



CERTIFICATION TEST REPORT

Report Number. : 12216366-E9V2

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

Model : A2105

FCC ID : BCG-E3237A

EUT Description : SMARTPHONE

Test Standard(s) : CFR47 PART 27

Date Of Issue:
AUGUST 29, 2018

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NVLAP LAB CODE 200065-0 (FREMONT)

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	8/23/2018	Initial Review	Mengistu Mekuria
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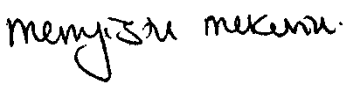
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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	A2105
FCC ID	BCG-E3237A
EUT Description	SMARTPHONE
Serial Number	C7CWN00TK3MD
Date Tested	APRIL 02, 2018 to JULY 03, 2018
Applicable Standards	CFR47 PART 27
Test Results	COMPLIES

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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 any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released By: 	Prepared By: 
Mengistu Mekuria Senior Test Engineer UL Verification Services Inc.	Ellen Chu Laboratory Engineer UL Verification Services Inc.

2. TEST METHODOLOGY

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

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
☐ Chamber A (IC:2324B-1)	☐ Chamber D (IC:22541-1)
☐ Chamber B (IC:2324B-2)	☒ Chamber E (IC:22541-2)
☒ Chamber C (IC:2324B-3)	☐ Chamber F (IC:22541-3)
	☐ Chamber G (IC:22541-4)
	☐ Chamber H (IC:22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at [NVLAP Lab Search](#).

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

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

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

The Apple iPhone, 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, Bluetooth, GPS and NFC. All models support at least one UICC based SIM. The second SIM is either UICC based, electronic SIM (e-SIM), or second SIM is not present. The device has a built-in inductive charging receiver which is not user accessible. The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

ERP/EIRP LIMIT

\$2.1046, \$27.50

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015

KDB 971168 D01 Section 5.6

KDB 412172 D01 Determining ERP and EIRP v01r01

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

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

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

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

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

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

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted and ERP/EIRP output powers as follows:

OUTPUT POWER FOR LTE BAND 7

Part 27 / RSS 199								
EIRP Limit (W)		2.00						
Antenna Gain (dBi)		-0.90						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
10+20	QPSK	2505.5	2560.0	25.0	24.10	0.257	28290	28M3G7W
	16QAM			23.8	22.90	0.195	28280	28M3D7W
	64QAM			23.0	22.10	0.162	28319	28M3D7W
20+10	QPSK	2510.0	2564.5	24.9	24.00	0.251	28284	28M3G7W
	16QAM			23.9	23.00	0.200	28262	28M3D7W
	64QAM			23.1	22.20	0.166	28378	28M4D7W
15+15	QPSK	2507.5	2562.5	24.9	24.00	0.251	28829	28M8G7W
	16QAM			24.0	23.10	0.204	28884	28M9D7W
	64QAM			22.9	22.00	0.158	28846	28M8D7W
15+20	QPSK	2507.8	2560.0	24.9	24.00	0.251	33114	33M1G7W
	16QAM			24.0	23.10	0.204	33106	33M1D7W
	64QAM			23.0	22.10	0.162	33179	33M2D7W
20+15	QPSK	2510.0	2562.2	25.0	24.10	0.257	33117	33M1G7W
	16QAM			24.0	23.10	0.204	32879	32M9D7W
	64QAM			23.1	22.20	0.166	33089	33M1D7W
20+20	QPSK	2510.0	2560.0	25.0	24.10	0.257	37984	38M0G7W
	16QAM			24.0	23.10	0.204	37880	37M9D7W
	64QAM			23.2	22.30	0.170	38000	38M0D7W

OUTPUT POWER FOR LTE BAND 41

Part 27								
EIRP Limit (W)		2.00						
Antenna Gain (dBi)		-0.90						
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
5+20	QPSK	2499.3	2680.0	25.0	24.10	0.257	23483	23M5G7W
	16QAM			23.9	23.00	0.200	23442	23M4D7W
	64QAM			23.0	22.10	0.162	23118	23M1D7W
20+5	QPSK	2506.0	2686.7	25.0	24.10	0.257	23216	23M2G7W
	16QAM			24.2	23.30	0.214	23542	23M5D7W
	64QAM			23.2	22.30	0.170	23263	23M3D7W
10+20	QPSK	2501.5	2680.0	25.0	24.10	0.257	28310	28M3G7W
	16QAM			24.0	23.10	0.204	28198	28M2D7W
	64QAM			23.2	22.30	0.170	27962	28M0D7W
20+10	QPSK	2506.0	2684.5	24.9	24.00	0.251	27884	27M9G7W
	16QAM			23.8	22.90	0.195	28210	28M2D7W
	64QAM			22.9	22.00	0.158	27948	27M9D7W
15+15	QPSK	2503.5	2682.5	24.8	23.90	0.245	28771	28M8G7W
	16QAM			24.0	23.10	0.204	28826	28M8D7W
	64QAM			22.9	22.00	0.158	28584	28M6D7W
15+20	QPSK	2503.8	2680.0	25.0	24.10	0.257	33144	33M1G7W
	16QAM			23.9	23.00	0.200	32975	33M0D7W
	64QAM			23.0	22.10	0.162	32785	32M8D7W
20+15	QPSK	2506.0	2682.2	24.9	24.00	0.251	32742	32M7G7W
	16QAM			24.0	23.10	0.204	33062	33M1D7W
	64QAM			23.0	22.10	0.162	32819	32M8D7W
20+20	QPSK	2506.0	2680.0	24.9	24.00	0.251	37555	37M6G7W
	16QAM			24.0	23.10	0.204	37869	37M9D7W
	64QAM			23.0	22.10	0.162	37554	37M6D7W

