CERTIFICATION TEST REPORT

Report Number. : 12696945-E9V3

Applicant	:	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A2221
FCC ID	:	579C-E3304A
EUT Description	:	SMARTPHONE
Test Standard(s)	:	FCC CFR47 PART 22H, PART 27

Date Of Issue:
AUGUST 14, 2019

Prepared by:
UL Verification Services Inc.
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NVLAP TESTING

NVLAP Lab code: 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	7/19/2019	Initial Review	Mengistu Mekuria
V2	8/1/2019	Address TCB Questions	Mengistu Mekuria
V3	8/14/2019	Address TCB Questions	John Thompson

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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	A2221
FCC ID	579C-E3304A
EUT Description	SMARTPHONE
Serial Number	C7CYQ00AMTCF (Conducted), C7CYG03EMCHT (Radiated)
Date Tested	FEBRUARY 18, 2019 to AUGUST 05, 2019
Applicable Standards	FCC CFR47 PART 22H, PART 27
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 Project Engineer UL Verification Services Inc.	Lieu Nguyen Test Engineer UL Verification Services Inc.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26:2015, FCC CFR 47 Part 2, FCC KDB 971168 D01 v03r01/ D02 v02r01, KDB 412172 D01 Determining ERP and EIRP v01r01, PART 22H, Part 27.

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 Rd.
☐ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)	☐ Chamber I (ISED: 2324A-5)
☒ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)	☐ Chamber J (ISED: 2324A-6)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	☐ Chamber K (ISED: 2324A-1)
	☐ Chamber G (ISED:22541-4)	☐ Chamber L (ISED: 2324A-3)
	☐ Chamber H (ISED:22541-5)	

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.

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. 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

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4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Radiated Disturbance,1000 to 18000 MHz	4.24 dB
Radiated Disturbance,18000 to 26000 MHz	4.37 dB
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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, TD-SCDMA, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wide band, GPS and NFC. All models support at least one UICC based SIM. The second SIM, if present, is either UICC based pSIM (physical SIM) or e-SIM (electronic SIM). The device has a built-in inductive charging receiver. The rechargeable battery is also not user accessible.

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5.2. MAXIMUM OUTPUT POWER

EIRP LIMIT

FCC: §2.1046, §22H, §27.50

EIRP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.6

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.2

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

Part 22H	
ERP Limit (W)	7.00
Antenna Gain (dBi)	-3.20

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)	99% BW (kHz)	Emission Designator
3+5	QPSK	825.5	846.5	24.7	19.35	0.086	7658.9	7M66G7W
	16QAM			23.8	18.45	0.070	7660.6	7M66D7W
	64QAM			22.8	17.45	0.056	7703.6	7M70D7W
5+3	QPSK	826.5	847.5	24.6	19.25	0.084	7536.0	7M54G7W
	16QAM			23.6	18.25	0.067	7502.5	7M50D7W
	64QAM			22.5	17.15	0.052	7483.0	7M48D7W
5+10	QPSK	826.5	844.0	25.0	19.65	0.092	13844.0	13M8G7W
	16QAM			24.0	18.60	0.072	13883.0	13M9D7W
	64QAM			21.7	16.38	0.043	13874.0	13M9D7W
10+5	QPSK	829.0	846.5	24.9	19.55	0.090	13743.0	13M7G7W
	16QAM			23.9	18.55	0.072	13746.0	13M7D7W
	64QAM			21.6	16.25	0.042	13911.0	13M9D7W
10+10	QPSK	829.0	844.0	24.9	19.55	0.090	19346.0	19M3G7W
	16QAM			24.1	18.75	0.075	19341.0	19M3D7W
	64QAM			21.7	16.35	0.043	19498.0	19M5D7W

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OUTPUT POWER FOR LTE BAND 7

Part 27	
EIRP Limit (W)	2.00
Antenna Gain (dBi)	-2.10

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	24.6	22.50	0.178	28313	28M3G7W
	16QAM			23.4	21.30	0.135	28171	28M2D7W
	64QAM			22.6	20.50	0.112	28072	28M1D7W
20+10	QPSK	2510.0	2564.5	24.4	22.30	0.170	28232	28M2G7W
	16QAM			23.6	21.50	0.141	28107	28M1D7W
	64QAM			22.5	20.40	0.110	28162	28M2D7W
15+15	QPSK	2507.5	2562.5	24.7	22.60	0.182	28742	28M7G7W
	16QAM			23.7	21.60	0.145	28668	28M7D7W
	64QAM			22.4	20.30	0.107	28660	28M7D7W
15+20	QPSK	2507.8	2560.0	24.7	22.60	0.182	33089	33M1G7W
	16QAM			23.7	21.60	0.145	33034	33M0D7W
	64QAM			22.6	20.50	0.112	33000	33M0D7W
20+15	QPSK	2510.0	2562.2	24.7	22.60	0.182	32981	33M0G7W
	16QAM			23.9	21.80	0.151	33021	33M0D7W
	64QAM			22.6	20.50	0.112	32957	33M0D7W
20+20	QPSK	2510.0	2560.0	25.0	22.90	0.195	37868	37M9G7W
	16QAM			24.1	22.00	0.158	37881	37M9D7W
	64QAM			22.9	20.80	0.120	37799	37M8D7W

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OUTPUT POWER FOR LTE BAND 41

Part 27	
EIRP Limit (W)	2.00
Antenna Gain (dBi)	-2.10

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	27.0	24.90	0.309	23139	23M1G7W
	16QAM			26.0	23.86	0.243	23147	23M1D7W
	64QAM			23.7	21.62	0.145	23173	23M2D7W
20+5	QPSK	2506.0	2686.7	26.6	24.52	0.283	23167	23M2G7W
	16QAM			25.7	23.59	0.229	23123	23M1D7W
	64QAM			23.5	21.42	0.139	23188	23M2D7W
10+20	QPSK	2501.5	2680.0	26.9	24.81	0.303	27928	27M9G7W
	16QAM			26.0	23.86	0.243	27870	27M9D7W
	64QAM			23.5	21.39	0.138	27899	27M9D7W
20+10	QPSK	2506.0	2684.5	26.7	24.56	0.286	27912	27M9G7W
	16QAM			25.7	23.65	0.232	27966	28M0D7W
	64QAM			23.4	21.30	0.135	27961	28M0D7W
15+15	QPSK	2503.5	2682.5	26.7	24.61	0.289	28486	28M5G7W
	16QAM			25.8	23.70	0.234	28466	28M5D7W
	64QAM			23.3	21.20	0.132	28538	28M5D7W
15+20	QPSK	2503.8	2680.0	26.9	24.84	0.305	32642	32M6G7W
	16QAM			26.0	23.90	0.245	32672	32M7D7W
	64QAM			23.6	21.50	0.141	32773	32M8D7W
20+15	QPSK	2506.0	2682.2	26.7	24.57	0.287	32692	32M7G7W
	16QAM			25.8	23.69	0.234	32709	32M7D7W
	64QAM			23.5	21.41	0.138	32744	32M7D7W
20+20	QPSK	2506.0	2680.0	26.8	24.70	0.295	37474	37M5G7W
	16QAM			25.8	23.73	0.236	37466	37M5D7W
	64QAM			23.6	21.52	0.142	37598	37M6D7W

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5.3. SOFTWARE AND FIRMWARE

The EUT Firmware installed during testing was version: 19-01.1919.01_27-0.22.00-27.

5.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	Ant 1 Antenna Gain (dBi)	Ant 2 Antenna Gain (dBi)
LTE Band 5, 824 – 849 MHz	-3.2	-5.4
LTE Band 7, 2500 – 2570 MHz	-2.1	-3.7
LTE Band 41, 2496 – 2690 MHz (FCC)	-2.1	-3.7

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5.5. WORST-CASE CONFIGURATION AND MODE

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

The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on QPSK, 16QAM and 64QAM modulations. It was found that QPSK and 16QAM results were worst case. All testing was performed using QPSK and 16QAM modulations to represent the worst case. Tests were performed on the conducted test at Ant 1 antenna as worst case since it has higher output powers.

The EUT was investigated in three orthogonal orientations X/Y/Z on both Ant 1 and Ant 2 antennas. For Ant 1 antenna, it was determined that Y(Landscape) orientation was worst-case orientation for band 5 and Z (Portrait) orientation was worst-case orientation for 7 and 41 bands without AC/DC adapter. For Ant 2 antenna, it was determined that X (Flatbed) orientation was worst-case orientation for band 5 and Y(Landscape) orientation was worst-case orientation for 7 and 41 bands without AC/DC adapter.

For Band Edge and Emission Mask: The highest BW combo and sample lower BW combinations were tested. Combination pairs of the same BW are considered generally equivalent. 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 combination and a sample lower combination was tested. The highest power RB combination was selected as worst case.

Radiated spurious emissions were investigated below 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found on below 30MHz and 30MHz-1GHz.

For interband transmission of multiple channels in Ant 1 and Ant 2 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.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	**Manufacturer**	**Model**	**Serial Number**
Laptop AC/DC adapter	Apple	85W MagSafe 2	C0651730MMMG6P4AL
Laptop	Apple	Macbook Pro	C02PM012G3QD
Laptop	Apple	Macbook Pro	C02P52HGG085

I/O CABLES (RF Conducted Test)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	3	US 115V	Un-shielded	2.0m	N/A
2	USB	1	DC	Un-shielded	1.0m	N/A
3	RF In/Out	1	EUT	Un-shielded	0.6m	N/A
4	RF In/Out	1	Communication Test Set	Un-shielded	1.2m	N/A
5	RF In/Out	1	Barrel	N/A	N/A	N/A

I/O CABLES (RF Radiated Test)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	RF In/Out	1	Antenna	Un-shielded	5.0m	N/A

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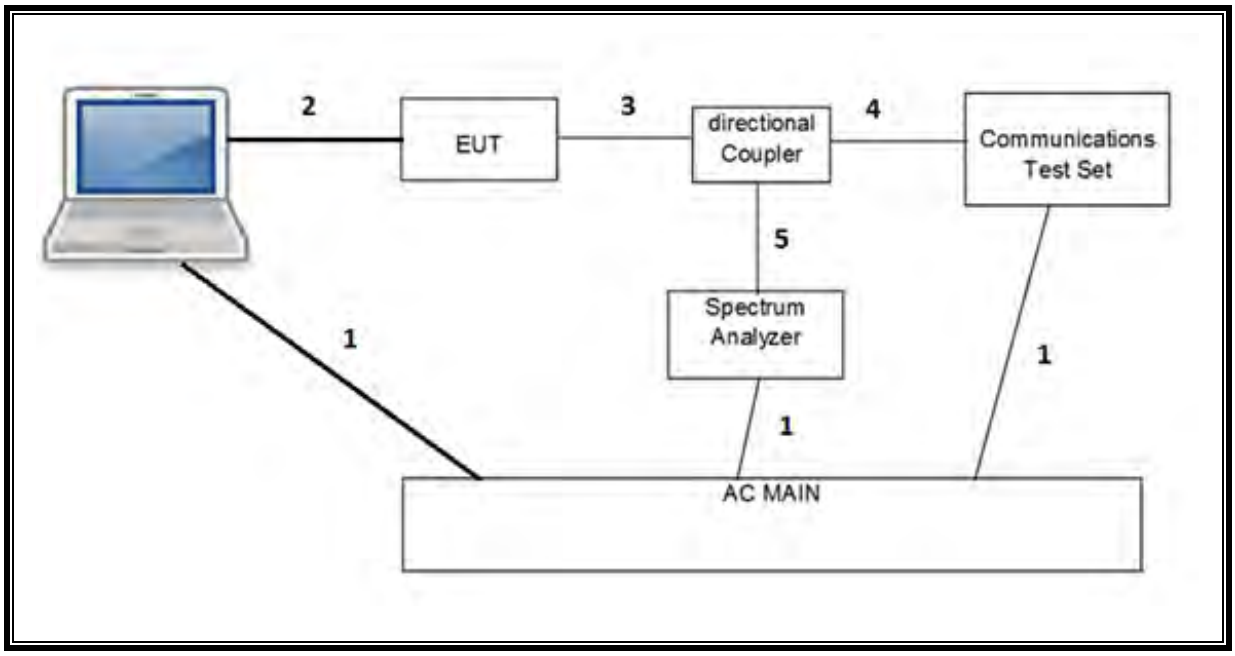
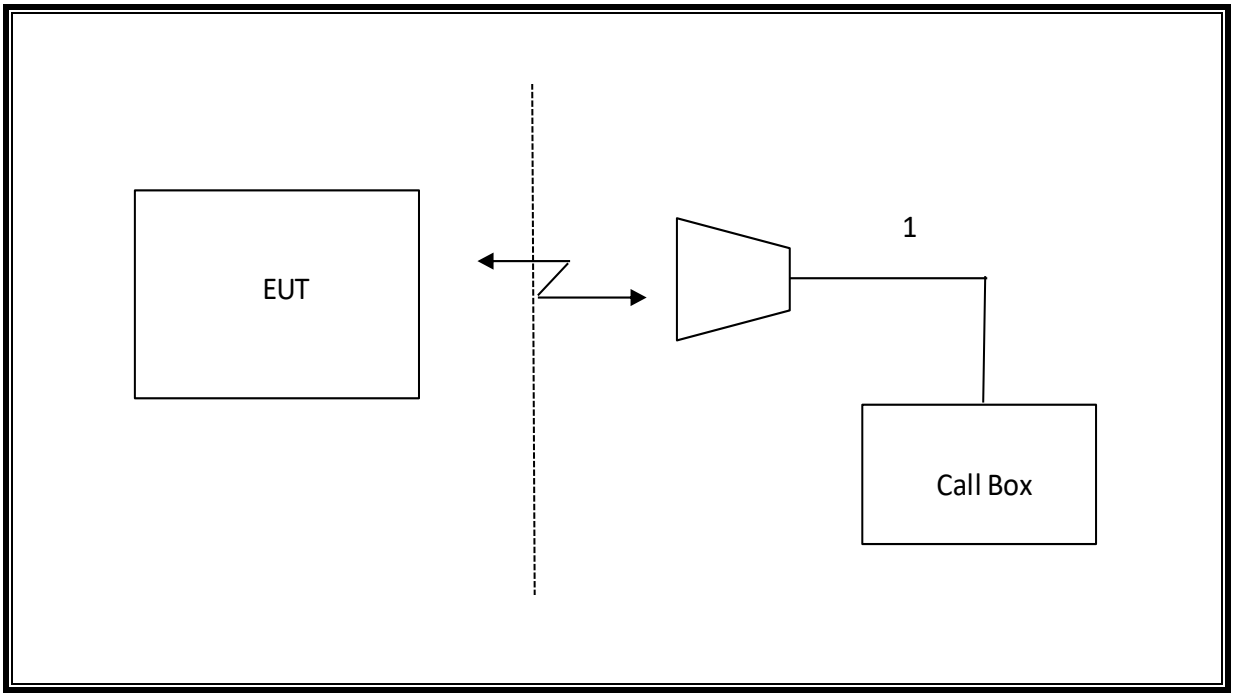
CONDUCTED SETUP



RADIATED SETUP



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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**
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T15	08/15/2019
Amplifier, 18-26GHz	Agilent	8449B	T404	3/23/2020
Amplifier, 26-40GHz	Miteq	TTA2640	T1804	3/23/2020
Spectrum Analyzer, PXA 3Hz to 44GHZ	Agilent	N9030A	T905	1/24/2020
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T340	01/22/2020
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1454	01/23/2020
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T908	01/23/2020
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T339	01/29/2020
Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	T931	05/11/2020
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	PRE0180176	11/01/2019
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	E4446A	T177	04/12/2019
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	E4446A	T123	01/28/2020
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	E4440A	T198	01/30/2020
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	E4440A	T99	1/28/2020
Directional Coupler	KRYTAR	152610	T1536	04/27/2019
Directional Coupler	KRYTAR	152610	T1537	04/27/2019
Wireless Communications Test Set, 8960 Series 10	Agilent	E5515C	T211	05/10/2020
Filter, HPF 3.0GHz	Micro-Tronics	HPM17543	T487	12/04/2019
Filter, HPF 1.2GHz	Micro-Tronics	WHKX1.2/15G-6ST	T1182	05/19/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T459	01/24/2020
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T959	02/16/2020
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T1871	02/18/2020
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T921	02/18/2020
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T376	02/21/2020
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T958	02/20/2020
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	T754	08/15/2019
Power Meter, P-series single channel	Keysight	N1911A	T1268	01/31/2020
Power Sensor	Keysight	N1921A	T1228	03/01/2020
Antenna, Horn 1-18GHz	ETS Lindgren	T3117	T346	05/14/2020
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T344	05/07/2020
Antenna, Horn 18-26GHz	ARA	MWH-1826/B	T447	6/16/2019
Antenna, Horn 26-40GHz	ARA	MWH-2640/B	T446	8/9/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	PRE0181574	08/01/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	PRE0077974	05/13/2020
Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	T1616	10/18/2019
UL AUTOMATION SOFTWARE				
CLT Software	UL	UL RF	Ver 9.5, April 26, 2016	
Power Measurement Software	UL	UL RF	Ver 2.2, June 2017	

NOTES:

1. For equipment listed above that had a calibration due during the testing period, its use was paused to allow for calibration.

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7. RF OUTPUT POWER VERIFICATION

RULE PART(S)

FCC: §2.1046

MODES TESTED

- LTE Band 5
- LTE Band 7
- LTE Band 41

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:

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7.1. LTE BAND 5

ID:	10646	Date:	6/20/19

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 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
10MHz / 10MHz	829.0	838.9	1	49	1	0	**24.9**	**24.1**	**21.7**	**23.5**	**22.5**	**20.5**
			50	0	50	0	22.7	21.6	21.4	21.1	20.1	20.2
	831.6	841.5	1	49	1	0	24.8	23.9	21.5	23.3	22.5	20.5
			50	0	50	0	22.6	21.5	21.4	21.1	20.1	20.2
	834.1	844.0	1	49	1	0	24.6	23.6	21.4	23.2	22.3	20.1
			50	0	50	0	22.6	21.6	21.4	20.9	20.0	19.9

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 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
5MHz / 10MHz	826.5	833.7	1	24	1	0	24.8	23.8	21.6	23.3	**22.4**	20.3
			50	0	50	0	22.7	21.7	21.5	21.1	20.1	20.1
	831.8	839.0	1	24	1	0	**25.0**	**24.0**	**21.7**	23.5	22.3	**20.6**
			50	0	50	0	22.7	21.7	21.5	20.9	20.1	20.2
	836.8	844.0	1	24	1	0	24.8	23.4	21.7	**23.5**	22.1	19.6
			50	0	50	0	22.7	21.6	21.5	20.9	19.9	19.9

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 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
10MHz / 5MHz	829.0	836.2	1	49	1	0	**24.9**	**23.9**	**21.6**	23.1	**22.4**	**20.3**
			50	0	25	0	22.6	21.6	20.4	21.1	20.1	19.9
	834.3	841.5	1	49	1	0	24.6	23.7	21.3	**23.2**	22.2	20.2
			50	0	25	0	22.6	21.6	20.4	21.1	20.1	20.1
	839.3	846.5	1	49	1	0	24.6	23.3	21.5	22.9	22.0	20.3
			50	0	25	0	22.7	21.7	20.4	20.9	19.9	20.0

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OUTPUT POWER FOR LTE BAND 5 (5.0MHz + 3.0MHz)

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	QPSK	16QAM	64QAM
5MHz / 3MHz	826.5	830.4	1	24	1	0	24.4	23.4	22.3	23.0	21.9	21.2
			25	0	15	0	22.8	21.8	21.1	21.2	20.2	19.8
	835.1	839.0	1	24	1	0	**24.6**	**23.6**	**22.5**	23.0	22.0	**21.3**
			25	0	15	0	22.9	22.0	21.0	21.3	20.2	20.0
	843.6	847.5	1	24	1	0	24.5	23.5	22.4	**23.1**	**22.1**	21.2
			25	0	15	0	22.9	22.0	21.1	21.4	20.3	20.0

OUTPUT POWER FOR LTE BAND 5 (3.0MHz + 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	QPSK	16QAM	64QAM
3MHz / 5MHz	825.5	829.4	1	14	1	0	24.6	23.7	22.7	23.3	22.5	21.5
			15	0	25	0	23.2	22.2	21.3	22.2	21.1	20.2
	834.1	838.0	1	14	1	0	**24.7**	**23.8**	**22.8**	**23.5**	**22.8**	**21.7**
			15	0	25	0	23.3	22.4	21.5	22.2	21.1	20.2
	842.6	846.5	1	14	1	0	24.6	23.7	22.4	23.0	22.1	21.1
			15	0	25	0	23.2	22.1	21.4	21.8	20.8	19.8

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7.2. LTE BAND 7

ID:	10646	Date:	6/20/19

OUTPUT POWER FOR LTE BAND 7 (10.0MHz + 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 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
10MHz / 20MHz	2505.5	2519.9	1	49	1	0	**24.6**	23.3	22.4	19.1	18.3	16.9
			50	0	100	0	22.4	21.3	22.3	17.9	16.4	14.7
	2525.6	2540.0	1	49	1	0	24.3	23.3	**22.6**	**19.5**	**18.5**	16.9
			50	0	100	0	22.1	21.2	22.3	18.5	16.0	14.8
	2545.6	2560.0	1	49	1	0	24.4	**23.4**	22.5	18.7	17.8	**17.3**
			50	0	100	0	21.6	20.7	22.0	17.7	16.5	14.8

