



FCC 47 CFR PART 02
FCC 47 CFR PART 22
FCC 47 CFR PART 24
FCC 47 CFR PART 27

CERTIFICATION TEST REPORT

For

WisePOS 4G

MODEL NUMBER: WisePOS 4G

FCC ID: 2AB7X-WISEPOS4G

REPORT NUMBER: 4788704908.1-6

ISSUE DATE: December 29, 2018

Prepared for

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/26/2018	Initial Issue	
1.0	12/17/2018	Update some plots of LTE Band7 Adjacent Channel Power	Jacky Jiang
2.0	12/29/2018	Add the plot of Emission mask for LTE Band7 to verify the highest emission	Jacky Jiang

Summary of Test Results			
Standard(s) Section	Description	Requirements	Result
FCC			
§22.913(a)	Effective(Isotropic) Radiated Power of Transmitter	ERP≤7 W	PASS
§24.232(c) §27.50(h)	Effective(Isotropic) Radiated Power of Transmitter	EIRP ≤ 2 W	PASS
§27.50(d)	Effective(Isotropic) Radiated Power of Transmitter	EIRP ≤1 W	PASS
§27.50(c)	Effective(Isotropic) Radiated Power of Transmitter	ERP≤3 W	PASS
§24.232(d) §27.50(a) §27.50(d) §27.50(c)	Peak to Average Radio	≤13dB	PASS
§2.1049	Occupied Bandwidth	OBW: No limit EBW: No limit	PASS
§2.1051, §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m)	Band Edge Compliance	≤ 43+10log ₁₀ (P[W])/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	PASS
§2.1051, §22.917(a) §24.238(a) §27.53(g) §27.53(h) §27.53(m)	Spurious Emission at Antenna Terminal	≤ 43+10log ₁₀ (P[W])/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	PASS
§2.1053, §22.917, §24.238(a), §27.53(g) §27.53(h) §27.53(m)	Radiated Spurious Emissions	≤ 43+10log ₁₀ (P[W])	PASS
§2.1055, §2.1053, §22.355, §24.235, §27.53(g) §27.54,	Frequency Stability	≤ ±2.5ppm(Part 22) Emission must remain in band(Part 24,27)	PASS

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: BBPOS International Limited
Address: Suite 1903-04, Tower 2, Nina Tower, 8 Yeung Uk Road, Tsuen Wan, NT, Hong Kong

Manufacturer Information

Company Name: BBPOS International Limited
Address: Suite 1903-04, Tower 2, Nina Tower, 8 Yeung Uk Road, Tsuen Wan, NT, Hong Kong

EUT Description

Product Name: WisePOS 4G
Brand Name: BBPOS
Model Name: WisePOS 4G
FCC ID: 2AB7X-WISEPOS4G
Date Tested: October 9, 2018~ November 22, 2018
December 17, 2018
December 28, 2018~ December 29, 2018

APPLICABLE STANDARDS

STANDARD	TEST RESULTS
FCC 47 CFR PART 22	PASS
FCC 47 CFR PART 24	PASS
FCC 47 CFR PART 27	PASS

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.26-2015 & KDB971168, FCC CFR 47 Part 2, Part 22, Part 24, Part 27.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<p>A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.</p> <p>FCC (FCC Designation No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules</p> <p>IC(Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320.</p> <p>VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793.</p> <p>Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011</p>
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Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

4. CALIBRATION AND UNCERTAINTY

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.

MEASUREMENT UNCERTAINTY

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

Test Item	Uncertainty
Uncertainty for Conduction emission test	3.32dB (150KHz-30MHz)
	3.72dB (9KHz-150KHz)
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	4.10dB(1-6GHz)
	4.40dB (6GHz-18Gz)
	3.54dB (18GHz-26Gz)
Bandwidth	1.1%
Stop Transmitting Time Test	0.6%

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

5. EQUIPMENT UNDER TEST

5.1 DESCRIPTION OF EUT

Equipment	WisePOS 4G
Model Name	WisePOS 4G
Power Input	5V/1A
Hardware Version	K960_MB_P2_V01
Software Version	960ABR9J1_BB_V001

5.2 TECHNICAL INFORMATION

E- UTRA Band	Characteristics		
	E-UTRA operating bands		Bandwidth
	Transmit	Receive	
2	1850 MHz to 1910 MHz	1930 MHz to 1990 MHz	<input checked="" type="checkbox"/> 1.4M <input type="checkbox"/> 3M <input type="checkbox"/> 5M <input checked="" type="checkbox"/> 10M <input checked="" type="checkbox"/> 15M <input type="checkbox"/> 20M
4	1710 MHz to 1755 MHz	2110 MHz to 2155 MHz	<input checked="" type="checkbox"/> 1.4M <input type="checkbox"/> 3M <input type="checkbox"/> 5M <input checked="" type="checkbox"/> 10M <input checked="" type="checkbox"/> 15M <input type="checkbox"/> 20M
5	824 MHz to 849 MHz	869 MHz to 894 MHz	<input checked="" type="checkbox"/> 1.4M <input type="checkbox"/> 3M <input type="checkbox"/> 5M <input checked="" type="checkbox"/> 10M
7	2500 MHz to 2 570 MHz	2620 MHz to 2690 MHz	<input checked="" type="checkbox"/> 5M <input type="checkbox"/> 10M <input type="checkbox"/> 15M <input checked="" type="checkbox"/> 20M
17	704 MHz to 716 MHz	734 MHz to 746 MHz	<input checked="" type="checkbox"/> 5M <input type="checkbox"/> 10M

5.3 MAXIMUM OUTPUT POWER

ERP/EIRP RULE PART(S)

FCC: §2.1046, §22.913, §24.232, §27.50

LIMITS

- 22.913(a) The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.
- 24.232(c) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.
- 27.50(c) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
- 27.50(d) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watts EIRP.
- 27.50(h) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13dB.

ERP/EIRP TEST PROCEDURE

ANSI C63.26:2015/ KDB 971168 D01 Section 5.6

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

where:

ERP or EIRP = effective or equivalent isotropically radiated power, respectively (expressed in the same units as PMes, typically dBW or dBm);

PMes = 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

The transmitter has a maximum radiated ERP / EIRP output powers as follows:

RESULTS

See the following pages

LTE Band2

Part 24						
EIRP Limit(W)		2.00				
Antenna Gain (dBi)		-1.00				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
1.4	QPSK	1850.7	1910.3	22.81	21.81	0.152
	16QAM			21.78	20.78	0.120
3	QPSK	1851.5	1908.5	22.58	21.58	0.144
	16QAM			21.48	20.48	0.112
5	QPSK	1852.5	1907.5	22.55	21.55	0.143
	16QAM			21.76	20.76	0.119
10	QPSK	1855.0	1905.0	22.58	21.58	0.144
	16QAM			21.69	20.69	0.117
15	QPSK	1857.5	1902.5	22.48	21.48	0.141
	16QAM			21.5	20.50	0.112
20	QPSK	1860.0	1900.0	22.52	21.52	0.142
	16QAM			21.68	20.68	0.117

LTE Band4

Part 27						
EIRP Limit(W)		1.00				
Antenna Gain (dBi)		-1.50				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
1.4	QPSK	1710.7	1754.3	23.00	21.50	0.141
	16QAM			21.75	20.25	0.106
3	QPSK	1711.5	1753.5	22.99	21.49	0.141
	16QAM			21.98	20.48	0.112
5	QPSK	1712.5	1752.5	23.00	21.50	0.141
	16QAM			21.95	20.45	0.111
10	QPSK	1715.0	1750.0	23.00	21.50	0.141
	16QAM			21.91	20.41	0.110
15	QPSK	1717.5	1747.5	22.85	21.35	0.136
	16QAM			21.79	20.29	0.107
20	QPSK	1720.0	1745.0	22.96	21.46	0.140
	16QAM			21.86	20.36	0.109

LTE Band5

Part 22H						
ERP Limit(W)		7.00				
Antenna Gain (dBi)		-3.20				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (W)
1.4	QPSK	824.7	848.3	22.45	17.10	0.051
	16QAM			21.55	16.20	0.042
3	QPSK	825.5	847.5	22.38	17.03	0.050
	16QAM			21.57	16.22	0.042
5	QPSK	826.5	846.5	22.48	17.13	0.052
	16QAM			21.76	16.41	0.044
10	QPSK	829.0	844.0	22.37	17.02	0.050
	16QAM			21.51	16.16	0.041

LTE Band7

Part 27						
EIRP Limit(W)		2.00				
Antenna Gain (dBi)		-1.70				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)
5	QPSK	2502.5	2567.5	22.48	20.78	0.120
	16QAM			21.55	19.85	0.097
10	QPSK	2505.0	2565.0	22.52	20.82	0.121
	16QAM			21.38	19.68	0.093
15	QPSK	2506.5	2562.5	22.51	20.81	0.121
	16QAM			21.47	19.77	0.095
20	QPSK	2510.0	2560.0	22.61	20.91	0.123
	16QAM			21.60	19.90	0.098

LTE Band17

Part 27						
ERP Limit(W)		3.00				
Antenna Gain (dBi)		-2.90				
Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	ERP Average (dBm)	ERP Average (W)
5	QPSK	706.5	713.5	22.98	17.93	0.062
	16QAM			21.97	16.92	0.049
10	QPSK	709.0	711.0	22.69	17.64	0.058
	16QAM			21.72	16.67	0.046

5.4 WORST-CASE CONFIGURATION AND MODE

During all testing, EUT is in link mode with base station emulator at maximum power level. 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. All testing was performed using QPSK and 16QAM modulations to represent the worst case.

The radiated spurious emissions measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT was investigated in three orthogonal orientations X,Y and Z. It was determined that Y orientation was the worst-case orientation connected with charger and earphone.

Radiated spurious emissions were investigated below 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found on below 30MHz. the emissions between 30MHz-1GHz were tested the highest transmitting power channel and the worse configuration.

worst case

Test Items	Test configuration				
	Description	Modulation	Channel	Bandwidth (MHz)	RB Configuration
Occupied Bandwidth	QPSK, 16QAM	L,M,H	1.4,3,5,10,15,20	Full RB	
Band Edge Compliance	QPSK, 16QAM	L,M,H	1.4,3,5,10,15,20	1.RB size=1, RB Location= Low & High 2.RB size =Full RB	
Spurious Emission at Antenna Terminal	QPSK, 16QAM	L,M,H	1.4,3,5,10,15,20	RB size=1, RB Location= Low	
Radiated Spurious Emissions	QPSK	L,M,H	The Minimum and Maximum BW	RB size=1, RB Location= Low	

5.5 TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	52%	
Atmospheric Pressure:	1025Pa	
Temperature	TN	25 °C
Voltage :	VL	3.23V
	VN	3.8V
	VH	4.35V
	End Voltage	3.0V

Note: VL= Lower Extreme Test Voltage

VN= Nominal Voltage

VH= Upper Extreme Test Voltage

TN= Normal Temperature

5.6 TEST CHANNEL LIST

Mode	TX	Low	Middle	High
LTE Band 2	TX(1.4M)	18607	18900	19193
		1850.7	1880	1909.3
	TX(3M)	18615	18900	19185
		1851.5	1880	1908.5
	TX(5M)	18625	18900	19175
		1852.5	1880	1907.5
	TX(10M)	18650	18900	19150
		1855	1880	1905
	TX(15M)	18675	18900	19125
		1857.5	1880	1902.5
	TX(20M)	18700	18900	19100
		1860	1880	1900

Mode	TX/RX	Low	Middle	High
LTE Band 4	TX(1.4M)	19957	20175	20393
		1710.7	1732.5	1754.3
	TX(3M)	19965	20175	20385
		1711.5	1732.5	1753.5
	TX(5M)	19975	20175	20375
		1712.5	1732.5	1752.5
	TX(10M)	20000	20175	20350
		1715	1732.5	1750
	TX(15M)	20025	20175	20325
		1717.5	1732.5	1747.5
	TX(20M)	20050	20175	20300
		1720	1732.5	1745

Mode	TX/RX	Low	Middle	High
LTE Band 5	TX(1.4M)	20407	20525	20643
		824.7	836.5	848.3
	TX(3M)	20415	20525	20635
		825.5	836.5	847.5
	TX(5M)	20425	20525	20625
		826.5	836.5	846.5
	TX(10M)	20450	20525	20600
		829	836.5	844

Mode	TX/RX	Low	Middle	High
LTE Band 7	TX(5M)	20775	21100	21425
		2502.5	2535	2567.5
	TX(10M)	20800	21100	21400
		2505	2535	2565
	TX(15M)	20825	21100	21375
		2507.5	2535	2562.5
	TX(20M)	20850	21100	21350
		2510	2535	2560

Mode	TX/RX	Low	Middle	High
LTE Band 17	TX(5M)	23755	23790	23825
		706.5	710	713.5
	TX(10M)	23780	23790	23800
		709	710	711
		714	710	706

5.7 DESCRIPTION OF AVAILABLE ANTENNAS

Band	Antenna Type	Antenna Gain (dBi)
LTE Band 2	PIFA	-1.0
LTE Band 4	PIFA	-1.5
LTE Band 5	PIFA	-3.2
LTE Band 7	PIFA	-1.7
LTE Band 17	PIFA	-2.9

5.8 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	FCC ID
1	N/A	N/A	N/A	N/A

