



RF TEST REPORT

Applicant Quectel Wireless Solutions Company Limited

FCC ID XMR2021SC200LEM

Product Multi-mode Smart LTE Module with Wi-Fi &
Bluetooth

Brand Quectel

Model SC200L-EM

Report No. R2101A0120-R2V1

Issue Date March 11, 2021

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2019)/ FCC CFR 47 Part 24E (2019)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Prepared by: Peng Tao

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	5
1.1. Notes of the test report	5
1.2. Test facility	5
1.3. Testing Location	5
2. General Description of Equipment under Test	6
2.3. Applicant and Manufacturer Information	6
2.4. General information	6
3. Applied Standards	8
4. Test Configuration	9
5. Test Case Results	11
5.1. RF Power Output and Effective Isotropic Radiated Power	11
5.2. Occupied Bandwidth	19
5.3. Band Edge Compliance	30
5.4. Peak-to-Average Power Ratio (PAPR)	41
5.5. Frequency Stability	44
5.6. Spurious Emissions at Antenna Terminals	51
5.7. Radiates Spurious Emission	57
6. Main Test Instruments	63
ANNEX A: The EUT Appearance	64
ANNEX B: Test Setup Photos	65



Version	Revision description	Issue Date
Rev.0	Initial issue of report.	March 3, 2021
Rev.1	Update information of applicant and manufacture;	March 11, 2021
Note: This revised report (Report No. R2101A0120-R2V1) supersedes and replaces the previously issued report (Report No. R2101A0120-R2). Please discard or destroy the previously issued report and dispose of it accordingly.		



Summary of measurement results

No.	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046 24.232(c)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	2.1051 /24.238(a)	PASS
4	Peak-to-Average Power Ratio	24.232/KDB 971168 D01(5.7)	PASS
5	Frequency Stability	2.1055 / 24.235	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 / 24.238(a)	PASS
7	Radiates Spurious Emission	2.1053 / 24.238(a)	PASS
Date of Testing: February 7, 2021~ February 25, 2021			
Date of Sample Received: February 4, 2021			
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. All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			



1. Test Laboratory

1.1. Notes of the test report

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

1.2. Test facility

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

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

A2LA (Certificate Number: 3857.01)

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

2.3. Applicant and Manufacturer Information

Applicant	Quectel Wireless Solutions Company Limited
Applicant address	Building 5, Shanghai Business Park PhaseIII (Area B),No.1016 Tianlin Road, Minhang District Shanghai China
Manufacturer	Quectel Wireless Solutions Company Limited
Manufacturer address	Building 5, Shanghai Business Park PhaseIII (Area B),No.1016 Tianlin Road, Minhang District Shanghai China

2.4. General information

EUT Description		
Model	SC200L-EM	
SN	P1C20KB30000013	
Hardware Version	R1.0	
Software Version	SC200LEMNAR02A04	
Power Supply	External power supply	
Antenna Type	The EUT don't have standard Antenna. The Antenna used for testing in this report is the after-market accessory	
Antenna Gain	1.3 dBi	
Test Mode(s)	GSM1900; WCDMA Band II; LTE Band 2;	
Test Modulation	(GSM/GPRS)GMSK, (EGPRS) GMSK/ 8PSK; (WCDMA) BPSK, QPSK,16QAM; (LTE)QPSK,16QAM,	
GPRS Multislot Class	33	
EGPRS Multislot Class	33	
HSDPA UE Category	14	
HSUPA UE Category	7	
DC-HSDPA UE Category	24	
HSPA+ UE Category	7	
LTE Category	4	
Maximum E.I.R.P	GSM 1900:	31.04dBm
	WCDMA Band II:	24.52dBm
	LTE Band 2:	25.43dBm
Rated Power Supply Voltage	3.8V	
Extreme Voltage	Minimum: 3.23V Maximum: 4.37V	
Extreme Temperature	Lowest: -30°C Highest: +75°C	
Operating Voltage	Minimum: 3.5V Maximum: 4.2V	
Operating Temperature	Lowest: -30°C Highest: +75°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

Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.



3. Applied Standards

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

Test standards:

FCC CFR 47 Part 24E (2019)

ANSI C63.26 (2015)

Reference standard:

FCC CFR47 Part 2 (2019)

KDB 971168 D01 Power Meas License Digital Systems v03r01

4. Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (X axis, horizontal polarization) for GSM and WCDMA and (Z axis, vertical polarization) for LTE, 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
RF Power Output and Effective Isotropic Radiated Power	GSM GPRS EGPRS	RMC HSDPA/HSUPA DC-HSDPA/HSPA+
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
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 and Effective Isotropic Radiated Power	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	O	O	-	-	O	O	O	O
Band Edge Compliance	O	O	O	O	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	O	O	O	-	-	O	O	O	O
Frequency Stability	O	O	O	O	O	O	O	O	O	-	-	-	O	-
Spurious Emissions at Antenna Terminals	O	O	O	O	O	O	O	-	O	-	-	O	O	O
Radiates Spurious Emission	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 and Effective Isotropic Radiated Power

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 was connected to the Base Station Simulator with a known loss. The EUT is controlled by the Base Station Simulator test set to ensure max power transmission with proper modulation.

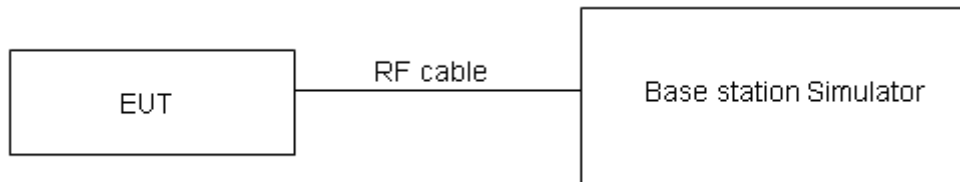
ERP can then be calculated as follows:

$$\text{EIRP (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBi)}$$

where:dBd refers to gain relative to an ideal dipole.

$$\text{EIRP (dBm)} = \text{ERP (dBm)} + 2.15 \text{ (dB.)}$$

Test Setup



Limits

No specific RF power output requirements in part 2.1046.

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

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

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

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.4 \text{ dB}$ for RF power output, $k = 2$, $U = 1.19 \text{ dB}$ for EIRP.

Test Results

GSM 1900		Maximum Output Power (dBm)			EIRP (dBm)		
		Channel 512	Channel 661	Channel 810	Channel 512	Channel 661	Channel 810
		1850.2 (MHz)	1880 (MHz)	1909.8 (MHz)	1850.2 (MHz)	1880 (MHz)	1909.8 (MHz)
GSM(GMSK)	Results	29.74	29.74	29.65	31.04	31.04	30.95
GPRS (GMSK)	1TXslot	29.74	29.69	29.64	31.04	30.99	30.94
	2TXslots	28.77	28.72	28.65	30.07	30.02	29.95
	3TXslots	26.90	26.82	26.71	28.20	28.12	28.01
	4TXslots	26.08	26.01	25.89	27.38	27.31	27.19
EGPRS (8PSK)	1TXslot	26.72	27.05	26.92	28.02	28.35	28.22
	2TXslots	25.81	26.12	26.17	27.11	27.42	27.47
	3TXslots	23.31	24.18	23.90	24.61	25.48	25.20
	4TXslots	23.12	23.79	23.63	24.42	25.09	24.93

WCDMA Band II		Maximum Output Power (dBm)			EIRP (dBm)		
		Channel 9262	Channel 9400	Channel 9538	Channel 9262	Channel 9400	Channel 9538
		1852.4 (MHz)	1880 (MHz)	1907.6 (MHz)	1852.4 (MHz)	1880 (MHz)	1907.6 (MHz)
RMC		23.16	23.20	23.22	24.46	24.50	24.52
HSDPA	Sub - Test 1	22.62	22.62	22.66	23.92	23.92	23.96
	Sub - Test 2	22.61	22.64	22.63	23.91	23.94	23.93
	Sub - Test 3	22.08	22.14	22.15	23.38	23.44	23.45
	Sub - Test 4	22.09	22.15	22.13	23.39	23.45	23.43
HSUPA	Sub - Test 1	22.58	22.61	22.61	23.88	23.91	23.91
	Sub - Test 2	21.57	21.59	21.60	22.87	22.89	22.90
	Sub - Test 3	22.04	22.07	22.09	23.34	23.37	23.39
	Sub - Test 4	21.50	21.56	21.57	22.80	22.86	22.87
	Sub - Test 5	22.51	22.54	22.55	23.81	23.84	23.85
DC-HSDPA	Sub - Test 1	22.50	22.56	22.56	23.80	23.86	23.86
	Sub - Test 2	22.49	22.55	22.55	23.79	23.85	23.85
	Sub - Test 3	22.07	22.04	22.06	23.37	23.34	23.36
	Sub - Test 4	22.06	22.03	22.05	23.36	23.33	23.35
HSPA+	16QAM	22.05	22.11	22.12	23.35	23.41	23.42



Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	EIRP
LTE Band2	1.4	18607	1	#0	QPSK	24.13	25.43
LTE Band2	1.4	18607	1	#Mid	QPSK	23.92	25.22
LTE Band2	1.4	18607	1	#Max	QPSK	23.91	25.21
LTE Band2	1.4	18607	3	#0	QPSK	24.09	25.39
LTE Band2	1.4	18607	3	#Mid	QPSK	24.09	25.39
LTE Band2	1.4	18607	3	#Max	QPSK	24.08	25.38
LTE Band2	1.4	18607	6	#0	QPSK	23.03	24.33
LTE Band2	1.4	18607	1	#0	QAM16	22.70	24.00
LTE Band2	1.4	18607	1	#Mid	QAM16	22.43	23.73
LTE Band2	1.4	18607	1	#Max	QAM16	22.42	23.72
LTE Band2	1.4	18607	3	#0	QAM16	23.02	24.32
LTE Band2	1.4	18607	3	#Mid	QAM16	23.05	24.35
LTE Band2	1.4	18607	3	#Max	QAM16	22.95	24.25
LTE Band2	1.4	18607	6	#0	QAM16	21.82	23.12
LTE Band2	1.4	18900	1	#0	QPSK	23.85	25.15
LTE Band2	1.4	18900	1	#Mid	QPSK	23.87	25.17
LTE Band2	1.4	18900	1	#Max	QPSK	23.85	25.15
LTE Band2	1.4	18900	3	#0	QPSK	23.69	24.99
LTE Band2	1.4	18900	3	#Mid	QPSK	23.72	25.02
LTE Band2	1.4	18900	3	#Max	QPSK	23.72	25.02
LTE Band2	1.4	18900	6	#0	QPSK	22.62	23.92
LTE Band2	1.4	18900	1	#0	QAM16	23.15	24.45
LTE Band2	1.4	18900	1	#Mid	QAM16	23.12	24.42
LTE Band2	1.4	18900	1	#Max	QAM16	23.07	24.37
LTE Band2	1.4	18900	3	#0	QAM16	22.72	24.02
LTE Band2	1.4	18900	3	#Mid	QAM16	22.73	24.03
LTE Band2	1.4	18900	3	#Max	QAM16	22.72	24.02
LTE Band2	1.4	18900	6	#0	QAM16	21.85	23.15
LTE Band2	1.4	19193	1	#0	QPSK	23.59	24.89
LTE Band2	1.4	19193	1	#Mid	QPSK	23.55	24.85
LTE Band2	1.4	19193	1	#Max	QPSK	23.55	24.85
LTE Band2	1.4	19193	3	#0	QPSK	23.74	25.04
LTE Band2	1.4	19193	3	#Mid	QPSK	23.74	25.04
LTE Band2	1.4	19193	3	#Max	QPSK	23.75	25.05
LTE Band2	1.4	19193	6	#0	QPSK	22.70	24.00
LTE Band2	1.4	19193	1	#0	QAM16	22.78	24.08
LTE Band2	1.4	19193	1	#Mid	QAM16	22.78	24.08
LTE Band2	1.4	19193	1	#Max	QAM16	22.80	24.10
LTE Band2	1.4	19193	3	#0	QAM16	22.87	24.17
LTE Band2	1.4	19193	3	#Mid	QAM16	22.87	24.17



LTE Band2	1.4	19193	3	#Max	QAM16	22.89	24.19
LTE Band2	1.4	19193	6	#0	QAM16	21.79	23.09
LTE Band2	3	18615	1	#0	QPSK	23.65	24.95
LTE Band2	3	18615	1	#Mid	QPSK	23.67	24.97
LTE Band2	3	18615	1	#Max	QPSK	23.63	24.93
LTE Band2	3	18615	8	#0	QPSK	22.76	24.06
LTE Band2	3	18615	8	#Mid	QPSK	22.77	24.07
LTE Band2	3	18615	8	#Max	QPSK	22.75	24.05
LTE Band2	3	18615	15	#0	QPSK	22.78	24.08
LTE Band2	3	18615	1	#0	QAM16	22.80	24.10
LTE Band2	3	18615	1	#Mid	QAM16	22.76	24.06
LTE Band2	3	18615	1	#Max	QAM16	22.75	24.05
LTE Band2	3	18615	8	#0	QAM16	21.94	23.24
LTE Band2	3	18615	8	#Mid	QAM16	21.93	23.23
LTE Band2	3	18615	8	#Max	QAM16	21.95	23.25
LTE Band2	3	18615	15	#0	QAM16	21.76	23.06
LTE Band2	3	18900	1	#0	QPSK	23.55	24.85
LTE Band2	3	18900	1	#Mid	QPSK	23.58	24.88
LTE Band2	3	18900	1	#Max	QPSK	23.58	24.88
LTE Band2	3	18900	8	#0	QPSK	22.69	23.99
LTE Band2	3	18900	8	#Mid	QPSK	22.69	23.99
LTE Band2	3	18900	8	#Max	QPSK	22.70	24.00
LTE Band2	3	18900	15	#0	QPSK	22.69	23.99
LTE Band2	3	18900	1	#0	QAM16	23.24	24.54
LTE Band2	3	18900	1	#Mid	QAM16	23.14	24.44
LTE Band2	3	18900	1	#Max	QAM16	23.19	24.49
LTE Band2	3	18900	8	#0	QAM16	21.78	23.08
LTE Band2	3	18900	8	#Mid	QAM16	21.80	23.10
LTE Band2	3	18900	8	#Max	QAM16	21.81	23.11
LTE Band2	3	18900	15	#0	QAM16	21.69	22.99
LTE Band2	3	19185	1	#0	QPSK	23.71	25.01
LTE Band2	3	19185	1	#Mid	QPSK	23.76	25.06
LTE Band2	3	19185	1	#Max	QPSK	23.68	24.98
LTE Band2	3	19185	8	#0	QPSK	22.56	23.86
LTE Band2	3	19185	8	#Mid	QPSK	22.56	23.86
LTE Band2	3	19185	8	#Max	QPSK	22.64	23.94
LTE Band2	3	19185	15	#0	QPSK	22.64	23.94
LTE Band2	3	19185	1	#0	QAM16	22.30	23.60
LTE Band2	3	19185	1	#Mid	QAM16	22.36	23.66
LTE Band2	3	19185	1	#Max	QAM16	22.41	23.71
LTE Band2	3	19185	8	#0	QAM16	21.81	23.11
LTE Band2	3	19185	8	#Mid	QAM16	21.78	23.08
LTE Band2	3	19185	8	#Max	QAM16	21.85	23.15



LTE Band2	3	19185	15	#0	QAM16	21.66	22.96
LTE Band2	5	18625	1	#0	QPSK	23.68	24.98
LTE Band2	5	18625	1	#Mid	QPSK	23.61	24.91
LTE Band2	5	18625	1	#Max	QPSK	23.63	24.93
LTE Band2	5	18625	12	#0	QPSK	22.74	24.04
LTE Band2	5	18625	12	#Mid	QPSK	22.75	24.05
LTE Band2	5	18625	12	#Max	QPSK	22.69	23.99
LTE Band2	5	18625	25	#0	QPSK	22.73	24.03
LTE Band2	5	18625	1	#0	QAM16	22.46	23.76
LTE Band2	5	18625	1	#Mid	QAM16	22.47	23.77
LTE Band2	5	18625	1	#Max	QAM16	22.42	23.72
LTE Band2	5	18625	12	#0	QAM16	21.77	23.07
LTE Band2	5	18625	12	#Mid	QAM16	21.78	23.08
LTE Band2	5	18625	12	#Max	QAM16	21.77	23.07
LTE Band2	5	18625	25	#0	QAM16	21.87	23.17
LTE Band2	5	18900	1	#0	QPSK	23.61	24.91
LTE Band2	5	18900	1	#Mid	QPSK	23.74	25.04
LTE Band2	5	18900	1	#Max	QPSK	23.72	25.02
LTE Band2	5	18900	12	#0	QPSK	22.75	24.05
LTE Band2	5	18900	12	#Mid	QPSK	22.76	24.06
LTE Band2	5	18900	12	#Max	QPSK	22.71	24.01
LTE Band2	5	18900	25	#0	QPSK	22.64	23.94
LTE Band2	5	18900	1	#0	QAM16	22.77	24.07
LTE Band2	5	18900	1	#Mid	QAM16	22.76	24.06
LTE Band2	5	18900	1	#Max	QAM16	22.70	24.00
LTE Band2	5	18900	12	#0	QAM16	21.62	22.92
LTE Band2	5	18900	12	#Mid	QAM16	21.60	22.90
LTE Band2	5	18900	12	#Max	QAM16	21.63	22.93
LTE Band2	5	18900	25	#0	QAM16	21.65	22.95
LTE Band2	5	19175	1	#0	QPSK	23.50	24.80
LTE Band2	5	19175	1	#Mid	QPSK	23.48	24.78
LTE Band2	5	19175	1	#Max	QPSK	23.57	24.87
LTE Band2	5	19175	12	#0	QPSK	22.62	23.92
LTE Band2	5	19175	12	#Mid	QPSK	22.62	23.92
LTE Band2	5	19175	12	#Max	QPSK	22.73	24.03
LTE Band2	5	19175	25	#0	QPSK	22.59	23.89
LTE Band2	5	19175	1	#0	QAM16	22.52	23.82
LTE Band2	5	19175	1	#Mid	QAM16	22.56	23.86
LTE Band2	5	19175	1	#Max	QAM16	22.63	23.93
LTE Band2	5	19175	12	#0	QAM16	21.61	22.91
LTE Band2	5	19175	12	#Mid	QAM16	21.60	22.90
LTE Band2	5	19175	12	#Max	QAM16	21.63	22.93
LTE Band2	5	19175	25	#0	QAM16	21.48	22.78



LTE Band2	10	18650	1	#0	QPSK	23.72	25.02
LTE Band2	10	18650	1	#Mid	QPSK	23.70	25.00
LTE Band2	10	18650	1	#Max	QPSK	23.62	24.92
LTE Band2	10	18650	25	#0	QPSK	22.68	23.98
LTE Band2	10	18650	25	#Mid	QPSK	22.68	23.98
LTE Band2	10	18650	25	#Max	QPSK	22.67	23.97
LTE Band2	10	18650	50	#0	QPSK	22.63	23.93
LTE Band2	10	18650	1	#0	QAM16	22.66	23.96
LTE Band2	10	18650	1	#Mid	QAM16	22.59	23.89
LTE Band2	10	18650	1	#Max	QAM16	22.49	23.79
LTE Band2	10	18650	25	#0	QAM16	21.83	23.13
LTE Band2	10	18650	25	#Mid	QAM16	21.85	23.15
LTE Band2	10	18650	25	#Max	QAM16	21.78	23.08
LTE Band2	10	18650	50	#0	QAM16	21.70	23.00
LTE Band2	10	18900	1	#0	QPSK	23.61	24.91
LTE Band2	10	18900	1	#Mid	QPSK	23.62	24.92
LTE Band2	10	18900	1	#Max	QPSK	23.63	24.93
LTE Band2	10	18900	25	#0	QPSK	22.69	23.99
LTE Band2	10	18900	25	#Mid	QPSK	22.68	23.98
LTE Band2	10	18900	25	#Max	QPSK	22.55	23.85
LTE Band2	10	18900	50	#0	QPSK	22.75	24.05
LTE Band2	10	18900	1	#0	QAM16	22.70	24.00
LTE Band2	10	18900	1	#Mid	QAM16	22.77	24.07
LTE Band2	10	18900	1	#Max	QAM16	22.80	24.10
LTE Band2	10	18900	25	#0	QAM16	21.78	23.08
LTE Band2	10	18900	25	#Mid	QAM16	21.74	23.04
LTE Band2	10	18900	25	#Max	QAM16	21.80	23.10
LTE Band2	10	18900	50	#0	QAM16	21.72	23.02
LTE Band2	10	19150	1	#0	QPSK	23.70	25.00
LTE Band2	10	19150	1	#Mid	QPSK	23.68	24.98
LTE Band2	10	19150	1	#Max	QPSK	23.72	25.02
LTE Band2	10	19150	25	#0	QPSK	22.61	23.91
LTE Band2	10	19150	25	#Mid	QPSK	22.59	23.89
LTE Band2	10	19150	25	#Max	QPSK	22.61	23.91
LTE Band2	10	19150	50	#0	QPSK	22.64	23.94
LTE Band2	10	19150	1	#0	QAM16	22.08	23.38
LTE Band2	10	19150	1	#Mid	QAM16	22.01	23.31
LTE Band2	10	19150	1	#Max	QAM16	22.06	23.36
LTE Band2	10	19150	25	#0	QAM16	21.78	23.08
LTE Band2	10	19150	25	#Mid	QAM16	21.77	23.07
LTE Band2	10	19150	25	#Max	QAM16	21.71	23.01
LTE Band2	10	19150	50	#0	QAM16	21.62	22.92
LTE Band2	15	18675	1	#0	QPSK	23.68	24.98