OUTPUT POWER FOR LTE BAND 7 (20.0MHz + 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 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
20MHz / 10MHz	2510.0	2524.4	1	99	1	0	**24.4**	**23.6**	**22.5**	19.5	18.4	16.9
			1	0	1	49	15.7	15.7	16.8	12.1	12.0	11.2
			100	0	50	0	22.1	21.2	20.3	18.5	17.3	16.7
	2530.1	2544.5	1	99	1	0	24.2	23.3	22.4	**19.7**	**18.4**	17.0
			1	0	1	49	15.6	15.6	16.8	11.9	12.0	11.2
			100	0	50	0	21.9	20.9	20.2	18.2	17.2	16.6
	2550.1	2564.5	1	99	1	0	24.3	23.4	22.3	19.1	18.3	**17.0**
			1	0	1	49	15.4	15.4	16.5	11.6	11.7	11.4
			100	0	50	0	22.3	21.2	20.1	18.3	17.3	16.7

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm) Ant 1 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
15MHz / 15MHz	2507.5	2522.5	1	74	1	0	**24.7**	**23.7**	22.4	18.5	**18.7**	16.8
			75	0	75	0	22.1	21.0	22.3	18.4	17.4	16.7
	2527.5	2542.5	1	74	1	0	24.6	23.6	**22.4**	**19.6**	18.6	16.8
			75	0	75	0	22.0	21.0	22.2	18.2	17.2	16.6
	2547.5	2562.5	1	74	1	0	24.6	23.6	22.1	19.3	18.2	**17.0**
			75	0	75	0	21.9	20.8	22.0	16.4	16.8	16.7

OUTPUT POWER FOR LTE BAND 7 (15.0MHz + 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 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
15MHz / 20MHz	2507.8	2524.9	1	74	1	0	**24.7**	**23.7**	**22.6**	18.5	17.8	17.1
			75	0	100	0	22.2	21.2	22.4	18.3	17.4	16.7
	2525.3	2542.4	1	74	1	0	24.5	23.5	22.5	**19.2**	18.0	**17.1**
			75	0	100	0	22.0	21.0	22.5	18.3	17.3	16.8
	2542.9	2560.0	1	74	1	0	24.4	23.5	22.4	18.9	**18.1**	17.0
			75	0	100	0	21.8	20.9	22.3	17.8	16.9	17.0

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

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	QPSK	16QAM	64QAM
20MHz / 15MHz	2510.0	2527.1	1	99	1	0	**24.7**	23.8	**22.6**	19.2	18.7	16.8
			100	0	75	0	22.3	21.2	22.5	18.6	17.5	16.7
	2527.6	2544.7	1	99	1	0	24.6	23.7	22.5	**19.6**	**19.2**	**17.2**
			100	0	75	0	21.9	21.0	22.4	18.3	17.3	16.8
	2545.1	2562.2	1	99	1	0	24.6	**23.9**	21.4	19.3	18.8	17.1
			100	0	75	0	22.3	21.4	22.2	17.8	16.3	16.9

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	QPSK	16QAM	64QAM
20MHz/ 20MHz	2510.0	2529.8	1	99	1	0	**25.0**	**24.1**	**22.9**	19.4	**19.0**	17.1
			1	0	1	99	16.0	16.0	17.0	8.9	12.2	10.8
			100	0	100	0	22.2	21.2	22.5	18.1	17.1	16.7
	2525.1	2544.9	1	99	1	0	24.6	23.9	22.7	**19.8**	18.9	17.0
			1	0	1	99	15.6	15.8	16.9	11.9	11.9	11.2
			100	0	100	0	22.0	21.1	22.4	18.4	17.4	16.8
	2540.2	2560.0	1	99	1	0	24.8	23.8	22.5	19.2	18.8	**17.1**
			1	0	1	99	15.7	15.6	16.5	11.6	11.8	10.9
			100	0	100	0	21.9	20.9	22.2	17.8	16.8	17.0

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7.3. LTE BAND 41

ID:	10646	Date:	6/21/19

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	QPSK	16QAM	64QAM
5MHz / 20MHz	2499.3	2511.0	1	24	1	0	26.6	25.5	23.4	**21.3**	**20.3**	**18.4**
			25	0	100	0	24.4	23.4	23.2	19.0	18.0	18.0
	2583.8	2595.5	1	24	1	0	**27.0**	**26.0**	**23.7**	20.8	19.7	17.9
			25	0	100	0	24.5	23.6	23.3	18.6	17.6	17.7
	2668.3	2680.0	1	24	1	0	26.6	25.6	23.3	20.5	19.6	17.7
			25	0	100	0	24.4	23.5	23.2	18.4	17.4	17.4

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	QPSK	16QAM	64QAM
20MHz / 5MHz	2506.0	2517.7	1	99	1	0	**26.6**	**25.7**	**23.5**	**21.3**	**20.4**	**18.4**
			1	0	1	24	17.9	18.0	17.6	12.4	12.5	12.4
			100	0	25	0	24.4	23.4	23.1	19.2	18.2	18.3
	2590.5	2602.2	1	99	1	0	26.5	25.5	23.3	20.7	19.7	17.8
			1	0	1	24	18.0	18.1	17.7	12.1	12.1	12.3
			100	0	25	0	24.5	23.4	23.2	18.6	17.6	17.6
	2675.0	2686.7	1	99	1	0	26.5	25.6	23.3	20.5	19.5	17.5
			1	0	1	24	17.9	17.9	17.7	11.8	11.9	11.9
			100	0	25	0	24.4	23.4	23.2	18.4	17.3	17.4

OUTPUT POWER FOR LTE BAND 41 (10.0MHz + 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	QPSK	16QAM	64QAM
10MHz / 20MHz	2501.5	2515.9	1	49	1	0	26.5	25.2	23.0	**21.4**	**20.2**	**18.3**
			50	0	100	0	24.3	23.4	23.1	19.1	18.1	18.1
	2583.6	2598.0	1	49	1	0	**26.9**	**26.0**	**23.5**	20.3	19.2	17.3
			50	0	100	0	24.4	23.5	23.3	18.6	17.7	17.7
	2665.6	2680.0	1	49	1	0	26.6	25.6	23.4	20.6	19.6	17.8
			50	0	100	0	24.4	23.4	23.1	18.3	17.3	17.3

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OUTPUT POWER FOR LTE BAND 41 (20.0MHz + 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 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
20MHz / 10MHz	2506.0	2520.4	1	99	1	0	**26.7**	**25.7**	23.3	**21.3**	**20.4**	**18.4**
			100	0	50	0	24.4	23.4	23.1	19.2	18.2	18.2
	2588.1	2602.5	1	99	1	0	26.6	25.7	**23.4**	20.8	19.8	17.8
			100	0	50	0	24.5	23.5	23.3	18.6	17.6	17.7
	2670.1	2684.5	1	99	1	0	26.6	25.6	23.4	20.6	19.6	17.6
			100	0	50	0	24.3	23.4	23.1	18.3	17.3	17.4

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm) Ant 1 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
15MHz / 15MHz	2503.5	2518.5	1	74	1	0	26.5	25.4	23.2	**21.4**	**20.4**	**18.3**
			75	0	75	0	24.4	23.4	23.1	19.1	18.1	18.1
	2585.5	2600.5	1	74	1	0	**26.7**	**25.8**	**23.3**	20.8	19.8	17.7
			75	0	75	0	24.5	23.5	23.2	18.6	17.6	17.6
	2667.5	2682.5	1	74	1	0	26.5	25.6	23.2	20.5	19.6	17.4
			75	0	75	0	24.4	23.3	23.1	18.3	17.3	17.3

OUTPUT POWER FOR LTE BAND 41 (15.0MHz + 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 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
15MHz / 20MHz	2503.8	2520.9	1	74	1	0	26.6	25.6	23.4	**21.5**	**20.5**	**18.4**
			75	0	100	0	24.5	23.5	23.2	19.2	18.2	18.2
	2583.3	2600.4	1	74	1	0	**26.9**	**26.0**	**23.6**	21.0	20.1	18.0
			75	0	100	0	24.6	23.5	23.3	18.7	17.7	17.8
	2662.9	2680.0	1	74	1	0	26.7	25.7	23.3	20.7	19.7	17.5
			75	0	100	0	24.4	23.4	23.1	18.4	17.4	17.4

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB Size	PCC RB Offset	SCC1 RB Size	SCC1 RB Offset	Conducted Average (dBm) Ant 1 QPSK	Ant 1 16QAM	Ant 1 64QAM	Ant 2 QPSK	Ant 2 16QAM	Ant 2 64QAM
20MHz / 15MHz	2506.0	2523.1	1	99	1	0	**26.7**	25.8	23.5	**21.3**	**20.5**	**18.5**
			100	0	75	0	24.5	23.5	23.3	19.2	18.2	18.2
	2585.6	2602.7	1	99	1	0	26.5	**25.8**	**23.5**	20.8	19.8	17.8
			100	0	75	0	24.6	23.6	23.3	18.7	17.7	17.7
	2665.1	2682.2	1	99	1	0	26.6	25.6	23.1	20.5	19.6	17.5
			100	0	75	0	24.4	23.5	23.1	18.4	17.4	17.4

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OUTPUT POWER FOR LTE BAND 41 (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	QPSK	16QAM	64QAM
20MHz/ 20MHz	2506.0	2525.8	1	99	1	0	26.7	25.8	23.5	**21.4**	**20.5**	**18.5**
			1	0	1	99	17.7	17.8	17.4	12.1	12.3	12.1
			100	0	100	0	24.5	23.5	23.3	19.2	18.2	18.2
	2583.1	2602.9	1	99	1	0	**26.8**	**25.8**	**23.6**	20.9	20.0	18.0
			1	0	1	99	17.7	17.8	17.6	11.8	11.9	12.0
			100	0	100	0	24.5	23.6	23.3	18.8	17.8	17.8
	2660.2	2680.0	1	99	1	0	26.6	25.7	23.4	20.6	19.7	17.7
			1	0	1	99	17.5	17.7	17.3	11.6	11.6	11.7
			100	0	100	0	24.4	23.4	23.2	18.4	17.4	17.4

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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.

MODES TESTED

- LTE Band 5
- LTE Band 7
- LTE Band 41

RESULTS

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

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LTE BAND 5

Band	Mode	RB Allocation/RB Offset	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 5	5MHz + 3MHz BAND QPSK	25/0+15/0	836.5	7.6589	16.47
	5MHz + 3MHz BAND 16QAM			7.6606	14.56
	5MHz + 3MHz BAND 64QAM			7.7036	15.41
	3MHz + 5MHz BAND QPSK	15/0 + 25/0		7.5360	7.954
	3MHz + 5MHz BAND 16QAM			7.5025	7.947
	3MHz + 5MHz BAND 64QAM			7.4830	8.054
	5MHz + 10MHz BAND QPSK	25/0 + 50/0		13.844	14.70
	5MHz + 10MHz BAND 16QAM			13.883	14.76
	5MHz + 10MHz BAND 64QAM			13.874	14.47
	10MHz + 5MHz BAND QPSK	50/0 + 25/0		13.743	14.36
	10MHz + 5MHz BAND 16QAM			13.746	14.33
	10MHz + 5MHz BAND 64QAM			13.911	14.37
	10MHz + 10MHz BAND QPSK	50/0 + 50/0		19.346	21.38
	10MHz + 10MHz BAND 16QAM			19.341	21.28
	10MHz + 10MHz BAND 64QAM			19.498	26.39

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	28.313	33.77
	10MHz + 20MHz BAND 16QAM			28.171	32.43
	10MHz + 20MHz BAND 64QAM			28.072	30.46
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		28.232	32.24
	20MHz + 10MHz BAND 16QAM			28.107	31.04
	20MHz + 10MHz BAND 64QAM			28.162	30.99
	15MHz + 15MHz BAND QPSK	75/0 + 75/0		28.742	33.52
	15MHz + 15MHz BAND 16QAM			28.668	31.27
	15MHz + 15MHz BAND 64QAM			28.660	31.44
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		33.089	41.16
	15MHz + 20MHz BAND 16QAM			33.034	41.90
	15MHz + 20MHz BAND 64QAM			33.000	39.78
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		32.981	40.69
	20MHz + 15MHz BAND 16QAM			33.021	39.83
	20MHz + 15MHz BAND 64QAM			32.957	36.59
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.868	45.45
	20MHz + 20MHz BAND 16QAM			37.881	46.85
	20MHz + 20MHz BAND 64QAM			37.799	47.31

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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	23.139	25.10
	5MHz + 20MHz BAND 16QAM			23.147	25.13
	5MHz + 20MHz BAND 64QAM			23.173	24.99
	20MHz + 5MHz BAND QPSK	100/0 + 25/0		23.167	24.92
	20MHz + 5MHz BAND 16QAM			23.123	24.83
	20MHz + 5MHz BAND 64QAM			23.188	25.04
	10MHz + 20MHz BAND QPSK	50/0 + 100/0		27.928	30.08
	10MHz + 20MHz BAND 16QAM			27.870	30.07
	10MHz + 20MHz BAND 64QAM			27.899	29.96
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		27.912	29.95
	20MHz + 10MHz BAND 16QAM			27.966	29.99
	20MHz + 10MHz BAND 64QAM			27.961	30.33
	15MHz + 15MHz BAND QPSK	75/0 + 75/0		28.486	30.61
	15MHz + 15MHz BAND 16QAM			28.466	30.62
	15MHz + 15MHz BAND 64QAM			28.538	30.71
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		32.642	35.07
	15MHz + 20MHz BAND 16QAM			32.672	34.99
	15MHz + 20MHz BAND 64QAM			32.773	35.04
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		32.692	34.91
	20MHz + 15MHz BAND 16QAM			32.709	35.02
	20MHz + 15MHz BAND 64QAM			32.744	35.41
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.474	40.04
	20MHz + 20MHz BAND 16QAM			37.466	39.89
	20MHz + 20MHz BAND 64QAM			37.598	40.11

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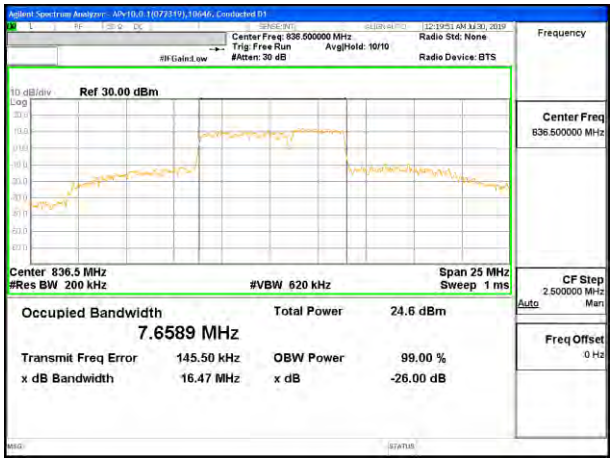
8.1.1. LTE BAND 5



LTE B5 5MHz + 3MHz QPSK RB25-0 + RB15-0

LTE B5 5MHz + 3MHz 16QAM RB25-0 + RB15-0

LTE B5 5MHz + 3MHz 64QAM RB25-0 + RB15-0

LTE B5 3MHz + 5MHz QPSK RB15-0 + RB25-0

LTE B5 3MHz + 5MHz 16QAM RB15-0 + RB25-0

LTE B5 3MHz + 5MHz 64QAM RB15-0 + RB25-0

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LTE B5 5MHz + 10MHz QPSK RB25-0 + RB50-0

LTE B5 5MHz + 10MHz 16QAM RB25-0 + RB50-0

B5 5MHz + 10MHz 64QAM RB25-0 + RB50-0

LTE B5 10MHz + 5MHz QPSK RB50-0 + RB25-0

LTE B5 10MHz + 5MHz 16QAM RB50-0 + RB25-0

LTE B5 10MHz + 5MHz 64QAM RB50-0 + RB25-0

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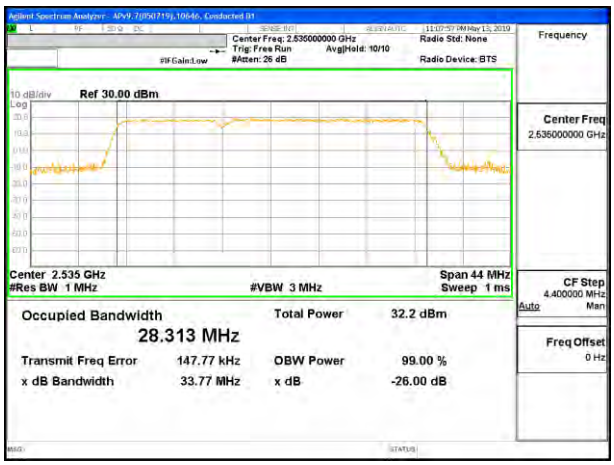
LTE B5 10MHz + 10MHz QPSK RB50-0 + RB50-0

LTE B5 10MHz + 10MHz QPSK RB50-0 + RB50-0

LTE B5 10MHz + 10MHz 64QAM RB50-0 + RB50-0

8.1.2. LTE BAND 7



LTE B7 10MHz + 20MHz QPSK RB50-0 + RB100-0

LTE B7 10MHz + 20MHz 16QAM RB50-0 + RB100-0

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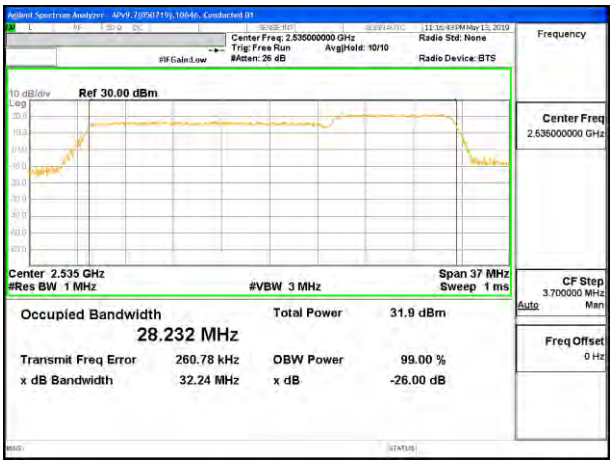
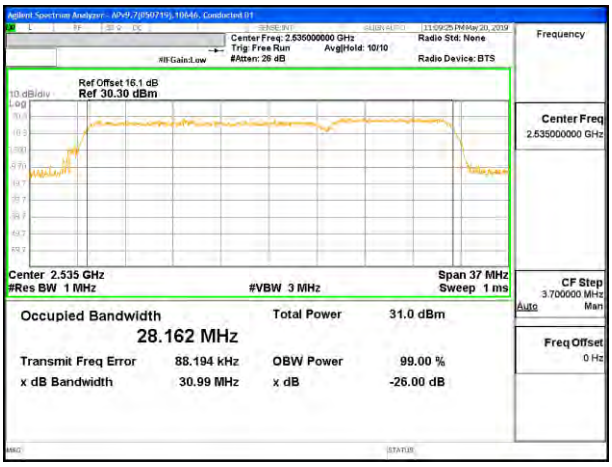
LTE B7 10MHz + 20MHz 64QAM RB50-0 + RB100-0



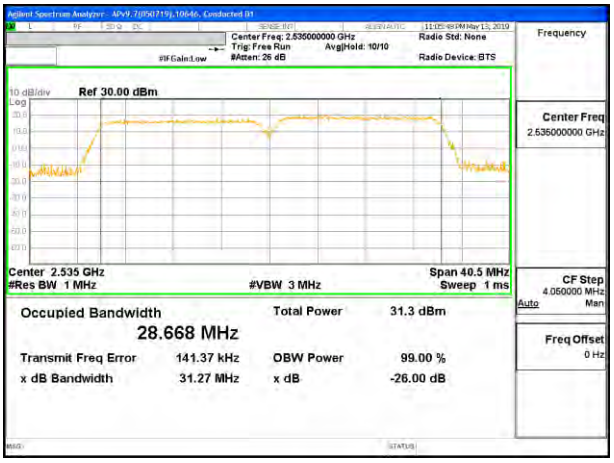
LTE B7 20MHz + 10MHz QPSK RB100-0 + RB50-0

LTE B7 20MHz + 10MHz 16QAM RB100-0 + RB50-0



LTE B7 20MHz + 10MHz 64QAM RB100-0 + RB50-0

LTE B7 15MHz + 15MHz QPSK RB75-0 + RB75-0



LTE B7 15MHz + 15MHz 16QAM RB75-0 + RB75-0

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LTE B7 15MHz + 15MHz 64QAM RB75-0 + RB75-0

LTE B7 15MHz + 20MHz QPSK RB75-0 + RB100-0

LTE B7 15MHz + 20MHz 16QAM RB75-0 + RB100-0

LTE B7 15MHz + 20MHz 64QAM RB75-0 + RB100-0

LTE B7 20MHz + 15MHz QPSK RB100-0 + RB75-0

LTE B7 20MHz + 15MHz 16QAM RB100-0 + RB75-0

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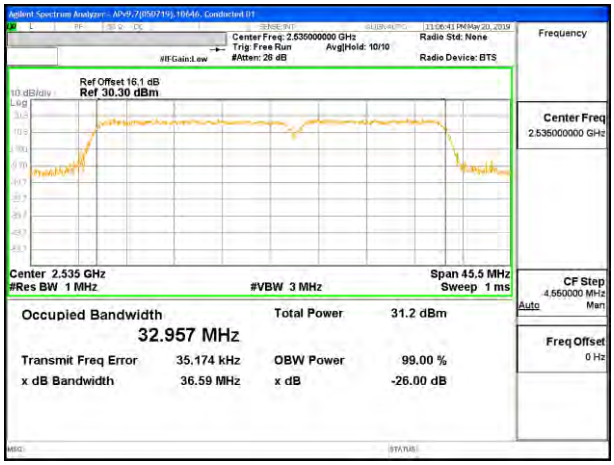

