



RF TEST REPORT

Applicant Xiaomi Communications Co., Ltd.
FCC ID 2AFZZK7AG
Product Mobile Phone
Brand Redmi
Model M2101K7AG
Report No. R2012A0833-R2V1
Issue Date January 18, 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	17
5.3. Band Edge Compliance	31
5.4. Peak-to-Average Power Ratio (PAPR)	46
5.5. Frequency Stability	49
5.6. Spurious Emissions at Antenna Terminals	54
5.7. Radiates Spurious Emission	60
6. Main Test Instruments	69
ANNEX A: The EUT Appearance	70
ANNEX B: Test Setup Photos	71



Version	Revision description	Issue Date
Rev.0	/	January 14, 2021
Rev.1	Update information for General Information	January 18, 2021
Note: This revised report (Report No. R2012A0833-R2V1) supersedes and replaces the previously issued report (Report No. R2012A0833-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: December 16, 2020 ~ January 3, 2021 Date of Sample Received: December 14, 2020			
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	Xiaomi Communications Co., Ltd.
Applicant address	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
Manufacturer	Xiaomi Communications Co., Ltd.
Manufacturer address	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

2.4. General information

EUT Description				
Model	M2101K7AG			
IMEI	IMEI 1: 868824050045644 IMEI 2: 868824050045651			
Hardware Version	P2			
Software Version	MIUI12			
Power Supply	Battery / AC adapter			
Antenna Type	Internal Antenna			
Antenna Gain	Band	Frequency (MHz)	Antenna Gain(dBi)	
			Main Antenna	Diversity Antenna
	GSM1900	1850	-3.0	-1.2
		1890	-3.5	-1.8
		1910	-3.6	-2.1
	WCDMA Band II	1850	-3.0	-1.2
		1890	-3.5	-1.8
		1910	-3.6	-2.1
	LTE Band 2	1850	-3.0	-1.2
		1870	-3.5	-1.8
		1890	-3.5	-1.8
		1910	-3.6	-2.1
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, 64QAM;			
GPRS Multislot Class	33			
EGPRS Multislot Class	33			
HSDPA UE Category	24			
HSUPA UE Category	8			
LTE Category	7			



Maximum E.I.R.P	GSM 1900:	28.67dBm	
	WCDMA Band II:	22.39dBm	
	LTE Band 2:	23.21dBm	
Rated Power Supply Voltage	3.87V		
Extreme Voltage	Minimum: 3.29V Maximum: 4.45V		
Extreme Temperature	Lowest: -30°C Highest: +50°C		
Operating Voltage	Minimum: 3.6V Maximum: 4.2V		
Operating Temperature	Lowest: 0°C Highest: +40°C		
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

There is more than one SIM card slot, each one should be applied throughout the compliance test respectively, and however, only the worst case (SIM 1) will be recorded in this report.

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) 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	64QAM	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	O
Occupied Bandwidth	O	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	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	O	O	O	O	-	-	O	O	O	O
Frequency Stability	O	O	O	O	O	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	-
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.

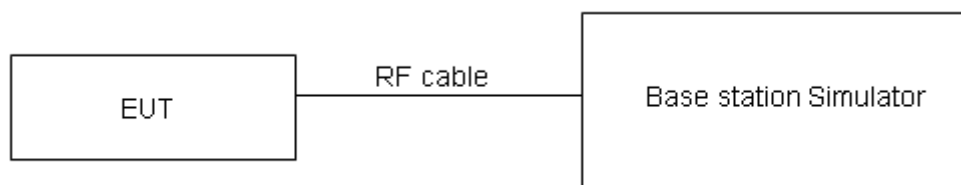
ERP can then be calculated as follows:

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

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)					
					Main Antenna			Diversity Antenna		
		Channel 512	Channel 661	Channel 810	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)	1850.2 (MHz)	1880 (MHz)	1909.8 (MHz)
GSM(GMSK)	Results	29.79	29.91	30.15	26.79	26.41	26.55	28.59	28.11	28.05
GPRS/EGPRS (GMSK)	1TXslot	29.87	30.04	30.21	26.87	26.54	26.61	28.67	28.24	28.11
	2TXslots	26.20	26.59	26.72	23.20	23.09	23.12	25.00	24.79	24.62
	3TXslots	24.60	24.91	25.17	21.60	21.41	21.57	23.40	23.11	23.07
	4TXslots	23.45	23.91	24.03	20.45	20.41	20.43	22.25	22.11	21.93
EGPRS (8PSK)	1TXslot	26.08	26.17	26.77	23.08	22.67	23.17	24.88	24.37	24.67
	2TXslots	23.27	23.88	24.08	20.27	20.38	20.48	22.07	22.08	21.98
	3TXslots	22.03	22.38	22.70	19.03	18.88	19.10	20.83	20.58	20.60
	4TXslots	21.54	21.62	21.65	18.54	18.12	18.05	20.34	19.82	19.55

WCDMA Band II		Maximum Output Power (dBm)			EIRP (dBm)					
					Main Antenna			Diversity Antenna		
		Channel 9262	Channel 9400	Channel 9538	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)	1852.4 (MHz)	1880 (MHz)	1907.6 (MHz)
RMC		23.59	23.68	23.78	20.59	20.18	20.18	22.39	21.88	21.68
HSDPA	Sub - Test 1	23.05	23.10	23.22	20.05	19.60	19.62	21.85	21.30	21.12
	Sub - Test 2	23.04	23.12	23.19	20.04	19.62	19.59	21.84	21.32	21.09
	Sub - Test 3	22.51	22.62	22.71	19.51	19.12	19.11	21.31	20.82	20.61
	Sub - Test 4	22.52	22.63	22.69	19.52	19.13	19.09	21.32	20.83	20.59
HSUPA	Sub - Test 1	23.01	23.09	23.17	20.01	19.59	19.57	21.81	21.29	21.07
	Sub - Test 2	22.00	22.07	22.16	19.00	18.57	18.56	20.80	20.27	20.06
	Sub - Test 3	22.47	22.55	22.65	19.47	19.05	19.05	21.27	20.75	20.55
	Sub - Test 4	21.93	22.04	22.13	18.93	18.54	18.53	20.73	20.24	20.03
	Sub - Test 5	22.94	23.02	23.11	19.94	19.52	19.51	21.74	21.22	21.01
DC-HSDPA	Sub - Test 1	22.93	23.04	23.12	19.93	19.54	19.52	21.73	21.24	21.02
	Sub - Test 2	22.92	23.03	23.11	19.92	19.53	19.51	21.72	21.23	21.01
	Sub - Test 3	22.50	22.52	22.62	19.50	19.02	19.02	21.30	20.72	20.52
	Sub - Test 4	22.49	22.51	22.61	19.49	19.01	19.01	21.29	20.71	20.51
HSPA+	16QAM	22.48	22.59	22.68	19.48	19.09	19.08	21.28	20.79	20.58

LTE Band 2				Maximum Output Power (dBm)			EIRP (dBm)					
							Main Antenna			Diversity Antenna		
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)								
				18607/ 1850.7	18900/ 1880	19193/ 1909.3	18607/ 1850.7	18900/ 1880	19193/ 1909.3	18607/ 1850.7	18900/ 1880	19193/ 1909.3
1.4MHz	QPSK	1	0	24.39	24.31	24.41	21.39	20.81	20.81	23.19	22.51	22.31
		1	2	24.29	24.25	24.20	21.29	20.75	20.60	23.09	22.45	22.10
		1	5	24.13	24.06	24.23	21.13	20.56	20.63	22.93	22.26	22.13
		3	0	24.31	24.33	24.16	21.31	20.83	20.56	23.11	22.53	22.06
		3	2	24.26	24.28	24.31	21.26	20.78	20.71	23.06	22.48	22.21
		3	3	24.33	24.20	24.17	21.33	20.70	20.57	23.13	22.40	22.07
		6	0	23.40	23.31	23.38	20.40	19.81	19.78	22.20	21.51	21.28
	16QAM	1	0	23.42	23.50	23.61	20.42	20.00	20.01	22.22	21.70	21.51
		1	2	23.40	23.37	23.39	20.40	19.87	19.79	22.20	21.57	21.29
		1	5	23.37	23.32	23.39	20.37	19.82	19.79	22.17	21.52	21.29
		3	0	23.48	23.41	23.51	20.48	19.91	19.91	22.28	21.61	21.41
		3	2	23.46	23.40	23.50	20.46	19.90	19.90	22.26	21.60	21.40
		3	3	23.28	23.24	23.31	20.28	19.74	19.71	22.08	21.44	21.21
		6	0	22.41	22.39	22.52	19.41	18.89	18.92	21.21	20.59	20.42
	64QAM	1	0	23.46	23.33	23.49	20.46	19.83	19.89	22.26	21.53	21.39
		1	2	23.43	23.37	23.45	20.43	19.87	19.85	22.23	21.57	21.35
		1	5	23.20	23.20	23.25	20.20	19.70	19.65	22.00	21.40	21.15
		3	0	23.34	23.26	23.34	20.34	19.76	19.74	22.14	21.46	21.24
		3	2	23.31	23.24	23.34	20.31	19.74	19.74	22.11	21.44	21.24
		3	3	23.24	23.21	23.27	20.24	19.71	19.67	22.04	21.41	21.17
		6	0	22.31	22.29	22.39	19.31	18.79	18.79	21.11	20.49	20.29
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)								
				18615/ 1851.5	18900/ 1880	19185/ 1908.5	18615/ 1851.5	18900/ 1880	19185/ 1908.5	18615/ 1851.5	18900/ 1880	19185/ 1908.5
3MHz	QPSK	1	0	24.41	24.35	24.44	21.41	20.85	20.84	23.21	22.55	22.34
		1	7	24.27	24.28	24.24	21.27	20.78	20.64	23.07	22.48	22.14
		1	14	24.16	24.11	24.27	21.16	20.61	20.67	22.96	22.31	22.17
		8	0	23.41	23.45	23.29	20.41	19.95	19.69	22.21	21.65	21.19
		8	4	23.38	23.38	23.43	20.38	19.88	19.83	22.18	21.58	21.33
		8	7	23.43	23.31	23.27	20.43	19.81	19.67	22.23	21.51	21.17
		15	0	23.40	23.35	23.41	20.40	19.85	19.81	22.20	21.55	21.31



	16QAM	1	0	23.45	23.52	23.64	20.45	20.02	20.04	22.25	21.72	21.54
		1	7	23.43	23.37	23.43	20.43	19.87	19.83	22.23	21.57	21.33
		1	14	23.39	23.36	23.42	20.39	19.86	19.82	22.19	21.56	21.32
		8	0	22.59	22.54	22.63	19.59	19.04	19.03	21.39	20.74	20.53
		8	4	22.57	22.53	22.62	19.57	19.03	19.02	21.37	20.73	20.52
		8	7	22.38	22.36	22.44	19.38	18.86	18.84	21.18	20.56	20.34
		15	0	22.44	22.43	22.55	19.44	18.93	18.95	21.24	20.63	20.45
	64QAM	1	0	23.49	23.35	23.35	20.49	19.85	19.75	22.29	21.55	21.25
		1	7	23.46	23.37	23.47	20.46	19.87	19.87	22.26	21.57	21.37
		1	14	23.22	23.19	23.28	20.22	19.69	19.68	22.02	21.39	21.18
		8	0	22.45	22.39	22.46	19.45	18.89	18.86	21.25	20.59	20.36
		8	4	22.42	22.37	22.46	19.42	18.87	18.86	21.22	20.57	20.36
		8	7	22.34	22.33	22.40	19.34	18.83	18.80	21.14	20.53	20.30
		15	0	22.34	22.33	22.42	19.34	18.83	18.82	21.14	20.53	20.32
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)								
				18625/ 1852.5	18900/ 1880	19175/ 1907.5	18625/ 1852.5	18900/ 1880	19175/ 1907.5	18625/ 1852.5	18900/ 1880	19175/ 1907.5
5MHz	QPSK	1	0	24.38	24.33	24.40	21.38	20.83	20.80	23.18	22.53	22.30
		1	13	24.25	24.24	24.21	21.25	20.74	20.61	23.05	22.44	22.11
		1	24	24.13	24.06	24.23	21.13	20.56	20.63	22.93	22.26	22.13
		12	0	23.38	23.40	23.25	20.38	19.90	19.65	22.18	21.60	21.15
		12	6	23.36	23.34	23.38	20.36	19.84	19.78	22.16	21.54	21.28
		12	13	23.41	23.29	23.23	20.41	19.79	19.63	22.21	21.49	21.13
		25	0	23.40	23.34	23.39	20.40	19.84	19.79	22.20	21.54	21.29
	16QAM	1	0	23.42	23.48	23.61	20.42	19.98	20.01	22.22	21.68	21.51
		1	13	23.40	23.35	23.40	20.40	19.85	19.80	22.20	21.55	21.30
		1	24	23.36	23.34	23.38	20.36	19.84	19.78	22.16	21.54	21.28
		12	0	22.57	22.50	22.60	19.57	19.00	19.00	21.37	20.70	20.50
		12	6	22.54	22.48	22.58	19.54	18.98	18.98	21.34	20.68	20.48
		12	13	22.35	22.31	22.40	19.35	18.81	18.80	21.15	20.51	20.30
		25	0	22.42	22.39	22.50	19.42	18.89	18.90	21.22	20.59	20.40
	64QAM	1	0	23.46	23.35	23.49	20.46	19.85	19.89	22.26	21.55	21.39
		1	13	23.43	23.39	23.44	20.43	19.89	19.84	22.23	21.59	21.34
		1	24	23.23	23.17	23.24	20.23	19.67	19.64	22.03	21.37	21.14
		12	0	22.43	22.35	22.47	19.43	18.85	18.87	21.23	20.55	20.37
		12	6	22.39	22.32	22.42	19.39	18.82	18.82	21.19	20.52	20.32
		12	13	22.31	22.28	22.36	19.31	18.78	18.76	21.11	20.48	20.26



		25	0	22.32	22.29	22.37	19.32	18.79	18.77	21.12	20.49	20.27
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)								
				18650/ 1855	18900/ 1880	19150/ 1905	18650/ 1855	18900/ 1880	19150/ 1905	18650/ 1855	18900/ 1880	19150/ 1905
10MHz	QPSK	1	0	24.40	24.34	24.43	21.40	20.84	20.83	23.20	22.54	22.33
		1	25	24.28	24.29	24.25	21.28	20.79	20.65	23.08	22.49	22.15
		1	49	24.15	24.10	24.26	21.15	20.60	20.66	22.95	22.30	22.16
		25	0	23.41	23.45	23.29	20.41	19.95	19.69	22.21	21.65	21.19
		25	13	23.39	23.39	23.42	20.39	19.89	19.82	22.19	21.59	21.32
		25	25	23.43	23.33	23.28	20.43	19.83	19.68	22.23	21.53	21.18
		50	0	23.44	23.36	23.43	20.44	19.86	19.83	22.24	21.56	21.33
	16QAM	1	0	23.44	23.51	23.63	20.44	20.01	20.03	22.24	21.71	21.53
		1	25	23.43	23.39	23.43	20.43	19.89	19.83	22.23	21.59	21.33
		1	49	23.39	23.36	23.41	20.39	19.86	19.81	22.19	21.56	21.31
		25	0	22.60	22.55	22.64	19.60	19.05	19.04	21.40	20.75	20.54
		25	13	22.56	22.52	22.61	19.56	19.02	19.01	21.36	20.72	20.51
		25	25	22.38	22.36	22.44	19.38	18.86	18.84	21.18	20.56	20.34
		50	0	22.45	22.44	22.54	19.45	18.94	18.94	21.25	20.64	20.44
	64QAM	1	0	23.48	23.34	23.42	20.48	19.84	19.82	22.28	21.54	21.32
		1	25	23.46	23.39	23.47	20.46	19.89	19.87	22.26	21.59	21.37
		1	49	23.22	23.19	23.27	20.22	19.69	19.67	22.02	21.39	21.17
		25	0	22.46	22.40	22.47	19.46	18.90	18.87	21.26	20.60	20.37
		25	13	22.41	22.36	22.45	19.41	18.86	18.85	21.21	20.56	20.35
		25	25	22.34	22.33	22.40	19.34	18.83	18.80	21.14	20.53	20.30
		50	0	22.35	22.34	22.41	19.35	18.84	18.81	21.15	20.54	20.31
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)								
				18675/ 1857.5	18900/ 1880	19125/ 1902.5	18675/ 1857.5	18900/ 1880	19125/ 1902.5	18675/ 1857.5	18900/ 1880	19125/ 1902.5
15MHz	QPSK	1	0	24.39	24.30	24.41	21.39	20.80	20.81	23.19	22.50	22.31
		1	38	24.26	24.28	24.22	21.26	20.78	20.62	23.06	22.48	22.12
		1	74	24.12	24.05	24.22	21.12	20.55	20.62	22.92	22.25	22.12
		36	0	23.39	23.41	23.26	20.39	19.91	19.66	22.19	21.61	21.16
		36	18	23.36	23.34	23.38	20.36	19.84	19.78	22.16	21.54	21.28
		36	39	23.40	23.30	23.24	20.40	19.80	19.64	22.20	21.50	21.14
		75	0	23.42	23.32	23.38	20.42	19.82	19.78	22.22	21.52	21.28
	16QAM	1	0	23.39	23.49	23.61	20.39	19.99	20.01	22.19	21.69	21.51
		1	38	23.41	23.36	23.41	20.41	19.86	19.81	22.21	21.56	21.31



		1	74	23.36	23.32	23.38	20.36	19.82	19.78	22.16	21.52	21.28
		36	0	22.57	22.53	22.61	19.57	19.03	19.01	21.37	20.73	20.51
		36	18	22.53	22.47	22.57	19.53	18.97	18.97	21.33	20.67	20.47
		36	39	22.36	22.32	22.41	19.36	18.82	18.81	21.16	20.52	20.31
		75	0	22.42	22.39	22.50	19.42	18.89	18.90	21.22	20.59	20.40
	64QAM	1	0	23.43	23.32	23.49	20.43	19.82	19.89	22.23	21.52	21.39
		1	38	23.44	23.36	23.45	20.44	19.86	19.85	22.24	21.56	21.35
		1	74	23.23	23.18	23.28	20.23	19.68	19.68	22.03	21.38	21.18
		36	0	22.45	22.42	22.48	19.45	18.92	18.88	21.25	20.62	20.38
		36	18	22.39	22.33	22.44	19.39	18.83	18.84	21.19	20.53	20.34
		36	39	22.32	22.29	22.37	19.32	18.79	18.77	21.12	20.49	20.27
		75	0	22.32	22.29	22.37	19.32	18.79	18.77	21.12	20.49	20.27
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)								
				18700/ 1860	18900/ 1880	19100/ 1900	18700/ 1860	18900/ 1880	19100/ 1900	18700/ 1860	18900/ 1880	19100/ 1900
20MHz	QPSK	1	0	24.36	24.26	24.38	21.36	20.76	20.78	23.16	22.46	22.28
		1	50	24.25	24.24	24.20	21.25	20.74	20.60	23.05	22.44	22.10
		1	99	24.10	24.04	24.19	21.10	20.54	20.59	22.90	22.24	22.09
		50	0	23.36	23.36	23.22	20.36	19.86	19.62	22.16	21.56	21.12
		50	25	23.34	23.30	23.35	20.34	19.80	19.75	22.14	21.50	21.25
		50	50	23.37	23.25	23.20	20.37	19.75	19.60	22.17	21.45	21.10
		100	0	23.39	23.27	23.34	20.39	19.77	19.74	22.19	21.47	21.24
	16QAM	1	0	23.49	23.45	23.56	20.49	19.95	19.96	22.29	21.65	21.46
		1	50	23.37	23.34	23.37	20.37	19.84	19.77	22.17	21.54	21.27
		1	99	23.34	23.29	23.36	20.34	19.79	19.76	22.14	21.49	21.26
		50	0	22.54	22.49	22.58	19.54	18.99	18.98	21.34	20.69	20.48
		50	25	22.50	22.45	22.54	19.50	18.95	18.94	21.30	20.65	20.44
		50	50	22.33	22.27	22.37	19.33	18.77	18.77	21.13	20.47	20.27
		100	0	22.40	22.35	22.47	19.40	18.85	18.87	21.20	20.55	20.37
	64QAM	1	0	23.41	23.28	23.44	20.41	19.78	19.84	22.21	21.48	21.34
		1	50	23.40	23.34	23.41	20.40	19.84	19.81	22.20	21.54	21.31
		1	99	23.17	23.12	23.22	20.17	19.62	19.62	21.97	21.32	21.12
		50	0	22.40	22.34	22.41	19.40	18.84	18.81	21.20	20.54	20.31
		50	25	22.35	22.29	22.38	19.35	18.79	18.78	21.15	20.49	20.28
		50	50	22.29	22.24	22.33	19.29	18.74	18.73	21.09	20.44	20.23
		100	0	22.30	22.25	22.34	19.30	18.75	18.74	21.10	20.45	20.24

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 18kHz 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),

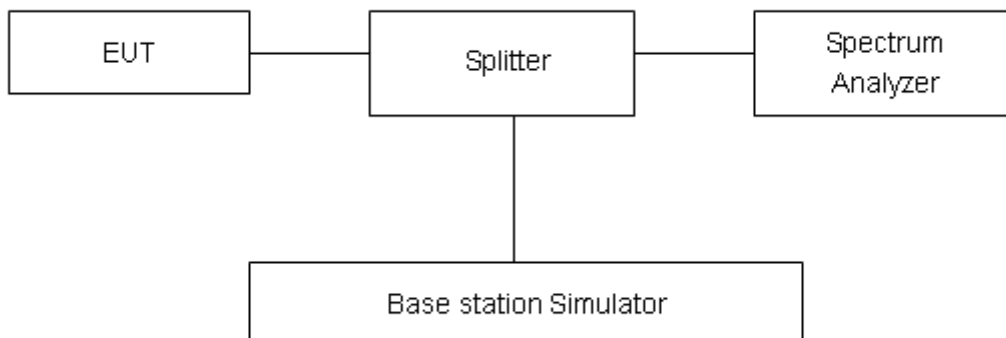
RBW is set to 200 kHz, VBW is set to 620kHz for LTE Band 2 (10MHz),

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	0.2483	0.310
	661	1880.0	0.2420	0.312
	810	1909.8	0.2424	0.312
GPRS 1900 (GMSK)	512	1850.2	0.2460	0.318
	661	1880.0	0.2448	0.307
	810	1909.8	0.2424	0.312
EGPRS 1900 (8PSK)	512	1850.2	0.2482	0.311
	661	1880.0	0.2471	0.317
	810	1909.8	0.2463	0.318
WCDMA Band II (RMC)	9262	1852.4	4.1248	4.685
	9400	1880	4.1225	4.702
	9538	1907.6	4.1182	4.671

LTE Band 2					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
QPSK	1.4	18607	1850.7	1.0912	1.235
		18900	1880.0	1.0915	1.251
		19193	1909.3	1.0894	1.236
	3	18615	1851.5	2.7016	2.955
		18900	1880	2.7150	2.986
		19185	1908.5	2.7048	3.008
	5	18625	1852.5	4.5229	5.003
		18900	1880	4.5041	4.962
		19175	1907.5	4.5091	4.980
	10	18650	1855	9.0126	9.755
		18900	1880	8.9762	9.772
		19150	1905	8.9847	9.766
	15	18675	1857.5	13.4470	14.680
		18900	1880	13.4890	14.600
		19125	1902.5	13.4470	14.690
	20	18700	1860	17.9290	19.270
		18900	1880	17.9430	19.450
		19100	1900	17.8800	19.450
16QAM	1.4	18607	1850.7	1.0928	1.228



		18900	1880.0	1.0929	1.241
		19193	1909.3	1.0879	1.228
	3	18615	1851.5	2.6985	2.964
		18900	1880	2.6991	2.993
		19185	1908.5	2.7045	3.016
	5	18625	1852.5	4.5043	4.925
		18900	1880	4.5254	4.985
		19175	1907.5	4.5392	4.980
	10	18650	1855	9.0012	9.768
		18900	1880	8.9751	9.778
		19150	1905	8.9783	9.696
	15	18675	1857.5	13.4720	14.640
		18900	1880	13.4830	14.670
		19125	1902.5	13.4710	14.620
	20	18700	1860	17.9730	19.220
		18900	1880	17.9560	19.280
		19100	1900	17.9150	19.290
64QAM	1.4	18607	1850.7	1.0931	1.239
		18900	1880.0	1.0895	1.244
		19193	1909.3	1.0981	1.251
	3	18615	1851.5	2.6966	3.012
		18900	1880	2.7132	3.026
		19185	1908.5	2.7051	3.000
	5	18625	1852.5	4.5468	4.993
		18900	1880	4.5244	4.927
		19175	1907.5	4.5061	4.950
	10	18650	1855	8.9823	9.842
		18900	1880	8.9755	9.721
		19150	1905	8.9901	9.792
	15	18675	1857.5	13.4610	14.580
		18900	1880	13.4540	14.680
		19125	1902.5	13.4310	14.580
	20	18700	1860	17.9380	19.180
		18900	1880	17.9080	19.380
		19100	1900	17.9520	19.290

