

# FCC Radio Test Report

## FCC ID: XMR202106EG91AUX

This report concerns: Original Grant

**Project No.** : 2009H029B  
**Equipment** : LTE Module  
**Brand Name** : Quectel  
**Test Model** : EG91-AUX  
**Series Model** : N/A  
**Applicant** : Quectel Wireless Solutions Company Limited  
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**Manufacturer** : Quectel Wireless Solutions Co., Ltd.  
**Address** : Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233.  
**Date of Receipt** : Apr. 16, 2021  
**Date of Test** : Apr. 16, 2021 ~ May 10, 2021  
**Issued Date** : May 27, 2021  
**Report Version** : R00  
**Test Sample** : Engineering Sample No.: SH2021041698 for Radiated;  
SH2020091134 for Conducted; SH2020091134-2 for adapter.  
**Standard(s)** : 47 CFR FCC Part 27 Subpart L  
47 CFR FCC Part 27 Subpart M  
47 CFR FCC Part 2  
ANSI/TIA/EIA-603-E-2016  
FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

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

Maker Qi

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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 is not use in determining the Pass/Fail results.

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**REPORT ISSUED HISTORY**

Report Version	Description	Issued Date
R00	This report is base on the reference report (Report No.: BTL-FCCP-3-2009H029A/FCC ID: XMR202106EG95AUX ) for worst case spot check (Except the output power) and record. Please refer to the “Differences Brief Description” in section 1.4 and other data in the reference report.	May 27, 2021

## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 27 Subpart L,M,H,E & Part 2			
Standard(s) Section	Test Item	Judgment	Remark
2.1046 27.50(d)(4) 27.50(h)(2) 27.50(b)(10) 27.50(c)(10)	Effective Radiated Power & Equivalent Isotropic Radiated Power	PASS	-----
2.1049	Occupied Bandwidth	PASS	-----
2.1051 27.53(c)(2)(4) 27.53(g) 27.53(h) 27.53(m)(4)	Conducted Spurious Emissions	PASS	-----
2.1053 27.53(c)(2) 27.53(f) 27.53(g) 27.53(h) 27.53(m)(4)	Radiated Spurious Emissions	PASS	-----
2.1051 27.53(c)(2)(4) 27.53(g) 27.53(h) 27.53(m)(4)	Band Edge Measurements	PASS	-----
-	Peak To Average Ratio	PASS	-----
2.1055 27.54	Frequency Stability	PASS	-----

Note:

For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".

### 1.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No. 29, Jintang Road, Tangzhen Industry Park, Pudong New Area, Shanghai 201210, China.

BTL's Test Firm Registration Number for FCC: 476765

BTL's Designation Number for FCC: CN1241

### 1.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty figures shall be calculated according the methods described in the ETSI TR 100 028 and shall correspond to an expansion factor (coverage factor)  $k=1.96$  or  $k=2$ (which provide confidence levels of respectively 90% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Measurement Uncertainty for a Level of Confidence of 95 %,  $U=2xUc(y)$ .

The BTL measurement uncertainty as below table:

#### A. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
SH-CB01 (3m)	CISPR	9KHz ~ 30MHz	V	3.79
		9KHz ~ 30MHz	H	3.57
		30MHz ~ 200MHz	V	4.12
		30MHz ~ 200MHz	H	3.20
		200MHz ~ 1,000MHz	V	3.12
		200MHz ~ 1,000MHz	H	3.18

Test Site	Method	Measurement Frequency Range	U,(dB)
SH-CB01 (3m)	CISPR	1GHz ~ 6GHz	4.40
		6GHz ~ 18GHz	4.86

Test Site	Method	Measurement Frequency Range	U,(dB)
SH-CB01 (3m)	CISPR	18 ~ 26.5 GHz	3.64
		26.5 ~ 40 GHz	3.78

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	Temperature	Humidity	Test Voltage	Tested By
Output Power & ERP	26°C	55%	DC 3.8V	Danny Dang
Occupied Bandwidth	26°C	55%	DC 3.8V	Danny Dang
Conducted Spurious Emissions	26°C	55%	DC 3.8V	Danny Dang
Radiated Spurious Emissions	24°C	58%	DC 3.8V	Forest Li
Band Edge	26°C	55%	DC 3.8V	Danny Dang
Peak to Average Ratio	26°C	55%	DC 3.8V	Danny Dang
Frequency Stability	Normal and Extreme			Danny Dang

#### **1.4 TEST DATA RE-USE SUMMARY**

Differences Brief Description:

1. EG95-AUX and EG91-AUX share the same hardware design, the layout is the same.
2. Both EG95-AUX and EG91-AUX built-in BB are MDM9207, but EG95-AUX is MDM9207-0 which support up to cat 4, and EG91-AUX is MDM9207-1 which support up to cat 1.
3. EG95-AUX supports diversity antenna, while EG91-AUX does not support LTE and WCDMA diversity.  
All the others are same.



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	LTE Module	
Brand Name	Quectel	
Test Model	EG91-AUX	
Series Model	N/A	
Model Difference(s)	N/A	
Software Version	EG91AUXGAR08A02M1G	
Hardware Version	R1.0	
Power Source	DC Voltage supplied from AC/DC adapter(support unit)	
Power Rating	Supply voltage:3.3-4.3V, Typical supply voltage:3.8V	
Antenna Type	Dipole	
Antenna Gain	LTE Band 4 & 66	2 dBi
	LTE Band 7	3 dBi
Modulation Type	LTE	UL: QPSK,16QAM DL: QPSK,16QAM,64QAM
Operation Frequency	LTE Band 4 (Channel Bandwidth: 1.4MHz)	1710.7MHz ~ 1754.3MHz
	LTE Band 4 (Channel Bandwidth: 3MHz)	1711.5MHz ~ 1753.5MHz
	LTE Band 4 (Channel Bandwidth: 5MHz)	1712.5MHz ~ 1752.5MHz
	LTE Band 4 (Channel Bandwidth: 10MHz)	1715.0MHz ~ 1750.0MHz
	LTE Band 4 (Channel Bandwidth: 15MHz)	1717.5MHz ~ 1747.5MHz
	LTE Band 4 (Channel Bandwidth: 20MHz)	1720.0MHz ~ 1745.0MHz
	LTE Band 7 (Channel Bandwidth: 5MHz)	2502.5MHz ~ 2567.5MHz
	LTE Band 7 (Channel Bandwidth: 10MHz)	2505.0MHz ~ 2565.0MHz
	LTE Band 7 (Channel Bandwidth: 15MHz)	2507.5MHz ~ 2562.5MHz
	LTE Band 7 (Channel Bandwidth: 20MHz)	2510.0MHz ~ 2560.0MHz
	LTE Band 66 (Channel Bandwidth: 1.4MHz)	1710.7MHz ~ 1779.5MHz
	LTE Band 66 (Channel Bandwidth: 3MHz)	1711.5MHz ~ 1778.5MHz
	LTE Band 66 (Channel Bandwidth: 5MHz)	1712.5MHz ~ 1777.5MHz
	LTE Band 66 (Channel Bandwidth: 10MHz)	1715.0MHz ~ 1775.0MHz
	LTE Band 66 (Channel Bandwidth: 15MHz)	1717.5MHz ~ 1772.5MHz
LTE Band 66 (Channel Bandwidth: 20MHz)	1720.0MHz ~ 1770.0MHz	

EIRP	LTE Band 4 (Channel Bandwidth: 1.4MHz)	QPSK	24.76	dBm
		16QAM	23.68	dBm
	LTE Band 4 (Channel Bandwidth: 3MHz)	QPSK	24.98	dBm
		16QAM	23.76	dBm
	LTE Band 4 (Channel Bandwidth: 5MHz)	QPSK	24.95	dBm
		16QAM	23.33	dBm
	LTE Band 4 (Channel Bandwidth: 10MHz)	QPSK	24.85	dBm
		16QAM	23.55	dBm
	LTE Band 4 (Channel Bandwidth: 15MHz)	QPSK	24.69	dBm
		16QAM	24.84	dBm
	LTE Band 4 (Channel Bandwidth: 20MHz)	QPSK	24.75	dBm
		16QAM	23.92	dBm
	LTE Band 7 (Channel Bandwidth: 5MHz)	QPSK	25.81	dBm
		16QAM	24.41	dBm
	LTE Band 7 (Channel Bandwidth: 10MHz)	QPSK	25.97	dBm
		16QAM	24.88	dBm
	LTE Band 7 (Channel Bandwidth: 15MHz)	QPSK	25.97	dBm
		16QAM	25.77	dBm
	LTE Band 7 (Channel Bandwidth: 20MHz)	QPSK	25.96	dBm
		16QAM	24.44	dBm
	LTE Band 66 (Channel Bandwidth: 1.4MHz)	QPSK	24.94	dBm
		16QAM	24.02	dBm
	LTE Band 66 (Channel Bandwidth: 3MHz)	QPSK	24.98	dBm
		16QAM	23.29	dBm
	LTE Band 66 (Channel Bandwidth: 5MHz)	QPSK	25.01	dBm
		16QAM	23.88	dBm
	LTE Band 66 (Channel Bandwidth: 10MHz)	QPSK	25.02	dBm
		16QAM	24.15	dBm
LTE Band 66 (Channel Bandwidth: 15MHz)	QPSK	24.90	dBm	
	16QAM	24.68	dBm	
LTE Band 66 (Channel Bandwidth: 20MHz)	QPSK	24.86	dBm	
	16QAM	24.28	dBm	

Note:

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

## 2.2 DESCRIPTION OF TEST MODES AND TEST CONDITION

Following channel(s) was (were) selected for the final test as listed below:

LTE BAND 4 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & EIRP	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1RB/3RB/6RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1RB/8RB/15RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1RB/25RB/50RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1RB/36RB/75RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1RB/50RB/100RB
Occupied Bandwidth	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	6RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	15RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	25RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	50RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	75 RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	100RB
Conducted Spurious Emission	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB
Radiated Spurious Emission	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB

LTE BAND 4 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Band Edge	19957 to 20393	19957	1.4MHz	QPSK	1RB/6RB
		20393	1.4MHz	QPSK	
	19965 to 20385	19965	3MHz	QPSK	1RB/15RB
		20385	3MHz	QPSK	
	19975 to 20375	19975	5MHz	QPSK	1RB/25RB
		20375	5MHz	QPSK	
	20000 to 20350	20000	10MHz	QPSK	1RB/50RB
		20350	10MHz	QPSK	
	20025 to 20325	20025	15MHz	QPSK	1RB/75RB
		20325	15MHz	QPSK	
	20050 to 20300	20050	20MHz	QPSK	1RB/100RB
		20300	20MHz	QPSK	
Peak To Average Ratio	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	6RB
	19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	15RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	25RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	50RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	75 RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	100RB
Frequency Stability	19957 to 20393	20175	1.4MHz	QPSK	1RB
	19965 to 20385	20175	3MHz	QPSK	1RB
	19975 to 20375	20175	5MHz	QPSK	1RB
	20000 to 20350	20175	10MHz	QPSK	1RB
	20025 to 20325	20175	15MHz	QPSK	1RB
	20050 to 20300	20175	20MHz	QPSK	1RB

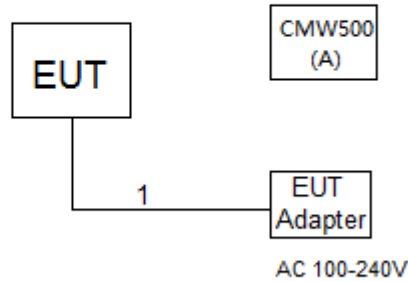
LTE BAND 7 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & EIRP	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	1RB/25RB/50RB
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	1RB/36RB/75RB
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	1RB/50RB/100RB
Occupied Bandwidth	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	25RB
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	50RB
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	75RB
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	100RB
Conducted Spurious Emission	20775 to 21425	21100	5MHz	QPSK	1 RB
	20850 to 21350	21100	20MHz	QPSK	1 RB
Radiated Spurious Emission	20775 to 21425	21100	5MHz	QPSK	1 RB
	20850 to 21350	21100	20MHz	QPSK	1 RB
Band Edge	20775 to 21425	20775	5MHz	QPSK	1RB/25RB
		21425	5MHz	QPSK	
	20800 to 21400	20800	10MHz	QPSK	1RB/50RB
		21400	10MHz	QPSK	
	20825 to 21375	20825	15MHz	QPSK	1RB/75RB
		21375	15MHz	QPSK	
	20850 to 21350	20850	20MHz	QPSK	1RB/100RB
		21350	20MHz	QPSK	
Peak To Average Ratio	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	25RB
	20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	50RB
	20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	75RB
	20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	100RB
Frequency Stability	20775 to 21425	21100	5MHz	QPSK	1RB
	20800 to 21400	21100	10MHz	QPSK	1RB
	20825 to 21375	21100	15MHz	QPSK	1RB
	20850 to 21350	21100	20MHz	QPSK	1RB

LTE BAND 66 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Output Power & EIRP	131979 to 132665	131979, 132322, 132665	1.4MHz	QPSK, 16QAM	1RB/3RB/6RB
	131987 to 132657	131987, 132322, 132657	3MHz	QPSK, 16QAM	1RB/8RB/15RB
	131997 to 132647	131997, 132322, 132647	5MHz	QPSK, 16QAM	1RB/12RB/25RB
	132022 to 132622	132022, 132322, 132622	10MHz	QPSK, 16QAM	1RB/25RB/50RB
	132047 to 132597	132047, 132322, 132597	15MHz	QPSK, 16QAM	1RB/36RB/75RB
	132072 to 132572	132072, 132322, 132572	20MHz	QPSK, 16QAM	1RB/50RB/100RB
Occupied Bandwidth	131979 to 132665	131979, 132322, 132665	1.4MHz	QPSK, 16QAM	6RB
	131987 to 132657	131987, 132322, 132657	3MHz	QPSK, 16QAM	15RB
	131997 to 132647	131997, 132322, 132647	5MHz	QPSK, 16QAM	25RB
	132022 to 132622	132022, 132322, 132622	10MHz	QPSK, 16QAM	50RB
	132047 to 132597	132047, 132322, 132597	15MHz	QPSK, 16QAM	75 RB
	132072 to 132572	132072, 132322, 132572	20MHz	QPSK, 16QAM	100RB
Conducted Spurious Emission	131979 to 132665	132322	1.4MHz	QPSK	1RB
	131997 to 132647	132322	5MHz	QPSK	1RB
	132072 to 132572	132322	20MHz	QPSK	1RB
Radiated Spurious Emission	131979 to 132665	132322	1.4MHz	QPSK	1RB
	131997 to 132647	132322	5MHz	QPSK	1RB
	132072 to 132572	132322	20MHz	QPSK	1RB

LTE BAND 66 MODE					
Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Band Edge	131979 to 132665	131979	1.4MHz	QPSK	1RB/6RB
		132665	1.4MHz	QPSK	
	131987 to 132657	131987	3MHz	QPSK	1RB/15RB
		132657	3MHz	QPSK	
	131997 to 132647	131997	5MHz	QPSK	1RB/25RB
		132647	5MHz	QPSK	
	132022 to 132622	132022	10MHz	QPSK	1RB/50RB
		132622	10MHz	QPSK	
	132047 to 132597	132047	15MHz	QPSK	1RB/75RB
		132597	15MHz	QPSK	
132072 to 132572	132072	20MHz	QPSK	1RB/100RB	
	132572	20MHz	QPSK		
Peak To Average Ratio	131979 to 132665	131979, 132322, 132665	1.4MHz	QPSK, 16QAM	1RB
	131987 to 132657	131987, 132322, 132657	3MHz	QPSK, 16QAM	1RB
	131997 to 132647	131997, 132322, 132647	5MHz	QPSK, 16QAM	1RB
	132022 to 132622	132022, 132322, 132622	10MHz	QPSK, 16QAM	1RB
	132047 to 132597	132047, 132322, 132597	15MHz	QPSK, 16QAM	1RB
	132072 to 132572	132072, 132322, 132572	20MHz	QPSK, 16QAM	1RB
Frequency Stability	131979 to 132665	132322	1.4MHz	QPSK	1RB
	131987 to 132657	132322	3MHz	QPSK	1RB
	131997 to 132647	132322	5MHz	QPSK	1RB
	132022 to 132622	132322	10MHz	QPSK	1RB
	132047 to 132597	132322	15MHz	QPSK	1RB
	132072 to 132572	132322	20MHz	QPSK	1RB

Note: The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

**2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED**



**2.4 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.
1	CMW500	N/A	N/A	131463

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	N/A	N/A	1.5m



### 3. TEST RESULT

#### 3.1 OUTPUT POWER MEASUREMENT

##### 3.1.1 LIMIT

Mobile / Portable station are limited to 1 watts e.i.r.p. (LTE Band 4 & LTE Band 66)

Mobile / Portable station are limited to 2 watts e.i.r.p. (LTE Band 7)

##### 3.1.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.

##### EIRP/ERP:

EIRP= Conducted Power +Antenan gain

ERP power=EIPR power-2.15dBi.

