



CERTIFICATION TEST REPORT

Report Number. : 13018918-E10V2

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

Model : A2296

FCC ID : BCG-E3501A

EUT Description : SMARTPHONE

Test Standard(s) : FCC CFR47 PART 22 H, PART 27

Date Of Issue:
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Revision History

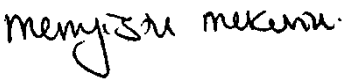
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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE INC. 1 APPLE PARK WAY CUPERTINO, CA. 95014, U.S.A.
Model	A2296
FCC ID	BCG-E3501A
EUT Description	SMARTPHONE
Serial Number	FFMZW06XPM62,FFMZW038PM62
Date Tested	SEPTEMBER 06, 2019 to OCTOBER 24, 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.

2. TEST METHODOLOGY

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

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

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. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

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

4.2 DECISION RULES

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

4.3 MEASUREMENT UNCERTAINTY

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

PARAMETER	U_{Lab}
Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Conducted Disturbance, 0.15 to 30 MHz	3.07 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, 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.

5.2. MAXIMUM OUTPUT POWER

EIRP LIMIT

FCC: §2.1046, §22.913, §27.50

EIRP TEST PROCEDURE

ANSI C63.26:2015

KDB 971168 D01 Section 5.6

KDB 412172 D01 Determining ERP and EIRP v01r01

$$\text{ERP/EIRP} = \text{PMeas} + \text{GT} - \text{LC}$$

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

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

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

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								
EIRP Limit (W)			2.00					
Antenna Gain (dBi)			-1.70					
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	24.5	20.65	0.116	7537.8	7M54G7W
	16QAM			24.4	20.55	0.114	7541.8	7M54D7W
	64QAM			23.3	19.45	0.088	7601.2	7M60D7W
5+3	QPSK	826.5	847.5	24.5	20.65	0.116	7564.3	7M56G7W
	16QAM			24.5	20.65	0.116	7540.7	7M54D7W
	64QAM			23.3	19.45	0.088	7553.3	7M55D7W
5+10	QPSK	826.5	844.0	24.5	20.65	0.116	13889	13M9G7W
	16QAM			24.4	20.55	0.114	13902	13M9D7W
	64QAM			23.2	19.35	0.086	13853	13M9D7W
10+5	QPSK	829.0	846.5	24.5	20.65	0.116	13871	13M9G7W
	16QAM			24.5	20.65	0.116	13869	13M9D7W
	64QAM			23.3	19.45	0.088	13880	13M9D7W
10+10	QPSK	829.0	844.0	24.5	20.65	0.116	18796	18M8G7W
	16QAM			24.5	20.65	0.116	18769	18M8D7W
	64QAM			23.3	19.45	0.088	18789	18M8D7W

OUTPUT POWER FOR LTE BAND 7

Part 27								
EIRP Limit (W)			2.00					
Antenna Gain (dBi)			-2.60					
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	24.5	21.90	0.155	28047	28M0G7W
	16QAM			24.2	21.60	0.145	28417	28M4D7W
	64QAM			22.9	20.30	0.107	28326	28M3D7W
20+10	QPSK	2510.0	2564.5	24.5	21.90	0.155	28121	28M1G7W
	16QAM			24.4	21.80	0.151	28349	28M3D7W
	64QAM			23.1	20.50	0.112	28306	28M3D7W
15+15	QPSK	2507.5	2562.5	24.5	21.90	0.155	28674	28M7G7W
	16QAM			24.2	21.60	0.145	28626	28M6D7W
	64QAM			23.0	20.40	0.110	28825	28M8D7W
15+20	QPSK	2507.8	2560.0	24.5	21.90	0.155	32927	32M9G7W
	16QAM			24.3	21.70	0.148	32877	32M9D7W
	64QAM			23.1	20.50	0.112	33120	33M1D7W
20+15	QPSK	2510.0	2562.2	24.5	21.90	0.155	32845	32M8G7W
	16QAM			24.4	21.80	0.151	33157	33M2D7W
	64QAM			23.1	20.50	0.112	33108	33M1D7W
20+20	QPSK	2510.0	2560.0	24.5	21.90	0.155	37694	37M7G7W
	16QAM			24.4	21.80	0.151	37706	37M7D7W
	64QAM			23.4	20.80	0.120	37935	37M9D7W

OUTPUT POWER FOR LTE BAND 41

Part 27								
EIRP Limit (W)		2.00						
Antenna Gain (dBi)		-2.60						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
5+20	QPSK	2499.3	2680.0	26.0	23.40	0.219	23376	23M4G7W
	16QAM			25.9	23.30	0.214	23363	23M4D7W
	64QAM			24.2	21.60	0.145	23209	23M2D7W
20+5	QPSK	2506.0	2686.7	26.0	23.40	0.219	23292	23M3G7W
	16QAM			25.8	23.20	0.209	23312	23M3D7W
	64QAM			24.4	21.80	0.151	23205	23M2D7W
10+20	QPSK	2501.5	2680.0	26.0	23.40	0.219	28158	28M2G7W
	16QAM			26.0	23.40	0.219	27965	28M0D7W
	64QAM			24.3	21.70	0.148	27973	28M0D7W
20+10	QPSK	2506.0	2684.5	26.0	23.40	0.219	28133	28M1G7W
	16QAM			26.0	23.40	0.219	28052	28M1D7W
	64QAM			24.3	21.70	0.148	27839	27M8D7W
15+15	QPSK	2503.5	2682.5	26.0	23.40	0.219	28568	28M6G7W
	16QAM			26.0	23.40	0.219	25588	25M6D7W
	64QAM			24.2	21.60	0.145	28583	28M6D7W
15+20	QPSK	2503.8	2680.0	26.0	23.40	0.219	32995	33M0G7W
	16QAM			25.9	23.30	0.214	32806	32M8D7W
	64QAM			24.4	21.80	0.151	32665	32M7D7W
20+15	QPSK	2506.0	2682.2	26.0	23.40	0.219	32796	32M8G7W
	16QAM			26.0	23.40	0.219	32943	32M9D7W
	64QAM			24.4	21.80	0.151	32831	32M8D7W
20+20	QPSK	2506.0	2680.0	26.0	23.40	0.219	37802	37M8G7W
	16QAM			25.9	23.30	0.214	37625	37M6D7W
	64QAM			24.5	21.90	0.155	37554	37M6D7W

5.3. SOFTWARE AND FIRMWARE

The EUT Firmware installed during testing was version: Baseband FW:19-1.05.18

5.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	LAT 1 (dBi)	UAT 1 (dBi)
LTE Band 5, 824 – 849 MHz	-1.70	-2.40
LTE Band 7, 2500 – 2570 MHz	-2.60	2.20
LTE Band 41, 2496 – 2690 MHz	-2.60	2.20

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 LAT 1 antenna as worst case since it has higher output powers.

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

For UAT 1 antenna, it was determined that Y (Landscape) orientation was worst-case orientation for band 5; X (Flatbed) orientation was worst-case orientation for bands 7, and 41 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 from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found with less than 20dB of margin from 9kHz to 1GHz.

For interband transmission of multiple channels in LAT 1 and UAT 1 in Cellular bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths. No noticeable new emission was found.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT 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

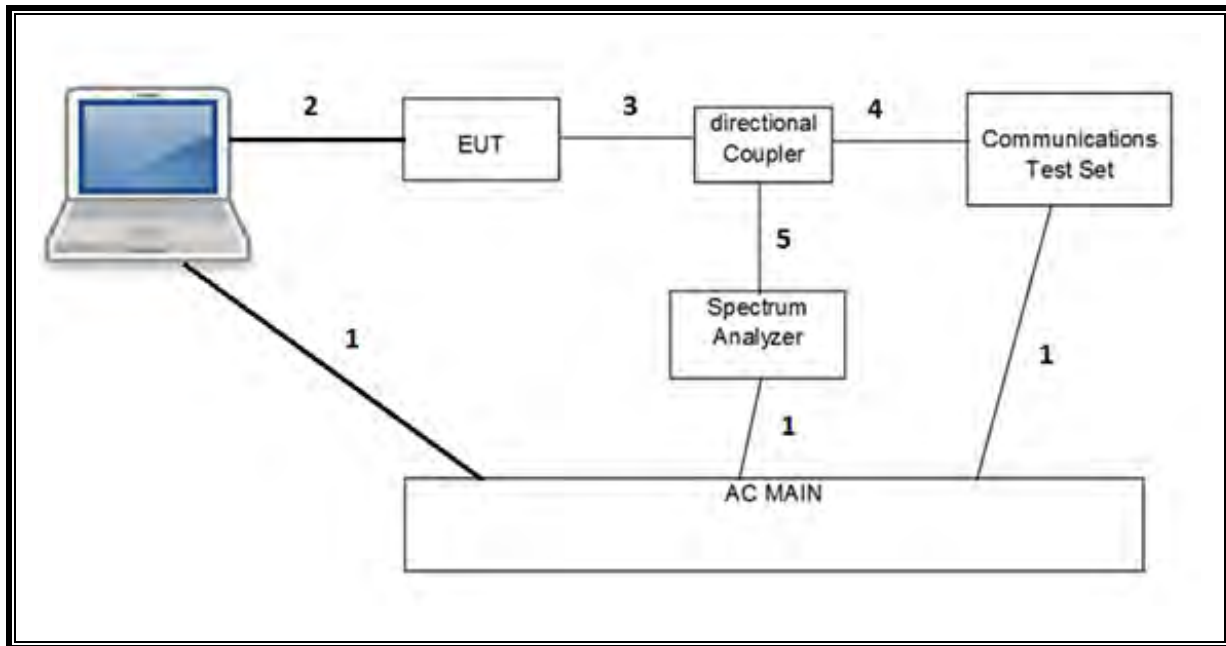
I/O CABLES (RF Conducted Test)

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

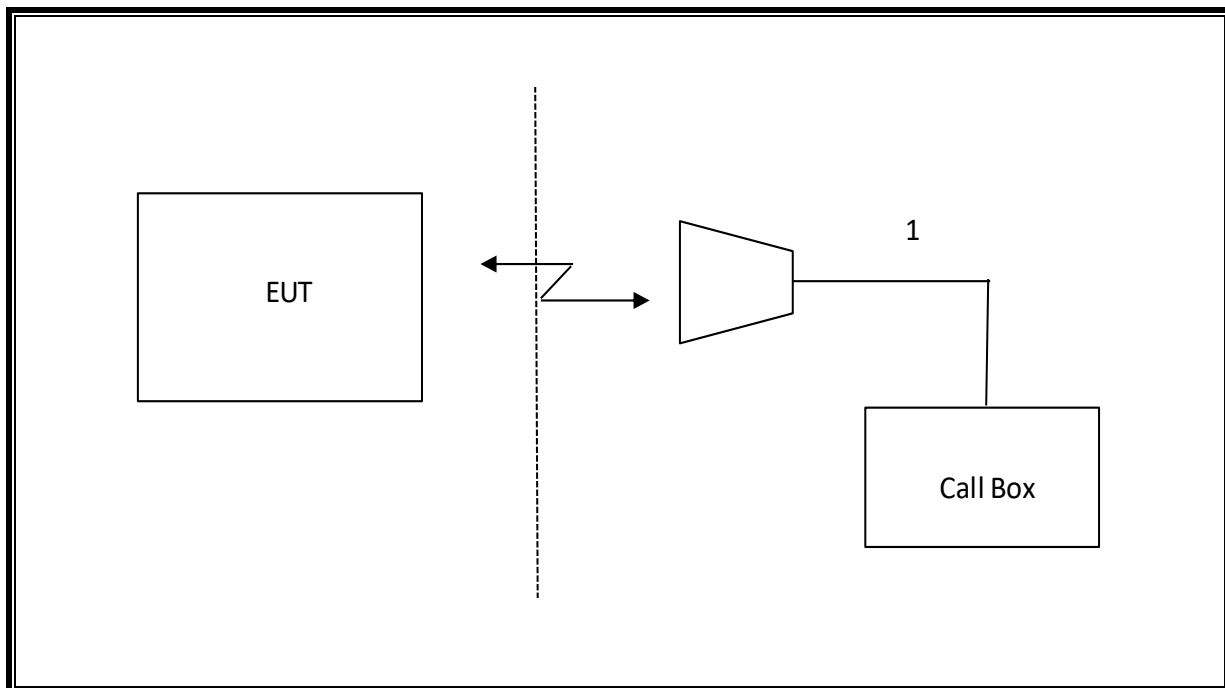
I/O CABLES (RF Radiated Test)

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

CONDUCTED SETUP



RADIATED SETUP



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
*Spectrum Analyzer, PXA 3Hz to 44GHz	Agilent	N9030A	T905	01/24/2020
*Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T340	01/22/2020
*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, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	PRE0186650	12/13/2019
*Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	E4440A	T198	01/30/2020
*Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	E4440A	T99	01/28/2020
Directional Coupler	KRYTAR	152610	T1537	06/09/2020
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	MICROTRONICS	WHKX1.2/15G-6ST	T1182	05/30/2020
*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	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	02/05/2020
*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	3117	T346	05/14/2020
Amplifier, 18-26GHz	Agilent	8449B	T404	03/23/2020
Amplifier, 26-40GHz	Miteq	TTA2640	T1804	03/23/2020
Antenna Horn, 18 to 26GHz	ARA	MWH-1826	T447	08/13/2020
Antenna, Horn 26.5GHz to 40GHz	ARA	MWH-2640/B	T446	08/13/2020
Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	T35	06/06/2020
UL AUTOMATION SOFTWARE				
CLT Software	UL	UL RF	Ver 2.8.1 Mar 11, 2020	
Power Measurement Software	UL	UL RF	Ver 2.7, 2019	
Radiated test software	UL	UL RF	Ver 9.5 June 15, 2019	

*Testing is completed before equipment expiration date.

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:

7.1. LTE BAND 5

ID:	19467	Date:	10/03/19
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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)					
							LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3MHz / 5MHz	825.5	829.4	1	14	1	0	24.4	24.4	23.3	23.0	22.1	20.2
			15	0	25	0	24.4	24.3	23.0	21.2	20.2	20.2
	834.1	838.0	1	14	1	0	24.4	24.4	23.2	23.0	22.3	20.2
			15	0	25	0	24.5	24.3	23.2	21.2	20.1	20.2
	842.6	846.5	1	14	1	0	24.2	24.2	23.0	23.0	22.1	20.0
			15	0	25	0	24.3	24.3	23.1	21.0	20.0	20.0

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)					
							LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz / 3MHz	826.5	830.4	1	24	1	0	24.5	24.5	23.2	23.0	22.1	20.0
			25	0	15	0	24.5	24.5	23.3	21.0	19.9	19.9
	835.0	838.9	1	24	1	0	24.4	24.5	23.2	22.9	21.9	20.0
			25	0	15	0	24.4	24.4	23.2	20.9	19.8	19.8
	846.5	842.6	1	24	1	0	24.2	24.3	23.0	22.8	21.8	20.0
			25	0	15	0	24.2	24.2	22.9	20.8	19.7	19.7

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)					
							LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz / 10MHz	826.5	833.7	1	24	1	0	24.5	24.4	23.2	23.0	22.0	20.1
			1	0	1	49	18.5	18.4	18.4	12.5	12.5	12.5
			25	0	50	0	24.4	24.4	23.1	20.9	19.9	19.9
	831.8	839.0	1	24	1	0	24.3	24.4	23.1	23.0	22.0	20.1
			1	0	1	49	18.4	18.5	18.4	12.5	12.4	12.5
			25	0	50	0	24.4	24.3	23.1	20.9	19.9	19.9
	836.8	844.0	1	24	1	0	24.2	24.3	23.0	22.9	21.9	20.0
			1	0	1	49	18.3	18.4	18.2	12.5	12.5	12.5
			25	0	50	0	24.3	24.3	23.0	20.8	19.8	19.8

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10MHz/ 5MHz	829.0	836.2	1	49	1	0	24.5	24.5	23.3	23.0	22.0	20.0
			50	0	25	0	24.4	24.5	23.2	20.8	19.8	19.8
	834.3	841.5	1	49	1	0	24.4	24.4	23.2	22.9	21.9	19.8
			50	0	25	0	24.5	24.5	23.2	20.8	19.8	19.7
	839.3	846.5	1	49	1	0	24.4	24.5	23.2	22.8	21.8	19.8
			50	0	25	0	24.3	24.3	23.1	20.8	19.7	19.7

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10MHz/ 10MHz	829.0	838.9	1	49	1	0	24.5	24.4	23.2	23.0	22.1	20.1
			1	0	1	49	18.6	18.7	18.5	12.5	12.5	12.4
			50	0	50	0	24.4	24.4	23.2	20.8	19.9	19.9
	831.5	841.4	1	49	1	0	24.5	24.4	23.3	22.9	22.0	20.0
			1	0	1	49	18.6	18.6	18.4	12.5	12.5	12.4
			50	0	50	0	24.5	24.5	23.2	20.9	19.9	19.9
	844.0	834.1	1	49	1	0	24.4	24.3	23.2	22.9	22.0	19.9
			1	0	1	49	18.4	18.6	18.3	12.5	12.5	12.4
			50	0	50	0	24.3	24.4	23.1	20.8	19.9	19.9

