



RF TEST REPORT

Applicant	Huawei Technologies Co., Ltd.
FCC ID	QISB612-533
Product	LTE CPE
Model	B612-533
Report No.	R1910H0207-R2
Issue Date	November 7, 2019

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

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Summary of measurement results

No.	Test Case	Clause in FCC rules	Verdict
1	RF power output and Effective 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
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.			
Date of Testing: October 17, 2019~ October 30, 2019			



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. Testing Location

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

2.1. Applicant and Manufacturer Information

Applicant	Huawei Technologies Co., Ltd.
Applicant address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Manufacturer	Huawei Technologies Co., Ltd.
Manufacturer address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

2.2. General information

EUT Description			
Model	B612-533		
SN	CSD7S19919000100		
Hardware Version	WL2B612M01		
Software Version	10.0.2.1（H200SP5C00）		
Power Supply	AC/DC adapter		
Antenna Type	Internal Antenna / External Antenna		
Antenna Gain	Internal Antenna: 2 dBi External Antenna 1: 3 dBi External Antenna 2: 1 dBi		
Test Mode(s)	GSM1900; WCDMA Band II; LTE Band 2;		
Test Modulation	(GSM)GMSK,8PSK; (WCDMA) QPSK,16QAM; (LTE)QPSK,16QAM		
GPRS Multislot Class	12		
EGPRS Multislot Class	12		
HSDPA UE Category	24		
HSUPA UE Category	6		
DC-HSDPA UE Category	24		
LTE Category	6		
Maximum E.I.R.P	GSM 1900:	31.90 dBm	
	WCDMA Band II:	25.17 dBm	
	LTE Band 2:	26.07 dBm	
Rated Power Supply Voltage	12V		
Extreme Voltage	Minimum: 10.8V Maximum: 13.2V		
Extreme Temperature	Lowest: 0℃ Highest: +40℃		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)



	GSM1900	1850 ~ 1910	1930 ~ 1990
	WCDMA Band II	1850 ~ 1910	1930 ~ 1990
	LTE Band 2	1850 ~ 1910	1930 ~ 1990
EUT Accessory			
Adapter 1	Manufacturer: Huawei Technologies Co., Ltd. Model:HW-120100E01		
Adapter 2	Manufacturer: Huawei Technologies Co., Ltd. Model: HW-120100B01		
Adapter 3	Manufacturer: Huawei Technologies Co., Ltd. Model: HW-120100U01		
Adapter 4	Manufacturer: Huawei Technologies Co., Ltd. Model: HW-120100A01		
Note: 1. The information of the EUT is declared by the manufacturer.			

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 (2018)

ANSI C63.26 (2015)

Reference standard:

FCC CFR47 Part 2 (2018)

KDB 971168 D01 Power Meas License Digital Systems v03r01

4. Test Configuration

There is more than one antenna and adapter, each one should be applied throughout the compliance test respectively, and however, only the worst case 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 (Z axis, horizontal polarization) and the worst case was recorded.

All mode and data rates and RB size and positions 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
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	100%	L	M	H
RF power output and Effective Isotropic Radiated power	O	O	O	O	O	O	O	O	-	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	O	O	-	O	O	O	O
Band Edge Compliance	O	O	O	O	O	O	O	O	O	O	O	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	O	O	O	-	O	O	O	O
Frequency Stability	O	O	O	O	O	O	O	O	-	O	O	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 Radiated Power

Ambient condition

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

Methods of Measurement

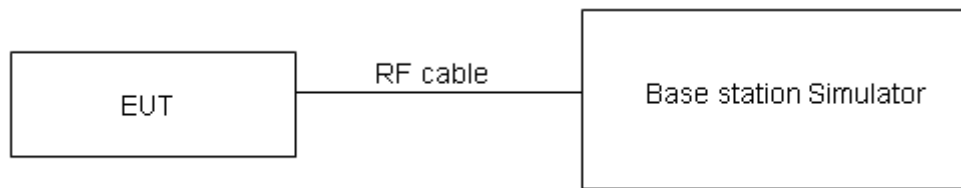
During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

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

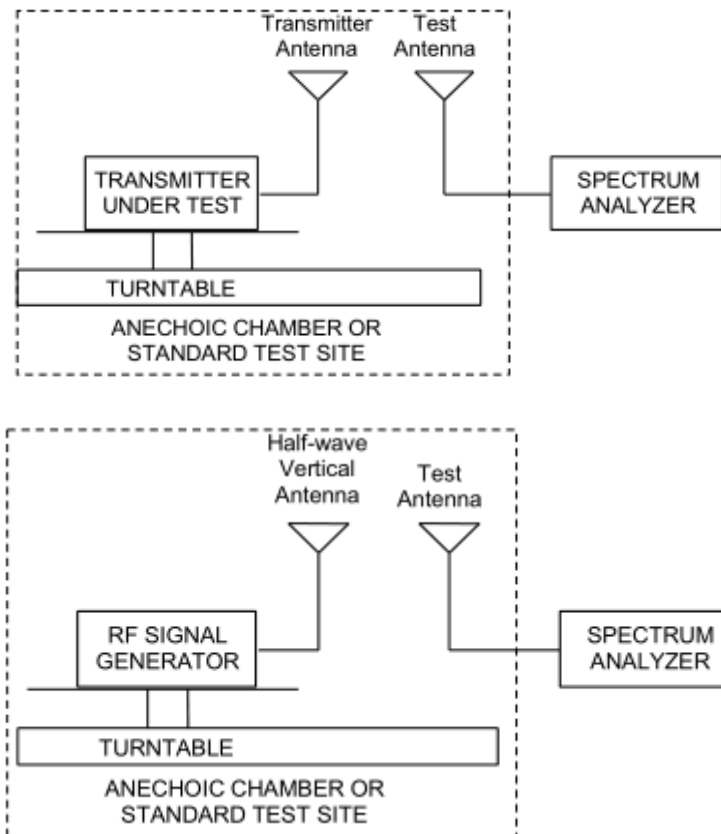
- Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.
- Key the transmitter,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

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

Test Setup



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



Limits

No specific RF power output requirements in part 2.1046.

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)
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Measurement Uncertainty

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



Test Results

GSM 1900		Conducted Power (dBm)			Internal Antenna EIRP (dBm)			External Antenna 1 EIRP (dBm)			External Antenna 2 EIRP (dBm)		
		Channel 512	Channel 661	Channel 810	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)	1850.2 (MHz)	1880 (MHz)	1909.8 (MHz)
GSM	Results	28.63	28.78	28.90	30.63	30.78	30.90	31.63	31.78	31.90	29.63	29.78	29.90
GPRS/EGPRS (GMSK)	1TXslot	28.67	28.71	28.81	30.67	30.71	30.81	31.67	31.71	31.81	29.67	29.71	29.81
	2TXslots	26.41	26.52	26.71	28.41	28.52	28.71	29.41	29.52	29.71	27.41	27.52	27.71
	3TXslots	24.28	24.36	24.52	26.28	26.36	26.52	27.28	27.36	27.52	25.28	25.36	25.52
	4TXslots	22.96	23.07	23.20	24.96	25.07	25.20	25.96	26.07	26.20	23.96	24.07	24.20
EGPRS (8PSK)	1TXslot	24.22	24.02	24.30	26.22	26.02	26.30	27.22	27.02	27.30	25.22	25.02	25.30
	2TXslots	23.01	22.52	22.82	25.01	24.52	24.82	26.01	25.52	25.82	24.01	23.52	23.82
	3TXslots	20.77	20.57	20.84	22.77	22.57	22.84	23.77	23.57	23.84	21.77	21.57	21.84
	4TXslots	18.71	18.88	18.73	20.71	20.88	20.73	21.71	21.88	21.73	19.71	19.88	19.73

WCDMA Band II		Conducted Power (dBm)			Internal Antenna EIRP (dBm)			External Antenna 1 EIRP (dBm)			External Antenna 2 EIRP (dBm)		
		Channel 9262	Channel 9400	Channel 9538	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)	1852.4 (MHz)	1880 (MHz)	1907.6 (MHz)
RMC		22.17	22.11	22.16	24.17	24.11	24.16	25.17	25.11	25.16	23.17	23.11	23.16
HSDPA	Sub-Test 1	21.63	21.53	21.60	23.63	23.53	23.60	24.63	24.53	24.60	22.63	22.53	22.60
	Sub-Test 2	21.62	21.55	21.57	23.62	23.55	23.57	24.62	24.55	24.57	22.62	22.55	22.57
	Sub-Test 3	21.09	21.05	21.09	23.09	23.05	23.09	24.09	24.05	24.09	22.09	22.05	22.09
	Sub-Test 4	21.10	21.06	21.07	23.10	23.06	23.07	24.10	24.06	24.07	22.10	22.06	22.07
HSUPA	Sub-Test 1	21.59	21.52	21.55	23.59	23.52	23.55	24.59	24.52	24.55	22.59	22.52	22.55
	Sub-Test 2	20.58	20.50	20.54	22.58	22.50	22.54	23.58	23.50	23.54	21.58	21.50	21.54
	Sub-Test 3	21.05	20.98	21.03	23.05	22.98	23.03	24.05	23.98	24.03	22.05	21.98	22.03
	Sub-Test 4	20.51	20.47	20.51	22.51	22.47	22.51	23.51	23.47	23.51	21.51	21.47	21.51
	Sub-Test 5	21.52	21.45	21.49	23.52	23.45	23.49	24.52	24.45	24.49	22.52	22.45	22.49
DC-HSDPA	Sub-Test 1	21.51	21.47	21.50	23.51	23.47	23.50	24.51	24.47	24.50	22.51	22.47	22.50
	Sub-Test 2	21.50	21.46	21.49	23.50	23.46	23.49	24.50	24.46	24.49	22.50	22.46	22.49
	Sub-Test 3	21.08	20.95	21.00	23.08	22.95	23.00	24.08	23.95	24.00	22.08	21.95	22.00
	Sub-Test 4	21.07	20.94	20.99	23.07	22.94	22.99	24.07	23.94	23.99	22.07	21.94	21.99



LTE 2

BAND	Bandwidth	Modulation	Channel	RB Configuration	Conducted Power(dBm)	Internal Antenna EIRP	External Antenna 1 EIRP	External Antenna 2 EIRP
Band2	1.4M	QPSK	18607	1RB#0	22.86	24.86	25.86	23.86
Band2	1.4M	QPSK	18607	1RB#2	22.63	24.63	25.63	23.63
Band2	1.4M	QPSK	18607	1RB#5	22.19	24.19	25.19	23.19
Band2	1.4M	QPSK	18607	3RB#0	21.61	23.61	24.61	22.61
Band2	1.4M	QPSK	18607	3RB#2	21.55	23.55	24.55	22.55
Band2	1.4M	QPSK	18607	3RB#3	21.18	23.18	24.18	22.18
Band2	1.4M	QPSK	18607	6RB#0	21.44	23.44	24.44	22.44
Band2	1.4M	QPSK	18900	1RB#0	22.22	24.22	25.22	23.22
Band2	1.4M	QPSK	18900	1RB#2	22.97	24.97	25.97	23.97
Band2	1.4M	QPSK	18900	1RB#5	22.85	24.85	25.85	23.85
Band2	1.4M	QPSK	18900	3RB#0	21.59	23.59	24.59	22.59
Band2	1.4M	QPSK	18900	3RB#2	21.64	23.64	24.64	22.64
Band2	1.4M	QPSK	18900	3RB#3	21.79	23.79	24.79	22.79
Band2	1.4M	QPSK	18900	6RB#0	21.69	23.69	24.69	22.69
Band2	1.4M	QPSK	19193	1RB#0	22.36	24.36	25.36	23.36
Band2	1.4M	QPSK	19193	1RB#2	22.38	24.38	25.38	23.38
Band2	1.4M	QPSK	19193	1RB#5	22.45	24.45	25.45	23.45
Band2	1.4M	QPSK	19193	3RB#0	21.56	23.56	24.56	22.56
Band2	1.4M	QPSK	19193	3RB#2	21.56	23.56	24.56	22.56
Band2	1.4M	QPSK	19193	3RB#3	21.19	23.19	24.19	22.19
Band2	1.4M	QPSK	19193	6RB#0	21.53	23.53	24.53	22.53
Band2	1.4M	16QAM	18607	1RB#0	21.94	23.94	24.94	22.94
Band2	1.4M	16QAM	18607	1RB#2	21.73	23.73	24.73	22.73
Band2	1.4M	16QAM	18607	1RB#5	21.25	23.25	24.25	22.25
Band2	1.4M	16QAM	18607	3RB#0	21.49	23.49	24.49	22.49
Band2	1.4M	16QAM	18607	3RB#2	21.47	23.47	24.47	22.47
Band2	1.4M	16QAM	18607	3RB#3	21.05	23.05	24.05	22.05
Band2	1.4M	16QAM	18607	6RB#0	21.35	23.35	24.35	22.35
Band2	1.4M	16QAM	18900	1RB#0	21.25	23.25	24.25	22.25
Band2	1.4M	16QAM	18900	1RB#2	21.92	23.92	24.92	22.92
Band2	1.4M	16QAM	18900	1RB#5	21.93	23.93	24.93	22.93
Band2	1.4M	16QAM	18900	3RB#0	21.35	23.35	24.35	22.35
Band2	1.4M	16QAM	18900	3RB#2	21.43	23.43	24.43	22.43
Band2	1.4M	16QAM	18900	3RB#3	21.62	23.62	24.62	22.62
Band2	1.4M	16QAM	18900	6RB#0	21.54	23.54	24.54	22.54
Band2	1.4M	16QAM	19193	1RB#0	21.54	23.54	24.54	22.54
Band2	1.4M	16QAM	19193	1RB#2	21.49	23.49	24.49	22.49
Band2	1.4M	16QAM	19193	1RB#5	21.49	23.49	24.49	22.49



