

FCC Radio Test Report

FCC ID: 2AVVT-AD00A10057

Report No. : BTL-FCCP-1-2004T194
Equipment : Connectivity Control Unit - iTraMS
Model Name : AD00A10057, CU-304-0503
Brand Name : Bosch
Applicant : Robert Bosch Engineering and Business Solutions Private Limited
Address : RBEI/Pac, Ban601, Post Box No 3000 Hosur Road, Adegodi
Bengaluru 560030 India (Republic Of)

Radio Function : WCDMA Band V, LTE Band 5

FCC Rule Part(s) : 47 CFR FCC Part 22 Subpart H
47 CFR FCC Part 2
ANSI/TIA/EIA-603-E-2016
FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

Measurement Procedure(s) : ANSI C63.10-2013

Date of Receipt : 2020/5/13

Date of Test : 2020/5/13 ~ 2020/6/12

Issued Date : 2020/7/15

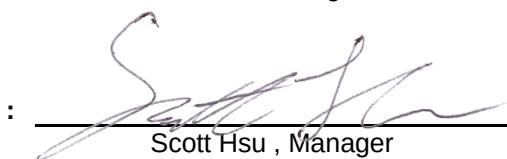
The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

Prepared by


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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

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BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	2020/7/15

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 22 Subpart H & Part 2			
Standard(s) Section	Test Item	Judgment	Remark
2.1046 22.913(a)(5)	Effective Radiated Power	PASS	-----
2.1049	Occupied Bandwidth	PASS	-----
2.1051 22.917(a)	Conducted Spurious Emissions	PASS	-----
2.1053 22.917(a)	Radiated Spurious Emissions	PASS	-----
22.917(a)	Band Edge Measurements	PASS	-----
-	Peak To Average Ratio	PASS	Record Only
2.1055 22.355	Frequency Stability	PASS	-----

Note:

- (1) "N/A" denotes test is not applicable in this test report.
- (2) The report format version is TP.1.1.1

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

The test sites and facilities are covered under FCC RN: 674415 and DN: TW0659.

☐ C05 ☐ CB08 ☐ CB11 ☒ CB15 ☐ CB16
☒ SR06

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, providing a level of confidence of approximately **95 %**.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{CISPR} requirement.

A. Radiated emissions test :

Test Site	Measurement Frequency Range	U,(dB)
CB15	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
	1 GHz ~ 6 GHz	5.21
	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

NOTE:

Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Test Voltage	Tested by
Output Power	24.4 °C, 42 %	DC 32V	William Wei
ERP	22 °C, 65 %	DC 32V	Hunter Chiang
Occupied Bandwidth	24.4 °C, 42 %	DC 32V	William Wei
Conducted Spurious Emissions	24.4 °C, 42 %	DC 32V	William Wei
Radiated Spurious Emissions	22 °C, 65 %	DC 32V	Hunter Chiang
Band Edge	24.4 °C, 42 %	DC 32V	William Wei
Peak to Average Ratio	24.4 °C, 42 %	DC 32V	William Wei
Frequency Stability	Normal and Extreme		William Wei

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Connectivity Control Unit - iTraMS	
Brand Name	Bosch	
Model Name	AD00A10057	
Series Model	CU-304-0503	
Model Difference(s)	Different model distribute to different area.	
Hardware Version	B2LTE	
Software Version	CCU_REL9.0 (uuu_512MB_FCC_wifi100_eMMC166_OnEngine)	
RAM and eMMC details	512MB and 8GB	
Power Source	Supplied from Battery.	
Power Rating	DC 9-32V	
Test Model	AD00A10057	
Sample Status	Engineering Sample	
EUT Modification(s)	N/A	
Modulation Type	WCDMA/HSDPA/HSUPA	UL: QPSK DL: QPSK
	LTE	UL: QPSK,16QAM DL: QPSK,16QAM

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

WCDMA Band V				
Test Frequency ID	UARFCN	Frequency of Uplink (MHz)	UARFCN	Frequency of Downlink (MHz)
Low Range	4132	826.4	4357	871.4
Mid Range	4183	836.6	4408	881.6
High Range	4233	846.6	4458	891.6

LTE Band 5					
Test Frequency ID	Bandwidth (MHz)	N _{UL}	Frequency of Uplink (MHz)	N _{DL}	Frequency of Downlink (MHz)
Low Range	1.4	20407	824.7	2407	869.7
	3	20415	825.5	2415	870.5
	5	20425	826.5	2425	871.5
	10	20450	829	2450	874
Mid Range	1.4/3/5/10	20525	836.5	2525	881.5
High Range	1.4	20643	848.3	2643	893.3
	3	20635	847.5	2635	892.5
	5	20625	846.5	2625	891.5
	10	20600	844	2600	889

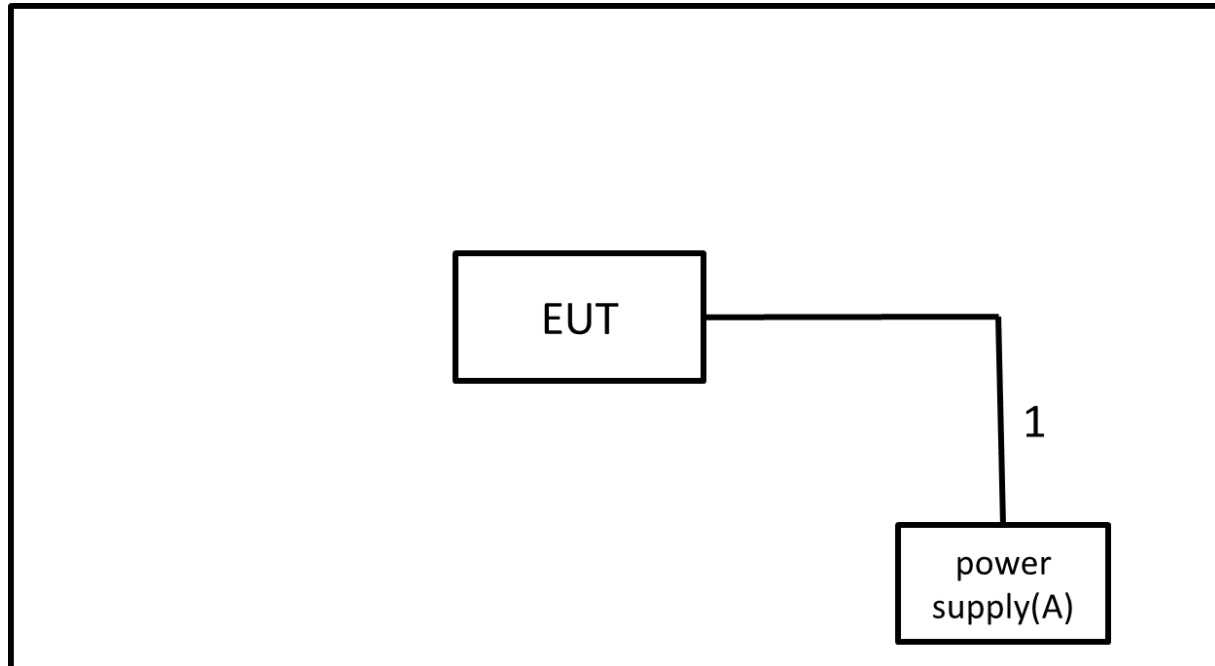
2.2 DESCRIPTION OF TEST MODES

Following mode(s) is (were) found to be the worst case(s) and selected for the final test.

WCDMA BAND V MODE			
Test Item	Available Channel	Tested Channel	Mode
Output Power	4132 to 4233	4132, 4183, 4233	WCDMA, HSDPA, HSUPA
ERP	4132 to 4233	4132, 4183, 4233	WCDMA
Occupied Bandwidth	4132 to 4233	4132, 4183, 4233	WCDMA
Conducted Spurious Emissions	4132 to 4233	4183	WCDMA
Radiated Spurious Emissions	4132 to 4233	4183	WCDMA
Band Edge	4132 to 4233	4132, 4233	WCDMA
Peak to Average Ratio	4132 to 4233	4132, 4183, 4233	WCDMA
Frequency Stability	4132 to 4233	4183	WCDMA

LTE BAND 5 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK, 16QAM	1RB/3RB/6RB
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM	1RB/8RB/15RB
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK, 16QAM	1RB/25RB/50RB
ERP	20450 to 20600	20450, 20525, 20600	10MHz	QPSK	1RB/25RB/50RB
Occupied Bandwidth	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK, 16QAM	6RB
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM	15RB
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM	25RB
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK, 16QAM	50RB
Conducted Spurious Emissions	20407 to 20643	20525	1.4MHz	QPSK	1RB
	20415 to 20635	20525	3MHz	QPSK	1RB
	20425 to 20625	20525	5MHz	QPSK	1RB
	20450 to 20600	20525	10MHz	QPSK	1RB
Radiated Spurious Emissions	20450 to 20600	20525	10MHz	QPSK	1RB
Band Edge	20407 to 20643	20407, 20643	1.4MHz	QPSK	1RB
					6RB
	20415 to 20635	20415, 20635	3MHz	QPSK	1RB
					15RB
	20425 to 20625	20425, 20625	5MHz	QPSK	1RB
					25RB
Peak To Average Ratio	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK, 16QAM	1RB
					1RB
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM	1RB
					1RB
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM	1RB
					1RB
Frequency Stability	20407 to 20643	20525	1.4MHz	QPSK	1RB
	20415 to 20635	20525	3MHz	QPSK	1RB
	20425 to 20625	20525	5MHz	QPSK	1RB
	20450 to 20600	20525	10MHz	QPSK	1RB

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATIONOFSYSTEMTESTED



3.4 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.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.
A	Power supply	Twinex	TP-6010	1616AP051502100

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	Power cable	NA	NA	1.5m

3. TEST RESULT

3.1 RADIATED POWER MEASUREMENT

3.1.1 LIMIT

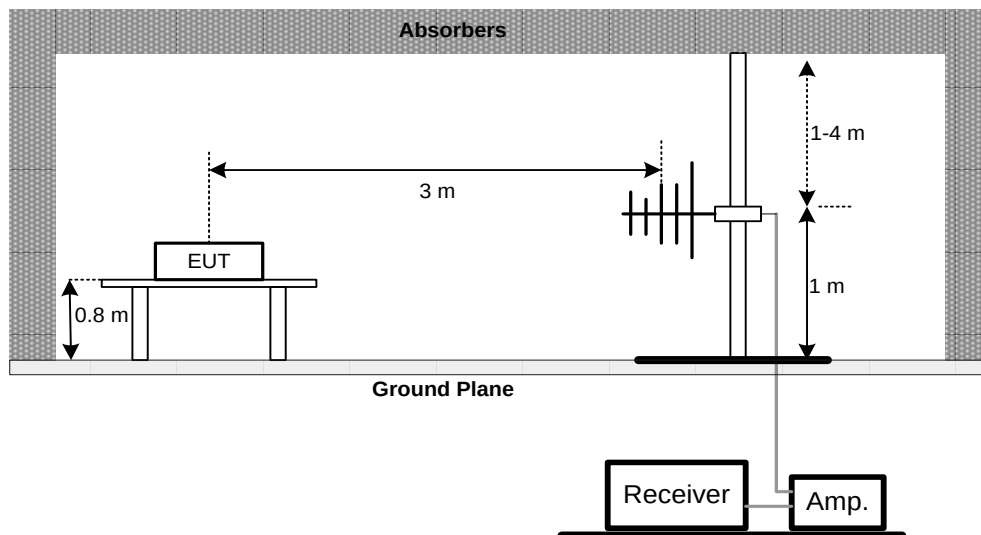
Mobile / Portable station are limited to 7 watts e.r.p.

3.1.2 TEST PROCEDURES

1. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m 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 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
2. 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
3. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
4. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15\text{dBi}.$
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.1.3 TEST SETUP LAYOUT

Radiated Power Measurement



3.1.4 TEST DEVIATION

No deviation

3.1.5 TEST RESULTS

Please refer to the APPENDIX A.

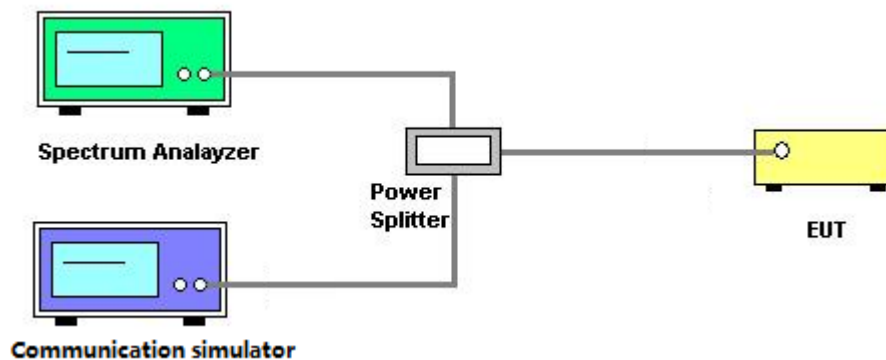
3.2 OCCUPIED BANDWIDTH MEASUREMENT

3.2.1 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 4.