7.2. LTE BAND 7

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
							LAT 1			UAT 1		
			Size	Offset	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10MHz / 20MHz	2505.5	2519.9	1	49	1	0	24.5	24.2	22.8	18.1	17.8	16.8
			50	0	100	0	24.4	24.1	22.9	16.0	15.5	16.4
	2525.6	2540.0	1	49	1	0	24.3	24.1	22.8	18.7	18.3	16.7
			50	0	100	0	24.3	24.0	22.8	16.6	16.1	16.3
	2545.5	2560.0	1	49	1	0	24.1	23.9	22.6	18.0	17.9	16.2
			50	0	100	0	24.1	23.8	22.5	16.4	15.9	16.1

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
							LAT 1			UAT 1		
			Size	Offset	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 10MHz	2510.0	2524.4	1	99	1	0	24.5	24.4	23.1	18.7	18.5	17.0
			1	0	1	49	19.8	19.9	19.6	9.9	10.7	11.0
			100	0	50	0	24.2	24.1	22.9	16.6	16.4	16.6
	2530.1	2544.5	1	99	1	0	24.2	24.2	23.0	18.4	18.2	16.6
			1	0	1	49	19.7	19.8	19.7	9.8	10.6	10.8
			100	0	50	0	24.0	24.0	22.8	16.4	16.2	16.3
	2550.1	2564.5	1	99	1	0	24.0	24.0	22.8	18.1	17.9	16.5
			1	0	1	49	19.6	19.6	19.5	9.5	10.3	10.6
			100	0	50	0	23.8	23.8	22.5	16.1	15.8	16.0

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
							LAT 1			UAT 1		
			Size	Offset	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15MHz / 15MHz	2507.5	2522.5	1	74	1	0	24.5	24.2	23.0	18.7	18.4	16.7
			75	0	75	0	24.1	24.1	22.9	16.7	16.3	16.5
	2527.5	2542.5	1	74	1	0	24.0	24.1	22.8	18.5	18.2	16.6
			75	0	75	0	24.1	24.0	22.7	16.5	16.1	16.3
	2547.5	2562.5	1	74	1	0	23.9	24.0	22.6	18.3	17.9	16.3
			75	0	75	0	23.8	23.8	22.5	16.2	15.8	16.0

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15MHz / 20MHz	2507.8	2524.9	1	74	1	0	24.2	24.3	23.1	18.7	18.5	16.8
			75	0	100	0	24.5	24.3	23.0	16.7	16.4	16.6
	2525.3	2542.4	1	74	1	0	24.2	24.2	22.9	18.6	18.4	16.6
			75	0	100	0	23.9	24.0	22.9	16.6	16.2	16.4
	2542.9	2560.0	1	74	1	0	23.9	24.0	22.8	18.3	18.0	16.3
			75	0	100	0	23.9	23.9	22.7	16.3	16.0	16.1

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 15MHz	2510.0	2527.1	1	99	1	0	24.5	24.4	23.1	18.7	18.6	17.0
			100	0	75	0	24.3	24.3	23.0	16.7	16.4	16.7
	2527.6	2544.7	1	99	1	0	24.1	24.3	23.1	18.5	18.3	16.7
			100	0	75	0	24.1	24.1	22.8	16.5	16.2	16.4
	2545.1	2562.2	1	99	1	0	24.0	24.1	22.9	18.2	17.9	16.5
			100	0	75	0	23.9	23.9	22.6	16.2	15.9	16.1

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz/ 20MHz	2510.0	2529.8	1	99	1	0	24.5	24.4	23.4	18.7	18.6	17.1
			1	0	1	99	19.6	19.6	19.5	9.8	10.5	10.6
			100	0	100	0	24.4	24.3	23.1	16.6	16.4	16.6
	2525.1	2544.9	1	99	1	0	24.2	24.2	23.1	18.5	18.3	16.8
			1	0	1	99	19.2	19.4	19.5	9.3	10.3	10.3
			100	0	100	0	24.1	24.1	22.9	16.4	16.3	16.4
	2540.2	2560.0	1	99	1	0	24.1	24.2	23.0	18.3	18.1	16.5
			1	0	1	99	19.2	19.7	19.5	9.0	10.0	10.2
			100	0	100	0	24.0	24.0	22.8	16.2	16.0	16.1

7.3. LTE BAND 41

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz / 20MHz	2499.3	2511.0	1	24	1	0	25.5	25.9	23.1	19.7	18.9	16.0
			25	0	100	0	25.8	25.3	24.1	17.3	16.7	16.7
	2583.8	2595.5	1	24	1	0	26.0	25.9	24.2	19.4	18.4	15.4
			25	0	100	0	25.8	25.3	24.0	16.7	16.1	16.5
	2668.3	2680.0	1	24	1	0	25.8	25.8	24.1	19.0	18.3	16.7
			25	0	100	0	25.8	25.3	24.0	16.9	16.2	16.6

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 5MHz	2506.0	2517.7	1	99	1	0	26.0	25.8	24.4	19.7	19.2	17.4
			1	0	1	24	19.9	19.9	19.7	10.8	11.3	11.6
			100	0	25	0	25.9	25.4	24.1	17.6	17.0	17.3
	2590.5	2602.2	1	99	1	0	25.9	25.8	24.1	19.1	18.5	16.8
			1	0	1	24	19.8	19.8	19.8	10.2	10.8	11.0
			100	0	25	0	25.9	25.4	24.1	16.8	16.3	16.6
	2675.0	2686.7	1	99	1	0	25.9	25.8	24.2	19.1	18.5	16.8
			1	0	1	24	19.8	19.7	19.8	10.4	10.8	11.1
			100	0	25	0	25.8	25.3	24.1	16.9	16.3	16.6

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10MHz / 20MHz	2501.5	2515.9	1	49	1	0	25.9	26.0	24.3	19.7	19.0	17.4
			50	0	100	0	26.0	25.5	24.1	17.4	16.8	17.1
	2583.6	2598.0	1	49	1	0	26.0	25.9	24.2	18.8	18.2	16.6
			50	0	100	0	25.8	25.3	24.0	16.8	16.2	16.5
	2665.6	2680.0	1	49	1	0	25.8	25.7	24.1	19.0	18.3	16.7
			50	0	100	0	25.8	25.2	24.0	16.9	16.3	16.6

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 10MHz	2506.0	2520.4	1	99	1	0	26.0	26.0	24.3	19.7	19.2	17.4
			100	0	50	0	25.8	25.3	24.1	17.6	17.0	17.2
	2588.1	2602.5	1	99	1	0	25.8	25.8	24.2	19.0	18.5	16.8
			100	0	50	0	25.7	25.2	24.1	16.8	16.3	16.6
	2670.1	2684.5	1	99	1	0	25.8	25.8	24.2	19.1	18.5	16.8
			100	0	50	0	25.6	25.1	24.0	16.9	16.3	16.6

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15MHz / 15MHz	2503.5	2518.5	1	74	1	0	26.0	26.0	24.2	19.7	19.1	17.3
			75	0	75	0	26.0	25.5	24.1	17.5	16.9	17.1
	2585.5	2600.5	1	74	1	0	25.9	25.9	24.2	19.0	18.2	16.6
			75	0	75	0	25.9	25.3	24.1	16.8	16.2	16.6
	2667.5	2682.5	1	74	1	0	25.9	25.9	24.2	19.0	18.2	16.7
			75	0	75	0	25.8	25.3	24.0	16.9	16.3	16.6

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15MHz / 20MHz	2503.8	2520.9	1	74	1	0	26.0	25.9	24.4	19.7	19.1	17.4
			75	0	100	0	26.0	25.4	24.3	17.6	16.9	17.2
	2583.3	2600.4	1	74	1	0	25.8	25.6	24.2	19.0	18.2	16.7
			75	0	100	0	25.8	25.2	24.2	16.9	16.3	16.6
	2663.0	2680.0	1	74	1	0	25.7	25.5	24.1	19.1	18.3	16.7
			75	0	100	0	25.7	25.2	24.1	16.9	16.3	16.6

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 15MHz	2506.0	2523.1	1	99	1	0	26.0	26.0	24.4	19.7	19.3	17.5
			100	0	75	0	25.9	25.3	24.2	17.5	17.0	17.3
	2585.6	2602.7	1	99	1	0	25.7	25.5	24.3	19.0	18.5	16.7
			100	0	75	0	25.7	25.1	24.2	16.8	16.3	16.7
	2665.1	2682.2	1	99	1	0	25.7	25.7	24.2	19.0	18.5	16.8
			100	0	75	0	25.6	25.2	24.1	16.9	16.4	16.7

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
							LAT 1			UAT 1		
			Size	Offset	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz/ 20MHz	2506.0	2525.8	1	99	1	0	26.0	25.9	24.5	19.7	19.1	17.5
			1	0	1	99	19.8	19.6	19.9	10.6	11.0	11.3
			100	0	100	0	25.9	25.4	24.4	17.4	17.0	17.2
	2583.1	2602.9	1	99	1	0	25.7	25.6	24.3	19.0	18.6	16.9
			1	0	1	99	19.6	19.5	19.8	10.2	10.8	11.1
			100	0	100	0	25.7	25.1	24.2	16.8	16.3	16.6
	2660.2	2680.0	1	99	1	0	25.7	25.8	24.2	19.0	18.5	16.8
			1	0	1	99	19.6	19.6	19.8	10.4	11.0	11.2
			100	0	100	0	25.6	25.1	24.1	16.9	16.4	16.7

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

LTE BAND 5

Band	Mode	RB Allocation/RB Offset	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 5	3MHz + 5MHz BAND QPSK	15/0 + 25/0	836.5	7.5378	8.106
	3MHz + 5MHz BAND 16QAM			7.5418	8.066
	3MHz + 5MHz BAND 64QAM			7.6012	8.148
	5MHz + 3MHz BAND QPSK	25/0 + 15/0		7.5643	8.128
	5MHz + 3MHz BAND 16QAM			7.5407	8.089
	5MHz + 3MHz BAND 64QAM			7.5533	8.078
	5MHz + 10MHz BAND QPSK	25/0 + 50/0		13.889	14.95
	5MHz + 10MHz BAND 16QAM			13.902	14.91
	5MHz + 10MHz BAND 64QAM			13.853	14.83
	10MHz + 5MHz BAND QPSK	50/0 + 25/0		13.871	14.92
	10MHz + 5MHz BAND 16QAM			13.869	14.9
	10MHz + 5MHz BAND 64QAM			13.88	14.83
	10MHz + 10MHz BAND QPSK	50/0 + 50/0		18.796	20.43
	10MHz + 10MHz BAND 16QAM			18.769	20.41
	10MHz + 10MHz BAND 64QAM			18.789	20.33

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	28.047	30.66
	10MHz + 20MHz BAND 16QAM			28.417	31.48
	10MHz + 20MHz BAND 64QAM			28.326	30.42
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		28.121	31.59
	20MHz + 10MHz BAND 16QAM			28.349	31.75
	20MHz + 10MHz BAND 64QAM			28.306	30.69
	15MHz + 15MHz BAND QPSK	75/0 + 75/0		28.674	33.27
	15MHz + 15MHz BAND 16QAM			28.626	31.19
	15MHz + 15MHz BAND 64QAM			28.825	32.43
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		32.927	36.08
	15MHz + 20MHz BAND 16QAM			32.877	36.33
	15MHz + 20MHz BAND 64QAM			33.12	36.04
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		32.845	35.85
	20MHz + 15MHz BAND 16QAM			33.157	36.33
	20MHz + 15MHz BAND 64QAM			33.108	35.44
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.694	44.76
	20MHz + 20MHz BAND 16QAM			37.706	44.14
	20MHz + 20MHz BAND 64QAM			37.935	44.09

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	23.376	25.21
	5MHz + 20MHz BAND 16QAM			23.363	25.09
	5MHz + 20MHz BAND 64QAM			23.209	25.1
	20MHz + 5MHz BAND QPSK	100/0 + 25/0		23.292	24.99
	20MHz + 5MHz BAND 16QAM			23.312	25.05
	20MHz + 5MHz BAND 64QAM			23.205	24.92
	10MHz + 20MHz BAND QPSK	50/0 + 100/0		28.158	30.06
	10MHz + 20MHz BAND 16QAM			27.965	29.9
	10MHz + 20MHz BAND 64QAM			27.973	30.23
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		28.133	30.03
	20MHz + 10MHz BAND 16QAM			28.052	29.97
	20MHz + 10MHz BAND 64QAM			27.839	29.85
	15MHz + 15MHz BAND QPSK	75/0 + 75/0		28.568	30.64
	15MHz + 15MHz BAND 16QAM			25.588	30.75
	15MHz + 15MHz BAND 64QAM			28.583	30.59
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		32.995	35.16
	15MHz + 20MHz BAND 16QAM			32.806	35.06
	15MHz + 20MHz BAND 64QAM			32.665	34.73
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		32.796	34.98
	20MHz + 15MHz BAND 16QAM			32.943	35.02
	20MHz + 15MHz BAND 64QAM			32.831	34.89
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.802	40.15
	20MHz + 20MHz BAND 16QAM			37.625	40.07
	20MHz + 20MHz BAND 64QAM			37.554	39.87

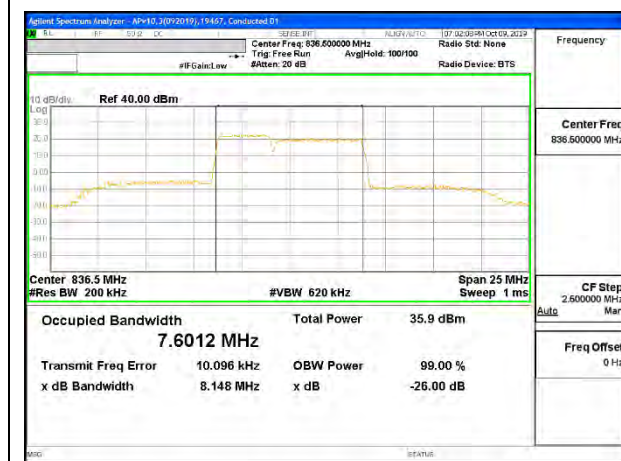
8.1.1. LTE BAND 5



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



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



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

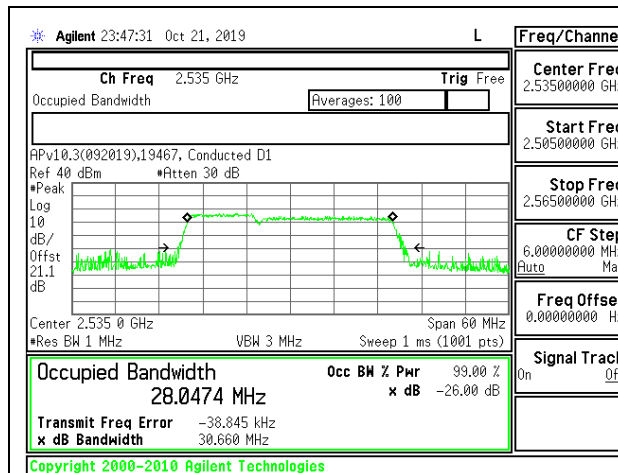


LTE B5 5MHz + 3MHz 64QAM RB25-0 + RB15-0





8.1.2. LTE BAND 7



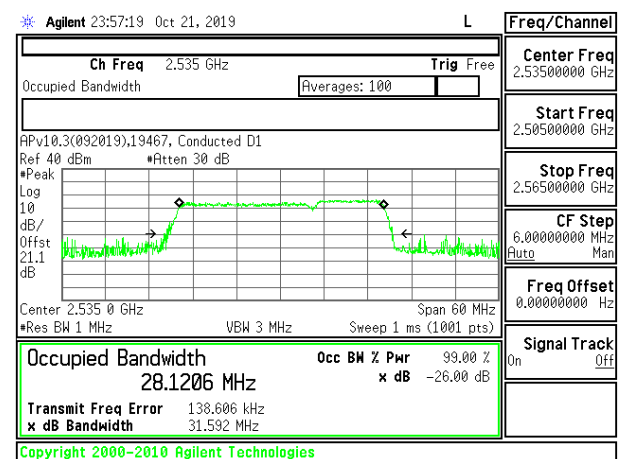
LTE B7 10MHz + 20MHz QPSK RB50-0 + RB100-0



