



RF TEST REPORT

Applicant Quectel Wireless Solutions Co., Ltd
FCC ID XMR201903EG91NS
Product LTE Cat 1 Module
Brand Quectel
Model EG91-NS
Report No. R1902A0059-R2
Issue Date March 18, 2019

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2018)/ FCC CFR 47 Part 24E (2018)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of measurement results

No.	Test Case	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Isotropic Radiated power	24.232(c)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	2.1051 /24.238(a)	PASS
5	Peak-to-Average Power Ratio	24.232/KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 24.235	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 24.238(a)	PASS
8	Radiates Spurious Emission	2.1053 / 24.238(a)	PASS

Date of Testing: May 25, 2018 ~ June 27, 2018 & February 17, 2019 ~ March 10, 2019

Note: PASS: The EUT complies with the essential requirements in the standard.
FAIL: The EUT does not comply with the essential requirements in the standard.



1. Test Laboratory

1.1. Notes of the test report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



1.3. Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
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2. General Description of Equipment under Test

Client Information

Applicant	Quectel Wireless Solutions Co., Ltd
Applicant address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China
Manufacturer	Quectel Wireless Solutions Co., Ltd
Manufacturer address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

General information

EUT Description		
Model	EG91-NS	
IMEI	865743040001918	
Hardware Version	R1.0	
Software Version	EG91NSGAR05A02M4G	
Power Supply	External Power Supply	
Antenna Type	The EUT don't have standard Antenna, The Antenna used for testing in this report is the after-market accessory (Dipole Antenna)	
Antenna Gain	4 dBi	
Test Mode(s)	WCDMA Band II; LTE Band 2/25;	
Test Modulation	(WCDMA)QPSK; (LTE)QPSK,16QAM	
HSDPA UE Category	24	
HSUPA UE Category	6	
DC-HSDPA UE Category	24	
LTE Category	1	
Maximum E.I.R.P	WCDMA Band II:	25.56 dBm
	LTE Band 2:	26.29 dBm
	LTE Band 25:	25.85 dBm
Rated Power Supply Voltage	3.8V	
Extreme Voltage	Minimum: 3.3V Maximum: 4.3V	
Extreme Temperature	Lowest: -40°C Highest: +85°C	
Operating Frequency Range(s)	Band	Tx (MHz)
	WCDMA Band II	1850 ~ 1910
	LTE Band 2	1850 ~ 1910
	LTE Band 25	1850 ~ 1915
Note: 1. The information of the EUT is declared by the manufacturer.		
2. For LTE, 16QAM only supports 25%RB.		



3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC CFR47 Part 2 (2018)

FCC CFR 47 Part 24E (2018)

ANSI C63.26 (2015)

KDB 971168 D01 Power Meas License Digital Systems v03r01



4. Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (Z axis, Horizontal polarization) and the worst case was recorded.

All mode and data rates and positions and RB size and modulations were investigated. Subsequently, only the worst case emissions are reported.

The following testing in WCDMA/LTE is set based on the maximum RF Output Power.

Test modes are chosen to be reported as the worst case configuration below:

Test items	Modes/Modulation
	WCDMA Band II
RF power output	RMC HSDPA/HSUPA/DC-HSDPA
Effective Isotropic Radiated power	RMC
Occupied Bandwidth	RMC
Band Edge Compliance	RMC
Peak-to-Average Power Ratio	RMC
Frequency Stability	RMC
Spurious Emissions at Antenna Terminals	RMC
Radiates Spurious Emission	RMC



Test modes are chosen to be reported as the worst case configuration below for LTE Band 2/25:

Test items	Modes	Bandwidth (MHz)						Modulation		RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	LTE 2	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 25	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	LTE 2	O	O	O	O	O	O	O	O	-	-	O	O	O	O
	LTE 25	O	O	O	O	O	O	O	O	-	-	O	O	O	O
Occupied Bandwidth	LTE 2	O	O	O	O	O	O	O	O	O	-	O	O	O	O
	LTE 25	O	O	O	O	O	O	O	O	O	-	O	O	O	O
Band Edge Compliance	LTE 2	O	O	O	O	O	O	O	O	O	-	O	O	-	O
	LTE 25	O	O	O	O	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	LTE 2	O	O	O	O	O	O	O	O	O	-	O	O	O	O
	LTE 25	O	O	O	O	O	O	O	O	O	-	O	O	O	O
Frequency Stability	LTE 2	-	-	-	-	-	O	O	O	-	-	O	O	-	O
	LTE 25	-	-	-	-	-	O	O	O	-	-	O	O	-	O
Conducted Spurious Emissions	LTE 2	O	O	O	O	O	O	O	O	-	O	-	-	O	O
	LTE 25	O	O	O	O	O	O	O	O	-	O	-	-	O	O
Radiates Spurious Emission	LTE 2	-	-	-	-	-	O	O	-	O	-	-	O	O	O
	LTE 25	-	-	-	-	-	O	O	-	O	-	-	O	O	O
Note	1. The mark "O" means that this configuration is chosen for testing. 2. The mark "-" means that this configuration is not testing. 3. For LTE, 16QAM only supports 25%RB.														

5. Test Case Results

5.1. RF Power Output

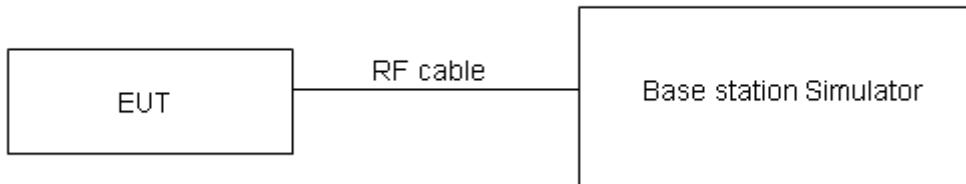
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

Limits

No specific RF power output requirements in part 2.1046.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.4$ dB.



Test Results

WCDMA Band II		Conducted Power(dBm)		
		Channel 9262	Channel 9400	Channel 9538
		1852.4(MHz)	1880(MHz)	1907.6(MHz)
RMC		23.38	23.33	23.18
HSDPA	Sub - Test 1	22.36	22.37	22.35
	Sub - Test 2	22.39	22.37	22.30
	Sub - Test 3	21.86	21.87	21.80
	Sub - Test 4	21.90	21.81	21.80
HSUPA	Sub - Test 1	22.40	22.39	22.30
	Sub - Test 2	21.90	21.88	21.82
	Sub - Test 3	22.43	22.38	22.34
	Sub - Test 4	22.48	22.34	22.32
	Sub - Test 5	22.32	22.21	22.18
DC-HSDPA	Sub - Test 1	23.31	23.22	23.07
	Sub - Test 2	23.30	23.21	23.06
	Sub - Test 3	22.79	22.70	22.55
	Sub - Test 4	22.78	22.79	22.53

LTE Band 2				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18607/1850.7	18900/1880	19193/1909.3
1.4MHz	QPSK	1	0	23.90	23.76	23.58
		1	2	24.19	23.97	23.68
		1	5	24.22	23.89	23.78
		3	0	23.86	23.87	23.81
		3	2	23.96	23.65	23.86
		3	3	24.12	23.89	23.67
		6	0	22.98	22.88	22.84
	16QAM	1	0	22.89	22.67	23.09
		1	2	23.05	22.96	23.17
		1	5	22.95	22.85	22.95
		3	0	21.31	21.49	21.46
		3	2	21.62	21.56	21.42
		3	3	21.36	21.65	21.25
		6	0	21.50	21.46	21.57
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18615/1851.5	18900/1880	19185/1908.5



3MHz	QPSK	1	0	23.98	23.77	23.64	
		1	7	24.13	23.84	24.43	
		1	14	23.82	23.58	23.52	
		8	0	22.96	22.95	22.74	
		8	4	22.90	22.82	22.94	
		8	7	22.87	22.88	22.89	
		15	0	22.82	22.89	22.98	
	16QAM	1	0	23.17	22.99	23.43	
5MHz		1	7	23.76	22.88	24.14	
		1	14	23.09	22.90	23.32	
		8	0	21.28	21.47	21.43	
		8	4	21.59	21.51	21.38	
		8	7	21.34	21.58	21.22	
		15	0	21.47	21.41	21.53	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			
				10MHz			
QPSK	1	0	23.95	23.75	23.60		
	1	13	24.11	23.80	24.40		
	1	24	23.79	23.53	23.48		
	12	0	22.93	22.90	22.70		
	12	6	22.88	22.78	22.89		
	12	13	22.85	22.86	22.85		
16QAM	25	0	22.80	22.88	22.96		
	10MHz		1	0	23.14	22.95	23.40
			1	13	23.73	22.86	24.11
			1	24	23.06	22.88	23.28
			12	0	21.25	21.43	21.40
			12	6	21.56	21.49	21.35
			12	13	21.31	21.53	21.18
			25	0	21.45	21.37	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			
				10MHz			
QPSK	1	0	23.97	23.76	23.63		
	1	25	24.14	23.85	24.44		
	1	49	23.81	23.57	23.51		
	25	0	22.96	22.95	22.74		
	25	13	22.91	22.83	22.93		
	25	25	22.87	22.90	22.90		
16QAM	50	0	22.88	22.90	23.00		
16QAM	1	0	23.16	22.98	23.42		



		1	25	23.76	22.90	24.14
		1	49	23.09	22.90	23.31
		25	0	21.61	21.39	21.44
		25	13	21.63	21.47	21.41
		25	25	21.64	21.59	21.46
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
15MHz	QPSK	1	0	18675/1857.5	18900/1880	19125/1902.5
				23.96	23.72	23.61
				24.12	23.84	24.41
				23.78	23.52	23.47
				22.94	22.91	22.71
				22.88	22.78	22.89
				22.84	22.87	22.86
	16QAM	75	0	22.86	22.86	22.95
				23.11	22.96	23.40
				23.74	22.87	24.12
				23.06	22.86	23.28
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
20MHz	QPSK	1	0	18700/1860	18900/1880	19100/1900
				23.93	23.68	23.58
				24.11	23.80	24.39
				23.76	23.51	23.44
				22.91	22.86	22.67
				22.86	22.74	22.86
				22.81	22.82	22.82
	16QAM	100	0	22.83	22.81	22.91
				23.09	22.92	23.35
				23.70	22.85	24.08
				23.04	22.83	23.26

LTE Band 25				Average Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
1.4MHz	QPSK	1	0	26047/1850.7	26365/1882.5	26683/1914.3
				23.50	23.25	23.71
				23.44	23.36	23.83
				23.43	23.28	23.79
				23.47	23.45	23.62
				23.42	23.55	23.58
				23.36	23.50	23.52



	16QAM	6	0	22.71	22.63	22.79
		1	0	22.99	22.93	23.14
		1	2	22.81	23.18	22.83
		1	5	22.61	23.01	22.63
		3	0	22.89	22.51	22.65
		3	2	22.74	22.41	22.82
		3	3	22.63	22.45	22.83
		6	0	21.80	21.58	21.98
		Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)
3MHz	QPSK					26055/1851.5
	1	0	23.47	23.46	23.25	
	1	7	23.34	23.39	23.63	
	1	14	23.37	23.33	23.70	
	8	0	22.74	22.67	22.80	
	8	4	22.76	22.62	22.94	
	8	7	22.80	22.69	22.99	
	16QAM	15	0	22.73	22.78	22.84
		1	0	22.82	23.04	23.33
		1	7	23.02	22.90	23.79
		1	14	22.80	22.65	23.58
		8	0	21.73	21.50	21.54
		8	4	21.66	21.53	21.51
		8	7	21.60	21.57	22.36
5MHz	QPSK	15	0	21.56	21.48	21.75
	16QAM	Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)
						26065/1852.5
		QPSK	16QAM			26365/1882.5
			1	0	23.45	
			1	13	23.55	
			1	24	23.34	
		QPSK	16QAM	12	0	22.73
				12	6	22.70
				12	13	22.75
				25	0	22.66
		16QAM	16QAM	1	0	22.29
				1	13	22.61
				1	24	22.40



Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			
				26090/1855	26365/1882.5	26640/1910	
10MHz	QPSK	1	0	23.63	23.53	23.39	
		1	25	23.70	23.64	23.30	
		1	49	23.47	23.20	23.73	
		25	0	22.89	22.75	22.77	
		25	13	22.85	22.66	22.73	
		25	25	22.79	22.61	22.70	
		50	0	22.73	22.66	22.80	
	16QAM	1	0	23.23	23.18	23.02	
		1	25	23.49	23.36	23.43	
		1	49	22.34	22.90	23.90	
		25	0	21.64	21.83	21.85	
		25	13	21.62	21.71	21.69	
		25	25	21.67	21.53	21.53	
		RB size	RB offset	Channel/Frequency (MHz)			
15MHz	QPSK			26115/1857.5	26365/1882.5	26615/1907.5	
	1	0	23.43	23.47	23.52		
	1	38	23.58	23.36	23.46		
	1	74	23.38	23.25	23.57		
	36	0	22.87	22.67	22.83		
	36	18	22.74	22.62	22.81		
	36	39	22.65	22.60	22.80		
	16QAM	75	0	22.72	22.71	22.85	
		1	0	23.34	23.04	22.34	
		1	38	23.86	23.76	22.84	
		1	74	23.21	22.63	22.17	
	Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
20MHz					26140/1860	26365/1882.5	26590/1905
QPSK	1	0	23.54	23.89	23.26		
	1	50	23.83	23.93	23.61		
	1	99	23.28	23.37	23.57		
	50	0	22.77	22.71	22.82		
	50	25	22.74	22.68	22.79		
	50	50	22.76	22.65	22.70		
	100	0	22.84	22.72	22.78		
16QAM	1	0	23.20	22.68	23.39		
	1	50	23.51	22.81	23.76		
	1	99	23.27	22.61	24.06		



5.2. Effective Isotropic Radiated Power

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

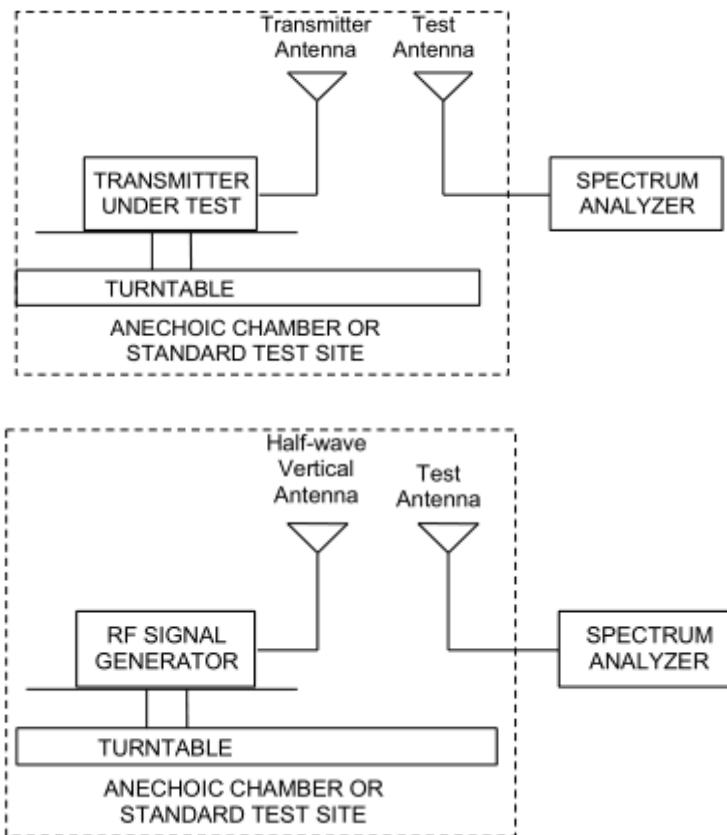
Methods of Measurement

The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).

- a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.
 - b) Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).
 - c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.
 - d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading.
$$\text{LOSS} = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$$
 - e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:
$$\text{ERP (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$$
 - f) The maximum ERP is the maximum value determined in the preceding step.
 - g) When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g.transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:
$$\text{EIRP (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBi)}$$
where: dBd refers to gain relative to an ideal dipole.
- EIRP (dBm) = ERP (dBm) + 2.15 (dB.)

