

FCC Test Report

(PART 24)

Report No.: RF181008C16-1

FCC ID: NKRUMC-9628FHN

Test Model: UMC-9628FHN

Received Date: Oct. 08, 2018

Test Date: Oct. 24, 2018 ~ Oct. 27, 2018

Issued Date: Nov. 14, 2018

Applicant: Wistron NeWeb Corporation

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

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(R.O.C)

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

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



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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	13
3.5 General Description of Applied Standards	13
4 Test Types and Results	14
4.1 Output Power Measurement	14
4.1.1 Limits of Output Power Measurement	14
4.1.2 Test Procedures	14
4.1.3 Test Setup	15
4.1.4 Test Results	16
4.2 Modulation Characteristics Measurement	25
4.2.1 Limits of Modulation Characteristics	25
4.2.2 Test Setup	25
4.2.3 Test Procedure	25
4.2.4 Test Results	26
4.3 Frequency Stability Measurement	28
4.3.1 Limits of Frequency Stability Measurement	28
4.3.2 Test Procedure	28
4.3.3 Test Setup	28
4.3.4 Test Results	29
4.4 Occupied Bandwidth Measurement	38
4.4.1 Test Procedure	38
4.4.2 Test Setup	38
4.4.3 Test Result	39
4.5 Band Edge Measurement	43
4.5.1 Limits of Band Edge Measurement	43
4.5.2 Test Setup	43
4.5.3 Test Procedures	43
4.5.4 Test Results	44
4.6 Peak to Average Ratio	51
4.6.1 Limits of Peak to Average Ratio Measurement	51
4.6.2 Test Setup	51
4.6.3 Test Procedures	51
4.6.4 Test Results	52
4.7 Conducted Spurious Emissions	56
4.7.1 Limits of Conducted Spurious Emissions Measurement	56
4.7.2 Test Setup	56
4.7.3 Test Procedure	56
4.7.4 Test Results	57
4.8 Radiated Emission Measurement	84
4.8.1 Limits of Radiated Emission Measurement	84
4.8.2 Test Procedure	84
4.8.3 Deviation from Test Standard	84
4.8.4 Test Setup	85
4.8.5 Test Results	86

5 Pictures of Test Arrangements.....	122
Appendix – Information on the Testing Laboratories	123

Release Control Record

Issue No.	Description	Date Issued
RF181008C16-1	Original Release	Nov. 14, 2018

1 Certificate of Conformity

Product: LTE Module

Brand: Wistron NeWeb Corp.

Test Model: UMC-9628FHN

Sample Status: Identical Prototype

Applicant: Wistron NeWeb Corporation

Test Date: Oct. 24, 2018 ~ Oct. 27, 2018

Standards: FCC Part 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 : Gina Liu, **Date:** Nov. 14, 2018
Gina Liu / Specialist

Approved by : Dylan Chiou, **Date:** Nov. 14, 2018
Dylan Chiou / 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.
2.1046 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 24.238(b)	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238(b)	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 -9.54 dB at 5550.60 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	Expanded Uncertainty (k=2) ($\pm$)
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 12, 2017	Dec. 11, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	148	Dec. 13, 2017	Dec. 12, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 06, 2017	Dec. 05, 2018
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 16, 2018	Apr. 15, 2019
MXG Vector signal generator Agilent	N5182B	MY53050162	Jan. 10, 2018	Jan. 09, 2019
Preamplifier EMCI	EMC 184045	980116	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 012645	980115	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 330H	980112	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-800 0&3000	140811+170717	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1 000(140807)	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 12, 2018	Oct. 11, 2019
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Communications Tester-Wireless Agilent	8960 Series 10	MY53201073	Jun. 28, 2017	Jun. 27, 2019
Radio Communication Analyzer Anritsu	MT8820C	6201300640	Aug. 16, 2017	Aug. 15, 2019
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 05, 2018	Sep. 04, 2019
DC Power Supply Topward	33010D	807748	N/A	N/A

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

3 General Information

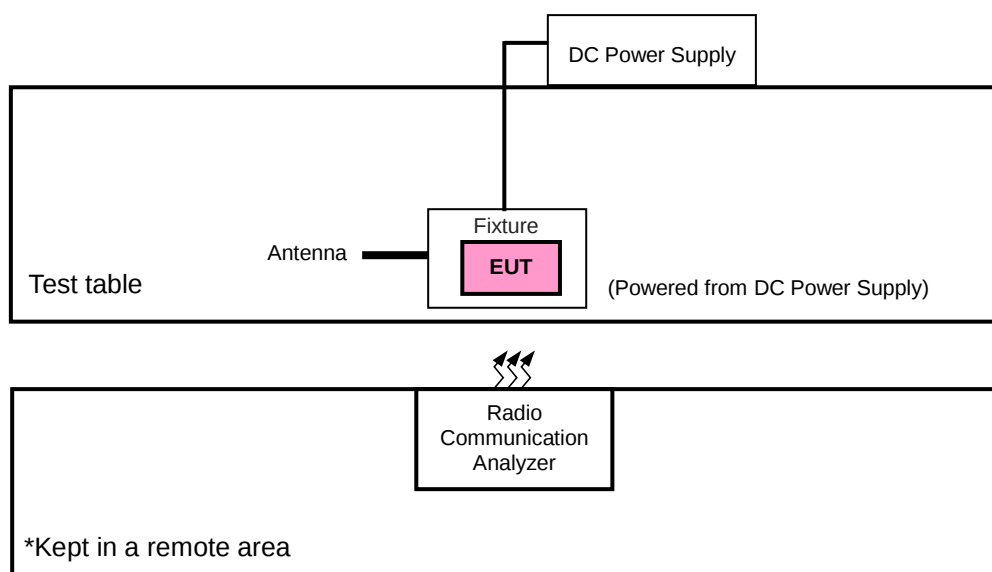
3.1 General Description of EUT

Product	LTE Module	
Brand	Wistron NeWeb Corp.	
Test Model	UMC-9628FHN	
Status of EUT	Identical Prototype	
Power Supply Rating	3.8 Vdc (DC Power Supply)	
Modulation Type	GSM/GPRS	GMSK
	EDGE	GMSK, 8PSK
	WCDMA	QPSK
	LTE	QPSK, 16QAM, 64QAM
Frequency Range	GSM/GPRS/EDGE	1850.2 ~ 1909.8 MHz
	WCDMA	1852.4 ~ 1907.6 MHz
	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	GSM/GPRS	1883.65 mW
	EDGE	737.90 mW
	WCDMA	454.99 mW
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	283.14 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	299.23 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	317.69 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	337.29 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	355.63 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	375.84 mW
Emission Designator	GSM/GPRS	247KGXW
	EDGE	246KG7W
	WCDMA	4M14F9W
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09W7D
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M70W7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M49W7D
	LTE Band 2 (Channel Bandwidth: 10 MHz)	8M95G7D
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M4G7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	17M9W7D
Antenna Type	Fixed External Antenna with 3.3 dBi gain	
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

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

3.2 Configuration of System under Test



3.2.1 Description of Support Units

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

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

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

Note:

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

3.3 Test Mode Applicability and Tested Channel Detail

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

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

Band	EIRP	Radiated Emission
GSM	Z-plane	X-axis
EDGE	Z-plane	X-axis
WCDMA	Z-plane	X-axis
LTE Band 2	X-plane	Z-axis

GSM

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	512 to 810	512, 661, 810	GSM, EDGE
-	Modulation Characteristics	512 to 810	512	GSM, EDGE
-	Frequency Stability	512 to 810	512, 810	GSM, EDGE
-	Occupied Bandwidth	512 to 810	512, 661, 810	GSM, EDGE
-	Band Edge	512 to 810	512, 810	GSM, EDGE
-	Peak to Average Ratio	512 to 810	512, 661, 810	GSM, EDGE
-	Conducted Emission	512 to 810	512, 661, 810	GSM, EDGE
-	Radiated Emission	512 to 810	512, 661, 810	GSM, EDGE

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
-	Modulation Characteristics	9262 to 9538	9262	WCDMA
-	Frequency Stability	9262 to 9538	9262, 9538	WCDMA
-	Occupied Bandwidth	9262 to 9538	9262, 9400, 9538	WCDMA
-	Band Edge	9262 to 9538	9262, 9538	WCDMA
-	Peak to Average Ratio	9262 to 9538	9262, 9400, 9538	WCDMA
-	Conducted Emission	9262 to 9538	9262, 9400, 9538	WCDMA
-	Radiated Emission	9262 to 9538	9262, 9400, 9538	WCDMA

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, 64QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	18700 to 19100	18900	5 MHz	QPSK, 16QAM, 64QAM	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, 64QAM	6 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM, 64QAM	15 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM, 64QAM	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.

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
			19193	1.4 MHz	QPSK	6 RB / 0 RB Offset
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 5 RB Offset
			19185	3 MHz	QPSK	6 RB / 0 RB Offset
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset
			19175	5 MHz	QPSK	15 RB / 0 RB Offset
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 14 RB Offset
			19150	10 MHz	QPSK	15 RB / 0 RB Offset
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset
			19125	15 MHz	QPSK	25 RB / 0 RB Offset
		18700 to 19100	18700	20 MHz	QPSK	1 RB / 24 RB Offset
			19100	20 MHz	QPSK	25 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	6 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 5 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	6 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	1 RB / 14 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	15 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	6 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	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	26 deg. C, 58 % RH	3.8 Vdc	Thomas Wei
Modulation Characteristics	26 deg. C, 58 % RH	3.8 Vdc	Frank Chiu
Frequency Stability	26 deg. C, 58 % RH	3.8 Vdc	Frank Chiu
Occupied Bandwidth	26 deg. C, 58 % RH	3.8 Vdc	Frank Chiu
Band Edge	26 deg. C, 58 % RH	3.8 Vdc	Frank Chiu
Peak to Average Ratio	26 deg. C, 58 % RH	3.8 Vdc	Frank Chiu
Conducted Emission	26 deg. C, 58 % RH	3.8 Vdc	Frank Chiu
Radiated Emission	25 deg. C, 65 % RH	3.8 Vdc	Thomas Wei

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards

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

FCC 47 CFR Part 2

FCC 47 CFR Part 24

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

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 GSM, GPRS & EDGE, 5 MHz for WCDMA, and 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. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$.

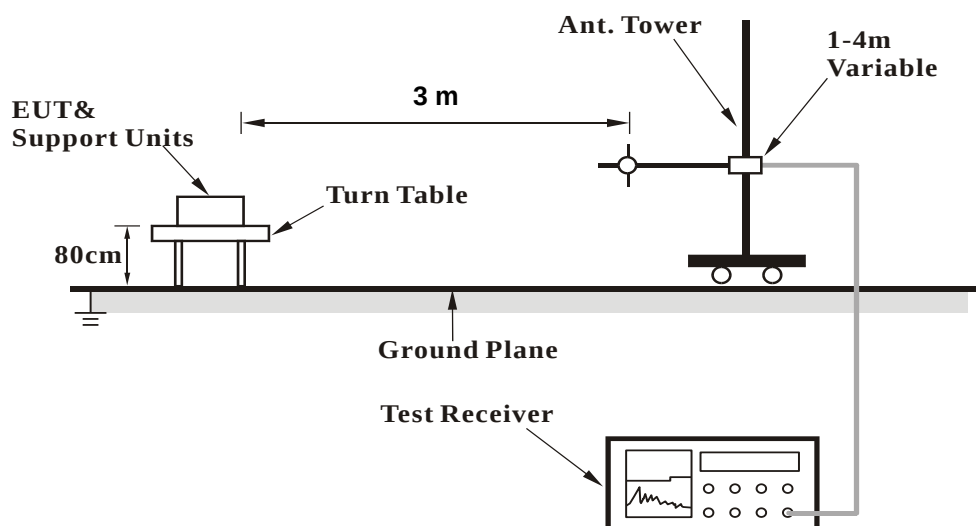
Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, and 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.

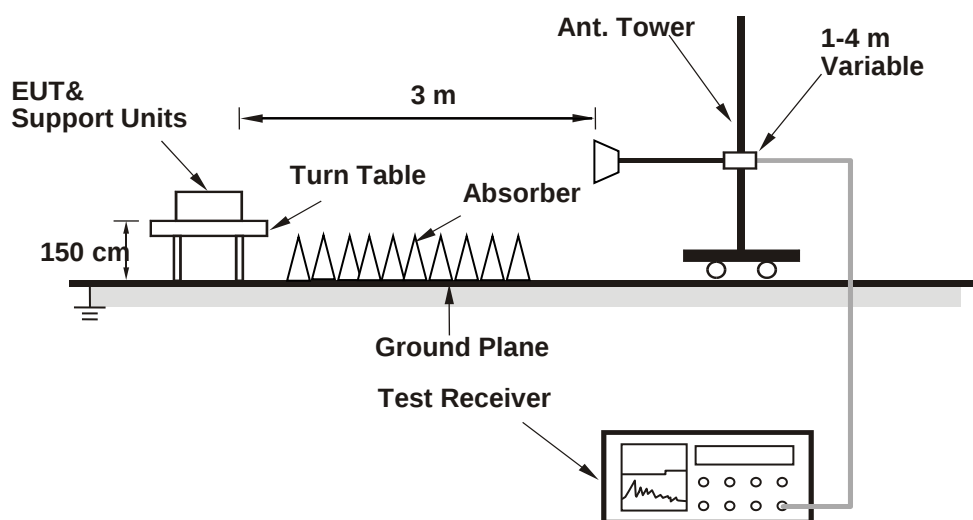
4.1.3 Test Setup

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

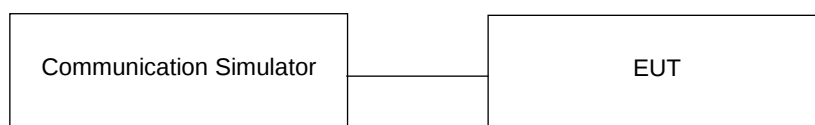


<Radiated Emission above 1 GHz>



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)

Band	GSM1900		
Channel	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8
GPRS (GMSK, 1Tx-slot)	30.45	30.36	30.75
EDGE (8PSK, 1Tx-slot)	25.82	25.69	26.09

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	23.72	23.84	23.88
HSDPA Subtest-1	22.46	22.74	22.37
HSDPA Subtest-2	22.45	22.73	22.40
HSDPA Subtest-3	21.94	22.27	21.96
HSDPA Subtest-4	21.92	22.25	21.90
HSUPA Subtest-1	21.80	22.49	22.22
HSUPA Subtest-2	21.48	21.91	21.44
HSUPA Subtest-3	21.44	21.51	20.75
HSUPA Subtest-4	21.44	21.87	21.45
HSUPA Subtest-5	22.58	22.98	22.60

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)
		Channel		18700	18900	19100				Channel		18675	18900	19125	
		Frequency (MHz)		1860.0	1880.0	1900.0				Frequency (MHz)		1857.5	1880.0	1902.5	
20M	QPSK	1	0	23.54	23.45	24.35	0	15M	QPSK	1	0	23.51	23.37	24.30	0
		1	50	23.45	23.33	24.24	0			1	37	23.35	23.27	24.13	0
		1	99	23.17	23.23	23.97	0			1	74	23.30	23.08	24.03	0
		50	0	22.44	22.32	23.24	1			36	0	22.34	22.29	23.19	1
		50	25	22.22	22.11	23.03	1			36	19	22.15	22.09	22.97	1
		50	50	22.18	22.05	22.90	1			36	39	22.08	22.00	22.88	1
		100	0	22.45	22.31	23.21	1			75	0	22.28	22.24	23.19	1
		1	0	22.48	22.40	23.28	1		16QAM	1	0	22.31	22.28	23.18	1
	16QAM	1	50	22.33	22.22	23.19	1			1	37	22.36	22.26	23.18	1
		1	99	22.15	22.11	22.96	1			1	74	22.24	22.06	22.98	1
		50	0	21.20	21.29	22.21	2			36	0	21.23	21.22	22.09	2
		50	25	21.18	21.17	21.95	2			36	19	21.10	21.07	21.86	2
		50	50	21.07	21.00	21.95	2			36	39	21.04	20.90	21.81	2
		100	0	21.28	21.28	22.18	2			75	0	21.29	21.30	22.07	2
		1	0	21.43	21.33	22.29	2		64QAM	1	0	21.43	21.26	22.16	2
	64QAM	1	50	21.28	21.26	22.10	2			1	37	21.31	21.19	22.05	2
		1	99	20.97	20.89	21.82	2			1	74	21.15	20.94	21.90	2
		50	0	20.17	20.19	21.07	3			36	0	20.20	19.93	20.79	3
		50	25	20.18	20.00	20.97	3			36	19	20.06	19.91	20.87	3
		50	50	20.05	19.98	20.86	3			36	39	19.99	19.76	20.85	3
		100	0	20.27	20.09	21.07	3			75	0	20.33	20.19	21.06	3
10M	QPSK	1	0	23.44	23.29	24.24	0	5M	QPSK	1	0	23.41	23.28	24.21	0
		1	24	23.34	23.25	24.08	0			1	12	23.32	23.20	24.03	0
		1	49	23.08	22.96	23.93	0			1	24	23.14	22.94	23.87	0
		25	0	22.31	22.19	23.19	1			12	0	22.24	22.15	23.09	1
		25	12	22.15	22.07	22.90	1			12	6	22.05	22.00	22.97	1
		25	25	21.99	22.00	22.92	1			12	13	21.96	21.92	22.77	1
		50	0	22.29	22.12	23.02	1			25	0	22.26	22.03	22.99	1
		1	0	22.27	22.15	23.06	1		16QAM	1	0	21.99	21.97	22.84	1
	16QAM	1	24	22.29	22.14	23.06	1			1	12	22.20	22.19	23.00	1
		1	49	22.06	21.96	22.93	1			1	24	21.99	21.87	22.87	1
		25	0	21.21	21.11	21.97	2			12	0	21.02	20.97	22.13	2
		25	12	21.09	20.88	21.92	2			12	6	21.00	20.97	21.92	2
		25	25	21.06	20.84	21.79	2			12	13	20.93	20.85	21.75	2
		50	0	21.20	21.12	22.09	2			25	0	21.22	21.13	21.98	2
		1	0	21.37	21.23	22.13	2		64QAM	1	0	21.33	21.21	22.10	2
	64QAM	1	24	21.21	21.07	21.93	2			1	12	21.12	21.18	22.02	2
		1	49	20.98	21.00	21.85	2			1	24	20.95	20.85	21.76	2
		25	0	20.19	19.89	20.95	3			12	0	20.06	19.94	20.89	3
		25	12	19.90	19.92	20.88	3			12	6	19.96	19.90	20.77	3
		25	25	19.81	19.84	20.83	3			12	13	19.84	19.79	20.71	3
		50	0	20.26	20.08	20.89	3			25	0	20.24	19.77	20.81	3
3M	QPSK	1	0	23.39	23.19	24.12	0	1.4M	QPSK	1	0	23.26	23.17	24.12	0
		1	7	23.19	23.13	24.01	0			1	2	23.25	23.15	23.92	0
		1	14	23.01	22.99	23.91	0			1	5	22.86	23.01	23.75	0
		8	0	22.17	22.12	23.01	1			3	0	22.24	22.07	22.98	0
		8	3	22.08	21.98	22.79	1			3	1	21.94	21.89	22.71	0
		8	7	21.84	21.79	22.77	1			3	3	21.88	21.72	22.64	0
		15	0	22.22	22.05	23.08	1			6	0	22.10	21.94	22.92	1
		1	0	22.02	21.93	22.89	1		16QAM	1	0	22.14	22.13	23.06	1
	16QAM	1	7	22.19	22.13	23.01	1			1	2	22.12	22.10	22.85	1
		1	14	21.89	21.92	22.93	1			1	5	21.83	21.83	22.73	1
		8	0	21.06	21.00	21.90	2			3	0	21.01	20.99	21.90	1
		8	3	21.01	20.88	21.74	2			3	1	20.91	20.78	21.70	1
		8	7	20.95	20.87	21.68	2			3	3	20.84	20.80	21.74	1
		15	0	21.05	21.03	21.88	2			6	0	20.96	21.04	21.86	2
		1	0	21.26	21.15	22.11	2		64QAM	1	0	21.09	21.12	21.93	2
	64QAM	1	7	21.12	21.04	21.88	2			1	2	21.07	21.09	21.84	2
		1	14	20.98	20.73	21.84	2			1	5	21.03	21.00	21.83	2
		8	0	19.89	19.87	20.79	3			3	0	20.95	20.95	21.75	2
		8	3	19.97	19.90	20.67	3			3	1	20.88	20.84	21.75	2
		8	7	19.72	19.86	20.61	3			3	3	20.76	20.88	21.61	2
		15	0	19.87	19.76	20.69	3			6	0	20.02	20.02	20.77	3

EIRP Power (dBm)

GSM							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	512	1850.2	-9.59	36.57	26.98	498.88	H
	661	1880.0	-9.70	37.22	27.52	564.94	
	810	1909.8	-10.02	37.18	27.16	520.00	
	512	1850.2	-5.37	37.65	32.28	1690.44	V
	661	1880.0	-4.83	37.58	32.75	1883.65	
	810	1909.8	-4.89	37.48	32.59	1815.52	

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

EDGE							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	512	1850.2	-15.72	36.57	20.85	121.62	H
	661	1880.0	-15.64	37.22	21.58	143.88	
	810	1909.8	-16.17	37.18	21.01	126.18	
	512	1850.2	-9.80	37.65	27.85	609.54	V
	661	1880.0	-8.90	37.58	28.68	737.90	
	810	1909.8	-9.33	37.48	28.15	653.13	

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

WCDMA							
Plane	Channel	Frequency (MHz)	Reading (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	9262	1852.4	-16.09	36.57	20.48	111.69	H
	9400	1880.0	-16.27	37.22	20.95	124.45	
	9538	1907.6	-16.51	37.18	20.67	116.68	
	9262	1852.4	-11.56	37.65	26.09	406.44	V
	9400	1880.0	-11.00	37.58	26.58	454.99	
	9538	1907.6	-11.12	37.48	26.36	432.51	

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

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	-12.31	36.57	24.26	266.69	H
	18900	1880.0	-12.70	37.22	24.52	283.14	
	19193	1909.3	-13.08	37.18	24.10	257.04	
	18607	1850.7	-19.03	37.65	18.62	72.78	V
	18900	1880.0	-18.56	37.58	19.02	79.80	
	19193	1909.3	-19.23	37.48	18.25	66.83	
Channel Bandwidth: 1.4 MHz / 16QAM							
X	18607	1850.7	-13.30	36.57	23.27	212.32	H
	18900	1880.0	-13.69	37.22	23.53	225.42	
	19193	1909.3	-14.07	37.18	23.11	204.64	
	18607	1850.7	-20.02	37.65	17.63	57.94	V
	18900	1880.0	-19.55	37.58	18.03	63.53	
	19193	1909.3	-20.22	37.48	17.26	53.21	
Channel Bandwidth: 1.4 MHz / 64QAM							
X	18607	1850.7	-14.31	36.57	22.26	168.27	H
	18900	1880.0	-14.70	37.22	22.52	178.65	
	19193	1909.3	-15.08	37.18	22.10	162.18	
	18607	1850.7	-21.03	37.65	16.62	45.92	V
	18900	1880.0	-20.56	37.58	17.02	50.35	
	19193	1909.3	-21.23	37.48	16.25	42.17	

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	-12.07	36.57	24.50	281.84	H
	18900	1880.0	-12.46	37.22	24.76	299.23	
	19185	1908.5	-12.84	37.18	24.34	271.64	
	18615	1851.5	-18.79	37.65	18.86	76.91	V
	18900	1880.0	-18.32	37.58	19.26	84.33	
	19185	1908.5	-18.99	37.48	18.49	70.63	
Channel Bandwidth: 3 MHz / 16QAM							
X	18615	1851.5	-13.07	36.57	23.50	223.87	H
	18900	1880.0	-13.46	37.22	23.76	237.68	
	19185	1908.5	-13.84	37.18	23.34	215.77	
	18615	1851.5	-19.79	37.65	17.86	61.09	V
	18900	1880.0	-19.32	37.58	18.26	66.99	
	19185	1908.5	-19.99	37.48	17.49	56.10	
Channel Bandwidth: 3 MHz / 64QAM							
X	18615	1851.5	-14.07	36.57	22.50	177.83	H
	18900	1880.0	-14.46	37.22	22.76	188.80	
	19185	1908.5	-14.84	37.18	22.34	171.40	
	18615	1851.5	-20.79	37.65	16.86	48.53	V
	18900	1880.0	-20.32	37.58	17.26	53.21	
	19185	1908.5	-20.99	37.48	16.49	44.57	

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	-11.81	36.57	24.76	299.23	H
	18900	1880.0	-12.20	37.22	25.02	317.69	
	19175	1907.5	-12.58	37.18	24.60	288.40	
	18625	1852.5	-18.53	37.65	19.12	81.66	V
	18900	1880.0	-18.06	37.58	19.52	89.54	
	19175	1907.5	-18.73	37.48	18.75	74.99	
Channel Bandwidth: 5 MHz / 16QAM							
X	18625	1852.5	-12.83	36.57	23.74	236.59	H
	18900	1880.0	-13.22	37.22	24.00	251.19	
	19175	1907.5	-13.60	37.18	23.58	228.03	
	18625	1852.5	-19.55	37.65	18.10	64.57	V
	18900	1880.0	-19.08	37.58	18.50	70.79	
	19175	1907.5	-19.75	37.48	17.73	59.29	
Channel Bandwidth: 5 MHz / 64QAM							
X	18625	1852.5	-13.83	36.57	22.74	187.93	H
	18900	1880.0	-14.22	37.22	23.00	199.53	
	19175	1907.5	-14.60	37.18	22.58	181.13	
	18625	1852.5	-20.55	37.65	17.10	51.29	V
	18900	1880.0	-20.08	37.58	17.50	56.23	
	19175	1907.5	-20.75	37.48	16.73	47.10	

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	-11.55	36.57	25.02	317.69	H
	18900	1880.0	-11.94	37.22	25.28	337.29	
	19150	1905.0	-12.32	37.18	24.86	306.20	
	18650	1855.0	-18.27	37.65	19.38	86.70	V
	18900	1880.0	-17.80	37.58	19.78	95.06	
	19150	1905.0	-18.47	37.48	19.01	79.62	
Channel Bandwidth: 10 MHz / 16QAM							
X	18650	1855.0	-12.60	36.57	23.97	249.46	H
	18900	1880.0	-12.99	37.22	24.23	264.85	
	19150	1905.0	-13.37	37.18	23.81	240.44	
	18650	1855.0	-19.32	37.65	18.33	68.08	V
	18900	1880.0	-18.85	37.58	18.73	74.64	
	19150	1905.0	-19.52	37.48	17.96	62.52	
Channel Bandwidth: 10 MHz / 64QAM							
X	18650	1855.0	-13.58	36.57	22.99	199.07	H
	18900	1880.0	-13.97	37.22	23.25	211.35	
	19150	1905.0	-14.35	37.18	22.83	191.87	
	18650	1855.0	-20.30	37.65	17.35	54.33	V
	18900	1880.0	-19.83	37.58	17.75	59.57	
	19150	1905.0	-20.50	37.48	16.98	49.89	

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	-11.32	36.57	25.25	334.97	H
	18900	1880.0	-11.71	37.22	25.51	355.63	
	19125	1902.5	-12.09	37.18	25.09	322.85	
	18675	1857.5	-18.04	37.65	19.61	91.41	V
	18900	1880.0	-17.57	37.58	20.01	100.23	
	19125	1902.5	-18.24	37.48	19.24	83.95	
Channel Bandwidth: 15 MHz / 16QAM							
X	18675	1857.5	-12.34	36.57	24.23	264.85	H
	18900	1880.0	-12.73	37.22	24.49	281.19	
	19125	1902.5	-13.11	37.18	24.07	255.27	
	18675	1857.5	-19.06	37.65	18.59	72.28	V
	18900	1880.0	-18.59	37.58	18.99	79.25	
	19125	1902.5	-19.26	37.48	18.22	66.37	
Channel Bandwidth: 15 MHz / 64QAM							
X	18675	1857.5	-13.34	36.57	23.23	210.38	H
	18900	1880.0	-13.73	37.22	23.49	223.36	
	19125	1902.5	-14.11	37.18	23.07	202.77	
	18675	1857.5	-20.06	37.65	17.59	57.41	V
	18900	1880.0	-19.59	37.58	17.99	62.95	
	19125	1902.5	-20.26	37.48	17.22	52.72	

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	-11.08	36.57	25.49	354.00	H
	18900	1880.0	-11.47	37.22	25.75	375.84	
	19100	1900.0	-11.85	37.18	25.33	341.19	
	18700	1860.0	-17.80	37.65	19.85	96.61	V
	18900	1880.0	-17.33	37.58	20.25	105.93	
	19100	1900.0	-18.00	37.48	19.48	88.72	
Channel Bandwidth: 20 MHz / 16QAM							
X	18700	1860.0	-12.10	36.57	24.47	279.90	H
	18900	1880.0	-12.49	37.22	24.73	297.17	
	19100	1900.0	-12.87	37.18	24.31	269.77	
	18700	1860.0	-18.82	37.65	18.83	76.38	V
	18900	1880.0	-18.35	37.58	19.23	83.75	
	19100	1900.0	-19.02	37.48	18.46	70.15	
Channel Bandwidth: 20 MHz / 64QAM							
X	18700	1860.0	-13.11	36.57	23.46	221.82	H
	18900	1880.0	-13.50	37.22	23.72	235.50	
	19100	1900.0	-13.88	37.18	23.30	213.80	
	18700	1860.0	-19.83	37.65	17.82	60.53	V
	18900	1880.0	-19.36	37.58	18.22	66.37	
	19100	1900.0	-20.03	37.48	17.45	55.59	