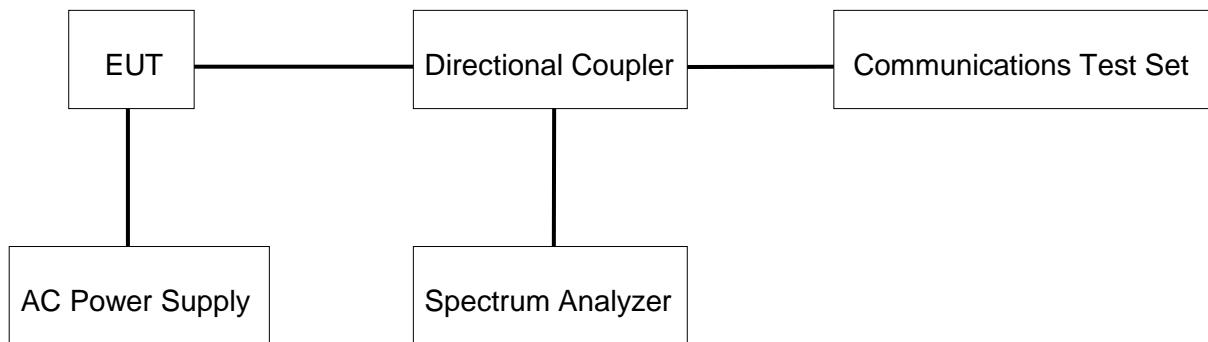
I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	N/A	N/A	0.5	N/A

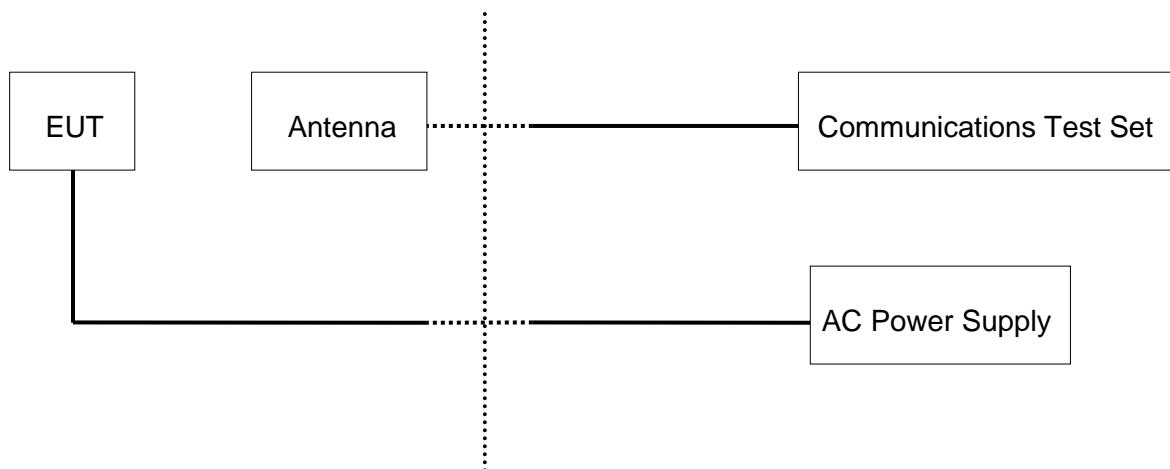
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	Headphone	SONY	MDR-ZX310	/
	Adapter	XIAOMI	MDY-08-EF	5V/1A

CONDUCTED TEST SETUP



RADIATED TEST SETUP



5.9 MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions												
Instrument												
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.					
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESR3	101961	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018					
<input checked="" type="checkbox"/>	Two-Line V-Network	R&S	ENV216	101983	Dec.20, 2016	Dec.12, 2017	Dec.11, 2018					
<input checked="" type="checkbox"/>	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Feb.10, 2017	Dec.12, 2017	Dec.11, 2018					
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	155523	Dec.13, 2017	Dec.12, 2018	Dec.10, 2019					
Software												
Used	Description			Manufacturer	Name	Version						
<input checked="" type="checkbox"/>	Test Software for Conducted disturbance			Farad	EZ-EMC	Ver. UL-3A1						
Radiated Emissions												
Instrument												
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.					
<input checked="" type="checkbox"/>	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Feb. 24, 2017	Dec.12, 2017	Dec.11, 2018					
<input checked="" type="checkbox"/>	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Jan.09, 2016	Jan.09, 2016	Jan.09, 2019					
<input checked="" type="checkbox"/>	Preamplifier	HP	8447D	2944A09099	Feb. 13, 2017	Dec.12, 2017	Dec.11, 2018					
<input checked="" type="checkbox"/>	EMI Measurement Receiver	R&S	ESR26	101377	Dec. 20, 2016	Dec.12, 2017	Dec.11, 2018					
<input checked="" type="checkbox"/>	Horn Antenna	TDK	HRN-0118	130939	Jan. 09, 2016	Jan. 09, 2016	Jan. 09, 2019					
<input checked="" type="checkbox"/>	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Jan.06, 2016	Jan.06, 2016	Jan.06, 2019					
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Jan. 14, 2017	Dec.12, 2017	Dec.11, 2018					
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec. 20, 2016	Dec.12, 2017	Dec.11, 2018					
<input checked="" type="checkbox"/>	Loop antenna	Schwarzbeck	1519B	00008	Mar. 26, 2016	Mar. 26, 2016	Mar. 26, 2019					
Software												
Used	Description			Manufacturer	Name	Version						
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance			Farad	EZ-EMC	Ver. UL-3A1						
Other instruments												
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.					
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec.12, 2017	Dec.11, 2018	Dec.10.2019					
<input checked="" type="checkbox"/>	Power Meter	Keysight	N9031A	MY55416024	Dec.13, 2017	Dec.12, 2018	Dec.10, 2019					
<input checked="" type="checkbox"/>	Thermostatic and Humidistatic Box	SANMOOD	SG-80-CC-2	2088	Feb.14,2017	Dec.22,2017	Dec.22,2018					

6. TEST RESULTS

6.1 OUTPUT POWER VERIFICATION

LTE Band 2

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18607	18900	19193
Band 2 1.4MHz	QPSK	1	0	22.37	22.68	22.66
		1	3	22.51	22.81	22.81
		1	5	22.38	22.70	22.66
		3	0	22.40	22.59	22.54
		3	2	22.46	22.65	22.57
		3	3	22.47	22.62	22.54
		6	0	21.52	21.69	21.71
	16QAM	1	0	21.31	21.51	21.69
		1	3	21.40	21.61	21.78
		1	5	21.32	21.52	21.67
		3	0	21.52	21.53	21.51
		3	2	21.58	21.58	21.50
		3	3	21.57	21.55	21.48
		6	0	20.65	20.67	20.43
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18615	18900	19185
Band 2 3MHz	QPSK	1	0	22.46	22.55	22.46
		1	7	22.58	22.57	22.27
		1	14	22.45	22.37	22.17
		8	0	21.46	21.38	21.11
		8	4	21.49	21.49	21.15
		8	7	21.48	21.31	21.13
		15	0	21.39	21.29	21.01
	16QAM	1	0	21.36	20.99	21.28
		1	7	21.48	21.09	21.41
		1	14	21.29	21.05	21.24
		8	0	20.49	20.48	20.16
		8	4	20.55	20.56	20.19
		8	7	20.52	20.53	20.19
		15	0	20.42	20.47	20.10
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18625	18900	19175
Band 2	QPSK	1	0	22.27	22.18	22.36

5MHz		1	13	22.54	22.42	22.55
		1	24	22.28	22.20	22.37
		12	0	21.19	21.18	21.32
		12	6	21.22	21.23	21.36
		12	13	21.25	21.21	21.33
		25	0	21.23	21.17	21.28
	16QAM	1	0	21.26	21.52	21.23
		1	13	21.49	21.76	21.45
		1	24	21.24	21.56	21.22
		12	0	20.35	20.27	20.29
		12	6	20.39	20.31	20.32
		12	13	20.41	20.28	20.30
		25	0	20.29	20.16	20.15
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18650	18900	19150
Band 2 10MHz	QPSK	1	0	22.30	22.29	22.38
		1	25	22.40	22.44	22.58
		1	49	22.30	22.30	22.47
		25	0	21.24	21.30	21.38
		25	13	21.28	21.27	21.36
		25	25	21.33	21.25	21.34
		50	0	21.27	21.24	21.34
	16QAM	1	0	21.19	21.01	21.53
		1	25	21.27	21.14	21.69
		1	49	21.17	21.06	21.46
		25	0	20.38	20.23	20.31
		25	13	20.43	20.21	20.30
		25	25	20.47	20.19	20.27
		50	0	20.36	20.16	20.24
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18675	18900	19125
Band 2 15MHz	QPSK	1	0	22.48	22.08	22.16
		1	38	22.35	22.27	22.33
		1	74	22.07	22.02	22.10
		36	0	21.07	21.19	21.32
		36	18	21.22	21.20	21.32
		36	39	21.17	21.25	21.30
		75	0	21.13	21.29	21.29
	16QAM	1	0	21.15	20.82	21.34
		1	38	21.41	21.10	21.50
		1	74	21.18	20.88	21.20
		36	0	20.02	20.26	20.34
		36	18	20.13	20.29	20.35
		36	39	20.26	20.29	20.33

		75	0	20.22	20.29	20.30
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				18700	18900	19100
Band 2 20MHz	QPSK	1	0	22.23	21.90	21.94
		1	50	22.52	22.33	22.31
		1	99	21.91	21.93	21.91
		50	0	20.94	21.13	21.18
		50	25	21.16	21.14	21.17
		50	50	21.16	21.12	21.08
		100	0	21.07	21.13	21.15
	16QAM	1	0	20.99	21.26	21.22
		1	50	21.43	21.68	21.54
		1	99	21.10	21.34	21.08
		50	0	20.04	20.18	20.24
		50	25	20.30	20.23	20.23
		50	50	20.20	20.21	20.13
		100	0	20.14	20.22	20.19

LTE Band 4

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				19957	20175	20393
Band 4 1.4MHz	QPSK	1	0	22.48	22.71	22.82
		1	3	22.56	22.84	23.00
		1	5	22.47	22.71	22.88
		3	0	22.41	22.49	22.63
		3	2	22.44	22.53	22.67
		3	3	22.45	22.53	22.71
		6	0	21.43	21.72	21.93
	16QAM	1	0	21.35	21.65	21.51
		1	3	21.42	21.75	21.56
		1	5	21.37	21.66	21.51
		3	0	21.40	21.50	21.66
		3	2	21.41	21.50	21.70
		3	3	21.40	21.50	21.70
		6	0	20.60	20.52	20.89
Band 4 3MHz	QPSK	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				19965	20175	20385
		1	0	22.50	22.77	22.90
		1	7	22.63	22.83	22.99
		1	14	22.48	22.87	22.98
		8	0	21.43	21.75	21.82
		8	4	21.54	21.84	21.95

		16QAM	1	0	21.37	21.32	21.93
		16QAM	1	7	21.54	21.43	21.98
		16QAM	1	14	21.35	21.32	21.94
		16QAM	8	0	20.64	20.65	20.68
		16QAM	8	4	20.74	20.75	20.77
		16QAM	8	7	20.73	20.76	20.77
		16QAM	15	0	20.47	20.55	20.77
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)			
				Channel	Channel	Channel	
				19975	20175	20375	
Band 4 5MHz	QPSK	1	0	22.43	22.76	22.72	
		1	13	22.69	22.94	23.00	
		1	24	22.50	22.80	22.95	
		12	0	21.41	21.54	21.67	
		12	6	21.50	21.59	21.79	
		12	13	21.47	21.56	21.75	
		25	0	21.45	21.53	21.68	
	16QAM	1	0	21.36	21.50	21.89	
		1	13	21.62	21.74	21.95	
		1	24	21.44	21.55	21.93	
		12	0	20.56	20.60	20.84	
		12	6	20.61	20.63	20.95	
		12	13	20.61	20.61	20.91	
		25	0	20.48	20.52	20.78	
Band 4 10MHz	QPSK	RB size	RB offset	Average Power (dBm)			
				Channel	Channel	Channel	
				20000	20175	20350	
		1	0	22.46	22.74	22.76	
		1	25	22.62	22.94	22.96	
		1	49	22.54	22.80	23.00	
		25	0	21.43	21.61	21.68	
	16QAM	25	13	21.49	21.57	21.72	
		25	25	21.59	21.56	21.75	
		50	0	21.51	21.52	21.68	
		1	0	21.32	21.27	21.90	
		1	25	21.49	21.43	21.91	
		1	49	21.35	21.37	21.86	
		25	0	20.60	20.60	20.72	
Band 4 15MHz	QPSK	25	13	20.65	20.56	20.80	
		25	25	20.74	20.56	20.84	
		50	0	20.60	20.52	20.75	
		RB size	RB offset	Average Power (dBm)			
				Channel	Channel	Channel	
				20025	20175	20325	

		36	39	21.70	21.78	21.71
		75	0	21.57	21.79	21.60
16QAM	Bandwidth	1	0	21.40	21.53	21.01
		1	38	21.59	21.79	21.30
		1	74	21.47	21.71	21.09
		36	0	20.56	20.72	20.70
		36	18	20.71	20.74	20.79
		36	39	20.71	20.74	20.73
		75	0	20.68	20.72	20.82
		Modulation	RB size	Average Power (dBm)		
				Channel	Channel	Channel
				20050	20175	20300
Band 4 20MHz	QPSK	1	0	22.19	22.37	22.47
		1	50	22.76	22.96	22.81
		1	99	22.33	22.42	21.60
		50	0	21.27	21.54	21.45
		50	25	21.46	21.57	21.55
		50	50	21.42	21.50	21.58
		100	0	21.40	21.53	21.53
	16QAM	1	0	21.25	21.41	21.24
		1	50	21.84	21.83	21.86
		1	99	21.37	21.66	21.54
		50	0	20.44	20.51	20.49
		50	25	20.58	20.54	20.58
		50	50	20.50	20.49	20.64
		100	0	20.46	20.54	20.60