The RB allocation refers to section 5.1, using the maximum output power configuration.

Test setup



Limits

Rule Part 24.232(c) Mobile and portable stations are limited to 2 watts EIRP.

Rule Part 24.232(e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Limit	$\leq 2 \text{ W}$ (33 dBm)
-------	-----------------------------

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 1.19 \text{ dB}$

**Test Results:**

The measurement is performed for both of horizontal and vertical antenna Polarization, and only the data of worst mode is recorded in this report.

Mode	Channel	Frequency (MHz)	Polarization	EIRP (dBm)	Limit (dBm)	Conclusion
WCDMA Band II	Low	1852.4	Horizontal	24.95	33	Pass
	Mid	1880	Horizontal	25.56	33	Pass
	High	1907.6	Horizontal	25.48	33	Pass

LTE Band 2						
bandwidth	Channel	Frequency (MHz)	Polarization	EIRP (dBm)	Limit (dBm)	Conclusion
1.4 MHz (QPSK)	Low	1850.7	Horizontal	25.62	33	Pass
	Mid	1880	Horizontal	25.87	33	Pass
	High	1909.3	Horizontal	25.89	33	Pass
3 MHz (QPSK)	Low	1851.5	Horizontal	25.95	33	Pass
	Mid	1880	Horizontal	26.14	33	Pass
	High	1908.5	Horizontal	26.29	33	Pass
5 MHz (QPSK)	Low	1852.5	Horizontal	25.68	33	Pass
	Mid	1880	Horizontal	26.22	33	Pass
	High	1907.5	Horizontal	26.23	33	Pass
10 MHz (QPSK)	Low	1855	Horizontal	25.54	33	Pass
	Mid	1880	Horizontal	25.60	33	Pass
	High	1905	Horizontal	25.50	33	Pass
15 MHz (QPSK)	Low	1857.5	Horizontal	25.34	33	Pass
	Mid	1880	Horizontal	25.59	33	Pass
	High	1902.5	Horizontal	25.79	33	Pass
20 MHz (QPSK)	Low	1860	Horizontal	25.78	33	Pass
	Mid	1880	Horizontal	25.89	33	Pass
	High	1900	Horizontal	26.03	33	Pass
1.4 MHz (16QAM)	Low	1850.7	Horizontal	25.31	33	Pass
	Mid	1880	Horizontal	25.47	33	Pass
	High	1909.3	Horizontal	25.51	33	Pass
3 MHz (16QAM)	Low	1851.5	Horizontal	25.56	33	Pass
	Mid	1880	Horizontal	25.79	33	Pass
	High	1908.5	Horizontal	25.92	33	Pass
5 MHz (16QAM)	Low	1852.5	Horizontal	25.34	33	Pass
	Mid	1880	Horizontal	25.89	33	Pass
	High	1907.5	Horizontal	25.69	33	Pass
10 MHz (16QAM)	Low	1855	Horizontal	25.32	33	Pass
	Mid	1880	Horizontal	25.29	33	Pass



LTE Band 2						
bandwidth	Channel	Frequency (MHz)	Polarization	EIRP (dBm)	Limit (dBm)	Conclusion
	High	1905	Horizontal	25.19	33	Pass
15 MHz (16QAM)	Low	1857.5	Horizontal	25.05	33	Pass
	Mid	1880	Horizontal	25.12	33	Pass
	High	1902.5	Horizontal	25.19	33	Pass
20 MHz (16QAM)	Low	1860	Horizontal	25.47	33	Pass
	Mid	1880	Horizontal	25.88	33	Pass
	High	1900	Horizontal	25.87	33	Pass

LTE Band 25						
bandwidth	Channel	Frequency (MHz)	Polarization	EIRP (dBm)	Limit (dBm)	Conclusion
1.4 MHz (QPSK)	Low	1850.7	Horizontal	25.53	33	Pass
	Mid	1882.5	Horizontal	25.12	33	Pass
	High	1914.3	Horizontal	25.79	33	Pass
3 MHz (QPSK)	Low	1851.5	Horizontal	25.53	33	Pass
	Mid	1882.5	Horizontal	25.22	33	Pass
	High	1913.5	Horizontal	25.71	33	Pass
5 MHz (QPSK)	Low	1852.5	Horizontal	25.43	33	Pass
	Mid	1882.5	Horizontal	25.57	33	Pass
	High	1912.5	Horizontal	25.69	33	Pass
10 MHz (QPSK)	Low	1855	Horizontal	25.55	33	Pass
	Mid	1882.5	Horizontal	25.63	33	Pass
	High	1910	Horizontal	25.58	33	Pass
15 MHz (QPSK)	Low	1857.5	Horizontal	25.38	33	Pass
	Mid	1882.5	Horizontal	25.51	33	Pass
	High	1907.5	Horizontal	25.21	33	Pass
20 MHz (QPSK)	Low	1860	Horizontal	25.29	33	Pass
	Mid	1882.5	Horizontal	25.74	33	Pass
	High	1905	Horizontal	24.94	33	Pass
1.4 MHz (16QAM)	Low	1850.7	Horizontal	25.03	33	Pass
	Mid	1882.5	Horizontal	24.59	33	Pass
	High	1914.3	Horizontal	25.13	33	Pass
3 MHz (16QAM)	Low	1851.5	Horizontal	24.97	33	Pass
	Mid	1882.5	Horizontal	24.76	33	Pass
	High	1913.5	Horizontal	25.01	33	Pass
5 MHz (16QAM)	Low	1852.5	Horizontal	24.97	33	Pass
	Mid	1882.5	Horizontal	24.91	33	Pass



LTE Band 25						
bandwidth	Channel	Frequency (MHz)	Polarization	EIRP (dBm)	Limit (dBm)	Conclusion
	High	1912.5	Horizontal	25.07	33	Pass
10 MHz (16QAM)	Low	1855	Horizontal	24.91	33	Pass
	Mid	1882.5	Horizontal	25.11	33	Pass
	High	1910	Horizontal	25.85	33	Pass
15 MHz (16QAM)	Low	1857.5	Horizontal	24.76	33	Pass
	Mid	1882.5	Horizontal	24.93	33	Pass
	High	1907.5	Horizontal	24.65	33	Pass
20 MHz (16QAM)	Low	1860	Horizontal	24.77	33	Pass
	Mid	1882.5	Horizontal	25.18	33	Pass
	High	1905	Horizontal	24.43	33	Pass

5.3.Occupied Bandwidth

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to 51kHz, VBW is set to 160kHz for WCDMA Band II,

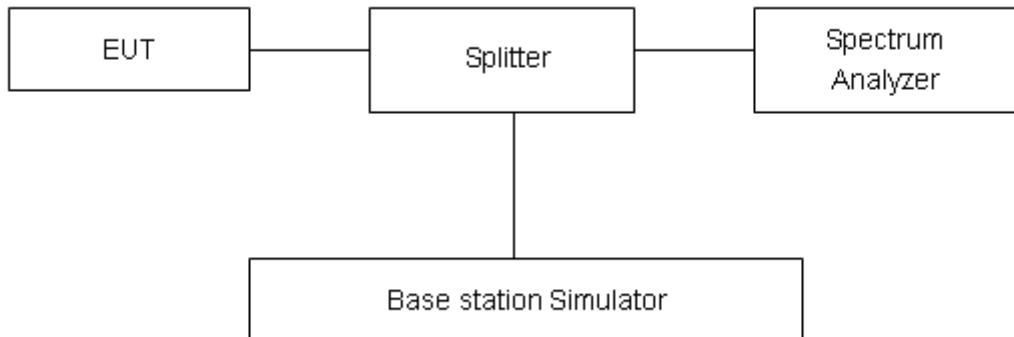
RBW is set to 51kHz, VBW is set to 160kHz for LTE Band 2/25(1.4MHz),

RBW is set to 100kHz,VBW is set to 300kHz for LTE Band 2/25 (3MHz/5MHz),

RBW is set to 300kHz,VBW is set to 1MHz for LTE Band 2/25(10MHz/15MHz/20MHz).

99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 624\text{Hz}$.

**Test Result**

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
WCDMA Band II (RMC)	9262	1852.4	4.1242	4.675
	9400	1880	4.1211	4.676
	9538	1907.6	4.1201	4.673

LTE Band 2						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	1.4	18607	1850.7	1.1257	1.345
			18900	1880.0	1.1328	1.344
			19193	1909.3	1.1144	1.338
		3	18615	1851.5	2.7424	3.060
			18900	1880	2.7347	3.053
			19185	1908.5	2.7321	3.053
		5	18625	1852.5	4.5299	5.031
			18900	1880	4.5307	5.031
			19175	1907.5	4.5335	5.063
		10	18650	1855	9.0476	10.010
			18900	1880	9.0180	9.916
			19150	1905	9.0078	9.985
		15	18675	1857.5	13.4420	14.720
			18900	1880	13.4500	14.680
			19125	1902.5	13.4090	14.570
		20	18700	1860	17.8420	19.180
			18900	1880	17.8690	19.140
			19100	1900	17.8360	19.190
1	16QAM	1.4	18607	1850.7	0.3327	0.4677
			18900	1880.0	0.3270	0.4657
			19193	1909.3	0.3159	0.4742
		3	18615	1851.5	0.4106	0.5634
			18900	1880	0.4071	0.5594
			19185	1908.5	0.4095	0.5682



			18625	1852.5	0.4905	0.6986
5			18900	1880	0.4973	0.7215
			19175	1907.5	0.4732	0.6778
			18650	1855	0.9149	1.2710
10			18900	1880	0.8973	1.2150
			19150	1905	0.8933	1.1940
			18675	1857.5	1.1602	1.6300
15			18900	1880	1.1659	1.6020
			19125	1902.5	1.1132	1.5630
			18700	1860	1.2621	1.7960
20			18900	1880	1.2355	1.7650
			19100	1900	1.2209	1.7690

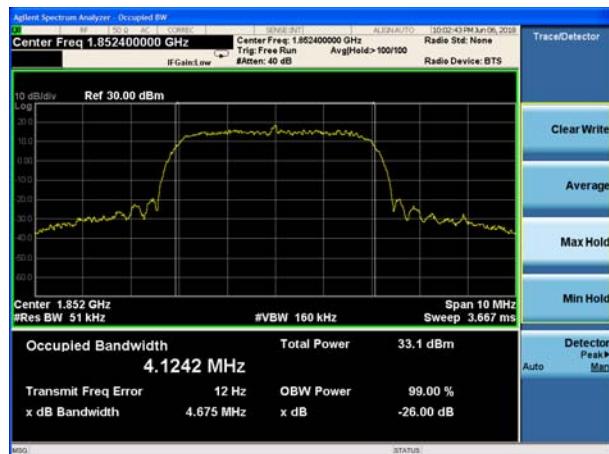
LTE Band 25						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	1.4	26047	1850.7	1.1138	1.338
			26365	1882.5	1.1188	1.329
			26683	1914.3	1.1361	1.336
		3	26055	1851.5	2.7461	3.067
			26365	1882.5	2.7547	3.039
			26675	1913.5	2.7549	3.052
		5	26065	1852.5	4.5335	5.046
			26365	1882.5	4.5207	4.983
			26665	1912.5	4.5234	5.035
		10	26090	1855	9.0318	9.984
			26365	1882.5	9.0078	9.958
			26640	1910	9.0279	10.010
		15	26115	1857.5	13.4610	14.730
			26365	1882.5	13.4040	14.660
			26615	1907.5	13.3900	14.550
		20	26140	1860	17.8710	19.240
			26365	1882.5	17.8300	19.080
			26590	1905	17.7730	19.160



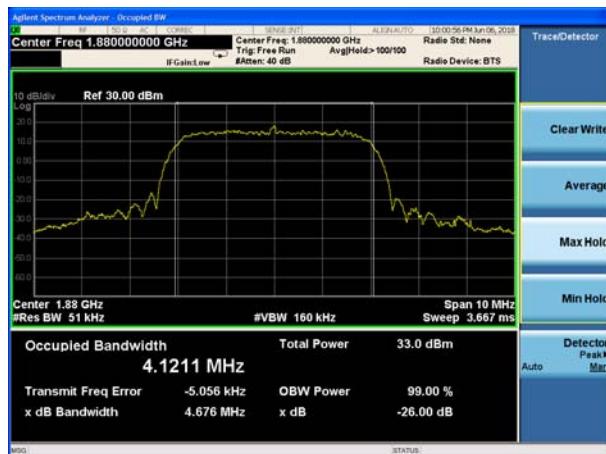
1	16QAM	1.4	26047	1850.7	0.3150	0.439
			26365	1882.5	0.3237	0.474
			26683	1914.3	0.3300	0.481
		3	26055	1851.5	0.3992	0.544
			26365	1882.5	0.3926	0.554
			26675	1913.5	0.3988	0.540
		5	26065	1852.5	0.4780	0.689
			26365	1882.5	0.4762	0.684
			26665	1912.5	0.4763	0.700
		10	26090	1855	0.8586	1.131
			26365	1882.5	0.8685	1.179
			26640	1910	0.9018	1.251
		15	26115	1857.5	1.0878	1.529
			26365	1882.5	1.1127	1.558
			26615	1907.5	1.0725	1.517
		20	26140	1860	1.2054	1.744
			26365	1882.5	1.1469	1.654
			26590	1905	1.1964	1.668