LTE B7 20MHz + 15MHz 64QAM RB100-0 + RB75-0

LTE B7 20MHz + 20MHz QPSK RB100-0 + RB100-0

LTE B7 20MHz + 20MHz 16QAM RB100-0 + RB100-0

LTE B7 20MHz + 20MHz 64QAM RB100-0 + RB100-0

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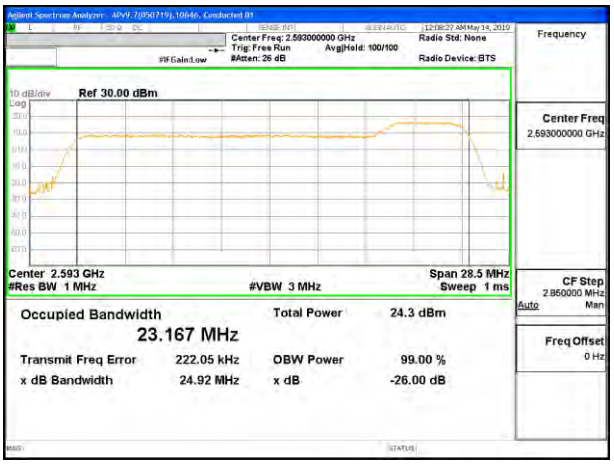
8.1.3. LTE BAND 41

LTE B41 5MHz + 20MHz QPSK RB25-0 + RB100-0

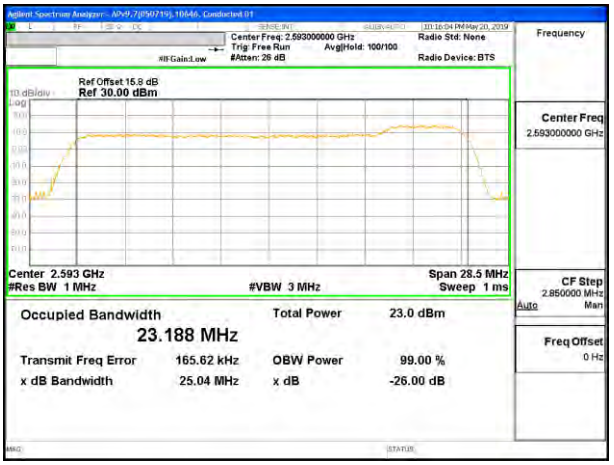
LTE B41 5MHz + 20MHz 16QAM RB25-0 + RB100-0

LTE B41 5MHz + 20MHz 64QAM RB25-0 + RB100-0



LTE B41 20MHz + 5MHz QPSK RB100-0 + RB25-0

LTE B41 20MHz + 5MHz 16QAM RB100-0 + RB25-0



LTE B41 20MHz + 5MHz 64QAM RB100-0 + RB25-0

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LTE B41 10MHz + 20MHz QPSK RB50-0 + RB100-0

LTE B41 10MHz + 20MHz 16QAM RB50-0 + RB100-0

LTE B41 10MHz + 20MHz 64QAM RB50-0 + RB100-0

LTE B41 20MHz + 10MHz QPSK RB100-0 + RB50-0

LTE B41 20MHz + 10MHz 16QAM RB100-0 + RB50-0

LTE B41 20MHz + 10MHz 64QAM RB100-0 + RB50-0

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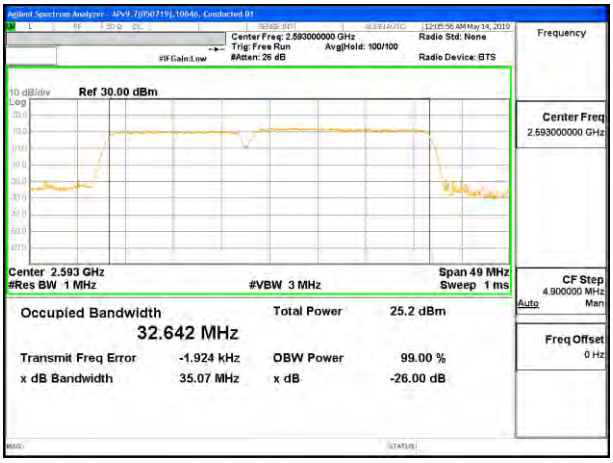
LTE B41 15MHz + 15MHz QPSK RB75-0 + RB75-0

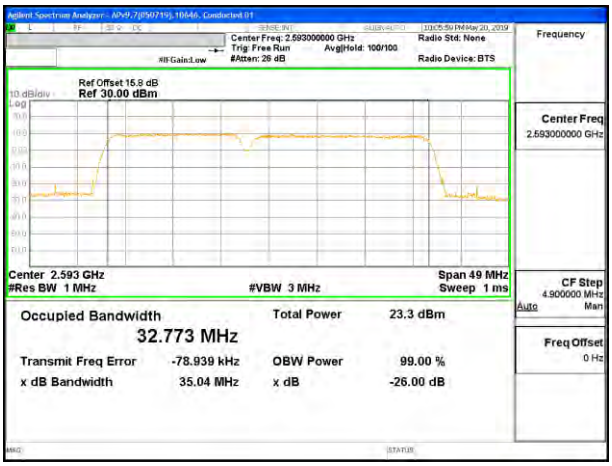
LTE B41 15MHz + 15MHz 16QAM RB75-0 + RB75-0

LTE B41 15MHz + 15MHz 64QAM RB75-0 + RB75-0



LTE B41 15MHz + 20MHz QPSK RB75-0 + RB100-0

LTE B41 15MHz + 20MHz 16QAM RB75-0 + RB100-0



LTE B41 15MHz + 20MHz 64QAM RB75-0 + RB100-0

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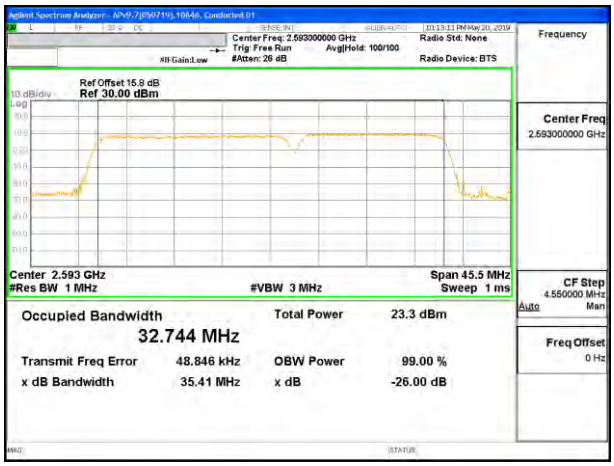
LTE B41 20MHz + 15MHz QPSK RB100-0 + RB75-0

LTE B41 20MHz + 15MHz 16QAM RB100-0 + RB75-0



LTE B41 20MHz + 15MHz 64QAM RB100-0 + RB75-0

LTE B41 20MHz + 20MHz QPSK RB100-0 + RB100-0

LTE B41 20MHz + 20MHz 16QAM RB100-0 + RB100-0

LTE B41 20MHz + 20MHz 64QAM RB100-0 + RB100-0

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8.2. BAND EDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051, §22.917, and §27.53

LIMITS

FCC: §22.917, §24.238, §27.53(h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

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 that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE FOR FCC PART 27

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

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

Set resolution bandwidth to at least 1% of emission bandwidth.

(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.

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MODES TESTED

- LTE Band 5
- LTE Band 7
- LTE Band 41

RESULTS

The highest BW combo and sample lower BW combinations were tested. Combination pairs of the same BW are considered generally equivalent. The RB combinations were selected such that the signal is active closest to the band limit, as this is the worst case.

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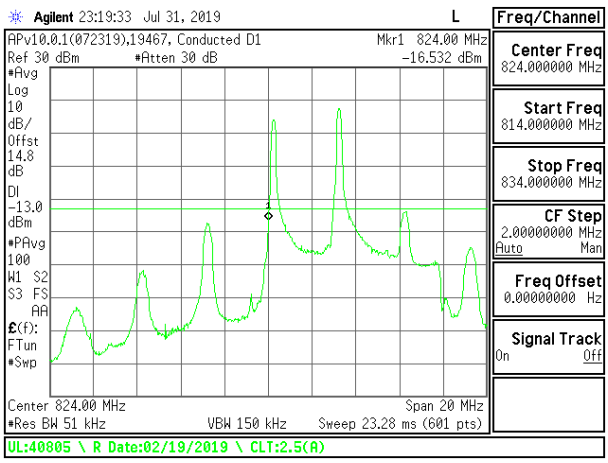
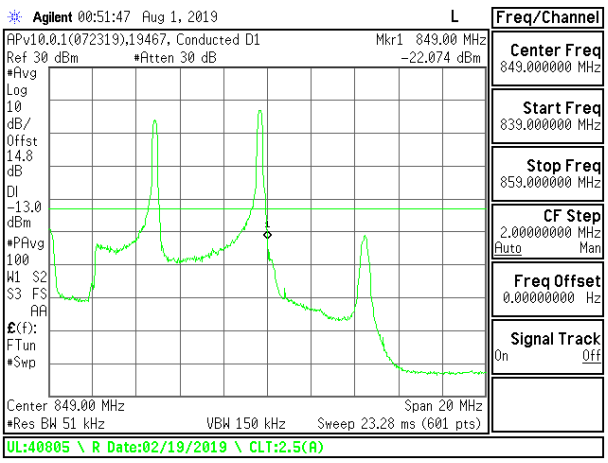
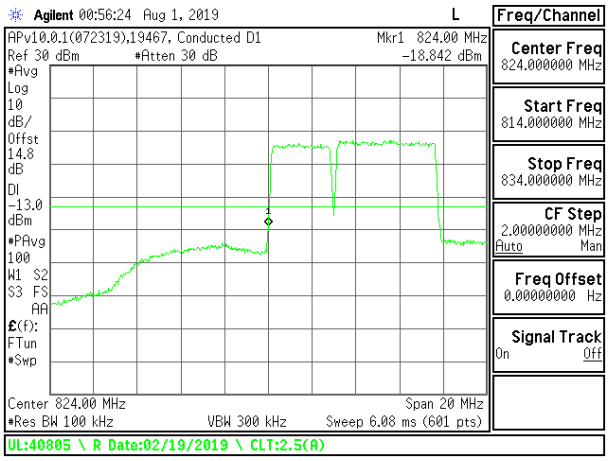
8.2.1. LTE BAND 5



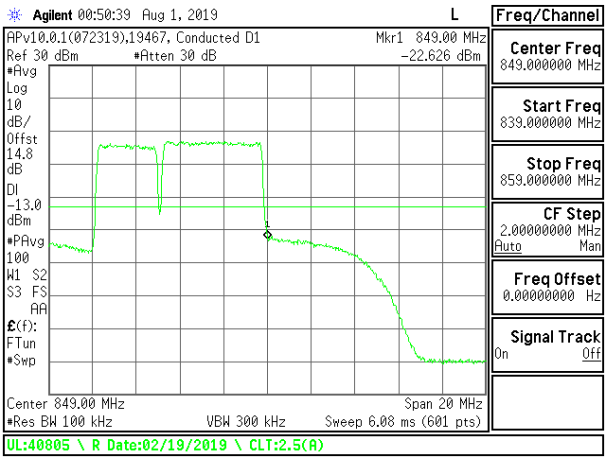
LTE B5 3MHz + 5MHz QPSK Low Ch RB1-0 + RB1-0



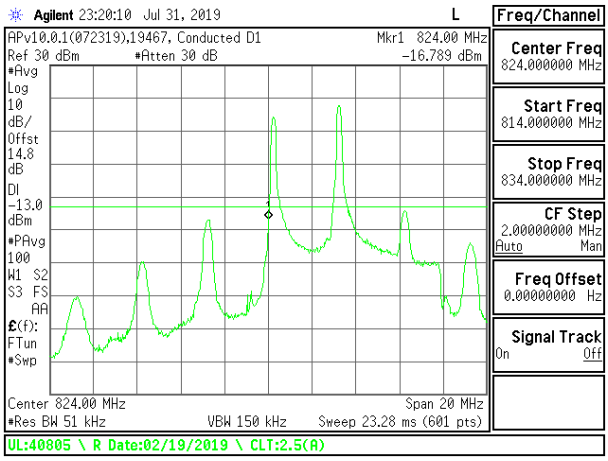
LTE B5 3MHz + 5MHz QPSK High Ch RB1-14 + RB1-24



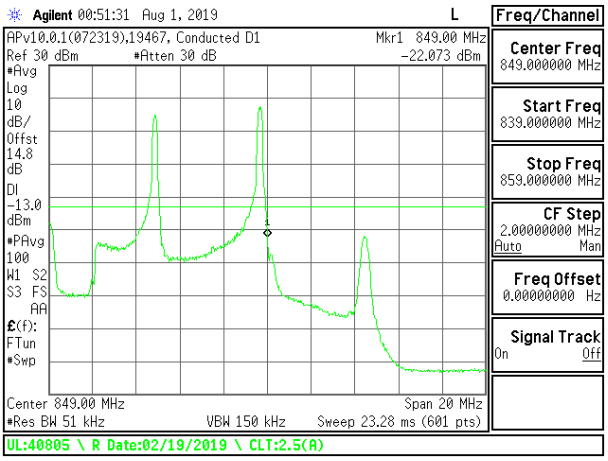
LTE B5 3MHz + 5MHz QPSK Low Ch RB25-0 + RB15-0



LTE B5 3MHz + 5MHz QPSK High Ch RB25-0 + RB15-0



LTE B5 3MHz + 5MHz 16QAM Low Ch RB1-0 + RB1-0



LTE B5 3MHz + 5MHz 16QAM High Ch RB1-14 + RB1-24

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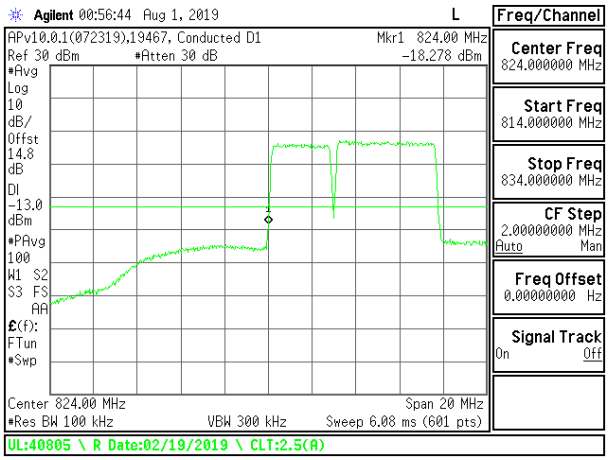
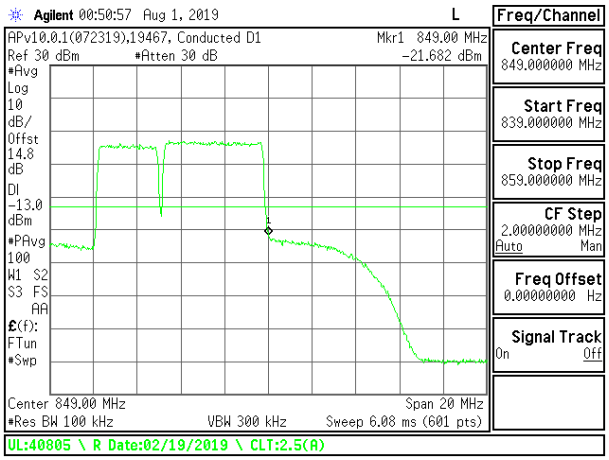
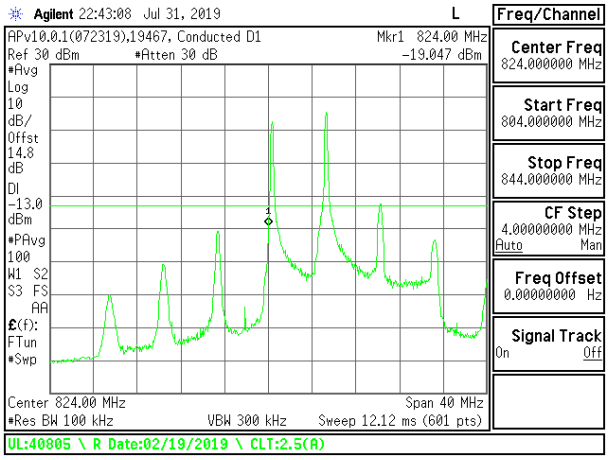


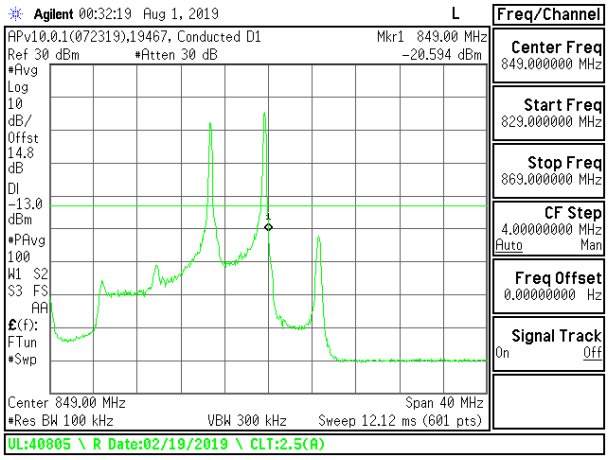
LTE B5 3MHz + 5MHz 16QAM Low Ch RB25-0 + RB15-0



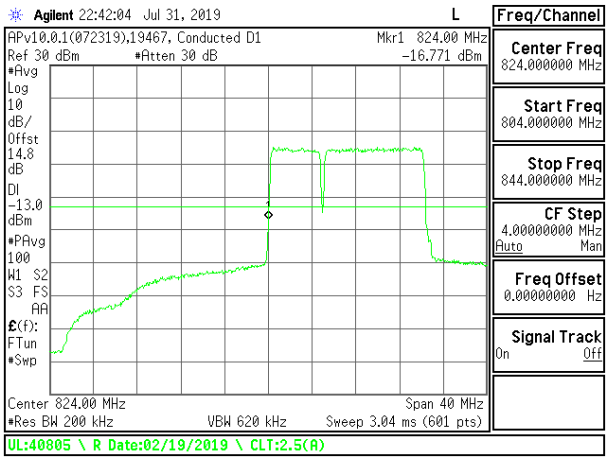
LTE B5 3MHz + 5MHz 16QAM High Ch RB25-0 + RB15-0



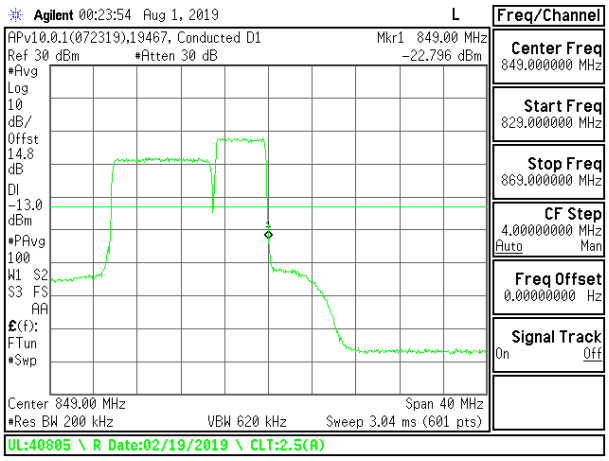
LTE B5 5MHz + 10MHz QPSK Low Ch RB1-0 + RB1-0



LTE B5 10MHz + 5MHz QPSK High Ch RB1-49 + RB1-24



LTE B5 5MHz + 10MHz QPSK Low Ch RB25-0 + RB50-0



LTE B5 10MHz + 5MHz QPSK High Ch RB50-0 + RB25-0

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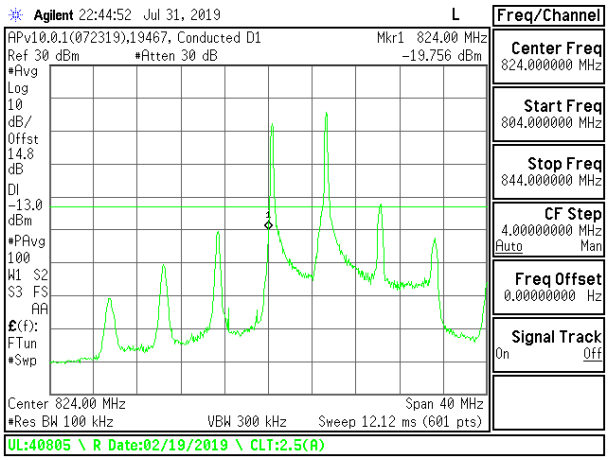
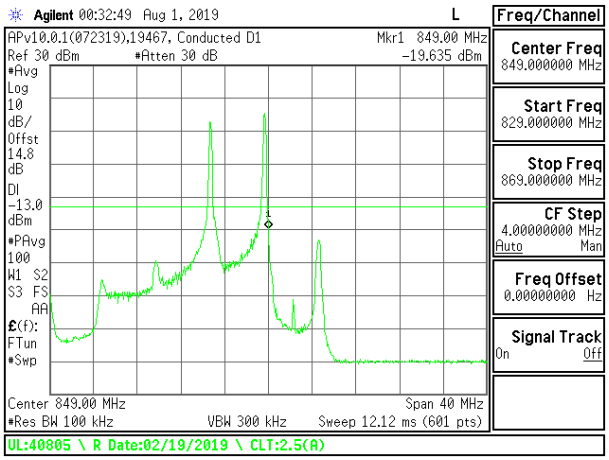
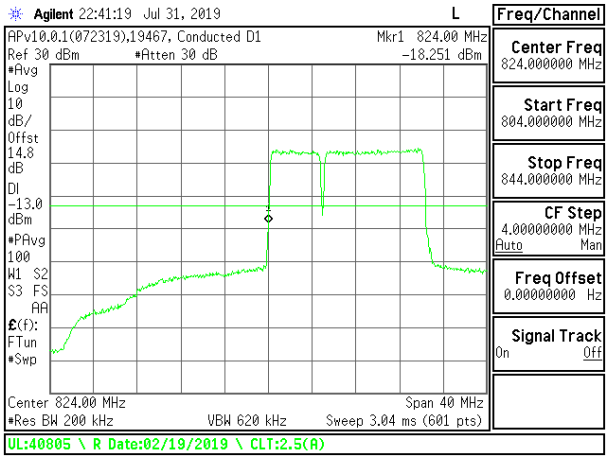


