TEST REPORT

Report Number: 14144423-E1V4

Applicant	:	COGNYTE SOFTWARE LP 35 PINELAWN ROAD, SUITE 204 MELVILLE, NEW YORK 11747 USA
Model	:	Series01 Box
FCC ID	:	2A7A2-S1
EUT Description	:	PORTABLE TDD BTS
Test Standard(s)	:	FCC CFR 47 Part 27

Date Of Issue:
2022-09-30

Prepared by:
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ACCREDITED
CERT #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2022-09-13	Initial Review	--
V2	2022-09-20	Updated Section 2 and 9.1	K.Kedida
V3	2022-09-22	Updated Section 2 and 9.2.1	K.Kedida
V4	2022-09-30	Updated Section 10.1.1 and 10.2.1	K.Kedida

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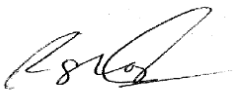
1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	COGNYTE 35 PINELAWN ROAD, SUITE 204 MELVILLE, NEW YORK 11747 USA
Model	Series01 Box
FCC ID	2A7A2-S1
EUT Description	PORTABLE TDD BTS
Serial Number	224A047100013 224A047100014
Date Tested	MAY 31, 2022 to JUNE 17, 2022
Applicable Standards	FCC CFR 47
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, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released By:	Reviewed By:	Prepared By:
		
Dan Coronia Operations Leader Consumer Technology Division UL Verification Services Inc.	Kiya Kedida Senior Project Engineer Consumer Technology Division UL Verification Services Inc.	Rolly Alegre Laboratory Engineer Consumer Technology Division UL Verification Services Inc.

2. SUMMARY OF TEST RESULTS

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

Requirement Description	Band	Requirement Clause Number (FCC)	Result	Remarks
Equivalent Isotropic Radiated Power	41	27.50 (h) (1)(i)	Complies	

Requirement Description	Requirement Clause Number (FCC)	Result	Remarks
Occupied Bandwidth	2.1049, 27.53	Complies	
Band Edge and Emission Mask	27.53 (m)(2) (v)	Complies	
Out of Band Emissions	27.53 (m)(2) (v), 27.53 (m)(4)	Complies	
Frequency Stability	27.54	Complies	
Peak-to-Average Ratio	27.50	Complies	
Field Strength of Spurious Radiation	27.53 (m)(2) (v)	Complies	

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 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

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	208313
☐	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA	US0104	22541	208313
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA	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}
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.84 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB
Occupied Channel Bandwidth	±1.22 %
Temperature	±2.26%
Supply voltages	±0.57 %
Time	±3.39 %

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 base station and support LTE Band 41.

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:

LTE BAND 41

Part 27	
EIRP Limit (W)	2238.72
Antenna Gain (dBi)	10.00
Antenna Cable Loss (dB)	-1.60

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
20.0	QPSK	2506.0	2680.0	32.40	40.80	12.023	17948	17M9W7W

6.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version v2.50,

The EUT software used during testing was version 58.1.

The EUT board used during the testing was version BTS RevD.

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6.4. MAXIMUM ANTENNA GAIN

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

LTE Bands	Frequency Range (MHz)	Antenna Type	Antenna Gain (dBi)
LTE Band 41	2496 – 2690	Directional	10

6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports the following LTE:
Band 41 (20MHz Bandwidths, QPSK only)

All measurements is tested on QPSK modulation.

The EUT can only be setup in desktop orientation; therefore, all radiated testing was performed with the EUT in desktop orientation. Radiated spurious emissions were investigated from 30MHz-1GHz and above 1GHz. There were no emissions found with less than 20dB of margin from 18GHz to 40GHz.

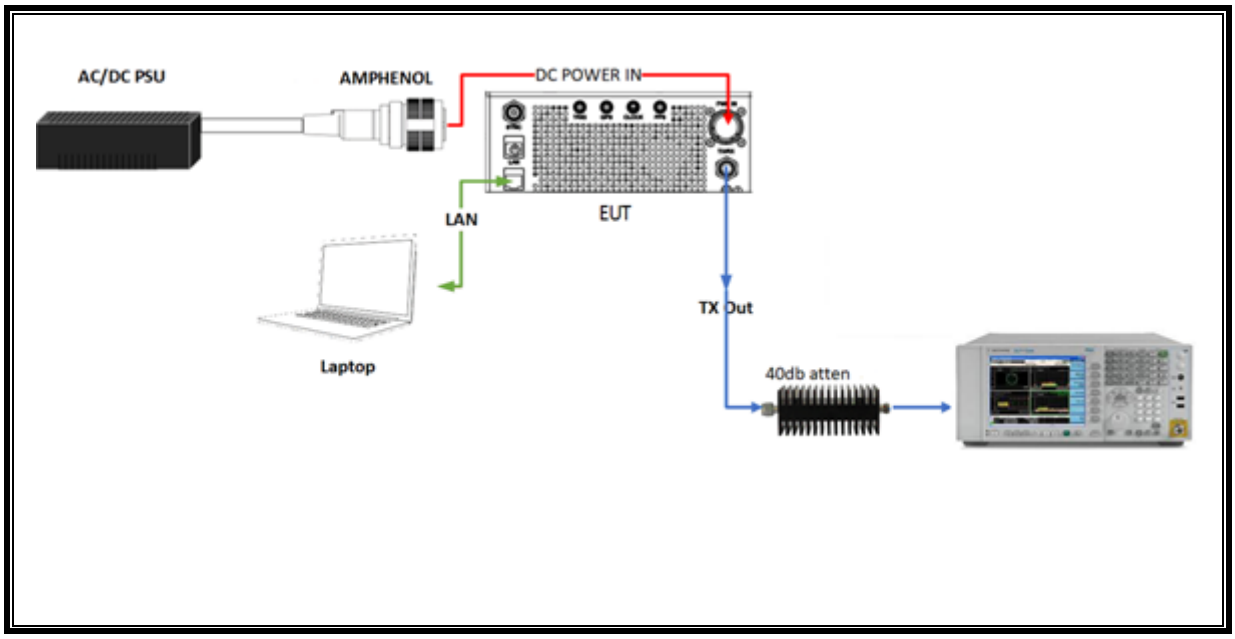
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/ DoC**
Laptop	Lenovo	ThinkPad T14 Gen 2, Intel Core i7-1185G7 Processor	N/A	N/A
AC/DC adapter	Relec Electronics	EA12501Q(TD03)	N/A	N/A
AC/DC PSU (AMPHENOL) to EUT	EDACPOWER ELEC.	EA12501Q-240(16)	E209833	N/A