LTE Band 5

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20407	20525	20643
Band 5 1.4MHz	QPSK	1	0	22.03	22.31	22.22
		1	3	22.18	22.45	22.38
		1	5	22.08	22.30	22.25
		3	0	22.10	22.21	22.26
		3	2	22.14	22.24	22.30
		3	3	22.15	22.24	22.29
		6	0	21.14	21.31	21.28
	16QAM	1	0	20.97	21.12	21.43
		1	3	21.07	21.24	21.55
		1	5	21.02	21.12	21.42
		3	0	21.22	21.12	21.36
		3	2	21.29	21.19	21.39
		3	3	21.28	21.18	21.35
		6	0	20.31	20.38	20.17
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20415	20525	20635
Band 5	QPSK	1	0	22.11	22.21	22.24

3MHz	16QAM	1	7	22.23	22.37	22.38
		1	14	22.13	22.30	22.29
		8	0	21.03	21.21	21.16
		8	4	21.13	21.32	21.21
		8	7	21.17	21.31	21.26
		15	0	21.02	21.16	21.17
		1	0	21.04	21.01	21.44
		1	7	21.16	21.06	21.57
		1	14	21.02	20.95	21.46
		8	0	20.18	20.24	20.07
		8	4	20.30	20.32	20.14
		8	7	20.33	20.33	20.15
		15	0	20.01	20.18	20.24
		RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20425	20525	20625
Band 5 5MHz	QPSK	1	0	22.05	22.26	22.12
		1	13	22.31	22.48	22.36
		1	24	22.13	22.28	22.19
		12	0	20.97	21.13	21.14
		12	6	21.09	21.17	21.17
		12	13	21.08	21.19	21.15
		25	0	21.03	21.17	21.11
	16QAM	1	0	20.99	21.19	21.48
		1	13	21.26	21.37	21.76
		1	24	21.12	21.16	21.51
		12	0	20.11	20.27	20.36
		12	6	20.21	20.30	20.39
		12	13	20.21	20.29	20.36
		25	0	20.04	20.20	20.23
Band 5 10MHz	QPSK	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20450	20525	20600
		1	0	22.11	22.13	22.24
		1	25	22.29	22.37	22.32
		1	49	22.22	22.26	22.25
		25	0	21.05	21.21	21.09
	16QAM	25	13	21.14	21.20	21.18
		25	25	21.10	21.28	21.12
		50	0	21.10	21.23	21.11
		1	0	21.28	21.09	20.93
		1	25	21.51	21.14	21.07
		1	49	21.43	21.05	20.98
		25	0	20.18	20.37	20.15

LTE Band 7

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20775	21100	21425
Band 7 5MHz	QPSK	1	0	22.33	22.10	22.21
		1	13	22.48	22.28	21.93
		1	24	22.27	22.12	21.71
		12	0	21.06	21.01	21.08
		12	6	21.09	21.06	21.15
		12	13	21.10	21.05	21.12
		25	0	21.06	21.01	21.08
	16QAM	1	0	21.37	20.88	20.99
		1	13	21.55	21.12	21.29
		1	24	21.40	20.93	21.10
		12	0	20.12	19.98	20.01
		12	6	20.18	20.04	20.03
		12	13	20.19	20.03	20.03
		25	0	20.06	19.89	19.93
Band 7 10MHz	QPSK	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20800	21100	21400
		1	0	22.38	22.21	22.41
		1	25	22.52	22.43	22.04
		1	49	22.29	22.33	21.59
		25	0	21.05	21.12	21.22
	16QAM	25	13	21.10	21.14	21.15
		25	25	21.11	21.16	21.17
		50	0	21.05	21.14	21.12
		1	0	21.20	20.93	21.22
		1	25	21.33	21.08	21.38
		1	49	21.23	20.98	21.09
		25	0	19.98	20.16	20.11
Band 7 15MHz	QPSK	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20825	21100	21375
		1	0	22.46	22.27	22.29
		1	38	22.51	22.50	22.35
		1	74	22.28	22.34	21.71
		36	0	21.43	21.31	21.39
	16QAM	36	18	21.42	21.33	21.43
		36	39	21.43	21.33	21.44
		75	0	21.41	21.35	21.39
		1	0	21.29	21.11	20.81
		1	38	21.47	21.34	21.01
		1	74	21.26	21.17	20.94

		36	0	20.28	20.13	20.17
		36	18	20.28	20.13	20.22
		36	39	20.30	20.15	20.19
		75	0	20.27	20.17	20.19
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				20850	21100	21350
Band 7 20MHz	QPSK	1	0	22.27	21.96	22.05
		1	50	22.61	22.55	22.57
		1	99	22.04	22.07	21.68
		50	0	21.08	21.13	21.13
		50	25	21.16	21.15	21.17
		50	50	21.15	21.14	20.99
		100	0	21.09	21.13	21.06
	16QAM	1	0	21.07	20.99	21.22
		1	50	21.46	21.44	21.60
		1	99	21.07	21.13	21.32
		50	0	20.02	20.03	20.02
		50	25	20.10	20.06	20.06
		50	50	20.10	20.07	19.89
		100	0	20.03	20.08	19.99

LTE Band 17

Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				23755	23790	23825
Band7 5MHz	QPSK	1	0	22.78	22.61	22.26
		1	13	22.98	22.82	22.48
		1	24	22.72	22.38	22.30
		12	0	21.75	21.51	21.31
		12	6	21.83	21.45	21.30
		12	13	21.84	21.28	21.32
		25	0	21.80	21.27	21.35
	16QAM	1	0	21.87	21.72	21.31
		1	13	21.96	21.97	21.44
		1	24	21.86	21.72	21.21
		12	0	20.85	20.45	20.38
		12	6	20.95	20.50	20.36
		12	13	20.95	20.45	20.36
		25	0	20.79	20.39	20.26
Bandwidth	Modulation	RB size	RB offset	Average Power (dBm)		
				Channel	Channel	Channel
				23780	23790	23800
Band7 10MHz	QPSK	1	0	22.69	22.29	22.35
		1	25	22.44	22.36	22.42
		1	49	22.27	22.33	22.41
		25	0	21.34	21.40	21.42
		25	13	21.32	21.34	21.37

		25	25	21.13	21.18	21.28
		50	0	21.22	21.29	21.37
16QAM	1	0	21.31	21.21	21.65	
	1	25	21.41	21.26	21.72	
	1	49	21.23	21.07	21.54	
	25	0	20.43	20.39	20.42	
	25	13	20.41	20.34	20.41	
	25	25	20.21	20.17	20.29	
	50	0	20.24	20.27	20.35	

6.2 PEAK TO AVERAGE RADIO

Test Procedure

Per KDB 971168 D01 Power Meas License Digital Systems v03r01;

The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The PAR were measured on the Spectrum Analyzer.

Test Spec

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

RESULTS

See the following pages.

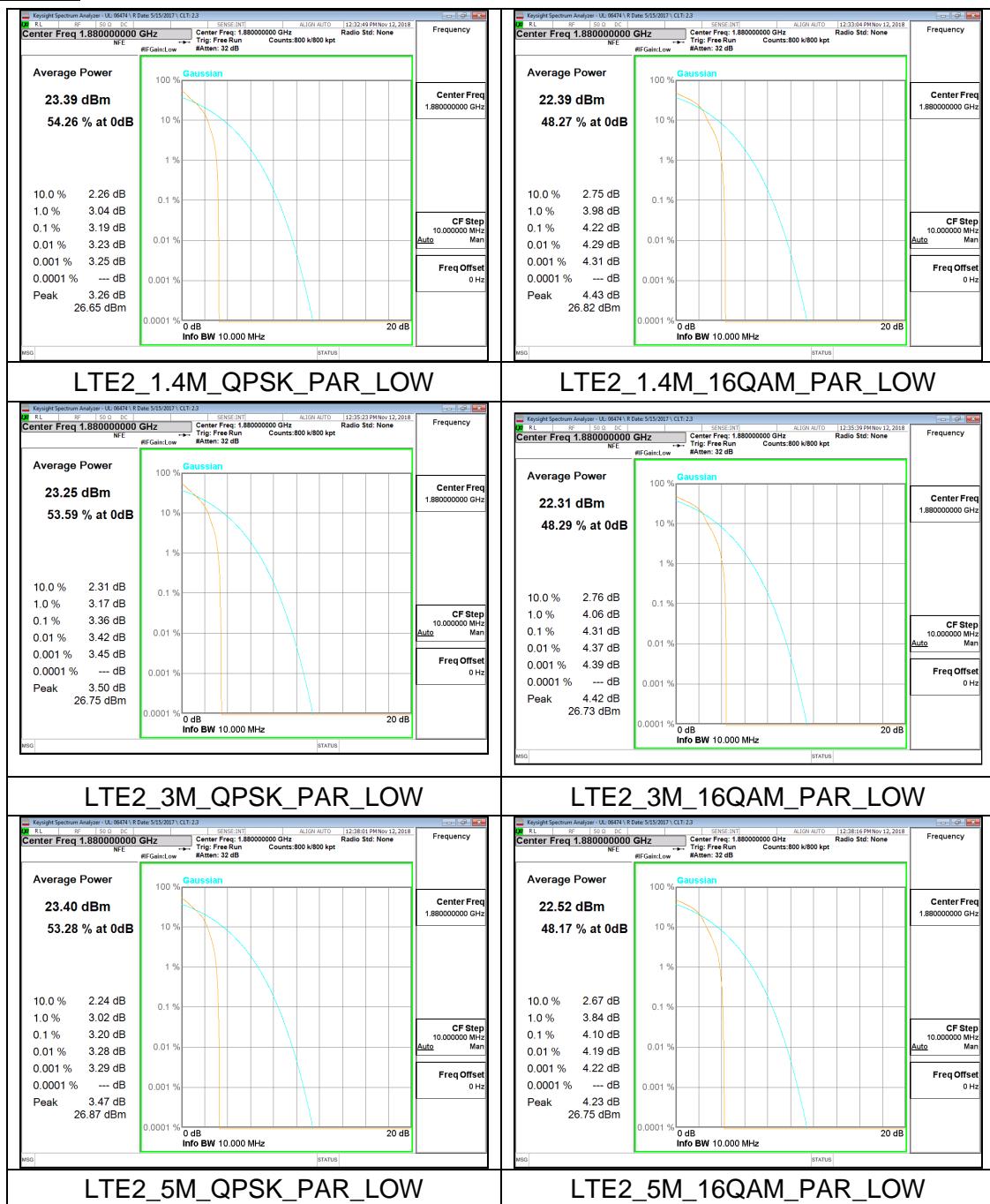
LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
2	1.4	1850.7	1RB 0#	QPSK	3.26	13	PASS
	3	1851.5		16QAM	4.43	13	PASS
	5	1852.5		QPSK	3.50	13	PASS
	10	1855		16QAM	4.42	13	PASS
	15	1857.5		QPSK	3.47	13	PASS
	20	1860		16QAM	4.23	13	PASS
				QPSK	3.33	13	PASS
				16QAM	4.29	13	PASS
				QPSK	3.43	13	PASS
				16QAM	4.48	13	PASS
				QPSK	3.45	13	PASS
				16QAM	4.37	13	PASS

