



CERTIFICATION TEST REPORT

Report Number. : 13018973-E10V2

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

Model : A2275, A2297, A2298

FCC ID : BCG-E3500A

EUT Description : SMARTPHONE

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

Date Of Issue:
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NVLAP LAB CODE 200065-0

Revision History

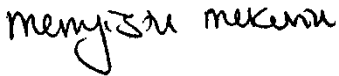
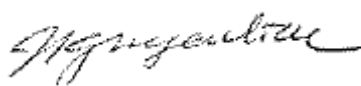
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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	A2275, A2297, A2298
FCC ID	BCG-E3500A
EUT Description	SMARTPHONE
Serial Number	FFMZV06DPM63, FFMZW0BLPM63
Date Tested	OCTOBER 01, 2019 to MARCH 24, 2020
Applicable Standards	CFR47 PART 22H and 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 Lead Test 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

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, 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. DIFFERENCE IN MODEL NUMBER

Model A2275, A2297 and A2298 is electrically identical to Model A2275. Three model numbers are allocated for marketing and logistic purposes only. A2275 was used to perform all final tests.

5.3. MAXIMUM OUTPUT POWER

ERP/EIRP LIMIT

FCC: §2.1046, §22H, §27.50

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.6

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

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								
ERP Limit (W)		7.00						
Antenna Gain (dBi)		-1.80						
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	20.55	0.114	7553.4	7M55G7W
	16QAM			24.0	20.05	0.101	7533.2	7M53D7W
	64QAM			23.4	19.45	0.088	7532.9	7M53D7W
5+3	QPSK	826.5	847.5	24.5	20.55	0.114	7534.2	7M53G7W
	16QAM			24.0	20.05	0.101	7534.9	7M53D7W
	64QAM			23.5	19.55	0.090	7556.8	7M56D7W
5+10	QPSK	826.5	844.0	24.4	20.45	0.111	13901	13M9G7W
	16QAM			23.9	19.95	0.099	13911.5	13M9D7W
	64QAM			23.5	19.55	0.090	13898.5	13M9D7W
10+5	QPSK	829.0	846.5	24.5	20.55	0.114	13917.3	13M9G7W
	16QAM			23.8	19.85	0.097	13881.2	13M9D7W
	64QAM			23.5	19.55	0.090	13877.4	13M9D7W
10+10	QPSK	829.0	844.0	24.5	20.55	0.114	18912.3	18M9G7W
	16QAM			23.8	19.85	0.097	18867.5	18M9D7W
	64QAM			23.4	19.45	0.088	18903.5	18M9D7W

OUTPUT POWER FOR LTE BAND 7

Part 27								
EIRP Limit (W)		2.00						
Antenna Gain (dBi)		-0.40						
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	24.10	0.257	28115.6	28M1G7W
	16QAM			23.9	23.50	0.224	28186.5	28M2D7W
	64QAM			23.4	23.00	0.200	28101.1	28M1D7W
20+10	QPSK	2510.0	2564.5	24.5	24.10	0.257	28143.7	28M1G7W
	16QAM			23.7	23.30	0.214	28192	28M2D7W
	64QAM			23.3	22.90	0.195	28086	28M1D7W
15+15	QPSK	2507.5	2562.5	24.4	24.00	0.251	28650.3	28M7G7W
	16QAM			23.4	23.00	0.200	28581	28M6D7W
	64QAM			22.6	22.20	0.166	28571.9	28M6D7W
15+20	QPSK	2507.8	2560.0	24.5	24.10	0.257	32874.1	32M9G7W
	16QAM			23.7	23.30	0.214	32740.1	32M7D7W
	64QAM			23.0	22.60	0.182	32768.6	32M8D7W
20+15	QPSK	2510.0	2562.2	24.5	24.10	0.257	32995.5	33M0G7W
	16QAM			23.7	23.30	0.214	32887.3	32M9D7W
	64QAM			22.6	22.20	0.166	32854.7	32M9D7W
20+20	QPSK	2510.0	2560.0	24.5	24.10	0.257	37710.7	37M7G7W
	16QAM			23.7	23.30	0.214	37715.4	37M7D7W
	64QAM			22.7	22.30	0.170	37697.9	37M7D7W

OUTPUT POWER FOR LTE BAND 41 (FCC)

Part 27								
EIRP Limit (W)		2.00						
Antenna Gain (dBi)		-0.40						
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	25.60	0.363	23148.9	23M1G7W
	16QAM			25.2	24.80	0.302	23173.2	23M2D7W
	64QAM			24.5	24.10	0.257	23289.7	23M3D7W
20+5	QPSK	2506.0	2686.7	26.0	25.60	0.363	23377.1	23M4G7W
	16QAM			25.0	24.60	0.288	23229.2	23M2D7W
	64QAM			24.2	23.80	0.240	23314.3	23M3D7W
10+20	QPSK	2501.5	2680.0	25.9	25.50	0.355	28002.7	28M0G7W
	16QAM			25.0	24.60	0.288	28003.7	28M0D7W
	64QAM			24.4	24.00	0.251	27973.8	28M0D7W
20+10	QPSK	2506.0	2684.5	26.0	25.60	0.363	28081.2	28M1G7W
	16QAM			25.2	24.80	0.302	27897.5	27M9D7W
	64QAM			23.8	23.40	0.219	27875.3	27M9D7W
15+15	QPSK	2503.5	2682.5	25.9	25.50	0.355	28223.1	28M2G7W
	16QAM			25.0	24.60	0.288	28136.2	28M1D7W
	64QAM			23.9	23.50	0.224	28246.1	28M2D7W
15+20	QPSK	2503.8	2680.0	26.0	25.60	0.363	32838.1	32M8G7W
	16QAM			25.0	24.60	0.288	32622.1	32M6D7W
	64QAM			24.0	23.60	0.229	32728.2	32M7D7W
20+15	QPSK	2506.0	2682.2	26.0	25.60	0.363	32694.2	32M7G7W
	16QAM			24.9	24.50	0.282	32733.8	32M7D7W
	64QAM			24.1	23.70	0.234	32716.9	32M7D7W
20+20	QPSK	2506.0	2680.0	26.0	25.60	0.363	37733.8	37M7G7W
	16QAM			24.9	24.50	0.282	37616.7	37M6D7W
	64QAM			24.0	23.60	0.229	37675.5	37M7D7W

5.4. SOFTWARE AND FIRMWARE

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

5.5. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	LAT 1 (dBi)	UAT 1 (dBi)
LTE Band 5, 824 – 849 MHz	-1.80	-2.30
LTE Band 7, 2500 – 2570 MHz	-0.40	2.20
LTE Band 41, 2496 – 2690 MHz (FCC)	-0.40	2.20

5.6. 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 LAT1 and UAT1. 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 simultaneous transmission of multiple channels in the 2.4GHz and 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.

5.7. 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

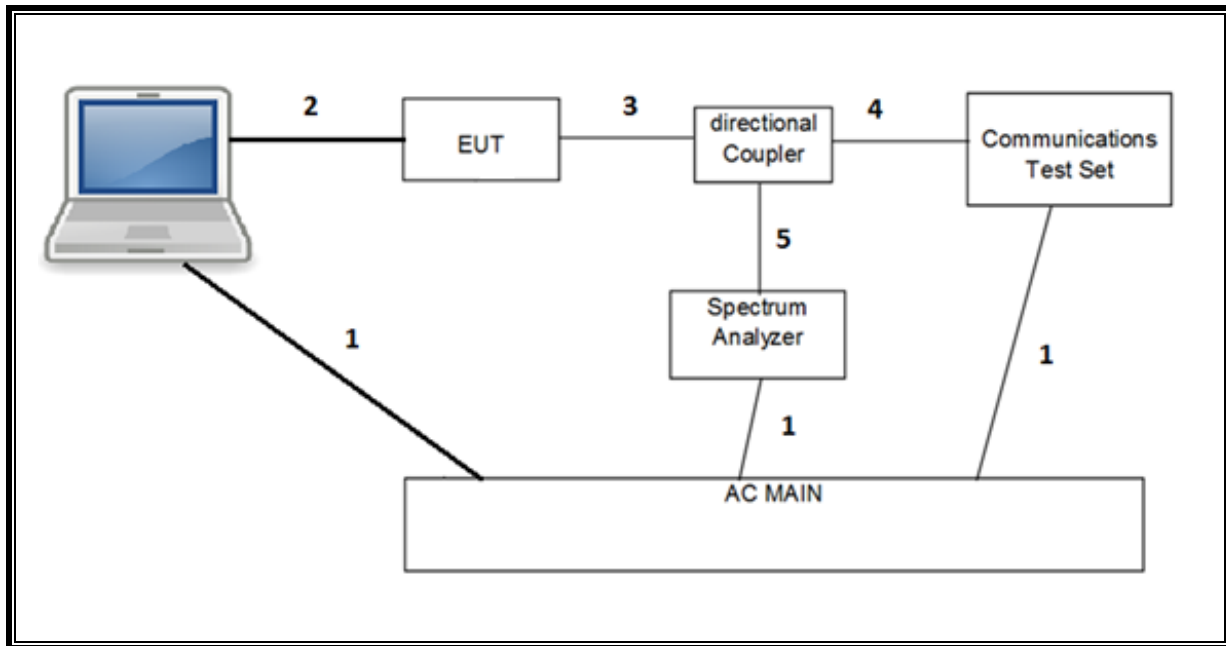
I/O CABLES (RF Conducted Test)

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	Shielded	0.6m	N/A
4	RF In/Out	1	Communication Test Set	Shielded	1.2m	N/A
5	RF In/Out	1	Barrel	N/A	N/A	N/A

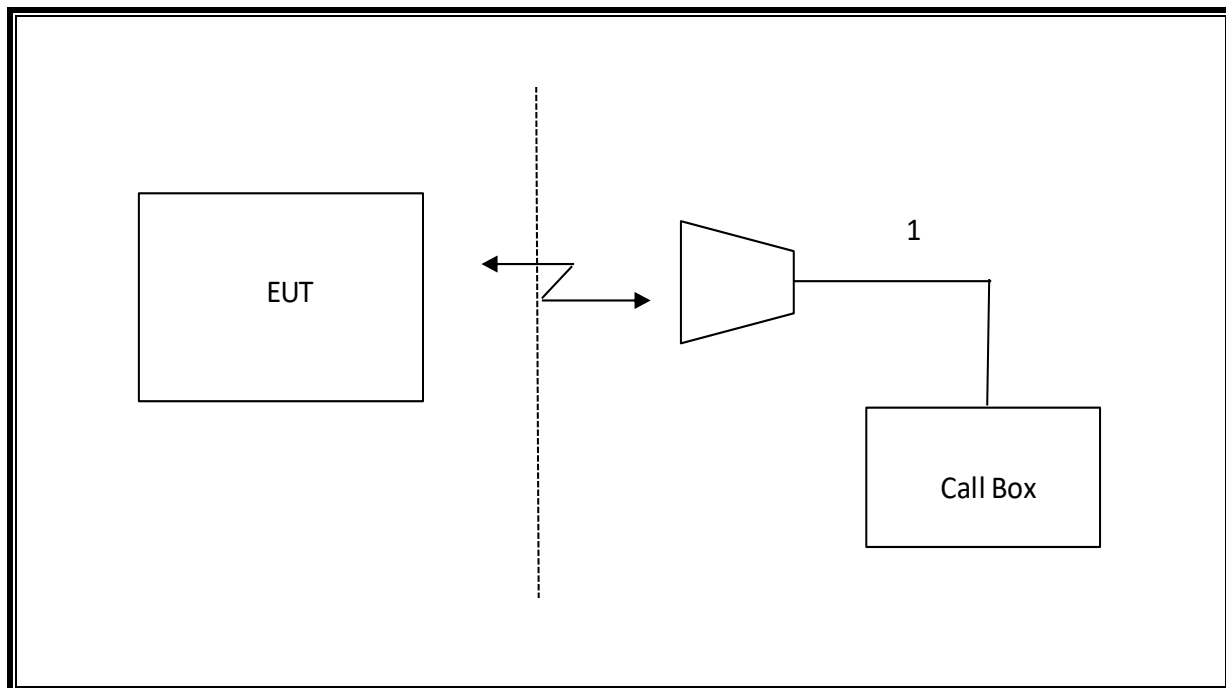
I/O CABLES (RF Radiated Test)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF In/Out	1	Antenna	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
Amplifier, 18-26GHz	Agilent	8449B	T404	03/23/2020
Amplifier, 26-40GHz	Miteq	TTA2640	T1804	03/23/2020
*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	T123	01/28/2020
*Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	E4440A	T99	01/28/2020
Directional Coupler	KRYTAR	152610	T1536	07/09/2020
Directional Coupler	KRYTAR	152610	T1537	07/08/2020
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	Micro-Tronics	WHKX1.2/15G-6ST	T1182	05/30/2020
*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	07/28/2020
*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
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T344	05/07/2020
Antenna, Horn 18-26GHz	ARA	MWH-1826/B	T447	08/13/2020
Antenna, Horn 26-40GHz	ARA	MWH-2640/B	T446	08/13/2020
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	PRE0181574	10/14/2020
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	PRE0077974	05/13/2020
Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	T1616	10/28/2020
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:	39004	Date:	10/12/19
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OUTPUT POWER FOR LTE BAND 5 (3.0MHz + 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
3MHz / 5MHz	825.5	829.4	1	14	1	0	24.3	23.8	23.3	22.5	21.6	19.6
			15	0	25	0	24.5	24.0	23.4	20.7	19.7	19.7
	834.0	837.9	1	14	1	0	24.2	23.7	23.2	22.9	21.8	19.9
			15	0	25	0	24.3	23.7	23.3	20.9	19.9	19.9
	842.6	846.5	1	14	1	0	24.0	23.5	23.1	22.6	21.6	19.7
			15	0	25	0	24.2	23.7	23.1	20.7	19.6	19.7

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

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 / 3MHz	826.5	830.4	1	24	1	0	24.5	24.0	23.5	22.8	21.7	19.8
			25	0	15	0	24.5	23.9	23.4	20.7	19.7	19.7
	835.0	838.9	1	24	1	0	24.3	23.9	23.3	23.0	22.1	20.1
			25	0	15	0	24.3	23.9	23.2	21.0	19.9	19.9
	843.6	847.5	1	24	1	0	24.1	23.8	23.2	22.7	21.6	19.8
			25	0	15	0	24.2	23.8	23.1	20.7	19.6	19.6

OUTPUT POWER FOR LTE BAND 5 (5.0MHz + 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
5MHz / 10MHz	826.5	833.7	1	24	1	0	24.4	23.9	23.50	22.37	21.41	20.41
			25	0	50	0	24.4	23.8	23.48	20.46	19.45	18.96
	831.6	838.8	1	24	1	0	24.3	23.8	23.39	22.97	21.87	18.45
			25	0	50	0	24.3	23.7	23.35	20.91	19.93	17.97
	836.8	844.0	1	24	1	0	24.1	23.6	23.20	23.00	21.97	21.46
			25	0	50	0	24.1	23.6	23.18	20.83	19.80	19.91

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	23.8	23.4	23.0	22.1	20.1
			50	0	25	0	24.5	23.7	23.5	20.7	19.8	19.8
	834.3	841.5	1	49	1	0	24.3	23.6	23.3	23.0	22.1	20.1
			50	0	25	0	24.3	23.5	23.3	20.8	20.0	19.9
	839.3	846.5	1	49	1	0	24.3	23.6	23.3	22.7	21.8	19.9
			50	0	25	0	24.2	23.6	23.2	20.7	19.7	18.8

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	23.8	23.4	22.0	21.7	20.2
			1	0	1	49	18.2	17.5	17.2	12.1	12.2	12.4
			50	0	50	0	24.5	23.8	23.4	20.5	19.5	19.9
	831.5	841.4	1	49	1	0	24.5	23.8	23.4	22.7	21.5	20.1
			1	0	1	49	18.2	17.7	17.3	12.1	12.0	11.5
			50	0	50	0	24.4	23.7	23.3	20.5	19.6	18.9
	834.1	844.0	1	49	1	0	24.4	23.7	23.3	22.7	21.6	20.2
			1	0	1	49	18.1	17.4	17.2	12.2	12.1	12.4
			50	0	50	0	24.4	23.7	23.3	20.5	19.6	19.0

7.2. LTE BAND 7

ID:	39004	Date:	10/12/19
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OUTPUT POWER FOR LTE BAND 7 (10.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10MHz / 20MHz	2505.5	2519.9	1	49	1	0	24.3	23.8	23.3	18.7	18.3	16.3
			50	0	100	0	24.5	23.9	23.4	16.6	16.0	16.0
	2525.6	2540.0	1	49	1	0	24.4	23.8	23.2	18.2	17.8	15.8
			50	0	100	0	24.4	23.8	23.1	16.1	15.5	15.5
	2545.6	2560.0	1	49	1	0	23.9	23.4	22.7	18.2	17.6	15.7
			50	0	100	0	24.0	23.4	22.9	16.1	15.5	15.0

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 10MHz	2510.0	2524.4	1	99	1	0	24.3	23.6	23.2	18.6	18.0	16.3
			100	0	50	0	24.5	23.7	23.3	16.5	15.7	16.0
	2530.1	2544.5	1	99	1	0	24.4	23.6	23.1	18.1	17.5	15.8
			100	0	50	0	24.4	23.6	23.0	16.0	15.2	14.8
	2550.1	2564.5	1	99	1	0	23.9	23.2	22.6	18.1	17.3	15.7
			100	0	50	0	24.0	23.2	22.8	16.0	15.2	14.7

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15MHz / 15MHz	2507.5	2522.5	1	74	1	0	24.4	23.4	22.6	18.7	18.2	16.2
			75	0	75	0	24.4	23.3	22.4	17.0	16.0	16.0
	2527.5	2542.5	1	74	1	0	24.2	23.3	22.4	18.6	17.7	15.8
			75	0	75	0	24.2	23.2	22.3	16.6	15.5	15.0
	2547.5	2562.5	1	74	1	0	24.4	23.1	22.1	18.3	17.7	15.7
			75	0	75	0	23.9	22.9	22.0	16.5	15.5	15.0

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	24.4	23.6	23.0	18.7	18.2	16.2
			75	0	100	0	24.5	23.7	23.0	16.7	16.1	15.7
	2525.3	2542.4	1	74	1	0	24.4	23.7	23.0	18.4	17.8	15.9
			75	0	100	0	24.4	23.6	22.9	16.3	15.7	14.7
	2542.9	2560.0	1	74	1	0	24.0	23.3	22.6	18.3	17.7	15.7
			75	0	100	0	24.1	23.3	22.6	16.3	15.6	14.8

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	23.7	22.6	18.7	18.2	16.3
			100	0	75	0	24.4	23.6	22.4	16.7	16.2	16.1
	2527.6	2544.7	1	99	1	0	24.2	23.3	22.3	18.2	17.8	15.9
			100	0	75	0	24.2	23.3	22.3	16.2	15.7	14.8
	2545.1	2562.2	1	99	1	0	24.0	23.2	22.1	18.3	17.8	15.9
			100	0	75	0	24.0	23.1	22.0	16.2	15.6	14.6

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	23.7	22.7	18.7	18.2	16.4
			1	0	1	99	18.4	17.7	17.3	9.9	10.4	10.1
			100	0	100	0	24.4	23.6	22.5	16.7	16.1	16.0
	2525.1	2544.9	1	99	1	0	24.2	23.4	22.4	18.4	17.8	15.9
			1	0	1	99	18.5	18.0	16.5	9.7	9.6	8.9
			100	0	100	0	24.2	23.4	22.3	16.3	15.7	14.8
	2540.2	2560.0	1	99	1	0	23.9	23.2	22.1	18.4	17.8	16.0
			1	0	1	99	18.5	17.6	16.2	9.2	9.1	8.6
			100	0	100	0	23.9	23.1	22.0	16.3	15.7	14.9

7.3. LTE BAND 41

ID:	39004	Date:	11/20/19
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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	25.9	25.2	24.4	19.9	18.8	16.8
			25	0	100	0	25.2	23.6	24.2	17.6	16.6	16.5
	2583.8	2595.5	1	24	1	0	26.0	25.1	24.5	19.2	18.3	16.2
			25	0	100	0	25.2	23.6	24.4	17.1	16.1	15.1
	2668.3	2680.0	1	24	1	0	25.7	25.2	24.4	19.5	18.5	16.3
			25	0	100	0	25.2	23.5	24.3	17.3	16.3	15.2

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	25.0	24.2	19.8	19.0	17.0
			1	0	1	24	18.7	18.0	18.4	11.8	11.2	10.0
			100	0	25	0	25.3	23.4	23.9	17.6	16.8	16.0
	2590.5	2602.2	1	99	1	0	25.9	24.8	24.1	18.9	18.3	16.2
			1	0	1	24	18.8	18.0	18.6	11.4	10.7	10.1
			100	0	25	0	25.3	23.4	24.1	16.8	16.2	15.1
	2675.0	2686.7	1	99	1	0	26.0	24.9	24.2	19.1	18.3	16.3
			1	0	1	24	18.7	17.9	18.6	10.5	10.2	9.7
			100	0	25	0	25.3	23.3	24.0	17.0	16.3	15.2

