



TEST REPORT

Report Number : 13171736-E10V3

Applicant : APPLE, INC
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

Model : A2402

FCC ID : BCG-E3543A

EUT Description : SMARTPHONE

Test Standard(s) : FCC CFR47 22H, 27L, 27M, and 96

Date Of Issue:
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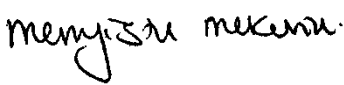
Revision History

Rev.	Issue Date	Revisions	Revised By
V1	9/15/2020	Initial Review	Mengistu Mekuria
V2	9/15/2020	Addressed TCB Feedback	John Thompson
V3	9/29/2020	Updated Antenna gains, and Updated Section5.8	John Thompson

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. DECISION RULES AND MEASUREMENT UNCERTAINTY	6
4.1. METROLOGICAL TRACEABILITY	6
4.2. DECISION RULES	6
4.3. MEASUREMENT UNCERTAINTY	6
4.4. SAMPLE CALCULATION	6
5. EQUIPMENT UNDER TEST	7
5.1. DESCRIPTION OF EUT	7
5.2. INTRODUCTION	7
5.3. MODEL DIFFERENCES	7
5.4. SPOT CHECK VERIFICATION RESULTS SUMMARY	8
5.5. REFERENCE DETAIL	9
5.6. SOFTWARE AND FIRMWARE	9
5.7. MAXIMUM ANTENNA GAIN	9
5.8. WORST-CASE CONFIGURATION AND MODE	10
5.9. DESCRIPTION OF TEST SETUP	11
6. TEST AND MEASUREMENT EQUIPMENT	13
7. RADIATED TEST RESULTS	14
8. SETUP PHOTOS	18

1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE, INC 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	A2402
FCC ID	BCG-E3543A
EUT Description	SMARTPHONE
Serial Number	MODEL (A2402): C07028700B8P5595 (Conducted) and G6TD200504HT (Radiated)
Date Tested	MAY 19, 2017 to AUGUST 26, 2020
Applicable Standards	FCC CFR47 22H, 27L, 27M, and 96
Test Results	COMPLIES
UL Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.	
Approved & Released By:	Prepared By:
	
Mengistu Mekuria Lead Test Engineer UL Verification Services Inc.	John Thompson Laboratory Engineer UL Verification Services Inc.

2. 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 27 and Part 96
- [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

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Road
☐ Chamber A	☐ Chamber D	☐ Chamber I
☒ Chamber B	☐ Chamber E	☐ Chamber J
☐ Chamber C	☐ Chamber F	☐ Chamber K
	☐ Chamber G	☐ Chamber L
	☐ Chamber H	☐ Chamber M

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code: 2324A.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. 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.

4.2. 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.)

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{Lab}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB
Occupied Channel Bandwidth	±0.39 %
Temperature	±0.9 °C
Supply voltages	±0.45 %
Time	±0.02 %

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

4.4. 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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and WPT. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible.

5.2. INTRODUCTION

This application for certification is leveraging the data reuse procedures from KDB 484596 D01 based on reference FCC ID BCG-E3542A to cover variant model BCG-E3543A. The major difference between the parent/reference model and the variant model is the depopulation in the variant model of the mmWave transmitter. All other circuitry and features are identical. The data reuse test plan was approved via manufacturer KDB inquiry.

5.3. MODEL DIFFERENCES

The manufacturer hereby declares the following for models A2172 and A2402.

A2172 and A2402 are highly similar, with the only difference being the supported cellular bands.

They have the same PCB layout, design, common components, antennas, antenna locations and housing cases.

More specifically, their cellular modem, Wi-Fi, BT, NFC, WPT and UWB transmitters are identical, and removal of cellular bands is done by software and depopulation of band-specific components associated with the removed bands.

Spot check verification and additional full radiated spurious emission test on ANT2 have been done on model A2402 in accordance with the test plan approved via KDB inquiry. Comparison of the models, upper deviation is within 3dB range and all tests are under FCC/ISED Technical Limits. The results documented for model A2172 may be applied as representative to model A2402.

5.4. SPOT CHECK VERIFICATION RESULTS SUMMARY

Spot check verification has been done on device model A2402, FCC ID: BCG-E3543A for antenna port power and radiated spurious emission tests in accordance with the Test Plan that was approved via KDB inquiry.

A2402 Spotcheck Results								
Technology	Worst Mode	Test Item	Channel	Measured Frequency MHz	Original Model: A2172	Sub Model: A2402	Delta (dB)	Remarks
					FCC ID: BCG3542A	FCC ID: BCG3543A		
LTE5CA	QPSK @ 1-49RB&1-0RB	ERP	High	839.0	18.35	18.29	-0.06	
	QPSK @ 1-49RB&1-0RB	RSE	High	1678.1	-37.55	-51.73	-14.18	
LTE7CA	QPSK @ 1-99RB&1-0RB	EIRP	Mid	2535.0	25.9	25.82	-0.08	
	QPSK @ 1-99RB&1-0RB	RSE	Low	10956.6	-39.44	-39.4	0.04	Noise Floor Level

5.5. REFERENCE DETAIL

Reference application that contains the reused reference data.

Equipment Class	Reference FCC ID	Reference Application	Report Title/Section
PCE, CBE	BCG-E3542A	13179116-E10	FCC LTE Carrier Aggregation Report / All Sections except Radiated spurious emission on ANT2

5.6. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 0.28.03-1.

5.7. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	Antenna Gain (dBi)						
	ANT 1	ANT 2	ANT 3	ANT 4	ANT 7	ANT 8	ANT 9
LTE Band 5, 824 – 849 MHz	-5.2	-5.6	NA	NA	NA	NA	NA
LTE Band 7, 2500 – 2570 MHz	-2.9	-0.4	0.9	-3.0	NA	NA	NA
LTE Band 41, 2496 – 2690 MHz	-2.5	-0.4	0.9	-2.8	NA	NA	NA
LTE Band 48, 3550 – 3700 MHz	NA	NA	NA	-0.5	-0.1	-5.3	-0.9

5.8. WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE dual carrier Bands of: Band 5, Band 7, Band 41 and Band 48.

The worst-case scenario for all measurements is based on an engineering evaluation and QPSK was observed as the worst one and set for all conducted and radiated. Output power measurements were measured on QPSK, 16QAM, 64QAM, and 256QAM modulations. Conducted tests were performed on the worst case antenna because it has the highest conducted power. ANT1 is the worst case for all bands except Band 48. For band 48 ANT9 is the worst case antenna.

The EUT was investigated in three orthogonal orientations X/Y/Z on all ANT 1, ANT2, ANT3, ANT4, ANT7, ANT8 and ANT 9 antennas to determine the worst case orientation. The following table exhibit the worst case orientation for different frequency bands. The full tests of the EUT have made upon the orientations that shown in the table below.

Bands	ANT1	ANT2	ANT3	ANT4	ANT7	ANT8	ANT9
Cell (850MHz)	Y	X	N/A	N/A	N/A	N/A	N/A
Band 7, 41	Y	Y	Y	X	N/A	N/A	N/A
Band 48	N/A	N/A	N/A	X	Y	X	Y

For Band Edge and Emission Mask: The highest bandwidth combo was tested. The RB combinations were selected such that the signal is active closest to the band limit, as this is the worst case.

For Out of Band Emissions: The highest bandwidth combination was tested. The highest power RB combination was selected as worst case.

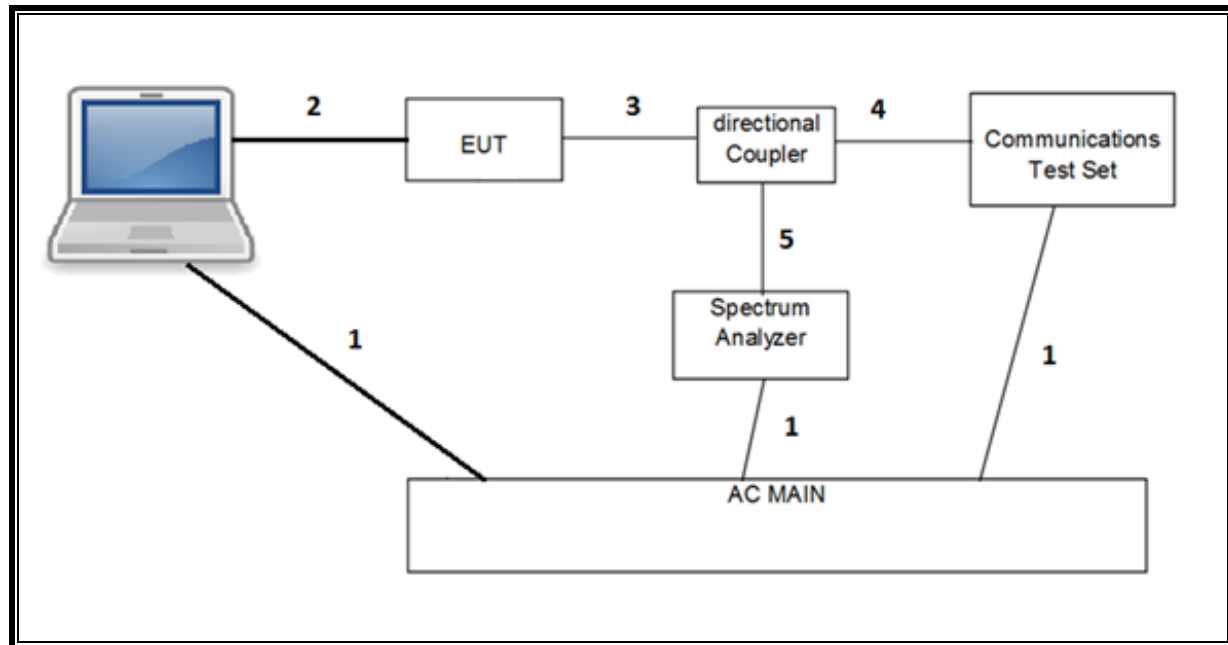
Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found with less than 20dB of margin from 9kHz to 1GHz.

For interband transmission of multiple channels in different antenna combination in Cellular bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths. No noticeable new emission was found.

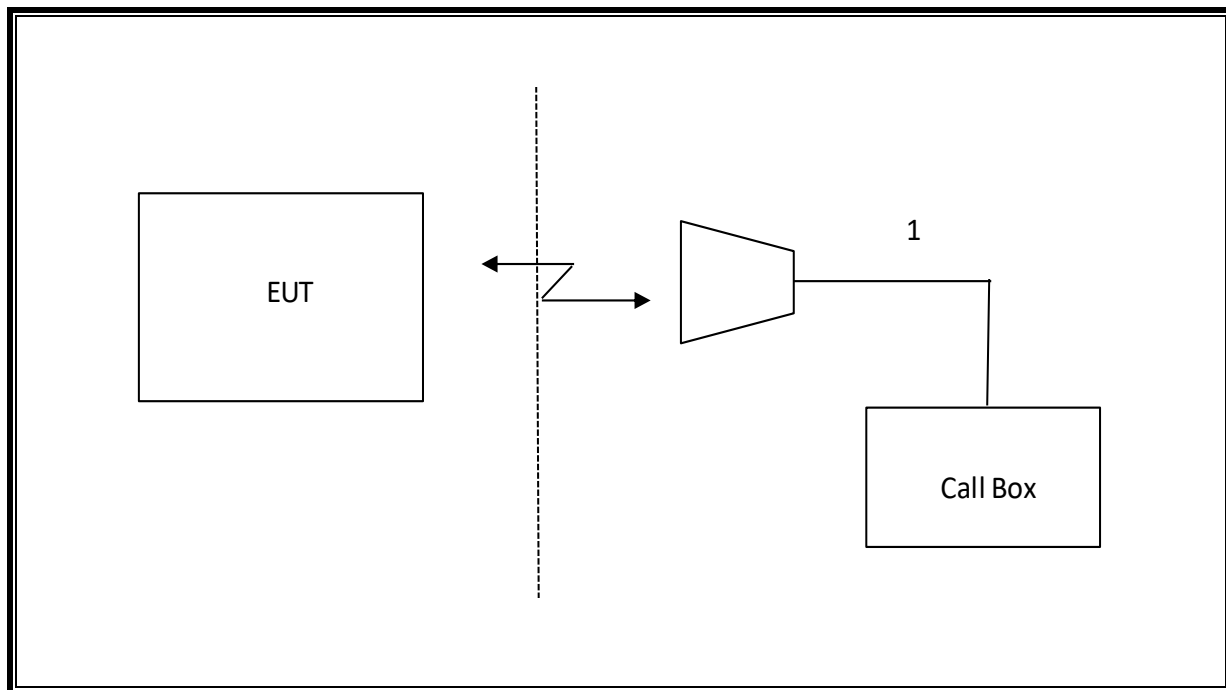
5.9. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description		Manufacturer	Model	Serial Number		FCC ID/ DoC
Laptop		Apple	A1398	C02PM012G3QD		QDS-BRCM1069
Laptop AC/DC adapter		Liteon Technology	PA-1450-BA1	B123		N/A
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	3	US 115V	Un-shielded	2.0	N/A
2	USB	1	DC	Un-shielded	1.0	N/A
3	RF In/Out	1	EUT	Un-shielded	0.6	N/A
4	RF In/Out	1	Communication Test Set	Un-shielded	1.2	N/A
5	RF In/Out	1	Barrel	N/A	N/A	N/A
I/O CABLES (RF RADIATED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF In/Out	1	Antenna	Un-shielded	5.0	N/A

CONDUCTED SETUP



RADIATED SETUP



6. 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	A.H. Systems, Inc.	SAS-571	T961	01/25/2021
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T136	07/07/2021
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T407	05/20/2021
Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	T931	05/11/2021
Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	T1165	08/10/2021
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	PRE0180176	07/14/2021
Filter, BRF 2495 to 2690MHz	MICRO-TRONICS	BRM50709-02	T1790	06/23/2021
Filter, BRF 1850 – 1910 MHz	Micro-Tronics	BRM50714-02	T1796	06/23/2021
Filter, BRF 824 – 848 MHz	Micro-Tronics	BRM20025	PRE0191180	06/23/2021
*Directional Coupler	KRYTAR	152610	T1161	08/14/2020
Spectrum Analyzer, PXA 3Hz to 44GHZ	Keysight	N9030A	T340	01/22/2021
Spectrum Analyzer, PXA 3Hz to 44GHZ	Keysight	N9030A	T907	01/22/2021
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T260	02/19/2021
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T959	02/19/2021
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T1871	02/25/2021
Power Meter, P-series single channel	Keysight	N1912A	T1245	01/22/2021
Power Sensor	Keysight	N1921A	T1225	02/23/2021
UL AUTOMATION SOFTWARE				
CLT Software	UL	UL RF	Ver 7.6, November 11, 2017	
Power Measurement Software	UL	UL RF	Ver 2.7, 2019	
Radiated test software	UL	UL RF	Ver 9.5 June 15, 2019	

NOTES:

* Testing is completed before equipment expiration date.

7. RADIATED TEST RESULTS

RADIATED SPOT CHECK FOR A2402

7.1. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT2

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02/r01

RESULTS

Maximum + maximum bandwidth combinations of QPSK mode was tested, QPSK results are reported as worst case.

7.1.1. LTE BAND 5

LIMIT

FCC: §22.917(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 5 (10.0MHZ + 10.0MHZ BANDWIDTH)

Project #:	13171736									
Date:	8/7/2020									
Test Engineer:	19206									
Configuration:	EUT Only									
Mode:	Band 5 QPSK 10+10									
Chamber #:	Chamber B									
Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	HPF 1.2GHz T1737 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz										
1.987	41.49	Pk	27.4	-29.9	.6	-95.2	-55.61	-13	-42.61	H
1.99592	40.79	Pk	27.4	-29.9	.5	-95.2	-56.41	-13	-43.41	V
2.68987	39.68	Pk	29.2	-29	.6	-95.2	-54.72	-13	-41.72	V
2.69448	39.63	Pk	29.1	-29	.5	-95.2	-54.97	-13	-41.97	H
3.45582	38.53	Pk	30.4	-27.9	.5	-95.2	-53.67	-13	-40.67	H
3.48008	38.14	Pk	30.2	-27.8	.8	-95.2	-53.86	-13	-40.86	V
Mid Channel, 831.6MHz + 841.5MHz										
1.69263	40.32	Pk	25	-30.4	.7	-95.2	-59.58	-13	-46.58	V
1.71494	40.46	Pk	25.2	-30.4	.6	-95.2	-59.34	-13	-46.34	H
2.68816	39.86	Pk	29.2	-29	.6	-95.2	-54.54	-13	-41.54	V
2.69436	39.97	Pk	29.1	-29	.5	-95.2	-54.63	-13	-41.63	H
3.83268	39.29	Pk	31	-27.8	.4	-95.2	-52.31	-13	-39.31	H
3.89711	38.97	Pk	31.4	-27.5	.6	-95.2	-51.73	-13	-38.73	V
High Channel, 834.1MHz + 844MHz										
1.70382	40.93	Pk	25.2	-30.3	.6	-95.2	-58.77	-13	-45.77	H
1.71442	40.59	Pk	25.2	-30.4	.6	-95.2	-59.21	-13	-46.21	V
2.28206	40.26	Pk	27.5	-29.4	.5	-95.2	-56.34	-13	-43.34	H
2.29436	40.06	Pk	27.5	-29.5	.5	-95.2	-56.64	-13	-43.64	V
3.204	38.22	Pk	31.3	-28.4	.6	-95.2	-53.48	-13	-40.48	H
3.23206	39.45	Pk	31.4	-28.3	.4	-95.2	-52.25	-13	-39.25	V

7.1.2. LTE BAND 7

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 7 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13171736									
Date:	8/7/2020									
Test Engineer:	39005									
Configuration:	EUT Only									
Mode:	Band 7 QPSK 20+20									
Chamber #:	Chamber B									
Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	BRF 2495-2690MHz T1790 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz										
5.02453	37.33	Pk	33.7	-25.9	.7	-95.2	-49.37	-25	-24.37	H
5.12438	38.4	Pk	33.9	-26.4	.8	-95.2	-48.5	-25	-23.5	V
7.60453	35.22	Pk	37	-23.7	.4	-95.2	-46.28	-25	-21.28	V
7.72969	34.82	Pk	37.1	-23.4	.3	-95.2	-46.38	-25	-21.38	H
10.54734	33.98	Pk	39.5	-19.7	.6	-95.2	-40.82	-25	-15.82	V
10.56234	32.94	Pk	39.6	-19.4	.8	-95.2	-41.26	-25	-16.26	H
Mid Channel, 2525.1MHz + 2544.9MHz										
5.09344	37.25	Pk	33.9	-26.3	.8	-95.2	-49.55	-25	-24.55	V
5.12672	37.84	Pk	33.8	-26.3	.8	-95.2	-49.06	-25	-24.06	H
7.89094	33.98	Pk	37.3	-22.8	.6	-95.2	-46.12	-25	-21.12	V
7.98984	35.52	Pk	37.1	-23	.3	-95.2	-45.28	-25	-20.28	H
9.74297	34.43	Pk	38.7	-19.9	.7	-95.2	-41.27	-25	-16.27	H
10.52977	34.1	Pk	39.6	-19.7	.5	-95.2	-40.7	-25	-15.7	V
High Channel, 2540.2MHz + 2560MHz										
5.0833	37.74	Pk	33.8	-26.2	.8	-95.2	-49.06	-25	-24.06	V
5.14359	37.97	Pk	33.8	-26.2	.8	-95.2	-48.83	-25	-23.83	H
7.84312	35.7	Pk	37.3	-22.7	.3	-95.2	-44.6	-25	-19.6	H
7.90062	35.57	Pk	37.3	-22.6	.5	-95.2	-44.43	-25	-19.43	V
10.37167	33.85	Pk	39.2	-19.3	.8	-95.2	-40.65	-25	-15.65	V
10.44361	34.8	Pk	39.4	-19.2	.8	-95.2	-39.4	-25	-14.4	H

7.1.3. LTE BAND 41

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 41 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13171736
Date:	8/7/2020
Test Engineer:	39005
Configuration:	EUT Only
Mode:	Band 41 QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	BRF 2495-2690MHz T1790 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz										
4.95516	38.02	Pk	33.5	-26	.6	-95.2	-49.08	-25	-24.08	V
4.95563	36.27	Pk	33.5	-26	.6	-95.2	-50.83	-25	-25.83	H
7.13953	36.58	Pk	36.9	-23.9	.4	-95.2	-45.22	-25	-20.22	H
7.4475	36.07	Pk	36.8	-23.8	.4	-95.2	-45.73	-25	-20.73	V
10.24125	33.62	Pk	38.8	-19.4	.8	-95.2	-41.38	-25	-16.38	V
10.57594	33.77	Pk	39.5	-19.4	.9	-95.2	-40.43	-25	-15.43	H
Mid Channel, 2583.1MHz + 2602.9MHz										
5.07047	36.89	Pk	33.8	-26.1	.7	-95.2	-48.91	-25	-24.01	H
5.14359	36.73	Pk	33.8	-26.2	.8	-95.2	-49.07	-25	-25.07	V
7.67156	35.41	Pk	36.9	-23.3	.4	-95.2	-44.79	-25	-20.11	H
7.68516	35.28	Pk	36.9	-23.4	.5	-95.2	-44.92	-25	-20.70	V
10.94813	34.87	Pk	39.4	-19.4	.9	-95.2	-39.43	-25	-14.00	V
11.02406	33.68	Pk	39.4	-19.5	.5	-95.2	-40.12	-25	-16.09	H
High Channel, 2660.2MHz + 2680MHz										
5.10663	37.07	Pk	34	-26.4	.8	-95.2	-49.73	-25	-24.73	V
5.13689	38.03	Pk	33.9	-26.2	.8	-95.2	-48.67	-25	-23.67	H
7.85283	35.56	Pk	37.3	-22.7	.3	-95.2	-44.74	-25	-19.74	H
8.03306	35.41	Pk	37.1	-22.7	.4	-95.2	-44.99	-25	-19.99	V
10.5555	33.78	Pk	39.5	-19.5	.7	-95.2	-40.72	-25	-15.72	V
10.76496	34.75	Pk	39.3	-19.4	.9	-95.2	-39.65	-25	-14.65	H

8. SETUP PHOTOS

Please refer to 13179116-EP1 for setup photos

Appendix A – Reference Test Report 13179116-E10

Attached is the test report from the parent / reference model. The data from the reference report is being reused for the variant model described in this test report (13171736-E10).