LTE Band2	15	18675	1	#Mid	QPSK	23.56	24.86
LTE Band2	15	18675	1	#Max	QPSK	23.59	24.89
LTE Band2	15	18675	36	#0	QPSK	22.68	23.98
LTE Band2	15	18675	36	#Mid	QPSK	22.64	23.94
LTE Band2	15	18675	36	#Max	QPSK	22.66	23.96
LTE Band2	15	18675	75	#0	QPSK	22.67	23.97
LTE Band2	15	18675	1	#0	QAM16	22.66	23.96
LTE Band2	15	18675	1	#Mid	QAM16	22.53	23.83
LTE Band2	15	18675	1	#Max	QAM16	22.46	23.76
LTE Band2	15	18675	36	#0	QAM16	21.77	23.07
LTE Band2	15	18675	36	#Mid	QAM16	21.78	23.08
LTE Band2	15	18675	36	#Max	QAM16	21.82	23.12
LTE Band2	15	18675	75	#0	QAM16	21.86	23.16
LTE Band2	15	18900	1	#0	QPSK	23.50	24.80
LTE Band2	15	18900	1	#Mid	QPSK	23.48	24.78
LTE Band2	15	18900	1	#Max	QPSK	23.52	24.82
LTE Band2	15	18900	36	#0	QPSK	22.60	23.90
LTE Band2	15	18900	36	#Mid	QPSK	22.60	23.90
LTE Band2	15	18900	36	#Max	QPSK	22.60	23.90
LTE Band2	15	18900	75	#0	QPSK	22.61	23.91
LTE Band2	15	18900	1	#0	QAM16	22.87	24.17
LTE Band2	15	18900	1	#Mid	QAM16	22.92	24.22
LTE Band2	15	18900	1	#Max	QAM16	22.91	24.21
LTE Band2	15	18900	36	#0	QAM16	21.62	22.92
LTE Band2	15	18900	36	#Mid	QAM16	21.68	22.98
LTE Band2	15	18900	36	#Max	QAM16	21.69	22.99
LTE Band2	15	18900	75	#0	QAM16	21.63	22.93
LTE Band2	15	19125	1	#0	QPSK	23.57	24.87
LTE Band2	15	19125	1	#Mid	QPSK	23.62	24.92
LTE Band2	15	19125	1	#Max	QPSK	23.51	24.81
LTE Band2	15	19125	36	#0	QPSK	22.68	23.98
LTE Band2	15	19125	36	#Mid	QPSK	22.69	23.99
LTE Band2	15	19125	36	#Max	QPSK	22.59	23.89
LTE Band2	15	19125	75	#0	QPSK	22.53	23.83
LTE Band2	15	19125	1	#0	QAM16	22.55	23.85
LTE Band2	15	19125	1	#Mid	QAM16	22.52	23.82
LTE Band2	15	19125	1	#Max	QAM16	22.57	23.87
LTE Band2	15	19125	36	#0	QAM16	21.80	23.10
LTE Band2	15	19125	36	#Mid	QAM16	21.80	23.10
LTE Band2	15	19125	36	#Max	QAM16	21.77	23.07
LTE Band2	15	19125	75	#0	QAM16	21.85	23.15
LTE Band2	20	18700	1	#0	QPSK	23.86	25.16
LTE Band2	20	18700	1	#Mid	QPSK	23.67	24.97



LTE Band2	20	18700	1	#Max	QPSK	23.66	24.96
LTE Band2	20	18700	50	#0	QPSK	22.68	23.98
LTE Band2	20	18700	50	#Mid	QPSK	22.69	23.99
LTE Band2	20	18700	50	#Max	QPSK	22.58	23.88
LTE Band2	20	18700	100	#0	QPSK	22.63	23.93
LTE Band2	20	18700	1	#0	QAM16	22.82	24.12
LTE Band2	20	18700	1	#Mid	QAM16	22.77	24.07
LTE Band2	20	18700	1	#Max	QAM16	22.75	24.05
LTE Band2	20	18700	50	#0	QAM16	21.80	23.10
LTE Band2	20	18700	50	#Mid	QAM16	21.77	23.07
LTE Band2	20	18700	50	#Max	QAM16	21.77	23.07
LTE Band2	20	18700	100	#0	QAM16	21.72	23.02
LTE Band2	20	18900	1	#0	QPSK	23.79	25.09
LTE Band2	20	18900	1	#Mid	QPSK	23.90	25.20
LTE Band2	20	18900	1	#Max	QPSK	23.89	25.19
LTE Band2	20	18900	50	#0	QPSK	22.71	24.01
LTE Band2	20	18900	50	#Mid	QPSK	22.70	24.00
LTE Band2	20	18900	50	#Max	QPSK	22.67	23.97
LTE Band2	20	18900	100	#0	QPSK	22.78	24.08
LTE Band2	20	18900	1	#0	QAM16	22.28	23.58
LTE Band2	20	18900	1	#Mid	QAM16	22.33	23.63
LTE Band2	20	18900	1	#Max	QAM16	22.31	23.61
LTE Band2	20	18900	50	#0	QAM16	21.72	23.02
LTE Band2	20	18900	50	#Mid	QAM16	21.71	23.01
LTE Band2	20	18900	50	#Max	QAM16	21.76	23.06
LTE Band2	20	18900	100	#0	QAM16	21.62	22.92
LTE Band2	20	19100	1	#0	QPSK	23.78	25.08
LTE Band2	20	19100	1	#Mid	QPSK	23.73	25.03
LTE Band2	20	19100	1	#Max	QPSK	23.79	25.09
LTE Band2	20	19100	50	#0	QPSK	22.71	24.01
LTE Band2	20	19100	50	#Mid	QPSK	22.71	24.01
LTE Band2	20	19100	50	#Max	QPSK	22.56	23.86
LTE Band2	20	19100	100	#0	QPSK	22.63	23.93
LTE Band2	20	19100	1	#0	QAM16	22.54	23.84
LTE Band2	20	19100	1	#Mid	QAM16	22.53	23.83
LTE Band2	20	19100	1	#Max	QAM16	22.52	23.82
LTE Band2	20	19100	50	#0	QAM16	21.72	23.02
LTE Band2	20	19100	50	#Mid	QAM16	21.71	23.01
LTE Band2	20	19100	50	#Max	QAM16	21.72	23.02
LTE Band2	20	19100	100	#0	QAM16	21.72	23.02

5.2.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 6.2kHz, VBW is set to 20kHz for GSM 1900,

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

RBW is set to 30 kHz, VBW is set to 91kHz for LTE Band 2 (1.4MHz),

RBW is set to 62 kHz, VBW is set to 180 kHz for LTE Band 2 (3MHz),

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

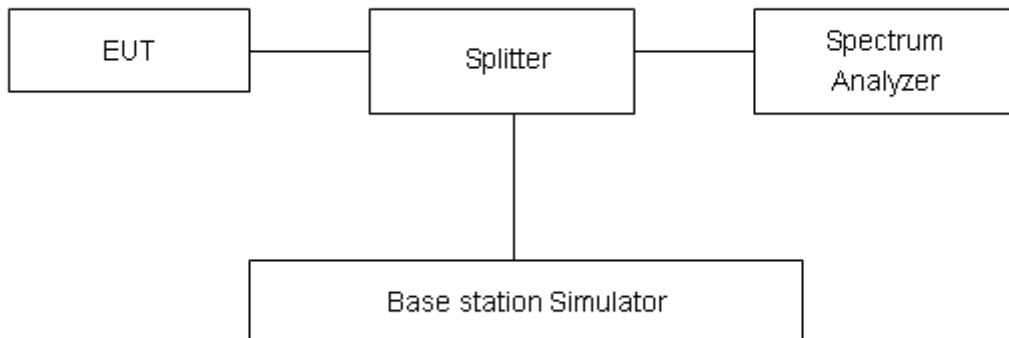
RBW is set to 200 kHz, VBW is set to 620kHz for LTE Band 2 (10MHz),

RBW is set to 300kHz,VBW is set to 910kHz for LTE Band 2 (15MHz).

RBW is set to 430kHz,VBW is set to 1.2MHz for LTE Band 2 (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 $k = 2$, $U = 624\text{Hz}$.

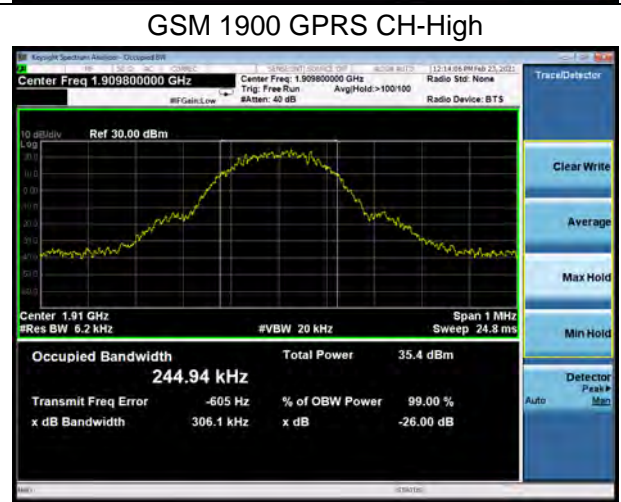
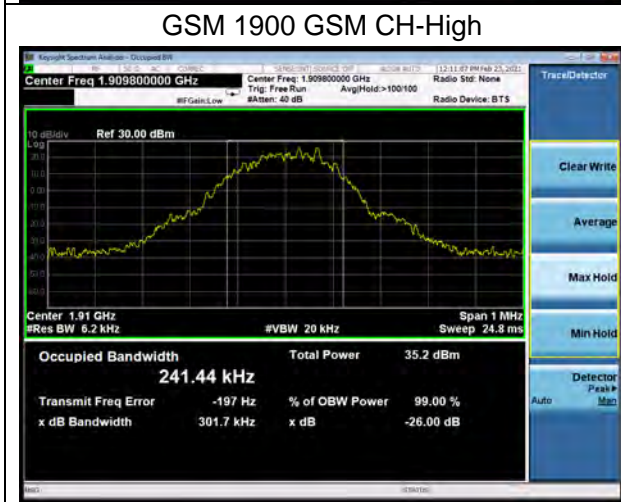
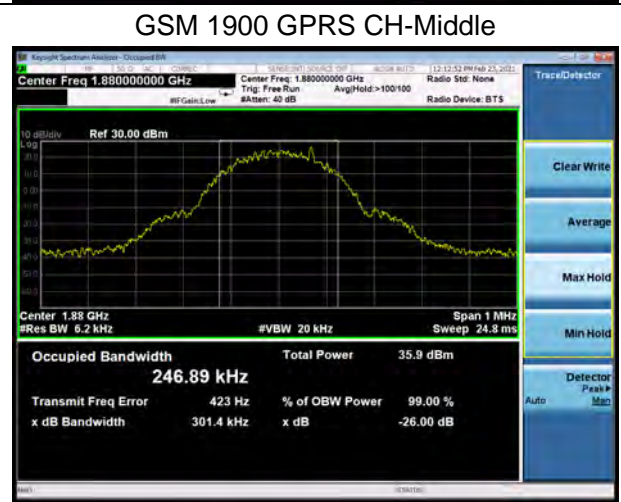
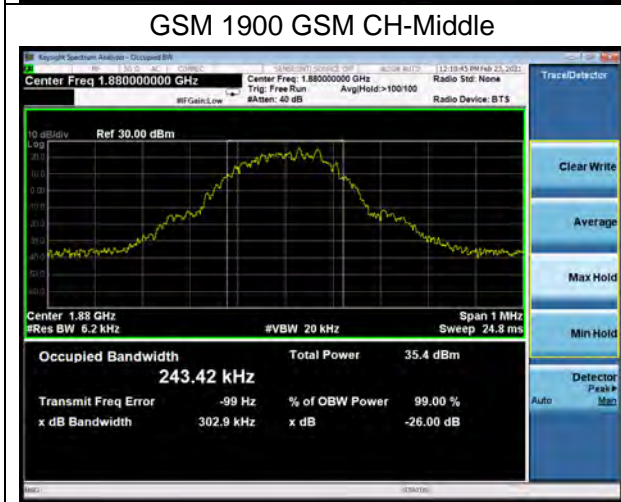
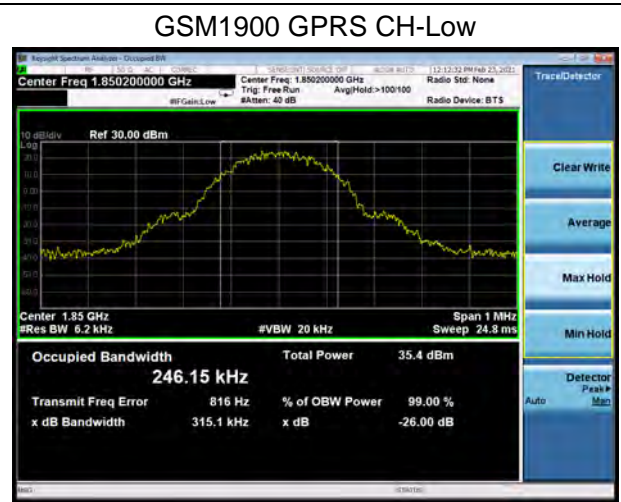
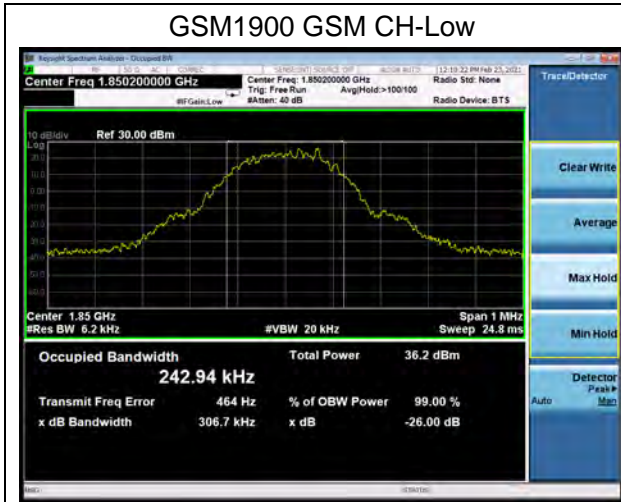
Test Result

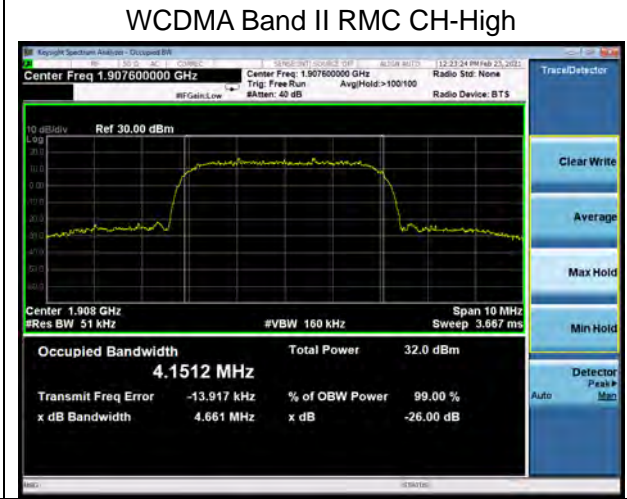
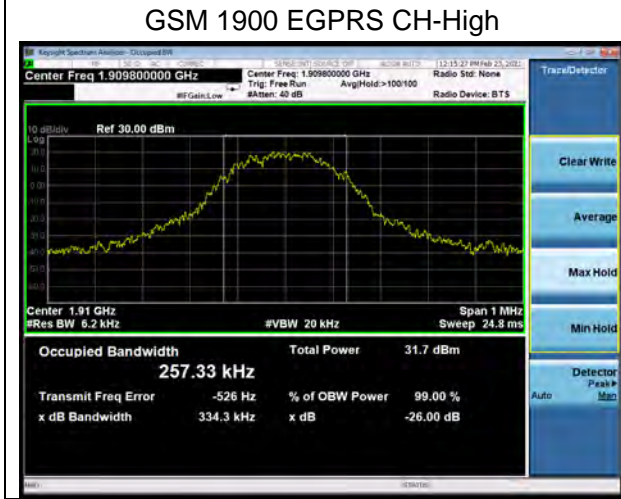
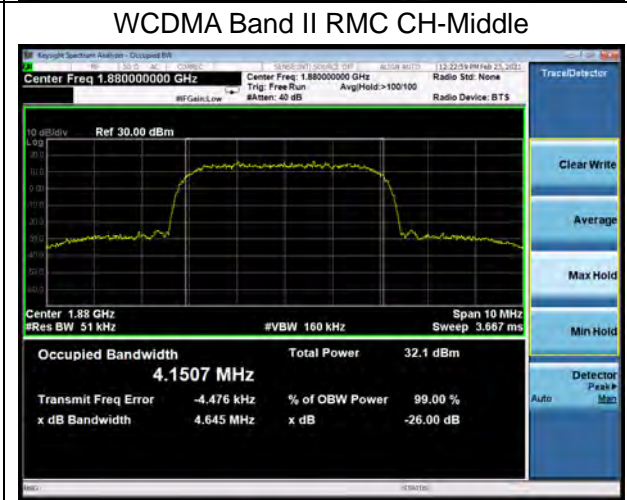
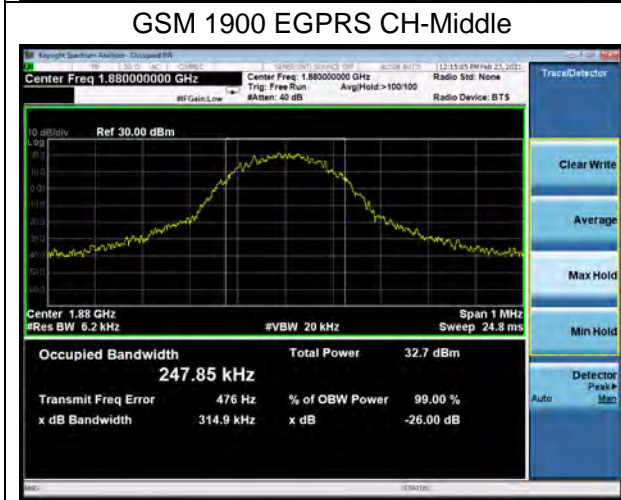
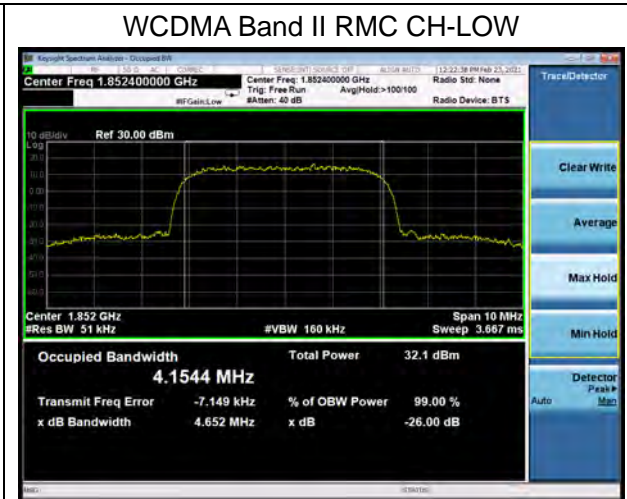
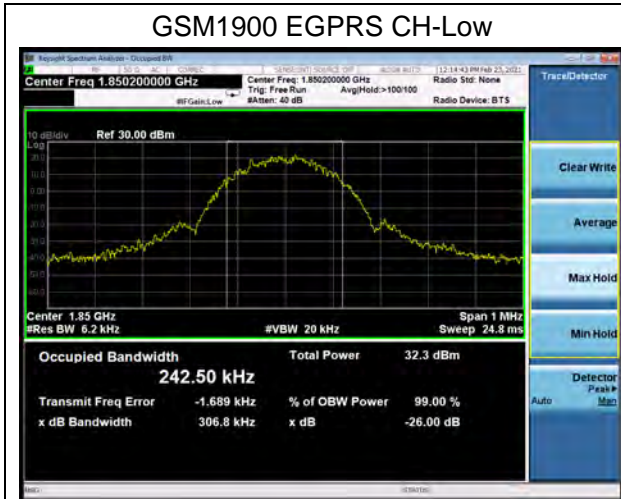
Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GSM 1900 (GMSK)	512	1850.2	0.2429	0.3067
	661	1880.0	0.2434	0.3029
	810	1909.8	0.2414	0.3017
GPRS 1900 (GMSK)	512	1850.2	0.2461	0.3151
	661	1880.0	0.2468	0.3014
	810	1909.8	0.2449	0.3061
EGPRS 1900 (8PSK)	512	1850.2	0.2425	0.3068
	661	1880.0	0.2478	0.3149
	810	1909.8	0.2573	0.3343
WCDMA Band II (RMC)	9262	1852.4	4.1544	4.6520
	9400	1880	4.1507	4.6450
	9538	1907.6	4.1512	4.6610