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	25.8	24.9	24.2	19.8	18.8	16.8
			50	0	100	0	25.3	23.4	24.3	17.5	16.6	16.6
	2583.6	2598.0	1	49	1	0	25.9	25.0	24.4	19.1	18.1	16.1
			50	0	100	0	25.2	23.4	24.4	17.0	16.2	15.1
	2665.6	2680.0	1	49	1	0	25.8	24.8	24.2	19.3	18.4	16.2
			50	0	100	0	25.1	24.3	24.2	17.2	16.4	15.3

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	25.2	23.8	20.0	18.9	17.0
			100	0	50	0	25.3	23.6	23.5	17.7	16.8	15.7
	2588.1	2602.5	1	99	1	0	25.9	25.1	23.7	19.2	18.2	16.3
			100	0	50	0	25.2	23.7	23.6	17.1	16.2	15.1
	2670.1	2684.5	1	99	1	0	25.9	25.0	23.7	19.3	18.4	16.4
			100	0	50	0	25.1	23.5	23.4	17.3	16.4	15.2

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	25.9	25.0	23.9	19.9	18.9	16.8
			75	0	75	0	25.3	23.4	23.8	17.7	16.8	16.1
	2585.5	2600.5	1	74	1	0	25.9	24.9	23.9	19.2	18.2	16.1
			75	0	75	0	25.2	23.4	23.9	17.1	16.1	15.1
	2667.5	2682.5	1	74	1	0	25.8	24.9	23.7	19.3	18.5	16.2
			75	0	75	0	25.1	23.3	23.7	17.3	16.3	15.2

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	25.9	25.0	24.0	20.0	19.1	16.8
			75	0	100	0	25.4	23.6	24.0	17.8	16.9	16.8
	2583.3	2600.4	1	74	1	0	26.0	25.0	24.0	19.2	18.0	16.2
			75	0	100	0	25.4	23.5	23.9	17.2	15.9	15.2
	2662.9	2680.0	1	74	1	0	25.7	24.8	23.7	19.4	18.3	16.3
			75	0	100	0	25.2	23.4	23.8	17.4	16.3	15.4

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	24.9	24.1	20.0	19.1	17.1
			100	0	75	0	25.4	23.5	24.0	17.8	16.9	16.1
	2585.6	2602.7	1	99	1	0	26.0	24.8	24.1	19.2	18.4	16.3
			100	0	75	0	25.3	23.5	24.0	17.1	16.3	15.2
	2665.1	2682.2	1	99	1	0	25.9	24.8	24.0	19.4	18.6	16.5
			100	0	75	0	25.2	23.3	23.8	17.3	16.5	15.4

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	LAT 1			UAT 1		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz/ 20MHz	2506.0	2525.8	1	99	1	0	26.0	24.9	24.0	19.9	19.0	17.0
			1	0	1	99	18.7	17.8	18.3	11.9	11.0	9.9
			100	0	100	0	25.3	23.4	23.9	17.7	16.9	15.8
	2583.1	2602.9	1	99	1	0	25.9	24.8	24.0	19.2	18.3	16.4
			1	0	1	99	18.7	17.9	18.4	10.5	10.7	10.7
			100	0	100	0	25.2	23.3	23.9	17.1	16.3	15.2
	2660.2	2680.0	1	99	1	0	25.7	24.8	23.7	19.3	18.5	16.5
			1	0	1	99	18.6	17.7	18.3	10.8	11.0	10.2
			100	0	100	0	25.0	23.1	23.7	17.4	16.5	16.0

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	5MHz + 3MHz BAND OPSK	25/0 + 15/0	835	7.5342	8.111
	5MHz + 3MHz BAND 16OAM			7.5349	8.088
	5MHz + 3MHz BAND 64OAM			7.5568	8.118
	3MHz + 5MHz BAND OPSK	15/0 + 25/0		7.5534	8.132
	3MHz + 5MHz BAND 16OAM			7.5332	8.114
	3MHz + 5MHz BAND 64OAM			7.5329	8.111
	5MHz + 10MHz BAND OPSK	25/0 + 50/0		13.9010	14.959
	5MHz + 10MHz BAND 16OAM			13.9115	14.907
	5MHz + 10MHz BAND 64OAM			13.8985	14.917
	10MHz + 5MHz BAND OPSK	50/0 + 25/0		13.9173	14.977
	10MHz + 5MHz BAND 16OAM			13.8812	14.927
	10MHz + 5MHz BAND 64OAM			13.8774	14.884
	10MHz + 10MHz BAND OPSK	50/0 + 50/0		18.9123	20.583
	10MHz + 10MHz BAND 16OAM			18.8675	20.579
	10MHz + 10MHz BAND 64OAM			18.9035	20.613

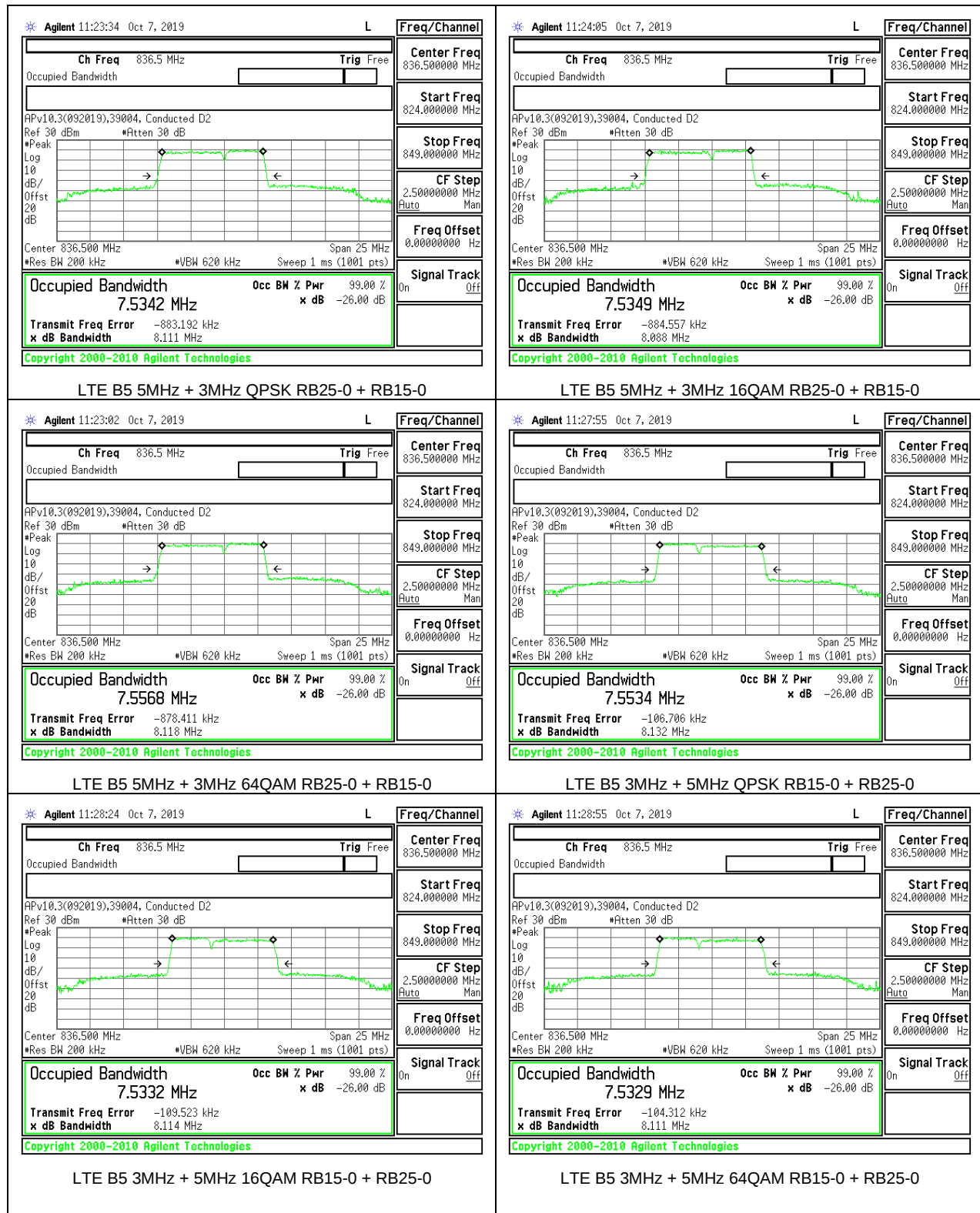
LTE BAND 7

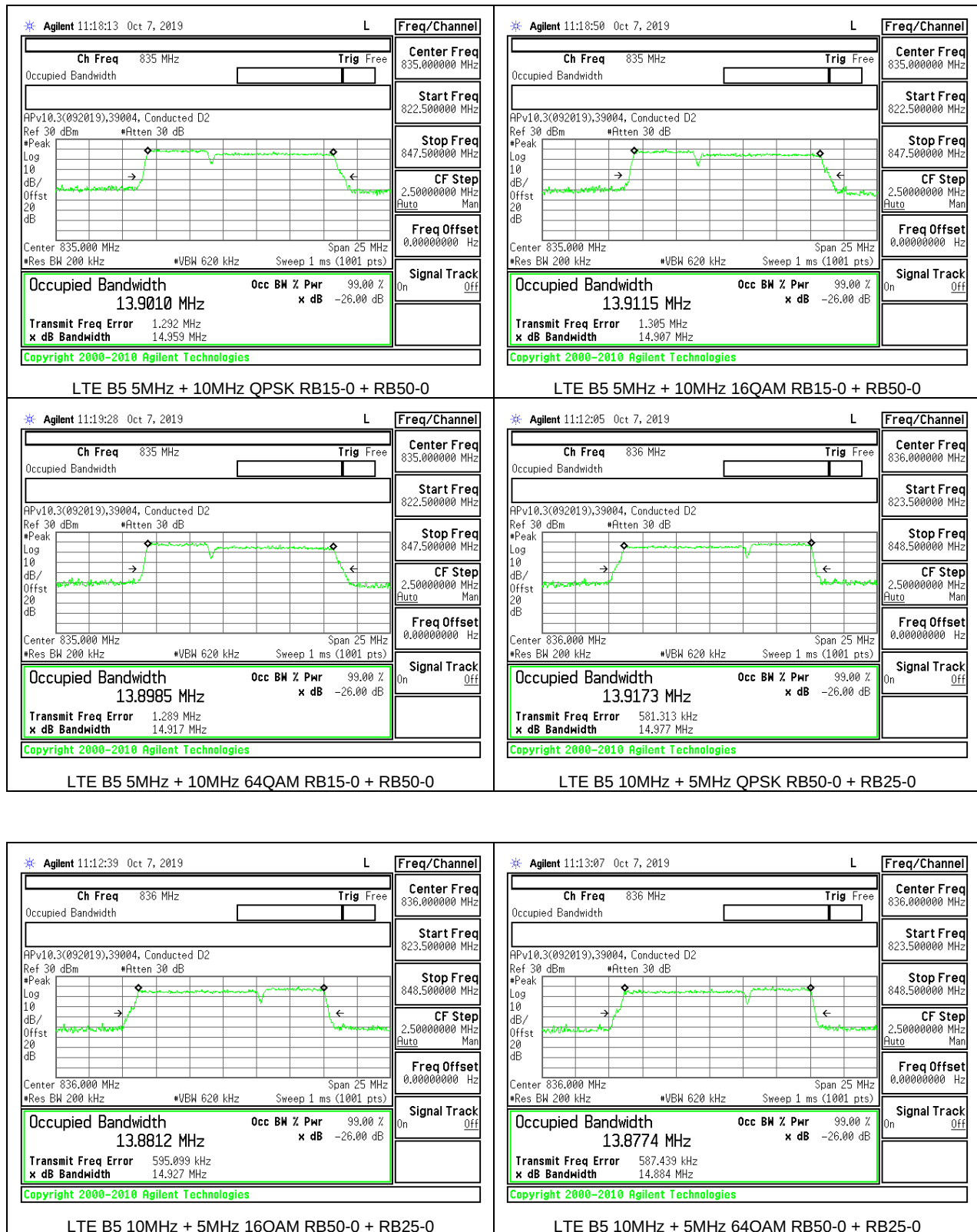
Band	Mode	RB Allocation/RB Offset	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 7	10MHz + 20MHz BAND QPSK	50/0 + 100/0	2535	28.1156	30.680
	10MHz + 20MHz BAND 16QAM			28.1865	31.242
	10MHz + 20MHz BAND 64QAM			28.1011	30.951
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		28.1437	30.682
	20MHz + 10MHz BAND 16QAM			28.1920	30.938
	20MHz + 10MHz BAND 64QAM			28.0860	33.363
	15MHz + 15MHz BAND QPSK	75/0 + 75/0		28.6503	31.431
	15MHz + 15MHz BAND 16QAM			28.5810	31.482
	15MHz + 15MHz BAND 64QAM			28.5719	30.959
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		32.8741	36.328
	15MHz + 20MHz BAND 16QAM			32.7401	37.096
	15MHz + 20MHz BAND 64QAM			32.7686	35.649
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		32.9955	38.830
	20MHz + 15MHz BAND 16QAM			32.8873	36.422
	20MHz + 15MHz BAND 64QAM			32.8547	36.959
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.7107	45.218
	20MHz + 20MHz BAND 16QAM			37.7154	44.090
	20MHz + 20MHz BAND 64QAM			37.6979	41.404

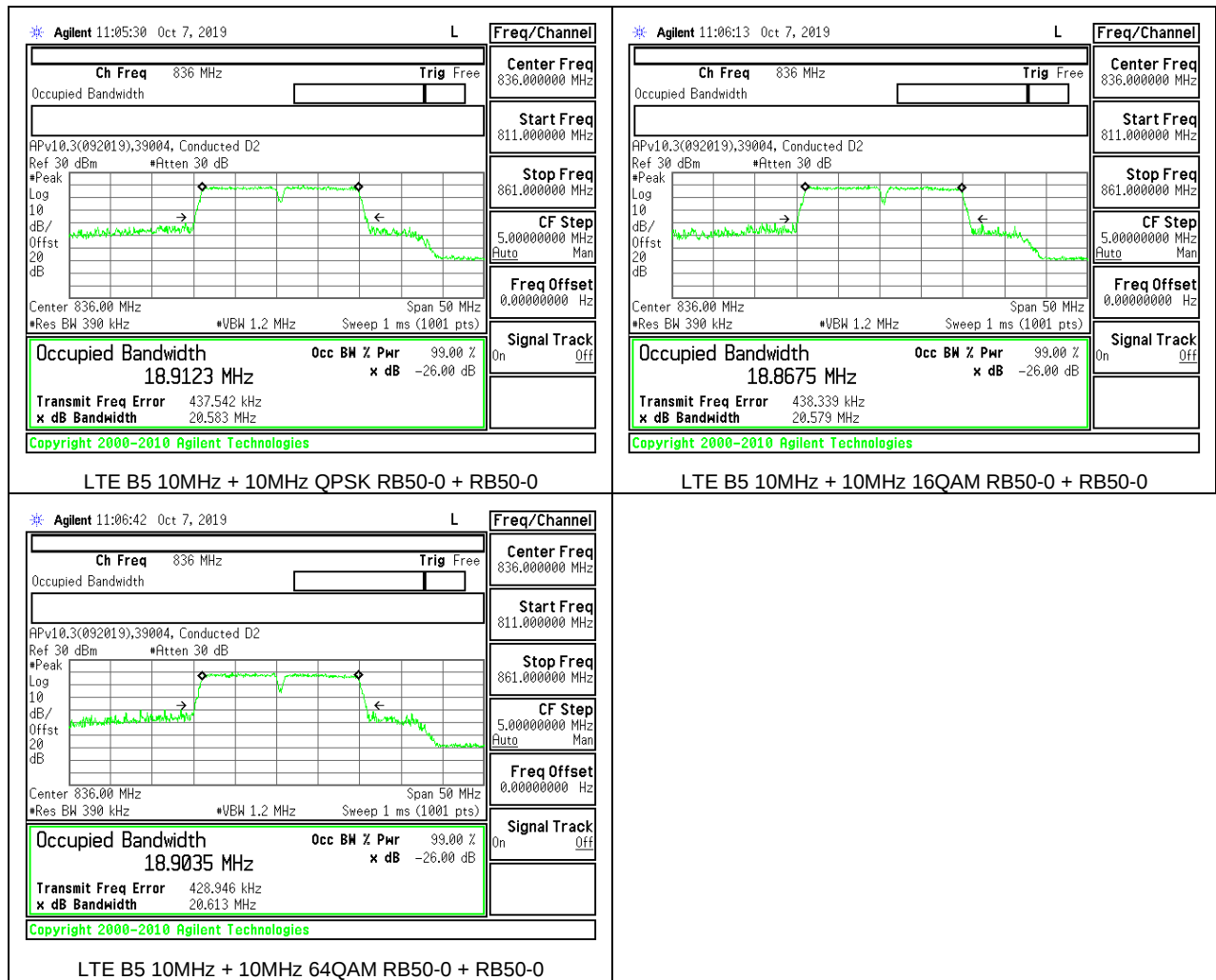
LTE BAND 41

Band	Mode	RB Allocation/RB Offset	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 41 (FCC)	5MHz + 20MHz BAND OPSK	25/0 + 100/0	2593	23.1489	24.865
	5MHz + 20MHz BAND 16OAM			23.1732	24.750
	5MHz + 20MHz BAND 64OAM			23.2897	25.599
	20MHz + 5MHz BAND OPSK	100/0 + 25/0		23.3771	25.807
	20MHz + 5MHz BAND 16OAM			23.2292	25.292
	20MHz + 5MHz BAND 64OAM			23.3143	24.864
	10MHz + 20MHz BAND OPSK	50/0 + 100/0		28.0027	29.807
	10MHz + 20MHz BAND 16OAM			28.0037	29.838
	10MHz + 20MHz BAND 64OAM			27.9738	31.051
	20MHz + 10MHz BAND OPSK	100/0 + 50/0		28.0812	34.005
	20MHz + 10MHz BAND 16OAM			27.8975	30.214
	20MHz + 10MHz BAND 64OAM			27.8753	30.329
	15MHz + 15MHz BAND OPSK	75/0 + 75/0		28.2231	30.806
	15MHz + 15MHz BAND 16OAM			28.1362	30.573
	15MHz + 15MHz BAND 64OAM			28.2461	30.661
	15MHz + 20MHz BAND OPSK	75/0 + 100/0		32.8381	35.476
	15MHz + 20MHz BAND 16OAM			32.6221	34.873
	15MHz + 20MHz BAND 64OAM			32.7282	34.777
	20MHz + 15MHz BAND OPSK	100/0 + 75/0		32.6942	35.018
	20MHz + 15MHz BAND 16OAM			32.7338	37.961
	20MHz + 15MHz BAND 64OAM			32.7168	37.221
	20MHz + 20MHz BAND OPSK	100/0 + 100/0		37.7338	40.110
	20MHz + 20MHz BAND 16OAM			37.6167	40.008
	20MHz + 20MHz BAND 64OAM			37.6755	42.867