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



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



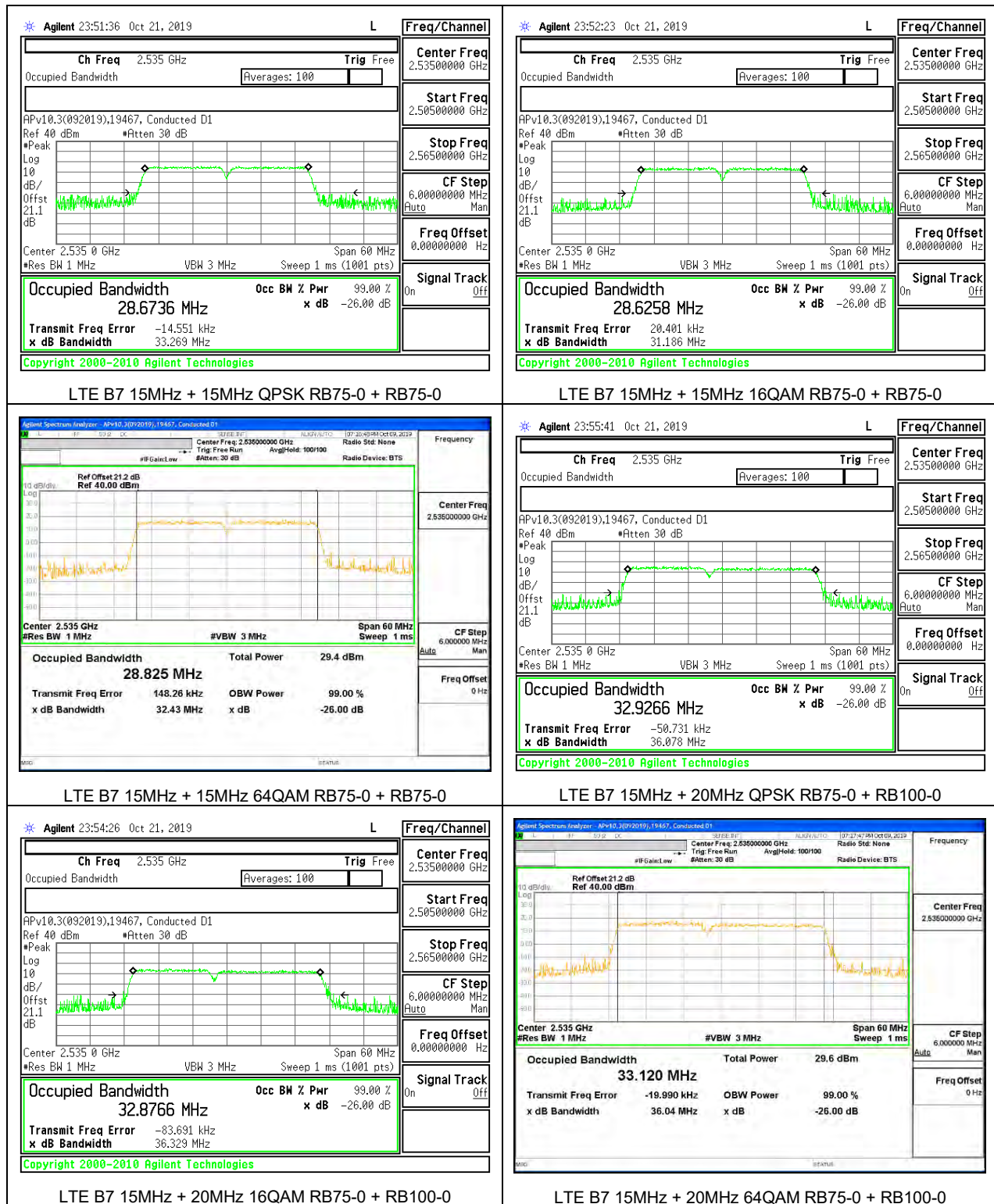
LTE B7 20MHz + 10MHz QPSK RB100-0 + RB50-0

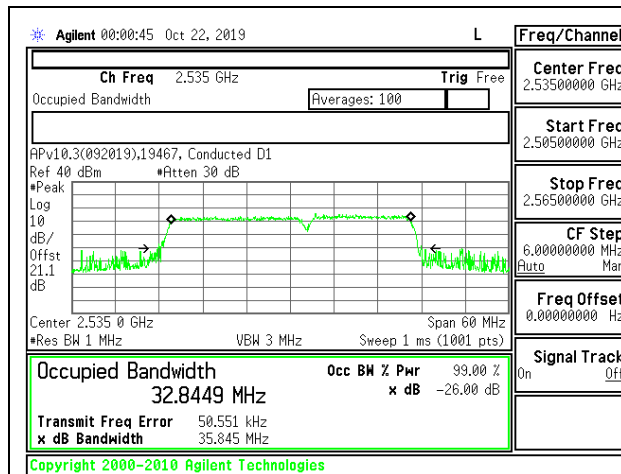


LTE B7 20MHz + 10MHz 16QAM RB100-0 + RB50-0



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





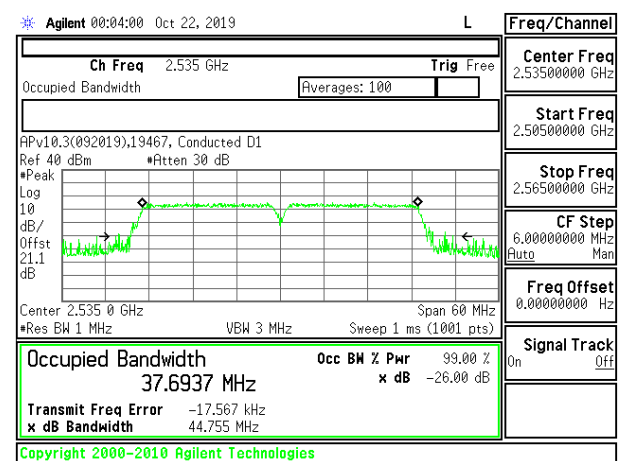
LTE B7 20MHz + 15MHz QPSK RB100-0 + RB75-0



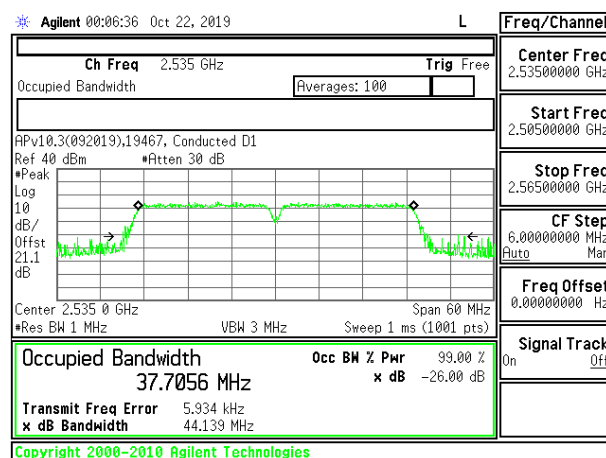
LTE B7 20MHz + 15MHz 16QAM RB100-0 + RB75-0



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

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







8.2. BAND EDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051, §22.917, §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 than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

TEST PROCEDURE FOR FCC PART 27

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

For each band edge measurement:

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.

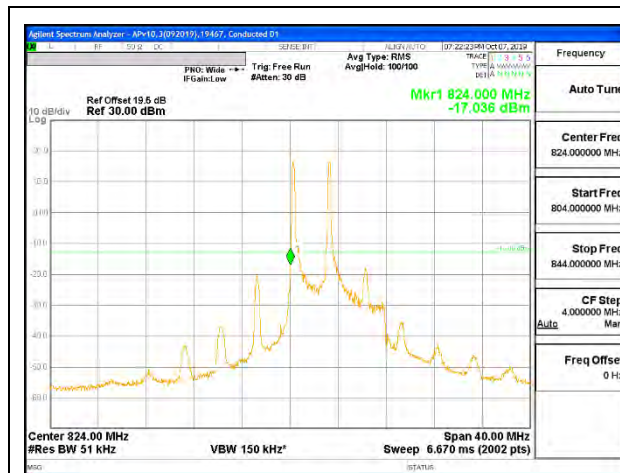
(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of 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.

MODES TESTED

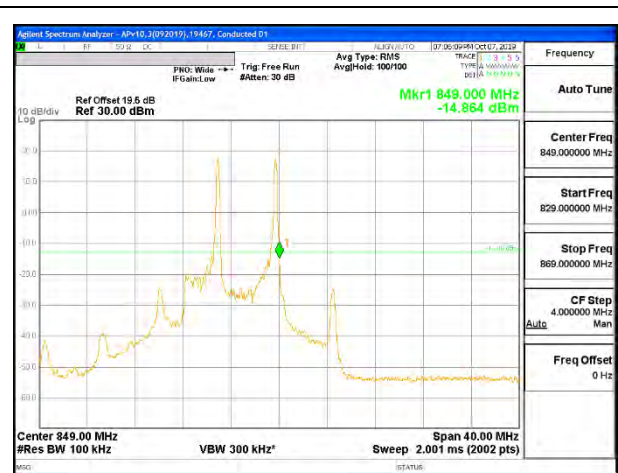
- LTE Band 5
- LTE Band 7
- LTE Band 41

RESULTS

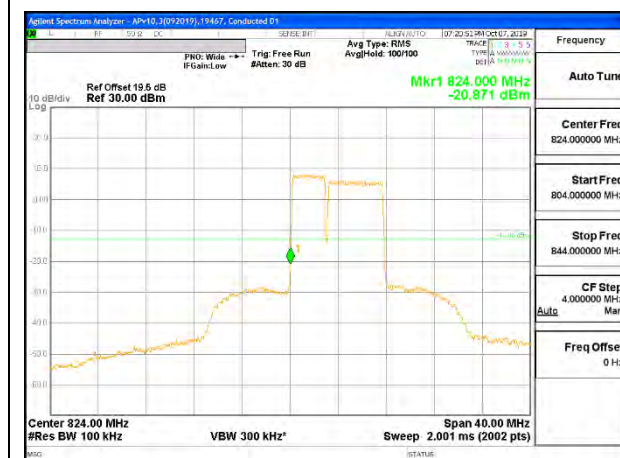
8.2.1. LTE BAND 5



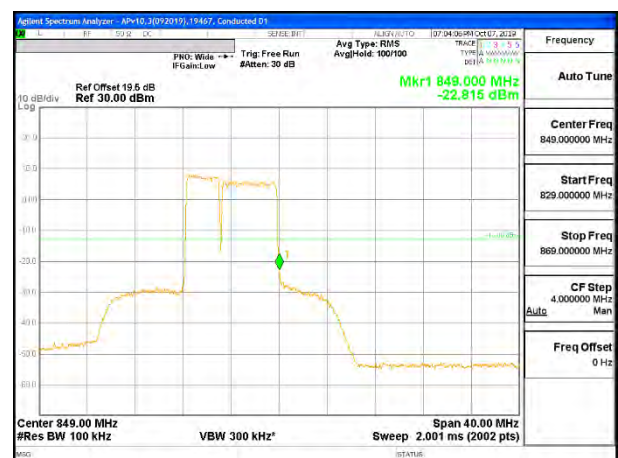
LTE B5 3MHz + 5MHz QPSK Low Ch RB1-0 + RB1-0



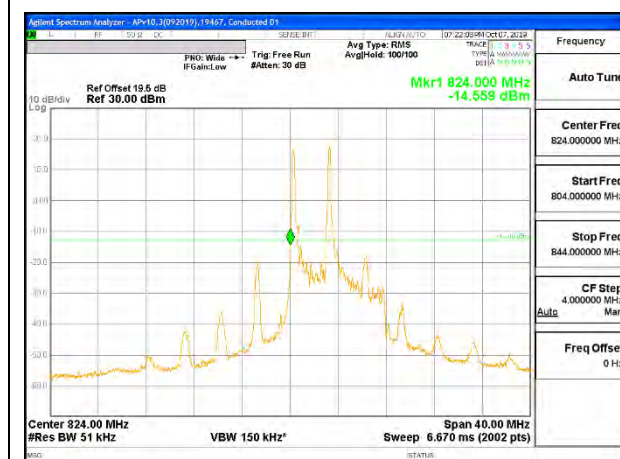
LTE B5 5MHz + 3MHz QPSK High Ch RB1-24 + RB1-14



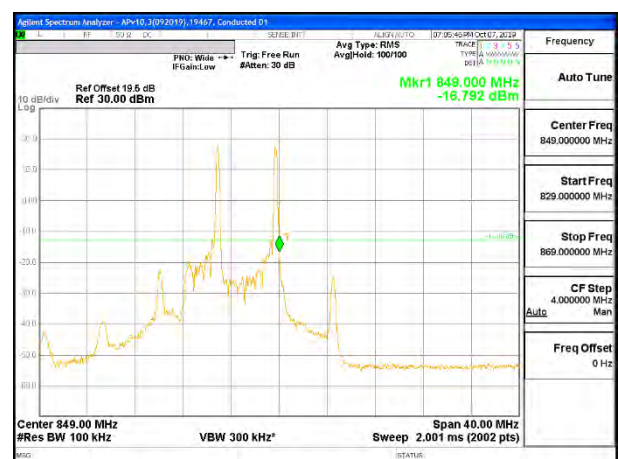
LTE B5 3MHz + 5MHz QPSK Low Ch RB25-0 + RB15-0



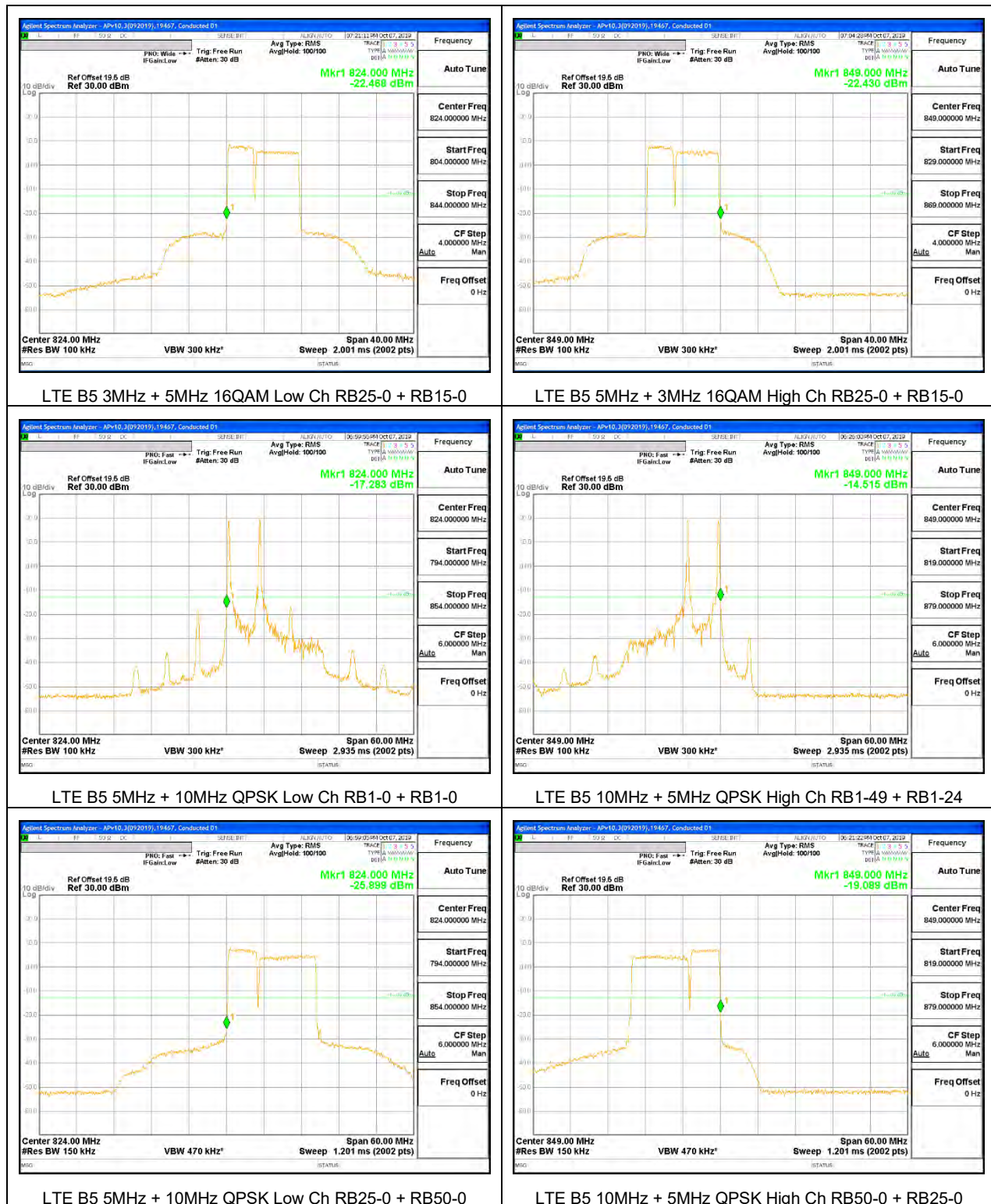
LTE B5 5MHz + 3MHz QPSK High Ch RB25-0 + RB15-0

