RF TEST REPORT

Applicant	ZTE Corporation
FCC ID	SRQ-ZTEBLADEV8Q
Product	LTE/WCDMA/GSM(GPRS) Multi-Mode Digital Mobile Phone
Model	ZTE BLADE V0840 /ZTE BLADE V8Q/ BLADE V8Q
Report No.	RXA1708-0309RF02R1
Issue Date	October 11, 2017

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2017)/ FCC CFR 47 Part 24E (2017)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Jiangpeng Lan

Performed by: Jiangpeng Lan

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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: August 31, 2017~ September 22, 2017			
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.			

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1. Test Laboratory

1.1. Notes of the test report

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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.

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1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
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2. General Description of Equipment under Test

Client Information

Applicant	ZTE Corporation
Applicant address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China
Manufacturer	ZTE Corporation
Manufacturer address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

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General information

EUT Description			
Model	ZTE BLADE V0840 / ZTE BLADE V8Q / BLADE V8Q		
IMEI	866032030009910		
Hardware Version	MBV1.0		
Software Version	GEN_ZTE_V0840_V1.0		
Power Supply	Battery/AC adapter		
Antenna Type	Internal Antenna		
Test Mode(s)	GSM1900; WCDMA Band II; LTE Band 2;		
Test Modulation	(GSM)GMSK,8PSK; (WCDMA)QPSK; (LTE)QPSK,16QAM		
GPRS Multislot Class	12		
EGPRS Multislot Class	12		
HSDPA UE Category	24		
HSUPA UE Category	6		
LTE Category	R10		
Maximum E.I.R.P	GSM 1900:	31.00dBm	
	WCDMA Band II:	22.96dBm	
	LTE Band 2:	24.23dBm	
Rated Power Supply Voltage	3.85V		
Extreme Voltage	Minimum: 3.6V Maximum: 4.4V		
Extreme Temperature	Lowest: -10°C Highest: +55°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM1900	1850 ~ 1910	1930 ~ 1990
	WCDMA Band II	1850 ~ 1910	1930 ~ 1990
	LTE Band 2	1850 ~ 1910	1930 ~ 1990
	LTE Band 25	1850 ~ 1915	1930 ~ 1995
EUT Accessory			
Adapter 1	Manufacturer: SHENZHEN RUIJING INDUSTRIAL CO LTD RUIJING Model: STC-A51A-Z		
Adapter 2	Manufacturer:Jiangsu Chenyang Electronics Co., Ltd. Model:STC-A51A-Z		
Adapter 3	Manufacturer:DONGGUAN AOHAI POWER TECHNOLOGY CO., LTD. Model:STC-A51A-Z		
Adapter 4	Manufacturer: SHENZHEN RUIJING INDUSTRIAL CO LTD RUIJING Model: STC-A51A-A		
Adapter 5	Manufacturer:Jiangsu Chenyang Electronics Co., Ltd. Model: STC-A51A-A		
Battery	Manufacturer: Zhongshan tianmao battery co., ltd		

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	Model: Li3825T43P3h736037 Power Rating: DC 3.8V, 2500mAh, Li-ion
Earphone	Manufacturer: GoerTek Inc Model: HMZ17-CTIA-3.5
USB Extend Cable 1	Manufacturer:Chuan electronics co., ltd SN:080410500049
USB Extend Cable 2	Manufacturer:KoEY Huaxing electronics co., ltd SN:080410500049
Note: The information of the EUT is declared by the manufacturer.	

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3. Applied Standards

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

FCC CFR47 Part 2 (2017)

FCC CFR 47 Part 24E (2017)

ANSI/TIA-603-D (2010)

KDB 971168 D01 Power Meas License Digital Systems v02r02

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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 EUT in position (Z axis, vertical polarization) and Receiver antenna horizontal polarization 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 GSM/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	
		GSM 1900	WCDMA Band II
Conducted Test cases	RF power output	GSM GPRS EGPRS	RMC/ HSDPA/ HSUPA/ DC-HSDPA
	Occupied Bandwidth	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Band Edge Compliance	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Peak-to-Average Power Ratio	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Frequency Stability	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Spurious Emissions at Antenna Terminals	GSM	RMC
Radiated Test cases	Effective Isotropic Radiated power	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Radiates Spurious Emission	GSM	RMC

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

Test items	Bandwidth (MHz)						Modulation		RB			Test Channel		
	1.4	3	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	O	O	-	-	O	O	O	O
Band Edge Compliance	O	O	O	O	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	O	O	O	-	-	O	O	O	O
Frequency Stability	O	O	O	O	O	O	O	O	-	-	O	-	O	-
Conducted Spurious Emissions	O	O	O	O	O	O	O	-	O	-	-	O	O	O
Radiates Spurious Emission	O	O	O	O	O	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.													

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5. Test Case Results

5.1. RF Power Output

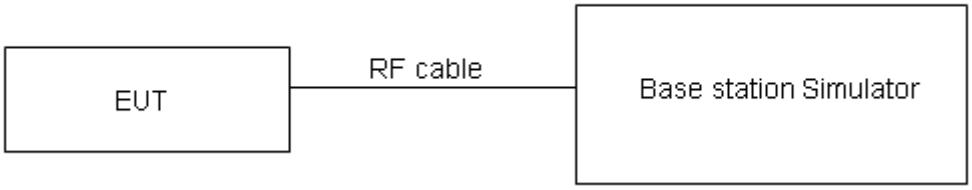
Ambient condition

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.

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Test Results

GSM 1900		Conducted Power(dBm)		
		Channel 512	Channel 661	Channel 810
		1850.2(MHz)	1880(MHz)	1909.8(MHz)
GSM	Results	30.52	30.33	30.20
GPRS (GMSK)	1TXslot	30.48	30.37	30.12
	2TXslots	29.02	28.87	28.71
	3TXslots	27.96	27.74	27.53
	4TXslots	27.78	27.55	27.38
EGPRS (8PSK)	1TXslot	26.39	26.23	25.91
	2TXslots	25.50	25.43	25.10
	3TXslots	24.41	24.30	24.07
	4TXslots	22.38	22.10	22.06

WCDMA Band II		Conducted Power(dBm)		
		Channel 9262	Channel 9400	Channel 9538
		1852.4(MHz)	1880(MHz)	1907.6(MHz)
RMC		22.64	22.55	22.69
HSDPA	Sub - Test 1	22.47	22.38	22.52
	Sub - Test 2	22.55	22.46	22.60
	Sub - Test 3	22.04	21.95	22.09
	Sub - Test 4	22.03	21.94	22.08
HSUPA	Sub - Test 1	22.52	22.43	22.57
	Sub - Test 2	20.71	20.62	20.76
	Sub - Test 3	21.44	21.35	21.65
	Sub - Test 4	20.66	20.57	20.74
	Sub - Test 5	22.58	22.49	22.63
DC-HSDPA	Sub - Test 1	22.57	22.44	22.58
	Sub - Test 2	22.56	22.43	22.57
	Sub - Test 3	22.05	21.92	22.06
	Sub - Test 4	22.04	22.01	22.04

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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	22.91	23.26	23.20
		1	2	23.06	23.19	23.36
		1	5	22.86	23.23	23.02
		3	0	23.02	23.18	23.34
		3	2	23.12	23.25	23.30
		3	3	23.01	23.21	23.23
		6	0	22.17	22.24	22.39
	16QAM	1	0	22.39	22.65	22.82
		1	2	22.56	22.77	22.87
		1	5	22.50	22.63	22.62
		3	0	22.50	22.48	22.56
		3	2	22.43	22.51	22.60
		3	3	22.37	22.45	22.45
		6	0	21.34	21.24	21.44
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18615/1851.5	18900/1880	19185/1908.5
3MHz	QPSK	1	0	22.90	23.17	22.95
		1	7	23.32	23.05	23.00
		1	14	23.27	22.97	22.95
		8	0	21.94	21.98	22.00
		8	4	21.95	21.90	21.98
		8	7	22.02	21.83	22.01
		15	0	22.06	21.90	21.99
	16QAM	1	0	22.09	22.75	22.96
		1	7	22.11	22.61	22.89
		1	14	22.04	22.34	22.73
		8	0	21.06	21.22	20.96
		8	4	21.09	21.15	21.09
		8	7	21.08	21.05	20.99
		15	0	21.02	21.01	21.01
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18625/1852.5	18900/1880	19175/1907.5
5MHz	QPSK	1	0	22.87	23.15	22.91
		1	13	23.30	23.01	22.97
		1	24	23.24	22.92	22.91
		12	0	21.91	21.93	21.96

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		12	6	21.93	21.86	21.93
		12	13	22.00	21.81	21.97
		25	0	22.04	21.89	21.97
	16QAM	1	0	22.06	22.71	22.93
		1	13	22.08	22.59	22.86
		1	24	22.01	22.32	22.69
		12	0	21.04	21.18	20.93
		12	6	21.06	21.10	21.05
		12	13	21.05	21.00	20.95
		25	0	21.00	20.97	20.96
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18650/1855	18900/1880	19150/1905
10MHz	QPSK	1	0	22.89	23.16	22.94
		1	25	23.33	23.06	23.01
		1	49	23.26	22.96	22.94
		25	0	21.94	21.98	22.00
		25	13	21.96	21.91	21.97
		25	25	22.02	21.85	22.02
		50	0	22.12	21.91	22.01
	16QAM	1	0	22.08	22.74	22.95
		1	25	22.11	22.63	22.89
		1	49	22.04	22.34	22.72
		25	0	21.07	21.23	20.97
		25	13	21.08	21.14	21.08
		25	25	21.08	21.05	20.99
		50	0	21.03	21.02	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18675/1857.5	18900/1880	19125/1902.5
15MHz	QPSK	1	0	22.88	23.12	22.92
		1	38	23.31	23.05	22.98
		1	74	23.23	22.91	22.90
		36	0	21.92	21.94	21.97
		36	18	21.93	21.86	21.93
		36	39	21.99	21.82	21.98
		75	0	22.10	21.87	21.96
	16QAM	1	0	22.03	22.72	22.93
		1	38	22.09	22.60	22.87
		1	74	22.01	22.30	22.69
		36	0	21.04	21.21	20.94
		36	18	21.05	21.09	21.04

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		36	39	21.06	21.01	20.96
		75	0	21.00	20.97	20.96
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18700/1860	18900/1880	19100/1900
20MHz	QPSK	1	0	22.85	23.08	22.89
		1	50	23.30	23.01	22.96
		1	99	23.21	22.90	22.87
		50	0	21.89	21.89	21.93
		50	25	21.91	21.82	21.90
		50	50	21.96	21.77	21.94
		100	0	22.07	21.82	21.92
	16QAM	1	0	22.01	22.68	22.88
		1	50	22.05	22.58	22.83
		1	99	21.99	22.27	22.67
		50	0	21.01	21.17	20.91
		50	25	21.02	21.07	21.01
		50	50	21.03	20.96	20.92
		100	0	20.98	20.93	20.93

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5.2. Effective Isotropic Radiated Power

Ambient condition

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

Methods of Measurement

1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI/TIA-603-D-2010.

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.LOSS = Generator Output Power (dBm) – 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:ERP (dBm) = LVL (dBm) + 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:
ERP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBd)
where:dBd refers to gain relative to an ideal dipole.
EIRP (dBm) = ERP (dBm) + 2.15 (dB.)

