



CERTIFICATION TEST REPORT

Report Number. : 12737383-E9V2

Applicant : Samsung Electronics Co., Ltd.
129 Samsung-Ro, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, 16677, Korea

Model : SMA-7050

FCC ID : A3LSMA7050

EUT Description : GSM/CDMA/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, ANT+ and NFC

Test Standard(s) : FCC CFR47 PART 27 SUBPART M

Date Of Issue:

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NVLAP Lab code: 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	4/1/2019	Initial Issue	--
V2	4/2/2019	Updated Sections 1, 2, 5.2, 5.5, 6.5, 7, and 9.1	Steven Tran

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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA		
Model	SM-A7050		
FCC ID	A3LSMA7050		
EUT Description	GSM/CDMA/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, ANT+ and NFC		
Serial Number	R38M20759DP(CONDUCTED), R38M2074Q7T, R38M207598Z(RADIATED)		
Date Tested	MARCH 20, 2019 to MARCH 29, 2019		
Applicable Standards	FCC CFR 47 27M		
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 For UL Verification Services Inc. By: 		Reviewed By: 	
Dan Corona Operations Leader Consumer Technology Division UL Verification Services Inc.		Steven Tran Project Engineer Consumer Technology Division UL Verification Services Inc.	

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26:2015, TIA-603-E, FCC CFR 47 Part 2, Part 27, FCC KDB 971168 D01 v03r01, and FCC KDB 971168 D02 v02r01.

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. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd
☐ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)	☒ Chamber I (ISED:2324A-5)
☐ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)	☐ Chamber J (ISED:2324A-6)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	☐ Chamber K (ISED:2324A-1)
	☐ Chamber G (ISED:22541-4)	☐ Chamber L (ISED:2324A-3)
	☐ Chamber H (ISED:22541-5)	

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/CDMA/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, ANT+ and NFC.

5.2. MAXIMUM OUTPUT POWER

ERP/EIRP LIMIT

FCC: §2.1046, §27.50

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015/ TIA-603-E Clause 2.2.17

KDB 971168 D01Section 5.6

KDB 412172 D01

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

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

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

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

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

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

The transmitter has a maximum average conducted and ERP / EIRP output powers as follows:

LTE BAND BAND 41

RSS 199								
EIRP Limit (W)		2.00						
Antenna Gain (dBi)		-5.80						
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	2558.3	2645.0	24.4	18.60	0.072	23248	23M2G7W
	16QAM			23.6	17.80	0.060	23239	23M2D7W
	64QAM			21.8	16.00	0.040		
10+20	QPSK	2560.5	2645.0	24.4	18.60	0.072	28021	28M0G7W
	16QAM			23.6	17.80	0.060	28021	28M0D7W
	64QAM			21.7	15.90	0.039		
15+15	QPSK	2562.5	2647.5	24.4	18.60	0.072	28794	28M8G7W
	16QAM			23.6	17.80	0.060	28673	28M7D7W
	64QAM			21.8	16.00	0.040		
15+20	QPSK	2562.8	2645.0	24.3	18.50	0.071	33058	33M1D7W
	16QAM			23.7	17.90	0.062	33005	33M0D7W
	64QAM			21.9	16.10	0.041		
20+5	QPSK	2565.0	2651.7	24.3	18.50	0.071	23192	23M2G7W
	16QAM			23.6	17.80	0.060	23234	23M2D7W
	64QAM			21.5	15.70	0.037		
20+10	QPSK	2565.0	2649.5	24.3	18.50	0.071	27979	27M0G7W
	16QAM			23.6	17.80	0.060	27992	27M0D7W
	64QAM			21.7	15.90	0.039		
20+15	QPSK	2565.0	2647.2	24.3	18.50	0.071	32921	32M9G7W
	16QAM			23.7	17.90	0.062	33036	33M0D7W
	64QAM			21.9	16.10	0.041		
20+20	QPSK	2565.0	2645.0	24.5	18.70	0.074	37792	37M8G7W
	16QAM			23.9	18.10	0.065	37808	37M8D7W
	64QAM			21.9	16.10	0.041		

5.3. SOFTWARE AND FIRMWARE

The test utility software used during testing was A7050.001

5.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	Antenna Gain (dBi)
LTE BAND 41 (FCC), 2555 - 2655 MHz	-5.80

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports LTE Uplink Carrier Aggregation Bands of:
Band 41C

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. All testing was performed using QPSK, and 16QAM modulations to represent the worst case. Out of band emissions and spurious radiation were only performed on bandwidth and RB offset(with RB size 1) with the highest power for both QPSK and 16QAM.

Highest Power for Each Band				
LTE Band	Component Carrier	Bandwidth (MHz)	RB Size	RB Offset
41 (Uplink CA)	PCC	20	1	99
	SCC	20	1	0

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, & Z, and it was determined that X-Axis for 2500MHz with AC/DC Adapter and headset was worst-case orientation.

All radios that can be transmitted simultaneously have been evaluated for radiated for all possible combinations of transmission and found to be in compliance.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	EP-TA800 (China)	R37M2100011SE3	N/A
AC Adapter	Samsung	EP-TA800 (Hong Kong)	R37M3JA00F1DK3	N/A
Earphone	Samsung	N/A	N/A	N/A

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	RF Out	1	Spectrum Analyzer	Shielded	None	NA
2	Antenna Port	1	EUT	Shielded	0.1m	NA
3	RF In/Out	1	Communication Test Set	Shielded	1m	NA

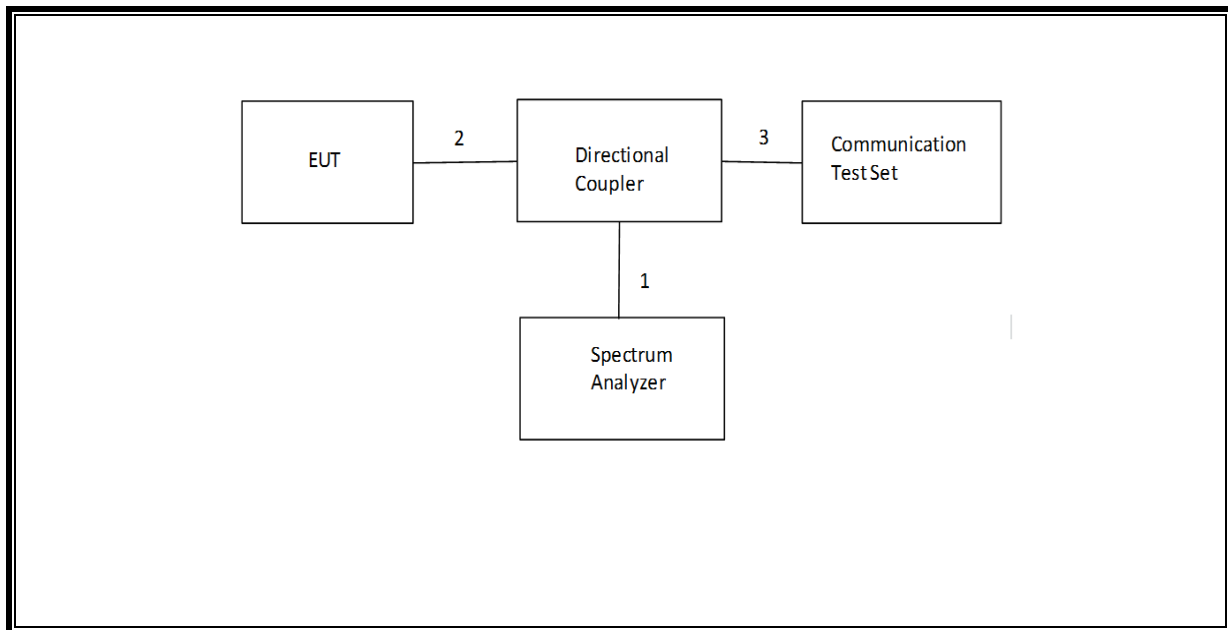
I/O CABLES (RF Radiated Test)

I/O Cable List						
Cable No	Port	# of identic	Connector Type	Cable Type	Cable Length	Remarks
1	USB	1	AC Adapter	Un-shielded	1.2m	No
2	Earphone	1	USB	Un-shielded	1m	No
3	RF In/out	1	Communication Test Set	Un-shielded	2m	No