1. 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 and 26dB bandwidth.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. $RBW = (1\% \sim 5\%) \cdot EBW$
 $VBW \geq 3 \cdot RBW$
4. Set spectrum analyzer with Peak detector.

3.2.2 TEST SETUP LAYOUT



3.2.3 TEST DEVIATION

No deviation

3.2.4 TEST RESULTS

Please refer to the APPENDIX B.

3.3 CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

3.3.1 LIMIT

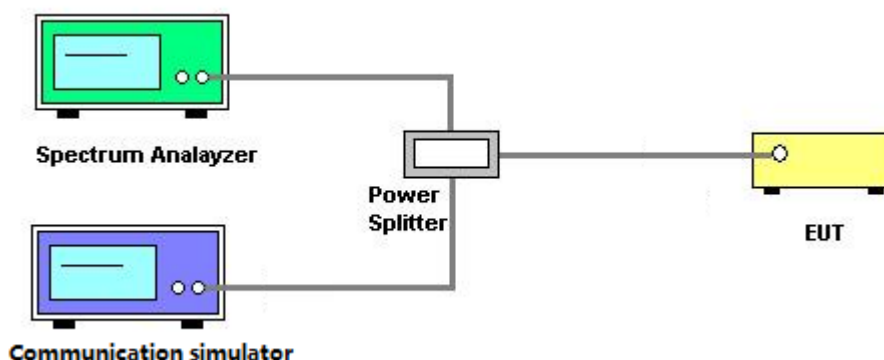
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm.

3.3.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Set RBW $\geq 1\%$ EBW in the 1MHz band immediately outside and adjacent to the band edge.
3. Set spectrum analyzer with Peak detector.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.3.3 TEST SETUP LAYOUT



3.3.4 TEST DEVIATION

No deviation

3.3.5 TEST RESULTS

Please refer to the APPENDIX C.

3.4 RADIATED SPURIOUS EMISSIONS MEASUREMENT

3.4.1 LIMIT

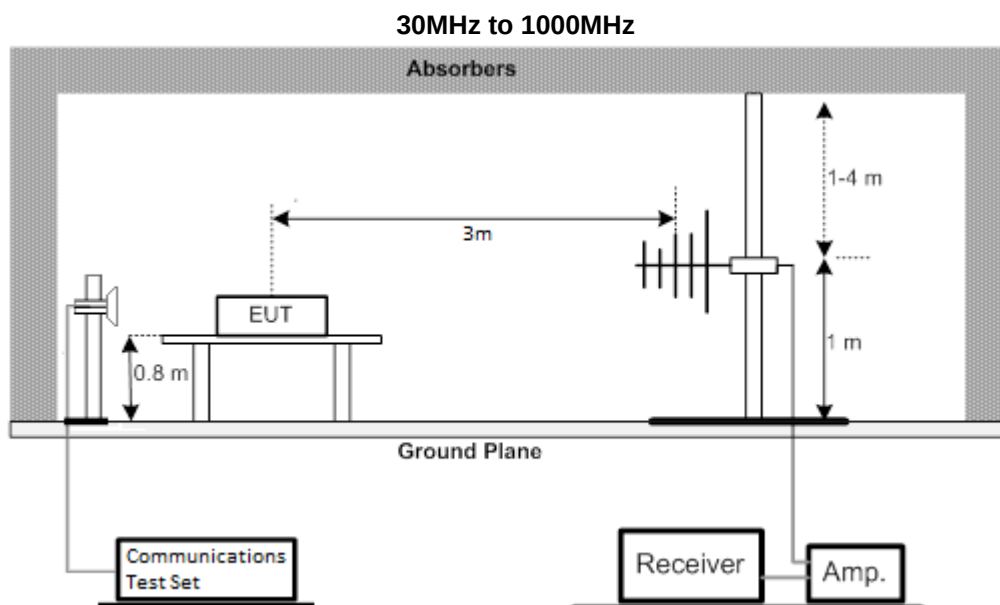
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm.

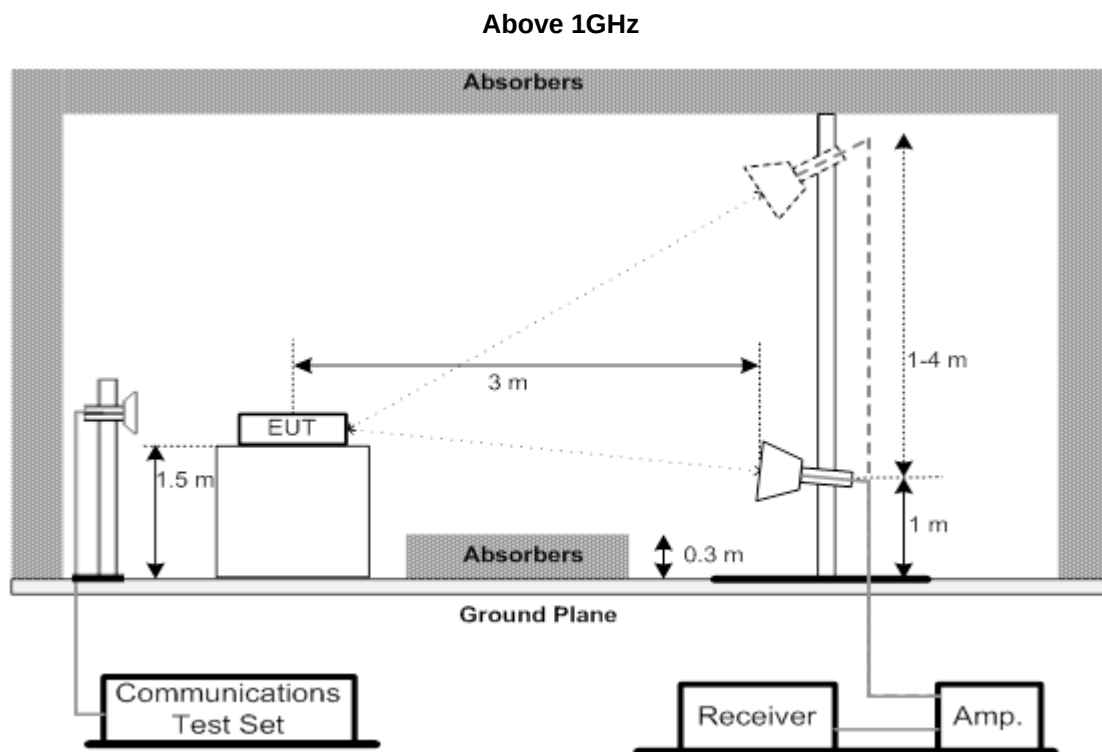
3.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.2.

1. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m 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 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
2. 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
3. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
4. ERP can be calculated form EIRP by subtracting the gain of dipole, $ERP = EIPR - 2.15\text{dBi}.$
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.4.3 TEST SETUP LAYOUT





3.4.4 TEST DEVIATION

No deviation

3.4.5 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX D.

3.4.6 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX E.

3.5 BAND EDGE MEASUREMENT

3.5.1 LIMIT

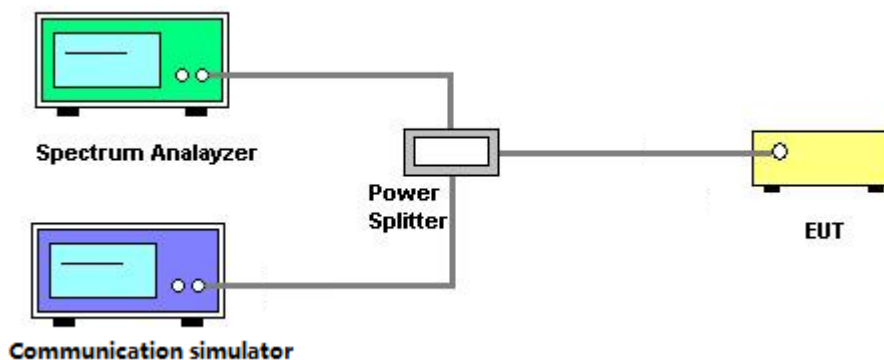
A Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the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

3.5.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.

1. All measurements were done at low and high operational frequency range.
2. Record the max trace plot into the test report.

3.5.3 TEST SETUP LAYOUT



3.5.4 TEST DEVIATION

No deviation

3.5.5 TEST RESULTS

Please refer to the APPENDIX F.

3.6 PEAK TO AVERAGE RATIO MEASUREMENT

3.6.1 LIMIT

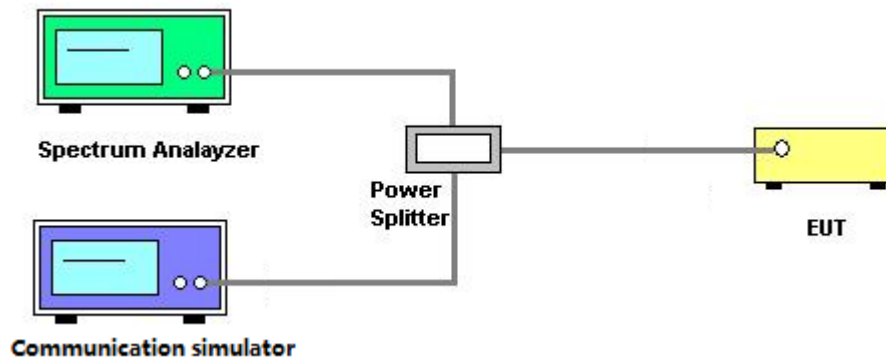
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.6.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.7.

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%.

3.6.3 TEST SETUP LAYOUT



3.6.4 TEST DEVIATION

No deviation

3.6.5 TEST RESULTS

Please refer to the APPENDIX G.

3.7 FREQUENCY STABILITY MEASUREMENT

3.7.1 LIMIT

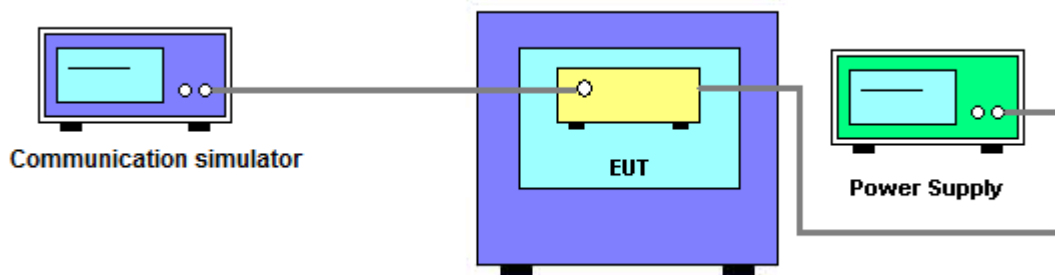
± 1.5 ppm is for base and fixed station. ± 2.5 ppm is for mobile station.

3.7.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 9.

1. 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.
2. 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.
3. 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.
4. The frequency error was recorded frequency error from the communication simulator.

3.7.3 TEST SETUP LAYOUT



3.7.4 TEST DEVIATION

No deviation

3.7.5 TEST RESULTS

Please refer to the APPENDIX H.

4. LIST OF MEASUREMENT EQUIPMENTS

ERP Power Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Radio Communication Analyzer	Anritsu	MT8820C	6201525878	2019/6/5	2020/6/4
2	8960 Series 10 Wireless Com Test Set	Agilent	E5515C	GB47390193	2019/7/5	2020/7/4

Radiated Emissions Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Preamplifier	EMCI	EMC001340	980555	2020/4/10	2021/4/9
2	Preamplifier	EMCI	EMC02325B	980217	2020/4/10	2021/4/9
3	Preamplifier	EMCI	EMC012645B	980267	2020/4/10	2021/4/9
4	Preamplifier	EMCI	EMC2654045	980030	2020/1/31	2021/1/30
5	Test Cable	EMCI	EMC104-SM-SM-800	150207	2020/4/10	2021/4/9
6	Test Cable	EMCI	EMC104-SM-SM-3000	151205	2020/4/10	2021/4/9
7	Test Cable	EMCI	EMC-SM-SM-7000	180408	2020/4/10	2021/4/9
8	MXE EMI Receiver	Agilent	N9038A	MY55420127	2020/3/24	2021/3/23
9	Signal Analyzer	Agilent	N9010A	MY56480554	2019/6/6	2020/6/5
10	Horn Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	2019/6/10	2020/6/9
11	Horn Ant	Schwarzbeck	BBHA 9170	187	2019/12/21	2020/12/20
12	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	000992	2019/5/29	2020/5/28
13	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0508	2019/5/29	2020/5/28

Frequency Stability Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Radio Communication Analyzer	Anritsu	MT8820C	6201525878	2019/6/5	2020/6/4
2	8960 Series 10 Wireless Com Test Set	Agilent	E5515C	GB47390193	2019/7/5	2020/7/4
3	Thermal Chamber	HOLINK	H-TH-2SP-B	H1/EK04101902	2018/7/26	2019/7/25

Others Conducted Measurement						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP40	100129	2020/5/22	2021/5/21
2	Spectrum Analyzer	Agilent	N9010A	MY54200240	2019/11/19	2020/11/18

Remark: "N/A" denotes no model name, no serial no. or no calibration specified.
All calibration period of equipment list is one year.