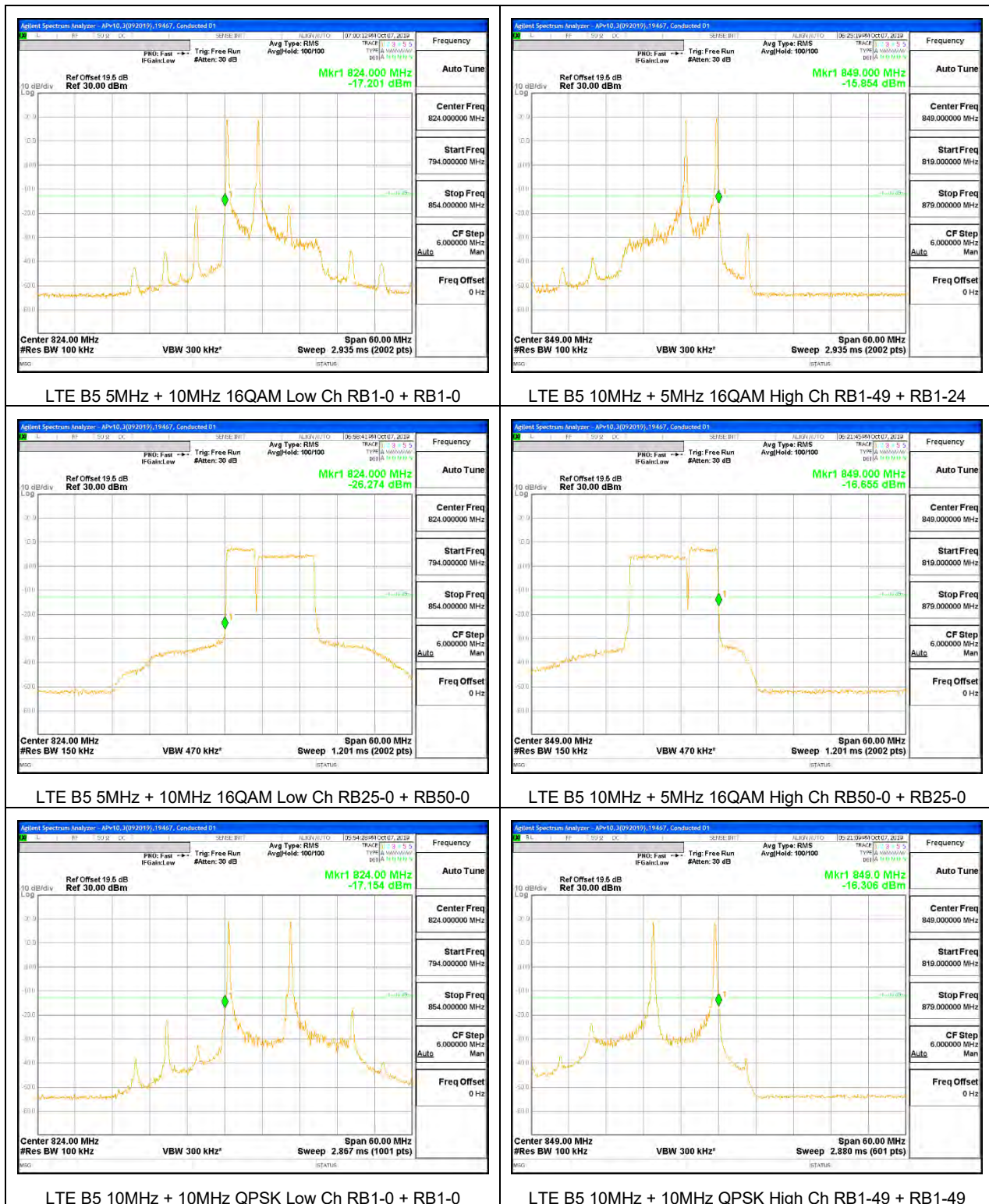


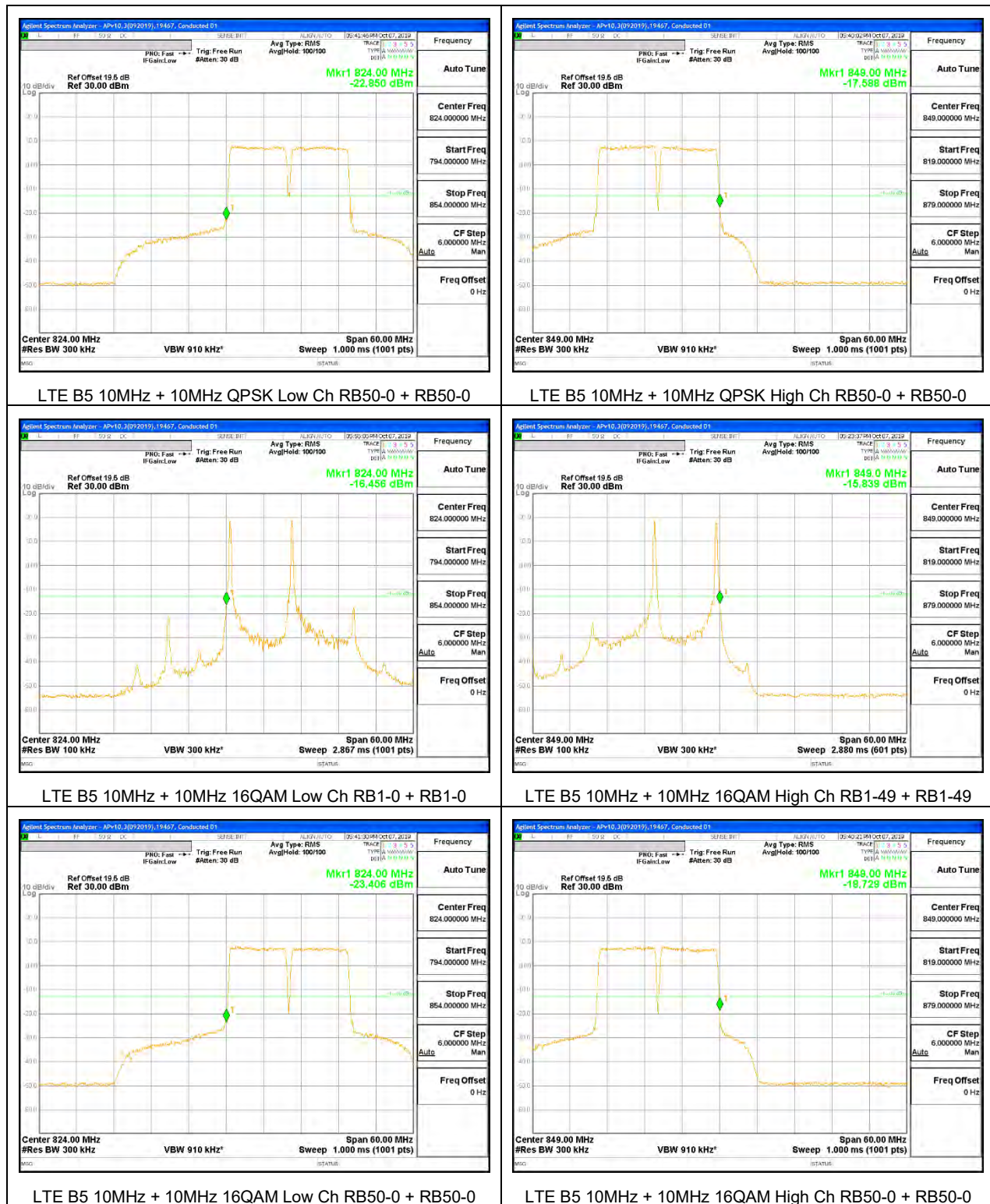
LTE B5 3MHz + 5MHz 16QAM Low Ch RB1-0 + RB1-0



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







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

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

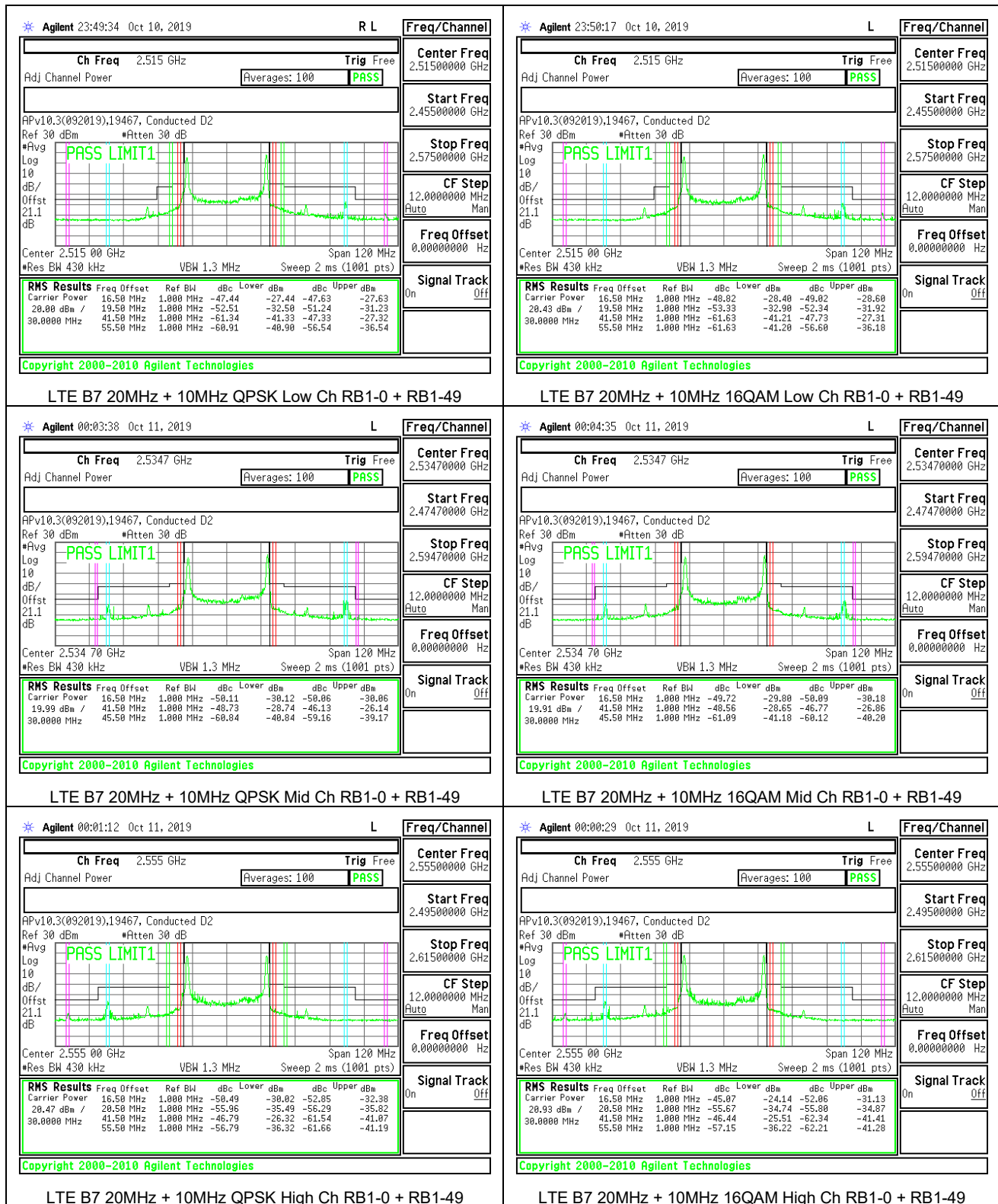
LTE B5 10MHz + 10MHz 16QAM Low Ch RB1-0 + RB1-0

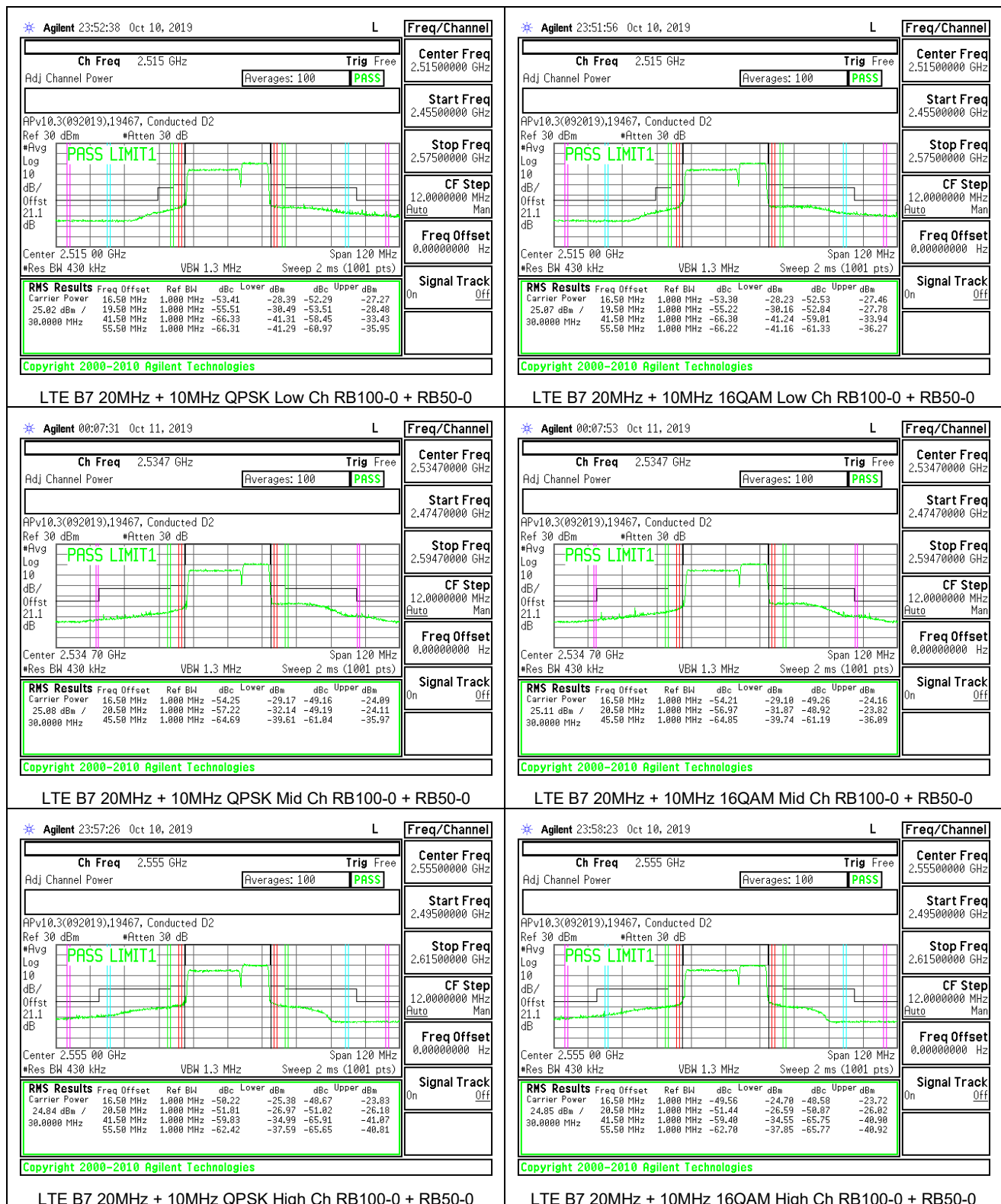
LTE B5 10MHz + 10MHz 16QAM High Ch RB1-49 + RB1-49

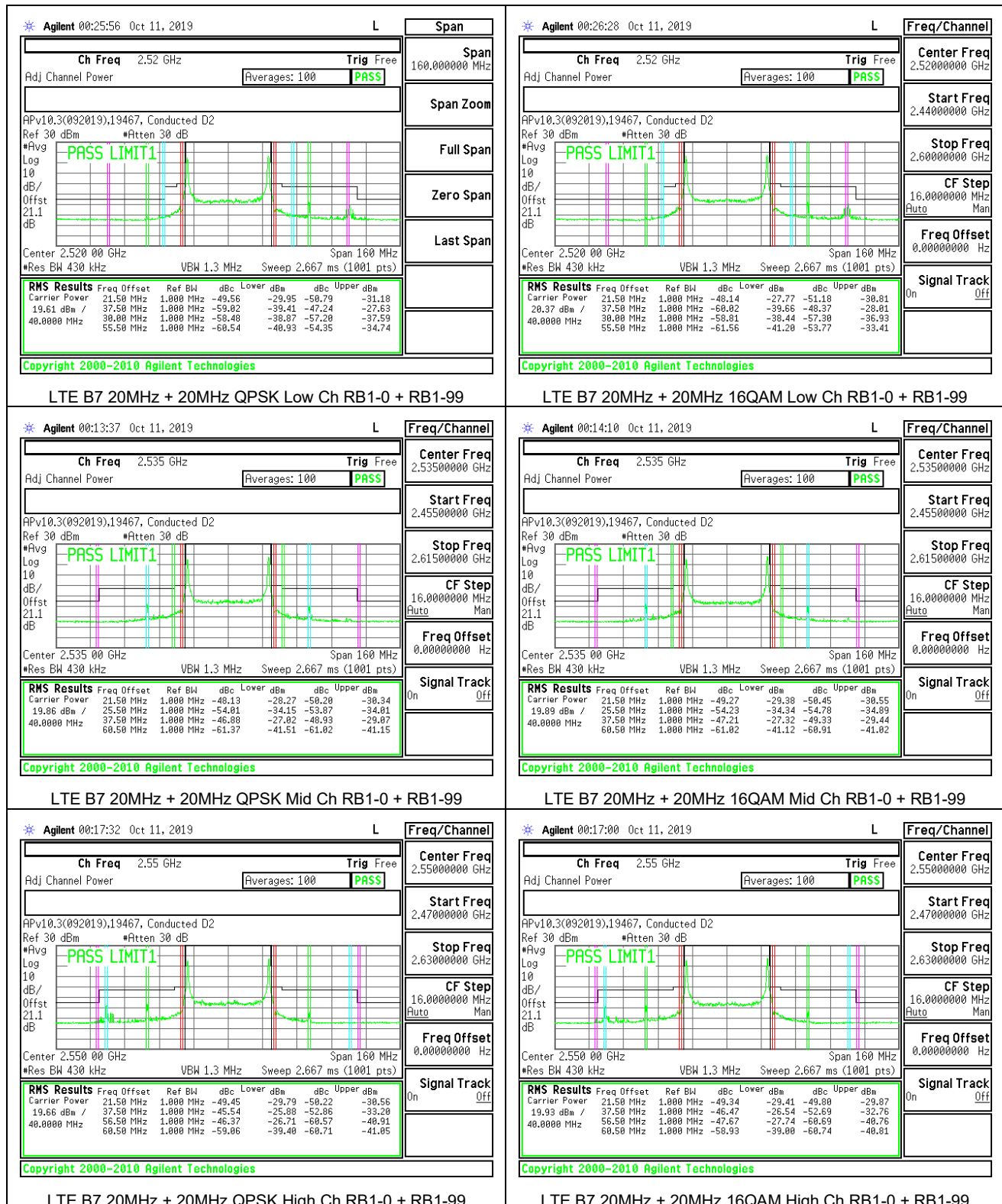
LTE B5 10MHz + 10MHz 16QAM Low Ch RB50-0 + RB50-0