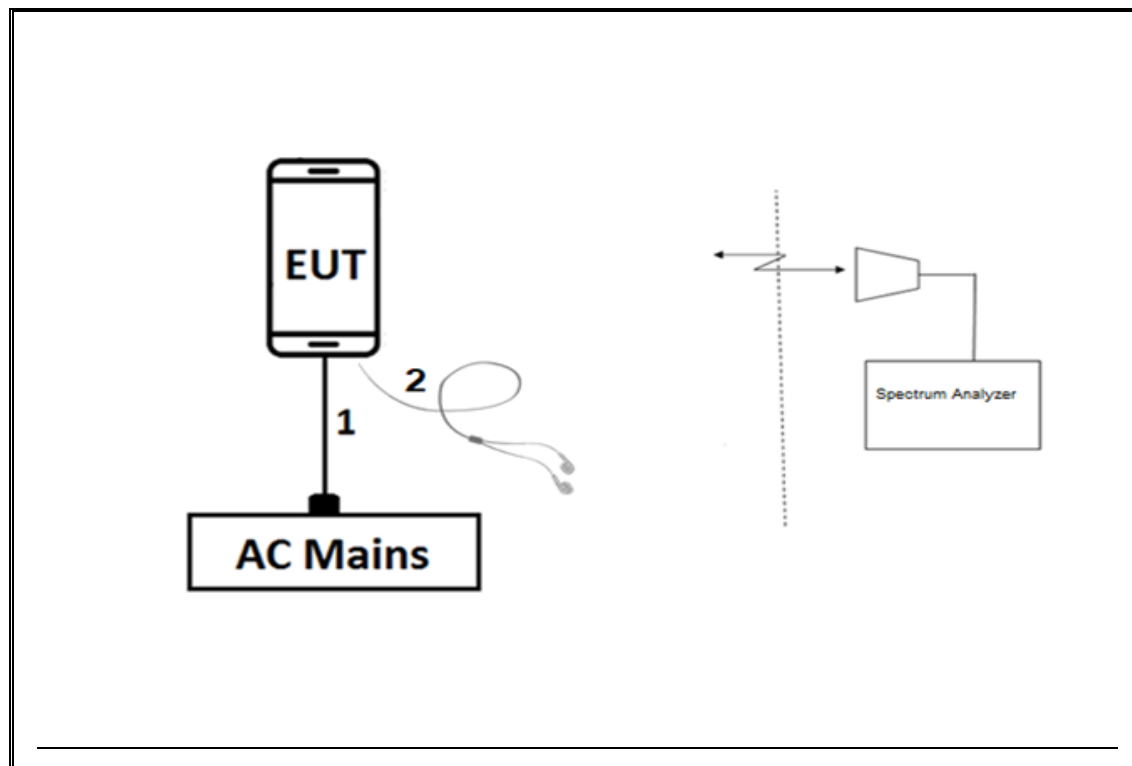
TEST SETUP

The EUT is continuously communicated to the call box during the tests

CONDUCTED TEST SETUP DIAGRAM



RADIATED TEST SETUP DIAGRAM



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	ID Num	Cal Due	Last Cal
Highpass Filter, 2.7 GHz	Micro-Circuits	H2G518G6	T772	07/05/19	07/05/18
Highpass Filter, 1.2 GHz	Micro-Tronics	HPM50108	T1737	04/17/19	04/17/18
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM50114	T1852	07/31/19	07/31/18
Highpass Filter, 4GHz	Micro-Tronics	HPM13351	T1240	08/31/19	08/31/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	04/30/19	04/30/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	05/24/19	05/24/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	AT0067	03/26/19	03/26/18
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T345	04/25/19	04/25/18
Ant., Horn 18 - 26.5 GHz	ARA	MWH-1826/B	T477	06/16/2019	06/16/2018
Hybrid Antenna	SunAR rf motion	JB3	PRE0184052	10/24/19	10/24/18
Hybrid Antenna	SunAR rf motion	JB3	PRE0184971	11/13/19	11/13/18
Hybrid Antenna	SunAR rf motion	JB3	PRE0181575	08/01/19	08/01/18
Hybrid Antenna	SunAR rf motion	JB3	PRE0181574	08/01/19	08/01/18
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	174060	08/01/19	08/01/18
RF Amplifier	AMPLICAL	AMP1G18-35	T1571	07/30/19	07/30/18
RF Amplifier	AMPLICAL	AMP1G18-35	T1569	06/03/19	06/03/18
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T1165	02/20/20	02/20/19
RF Amplifier 9KHz – 1GHz	SONOMA INSTR	310	PRE0180175	07/09/19	07/09/18
RF Amplifier 9KHz – 1GHz	SONOMA INSTR	310	PRE0180174	05/31/19	05/31/18
RF Amplifier 9KHz – 1GHz	SONOMA INSTR	310	175953	12/13/19	12/13/18
Amplifier 100kHz – 1GHz	Agilent	8447D	T15	10/20/19	10/20/18
Directional Coupler	KRYTAR	T922	PRE0078321	06/18/19	06/18/18
Wideband Communication Test Set, Call Box	R&S	CMW500	T375	02/18/20	02/18/19
Wideband Communication Test Set, Call Box	R&S	CMW500	T1871	02/18/20	02/18/19
Wideband Communication Test Set, Call Box	R&S	CMW500	T949	02/21/20	02/21/19
Wideband Communication Test Set, Call Box	R&S	CMW500	T953	02/18/20	02/18/20
Chamber, Environmental	Thermotron	SE-600-10-10	T80	05/01/19	11/01/18
Spectrum Analyzer	Agilent (Keysight) Technologies	E4440A	T200	01/28/20	01/28/19
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179375	05/08/19	05/08/18
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179372	05/04/19	05/04/18
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179367	04/25/19	04/25/18
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/25/20	01/25/19
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T917	01/24/20	01/24/19
DC power supply, 8 V @ 3 A or 15 V @ 2 A	Agilent / HP	E3610A	None	CNR	CNR
DC power supply 15V	Sprensen	XT15-4	T463	CNR	CNR
Power Meter	Keysight	N1911A	T1265	01/29/20	01/29/19
Power Sensor	Keysight	N1921A	T1227	02/05/20	02/05/19

UL AUTOMATION SOFTWARE			
CLT Software	UL	UL RF	Ver 7.6, November 11, 2017
Power Measurement Software	UL	UL RF	Ver 2.2, June 2017

NOTES:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

7. RF OUTPUT POWER VERIFICATION

7.1. CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

All LTE bands conducted average power is obtained from the CMW500 telecommunication test set. The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".3.

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10, 15, 20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 ¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
...					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

MODES TESTED

- LTE 41

RESULTS

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:

7.1.1. LTE BAND 41

ID:	44351	Date:	1/2/19
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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		
			Size	Offset	Size	Offset	(dBm)		
							QPSK	16QAM	64QAM
5MHz / 20MHz	2558.3	2570.0	1	24	1	0	24.4	23.6	21.8
			25	0	100	0	20.4	20.5	20.4
	2595.8	2607.5	1	24	1	0	24.2	23.6	21.8
			25	0	100	0	21.5	20.6	20.5
	2633.3	2645.0	1	24	1	0	23.6	23.0	20.9
			25	0	100	0	20.7	19.8	19.7

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		
			Size	Offset	Size	Offset	(dBm)		
							QPSK	16QAM	64QAM
10MHz / 20MHz	2560.5	2574.9	1	49	1	0	24.3	23.6	21.7
			50	0	100	0	20.5	20.6	20.4
	2595.6	2610.0	1	49	1	0	24.4	23.6	21.7
			50	0	100	0	21.6	20.7	20.6
	2630.6	2645.0	1	49	1	0	23.6	23.0	20.9
			50	0	100	0	20.7	19.8	19.7

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		
			Size	Offset	Size	Offset	(dBm)		
							QPSK	16QAM	64QAM
15MHz / 15MHz	2562.5	2577.5	1	74	1	0	24.2	23.6	21.8
			75	0	75	0	21.8	21.0	20.9
	2597.5	2612.5	1	74	1	0	24.4	23.6	21.8
			75	0	75	0	21.7	20.8	20.7
	2632.5	2647.5	1	74	1	0	23.6	22.8	21.2
			75	0	75	0	21.0	20.2	20.1

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		
			Size	Offset	Size	Offset	(dBm)		
							QPSK	16QAM	64QAM
15MHz / 20MHz	2562.8	2579.9	1	74	1	0	24.3	23.6	21.8
			75	0	100	0	21.7	20.7	20.6
	2595.4	2612.5	1	74	1	0	24.3	23.7	21.9
			75	0	100	0	21.7	20.8	20.7
	2627.9	2645.0	1	74	1	0	24.2	23.4	21.8
			75	0	100	0	21.5	20.7	20.6

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		
			Size	Offset	Size	Offset	(dBm)		
							QPSK	16QAM	64QAM
20MHz / 5MHz	2565.0	2576.7	1	99	1	0	24.3	23.6	21.5
			1	0	1	24	15.9	15.8	15.7
			100	0	25	0	20.4	20.5	20.4
	2602.5	2614.2	1	99	1	0	24.2	23.6	21.5
			1	0	1	24	15.7	15.5	15.4
			100	0	25	0	21.9	21.1	21.0
	2640.0	2651.7	1	99	1	0	23.7	23.0	20.9
			1	0	1	24	15.1	15.4	15.1
			100	0	25	0	21.5	20.7	20.6

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		
			Size	Offset	Size	Offset	(dBm)		
							QPSK	16QAM	64QAM
20MHz / 10MHz	2565.0	2579.4	1	99	1	0	24.3	23.6	21.7
			100	0	50	0	22.1	21.3	21.2
	2600.1	2614.5	1	99	1	0	24.2	23.6	21.6
			100	0	50	0	22.4	21.6	21.5
	2635.1	2649.5	1	99	1	0	23.6	22.7	21.0
			100	0	50	0	20.9	20.1	20.0

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		
			Size	Offset	Size	Offset	(dBm)		
							QPSK	16QAM	64QAM
20MHz / 15MHz	2565.0	2582.1	1	99	1	0	24.2	23.7	21.9
			100	0	75	0	21.7	20.7	20.6
	2597.6	2614.7	1	99	1	0	24.3	23.6	21.4
			100	0	75	0	21.9	21.0	20.9
	2630.1	2647.2	1	99	1	0	24.3	23.4	21.9
			100	0	75	0	21.5	20.7	20.6

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		
			Size	Offset	Size	Offset	(dBm)		
							QPSK	16QAM	64QAM
20MHz/ 20MHz	2565.0	2584.8	1	99	1	0	24.3	23.7	21.8
			1	0	1	99	14.9	14.8	14.7
			100	0	100	0	21.8	20.8	20.7
	2595.1	2614.9	1	99	1	0	24.5	23.9	21.8
			1	0	1	99	15.2	15.1	15.0
			100	0	100	0	21.8	20.8	20.7
	2625.2	2645.0	1	99	1	0	24.2	23.7	21.9
			1	0	1	99	14.9	14.8	14.7
			100	0	100	0	21.7	20.9	20.7