5. EUT TEST PHOTOS

Please refer to document Appendix No.: TP-2004T194-FCCP-1 (APPENDIX-TEST PHOTOS).

6. EUT PHOTOS

Please refer to document Appendix No.: EP-2004T194-1 (APPENDIX-EUT PHOTOS).

APPENDIX A - RADIATED POWER

Output Power (dBm):

Modulation	Band	WCDMA Band V		
	Tx Channel	4132CH	4183CH	4233CH
	Frequency	826.4MHz	836.6MHz	846.6MHz
QPSK	RMC 12.2K	23.9	24.0	23.8
	HSDPA Subtest-1	23.7	23.5	23.4
	HSDPA Subtest-2	23.1	23.1	22.9
	HSDPA Subtest-3	22.5	22.4	22.5
	HSDPA Subtest-4	22.5	22.3	22.5
	HSUPA Subtest-1	23.9	23.6	23.7
	HSUPA Subtest-2	22.0	21.7	21.8
	HSUPA Subtest-3	23.1	22.8	22.9
	HSUPA Subtest-4	21.9	21.8	21.9
	HSUPA Subtest-5	23.8	23.8	23.7

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20407CH	20525CH	20643CH
				824.7MHz	836.5MHz	848.3MHz
5 / 1.4M	QPSK	1	0	23.7	23.6	23.8
		1	2	23.7	23.7	23.5
		1	5	23.5	23.4	23.7
		3	0	23.7	23.6	23.8
		3	1	23.7	23.7	23.5
		3	2	23.5	23.4	23.7
		6	0	22.6	22.4	22.9
	16QAM	1	0	22.7	22.7	23.1
		1	2	23.0	22.9	22.9
		1	5	22.6	22.7	22.9
		3	0	22.7	22.7	23.1
		3	1	23.0	22.9	22.9
		3	2	22.6	22.7	22.9
		6	0	22.5	21.6	22.8

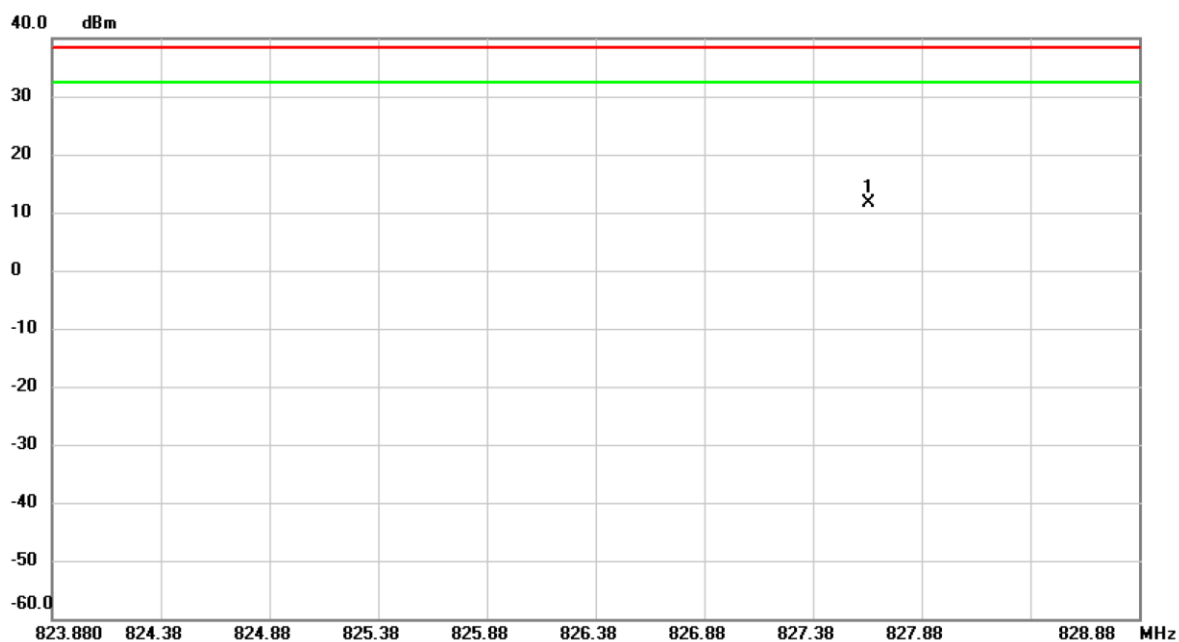
LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20415CH	20525CH	20635CH
				825.5MHz	836.5MHz	847.5MHz
5 / 3M	QPSK	1	0	23.7	23.7	23.8
		1	7	23.8	23.7	23.6
		1	14	23.5	23.5	23.7
		8	0	22.9	22.9	23.1
		8	4	22.8	22.8	23.1
		8	7	22.7	22.6	23.0
		15	0	22.6	22.5	23.0
	16QAM	1	0	22.8	22.8	23.1
		1	7	23.0	22.9	23.0
		1	14	22.7	22.7	23.0
		8	0	21.8	21.8	22.1
		8	4	22.0	21.8	22.1
		8	7	21.6	21.8	22.0
		15	0	22.5	21.6	21.9

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20425CH	20525CH	20625CH
				826.5MHz	836.5MHz	846.5MHz
5 / 5M	QPSK	1	0	23.8	23.7	23.9
		1	12	23.8	23.8	23.6
		1	24	23.6	23.5	23.8
		12	0	23.0	23.0	23.1
		12	6	22.8	22.8	23.1
		12	11	22.8	22.7	23.1
		25	0	22.7	22.5	23.0
	16QAM	1	0	22.8	22.8	23.2
		1	12	23.1	23.0	23.0
		1	24	22.7	22.8	23.0
		12	0	21.8	21.8	22.1
		12	6	22.0	21.9	22.2
		12	11	21.6	21.8	22.1
		25	0	22.6	21.6	22.0

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20450CH	20525CH	20600CH
				829.0MHz	836.5MHz	844.0MHz
5 / 10M	QPSK	1	0	23.8	23.8	23.9
		1	24	23.9	23.8	23.7
		1	49	23.6	23.6	23.8
		25	0	23.0	23.0	23.2
		25	12	22.9	22.9	23.2
		25	24	22.8	22.7	23.1
		50	0	22.7	22.6	23.1
	16QAM	1	0	22.9	22.9	23.2
		1	24	23.1	23.0	23.1
		1	49	22.8	22.8	23.1
		25	0	21.9	21.9	22.2
		25	12	22.1	21.9	22.2
		25	24	21.7	21.9	22.1
		50	0	22.6	21.7	22.0

ERP (dBm):

Test Mode	WCDMA Band V	Test Date	2020/6/1
Test Channel	CH4357	Polarization	Vertical



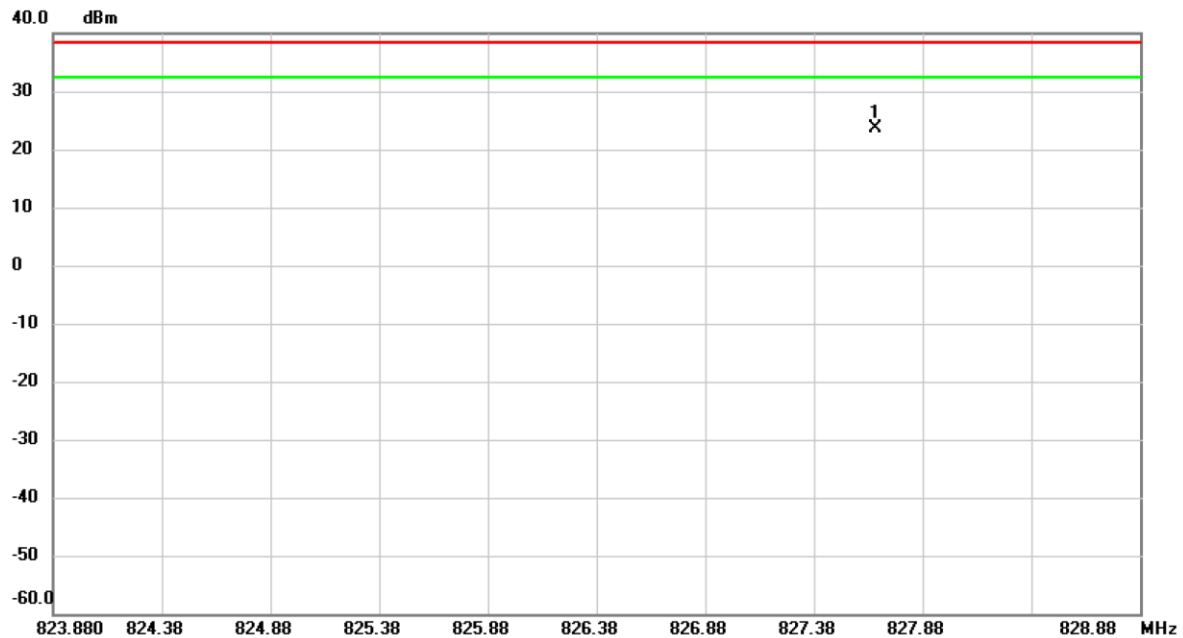
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	827.6350	0.09	11.65	11.74	38.45	-26.71	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	WCDMA Band V	Test Date	2020/6/1
Test Channel	CH4357	Polarization	Horizontal



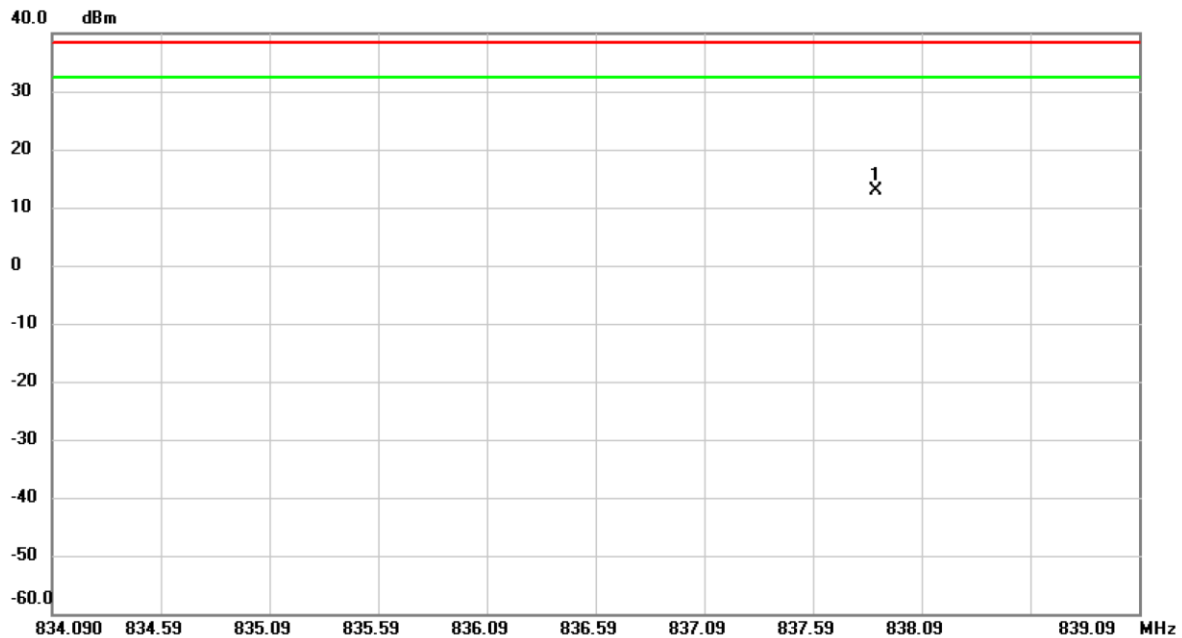
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	827.6650	5.67	18.02	23.69	38.45	-14.76	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	WCDMA Band V	Test Date	2020/6/1
Test Channel	CH4408	Polarization	Vertical