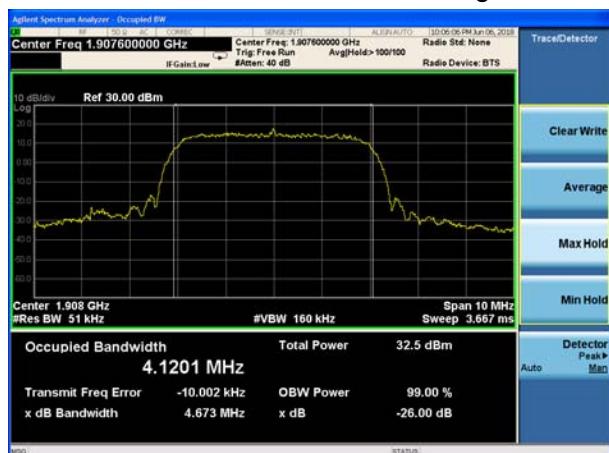
WCDMA Band II RMC CH-LOW



WCDMA Band II RMC CH-Middle

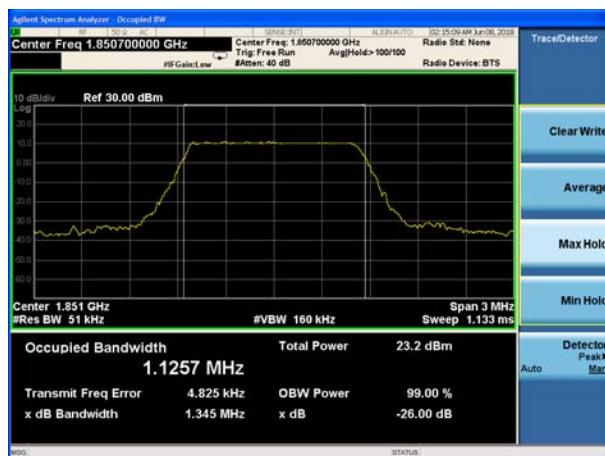


WCDMA Band II RMC CH-High

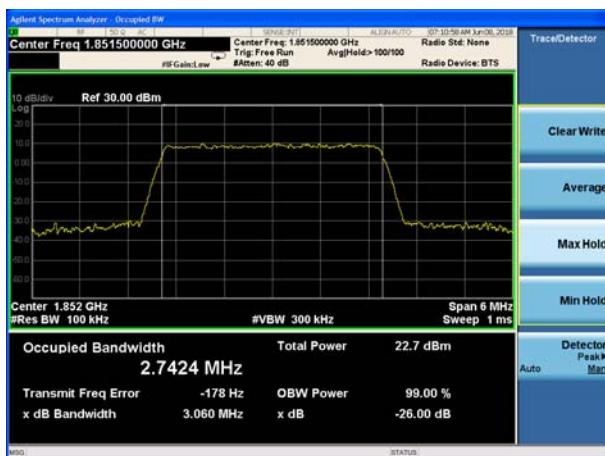




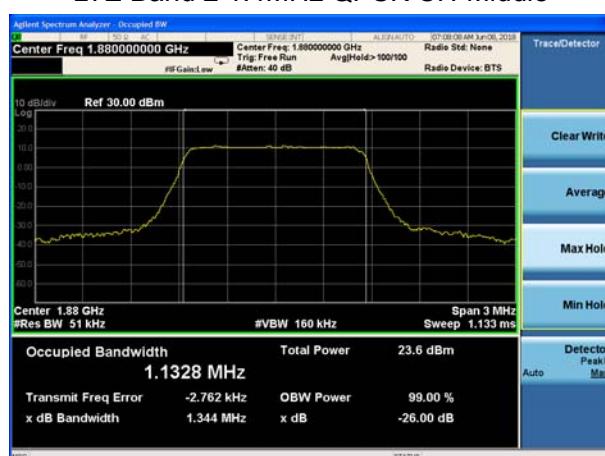
LTE Band 2 1.4MHz QPSK CH-Low



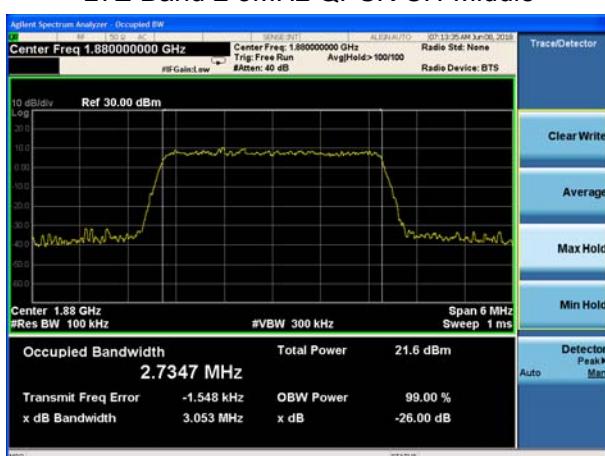
LTE Band 2 3MHz QPSK CH-Low



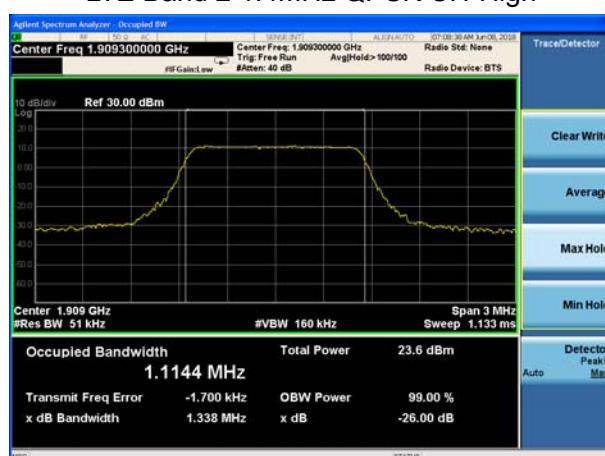
LTE Band 2 1.4MHz QPSK CH-Middle



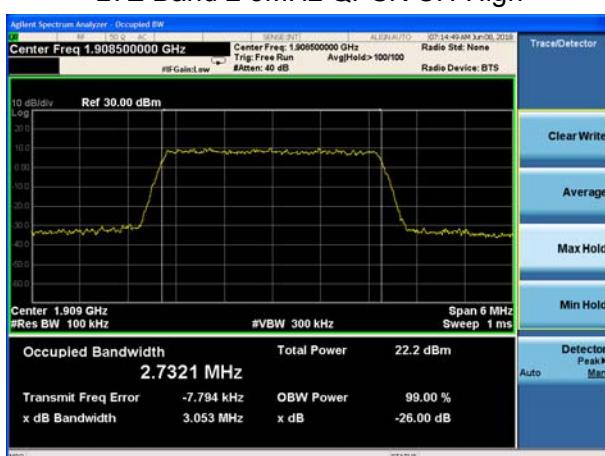
LTE Band 2 3MHz QPSK CH-Middle



LTE Band 2 1.4MHz QPSK CH-High

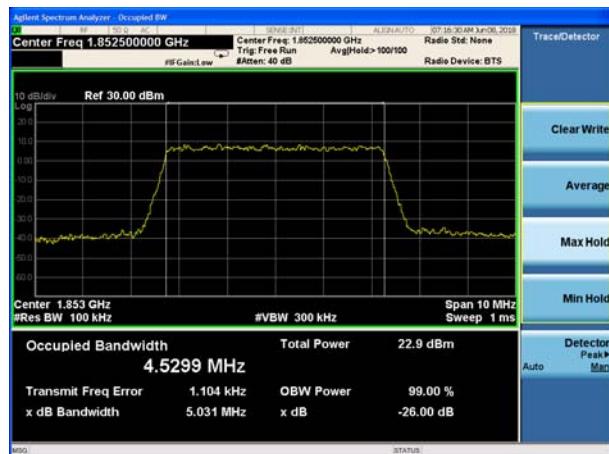


LTE Band 2 3MHz QPSK CH-High

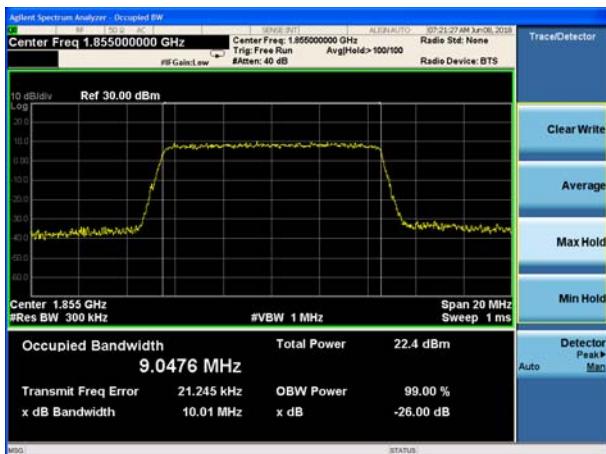




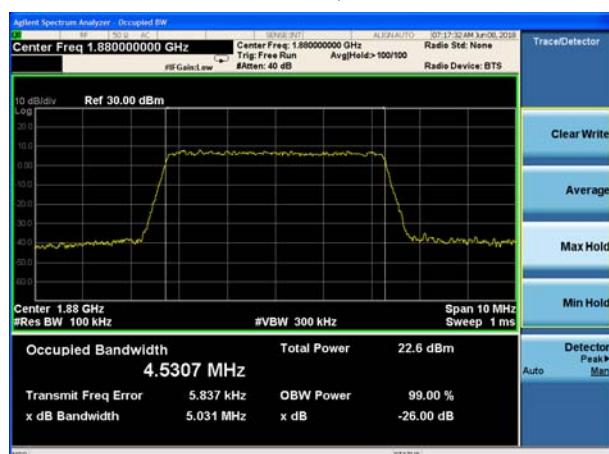
LTE Band 2 5MHz QPSK CH-Low



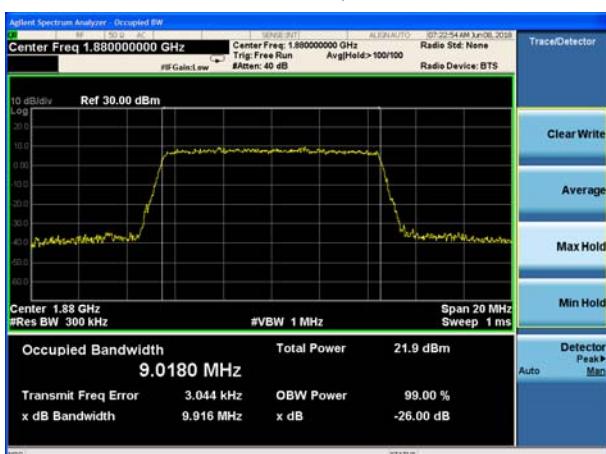
LTE Band 2 10MHz QPSK CH-Low



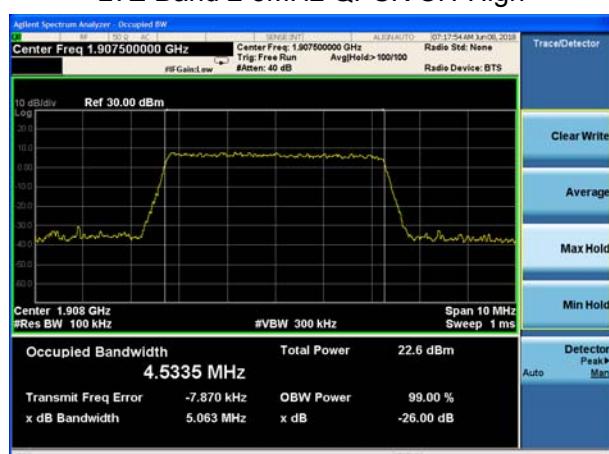
LTE Band 2 5MHz QPSK CH-Middle



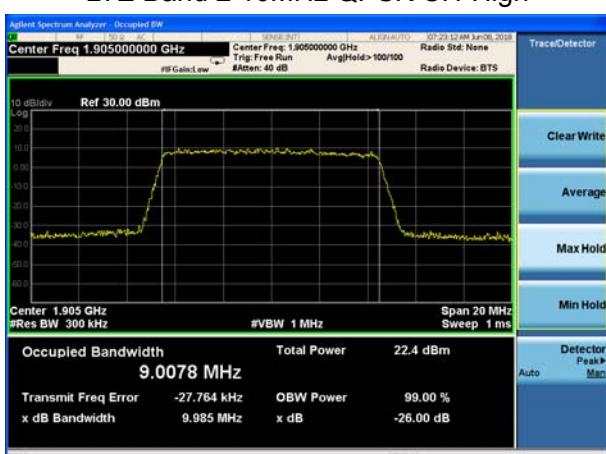
LTE Band 2 10MHz QPSK CH-Middle



LTE Band 2 5MHz QPSK CH-High

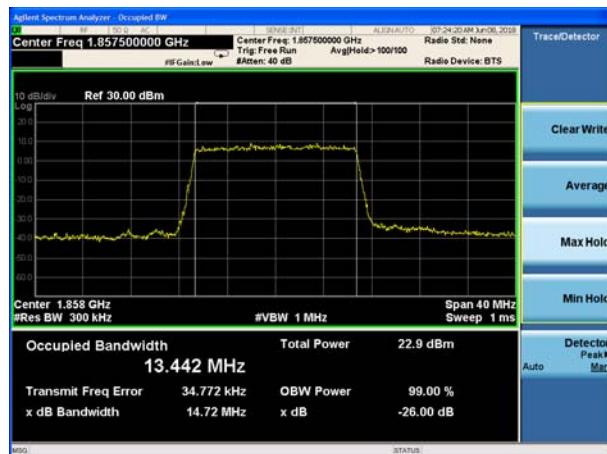


LTE Band 2 10MHz QPSK CH-High

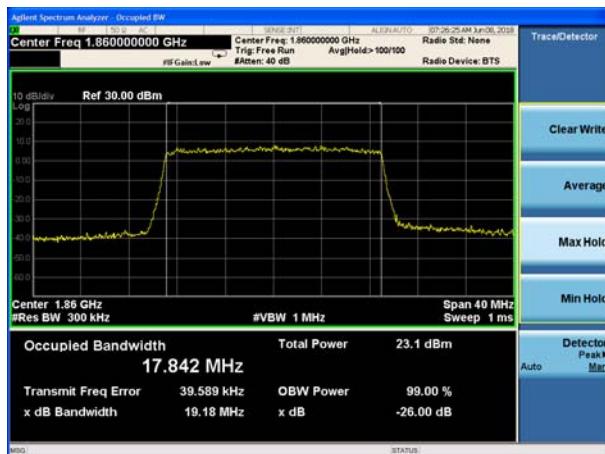




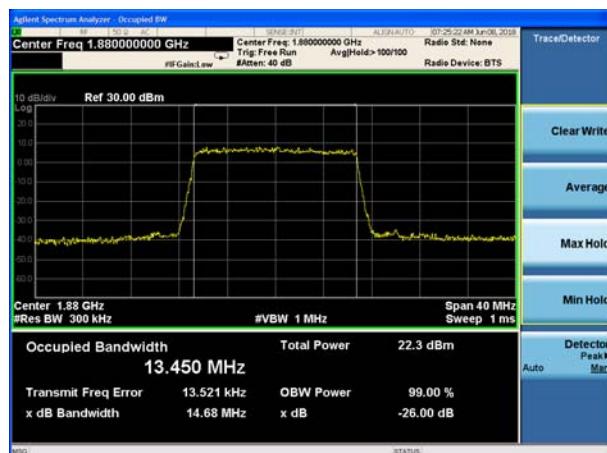
LTE Band 2 15MHz QPSK CH-Low



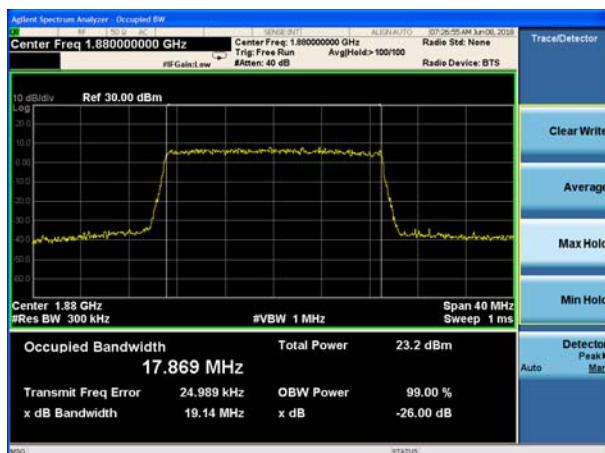