GSM1900 GSM CH-Low



GSM1900 GPRS CH-Low



GSM 1900 GSM CH-Middle



GSM 1900 GPRS CH-Middle



GSM 1900 GSM CH-High



GSM 1900 GPRS CH-High



GSM1900 EGPRS CH-Low



WCDMA Band II RMC CH-Low



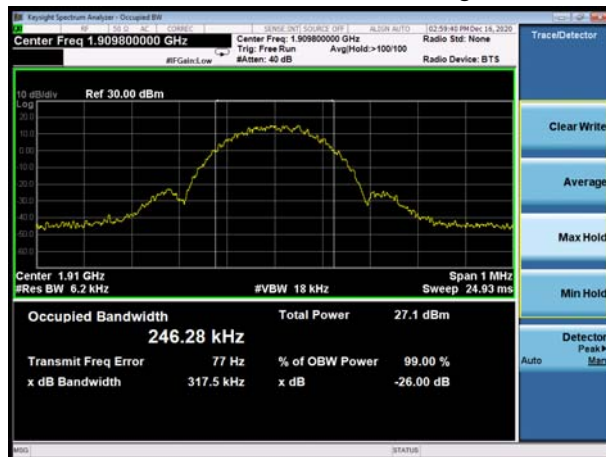
GSM 1900 EGPRS CH-Middle



WCDMA Band II RMC CH-Middle



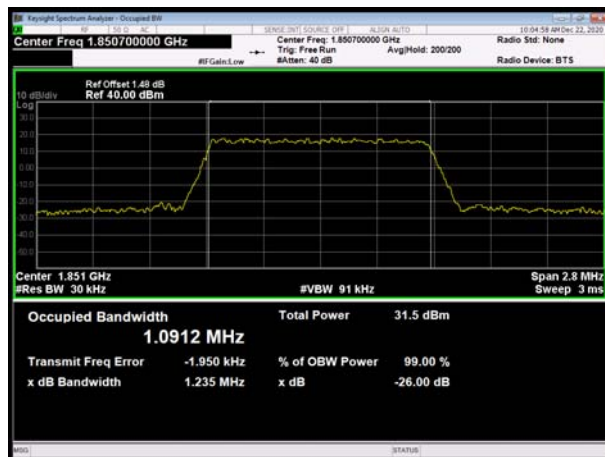
GSM 1900 EGPRS CH-High



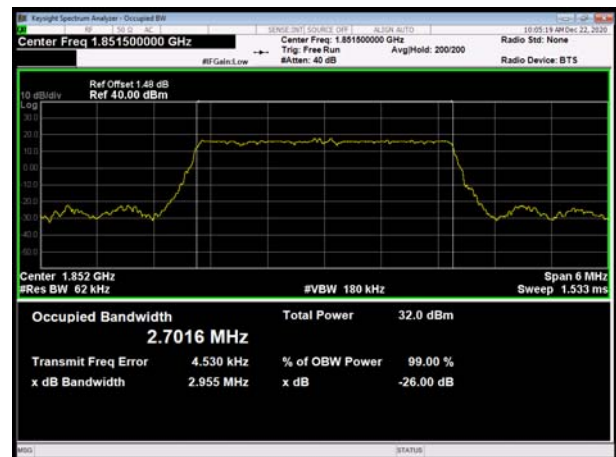
WCDMA Band II RMC CH-High



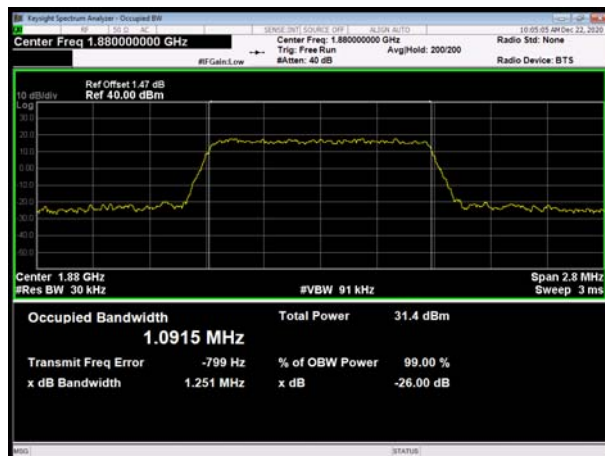
LTE Band 2 1.4MHz QPSK CH-Low



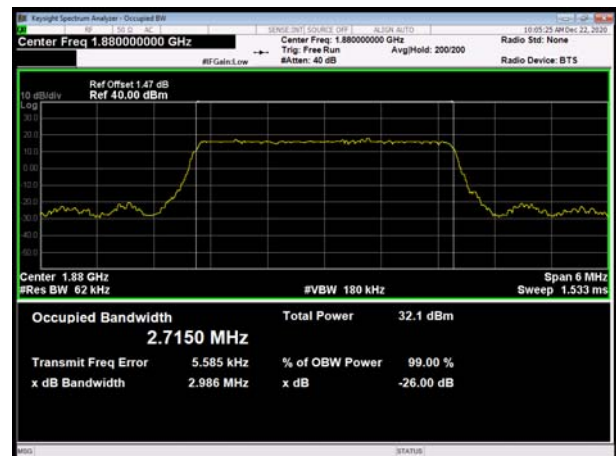
LTE Band 2 3MHz QPSK CH-Low



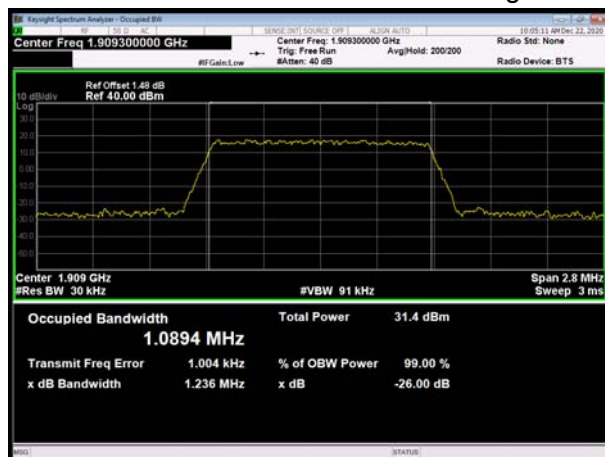
LTE Band 2 1.4MHz QPSK CH-Middle



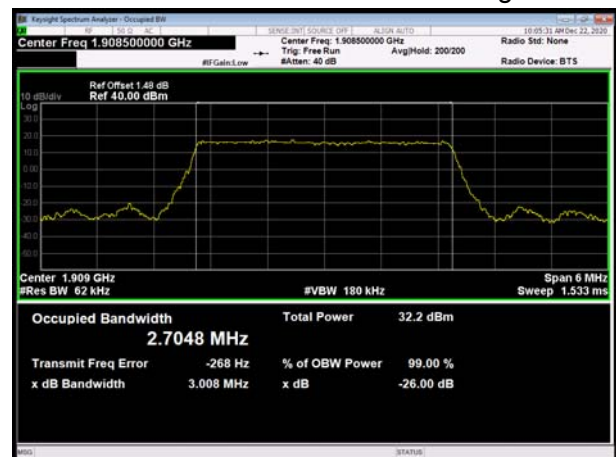
LTE Band 2 3MHz QPSK CH-Middle



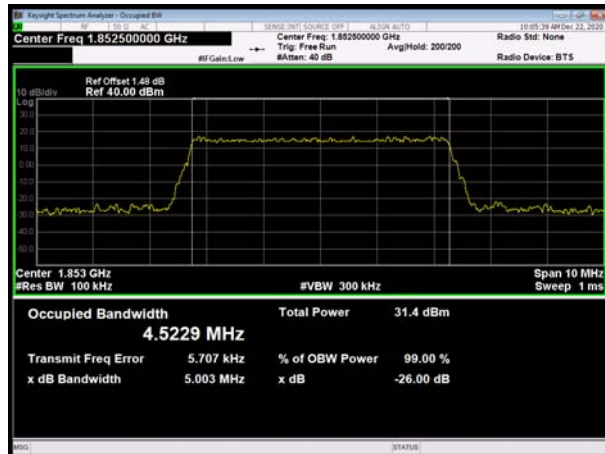
LTE Band 2 1.4MHz QPSK CH-High



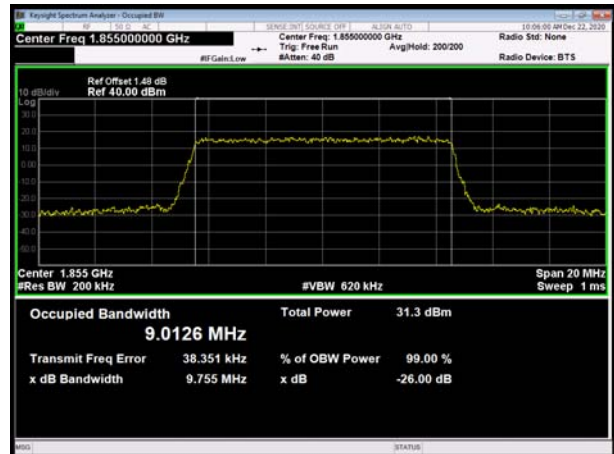
LTE Band 2 3MHz QPSK CH-High



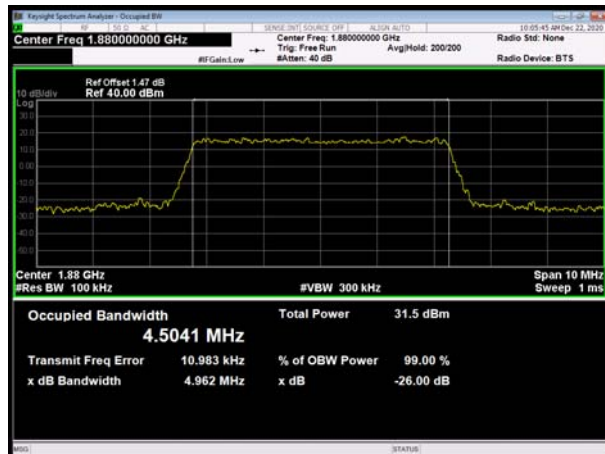
LTE Band 2 5MHz QPSK CH-Low



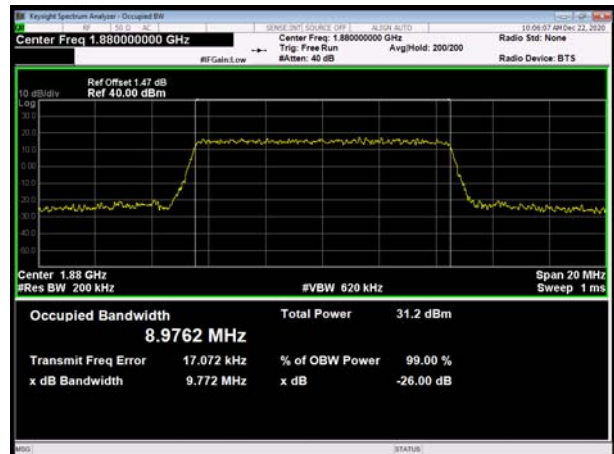
LTE Band 2 10MHz QPSK CH-Low



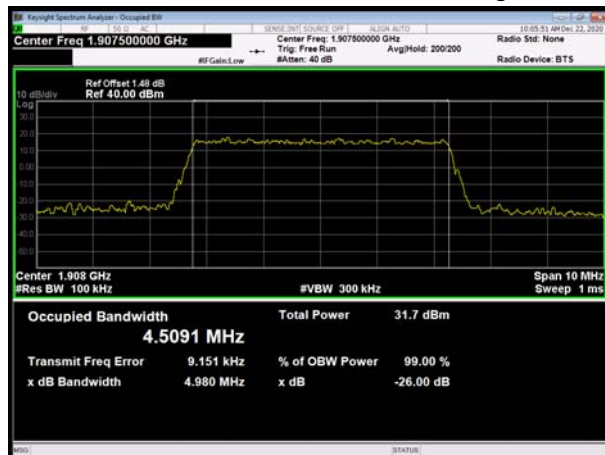
LTE Band 2 5MHz QPSK CH-Middle



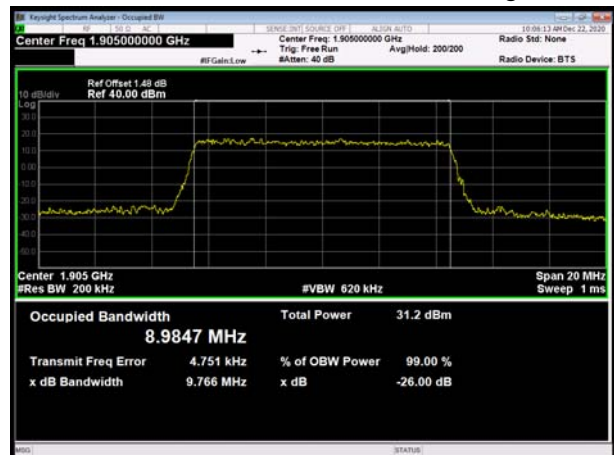
LTE Band 2 10MHz QPSK CH-Middle



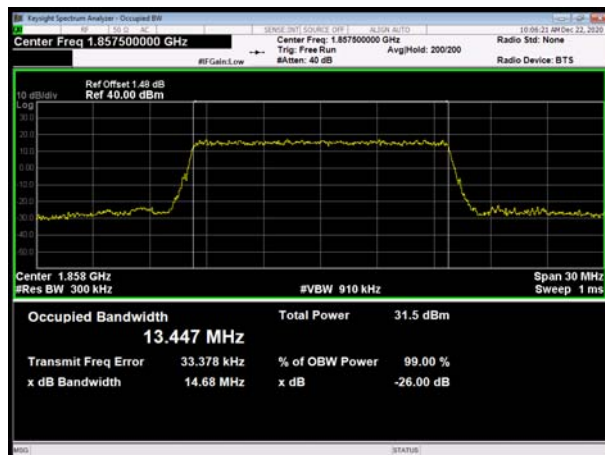
LTE Band 2 5MHz QPSK CH-High



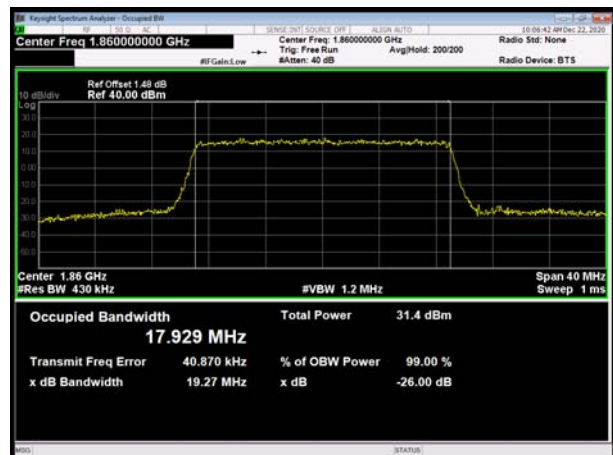
LTE Band 2 10MHz QPSK CH-High



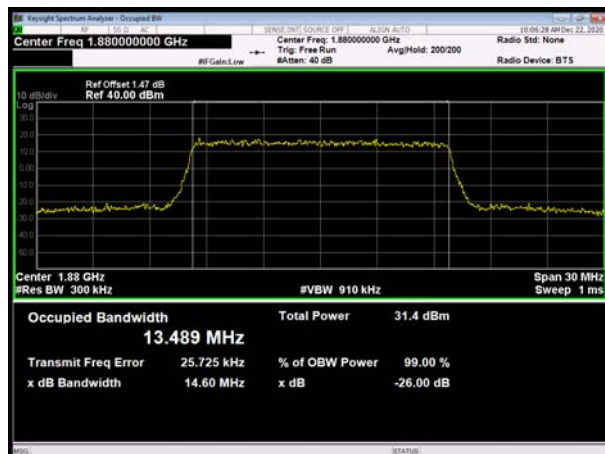
LTE Band 2 15MHz QPSK CH-Low



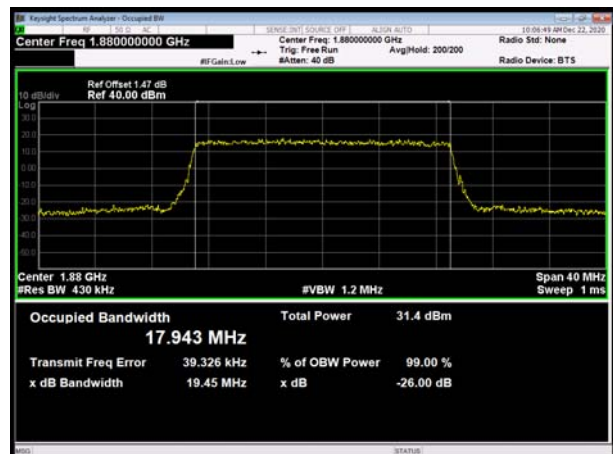
LTE Band 2 20MHz QPSK CH-Low



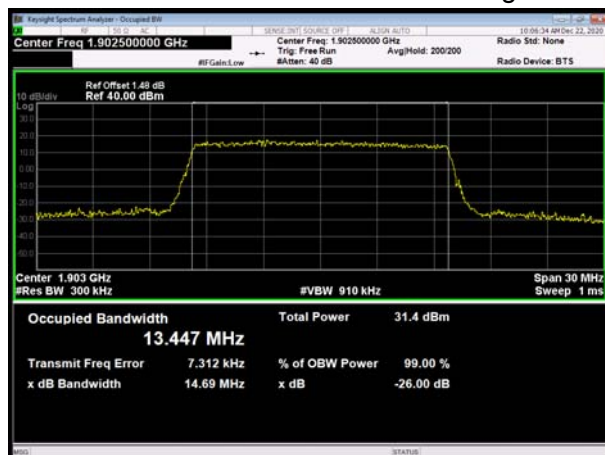
LTE Band 2 15MHz QPSK CH-Middle



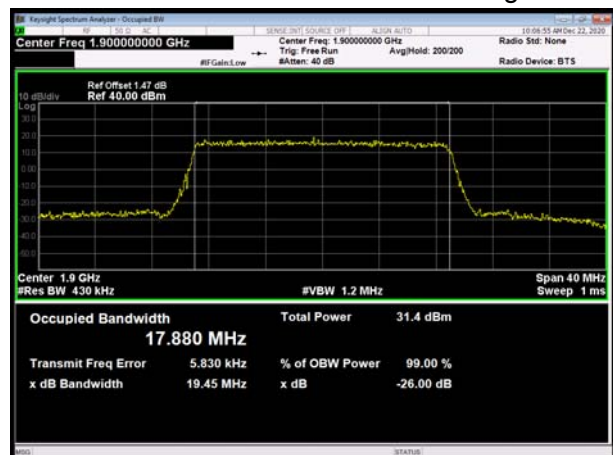
LTE Band 2 20MHz QPSK CH-Middle



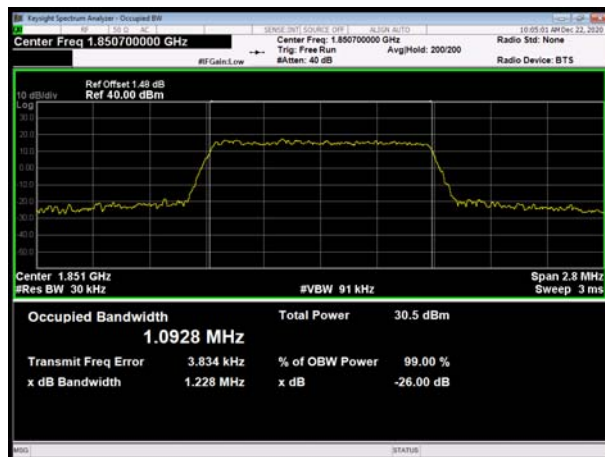
LTE Band 2 15MHz QPSK CH-High



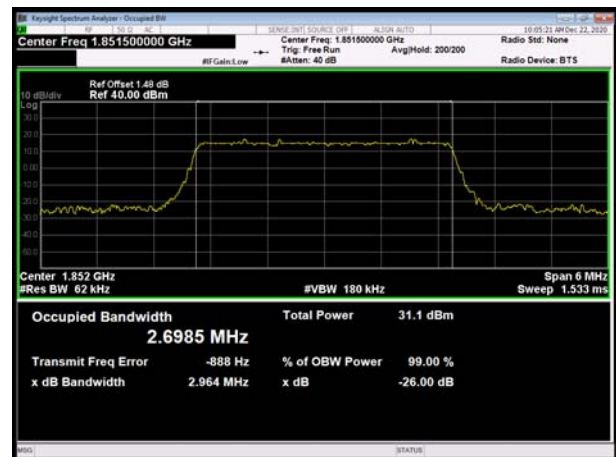
LTE Band 2 20MHz QPSK CH-High



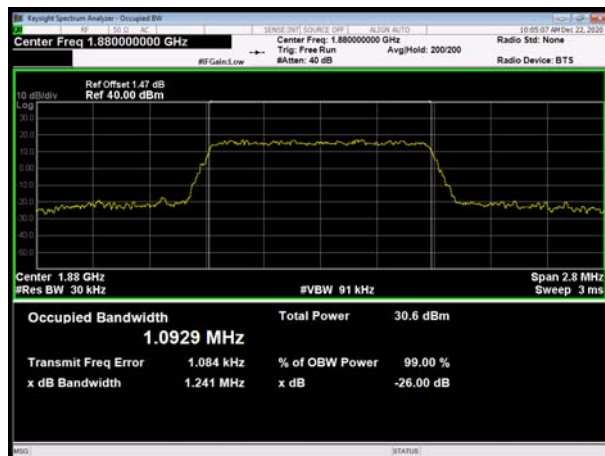
LTE Band 2 1.4MHz 16QAM CH-Low



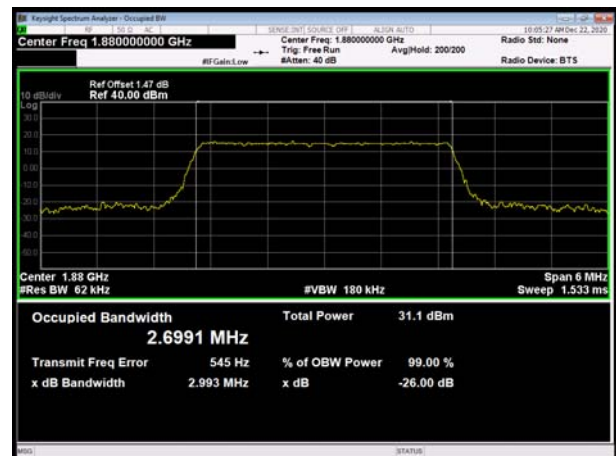
LTE Band 2 3MHz 16QAM CH-Low



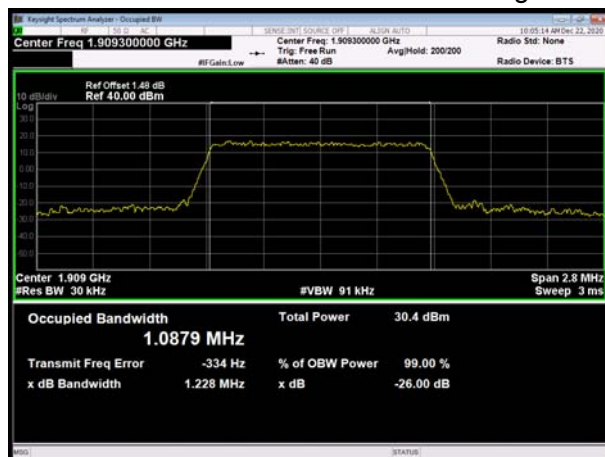
LTE Band 2 1.4MHz 16QAM CH-Middle



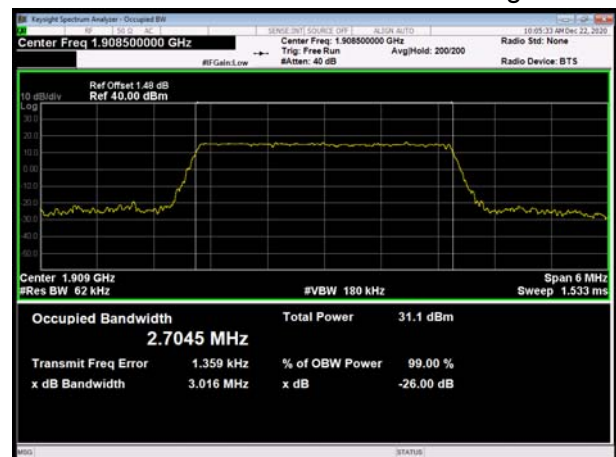
LTE Band 2 3MHz 16QAM CH-Middle



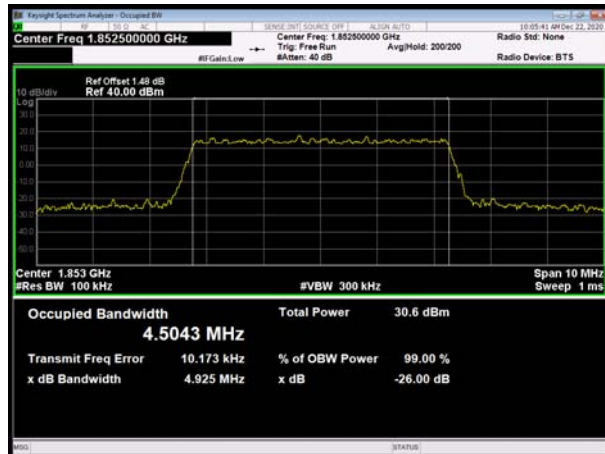
LTE Band 2 1.4MHz 16QAM CH-High



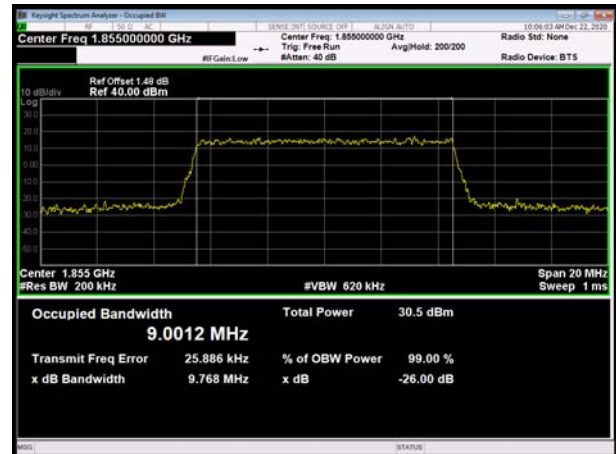
LTE Band 2 3MHz 16QAM CH-High



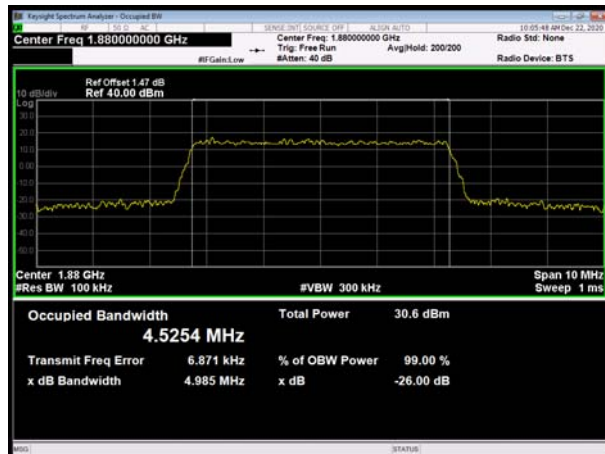
LTE Band 2 5MHz 16QAM CH-Low



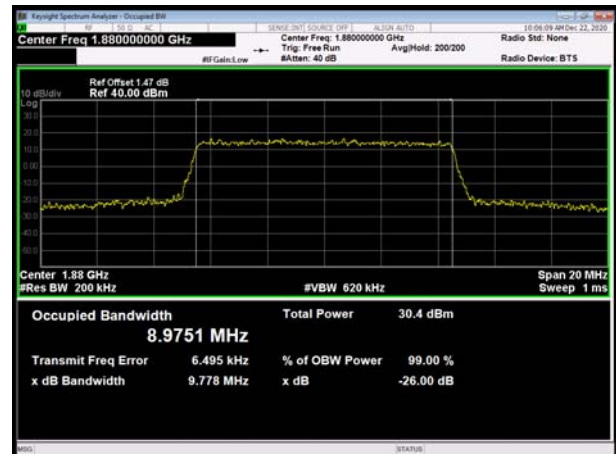
LTE Band 2 10MHz 16QAM CH-Low