TEST REPORT

Report Number. : 13179116-E10V5

Applicant : APPLE, INC
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

Model : A2172

FCC ID : BCG-E3542A

EUT Description : SMARTPHONE

Test Standard(s) : FCC CFR47 22H, 27L, 27M, and 96

Date Of Issue:
SEPTEMBER 29, 2020

Prepared by:
UL Verification Services Inc.
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NVLAP Lab code: 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	8/27/2020	Initial Review	Mengistu Mekuria
V2	9/9/2020	Addressed TCB Questions	John Thompson
V3	9/10/2020	Addressed TCB Questions	John Thompson
V4	9/10/2020	Addressed TCB Questions	John Thompson
V5	9/29/2020	Updated Antenna gains, and Updated section 5.5	John Thompson

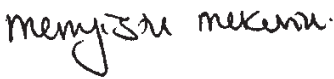
TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	6
2. TEST METHODOLOGY	7
3. FACILITIES AND ACCREDITATION	7
4. DECISION RULES AND MEASUREMENT UNCERTAINTY.....	8
4.1. METROLOGICAL TRACEABILITY	8
4.2. DECISION RULES	8
4.3. MEASUREMENT UNCERTAINTY	8
4.4. SAMPLE CALCULATION	8
5. EQUIPMENT UNDER TEST	9
5.1. DESCRIPTION OF EUT	9
5.2. MAXIMUM OUTPUT POWER	9
5.3. SOFTWARE AND FIRMWARE	12
5.4. MAXIMUM ANTENNA GAIN	12
5.5. WORST-CASE CONFIGURATION AND MODE	13
5.6. DESCRIPTION OF TEST SETUP	14
6. TEST AND MEASUREMENT EQUIPMENT	16
7. RF OUTPUT POWER VERIFICATION.....	18
7.1. LTE BAND 5.....	19
7.2. LTE BAND 7.....	20
7.3. LTE BAND 41.....	23
7.4. LTE BAND 48.....	27
8. CONDUCTED TEST RESULTS	31
8.1. OCCUPIED BANDWIDTH.....	31
8.1.1. LTE BAND 5.....	35
8.1.2. LTE BAND 7.....	36
8.1.3. LTE BAND 41.....	37
8.1.4. LTE BAND 48.....	39
8.2. BAND EDGE AND EMISSION MASK	41
8.2.1. LTE BAND 5.....	43
8.2.2. LTE BAND 7.....	45

8.2.3.	LTE BAND 41.....	48
8.2.4.	LTE BAND 48.....	51
8.3.	OUT OF BAND EMISSIONS	54
8.3.1.	LTE BAND 5.....	55
8.3.2.	LTE BAND 7.....	56
8.3.3.	LTE BAND 41.....	57
8.3.4.	LTE BAND 48.....	58
8.4.	FREQUENCY STABILITY	60
8.4.1.	LTE BAND 5.....	61
8.4.2.	LTE BAND 7.....	62
8.4.3.	LTE BAND 41.....	63
8.4.4.	LTE BAND 48.....	64
8.5.	PEAK-TO-AVERAGE POWER RATIO	65
8.5.1.	LTE BAND 5.....	66
8.5.2.	LTE BAND 7.....	66
8.5.3.	LTE BAND 41.....	67
8.5.4.	LTE BAND 48.....	67
9.	RADIATED TEST RESULTS	68
9.1.	Example Plot.....	68
9.2.	FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT1	70
9.2.1.	LTE BAND 5.....	71
9.2.2.	LTE BAND 7.....	72
9.2.3.	LTE BAND 41.....	73
9.3.	FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT2	74
9.3.1.	LTE BAND 5.....	75
9.3.2.	LTE BAND 7.....	76
9.3.3.	LTE BAND 41.....	77
9.4.	FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT3	78
9.4.1.	LTE BAND 7.....	79
9.4.2.	LTE BAND 41.....	80
9.5.	FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT4	81
9.5.1.	LTE BAND 7.....	82
9.5.2.	LTE BAND 41.....	83
9.5.3.	LTE BAND 48.....	84

9.6.	FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT7	85
9.6.1.	LTE BAND 48.....	86
9.7.	FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT8	87
9.7.1.	LTE BAND 48.....	88
9.8.	FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT9	89
9.8.1.	LTE BAND 48.....	90
10.	SETUP PHOTOS.....	91

1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE, INC 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	A2172
FCC ID	BCG-E3542A
EUT Description	SMARTPHONE
Serial Number	MODEL (A2172): C070287006(Conducted) and G6TD200304FR (Radiated)
Date Tested	MAY 19, 2017 to AUGUST 26, 2020
Applicable Standards	FCC CFR47 22H, 27L, 27M, and 96
Test Results	COMPLIES
UL Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.	
Approved & Released By:	Prepared By:
	
Mengistu Mekuria Lead Test Engineer UL Verification Services Inc.	John Thompson Laboratory Engineer UL Verification Services Inc.

2. 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 27 and Part 96
- [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

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Road
☐ Chamber A	☐ Chamber D	☐ Chamber I
☒ Chamber B	☐ Chamber E	☐ Chamber J
☐ Chamber C	☐ Chamber F	☐ Chamber K
	☐ Chamber G	☐ Chamber L
	☐ Chamber H	☐ Chamber M

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code: 2324A.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. 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.

4.2. 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.)

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{Lab}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB
Occupied Channel Bandwidth	±0.39 %
Temperature	±0.9 °C
Supply voltages	±0.45 %
Time	±0.02 %

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

4.4. 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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and WPT. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

ERP/EIRP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.6

$ERP/EIRP = P_{Meas} + GT - LC$

where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P_{Meas} , typically dBW or dBm);

P_{Meas} = 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.

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 and ERP/EIRP output powers as follows:

OUTPUT POWER FOR LTE BAND 5 (FCC)

Part 22H								
ERP Limit (W)		7.00						
Antenna Gain (dBi)		-5.20						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
5+10	QPSK	826.5	844.0	25.7	18.35	0.068	13836.9	13M8G7W
	16QAM			24.8	17.46	0.056	13834.1	13M8D7W
10+5	QPSK	829.0	846.5	25.7	18.35	0.068	13839	13M8G7W
	16QAM			24.5	17.15	0.052	13917.3	13M9D7W
10+10	QPSK	829.0	844.0	25.7	18.35	0.068	18850.3	18M9G7W
	16QAM			24.8	17.40	0.055	18698.5	18M7D7W

OUTPUT POWER FOR LTE BAND 7

Part 27 / RSS 199								
EIRP Limit (W)		2.00						
Antenna Gain (dBi)		0.90						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
10+20	QPSK	2505.5	2560.0	25.0	25.90	0.389	28084.6	28M1G7W
	16QAM			24.0	24.91	0.310	27991.3	28M0D7W
20+10	QPSK	2510.0	2564.5	25.0	25.90	0.389	27975.4	28M0G7W
	16QAM			24.0	24.93	0.311	27975.4	28M0D7W
15+15	QPSK	2507.5	2562.5	25.0	25.90	0.389	28519.6	28M5G7W
	16QAM			24.1	24.96	0.313	28557.4	28M6D7W
15+20	QPSK	2507.8	2560.0	25.0	25.90	0.389	32768	32M8G7W
	16QAM			24.1	24.97	0.314	32745.4	32M7D7W
20+15	QPSK	2510.0	2562.2	25.0	25.90	0.389	32814.5	32M8G7W
	16QAM			24.0	24.92	0.311	32834.9	32M8D7W
20+20	QPSK	2510.0	2560.0	25.0	25.90	0.389	37658.6	37M7G7W
	16QAM			24.1	24.96	0.313	37600.1	37M6D7W

v

OUTPUT POWER FOR LTE BAND 41

Part 27								
EIRP Limit (W)			2.00					
Antenna Gain (dBi)			0.90					
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
5+20	QPSK	2499.3	2680.0	26.0	26.90	0.490	22812	22M8G7W
	16QAM			24.9	25.79	0.379	22850	22M9D7W
20+5	QPSK	2506.0	2686.7	26.0	26.90	0.490	22804	22M8G7W
	16QAM			25.4	26.31	0.428	22838	22M8D7W
10+20	QPSK	2501.5	2680.0	26.0	26.90	0.490	27.648	27K6G7W
	16QAM			24.6	25.55	0.359	27743	27M7D7W
20+10	QPSK	2506.0	2684.5	26.0	26.90	0.490	27770	27M8G7W
	16QAM			25.5	26.40	0.437	27659	27M7D7W
15+15	QPSK	2503.5	2682.5	26.0	26.90	0.490	28214	28M2G7W
	16QAM			24.6	25.51	0.356	28214	28M2D7W
15+20	QPSK	2503.8	2680.0	26.0	26.90	0.490	32510	32M5G7W
	16QAM			24.6	25.53	0.357	32525	32M5D7W
20+15	QPSK	2506.0	2682.2	26.0	26.90	0.490	32504	32M5G7W
	16QAM			24.7	25.56	0.360	32656	32M7D7W
20+20	QPSK	2506.0	2680.0	26.0	26.90	0.490	37409	37M4G7W
	16QAM			24.6	25.55	0.359	37513	37M5D7W

OUTPUT POWER FOR LTE BAND 48

Part 96								
EIRP Limit (W)/ 10MHz			0.20					
Antenna Gain (dBi)			-0.90					
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
5+20	QPSK	3553.3	3690.0	22.6	21.70	0.148	23321	23M3G7W
	16QAM			22.5	21.63	0.146	23234	23M2D7W
20+5	QPSK	3560.0	3696.7	22.5	21.63	0.146	23227	23M2G7W
	64QAM			22.6	21.74	0.149	23275	23M3D7W
10+20	QPSK	3555.5	3690.0	23.1	22.16	0.164	28072	28M1G7W
	16QAM			23.1	22.20	0.166	27984	28M0D7W
20+10	QPSK	3560.0	3694.5	23.1	22.19	0.165	27983	28M0G7W
	16QAM			23.1	22.20	0.166	27944	27M9D7W
15+20	QPSK	3557.8	3690.0	22.8*	22.70	0.186	32884	32M9G7W
	16QAM			23.6	22.70	0.186	32841	32M8D7W
20+15	QPSK	3560.0	3692.2	23.6	22.70	0.186	32750	32M8G7W
	16QAM			22.8*	22.70	0.186	32772	32M8D7W
20+20	QPSK	3560.0	3690.0	23.6	22.70	0.186	37756	37M8G7W
	16QAM			22.8*	22.70	0.186	37731	37M7D7W

*Values from Ant 7 with Antenna Gain of -0.1dBi, which have a higher EIRP than Ant 9.

5.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 0.28.03-1.

5.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	Antenna Gain (dBi)						
	ANT 1	ANT 2	ANT 3	ANT 4	ANT 7	ANT 8	ANT 9
LTE Band 5, 824 – 849 MHz	-5.2	-5.4	NA	NA	NA	NA	NA
LTE Band 7, 2500 – 2570 MHz	-2.9	0.9	0.9	-3.0	NA	NA	NA
LTE Band 41, 2496 – 2690 MHz	-2.5	0.9	0.9	-2.8	NA	NA	NA
LTE Band 48, 3550 – 3700 MHz	NA	NA	NA	-0.5	-0.1	-5.3	-0.9

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE dual carrier Bands of: Band 5, Band 7, Band 41 and Band 48.

The worst-case scenario for all measurements is based on an engineering evaluation and QPSK was observed as the worst one and set for all conducted and radiated. Output power measurements were measured on QPSK, 16QAM, 64QAM and 256QAM modulations. For testing purposes emissions on sections 8 and 9 were measured while QPSK was set at or above target power for all bands. Conducted tests were performed on the worst case antenna because it has the highest conducted power. ANT1 is the worst case for all bands except Band 48. For band 48 ANT9 is the worst case antenna.

The EUT was investigated in three orthogonal orientations X/Y/Z on all ANT 1, ANT2, ANT3, ANT4, ANT7, ANT8 and ANT 9 antennas to determine the worst case orientation. The following table exhibit the worst case orientation for different frequency bands. The full tests of the EUT have made upon the orientations that shown in the table below.

Bands	ANT1	ANT2	ANT3	ANT4	ANT7	ANT8	ANT9
Cell (850MHz)	Y	Z	N/A	N/A	N/A	N/A	N/A
Band 7, 41	Y	Z	Y	X	N/A	N/A	N/A
Band 48	N/A	N/A	N/A	X	Y	X	Y

For Band Edge and Emission Mask: The highest bandwidth combo was tested. The RB combinations were selected such that the signal is active closest to the band limit, as this is the worst case.

For Out of Band Emissions: The highest bandwidth combination was tested. The highest power RB combination was selected as worst case.

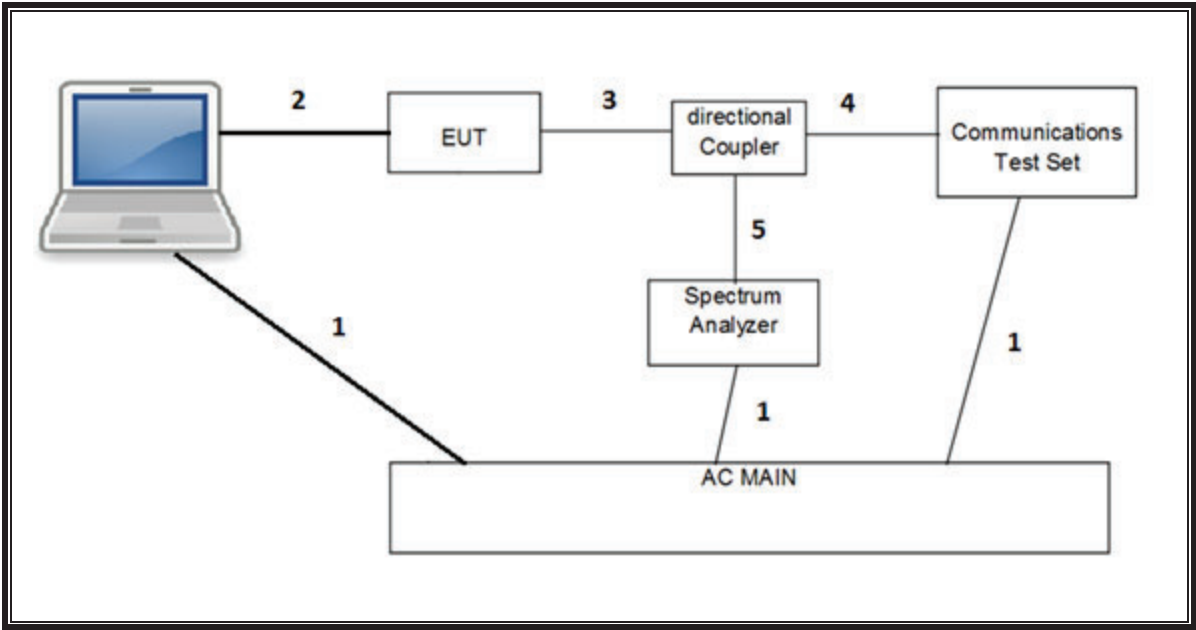
Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found with less than 20dB of margin from 9kHz to 1GHz.

For interband transmission of multiple channels in different antenna combination in Cellular bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths. No noticeable new emission was found.

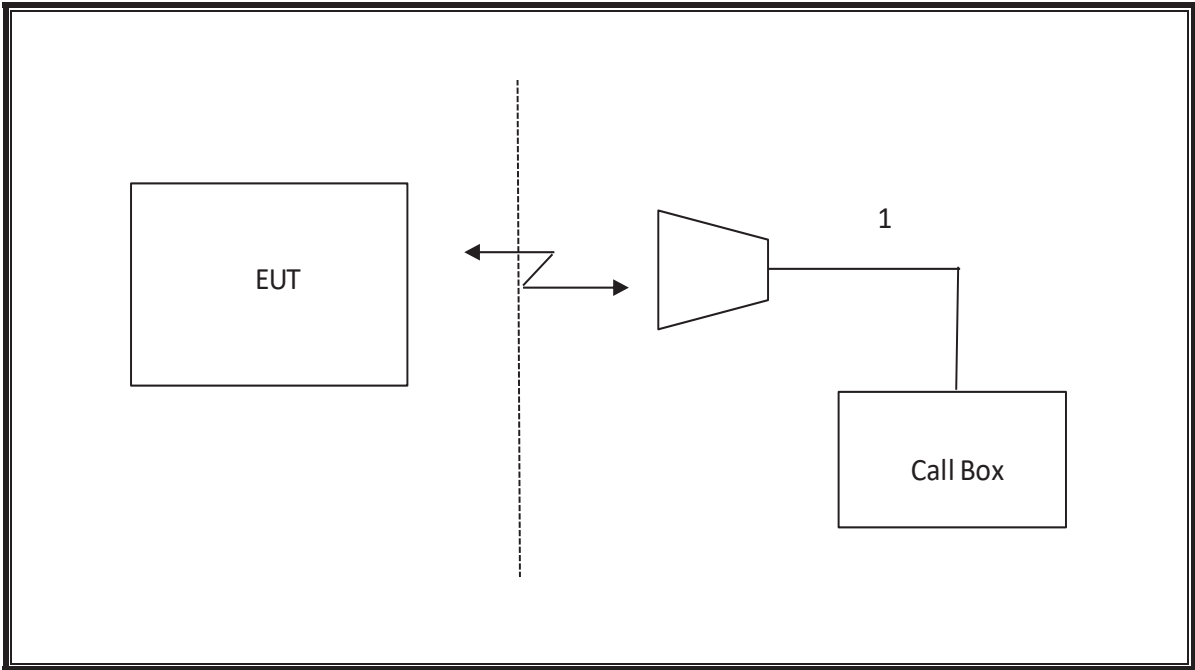
5.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description		Manufacturer	Model	Serial Number		FCC ID/ DoC
Laptop		Apple	A1398	C02PM012G3QD		QDS-BRCM1069
Laptop AC/DC adapter		Liteon Technology	PA-1450-BA1	B123		N/A
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	3	US 115V	Un-shielded	2.0	N/A
2	USB	1	DC	Un-shielded	1.0	N/A
3	RF In/Out	1	EUT	Un-shielded	0.6	N/A
4	RF In/Out	1	Communication Test Set	Un-shielded	1.2	N/A
5	RF In/Out	1	Barrel	N/A	N/A	N/A
I/O CABLES (RF RADIATED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF In/Out	1	Antenna	Un-shielded	5.0	N/A

CONDUCTED SETUP



RADIATED SETUP



6. 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	A.H. Systems, Inc.	SAS-571	T962	01/25/2021
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T346	07/20/2021
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T136	07/07/2021
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T407	05/20/2021
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	PRE0184052	11/12/2020
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	PRE0181575	09/05/2020
Antenna, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T757	10/01/2020
Antenna Horn, 18 to 26GHz	ARA	SWH-28	T125	04/17/2021
Antenna, Horn 26-40GHz	ARA	MWH-2640/B	PRE0182203	04/17/2021
*Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	T1165	05/18/2020
Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	PRE0181078	05/06/2021
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	PRE0180176	07/14/2021
Amplifier, 100KHz to 1GHz, 32dB	Keysight	8447D	T15	10/26/2020
*Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	PRE0180175	05/29/2020
Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	04/08/2021
Amplifier, 26-40GHz	Miteq	TTA2640	T1864	04/08/2021
Filter, BRF 680MHz 1GHz	MICRO-TRONICS	BRM19870	PRE0183134	12/02/2020
Filter, BRF 1850 – 1910 MHz	Micro-Tronics	BRM50714-02	T1796	06/23/2021
Filter, BRF 824 – 848 MHz	Micro-Tronics	BRM20025	PRE0191180	06/23/2021
Filter, BRF 1710 to 1785MHz, 9GHz	MICRO-TRONICS	BRM50713-02	T1794	06/23/2021
Filter, BRF 2495 to 2690MHz	MICRO-TRONICS	BRM50709-02	T1790	06/23/2021
Filter, HPF 1.2 GHz	MICRO-TRONICS	MICRO-TRONICS	T1737	06/23/2021
*Directional Coupler	KRYTAR	152610	T1536	06/09/2020
*Directional Coupler	KRYTAR	152610	T1161	08/14/2020
*Directional Coupler	KRYTAR	152613	T1537	06/08/2020
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T340	01/22/2021
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1454	07/15/2021
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T907	01/22/2021
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	N9030A	T908	05/05/2021
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Keysight	E4440A	T198	01/28/2021
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	E4440A	T200	01/24/2021
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179522	02/18/2021
Wireless Communications Test Set, 8960 Series 10	Agilent	E5515C	T211	02/18/2021
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T948	08/10/2021
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T1871	02/25/2021
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T972	02/24/2021
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T260	02/19/2021
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T959	02/19/2021
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	163287	10/23/2020
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	T754	12/22/2020
Environmental Chamber	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	T1154	12/22/2020
Power Meter, P-series single channel	Keysight	N1912A	T1245	01/22/2021
Power Sensor	Keysight	N1921A	T1225	02/23/2021
UL AUTOMATION SOFTWARE				
CLT Software	UL	UL RF	Ver 7.6, November 11, 2017	
Power Measurement Software	UL	UL RF	Ver 2.7, 2019	
Radiated test software	UL	UL RF	Ver 9.5 June 15, 2019	

NOTES:

* Testing is completed before equipment expiration date.