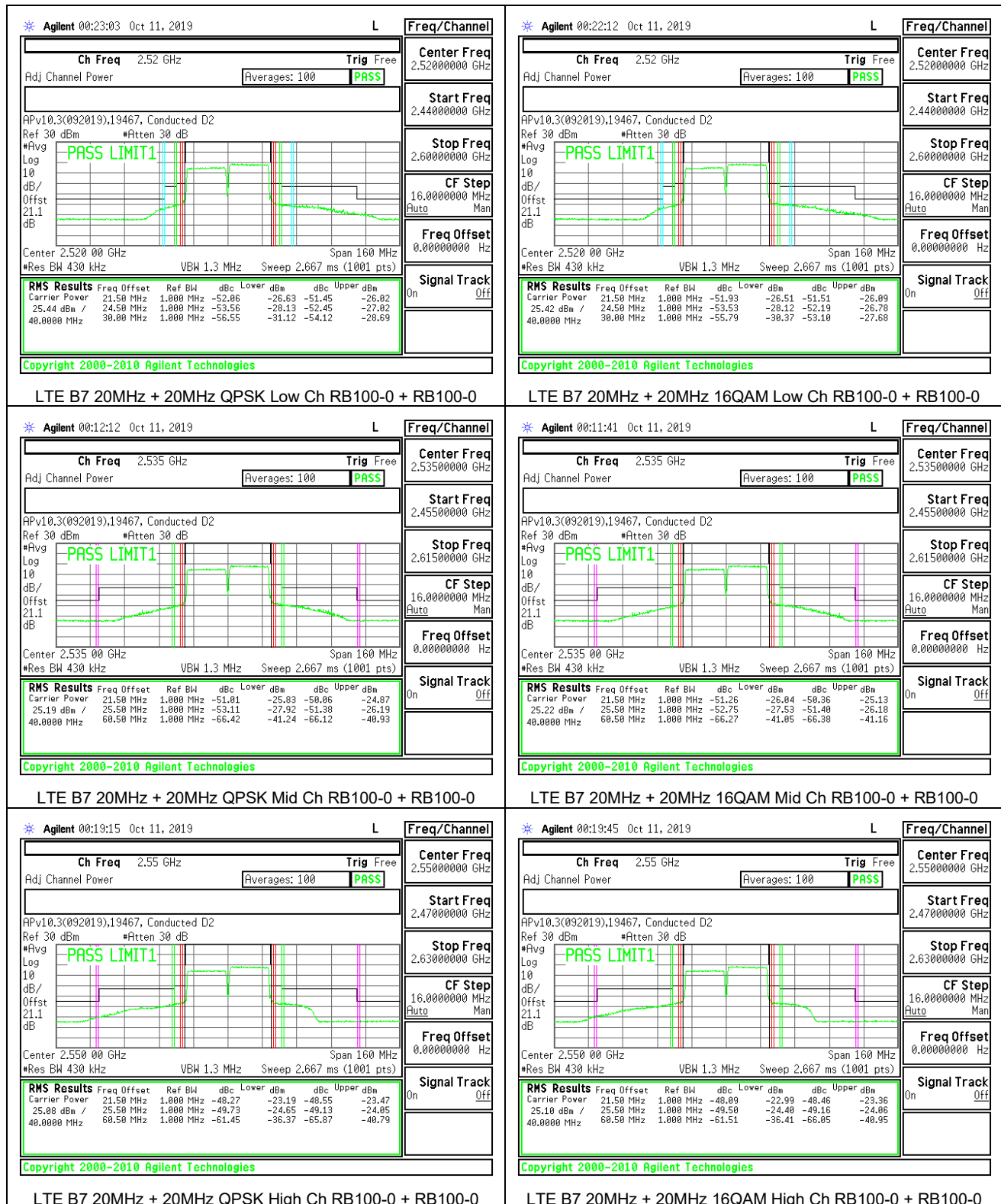
LTE B5 10MHz + 10MHz 16QAM High Ch RB50-0 + RB50-0