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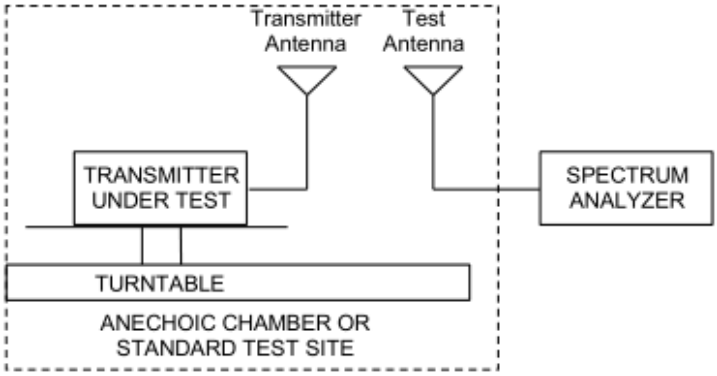
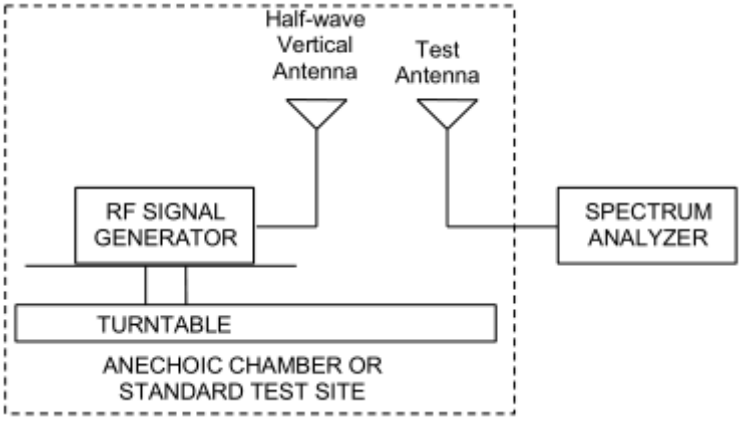
Test setup





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 (EIRP)	⩽ 2 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 dB

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Test Results:

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

Mode	Antenna Polarization	Frequency (MHz)	Output Power (dBm)	Losses (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Conclusion
GSM 1900	Horizontal	1850.2	-24.46	-53.21	1.92	30.67	33	Pass
	Horizontal	1880	-25.08	-53.42	1.94	30.28	33	Pass
	Horizontal	1909.8	-25.25	-53.67	1.90	30.32	33	Pass
GPRS 1900	Horizontal	1850.2	-24.99	-53.21	1.92	30.14	33	Pass
	Horizontal	1880	-25.04	-53.42	1.94	30.32	33	Pass
	Horizontal	1909.8	-24.57	-53.67	1.90	31.00	33	Pass
EGPRS 1900	Horizontal	1850.2	-24.21	-53.21	1.92	30.92	33	Pass
	Horizontal	1880	-25.26	-53.42	1.94	30.10	33	Pass
	Horizontal	1909.8	-24.78	-53.67	1.90	30.78	33	Pass
WCDMA Band II	Horizontal	1852.4	-32.37	-53.19	1.92	22.74	33	Pass
	Horizontal	1880	-32.58	-53.42	1.94	22.78	33	Pass
	Horizontal	1907.6	-32.61	-53.66	1.92	22.96	33	Pass
Note: The worst emission was found in the antenna is Horizontal position.								

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LTE Band 2								
bandwidth	Antenna Polarization	Frequency (MHz)	Output Power (dBm)	Losses (dB)	Antenna Gain (dBd)	EIRP (dBm)	Limit (dBm)	Conclusion
1.4 MHz (QPSK)	Horizontal	1850.7	-32.71	-54.89	1.90	24.08	33	Pass
	Horizontal	1880	-34.90	-56.66	1.92	23.68	33	Pass
	Horizontal	1909.3	-36.71	-58.09	1.91	23.28	33	Pass
3 MHz (QPSK)	Horizontal	1851.5	-32.79	-54.93	1.91	24.04	33	Pass
	Horizontal	1880	-34.75	-56.66	1.94	23.85	33	Pass
	Horizontal	1908.5	-36.72	-58.08	1.91	23.27	33	Pass
5 MHz (QPSK)	Horizontal	1852.5	-32.83	-55.14	1.92	24.23	33	Pass
	Horizontal	1880	-34.44	-56.41	1.94	23.91	33	Pass
	Horizontal	1907.5	-36.47	-57.97	1.90	23.40	33	Pass
10 MHz (QPSK)	Horizontal	1855	-32.91	-55.09	1.91	24.09	33	Pass
	Horizontal	1880	-34.84	-56.66	1.94	23.76	33	Pass
	Horizontal	1905	-36.68	-58.01	1.92	23.26	33	Pass
15 MHz (QPSK)	Horizontal	1857.5	-33.34	-55.24	1.93	23.83	33	Pass
	Horizontal	1880	-34.92	-56.41	1.94	23.43	33	Pass
	Horizontal	1902.5	-36.57	-57.69	1.92	23.04	33	Pass
20 MHz (QPSK)	Horizontal	1860	-33.49	-55.35	1.93	23.80	33	Pass
	Horizontal	1880	-35.00	-56.66	1.94	23.60	33	Pass
	Horizontal	1900	-36.76	-57.86	1.92	23.02	33	Pass
1.4 MHz (16QAM)	Horizontal	1850.7	-32.86	-54.89	1.90	23.93	33	Pass
	Horizontal	1880	-35.05	-56.66	1.92	23.53	33	Pass
	Horizontal	1909.3	-36.86	-58.09	1.91	23.14	33	Pass
3 MHz (16QAM)	Horizontal	1851.5	-32.94	-54.93	1.91	23.90	33	Pass
	Horizontal	1880	-34.90	-56.66	1.94	23.70	33	Pass
	Horizontal	1908.5	-36.87	-58.08	1.91	23.12	33	Pass
5 MHz (16QAM)	Horizontal	1852.5	-32.97	-55.14	1.92	24.09	33	Pass
	Horizontal	1880	-34.59	-56.41	1.94	23.76	33	Pass
	Horizontal	1907.5	-36.61	-57.97	1.90	23.26	33	Pass
10 MHz (16QAM)	Horizontal	1855	-33.06	-55.09	1.91	23.94	33	Pass
	Horizontal	1880	-34.99	-56.66	1.94	23.61	33	Pass
	Horizontal	1905	-36.82	-58.01	1.92	23.11	33	Pass
15 MHz (16QAM)	Horizontal	1857.5	-33.48	-55.24	1.93	23.69	33	Pass
	Horizontal	1880	-35.06	-56.41	1.94	23.29	33	Pass
	Horizontal	1902.5	-36.72	-57.69	1.92	22.89	33	Pass
20 MHz (16QAM)	Horizontal	1860	-33.63	-55.35	1.93	23.65	33	Pass
	Horizontal	1880	-35.14	-56.66	1.94	23.46	33	Pass
	Horizontal	1900	-36.91	-57.86	1.92	22.88	33	Pass
Note: The worst emission was found in the antenna is Horizontal position.								

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5.3. Occupied Bandwidth

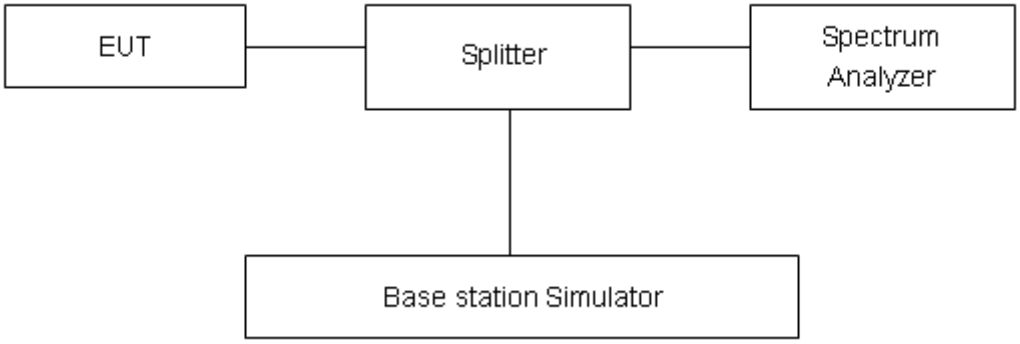
Ambient condition

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 3kHz, VBW is set to 10kHz for GSM 1900,
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 (1.4MHz),
RBW is set to 100kHz,VBW is set to 300kHz for LTE Band 2 (3MHz/5MHz),
RBW is set to 300kHz,VBW is set to 1MHz for LTE Band 2 (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= 624Hz.

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Test Result

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GSM 1900 (GSM)	512	1850.2	0.24602	0.3093
	661	1880.0	0.24435	0.3108
	810	1909.8	0.24204	0.3092
GPRS 1900 (GMSK)	512	1850.2	0.24753	0.3126
	661	1880.0	0.24582	0.3103
	810	1909.8	0.24683	0.3110
EGPRS 1900 (8-PSK)	512	1850.2	0.24327	0.3070
	661	1880.0	0.24296	0.3037
	810	1909.8	0.24499	0.3055
WCDMA Band II (RMC)	9662	1932.4	4.1243	4.692
	9800	1960.0	4.1220	4.677
	9938	1987.6	4.1299	4.684

LTE Band 2					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
QPSK	1.4	18607	1850.7	1.1275	1.363
		18900	1880.0	1.1241	1.346
		19193	1909.3	1.1395	1.366
	3	18615	1851.5	2.7492	3.056
		18900	1880.0	2.7441	3.064
		19185	1908.5	2.7431	3.078
	5	18625	1852.5	4.5155	5.009
		18900	1880.0	4.5071	5.028
		19175	1907.5	4.5233	5.072
	10	18650	1855.0	9.0400	10.11
		18900	1880.0	9.0305	10.02
		19150	1905.0	9.0407	10.07
	15	18675	1857.5	13.425	14.77

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		18900	1880.0	13.468	14.82
		19125	1902.5	13.421	14.71
	20	18700	1860.0	17.871	19.52
		18900	1880.0	17.854	19.24
		19100	1900.0	17.886	19.19
16QAM	1.4	18607	1850.7	1.1251	1.339
		18900	1880.0	1.1276	1.343
		19193	1909.3	1.1226	1.354
	3	18615	1851.5	2.7343	3.062
		18900	1880.0	2.7544	3.075
		19185	1908.5	2.7443	3.082
	5	18625	1852.5	4.526	5.072
		18900	1880.0	4.5174	5.059
		19175	1907.5	4.514	5.031
	10	18650	1855.0	9.0401	10.06
		18900	1880.0	9.0392	10.00
		19150	1905.0	9.0155	10.14
	15	18675	1857.5	13.459	14.74
		18900	1880.0	13.470	14.70
		19125	1902.5	13.431	14.74
	20	18700	1860.0	17.880	19.50
		18900	1880.0	17.917	19.37
		19100	1900.0	17.805	19.23

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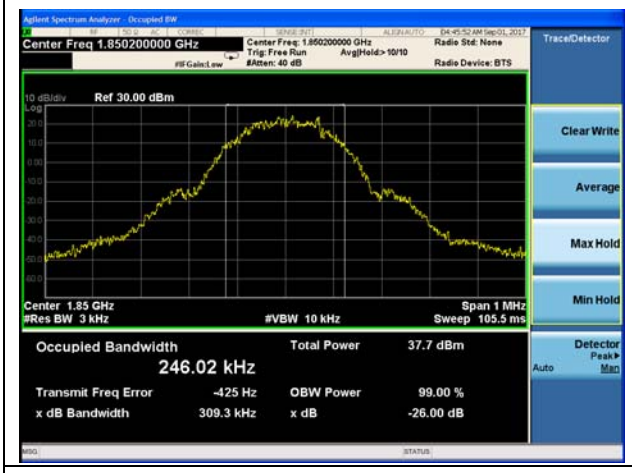
GSM1900 GSM CH-Low