7. RF OUTPUT POWER VERIFICATION

RULE PART(S)

FCC: §2.1046, §22.713, §27.50

RESULT

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:

7.1. LTE BAND 5

Test Engineer ID:	10646	Test Date:	8/24/2020
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OUTPUT POWER FOR LTE BAND 5 (5.0MHz + 10.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
5MHz / 10MHz	826.5	833.7	1	24	1	0	25.7	24.8	23.2	20.6	24.5	23.4	22.3	19.4
			25	0	50	0	23.9	22.9	22.8	20.8	22.6	21.5	21.5	19.5
	831.6	838.8	1	24	1	0	25.6	24.7	23.2	20.6	24.4	23.3	22.5	19.4
			25	0	50	0	23.7	22.8	22.7	20.7	22.5	21.5	21.5	19.5
	836.8	844.0	1	24	1	0	25.7	24.6	23.1	20.6	24.3	23.4	21.9	19.4
			25	0	50	0	23.8	22.7	22.8	20.7	22.5	21.5	21.5	19.5

OUTPUT POWER FOR LTE BAND 5 (10.0MHz + 5.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
10MHz/ 5MHz	829.0	836.2	1	49	1	0	25.4	24.5	23.3	20.4	24.5	23.6	22.6	19.6
			50	0	25	0	23.6	22.6	22.6	20.6	22.7	21.7	21.7	19.7
	834.3	841.5	1	49	1	0	25.4	24.4	22.8	20.4	24.4	23.5	22.1	19.5
			50	0	25	0	23.6	22.6	22.6	20.5	22.7	21.7	21.7	19.7
	839.3	846.5	1	49	1	0	25.7	24.5	22.2	20.6	24.5	23.5	21.8	19.6
			50	0	25	0	23.6	22.6	22.3	20.6	22.7	21.7	21.7	19.7

OUTPUT POWER FOR LTE BAND 5 (10.0MHz + 10.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
10MHz/ 10MHz	829.0	838.9	1	49	1	0	25.6	24.8	23.5	20.8	24.4	23.5	22.6	19.5
			1	0	1	49	15.4	15.6	15.5	15.5	14.2	14.4	14.2	14.2
			50	0	50	0	23.9	22.9	22.9	20.9	22.7	21.7	21.7	19.7
	831.5	841.4	1	49	1	0	25.6	24.6	23.4	20.7	24.5	23.4	22.5	19.4
			1	0	1	49	15.4	15.3	15.5	15.3	14.2	14.1	14.2	14.1
			50	0	50	0	23.9	22.9	22.9	20.8	22.7	21.7	21.7	19.7
	834.1	844.0	1	49	1	0	25.7	24.6	23.1	20.6	24.5	23.4	22.1	19.5
			1	0	1	49	15.4	15.4	15.2	15.2	14.2	14.2	14.0	14.2
			50	0	50	0	23.9	22.9	22.9	20.8	22.7	21.7	21.7	19.7

7.2. LTE BAND 7

Test Engineer ID:	10646	Test Date:	8/24/2020
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OUTPUT POWER FOR LTE BAND 7 (10.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
10MHz / 20MHz	2505.5	2519.9	1	49	1	0	24.7	23.7	22.9	19.4	21.9	20.8	20.0	16.9
			50	0	100	0	22.8	21.8	21.8	19.6	19.9	18.8	18.8	16.8
	2525.6	2540.0	1	49	1	0	25.7	24.7	23.4	20.5	22.8	21.8	20.8	17.7
			50	0	100	0	23.8	22.9	22.8	20.6	20.9	19.9	19.9	17.8
	2545.6	2560.0	1	49	1	0	25.7	24.7	23.1	20.7	22.7	21.6	20.4	17.6
			50	0	100	0	23.7	22.7	22.7	20.6	20.8	19.8	19.8	17.7

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
10MHz / 20MHz	2505.5	2519.9	1	49	1	0	24.1	23.2	22.0	19.0	21.5	20.6	19.7	16.6
			50	0	100	0	22.1	21.1	21.1	18.9	19.5	18.5	18.6	16.6
	2525.6	2540.0	1	49	1	0	25.0	24.0	23.2	19.9	22.5	21.6	20.7	17.6
			50	0	100	0	23.1	22.1	22.1	20.0	20.6	19.6	19.7	17.7
	2545.6	2560.0	1	49	1	0	24.9	23.9	22.5	20.0	22.5	21.5	20.7	17.6
			50	0	100	0	22.9	21.9	21.9	19.9	20.6	19.6	19.6	17.7

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 10.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 10MHz	2510.0	2524.4	1	99	1	0	24.6	23.7	22.8	19.5	21.8	20.8	19.9	16.7
			100	0	50	0	22.7	21.8	21.8	19.6	19.8	18.9	18.9	16.8
	2530.1	2544.5	1	99	1	0	25.7	24.8	23.4	20.6	22.8	21.9	20.5	17.8
			100	0	50	0	23.8	22.8	22.8	20.7	20.9	19.9	19.9	17.9
	2550.1	2564.5	1	99	1	0	25.6	24.8	23.3	20.5	22.7	21.8	20.7	17.7
			100	0	50	0	23.7	22.7	22.7	20.6	20.8	19.8	19.7	17.7

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 10MHz	2510.0	2524.4	1	99	1	0	24.20	23.20	21.78	19.07	21.50	20.58	19.63	16.45
			100	0	50	0	22.23	21.22	21.24	19.09	19.49	18.52	18.55	16.53
	2530.1	2544.5	1	99	1	0	25.00	24.03	22.75	19.95	22.50	21.47	20.56	17.49
			100	0	50	0	23.14	22.12	22.16	20.11	20.54	19.53	19.57	17.60
	2550.1	2564.5	1	99	1	0	24.95	24.03	22.76	19.80	22.42	21.52	20.57	17.62
			100	0	50	0	22.93	21.96	21.98	19.95	20.45	19.46	19.52	17.55

OUTPUT POWER FOR LTE BAND 7 (15.0MHz + 15.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 15MHz	2507.5	2522.5	1	74	1	0	24.6	23.7	22.7	19.5	21.2	20.4	17.6	16.8
			75	0	75	0	22.7	21.7	21.8	19.6	19.8	18.8	18.8	16.8
	2527.5	2542.5	1	74	1	0	25.7	24.7	23.6	20.5	22.8	21.9	20.9	17.8
			75	0	75	0	23.8	22.8	22.8	20.6	20.9	19.9	19.9	17.8
	2547.5	2562.5	1	74	1	0	25.5	24.5	22.9	20.6	22.7	21.6	20.8	17.7
			75	0	75	0	23.7	22.7	22.7	20.6	20.7	19.8	19.7	17.7

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 15MHz	2507.5	2522.5	1	74	1	0	24.2	23.2	21.7	19.2	21.5	20.5	19.7	16.6
			75	0	75	0	22.1	21.2	21.2	19.0	19.5	18.5	18.6	16.6
	2527.5	2542.5	1	74	1	0	25.0	24.1	23.1	17.3	22.4	21.4	20.6	17.5
			75	0	75	0	23.1	22.1	22.1	16.4	20.6	19.6	19.6	17.7
	2547.5	2562.5	1	74	1	0	24.8	23.9	22.5	19.8	22.5	21.5	20.7	17.7
			75	0	75	0	22.9	21.9	22.0	19.9	20.5	19.5	19.6	17.6

OUTPUT POWER FOR LTE BAND 7 (15.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 20MHz	2507.8	2524.9	1	74	1	0	24.7	23.7	22.6	19.6	21.7	20.9	19.9	16.8
			75	0	100	0	22.7	21.7	21.8	19.6	19.8	18.8	18.9	16.8
	2525.3	2542.4	1	74	1	0	25.7	24.7	23.8	20.5	22.8	21.9	20.9	17.7
			75	0	100	0	23.8	22.8	22.8	20.6	20.9	19.9	19.9	17.8
	2542.9	2560.0	1	74	1	0	25.7	24.7	23.0	20.6	22.7	21.6	20.4	17.8
			75	0	100	0	23.7	22.7	22.7	20.6	20.8	19.8	19.8	17.7

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 20MHz	2507.8	2524.9	1	74	1	0	24.2	23.4	21.5	19.2	21.5	20.6	19.6	16.7
			75	0	100	0	22.1	21.1	21.2	19.0	19.5	18.5	18.6	16.6
	2525.3	2542.4	1	74	1	0	25.0	24.1	23.2	20.0	22.5	21.5	20.6	17.6
			75	0	100	0	23.1	22.1	22.1	20.1	20.6	19.6	19.7	17.7
	2542.9	2560.0	1	74	1	0	24.9	24.0	22.7	19.9	22.5	21.5	20.7	17.5
			75	0	100	0	23.0	22.0	22.0	19.9	20.6	19.6	19.6	17.6

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 15.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 15MHz	2510.0	2527.1	1	99	1	0	24.7	23.8	22.4	19.5	21.8	20.8	19.8	16.8
			100	0	75	0	22.7	21.7	21.8	19.6	19.8	18.8	18.9	16.8
	2527.6	2544.7	1	99	1	0	25.7	24.8	23.2	20.7	22.8	21.9	20.9	17.8
			100	0	75	0	23.8	22.9	22.8	20.6	20.9	19.9	19.9	17.9
	2545.1	2562.2	1	99	1	0	25.6	24.7	22.9	20.5	22.7	21.8	20.8	17.8
			100	0	75	0	23.7	22.7	22.7	20.6	20.8	19.8	19.8	17.8

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 15MHz	2510.0	2527.1	1	99	1	0	24.1	23.2	21.6	19.1	21.5	20.6	19.7	16.5
			100	0	75	0	22.1	21.1	21.1	19.0	19.5	18.6	18.6	16.6
	2527.6	2544.7	1	99	1	0	25.0	24.0	23.0	19.8	22.5	21.4	20.7	17.7
			100	0	75	0	23.1	22.1	22.1	20.0	20.6	19.6	19.6	17.6
	2545.1	2562.2	1	99	1	0	24.9	24.0	22.6	19.7	22.5	21.6	20.6	17.6
			100	0	75	0	22.9	21.9	21.9	19.9	20.5	19.6	19.6	17.6

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz/ 20MHz	2510.0	2529.8	1	99	1	0	24.7	23.8	22.4	19.6	21.7	20.7	19.8	16.7
			1	0	1	99	15.8	15.7	15.8	15.8	12.9	12.9	12.9	12.9
			100	0	100	0	22.7	21.7	21.7	19.5	19.8	18.8	18.8	16.8
	2525.1	2544.9	1	99	1	0	25.7	24.8	23.7	20.5	22.8	21.8	20.9	17.7
			1	0	1	99	16.9	16.9	16.9	16.7	13.9	14.0	14.1	13.8
			100	0	100	0	23.7	22.7	22.7	20.6	20.8	19.8	19.8	17.8
	2540.2	2560.0	1	99	1	0	25.6	24.6	23.1	20.6	22.8	21.9	20.4	17.8
			1	0	1	99	16.8	16.9	16.8	16.7	13.8	13.9	13.9	14.0
			100	0	100	0	23.6	22.6	22.7	20.5	20.7	19.7	19.7	17.7

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz/ 20MHz	2510.0	2529.8	1	99	1	0	24.1	23.2	21.7	19.1	21.5	20.6	19.6	16.6
			1	0	1	99	14.9	14.9	14.9	14.8	12.4	12.4	12.4	12.5
			100	0	100	0	22.1	21.1	21.1	19.0	19.5	18.5	18.5	16.5
	2525.1	2544.9	1	99	1	0	25.0	24.1	23.1	19.8	22.5	21.5	20.7	17.5
			1	0	1	99	16.3	16.3	16.4	16.2	13.7	13.7	13.9	13.7
			100	0	100	0	23.1	22.1	22.1	20.0	20.5	19.6	19.6	17.6
	2540.2	2560.0	1	99	1	0	24.9	23.9	22.7	19.8	22.4	21.6	20.6	17.7
			1	0	1	99	16.1	16.2	16.0	15.9	13.5	13.6	13.8	13.8
			100	0	100	0	22.9	21.9	21.9	19.8	20.5	19.5	19.5	17.5

7.3. LTE BAND 41

Test Engineer ID:	10646	Test Date:	8/23/2020
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OUTPUT POWER FOR LTE BAND 41 (5.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
5MHz / 20MHz	2499.3	2511.0	1	24	1	0	22.4	22.4	22.2	22.6	19.1	16.8	19.2	19.6
			25	0	100	0	22.6	22.6	22.6	22.7	19.5	19.8	19.6	19.7
	2583.8	2595.5	1	24	1	0	27.7	26.6	24.6	23.0	24.8	23.3	22.6	19.7
			25	0	100	0	25.9	24.9	25.0	23.0	22.6	21.9	21.8	19.8
	2668.3	2680.0	1	24	1	0	27.7	26.1	25.1	23.2	24.8	23.6	22.2	20.4
			25	0	100	0	25.8	24.8	25.1	23.2	23.0	22.4	22.2	20.4

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
5MHz / 20MHz	2499.3	2511.0	1	24	1	0	20.6	20.6	19.3	20.4	19.3	19.3	19.1	19.2
			25	0	100	0	21.0	21.0	21.0	20.7	19.5	19.5	19.5	19.4
	2583.8	2595.5	1	24	1	0	26.0	24.6	21.3	21.0	24.5	23.5	21.4	19.8
			25	0	100	0	24.2	23.2	21.0	22.8	21.8	21.8	21.8	19.8
	2668.3	2680.0	1	24	1	0	26.0	24.9	21.0	20.9	24.5	22.9	21.7	19.4
			25	0	100	0	24.3	23.3	22.8	20.9	22.6	21.6	21.7	19.5

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 5.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 5MHz	2506.0	2517.7	1	99	1	0	26.9	26.3	25.2	23.2	24.0	23.8	22.1	20.3
			100	0	25	0	23.0	23.1	23.2	23.2	20.2	20.5	20.4	20.3
	2590.5	2602.2	1	99	1	0	27.7	26.1	26.0	22.8	24.8	23.7	22.6	20.0
			100	0	25	0	25.7	24.7	24.8	22.9	23.0	22.3	22.2	20.1
	2675.0	2686.7	1	99	1	0	27.7	26.4	25.9	23.3	24.8	23.6	23.3	20.3
			100	0	25	0	25.8	24.8	25.1	23.2	22.9	22.3	22.2	20.2

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 5MHz	2506.0	2517.7	1	99	1	0	26.0	25.4	24.3	21.7	24.2	23.7	22.2	20.4
			100	0	25	0	22.0	22.0	22.0	21.8	20.3	20.4	20.3	20.2
	2590.5	2602.2	1	99	1	0	26.0	24.6	24.2	20.9	24.5	23.0	22.6	19.4
			100	0	25	0	24.3	23.3	23.4	21.0	22.7	21.7	21.7	19.6
	2675.0	2686.7	1	99	1	0	26.0	23.9	22.9	20.2	24.5	23.1	22.4	19.6
			100	0	25	0	23.4	22.4	22.4	20.1	22.5	21.6	21.6	19.5

OUTPUT POWER FOR LTE BAND 41 (10.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
10MHz / 20MHz	2501.5	2515.9	1	49	1	0	21.9	22.1	22.2	22.7	19.2	19.6	19.4	19.7
			50	0	100	0	22.3	22.4	22.5	22.7	19.4	19.8	19.7	19.7
	2583.6	2598.0	1	49	1	0	27.7	26.1	26.1	23.2	24.8	23.4	22.9	19.8
			50	0	100	0	25.9	24.9	25.0	23.1	22.6	22.1	22.0	19.9
	2665.6	2680.0	1	49	1	0	27.7	26.3	25.5	23.1	24.8	23.9	23.3	20.5
			50	0	100	0	25.9	24.9	25.1	23.2	23.1	22.5	22.4	20.5

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
10MHz / 20MHz	2501.5	2515.9	1	49	1	0	21.0	20.7	20.7	20.6	19.4	19.3	19.2	19.5
			50	0	100	0	21.0	21.0	21.0	20.7	19.4	19.4	19.4	19.4
	2583.6	2598.0	1	49	1	0	26.0	24.6	24.4	21.0	24.5	23.2	23.0	19.7
			50	0	100	0	24.3	23.3	23.3	21.0	22.9	21.9	21.9	19.8
	2665.6	2680.0	1	49	1	0	26.0	24.6	22.6	21.0	24.5	22.8	22.6	19.5
			50	0	100	0	24.4	23.4	22.7	21.1	22.7	21.6	21.7	19.6

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 10.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 10MHz	2506.0	2520.4	1	99	1	0	26.9	26.3	25.4	23.4	23.9	23.7	22.2	20.3
			100	0	50	0	23.0	23.1	23.2	23.3	20.2	20.5	20.4	20.3
	2588.1	2602.5	1	99	1	0	27.7	26.4	26.0	23.0	24.8	23.7	22.9	20.1
			100	0	50	0	25.8	24.9	25.1	23.1	23.0	22.3	22.3	20.2
	2670.1	2684.5	1	99	1	0	27.7	26.3	25.7	23.3	24.8	23.8	23.3	20.1
			100	0	50	0	25.8	24.8	25.1	23.2	22.9	22.3	22.2	20.2

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 10MHz	2506.0	2520.4	1	99	1	0	26.0	25.5	24.4	22.0	24.3	23.7	22.7	20.4
			100	0	50	0	22.1	22.1	22.1	21.9	20.4	20.4	20.4	20.3
	2588.1	2602.5	1	99	1	0	26.0	24.7	24.2	20.9	24.5	23.1	22.6	19.6
			100	0	50	0	24.4	23.4	23.4	21.1	22.7	21.7	21.7	19.7
	2670.1	2684.5	1	99	1	0	26.0	24.6	23.0	21.0	24.5	23.0	22.6	19.5
			100	0	50	0	24.3	23.1	22.7	21.0	22.6	21.6	21.7	19.6

OUTPUT POWER FOR LTE BAND 41 (15.0MHz + 15.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 15MHz	2503.5	2518.5	1	74	1	0	27.7	26.1	25.2	22.9	24.8	23.6	22.1	20.1
			75	0	75	0	22.8	22.8	23.0	23.0	20.0	20.3	20.4	20.2
	2585.5	2600.5	1	74	1	0	27.7	26.3	26.0	23.0	24.8	23.7	23.3	20.1
			75	0	75	0	25.9	24.9	25.0	23.1	23.0	22.3	22.3	20.2
	2667.5	2682.5	1	74	1	0	27.7	26.1	25.5	23.0	24.8	23.8	23.2	20.4
			75	0	75	0	25.9	24.9	25.0	23.1	23.0	22.5	22.4	20.4

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 15MHz	2503.5	2518.5	1	74	1	0	26.0	24.3	23.2	21.0	24.5	22.8	21.3	19.5
			75	0	75	0	20.9	20.9	21.1	21.1	19.3	19.4	19.4	19.4
	2585.5	2600.5	1	74	1	0	26.0	24.6	24.3	21.3	24.5	23.0	22.4	19.5
			75	0	75	0	24.3	23.4	23.4	21.5	22.7	21.7	21.8	19.7
	2667.5	2682.5	1	74	1	0	26.0	24.6	22.7	21.2	24.5	23.0	22.5	19.5
			75	0	75	0	24.2	23.2	22.7	21.3	22.7	21.7	21.7	19.6

OUTPUT POWER FOR LTE BAND 41 (15.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 20MHz	2503.8	2520.9	1	74	1	0	27.7	26.4	24.9	23.2	24.8	23.7	21.7	20.1
			75	0	100	0	23.0	23.0	23.1	23.2	20.0	20.4	20.3	20.2
	2583.3	2600.4	1	74	1	0	27.7	26.2	26.0	22.9	24.8	23.6	22.9	20.0
			75	0	100	0	25.8	24.9	24.9	23.0	23.0	22.4	22.3	20.1
	2662.9	2680.0	1	74	1	0	27.7	26.1	25.2	22.9	24.8	23.8	23.4	20.3
			75	0	100	0	25.8	24.8	24.9	23.0	23.1	22.5	22.4	20.4

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 20MHz	2503.8	2520.9	1	74	1	0	26.0	24.3	23.0	21.1	24.5	23.2	21.9	19.8
			75	0	100	0	21.0	21.0	21.0	21.0	19.7	19.8	19.8	19.7
	2583.3	2600.4	1	74	1	0	26.0	24.6	24.3	21.3	24.5	23.3	22.9	19.9
			75	0	100	0	24.4	23.4	23.4	21.5	23.0	22.0	22.0	19.9
	2662.9	2680.0	1	74	1	0	26.0	24.5	22.3	21.1	24.5	22.9	22.5	19.4
			75	0	100	0	24.2	23.2	22.4	21.3	22.6	21.7	21.7	19.5

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 15.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 15MHz	2506.0	2523.1	1	99	1	0	27.7	26.2	25.6	23.2	24.8	23.7	22.2	20.1
			100	0	75	0	22.9	23.0	23.0	23.2	20.1	20.4	20.4	20.2
	2585.6	2602.7	1	99	1	0	27.7	26.3	25.9	23.0	24.8	23.7	23.2	20.1
			100	0	75	0	25.9	24.9	25.0	23.1	23.1	22.4	22.4	20.2
	2665.1	2682.2	1	99	1	0	27.7	26.2	25.6	22.9	24.8	23.6	22.9	19.9
			100	0	75	0	25.8	24.9	25.0	23.1	22.7	22.2	22.1	20.0

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 15MHz	2506.0	2523.1	1	99	1	0	26.0	24.4	23.3	21.2	24.5	23.0	21.6	19.4
			100	0	75	0	21.1	21.1	21.2	21.3	19.7	19.7	19.7	19.6
	2585.6	2602.7	1	99	1	0	26.0	24.7	24.2	21.2	24.5	22.9	22.6	19.5
			100	0	75	0	24.4	23.4	23.5	21.4	22.8	21.8	21.8	19.7
	2665.1	2682.2	1	99	1	0	26.0	24.7	22.8	21.3	24.5	22.9	22.5	19.5
			100	0	75	0	24.3	23.3	22.8	21.3	22.6	21.6	21.6	19.5

OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 1				Ant 2			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz/ 20MHz	2506.0	2525.8	1	99	1	0	27.7	26.2	25.5	23.2	24.8	23.6	22.2	20.2
			1	0	1	99	14.9	15.1	14.9	14.5	11.9	10.7	12.3	11.7
			100	0	100	0	22.9	23.0	23.1	23.1	20.0	20.4	20.3	20.2
	2583.1	2602.9	1	99	1	0	27.7	26.3	26.1	23.2	24.8	23.7	23.1	20.1
			1	0	1	99	19.6	19.1	18.6	19.0	16.2	16.4	16.1	15.9
			100	0	100	0	26.2	25.2	25.2	23.3	23.1	22.3	22.3	20.2
	2660.2	2680.0	1	99	1	0	27.7	26.3	25.4	22.9	24.8	23.8	23.1	20.1
			1	0	1	99	18.5	17.8	17.3	17.8	15.6	14.6	13.6	15.0
			100	0	100	0	25.9	24.9	25.1	23.1	23.0	22.4	22.4	20.2

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 3				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz/ 20MHz	2506.0	2525.8	1	99	1	0	26.0	24.6	23.4	21.1	24.5	23.1	21.8	19.5
			1	0	1	99	12.9	12.9	12.3	12.9	11.3	9.8	11.0	11.3
			100	0	100	0	21.2	21.3	21.3	21.2	19.8	19.8	19.8	19.6
	2583.1	2602.9	1	99	1	0	26.0	24.6	24.2	21.1	24.5	22.8	22.6	19.6
			1	0	1	99	17.8	15.6	17.9	16.9	15.9	13.0	16.4	15.5
			100	0	100	0	24.4	23.4	23.4	21.4	22.8	21.8	21.8	19.7
	2660.2	2680.0	1	99	1	0	26.0	24.6	22.6	21.3	24.5	22.8	22.4	19.2
			1	0	1	99	15.9	16.0	15.0	13.4	15.0	15.3	15.2	14.2
			100	0	100	0	24.4	23.4	22.6	21.3	22.6	21.6	21.7	19.5