LTE Band 2 20MHz QPSK CH-Low



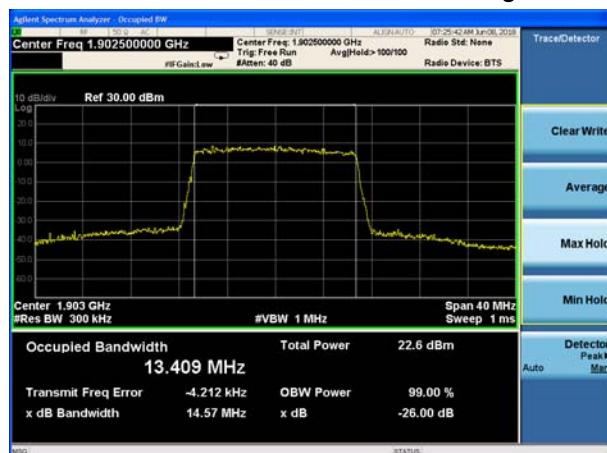
LTE Band 2 15MHz QPSK CH-Middle



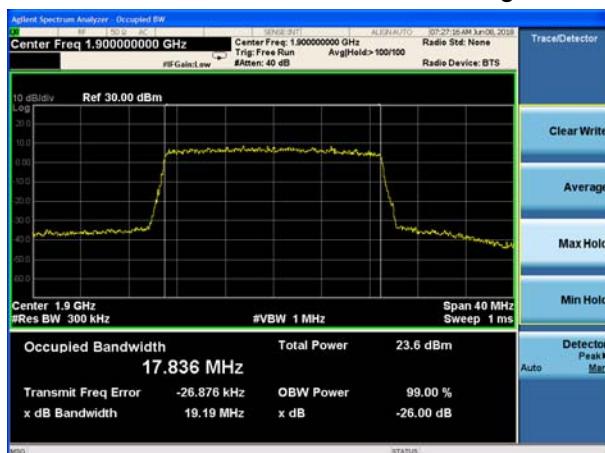
LTE Band 2 20MHz QPSK CH-Middle



LTE Band 2 15MHz QPSK CH-High

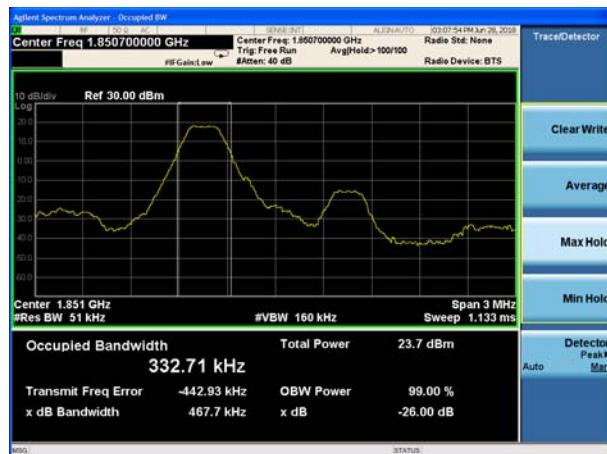


LTE Band 2 20MHz QPSK CH-High

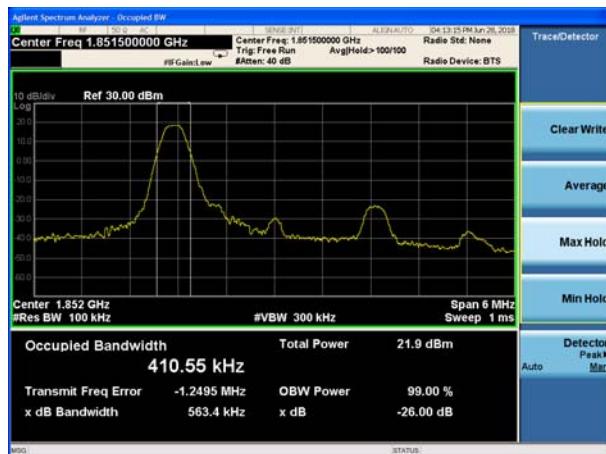




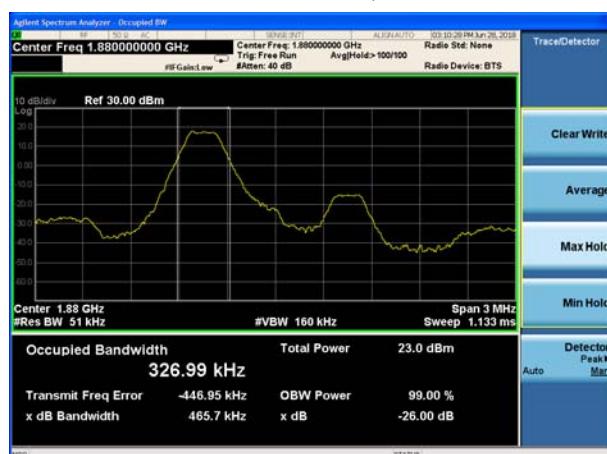
LTE Band 2 1.4MHz 16QAM CH-Low



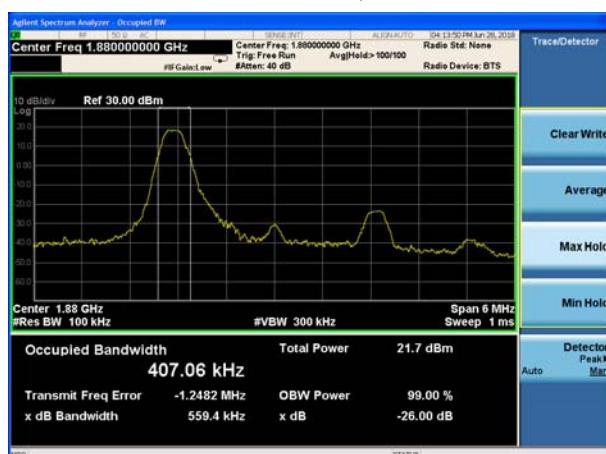
LTE Band 2 3MHz 16QAM CH-Low



LTE Band 2 1.4MHz 16QAM CH-Middle



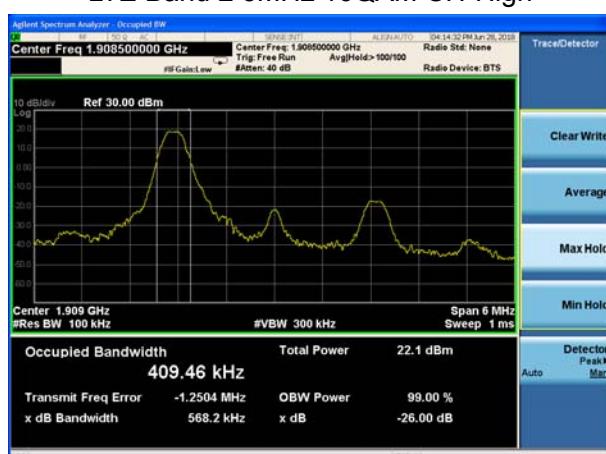
LTE Band 2 3MHz 16QAM CH-Middle



LTE Band 2 1.4MHz 16QAM CH-High

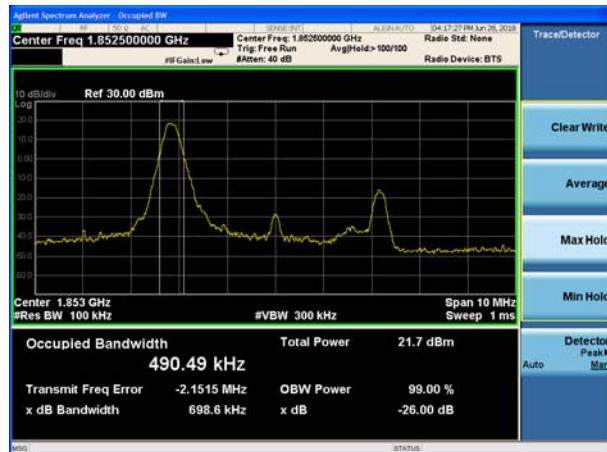


LTE Band 2 3MHz 16QAM CH-High

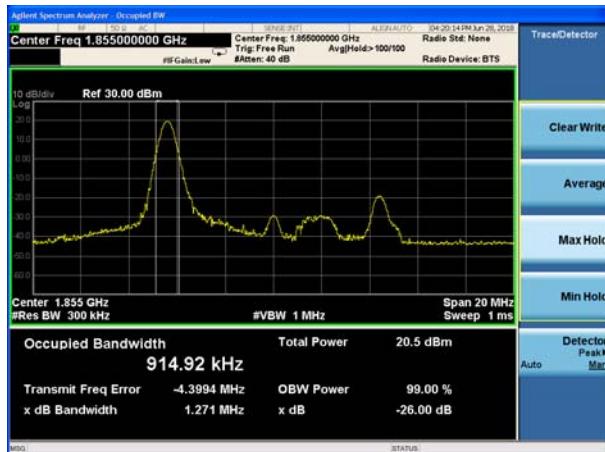




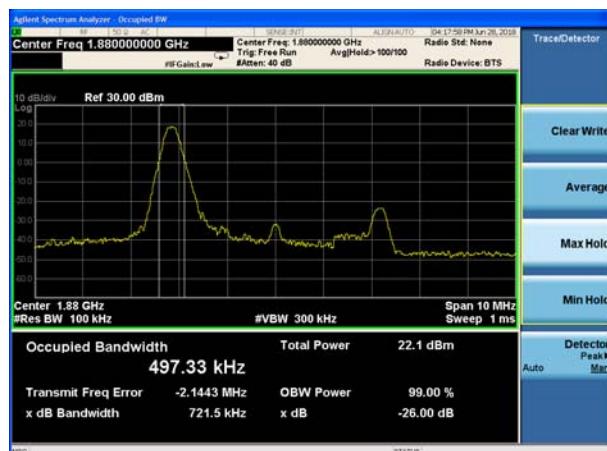
LTE Band 2 5MHz 16QAM CH-Low



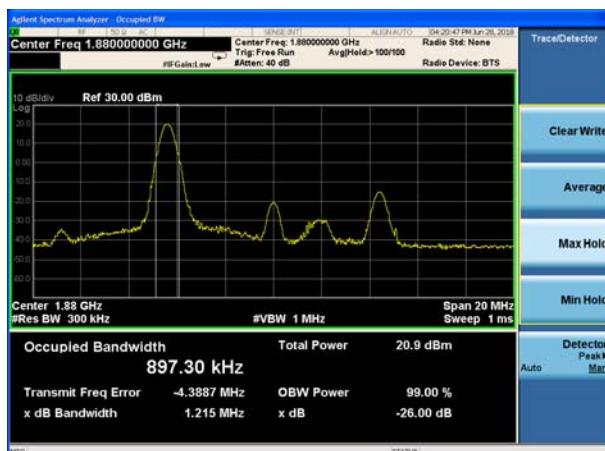
LTE Band 2 10MHz 16QAM CH-Low



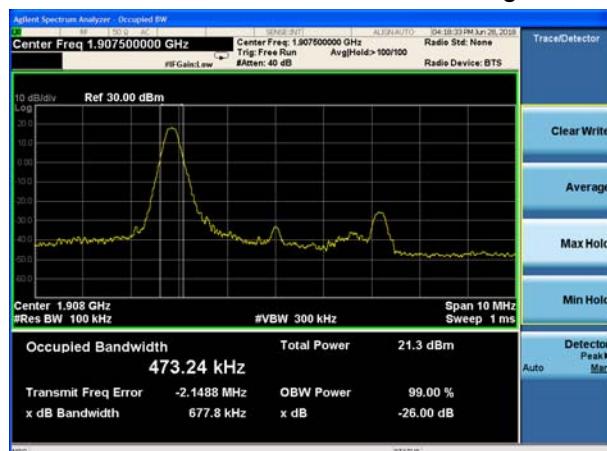
LTE Band 2 5MHz 16QAM CH-Middle



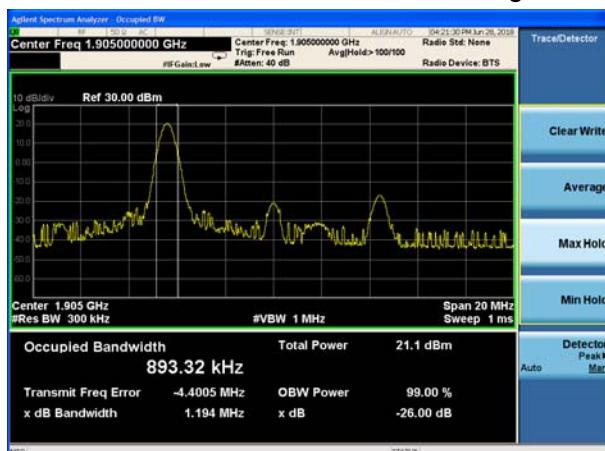
LTE Band 2 10MHz 16QAM CH-Middle



LTE Band 2 5MHz 16QAM CH-High

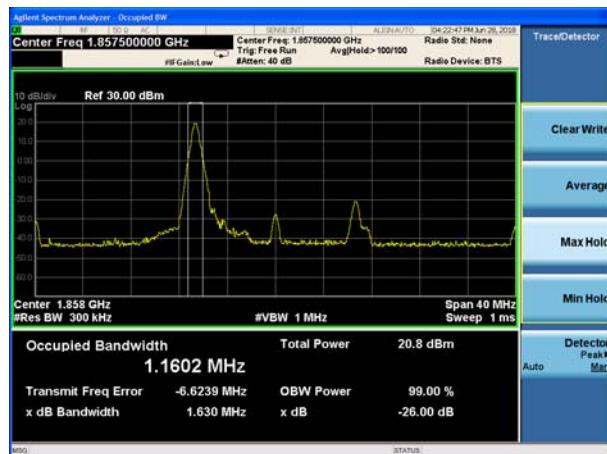


LTE Band 2 10MHz 16QAM CH-High

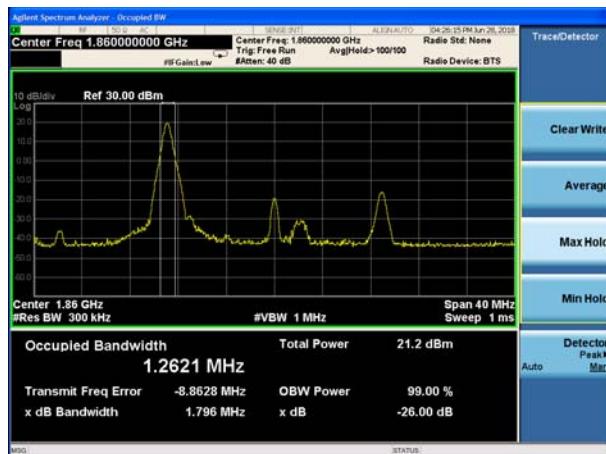




