



RF TEST REPORT

Applicant ZTE Corporation
FCC ID SRQ-ZTEBLADEA521
Product LTE/WCDMA/GSM(GPRS)
Multi-Mode Digital Mobile Phone
Model ZTE BLADE A521/BLADE A521
Report No. RXA1704-0112RF02
Issue Date May 9, 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 24H (2017)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Performed by: Xianqing Li

Approved by: Kai Xu

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000



TABLE OF CONTENT

1. Test Laboratory	4
1.1. Notes of the test report.....	4
1.2. Test facility.....	4
1.3. Testing Location	5
2. General Description of Equipment under Test.....	6
3. Applied Standards.....	8
4. Test Configuration.....	9
5. Test Case Results.....	11
5.1. RF Power Output.....	11
5.2. Effective Isotropic Radiated Power	16
5.3. Occupied Bandwidth	21
5.4. Band Edge Compliance.....	32
5.5. Peak-to-Average Power Ratio (PAPR)	42
5.6. Frequency Stability	45
5.7. Spurious Emissions at Antenna Terminals	49
5.8. Radiates Spurious Emission	61
6. Main Test Instruments	76
ANNEX A: EUT Appearance and Test Setup.....	77
A.1 EUT Appearance	77
A.2 Test Setup.....	79

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	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	24.238	PASS
5	Peak-to-Average Power Ratio	24.232(d)/ KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 24.235	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 24.238	PASS
8	Radiates Spurious Emission	2.1053 / 24.238	PASS
Date of Testing: April 11, 2017 ~ April 26, 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.			



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. This report must not be used by the client to claim product certification, approval, or endorsement by any government agencies.

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 (recognition number is 428261)

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-766)

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.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City: Shanghai
Post code: 201201
Country: P. R. China
Contact: Xu Kai
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
Website: <http://www.ta-shanghai.com>
E-mail: xukai@ta-shanghai.com



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

General information

EUT Description			
Model	ZTE BLADE A521/BLADE A521		
IMEI	863908030028104		
Hardware Version	csrB		
Software Version	ATT_MX_BA521_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		
Maximum E.I.R.P	GSM 1900:	28.94dBm	
	WCDMA Band II:	21.26dBm	
	LTE Band 2:	23.50dBm	
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
EUT Accessory			
Adapter	Manufacturer: SHENZHEN RUIJING INDUSTRIAL CO LTD Model: STC-A51A-Z Input power:100-240 VAC 50-60Hz 250mA Output power:5V DC 1000mA		
Battery	Manufacturer: Zhongshan Tianmao Battery Co., Ltd Model: Li3824T44P4h716043 Power Rating: DC 3.85V, 2400mAh, Li-ion		
Earphone	Manufacturer: Shen zhen FDC Electronic Co.,Ltd. Model: 500002134813		
USB Cable	97cm Cable, Shielded		
Note: The information of the EUT is declared by the manufacturer. Please refer to the specifications or user manual for details.			



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 24H (2017)

ANSI/TIA-603-D (2010)

KDB 971168 D01 Power Meas License Digital Systems v02r02

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, vertical 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 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(1Tx slot) EGPRS(1Tx slot)	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

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
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.													

5. Test Case Results

5.1.RF Power Output

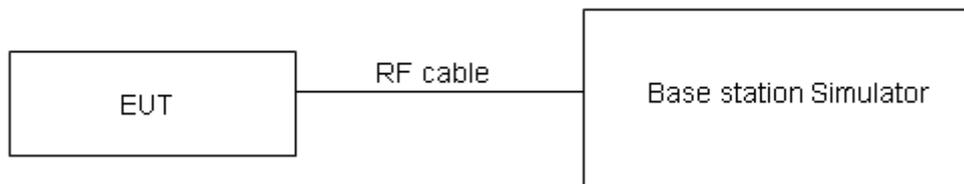
Ambient condition

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

GSM 1900		Conducted Power(dBm)		
		Channel 512	Channel 661	Channel 810
		1850.2(MHz)	1880(MHz)	1909.8(MHz)
GSM	Results	31.21	31.14	31.11
GPRS (GMSK)	1TXslot	30.84	30.79	30.75
	2TXslots	27.80	27.69	27.66
	3TXslots	25.75	25.74	25.73
	4TXslots	24.39	24.34	24.43
EGPRS (8PSK)	1TXslot	26.32	26.18	26.22
	2TXslots	24.34	24.20	24.08
	3TXslots	21.97	21.89	21.92
	4TXslots	19.86	19.81	19.67

WCDMA Band II		Conducted Power(dBm)		
		Channel 9262	Channel 9400	Channel 9538
		1852.4(MHz)	1880(MHz)	1907.6(MHz)
RMC		22.47	22.51	22.73
HSDPA	Sub - Test 1	22.30	22.34	22.56
	Sub - Test 2	22.38	22.42	22.64
	Sub - Test 3	21.87	21.91	22.13
	Sub - Test 4	21.86	21.90	22.12
HSUPA	Sub - Test 1	22.35	22.39	22.61
	Sub - Test 2	20.54	20.58	20.68
	Sub - Test 3	21.27	21.31	21.69
	Sub - Test 4	20.49	20.53	20.78
	Sub - Test 5	22.41	22.45	22.67
DC-HSDPA	Sub - Test 1	22.40	22.40	22.62
	Sub - Test 2	22.39	22.39	22.61
	Sub - Test 3	21.88	21.88	22.10
	Sub - Test 4	21.87	21.97	22.08



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	23.67	23.58	23.82
		1	2	23.58	23.55	23.70
		1	5	23.61	23.50	23.78
		3	0	23.26	23.30	23.37
		3	2	23.29	23.29	23.46
		3	3	23.31	23.23	23.34
		6	0	22.23	22.49	22.60
	16QAM	1	0	22.81	22.64	22.24
		1	2	22.48	22.63	22.75
		1	5	22.52	22.60	22.42
		3	0	22.29	22.11	22.26
		3	2	22.37	22.05	22.39
		3	3	22.30	22.16	22.26
		6	0	21.35	21.37	21.43
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18615/1851.5	18900/1880	19185/1908.5
3MHz	QPSK	1	0	23.69	23.62	23.85
		1	7	23.61	23.60	23.74
		1	14	23.64	23.55	23.82
		8	0	22.36	22.42	22.50
		8	4	22.41	22.39	22.58
		8	7	22.41	22.34	22.44
		15	0	22.26	22.53	22.63
	16QAM	1	0	22.84	22.66	22.27
		1	7	22.51	22.68	22.79
		1	14	22.54	22.64	22.45
		8	0	21.40	21.24	21.38
		8	4	21.48	21.18	21.51
		8	7	21.40	21.28	21.39
		15	0	21.38	21.41	21.46
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18625/1852.5	18900/1880	19175/1907.5
5MHz	QPSK	1	0	23.66	23.60	23.81
		1	13	23.59	23.56	23.71
		1	24	23.61	23.50	23.78
		12	0	22.33	22.37	22.46



	16QAM	12	6	22.39	22.35	22.53
		12	13	22.39	22.32	22.40
		25	0	22.24	22.52	22.61
		1	0	22.81	22.62	22.24
		1	13	22.48	22.66	22.76
		1	24	22.51	22.62	22.41
		12	0	21.38	21.20	21.35
		12	6	21.45	21.13	21.47
		12	13	21.37	21.23	21.35
		25	0	21.36	21.37	21.41
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18650/1855	18900/1880	19150/1905
10MHz	QPSK	1	0	23.70	23.61	23.85
		1	25	23.61	23.64	23.74
		1	49	23.62	23.50	23.80
		25	0	22.37	22.43	22.51
		25	13	22.41	22.39	22.56
		25	25	22.41	22.38	22.45
		50	0	22.33	22.55	22.64
	16QAM	1	0	22.80	22.67	22.29
		1	25	22.53	22.69	22.81
		1	49	22.53	22.63	22.43
		25	0	21.41	21.27	21.39
		25	13	21.47	21.14	21.49
		25	25	21.41	21.29	21.40
		50	0	21.38	21.41	21.44
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18675/1857.5	18900/1880	19125/1902.5
15MHz	QPSK	1	0	23.67	23.57	23.82
		1	38	23.60	23.60	23.72
		1	74	23.60	23.49	23.77
		36	0	22.34	22.38	22.47
		36	18	22.39	22.35	22.53
		36	39	22.38	22.33	22.41
		75	0	22.30	22.50	22.60
	16QAM	1	0	22.78	22.63	22.24
		1	38	22.49	22.67	22.77
		1	74	22.51	22.60	22.41
		36	0	21.38	21.23	21.36
		36	18	21.44	21.12	21.46



Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)		
				18700/1860	18900/1880	19100/1900
		36	39	21.38	21.24	21.36
		75	0	21.36	21.37	21.41
20MHz	QPSK	1	0	23.64	23.53	23.79
		1	50	23.59	23.56	23.70
		1	99	23.58	23.48	23.74
		50	0	22.31	22.33	22.43
		50	25	22.37	22.31	22.50
		50	50	22.35	22.28	22.37
		100	0	22.27	22.45	22.56
	16QAM	1	0	22.76	22.59	22.19
		1	50	22.45	22.65	22.73
		1	99	22.49	22.57	22.39
		50	0	21.35	21.19	21.33
		50	25	21.41	21.10	21.43
		50	50	21.35	21.19	21.32
		100	0	21.34	21.33	21.38

5.2. Effective Isotropic Radiated Power

Ambient condition

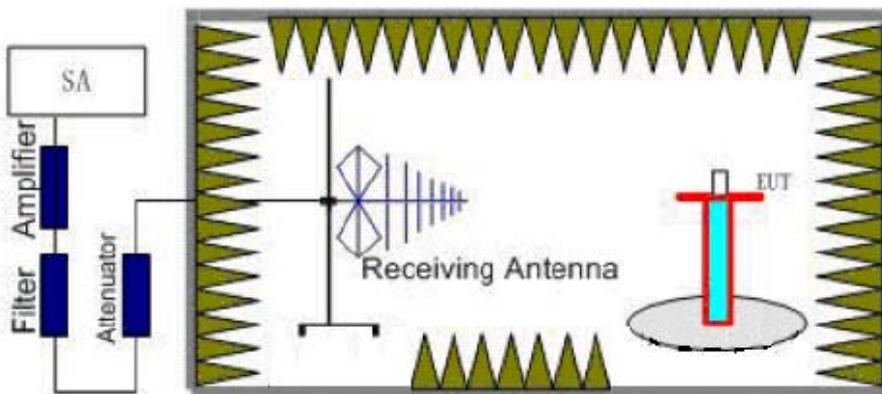
Temperature	Relative humidity
21°C ~25°C	40%~60%

Methods of Measurement

The measurement procedures in TIA- 603-D are used.

1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;
UMTS operating modes: Set RBW= 100 KHz, VBW= 300 KHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per section 4.0 of KDB 971168 D01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10. $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$
 P_s (dBm) : Input power to substitution antenna.
 G_s (dBi or dBd) : Substitution antenna Gain.
 $E_t = R_t + AF$
 $E_s = R_s + AF$
 AF (dB/m) : Receive antenna factor
 R_t : The highest received signal in spectrum analyzer for EUT.
 R_s : The highest received signal in spectrum analyzer for substitution antenna.

Test Setup



Limits

Rule Part 24.232(b) specifies that "Mobile/portable stations are limited to 2 watts EIRP. Peak power" and Rule Part 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage".

Limit (EIRP)	$\leq 2 \text{ W}$ (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:

Mode	Polarization	Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	Limit (dBm)	Conclusion
GSM 1900	H	1850.2	-26.46	-53.21	0.00	1.92	28.67	33	Pass
	H	1880	-26.67	-53.42	0.00	1.94	28.69	33	Pass
	H	1909.8	-26.63	-53.67	0.00	1.90	28.94	33	Pass
	V	1850.2	-26.95	-53.70	0.00	1.92	28.67	33	Pass
	V	1880	-27.16	-53.91	0.00	1.94	28.69	33	Pass
	V	1909.8	-27.51	-54.55	0.00	1.90	28.94	33	Pass
GPRS 1900	H	1850.2	-33.74	-53.21	0.00	1.92	21.39	33	Pass
	H	1880	-33.64	-53.42	0.00	1.94	21.72	33	Pass
	H	1909.8	-34.32	-53.67	0.00	1.90	21.25	33	Pass
	V	1850.2	-33.27	-53.70	0.00	1.92	22.35	33	Pass
	V	1880	-33.18	-53.91	0.00	1.94	22.67	33	Pass
	V	1909.8	-33.96	-54.55	0.00	1.90	22.49	33	Pass
EGPRS 1900	H	1850.2	-36.09	-53.21	0.00	1.92	19.04	33	Pass
	H	1880	-38.83	-53.42	0.00	1.94	16.53	33	Pass
	H	1909.8	-38.55	-53.67	0.00	1.90	17.02	33	Pass
	V	1850.2	-34.36	-53.70	0.00	1.92	21.26	33	Pass
	V	1880	-34.74	-53.91	0.00	1.94	21.11	33	Pass
	V	1909.8	-37.13	-54.55	0.00	1.90	19.32	33	Pass
WCDMA Band II	H	1852.4	-34.47	-53.19	0.00	1.92	20.64	33	Pass
	H	1880	-35.53	-53.42	0.00	1.94	19.83	33	Pass
	H	1907.6	-35.36	-53.66	0.00	1.92	20.22	33	Pass
	V	1852.4	-34.97	-53.69	0.00	1.92	20.64	33	Pass
	V	1880	-35.26	-53.91	0.00	1.94	20.59	33	Pass
	V	1907.6	-35.20	-54.54	0.00	1.92	21.26	33	Pass



LTE Band 2									
bandwidth	Polarization	Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	Limit (dBm)	Conclusion
1.4 MHz (QPSK)	H	1850.7	-38.97	-54.89	0.00	1.90	17.82	33	Pass
	H	1880	-40.42	-56.66	0.00	1.92	18.16	33	Pass
	H	1909.3	-40.99	-58.09	0.00	1.91	19.01	33	Pass
	V	1850.7	-34.57	-55.05	0.00	1.90	22.38	33	Pass
	V	1880	-35.80	-56.41	0.00	1.92	22.53	33	Pass
	V	1909.3	-36.26	-57.85	0.00	1.91	23.50	33	Pass
1.4 MHz (16QAM)	H	1850.7	-39.27	-54.89	0.00	1.90	17.52	33	Pass
	H	1880	-40.58	-56.66	0.00	1.92	18.00	33	Pass
	H	1909.3	-41.20	-58.09	0.00	1.91	18.80	33	Pass
	V	1850.7	-34.90	-55.05	0.00	1.90	22.05	33	Pass
	V	1880	-36.00	-56.41	0.00	1.92	22.33	33	Pass
	V	1909.3	-36.44	-57.85	0.00	1.91	23.32	33	Pass
3 MHz (QPSK)	H	1851.5	-39.08	-54.93	0.00	1.91	17.76	33	Pass
	H	1880	-41.25	-56.66	0.00	1.94	17.35	33	Pass
	H	1908.5	-41.18	-58.08	0.00	1.91	18.81	33	Pass
	V	1851.5	-34.57	-55.04	0.00	1.91	22.38	33	Pass
	V	1880	-35.56	-56.41	0.00	1.94	22.79	33	Pass
	V	1908.5	-36.44	-57.86	0.00	1.91	23.33	33	Pass
3 MHz (16QAM)	H	1851.5	-39.29	-54.93	0.00	1.91	17.55	33	Pass
	H	1880	-41.56	-56.66	0.00	1.94	17.04	33	Pass
	H	1908.5	-41.49	-58.08	0.00	1.91	18.50	33	Pass
	V	1851.5	-34.90	-55.04	0.00	1.91	22.05	33	Pass
	V	1880	-36.11	-56.41	0.00	1.94	22.24	33	Pass
	V	1908.5	-36.76	-57.86	0.00	1.91	23.01	33	Pass
5 MHz (QPSK)	H	1852.5	-39.36	-54.98	0.00	1.92	17.54	33	Pass
	H	1880	-41.26	-56.66	0.00	1.94	17.34	33	Pass
	H	1907.5	-41.89	-58.05	0.00	1.90	18.06	33	Pass
	V	1852.5	-35.02	-55.14	0.00	1.92	22.04	33	Pass
	V	1880	-36.15	-56.41	0.00	1.94	22.20	33	Pass
	V	1907.5	-36.82	-57.97	0.00	1.90	23.05	33	Pass
5 MHz (16QAM)	H	1852.5	-39.69	-54.98	0.00	1.92	17.21	33	Pass
	H	1880	-41.57	-56.66	0.00	1.94	17.03	33	Pass
	H	1907.5	-42.20	-58.05	0.00	1.90	17.75	33	Pass
	V	1852.5	-35.34	-55.14	0.00	1.92	21.72	33	Pass
	V	1880	-36.45	-56.41	0.00	1.94	21.90	33	Pass
	V	1907.5	-37.17	-57.97	0.00	1.90	22.70	33	Pass
10 MHz (QPSK)	H	1855	-39.28	-55.09	0.00	1.91	17.72	33	Pass
	H	1880	-40.78	-56.66	0.00	1.94	17.82	33	Pass
	H	1905	-41.43	-58.01	0.00	1.92	18.50	33	Pass



LTE Band 2									
bandwidth	Polarization	Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	Limit (dBm)	Conclusion
	V	1855	-34.94	-55.08	0.00	1.91	22.05	33	Pass
	V	1880	-36.34	-56.41	0.00	1.94	22.01	33	Pass
	V	1905	-37.04	-57.81	0.00	1.92	22.69	33	Pass
10 MHz (16QAM)	H	1855	-39.60	-55.09	0.00	1.91	17.40	33	Pass
	H	1880	-41.09	-56.66	0.00	1.94	17.51	33	Pass
	H	1905	-41.73	-58.01	0.00	1.92	18.20	33	Pass
	V	1855	-35.24	-55.08	0.00	1.91	21.75	33	Pass
	V	1880	-36.55	-56.41	0.00	1.94	21.80	33	Pass
	V	1905	-37.38	-57.81	0.00	1.92	22.35	33	Pass
15 MHz (QPSK)	H	1857.5	-38.99	-55.23	0.00	1.93	18.17	33	Pass
	H	1880	-40.39	-56.66	0.00	1.94	18.21	33	Pass
	H	1902.5	-41.38	-57.95	0.00	1.92	18.49	33	Pass
	V	1857.5	-34.66	-55.24	0.00	1.93	22.51	33	Pass
	V	1880	-35.97	-56.41	0.00	1.94	22.38	33	Pass
	V	1902.5	-36.90	-57.69	0.00	1.92	22.71	33	Pass
15 MHz (16QAM)	H	1857.5	-39.28	-55.23	0.00	1.93	17.88	33	Pass
	H	1880	-40.70	-56.66	0.00	1.94	17.90	33	Pass
	H	1902.5	-41.78	-57.95	0.00	1.92	18.09	33	Pass
	V	1857.5	-34.97	-55.24	0.00	1.93	22.20	33	Pass
	V	1880	-36.27	-56.41	0.00	1.94	22.08	33	Pass
	V	1902.5	-37.31	-57.69	0.00	1.92	22.30	33	Pass
20 MHz (QPSK)	H	1860	-39.66	-55.35	0.00	1.93	17.62	33	Pass
	H	1880	-40.86	-56.66	0.00	1.94	17.74	33	Pass
	H	1900	-41.92	-57.86	0.00	1.92	17.86	33	Pass
	V	1860	-35.04	-55.31	0.00	1.93	22.20	33	Pass
	V	1880	-36.33	-56.41	0.00	1.94	22.02	33	Pass
	V	1900	-36.97	-57.66	0.00	1.92	22.61	33	Pass
20 MHz (16QAM)	H	1860	-39.96	-55.35	0.00	1.93	17.32	33	Pass
	H	1880	-41.15	-56.66	0.00	1.94	17.45	33	Pass
	H	1900	-42.22	-57.86	0.00	1.92	17.56	33	Pass
	V	1860	-35.34	-55.31	0.00	1.93	21.90	33	Pass
	V	1880	-36.63	-56.41	0.00	1.94	21.72	33	Pass
	V	1900	-37.27	-57.66	0.00	1.92	22.31	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 3kHz, VBW is set to 10kHz for GSM 1900,

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

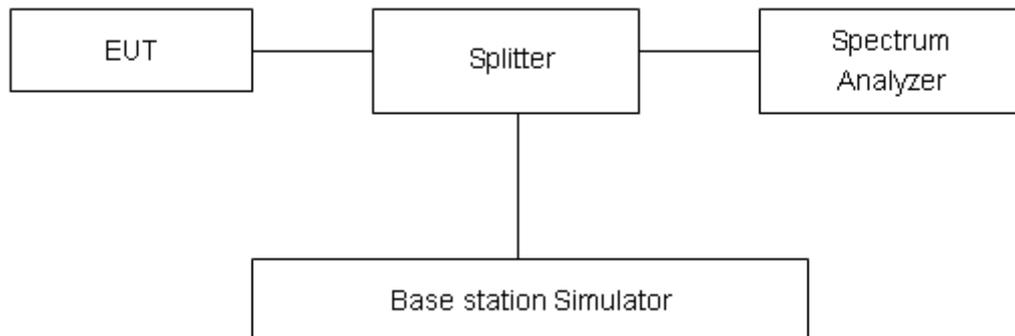
RBW is set to 51kHz, VBW is set to 160kHz for LTE Band 2 (1.4MHz),

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 $k = 2$, $U = 624\text{Hz}$.



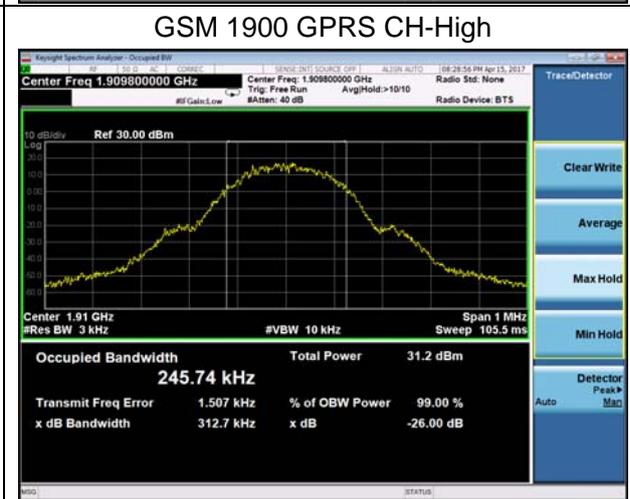
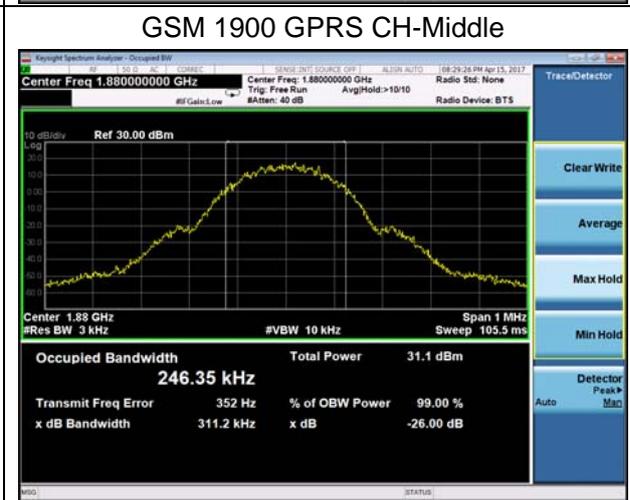
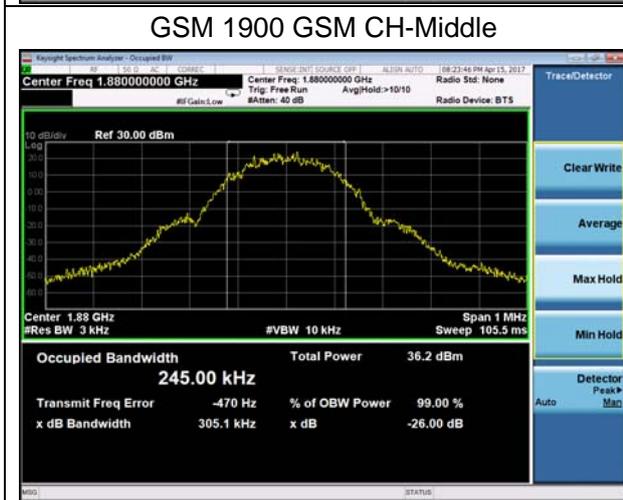
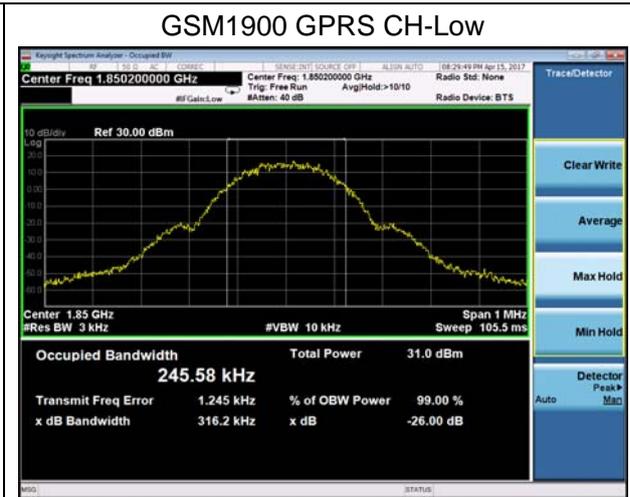
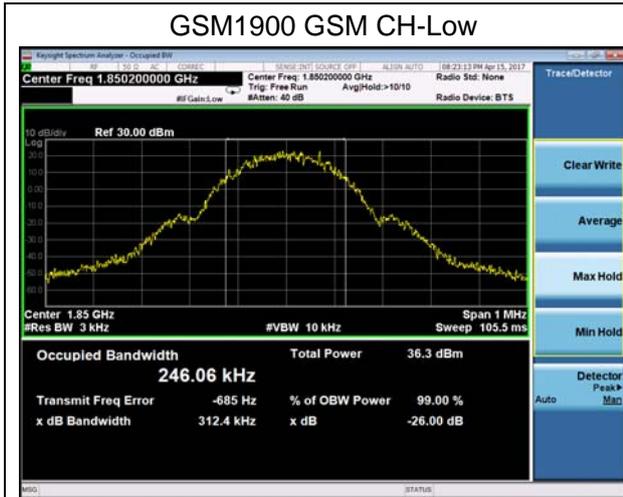
Test Result

