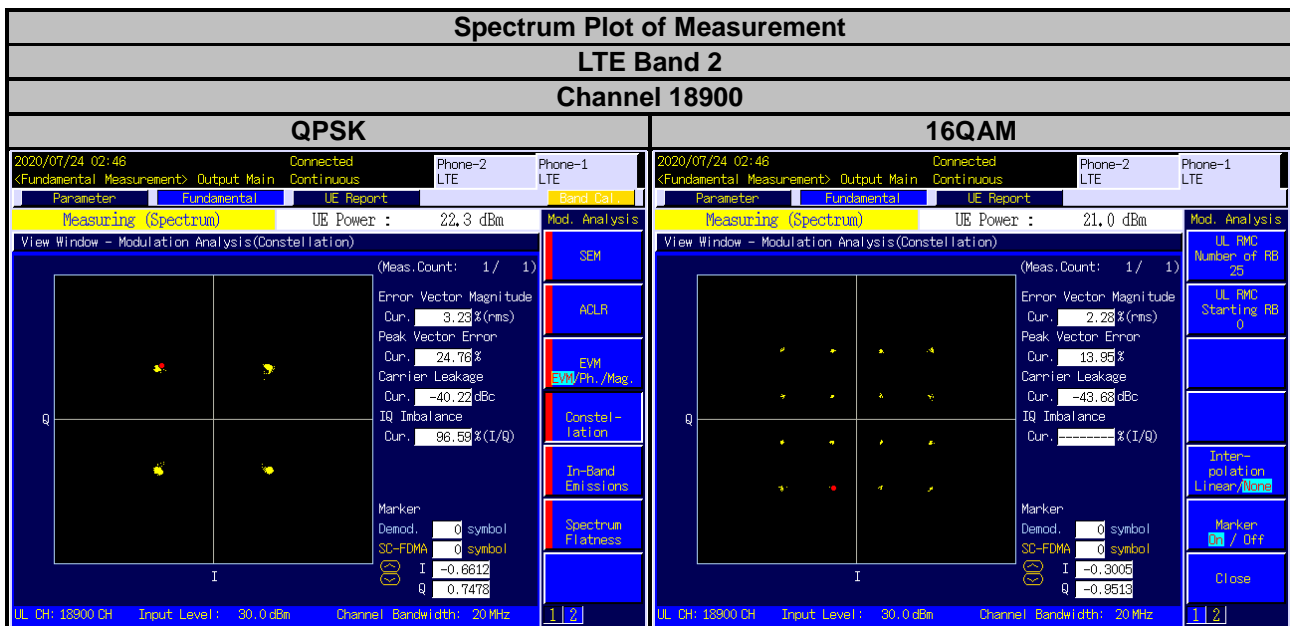
4.2.2 Test Setup



4.2.3 Test Procedure

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

4.2.4 Test Results



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

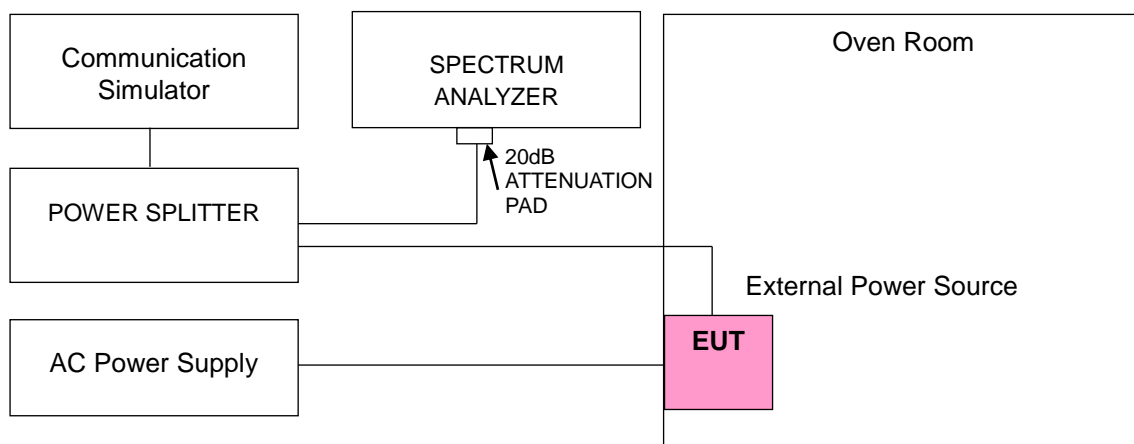
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.3.2 Test Procedure

- 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.
- EUT is connected the external power supply to control the AC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ 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 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1850.700002	0.001	1909.300000	0.002
102	1850.700004	0.002	1909.300002	0.001
138	1850.700004	0.002	1909.300001	0.001

Note: The applicant defined the normal working voltage is from 102 Vac to 138 Vac.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700003	0.002	1909.300002	0.001
-20	1850.700001	0.001	1909.300002	0.001
-10	1850.700001	0.001	1909.300001	0.001
0	1850.700003	0.001	1909.300003	0.002
10	1850.700002	0.001	1909.300001	0.001
20	1850.699997	-0.002	1909.299999	-0.001
30	1850.699997	-0.002	1909.299999	-0.001
40	1850.699999	-0.001	1909.299997	-0.002
50	1850.699998	-0.001	1909.299998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1851.500002	0.001	1908.500003	0.002
102	1851.500002	0.001	1908.500001	0.001
138	1851.500003	0.002	1908.500002	0.001

Note: The applicant defined the normal working voltage is from 102 Vac to 138 Vac.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1851.500002	0.001	1908.500004	0.002
-20	1851.500002	0.001	1908.500001	0.001
-10	1851.500004	0.002	1908.500002	0.001
0	1851.500004	0.002	1908.500004	0.002
10	1851.500002	0.001	1908.500004	0.002
20	1851.499997	-0.002	1908.499996	-0.002
30	1851.499999	-0.001	1908.499998	-0.001
40	1851.499998	-0.001	1908.499999	-0.001
50	1851.499998	-0.001	1908.499998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1852.500004	0.002	1907.500002	0.001
102	1852.500002	0.001	1907.500003	0.002
138	1852.500002	0.001	1907.500002	0.001

Note: The applicant defined the normal working voltage is from 102 Vac to 138 Vac.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.500003	0.002	1907.500002	0.001
-20	1852.500003	0.002	1907.500004	0.002
-10	1852.500003	0.002	1907.500004	0.002
0	1852.500001	0.001	1907.500001	0.001
10	1852.500001	0.001	1907.500003	0.002
20	1852.499998	-0.001	1907.499998	-0.001
30	1852.499997	-0.002	1907.499998	-0.001
40	1852.499998	-0.001	1907.499996	-0.002
50	1852.499996	-0.002	1907.499997	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1855.000002	0.001	1905.000001	0.001
102	1855.000002	0.001	1905.000004	0.002
138	1855.000004	0.002	1905.000001	0.001

Note: The applicant defined the normal working voltage is from 102 Vac to 138 Vac.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1855.000002	0.001	1905.000003	0.001
-20	1855.000003	0.002	1905.000003	0.002
-10	1855.000004	0.002	1905.000002	0.001
0	1855.000001	0.001	1905.000002	0.001
10	1855.000002	0.001	1905.000002	0.001
20	1854.999999	-0.001	1904.999998	-0.001
30	1854.999998	-0.001	1904.999996	-0.002
40	1854.999998	-0.001	1904.999996	-0.002
50	1854.999998	-0.001	1904.999997	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1857.500003	0.002	1902.500002	0.001
102	1857.500004	0.002	1902.500002	0.001
138	1857.500003	0.002	1902.500003	0.002

Note: The applicant defined the normal working voltage is from 102 Vac to 138 Vac.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1857.500003	0.002	1902.500003	0.001
-20	1857.500002	0.001	1902.500004	0.002
-10	1857.500003	0.002	1902.500002	0.001
0	1857.500004	0.002	1902.500001	0.001
10	1857.500004	0.002	1902.500003	0.001
20	1857.499997	-0.002	1902.499997	-0.002
30	1857.499998	-0.001	1902.499999	-0.001
40	1857.499996	-0.002	1902.499997	-0.001
50	1857.499997	-0.001	1902.499996	-0.002

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
120	1860.000003	0.001	1900.000004	0.002
102	1860.000001	0.001	1900.000002	0.001
138	1860.000003	0.001	1900.000001	0.001

Note: The applicant defined the normal working voltage is from 102 Vac to 138 Vac.

Frequency Error vs. Temperature

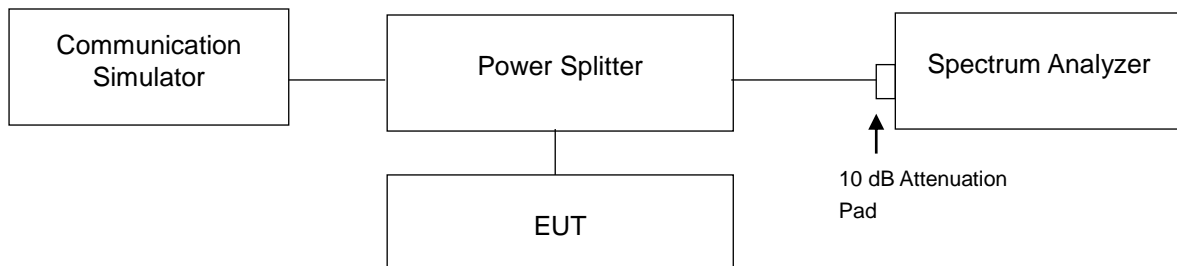
Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1860.000001	0.001	1900.000004	0.002
-20	1860.000004	0.002	1900.000004	0.002
-10	1860.000002	0.001	1900.000004	0.002
0	1860.000001	0.001	1900.000003	0.002
10	1860.000004	0.002	1900.000002	0.001
20	1859.999999	-0.001	1899.999997	-0.002
30	1859.999998	-0.001	1899.999996	-0.002
40	1859.999998	-0.001	1899.999999	-0.001
50	1859.999997	-0.002	1899.999997	-0.002

4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.4.2 Test Setup



4.4.3 Test Result

LTE Band 2					
Channel Bandwidth: 1.4 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18607	1850.7	1.0924	1.0937	1.320	1.284
18900	1880.0	1.0875	1.0892	1.262	1.257
19193	1909.3	1.0878	1.0898	1.263	1.256
Channel Bandwidth: 3 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18615	1851.5	2.7035	2.6984	2.954	2.945
18900	1880.0	2.7001	2.6967	2.912	2.920
19185	1908.5	2.6996	2.6960	2.925	2.925



LTE Band 2					
Channel Bandwidth: 5 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		26 dB Bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
18625	1852.5	4.4964	4.4960	4.875	4.892
18900	1880.0	4.4890	4.4908	4.810	4.824
19175	1907.5	4.4857	4.4868	4.808	4.822

Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
		QPSK	QPSK
18650	1855.0	8.9596	9.519
18900	1880.0	8.9465	9.490
19150	1905.0	8.9391	9.501



LTE Band 2			
Channel Bandwidth: 15 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
		QPSK	QPSK
18675	1857.5	13.448	14.24
18900	1880.0	13.408	14.22
19125	1902.5	13.448	14.23
Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
		QPSK	QPSK
18700	1860.0	17.923	19.04
18900	1880.0	17.862	19.00
19100	1900.0	17.931	19.03

