TEST REPORT

Report Number	:	R14177661-E1V4
Applicant	:	SONY CORPORATION 1-7-1 KONAN MINATO-KU TOKYO, 108-0076, JAPAN
FCC ID	:	PY7-62883W
EUT Description	:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC
Test Standard(s)	:	FCC CFR47 Part 2, Part 22, Part 24, and Part 27.

Date Of Issue:
2022-04-15

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ACCREDITED
CERT #0751.06

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2022-04-08	Initial Review	Noah Bennett
V2	2022-04-15	Addressed TCB Feedback -Fixed PDF errors. -Fixed Typo on Section 6.2 -Fixed Antenna # on section 6.4	Noah Bennett
V3	2022-04-15	Revised Section 7.3 with TCB feedback.	Noah Bennett
V4	2022-04-15	Revised Section 7.3 with TCB feedback.	Kiya Kedida

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	SONY CORPORATION 1-7-1 KONAN MINATO-KU TOKYO, 108-0076, JAPAN
FCC ID	PY7-62883W
EUT Description	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC
Serial Number	QV7700C2BX
Sample(s) Receipt Date	2022-03-01 and 2022-03-16
Date Tested	2022-03-01 to 2022-03-25
Applicable Standards	FCC CFR47 Part 2, Part 22, Part 24, and Part 27.
Test Results	COMPLIES

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the U.S. government.

Approved & Released By:	Reviewed By:	Prepared By:
		
Dan Coronia Operations Leader UL LLC.	Kiya Kedida Project Engineer UL LLC.	Noah Bennett Engineer UL LLC.

2. SUMMARY OF TEST RESULTS

This report contains data provided by the customer which can impact the validity of results. UL LLC Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

Requirement Description	Requirement Clause Number (FCC)	Result	Remarks
Equivalent Isotropic Radiated Power	24.238, 22.913 (a)	Pass	See Note 1.
Occupied Bandwidth	2.1049		
Band Edge and Emission Mask	2.1051, 24.238 (a) (c)	Pass	
Out of Band Emissions	2.1051, 24.238 (a) (c)	Pass	
Frequency Stability	2.1055, 24.235,	Pass	
Peak-to-Average Ratio	24.232 (d)	Pass	
Field Strength of Spurious Radiation	2.1053, 24.238 27.53 (g),	Pass	None.

Note 1: Full testing was only done on LTE Band 2. Please see Data-Reuse Justification in section 7.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following:

- ANSI C63.26:2015
- FCC CFR 47 Part 2, Part 22, Part 24, Part 27
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01. Determining ERP and EIRP
- FCC KDB 484596 D01 Referencing Test Data v01

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below. All testing with the exception of RF Conducted Output Power was performed at the below site.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

UL Verification Services Inc. is accredited by A2LA, Certificate Number #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below. RF Conducted Output Power was the only test performed at the below site.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	208313
☒	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	208313
☒	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	208313

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{Lab}
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC. This report covers GSM/WCDMA/LTE.

6.2. MAXIMUM OUTPUT POWER

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.6

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

The transmitter has a maximum average conducted and ERP / EIRP output powers as follows:

GSM MODES

Part 22 850MHz								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	ERP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
824.2-848.8	GPRS	32.8	-2.80	7.0	27.85	0.610	240.2	240KGXW
	EGPRS	27.1			22.15	0.164	247.1	247KG7W
Part 24 1900MHz								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	EIRP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
1850.2-1909.8	GPRS	27.4	-2.70	2.0	24.70	0.295	239.8	240KGXW
	EGPRS	26.6			23.90	0.245	244.1	244KG7W

WCDMA MODE

Part 24 Band 2								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	EIRP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
1852.4-1907.6	REL 99	19.7	-2.70	2.0	17.00	0.050	4159.9	4M16F9W
	HSDPA	18.7			16.00	0.040	414511	414MF9W
Part 27 Band 4								
Frequency range (MHz)	Modulation	Conducted (Average) (dBm)	Antenna Gain (dBi)	Limit (W)	EIRP		99% BW (kHz)	Emission Designator
					(dBm)	(W)		
1712.4-1752.6	REL 99	19.7	-4.40	1.0	15.30	0.034	4412.4	4M41F9W
	HSDPA	18.7			14.30	0.027	4164.4	4M16F9W

LTE BAND 2

Part 24 / RSS 133	
EIRP Limit (W)	2.00
Antenna Gain (dBi)	-2.70

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	1850.7	1909.3	19.70	17.00	0.050	1080	1M08G7W
	16QAM			20.00	17.30	0.054	1090	1M09D7W
3.0	QPSK	1851.5	1908.5	19.70	17.00	0.050	2700	2M70G7W
	16QAM			20.00	17.30	0.054	2700	2M70D7W
5.0	QPSK	1852.5	1907.5	19.80	17.10	0.051	4490	4M49G7W
	16QAM			20.00	17.30	0.054	4490	4M49D7W
10.0	QPSK	1855.0	1905.0	19.70	17.00	0.050	8980	8M98G7W
	16QAM			20.00	17.30	0.054	8980	8M98D7W
15.0	QPSK	1857.5	1902.5	19.60	16.90	0.049	13470	13M5G7W
	16QAM			19.90	17.20	0.052	13470	13M5D7W
20.0	QPSK	1860.0	1900.0	19.60	16.90	0.049	17960	18M0G7W
	16QAM			20.00	17.30	0.054	17970	18M0D7W

LTE BAND 4

Part 27	
EIRP Limit (W)	1.00
Antenna Gain (dBi)	-4.40

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	1710.7	1754.3	19.7	15.30	0.034	1090	1M09G7W
	16QAM			20.0	15.60	0.036	1090	1M09D7W
3.0	QPSK	1711.5	1753.5	19.7	15.30	0.034	2690	2M69G7W
	16QAM			20.0	15.60	0.036	2690	2M69D7W
5.0	QPSK	1712.5	1752.5	19.8	15.40	0.035	4500	4M50G7W
	16QAM			20.0	15.60	0.036	4510	4M51D7W
10.0	QPSK	1715.0	1750.0	19.7	15.30	0.034	8950	8M95G7W
	16QAM			20.0	15.60	0.036	8970	8M97D7W
15.0	QPSK	1717.5	1747.5	19.6	15.20	0.033	13420	13M4G7W
	16QAM			19.9	15.50	0.035	13460	13M5D7W
20.0	QPSK	1720.0	1745.0	19.6	15.20	0.033	17920	17M9G7W
	16QAM			20.0	15.60	0.036	17880	17M9D7W

LTE BAND 12

Part 27	
ERP Limit (W)	3.00
Antenna Gain (dBi)	-9.50

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	699.7	715.3	21.4	9.75	0.009	1090	1M09G7W
	16QAM			21.8	10.15	0.010	1090	1M09D7W
3.0	QPSK	700.5	714.5	21.4	9.75	0.009	2690	2M69G7W
	16QAM			21.7	10.05	0.010	2690	2M69D7W
5.0	QPSK	701.5	713.5	21.4	9.75	0.009	4490	4M49G7W
	16QAM			21.9	10.25	0.011	4500	4M50D7W
10.0	QPSK	704.0	711.0	21.7	10.05	0.010	8940	8M94G7W
	16QAM			21.4	9.75	0.009	8950	8M95D7W

LTE BAND 17

Part 27 / RSS 130	
ERP Limit (W)	3.00
Antenna Gain (dBi)	-9.50

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
5.0	QPSK	706.5	713.5	21.7	10.05	0.010	4488.8	4M49G7W
	16QAM			22.0	10.35	0.011	4489.1	4M49D7W
10.0	QPSK	709.0	711.0	21.6	9.95	0.010	8969	8M97G7W
	16QAM			22.0	10.35	0.011	8961	8M96D7W

6.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 0.492 for conducted sample and 0.502 for radiated sample.

6.4. MAXIMUM ANTENNA GAIN

The antenna(s) gain, as provided by the manufacturer' are as follows:

Antenna	Support bands	Frequency range (MHz)	Peak gain (dBi)
Main Antenna 1	GSM850	824 -849	-2.8
Main Antenna 1	LTE B12/B17	699-716	-9.5
Main Antenna 2	GSM1900/WCDMA2/LTE B2	1850-1910	-2.7
Main Antenna 2	WCDMA4/LTE B4	1710-1755	-4.4

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE Bands of:
Band 2, Band 4, Band 12, and Band 17.

The EUT supports 2G and 3G Bands of:
WCDMA Band II, Band IV, GSM 850 and GSM 1900.

FCC ID: PY7-62883W (this device) is tested as part of a Class 2 Permissive change from lead model FCC ID: PY7-24116L. As such, Full Conducted testing was performed on LTE Bands added by the manufacturer under the C2PC change, and Full Radiated Emission testing was performed on all LTE Bands. Additional testing required for certification was previously performed as part of the initial certification.

The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK, 16QAM and 64QAM modulations. It was found that QPSK and 16QAM results were worst case. All testing was performed using QPSK and 16QAM modulations to represent the worst case. All Conduced Spurious emissions testing was done with the EUT set to RB1-0.

The EUT was investigated in three orthogonal orientations X/Y/Z for both Low Band (Fc <1GHz) and Mid Band (1GHz < Fc < 3GHz). For Low Band, it was determined that (Y) orientation was the worst-case orientation. For Mid Band, it was determined that X orientation was the worst-case orientation. For Radiated measurements the EUT was tested with the AC/DC adaptor and headphones connected as this represents a worst-case mode of operation.

The worst-case scenario for below 1GHz and above 18GHz measurements are as followed:

- LTE QPSK

Simultaneous transmission worst case modes selected are as follows:

- LTE Band 12, 23060, 704MHz, 10MHz, 1RB and 2462MHz 106T/R54 C0/C1

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	HP	14-dk1003dx	5CG016B4XM	TX2-RTL8821CE
Headphones	Sony	MDR-EX15AP	NA	NA
AC Adapter	Sony	XQZ-UC11-010-236-21	1821W34209742	NA
AC Adapter	Sony	XQZ-UC11-010-236-21	1821W34209856	NA
USB Cable Type C	Sony	XQZ-UB1	NA	NA

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB-C	Non-Shielded	<3m	Connected to Power Supply
2	3.5mm	1	3.5mm Audio	Non-Shielded	<1m	Connected to headphones

TEST SETUP

The EUT was powered on and configured to be connected to a communications device before the test. The EUT was connected and communicating with the device during the entire test suite. The EUT was connected to AC Mains via power supply and had headphones connected.

SETUP DIAGRAMS

Please refer to UL Report R14177661-EP1 for Setup Diagrams.

7. REUSE OF TEST DATA

7.1. INTRODUCTION

According to the manufacturer the major change between FCC ID: PY7-83262V (Lead Model), FCC ID: PY7-24116L (Parent Model) and FCC ID: PY7-62883W (This Model) is changing band configuration by software. The FCC ID: PY7-83262V (Lead Model) and FCC ID: PY7-24116L (Parent Model) conducted test data shall remain representative of FCC ID: PY7-62883W so, FCC ID: PY7-62883W leverages conducted test data from FCC ID: PY7-24116L and PY7-83262V.

The applicant takes full responsibility that the test data as referenced in this section represents compliance for this FCC ID.

7.2. DEVICE DIFFERENCES

Difference between PY7-83262V (Lead Model), FCC ID: PY7-24116L (Parent Model) and FCC ID: PY7-62883W (This Model):

Sony Corporation hereby declares that the PCB layout and the components except for antenna for licensed band (GSM, WCDMA and LTE) is identical between PY7-83262V (lead model), PY7-24116L (Parent model) and PY7-62883W (This Model). Therefore, the conducted test data of licensed band for PY7-83262V and PY7-24116L can be re-used to PY7-62883W except for LTE B2.

7.3. REFERENCE DETAIL

Equipment Class	Reference FCC ID	Report Title	Referenced Testing
Licensed (WWAN)	PY7-83262V	R14176139-E1V3 FCC Report WWAN_Final	All Radiated emissions data other than LTE B12. Conducted Antenna port data for LTE Band 12 only.
	PY7-24116L	R14176161-E1V4 FCC Report WWAN Full Test & Spot Check	All Radiated emissions data other than LTE B2 Conducted Antenna port data for all supported bands except LTE Band 2.

*Notes:
1. Full radiated testing was done on all LTE Band 2 and Band 12.
2. ERP/EIRP is updated in this report due to changes in antenna gain. ERP/EIRP is based on conducted power plus antenna gain.

7.4 SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device PY7-62883W for Conducted output power. The data from the application has been verified through appropriate spot checks to demonstrate compliance for this device as shown in the summary.

PY7-62883W SPOT CHECK RESULTS						
Technology	BW	Channel	Measured Frequency (MHz)	PY7-83262V	PY7-62883W	Delta (dB) <+3dB
				Conducted Output Power	Conducted Output Power (dBm)	Margin
LTE Band 12	10MHz	QPSK	707.5 MHz	21.4	21.4	0.00
		8PSK		21.7	21.7	0.00

7.5 DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major changes filed under Class II Permissive Change application is:

- Disabled WCDMA Band 5, LTE Band 5, LTE 13
- Enabled LTE Band 2, Band 12

8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 2				
T177	Spectrum Analyzer	Keysight Technologies	N9030A	2021-05-19	2022-05-19
212967	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	2021-11-15	2022-11-15
51845	Temp/Humid Chamber	Thermotron	SM-32-8200	2022-01-25	2023-01-25
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2021-07-12	2022-07-12
MY61466084	DC Regulated Power Supply	Keysight	E3633A	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2021.11.03	NA	NA
	Additional Equipment used				
MM0167 (PRE0126458)	True RMS Multimeter	Agilent	U1232A	2021-08-17	2021-08-17

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
AT0072	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2021-05-03	2022-05-03
	Gain-Loss Chains				
C2-SAC03	Gain-loss string: 1-18GHz	Various	Various	2021-07-09	2022-07-09
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-03-08	2023-03-08
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
HPF012	1GHz high-pass filter, 2W, F_{high} =18GHz	Micro-Tronics	HPM18129	2022-02-17	2023-02-17
BRF008	1710-1785MHz notch filter, 2W, F_{high} = 9GHz	Micro-Tronics	BRM50713-01	2022-02-17	2023-02-17
BRF010	1.85-1.97GHz notch filter, 2W, F_{high} = 9GHz	Micro-Tronics	BRM50714-01	2022-02-17	2023-02-17
s/n 181474409	Environmental Meter	Fisher Scientific	15-077-963	2021-09-27	2022-09-27
PS214	AC Power Source	Elgar	CW2501M (s/n 1523A02396)	NA	NA

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
AT0036	Passive Loop Antenna	Electro-Metrics	EM-6872	2021-07-20	2022-07-10
AT0037	Passive Loop Antenna	Electro-Metrics	EM-6871	2021-07-20	2022-07-10
	30-1000 MHz				
AT0066	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2022-03-01	2023-03-01
	18-40 GHz				
AT0063	Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2021-11-04	2022-11-04
AT0061	Horn Antenna, 26-40GHz	ARA	MWH-2640/B	2021-11-04	2022-11-04
	Gain-Loss Chains				
C1-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2021-07-20	2022-07-20
C1-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2021-07-20	2022-07-20
C1-SAC04	Gain-loss string: 18-40GHz	Various	Various	2021-07-20	2022-07-20
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-30	2022-03-30
SA0020	Spectrum Analyzer	Agilent	E4446A	2021-05-25	2022-05-25
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
s/n 200037610	Environmental Meter	Fisher Scientific	06-662-4	2020-01-22	2022-01-22
s/n 181474341	Environmental Meter	Fisher Scientific	15-077-963	2021-09-27	2022-09-27
208720	Wideband Radio Communications Tester	Rohde and Schwartz	CMW500	2021-04-26	2022-04-26
BRF001	900MHz notch filter, 2W, F_{high} =6GHz	Micro-Tronics	BRM50706	2021-07-22	2022-07-22

NOTES:

1. * Testing is completed before equipment expiration date.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

9. RF OUTPUT POWER VERIFICATION

9.1. LTE

CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

All LTE bands conducted average power is obtained from the CMW500 telecommunication test set.
The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS136.101 specification.
UE Power Class: 3 (23 +/- 2dBm). Band 41 UE Power Class: 2 (26 +/-2 dBm).The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS136.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS136.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36, 66, 70	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2, 6.6.3.3.19	41	5, 10, 15, 20	Table 6.2.4-4, Table 6.2.4-4a	

RESULTS

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted output powers as follows:

LTE BAND 2

Test Date	3/1/2022
Tested By	27556
Sample no.	QV7700BUBB
Call Box S/N	85780
Cable loss	0.8
Antenna Port	Main Ant 2