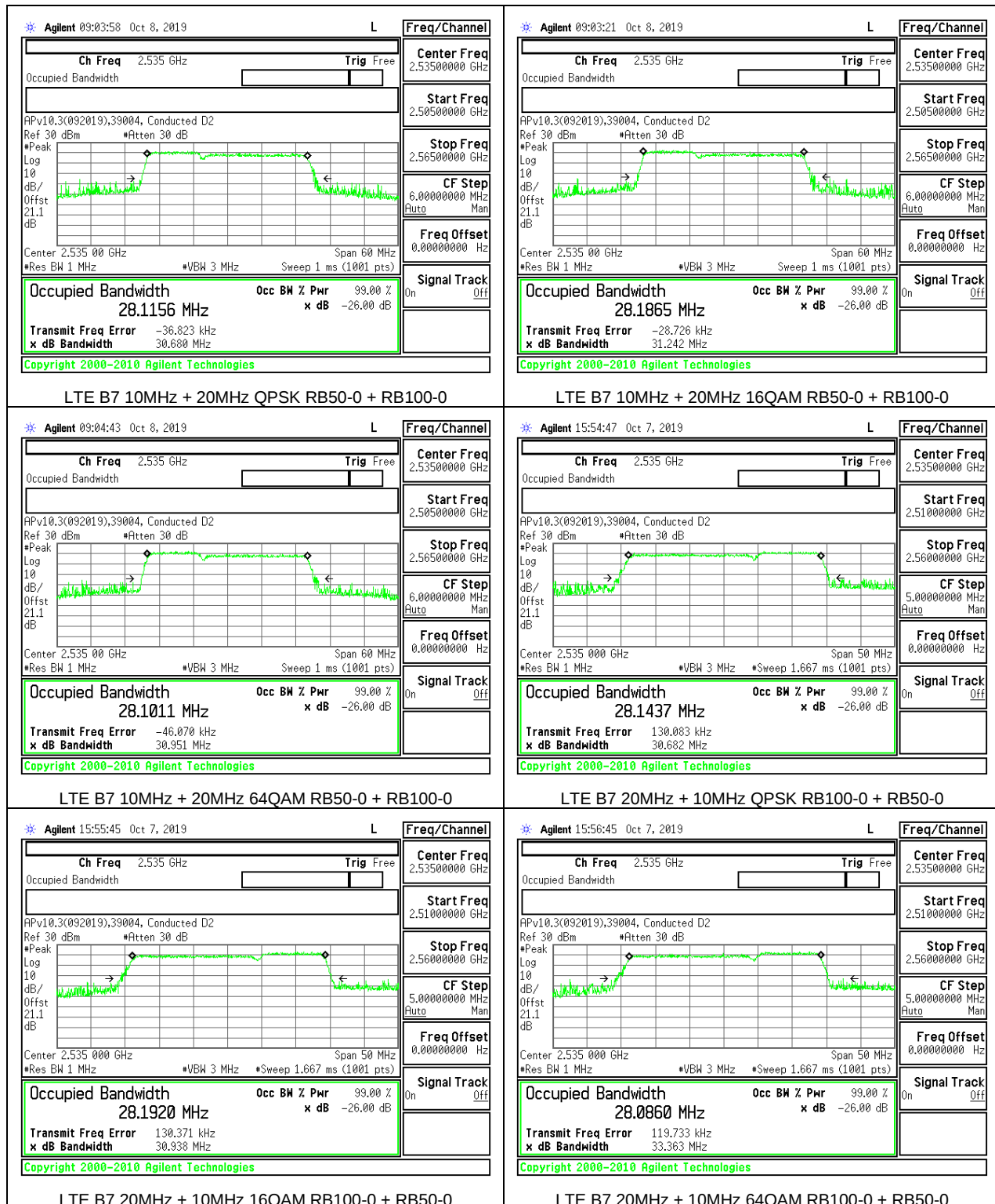
8.1.1. LTE BAND 5

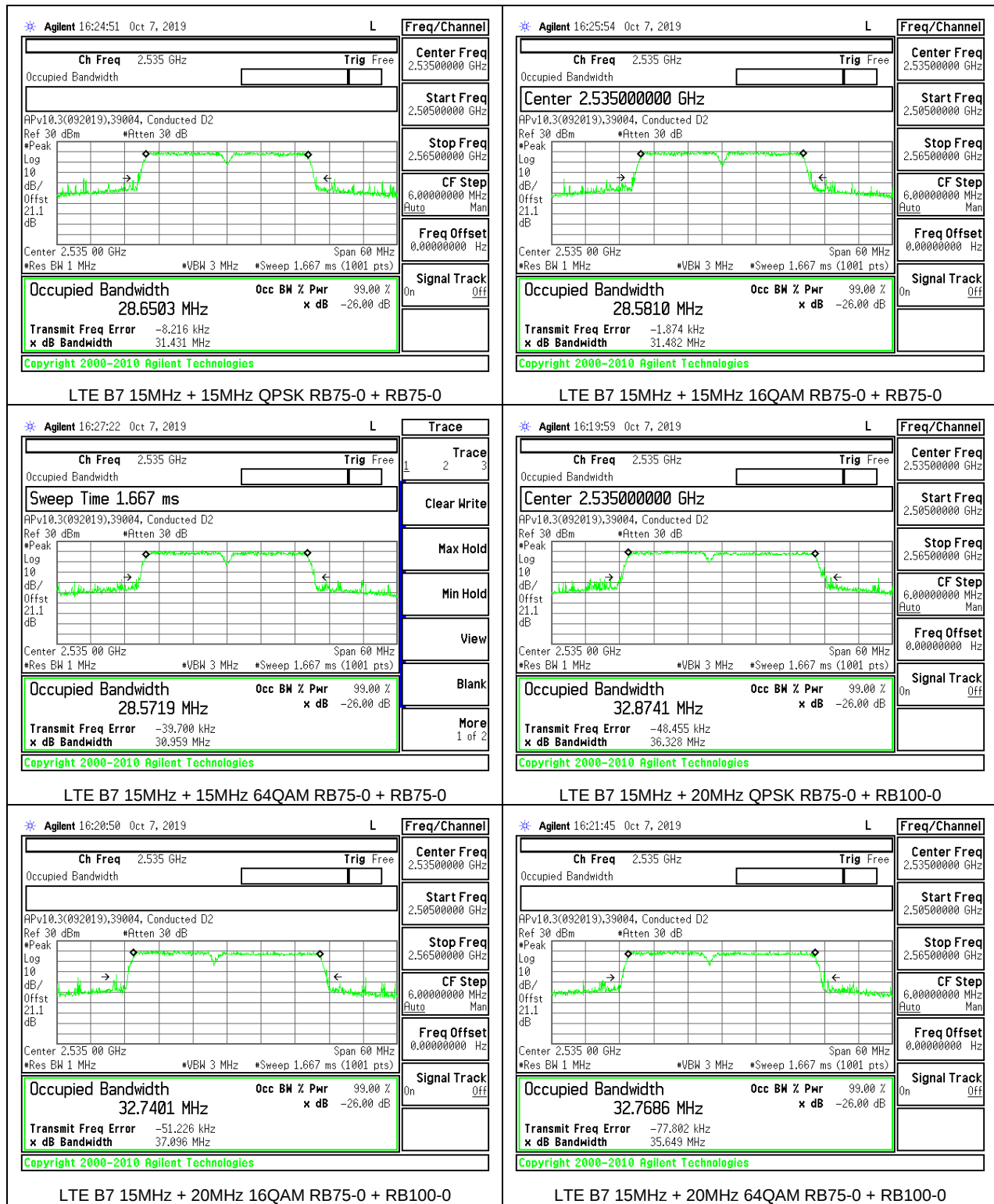


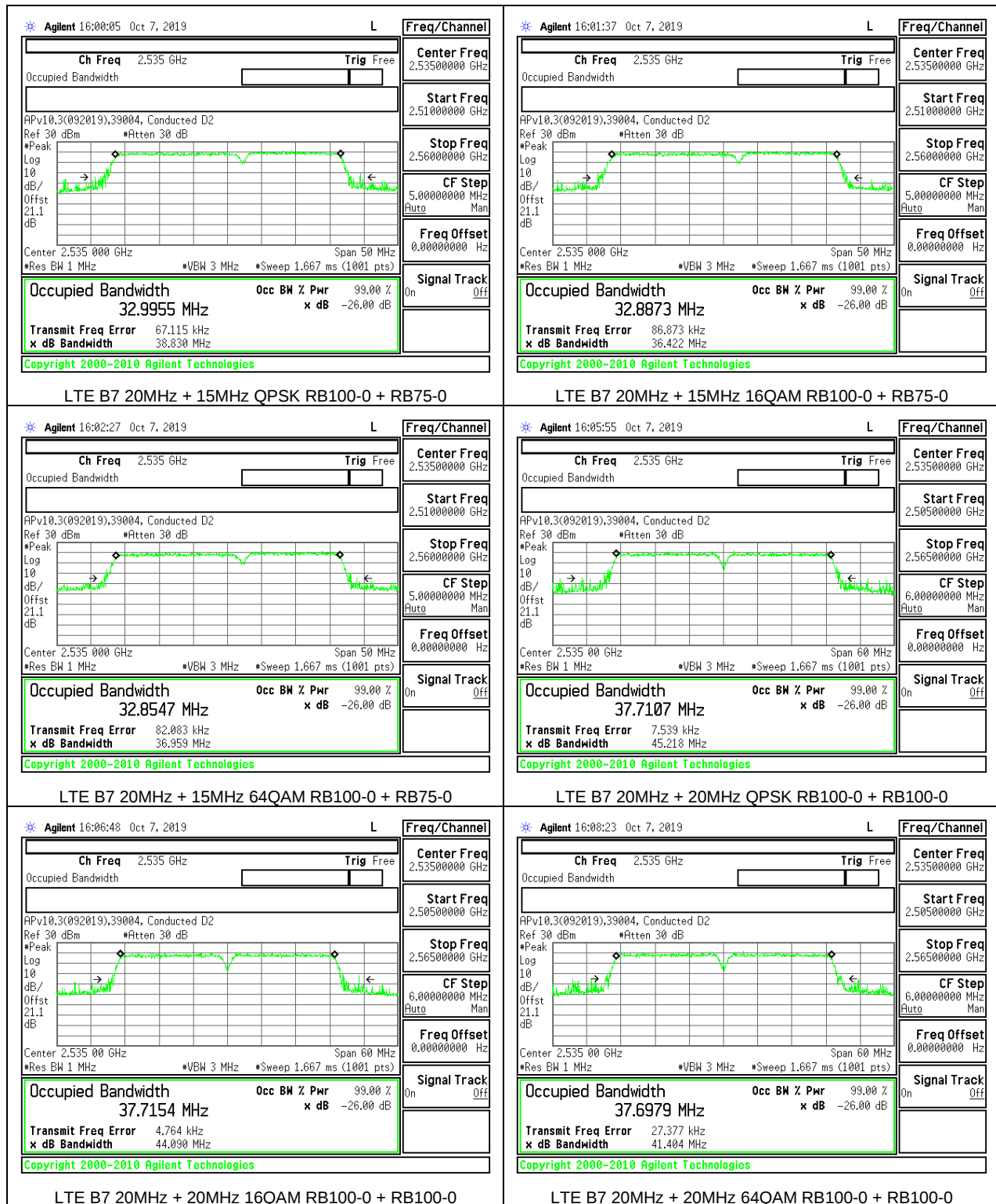




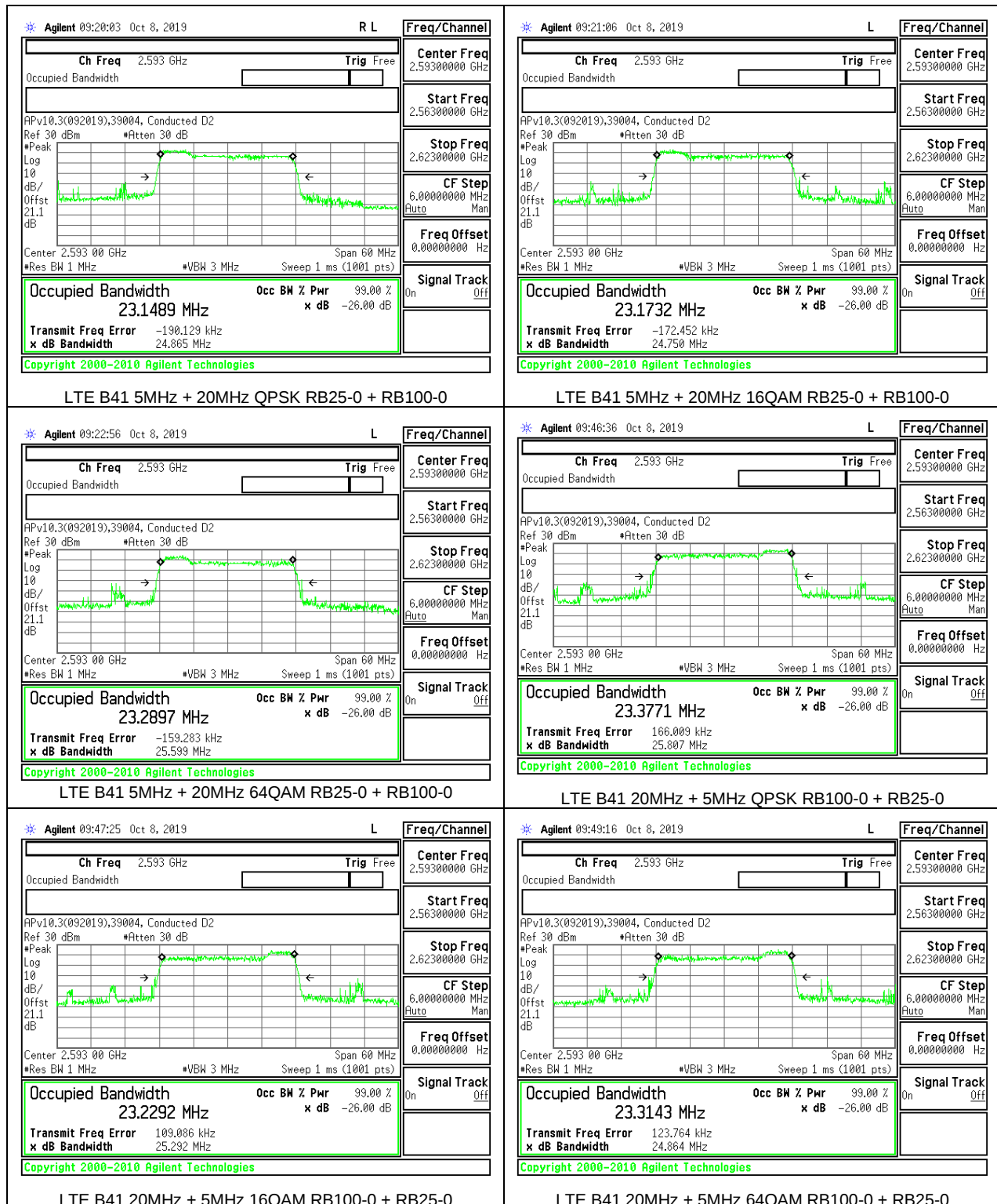
8.1.2. LTE BAND 7

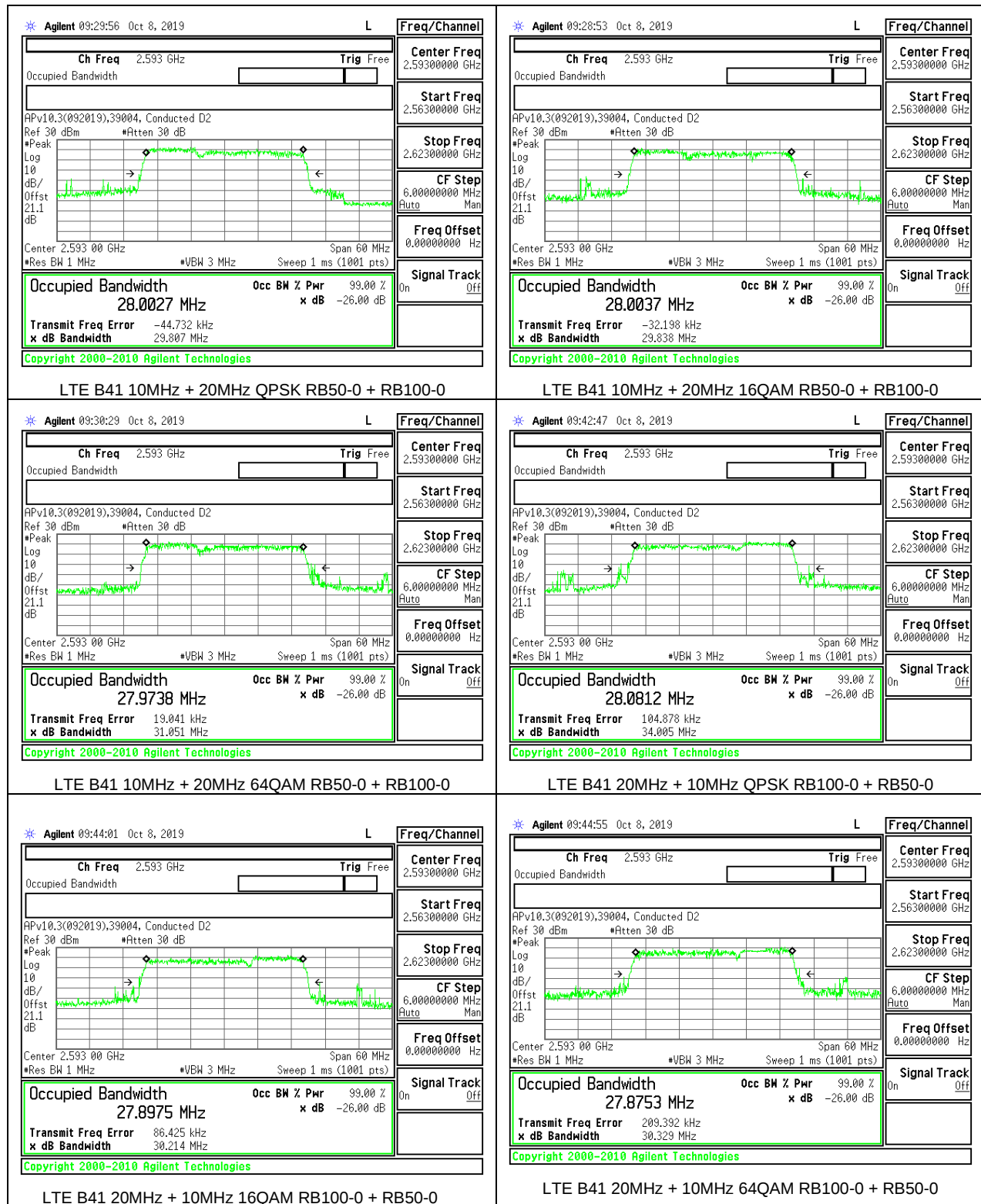


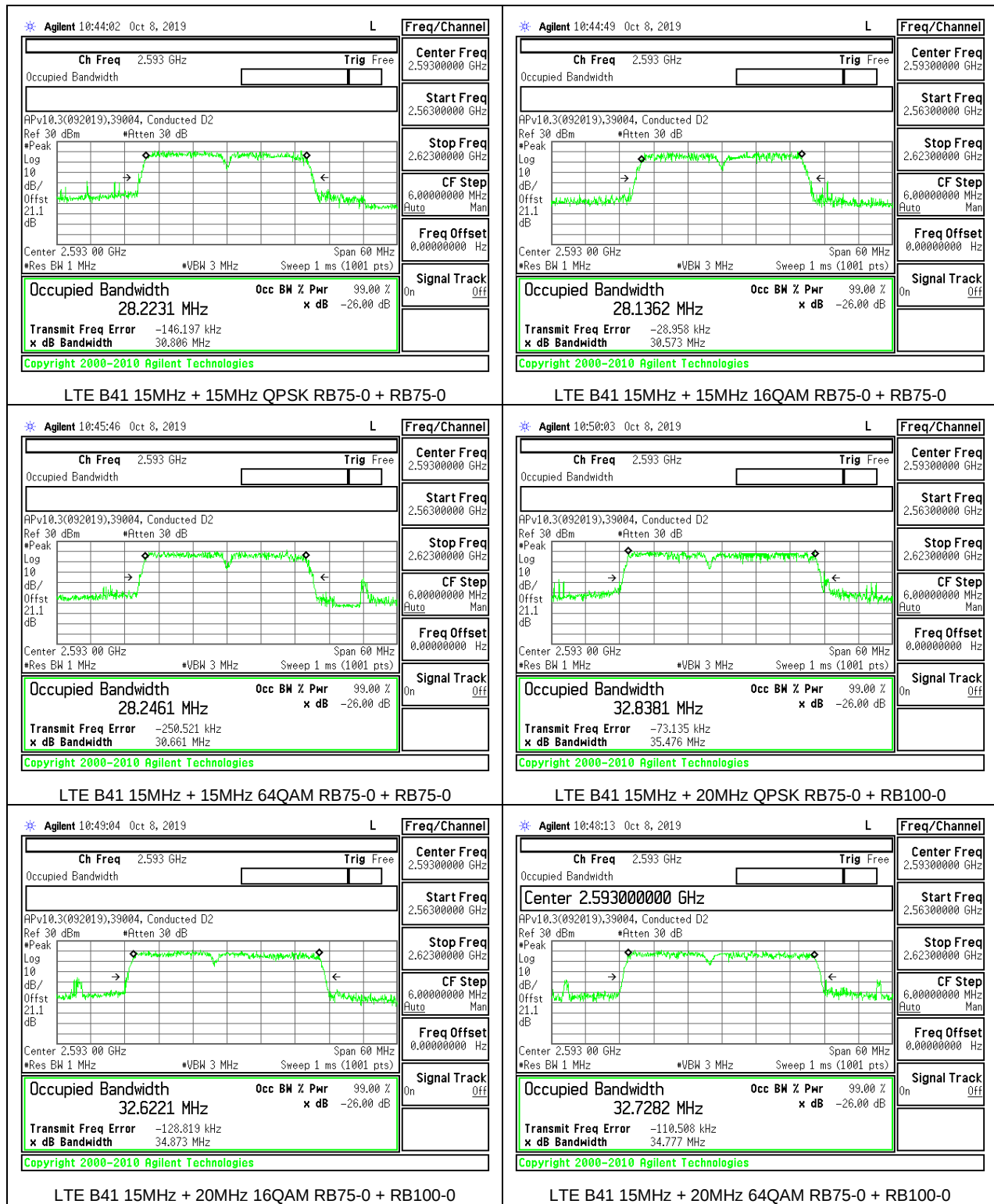


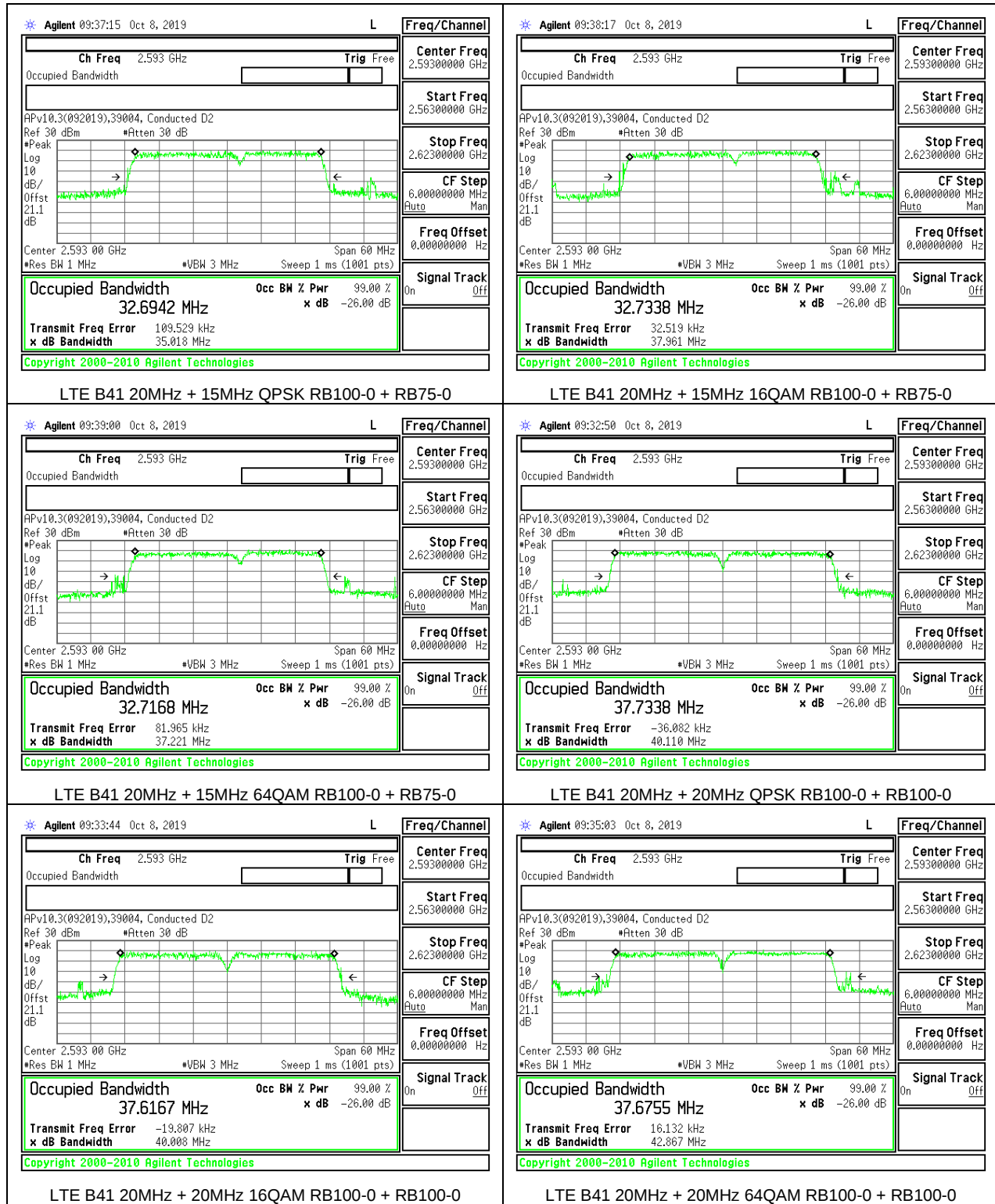


8.1.3. LTE BAND 41









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

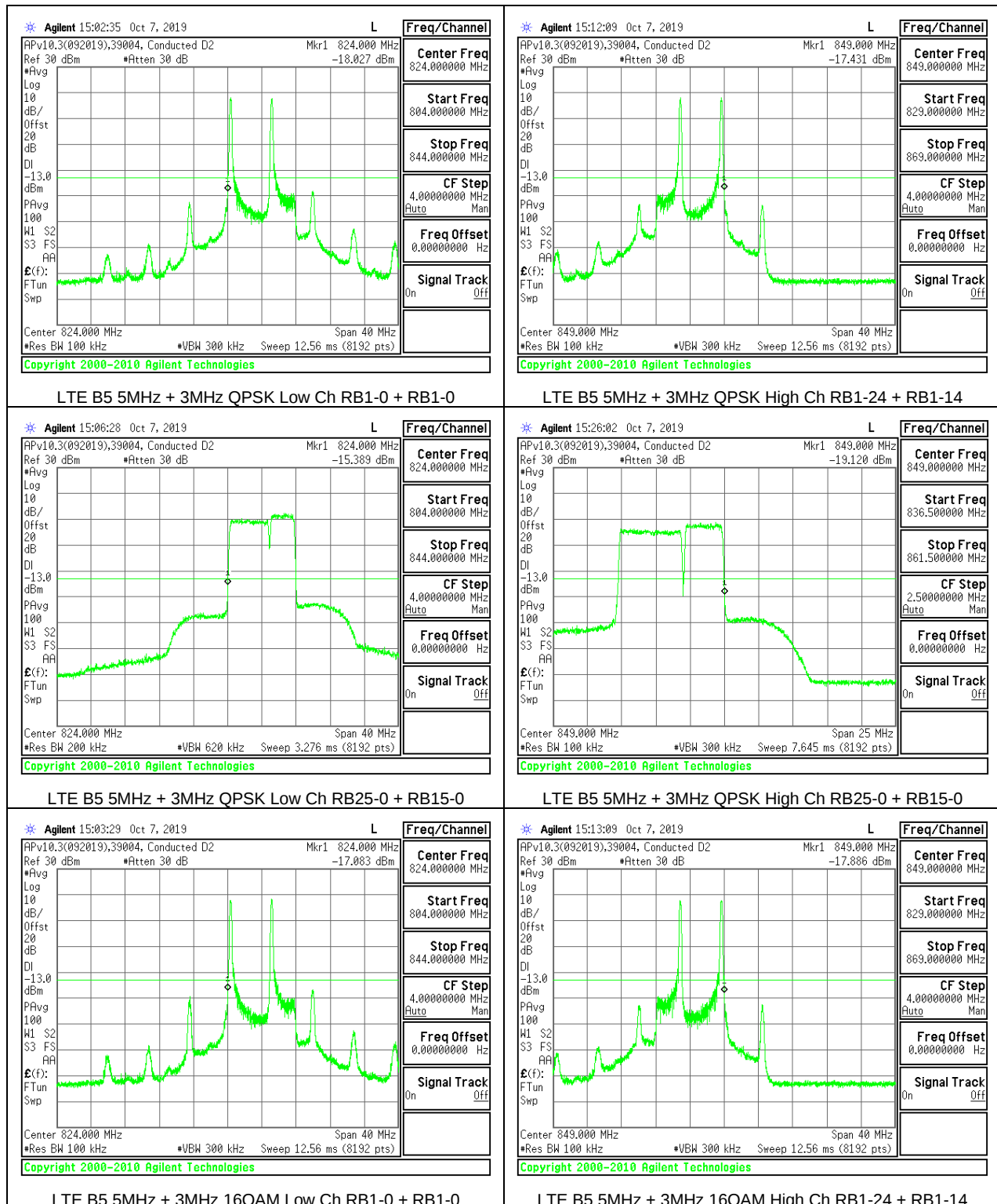
(m)(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of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