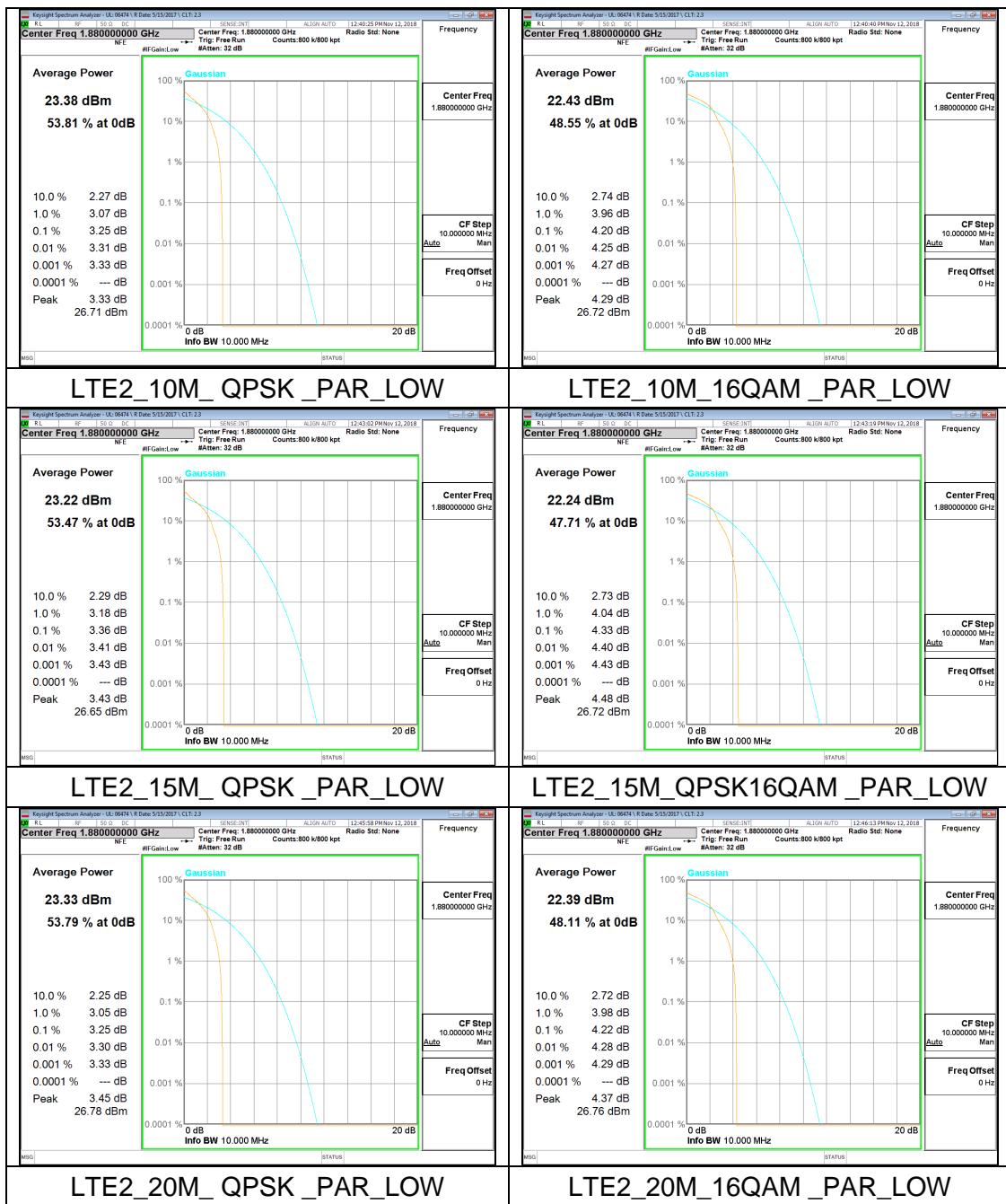
LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
4	1.4	1710.7	1RB 0#	QPSK	4.11	13	PASS
	3	1711.5		16QAM	5.18	13	PASS
	5	1712.5		QPSK	4.27	13	PASS
	10	1715		16QAM	5.35	13	PASS
	15	1717.5		QPSK	4.29	13	PASS
	20	1720		16QAM	5.23	13	PASS
				QPSK	4.37	13	PASS
				16QAM	5.30	13	PASS
				QPSK	4.22	13	PASS
				16QAM	5.23	13	PASS
				QPSK	3.86	13	PASS
				16QAM	4.81	13	PASS

LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
7	5	2502.5	1RB 0#	QPSK	1.89	13	PASS
				16QAM	2.99	13	PASS
	10	2505		QPSK	1.58	13	PASS
				16QAM	3.06	13	PASS
	15	2507.5		QPSK	1.49	13	PASS
				16QAM	3.22	13	PASS
	20	2510		QPSK	2.17	13	PASS
				16QAM	3.21	13	PASS

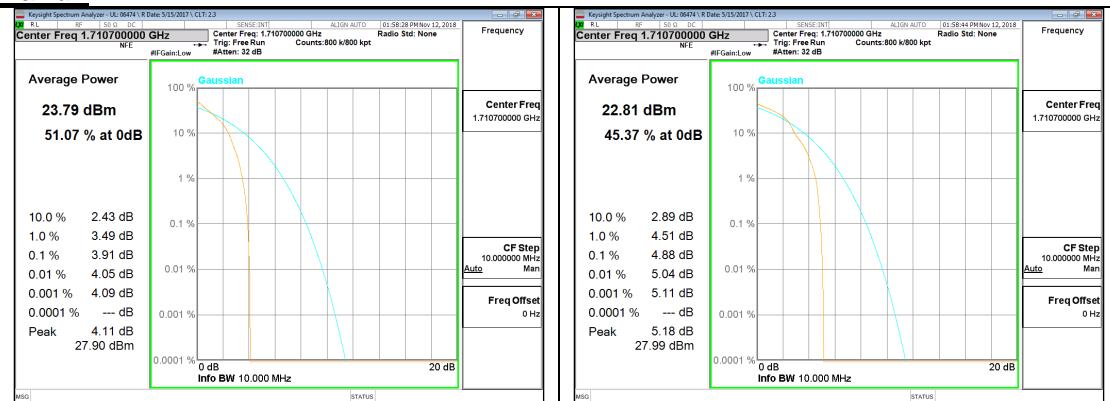
LTE Band	Bandwidth (MHz)	F (MHz)	RB Configuration	Modulation	Measured (dB)	Limit (dB)	Verdict
17	5	706.5	1RB 0#	QPSK	4.37	13	PASS
				16QAM	5.27	13	PASS
	10	714		QPSK	4.76	13	PASS
				16QAM	5.51	13	PASS