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				18700	18900	19100	MPR	Tune-up Limit
				1860 MHz	1880 MHz	1900 MHz		
20 MHz	QPSK	1	0	19.5	19.6	19.6	0	20
		1	49	19.5	19.6	19.5	0	20
		1	99	19.5	19.5	19.4	0	20
		50	0	19.5	19.6	19.6	0	20
		50	24	19.6	19.6	19.6	0	20
		50	50	19.5	19.6	19.5	0	20
		100	0	19.6	19.6	19.6	0	20
	16QAM	1	0	19.8	19.9	19.9	0	20
		1	49	19.9	20.0	20.0	0	20
		1	99	19.7	20.0	19.7	0	20
		50	0	19.5	19.6	19.6	0	20
		50	24	19.6	19.6	19.6	0	20
		50	50	19.6	19.6	19.5	0	20
		100	0	19.6	19.6	19.6	0	20
	64QAM	1	0	19.9	19.8	19.8	0	20
		1	49	20.0	20.0	19.9	0	20
		1	99	19.9	19.8	19.6	0	20
		50	0	19.6	19.6	19.6	0	20
		50	24	19.6	19.6	19.6	0	20
		50	50	19.6	19.6	19.6	0	20
		100	0	19.6	19.6	19.6	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				18675	18900	19125	MPR	Tune-up Limit
				1857.5 MHz	1880 MHz	1902.5 MHz		
15 MHz	QPSK	1	0	19.5	19.6	19.5	0	20
		1	37	19.6	19.6	19.5	0	20
		1	74	19.5	19.5	19.4	0	20
		36	0	19.5	19.6	19.6	0	20
		36	20	19.6	19.6	19.5	0	20
		36	39	19.5	19.5	19.5	0	20
		75	0	19.5	19.5	19.5	0	20
	16QAM	1	0	19.8	19.9	19.8	0	20
		1	37	19.9	19.9	19.8	0	20
		1	74	19.8	19.7	19.7	0	20
		36	0	19.5	19.6	19.6	0	20
		36	20	19.6	19.6	19.6	0	20
		36	39	19.6	19.6	19.5	0	20
		75	0	19.5	19.6	19.5	0	20
	64QAM	1	0	19.8	20.0	19.7	0	20
		1	37	19.8	20.0	19.7	0	20
		1	74	19.7	19.9	19.6	0	20
		36	0	19.5	19.6	19.6	0	20
		36	20	19.6	19.6	19.6	0	20
		36	39	19.6	19.6	19.5	0	20
		75	0	19.6	19.6	19.6	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				18650	18900	19150	MPR	Tune-up Limit
				1855 MHz	1880 MHz	1905 MHz		
10 MHz	QPSK	1	0	19.6	19.7	19.6	0	20
		1	25	19.6	19.7	19.6	0	20
		1	49	19.5	19.6	19.5	0	20
		25	0	19.7	19.7	19.7	0	20
		25	12	19.6	19.7	19.6	0	20
		25	25	19.6	19.6	19.6	0	20
		50	0	19.6	19.7	19.6	0	20
	16QAM	1	0	19.9	20.0	20.0	0	20
		1	25	20.0	20.0	19.9	0	20
		1	49	19.9	19.9	20.0	0	20
		25	0	19.6	19.7	19.7	0	20
		25	12	19.6	19.7	19.7	0	20
		25	25	19.6	19.7	19.6	0	20
		50	0	19.6	19.7	19.7	0	20
	64QAM	1	0	19.9	20.0	19.9	0	20
		1	25	19.8	20.0	19.9	0	20
		1	49	19.8	19.9	19.9	0	20
		25	0	19.7	19.7	19.7	0	20
		25	12	19.7	19.7	19.7	0	20
		25	25	19.6	19.7	19.6	0	20
		50	0	19.7	19.7	19.7	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				18625	18900	19175	MPR	Tune-up Limit
				1852.5 MHz	1880 MHz	1907.5 MHz		
5 MHz	QPSK	1	0	19.6	19.7	19.6	0	20
		1	12	19.7	19.8	19.6	0	20
		1	24	19.5	19.7	19.5	0	20
		12	0	19.7	19.7	19.7	0	20
		12	7	19.7	19.7	19.6	0	20
		12	13	19.6	19.7	19.6	0	20
		25	0	19.6	19.6	19.6	0	20
	16QAM	1	0	20.0	20.0	20.0	0	20
		1	12	20.0	20.0	20.0	0	20
		1	24	20.0	20.0	19.9	0	20
		12	0	19.7	19.8	19.7	0	20
		12	7	19.7	19.8	19.7	0	20
		12	13	19.6	19.8	19.6	0	20
		25	0	19.6	19.7	19.7	0	20
	64QAM	1	0	20.0	20.0	19.9	0	20
		1	12	20.0	20.0	19.9	0	20
		1	24	20.0	19.9	19.9	0	20
		12	0	19.7	19.8	19.6	0	20
		12	7	19.6	19.8	19.6	0	20
		12	13	19.5	19.8	19.5	0	20
		25	0	19.7	19.7	19.6	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				18615	18900	19185	MPR	Tune-up Limit
				1851.5 MHz	1880 MHz	1908.5 MHz		
3 MHz	QPSK	1	0	19.6	19.6	19.6	0	20
		1	8	19.6	19.7	19.6	0	20
		1	14	19.4	19.5	19.4	0	20
		8	0	19.7	19.7	19.6	0	20
		8	4	19.6	19.7	19.6	0	20
		8	7	19.6	19.7	19.6	0	20
		15	0	19.6	19.6	19.6	0	20
	16QAM	1	0	19.9	20.0	20.0	0	20
		1	8	19.9	20.0	20.0	0	20
		1	14	19.7	20.0	19.8	0	20
		8	0	19.7	19.7	19.8	0	20
		8	4	19.7	19.7	19.8	0	20
		8	7	19.6	19.8	19.7	0	20
		15	0	19.6	19.6	19.6	0	20
	64QAM	1	0	19.8	20.0	19.9	0	20
		1	8	19.8	20.0	19.9	0	20
		1	14	19.6	19.9	19.8	0	20
		8	0	19.7	19.7	19.7	0	20
		8	4	19.7	19.7	19.6	0	20
		8	7	19.7	19.8	19.6	0	20
		15	0	19.7	19.7	19.6	0	20

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				
				18607	18900	19193	MPR	Tune-up Limit
				1850.7 MHz	1880 MHz	1909.3 MHz		
1.4 MHz	QPSK	1	0	19.6	19.7	19.6	0	20
		1	3	19.6	19.7	19.6	0	20
		1	5	19.5	19.6	19.5	0	20
		3	0	19.6	19.7	19.6	0	20
		3	1	19.6	19.7	19.5	0	20
		3	3	19.6	19.7	19.5	0	20
		6	0	19.6	19.7	19.5	0	20
	16QAM	1	0	19.8	20.0	20.0	0	20
		1	3	19.8	20.0	20.0	0	20
		1	5	19.7	20.0	19.9	0	20
		3	0	19.8	19.9	19.7	0	20
		3	1	19.8	19.9	19.8	0	20
		3	3	19.8	19.9	19.8	0	20
		6	0	19.6	19.7	19.7	0	20
	64QAM	1	0	20.0	19.9	20.0	0	20
		1	3	20.0	20.0	19.9	0	20
		1	5	19.8	19.8	19.9	0	20
		3	0	19.7	19.9	19.8	0	20
		3	1	19.7	19.9	19.8	0	20
		3	3	19.7	19.9	19.7	0	20
		6	0	19.7	19.7	19.6	0	20

10. CONDUCTED TEST RESULTS

10.1. OCCUPIED BANDWIDTH

RULE PART(S)
FCC: §2.1049

LIMITS
For reporting purposes only.

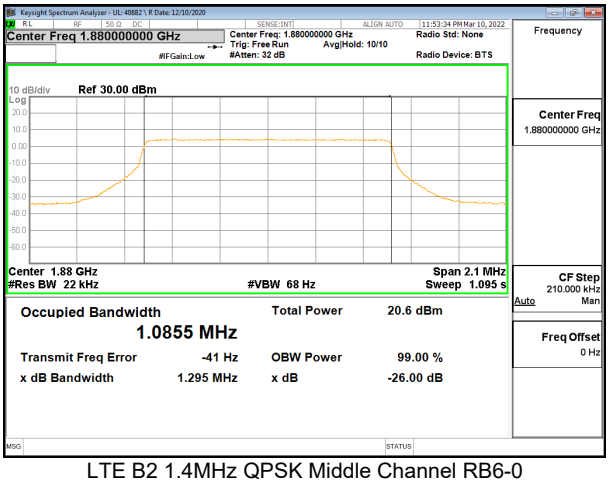
TEST PROCEDURE
The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the middle channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

RESULTS
There is no limit required and power is the same for low, middle and high channel; therefore, only middle channel was tested.

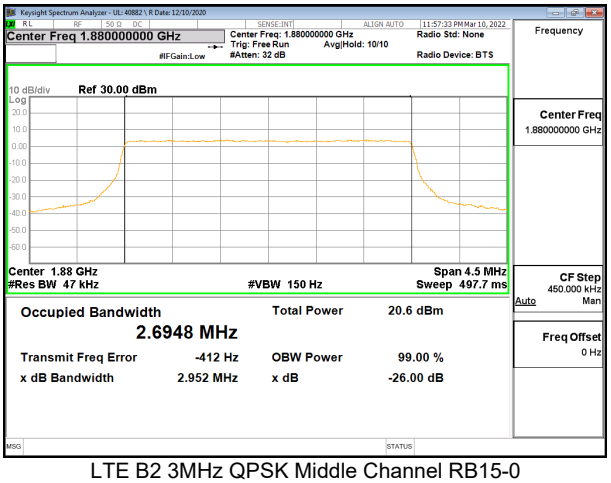
LTE BAND 2

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)
LTE BAND 2	1.4MHz, QPSK	6/0	1880.0	1.08
	1.4MHz,16QAM			1.09
	3MHz, QPSK	15/0		2.7
	3MHz, 16QAM			2.7
	5MHz, QPSK	25/0		4.49
	5MHz, 16QAM			4.49
	10MHz, QPSK	50/0		8.98
	10MHz, 16QAM			8.98
	15MHz, QPSK	75/0		13.47
	15MHz, 16QAM			13.47
	20MHz, QPSK	100/0		17.96
	20MHz, 16QAM			17.97

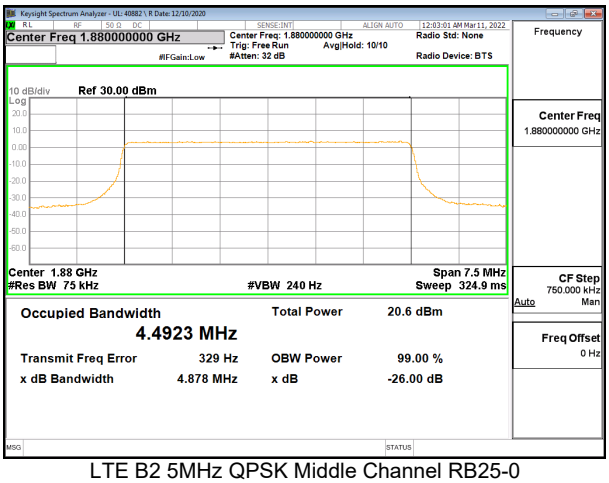
LTE BAND 2



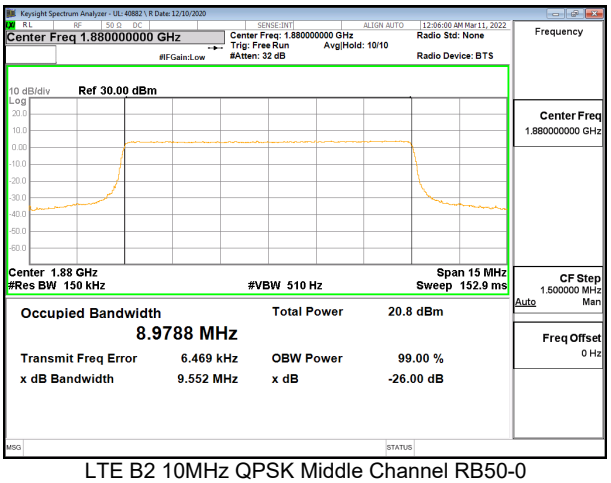
LTE B2 1.4MHz QPSK Middle Channel RB6-0



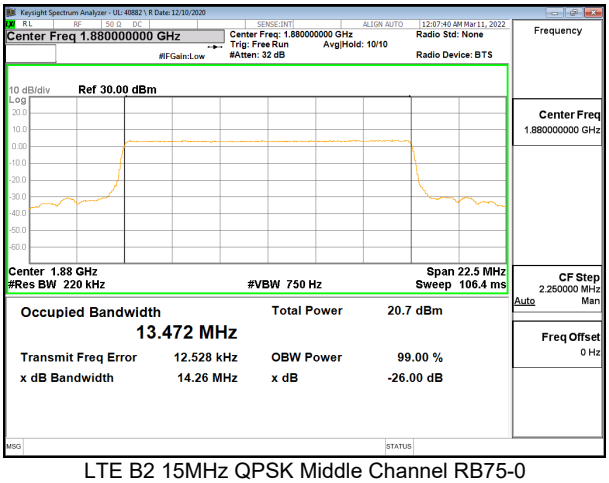
LTE B2 3MHz QPSK Middle Channel RB15-0



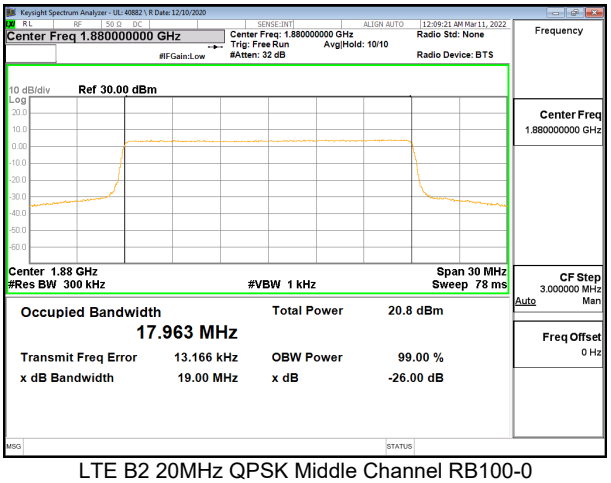
LTE B2 5MHz QPSK Middle Channel RB25-0



LTE B2 10MHz QPSK Middle Channel RB50-0



LTE B2 15MHz QPSK Middle Channel RB75-0



LTE B2 20MHz QPSK Middle Channel RB100-0

10.2. BAND EDGE AND EMISSION MASK

LIMITS

FCC: §24.238 (a)

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.

TEST PROCEDURE

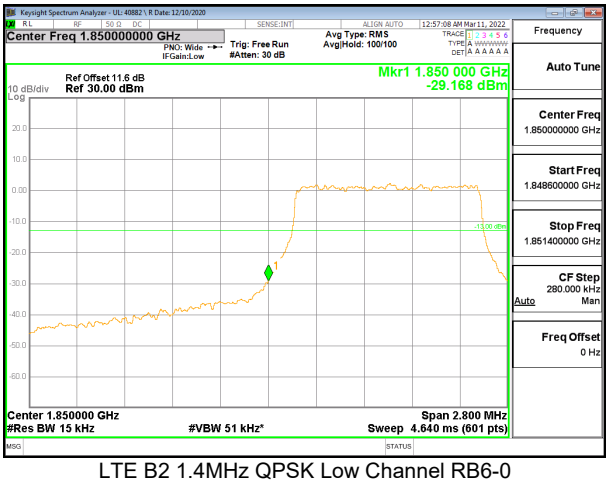
The transmitter output was connected to a R&S CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

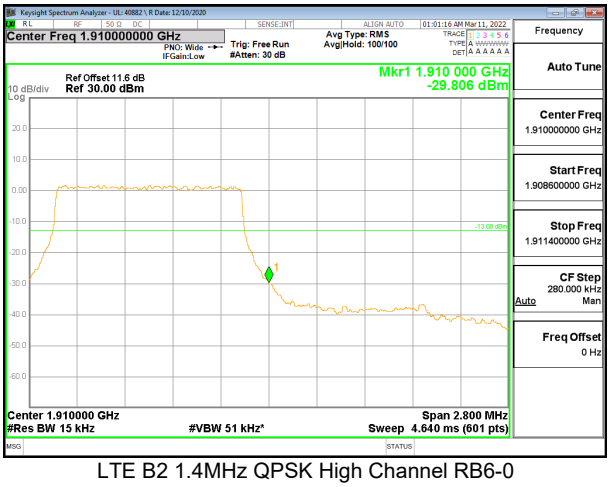
- Set the spectrum analyzer span to include the block edge frequency.
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