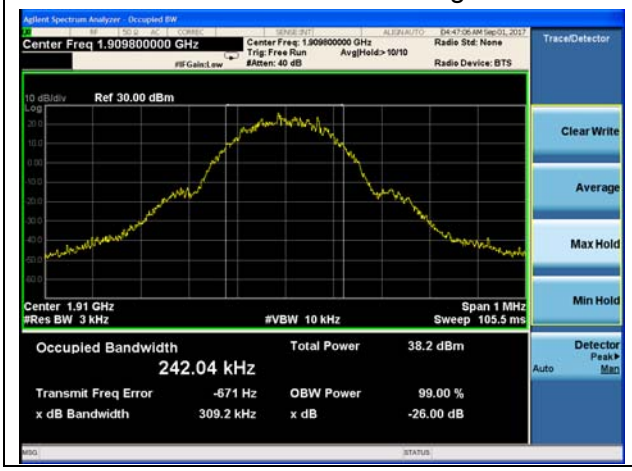


GSM1900 GPRS CH-Low

GSM 1900 GSM CH-Middle

GSM 1900 GPRS CH-Middle

GSM 1900 GSM CH-High



GSM 1900 GPRS CH-High

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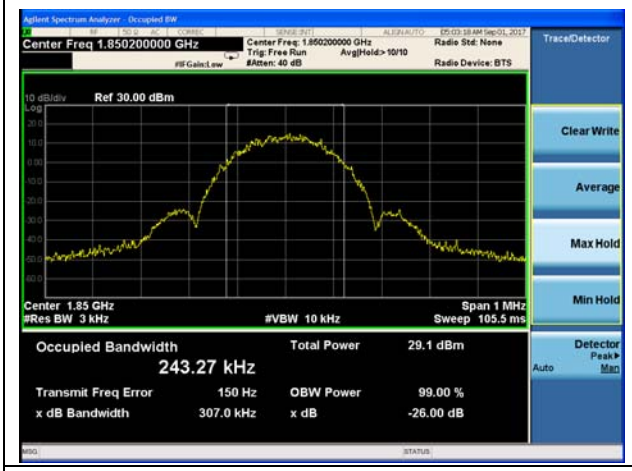
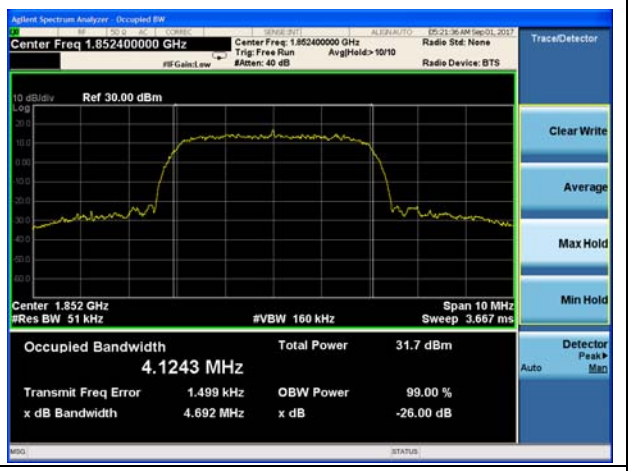
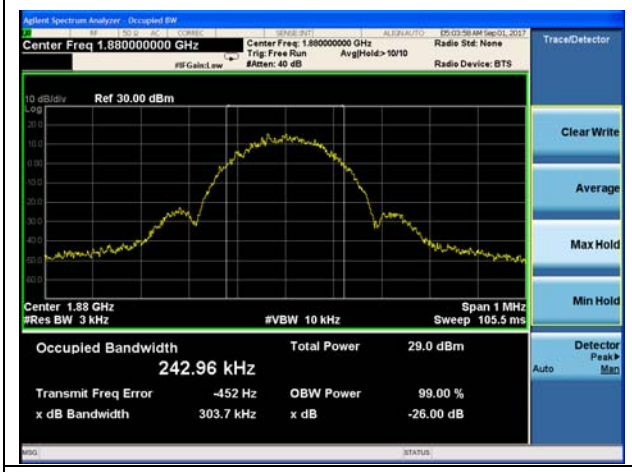
GSM1900 EGPRS CH-Low



WCDMA Band II RMC CH-LOW

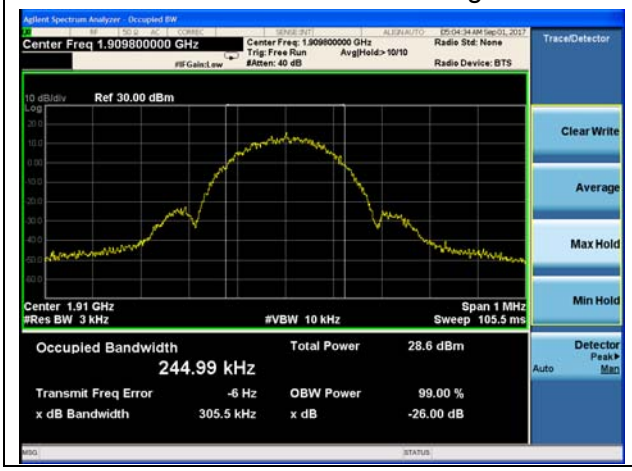


GSM 1900 EGPRS CH-Middle



WCDMA Band II RMC CH-Middle

GSM 1900 EGPRS CH-High



WCDMA Band II RMC CH-High

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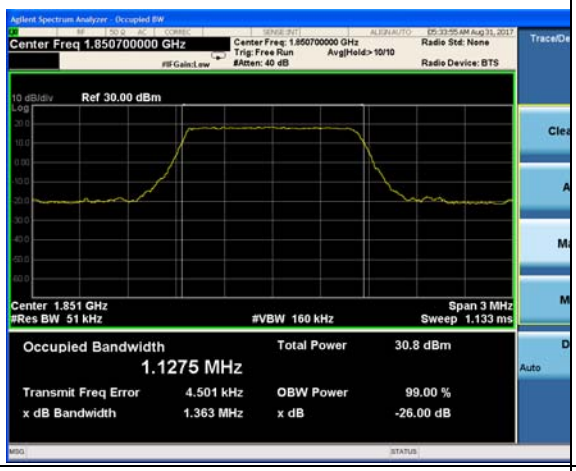
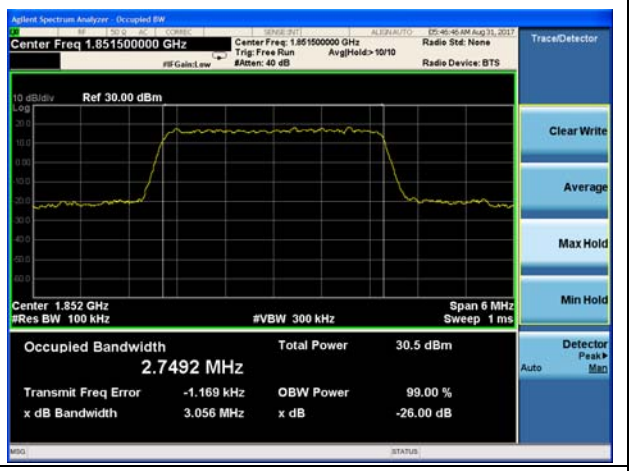
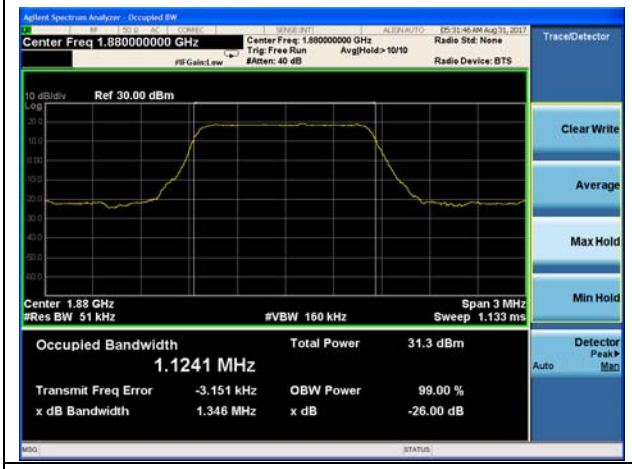
LTE Band 2 1.4MHz QPSK CH-Low



LTE Band 2 3MHz QPSK CH-Low

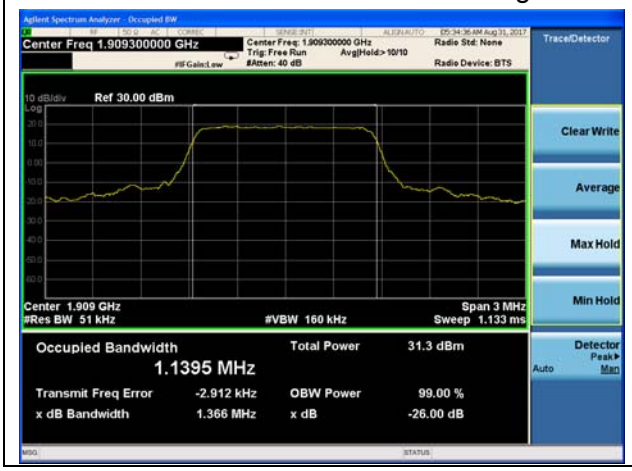


LTE Band 2 1.4MHz QPSK CH-Middle

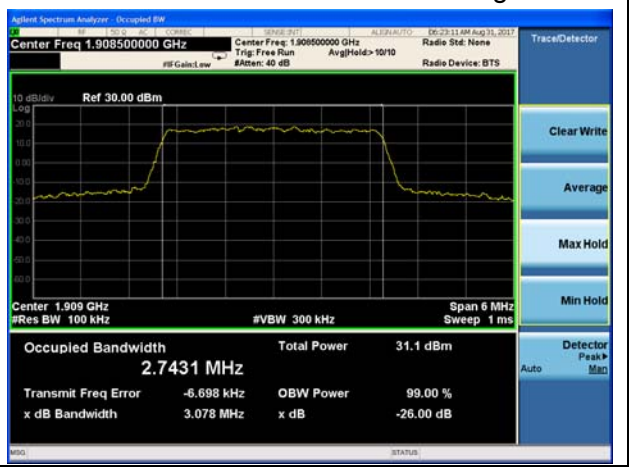


LTE Band 2 3MHz QPSK CH-Middle

LTE Band 2 1.4MHz QPSK CH-High



LTE Band 2 3MHz QPSK CH-High



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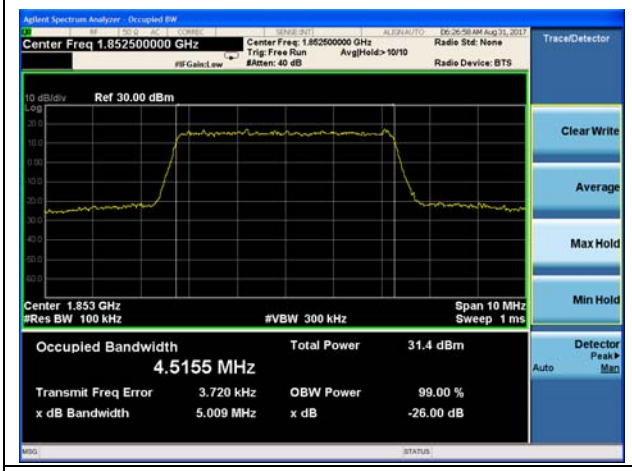
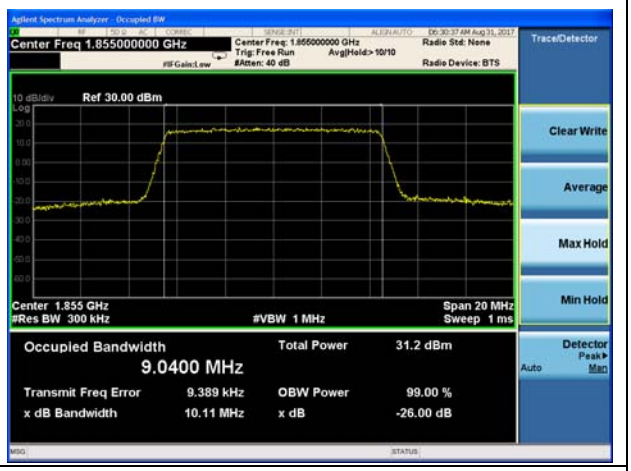
LTE Band 2 5MHz QPSK CH-Low



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

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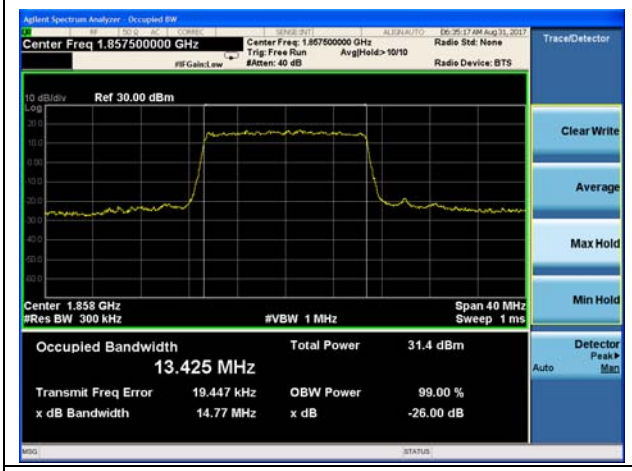
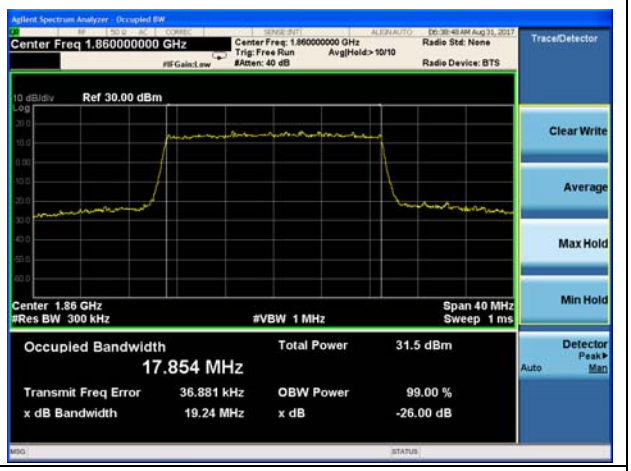
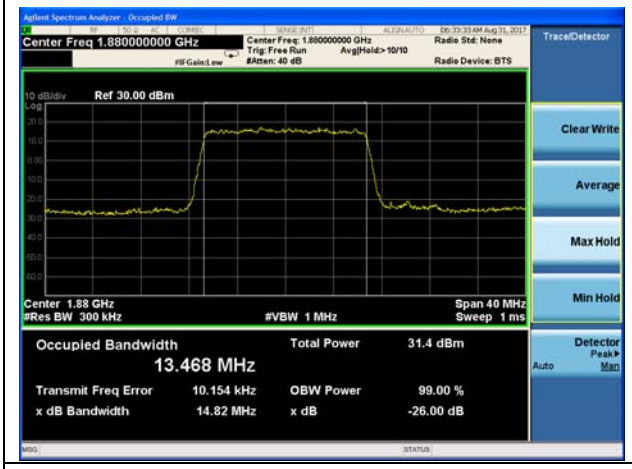
LTE Band 2 15MHz QPSK CH-Low