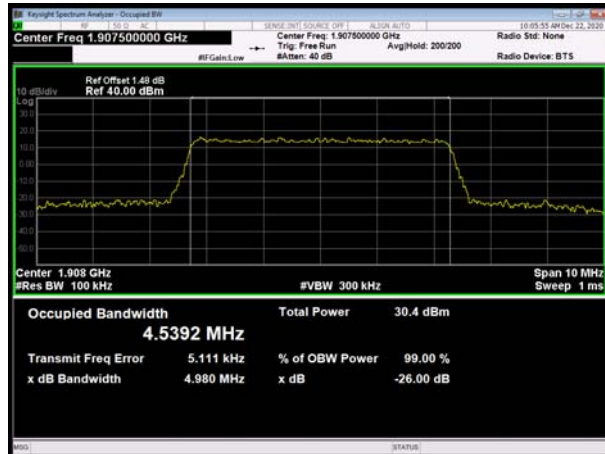
LTE Band 2 5MHz 16QAM CH-Middle



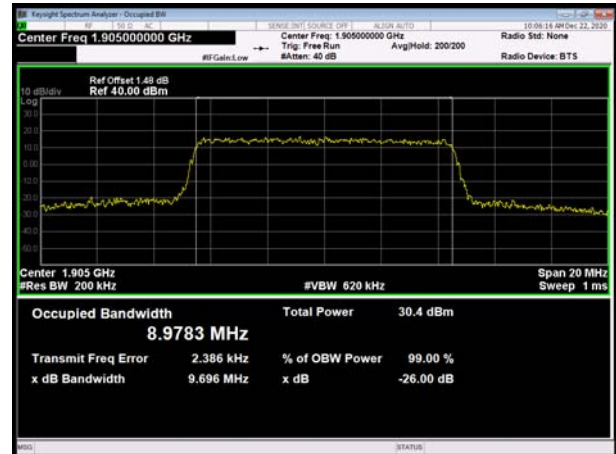
LTE Band 2 10MHz 16QAM CH-Middle



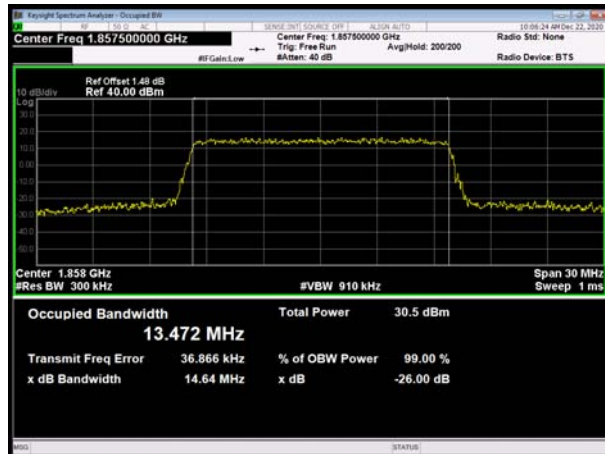
LTE Band 2 5MHz 16QAM CH-High



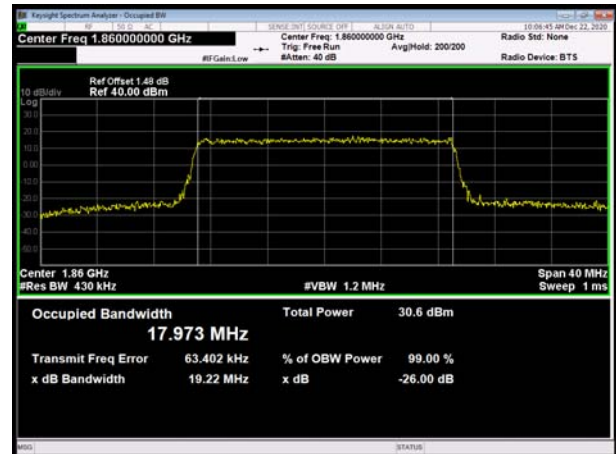
LTE Band 2 10MHz 16QAM CH-High



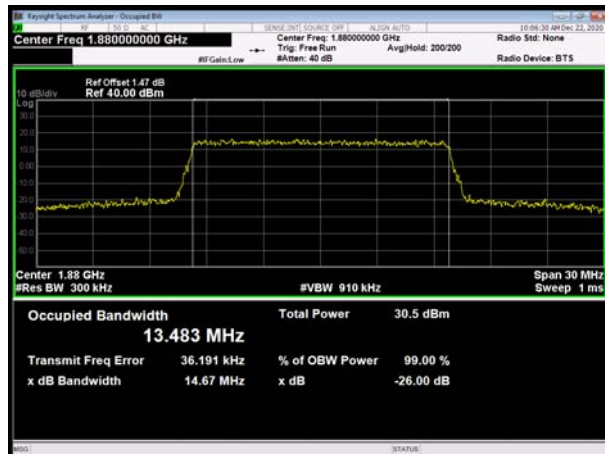
LTE Band 2 15MHz 16QAM CH-Low



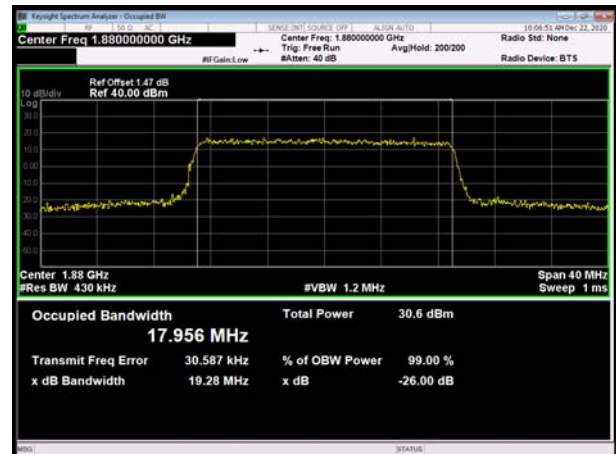
LTE Band 2 20MHz 16QAM CH-Low



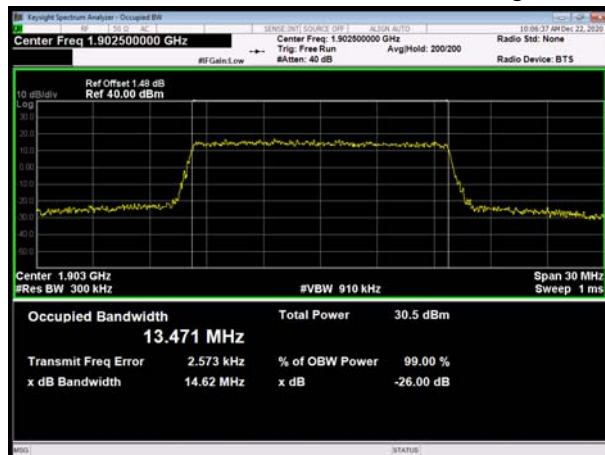
LTE Band 2 15MHz 16QAM CH-Middle



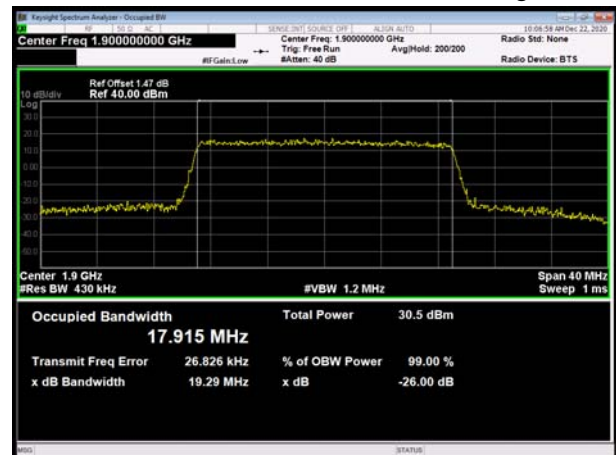
LTE Band 2 20MHz 16QAM CH-Middle



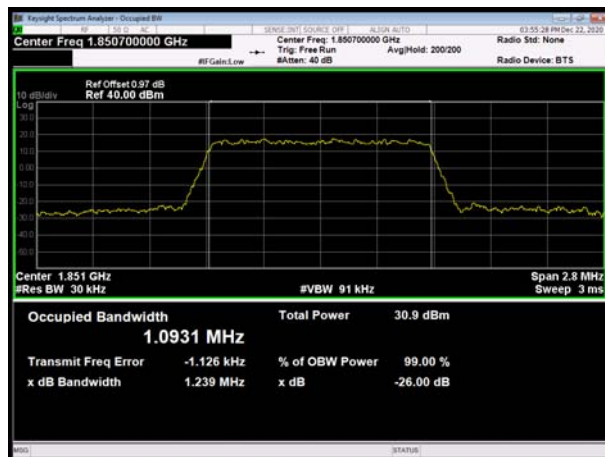
LTE Band 2 15MHz 16QAM CH-High



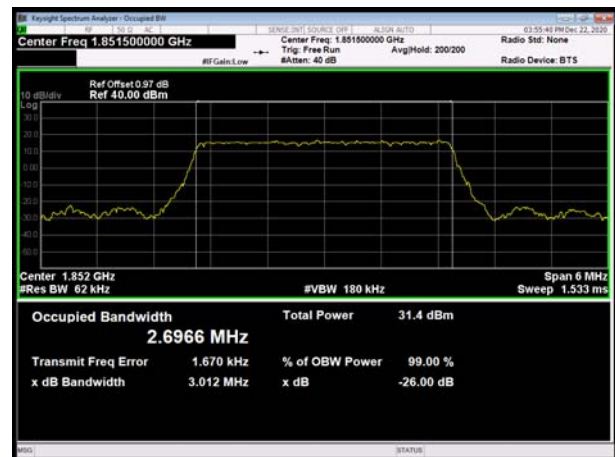
LTE Band 2 20MHz 16QAM CH-High



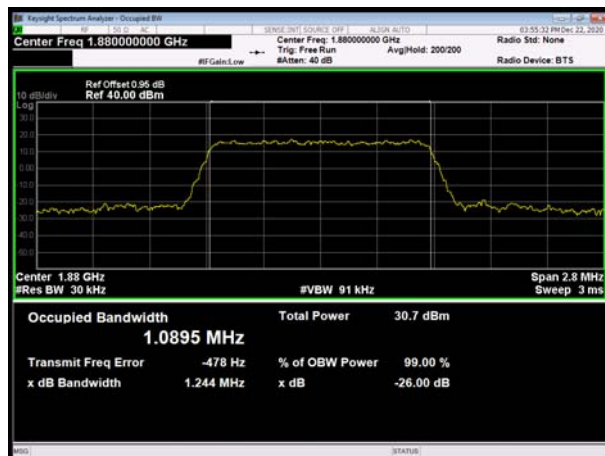
LTE Band 2 1.4MHz 64QAM CH-Low



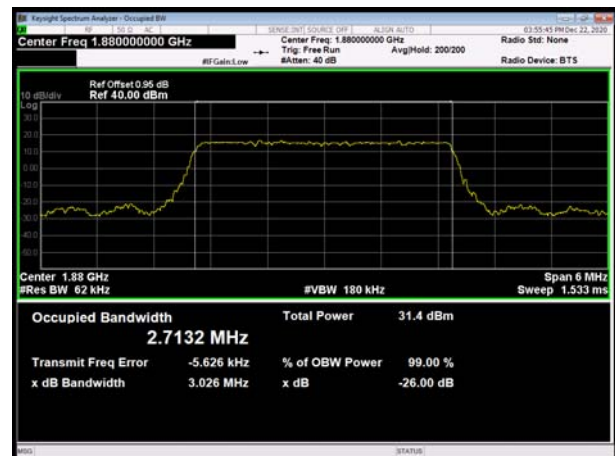
LTE Band 2 3MHz 64QAM CH-Low



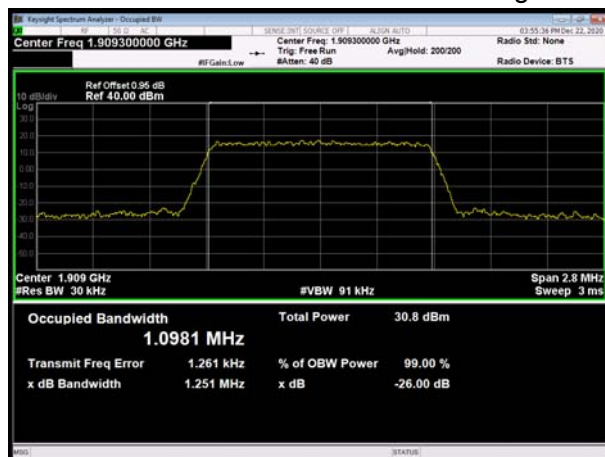
LTE Band 2 1.4MHz 64QAM CH-Middle



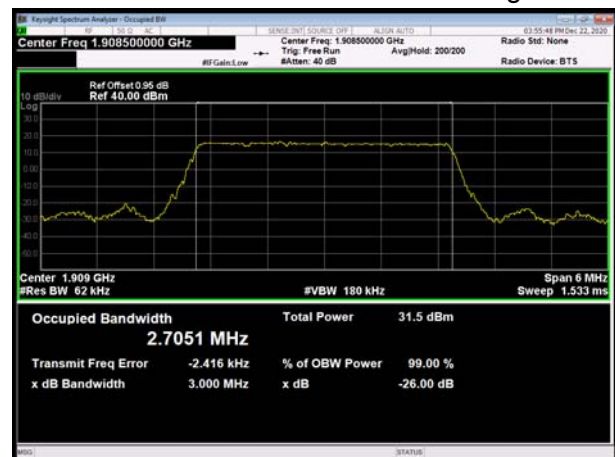
LTE Band 2 3MHz 64QAM CH-Middle



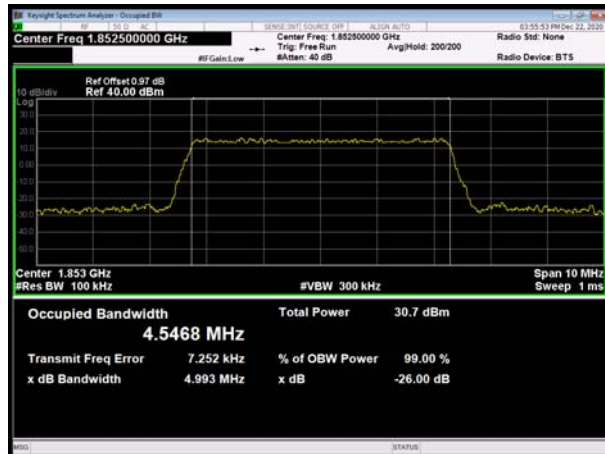
LTE Band 2 1.4MHz 64QAM CH-High



LTE Band 2 3MHz 64QAM CH-High



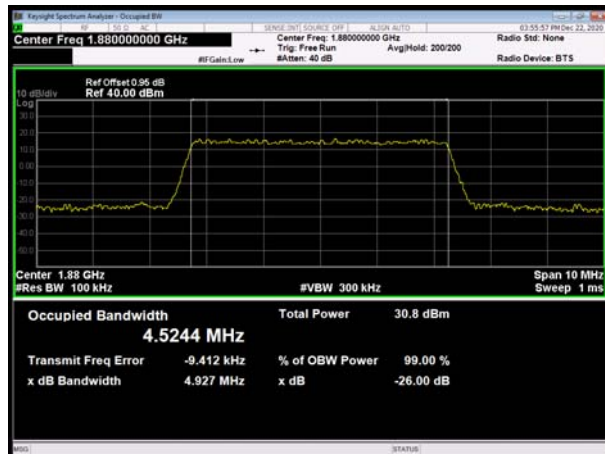
LTE Band 2 5MHz 64QAM CH-Low



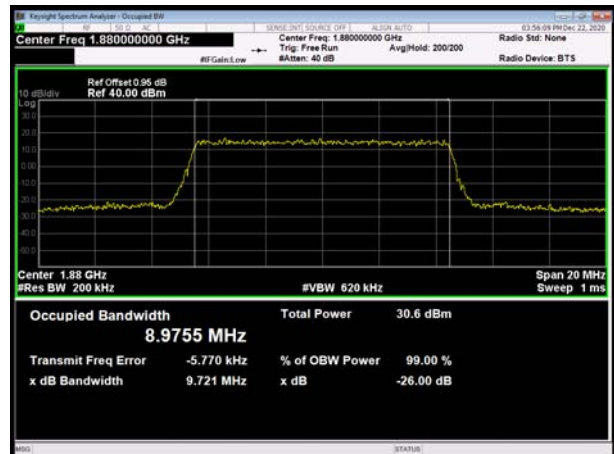
LTE Band 2 10MHz 64QAM CH-Low



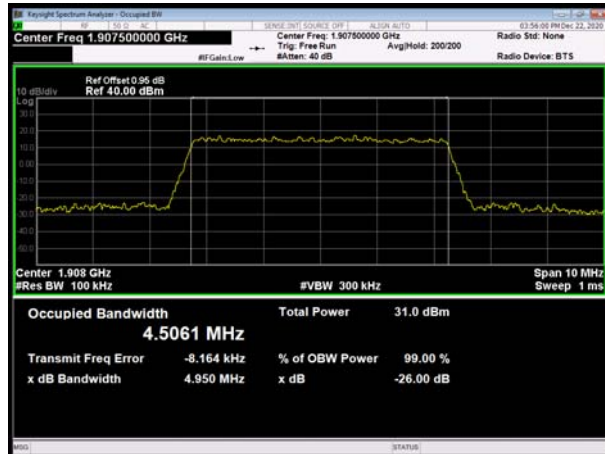
LTE Band 2 5MHz 64QAM CH-Middle



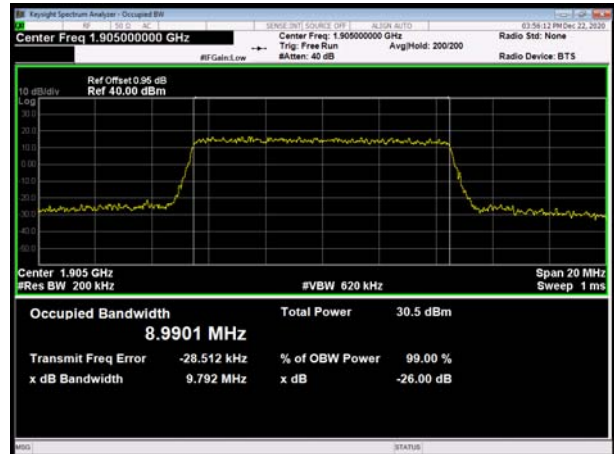
LTE Band 2 10MHz 64QAM CH-Middle



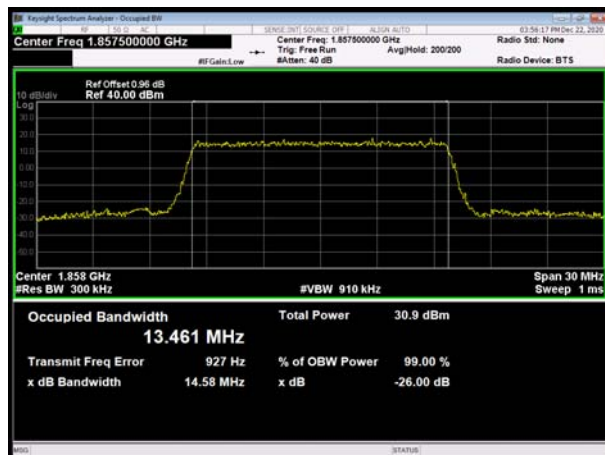
LTE Band 2 5MHz 64QAM CH-High



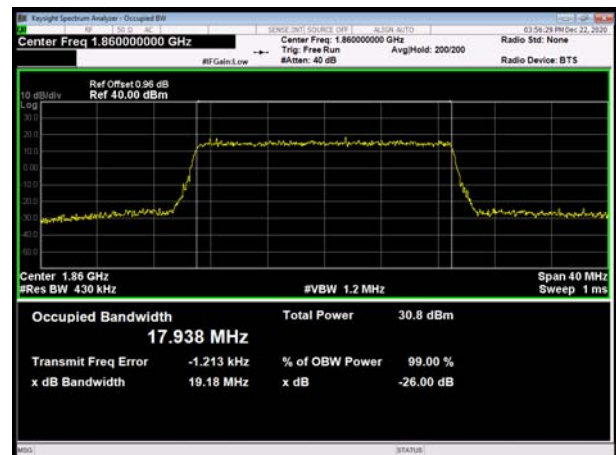
LTE Band 2 10MHz 64QAM CH-High



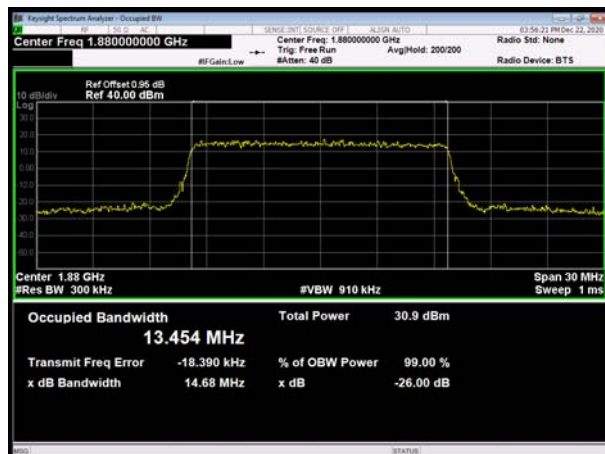
LTE Band 2 15MHz 64QAM CH-Low



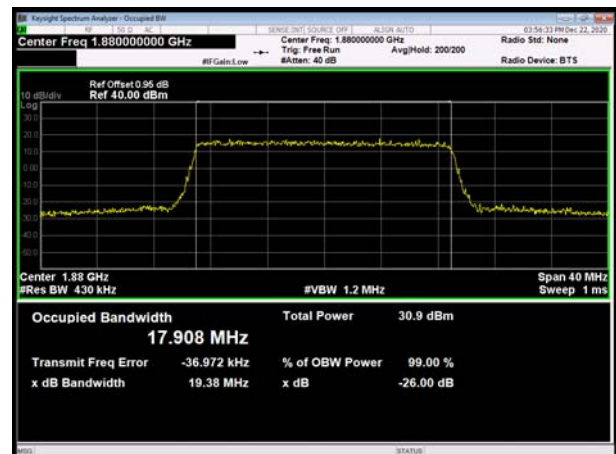
LTE Band 2 20MHz 64QAM CH-Low



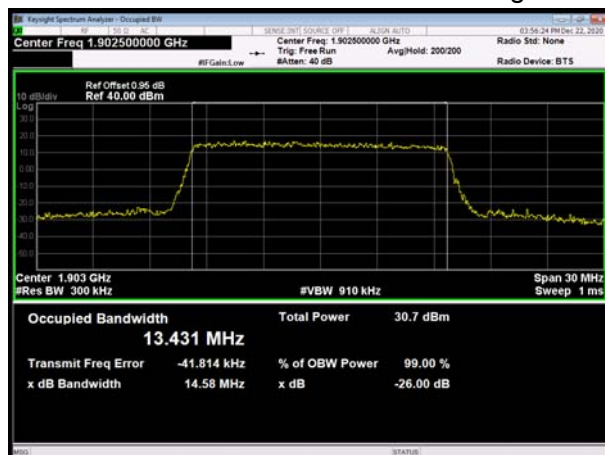
LTE Band 2 15MHz 64QAM CH-Middle



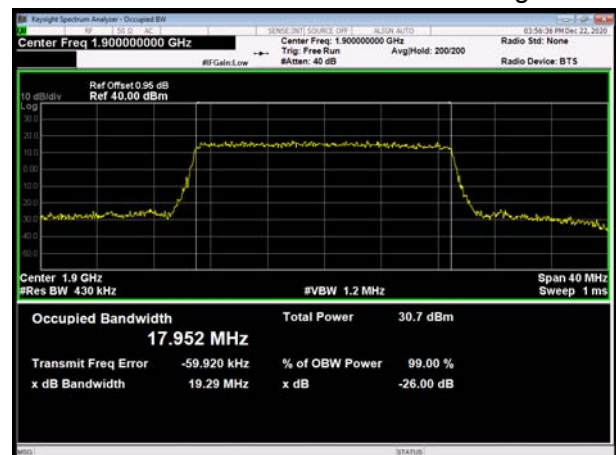
LTE Band 2 20MHz 64QAM CH-Middle



LTE Band 2 15MHz 64QAM CH-High



LTE Band 2 20MHz 64QAM CH-High



5.3.Band Edge Compliance

Ambient condition

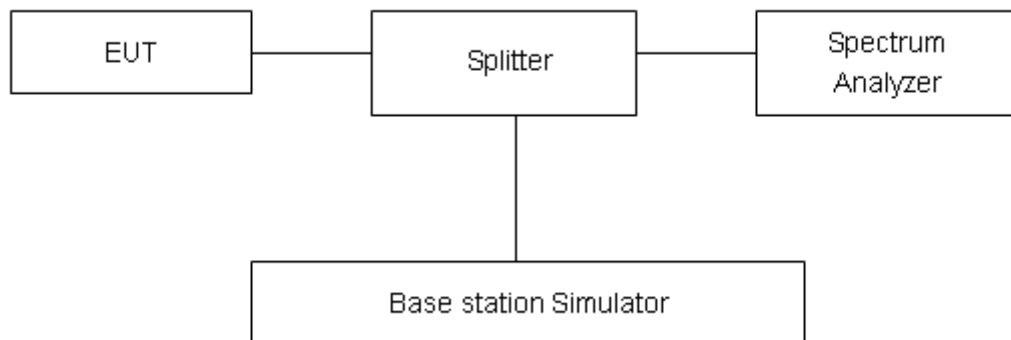
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 18kHz 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 $43 + 10 \log_{10} (P)$ dB.”

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

Measurement Uncertainty

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



Test Result:

GSM1900 GSM CH-Low



GSM 1900 GSM CH-High



GSM1900 GPRS CH-Low



GSM 1900 GPRS CH-High



GSM1900 EGPRS CH-Low



GSM 1900 EGPRS CH-High



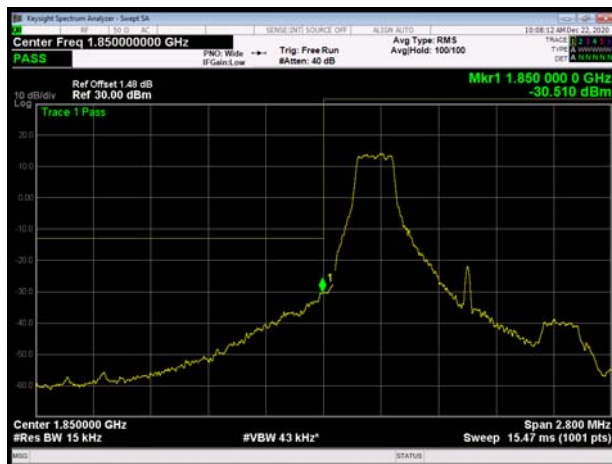
WCDMA Band II RMC CH-Low



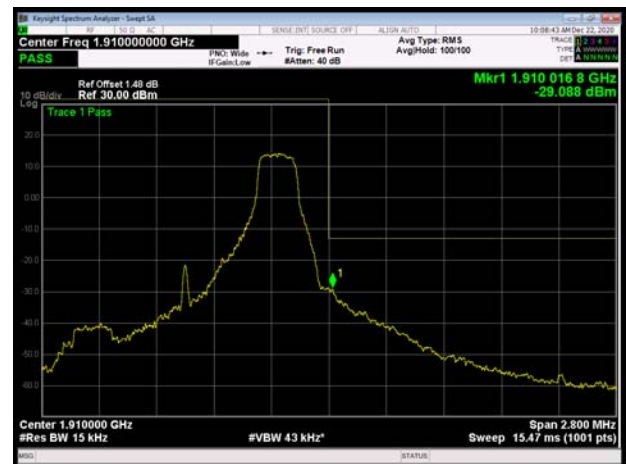
WCDMA Band II RMC CH-High



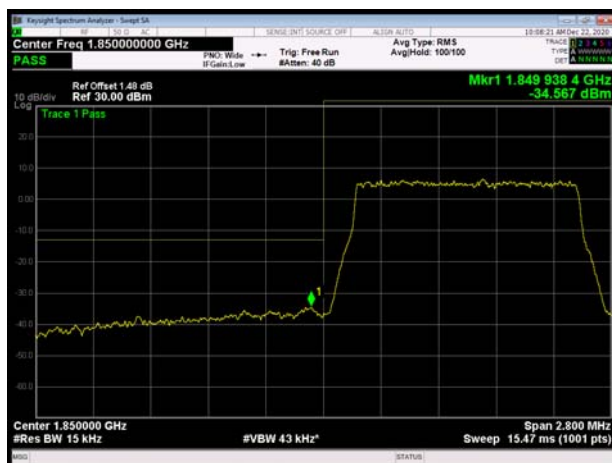
LTE Band 2 1.4MHz QPSK 1RB CH-Low



LTE Band 2 1.4MHz QPSK 1RB CH-High



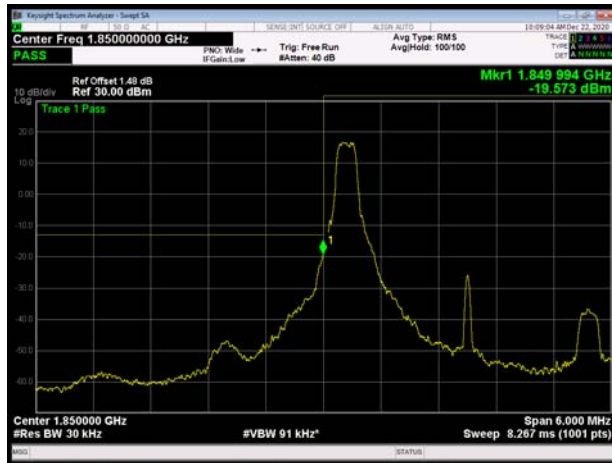
LTE Band 2 1.4MHz QPSK 100%RB CH-Low



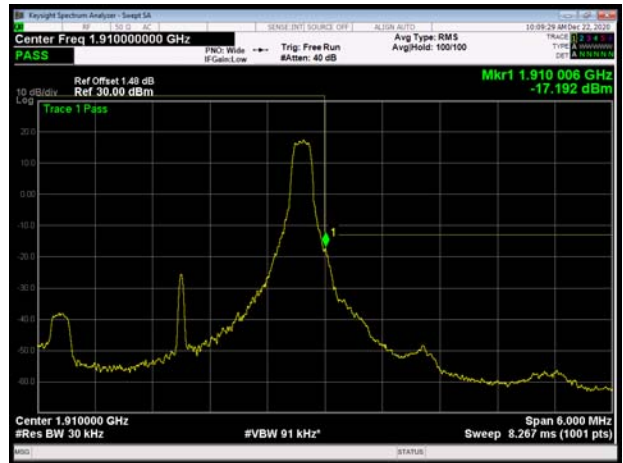
LTE Band 2 1.4MHz QPSK 100%RB CH-High



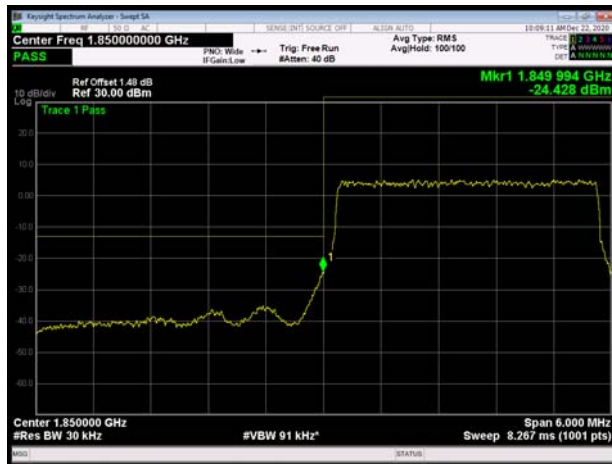
LTE Band 2 3MHz QPSK 1RB CH-Low



LTE Band 2 3MHz QPSK 1RB CH-High



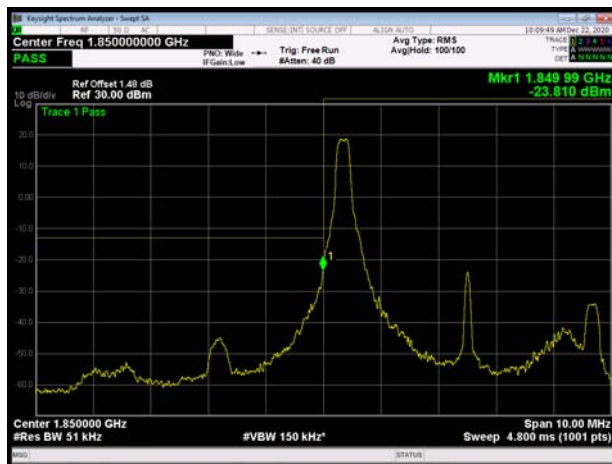
LTE Band 2 3MHz QPSK 100%RB CH-Low



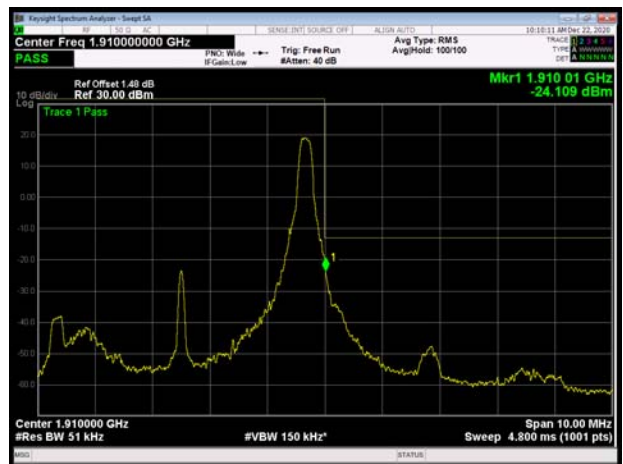
LTE Band 2 3MHz QPSK 100%RB CH-High



LTE Band 2 5MHz QPSK 1RB CH-Low



LTE Band 2 5MHz QPSK 1RB CH-High





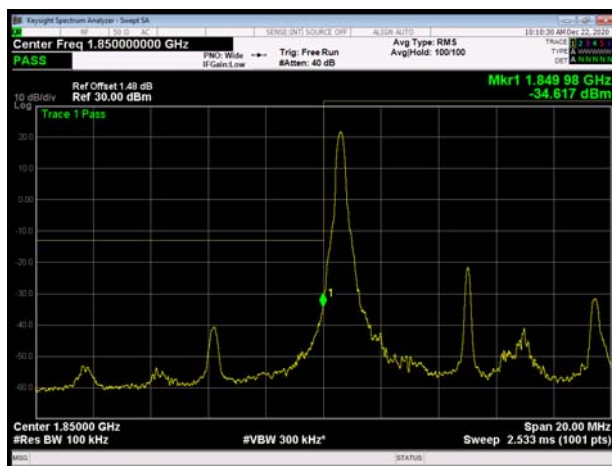
LTE Band 2 5MHz QPSK 100%RB CH-Low



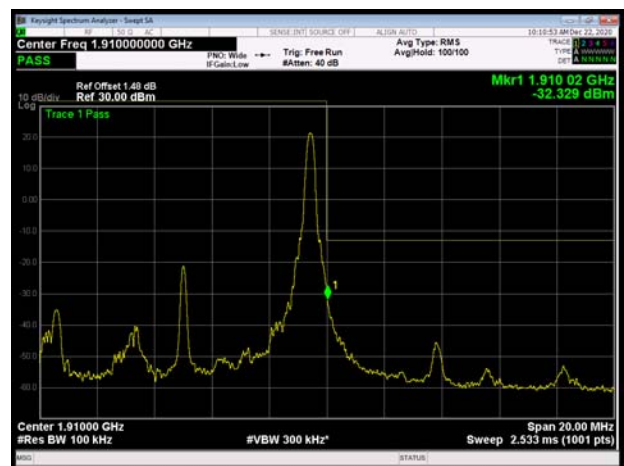
LTE Band 2 5MHz QPSK 100%RB CH-High



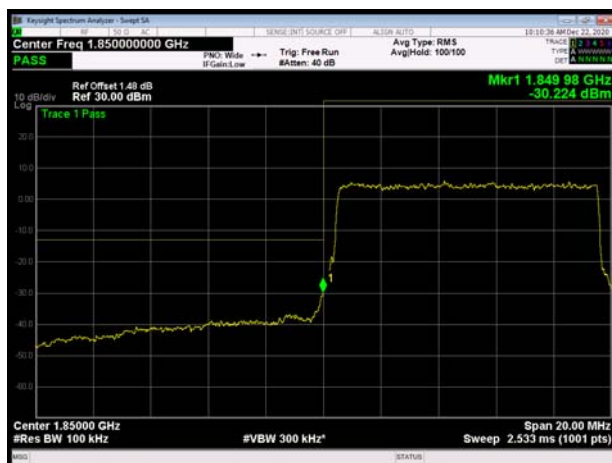
LTE Band 2 10MHz QPSK 1RB CH-Low



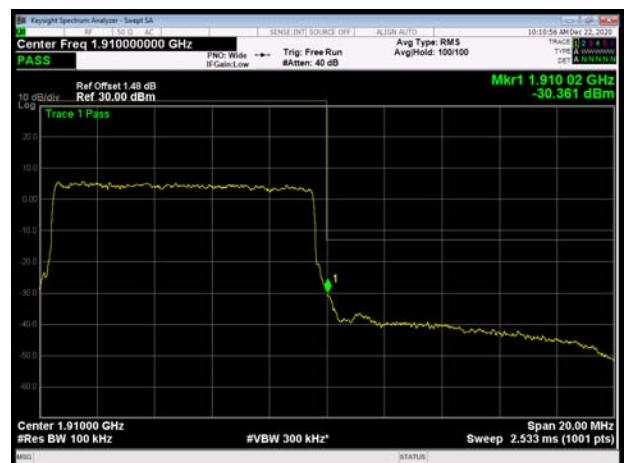
LTE Band 2 10MHz QPSK 1RB CH-High



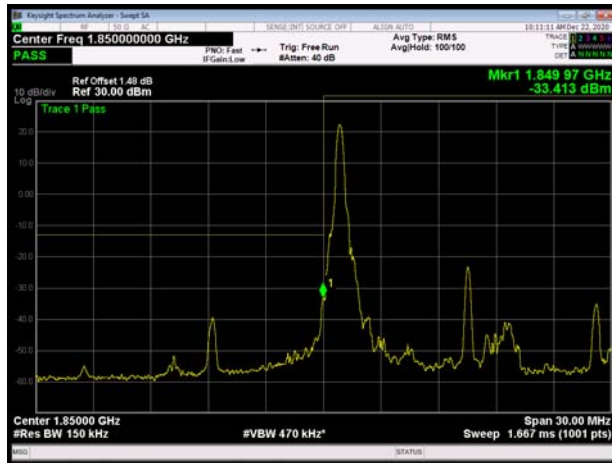
LTE Band 2 10MHz QPSK 100%RB CH-Low



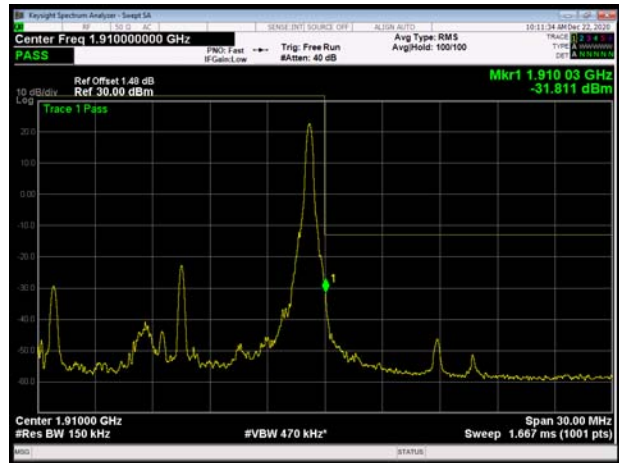
LTE Band 2 10MHz QPSK 100%RB CH-High



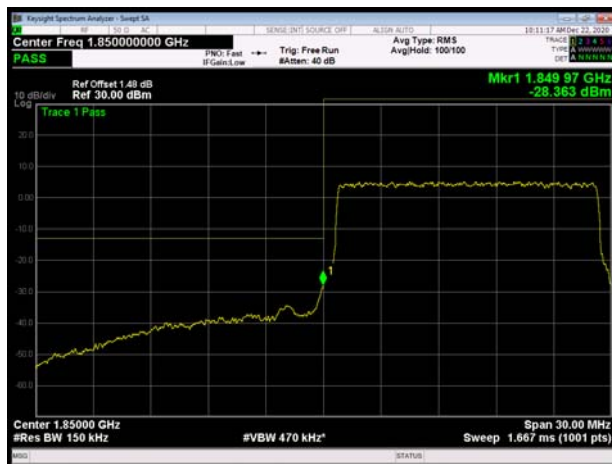
LTE Band 2 15MHz QPSK 1RB CH-Low



LTE Band 2 15MHz QPSK 1RB CH-High



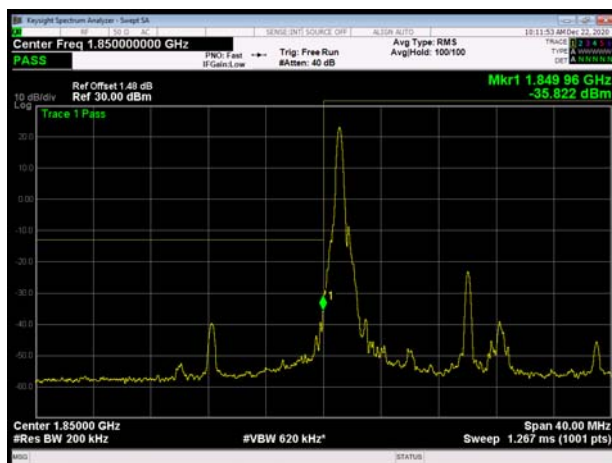
LTE Band 2 15MHz QPSK 100%RB CH-Low



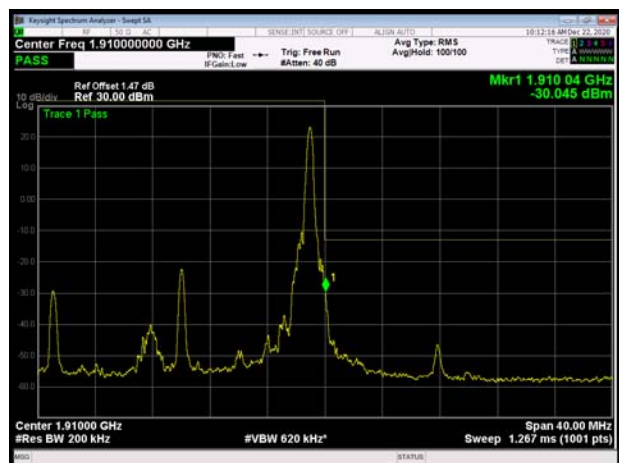
LTE Band 2 15MHz QPSK 100%RB CH-High



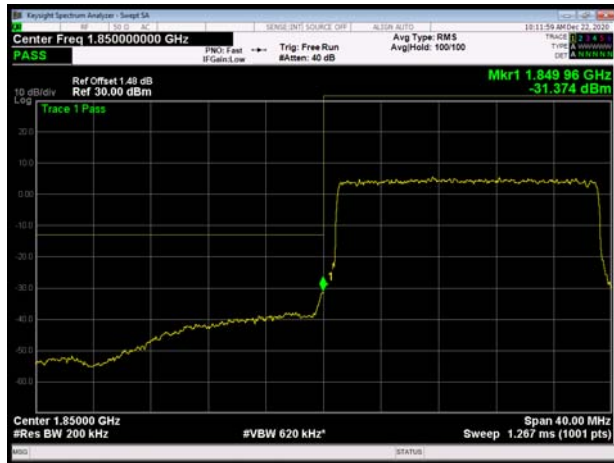
LTE Band 2 20MHz QPSK 1RB CH-Low



LTE Band 2 20MHz QPSK 1RB CH-High



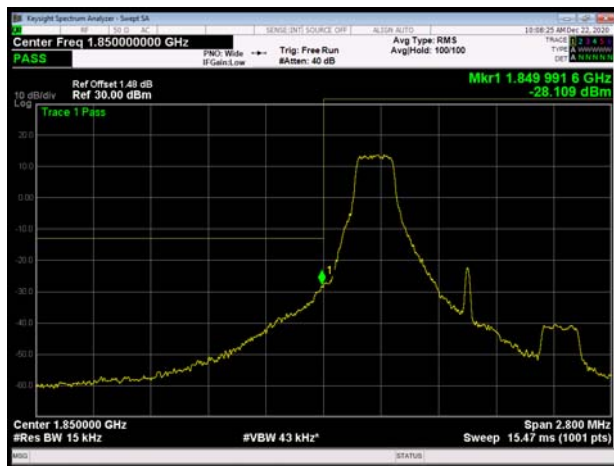
LTE Band 2 20MHz QPSK 100%RB CH-Low



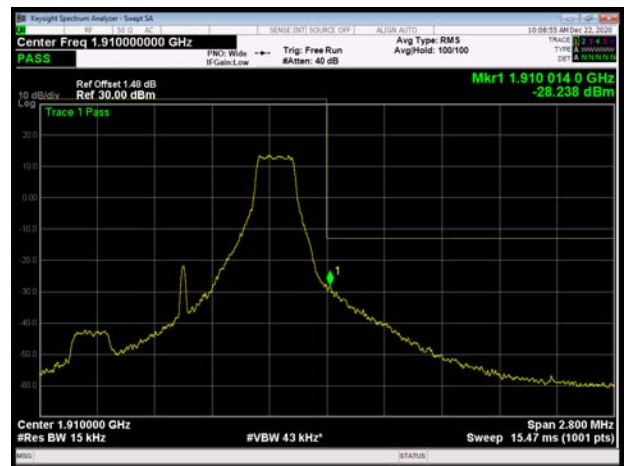
LTE Band 2 20MHz QPSK 100%RB CH-High



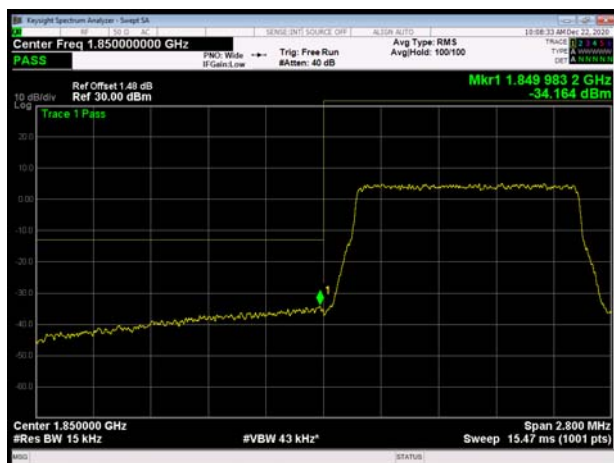
LTE Band 2 1.4MHz 16QAM 1RB CH-Low



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



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

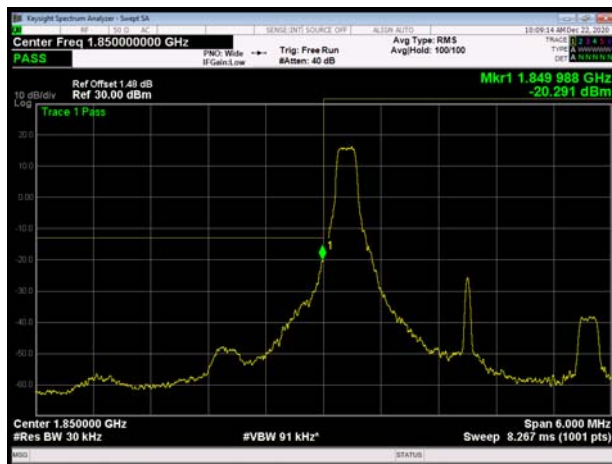


LTE Band 2 1.4MHz 16QAM 100%RB CH-High

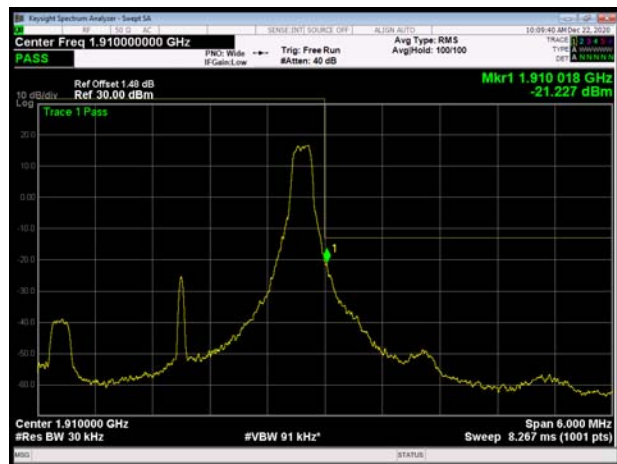




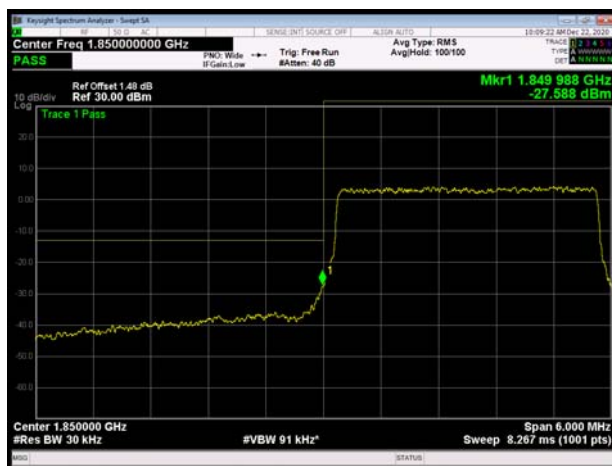
LTE Band 2 3MHz 16QAM 1RB CH-Low



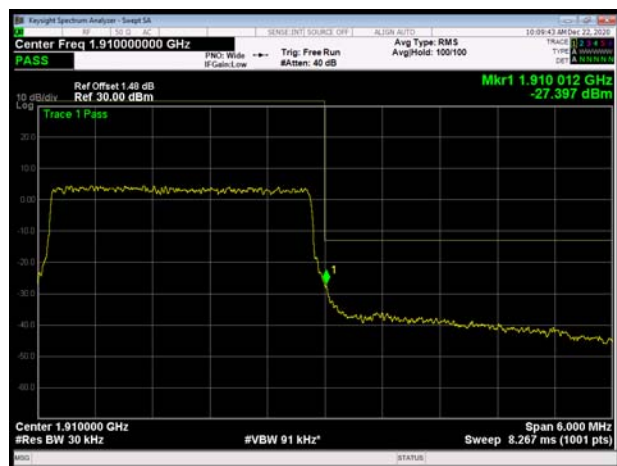
LTE Band 2 3MHz 16QAM 1RB CH-High



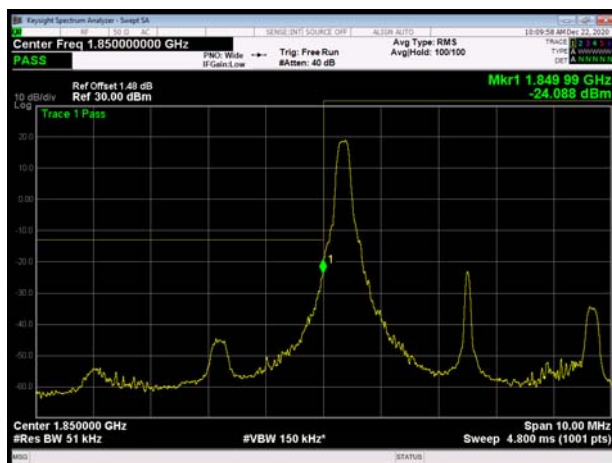
LTE Band 2 3MHz 16QAM 100%RB CH-Low



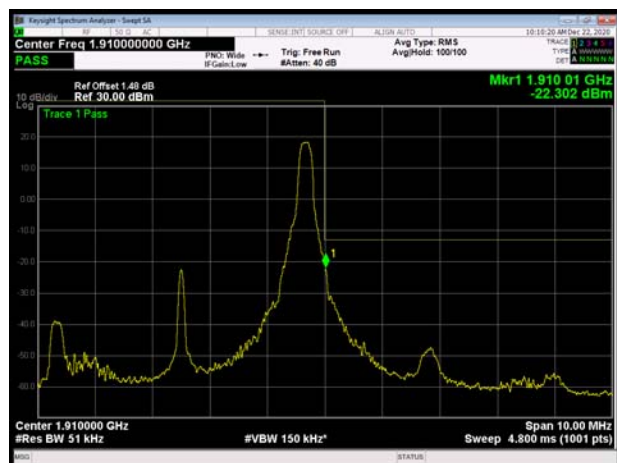
LTE Band 2 3MHz 16QAM 100%RB CH-High



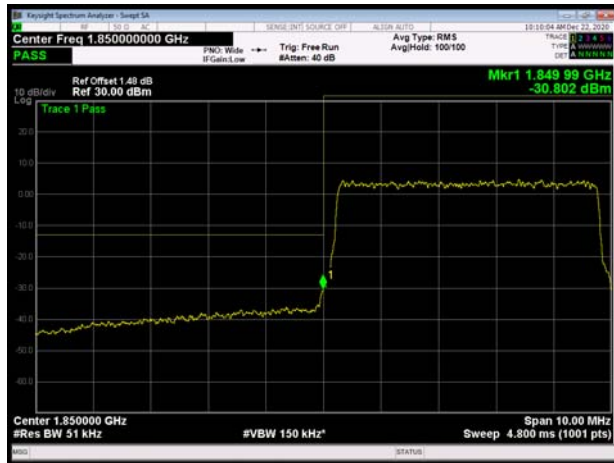
LTE Band 2 5MHz 16QAM 1RB CH-Low



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



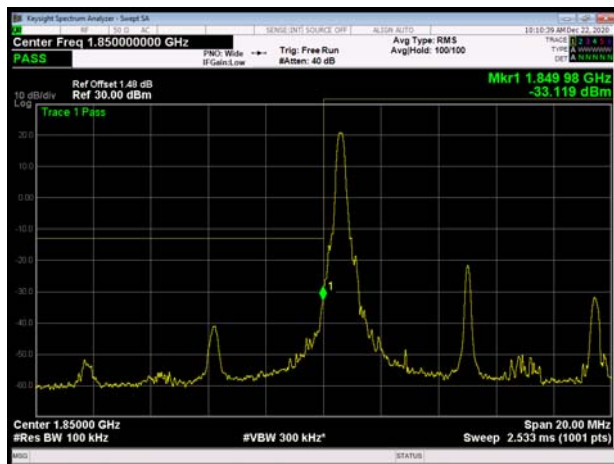
LTE Band 2 5MHz 16QAM 100%RB CH-Low



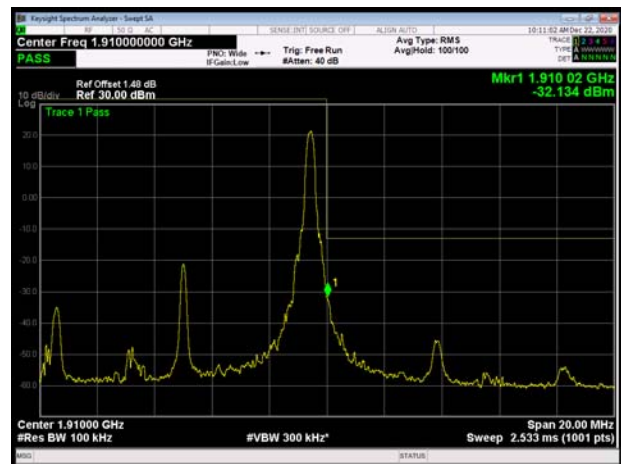
LTE Band 2 5MHz 16QAM 100%RB CH-High



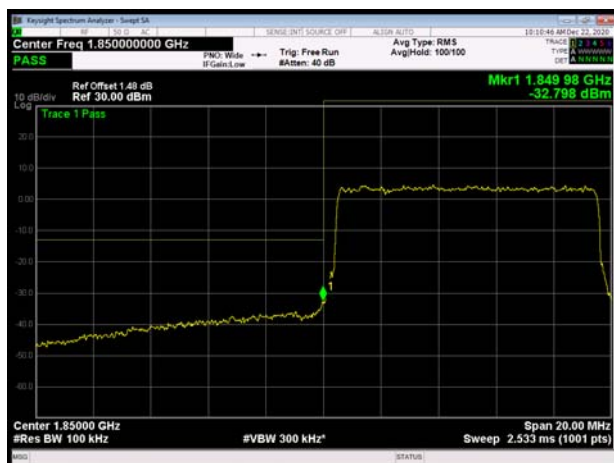