8.2.2. LTE BAND 7

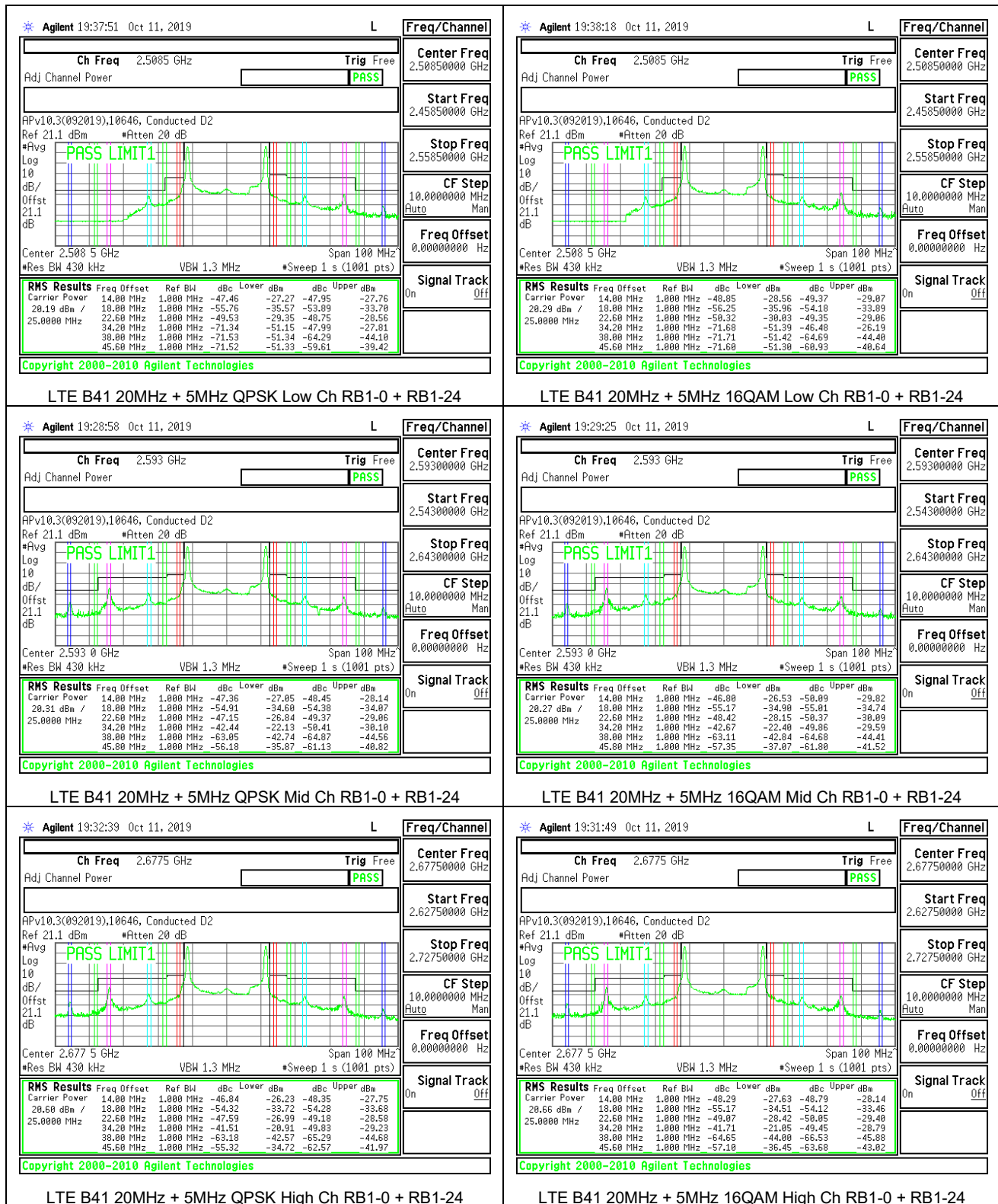


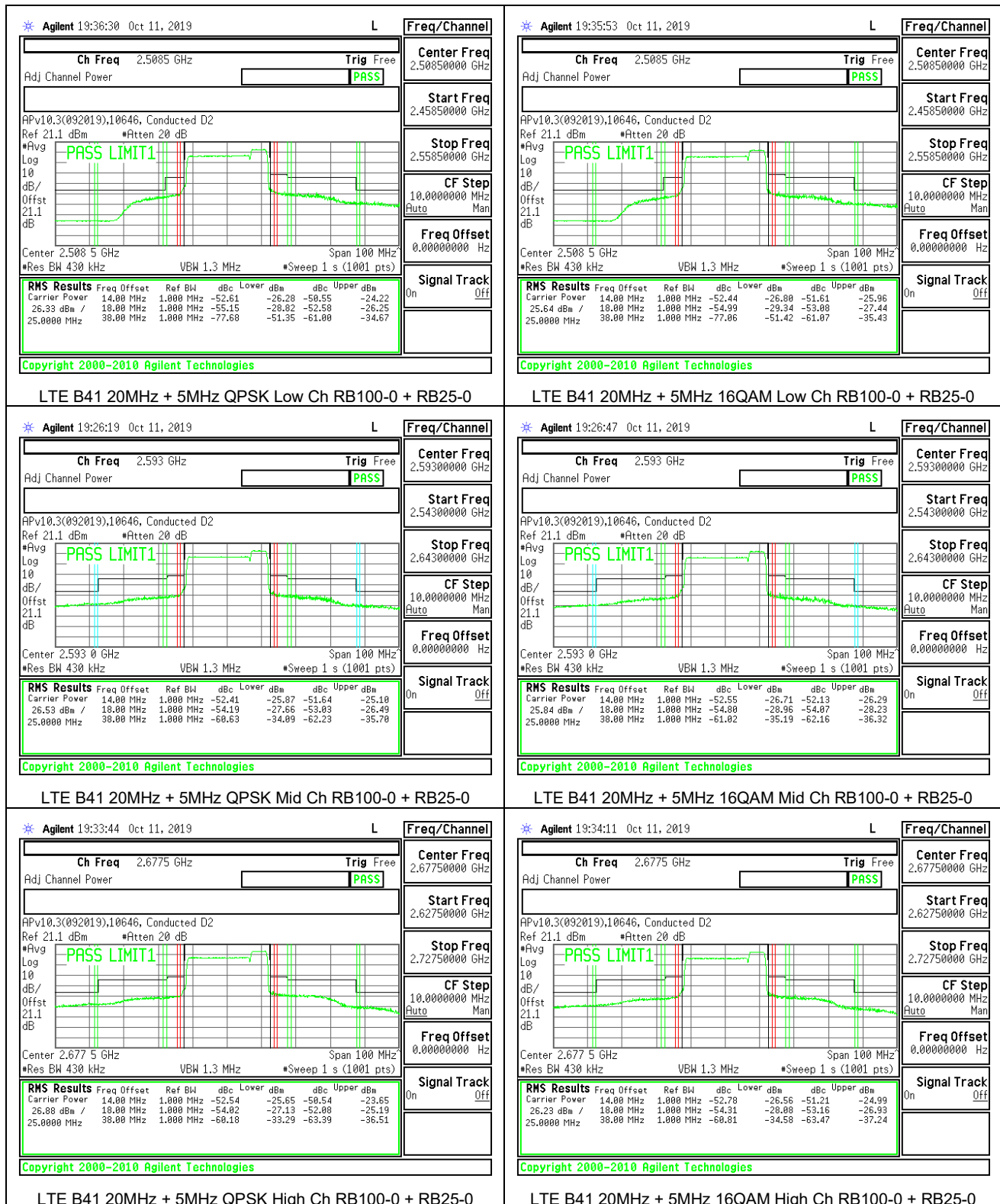


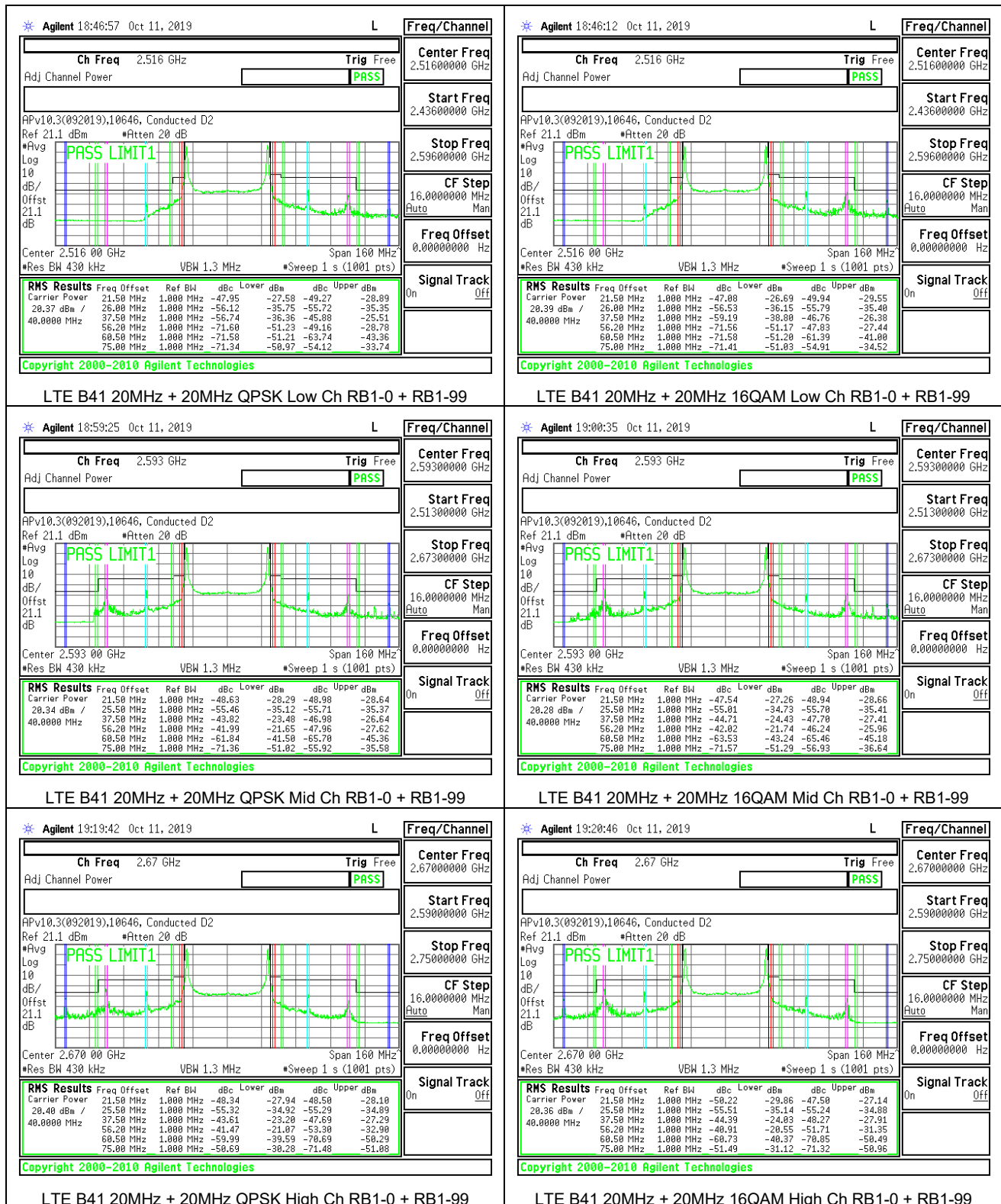


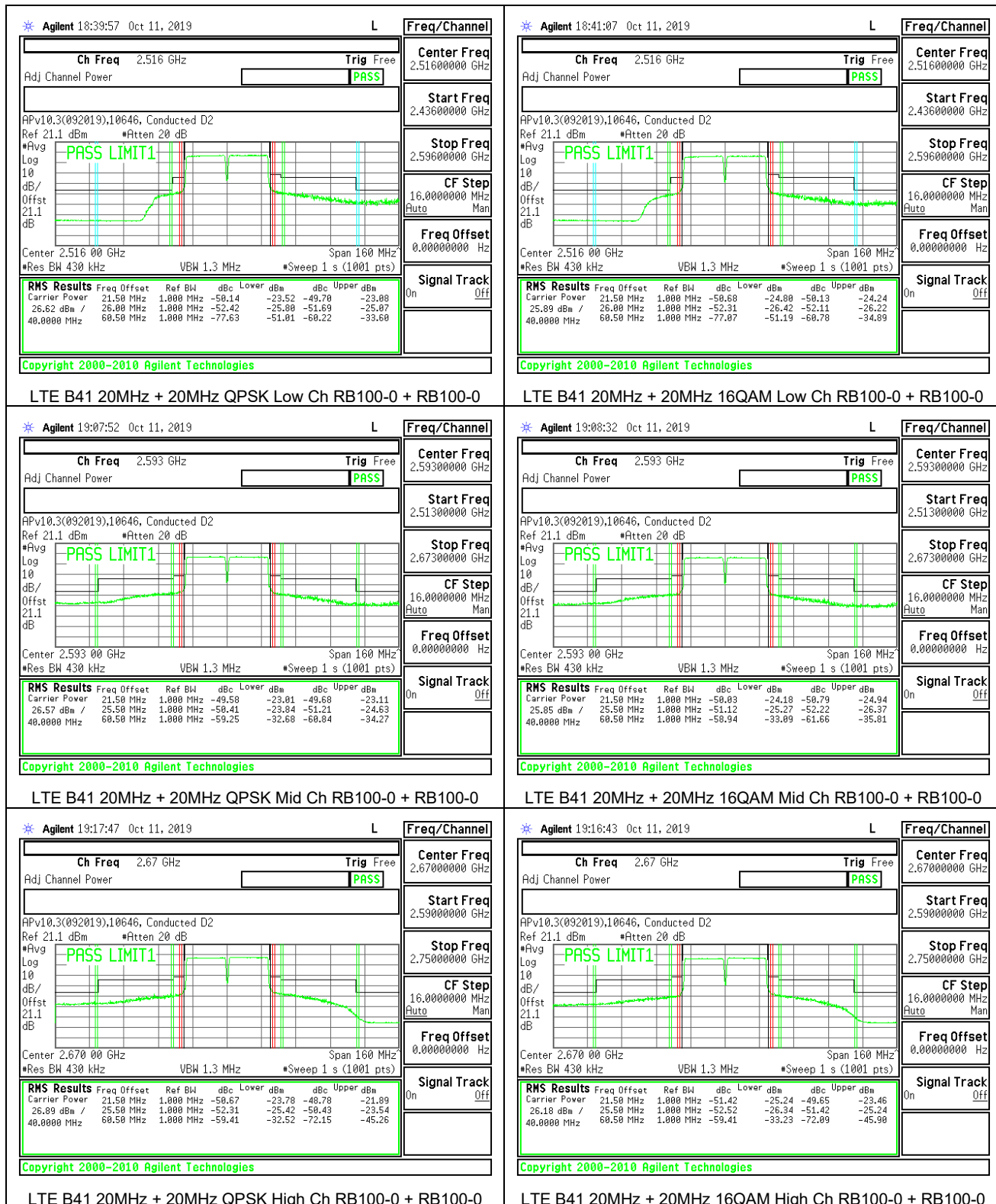


8.2.3. LTE BAND 41









8.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, §22.917, §27.53

LIMITS

FCC: §27.53 (m)

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

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.

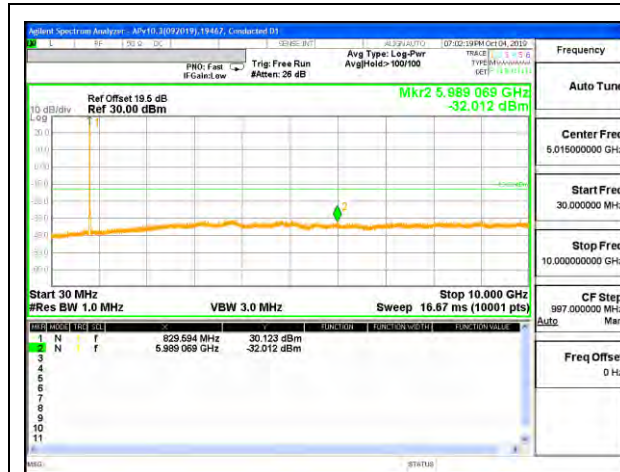
For each out of band emissions measurement:

- Set display line at -25 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.
(NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

MODES TESTED

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

8.3.1. LTE BAND 5



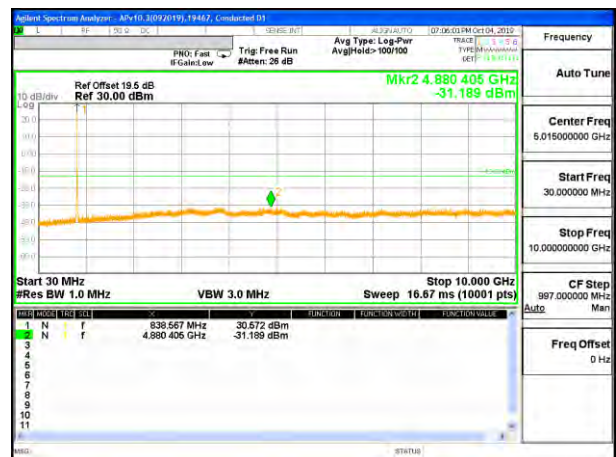
LTE B5 5MHz + 3MHz QPSK Low Ch RB1-24 + RB1-0



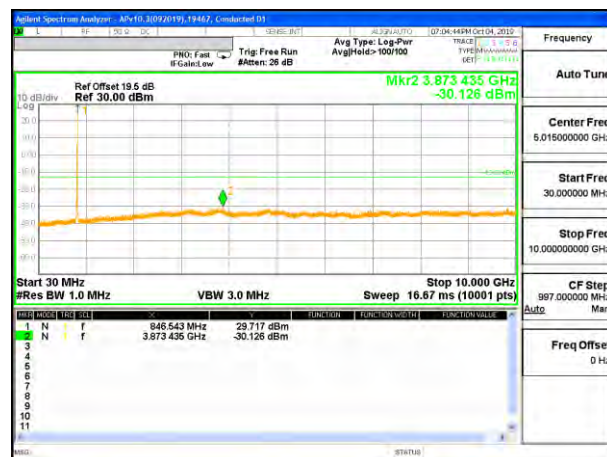
LTE B5 5MHz + 3MHz 16QAM Low Ch RB1-24 + RB1-0



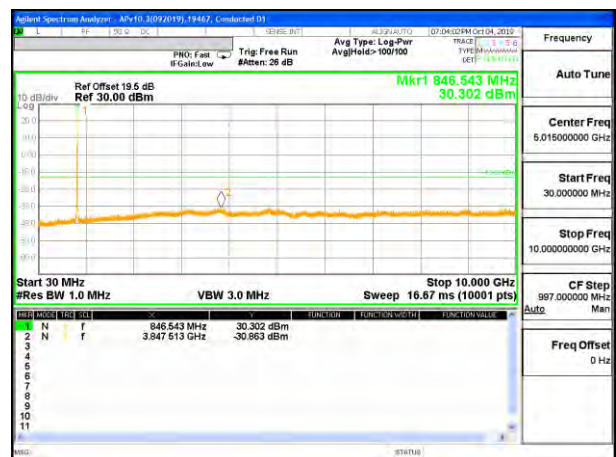
LTE B5 5MHz + 3MHz QPSK Middle Ch RB1-24 + RB1-0



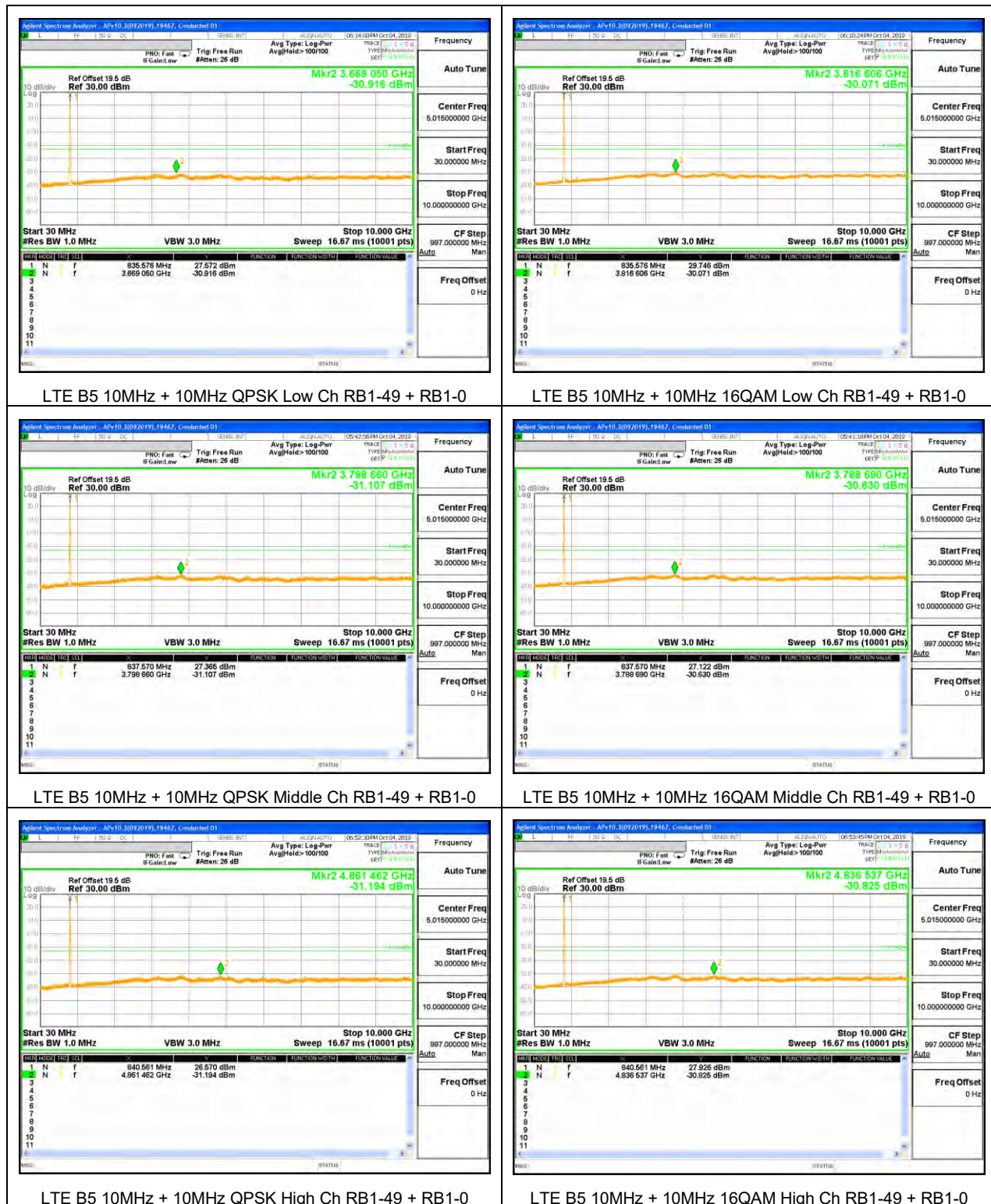
LTE B5 5MHz + 3MHz 16QAM Middle Ch RB1-24 + RB1-0



LTE B5 5MHz + 3MHz QPSK High Ch RB1-24 + RB1-0



LTE B5 5MHz + 3MHz 16QAM High Ch RB1-24 + RB1-0



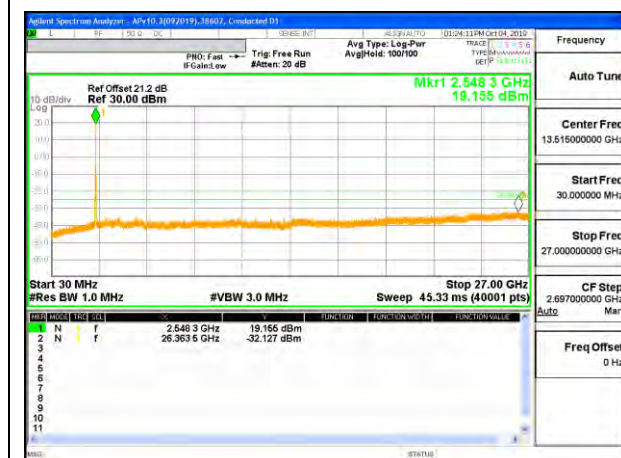
8.3.2. LTE BAND 7



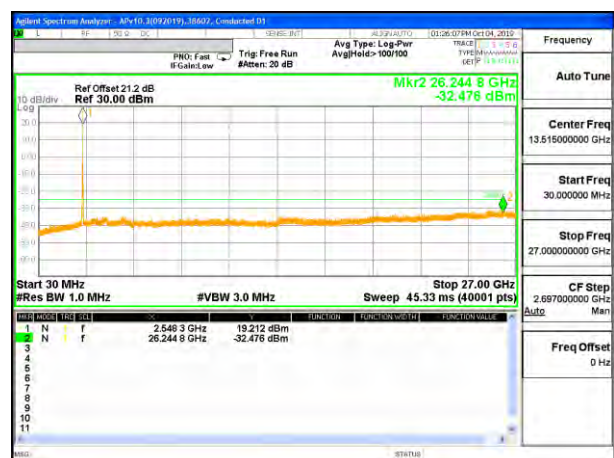
LTE B7 20MHz + 10MHz QPSK Low Ch RB1-99 + RB1-0



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



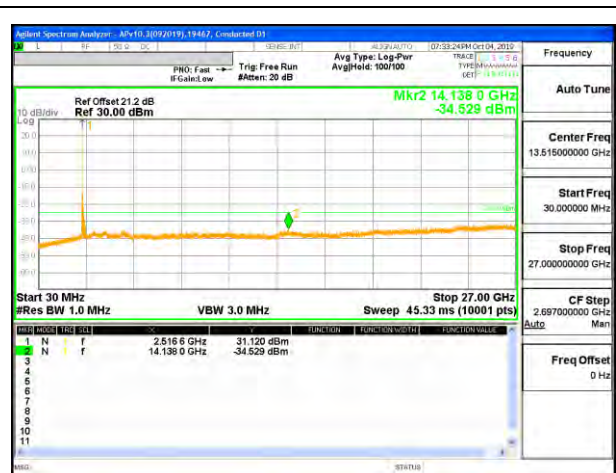
LTE B7 20MHz + 10MHz 16QAM High Ch RB1-99 + RB1-0



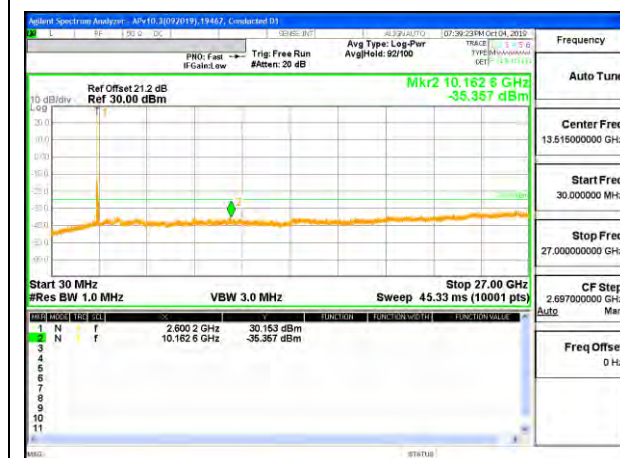
8.3.3. LTE BAND 41



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



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



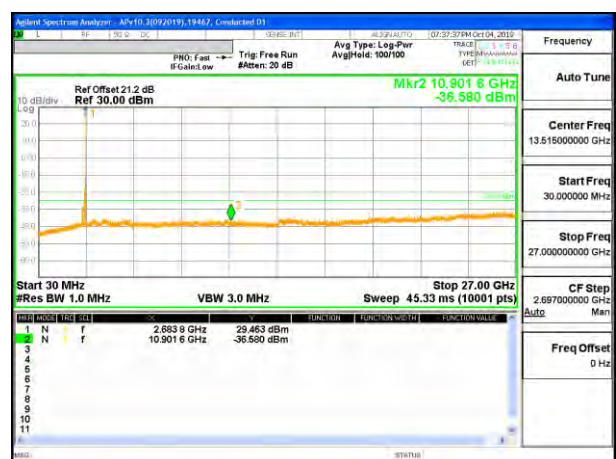
LTE B41 20MHz + 5MHz QPSK Middle Ch RB1-99 + RB1-0



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



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

Frequency Stability vs Voltage:

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

MODES TESTED

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

RESULTS

See the following pages.