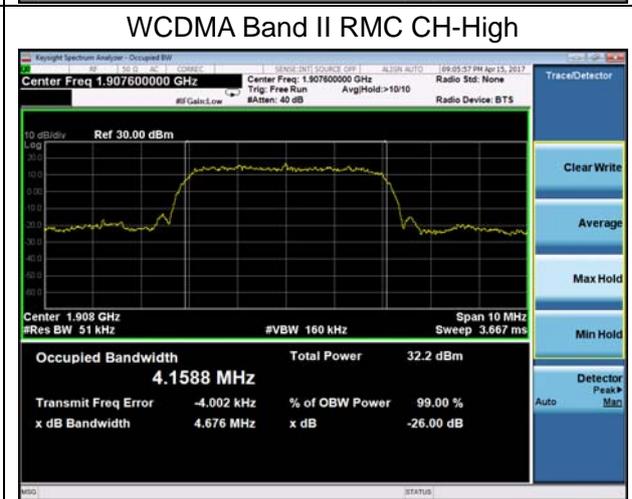
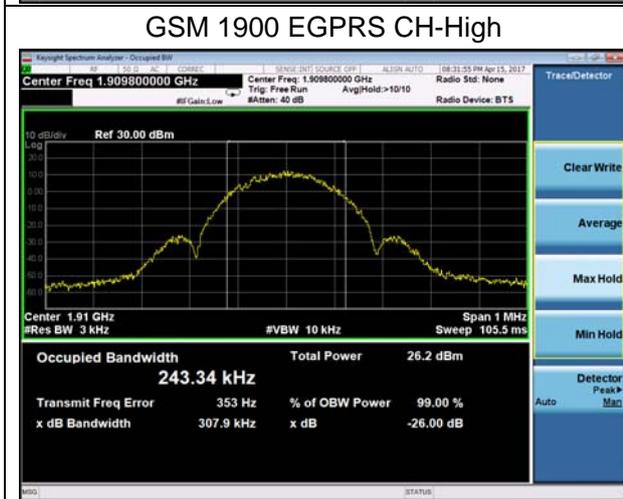
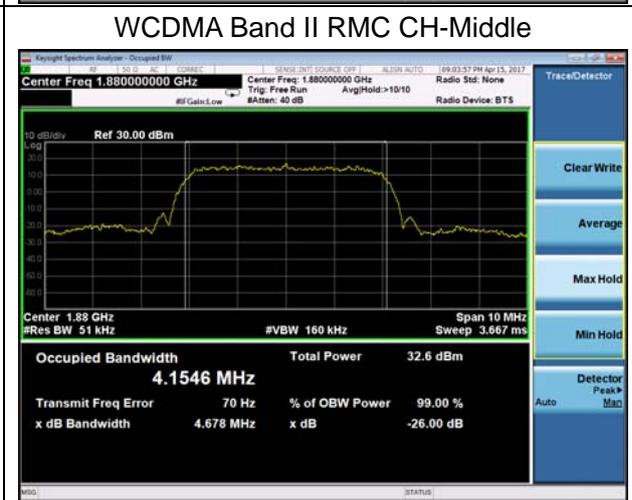
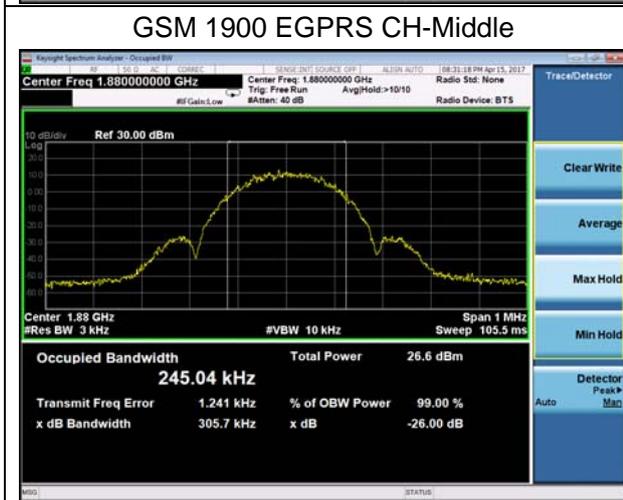
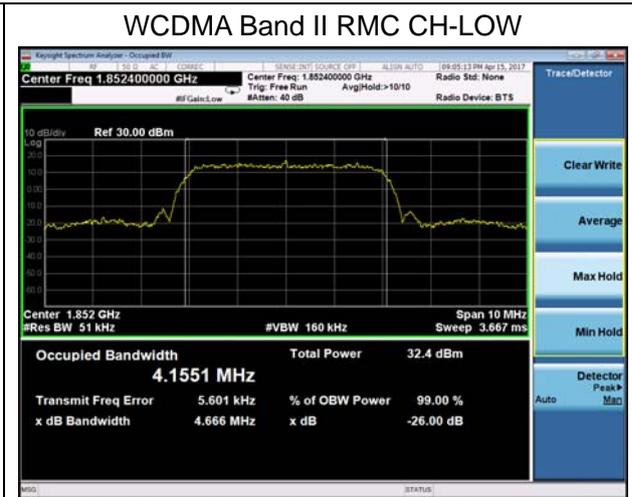
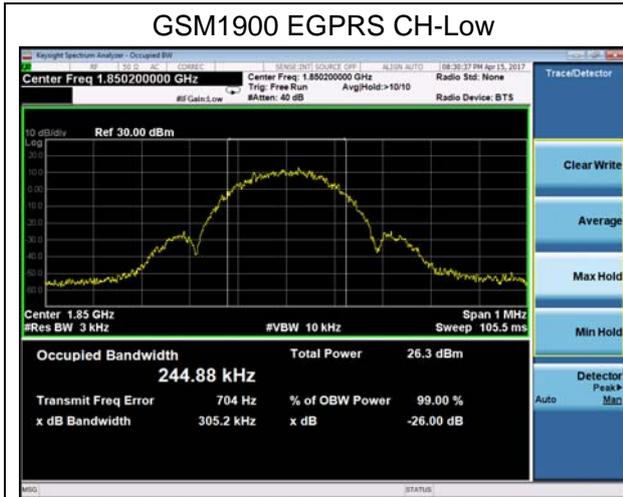
Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GSM 1900 (GSM)	512	1850.2	0.246	0.312
	661	1880.0	0.245	0.305
	810	1909.8	0.248	0.311
GPRS 1900 (GMSK)	512	1850.2	0.246	0.316
	661	1880.0	0.246	0.311
	810	1909.8	0.246	0.313
EGPRS 1900 (8-PSK)	512	1850.2	0.245	0.305
	661	1880.0	0.245	0.305
	810	1909.8	0.243	0.308
WCDMA Band II (RMC)	9262	1852.4	4.155	4.666
	9400	1880	4.155	4.666
	9538	1907.6	4.155	4.678

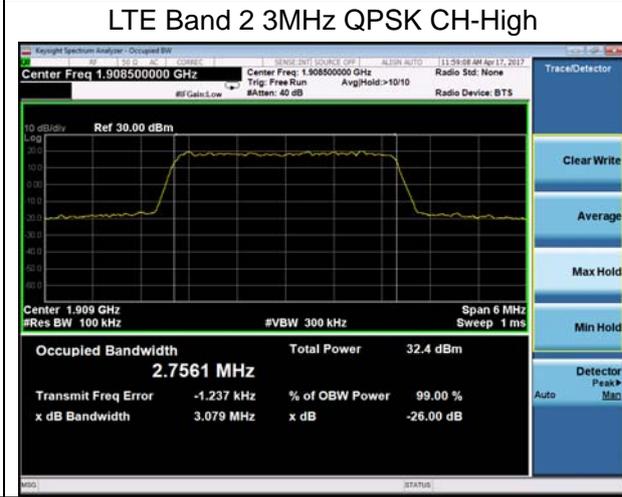
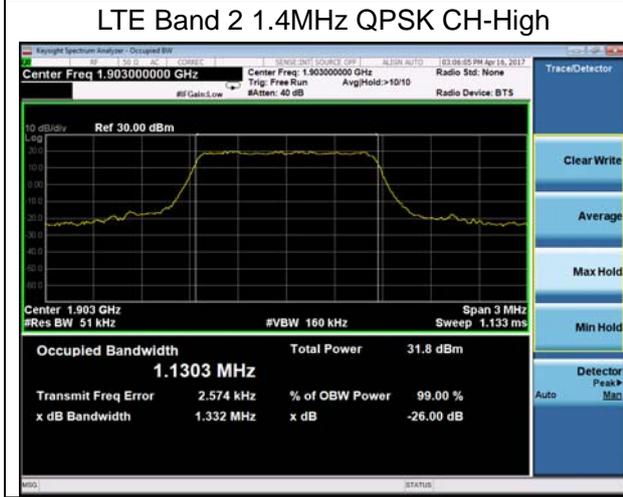
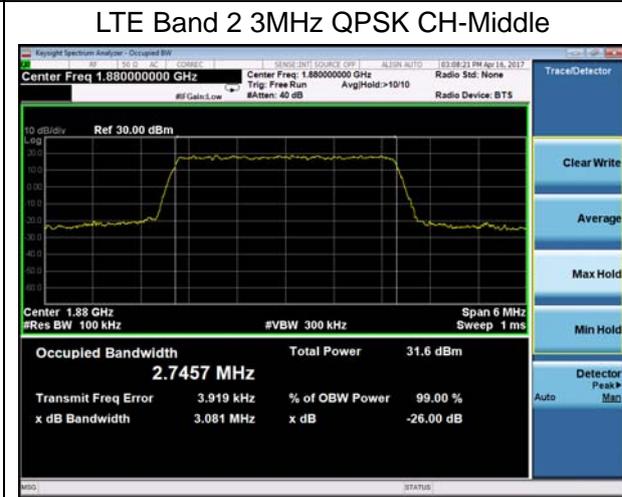
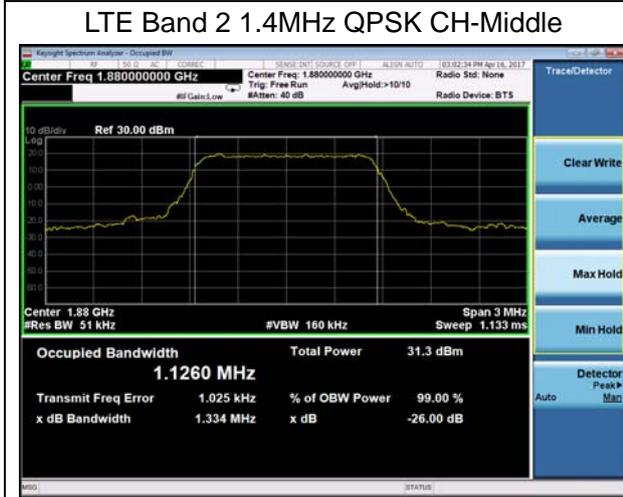
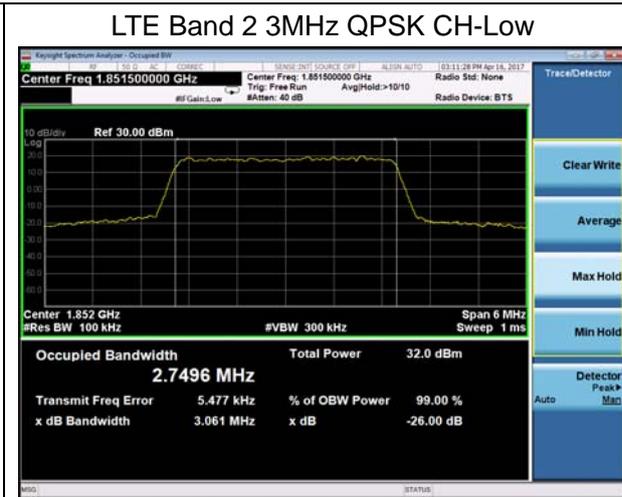
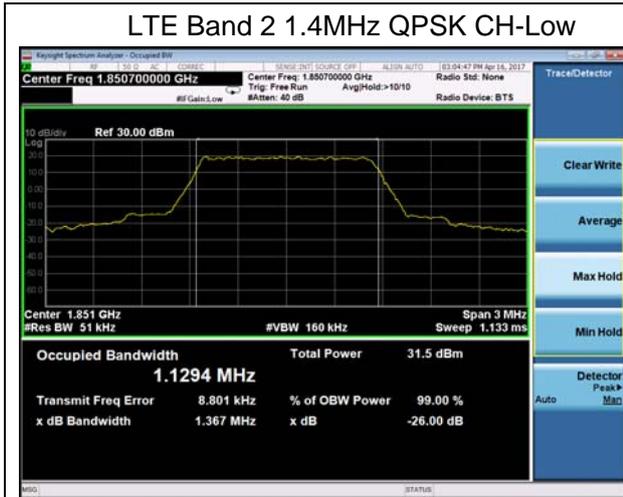
LTE Band 2					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
QPSK	1.4	18607	1850.7	1.1294	1.367
		18900	1880.0	1.1260	1.334
		19193	1909.3	1.1303	1.332
	3	18615	1851.5	2.7496	3.061
		18900	1880	2.7457	3.081
		19185	1908.5	2.7561	3.079
	5	18625	1852.5	4.5214	5.042
		18900	1880	4.5332	5.051
		19175	1907.5	4.5074	4.996
	10	18650	1855	9.0366	10.12
		18900	1880	9.0715	10.08
		19150	1905	9.0607	10.15
	15	18675	1857.5	13.451	14.71

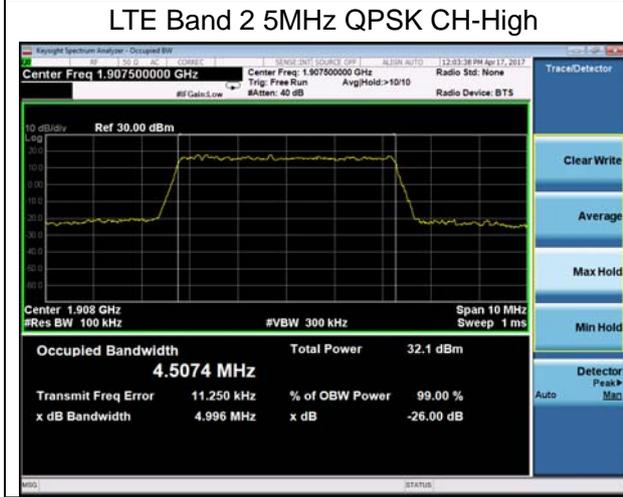
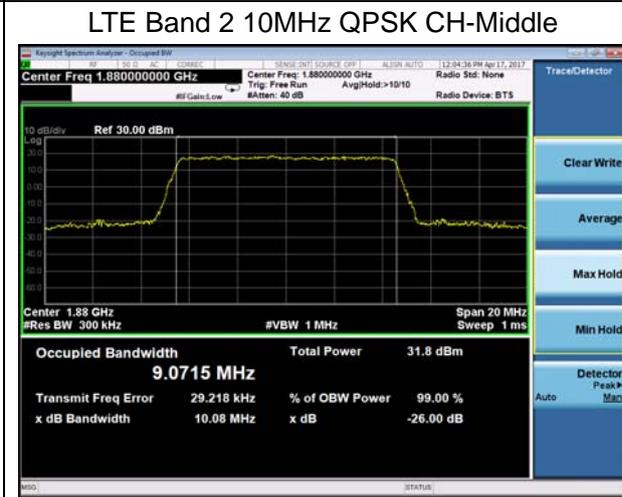
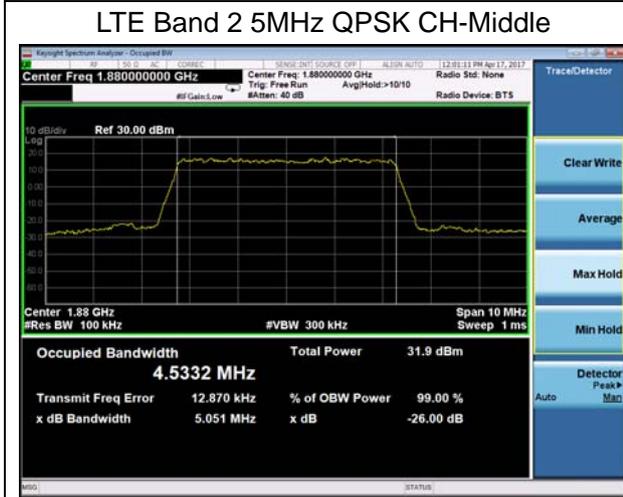
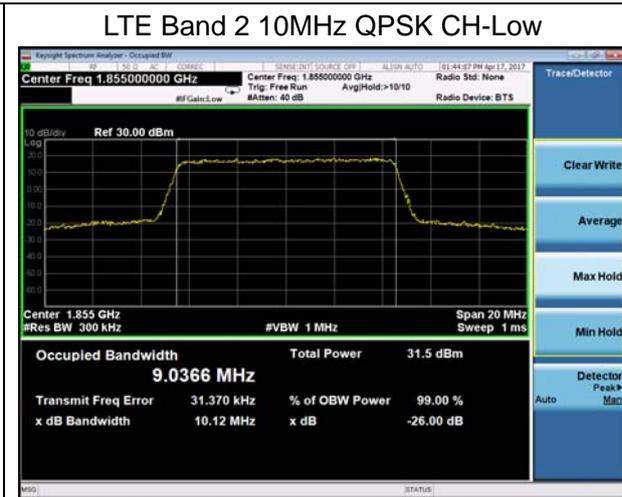
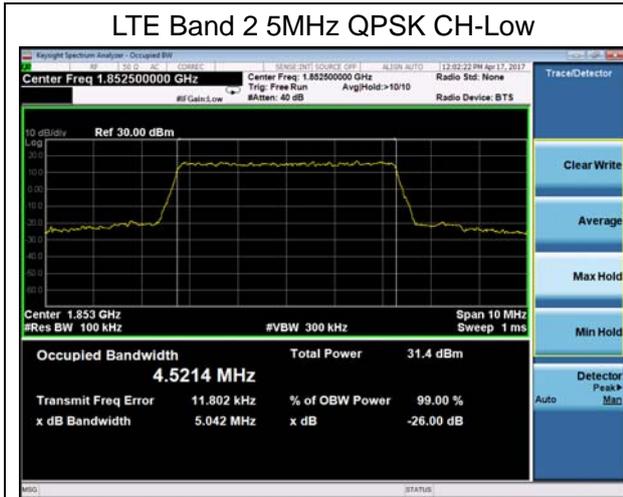


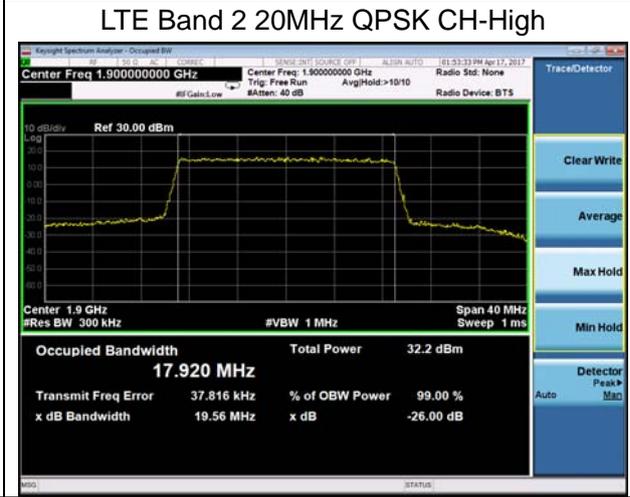
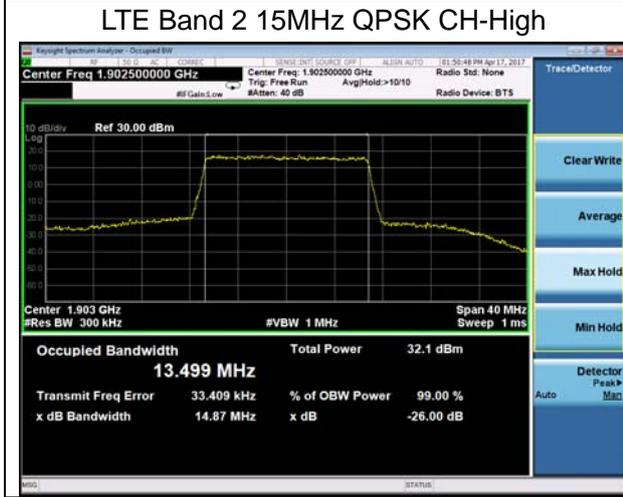
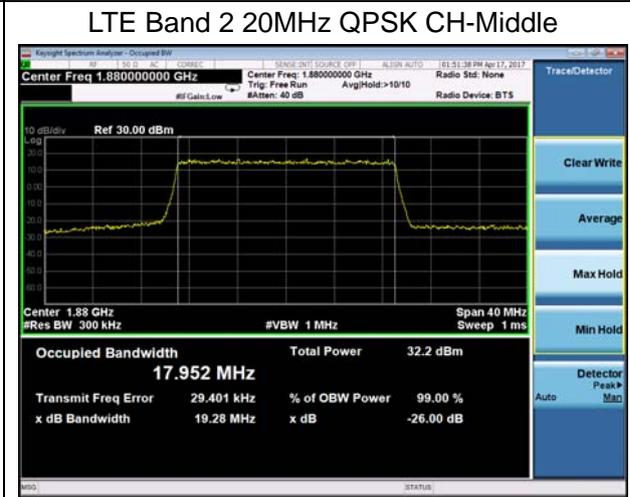
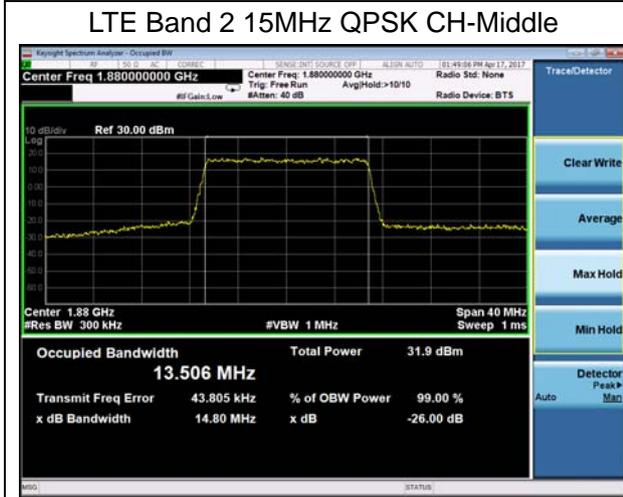
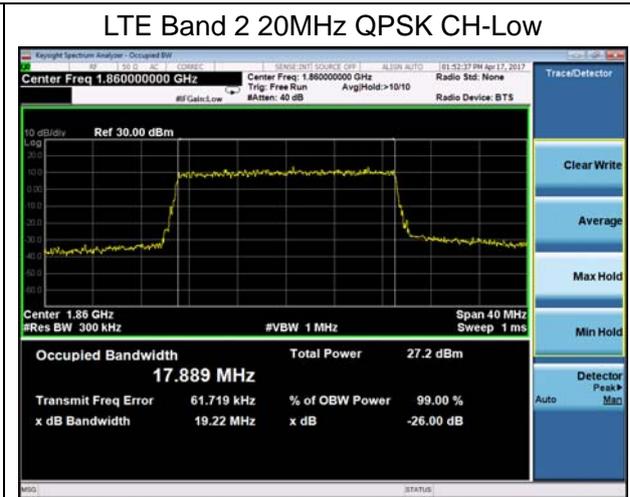
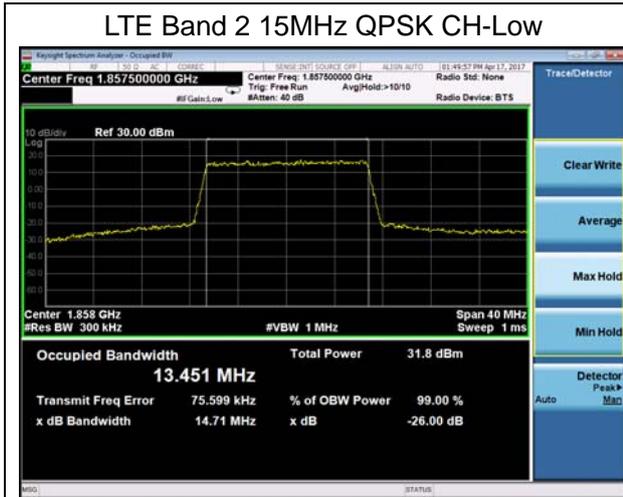
		18900	1880	13.506	14.80
		19125	1902.5	13.499	14.87
	20	18700	1860	17.889	19.22
		18900	1880	17.952	19.28
		19100	1900	17.920	19.56
16QAM	1.4	18607	1850.7	1.1276	1.324
		18900	1880.0	1.1277	1.349
		19193	1909.3	1.1204	1.352
	3	18615	1851.5	2.7368	3.051
		18900	1880	2.7380	3.028
		19185	1908.5	2.7372	3.056
	5	18625	1852.5	4.5330	5.032
		18900	1880	4.5119	5.018
		19175	1907.5	4.5340	5.069
	10	18650	1855	9.0421	10.06
		18900	1880	9.0196	9.992
		19150	1905	9.0433	10.04
	15	18675	1857.5	13.501	14.77
		18900	1880	13.509	14.76
		19125	1902.5	13.489	14.70
	20	18700	1860	17.950	19.37
		18900	1880	17.975	19.32
		19100	1900	17.886	19.40