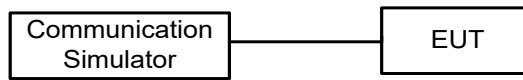
##### Output Power:

The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.

Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

##### 3.1.3 TEST SETUP LAYOUT

Conducted Power Measurement



##### 3.1.4 TEST DEVIATION

No deviation

##### 3.1.5 TEST RESULTS

Please refer to the Appendix A.

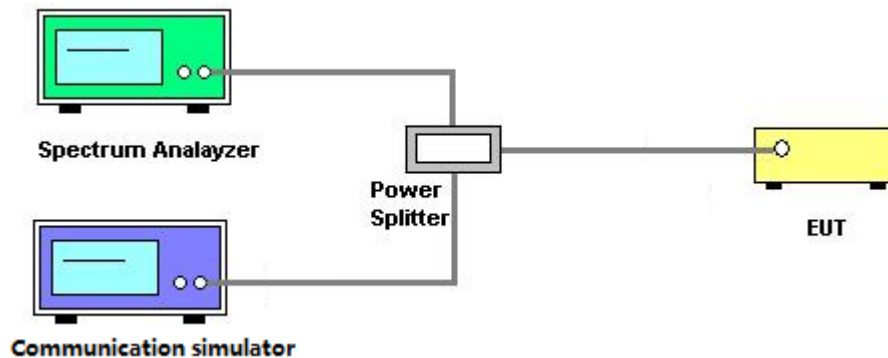
## 3.2 OCCUPIED BANDWIDTH MEASUREMENT

### 3.2.1 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 4.

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.

### 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 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.

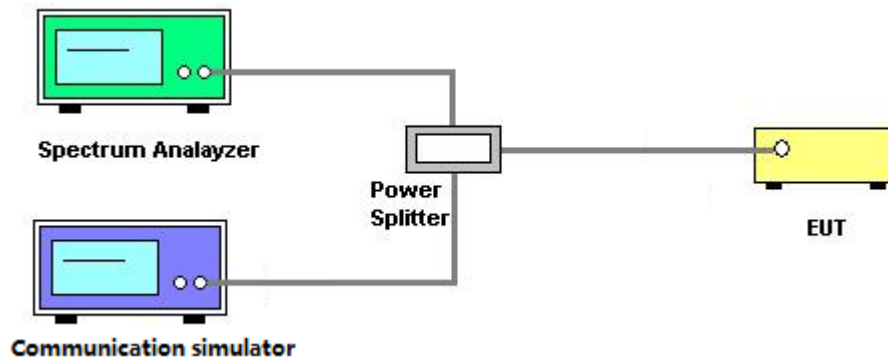
( LTE Band 4, Band 66.)

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  $55 + 10 \log(P)$  dB. The emission limit equal to -25dBm. (LTE Band 7)

#### 3.3.2 TEST PROCEDURES

1. The testing follows FCC KDB 971168 v03r01 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. 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.
4. Set spectrum analyzer with RMS detector.
5. 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 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.

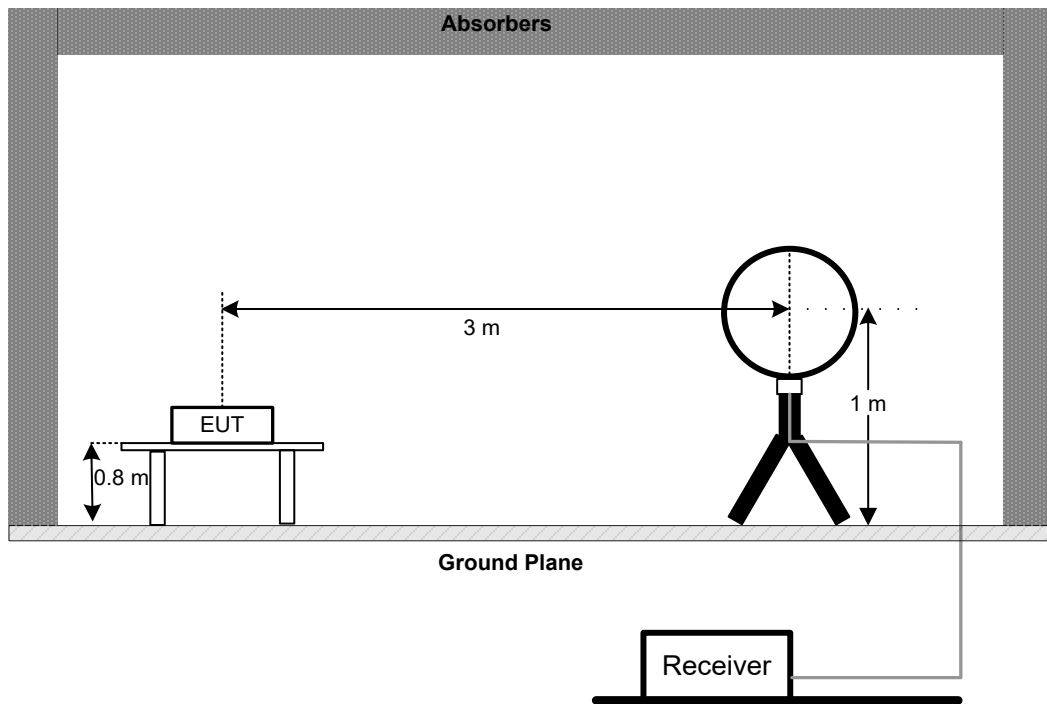
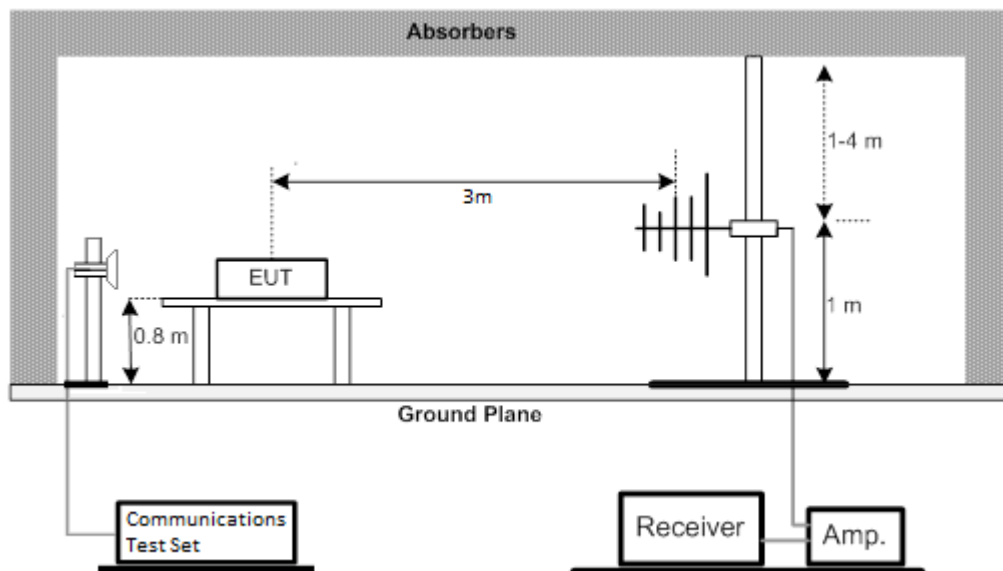
( LTE Band 4, Band 66.)

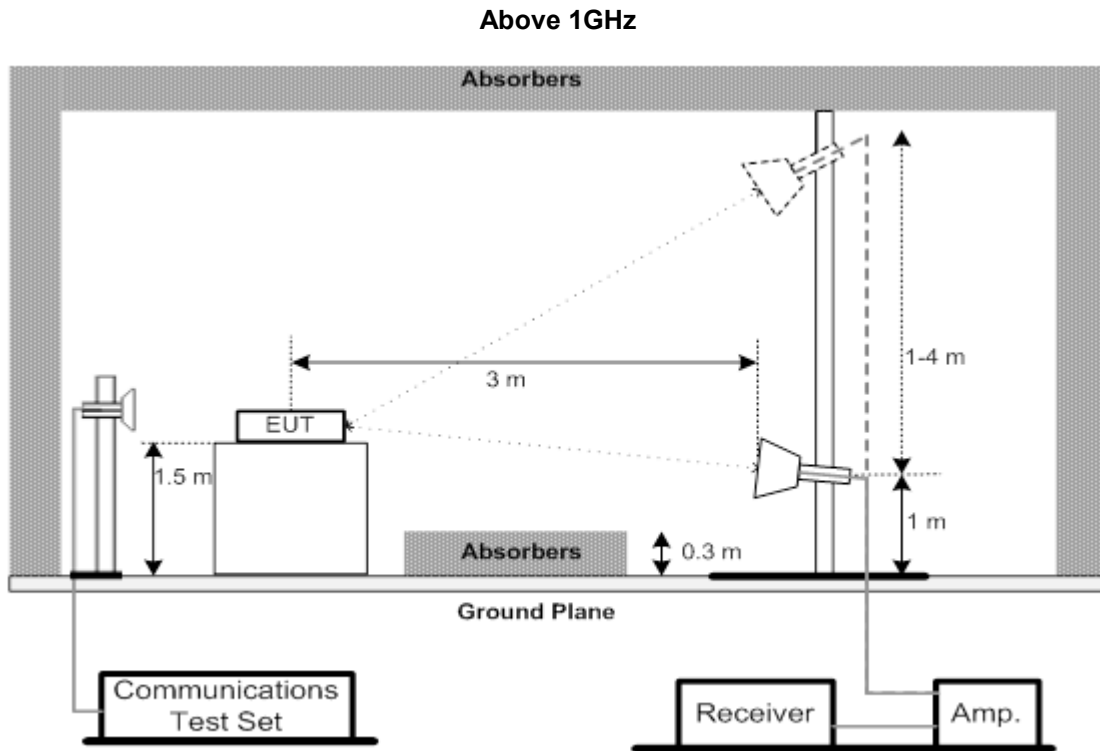
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $55 + 10 \log(P)$  dB. The emission limit equal to -25dBm. (LTE Band 7.)

#### **3.4.2 TEST PROCEDURES**

The testing follows FCC KDB 971168 v03r01 Section 6.2.

1. 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 = Output power level of S.G – TX cable loss + 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 power = E.I.P.R power - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

**3.4.3 TEST SETUP LAYOUT****Below 30MHz****30MHz to 1GHz**



#### 3.4.4 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the APPENDIX D.

#### 3.4.5 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the APPENDIX E.

#### 3.4.6 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the APPENDIX F.

### **3.5 BAND EDGE MEASUREMENT**

#### **3.5.1 LIMIT**

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed. (LTE Band 4, Band 66.)

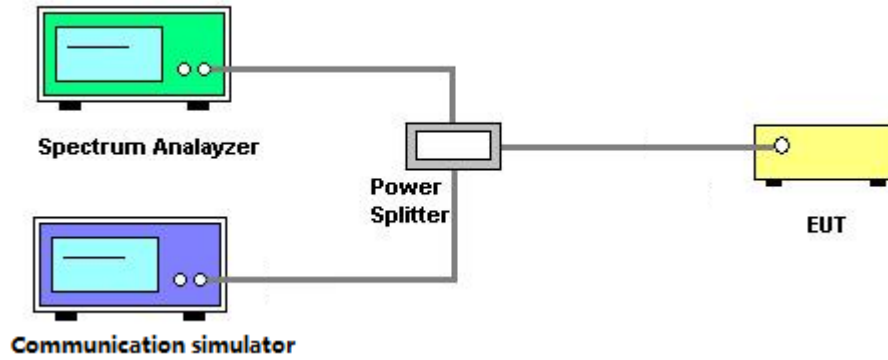
For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. (LTE Band 7)

#### **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. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 15kHz and VB of the spectrum is 43kHz (LTE Bandwidth 1.4MHz).
3. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 30kHz and VB of the spectrum is 91kHz (LTE Bandwidth 3MHz).
4. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 51kHz and VB of the spectrum is 150kHz (LTE Bandwidth 5MHz).
5. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Bandwidth 10MHz).
6. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (LTE Bandwidth 15MHz).
7. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 200kHz and VB of the spectrum is 620kHz (LTE Bandwidth 20MHz).
8. 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 G.



### 3.6 PEAK TO AVERAGE RATIO MEASUREMENT

#### 3.6.1 LIMIT

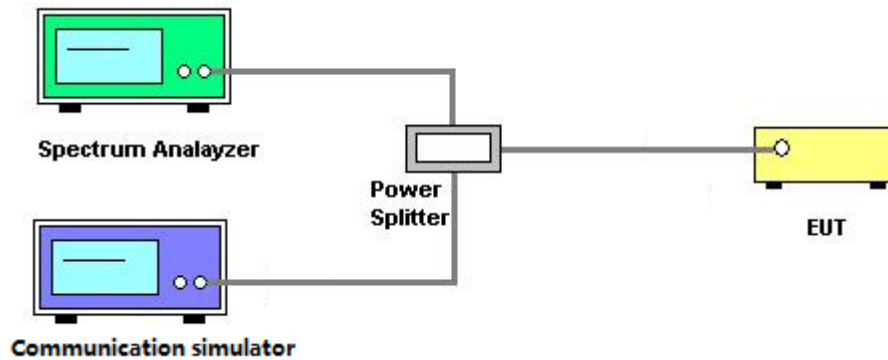
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

#### 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 H.

### 3.7 FREQUENCY STABILITY MEASUREMENT

#### 3.7.1 LIMIT

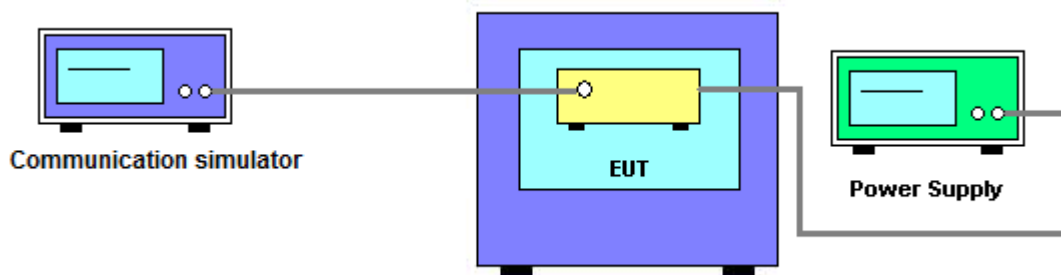
$\pm 1.5$  ppm is for base and fixed station.  $\pm 2.5$  ppm is for mobile station.