LTE Band 2 20MHz QPSK CH-Low

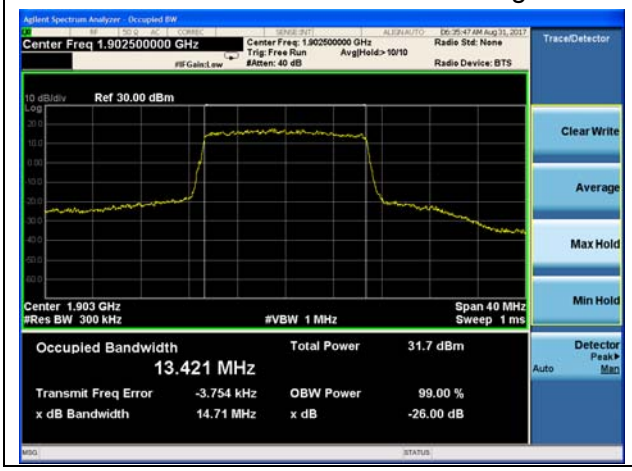


LTE Band 2 15MHz QPSK CH-Middle



LTE Band 2 20MHz QPSK CH-Middle

LTE Band 2 15MHz QPSK CH-High



LTE Band 2 20MHz QPSK CH-High

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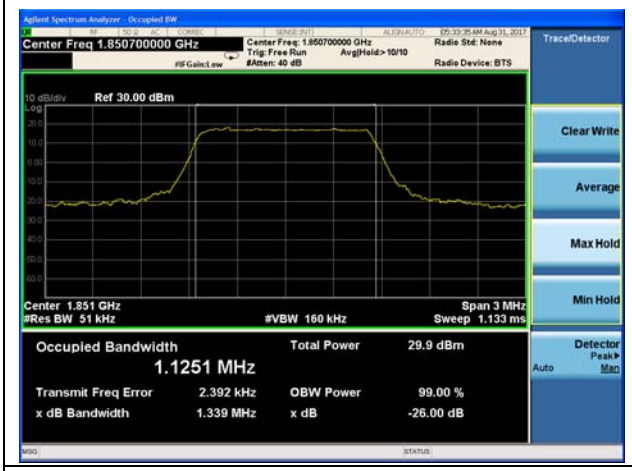
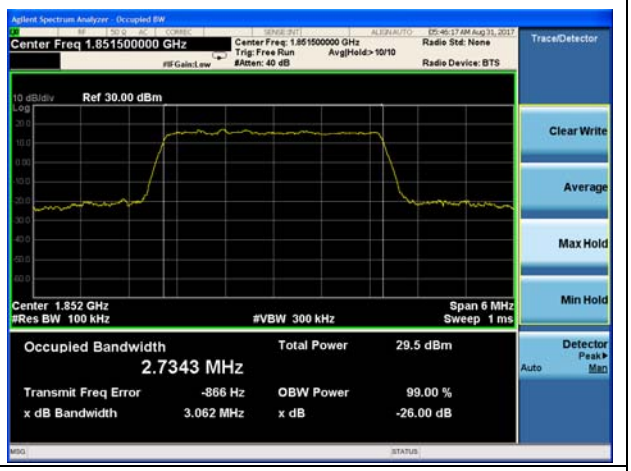
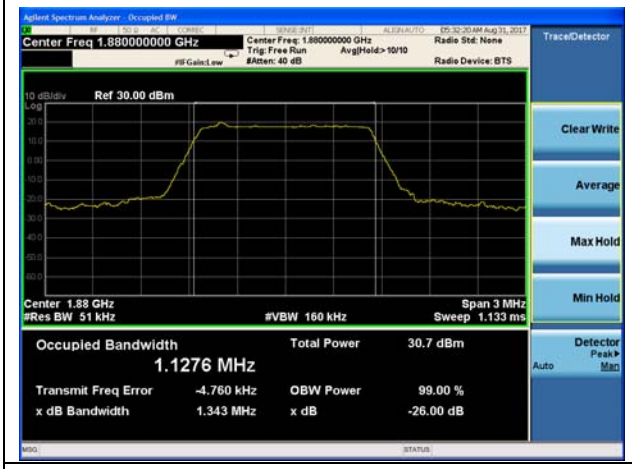
LTE Band 2 1.4MHz 16QAM CH-Low



LTE Band 2 3MHz 16QAM CH-Low

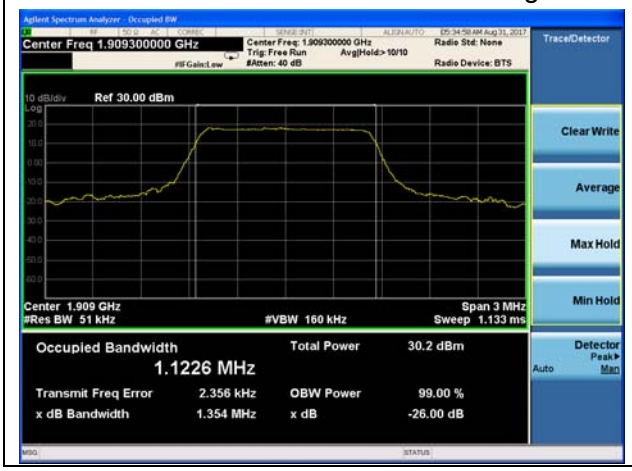


LTE Band 2 1.4MHz 16QAM CH-Middle

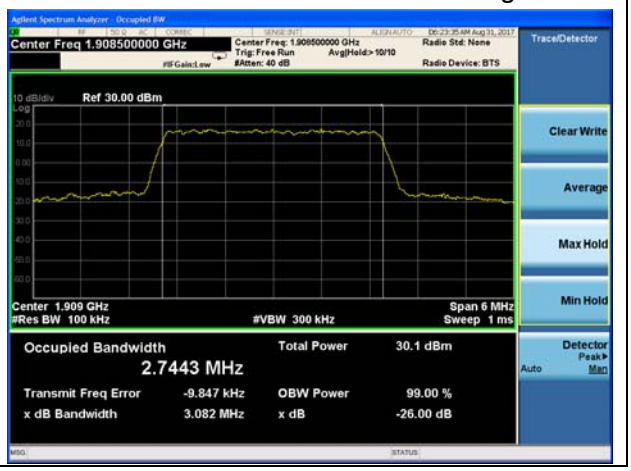


LTE Band 2 3MHz 16QAM CH-Middle

LTE Band 2 1.4MHz 16QAM CH-High



LTE Band 2 3MHz 16QAM CH-High



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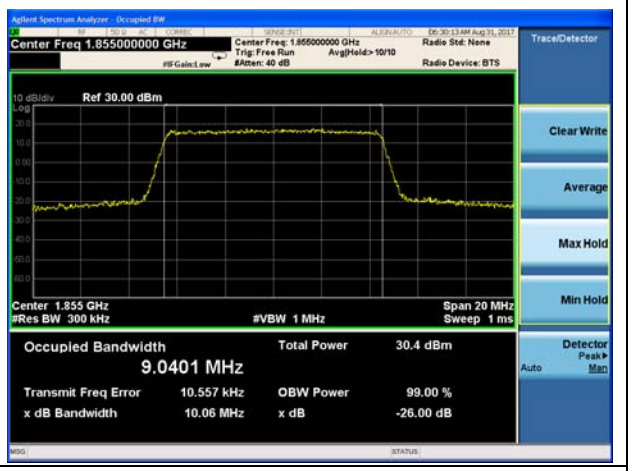
LTE Band 2 5MHz 16QAM CH-Low

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

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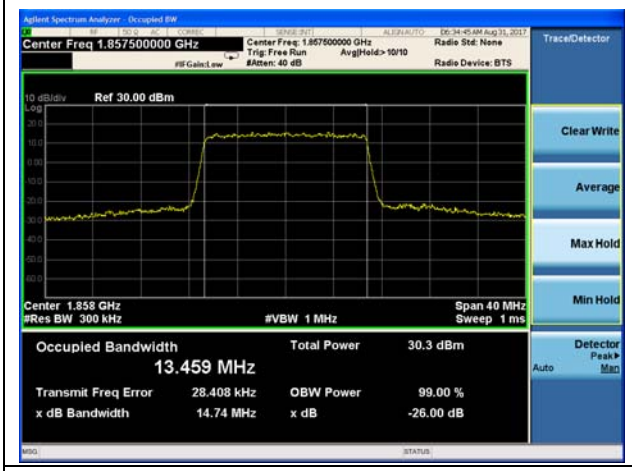
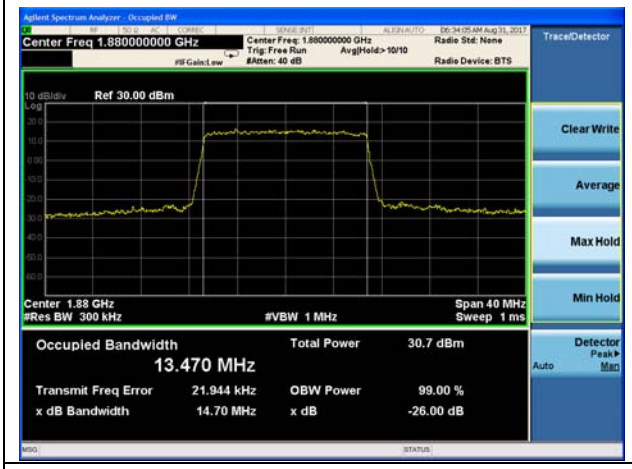
LTE Band 2 15MHz 16QAM CH-Low