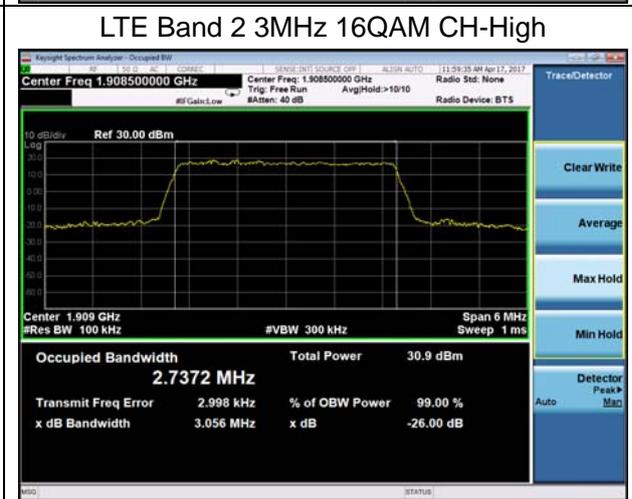
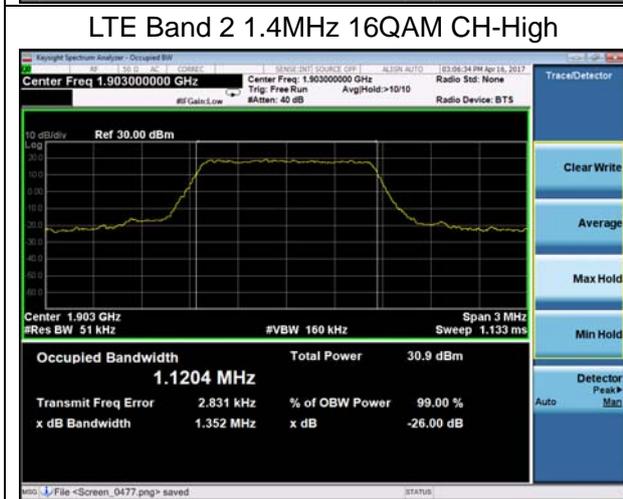
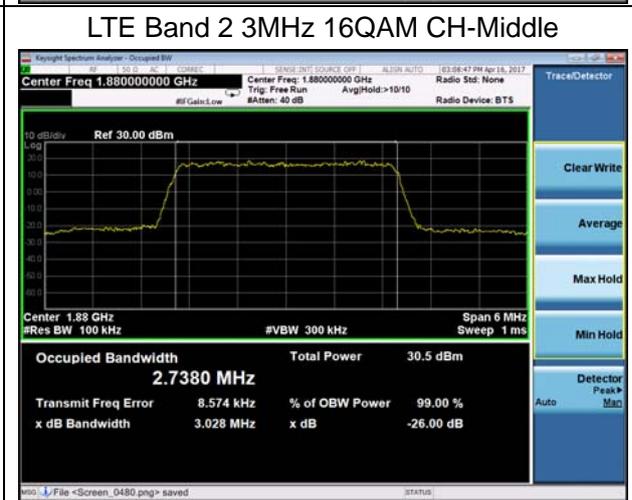
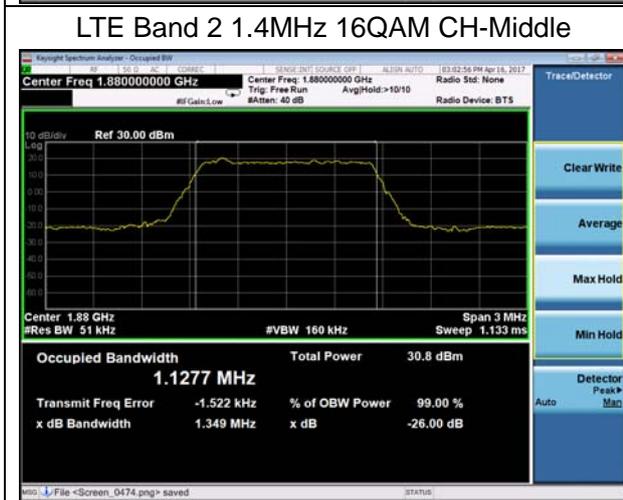
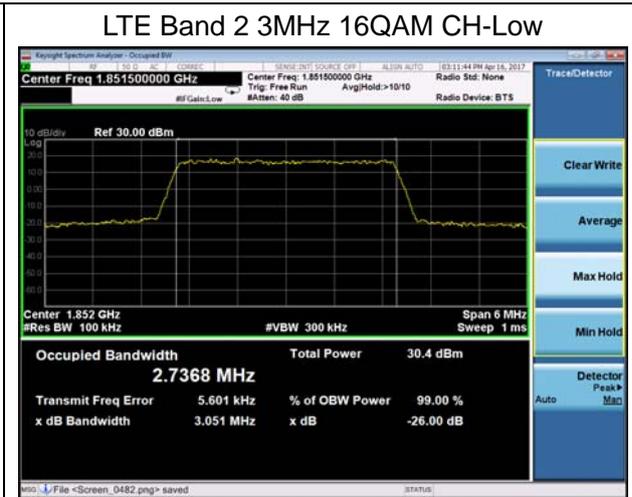
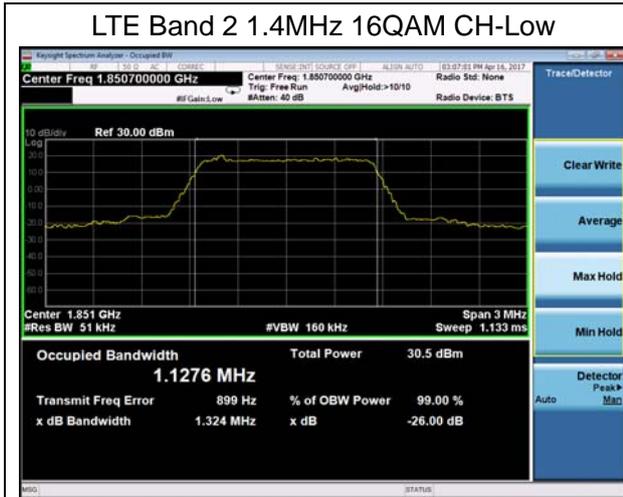


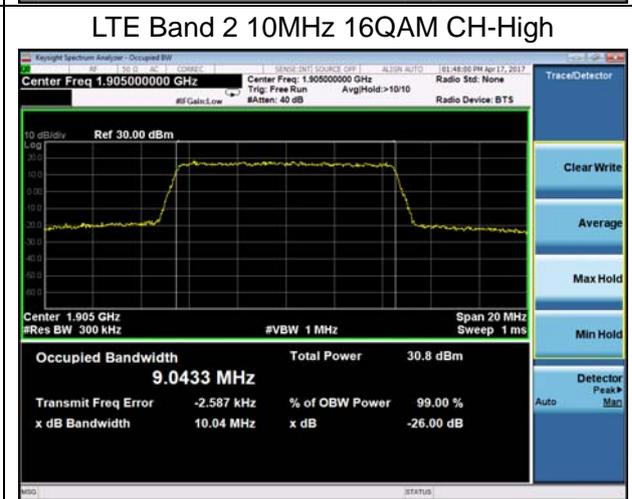
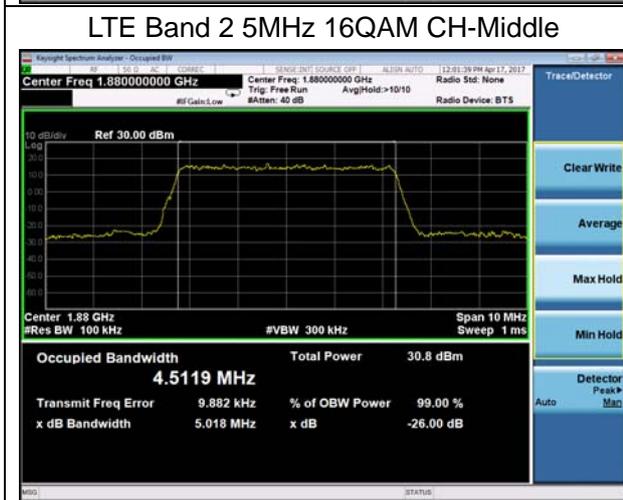
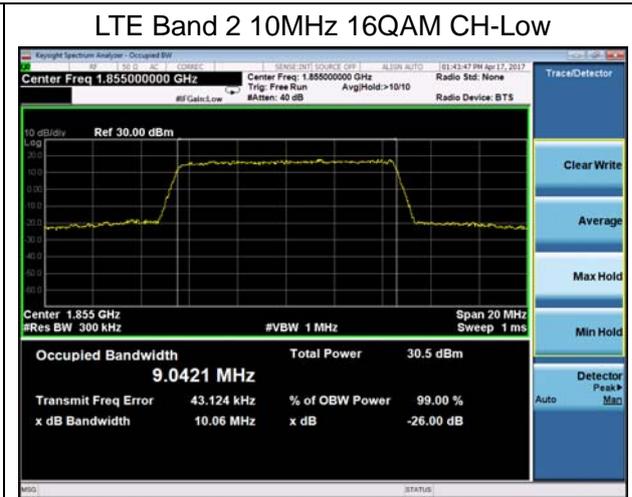
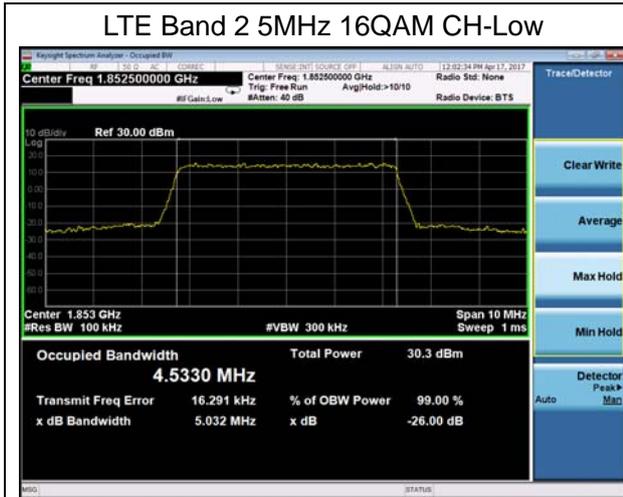


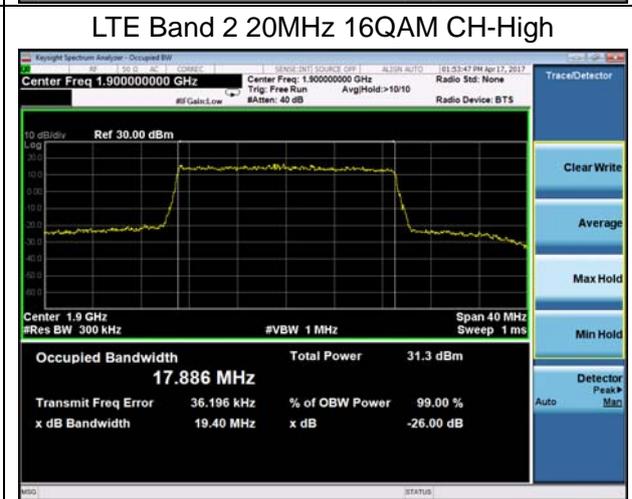
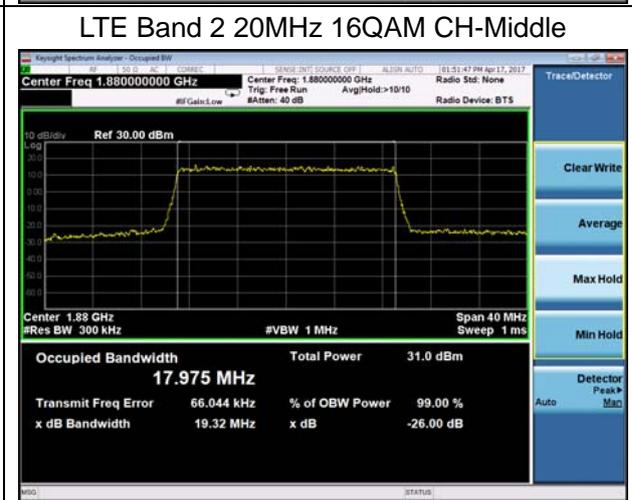
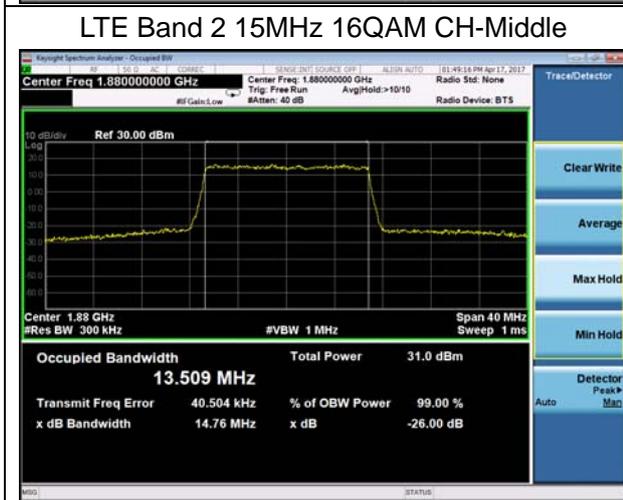
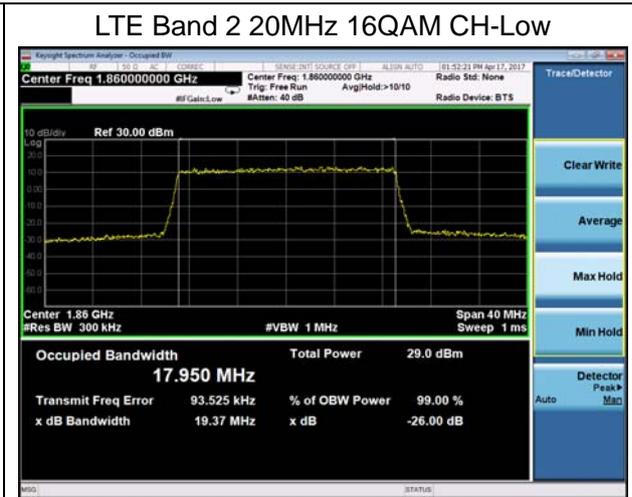
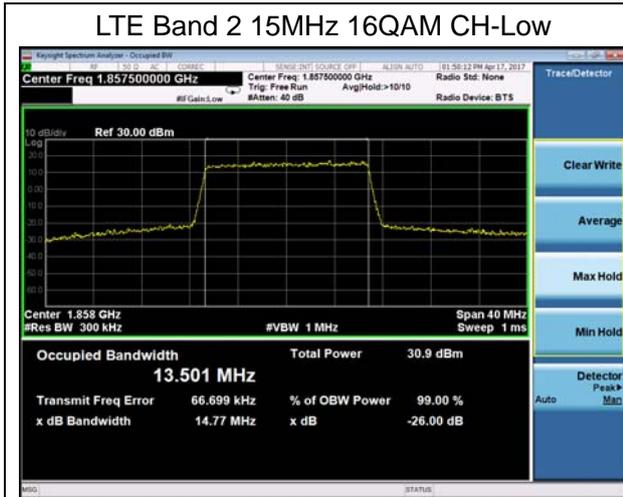












5.4. Band Edge Compliance

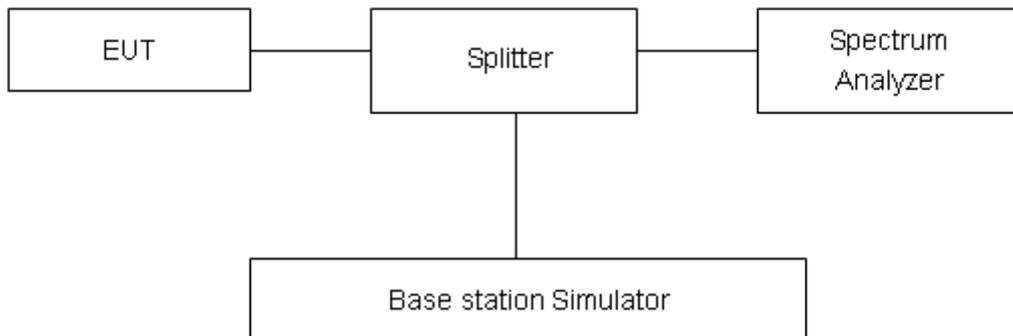
Ambient condition

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

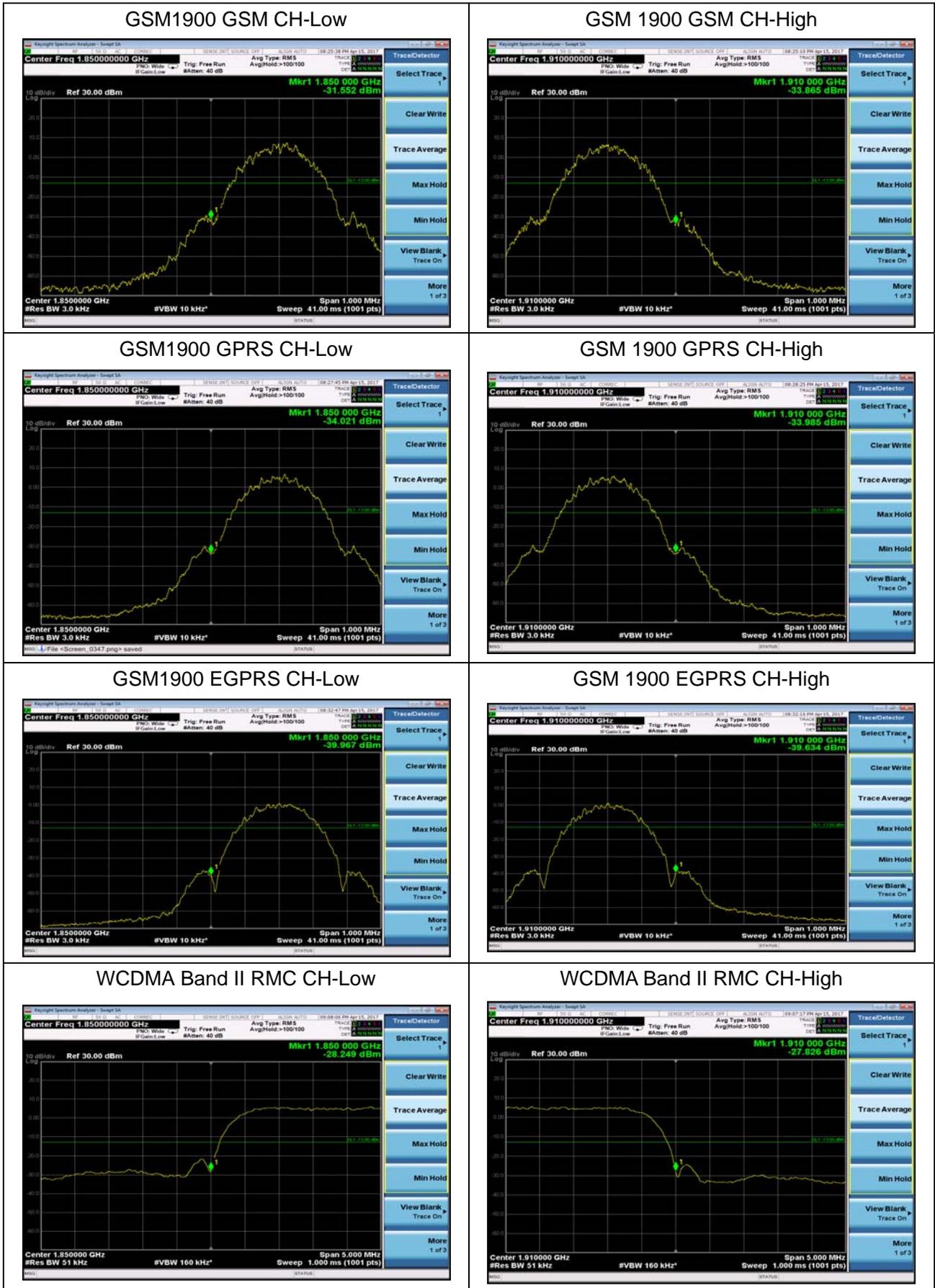
Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log₁₀ (P) dB.”

Limit	-13 dBm
-------	---------

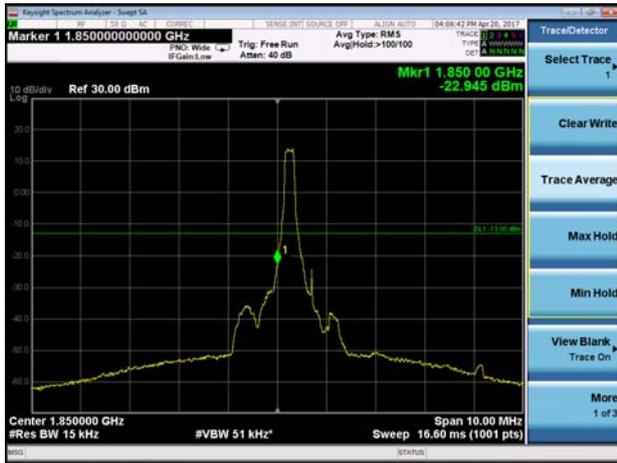
Measurement Uncertainty

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

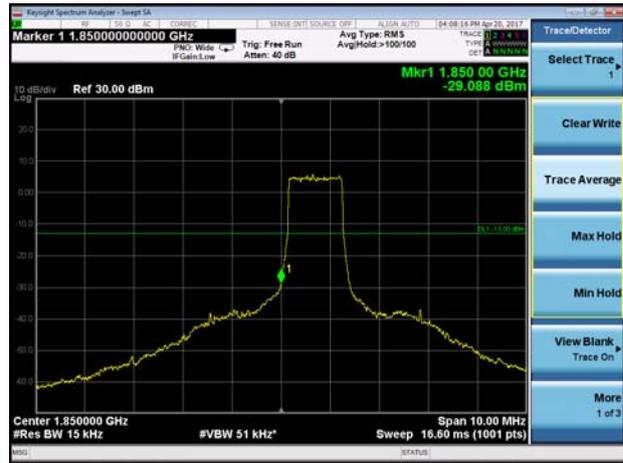
Test Result:



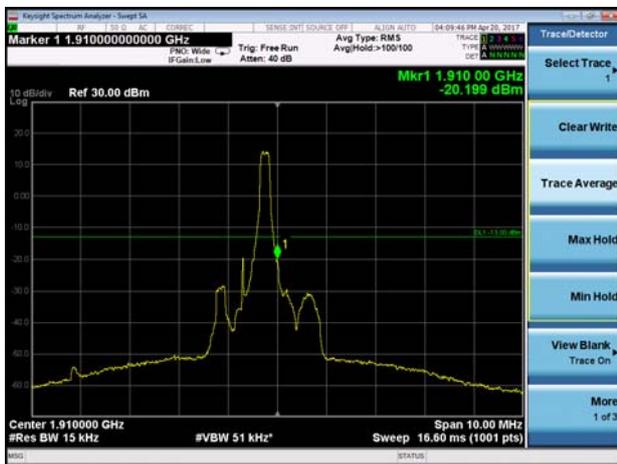
LTE Band 2 1.4MHz QPSK 1RB CH-Low



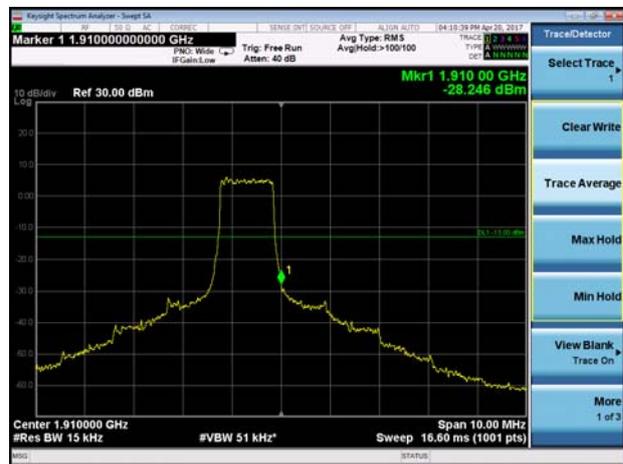
LTE Band 2 1.4MHz QPSK 100%RB CH-Low



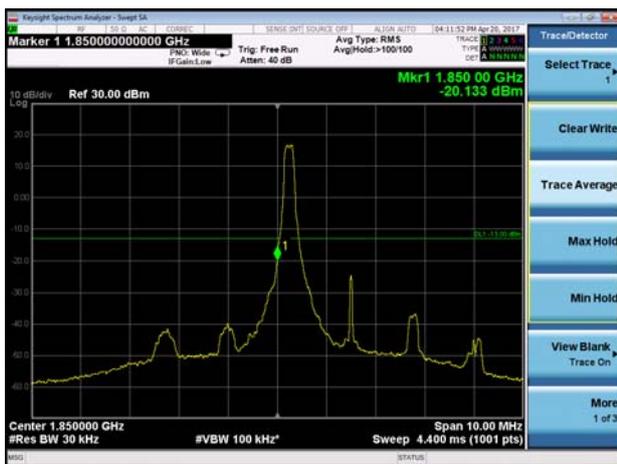
LTE Band 2 1.4MHz QPSK 1RB CH-High



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



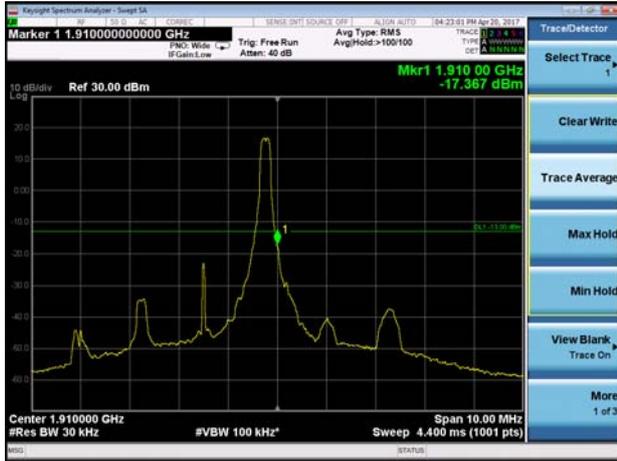
LTE Band 2 3MHz QPSK 1RB CH-Low



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



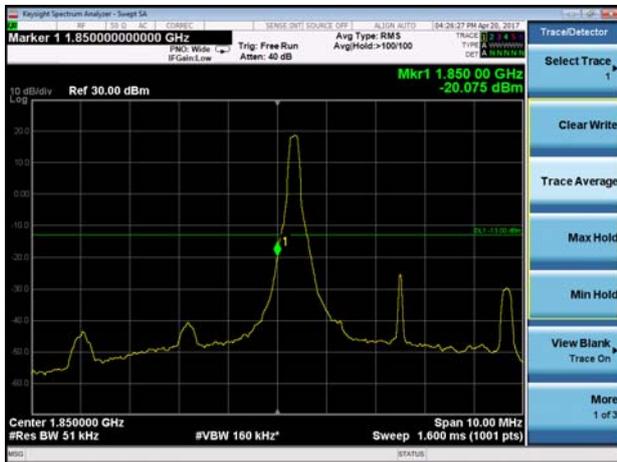
LTE Band 2 3MHz QPSK 1RB CH-High



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



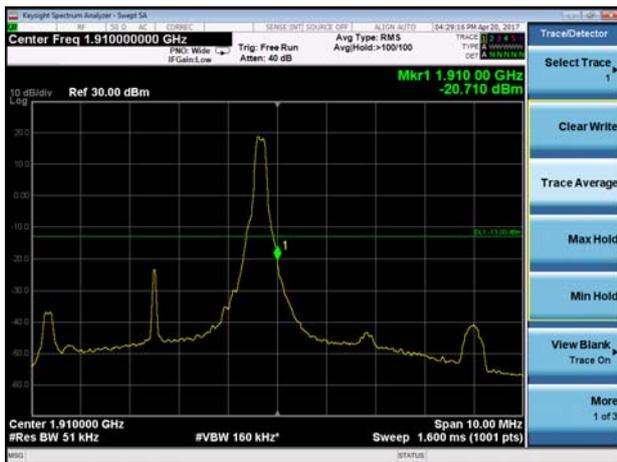
LTE Band 2 5MHz QPSK 1RB CH-Low



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



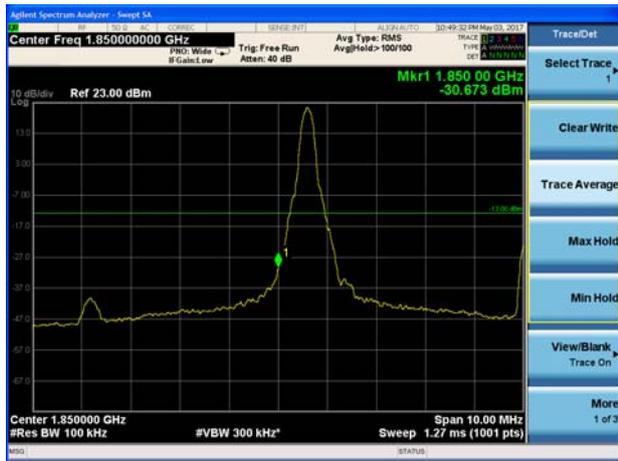
LTE Band 2 5MHz QPSK 1RB CH-High



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



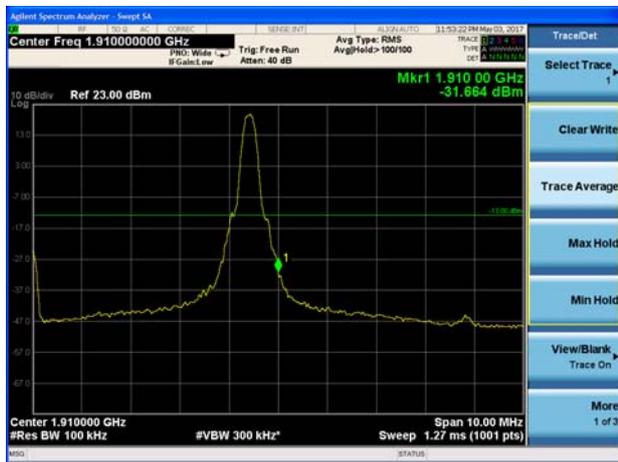
LTE Band 2 10MHz QPSK 1RB CH-Low



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



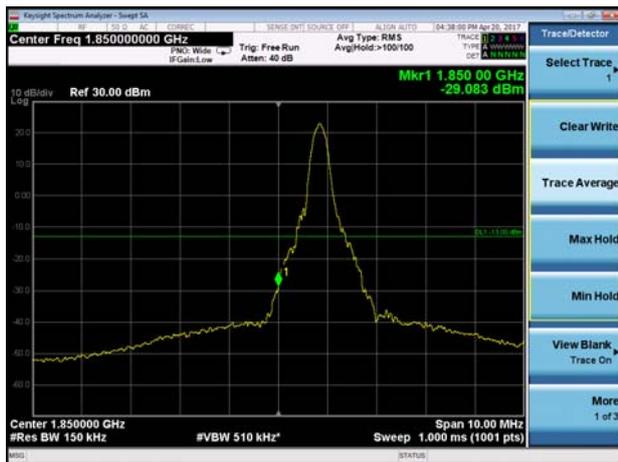
LTE Band 2 10MHz QPSK 1RB CH-High



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



LTE Band 2 15MHz QPSK 1RB CH-Low



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



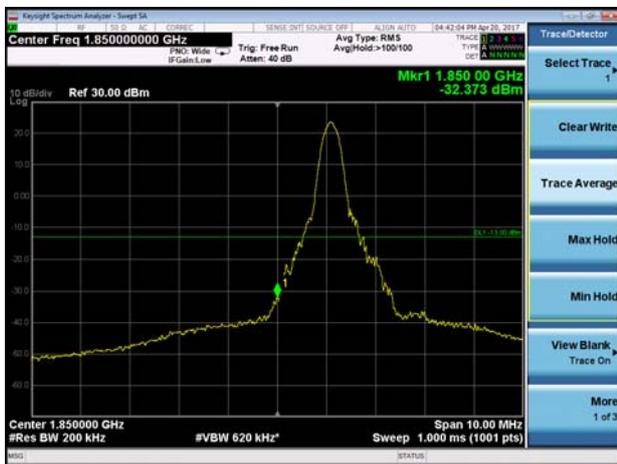
LTE Band 2 15MHz QPSK 1RB CH-High



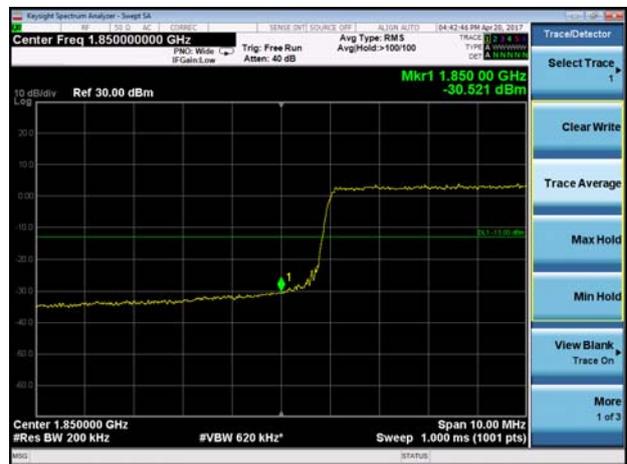
LTE Band 2 15MHz QPSK 100%RB CH-High



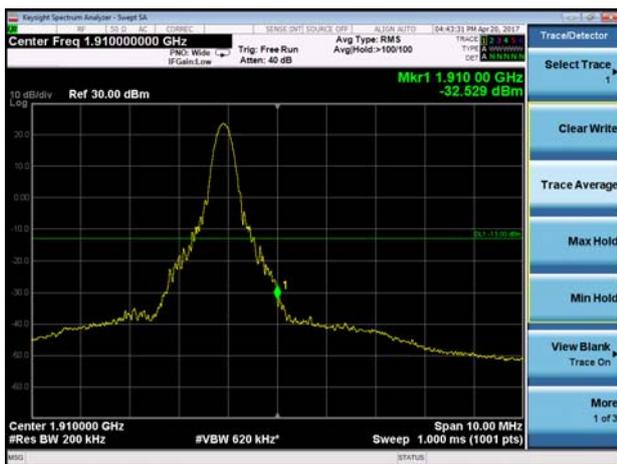
LTE Band 2 20MHz QPSK 1RB CH-Low



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



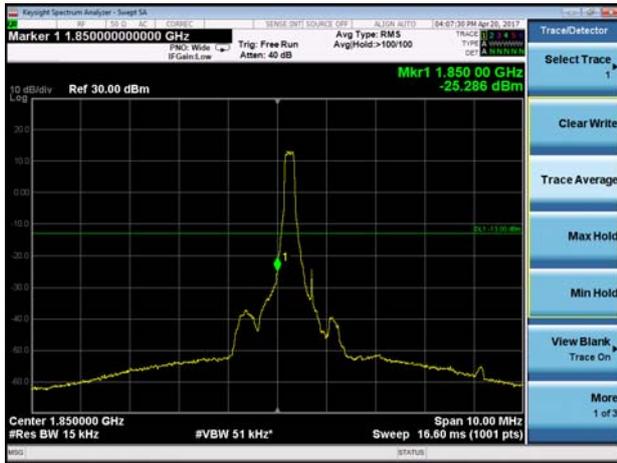
LTE Band 2 20MHz QPSK 1RB CH-High



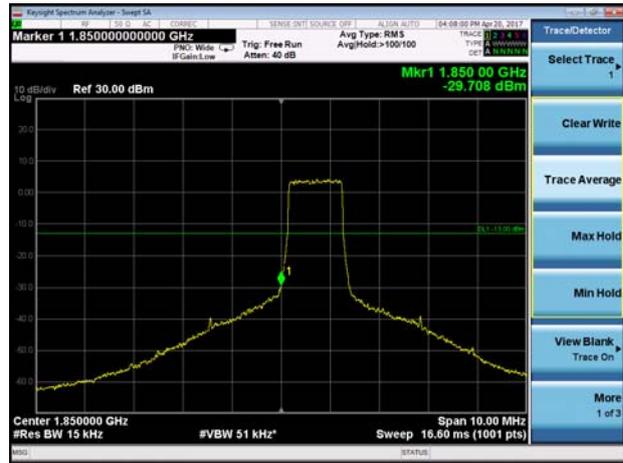
LTE Band 2 20MHz QPSK 100%RB CH-High



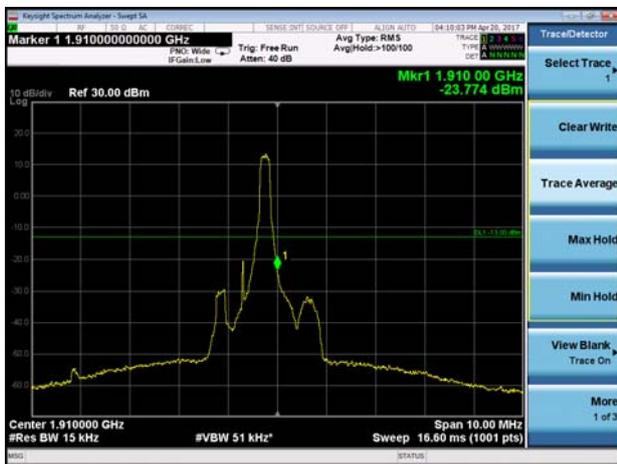
LTE Band 2 1.4MHz 16QAM 1RB CH-Low



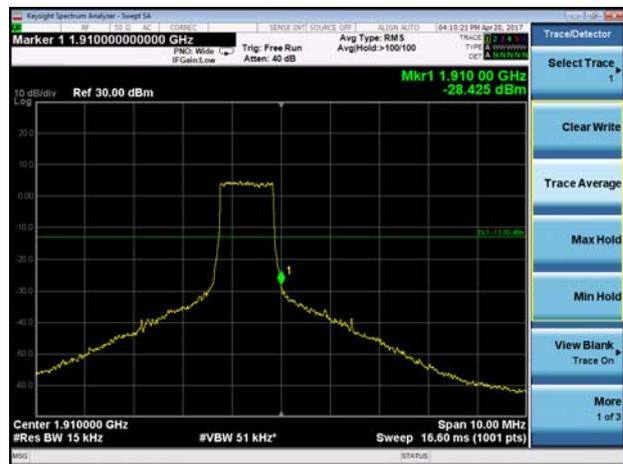
LTE Band 2 1.4MHz 16QAM 100%RB CH-Low



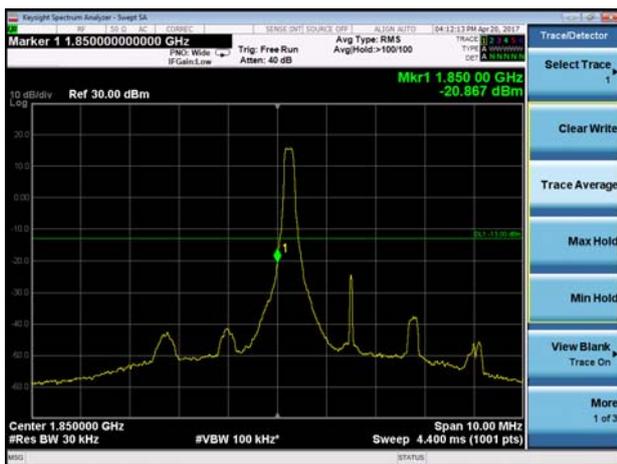
LTE Band 2 1.4MHz 16QAM 1RB CH-High



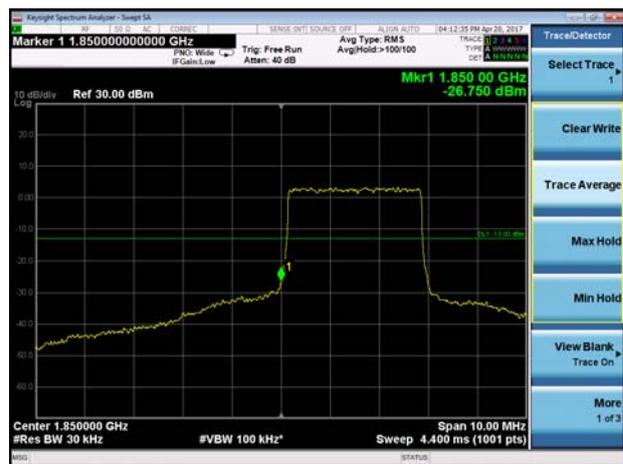
LTE Band 2 1.4MHz 16QAM 100%RB CH-High



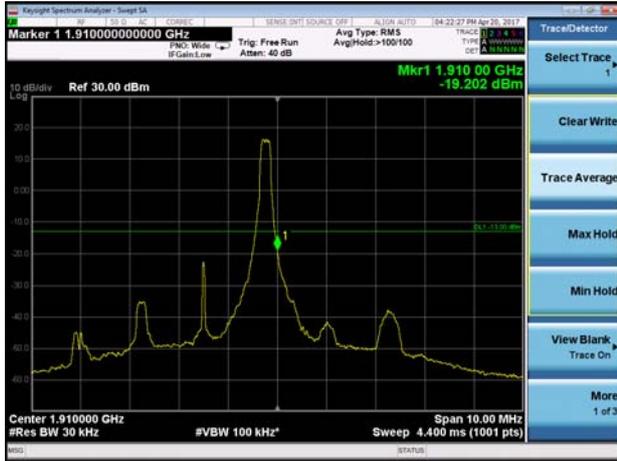
LTE Band 2 3MHz 16QAM 1RB CH-Low



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



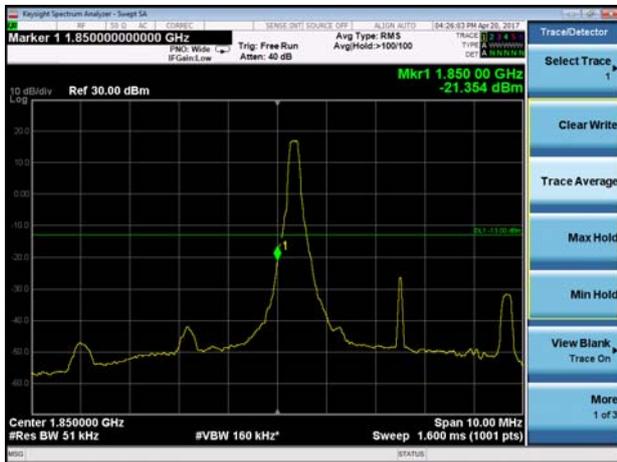
LTE Band 2 3MHz 16QAM 1RB CH-High



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



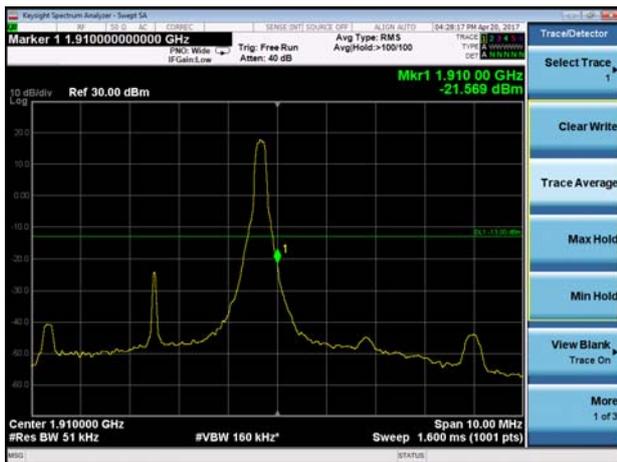
LTE Band 2 5MHz 16QAM 1RB CH-Low



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



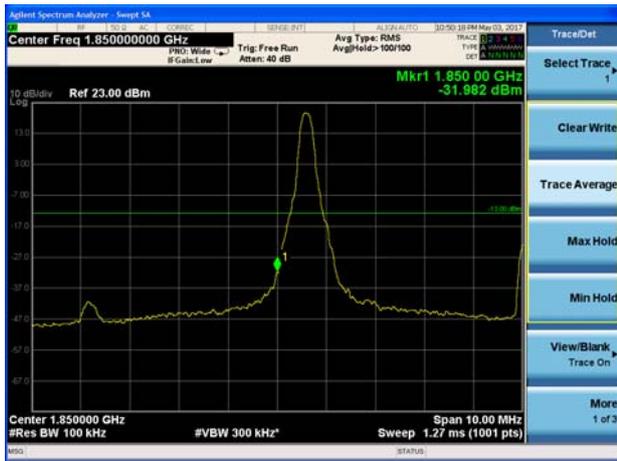
LTE Band 2 5MHz 16QAM 1RB CH-High



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



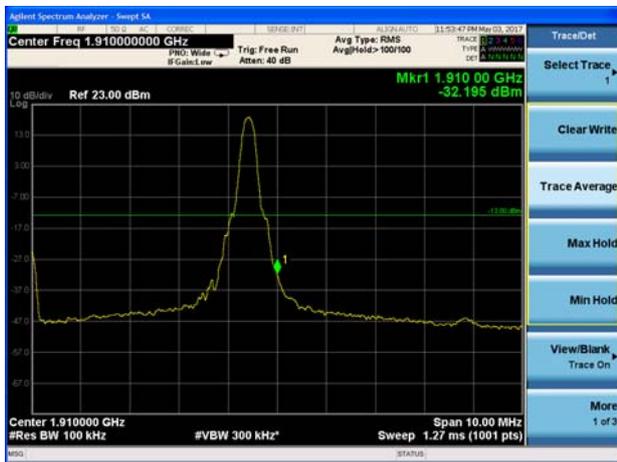
LTE Band 2 10MHz 16QAM 1RB CH-Low



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



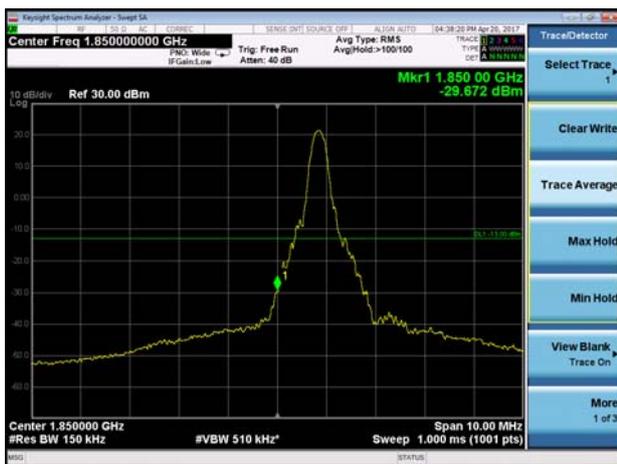
LTE Band 2 10MHz 16QAM 1RB CH-High



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



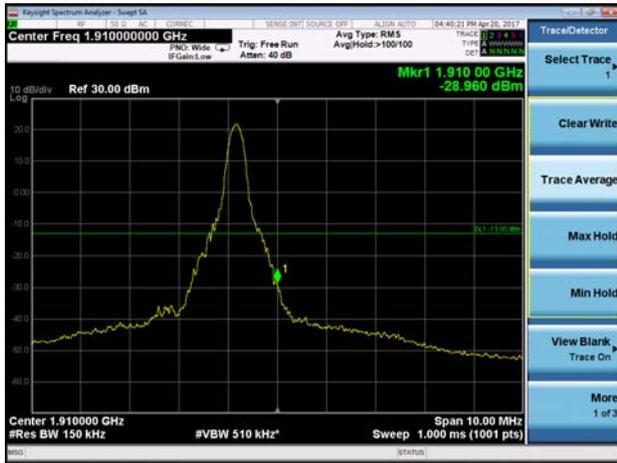
LTE Band 2 15MHz 16QAM 1RB CH-Low



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



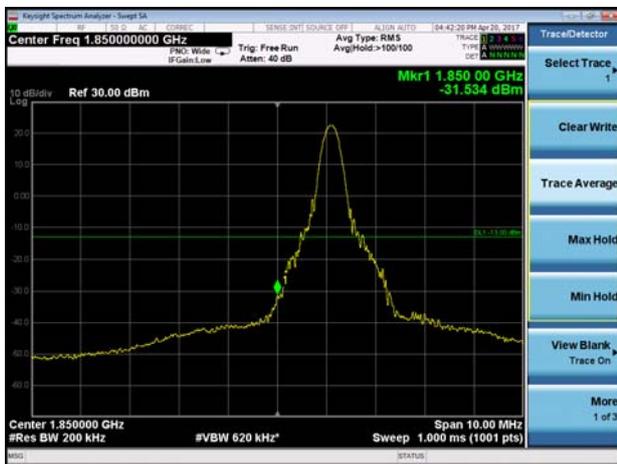
LTE Band 2 15MHz 16QAM 1RB CH-High



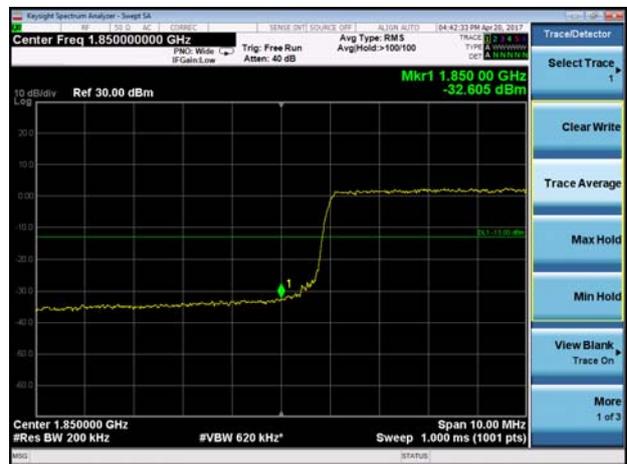
LTE Band 2 15MHz 16QAM 100%RB CH-High



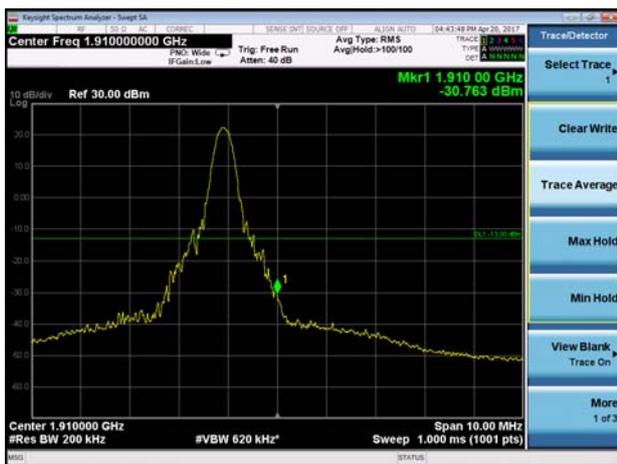
LTE Band 2 20MHz 16QAM 1RB CH-Low



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



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



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



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

Ambient condition

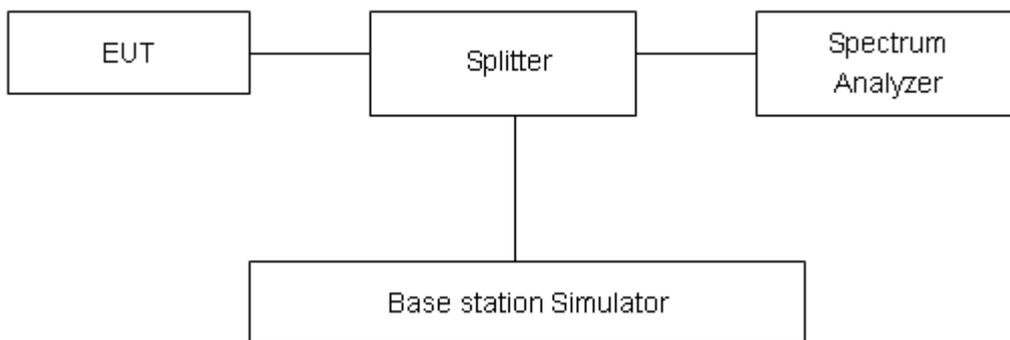
Temperature	Relative humidity
21°C ~25°C	40%~60%

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 peak-to-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.