#### 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 I.

#### 4. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emission Measurement(30M-1G)					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	719	Mar. 26, 2022
2	Pre-Amplifier	emci	EMC9135	980400	Mar. 20, 2022
3	MXE EMI Receiver	Keysight	N9038A	MY56400088	Mar. 21, 2022
4	Test Cable	emci	EMC104-SM-SM-7000	170330	Apr. 11, 2022
5	Test Cable	emci	EMC104-SM-SM-1000	170331	Apr. 11, 2022
6	Test Cable	emci	EMC104-SM-NM-3500	170621	Apr. 11, 2022
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2021

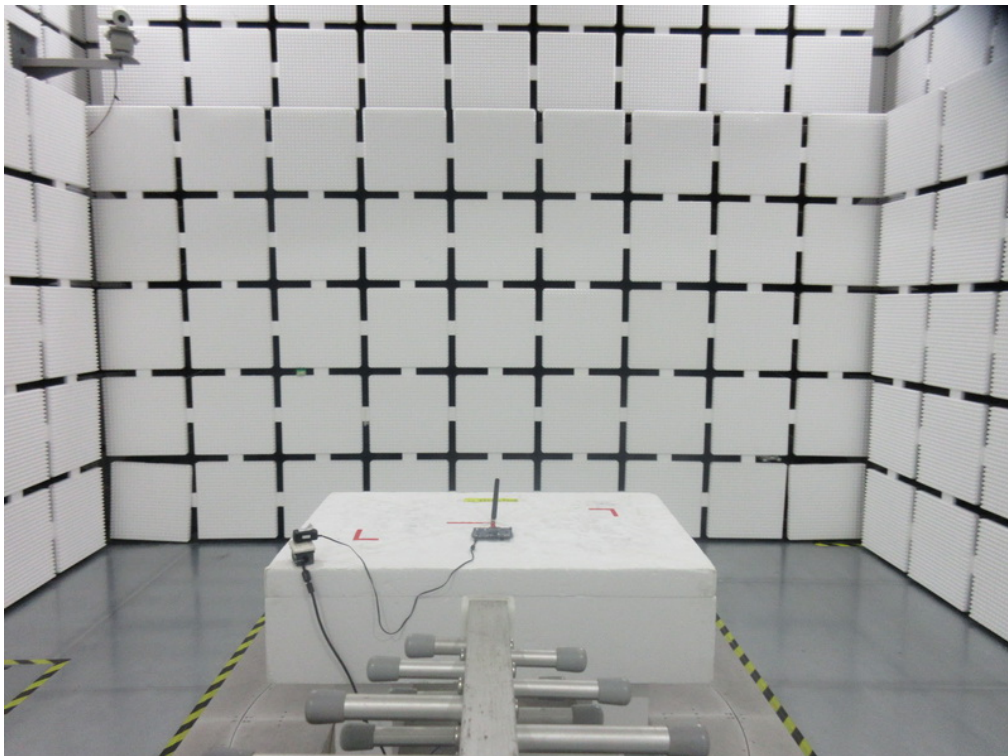
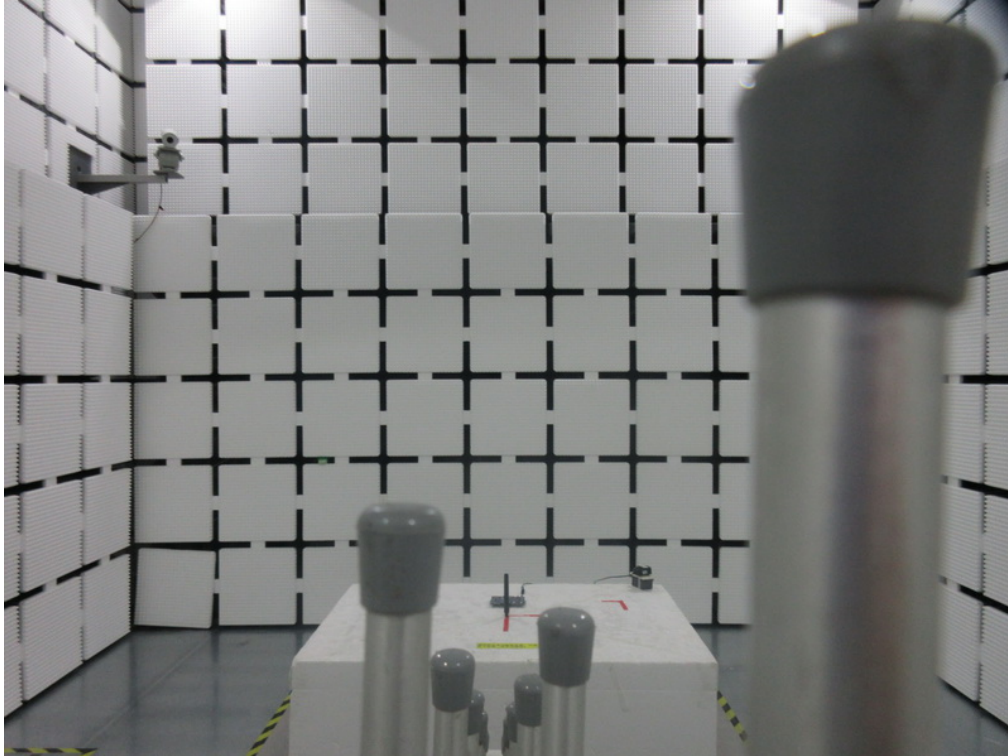
Radiated Emission Measurement(1G-18G)					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Double-Ridged Waveguide Horn Antenna	ETS-Lindgren	9120D	00206960	Mar. 26, 2022
2	Pre-Amplifier	emci	EMC012645SE	980421	May. 11, 2021
3	EXA Spectrum Analyzer	Keysight	N9010A	MY56480545	Mar. 20, 2022
4	Test Cable	emci	EMC104-SM-SM-7000	170330	Apr. 11, 2022
5	Test Cable	emci	EMC104-SM-SM-1000	170331	Apr. 11, 2022
6	Test Cable	emci	EMC104-SM-NM-3500	170621	Apr. 11, 2022
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
8	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2021

Conducted Emission & Band Edge & Occupied Bandwidth Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EXA Spectrum Analyzer	Keysight	N9010A	MY56480579	Mar. 21, 2022
2	Power Divider	JUK	PD-4SF-2060	N/A	N/A
3	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2021
4	Spectrum Analyzer	R&S	FSP40	100626	May. 06, 2021 May. 05, 2022

Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EXA Spectrum Analyzer	Keysight	N9010A	MY56480579	Mar. 21, 2022
2	Power Divider	JUK	PD-4SF-2060	N/A	N/A
3	Wideband Radio Communication Test	R&S	CMW500	129246	Aug. 23, 2021
4	Spectrum Analyzer	R&S	FSP40	100626	May. 06, 2021 May. 05, 2022
5	Temperature And Humidity Box	Blue pand	BPHS-120B	170616454	Aug. 23, 2021

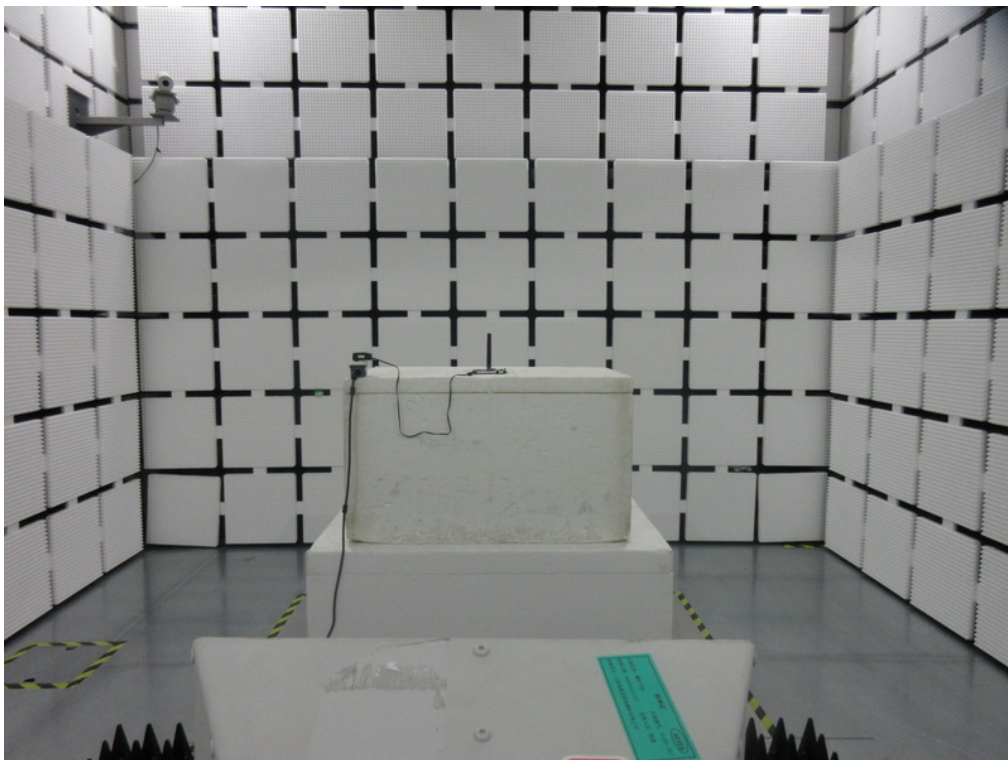
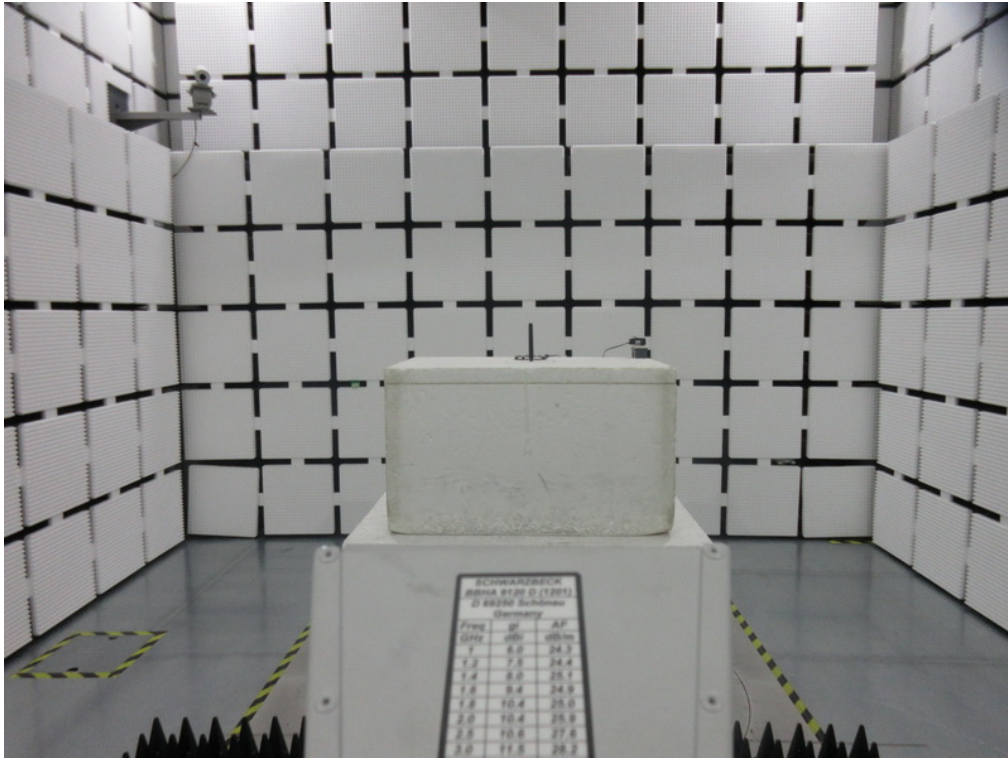
Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

**5. EUT TEST PHOTO****Radiated Emissions Test Photos****30 MHz to 1000 MHz**



**Radiated Emissions Test Photos**  
**Above 1 GHz**



## APPENDIX A - OUTPUT POWER

**Output Power (dBm):**

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19957CH	20175CH	20393CH
				1710.7MHz	1732.5MHz	1754.3MHz
4 / 1.4M	QPSK	1	0	22.62	22.60	22.56
		1	2	22.70	22.76	22.54
		1	5	22.56	22.59	22.73
		3	0	22.48	22.40	22.45
		3	1	22.53	22.65	22.40
		3	2	22.55	22.54	22.43
	16QAM	6	0	21.57	21.45	21.48
		1	0	21.32	21.40	21.34
		1	2	21.39	21.42	21.50
		1	5	21.28	21.50	21.45
		3	0	21.21	21.61	21.68
		3	1	21.25	21.26	21.66
		3	2	21.36	21.25	21.67
		6	0	20.15	20.58	20.57

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19965CH	20175CH	20385CH
				1711.5MHz	1732.5MHz	1753.5MHz
4 / 3M	QPSK	1	0	22.70	22.76	22.77
		1	7	22.98	22.87	22.86
		1	14	22.77	22.95	22.87
		8	0	21.43	21.54	21.52
		8	4	21.51	21.55	21.57
		8	7	21.41	21.50	21.56
		15	0	21.61	21.51	21.54
	16QAM	1	0	21.76	21.29	21.15
		1	7	21.72	21.55	21.05
		1	14	21.68	21.52	21.04
		8	0	21.00	20.41	20.28
		8	4	21.09	20.42	20.35
		8	7	20.97	20.78	20.33
		15	0	20.85	20.55	20.26



LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19975CH	20175CH	20375CH
				1712.5MHz	1732.5MHz	1752.5MHz
4 / 5M	QPSK	1	0	22.67	22.81	22.65
		1	13	22.92	22.86	22.88
		1	24	22.73	22.95	22.77
		12	0	21.59	21.60	21.63
		12	6	21.70	21.73	21.61
		12	11	21.63	21.64	21.67
	16QAM	25	0	21.86	21.70	21.61
		1	0	21.24	21.26	21.27
		1	13	21.30	21.32	21.33
		1	24	21.27	21.33	21.31
		12	0	20.50	20.50	20.51
		12	6	20.48	20.48	20.69
		12	11	20.54	20.88	20.56
		25	0	20.45	20.67	20.70

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20000CH	20175CH	20350CH
				1715MHz	1732.5MHz	1750MHz
4 / 10M	QPSK	1	0	22.79	22.76	22.78
		1	25	22.85	22.71	22.60
		1	49	22.71	22.83	22.63
		25	0	21.55	21.57	21.47
		25	13	21.69	21.53	21.58
		25	25	21.63	21.40	21.45
		50	0	21.73	21.71	21.66
	16QAM	1	0	21.54	21.41	21.25
		1	25	21.34	21.29	21.37
		1	49	21.55	21.43	21.10
		25	0	20.57	20.55	20.51
		25	13	20.70	20.52	20.61
		25	25	20.72	20.51	20.49
		50	0	20.68	20.74	20.57

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20025CH	20175CH	20325CH
				1717.5MHz	1732.5MHz	1747.5MHz
4 / 15M	QPSK	1	0	22.69	22.50	22.49
		1	38	22.65	22.45	22.44
		1	74	22.62	22.33	22.54
		36	0	21.78	21.67	21.66
		36	18	21.82	21.79	21.75
		36	39	21.86	21.62	21.55
		75	0	21.77	21.71	21.61
	16QAM	1	0	21.26	22.25	22.71
		1	38	21.46	22.14	22.84
		1	74	21.26	22.13	22.55
		36	0	20.66	20.76	20.69
		36	18	20.69	20.75	20.68
		36	39	20.67	20.73	20.63
		75	0	20.72	20.81	20.52

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20050CH	20175CH	20300CH
				1720MHz	1732.5MHz	1745MHz
4 / 20M	QPSK	1	0	22.62	22.75	22.69
		1	50	22.60	22.70	22.63
		1	99	21.95	22.52	22.71
		50	0	21.68	21.66	21.74
		50	25	21.75	21.81	21.76
		50	50	21.80	21.69	21.71
		100	0	21.73	21.76	21.71
	16QAM	1	0	21.44	21.12	21.55
		1	50	21.92	21.22	21.43
		1	99	20.99	20.79	21.42
		50	0	20.79	20.84	20.62
		50	25	20.68	20.73	20.65
		50	50	20.73	20.71	20.68
		100	0	20.79	20.78	20.84

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20775CH	21100CH	21425CH
				2502.5MHz	2535MHz	2567.5MHz
7 / 5M	QPSK	1	0	22.68	22.73	22.70
		1	13	22.69	22.81	22.78
		1	24	22.58	22.72	22.74
		12	0	21.40	21.43	21.61
		12	6	21.37	21.52	21.39
		12	11	21.52	21.52	21.53
		25	0	21.43	21.51	21.46
	16QAM	1	0	21.35	21.41	20.92
		1	13	21.12	21.36	20.43
		1	24	21.10	21.40	20.97
		12	0	20.28	20.27	20.53
		12	6	20.24	20.32	20.31
		12	11	20.27	20.35	20.37
		25	0	20.61	20.34	20.51