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5.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 00.28.02.

5.4. MAXIMUM ANTENNA GAIN

Please see table below:

LTE Bands	ANT 1 Antenna Gain (dBi)	ANT 2 Antenna Gain (dBi)
LTE Band 7, 2500 – 2570 MHz	-0.9	-1.6
LTE Band 41, 2496 – 2690 MHz	-0.9	-1.6

5.5. WORST-CASE CONFIGURATION AND MODE

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

LTE Band 38 (2570-2620MHz) is covered by LTE Band 41 because it is a subset of LTE band 41. Also, they have the same output power and supported bandwidths on Ant 1.

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.

The EUT was investigated in three orthogonal orientations X/Y/Z on both LAT 1 and UAT 1 antennas, it was determined that Y (Landscapes) orientation was worst-case orientation for all bands on both antennas without AC/DC adapter, headphones.

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
Laptop AC/DC adapter	Apple	MD592LL/A	N/A
Laptop	Apple	A1466	C02PS2H6G08S

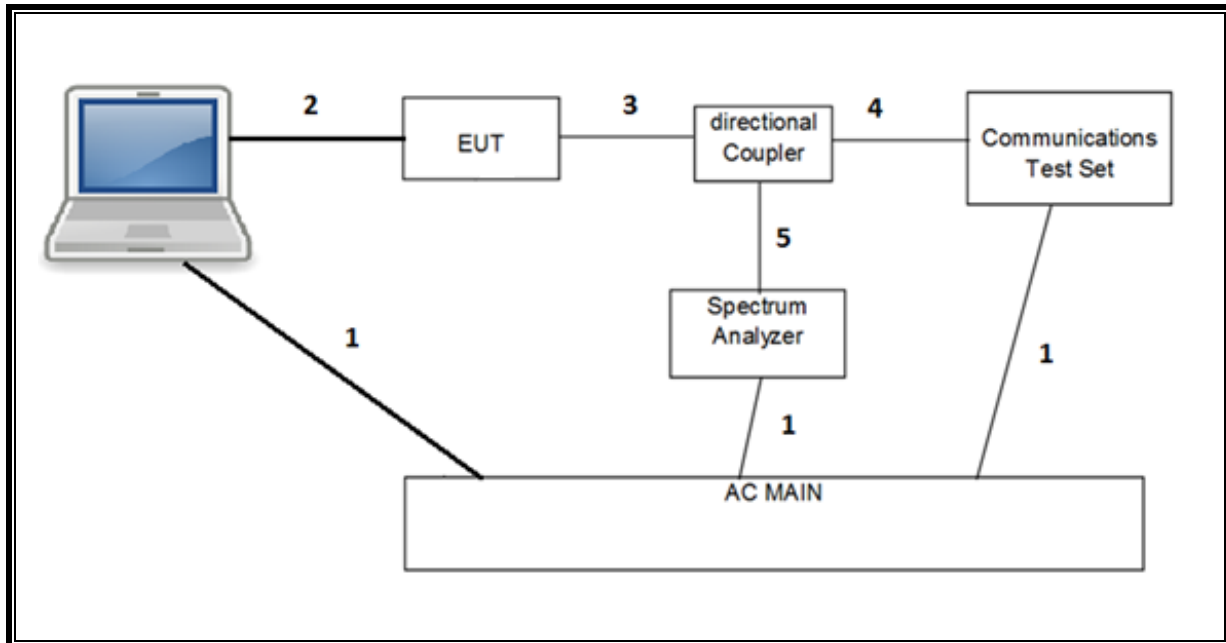
I/O CABLES (RF Conducted Test)