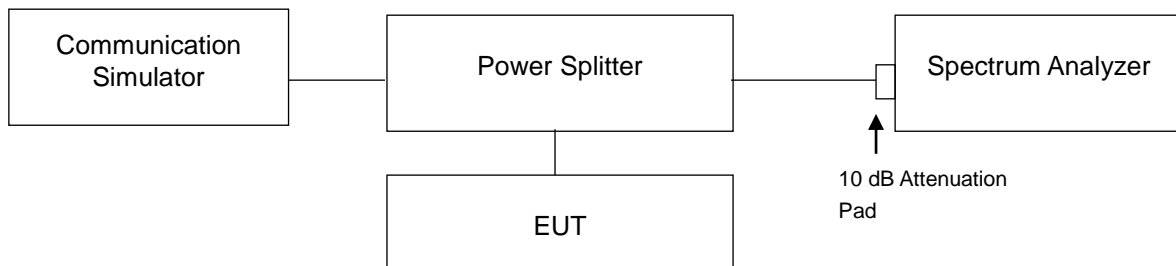


4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

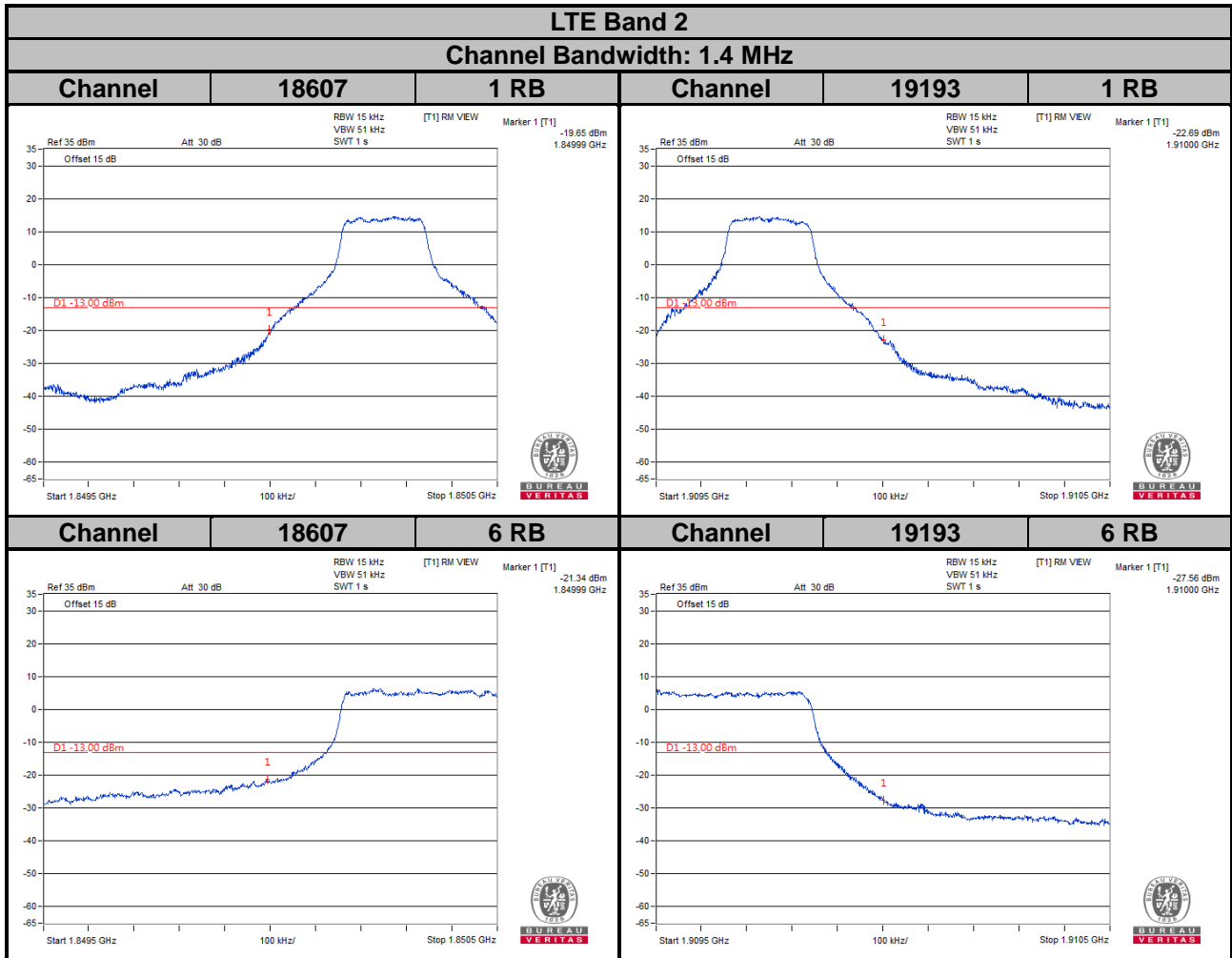
4.5.2 Test Setup



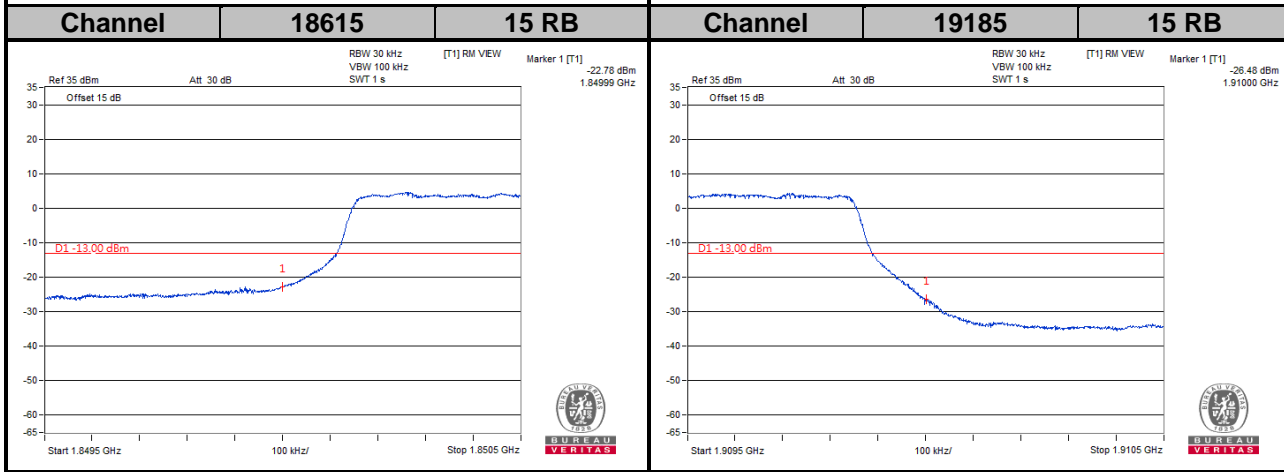
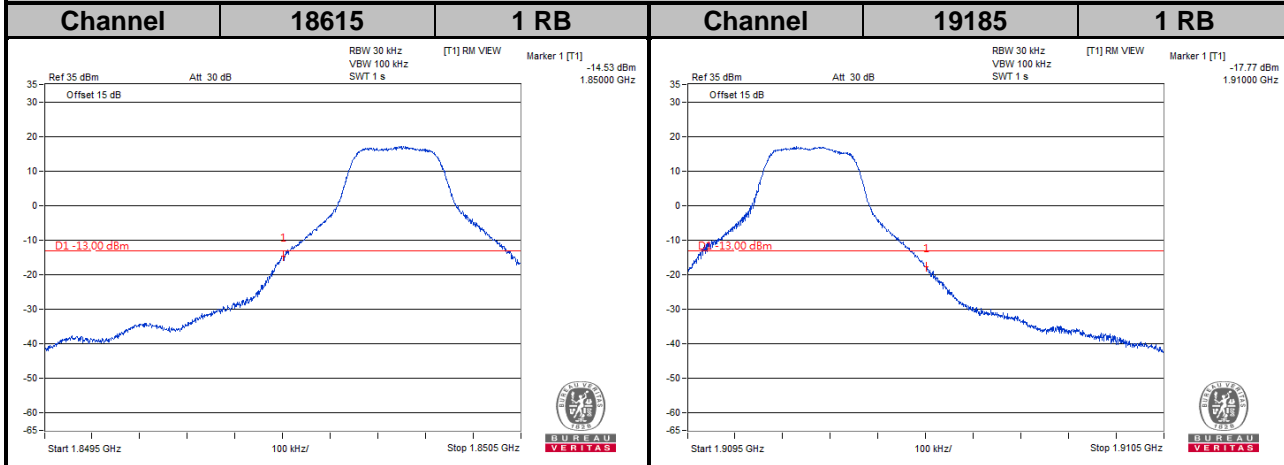
4.5.3 Test Procedures

- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 15 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 3 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 51 kHz and VB of the spectrum is 160 kHz (LTE Bandwidth 5 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 10 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 150 kHz and VB of the spectrum is 470 kHz (LTE Bandwidth 15 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 20 MHz).
- Record the max trace plot into the test report.

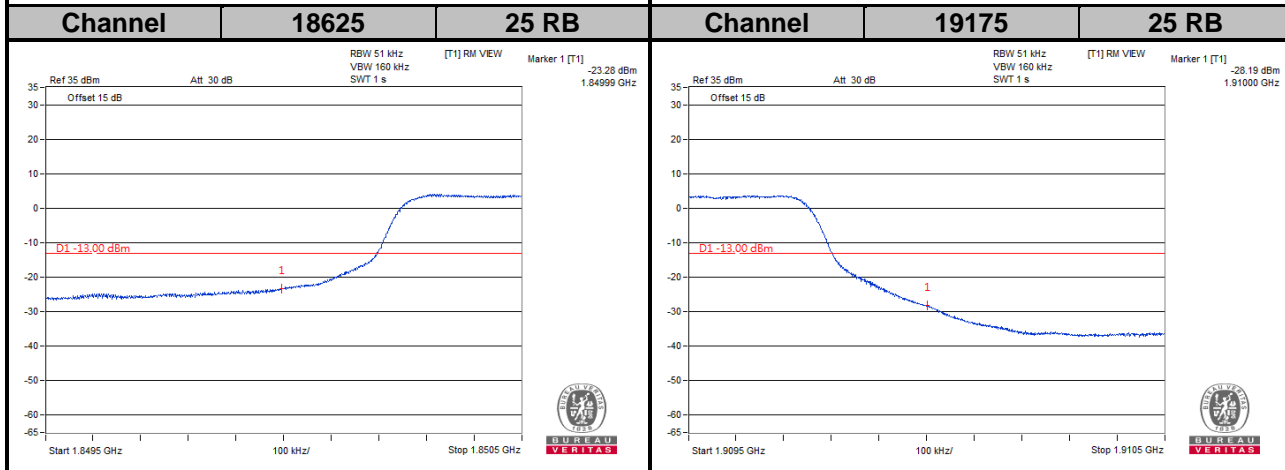
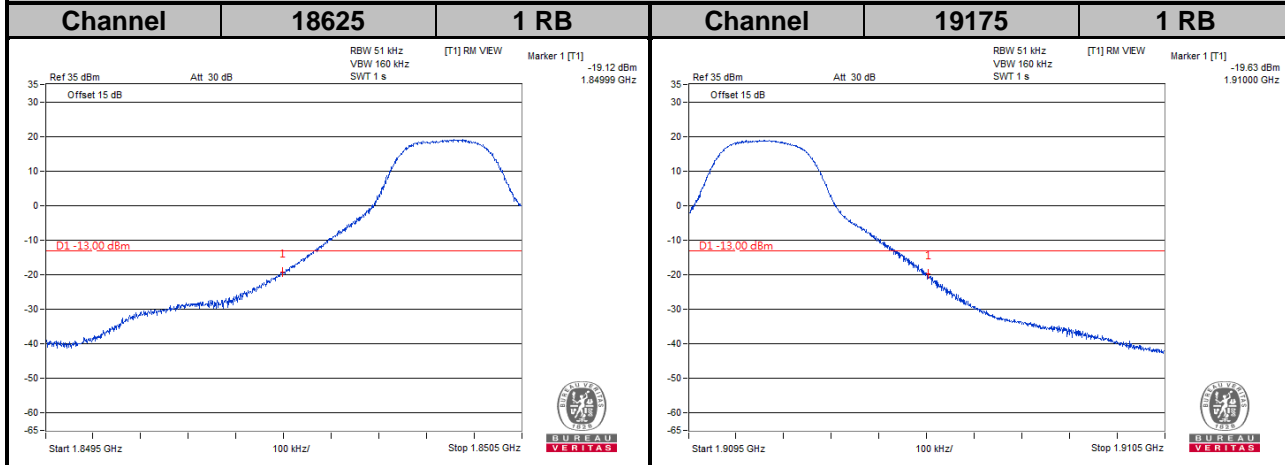
4.5.4 Test Results

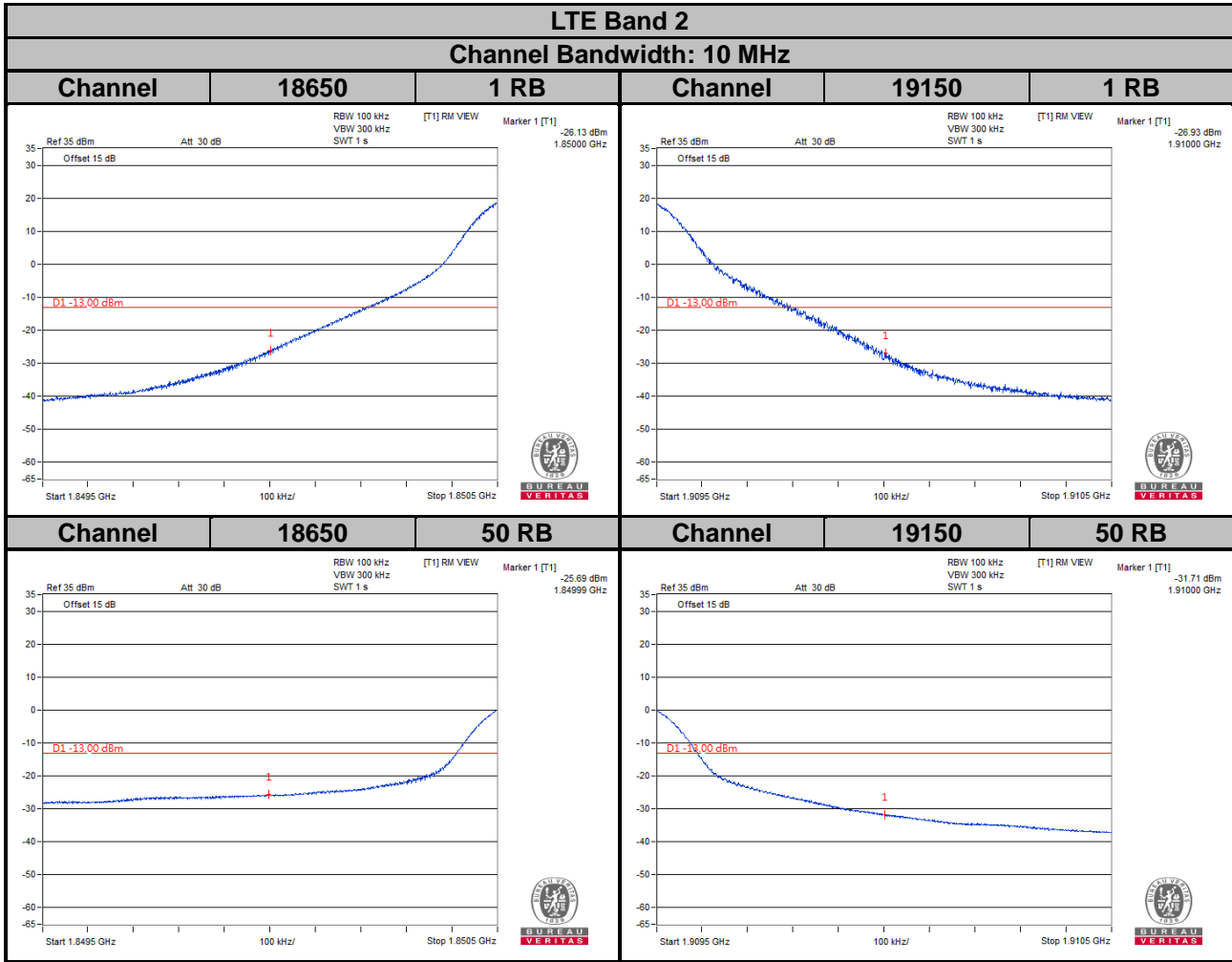


LTE Band 2
Channel Bandwidth: 3 MHz

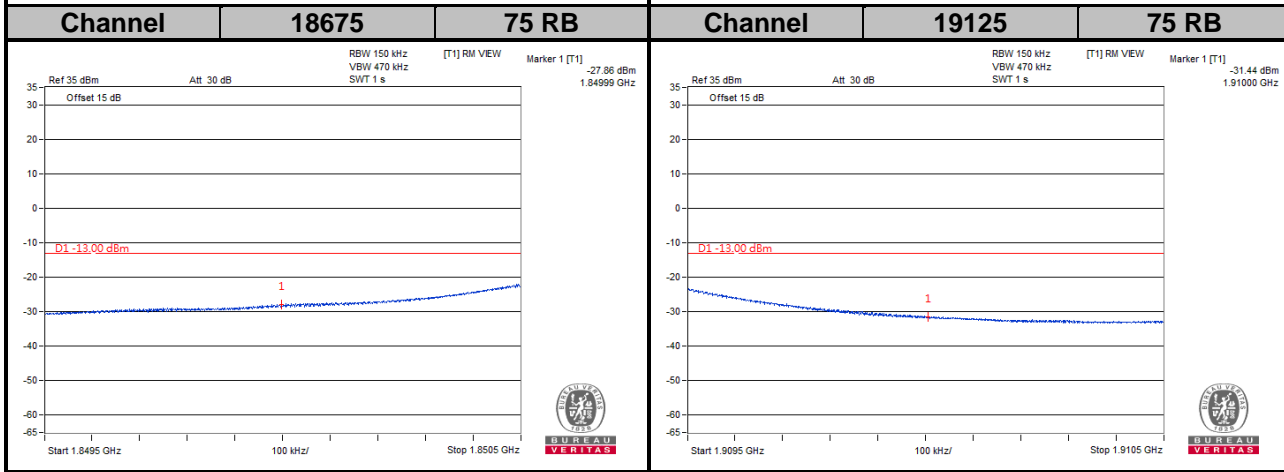
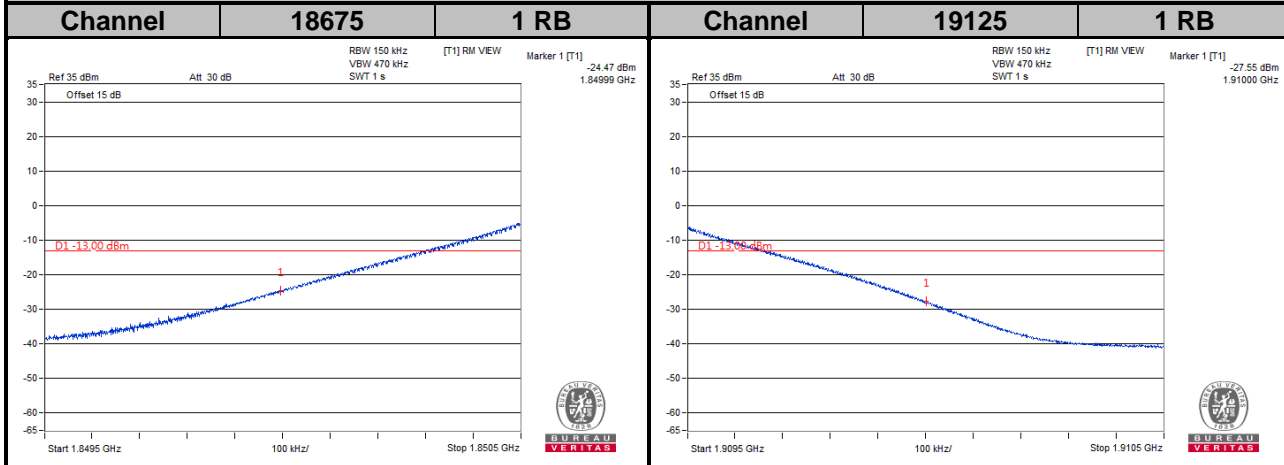