LTE Band 2 10MHz 16QAM 1RB CH-Low



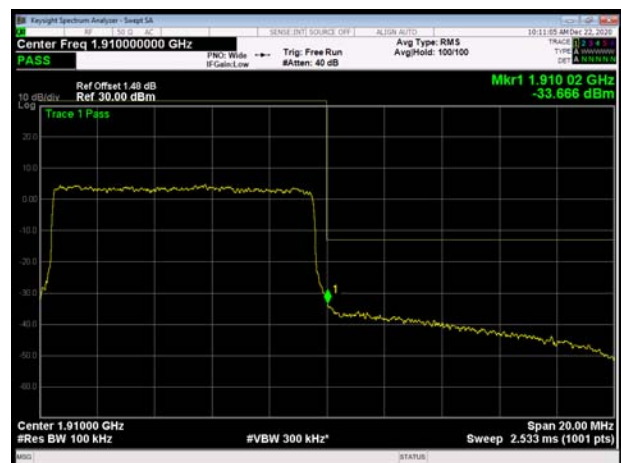
LTE Band 2 10MHz 16QAM 1RB CH-High



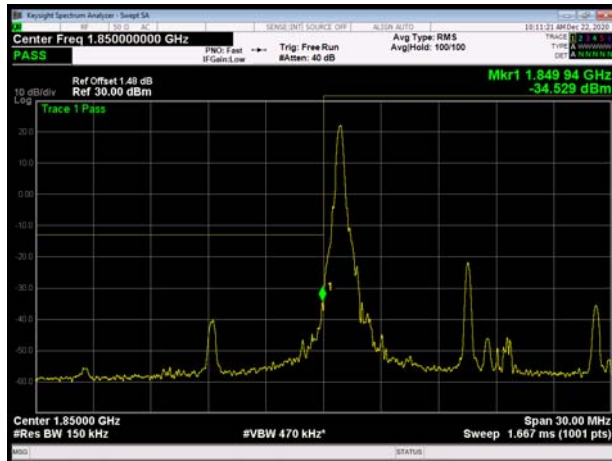
LTE Band 2 10MHz 16QAM 100%RB CH-Low



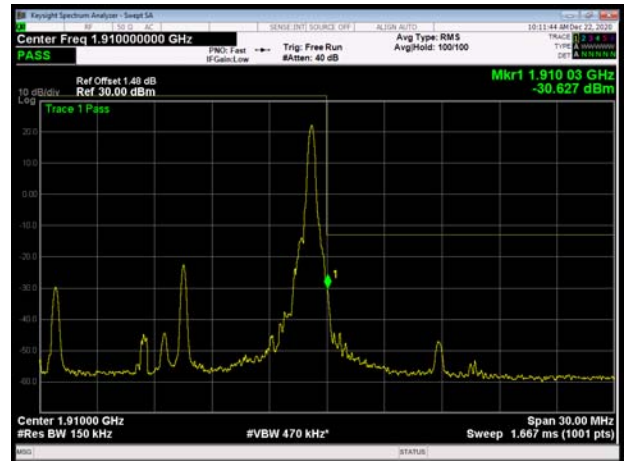
LTE Band 2 10MHz 16QAM 100%RB CH-High



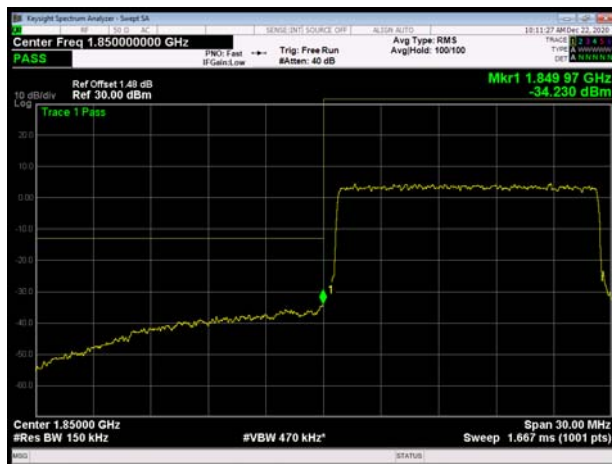
LTE Band 2 15MHz 16QAM 1RB CH-Low



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



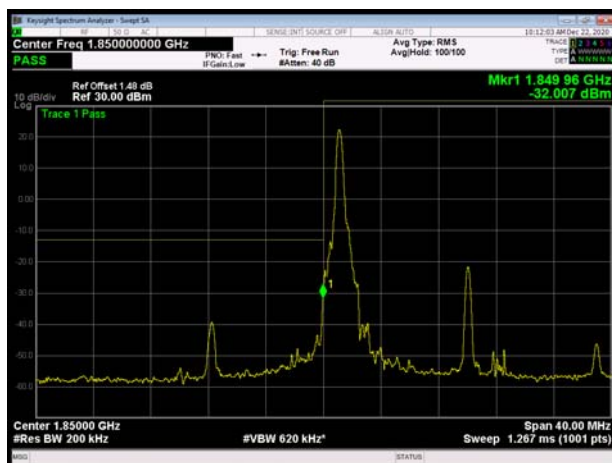
LTE Band 2 15MHz 16QAM 100%RB CH-Low



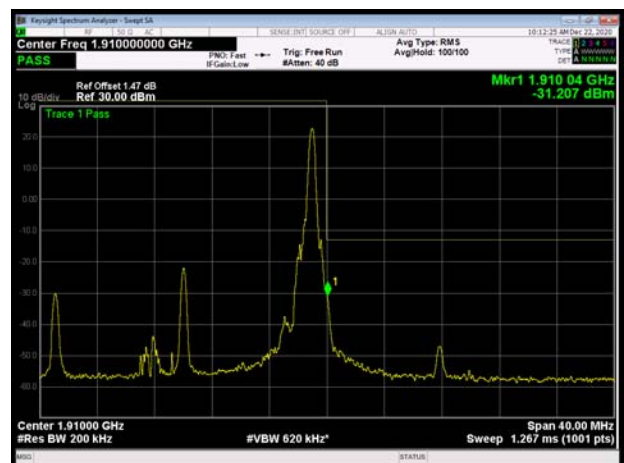
LTE Band 2 15MHz 16QAM 100%RB CH-High



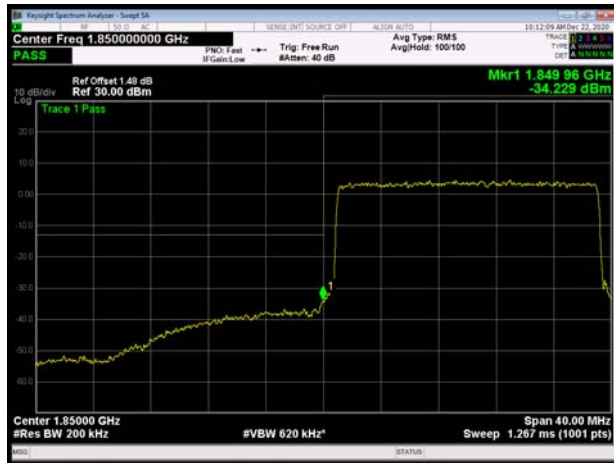
LTE Band 2 20MHz 16QAM 1RB CH-Low



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



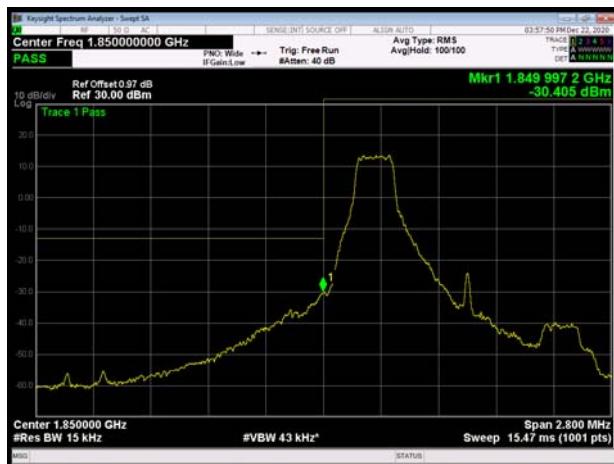
LTE Band 2 20MHz 16QAM 100%RB CH-Low



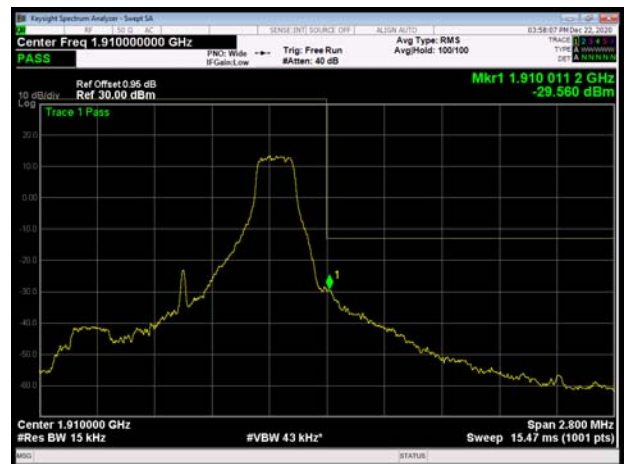
LTE Band 2 20MHz 16QAM 100%RB CH-High



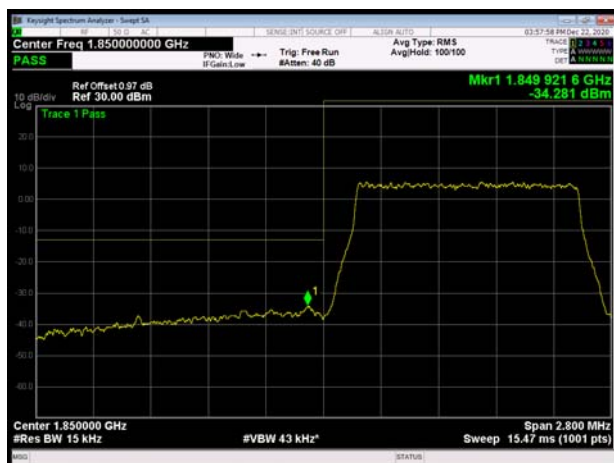
LTE Band 2 1.4MHz 64QAM 1RB CH-Low



LTE Band 2 1.4MHz 64QAM 1RB CH-High



LTE Band 2 1.4MHz 64QAM 100%RB CH-Low

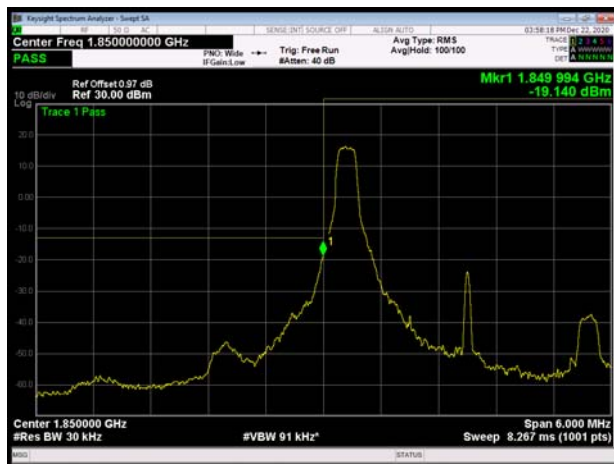


LTE Band 2 1.4MHz 64QAM 100%RB CH-High

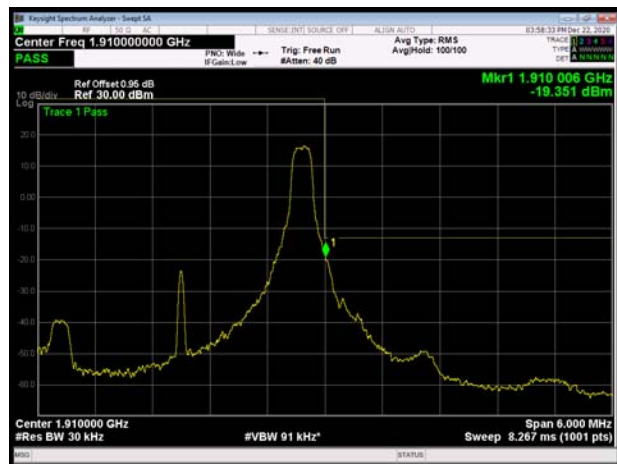




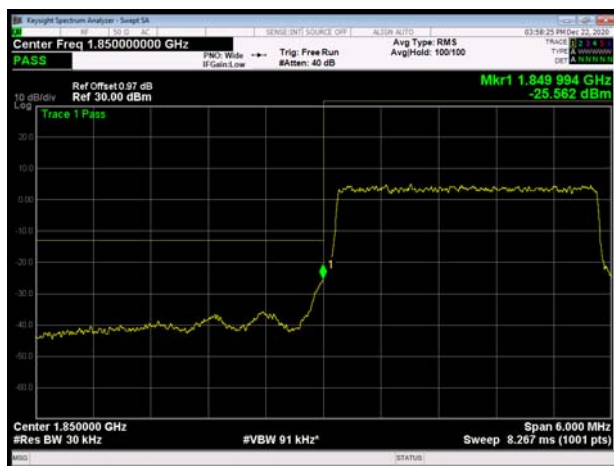
LTE Band 2 3MHz 64QAM 1RB CH-Low



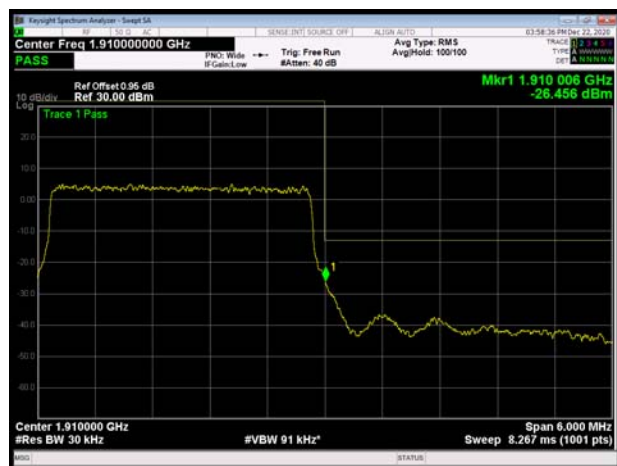
LTE Band 2 3MHz 64QAM 1RB CH-High



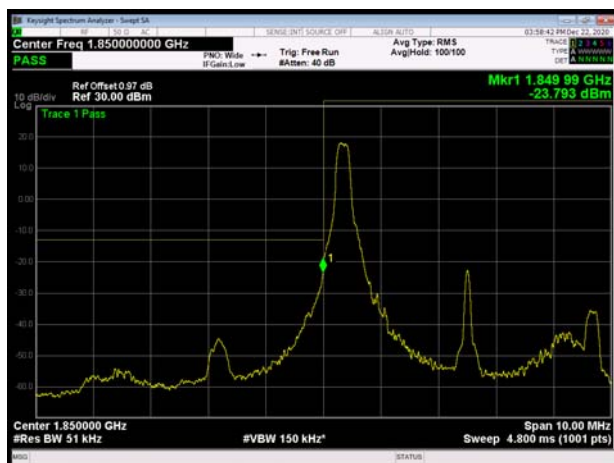
LTE Band 2 3MHz 16QAM 100%RB CH-Low



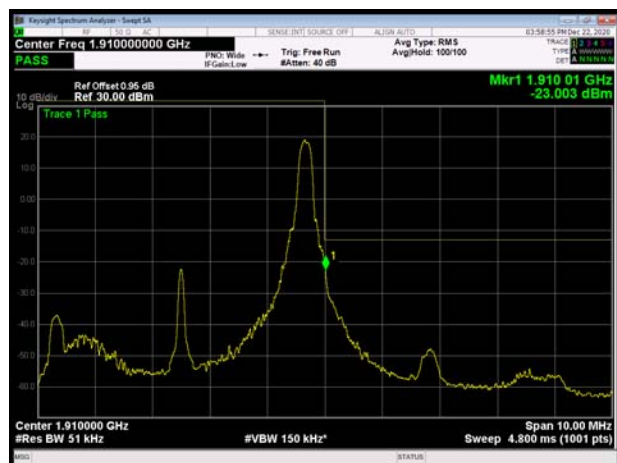
LTE Band 2 3MHz 64QAM 100%RB CH-High



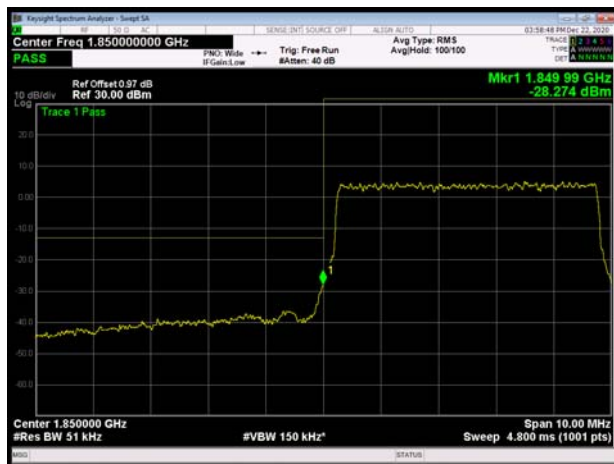
LTE Band 2 5MHz 64QAM 1RB CH-Low



LTE Band 2 5MHz 64QAM 1RB CH-High



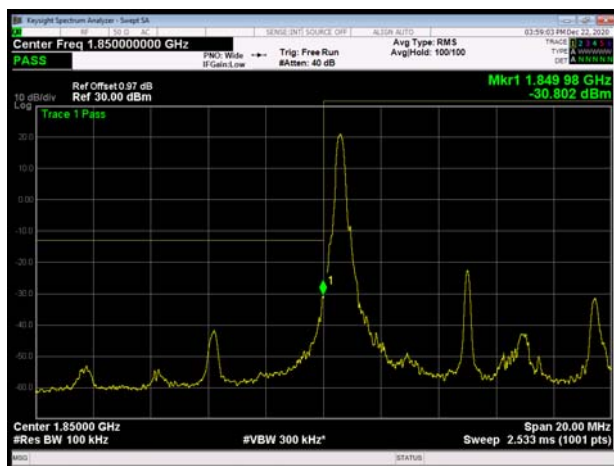
LTE Band 2 5MHz 64QAM 100%RB CH-Low



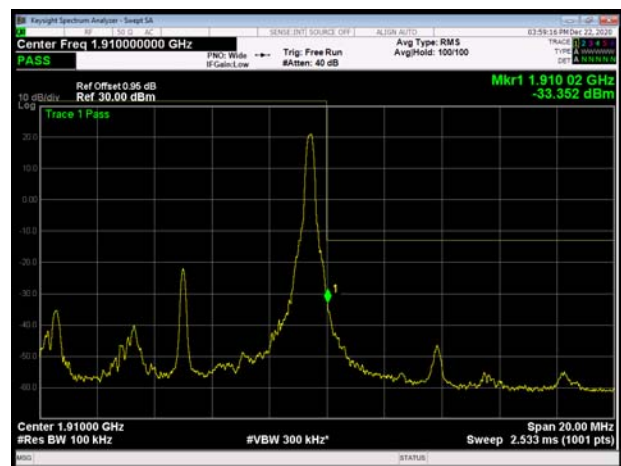
LTE Band 2 5MHz 64QAM 100%RB CH-High



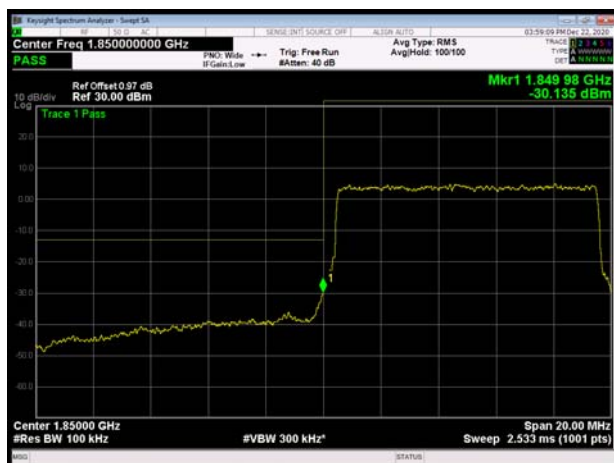
LTE Band 2 10MHz 64QAM 1RB CH-Low



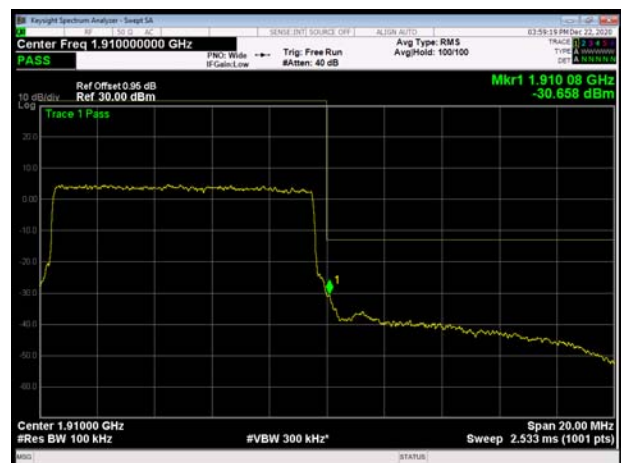
LTE Band 2 10MHz 64QAM 1RB CH-High



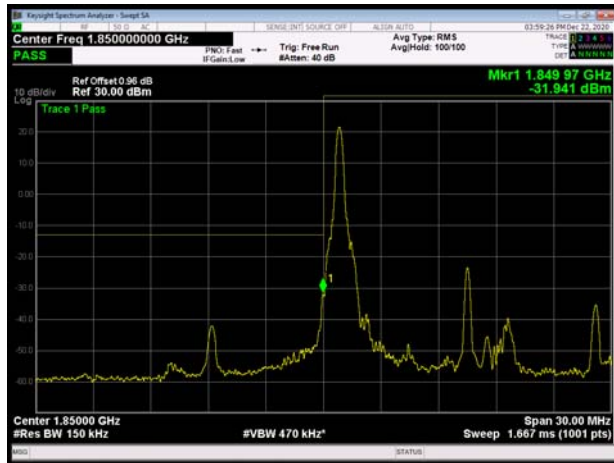
LTE Band 2 10MHz 64QAM 100%RB CH-Low



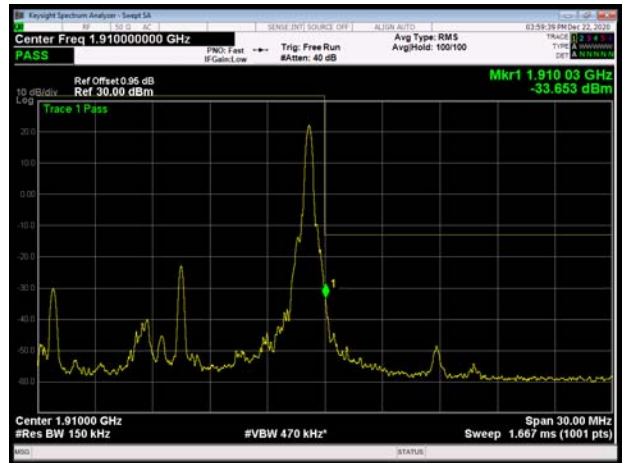
LTE Band 2 10MHz 64QAM 100%RB CH-High



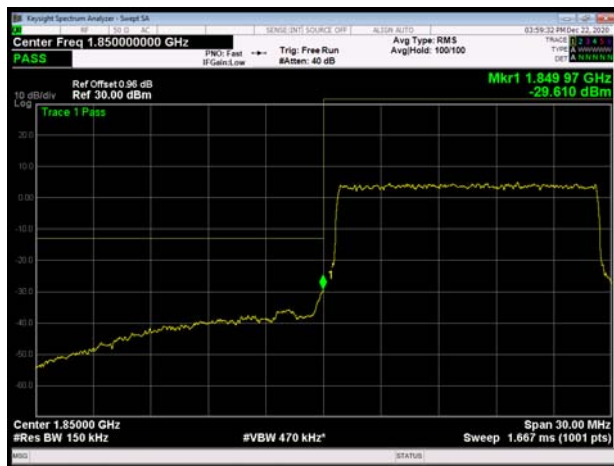
LTE Band 2 15MHz 64QAM 1RB CH-Low



LTE Band 2 15MHz 64QAM 1RB CH-High



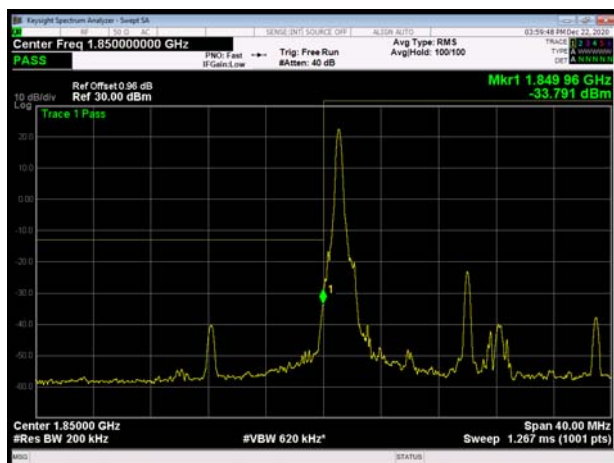
LTE Band 2 15MHz 64QAM 100%RB CH-Low



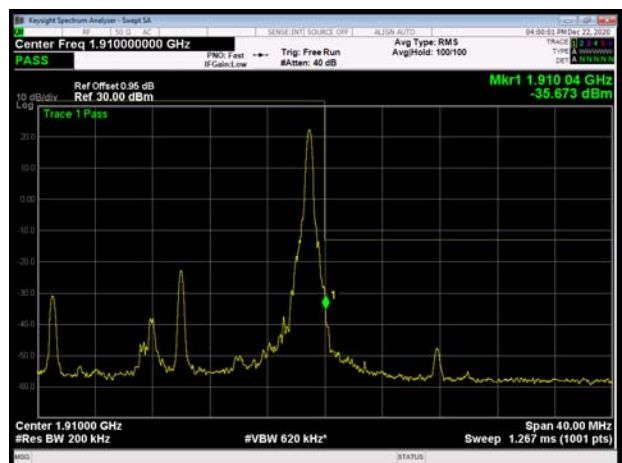
LTE Band 2 15MHz 64QAM 100%RB CH-High



LTE Band 2 20MHz 64QAM 1RB CH-Low

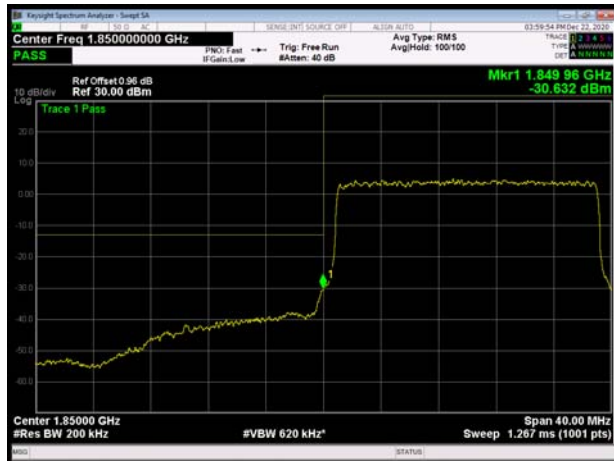


LTE Band 2 20MHz 64QAM 1RB CH-High





LTE Band 2 20MHz 64QAM 100%RB CH-Low



LTE Band 2 20MHz 64QAM 100%RB CH-High



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

Ambient condition

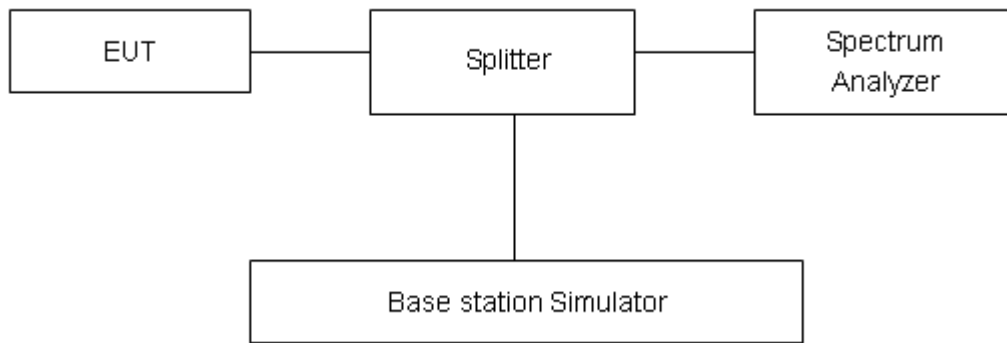
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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:

$$\text{PAPR (dB)} = \text{PPk (dBm)} - \text{PAvg (dBm)}.$$

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	34.31	32.73	1.58	≤13	PASS