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

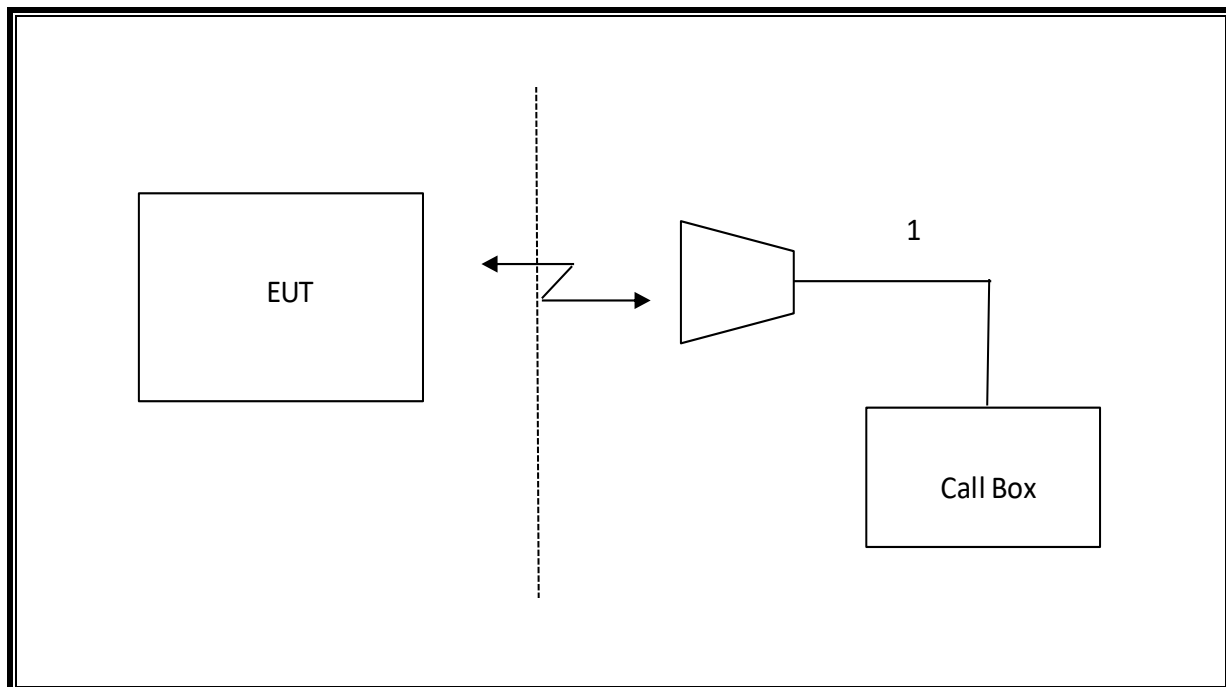
I/O CABLES (RF Radiated Test)

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

CONDUCTED SETUP



RADIATED SETUP



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T119	04/03/2019
*Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T900	5/31/2018
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T1131	12/30/2018
*Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T285	6/24/2018
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1113	12/21/2018
Spectrum Analyzer, PXA, 3Hz to 50GHz w/Ext. Mixer	Keysight	N9030A	T342	02/22/2019
Spectrum Analyzer, PSA 3Hz to 44GHz	Keysight	E4446A	T123	10/28/2018
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	AE0038201512	connection purpose only
Directional Coupler	KRYTAR	152610	T1536	4/27/2019
Directional Coupler	KRYTAR	152610	T1537	4/27/2019
Power Meter, P-series single channel	Keysight	N1911A	T1265	12/15//2018
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	T750	10/27/2018
Filter, HPF 3.0GHz	MICROTRONICS	HPM17543	T487	12/04/2018
Filter, HPF 1.2GHz	Micro-Tronics	WHKX1.2/15G-6ST	T1182	05/19/2019
*Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T1210	07/17/2018
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T959	02/17/2019
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T971	02/19/2019
Chamber, Environmental	Cincinnati Sub Zero	ZPHS-8-3.5-SCT/WC	T754	9/05/2018
Amplifier, 26.5GHz to 40GHz	Miteq	TTA2640-35_HG	T1864	03/09/2019
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	T404	03/09/2019
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T447	06/16/2019
Antenna, Horn 26.5GHz to 40GHz	ARA	MWH-2640	T90	8/25/2018
Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	T1616	09/14/2018

NOTES:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
*Testing is completed before equipment expiration date.

7. RF OUTPUT POWER VERIFICATION

RULE PART(S)

§2.1046, §27.50

MODES TESTED

- 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. ANT1 and ANT2

7.1.1. LTE BAND 7

ID:	10646	Date:	6/16/18
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OUTPUT POWER FOR LTE BAND 7 (10.0MHz + 20.0MHz)

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10MHz / 20MHz	2505.5	2519.9	1	49	1	0	25.0	23.8	22.6	21.5	21.0	20.0
			50	0	100	0	20.6	19.7	19.8	19.7	18.7	17.9
	2525.6	2540.0	1	49	1	0	24.7	23.5	23.0	21.4	20.7	21.1
			50	0	100	0	20.7	19.9	19.8	19.5	18.5	17.9
	2545.6	2560.0	1	49	1	0	24.5	23.6	22.9	21.0	20.4	20.8
			50	0	100	0	22.8	21.7	19.8	19.3	18.4	17.7