Band2	1.4M	16QAM	19193	3RB#0	21.46	23.46	24.46	22.46
Band2	1.4M	16QAM	19193	3RB#2	21.41	23.41	24.41	22.41
Band2	1.4M	16QAM	19193	3RB#3	21.08	23.08	24.08	22.08
Band2	1.4M	16QAM	19193	6RB#0	21.41	23.41	24.41	22.41
Band2	3M	QPSK	18615	1RB#0	22.88	24.88	25.88	23.88
Band2	3M	QPSK	18615	1RB#7	22.66	24.66	25.66	23.66
Band2	3M	QPSK	18615	1RB#14	22.22	24.22	25.22	23.22
Band2	3M	QPSK	18615	8RB#0	21.69	23.69	24.69	22.69
Band2	3M	QPSK	18615	8RB#4	21.65	23.65	24.65	22.65
Band2	3M	QPSK	18615	8RB#7	21.26	23.26	24.26	22.26
Band2	3M	QPSK	18615	15RB#0	21.47	23.47	24.47	22.47
Band2	3M	QPSK	18900	1RB#0	22.26	24.26	25.26	23.26
Band2	3M	QPSK	18900	1RB#7	23.02	25.02	26.02	24.02
Band2	3M	QPSK	18900	1RB#14	22.9	24.9	25.90	23.90
Band2	3M	QPSK	18900	8RB#0	21.69	23.69	24.69	22.69
Band2	3M	QPSK	18900	8RB#4	21.72	23.72	24.72	22.72
Band2	3M	QPSK	18900	8RB#7	21.88	23.88	24.88	22.88
Band2	3M	QPSK	18900	15RB#0	21.73	23.73	24.73	22.73
Band2	3M	QPSK	19185	1RB#0	22.39	24.39	25.39	23.39
Band2	3M	QPSK	19185	1RB#7	22.42	24.42	25.42	23.42
Band2	3M	QPSK	19185	1RB#14	22.49	24.49	25.49	23.49
Band2	3M	QPSK	19185	8RB#0	21.67	23.67	24.67	22.67
Band2	3M	QPSK	19185	8RB#4	21.66	23.66	24.66	22.66
Band2	3M	QPSK	19185	8RB#7	21.27	23.27	24.27	22.27
Band2	3M	QPSK	19185	15RB#0	21.56	23.56	24.56	22.56
Band2	3M	16QAM	18615	1RB#0	21.97	23.97	24.97	22.97
Band2	3M	16QAM	18615	1RB#7	21.76	23.76	24.76	22.76
Band2	3M	16QAM	18615	1RB#14	21.27	23.27	24.27	22.27
Band2	3M	16QAM	18615	8RB#0	21.58	23.58	24.58	22.58
Band2	3M	16QAM	18615	8RB#4	21.56	23.56	24.56	22.56
Band2	3M	16QAM	18615	8RB#7	21.13	23.13	24.13	22.13
Band2	3M	16QAM	18615	15RB#0	21.38	23.38	24.38	22.38
Band2	3M	16QAM	18900	1RB#0	21.27	23.27	24.27	22.27
Band2	3M	16QAM	18900	1RB#7	21.97	23.97	24.97	22.97
Band2	3M	16QAM	18900	1RB#14	21.97	23.97	24.97	22.97
Band2	3M	16QAM	18900	8RB#0	21.46	23.46	24.46	22.46
Band2	3M	16QAM	18900	8RB#4	21.54	23.54	24.54	22.54
Band2	3M	16QAM	18900	8RB#7	21.72	23.72	24.72	22.72
Band2	3M	16QAM	18900	15RB#0	21.58	23.58	24.58	22.58
Band2	3M	16QAM	19185	1RB#0	21.57	23.57	24.57	22.57
Band2	3M	16QAM	19185	1RB#7	21.53	23.53	24.53	22.53
Band2	3M	16QAM	19185	1RB#14	21.52	23.52	24.52	22.52
Band2	3M	16QAM	19185	8RB#0	21.56	23.56	24.56	22.56



Band2	3M	16QAM	19185	8RB#4	21.51	23.51	24.51	22.51
Band2	3M	16QAM	19185	8RB#7	21.19	23.19	24.19	22.19
Band2	3M	16QAM	19185	15RB#0	21.44	23.44	24.44	22.44
Band2	5M	QPSK	18625	1RB#0	22.92	24.92	25.92	23.92
Band2	5M	QPSK	18625	1RB#13	22.73	24.73	25.73	23.73
Band2	5M	QPSK	18625	1RB#24	22.28	24.28	25.28	23.28
Band2	5M	QPSK	18625	12RB#0	21.76	23.76	24.76	22.76
Band2	5M	QPSK	18625	12RB#6	21.7	23.7	24.70	22.70
Band2	5M	QPSK	18625	12RB#13	21.33	23.33	24.33	22.33
Band2	5M	QPSK	18625	25RB#0	21.55	23.55	24.55	22.55
Band2	5M	QPSK	18900	1RB#0	22.38	24.38	25.38	23.38
Band2	5M	QPSK	18900	1RB#13	23.07	25.07	26.07	24.07
Band2	5M	QPSK	18900	1RB#24	22.97	24.97	25.97	23.97
Band2	5M	QPSK	18900	12RB#0	21.73	23.73	24.73	22.73
Band2	5M	QPSK	18900	12RB#6	21.77	23.77	24.77	22.77
Band2	5M	QPSK	18900	12RB#13	21.98	23.98	24.98	22.98
Band2	5M	QPSK	18900	25RB#0	21.82	23.82	24.82	22.82
Band2	5M	QPSK	19175	1RB#0	22.44	24.44	25.44	23.44
Band2	5M	QPSK	19175	1RB#13	22.49	24.49	25.49	23.49
Band2	5M	QPSK	19175	1RB#24	22.58	24.58	25.58	23.58
Band2	5M	QPSK	19175	12RB#0	21.73	23.73	24.73	22.73
Band2	5M	QPSK	19175	12RB#6	21.7	23.7	24.70	22.70
Band2	5M	QPSK	19175	12RB#13	21.27	23.27	24.27	22.27
Band2	5M	QPSK	19175	25RB#0	21.57	23.57	24.57	22.57
Band2	5M	16QAM	18625	1RB#0	21.99	23.99	24.99	22.99
Band2	5M	16QAM	18625	1RB#13	21.78	23.78	24.78	22.78
Band2	5M	16QAM	18625	1RB#24	21.29	23.29	24.29	22.29
Band2	5M	16QAM	18625	12RB#0	21.62	23.62	24.62	22.62
Band2	5M	16QAM	18625	12RB#6	21.58	23.58	24.58	22.58
Band2	5M	16QAM	18625	12RB#13	21.18	23.18	24.18	22.18
Band2	5M	16QAM	18625	25RB#0	21.41	23.41	24.41	22.41
Band2	5M	16QAM	18900	1RB#0	21.29	23.29	24.29	22.29
Band2	5M	16QAM	18900	1RB#13	22.04	24.04	25.04	23.04
Band2	5M	16QAM	18900	1RB#24	22.04	24.04	25.04	23.04
Band2	5M	16QAM	18900	12RB#0	21.5	23.5	24.50	22.50
Band2	5M	16QAM	18900	12RB#6	21.58	23.58	24.58	22.58
Band2	5M	16QAM	18900	12RB#13	21.72	23.72	24.72	22.72
Band2	5M	16QAM	18900	25RB#0	21.59	23.59	24.59	22.59
Band2	5M	16QAM	19175	1RB#0	21.61	23.61	24.61	22.61
Band2	5M	16QAM	19175	1RB#13	21.57	23.57	24.57	22.57
Band2	5M	16QAM	19175	1RB#24	21.55	23.55	24.55	22.55
Band2	5M	16QAM	19175	12RB#0	21.61	23.61	24.61	22.61
Band2	5M	16QAM	19175	12RB#6	21.56	23.56	24.56	22.56



Band2	5M	16QAM	19175	12RB#13	21.22	23.22	24.22	22.22
Band2	5M	16QAM	19175	25RB#0	21.45	23.45	24.45	22.45
Band2	10M	QPSK	18650	1RB#0	22.87	24.87	25.87	23.87
Band2	10M	QPSK	18650	1RB#25	22.67	24.67	25.67	23.67
Band2	10M	QPSK	18650	1RB#49	22.21	24.21	25.21	23.21
Band2	10M	QPSK	18650	25RB#0	21.69	23.69	24.69	22.69
Band2	10M	QPSK	18650	25RB#13	21.66	23.66	24.66	22.66
Band2	10M	QPSK	18650	25RB#25	21.26	23.26	24.26	22.26
Band2	10M	QPSK	18650	50RB#0	21.53	23.53	24.53	22.53
Band2	10M	QPSK	18900	1RB#0	22.25	24.25	25.25	23.25
Band2	10M	QPSK	18900	1RB#25	23.03	25.03	26.03	24.03
Band2	10M	QPSK	18900	1RB#49	22.89	24.89	25.89	23.89
Band2	10M	QPSK	18900	25RB#0	21.69	23.69	24.69	22.69
Band2	10M	QPSK	18900	25RB#13	21.73	23.73	24.73	22.73
Band2	10M	QPSK	18900	25RB#25	21.9	23.9	24.90	22.90
Band2	10M	QPSK	18900	50RB#0	21.74	23.74	24.74	22.74
Band2	10M	QPSK	19150	1RB#0	22.38	24.38	25.38	23.38
Band2	10M	QPSK	19150	1RB#25	22.43	24.43	25.43	23.43
Band2	10M	QPSK	19150	1RB#49	22.48	24.48	25.48	23.48
Band2	10M	QPSK	19150	25RB#0	21.67	23.67	24.67	22.67
Band2	10M	QPSK	19150	25RB#13	21.65	23.65	24.65	22.65
Band2	10M	QPSK	19150	25RB#25	21.28	23.28	24.28	22.28
Band2	10M	QPSK	19150	50RB#0	21.58	23.58	24.58	22.58
Band2	10M	16QAM	18650	1RB#0	21.96	23.96	24.96	22.96
Band2	10M	16QAM	18650	1RB#25	21.76	23.76	24.76	22.76
Band2	10M	16QAM	18650	1RB#49	21.27	23.27	24.27	22.27
Band2	10M	16QAM	18650	25RB#0	21.59	23.59	24.59	22.59
Band2	10M	16QAM	18650	25RB#13	21.55	23.55	24.55	22.55
Band2	10M	16QAM	18650	25RB#25	21.13	23.13	24.13	22.13
Band2	10M	16QAM	18650	50RB#0	21.39	23.39	24.39	22.39
Band2	10M	16QAM	18900	1RB#0	21.26	23.26	24.26	22.26
Band2	10M	16QAM	18900	1RB#25	21.99	23.99	24.99	22.99
Band2	10M	16QAM	18900	1RB#49	21.97	23.97	24.97	22.97
Band2	10M	16QAM	18900	25RB#0	21.47	23.47	24.47	22.47
Band2	10M	16QAM	18900	25RB#13	21.53	23.53	24.53	22.53
Band2	10M	16QAM	18900	25RB#25	21.72	23.72	24.72	22.72
Band2	10M	16QAM	18900	50RB#0	21.59	23.59	24.59	22.59
Band2	10M	16QAM	19150	1RB#0	21.56	23.56	24.56	22.56
Band2	10M	16QAM	19150	1RB#25	21.53	23.53	24.53	22.53
Band2	10M	16QAM	19150	1RB#49	21.51	23.51	24.51	22.51
Band2	10M	16QAM	19150	25RB#0	21.57	23.57	24.57	22.57
Band2	10M	16QAM	19150	25RB#13	21.5	23.5	24.50	22.50
Band2	10M	16QAM	19150	25RB#25	21.19	23.19	24.19	22.19



Band2	10M	16QAM	19150	50RB#0	21.43	23.43	24.43	22.43
Band2	15M	QPSK	18675	1RB#0	22.86	24.86	25.86	23.86
Band2	15M	QPSK	18675	1RB#38	22.65	24.65	25.65	23.65
Band2	15M	QPSK	18675	1RB#74	22.18	24.18	25.18	23.18
Band2	15M	QPSK	18675	36RB#0	21.67	23.67	24.67	22.67
Band2	15M	QPSK	18675	36RB#18	21.63	23.63	24.63	22.63
Band2	15M	QPSK	18675	36RB#39	21.23	23.23	24.23	22.23
Band2	15M	QPSK	18675	75RB#0	21.51	23.51	24.51	22.51
Band2	15M	QPSK	18900	1RB#0	22.21	24.21	25.21	23.21
Band2	15M	QPSK	18900	1RB#38	23.02	25.02	26.02	24.02
Band2	15M	QPSK	18900	1RB#74	22.84	24.84	25.84	23.84
Band2	15M	QPSK	18900	36RB#0	21.65	23.65	24.65	22.65
Band2	15M	QPSK	18900	36RB#18	21.68	23.68	24.68	22.68
Band2	15M	QPSK	18900	36RB#39	21.87	23.87	24.87	22.87
Band2	15M	QPSK	18900	75RB#0	21.7	23.7	24.70	22.70
Band2	15M	QPSK	19125	1RB#0	22.36	24.36	25.36	23.36
Band2	15M	QPSK	19125	1RB#38	22.4	24.4	25.40	23.40
Band2	15M	QPSK	19125	1RB#74	22.44	24.44	25.44	23.44
Band2	15M	QPSK	19125	36RB#0	21.64	23.64	24.64	22.64
Band2	15M	QPSK	19125	36RB#18	21.61	23.61	24.61	22.61
Band2	15M	QPSK	19125	36RB#39	21.24	23.24	24.24	22.24
Band2	15M	QPSK	19125	75RB#0	21.53	23.53	24.53	22.53
Band2	15M	16QAM	18675	1RB#0	21.91	23.91	24.91	22.91
Band2	15M	16QAM	18675	1RB#38	21.74	23.74	24.74	22.74
Band2	15M	16QAM	18675	1RB#74	21.24	23.24	24.24	22.24
Band2	15M	16QAM	18675	36RB#0	21.56	23.56	24.56	22.56
Band2	15M	16QAM	18675	36RB#18	21.52	23.52	24.52	22.52
Band2	15M	16QAM	18675	36RB#39	21.11	23.11	24.11	22.11
Band2	15M	16QAM	18675	75RB#0	21.36	23.36	24.36	22.36
Band2	15M	16QAM	18900	1RB#0	21.24	23.24	24.24	22.24
Band2	15M	16QAM	18900	1RB#38	21.96	23.96	24.96	22.96
Band2	15M	16QAM	18900	1RB#74	21.93	23.93	24.93	22.93
Band2	15M	16QAM	18900	36RB#0	21.45	23.45	24.45	22.45
Band2	15M	16QAM	18900	36RB#18	21.48	23.48	24.48	22.48
Band2	15M	16QAM	18900	36RB#39	21.68	23.68	24.68	22.68
Band2	15M	16QAM	18900	75RB#0	21.54	23.54	24.54	22.54
Band2	15M	16QAM	19125	1RB#0	21.54	23.54	24.54	22.54
Band2	15M	16QAM	19125	1RB#38	21.51	23.51	24.51	22.51
Band2	15M	16QAM	19125	1RB#74	21.48	23.48	24.48	22.48
Band2	15M	16QAM	19125	36RB#0	21.54	23.54	24.54	22.54
Band2	15M	16QAM	19125	36RB#18	21.46	23.46	24.46	22.46
Band2	15M	16QAM	19125	36RB#39	21.16	23.16	24.16	22.16
Band2	15M	16QAM	19125	75RB#0	21.39	23.39	24.39	22.39