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

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

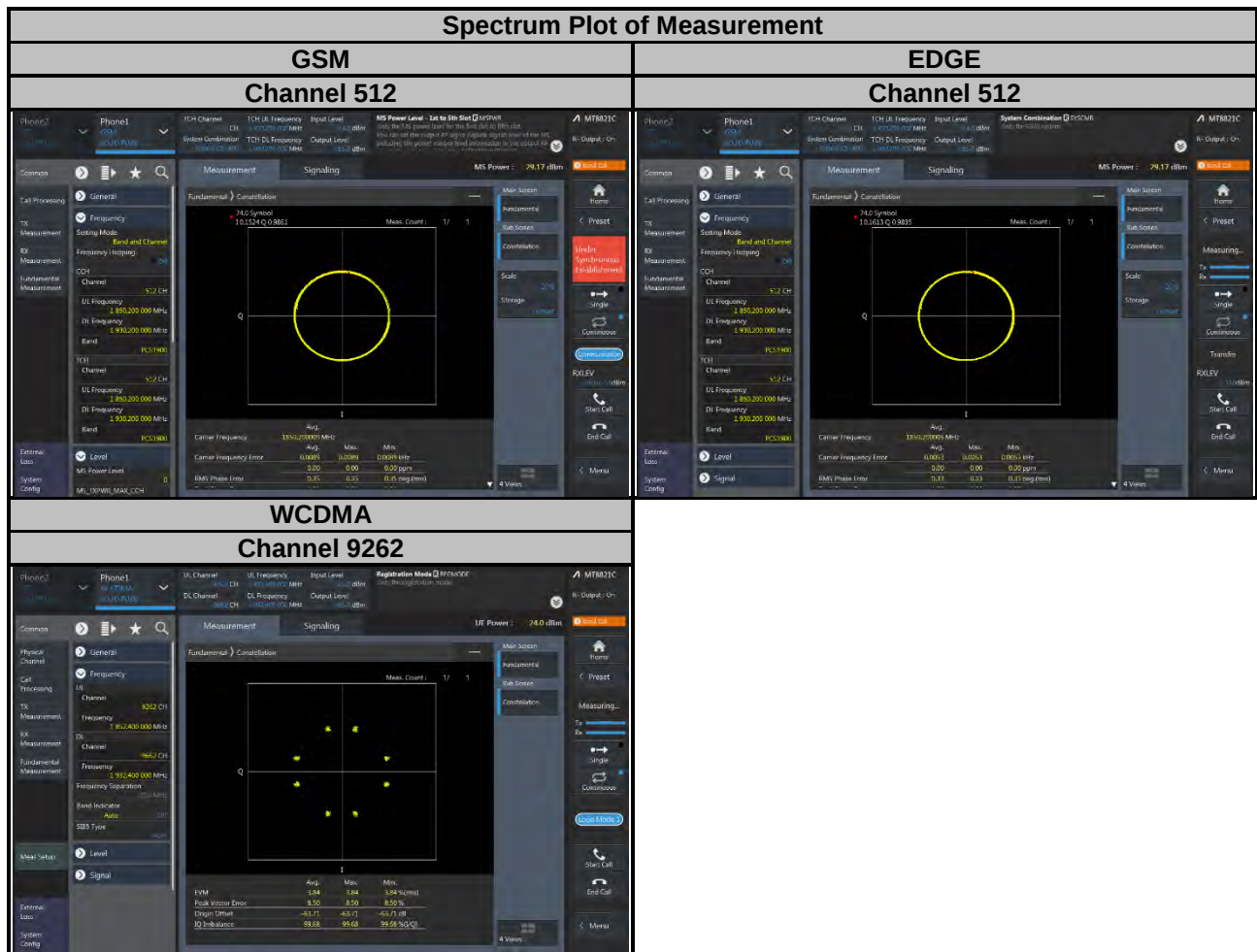
4.2.2 Test Setup



4.2.3 Test Procedure

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

4.2.4 Test Results

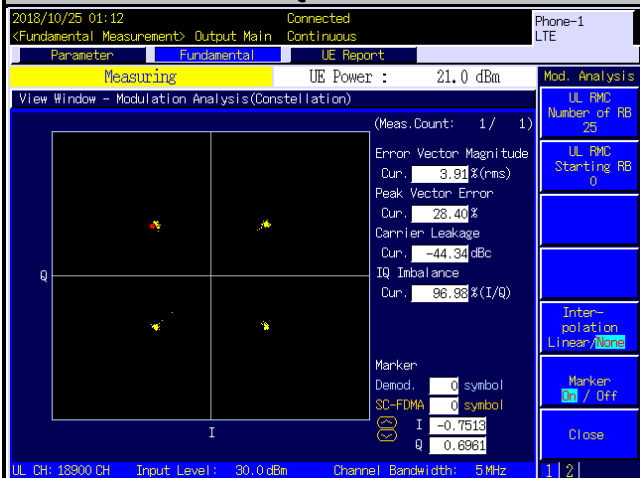


Spectrum Plot of Measurement

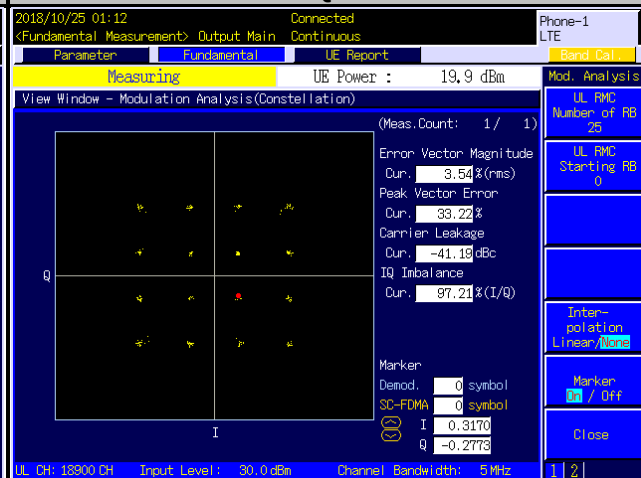
LTE Band 2

Channel 18900

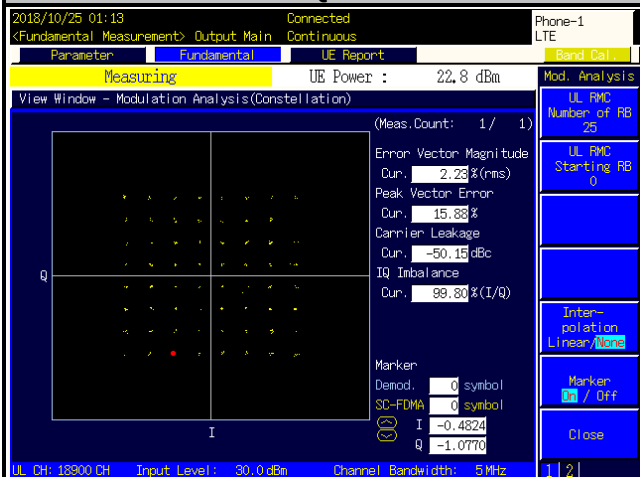
QPSK



16QAM



64QAM



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

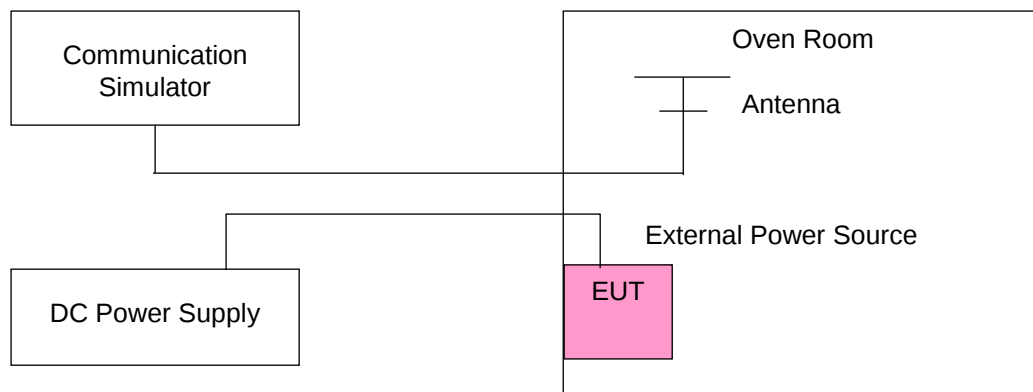
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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 DC 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 ± 0.5 °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)	GSM				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1850.200003	0.002	1909.800004	0.002	2.5
3.23	1850.200001	0.001	1909.800002	0.001	2.5
4.37	1850.200004	0.002	1909.800002	0.001	2.5

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

Frequency Error vs. Temperature

Temp. (°C)	GSM				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1850.200004	0.002	1909.800004	0.002	2.5
-20	1850.200002	0.001	1909.800003	0.002	2.5
-10	1850.200003	0.002	1909.800003	0.002	2.5
0	1850.200001	0.001	1909.800003	0.002	2.5
10	1850.200002	0.001	1909.800001	0.001	2.5
20	1850.200001	0.001	1909.800002	0.001	2.5
30	1850.199996	-0.002	1909.799996	-0.002	2.5
40	1850.199996	-0.002	1909.799998	-0.001	2.5
50	1850.199996	-0.002	1909.799997	-0.002	2.5
60	1850.199998	-0.001	1909.799997	-0.002	2.5
70	1850.199998	-0.001	1909.799999	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	EDGE				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1850.200001	0.001	1909.800002	0.001	2.5
3.23	1850.200003	0.002	1909.800004	0.002	2.5
4.37	1850.200004	0.002	1909.800002	0.001	2.5

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

Frequency Error vs. Temperature

Temp. (°C)	EDGE				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1850.200002	0.001	1909.800002	0.001	2.5
-20	1850.200004	0.002	1909.800004	0.002	2.5
-10	1850.200001	0.001	1909.800004	0.002	2.5
0	1850.200003	0.002	1909.800002	0.001	2.5
10	1850.200002	0.001	1909.800001	0.001	2.5
20	1850.200002	0.001	1909.800002	0.001	2.5
30	1850.199996	-0.002	1909.799997	-0.001	2.5
40	1850.199999	-0.001	1909.799997	-0.002	2.5
50	1850.199997	-0.002	1909.799998	-0.001	2.5
60	1850.199996	-0.002	1909.799997	-0.002	2.5
70	1850.199997	-0.002	1909.799998	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1852.400002	0.001	1907.600002	0.001	2.5
3.23	1852.400001	0.001	1907.600001	0.001	2.5
4.37	1852.400002	0.001	1907.600002	0.001	2.5

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

Frequency Error vs. Temperature

Temp. (°C)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1852.400003	0.002	1907.600003	0.001	2.5
-20	1852.400002	0.001	1907.600002	0.001	2.5
-10	1852.400004	0.002	1907.600003	0.001	2.5
0	1852.400002	0.001	1907.600004	0.002	2.5
10	1852.400004	0.002	1907.600001	0.001	2.5
20	1852.400003	0.001	1907.600004	0.002	2.5
30	1852.399999	-0.001	1907.599999	-0.001	2.5
40	1852.399998	-0.001	1907.599997	-0.002	2.5
50	1852.399997	-0.002	1907.599997	-0.002	2.5
60	1852.399998	-0.001	1907.599999	-0.001	2.5
70	1852.399998	-0.001	1907.599998	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1850.700002	0.001	1909.300000	0.002	2.5
3.23	1850.700004	0.002	1909.300004	0.002	2.5
4.37	1850.700002	0.001	1909.300004	0.002	2.5

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

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1850.700002	0.001	1909.300002	0.001	2.5
-20	1850.700001	0.001	1909.300002	0.001	2.5
-10	1850.700003	0.002	1909.300004	0.002	2.5
0	1850.700002	0.001	1909.300004	0.002	2.5
10	1850.700003	0.002	1909.300003	0.002	2.5
20	1850.700004	0.002	1909.300002	0.001	2.5
30	1850.699998	-0.001	1909.299996	-0.002	2.5
40	1850.699997	-0.002	1909.299996	-0.002	2.5
50	1850.699996	-0.002	1909.299999	-0.001	2.5
60	1850.699998	-0.001	1909.299998	-0.001	2.5
70	1850.699999	-0.001	1909.299999	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1851.500004	0.002	1907.500002	0.001	2.5
3.23	1851.500002	0.001	1907.500004	0.002	2.5
4.37	1851.500001	0.001	1907.500001	0.001	2.5

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

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1851.500004	0.002	1907.500004	0.002	2.5
-20	1851.500004	0.002	1907.500003	0.002	2.5
-10	1851.500002	0.001	1907.500002	0.001	2.5
0	1851.500004	0.002	1907.500003	0.002	2.5
10	1851.500001	0.001	1907.500003	0.002	2.5
20	1851.500002	0.001	1907.500002	0.001	2.5
30	1851.499999	-0.001	1907.499997	-0.002	2.5
40	1851.499998	-0.001	1907.499998	-0.001	2.5
50	1851.499999	-0.001	1907.499998	-0.001	2.5
60	1851.499996	-0.002	1907.499997	-0.002	2.5
70	1851.499998	-0.001	1907.499996	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1852.500002	0.001	1907.500002	0.001	2.5
3.23	1852.500002	0.001	1907.500004	0.002	2.5
4.37	1852.500003	0.001	1907.500002	0.001	2.5

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

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1852.500002	0.001	1907.500003	0.002	2.5
-20	1852.500001	0.001	1907.500001	0.001	2.5
-10	1852.500002	0.001	1907.500003	0.002	2.5
0	1852.500002	0.001	1907.500003	0.002	2.5
10	1852.500002	0.001	1907.500003	0.002	2.5
20	1852.500002	0.001	1907.500003	0.001	2.5
30	1852.499998	-0.001	1907.499997	-0.002	2.5
40	1852.499997	-0.002	1907.499998	-0.001	2.5
50	1852.499996	-0.002	1907.499997	-0.002	2.5
60	1852.499999	-0.001	1907.499996	-0.002	2.5
70	1852.499998	-0.001	1907.499997	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1855.000002	0.001	1905.000004	0.002	2.5
3.23	1855.000002	0.001	1905.000003	0.002	2.5
4.37	1855.000004	0.002	1905.000003	0.002	2.5

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

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1855.000002	0.001	1905.000002	0.001	2.5
-20	1855.000001	0.001	1905.000003	0.002	2.5
-10	1855.000001	0.001	1905.000004	0.002	2.5
0	1855.000002	0.001	1905.000002	0.001	2.5
10	1855.000004	0.002	1905.000003	0.002	2.5
20	1855.000004	0.002	1905.000003	0.001	2.5
30	1854.999996	-0.002	1904.999999	-0.001	2.5
40	1854.999996	-0.002	1904.999997	-0.002	2.5
50	1854.999997	-0.002	1904.999998	-0.001	2.5
60	1854.999999	-0.001	1904.999997	-0.001	2.5
70	1854.999997	-0.002	1904.999996	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1857.500004	0.002	1902.500002	0.001	2.5
3.23	1857.500002	0.001	1902.500003	0.002	2.5
4.37	1857.500003	0.002	1902.500003	0.002	2.5

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

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	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	2.5
-20	1857.500004	0.002	1902.500002	0.001	2.5
-10	1857.500001	0.001	1902.500003	0.001	2.5
0	1857.500001	0.001	1902.500003	0.002	2.5
10	1857.500002	0.001	1902.500002	0.001	2.5
20	1857.500003	0.001	1902.500003	0.001	2.5
30	1857.499996	-0.002	1902.499998	-0.001	2.5
40	1857.499999	-0.001	1902.499998	-0.001	2.5
50	1857.499999	-0.001	1902.499996	-0.002	2.5
60	1857.499996	-0.002	1902.499999	-0.001	2.5
70	1857.499998	-0.001	1902.499999	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1860.000003	0.002	1900.000002	0.001	2.5
3.23	1860.000002	0.001	1900.000002	0.001	2.5
4.37	1860.000001	0.001	1900.000003	0.002	2.5

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

Frequency Error vs. Temperature

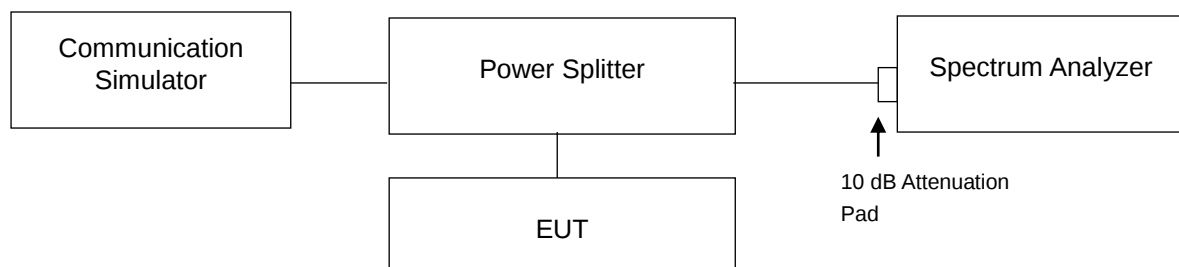
Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1860.000002	0.001	1900.000002	0.001	2.5
-20	1860.000003	0.002	1900.000002	0.001	2.5
-10	1860.000002	0.001	1900.000001	0.001	2.5
0	1860.000001	0.001	1900.000002	0.001	2.5
10	1860.000001	0.001	1900.000002	0.001	2.5
20	1860.000001	0.001	1900.000004	0.002	2.5
30	1859.999998	-0.001	1899.999998	-0.001	2.5
40	1859.999998	-0.001	1899.999996	-0.002	2.5
50	1859.999997	-0.002	1899.999997	-0.002	2.5
60	1859.999998	-0.001	1899.999996	-0.002	2.5
70	1859.999999	-0.001	1899.999997	-0.001	2.5

4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

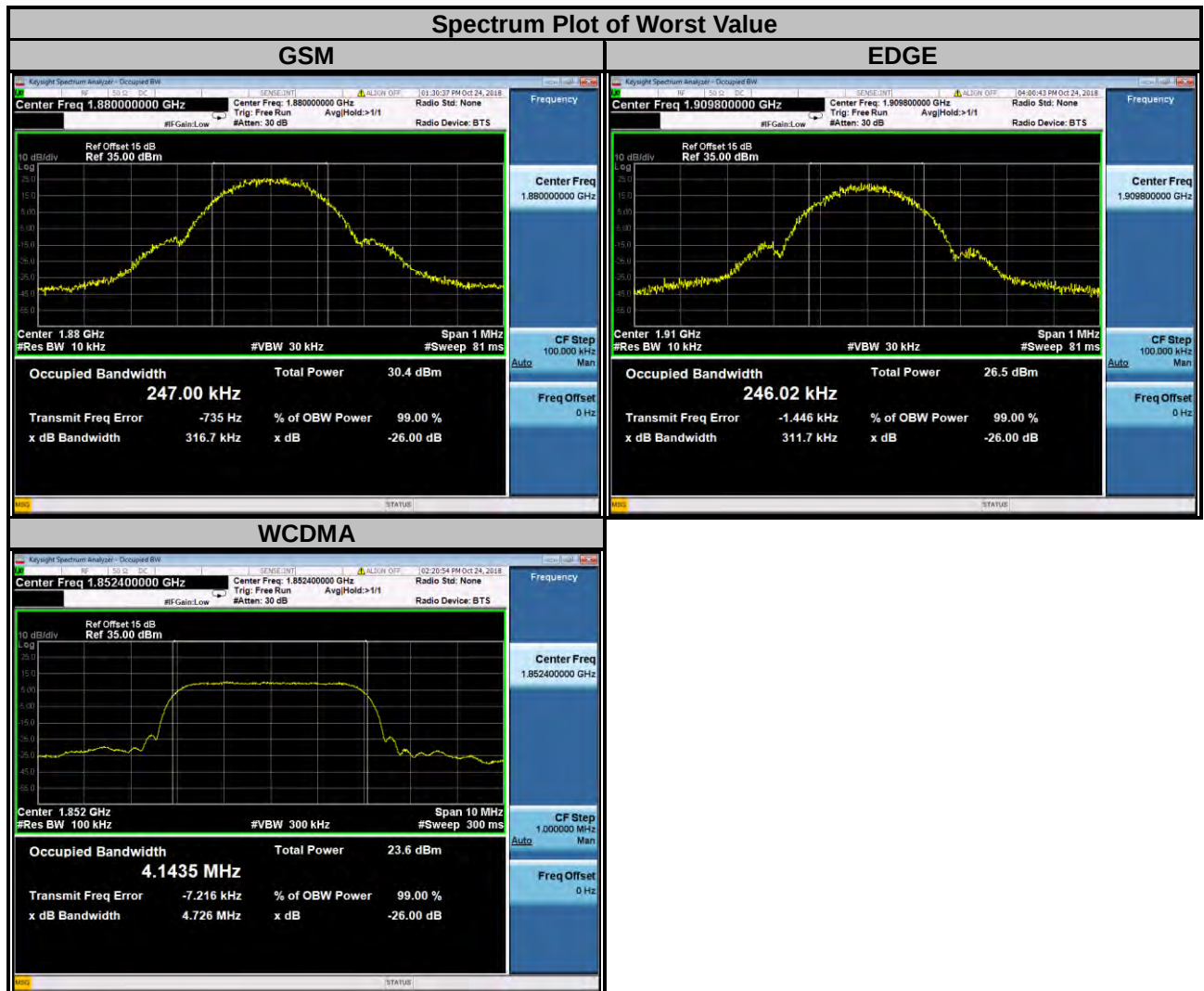
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function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

4.4.2 Test Setup

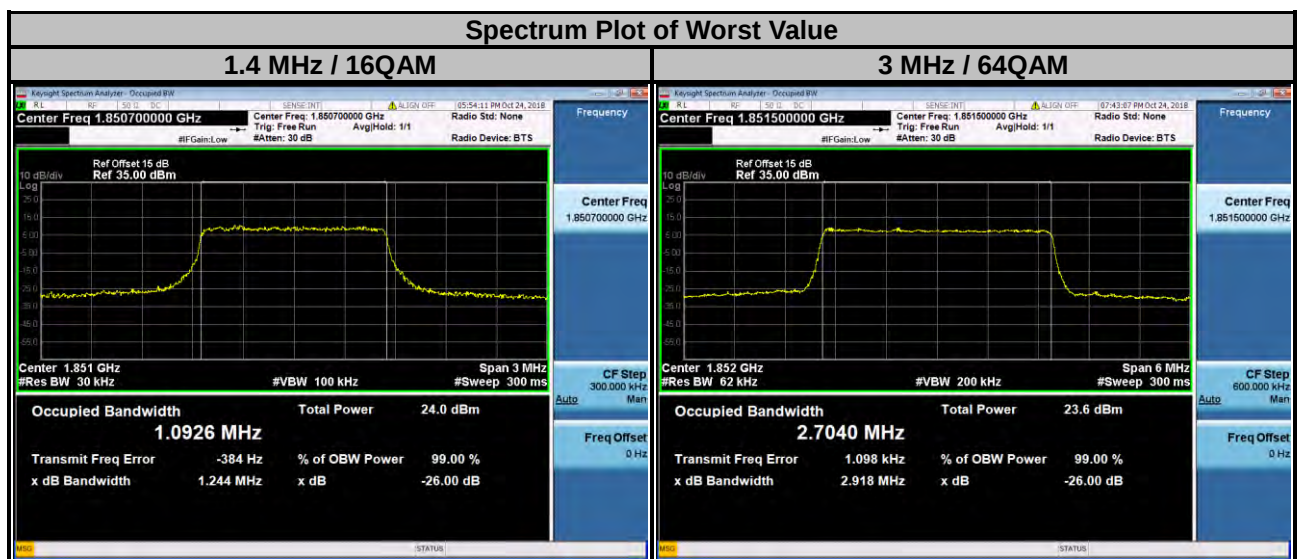


4.4.3 Test Result

Channel	Frequency (MHz)	99 % Occupied Bandwidth (kHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)
		GSM	EDGE			
512	1850.2	244.85	245.25	9262	1852.4	4.1435
661	1880.0	247.00	245.19	9400	1880.0	4.1430
810	1909.8	243.62	246.02	9538	1907.6	4.1386



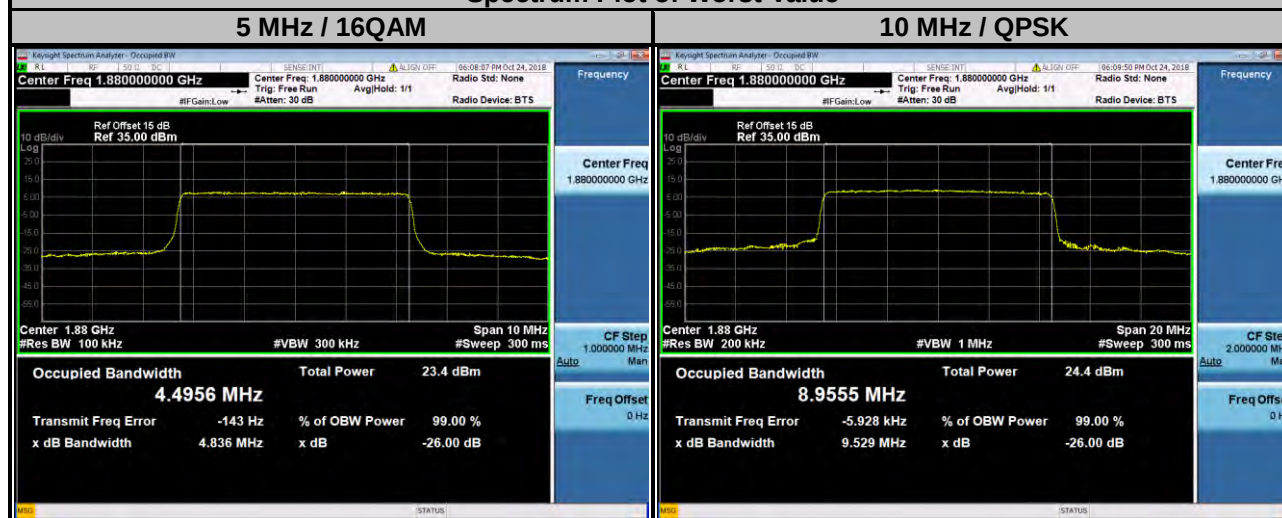
LTE Band 2									
Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
18607	1850.7	1.0883	1.0926	1.0878	18615	1851.5	2.7027	2.6983	2.7040
18900	1880.0	1.0866	1.0896	1.0880	18900	1880.0	2.7039	2.6980	2.7033
19193	1909.3	1.0884	1.0908	1.0885	19185	1908.5	2.7006	2.7002	2.7036



LTE Band 2

Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
18625	1852.5	4.4927	4.4925	4.4930	18650	1855.0	8.9538	8.9526	8.9515
18900	1880.0	4.4915	4.4956	4.4951	18900	1880.0	8.9555	8.9488	8.9491
19175	1907.5	4.4881	4.4928	4.4929	19150	1905.0	8.9441	8.9491	8.9443

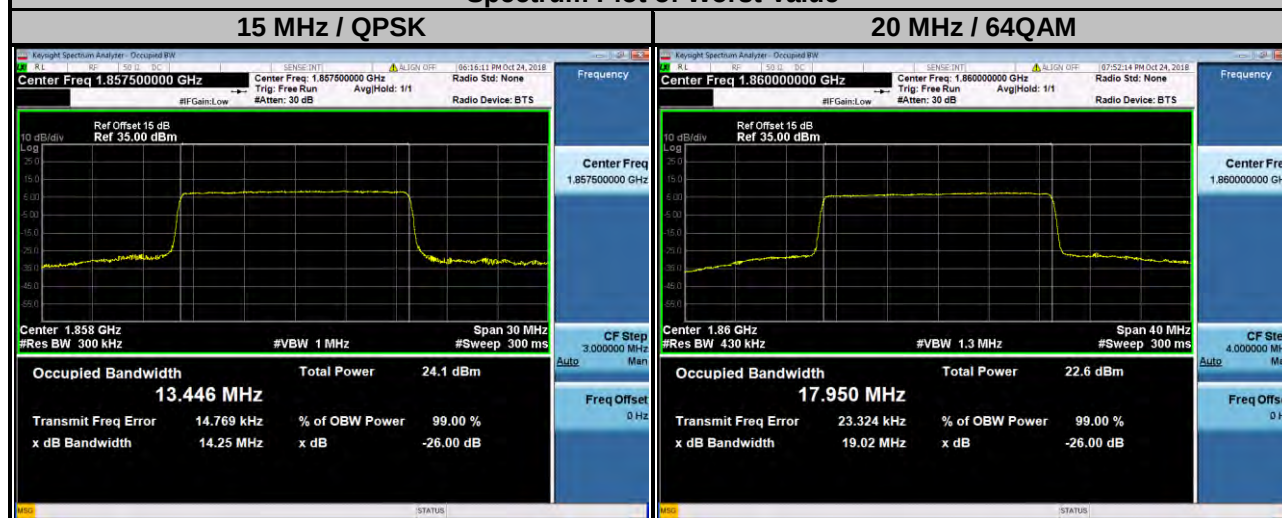
Spectrum Plot of Worst Value



LTE Band 2

Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
18675	1857.5	13.446	13.433	13.436	18700	1860.0	17.930	17.945	17.950
18900	1880.0	13.430	13.414	13.408	18900	1880.0	17.857	17.885	17.886
19125	1902.5	13.401	13.394	13.388	19100	1900.0	17.830	17.857	17.849

Spectrum Plot of Worst Value

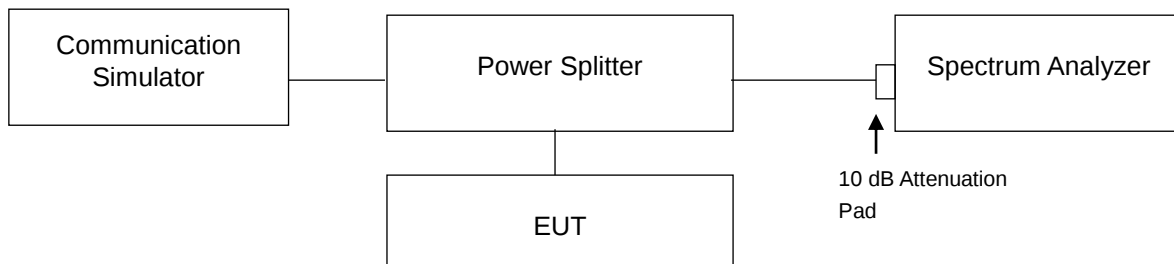


4.5 Band Edge Measurement

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.