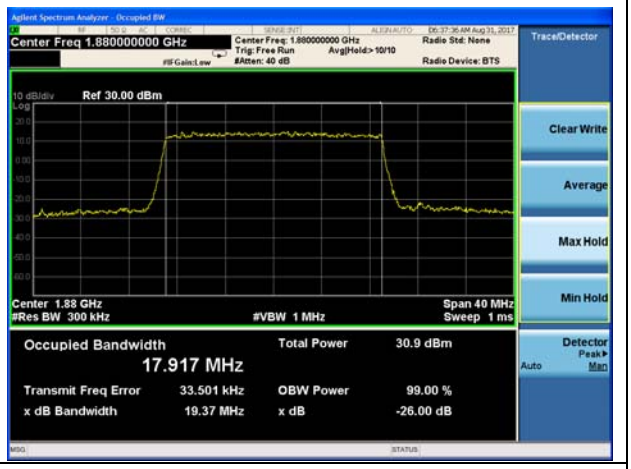


LTE Band 2 20MHz 16QAM CH-Low

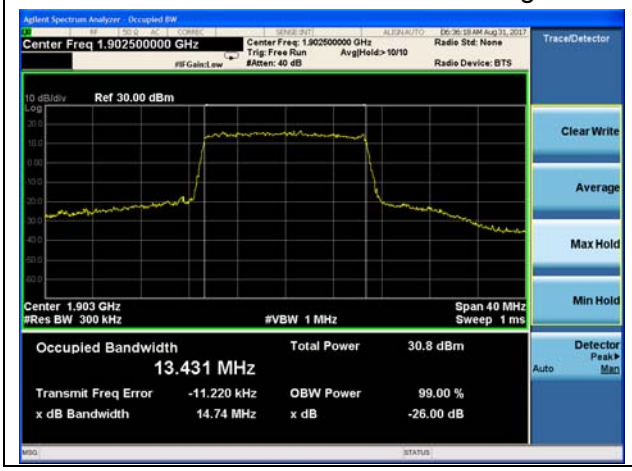
LTE Band 2 15MHz 16QAM CH-Middle



LTE Band 2 20MHz 16QAM CH-Middle



LTE Band 2 15MHz 16QAM CH-High



LTE Band 2 20MHz 16QAM CH-High

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5.4. Band Edge Compliance

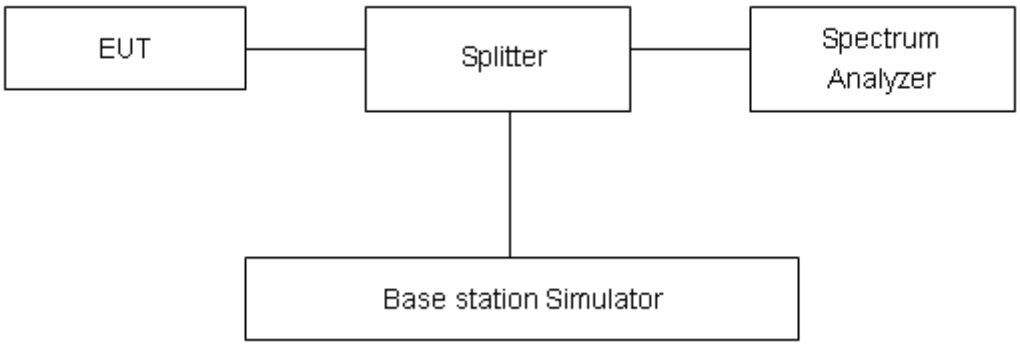
Ambient condition

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 3kHz, VBW is set to 10kHz for GSM 1900,
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 (1.4MHz),
RBW is set to 30kHz,VBW is set to 100kHz for LTE Band 2 (3MHz),
RBW is set to 51kHz,VBW is set to 160kHz for LTE Band 2 (5MHz),
RBW is set to 100kHz,VBW is set to 300kHz for LTE Band 2 (10MHz),
RBW is set to 150kHz,VBW is set to 510kHz for LTE Band 2 (15MHz),
RBW is set to 200kHz,VBW is set to 620kHz for LTE Band 2 (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 log10 (P) dB.”

Limit	-13 dBm

Measurement Uncertainty

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

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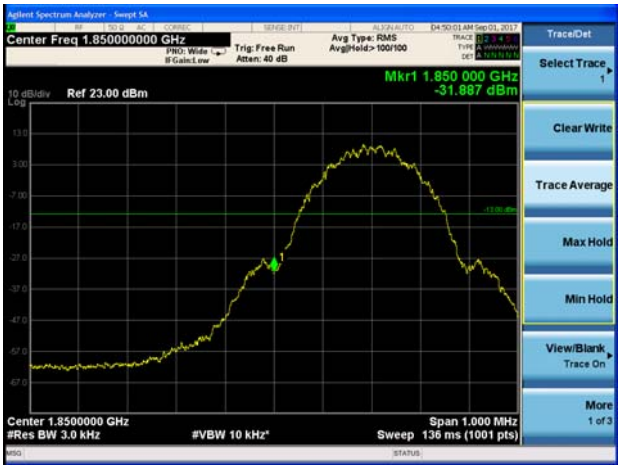
Test Result:

GSM1900 GSM CH-Low

GSM 1900 GSM CH-High

GSM1900 GPRS CH-Low



GSM 1900 GPRS CH-High

GSM1900 EGPRS CH-Low

GSM 1900 EGPRS CH-High

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WCDMA Band II RMC CH-Low	WCDMA Band II RMC CH-High

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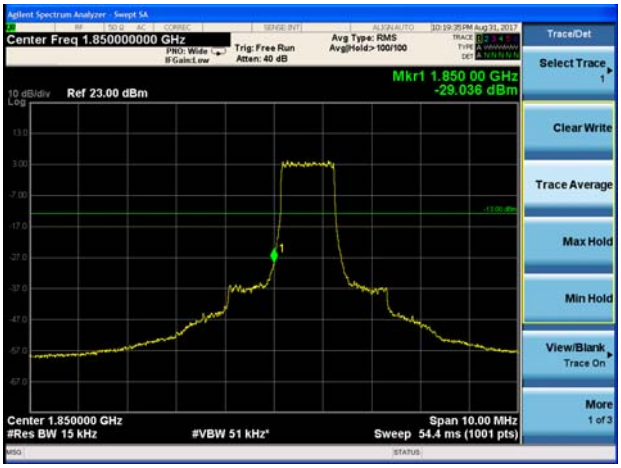
LTE Band 2 1.4MHz QPSK 1RB CH-Low

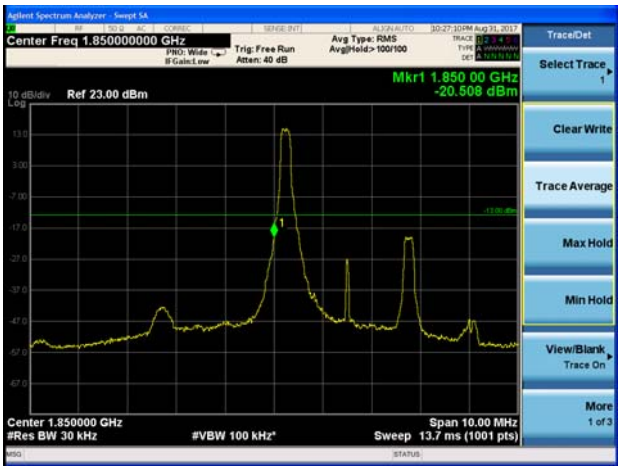
LTE Band 2 1.4MHz QPSK 1RB CH-High

LTE Band 2 1.4MHz QPSK 100%RB CH-Low

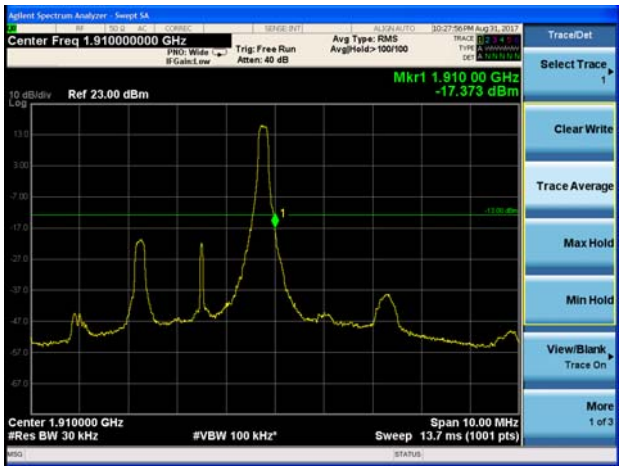


LTE Band 2 1.4MHz QPSK 100%RB CH-High

LTE Band 2 3MHz QPSK 1RB CH-Low



LTE Band 2 3MHz QPSK 1RB CH-High



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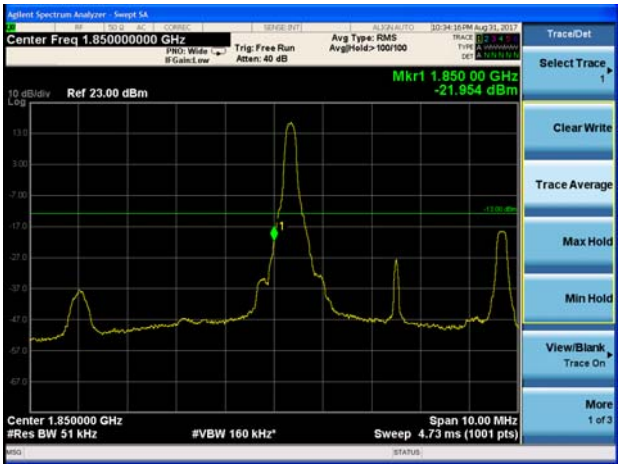
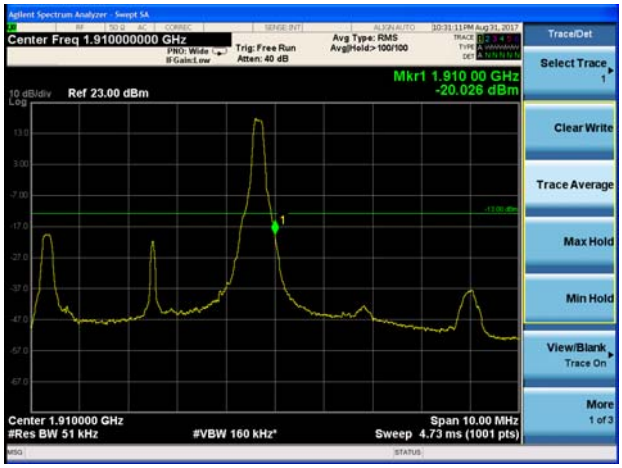
LTE Band 2 3MHz QPSK 100%RB CH-Low

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

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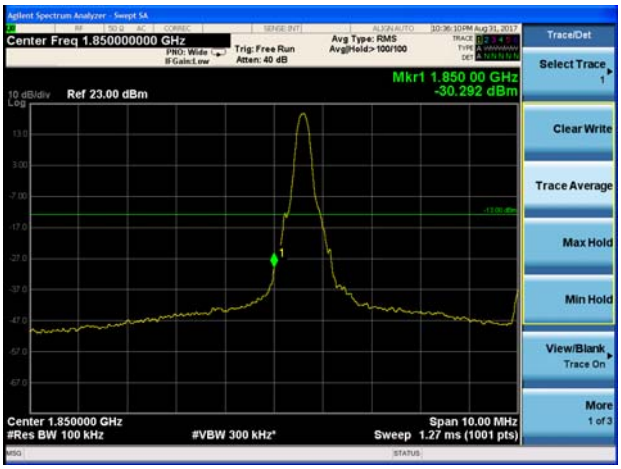
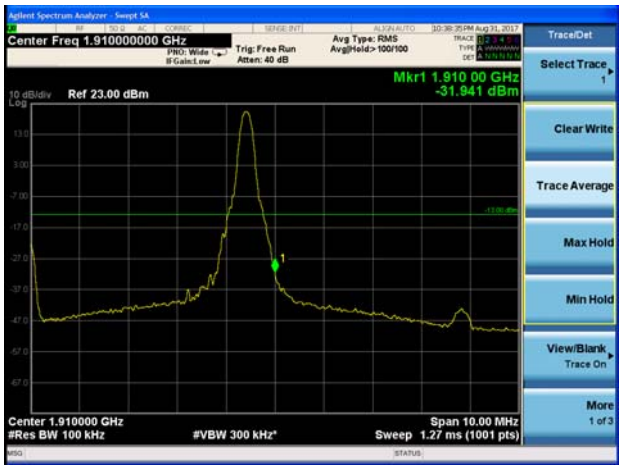
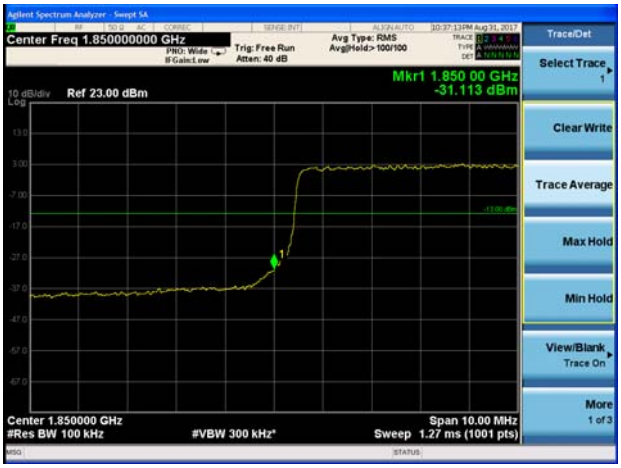
LTE Band 2 10MHz QPSK 1RB CH-Low