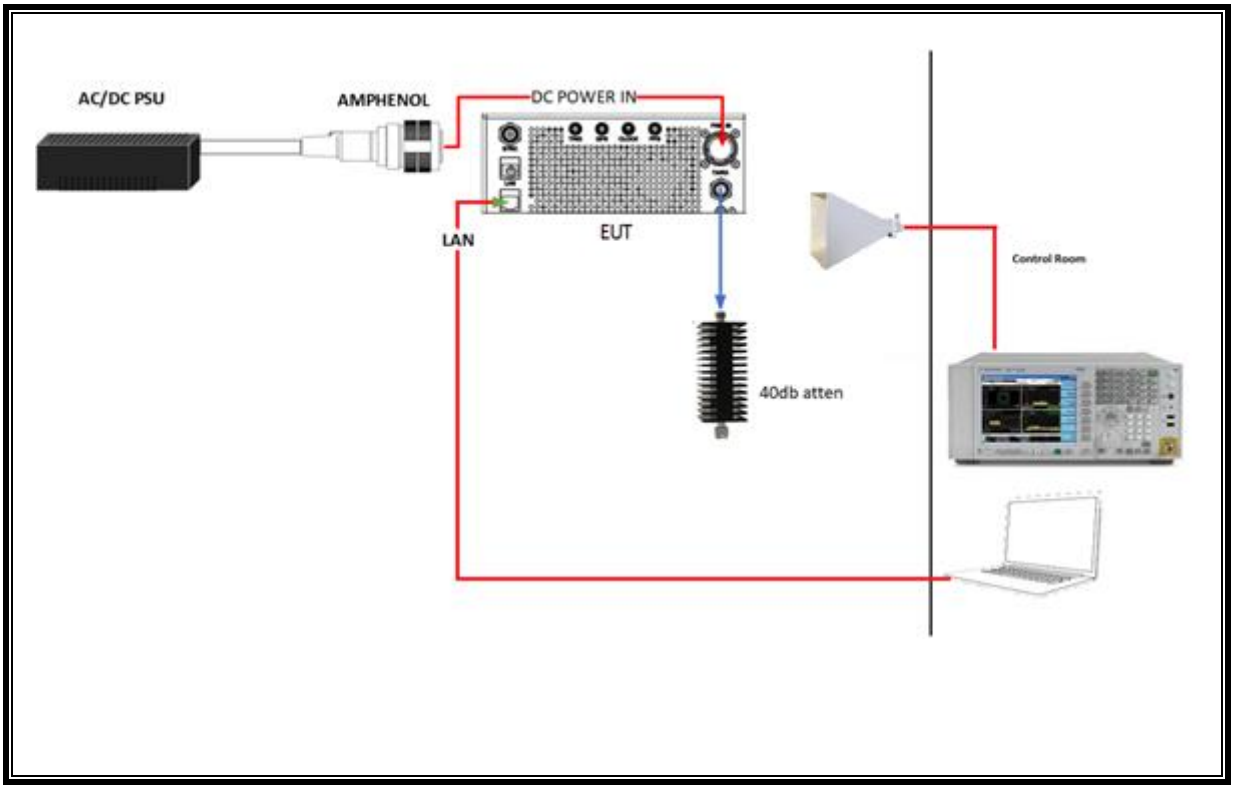
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC/DC PSU	1	AMPHENOL	Shielded	1.2	N/A
2	RF In/Out	1	40dB attenuator	N/A	N/A	N/A
3	RF In/Out	1	20dB attenuator	N/A	N/A	N/A
4	RF In/Out	1	RF cable QN to Ntype Male	Shielded	3.0	N/A
5	LAN	1	RJ-45 CAT6	Shielded	1.0	N/A
6	RF In/Out	1	SMA cable	Shielded	0.5	N/A

I/O CABLES (RF RADIATED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC/PSU	1	AMPHENOL	Shielded	0.7	To AC Mains
2	DC/PSU	1	AMPHENOL	Shielded	0.5	To EUT
3	RF In/Out	1	RF cable QN to Ntype Male	Shielded	3.0	To 40dB attenuator
4	RF In/Out	1	40dB attenuator	N/A	N/A	To SMA cable
5	RF In/Out	1	SMA cable	Shielded	0.5	To EUT
6	LAN	1	RJ-45 CAT6	Shielded	1.0	From Laptop to EUT

CONDUCTED SETUP



RADIATED SETUP



7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Horn 1-18GHz	ETS Lindgren	3117	80707	4/28/2023
Antenna, Broadband Hybrid, 30MHz to 3000MHz	Sunol Sciences	JB3	171862	9/28/2022
RF Filter Box, 1 to 18GHz	UL FREMONT	SAC-L1	171013	3/9/2023
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	981661	4/24/2023
ESW EMI Test Receiver, 2Hz to 44GHz	ROHDE & SCHWARZ	ESW44	PRE0179377	2/20/2023
Power Meter, P-series single channel	Keysight	N1911A	90733	1/24/2023
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	90388	1/24/2023
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	80396	2/1/2023
Chamber, Environmental	Thermotron	29800	T80	11/5/2023
Amplifier 26.5-40GHz +5Vdc, -62dBm P1dB	AMPLICAL	AMP26G40-65	172346	2/1/2023
Amplifier 18-26.5GHz, +5Vdc, -54dBm P1dB	AMPLICAL	AMP18G26.5-60	171583	1/27/2023
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	172363	12/7/2022
Antenna, Horn 26.5GHz to 40GHz	ARA	MWH-2640/B	172366	12/7/2022
ESW EMI Test Receiver	ROHDE & SCHWARZ	ESW44	169927	2/16/2023
UL AUTOMATION SOFTWARE				
Radiated test software	UL	UL EMC	Ver 9.5 April 30, 2020	

NOTES:

1. * Testing is completed before equipment expiration date.

8. RF OUTPUT POWER VERIFICATION

CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 36.101 specification.