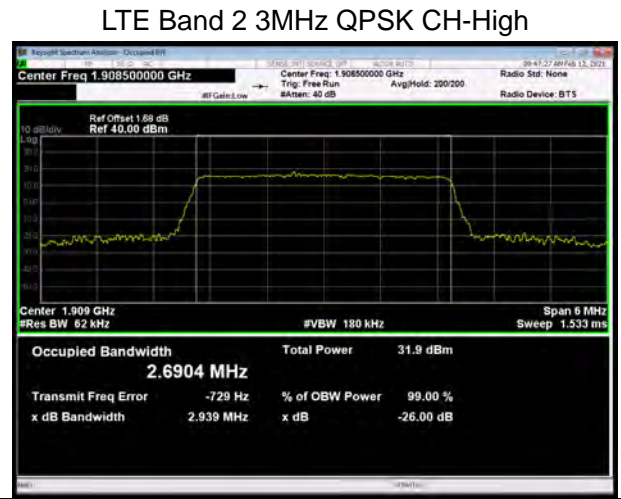
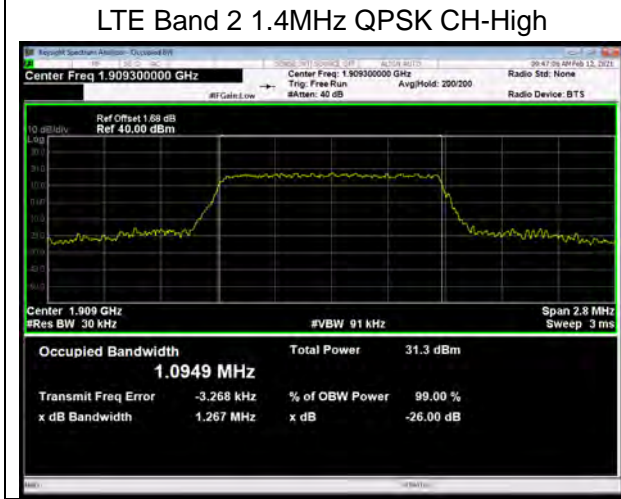
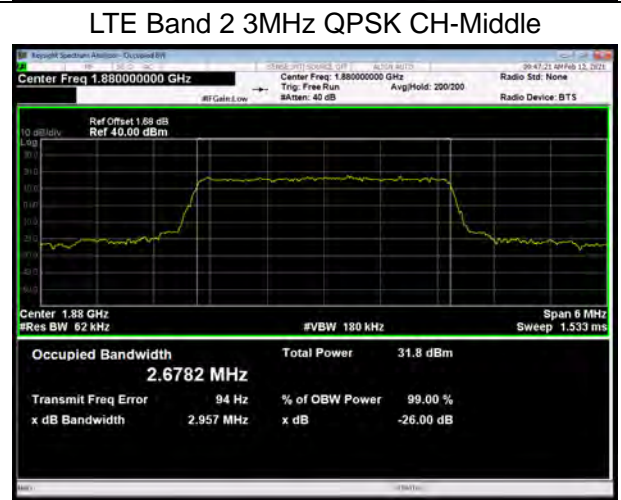
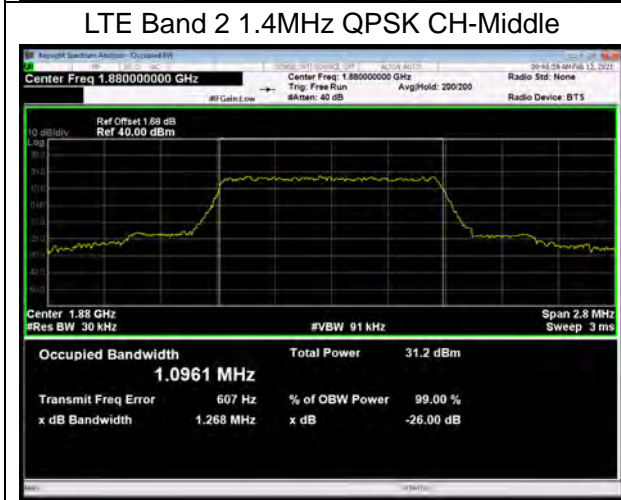
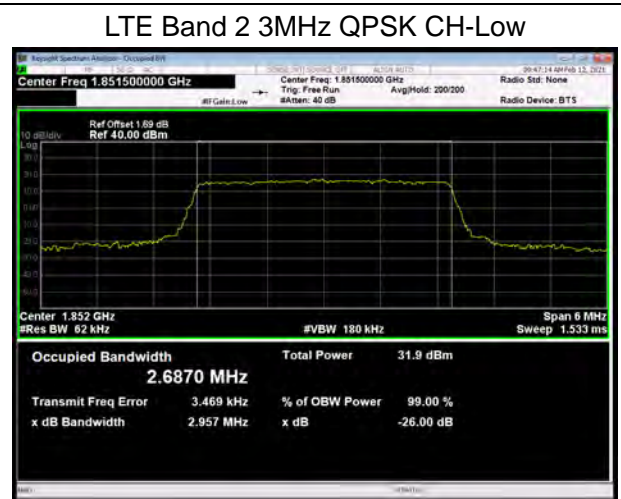
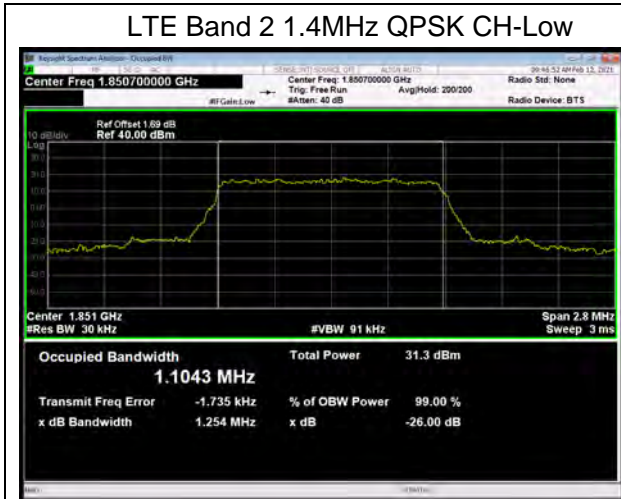
LTE Band 2					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
QPSK	1.4	18607	1850.7	1.1043	1.254
		18900	1880.0	1.0961	1.268
		19193	1909.3	1.0949	1.267
	3	18615	1851.5	2.6870	2.957
		18900	1880	2.6782	2.957
		19185	1908.5	2.6904	2.939
	5	18625	1852.5	4.5094	4.899
		18900	1880	4.5133	4.872
		19175	1907.5	4.5096	4.894
	10	18650	1855	8.9673	9.645
		18900	1880	8.9814	9.683
		19150	1905	8.9926	9.703
15	18675	1857.5	13.4670	14.600	
	18900	1880	13.4720	14.420	

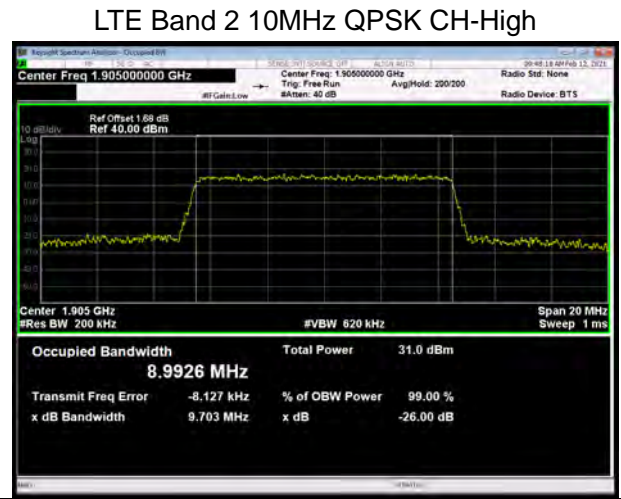
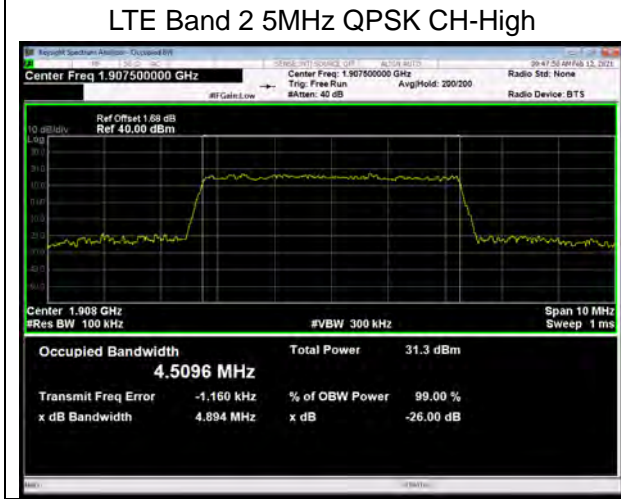
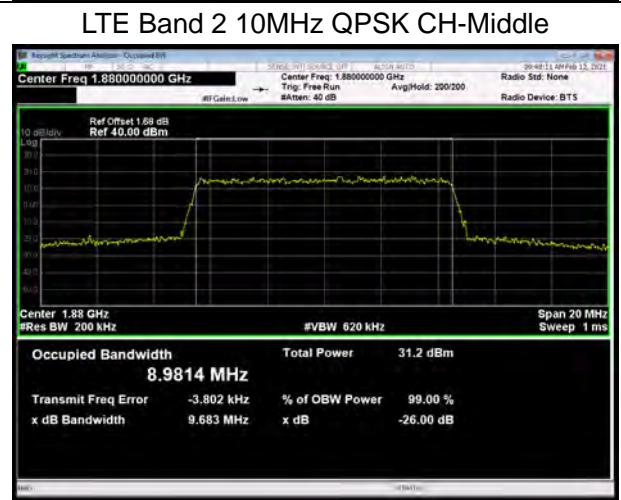
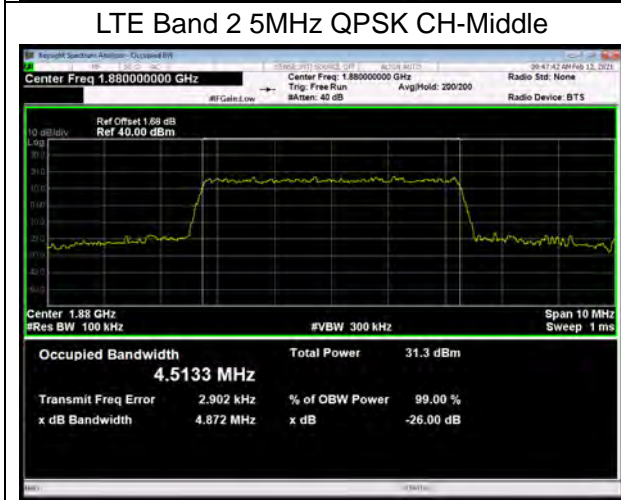
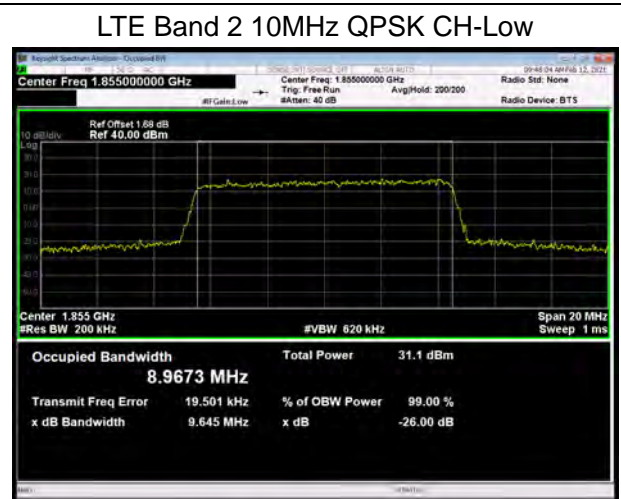
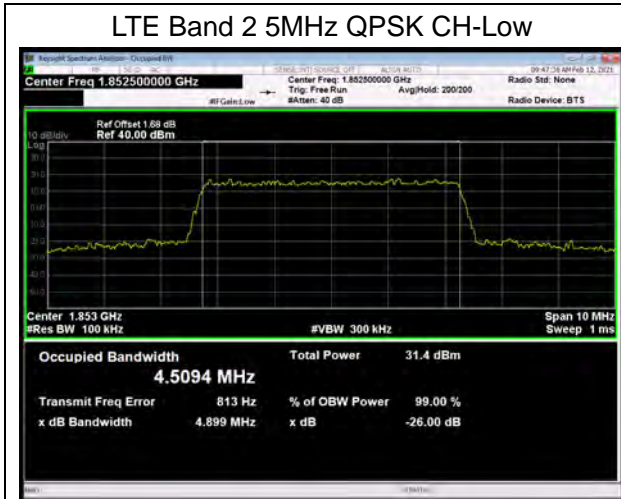


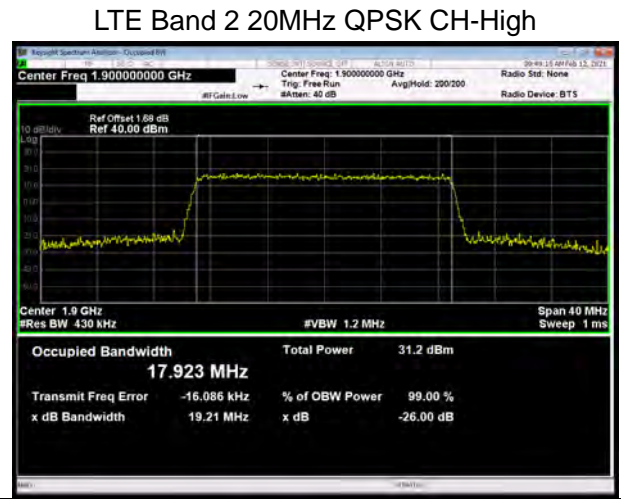
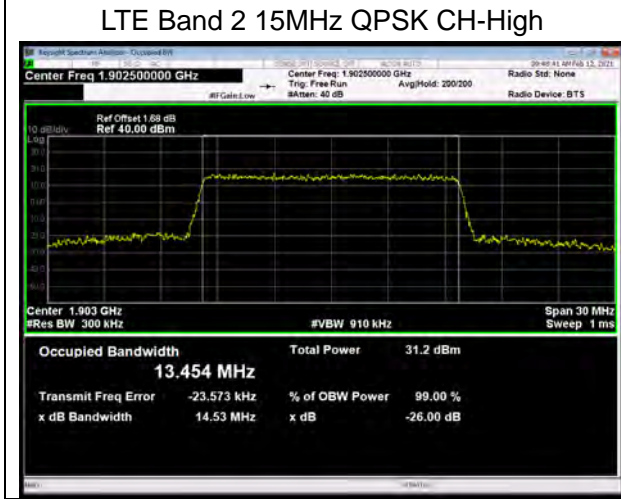
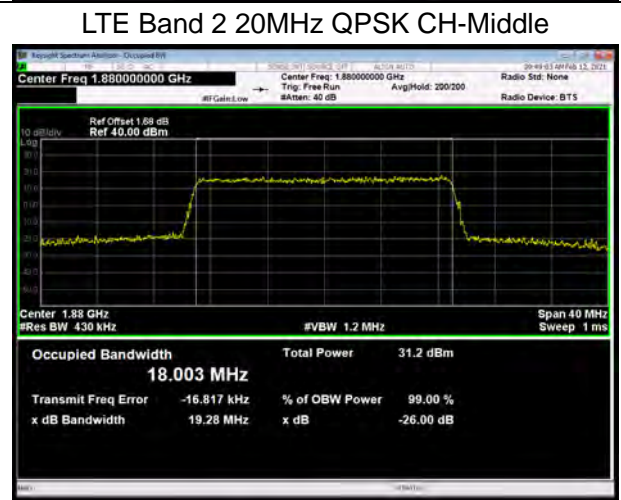
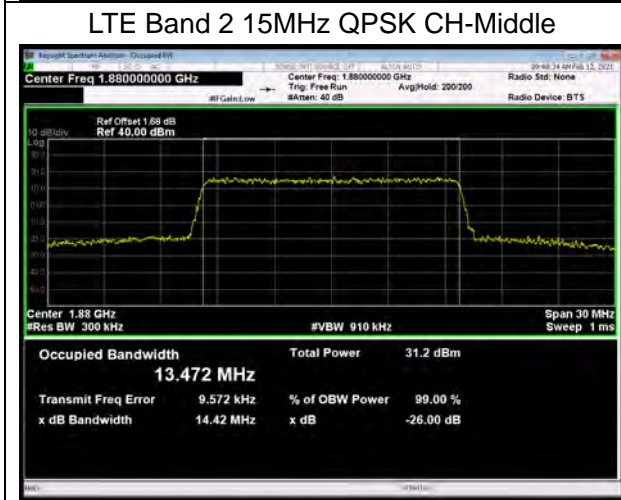
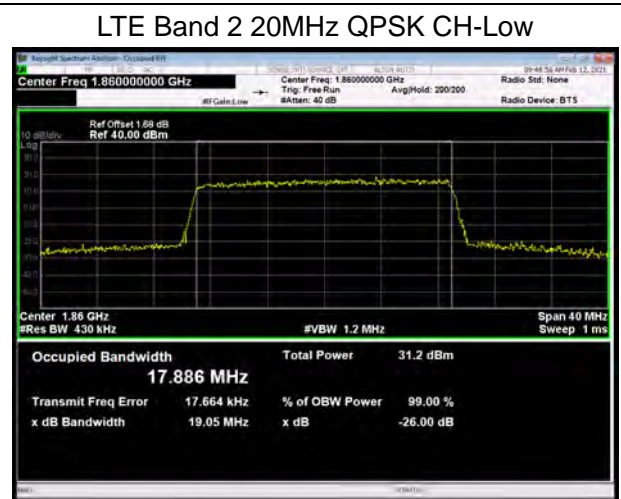
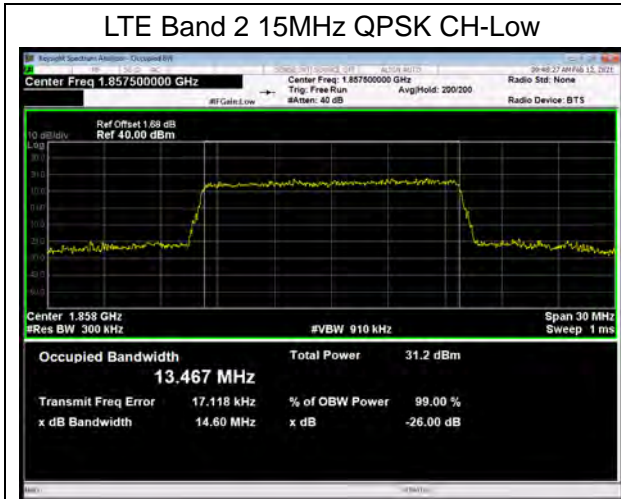
		19125	1902.5	13.4540	14.530
	20	18700	1860	17.8860	19.050
		18900	1880	18.0030	19.280
		19100	1900	17.9230	19.210
16QAM	1.4	18607	1850.7	1.0986	1.277
		18900	1880.0	1.1018	1.272
		19193	1909.3	1.0908	1.254
	3	18615	1851.5	2.6886	2.949
		18900	1880	2.6928	2.954
		19185	1908.5	2.6904	2.980
	5	18625	1852.5	4.5105	4.846
		18900	1880	4.5053	4.874
		19175	1907.5	4.5127	4.888
	10	18650	1855	8.9714	9.620
		18900	1880	8.9899	9.726
		19150	1905	8.9468	9.695
	15	18675	1857.5	13.4330	14.500
		18900	1880	13.4490	14.540
		19125	1902.5	13.4590	14.380
	20	18700	1860	17.8680	19.210
		18900	1880	18.0030	19.380
		19100	1900	17.9450	19.330