LTE Band 2

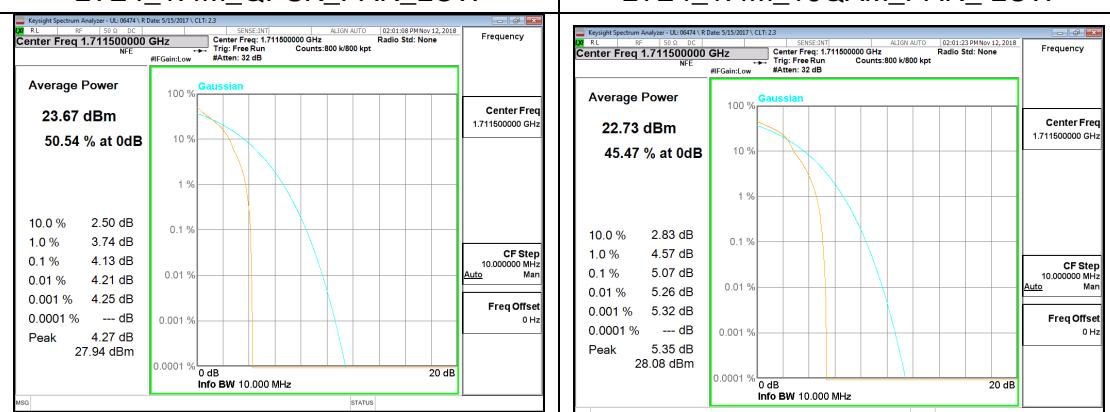




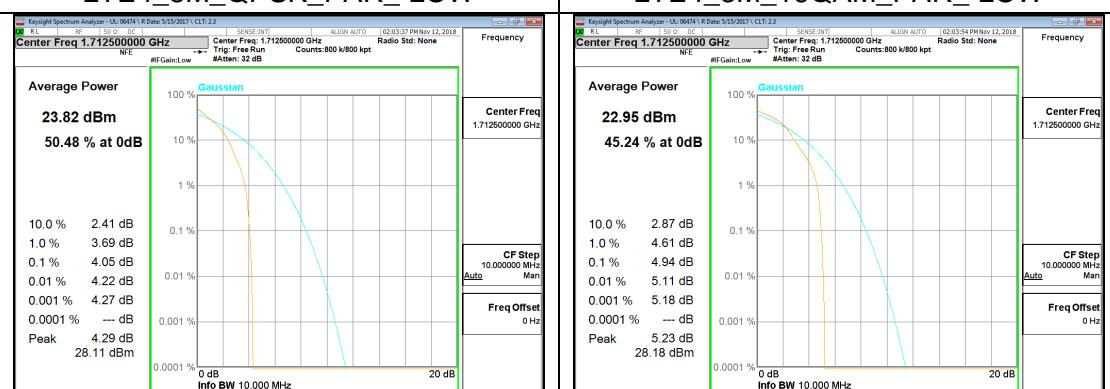
LTE Band4



LTE4_1.4M_QPSK_PAR_LOW

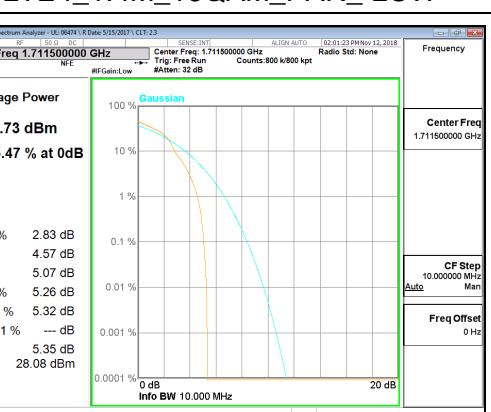


LTE4_3M_QPSK_PAR_LOW



LTE4_5M_QPSK_PAR_LOW

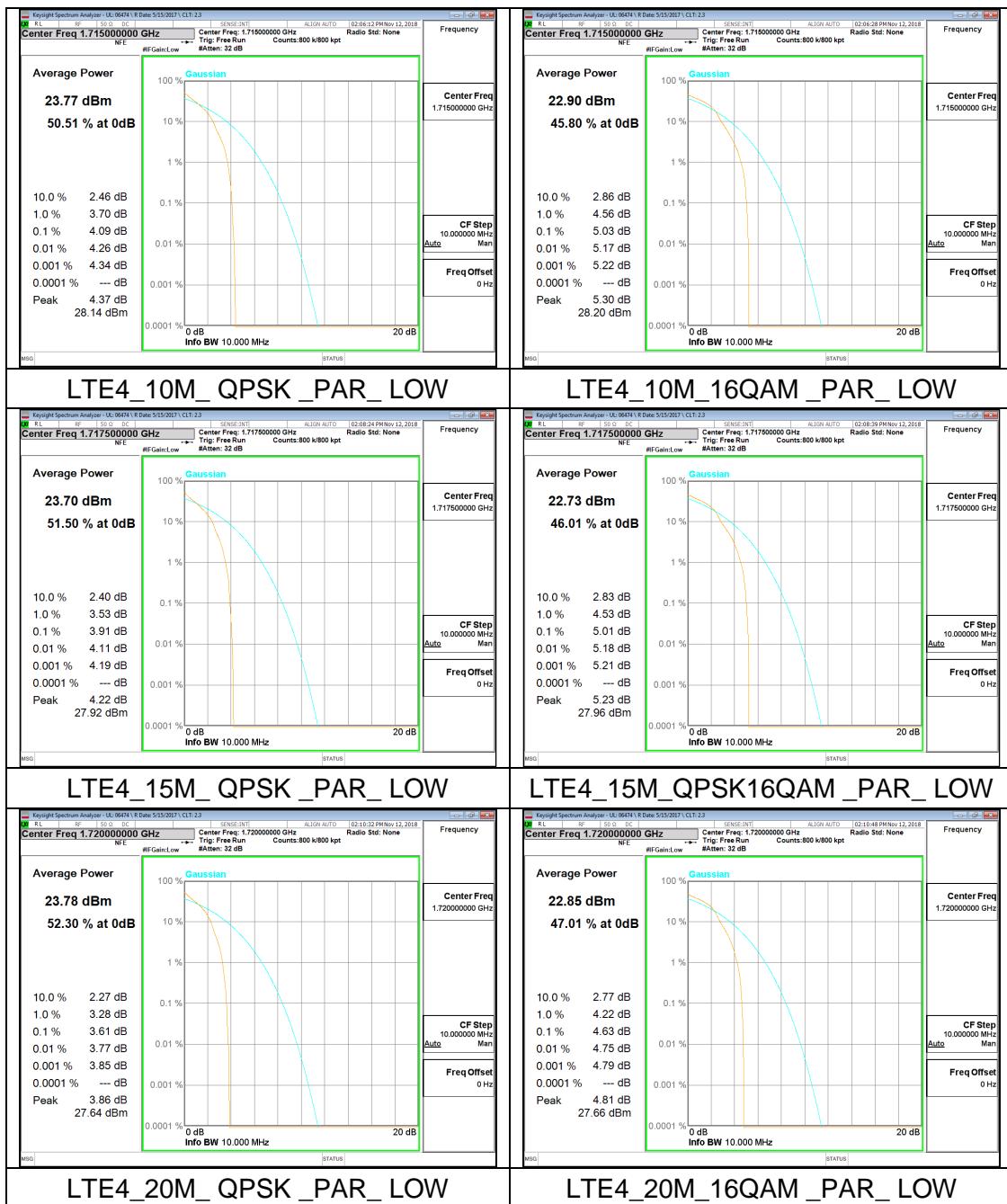
LTE4_1.4M_16QAM_PAR_LOW



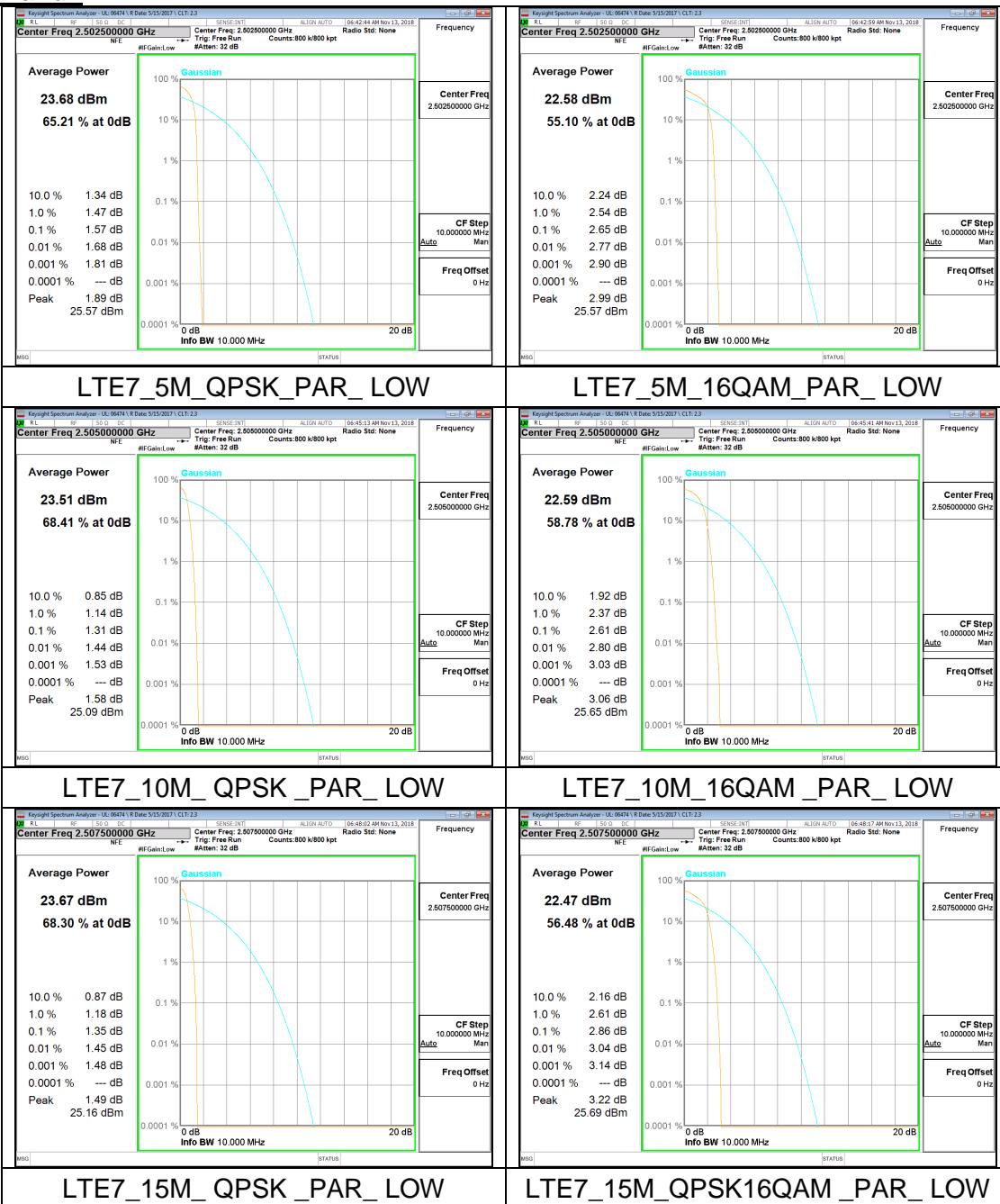
LTE4_3M_16QAM_PAR_LOW

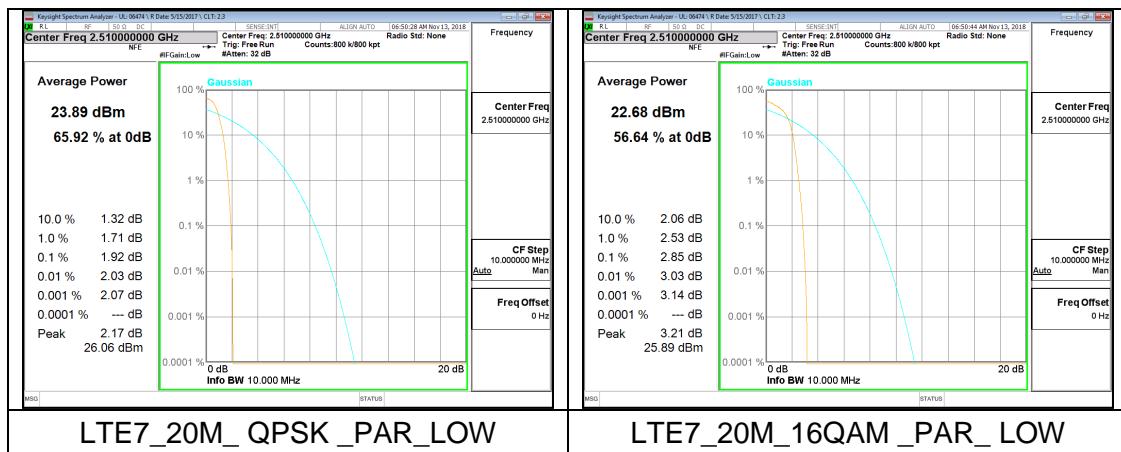


LTE4_5M_16QAM_PAR_LOW

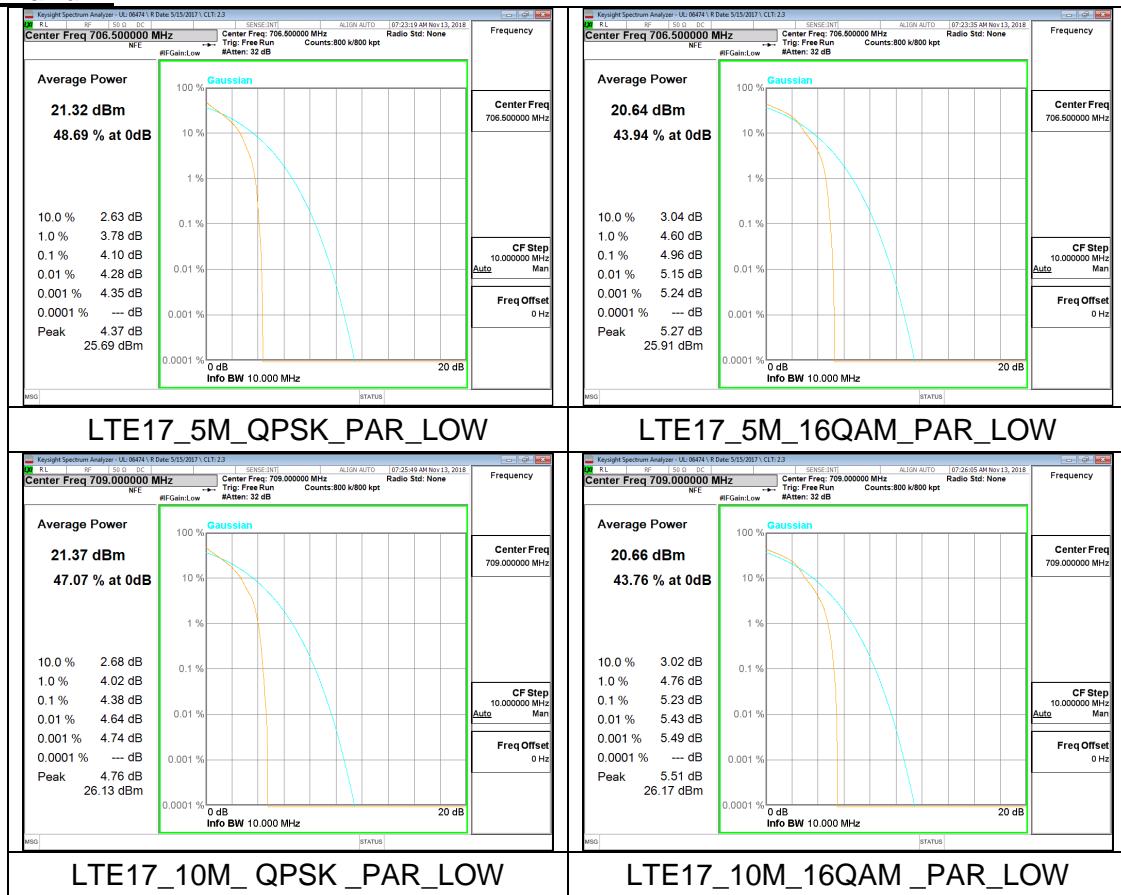


LTE Band7





LTE Band17



6.3 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 low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

(KDB 971168 D01 Power Meas License Digital Systems v03r01)