RESULTS

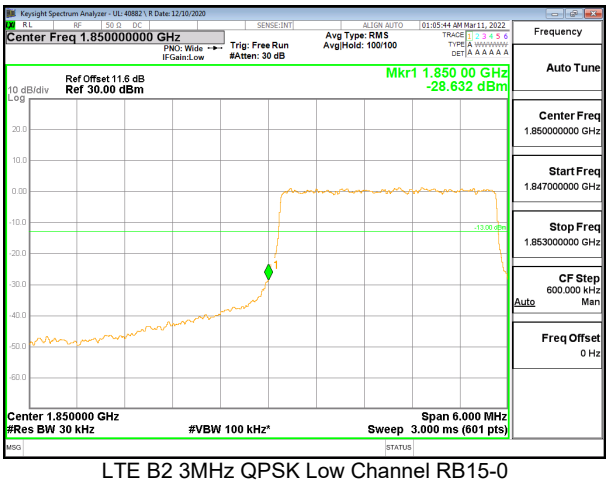
LTE BAND 2 BANDEDGE



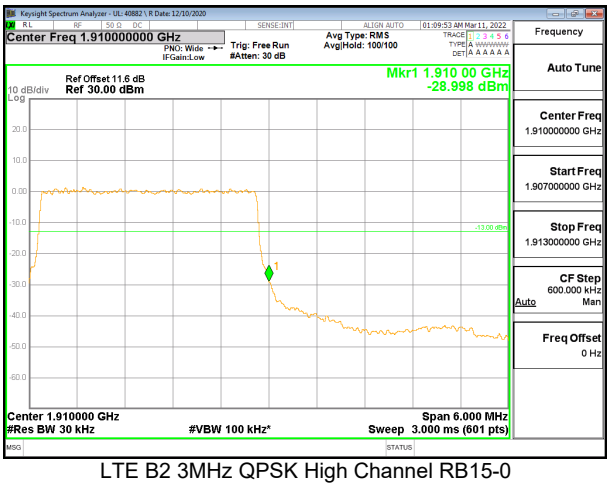
LTE B2 1.4MHz QPSK Low Channel RB6-0



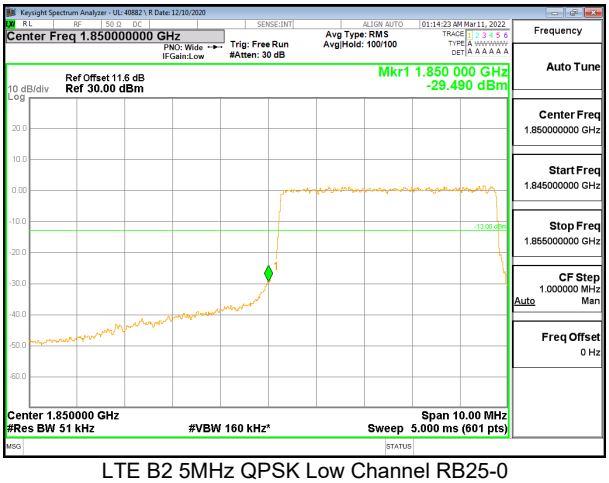
LTE B2 1.4MHz QPSK High Channel RB6-0



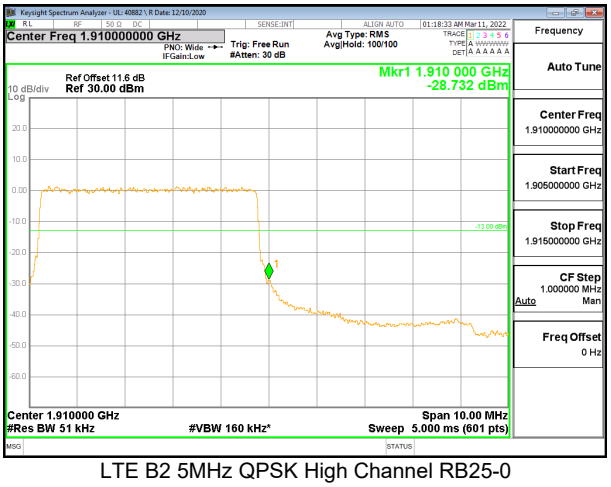
LTE B2 3MHz QPSK Low Channel RB15-0



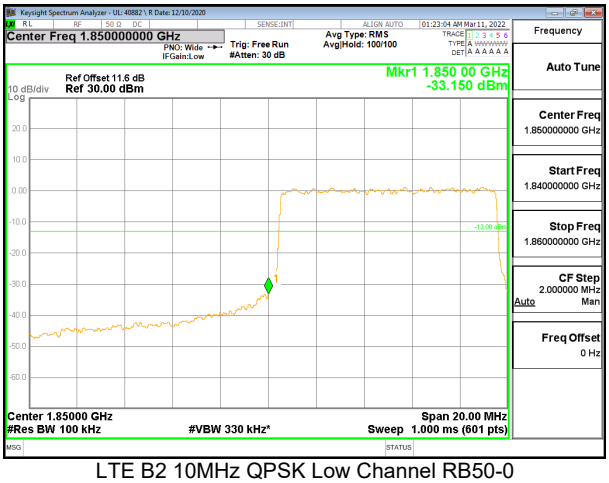
LTE B2 3MHz QPSK High Channel RB15-0



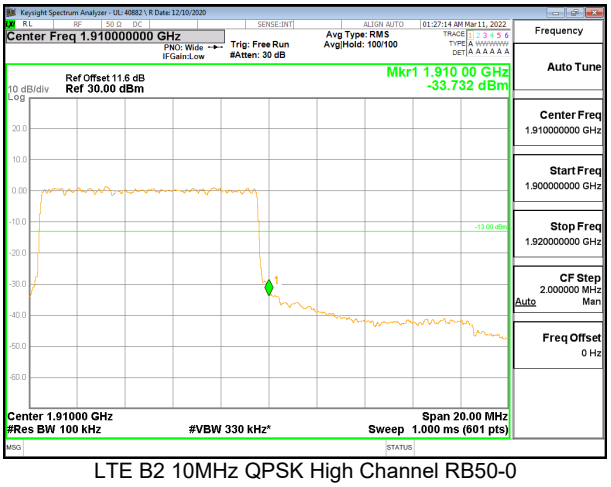
LTE B2 5MHz QPSK Low Channel RB25-0



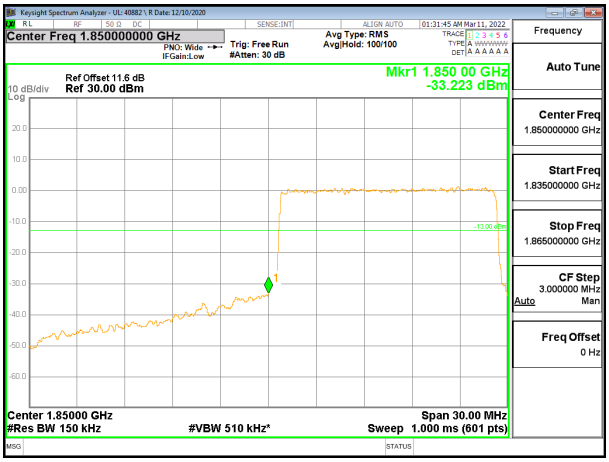
LTE B2 5MHz QPSK High Channel RB25-0



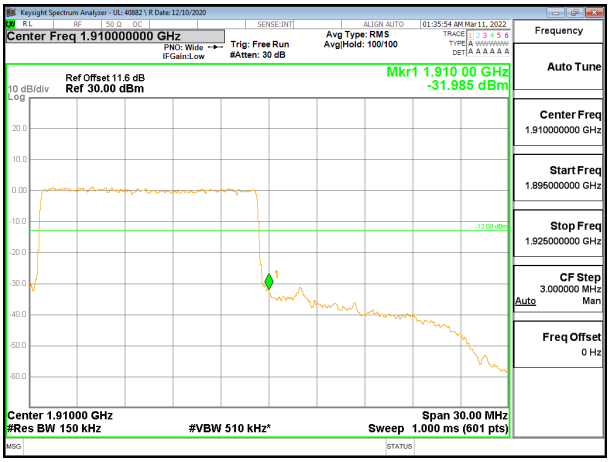
LTE B2 10MHz QPSK Low Channel RB50-0



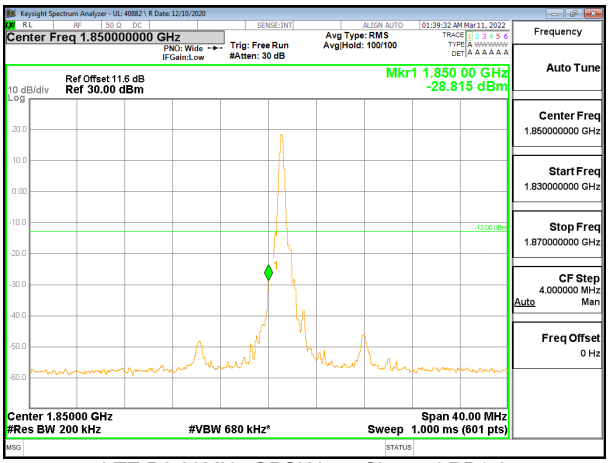
LTE B2 10MHz QPSK High Channel RB50-0



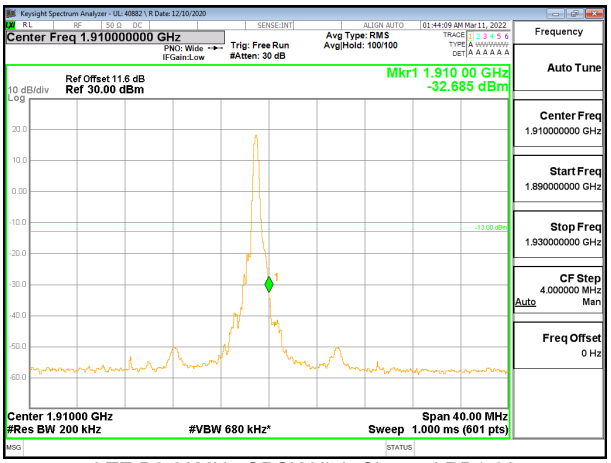
LTE B2 15MHz QPSK Low Channel RB75-0



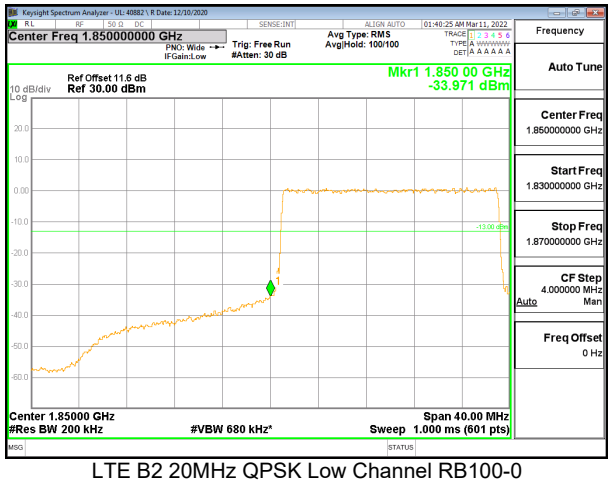
LTE B2 15MHz QPSK High Channel RB75-0



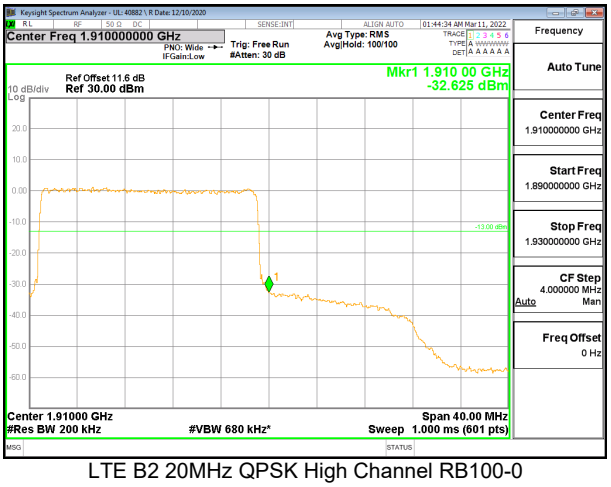
LTE B2 20MHz QPSK Low Channel RB1-0



LTE B2 20MHz QPSK High Channel RB1-99



LTE B2 20MHz QPSK Low Channel RB100-0



LTE B2 20MHz QPSK High Channel RB100-0

10.3. OUT OF BAND EMISSIONS

RULE PART(S)
FCC:§24.238 (a)

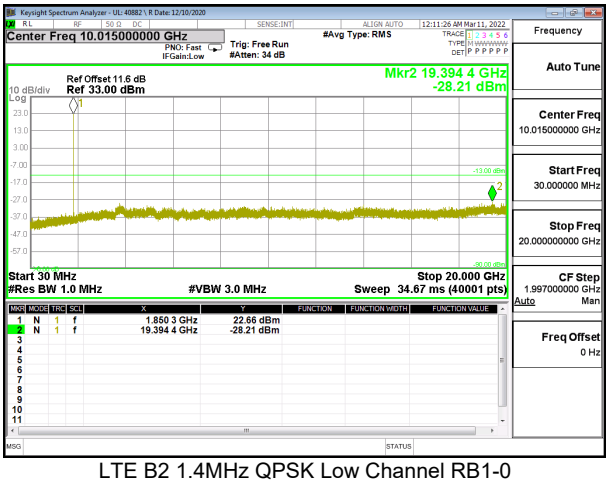
LIMITS
FCC: §24.238,
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

TEST PROCEDURE
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

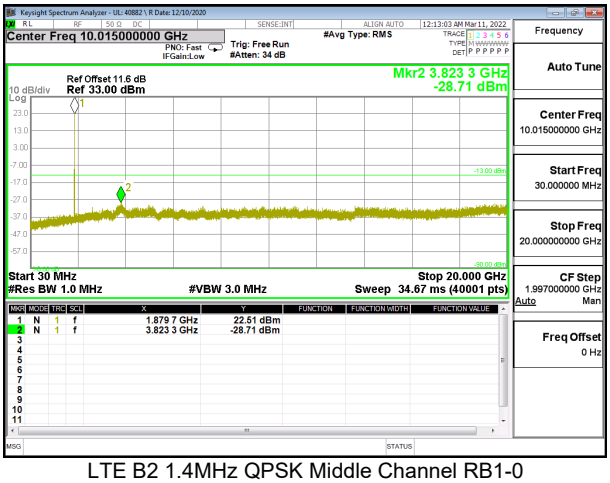
For each out of band emissions measurement:
- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