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 41

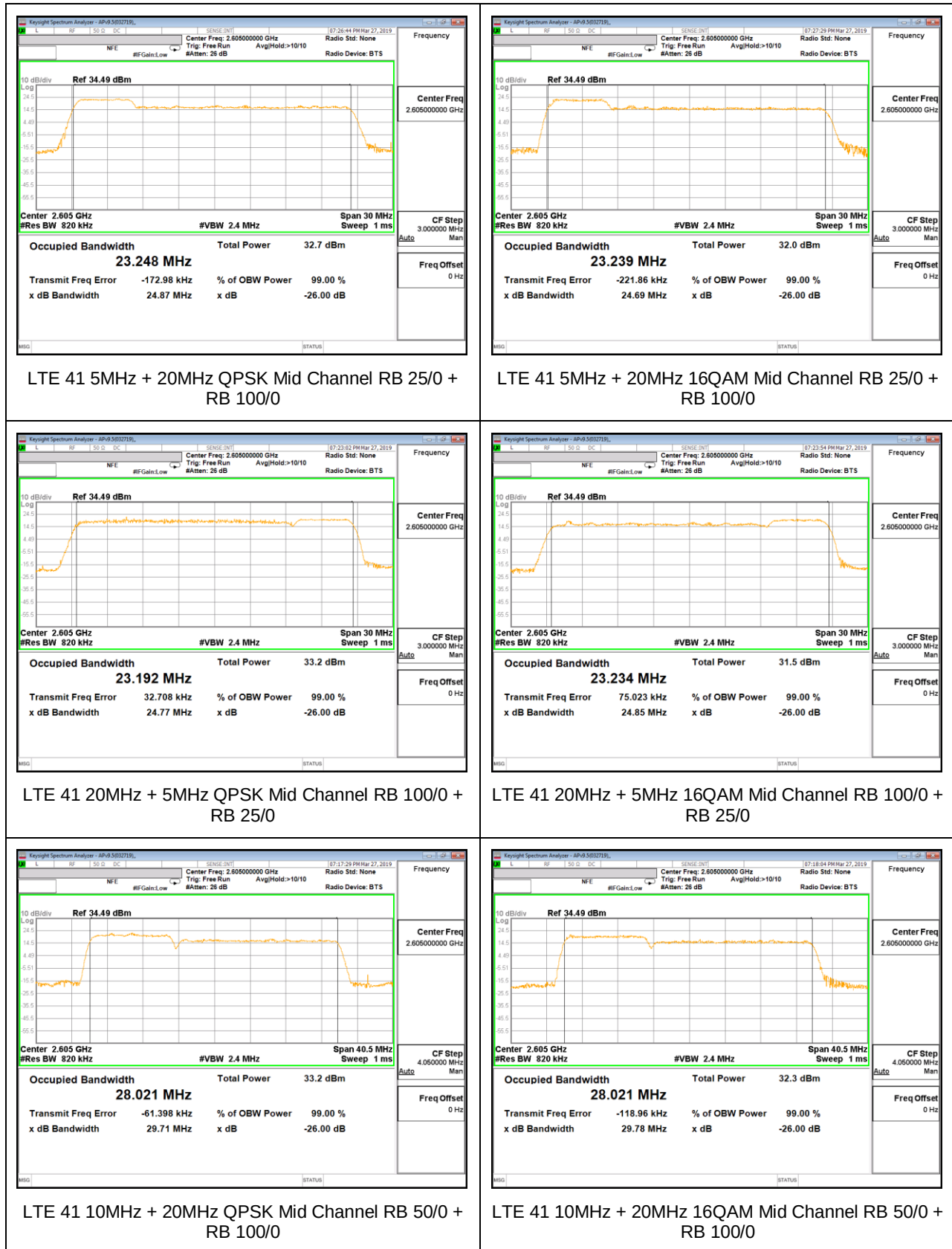
RESULTS

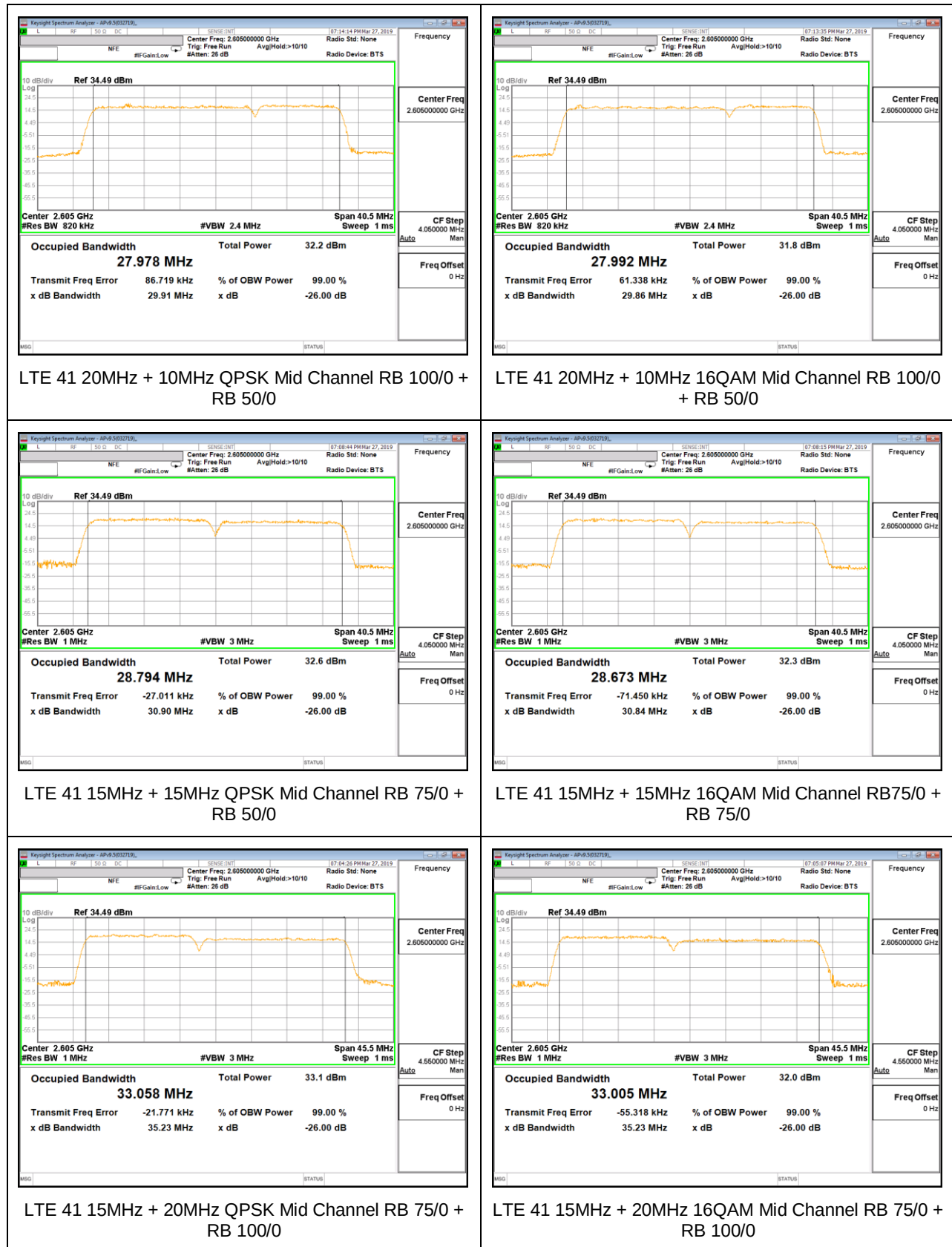
There is no limit required and power is the same for low, middle and high channel; therefore, only middle channel was tested.

LTE41

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
41	5 MHz +20 MHz, QPSK	25/0 +100/0	2605	23.248	24.87
	5 MHz +20 MHz, 16QAM			23.239	24.69
	20 MHz + 5 MHz, QPSK	100/0 + 25/0		23.192	24.77
	20 MHz + 5 MHz, 16QAM			23.234	24.85
	10 MHz + 20 MHz, QPSK	50/0 +100/0		28.021	29.71
	10 MHz + 20 MHz, 16QAM			28.021	29.78
	20MHz + 10 MHz, QPSK	100/0 + 50/0		27.978	29.91
	20MHz + 10 MHz, 16QAM			27.992	29.86
	15MHz + 15 MHz, QPSK	75/0 + 75/0		28.794	30.90
	15MHz + 15 MHz, 16QAM			28.673	30.84
	15MHz + 20 MHz, QPSK	75/0 +100/0		33.058	35.23
	15MHz + 20 MHz, 16QAM			33.005	35.23
	20MHz + 15 MHz, QPSK	100/0 +75/0		32.921	38.14
	20MHz +15 MHz, 16QAM			33.036	35.18
	20MHz + 20 MHz, QPSK	100/0 +100/0		37.792	40.06
	20MHz + 20 MHz, 16QAM			37.808	40.03

8.1.1. LTE BAND 41







8.2. BAND EDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051 and §27.53

LIMITS

FCC: §27.53 (Band 7, 41)

(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

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:

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

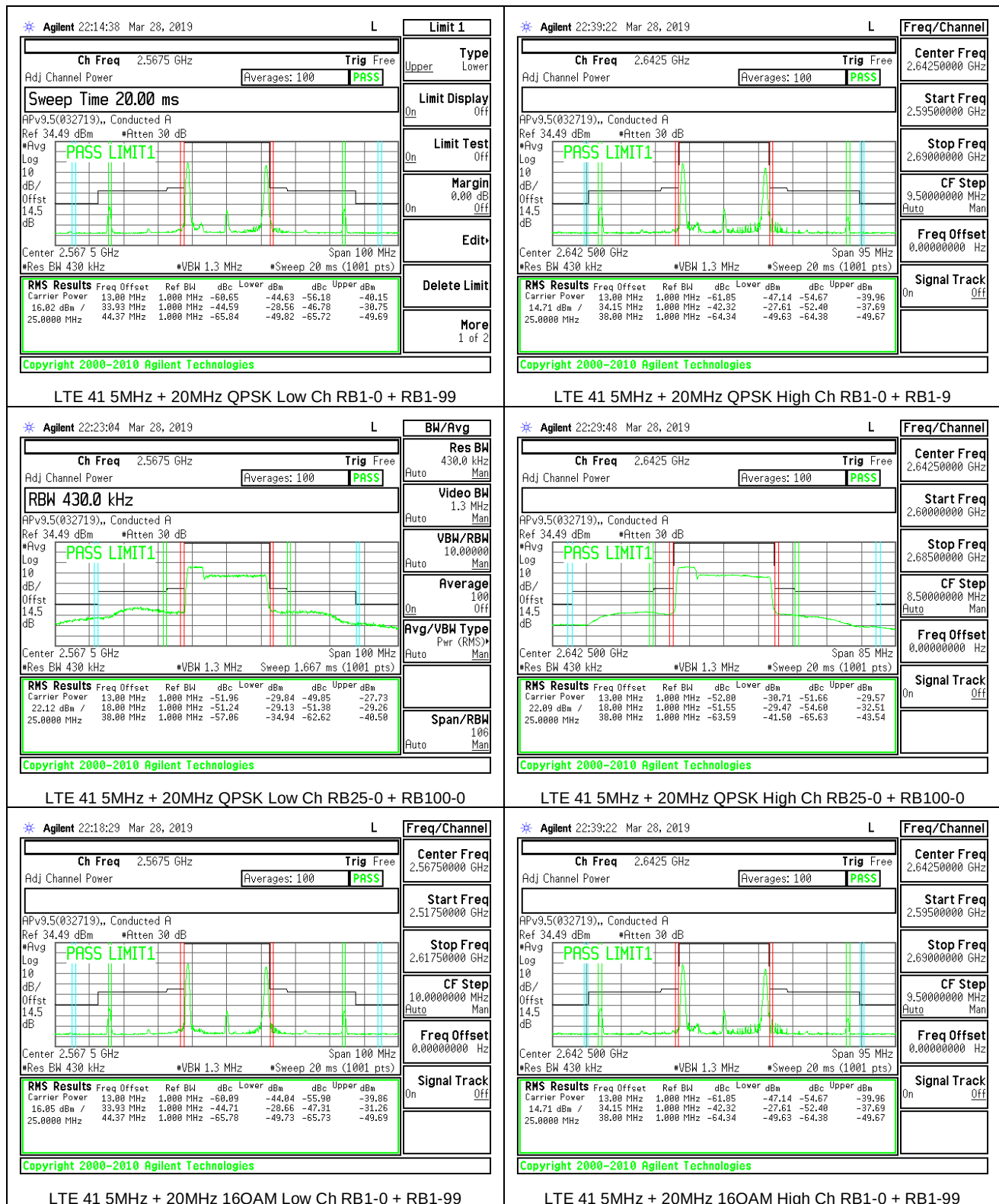
MODES TESTED

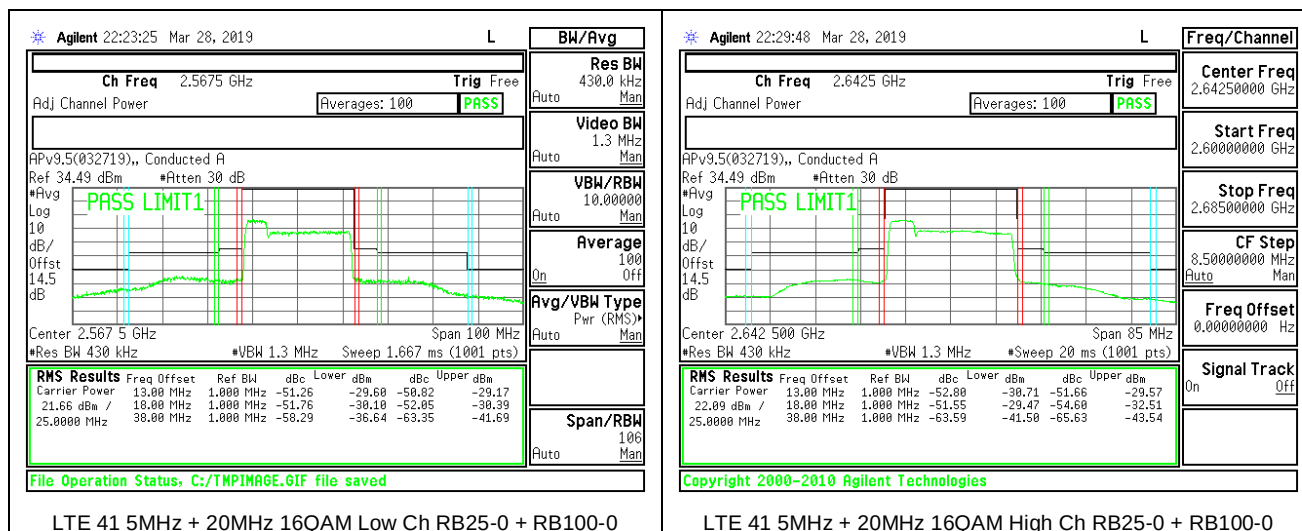
- LTE Band 41

RESULTS

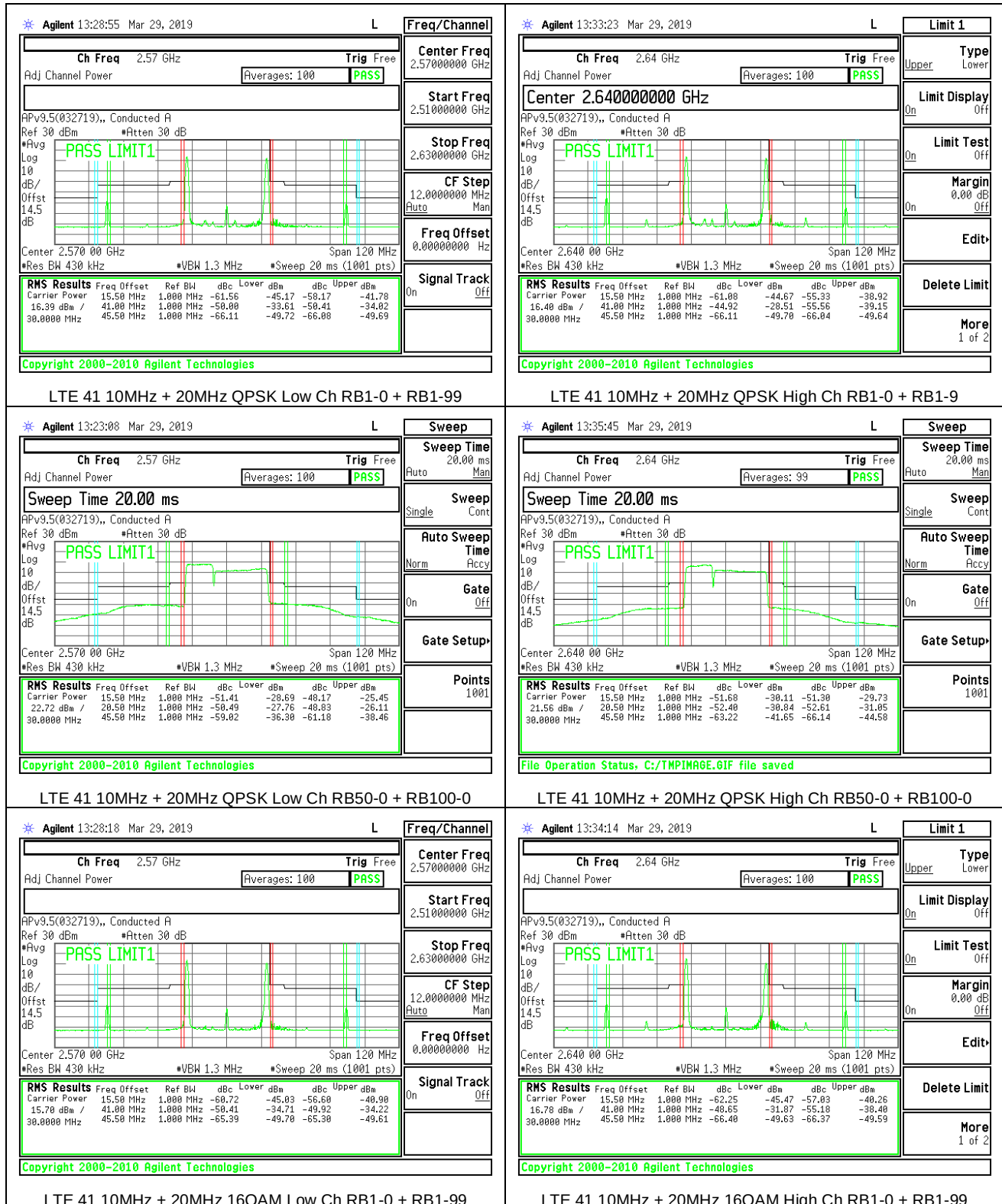
8.2.1. LTE BAND 41 ADJACENT CHANNEL POWER