**Test Results**

Mode	Channel	Frequency (MHz)	Peak(dBm)	Avg(dBm)	PAPR(dB)	Limit(dB)	Conclusion
GSM 1900 (GSM)	512	1850.2	32.71	31.21	1.50	13	PASS
	661	1880	32.27	31.14	1.13	13	PASS
	810	1909.8	32.27	31.11	1.16	13	PASS
GPRS 1900 (GMSK)	512	1850.2	25.23	24.39	0.84	13	PASS
	661	1880	25.19	24.34	0.85	13	PASS
	810	1909.8	25.34	24.43	0.91	13	PASS
EGPRS 1900 (8-PSK)	512	1850.2	20.73	19.86	0.87	13	PASS
	661	1880	20.77	19.81	0.96	13	PASS
	810	1909.8	20.54	19.67	0.87	13	PASS
WCDMA Band II (RMC)	9262	1852.4	25.77	22.47	3.30	13	PASS
	9400	1880	25.73	22.51	3.22	13	PASS
	9538	1907.6	25.88	22.73	3.15	13	PASS



LTE Band 2		Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit(dB)	Conclusion
Modulation	Bandwidth							
QPSK	1.4MHz	18607	1850.7	27.55	22.23	5.32	13	PASS
		18900	1880.0	28.05	22.49	5.56	13	PASS
		19193	1909.3	27.68	22.60	5.08	13	PASS
	3MHz	18615	1851.5	27.59	22.26	5.33	13	PASS
		18900	1880	27.78	22.53	5.25	13	PASS
		19185	1908.5	27.77	22.63	5.14	13	PASS
	5MHz	18625	1852.5	27.65	22.24	5.41	13	PASS
		18900	1880	27.81	22.52	5.29	13	PASS
		19175	1907.5	27.76	22.61	5.15	13	PASS
	10MHz	18650	1855	27.66	22.33	5.33	13	PASS
		18900	1880	27.74	22.55	5.19	13	PASS
		19150	1905	27.65	22.64	5.01	13	PASS
	15MHz	18675	1857.5	27.77	22.30	5.47	13	PASS
		18900	1880	28.20	22.50	5.70	13	PASS
		19125	1902.5	27.88	22.60	5.28	13	PASS
20MHz	18700	1860	27.41	22.27	5.14	13	PASS	
	18900	1880	28.81	22.45	6.36	13	PASS	
	19100	1900	27.54	22.56	4.98	13	PASS	
16QAM	1.4MHz	18607	1850.7	27.53	21.35	6.18	13	PASS
		18900	1880.0	27.42	21.37	6.05	13	PASS
		19193	1909.3	27.39	21.43	5.96	13	PASS
	3MHz	18615	1851.5	27.67	21.38	6.29	13	PASS
		18900	1880	27.46	21.41	6.05	13	PASS
		19185	1908.5	27.56	21.46	6.10	13	PASS
	5MHz	18625	1852.5	27.58	21.36	6.22	13	PASS
		18900	1880	27.48	21.37	6.11	13	PASS
		19175	1907.5	27.44	21.41	6.03	13	PASS
	10MHz	18650	1855	27.58	21.38	6.20	13	PASS
		18900	1880	27.43	21.41	6.02	13	PASS
		19150	1905	27.34	21.44	5.90	13	PASS
	15MHz	18675	1857.5	27.55	21.36	6.19	13	PASS
		18900	1880	27.43	21.37	6.06	13	PASS
		19125	1902.5	27.44	21.41	6.03	13	PASS
20MHz	18700	1860	27.36	21.34	6.02	13	PASS	
	18900	1880	28.56	21.33	7.23	13	PASS	
	19100	1900	27.22	21.38	5.84	13	PASS	

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 +50°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 +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

2. Frequency Stability (Voltage Variation)

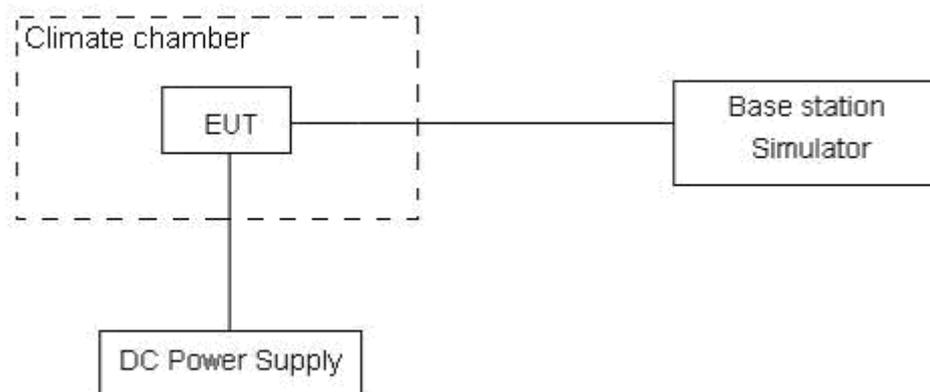
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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



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 $k = 3$, $U = 0.01\text{ppm}$.

Test Result

Mode	Test status	Test Results (ppm)		
		GSM(GMSK)	GPRS(GMSK)	EGPRS(8PSK)
GSM 1900 Middle Channel	-30°C/Normal Voltage	0.0090	0.0124	0.0094
	-20°C/Normal Voltage	-0.0088	0.0112	0.0123
	-10°C/Normal Voltage	0.0065	0.0119	0.0113
	0°C/Normal Voltage	0.0047	0.0145	0.0122
	10°C/Normal Voltage	0.0038	0.0117	0.0106
	20°C/Normal Voltage	0.0092	0.0136	0.0119
	30°C/Normal Voltage	0.0105	0.0153	0.0115
	40°C/Normal Voltage	0.0061	0.0081	0.0144
	50°C/Normal Voltage	0.0075	0.0063	0.0124
	20°C/Min Voltage	-0.0065	0.0045	0.0089
	20°C/Max Voltage	-0.0116	0.0092	0.0080
/	/	RMC		
WCDMA Band II Middle Channel	-30°C/Normal Voltage	-0.000403		
	-20°C/Normal Voltage	-0.000477		
	-10°C/Normal Voltage	-0.000657		
	0°C/Normal Voltage	-0.000054		
	10°C/Normal Voltage	-0.000569		
	20°C/Normal Voltage	-0.000314		
	30°C/Normal Voltage	-0.000022		
	40°C/Normal Voltage	-0.000188		
	50°C/Normal Voltage	-0.000569		
	20°C/Min Voltage	-0.000317		
	20°C/Max Voltage	-0.000483		



Bandwidth	Test status	LTE Band 2 Middle Channel Test Results (ppm)	
		QPSK	16QAM
1.4MHz	-30°C/Normal Voltage	-0.00659	0.00171
	-20°C/Normal Voltage	0.00384	-0.00292
	-10°C/Normal Voltage	0.00500	0.00252
	0°C/Normal Voltage	0.00245	-0.00381
	10°C/Normal Voltage	-0.00457	-0.00464
	20°C/Normal Voltage	0.00744	0.00496
	30°C/Normal Voltage	-0.00380	0.00457
	40°C/Normal Voltage	-0.00497	0.00587
	50°C/Normal Voltage	-0.00534	-0.00516
	20°C/Min Voltage	-0.00305	0.00551
	20°C/Max Voltage	-0.00378	0.00588
3MHz	-30°C/Normal Voltage	-0.00500	0.00331
	-20°C/Normal Voltage	0.00545	-0.00133
	-10°C/Normal Voltage	-0.00659	0.00414
	0°C/Normal Voltage	0.00405	-0.00219
	10°C/Normal Voltage	-0.00296	-0.00301
	20°C/Normal Voltage	0.00903	0.00658
	30°C/Normal Voltage	-0.00220	-0.00619
	40°C/Normal Voltage	-0.00338	0.00745
	50°C/Normal Voltage	0.00377	-0.00355
	20°C/Min Voltage	-0.00145	0.00710
	20°C/Max Voltage	0.00218	0.00750
5MHz	-30°C/Normal Voltage	-0.00653	0.00179
	-20°C/Normal Voltage	0.00391	-0.00288
	-10°C/Normal Voltage	0.00509	0.00261
	0°C/Normal Voltage	0.00244	-0.00372
	10°C/Normal Voltage	-0.00449	-0.00457
	20°C/Normal Voltage	0.00748	0.00506
	30°C/Normal Voltage	-0.00374	0.00467
	40°C/Normal Voltage	-0.00490	0.00595
	50°C/Normal Voltage	-0.00532	-0.00512
	20°C/Min Voltage	-0.00296	0.00561
	20°C/Max Voltage	-0.00372	0.00594
10MHz	-30°C/Normal Voltage	-0.00400	0.00432
	-20°C/Normal Voltage	-0.00643	-0.00033
	-10°C/Normal Voltage	0.00760	-0.00512



	0°C/Normal Voltage	0.00503	-0.00118
	10°C/Normal Voltage	-0.00197	-0.00202
	20°C/Normal Voltage	-0.01002	0.00759
	30°C/Normal Voltage	0.00122	-0.00720
	40°C/Normal Voltage	-0.00239	0.00846
	50°C/Normal Voltage	-0.00279	-0.00258
	20°C/Min Voltage	0.00285	0.00812
	20°C/Max Voltage	-0.00238	0.00848
15MHz	-30°C/Normal Voltage	-0.00655	0.00175
	-20°C/Normal Voltage	0.00387	-0.00294
	-10°C/Normal Voltage	0.00506	0.00258
	0°C/Normal Voltage	0.00240	-0.00377
	10°C/Normal Voltage	-0.00342	-0.00350
	20°C/Normal Voltage	0.00854	0.00613
	30°C/Normal Voltage	-0.00267	0.00573
	40°C/Normal Voltage	-0.00494	0.00589
	50°C/Normal Voltage	-0.00536	-0.00518
	20°C/Min Voltage	-0.00190	0.00665
	20°C/Max Voltage	-0.00265	0.00698
20MHz	-30°C/Normal Voltage	-0.00800	-0.00512
	-20°C/Normal Voltage	0.00244	-0.00434
	-10°C/Normal Voltage	0.00362	0.00591
	0°C/Normal Voltage	-0.00098	-0.00516
	10°C/Normal Voltage	-0.00595	-0.00603
	20°C/Normal Voltage	-0.00603	-0.00357
	30°C/Normal Voltage	0.00521	-0.00318
	40°C/Normal Voltage	-0.00637	0.00446
	50°C/Normal Voltage	0.00678	-0.00660
	20°C/Min Voltage	-0.00444	-0.00411
	20°C/Max Voltage	-0.00518	0.00446

5.7. Spurious Emissions at Antenna Terminals

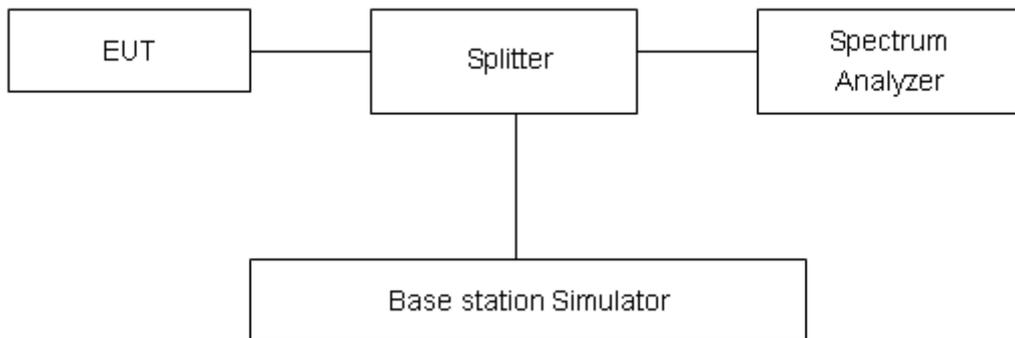
Ambient condition

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 measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used. RBW and VBW are set to 100 kHz, Sweep is set to ATUO.

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

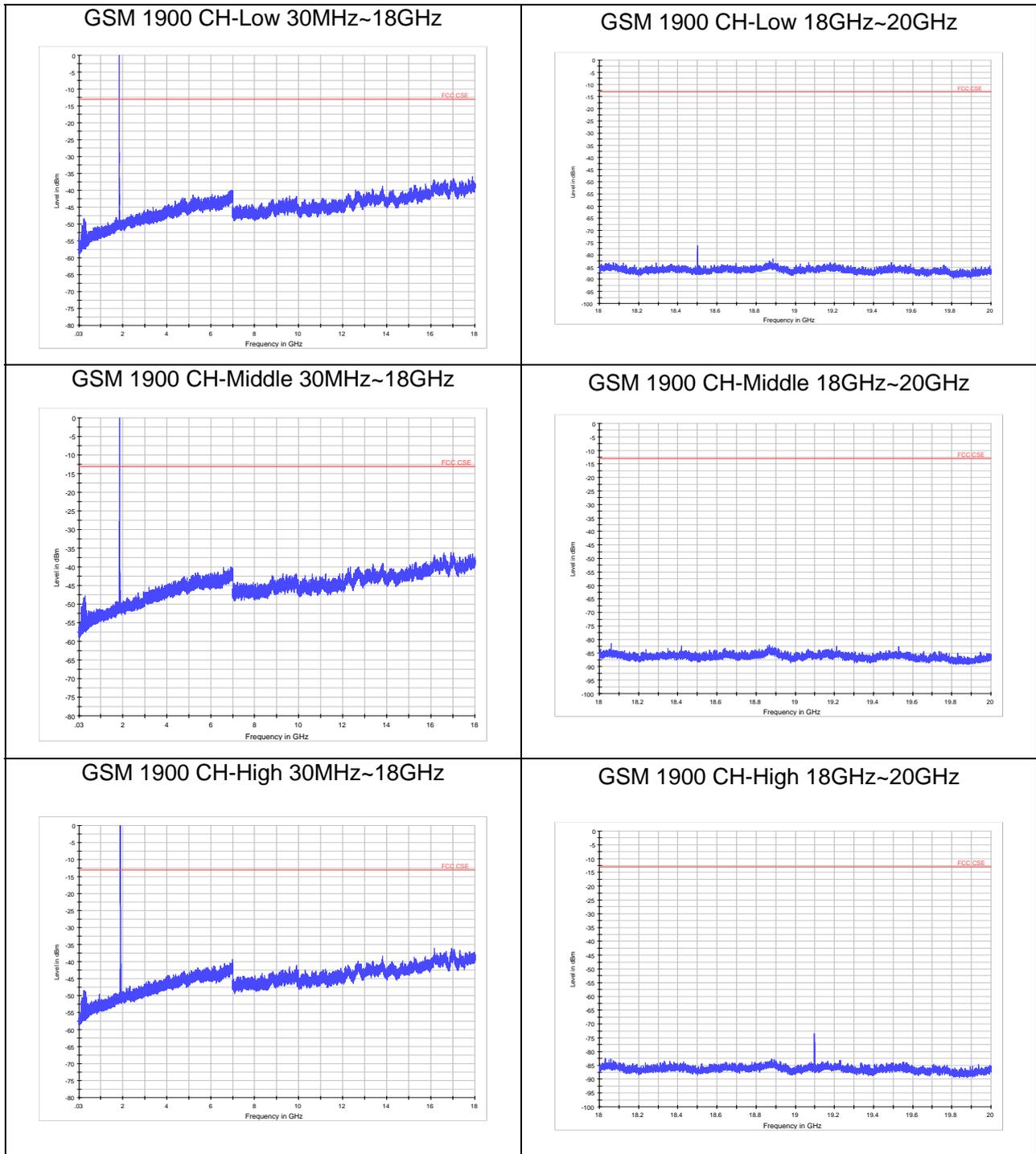
The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-18GHz	1.407 dB

Test Result

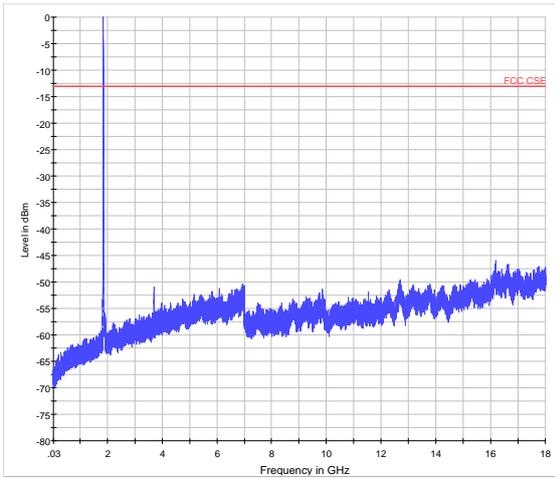
Sweep from 9 kHz to 30MHz, and the emissions more than 20 dB below the permissible value are not reported.

If disturbances were found more than 20dB below limit line, the mark is not required for the EUT.
The signal beyond the limit is carrier.