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 10MHz	2510.0	2524.4	1	99	1	0	24.9	23.9	23.1	21.4	20.7	21.0
			1	0	1	49	16.4	16.5	16.6	13.2	13.2	14.7
			100	0	50	0	22.9	21.9	22.0	19.7	18.8	20.0
	2530.1	2544.5	1	99	1	0	24.9	23.9	23.0	21.2	20.6	21.1
			1	0	1	49	16.4	16.3	16.4	13.0	13.1	14.4
			100	0	50	0	22.8	21.8	21.8	19.6	18.6	19.8
	2550.1	2564.5	1	99	1	0	24.7	23.8	22.9	21.1	20.4	20.7
			1	0	1	49	16.2	16.2	16.3	12.8	12.9	14.2
			100	0	50	0	22.7	21.7	21.7	19.4	18.4	19.6

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15MHz / 15MHz	2507.5	2522.5	1	74	1	0	24.9	24.0	22.9	19.7	19.1	19.3
			75	0	75	0	20.1	20.7	20.7	18.0	17.0	17.0
	2527.5	2542.5	1	74	1	0	24.8	24.0	22.9	21.5	19.0	19.3
			75	0	75	0	21.6	20.6	20.6	17.8	16.8	17.0
	2547.5	2562.5	1	74	1	0	24.7	23.9	22.8	19.3	18.7	18.9
			75	0	75	0	21.5	20.6	20.5	17.6	16.6	16.7

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15MHz / 20MHz	2507.8	2524.9	1	74	1	0	24.9	24.0	23.0	21.3	20.8	21.1
			75	0	100	0	21.5	20.5	20.5	19.7	18.7	18.4
	2525.3	2542.4	1	74	1	0	24.8	24.0	23.0	21.3	20.8	21.0
			75	0	100	0	21.3	20.8	20.3	19.6	18.5	18.4
	2542.9	2560.0	1	74	1	0	24.7	23.8	21.9	21.0	20.4	20.7
			75	0	100	0	21.3	20.4	20.3	19.5	18.4	18.3

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 15MHz	2510.0	2527.1	1	99	1	0	24.9	22.0	23.1	21.3	20.7	21.0
			100	0	75	0	22.5	21.4	21.4	19.7	18.7	19.4
	2527.6	2544.7	1	99	1	0	25.0	24.0	22.9	21.3	20.7	21.2
			100	0	75	0	22.4	21.3	21.3	19.6	18.6	19.4
	2545.1	2562.2	1	99	1	0	24.7	23.8	22.9	21.0	20.4	20.7
			100	0	75	0	22.1	21.2	21.2	19.4	18.4	19.1

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz/ 20MHz	2510.0	2529.8	1	99	1	0	25.0	24.0	23.2	21.3	20.8	21.1
			1	0	1	99	13.2	13.4	13.5	13.0	13.0	11.4
			100	0	100	0	22.0	20.9	20.9	19.8	18.8	18.9
	2525.1	2544.9	1	99	1	0	24.9	24.0	23.2	21.4	20.8	21.2
			1	0	1	99	13.1	13.5	13.5	12.8	12.8	11.5
			100	0	100	0	21.9	20.8	20.8	19.7	18.7	18.9
	2540.2	2560.0	1	99	1	0	21.8	23.9	23.0	21.1	20.5	20.9
			1	0	1	99	13.0	13.2	13.1	12.7	12.7	11.1
			100	0	100	0	21.8	20.7	20.8	19.6	18.5	18.8

7.1.2. LTE BAND 41

ID:	10646	Date:	6/15/18
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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	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5MHz / 20MHz	2499.3	2511.0	1	24	1	0	25.0	23.9	23.0	22.3	21.6	20.5
			25	0	100	0	22.9	21.9	21.9	20.5	19.6	19.6
	2583.8	2595.5	1	24	1	0	22.9	22.1	21.1	22.1	21.1	20.0
			25	0	100	0	20.7	19.7	19.8	20.2	19.2	19.2
	2668.3	2680.0	1	24	1	0	22.9	21.9	21.1	22.5	21.7	20.7
			25	0	100	0	20.7	19.7	19.7	20.3	19.3	19.3

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	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 5MHz	2506.0	2517.7	1	99	1	0	25.0	24.2	23.2	22.5	21.5	20.5
			1	0	1	24	16.3	16.4	16.5	14.0	14.1	14.0
			100	0	25	0	22.9	22.0	22.0	20.5	19.5	19.5
	2590.5	2602.2	1	99	1	0	24.9	23.8	23.0	22.1	21.1	20.1
			1	0	1	24	25.0	16.0	16.1	13.5	13.5	13.5
			100	0	25	0	23.8	21.6	21.6	20.0	19.0	19.0
	2675.0	2686.7	1	99	1	0	24.9	23.8	23.0	22.1	21.1	20.2
			1	0	1	24	16.1	16.0	16.2	13.6	13.6	13.7
			100	0	25	0	22.7	21.7	21.7	20.1	19.1	19.1