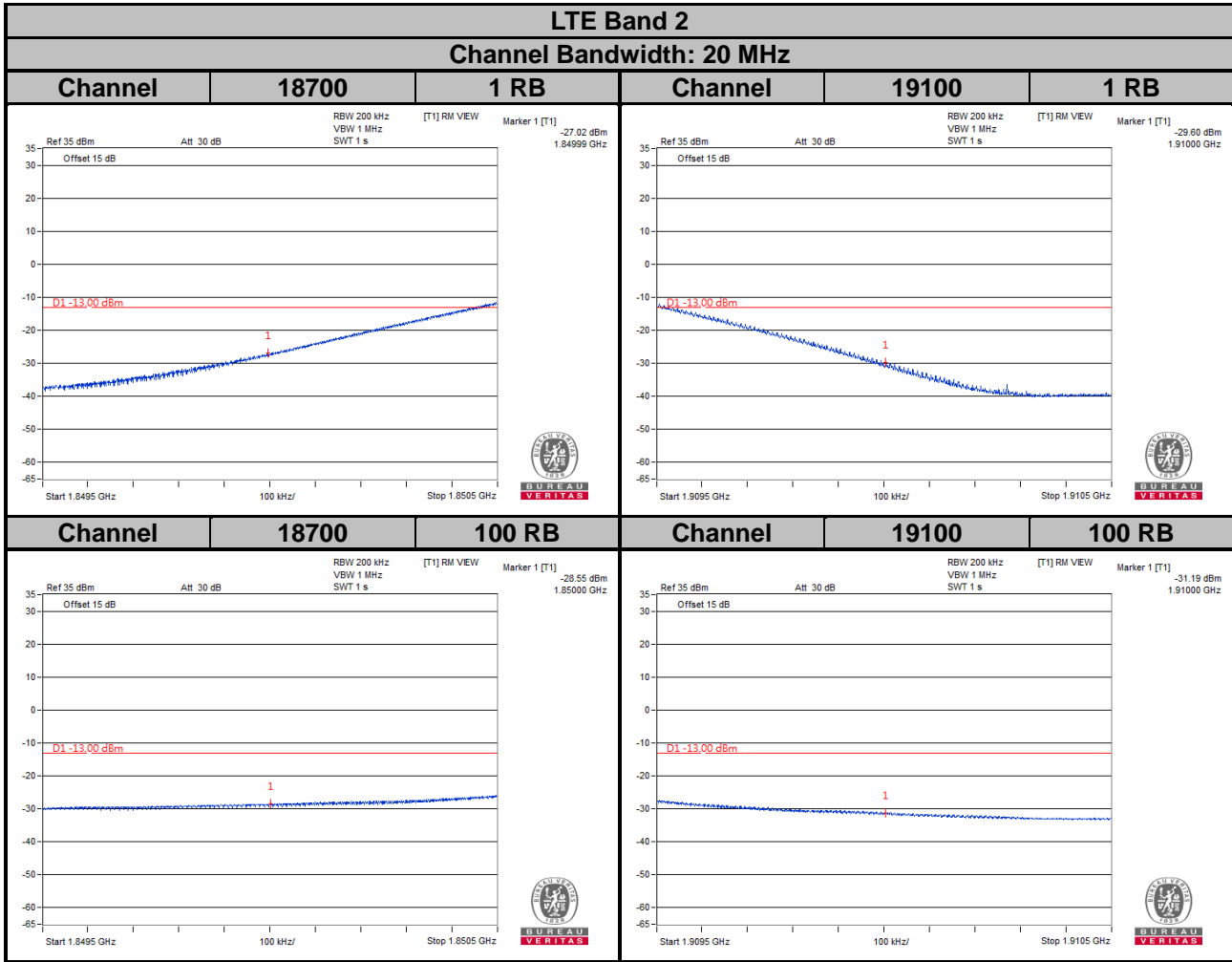
LTE Band 2
Channel Bandwidth: 5 MHz





LTE Band 2
Channel Bandwidth: 15 MHz



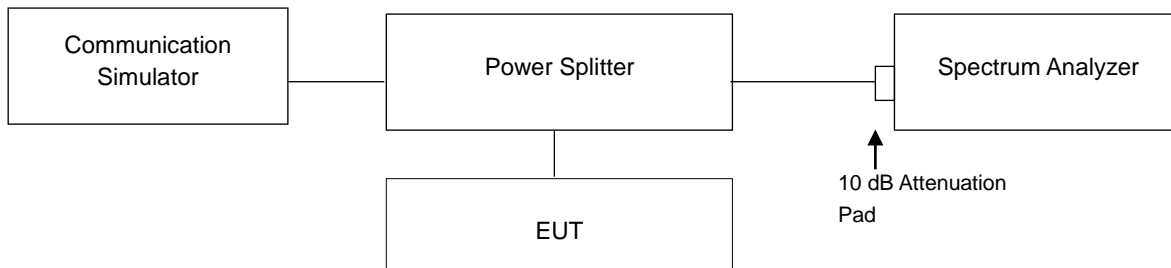


4.6 Peak to Average Ratio

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

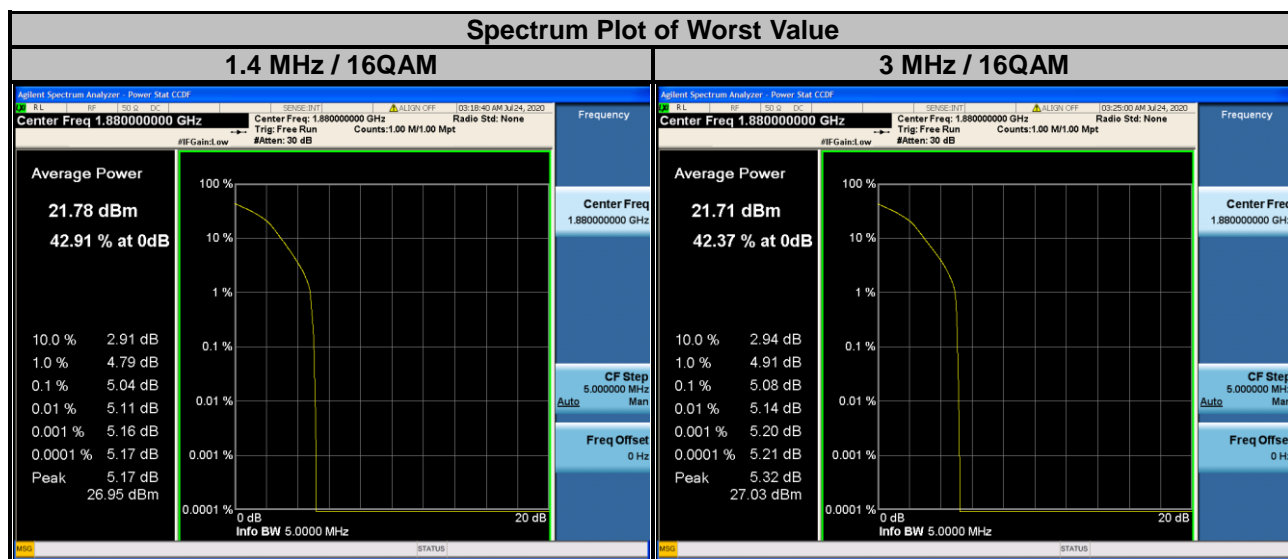


4.6.3 Test Procedures

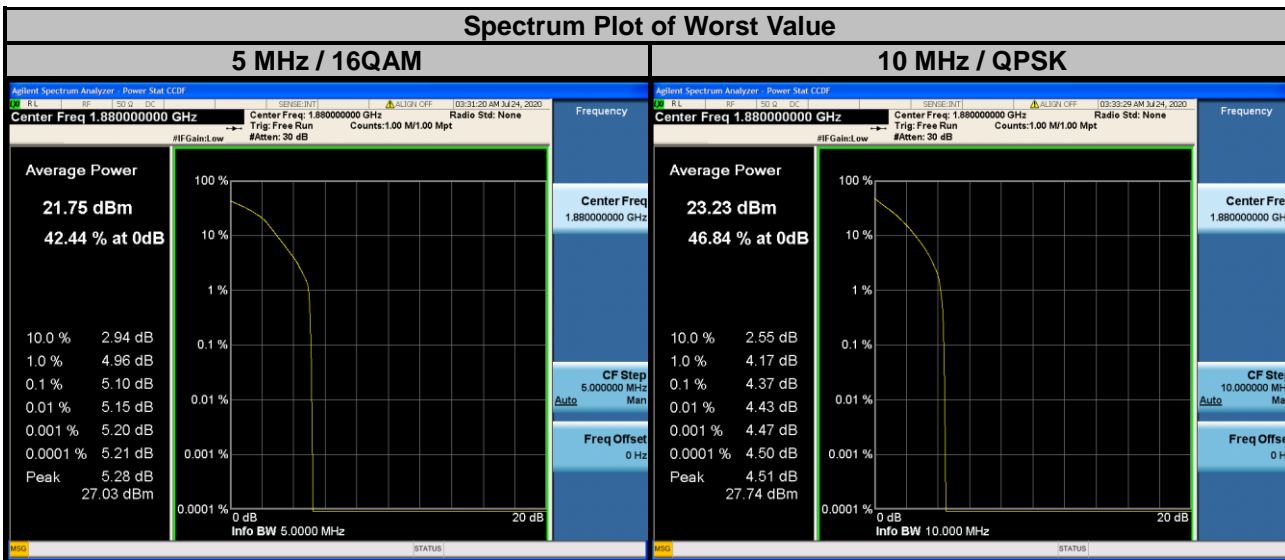
1. Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.6.4 Test Results

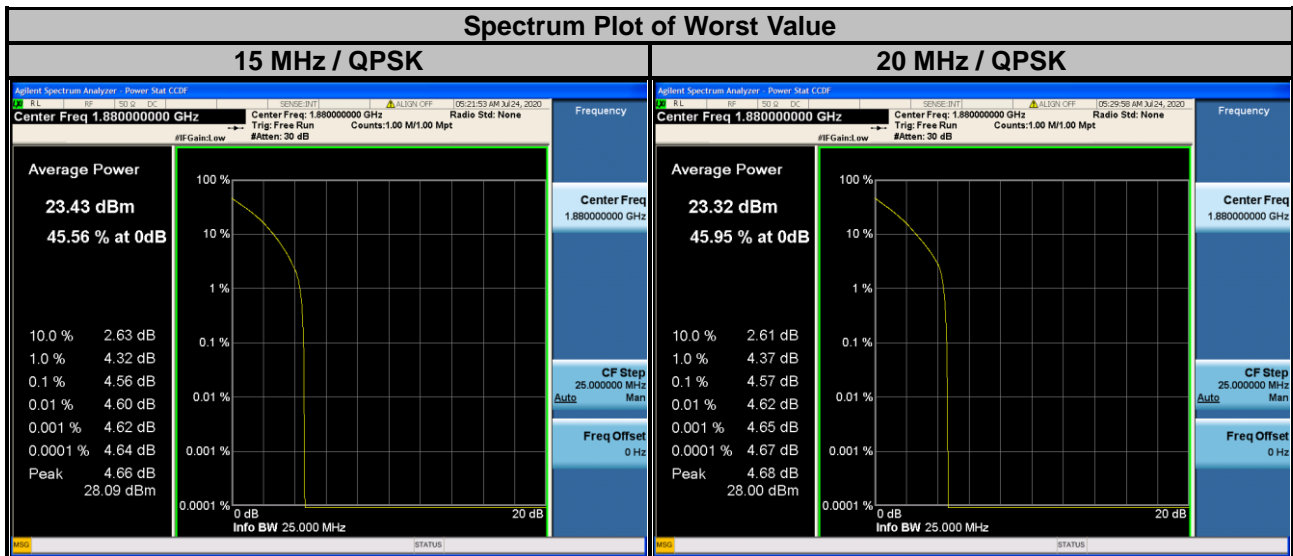
LTE Band 2							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	2.89	3.85	18615	1851.5	3.02	4.03
18900	1880.0	4.23	5.04	18900	1880.0	4.26	5.08
19193	1909.3	3.51	4.52	19185	1908.5	3.92	4.93



LTE Band 2						
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
18625	1852.5	3.03	4.04	18650	1855.0	3.02
18900	1880.0	4.26	5.10	18900	1880.0	4.37
19175	1907.5	4.20	5.22	19150	1905.0	4.12



LTE Band 2					
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			QPSK
18675	1857.5	2.88	18700	1860.0	2.87
18900	1880.0	4.56	18900	1880.0	4.57
19125	1902.5	3.84	19100	1900.0	3.73

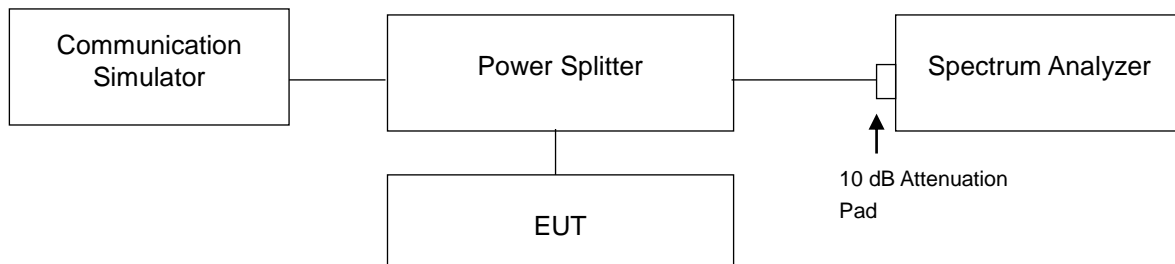


4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13 dBm.