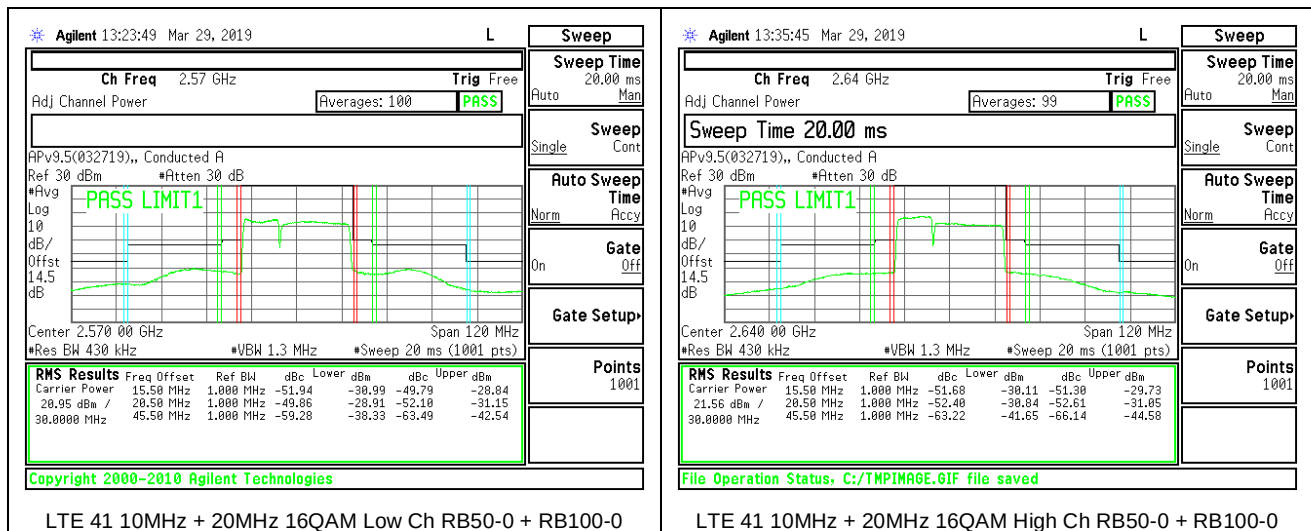
5MHz – 20MHz



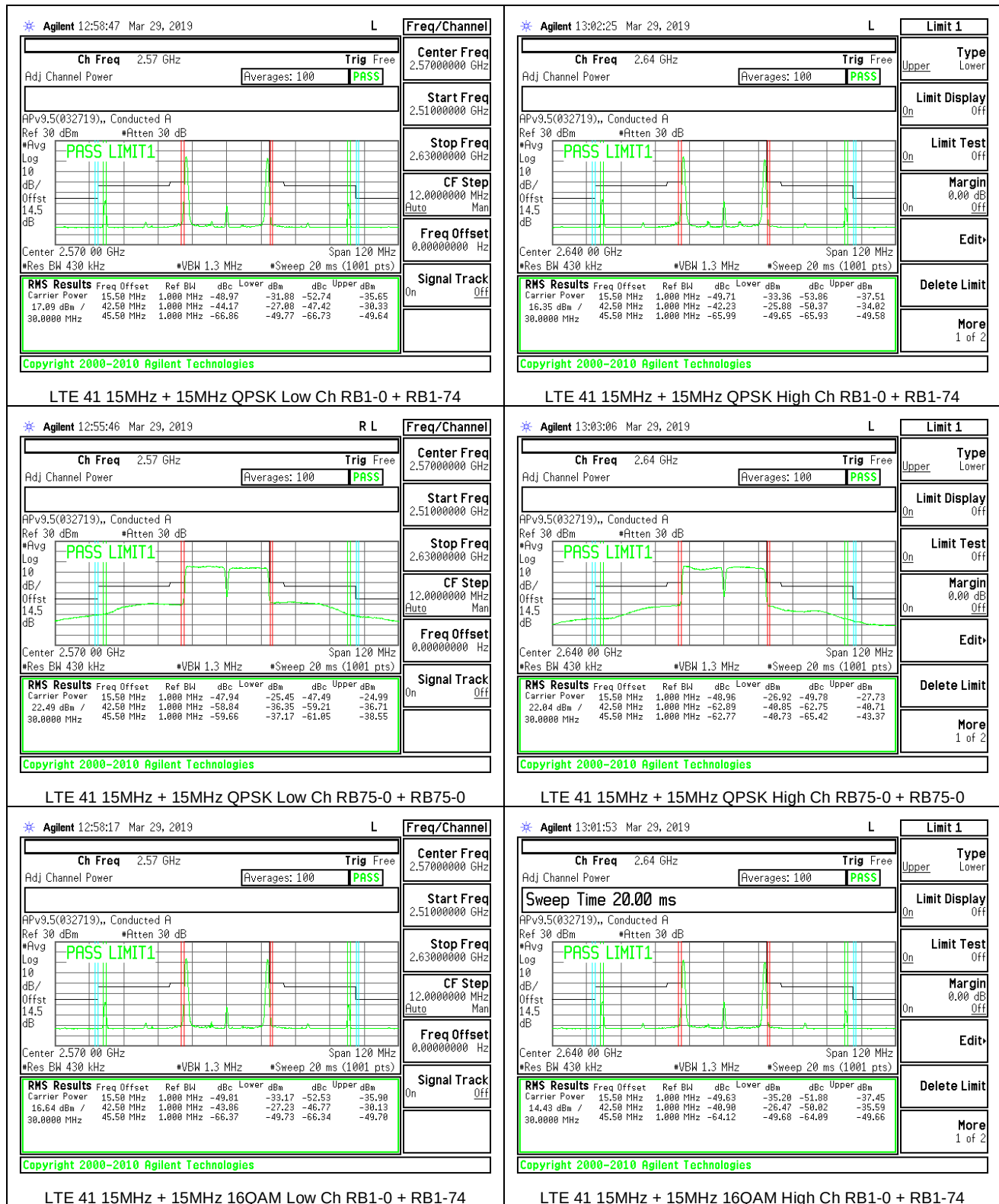


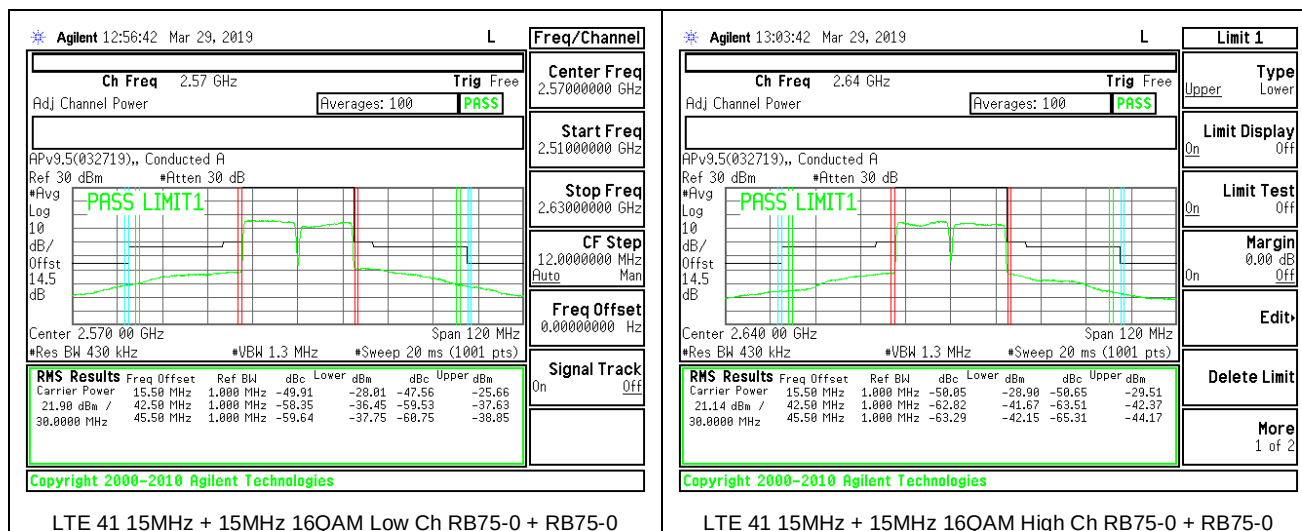
10MHz – 20MHz



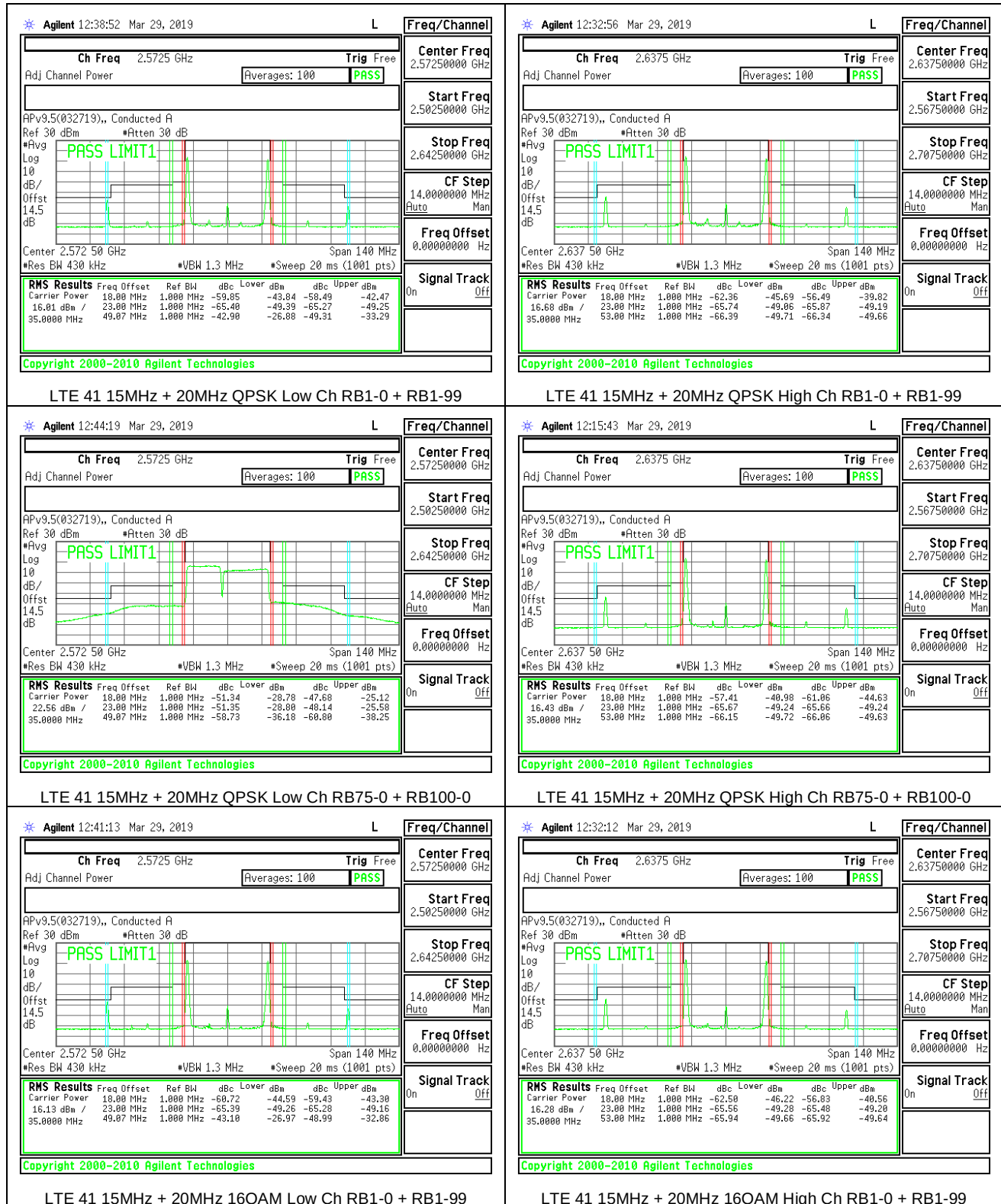


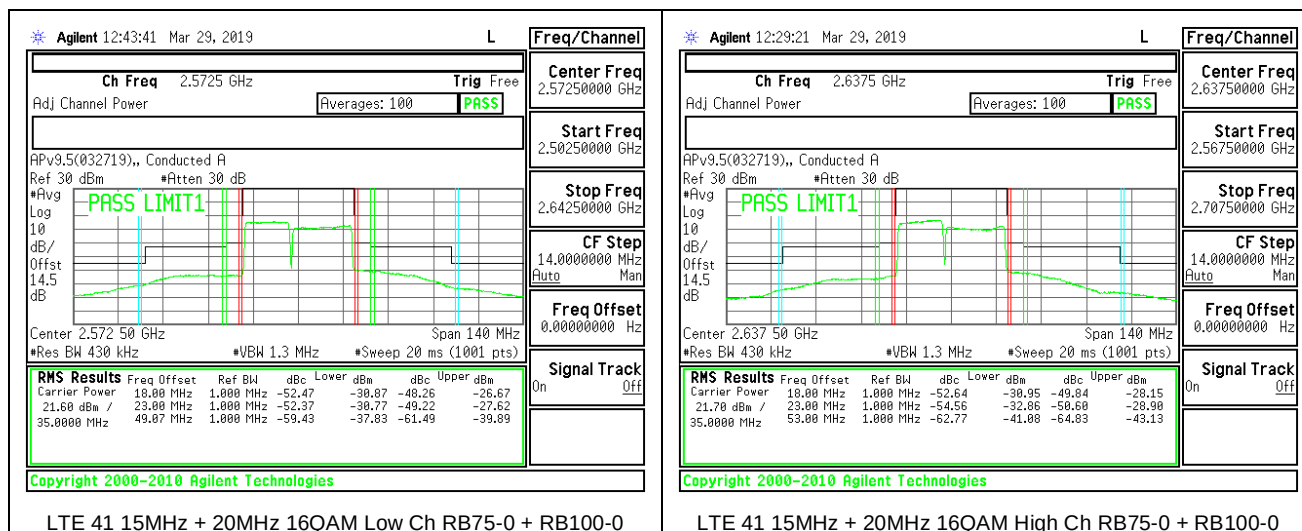
15MHz -15MHz