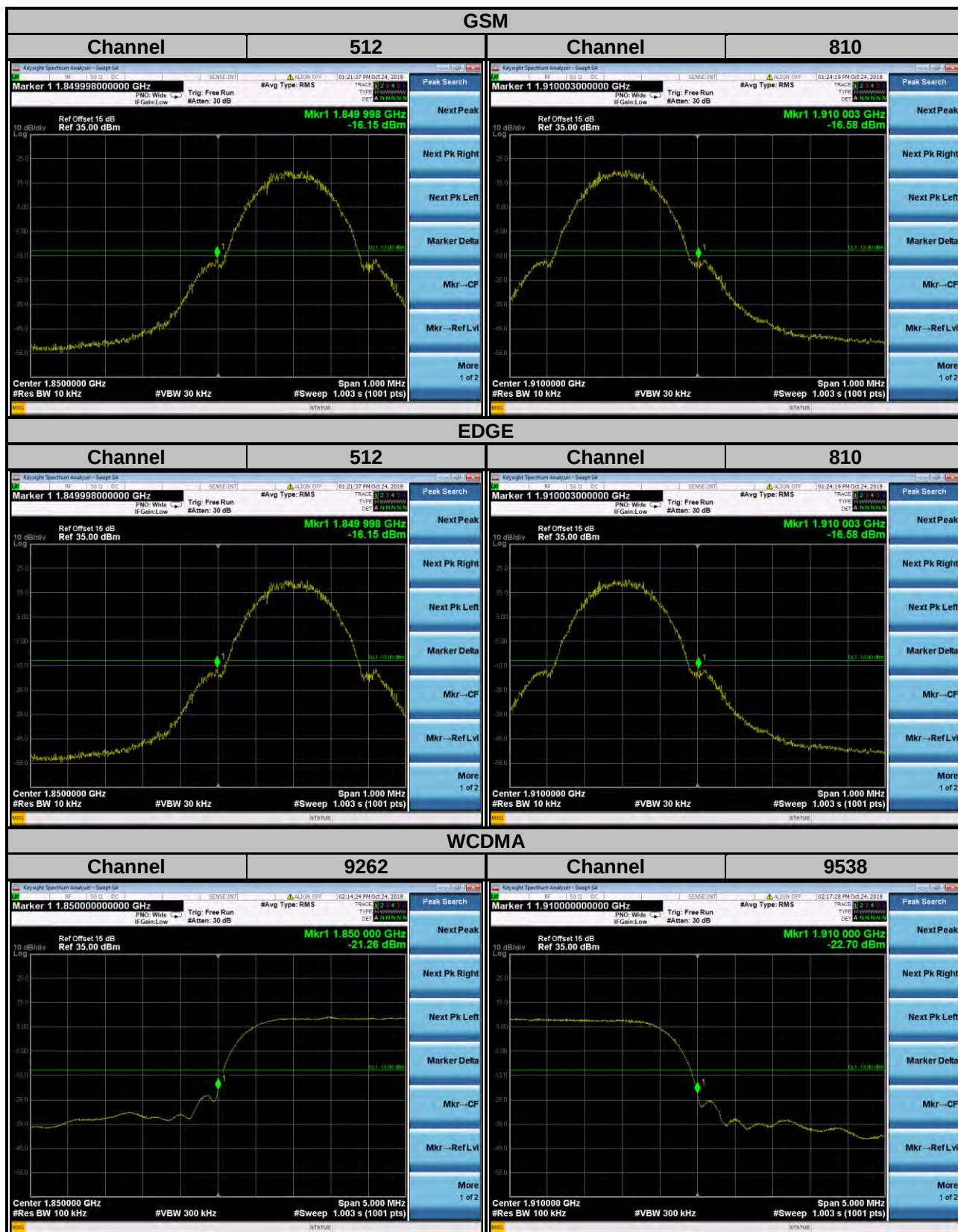
4.5.2 Test Setup

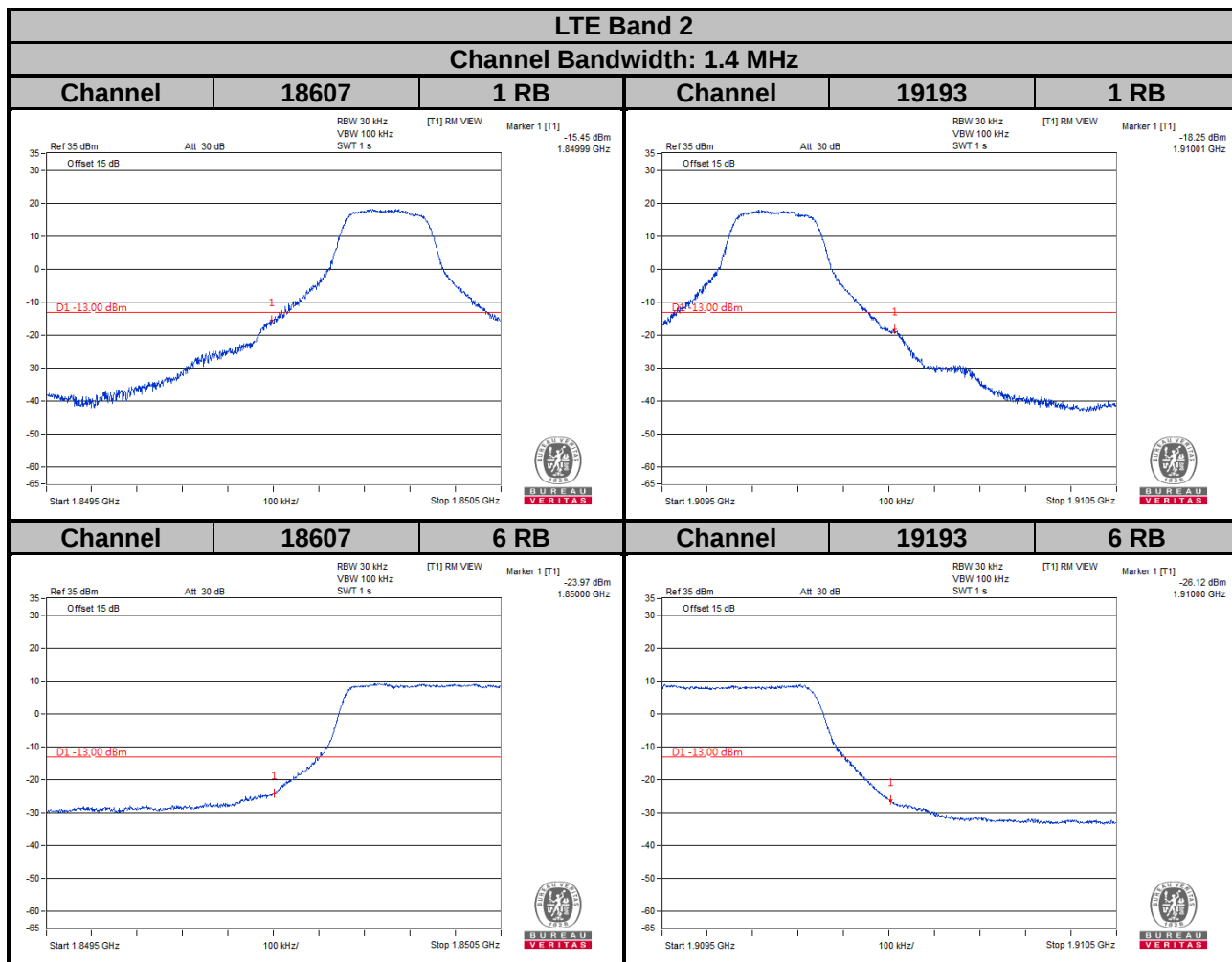


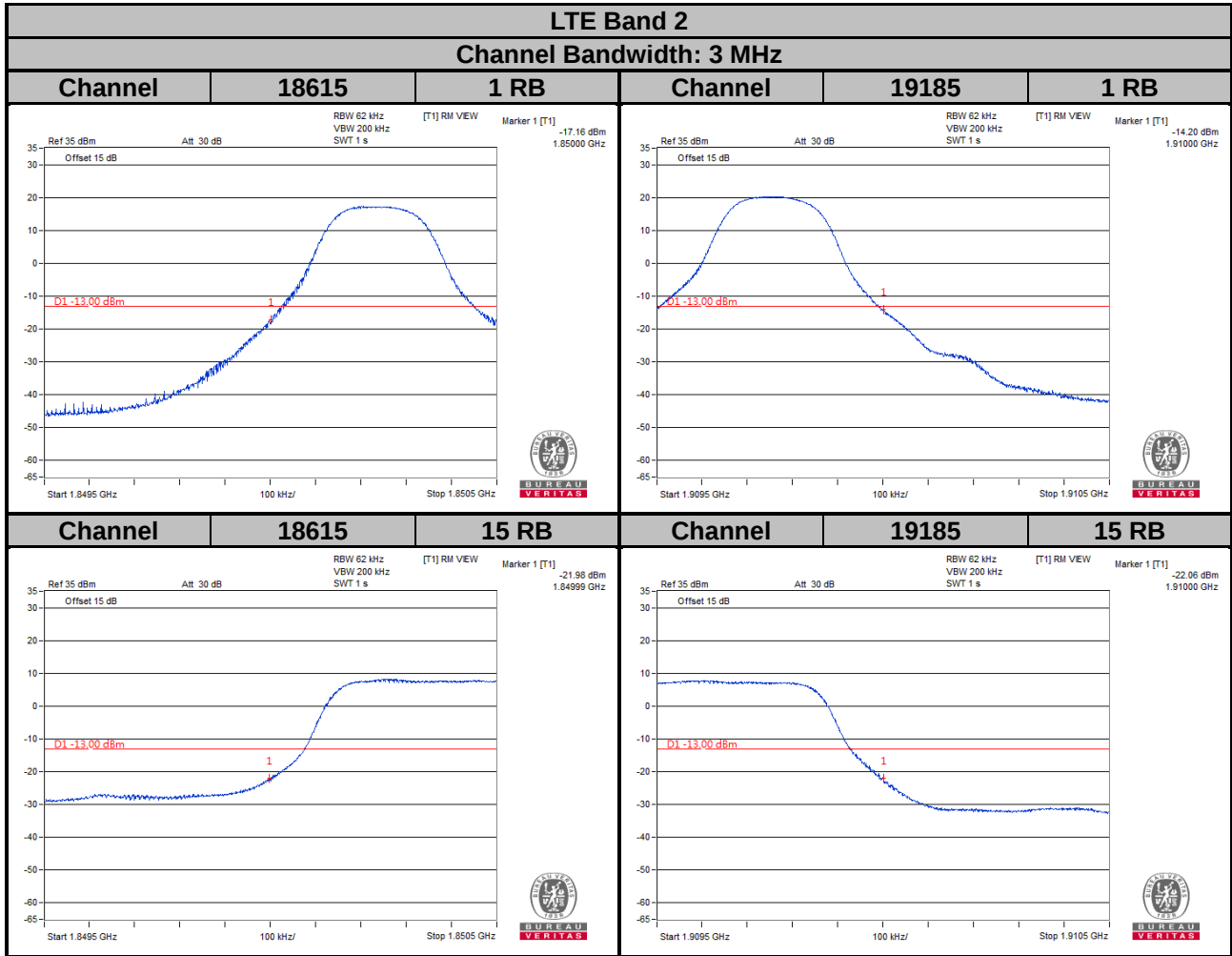
4.5.3 Test Procedures

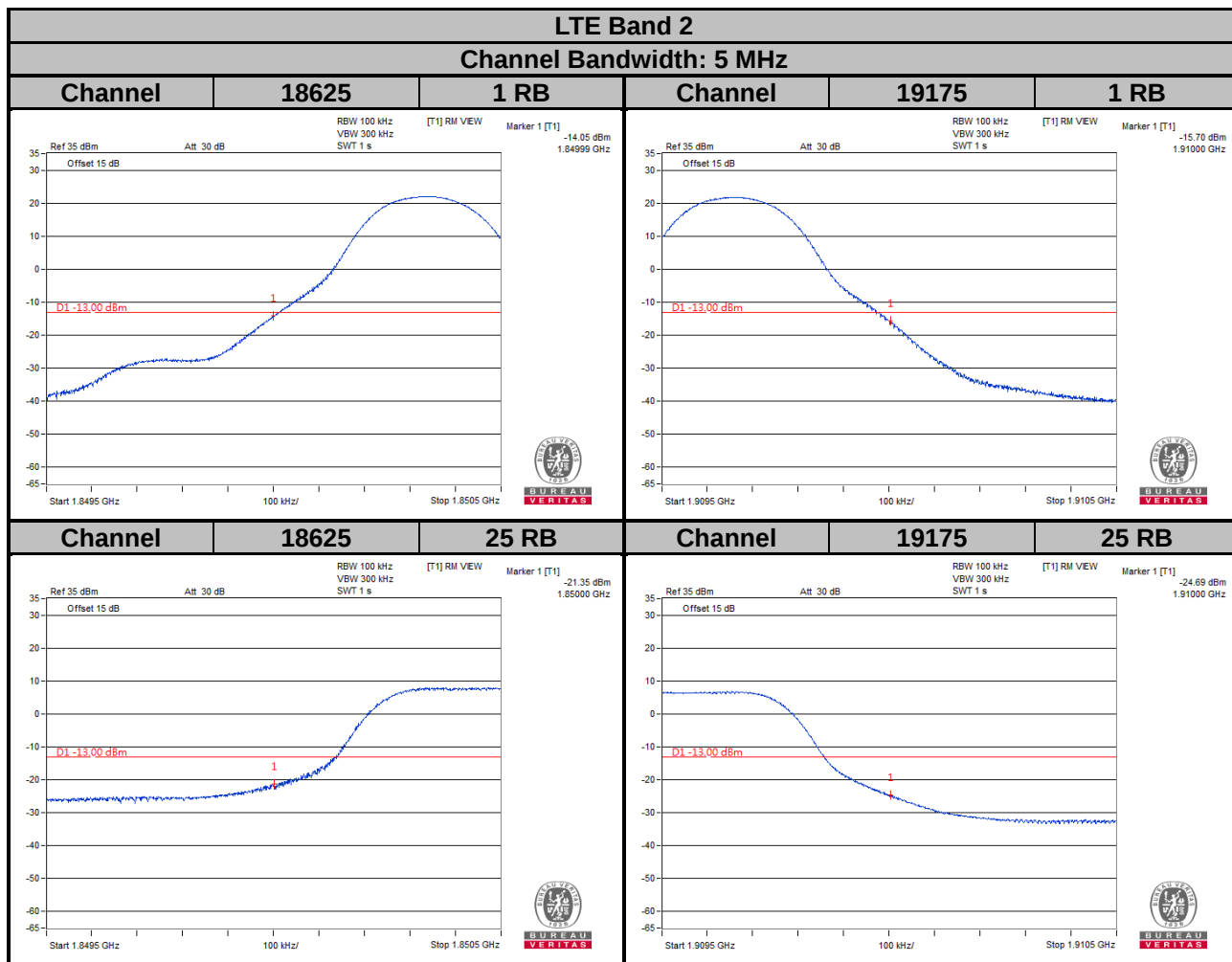
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 10 kHz and VB of the spectrum is 30 kHz (GSM/GPRS/EDGE).
- The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (WCDMA).
- 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 1.4 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 62 kHz and VB of the spectrum is 200 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 100 kHz and VB of the spectrum is 300 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 200 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 10 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 300 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 15 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 430 kHz and VB of the spectrum is 1.3 MHz (LTE Bandwidth 20 MHz).
- Record the max trace plot into the test report.

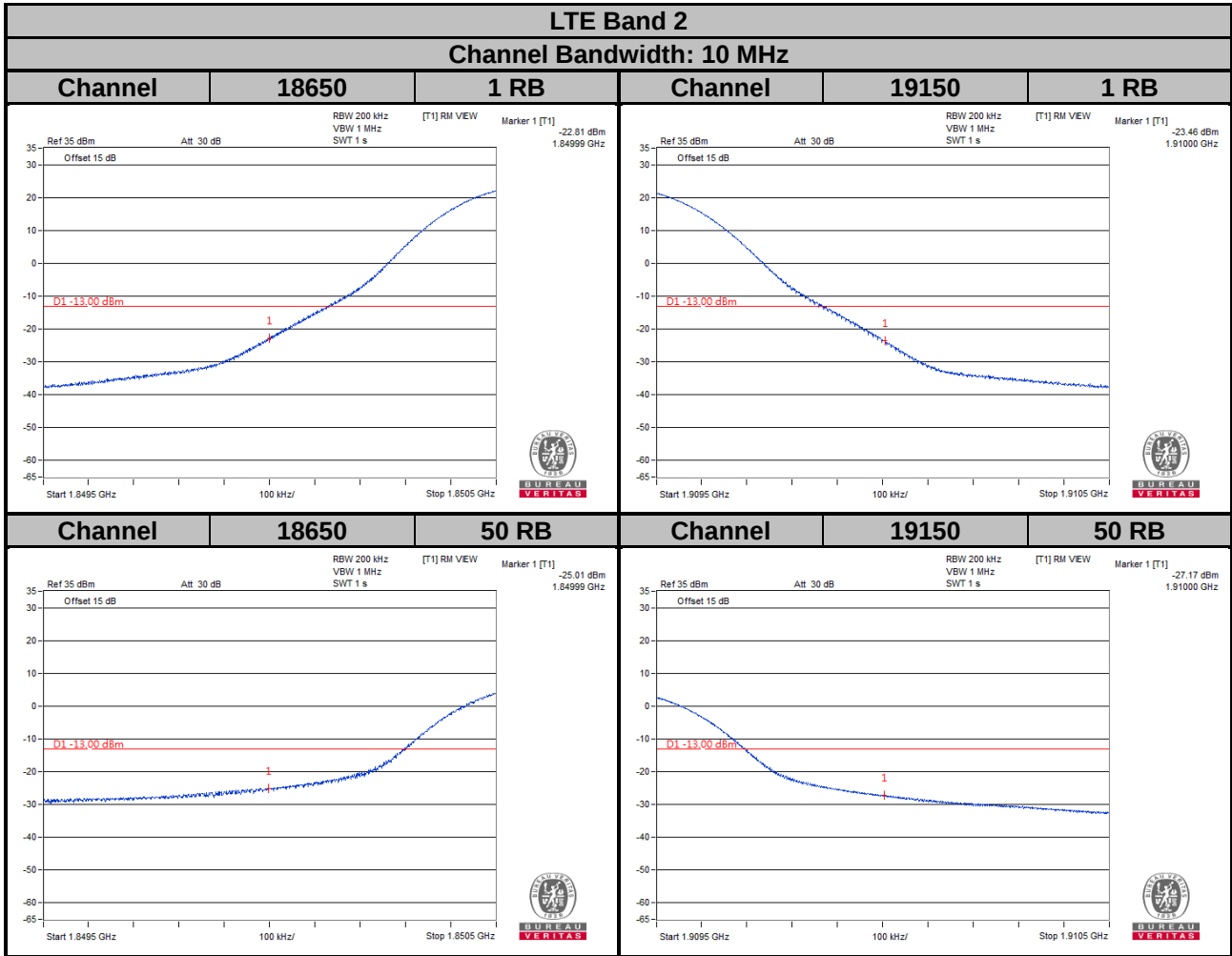
4.5.4 Test Results

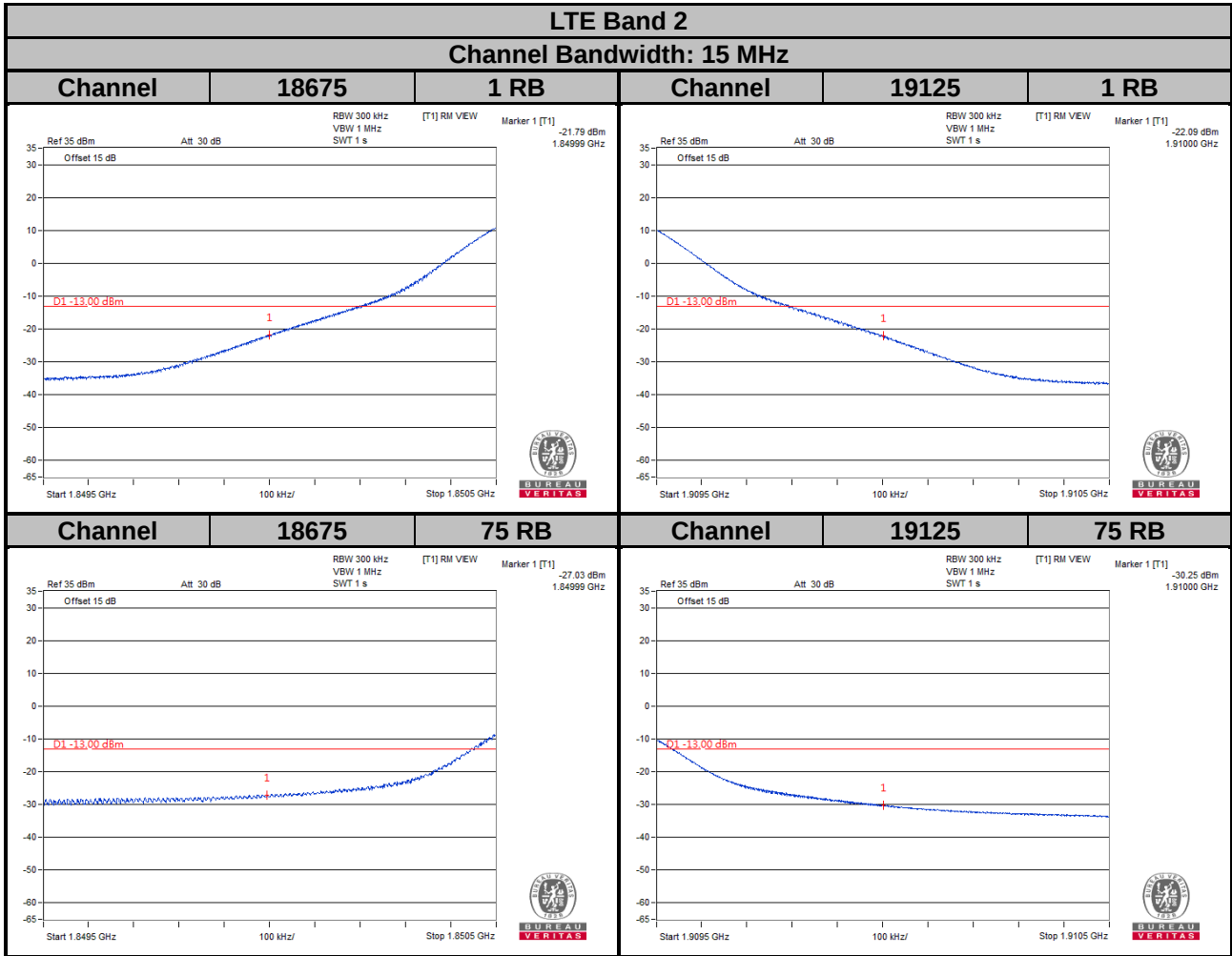


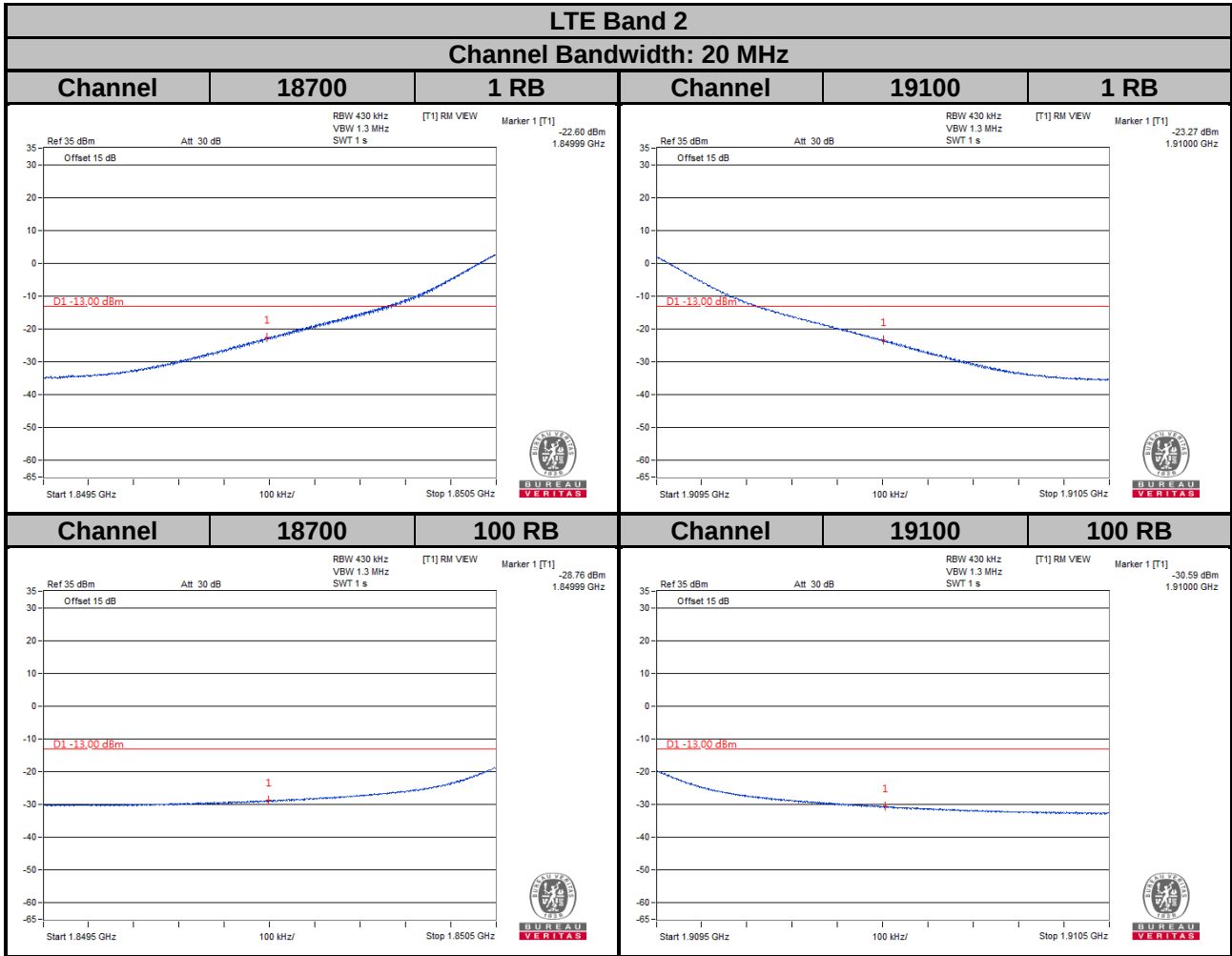










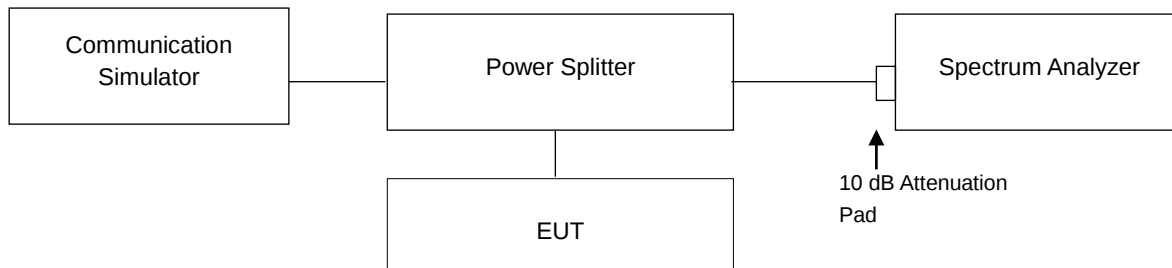


4.6 Peak to Average Ratio

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

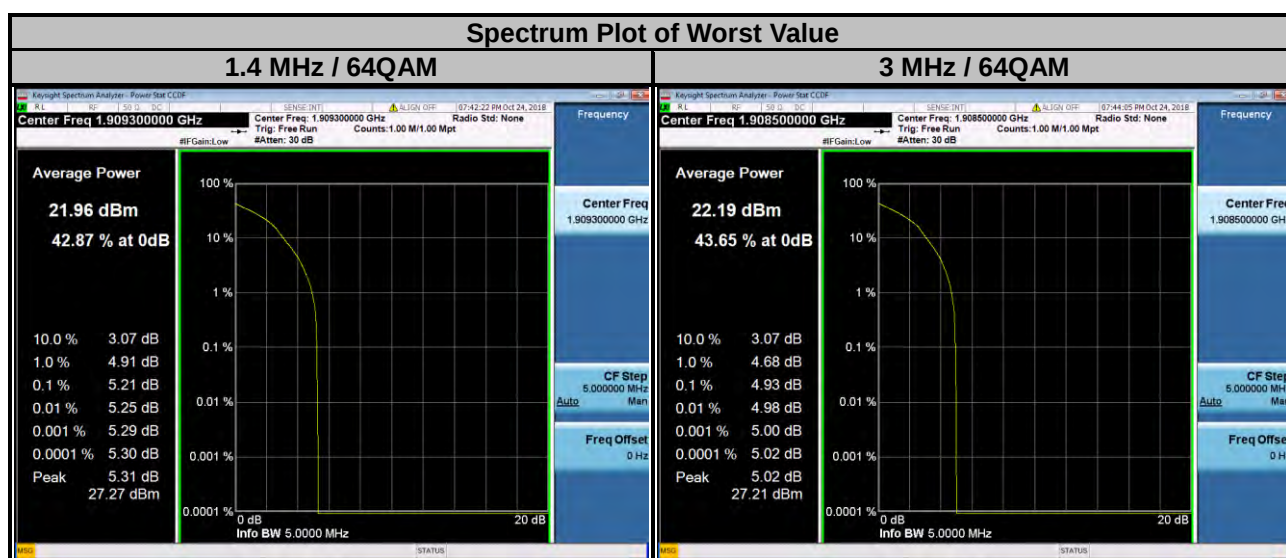
1. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.6.4 Test Results

Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		GSM	EDGE			
512	1850.2	0.17	3.25	9262	1852.4	3.08
661	1880.0	0.15	3.21	9400	1880.0	2.85
810	1909.8	0.17	3.17	9538	1907.6	3.08



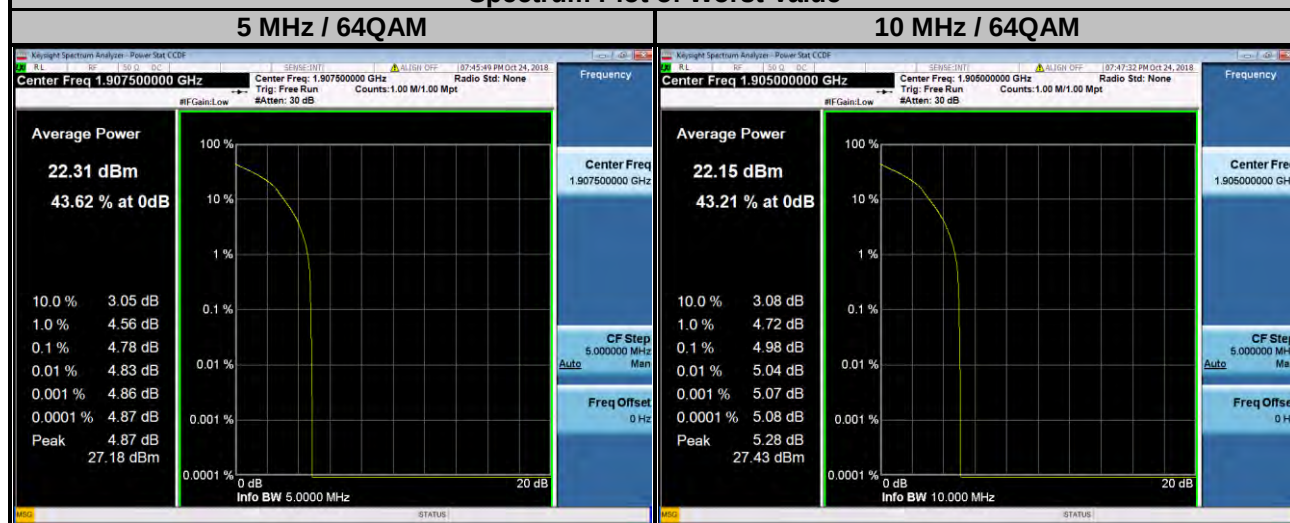
LTE Band 2									
Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
18607	1850.7	3.52	4.44	4.66	18615	1851.5	3.41	4.64	4.78
18900	1880.0	2.87	4.04	4.30	18900	1880.0	2.94	3.85	4.24
19193	1909.3	3.96	4.85	5.21	19185	1908.5	3.64	4.81	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	64QAM			QPSK	16QAM	64QAM
18625	1852.5	3.39	4.74	4.75	18650	1855.0	3.55	4.55	4.63
18900	1880.0	3.01	4.06	4.15	18900	1880.0	3.22	4.16	4.56
19175	1907.5	3.74	4.66	4.78	19150	1905.0	3.73	4.67	4.98

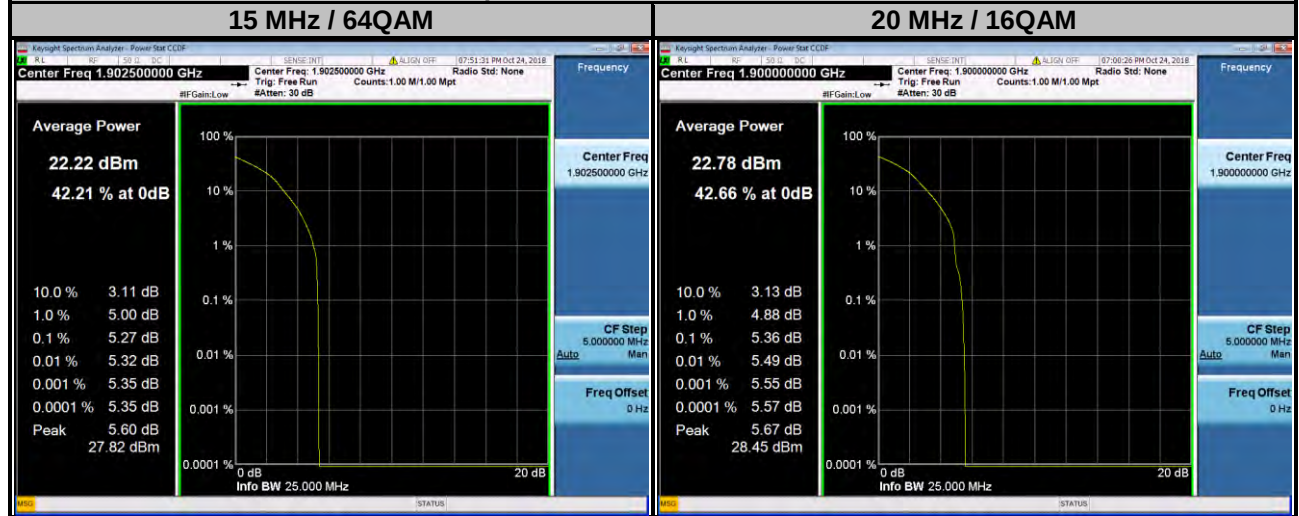
Spectrum Plot of Worst Value



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	16QAM	64QAM			QPSK	16QAM	64QAM
18675	1857.5	3.48	4.35	4.96	18700	1860.0	3.49	4.10	4.74
18900	1880.0	3.35	4.65	4.62	18900	1880.0	3.93	4.79	4.81
19125	1902.5	4.16	4.98	5.27	19100	1900.0	4.25	5.36	5.21

Spectrum Plot of Worst Value

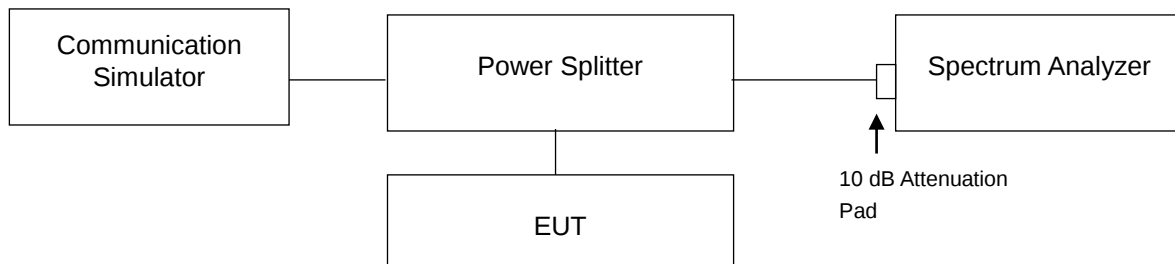


4.7 Conducted Spurious Emissions

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.

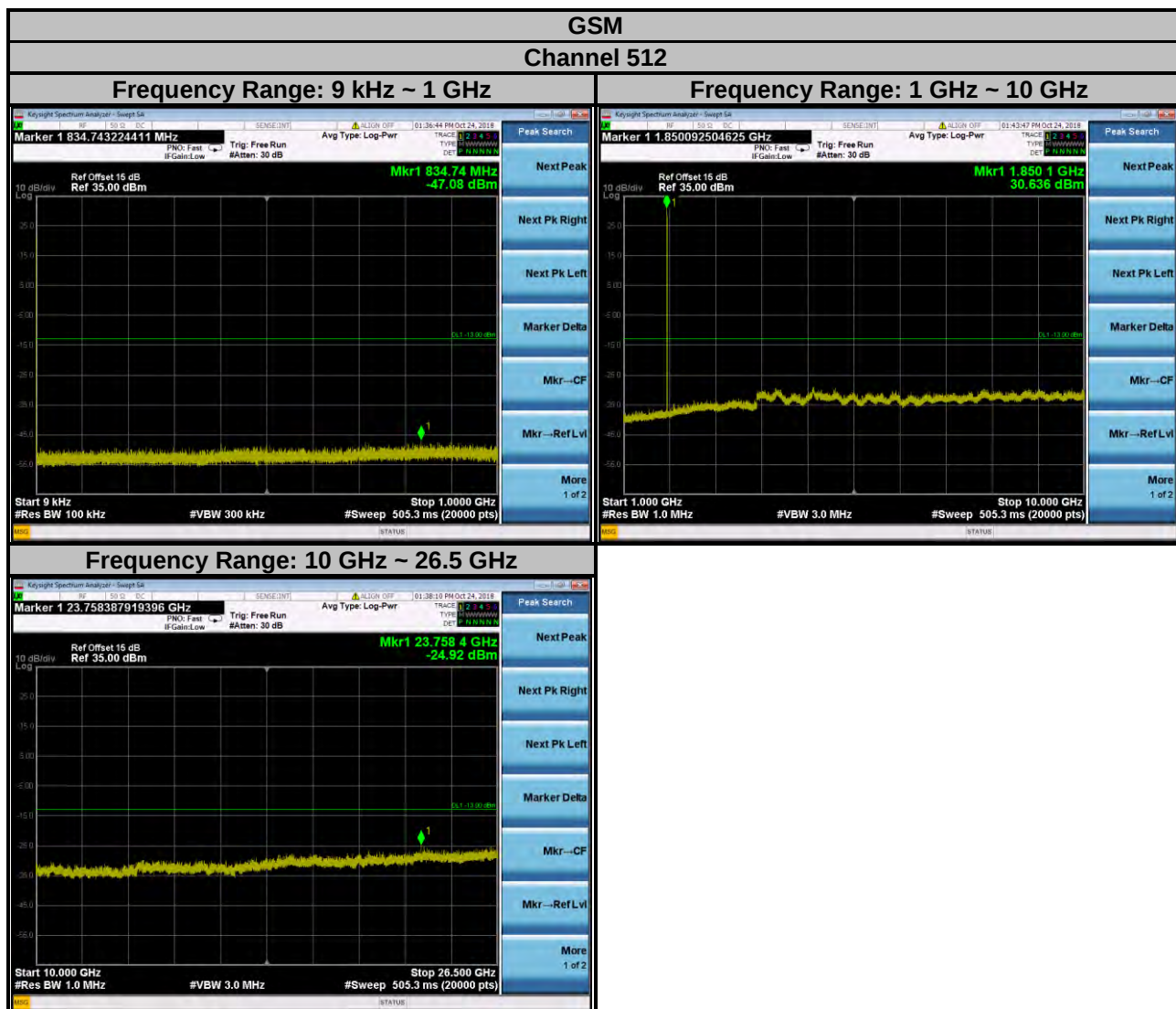
4.7.2 Test Setup



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 = 100 kHz and VBW = 300 kHz is used for conducted emission measurement.
- Measuring frequency range is from 1 GHz to 26.5 GHz / 27 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

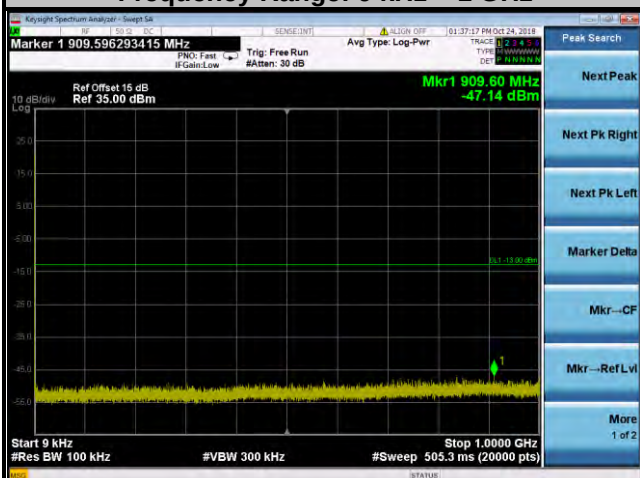


Note: The signal over the limit in 9 kHz is from spectrum analyzer.