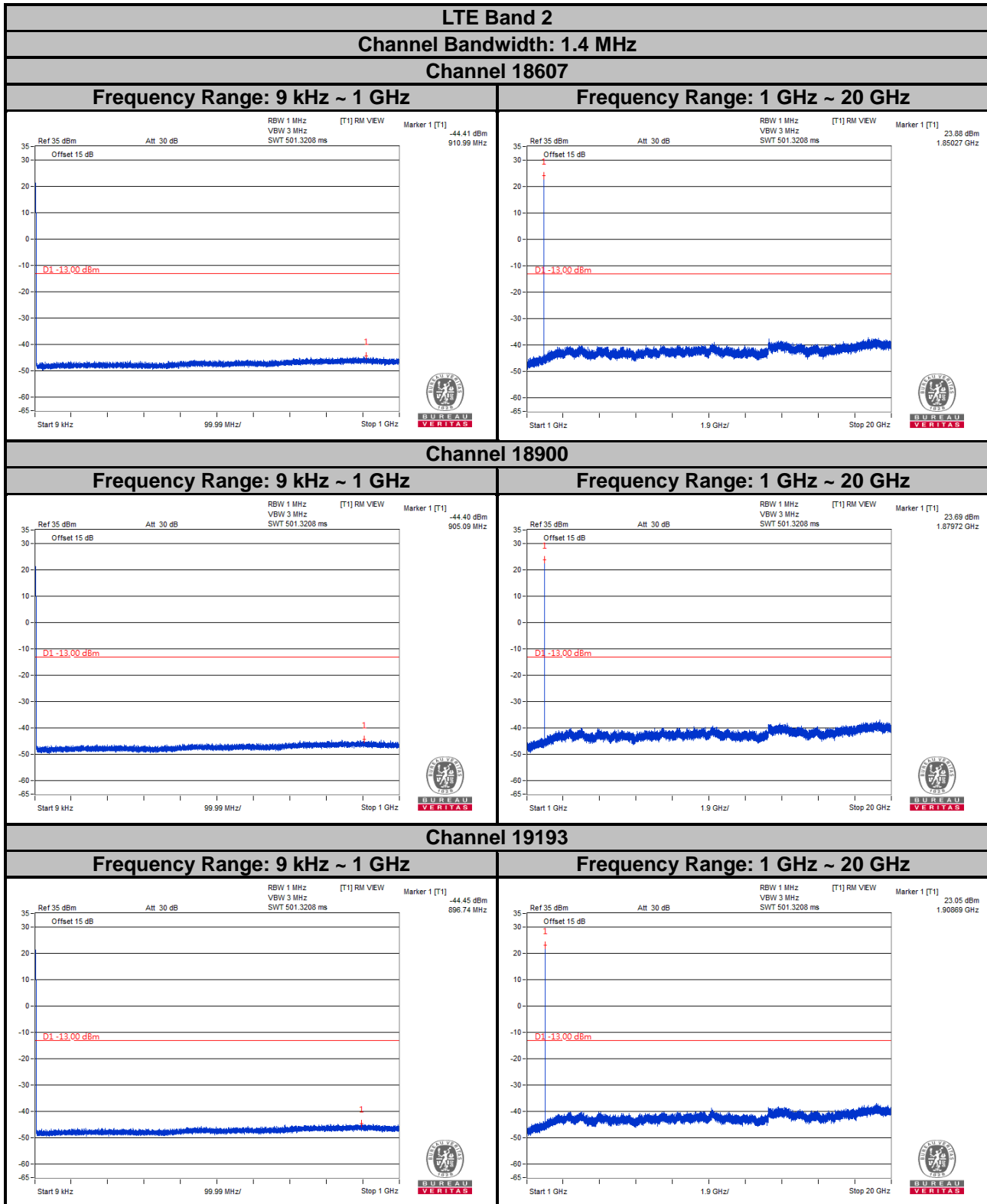
4.7.2 Test Setup



4.7.3 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 1 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.
- Measuring frequency range is from 1 GHz to 20 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.

4.7.4 Test Results



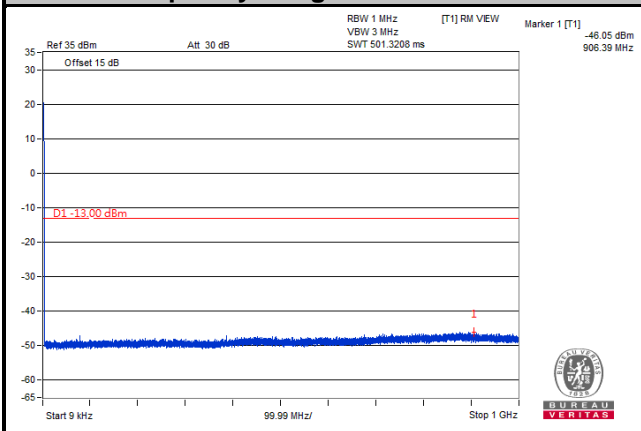
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2

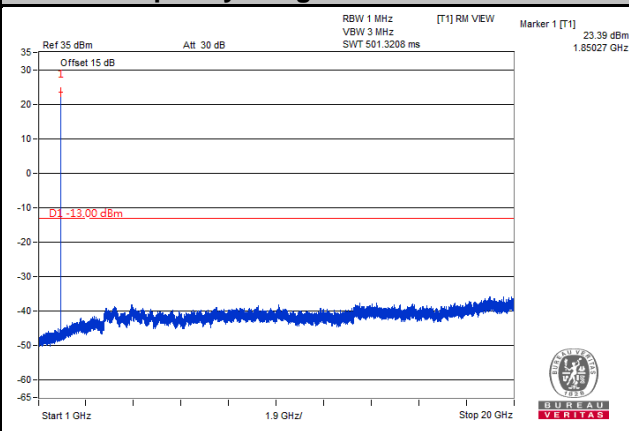
Channel Bandwidth: 3 MHz

Channel 18615

Frequency Range: 9 kHz ~ 1 GHz

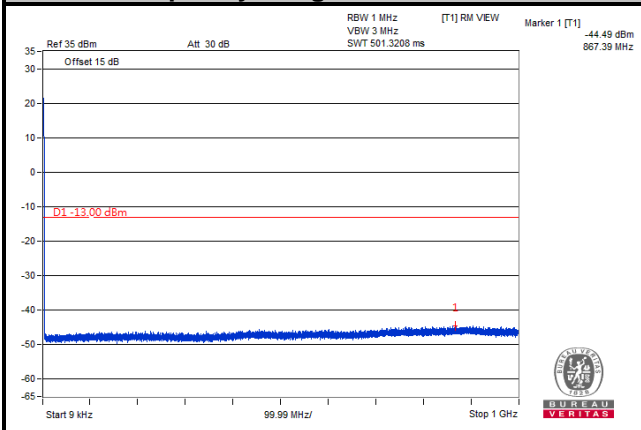


Frequency Range: 1 GHz ~ 20 GHz

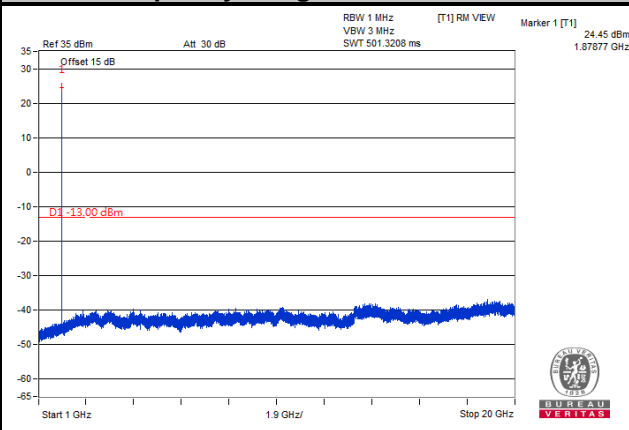


Channel 18900

Frequency Range: 9 kHz ~ 1 GHz

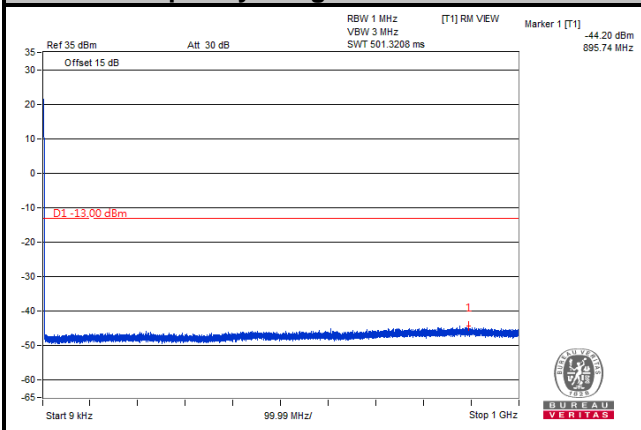


Frequency Range: 1 GHz ~ 20 GHz

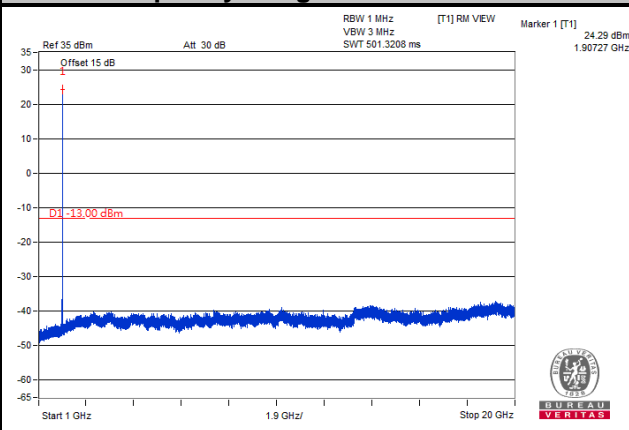


Channel 19185

Frequency Range: 9 kHz ~ 1 GHz

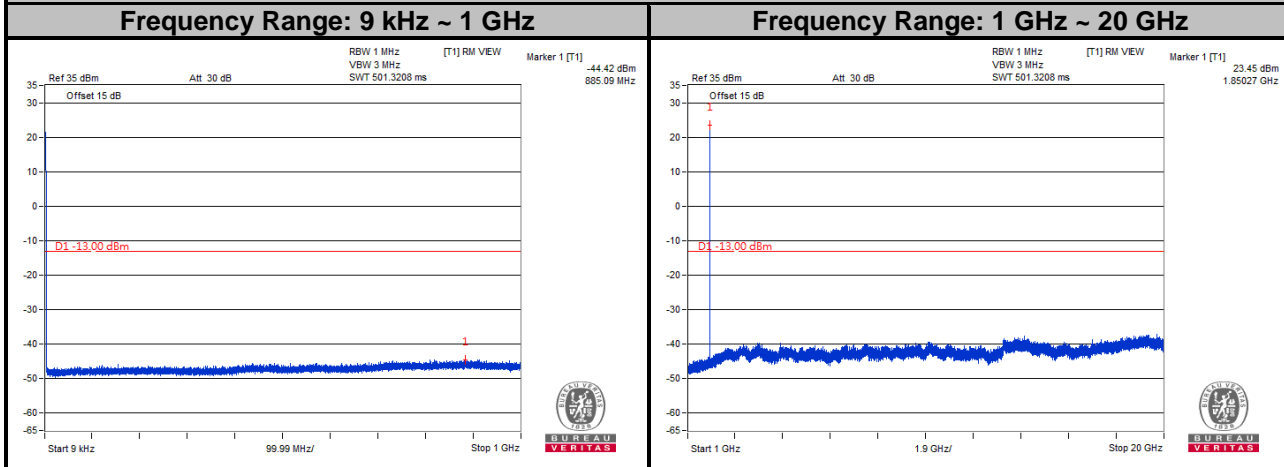


Frequency Range: 1 GHz ~ 20 GHz

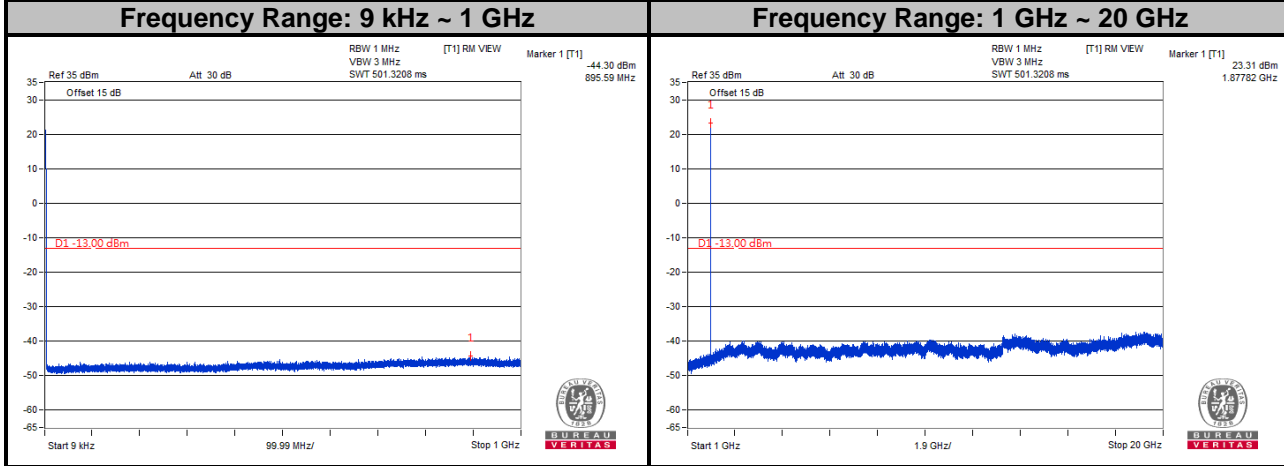


Note: The signal over the limit in 9 kHz is from spectrum analyzer.