	661	1880	34.50	32.96	1.54	≤13	PASS
	810	1909.8	34.18	32.68	1.50	≤13	PASS
GPRS 1900 (GMSK)	512	1850.2	34.17	32.70	1.47	≤13	PASS
	661	1880	34.57	33.01	1.56	≤13	PASS
	810	1909.8	34.24	32.65	1.59	≤13	PASS
EGPRS 1900 (8PSK)	512	1850.2	28.98	26.93	2.05	≤13	PASS
	661	1880	29.14	27.04	2.10	≤13	PASS
	810	1909.8	29.24	27.17	2.07	≤13	PASS
WCDMA Band II (RMC)	9262	1852.4	25.88	22.84	3.04	≤13	PASS
	9400	1880	25.76	22.81	2.95	≤13	PASS
	9538	1907.6	25.70	22.70	3.00	≤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	27.49	23.34	4.15	≤13	PASS
		18900	1880.0	27.44	23.38	4.06	≤13	PASS
		19193	1909.3	27.68	23.42	4.26	≤13	PASS
	3	18615	1851.5	27.49	23.38	4.11	≤13	PASS
		18900	1880	27.40	23.43	3.97	≤13	PASS
		19185	1908.5	27.59	23.49	4.10	≤13	PASS
	5	18625	1852.5	27.63	23.39	4.24	≤13	PASS
		18900	1880	27.52	23.44	4.08	≤13	PASS
		19175	1907.5	27.65	23.48	4.17	≤13	PASS
	10	18650	1855	27.83	23.52	4.31	≤13	PASS
		18900	1880	27.51	23.42	4.09	≤13	PASS
		19150	1905	27.62	23.37	4.25	≤13	PASS
	15	18675	1857.5	28.08	23.50	4.58	≤13	PASS
		18900	1880	27.88	23.50	4.38	≤13	PASS
		19125	1902.5	27.86	23.39	4.47	≤13	PASS
16QAM	1.4	18700	1860	28.00	23.51	4.49	≤13	PASS
		18900	1880	27.86	23.49	4.37	≤13	PASS
		19100	1900	27.85	23.39	4.46	≤13	PASS



	3	19193	1909.3	27.80	22.47	5.33	≤13	PASS
		18615	1851.5	27.67	22.45	5.22	≤13	PASS
		18900	1880	27.59	22.51	5.08	≤13	PASS
		19185	1908.5	27.77	22.55	5.22	≤13	PASS
	5	18625	1852.5	27.75	22.48	5.27	≤13	PASS
		18900	1880	27.60	22.49	5.11	≤13	PASS
		19175	1907.5	27.72	22.54	5.18	≤13	PASS
	10	18650	1855	27.96	22.61	5.35	≤13	PASS
		18900	1880	27.61	22.52	5.09	≤13	PASS
		19150	1905	27.73	22.48	5.25	≤13	PASS
	15	18675	1857.5	28.20	22.61	5.59	≤13	PASS
		18900	1880	27.91	22.57	5.34	≤13	PASS
		19125	1902.5	27.94	22.51	5.43	≤13	PASS
	20	18700	1860	28.19	22.59	5.60	≤13	PASS
		18900	1880	27.95	22.51	5.44	≤13	PASS
		19100	1900	28.00	22.48	5.52	≤13	PASS
64QAM	1.4	18607	1850.7	26.91	22.77	4.14	≤13	PASS
		18900	1880.0	26.82	22.79	4.03	≤13	PASS
		19193	1909.3	27.03	22.78	4.25	≤13	PASS
	3	18615	1851.5	26.90	22.85	4.05	≤13	PASS
		18900	1880	26.78	22.86	3.92	≤13	PASS
		19185	1908.5	26.95	22.86	4.09	≤13	PASS
	5	18625	1852.5	27.04	22.80	4.24	≤13	PASS
		18900	1880	26.87	22.85	4.02	≤13	PASS
		19175	1907.5	26.99	22.86	4.13	≤13	PASS
	10	18650	1855	27.24	22.93	4.31	≤13	PASS
		18900	1880	26.91	22.87	4.04	≤13	PASS
		19150	1905	26.98	22.76	4.22	≤13	PASS
	15	18675	1857.5	27.49	22.94	4.55	≤13	PASS
		18900	1880	27.23	22.86	4.37	≤13	PASS
		19125	1902.5	27.25	22.79	4.46	≤13	PASS
	20	18700	1860	27.39	22.90	4.49	≤13	PASS
		18900	1880	27.24	22.88	4.36	≤13	PASS
		19100	1900	27.20	22.75	4.45	≤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 +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.

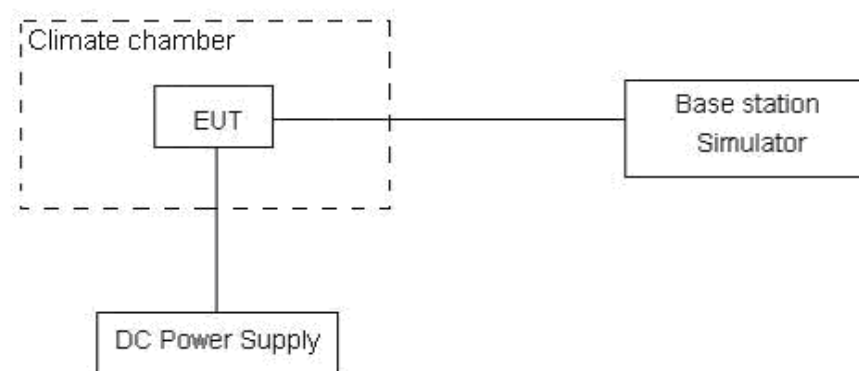
Frequency Stability (Voltage Variation)

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 3.29V and 4.45V, with a nominal voltage of 3.87V.