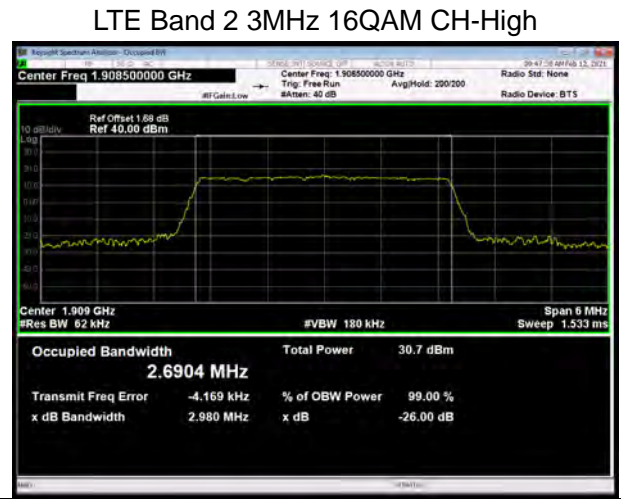
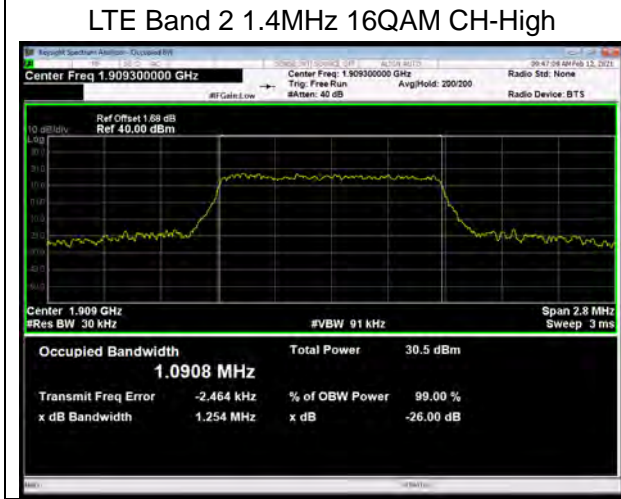
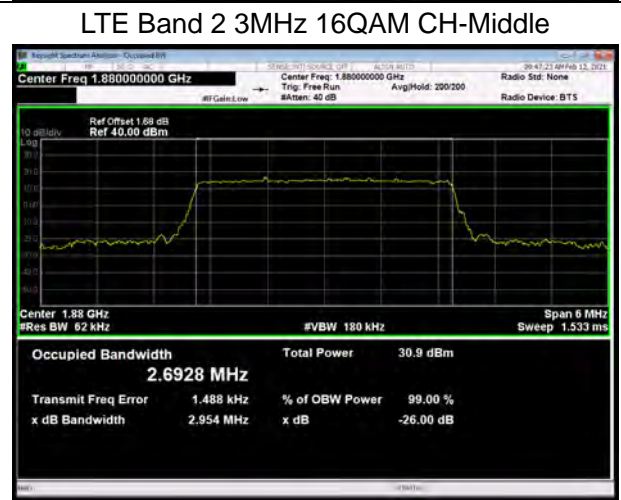
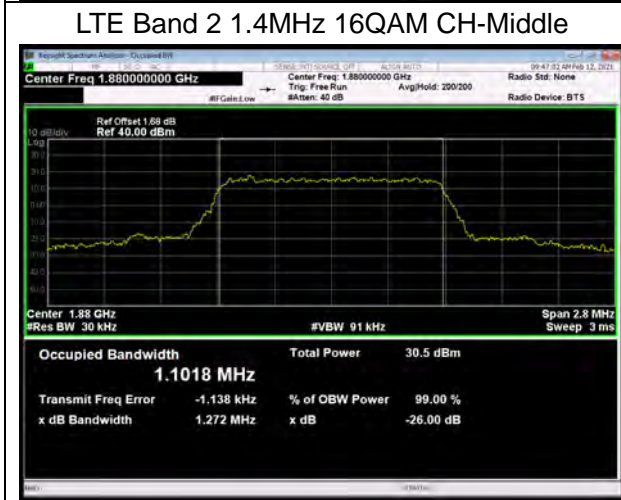
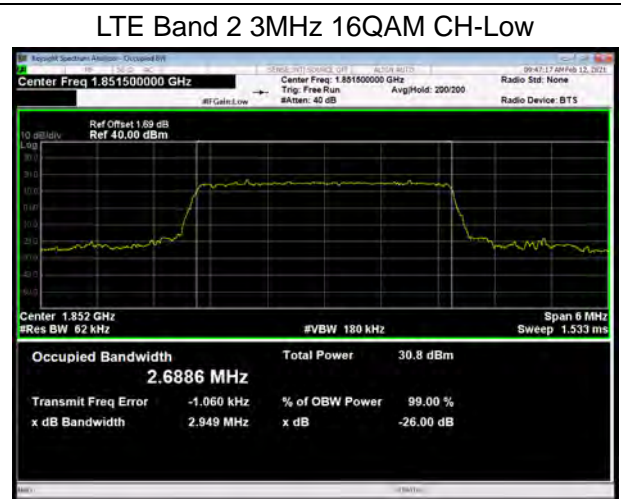
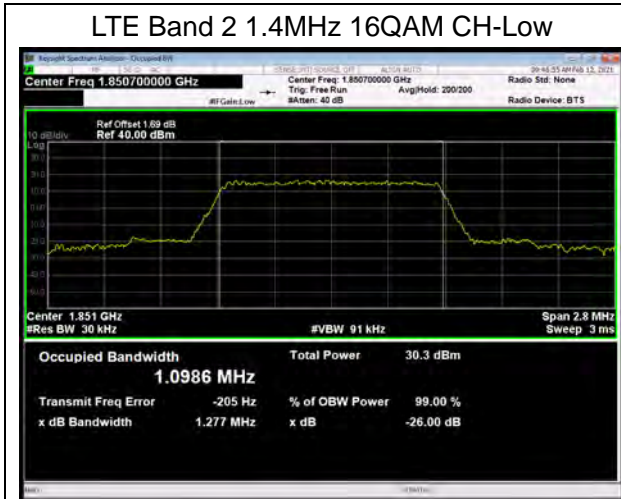


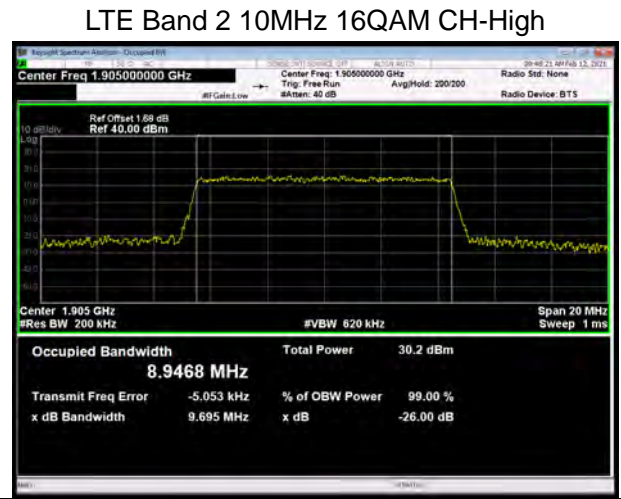
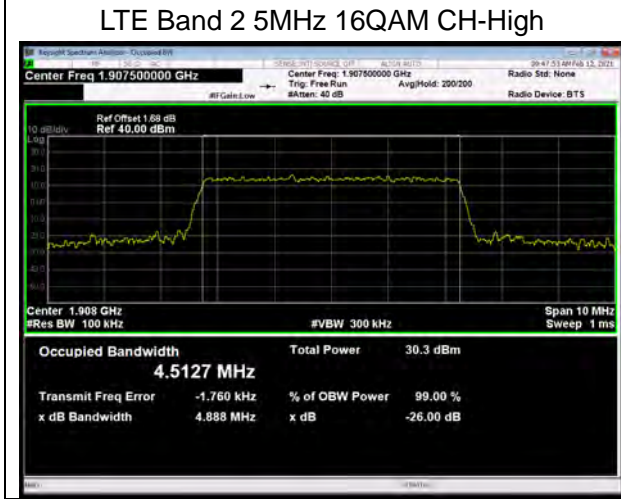
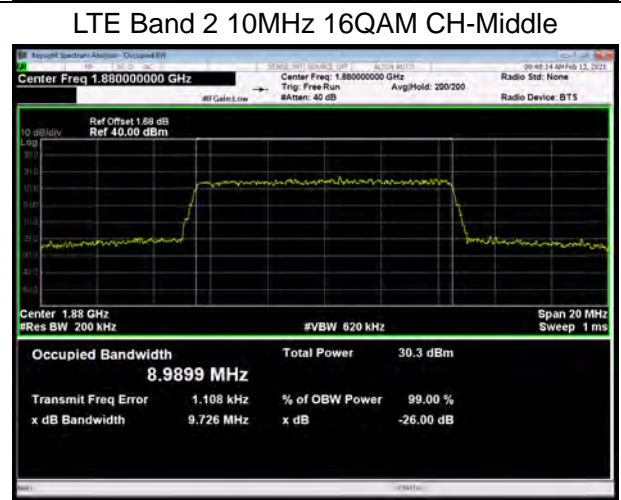
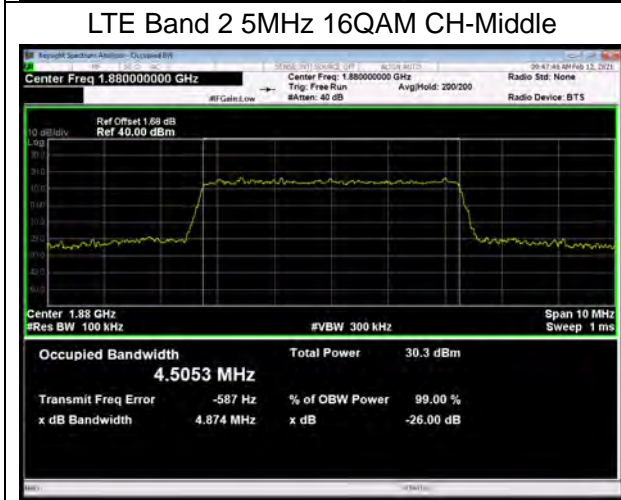
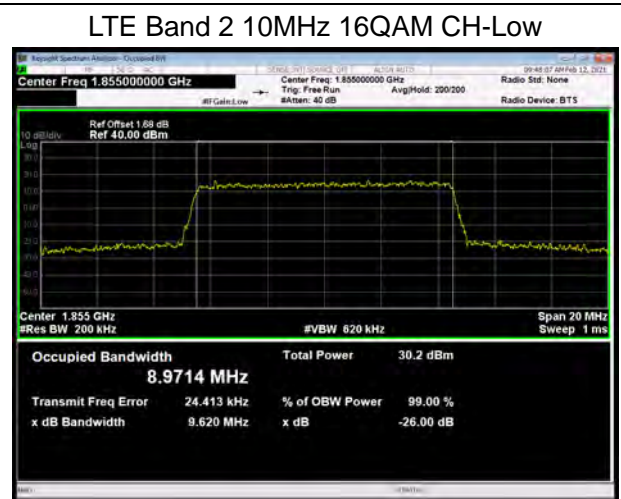
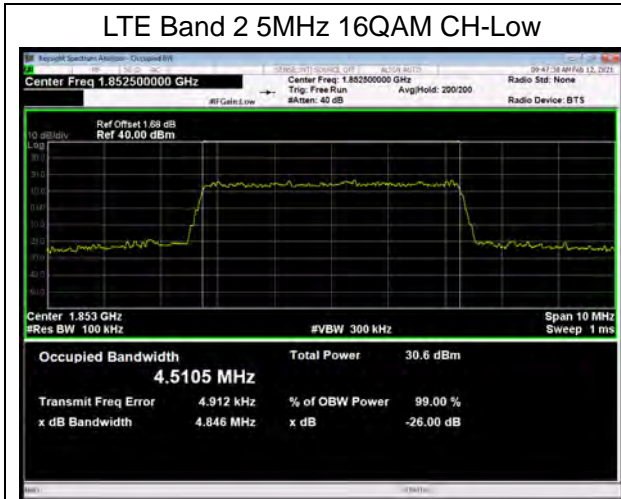






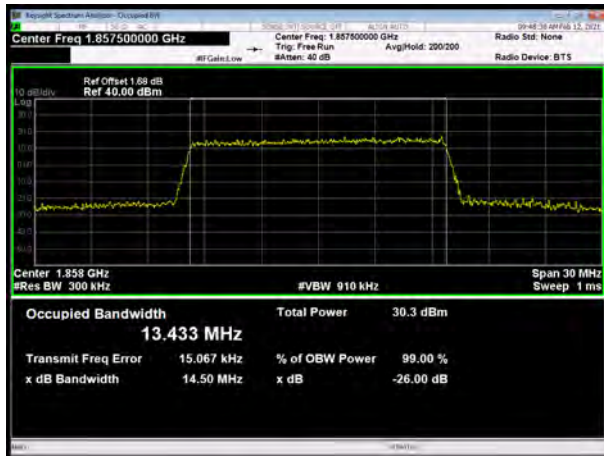




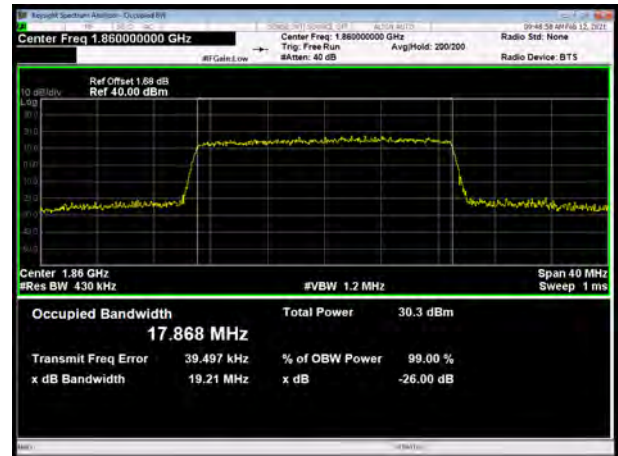




LTE Band 2 15MHz 16QAM CH-Low



LTE Band 2 20MHz 16QAM CH-Low



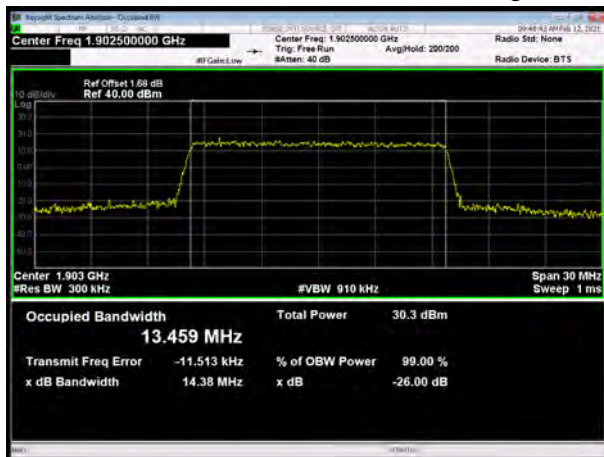
LTE Band 2 15MHz 16QAM CH-Middle



LTE Band 2 20MHz 16QAM CH-Middle



LTE Band 2 15MHz 16QAM CH-High



LTE Band 2 20MHz 16QAM CH-High



5.3. Band Edge Compliance

Ambient condition

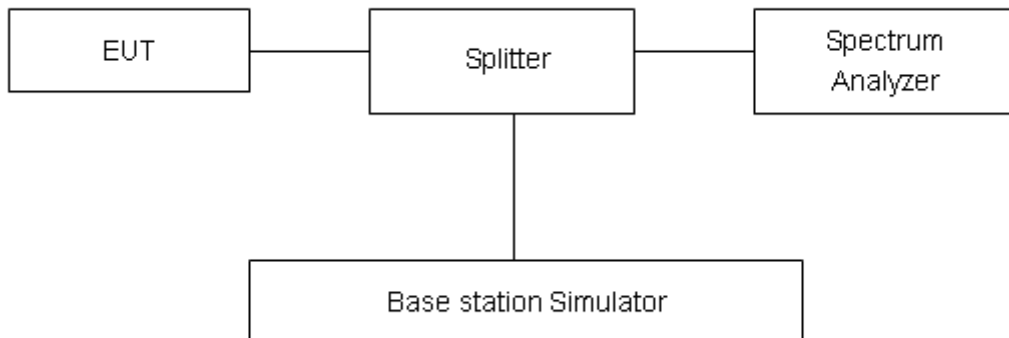
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 6.2kHz, VBW is set to 20kHz 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 43kHz for LTE Band 2 (1.4MHz), RBW is set to 30kHz, VBW is set to 91kHz for LTE Band 2 (3MHz), RBW is set to 51kHz, VBW is set to 150kHz 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 470kHz 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

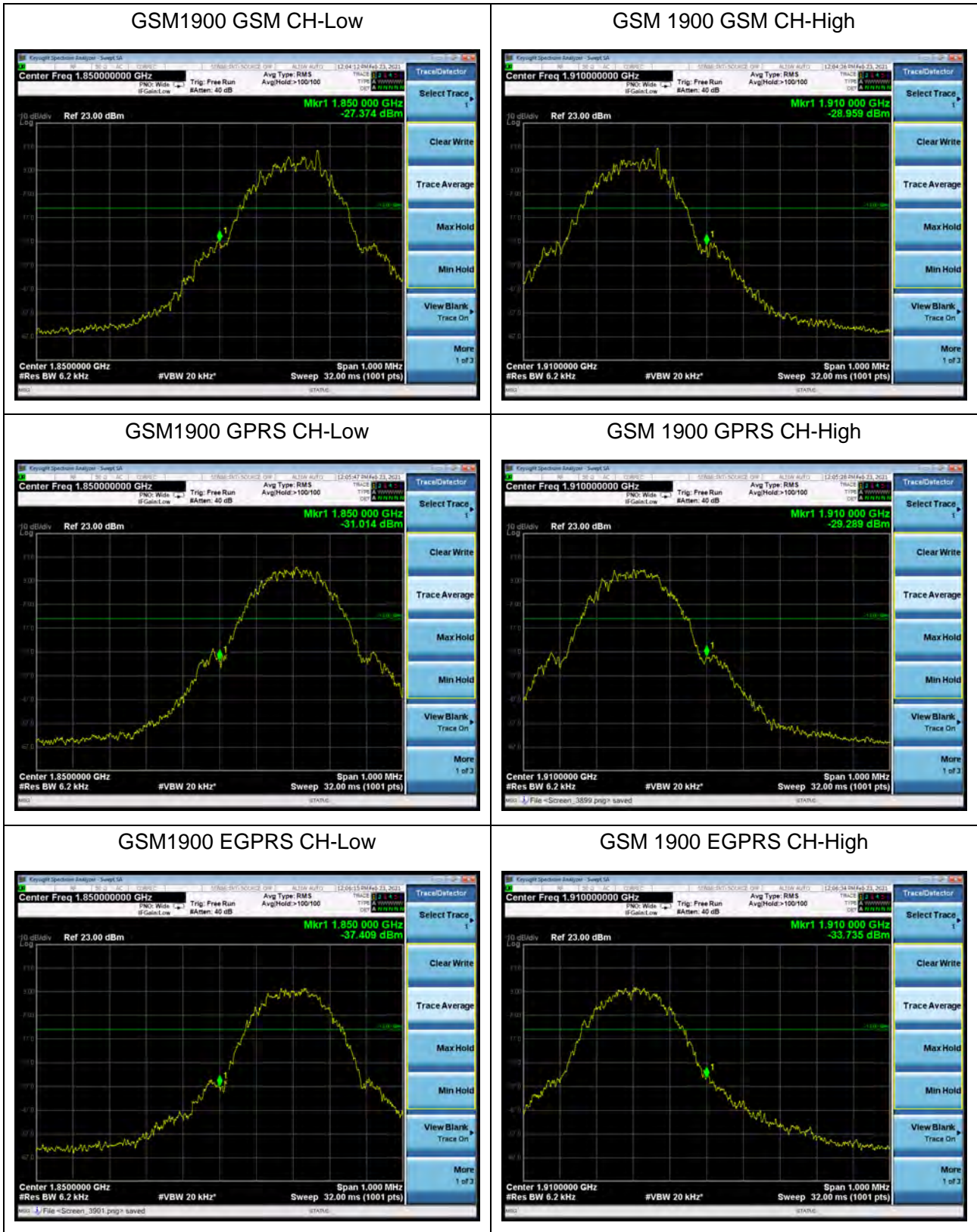
Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.”