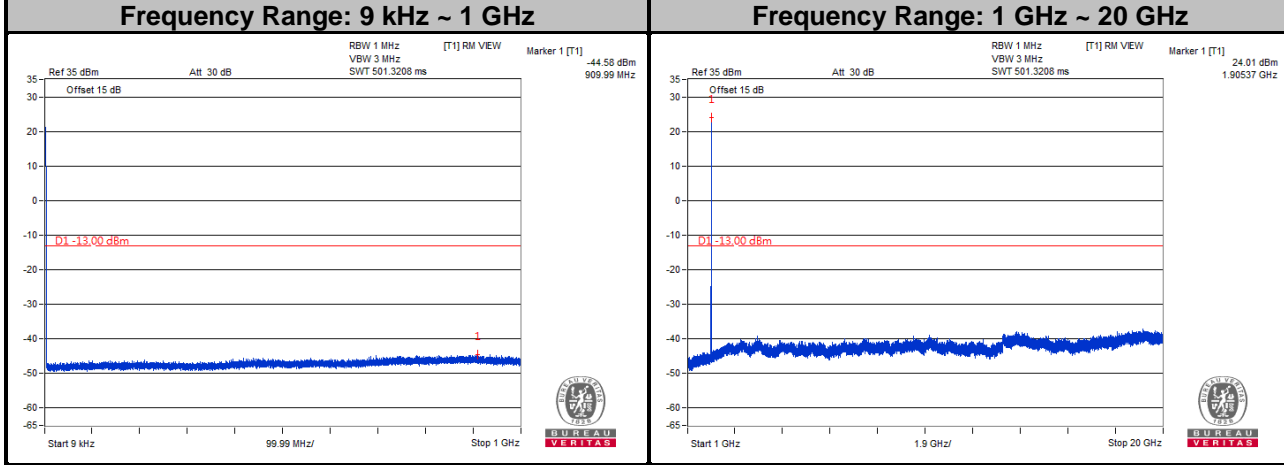
LTE Band 2
Channel Bandwidth: 5 MHz
Channel 18625



Channel 18900

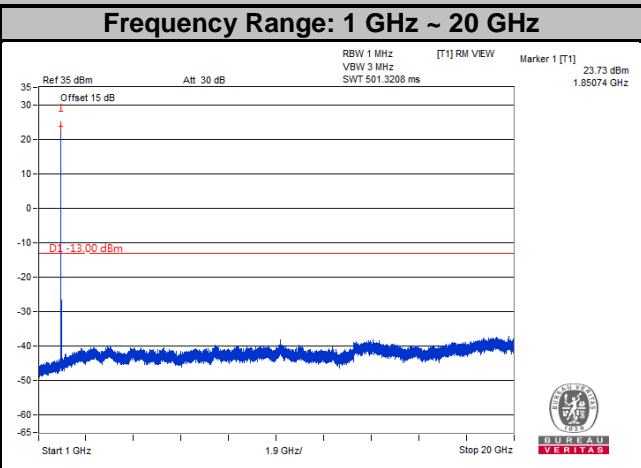
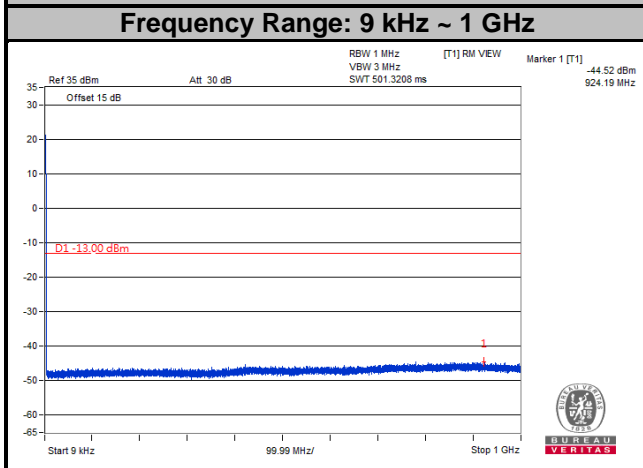


Channel 19175

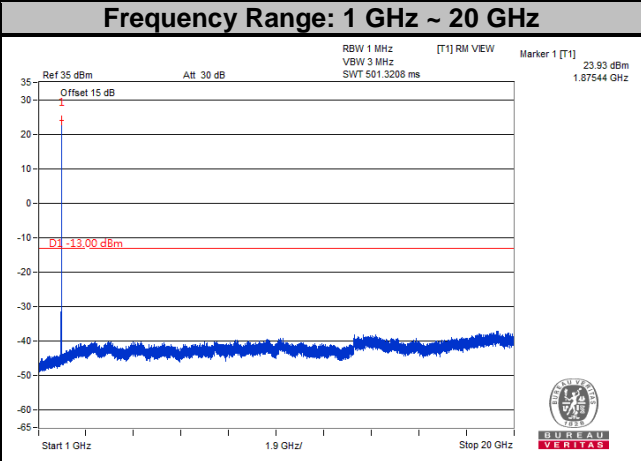
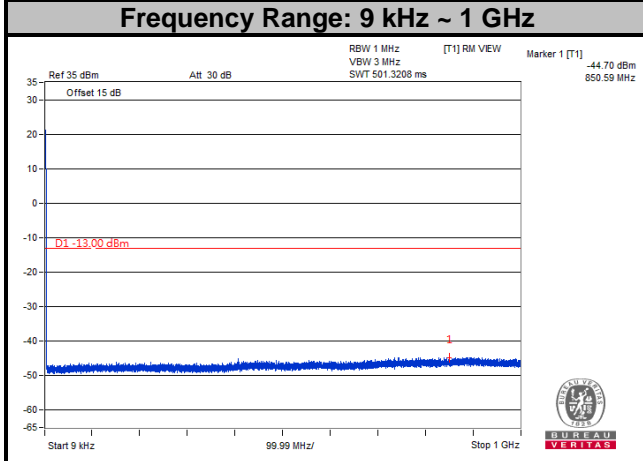


Note: The signal over the limit in 9 kHz is from spectrum analyzer.

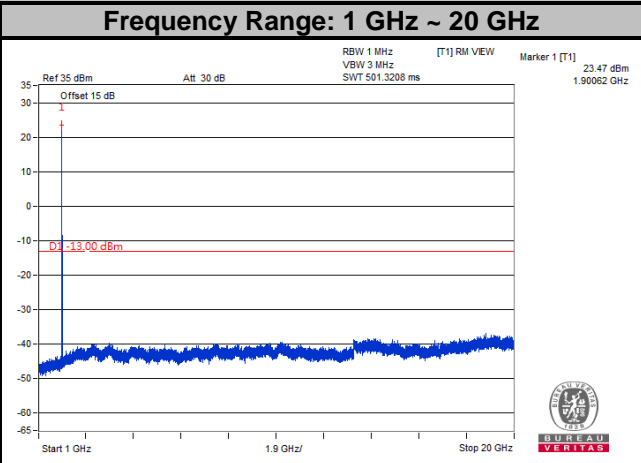
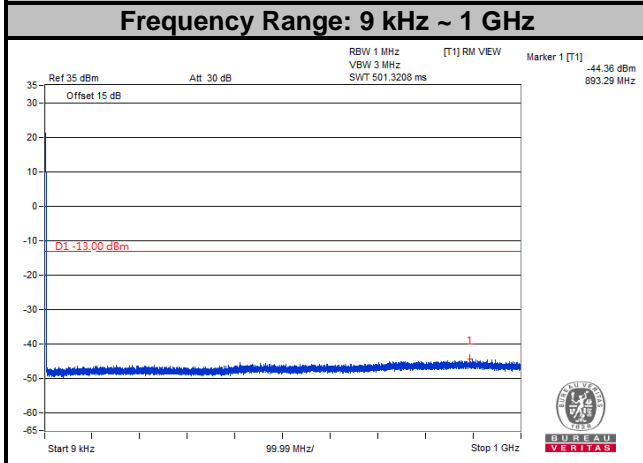
LTE Band 2
Channel Bandwidth: 10 MHz
Channel 18650



Channel 18900

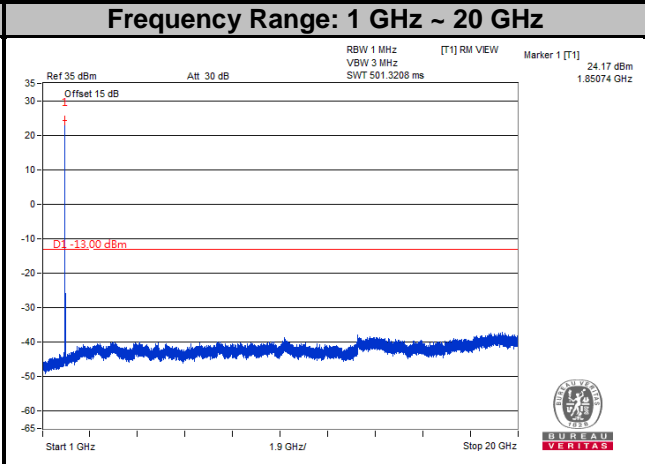
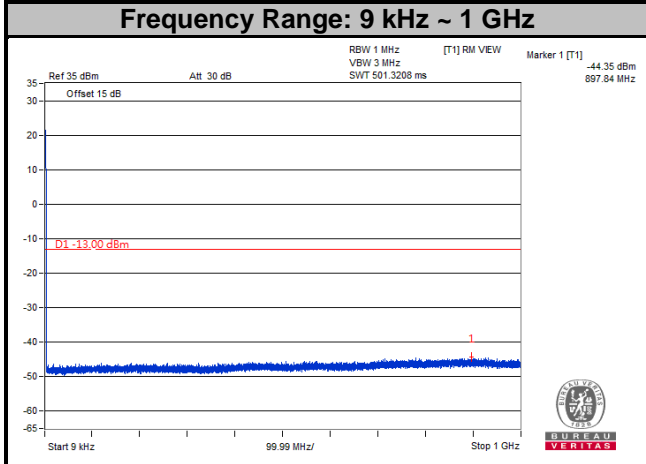


Channel 19150

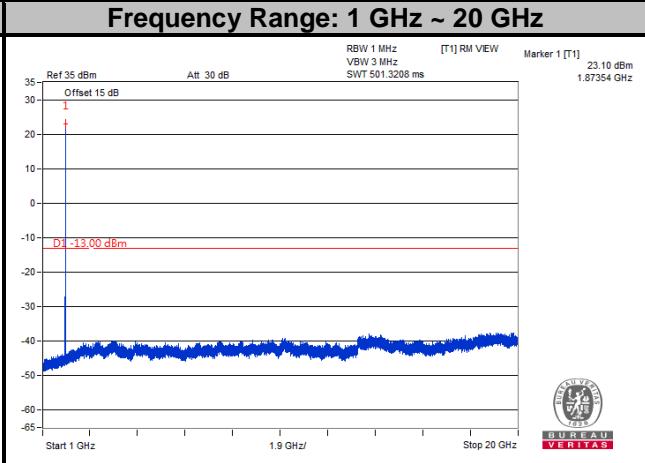
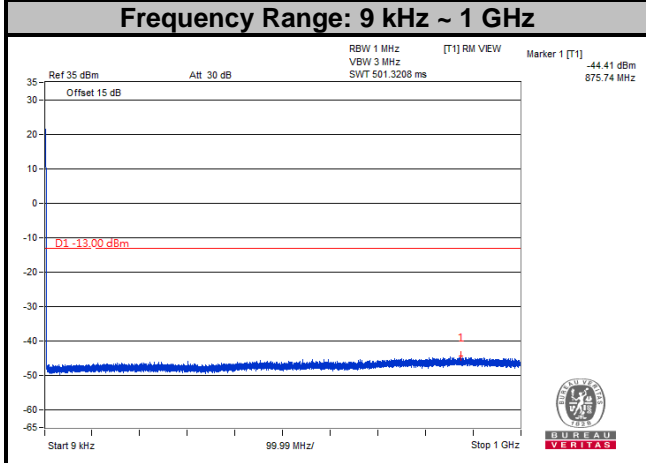


Note: The signal over the limit in 9 kHz is from spectrum analyzer.

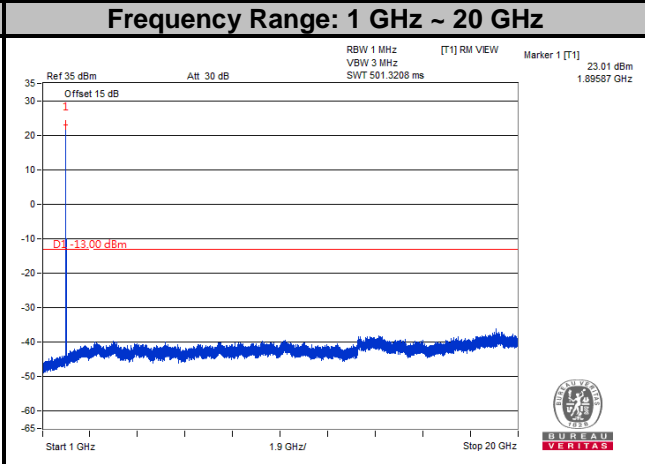
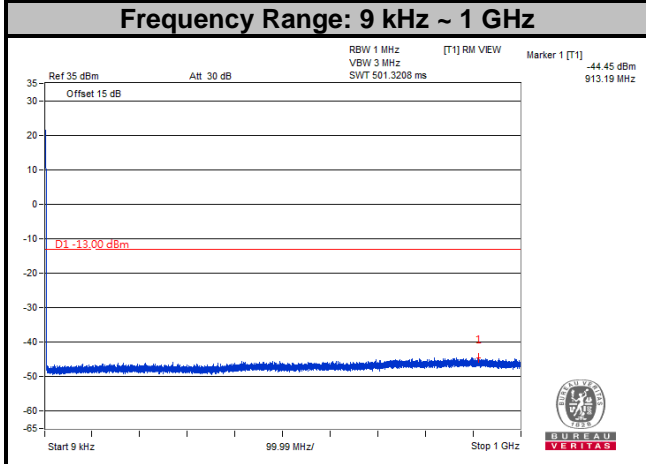
LTE Band 2
Channel Bandwidth: 15 MHz
Channel 18675



Channel 18900

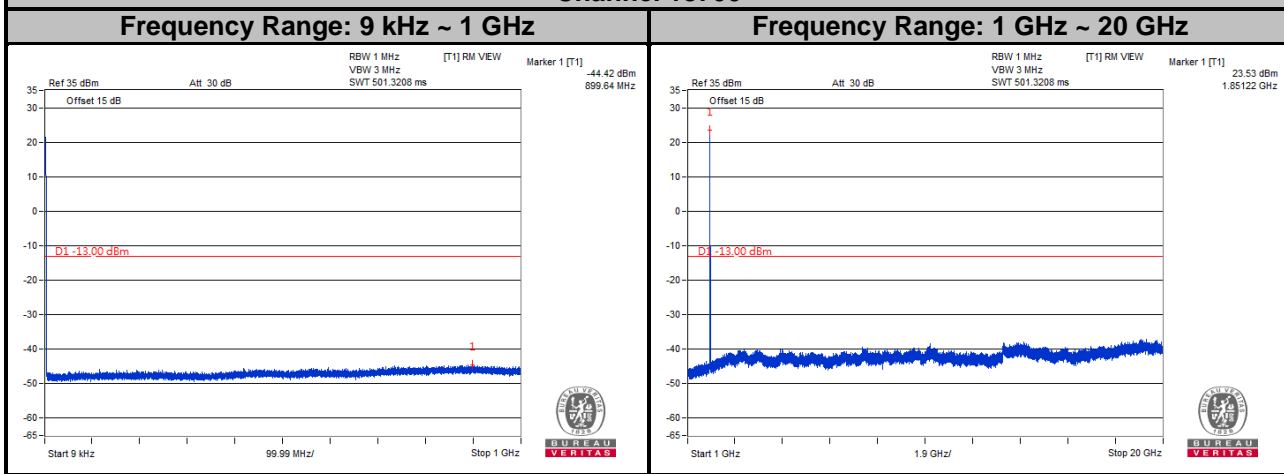


Channel 19125

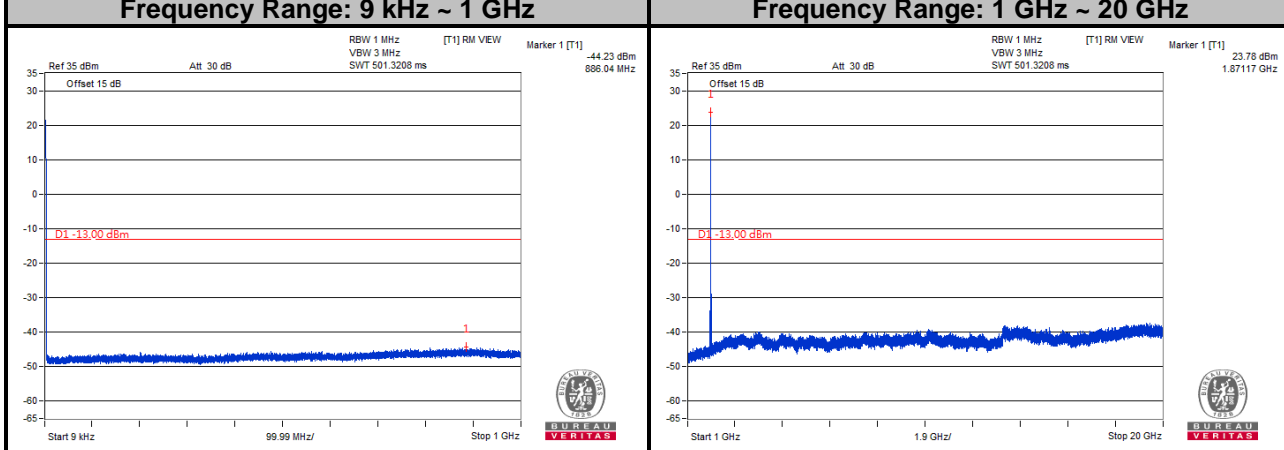


Note: The signal over the limit in 9 kHz is from spectrum analyzer.