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 TS 36.101.

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 following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 38.521-1 specification.

The allowed MPR for SRS, PUCCH formats 0, 1, 3 and 4, and PRACH shall be as specified for QPSK modulated DFTs-OFDM of equivalent RB allocation. The allowed MPR for PUCCH format 2 shall be as specified for QPSK modulated CP-OFDM of equivalent RB allocation.

Table 6.2.2.3-1: Maximum power reduction (MPR) for power class 3

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5[1]	≤ 1.2[1]	≤ 0.2[1]
		≤ 0.5[2]		0[2]
	Pi/2 BPSK w Pi/2 BPSK DMRS	≤ 0.5[2]	0[2]	
	QPSK	≤ 1		0
	16 QAM	≤ 2		≤ 1
	64 QAM	≤ 2.5		
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3		≤ 1.5
	16 QAM	≤ 3		≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

NOTE 1: Applicable for UE operating in TDD mode with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and if the IE *powerBoostPi2BPSK* is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0dB MPR is 26dBm.

NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 with Pi/2 BPSK modulation and if the IE *powerBoostPi2BPSK* is set to 0 and if more than 40% of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.

Table 6.2.2.3-2: Maximum power reduction (MPR) for power class 2

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5	≤ 0.5	0
	QPSK	≤ 3.5	≤ 1	0
	16 QAM	≤ 3.5	≤ 2	≤ 1
	64 QAM	≤ 3.5	≤ 2.5	
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3.5	≤ 3	≤ 1.5
	16 QAM	≤ 3.5	≤ 3	≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS 36.101 are in addition to the allowed MPR requirements.

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

8.1. LTE BAND 41

Test Engineer ID:	39005	Test Date:	6/10/2022

OUTPUT POWER FOR LTE BAND 41 (20.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Conducted Average (dBm)		
				39750	40620	41490
				2506.0 MHz	2593.0 MHz	2680.0 MHz
20.0	QPSK	100	0	32.24	**32.40**	32.30

9. CONDUCTED TEST RESULTS

9.1. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049, §27.53

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.

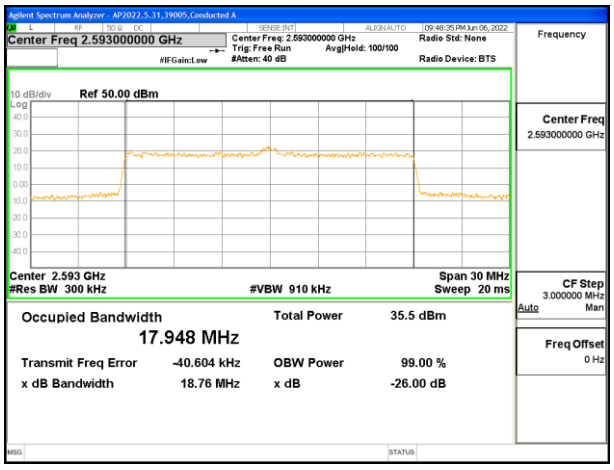
RESULTS

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

LTE BAND 41

Band	Mode	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 41	20MHz, QPSK	2593	17.948	18.76

9.1.1. LTE BAND 41



LTE B41 20MHz QPSK Middle Channel RB100-0

9.2. EMISSION MASK AND ADJACENT CHANNEL POWER

For Spectrum Emission Mask plots, the Keysight PXA N9030A is configured to sweep with a moving integration window, the width of which can be adjusted to different sizes across the sweep. The window width is configured to be greater than or equal to the required reference bandwidth. The center frequencies of the integration window for the different integration windows was set such that the upper and lower edges of the windows are aligned with the transition points in the reference bandwidths. This is achieved by setting the start / stop frequencies of the window with an offset equal to the reference bandwidth / 2 from the transition point.

TEST PROCEDURE

The transmitter output was connected to a CMW500Test 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:

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

TEST PROCEDURE (FCC LTE BAND 41)

(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

TEST PROCEDURE FOR RSS 199

In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for base station and fixed subscriber equipment and 2% for mobile subscriber equipment. Beyond the 1 MHz band, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth is allowed to be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1%/2% of the occupied bandwidth, as applicable.

RESULTS

9.2.1. LTE BAND 41 EMISSION MASK

LIMITS

FCC: §27.53
(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

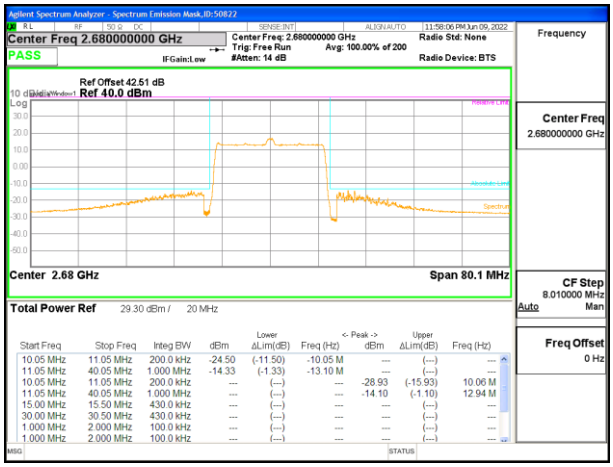
(2) For digital base stations, the attenuation shall be not less than 43 + 10 log (P) dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No. 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided that a documented interference complaint cannot be mutually resolved between the parties prior to the applicable deadline, then the following additional attenuation requirements shall apply:

(V) For all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge.