RESULTS

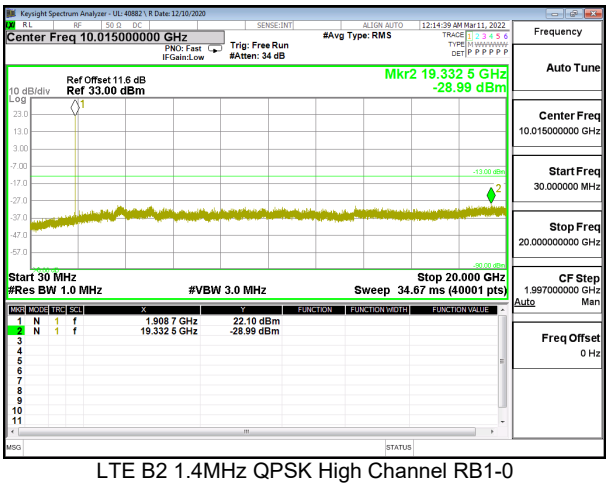
LTE BAND 2



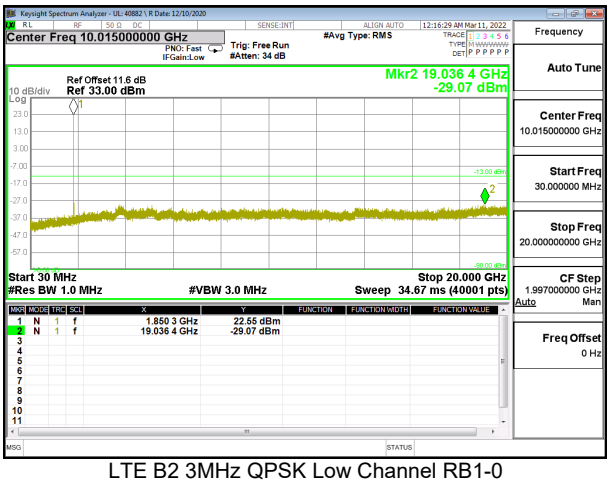
LTE B2 1.4MHz QPSK Low Channel RB1-0



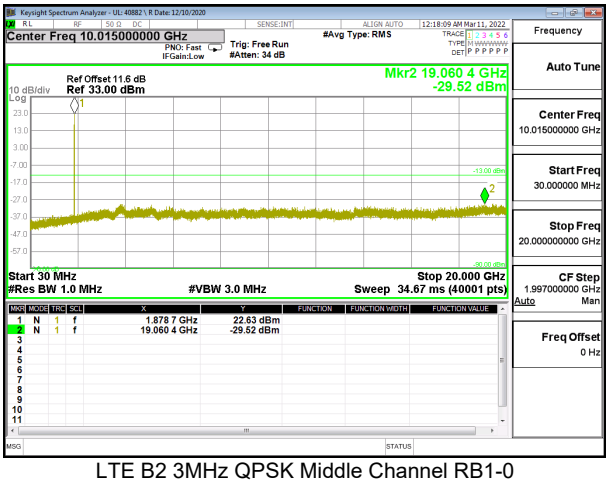
LTE B2 1.4MHz QPSK Middle Channel RB1-0



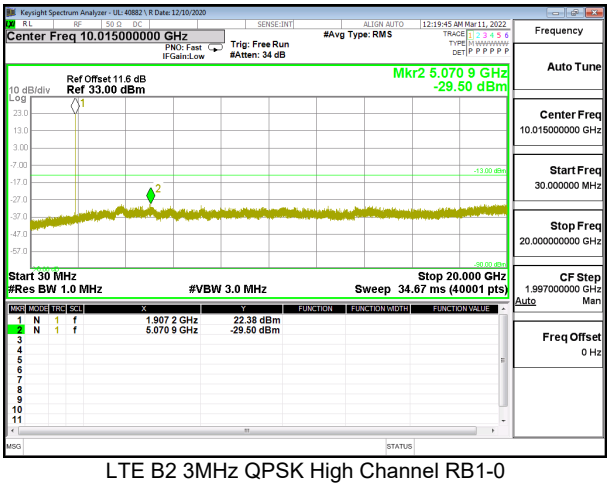
LTE B2 1.4MHz QPSK High Channel RB1-0



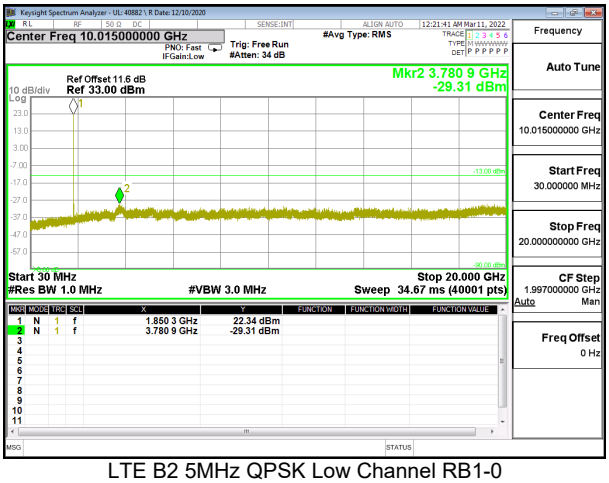
LTE B2 3MHz QPSK Low Channel RB1-0



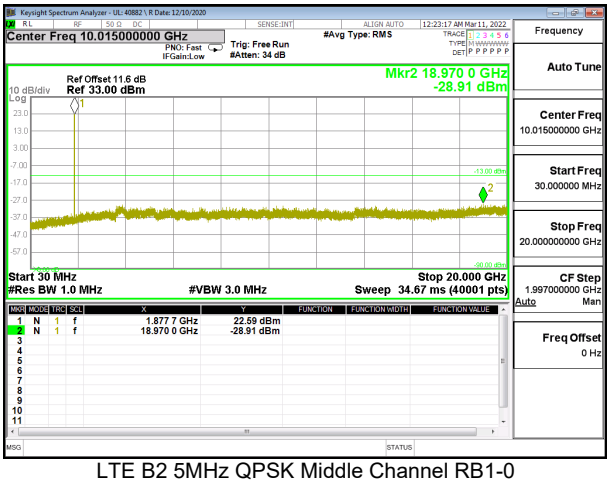
LTE B2 3MHz QPSK Middle Channel RB1-0



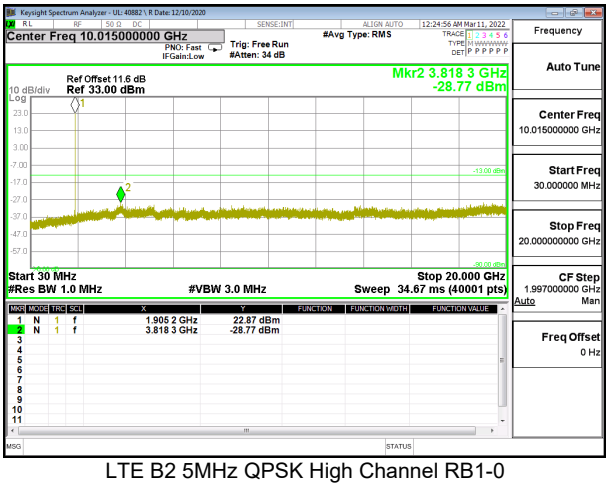
LTE B2 3MHz QPSK High Channel RB1-0



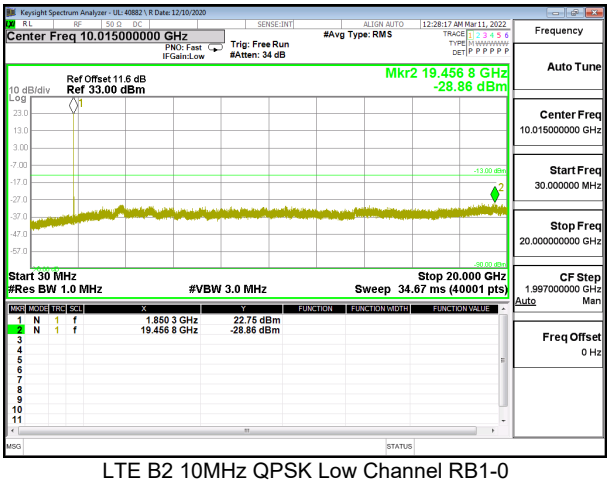
LTE B2 5MHz QPSK Low Channel RB1-0



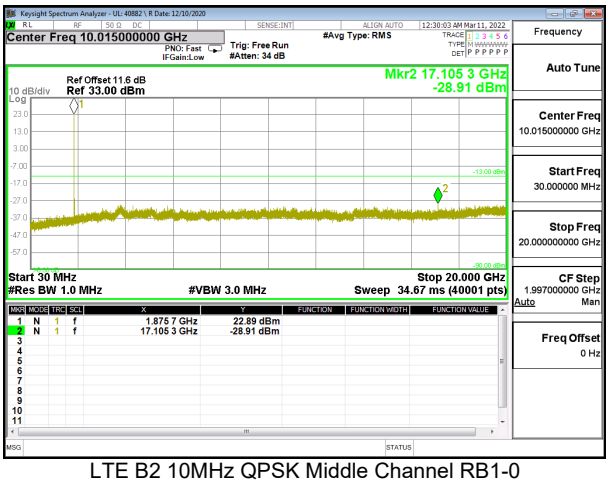
LTE B2 5MHz QPSK Middle Channel RB1-0



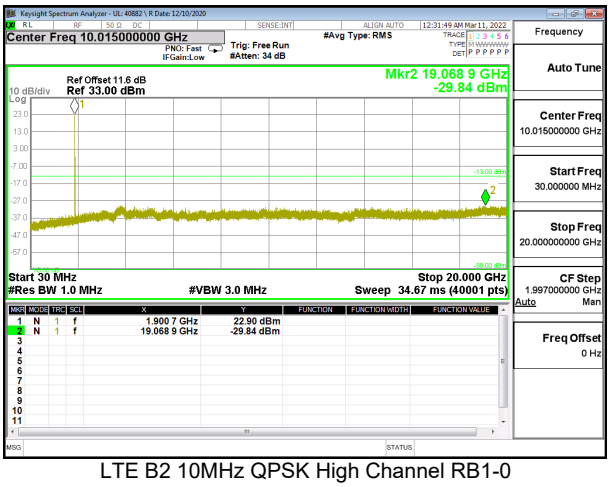
LTE B2 5MHz QPSK High Channel RB1-0



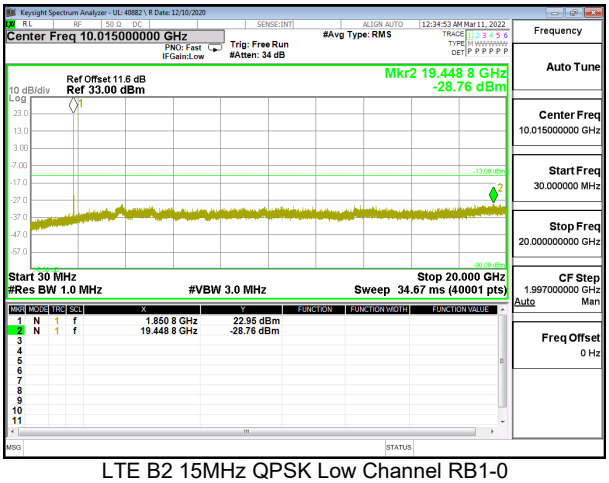
LTE B2 10MHz QPSK Low Channel RB1-0



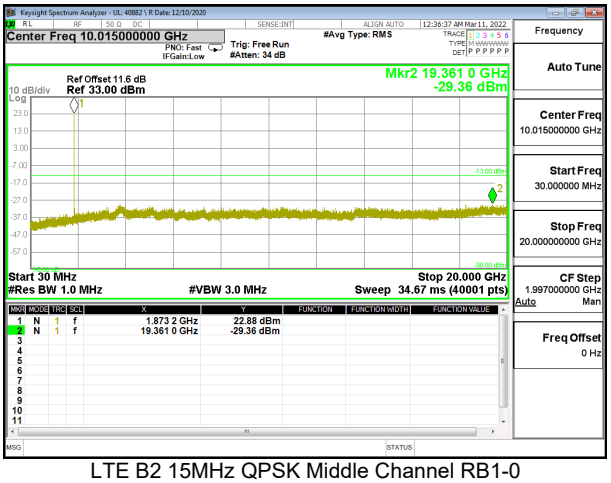
LTE B2 10MHz QPSK Middle Channel RB1-0



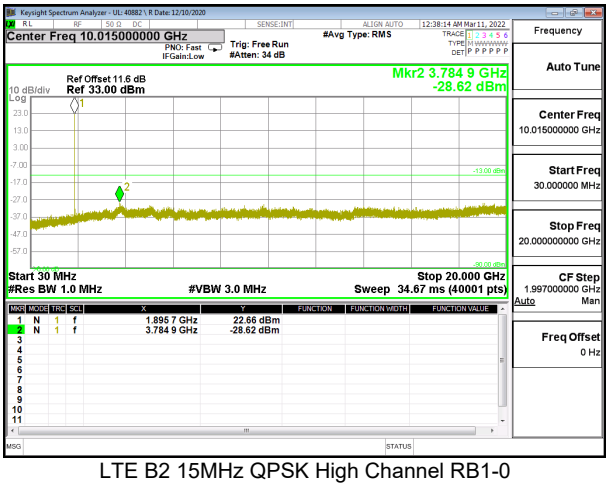
LTE B2 10MHz QPSK High Channel RB1-0



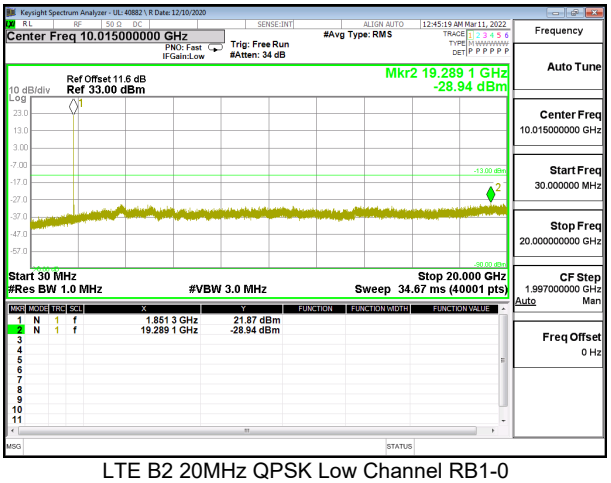
LTE B2 15MHz QPSK Low Channel RB1-0



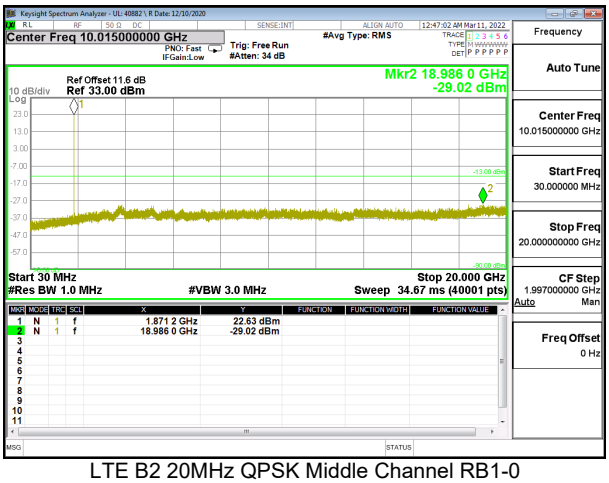
LTE B2 15MHz QPSK Middle Channel RB1-0



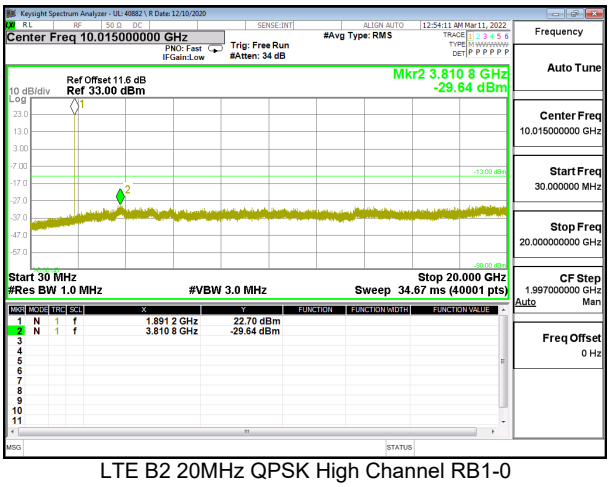
LTE B2 15MHz QPSK High Channel RB1-0



LTE B2 20MHz QPSK Low Channel RB1-0



LTE B2 20MHz QPSK Middle Channel RB1-0



LTE B2 20MHz QPSK High Channel RB1-0

10.4. FREQUENCY STABILITY

RULE PART(S)
FCC: §24.235

LIMITS
FCC §24.235
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE
Use CMW 500 with Frequency Error measurement capability.

(i) Temp. = −30°C to +50°C
(ii) Voltage = (85% - 115%)
Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.
End Voltage, 3.2VDC.

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

RESULTS

LTE BAND 2

Test Engineer ID:	27465/40882	Test Date:	3/15/2022

QPSK (20MHz)

Limit		1850	1910	Delta (Hz) LOW	Delta (Hz) HIGH
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.0001	1909.9999		
Extreme (50C)		1850.0001	1909.9999	1.0	1.0
Extreme (40C)		1850.0001	1909.9999	1.5	-0.7
Extreme (30C)		1850.0001	1909.9999	-0.3	-3.4
Extreme (10C)		1850.0001	1909.9999	1.9	-1.6
Extreme (0C)		1850.0001	1909.9999	0.2	-0.2
Extreme (-10C)		1850.0001	1909.9999	-1.7	2.1
Extreme (-20C)		1850.0001	1909.9999	-2.2	-9.3
Extreme (-30C)		1850.0001	1909.9999	0.9	-0.1
20C	End Point	1850.0001	1909.9999	-2.0	3.2

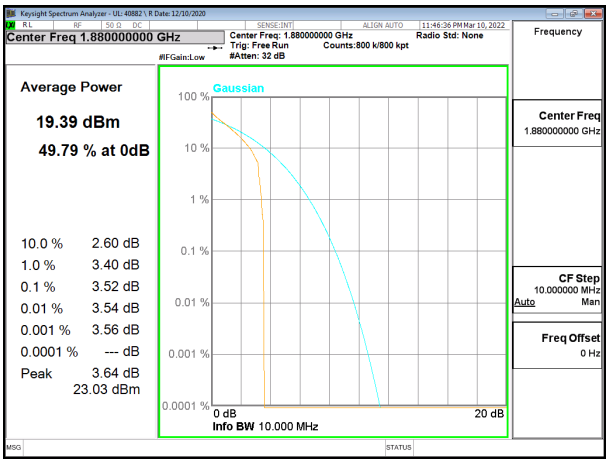
10.5. PEAK TO AVERAGE RATIO

LIMITS

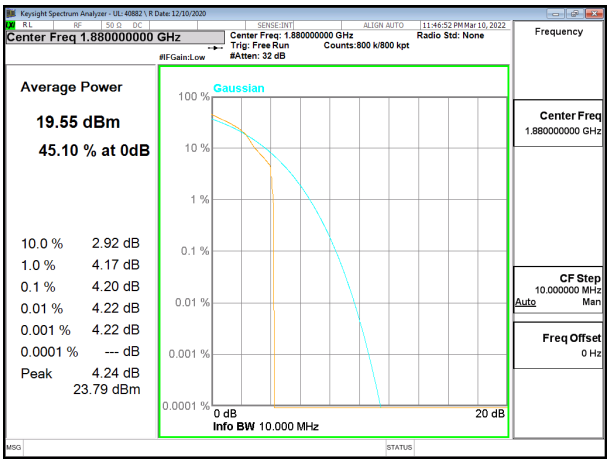
In addition, the peak to average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

RESULT

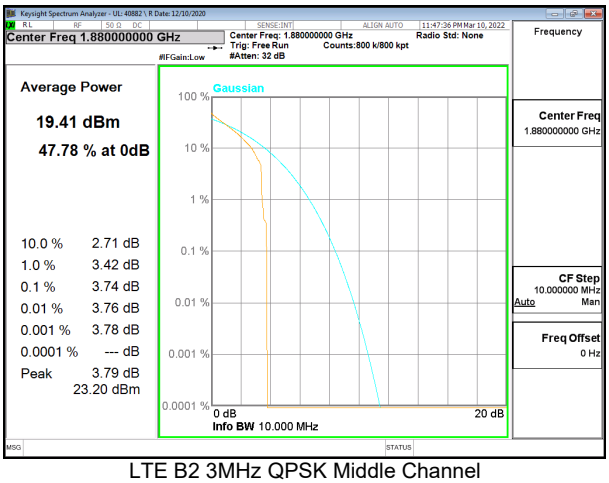
LTE BAND 2



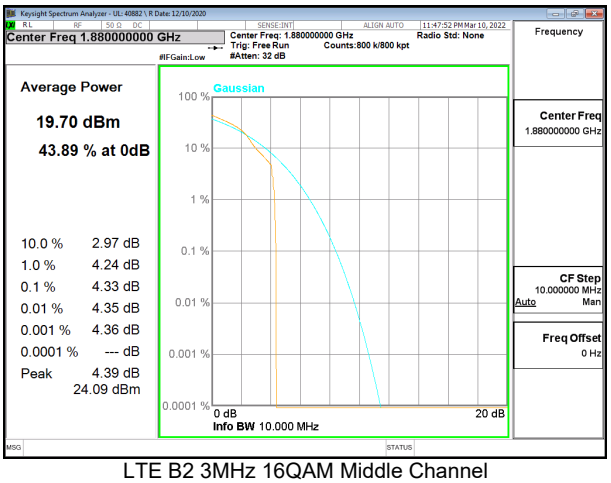
LTE B2 1.4MHz QPSK Middle Channel



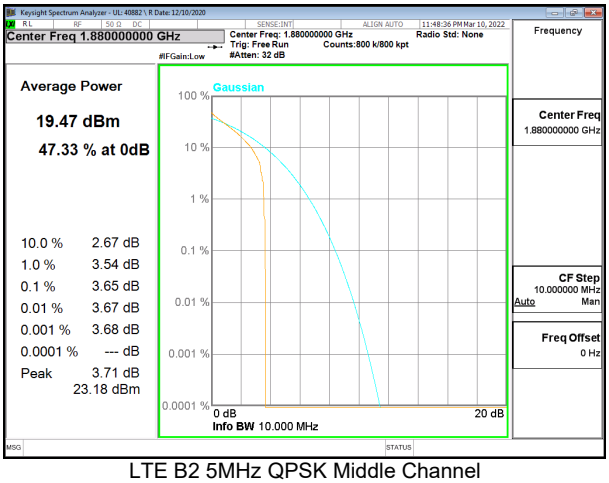
LTE B2 1.4MHz 16QAM Middle Channel



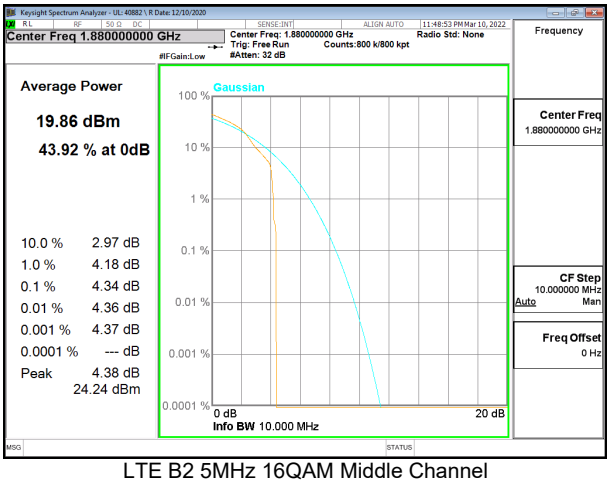
LTE B2 3MHz QPSK Middle Channel



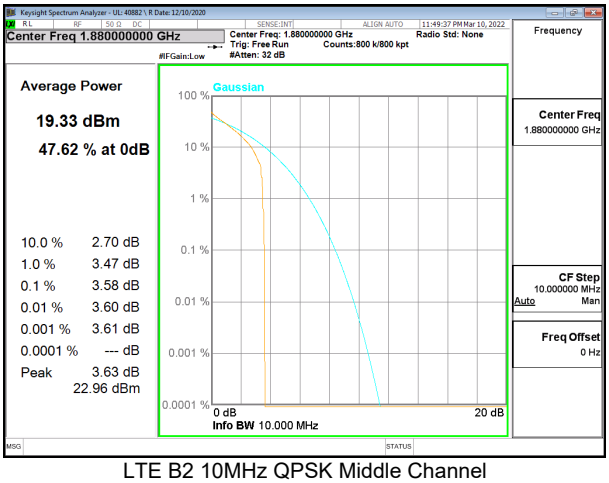
LTE B2 3MHz 16QAM Middle Channel



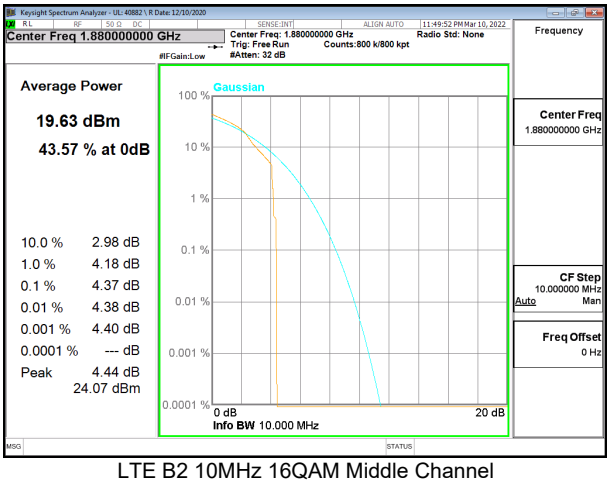
LTE B2 5MHz QPSK Middle Channel



LTE B2 5MHz 16QAM Middle Channel



LTE B2 10MHz QPSK Middle Channel



LTE B2 10MHz 16QAM Middle Channel

LTE Band and BW:	QPSK Mid Channel:	16QAM Mid Channel:
Band 2 15MHz	24.32dBm – 19.6dBm = 4.72dB	24.34dBm – 19.6dBm = 4.74dB
Band 2 20MHz	24.50dBm – 19.6dBm = 4.90dB	25.59dBm – 20.0dBm = 5.59dB

Note: Due to limitations of the test equipment PAR testing of frequencies with BWs greater than 10MHz were done with a Wideband power meter. Testing was performed in accordance with ANCI:C63.26-2015, where PAPR (dB) = P_{pk} (Meas. Peak Power) – P_{avg} (Meas. Avg Power).