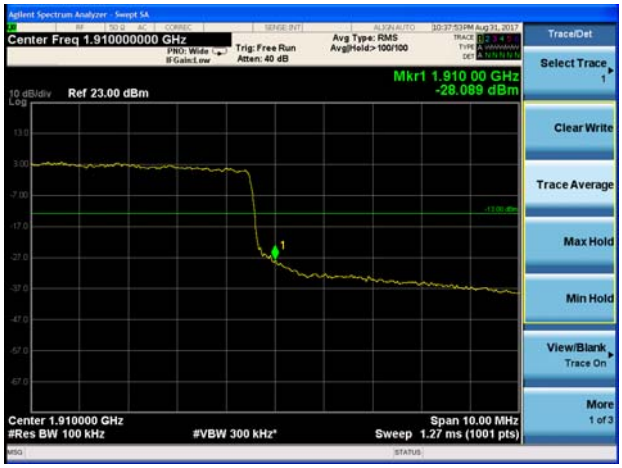
LTE Band 2 10MHz QPSK 1RB CH-High



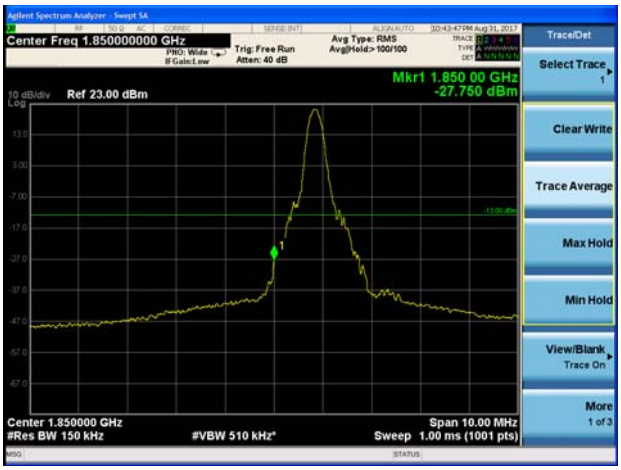
LTE Band 2 10MHz QPSK 100%RB CH-Low



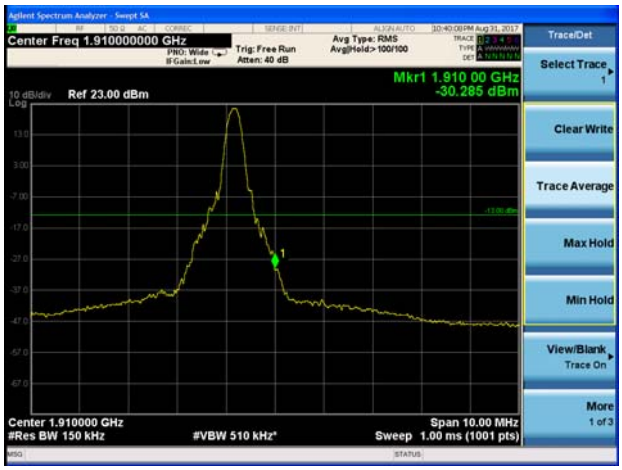
LTE Band 2 10MHz QPSK 100%RB CH-High



LTE Band 2 15MHz QPSK 1RB CH-Low



LTE Band 2 15MHz QPSK 1RB CH-High



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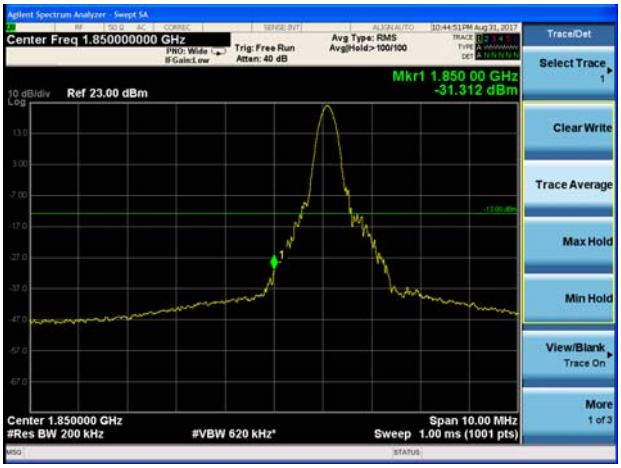
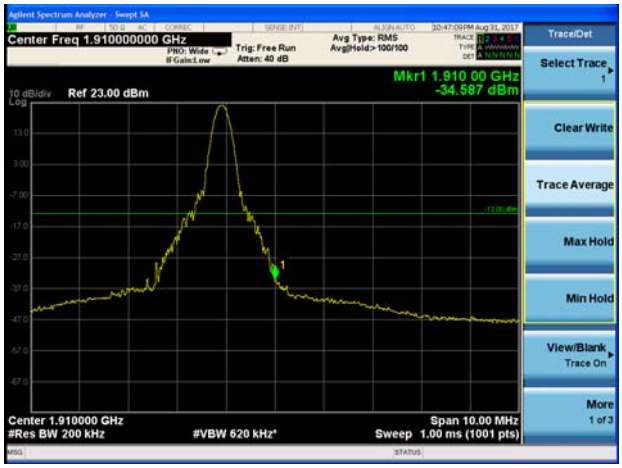
LTE Band 2 15MHz QPSK 100%RB CH-Low

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

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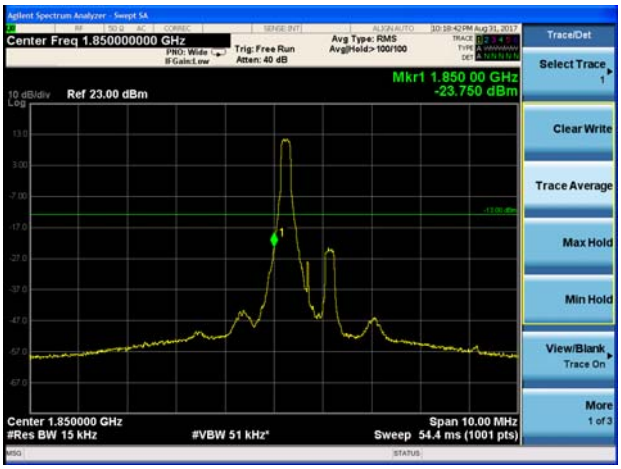
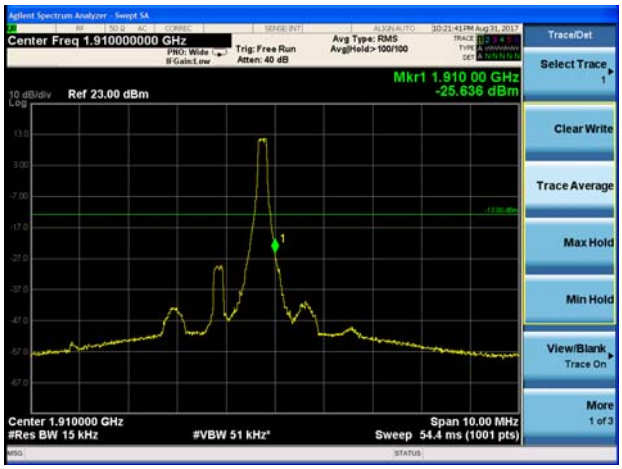
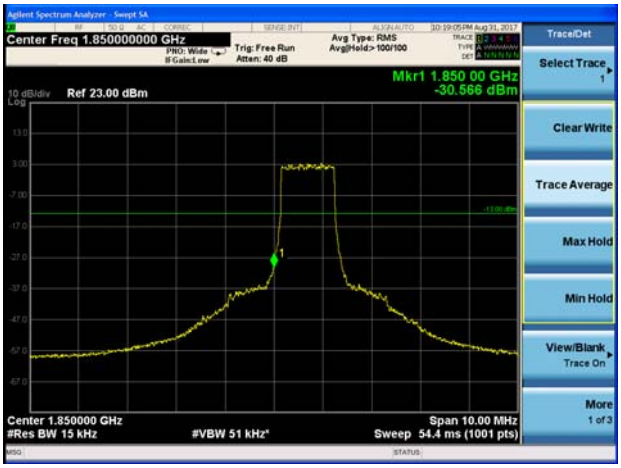
LTE Band 2 1.4MHz 16QAM 1RB CH-Low



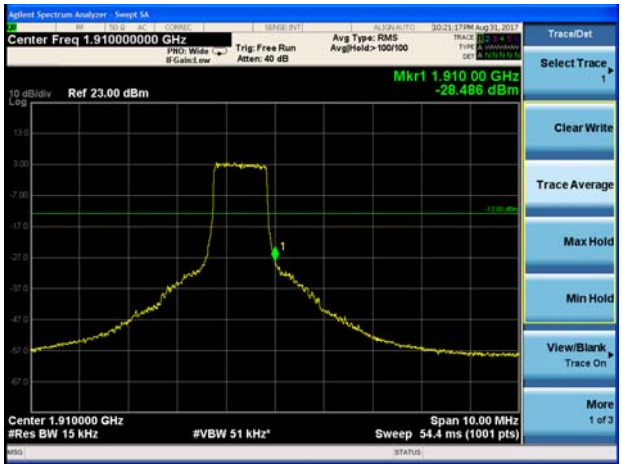
LTE Band 2 1.4MHz 16QAM 1RB CH-High



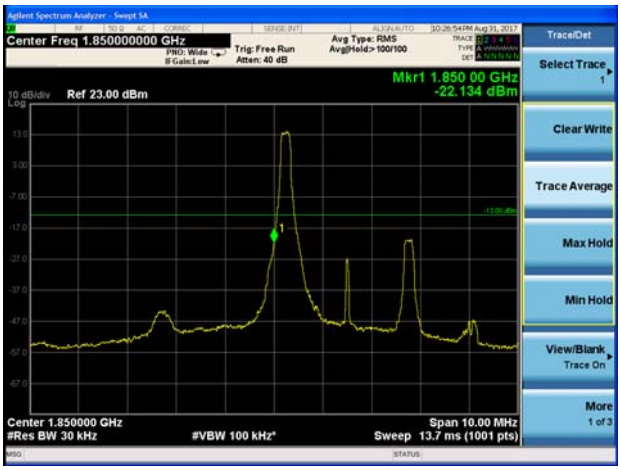
LTE Band 2 1.4MHz 16QAM 100%RB CH-Low



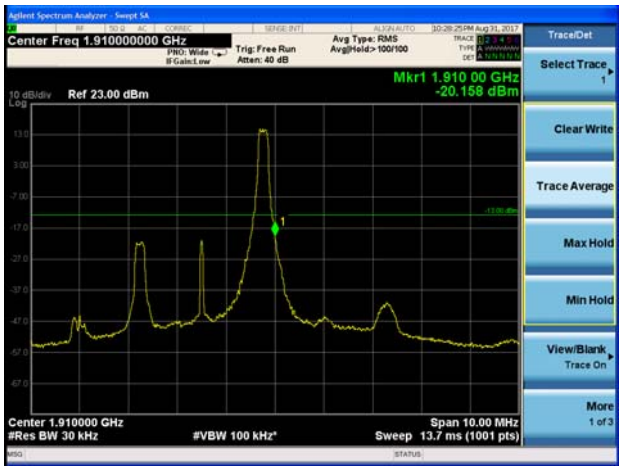
LTE Band 2 1.4MHz 16QAM 100%RB CH-High



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



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



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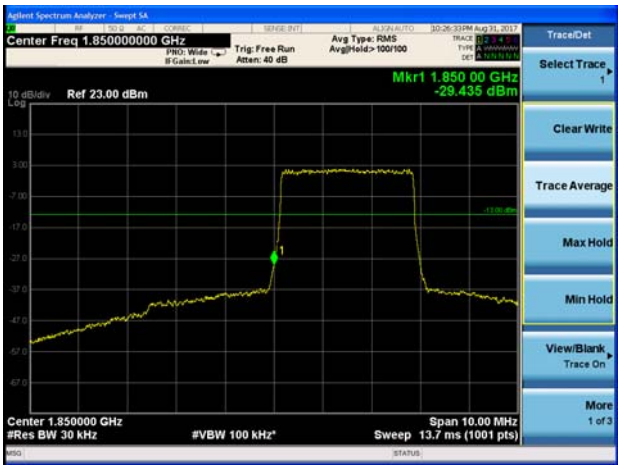
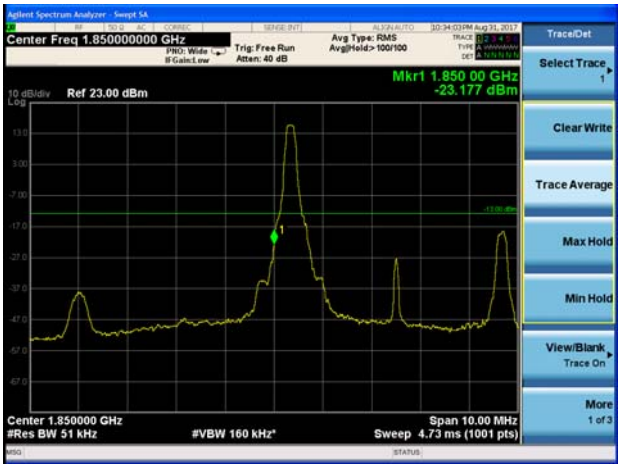
LTE Band 2 3MHz 16QAM 100%RB CH-Low