LTE B5 5MHz + 10MHz 16QAM Low Ch RB1-0 + RB1-0



LTE B5 10MHz + 5MHz 16QAM High Ch RB1-49 + RB1-24



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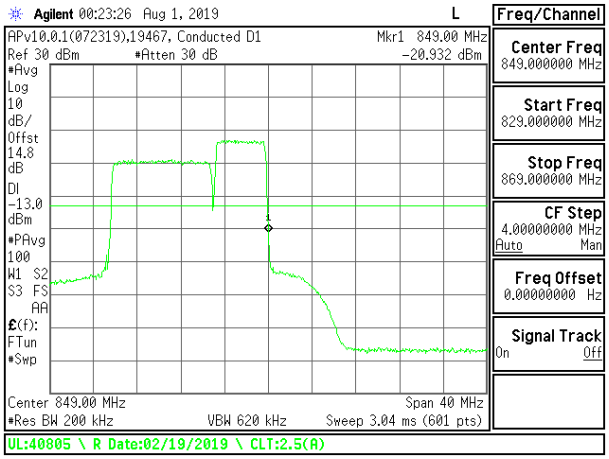
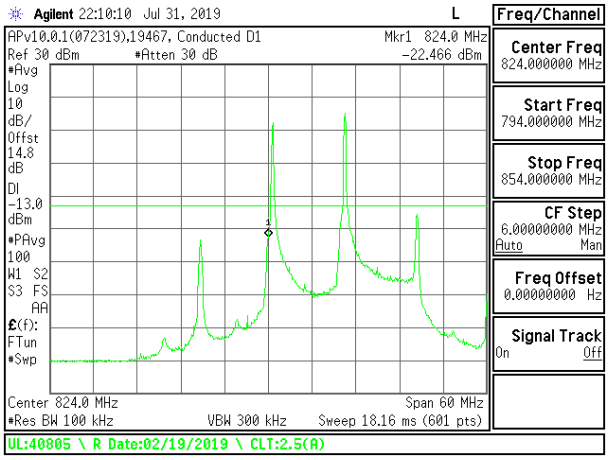
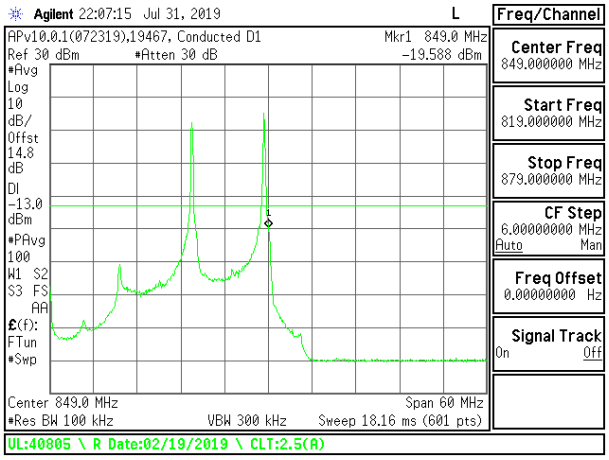


LTE B5 10MHz + 5MHz 16QAM High Ch RB50-0 + RB25-0



LTE B5 10MHz + 10MHz QPSK Low Ch RB1-0 + RB1-0



LTE B5 10MHz + 10MHz QPSK High Ch RB1-49 + RB1-49

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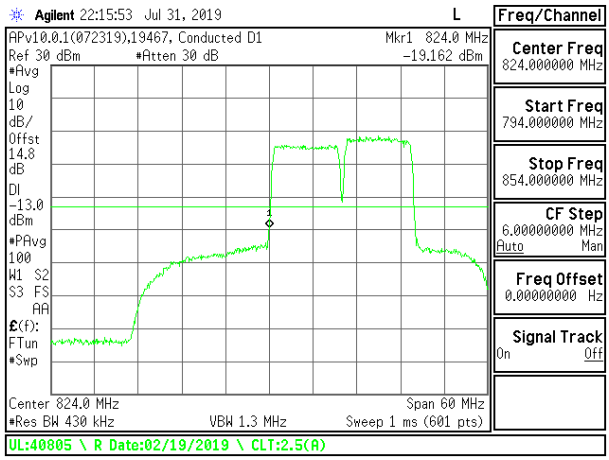

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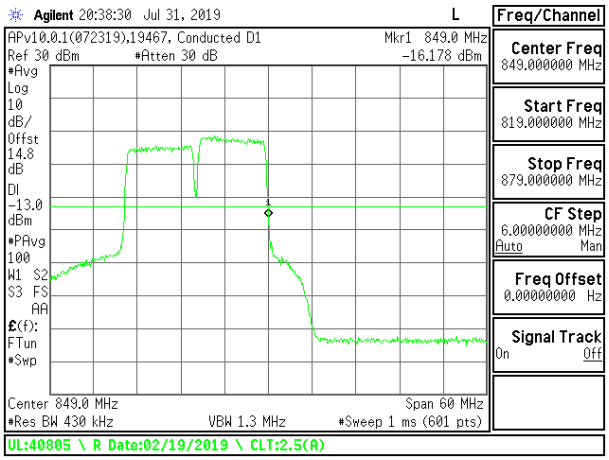
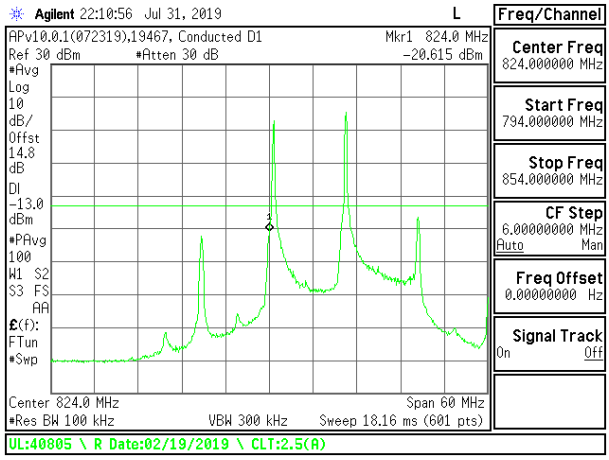
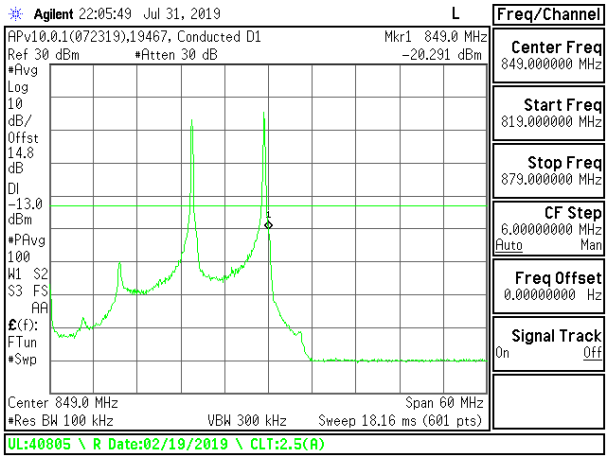


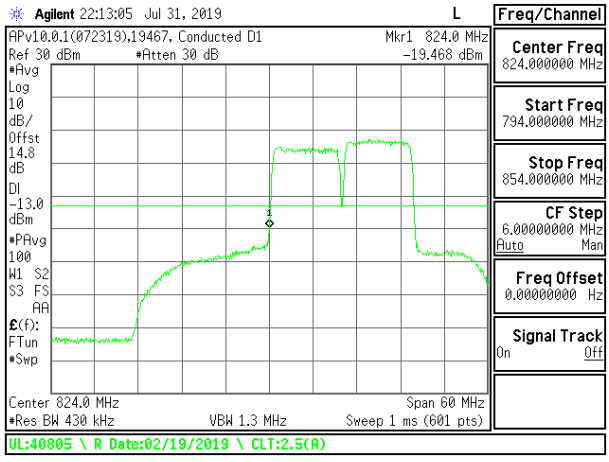
LTE B5 10MHz + 10MHz QPSK High Ch RB50-0 + RB50-0



LTE B5 10MHz + 10MHz 16QAM Low Ch RB1-0 + RB1-0



LTE B5 10MHz + 10MHz 16QAM High Ch RB1-49 + RB1-49



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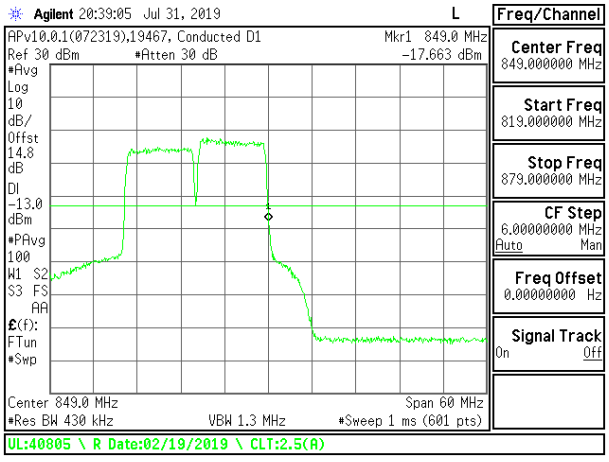

LTE B5 10MHz + 10MHz 16QAM High Ch RB50-0 + RB50-0

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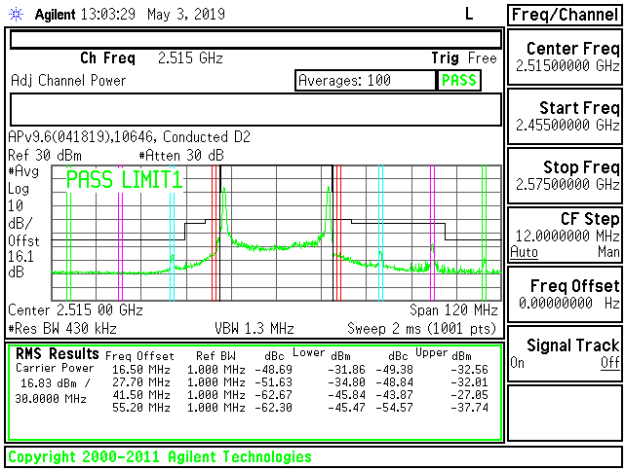
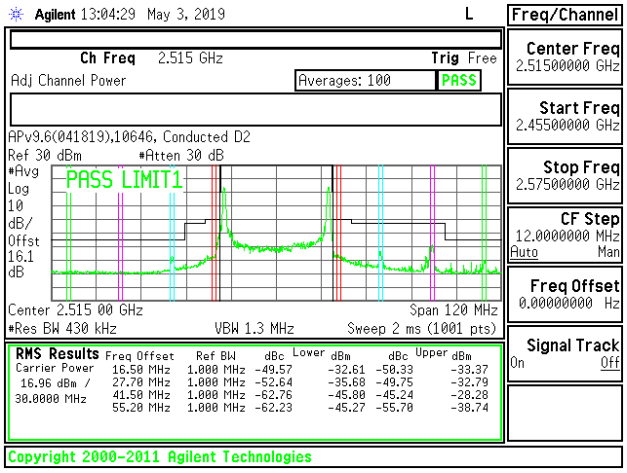
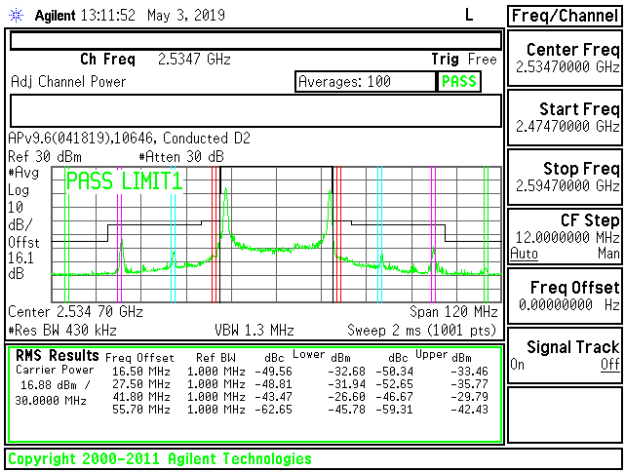
8.2.2. LTE BAND 7



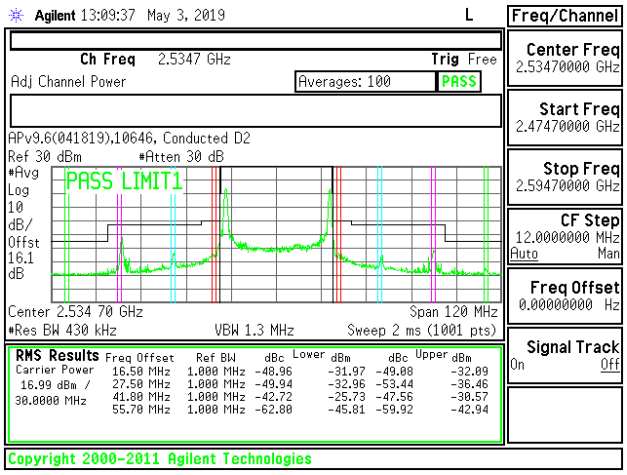
LTE B7 20MHz + 10MHz QPSK Low Ch RB1-0 + RB1-49



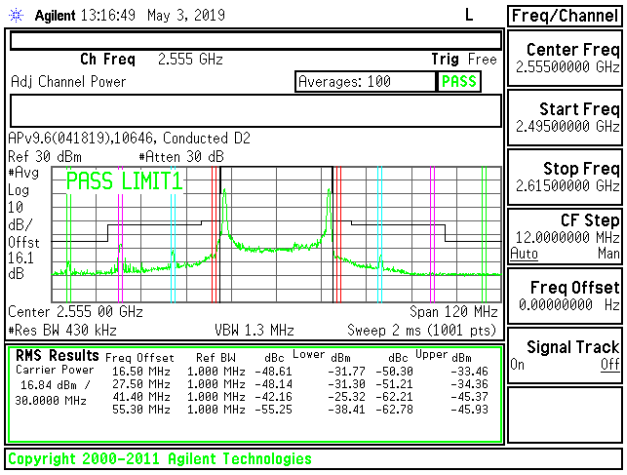
LTE B7 20MHz + 10MHz 16QAM Low Ch RB1-0 + RB1-49



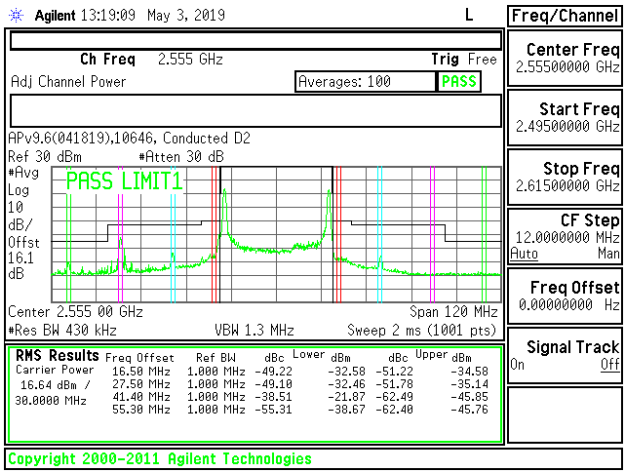
LTE B7 20MHz + 10MHz QPSK Mid Ch RB1-0 + RB1-49



LTE B7 20MHz + 10MHz 16QAM Mid Ch RB1-0 + RB1-49



LTE B7 20MHz + 10MHz QPSK High Ch RB1-0 + RB1-49



LTE B7 20MHz + 10MHz 16QAM High Ch RB1-0 + RB1-49

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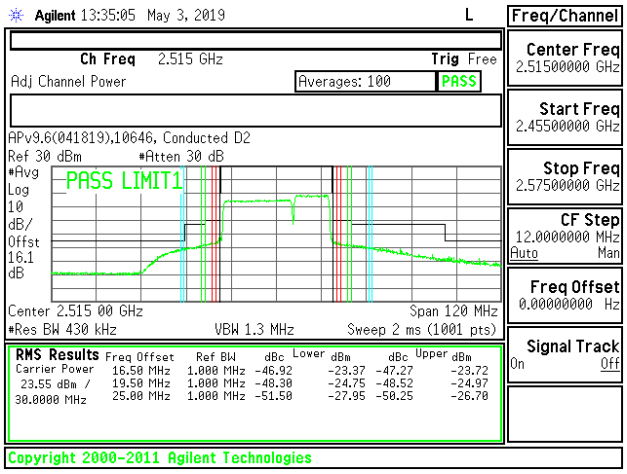
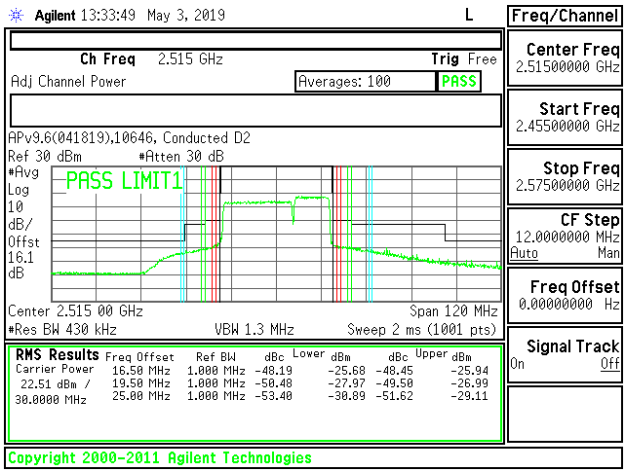
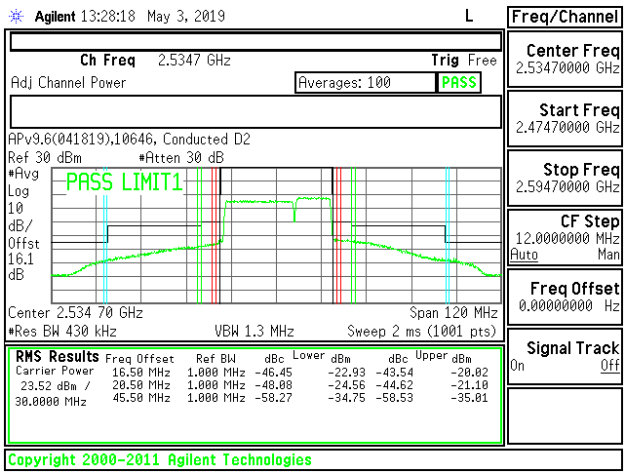


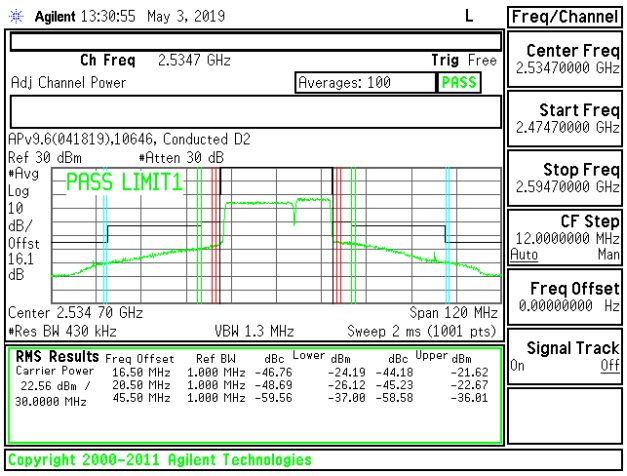
LTE B7 20MHz + 10MHz QPSK Low Ch RB100-0 + RB50-0



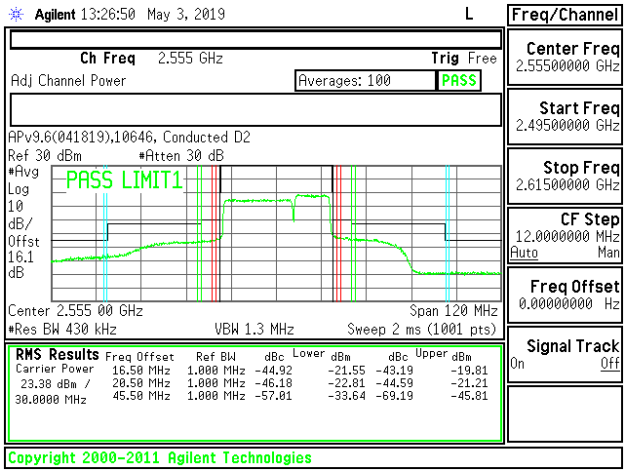
LTE B7 20MHz + 10MHz 16QAM Low Ch RB100-0 + RB50-0



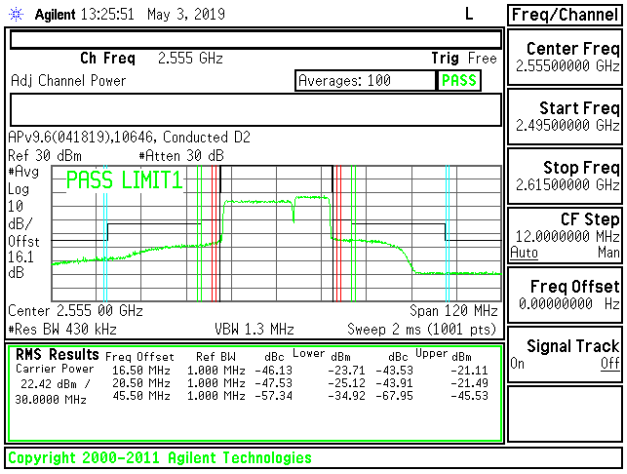
LTE B7 20MHz + 10MHz QPSK Mid Ch RB100-0 + RB50-0