7.4. LTE BAND 48

Test Engineer ID:	10646	Test Date:	8/23/2020
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OUTPUT POWER FOR LTE BAND 48 (5.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 7				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
5MHz / 20MHz	3553.3	3565.0	1	24	1	0	17.9	18.0	17.9	18.3	15.9	15.8	16.0	16.5
			25	0	100	0	11.6	11.6	11.5	11.6	9.5	9.5	9.5	9.6
	3615.8	3627.5	1	24	1	0	21.8	21.7	19.5	18.5	20.0	20.0	19.8	17.5
			25	0	100	0	20.0	20.0	20.0	18.3	18.1	18.2	18.2	17.3
	3678.3	3690.0	1	24	1	0	18.3	11.0	18.1	15.7	16.4	16.4	14.0	16.5
			25	0	100	0	11.9	12.0	11.9	11.1	10.0	10.1	10.0	10.2

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 9				Ant 8			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
5MHz / 20MHz	3553.3	3565.0	1	24	1	0	18.9	18.7	18.8	19.1	17.3	17.3	17.7	17.3
			25	0	100	0	12.5	12.5	12.4	12.4	10.8	10.8	10.8	10.8
	3615.8	3627.5	1	24	1	0	22.6	22.5	22.4	19.5	21.2	21.2	20.9	18.4
			25	0	100	0	20.5	20.5	20.4	19.5	19.4	19.4	19.4	18.4
	3678.3	3690.0	1	24	1	0	19.1	18.1	18.7	19.0	17.7	17.7	17.5	17.6
			25	0	100	0	12.8	12.8	12.7	12.7	11.3	11.3	11.3	11.3

OUTPUT POWER FOR LTE BAND 48 (20.0MHz + 5.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 7				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 5MHz	3560.0	3571.7	1	99	1	0	17.9	17.9	18.3	18.2	16.4	16.4	16.5	16.5
			100	0	25	0	11.0	11.0	11.0	11.1	9.6	9.6	9.5	9.4
	3622.5	3634.2	1	99	1	0	21.7	21.7	21.8	18.7	19.9	19.9	20.0	16.6
			100	0	25	0	19.9	19.9	19.9	18.9	18.2	18.2	18.2	16.8
	3685.0	3696.7	1	99	1	0	18.1	18.2	18.0	18.3	16.0	16.1	16.5	15.8
			100	0	25	0	11.1	11.1	11.1	11.2	9.1	9.1	9.1	8.7

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 9				Ant 8			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 5MHz	3560.0	3571.7	1	99	1	0	18.7	18.7	19.1	18.7	17.3	17.3	17.7	17.5
			100	0	25	0	12.0	12.0	11.9	12.0	10.4	10.4	10.4	10.4
	3622.5	3634.2	1	99	1	0	22.5	22.5	22.6	19.8	21.2	21.1	21.2	18.1
			100	0	25	0	20.7	20.7	20.7	19.7	19.3	19.3	19.3	18.2
	3685.0	3696.7	1	99	1	0	19.1	19.1	19.0	19.1	17.6	17.7	17.6	17.7
			100	0	25	0	12.1	12.1	12.0	12.1	10.6	10.6	10.6	10.6

OUTPUT POWER FOR LTE BAND 48 (10.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 7				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
10MHz / 20MHz	3555.5	3569.9	1	49	1	0	17.6	17.7	17.6	17.8	16.3	16.4	16.3	16.1
			50	0	100	0	12.7	12.7	12.7	12.7	11.4	11.4	11.4	11.1
	3615.6	3630.0	1	49	1	0	22.2	22.3	22.1	19.0	20.8	20.9	20.6	17.1
			50	0	100	0	19.3	19.3	19.4	18.8	17.9	17.9	17.9	17.1
	3675.6	3690.0	1	49	1	0	17.7	17.8	17.7	17.8	16.3	16.3	16.4	16.0
			50	0	100	0	12.9	12.8	12.8	12.9	11.4	11.4	11.4	11.1

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 9				Ant 8			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
10MHz / 20MHz	3555.5	3569.9	1	49	1	0	18.2	18.3	18.6	18.4	17.0	17.2	17.1	17.2
			50	0	100	0	13.3	13.2	13.3	13.3	12.1	12.2	12.2	12.2
	3615.6	3630.0	1	49	1	0	23.1	23.1	22.6	20.0	21.6	21.7	21.5	18.3
			50	0	100	0	20.3	20.3	20.3	19.9	18.7	18.8	18.8	18.3
	3675.6	3690.0	1	49	1	0	18.2	18.3	18.2	18.6	17.0	17.0	17.0	17.2
			50	0	100	0	13.5	13.4	13.4	13.4	12.0	12.1	12.0	12.0

OUTPUT POWER FOR LTE BAND 48 (20.0MHz + 10.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 7				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 10MHz	3560.0	3574.4	1	99	1	0	17.3	17.4	17.8	17.6	16.4	16.4	16.2	16.1
			100	0	50	0	12.6	12.5	12.5	12.5	11.3	11.3	11.4	11.1
	3620.1	3634.5	1	99	1	0	22.3	22.3	21.8	18.7	20.9	20.8	20.8	17.2
			100	0	50	0	19.4	19.4	19.4	18.8	17.9	18.0	17.9	17.3
	3680.1	3694.5	1	99	1	0	17.7	17.7	17.6	17.8	16.3	16.1	16.3	16.3
			100	0	50	0	12.7	12.6	12.6	12.7	11.4	11.4	11.4	11.2

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 9				Ant 8			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 10MHz	3560.0	3574.4	1	99	1	0	18.6	18.4	18.6	18.5	16.8	16.8	17.2	16.9
			100	0	50	0	13.8	13.7	13.7	13.8	12.0	12.0	12.0	11.9
	3620.1	3634.5	1	99	1	0	23.1	23.1	22.5	19.5	21.7	21.6	21.2	18.1
			100	0	50	0	20.1	20.1	20.1	19.6	18.8	18.8	18.8	18.2
	3680.1	3694.5	1	99	1	0	18.1	18.2	18.6	18.5	17.1	17.1	17.0	17.2
			100	0	50	0	13.4	13.3	13.3	13.3	12.0	12.1	12.1	12.0

OUTPUT POWER FOR LTE BAND 48 (15.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 7				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 20MHz	3557.8	3574.9	1	74	1	0	17.6	17.7	17.6	17.8	16.2	16.3	16.3	16.2
			75	0	100	0	12.6	12.6	12.6	12.5	11.6	11.6	11.6	11.1
	3615.3	3632.4	1	74	1	0	22.8	22.7	21.7	19.0	21.5	21.7	20.9	17.2
			75	0	100	0	19.3	19.4	19.4	18.8	18.1	18.1	18.1	17.2
	3672.9	3690.0	1	74	1	0	17.4	17.5	17.8	17.5	16.5	16.6	16.5	16.1
			75	0	100	0	12.6	12.5	12.5	12.6	11.6	11.7	11.7	11.2

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 9				Ant 8			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
15MHz / 20MHz	3557.8	3574.9	1	74	1	0	18.5	18.5	18.4	18.6	17.0	17.1	17.1	17.2
			75	0	100	0	13.6	13.5	13.5	13.6	12.1	12.1	12.1	12.1
	3615.3	3632.4	1	74	1	0	23.5	23.6	22.8	19.6	22.1	22.2	21.5	18.3
			75	0	100	0	20.1	20.1	20.2	19.6	18.8	18.8	18.8	18.2
	3672.9	3690.0	1	74	1	0	18.2	18.3	18.3	18.6	16.9	17.1	17.0	17.2
			75	0	100	0	13.5	13.3	13.4	13.4	12.0	12.0	12.0	12.0

OUTPUT POWER FOR LTE BAND 48 (20.0MHz + 15.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 7				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 15MHz	3560.0	3577.1	1	99	1	0	17.6	17.4	17.6	17.8	16.0	16.0	16.4	15.9
			100	0	75	0	12.7	12.7	12.7	12.7	11.2	11.3	11.2	10.9
	3617.6	3634.7	1	99	1	0	22.8	22.8	21.7	18.6	21.4	21.3	20.4	17.1
			100	0	75	0	19.2	19.3	19.3	18.7	17.9	17.9	17.9	17.2
	3675.1	3692.2	1	99	1	0	17.7	17.7	17.6	17.8	16.4	16.3	16.2	15.9
			100	0	75	0	12.7	12.6	12.6	12.7	11.4	11.4	11.5	11.1

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)							
			Size	Offset	Size	Offset	Ant 9				Ant 8			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz / 15MHz	3560.0	3577.1	1	99	1	0	18.6	18.6	18.4	18.6	16.7	16.8	17.2	17.0
			100	0	75	0	13.6	13.5	13.6	13.6	11.9	12.0	11.9	11.9
	3617.6	3634.7	1	99	1	0	23.6	23.5	23.0	19.8	22.2	22.1	21.2	18.2
			100	0	75	0	20.2	20.2	20.2	19.8	18.8	18.8	18.8	18.3
	3675.1	3692.2	1	99	1	0	18.6	18.5	18.6	18.6	17.1	17.1	17.0	17.2
			100	0	75	0	13.8	13.6	13.7	13.7	12.0	12.1	12.1	12.0

OUTPUT POWER FOR LTE BAND 48 (20.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 7				Ant 4			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz/20MHz	3560.0	3579.8	1	99	1	0	18.8	18.8	19.3	18.6	17.7	17.7	17.6	17.0
			1	0	1	99	5.1	5.2	5.4	5.3	3.9	3.9	3.8	3.8
			100	0	100	0	12.5	12.5	12.5	12.5	11.1	11.1	11.1	10.9
	3615.1	3634.9	1	99	1	0	22.8	22.8	21.8	19.0	21.2	21.2	20.6	17.4
			1	0	1	99	12.3	12.3	12.3	12.2	10.6	10.6	10.9	10.6
			100	0	100	0	19.4	19.4	19.4	18.9	17.8	17.8	17.9	17.2
	3670.2	3690.0	1	99	1	0	19.3	19.3	19.2	18.6	17.7	17.6	17.7	16.6
			1	0	1	99	5.5	5.5	5.5	5.4	4.0	4.1	4.1	3.5
			100	0	100	0	12.7	12.6	12.7	12.7	11.3	11.3	11.3	10.8

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm)							
							Ant 9				Ant 8			
							QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
20MHz/20MHz	3560.0	3579.8	1	99	1	0	20.1	20.1	20.0	19.7	18.7	18.5	18.7	18.2
			1	0	1	99	6.5	6.5	6.4	6.6	4.9	4.9	5.0	4.9
			100	0	100	0	13.7	13.6	13.6	13.6	12.2	12.2	12.2	12.2
	3615.1	3634.9	1	99	1	0	23.6	23.5	23.0	19.9	22.2	22.2	21.1	18.3
			1	0	1	99	13.2	13.2	13.4	13.1	11.6	11.6	11.6	11.7
			100	0	100	0	20.2	20.2	20.3	19.8	18.6	18.7	18.6	18.1
	3670.2	3690.0	1	99	1	0	20.0	20.0	20.1	19.5	18.3	18.3	18.7	18.0
			1	0	1	99	6.3	6.3	6.3	6.3	4.6	4.6	4.8	4.6
			100	0	100	0	13.7	13.5	13.6	13.6	11.9	11.9	11.9	11.8

8. CONDUCTED TEST RESULTS

8.1. 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. Only QPSK plots are reported to show setting parameter complies with testing method/procedure.

LTE BAND 5

Band	Mode	RB Allocation/RB Offset	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
	5MHz + 10MHz BAND QPSK	25/0 + 50/0	836.5	13.8369	14.488
	5MHz + 10MHz BAND 16QAM			13.8341	14.366
	5MHz + 10MHz BAND 64QAM			13.8238	14.417
	10MHz + 5MHz BAND QPSK	50/0 + 25/0		13.8390	14.443
	10MHz + 5MHz BAND 16QAM			13.9173	14.371
	10MHz + 5MHz BAND 64QAM			13.8723	14.408
	10MHz + 10MHz BAND QPSK	50/0 + 50/0		18.8503	19.707
	10MHz + 10MHz BAND 16QAM			18.6985	19.767
	10MHz + 10MHz BAND 64QAM			18.7840	19.728

LTE BAND 7

Band	Mode	RB Allocation/RB Offset	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 7	10MHz + 20MHz BAND QPSK	50/0 + 100/0	2535	28.0846	30.173
	10MHz + 20MHz BAND 16QAM			27.9913	30.052
	10MHz + 20MHz BAND 64QAM			27.9658	30.134
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		27.9754	30.119
	20MHz + 10MHz BAND 16QAM			27.9754	30.125
	20MHz + 10MHz BAND 64QAM			28.0283	30.135
	15MHz + 15MHz BAND QPSK	75/0 + 75/0		28.5196	30.784
	15MHz + 15MHz BAND 16QAM			28.5574	30.692
	15MHz + 15MHz BAND 64QAM			28.5587	30.660
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		32.7680	34.973
	15MHz + 20MHz BAND 16QAM			32.7454	35.104
	15MHz + 20MHz BAND 64QAM			32.8072	34.994
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		32.8145	35.178
	20MHz + 15MHz BAND 16QAM			32.8158	35.090
	20MHz + 15MHz BAND 64QAM			32.8349	35.046
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.6586	40.175
	20MHz + 20MHz BAND 16QAM			37.6001	40.172
	20MHz + 20MHz BAND 64QAM			37.7190	39.924

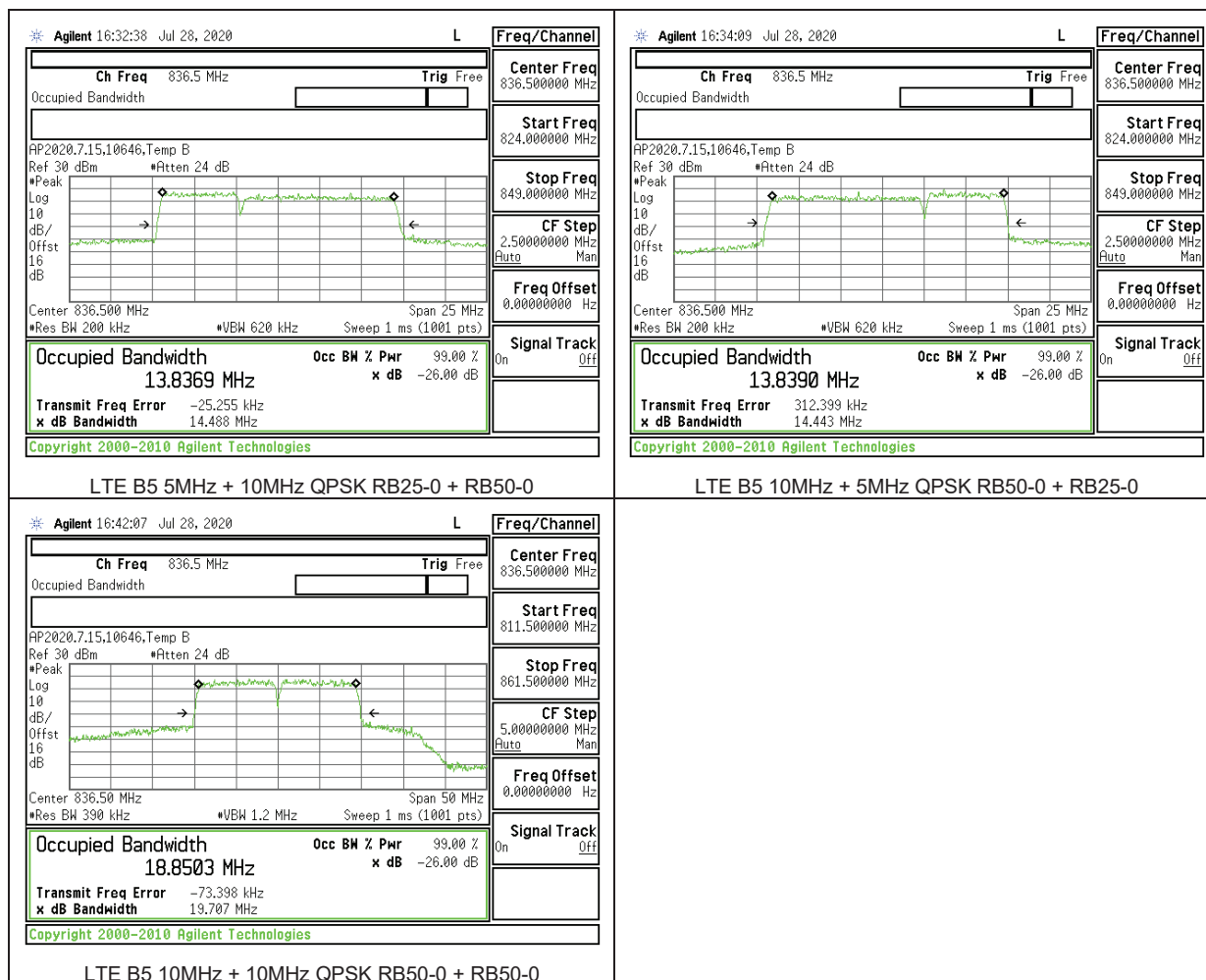
LTE BAND 41

Band	Mode	RB Allocation/RB Offset	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 41 (FCC)	5MHz + 20MHz BAND QPSK	25/0 + 100/0	2593	22.812	23.92
	5MHz + 20MHz BAND 16QAM			22.850	23.69
	5MHz + 20MHz BAND 64QAM			22.827	23.83
	20MHz + 5MHz BAND QPSK	100/0 + 25/0		22.804	23.81
	20MHz + 5MHz BAND 16QAM			22.838	23.86
	20MHz + 5MHz BAND 64QAM			22.859	23.85
	10MHz + 20MHz BAND QPSK	50/0 + 100/0		27.648	28.81
	10MHz + 20MHz BAND 16QAM			27.743	29.01
	10MHz + 20MHz BAND 64QAM			27.613	29.74
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		27.770	28.74
	20MHz + 10MHz BAND 16QAM			27.659	28.66
	20MHz + 10MHz BAND 64QAM			27.648	28.79
	15MHz + 15MHz BAND QPSK	75/0 + 75/0		28.214	29.30
	15MHz + 15MHz BAND 16QAM			28.214	29.34
	15MHz + 15MHz BAND 64QAM			28.306	29.50
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		32.510	33.87
	15MHz + 20MHz BAND 16QAM			32.525	33.89
	15MHz + 20MHz BAND 64QAM			32.439	33.69
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		32.504	33.67
	20MHz + 15MHz BAND 16QAM			32.656	33.72
	20MHz + 15MHz BAND 64QAM			32.551	33.74
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.409	38.63
	20MHz + 20MHz BAND 16QAM			37.513	38.66
	20MHz + 20MHz BAND 64QAM			37.247	38.97

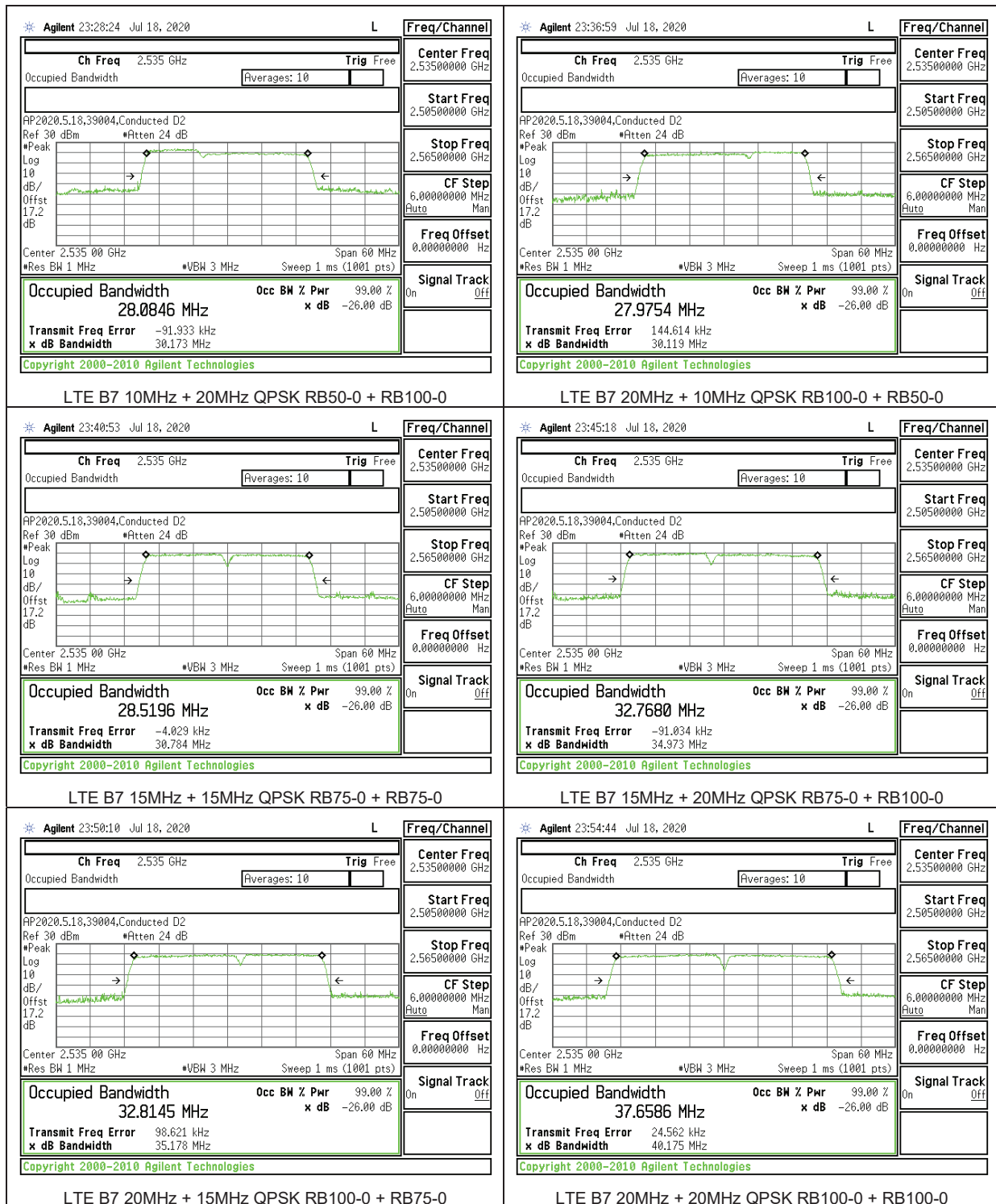
LTE BAND 48

Band	Mode	RB Allocation/RB Offset	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 48 (FCC)	5MHz + 20MHz BAND QPSK	25/0 + 100/0	3625	23.321	25.11
	5MHz + 20MHz BAND 16QAM			23.234	24.99
	5MHz + 20MHz BAND 64QAM			23.208	24.87
	20MHz + 5MHz BAND QPSK	100/0 + 25/0		23.227	25.08
	20MHz + 5MHz BAND 64QAM			23.275	25.01
	20MHz + 5MHz BAND 16QAM			23.322	25.01
	10MHz + 20MHz BAND QPSK	50/0 + 100/0		28.072	29.75
	10MHz + 20MHz BAND 16QAM			27.984	29.98
	10MHz + 20MHz BAND 64QAM			27.986	29.94
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		27.983	30.06
	20MHz + 10MHz BAND 16QAM			27.944	30.03
	20MHz + 10MHz BAND 64QAM			28.057	30.07
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		32.884	34.96
	15MHz + 20MHz BAND 16QAM			32.841	34.98
	15MHz + 20MHz BAND 64QAM			32.952	35.08
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		32.750	34.95
	20MHz + 15MHz BAND 16QAM			32.772	35.14
	20MHz + 15MHz BAND 64QAM			32.883	34.86
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.756	40.31
	20MHz + 20MHz BAND 16QAM			37.731	39.89
	20MHz + 20MHz BAND 64QAM			37.569	39.81