(4) 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 that 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 B41 20MHz QPSK Low Channel RB100-0

LTE B41 20MHz QPSK Middle Channel RB100-0



LTE B41 20MHz QPSK High Channel RB100-0

9.3. OUT OF BAND EMISSIONS

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:

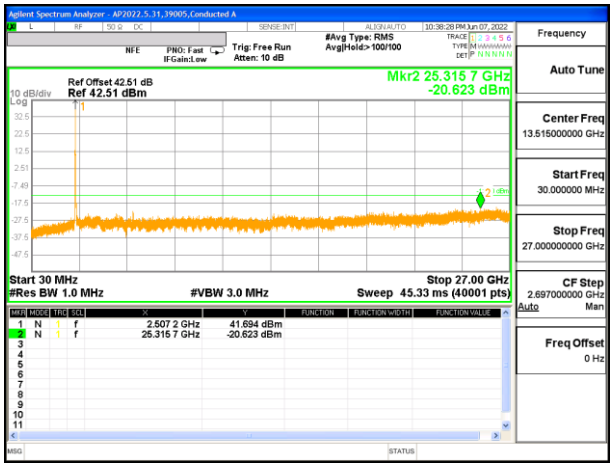
- Set display line at -13 dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

RESULTS

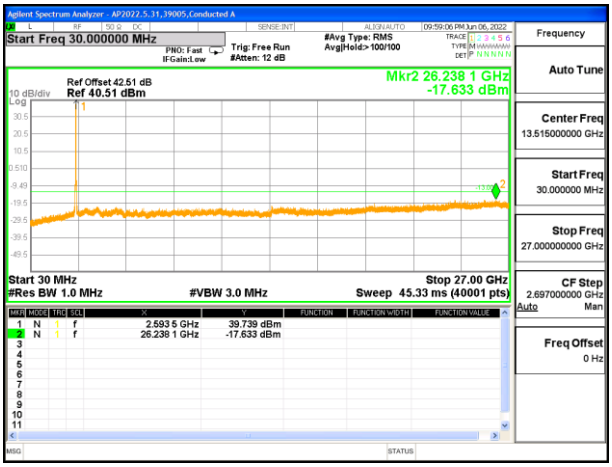
9.3.1. LTE BAND 41 (FCC)

LIMITS

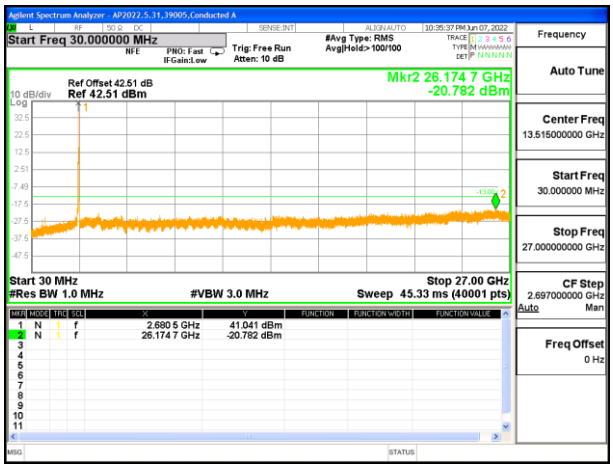
FCC: §27.53 (m)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



LTE B41 20MHz QPSK Low Channel



LTE B41 20MHz QPSK Middle Channel



LTE B41 20MHz QPSK High Channel

9.4. FREQUENCY STABILITY

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30°C to +50°C
- Voltage = (85% - 115%)

  Low voltage, 102VAC, Normal, 120VAC and High voltage, 138VAC.

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

See the following pages.

9.4.1. LTE BAND 41

LIMITS

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Engineer ID:	39005	Test Date:	6/14/2022

LTE BAND 41 QPSK (20MHz BANDWIDTH)

Band	41	Frequency Range		Delta	Limit	
Condition		2496	2690		NA	
		Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage					
Normal (20°C)	Normal	2496.9854	2689.0021			
Extreme (50°C)		2496.7700	2689.1800	-0.025	NA	Yes
Extreme (40°C)		2496.9280	2689.1850	0.056745	NA	Yes
Extreme (30°C)		2496.9090	2689.1420	0.025596	NA	Yes
Extreme (10°C)		2496.6380	2689.2770	-0.04232	NA	Yes
Extreme (0°C)		2496.8513	2688.9985	-0.07509	NA	Yes
Extreme (-10°C)		2496.9131	2689.0205	-0.03318	NA	Yes
Extreme (-20°C)		2496.9757	2689.0302	0.002933	NA	Yes
Extreme (-30°C)		2496.8484	2688.9961	-0.07777	NA	Yes
20°C	15%	2497.0093	2689.1229	0.066101	NA	Yes
	-15%	2496.8684	2689.0026	-0.06451	NA	Yes

9.5. PEAK-TO-AVERAGE POWER RATIO

LIMIT

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

Full resource block (FRB) for each bandwidth was used to measure as the worst case. The results from all CCDF measurements are passed with 13dB peak-to-average power ratio criteria.

9.5.1. LTE BAND 41

Test Engineer ID:		Test Date:	6/17/2022

Band	Bandwidth (MHz)	Frequency (MHz)	RB Allocation	RB OffSet	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
						Peak	Average	
Band 41	20MHz	2593.0	100	0	QPSK	47.29	33.15	12.66
Duty Cycle Correction Factor (dB) =			1.48					
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor								

10. RADIATED TEST RESULTS

10.1. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02/r01

All tests above 1GHz were done with a Resolution Bandwidth of 1MHz, and a Video Bandwidth of 3MHz

RESULTS

Only QPSK and 20MHz bandwidth is tested.