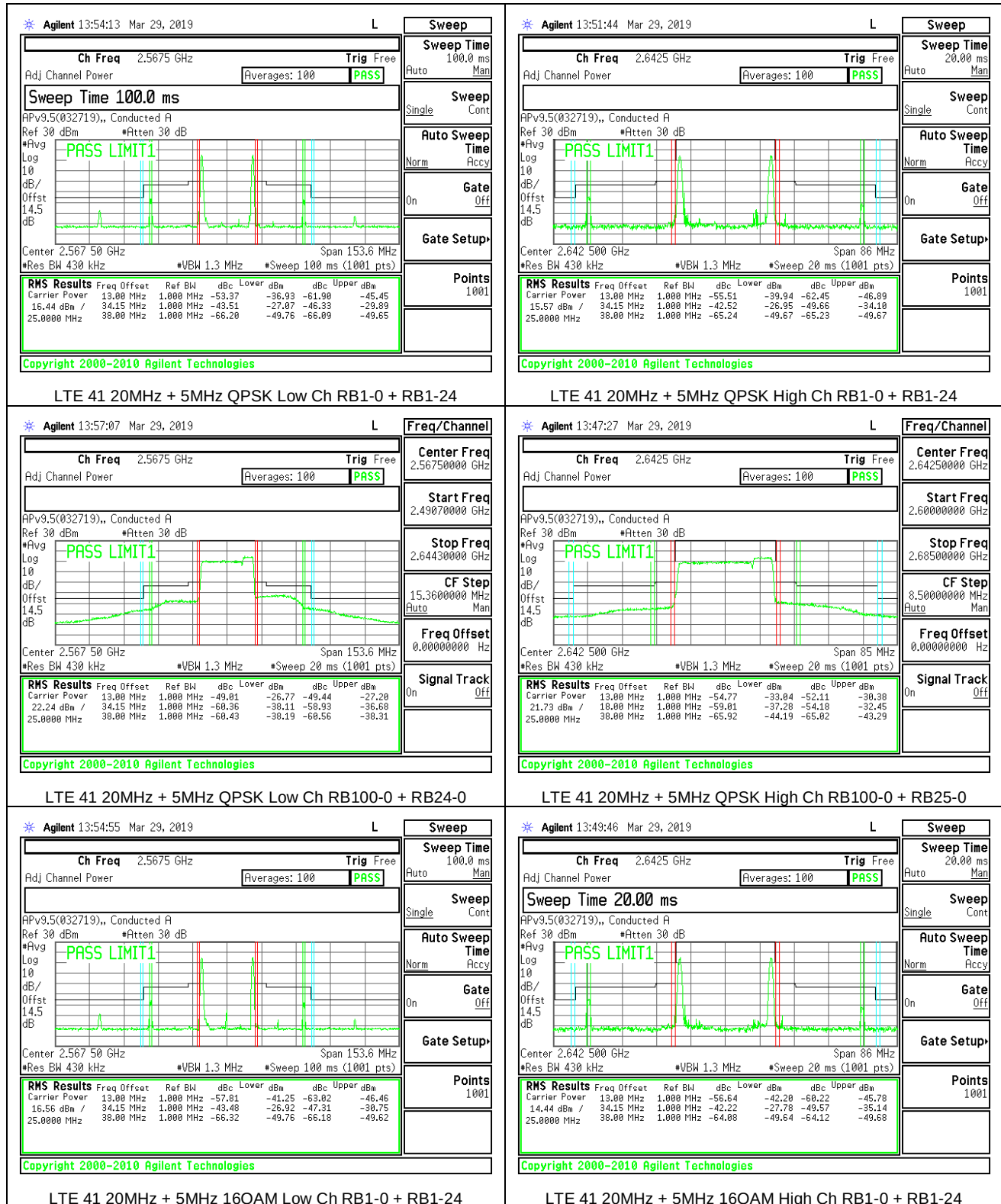


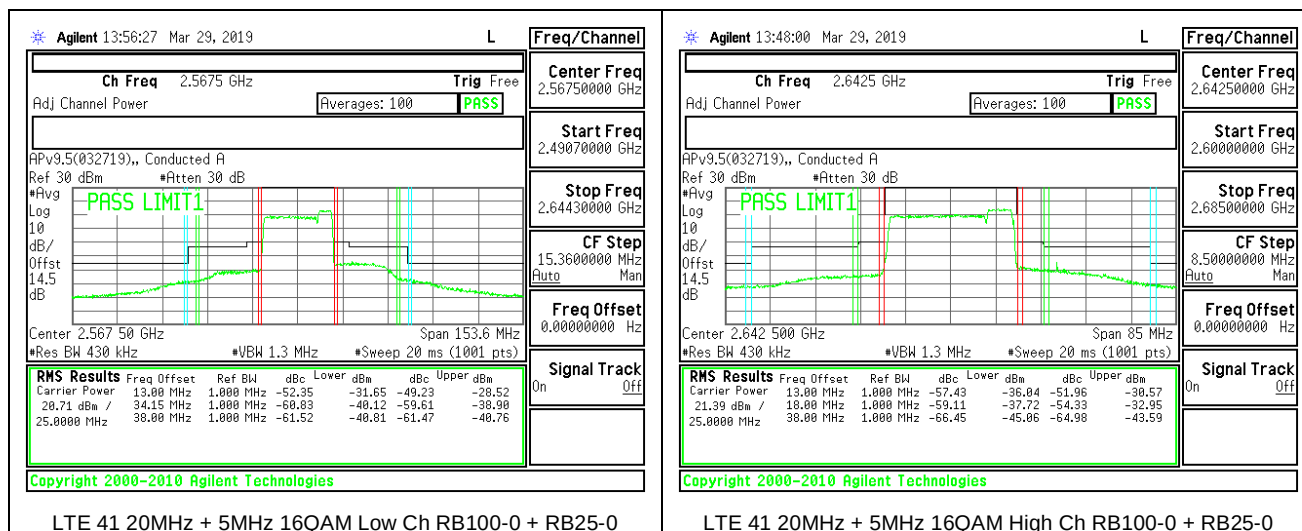
15MHz – 20MHz



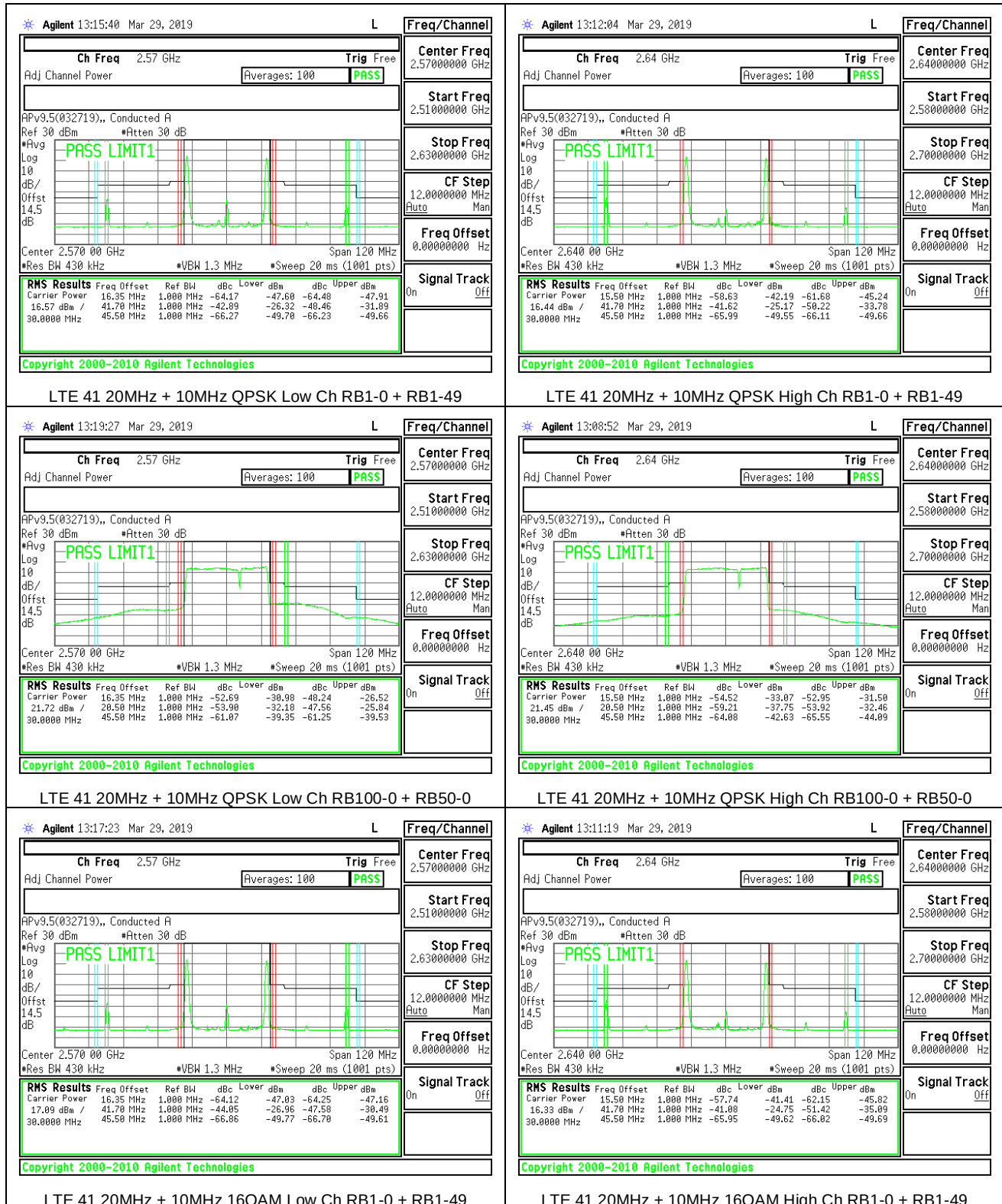


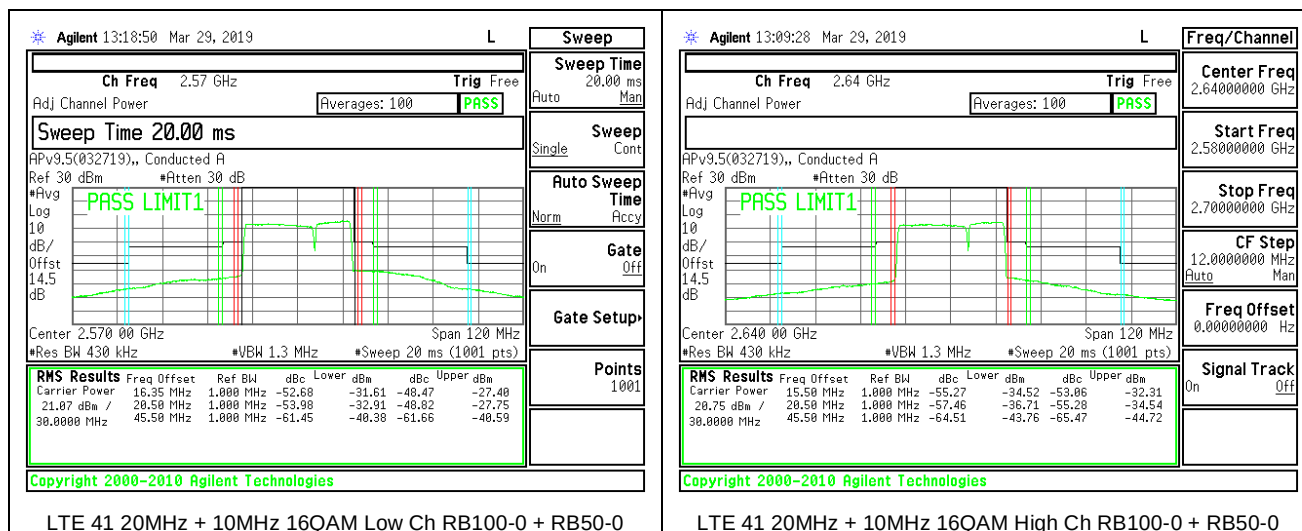
20MHz - 5MHz



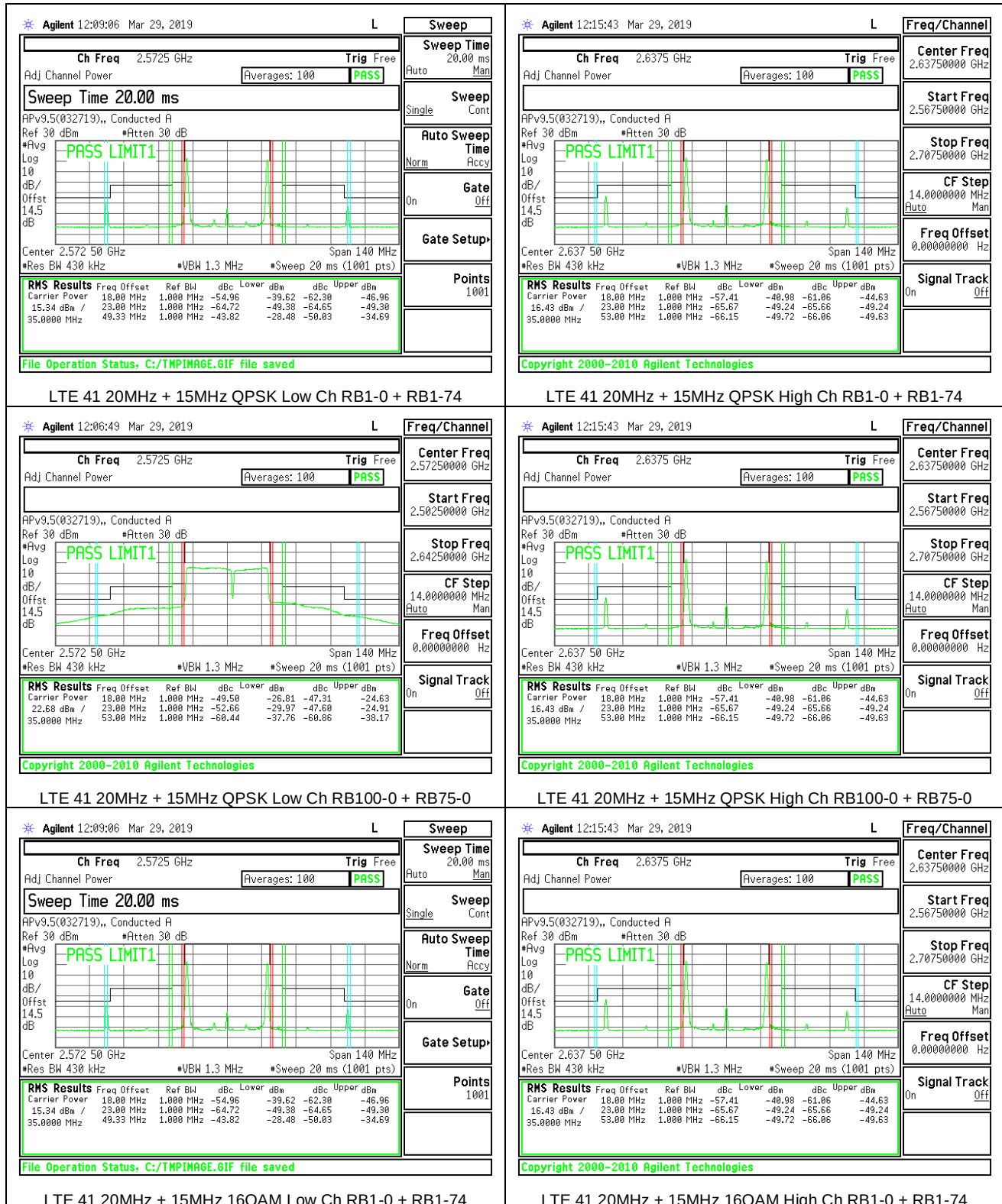


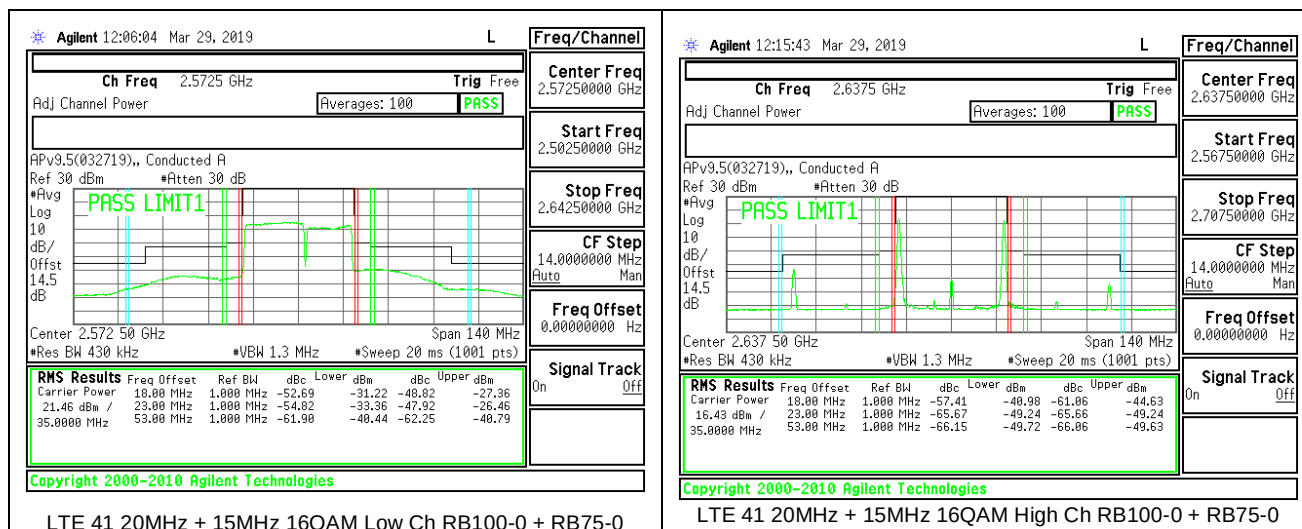