11. RADIATED TEST RESULTS

11.1. FIELD STRENGTH OF SPURIOUS RADIATION ABOVE 1GHz

RULE PART(S)
FCC: §24.238, §27.53

LIMITS
FCC: §24.238(a), §27.53 (h),
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.

TEST PROCEDURE
KDB 971168 D01 v02r02/D02 v01

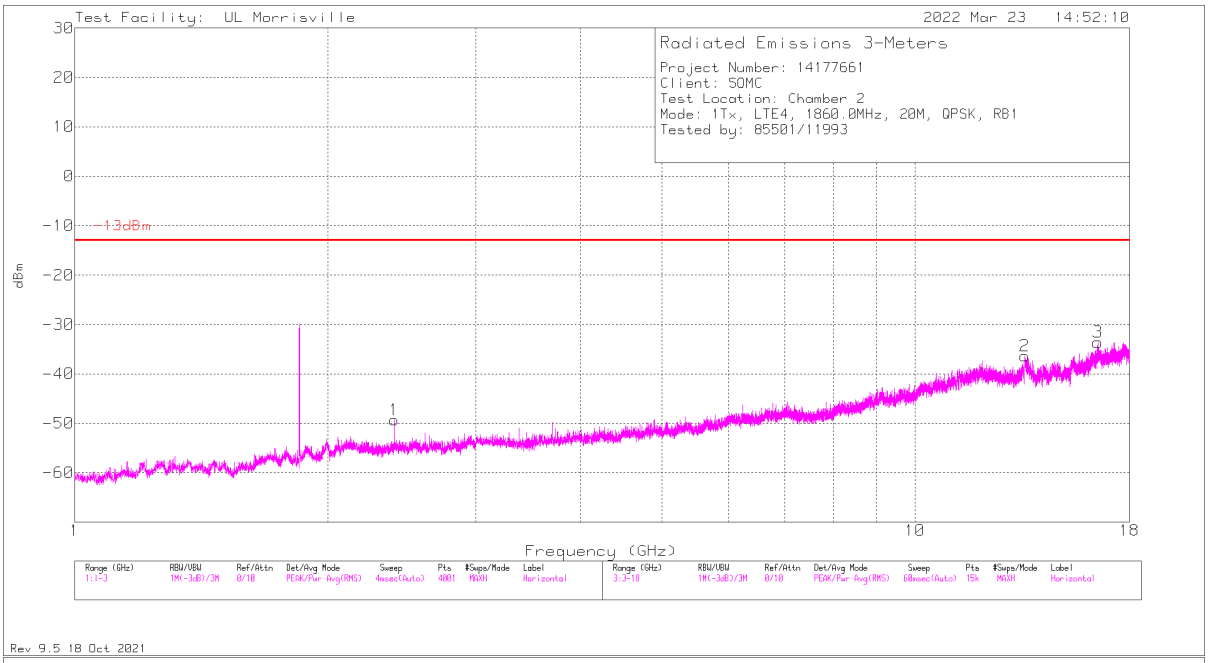
RESULTS

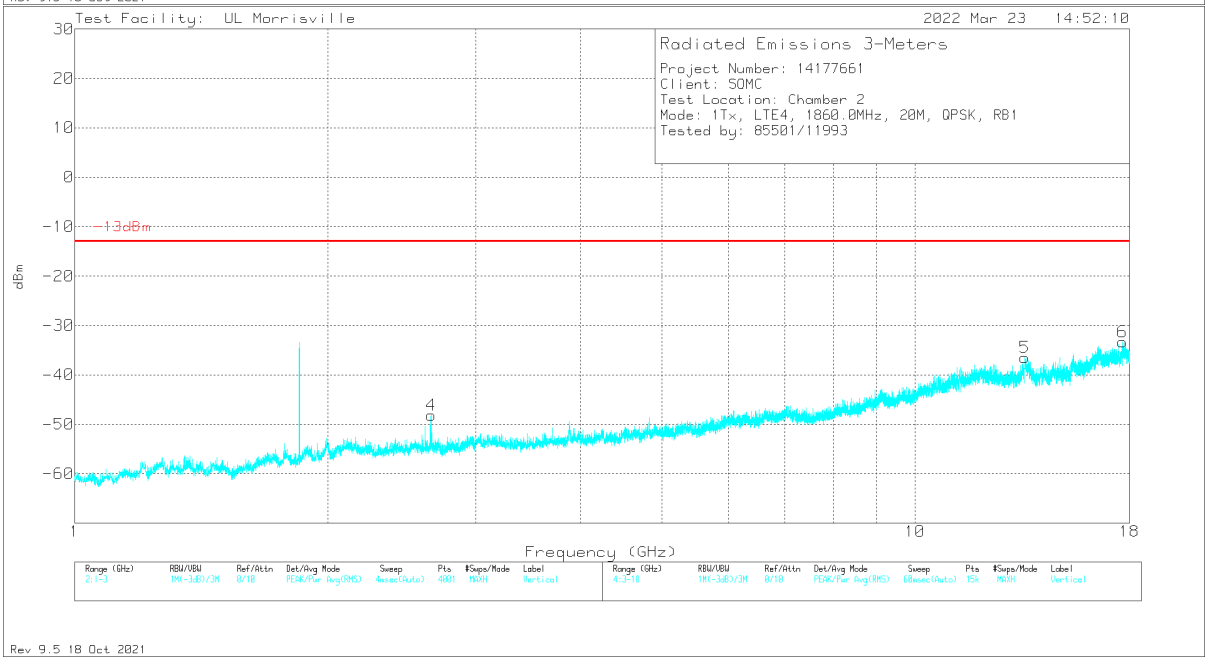
LTE BAND 2

LIMITS

FCC: §24.238(a)
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.

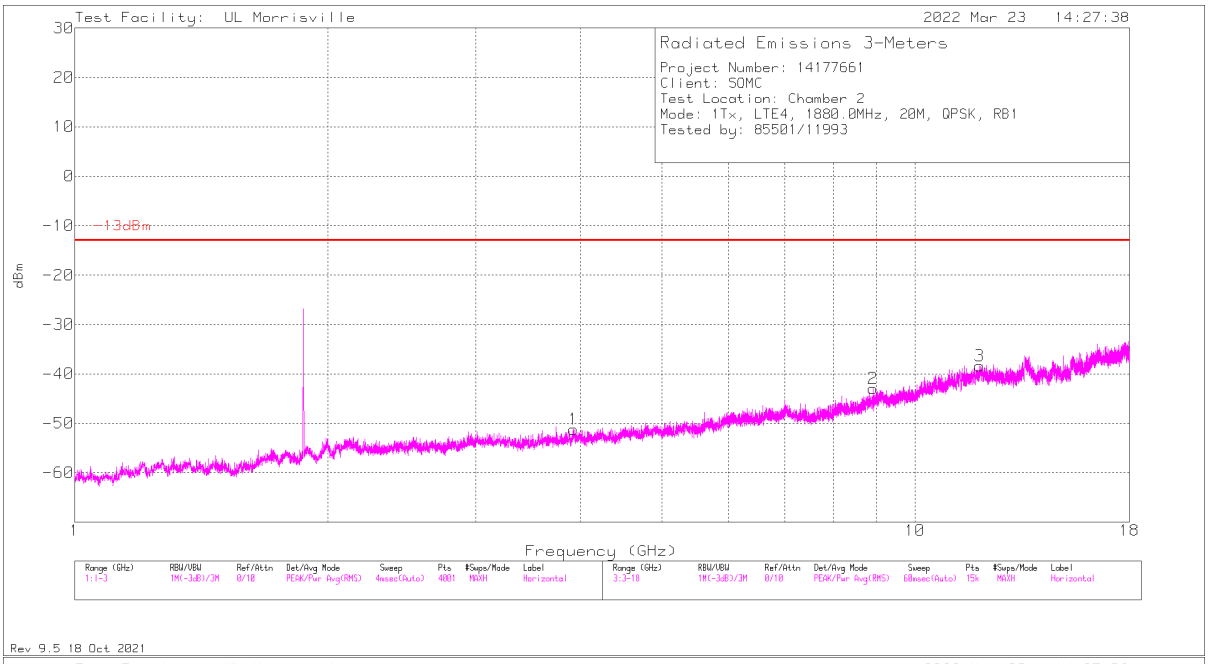
QPSK LTE BAND 2 (20.0MHZ BANDWIDTH)

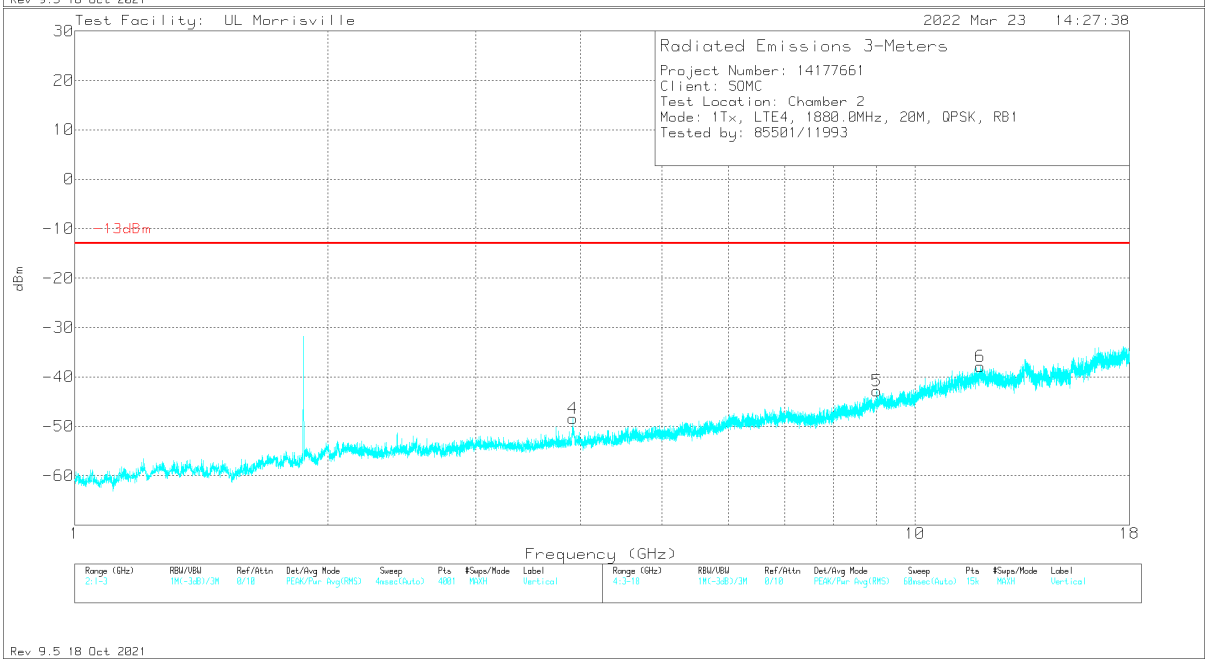




Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.402	-59.88	Pk	32.4	-34.2	11.8	.6	-49.28	-13	-36.28	0-360	199	H
4	2.6545	-59.27	Pk	32.6	-33.8	11.8	.5	-48.17	-13	-35.17	0-360	101	V
2	13.516	-63.83	Pk	38.9	-23.2	11.8	0	-36.33	-13	-23.33	0-360	300	H
5	13.52	-63.73	Pk	38.9	-23.5	11.8	0	-36.53	-13	-23.53	0-360	101	V
3	16.504	-65.52	Pk	41.7	-21.6	11.8	0	-33.62	-13	-20.62	0-360	300	H
6	17.652	-64.76	Pk	41.5	-21.8	11.8	0	-33.26	-13	-20.26	0-360	200	V

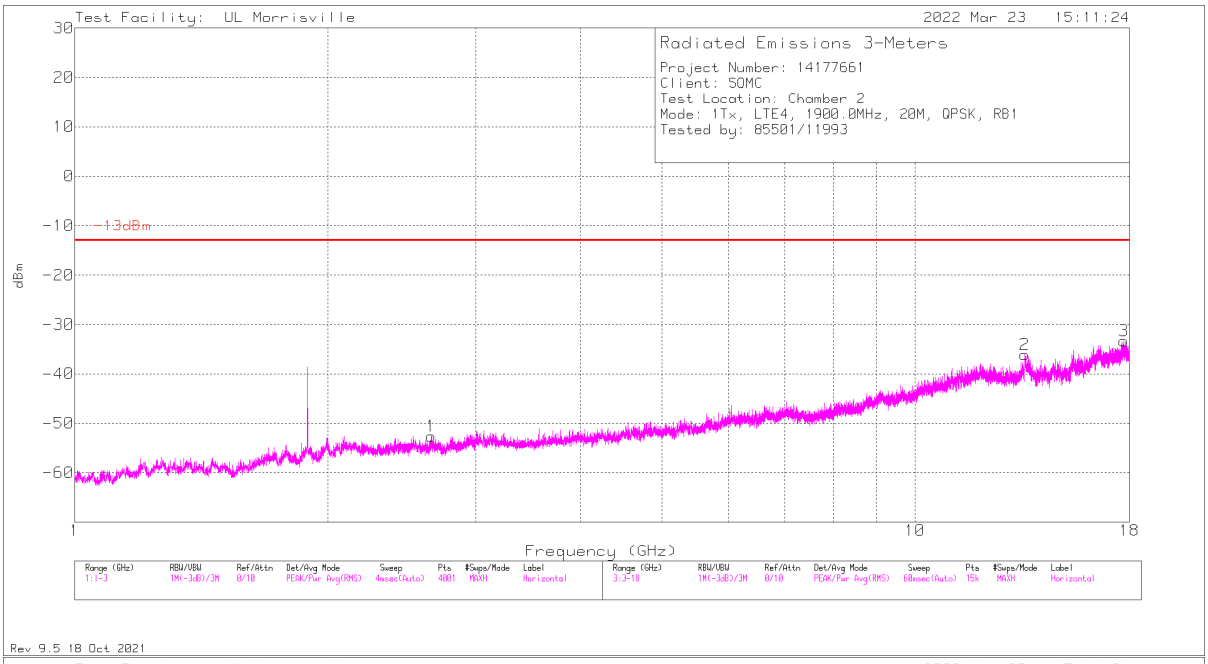
Pk - Peak detector

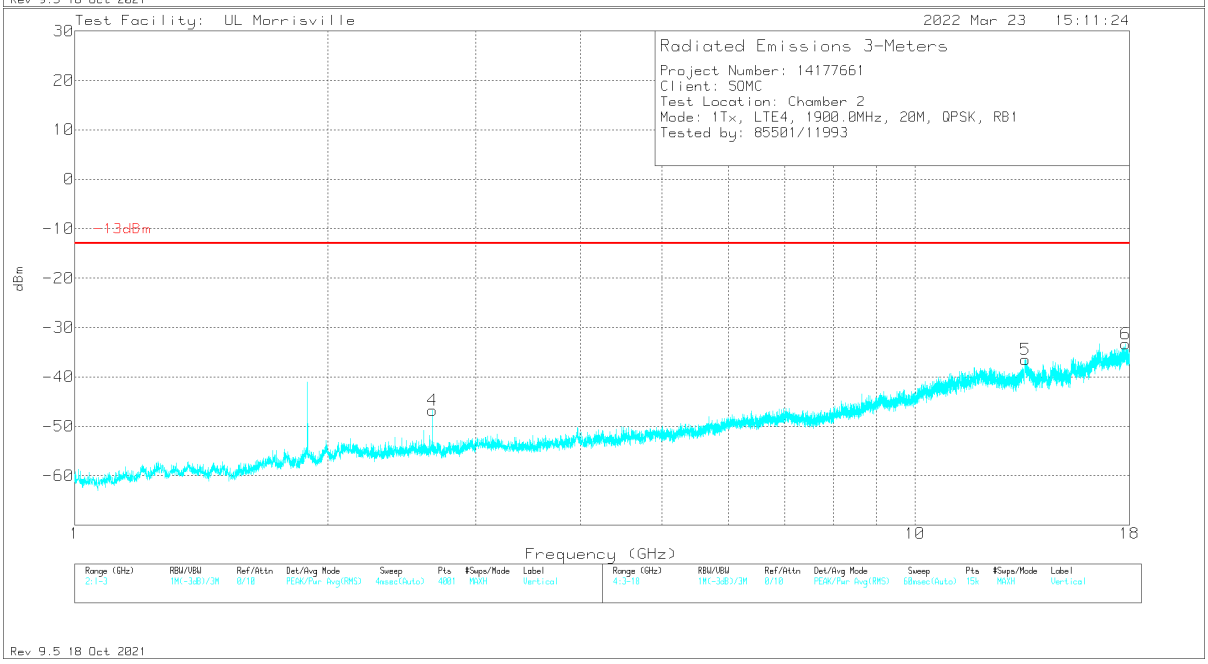




Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	3.914	-62.24	Pk	33.5	-31.5	11.8	0	-48.44	-13	-35.44	0-360	200	V
1	3.921	-65.08	Pk	33.5	-31.4	11.8	0	-51.18	-13	-38.18	0-360	200	H
2	8.91	-64.34	Pk	36.2	-26.6	11.8	0	-42.94	-13	-29.94	0-360	299	H
5	9.013	-64.84	Pk	36.2	-26	11.8	0	-42.84	-13	-29.84	0-360	200	V
3	11.944	-66.34	Pk	38.7	-22.6	11.8	0	-38.44	-13	-25.44	0-360	299	H
6	11.965	-65.71	Pk	38.7	-22.7	11.8	0	-37.91	-13	-24.91	0-360	299	V