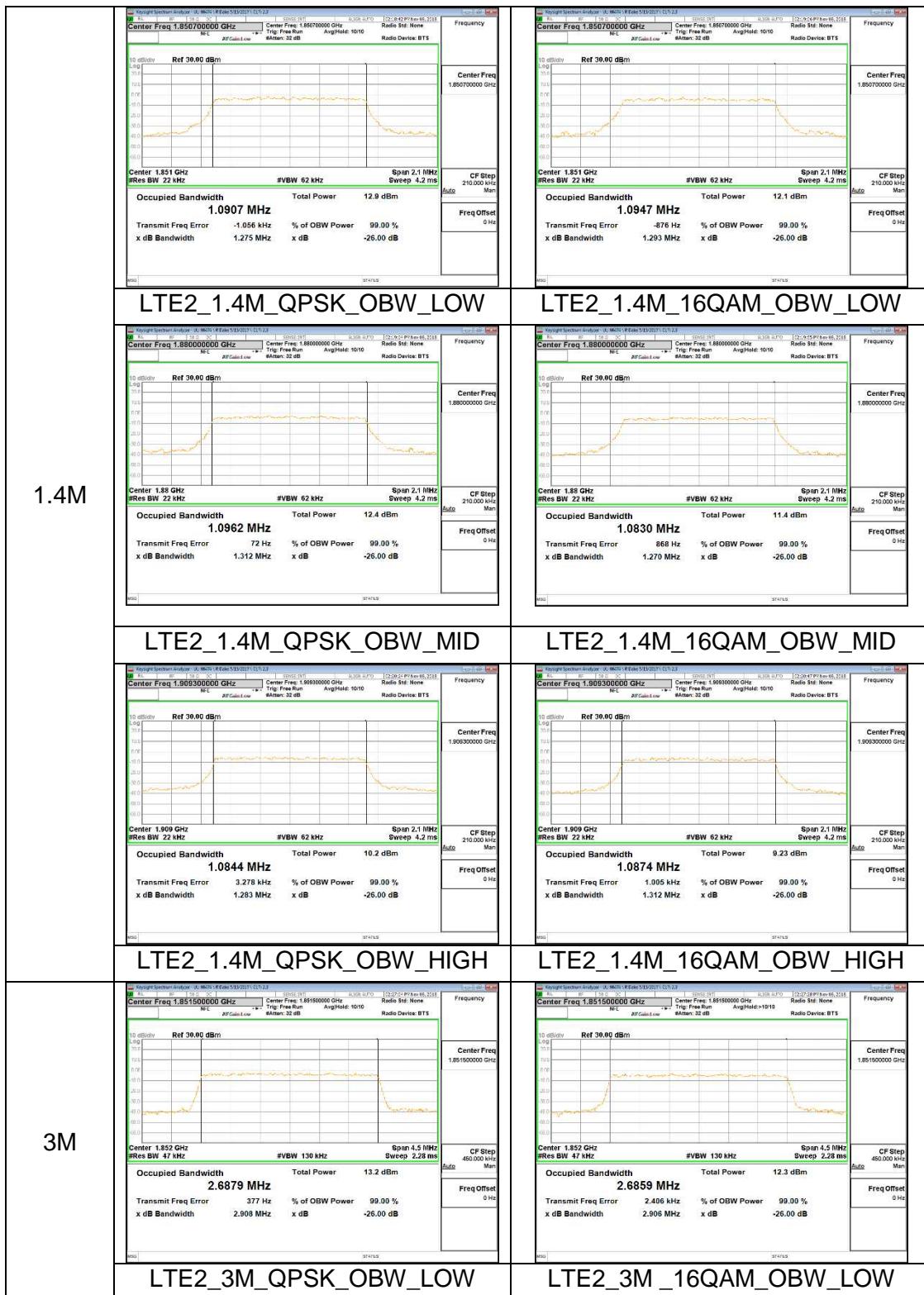
RESULTS

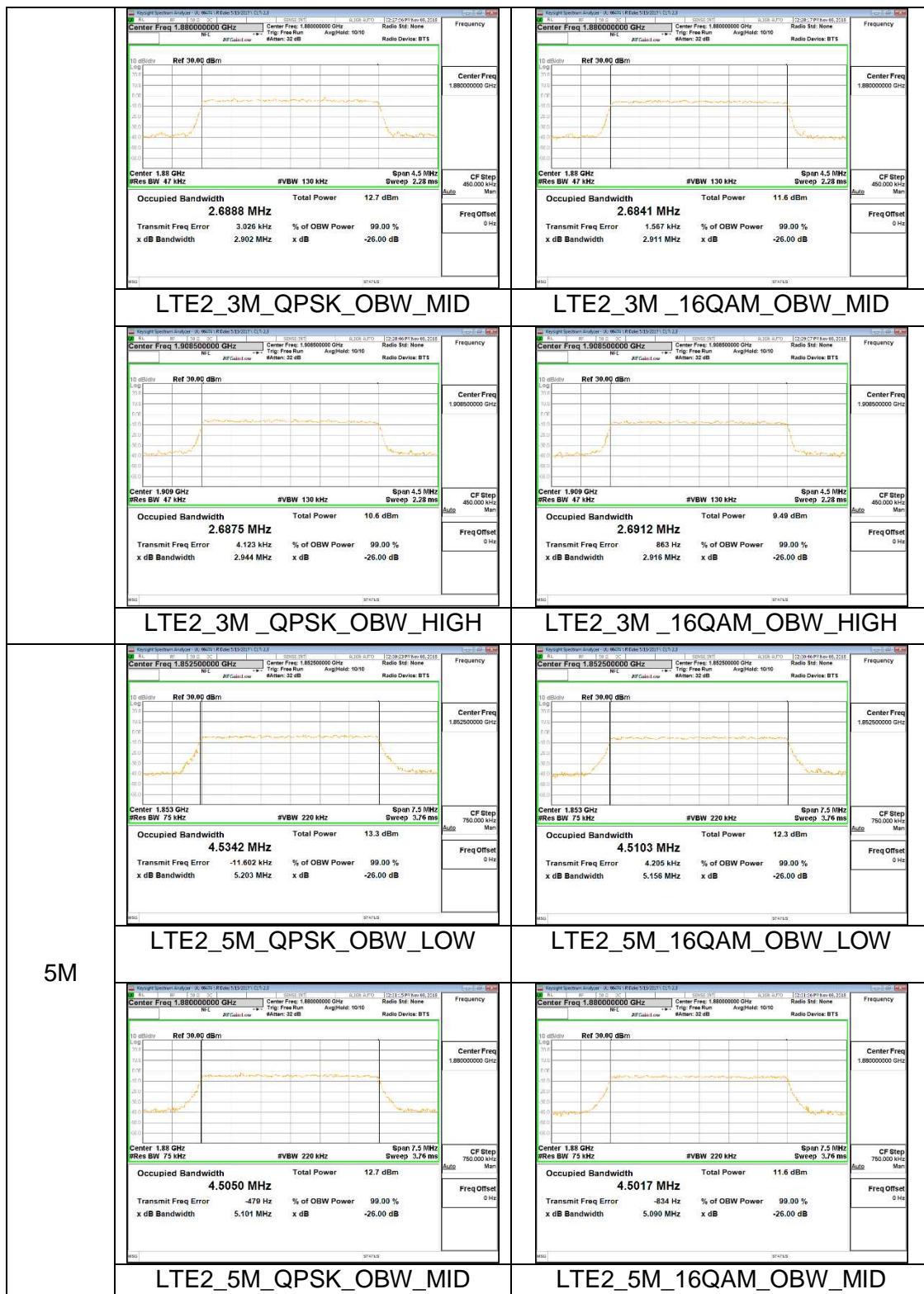
See the following pages

LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW
2	1.4	MID	QPSK	1.0962
		LOW	16QAM	1.0947
	3	MID	QPSK	2.6888
		HIGH	16QAM	2.6912
	5	LOW	QPSK	4.5342
		MID	16QAM	4.5103
	10	LOW	QPSK	8.9923
		MID	16QAM	9.0023
	15	MID	QPSK	13.467
		LOW	16QAM	13.470
4	20	LOW	QPSK	17.916
		MID	16QAM	17.929
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW
4	1.4	MID	QPSK	1.1003
		LOW	16QAM	1.0925
	3	MID	QPSK	2.6903
		HIGH	16QAM	2.6900
	5	LOW	QPSK	4.5369
		LOW	16QAM	4.5099
	10	MID	QPSK	9.0111
		MID	16QAM	9.0080
	15	LOW	QPSK	13.465
		MID	16QAM	13.469
	20	HIGH	QPSK	17.937
		MID	16QAM	17.921

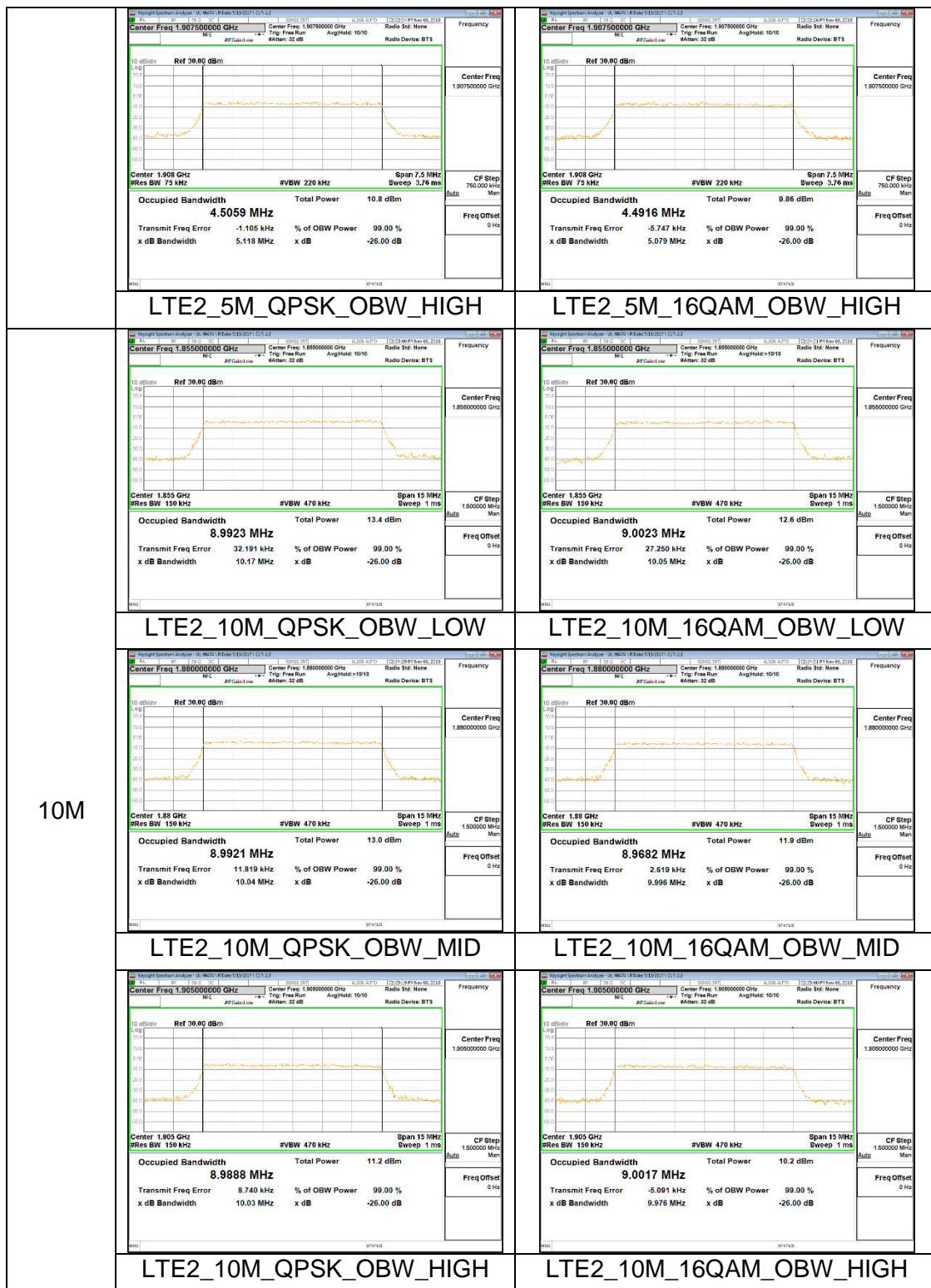
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW
5	1.4	MID	QPSK	1.0979
		LOW	16QAM	1.0940
	3	MID	QPSK	2.6893
		HIGH	16QAM	2.6904
	5	LOW	QPSK	4.5313
		LOW	16QAM	4.5100
	10	HIGH	QPSK	8.9996
		MID	16QAM	9.9909
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW
7	5	LOW	QPSK	4.5484
		LOW	16QAM	4.5160
	10	MID	QPSK	9.0092
		LOW	16QAM	9.0105
	15	HIGH	QPSK	13.487
		MID	16QAM	13.481
	20	MID	QPSK	17.966
		MID	16QAM	17.931
LTE Band	Bandwidth (MHz)	Channel	Modulation	The Maximum Measured OBW
17	5	LOW	QPSK	4.5298
		LOW	16QAM	4.5081
	10	HIGH	QPSK	8.9988
		HIGH	16QAM	9.0118