8.1.1. LTE BAND 5

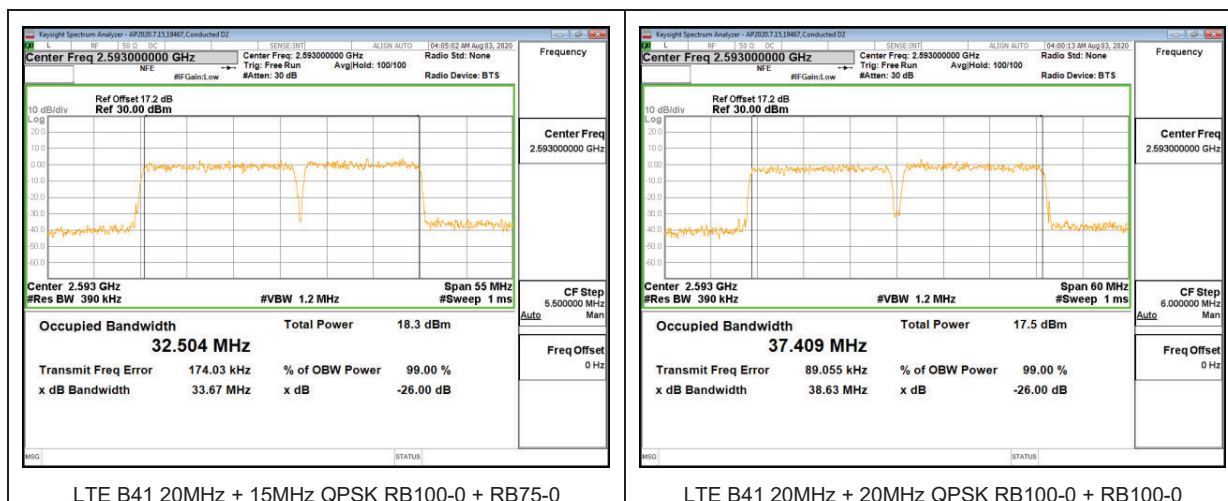


8.1.2. LTE BAND 7

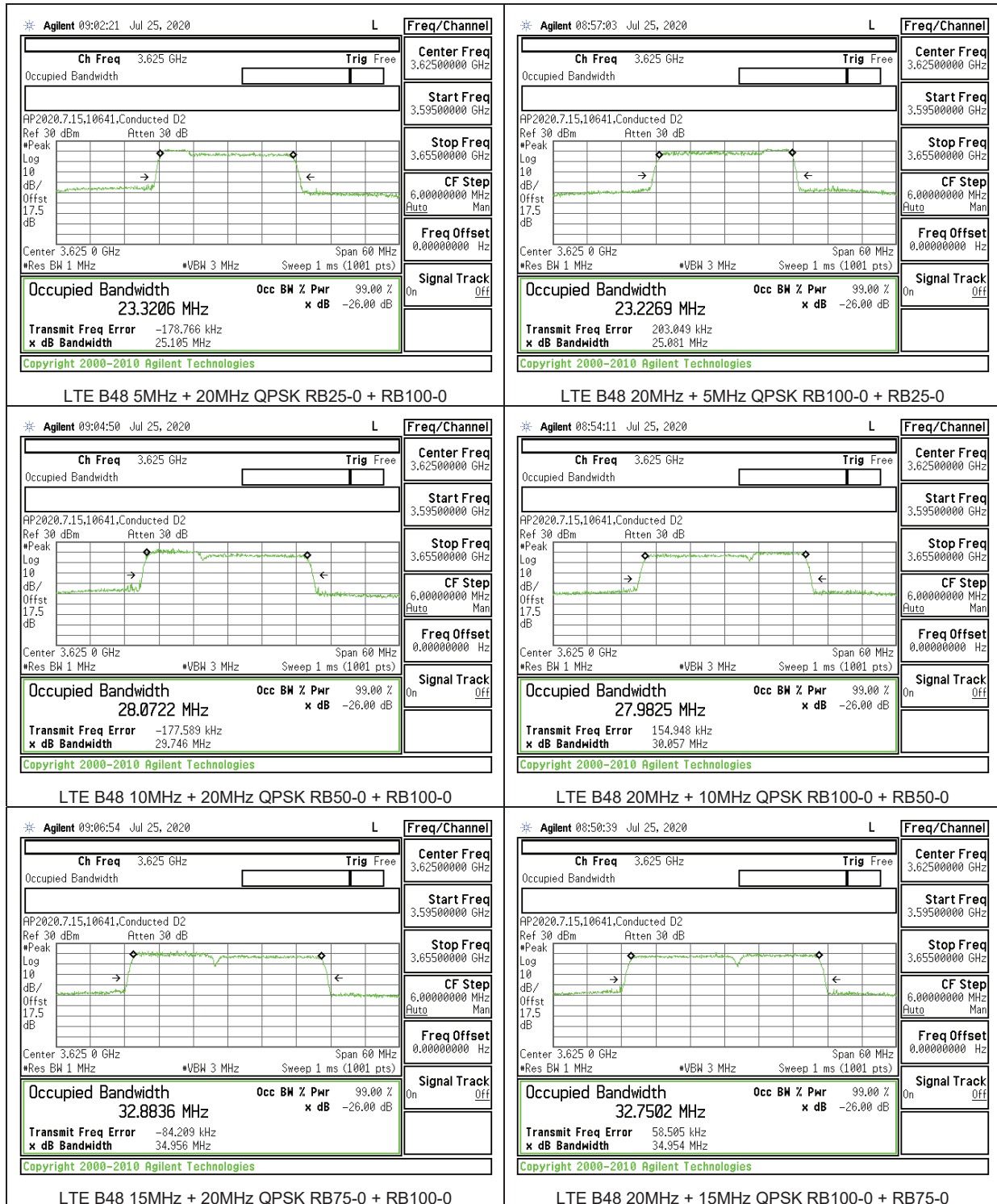


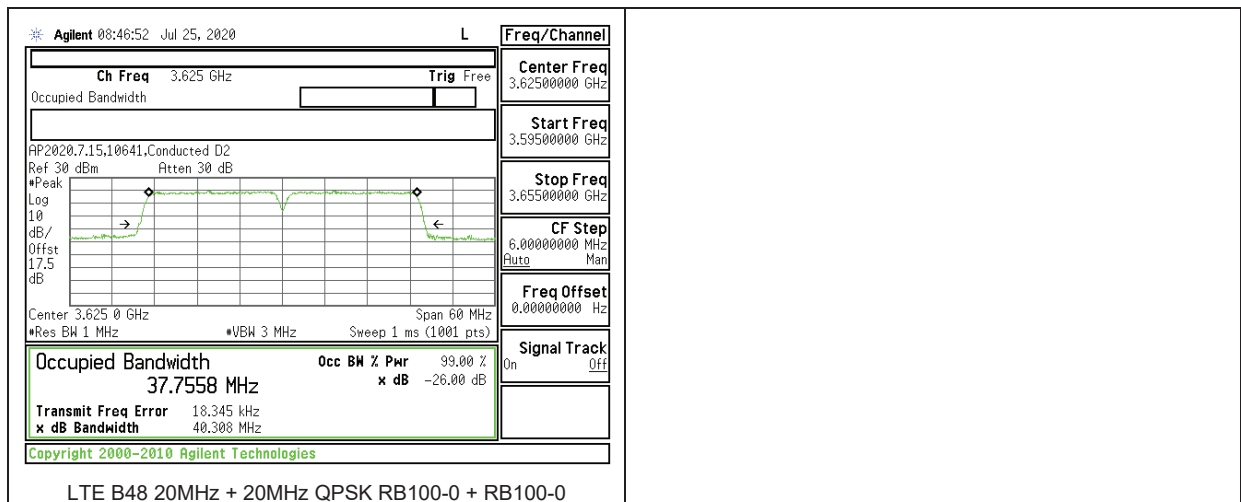
8.1.3. LTE BAND 41





8.1.4. LTE BAND 48





8.2. BAND EDGE AND EMISSION MASK

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.

TEST PROCEDURE FOR FCC PART 27

(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 FCC PART 96

(3) Measurement procedure.

(i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's authorized frequency channel, a resolution bandwidth of no less than one percent of the fundamental emission bandwidth 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 reference bandwidth (i.e., 1 MHz or 1 percent of emission bandwidth, as specified). The fundamental 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.

(ii) When measuring unwanted emissions to demonstrate compliance with the limits, the CBSD and End User Device nominal carrier frequency/channel shall be adjusted as close to the licensee's authorized frequency block edges, both upper and lower, as the design permits.

(iii) Compliance with emission limits shall be demonstrated using either average (RMS)-detected or peak-detected power measurement techniques.

RESULTS

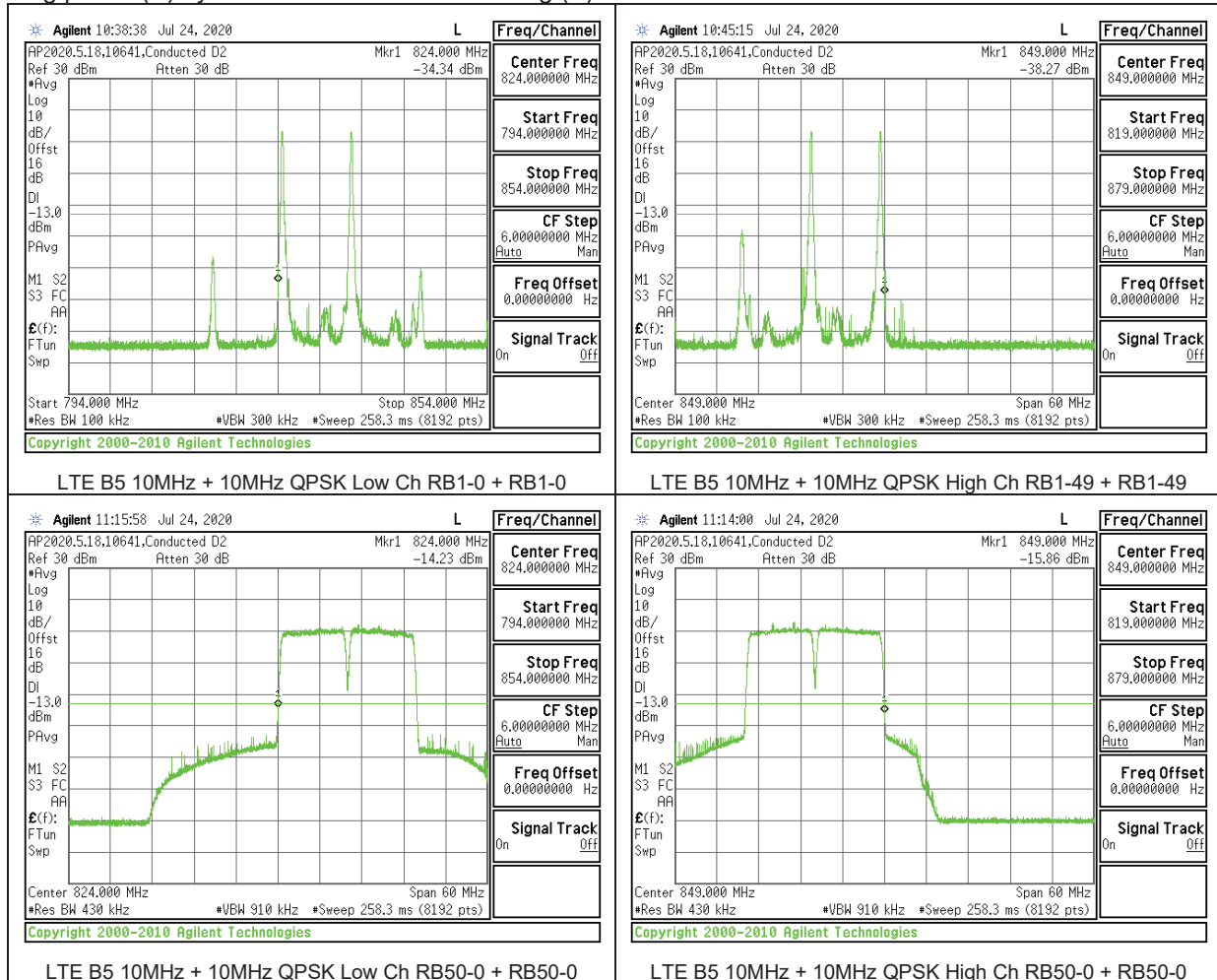
Both maximum + maximum bandwidth combinations of QPSK and 16QAM modes are tested, QPSK results are reported as worst case.

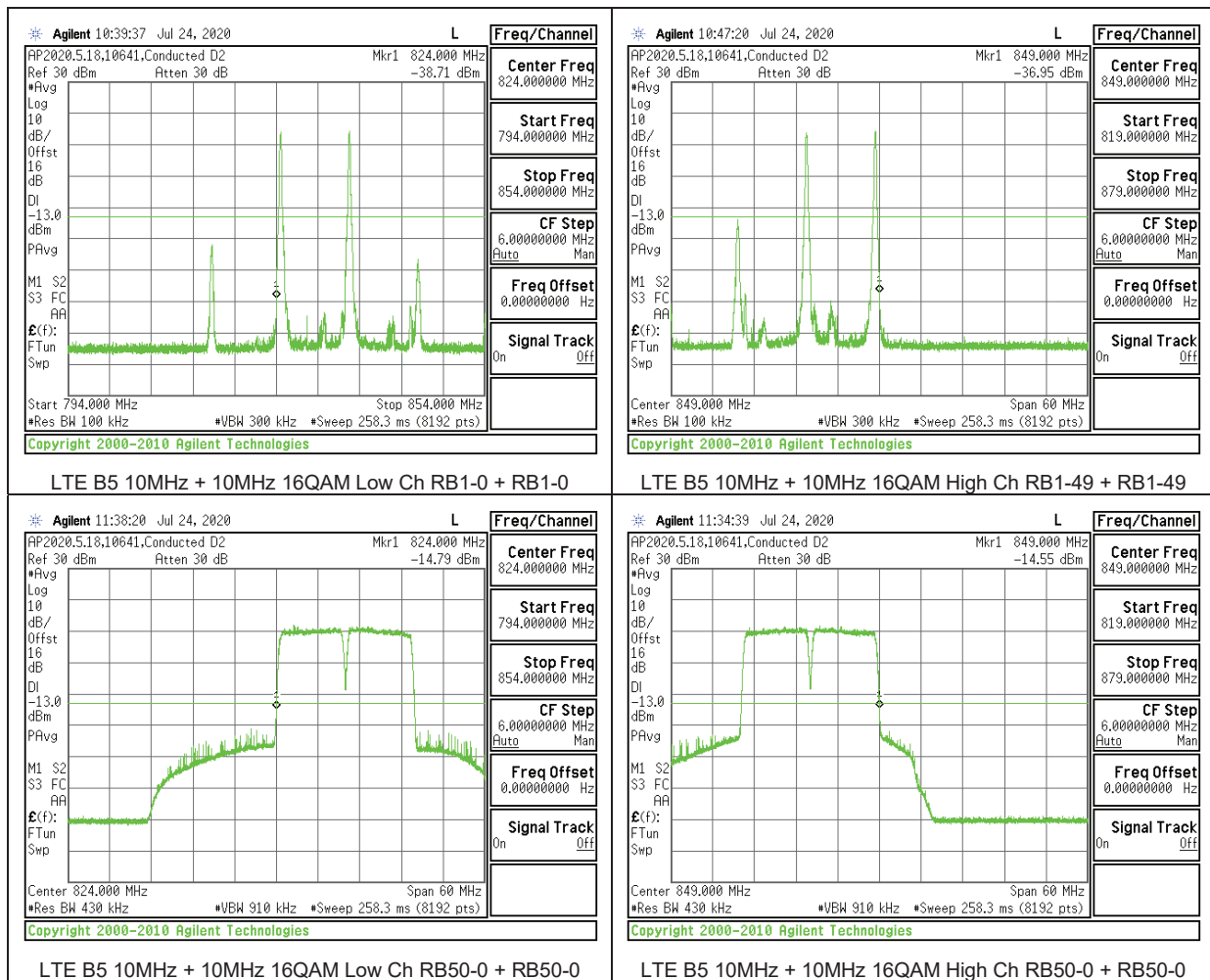
8.2.1. LTE BAND 5

LIMITS

FCC: §22.917

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.





8.2.2. LTE BAND 7

LIMITS

FCC: §27.53(m)(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 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.



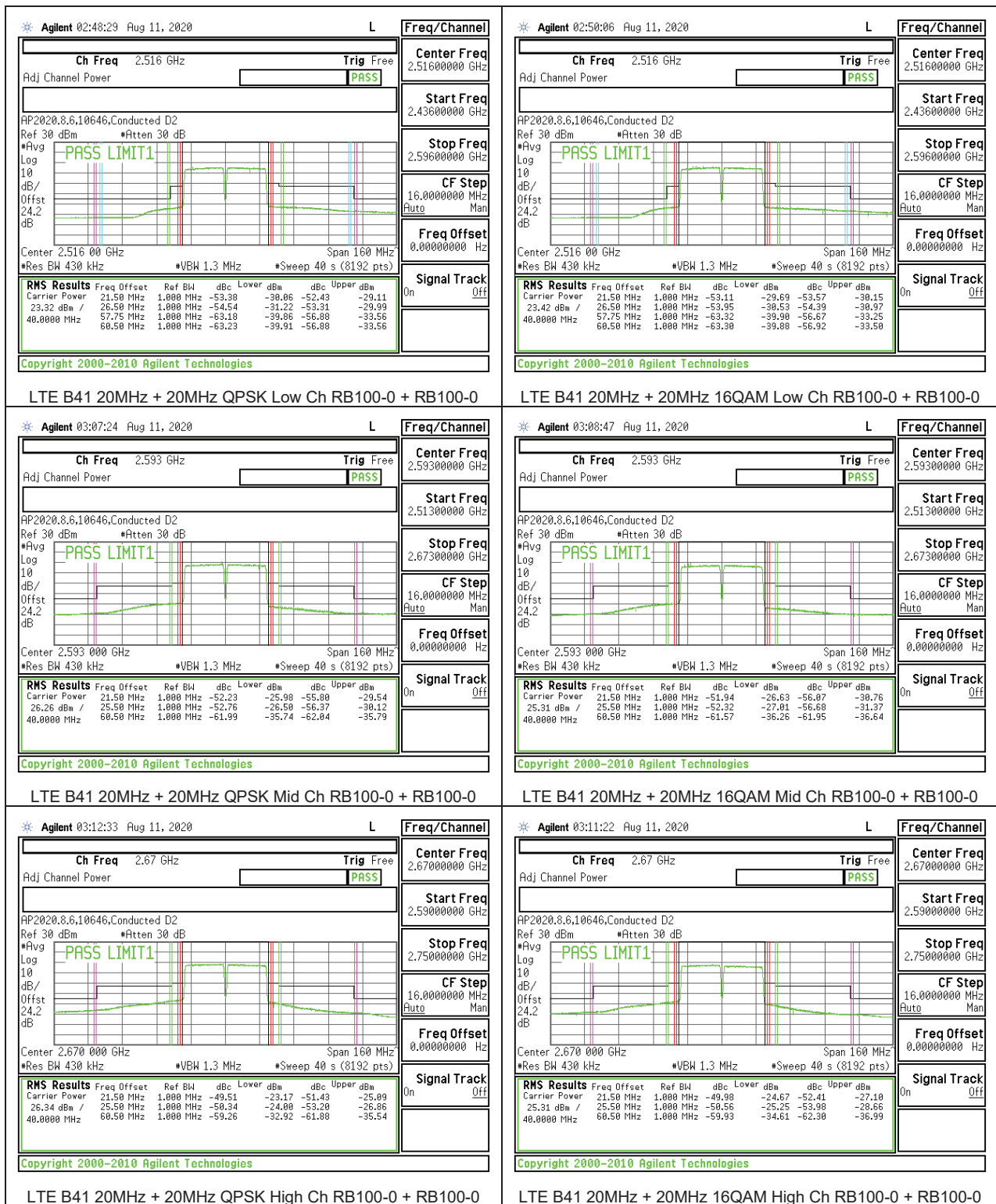


8.2.3. LTE BAND 41

LIMITS

FCC: §27.53(m)(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 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.