Pk - Peak detector

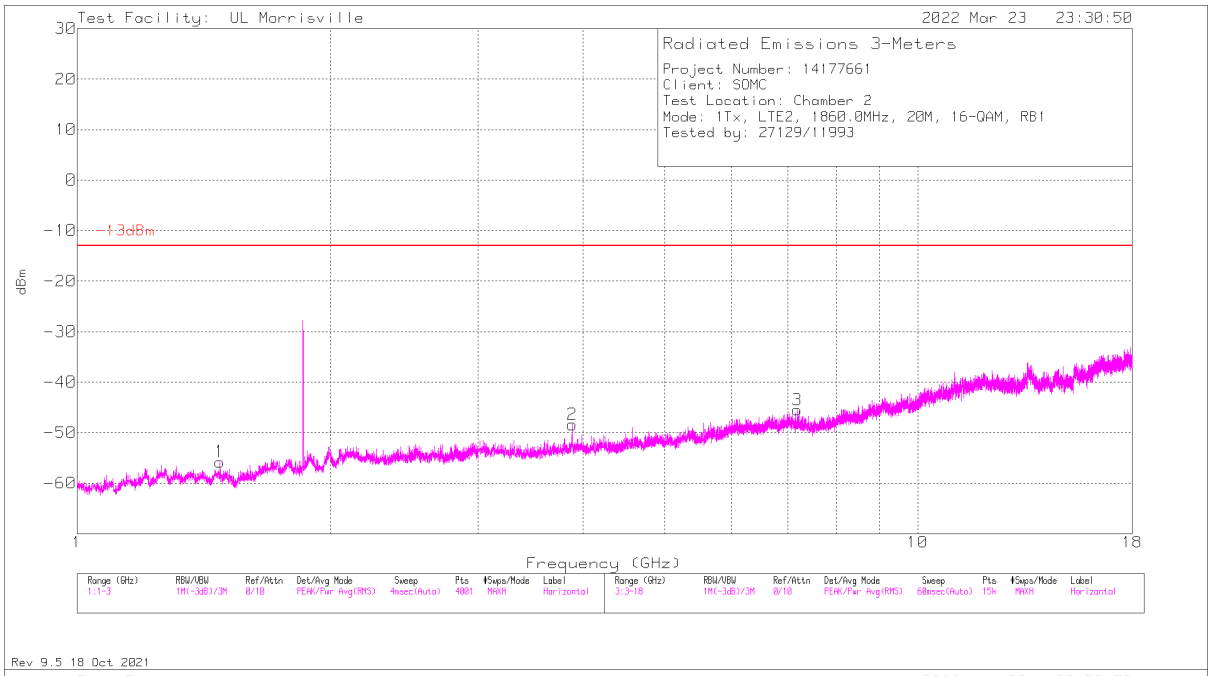


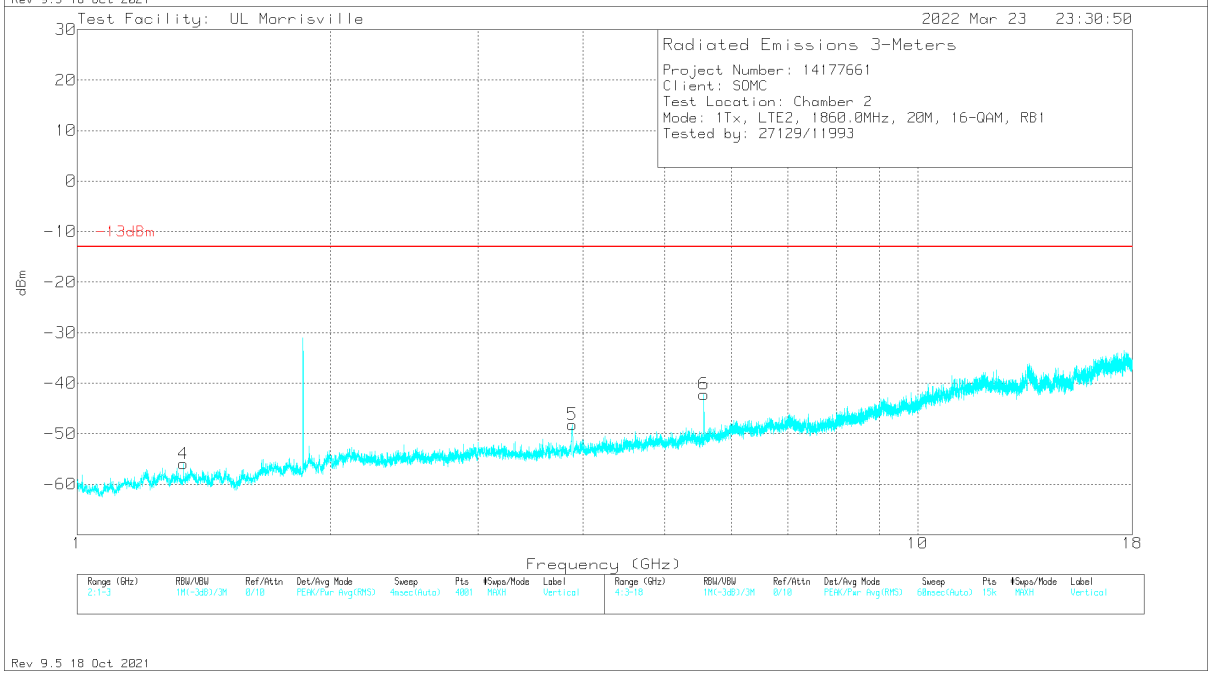


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.658	-63.68	Pk	32.6	-33.8	11.8	.5	-52.58	-13	-39.58	0-360	299	H
4	2.6665	-57.38	Pk	32.4	-34.1	11.8	.5	-46.78	-13	-33.78	0-360	101	V
2	13.502	-63.31	Pk	39	-23.6	11.8	0	-36.11	-13	-23.11	0-360	300	H
5	13.534	-63.58	Pk	38.9	-23.6	11.8	0	-36.48	-13	-23.48	0-360	300	V
3	17.716	-64.82	Pk	41.6	-21.9	11.8	0	-33.32	-13	-20.32	0-360	300	H
6	17.819	-65.75	Pk	41.7	-21	11.8	0	-33.25	-13	-20.25	0-360	200	V

Pk - Peak detector

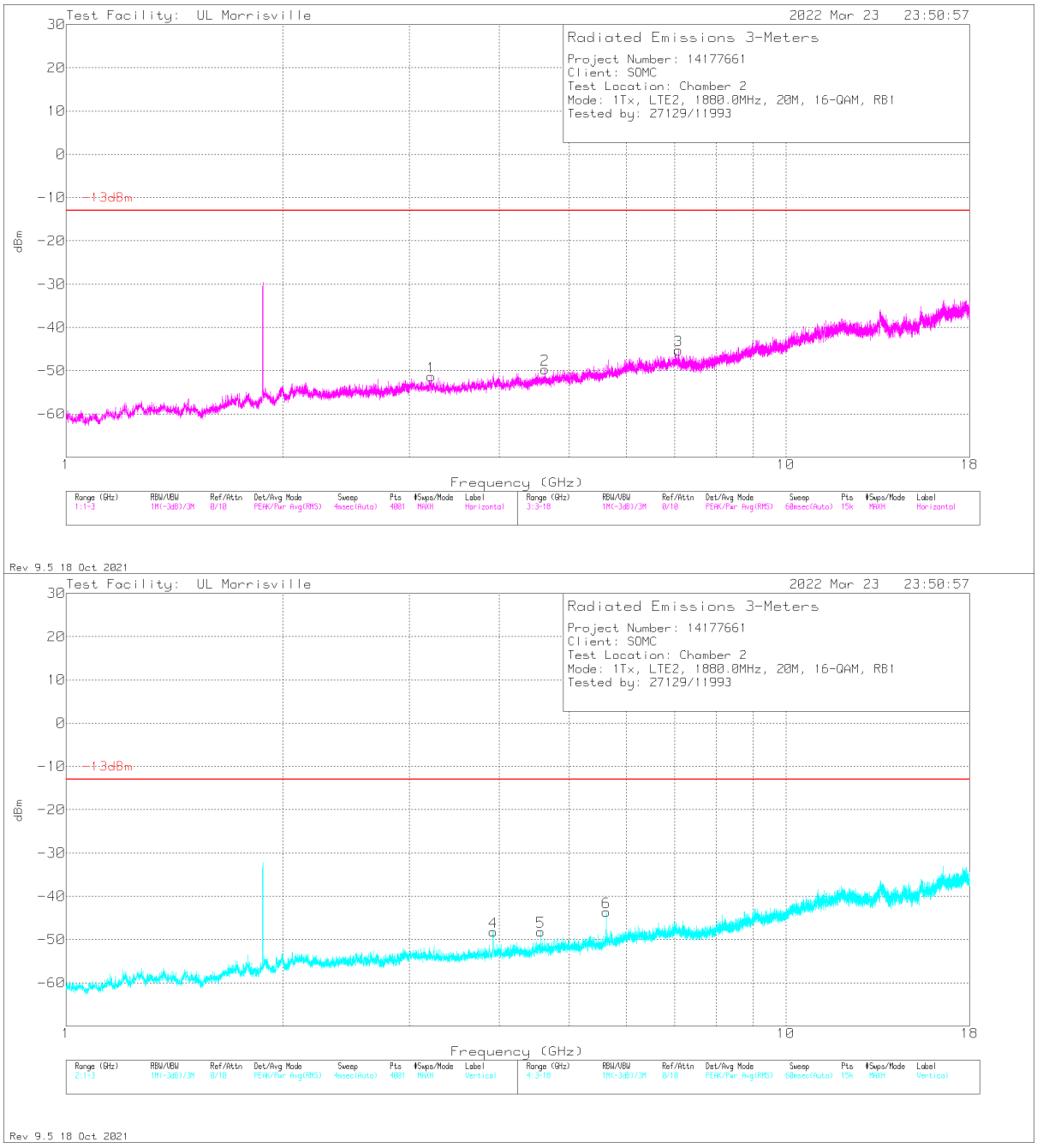
16QAM LTE BAND 2 (20.0MHZ BANDWIDTH)





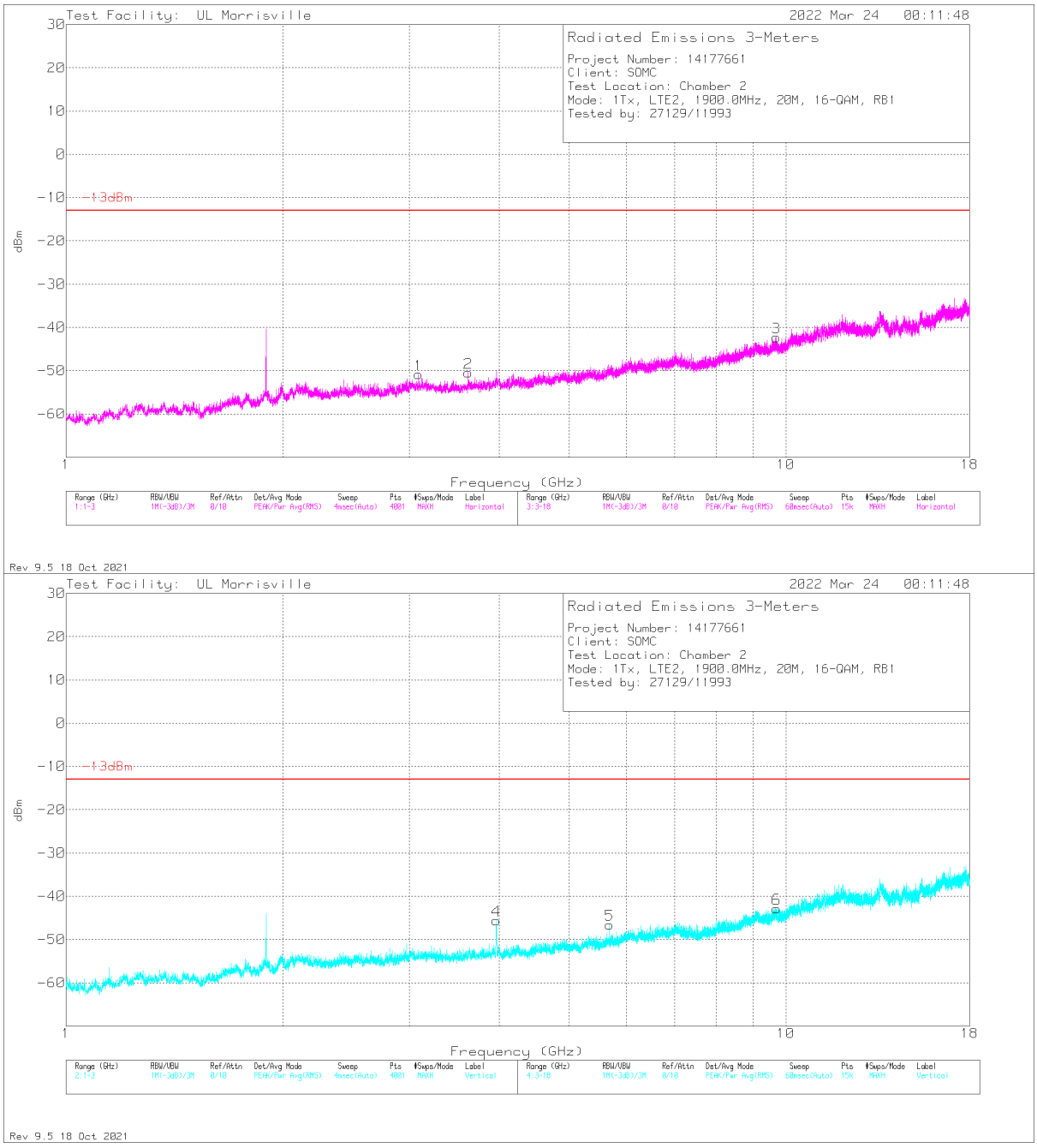
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	1.3375	-62.54	Pk	29	-34.7	11.8	.5	-55.94	-13	-42.94	0-360	101	V
1	1.478	-62.19	Pk	28.4	-34.7	11.8	.9	-55.79	-13	-42.79	0-360	101	H
5	3.88	-62.39	Pk	33.5	-31.1	11.8	0	-48.19	-13	-35.19	0-360	201	V
2	3.882	-62.48	Pk	33.5	-31.2	11.8	0	-48.38	-13	-35.38	0-360	101	H
6	5.567	-58.99	Pk	34.6	-29.6	11.8	0	-42.19	-13	-29.19	0-360	101	V
3	7.192	-66.11	Pk	35.8	-27	11.8	0	-45.51	-13	-32.51	0-360	200	H

Pk - Peak detector



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.215	-63.96	Pk	33.3	-32.5	11.8	0	-51.36	-13	-38.36	0-360	100	H
4	3.921	-62.15	Pk	33.5	-31.4	11.8	0	-48.25	-13	-35.25	0-360	299	V
5	4.565	-63.4	Pk	34	-30.6	11.8	0	-48.2	-13	-35.2	0-360	299	V
2	4.629	-64.7	Pk	34.1	-30.9	11.8	0	-49.7	-13	-36.7	0-360	100	H
6	5.627	-61.22	Pk	34.7	-28.9	11.8	0	-43.62	-13	-30.62	0-360	101	V
3	7.092	-65.67	Pk	35.9	-27.3	11.8	0	-45.27	-13	-32.27	0-360	100	H

Pk - Peak detector



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr (dB)	CF (dB)	Filter (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.087	-63.23	Pk	33.3	-32.7	11.8	0	-50.83	-13	-37.83	0-360	300	H
2	3.62	-64.09	Pk	33	-31.2	11.8	0	-50.49	-13	-37.49	0-360	200	H
4	3.96	-59.47	Pk	33.6	-31.5	11.8	0	-45.57	-13	-32.57	0-360	201	V
5	5.686	-64.55	Pk	34.8	-28.6	11.8	0	-46.55	-13	-33.55	0-360	101	V
3	9.696	-66.49	Pk	36.9	-24.5	11.8	0	-42.29	-13	-29.29	0-360	300	H
6	9.709	-66.35	Pk	36.8	-25.1	11.8	0	-42.85	-13	-29.85	0-360	101	V