10.1.1. LTE BAND 41

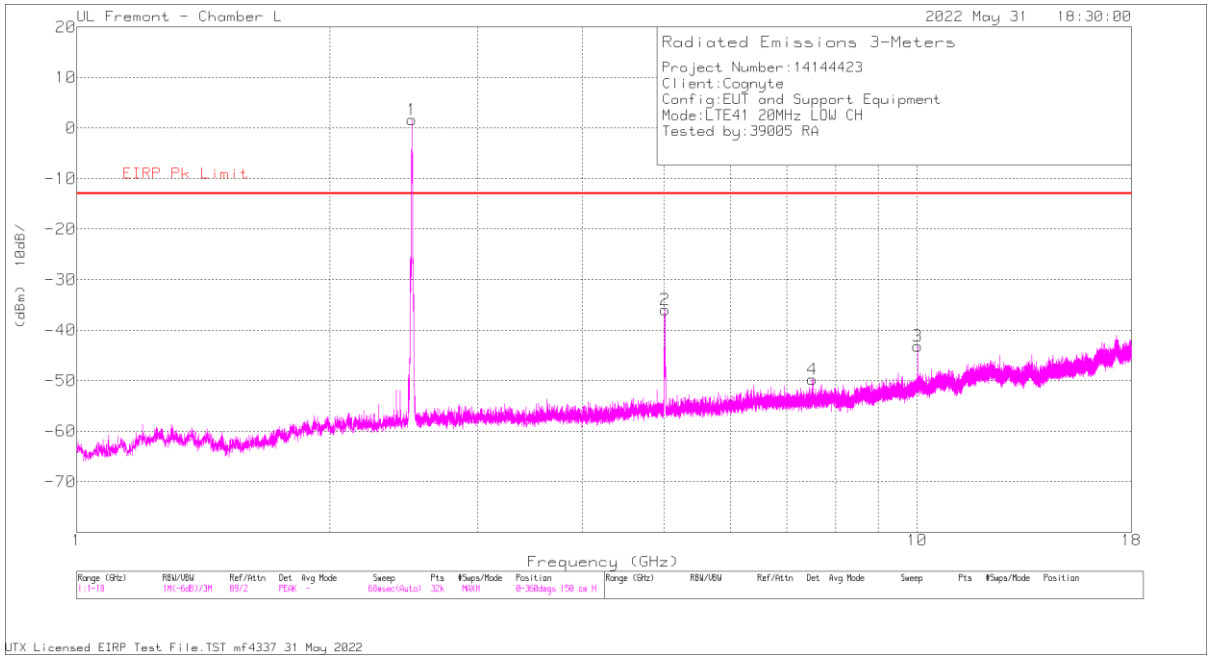
LIMITS

FCC: §27.53 (m)

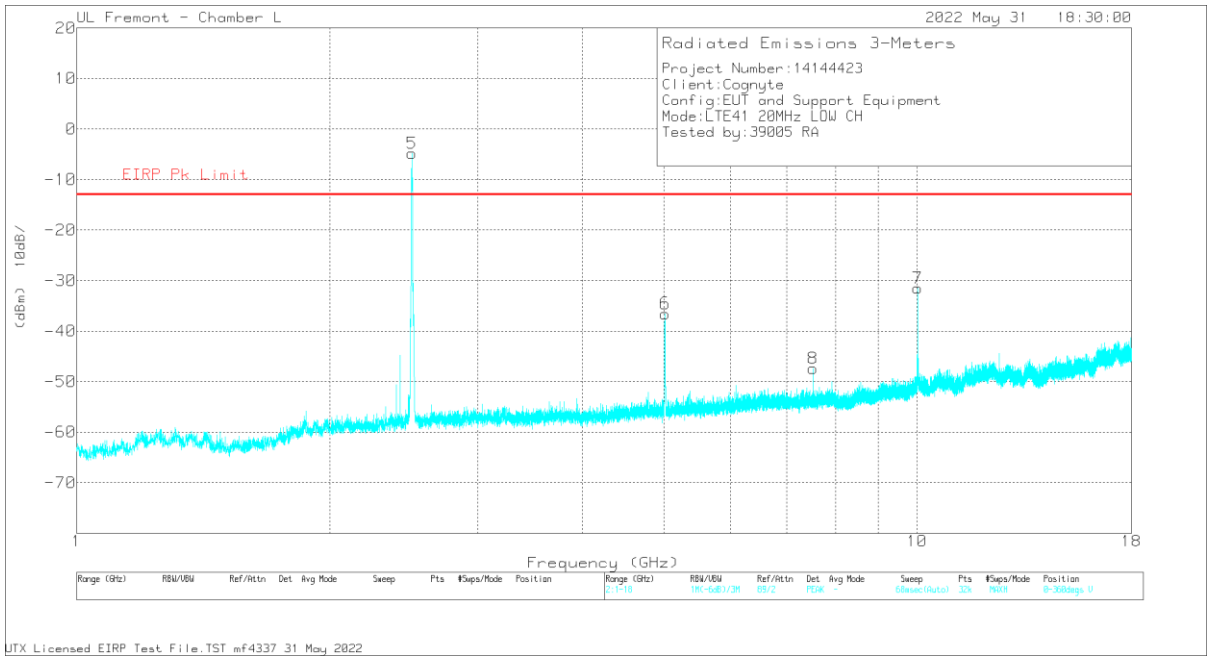
(V) For all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge.

QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)