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10MHz / 20MHz	2501.5	2515.9	1	49	1	0	25.0	24.0	23.1	22.5	21.4	20.5
			50	0	100	0	22.6	21.7	21.7	19.9	19.0	19.0
	2583.6	2598.0	1	49	1	0	24.9	23.9	23.2	21.9	20.9	19.8
			50	0	100	0	22.5	21.6	21.6	19.6	18.7	18.7
	2665.6	2680.0	1	49	1	0	24.9	24.0	23.0	22.2	21.3	20.3
			50	0	100	0	22.5	21.5	21.5	19.8	18.8	18.8

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 10MHz	2506.0	2520.4	1	99	1	0	24.9	23.8	22.9	22.3	21.1	20.1
			100	0	50	0	22.7	21.7	21.7	20.0	19.0	19.0
	2588.1	2602.5	1	99	1	0	24.7	23.7	22.8	21.7	20.7	19.7
			100	0	50	0	22.5	21.5	21.5	19.6	18.6	18.6
	2670.1	2684.5	1	99	1	0	24.7	23.7	22.8	22.1	20.8	20.0
			100	0	50	0	22.5	21.5	21.5	19.8	18.8	18.8

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15MHz / 15MHz	2503.5	2518.5	1	74	1	0	24.8	24.0	22.9	21.9	21.2	20.0
			75	0	75	0	22.7	21.7	21.7	19.9	19.0	19.0
	2585.5	2600.5	1	74	1	0	24.7	23.9	22.8	22.2	20.8	19.8
			75	0	75	0	22.4	21.5	21.5	19.6	18.6	18.6
	2667.5	2682.5	1	74	1	0	24.7	23.8	22.8	22.0	21.0	19.9
			75	0	75	0	22.4	21.5	21.5	19.8	18.8	18.8

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15MHz / 20MHz	2503.8	2520.9	1	74	1	0	25.0	23.9	23.0	22.4	21.1	20.1
			75	0	100	0	22.6	21.7	21.7	20.1	19.1	19.1
	2583.3	2600.4	1	74	1	0	24.9	23.9	23.0	21.9	20.9	19.8
			75	0	100	0	22.5	21.5	21.6	19.7	18.7	18.7
	2662.9	2680.0	1	74	1	0	24.8	23.8	22.9	22.0	21.1	20.0
			75	0	100	0	21.5	21.5	21.5	19.8	18.8	18.8

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz / 15MHz	2506.0	2523.1	1	99	1	0	24.9	24.0	23.0	20.5	19.3	17.3
			100	0	75	0	22.7	21.8	21.8	18.3	17.2	16.2
	2585.6	2602.7	1	99	1	0	24.7	23.6	22.7	19.9	19.0	18.0
			100	0	75	0	22.5	21.6	21.5	17.8	16.8	16.9
	2665.1	2682.2	1	99	1	0	24.7	23.7	22.8	22.2	21.1	20.2
			100	0	75	0	22.5	21.5	21.5	21.9	21.0	20.0

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

Bandwidth	PCC Frequency (MHz)	SCC1 Frequency (MHz)	PCC RB	PCC RB	SCC1 RB	SCC1 RB	Conducted Average (dBm)					
			Size	Offset	Size	Offset	Ant 1			Ant 2		
							QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20MHz/ 20MHz	2506.0	2525.8	1	99	1	0	24.7	24.0	23.0	22.2	21.4	20.4
			1	0	1	99	16.0	16.0	16.0	16.1	16.2	16.1
			100	0	100	0	22.7	21.8	21.8	22.3	21.3	20.4
	2583.1	2602.9	1	99	1	0	24.9	23.9	23.0	20.1	19.1	18.1
			1	0	1	99	15.9	15.9	15.9	11.3	11.3	11.3
			100	0	100	0	22.6	21.6	21.6	17.9	16.9	16.9
	2660.2	2680.0	1	99	1	0	24.8	23.8	22.9	22.2	21.2	20.3
			1	0	1	99	15.9	15.8	15.9	15.9	15.8	15.8
			100	0	100	0	22.6	21.6	21.6	21.9	20.9	20.0

8. CONDUCTED TEST RESULTS

8.1. OCCUPIED BANDWIDTH

RULE PART(S)

§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 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 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	28.290	36.88
	10MHz + 20MHz BAND 16QAM			28.280	37.19
	10MHz + 20MHz BAND 64QAM			28.319	39.82
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		28.284	34.96
	20MHz + 10MHz BAND 16QAM			28.262	43.01
	20MHz + 10MHz BAND 64QAM			28.378	35.88
	15MHz + 15MHz BAND QPSK	75/0 + 75/0		28.829	38.73
	15MHz + 15MHz BAND 16QAM			28.884	35.70
	15MHz + 15MHz BAND 64QAM			28.846	34.39
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		33.114	48.00
	15MHz + 20MHz BAND 16QAM			33.106	45.08
	15MHz + 20MHz BAND 64QAM			33.179	45.30
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		33.117	42.20
	20MHz + 15MHz BAND 16QAM			32.879	34.90
	20MHz + 15MHz BAND 64QAM			33.089	44.76
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.984	52.80
	20MHz + 20MHz BAND 16QAM			37.880	53.02
	20MHz + 20MHz BAND 64QAM			38.000	53.33