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20800CH	21100CH	21400CH
				2505MHz	2535MHz	2565MHz
7 / 10M	QPSK	1	0	22.85	22.87	22.88
		1	25	22.84	22.89	22.97
		1	49	22.80	22.94	22.85
		25	0	21.62	21.65	21.65
		25	13	21.67	21.70	21.61
		25	25	21.67	21.70	21.57
		50	0	21.57	21.67	21.70
	16QAM	1	0	21.64	21.55	21.69
		1	25	21.59	21.41	21.66
		1	49	21.35	21.44	21.88
		25	0	20.69	20.57	20.84
		25	13	20.74	20.69	20.75
		25	25	20.47	20.62	20.74
		50	0	20.26	20.29	20.39

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20825CH	21100CH	21375CH
				2507.5MHz	2535MHz	2562.5MHz
7 / 15M	QPSK	1	0	22.78	22.85	22.95
		1	38	22.79	22.97	22.91
		1	74	22.87	22.89	22.94
		36	0	22.04	21.97	22.00
		36	18	21.64	21.57	21.60
		36	39	21.62	21.55	21.55
		75	0	21.63	21.55	21.57
	16QAM	1	0	21.67	21.98	22.77
		1	38	21.54	21.42	22.45
		1	74	21.68	21.53	22.37
		36	0	20.11	20.31	20.41
		36	18	20.24	20.36	20.44
		36	39	20.24	20.34	20.39
		75	0	20.22	20.29	20.46

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20850CH	21100CH	21350CH
				2510MHz	2535MHz	2560MHz
7 / 20M	QPSK	1	0	22.61	22.84	22.86
		1	50	22.60	22.92	22.96
		1	99	22.77	22.75	22.89
		50	0	21.26	21.10	21.18
		50	25	21.27	21.39	21.46
		50	50	21.35	21.19	21.02
		100	0	21.22	21.29	21.16
	16QAM	1	0	21.44	20.99	20.80
		1	50	21.35	20.96	20.76
		1	99	21.28	21.21	21.10
		50	0	20.46	20.53	20.52
		50	25	20.45	20.53	20.57
		50	50	20.42	20.50	20.54
		100	0	20.42	20.50	20.53

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131979CH	132322CH	132665CH
				1710.7MHz	1745MHz	1779.3MHz
66 / 1.4M	QPSK	1	0	22.84	22.67	22.65
		1	2	22.91	22.68	22.70
		1	5	22.80	22.61	22.78
		3	0	22.71	22.69	22.80
		3	1	22.82	22.72	22.83
		3	2	22.94	22.71	22.81
	16QAM	6	0	21.91	21.67	21.99
		1	0	21.92	21.67	21.73
		1	2	22.02	21.70	21.77
		1	5	21.91	21.58	21.85
		3	0	21.70	21.55	21.79
		3	1	21.76	21.59	21.72
		3	2	21.77	21.79	21.92
		6	0	20.62	21.86	21.05

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131987CH	132322CH	132657CH
				1711.5MHz	1745MHz	1778.5MHz
66 / 3M	QPSK	1	0	22.81	22.85	22.86
		1	7	22.98	22.83	22.74
		1	14	22.76	22.79	22.92
		8	0	21.03	21.01	21.26
		8	4	21.23	20.96	21.17
		8	7	21.07	21.08	21.02
		15	0	21.09	21.03	21.14
	16QAM	1	0	20.84	20.96	21.20
		1	7	20.98	21.29	21.22
		1	14	20.78	20.82	20.89
		8	0	19.87	20.11	20.23
		8	4	19.87	20.06	20.35
		8	7	19.88	19.85	20.30
		15	0	20.12	19.97	20.10

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131997CH	132322CH	132647CH
				1712.5MHz	1745MHz	1777.5MHz
66 / 5M	QPSK	1	0	23.01	22.21	22.61
		1	13	22.77	22.36	22.73
		1	24	22.72	22.58	22.73
		12	0	21.86	21.87	21.84
		12	6	21.98	21.85	21.90
		12	11	21.90	21.79	21.96
	16QAM	25	0	21.96	21.72	21.93
		1	0	21.23	21.73	21.54
		1	13	21.42	21.88	21.69
		1	24	21.14	21.73	21.52
		12	0	20.84	20.74	20.92
		12	6	20.95	20.62	21.07
		12	11	20.88	20.87	20.76
		25	0	21.06	20.71	20.82

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132022CH	132322CH	132622CH
				1715MHz	1745MHz	1775MHz
66 / 10M	QPSK	1	0	23.02	22.71	22.87
		1	25	22.86	22.84	22.85
		1	49	22.80	22.78	22.94
		25	0	21.96	21.89	21.83
		25	13	21.93	21.89	21.83
		25	25	21.64	21.69	21.81
		50	0	21.77	21.82	21.69
	16QAM	1	0	22.02	21.67	21.73
		1	25	22.15	21.73	21.75
		1	49	22.08	21.93	21.63
		25	0	21.16	20.90	20.91
		25	13	21.05	20.93	20.92
		25	25	21.11	20.73	20.90
		50	0	21.06	21.15	20.85

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132047CH	132322CH	132597CH
				1717.5MHz	1745MHz	1772.5MHz
66 / 15M	QPSK	1	0	22.80	22.68	22.71
		1	38	22.90	22.79	22.69
		1	74	22.84	22.54	22.52
		36	0	21.81	21.76	21.83
		36	18	21.77	21.81	21.76
		36	39	21.73	21.81	21.87
		75	0	21.73	21.72	21.73
	16QAM	1	0	21.75	21.83	22.38
		1	38	22.18	21.77	22.68
		1	74	21.76	21.24	22.41
		36	0	20.93	20.86	21.05
		36	18	20.75	20.59	20.85
		36	39	20.72	20.89	20.83
		75	0	20.57	20.64	20.54

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132072CH	132322CH	132572CH
				1720MHz	1745MHz	1770MHz
66 / 20M	QPSK	1	0	22.78	22.82	22.60
		1	50	22.75	22.84	22.86
		1	99	22.79	22.81	22.66
		50	0	21.78	21.87	21.75
		50	25	21.42	21.28	21.52
		50	50	21.84	21.80	21.80
		100	0	21.78	21.85	21.72
	16QAM	1	0	21.34	21.42	21.14
		1	50	21.90	21.68	22.28
		1	99	21.23	21.42	21.35
		50	0	20.42	20.56	20.53
		50	25	20.38	20.49	20.92
		50	50	20.34	20.57	20.77
		100	0	20.21	21.46	20.48

**EIRP Power (dBm):**

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19957CH	20175CH	20393CH
				1710.7MHz	1732.5MHz	1754.3MHz
4 / 1.4M	QPSK	1	0	24.62	24.60	24.56
		1	2	24.70	24.76	24.54
		1	5	24.56	24.59	24.73
		3	0	24.48	24.40	24.45
		3	1	24.53	24.65	24.40
		3	2	24.55	24.54	24.43
	16QAM	6	0	23.57	23.45	23.48
		1	0	23.32	23.40	23.34
		1	2	23.39	23.42	23.50
		1	5	23.28	23.50	23.45
		3	0	23.21	23.61	23.68
		3	1	23.25	23.26	23.66
		3	2	23.36	23.25	23.67
		6	0	22.15	22.58	22.57

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19965CH	20175CH	20385CH
				1711.5MHz	1732.5MHz	1753.5MHz
4 / 3M	QPSK	1	0	24.70	24.76	24.77
		1	7	24.98	24.87	24.86
		1	14	24.77	24.95	24.87
		8	0	23.43	23.54	23.52
		8	4	23.51	23.55	23.57
		8	7	23.41	23.50	23.56
		15	0	23.61	23.51	23.54
	16QAM	1	0	23.76	23.29	23.15
		1	7	23.72	23.55	23.05
		1	14	23.68	23.52	23.04
		8	0	23.00	22.41	22.28
		8	4	23.09	22.42	22.35
		8	7	22.97	22.78	22.33
		15	0	22.85	22.55	22.26



LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				19975CH	20175CH	20375CH
				1712.5MHz	1732.5MHz	1752.5MHz
4 / 5M	QPSK	1	0	24.67	24.81	24.65
		1	13	24.92	24.86	24.88
		1	24	24.73	24.95	24.77
		12	0	23.59	23.60	23.63
		12	6	23.70	23.73	23.61
		12	11	23.63	23.64	23.67
	16QAM	25	0	23.86	23.70	23.61
		1	0	23.24	23.26	23.27
		1	13	23.30	23.32	23.33
		1	24	23.27	23.33	23.31
		12	0	22.50	22.50	22.51
		12	6	22.48	22.48	22.69
		12	11	22.54	22.88	22.56
		25	0	22.45	22.67	22.70

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20000CH	20175CH	20350CH
				1715MHz	1732.5MHz	1750MHz
4 / 10M	QPSK	1	0	24.79	24.76	24.78
		1	25	24.85	24.71	24.60
		1	49	24.71	24.83	24.63
		25	0	23.55	23.57	23.47
		25	13	23.69	23.53	23.58
		25	25	23.63	23.40	23.45
		50	0	23.73	23.71	23.66
	16QAM	1	0	23.54	23.41	23.25
		1	25	23.34	23.29	23.37
		1	49	23.55	23.43	23.10
		25	0	22.57	22.55	22.51
		25	13	22.70	22.52	22.61
		25	25	22.72	22.51	22.49
		50	0	22.68	22.74	22.57

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20025CH	20175CH	20325CH
				1717.5MHz	1732.5MHz	1747.5MHz
4 / 15M	QPSK	1	0	24.69	24.50	24.49
		1	38	24.65	24.45	24.44
		1	74	24.62	24.33	24.54
		36	0	23.78	23.67	23.66
		36	18	23.82	23.79	23.75
		36	39	23.86	23.62	23.55
		75	0	23.77	23.71	23.61
	16QAM	1	0	23.26	24.25	24.71
		1	38	23.46	24.14	24.84
		1	74	23.26	24.13	24.55
		36	0	22.66	22.76	22.69
		36	18	22.69	22.75	22.68
		36	39	22.67	22.73	22.63
		75	0	22.72	22.81	22.52

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20050CH	20175CH	20300CH
				1720MHz	1732.5MHz	1745MHz
4 / 20M	QPSK	1	0	24.62	24.75	24.69
		1	50	24.60	24.70	24.63
		1	99	23.95	24.52	24.71
		50	0	23.68	23.66	23.74
		50	25	23.75	23.81	23.76
		50	50	23.80	23.69	23.71
		100	0	23.73	23.76	23.71
	16QAM	1	0	23.44	23.12	23.55
		1	50	23.92	23.22	23.43
		1	99	22.99	22.79	23.42
		50	0	22.79	22.84	22.62
		50	25	22.68	22.73	22.65
		50	50	22.73	22.71	22.68
		100	0	22.79	22.78	22.84

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20775CH	21100CH	21425CH
				2502.5MHz	2535MHz	2567.5MHz
7 / 5M	QPSK	1	0	25.68	25.73	25.70
		1	13	25.69	25.81	25.78
		1	24	25.58	25.72	25.74
		12	0	24.40	24.43	24.61
		12	6	24.37	24.52	24.39
		12	11	24.52	24.52	24.53
		25	0	24.43	24.51	24.46
	16QAM	1	0	24.35	24.41	23.92
		1	13	24.12	24.36	23.43
		1	24	24.10	24.40	23.97
		12	0	23.28	23.27	23.53
		12	6	23.24	23.32	23.31
		12	11	23.27	23.35	23.37
		25	0	23.61	23.34	23.51

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20800CH	21100CH	21400CH
				2505MHz	2535MHz	2565MHz
7 / 10M	QPSK	1	0	25.85	25.87	25.88
		1	25	25.84	25.89	25.97
		1	49	25.80	25.94	25.85
		25	0	24.62	24.65	24.65
		25	13	24.67	24.70	24.61
		25	25	24.67	24.70	24.57
		50	0	24.57	24.67	24.70
	16QAM	1	0	24.64	24.55	24.69
		1	25	24.59	24.41	24.66
		1	49	24.35	24.44	24.88
		25	0	23.69	23.57	23.84
		25	13	23.74	23.69	23.75
		25	25	23.47	23.62	23.74
		50	0	23.26	23.29	23.39

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20825CH	21100CH	21375CH
				2507.5MHz	2535MHz	2562.5MHz
7 / 15M	QPSK	1	0	25.78	25.85	25.95
		1	38	25.79	25.97	25.91
		1	74	25.87	25.89	25.94
		36	0	25.04	24.97	25.00
		36	18	24.64	24.57	24.60
		36	39	24.62	24.55	24.55
		75	0	24.63	24.55	24.57
	16QAM	1	0	24.67	24.98	25.77
		1	38	24.54	24.42	25.45
		1	74	24.68	24.53	25.37
		36	0	23.11	23.31	23.41
		36	18	23.24	23.36	23.44
		36	39	23.24	23.34	23.39
		75	0	23.22	23.29	23.46

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				20850CH	21100CH	21350CH
				2510MHz	2535MHz	2560MHz
7 / 20M	QPSK	1	0	25.61	25.84	25.86
		1	50	25.60	25.92	25.96
		1	99	25.77	25.75	25.89
		50	0	24.26	24.10	24.18
		50	25	24.27	24.39	24.46
		50	50	24.35	24.19	24.02
		100	0	24.22	24.29	24.16
	16QAM	1	0	24.44	23.99	23.80
		1	50	24.35	23.96	23.76
		1	99	24.28	24.21	24.10
		50	0	23.46	23.53	23.52
		50	25	23.45	23.53	23.57
		50	50	23.42	23.50	23.54
		100	0	23.42	23.50	23.53

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131979CH	132322CH	132665CH
				1710.7MHz	1745MHz	1779.3MHz
66 / 1.4M	QPSK	1	0	24.84	24.67	24.65
		1	2	24.91	24.68	24.70
		1	5	24.80	24.61	24.78
		3	0	24.71	24.69	24.80
		3	1	24.82	24.72	24.83
		3	2	24.94	24.71	24.81
	16QAM	6	0	23.91	23.67	23.99
		1	0	23.92	23.67	23.73
		1	2	24.02	23.70	23.77
		1	5	23.91	23.58	23.85
		3	0	23.70	23.55	23.79
		3	1	23.76	23.59	23.72
		3	2	23.77	23.79	23.92
		6	0	22.62	23.86	23.05

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131987CH	132322CH	132657CH
				1711.5MHz	1745MHz	1778.5MHz
66 / 3M	QPSK	1	0	24.81	24.85	24.86
		1	7	24.98	24.83	24.74
		1	14	24.76	24.79	24.92
		8	0	23.03	23.01	23.26
		8	4	23.23	22.96	23.17
		8	7	23.07	23.08	23.02
		15	0	23.09	23.03	23.14
	16QAM	1	0	22.84	22.96	23.20
		1	7	22.98	23.29	23.22
		1	14	22.78	22.82	22.89
		8	0	21.87	22.11	22.23
		8	4	21.87	22.06	22.35
		8	7	21.88	21.85	22.30
		15	0	22.12	21.97	22.10

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				131997CH	132322CH	132647CH
				1712.5MHz	1745MHz	1777.5MHz
66 / 5M	QPSK	1	0	25.01	24.21	24.61
		1	13	24.77	24.36	24.73
		1	24	24.72	24.58	24.73
		12	0	23.86	23.87	23.84
		12	6	23.98	23.85	23.90
		12	11	23.90	23.79	23.96
		25	0	23.96	23.72	23.93
	16QAM	1	0	23.23	23.73	23.54
		1	13	23.42	23.88	23.69
		1	24	23.14	23.73	23.52
		12	0	22.84	22.74	22.92
		12	6	22.95	22.62	23.07
		12	11	22.88	22.87	22.76
		25	0	23.06	22.71	22.82

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132022CH	132322CH	132622CH
				1715MHz	1745MHz	1775MHz
66 / 10M	QPSK	1	0	25.02	24.71	24.87
		1	25	24.86	24.84	24.85
		1	49	24.80	24.78	24.94
		25	0	23.96	23.89	23.83
		25	13	23.93	23.89	23.83
		25	25	23.64	23.69	23.81
		50	0	23.77	23.82	23.69
	16QAM	1	0	24.02	23.67	23.73
		1	25	24.15	23.73	23.75
		1	49	24.08	23.93	23.63
		25	0	23.16	22.90	22.91
		25	13	23.05	22.93	22.92
		25	25	23.11	22.73	22.90
		50	0	23.06	23.15	22.85