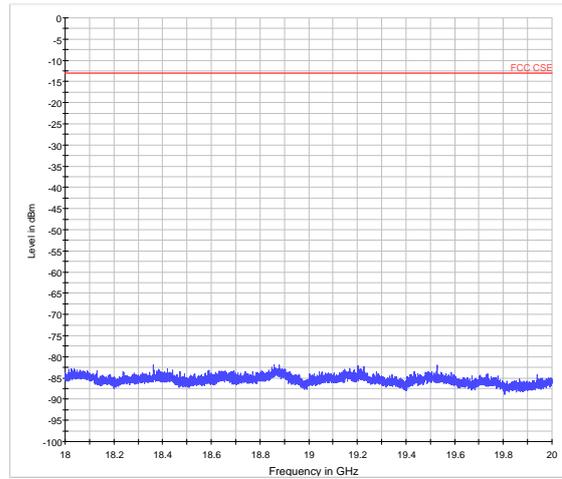




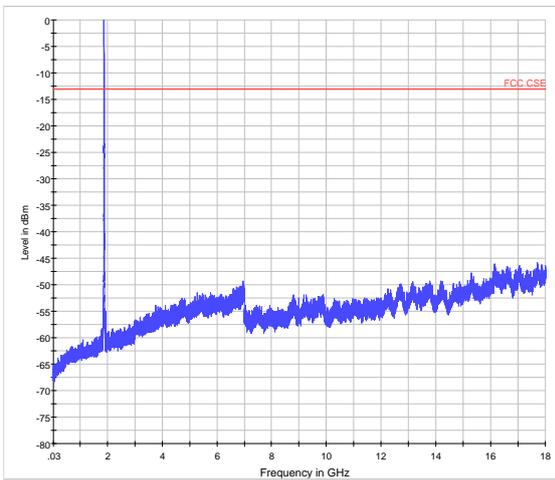
WCDMA Band II CH-Low 30MHz~18GHz



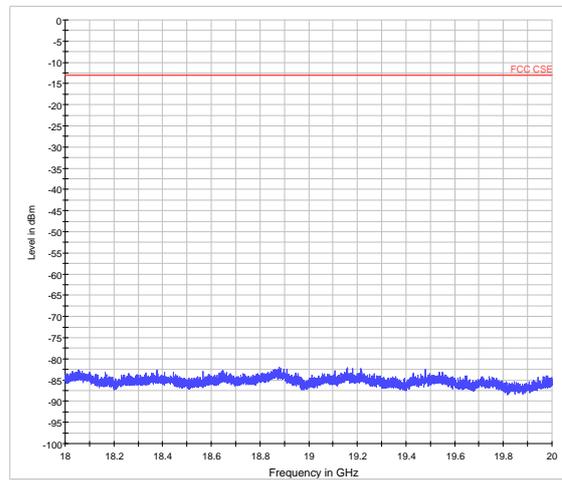
WCDMA Band II CH-Low 18GHz~20GHz



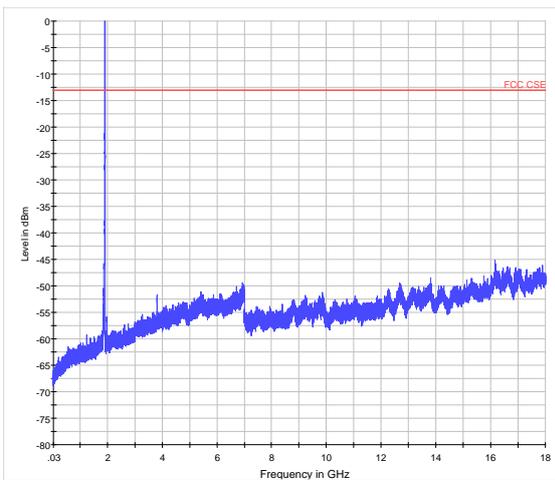
WCDMA Band II CH-Middle 30MHz~18GHz



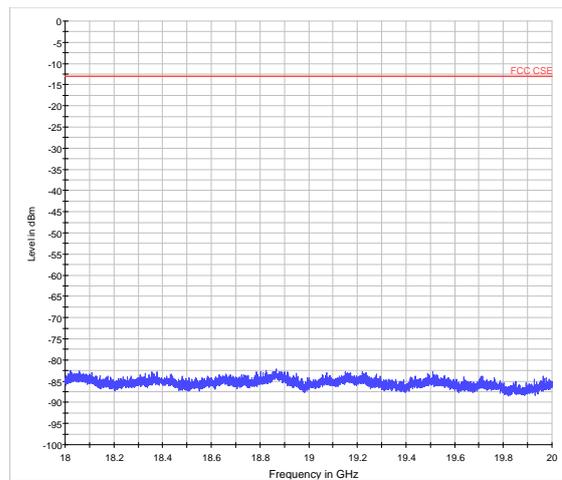
WCDMA Band II CH-Middle 18GHz~20GHz



WCDMA Band II CH-High 30MHz~18GHz

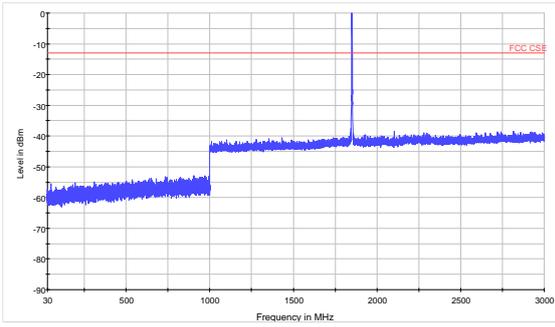


WCDMA Band II CH-High 18GHz~20GHz

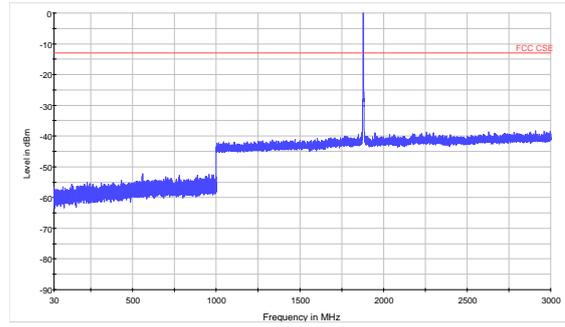




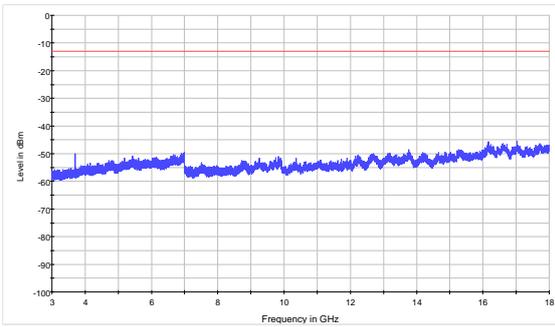
LTE Band 2 1.4MHz CH-Low 30MHz~3GHz



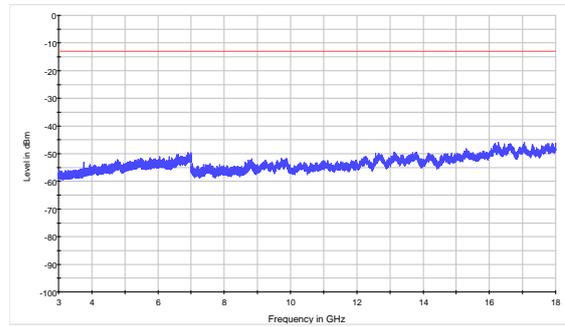
LTE Band 2 1.4MHz CH-Middle 30MHz~3GHz



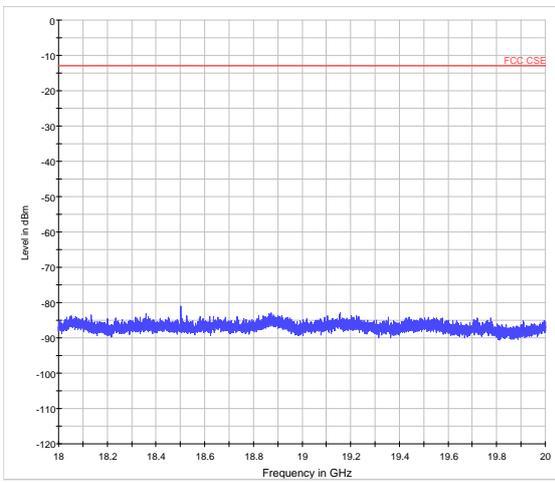
LTE Band 2 1.4MHz CH-Low 3GHz~18GHz



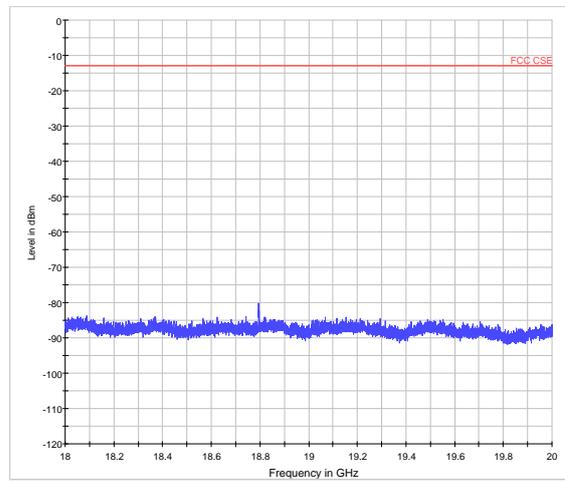
LTE Band 2 1.4MHz CH-Middle 3GHz~18GHz



LTE Band 2 1.4MHz CH-Low 18GHz~20GHz

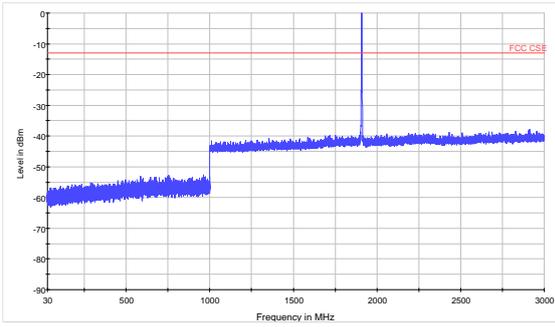


LTE Band 2 1.4MHz CH-Middle 18GHz~20GHz

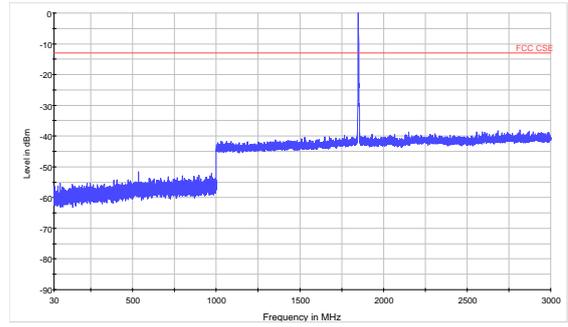




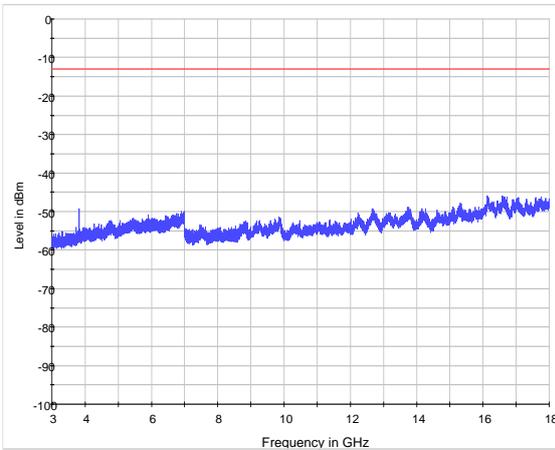
LTE Band 2 1.4MHz CH-High 30MHz~3GHz



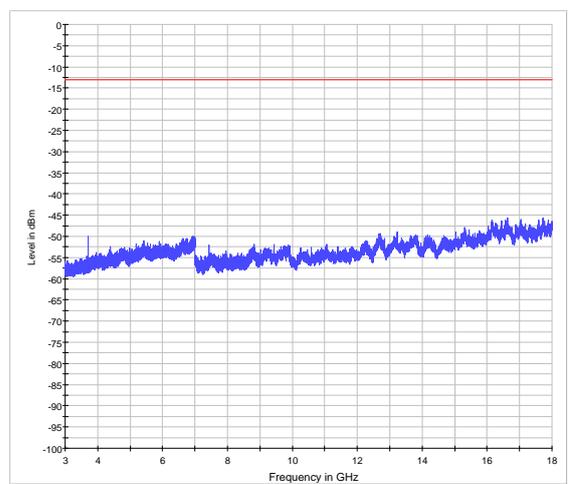
LTE Band 2 3MHz CH-Low 30MHz~3GHz



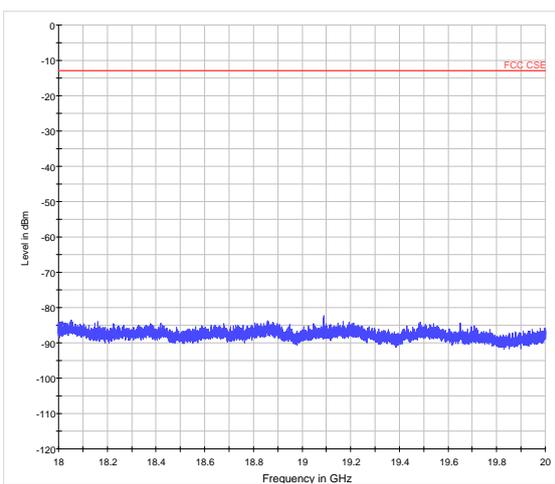
LTE Band 2 1.4MHz CH-High 3GHz~18GHz



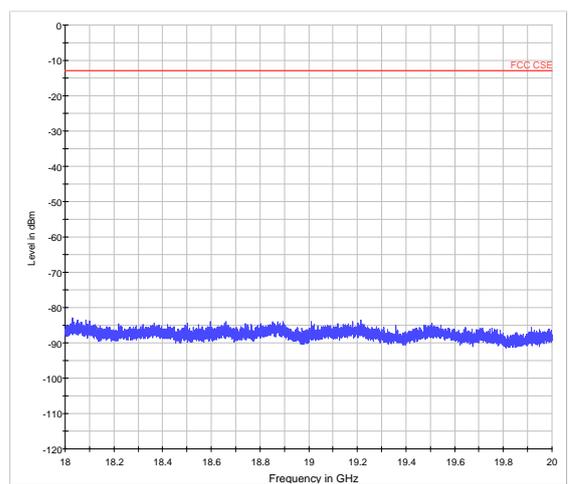
LTE Band 2 3MHz CH-Low 3GHz~18GHz



LTE Band 2 1.4MHz CH-High 18GHz~20GHz

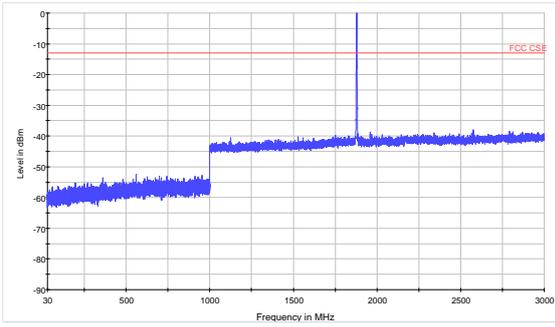


LTE Band 2 3MHz CH-Low 18GHz~20GHz

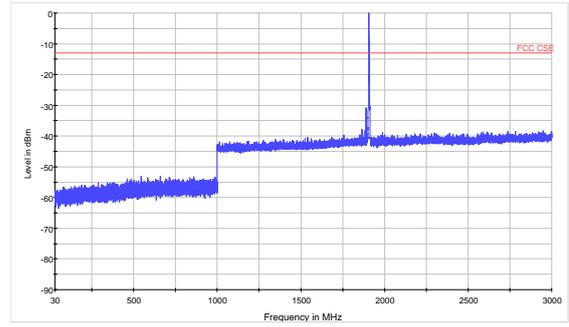




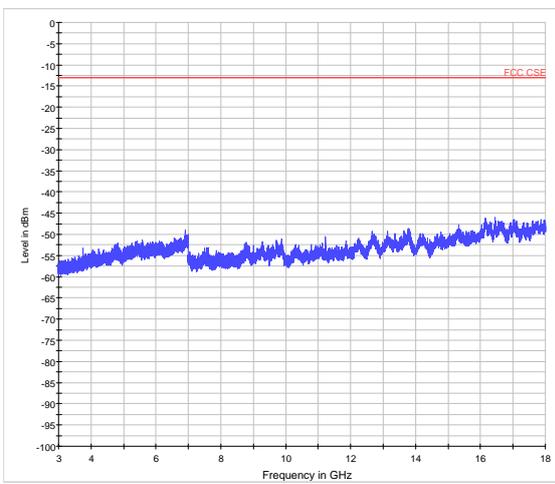
LTE Band 2 3MHz CH-Middle 30MHz~3GHz



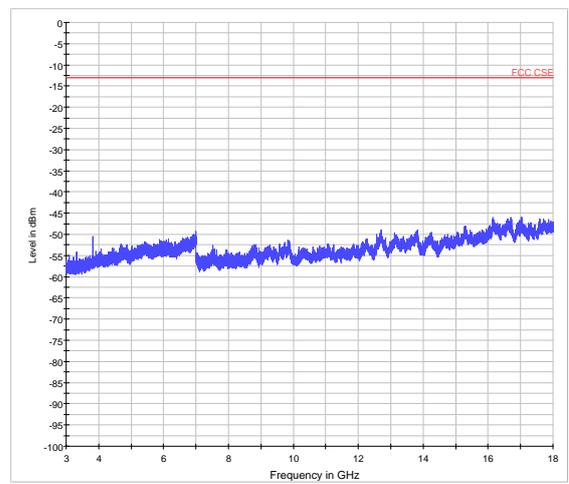
LTE Band 2 3MHz CH-High 30MHz~3GHz



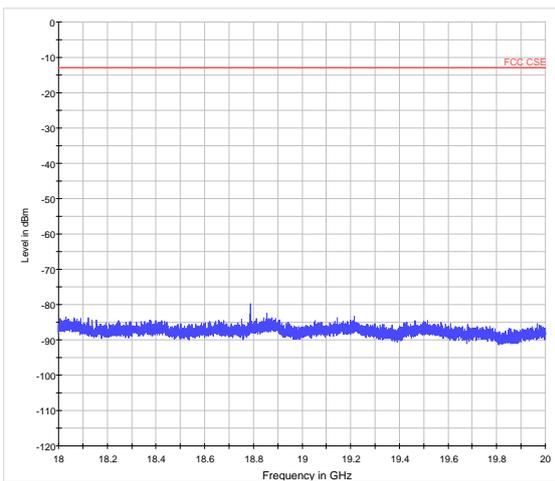
LTE Band 2 3MHz CH-Middle 3GHz~18GHz



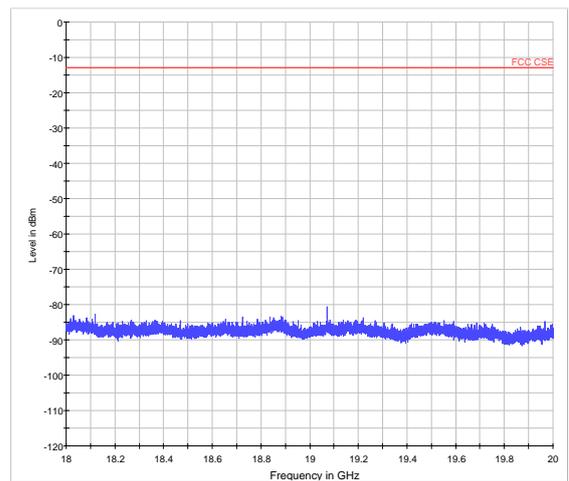
LTE Band 2 3MHz CH-High 3GHz~18GHz



LTE Band 2 3MHz CH-Middle 18GHz~20GHz

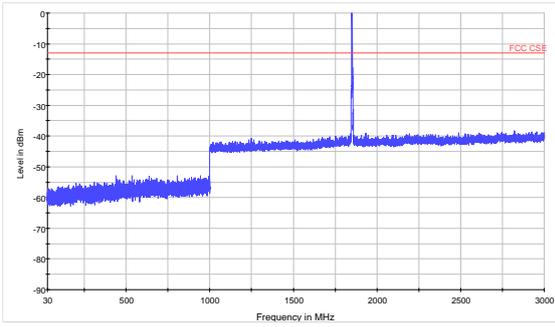


LTE Band 2 3MHz CH-High 18GHz~20GHz

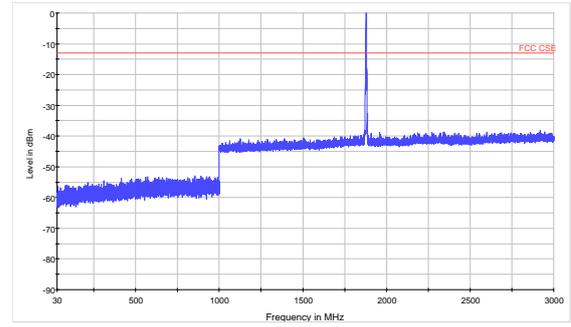




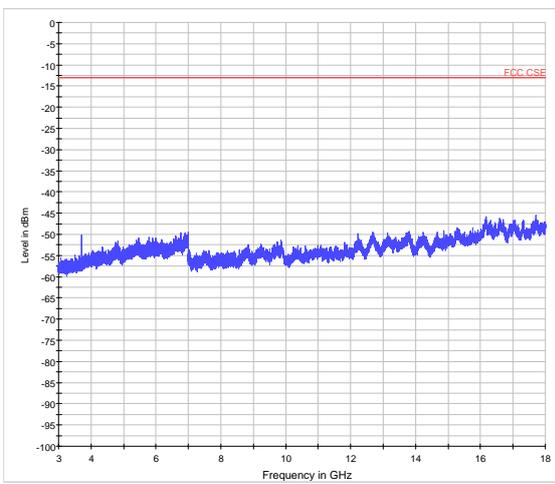
LTE Band 2 5MHz CH-Low 30MHz~3GHz



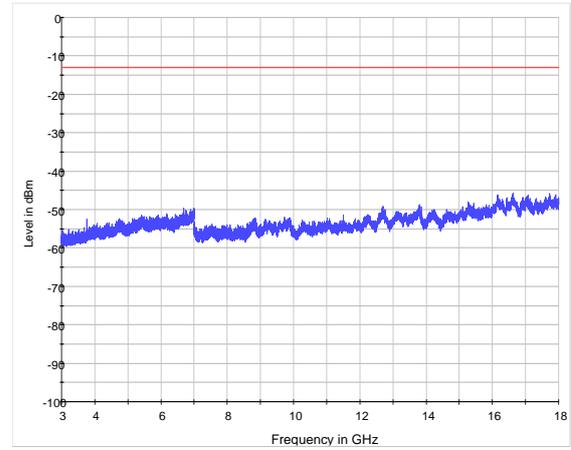
LTE Band 2 5MHz CH-Middle 30MHz~3GHz



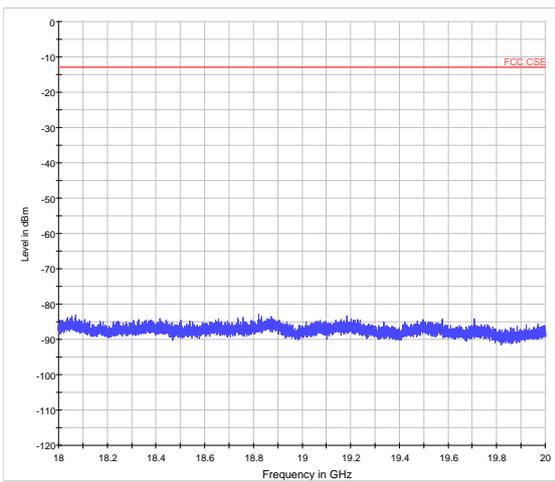
LTE Band 2 5MHz CH-Low 3GHz~18GHz



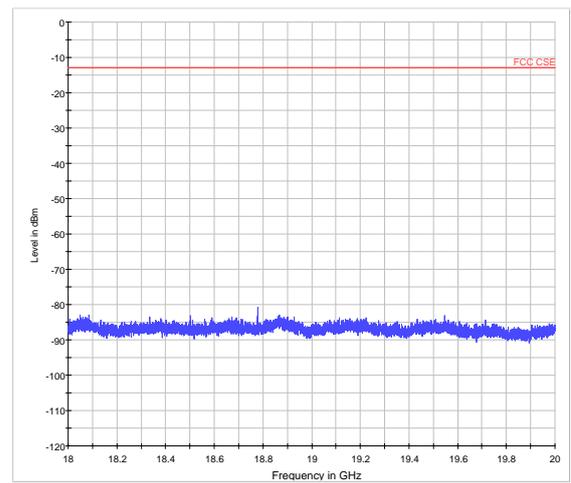
LTE Band 2 5MHz CH-Middle 3GHz~18GHz



LTE Band 2 5MHz CH-Low 18GHz~20GHz

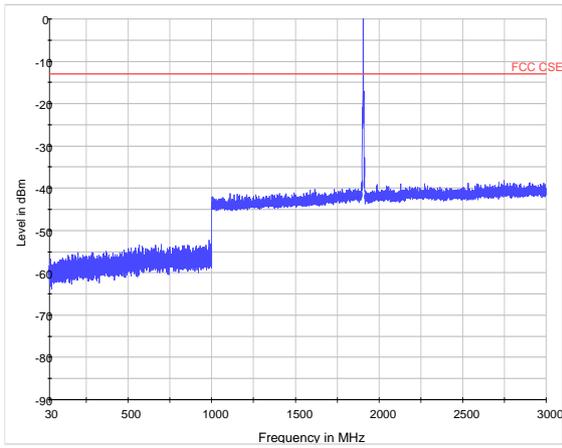


LTE Band 2 5MHz CH-Middle 18GHz~20GHz

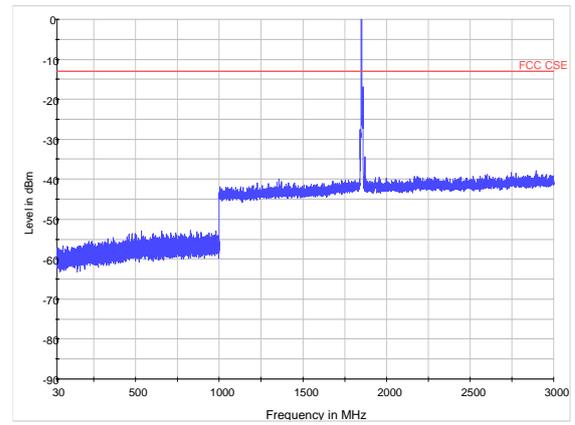




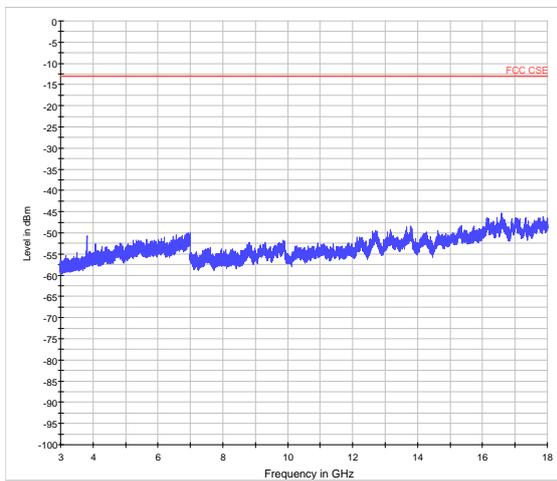
LTE Band 2 5MHz CH-High 30MHz~3GHz



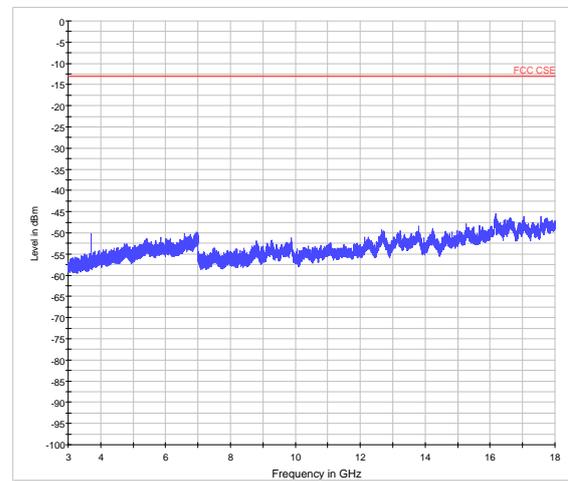
LTE Band 2 10MHz CH-Low 30MHz~3GHz



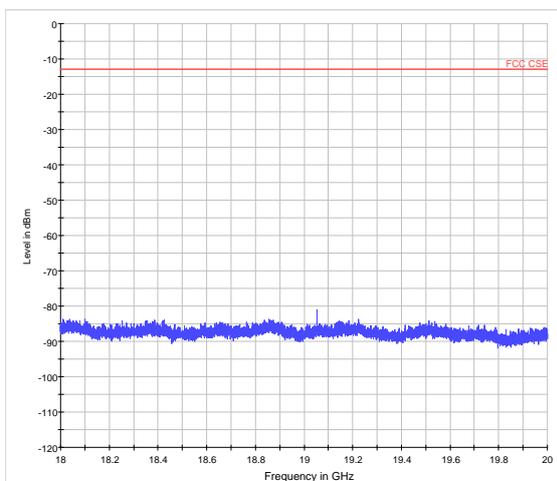
LTE Band 2 5MHz CH-High 3GHz~18GHz



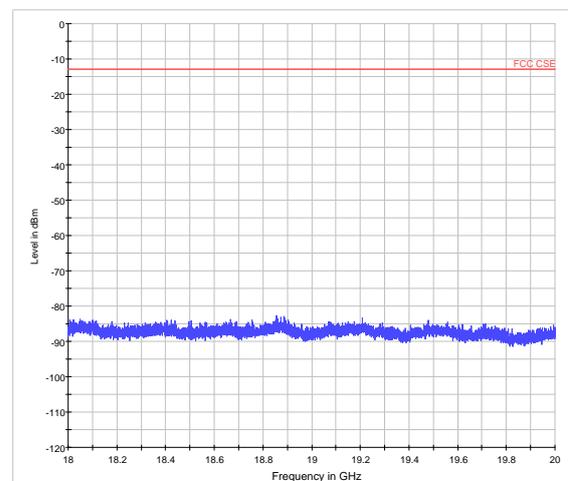
LTE Band 2 10MHz CH-Low 3GHz~18GHz



LTE Band 2 5MHz CH-High 18GHz~20GHz

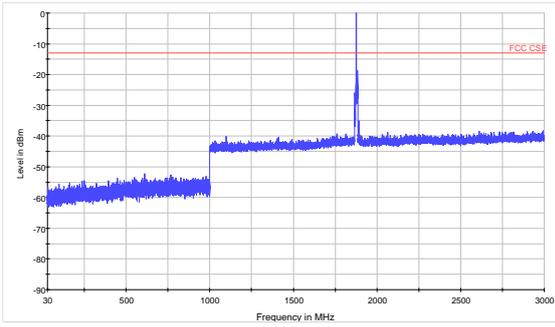


LTE Band 2 10MHz CH-Low 18GHz~20GHz

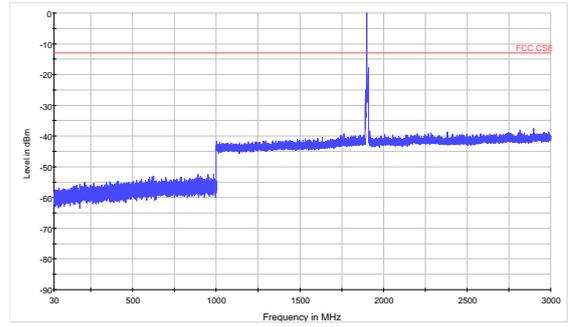




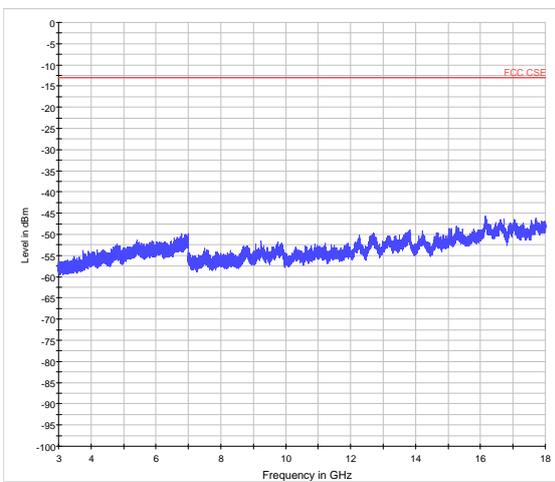
LTE Band 2 10MHz CH-Middle 30MHz~3GHz



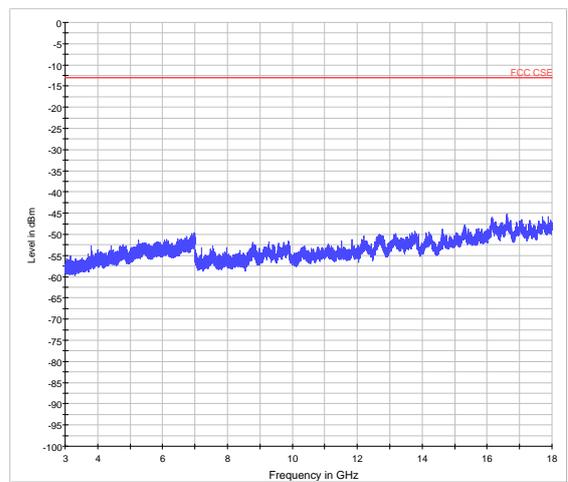
LTE Band 2 10MHz CH-High 30MHz~3GHz



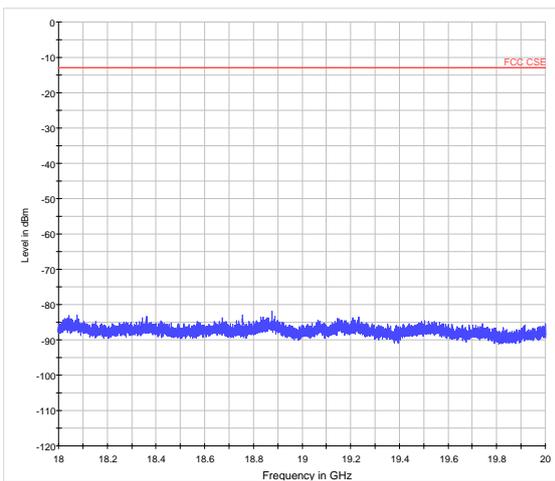
LTE Band 2 10MHz CH-Middle 3GHz~18GHz



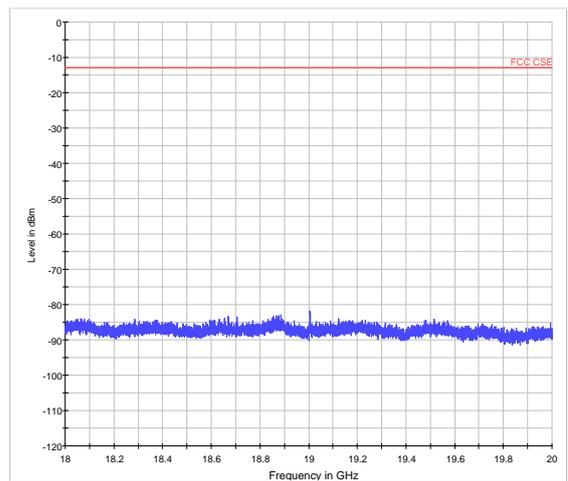
LTE Band 2 10MHz CH-High 3GHz~18GHz



LTE Band 2 10MHz CH-Middle 18GHz~20GHz

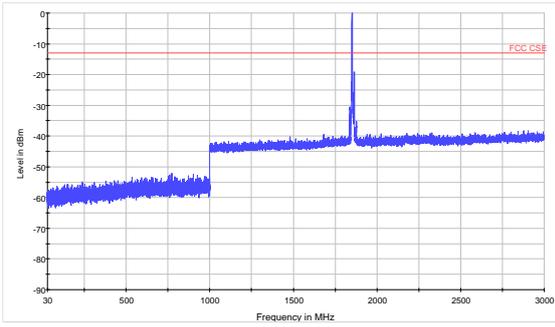


LTE Band 2 10MHz CH-High 18GHz~20GHz

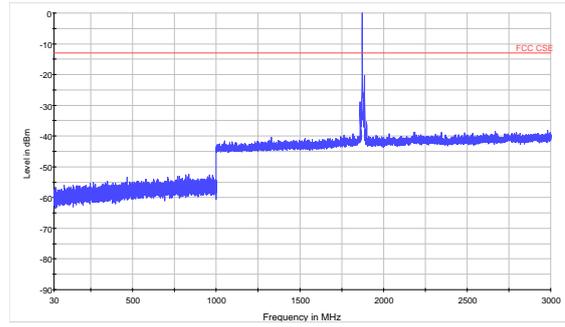




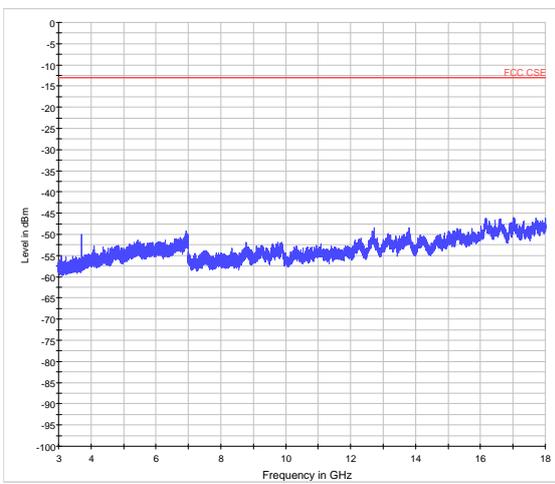
LTE Band 2 15MHz CH-Low 30MHz~3GHz



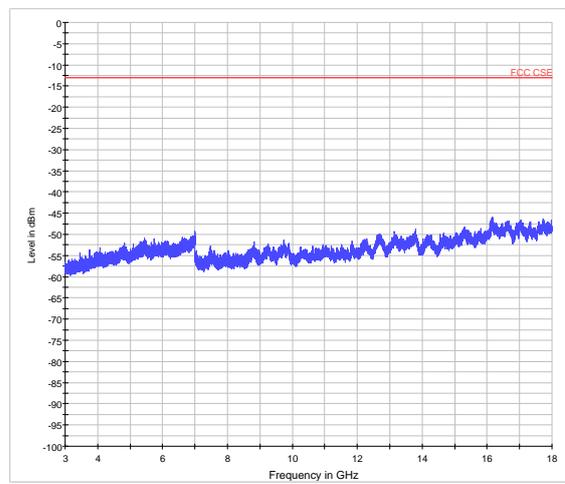
LTE Band 2 15MHz CH-Middle 30MHz~3GHz



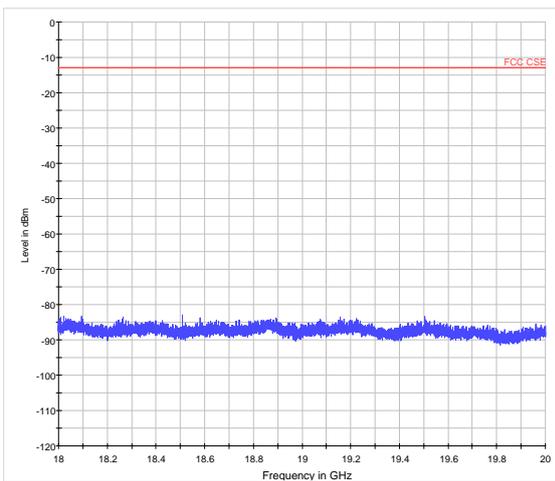
LTE Band 2 15MHz CH-Low 3GHz~18GHz



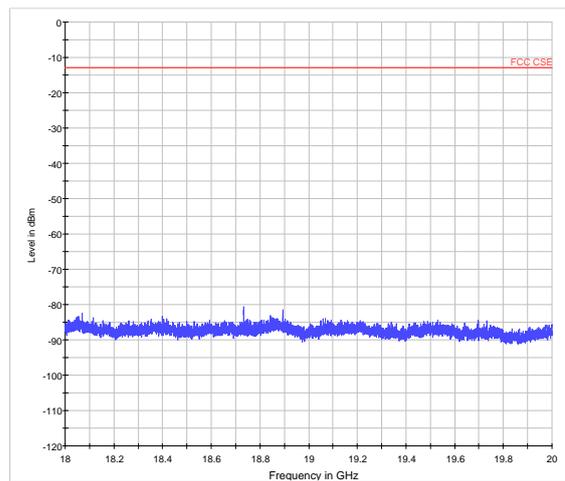
LTE Band 2 15MHz CH-Middle 3GHz~18GHz



LTE Band 2 15MHz CH-Low 18GHz~20GHz

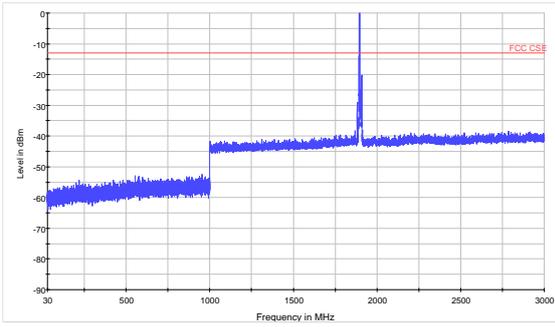


LTE Band 2 15MHz CH-Middle 18GHz~20GHz