Band2	20M	QPSK	18700	1RB#0	22.83	24.83	25.83	23.83
Band2	20M	QPSK	18700	1RB#50	22.64	24.64	25.64	23.64
Band2	20M	QPSK	18700	1RB#99	22.16	24.16	25.16	23.16
Band2	20M	QPSK	18700	50RB#0	21.64	23.64	24.64	22.64
Band2	20M	QPSK	18700	50RB#25	21.61	23.61	24.61	22.61
Band2	20M	QPSK	18700	50RB#50	21.2	23.2	24.20	22.20
Band2	20M	QPSK	18700	100RB#0	21.48	23.48	24.48	22.48
Band2	20M	QPSK	18900	1RB#0	22.17	24.17	25.17	23.17
Band2	20M	QPSK	18900	1RB#50	22.98	24.98	25.98	23.98
Band2	20M	QPSK	18900	1RB#99	22.83	24.83	25.83	23.83
Band2	20M	QPSK	18900	50RB#0	21.6	23.6	24.60	22.60
Band2	20M	QPSK	18900	50RB#25	21.64	23.64	24.64	22.64
Band2	20M	QPSK	18900	50RB#50	21.82	23.82	24.82	22.82
Band2	20M	QPSK	18900	100RB#0	21.65	23.65	24.65	22.65
Band2	20M	QPSK	19100	1RB#0	22.33	24.33	25.33	23.33
Band2	20M	QPSK	19100	1RB#50	22.38	24.38	25.38	23.38
Band2	20M	QPSK	19100	1RB#99	22.41	24.41	25.41	23.41
Band2	20M	QPSK	19100	50RB#0	21.6	23.6	24.60	22.60
Band2	20M	QPSK	19100	50RB#25	21.58	23.58	24.58	22.58
Band2	20M	QPSK	19100	50RB#50	21.2	23.2	24.20	22.20
Band2	20M	QPSK	19100	100RB#0	21.49	23.49	24.49	22.49
Band2	20M	16QAM	18700	1RB#0	21.89	23.89	24.89	22.89
Band2	20M	16QAM	18700	1RB#50	21.7	23.7	24.70	22.70
Band2	20M	16QAM	18700	1RB#99	21.22	23.22	24.22	22.22
Band2	20M	16QAM	18700	50RB#0	21.53	23.53	24.53	22.53
Band2	20M	16QAM	18700	50RB#25	21.49	23.49	24.49	22.49
Band2	20M	16QAM	18700	50RB#50	21.08	23.08	24.08	22.08
Band2	20M	16QAM	18700	100RB#0	21.34	23.34	24.34	22.34
Band2	20M	16QAM	18900	1RB#0	21.2	23.2	24.20	22.20
Band2	20M	16QAM	18900	1RB#50	21.94	23.94	24.94	22.94
Band2	20M	16QAM	18900	1RB#99	21.9	23.9	24.90	22.90
Band2	20M	16QAM	18900	50RB#0	21.41	23.41	24.41	22.41
Band2	20M	16QAM	18900	50RB#25	21.46	23.46	24.46	22.46
Band2	20M	16QAM	18900	50RB#50	21.63	23.63	24.63	22.63
Band2	20M	16QAM	18900	100RB#0	21.5	23.5	24.50	22.50
Band2	20M	16QAM	19100	1RB#0	21.49	23.49	24.49	22.49
Band2	20M	16QAM	19100	1RB#50	21.47	23.47	24.47	22.47
Band2	20M	16QAM	19100	1RB#99	21.46	23.46	24.46	22.46
Band2	20M	16QAM	19100	50RB#0	21.51	23.51	24.51	22.51
Band2	20M	16QAM	19100	50RB#25	21.43	23.43	24.43	22.43
Band2	20M	16QAM	19100	50RB#50	21.12	23.12	24.12	22.12
Band2	20M	16QAM	19100	100RB#0	21.36	23.36	24.36	22.36

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 3kHz, VBW is set to 10kHz for GSM 1900,

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

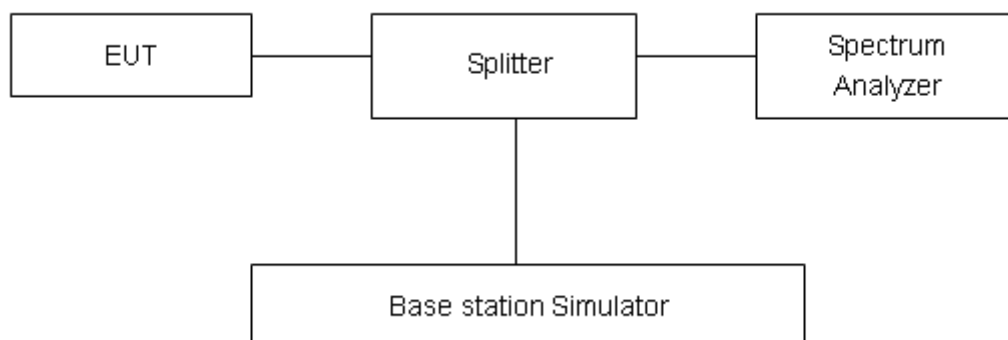
RBW is set to 51kHz, VBW is set to 160kHz for LTE Band 2 (1.4MHz),

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

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

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

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

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

Test Result

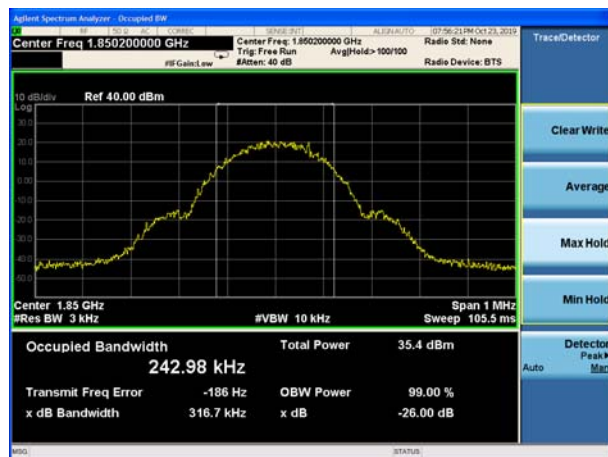
Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GSM 1900 (GSM)	512	1850.2	0.24298	0.3167
	661	1880.0	0.24537	0.3051
	810	1909.8	0.24397	0.3114
GPRS 1900 (GMSK)	512	1850.2	0.24523	0.3108
	661	1880.0	0.24385	0.3082
	810	1909.8	0.24633	0.3085
EGPRS 1900 (8-PSK)	512	1850.2	0.25137	0.3060
	661	1880.0	0.25018	0.3115
	810	1909.8	0.24791	0.3113
WCDMA Band II (RMC)	9262	1852.4	4.1383	4.666
	9400	1880	4.1305	4.655
	9538	1907.6	4.1288	4.709

LTE Band 2					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
QPSK	1.4	18607	1850.7	1.1131	1.290
		18900	1880.0	1.1204	1.281
		19193	1909.3	1.1156	1.292
	3	18615	1851.5	2.7381	3.051
		18900	1880	2.7385	3.041
		19185	1908.5	2.7341	3.041
	5	18625	1852.5	4.5232	4.959
		18900	1880	4.5272	4.988
		19175	1907.5	4.5286	4.991
	10	18650	1855	9.0864	10.050
		18900	1880	9.0809	10.020
		19150	1905	9.0765	10.050
	15	18675	1857.5	13.4900	14.930
		18900	1880	13.4860	15.010



	20	19125	1902.5	13.4790	14.950
		18700	1860	17.9070	19.550
		18900	1880	17.9020	19.520
		19100	1900	17.8760	19.540
16QAM	1.4	18607	1850.7	1.1170	1.285
		18900	1880.0	1.1225	1.283
		19193	1909.3	1.1088	1.297
	3	18615	1851.5	2.7448	3.065
		18900	1880	2.7467	3.049
		19185	1908.5	2.7358	3.042
	5	18625	1852.5	4.5316	4.963
		18900	1880	4.5136	4.984
		19175	1907.5	4.5218	4.967
	10	18650	1855	9.0421	10.020
		18900	1880	9.0807	10.080
		19150	1905	9.0833	10.050
	15	18675	1857.5	13.5090	14.880
		18900	1880	13.5550	15.010
		19125	1902.5	13.5620	14.980
	20	18700	1860	17.8980	19.710
		18900	1880	17.9140	19.640
		19100	1900	17.9080	19.640