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132047CH	132322CH	132597CH
				1717.5MHz	1745MHz	1772.5MHz
66 / 15M	QPSK	1	0	24.80	24.68	24.71
		1	38	24.90	24.79	24.69
		1	74	24.84	24.54	24.52
		36	0	23.81	23.76	23.83
		36	18	23.77	23.81	23.76
		36	39	23.73	23.81	23.87
		75	0	23.73	23.72	23.73
	16QAM	1	0	23.75	23.83	24.38
		1	38	24.18	23.77	24.68
		1	74	23.76	23.24	24.41
		36	0	22.93	22.86	23.05
		36	18	22.75	22.59	22.85
		36	39	22.72	22.89	22.83
		75	0	22.57	22.64	22.54

LTE Band / BW	Modulation	RB Size	RB Offset	Low CH	Mid CH	High CH
				132072CH	132322CH	132572CH
				1720MHz	1745MHz	1770MHz
66 / 20M	QPSK	1	0	24.78	24.82	24.60
		1	50	24.75	24.84	24.86
		1	99	24.79	24.81	24.66
		50	0	23.78	23.87	23.75
		50	25	23.42	23.28	23.52
		50	50	23.84	23.80	23.80
		100	0	23.78	23.85	23.72
	16QAM	1	0	23.34	23.42	23.14
		1	50	23.90	23.68	24.28
		1	99	23.23	23.42	23.35
		50	0	22.42	22.56	22.53
		50	25	22.38	22.49	22.92
		50	50	22.34	22.57	22.77
		100	0	22.21	23.46	22.48

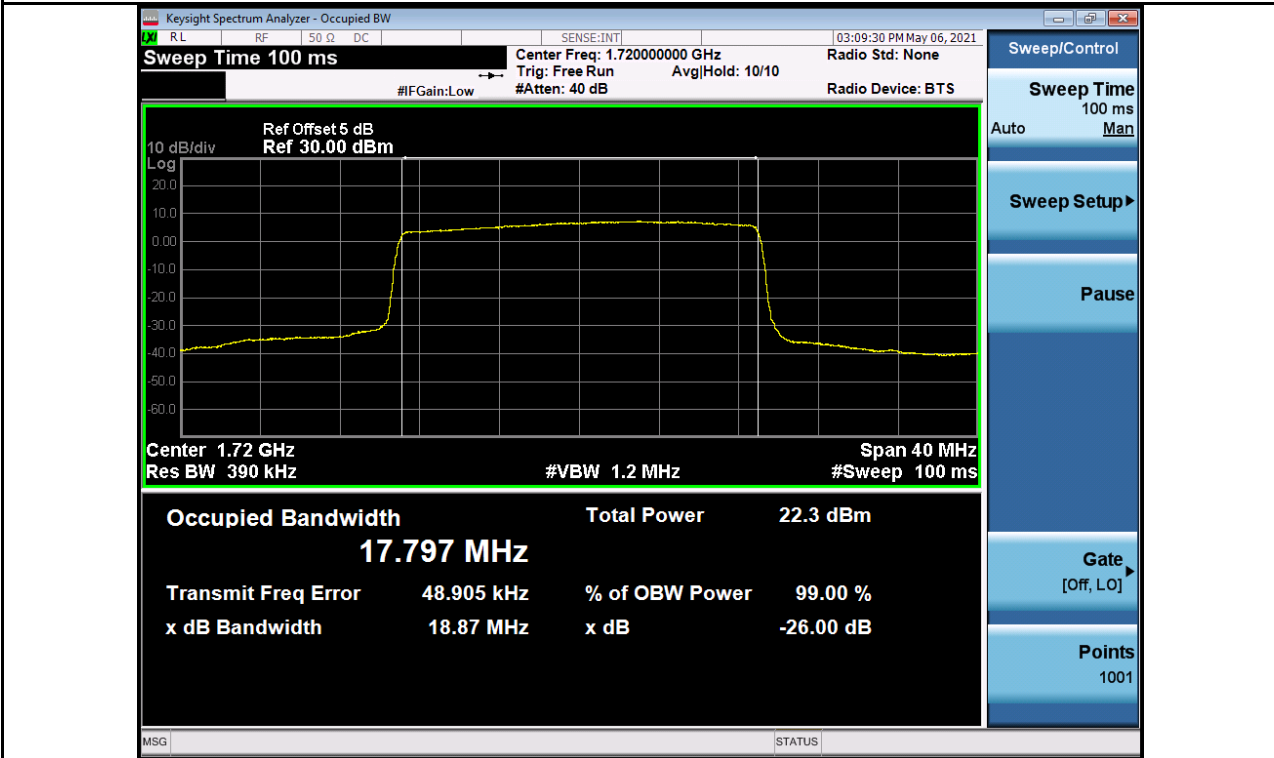
## APPENDIX B - OCCUPIED BANDWIDTH



LTE Band 4_20M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20050	1720	17.7970	20050	1720	18.870

Spectrum Plot

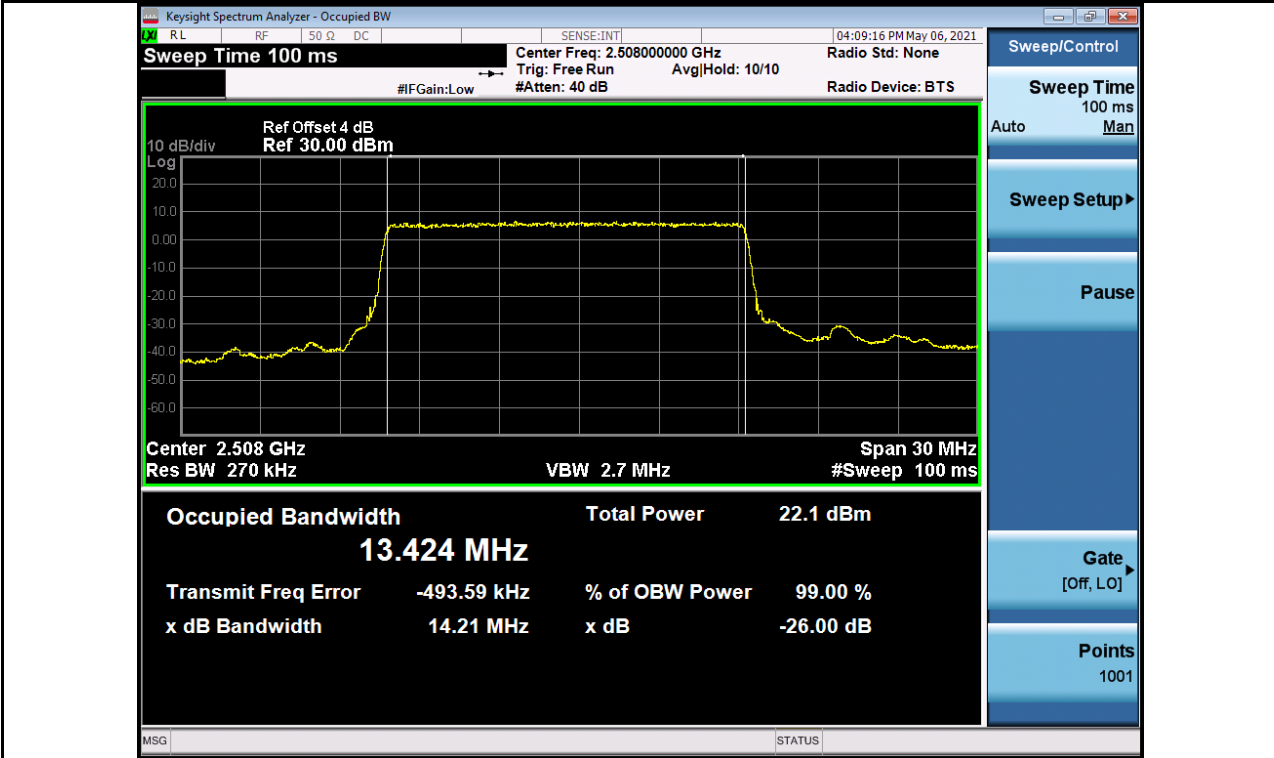
QPSK-20050



LTE Band 7_15M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20825	2507.5	13.4240	20825	2507.5	14.210

Spectrum Plot

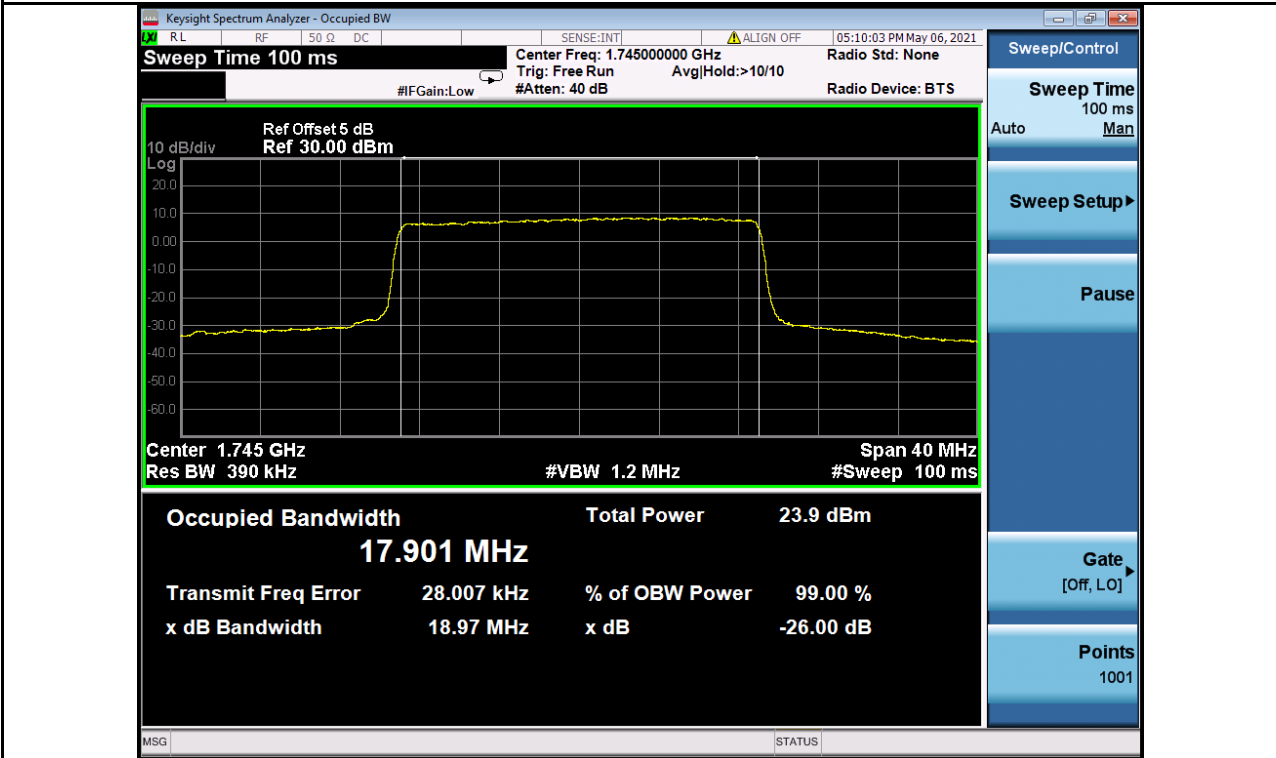
QPSK-20825



LTE Band 66_20M					
QPSK					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
132322	1745.0	17.9010	132322	1745.0	18.970

Spectrum Plot

QPSK-132322



## **APPENDIX C - CONDUCTED EMISSIONS**

LTE Band 4_20M			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
20175	1732.5	20175	1732.5
Channel	Frequency(MHz)	-	-
20175	1732.5	-	-

LTE Band 7_20M			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
21100	2535	21100	2535
Channel	Frequency(MHz)	-	-
21100	2535	-	-

## LTE Band 66\_3M

Channel	Frequency(MHz)	Channel	Frequency(MHz)
132322	1745	132322	1745

Channel	Frequency(MHz)	Channel	Frequency(MHz)
132322	1745	-	-

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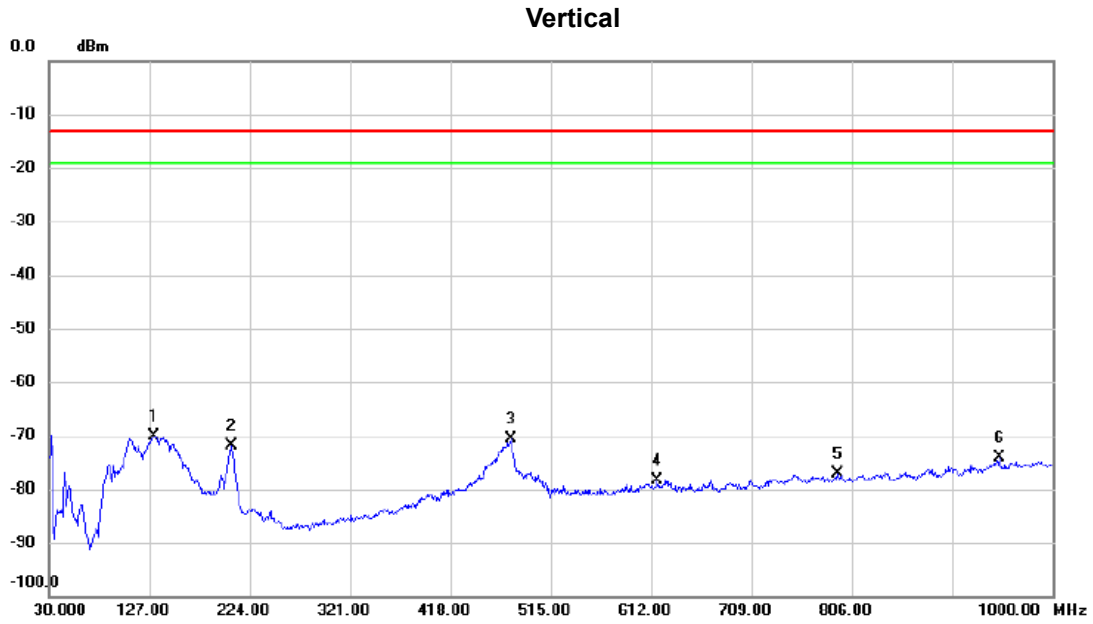
## **APPENDIX D - RADIATED SPURIOUS EMISSION (9KHZ TO 30MHZ)**

Note: Below 30MHz, The measured value have enough margin over 20dB than the limit, therefore they are not reported



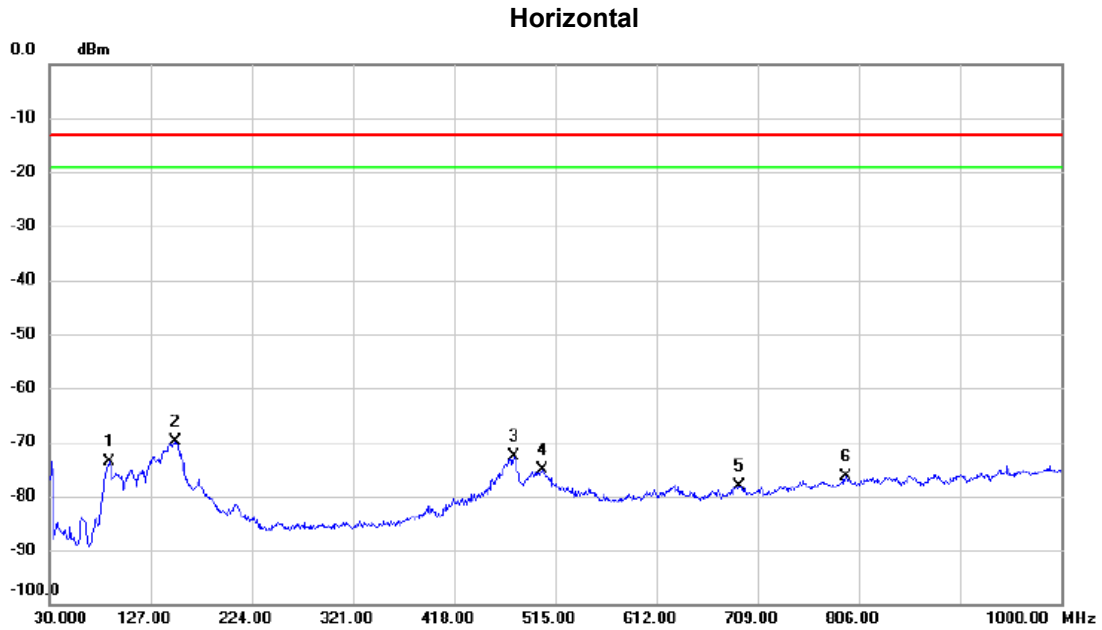
## **APPENDIX E - RADIATED EMISSION (30MHZ TO 1GHZ)**