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

GSM 1900						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
Temperature	Voltage	GMSK	8PSK	GMSK	8PSK	
Normal (25℃)	Normal	16.79	9.43	0.00893	0.00502	PASS
Extreme (50℃)		11.33	16.86	0.00603	0.00897	PASS
Extreme (40℃)		4.90	11.67	0.00261	0.00621	PASS
Extreme (30℃)		16.51	10.75	0.00878	0.00572	PASS
Extreme (20℃)		14.95	1.22	0.00795	0.00065	PASS
Extreme (10℃)		2.59	11.43	0.00138	0.00608	PASS
Extreme (0℃)		12.68	15.41	0.00674	0.00820	PASS
Extreme (-10℃)		7.01	7.62	0.00373	0.00406	PASS
Extreme (-20℃)		11.21	14.04	0.00596	0.00747	PASS
Extreme (-30℃)		10.06	14.64	0.00535	0.00779	PASS
25℃	LV	9.36	4.40	0.00498	0.00234	PASS
	HV	9.62	14.61	0.00512	0.00777	PASS

WCDMA Band II						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
Temperature	Voltage	QPSK	BPSK	QPSK	BPSK	
Normal (25℃)	Normal	6.94	1.98	0.00369	0.00105	PASS
Extreme (50℃)		8.75	11.98	0.00465	0.00637	PASS
Extreme (40℃)		13.85	10.28	0.00737	0.00547	PASS
Extreme (30℃)		8.38	17.65	0.00446	0.00939	PASS
Extreme (20℃)		10.85	5.02	0.00577	0.00267	PASS
Extreme (10℃)		8.05	15.54	0.00428	0.00827	PASS
Extreme (0℃)		11.45	10.86	0.00609	0.00578	PASS
Extreme (-10℃)		13.34	12.02	0.00709	0.00639	PASS
Extreme (-20℃)		5.96	11.00	0.00317	0.00585	PASS
Extreme (-30℃)		9.47	3.96	0.00504	0.00211	PASS
25℃	LV	2.98	14.47	0.00158	0.00770	PASS
	HV	16.04	12.44	0.00853	0.00662	PASS



LTE Band 2								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	12.61	11.74	7.01	0.00671	0.00624	0.00373	PASS
Extreme (50℃)		15.17	11.13	12.97	0.00807	0.00592	0.00690	PASS
Extreme (40℃)		17.63	7.40	6.55	0.00938	0.00394	0.00349	PASS
Extreme (30℃)		3.82	7.97	7.11	0.00203	0.00424	0.00378	PASS
Extreme (20℃)		5.51	3.09	5.27	0.00293	0.00164	0.00281	PASS
Extreme (10℃)		7.87	11.49	2.60	0.00419	0.00611	0.00138	PASS
Extreme (0℃)		14.36	16.58	14.77	0.00764	0.00882	0.00785	PASS
Extreme (-10℃)		6.69	16.83	13.97	0.00356	0.00895	0.00743	PASS
Extreme (-20℃)		3.67	5.89	12.11	0.00195	0.00313	0.00644	PASS
Extreme (-30℃)		9.64	7.94	15.76	0.00513	0.00422	0.00838	PASS
25℃	LV	10.24	13.18	8.35	0.00545	0.00701	0.00444	PASS
	HV	14.60	10.52	10.54	0.00777	0.00559	0.00561	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	3MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	16.67	8.10	1.89	0.00887	0.00431	0.00101	PASS
Extreme (50℃)		4.31	16.91	6.21	0.00229	0.00899	0.00330	PASS
Extreme (40℃)		10.17	12.50	5.52	0.00541	0.00665	0.00294	PASS
Extreme (30℃)		11.79	3.26	17.41	0.00627	0.00174	0.00926	PASS
Extreme (20℃)		3.50	8.98	4.32	0.00186	0.00478	0.00230	PASS
Extreme (10℃)		11.50	16.70	2.63	0.00612	0.00888	0.00140	PASS
Extreme (0℃)		13.85	4.93	12.77	0.00736	0.00262	0.00679	PASS
Extreme (-10℃)		8.85	11.39	15.00	0.00471	0.00606	0.00798	PASS
Extreme (-20℃)		14.53	1.40	13.26	0.00773	0.00074	0.00705	PASS
Extreme (-30℃)		10.02	5.45	8.11	0.00533	0.00290	0.00431	PASS
25℃	LV	12.36	8.45	4.14	0.00658	0.00449	0.00220	PASS
	HV	6.89	5.32	4.94	0.00367	0.00283	0.00263	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	3.54	12.93	4.15	0.00188	0.00688	0.00221	PASS
Extreme (50℃)		6.11	4.59	2.18	0.00325	0.00244	0.00116	PASS



Extreme (40℃)		13.50	15.27	2.90	0.00718	0.00812	0.00154	PASS
Extreme (30℃)		1.31	12.75	6.75	0.00070	0.00678	0.00359	PASS
Extreme (20℃)		12.14	8.13	16.37	0.00646	0.00433	0.00871	PASS
Extreme (10℃)		3.32	15.96	8.11	0.00177	0.00849	0.00431	PASS
Extreme (0℃)		13.65	13.57	14.50	0.00726	0.00722	0.00771	PASS
Extreme (-10℃)		14.86	8.18	7.97	0.00791	0.00435	0.00424	PASS
Extreme (-20℃)		16.51	5.87	3.46	0.00878	0.00312	0.00184	PASS
Extreme (-30℃)		6.75	13.59	10.18	0.00359	0.00723	0.00542	PASS
25℃	LV	9.33	7.62	2.20	0.00496	0.00405	0.00117	PASS
	HV	3.13	10.77	6.48	0.00167	0.00573	0.00345	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	4.05	16.12	1.69	0.00216	0.00857	0.00090	PASS
Extreme (50℃)		6.86	15.75	11.78	0.00365	0.00838	0.00626	PASS
Extreme (40℃)		5.30	6.67	16.31	0.00282	0.00355	0.00868	PASS
Extreme (30℃)		5.88	13.06	13.84	0.00313	0.00695	0.00736	PASS
Extreme (20℃)		1.88	3.55	17.92	0.00100	0.00189	0.00953	PASS
Extreme (10℃)		17.56	15.60	14.11	0.00934	0.00830	0.00751	PASS
Extreme (0℃)		2.38	15.16	8.55	0.00126	0.00806	0.00455	PASS
Extreme (-10℃)		6.35	11.38	8.46	0.00338	0.00605	0.00450	PASS
Extreme (-20℃)		9.07	17.88	4.71	0.00483	0.00951	0.00251	PASS
Extreme (-30℃)		8.40	3.04	9.84	0.00447	0.00162	0.00524	PASS
25℃	LV	3.19	15.82	1.13	0.00170	0.00841	0.00060	PASS
	HV	1.74	9.53	6.76	0.00093	0.00507	0.00360	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	15MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	9.05	16.52	15.80	0.00481	0.00879	0.00840	PASS
Extreme (50℃)		1.14	10.50	2.38	0.00060	0.00559	0.00126	PASS
Extreme (40℃)		13.12	11.69	15.98	0.00698	0.00622	0.00850	PASS
Extreme (30℃)		16.62	15.24	5.18	0.00884	0.00811	0.00276	PASS
Extreme (20℃)		13.29	5.77	14.32	0.00707	0.00307	0.00762	PASS
Extreme (10℃)		1.11	5.26	4.88	0.00059	0.00280	0.00259	PASS
Extreme (0℃)		1.47	13.01	15.39	0.00078	0.00692	0.00819	PASS
Extreme (-10℃)		17.98	10.06	5.66	0.00956	0.00535	0.00301	PASS
Extreme (-20℃)		15.16	15.95	4.35	0.00807	0.00848	0.00232	PASS
Extreme (-30℃)		5.14	9.42	2.24	0.00273	0.00501	0.00119	PASS
25℃	LV	4.56	9.33	8.25	0.00243	0.00496	0.00439	PASS



	HV	17.41	4.41	16.43	0.00926	0.00234	0.00874	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	14.20	6.17	10.02	0.00755	0.00328	0.00533	PASS
Extreme (50℃)		1.90	8.76	2.38	0.00101	0.00466	0.00127	PASS
Extreme (40℃)		12.68	6.01	8.94	0.00675	0.00320	0.00475	PASS
Extreme (30℃)		10.89	3.51	4.27	0.00579	0.00187	0.00227	PASS
Extreme (20℃)		8.69	12.86	8.43	0.00462	0.00684	0.00448	PASS
Extreme (10℃)		4.64	11.14	5.12	0.00247	0.00592	0.00272	PASS
Extreme (0℃)		12.12	5.36	17.84	0.00645	0.00285	0.00949	PASS
Extreme (-10℃)		11.51	3.48	1.92	0.00612	0.00185	0.00102	PASS
Extreme (-20℃)		8.86	16.81	2.40	0.00471	0.00894	0.00128	PASS
Extreme (-30℃)		1.73	1.54	8.82	0.00092	0.00082	0.00469	PASS
25℃	LV	9.22	7.33	15.28	0.00490	0.00390	0.00813	PASS
	HV	16.02	13.33	4.62	0.00852	0.00709	0.00246	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),

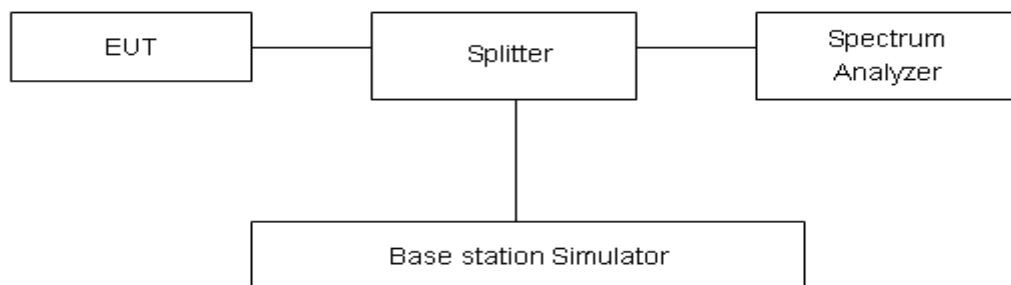
RBW is set to 100 kHz (30MHz~1000 MHz),

RBW is set to 1000 kHz (above 1000MHz),

Sweep is set to ATUO.

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 $43 + 10 \log_{10} (P)$ 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 $k = 1.96$.

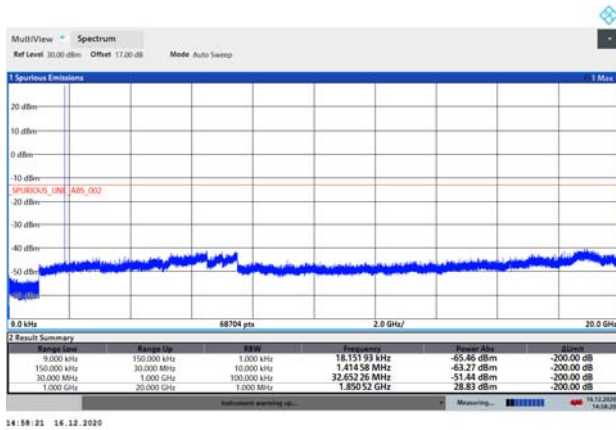
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB

Test Result

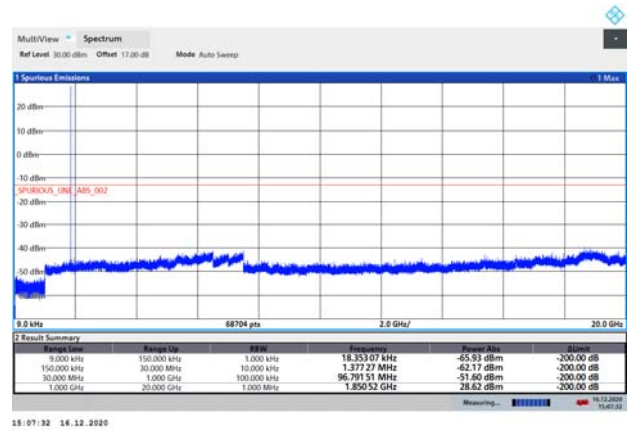
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