GSM1900 GSM CH-Low



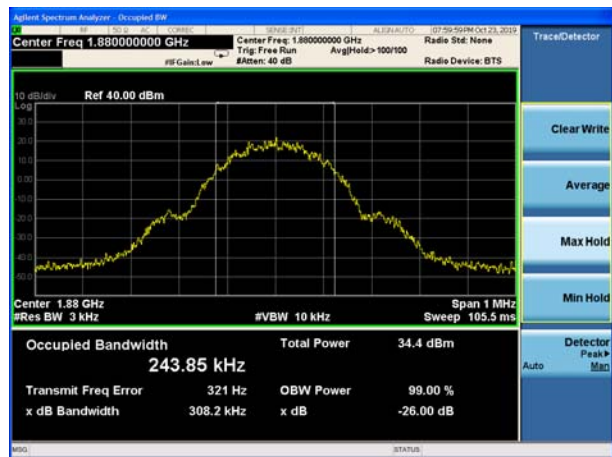
GSM1900 GPRS CH-Low



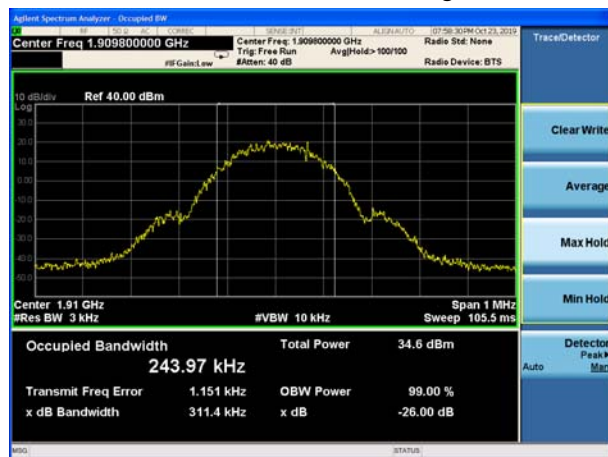
GSM 1900 GSM CH-Middle



GSM 1900 GPRS CH-Middle



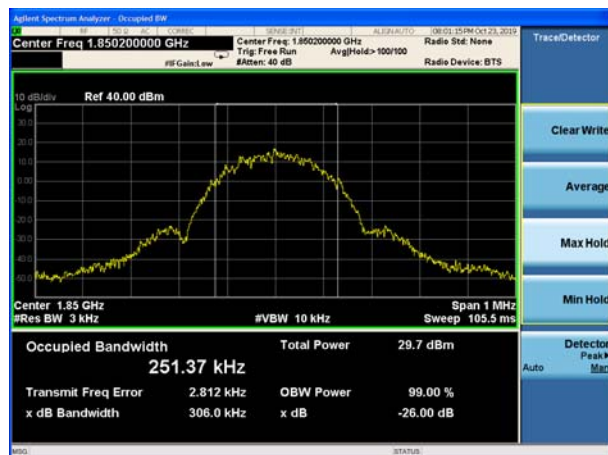
GSM 1900 GSM CH-High



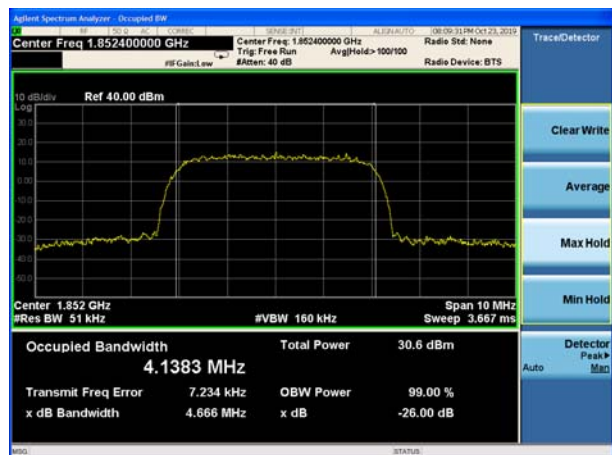
GSM 1900 GPRS CH-High



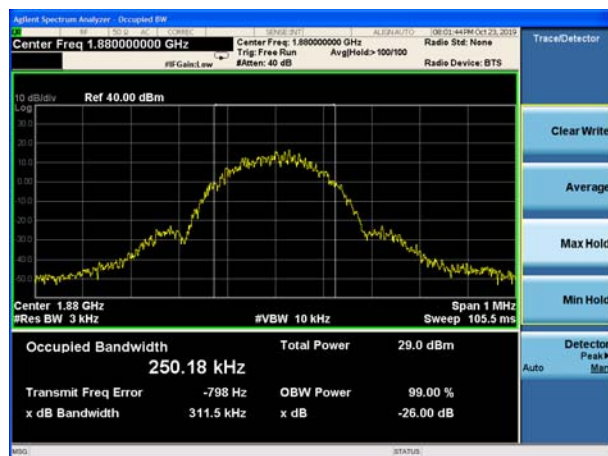
GSM1900 EGPRS CH-Low



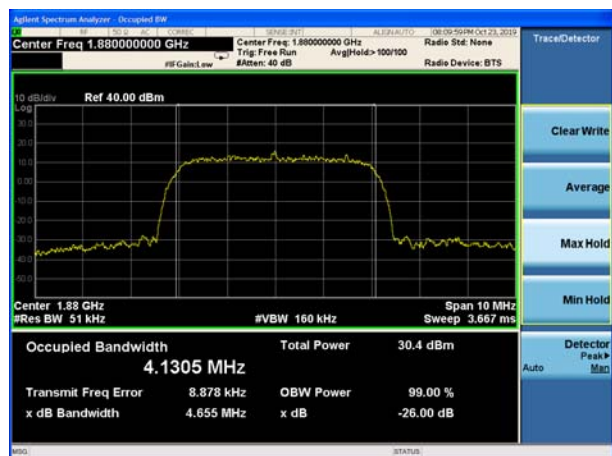
WCDMA Band II RMC CH-LOW



GSM 1900 EGPRS CH-Middle



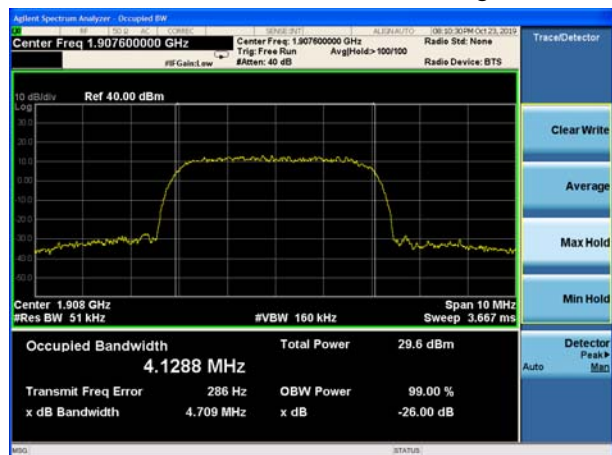
WCDMA Band II RMC CH-Middle



GSM 1900 EGPRS CH-High

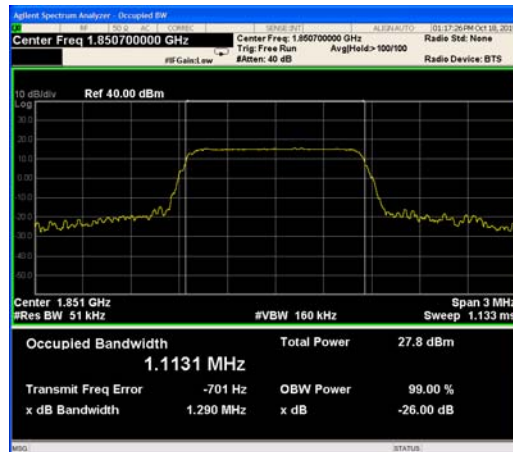


WCDMA Band II RMC CH-High





LTE Band 2 1.4MHz QPSK CH-Low



LTE Band 2 3MHz QPSK CH-Low



LTE Band 2 1.4MHz QPSK CH-Middle



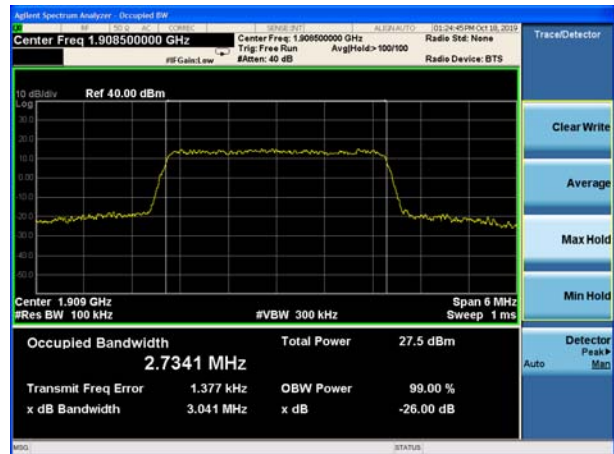
LTE Band 2 3MHz QPSK CH-Middle



LTE Band 2 1.4MHz QPSK CH-High



LTE Band 2 3MHz QPSK CH-High



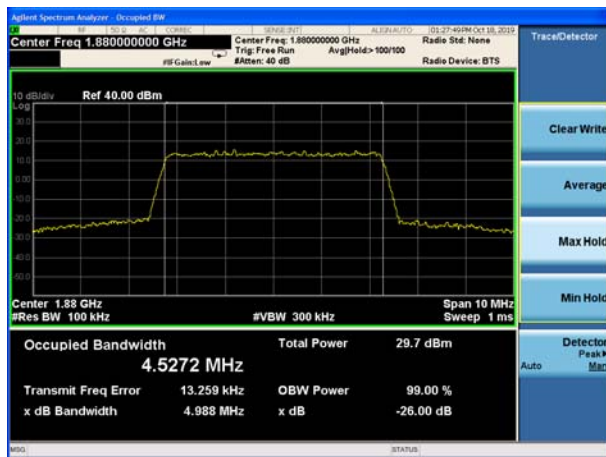
LTE Band 2 5MHz QPSK CH-Low



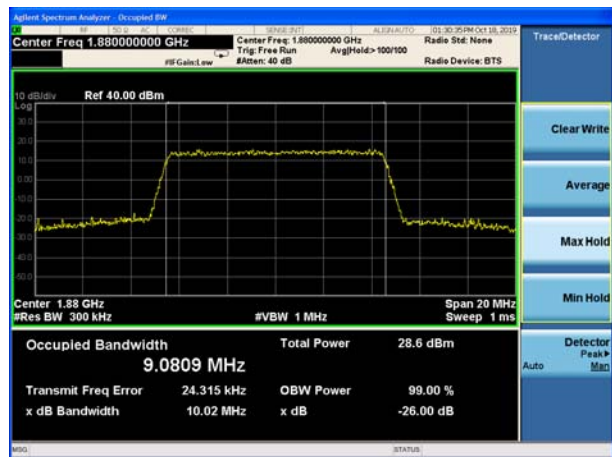
LTE Band 2 10MHz QPSK CH-Low



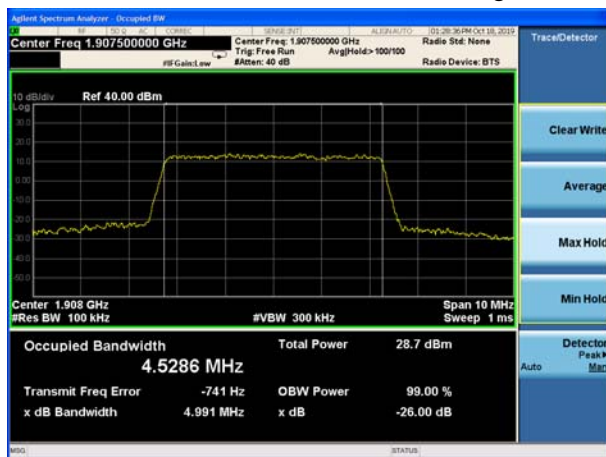
LTE Band 2 5MHz QPSK CH-Middle



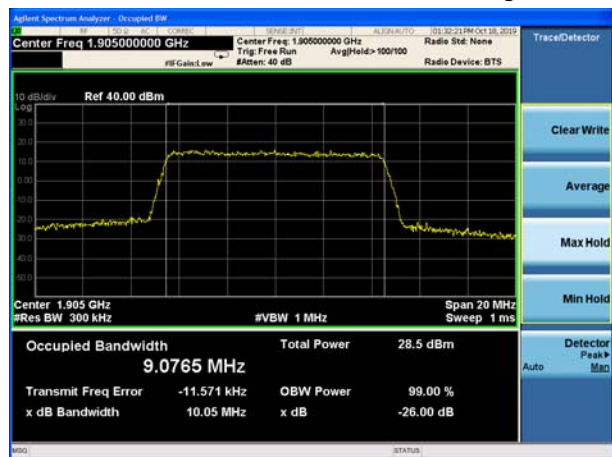
LTE Band 2 10MHz QPSK CH-Middle



LTE Band 2 5MHz QPSK CH-High

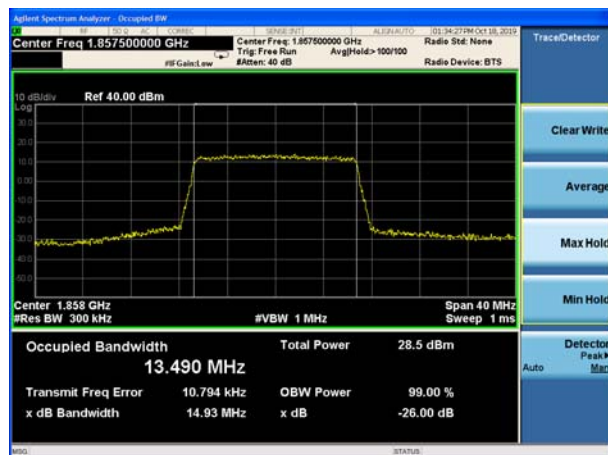


LTE Band 2 10MHz QPSK CH-High

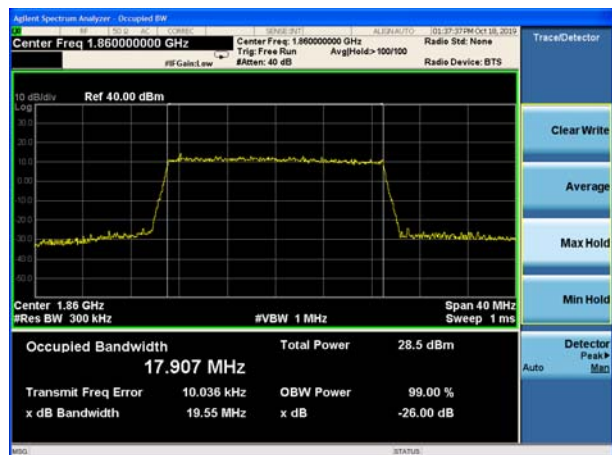




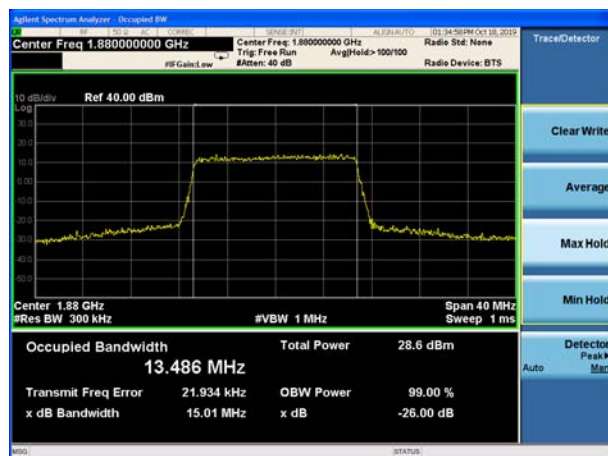
LTE Band 2 15MHz QPSK CH-Low



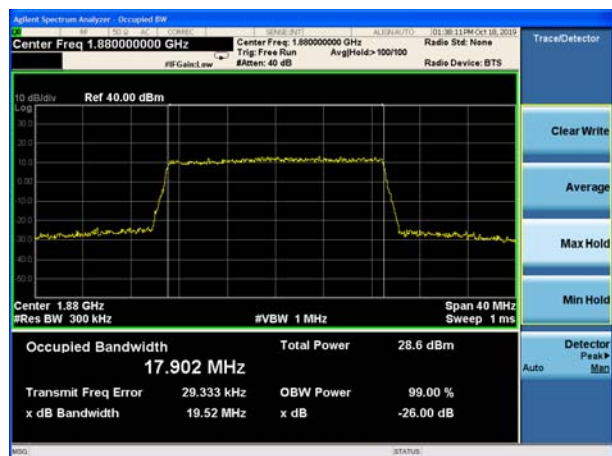
LTE Band 2 20MHz QPSK CH-Low



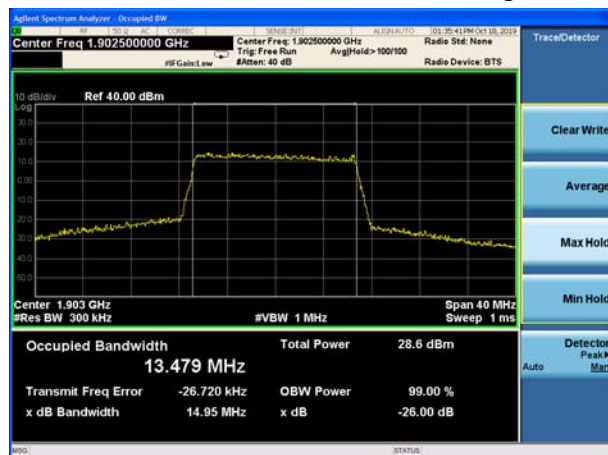
LTE Band 2 15MHz QPSK CH-Middle



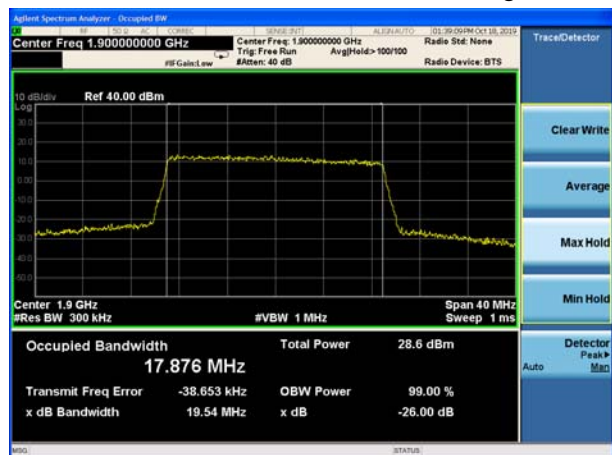
LTE Band 2 20MHz QPSK CH-Middle



LTE Band 2 15MHz QPSK CH-High



LTE Band 2 20MHz QPSK CH-High





LTE Band 2 1.4MHz 16QAM CH-Low