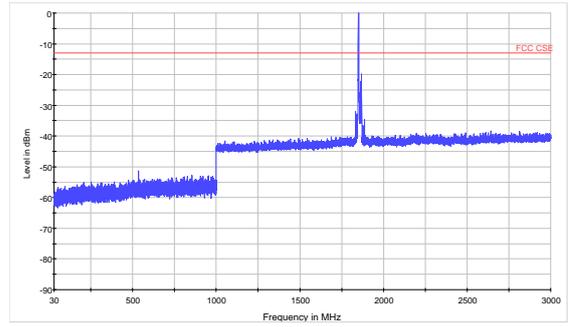




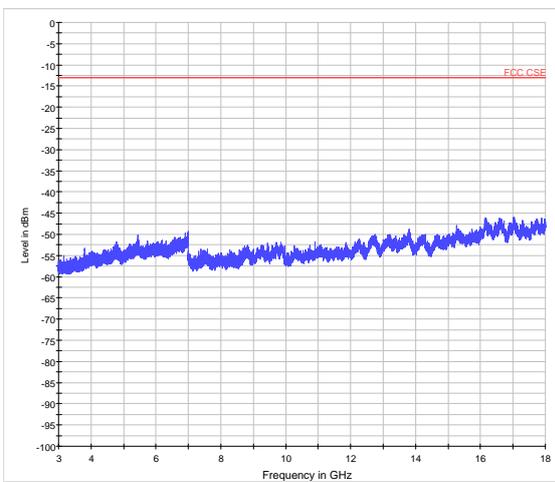
LTE Band 2 15MHz CH-High 30MHz~3GHz



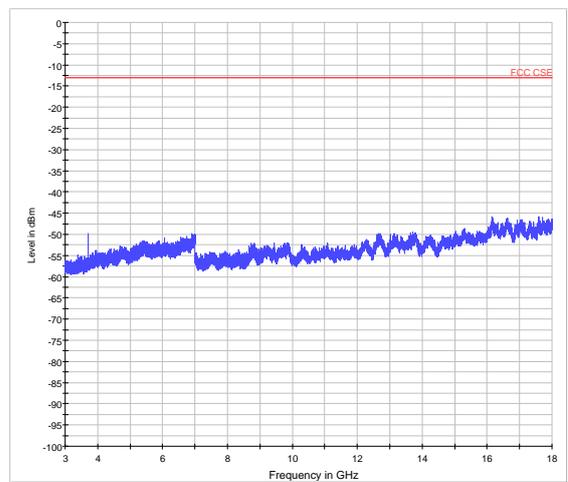
LTE Band 2 20MHz CH-Low 30MHz~3GHz



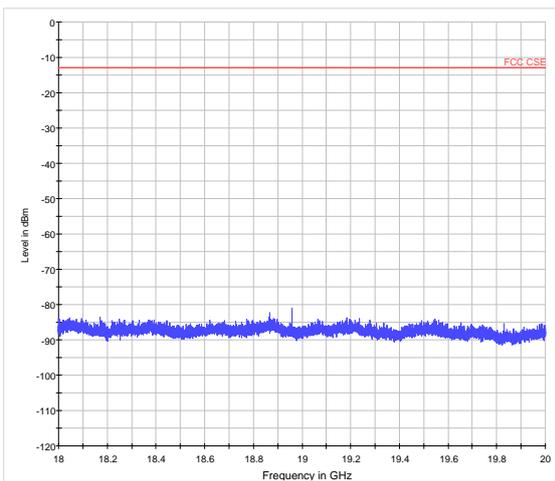
LTE Band 2 15MHz CH-High 3GHz~18GHz



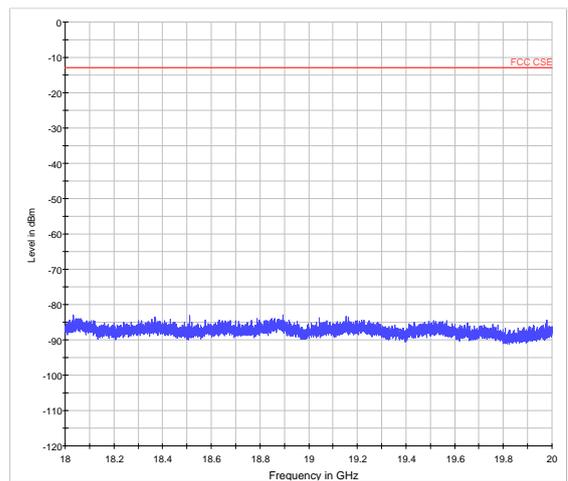
LTE Band 2 20MHz CH-Low 3GHz~18GHz



LTE Band 2 15MHz CH-High 18GHz~20GHz

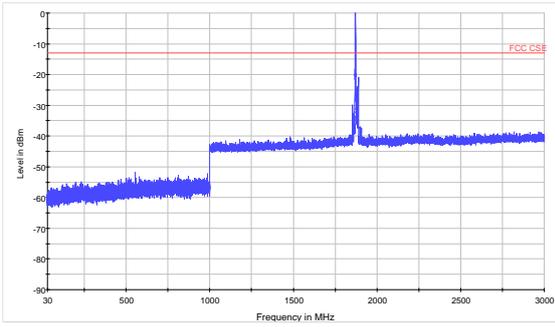


LTE Band 2 20MHz CH-Low 18GHz~20GHz

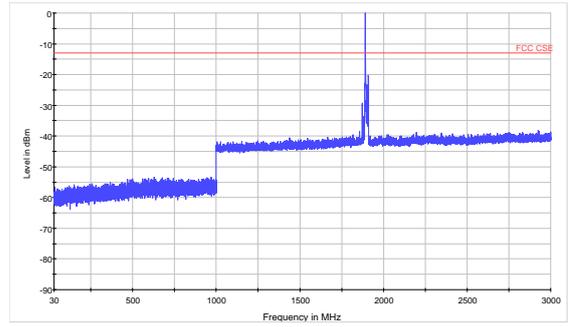




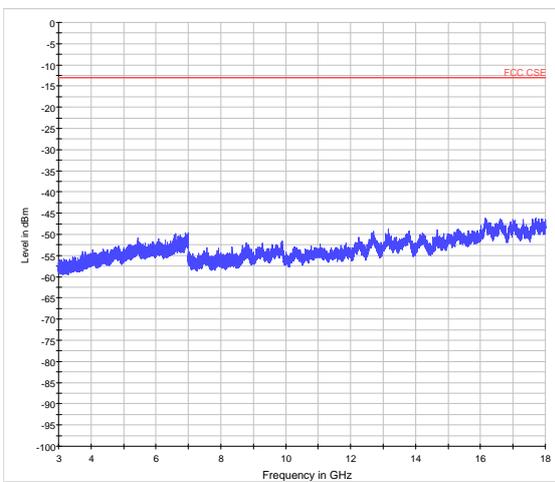
LTE Band 2 20MHz CH-Middle 30MHz~3GHz



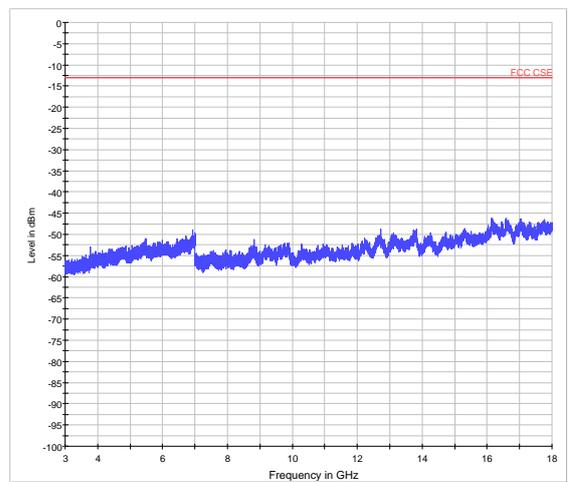
LTE Band 2 20MHz CH-High 30MHz~3GHz



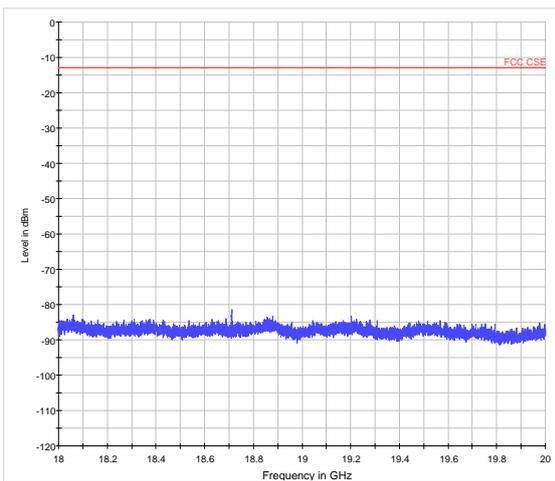
LTE Band 2 20MHz CH-Middle 3GHz~18GHz



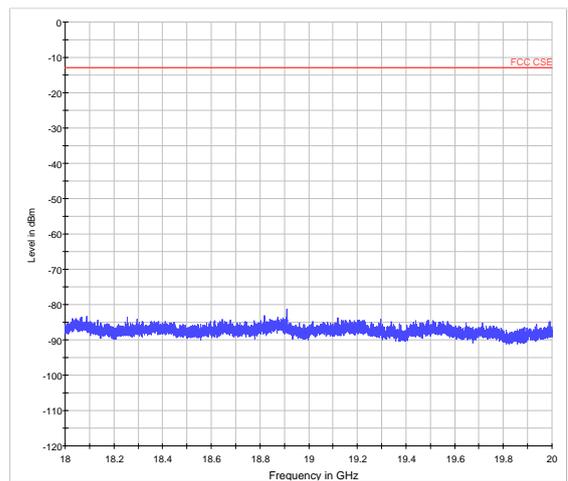
LTE Band 2 20MHz CH-High 3GHz~18GHz



LTE Band 2 20MHz CH-Middle 18GHz~20GHz



LTE Band 2 20MHz CH-High 18GHz~20GHz



5.8. Radiates Spurious Emission

Ambient condition

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

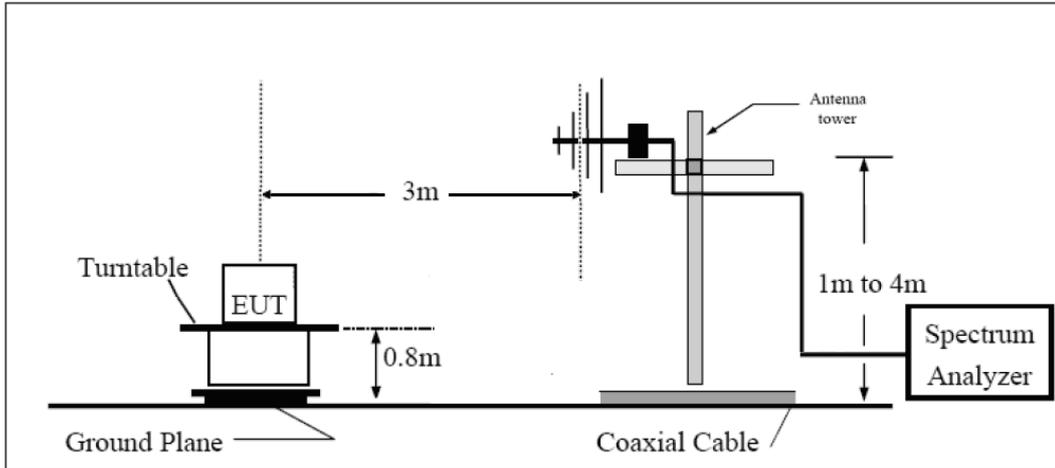
Method of Measurement

1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
2. Above 30MHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100kHz, VBW=300kHz for 30MHz to 1GHz., And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + Ga

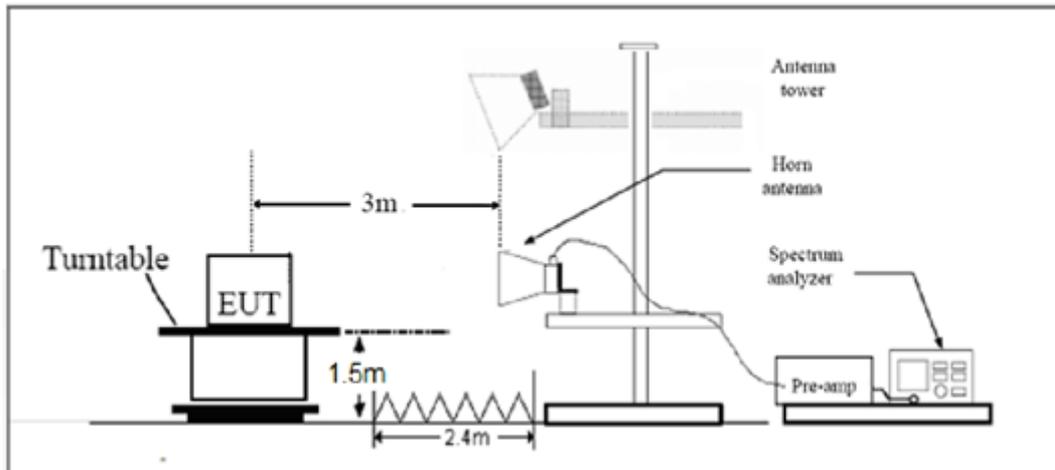
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

Test setup

30MHz~~~ 1GHz



Above 1GHz



Note: Area side: 2.4mX3.6m

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.

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
-------	---------

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U = 3.55$ dB.

**Test Result**

GSM 1900 CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3700.4	-49.27	5.1	11.05	Horizontal	-43.32	-13.00	30.32	45
3	5550.6	-51.13	5.42	12.65	Horizontal	-43.90	-13.00	30.90	90
4	7400.8	-48.65	6.7	13.85	Horizontal	-41.50	-13.00	28.50	45
5	9251.0	-47.34	7.01	14.75	Horizontal	-39.60	-13.00	26.60	0
6	11101.2	-45.63	7.48	15.95	Horizontal	-37.16	-13.00	24.16	135
7	12951.4	-46.54	7.51	16.55	Horizontal	-37.50	-13.00	24.50	180
8	14801.6	-42.47	8.24	15.35	Horizontal	-35.36	-13.00	22.36	315
9	16651.8	-43.24	8.41	14.95	Horizontal	-36.70	-13.00	23.70	270
10	18502.0	-40.97	8.54	15.45	Horizontal	-34.06	-13.00	21.06	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2.The worst emission was found in the antenna is Horizontal position.

GSM 1900 CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3760.0	-54.35	5.1	11.05	Horizontal	-48.40	-13.00	35.40	225
3	5640.0	-52.73	5.42	12.65	Horizontal	-45.50	-13.00	32.50	270
4	7520.0	-50.64	6.7	13.85	Horizontal	-43.49	-13.00	30.49	90
5	9400.0	-47.34	7.01	14.75	Horizontal	-39.60	-13.00	26.60	45
6	11280.0	-46.00	7.48	15.95	Horizontal	-37.53	-13.00	24.53	90
7	13160.0	-45.53	7.51	16.55	Horizontal	-36.49	-13.00	23.49	45
8	15040.0	-40.58	8.24	15.35	Horizontal	-33.47	-13.00	20.47	0
9	16920.0	-40.96	8.41	14.95	Horizontal	-34.42	-13.00	21.42	135
10	18800.0	-40.41	8.54	15.45	Horizontal	-33.50	-13.00	20.50	180

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

GSM 1900 CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3819.6	-53.65	5.1	11.05	Horizontal	-47.70	-13.00	34.70	315
3	5729.4	-51.33	5.42	12.65	Horizontal	-44.10	-13.00	31.10	270
4	7639.2	-48.35	6.7	13.85	Horizontal	-41.20	-13.00	28.20	315
5	9549.0	-47.04	7.01	14.75	Horizontal	-39.30	-13.00	26.30	270
6	11458.8	-43.17	7.48	15.95	Horizontal	-34.70	-13.00	21.70	45
7	13368.6	-44.20	7.51	16.55	Horizontal	-35.16	-13.00	22.16	225
8	15278.4	-42.01	8.24	15.35	Horizontal	-34.90	-13.00	21.90	270
9	17188.2	-40.94	8.41	14.95	Horizontal	-34.40	-13.00	21.40	90
10	19098.0	-40.41	8.54	15.45	Horizontal	-33.50	-13.00	20.50	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2. The worst emission was found in the antenna is Horizontal position.