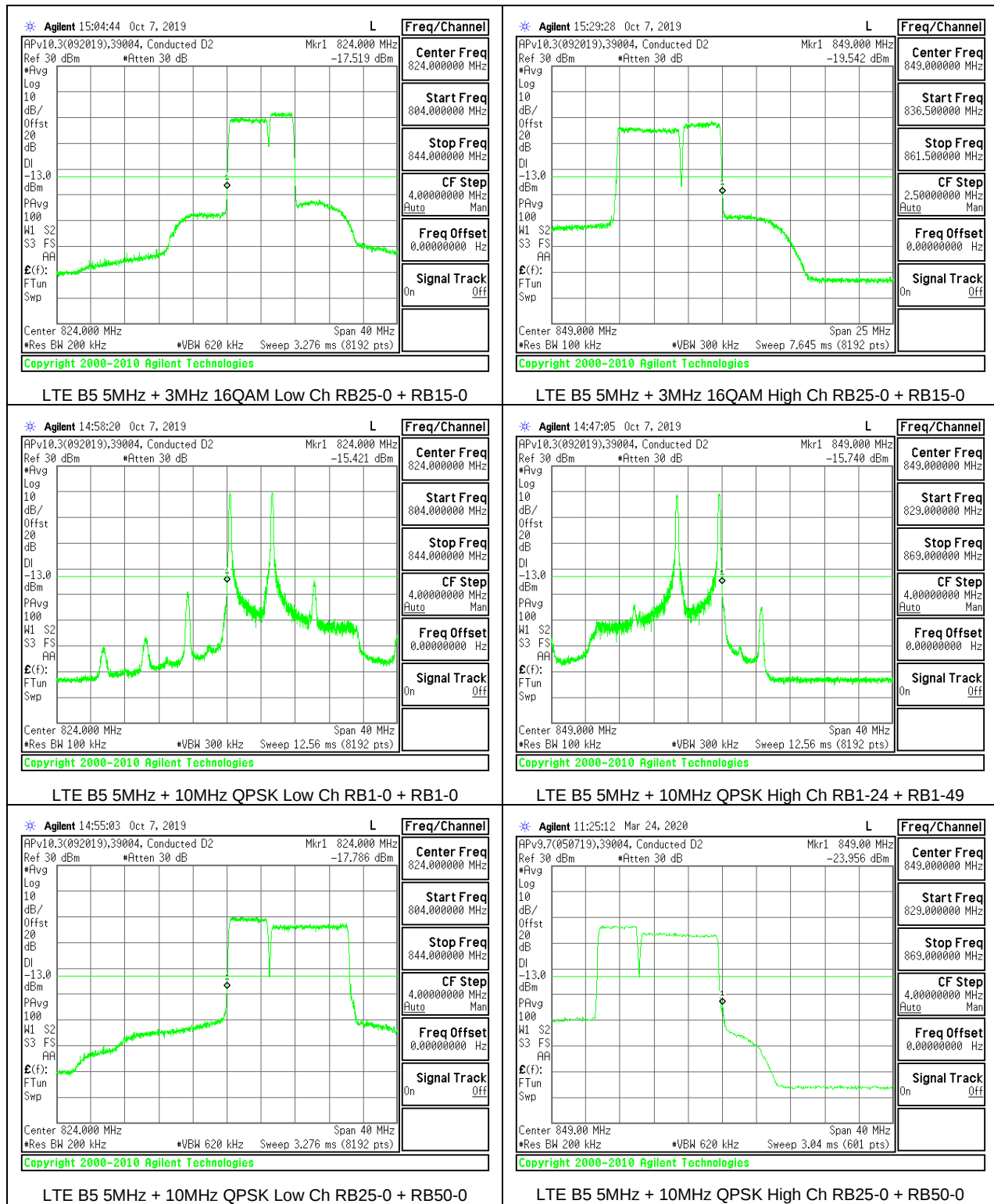
MODES TESTED

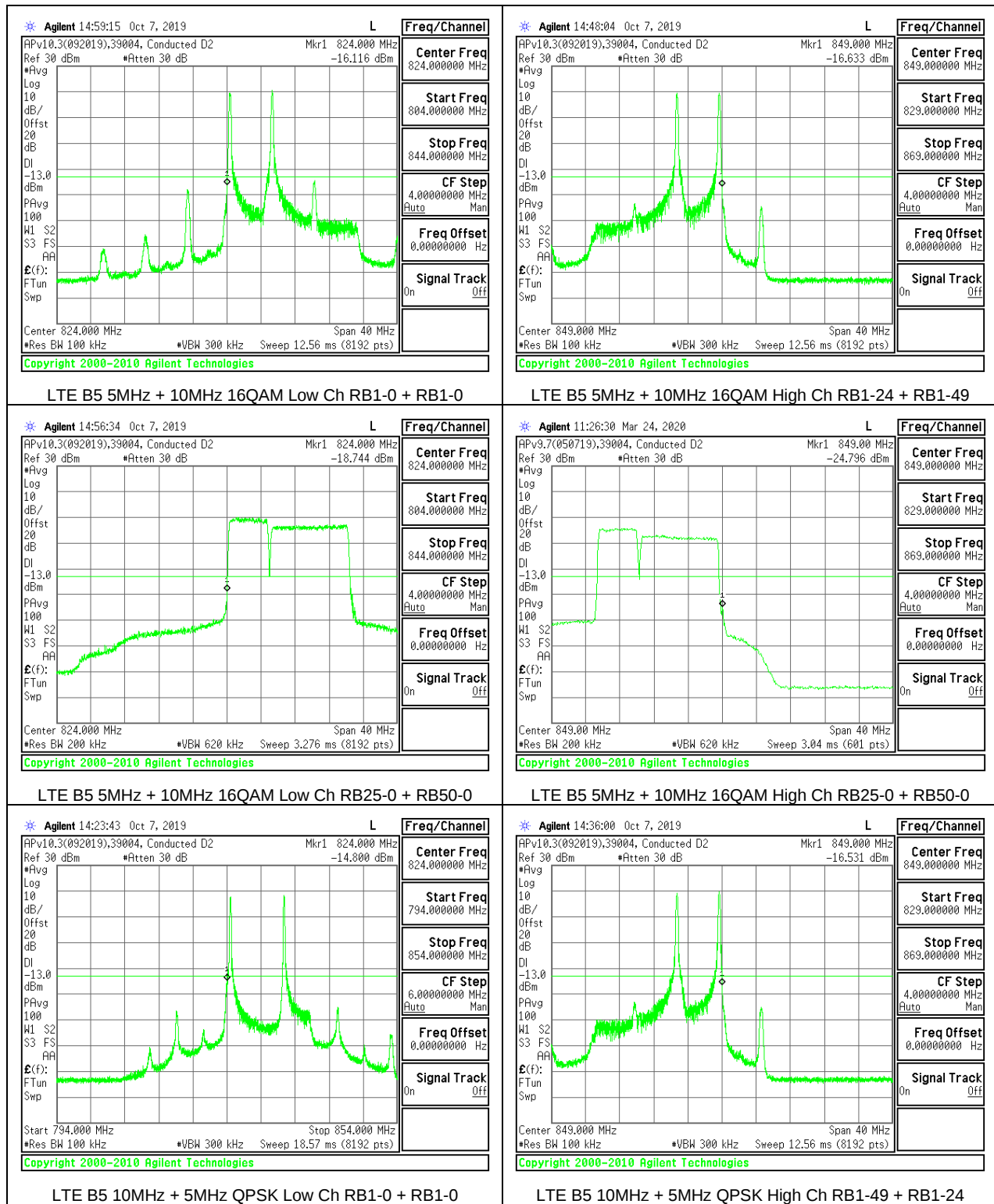
- LTE Band 5
- LTE Band 7
- LTE Band 41

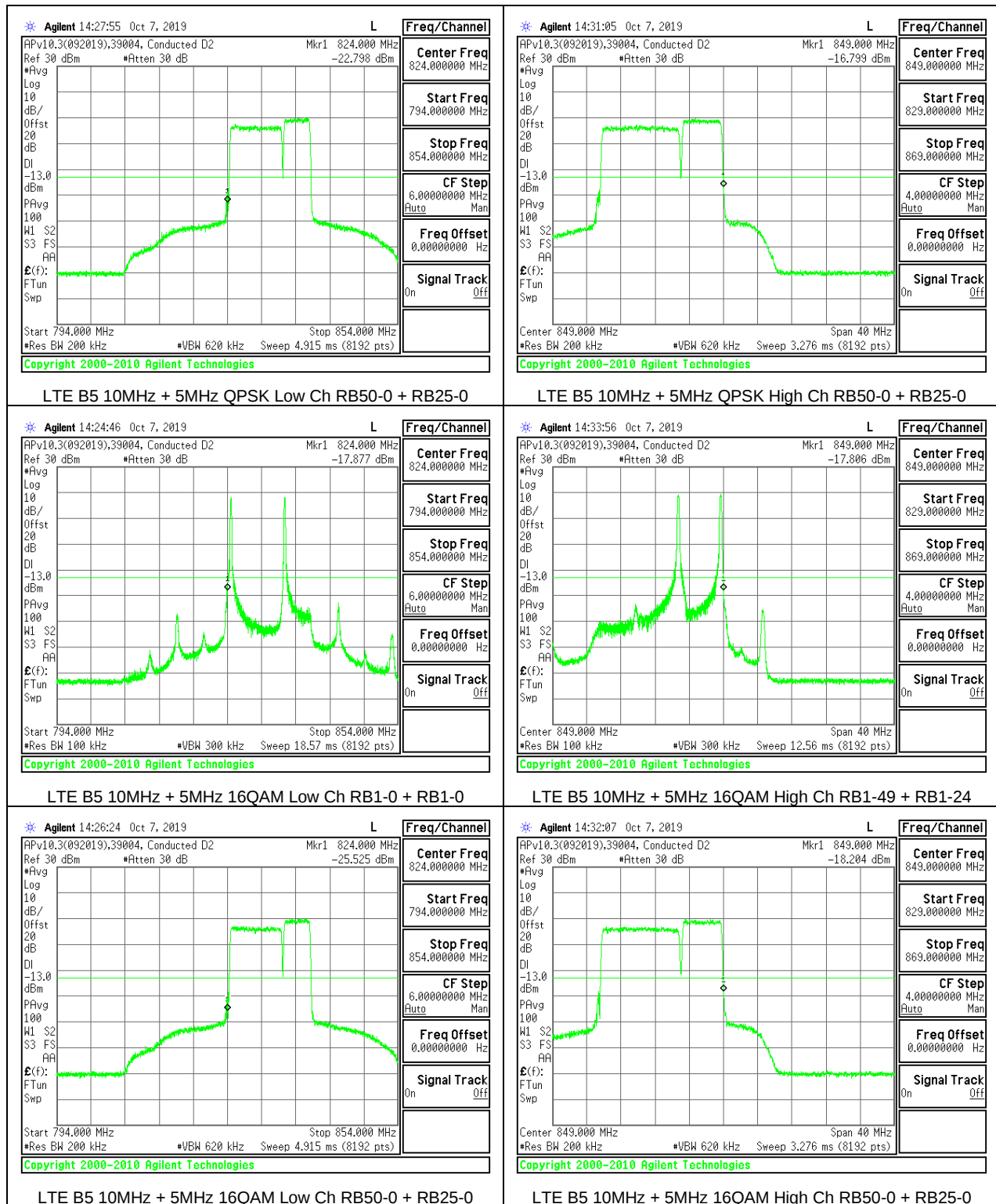
RESULTS

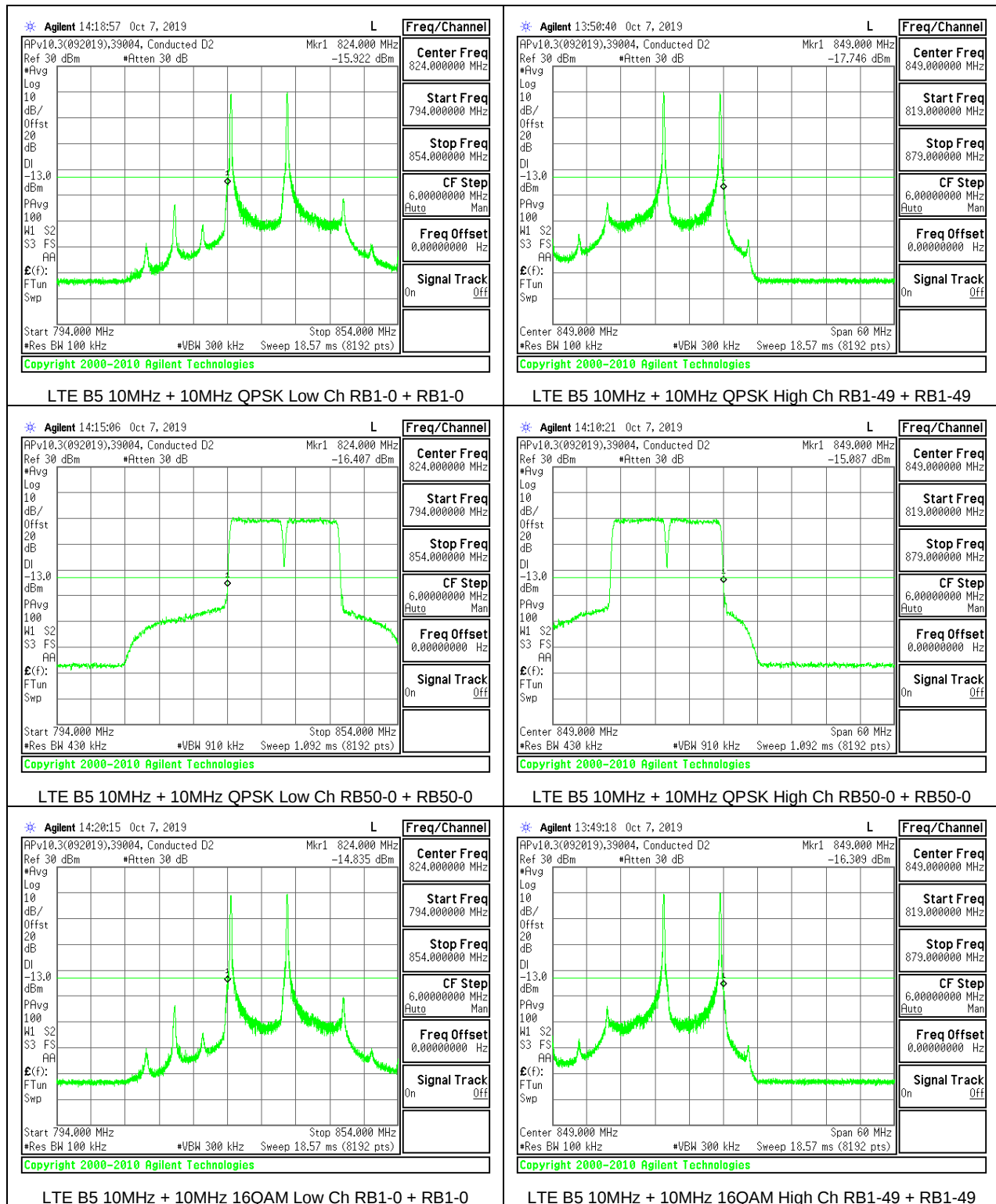
8.2.1. E BAND 5

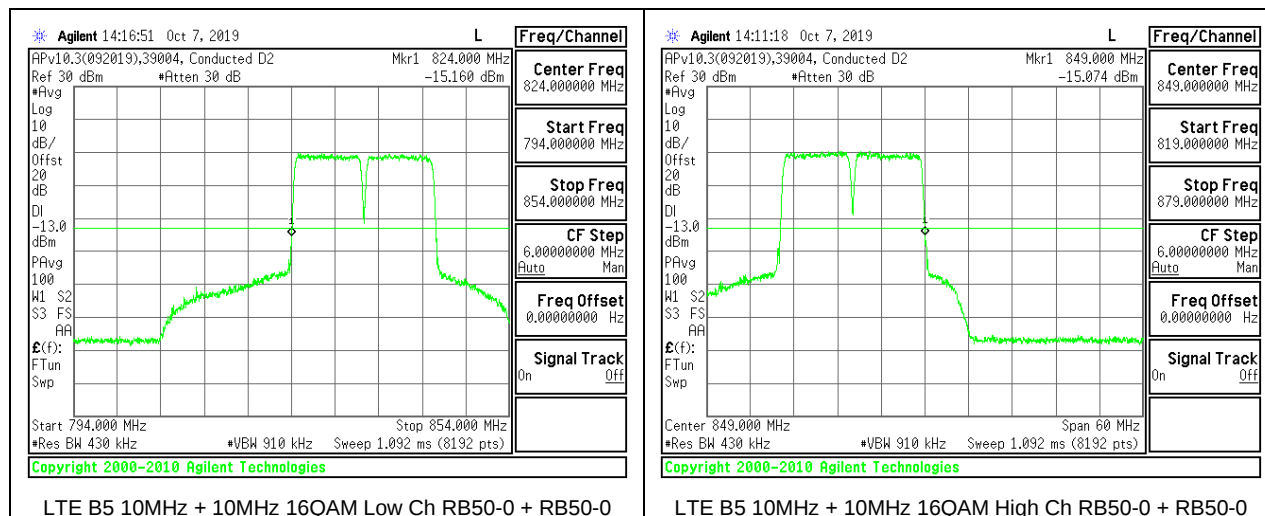




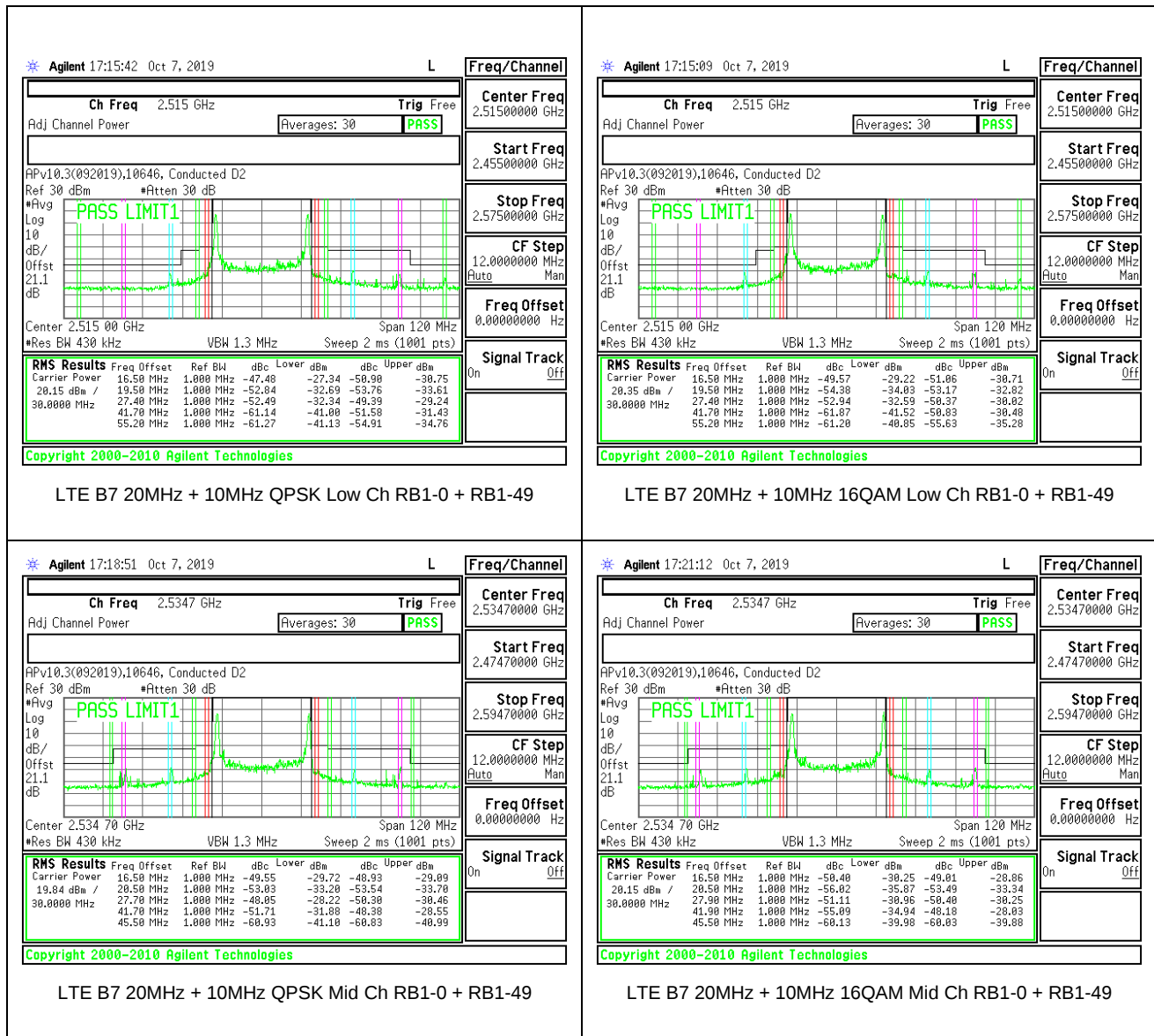