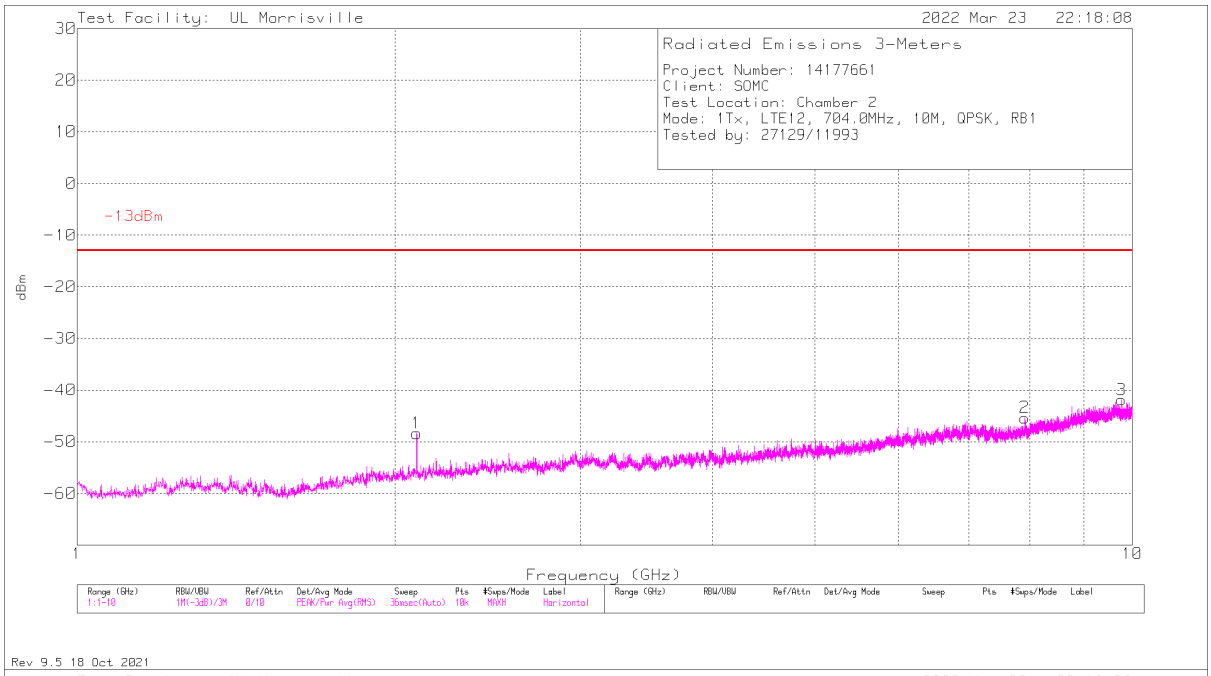
Pk - Peak detector

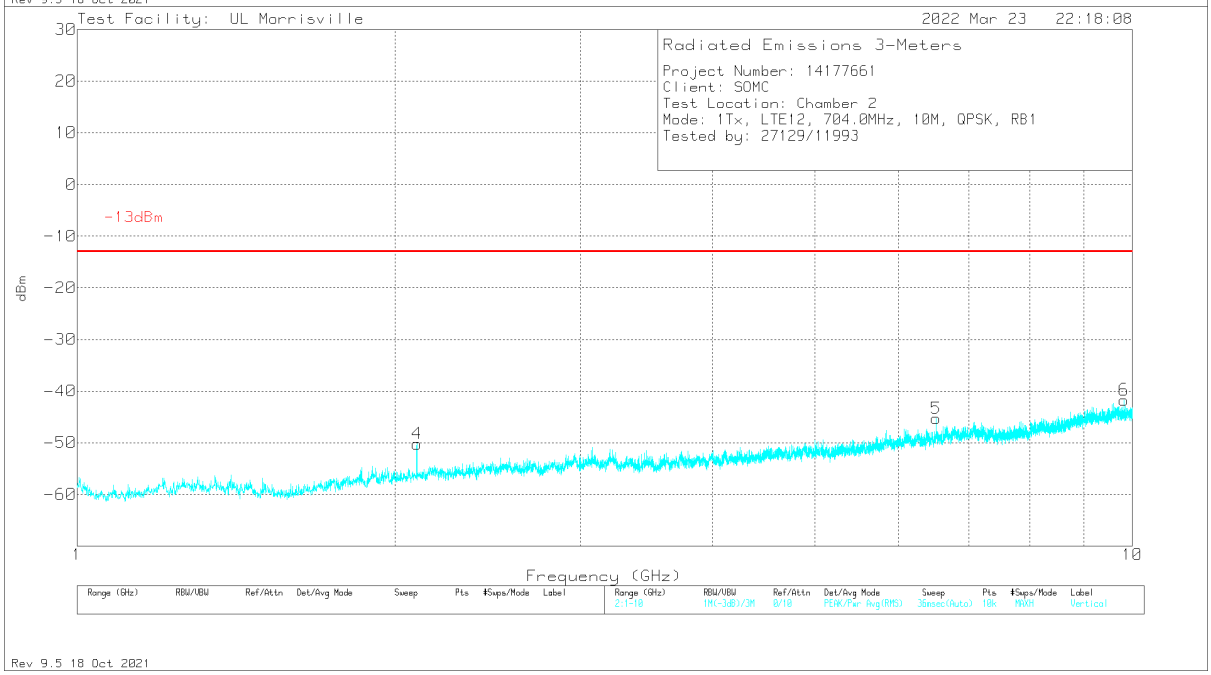
LTE BAND 12

LIMITS

FCC: §27.53 (g)
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.

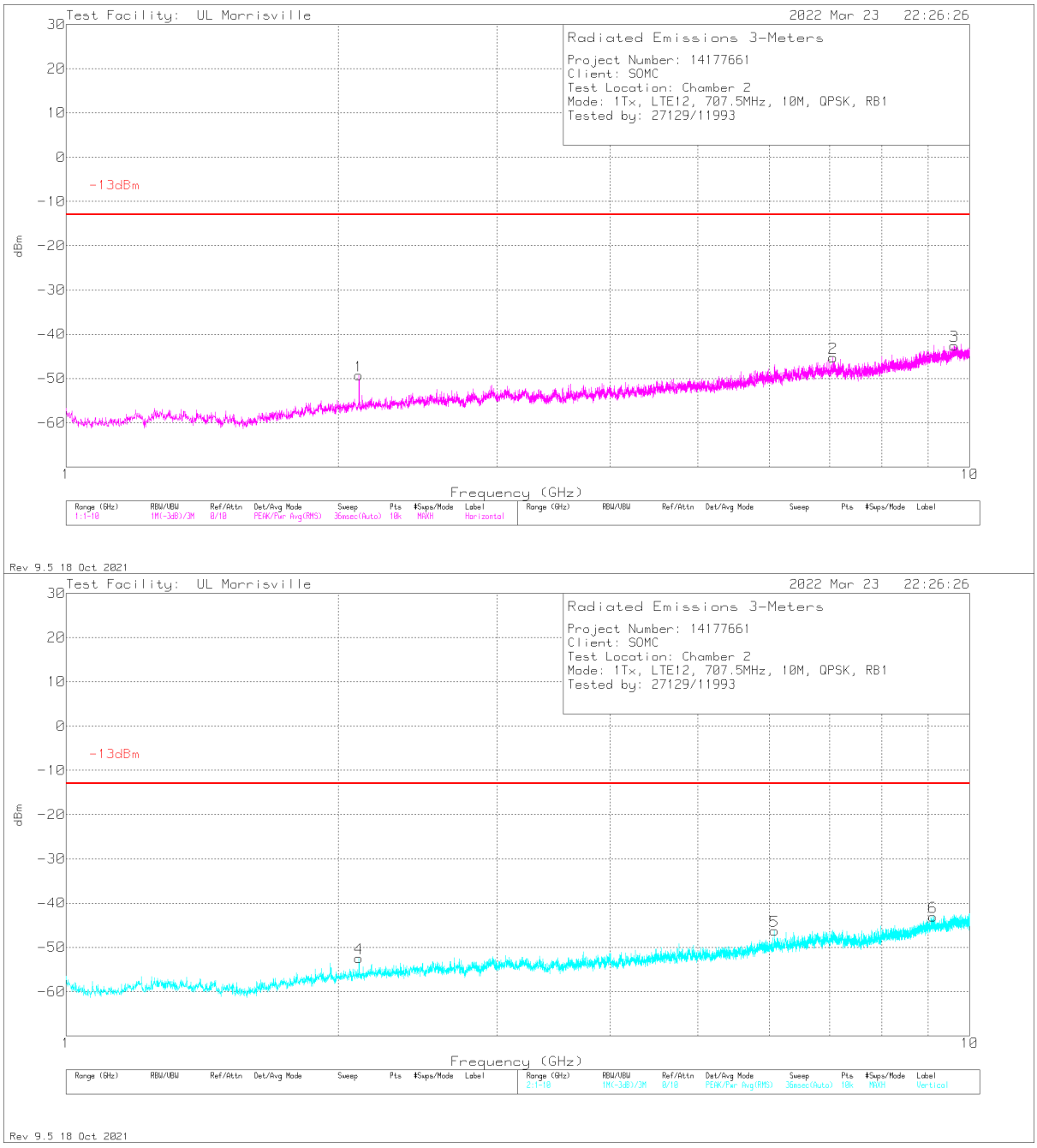
QPSK LTE BAND 12 (10.0MHZ BANDWIDTH)





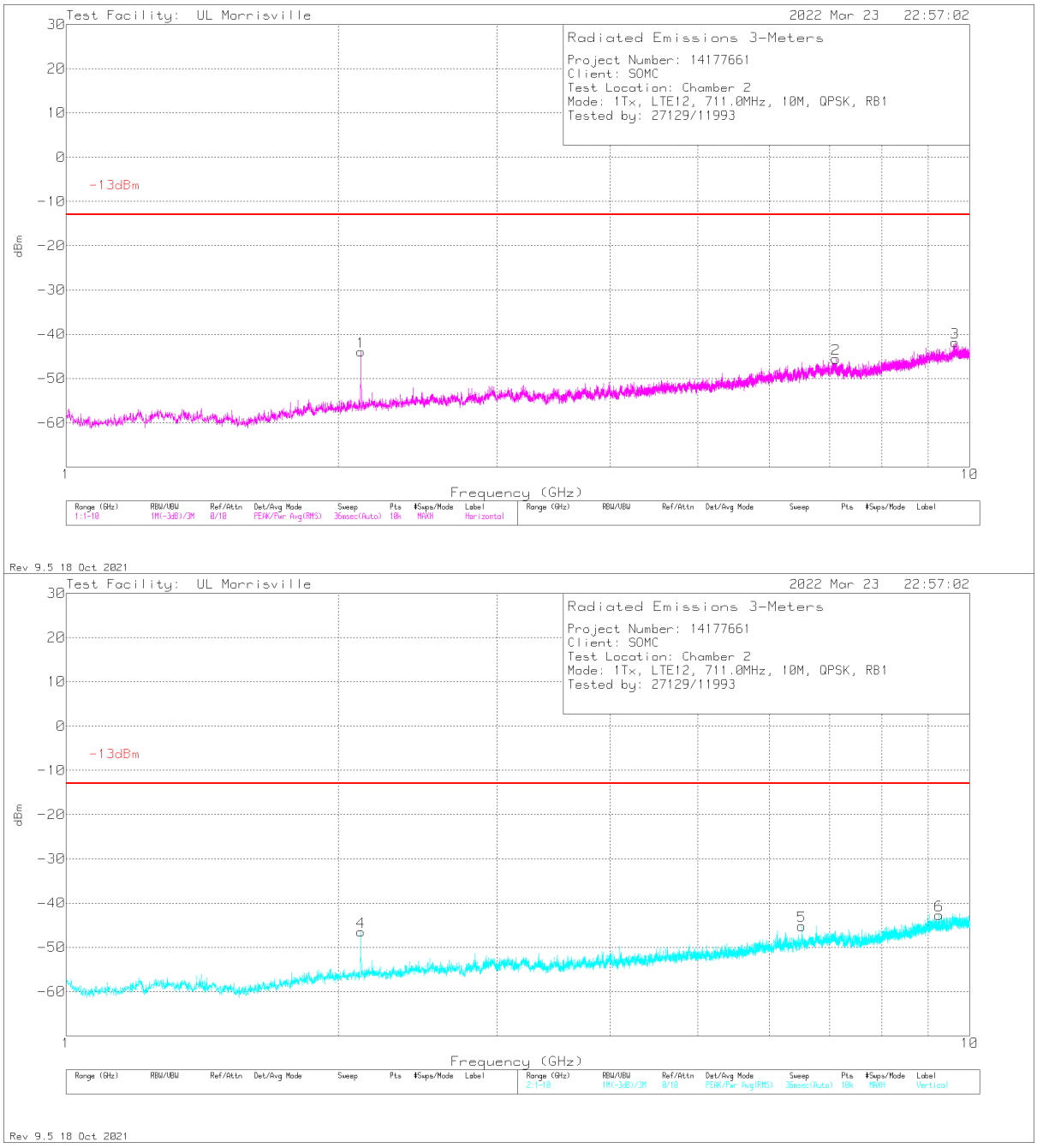
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.098	-57.87	Pk	31.6	-34.2	.3	11.8	-48.37	-13	-35.37	0-360	101	H
4	2.0989	-59.8	Pk	31.7	-34.2	.3	11.8	-50.2	-13	-37.2	0-360	300	V
5	6.5206	-65.12	Pk	35.6	-28.3	.7	11.8	-45.32	-13	-32.32	0-360	101	V
2	7.9111	-66.15	Pk	35.9	-27.4	.5	11.8	-45.35	-13	-32.35	0-360	101	H
3	9.7651	-65.6	Pk	36.9	-25.9	.9	11.8	-41.9	-13	-28.9	0-360	101	H
6	9.82	-65.94	Pk	36.9	-25.1	.6	11.8	-41.74	-13	-28.74	0-360	101	V

Pk - Peak detector



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.1088	-58.81	Pk	31.4	-34.1	.4	11.8	-49.31	-13	-36.31	0-360	200	H
4	2.1088	-61.94	Pk	31.4	-34.1	.4	11.8	-52.44	-13	-39.44	0-360	200	V
5	6.0814	-65.55	Pk	35.4	-28.7	.8	11.8	-46.25	-13	-33.25	0-360	300	V
2	7.0615	-65.56	Pk	35.8	-27.9	.6	11.8	-45.26	-13	-32.26	0-360	101	H
6	9.1063	-65.18	Pk	36.3	-26.6	.6	11.8	-43.08	-13	-30.08	0-360	200	V
3	9.6148	-66.38	Pk	36.9	-25.7	.8	11.8	-42.58	-13	-29.58	0-360	300	H

Pk - Peak detector



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AT0072 (dB/m)	Amp/Cbl (dB)	Filter (dB)	CF (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.1196	-53.05	Pk	31.4	-34.5	.4	11.8	-43.95	-13	-30.95	0-360	101	H
4	2.1196	-55.62	Pk	31.4	-34.5	.4	11.8	-46.52	-13	-33.52	0-360	101	V
5	6.5152	-65.02	Pk	35.6	-28.4	.8	11.8	-45.22	-13	-32.22	0-360	300	V
2	7.111	-65.97	Pk	36	-27.9	.5	11.8	-45.57	-13	-32.57	0-360	101	H
6	9.2521	-65.56	Pk	36.4	-26.1	.7	11.8	-42.76	-13	-29.76	0-360	101	V
3	9.6319	-65.7	Pk	36.9	-25.8	.9	11.8	-41.9	-13	-28.9	0-360	300	H

Pk - Peak detector

11.2. WORST CASE EMISSIONS

RULE PART(S)
FCC: §2.1053, §24.238, §27.53.

LIMITS
FCC: §24.238(a), §27.53 (h)
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.

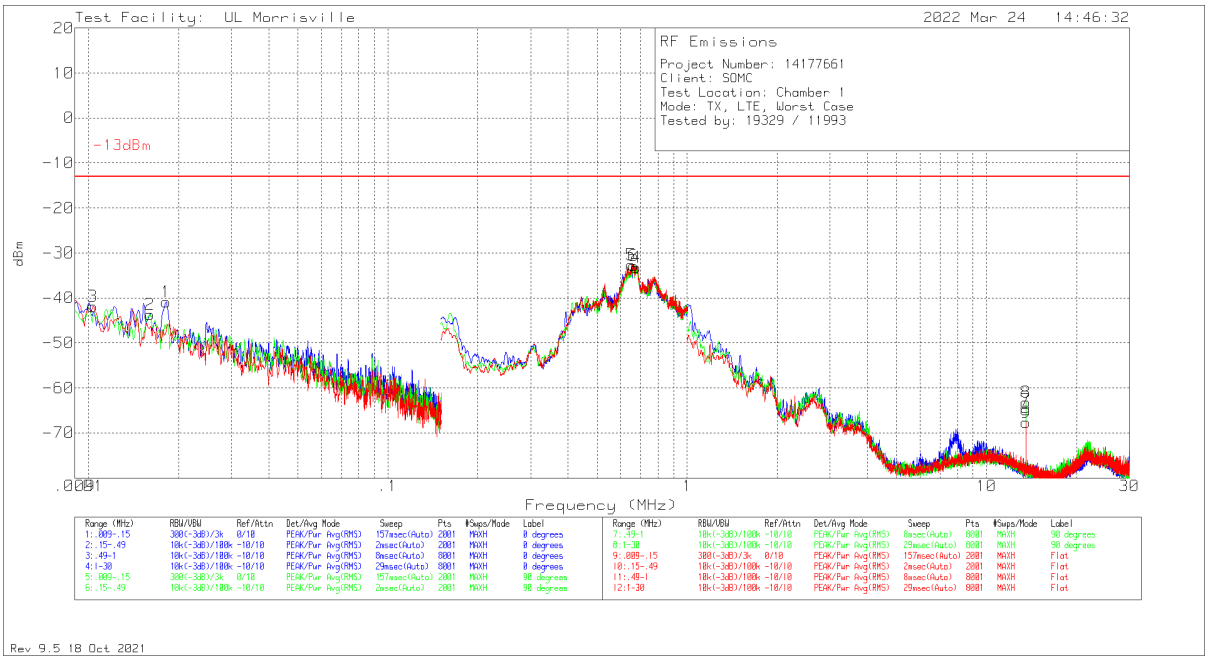
TEST PROCEDURE
KDB 971168 D01 v02r02/D02 v01