WCDMA Band II CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3704.8	-53.93	5.1	11.05	Horizontal	-47.98	-13.00	34.98	45
3	5557.2	-50.99	5.42	12.65	Horizontal	-43.76	-13.00	30.76	0
4	7409.6	-47.15	6.7	13.85	Horizontal	-40.00	-13.00	27.00	135
5	9262.0	-46.29	7.01	14.75	Horizontal	-38.55	-13.00	25.55	180
6	11114.4	-44.67	7.48	15.95	Horizontal	-36.20	-13.00	23.20	315
7	12966.8	-43.22	7.51	16.55	Horizontal	-34.18	-13.00	21.18	270
8	14819.2	-42.61	8.24	15.35	Horizontal	-35.50	-13.00	22.50	45
9	16671.6	-40.23	8.41	14.95	Horizontal	-33.69	-13.00	20.69	225
10	18524.0	-39.41	8.54	15.45	Horizontal	-32.50	-13.00	19.50	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.



WCDMA Band II CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3760.0	-54.02	5.1	11.05	Horizontal	-48.07	-13.00	35.07	90
3	5640.0	-50.43	5.42	12.65	Horizontal	-43.20	-13.00	30.20	45
4	7520.0	-47.65	6.7	13.85	Horizontal	-40.50	-13.00	27.50	90
5	9400.0	-45.87	7.01	14.75	Horizontal	-38.13	-13.00	25.13	45
6	11280.0	-43.78	7.48	15.95	Horizontal	-35.31	-13.00	22.31	0
7	13160.0	-43.24	7.51	16.55	Horizontal	-34.20	-13.00	21.20	135
8	15040.0	-41.11	8.24	15.35	Horizontal	-34.00	-13.00	21.00	180
9	16920.0	-40.04	8.41	14.95	Horizontal	-33.50	-13.00	20.50	315
10	18800.0	-40.01	8.54	15.45	Horizontal	-33.10	-13.00	20.10	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is Horizontal position.

WCDMA Band II CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3815.2	-53.18	5.1	11.05	Horizontal	-47.23	-13.00	34.23	315
3	5722.8	-48.13	5.42	12.65	Horizontal	-40.90	-13.00	27.90	270
4	7630.4	-46.95	6.7	13.85	Horizontal	-39.80	-13.00	26.80	45
5	9538.0	-45.11	7.01	14.75	Horizontal	-37.37	-13.00	24.37	225
6	11445.6	-44.17	7.48	15.95	Horizontal	-35.70	-13.00	22.70	270
7	13353.2	-43.84	7.51	16.55	Horizontal	-34.80	-13.00	21.80	90
8	15260.8	-42.50	8.24	15.35	Horizontal	-35.39	-13.00	22.39	45
9	17168.4	-40.49	8.41	14.95	Horizontal	-33.95	-13.00	20.95	90
10	19076.0	-39.41	8.54	15.45	Horizontal	-32.50	-13.00	19.50	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is Horizontal position.



LTE Band 2 1.4MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3700.9	-50.89	5.1	11.05	Horizontal	-44.94	-13.00	31.94	225
3	5551.1	-43.32	5.42	12.65	Horizontal	-36.09	-13.00	23.09	270
4	7401.4	-50.39	6.7	13.85	Horizontal	-43.24	-13.00	30.24	90
5	9251.6	-49.23	7.01	14.75	Horizontal	-41.49	-13.00	28.49	45
6	11101.9	-47.86	7.48	15.95	Horizontal	-39.39	-13.00	26.39	90
7	12952.1	-47.84	7.51	16.55	Horizontal	-38.80	-13.00	25.80	45
8	14802.4	-42.70	8.24	15.35	Horizontal	-35.59	-13.00	22.59	0
9	16652.6	-42.91	8.41	14.95	Horizontal	-36.37	-13.00	23.37	135
10	18502.9	-42.41	8.54	15.45	Horizontal	-35.50	-13.00	22.50	180

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 1.4MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3760.0	-52.76	5.10	11.05	Horizontal	-46.81	-13.00	33.81	270
3	5640.0	-42.81	5.42	12.65	Horizontal	-35.58	-13.00	22.58	0
4	7520.0	-48.43	6.70	13.85	Horizontal	-41.28	-13.00	28.28	135
5	9400.0	-48.68	7.01	14.75	Horizontal	-40.94	-13.00	27.94	180
6	11280.0	-46.26	7.48	15.95	Horizontal	-37.79	-13.00	24.79	315
7	13160.0	-47.74	7.51	16.55	Horizontal	-38.70	-13.00	25.70	270
8	15040.0	-44.90	8.24	15.35	Horizontal	-37.79	-13.00	24.79	45
9	16920.0	-43.04	8.41	14.95	Horizontal	-36.50	-13.00	23.50	225
10	18800.0	-42.41	8.54	15.45	Horizontal	-35.50	-13.00	22.50	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 1.4MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3817.4	-43.88	5.10	11.05	Horizontal	-37.93	-13.00	24.93	45
3	5726.6	-38.35	5.42	12.65	Horizontal	-31.12	-13.00	18.12	90
4	7637.2	-49.45	6.70	13.85	Horizontal	-42.30	-13.00	29.30	45
5	9546.5	-49.56	7.01	14.75	Horizontal	-41.82	-13.00	28.82	0
6	11455.8	-44.71	7.48	15.95	Horizontal	-36.24	-13.00	23.24	135
7	13365.1	-45.29	7.51	16.55	Horizontal	-36.25	-13.00	23.25	180
8	15274.4	-44.38	8.24	15.35	Horizontal	-37.27	-13.00	24.27	315
9	17183.7	-43.02	8.41	14.95	Horizontal	-36.48	-13.00	23.48	270
10	19093.0	-42.61	8.54	15.45	Horizontal	-35.70	-13.00	22.70	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 3MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3701.6	-52.90	5.10	11.05	Horizontal	-46.95	-13.00	33.95	270
3	5556.8	-47.27	5.42	12.65	Horizontal	-40.04	-13.00	27.04	90
4	7406.0	-45.56	6.70	13.85	Horizontal	-38.41	-13.00	25.41	45
5	9257.5	-49.40	7.01	14.75	Horizontal	-41.66	-13.00	28.66	90
6	11109.0	-47.27	7.48	15.95	Horizontal	-38.80	-13.00	25.80	45
7	12960.5	-45.39	7.51	16.55	Horizontal	-36.35	-13.00	23.35	0
8	14812.0	-42.29	8.24	15.35	Horizontal	-35.18	-13.00	22.18	135
9	16663.5	-43.34	8.41	14.95	Horizontal	-36.80	-13.00	23.80	180
10	18515.0	-42.51	8.54	15.45	Horizontal	-35.60	-13.00	22.60	315

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.



LTE Band 2 3MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3757.5	-51.49	5.10	11.05	Horizontal	-45.54	-13.00	32.54	45
3	5636.6	-41.81	5.42	12.65	Horizontal	-34.58	-13.00	21.58	225
4	7520.0	-46.12	6.70	13.85	Horizontal	-38.97	-13.00	25.97	270
5	9400.0	-47.96	7.01	14.75	Horizontal	-40.22	-13.00	27.22	90
6	11280.0	-46.92	7.48	15.95	Horizontal	-38.45	-13.00	25.45	45
7	13160.0	-48.01	7.51	16.55	Horizontal	-38.97	-13.00	25.97	90
8	15040.0	-45.30	8.24	15.35	Horizontal	-38.19	-13.00	25.19	45
9	16920.0	-43.20	8.41	14.95	Horizontal	-36.66	-13.00	23.66	0
10	18800.0	-42.41	8.54	15.45	Horizontal	-35.50	-13.00	22.50	135

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 3MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3814.1	-48.71	5.10	11.05	Horizontal	-42.76	-13.00	29.76	315
3	5721.8	-39.34	5.42	12.65	Horizontal	-32.11	-13.00	19.11	270
4	7634.0	-48.21	6.70	13.85	Horizontal	-41.06	-13.00	28.06	45
5	9542.5	-49.12	7.01	14.75	Horizontal	-41.38	-13.00	28.38	225
6	11451.0	-46.90	7.48	15.95	Horizontal	-38.43	-13.00	25.43	270
7	13359.5	-46.29	7.51	16.55	Horizontal	-37.25	-13.00	24.25	90
8	15268.0	-44.75	8.24	15.35	Horizontal	-37.64	-13.00	24.64	45
9	17176.5	-42.16	8.41	14.95	Horizontal	-35.62	-13.00	22.62	90
10	19085.0	-41.41	8.54	15.45	Horizontal	-34.50	-13.00	21.50	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 5MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3704.6	-53.28	5.10	11.05	Horizontal	-47.33	-13.00	34.33	135
3	5554.5	-48.52	5.42	12.65	Horizontal	-41.29	-13.00	28.29	180
4	7410.0	-46.62	6.70	13.85	Horizontal	-39.47	-13.00	26.47	315
5	9262.5	-48.02	7.01	14.75	Horizontal	-40.28	-13.00	27.28	270
6	11115.0	-47.56	7.48	15.95	Horizontal	-39.09	-13.00	26.09	45
7	12967.5	-47.25	7.51	16.55	Horizontal	-38.21	-13.00	25.21	225
8	14820.0	-42.95	8.24	15.35	Horizontal	-35.84	-13.00	22.84	270
9	16672.5	-42.20	8.41	14.95	Horizontal	-35.66	-13.00	22.66	90
10	18525.0	-42.11	8.54	15.45	Horizontal	-35.20	-13.00	22.20	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 5MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3762.4	-54.02	5.10	11.05	Horizontal	-48.07	-13.00	35.07	45
3	5636.6	-42.19	5.42	12.65	Horizontal	-34.96	-13.00	21.96	0
4	7520.0	-47.36	6.70	13.85	Horizontal	-40.21	-13.00	27.21	135
5	9400.0	-49.79	7.01	14.75	Horizontal	-42.05	-13.00	29.05	180
6	11280.0	-45.30	7.48	15.95	Horizontal	-36.83	-13.00	23.83	315
7	13160.0	-46.34	7.51	16.55	Horizontal	-37.30	-13.00	24.30	270
8	15040.0	-45.08	8.24	15.35	Horizontal	-37.97	-13.00	24.97	45
9	16920.0	-41.47	8.41	14.95	Horizontal	-34.93	-13.00	21.93	225
10	18800.0	-41.01	8.54	15.45	Horizontal	-34.10	-13.00	21.10	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 5MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3810.4	-50.55	5.10	11.05	Horizontal	-44.60	-13.00	31.60	45
3	5716.1	-39.94	5.42	12.65	Horizontal	-32.71	-13.00	19.71	90
4	7630.0	-47.36	6.70	13.85	Horizontal	-40.21	-13.00	27.21	45
5	9537.5	-49.79	7.01	14.75	Horizontal	-42.05	-13.00	29.05	0
6	11445.0	-45.30	7.48	15.95	Horizontal	-36.83	-13.00	23.83	135
7	13352.5	-46.34	7.51	16.55	Horizontal	-37.30	-13.00	24.30	180
8	15260.0	-45.08	8.24	15.35	Horizontal	-37.97	-13.00	24.97	315
9	17167.5	-41.47	8.41	14.95	Horizontal	-34.93	-13.00	21.93	270
10	19075.0	-41.84	8.54	15.45	Horizontal	-34.93	-13.00	21.93	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 10MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3701.3	-48.76	5.10	11.05	Horizontal	-42.81	-13.00	29.81	270
3	5551.9	-41.51	5.42	12.65	Horizontal	-34.28	-13.00	21.28	90
4	7420.0	-49.16	6.70	13.85	Horizontal	-42.01	-13.00	29.01	45
5	9275.0	-48.02	7.01	14.75	Horizontal	-40.28	-13.00	27.28	90
6	11130.0	-47.18	7.48	15.95	Horizontal	-38.71	-13.00	25.71	45
7	12985.0	-45.90	7.51	16.55	Horizontal	-36.86	-13.00	23.86	0
8	14840.0	-43.21	8.24	15.35	Horizontal	-36.10	-13.00	23.10	135
9	16695.0	-43.21	8.41	14.95	Horizontal	-36.67	-13.00	23.67	180
10	18550.0	-42.51	8.54	15.45	Horizontal	-35.60	-13.00	22.60	315

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 10MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3751.1	-53.72	5.10	11.05	Horizontal	-47.77	-13.00	34.77	45
3	5627.0	-41.94	5.42	12.65	Horizontal	-34.71	-13.00	21.71	225
4	7520.0	-46.58	6.70	13.85	Horizontal	-39.43	-13.00	26.43	270
5	9400.0	-47.92	7.01	14.75	Horizontal	-40.18	-13.00	27.18	90
6	11280.0	-45.91	7.48	15.95	Horizontal	-37.44	-13.00	24.44	45
7	13160.0	-47.73	7.51	16.55	Horizontal	-38.69	-13.00	25.69	90
8	15040.0	-44.02	8.24	15.35	Horizontal	-36.91	-13.00	23.91	45
9	16920.0	-42.74	8.41	14.95	Horizontal	-36.20	-13.00	23.20	0
10	18800.0	-41.11	8.54	15.45	Horizontal	-34.20	-13.00	21.20	135

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 10MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3801.0	-47.42	5.10	11.05	Horizontal	-41.47	-13.00	28.47	315
3	5702.0	-42.74	5.42	12.65	Horizontal	-35.51	-13.00	22.51	270
4	7620.0	-49.99	6.70	13.85	Horizontal	-42.84	-13.00	29.84	45
5	9525.0	-50.09	7.01	14.75	Horizontal	-42.35	-13.00	29.35	225
6	11430.0	-45.35	7.48	15.95	Horizontal	-36.88	-13.00	23.88	270
7	13335.0	-45.68	7.51	16.55	Horizontal	-36.64	-13.00	23.64	90
8	15240.0	-43.88	8.24	15.35	Horizontal	-36.77	-13.00	23.77	45
9	17145.0	-42.02	8.41	14.95	Horizontal	-35.48	-13.00	22.48	90
10	19050.0	-41.79	8.54	15.45	Horizontal	-34.88	-13.00	21.88	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 15MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3701.3	-48.93	5.10	11.05	Horizontal	-42.98	-13.00	29.98	135
3	5552.6	-41.06	5.42	12.65	Horizontal	-33.83	-13.00	20.83	180
4	7430.0	-50.24	6.70	13.85	Horizontal	-43.09	-13.00	30.09	315
5	9287.5	-47.26	7.01	14.75	Horizontal	-39.52	-13.00	26.52	270
6	11145.0	-47.45	7.48	15.95	Horizontal	-38.98	-13.00	25.98	45
7	13002.5	-46.93	7.51	16.55	Horizontal	-37.89	-13.00	24.89	225
8	14860.0	-43.89	8.24	15.35	Horizontal	-36.78	-13.00	23.78	270
9	16717.5	-42.80	8.41	14.95	Horizontal	-36.26	-13.00	23.26	90
10	18575.0	-42.51	8.54	15.45	Horizontal	-35.60	-13.00	22.60	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 15MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3746.6	-53.15	5.10	11.05	Horizontal	-47.20	-13.00	34.20	45
3	5620.1	-41.50	5.42	12.65	Horizontal	-34.27	-13.00	21.27	0
4	7520.0	-46.20	6.70	13.85	Horizontal	-39.05	-13.00	26.05	135
5	9400.0	-48.31	7.01	14.75	Horizontal	-40.57	-13.00	27.57	180
6	11280.0	-46.55	7.48	15.95	Horizontal	-38.08	-13.00	25.08	315
7	13160.0	-48.32	7.51	16.55	Horizontal	-39.28	-13.00	26.28	270
8	15040.0	-44.03	8.24	15.35	Horizontal	-36.92	-13.00	23.92	45
9	16920.0	-43.63	8.41	14.95	Horizontal	-37.09	-13.00	24.09	225
10	18800.0	-42.31	8.54	15.45	Horizontal	-35.40	-13.00	22.40	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 15MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3792.0	-46.98	5.10	11.05	Horizontal	-41.03	-13.00	28.03	45
3	5688.0	-43.24	5.42	12.65	Horizontal	-36.01	-13.00	23.01	90
4	7610.0	-46.10	6.70	13.85	Horizontal	-38.95	-13.00	25.95	45
5	9512.5	-49.89	7.01	14.75	Horizontal	-42.15	-13.00	29.15	0
6	11415.0	-45.18	7.48	15.95	Horizontal	-36.71	-13.00	23.71	135
7	13317.5	-45.53	7.51	16.55	Horizontal	-36.49	-13.00	23.49	180
8	15220.0	-43.95	8.24	15.35	Horizontal	-36.84	-13.00	23.84	315
9	17122.5	-41.80	8.41	14.95	Horizontal	-35.26	-13.00	22.26	270
10	19025.0	-41.11	8.54	15.45	Horizontal	-34.20	-13.00	21.20	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 20MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3720.0	-54.09	5.10	11.05	Horizontal	-48.14	-13.00	35.14	270
3	5580.0	-50.71	5.42	12.65	Horizontal	-43.48	-13.00	30.48	90
4	7440.0	-47.35	6.70	13.85	Horizontal	-40.20	-13.00	27.20	45
5	9300.0	-45.31	7.01	14.75	Horizontal	-37.57	-13.00	24.57	90
6	11160.0	-44.45	7.48	15.95	Horizontal	-35.98	-13.00	22.98	45
7	13020.0	-47.13	7.51	16.55	Horizontal	-38.09	-13.00	25.09	0
8	14880.0	-41.85	8.24	15.35	Horizontal	-34.74	-13.00	21.74	135
9	16740.0	-42.39	8.41	14.95	Horizontal	-35.85	-13.00	22.85	180
10	18600.0	-41.61	8.54	15.45	Horizontal	-34.70	-13.00	21.70	315

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 20MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3760.0	-55.72	5.10	11.05	Horizontal	-49.77	-13.00	36.77	45
3	5640.0	-50.40	5.42	12.65	Horizontal	-43.17	-13.00	30.17	225
4	7520.0	-49.31	6.70	13.85	Horizontal	-42.16	-13.00	29.16	270
5	9400.0	-46.61	7.01	14.75	Horizontal	-38.87	-13.00	25.87	90
6	11280.0	-45.36	7.48	15.95	Horizontal	-36.89	-13.00	23.89	45
7	13160.0	-46.99	7.51	16.55	Horizontal	-37.95	-13.00	24.95	90
8	15040.0	-44.01	8.24	15.35	Horizontal	-36.90	-13.00	23.90	45
9	16920.0	-41.73	8.41	14.95	Horizontal	-35.19	-13.00	22.19	0
10	18800.0	-41.11	8.54	15.45	Horizontal	-34.20	-13.00	21.20	135

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

LTE Band 2 20MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3800.0	-51.35	5.10	11.05	Horizontal	-45.40	-13.00	32.40	315
3	5700.0	-51.30	5.42	12.65	Horizontal	-44.07	-13.00	31.07	270
4	7600.0	-49.85	6.70	13.85	Horizontal	-42.70	-13.00	29.70	45
5	9500.0	-49.14	7.01	14.75	Horizontal	-41.40	-13.00	28.40	225
6	11400.0	-44.17	7.48	15.95	Horizontal	-35.70	-13.00	22.70	270
7	13300.0	-46.34	7.51	16.55	Horizontal	-37.30	-13.00	24.30	90
8	15200.0	-42.84	8.24	15.35	Horizontal	-35.73	-13.00	22.73	45
9	17100.0	-41.46	8.41	14.95	Horizontal	-34.92	-13.00	21.92	90
10	19000.0	-40.51	8.54	15.45	Horizontal	-33.60	-13.00	20.60	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
 2.The worst emission was found in the antenna is Horizontal position.

6. Main Test Instruments

Name	Type	Manufacturer	Serial Number	Calibration Date	Expiration Time
Base Station Simulator	CMU200	R&S	118133	2016-05-21	2017-05-20
Power Splitter	SHX-GF2-2-13	Hua Xiang	10120101	NA	NA
Spectrum Analyzer	N9010A	Agilent	MY47191109	2016-05-21	2017-05-20
Universal Radio Communication Tester	E5515C	Agilent	MY48367192	2016-05-21	2017-05-20
Signal Analyzer	FSV30	R&S	100815	2016-12-16	2017-12-15
Signal generator	SMB 100A	R&S	102594	2016-05-22	2017-05-21
Signal generator	SMR27	R&S	100365	2016-05-22	2017-05-21
EMI Test Receiver	ESCI	R&S	100948	2016-06-01	2017-05-31
Trilog Antenna	VUBL 9163	SCHWARZBECK	9163-201	2014-12-06	2017-12-05
Trilog Antenna	VUBL 9163	SCHWARZBECK	9163-391	2014-12-06	2017-12-05
Horn Antenna	HF907	R&S	100126	2014-12-06	2017-12-05
Horn Antenna	HF907	R&S	100125	2014-12-06	2017-12-05
Climatic Chamber	PT-30B	Re Ce	20101891	2016-07-17	2017-07-16
Horn Antenna	3160-09	ETS-Lindgren	00102644	2015-01-30	2018-01-29
RF Cable	SMA 15cm	Agilent	0001	2017-02-06	2017-08-05

*****END OF REPORT *****

ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance



Front Side



Back Side

a: EUT



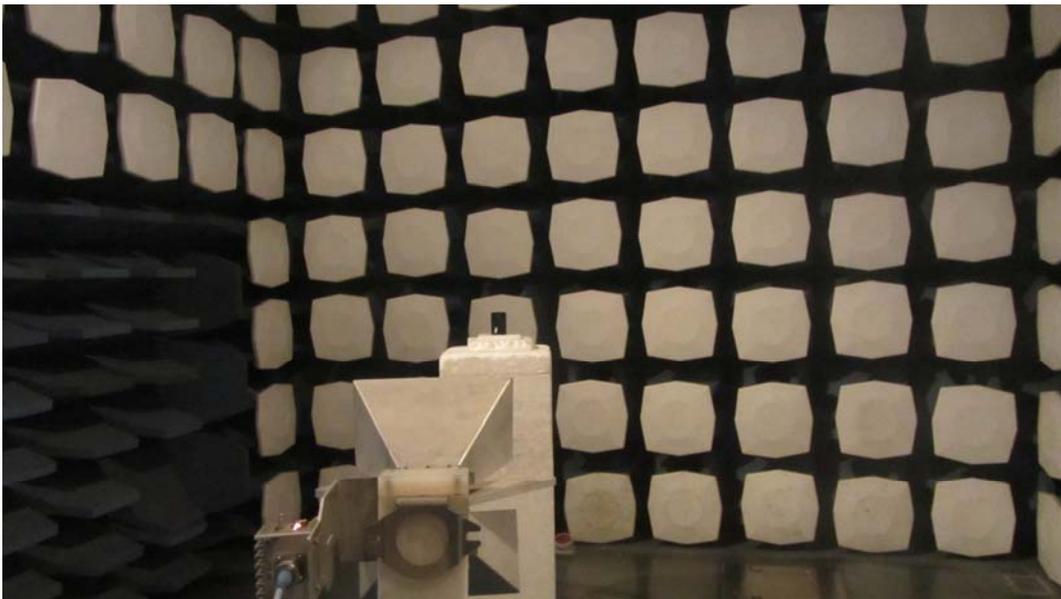
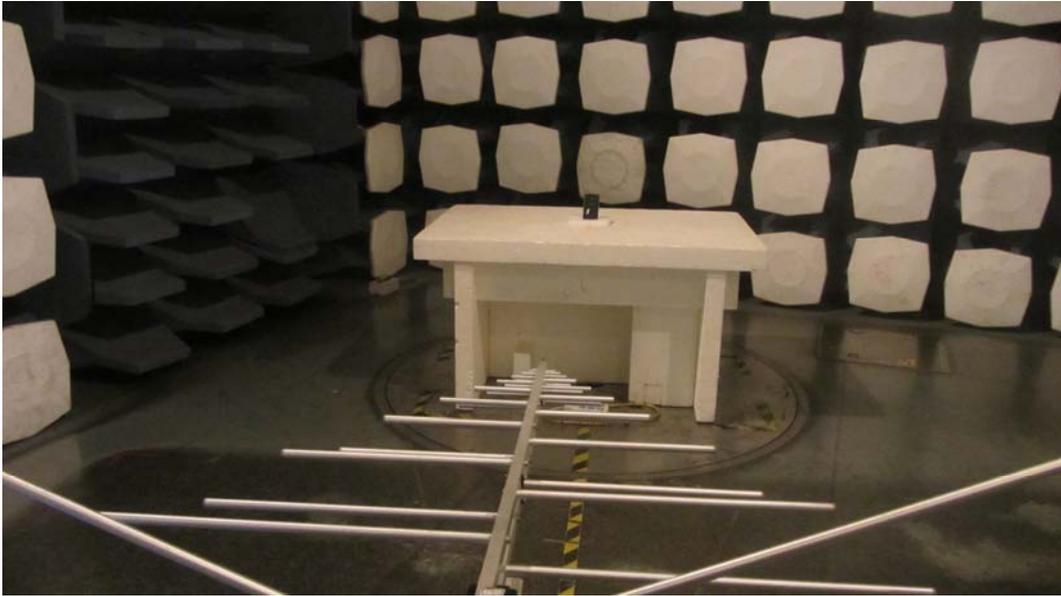
b: Adapter



c: USB Cable

Picture 1 EUT and Accessory

A.2 Test Setup



Picture 2: Radiated Spurious Emissions Test setup