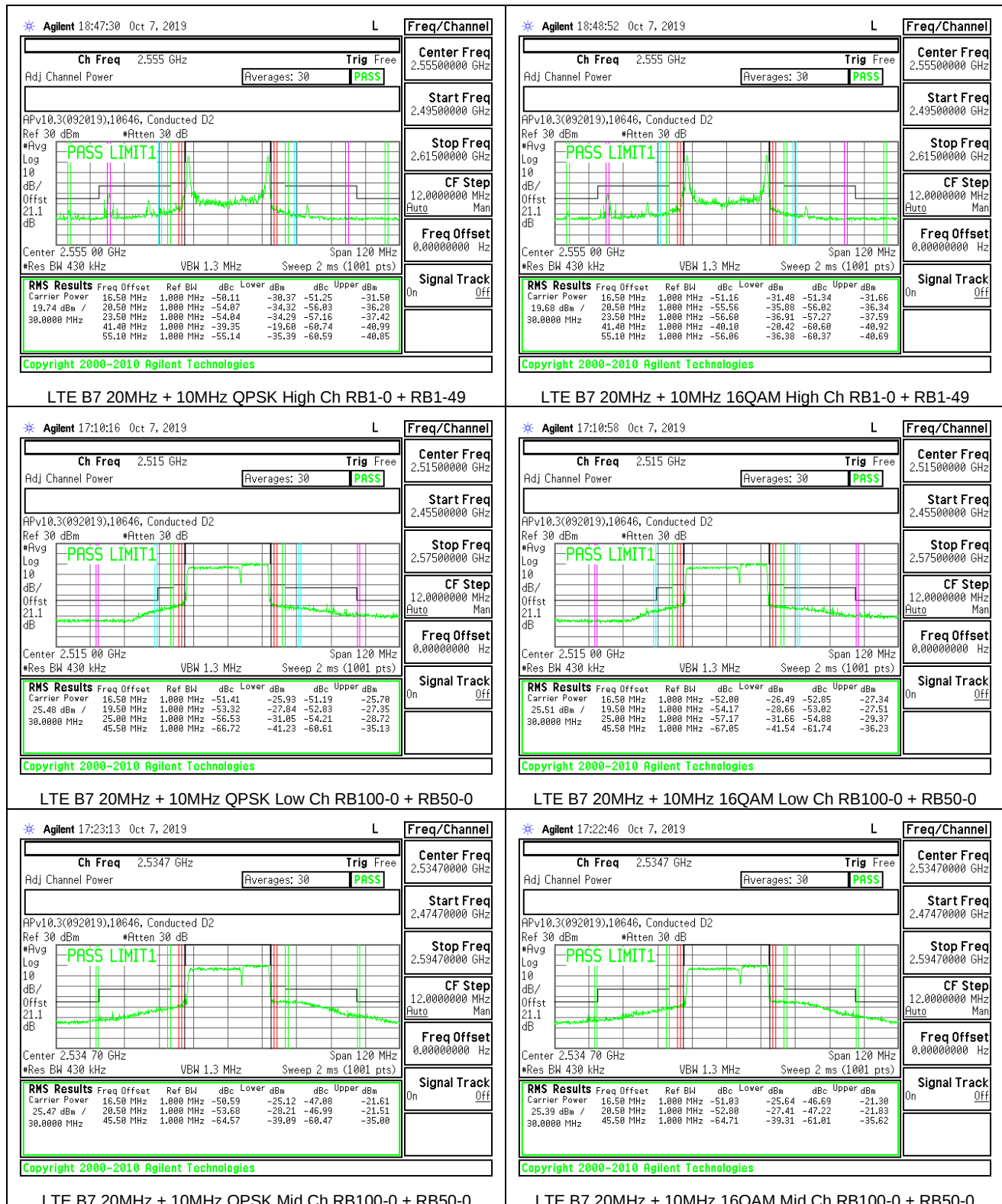


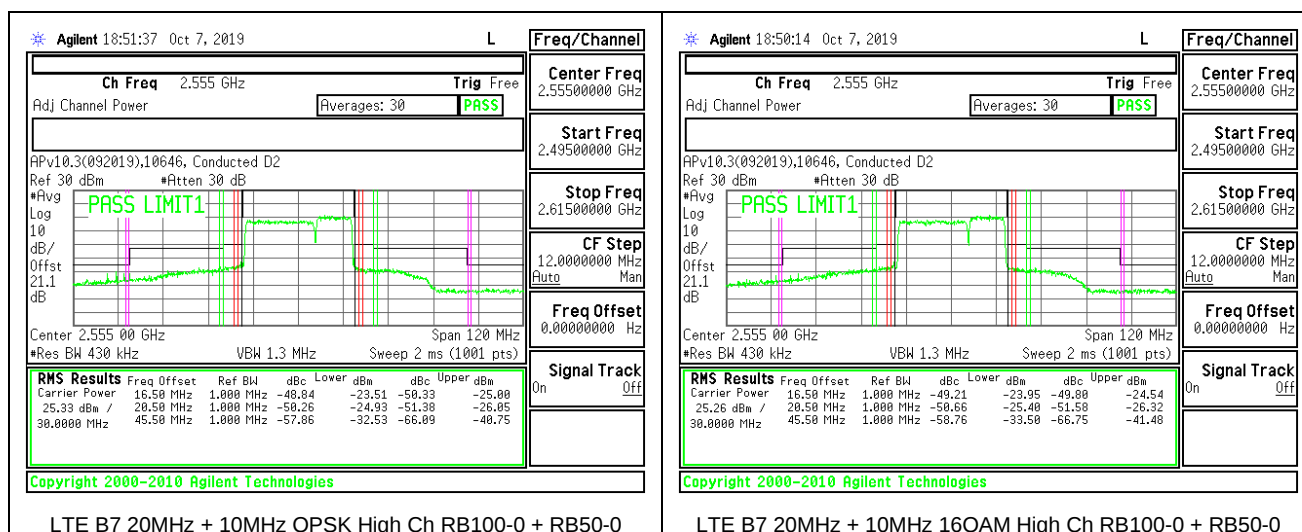


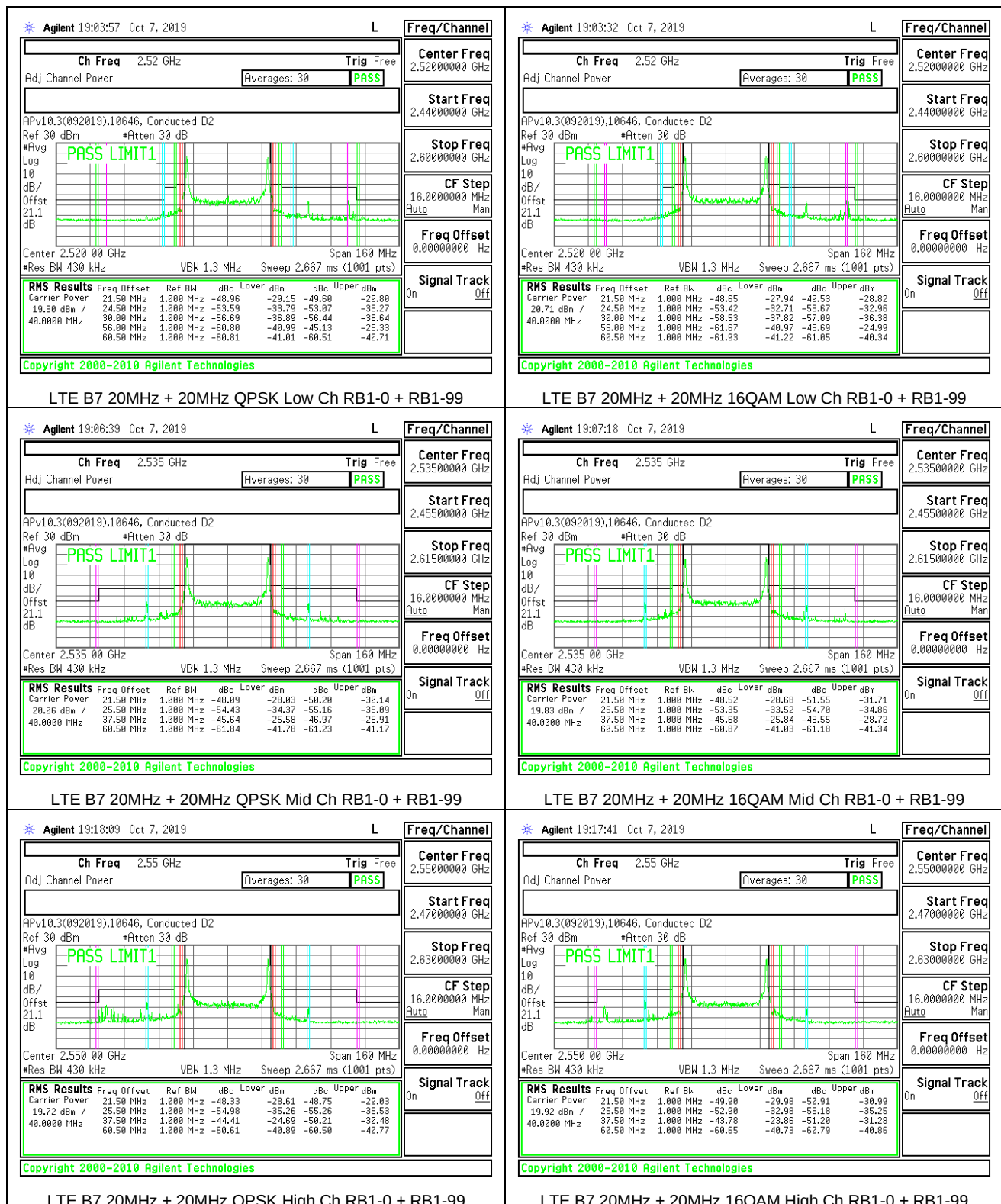


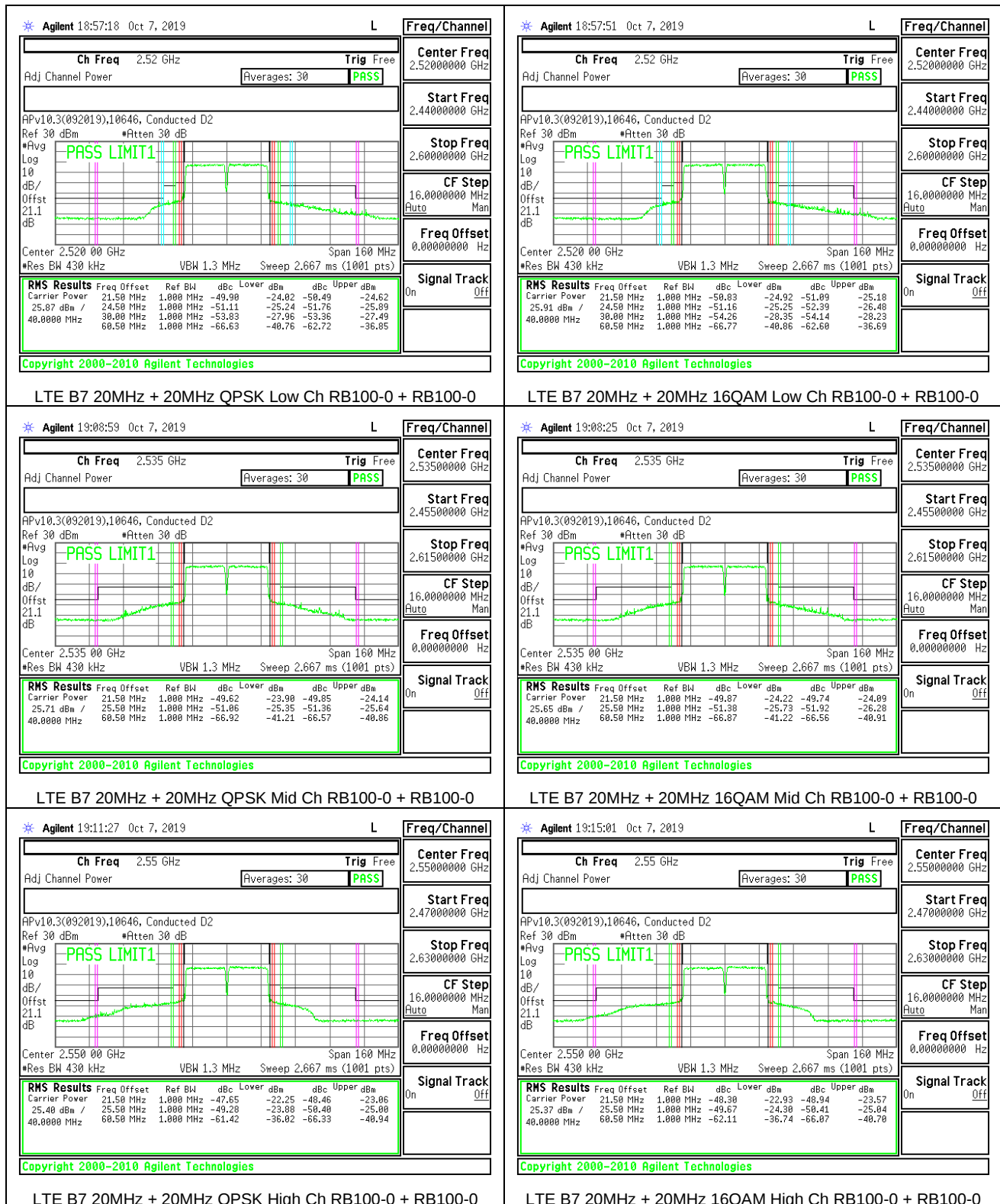
8.2.2. LTE BAND 7



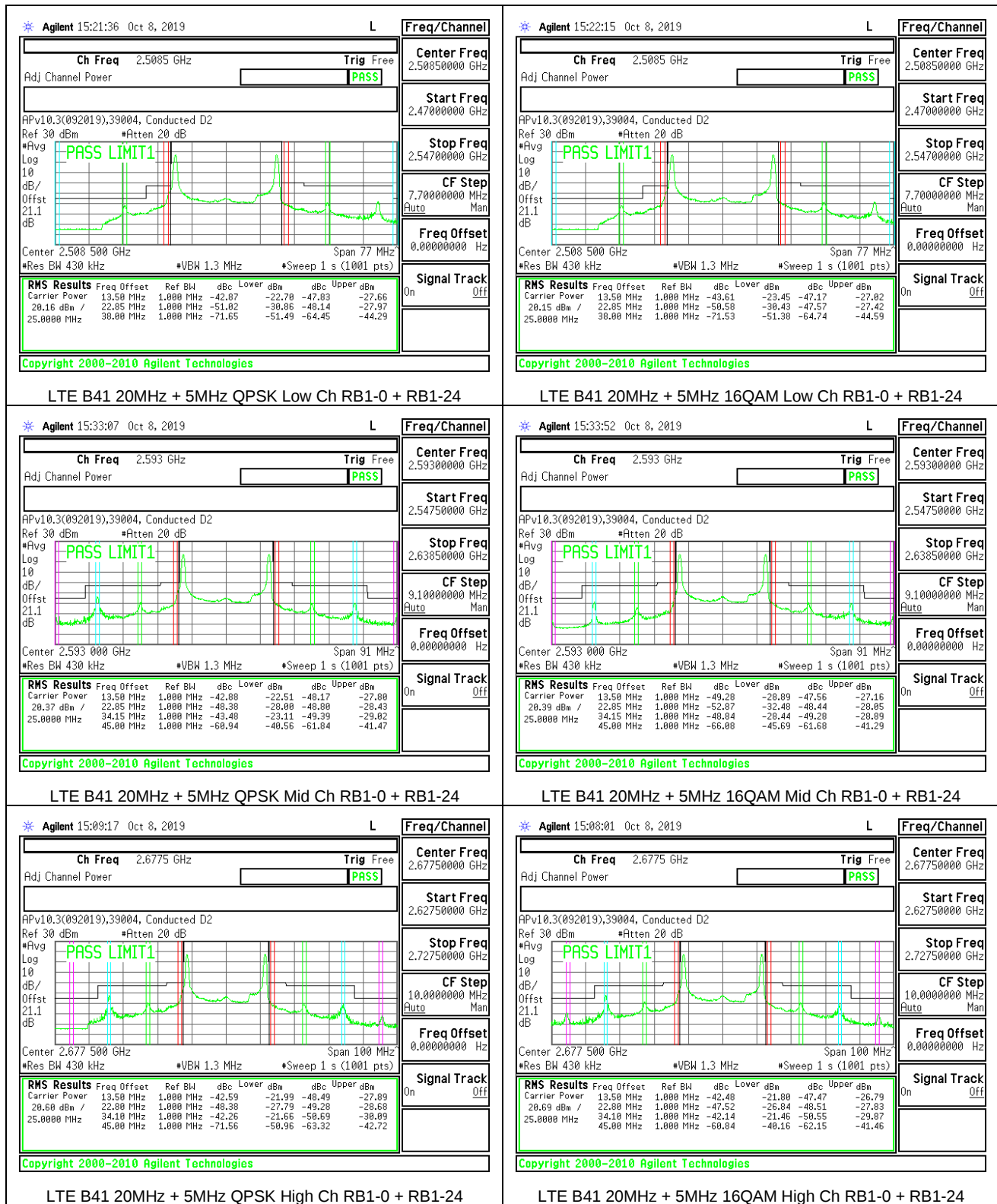


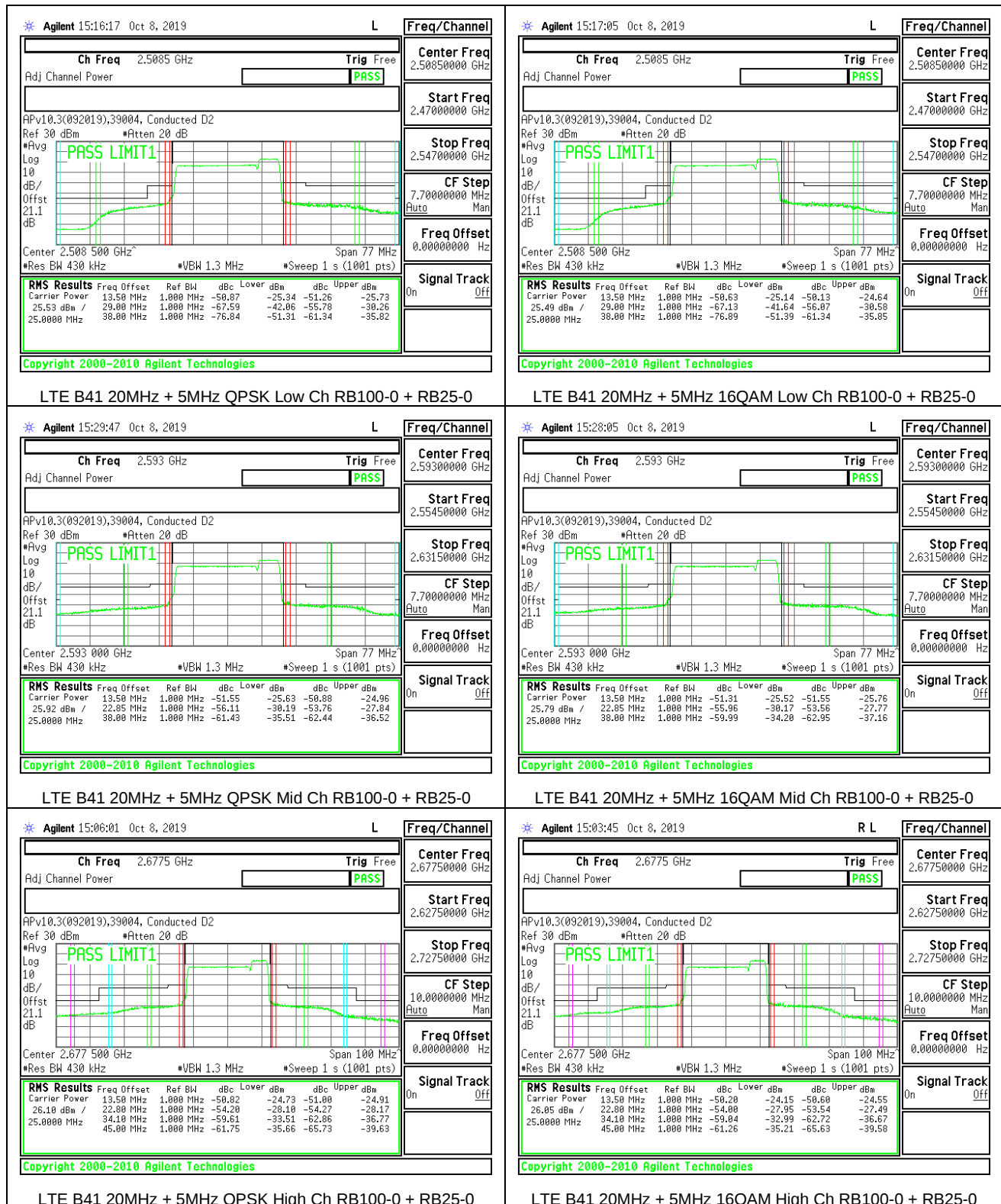


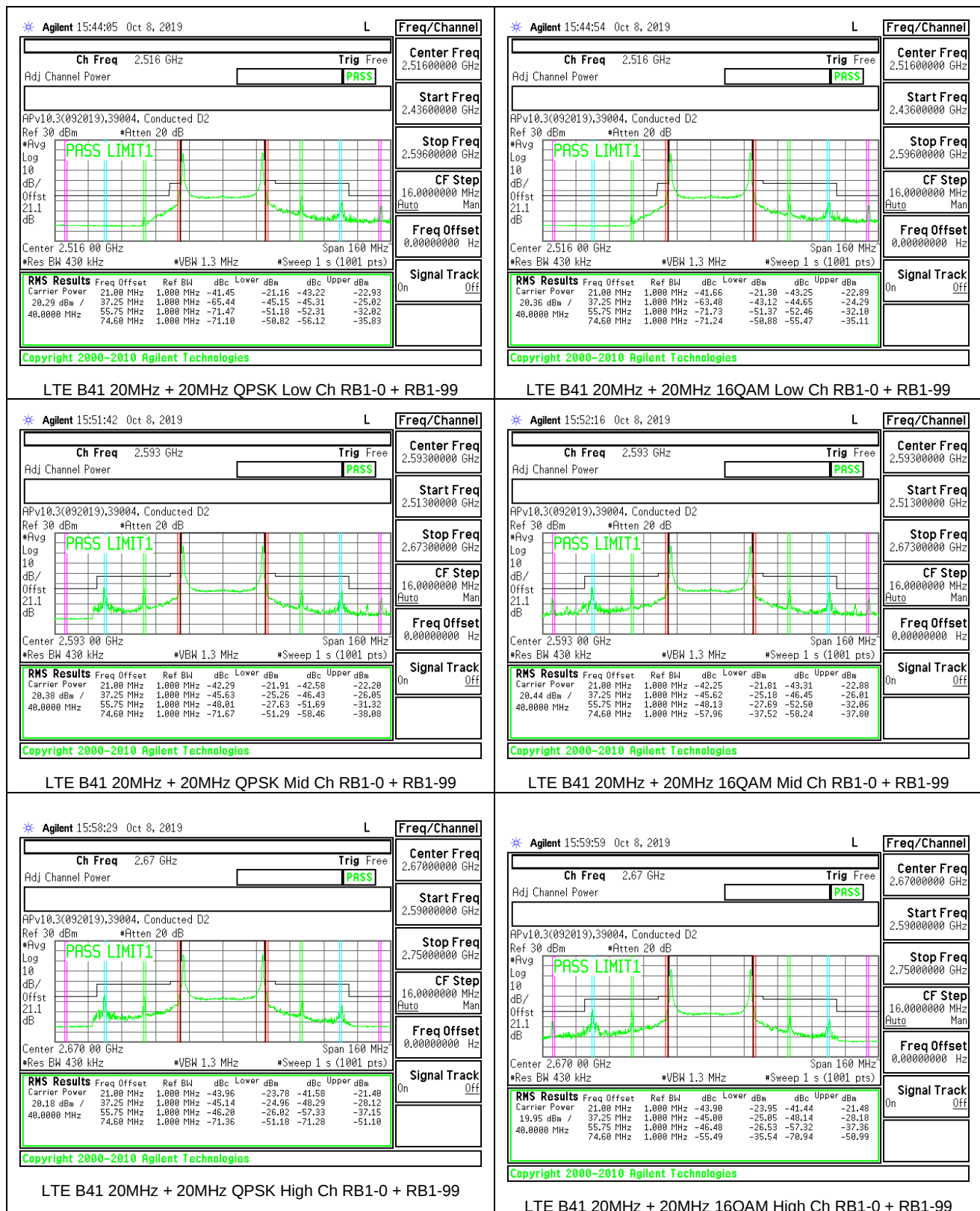


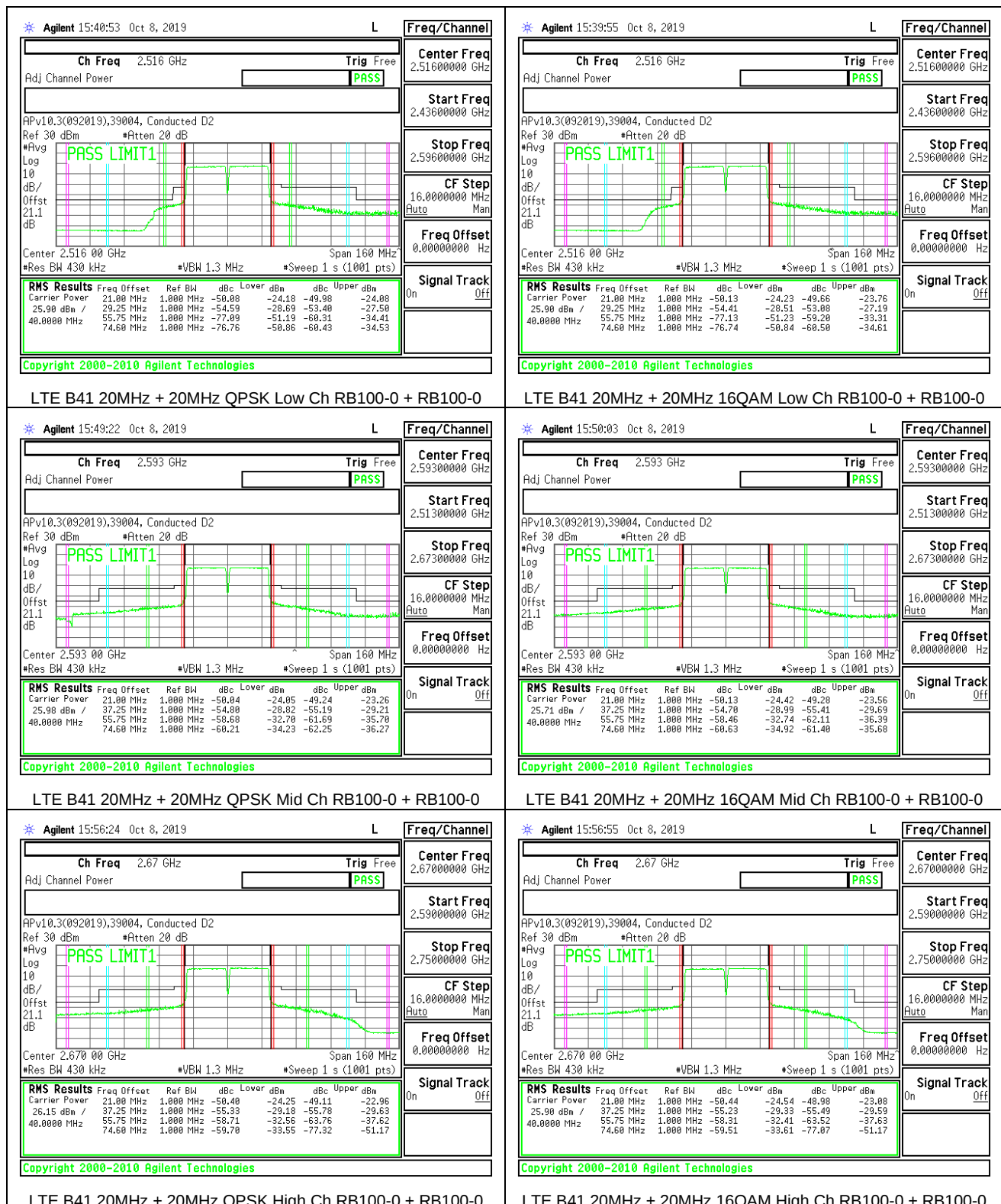