Test Mode: LTE Band 4\_TX Mode\_20M



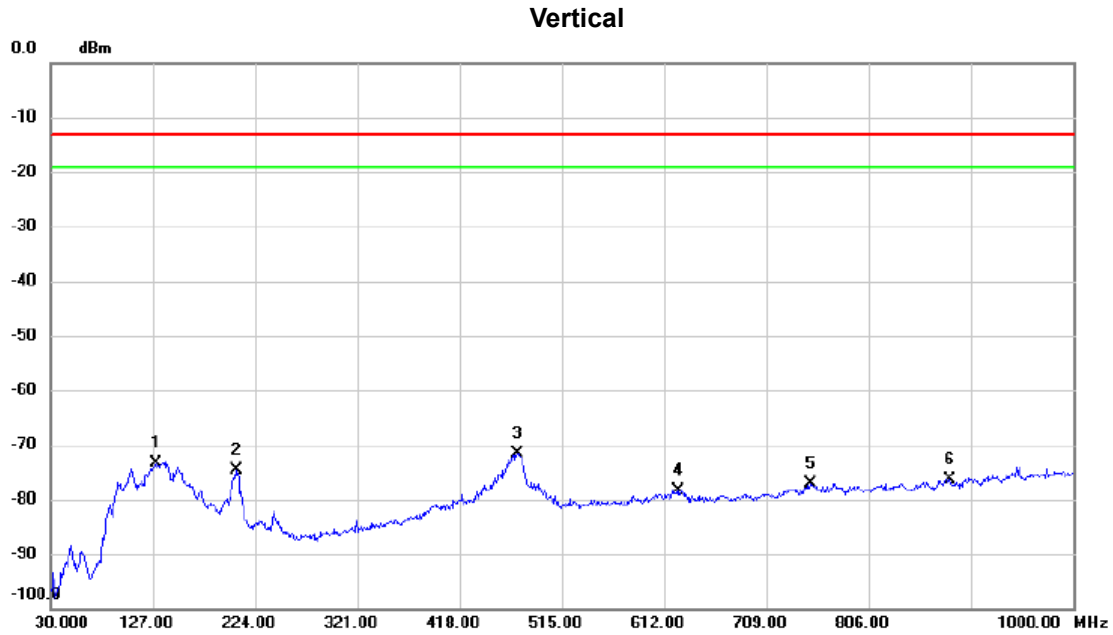
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	130.8800	-71.36	1.30	-70.06	-13.00	-57.06	RMS	
2		206.5400	-68.42	-3.56	-71.98	-13.00	-58.98	RMS	
3		476.2000	-71.87	1.15	-70.72	-13.00	-57.72	RMS	
4		617.8200	-82.39	4.13	-78.26	-13.00	-65.26	RMS	
5		792.9050	-82.63	5.61	-77.02	-13.00	-64.02	RMS	
6		948.5900	-81.42	7.22	-74.20	-13.00	-61.20	RMS	

Test Mode: LTE Band 4\_TX Mode\_20M



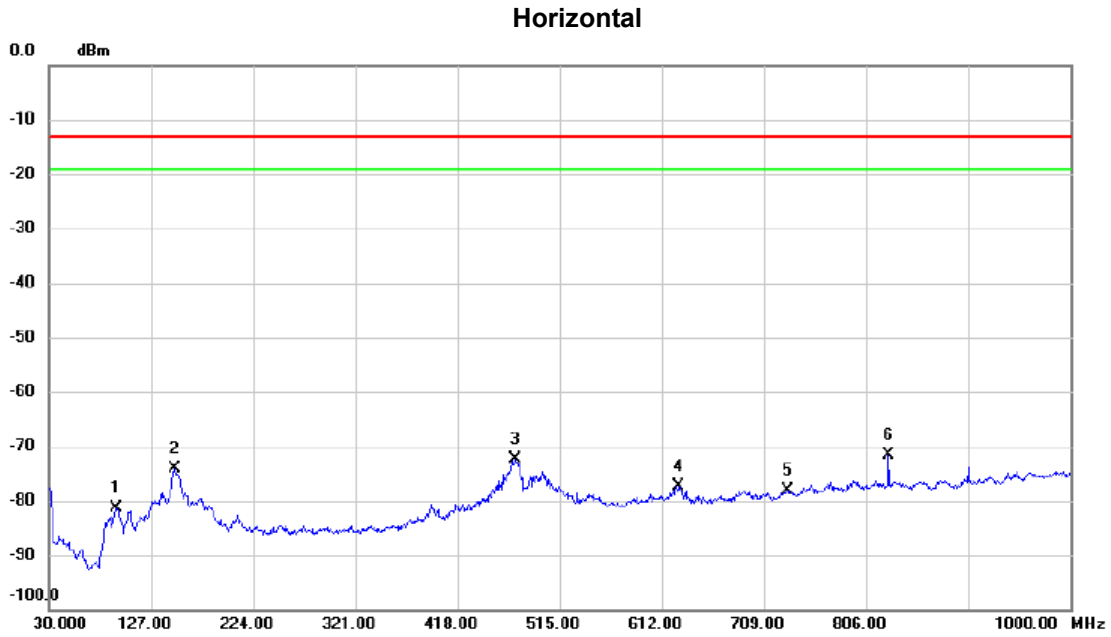
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		87.2300	-66.78	-6.91	-73.69	-13.00	-60.69	RMS	
2	*	150.2800	-67.13	-2.82	-69.95	-13.00	-56.95	RMS	
3		475.2300	-73.97	1.24	-72.73	-13.00	-59.73	RMS	
4		502.3900	-76.79	1.68	-75.11	-13.00	-62.11	RMS	
5		691.0550	-82.12	4.12	-78.00	-13.00	-65.00	RMS	
6		793.8750	-82.65	6.32	-76.33	-13.00	-63.33	RMS	

Test Mode: LTE Band 7\_TX Mode\_20M



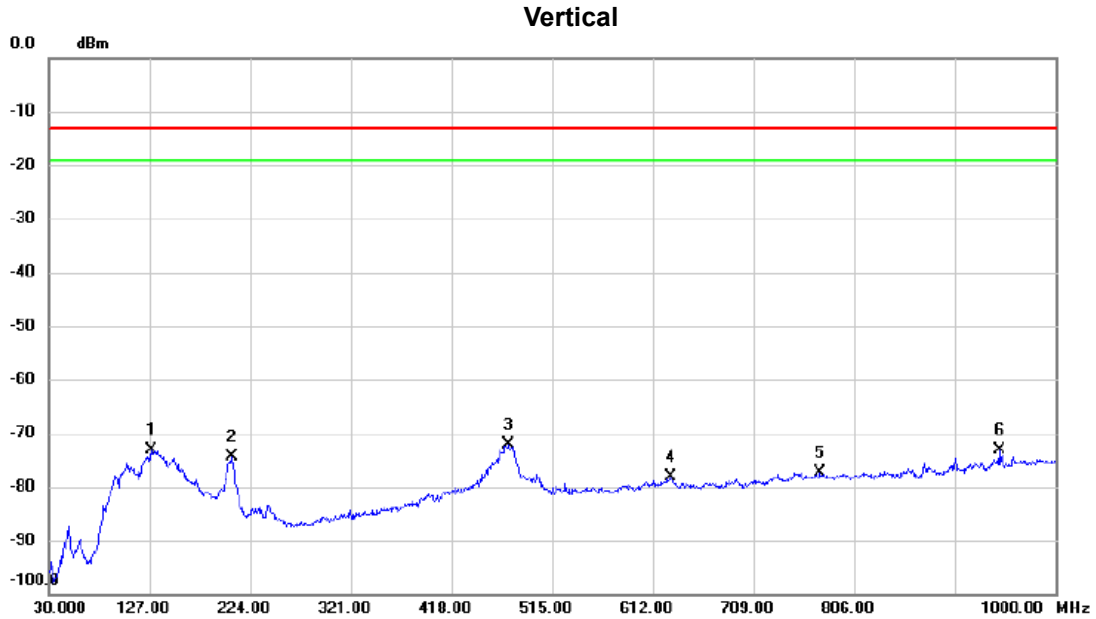
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		130.3950	-74.74	1.32	-73.42	-13.00	-60.42	RMS	
2		206.0550	-71.12	-3.56	-74.68	-13.00	-61.68	RMS	
3	*	472.8050	-72.62	1.12	-71.50	-13.00	-58.50	RMS	
4		625.5800	-82.39	4.12	-78.27	-13.00	-65.27	RMS	
5		750.7100	-82.84	5.76	-77.08	-13.00	-64.08	RMS	
6		882.6300	-82.52	6.18	-76.34	-13.00	-63.34	RMS	

Test Mode: LTE Band 7\_TX Mode\_20M



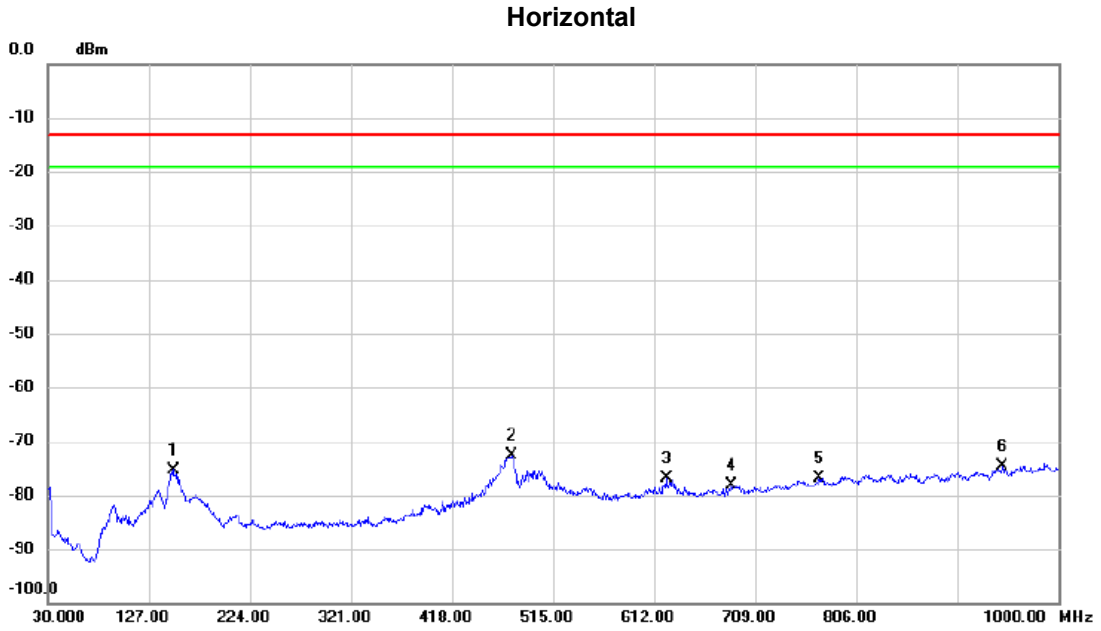
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		94.5050	-74.56	-6.72	-81.28	-13.00	-68.28	RMS	
2		149.3100	-71.17	-2.87	-74.04	-13.00	-61.04	RMS	
3		473.2900	-73.63	1.21	-72.42	-13.00	-59.42	RMS	
4		628.4900	-81.39	4.09	-77.30	-13.00	-64.30	RMS	
5		731.7950	-83.03	5.01	-78.02	-13.00	-65.02	RMS	
6	*	827.8250	-77.90	6.39	-71.51	-13.00	-58.51	RMS	

Test Mode: LTE Band 66\_TX CH132322\_20M



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		129.4250	-74.51	1.36	-73.15	-13.00	-60.15	RMS	
2		206.0550	-70.71	-3.56	-74.27	-13.00	-61.27	RMS	
3	*	473.2900	-73.24	1.13	-72.11	-13.00	-59.11	RMS	
4		629.4600	-82.19	4.11	-78.08	-13.00	-65.08	RMS	
5		773.5050	-83.07	5.68	-77.39	-13.00	-64.39	RMS	
6		946.1650	-80.40	7.17	-73.23	-13.00	-60.23	RMS	

Test Mode: LTE Band 66\_TX CH132322\_20M

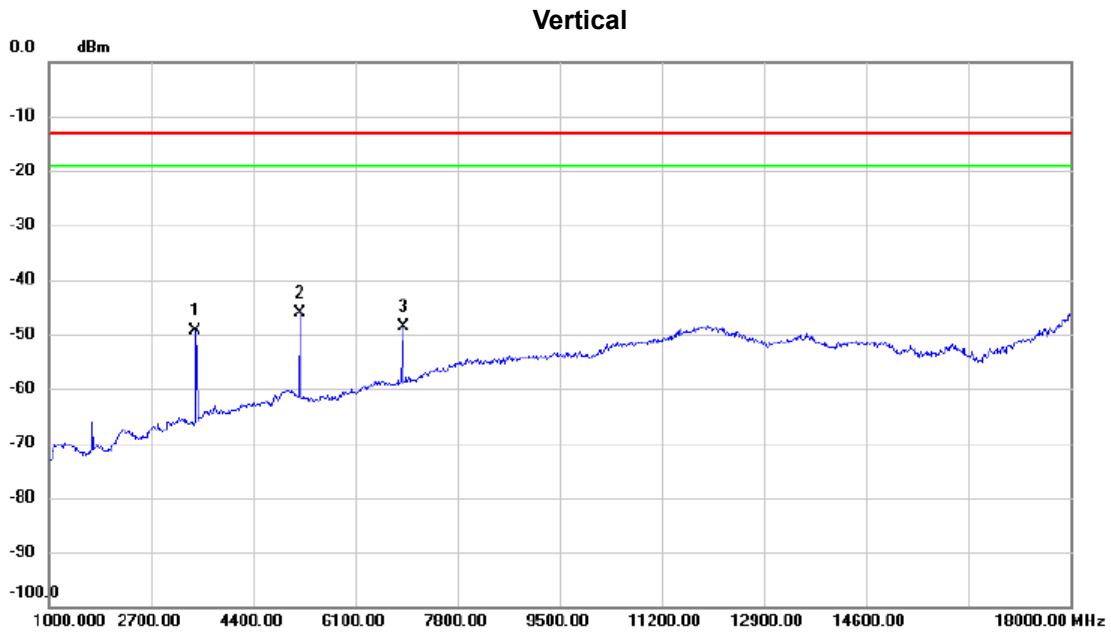


No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		150.2800	-72.43	-2.82	-75.25	-13.00	-62.25	RMS	
2	*	475.2300	-73.93	1.24	-72.69	-13.00	-59.69	RMS	
3		623.6400	-80.96	4.10	-76.86	-13.00	-63.86	RMS	
4		686.6900	-82.28	4.12	-78.16	-13.00	-65.16	RMS	
5		770.1100	-82.85	5.89	-76.96	-13.00	-63.96	RMS	
6		946.1650	-81.74	7.05	-74.69	-13.00	-61.69	RMS	