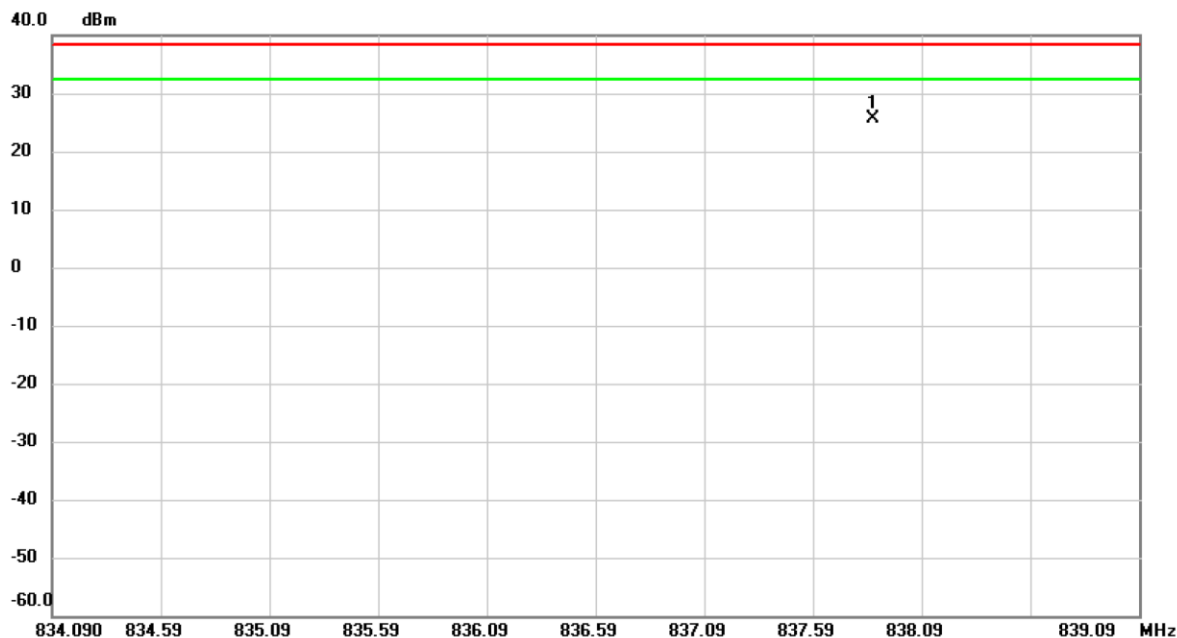
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	837.8800	1.17	11.78	12.95	38.45	-25.50	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	WCDMA Band V	Test Date	2020/6/1
Test Channel	CH4408	Polarization	Horizontal



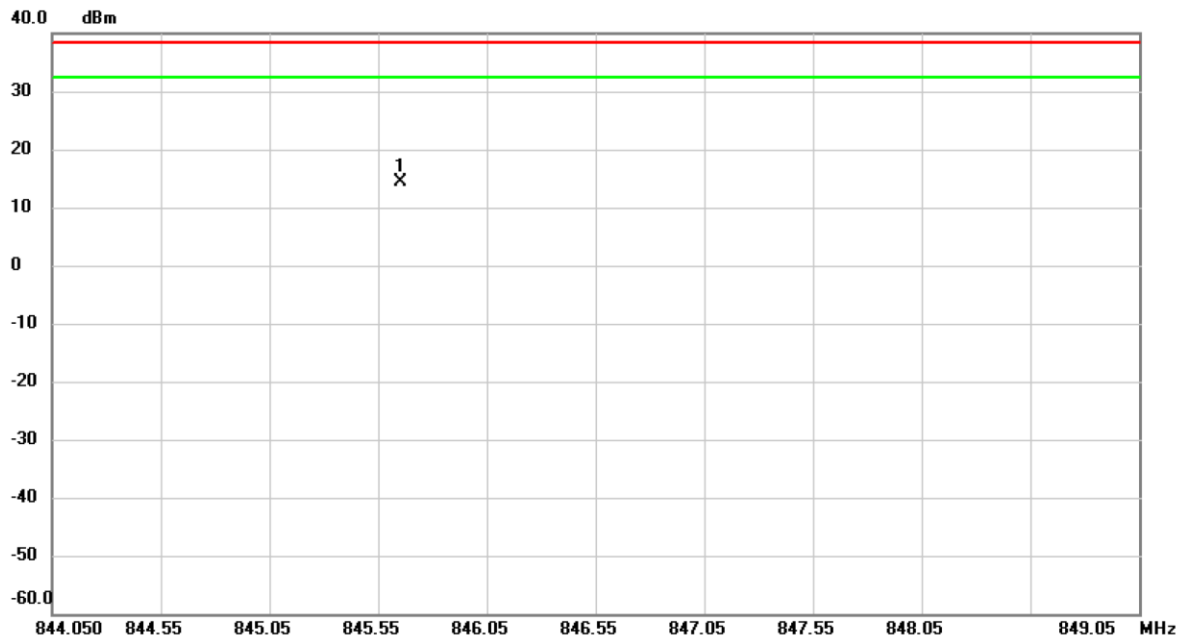
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	837.8700	7.34	18.27	25.61	38.45	-12.84	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	WCDMA Band V	Test Date	2020/6/1
Test Channel	CH4458	Polarization	Vertical



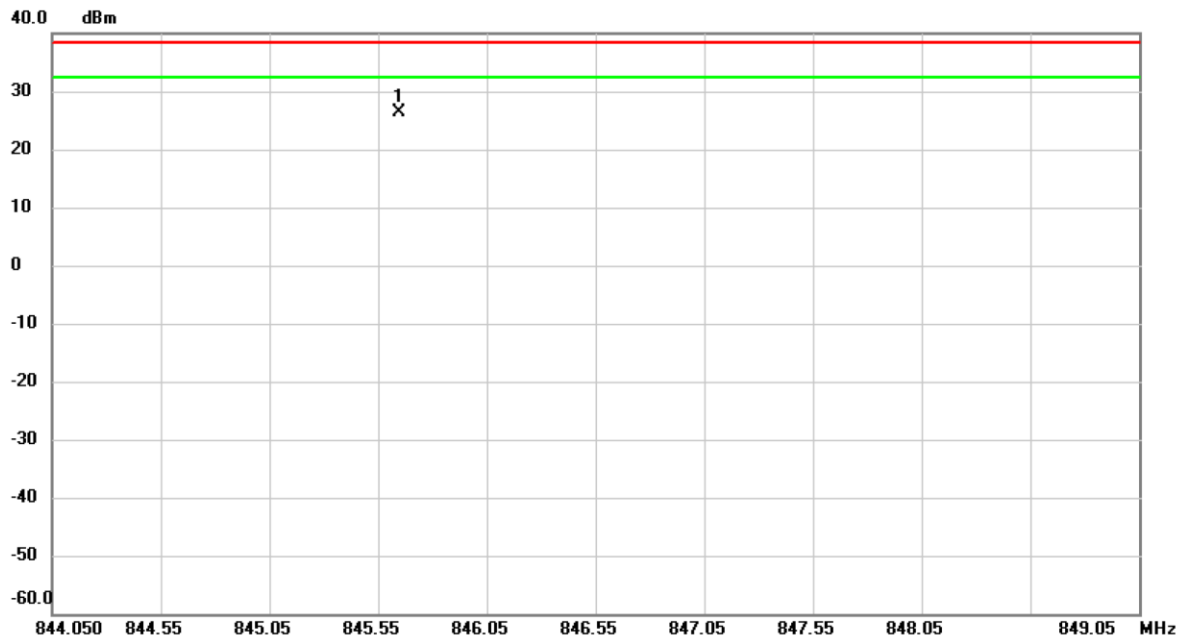
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	845.6550	2.40	11.88	14.28	38.45	-24.17	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	WCDMA Band V	Test Date	2020/6/1
Test Channel	CH4458	Polarization	Horizontal



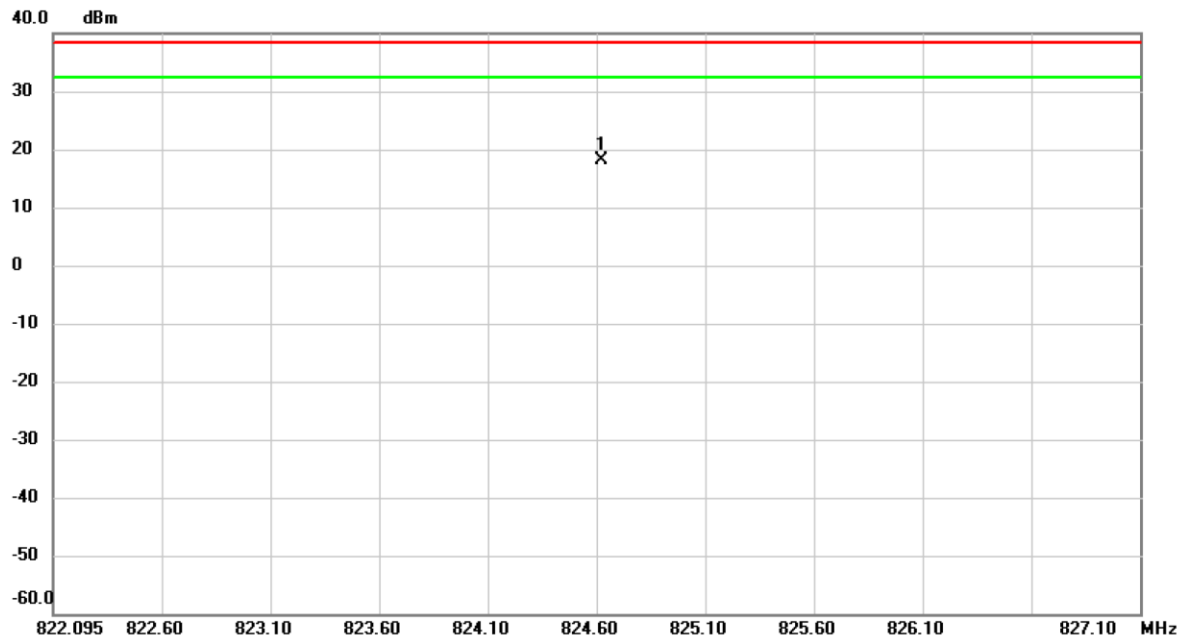
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	845.6450	7.99	18.46	26.45	38.45	-12.00	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	LTE Band 5	Test Date	2020/6/1
Test Channel	CH20450	Polarization	Vertical



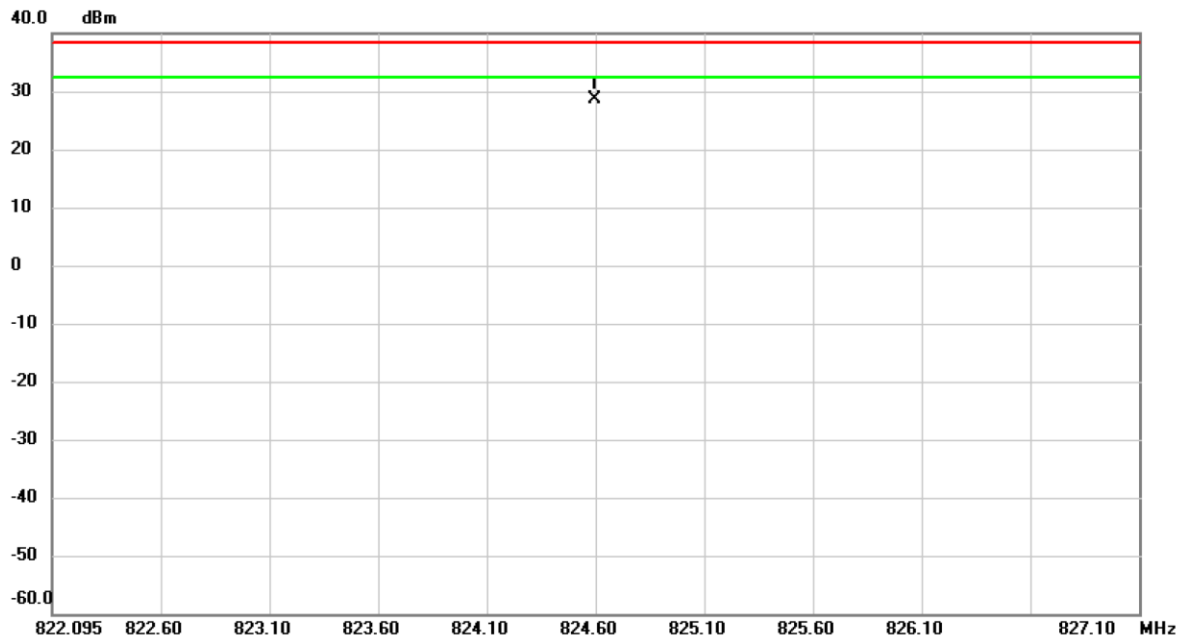
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	824.6225	8.56	9.47	18.03	38.45	-20.42	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	LTE Band 5	Test Date	2020/6/1
Test Channel	CH20450	Polarization	Horizontal