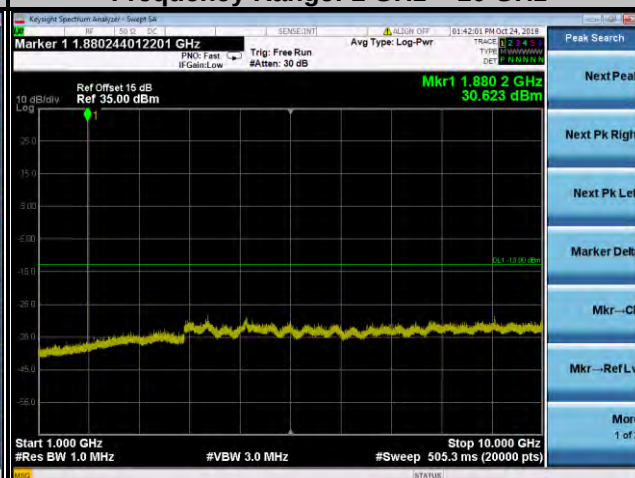
GSM

Channel 661

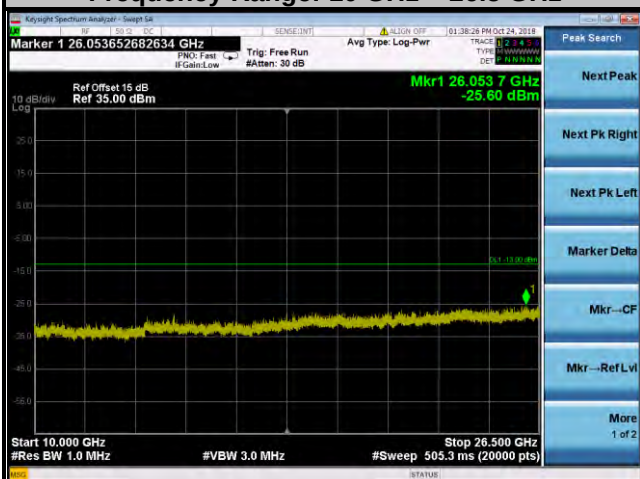
Frequency Range: 9 kHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



Frequency Range: 10 GHz ~ 26.5 GHz

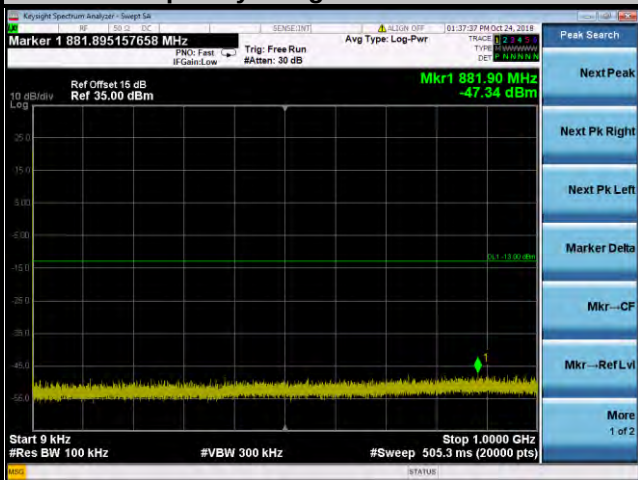


Note: The signal over the limit in 9 kHz is from spectrum analyzer.

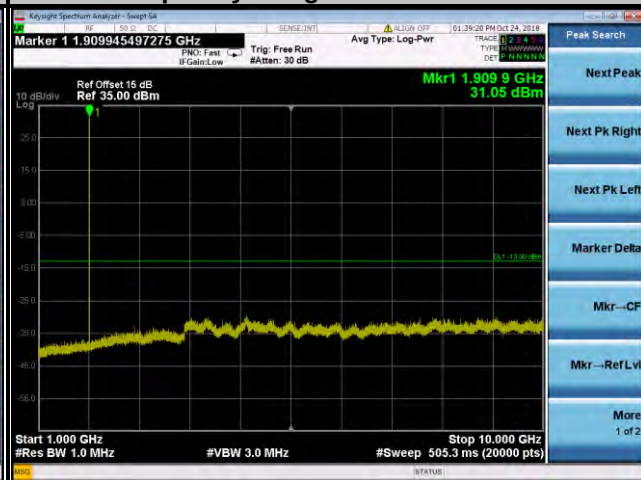
GSM

Channel 810

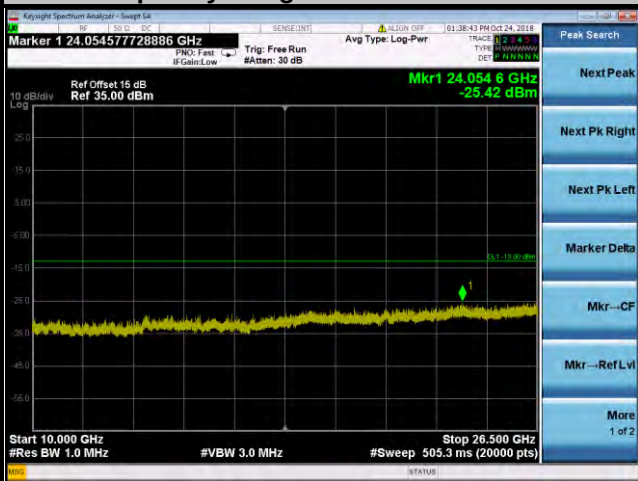
Frequency Range: 9 kHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



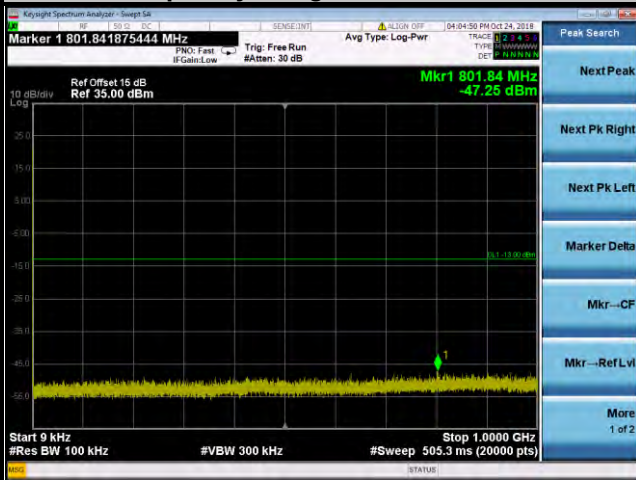
Frequency Range: 10 GHz ~ 26.5 GHz



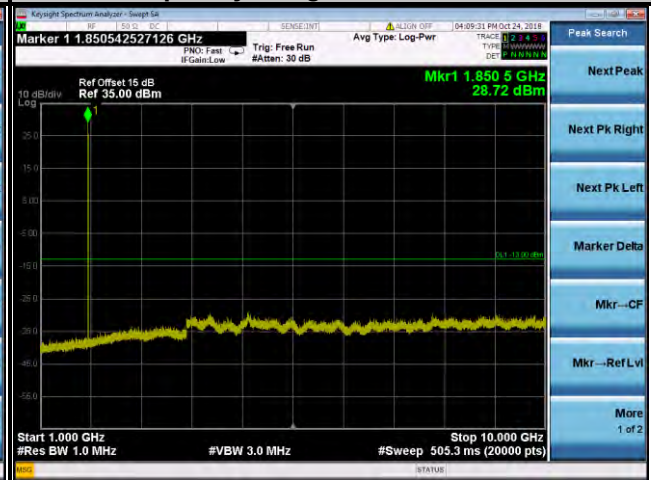
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

EDGE Channel 512

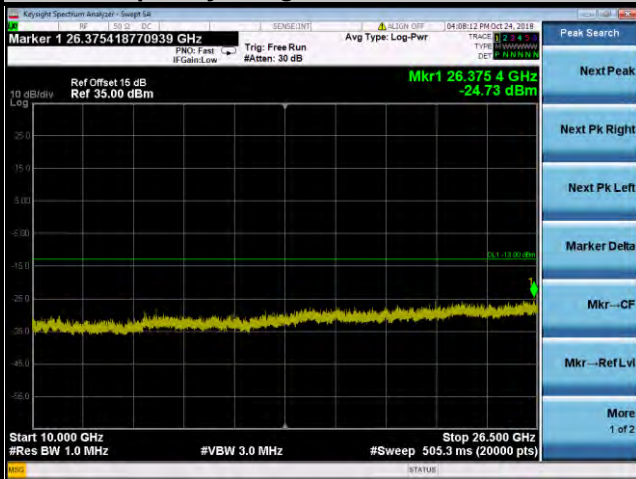
Frequency Range: 9 kHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



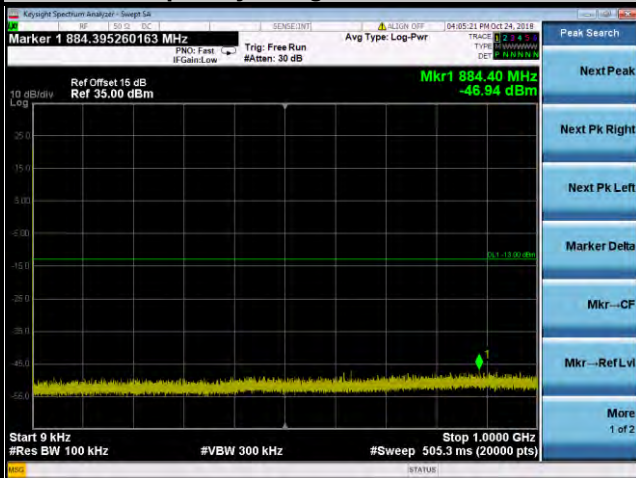
Frequency Range: 10 GHz ~ 26.5 GHz



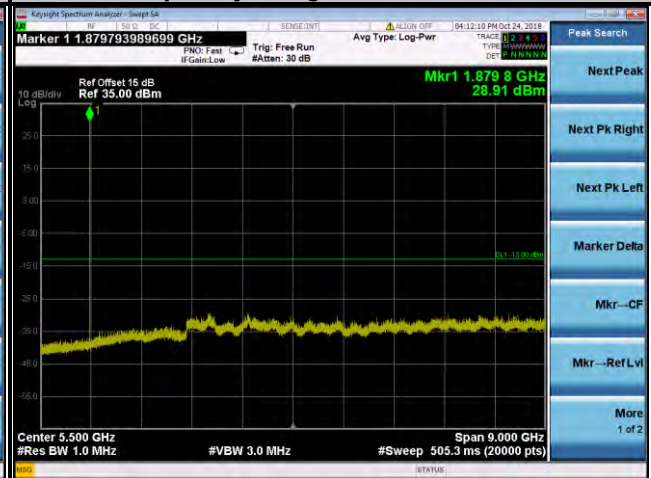
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

EDGE Channel 661

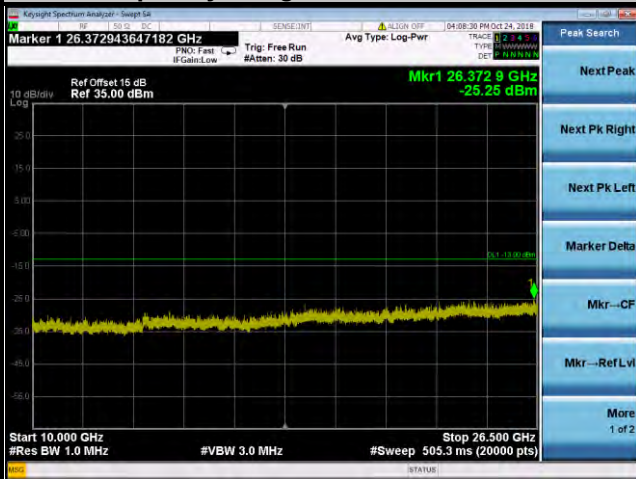
Frequency Range: 9 kHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



Frequency Range: 10 GHz ~ 26.5 GHz

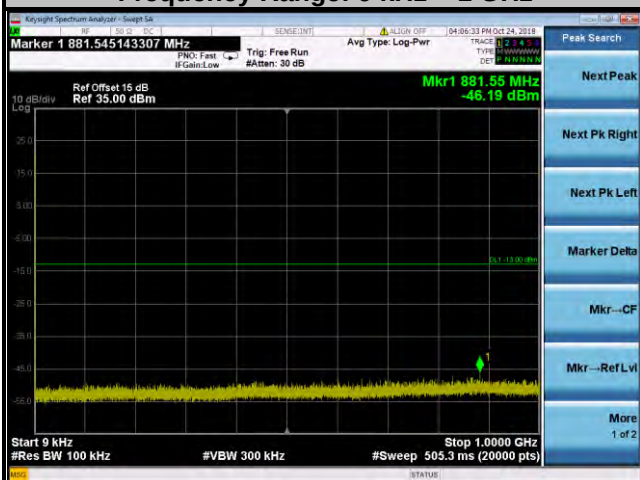


Note: The signal over the limit in 9 kHz is from spectrum analyzer.

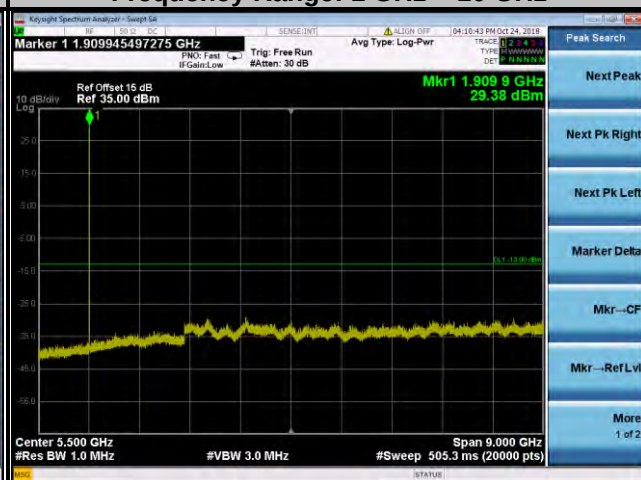
EDGE

Channel 810

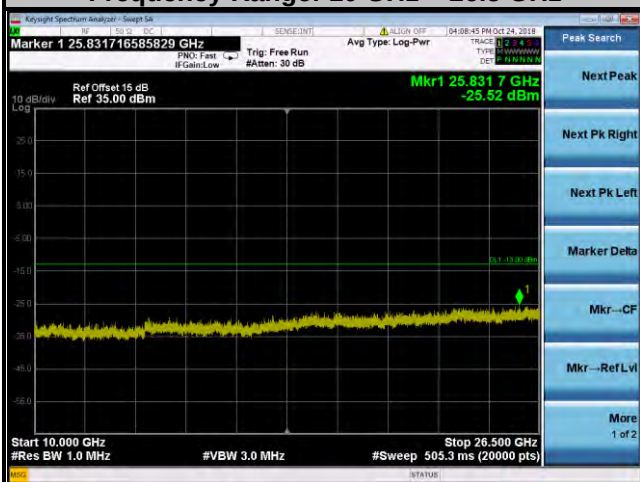
Frequency Range: 9 kHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



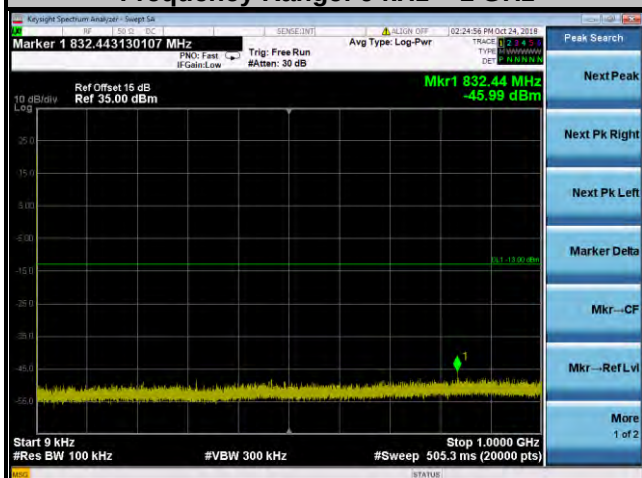
Frequency Range: 10 GHz ~ 26.5 GHz



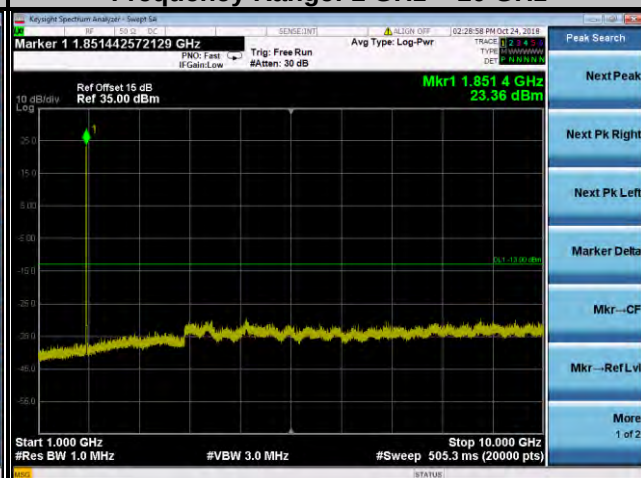
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

WCDMA Channel 9262

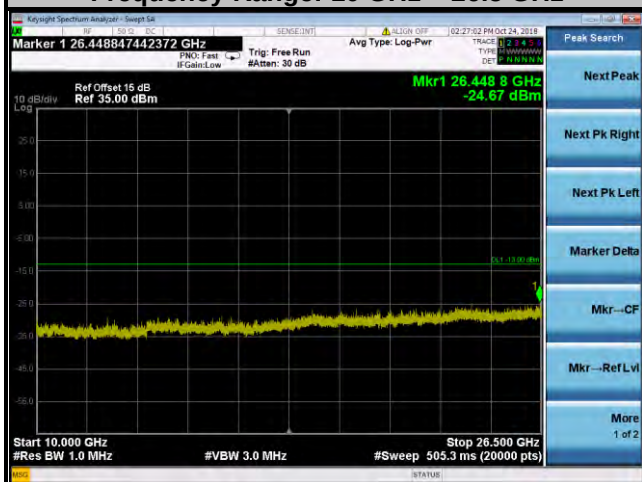
Frequency Range: 9 kHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



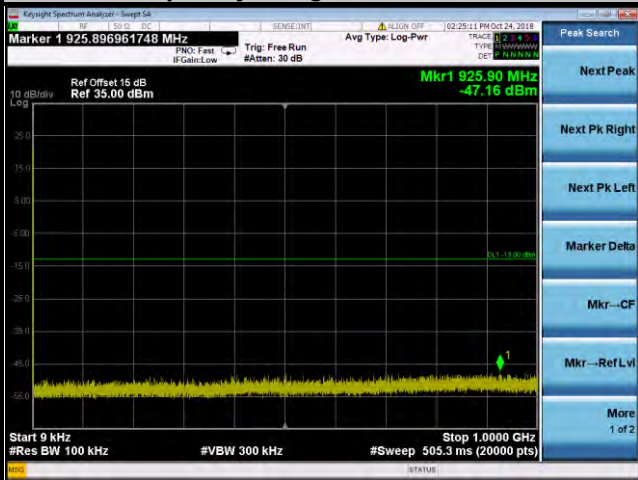
Frequency Range: 10 GHz ~ 26.5 GHz



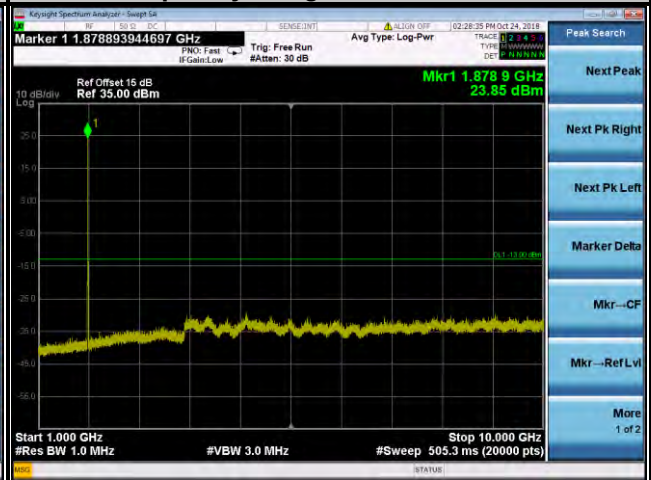
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

WCDMA Channel 9400

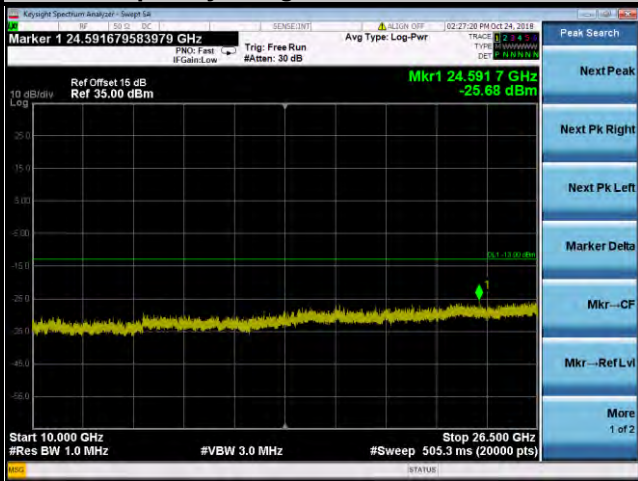
Frequency Range: 9 kHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



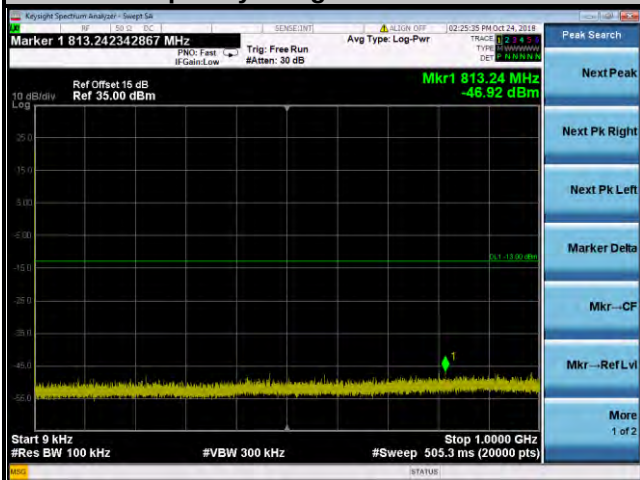
Frequency Range: 10 GHz ~ 26.5 GHz



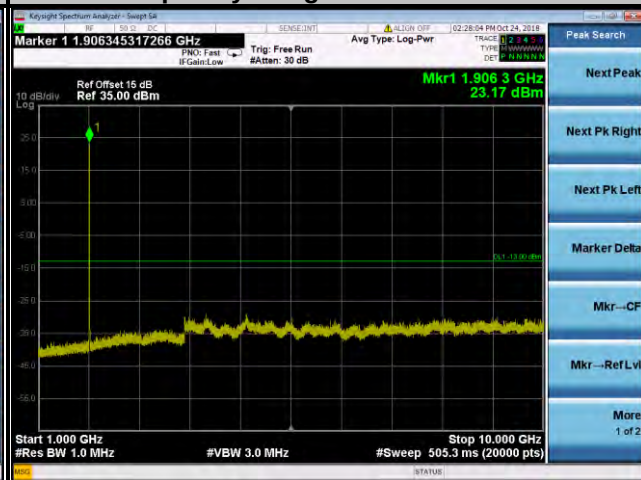
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

WCDMA Channel 9538

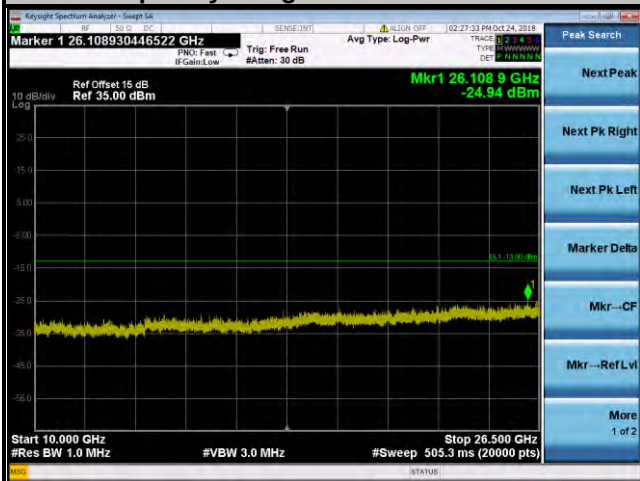
Frequency Range: 9 kHz ~ 1 GHz



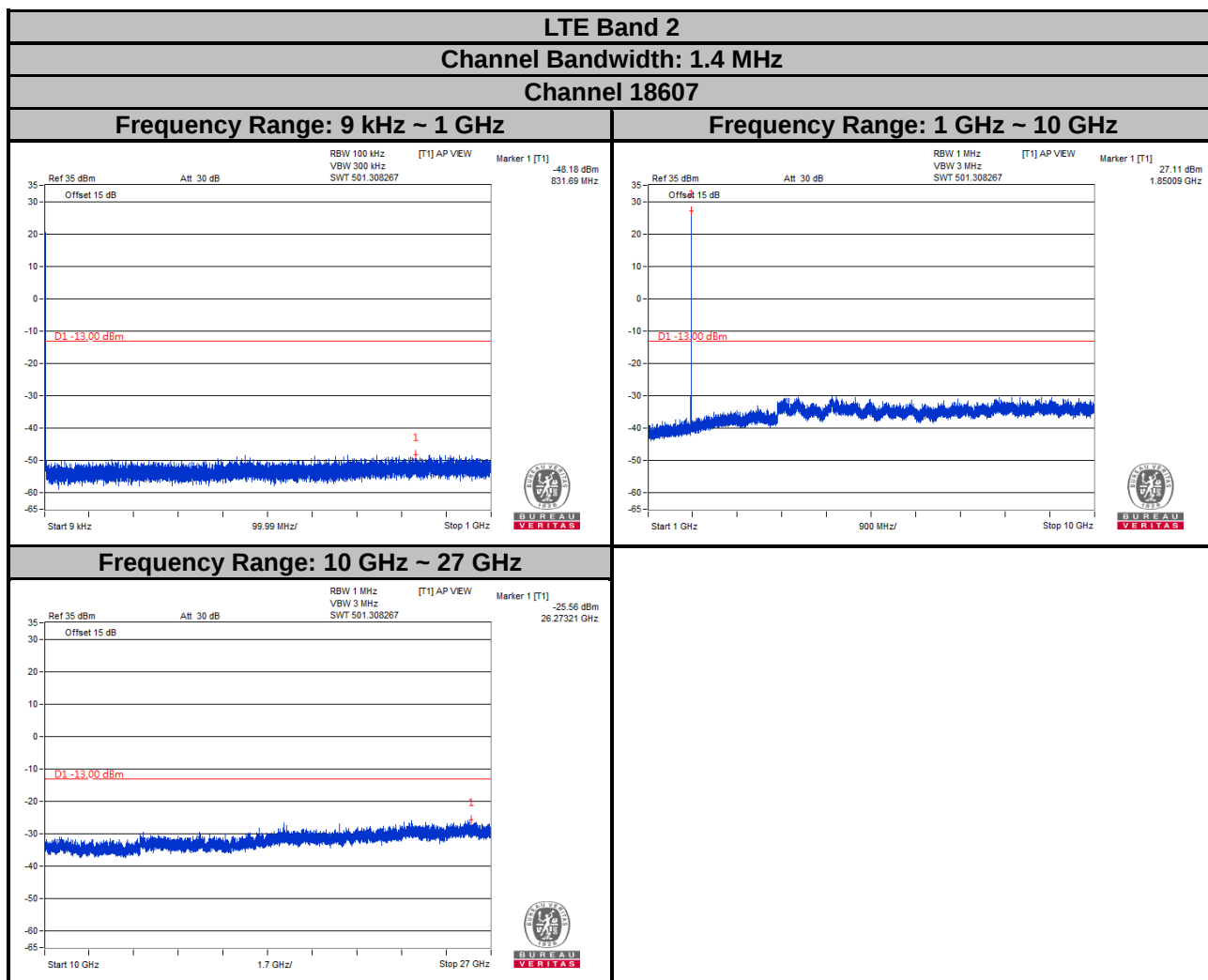
Frequency Range: 1 GHz ~ 10 GHz



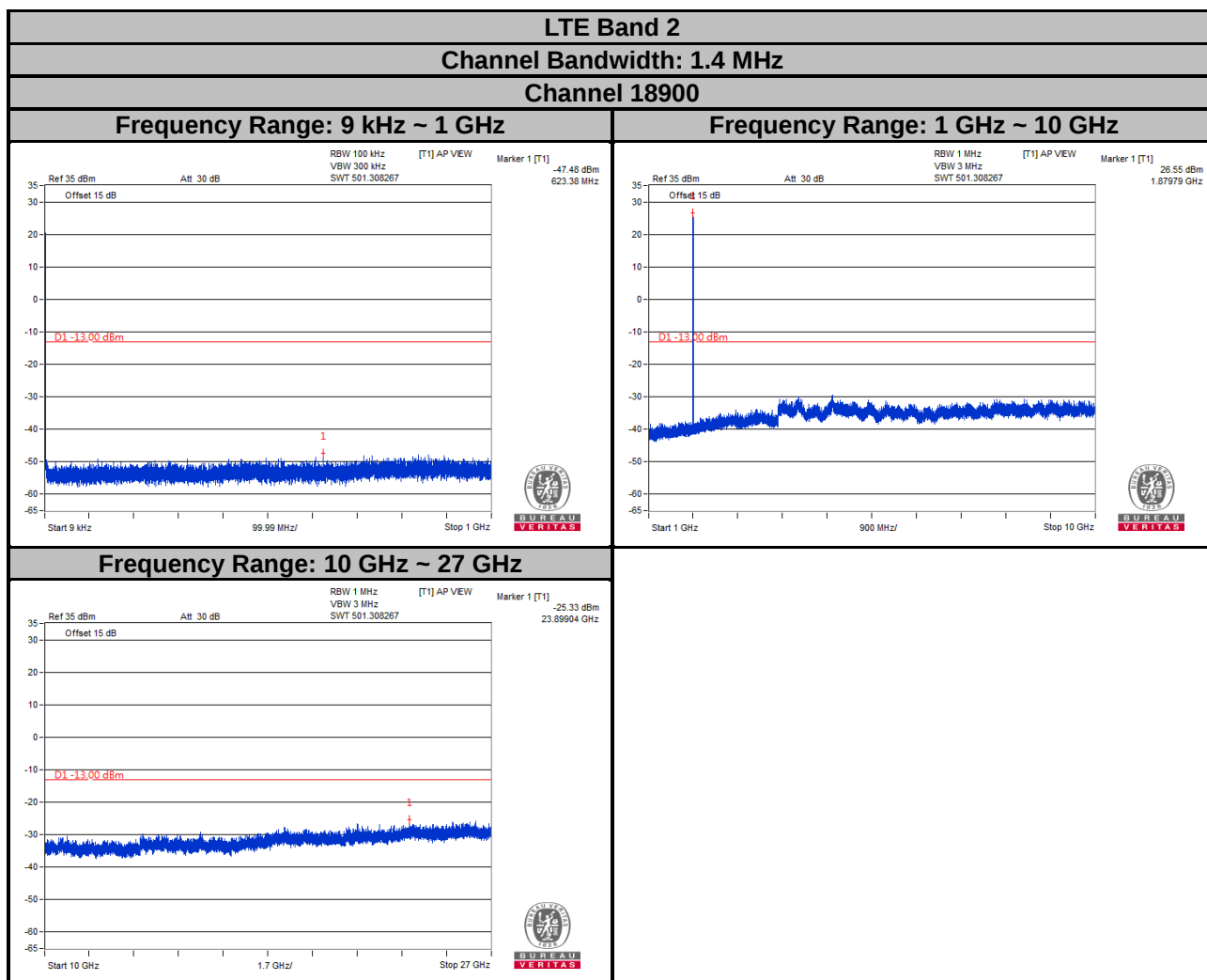
Frequency Range: 10 GHz ~ 26.5 GHz



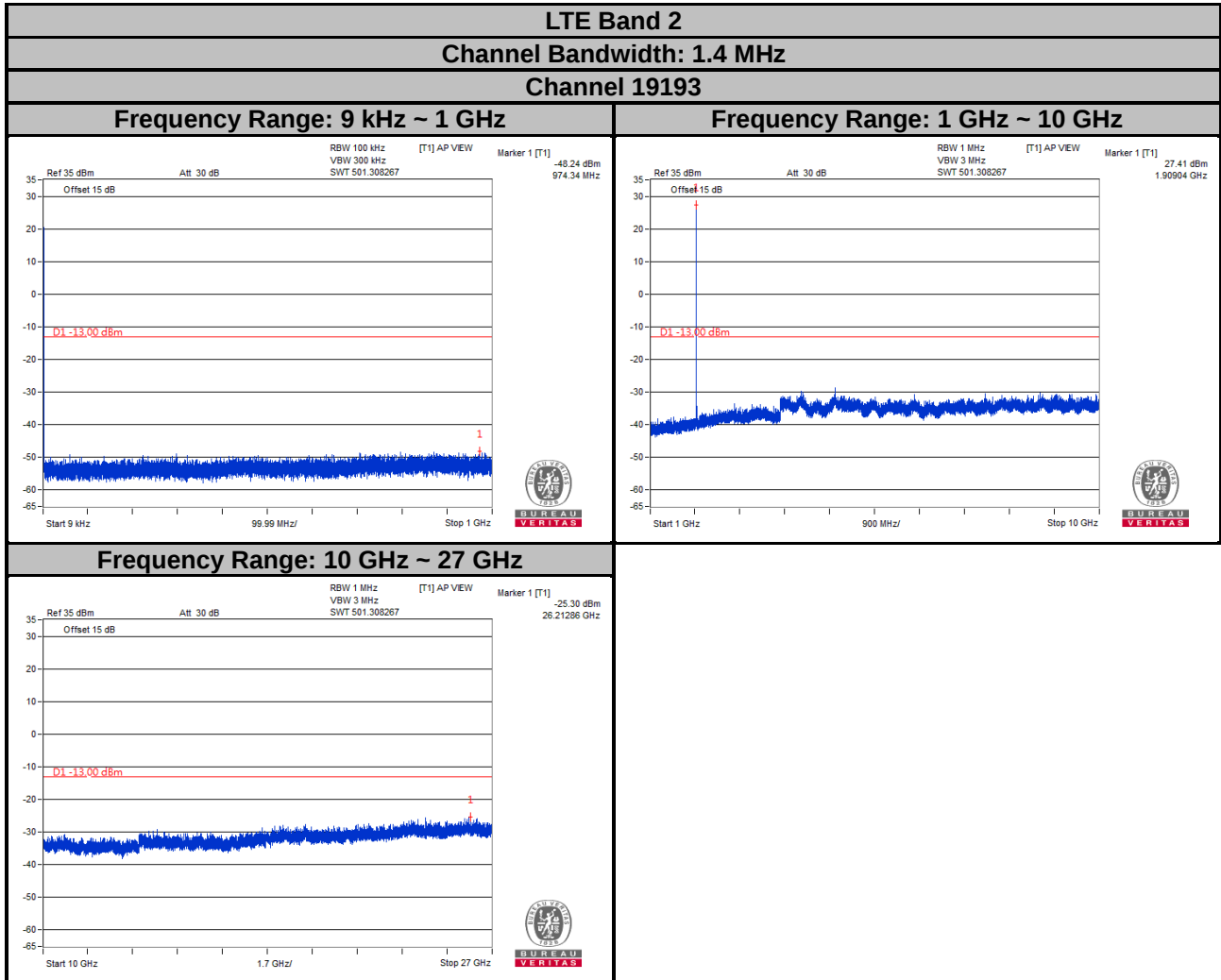
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