## **APPENDIX F - RADIATED EMISSION (ABOVE 1GHZ)**

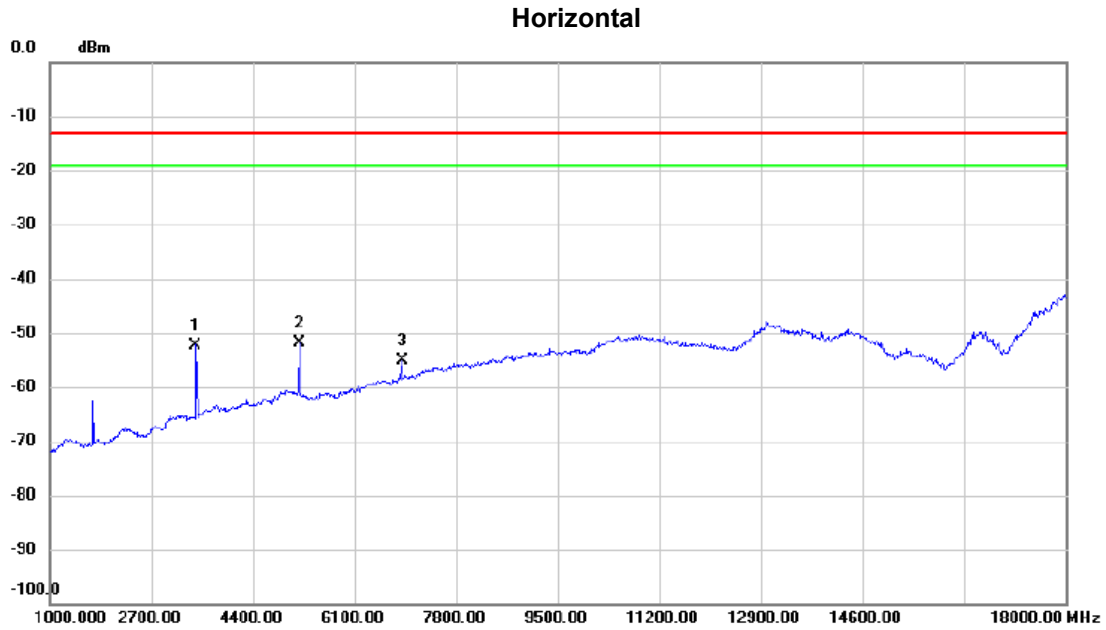


Test Mode: LTE Band 4\_TX CH20175\_20M



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		3447.150	-48.72	-0.77	-49.49	-13.00	-36.49	RMS	
2	*	5170.950	-50.68	4.49	-46.19	-13.00	-33.19	RMS	
3		6893.900	-56.55	7.89	-48.66	-13.00	-35.66	RMS	

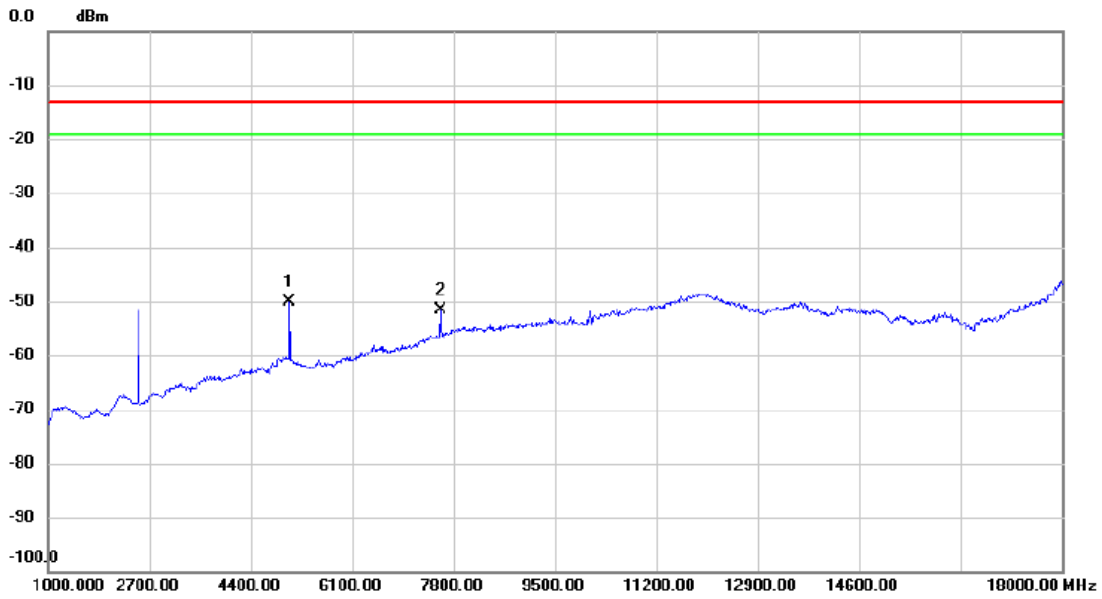
Test Mode: LTE Band 4\_TX CH20175\_20M



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		3447.150	-51.14	-1.11	-52.25	-13.00	-39.25	RMS	
2	*	5170.950	-55.87	4.09	-51.78	-13.00	-38.78	RMS	
3		6893.900	-62.99	7.75	-55.24	-13.00	-42.24	RMS	

Test Mode: LTE Band 7\_TX CH21100\_20M

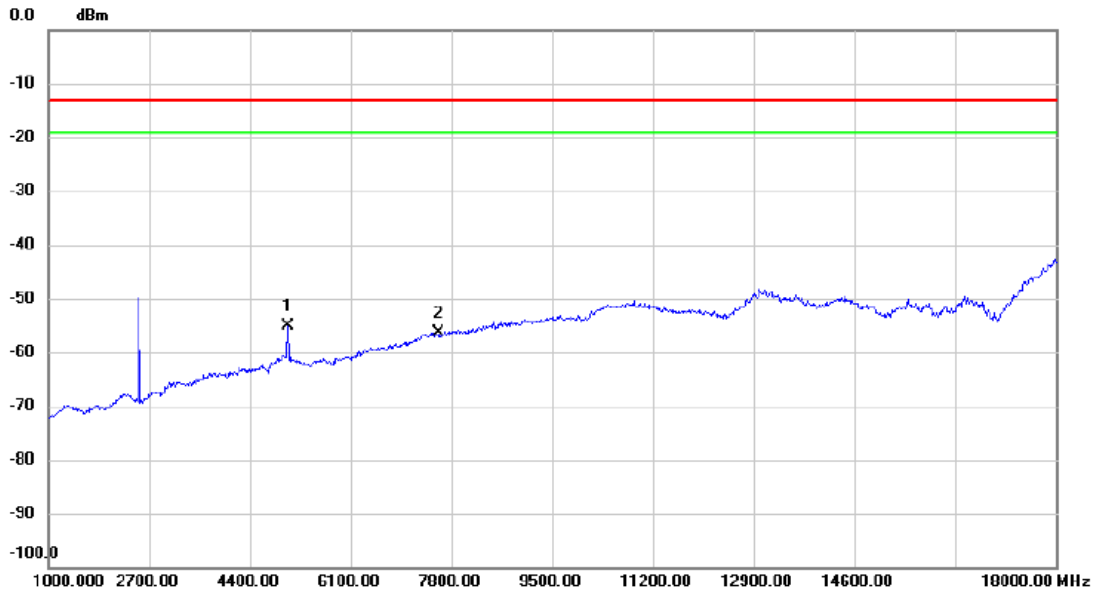
### Vertical



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	5051.950	-55.31	5.23	-50.08	-13.00	-37.08	RMS	
2		7578.150	-62.58	10.88	-51.70	-13.00	-38.70	RMS	

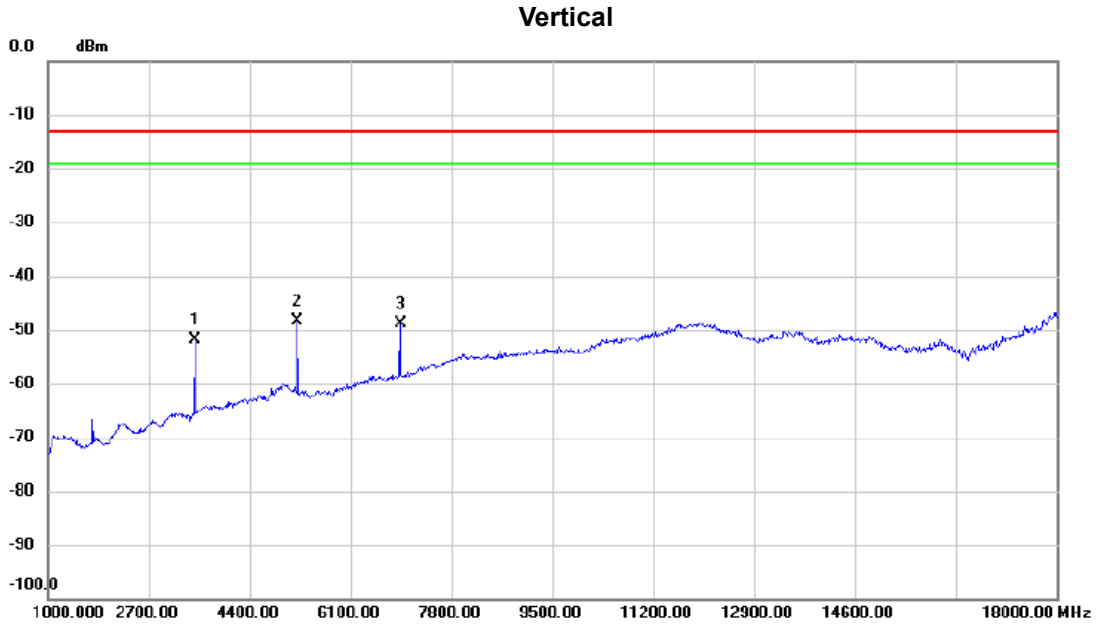
Test Mode: LTE Band 7\_TX CH21100\_20M

### Horizontal



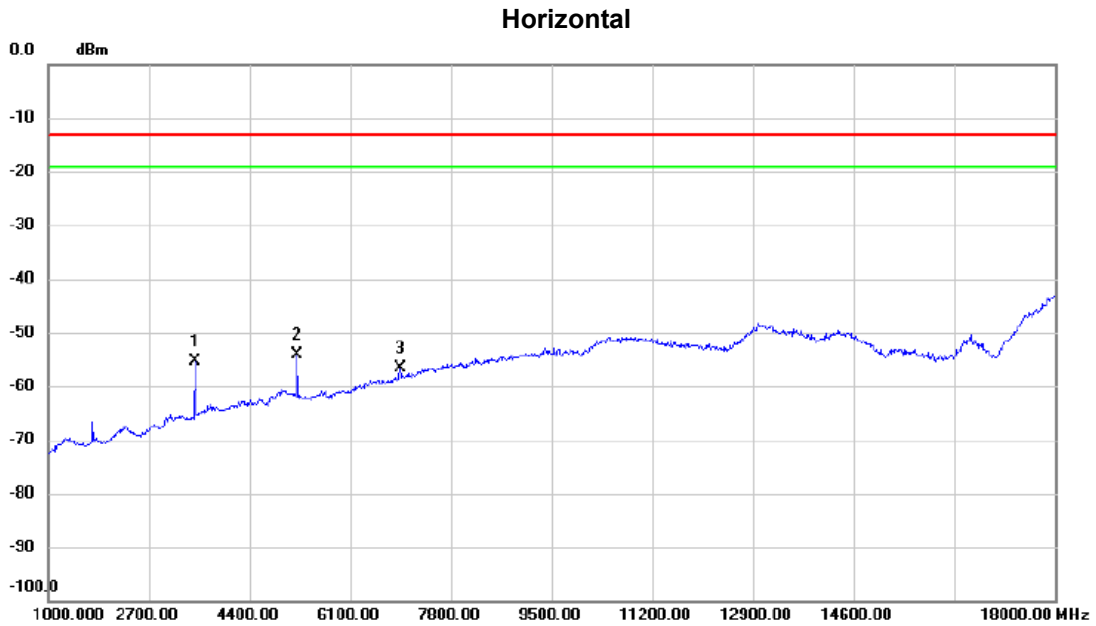
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	5051.950	-59.81	4.59	-55.22	-13.00	-42.22	RMS	
2		7578.150	-66.79	10.39	-56.40	-13.00	-43.40	RMS	

Test Mode: LTE Band 66\_TX CH132322\_20M



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		3471.800	-51.47	-0.45	-51.92	-13.00	-38.92	RMS	
2	*	5208.350	-52.72	4.30	-48.42	-13.00	-35.42	RMS	
3		6944.050	-56.92	7.96	-48.96	-13.00	-35.96	RMS	

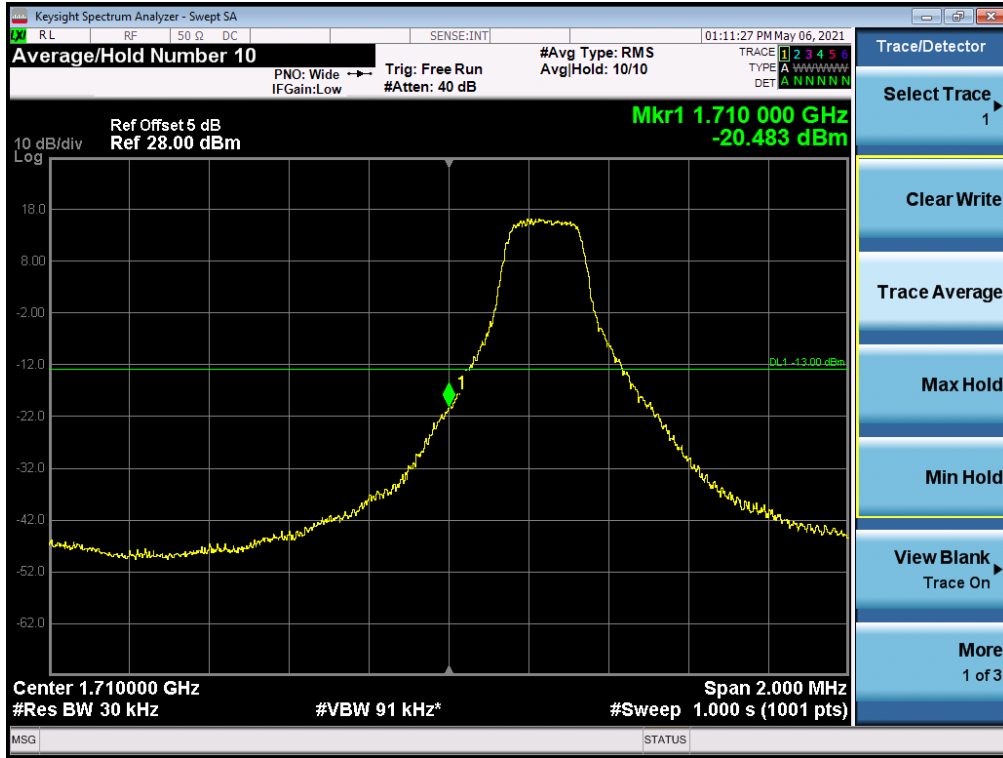
Test Mode: LTE Band 66\_TX CH132322\_20M