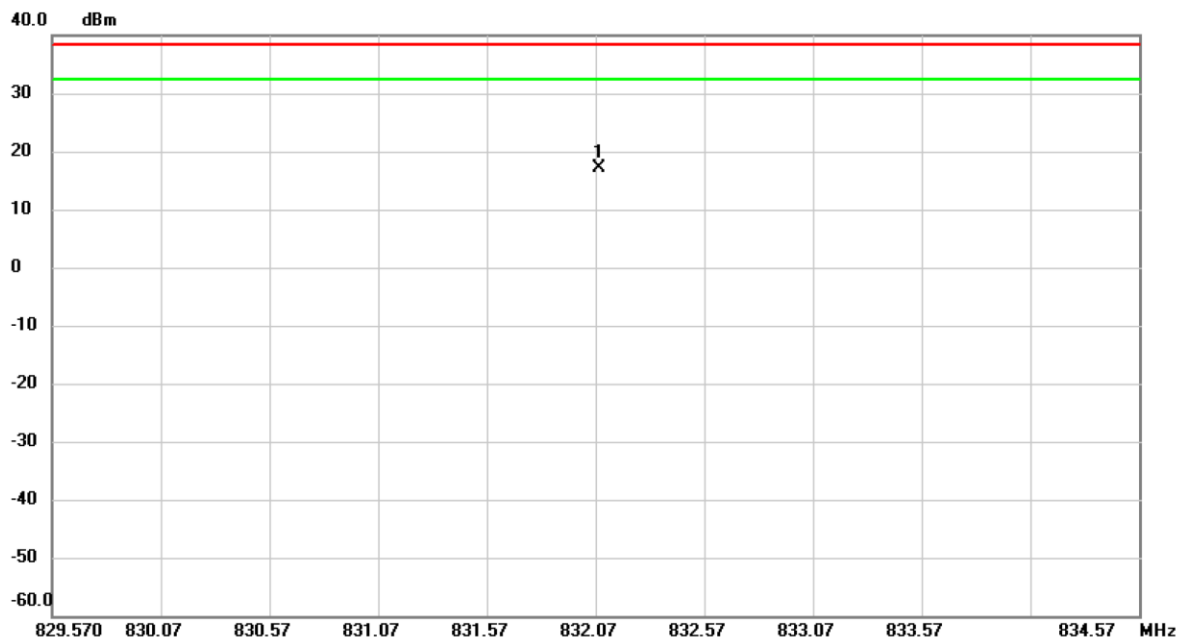
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	824.5974	12.82	15.80	28.62	38.45	-9.83	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	LTE Band 5	Test Date	2020/6/1
Test Channel	CH20525	Polarization	Vertical



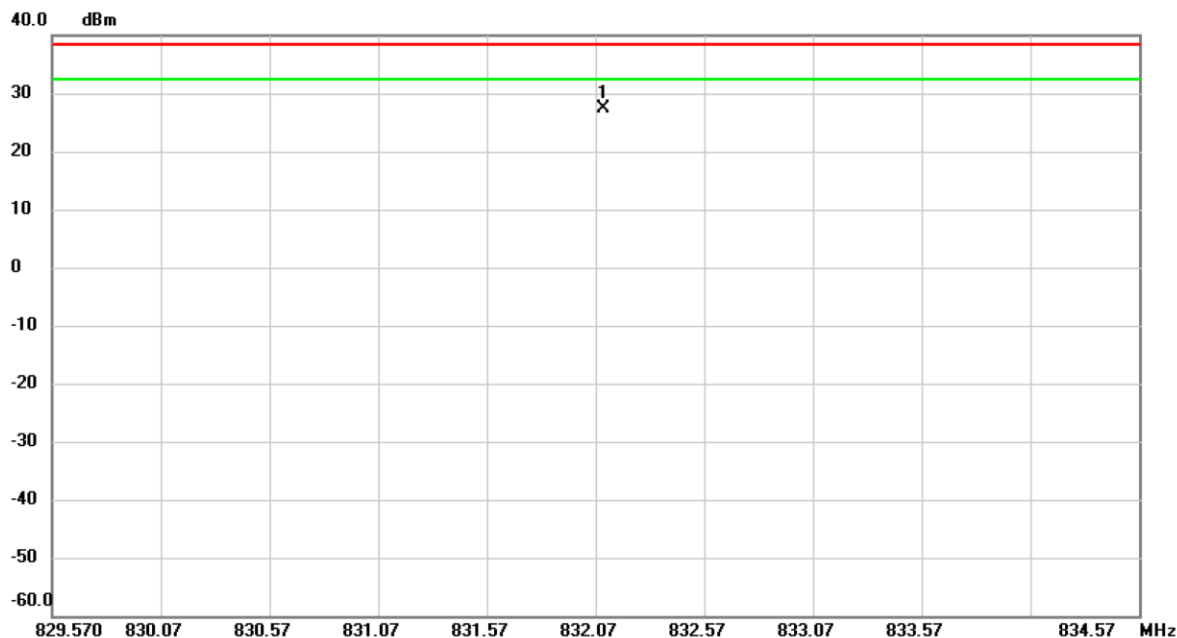
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	832.0900	7.58	9.56	17.14	38.45	-21.31	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	LTE Band 5	Test Date	2020/6/1
Test Channel	CH20525	Polarization	Horizontal



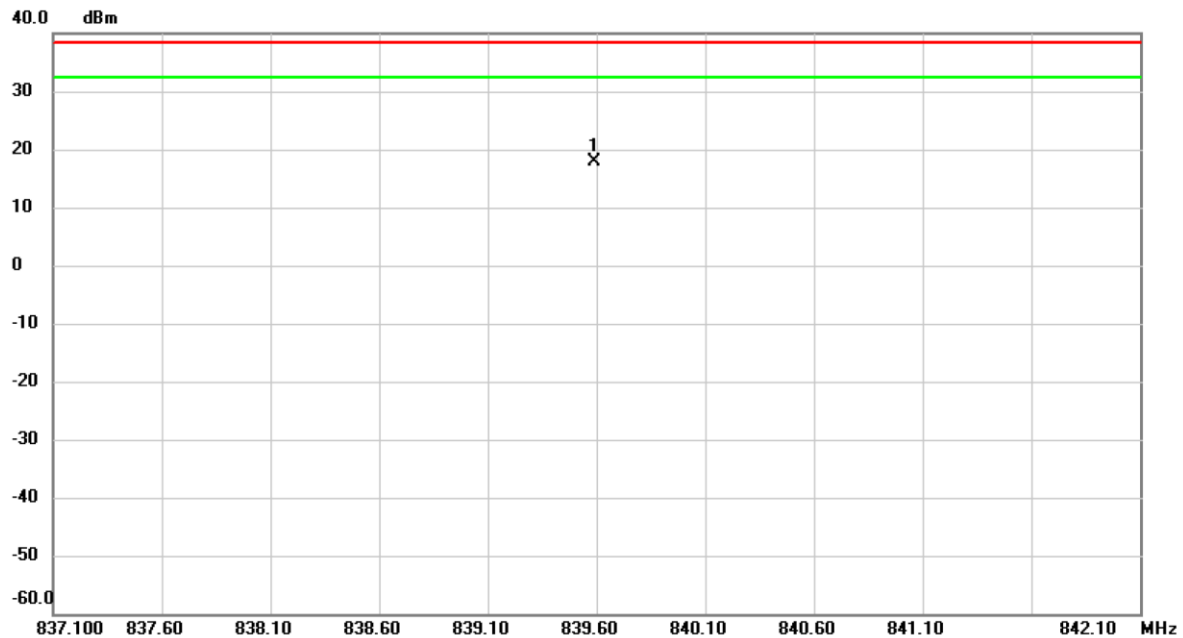
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	832.1100	11.33	15.98	27.31	38.45	-11.14	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	LTE Band 5	Test Date	2020/6/1
Test Channel	CH20600	Polarization	Vertical



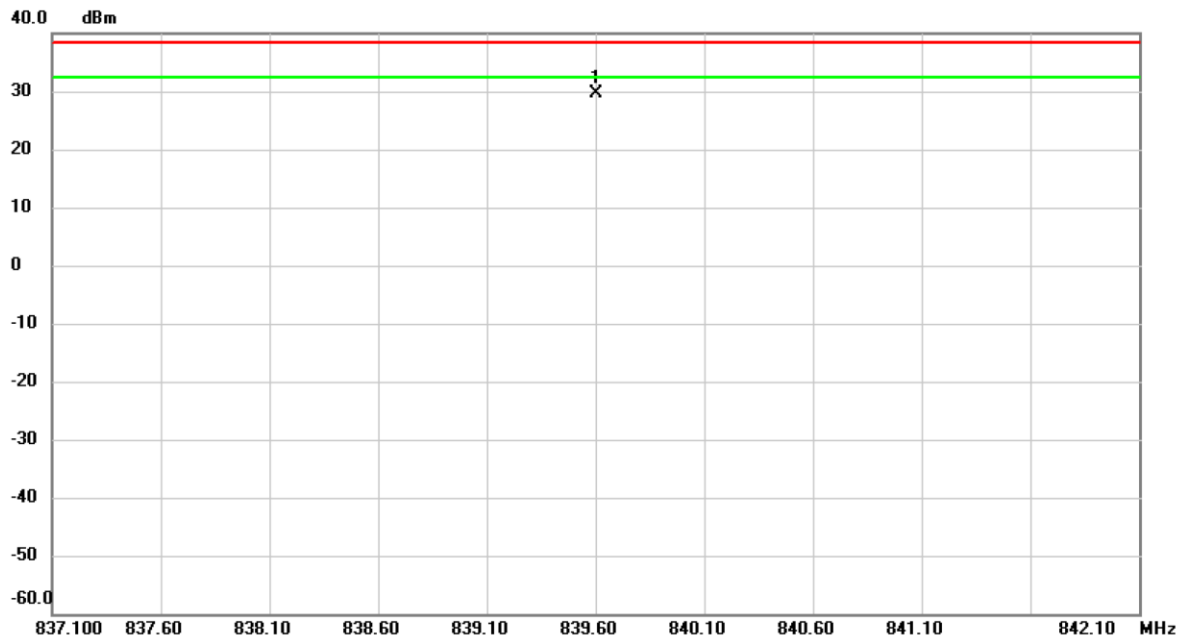
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	839.5900	8.12	9.66	17.78	38.45	-20.67	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	LTE Band 5	Test Date	2020/6/1
Test Channel	CH20600	Polarization	Horizontal



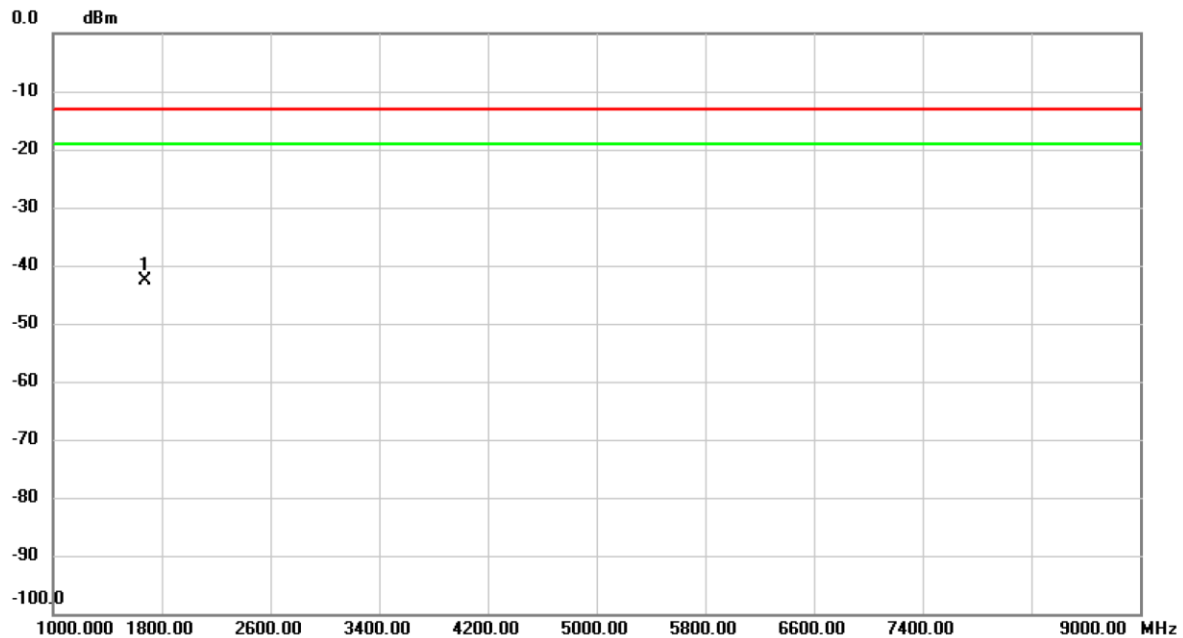
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	839.6050	13.50	16.16	29.66	38.45	-8.79	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	WCDMA Band V	Test Date	2020/6/1
Test Channel	CH4408	Polarization	Vertical