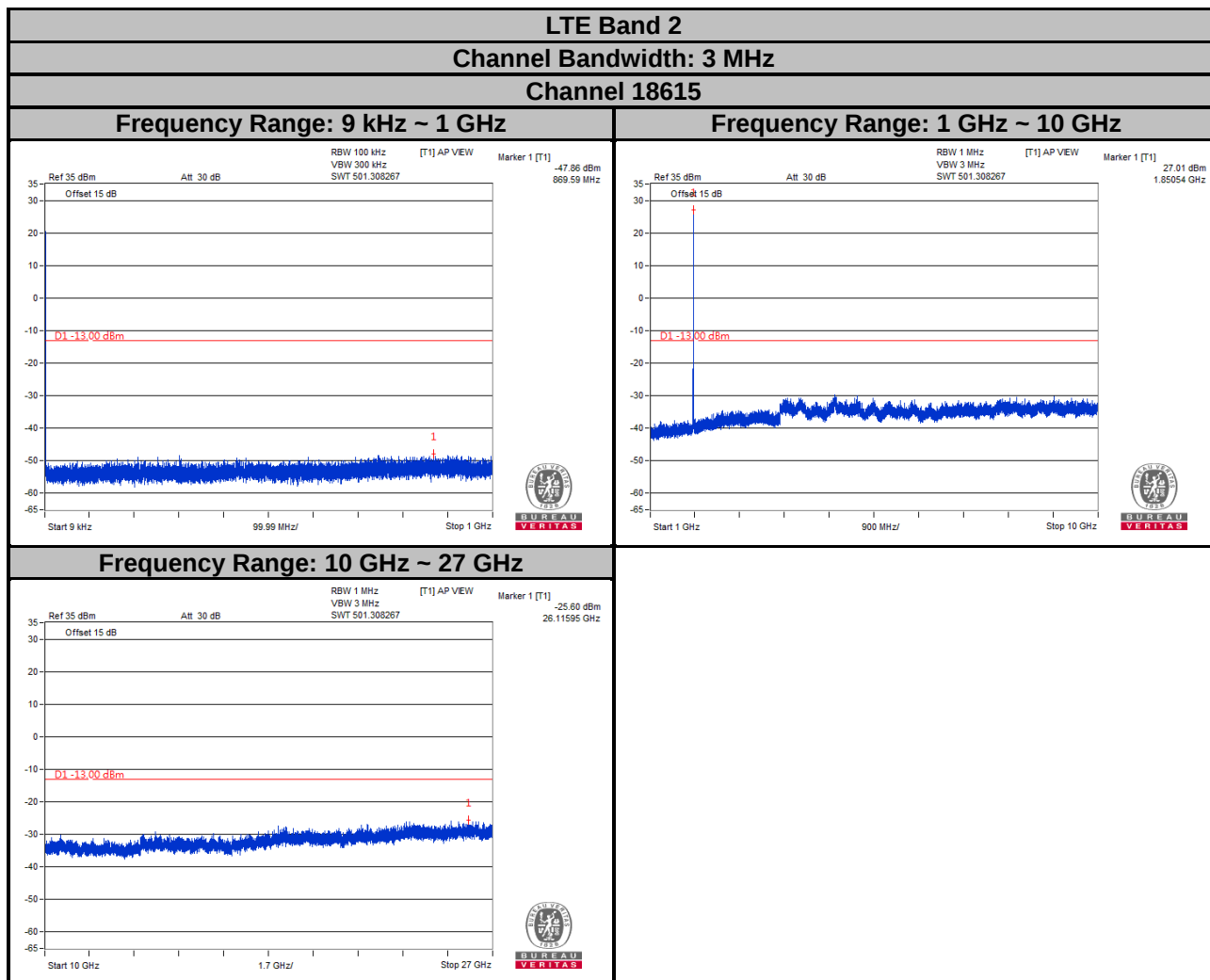
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



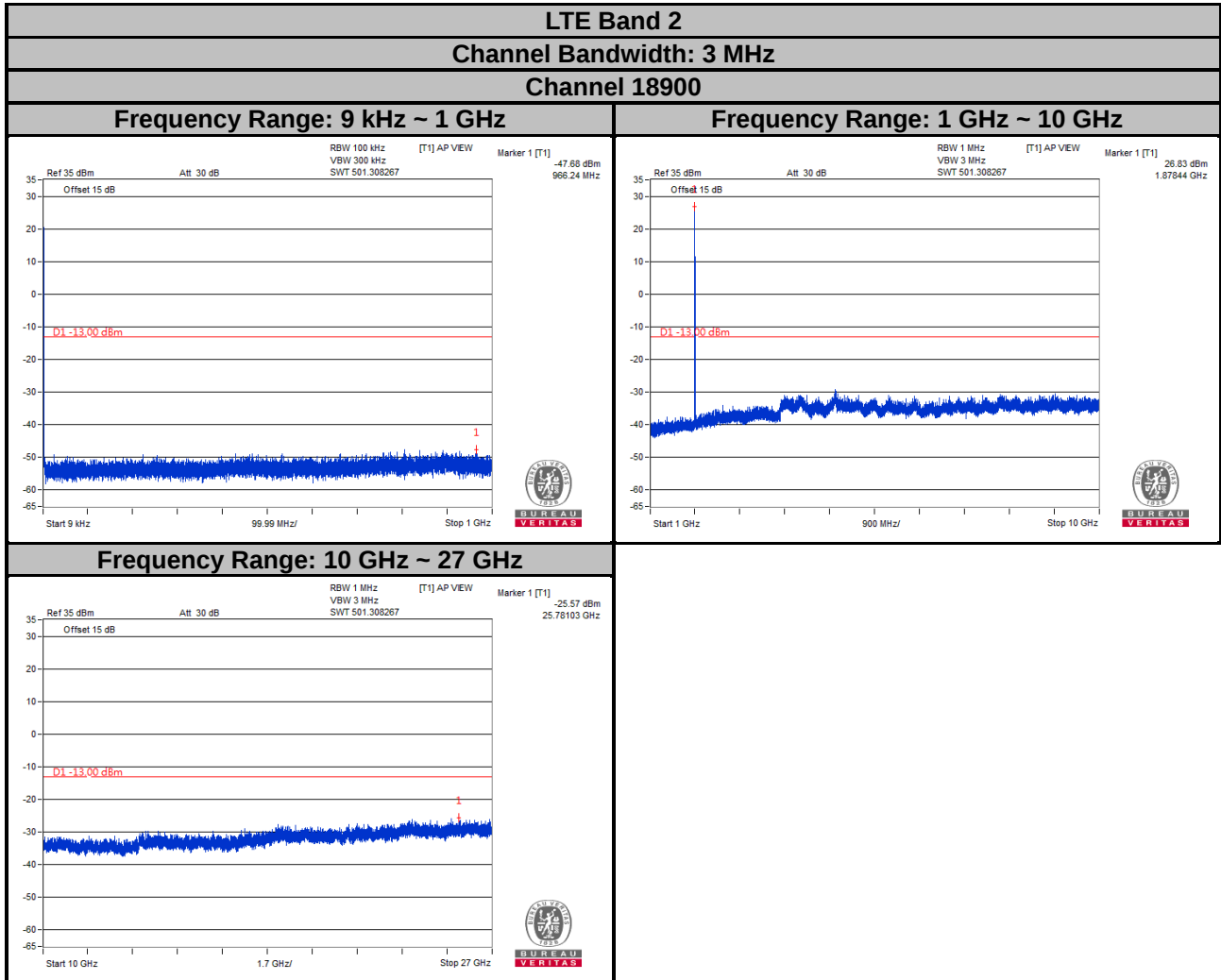
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



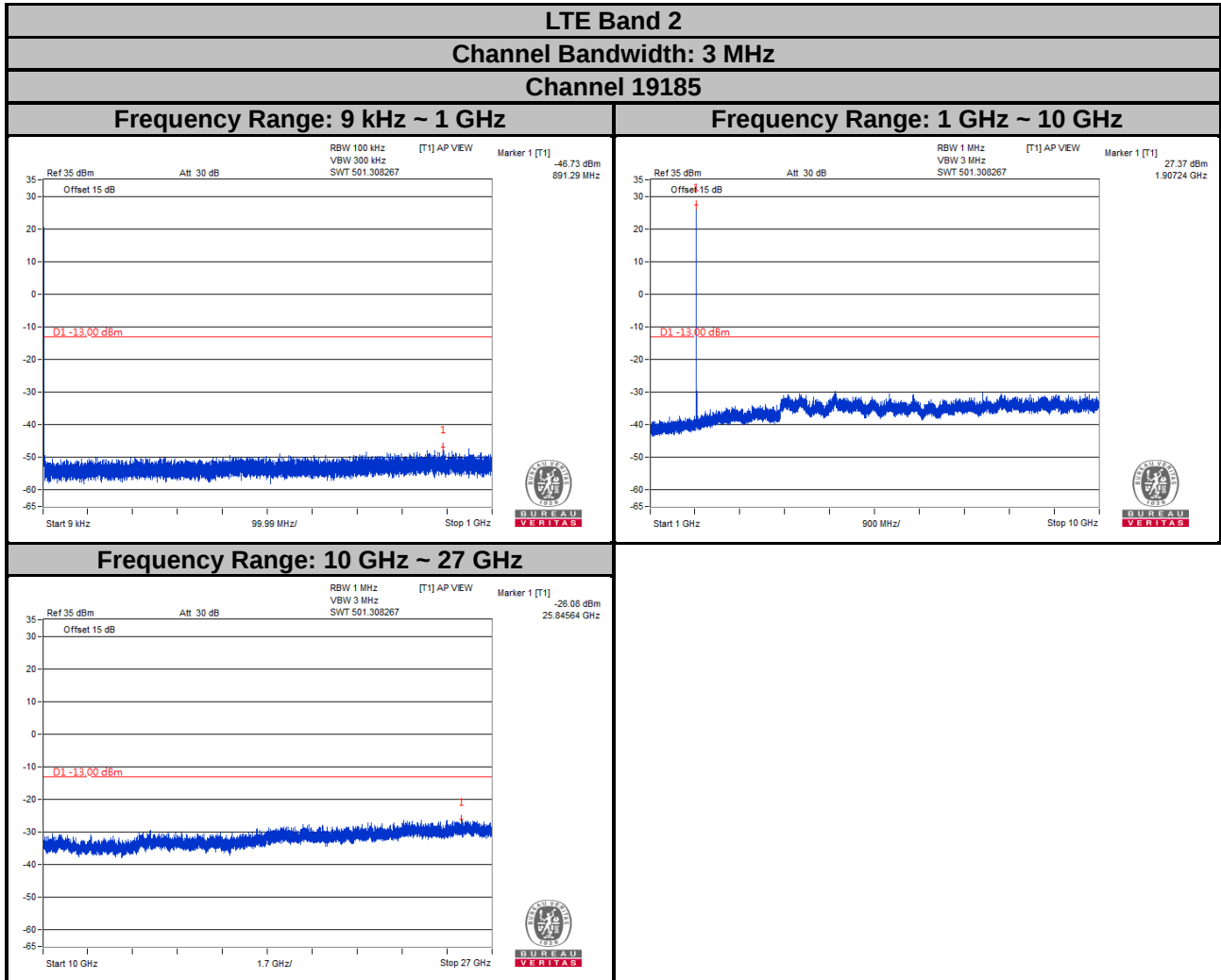
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



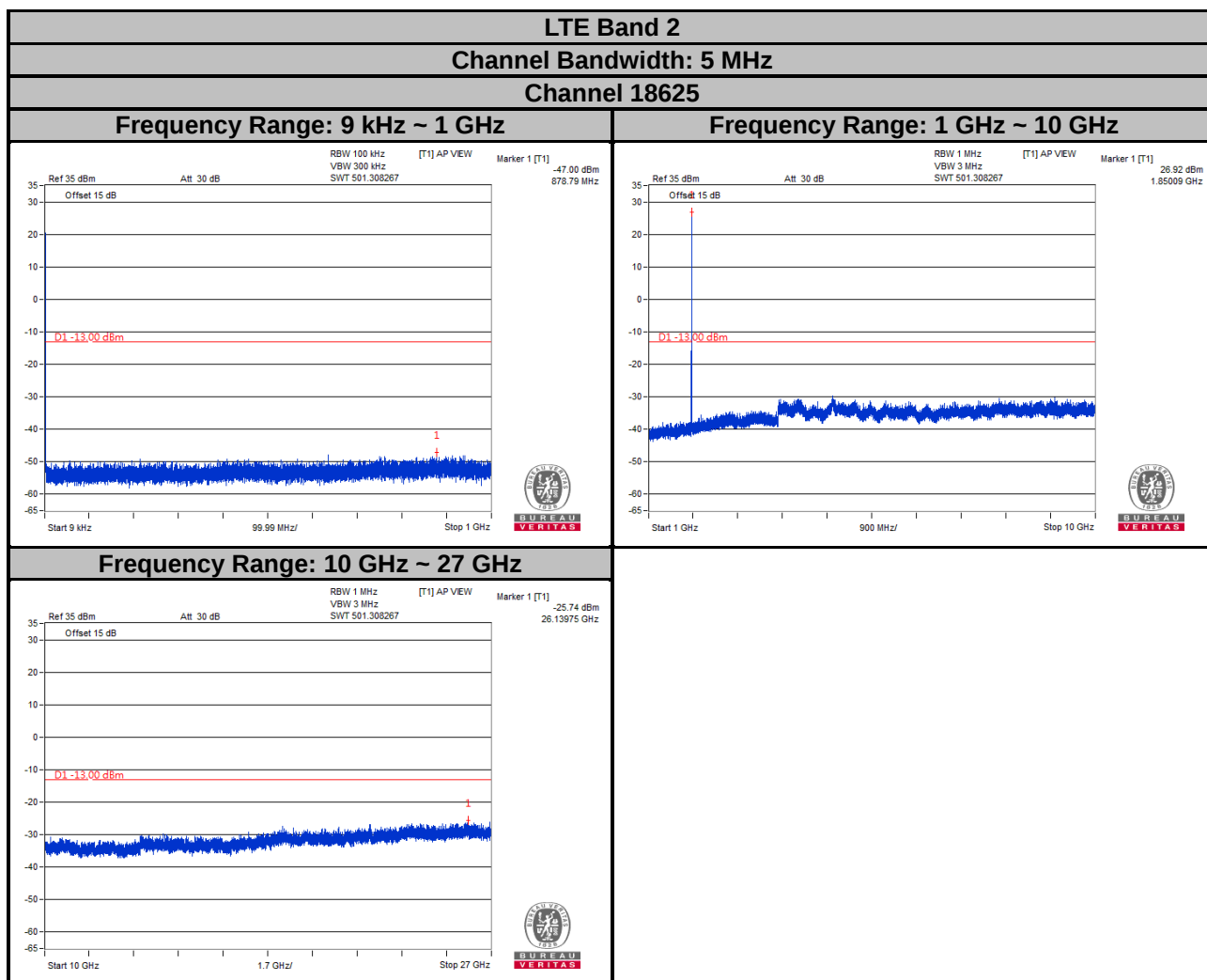
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



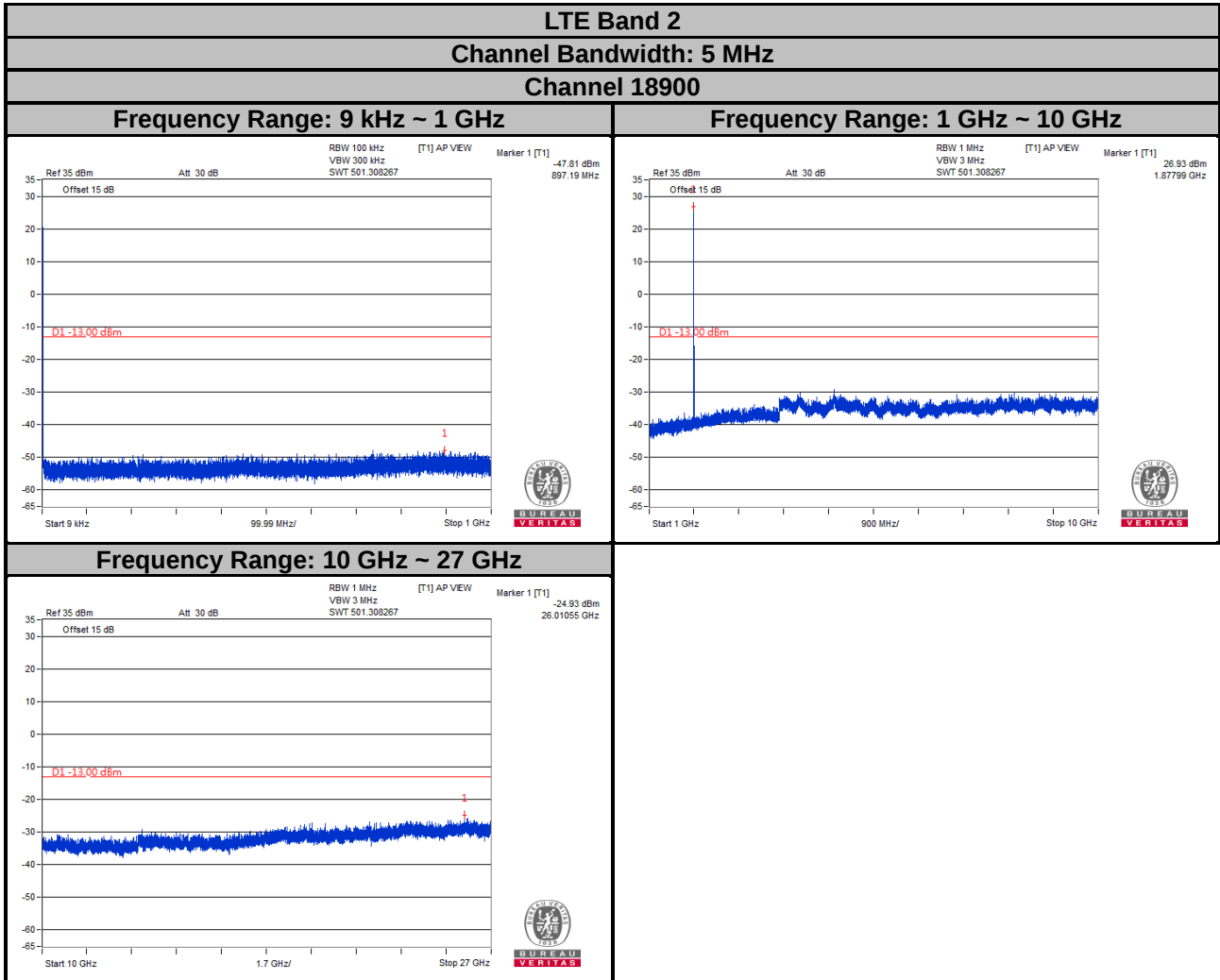
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



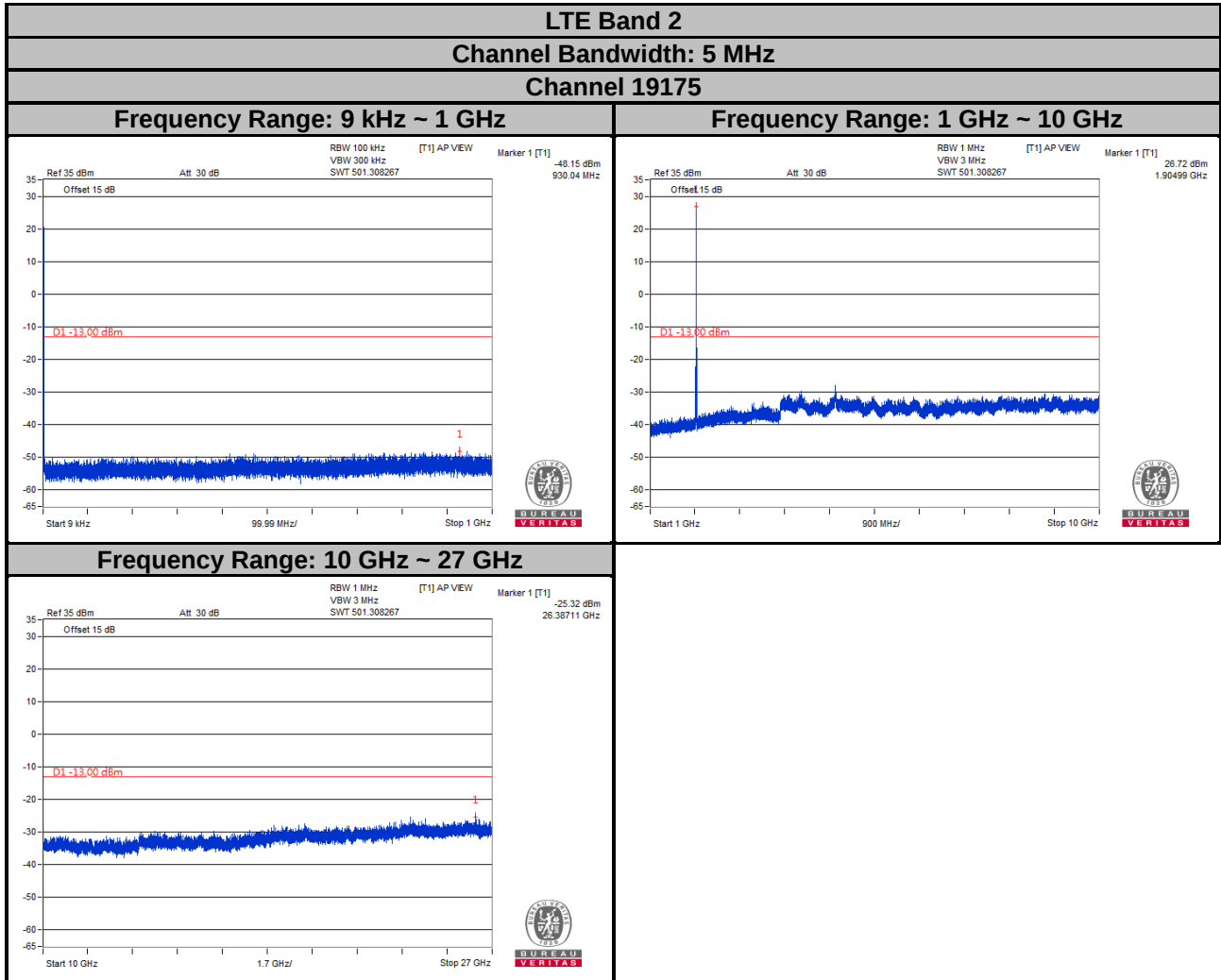
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



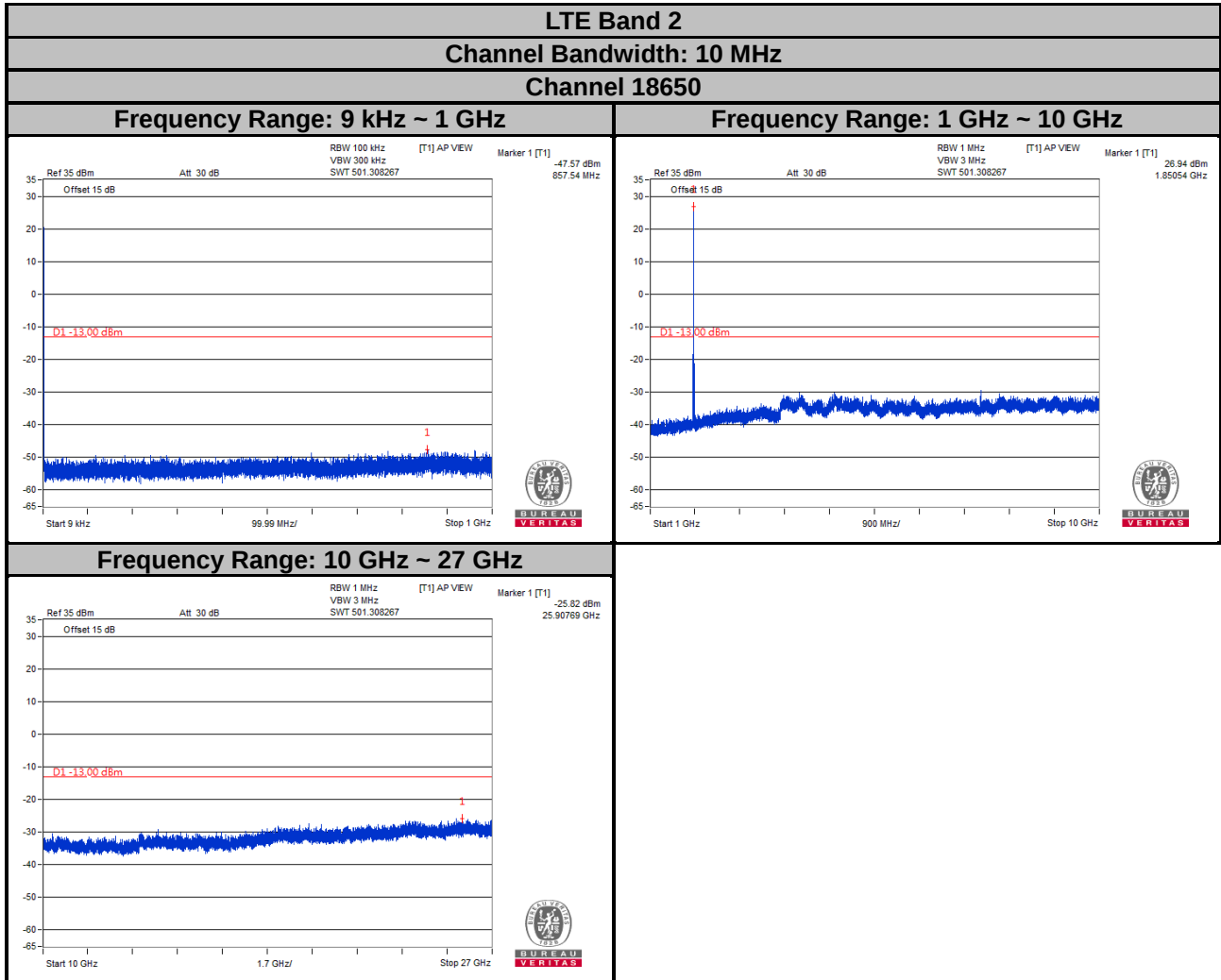
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



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



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



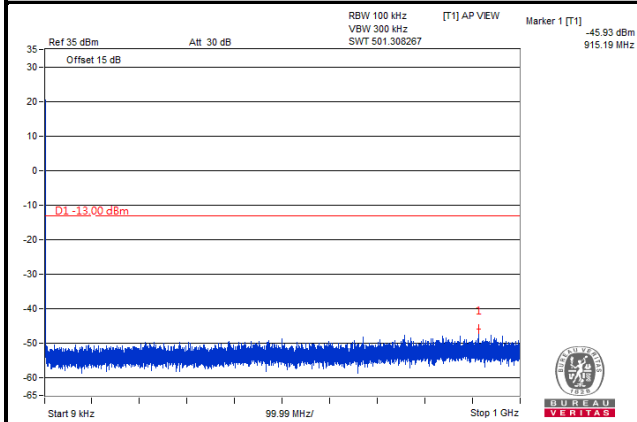
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2