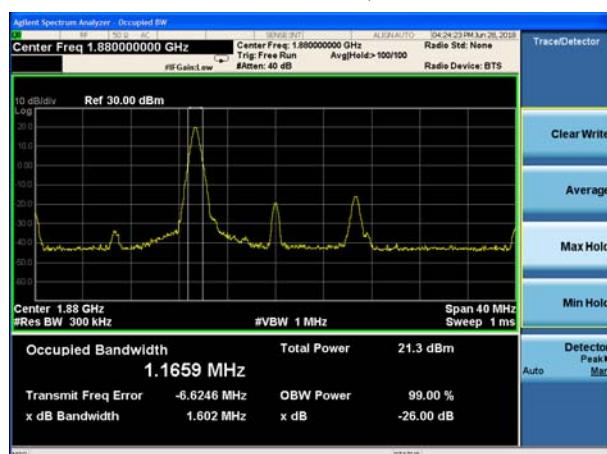
LTE Band 2 15MHz 16QAM CH-Low



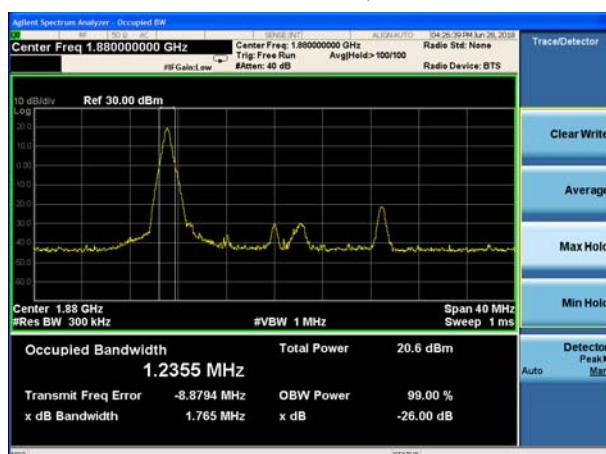
LTE Band 2 20MHz 16QAM CH-Low



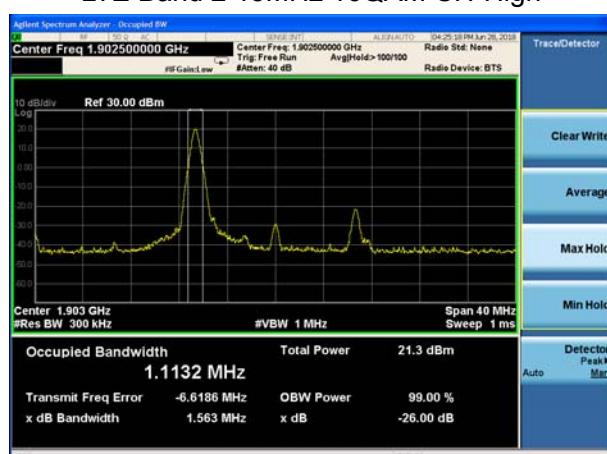
LTE Band 2 15MHz 16QAM CH-Middle



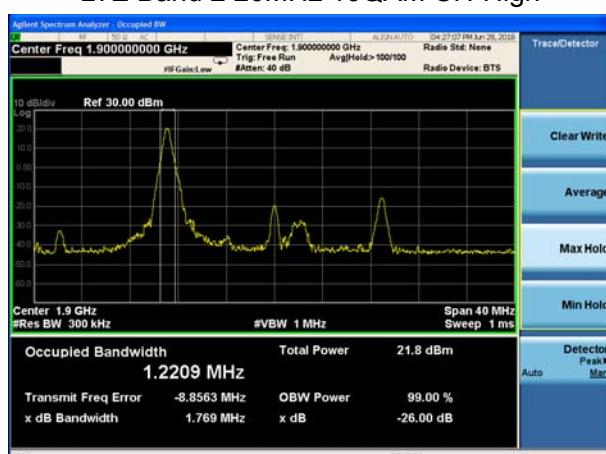
LTE Band 2 20MHz 16QAM CH-Middle

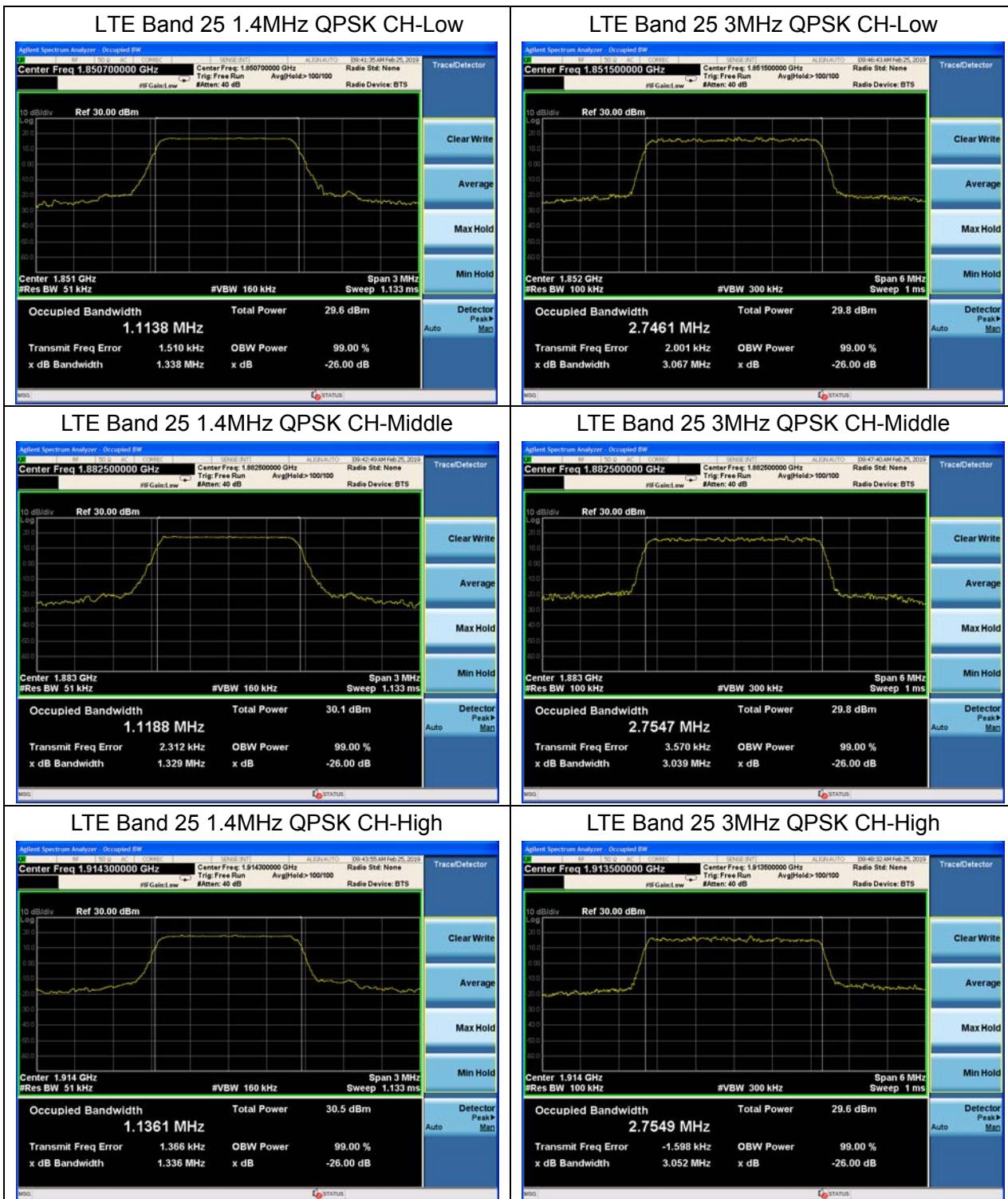


LTE Band 2 15MHz 16QAM CH-High



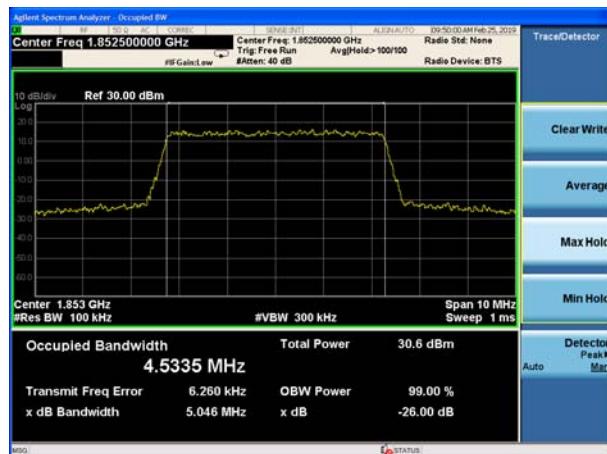
LTE Band 2 20MHz 16QAM CH-High



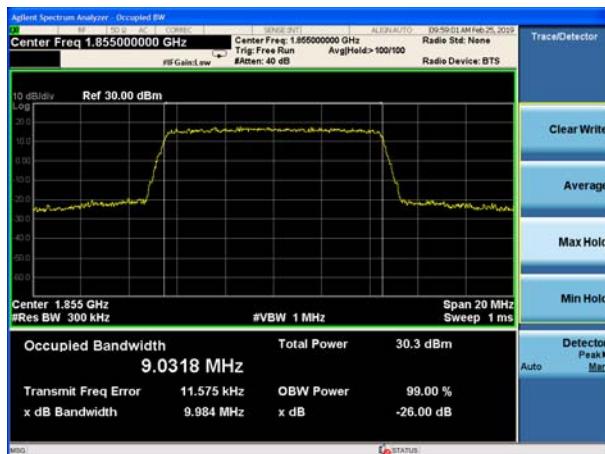




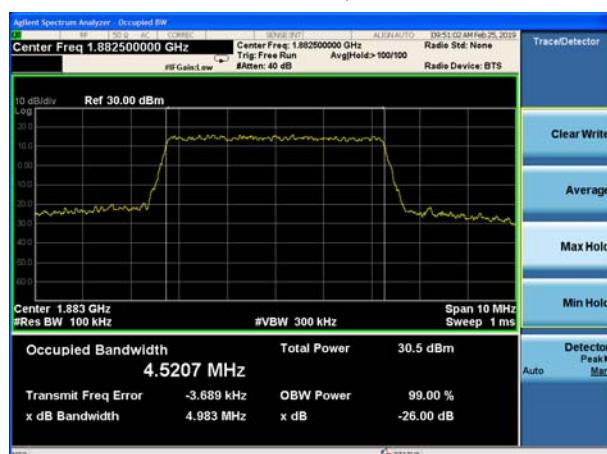
LTE Band 25 5MHz QPSK CH-Low



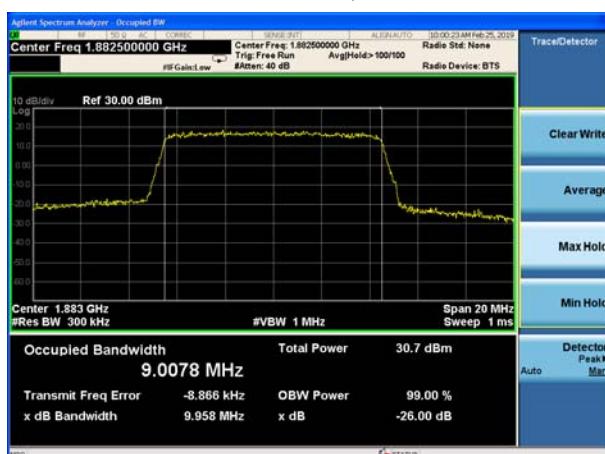
LTE Band 25 10MHz QPSK CH-Low



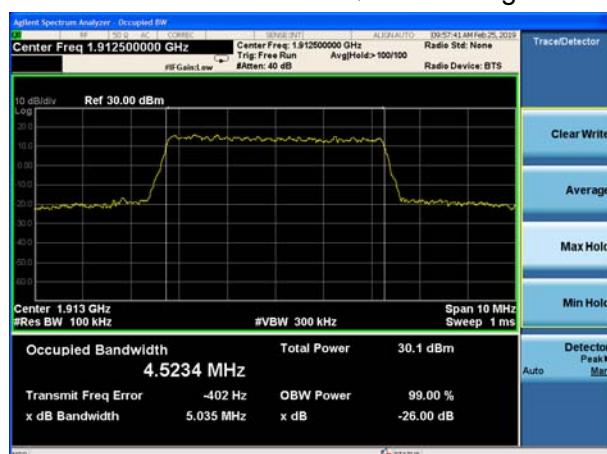
LTE Band 25 5MHz QPSK CH-Middle



LTE Band 25 10MHz QPSK CH-Middle



LTE Band 25 5MHz QPSK CH-High

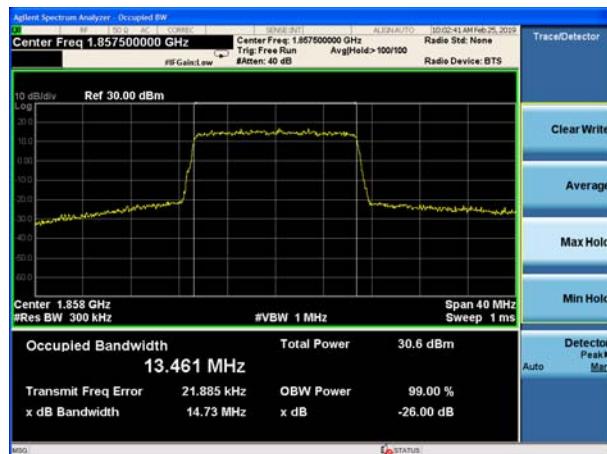


LTE Band 25 10MHz QPSK CH-High

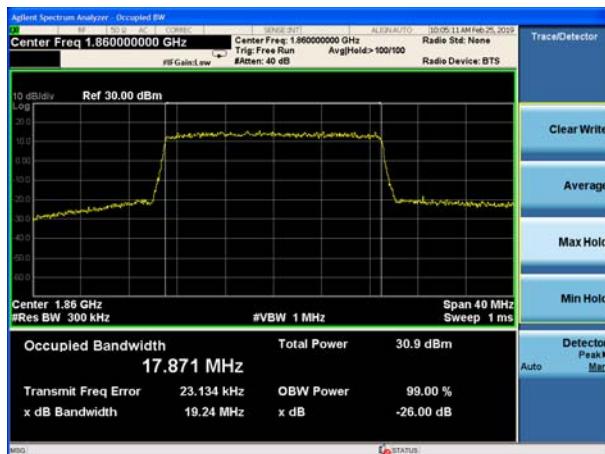




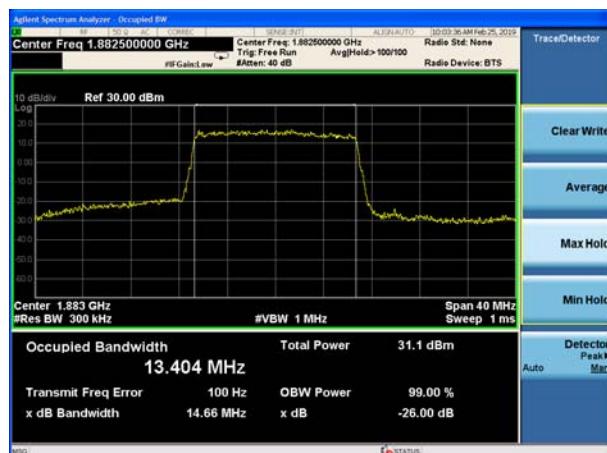
LTE Band 25 15MHz QPSK CH-Low



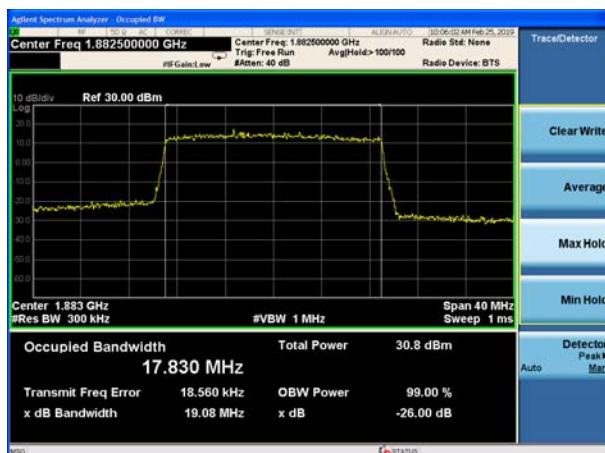
LTE Band 25 20MHz QPSK CH-Low



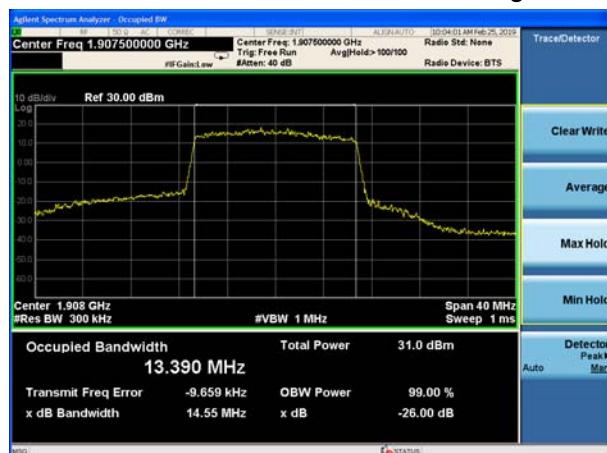
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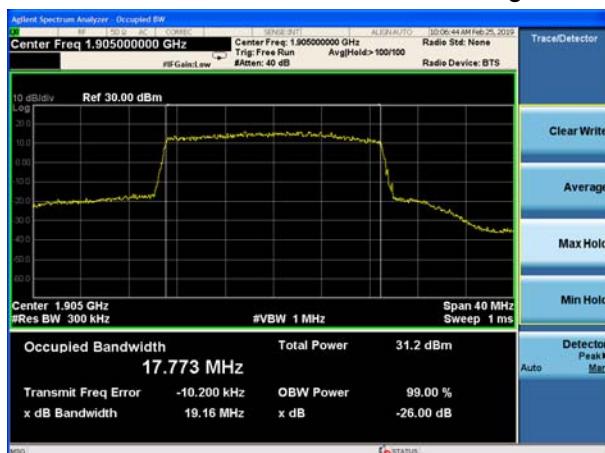
LTE Band 25 20MHz QPSK CH-Middle