LOW CHANNEL RESULTS



HORIZONTAL



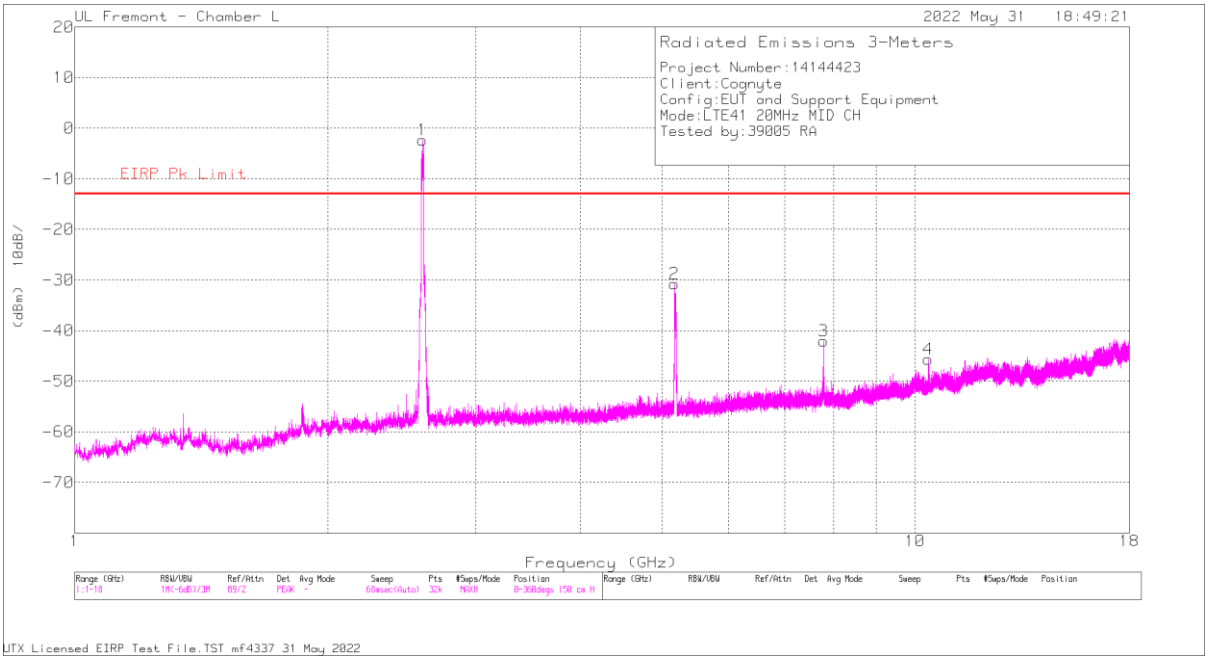
VERTICAL

Trace Markers

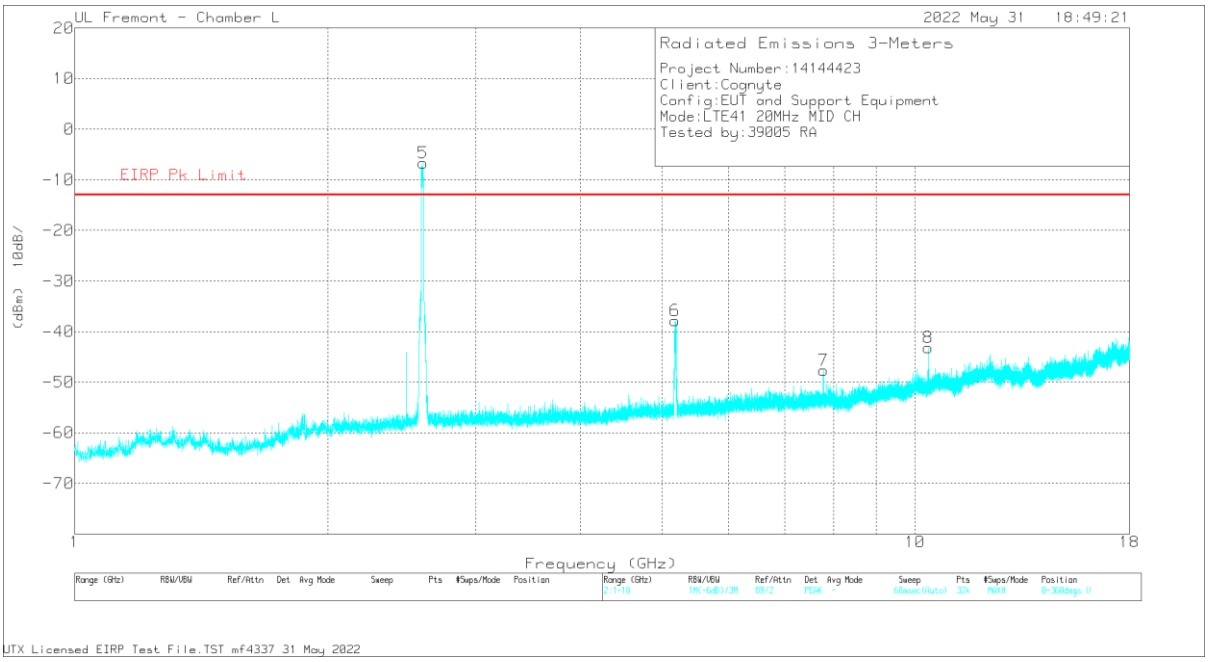
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	EIRP CF	Corrected Reading (dBm)	EIRP Pk Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	**2.505828	94.98	Pk	32.4	-30.5	-95.2	1.68	-	-	0-360	150	H
2	* 5.013063	51.91	Pk	34.2	-26.9	-95.2	-35.99	-13	-22.99	0-360	150	H
3	10.023813	34.82	Pk	37.1	-19.9	-95.2	-43.18	-13	-30.18	0-360	150	H
4	* 7.511	33.41	Pk	35.7	-23.6	-95.2	-49.69	-13	-36.69	0-360	150	H
5	**2.506094	88.45	Pk	32.4	-30.5	-95.2	-4.85	-	-	0-360	150	V
6	* 5.011469	51.38	Pk	34.2	-26.9	-95.2	-36.52	-13	-23.52	0-360	150	V
7	10.023813	46.5	Pk	37.1	-19.9	-95.2	-31.5	-13	-18.50	0-360	150	V
8	* 7.517906	35.62	Pk	35.7	-23.5	-95.2	-47.38	-13	-34.38	0-360	150	V