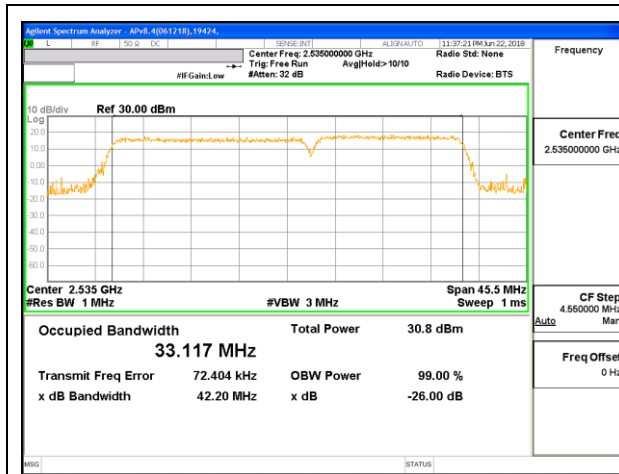
LTE BAND 41

Band	Mode	RB Allocation/RB Offset	f (MHz)	99% BW (MHz)	- 26dB BW (MHz)
LTE BAND 41	5MHz + 20MHz BAND QPSK	25/0 + 100/0	2593	23.483	29.60
	5MHz + 20MHz BAND 16QAM			23.442	25.42
	5MHz + 20MHz BAND 64QAM			23.118	24.89
	20MHz + 5MHz BAND QPSK	100/0 + 25/0		23.216	24.98
	20MHz + 5MHz BAND 16QAM			23.542	34.00
	20MHz + 5MHz BAND 64QAM			23.263	24.94
	10MHz + 20MHz BAND QPSK	50/0 + 100/0		28.310	38.45
	10MHz + 20MHz BAND 16QAM			28.198	35.67
	10MHz + 20MHz BAND 64QAM			27.962	30.43
	20MHz + 10MHz BAND QPSK	100/0 + 50/0		27.884	29.98
	20MHz + 10MHz BAND 16QAM			28.210	37.65
	20MHz + 10MHz BAND 64QAM			27.948	30.15
	15MHz + 15MHz BAND QPSK	75/0 + 75/0		28.771	46.85
	15MHz + 15MHz BAND 16QAM			28.826	43.31
	15MHz + 15MHz BAND 64QAM			28.584	30.68
	15MHz + 20MHz BAND QPSK	75/0 + 100/0		33.144	48.66
	15MHz + 20MHz BAND 16QAM			32.975	41.23
	15MHz + 20MHz BAND 64QAM			32.785	35.30
	20MHz + 15MHz BAND QPSK	100/0 + 75/0		32.742	35.00
	20MHz + 15MHz BAND 16QAM			33.062	44.45
	20MHz + 15MHz BAND 64QAM			32.819	35.01
	20MHz + 20MHz BAND QPSK	100/0 + 100/0		37.555	40.02
	20MHz + 20MHz BAND 16QAM			37.869	48.10
	20MHz + 20MHz BAND 64QAM			37.554	39.95