8.4.1. LTE BAND 5

ID:	38602	Date:	10/23/19
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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	824.5817	848.6748		
Extreme (50C)		824.5817	848.6749	29.2	0.035
Extreme (40C)		824.5817	848.6749	27.7	0.033
Extreme (30C)		824.5817	848.6749	23.8	0.028
Extreme (10C)		824.5817	848.6749	17.2	0.021
Extreme (0C)		824.5817	848.6749	15.3	0.018
Extreme (-10C)		824.5817	848.6748	9.5	0.011
Extreme (-20C)		824.5817	848.6748	6.4	0.008
Extreme (-30C)		824.5817	848.6748	3.7	0.004
20C	15%	824.5817	848.6749	22.7	0.027
	-15%	824.5817	848.6749	16.8	0.020
	End Point	824.5817	848.6748	2.4	0.003

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	824.5887	848.4394		
Extreme (50C)		824.5887	848.4394	16.3	0.019
Extreme (40C)		824.5887	848.4394	12.5	0.015
Extreme (30C)		824.5887	848.4394	15.0	0.018
Extreme (10C)		824.5887	848.4394	-11.3	-0.014
Extreme (0C)		824.5887	848.4394	-7.1	-0.008
Extreme (-10C)		824.5887	848.4394	-9.8	-0.012
Extreme (-20C)		824.5887	848.4394	-10.3	-0.012
Extreme (-30C)		824.5887	848.4394	-9.4	-0.011
20C	15%	824.5887	848.4394	-5.5	-0.007
	-15%	824.5888	848.4394	27.4	0.033
	End Point	824.5887	848.4394	-6.8	-0.008

8.4.2. LTE BAND 7

ID:	38602	Date:	10/24/19
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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	2501.1004	2568.9259		
Extreme (50C)		2501.1004	2568.9259	38.1	0.015
Extreme (40C)		2501.1004	2568.9259	33.4	0.013
Extreme (30C)		2501.1004	2568.9259	30.5	0.012
Extreme (10C)		2501.1004	2568.9259	36.1	0.014
Extreme (0C)		2501.1004	2568.9259	32.3	0.013
Extreme (-10C)		2501.1004	2568.9259	21.8	0.009
Extreme (-20C)		2501.1004	2568.9259	12.4	0.005
Extreme (-30C)		2501.1004	2568.9259	-1.6	-0.001
20C	15%	2501.1004	2568.9259	26.3	0.010
	-15%	2501.1004	2568.9259	34.2	0.013
	End Point	2501.1004	2568.9258	-8.7	-0.003

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	2501.1429	2568.8668		
Extreme (50C)		2501.1430	2568.8669	59.8	0.024
Extreme (40C)		2501.1430	2568.8669	71.5	0.028
Extreme (30C)		2501.1430	2568.8669	70.6	0.028
Extreme (10C)		2501.1430	2568.8669	64.5	0.025
Extreme (0C)		2501.1430	2568.8669	50.8	0.020
Extreme (-10C)		2501.1430	2568.8668	33.5	0.013
Extreme (-20C)		2501.1429	2568.8668	1.7	0.001
Extreme (-30C)		2501.1429	2568.8668	-10.5	-0.004
20C	15%	2501.1430	2568.8669	66.1	0.026
	-15%	2501.1430	2568.8669	59.5	0.023
	End Point	2501.1429	2568.8668	-14.7	-0.006

8.4.3. LTE BAND 41

ID:	30606	Date:	10/23/19
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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	2496.7924	2689.0977		
Extreme (50C)		2496.7924	2689.0977	-23.8	-0.009
Extreme (40C)		2496.7924	2689.0977	-7.4	-0.003
Extreme (30C)		2496.7924	2689.0977	-4.6	-0.002
Extreme (10C)		2496.7924	2689.0977	-19.5	-0.008
Extreme (0C)		2496.7924	2689.0977	-2.2	-0.001
Extreme (-10C)		2496.7924	2689.0977	9.8	0.004
Extreme (-20C)		2496.7924	2689.0977	39.7	0.015
Extreme (-30C)		2496.7925	2689.0977	60.6	0.023
20C	15%	2496.7924	2689.0977	51.5	0.020
	-15%	2496.7924	2689.0977	34.2	0.013
	End Point	2496.7924	2689.0977	-11.6	-0.004

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	2497.2270	2689.7744		
Extreme (50C)		2497.2270	2689.7744	18.1	0.007
Extreme (40C)		2497.2270	2689.7744	1.9	0.001
Extreme (30C)		2497.2270	2689.7744	-14.5	-0.006
Extreme (10C)		2497.2270	2689.7744	-34.2	-0.013
Extreme (0C)		2497.2270	2689.7744	-41.7	-0.016
Extreme (-10C)		2497.2270	2689.7744	-46.4	-0.018
Extreme (-20C)		2497.2270	2689.7744	-44.3	-0.017
Extreme (-30C)		2497.2270	2689.7744	-42.4	-0.016
20C	15%	2497.2270	2689.7744	-24.6	-0.009
	-15%	2497.2270	2689.7744	-35.4	-0.014
	End Point	2497.2270	2689.7744	-43.2	-0.017

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 1 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.

8.5.1. LTE BAND 5

ID:	10646	Date:	10/11/19
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Band	Bandwidth (MHz)	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
Band 5	3MHz / 5MHz	834.1	838.0	QPSK	36.19	25.83	10.36
				16QAM	36.16	25.26	10.90
	5 MHz / 3MHz	835.1	839.0	QPSK	35.80	25.79	10.01
				16QAM	36.10	25.28	10.82
	5MHz / 10MHz	831.8	839.0	QPSK	35.44	25.74	9.70
				16QAM	35.62	25.22	10.40
	10MHz / 5MHz	834.3	841.5	QPSK	35.74	25.76	9.98
				16QAM	35.67	25.25	10.42
10MHz / 10MHz	831.6	841.5	QPSK	34.94	25.63	9.31	
			16QAM	36.23	25.17	11.06	
Duty Cycle Correction Factor (dB) =			0.00				

8.5.2. LTE BAND 7

ID:	10646	Date:	10/11/19
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Band	Bandwidth (MHz)	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
Band 7	10MHz / 20MHz	2525.6	2540.0	QPSK	33.04	24.84	8.20
				16QAM	33.71	24.34	9.37
	15 MHz / 15MHz	2527.5	2542.5	QPSK	32.70	24.82	7.88
				16QAM	33.39	24.32	9.07
	15MHz / 20MHz	2525.3	2542.4	QPSK	33.10	24.93	8.17
				16QAM	33.43	24.40	9.03
	20MHz / 10MHz	2530.1	2544.5	QPSK	33.13	24.83	8.30
				16QAM	33.80	24.36	9.44
	20MHz / 15MHz	2527.6	2544.7	QPSK	33.10	24.93	8.17
				16QAM	33.21	24.43	8.78
20MHz / 20MHz	2525.1	2544.9	QPSK	32.83	24.89	7.94	
			16QAM	33.18	24.41	8.77	
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

8.5.3. LTE BAND 41

ID:	10646	Date:	10/11/19
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Band	Bandwidth (MHz)	PCC f (MHz)	SCC1 f (MHz)	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
					Peak	Average	
Band 41 (FCC)	5MHz / 20MHz	2583.8	2595.5	QPSK	36.03	20.06	8.98
				16QAM	36.38	19.42	9.97
	10MHz / 20MHz	2583.6	2598.0	QPSK	35.79	20.01	8.79
				16QAM	35.96	19.35	9.62
	15MHz / 15MHz	2585.5	2600.5	QPSK	35.31	20.03	8.29
				16QAM	35.78	19.38	9.41
	15MHz / 20MHz	2583.3	2600.4	QPSK	35.26	20.08	8.19
				16QAM	35.62	19.43	9.20
	20MHz / 5MHz	2590.5	2602.2	QPSK	35.56	20.11	8.46
				16QAM	36.70	19.47	10.24
	20MHz / 10MHz	2588.1	2602.5	QPSK	35.71	20.08	8.64
				16QAM	36.23	19.42	9.82
	20MHz / 15MHz	2585.6	2602.7	QPSK	35.19	20.08	8.12
				16QAM	36.14	19.43	9.72
	20MHz / 20MHz	2583.1	2602.9	QPSK	34.83	20.07	7.77
				16QAM	35.29	19.41	8.89
Duty Cycle Correction Factor (dB) =			6.99				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

9. RADIATED TEST RESULTS

9.1. FIELD STRENGTH OF SPURIOUS RADIATION, LAT 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

9.1.1. LTE BAND 5

Company:	
Project #:	13018918
Date:	9/6/2019
Test Engineer:	12491
Configuration:	EUT
Mode:	LTE 5 QPSK 10MHz + 10MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.662	-64.71	Pk	28.6	-29.8	10.2	-55.71	-13	-42.71	H
2.27	-64.86	Pk	31.7	-28.7	9	-52.86	-13	-39.86	H
2.277	-65.39	Pk	31.8	-28.8	9.3	-53.09	-13	-40.09	V
1.638	-65.04	Pk	28.4	-29.9	10.6	-55.94	-13	-42.94	V
3.315	-65.22	Pk	32.8	-27.1	9.5	-50.02	-13	-37.02	H
3.359	-65.75	Pk	32.8	-27.2	9.9	-50.25	-13	-37.25	V
Mid Channel, 831.6MHz + 841.5MHz									
1.685	-67.99	Pk	28.7	-29.8	10.9	-58.19	-13	-45.19	H
1.683	-67.71	Pk	28.7	-29.7	9.7	-59.01	-13	-46.01	V
2.527	-68.21	Pk	32.4	-28.5	9.6	-54.71	-13	-41.71	V
2.529	-68.18	Pk	32.4	-28.5	8.9	-55.38	-13	-42.38	H
3.363	-65.39	Pk	32.8	-27.1	9.7	-49.99	-13	-36.99	V
3.367	-69.23	Pk	32.8	-27.1	9.6	-53.93	-13	-40.93	H
High Channel, 834.1MHz + 844MHz									
1.677	-69.53	Pk	28.7	-29.8	10.6	-60.03	-13	-47.03	H
3.346	-67.09	Pk	32.8	-27.2	9.1	-52.39	-13	-39.39	H
1.672	-69.09	Pk	28.7	-29.9	9	-61.29	-13	-48.29	V
3.353	-67.33	Pk	32.8	-27.2	9.7	-52.03	-13	-39.03	V
2.51	-68.06	Pk	32.4	-28.6	9.3	-54.96	-13	-41.96	V
2.515	-67.52	Pk	32.4	-28.5	9.1	-54.52	-13	-41.52	H

Pk - Peak detector

Company:	
Project #:	13018918
Date:	9/6/2019
Test Engineer:	12491
Configuration:	EUT
Mode:	LTE 5 16QAM 10MHz + 10MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.665	-64.57	Pk	28.6	-29.8	10.2	-55.57	-13	-42.57	H
3.335	-69.89	Pk	32.8	-27.3	8.6	-55.79	-13	-42.79	H
3.339	-72.58	Pk	32.8	-27.2	9	-57.98	-13	-44.98	V
1.66	-64.42	Pk	28.6	-29.8	9.1	-56.52	-13	-43.52	V
2.502	-64.82	Pk	32.4	-28.6	8.9	-52.12	-13	-39.12	H
2.509	-65.29	Pk	32.4	-28.5	9.3	-52.09	-13	-39.09	V
Mid Channel, 831.5MHz + 841.4MHz									
1.668	-69.41	Pk	28.6	-29.8	10.6	-60.01	-13	-47.01	H
3.338	-67.21	Pk	32.8	-27.2	8.8	-52.81	-13	-39.81	H
1.661	-67.73	Pk	28.6	-29.8	8.8	-60.13	-13	-47.13	V
3.335	-67.46	Pk	32.8	-27.3	8.9	-53.06	-13	-40.06	V
2.505	-67.3	Pk	32.4	-28.5	9	-54.4	-13	-41.4	H
2.507	-67.65	Pk	32.4	-28.5	9.3	-54.45	-13	-41.45	V
High Channel, 834.1MHz + 844MHz									
1.676	-68.34	Pk	28.7	-29.8	10.5	-58.94	-13	-45.94	H
3.349	-67.41	Pk	32.8	-27.2	9.2	-52.61	-13	-39.61	H
1.673	-69.8	Pk	28.7	-29.9	9	-62	-13	-49	V
3.35	-67.66	Pk	32.8	-27.2	9.5	-52.56	-13	-39.56	V
2.513	-68.11	Pk	32.4	-28.5	9.5	-54.71	-13	-41.71	V
2.516	-67.58	Pk	32.4	-28.5	9.2	-54.48	-13	-41.48	H

Pk - Peak detector

9.1.2. LTE BAND 7

Company:	
Project #:	13018918
Date:	9/13/2019
Test Engineer:	31300
Configuration:	EUT
Mode:	LTE 7 QPSK 20MHz + 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz									
4.976	-67.75	Pk	34.3	-27.7	11.1	-50.05	-25	-25.05	H
7.546	-71.06	Pk	35.8	-23.4	10.8	-47.86	-25	-22.86	H
4.987	-66.36	Pk	34.3	-27.7	10.8	-48.96	-25	-23.96	V
7.438	-70.65	Pk	35.8	-23.6	11.3	-47.15	-25	-22.15	V
10.123	-71.37	Pk	37.2	-20.8	10.3	-44.67	-25	-19.67	V
10.129	-72.05	Pk	37.2	-20.7	9.7	-45.85	-25	-20.85	H
Mid Channel, 2525.1MHz + 2544.9MHz									
5.053	-66.75	Pk	34.3	-27.8	11.1	-49.15	-25	-24.15	H
7.565	-70.39	Pk	35.8	-23.3	10.8	-47.09	-25	-22.09	H
5.102	-67.14	Pk	34.5	-27.6	11.4	-48.84	-25	-23.84	V
7.445	-70.09	Pk	35.7	-23.5	11.2	-46.69	-25	-21.69	V
10.114	-71.48	Pk	37.2	-20.8	10.6	-44.48	-25	-19.48	V
10.178	-71.68	Pk	37.2	-20.5	10.6	-44.38	-25	-19.38	H
High Channel, 2540.2MHz + 2560MHz									
2.947	-66.3	Pk	32.7	-29.8	11.7	-51.7	-25	-26.7	V
3.820	-65.96	Pk	33.7	-28.6	11.6	-49.26	-25	-24.26	H
3.870	-66.04	Pk	33.6	-28.5	11.7	-49.24	-25	-24.24	V
7.788	-69.3	Pk	35.8	-23.4	11.2	-45.7	-25	-20.7	H
10.871	-71.41	Pk	37.9	-19.5	11.1	-41.91	-25	-16.91	V
11.476	-71.07	Pk	38	-19.8	10.9	-41.97	-25	-16.97	H

Pk - Peak detector

Company:	
Project #:	13018918
Date:	9/13/2019
Test Engineer:	12491
Configuration:	EUT
Mode:	LTE 7 16QAM 20MHz + 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz									
5.056	-67.05	Pk	34.3	-27.8	11.1	-49.45	-25	-24.45	H
7.576	-71.01	Pk	35.7	-23.3	10.6	-48.01	-25	-23.01	H
5.056	-67.39	Pk	34.3	-27.9	11.2	-49.79	-25	-24.79	V
7.580	-70.95	Pk	35.7	-23.3	10.9	-47.65	-25	-22.65	V
10.119	-71.68	Pk	37.2	-20.8	10.5	-44.78	-25	-19.78	V
10.134	-70.83	Pk	37.2	-20.6	9.6	-44.63	-25	-19.63	H
Mid Channel, 2525.1MHz + 2544.9MHz									
5.101	-67.49	Pk	34.5	-27.6	11.3	-49.29	-25	-24.29	H
7.601	-70.87	Pk	35.8	-23.4	10.6	-47.87	-25	-22.87	H
5.110	-66.53	Pk	34.4	-27.7	11.2	-48.63	-25	-23.63	V
7.617	-69.9	Pk	35.7	-23.4	11.4	-46.2	-25	-21.2	V
10.088	-71.55	Pk	37.1	-20.7	10.3	-44.85	-25	-19.85	H
10.094	-71.7	Pk	37.1	-20.6	10.6	-44.6	-25	-19.6	V
High Channel, 2540.2MHz + 2560MHz									
3.759	-65.63	Pk	33.5	-28.9	11.5	-49.53	-25	-24.53	H
3.807	-65.64	Pk	33.7	-28.6	11.2	-49.34	-25	-24.34	V
5.484	-67.81	Pk	34.9	-27.1	11.3	-48.71	-25	-23.71	V
5.498	-67.92	Pk	34.9	-27.1	10.7	-49.42	-25	-24.42	H
7.014	-69.48	Pk	35.9	-24.1	10.3	-47.38	-25	-22.38	H
16.543	-71.34	Pk	41.4	-18.4	10.4	-37.94	-25	-12.94	V