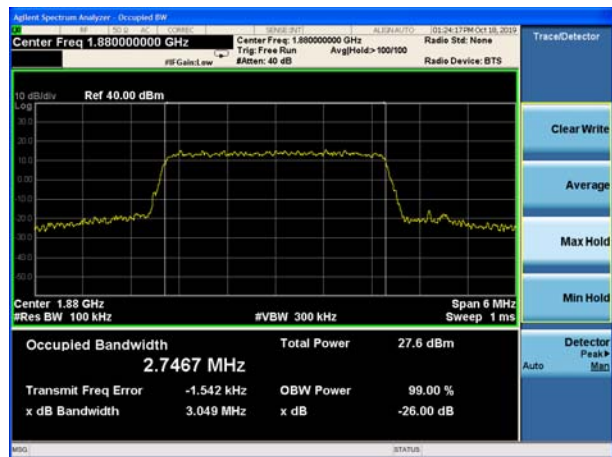
LTE Band 2 3MHz 16QAM CH-Low



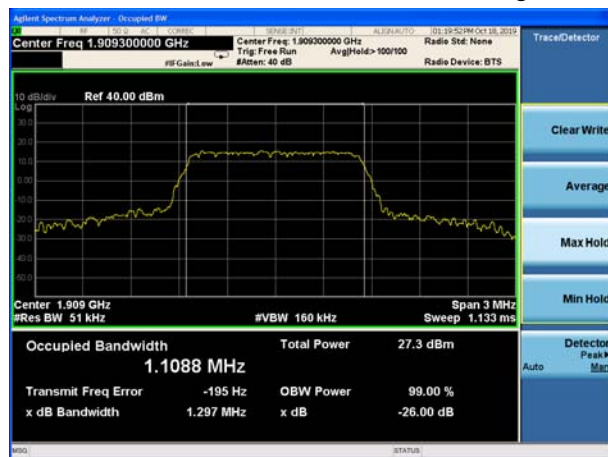
LTE Band 2 1.4MHz 16QAM CH-Middle



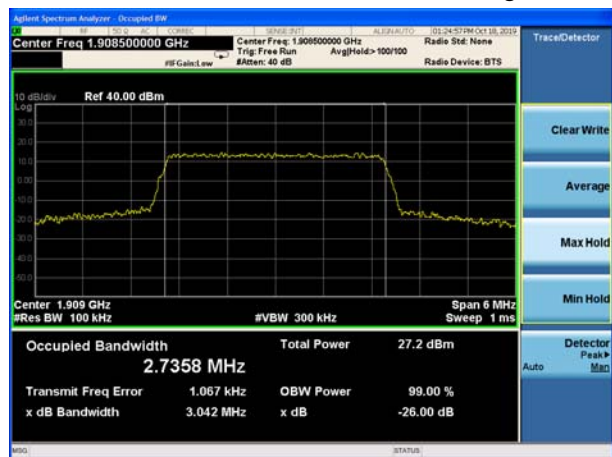
LTE Band 2 3MHz 16QAM CH-Middle



LTE Band 2 1.4MHz 16QAM CH-High



LTE Band 2 3MHz 16QAM CH-High



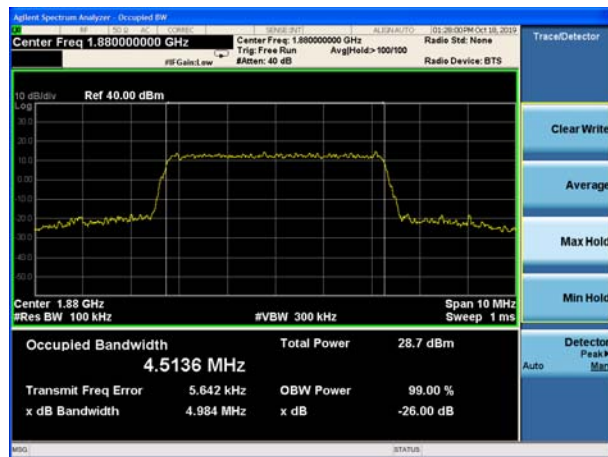
LTE Band 2 5MHz 16QAM CH-Low



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



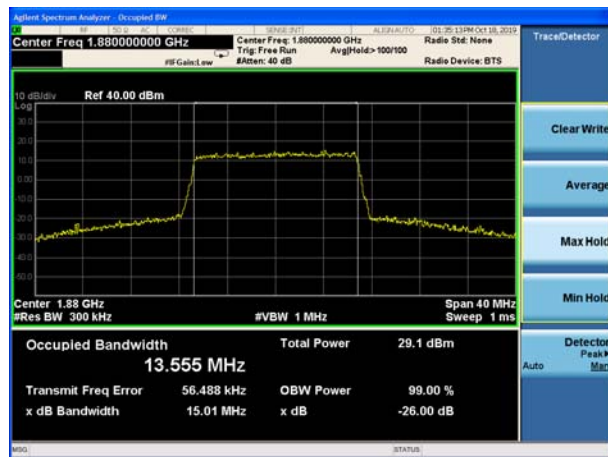
LTE Band 2 15MHz 16QAM CH-Low



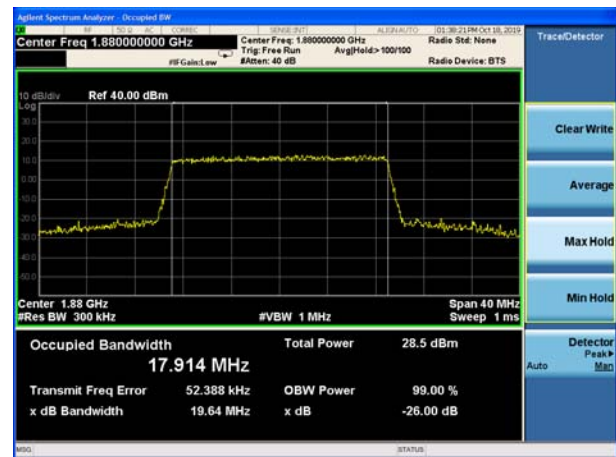
LTE Band 2 20MHz 16QAM CH-Low



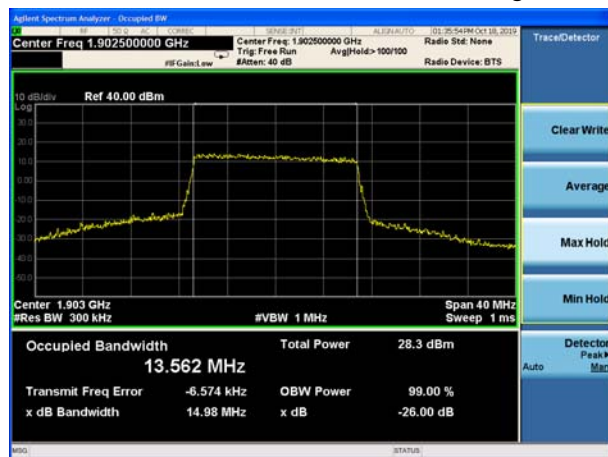
LTE Band 2 15MHz 16QAM CH-Middle



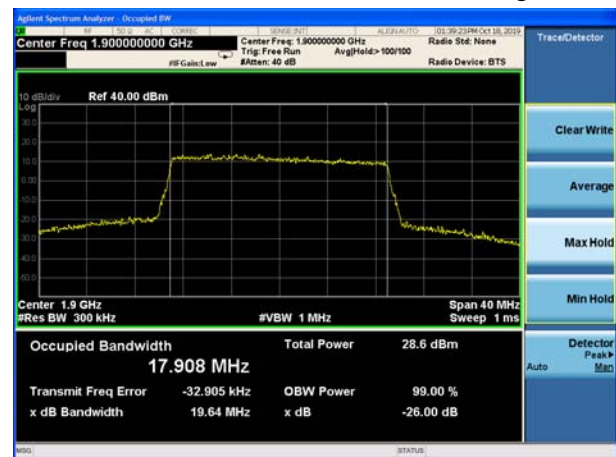
LTE Band 2 20MHz 16QAM CH-Middle



LTE Band 2 15MHz 16QAM CH-High



LTE Band 2 20MHz 16QAM CH-High



5.3.Band Edge Compliance

Ambient condition

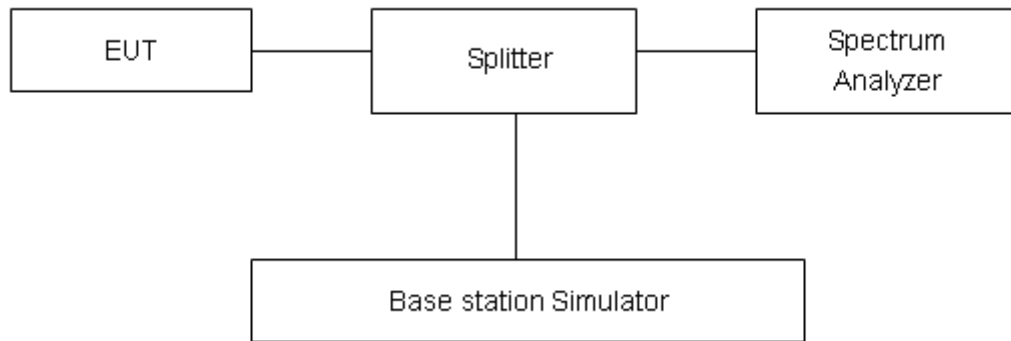
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 3kHz, VBW is set to 10kHz for GSM 1900, RBW is set to 51kHz, VBW is set to 160kHz for WCDMA Band II, RBW is set to 15kHz, VBW is set to 51kHz for LTE Band 2/25(1.4MHz), RBW is set to 30kHz,VBW is set to 100kHz for LTE Band 2/25 (3MHz), RBW is set to 51kHz,VBW is set to 160kHz for LTE Band 2/25 (5MHz), RBW is set to 100kHz,VBW is set to 300kHz for LTE Band 2/25(10MHz), RBW is set to 150kHz,VBW is set to 510kHz for LTE Band 2/25(15MHz), RBW is set to 200kHz,VBW is set to 620kHz for LTE Band 2/25(20MHz).

Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

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

Limit	-13 dBm
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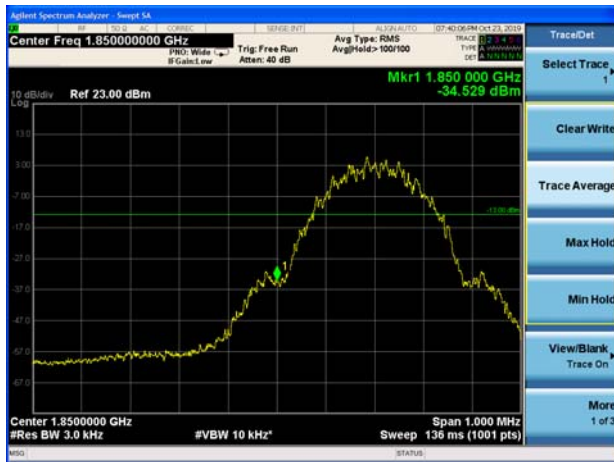
Measurement Uncertainty

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



Test Result:

GSM1900 GSM CH-Low



GSM 1900 GSM CH-High



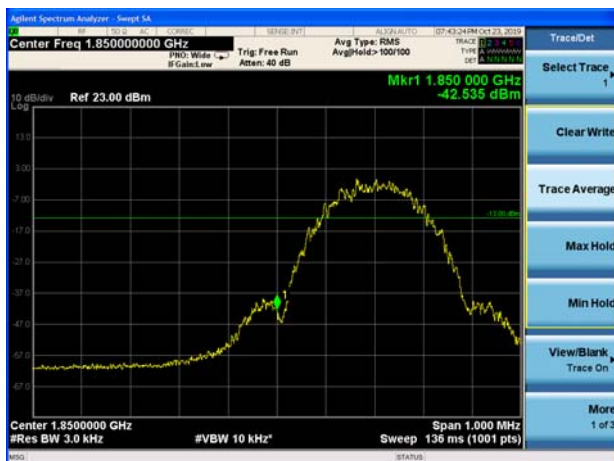
GSM1900 GPRS CH-Low



GSM 1900 GPRS CH-High



GSM1900 EGPRS CH-Low

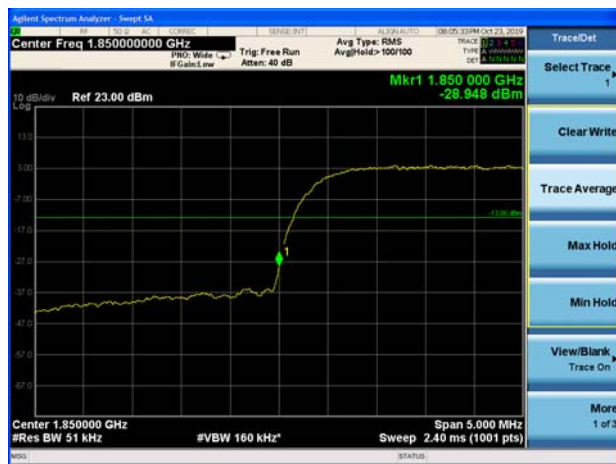


GSM 1900 EGPRS CH-High





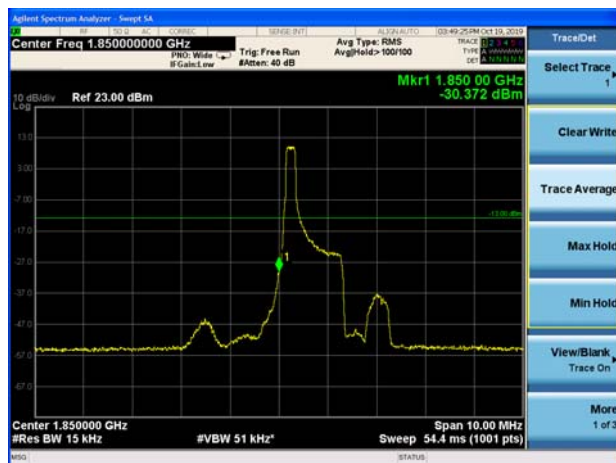
WCDMA Band II RMC CH-Low



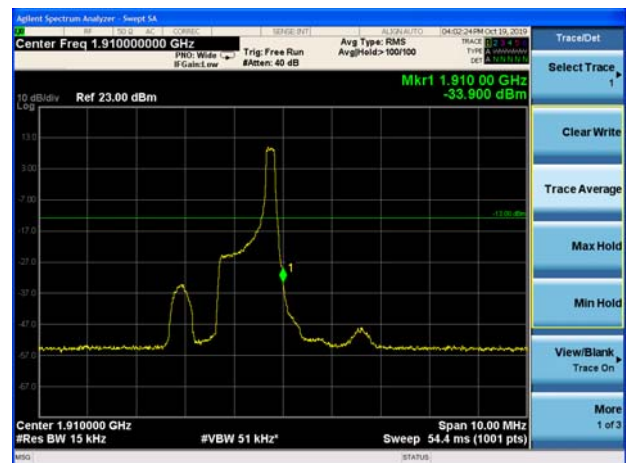
WCDMA Band II RMC CH-High



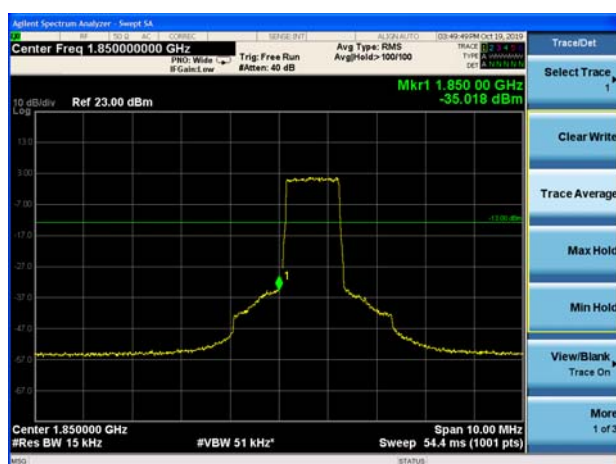
LTE Band 2 1.4MHz QPSK 1RB CH-Low



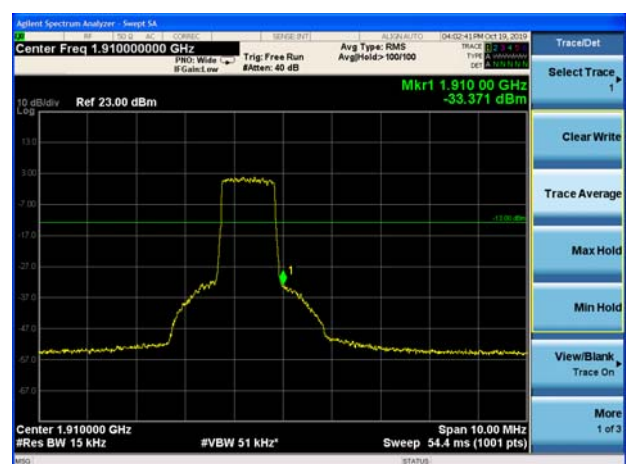
LTE Band 2 1.4MHz QPSK 1RB CH-High



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

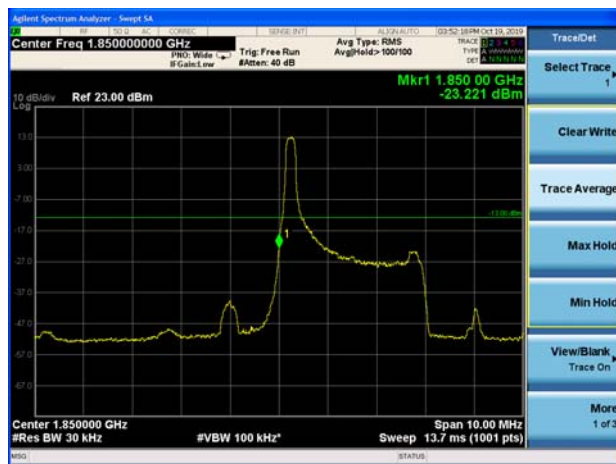


LTE Band 2 1.4MHz QPSK 100%RB CH-High

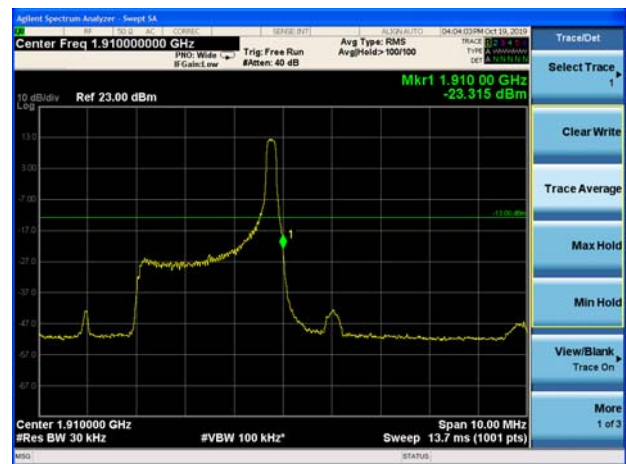




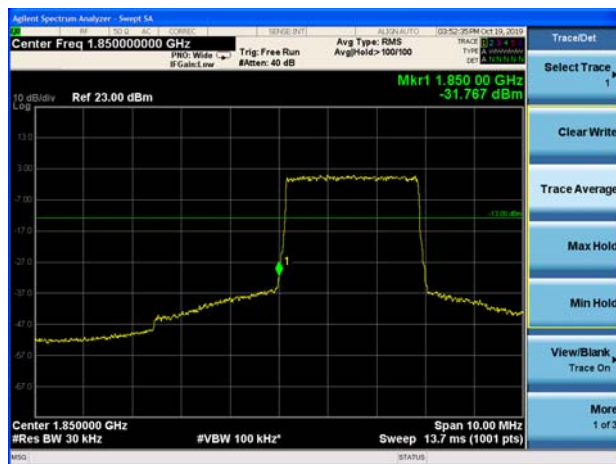
LTE Band 2 3MHz QPSK 1RB CH-Low



LTE Band 2 3MHz QPSK 1RB CH-High



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



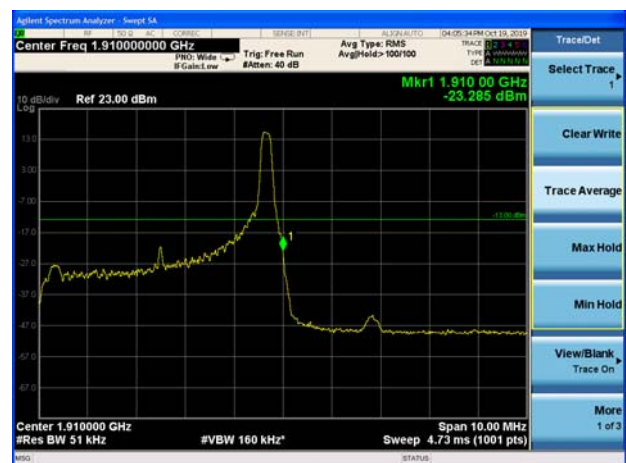
LTE Band 2 3MHz QPSK 100%RB CH-High



LTE Band 2 5MHz QPSK 1RB CH-Low



LTE Band 2 5MHz QPSK 1RB CH-High





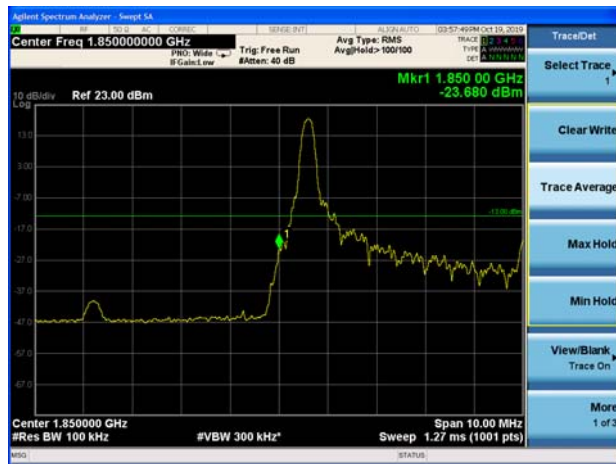
LTE Band 2 5MHz QPSK 100%RB CH-Low



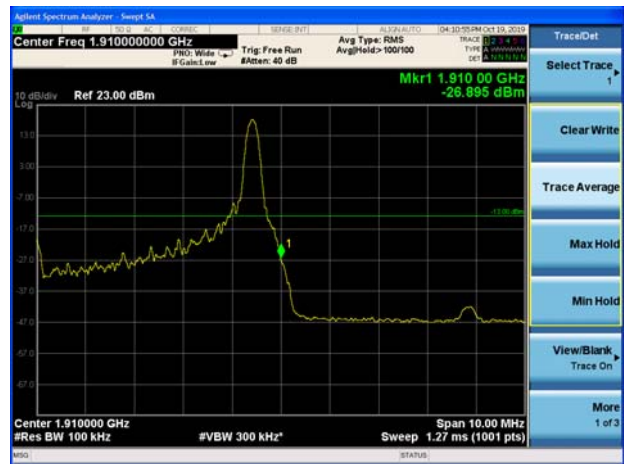
LTE Band 2 5MHz QPSK 100%RB CH-High



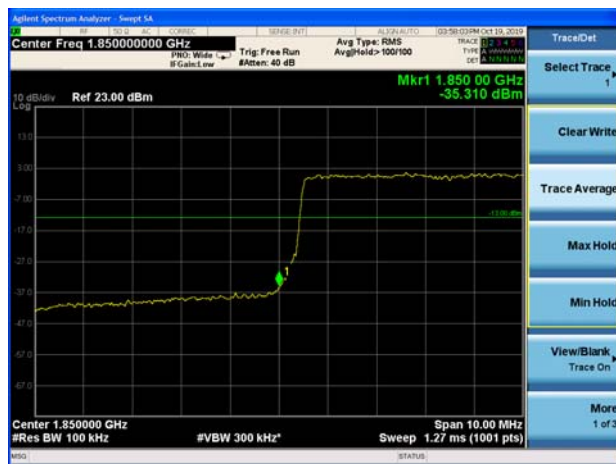
LTE Band 2 10MHz QPSK 1RB CH-Low



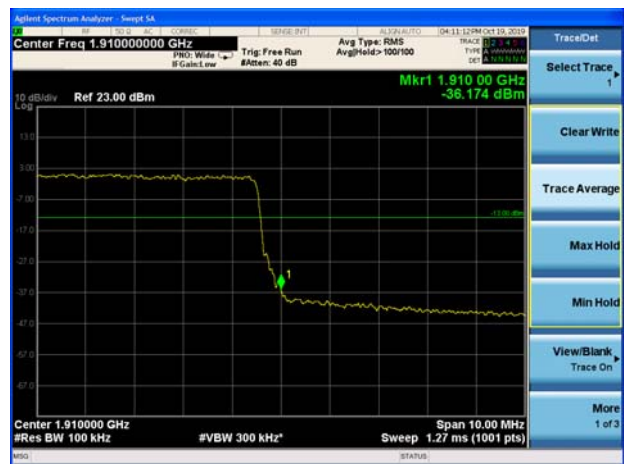
LTE Band 2 10MHz QPSK 1RB CH-High



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

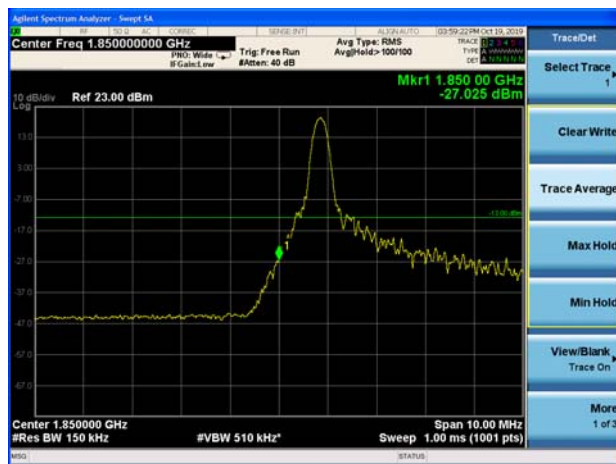


LTE Band 2 10MHz QPSK 100%RB CH-High

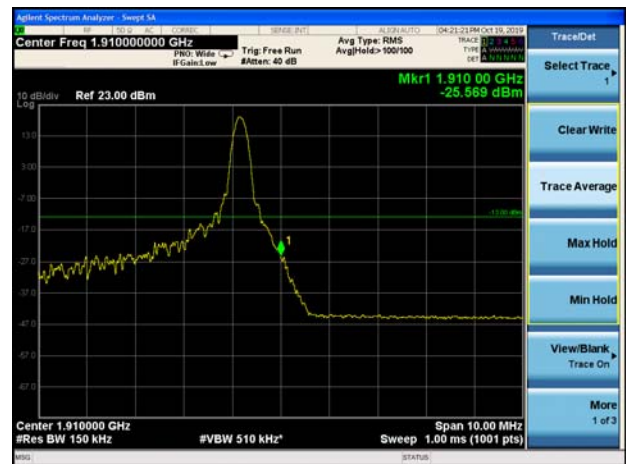




LTE Band 2 15MHz QPSK 1RB CH-Low



LTE Band 2 15MHz QPSK 1RB CH-High



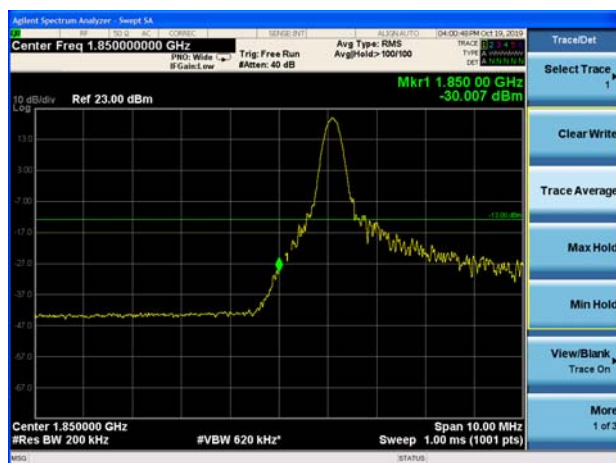
LTE Band 2 15MHz QPSK 100%RB CH-Low



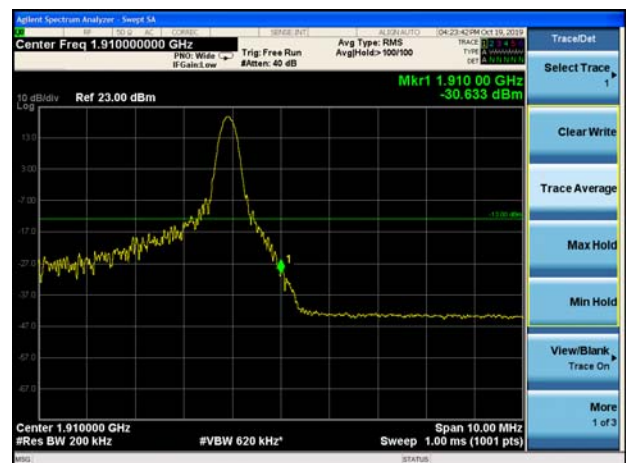
LTE Band 2 15MHz QPSK 100%RB CH-High



LTE Band 2 20MHz QPSK 1RB CH-Low



LTE Band 2 20MHz QPSK 1RB CH-High



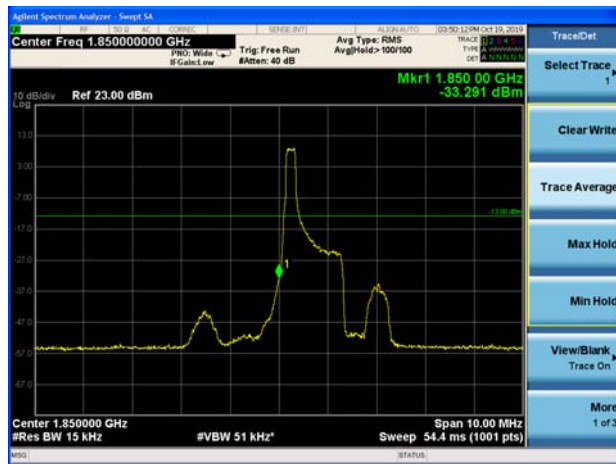
LTE Band 2 20MHz QPSK 100%RB CH-Low



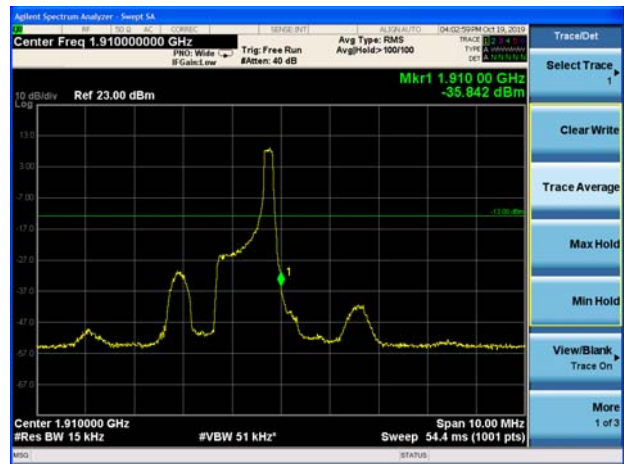
LTE Band 2 20MHz QPSK 100%RB CH-High



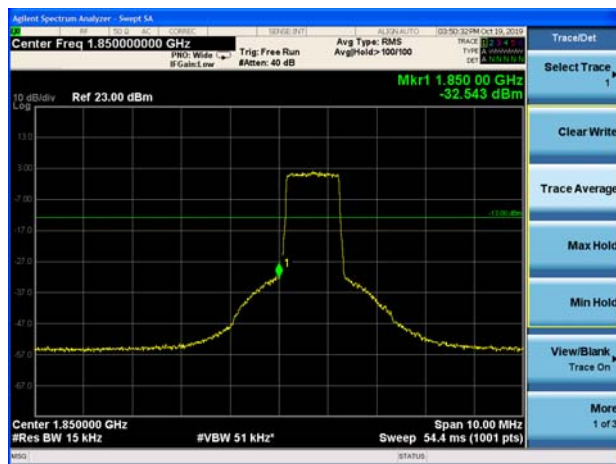
LTE Band 2 1.4MHz 16QAM 1RB CH-Low



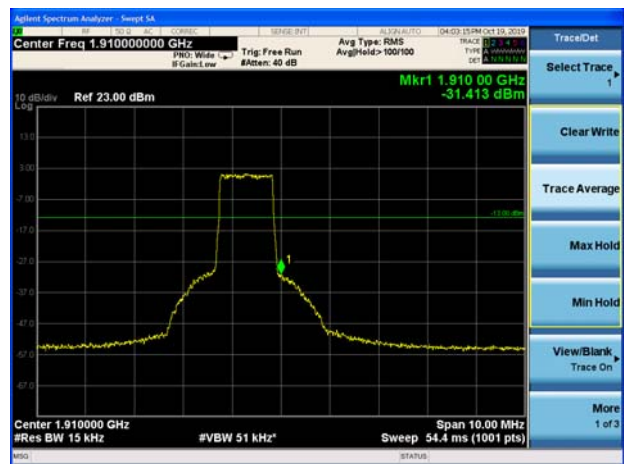
LTE Band 2 1.4MHz 16QAM 1RB CH-High



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



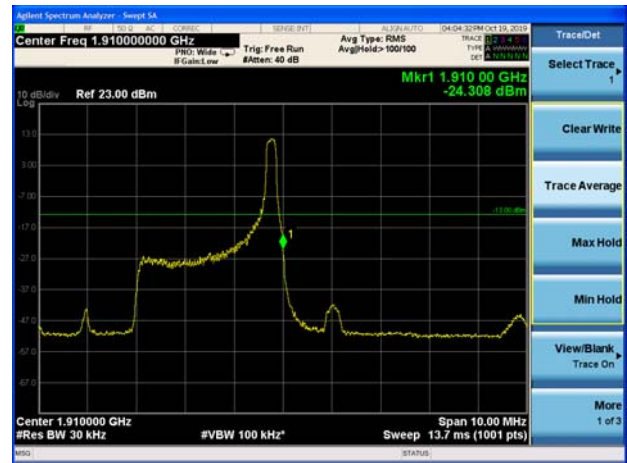
LTE Band 2 1.4MHz 16QAM 100%RB CH-High



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



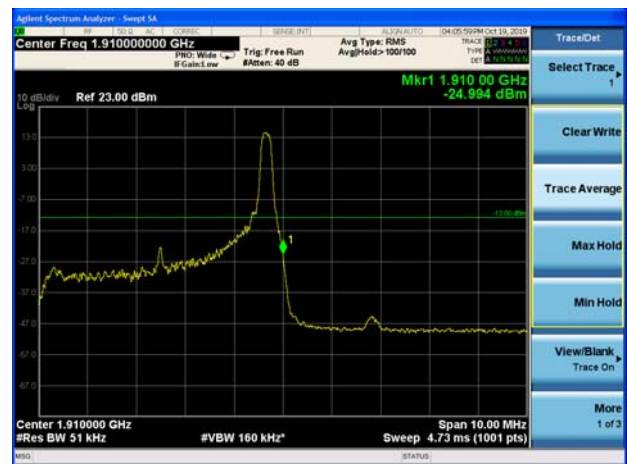
LTE Band 2 3MHz 16QAM 100%RB CH-High



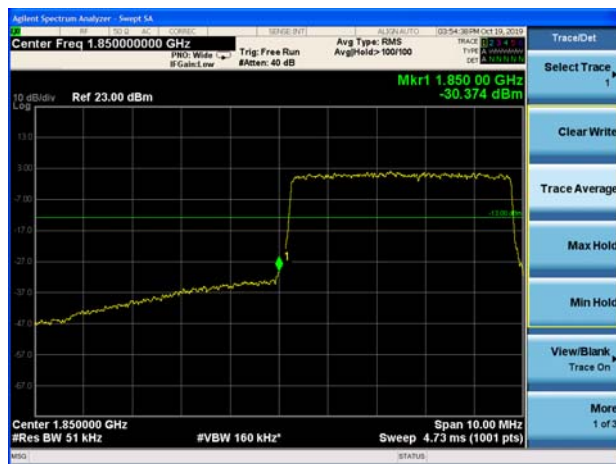
LTE Band 2 5MHz 16QAM 1RB CH-Low



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



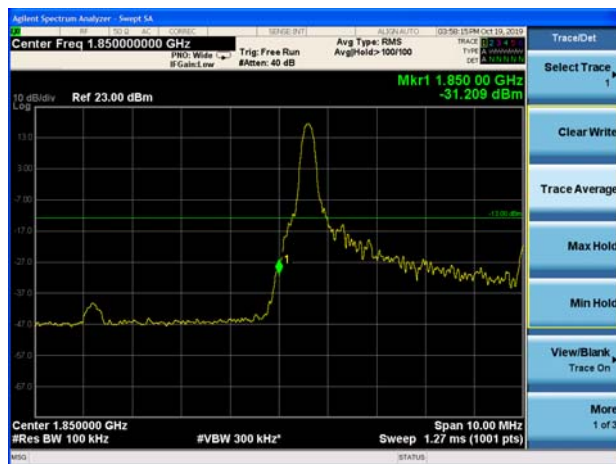
LTE Band 2 5MHz 16QAM 100%RB CH-Low



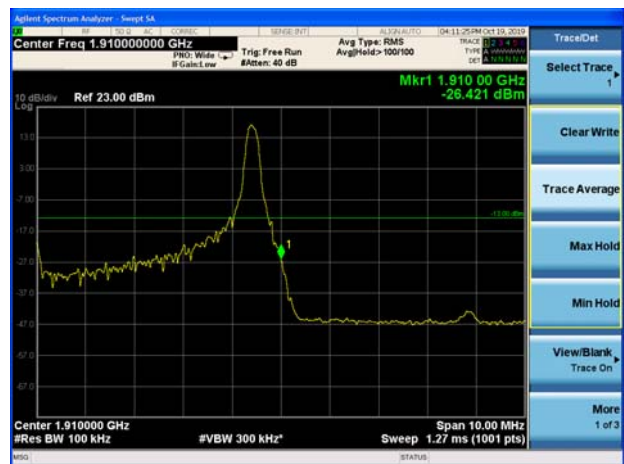
LTE Band 2 5MHz 16QAM 100%RB CH-High



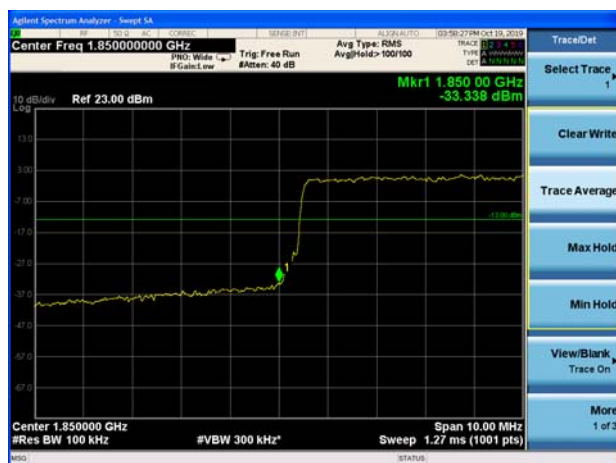
LTE Band 2 10MHz 16QAM 1RB CH-Low



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



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

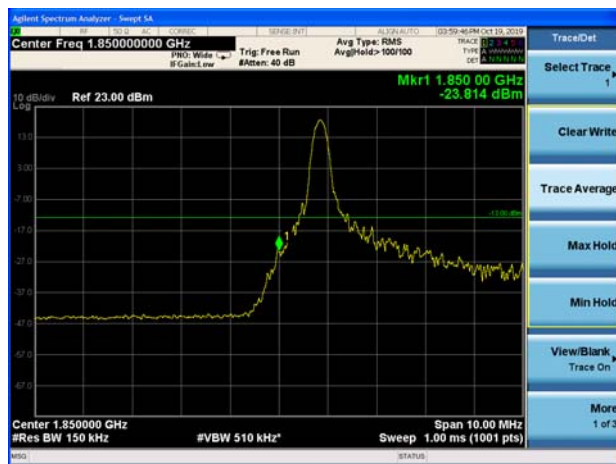