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:



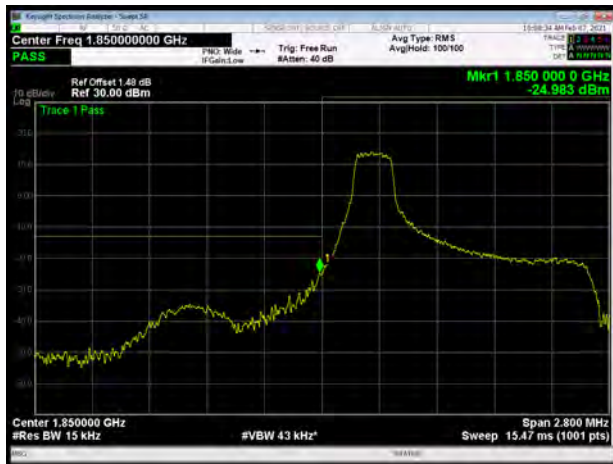
WCDMA Band II RMC CH-Low



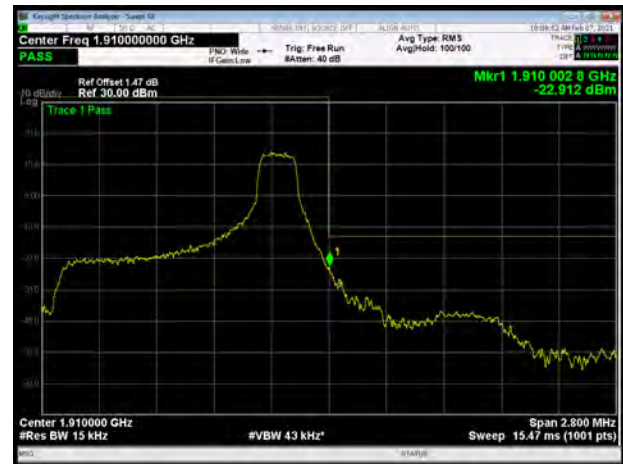
WCDMA Band II RMC CH-High



LTE Band 2 1.4MHz QPSK 1RB CH-Low



LTE Band 2 1.4MHz QPSK 1RB CH-High



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

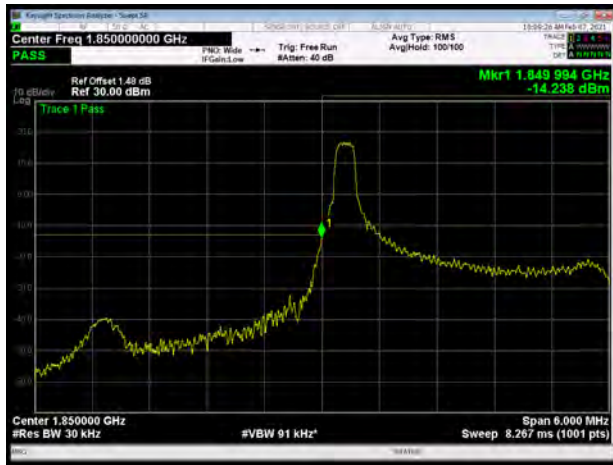


LTE Band 2 1.4MHz QPSK 100%RB CH-High





LTE Band 2 3MHz QPSK 1RB CH-Low



LTE Band 2 3MHz QPSK 1RB CH-High



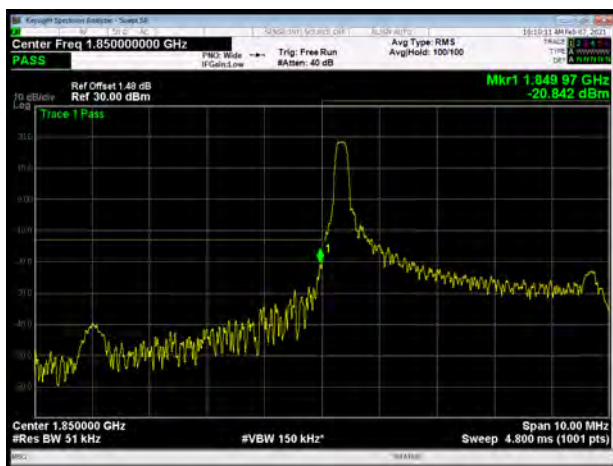
LTE Band 2 3MHz QPSK 100%RB CH-Low



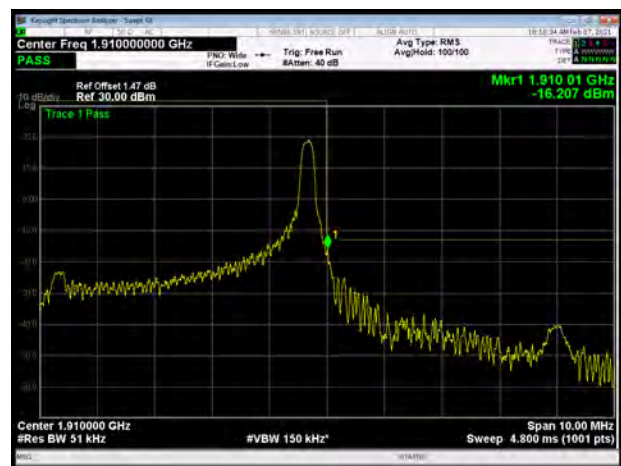
LTE Band 2 3MHz QPSK 100%RB CH-High



LTE Band 2 5MHz QPSK 1RB CH-Low



LTE Band 2 5MHz QPSK 1RB CH-High

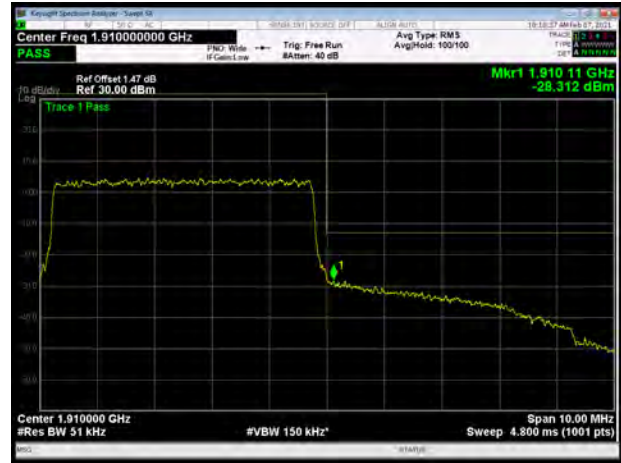




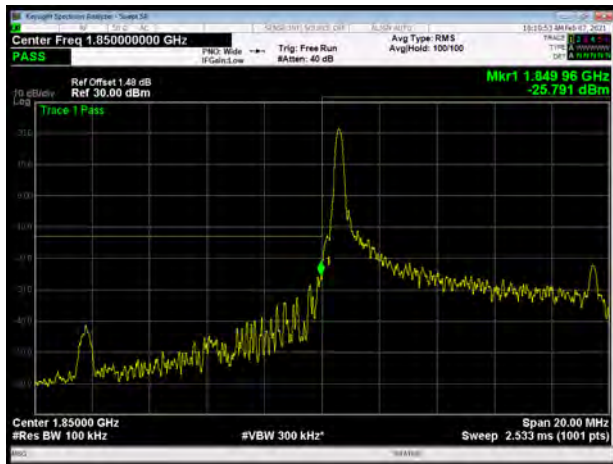
LTE Band 2 5MHz QPSK 100%RB CH-Low



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



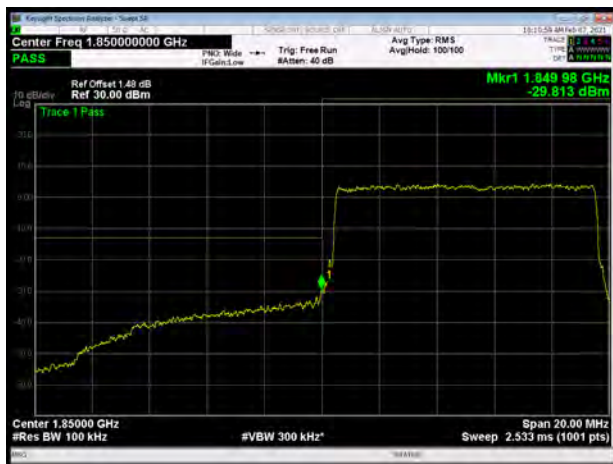
LTE Band 2 10MHz QPSK 1RB CH-Low



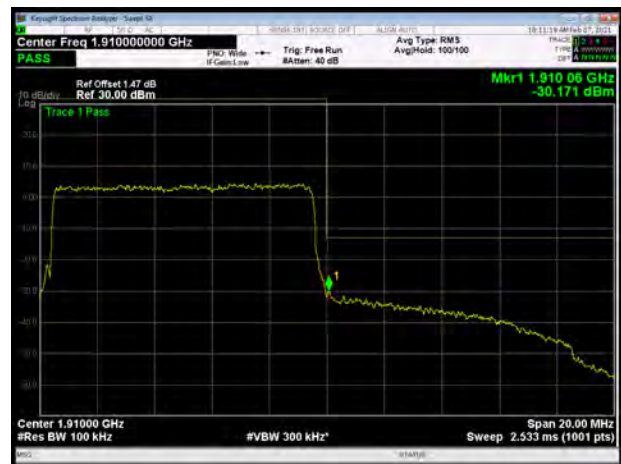
LTE Band 2 10MHz QPSK 1RB CH-High



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

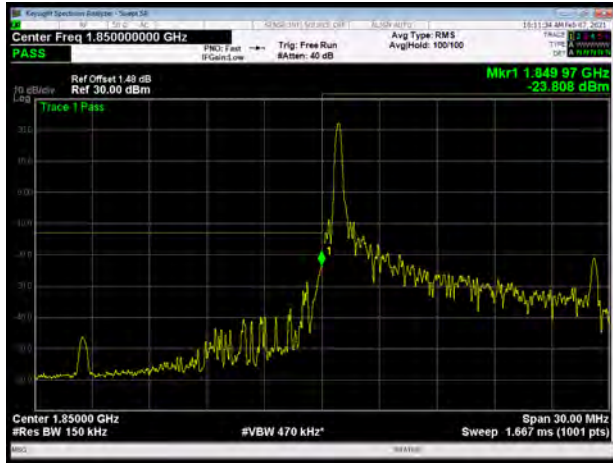


LTE Band 2 10MHz QPSK 100%RB CH-High

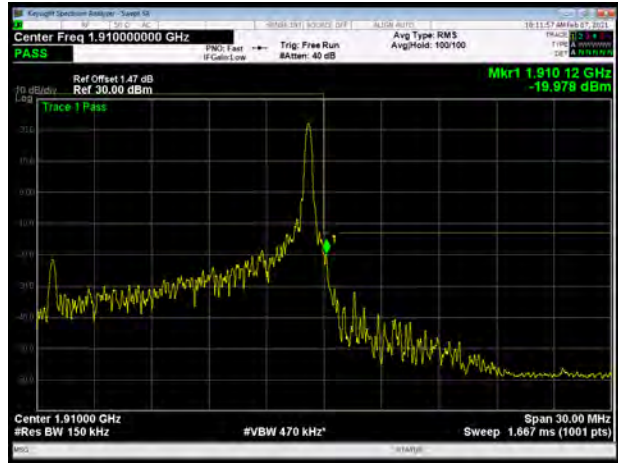




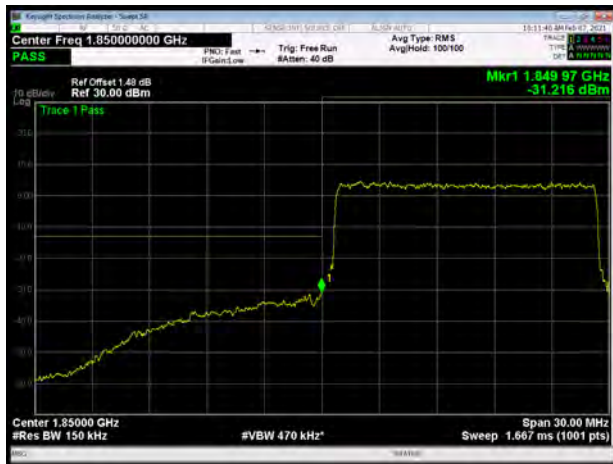
LTE Band 2 15MHz QPSK 1RB CH-Low



LTE Band 2 15MHz QPSK 1RB CH-High



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



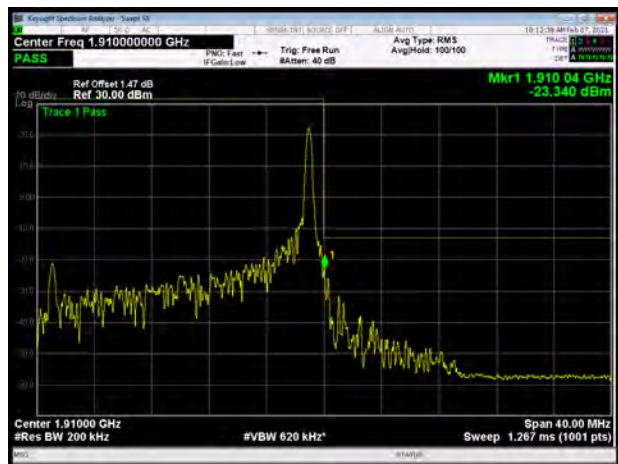
LTE Band 2 15MHz QPSK 100%RB CH-High



LTE Band 2 20MHz QPSK 1RB CH-Low

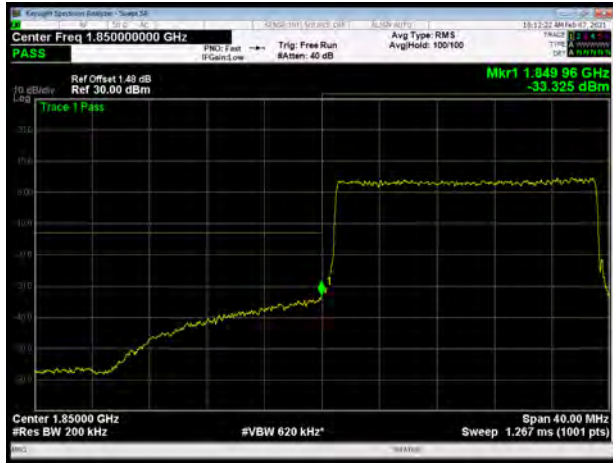


LTE Band 2 20MHz QPSK 1RB CH-High

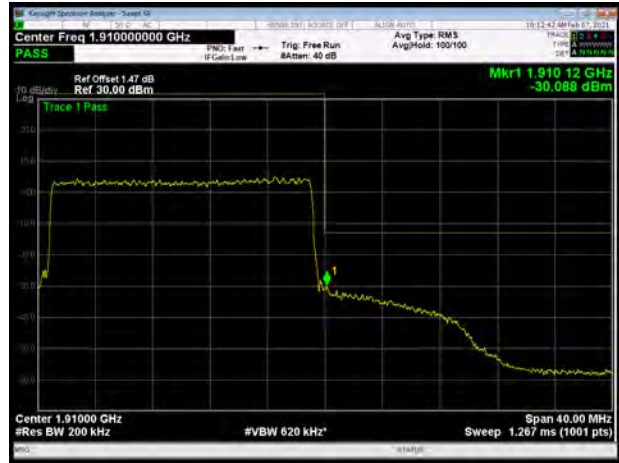




LTE Band 2 20MHz QPSK 100%RB CH-Low



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



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



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



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



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

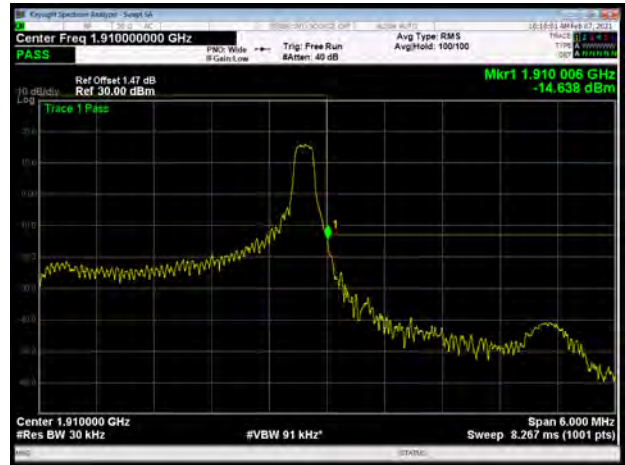




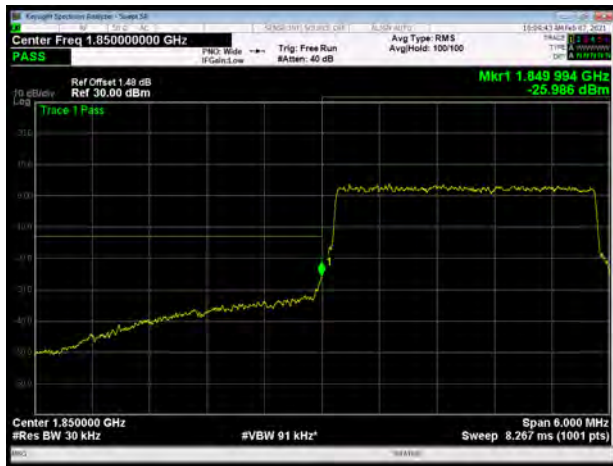
LTE Band 2 3MHz 16QAM 1RB CH-Low



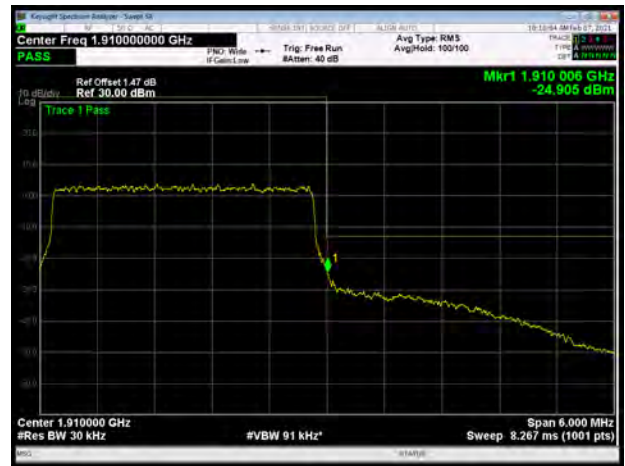
LTE Band 2 3MHz 16QAM 1RB CH-High



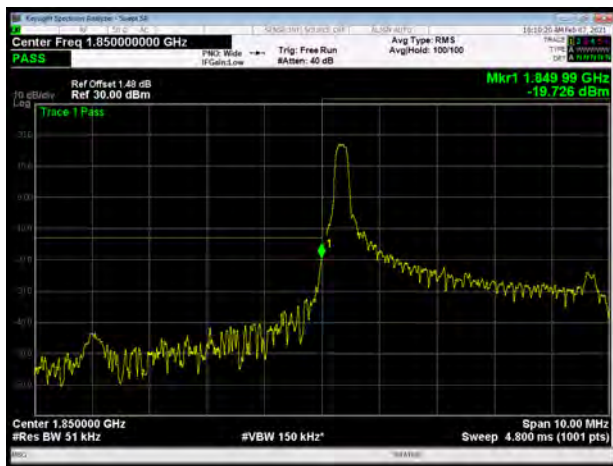
LTE Band 2 3MHz 16QAM 100%RB CH-Low



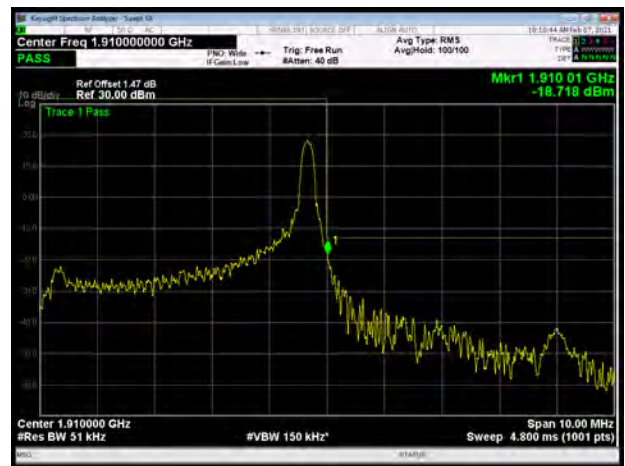
LTE Band 2 3MHz 16QAM 100%RB CH-High



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

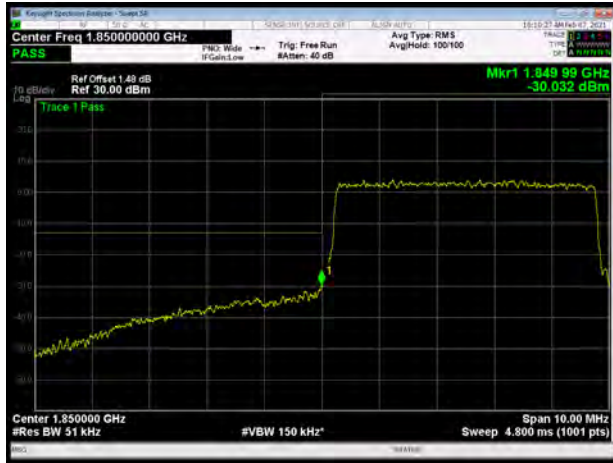


LTE Band 2 5MHz 16QAM 1RB CH-High

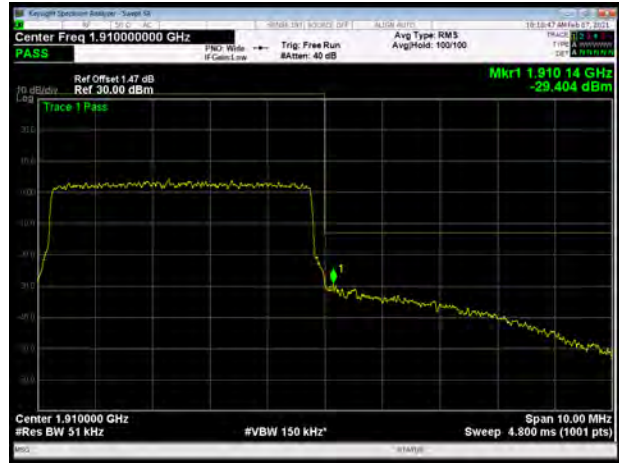




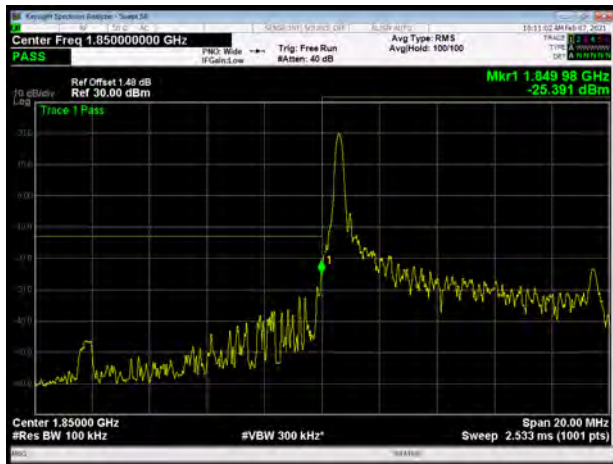
LTE Band 2 5MHz 16QAM 100%RB CH-Low



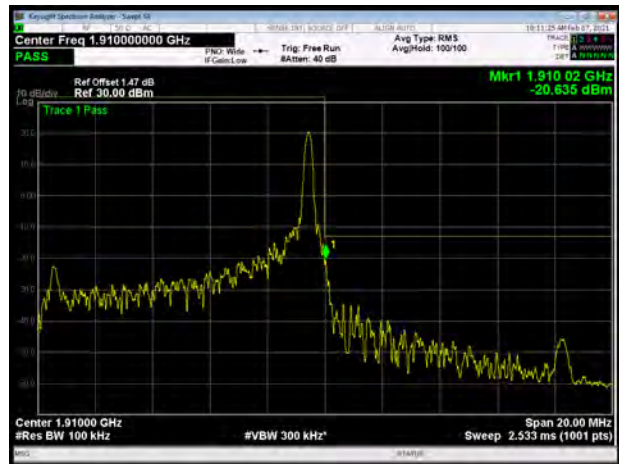
LTE Band 2 5MHz 16QAM 100%RB CH-High



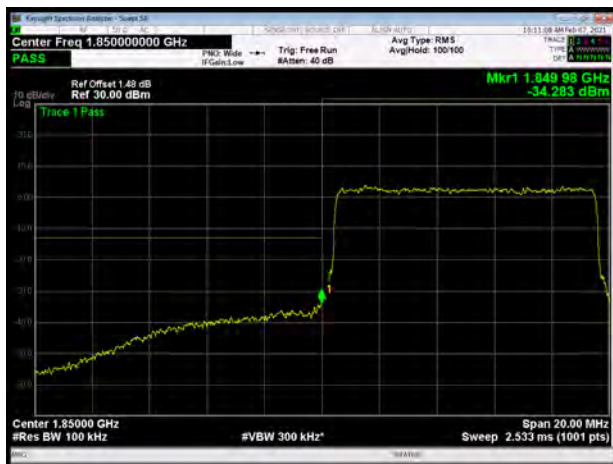
LTE Band 2 10MHz 16QAM 1RB CH-Low



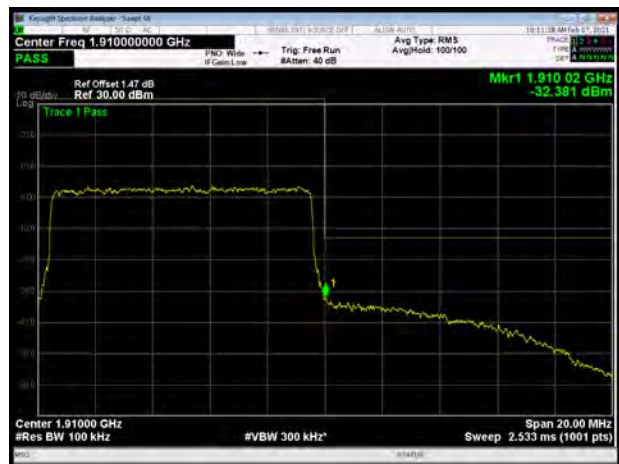
LTE Band 2 10MHz 16QAM 1RB CH-High



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

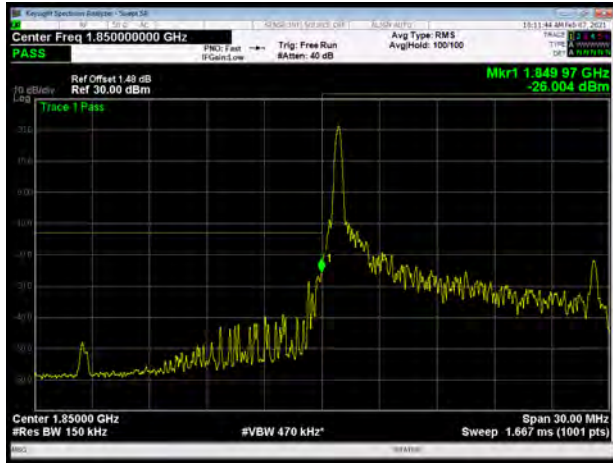


LTE Band 2 10MHz 16QAM 100%RB CH-High





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



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



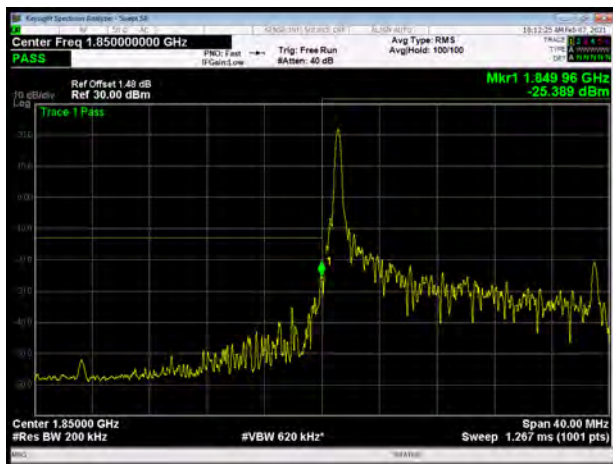
LTE Band 2 15MHz 16QAM 100%RB CH-Low



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



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