LTE Band2

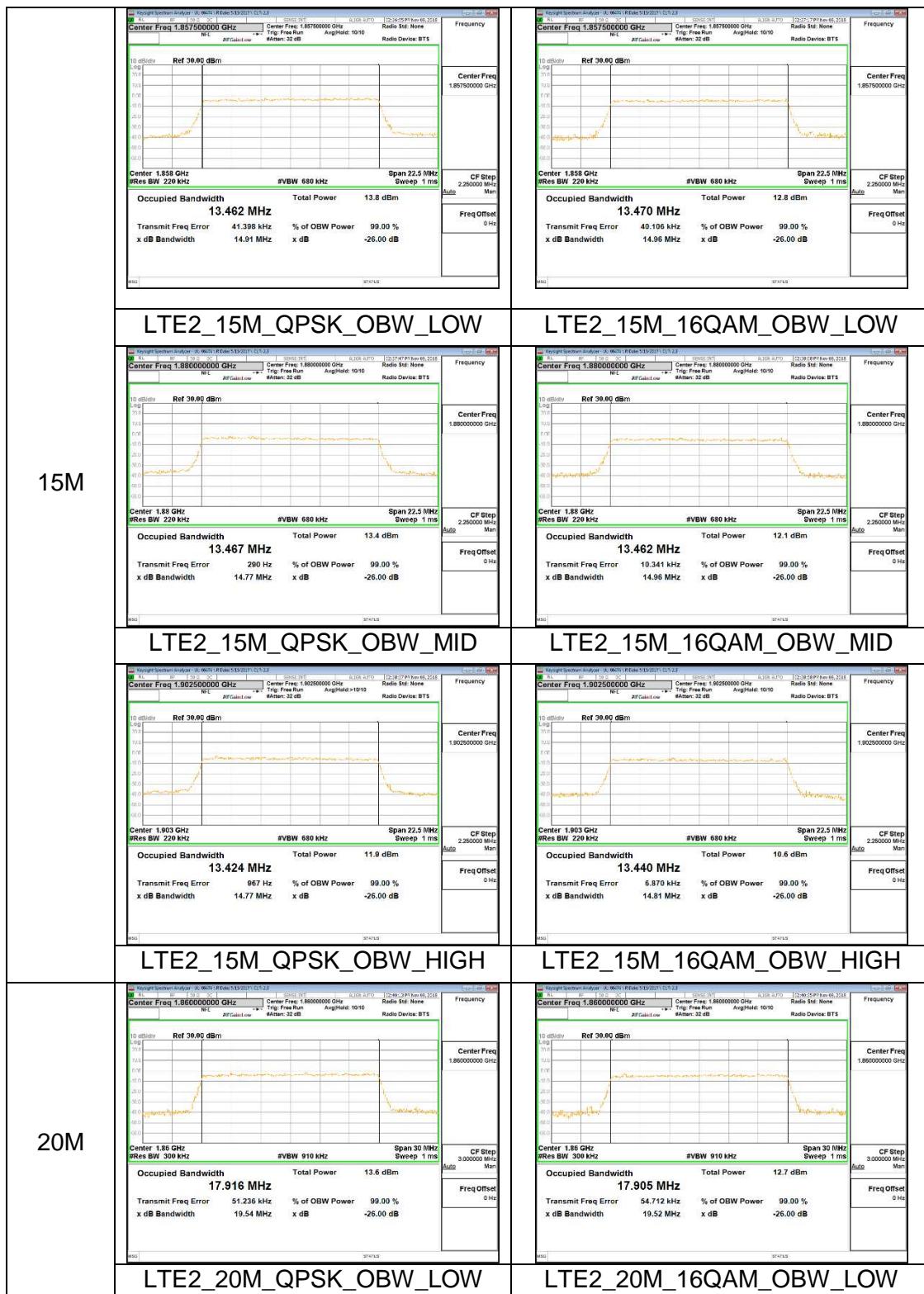


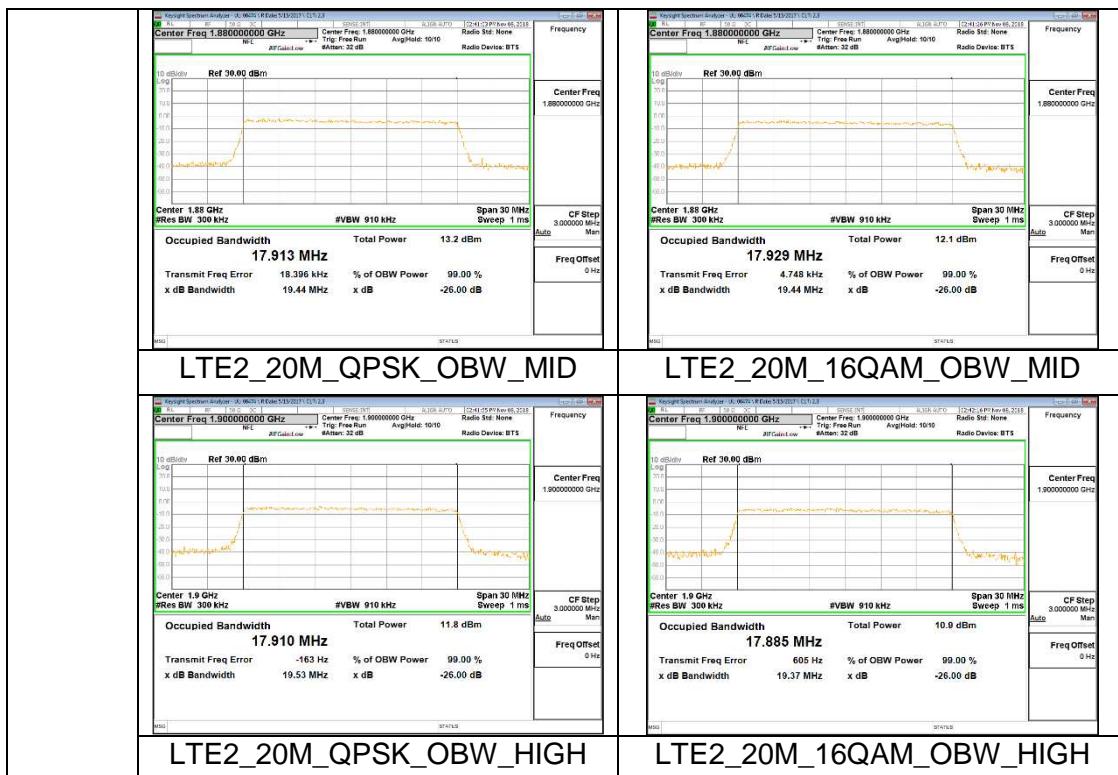


5M

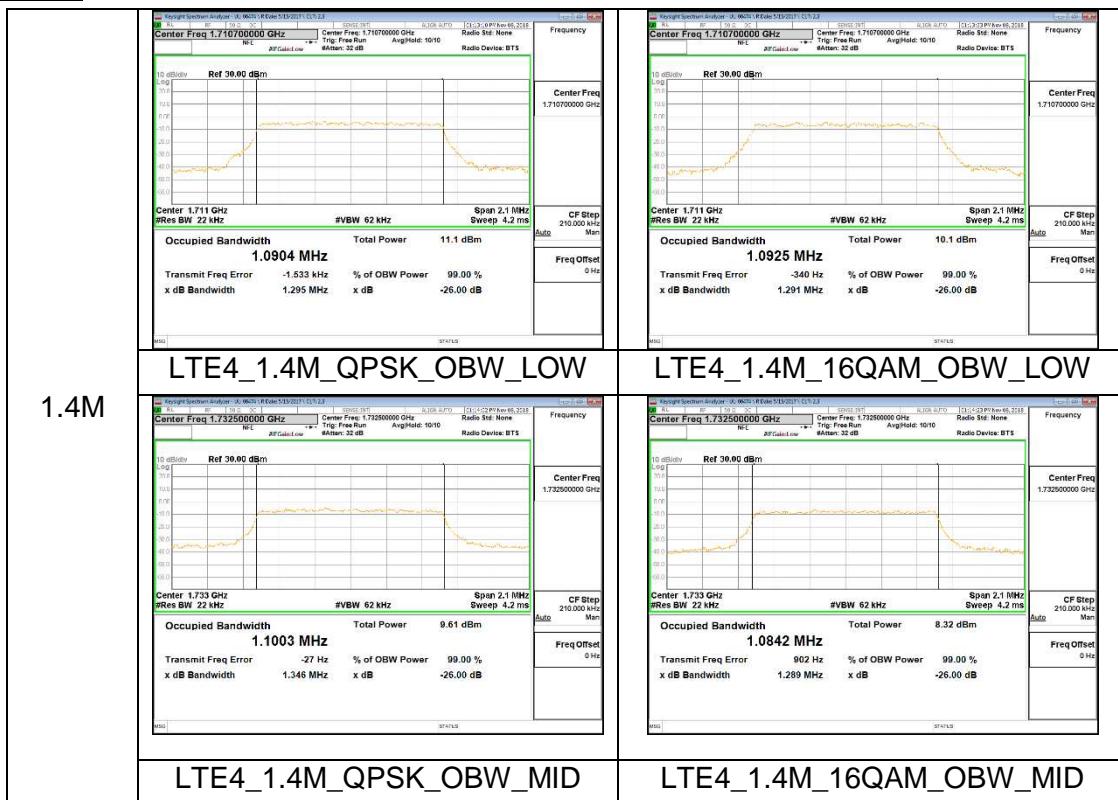


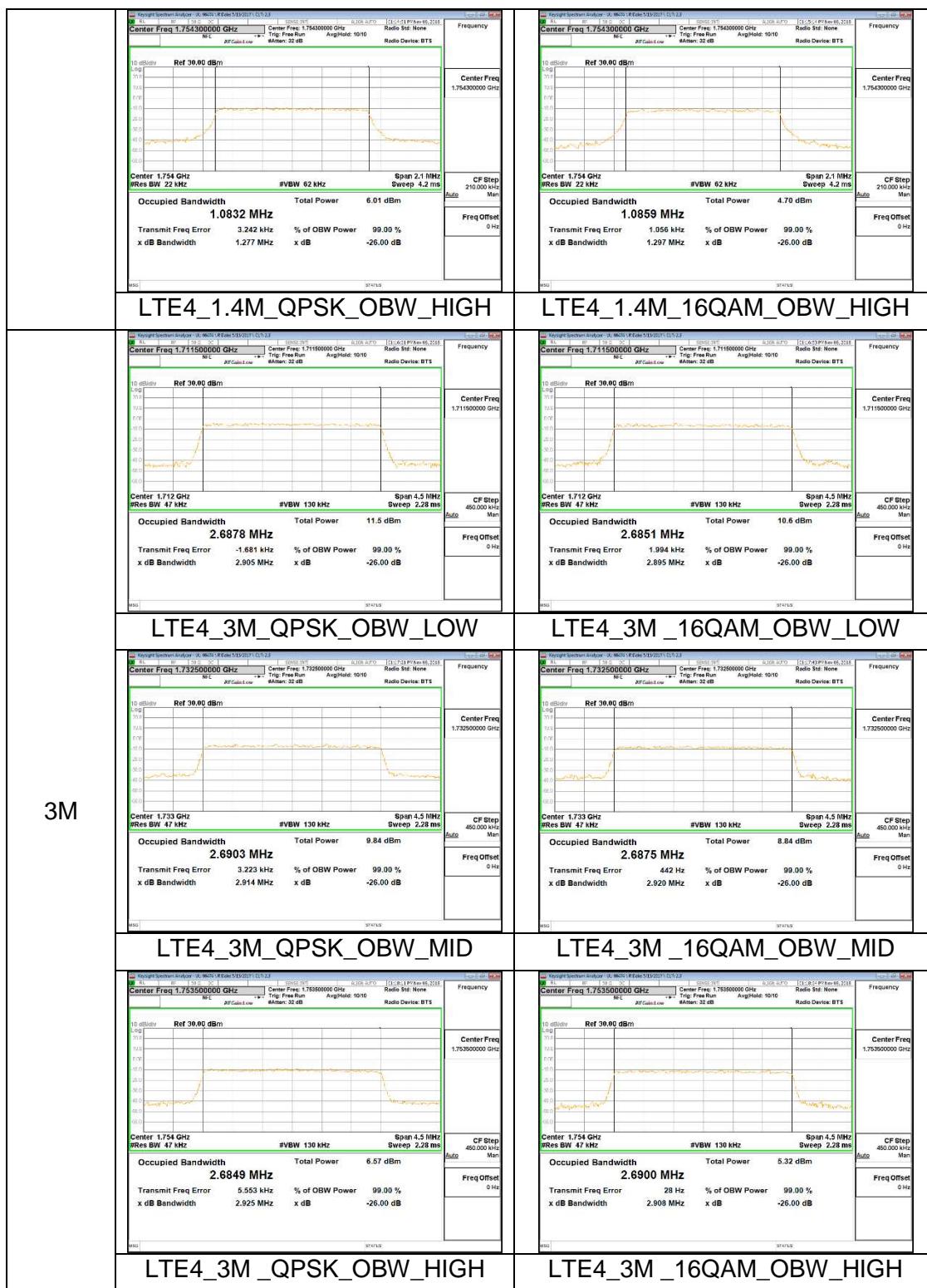
10M



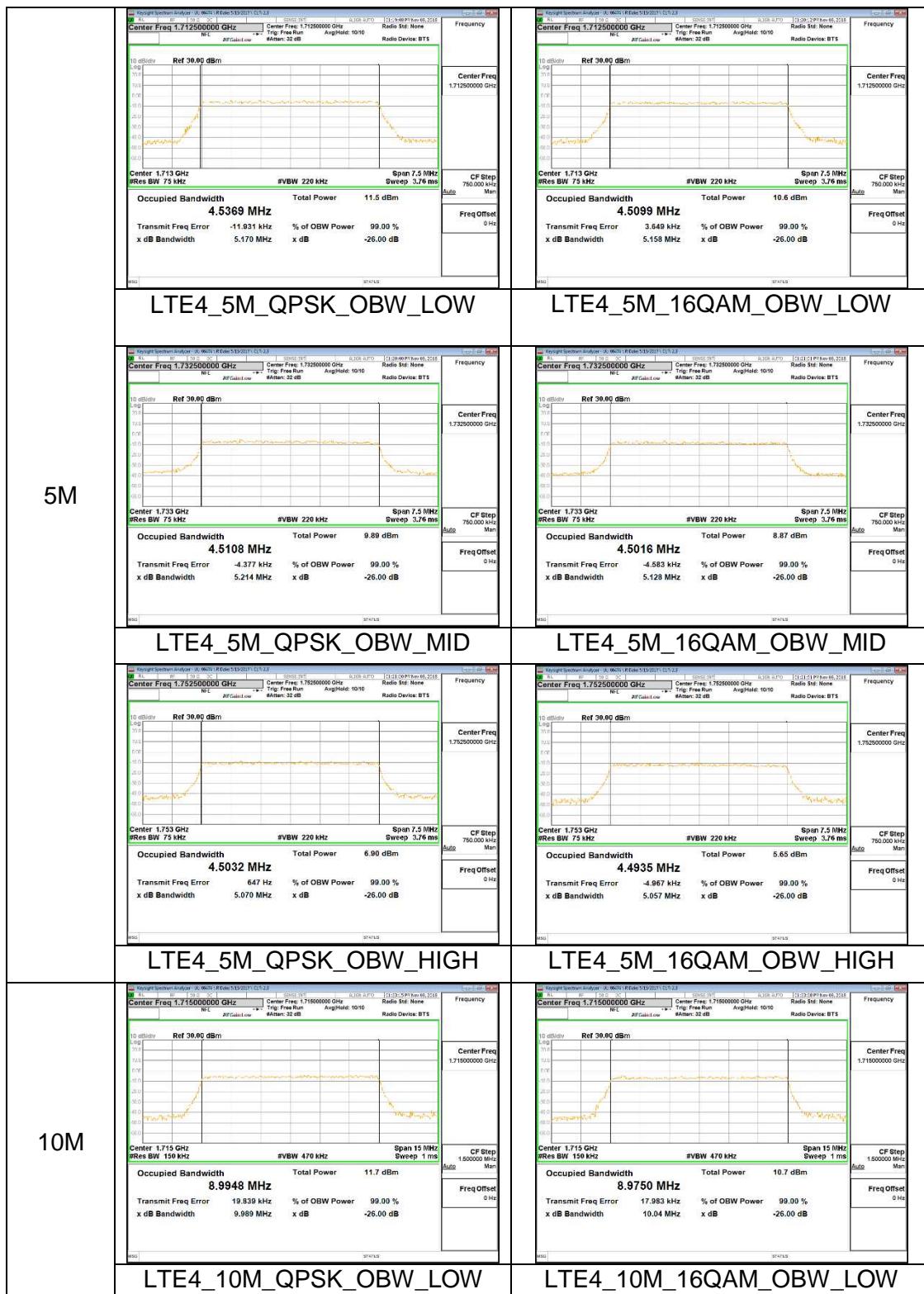