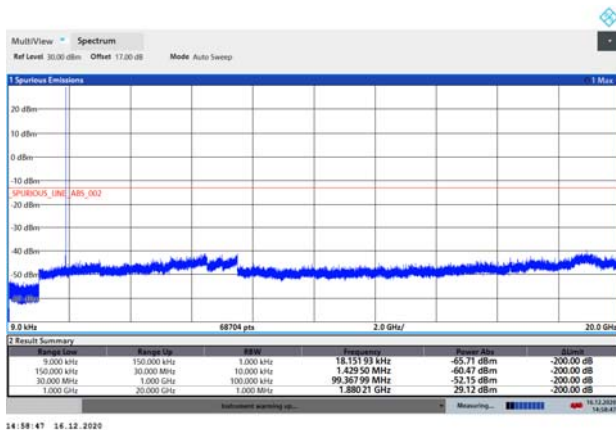
GSM 1900 CH-Low 9kHz ~ 20GHz



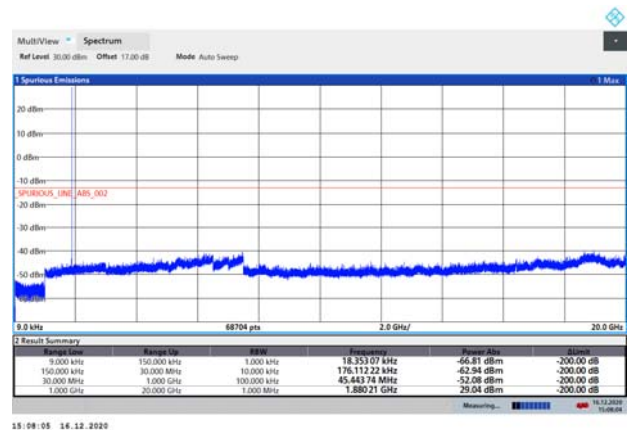
GPRS 1900 CH-Low 9kHz ~ 20GHz



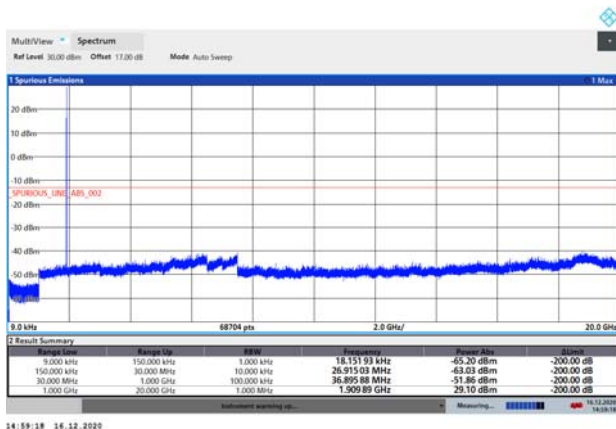
GSM 1900 CH- Middle 9kHz ~ 20GHz



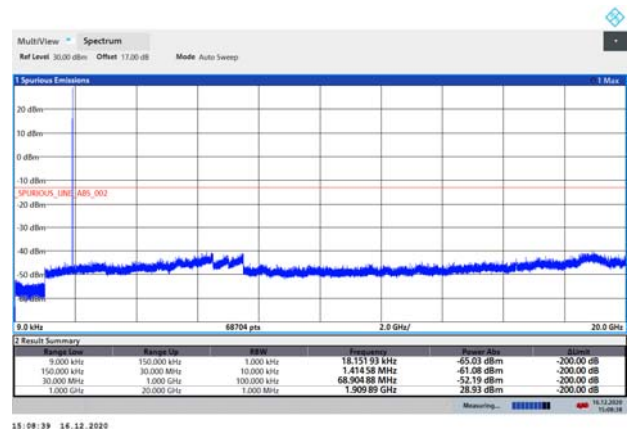
GPRS 1900 CH- Middle 9kHz ~ 20GHz



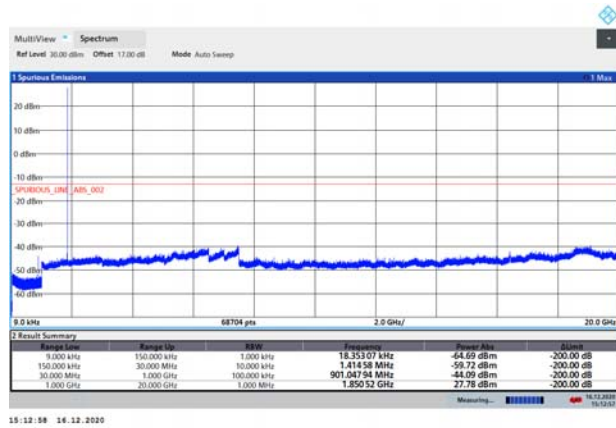
GSM 1900 CH-High 9kHz ~ 20GHz



GPRS 1900 CH-High 9kHz ~ 20GHz

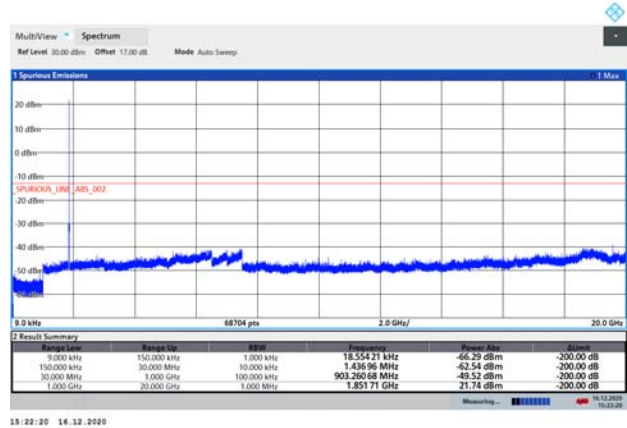


EGPRS 1900 CH-Low 9kHz ~ 20GHz



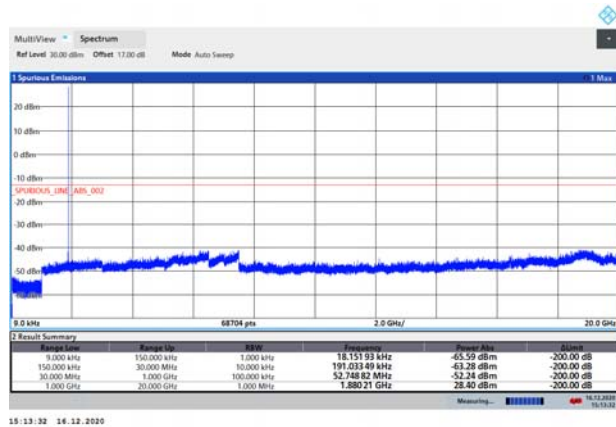
15:12:58 16.12.2020

WCDMA BAND II CH-Low 9kHz ~ 20GHz



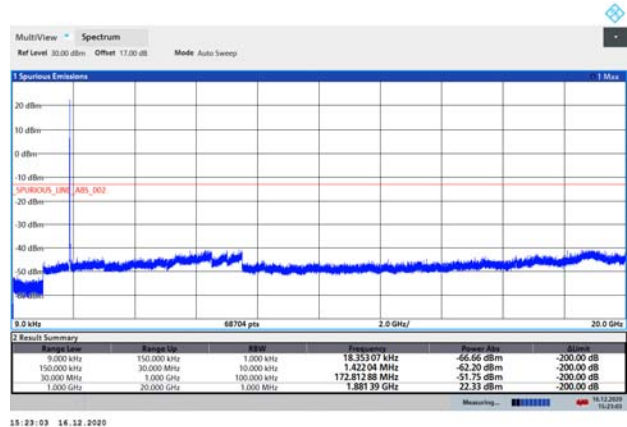
15:12:20 16.12.2020

EGPRS 1900 CH- Middle 9kHz ~ 20GHz



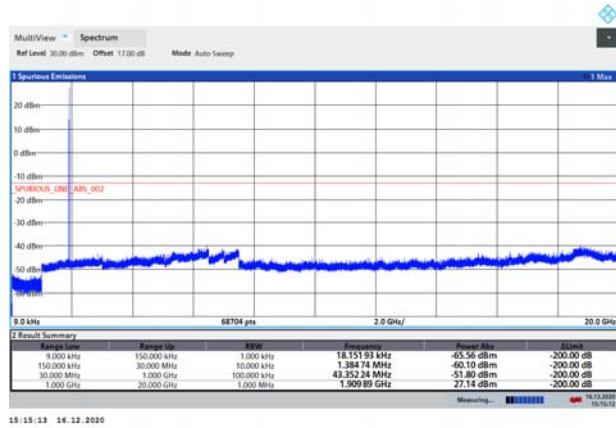
15:13:32 16.12.2020

WCDMA BAND II CH- Middle 9kHz ~ 20GHz



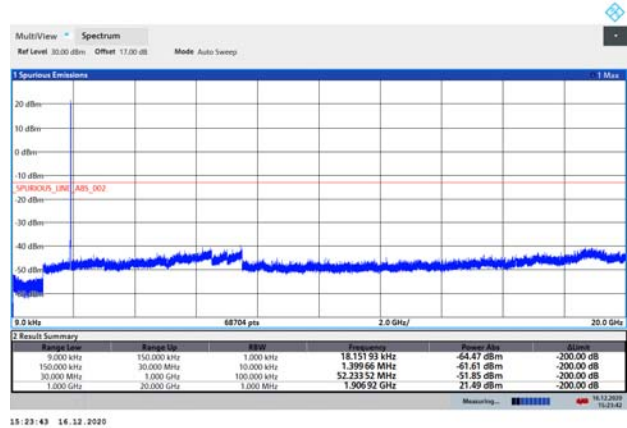
15:13:03 16.12.2020

EGPRS 1900 CH-High 9kHz ~ 20GHz



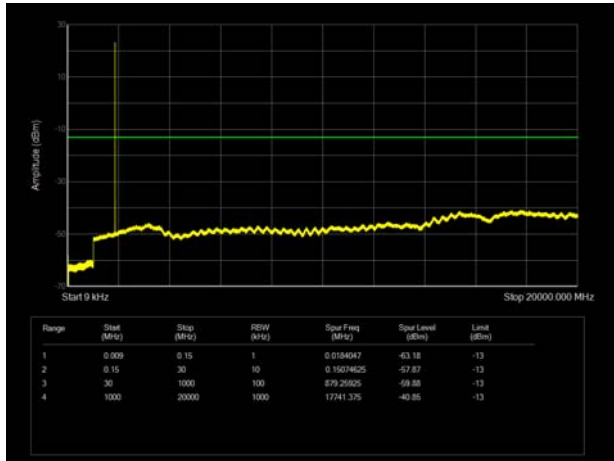
15:15:13 16.12.2020

WCDMA BAND II CH-High 9kHz ~ 20GHz

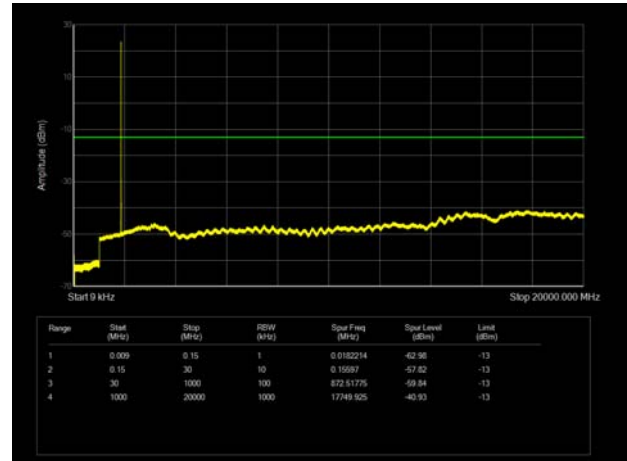


15:13:43 16.12.2020

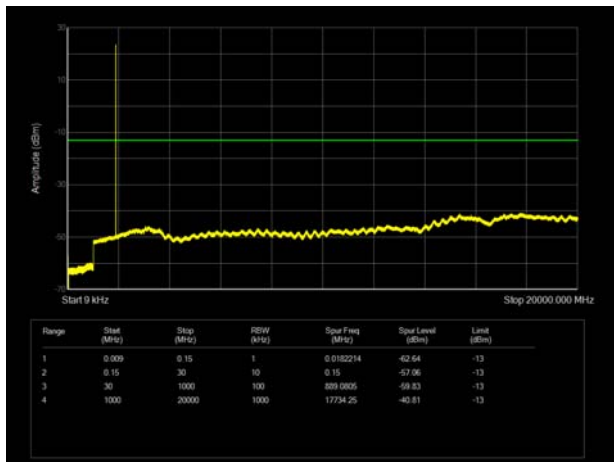
LTE Band 2 1.4MHz CH-Low 9kHz~20GHz



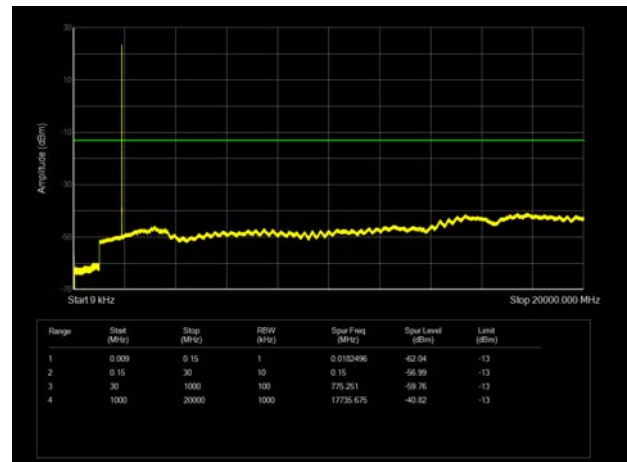
LTE Band 2 3MHz CH-Low 9kHz~20GHz



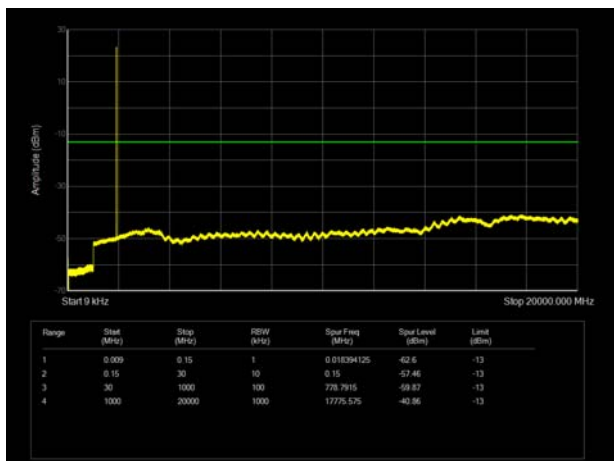
LTE Band 2 1.4MHz CH-Middle 9kHz~20GHz



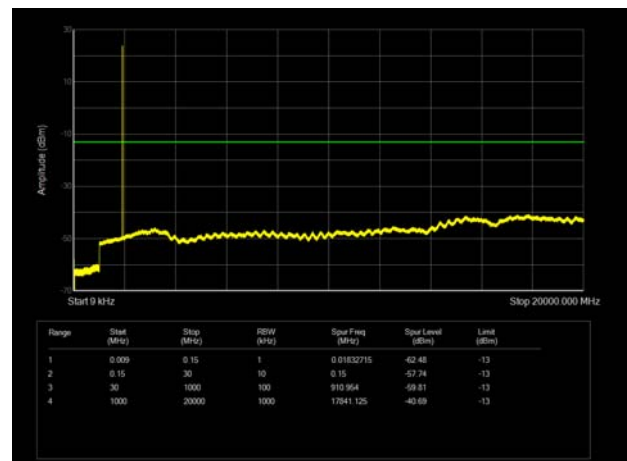
LTE Band 2 3MHz CH-Middle 9kHz~20GHz



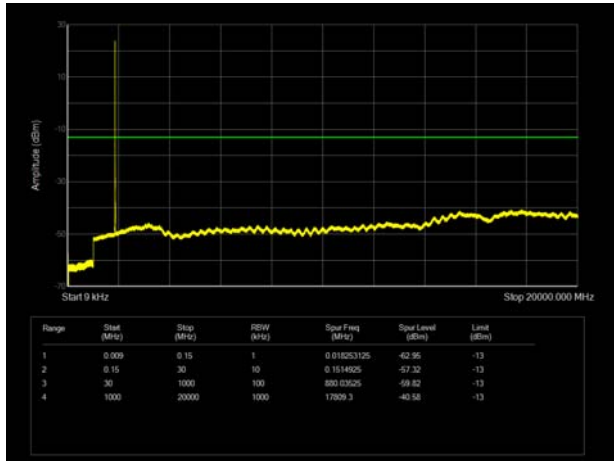
LTE Band 2 1.4MHz CH-High 9kHz~20GHz



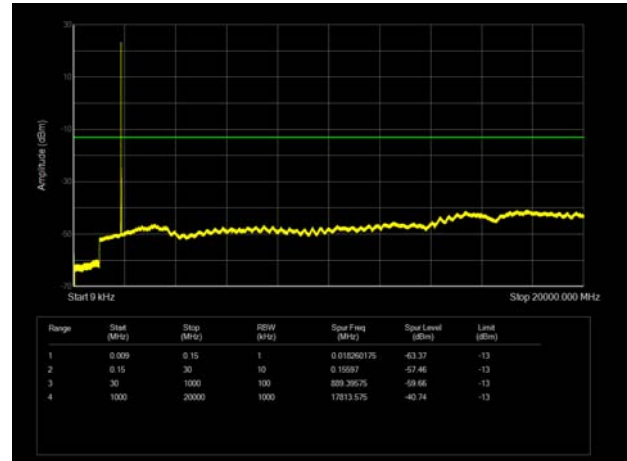
LTE Band 2 3MHz CH-High 9kHz~20GHz



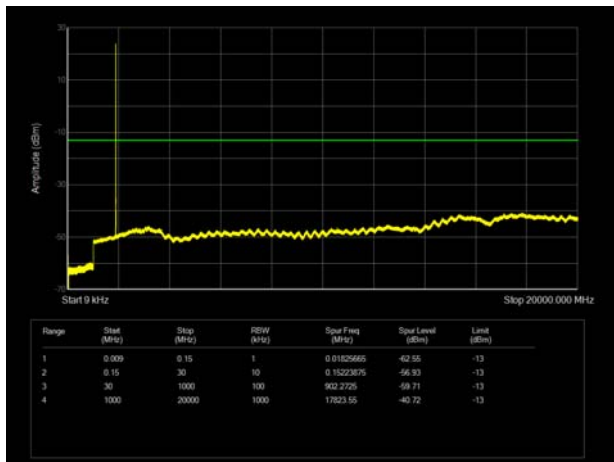
LTE Band 2 5MHz CH-Low 9kHz~20GHz



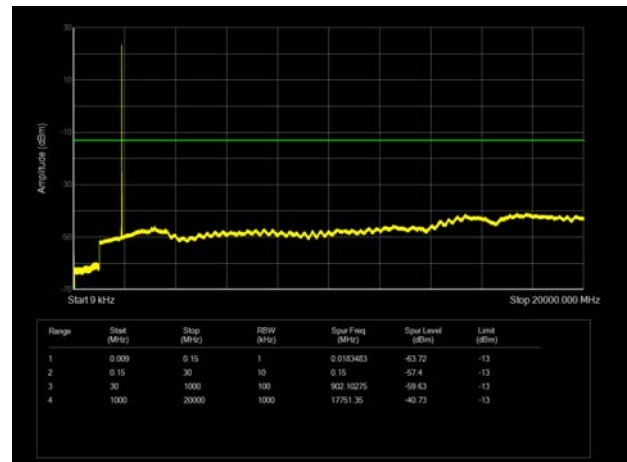
LTE Band 2 10MHz CH-Low 9kHz~20GHz



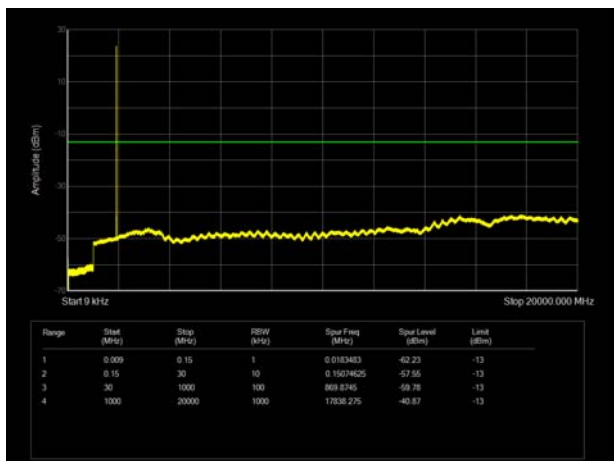
LTE Band 2 5MHz CH-Middle 9kHz~20GHz



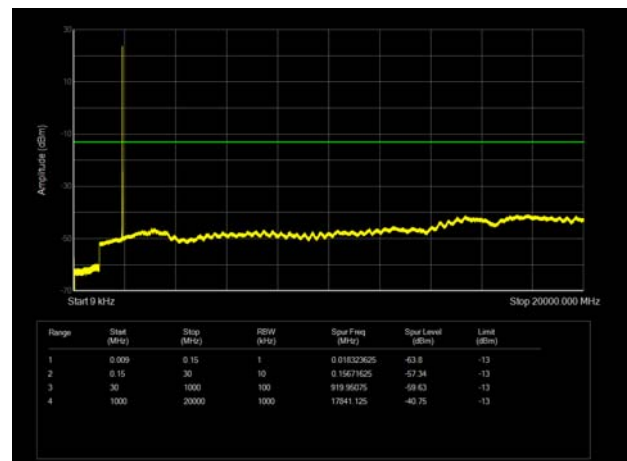
LTE Band 2 10MHz CH-Middle 9kHz~20GHz



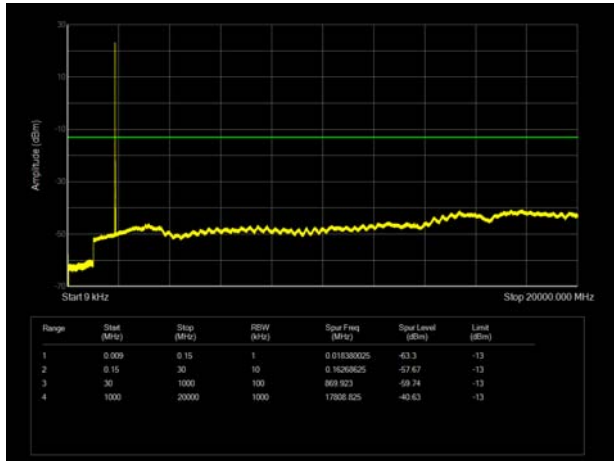
LTE Band 2 5MHz CH-High 9kHz~20GHz



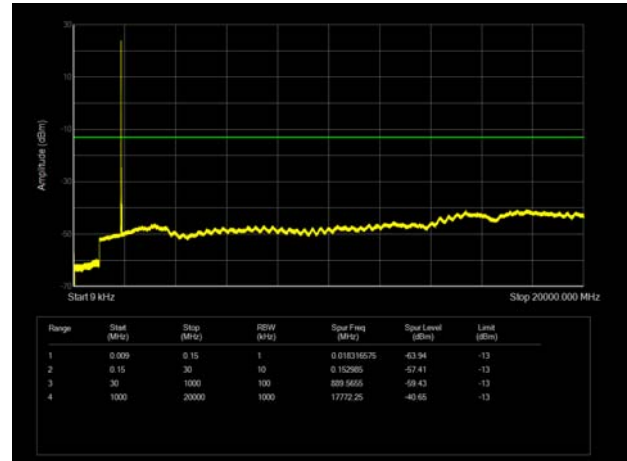
LTE Band 2 10MHz CH-High 9kHz~20GHz



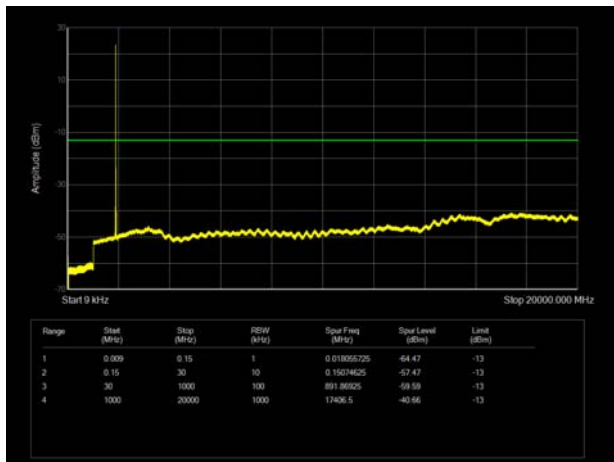
LTE Band 2 15MHz CH-Low 9kHz~20GHz



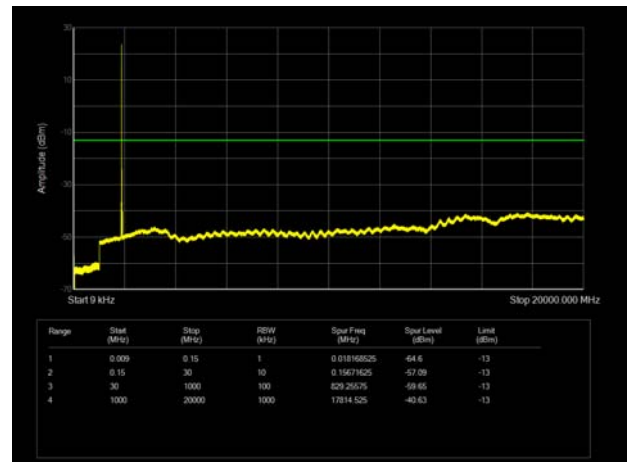
LTE Band 2 20MHz CH-Low 9kHz~20GHz



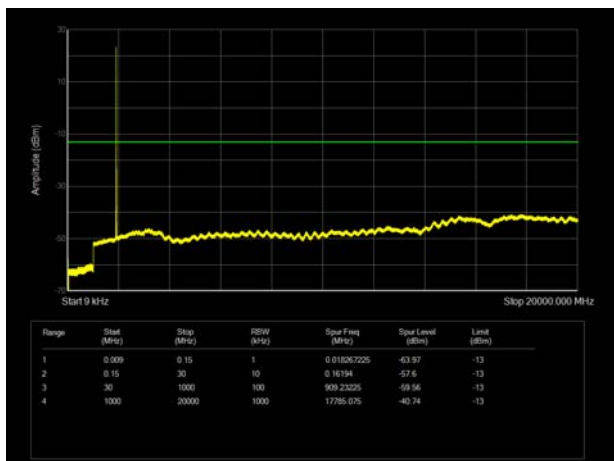
LTE Band 2 15MHz CH-Middle 9kHz~20GHz



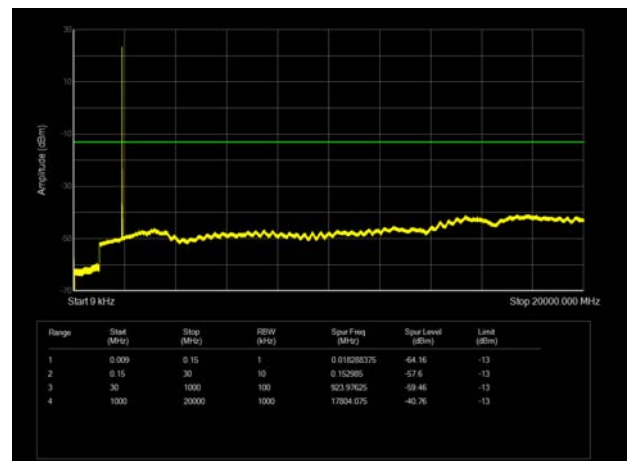
LTE Band 2 20MHz CH-Middle 9kHz~20GHz



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:

$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$
The measurement results are amend as described below:

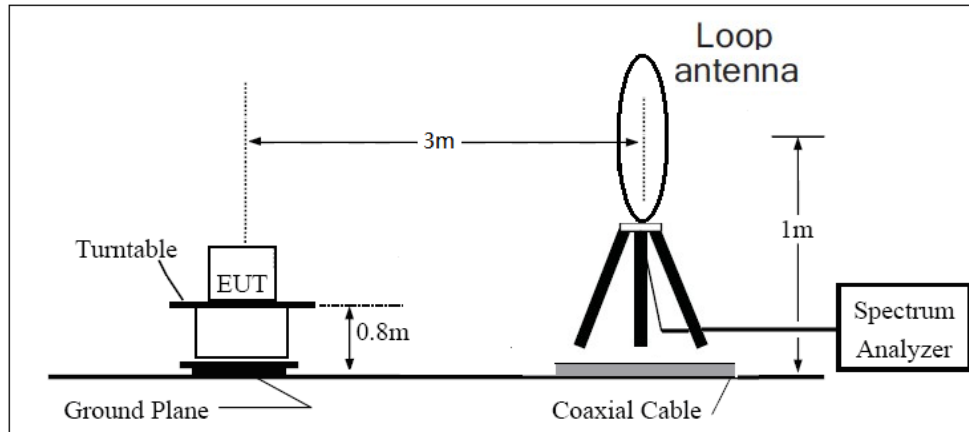
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi)

and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.

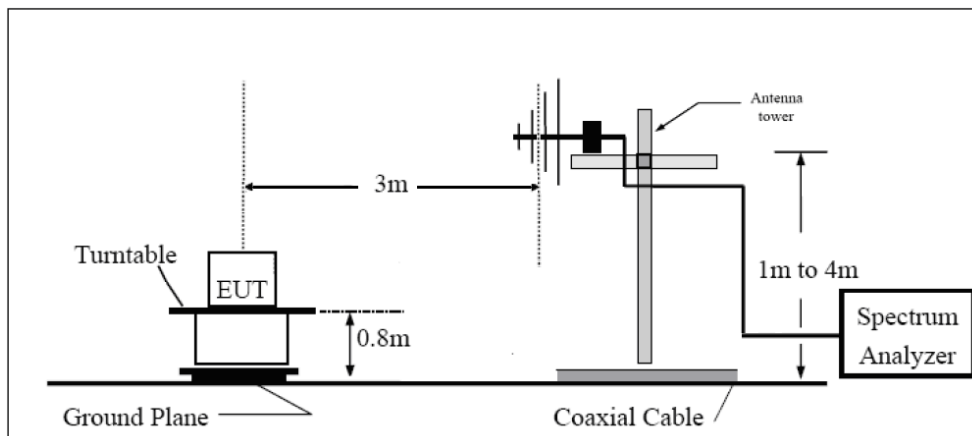
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

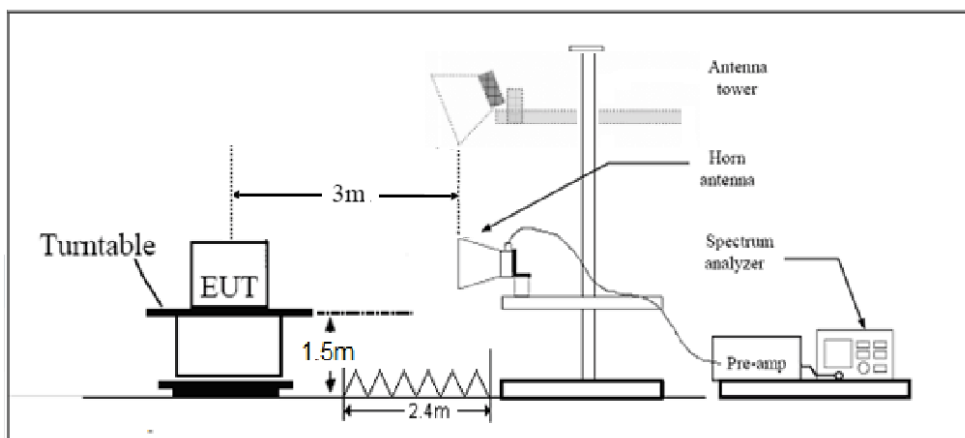
9KHz ~ 30MHz



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.

Main Antenna:

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	-60.49	5.10	11.05	Horizontal	-54.54	-13.00	41.54	90
3	5640.00	-59.13	5.42	12.65	Horizontal	-51.90	-13.00	38.90	315
4	7520.00	-55.82	6.70	13.85	Horizontal	-48.67	-13.00	35.67	45
5	9400.00	-53.27	7.01	14.75	Horizontal	-45.53	-13.00	32.53	225
6	11280.00	-52.35	7.48	15.95	Horizontal	-43.88	-13.00	30.88	0
7	13160.00	-51.77	7.51	16.55	Horizontal	-42.73	-13.00	29.73	135
8	15040.00	-49.61	8.24	15.35	Horizontal	-42.50	-13.00	29.50	180
9	16920.00	-43.16	8.41	14.95	Horizontal	-36.62	-13.00	23.62	225
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.

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	3760.00	-61.18	5.10	11.05	Horizontal	-55.23	-13.00	42.23	90
3	5640.00	-59.05	5.42	12.65	Horizontal	-51.82	-13.00	38.82	45
4	7520.00	-56.40	6.70	13.85	Horizontal	-49.25	-13.00	36.25	0
5	9400.00	-53.18	7.01	14.75	Horizontal	-45.44	-13.00	32.44	315
6	11280.00	-52.13	7.48	15.95	Horizontal	-43.66	-13.00	30.66	90
7	13160.00	-52.25	7.51	16.55	Horizontal	-43.21	-13.00	30.21	270
8	15040.00	-50.23	8.24	15.35	Horizontal	-43.12	-13.00	30.12	90
9	16920.00	-44.12	8.41	14.95	Horizontal	-37.58	-13.00	24.58	225
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 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	-61.37	5.10	11.05	Horizontal	-55.42	-13.00	42.42	180
3	5638.88	-59.43	5.42	12.65	Horizontal	-52.20	-13.00	39.20	0
4	7520.00	-57.67	6.70	13.85	Horizontal	-50.52	-13.00	37.52	135
5	9400.00	-52.30	7.01	14.75	Horizontal	-44.56	-13.00	31.56	225
6	11280.00	-52.20	7.48	15.95	Horizontal	-43.73	-13.00	30.73	90
7	13160.00	-52.12	7.51	16.55	Horizontal	-43.08	-13.00	30.08	270
8	15040.00	-50.14	8.24	15.35	Horizontal	-43.03	-13.00	30.03	315
9	16920.00	-44.79	8.41	14.95	Horizontal	-38.25	-13.00	25.25	45
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	-61.01	5.10	11.05	Horizontal	-55.06	-13.00	42.06	90
3	5633.63	-59.71	5.42	12.65	Horizontal	-52.48	-13.00	39.48	45
4	7520.00	-56.07	6.70	13.85	Horizontal	-48.92	-13.00	35.92	270
5	9400.00	-53.93	7.01	14.75	Horizontal	-46.19	-13.00	33.19	135
6	11280.00	-51.96	7.48	15.95	Horizontal	-43.49	-13.00	30.49	225
7	13160.00	-52.53	7.51	16.55	Horizontal	-43.49	-13.00	30.49	315
8	15040.00	-50.89	8.24	15.35	Horizontal	-43.78	-13.00	30.78	45
9	16920.00	-45.17	8.41	14.95	Horizontal	-38.63	-13.00	25.63	0
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	-61.36	5.10	11.05	Horizontal	-55.41	-13.00	42.41	0
3	5613.38	-59.47	5.42	12.65	Horizontal	-52.24	-13.00	39.24	135
4	7484.63	-57.08	6.70	13.85	Horizontal	-49.93	-13.00	36.93	225
5	9400.00	-52.01	7.01	14.75	Horizontal	-44.27	-13.00	31.27	90
6	11280.00	-52.10	7.48	15.95	Horizontal	-43.63	-13.00	30.63	270
7	13160.00	-52.53	7.51	16.55	Horizontal	-43.49	-13.00	30.49	135
8	15040.00	-50.74	8.24	15.35	Horizontal	-43.63	-13.00	30.63	315
9	16920.00	-45.61	8.41	14.95	Horizontal	-39.07	-13.00	26.07	45
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.

Diversity Antenna:
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	-59.98	5.10	11.05	Horizontal	-54.03	-13.00	41.03	180
3	5640.00	-59.15	5.42	12.65	Horizontal	-51.92	-13.00	38.92	0
4	7520.00	-55.70	6.70	13.85	Horizontal	-48.55	-13.00	35.55	180
5	9400.00	-53.50	7.01	14.75	Horizontal	-45.76	-13.00	32.76	225
6	11280.00	-52.29	7.48	15.95	Horizontal	-43.82	-13.00	30.82	0
7	13160.00	-54.36	7.51	16.55	Horizontal	-45.32	-13.00	32.32	45
8	15040.00	-49.90	8.24	15.35	Horizontal	-42.79	-13.00	29.79	90
9	16920.00	-42.09	8.41	14.95	Horizontal	-35.55	-13.00	22.55	270
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.

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	3760.00	-60.87	5.10	11.05	Horizontal	-54.92	-13.00	41.92	180
3	5640.00	-59.59	5.42	12.65	Horizontal	-52.36	-13.00	39.36	225
4	7520.00	-56.39	6.70	13.85	Horizontal	-49.24	-13.00	36.24	45
5	9400.00	-52.78	7.01	14.75	Horizontal	-45.04	-13.00	32.04	90
6	11280.00	-51.00	7.48	15.95	Horizontal	-42.53	-13.00	29.53	0
7	13160.00	-52.39	7.51	16.55	Horizontal	-43.35	-13.00	30.35	225
8	15040.00	-50.44	8.24	15.35	Horizontal	-43.33	-13.00	30.33	270
9	16920.00	-44.89	8.41	14.95	Horizontal	-38.35	-13.00	25.35	45
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 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	-59.38	5.10	11.05	Horizontal	-53.43	-13.00	40.43	135
3	5638.88	-50.04	5.42	12.65	Horizontal	-42.81	-13.00	29.81	225
4	7520.00	-56.54	6.70	13.85	Horizontal	-49.39	-13.00	36.39	90
5	9400.00	-53.94	7.01	14.75	Horizontal	-46.20	-13.00	33.20	270
6	11280.00	-52.18	7.48	15.95	Horizontal	-43.71	-13.00	30.71	90
7	13160.00	-52.02	7.51	16.55	Horizontal	-42.98	-13.00	29.98	45
8	15040.00	-47.62	8.24	15.35	Horizontal	-40.51	-13.00	27.51	0
9	16920.00	-45.40	8.41	14.95	Horizontal	-38.86	-13.00	25.86	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.

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	-60.25	5.10	11.05	Horizontal	-54.30	-13.00	41.30	90
3	5633.63	-58.33	5.42	12.65	Horizontal	-51.10	-13.00	38.10	135
4	7520.00	-56.15	6.70	13.85	Horizontal	-49.00	-13.00	36.00	270
5	9400.00	-53.50	7.01	14.75	Horizontal	-45.76	-13.00	32.76	225
6	11280.00	-52.26	7.48	15.95	Horizontal	-43.79	-13.00	30.79	270
7	13160.00	-51.95	7.51	16.55	Horizontal	-42.91	-13.00	29.91	135
8	15040.00	-50.21	8.24	15.35	Horizontal	-43.10	-13.00	30.10	315
9	16920.00	-44.74	8.41	14.95	Horizontal	-38.20	-13.00	25.20	0
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	-60.40	5.10	11.05	Horizontal	-54.45	-13.00	41.45	0
3	5613.38	-49.54	5.42	12.65	Horizontal	-42.31	-13.00	29.31	135
4	7484.63	-56.65	6.70	13.85	Horizontal	-49.50	-13.00	36.50	225
5	9400.00	-53.39	7.01	14.75	Horizontal	-45.65	-13.00	32.65	90
6	11280.00	-52.34	7.48	15.95	Horizontal	-43.87	-13.00	30.87	270
7	13160.00	-52.45	7.51	16.55	Horizontal	-43.41	-13.00	30.41	135
8	15040.00	-49.17	8.24	15.35	Horizontal	-42.06	-13.00	29.06	315
9	16920.00	-45.56	8.41	14.95	Horizontal	-39.02	-13.00	26.02	45
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.