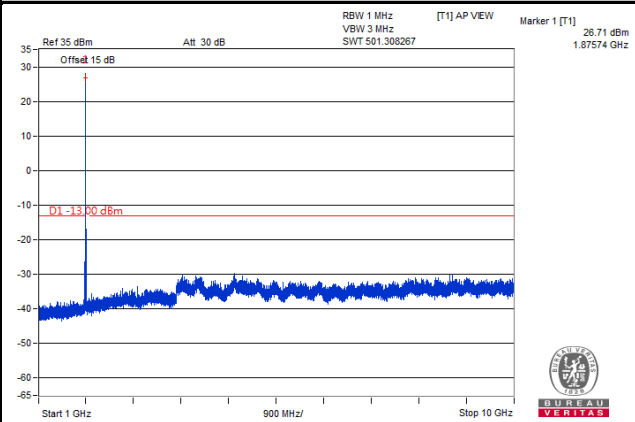
Channel Bandwidth: 10 MHz

Channel 18900

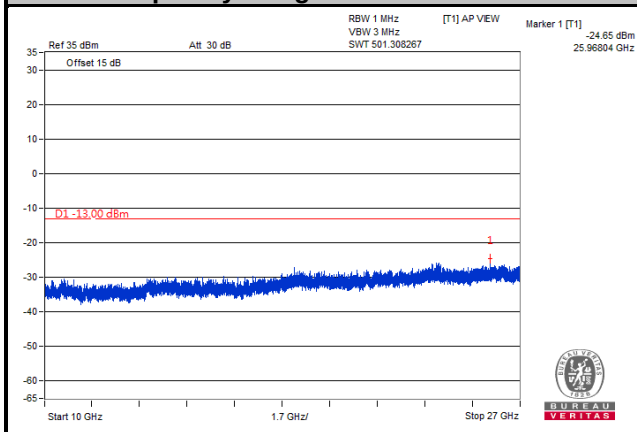
Frequency Range: 9 kHz ~ 1 GHz

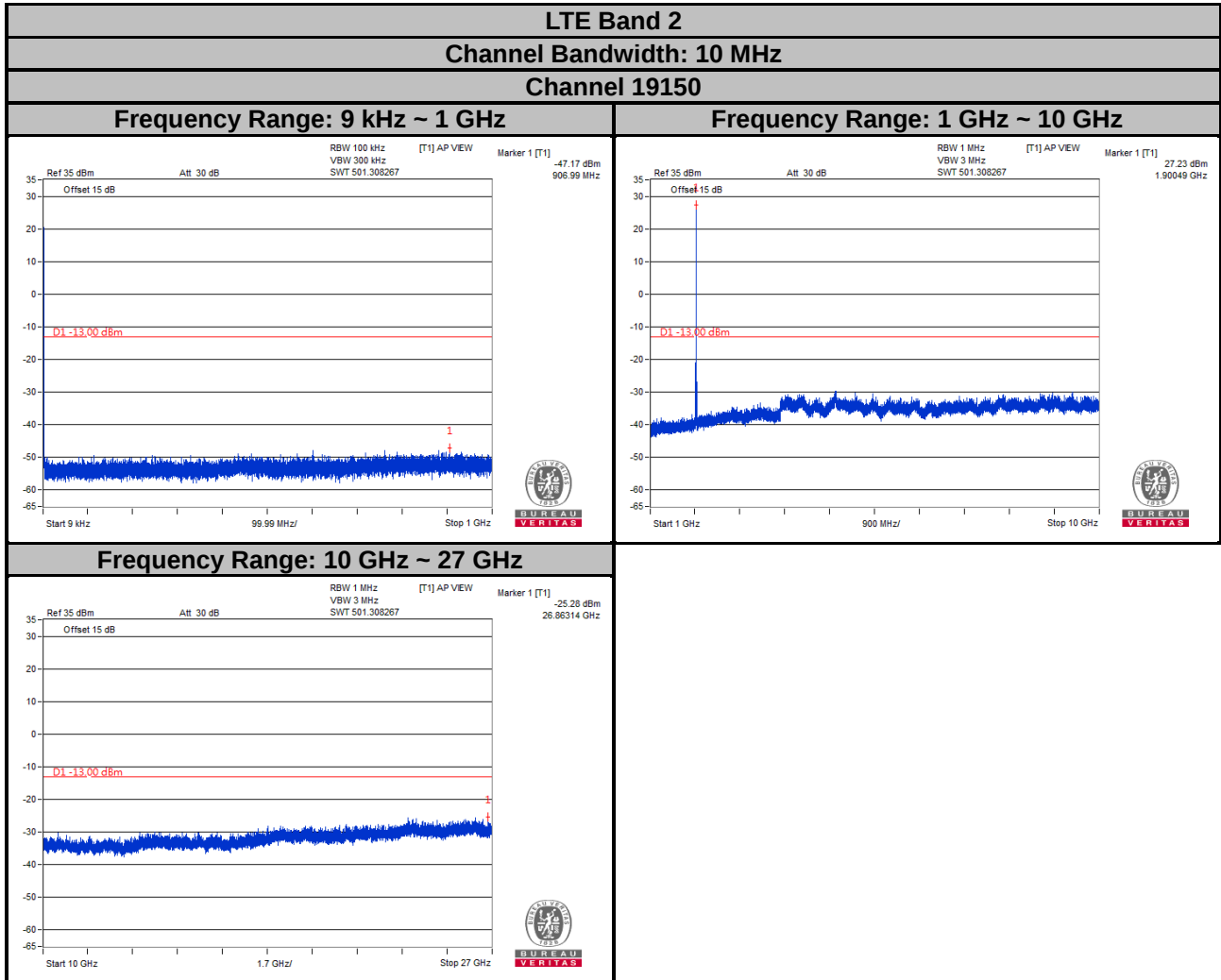


Frequency Range: 1 GHz ~ 10 GHz

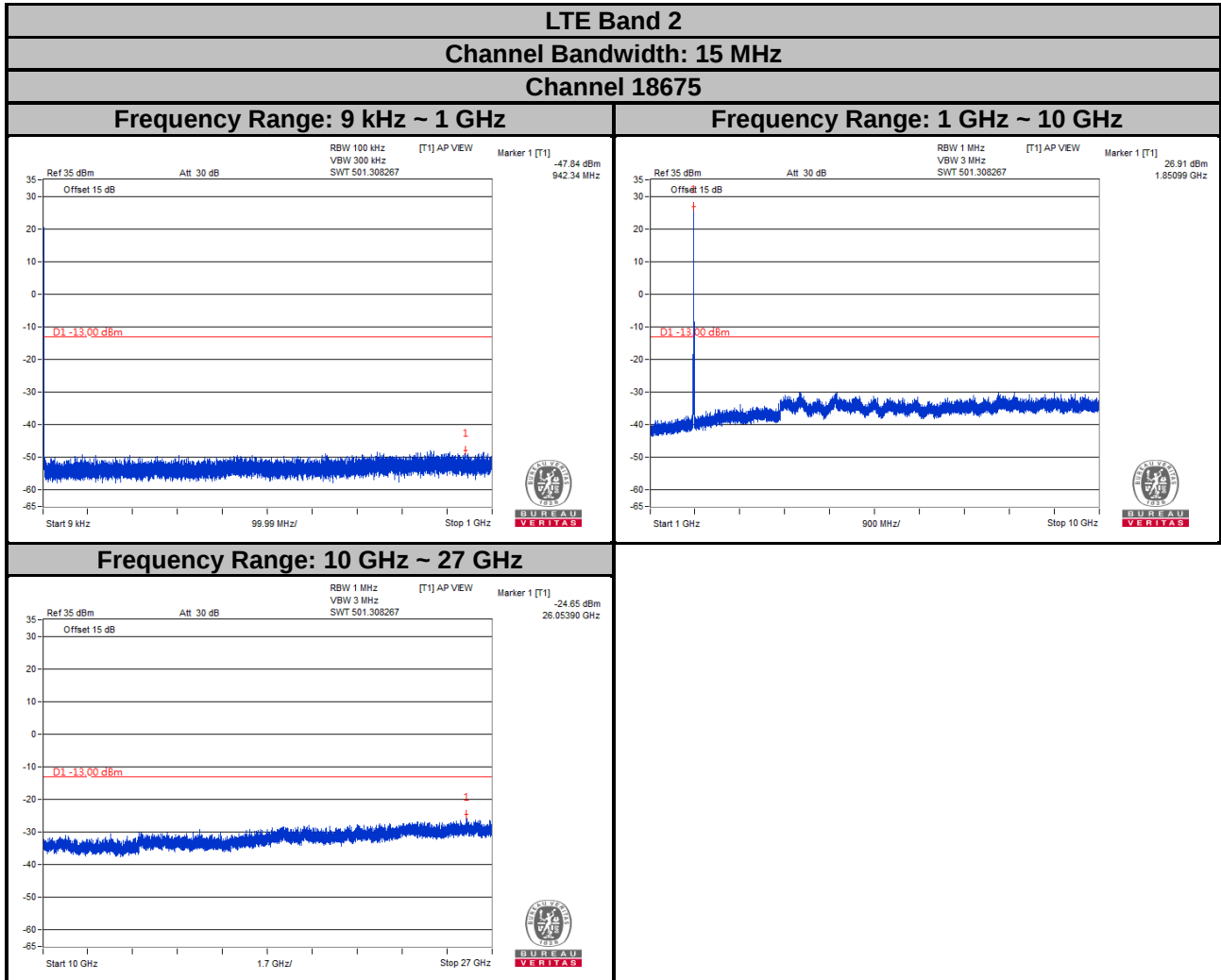


Frequency Range: 10 GHz ~ 27 GHz

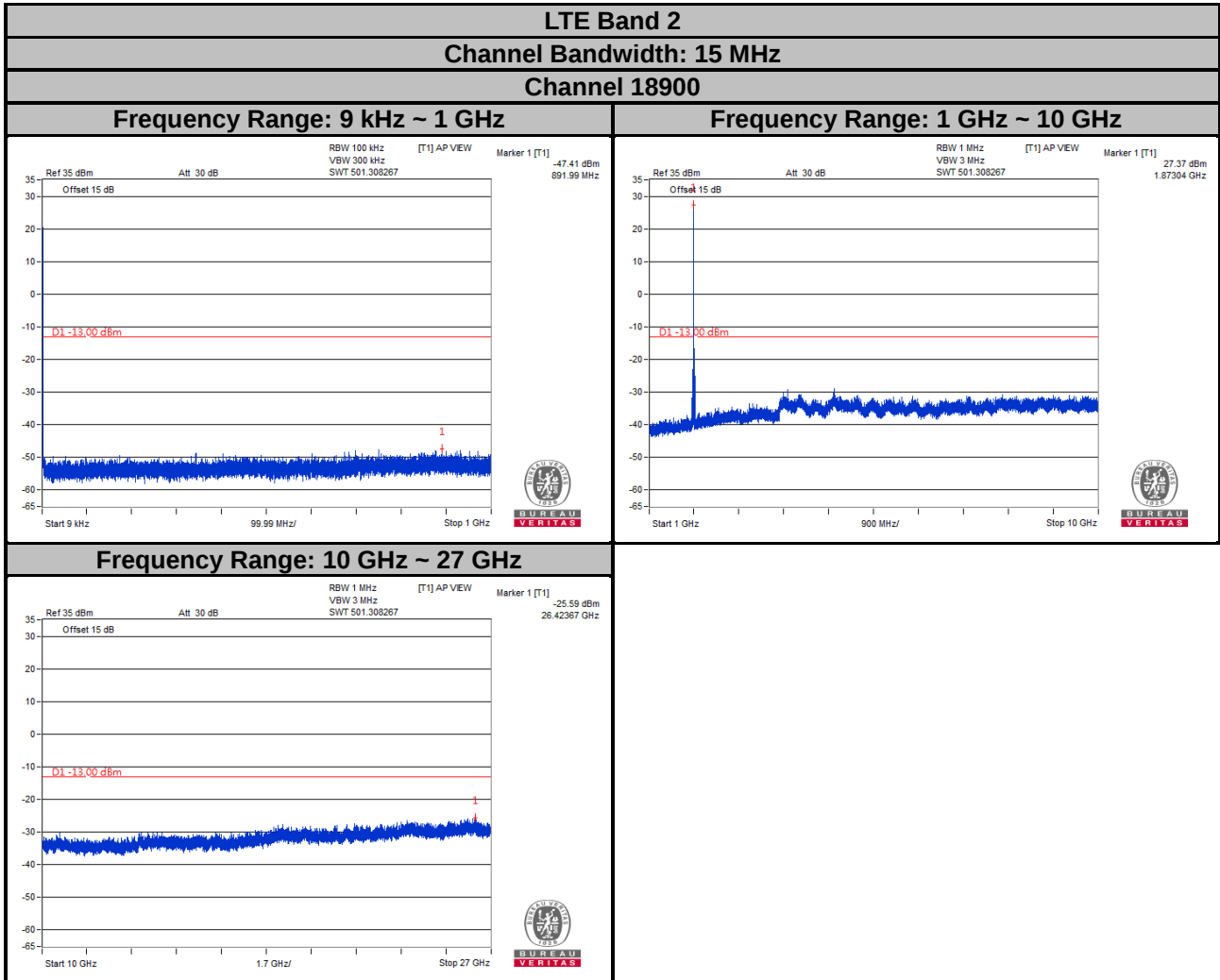




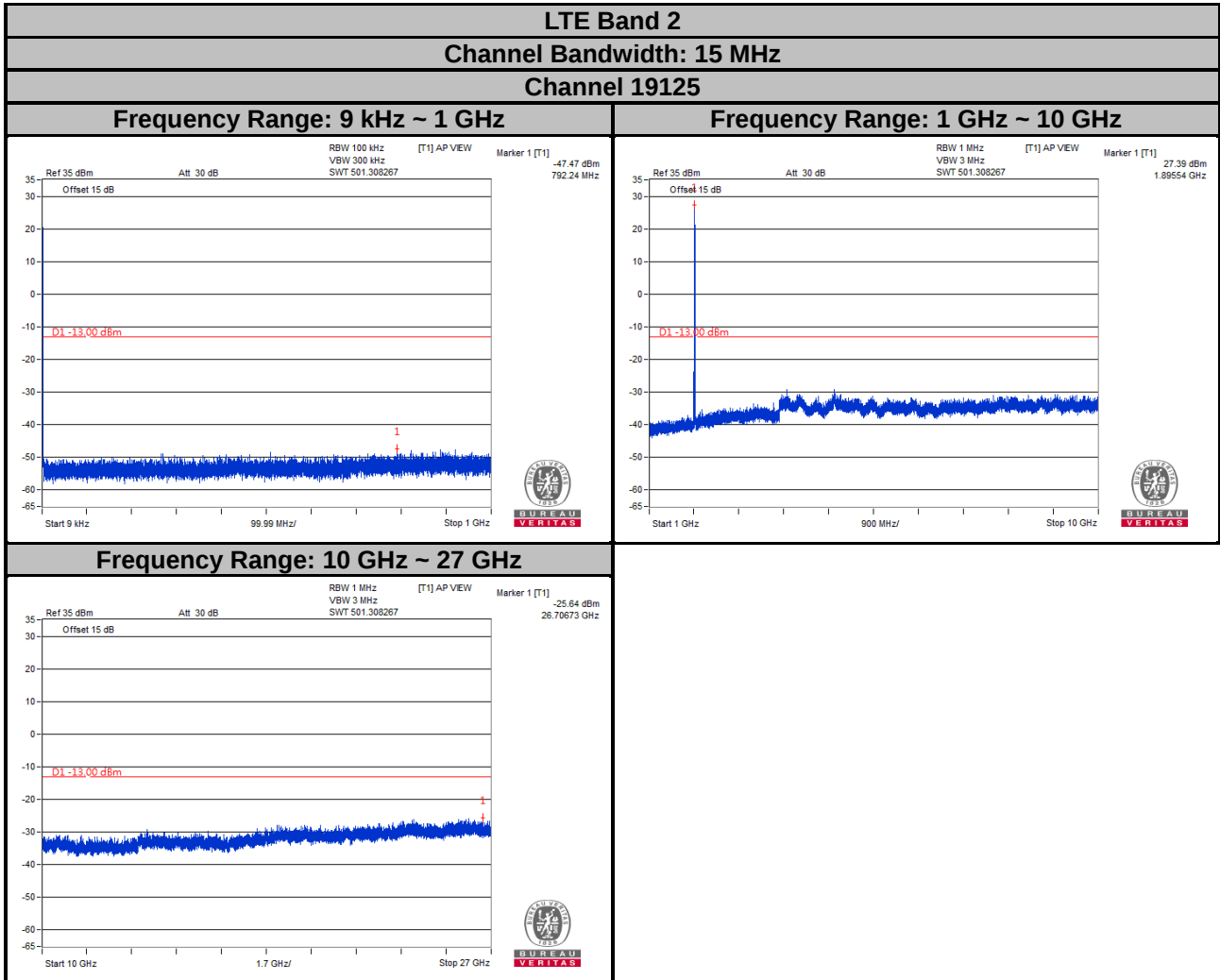
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



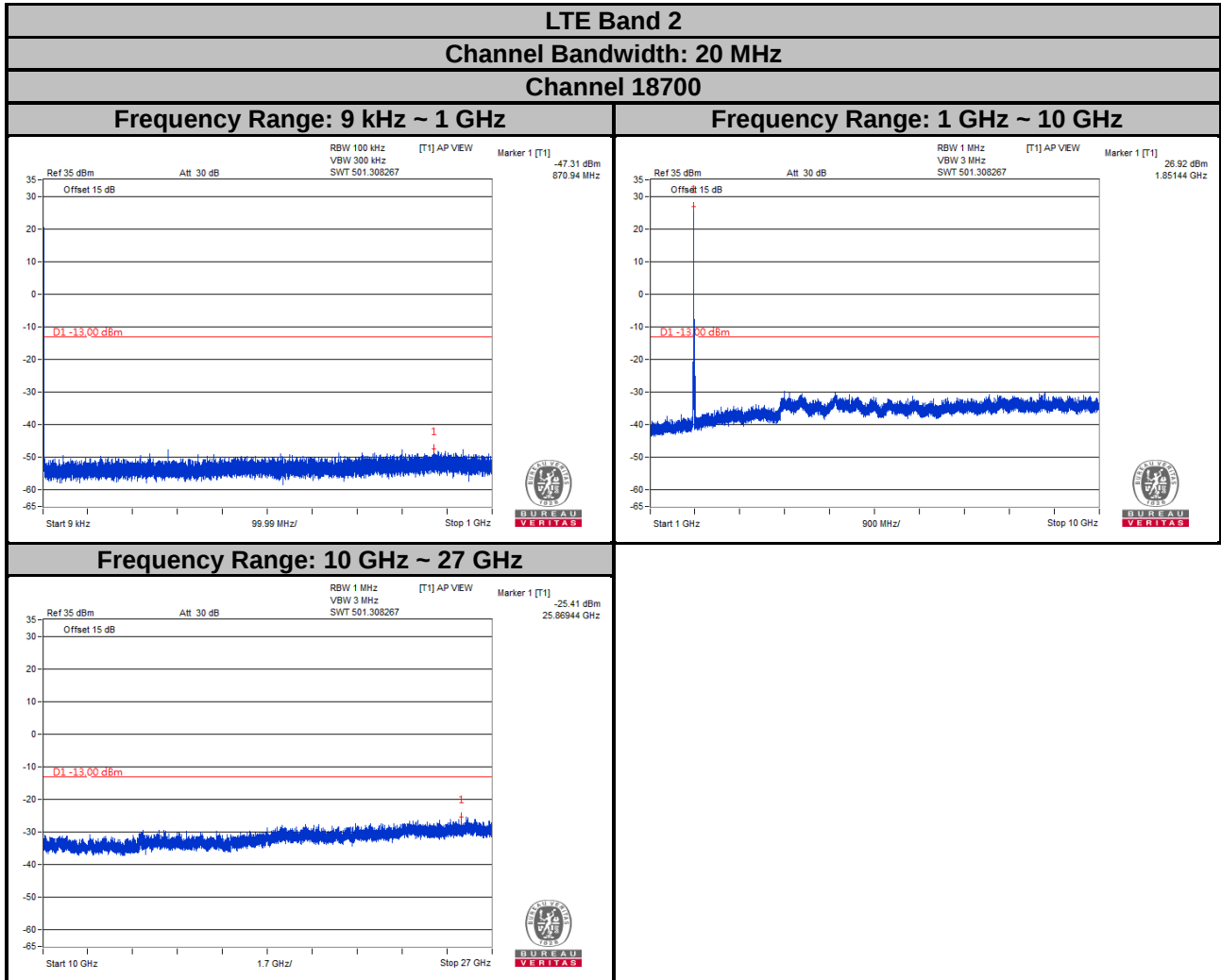
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



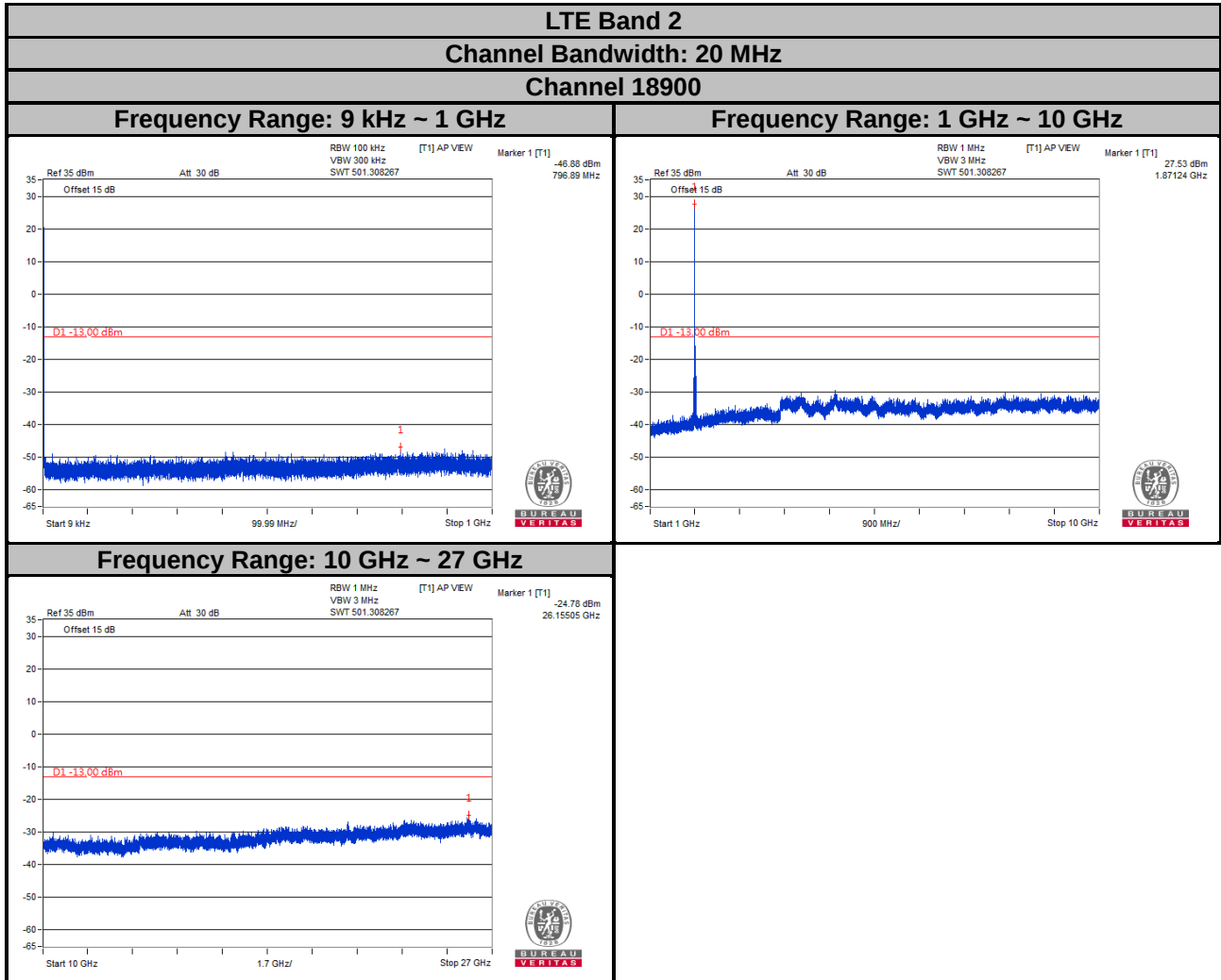
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



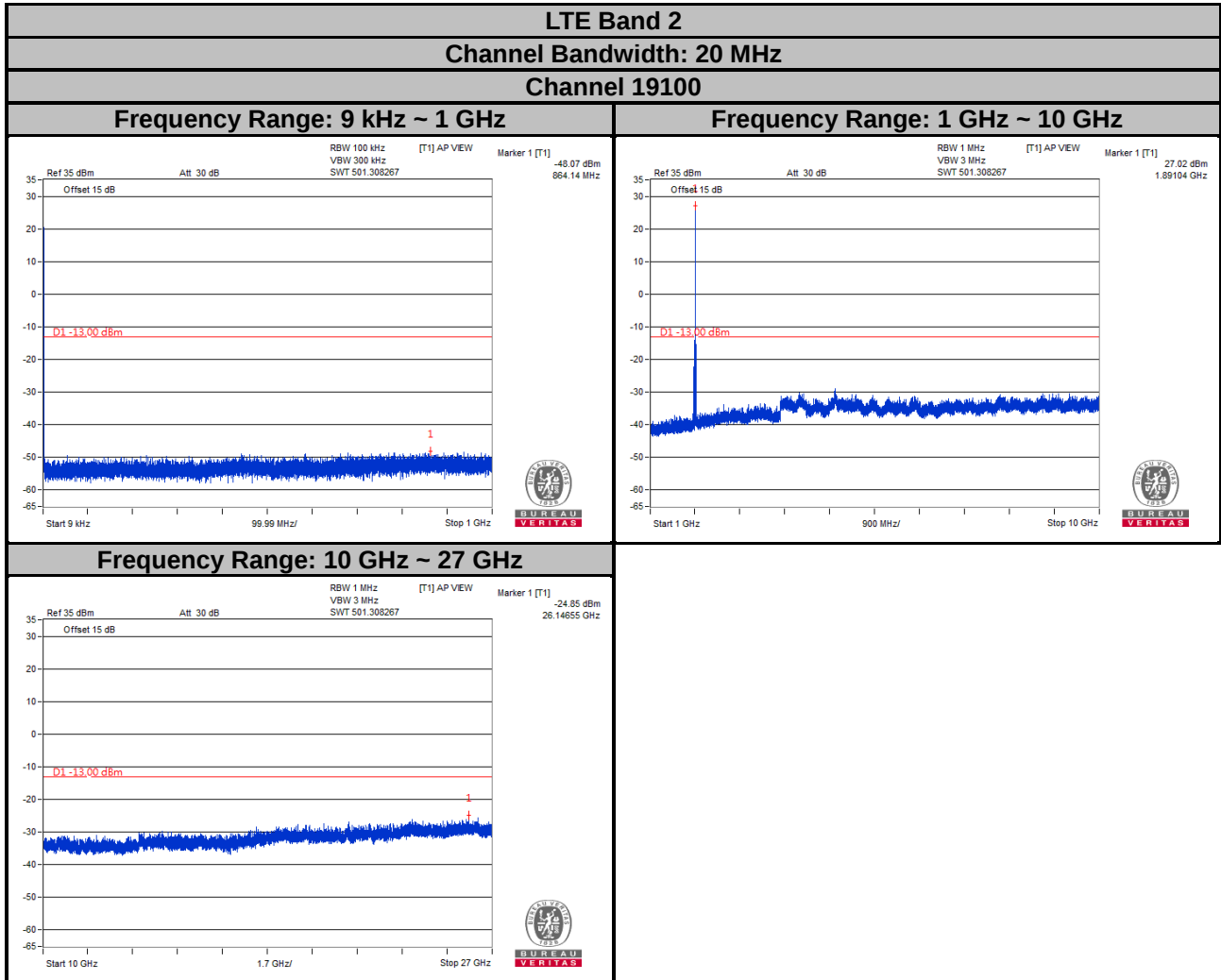
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



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



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



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

- 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.
- 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.
- $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}.$

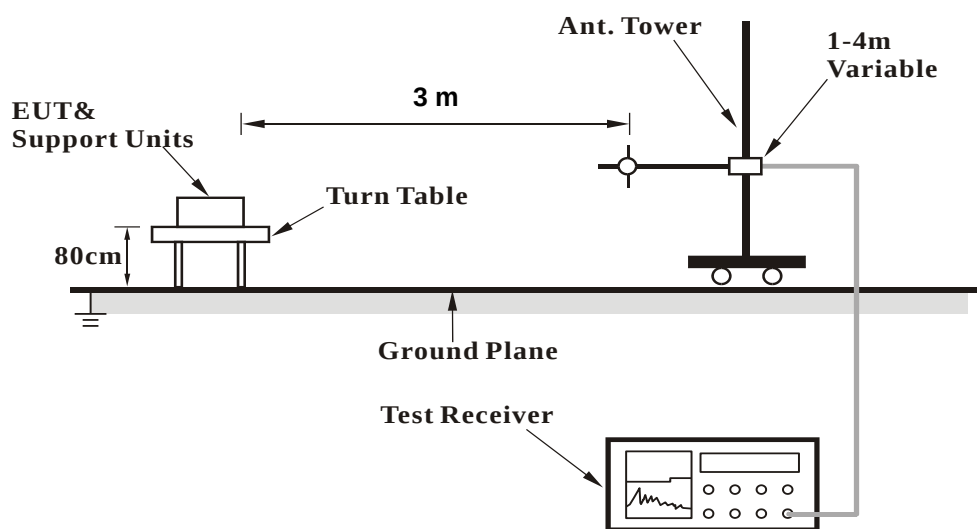
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.8.3 Deviation from Test Standard

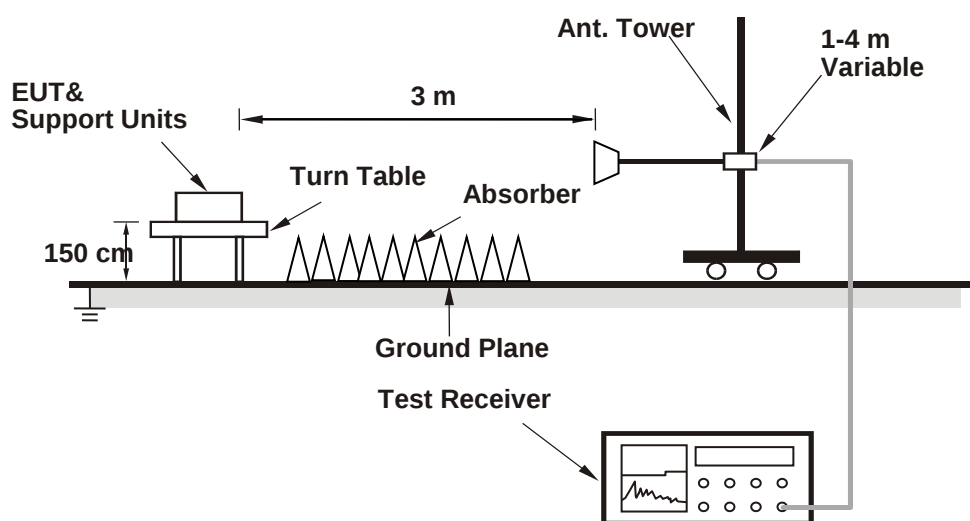
No deviation.

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

GSM:

Low Channel

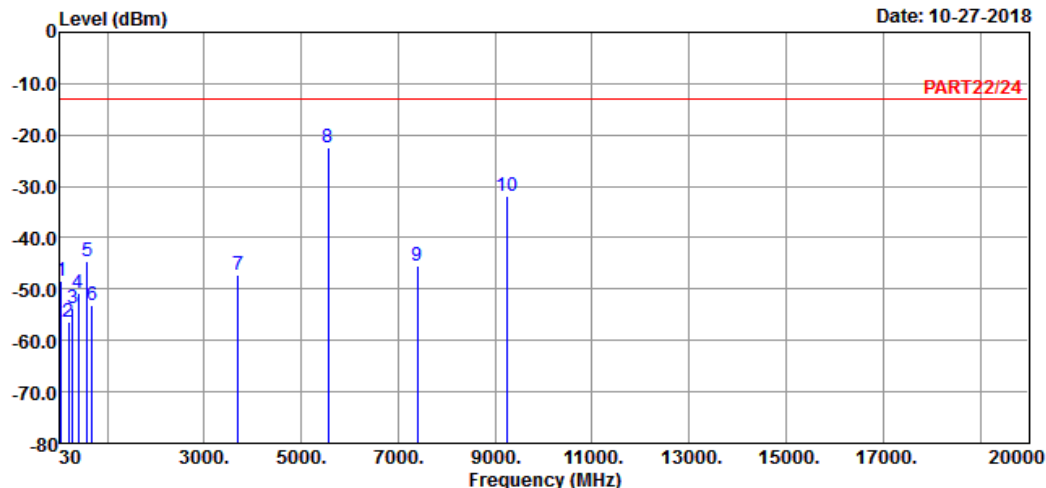


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remark : GPRS 1900 Link_L-CH

Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	44.55	-48.35	-46.36	-13.00	-35.35	-1.99	Peak
2	209.45	-56.34	-48.71	-13.00	-43.34	-7.63	Peak
3	282.20	-53.70	-47.05	-13.00	-40.70	-6.65	Peak
4	411.21	-50.89	-45.03	-13.00	-37.89	-5.86	Peak
5	588.72	-44.67	-43.43	-13.00	-31.67	-1.24	Peak
6	695.42	-53.11	-52.94	-13.00	-40.11	-0.17	Peak
7	3700.40	-47.11	-40.18	-13.00	-34.11	-6.93	Peak
8 pp	5550.60	-22.54	-20.64	-13.00	-9.54	-1.90	Peak
9	7400.80	-45.47	-49.58	-13.00	-32.47	4.11	Peak
10	9251.00	-31.92	-36.82	-13.00	-18.92	4.90	Peak

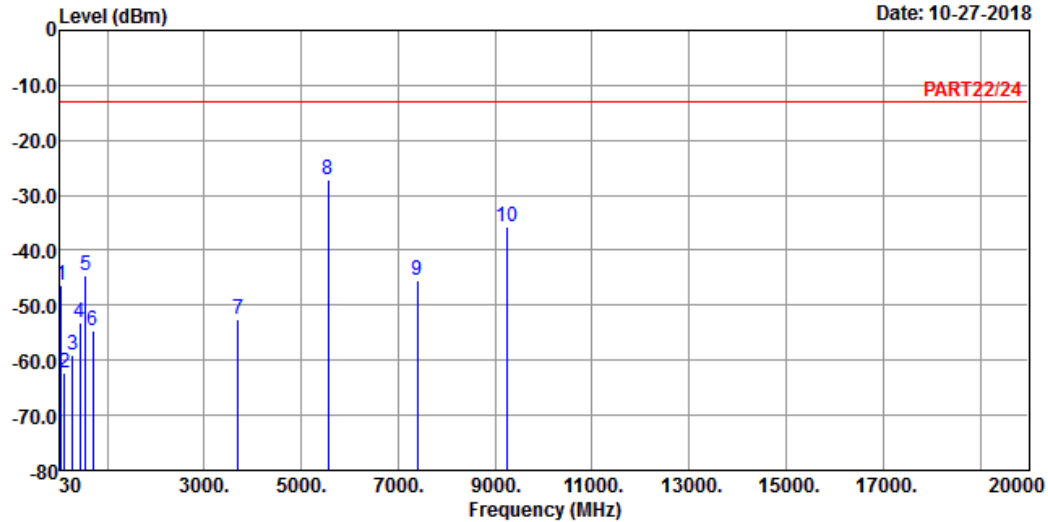


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 10-27-2018



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remark : GPRS 1900 Link_L-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	44.55	-46.20	-44.21	-13.00	-33.20	-1.99	Peak
2	112.45	-62.26	-52.06	-13.00	-49.26	-10.20	Peak
3	282.20	-59.01	-52.36	-13.00	-46.01	-6.65	Peak
4	439.34	-53.06	-47.43	-13.00	-40.06	-5.63	Peak
5	547.01	-44.57	-41.62	-13.00	-31.57	-2.95	Peak
6	700.27	-54.57	-54.47	-13.00	-41.57	-0.10	Peak
7	3700.40	-52.51	-45.58	-13.00	-39.51	-6.93	Peak
8 pp	5550.60	-27.06	-25.16	-13.00	-14.06	-1.90	Peak
9	7400.80	-45.55	-49.66	-13.00	-32.55	4.11	Peak
10	9251.00	-35.77	-40.67	-13.00	-22.77	4.90	Peak