LTE B7 20MHz + 10MHz 16QAM Mid Ch RB100-0 + RB50-0



LTE B7 20MHz + 10MHz QPSK High Ch RB100-0 + RB50-0



LTE B7 20MHz + 10MHz 16QAM High Ch RB100-0 + RB50-0

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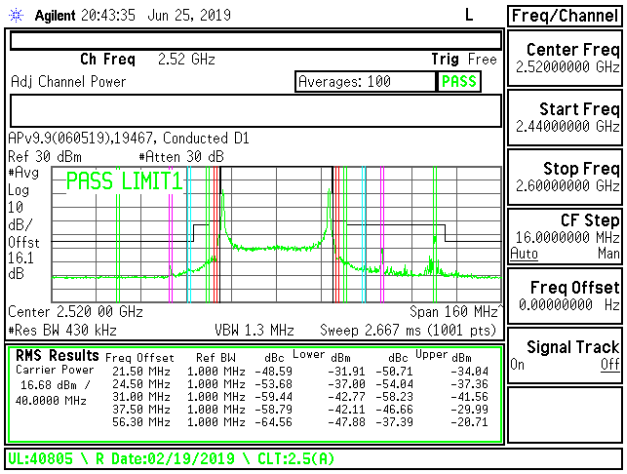
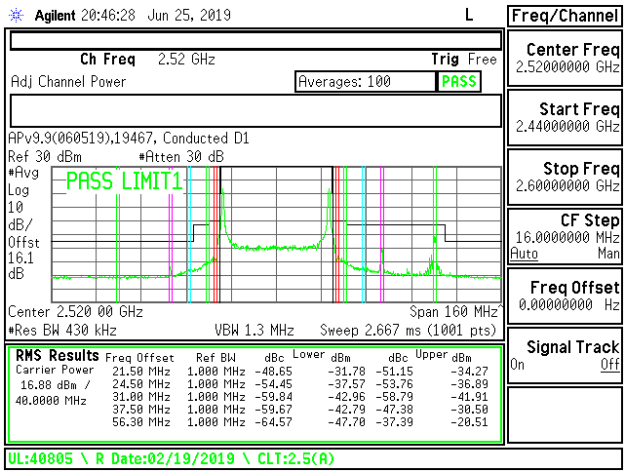
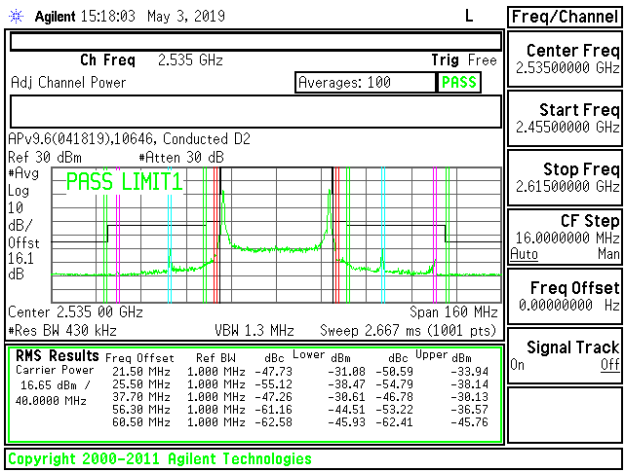


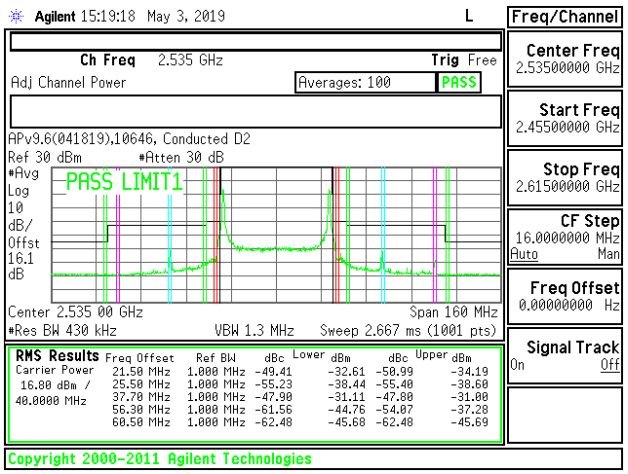
LTE B7 20MHz + 20MHz QPSK Low Ch RB1-0 + RB1-99



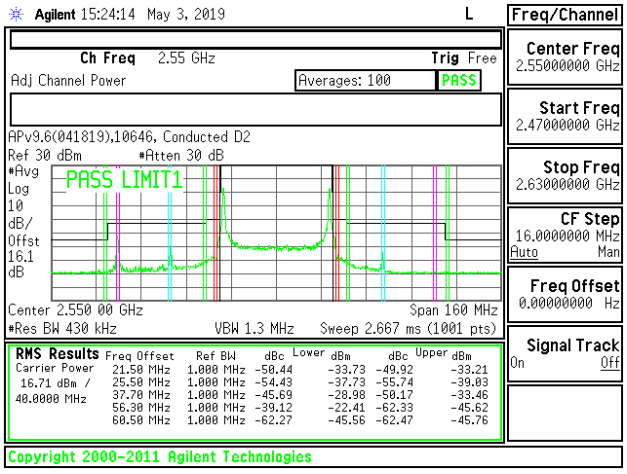
LTE B7 20MHz + 20MHz 16QAM Low Ch RB1-0 + RB1-99



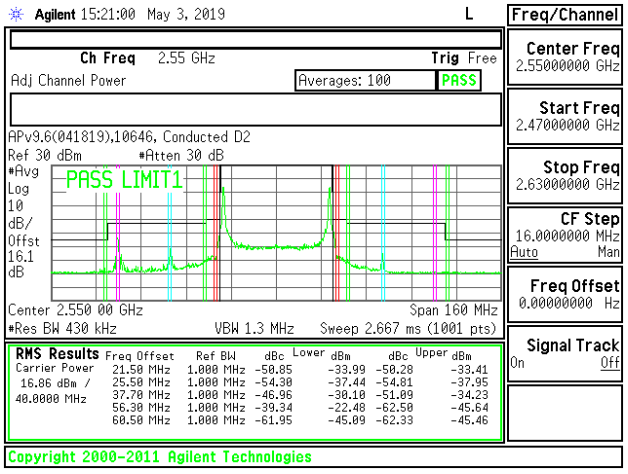
LTE B7 20MHz + 20MHz QPSK Mid Ch RB1-0 + RB1-99



LTE B7 20MHz + 20MHz 16QAM Mid Ch RB1-0 + RB1-99



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



LTE B7 20MHz + 20MHz 16QAM High Ch RB1-0 + RB1-99

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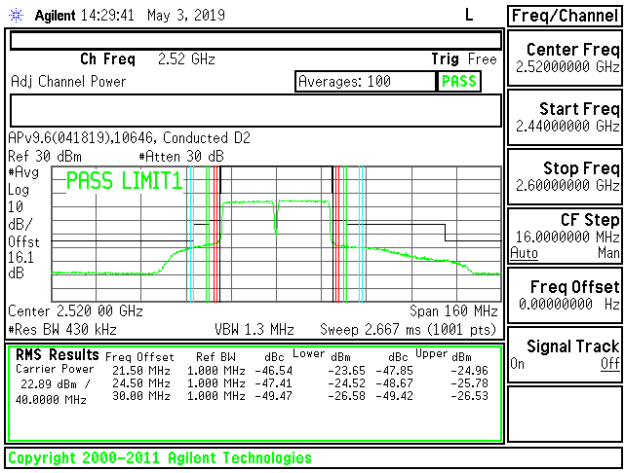
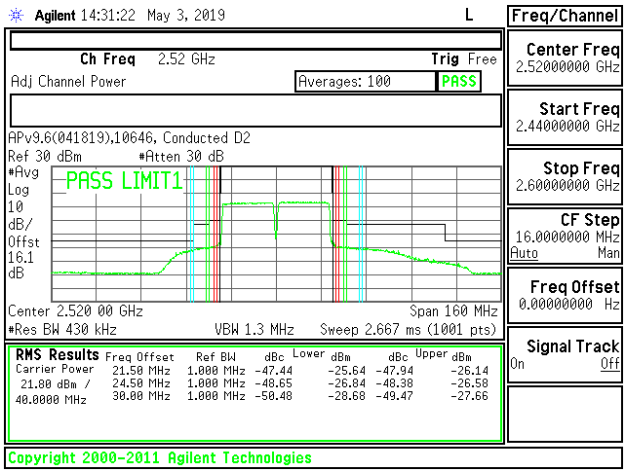
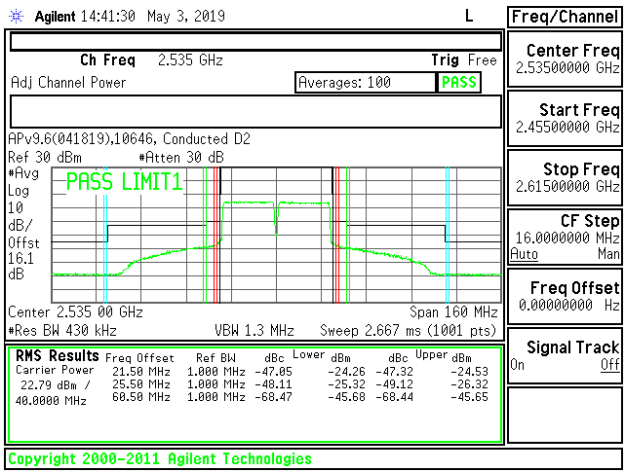


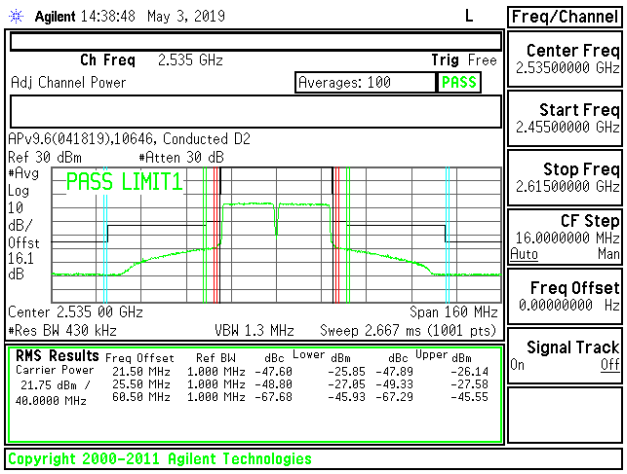
LTE B7 20MHz + 20MHz QPSK Low Ch RB100-0 + RB100-0



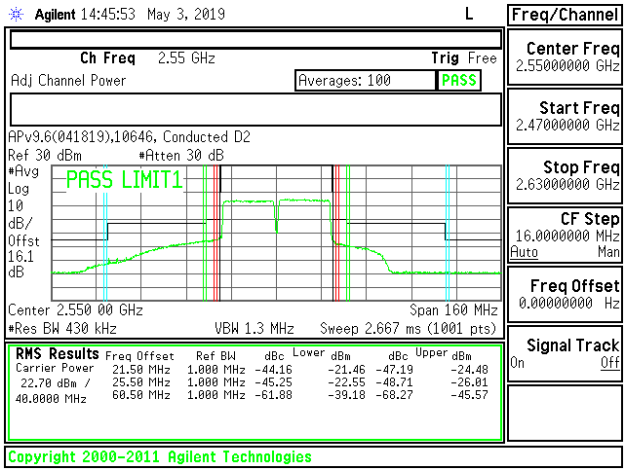
LTE B7 20MHz + 20MHz 16QAM Low Ch RB100-0 + RB100-0



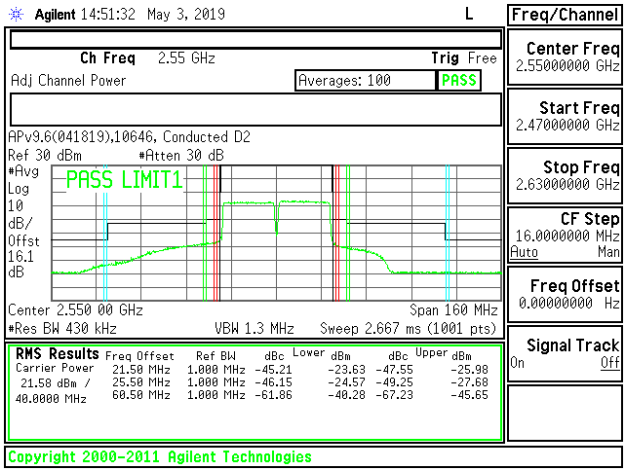
LTE B7 20MHz + 20MHz QPSK Mid Ch RB100-0 + RB100-0



LTE B7 20MHz + 20MHz 16QAM Mid Ch RB100-0 + RB100-0



LTE B7 20MHz + 20MHz QPSK High Ch RB100-0 + RB100-0



LTE B7 20MHz + 20MHz 16QAM High Ch RB100-0 + RB100-0

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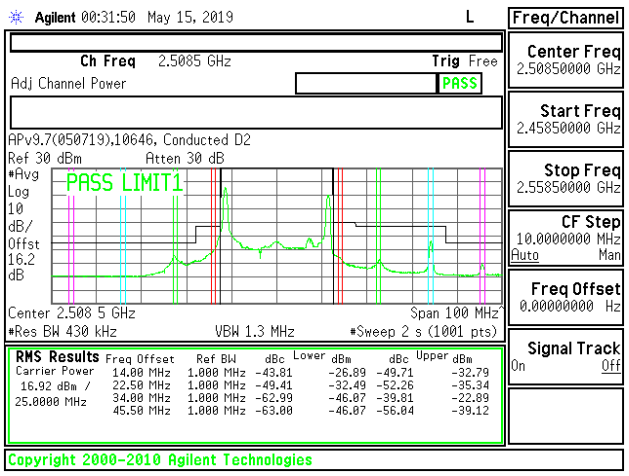
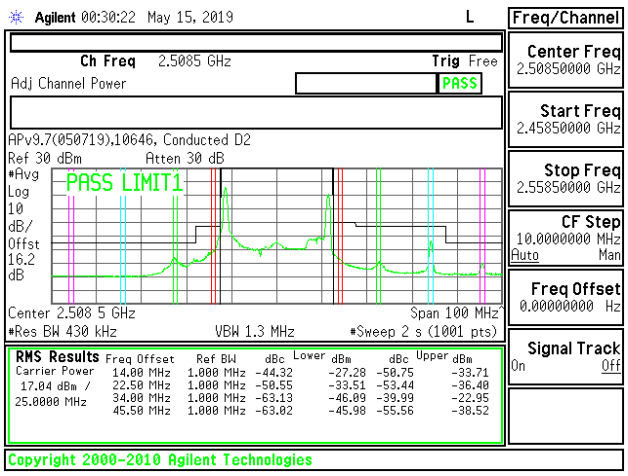
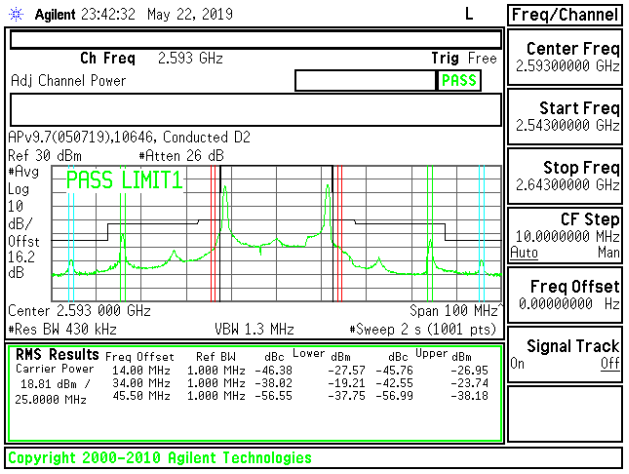
8.2.3. LTE BAND 41



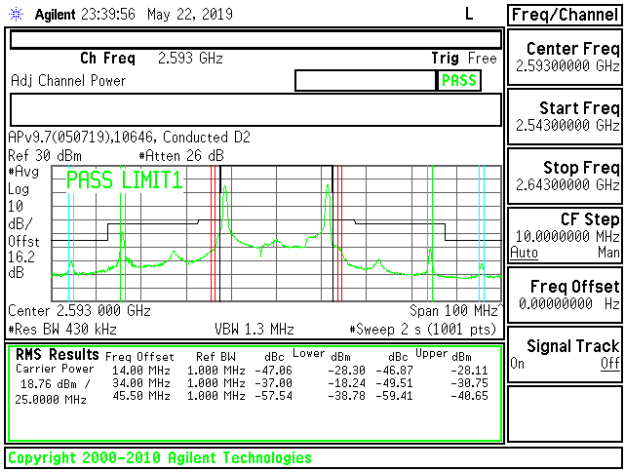
LTE B41 20MHz + 5MHz QPSK Low Ch RB1-0 + RB1-24



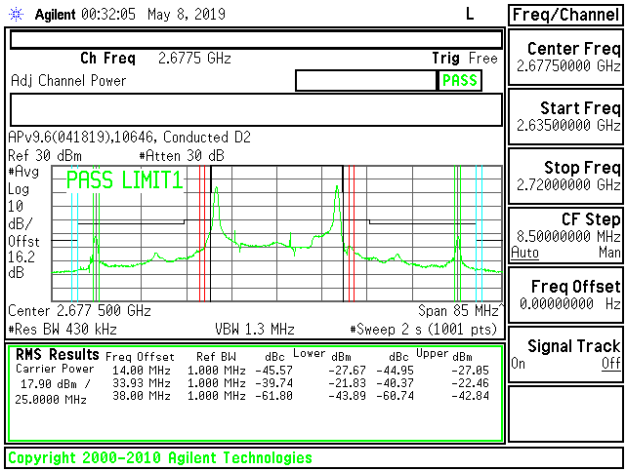
LTE B41 20MHz + 5MHz 16QAM Low Ch RB1-0 + RB1-24



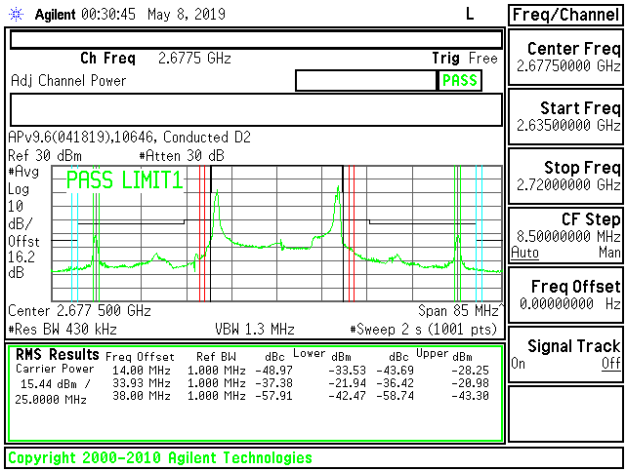
LTE B41 20MHz + 5MHz QPSK Mid Ch RB1-0 + RB1-24



LTE B41 20MHz + 5MHz 16QAM Mid Ch RB1-0 + RB1-24



LTE B41 20MHz + 5MHz QPSK High Ch RB1-0 + RB1-24



LTE B41 20MHz + 5MHz 16QAM High Ch RB1-0 + RB1-24

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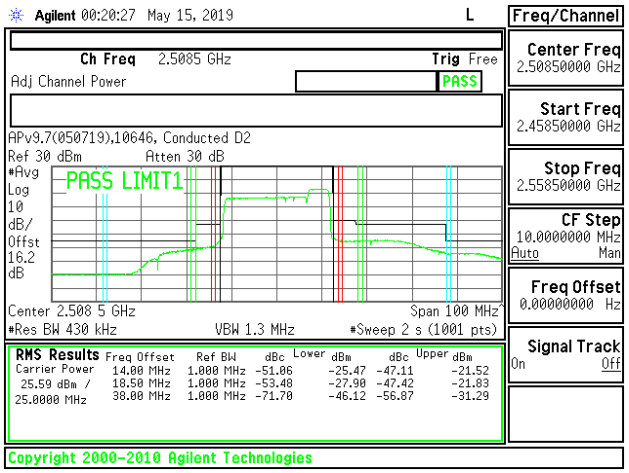
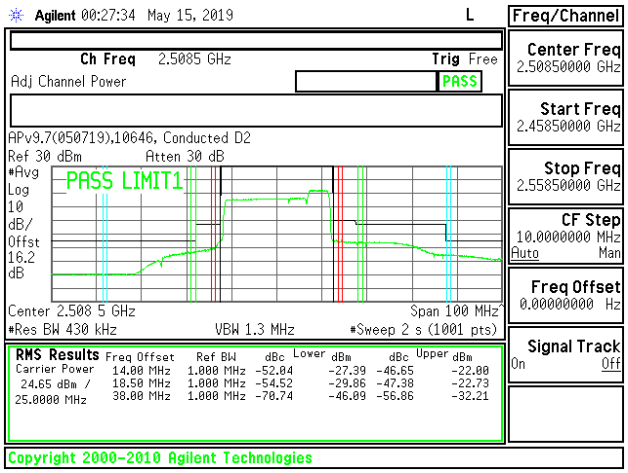
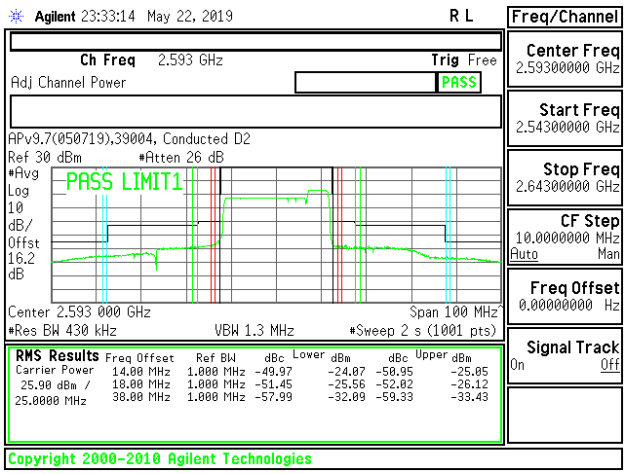