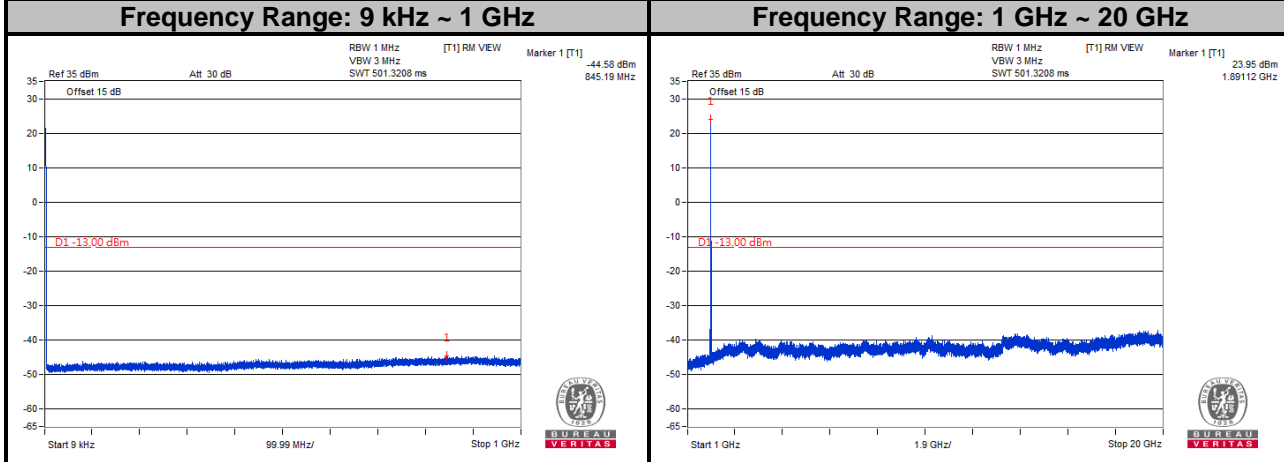
LTE Band 2
Channel Bandwidth: 20 MHz
Channel 18700



Channel 18900



Channel 19100



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

4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit is equal to -13 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.

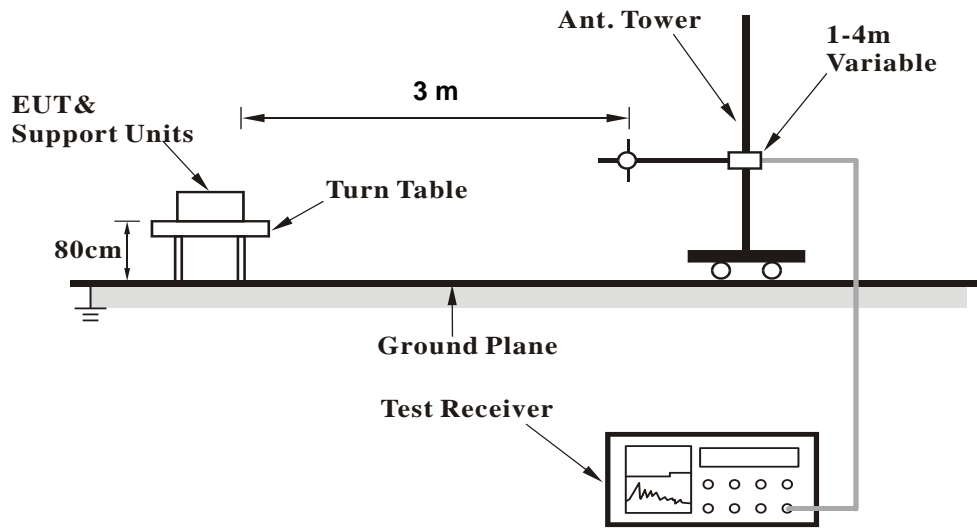
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.8.3 Deviation from Test Standard

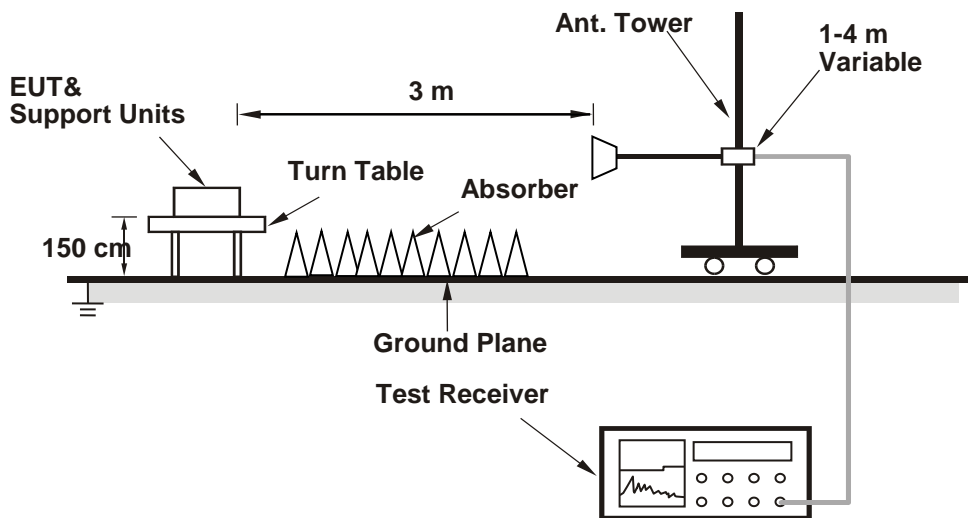
No deviation.

4.8.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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

4.8.5 Test Results

LTE Band 2

Channel Bandwidth: 1.4 MHz / QPSK

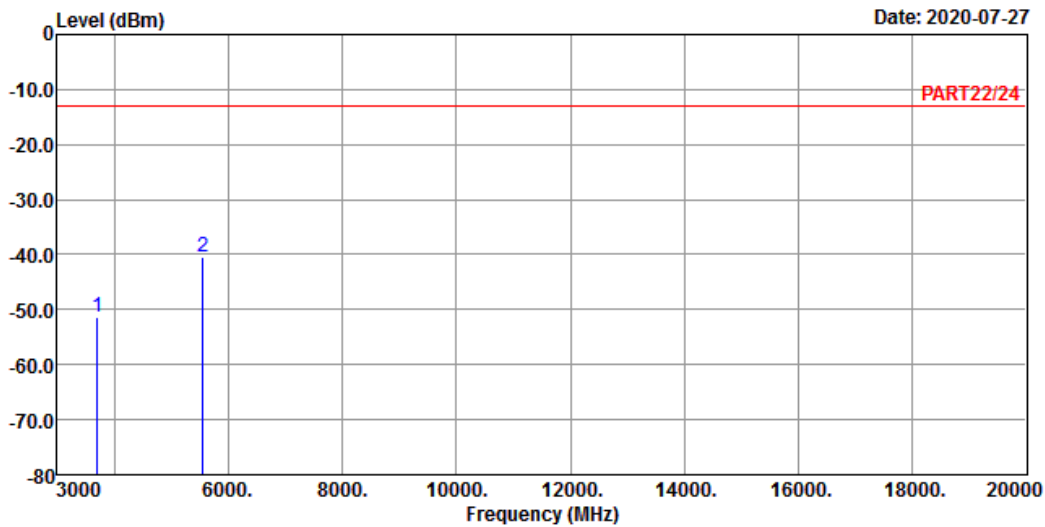
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5
 Condition: PART22/24 HORIZONTAL
 Remak : LTE Band 2 QPSK_1.4M Link_L-CH
 Tested by: Cyril Chen

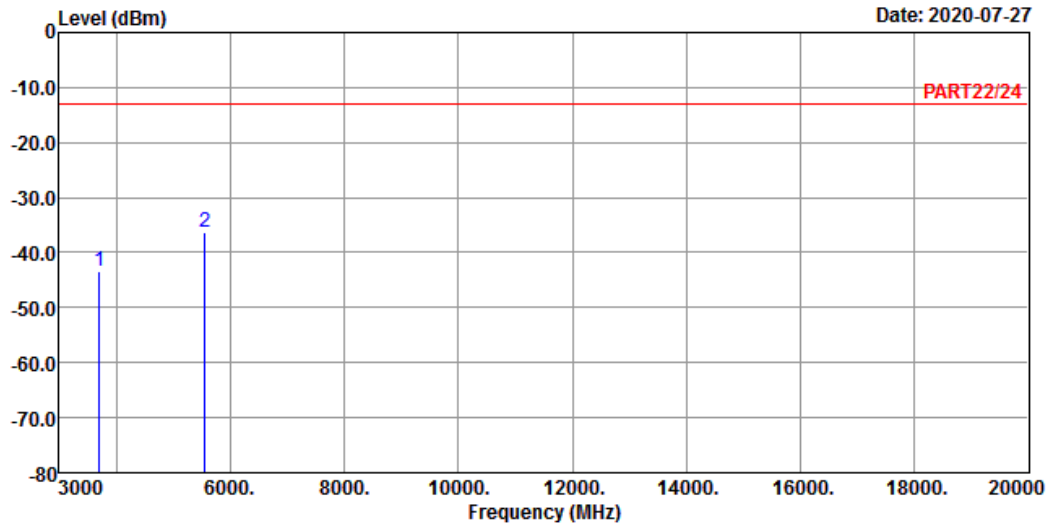
	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3701.40	-51.46	-44.53	-13.00	-6.93	-38.46	Peak
2 pp	5552.10	-40.45	-38.55	-13.00	-1.90	-27.45	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : LTE Band 2 QPSK_1.4M Link_L-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3701.40	-43.53	-36.60	-13.00	-6.93	-30.53	Peak
2	5552.10	-36.32	-34.42	-13.00	-1.90	-23.32	Peak

Middle Channel

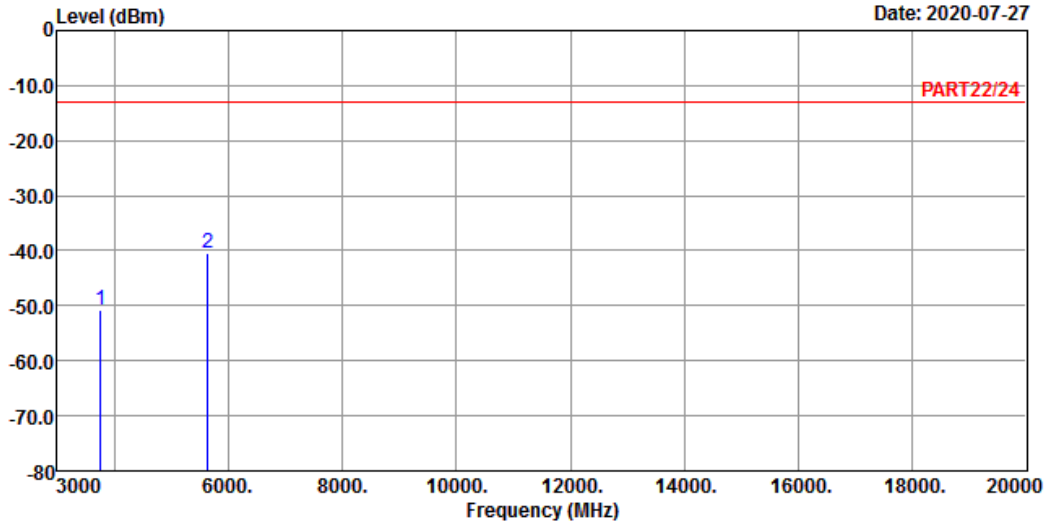


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 HORIZONTAL
 Remak : LTE Band 2 QPSK_1.4M Link_M-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Over Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-50.70	-44.05	-13.00	-6.65	-37.70	Peak
2 pp	5640.00	-40.46	-38.60	-13.00	-1.86	-27.46	Peak

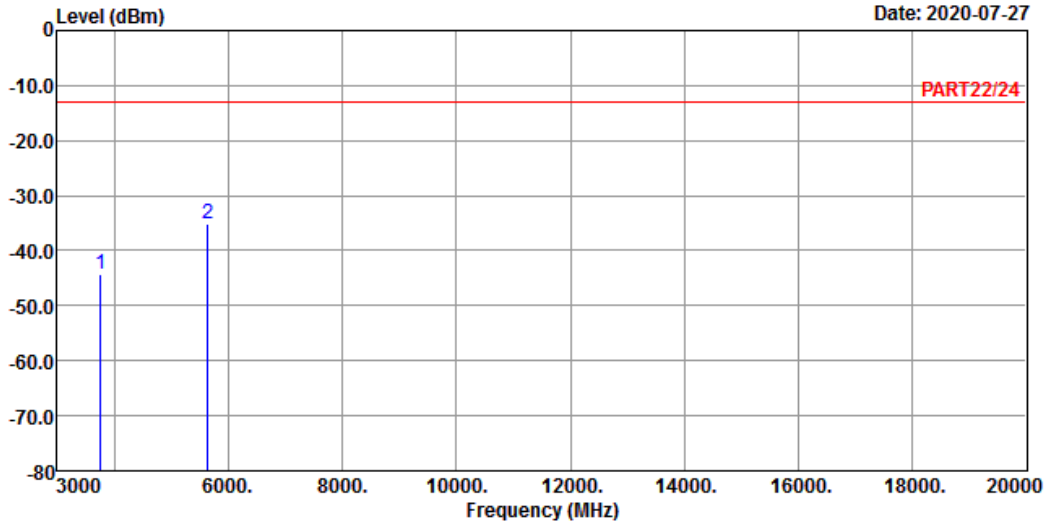


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : LTE Band 2 QPSK_1.4M Link_M-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-44.16	-37.51	-13.00	-6.65	-31.16	Peak
2	5640.00	-35.22	-33.36	-13.00	-1.86	-22.22	Peak