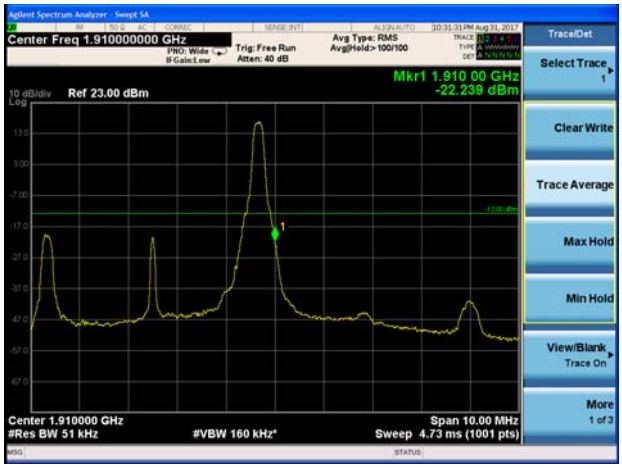


LTE Band 2 3MHz 16QAM 100%RB CH-High

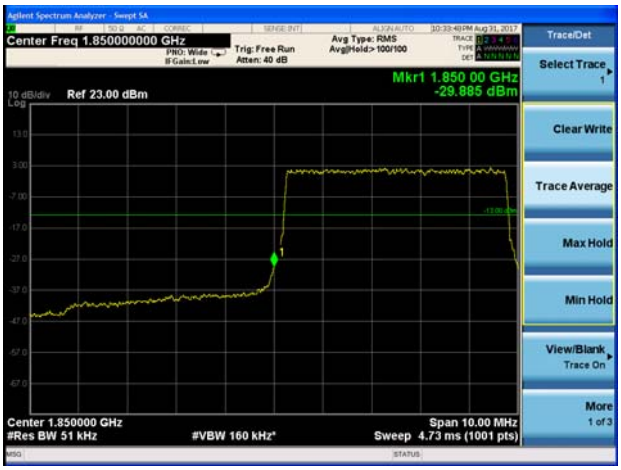
LTE Band 2 5MHz 16QAM 1RB CH-Low



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



LTE Band 2 5MHz 16QAM 100%RB CH-Low



LTE Band 2 5MHz 16QAM 100%RB CH-High

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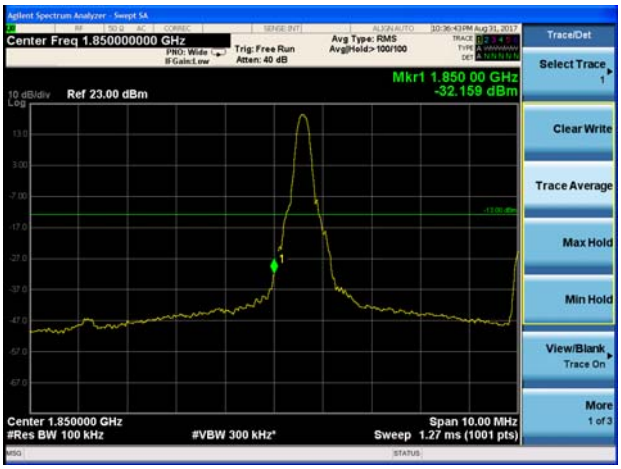
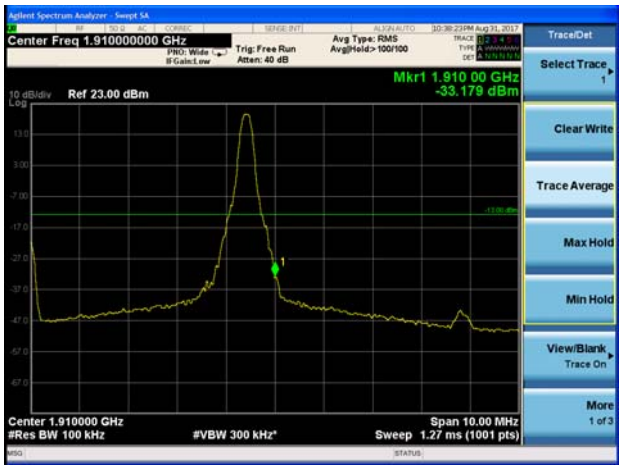
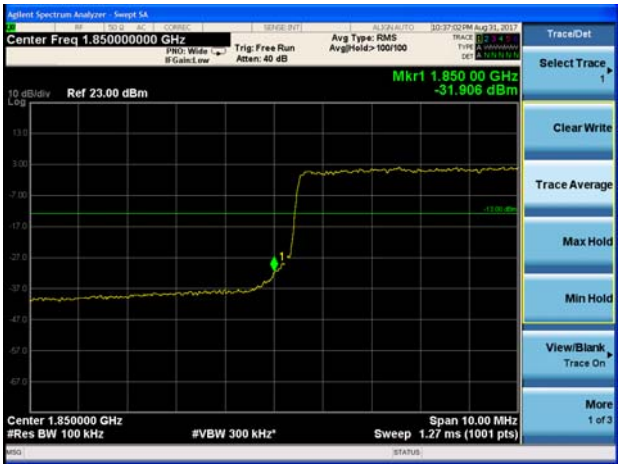
LTE Band 2 10MHz 16QAM 1RB CH-Low



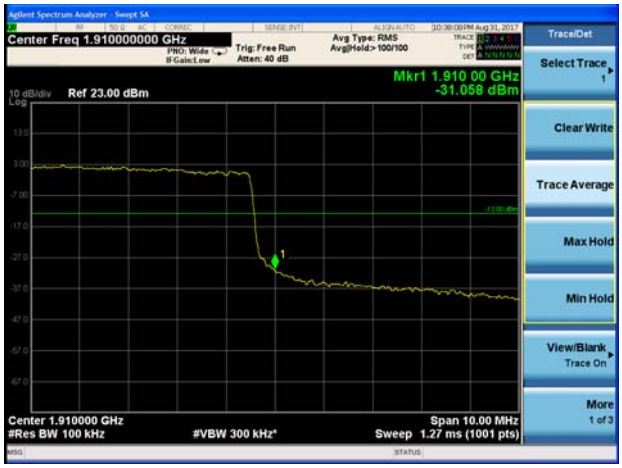
LTE Band 2 10MHz 16QAM 1RB CH-High



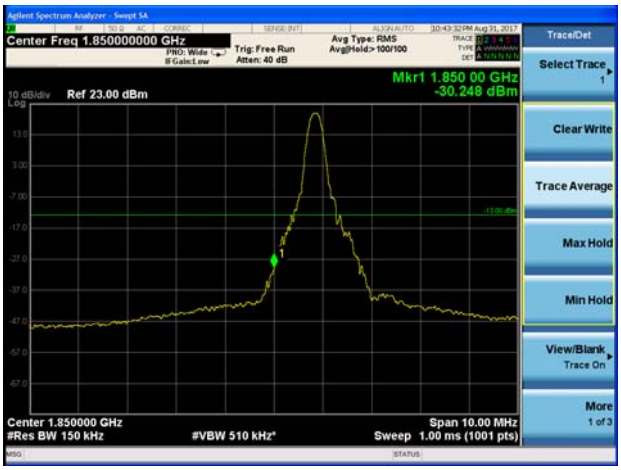
LTE Band 2 10MHz 16QAM 100%RB CH-Low



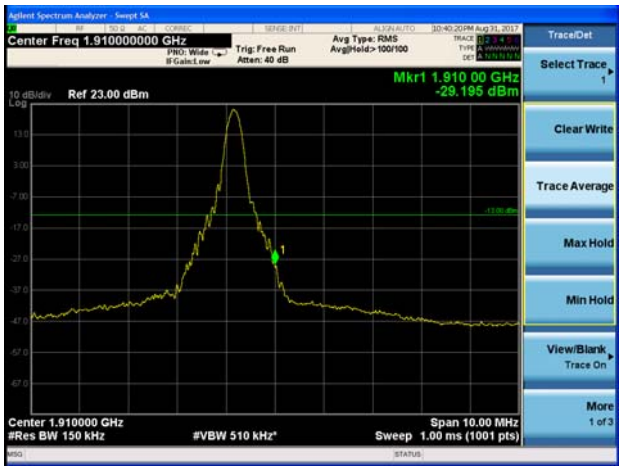
LTE Band 2 10MHz 16QAM 100%RB CH-High



LTE Band 2 15MHz 16QAM 1RB CH-Low



LTE Band 2 15MHz 16QAM 1RB CH-High



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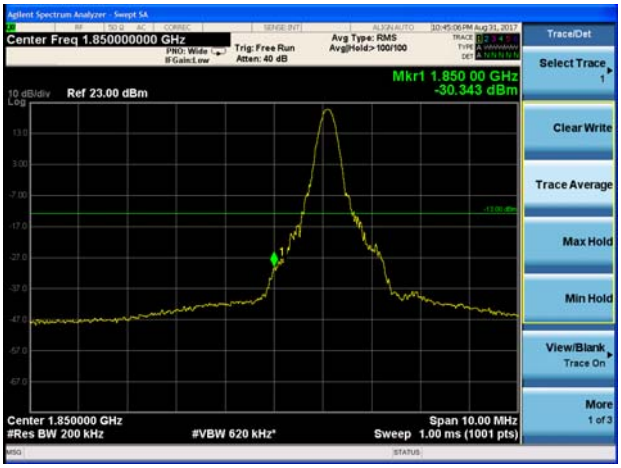
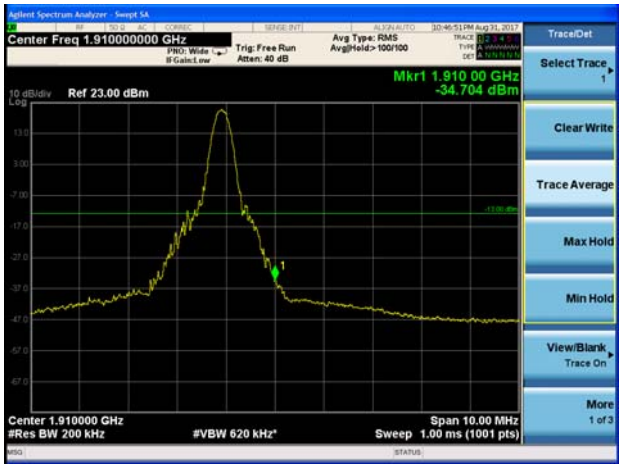
LTE Band 2 15MHz 16QAM 100%RB CH-Low

LTE Band 2 15MHz 16QAM 100%RB CH-High

LTE Band 2 20MHz 16QAM 1RB CH-Low



LTE Band 2 20MHz 16QAM 1RB CH-High



LTE Band 2 20MHz 16QAM 100%RB CH-Low

LTE Band 2 20MHz 16QAM 100%RB CH-High

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5.5. Peak-to-Average Power Ratio (PAPR)

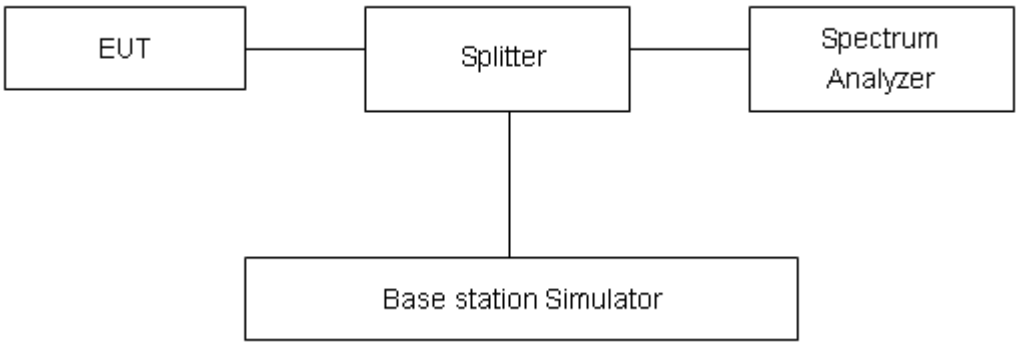
Ambient condition

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

Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (*e.g.*, dBm). Determine the PAPR from:
PAPR (dB) = PPk (dBm) - PAvg (dBm).