LTE Band 25 15MHz QPSK CH-High



LTE Band 25 20MHz QPSK CH-High

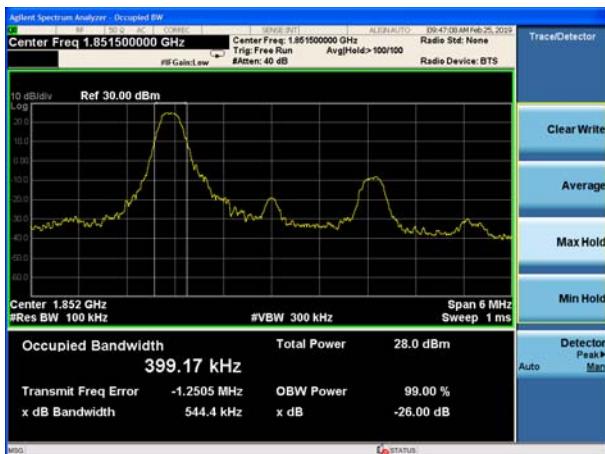




LTE Band 25 1.4MHz 16QAM CH-Low



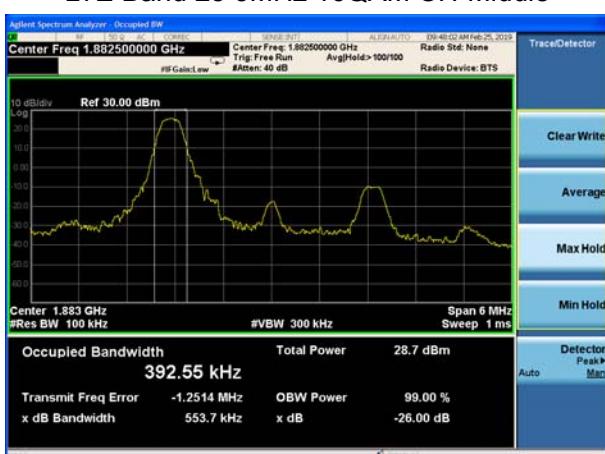
LTE Band 25 3MHz 16QAM CH-Low



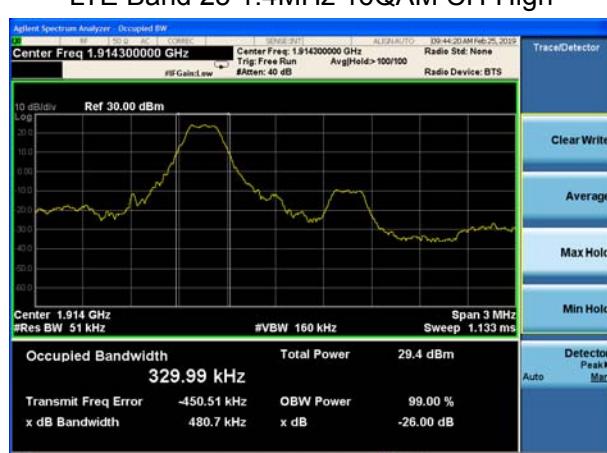
LTE Band 25 1.4MHz 16QAM CH-Middle



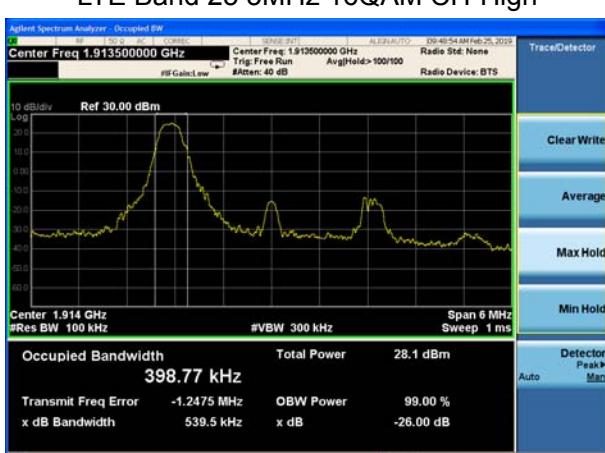
LTE Band 25 3MHz 16QAM CH-Middle



LTE Band 25 1.4MHz 16QAM CH-High

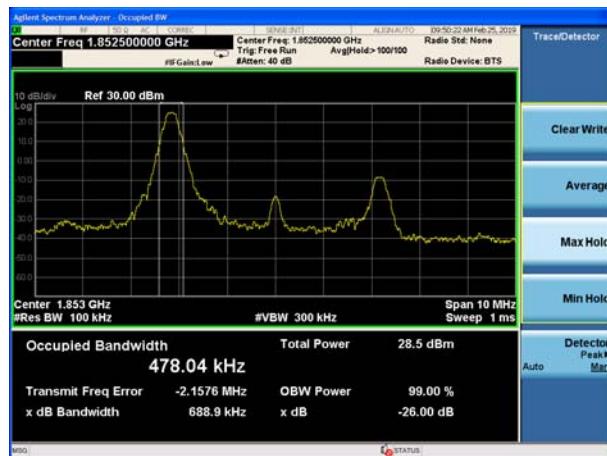


LTE Band 25 3MHz 16QAM CH-High

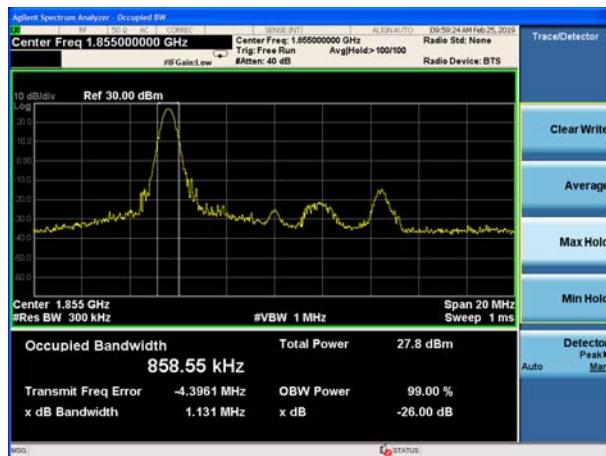




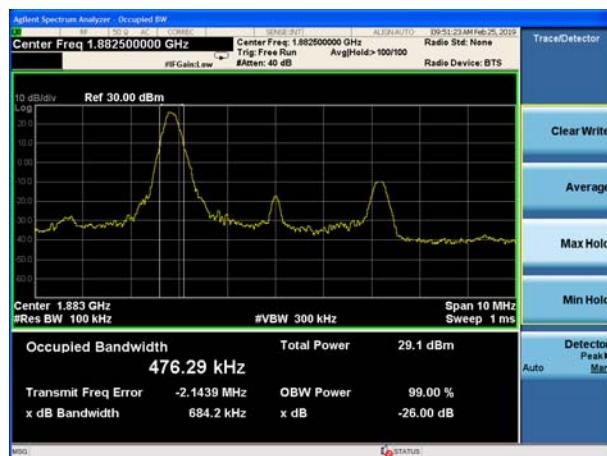
LTE Band 25 5MHz 16QAM CH-Low



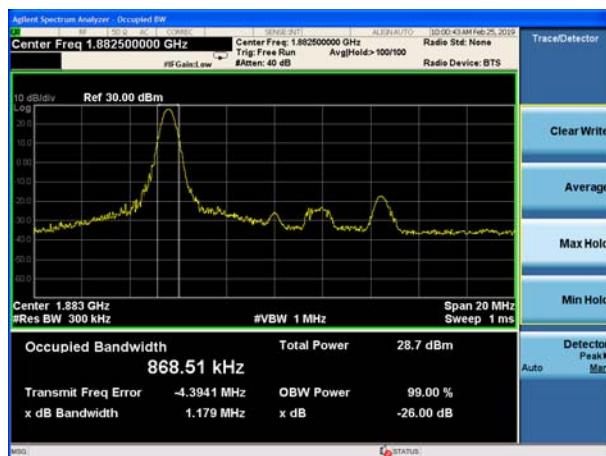
LTE Band 25 10MHz 16QAM CH-Low



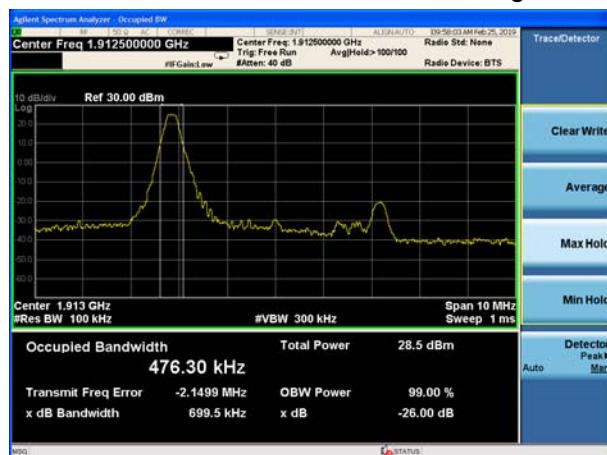
LTE Band 25 5MHz 16QAM CH-Middle



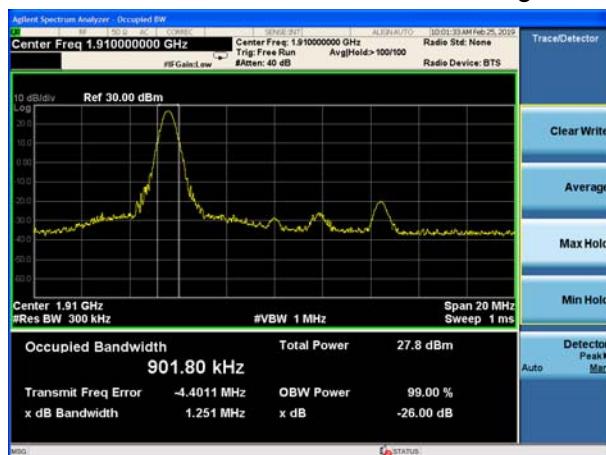
LTE Band 25 10MHz 16QAM CH-Middle



LTE Band 25 5MHz 16QAM CH-High

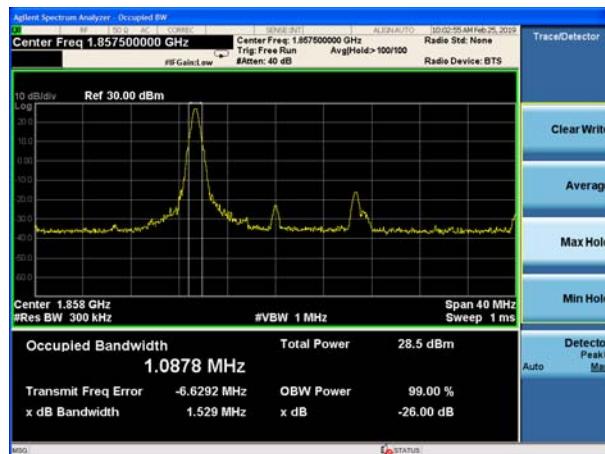


LTE Band 25 10MHz 16QAM CH-High

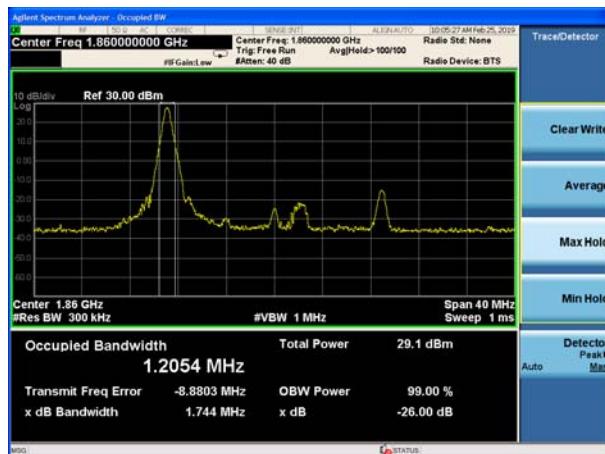




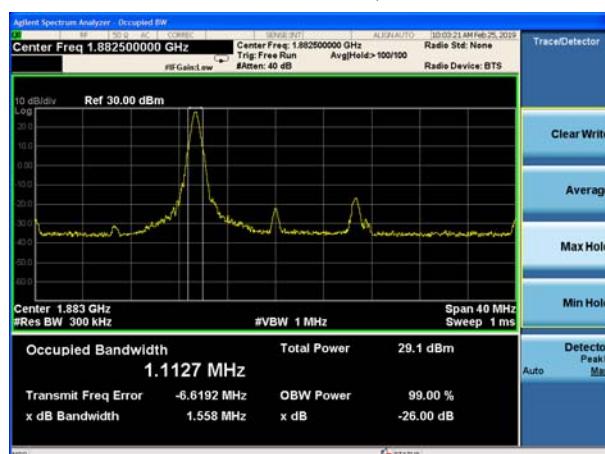
LTE Band 25 15MHz 16QAM CH-Low



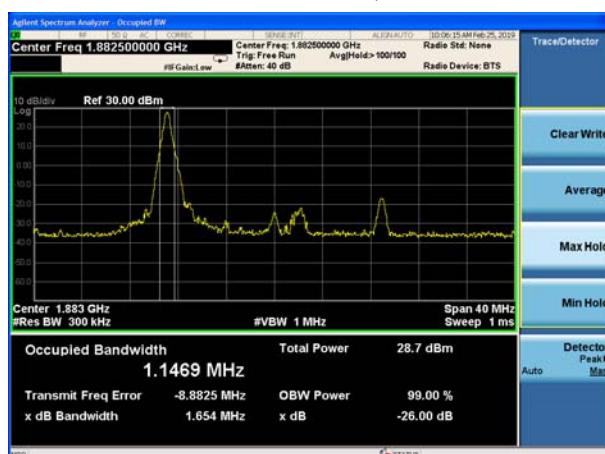
LTE Band 25 20MHz 16QAM CH-Low



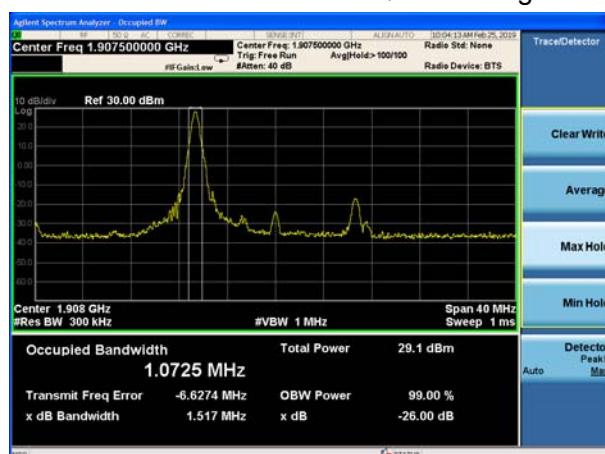
LTE Band 25 15MHz 16QAM CH-Middle



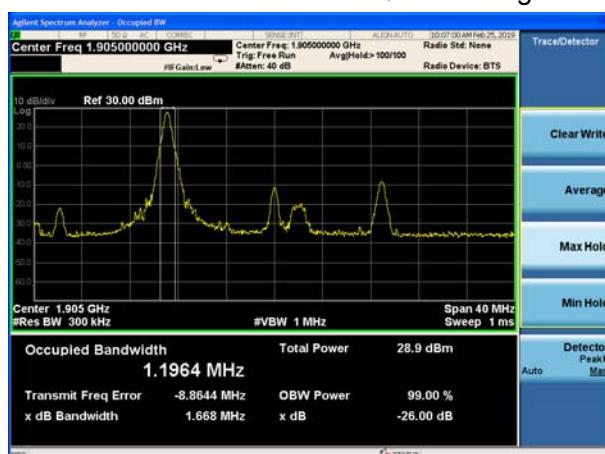
LTE Band 25 20MHz 16QAM CH-Middle



LTE Band 25 15MHz 16QAM CH-High



LTE Band 25 20MHz 16QAM CH-High



5.4. Band Edge Compliance

Ambient condition

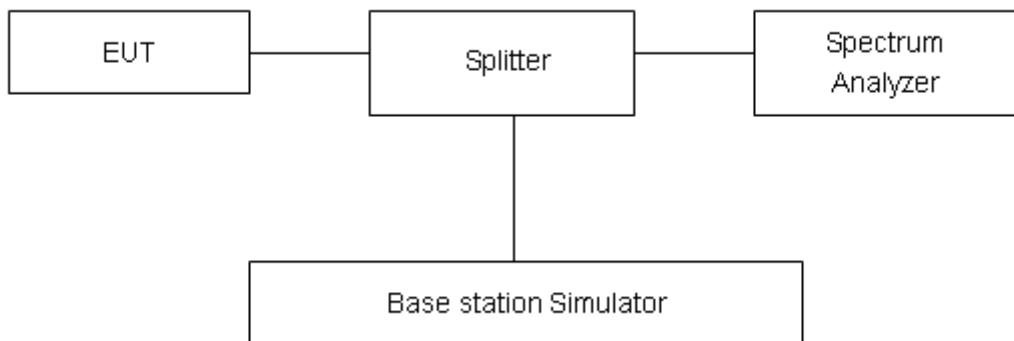
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The Average detector is used and RBW is set to 51kHz, VBW is set to 160kHz for WCDMA Band II, RBW is set to 15kHz, VBW is set to 51kHz for LTE Band 2/25(1.4MHz), RBW is set to 30kHz,VBW is set to 100kHz for LTE Band 2/25 (3MHz), RBW is set to 51kHz,VBW is set to 160kHz for LTE Band 2/25 (5MHz), RBW is set to 100kHz,VBW is set to 300kHz for LTE Band 2/25(10MHz), RBW is set to 150kHz,VBW is set to 510kHz for LTE Band 2/25(15MHz), RBW is set to 200kHz,VBW is set to 620kHz for LTE Band 2/25(20MHz).