8.2.3. LTE BAND 41









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.

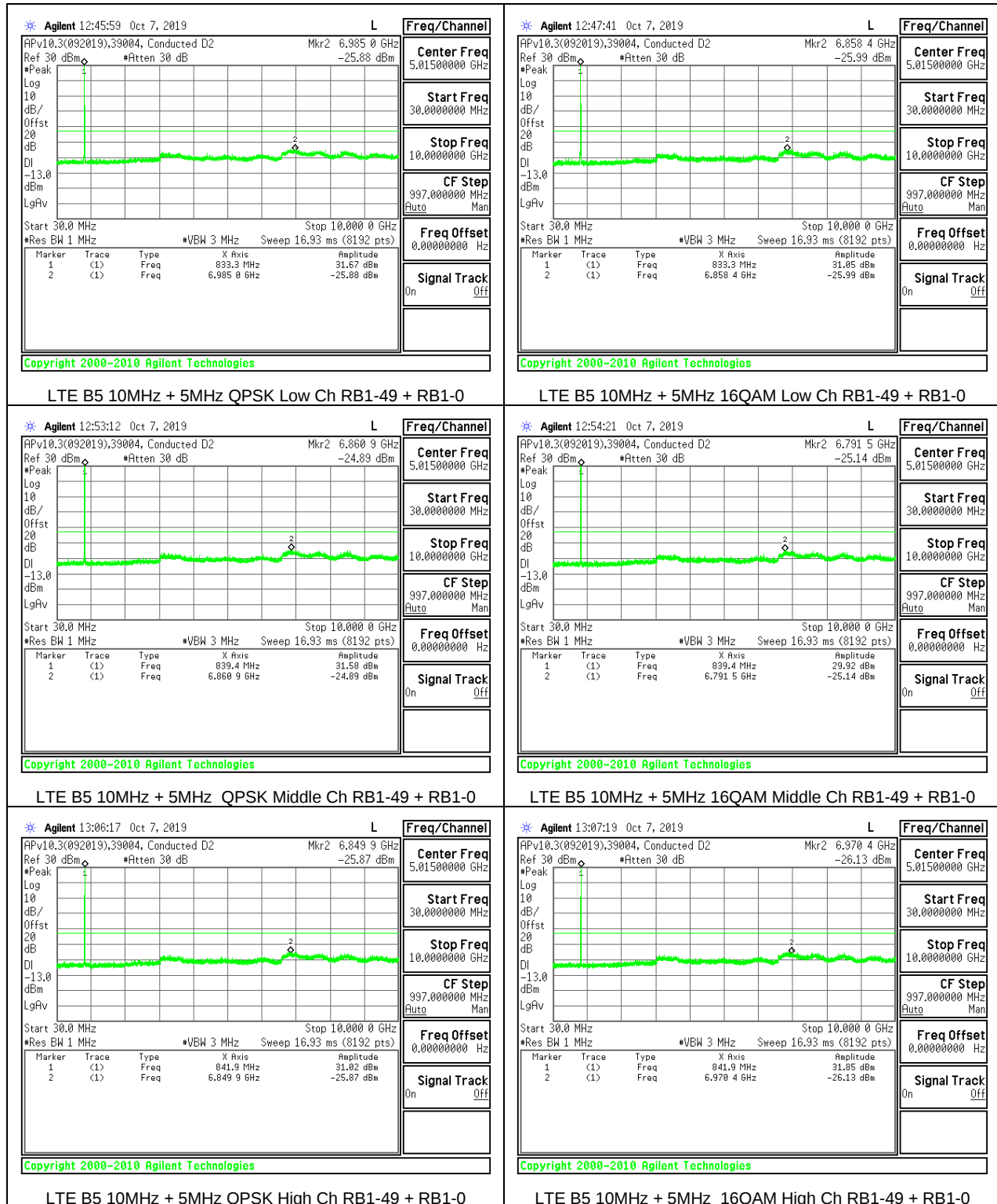
For each out of band emissions measurement:

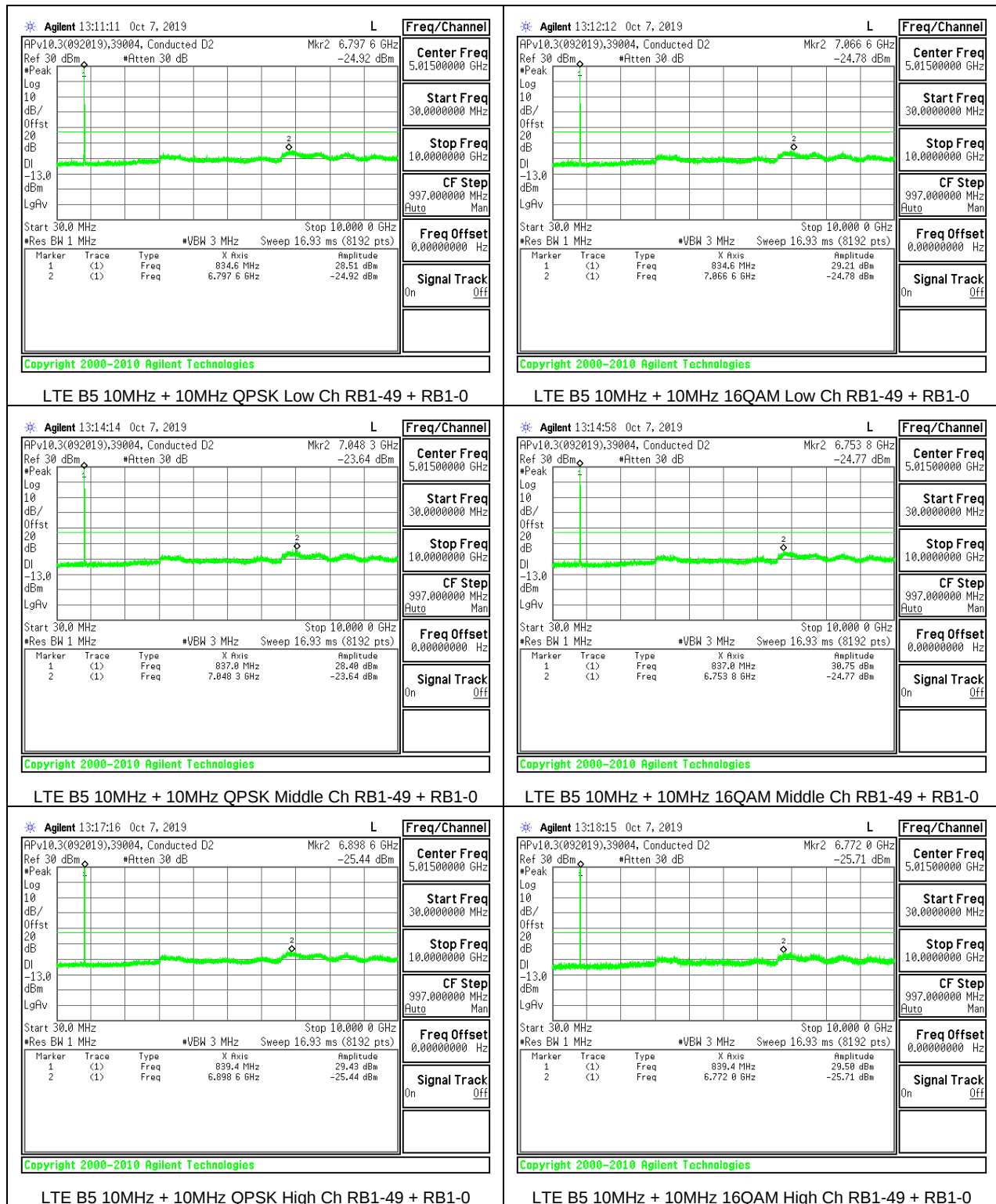
- Set display line at -25 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.
(NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