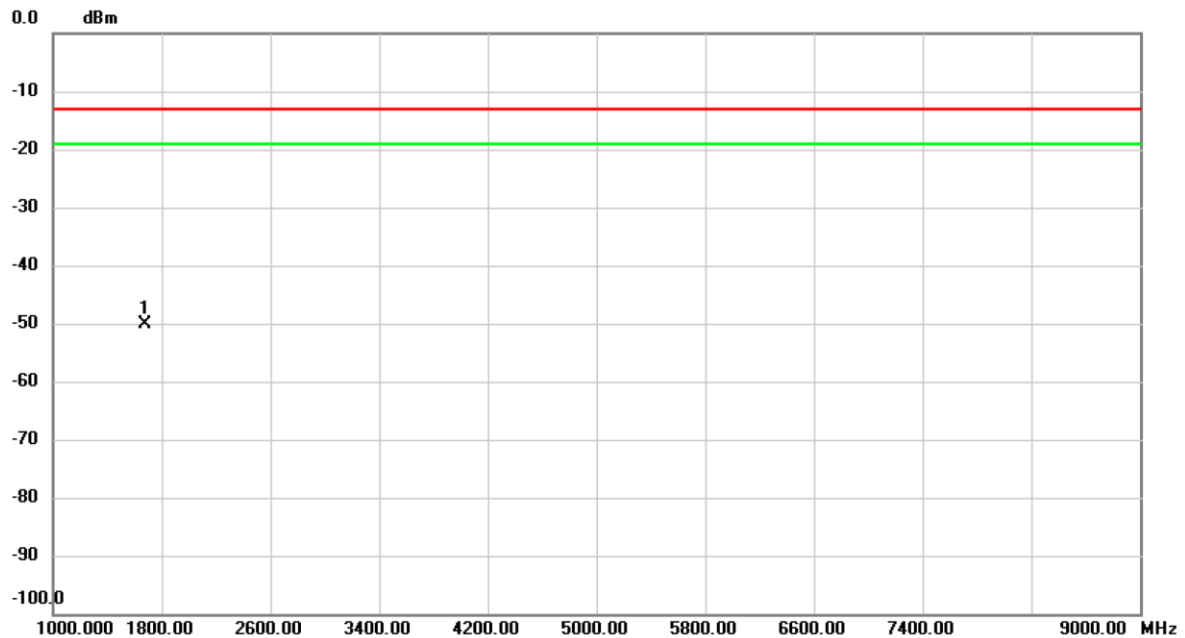
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1673.000	-35.59	-6.97	-42.56	-13.00	-29.56	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	WCDMA Band V	Test Date	2020/6/1
Test Channel	CH4408	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	1673.000	-43.06	-7.09	-50.15	-13.00	-37.15	peak	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

APPENDIX B - OCCUPIED BANDWIDTH

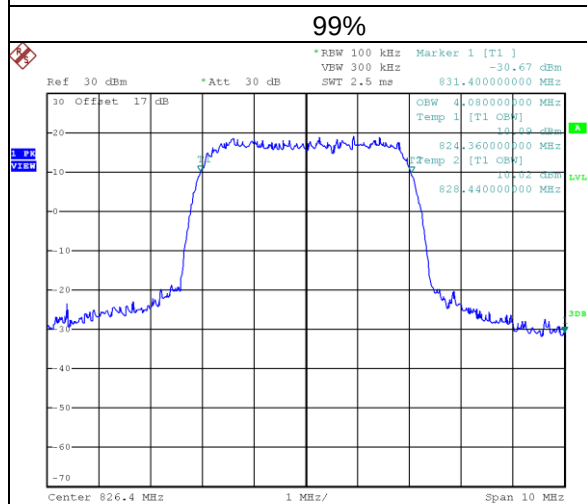
WCDMA Band V_WCDMA

QPSK

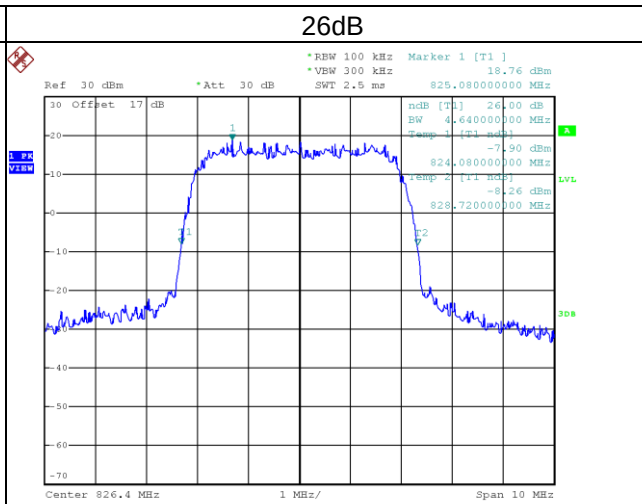
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
4132	826.4	4.0800	4132	826.4	4.640
4183	836.6	4.0800	4183	836.6	4.620
4233	846.6	4.0800	4233	846.6	4.660

Spectrum Plot

4132

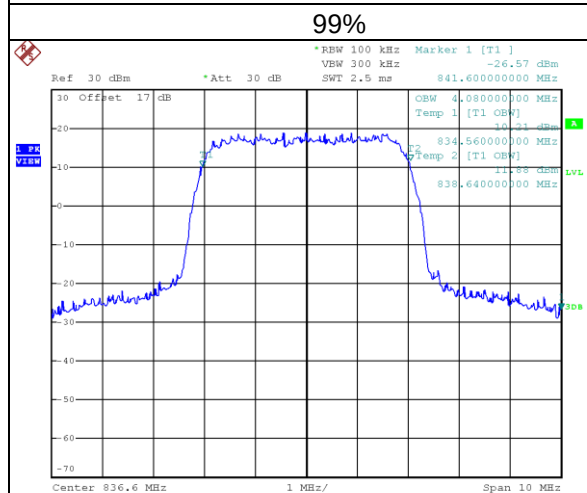


Date: 27.MAY.2020 20:03:27

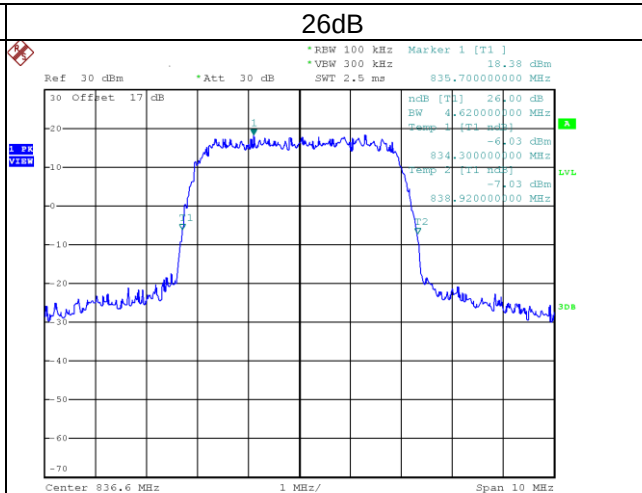


Date: 15.JUN.2020 21:52:34

4183



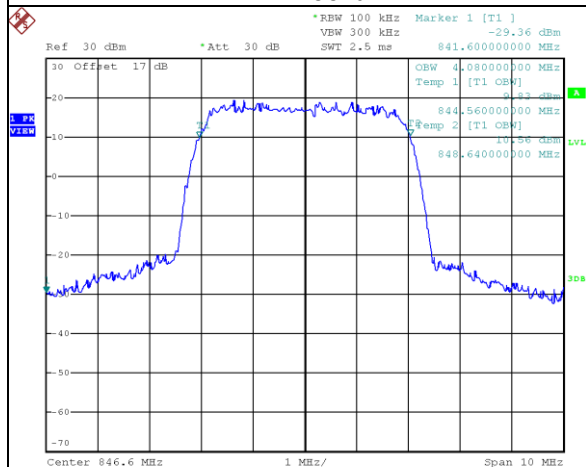
Date: 27.MAY.2020 20:02:29



Date: 15.JUN.2020 21:47:46

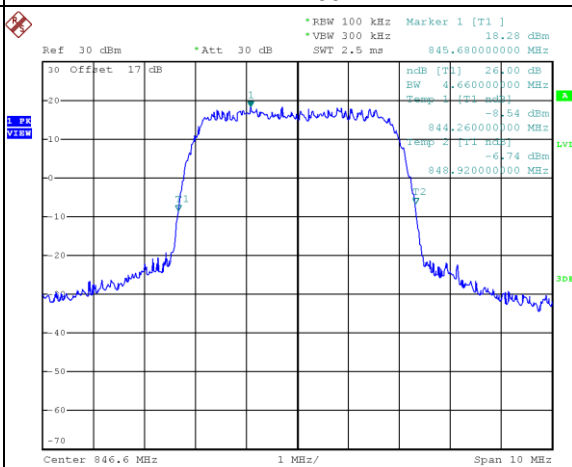
4233

99%



Date: 27.MAY.2020 20:04:24

26dB

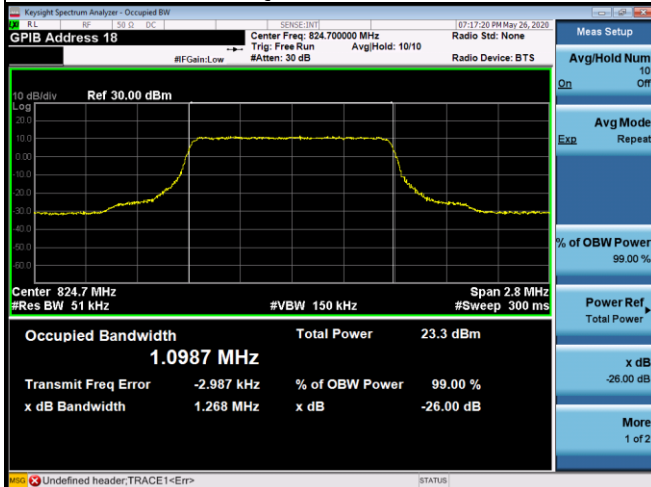


Date: 15.JUN.2020 21:54:12

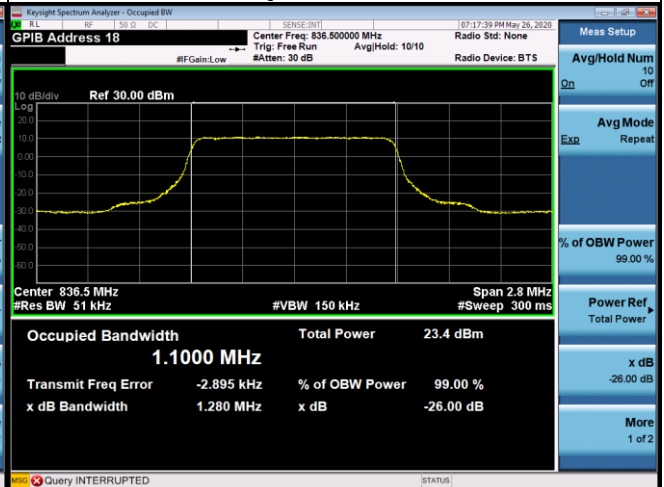
LTE Band 5_1.4M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20407	824.7	1.0987	20407	824.7	1.268
20525	836.5	1.1000	20525	836.5	1.280
20643	848.3	1.1005	20643	848.3	1.282
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20407	824.7	1.1007	20407	824.7	1.290
20525	836.5	1.1017	20525	836.5	1.299
20643	848.3	1.1019	20643	848.3	1.287