LTE Band 2 10MHz 16QAM 100%RB CH-High

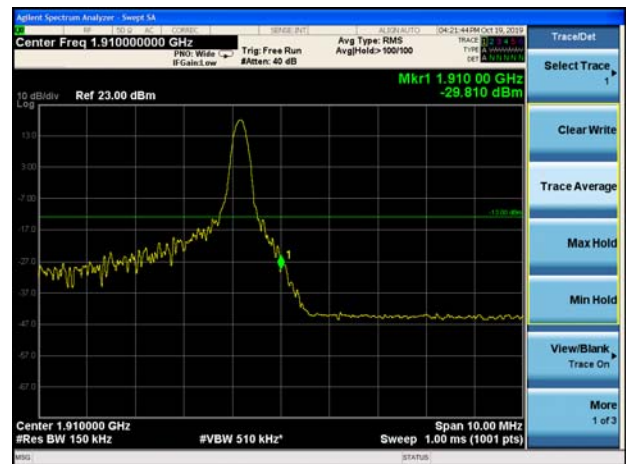




LTE Band 2 15MHz 16QAM 1RB CH-Low



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



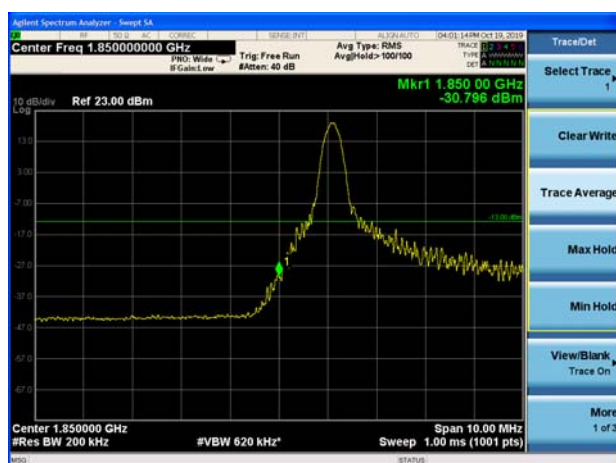
LTE Band 2 15MHz 16QAM 100%RB CH-Low



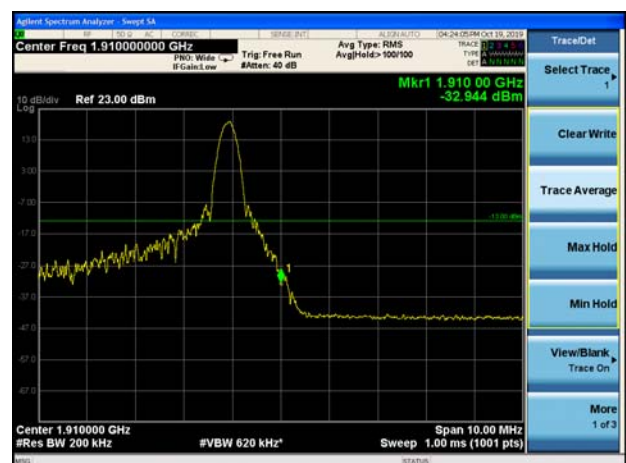
LTE Band 2 15MHz 16QAM 100%RB CH-High



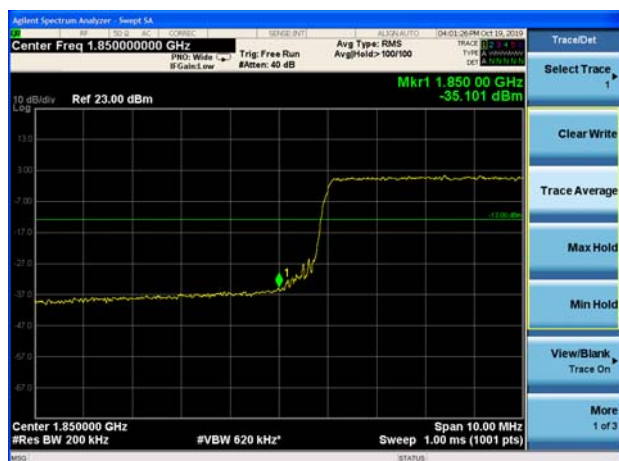
LTE Band 2 20MHz 16QAM 1RB CH-Low



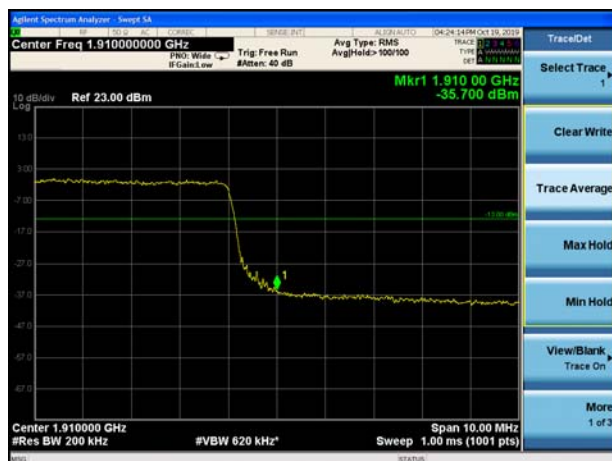
LTE Band 2 20MHz 16QAM 1RB CH-High



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



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



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

Ambient condition

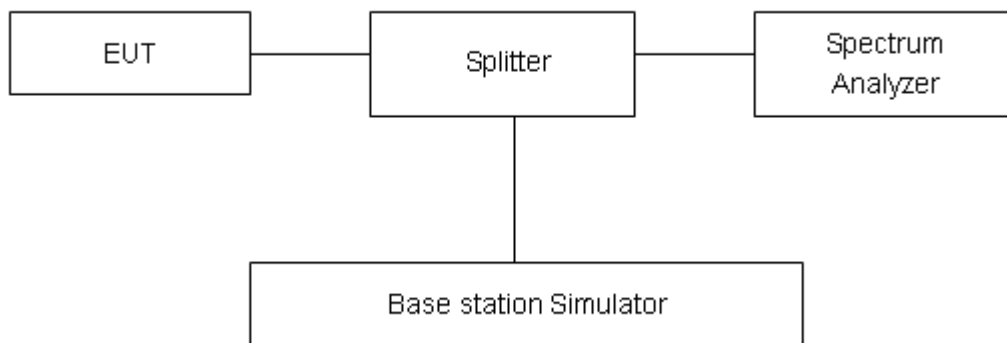
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 (GSM)	512	1850.2	30.76	28.63	2.13	≤13	PASS
	661	1880	30.86	28.78	2.08	≤13	PASS
	810	1909.8	31.05	28.90	2.15	≤13	PASS
GPRS 1900 (GMSK)	512	1850.2	30.93	28.67	2.26	≤13	PASS
	661	1880	30.88	28.71	2.17	≤13	PASS
	810	1909.8	30.93	28.81	2.12	≤13	PASS
EGPRS 1900 (8-PSK)	512	1850.2	27.67	24.22	3.45	≤13	PASS
	661	1880	27.54	24.02	3.52	≤13	PASS
	810	1909.8	27.86	24.30	3.56	≤13	PASS
WCDMA Band II (RMC)	9262	1852.4	24.52	21.65	2.87	≤13	PASS
	9400	1880	24.38	21.53	2.85	≤13	PASS
	9538	1907.6	23.63	20.33	3.30	≤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	24.10	19.17	4.93	≤13	PASS
		18900	1880.0	24.44	19.23	5.21	≤13	PASS
		19193	1909.3	24.12	19.23	4.89	≤13	PASS
	3	18615	1851.5	24.27	19.19	5.08	≤13	PASS
		18900	1880	24.51	19.24	5.27	≤13	PASS
		19185	1908.5	24.21	19.21	5.00	≤13	PASS
	5	18625	1852.5	24.85	19.80	5.05	≤13	PASS
		18900	1880	25.15	20.02	5.13	≤13	PASS
		19175	1907.5	25.20	20.01	5.19	≤13	PASS
	10	18650	1855	24.88	19.67	5.21	≤13	PASS
		18900	1880	25.15	19.93	5.22	≤13	PASS
		19150	1905	25.46	20.08	5.38	≤13	PASS
	15	18675	1857.5	24.94	19.59	5.35	≤13	PASS
		18900	1880	25.23	19.93	5.30	≤13	PASS
		19125	1902.5	25.04	19.78	5.26	≤13	PASS
	20	18700	1860	24.67	19.37	5.30	≤13	PASS
		18900	1880	25.05	19.82	5.23	≤13	PASS
		19100	1900	25.31	19.85	5.46	≤13	PASS
16QAM	1.4	18607	1850.7	24.32	19.10	5.22	≤13	PASS
		18900	1880.0	24.82	19.16	5.66	≤13	PASS
		19193	1909.3	24.32	19.10	5.22	≤13	PASS
	3	18615	1851.5	24.58	19.06	5.52	≤13	PASS
		18900	1880	24.93	19.15	5.78	≤13	PASS
		19185	1908.5	24.64	19.18	5.46	≤13	PASS
	5	18625	1852.5	25.15	19.66	5.49	≤13	PASS
		18900	1880	25.53	19.92	5.61	≤13	PASS
		19175	1907.5	25.62	19.90	5.72	≤13	PASS
	10	18650	1855	25.19	19.52	5.67	≤13	PASS
		18900	1880	25.68	19.97	5.71	≤13	PASS
		19150	1905	25.84	20.02	5.82	≤13	PASS
	15	18675	1857.5	25.16	19.49	5.67	≤13	PASS
		18900	1880	25.48	19.87	5.61	≤13	PASS
		19125	1902.5	25.32	19.74	5.58	≤13	PASS
	20	18700	1860	25.10	19.26	5.84	≤13	PASS
		18900	1880	25.46	19.72	5.74	≤13	PASS
		19100	1900	25.52	19.83	5.69	≤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 +55°C in 10°C or 5°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 or 5°C increments from -30°C to +55°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