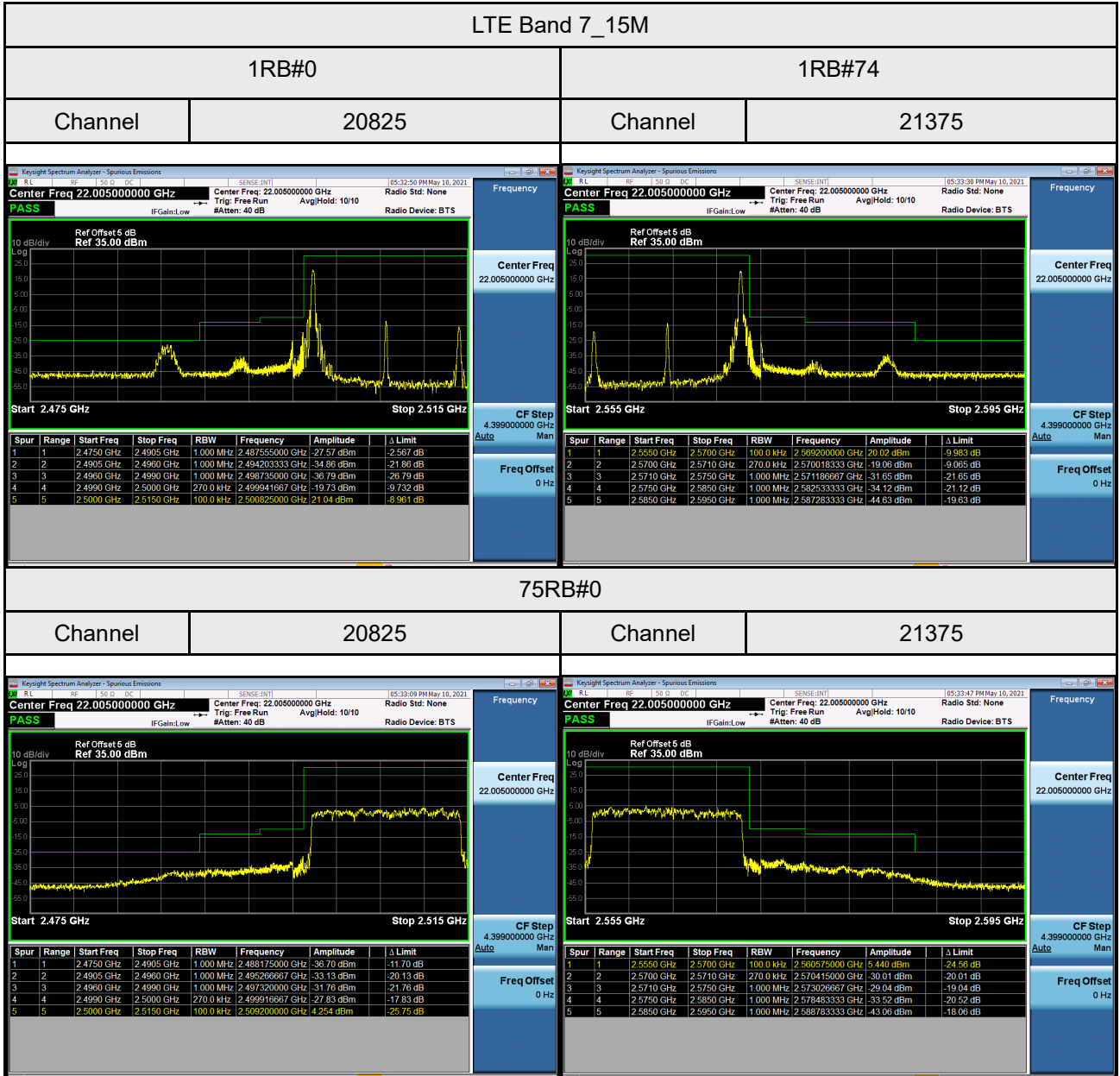
No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		3471.800	-54.54	-0.88	-55.42	-13.00	-42.42	RMS	
2	*	5208.350	-58.02	3.96	-54.06	-13.00	-41.06	RMS	
3		6944.050	-64.51	7.89	-56.62	-13.00	-43.62	RMS	

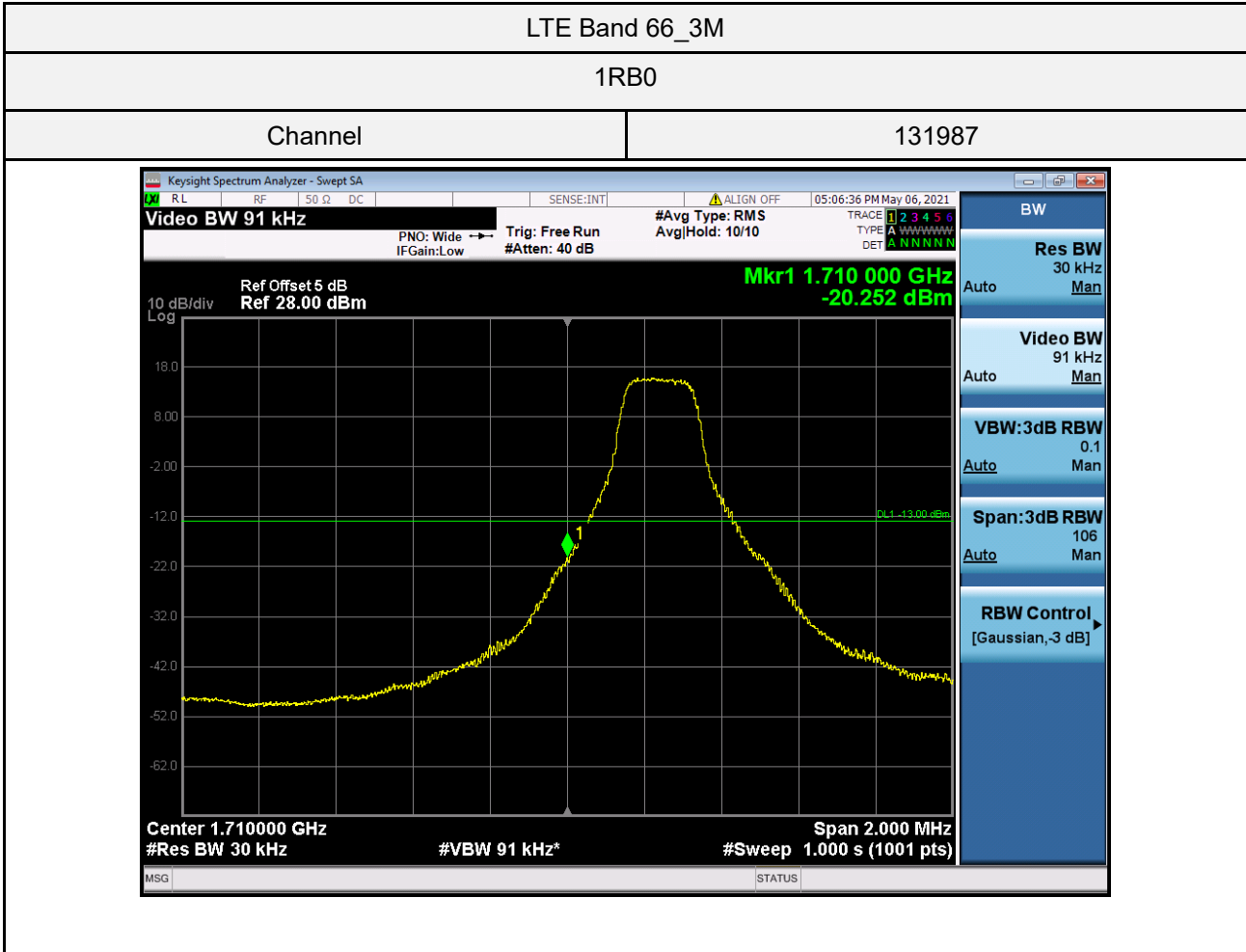
## APPENDIX G - BAND EDGE

LTE Band 4_3M	
1RB#0	
Channel	19965





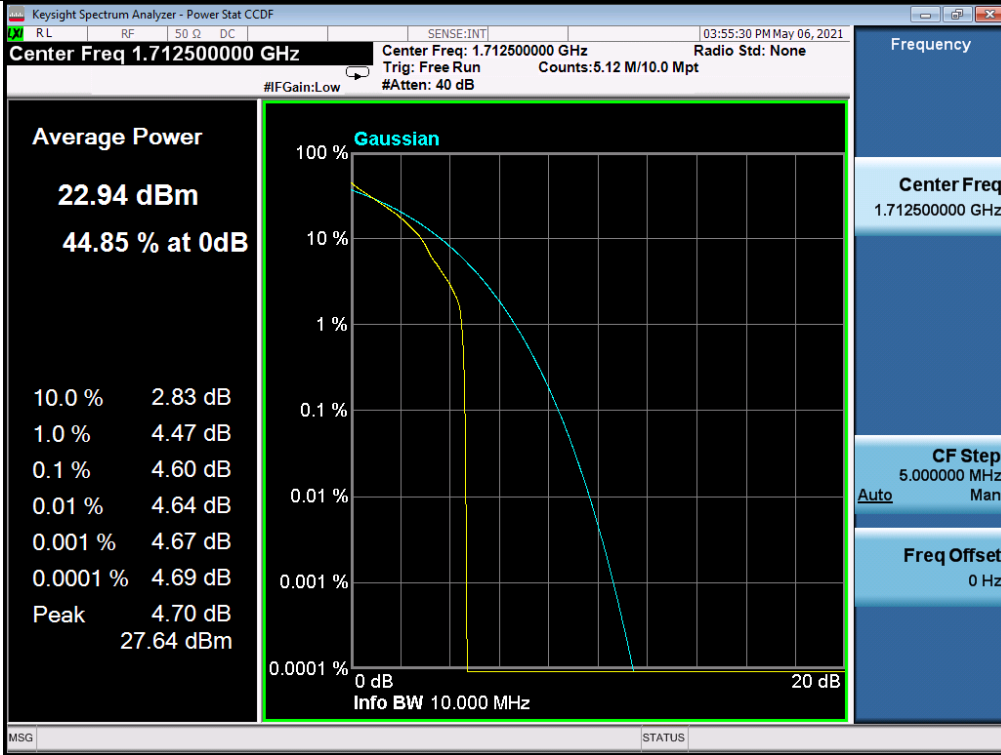


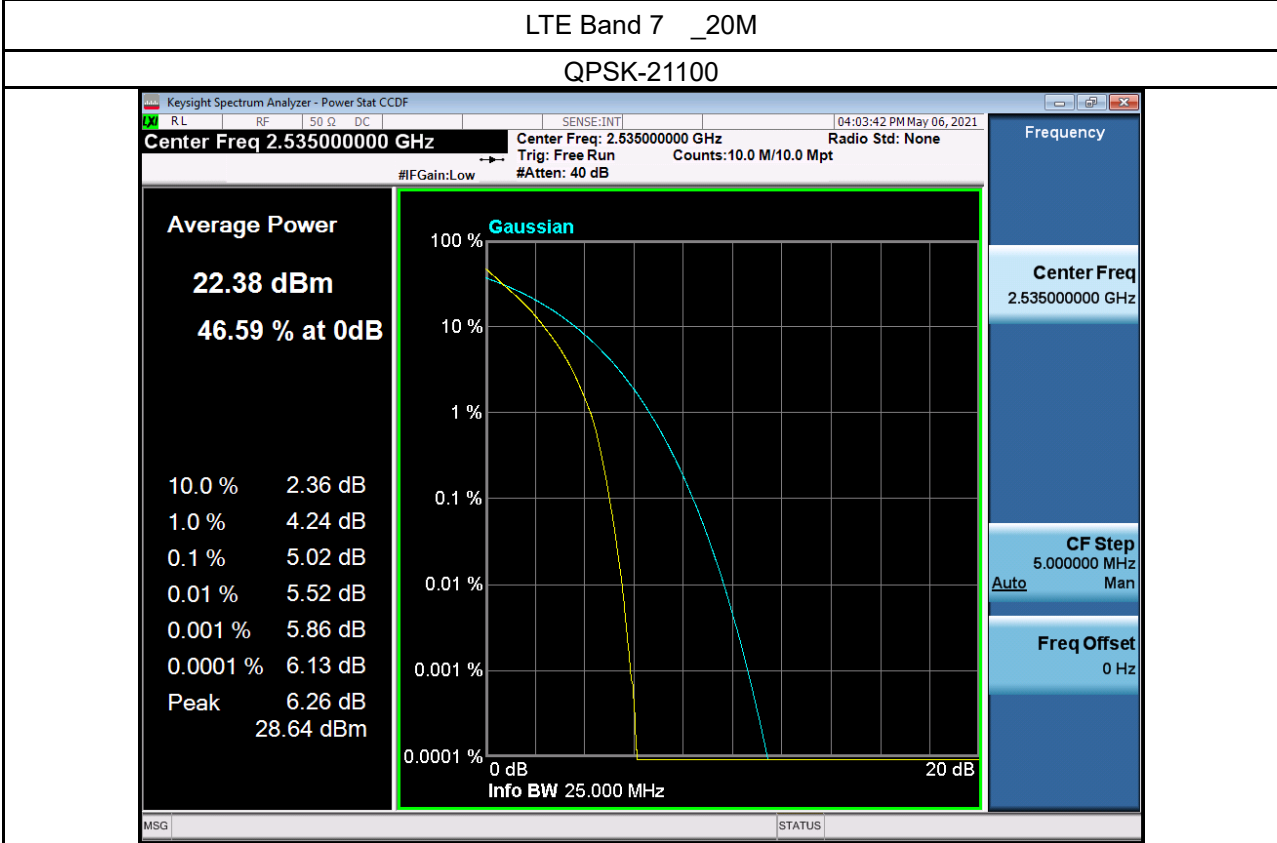


**APPENDIX H - PEAK TO AVERAGE RATIO**

LTE Band 4 \_5M

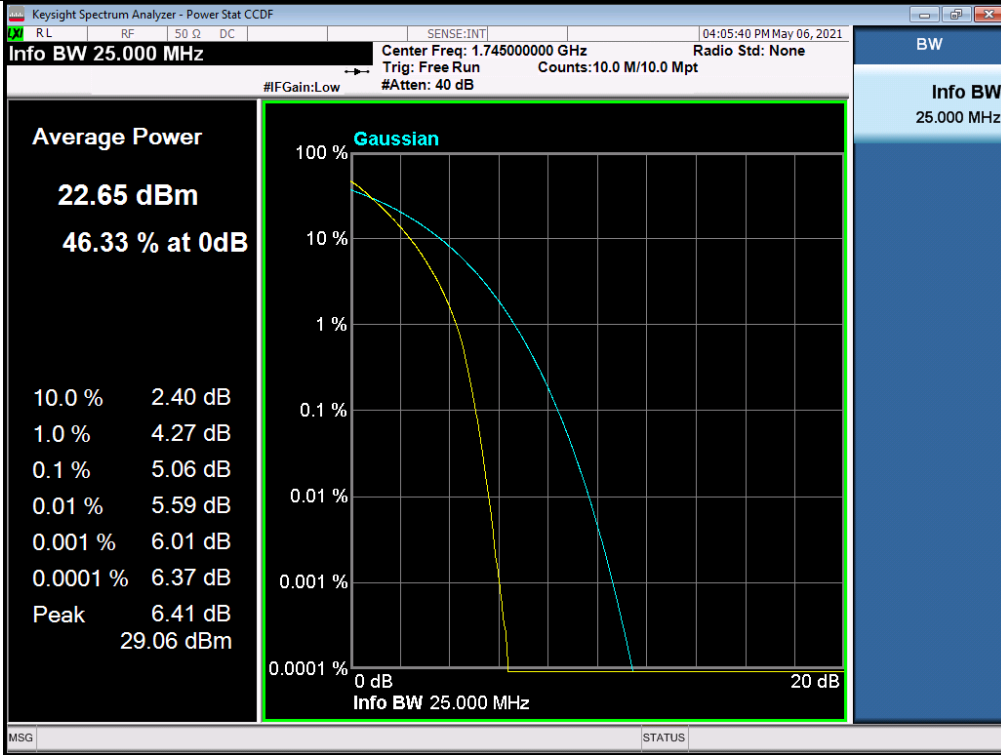
QPSK-19975





## LTE Band 66 \_20M

### QPSK-132322



## **APPENDIX I - FREQUENCY STABILITY**

Test Mode:	LTE Band 4_CH20175_15M
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**Temperature vs. Frequency Stability**

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-20	4.58	0.002643579	±2.5
-10	5.12	0.002955267	
0	-2.46	-0.001419913	
10	3.82	0.002204906	
20	-1.47	-0.000848485	
30	-2.95	-0.001702742	
40	2.48	0.001431457	
50	-4.34	-0.002505051	
Max. Deviation (ppm)	5.12	0.002955267	

Test Mode:	LTE Band 7_CH21100_5M
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**Temperature vs. Frequency Stability**

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-20	-3.46	-0.001364892	±2.5
-10	1.54	0.000607495	
0	0.89	0.000351085	
10	4.86	0.00191716	
20	2.07	0.000816568	
30	-1.53	-0.00060355	
40	-2.58	-0.001017751	
50	1.46	0.000575937	
Max. Deviation (ppm)	4.86	0.00191716	

Test Mode:	LTE Band 66_CH132322_3M
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**Temperature vs. Frequency Stability**

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-20	3.84	0.005485714	±2.5
-10	-3.21	-0.00458571	
0	-1.50	-0.00214286	
10	1.45	0.002071429	
20	-2.49	-0.00355714	
30	5.23	0.007471429	
40	2.74	0.003914286	
50	-0.85	-0.00121429	
Max. Deviation (ppm)	5.23	0.007471429	

End of Test Report