** Fundamental Frequency
Pk - Peak detector

MID CHANNEL RESULTS



HORIZONTAL



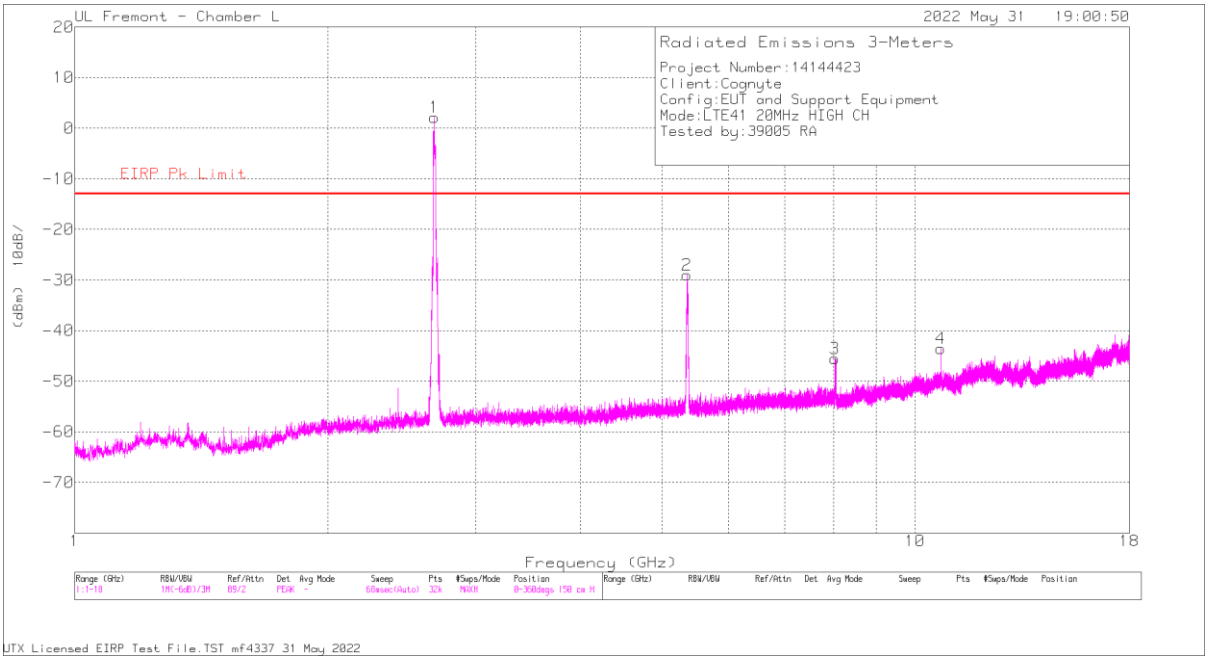
VERTICAL

Trace Markers

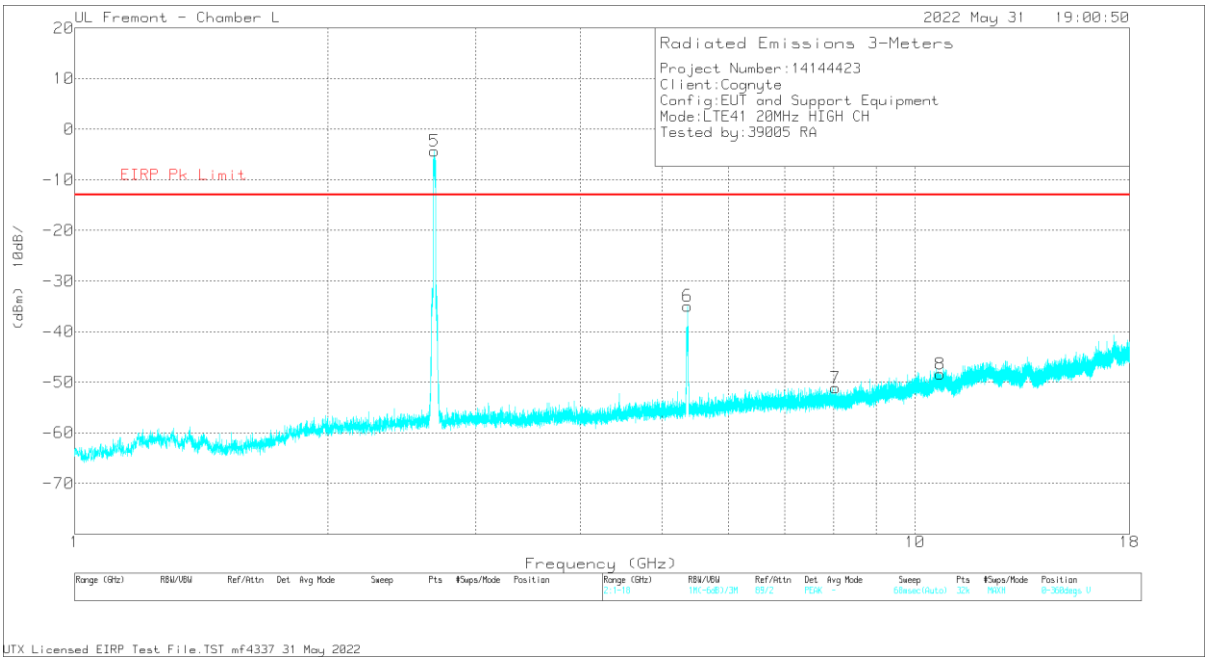
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	EIRP CF	Corrected Reading (dBm)	EIRP Pk Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	**2.592688	91.13	Pk	32.2	-30.4	-95.2	-2.27	-	-	0-360	150	H
2	5.176156	57.13	Pk	34.6	-27.3	-95.2	-30.77	-13	-17.77	0-360	150	H
3	7.77875	40.61	Pk	35.8	-23.3	-95.2	-42.09	-13	-29.09	0-360	150	H
4	10.374969	31.9	Pk	37.4	-19.7	-95.2	-45.6	-13	-32.6	0-360	150	H
5	**2.596406	86.61	Pk	32.3	-30.4	-95.2	-6.69	-	-	0-360	150	V
6	5.185719	50.03	Pk	34.6	-27.3	-95.2	-37.87	-13	-24.87	0-360	150	V
7	7.784063	35.02	Pk	35.8	-23.3	-95.2	-47.68	-13	-24.87	0-360	150	V
8	10.372313	34.32	Pk	37.4	-19.7	-95.2	-43.18	-13	-30.18	0-360	150	V

** Fundamental Frequency
Pk - Peak detector

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	EIRP CF	Corrected Reading (dBm)	EIRP Pk Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 2.679281	94.69	Pk	32.6	-29.9	-95.2	2.19	-	-	0-360	150	H
2	* 5.357844	57.99	Pk	34.9	-26.7	-95.2	-29.01	-13	-16.01	0-360	150	H
3	* 8.035344	36.68	Pk	35.8	-22.8	-95.2	-45.52	-13	-32.52	0-360	150	H
4	* 10.729844	33.67	Pk	37.9	-19.9	-95.2	-43.53	-13	-30.53	0-360	150	H
5	* 2.67875	88.16	Pk	32.6	-29.9	-95.2	-4.34	-	-	0-360	150	V
6	* 5.358906	52.09	Pk	34.9	-26.7	-95.2	-34.91	-13	-21.91	0-360	150	V
7	* 8.043313	31.09	Pk	35.8	-22.8	-95.2	-51.11	-13	-38.11	0-360	150	V
8	* 10.718688	28.77	Pk	37.9	-19.9	-95.2	-48.43	-13	-35.43	0-360	150	V

** Fundamental Frequency
Pk - Peak detector

10.2. FIELD STRENGTH OF SPURIOUS RADIATION, BELOW 1GHz

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02/r01

All tests below 1GHz were done with a Resolution Bandwidth of 100kHz, and a Video Bandwidth of 300kHz.