Spectrum Plot

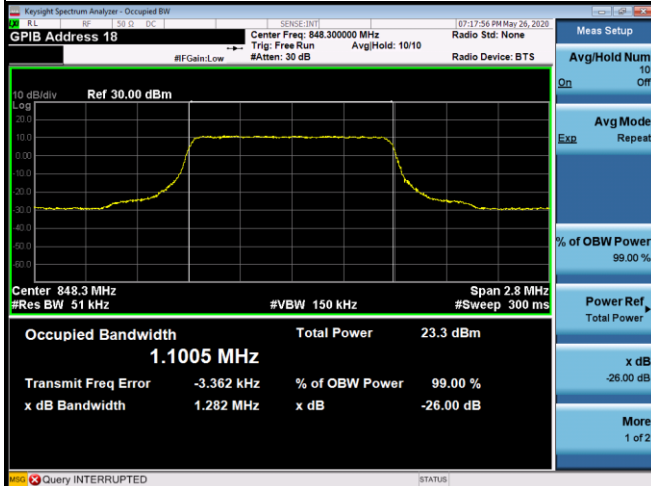
QPSK-20407



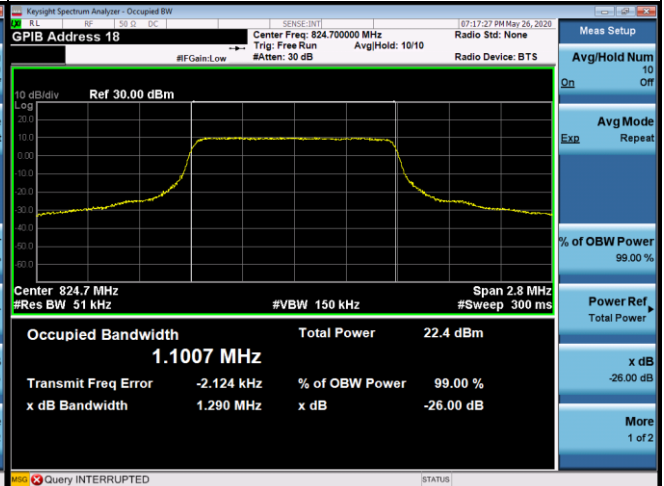
QPSK-20525



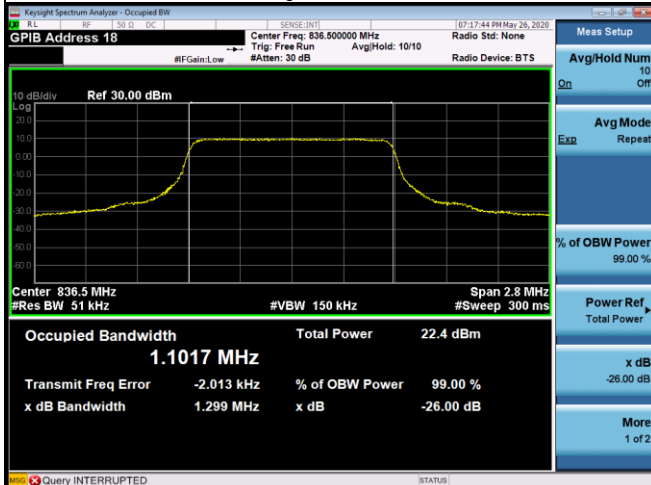
QPSK-20643



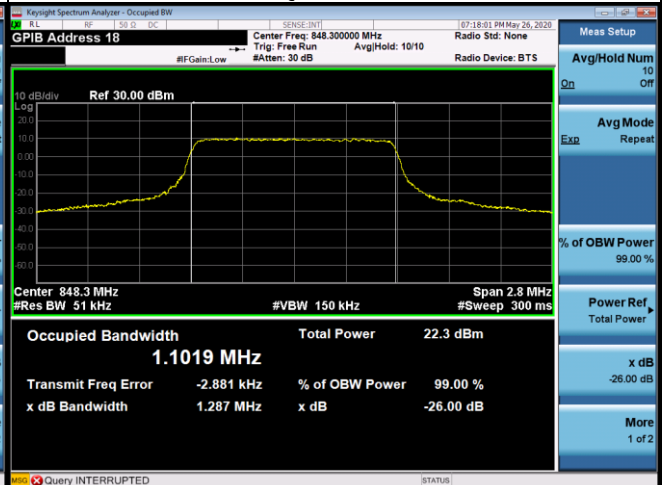
16QAM-20407



16QAM-20525



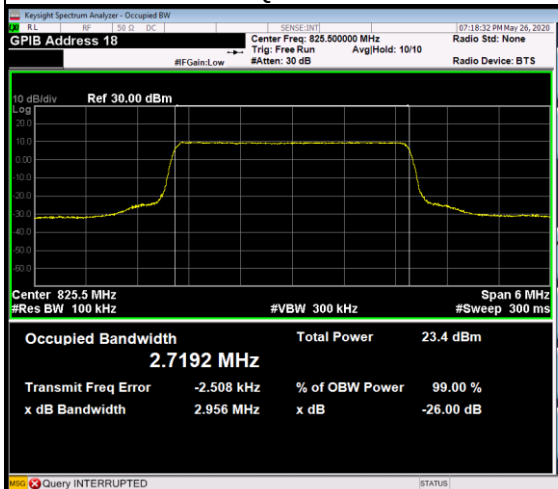
16QAM-20643



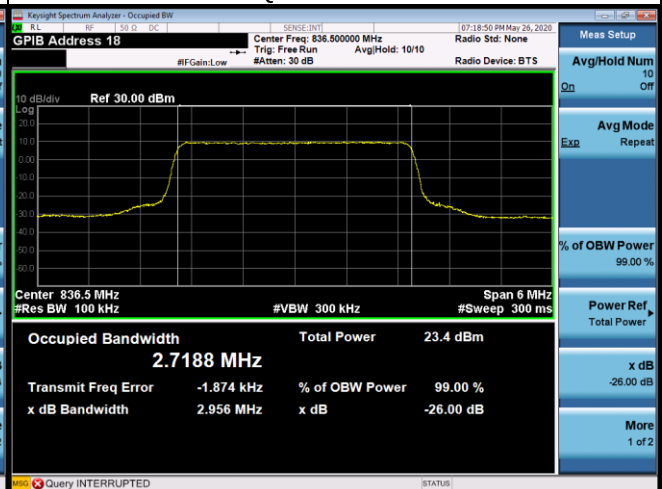
LTE Band 5_3M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20415	825.5	2.7192	20415	825.5	2.956
20525	836.5	2.7188	20525	836.5	2.956
20635	847.5	2.7182	20635	847.5	2.962
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20415	825.5	2.7181	20415	825.5	2.962
20525	836.5	2.7150	20525	836.5	2.955
20635	847.5	2.7175	20635	847.5	2.966

Spectrum Plot

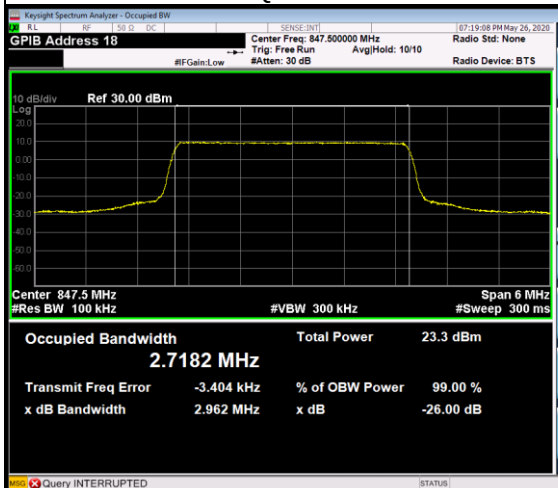
QPSK-20415



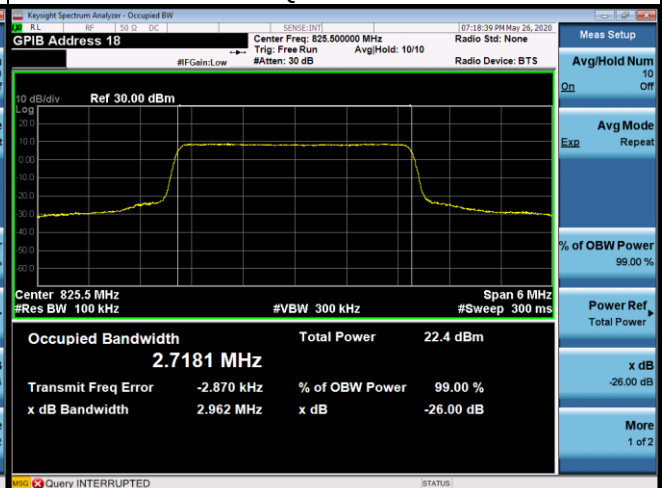
QPSK-20525



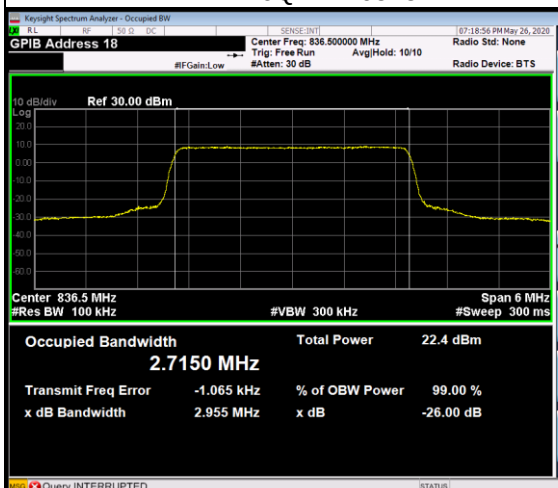
QPSK-20635



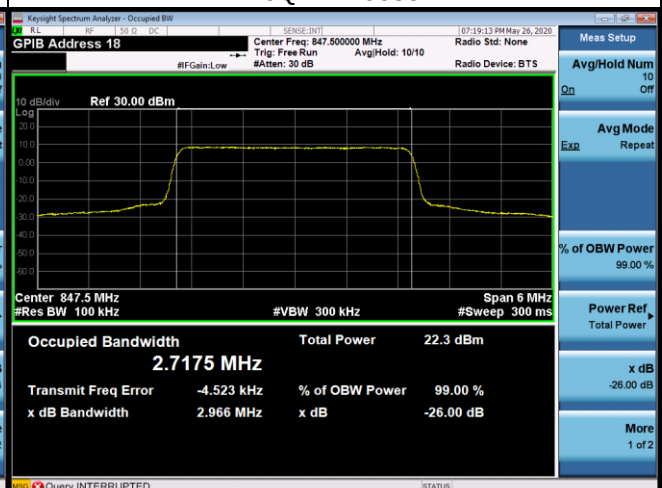
16QAM-20415



16QAM-20525



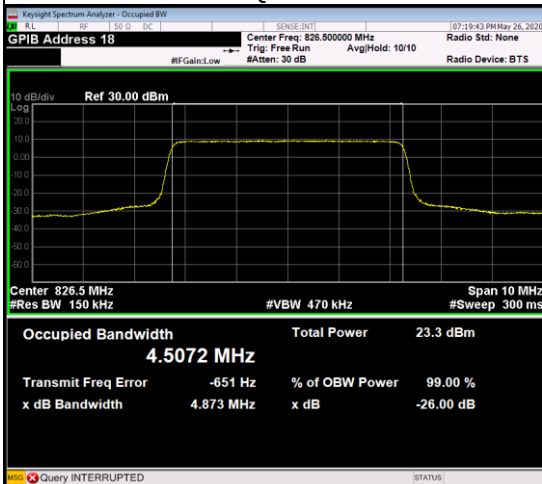
16QAM-20635



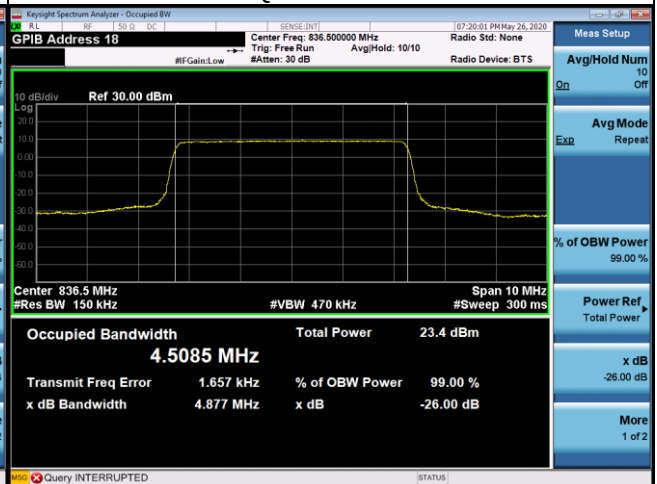
LTE Band 5_5M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20425	826.5	4.5072	20425	826.5	4.873
20525	836.5	4.5085	20525	836.5	4.877
20625	846.5	4.5068	20625	846.5	4.869
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20425	826.5	4.5007	20425	826.5	4.873
20525	836.5	4.5020	20525	836.5	4.870
20625	846.5	4.5018	20625	846.5	4.869

Spectrum Plot

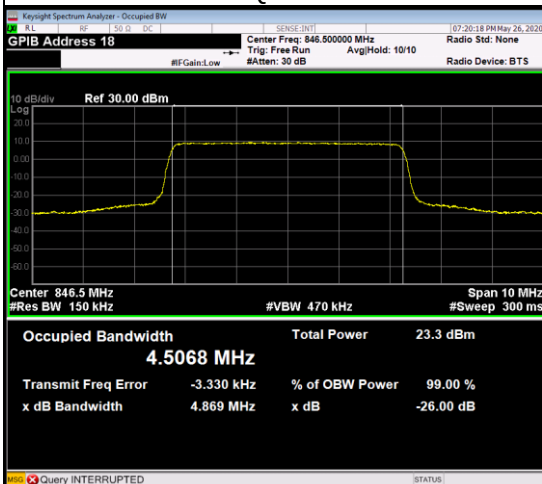
QPSK-20425



QPSK-20525



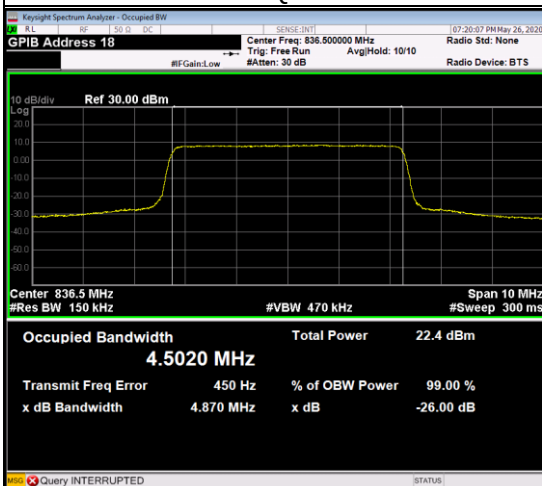
QPSK-20625



16QAM-20425



16QAM-20525



16QAM-20625



LTE Band 5_10M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20450	829.0	8.9534	20450	829.0	9.514
20525	836.5	8.9612	20525	836.5	9.528
20600	844.0	8.9478	20600	844.0	9.523
16QAM					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20450	829.0	8.9550	20450	829.0	9.520
20525	836.5	8.9600	20525	836.5	9.513
20600	844.0	8.9472	20600	844.0	9.507