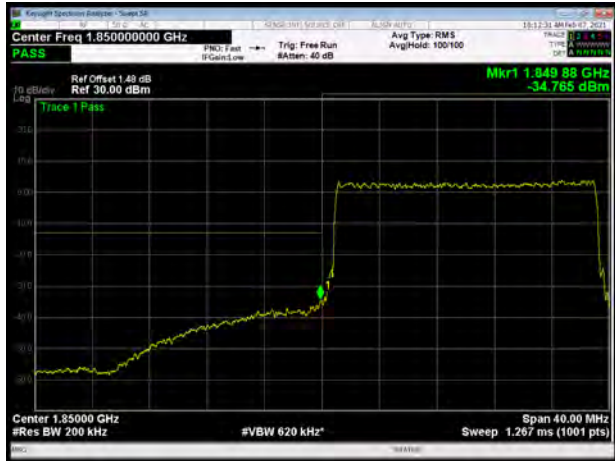


LTE Band 2 20MHz 16QAM 1RB CH-High





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



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



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

Ambient condition

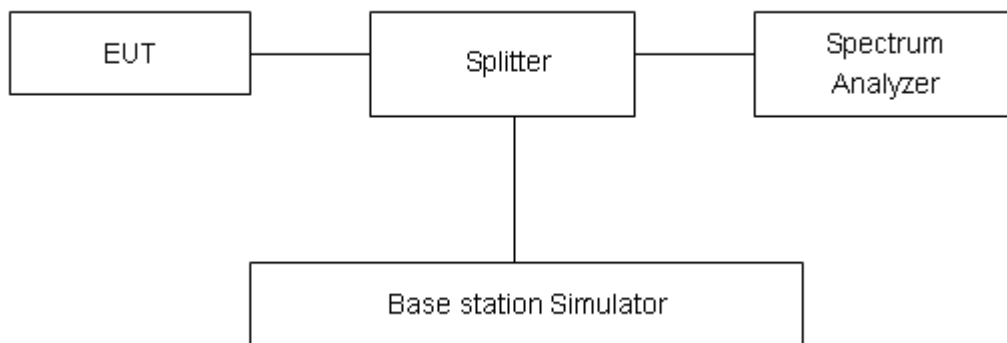
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

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

$$PAPR (dB) = PPk (dBm) - PAvg (dBm).$$

Test Setup



Limits

In measuring transmissions in this band using an average power technique, the 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 (GMSK)	512	1850.2	31.61	29.74	1.87	≤13	PASS
	661	1880	31.57	29.74	1.83	≤13	PASS
	810	1909.8	31.44	29.65	1.79	≤13	PASS
GPRS 1900 (GMSK)	512	1850.2	31.66	29.74	1.92	≤13	PASS
	661	1880	31.54	29.69	1.85	≤13	PASS
	810	1909.8	31.52	29.64	1.88	≤13	PASS
EGPRS 1900 (8PSK)	512	1850.2	28.96	26.72	2.24	≤13	PASS
	661	1880	29.18	27.05	2.13	≤13	PASS
	810	1909.8	29.10	26.92	2.18	≤13	PASS
WCDMA Band II (RMC)	9262	1852.4	26.02	23.21	2.81	≤13	PASS
	9400	1880	25.98	23.13	2.85	≤13	PASS
	9538	1907.6	25.70	22.96	2.74	≤13	PASS



LTE Band 2								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	1.4	18607	1850.7	26.92	22.52	4.40	≤13	PASS
		18900	1880.0	27.09	22.52	4.57	≤13	PASS
		19193	1909.3	26.45	22.47	3.98	≤13	PASS
	3	18615	1851.5	27.05	22.57	4.48	≤13	PASS
		18900	1880	27.07	22.54	4.53	≤13	PASS
		19185	1908.5	26.62	22.54	4.08	≤13	PASS
	5	18625	1852.5	27.22	22.52	4.70	≤13	PASS
		18900	1880	27.10	22.55	4.55	≤13	PASS
		19175	1907.5	26.79	22.45	4.34	≤13	PASS
	10	18650	1855	27.53	22.47	5.06	≤13	PASS
		18900	1880	27.21	22.61	4.60	≤13	PASS
		19150	1905	27.19	22.43	4.76	≤13	PASS
	15	18675	1857.5	27.98	22.42	5.56	≤13	PASS
		18900	1880	27.59	22.56	5.03	≤13	PASS
		19125	1902.5	27.62	22.32	5.30	≤13	PASS
20	18700	1860	27.93	22.50	5.43	≤13	PASS	
	18900	1880	27.68	22.64	5.04	≤13	PASS	
	19100	1900	27.73	22.51	5.22	≤13	PASS	
16QAM	1.4	18607	1850.7	26.84	21.77	5.07	≤13	PASS
		18900	1880.0	27.08	21.69	5.39	≤13	PASS
		19193	1909.3	26.44	21.57	4.87	≤13	PASS
	3	18615	1851.5	26.99	21.60	5.39	≤13	PASS
		18900	1880	27.10	21.67	5.43	≤13	PASS
		19185	1908.5	26.57	21.54	5.03	≤13	PASS
	5	18625	1852.5	27.10	21.65	5.45	≤13	PASS
		18900	1880	26.99	21.55	5.44	≤13	PASS
		19175	1907.5	26.77	21.54	5.23	≤13	PASS
	10	18650	1855	27.42	21.60	5.82	≤13	PASS
		18900	1880	27.08	21.60	5.48	≤13	PASS
		19150	1905	27.10	21.45	5.65	≤13	PASS
	15	18675	1857.5	27.76	21.69	6.07	≤13	PASS
		18900	1880	27.31	21.60	5.71	≤13	PASS
		19125	1902.5	27.48	21.64	5.84	≤13	PASS
20	18700	1860	27.85	21.70	6.15	≤13	PASS	
	18900	1880	27.44	21.64	5.80	≤13	PASS	
	19100	1900	27.51	21.56	5.95	≤13	PASS	

5.5.Frequency Stability

Ambient condition

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

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -30°C to +75°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 +75°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

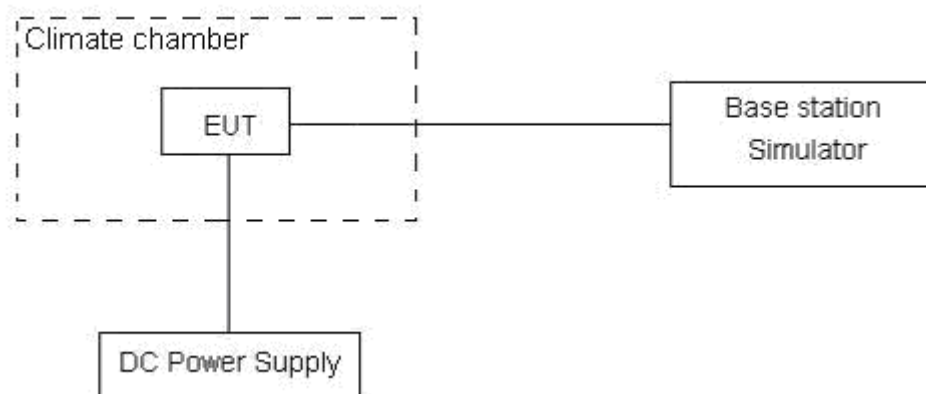
Frequency Stability (Voltage Variation)

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

Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced 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 3.23V and 4.37 V, with a nominal voltage of 3.8V.