Spectrum analyzer plots are included on the following pages.

Test Setup



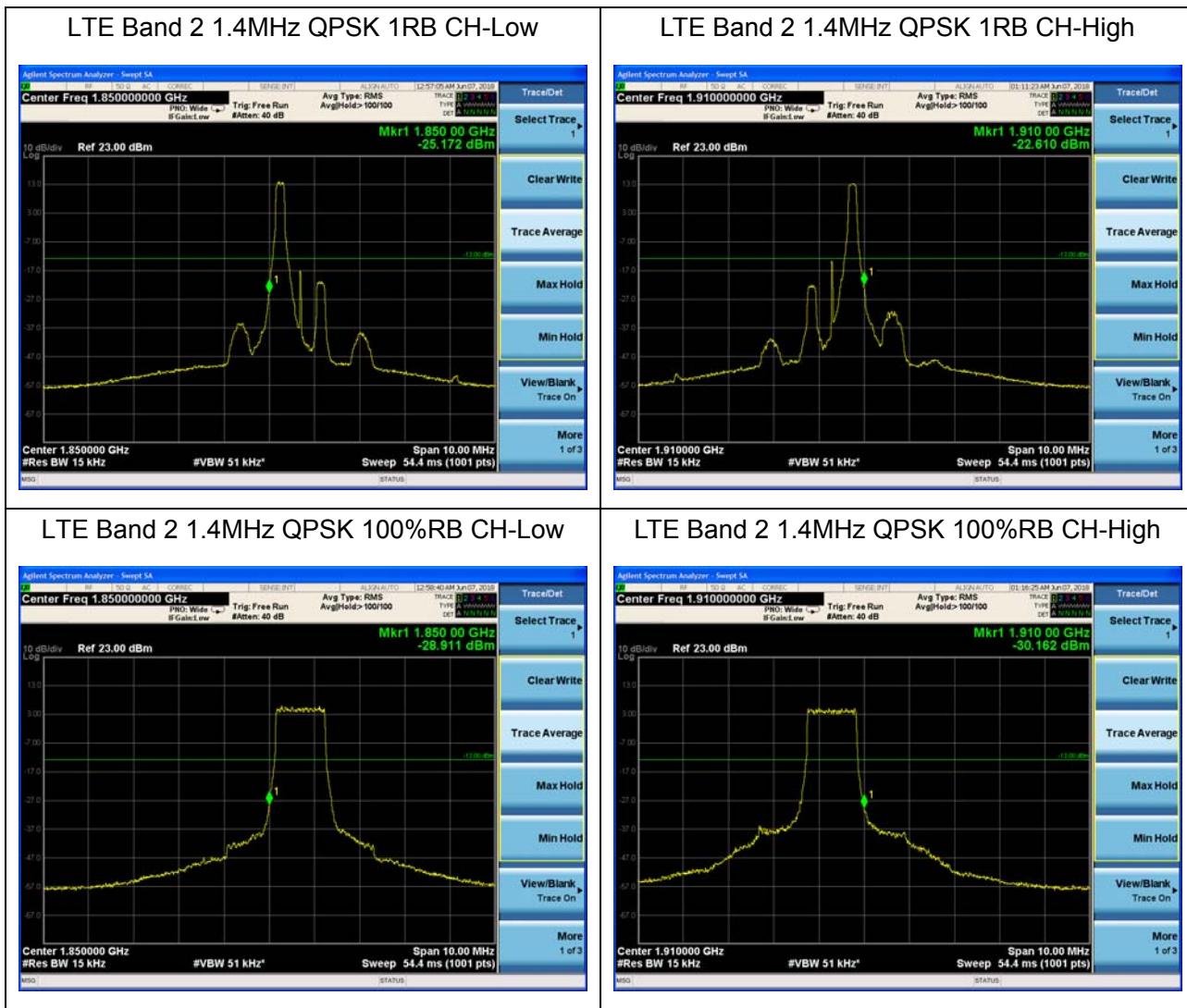
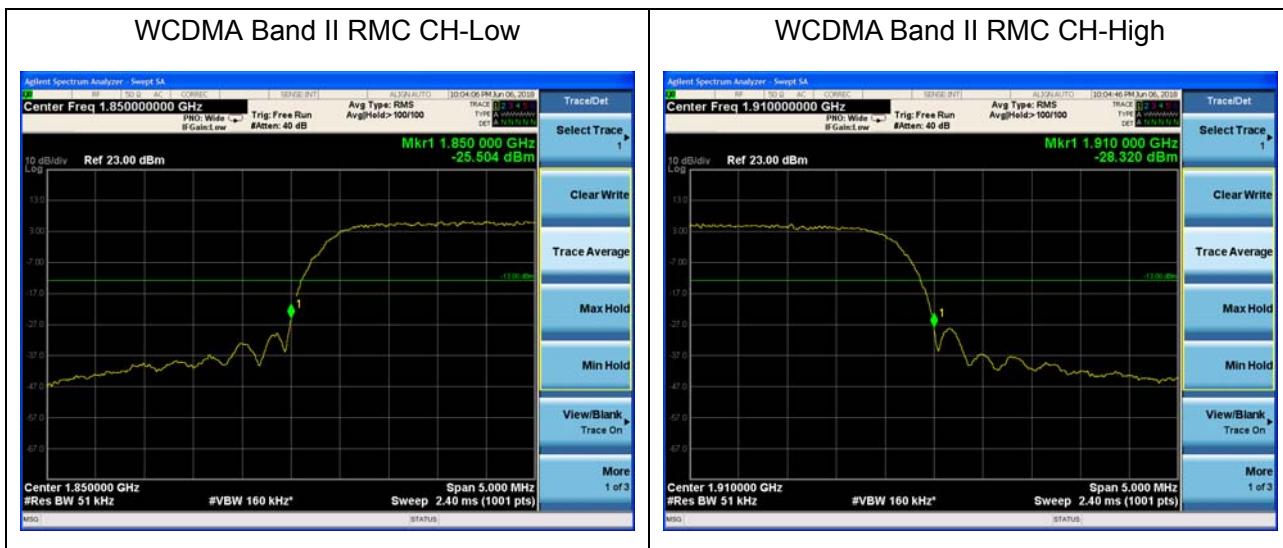
Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.”

Limit	-13 dBm
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U=0.684\text{dB}$.