RESULTS

10.2.1. LTE BAND 41

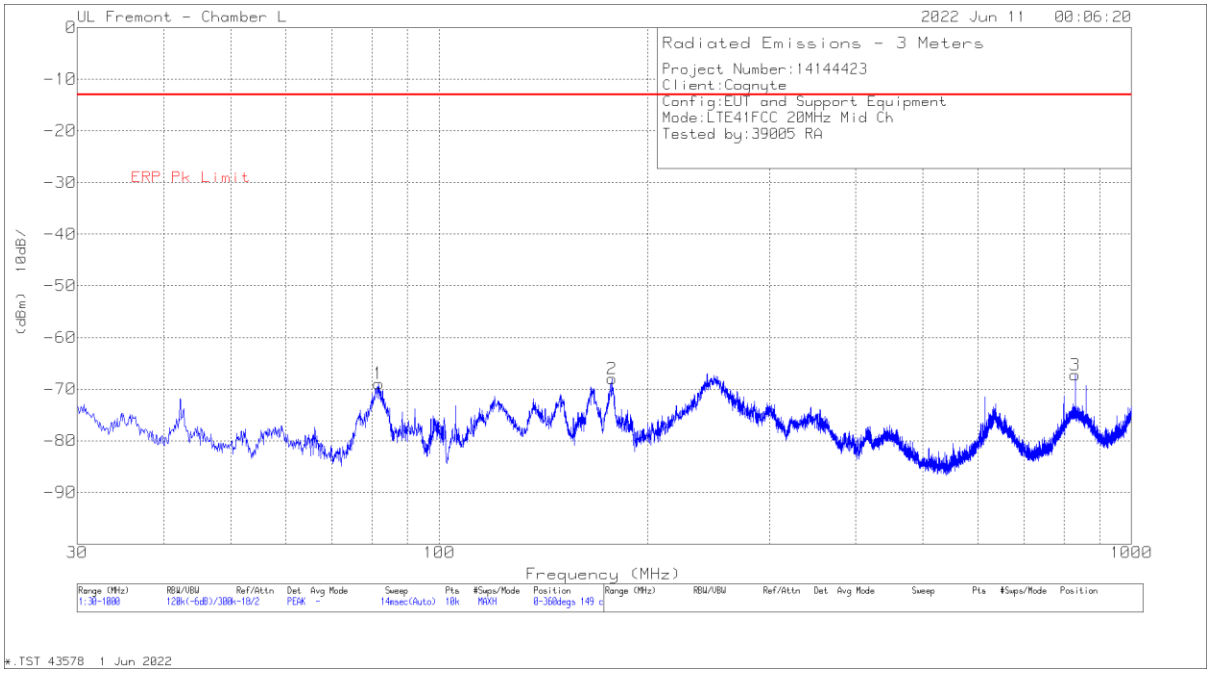
LIMITS

FCC: §27.53 (m)

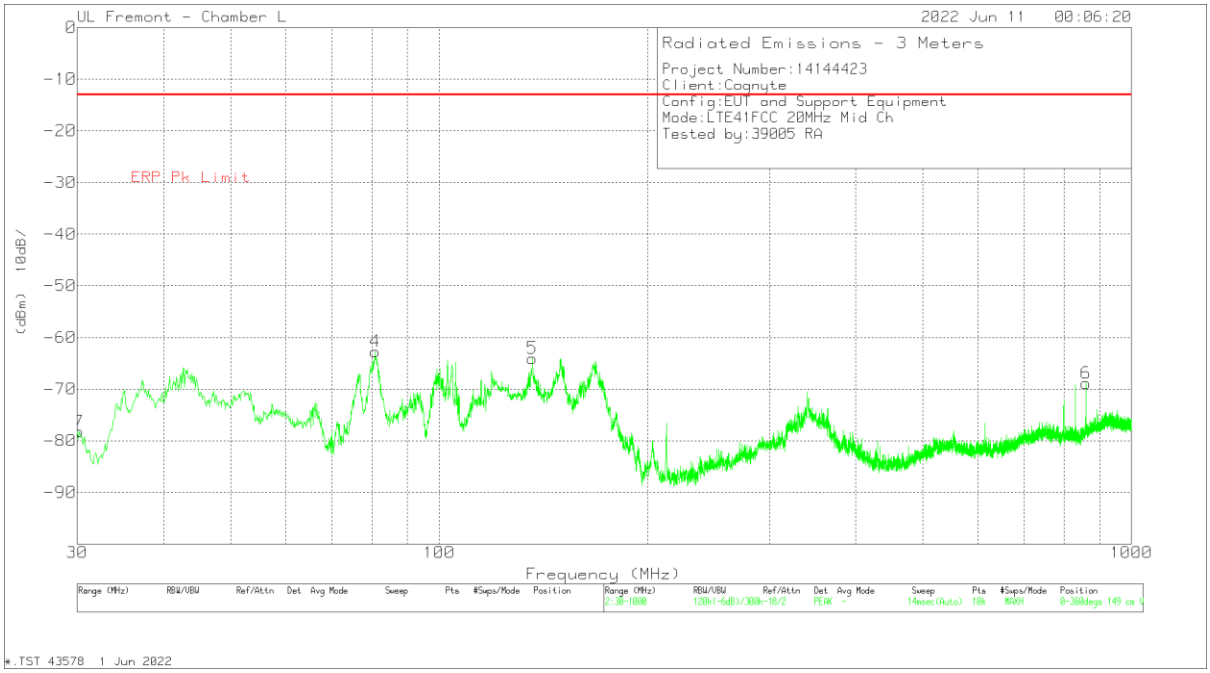
(V) For all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge.

QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	171862 ACF (dB)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	ERP Pk Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	81.798	-56.95	Pk	13.2	-30.8	5.6	-68.95	-13	-55.95	0-360	149	H
2	177.634	-57	Pk	17.1	-30.2	2.1	-68	-13	-55	0-360	149	H
3	829.474	-73.86	Pk	27.6	-27.8	6.8	-67.26	-13	-54.26	0-360	149	H
4	80.828	-52.31	Pk	13.3	-30.9	7.2	-62.71	-13	-49.71	0-360	149	V
5	* 136.312	-61.55	Pk	19.2	-30.5	8.8	-64.05	-13	-51.05	0-360	149	V
6	860.126	-72.88	Pk	27.7	-27.3	3.6	-68.88	-13	-55.88	0-360	149	V
7	30.194	-74.62	Pk	26.5	-31.4	1.3	-78.22	-13	-65.22	0-360	149	V

Pk - Peak detector