20MHz - 10MHz



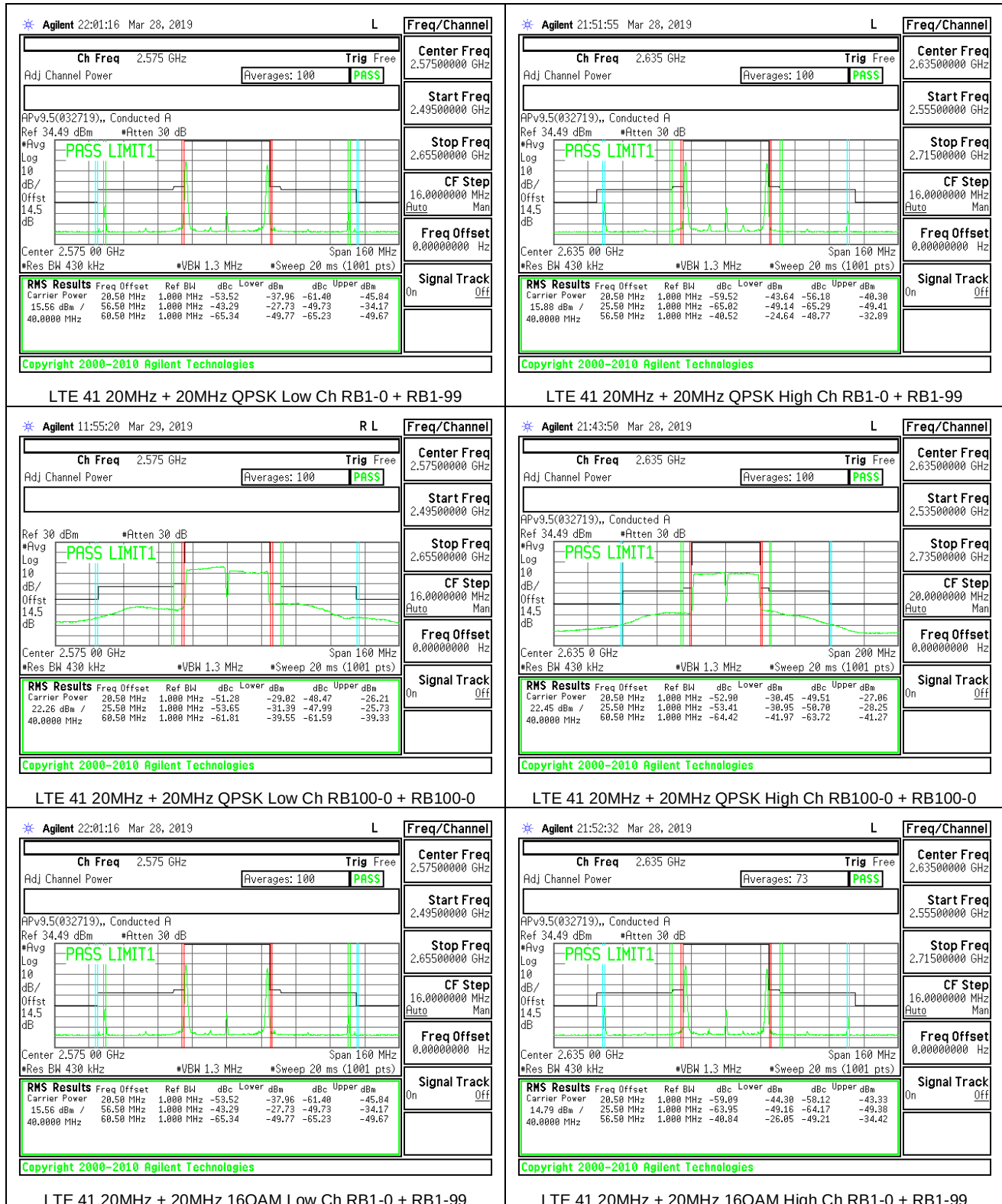


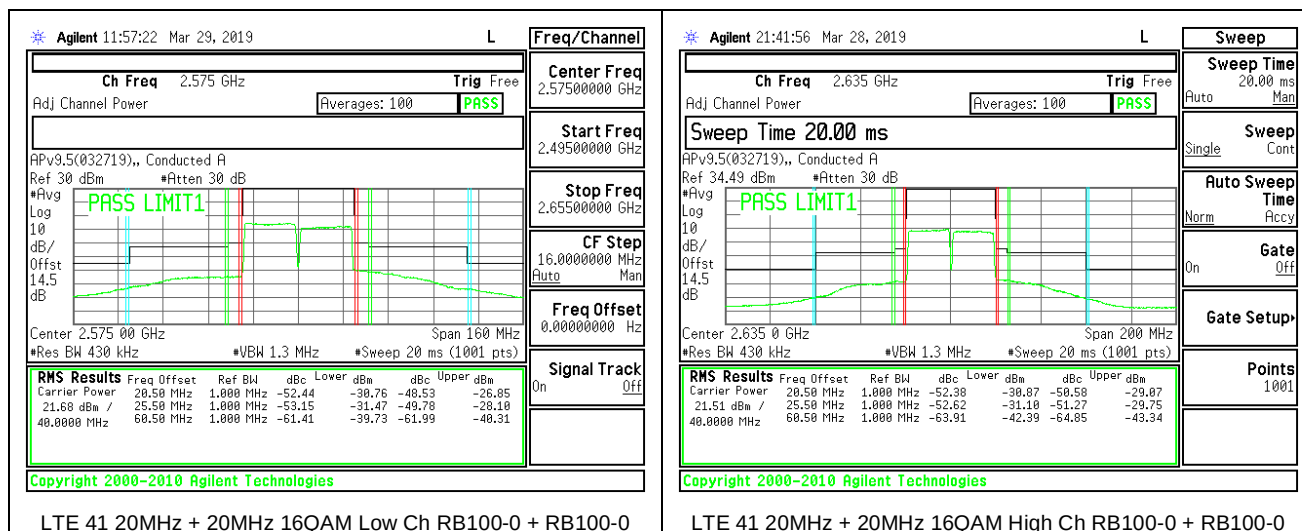
20MHz – 15MHz





20MHz – 20MHz





8.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051 and §27.53

LIMITS

FCC: §27.53 (m) (7 and 38)