Test Setup



Limits

In measuring transmissions in this band using an average power technique, the peakto-average ratio (PAR) of the transmission may not exceed 13 dB in 24.232(d).

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.

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Test Results

Mode	Channel	Frequency (MHz)	Peak(dBm)	Avg(dBm)	PAPR(dB)	Limit(dB)	Conclusion
GSM 1900 (GSM)	512	1850.2	31.40	30.52	0.88	≤13	PASS
	661	1880	31.27	30.33	0.94	≤13	PASS
	810	1909.8	31.03	30.20	0.83	≤13	PASS
GPRS 1900 (GMSK)	512	1850.2	28.59	27.78	0.81	≤13	PASS
	661	1880	28.40	27.55	0.85	≤13	PASS
	810	1909.8	28.24	27.38	0.86	≤13	PASS
EGPRS 1900 (8-PSK)	512	1850.2	23.40	22.38	1.02	≤13	PASS
	661	1880	23.14	22.10	1.04	≤13	PASS
	810	1909.8	23.16	22.06	1.10	≤13	PASS
WCDMA Band II (RMC)	9262	1852.4	25.51	22.64	2.87	≤13	PASS
	9400	1880	25.56	22.55	3.01	≤13	PASS
	9538	1907.6	25.43	22.69	2.74	≤13	PASS

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LTE Band 2		Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit(dB)	Conclusion
Modulation	Bandwidth							
QPSK	1.4MHz	18607	1850.7	26.69	22.17	4.52	≤13	PASS
		18900	1880.0	26.88	22.24	4.64	≤13	PASS
		19193	1909.3	26.68	22.39	4.29	≤13	PASS
	3MHz	18615	1851.5	26.75	22.06	4.69	≤13	PASS
		18900	1880	26.72	21.90	4.82	≤13	PASS
		19185	1908.5	26.49	21.99	4.50	≤13	PASS
	5MHz	18625	1852.5	26.77	22.04	4.73	≤13	PASS
		18900	1880	26.75	21.89	4.86	≤13	PASS
		19175	1907.5	26.47	21.97	4.50	≤13	PASS
	10MHz	18650	1855	26.85	22.12	4.73	≤13	PASS
		18900	1880	26.74	21.91	4.83	≤13	PASS
		19150	1905	26.59	22.01	4.58	≤13	PASS
	15MHz	18675	1857.5	26.79	22.10	4.69	≤13	PASS
		18900	1880	26.75	21.87	4.88	≤13	PASS
		19125	1902.5	26.58	21.96	4.62	≤13	PASS
	20MHz	18700	1860	26.73	22.07	4.66	≤13	PASS
		18900	1880	26.63	21.82	4.81	≤13	PASS
		19100	1900	26.57	21.92	4.65	≤13	PASS
16QAM	1.4MHz	18607	1850.7	26.69	21.34	5.35	≤13	PASS
		18900	1880.0	26.69	21.24	5.45	≤13	PASS
		19193	1909.3	26.57	21.44	5.13	≤13	PASS
	3MHz	18615	1851.5	26.55	21.02	5.53	≤13	PASS
		18900	1880	26.65	21.01	5.64	≤13	PASS
		19185	1908.5	26.29	21.01	5.28	≤13	PASS
	5MHz	18625	1852.5	26.53	21.00	5.53	≤13	PASS
		18900	1880	26.58	20.97	5.61	≤13	PASS
		19175	1907.5	26.27	20.96	5.31	≤13	PASS
	10MHz	18650	1855	26.54	21.03	5.51	≤13	PASS
		18900	1880	26.65	21.02	5.63	≤13	PASS
		19150	1905	26.41	21.00	5.41	≤13	PASS
	15MHz	18675	1857.5	26.47	21.00	5.47	≤13	PASS
		18900	1880	26.59	20.97	5.62	≤13	PASS
		19125	1902.5	26.39	20.96	5.43	≤13	PASS
	20MHz	18700	1860	26.44	20.98	5.46	≤13	PASS
		18900	1880	26.53	20.93	5.60	≤13	PASS
		19100	1900	26.49	20.93	5.56	≤13	PASS

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5.6. Frequency Stability

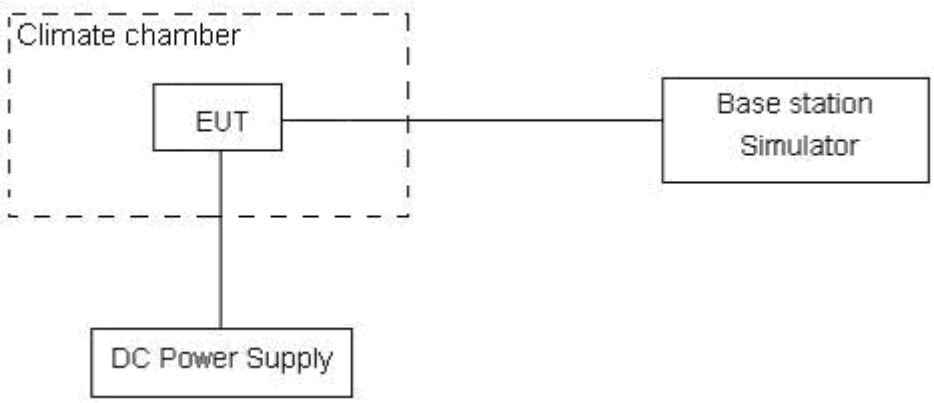
Ambient condition

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

Method of Measurement

1. Frequency Stability (Temperature Variation)
   The temperature inside the climate chamber is varied from -30°C to +55°C in 10°C step size,
   (1) With all power removed, the temperature was decreased to 0°C and permitted to stabilize for three hours.
   (2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.
   (3) Repeat the above measurements at 10°C increments from -30°C to +55°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.
2. Frequency Stability (Voltage Variation)
   The frequency stability shall be measured with variation of primary supply voltage as follows:
   (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
   (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.
   This transceiver is specified to operate with an input voltage of between 3.6 V and 4.4 V, with a nominal voltage of 3.85V.

Test setup



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Limits

No specific frequency stability requirements in part 24.235

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75％ confidence level for the normal distribution is with the coverage factor *k* = 3, U= 0.01ppm.

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Test Result

Mode	Test status	Test Results (ppm)		
		GSM(GMSK)	GPRS(GMSK)	EGPRS(8PSK)
GSM 1900 Middle Channel	-30°C/Normal Voltage	0.0075	0.0046	0.0051
	-20°C/Normal Voltage	-0.0034	0.0062	-0.0194
	-10°C/Normal Voltage	-0.0018	0.0046	0.0038
	0°C/Normal Voltage	-0.0035	0.0044	0.0053
	10°C/Normal Voltage	-0.0028	0.0025	0.0056
	20°C/Normal Voltage	-0.0045	0.0032	0.0053
	30°C/Normal Voltage	-0.0031	0.0052	0.0046
	40°C/Normal Voltage	-0.0054	0.0026	0.0068
	50°C/Normal Voltage	-0.0036	0.0037	0.0072
	55°C/Normal Voltage	-0.0026	0.0064	0.0053
	20°C/Min Voltage	-0.0048	0.0056	0.0056
	20°C/Max Voltage	-0.0035	0.0042	0.0047
/	/	RMC		
WCDMA Band II Middle Channel	-30°C/Normal Voltage	-0.000710		
	-20°C/Normal Voltage	0.000154		
	-10°C/Normal Voltage	-0.000625		
	0°C/Normal Voltage	-0.000004		
	10°C/Normal Voltage	-0.000067		
	20°C/Normal Voltage	-0.000340		
	30°C/Normal Voltage	-0.000135		
	40°C/Normal Voltage	-0.000274		
	50°C/Normal Voltage	-0.000467		
	55°C/Normal Voltage	0.000063		
	20°C/Min Voltage	-0.000559		
	20°C/Max Voltage	-0.000287		

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Bandwidth	Test status	LTE Band 2 Middle Channel Test Results (ppm)	
		QPSK	16QAM
1.4MHz	-30°C/Normal Voltage	-0.00182	-0.00134
	-20°C/Normal Voltage	-0.00360	-0.00272
	-10°C/Normal Voltage	-0.00223	-0.00197
	0°C/Normal Voltage	-0.00084	-0.00243
	10°C/Normal Voltage	-0.00147	-0.00329
	20°C/Normal Voltage	-0.00196	-0.00295
	30°C/Normal Voltage	-0.00219	-0.00036
	40°C/Normal Voltage	-0.00122	-0.00257
	50°C/Normal Voltage	-0.00450	-0.00219
	55°C/Normal Voltage	-0.00175	-0.00339
	20°C/Min Voltage	-0.00200	-0.00166
	20°C/Max Voltage	-0.00157	-0.00219
3MHz	-30°C/Normal Voltage	-0.00177	-0.00334
	-20°C/Normal Voltage	-0.00118	-0.00490
	-10°C/Normal Voltage	-0.00253	-0.00096
	0°C/Normal Voltage	-0.00003	-0.00191
	10°C/Normal Voltage	-0.00146	-0.00290
	20°C/Normal Voltage	-0.00170	-0.00229
	30°C/Normal Voltage	-0.00335	-0.00232
	40°C/Normal Voltage	-0.00322	-0.00238
	50°C/Normal Voltage	-0.00213	-0.00372
	55°C/Normal Voltage	-0.00139	-0.00170
	20°C/Min Voltage	-0.00295	-0.00230
	20°C/Max Voltage	-0.00091	-0.00273
5MHz	-30°C/Normal Voltage	-0.00441	-0.00268
	-20°C/Normal Voltage	-0.00387	-0.00361
	-10°C/Normal Voltage	-0.00144	-0.00222
	0°C/Normal Voltage	-0.00246	-0.00420
	10°C/Normal Voltage	-0.00165	-0.00296
	20°C/Normal Voltage	-0.00290	-0.00327
	30°C/Normal Voltage	-0.00386	-0.00107
	40°C/Normal Voltage	-0.00302	-0.00234
	50°C/Normal Voltage	-0.00353	-0.00097
	55°C/Normal Voltage	-0.00337	-0.00056
	20°C/Min Voltage	-0.00224	-0.00459
	20°C/Max Voltage	-0.00204	-0.00113

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10MHz	-30°C/Normal Voltage	-0.00198	-0.00384
	-20°C/Normal Voltage	-0.00150	-0.00245
	-10°C/Normal Voltage	-0.00191	-0.00372
	0°C/Normal Voltage	-0.00060	-0.00272
	10°C/Normal Voltage	0.00106	-0.00353
	20°C/Normal Voltage	-0.00134	-0.00288
	30°C/Normal Voltage	-0.00139	-0.00321
	40°C/Normal Voltage	-0.00215	-0.00224
	50°C/Normal Voltage	-0.00119	-0.00093
	55°C/Normal Voltage	-0.00211	-0.00132
	20°C/Min Voltage	-0.00122	-0.00239
	20°C/Max Voltage	-0.00220	-0.00279
15MHz	-30°C/Normal Voltage	-0.00170	-0.00203
	-20°C/Normal Voltage	-0.00082	-0.00036
	-10°C/Normal Voltage	-0.00279	-0.00196
	0°C/Normal Voltage	-0.00032	-0.00244
	10°C/Normal Voltage	-0.00099	-0.00239
	20°C/Normal Voltage	-0.00239	-0.00266
	30°C/Normal Voltage	-0.00186	-0.00207
	40°C/Normal Voltage	-0.00237	-0.00153
	50°C/Normal Voltage	-0.00446	-0.00083
	55°C/Normal Voltage	-0.00044	-0.00089
	20°C/Min Voltage	-0.00177	-0.00313
	20°C/Max Voltage	-0.00196	-0.00272
20MHz	-30°C/Normal Voltage	-0.00432	-0.00212
	-20°C/Normal Voltage	-0.00153	-0.00252
	-10°C/Normal Voltage	-0.00330	-0.00170
	0°C/Normal Voltage	-0.00147	-0.00189
	10°C/Normal Voltage	-0.00376	-0.00197
	20°C/Normal Voltage	-0.00195	-0.00202
	30°C/Normal Voltage	-0.00302	-0.00432
	40°C/Normal Voltage	-0.00486	-0.00338
	50°C/Normal Voltage	-0.00461	-0.00311
	55°C/Normal Voltage	-0.00126	-0.00170
	20°C/Min Voltage	-0.00217	-0.00253
	20°C/Max Voltage	-0.00247	-0.00294

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