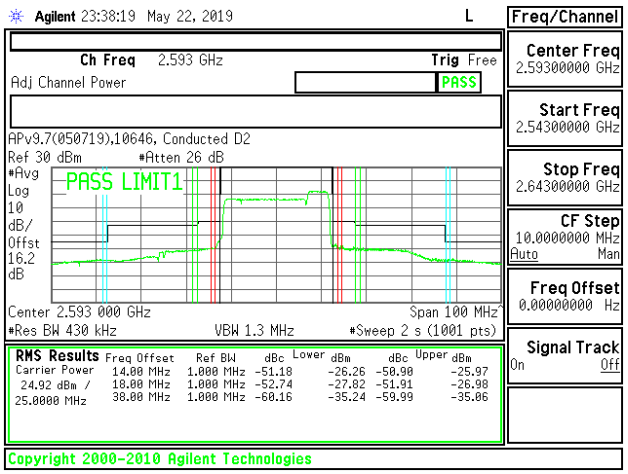
LTE B41 20MHz + 5MHz QPSK Low Ch RB100-0 + RB25-0



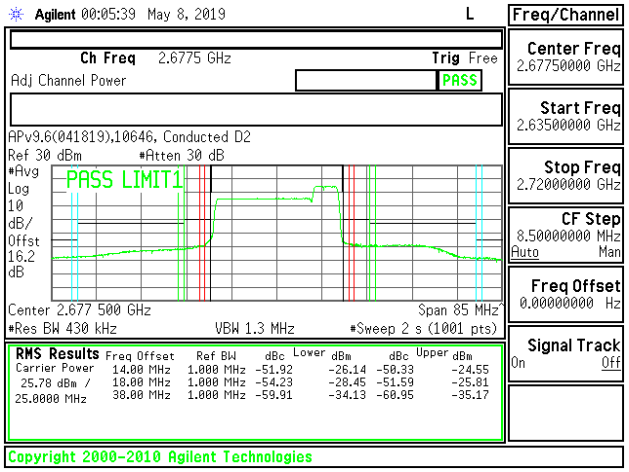
LTE B41 20MHz + 5MHz 16QAM Low Ch RB100-0 + RB25-0



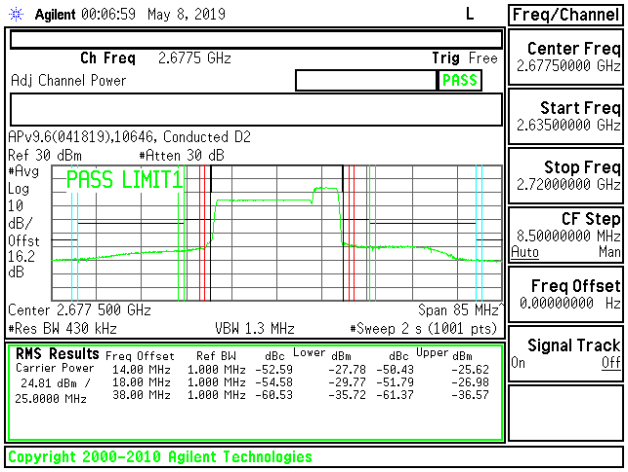
LTE B41 20MHz + 5MHz QPSK Mid Ch RB100-0 + RB25-0



LTE B41 20MHz + 5MHz 16QAM Mid Ch RB100-0 + RB25-0



LTE B41 20MHz + 5MHz QPSK High Ch RB100-0 + RB25-0



LTE B41 20MHz + 5MHz 16QAM High Ch RB100-0 + RB25-0

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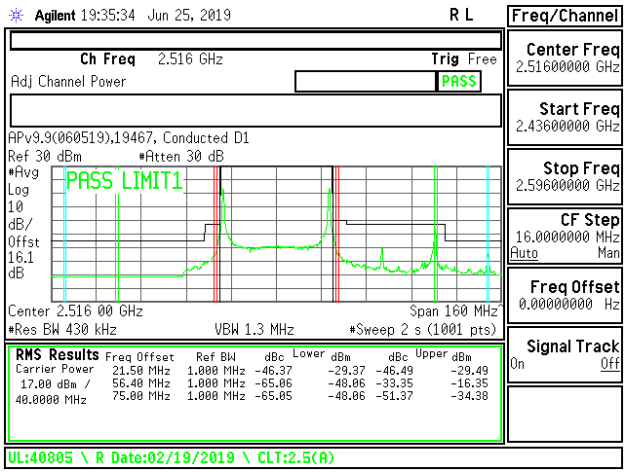
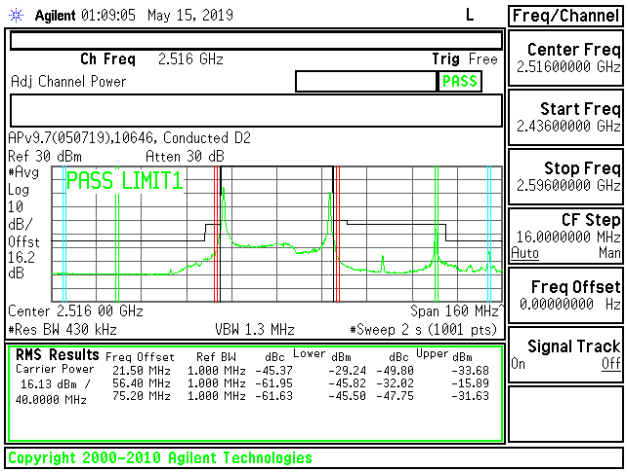
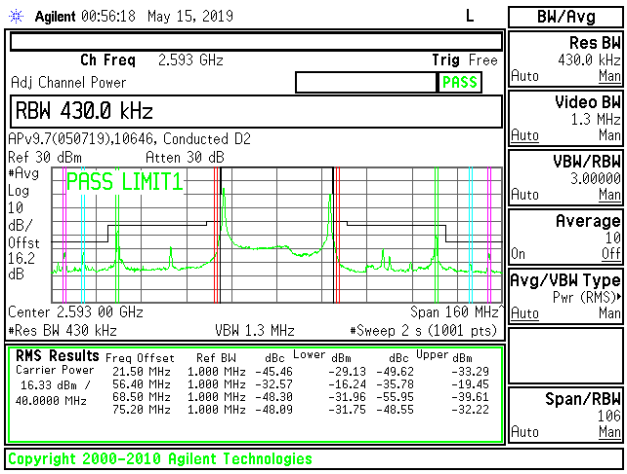


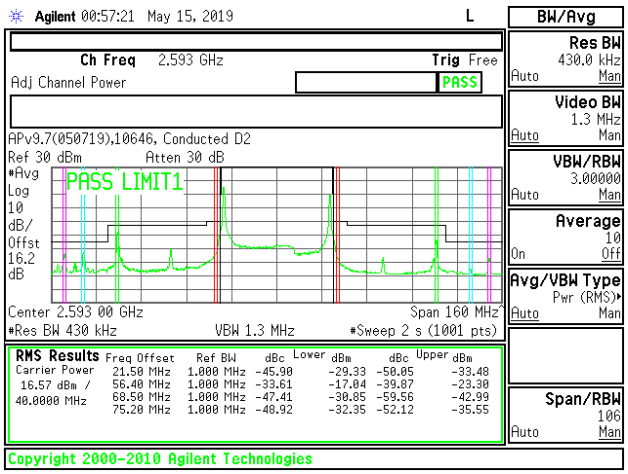
LTE B41 20MHz + 20MHz QPSK Low Ch RB1-0 + RB1-99



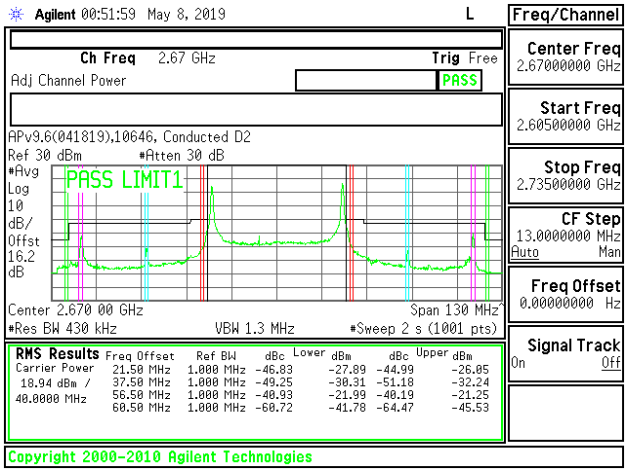
LTE B41 20MHz + 20MHz 16QAM Low Ch RB1-0 + RB1-99



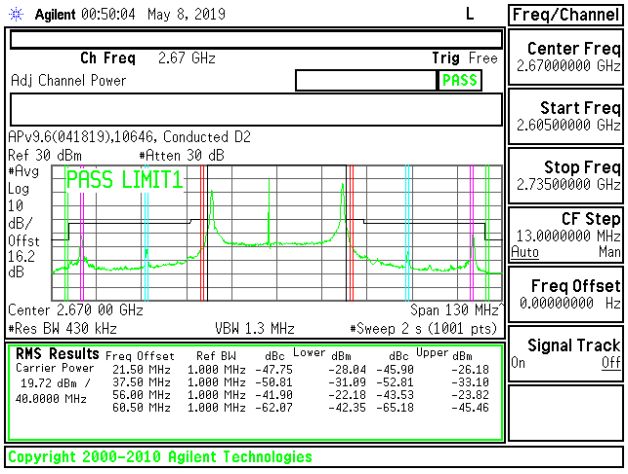
LTE B41 20MHz + 20MHz QPSK Mid Ch RB1-0 + RB1-99



LTE B41 20MHz + 20MHz 16QAM Mid Ch RB1-0 + RB1-99



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



LTE B41 20MHz + 20MHz 16QAM High Ch RB1-0 + RB1-99

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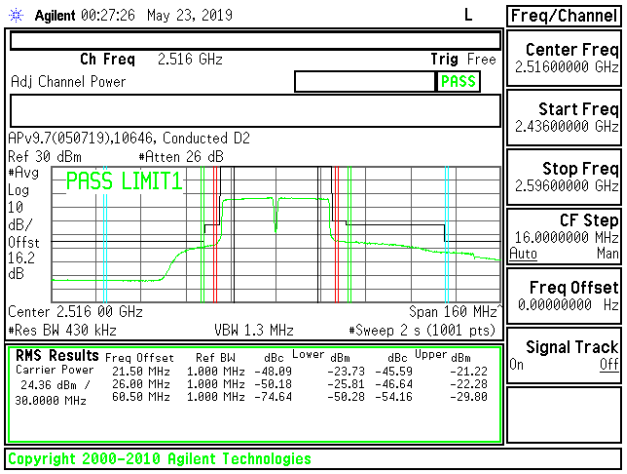
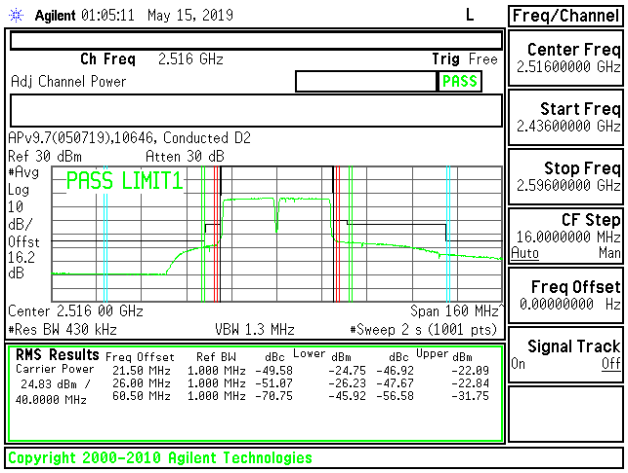
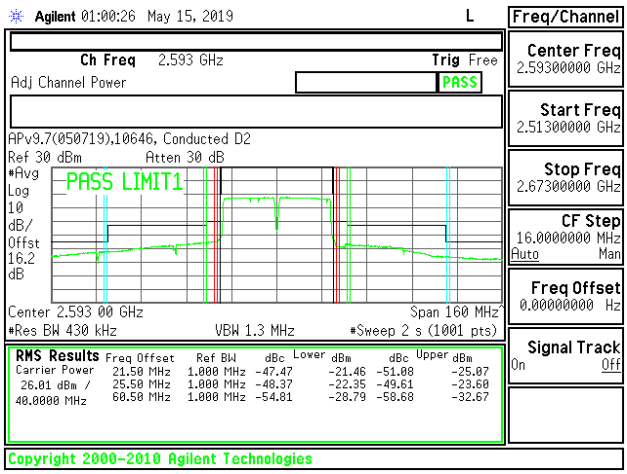


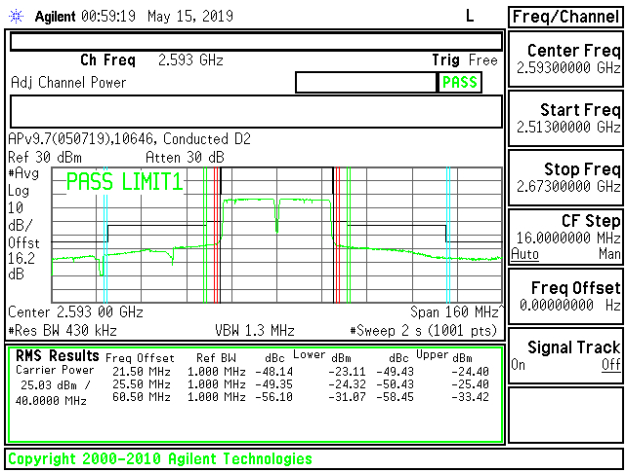
LTE B41 20MHz + 20MHz QPSK Low Ch RB100-0 + RB100-0



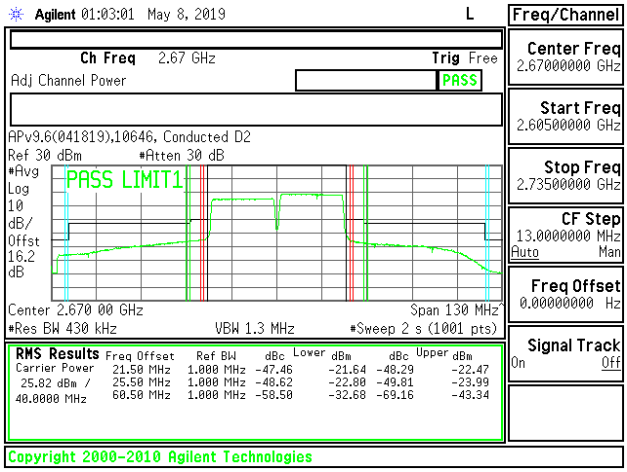
LTE B41 20MHz + 20MHz 16QAM Low Ch RB100-0 + RB100-0



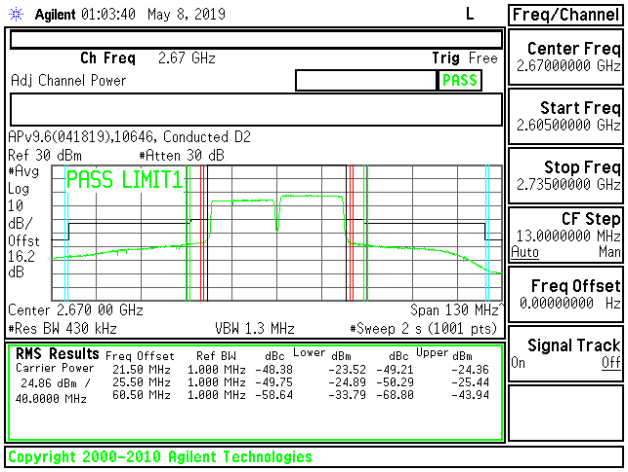
LTE B41 20MHz + 20MHz QPSK Mid Ch RB100-0 + RB100-0



LTE B41 20MHz + 20MHz 16QAM Mid Ch RB100-0 + RB100-0



LTE B41 20MHz + 20MHz QPSK High Ch RB100-0 + RB100-0



LTE B41 20MHz + 20MHz 16QAM High Ch RB100-0 + RB100-0

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8.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.917, §27.53

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.

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.

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 -13dBm or -25 dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

MODES TESTED

- LTE Band 5
- LTE Band 7
- LTE Band 41

RESULTS

The highest combination and a sample lower combination was tested. The highest power RB combination was selected as worst case.

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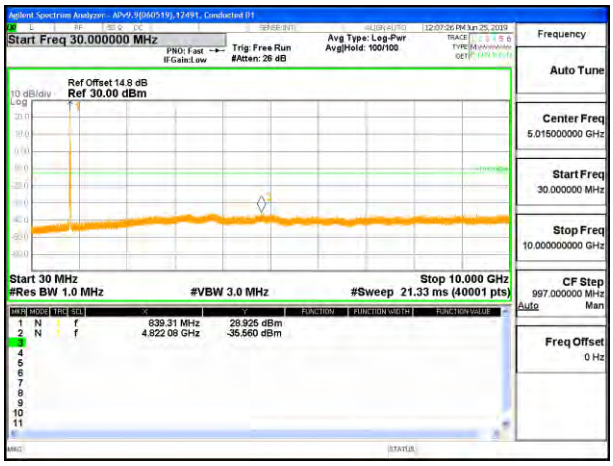
8.3.1. LTE BAND 5

LTE B5 10MHz + 5MHz QPSK Low Ch RB1-49 + RB1-0

LTE B5 10MHz + 5MHz 16QAM Low Ch RB1-49 + RB1-0



LTE B5 10MHz + 5MHz QPSK Middle Ch RB1-49 + RB1-0

LTE B5 10MHz + 5MHz 16QAM Middle Ch RB1-49 + RB1-0

LTE B5 10MHz + 5MHz QPSK High Ch RB1-49 + RB1-0

LTE B5 10MHz + 5MHz 16QAM High Ch RB1-49 + RB1-0

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LTE B5 10MHz + 10MHz QPSK Low Ch RB1-49 + RB1-0

LTE B5 10MHz + 10MHz 16QAM Low Ch RB1-49 + RB1-0

LTE B5 10MHz + 10MHz QPSK Middle Ch RB1-49 + RB1-0

LTE B5 10MHz + 10MHz 16QAM Middle Ch RB1-49 + RB1-0

LTE B5 10MHz + 10MHz QPSK High Ch RB1-49 + RB1-0

LTE B5 10MHz + 10MHz 16QAM High Ch RB1-49 + RB1-0

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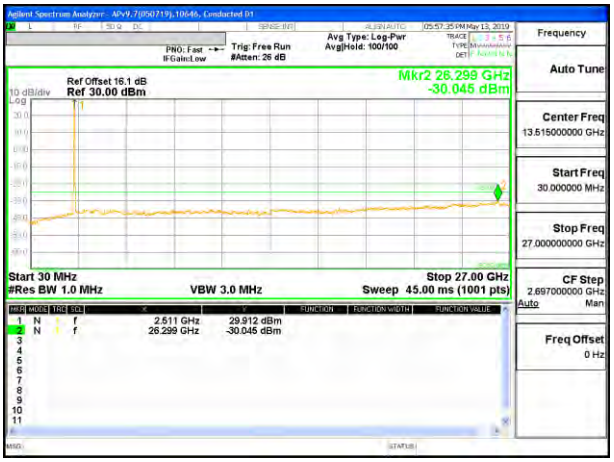
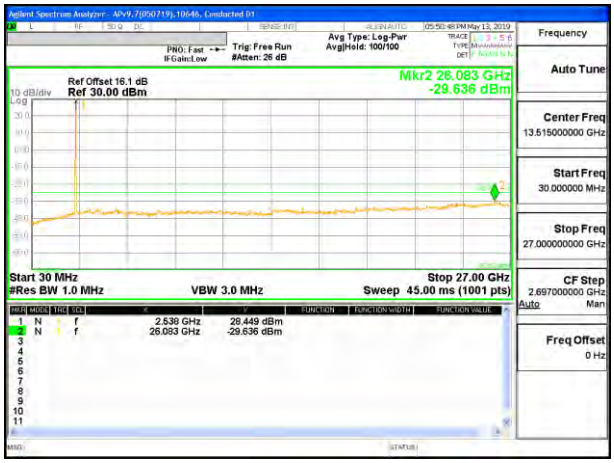
8.3.2. LTE BAND 7