Middle Channel

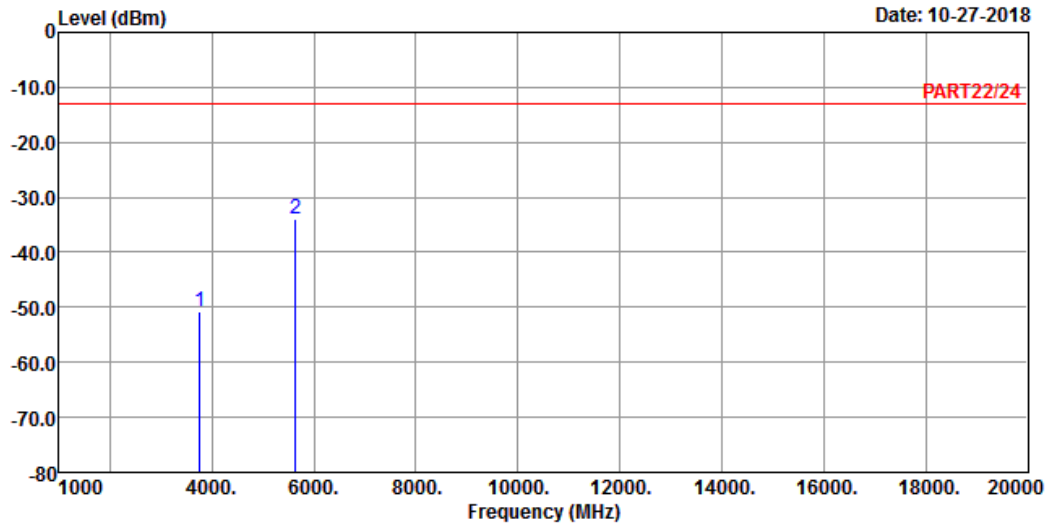


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 1

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remark : GPRS 1900 Link_M-CH

Tested by: Thomas Wei

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-50.91	-44.26	-13.00	-37.91	-6.65	Peak
2 pp	5640.00	-34.08	-32.22	-13.00	-21.08	-1.86	Peak

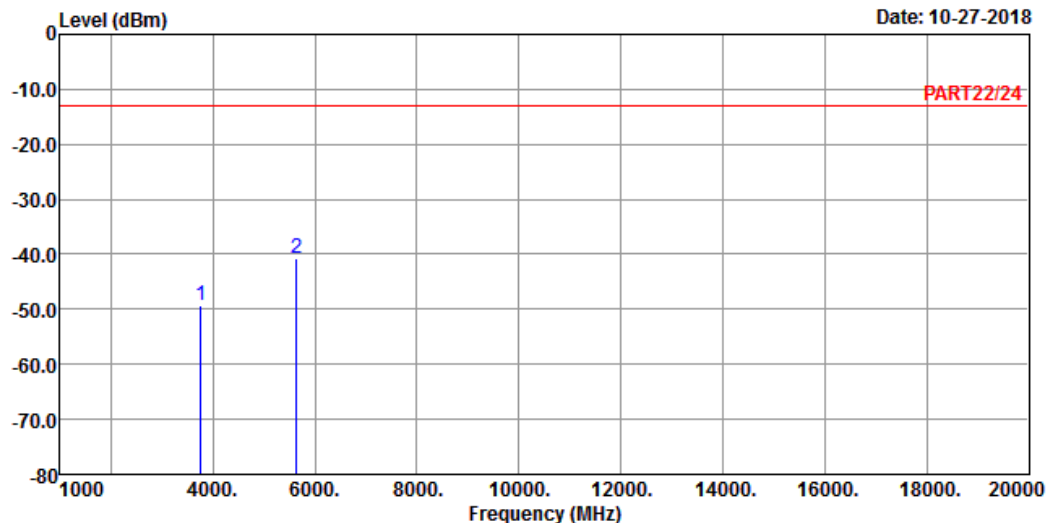


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remark : GPRS 1900 Link_M-CH

Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-49.44	-42.79	-13.00	-36.44	-6.65	Peak
2 pp	5640.00	-40.75	-38.89	-13.00	-27.75	-1.86	Peak

High Channel

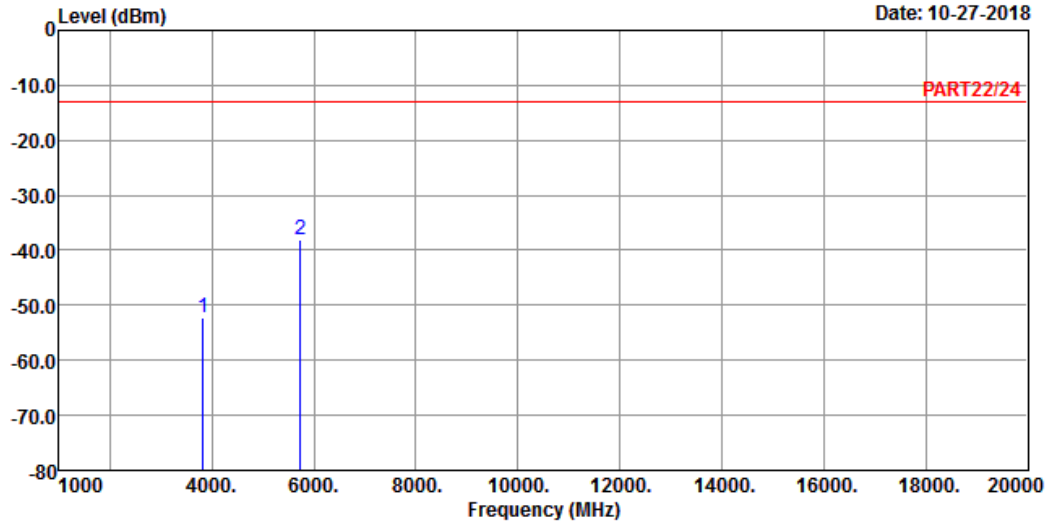


Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 1

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remark : GPRS 1900 Link_H-CH

Tested by: Thomas Wei

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3819.60	-52.19	-45.79	-13.00	-39.19	-6.40	Peak
2 pp	5729.40	-38.04	-36.39	-13.00	-25.04	-1.65	Peak

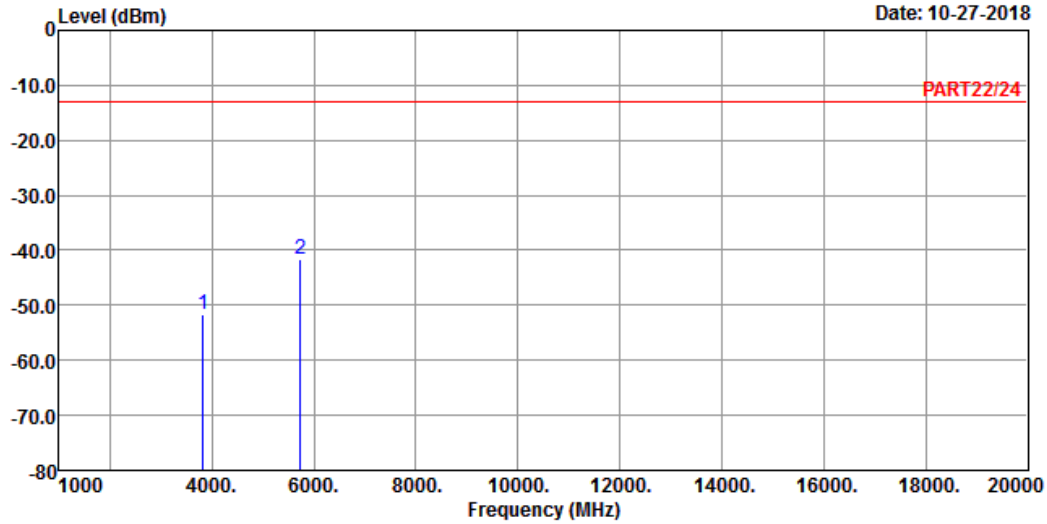


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remark : GPRS 1900 Link_H-CH

Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3819.60	-51.78	-45.38	-13.00	-38.78	-6.40	Peak
2 pp	5729.40	-41.58	-39.93	-13.00	-28.58	-1.65	Peak

EDGE:
Low Channel

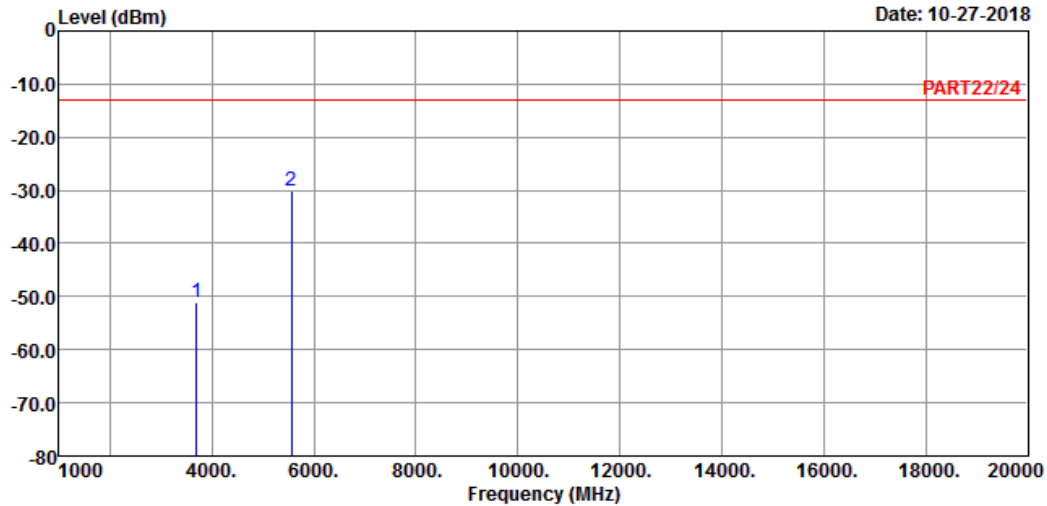


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 1

Date: 10-27-2018



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : EDGE 1900 Link_L-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3700.40	-51.10	-44.17	-13.00	-38.10	-6.93	Peak
2 pp	5550.60	-30.06	-28.16	-13.00	-17.06	-1.90	Peak

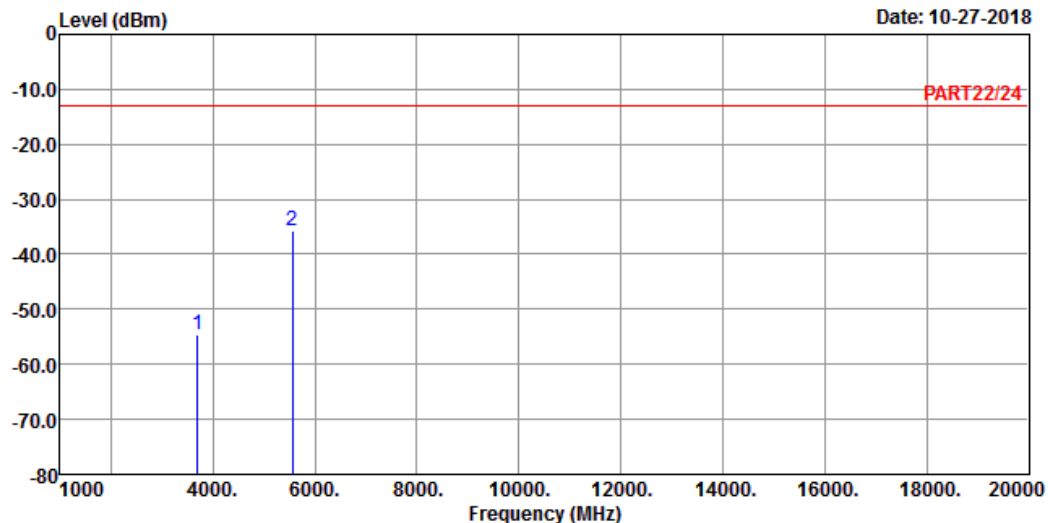


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remark : EDGE 1900 Link_L-CH

Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3700.40	-54.69	-47.76	-13.00	-41.69	-6.93	Peak
2 pp	5550.60	-35.64	-33.74	-13.00	-22.64	-1.90	Peak

Middle Channel

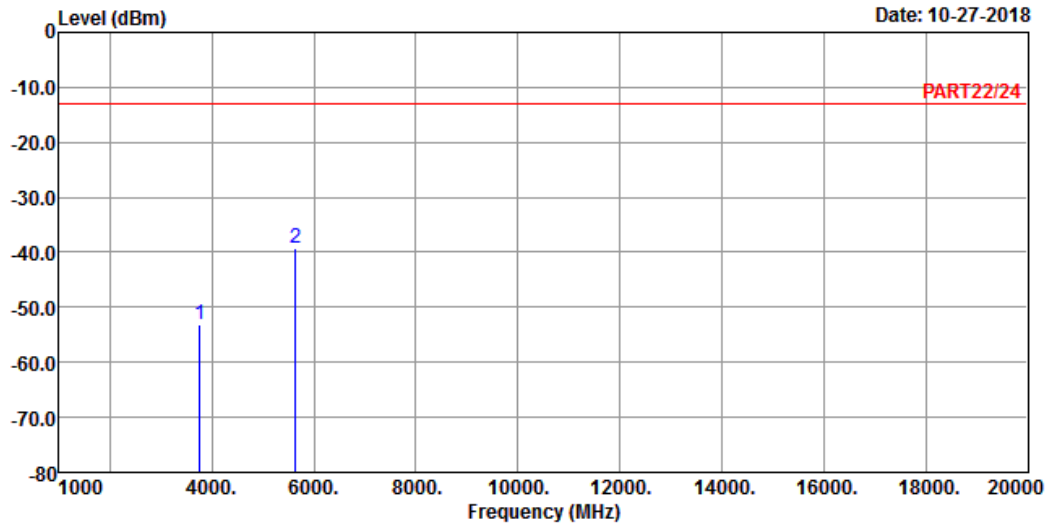


Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 1

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remark : EDGE 1900 Link_M-CH

Tested by: Thomas Wei

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3760.00	-53.10	-46.45	-13.00	-40.10	-6.65	Peak
2 pp	5640.00	-39.21	-37.35	-13.00	-26.21	-1.86	Peak

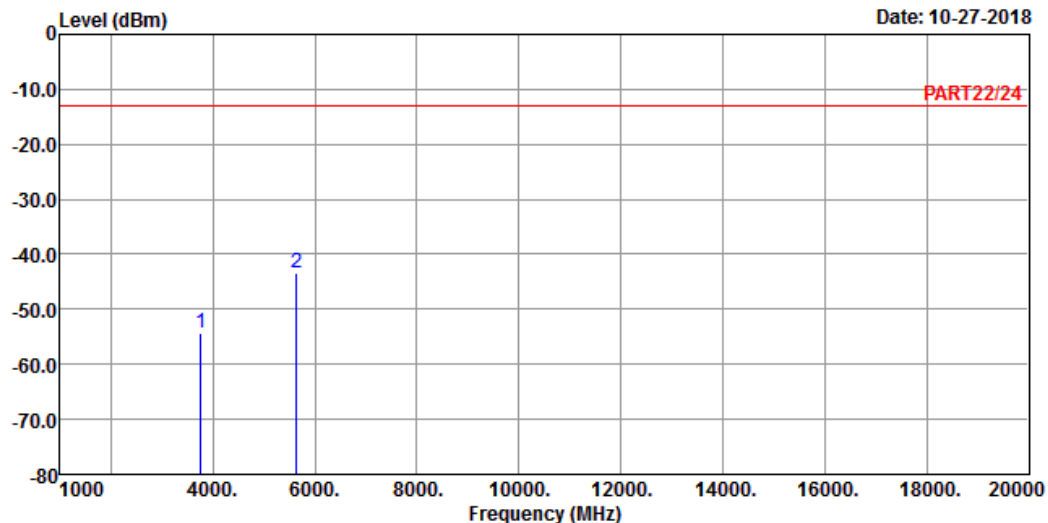


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remark : EDGE 1900 Link_M-CH

Tested by: Thomas Wei

			Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark	
MHz	dBm	dBm	dBm	dB	dB		
1	3760.00	-54.43	-47.78	-13.00	-41.43	-6.65	Peak
2 pp	5640.00	-43.52	-41.66	-13.00	-30.52	-1.86	Peak

High Channel

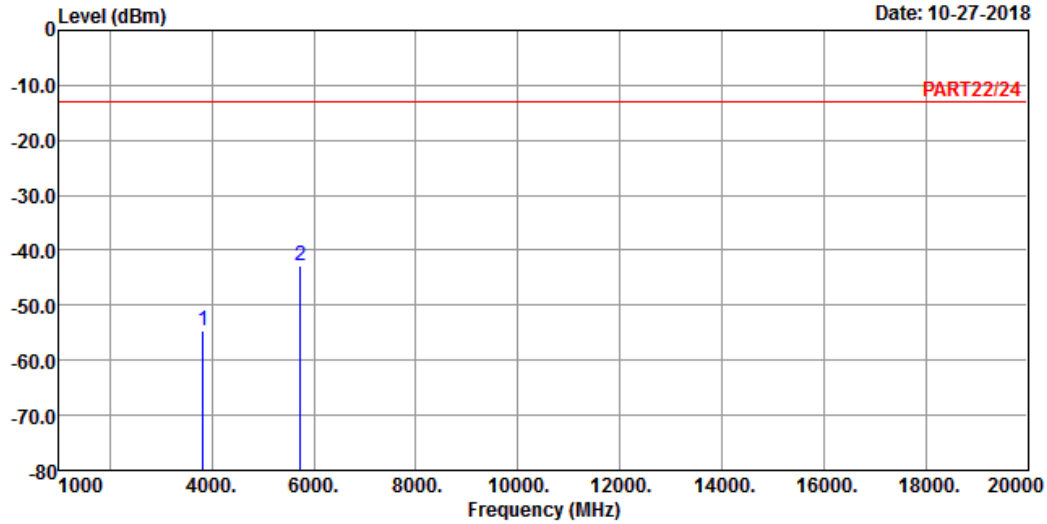


Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 1

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remark : EDGE 1900 Link_H-CH

Tested by: Thomas Wei

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3819.60	-54.71	-48.31	-13.00	-41.71	-6.40	Peak
2 pp	5729.40	-42.80	-41.15	-13.00	-29.80	-1.65	Peak

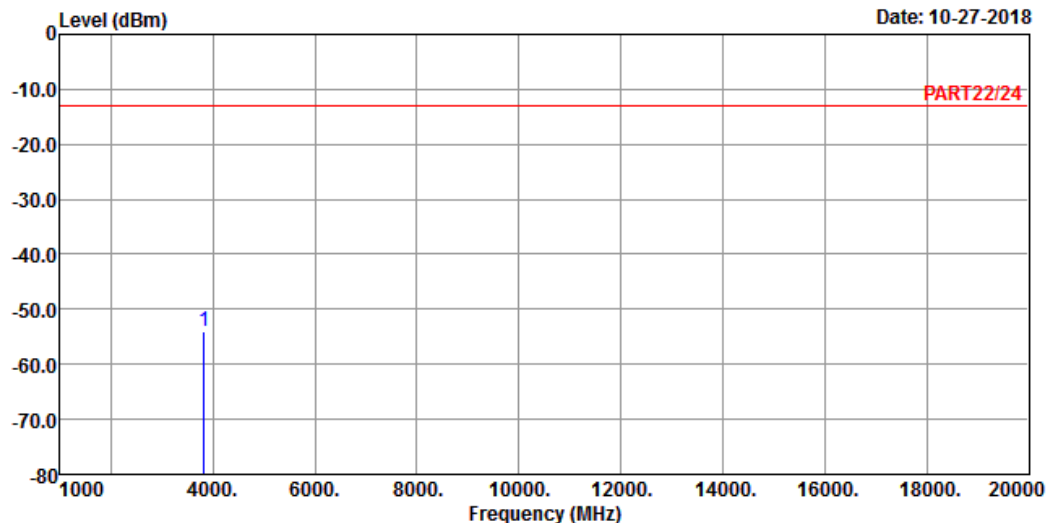


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remark : EDGE 1900 Link_H-CH

Tested by: Thomas Wei

Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3819.60 -53.95 -47.55 -13.00 -40.95 -6.40 Peak

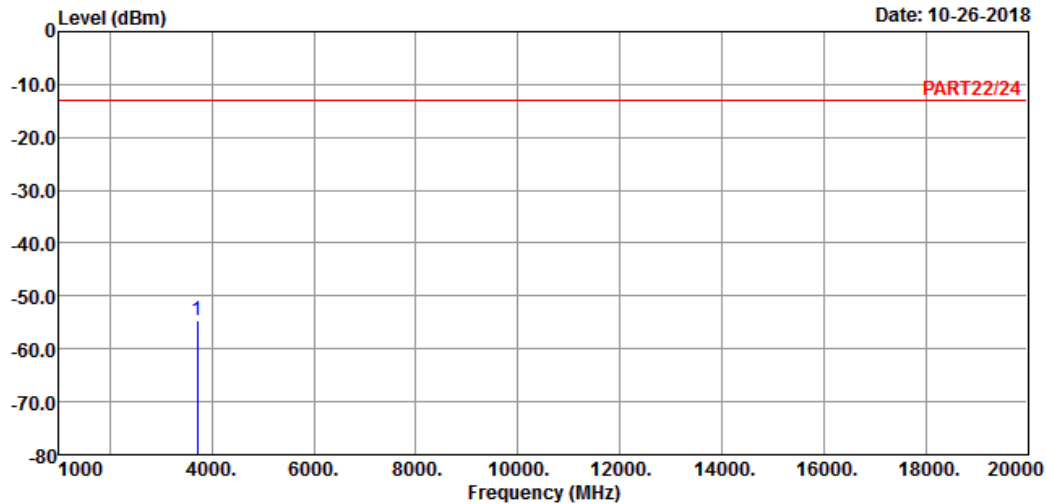
WCDMA:
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 1



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : WCDMA Band 2 Link_L-CH
Tested by: Thomas Wei

Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3704.80 -54.74 -47.81 -13.00 -41.74 -6.93 Peak

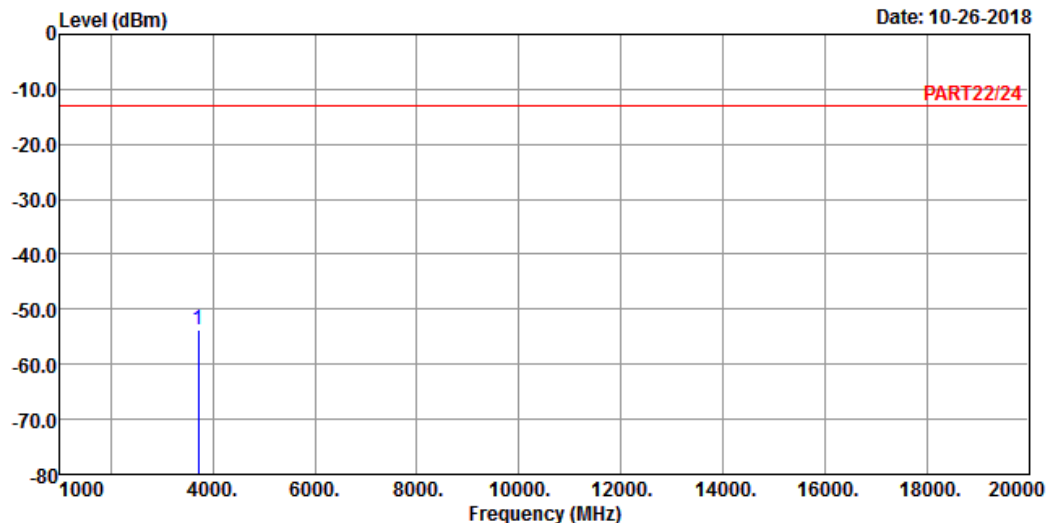


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-26-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remark : WCDMA Band 2 Link_L-CH

Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3704.80 -53.75 -46.82 -13.00 -40.75 -6.93 Peak

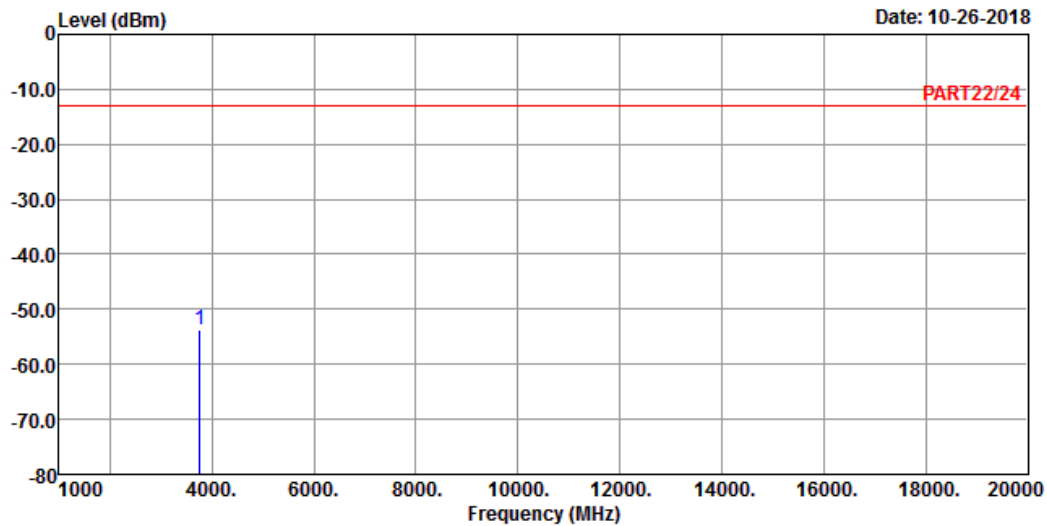
Middle Channel



Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 1



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : WCDMA Band 2 Link_M-CH
Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3760.00 -53.67 -47.02 -13.00 -40.67 -6.65 Peak

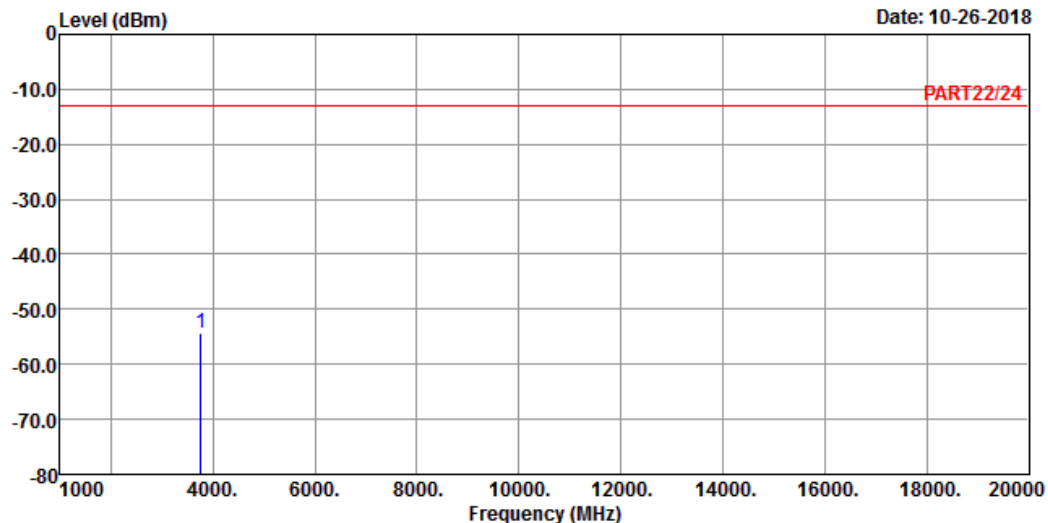


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-26-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remark : WCDMA Band 2 Link_M-CH

Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3760.00 -54.27 -47.62 -13.00 -41.27 -6.65 Peak

High Channel

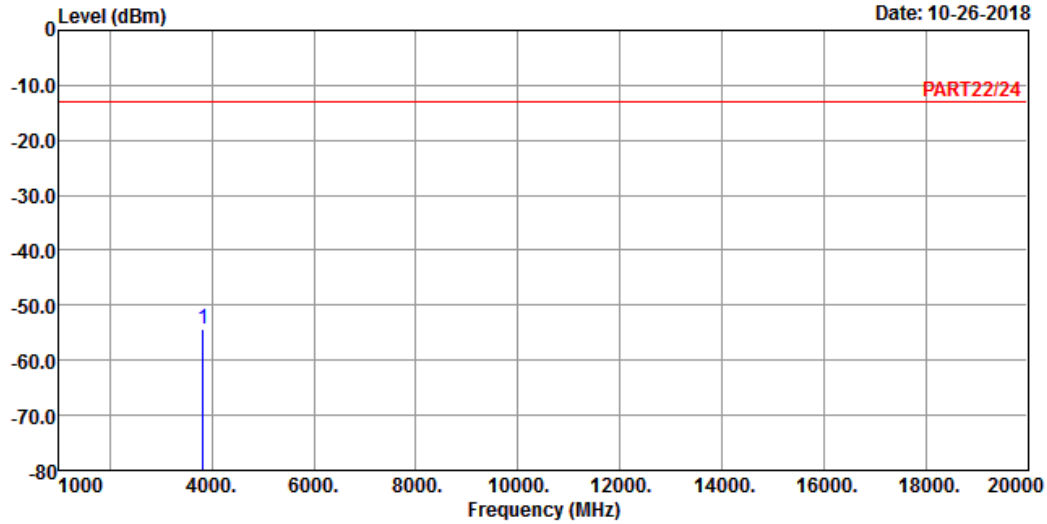


Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 1

Date: 10-26-2018



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remark : WCDMA Band 2 Link_H-CH
Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3815.20 -54.24 -47.84 -13.00 -41.24 -6.40 Peak

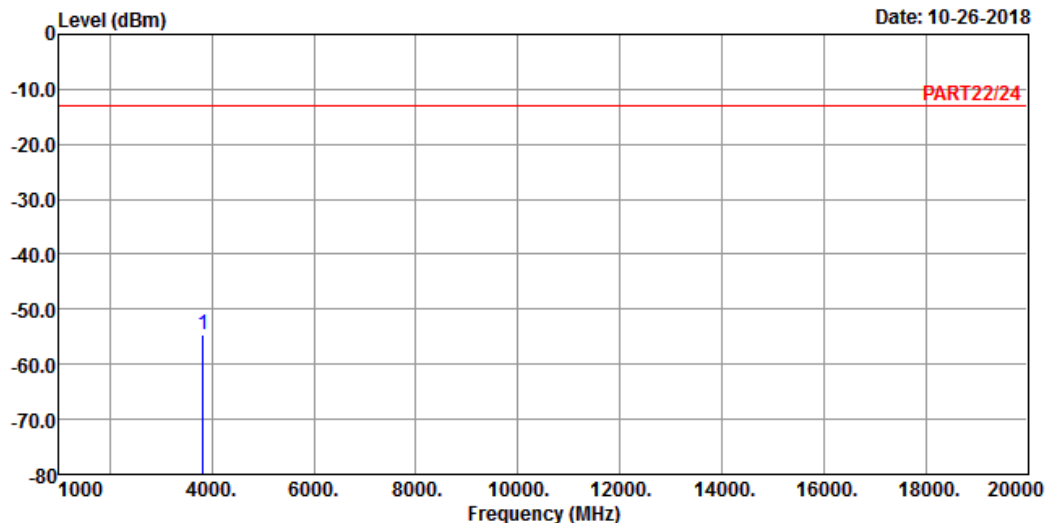


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-26-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remark : WCDMA Band 2 Link_H-CH

Tested by: Thomas Wei

Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3815.20 -54.47 -48.07 -13.00 -41.47 -6.40 Peak

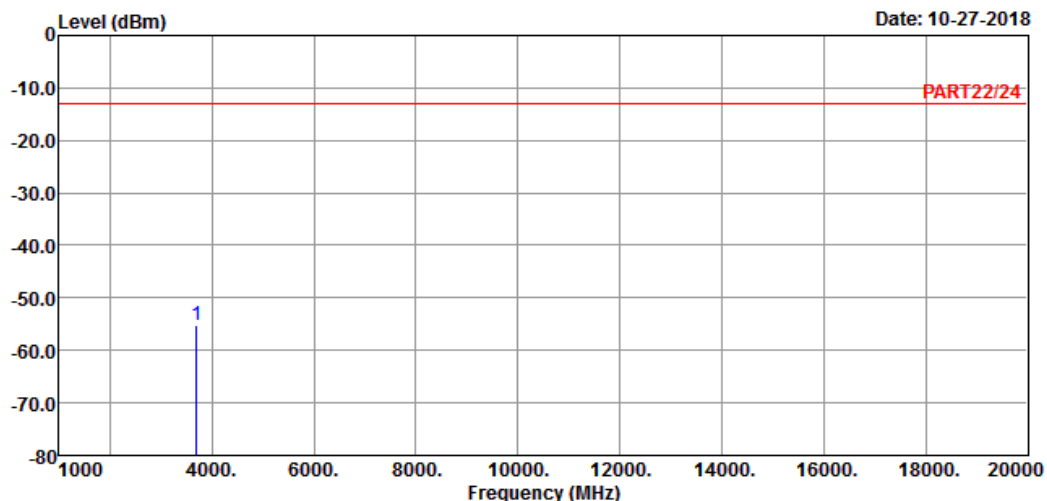
LTE Band 2
Channel Bandwidth: 1.4 MHz / QPSK
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 1



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

Freq	Level	Read	Limit	Over	Factor	Remark
		Level	Line	Limit		
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3701.40 -55.21 -48.28 -13.00 -42.21 -6.93 Peak