High Channel

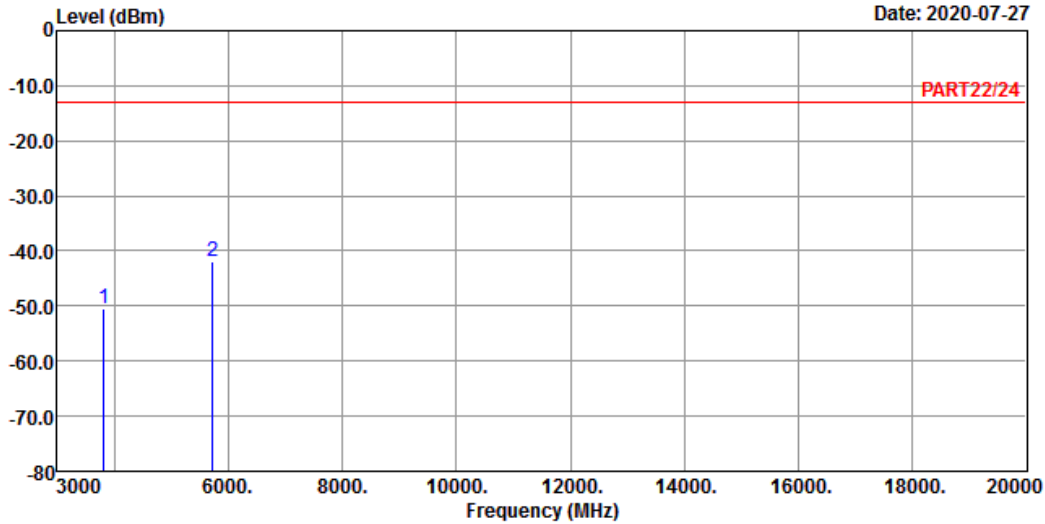


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 HORIZONTAL
 Remak : LTE Band 2 QPSK_1.4M Link_H-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Over Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3818.60	-50.56	-44.16	-13.00	-6.40	-37.56	Peak
2 pp	5727.90	-41.81	-40.16	-13.00	-1.65	-28.81	Peak

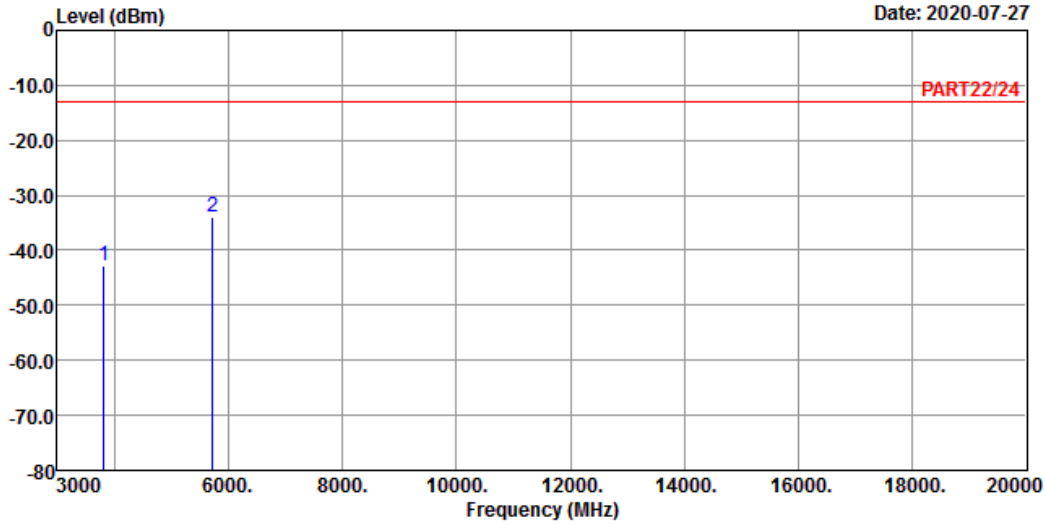


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : LTE Band 2 QPSK_1.4M Link_H-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3818.60	-42.90	-36.50	-13.00	-6.40	-29.90	Peak
2	5727.90	-34.07	-32.42	-13.00	-1.65	-21.07	Peak

Channel Bandwidth: 5 MHz / QPSK
Low Channel

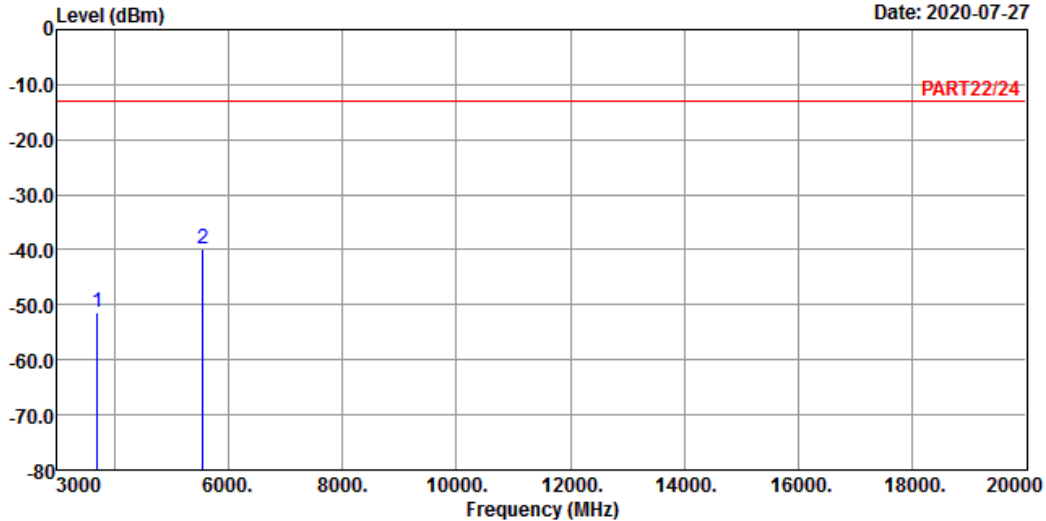


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3

Date: 2020-07-27



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_5M Link_L-CH
Tested by: Cyril Chen

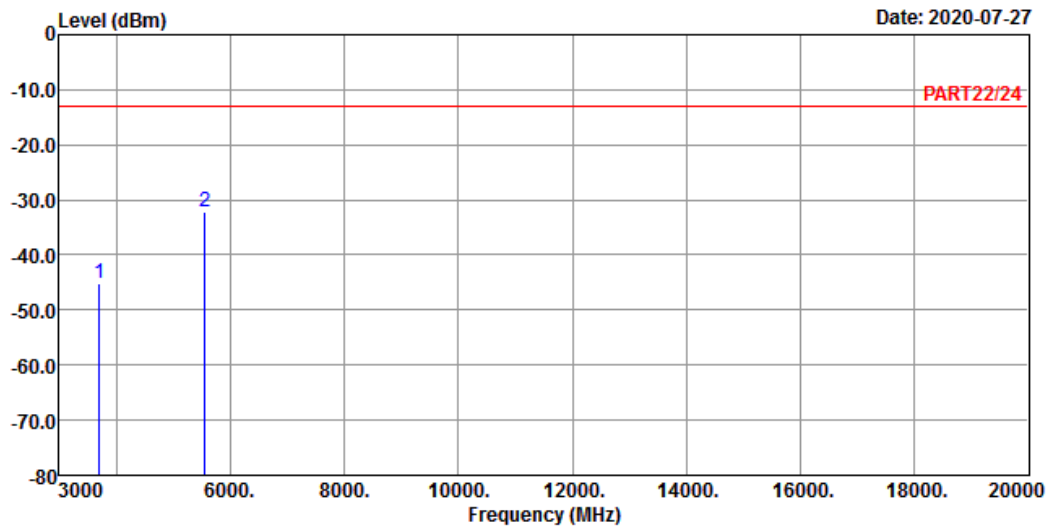
	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3705.00	-51.48	-44.55	-13.00	-6.93	-38.48	Peak
2 pp	5557.50	-39.99	-38.08	-13.00	-1.91	-26.99	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : LTE Band 2 QPSK_5M Link_L-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3705.00	-45.07	-38.14	-13.00	-6.93	-32.07	Peak
2	5557.50	-32.21	-30.30	-13.00	-1.91	-19.21	Peak

Middle Channel

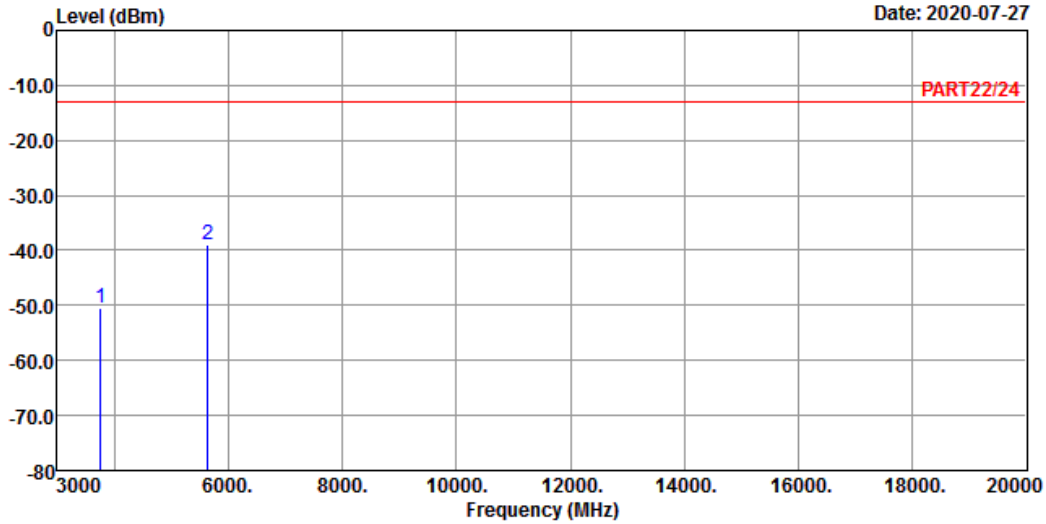


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 HORIZONTAL
 Remak : LTE Band 2 QPSK_5M Link_M-CH
 Tested by: Cyril Chen

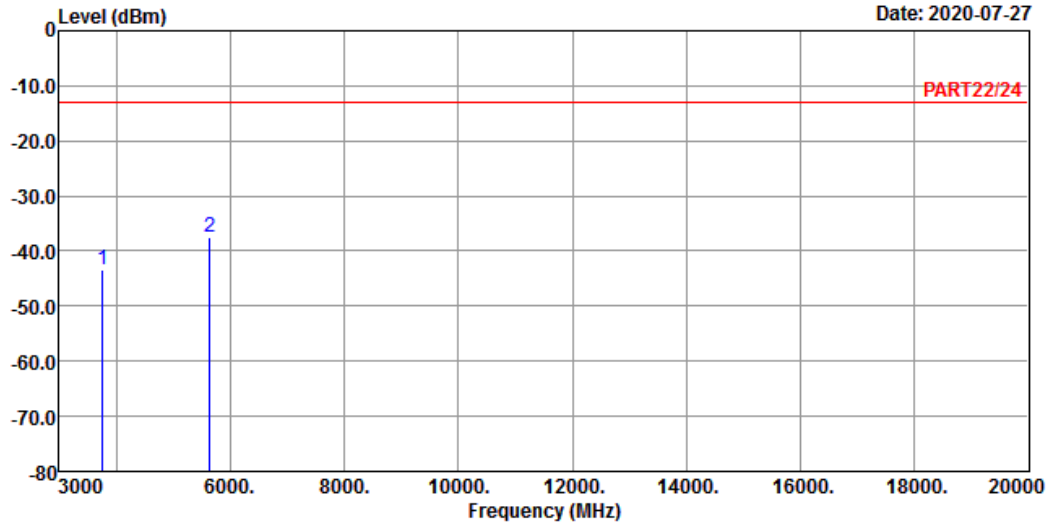
	Freq	Level	Read Level	Limit Line	Over Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-50.55	-43.90	-13.00	-6.65	-37.55	Peak
2 pp	5640.00	-38.93	-37.07	-13.00	-1.86	-25.93	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : LTE Band 2 QPSK_5M Link_M-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-43.39	-36.74	-13.00	-6.65	-30.39	Peak
2	5640.00	-37.56	-35.70	-13.00	-1.86	-24.56	Peak

High Channel

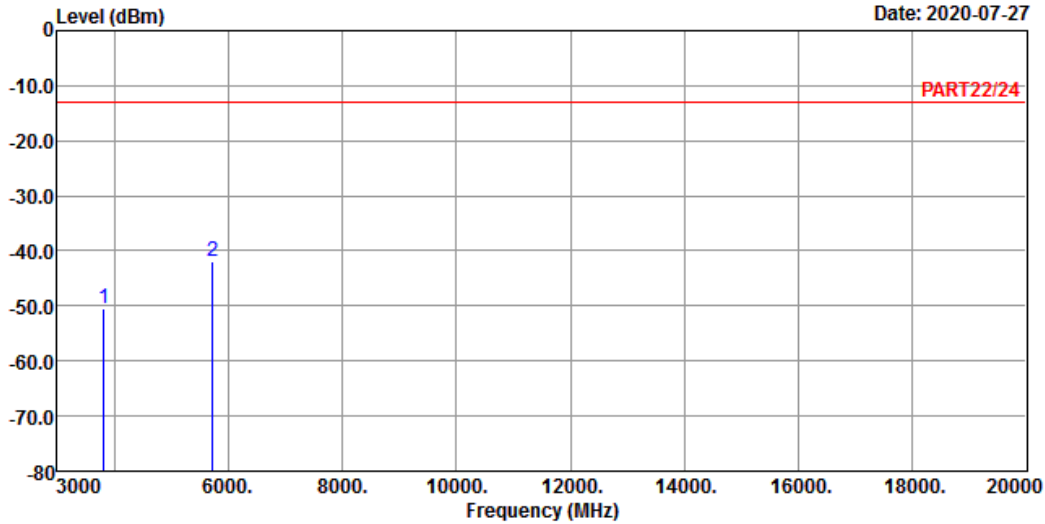


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 HORIZONTAL
 Remak : LTE Band 2 QPSK_5M Link_H-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Over Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3815.00	-50.46	-44.06	-13.00	-6.40	-37.46	Peak
2 pp	5722.50	-42.02	-40.33	-13.00	-1.69	-29.02	Peak