**Test Result:**



LTE Band 2 3MHz QPSK 1RB CH-Low



LTE Band 2 3MHz QPSK 1RB CH-High



LTE Band 2 3MHz QPSK 100%RB CH-Low



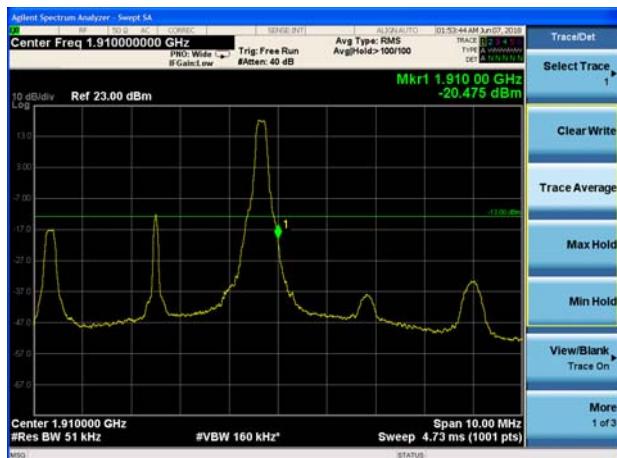
LTE Band 2 3MHz QPSK 100%RB CH-High



LTE Band 2 5MHz QPSK 1RB CH-Low



LTE Band 2 5MHz QPSK 1RB CH-High





LTE Band 2 5MHz QPSK 100%RB CH-Low



LTE Band 2 5MHz QPSK 100%RB CH-High



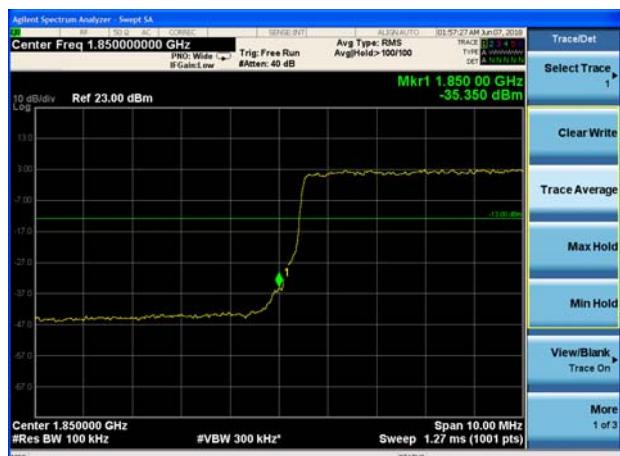
LTE Band 2 10MHz QPSK 1RB CH-Low



LTE Band 2 10MHz QPSK 1RB CH-High



LTE Band 2 10MHz QPSK 100%RB CH-Low



LTE Band 2 10MHz QPSK 100%RB CH-High





LTE Band 2 15MHz QPSK 1RB CH-Low



LTE Band 2 15MHz QPSK 1RB CH-High



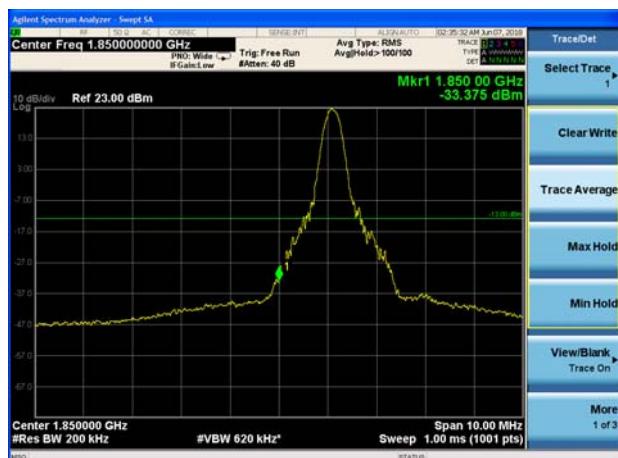
LTE Band 2 15MHz QPSK 100%RB CH-Low



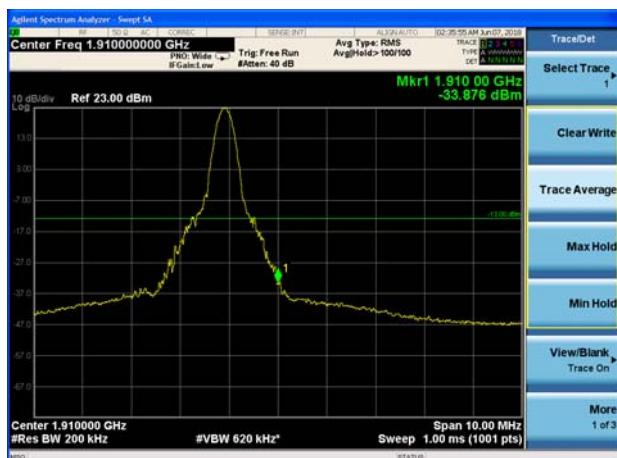
LTE Band 2 15MHz QPSK 100%RB CH-High



LTE Band 2 20MHz QPSK 1RB CH-Low



LTE Band 2 20MHz QPSK 1RB CH-High





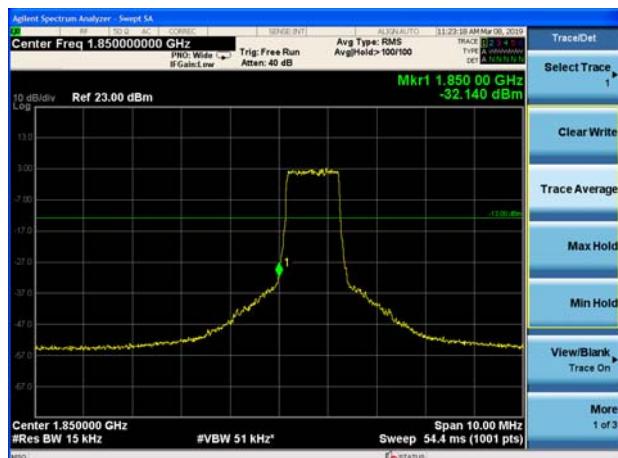
LTE Band 2 20MHz QPSK 100%RB CH-Low



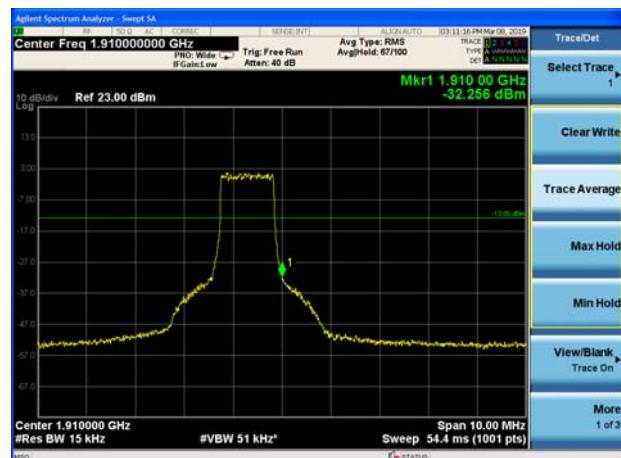
LTE Band 2 20MHz QPSK 100%RB CH-High



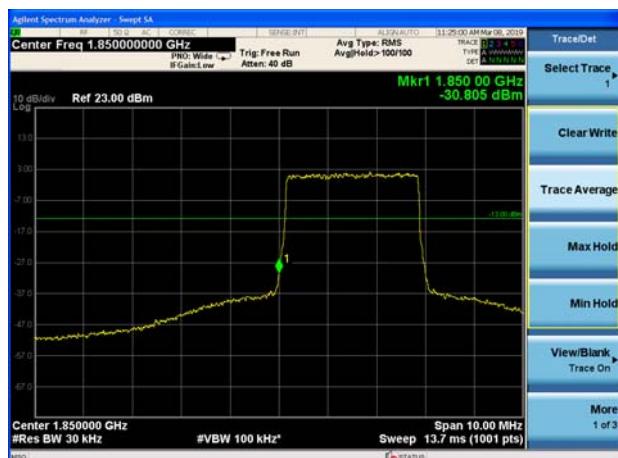
LTE Band 2 1.4MHz 16QAM 1RB CH-Low



LTE Band 2 1.4MHz 16QAM 1RB CH-High



LTE Band 2 3MHz 16QAM 1RB CH-Low



LTE Band 2 3MHz 16QAM 1RB CH-High





LTE Band 2 5MHz 16QAM 1RB CH-Low



LTE Band 2 5MHz 16QAM 1RB CH-High



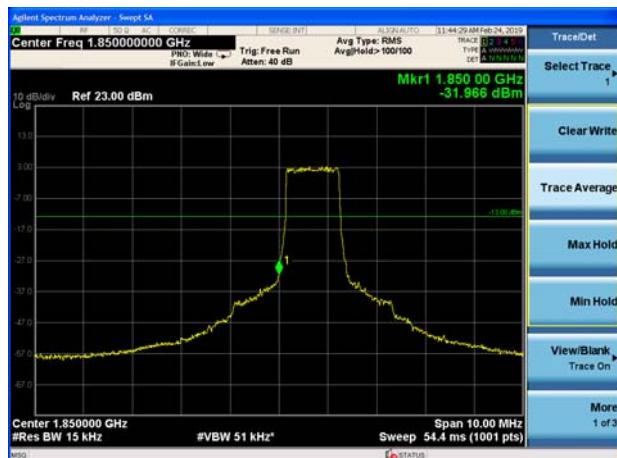
LTE Band 25 1.4MHz QPSK 1RB CH-Low



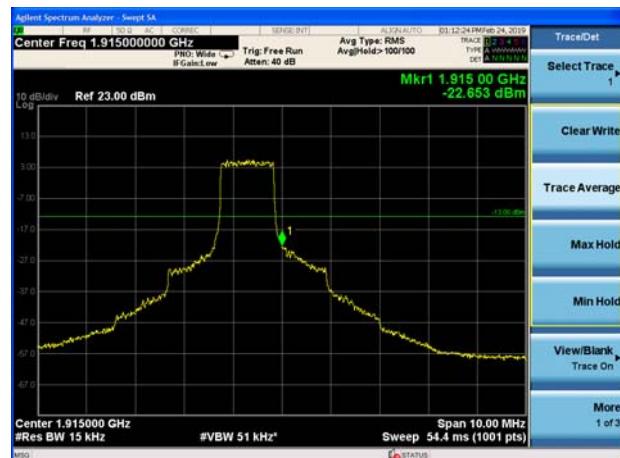
LTE Band 25 1.4MHz QPSK 1RB CH-High



LTE Band 25 1.4MHz QPSK 100%RB CH-Low



LTE Band 25 1.4MHz QPSK 100%RB CH-High





LTE Band 25 3MHz QPSK 1RB CH-Low



LTE Band 25 3MHz QPSK 1RB CH-High



LTE Band 25 3MHz QPSK 100%RB CH-Low



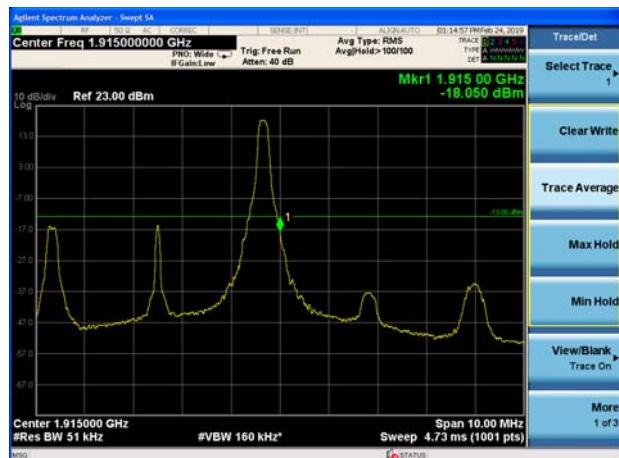
LTE Band 25 3MHz QPSK 100%RB CH-High



LTE Band 25 5MHz QPSK 1RB CH-Low



LTE Band 25 5MHz QPSK 1RB CH-High





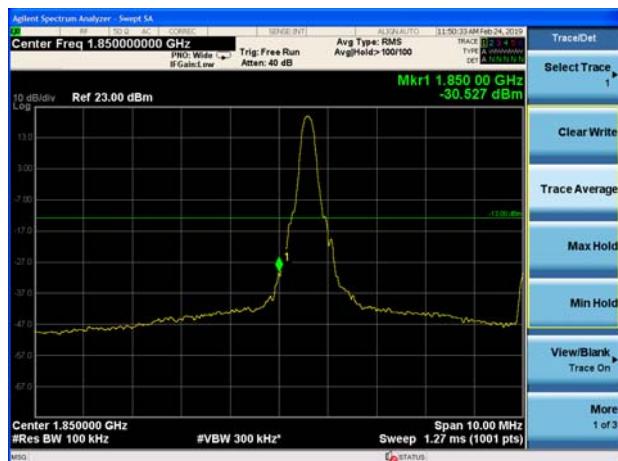
LTE Band 25 5MHz QPSK 100%RB CH-Low



LTE Band 25 5MHz QPSK 100%RB CH-High



LTE Band 25 10MHz QPSK 1RB CH-Low



LTE Band 25 10MHz QPSK 1RB CH-High



LTE Band 25 10MHz QPSK 100%RB CH-Low



LTE Band 25 10MHz QPSK 100%RB CH-High

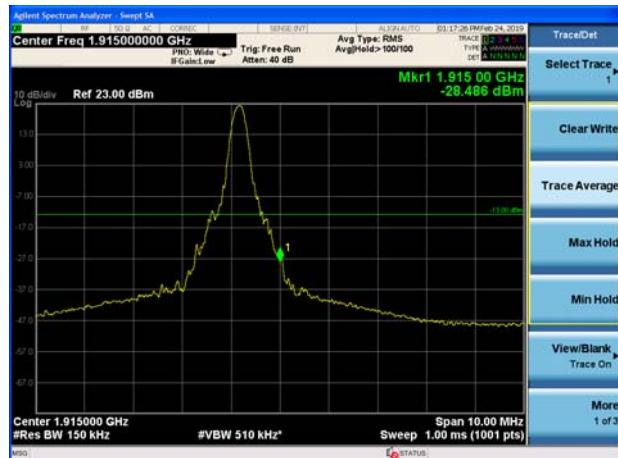




LTE Band 25 15MHz QPSK 1RB CH-Low



LTE Band 25 15MHz QPSK 1RB CH-High



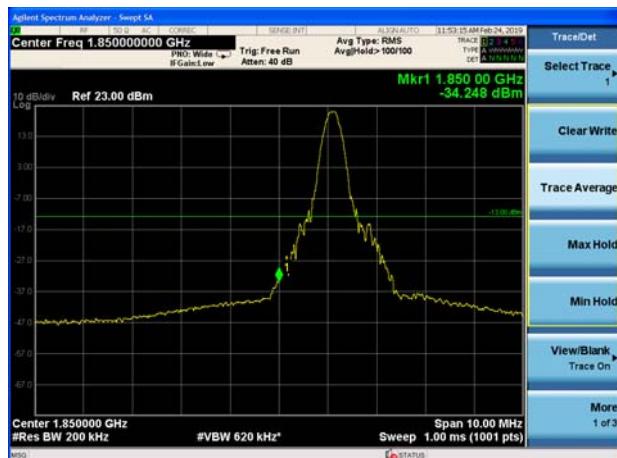
LTE Band 25 15MHz QPSK 100%RB CH-Low



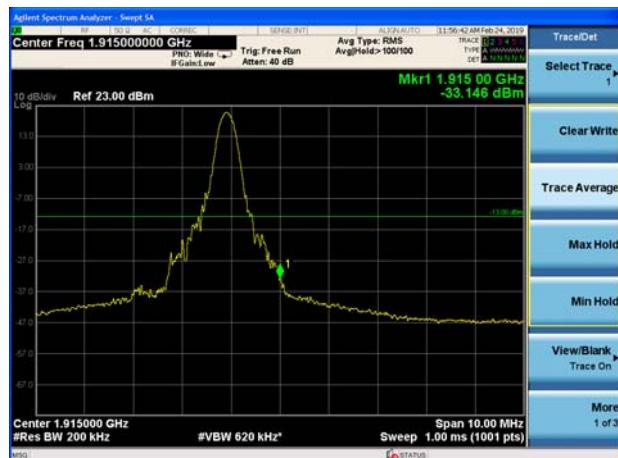
LTE Band 25 15MHz QPSK 100%RB CH-High



LTE Band 25 20MHz QPSK 1RB CH-Low



LTE Band 25 20MHz QPSK 1RB CH-High





LTE Band 25 20MHz QPSK 100%RB CH-Low



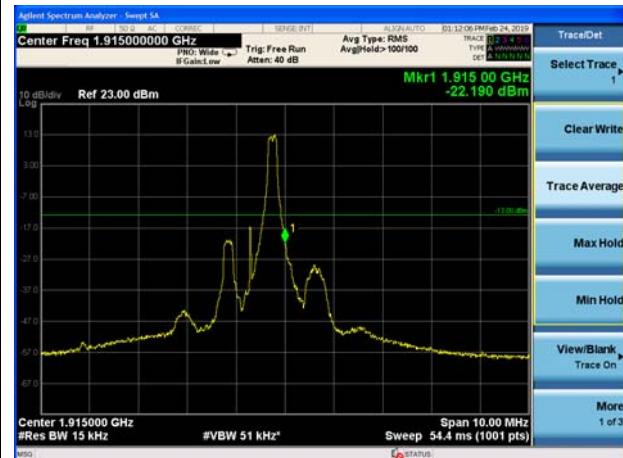
LTE Band 25 20MHz QPSK 100%RB CH-High



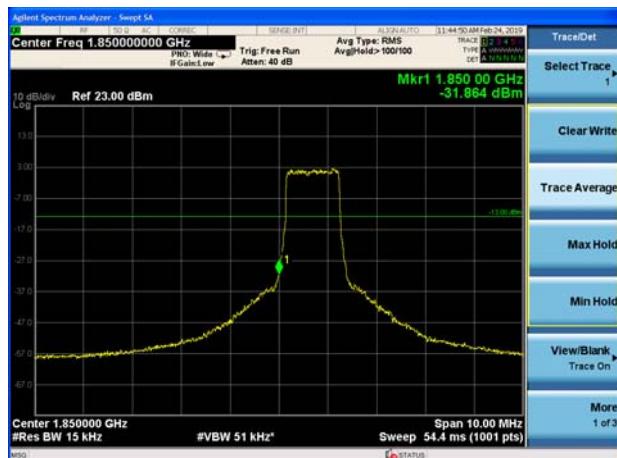
LTE Band 25 1.4MHz 16QAM 1RB CH-Low



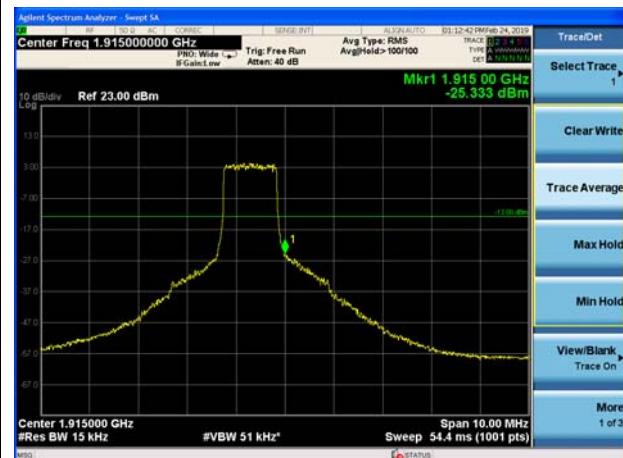
LTE Band 25 1.4MHz 16QAM 1RB CH-High



LTE Band 25 1.4MHz 16QAM 100%RB CH-Low



LTE Band 25 1.4MHz 16QAM 100%RB CH-High





LTE Band 25 3MHz 16QAM 1RB CH-Low



LTE Band 25 3MHz 16QAM 1RB CH-High



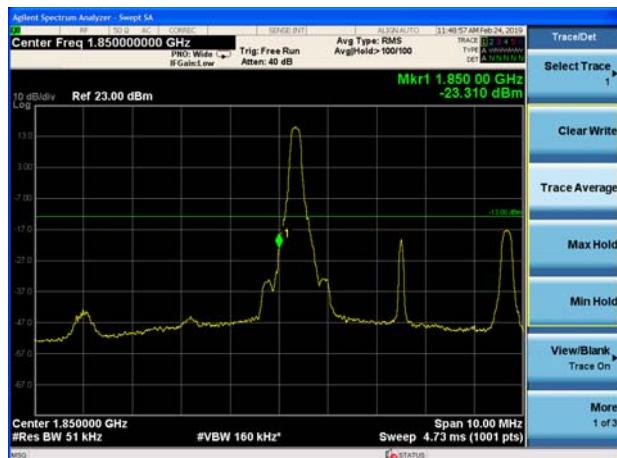
LTE Band 25 3MHz 16QAM 100%RB CH-Low



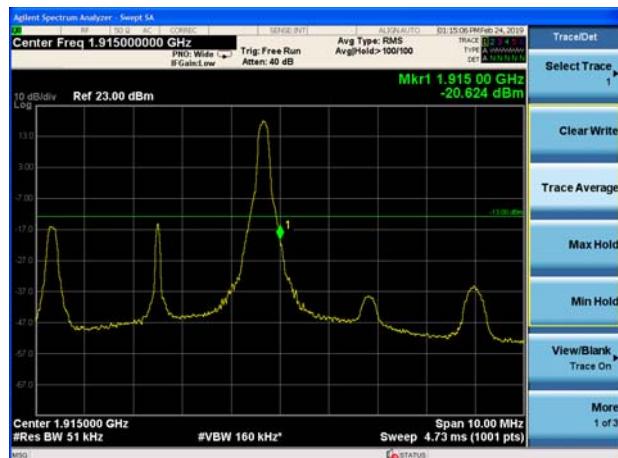
LTE Band 25 3MHz 16QAM 100%RB CH-High



LTE Band 25 5MHz 16QAM 1RB CH-Low



LTE Band 25 5MHz 16QAM 1RB CH-High





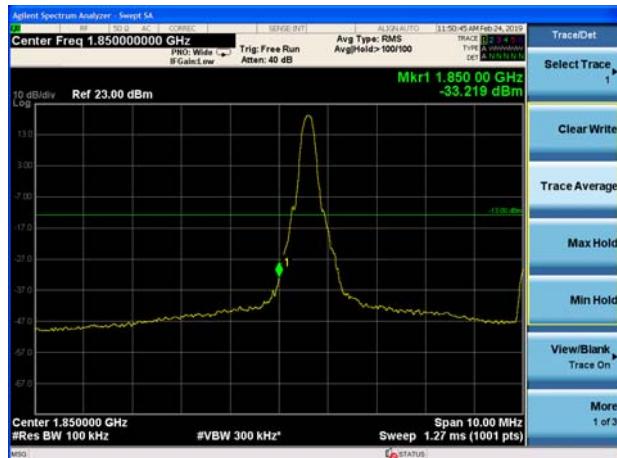
LTE Band 25 5MHz 16QAM 100%RB CH-Low



LTE Band 25 5MHz 16QAM 100%RB CH-High



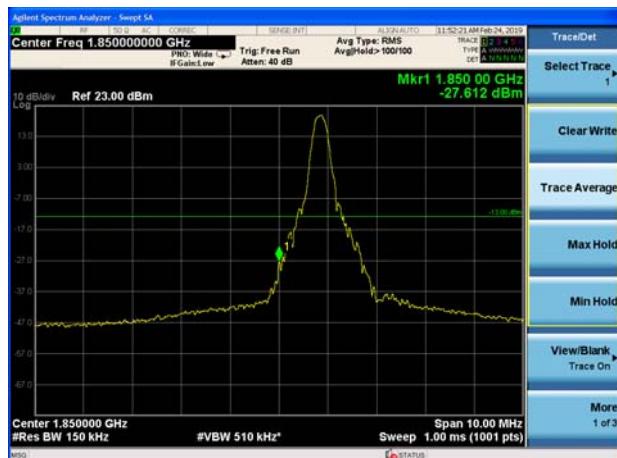
LTE Band 25 10MHz 16QAM 1RB CH-Low



LTE Band 25 10MHz 16QAM 1RB CH-High



LTE Band 25 15MHz 16QAM 1RB CH-Low



LTE Band 25 15MHz 16QAM 1RB CH-High