MODES TESTED

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

8.3.1. LTE BAND 5



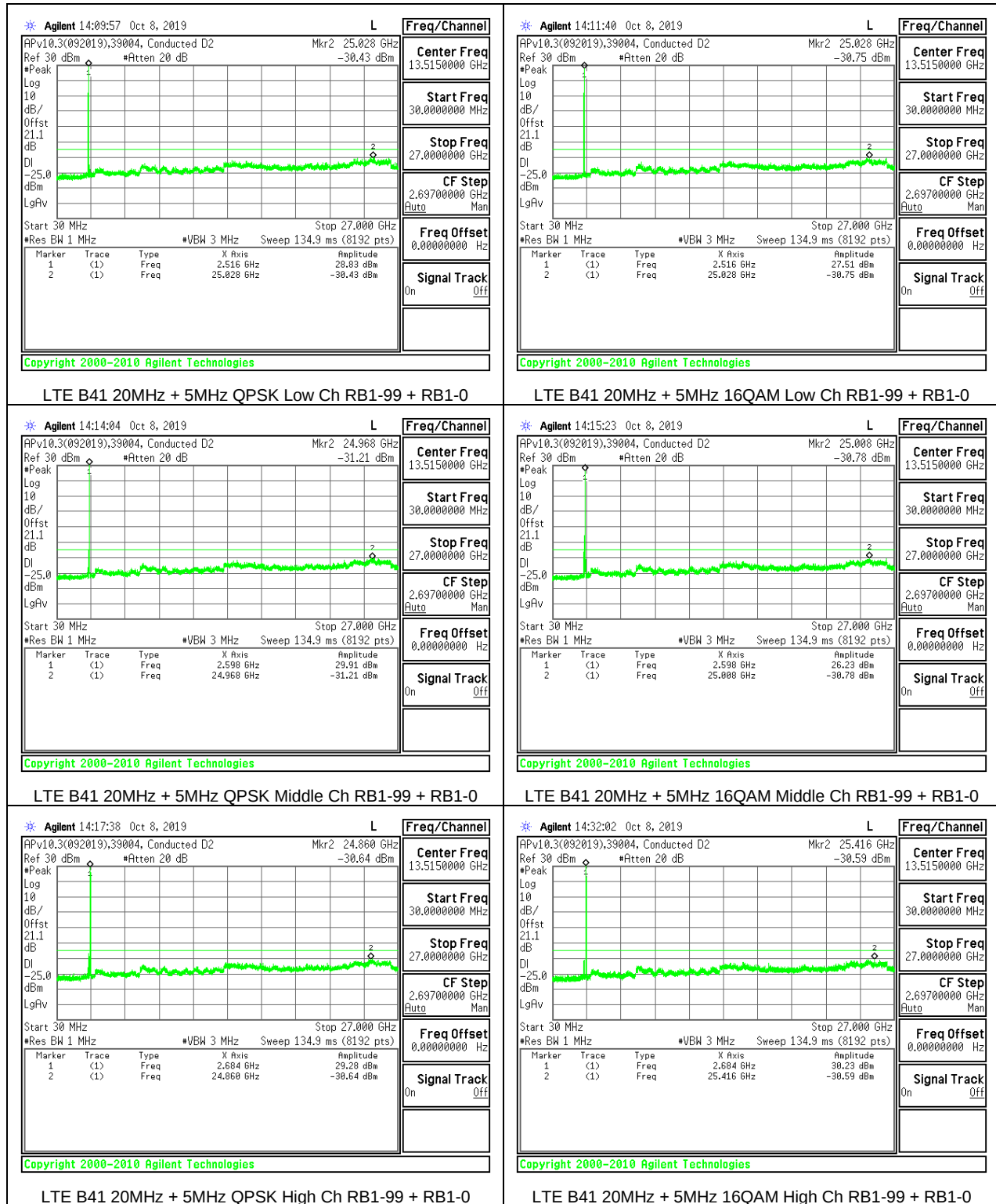


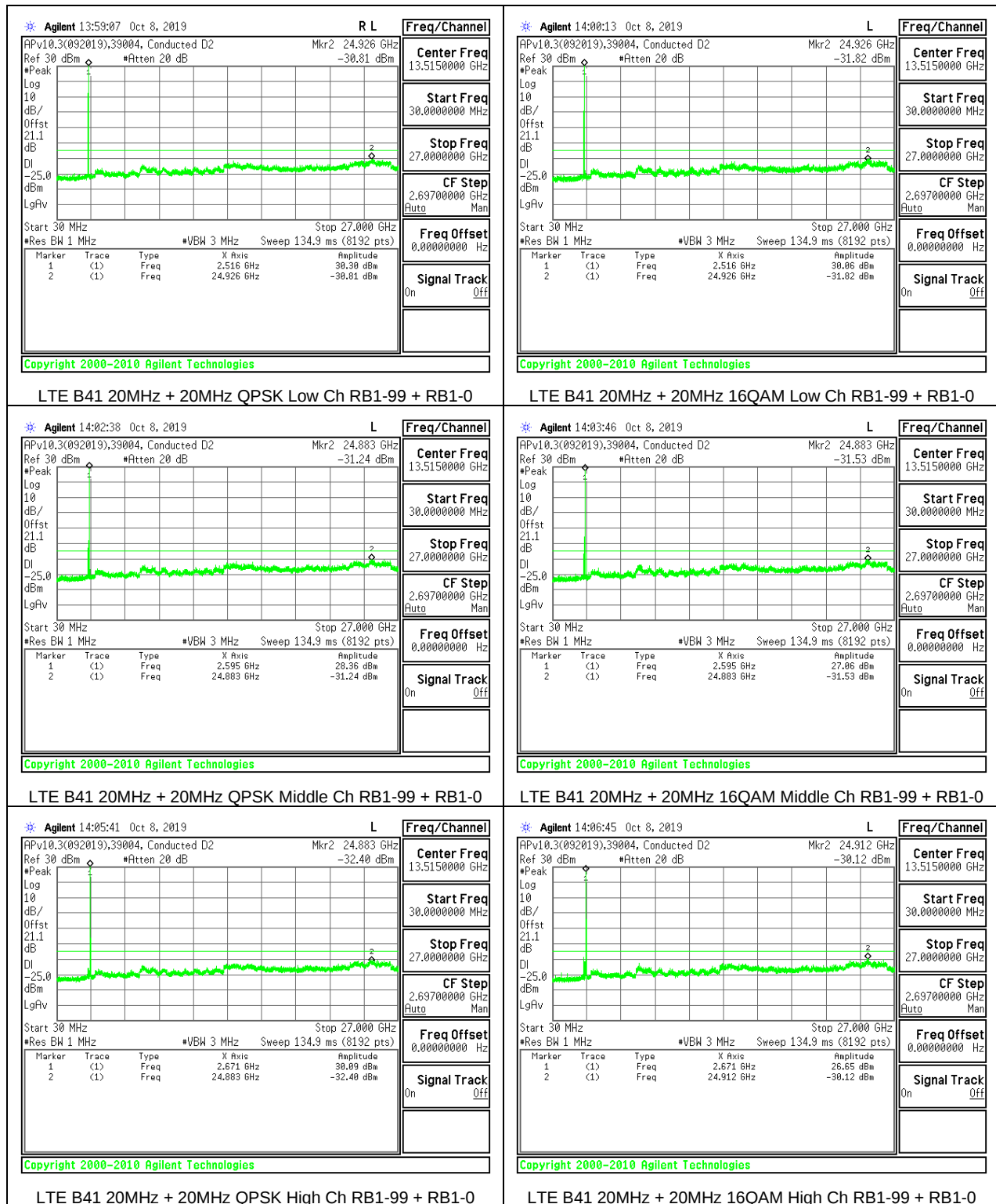
8.3.2. LTE BAND 7





8.3.3. LTE BAND 41





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

8.4.1. LTE BAND 5

ID:	30606	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	824.4152	848.8553		
Extreme (50C)		824.4152	848.8553	20.2	0.024
Extreme (40C)		824.4152	848.8553	18.3	0.022
Extreme (30C)		824.4152	848.8553	23.3	0.028
Extreme (10C)		824.4152	848.8553	25.6	0.031
Extreme (0C)		824.4152	848.8553	22.1	0.026
Extreme (-10C)		824.4152	848.8553	26.4	0.032
Extreme (-20C)		824.4152	848.8553	15.1	0.018
Extreme (-30C)		824.4152	848.8553	21.2	0.025
20C	15%	824.4152	848.8553	16.3	0.019
	-15%	824.4152	848.8553	16.5	0.020
	End Point	824.4152	848.8553	18.1	0.022

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	824.5972	848.4548		
Extreme (50C)		824.5972	848.4548	42.3	0.051
Extreme (40C)		824.5972	848.4548	43.2	0.052
Extreme (30C)		824.5972	848.4548	31.2	0.037
Extreme (10C)		824.5972	848.4548	24.4	0.029
Extreme (0C)		824.5972	848.4548	25.6	0.031
Extreme (-10C)		824.5972	848.4548	24.2	0.029
Extreme (-20C)		824.5972	848.4548	21.2	0.025
Extreme (-30C)		824.5972	848.4548	17.1	0.020
20C	15%	824.5972	848.4548	27.7	0.033
	-15%	824.5972	848.4548	26.4	0.032
	End Point	824.5972	848.4548	27.8	0.033

8.4.2. LTE BAND 7

ID:	30606	Date:	10/23/19
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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	2500.6054	2569.4553		
Extreme (50C)		2500.6054	2569.4553	30.7	0.012
Extreme (40C)		2500.6054	2569.4553	31.0	0.012
Extreme (30C)		2500.6054	2569.4553	26.6	0.010
Extreme (10C)		2500.6054	2569.4553	19.8	0.008
Extreme (0C)		2500.6054	2569.4553	-22.7	-0.009
Extreme (-10C)		2500.6054	2569.4553	-13.9	-0.005
Extreme (-20C)		2500.6054	2569.4553	-19.9	-0.008
Extreme (-30C)		2500.6054	2569.4553	-25.2	-0.010
20C	15%	2500.6054	2569.4553	-24.8	-0.010
	-15%	2500.6054	2569.4553	-22.2	-0.009
	End Point	2500.6054	2569.4553	-19.7	-0.008

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	2501.2019	2568.8815		
Extreme (50C)		2501.2020	2568.8816	66.6	0.026
Extreme (40C)		2501.2020	2568.8816	64.9	0.026
Extreme (30C)		2501.2019	2568.8815	27.9	0.011
Extreme (10C)		2501.2019	2568.8815	11.6	0.005
Extreme (0C)		2501.2019	2568.8815	-42.3	-0.017
Extreme (-10C)		2501.2019	2568.8815	-22.8	-0.009
Extreme (-20C)		2501.2019	2568.8815	-40.8	-0.016
Extreme (-30C)		2501.2018	2568.8814	-51.2	-0.020
20C	15%	2501.2018	2568.8814	-51.1	-0.020
	-15%	2501.2018	2568.8814	-55.3	-0.022
	End Point	2501.2018	2568.8814	-61.1	-0.024

8.4.3. LTE BAND 41

ID:	30606	Date:	10/25/19
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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	2496.6566	2689.4195		
Extreme (50C)		2496.6566	2689.4195	13.8	0.005
Extreme (40C)		2496.6566	2689.4195	12.5	0.005
Extreme (30C)		2496.6566	2689.4195	9.8	0.004
Extreme (10C)		2496.6566	2689.4195	8.4	0.003
Extreme (0C)		2496.6566	2689.4195	1.4	0.001
Extreme (-10C)		2496.6566	2689.4195	-3.7	-0.001
Extreme (-20C)		2496.6566	2689.4195	-6.1	-0.002
Extreme (-30C)		2496.6566	2689.4195	-11.5	-0.004
20C	15%	2496.6566	2689.4195	10.6	0.004
	-15%	2496.6566	2689.4195	3.5	0.001
	End Point	2496.6566	2689.4195	-14.2	-0.005

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	2496.7065	2689.3694		
Extreme (50C)		2496.7066	2689.3695	73.1	0.028
Extreme (40C)		2496.7066	2689.3695	53.6	0.021
Extreme (30C)		2496.7065	2689.3694	42.1	0.016
Extreme (10C)		2496.7065	2689.3694	-18.9	-0.007
Extreme (0C)		2496.7065	2689.3694	-33.4	-0.013
Extreme (-10C)		2496.7065	2689.3694	-46.6	-0.018
Extreme (-20C)		2496.7065	2689.3694	-35.0	-0.013
Extreme (-30C)		2496.7065	2689.3694	-33.2	-0.013
20C	15%	2496.7065	2689.3694	19.7	0.008
	-15%	2496.7065	2689.3694	20.8	0.008
	End Point	2496.7065	2689.3694	24.2	0.009

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:	39004	Date:	10/9/19
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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	5 MHz / 3MHz	835.1	839.0	QPSK	33.28	23.85	9.43
				16QAM	33.06	23.59	9.47
	3MHz / 5MHz	834.1	838.0	QPSK	33.26	23.83	9.43
				16QAM	32.92	23.58	9.34
	10MHz / 5MHz	834.3	841.5	QPSK	33.85	23.88	9.97
				16QAM	32.75	23.62	9.13
	5MHz / 10MHz	831.8	839.0	QPSK	33.05	23.92	9.13
				16QAM	33.35	23.63	9.72
	10MHz / 10MHz	831.6	831.5	QPSK	33.42	23.92	9.50
				16QAM	33.98	23.9	10.08
Duty Cycle Correction Factor (dB) =			0.00				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

8.5.2. LTE BAND 7

ID:	39004	Date:	10/9/19
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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	33.03	23.75	9.28
				16QAM	33.03	23.75	9.28
	15 MHz / 15MHz	2527.5	2542.5	QPSK	32.77	23.85	8.92
				16QAM	32.44	23.60	8.84
	15MHz / 20MHz	2525.3	2542.4	QPSK	33.18	23.91	9.27
				16QAM	33.01	23.68	9.33
	20MHz / 10MHz	2530.1	2544.5	QPSK	32.70	23.87	8.83
				16QAM	32.29	23.63	8.66
	20MHz / 15MHz	2527.6	2544.7	QPSK	30.07	23.93	6.14
				16QAM	32.80	23.69	9.11
20MHz / 20MHz	2525.1	2544.9	QPSK	32.64	23.84	8.80	
			16QAM	32.82	23.56	9.26	
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:	39004	Date:	10/9/19
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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	37.90	25.10	5.79
				16QAM	37.67	24.79	5.87
	10MHz / 20MHz	2583.6	2598.0	QPSK	37.99	25.13	5.85
				16QAM	38.06	24.80	6.25
	15MHz / 15MHz	2585.5	2600.5	QPSK	37.85	25.16	5.68
				16QAM	37.65	24.86	5.78
	15MHz / 20MHz	2583.3	2600.4	QPSK	37.83	24.89	5.93
				16QAM	37.71	24.91	5.79
	20MHz / 5MHz	2590.5	2602.2	QPSK	37.99	25.12	5.86
				16QAM	37.79	24.93	5.85
	20MHz / 10MHz	2588.1	2602.5	QPSK	37.95	25.17	5.77
				16QAM	37.79	24.86	5.92
	20MHz / 15MHz	2585.6	2602.7	QPSK	38.15	25.29	5.85
				16QAM	38.08	24.99	6.08
	20MHz / 20MHz	2583.1	2602.9	QPSK	38.12	25.24	5.87
				16QAM	37.82	24.90	5.91
Duty Cycle Correction Factor (dB) =			7.01				
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor							

9. RADIATED TEST RESULTS

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. FIELD STRENGTH OF SPURIOUS RADIATION, LAT 1

9.1.1. LTE BAND 5

Company:	
Project #:	13018973
Date:	10/1/2019
Test Engineer:	12491
Configuration:	EUT Only
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)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.67144	-65.84	Pk	28.9	-31.6	12.7	-55.84	-13	-42.84	H
2.49621	-65.59	Pk	32.6	-30.7	11.4	-52.29	-13	-39.29	H
3.34936	-67.41	Pk	32.8	-29.3	10.6	-53.31	-13	-40.31	H
1.66758	-62.63	Pk	28.8	-31.6	11.6	-53.83	-13	-40.83	V
2.4861	-66.14	Pk	32.6	-30.6	11.5	-52.64	-13	-39.64	V
3.3499	-67.22	Pk	32.8	-29.4	11.3	-52.52	-13	-39.52	V
Mid Channel, 831.6MHz + 841.5MHz									
1.67331	-62.86	Pk	28.9	-31.6	12.6	-52.96	-13	-39.96	H
1.67291	-62.93	Pk	28.9	-31.6	11.4	-54.23	-13	-41.23	V
3.35675	-66.86	Pk	32.8	-29.4	11.6	-51.86	-13	-38.86	V
2.5252	-67.08	Pk	32.6	-30.6	12.1	-52.98	-13	-39.98	V
2.54064	-65.85	Pk	32.6	-30.5	11.9	-51.85	-13	-38.85	H
3.3412	-67.73	Pk	32.8	-29.3	10.5	-53.73	-13	-40.73	H
High Channel, 834.1MHz + 844MHz									
1.67429	-65.74	Pk	28.9	-31.5	12.5	-55.84	-13	-42.84	H
3.35518	-67.33	Pk	32.8	-29.4	10.9	-53.03	-13	-40.03	H
1.67831	-62.93	Pk	28.9	-31.5	10.9	-54.63	-13	-41.63	V
2.50357	-66.64	Pk	32.7	-30.7	11.2	-53.44	-13	-40.44	H
2.50487	-66.61	Pk	32.7	-30.6	11.2	-53.31	-13	-40.31	V
3.32924	-67.41	Pk	32.8	-29.3	11	-52.91	-13	-39.91	V

Pk - Peak detector

Company:	
Project #:	13018973
Date:	10/1/2019
Test Engineer:	12941
Configuration:	EUT Only
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)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.66768	-62.26	Pk	28.8	-31.6	12.6	-52.46	-13	-39.46	H
1.66805	-63.09	Pk	28.8	-31.6	11.6	-54.29	-13	-41.29	V
2.49807	-66.36	Pk	32.6	-30.7	11.9	-52.56	-13	-39.56	V
3.33452	-67.51	Pk	32.8	-29.3	10.9	-53.11	-13	-40.11	V
2.50516	-66.37	Pk	32.7	-30.6	11.3	-52.97	-13	-39.97	H
3.31804	-67.63	Pk	32.8	-29.3	11.2	-52.93	-13	-39.93	H
Mid Channel, 831.6MHz + 841.5MHz									
1.67304	-63.15	Pk	28.9	-31.6	12.6	-53.25	-13	-40.25	H
2.49968	-66.75	Pk	32.6	-30.7	11.3	-53.55	-13	-40.55	H
1.67008	-64.87	Pk	28.8	-31.6	11.6	-56.07	-13	-43.07	V
2.49949	-66.08	Pk	32.6	-30.7	11.7	-52.48	-13	-39.48	V
3.33143	-67.09	Pk	32.8	-29.2	10.7	-52.79	-13	-39.79	H
3.36475	-66.61	Pk	32.8	-29.3	11.7	-51.41	-13	-38.41	V
High Channel, 834.1MHz + 844MHz									
1.6861	-65.16	Pk	28.9	-31.6	12.3	-55.56	-13	-42.56	H
2.49435	-65.72	Pk	32.6	-30.6	11.4	-52.32	-13	-39.32	H
3.35738	-66.88	Pk	32.8	-29.4	11	-52.48	-13	-39.48	H
1.67773	-62.93	Pk	28.9	-31.5	10.9	-54.63	-13	-41.63	V
2.49478	-65.55	Pk	32.6	-30.7	11.9	-51.75	-13	-38.75	V
3.35213	-67.41	Pk	32.8	-29.4	11.5	-52.51	-13	-39.51	V