Pk - Peak detector

9.1.3. LTE BAND 41

Company:	
Project #:	13018918
Date:	9/12/2019
Test Engineer:	31300
Configuration:	EUT
Mode:	LTE 41 QPSK 20MHz + 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz									
5.047	-66.4	Pk	34.4	-27.8	11.2	-48.6	-25	-23.6	H
7.616	-70.21	Pk	35.7	-23.4	10.9	-47.01	-25	-22.01	H
5.052	-66.2	Pk	34.3	-27.8	11.2	-48.5	-25	-23.5	V
7.635	-70.13	Pk	35.8	-23.4	11.2	-46.53	-25	-21.53	V
10.050	-71.74	Pk	37.1	-21	10.5	-45.14	-25	-20.14	V
10.068	-71.72	Pk	37.1	-21	10	-45.62	-25	-20.62	H
Mid Channel, 2583.1MHz + 2602.9MHz									
7.705	-70.71	Pk	35.8	-23.4	10.9	-47.41	-25	-22.41	H
7.697	-70.74	Pk	35.8	-23.4	11.4	-46.94	-25	-21.94	V
5.170	-67.84	Pk	34.6	-27.6	11.5	-49.34	-25	-24.34	V
5.170	-67.55	Pk	34.6	-27.6	11.6	-48.95	-25	-23.95	H
10.363	-72.11	Pk	37.5	-20.2	10.5	-44.31	-25	-19.31	V
10.371	-71.61	Pk	37.4	-20.3	10.3	-44.21	-25	-19.21	H
High Channel, 2660.2MHz + 2680MHz									
3.759	-72.51	Pk	33.5	-28.9	11.1	-56.81	-25	-31.81	V
3.895	-65.71	Pk	33.5	-28.6	11.3	-49.51	-25	-24.51	H
6.312	-75.68	Pk	35.8	-25.6	11.2	-54.28	-25	-29.28	V
7.156	-69.07	Pk	36.2	-24.3	10.2	-46.97	-25	-21.97	H
14.293	-78.02	Pk	39	-18.7	11.1	-46.62	-25	-21.62	V
14.798	-70.96	Pk	39.7	-18.8	10.7	-39.36	-25	-14.36	H

Pk - Peak detector

Company:	
Project #:	13018918
Date:	9/12/2019
Test Engineer:	31300
Configuration:	EUT
Mode:	LTE 41 16QAM 20MHz + 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz									
5.045	-67.1	Pk	34.3	-27.7	11.1	-49.4	-25	-24.4	H
7.561	-70.16	Pk	35.7	-23.3	10.9	-46.86	-25	-21.86	H
5.052	-66.66	Pk	34.3	-27.8	11.2	-48.96	-25	-23.96	V
7.558	-70.8	Pk	35.7	-23.3	11.2	-47.2	-25	-22.2	V
10.088	-72.11	Pk	37.1	-20.7	10.3	-45.41	-25	-20.41	H
10.103	-71.59	Pk	37.2	-20.7	10.7	-44.39	-25	-19.39	V
Mid Channel, 2583.1MHz + 2602.9MHz									
7.642	-70.72	Pk	35.8	-23.4	10.7	-47.62	-25	-22.62	H
10.885	-72.42	Pk	37.9	-19.5	10.4	-43.62	-25	-18.62	H
7.638	-70.34	Pk	35.8	-23.4	11.2	-46.74	-25	-21.74	V
10.892	-72.25	Pk	37.9	-19.6	10.6	-43.35	-25	-18.35	V
5.167	-67.64	Pk	34.5	-27.6	11.6	-49.14	-25	-24.14	H
5.294	-67.94	Pk	34.9	-27	11.1	-48.94	-25	-23.94	V
High Channel, 2660.2MHz + 2680MHz									
3.364	-73.97	Pk	32.8	-29.3	11.7	-58.77	-25	-33.77	V
3.857	-73.22	Pk	33.7	-28.6	12	-56.12	-25	-31.12	H
6.512	-76.08	Pk	35.8	-25.1	11.4	-53.98	-25	-28.98	V
9.121	-77.8	Pk	36.3	-22	11.1	-52.4	-25	-27.4	H
12.503	-79.16	Pk	39.1	-19.5	10.8	-48.76	-25	-23.76	V
14.320	-77.49	Pk	39	-19	11.1	-46.39	-25	-21.39	H

Pk - Peak detector

9.2. FIELD STRENGTH OF SPURIOUS RADIATION, UAT 1

9.2.1. LTE BAND 5

Company:	
Project #:	13018918
Date:	9/6/2019
Test Engineer:	12491
Configuration:	EUT
Mode:	LTE 5 QPSK 10MHz + 10MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.671	-67.59	Pk	28.7	-29.9	10.7	-58.09	-13	-45.09	H
1.672	-67.41	Pk	28.7	-29.9	9	-59.61	-13	-46.61	V
2.504	-67.74	Pk	32.4	-28.5	9.4	-54.44	-13	-41.44	V
2.510	-67.91	Pk	32.4	-28.6	9.1	-55.01	-13	-42.01	H
3.313	-68.76	Pk	32.8	-27.1	9.8	-53.26	-13	-40.26	V
3.329	-69.16	Pk	32.8	-27.3	8.9	-54.76	-13	-41.76	H
Mid Channel, 831.6MHz + 841.5MHz									
1.874	-65.86	Pk	31	-31.3	12	-54.16	-13	-41.16	H
2.010	-67.06	Pk	31.6	-31.2	12.6	-54.06	-13	-41.06	V
3.501	-67.79	Pk	34.1	-29.3	11.6	-51.39	-13	-38.39	H
3.776	-65.84	Pk	33.6	-28.9	11.4	-49.74	-13	-36.74	V
7.053	-69.68	Pk	36	-24.1	10.7	-47.08	-13	-34.08	V
8.015	-70.27	Pk	35.9	-23.1	11.1	-46.37	-13	-33.37	H
High Channel, 834.1MHz + 844MHz									
2.178	-68.58	Pk	31.6	-30.8	11.8	-55.98	-13	-42.98	H
2.634	-70.04	Pk	32.6	-30.2	13	-54.64	-13	-41.64	V
2.760	-68.64	Pk	32.4	-30.2	12.6	-53.84	-13	-40.84	H
4.772	-69.07	Pk	34.3	-27.7	10.7	-51.77	-13	-38.77	V
5.905	-70.68	Pk	35.3	-26.1	10.8	-50.68	-13	-37.68	H
9.571	-72.79	Pk	36.6	-21.6	11.1	-46.69	-13	-33.69	V

Pk - Peak detector

Company:	
Project #:	13018918
Date:	9/6/2019
Test Engineer:	12491
Configuration:	EUT
Mode:	LTE 5 16QAM 10MHz + 10MHz
Chamber #:	Chamber B

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.672	-67.41	Pk	28.7	-29.9	10.7	-57.91	-13	-44.91	H
2.499	-68.66	Pk	32.4	-28.5	8.8	-55.96	-13	-42.96	H
1.669	-68.03	Pk	28.6	-29.8	8.9	-60.33	-13	-47.33	V
3.334	-73.31	Pk	32.8	-27.3	8.9	-58.91	-13	-45.91	V
2.500	-68.25	Pk	32.4	-28.5	9.4	-54.95	-13	-41.95	V
3.329	-73.45	Pk	32.8	-27.3	8.9	-59.05	-13	-46.05	H
Mid Channel, 831.6MHz + 841.5MHz									
1.847	-66.28	Pk	30.7	-31.4	13.1	-53.88	-13	-40.88	H
1.975	-65.73	Pk	31.5	-31.2	11.9	-53.53	-13	-40.53	V
3.862	-65.48	Pk	33.6	-28.6	11.2	-49.28	-13	-36.28	V
3.879	-65.9	Pk	33.6	-28.5	11.6	-49.2	-13	-36.2	H
6.498	-69.73	Pk	35.8	-25.1	10.8	-48.23	-13	-35.23	H
6.858	-70.38	Pk	35.8	-24.1	10.8	-47.88	-13	-34.88	V
High Channel, 834.1MHz + 844MHz									
2.070	-65.97	Pk	31.7	-31.1	13	-52.37	-13	-39.37	H
2.120	-66.17	Pk	31.7	-30.9	12.5	-52.87	-13	-39.87	V
3.758	-66.35	Pk	33.5	-28.9	11.1	-50.65	-13	-37.65	V
3.928	-65.93	Pk	33.6	-28.7	11.5	-49.53	-13	-36.53	H
5.181	-67.52	Pk	34.6	-27.6	11.2	-49.32	-13	-36.32	V
6.376	-68.91	Pk	35.8	-25.2	11.1	-47.21	-13	-34.21	H

Pk - Peak detector

9.2.2. LTE BAND 7

Company:	
Project #:	13018918
Date:	9/13/2019
Test Engineer:	12491
Configuration:	EUT
Mode:	LTE 7 QPSK 20MHz + 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz									
5.000	-67.42	Pk	34.3	-27.8	10.7	-50.22	-25	-25.22	H
7.579	-70.92	Pk	35.7	-23.3	10.6	-47.92	-25	-22.92	H
4.998	-67.11	Pk	34.3	-27.8	10.8	-49.81	-25	-24.81	V
7.587	-70.21	Pk	35.8	-23.4	10.7	-47.11	-25	-22.11	V
10.071	-71.99	Pk	37.1	-20.9	10.3	-45.49	-25	-20.49	V
10.093	-72.21	Pk	37.1	-20.6	10.4	-45.31	-25	-20.31	H
Mid Channel, 2525.1MHz + 2544.9MHz									
5.060	-67.38	Pk	34.3	-27.9	11	-49.98	-25	-24.98	H
7.604	-70.3	Pk	35.8	-23.5	10.7	-47.3	-25	-22.3	H
5.044	-67.32	Pk	34.3	-27.8	11	-49.82	-25	-24.82	V
7.579	-69.63	Pk	35.7	-23.3	10.9	-46.33	-25	-21.33	V
10.150	-71.97	Pk	37.2	-20.1	10.1	-44.77	-25	-19.77	V
10.164	-71.95	Pk	37.2	-20.2	10.3	-44.65	-25	-19.65	H
High Channel, 2540.2MHz + 2560MHz									
3.859	-65.39	Pk	33.6	-28.6	11.4	-48.99	-25	-23.99	V
5.103	-65.58	Pk	34.5	-27.6	11.2	-47.48	-25	-22.48	H
6.308	-68.43	Pk	35.7	-25.5	10.8	-47.43	-25	-22.43	V
7.978	-68.78	Pk	35.8	-22.9	11.3	-44.58	-25	-19.58	H
13.615	-70.72	Pk	38.6	-19.5	11	-40.62	-25	-15.62	H
15.454	-70.82	Pk	40.4	-18.3	10.4	-38.32	-25	-13.32	V

Pk - Peak detector

Company:	
Project #:	13018918
Date:	9/13/2019
Test Engineer:	12491
Configuration:	EUT
Mode:	LTE 7 16QAM 20MHz + 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2510MHz + 2529.8MHz									
5.050	-66.96	Pk	34.3	-27.8	11.2	-49.26	-25	-24.26	H
7.546	-71	Pk	35.8	-23.4	10.8	-47.8	-25	-22.8	H
5.049	-66.8	Pk	34.4	-27.8	11.2	-49	-25	-24	V
7.559	-70.82	Pk	35.7	-23.3	11.2	-47.22	-25	-22.22	V
10.072	-72.45	Pk	37	-20.9	10.3	-46.05	-25	-21.05	V
10.094	-72.25	Pk	37.1	-20.6	10.4	-45.35	-25	-20.35	H
Mid Channel, 2525.1MHz + 2544.9MHz									
5.051	-67.04	Pk	34.3	-27.8	11.1	-49.44	-25	-24.44	H
7.618	-70.47	Pk	35.8	-23.4	10.9	-47.17	-25	-22.17	H
5.066	-67.37	Pk	34.3	-27.9	10.7	-50.27	-25	-25.27	V
7.617	-70.67	Pk	35.7	-23.4	11.4	-46.97	-25	-21.97	V
10.118	-71.56	Pk	37.2	-20.8	10.5	-44.66	-25	-19.66	V
10.176	-72.13	Pk	37.2	-20.4	10.6	-44.73	-25	-19.73	H
High Channel, 2540.2MHz + 2560MHz									
3.845	-65.35	Pk	33.7	-28.7	11.1	-49.25	-25	-24.25	H
3.870	-66.21	Pk	33.6	-28.5	11.7	-49.41	-25	-24.41	V
6.370	-67.83	Pk	35.8	-25.3	10.9	-46.43	-25	-21.43	V
9.100	-69.41	Pk	36.3	-22.1	10.9	-44.31	-25	-19.31	H
13.619	-70.47	Pk	38.6	-19.5	11.2	-40.17	-25	-15.17	H
14.805	-70.62	Pk	39.7	-19.2	10.5	-39.62	-25	-14.62	V

Pk - Peak detector

9.2.3. LTE BAND 41

Company:	
Project #:	13018918
Date:	9/12/2019
Test Engineer:	12491
Configuration:	EUT
Mode:	LTE 41 QPSK 20MHz + 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz									
5.055	-67.06	Pk	34.3	-27.8	11.1	-49.46	-25	-24.46	H
7.563	-70.42	Pk	35.7	-23.3	10.9	-47.12	-25	-22.12	H
5.054	-67.34	Pk	34.3	-27.8	11.2	-49.64	-25	-24.64	V
7.576	-71.03	Pk	35.7	-23.3	10.9	-47.73	-25	-22.73	V
10.076	-72.15	Pk	37.1	-20.9	10.4	-45.55	-25	-20.55	V
10.084	-71.66	Pk	37.1	-20.7	10.2	-45.06	-25	-20.06	H
Mid Channel, 2583.1MHz + 2602.9MHz									
5.164	-67.68	Pk	34.5	-27.6	11.6	-49.18	-25	-24.18	V
5.170	-66.88	Pk	34.6	-27.6	11.6	-48.28	-25	-23.28	H
7.751	-69.95	Pk	35.9	-23.3	11.1	-46.25	-25	-21.25	H
7.753	-70.76	Pk	35.9	-23.3	11.2	-46.96	-25	-21.96	V
10.359	-71.77	Pk	37.5	-20.1	10.5	-43.87	-25	-18.87	V
10.380	-72.42	Pk	37.5	-20.3	10	-45.22	-25	-20.22	H
High Channel, 2660.2MHz + 2680MHz									
3.755	-72.49	Pk	33.5	-28.9	11.5	-56.39	-25	-31.39	H
4.557	-74.11	Pk	34.3	-28	10.9	-56.91	-25	-31.91	V
6.434	-75.54	Pk	35.8	-25.2	10.9	-54.04	-25	-29.04	V
7.724	-76.82	Pk	35.9	-23.5	11	-53.42	-25	-28.42	H
10.823	-78.15	Pk	37.9	-19.1	10	-49.35	-25	-24.35	H
14.788	-77.82	Pk	39.7	-18.6	10.9	-45.82	-25	-20.82	V

Pk - Peak detector

Company:	
Project #:	13018918
Date:	9/12/2019
Test Engineer:	12491
Configuration:	EUT
Mode:	LTE 41 16QAM 20MHz + 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBm)	Det	AF T346 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2506MHz + 2525.8MHz									
5.057	-66.8	Pk	34.3	-27.9	11.1	-49.3	-25	-24.3	H
7.580	-70.59	Pk	35.7	-23.3	10.6	-47.59	-25	-22.59	H
5.051	-66.59	Pk	34.3	-27.8	11.2	-48.89	-25	-23.89	V
7.560	-70.53	Pk	35.7	-23.3	11.2	-46.93	-25	-21.93	V
10.082	-70.99	Pk	37.1	-20.8	10.3	-44.39	-25	-19.39	V
10.103	-71.9	Pk	37.2	-20.7	10.5	-44.9	-25	-19.9	H
Mid Channel, 2583.1MHz + 2602.9MHz									
5.274	-69.3	Pk	34.9	-26.9	11.5	-49.8	-25	-24.8	V
5.345	-67.03	Pk	35	-27.1	11.1	-48.03	-25	-23.03	H
7.769	-70.27	Pk	35.9	-23.4	11	-46.77	-25	-21.77	H
7.770	-70.76	Pk	35.9	-23.4	11.2	-47.06	-25	-22.06	V
10.381	-72.97	Pk	37.5	-20.3	9.9	-45.87	-25	-20.87	H
10.402	-72.21	Pk	37.6	-20.1	9.9	-44.81	-25	-19.81	V
High Channel, 2660.2MHz + 2680MHz									
3.601	-72.68	Pk	33.1	-29	11.1	-57.48	-25	-32.48	V
3.873	-72.75	Pk	33.6	-28.5	12	-55.65	-25	-30.65	H
6.490	-75.86	Pk	35.8	-25.2	11.2	-54.06	-25	-29.06	V
9.686	-77.42	Pk	36.8	-20.8	10.9	-50.52	-25	-25.52	H
11.136	-77.57	Pk	37.9	-19.9	10.9	-48.67	-25	-23.67	V
14.279	-76.91	Pk	38.9	-19	11.1	-45.91	-25	-20.91	H

Pk - Peak detector

10. SETUP PHOTOS

Please see setup photo report 13018918-EP1V1

END OF REPORT