8.2.4. LTE BAND 48

LIMITS

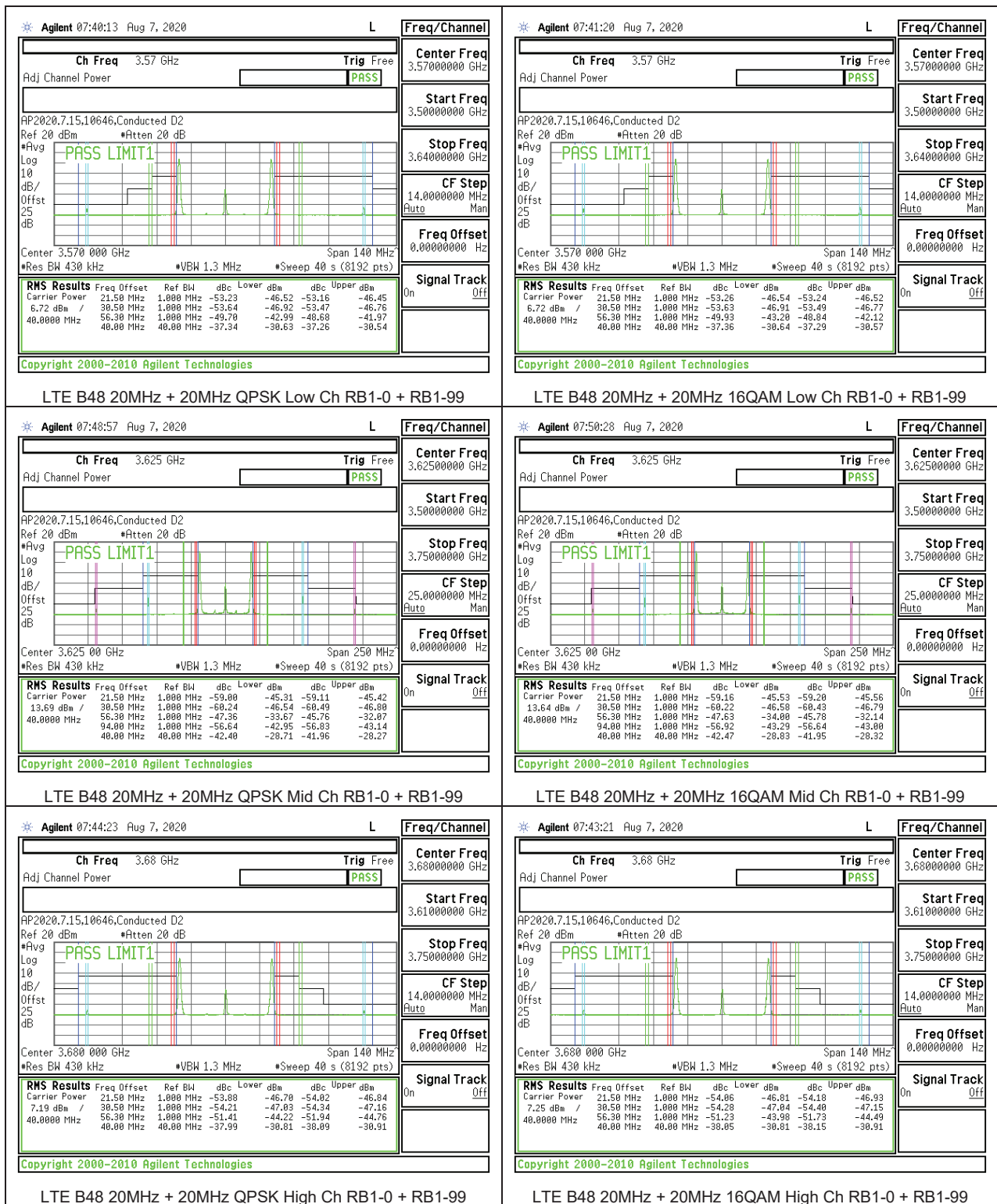
FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(1) General protection levels

(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed -25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

(2) Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz. licensees.





8.3. 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 to band 5 and -25 dBm to band 7 and 41
- 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

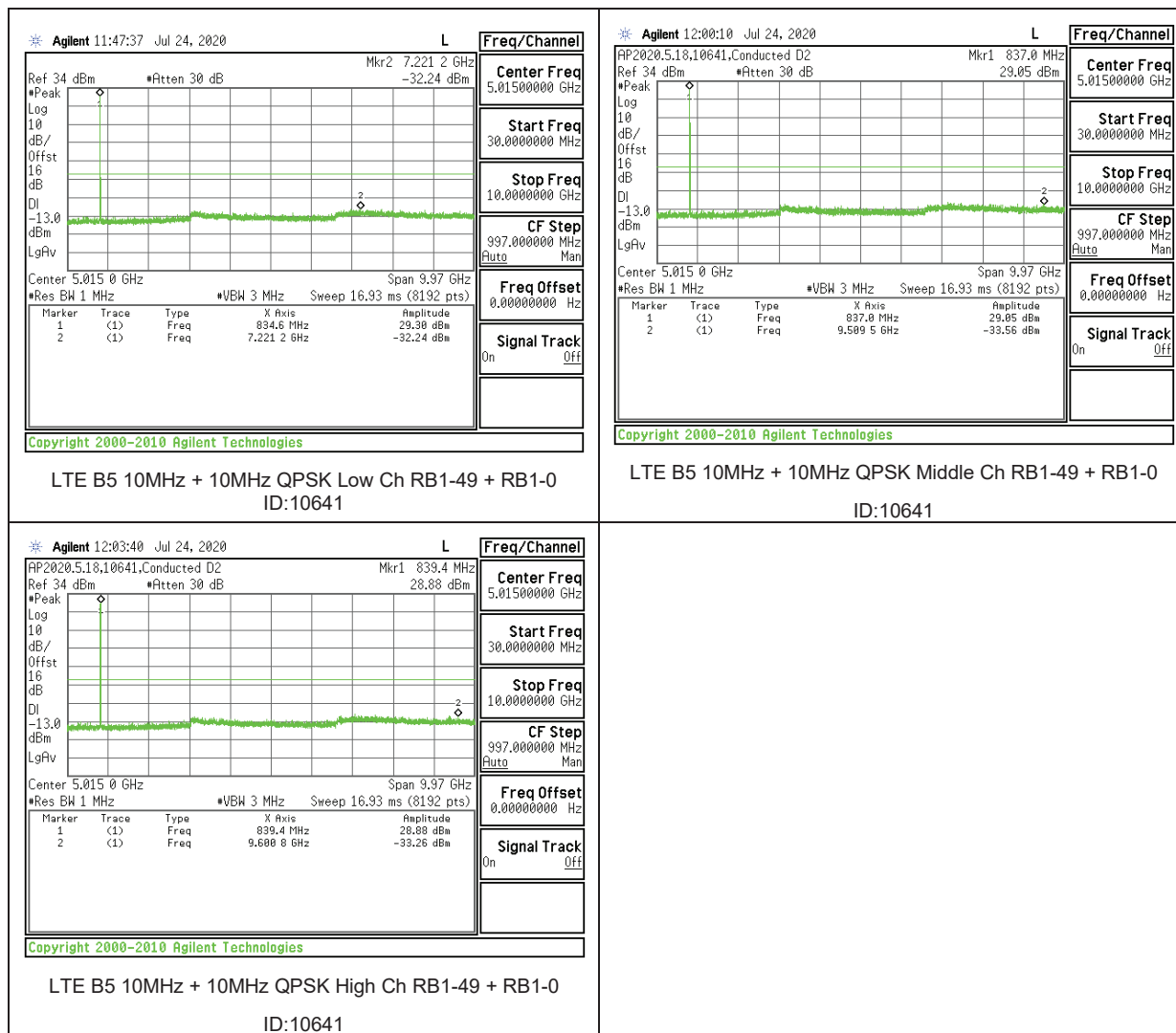
Both maximum + maximum bandwidth combinations of QPSK and 16QAM modes are tested, QPSK results are reported as worst case.

8.3.1. LTE BAND 5

LIMITS

FCC: §22.917

The minimum permissible attenuation level of any spurious emissions is $43 + 10 \log (P)$ dB where transmitting power (P) in Watts.

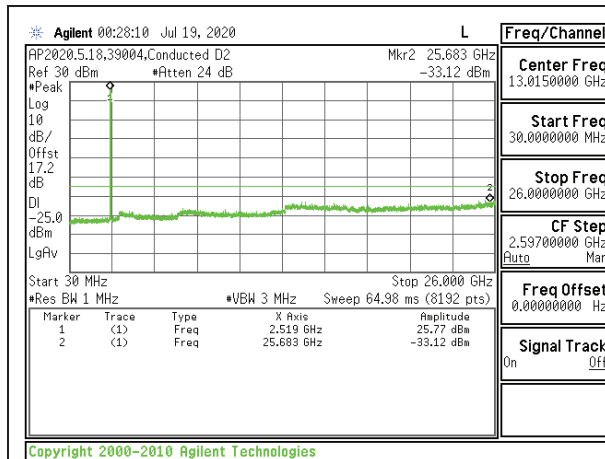


8.3.2. LTE BAND 7

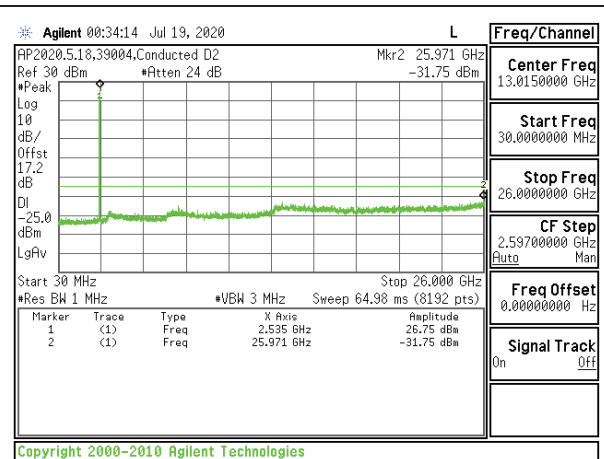
LIMITS

FCC: §27.53 (m)

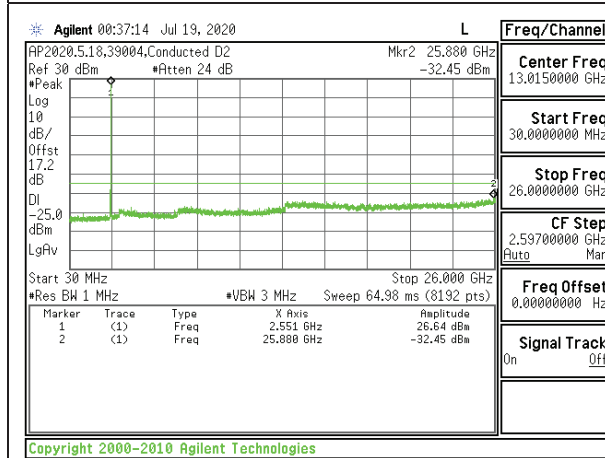
The minimum permissible attenuation level of any spurious emissions is $55 + 10 \log (P)$ dB where transmitting power (P) in Watts.



LTE B7 20MHz + 20MHz QPSK Low Ch RB1-99 + RB1-0



LTE B7 20MHz + 20MHz QPSK Middle Ch RB1-99 + RB1-0



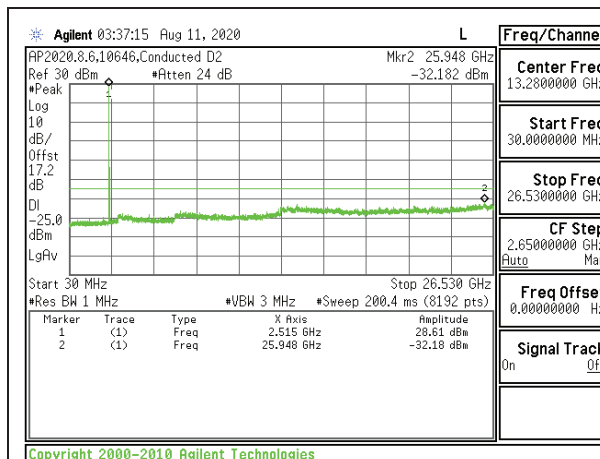
LTE B7 20MHz + 20MHz QPSK High Ch RB1-99 + RB1-0

8.3.3. LTE BAND 41

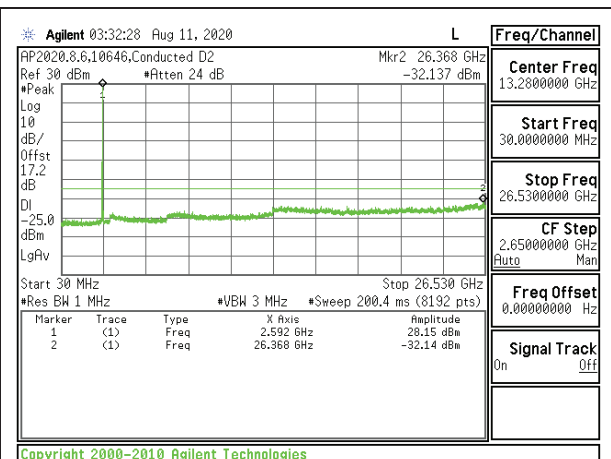
LIMITS

FCC: §27.53 (m)

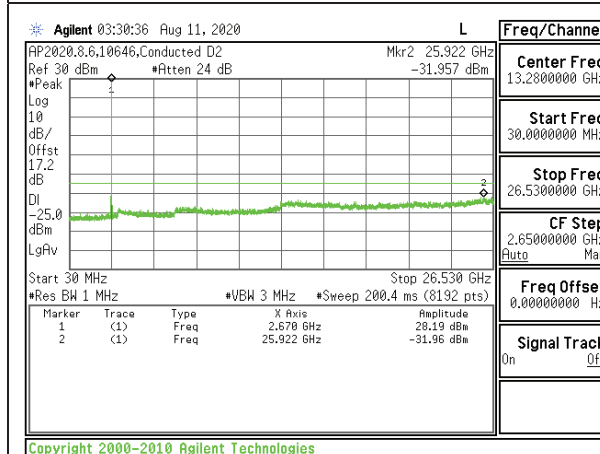
The minimum permissible attenuation level of any spurious emissions is $55 + 10 \log (P)$ dB where transmitting power (P) in Watts.



LTE B41 20MHz + 20MHz QPSK Low Ch RB1-99 + RB1-0



LTE B41 20MHz + 20MHz QPSK Middle Ch RB1-99 + RB1-0



LTE B41 20MHz + 20MHz QPSK High Ch RB1-99 + RB1-0

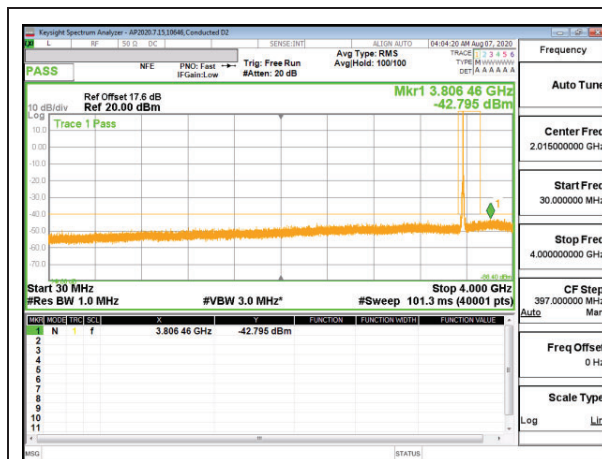
8.3.4. LTE BAND 48

LIMITS

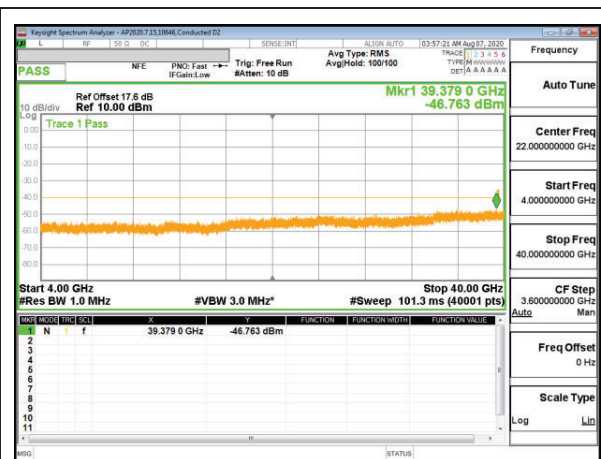
FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

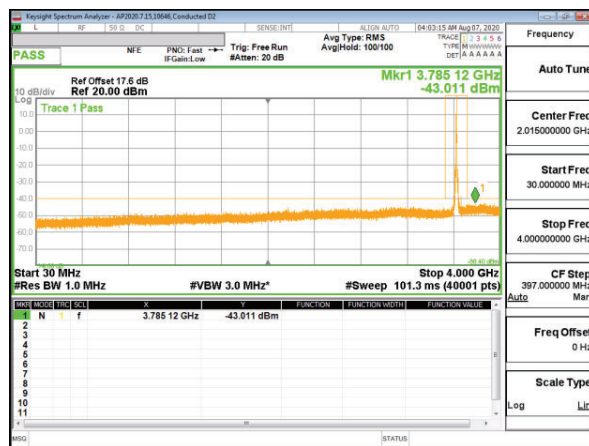
(2) Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.



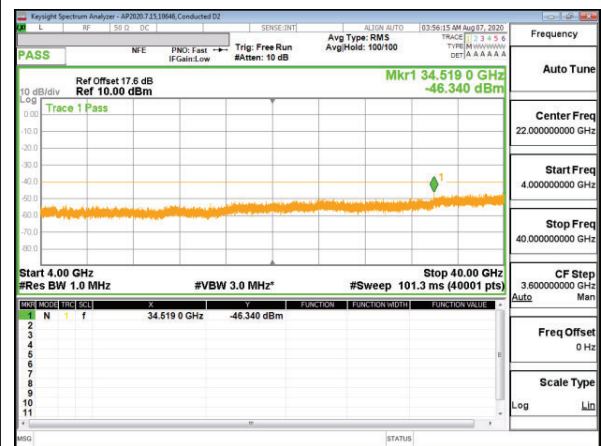
LTE B48 20MHz + 20MHz QPSK Low Ch RB1-99 + RB1-0
30MHz-4GHz



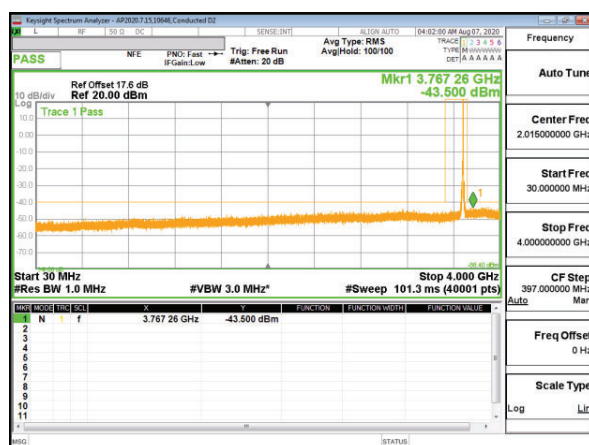
LTE B48 20MHz + 20MHz QPSK Low Ch RB1-99 + RB1-0
4GHz-40GHz



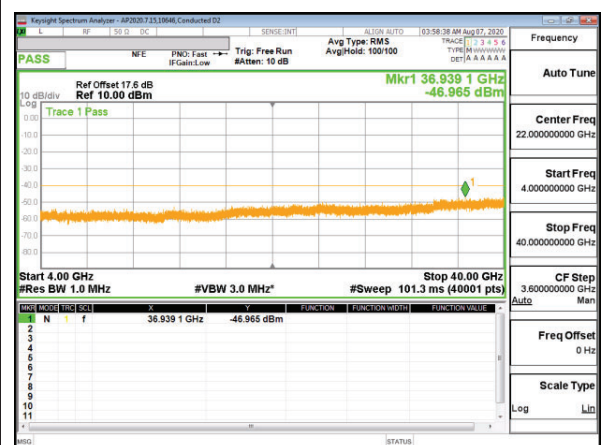
LTE B48 20MHz + 20MHz QPSK Middle Ch RB1-99 + RB1-0
30MHz-4GHz



LTE B48 20MHz + 20MHz QPSK Middle Ch RB1-99 + RB1-0
4GHz-40GHz



LTE B48 20MHz + 20MHz QPSK High Ch RB1-99 + RB1-0
30MHz-4GHz



LTE B48 20MHz + 20MHz QPSK High Ch RB1-99 + RB1-0
4GHz-40GHz

8.4. FREQUENCY STABILITY

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = -30°C to +50°C
- 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 placed inside a temperature chamber. The temperature is set to 20°C 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 +50°C is reached.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

RESULTS

See the following pages.

8.4.1. LTE BAND 5

LIMITS

FCC §22.355

The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

Test Engineer ID:	38602	Test Date:	7/24/2020
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QPSK, (10MHz + 10MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.5106	848.5945		
Extreme (50C)		824.5106	848.5945	9.3	0.011
Extreme (40C)		824.5106	848.5945	1.5	0.002
Extreme (30C)		824.5106	848.5945	-9.2	-0.011
Extreme (10C)		824.5106	848.5945	8.1	0.010
Extreme (0C)		824.5106	848.5945	3.7	0.004
Extreme (-10C)		824.5106	848.5945	-7.5	-0.009
Extreme (-20C)		824.5106	848.5944	-17.4	-0.021
Extreme (-30C)		824.5106	848.5944	-24.8	-0.030
20C	15%	824.5106	848.5945	12.3	0.015
	-15%	824.5106	848.5945	-1.6	-0.002
	End Point	824.5106	848.5945	-3.4	-0.004

8.4.2. LTE BAND 7

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:	38602	Test Date:	7/25/2020
-------------------	-------	------------	-----------

QPSK, (20MHz + 20MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2501.0731	2568.9873		
Extreme (50C)		2501.0731	2568.9873	33.7	0.013
Extreme (40C)		2501.0731	2568.9873	22.4	0.009
Extreme (30C)		2501.0731	2568.9873	7.9	0.003
Extreme (10C)		2501.0730	2568.9873	-26.3	-0.010
Extreme (0C)		2501.0730	2568.9873	-46.1	-0.018
Extreme (-10C)		2501.0730	2568.9872	-55.6	-0.022
Extreme (-20C)		2501.0730	2568.9873	-5.9	-0.002
Extreme (-30C)		2501.0730	2568.9873	-44.7	-0.018
20C	15%	2501.0731	2568.9873	-3.5	-0.001
	-15%	2501.0731	2568.9873	15.6	0.006
	End Point	2501.0730	2568.9872	-51.2	-0.020

8.4.3. 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:	38602	Test Date:	7/25/2020
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QPSK, (20MHz + 20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2497.1571	2689.0124		
Extreme (50C)		2497.1571	2689.0124	6.7	0.003
Extreme (40C)		2497.1571	2689.0124	-14.5	-0.006
Extreme (30C)		2497.1571	2689.0124	-28.8	-0.011
Extreme (10C)		2497.1571	2689.0123	-47.6	-0.018
Extreme (0C)		2497.1571	2689.0123	-55.3	-0.021
Extreme (-10C)		2497.1571	2689.0123	-61.2	-0.024
Extreme (-20C)		2497.1571	2689.0123	-53.7	-0.021
Extreme (-30C)		2497.1571	2689.0123	-60.8	-0.023
20C	15%	2497.1571	2689.0123	-33.5	-0.013
	-15%	2497.1571	2689.0123	-40.3	-0.016
	End Point	2497.1571	2689.0123	-42.4	-0.016

8.4.4. LTE BAND 48

Test Engineer ID:	38602	Test Date:	8/1/2020
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QPSK, (20MHz + 20MHz BANDWIDTH)

Limit		3550	3700	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	3550.8458	3699.0887		
Extreme (50C)		3550.8458	3699.0888	31.3	0.009
Extreme (40C)		3550.8458	3699.0887	28.4	0.008
Extreme (30C)		3550.8458	3699.0887	19.7	0.005
Extreme (10C)		3550.8458	3699.0887	-19.5	-0.005
Extreme (0C)		3550.8457	3699.0887	-40.6	-0.011
Extreme (-10C)		3550.8457	3699.0887	-57.8	-0.016
Extreme (-20C)		3550.8457	3699.0887	-64.7	-0.018
Extreme (-30C)		3550.8457	3699.0887	-52.8	-0.015
20C	15%	3550.8458	3699.0887	3.7	0.001
	-15%	3550.8458	3699.0887	2.8	0.001
	End Point	3550.8458	3699.0887	2.0	0.001

8.5. 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

Test was performed on Antenna 1; 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 ratio criteria.