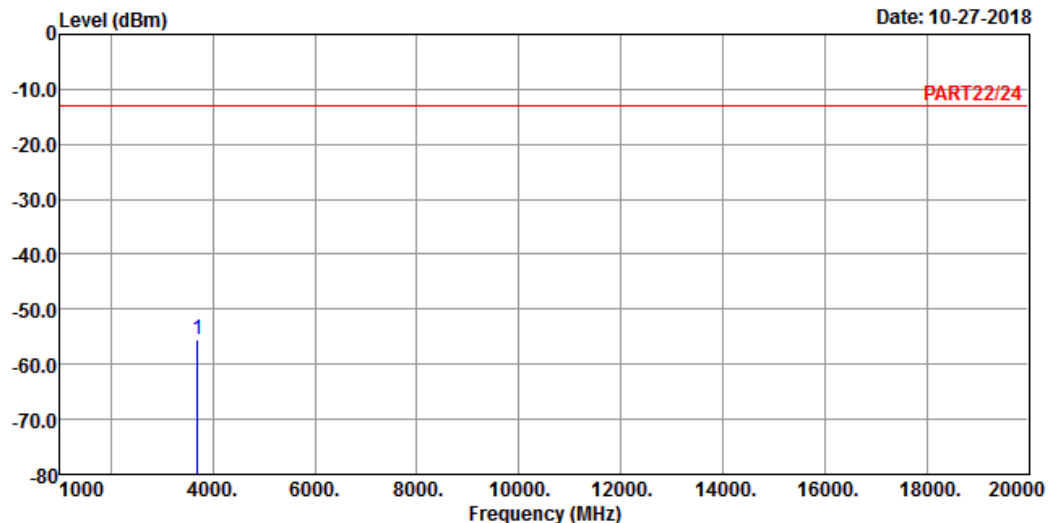


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_1.4M Link_L-CH

Tested by: Thomas Wei

Freq	Level	Read	Limit	Over	Factor	Remark
		Level	Line	Limit		
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3701.40 -55.38 -48.45 -13.00 -42.38 -6.93 Peak

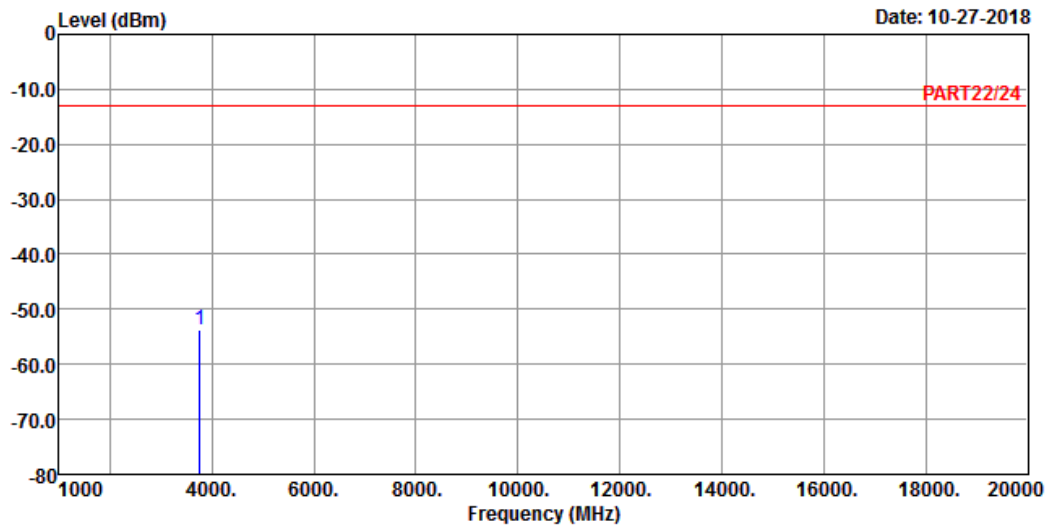
Middle Channel



Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 1



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

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3760.00 -53.75 -47.10 -13.00 -40.75 -6.65 Peak

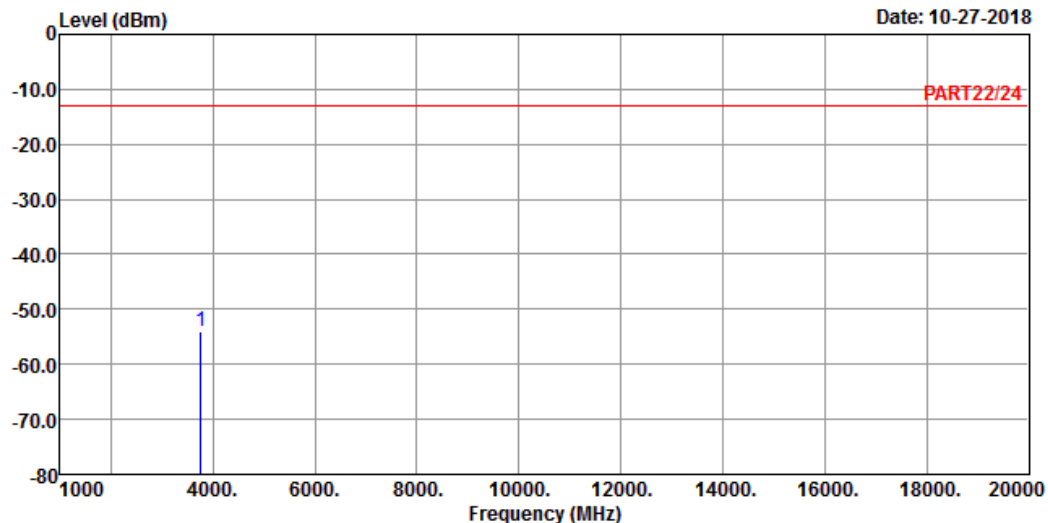


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_1.4M Link_M-CH

Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3760.00 -54.08 -47.43 -13.00 -41.08 -6.65 Peak

High Channel

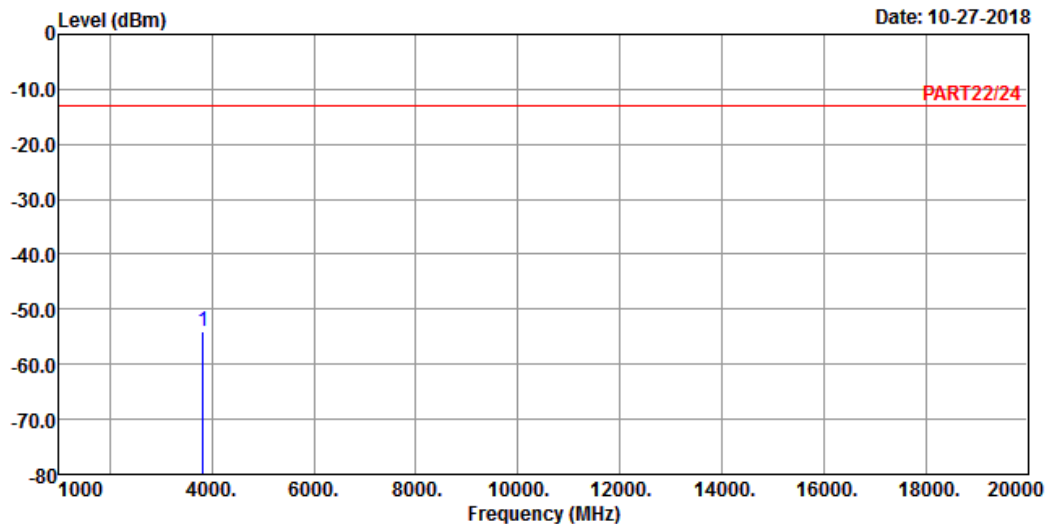


Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 1

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : LTE Band 2 QPSK_1.4M Link_H-CH

Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3818.60 -54.16 -47.76 -13.00 -41.16 -6.40 Peak

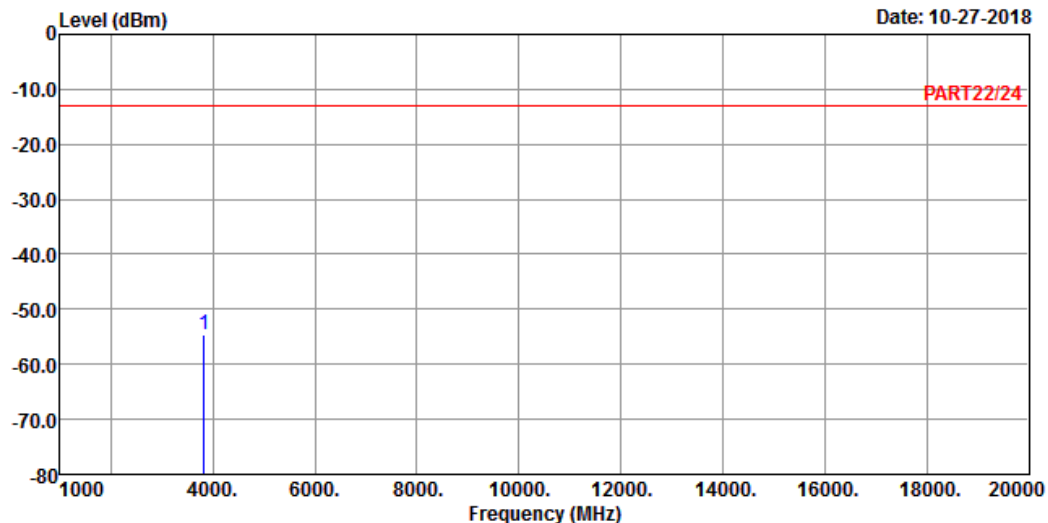


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_1.4M Link_H-CH

Tested by: Thomas Wei

Freq	Level	Read	Limit	Over	Factor	Remark
		Level	Line	Limit		
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3818.60 -54.59 -48.19 -13.00 -41.59 -6.40 Peak

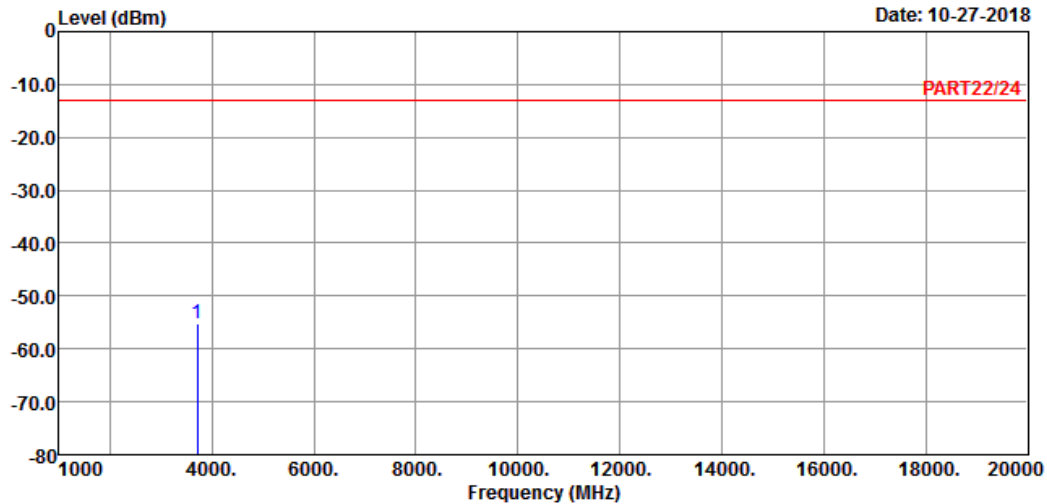
Channel Bandwidth: 5 MHz / QPSK
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 1



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

Freq	Level	Read	Limit	Over		
MHz	dBm	Level	Line	Limit	Factor	Remark
		dBm	dBm	dB	dB	

1 pp 3705.00 -55.11 -48.18 -13.00 -42.11 -6.93 Peak

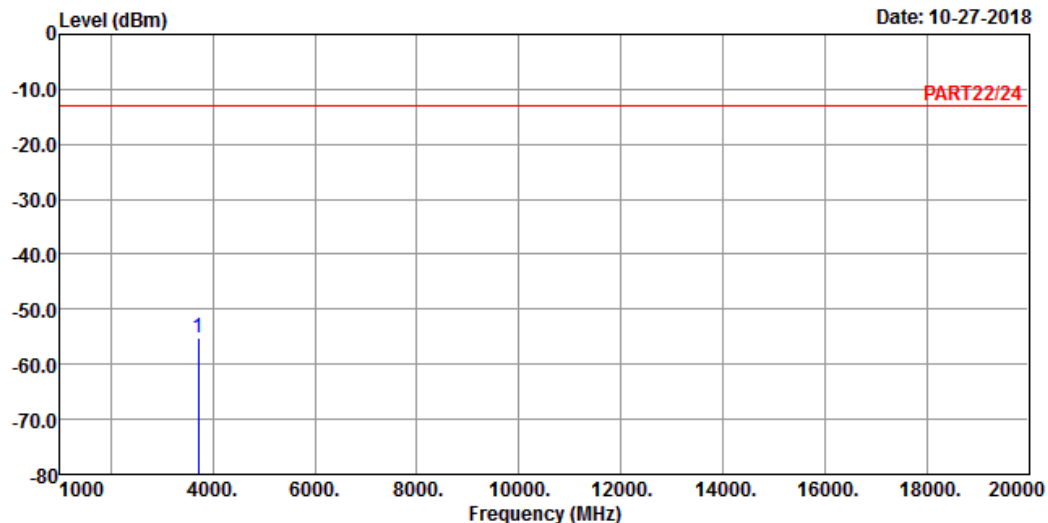


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_5M Link_L-CH

Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3705.00 -55.31 -48.38 -13.00 -42.31 -6.93 Peak

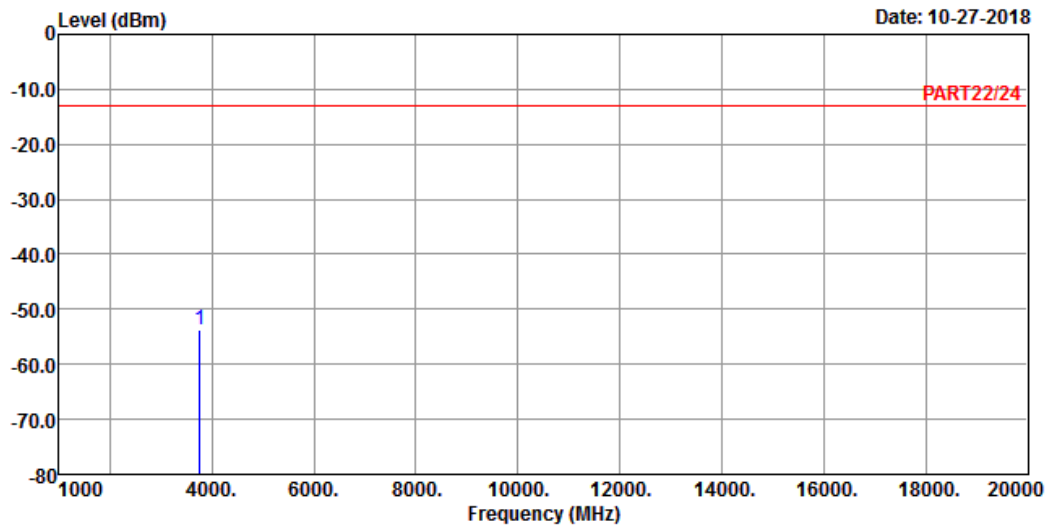
Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 1



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : LTE Band 2 QPSK_5M Link_M-CH

Tested by: Thomas Wei

Freq	Level	Read	Limit	Over	Factor	Remark
		Level	Line	Limit		
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3760.00 -53.72 -47.07 -13.00 -40.72 -6.65 Peak

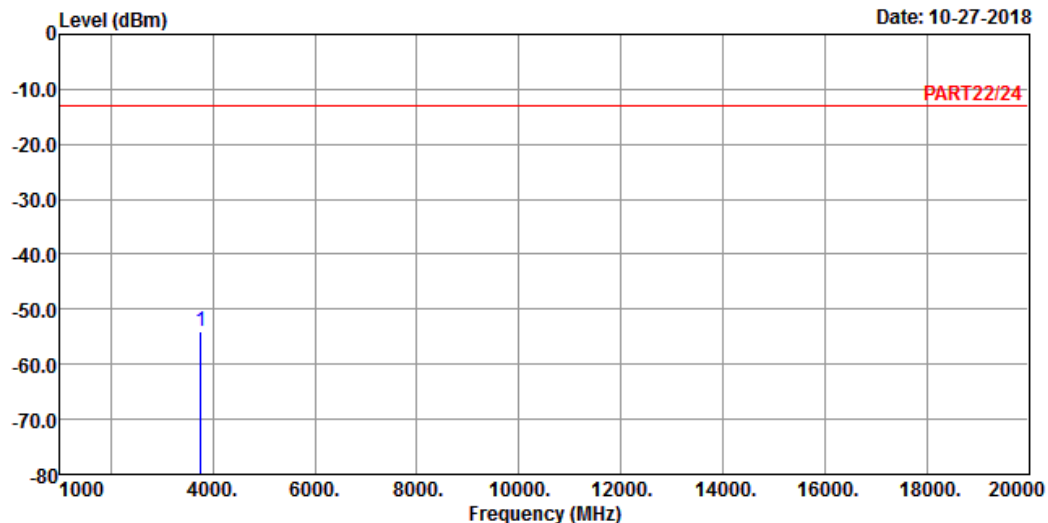


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_5M Link_M-CH

Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3760.00 -54.08 -47.43 -13.00 -41.08 -6.65 Peak

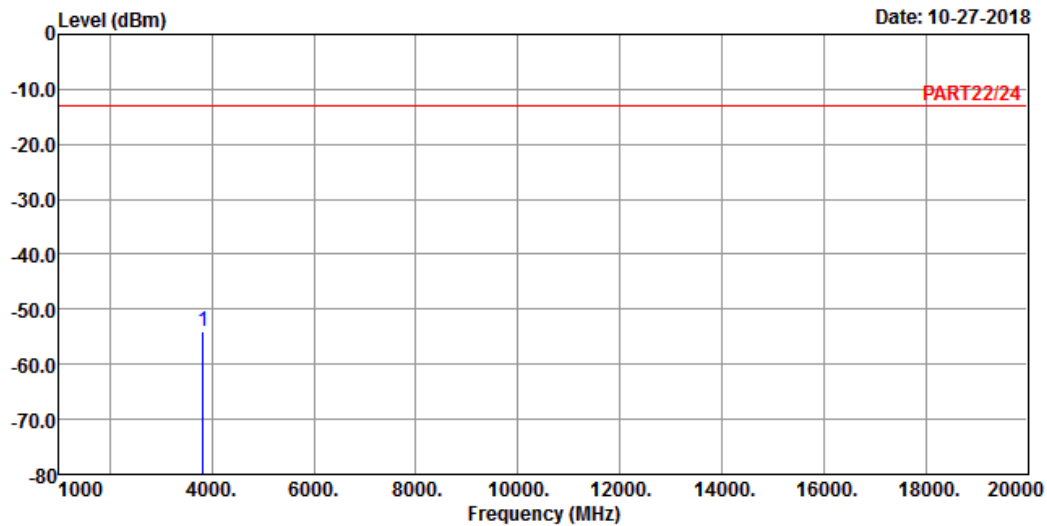
High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 1



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : LTE Band 2 QPSK_5M Link_H-CH

Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3815.00 -54.04 -47.64 -13.00 -41.04 -6.40 Peak

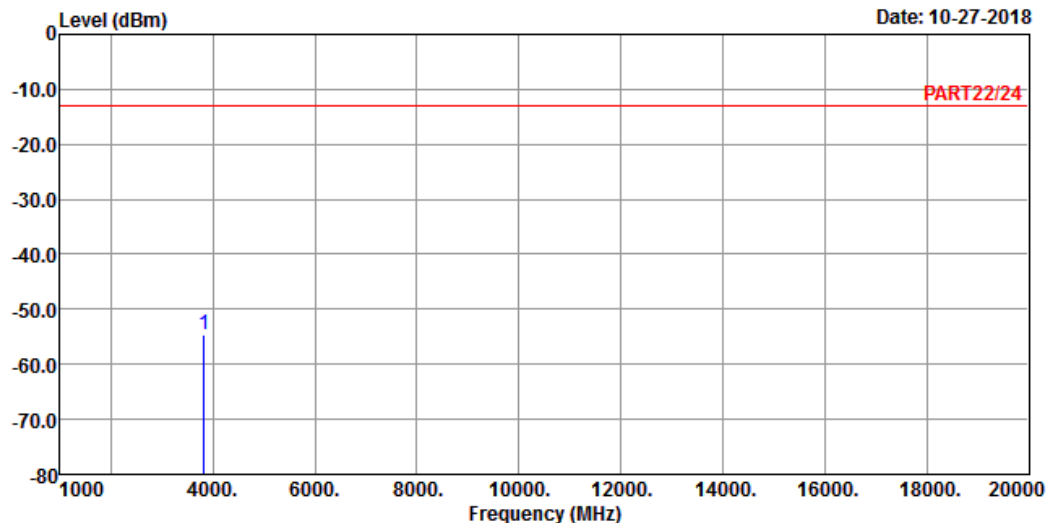


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_5M Link_H-CH

Tested by: Thomas Wei

			Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark	
MHz	dBm	dBm	dBm	dB	dB		

1 pp 3815.00 -54.52 -48.12 -13.00 -41.52 -6.40 Peak

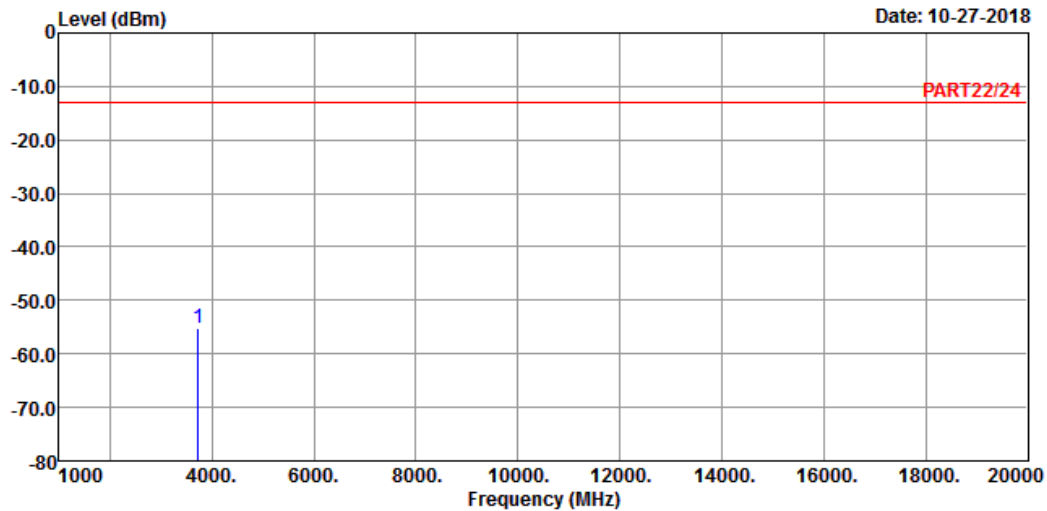
Channel Bandwidth: 20 MHz / QPSK
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 1



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

Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3720.00 -55.07 -48.25 -13.00 -42.07 -6.82 Peak

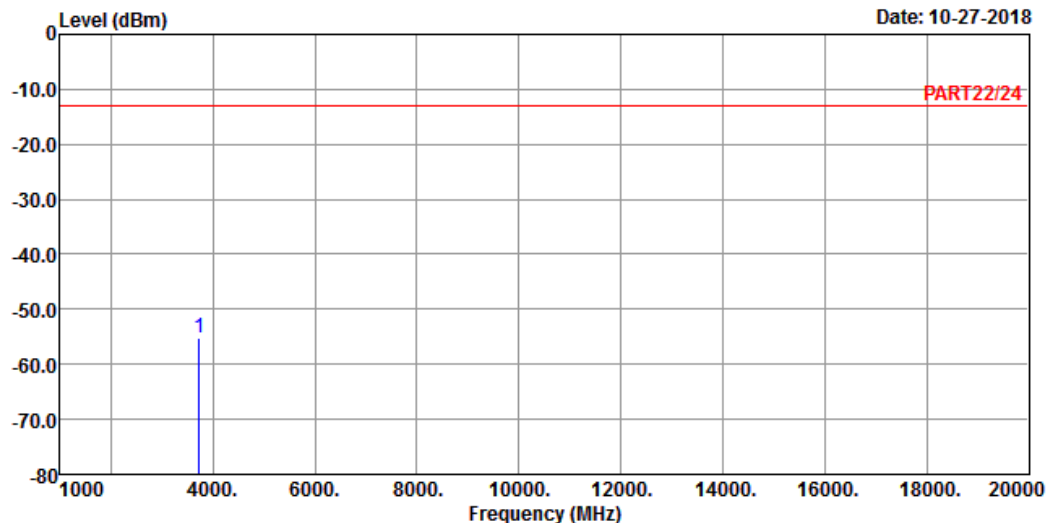


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_20M Link_L-CH

Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3720.00 -55.24 -48.42 -13.00 -42.24 -6.82 Peak

Middle Channel

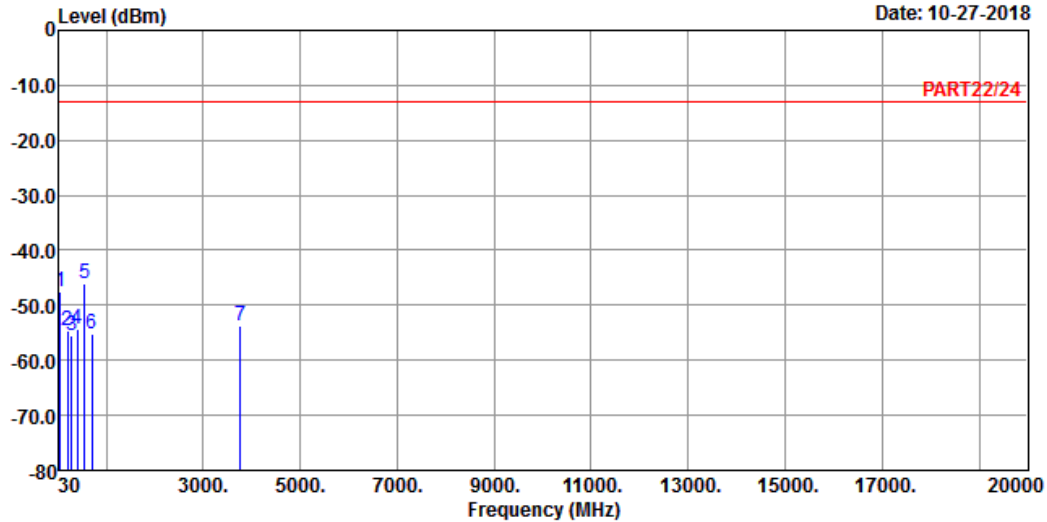


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : LTE Band 2 QPSK_20M Link_M-CH

Tested by: Thomas Wei

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	43.58	-47.65	-46.18	-13.00	-34.65	-1.47	Peak
2	208.79	-54.59	-46.92	-13.00	-41.59	-7.67	Peak
3	284.55	-55.38	-48.69	-13.00	-42.38	-6.69	Peak
4	401.51	-54.22	-48.29	-13.00	-41.22	-5.93	Peak
5 pp	547.98	-45.94	-43.02	-13.00	-32.94	-2.92	Peak
6	700.27	-55.12	-55.02	-13.00	-42.12	-0.10	Peak
7	3760.00	-53.65	-47.00	-13.00	-40.65	-6.65	Peak

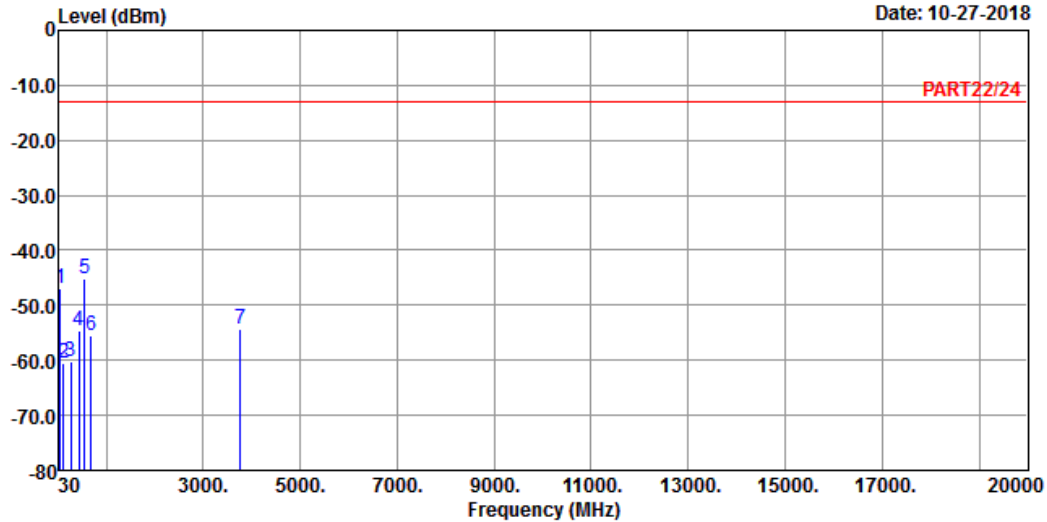


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_20M Link_M-CH

Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	44.55	-47.03	-45.04	-13.00	-34.03	-1.99	Peak
2	112.27	-60.55	-50.35	-13.00	-47.55	-10.20	Peak
3	269.59	-60.26	-53.87	-13.00	-47.26	-6.39	Peak
4	444.19	-54.53	-48.93	-13.00	-41.53	-5.60	Peak
5 pp	558.65	-45.12	-42.63	-13.00	-32.12	-2.49	Peak
6	695.42	-55.63	-55.46	-13.00	-42.63	-0.17	Peak
7	3760.00	-54.17	-47.52	-13.00	-41.17	-6.65	Peak

High Channel

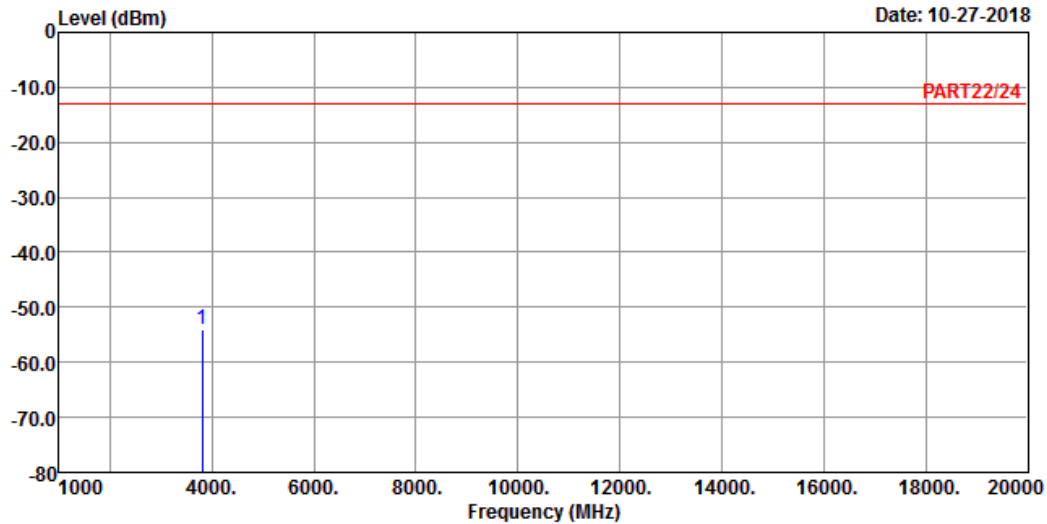


Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 1

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : LTE Band 2 QPSK_20M Link_H-CH

Tested by: Thomas Wei

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3800.00 -53.99 -47.56 -13.00 -40.99 -6.43 Peak

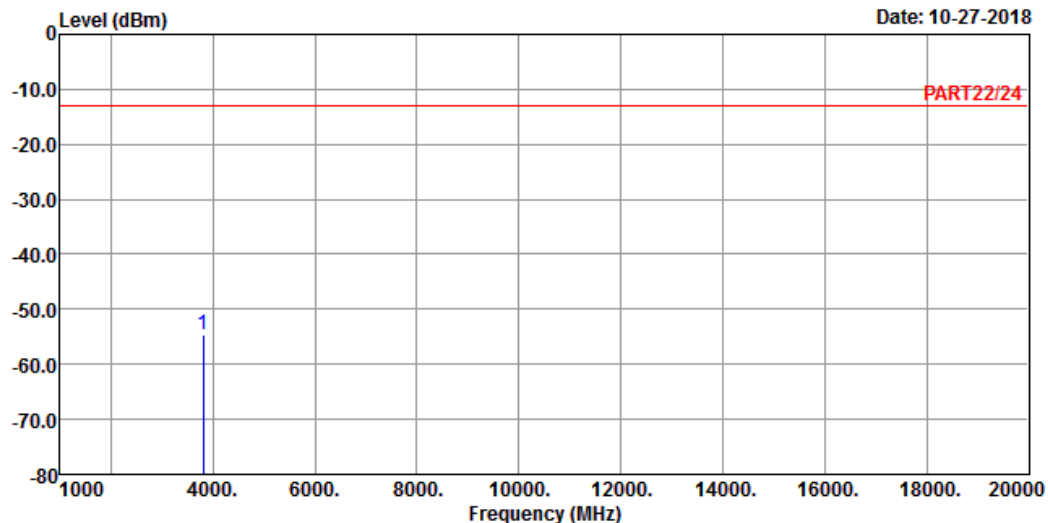


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 2

Date: 10-27-2018



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_20M Link_H-CH

Tested by: Thomas Wei

			Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark	
MHz	dBm	dBm	dBm	dB	dB		

1 pp 3800.00 -54.47 -48.04 -13.00 -41.47 -6.43 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 ---