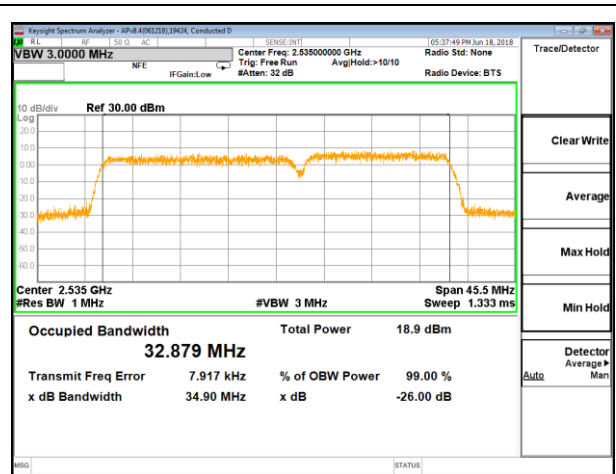
8.1.1. LTE BAND 7



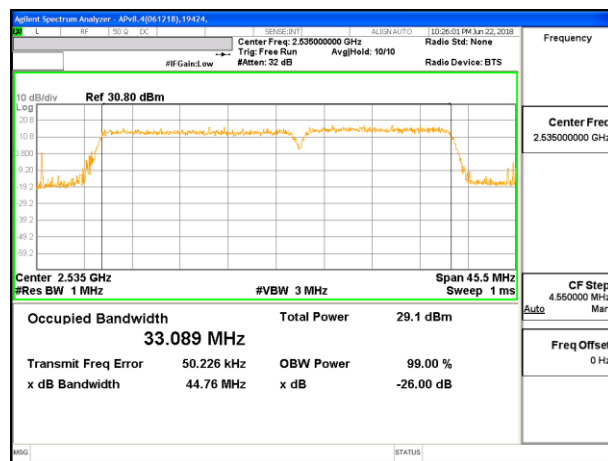




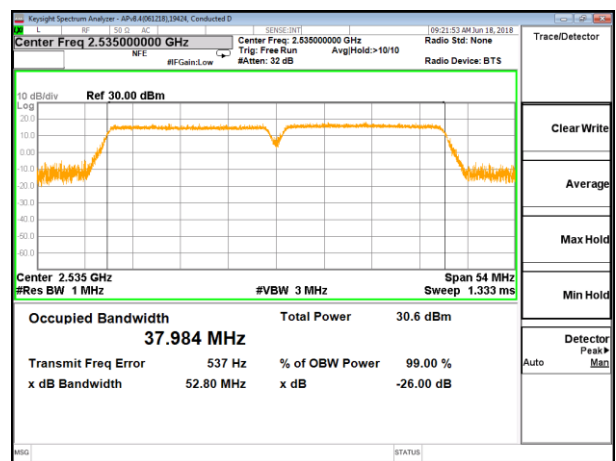
LTE B7 20MHz + 15MHz QPSK RB100-0 + RB75-0



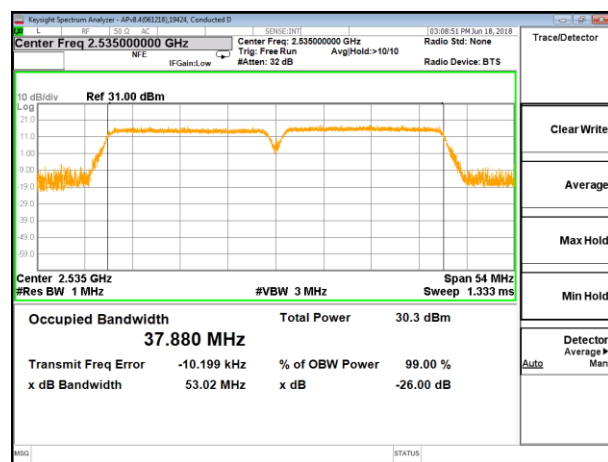
LTE B7 20MHz + 15MHz 16QAM RB100-0 + RB75-0



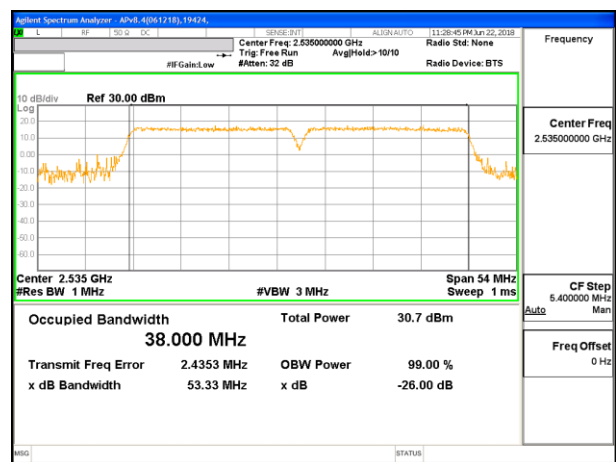
LTE B7 20MHz + 15MHz 64QAM RB100-0 + RB75-0



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



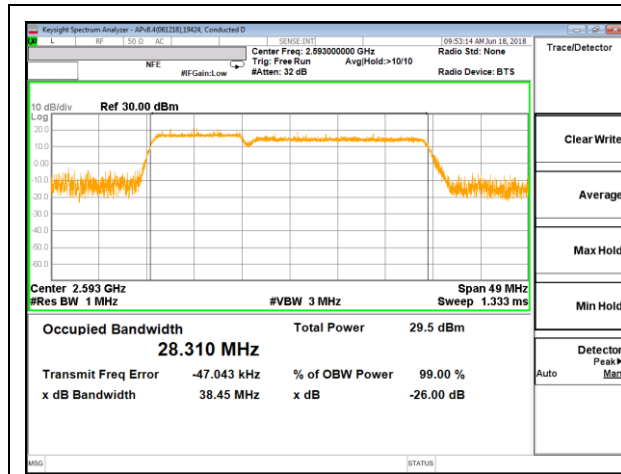
LTE B7 20MHz + 20MHz 16QAM RB100-0 + RB100-0