LTE B7 20MHz + 10MHz QPSK Low Ch RB1-99 + RB1-0



LTE B7 20MHz + 10MHz 16QAM Low Ch RB1-99 + RB1-0



LTE B7 20MHz + 10MHz QPSK Middle Ch RB1-99 + RB1-0

LTE B7 20MHz + 10MHz 16QAM Middle Ch RB1-99 + RB1-0

LTE B7 20MHz + 10MHz QPSK High Ch RB1-99 + RB1-0

LTE B7 20MHz + 10MHz 16QAM High Ch RB1-99 + RB1-0

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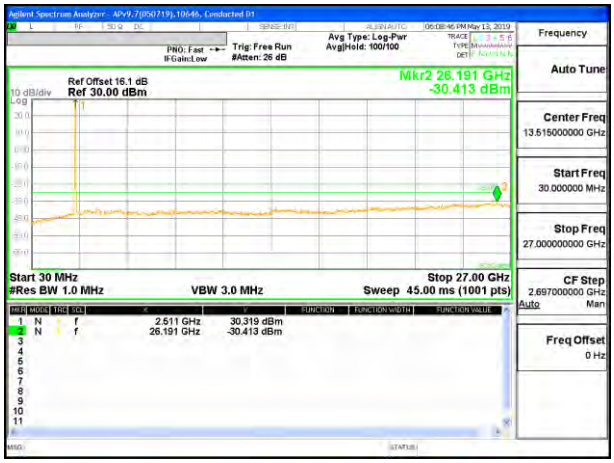
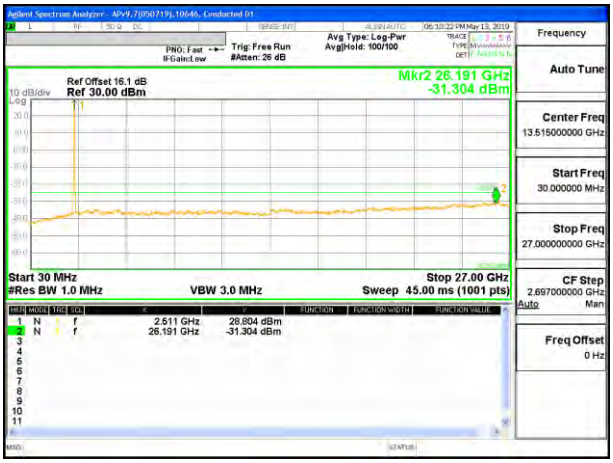


LTE B7 20MHz + 20MHz QPSK Low Ch RB1-99 + RB1-0



LTE B7 20MHz + 20MHz 16QAM Low Ch RB1-99 + RB1-0

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

LTE B7 20MHz + 20MHz 16QAM Middle Ch RB1-99 + RB1-0

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

LTE B7 20MHz + 20MHz 16QAM High Ch RB1-99 + RB1-0

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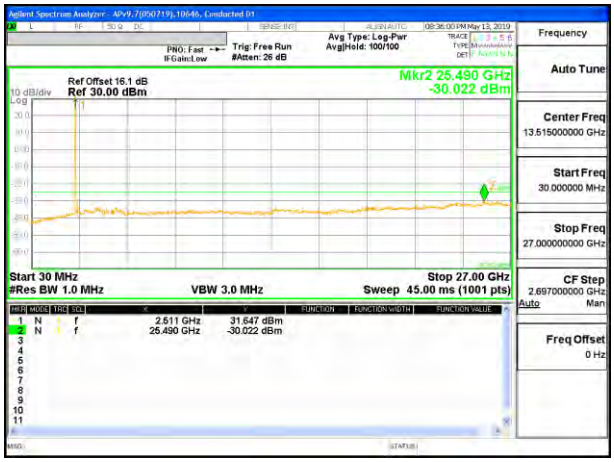
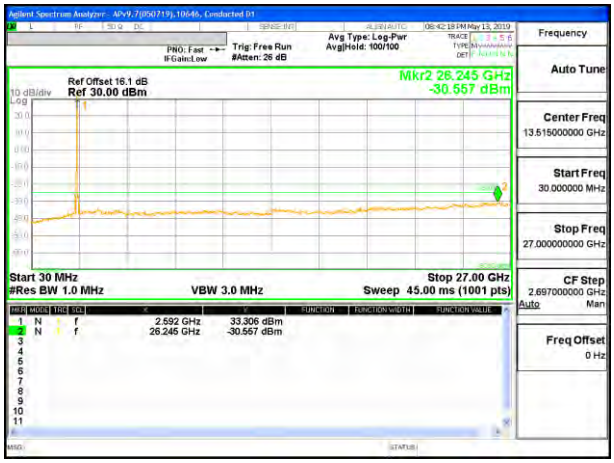
8.3.3. LTE BAND 41



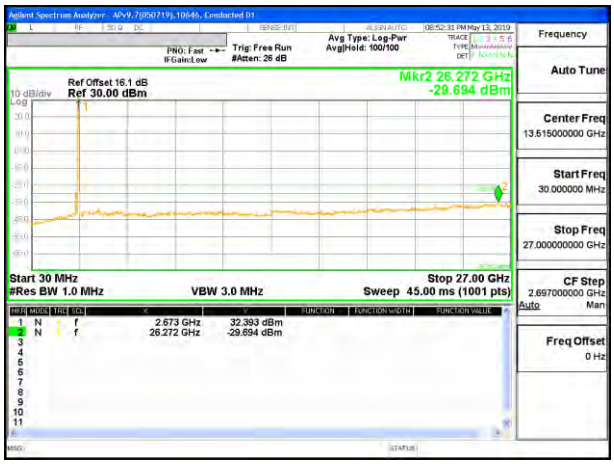
LTE B41 20MHz + 5MHz QPSK Low Ch RB1-99 + RB1-0

LTE B41 20MHz + 5MHz 16QAM Low Ch RB1-99 + RB1-0

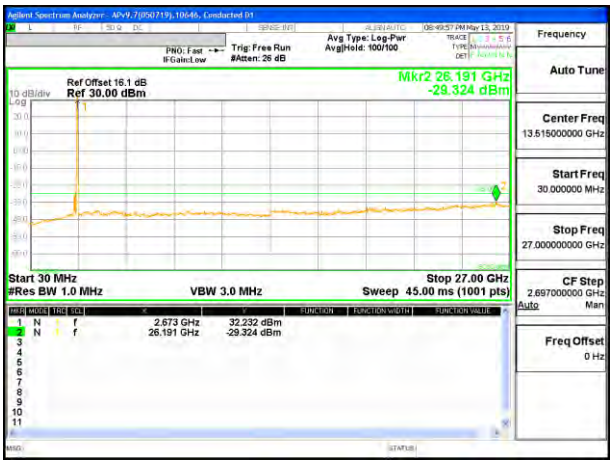


LTE B41 20MHz + 5MHz QPSK Middle Ch RB1-99 + RB1-0

LTE B41 20MHz + 5MHz 16QAM Middle Ch RB1-99 + RB1-0



LTE B41 20MHz + 5MHz QPSK High Ch RB1-99 + RB1-0



LTE B41 20MHz + 5MHz 16QAM High Ch RB1-99 + RB1-0

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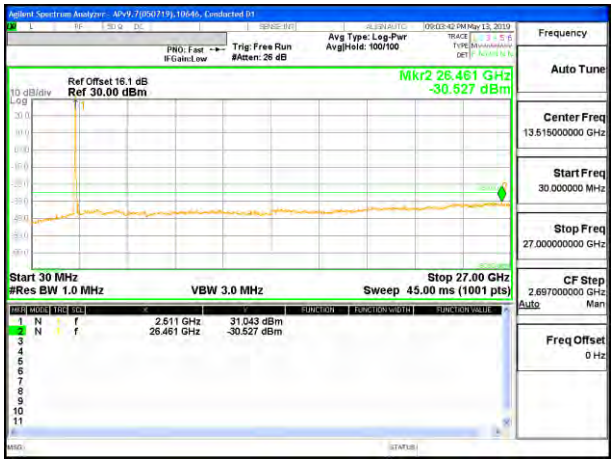
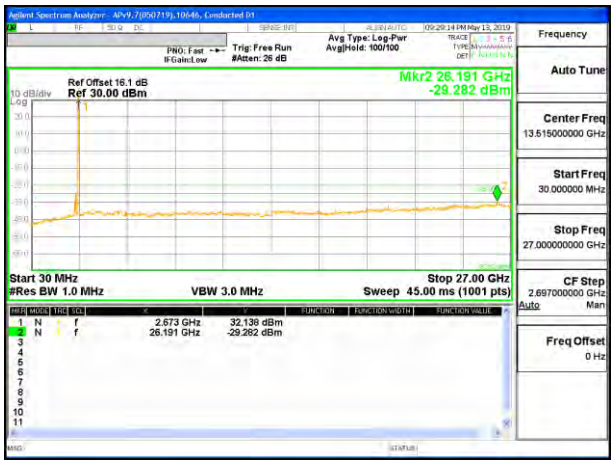


LTE B41 20MHz + 20MHz QPSK Low Ch RB1-99 + RB1-0

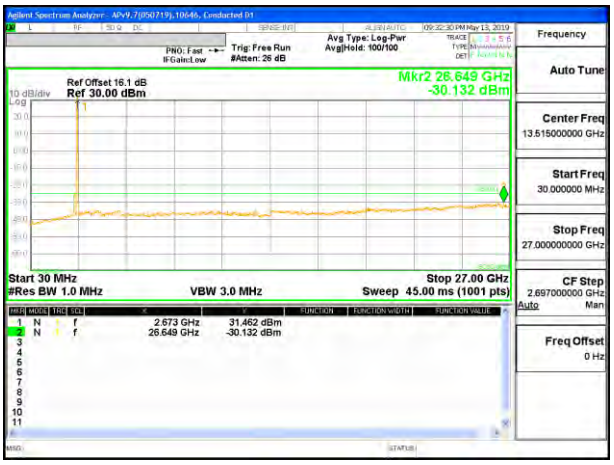
LTE B41 20MHz + 20MHz 16QAM Low Ch RB1-99 + RB1-0

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

LTE B41 20MHz + 20MHz 16QAM Middle Ch RB1-99 + RB1-0



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



LTE B41 20MHz + 20MHz 16QAM High Ch RB1-99 + RB1-0

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8.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §27.54

LIMITS

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

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

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

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

MODES TESTED

- LTE Band 5
- LTE Band 7
- LTE Band 41

RESULTS

See the following pages.

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8.4.1. LTE BAND 5

ID:	38602	Date:	5/22/19

QPSK, (10MHz + 5MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.4621	848.7277		
Extreme (50C)		824.4621	848.7277	16.3	0.019
Extreme (40C)		824.4621	848.7277	14.4	0.017
Extreme (30C)		824.4621	848.7277	8.9	0.011
Extreme (10C)		824.4621	848.7277	1.4	0.002
Extreme (0C)		824.4621	848.7277	6.8	0.008
Extreme (-10C)		824.4621	848.7277	2.2	0.003
Extreme (-20C)		824.4621	848.7277	-2.7	-0.003
Extreme (-30C)		824.4621	848.7277	-3.1	-0.004
20C	15%	824.4621	848.7277	4.1	0.005
	-15%	824.4621	848.7277	-1.6	-0.002
	End Point	824.4621	848.7277	-0.9	-0.001

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	824.4430	848.4984		
Extreme (50C)		824.4430	848.4984	26.5	0.032
Extreme (40C)		824.4430	848.4984	20.2	0.024
Extreme (30C)		824.4430	848.4984	12.7	0.015
Extreme (10C)		824.4430	848.4984	-3.4	-0.004
Extreme (0C)		824.4430	848.4984	-6.8	-0.008
Extreme (-10C)		824.4430	848.4984	-9.4	-0.011
Extreme (-20C)		824.4430	848.4984	-12.2	-0.015
Extreme (-30C)		824.4430	848.4984	-11.8	-0.014
20C	15%	824.4430	848.4984	3.5	0.004
	-15%	824.4430	848.4984	-11.4	-0.014
	End Point	824.4430	848.4984	-10.6	-0.013

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8.4.2. LTE BAND 7

ID:	38602	Date:	5/22/19

QPSK, (20MHz + 10MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2501.0729	2568.9199		
Extreme (50C)		2501.0729	2568.9199	27.4	0.011
Extreme (40C)		2501.0729	2568.9199	24.2	0.010
Extreme (30C)		2501.0729	2568.9199	18.9	0.007
Extreme (10C)		2501.0729	2568.9199	14.7	0.006
Extreme (0C)		2501.0729	2568.9199	-3.6	-0.001
Extreme (-10C)		2501.0729	2568.9199	-7.1	-0.003
Extreme (-20C)		2501.0729	2568.9199	-19.2	-0.008
Extreme (-30C)		2501.0729	2568.9199	-25.8	-0.010
20C	15%	2501.0729	2568.9199	25.5	0.010
	-15%	2501.0729	2568.9199	-16.7	-0.007

QPSK, (20MHz + 20MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2501.1430	2568.8724		
Extreme (50C)		2501.1431	2568.8725	51.1	0.020
Extreme (40C)		2501.1430	2568.8724	33.8	0.013
Extreme (30C)		2501.1430	2568.8724	16.2	0.006
Extreme (10C)		2501.1430	2568.8724	22.5	0.009
Extreme (0C)		2501.1430	2568.8724	-12.7	-0.005
Extreme (-10C)		2501.1430	2568.8724	-25.3	-0.010
Extreme (-20C)		2501.1430	2568.8724	-37.4	-0.015
Extreme (-30C)		2501.1430	2568.8724	-48.7	-0.019
20C	15%	2501.1430	2568.8724	11.2	0.004
	-15%	2501.1430	2568.8724	-35.6	-0.014
	End Point	2501.1430	2568.8724	-44.5	-0.018

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8.4.3. LTE BAND 41

ID:	30606	Date:	5/21/19

QPSK, (20MHz + 5MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2496.7409	2689.2804		
Extreme (50C)		2496.7409	2689.2804	9.4	0.004
Extreme (40C)		2496.7409	2689.2804	10.2	0.004
Extreme (30C)		2496.7409	2689.2804	9.9	0.004
Extreme (10C)		2496.7409	2689.2804	6.8	0.003
Extreme (0C)		2496.7409	2689.2804	6.8	0.003
Extreme (-10C)		2496.7409	2689.2804	8.6	0.003
Extreme (-20C)		2496.7409	2689.2804	9.1	0.004
Extreme (-30C)		2496.7409	2689.2804	8.7	0.003
20C	15%	2496.7409	2689.2804	18.6	0.007
	-15%	2496.7409	2689.2804	-5.6	-0.002
	End Point	2496.7409	2689.2804	-5.0	-0.002

QPSK, (20MHz + 20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2497.0262	2689.4484		
Extreme (50C)		2497.0262	2689.4484	10.5	0.004
Extreme (40C)		2497.0262	2689.4484	22.1	0.009
Extreme (30C)		2497.0262	2689.4484	19.3	0.007
Extreme (10C)		2497.0262	2689.4484	8.3	0.003
Extreme (0C)		2497.0262	2689.4484	7.1	0.003
Extreme (-10C)		2497.0262	2689.4484	7.7	0.003
Extreme (-20C)		2497.0262	2689.4484	8.4	0.003
Extreme (-30C)		2497.0262	2689.4484	8.0	0.003
20C	15%	2497.0262	2689.4484	7.5	0.003
	-15%	2497.0262	2689.4484	2.3	0.001
	End Point	2497.0262	2689.4484	2.0	0.001

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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 LAT antenna; 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.

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8.5.1. LTE BAND 5

ID:	10646	Date:	5/15/19

Band	Bandwidth (MHz)	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
Band 5	3MHz / 5MHz	834.1	838.0	QPSK	32.48	25.55	6.93
				16QAM	32.68	25.54	7.14
	5 MHz / 3MHz	835.1	839.0	QPSK	31.81	23.37	8.44
				16QAM	31.24	22.68	8.56
	5MHz / 10MHz	831.8	839.0	QPSK	31.97	23.51	8.46
				16QAM	31.94	22.49	9.45
	10MHz / 5MHz	834.3	841.5	QPSK	32.04	23.41	8.63
				16QAM	31.99	22.43	9.56
	10MHz / 10MHz	831.6	841.5	QPSK	31.78	23.41	8.37
				16QAM	31.77	22.44	9.33
Duty Cycle Correction Factor (dB) =			0.00				

8.5.2. LTE BAND 7

ID:	12491	Date:	5/15/19

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	31.70	24.26	7.44
				16QAM	31.25	23.40	7.85
	15 MHz / 15MHz	2527.5	2542.5	QPSK	31.33	24.25	7.08
				16QAM	31.37	23.28	8.09
	15MHz / 20MHz	2525.3	2542.4	QPSK	31.55	24.38	7.17
				16QAM	31.47	23.37	8.10
	20MHz / 10MHz	2530.1	2544.5	QPSK	31.24	24.23	7.01
				16QAM	31.25	23.31	7.94
	20MHz / 15MHz	2527.6	2544.7	QPSK	31.52	24.33	7.19
				16QAM	31.43	23.39	8.04
	20MHz / 20MHz	2525.1	2544.9	QPSK	31.55	24.32	7.23
				16QAM	31.56	23.35	8.21
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

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8.5.3. LTE BAND 41

ID:	12491	Date:	5/16/19

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	34.30	19.65	7.66
				16QAM	34.05	18.70	8.36
	10MHz / 20MHz	2583.6	2598.0	QPSK	34.49	19.67	7.83
				16QAM	34.29	18.65	8.65
	15MHz / 15MHz	2585.5	2600.5	QPSK	34.11	19.75	7.37
				16QAM	34.10	18.68	8.43
	15MHz / 20MHz	2583.3	2600.4	QPSK	34.25	19.82	7.44
				16QAM	34.06	18.84	8.23
	20MHz / 5MHz	2590.5	2602.2	QPSK	34.51	19.75	7.77
				16QAM	34.22	18.76	8.47
	20MHz / 10MHz	2588.1	2602.5	QPSK	34.21	19.71	7.51
				16QAM	34.17	18.74	8.44
	20MHz / 15MHz	2585.6	2602.7	QPSK	34.34	19.80	7.55
				16QAM	34.18	18.83	8.36
	20MHz / 20MHz	2583.1	2602.9	QPSK	34.02	19.76	7.27
				16QAM	34.17	18.76	8.42
Duty Cycle Correction Factor (dB) =			6.99				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

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9. RADIATED TEST RESULTS

9.1. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 1

RULE PART(S)

FCC: §2.1053, §22.917, §27.53

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.

TEST PROCEDURE

KDB 971168 D01/D02 v02r01

MODES TESTED

- LTE Band 5
- LTE Band 7
- LTE Band 41

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9.1.1. LTE BAND 5

Company:	
Project #:	12696945
Date:	6/19/2019
Test Engineer:	50822
Configuration:	EUT Only
Mode:	LTE 5 QPSK 10MHz + 10MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.644	-67.18	Pk	28.5	-29.9	10.7	-57.88	-13	-44.88	V
1.660	-66.46	Pk	28.6	-29.8	10.4	-57.26	-13	-44.26	H
2.495	-65.62	Pk	32.3	-28.4	8.5	-53.22	-13	-40.22	H
2.495	-68.12	Pk	32.3	-28.4	8.8	-55.42	-13	-42.42	V
3.313	-68.54	Pk	32.8	-27.1	9.6	-53.24	-13	-40.24	H
3.347	-68.91	Pk	32.8	-27.2	9.3	-54.01	-13	-41.01	V
Mid Channel, 831.6MHz + 841.5MHz									
1.661	-67.27	Pk	28.6	-29.8	8.9	-59.57	-13	-46.57	V
1.670	-67.3	Pk	28.7	-29.8	10.7	-57.7	-13	-44.7	H
2.503	-65.6	Pk	32.4	-28.6	8.9	-52.9	-13	-39.9	H
2.503	-58.1	Pk	32.4	-28.6	9.4	-44.9	-13	-31.90	V
3.327	-68.63	Pk	32.8	-27.3	9	-54.13	-13	-41.13	H
3.358	-69.08	Pk	32.8	-27.2	10	-53.48	-13	-40.48	V
High Channel, 834.1MHz + 844MHz									
1.704	-67.07	Pk	29.0	-29.7	8.4	-59.37	-13	-46.37	V
1.707	-67.46	Pk	29.0	-29.8	8.8	-59.46	-13	-46.46	H
2.553	-68.20	Pk	32.3	-28.4	9.5	-54.80	-13	-41.80	H
2.565	-67.93	Pk	32.3	-28.5	9.4	-54.73	-13	-41.73	V
3.387	-68.59	Pk	32.7	-27.2	8.6	-54.49	-13	-41.49	H
3.410	-68.89	Pk	32.7	-27.1	9.4	-53.89	-13	-40.89	V

Pk - Peak detector

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Company:	
Project #:	12696945
Date:	6/19/2019
Test Engineer:	50822
Configuration:	EUT Only
Mode:	LTE 5 16QAM 10MHz + 10MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.656	-66.42	Pk	28.6	-29.9	10.7	-57.02	-13	-44.02	H
1.670	-67.1	Pk	28.7	-29.8	9.0	-59.20	-13	-46.20	V
2.495	-66.66	Pk	32.3	-28.4	8.5	-54.26	-13	-41.26	H
2.495	-67.54	Pk	32.3	-28.4	8.8	-54.84	-13	-41.84	V
3.273	-69.19	Pk	32.9	-27.2	9.1	-54.39	-13	-41.39	V
3.294	-68.85	Pk	32.9	-27.1	9.6	-53.45	-13	-40.45	H
Mid Channel 831.6MHz + 841.5MHz									
1.666	-67.01	Pk	28.6	-29.8	10.3	-57.91	-13	-44.91	H
1.669	-67.17	Pk	28.6	-29.8	8.9	-59.47	-13	-46.47	V
2.506	-67.72	Pk	32.4	-28.5	9.1	-54.72	-13	-41.72	H
2.511	-67.51	Pk	32.4	-28.6	9.4	-54.31	-13	-41.31	V
3.315	-68.45	Pk	32.8	-27.2	9.8	-53.05	-13	-40.05	V
3.326	-69.08	Pk	32.8	-27.2	9.1	-54.38	-13	-41.38	H
High Channel 834.1MHz + 844MHz									
1.708	-66.65	Pk	29.0	-29.8	8.8	-58.65	-13	-45.65	H
1.708	-67.59	Pk	29.0	-29.8	8.5	-59.89	-13	-46.89	V
2.548	-67.69	Pk	32.3	-28.4	9.0	-54.79	-13	-41.79	V
2.551	-68.39	Pk	32.3	-28.4	9.4	-55.09	-13	-42.09	H
3.386	-68.89	Pk	32.7	-27.2	8.6	-54.79	-13	-41.79	H
3.395	-68.57	Pk	32.6	-27.3	8.8	-54.47	-13	-41.47	V