8.5.1. LTE BAND 5

Test Engineer ID:	39004	Test Date:	7/30/2020
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Band	Bandwidth (MHz)	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
Band 5	5MHz / 10MHz	831.8	839.0	QPSK	32.37	24.7	7.67
				16QAM	32.44	23.66	8.78
	10MHz / 5MHz	834.3	841.5	QPSK	32.04	24.67	7.37
				16QAM	32.04	23.69	8.35
	10MHz / 10MHz	831.6	831.5	QPSK	32.07	24.7	7.37
				16QAM	32.27	23.69	8.58
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

8.5.2. LTE BAND 7

Test Engineer ID:	39004	Test Date:	7/30/2020
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Band	Bandwidth (MHz)	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
Band 7	10MHz / 20MHz	2525.6	2540.0	QPSK	31.20	23.96	7.24
				16QAM	30.97	22.96	8.01
	20MHz / 10MHz	2530.1	2544.5	QPSK	31.52	23.80	7.72
				16QAM	31.45	22.81	8.64
	15 MHz / 15MHz	2527.5	2542.5	QPSK	31.28	23.92	7.36
				16QAM	31.08	22.92	8.16
	15MHz / 20MHz	2525.3	2542.4	QPSK	31.07	23.86	7.21
				16QAM	31.09	22.86	8.23
	20MHz / 15MHz	2527.6	2544.7	QPSK	31.74	23.74	8.00
				16QAM	31.49	22.82	8.67
20MHz / 20MHz	2525.1	2544.9	QPSK	31.66	23.77	7.89	
			16QAM	31.52	22.79	8.73	
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

8.5.3. LTE BAND 41

Test Engineer ID:	12482	Test Date:	8/2/2020
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Band	Bandwidth (MHz)	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
Band 41 (FCC)	5MHz / 20MHz	2583.8	2595.5	QPSK	31.89	16.94	7.95
				16QAM	31.74	16.66	8.08
	20MHz / 5MHz	2590.5	2602.2	QPSK	31.52	17.06	7.46
				16QAM	31.88	16.80	8.08
	10MHz / 20MHz	2583.6	2598.0	QPSK	31.31	16.90	7.41
				16QAM	31.61	16.59	8.02
	20MHz / 10MHz	2588.1	2602.5	QPSK	31.51	17.01	7.50
				16QAM	31.61	16.59	8.02
	15MHz / 15MHz	2585.5	2600.5	QPSK	31.44	16.91	7.53
				16QAM	31.68	16.64	8.04
	15MHz / 20MHz	2583.3	2600.4	QPSK	31.09	16.88	7.21
				16QAM	31.43	16.62	7.81
	20MHz / 15MHz	2585.6	2602.7	QPSK	31.06	16.94	7.12
				16QAM	31.40	16.68	7.72
	20MHz / 20MHz	2583.1	2602.9	QPSK	31.01	16.78	7.23
				16QAM	31.17	16.62	7.55
Duty Cycle Correction Factor (dB) =			7.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

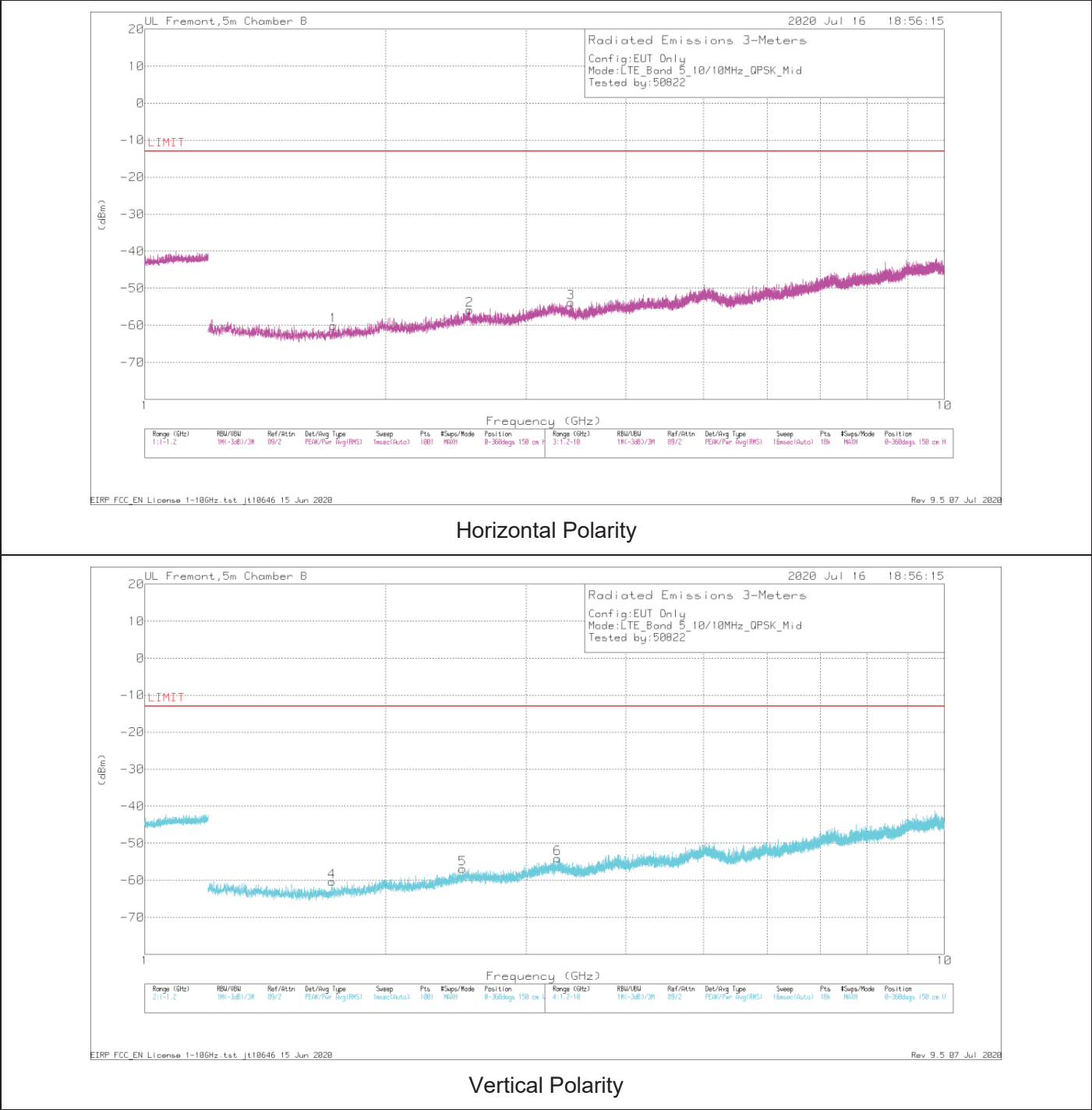
8.5.4. LTE BAND 48

Test Engineer ID:	39004	Test Date:	7/31/2020
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Band	Bandwidth (MHz)	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
Band 41 (FCC)	5MHz / 20MHz	3615.8	3627.5	QPSK	31.90	21.55	3.35
				16QAM	31.82	20.60	4.22
	20MHz / 5MHz	3622.5	3634.2	QPSK	32.20	21.46	3.74
				16QAM	31.85	20.48	4.37
	10MHz / 20MHz	3615.6	3630.0	QPSK	31.94	21.46	3.48
				16QAM	31.96	20.45	4.51
	20MHz / 10MHz	3620.1	3634.5	QPSK	32.18	21.48	3.70
				16QAM	31.80	20.48	4.32
	15MHz / 20MHz	3615.3	3632.4	QPSK	32.11	21.46	3.65
				16QAM	31.77	20.49	4.28
	20MHz / 15MHz	3617.6	3634.7	QPSK	32.21	21.42	3.79
				16QAM	31.80	20.47	4.33
	20MHz / 20MHz	3615.1	3634.9	QPSK	32.15	21.4	3.75
				16QAM	31.79	20.46	4.33
Duty Cycle Correction Factor (dB) =			7.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

9. RADIATED TEST RESULTS

9.1. Example Plot



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	HPF 1.2GHz T1737 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
1	1.72213	39.39	Pk	25.3	-30.3	.7	-95.2	-60.11	-13	-47.11	H
2	2.54787	38.69	Pk	29.3	-29.3	.7	-95.2	-55.81	-13	-42.81	H
3	3.41222	38.4	Pk	30.6	-28.1	.5	-95.2	-53.8	-13	-40.8	H
4	1.71333	39.38	Pk	25.2	-30.4	.6	-95.2	-60.42	-13	-47.42	V
5	2.498	37.89	Pk	29	-29.2	.6	-95.2	-56.91	-13	-43.91	V
6	3.28169	36.99	Pk	31.4	-28.1	.8	-95.2	-54.11	-13	-41.11	V

Pk - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	HPF 1.2GHz T1737 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
1.72213	40.42	Pk	25.3	-30.3	.7	-95.2	-59.08	-13	-46.08	H
2.54387	39.84	Pk	29.2	-29.2	.7	-95.2	-54.66	-13	-41.66	H
3.41285	38.32	Pk	30.6	-28.1	.5	-95.2	-53.88	-13	-40.88	H
1.71183	40.05	Pk	25.1	-30.3	.6	-95.2	-59.75	-13	-46.75	V
2.49649	38.12	Pk	29	-29.3	.6	-95.2	-56.78	-13	-43.78	V
3.27917	37.12	Pk	31.4	-28.1	.8	-95.2	-53.98	-13	-40.98	V

Pk - Peak detector

EIRP FCC_EN License 1-10GHz.tst jt10646 15 Jun 2020

Rev 9.5 07 Jul 2020

9.2. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT1

TEST PROCEDURE

KDB 971168 D01/D02 v02r01

RESULTS

Maximum + maximum bandwidth combinations of QPSK mode was tested, QPSK results are reported as worst case.

9.2.1. LTE BAND 5

LIMIT

FCC: §22.917(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 5 (10.0MHZ + 10.0MHZ BANDWIDTH)

Project #:	13179116
Date:	7/16/2020
Test Engineer:	50822
Configuration:	EUT Only
Mode:	Band 5 QPSK 10+10
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	HPF 1.2GHz T1737 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz										
1.66786	54.01	Pk	25	-30.4	.7	-95.2	-45.89	-13	-32.89	V
1.77213	40.06	Pk	25.8	-30.3	.6	-95.2	-59.04	-13	-46.04	H
2.3664	39.65	Pk	28.2	-29.5	.6	-95.2	-56.25	-13	-43.25	V
2.57311	39.93	Pk	29.3	-29.1	.5	-95.2	-54.57	-13	-41.57	H
3.27225	38.87	Pk	31.3	-28.2	.7	-95.2	-52.53	-13	-39.53	V
3.31093	38.31	Pk	31.1	-28	.7	-95.2	-53.09	-13	-40.09	H
Mid Channel, 831.6MHz + 841.5MHz										
1.71183	40.05	Pk	25.1	-30.3	.6	-95.2	-59.75	-13	-46.75	V
1.72213	40.42	Pk	25.3	-30.3	.7	-95.2	-59.08	-13	-46.08	H
2.49649	38.12	Pk	29	-29.3	.6	-95.2	-56.78	-13	-43.78	V
2.54387	39.84	Pk	29.2	-29.2	.7	-95.2	-54.66	-13	-41.66	H
3.27917	37.12	Pk	31.4	-28.1	.8	-95.2	-53.98	-13	-40.98	V
3.41285	38.32	Pk	30.6	-28.1	.5	-95.2	-53.88	-13	-40.88	H
High Channel, 834.1MHz + 844MHz										
1.66224	40.82	Pk	25	-30.4	.8	-95.2	-58.98	-13	-45.98	H
1.67807	62.45	Pk	24.9	-30.4	.7	-95.2	-37.55	-13	-24.55	V
2.51736	43.18	Pk	29.2	-29.3	.8	-95.2	-51.32	-13	-38.32	V
2.51795	40.94	Pk	29.2	-29.3	.8	-95.2	-53.56	-13	-40.56	H
3.22732	37.81	Pk	31.3	-28.3	.4	-95.2	-53.99	-13	-40.99	H
3.32588	38.69	Pk	31.1	-28.1	.6	-95.2	-52.91	-13	-39.91	V

9.2.2. LTE BAND 7

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 7 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13179116
Date:	7/16/2020
Test Engineer:	50822
Configuration:	EUT Only
Mode:	Band 7 QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	HPF 1.2GHz T1737 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz										
5.02401	38.17	Pk	33.7	-25.9	.7	-95.2	-48.53	-25	-23.53	V
5.15052	38.48	Pk	33.8	-26.3	.8	-95.2	-48.42	-25	-23.42	H
6.59097	36.6	Pk	35.5	-24.5	.5	-95.2	-47.10	-25	-22.10	V
6.77619	36.38	Pk	35.9	-24.7	.5	-95.2	-47.12	-25	-22.12	H
10.81566	34.14	Pk	39.3	-19.4	.6	-95.2	-40.56	-25	-15.56	H
11.40056	34.33	Pk	39.2	-19.6	.9	-95.2	-40.37	-25	-15.37	V
Mid Channel, 2525.1MHz + 2544.9MHz										
4.90693	37.32	Pk	33.3	-26.5	1	-95.2	-50.08	-25	-25.08	V
5.00573	38.27	Pk	33.7	-25.9	.8	-95.2	-48.33	-25	-23.33	H
7.02629	36.43	Pk	36.6	-23.8	.3	-95.2	-45.67	-25	-20.67	V
7.25565	35.69	Pk	37.2	-23.6	.5	-95.2	-45.41	-25	-20.41	H
9.65705	34.75	Pk	38.7	-20.3	.6	-95.2	-41.45	-25	-16.45	H
9.68295	34.46	Pk	38.7	-20.1	.8	-95.2	-41.34	-25	-16.34	V
High Channel, 2540.2MHz + 2560MHz										
4.58478	38.56	Pk	32	-27.1	.5	-95.2	-51.24	-25	-26.24	V
4.99568	36.89	Pk	33.6	-25.9	.8	-95.2	-49.81	-25	-24.81	H
7.20144	36.6	Pk	37.1	-23.9	.4	-95.2	-45.00	-25	-20.00	V
7.376	35.75	Pk	36.8	-23.8	.5	-95.2	-45.95	-25	-20.95	H
10.48974	34.08	Pk	39.5	-19.4	.7	-95.2	-40.32	-25	-15.32	H
10.9456	33.6	Pk	39.4	-19.4	.9	-95.2	-40.7	-25	-15.7	V

9.2.3. LTE BAND 41

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 41 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13179110
Date:	7/16/2020
Test Engineer:	50822
Configuration:	EUT Only
Mode:	Band 41FCC QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	BRF 2495-2690MHz T1790 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz										
5.03183	38.12	Pk	33.7	-26	.7	-95.2	-48.68	-25	-23.68	H
5.20749	37.65	Pk	33.6	-26.3	1	-95.2	-49.25	-25	-24.25	V
7.08827	36	Pk	36.7	-23.6	.4	-95.2	-45.7	-25	-20.7	H
7.26393	36.19	Pk	37.1	-23.5	.5	-95.2	-44.91	-25	-19.91	V
10.25466	34.27	Pk	38.8	-19.5	.7	-95.2	-40.93	-25	-15.93	H
10.45736	34.33	Pk	39.5	-19.4	.7	-95.2	-40.07	-25	-15.07	V
Mid Channel, 2583.1MHz + 2602.9MHz										
3.60174	39.39	Pk	30.1	-27.9	.5	-95.2	-53.11	-25	-28.11	H
4.24558	37.75	Pk	31.8	-27	.4	-95.2	-52.25	-25	-27.25	V
6.05064	37.84	Pk	34.6	-25.9	.5	-95.2	-48.16	-25	-23.16	H
7.2779	35.72	Pk	37.1	-23.2	.4	-95.2	-45.18	-25	-20.18	V
9.52176	34.75	Pk	38.9	-20.5	.7	-95.2	-41.35	-25	-16.35	H
10.15523	34.04	Pk	38.6	-20	.6	-95.2	-41.96	-25	-16.96	V
High Channel, 2660.2MHz + 2680MHz										
4.4737	37.75	Pk	32	-26.7	.6	-95.2	-51.55	-25	-26.55	V
4.78801	38.26	Pk	33	-27.1	.8	-95.2	-50.24	-25	-25.24	H
5.91639	37.63	Pk	34.1	-25.7	.6	-95.2	-48.57	-25	-23.57	H
7.71049	35.61	Pk	37	-23.3	.4	-95.2	-45.49	-25	-20.49	V
8.98122	35.07	Pk	38.4	-21.4	.5	-95.2	-42.63	-25	-17.63	H
10.37357	33.37	Pk	39.2	-19.3	.8	-95.2	-41.13	-25	-16.13	V

9.3. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT2

TEST PROCEDURE

KDB 971168 D01/D02 v02r01

RESULTS

Maximum + maximum bandwidth combinations of QPSK mode was tested, QPSK results are reported as worst case.

9.3.1. LTE BAND 5

LIMIT

FCC: §22.917(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 5 (10.0MHZ + 10.0MHZ BANDWIDTH)

Project #:	13179116									
Date:	7/20/2020									
Test Engineer:	19206									
Configuration:	EUT Only									
Mode:	Band 5 QPSK 10+10									
Chamber #:	Chamber B									
Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	HPF 1.2GHz T1737 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz										
1.75454	40.83	Pk	25.6	-30.3	.7	-95.2	-58.37	-13	-45.37	H
1.75919	40.68	Pk	25.6	-30.3	.7	-95.2	-58.52	-13	-45.52	V
2.50904	39.4	Pk	29.1	-29.3	.7	-95.2	-55.3	-13	-42.3	H
2.51111	39.72	Pk	29.1	-29.3	.7	-95.2	-54.98	-13	-41.98	V
3.31786	38.67	Pk	31.1	-28.1	.6	-95.2	-52.93	-13	-39.93	V
3.32333	38.57	Pk	31.1	-28.1	.6	-95.2	-53.03	-13	-40.03	H
Mid Channel, 831.6MHz + 841.5MHz										
1.69128	40.41	Pk	25	-30.4	.7	-95.2	-59.49	-13	-46.49	H
1.70098	39.75	Pk	25.1	-30.4	.7	-95.2	-60.05	-13	-47.05	V
2.44692	39.66	Pk	28.8	-29.4	.5	-95.2	-55.64	-13	-42.64	V
2.45254	38.91	Pk	28.8	-29.4	.5	-95.2	-56.39	-13	-43.39	H
3.20819	39.21	Pk	31.3	-28.4	.5	-95.2	-52.59	-13	-39.59	H
3.26431	39.23	Pk	31.4	-28.3	.6	-95.2	-52.27	-13	-39.27	V
High Channel, 834.1MHz + 844MHz										
1.64097	39.63	Pk	25	-30.4	.7	-95.2	-60.27	-13	-47.27	H
1.65716	39.74	Pk	25	-30.5	.8	-95.2	-60.16	-13	-47.16	V
2.61384	39.17	Pk	29.2	-29	.6	-95.2	-55.23	-13	-42.23	H
2.61902	38.98	Pk	29.2	-29.1	.6	-95.2	-55.52	-13	-42.52	V
3.31434	38.19	Pk	31.1	-28	.6	-95.2	-53.31	-13	-40.31	V
3.32375	39.16	Pk	31.1	-28.1	.6	-95.2	-52.44	-13	-39.44	H

9.3.2. LTE BAND 7

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 7 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13179116
Date:	7/22/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 7 QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	BRF 2495-2690MHz T1790 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz										
4.89822	37.01	Pk	33.3	-26.5	.9	-95.2	-50.49	-25	-25.49	V
4.92375	37.14	Pk	33.4	-26.3	1.1	-95.2	-49.86	-25	-24.86	H
6.56545	36.42	Pk	35.4	-24.5	.5	-95.2	-47.38	-25	-22.38	V
6.65662	35.79	Pk	35.7	-24.6	.3	-95.2	-48.01	-25	-23.01	H
9.15414	34.33	Pk	38.8	-21.1	.4	-95.2	-42.77	-25	-17.77	H
9.20596	34.73	Pk	38.7	-21	.5	-95.2	-42.27	-25	-17.27	V
Mid Channel, 2525.1MHz + 2544.9MHz										
5.01226	37.7	Pk	33.7	-26	.8	-95.2	-49	-25	-24.0	V
5.02038	37.45	Pk	33.7	-25.9	.8	-95.2	-49.15	-25	-24.15	H
7.20891	35.64	Pk	37.1	-23.7	.4	-95.2	-45.76	-25	-20.76	V
7.26977	35.59	Pk	37.2	-23.4	.5	-95.2	-45.31	-25	-20.31	H
10.50577	33.95	Pk	39.5	-19.2	.6	-95.2	-40.35	-25	-15.35	V
10.51035	34.16	Pk	39.5	-19.3	.6	-95.2	-40.24	-25	-15.24	H
High Channel, 2540.2MHz + 2560MHz										
5.04083	36.97	Pk	33.7	-26.2	.6	-95.2	-50.13	-25	-25.13	H
5.10126	37.71	Pk	33.9	-26.4	.8	-95.2	-49.19	-25	-24.19	V
7.06988	36.14	Pk	36.7	-23.8	.7	-95.2	-45.46	-25	-20.46	V
7.32886	35.16	Pk	37	-23.7	.3	-95.2	-46.44	-25	-21.44	H
9.67919	34.02	Pk	38.7	-20	.8	-95.2	-41.68	-25	-16.68	H
9.74287	34.78	Pk	38.7	-19.9	.7	-95.2	-40.92	-25	-15.92	V

9.3.3. LTE BAND 41

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 41 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13179116
Date:	7/19/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 41FCC QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	BRF 2495-2690MHz T1790 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz										
5.06232	37.7	Pk	33.9	-26.1	.6	-95.2	-49.1	-25	-24.1	H
5.07973	38.34	Pk	33.8	-26.1	.7	-95.2	-48.46	-25	-23.46	V
7.22865	35.16	Pk	37	-23.5	.3	-95.6	-46.64	-25	-21.64	H
7.19068	36.22	Pk	37	-24	.4	-95.2	-45.58	-25	-20.58	V
10.57779	34.31	Pk	39.5	-19.4	.9	-95.2	-39.89	-25	-14.89	H
10.58694	35.07	Pk	39.5	-19.6	.9	-95.2	-39.33	-25	-14.33	V
Mid Channel, 2583.1MHz + 2602.9MHz										
5.0298	37.73	Pk	33.7	-26	.7	-95.2	-49.07	-25	-24.07	H
5.03099	38.29	Pk	33.7	-26	.7	-95.2	-48.51	-25	-23.51	V
7.07768	35.78	Pk	36.6	-23.8	.5	-95.2	-46.12	-25	-21.12	V
7.08263	36.21	Pk	36.7	-23.7	.5	-95.2	-45.49	-25	-20.49	H
10.21866	34.23	Pk	38.7	-19.8	.9	-95.2	-41.17	-25	-16.17	V
10.3244	33.86	Pk	39.1	-19.6	.6	-95.2	-41.24	-25	-16.24	H
High Channel, 2660.2 + 2680MHz										
5.02414	37.67	Pk	33.7	-25.9	.7	-95.2	-49.03	-25	-24.03	V
5.09487	38.07	Pk	33.9	-26.3	.8	-95.2	-48.73	-25	-23.73	H
7.84558	35.03	Pk	37.3	-22.7	.3	-95.2	-45.27	-25	-20.27	V
7.92245	35.9	Pk	37.3	-22.6	.2	-95.2	-44.4	-25	-19.4	H
10.39697	33.9	Pk	39.3	-19.6	.8	-95.2	-40.8	-25	-15.8	V
10.58281	34.04	Pk	39.5	-19.5	.9	-95.2	-40.26	-25	-15.26	H

9.4. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT3

TEST PROCEDURE

KDB 971168 D01/D02 v02r01

RESULTS

Maximum + maximum bandwidth combinations of QPSK mode was tested, QPSK results are reported as worst case.