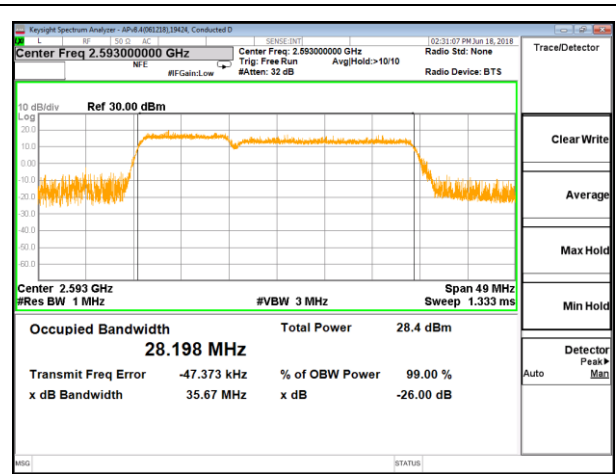
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8.1.2. LTE BAND 41

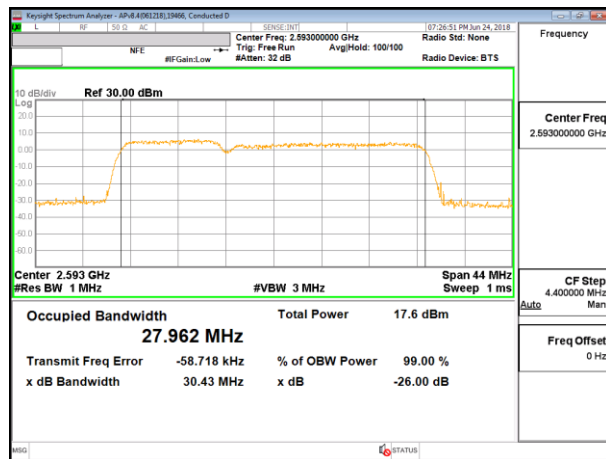




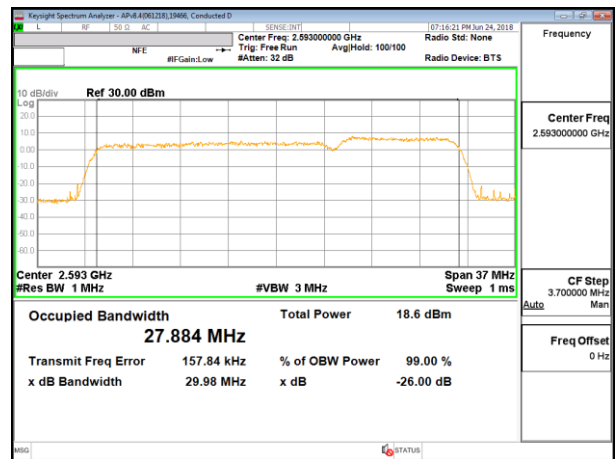
LTE B41 10MHz + 20MHz QPSK RB50-0 + RB100-0



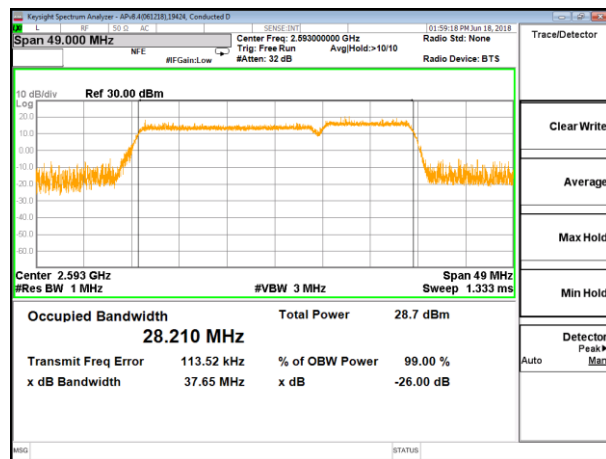
LTE B41 10MHz + 20MHz 16QAM RB50-0 + RB100-0



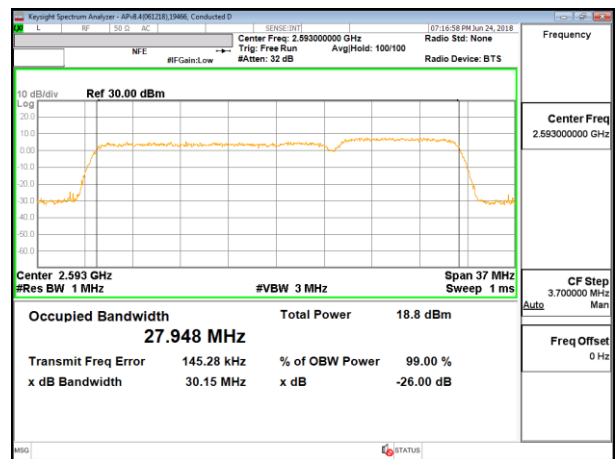
LTE B41 10MHz + 20MHz 64QAM RB50-0 + RB100-0



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



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



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