Spectrum Plot

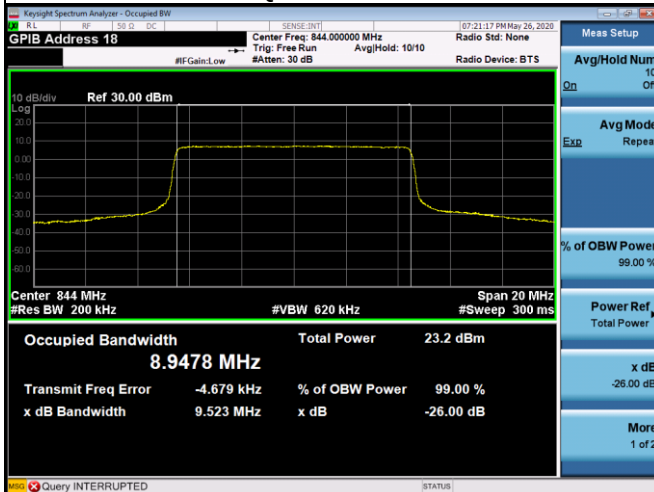
QPSK-20450



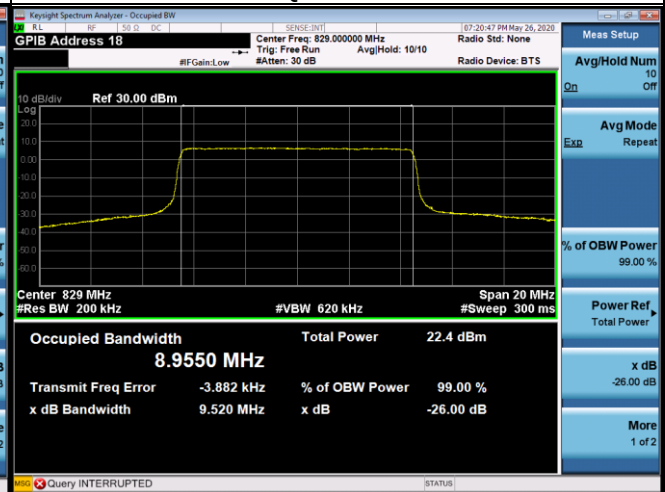
QPSK-20525



QPSK-20600



16QAM-20450



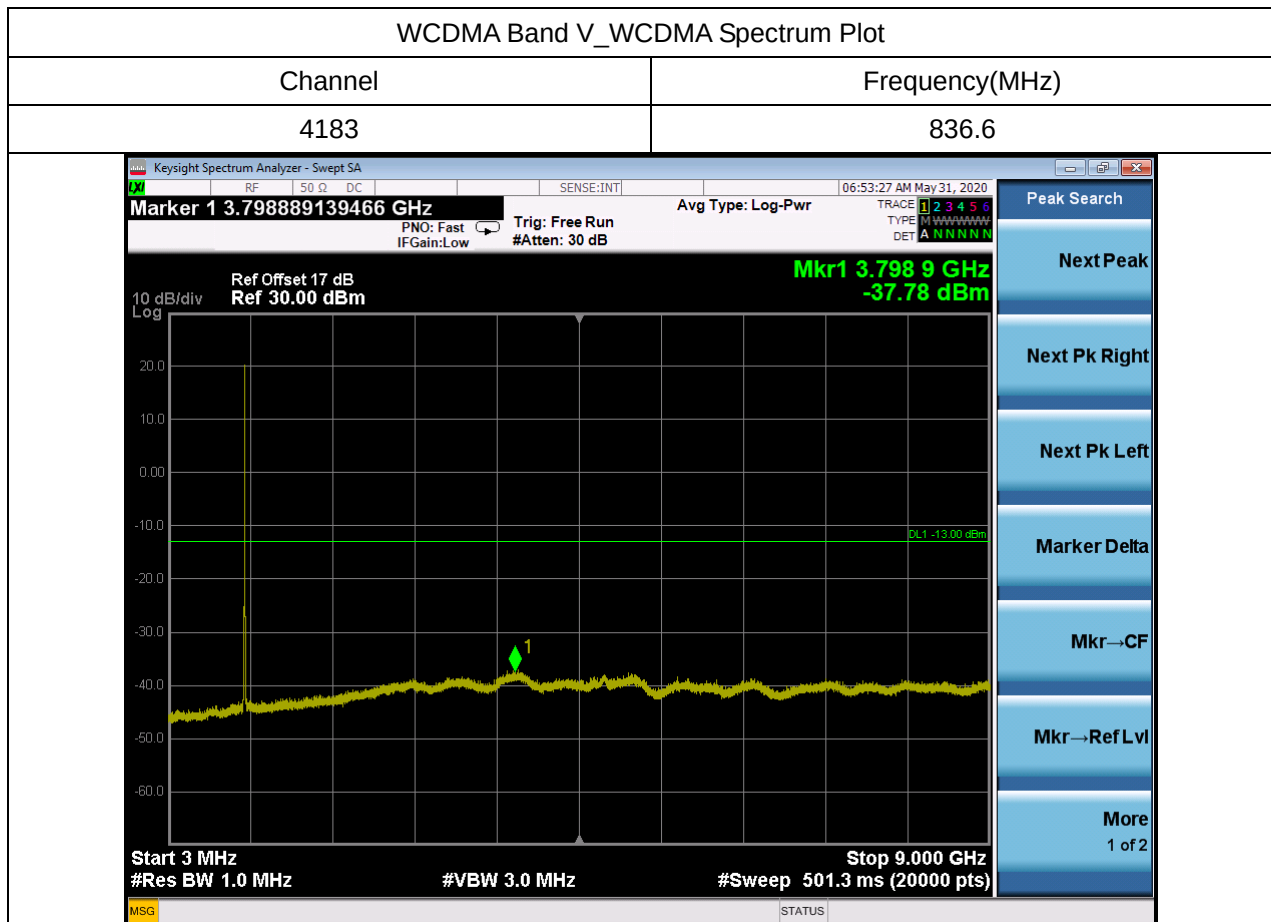
16QAM-20525



16QAM-20600



APPENDIX C - CONDUCTED SPURIOUS EMISSIONS



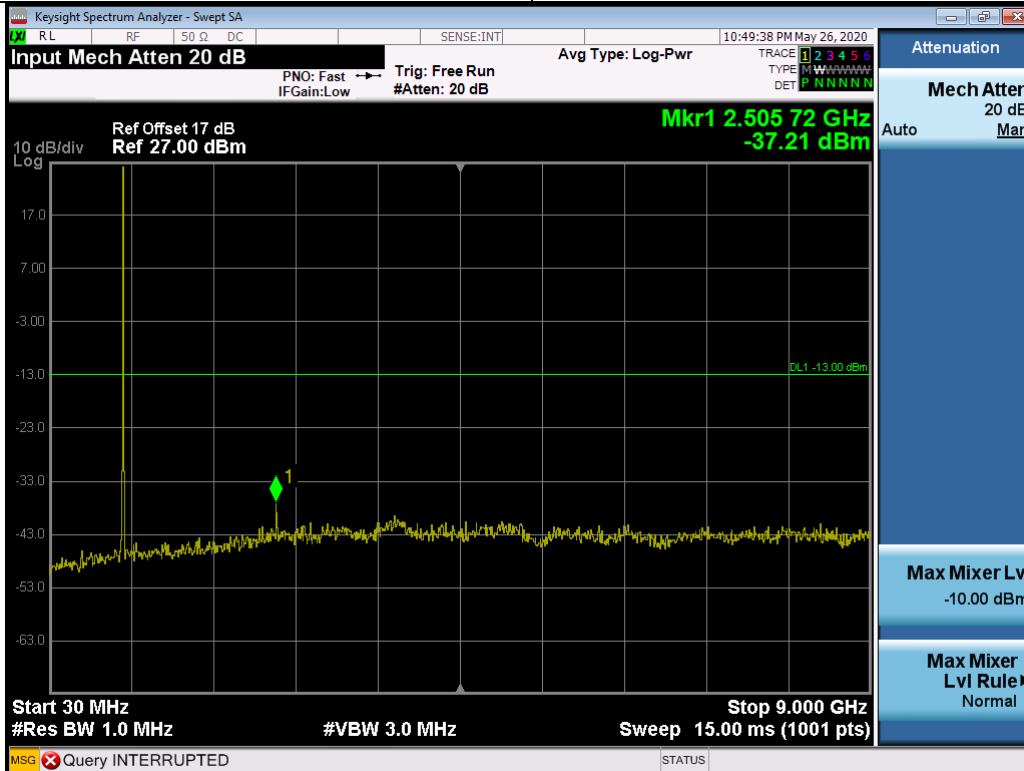
LTE Band 5_1.4M Spectrum Plot

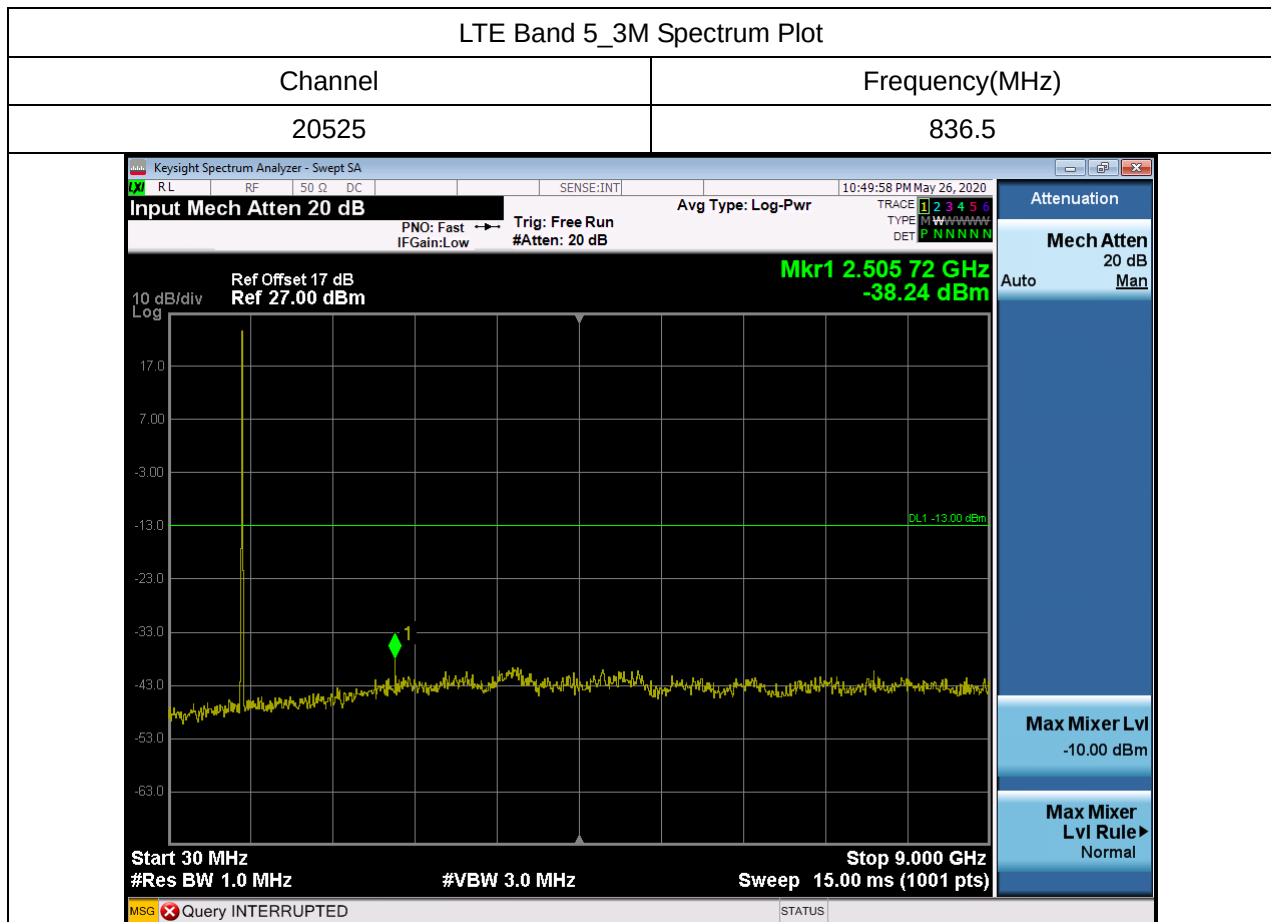
Channel

Frequency(MHz)

20525

836.5





LTE Band 5_5M Spectrum Plot

Channel

Frequency(MHz)

20525

836.5