9.4.1. LTE BAND 7

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 7 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13179116
Date:	7/22/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 7 QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	BRF 2495-2690MHz T1790 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz										
4.90861	37.09	Pk	33.4	-26.5	1.1	-95.2	-50.11	-25	-25.11	H
5.02765	37.32	Pk	33.7	-26.1	.7	-95.2	-49.58	-25	-24.58	V
7.07253	35.26	Pk	36.6	-23.8	.6	-95.2	-46.54	-25	-21.54	H
7.22741	35.95	Pk	37.1	-23.5	.3	-95.2	-45.35	-25	-20.35	V
10.95662	34.76	Pk	39.5	-19.4	.9	-95.2	-39.44	-25	-14.44	V
11.03414	34.34	Pk	39.4	-19.6	.5	-95.2	-40.56	-25	-15.56	H
Mid Channel, 2525.1MHz + 2544.9MHz										
5.22211	37.32	Pk	33.5	-26.3	1	-95.2	-49.68	-25	-24.68	V
5.22898	37.05	Pk	33.5	-26.4	.9	-95.2	-50.15	-25	-25.15	H
7.03589	35.89	Pk	36.6	-23.7	.5	-95.2	-45.91	-25	-20.91	H
7.27341	36.02	Pk	37.2	-23.3	.4	-95.2	-44.88	-25	-19.88	V
10.45532	33.96	Pk	39.5	-19.4	.7	-95.2	-40.44	-25	-15.44	V
10.57894	34.03	Pk	39.5	-19.4	.9	-95.2	-40.17	-25	-15.17	H
High Channel, 2540.2MHz + 2560MHz										
5.0144	37.55	Pk	33.7	-26	.8	-95.2	-49.15	-25	-24.15	V
5.02523	37.02	Pk	33.7	-26	.7	-95.2	-49.78	-25	-24.78	H
7.06139	35.55	Pk	36.6	-23.8	.8	-95.2	-46.05	-25	-21.05	V
7.13504	35.57	Pk	36.7	-24	.4	-95.2	-46.53	-25	-21.53	H
10.8086	33.95	Pk	39.3	-19.5	.7	-95.2	-40.75	-25	-15.75	H
11.08153	34.09	Pk	39.3	-19.4	.8	-95.2	-40.41	-25	-15.41	V

9.4.2. LTE BAND 41

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 41 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13179116
Date:	7/19/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 41FCC QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	BRF 2495-2690MHz T1790 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz										
5.02575	37.38	Pk	33.7	-26	.7	-95.2	-49.42	-25	-24.42	V
5.07913	37.32	Pk	33.8	-26.1	.7	-95.2	-49.48	-25	-24.48	H
7.08979	35.99	Pk	36.7	-23.6	.4	-95.2	-45.71	-25	-20.71	V
7.26519	35.23	Pk	37.1	-23.4	.5	-95.2	-45.77	-25	-20.77	H
9.68193	34.31	Pk	38.7	-20.1	.8	-95.2	-41.49	-25	-16.49	H
9.72381	34.88	Pk	38.7	-20	.8	-95.2	-40.82	-25	-15.82	V
Mid Channel, 2583.1MHz + 2602.9MHz										
5.01411	37.86	Pk	33.7	-25.9	.8	-95.2	-48.74	-25	-23.74	V
5.03991	37.47	Pk	33.6	-26.2	.6	-95.2	-49.73	-25	-24.73	H
7.20846	36.04	Pk	37.1	-23.8	.4	-95.2	-45.46	-25	-20.46	V
7.27702	35.31	Pk	37.1	-23.2	.4	-95.2	-45.59	-25	-20.59	H
10.9005	34.2	Pk	39.4	-19.4	.7	-95.2	-40.3	-25	-15.3	H
10.94579	34.52	Pk	39.4	-19.4	.9	-95.2	-39.78	-25	-14.78	V
High Channel, 2660.2MHz + 2680MHz										
5.04499	38.05	Pk	33.7	-26.3	.6	-95.2	-49.15	-25	-24.15	V
5.07488	37.28	Pk	33.8	-26.1	.7	-95.2	-49.52	-25	-24.52	H
7.98367	35.62	Pk	37.1	-23	.3	-95.2	-45.18	-25	-20.18	H
8.04104	35.16	Pk	37.1	-22.7	.4	-95.2	-45.24	-25	-20.24	V
10.58204	33.8	Pk	39.5	-19.5	.9	-95.2	-40.5	-25	-15.5	V
11.10863	34.41	Pk	39.2	-19.7	.9	-95.2	-40.39	-25	-15.39	H

9.5. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT4

TEST PROCEDURE

KDB 971168 D01/D02 v02r01

RESULTS

Maximum + maximum bandwidth combinations of QPSK mode was tested, QPSK results are reported as worst case.

9.5.1. LTE BAND 7

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 7 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13179116
Date:	7/22/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 7 QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	BRF 2495-2690MHz T1790 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz										
5.07787	38.23	Pk	33.8	-26.1	.7	-95.2	-48.57	-25	-23.57	V
5.10316	37.09	Pk	34	-26.4	.8	-95.2	-49.71	-25	-24.71	H
7.1593	36.12	Pk	37	-24	.4	-95.2	-45.68	-25	-20.68	V
7.26944	34.89	Pk	37.2	-23.4	.5	-95.2	-46.01	-25	-21.01	H
10.57052	33.88	Pk	39.6	-19.4	.8	-95.2	-40.32	-25	-15.32	V
11.03385	34.42	Pk	39.4	-19.6	.5	-95.2	-40.48	-25	-15.48	H
Mid Channel, 2525.1MHz + 2544.9MHz										
5.0267	37.68	Pk	33.7	-26	.7	-95.2	-49.12	-25	-24.12	H
5.15024	37.71	Pk	33.8	-26.3	.8	-95.2	-49.19	-25	-24.19	V
7.06788	35.39	Pk	36.7	-23.8	.7	-95.2	-46.21	-25	-21.21	H
7.28476	36.03	Pk	37.1	-23.1	.4	-95.2	-44.77	-25	-19.77	V
10.78605	34.34	Pk	39.3	-19.7	.8	-95.2	-40.46	-25	-15.46	H
10.97205	33.96	Pk	39.4	-19.5	.8	-95.2	-40.54	-25	-15.54	V
High Channel, 2540.2MHz + 2560MHz										
5.03953	37.25	Pk	33.7	-26.2	.6	-95.2	-49.85	-25	-24.85	H
5.07056	37.11	Pk	33.8	-26.1	.7	-95.2	-49.69	-25	-24.69	V
7.74336	35.69	Pk	37.1	-23.6	.3	-95.2	-45.71	-25	-20.71	H
7.98455	36.09	Pk	37.1	-23	.3	-95.2	-44.71	-25	-19.71	V
9.67986	33.8	Pk	38.7	-20	.8	-95.2	-41.9	-25	-16.9	H
9.72425	34.48	Pk	38.7	-20	.8	-95.2	-41.22	-25	-16.22	V

9.5.2. LTE BAND 41

LIMIT

FCC: §27.53 (m)

At least 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.

QPSK LTE BAND 41 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13179116
Date:	7/19/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 41FCC QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	BRF 2495-2690MHz T1790 1-18GHz	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz										
5.02387	37.57	Pk	33.7	-25.9	.7	-95.2	-49.13	-25	-24.13	V
5.10577	37.55	Pk	34	-26.4	.8	-95.2	-49.25	-25	-24.25	H
7.27241	35.97	Pk	37.2	-23.4	.4	-95.2	-45.03	-25	-20.03	V
7.32714	35.39	Pk	37	-23.6	.3	-95.2	-46.11	-25	-21.11	H
9.54922	34.64	Pk	38.9	-20.4	.6	-95.2	-41.46	-25	-16.46	H
9.73953	34.89	Pk	38.6	-19.8	.7	-95.2	-40.81	-25	-15.81	V
Mid Channel, 2583.1MHz + 2602.9MHz										
5.01737	37.35	Pk	33.7	-26	.8	-95.2	-49.35	-25	-24.35	V
5.16813	47.43	Pk	33.7	-26.5	.7	-95.2	-39.87	-25	-14.87	H
7.07626	36.3	Pk	36.6	-23.8	.6	-95.2	-45.5	-25	-20.5	V
7.27571	35.69	Pk	37.1	-23.2	.4	-95.2	-45.21	-25	-20.21	H
9.68393	34.25	Pk	38.7	-20.2	.8	-95.2	-41.65	-25	-16.65	H
9.8275	34.8	Pk	38.5	-20.4	.6	-95.2	-41.7	-25	-16.7	V
High Channel, 2660.2MHz + 2680MHz										
5.08613	37.65	Pk	33.8	-26.2	.8	-95.2	-49.15	-25	-24.15	H
5.0924	37.29	Pk	33.9	-26.3	.8	-95.2	-49.51	-25	-24.51	V
7.2409	35.75	Pk	37.1	-23.5	.4	-95.2	-45.45	-25	-20.45	H
7.2511	35.3	Pk	37.2	-23.6	.5	-95.2	-45.8	-25	-20.8	V
10.43792	33.83	Pk	39.4	-19.3	.8	-95.2	-40.47	-25	-15.47	V
10.69163	33.86	Pk	39.3	-19.4	.5	-95.2	-40.94	-25	-15.94	H

9.5.3. LTE BAND 48

LIMIT

FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

QPSK LTE BAND 48((20.0MHZ + 20.0MHZ BANDWIDTH))

Project #:	13179116
Date:	7/27/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 48 QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	T1792 3400-3800MHz BRF	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 3560MHz + 3579.8MHz										
4.97634	31.38	RMS	33.6	-26	.4	-95.2	-55.82	-40	-15.82	V
5.07742	31.86	RMS	33.8	-26.1	.6	-95.2	-55.04	-40	-15.04	H
7.25305	29.39	RMS	37.2	-23.6	.6	-95.2	-51.61	-40	-11.61	H
7.29552	29.35	RMS	37.1	-23.2	.6	-95.2	-51.35	-40	-11.35	V
10.42932	27.3	RMS	39.4	-19.3	.6	-95.2	-47.2	-40	-7.2	H
10.56367	27.8	RMS	39.6	-19.4	.6	-95.2	-46.6	-40	-6.6	V
Mid Channel, 3615.1MHz + 3634.9MHz										
4.96079	31.32	RMS	33.5	-25.9	.4	-95.2	-55.88	-40	-15.88	V
5.0131	31.26	RMS	33.7	-26	.6	-95.2	-55.64	-40	-15.64	H
7.20273	29.76	RMS	37.1	-23.9	.6	-95.2	-51.64	-40	-11.64	V
7.21187	29.93	RMS	37.1	-23.6	.6	-95.2	-51.17	-40	-11.17	H
9.76847	27.97	RMS	38.6	-20.2	.8	-95.2	-48.03	-40	-8.03	H
9.80188	28.33	RMS	38.6	-20	.8	-95.2	-47.47	-40	-7.47	V
High Channel, 3670.2MHz + 3690MHz										
4.82682	32.55	RMS	33.1	-26.9	.5	-95.2	-55.95	-40	-15.95	V
5.08682	32.58	RMS	33.8	-26.2	.5	-95.2	-54.52	-40	-14.52	H
7.19226	29.91	RMS	37	-24	.6	-95.2	-51.69	-40	-11.69	H
7.34867	29.98	RMS	37	-23.7	.6	-95.2	-51.32	-40	-11.32	V
9.7168	28.69	RMS	38.6	-20	.5	-95.2	-47.41	-40	-7.41	V
9.71932	28.23	RMS	38.6	-20	.5	-95.2	-47.87	-40	-7.87	H

9.6. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT7

TEST PROCEDURE

KDB 971168 D01/D02 v02r01

RESULTS

Maximum + maximum bandwidth combinations of QPSK mode was tested, QPSK results are reported as worst case.

9.6.1. LTE BAND 48

LIMIT

FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

QPSK LTE BAND 48 (20.0MHZ + 20.0MHZ BANDWIDTH)

Project #:	13179116
Date:	7/27/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 48 QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	T1792 3400-3800MHz BRF	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 3560MHz + 3579.8MHz										
5.20185	31.74	RMS	33.7	-26.2	.6	-95.2	-55.36	-40	-15.36	V
5.2057	31.41	RMS	33.6	-26.2	.6	-95.2	-55.79	-40	-15.79	H
7.01773	30.43	RMS	36.4	-24	.4	-95.2	-51.97	-40	-11.97	V
7.16894	30.12	RMS	36.9	-24	.6	-95.2	-51.58	-40	-11.58	H
8.3506	29.24	RMS	37.5	-22.6	.8	-95.2	-50.26	-40	-10.26	H
8.35325	29.91	RMS	37.5	-22.5	.8	-95.2	-49.49	-40	-9.49	V
Mid Channel, 3615.1MHz + 3634.9MHz										
7.25006	29.88	RMS	37.2	-23.6	.6	-95.2	-51.12	-40	-11.12	H
7.25093	30.29	RMS	37.2	-23.6	.6	-95.2	-50.71	-40	-10.71	V
10.87544	28.04	RMS	39.3	-19.4	.5	-95.2	-46.76	-40	-6.76	H
10.87603	27.48	RMS	39.3	-19.4	.5	-95.2	-47.32	-40	-7.32	V
14.49958	29.16	RMS	41.4	-21.4	.8	-95.2	-45.24	-40	-5.24	H
14.50106	29.44	RMS	41.4	-21.4	.8	-95.2	-44.96	-40	-4.96	V
High Channel, 3670.2MHz + 3690MHz										
4.71681	32.94	RMS	32.6	-27	.4	-95.2	-56.26	-40	-16.26	H
4.76981	32.33	RMS	32.8	-27	.6	-95.2	-56.47	-40	-16.47	V
7.16613	30.19	RMS	36.9	-24	.6	-95.2	-51.51	-40	-11.51	V
7.20263	30.25	RMS	37.1	-23.9	.6	-95.2	-51.15	-40	-11.15	H
9.29557	28.62	RMS	38.7	-21	.7	-95.2	-48.18	-40	-8.18	H
9.29751	28.22	RMS	38.7	-21	.7	-95.2	-48.58	-40	-8.58	V

9.7. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT8

TEST PROCEDURE

KDB 971168 D01/D02 v02r01

RESULTS

Maximum + maximum bandwidth combinations of QPSK mode was tested, QPSK results are reported as worst case.

9.7.1. LTE BAND 48

LIMIT

FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

QPSK LTE BAND 48((20.0MHZ + 20.0MHZ BANDWIDTH))

Project #:	13179116
Date:	7/26/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 48 QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	T1792 3400-3800MHz BRF	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 3560MHz + 3579.8MHz										
7.06618	29.77	RMS	36.7	-23.9	.7	-95.2	-51.93	-40	-11.93	H
7.20568	29.63	RMS	37	-23.8	.6	-95.2	-51.77	-40	-11.77	V
11.00808	27.95	RMS	39.4	-19.5	.7	-95.2	-46.65	-40	-6.65	V
11.00988	27.9	RMS	39.4	-19.5	.7	-95.2	-46.7	-40	-6.7	H
14.78603	28.75	RMS	42.2	-21.1	.9	-95.2	-44.45	-40	-4.45	H
15.11015	29.25	RMS	41.7	-21	.9	-95.2	-44.35	-40	-4.35	V
Mid Channel, 3615.1MHz + 3634.9MHz										
7.14322	29.68	RMS	36.9	-23.9	.6	-95.2	-51.92	-40	-11.92	H
7.14395	29.94	RMS	36.9	-24	.6	-95.2	-51.76	-40	-11.76	V
9.17765	28.08	RMS	38.7	-21	.7	-95.2	-48.72	-40	-8.72	H
9.3196	28.19	RMS	38.7	-20.9	.7	-95.2	-48.51	-40	-8.51	V
13.13383	28.66	RMS	40.3	-21.1	.9	-95.2	-46.44	-40	-6.44	H
13.14854	28.51	RMS	40.3	-21.2	.9	-95.2	-46.69	-40	-6.69	V
High Channel, 3670.2MHz + 3690MHz										
7.06699	29.84	RMS	36.7	-23.8	.7	-95.2	-51.76	-40	-11.76	H
7.06893	29.78	RMS	36.7	-23.8	.7	-95.2	-51.82	-40	-11.82	V
9.68322	28.45	RMS	38.7	-20.1	.6	-95.2	-47.55	-40	-7.55	V
9.7209	27.91	RMS	38.6	-20	.5	-95.2	-48.19	-40	-8.19	H
13.86392	28.86	RMS	40.6	-21.4	.7	-95.2	-46.44	-40	-6.44	H
14.01293	28.72	RMS	40.7	-21.2	.7	-95.2	-46.28	-40	-6.28	V

9.8. FIELD STRENGTH OF SPURIOUS RADIATION, ABOVE 1GHz, ANT9

TEST PROCEDURE

KDB 971168 D01/D02 v02r01

RESULTS

Maximum + maximum bandwidth combinations of QPSK mode was tested, QPSK results are reported as worst case.

9.8.1. LTE BAND 48

LIMIT

FCC: §96.41

(e) 3.5 GHz Emissions and Interference Limits—

(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

QPSK LTE BAND 48((20.0MHZ + 20.0MHZ BANDWIDTH))

Project #:	13179116
Date:	7/26/2020
Test Engineer:	19206
Configuration:	EUT Only
Mode:	Band 48 QPSK 20+20
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T962 (dB/m)	Amp/Cbl (dB)	T1792 3400-3800MHz BRF	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 3560MHz + 3579.8MHz										
7.17211	30.11	RMS	37	-24.1	.6	-95.2	-51.59	-40	-11.59	H
7.19776	29.88	RMS	37.1	-23.9	.6	-95.2	-51.52	-40	-11.52	V
8.49476	28.71	RMS	37.5	-22.2	.8	-95.2	-50.39	-40	-10.39	H
8.99857	28.77	RMS	38.5	-21.3	.8	-95.2	-48.43	-40	-8.43	V
14.81098	28.7	RMS	42.3	-21.3	.9	-95.2	-44.6	-40	-4.6	H
14.87326	29	RMS	42.4	-21.4	.8	-95.2	-44.4	-40	-4.4	V
Mid Channel, 3615.1MHz + 3634.9MHz										
7.24825	28.94	RMS	37.2	-23.6	.6	-95.2	-52.06	-40	-12.06	V
7.24883	28.96	RMS	37.2	-23.6	.6	-95.2	-52.04	-40	-12.04	H
10.87487	26.19	RMS	39.3	-19.4	.5	-95.2	-48.61	-40	-8.61	V
10.87606	26.7	RMS	39.3	-19.4	.5	-95.2	-48.1	-40	-8.1	H
14.500	28.78	RMS	41.4	-21.4	.8	-95.2	-45.62	-40	-5.62	V
14.5017	28.64	RMS	41.4	-21.4	.8	-95.2	-45.76	-40	-5.76	H
High Channel, 3670.2MHz + 3690MHz										
7.21041	30.24	RMS	37.1	-23.7	.6	-95.2	-50.96	-40	-10.96	V
7.25399	30.13	RMS	37.2	-23.6	.6	-95.2	-50.87	-40	-10.87	H
9.63626	27.48	RMS	38.8	-20.4	.7	-95.2	-48.62	-40	-8.62	V
9.68824	28.21	RMS	38.7	-20.2	.5	-95.2	-47.99	-40	-7.99	H
14.95416	28.95	RMS	42.3	-21.5	.9	-95.2	-44.55	-40	-4.55	V
15.10273	29.15	RMS	41.8	-21.1	.9	-95.2	-44.45	-40	-4.45	H

10. SETUP PHOTOS

Please refer to 13179116-EP1V1 for setup photos

END OF REPORT