Pk - Peak detector

9.1.2. LTE BAND 7

Company:	
Project #:	13018973
Date:	10/2/2019
Test Engineer:	50822
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									
5.04801	-66.38	Pk	34.4	-27.8	11.2	-48.58	-25	-23.58	H
7.56224	-70.04	Pk	35.7	-23.3	10.9	-46.74	-25	-21.74	H
5.05352	-66.68	Pk	34.3	-27.8	11.2	-48.98	-25	-23.98	V
7.56456	-70.53	Pk	35.7	-23.3	11.3	-46.83	-25	-21.83	V
10.02204	-72.3	Pk	37.1	-20.9	10.3	-45.8	-25	-20.8	H
10.02207	-71.85	Pk	37.1	-20.9	10.5	-45.15	-25	-20.15	V
Mid Channel 2525.1MHz + 2544.9MHz									
4.86316	-66.57	Pk	34.2	-27.7	11.3	-48.77	-25	-23.77	H
5.08997	-66.86	Pk	34.4	-27.8	11.1	-49.16	-25	-24.16	V
6.63863	-70.09	Pk	36	-25.2	10.7	-48.59	-25	-23.59	H
7.67497	-70.35	Pk	35.8	-23.5	11.4	-46.65	-25	-21.65	V
9.66578	-70.63	Pk	36.8	-21.1	10.9	-44.03	-25	-19.03	H
9.68203	-70.96	Pk	36.8	-20.9	11.2	-43.86	-25	-18.86	V
High Channel 2540.2MHz + 2560MHz									
3.8665	-66.12	Pk	33.6	-28.6	11.4	-49.72	-25	-24.72	H
3.89287	-66.41	Pk	33.5	-28.6	11.2	-50.31	-25	-25.31	V
5.10176	-67.31	Pk	34.5	-27.6	11.4	-49.01	-25	-24.01	V
5.16193	-67.44	Pk	34.5	-27.6	11.6	-48.94	-25	-23.94	H
6.45081	-68.79	Pk	35.9	-25.1	10.9	-47.09	-25	-22.09	H
7.14551	-69.87	Pk	36.1	-24.3	10.6	-47.47	-25	-22.47	V

Pk - Peak detector

Company:	
Project #:	13018973
Date:	10/2/2019
Test Engineer:	12491
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									
5.05296	-67.21	Pk	34.3	-27.8	11.1	-49.61	-25	-24.61	H
7.5774	-70.69	Pk	35.7	-23.3	10.6	-47.69	-25	-22.69	H
10.82017	-71.91	Pk	37.9	-19.1	10.1	-43.01	-25	-18.01	H
5.05222	-66.68	Pk	34.3	-27.8	11.2	-48.98	-25	-23.98	V
7.56873	-70.35	Pk	35.8	-23.3	11.1	-46.75	-25	-21.75	V
10.81284	-71.98	Pk	38	-19.2	10.5	-42.68	-25	-17.68	V
Mid Channel 2525.1MHz + 2544.9MHz									
5.10394	-66.82	Pk	34.5	-27.7	11.4	-48.62	-25	-23.62	V
5.1715	-67.57	Pk	34.6	-27.6	11.6	-48.97	-25	-23.97	H
6.93446	-70.54	Pk	36	-24.1	10.9	-47.74	-25	-22.74	H
7.02018	-69.31	Pk	36	-24.1	10.8	-46.61	-25	-21.61	V
9.67219	-69.92	Pk	36.8	-21	11	-43.12	-25	-18.12	V
9.87926	-71.71	Pk	36.9	-20.9	10.8	-44.91	-25	-19.91	H
High Channel 2540.2MHz + 2560MHz									
3.85997	-66.58	Pk	33.6	-28.6	11.9	-49.68	-25	-24.68	H
3.79197	-66.13	Pk	33.7	-28.8	11.5	-49.73	-25	-24.73	V
5.09856	-66.65	Pk	34.5	-27.6	11.4	-48.35	-25	-23.35	V
5.17182	-67.57	Pk	34.6	-27.6	11.6	-48.97	-25	-23.97	H
6.49978	-69.6	Pk	35.8	-25.1	10.9	-48	-25	-23	H
7.0085	-70.73	Pk	36	-24.2	11.1	-47.83	-25	-22.83	V

Pk - Peak detector

9.1.3. LTE BAND 41

Company:	
Project #:	13018973
Date:	10/3/2019
Test Engineer:	50822
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									
3.90675	-66.36	Pk	33.5	-28.7	10.8	-50.76	-25	-25.76	V
3.94247	-66.77	Pk	33.5	-28.8	11.6	-50.47	-25	-25.47	H
5.5302	-68.5	Pk	34.8	-27.2	11.4	-49.5	-25	-24.5	V
6.00117	-68.72	Pk	35.5	-26.4	11.4	-48.22	-25	-23.22	H
9.6655	-71.25	Pk	36.8	-21.1	10.9	-44.65	-25	-19.65	H
9.72425	-71.13	Pk	36.9	-21	10.9	-44.33	-25	-19.33	V
Mid Channel 2583.1MHz + 2602.9MHz									
3.79731	-65.92	Pk	33.7	-28.8	11.3	-49.72	-25	-24.72	V
3.79771	-64.97	Pk	33.7	-28.8	11.1	-48.97	-25	-23.97	H
5.5732	-68.16	Pk	34.9	-27.1	10.8	-49.56	-25	-24.56	H
6.01358	-68.46	Pk	35.5	-26.4	10.9	-48.46	-25	-23.46	V
7.34966	-70.23	Pk	35.7	-23.7	10.6	-47.63	-25	-22.63	H
8.92138	-70.49	Pk	36.2	-22.4	11.2	-45.49	-25	-20.49	V
High Channel 2660.2MHz + 2680MHz									
3.81173	-66.18	Pk	33.7	-28.6	11	-50.08	-25	-25.08	V
3.92089	-65.98	Pk	33.6	-28.7	11.4	-49.68	-25	-24.68	H
5.10495	-66.83	Pk	34.5	-27.7	11.3	-48.73	-25	-23.73	V
5.90024	-68.69	Pk	35.3	-26.2	10.8	-48.79	-25	-23.79	H
7.91323	-70.63	Pk	35.9	-23.1	11.2	-46.63	-25	-21.63	V
8.89056	-71.29	Pk	36.2	-22.4	11.2	-46.29	-25	-21.29	H

Pk - Peak detector

Company:	
Project #:	13018973
Date:	10/3/2019
Test Engineer:	50822
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									
3.68684	-65.84	Pk	33.2	-28.8	11.7	-49.74	-25	-24.74	H
3.80706	-66.21	Pk	33.7	-28.6	11.2	-49.91	-25	-24.91	V
5.20379	-67.93	Pk	34.6	-27.6	11	-49.93	-25	-24.93	V
5.57293	-68.56	Pk	34.9	-27.1	10.8	-49.96	-25	-24.96	H
7.97597	-70.88	Pk	35.8	-23	11.4	-46.68	-25	-21.68	V
9.68382	-71.24	Pk	36.8	-20.9	10.9	-44.44	-25	-19.44	H
Mid Channel 2583.1MHz + 2602.9MHz									
3.33978	-74.16	Av	32.8	-29.3	11	-59.66	-25	-34.66	V
3.68848	-65.41	Pk	33.2	-28.8	11.5	-49.51	-25	-24.51	H
5.1392	-66.33	Pk	34.6	-27.7	10.9	-48.53	-25	-23.53	H
5.58908	-67.77	Pk	34.9	-27.2	11	-49.07	-25	-24.07	V
7.35952	-70.55	Pk	35.7	-23.7	10.8	-47.75	-25	-22.75	H
9.70228	-71.85	Pk	36.8	-21.1	10.9	-45.25	-25	-20.25	V
High Channel 2660.2MHz + 2680MHz									
3.6905	-66.01	Pk	33.2	-28.8	11.4	-50.21	-25	-25.21	H
3.89526	-66.87	Pk	33.5	-28.6	11.1	-50.87	-25	-25.87	V
5.42474	-69.07	Pk	34.9	-27.2	11.5	-49.87	-25	-24.87	V
5.98103	-69.52	Pk	35.4	-26.2	10.9	-49.42	-25	-24.42	H
8.02178	-70.38	Pk	35.8	-23.1	11.3	-46.38	-25	-21.38	V
9.37605	-71.64	Pk	36.4	-21.6	10.9	-45.94	-25	-20.94	H

Pk - Peak detector

9.2. FIELD STRENGTH OF SPURIOUS RADIATION, UAT 1

9.2.1. LTE BAND 5

Company:	
Project #:	13018973
Date:	10/2/2019
Test Engineer:	50822
Configuration:	EUT Only
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)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.74861	-66.54	Pk	25.9	-29.5	9.6	-60.54	-13	-47.54	V
1.81841	-67.8	Pk	26.3	-29.5	10	-61	-13	-48	H
2.37698	-67.57	Pk	30.2	-28.6	9.6	-56.37	-13	-43.37	V
2.76831	-67.95	Pk	29.3	-28.1	9.9	-56.85	-13	-43.85	H
3.10739	-68.49	Pk	30.9	-27.5	10.6	-54.49	-13	-41.49	V
3.28187	-68.72	Pk	30.9	-27.4	9.6	-55.62	-13	-42.62	H
Mid Channel, 831.6MHz + 841.5MHz									
1.87565	-68.13	Pk	26.8	-29.2	10.4	-60.13	-13	-47.13	H
1.97554	-67.43	Pk	28.2	-29.3	10.6	-57.93	-13	-44.93	V
2.36023	-61.39	Pk	30.1	-28.7	10.7	-49.29	-13	-36.29	H
2.65285	-68.48	Pk	29.8	-28.2	9.3	-57.58	-13	-44.58	V
3.28025	-68.9	Pk	30.9	-27.4	9.6	-55.8	-13	-42.8	H
3.69286	-68.69	Pk	30.4	-26.8	9.9	-55.19	-13	-42.19	V
High Channel, 834.1MHz + 844MHz									
1.78021	-67.77	Pk	26	-29.6	10	-61.37	-13	-48.37	V
1.92311	-67.25	Pk	27.3	-29.3	10.3	-58.95	-13	-45.95	H
2.57679	-68.55	Pk	30.1	-28.4	10.2	-56.65	-13	-43.65	H
2.60571	-68.12	Pk	30	-28.3	9.1	-57.32	-13	-44.32	V
3.05475	-67.3	Pk	30.6	-27.6	9.6	-54.7	-13	-41.7	V
3.2429	-68.74	Pk	31	-27.3	10.1	-54.94	-13	-41.94	H

Pk - Peak detector

Company:	
Project #:	13018973
Date:	10/2/2019
Test Engineer:	50822
Configuration:	EUT Only
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)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 829MHz + 838.9MHz									
1.98642	-67.34	Pk	28.4	-29.1	11.3	-56.74	-13	-43.74	V
1.98824	-67.86	Pk	28.4	-29	10	-58.46	-13	-45.46	H
2.3329	-67.85	Pk	29.8	-28.7	10	-56.75	-13	-43.75	H
2.77218	-68.22	Pk	29.3	-28	9.3	-57.62	-13	-44.62	V
3.1127	-68.45	Pk	30.9	-27.6	9.3	-55.85	-13	-42.85	H
3.68561	-68.38	Pk	30.4	-26.7	10	-54.68	-13	-41.68	V
Mid Channel, 831.6MHz + 841.5MHz									
1.6855	-67.04	Pk	25.5	-29.8	9.8	-61.54	-13	-48.54	V
1.69221	-66.53	Pk	25.5	-29.7	9.7	-61.03	-13	-48.03	V
1.8305	-68.53	Pk	26.4	-29.5	11.2	-60.43	-13	-47.43	H
2.32185	-67.38	Pk	29.7	-28.8	10.9	-55.58	-13	-42.58	H
2.59918	-67.4	Pk	30	-28.3	9.2	-56.5	-13	-43.5	V
3.05475	-67.3	Pk	30.6	-27.6	9.6	-54.7	-13	-41.7	V
High Channel, 834.1MHz + 844MHz									
1.64227	-66.67	Pk	25.3	-29.9	10.9	-60.37	-13	-47.37	H
1.77668	-67.72	Pk	26	-29.6	10	-61.32	-13	-48.32	V
2.37587	-68.19	Pk	30.2	-28.6	9.6	-56.99	-13	-43.99	V
2.39726	-68.15	Pk	30.3	-28.8	9.8	-56.85	-13	-43.85	H
3.7952	-67.75	Pk	31	-26.9	10.1	-53.55	-13	-40.55	H
3.84436	-68.87	Pk	31.4	-26.7	9.6	-54.57	-13	-41.57	V

Pk - Peak detector

9.2.2. LTE BAND 7

Company:	
Project #:	13018973
Date:	10/2/2019
Test Engineer:	12491
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									
5.00445	-67.45	Pk	34.3	-27.9	10.8	-50.25	-25	-25.25	H
7.53577	-71.01	Pk	35.8	-23.4	10.6	-48.01	-25	-23.01	H
5.03742	-68.03	Pk	34.3	-27.8	11.1	-50.43	-25	-25.43	V
7.57122	-70.79	Pk	35.8	-23.3	11	-47.29	-25	-22.29	V
10.10491	-71.4	Pk	37.2	-20.7	10.6	-44.3	-25	-19.3	H
10.11735	-72.07	Pk	37.2	-20.8	10.5	-45.17	-25	-20.17	V
Mid Channel 2525.1MHz + 2544.9MHz									
5.0544	-66.99	Pk	34.3	-27.8	11.1	-49.39	-25	-24.39	H
7.6075	-71.02	Pk	35.8	-23.4	10.8	-47.82	-25	-22.82	H
5.06875	-67.21	Pk	34.3	-27.9	10.8	-50.01	-25	-25.01	V
7.60501	-70.47	Pk	35.8	-23.5	11.2	-46.97	-25	-21.97	V
10.12324	-71.99	Pk	37.2	-20.8	10.3	-45.29	-25	-20.29	V
10.15288	-71.82	Pk	37.2	-20.1	9.8	-44.92	-25	-19.92	H
High Channel 2540.2MHz + 2560MHz									
5.0904	-67.55	Pk	34.4	-27.8	10.8	-50.15	-25	-25.15	H
7.55343	-70.54	Pk	35.7	-23.4	10.9	-47.34	-25	-22.34	H
5.09588	-67.74	Pk	34.5	-27.6	11.2	-49.64	-25	-24.64	V
7.56892	-70.18	Pk	35.8	-23.3	11.1	-46.58	-25	-21.58	V
10.17055	-71.05	Pk	37.2	-20.3	10.6	-43.55	-25	-18.55	V
10.17086	-71.69	Pk	37.2	-20.3	10.5	-44.29	-25	-19.29	H

Pk - Peak detector

Company:	
Project #:	13018973
Date:	10/2/2019
Test Engineer:	12491
Configuration:	EUT Only
Mode:	LTE 7 16QAM 20MHz + 20MHz
Chamber #:	Chamber A

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									
5.03181	-68.14	Pk	34.3	-27.9	11.1	-50.64	-25	-25.64	H
7.55756	-70.43	Pk	35.7	-23.3	10.9	-47.13	-25	-22.13	H
5.04884	-67.36	Pk	34.4	-27.8	11.2	-49.56	-25	-24.56	V
7.55936	-70.97	Pk	35.7	-23.3	11.2	-47.37	-25	-22.37	V
10.09201	-72	Pk	37.1	-20.6	10.5	-45	-25	-20	V
10.09923	-71.4	Pk	37.2	-20.7	10.5	-44.4	-25	-19.4	H
Mid Channel 2525.1MHz + 2544.9MHz									
5.10328	-67	Pk	34.5	-27.7	11.2	-49	-25	-24	H
7.60221	-70.69	Pk	35.8	-23.4	10.7	-47.59	-25	-22.59	H
5.11145	-67.02	Pk	34.4	-27.7	11.1	-49.22	-25	-24.22	V
7.60321	-69.66	Pk	35.8	-23.5	11.1	-46.26	-25	-21.26	V
10.15442	-71.65	Pk	37.2	-20.1	9.9	-44.65	-25	-19.65	H
10.1557	-71.18	Pk	37.2	-20.1	10.3	-43.78	-25	-18.78	V
High Channel 2540.2MHz + 2560MHz									
5.11093	-66.56	Pk	34.4	-27.7	11.3	-48.56	-25	-23.56	H
7.66466	-70.38	Pk	35.8	-23.6	10.9	-47.28	-25	-22.28	H
5.10124	-67.42	Pk	34.5	-27.6	11.4	-49.12	-25	-24.12	V
7.63664	-69.78	Pk	35.8	-23.4	11.2	-46.18	-25	-21.18	V
10.18807	-71.51	Pk	37.2	-20.6	10.3	-44.61	-25	-19.61	H
10.20621	-71.96	Pk	37.2	-20.2	9.9	-45.06	-25	-20.06	V

Pk - Peak detector

9.2.3. LTE BAND 41

Company:	
Project #:	13018973
Date:	10/3/2019
Test Engineer:	12491
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									
3.98272	-68.3	Pk	31.7	-26.7	9.6	-53.7	-25	-28.7	H
3.98489	-67.83	Pk	31.7	-26.7	9.5	-53.33	-25	-28.33	V
5.09919	-69.72	Pk	34	-25.3	9.3	-51.72	-25	-26.72	V
5.56473	-69.8	Pk	33.7	-24.9	9	-52	-25	-27	H
6.58972	-70.95	Pk	36.4	-23.5	7.1	-50.95	-25	-25.95	V
7.2127	-71.29	Pk	37.3	-22.8	7.6	-49.19	-25	-24.19	H
Mid Channel 2583.1MHz + 2602.9MHz									
3.9258	-68.62	Pk	31.7	-26.5	9.7	-53.72	-25	-28.72	V
3.9315	-68.66	Pk	31.7	-26.6	9.8	-53.76	-25	-28.76	H
5.01045	-69.39	Pk	33.6	-25.2	9	-51.99	-25	-26.99	H
5.12329	-69.86	Pk	34	-25.4	8.5	-52.76	-25	-27.76	V
7.81236	-70.68	Pk	37.9	-22.2	7.9	-47.08	-25	-22.08	V
8.06192	-72.08	Pk	37.9	-21.5	7.6	-48.08	-25	-23.08	H
High Channel 2660.2MHz + 2680MHz									
7.73253	-70.52	Pk	35.9	-23.4	11.1	-46.92	-25	-21.92	H
10.75568	-71.89	Pk	37.9	-19.9	10.3	-43.59	-25	-18.59	H
7.73128	-70.27	Pk	35.9	-23.5	11.2	-46.67	-25	-21.67	V
10.75824	-72.35	Pk	37.9	-19.9	10.6	-43.75	-25	-18.75	V
5.19061	-67.25	Pk	34.6	-27.6	11	-49.25	-25	-24.25	V
5.1984	-68.13	Pk	34.6	-27.6	10.6	-50.53	-25	-25.53	H

Pk - Peak detector

Company:	
Project #:	13018973
Date:	10/2/2019
Test Engineer:	12491
Configuration:	EUT Only
Mode:	LTE 41 16QAM 20MHz + 20MHz
Chamber #:	Chamber A

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									
3.70101	-68.35	Pk	30.4	-26.8	10.3	-54.45	-25	-29.45	H
5.00685	-70.01	Pk	33.6	-25.1	9.4	-52.11	-25	-27.11	H
3.92829	-68.91	Pk	31.7	-26.5	9.6	-54.11	-25	-29.11	V
5.93085	-70.27	Pk	34.8	-24.8	8.7	-51.57	-25	-26.57	V
7.09091	-71.02	Pk	36.9	-22.8	7.5	-49.42	-25	-24.42	V
7.19688	-71.44	Pk	37.3	-22.8	7.8	-49.14	-25	-24.14	H
Mid Channel 2583.1MHz + 2602.9MHz									
3.36089	-69.46	Pk	30.6	-27.1	9.8	-56.16	-25	-31.16	V
4.03177	-69.48	Pk	31.6	-26.6	9.6	-54.88	-25	-29.88	H
4.99612	-70.77	Pk	33.6	-24.9	10	-52.07	-25	-27.07	V
5.15627	-69.54	Pk	34	-25.4	9.1	-51.84	-25	-26.84	H
7.14395	-71.72	Pk	37.1	-22.9	7.3	-50.22	-25	-25.22	V
7.15839	-71.21	Pk	37.1	-22.9	7.6	-49.41	-25	-24.41	H
High Channel 2660.2MHz + 2680MHz									
5.35506	-68.82	Pk	35	-27.1	11.3	-49.62	-25	-24.62	H
10.67087	-71.52	Pk	37.9	-20.2	10.7	-43.12	-25	-18.12	H
10.68511	-71.71	Pk	37.9	-20.1	11	-42.91	-25	-17.91	V
5.34742	-68.85	Pk	35	-27.1	11.2	-49.75	-25	-24.75	V
7.97906	-70.12	Pk	35.8	-22.9	11.3	-45.92	-25	-20.92	H
7.99527	-70.55	Pk	35.9	-22.9	11.7	-45.85	-25	-20.85	V

Pk - Peak detector

10. SETUP PHOTOS

Please see setup photo report 13018973-EP1V1

END OF REPORT