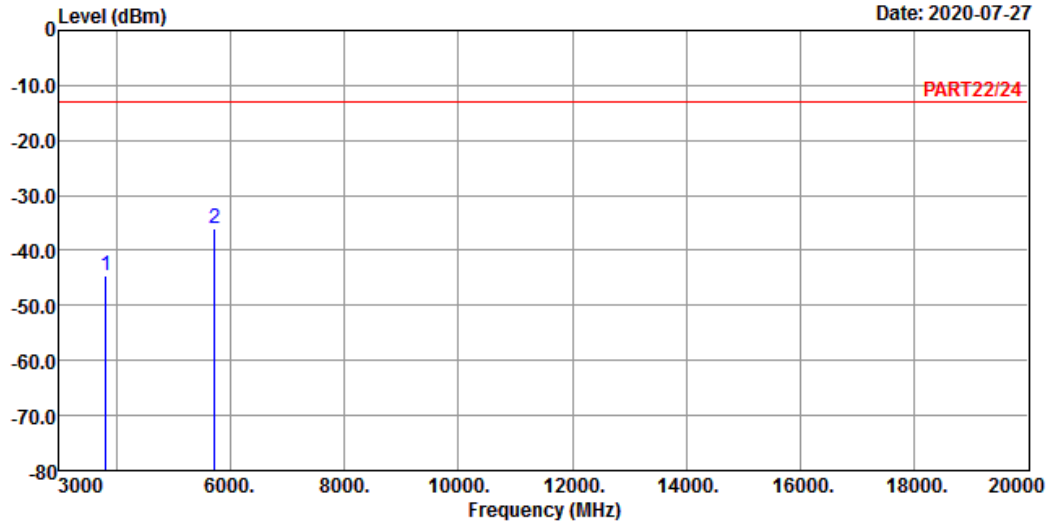


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : LTE Band 2 QPSK_5M Link_H-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3815.00	-44.67	-38.27	-13.00	-6.40	-31.67	Peak
2	5722.50	-36.03	-34.34	-13.00	-1.69	-23.03	Peak

Channel Bandwidth: 20 MHz / QPSK
Low Channel

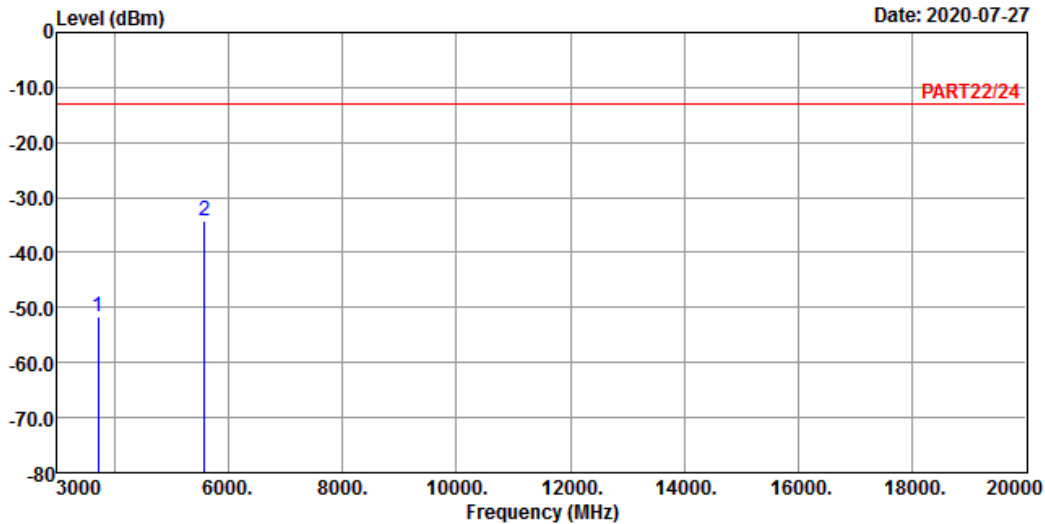


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3

Date: 2020-07-27



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_20M Link_L-CH
Tested by: Cyril Chen

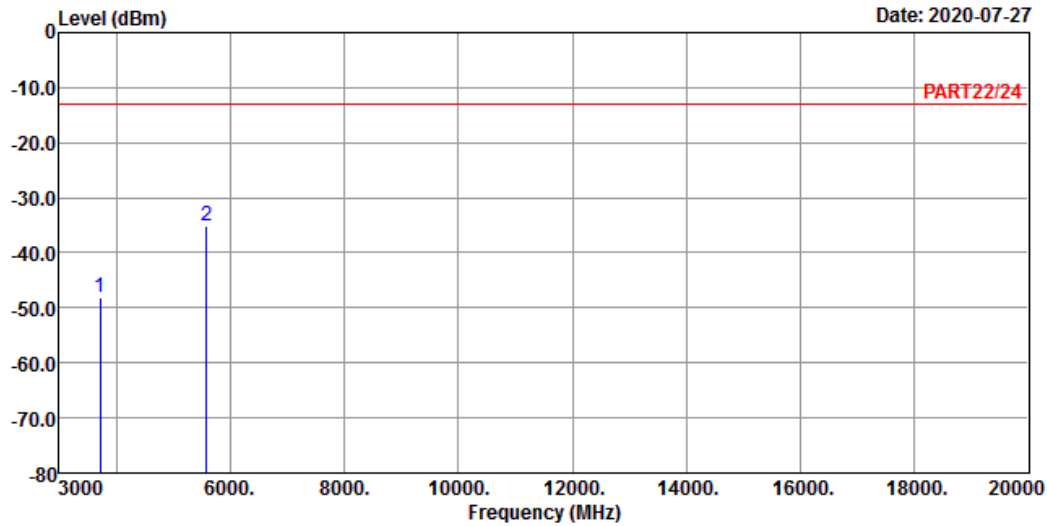
	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3720.00	-51.80	-44.98	-13.00	-6.82	-38.80	Peak
2 pp	5580.00	-34.39	-32.47	-13.00	-1.92	-21.39	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : LTE Band 2 QPSK_20M Link_L-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3720.00	-48.19	-41.37	-13.00	-6.82	-35.19	Peak
2	5580.00	-35.24	-33.32	-13.00	-1.92	-22.24	Peak

Middle Channel

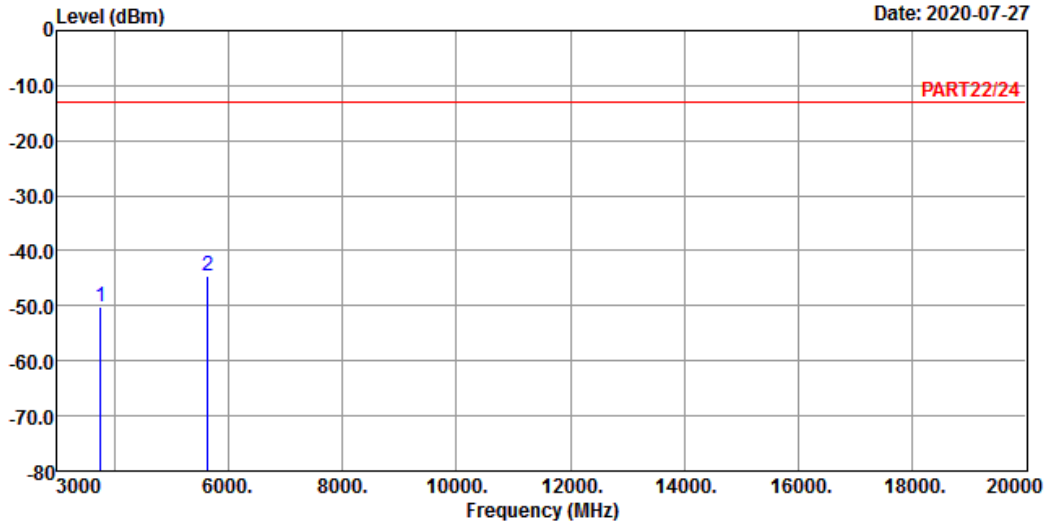


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 HORIZONTAL
 Remak : LTE Band 2 QPSK_20M Link_M-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Over Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-50.28	-43.63	-13.00	-6.65	-37.28	Peak
2 pp	5640.00	-44.56	-42.70	-13.00	-1.86	-31.56	Peak

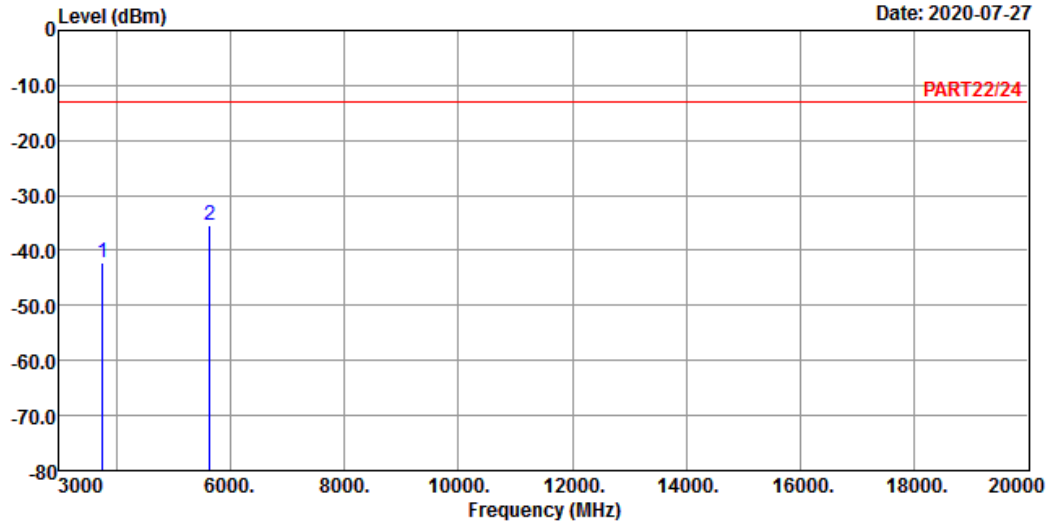


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : LTE Band 2 QPSK_20M Link_M-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-42.11	-35.46	-13.00	-6.65	-29.11	Peak
2	5640.00	-35.52	-33.66	-13.00	-1.86	-22.52	Peak

High Channel

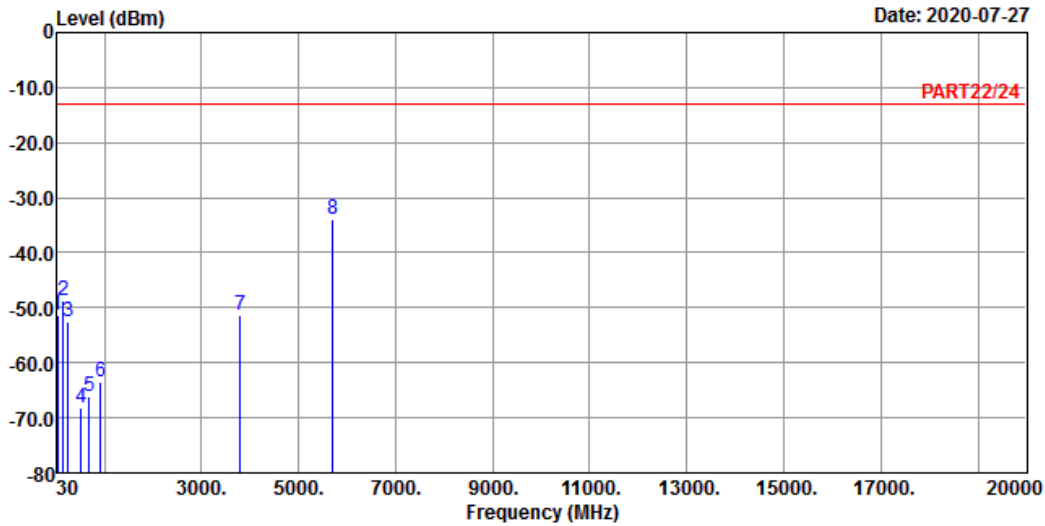


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 HORIZONTAL
 Remak : LTE Band 2 QPSK_20M Link_H-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit Line	Over Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	30.00	-51.28	-51.66	-13.00	0.38	-38.28	QP
2 qp	155.13	-48.71	-42.50	-13.00	-6.21	-35.71	QP
3	258.92	-52.42	-46.25	-13.00	-6.17	-39.42	QP
4	516.94	-68.34	-64.32	-13.00	-4.02	-55.34	QP
5	681.84	-66.14	-65.75	-13.00	-0.39	-53.14	QP
6	925.31	-63.47	-64.67	-13.00	1.20	-50.47	QP
7	3800.00	-51.26	-44.83	-13.00	-6.43	-38.26	Peak
8 pp	5700.00	-33.84	-32.11	-13.00	-1.73	-20.84	Peak

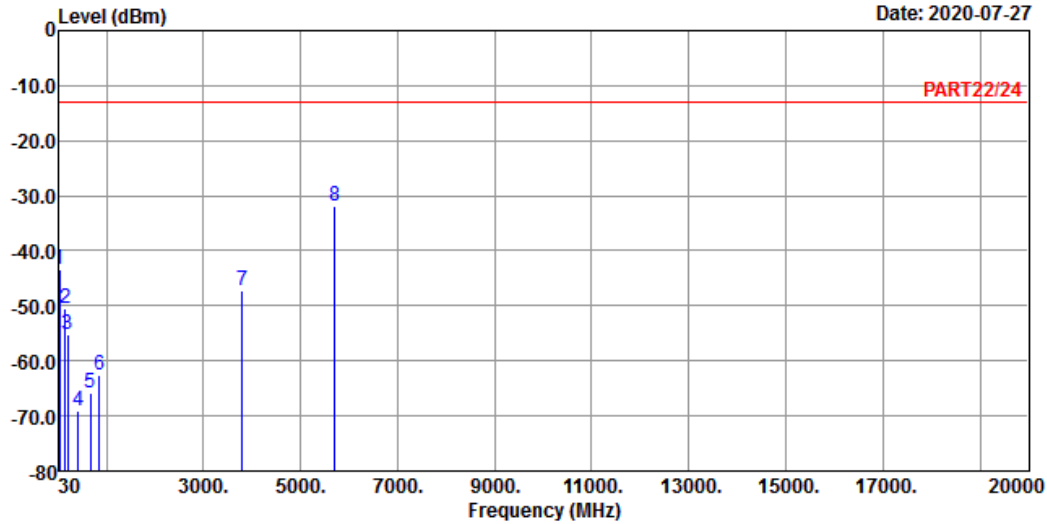


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2020-07-27



Site : 966 Chamber 5
 Condition: PART22/24 VERTICAL
 Remak : LTE Band 2 QPSK_20M Link_H-CH
 Tested by: Cyril Chen

	Freq	Level	Read Level	Limit	Line	Factor	Over	Limit	Remark
	MHz	dBm	dBm	dBm		dB	dB		
1	qp	30.00	-43.36	-43.74	-13.00	0.38	-30.36	QP	
2		156.10	-50.61	-44.67	-13.00	-5.94	-37.61	QP	
3		199.75	-55.14	-47.12	-13.00	-8.02	-42.14	QP	
4		425.76	-69.00	-63.26	-13.00	-5.74	-56.00	QP	
5		665.35	-65.90	-65.26	-13.00	-0.64	-52.90	QP	
6		857.41	-62.71	-63.04	-13.00	0.33	-49.71	QP	
7		3800.00	-47.16	-40.73	-13.00	-6.43	-34.16	Peak	
8	pp	5700.00	-31.74	-30.01	-13.00	-1.73	-18.74	Peak	

5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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

Lin Kou 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 Lab

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 ---