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 -13 dBm, -25dBm and -40dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

MODES TESTED

- LTE Band 41

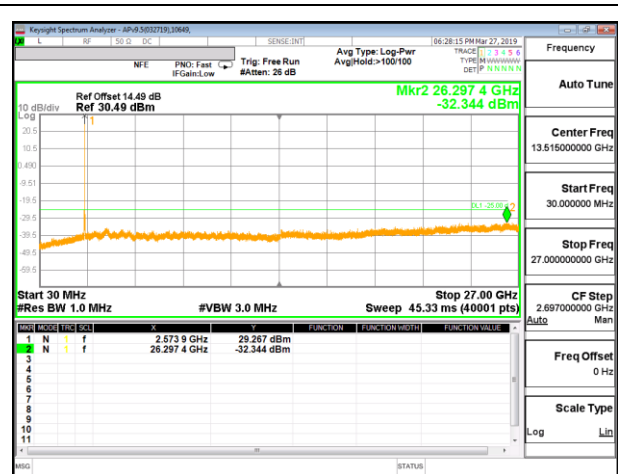
RESULTS

8.3.1. LTE BAND 41

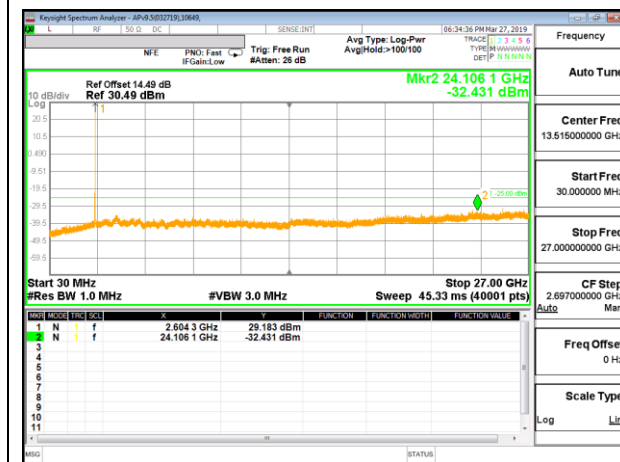
LTE BAND 41 (20.0MHz + 20.0MHz)



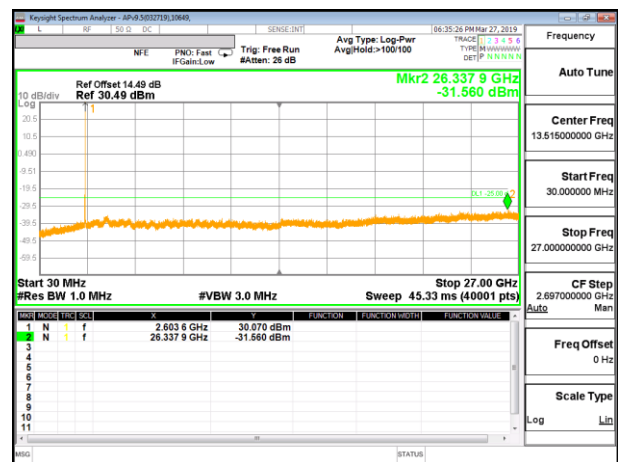
LTE 41 20.0MHz + 20.0MHz QPSK Low Channel RB1/99 + 1/0



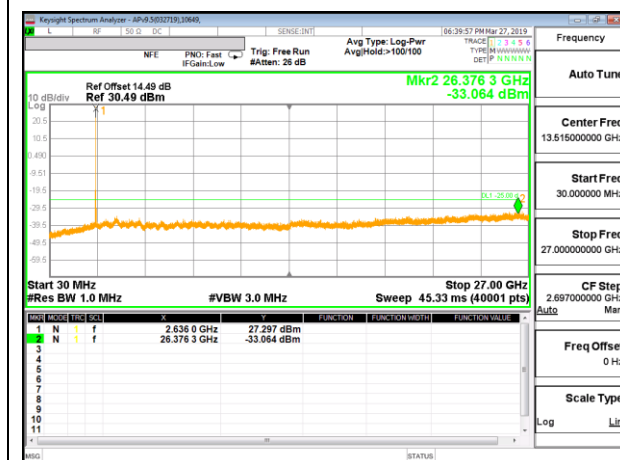
LTE 41 20.0MHz + 20.0MHz 16QAM Low Channel RB1/99 + 1/0



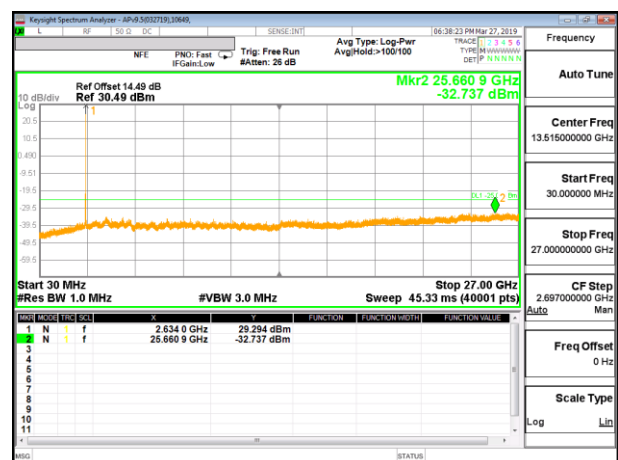
LTE 41 20.0MHz + 20.0MHz QPSK Mid Channel RB1/99 + 1/0



LTE 41 20.0MHz + 20.0MHz 16QAM Mid Channel RB1/99 + 1/0



LTE 41 20.0MHz + 20.0MHz QPSK High Channel RB1/99 + 1/0



LTE 41 20.0MHz + 20.0MHz 16QAM High Channel RB1/99 + 1/0

9. RADIATED TEST RESULTS

9.1. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053 and §27.53

LIMITS

FCC: §27.53 (m) (Band 7, 41)

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 v03r01/D02 v02r01
TIA-603-E, Section 2.2.12.

MODES TESTED

- LTE Band 41

RESULTS

9.1.1. LTE BAND 41

Company:	Samsung
Project #:	12737383
Date:	3/28/2019
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	20 MHz + 20 MHz QPSK 1RB + 1RB
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2565 +2584.8 MHz												
1	5.15	-68.92	Pk	34.4	-30.6	10.4	-54.72	-25	-29.72	0-360	150	H
3	7.721	-73.59	Pk	35.7	-26.5	10.3	-54.09	-25	-29.09	0-360	150	H
5	10.302	-75.34	Pk	37.3	-23.7	10.4	-51.34	-25	-26.34	0-360	150	H
2	5.151	-68.57	Pk	34.4	-30.6	10.6	-54.17	-25	-29.17	0-360	150	V
4	7.721	-72.34	Pk	35.7	-26.5	10.6	-52.54	-25	-27.54	0-360	150	V
6	10.3	-74.15	Pk	37.3	-23.7	10.7	-49.85	-25	-24.85	0-360	150	V
2595.1 + 2614.9 MHz												
1	5.21	-70.3	Pk	34.4	-30.4	10.9	-55.4	-25	-30.4	0-360	150	H
3	7.816	-73.82	Pk	35.7	-26.2	10.3	-54.02	-25	-29.02	0-360	150	H
5	10.422	-75.5	Pk	37.5	-23.2	10.4	-50.8	-25	-25.8	0-360	150	H
2	5.21	-70.24	Pk	34.4	-30.4	10.7	-55.54	-25	-30.54	0-360	150	V
4	7.816	-70.24	Pk	35.7	-26.2	10.6	-50.14	-25	-25.14	0-360	150	V
6	10.422	-72.81	Pk	37.5	-23.2	10.5	-48.01	-25	-23.01	0-360	150	V
2625.2 +2645 MHz												
1	5.268	-70.32	Pk	34.4	-30.1	10.7	-55.32	-25	-30.32	0-360	150	H
3	7.902	-73.4	Pk	35.8	-26.3	10	-53.9	-25	-28.9	0-360	150	H
5	10.537	-76.04	Pk	37.6	-23.2	10	-51.64	-25	-26.64	0-360	150	H
2	5.272	-70.57	Pk	34.4	-30.1	11	-55.27	-25	-30.27	0-360	150	V
4	7.902	-71.22	Pk	35.8	-26.3	10.2	-51.52	-25	-26.52	0-360	150	V
6	10.536	-75.31	Pk	37.6	-23.2	10.3	-50.61	-25	-25.61	0-360	150	V

Company:	Samsung
Project #:	12737383
Date:	3/28/2019
Test Engineer:	19480
Configuration:	EUT + Support Equipment
Mode:	20 MHz + 20 MHz 16QAM 1RB + 1RB
Chamber #:	Chamber I

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Limit	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2506MHz												
1	5.147	-69.48	Pk	34.4	-30.6	10.3	-55.38	-25	-30.38	0-360	150	H
3	7.725	-72.93	Pk	35.7	-26.5	10.3	-53.43	-25	-28.43	0-360	150	H
5	10.298	-75.04	Pk	37.3	-23.7	10.5	-50.94	-25	-25.94	0-360	150	H
2	5.148	-66.15	Pk	34.4	-30.6	10.6	-51.75	-25	-26.75	0-360	150	V
4	7.726	-71.98	Pk	35.7	-26.4	10.7	-51.98	-25	-26.98	0-360	150	V
6	10.299	-73.86	Pk	37.3	-23.7	10.7	-49.56	-25	-24.56	0-360	150	V
2593MHz												
1	5.21	-68.8	Pk	34.4	-30.5	10.9	-54	-25	-29	0-360	150	H
3	7.816	-72.61	Pk	35.7	-26.2	10.3	-52.81	-25	-27.81	0-360	150	H
5	10.418	-74	Pk	37.4	-23.2	10.3	-49.5	-25	-24.5	0-360	150	H
2	5.208	-68.38	Pk	34.4	-30.4	10.7	-53.68	-25	-28.68	0-360	150	V
4	7.818	-70.65	Pk	35.7	-26.2	10.5	-50.65	-25	-25.65	0-360	150	V
6	10.416	-71.13	Pk	37.4	-23.2	10.4	-46.53	-25	-21.53	0-360	150	V
2680MHz												
1	5.268	-70.09	Pk	34.4	-30.1	10.7	-55.09	-25	-30.09	0-360	150	H
3	7.902	-71.55	Pk	35.8	-26.3	10	-52.05	-25	-27.05	0-360	150	H
5	10.535	-75.45	Pk	37.6	-23.2	10	-51.05	-25	-26.05	0-360	150	H
2	5.268	-69.53	Pk	34.4	-30.1	11	-54.23	-25	-29.23	0-360	150	V
4	7.902	-69.13	Pk	35.8	-26.3	10.2	-49.43	-25	-24.43	0-360	150	V
6	10.536	-73.68	Pk	37.6	-23.2	10.3	-48.98	-25	-23.98	0-360	150	V