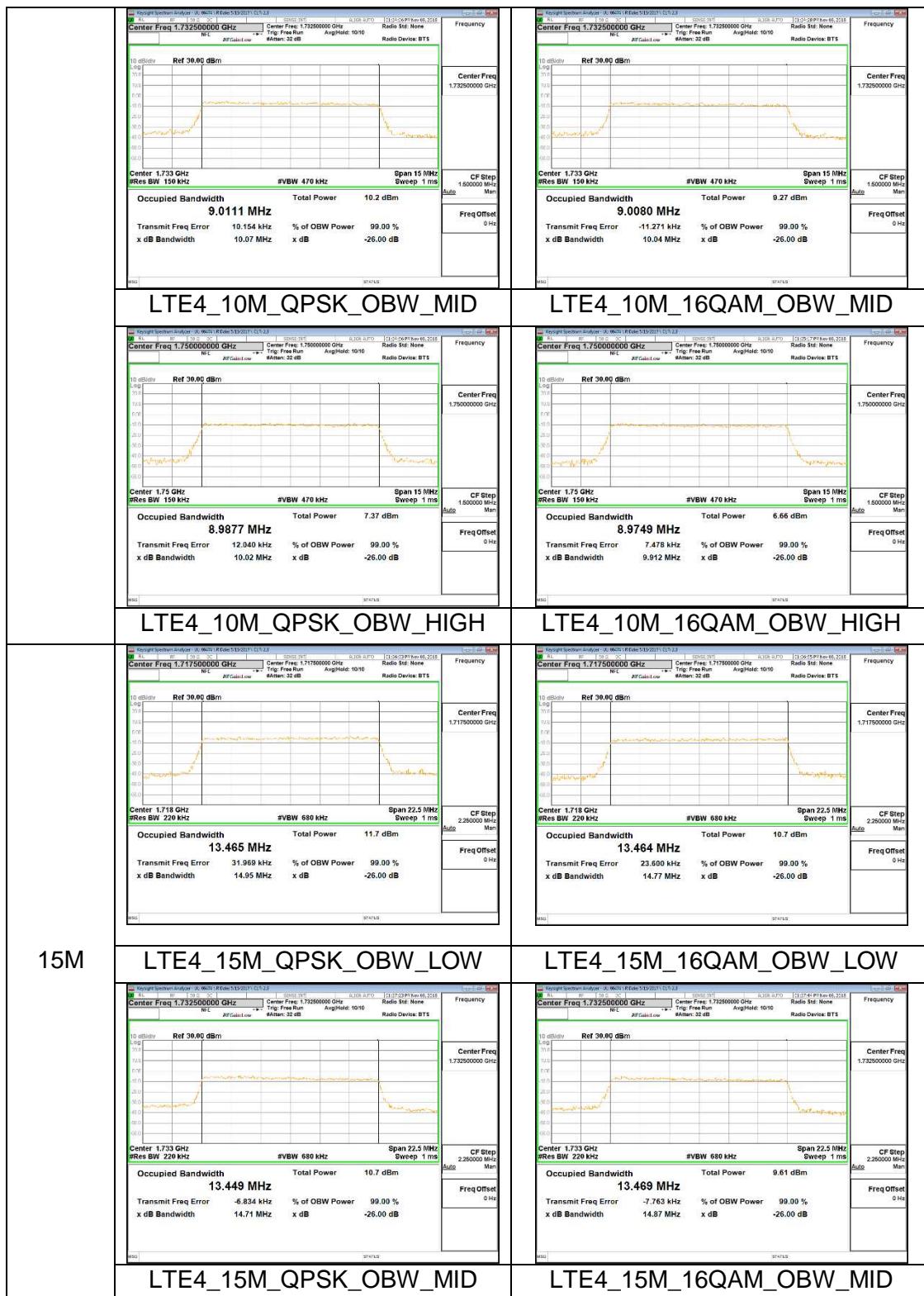
LTE Band4

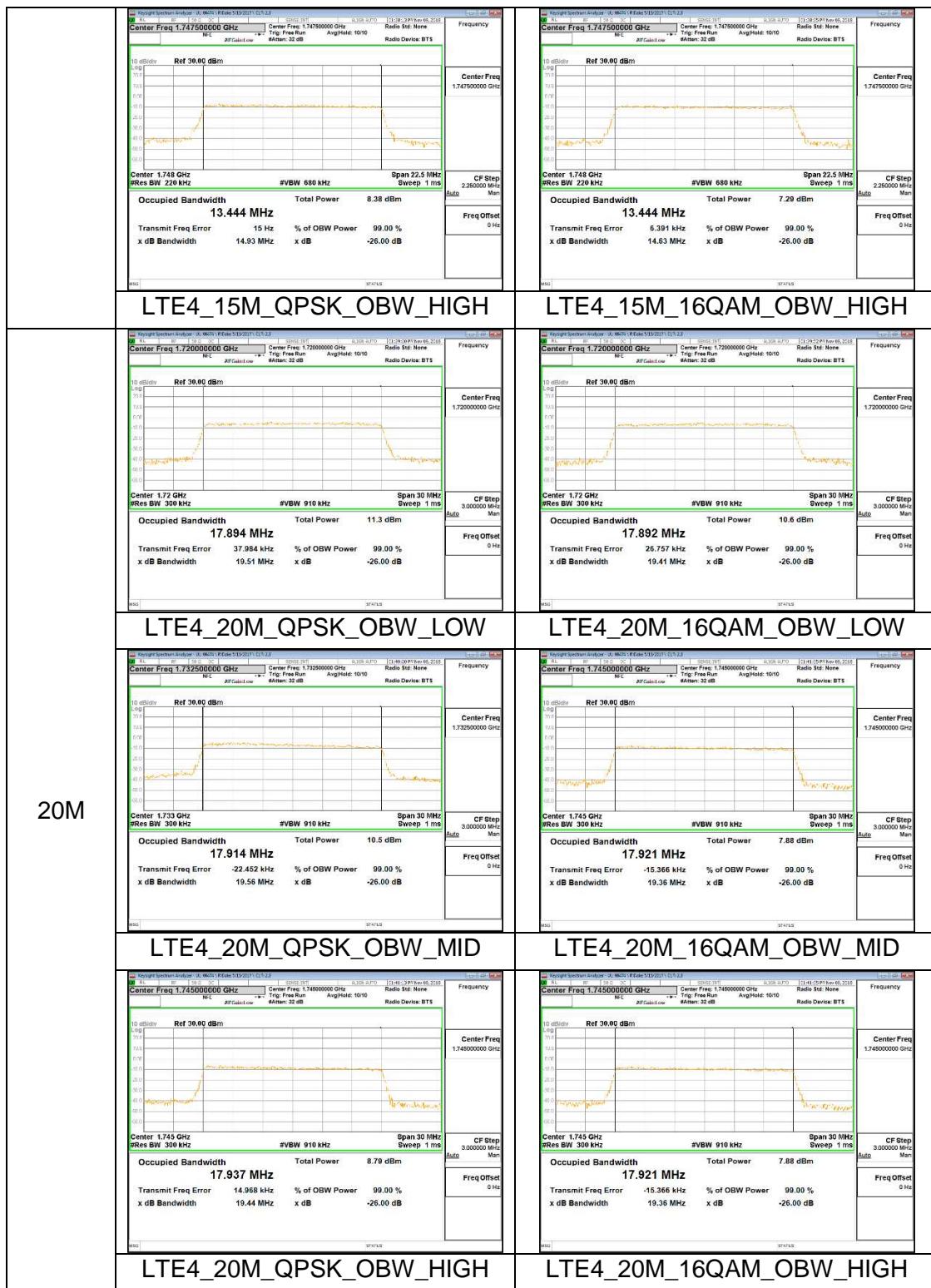




3M

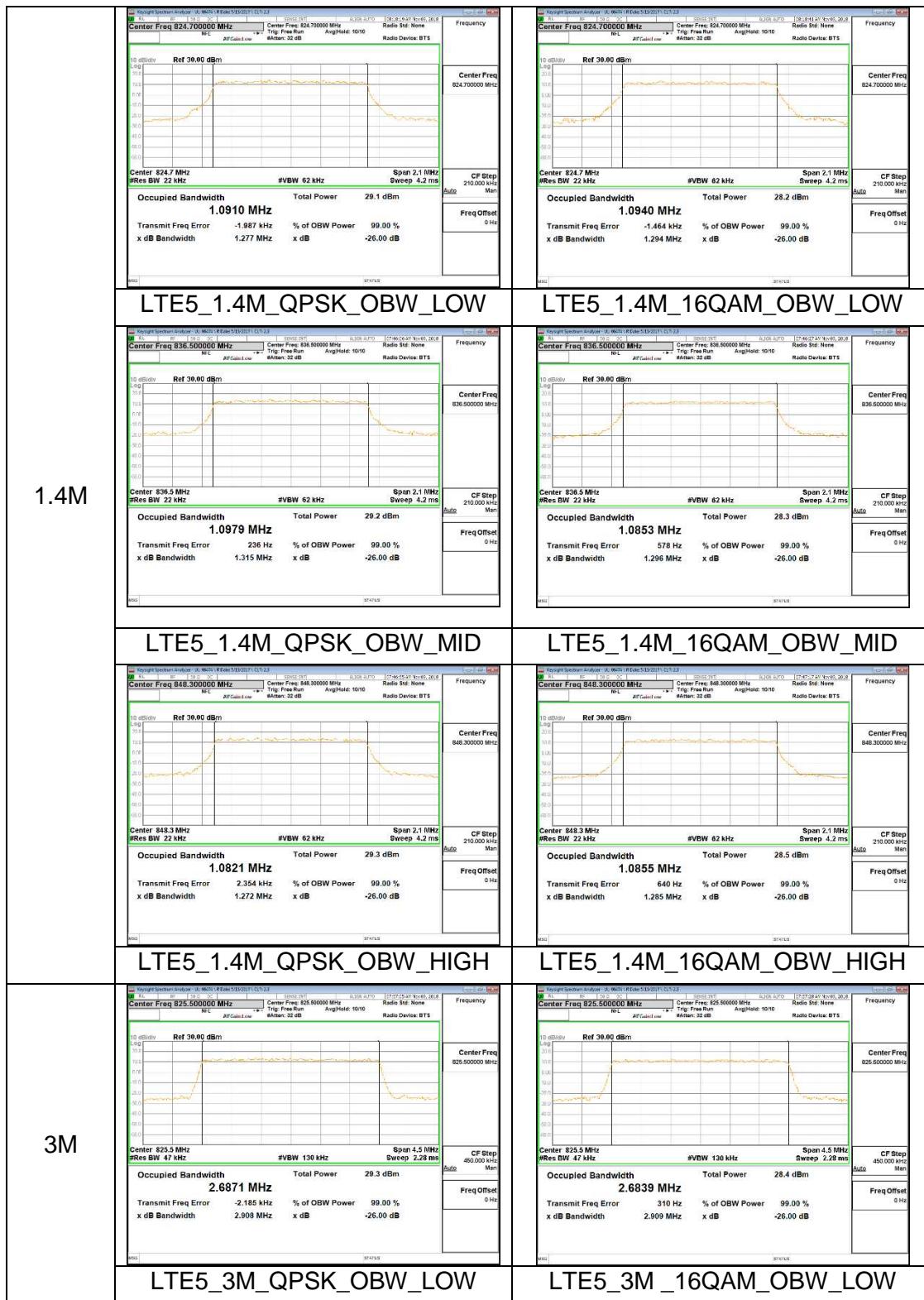


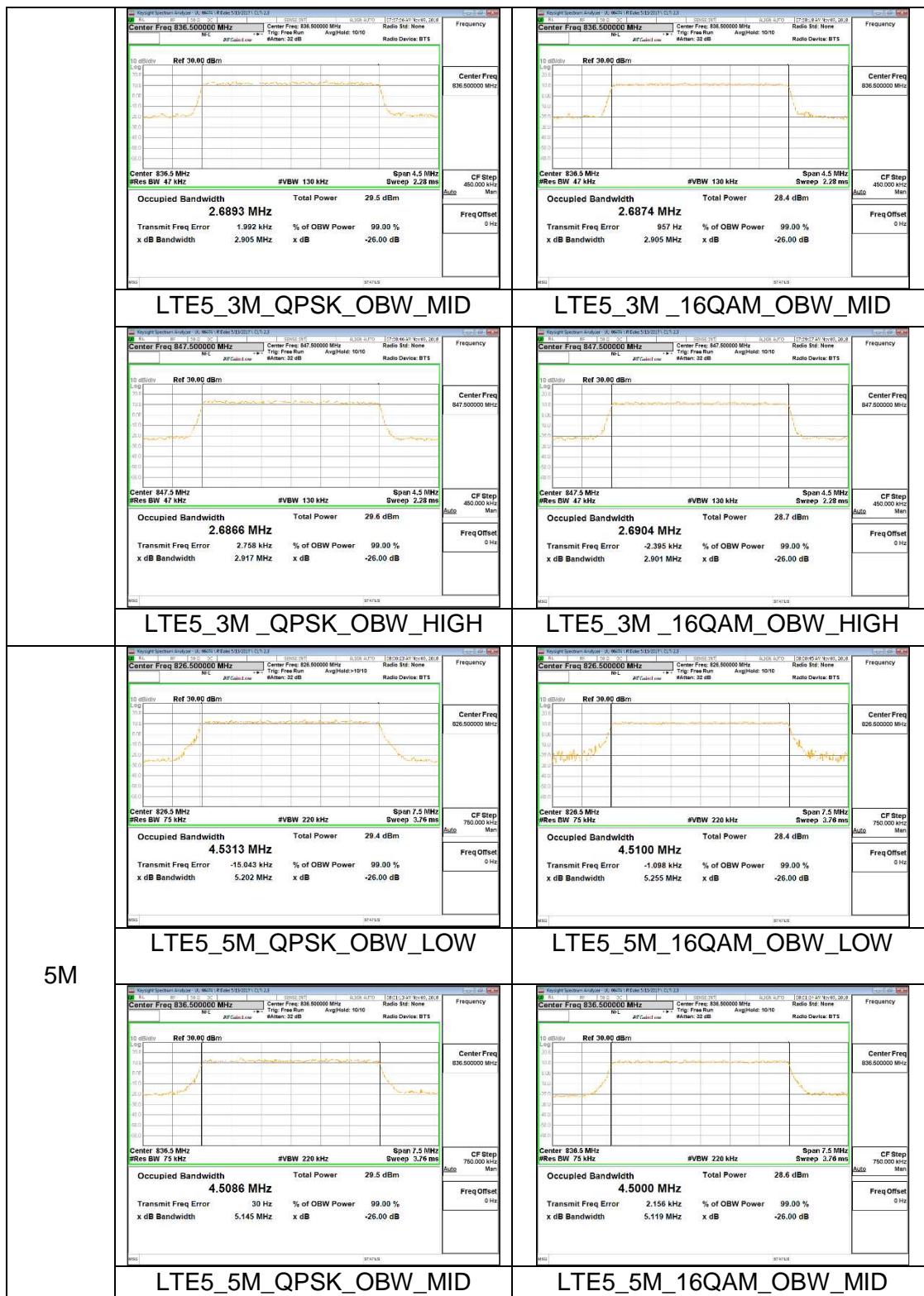




20M

LTE Band5





5M