RESULTS

Worst-Case Emissions for 4G

LTE Band 12 QPSK Mode

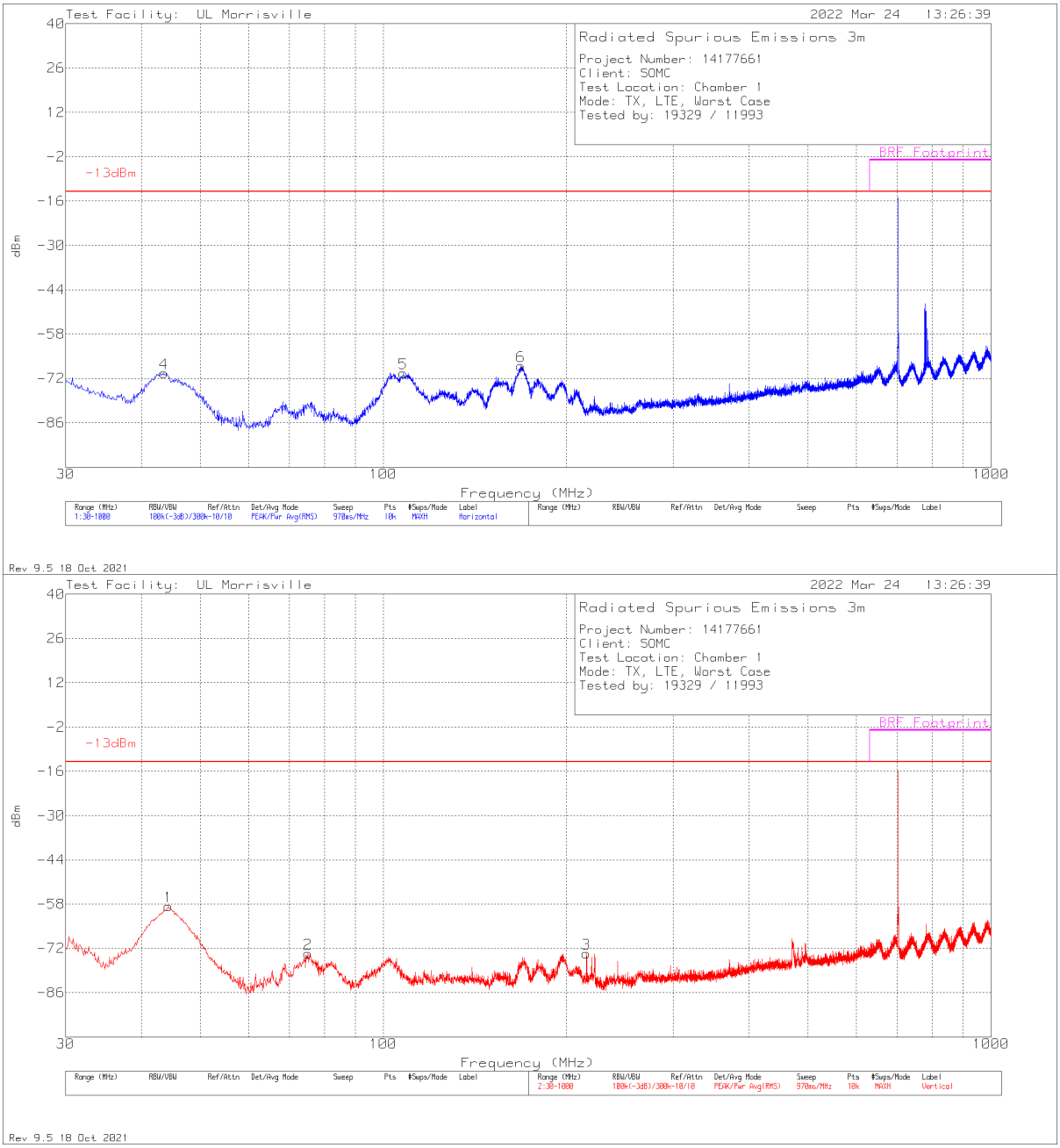
Spurious below 30MHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0037 (dB/m)	Amp/Cbl/Pad (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
3	.01035	-82.44	Pk	60.4	-31.6	11.8	-41.84	-13	-28.84	0-360	404	Flat
2	.01603	-83.43	Pk	59.6	-31.7	11.8	-43.73	-13	-30.73	0-360	404	90 degs
1	.01816	-80.13	Pk	59.3	-31.8	11.8	-40.83	-13	-27.83	0-360	404	0 degs
5	.65141	-68.12	Pk	56.1	-32.5	11.8	-32.72	-13	-19.72	0-360	404	90 degs
6	.66382	-68.32	Pk	56.1	-32.4	11.8	-32.82	-13	-19.82	0-360	404	Flat
4	.67592	-68.72	Pk	56.1	-32.4	11.8	-33.22	-13	-20.22	0-360	404	0 degs
7	13.56063	-78.71	Pk	33.9	-31.8	11.8	-64.81	-13	-51.81	0-360	404	0 degs
8	13.56063	-77.15	Pk	33.9	-31.8	11.8	-63.25	-13	-50.25	0-360	404	90 degs
9	13.56063	-81.6	Pk	33.9	-31.8	11.8	-67.7	-13	-54.7	0-360	404	Flat

Pk - Peak detector

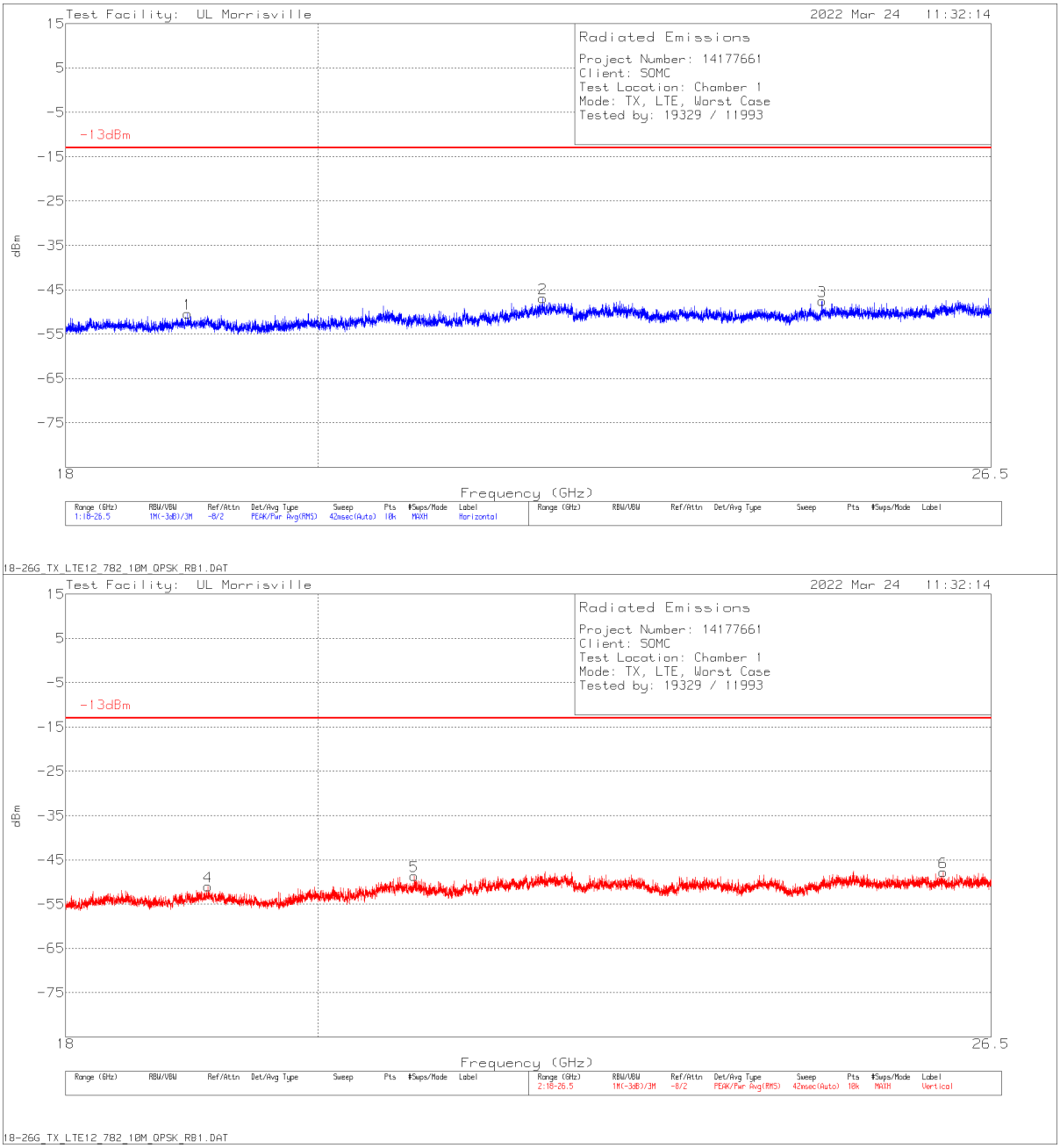
Spurious below 1GHz



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AT0066 (dB/m)	Amp/Cbl (dB)	Filter (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	Margin (dB)	BRF Footprint	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	43.58	-66	Pk	17.2	-31.3	.1	9.7	-70.3	-13	-57.3	-	-	0-360	200	H
1	44.259	-54.13	Pk	16.7	-31.1	.1	9.7	-58.73	-13	-45.73	-	-	0-360	100	V
2	75.105	-67.08	Pk	14.1	-30.5	.1	9.7	-73.68	-13	-60.68	-	-	0-360	100	V
5	107.794	-67.97	Pk	17.9	-30.3	.3	9.7	-70.37	-13	-57.37	-	-	0-360	300	H
6	168.419	-66.18	Pk	17.6	-29.7	.5	9.7	-68.08	-13	-55.08	-	-	0-360	200	H
3	215.949	-70.89	Pk	16.3	-29.1	.3	9.7	-73.69	-13	-60.69	-	-	0-360	100	V

Pk - Peak detector

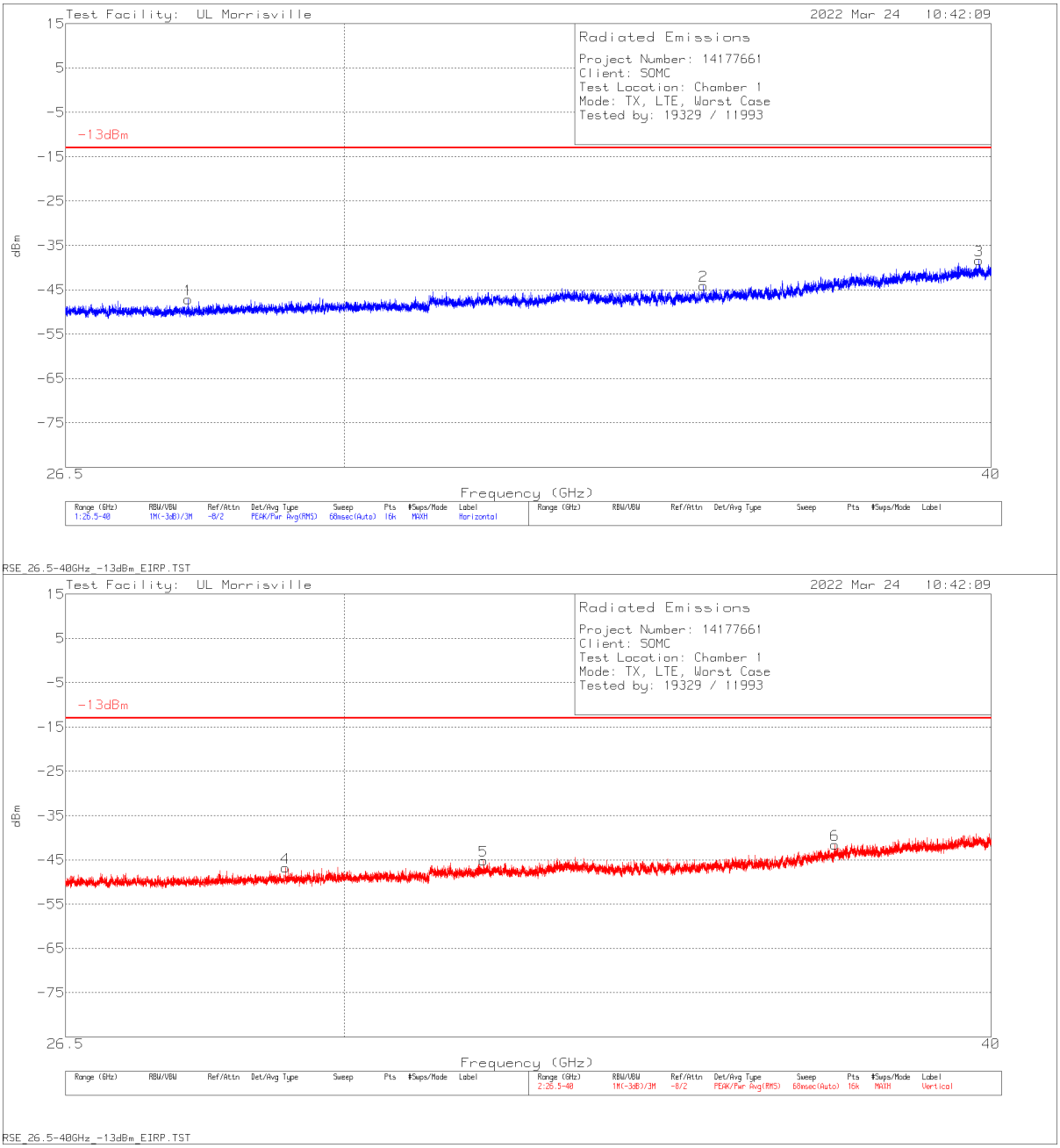
Spurious 18GHz to 26GHz



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	ANT (dB/m)	Amp/Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	18.94256	-56.84	Pk	33.3	-38.7	11.8	-50.44	-13	-37.44	0-360	200	H
4	19.10404	-57.28	Pk	33.4	-38.9	11.8	-50.98	-13	-37.98	0-360	101	V
5	20.82172	-55.19	Pk	34	-39.3	11.8	-48.69	-13	-35.69	0-360	300	V
2	21.9742	-56.05	Pk	36.8	-39.5	11.8	-46.95	-13	-33.95	0-360	101	H
3	24.69223	-55.96	Pk	35.1	-38.5	11.8	-47.56	-13	-34.56	0-360	149	H
6	25.97305	-57.44	Pk	35.4	-37.6	11.8	-47.84	-13	-34.84	0-360	150	V

Pk - Peak detector

Spurious 26GHz – 40GHz



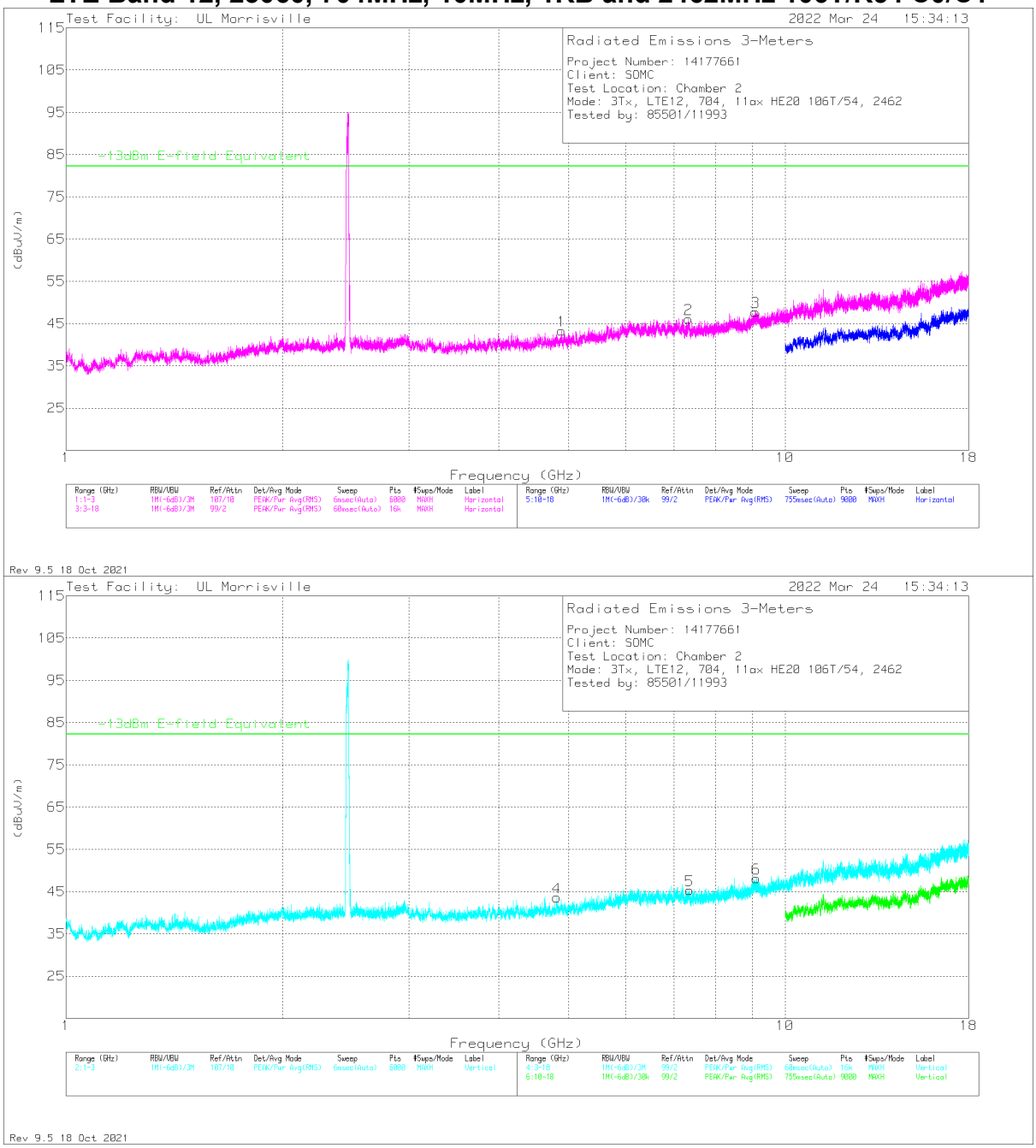
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	ANT (dB/m)	Amp/Cbl (dB)	Conversion Factor (dB)	Corrected Reading dBm	-13dBm	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	27.98406	-57.85	Pk	36	-37.1	11.8	-47.15	-13	-34.15	0-360	200	H
4	29.22599	-58.21	Pk	36.2	-36.6	11.8	-46.81	-13	-33.81	0-360	149	V
5	31.91738	-57.24	Pk	37	-36.7	11.8	-45.14	-13	-32.14	0-360	249	V
2	35.1943	-56.55	Pk	37.8	-37.1	11.8	-44.05	-13	-31.05	0-360	101	H
6	37.31873	-56.32	Pk	38.4	-35.5	11.8	-41.62	-13	-28.62	0-360	249	V
3	39.78907	-55.2	Pk	38.7	-33.6	11.8	-38.3	-13	-25.3	0-360	300	H

Pk - Peak detecto

11.3. SIM TX

RESULTS

LTE Band 12, 23060, 704MHz, 10MHz, 1RB and 2462MHz 106T/R54 C0/C1



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AT0072 (dB/m)	Amp/Cbl/Fltr (dB)	Filter (dB)	Corrected Reading (dBuV/m)	-13dBm E-field Equivalent	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* ** 4.88625	39.03	Pk	34.1	-30.1	.3	43.33	82.2	-38.87	0-360	101	H
2	* ** 7.33594	36.22	Pk	35.7	-26.4	.6	46.12	82.2	-36.08	0-360	199	H
3	* ** 9.09469	36.16	Pk	36.3	-25.4	.7	47.76	82.2	-34.44	0-360	199	H
4	* ** 4.81594	39.32	Pk	34.1	-30.1	.3	43.62	82.2	-38.58	0-360	199	V
5	* ** 7.36125	35.62	Pk	35.7	-26.6	.6	45.32	82.2	-36.88	0-360	199	V
6	* ** 9.11906	36.75	Pk	36.3	-25.5	.6	48.15	82.2	-34.05	0-360	199	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - indicates frequency in Taiwan NCC LP0002 Restricted Band
Pk - Peak detector

12 . SETUP PHOTOS

Please see R14177661-EP1 for Setup Photos.

END OF REPORT