Pk - Peak detector

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9.1.2. LTE BAND 7

Company:	
Project #:	12696945
Date:	3/23/2019
Test Engineer:	12501
Configuration:	EUT Only
Mode:	LTE 7 QPSK 20MHz + 20MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz									
5.112	-67.62	Pk	34.2	-28.4	11.3	-50.52	-25	-25.52	H
7.560	-71.56	Pk	35.7	-24.4	10.9	-49.36	-25	-24.36	H
7.643	-70.18	Pk	35.7	-24.5	11.2	-47.78	-25	-22.78	V
5.166	-68.13	Pk	34.2	-28.5	11.6	-50.83	-25	-25.83	V
10.109	-72.05	Pk	37.3	-21.8	10.6	-45.95	-25	-20.95	H
10.185	-71.88	Pk	37.3	-21.6	10.5	-45.68	-25	-20.68	V
Mid Channel 2525.1MHz + 2544.9MHz									
5.063	-67.76	Pk	34.1	-28.8	10.9	-51.56	-25	-26.56	V
5.114	-67.46	Pk	34.2	-28.5	11.2	-50.56	-25	-25.56	H
7.596	-69.75	Pk	35.7	-24.4	10.8	-47.65	-25	-22.65	V
7.611	-71.41	Pk	35.7	-24.4	10.8	-49.31	-25	-24.31	H
10.128	-71.81	Pk	37.3	-21.8	9.9	-46.41	-25	-21.41	H
10.163	-72.07	Pk	37.3	-21.6	10.4	-45.97	-25	-20.97	V
High Channel 2540.2MHz + 2560MHz									
5.080	-67.98	Pk	34.2	-28.7	10.8	-51.68	-25	-26.68	V
5.114	-67.61	Pk	34.2	-28.5	11.2	-50.71	-25	-25.71	H
7.647	-70.71	Pk	35.7	-24.5	11.1	-48.41	-25	-23.41	V
7.682	-70.9	Pk	35.7	-24.5	11.2	-48.5	-25	-23.50	H
10.182	-72.31	Pk	37.3	-21.5	10.5	-46.01	-25	-21.01	H
10.232	-71.24	Pk	37.4	-21.6	10.3	-45.14	-25	-20.14	V

Pk - Peak detector

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Company:	
Project #:	12696945
Date:	3/23/2019
Test Engineer:	12501
Configuration:	EUT Only
Mode:	LTE 7 16QAM 20MHz + 20MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz									
5.076	-66.70	Pk	34.2	-28.7	10.6	-50.60	-25	-25.60	H
7.599	-69.23	Pk	35.7	-24.4	10.6	-47.33	-25	-22.33	H
5.148	-70.92	Pk	34.2	-28.6	11.2	-54.12	-25	-29.12	V
7.670	-71.31	Pk	35.7	-24.6	11.3	-48.91	-25	-23.91	V
10.125	-71.49	Pk	37.3	-21.8	10	-45.99	-25	-20.99	H
10.180	-72.01	Pk	37.3	-21.5	10.6	-45.61	-25	-20.61	V
Mid Channel 2525.1MHz + 2544.9MHz									
5.129	-67.83	Pk	34.2	-28.5	10.6	-51.53	-25	-26.53	H
7.594	-70.61	Pk	35.7	-24.4	10.5	-48.81	-25	-23.81	H
7.611	-70.32	Pk	35.7	-24.4	11.2	-47.82	-25	-22.82	V
5.169	-67.29	Pk	34.2	-28.5	11.6	-49.99	-25	-24.99	V
10.175	-72.13	Pk	37.4	-21.5	10.7	-45.53	-25	-20.53	V
10.236	-71.60	Pk	37.4	-21.6	10.1	-45.7	-25	-20.70	H
High Channel 2540.2MHz + 2560MHz									
5.092	-69.96	Pk	34.5	-28.7	9.1	-55.06	-25	-30.06	H
7.644	-70.27	Pk	36.4	-26.1	7.6	-52.37	-25	-27.37	H
5.095	-70.12	Pk	34.5	-28.7	9.1	-55.22	-25	-30.22	V
7.649	-70.50	Pk	36.4	-26.1	7.5	-52.7	-25	-27.7	V
10.199	-73.12	Pk	37.8	-22.5	7.0	-50.82	-25	-25.82	V
10.201	-72.57	Pk	37.8	-22.5	6.9	-50.37	-25	-25.37	H

Pk - Peak detector

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9.1.1. LTE BAND 41

Company:	
Project #:	12696945
Date:	3/25/2019
Test Engineer:	10641
Configuration:	EUT Only
Mode:	LTE 41 QPSK 20MHz + 20MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz									
5.030	-67.89	Pk	34.1	-28.8	10.9	-51.69	-25	-26.69	V
5.048	-67.18	Pk	34.2	-28.5	11.2	-50.28	-25	-25.28	H
7.561	-71.36	Pk	35.7	-24.4	10.9	-49.16	-25	-24.16	H
7.579	-70.30	Pk	35.7	-24.3	10.9	-48.00	-25	-23.00	V
10.064	-72.12	Pk	37.8	-21.0	10.5	-44.82	-25	-19.82	H
10.064	-72.33	Pk	37.8	-21.0	10.9	-44.63	-25	-19.63	V
Mid Channel 2583.1MHz + 2602.9MHz									
5.216	-67.27	Pk	34.3	-28.2	11.3	-49.87	-25	-24.87	H
5.218	-68.24	Pk	34.3	-28.2	11.2	-50.94	-25	-25.94	V
7.782	-69.41	Pk	35.8	-24.4	11.1	-46.91	-25	-21.91	V
7.785	-70.75	Pk	35.8	-24.4	11.1	-48.25	-25	-23.25	H
10.365	-71.91	Pk	37.6	-21.2	10.4	-45.11	-25	-20.11	V
10.368	-72.33	Pk	37.5	-21.2	10.3	-45.73	-25	-20.73	H
High Channel 2660.2MHz + 2680MHz									
5.353	-68.42	Pk	34.6	-27.9	11.2	-50.52	-25	-25.52	H
5.353	-70.18	Pk	34.6	-27.9	11.0	-52.48	-25	-27.48	V
8.055	-70.58	Pk	35.9	-24.1	11.3	-47.48	-25	-22.48	H
8.055	-70.54	Pk	35.9	-24.1	11.4	-47.34	-25	-22.34	V
10.675	-72.39	Pk	37.8	-21.1	10.8	-44.89	-25	-19.89	V
10.691	-72.77	Pk	37.8	-21.4	10.5	-45.87	-25	-20.87	H

Pk - Peak detector

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Company:	
Project #:	12696945
Date:	3/25/2019
Test Engineer:	10641
Configuration:	EUT Only
Mode:	LTE 41 16QAM 20MHz + 20MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz									
5.029	-67.89	Pk	34.1	-28.8	10.8	-51.79	-25	-26.79	V
5.047	-67.57	Pk	34.2	-28.5	11.2	-50.67	-25	-25.67	H
7.543	-71.34	Pk	35.7	-24.5	10.7	-49.44	-25	-24.44	H
7.546	-75.49	Pk	35.7	-24.4	10.9	-53.29	-25	-28.29	V
10.060	-72.24	Pk	37.2	-22.1	10.2	-46.94	-25	-21.94	H
10.060	-72.44	Pk	37.2	-22.1	10.5	-46.84	-25	-21.84	V
Mid Channel 2583.1MHz + 2602.9MHz									
5.154	-68.45	Pk	34.6	-27.9	11.2	-50.55	-25	-25.55	H
5.167	-69.97	Pk	34.6	-28.0	10.7	-52.67	-25	-27.67	V
7.738	-70.56	Pk	35.9	-24.4	11.5	-47.56	-25	-22.56	V
7.739	-70.74	Pk	35.9	-24.4	11.3	-47.94	-25	-22.94	H
10.355	-72.62	Pk	37.8	-21.1	10.7	-45.22	-25	-20.22	V
10.356	-72.45	Pk	37.8	-21.1	10.4	-45.35	-25	-20.35	H
High Channel 2660.2MHz + 2680MHz									
5.333	-70.65	Pk	34.5	-28.1	10.6	-53.65	-25	-28.65	V
5.336	-69.88	Pk	34.5	-28.1	10.4	-53.08	-25	-28.08	H
8.005	-70.54	Pk	35.9	-24.2	11.4	-47.44	-25	-22.44	V
8.006	-69.90	Pk	35.9	-24.1	11.2	-46.90	-25	-21.90	H
10.673	-72.94	Pk	37.8	-21.1	10.7	-45.54	-25	-20.54	H
10.673	-71.47	Pk	37.8	-21.1	10.9	-43.87	-25	-18.87	V

Pk - Peak detector

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9.2. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 2

9.2.1. LTE BAND 5

Company:	
Project #:	12696945
Date:	6/19/2019
Test Engineer:	50822
Configuration:	EUT Only
Mode:	LTE 5 QPSK 10MHz + 10MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.656	-67.38	Pk	28.6	-29.9	10.7	-57.98	-13	-44.98	H
1.656	-67.33	Pk	28.6	-29.9	9.6	-59.03	-13	-46.03	V
2.502	-58.47	Pk	32.4	-28.6	8.9	-45.77	-13	-32.77	H
2.509	-67.42	Pk	32.4	-28.5	9.3	-54.22	-13	-41.22	V
3.304	-68.61	Pk	32.9	-27.2	9.7	-53.21	-13	-40.21	H
3.307	-68.57	Pk	32.8	-27.2	9.9	-53.07	-13	-40.07	V
Mid Channel 831.6MHz + 841.5MHz									
1.655	-66.80	Pk	28.6	-29.9	9.6	-58.50	-13	-45.50	V
1.660	-67.10	Pk	28.6	-29.8	10.4	-57.90	-13	-44.90	H
2.509	-59.14	Pk	32.4	-28.5	9.1	-46.14	-13	-33.14	H
2.510	-67.14	Pk	32.4	-28.5	9.3	-53.94	-13	-40.94	V
3.318	-68.70	Pk	32.8	-27.2	9.3	-53.8	-13	-40.80	H
3.324	-68.21	Pk	32.8	-27.2	9.2	-53.41	-13	-40.41	V
High Channel 834.1MHz + 844MHz									
1.699	-66.97	Pk	28.8	-29.7	9.0	-58.87	-13	-45.87	V
1.700	-67.31	Pk	28.8	-29.7	9.5	-58.71	-13	-45.71	H
2.557	-68.02	Pk	32.3	-28.4	9.6	-54.52	-13	-41.52	H
2.561	-67.88	Pk	32.4	-28.5	9.4	-54.58	-13	-41.58	V
3.395	-69.17	Pk	32.6	-27.3	8.7	-55.17	-13	-42.17	H
3.410	-69.12	Pk	32.7	-27.1	9.3	-54.22	-13	-41.22	V

Pk - Peak detector

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Company:	
Project #:	12696945
Date:	6/19/2019
Test Engineer:	50822
Configuration:	EUT Only
Mode:	LTE 5 16QAM 10MHz + 10MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.651	-67.57	Pk	28.5	-29.8	9.9	-58.97	-13	-45.97	V
1.657	-66.64	Pk	28.6	-29.9	10.7	-57.24	-13	-44.24	H
2.502	-58.90	Pk	32.4	-28.6	8.9	-46.20	-13	-33.20	H
2.534	-67.95	Pk	32.3	-28.4	9.5	-54.55	-13	-41.55	V
3.316	-68.45	Pk	32.8	-27.2	9.5	-53.35	-13	-40.35	H
3.348	-69.03	Pk	32.8	-27.2	9.4	-54.03	-13	-41.03	V
Mid Channel 831.6MHz + 841.5MHz									
1.672	-67.69	Pk	28.7	-29.9	10.7	-58.19	-13	-45.19	H
1.678	-66.65	Pk	28.7	-29.8	9.1	-58.65	-13	-45.65	V
2.509	-63.24	Pk	32.4	-28.5	9.1	-50.24	-13	-37.24	H
2.519	-67.63	Pk	32.3	-28.5	9.3	-54.53	-13	-41.53	V
3.313	-68.29	Pk	32.8	-27.1	9.8	-52.79	-13	-39.79	V
3.329	-68.45	Pk	32.8	-27.3	8.9	-54.05	-13	-41.05	H
High Channel 834.1MHz + 844MHz									
1.690	-67.50	Pk	28.7	-29.7	9.7	-58.80	-13	-45.80	V
1.700	-66.25	Pk	28.8	-29.7	9.5	-57.65	-13	-44.65	H
2.554	-68.3	Pk	32.3	-28.4	9.5	-54.90	-13	-41.90	H
2.554	-68.25	Pk	32.3	-28.4	9.3	-55.05	-13	-42.05	V
3.383	-68.60	Pk	32.7	-27.2	8.8	-54.30	-13	-41.30	V
3.387	-68.67	Pk	32.7	-27.2	8.6	-54.57	-13	-41.57	H

Pk - Peak detector

9.2.2. LTE BAND 7

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Company:	
Project #:	12696945
Date:	3/28/2019
Test Engineer:	12492
Configuration:	EUT Only
Mode:	LTE 7 QPSK 20MHz + 20MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz									
5.046	-68.74	Pk	34.6	-28.7	9.1	-53.74	-25	-28.74	H
7.558	-69.72	Pk	36.3	-26.5	7.3	-52.62	-25	-27.62	H
5.042	-69.31	Pk	34.6	-28.8	9.1	-54.41	-25	-29.41	V
7.560	-70.73	Pk	36.3	-26.5	7.3	-53.63	-25	-28.63	V
10.079	-73.63	Pk	37.6	-22.8	7.9	-50.93	-25	-25.93	H
10.083	-73.23	Pk	37.6	-22.9	7.8	-50.73	-25	-25.73	V
Mid Channel 2525.1MHz + 2544.9MHz									
5.069	-69.68	Pk	34.5	-28.7	8.6	-55.28	-25	-30.28	H
7.606	-71.14	Pk	36.4	-26.3	7.6	-53.44	-25	-28.44	H
5.077	-69.47	Pk	34.5	-28.7	8.3	-55.37	-25	-30.37	V
7.610	-70.98	Pk	36.4	-26.3	7.4	-53.48	-25	-28.48	V
10.142	-71.93	Pk	37.7	-22.6	6.5	-50.33	-25	-25.33	H
10.142	-72.57	Pk	37.7	-22.6	6.4	-51.07	-25	-26.07	V
High Channel 2540.2MHz + 2560MHz									
5.095	-69.27	Pk	34.5	-28.7	9.2	-54.27	-25	-29.27	H
7.653	-70.76	Pk	36.4	-26.0	7.6	-52.76	-25	-27.76	H
5.103	-69.75	Pk	34.5	-28.8	9.5	-54.55	-25	-29.55	V
7.648	-70.65	Pk	36.4	-26.1	7.5	-52.85	-25	-27.85	V
10.203	-73.15	Pk	37.8	-22.4	6.9	-50.85	-25	-25.85	V
10.204	-73.93	Pk	37.8	-22.4	6.9	-51.63	-25	-26.63	H

Pk - Peak detector

Company:	
Project #:	12696945

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Date:	3/28/2019
Test Engineer:	12492
Configuration:	EUT Only
Mode:	LTE 7 16QAM 20MHz + 20MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz									
5.045	-70.19	Pk	34.6	-28.8	9.0	-55.39	-25	-30.39	H
7.560	-70.87	Pk	36.3	-26.5	7.3	-53.77	-25	-28.77	H
5.043	-68.95	Pk	34.6	-28.8	9.1	-54.05	-25	-29.05	V
7.556	-70.45	Pk	36.3	-26.5	7.2	-53.45	-25	-28.45	V
10.073	-73.70	Pk	37.6	-22.8	8.0	-50.90	-25	-25.90	H
10.077	-73.78	Pk	37.6	-22.8	7.9	-51.08	-25	-26.08	V
Mid Channel 2525.1MHz + 2544.9MHz									
5.068	-69.51	Pk	34.5	-28.7	8.7	-55.01	-25	-30.01	H
7.604	-70.98	Pk	36.4	-26.3	7.7	-53.18	-25	-28.18	H
5.068	-69.62	Pk	34.5	-28.7	8.6	-55.22	-25	-30.22	V
7.605	-71.75	Pk	36.4	-26.3	7.6	-54.05	-25	-29.05	V
10.141	-73.74	Pk	37.7	-22.6	6.5	-52.14	-25	-27.14	H
10.143	-73.42	Pk	37.7	-22.6	6.4	-51.92	-25	-26.92	V
High Channel 2540.2MHz + 2560MHz									
5.092	-69.96	Pk	34.5	-28.7	9.1	-55.06	-25	-30.06	H
7.644	-70.27	Pk	36.4	-26.1	7.6	-52.37	-25	-27.37	H
5.095	-70.12	Pk	34.5	-28.7	9.1	-55.22	-25	-30.22	V
7.649	-70.50	Pk	36.4	-26.1	7.5	-52.70	-25	-27.70	V
10.199	-73.12	Pk	37.8	-22.5	7	-50.82	-25	-25.82	V
10.201	-72.57	Pk	37.8	-22.5	6.9	-50.37	-25	-25.37	H

Pk - Peak detector

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9.2.3. LTE BAND 41

Company:	
Project #:	12696945
Date:	3/29/2019
Test Engineer:	12492
Configuration:	EUT Only
Mode:	LTE 41 QPSK 20MHz + 20MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz									
5.044	-71.33	Pk	34.6	-28.8	9.0	-56.53	-25	-31.53	H
7.552	-71.34	Pk	36.3	-26.5	7.3	-54.24	-25	-29.24	H
5.037	-70.08	Pk	34.6	-28.8	8.9	-55.38	-25	-30.38	V
7.553	-71.10	Pk	36.3	-26.5	7.3	-54	-25	-29.00	V
10.068	-72.64	Pk	37.6	-22.8	7.9	-49.94	-25	-24.94	H
10.072	-72.94	Pk	37.6	-22.8	7.9	-50.24	-25	-25.24	V
Mid Channel 2583.1MHz + 2602.9MHz									
7.581	-70.34	Pk	36.3	-26.2	7.1	-53.14	-25	-28.14	H
7.582	-70.40	Pk	36.3	-26.2	7.1	-53.20	-25	-28.20	V
5.194	-69.31	Pk	34.7	-28.9	9.1	-54.41	-25	-29.41	H
5.194	-69.06	Pk	34.7	-28.9	8.8	-54.46	-25	-29.46	V
10.382	-73.16	Pk	37.8	-22.2	7.9	-49.66	-25	-24.66	V
10.384	-72.66	Pk	37.9	-22.1	7.9	-48.96	-25	-23.96	H
High Channel 2660.2MHz + 2680MHz									
5.365	-69.28	Pk	35.1	-29.1	8.6	-54.68	-25	-29.68	H
10.686	-73.09	Pk	37.8	-22.1	8.2	-49.19	-25	-24.19	H
5.368	-85.26	Pk	35.1	-29.2	8.8	-70.56	-25	-45.56	V
10.680	-72.65	Pk	37.8	-22.0	8.0	-48.85	-25	-23.85	V
8.007	-70.90	Pk	36.4	-25.6	7.6	-52.50	-25	-27.50	V
8.012	-71.20	Pk	36.4	-25.7	7.4	-53.10	-25	-28.10	H

Pk - Peak detector

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Company:	
Project #:	12696945
Date:	3/29/2019
Test Engineer:	12492
Configuration:	EUT Only
Mode:	LTE 41 16QAM 20MHz + 20MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz									
5.046	-70.30	Pk	34.6	-28.7	9.1	-55.30	-25	-30.30	H
7.562	-71.31	Pk	36.3	-26.5	7.4	-54.11	-25	-29.11	H
5.042	-68.24	Pk	34.6	-28.8	9.1	-53.34	-25	-28.34	V
7.564	-71.04	Pk	36.3	-26.5	7.4	-53.84	-25	-28.84	V
10.075	-73.10	Pk	37.6	-22.8	8.0	-50.30	-25	-25.30	H
10.077	-72.92	Pk	37.6	-22.8	7.9	-50.22	-25	-25.22	V
Mid Channel 2583.1MHz + 2602.9MHz									
5.182	-69.00	Pk	34.7	-28.9	8.9	-54.30	-25	-29.30	H
5.192	-67.40	Pk	34.7	-28.8	8.7	-52.80	-25	-27.80	V
7.787	-70.71	Pk	36.4	-25.8	7.8	-52.31	-25	-27.31	V
7.788	-71.93	Pk	36.4	-25.8	7.8	-53.53	-25	-28.53	H
10.380	-72.86	Pk	37.8	-22.2	7.9	-49.36	-25	-24.36	V
10.384	-72.97	Pk	37.9	-22.1	7.9	-49.27	-25	-24.27	H
High Channel 2660.2MHz + 2680MHz									
10.684	-72.06	Pk	37.8	-22	8.2	-48.06	-25	-23.06	H
10.682	-71.95	Pk	37.8	-22	8.1	-48.05	-25	-23.05	V
5.342	-65.44	Pk	35	-29.1	7.8	-51.74	-25	-26.74	H
5.342	-69.76	Pk	35	-29.1	7.4	-56.46	-25	-31.46	V
8.012	-71.14	Pk	36.4	-25.7	7.3	-53.14	-25	-28.14	V
8.013	-70.05	Pk	36.4	-25.7	7.4	-51.95	-25	-26.95	H

Pk - Peak detector

END OF REPORT

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4031B
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10. SETUP PHOTOS

Please see setup report 12696945-EP1V1

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