Test setup



**Limits**

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block

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

GSM1900						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
Temperature	Voltage	GMSK	8PSK	GMSK	8PSK	
Normal (25°C)	Normal	9.86	1.30	0.00525	0.00069	PASS
Extreme (75°C)		5.85	17.85	0.00311	0.00949	PASS
Extreme (70°C)		17.35	1.64	0.00923	0.00087	PASS
Extreme (60°C)		15.30	4.20	0.00814	0.00223	PASS
Extreme (50°C)		14.34	8.04	0.00763	0.00427	PASS
Extreme (40°C)		11.84	11.61	0.00630	0.00617	PASS
Extreme (30°C)		8.31	10.16	0.00442	0.00540	PASS
Extreme (20°C)		8.43	11.57	0.00449	0.00615	PASS
Extreme (10°C)		14.07	13.20	0.00748	0.00702	PASS
Extreme (0°C)		11.74	6.11	0.00624	0.00325	PASS
Extreme (-10°C)		10.06	7.66	0.00535	0.00407	PASS
Extreme (-20°C)		11.80	13.41	0.00628	0.00713	PASS
Extreme (-30°C)		10.44	17.61	0.00555	0.00937	PASS
25°C	LV	10.67	12.52	0.00568	0.00666	PASS
	HV	9.71	2.68	0.00516	0.00143	PASS



WCDMA Band II						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal (25°C)	Normal	11.84	10.88	0.00630	0.00579	PASS
Extreme (75°C)		3.05	2.83	0.00162	0.00151	PASS
Extreme (70°C)		13.10	8.21	0.00697	0.00437	PASS
Extreme (60°C)		14.18	6.76	0.00754	0.00359	PASS
Extreme (50°C)		3.81	12.33	0.00203	0.00656	PASS
Extreme (40°C)		8.88	6.34	0.00472	0.00337	PASS
Extreme (30°C)		15.73	17.04	0.00836	0.00906	PASS
Extreme (20°C)		14.11	6.37	0.00751	0.00339	PASS
Extreme (10°C)		15.63	9.45	0.00831	0.00503	PASS
Extreme (0°C)		5.38	14.22	0.00286	0.00757	PASS
Extreme (-10°C)		9.01	14.06	0.00479	0.00748	PASS
Extreme (-20°C)		12.84	12.83	0.00683	0.00683	PASS
Extreme (-30°C)		5.15	6.93	0.00274	0.00369	PASS
25°C		LV	7.61	11.38	0.00405	0.00605
	HV	2.44	10.33	0.00130	0.00549	PASS



LTE Band 2						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	16.19	17.63	0.00861	0.00938	PASS
Extreme (75°C)		2.51	1.33	0.00134	0.00071	PASS
Extreme (70°C)		15.67	14.98	0.00833	0.00797	PASS
Extreme (60°C)		6.11	11.63	0.00325	0.00619	PASS
Extreme (50°C)		1.05	5.01	0.00056	0.00266	PASS
Extreme (40°C)		3.69	7.26	0.00196	0.00386	PASS
Extreme (30°C)		15.76	11.09	0.00838	0.00590	PASS
Extreme (20°C)		16.99	13.60	0.00904	0.00723	PASS
Extreme (10°C)		6.46	9.51	0.00343	0.00506	PASS
Extreme (0°C)		15.30	16.77	0.00814	0.00892	PASS
Extreme (-10°C)		17.24	9.20	0.00917	0.00489	PASS
Extreme (-20°C)		1.11	10.58	0.00059	0.00563	PASS
Extreme (-30°C)		11.78	7.16	0.00627	0.00381	PASS
25°C		LV	13.54	7.80	0.00720	0.00415
	HV	12.56	11.83	0.00668	0.00629	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	3MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	7.73	4.23	0.00411	0.00225	PASS
Extreme (75°C)		9.09	11.47	0.00483	0.00610	PASS
Extreme (70°C)		13.76	17.94	0.00732	0.00954	PASS
Extreme (60°C)		10.09	16.17	0.00537	0.00860	PASS
Extreme (50°C)		13.19	14.90	0.00701	0.00793	PASS
Extreme (40°C)		8.07	16.91	0.00429	0.00899	PASS
Extreme (30°C)		3.99	7.10	0.00212	0.00378	PASS
Extreme (20°C)		11.83	5.40	0.00629	0.00287	PASS
Extreme (10°C)		7.28	13.94	0.00387	0.00741	PASS
Extreme (0°C)		4.52	2.40	0.00240	0.00127	PASS
Extreme (-10°C)		8.83	1.61	0.00470	0.00086	PASS
Extreme (-20°C)		3.26	4.70	0.00173	0.00250	PASS
Extreme (-30°C)		15.56	8.84	0.00828	0.00470	PASS
25°C		LV	7.55	10.92	0.00402	0.00581
	HV	9.68	11.24	0.00515	0.00598	PASS
Condition		Freq.Error	Freq.Error	Frequency	Frequency	Verdict



BANDWIDTH		5MHz	(Hz)	(Hz)	Stability (ppm)	Stability (ppm)	
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK		
Normal (25°C)	Normal	16.93	17.88	0.00901	0.00951	PASS	
Extreme (75°C)		4.97	10.99	0.00265	0.00584	PASS	
Extreme (70°C)		15.04	4.76	0.00800	0.00253	PASS	
Extreme (60°C)		4.07	1.87	0.00216	0.00099	PASS	
Extreme (50°C)		14.10	5.69	0.00750	0.00302	PASS	
Extreme (40°C)		5.50	5.40	0.00293	0.00287	PASS	
Extreme (30°C)		7.11	1.78	0.00378	0.00094	PASS	
Extreme (20°C)		8.82	9.32	0.00469	0.00496	PASS	
Extreme (10°C)		12.44	14.29	0.00662	0.00760	PASS	
Extreme (0°C)		15.83	3.48	0.00842	0.00185	PASS	
Extreme (-10°C)		2.71	8.05	0.00144	0.00428	PASS	
Extreme (-20°C)		5.75	8.65	0.00306	0.00460	PASS	
Extreme (-30°C)		3.31	17.36	0.00176	0.00923	PASS	
25°C		LV	15.85	7.64	0.00843	0.00406	PASS
	HV	4.75	4.63	0.00253	0.00246	PASS	
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict	
BANDWIDTH	10MHz						
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK		
Normal (25°C)	Normal	5.73	16.15	0.00305	0.00859	PASS	
Extreme (75°C)		11.52	12.37	0.00613	0.00658	PASS	
Extreme (70°C)		7.00	15.34	0.00373	0.00816	PASS	
Extreme (60°C)		15.85	3.19	0.00843	0.00169	PASS	
Extreme (50°C)		11.73	7.20	0.00624	0.00383	PASS	
Extreme (40°C)		7.91	9.43	0.00421	0.00501	PASS	
Extreme (30°C)		5.06	16.57	0.00269	0.00881	PASS	
Extreme (20°C)		8.34	16.92	0.00444	0.00900	PASS	
Extreme (10°C)		2.24	12.82	0.00119	0.00682	PASS	
Extreme (0°C)		8.55	10.47	0.00455	0.00557	PASS	
Extreme (-10°C)		3.85	14.15	0.00205	0.00752	PASS	
Extreme (-20°C)		12.90	16.63	0.00686	0.00884	PASS	
Extreme (-30°C)		5.12	17.63	0.00272	0.00938	PASS	
25°C		LV	9.01	14.04	0.00479	0.00747	PASS
	HV	13.77	16.19	0.00733	0.00861	PASS	
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict	
BANDWIDTH	15MHz						



Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	10.43	9.50	0.00555	0.00505	PASS
Extreme (75°C)		11.67	16.46	0.00621	0.00875	PASS
Extreme (70°C)		10.16	8.63	0.00541	0.00459	PASS
Extreme (60°C)		12.99	13.49	0.00691	0.00718	PASS
Extreme (50°C)		14.59	6.80	0.00776	0.00362	PASS
Extreme (40°C)		15.41	7.23	0.00819	0.00385	PASS
Extreme (30°C)		9.40	2.84	0.00500	0.00151	PASS
Extreme (20°C)		1.73	1.48	0.00092	0.00079	PASS
Extreme (10°C)		8.97	15.18	0.00477	0.00807	PASS
Extreme (0°C)		14.49	2.72	0.00771	0.00145	PASS
Extreme (-10°C)		16.63	15.71	0.00884	0.00836	PASS
Extreme (-20°C)		6.39	9.62	0.00340	0.00512	PASS
Extreme (-30°C)		11.50	15.81	0.00612	0.00841	PASS
25°C		LV	3.69	6.24	0.00196	0.00332
	HV	7.81	13.67	0.00415	0.00727	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	8.00	11.87	0.00425	0.00632	PASS
Extreme (75°C)		6.96	14.96	0.00370	0.00796	PASS
Extreme (70°C)		12.18	15.00	0.00648	0.00798	PASS
Extreme (60°C)		4.74	15.96	0.00252	0.00849	PASS
Extreme (50°C)		3.48	6.26	0.00185	0.00333	PASS
Extreme (40°C)		13.17	2.04	0.00701	0.00108	PASS
Extreme (30°C)		4.68	12.70	0.00249	0.00676	PASS
Extreme (20°C)		16.42	7.59	0.00873	0.00404	PASS
Extreme (10°C)		16.03	10.02	0.00853	0.00533	PASS
Extreme (0°C)		12.17	4.37	0.00647	0.00233	PASS
Extreme (-10°C)		10.03	7.72	0.00533	0.00411	PASS
Extreme (-20°C)		9.43	7.15	0.00502	0.00380	PASS
Extreme (-30°C)		15.22	15.95	0.00809	0.00849	PASS
25°C		LV	4.91	1.19	0.00261	0.00063
	HV	16.27	17.97	0.00865	0.00956	PASS

5.6. 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 is set to 1 kHz (0.009MHz~ 0.15 MHz),

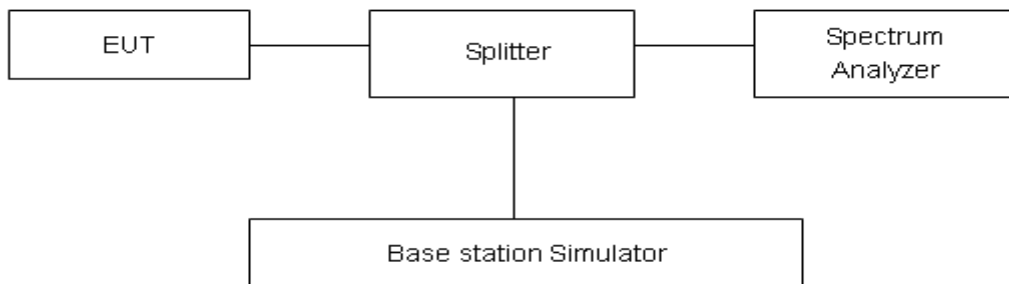
RBW is set to 10 kHz (0.15 MHz~ 30 MHz)

RBW is set to 100 kHz (30MHz~1000 MHz)

RBW is set to 1000 kHz (above 1000MHz)

The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

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
9kHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB



Test Result

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

GSM 1900 CH-Low 9kHz ~20GHz



13:43:26 23.02.2021

GPRS 1900 CH-Low 9kHz ~ 20GHz



13:45:10 23.02.2021

GSM 1900 CH- Middle 9kHz ~ 20GHz



13:43:52 23.02.2021

GPRS 1900 CH- Middle 9kHz ~ 20GHz



13:45:40 23.02.2021

GSM 1900 CH-High 9kHz ~ 20GHz



13:44:14 23.02.2021

GPRS 1900 CH-High 9kHz ~ 20GHz



13:44:21 23.02.2021



EGPRS 1900 CH-Low 9kHz ~ 20GHz



13:49:04 23.02.2021

WCDMA BAND II CH-Low 9kHz ~ 20GHz



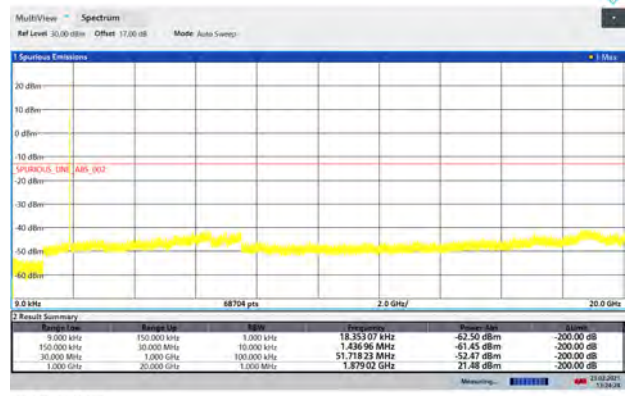
13:13:48 23.02.2021

EGPRS 1900 CH- Middle 9kHz ~ 20GHz



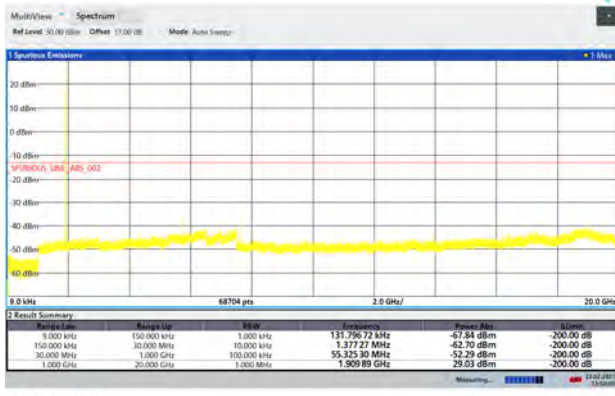
13:49:04 23.02.2021

WCDMA BAND II CH- Middle 9kHz ~ 20GHz



13:14:25 23.02.2021

EGPRS 1900 CH-High 9kHz ~ 20GHz



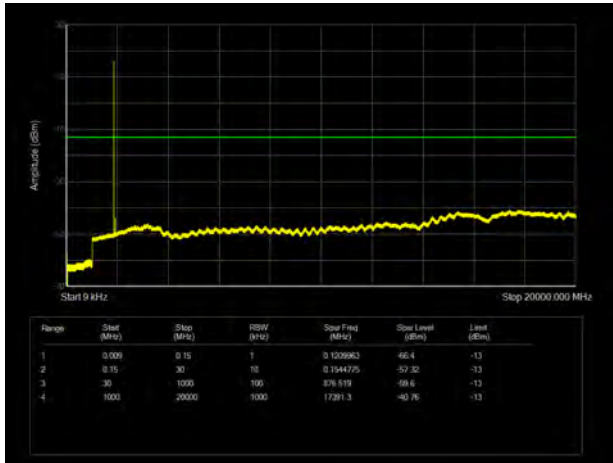
13:50:04 23.02.2021

WCDMA BAND II CH-High 9kHz ~ 20GHz

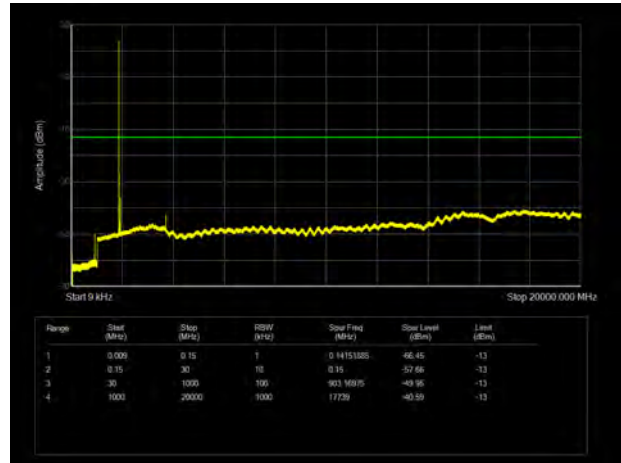


13:14:58 23.02.2021

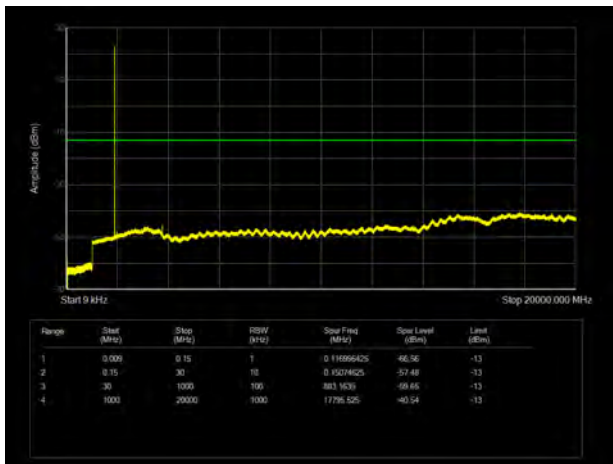
LTE Band 2 1.4MHz CH-Low 9kHz~20GHz



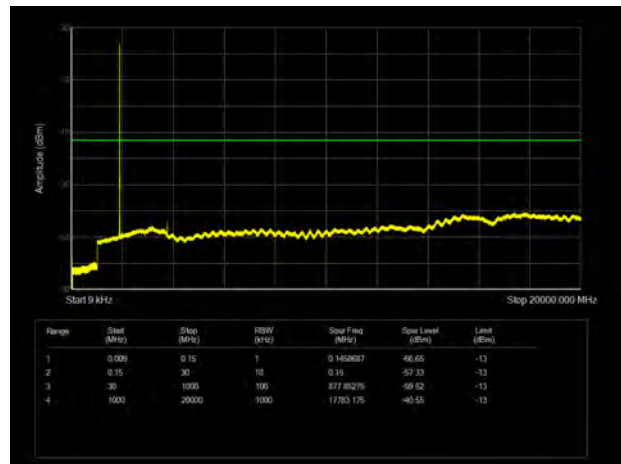
LTE Band 2 3MHz CH-Low 9kHz~20GHz



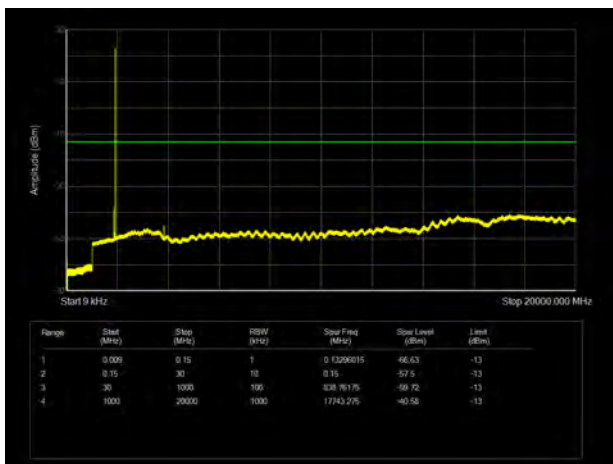
LTE Band 2 1.4MHz CH-Middle 9kHz~20GHz



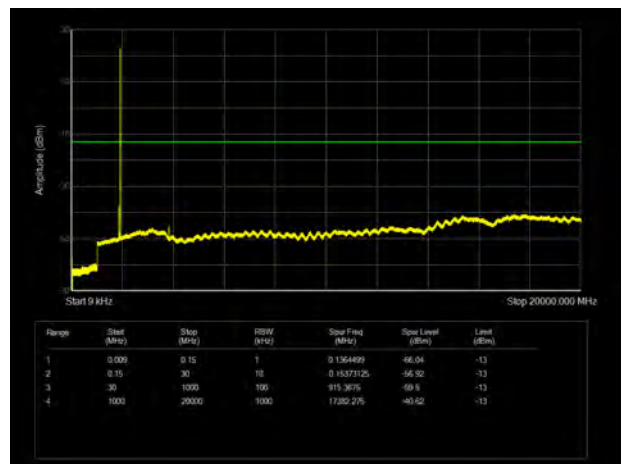
LTE Band 2 3MHz CH-Middle 9kHz~20GHz



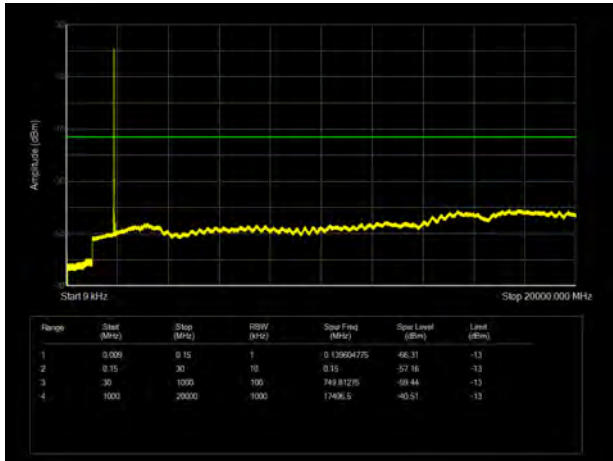
LTE Band 2 1.4MHz CH-High 9kHz~20GHz



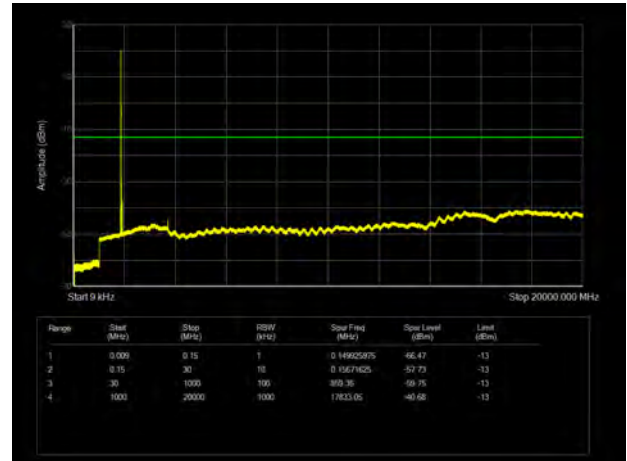
LTE Band 2 3MHz CH-High 9kHz~20GHz



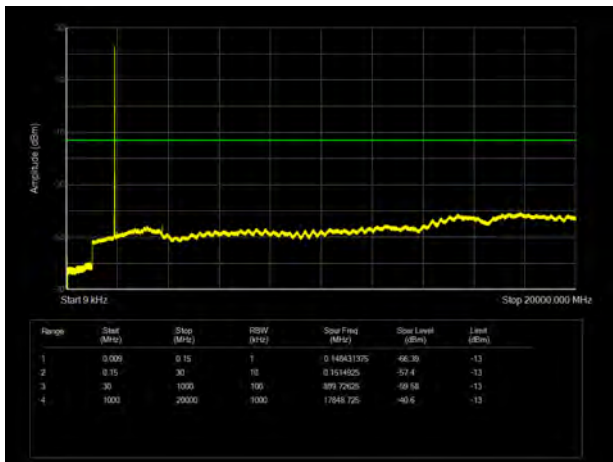
LTE Band 2 5MHz CH-Low 9kHz~20GHz



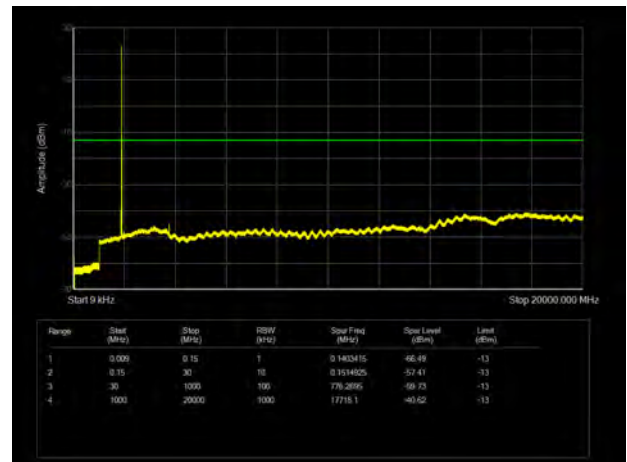
LTE Band 2 10MHz CH-Low 9kHz~20GHz



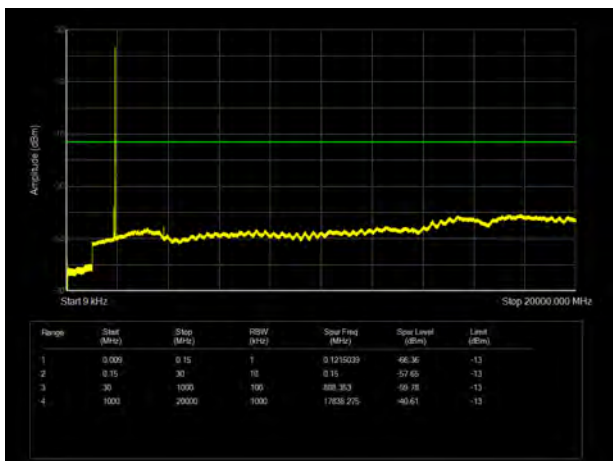
LTE Band 2 5MHz CH-Middle 9kHz~20GHz



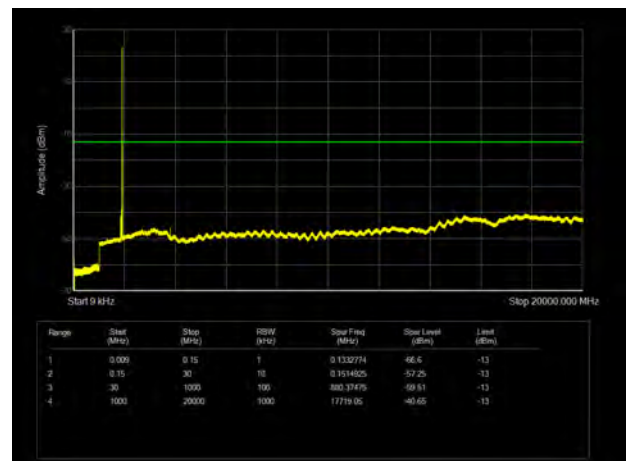
LTE Band 2 10MHz CH-Middle 9kHz~20GHz



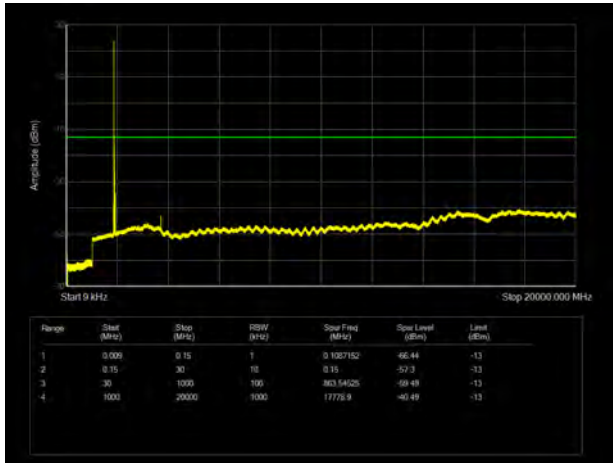
LTE Band 2 5MHz CH-High 9kHz~20GHz



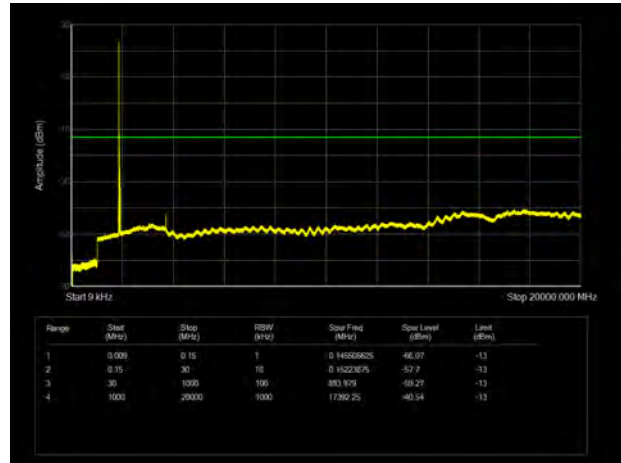
LTE Band 2 10MHz CH-High 9kHz~20GHz



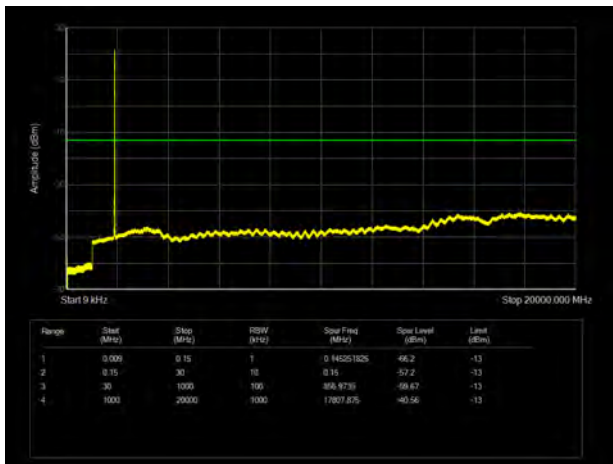
LTE Band 2 15MHz CH-Low 9kHz~20GHz



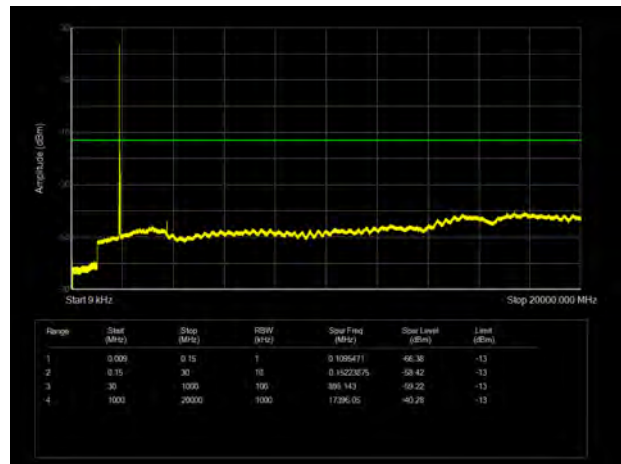
LTE Band 2 20MHz CH-Low 9kHz~20GHz



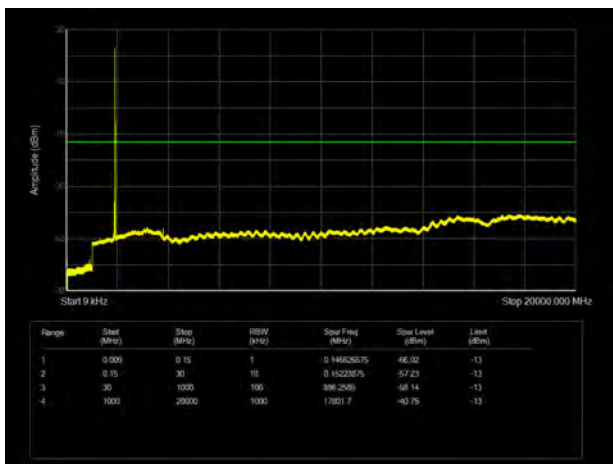
LTE Band 2 15MHz CH-Middle 9kHz~20GHz



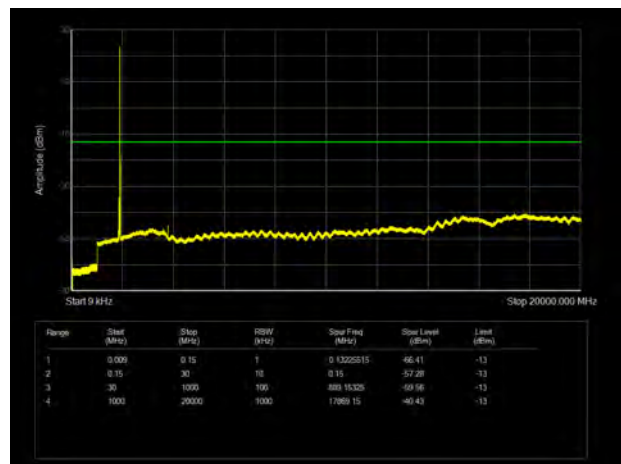
LTE Band 2 20MHz CH-Middle 9kHz~20GHz



LTE Band 2 15MHz CH-High 9kHz~20GHz



LTE Band 2 20MHz CH-High 9kHz~20GHz



5.7. Radiates Spurious Emission

Ambient condition

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

Method of Measurement

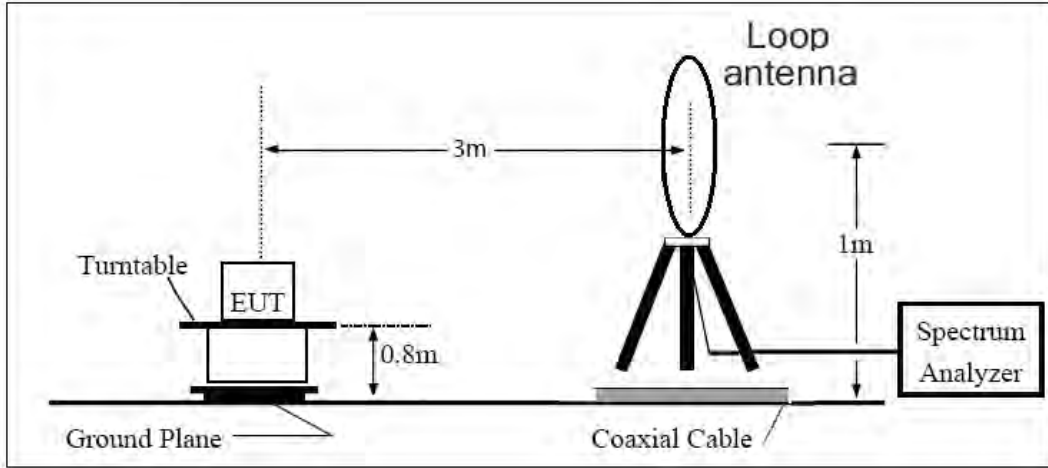
1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable 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 loop antenna, A log-periodic antenna or 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=200Hz,VBW=600Hz for 9kHz-150kHz , RBW=10kHz, VBW=30kHz 150kHz-30MHz , RBW=100kHz,VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 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
8. 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, $ERP = EIRP - 2.15\text{dBi}$.

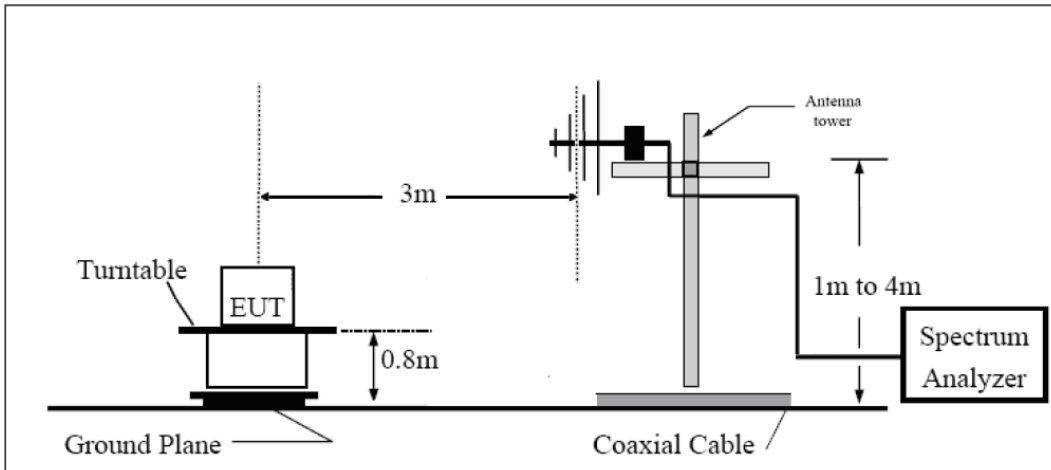
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

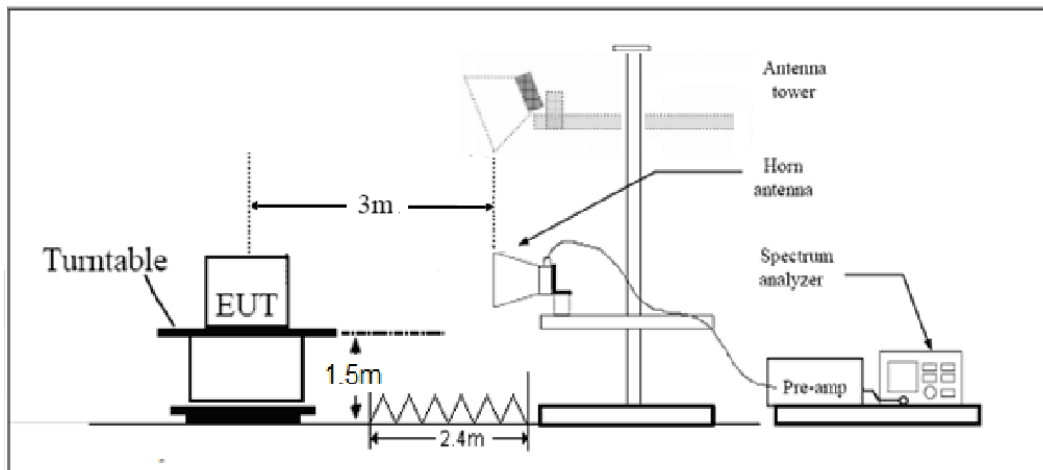
9KHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz





Note: Area side: 2.4mX3.6m

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

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

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	3760.00	-44.03	2.60	12.50	Horizontal	-34.13	-13.00	21.13	45
3	5640.00	-37.30	3.30	12.50	Horizontal	-28.10	-13.00	15.10	315
4	7520.00	-44.50	4.20	12.20	Horizontal	-36.50	-13.00	23.50	90
5	9400.00	-52.05	4.30	11.10	Horizontal	-45.25	-13.00	32.25	270
6	11280.00	-50.16	5.90	11.90	Horizontal	-44.16	-13.00	31.16	180
7	13160.00	-52.48	5.70	14.00	Horizontal	-44.18	-13.00	31.18	45
8	15040.00	-54.03	5.80	13.10	Horizontal	-46.73	-13.00	33.73	270
9	16920.00	-50.41	6.10	14.60	Horizontal	-41.91	-13.00	28.91	315
-	18800.00	-	-	-	-	-	-	-	-

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	-54.69	2.60	12.50	Horizontal	-44.79	-13.00	31.79	315
3	5640.0	-60.24	3.30	12.50	Horizontal	-51.04	-13.00	38.04	45
4	7520.0	-57.04	4.20	12.20	Horizontal	-49.04	-13.00	36.04	315
5	9400.0	-51.74	4.30	11.10	Horizontal	-44.94	-13.00	31.94	90
6	11280.0	-50.54	5.90	11.90	Horizontal	-44.54	-13.00	31.54	135
7	13160.0	-53.37	5.70	14.00	Horizontal	-45.07	-13.00	32.07	45
8	15040.0	-49.32	5.80	13.10	Horizontal	-42.02	-13.00	29.02	315
9	16920.0	-48.59	6.10	14.60	Horizontal	-40.09	-13.00	27.09	135
10	18800.0	-	-	-	-	-	-	-	-

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	3759.00	-48.36	2.60	12.50	Horizontal	-38.46	-13.00	25.46	0
3	5638.88	-50.52	3.30	12.50	Horizontal	-41.32	-13.00	28.32	315
4	7520.00	-49.65	4.20	12.20	Horizontal	-41.65	-13.00	28.65	90
5	9400.00	-51.34	4.30	11.10	Horizontal	-44.54	-13.00	31.54	45
6	11280.00	-50.50	5.90	11.90	Horizontal	-44.50	-13.00	31.50	270
7	13160.00	-52.79	5.70	14.00	Horizontal	-44.49	-13.00	31.49	180
8	15040.00	-48.32	5.80	13.10	Horizontal	-41.02	-13.00	28.02	45
9	16920.00	-47.04	6.10	14.60	Horizontal	-38.54	-13.00	25.54	315
10	18800.00	-	-	-	-	-	-	-	-

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	3755.63	-48.90	2.60	12.50	Horizontal	-39.00	-13.00	26.00	45
3	5633.63	-50.46	3.30	12.50	Horizontal	-41.26	-13.00	28.26	270
4	7511.00	-49.46	4.20	12.20	Horizontal	-41.46	-13.00	28.46	135
5	9400.00	-51.51	4.30	11.10	Horizontal	-44.71	-13.00	31.71	270
6	11280.00	-50.43	5.90	11.90	Horizontal	-44.43	-13.00	31.43	135
7	13160.00	-53.59	5.70	14.00	Horizontal	-45.29	-13.00	32.29	0
8	15040.00	-47.73	5.80	13.10	Horizontal	-40.43	-13.00	27.43	315
9	16920.00	-47.88	6.10	14.60	Horizontal	-39.38	-13.00	26.38	90
10	18800.00	-	-	-	-	-	-	-	-

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	3742.13	-51.64	2.60	12.50	Horizontal	-41.74	-13.00	28.74	45
3	5613.38	-55.09	3.30	12.50	Horizontal	-45.89	-13.00	32.89	315
4	7484.63	-49.36	4.20	12.20	Horizontal	-41.36	-13.00	28.36	180
5	9400.00	-52.10	4.30	11.10	Horizontal	-45.30	-13.00	32.30	45
6	11280.00	-50.52	5.90	11.90	Horizontal	-44.52	-13.00	31.52	270
7	13160.00	-53.75	5.70	14.00	Horizontal	-45.45	-13.00	32.45	45
8	15040.00	-48.34	5.80	13.10	Horizontal	-41.04	-13.00	28.04	315
9	16920.00	-46.54	6.10	14.60	Horizontal	-38.04	-13.00	25.04	180
10	18800.00	-	-	-	-	-	-	-	-

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	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMU200	118133	2020-05-17	2021-05-16
Base Station Simulator	R&S	CMW500	113824	2020-05-18	2021-05-17
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Key sight	N9010A	MY50210259	2020-05-18	2021-05-17
Universal Radio Communication Tester	Key sight	E5515C	MY48367192	2020-05-27	2021-05-26
Signal Analyzer	R&S	FSV30	100815	2020-12-13	2021-12-12
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2020-04-02	2023-04-01
TRILOG Broadband Antenna	SCHWARZBECK	VULB 9163	391	2019-12-16	2021-12-15
Horn Antenna	R&S	HF907	102723	2018-08-11	2021-08-10
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2021-06-19
Signal generator	R&S	SMB 100A	102594	2020-05-18	2021-05-17
Climatic Chamber	ESPEC	SU-242	93000506	2020-12-13	2021-12-12
Preamplifier	R&S	SCU18	102327	2020-05-18	2021-05-17
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2020-05-18	2021-05-17
RF Cable	Agilent	SMA 15cm	0001	2020-12-10	2021-06-09
Software	R&S	EMC32	9.26.0	/	/

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



ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.



ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.