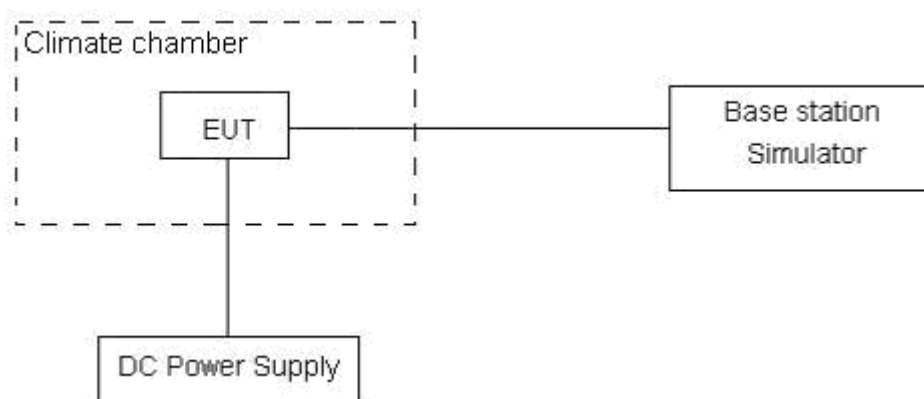
Frequency Stability (Voltage Variation)

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

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 10.8 V and 13.2 V, with a nominal voltage of 12V.

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℃)	Normal	8.82	9.83	0.00469	0.00523	PASS
Extreme (55℃)		14.21	10.51	0.00756	0.00559	PASS
Extreme (50℃)		10.71	11.45	0.00569	0.00609	PASS
Extreme (40℃)		9.63	1.56	0.00512	0.00083	PASS
Extreme (30℃)		12.28	4.02	0.00653	0.00214	PASS
Extreme (20℃)		3.32	10.73	0.00176	0.00571	PASS
Extreme (10℃)		3.53	7.06	0.00188	0.00375	PASS
Extreme (0℃)		5.59	6.37	0.00297	0.00339	PASS
Extreme (-10℃)		2.29	13.43	0.00122	0.00714	PASS
Extreme (-20℃)		10.85	5.21	0.00577	0.00277	PASS
Extreme (-30℃)		3.74	11.94	0.00199	0.00635	PASS
25℃	LV	9.87	13.31	0.00525	0.00708	PASS
	HV	2.84	8.84	0.00151	0.00470	PASS

WCDMA Band II						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	8.11	12.76	0.00431	0.00679	PASS
Extreme (55℃)		1.99	13.11	0.00106	0.00698	PASS
Extreme (50℃)		4.88	7.54	0.00259	0.00401	PASS
Extreme (40℃)		2.93	16.64	0.00156	0.00885	PASS
Extreme (30℃)		17.41	12.53	0.00926	0.00666	PASS
Extreme (20℃)		3.93	10.47	0.00209	0.00557	PASS
Extreme (10℃)		10.75	5.94	0.00572	0.00316	PASS
Extreme (0℃)		2.49	16.18	0.00132	0.00861	PASS
Extreme (-10℃)		9.29	5.15	0.00494	0.00274	PASS
Extreme (-20℃)		13.76	7.43	0.00732	0.00395	PASS
Extreme (-30℃)		16.12	10.44	0.00858	0.00555	PASS
25℃	LV	1.74	1.04	0.00092	0.00055	PASS
	HV	6.36	6.42	0.00338	0.00342	PASS

LTE Band 2						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz					
Temperature	Voltage					
Normal (25℃)	Normal	16QAM	QPSK	16QAM	QPSK	PASS
Extreme (55℃)		6.51	17.03	0.00346	0.00906	PASS
Extreme (50℃)		7.57	2.50	0.00403	0.00133	PASS
Extreme (40℃)		5.45	8.90	0.00290	0.00473	PASS
Extreme (30℃)		17.58	2.28	0.00935	0.00121	PASS
Extreme (20℃)		8.36	13.79	0.00445	0.00733	PASS
Extreme (10℃)		2.89	5.88	0.00154	0.00313	PASS
Extreme (0℃)		13.75	5.64	0.00731	0.00300	PASS
Extreme (-10℃)		13.68	5.77	0.00728	0.00307	PASS
Extreme (-20℃)		3.08	4.84	0.00164	0.00257	PASS
Extreme (-30℃)		1.59	7.97	0.00084	0.00424	PASS
25℃	9.57	11.01	0.00509	0.00586	PASS	
	LV	13.47	6.17	0.00716	0.00328	PASS
	HV	3.95	16.25	0.00210	0.00864	PASS

LTE Band 2						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	3MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	8.00	6.00	0.00426	0.00319	PASS
Extreme (55℃)		4.00	9.00	0.00213	0.00479	PASS
Extreme (50℃)		2.00	1.00	0.00106	0.00053	PASS
Extreme (40℃)		13.00	11.00	0.00691	0.00585	PASS
Extreme (30℃)		1.00	6.00	0.00053	0.00319	PASS
Extreme (20℃)		16.00	16.00	0.00851	0.00851	PASS
Extreme (10℃)		4.00	6.00	0.00213	0.00319	PASS
Extreme (0℃)		2.00	17.00	0.00106	0.00904	PASS
Extreme (-10℃)		6.00	12.00	0.00319	0.00638	PASS
Extreme (-20℃)		17.00	12.00	0.00904	0.00638	PASS
Extreme (-30℃)		10.00	3.00	0.00532	0.00160	PASS
25℃	LV	5.00	11.00	0.00266	0.00585	PASS
	HV	16.00	13.00	0.00851	0.00691	PASS

LTE Band 2						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	1.19	8.58	0.00063	0.00456	PASS
Extreme (55℃)		6.69	5.93	0.00356	0.00316	PASS
Extreme (50℃)		1.95	14.55	0.00104	0.00774	PASS
Extreme (40℃)		11.23	15.09	0.00597	0.00803	PASS
Extreme (30℃)		3.62	1.84	0.00193	0.00098	PASS
Extreme (20℃)		9.06	12.42	0.00482	0.00661	PASS
Extreme (10℃)		14.29	3.19	0.00760	0.00170	PASS
Extreme (0℃)		5.29	4.66	0.00282	0.00248	PASS
Extreme (-10℃)		12.96	7.63	0.00689	0.00406	PASS
Extreme (-20℃)		11.56	10.04	0.00615	0.00534	PASS
Extreme (-30℃)		12.77	16.83	0.00679	0.00895	PASS
25℃	LV	15.76	13.81	0.00838	0.00734	PASS
	HV	6.39	15.08	0.00340	0.00802	PASS

LTE Band 2						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	8.53	7.44	0.00454	0.00396	PASS
Extreme (55℃)		8.65	3.82	0.00460	0.00203	PASS
Extreme (50℃)		8.79	2.49	0.00468	0.00132	PASS
Extreme (40℃)		11.04	2.97	0.00587	0.00158	PASS
Extreme (30℃)		10.95	6.49	0.00582	0.00345	PASS
Extreme (20℃)		7.04	14.32	0.00375	0.00762	PASS
Extreme (10℃)		6.70	5.19	0.00356	0.00276	PASS
Extreme (0℃)		10.45	9.87	0.00556	0.00525	PASS
Extreme (-10℃)		3.29	10.18	0.00175	0.00541	PASS
Extreme (-20℃)		12.40	3.89	0.00659	0.00207	PASS
Extreme (-30℃)		11.07	9.04	0.00589	0.00481	PASS
25℃	LV	5.51	13.52	0.00293	0.00719	PASS
	HV	2.49	13.83	0.00133	0.00736	PASS

LTE Band 2						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	15MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	14.29	10.67	0.00760	0.00568	PASS
Extreme (55℃)		1.59	7.20	0.00085	0.00383	PASS
Extreme (50℃)		5.38	10.11	0.00286	0.00538	PASS
Extreme (40℃)		12.38	12.67	0.00658	0.00674	PASS
Extreme (30℃)		11.93	15.34	0.00635	0.00816	PASS
Extreme (20℃)		11.22	9.62	0.00597	0.00512	PASS
Extreme (10℃)		7.65	7.50	0.00407	0.00399	PASS
Extreme (0℃)		8.27	12.65	0.00440	0.00673	PASS
Extreme (-10℃)		3.61	9.54	0.00192	0.00508	PASS
Extreme (-20℃)		9.11	12.34	0.00485	0.00656	PASS
Extreme (-30℃)		7.12	15.65	0.00379	0.00832	PASS
25℃	LV	1.39	4.58	0.00074	0.00244	PASS
	HV	10.61	8.21	0.00564	0.00436	PASS

LTE Band 2						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	11.66	2.27	0.00620	0.00121	PASS
Extreme (55℃)		9.50	8.62	0.00506	0.00459	PASS
Extreme (50℃)		9.87	4.67	0.00525	0.00248	PASS
Extreme (40℃)		9.55	2.48	0.00508	0.00132	PASS
Extreme (30℃)		15.34	8.56	0.00816	0.00456	PASS
Extreme (20℃)		3.44	3.26	0.00183	0.00173	PASS
Extreme (10℃)		7.60	1.10	0.00404	0.00059	PASS
Extreme (0℃)		17.92	6.76	0.00953	0.00360	PASS
Extreme (-10℃)		17.56	7.23	0.00934	0.00385	PASS
Extreme (-20℃)		5.33	17.73	0.00284	0.00943	PASS
Extreme (-30℃)		5.85	11.47	0.00311	0.00610	PASS
25℃	LV	5.06	7.68	0.00269	0.00409	PASS
	HV	10.69	10.74	0.00569	0.00571	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

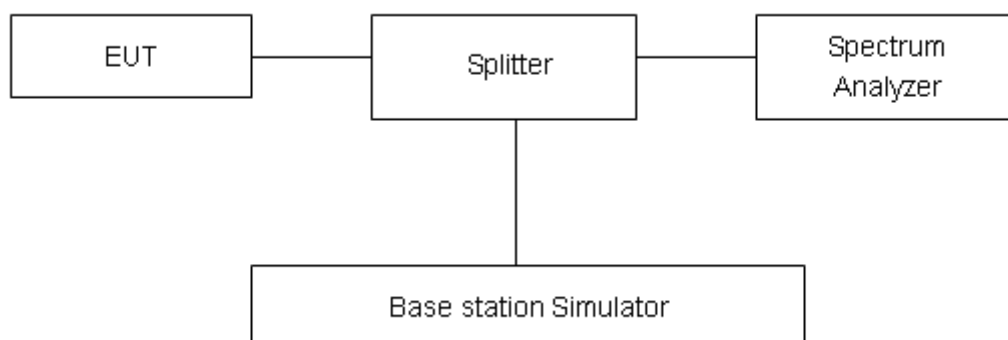
The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.

RBW is set to 100kHz, VBW is set to 300kHz for 9KHz~1GHz

RBW is set to 1MHz, VBW is set to 3MHz for above 1GHz, 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
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Measurement Uncertainty

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

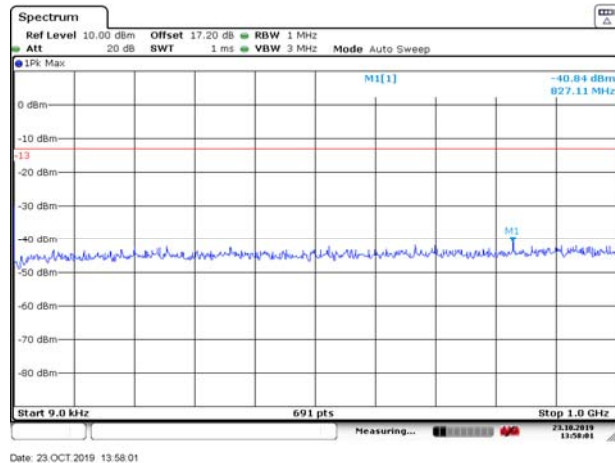
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB

Test Result

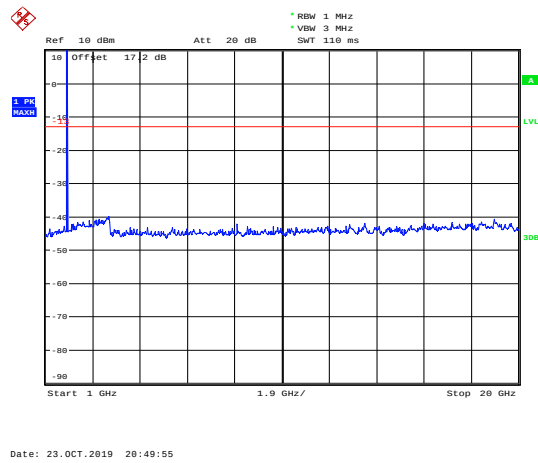
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

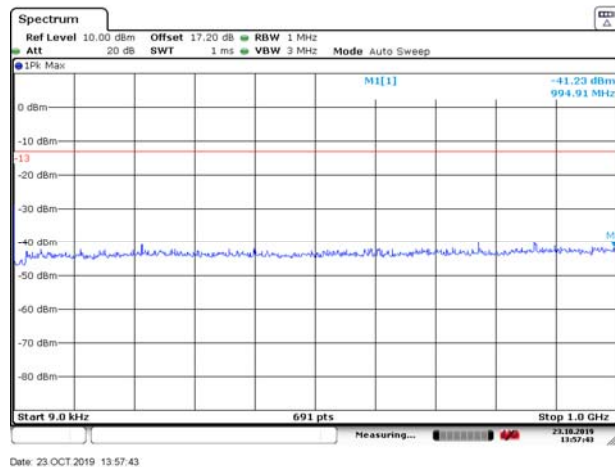
GSM 1900 CH-Low 9KHz~1GHz



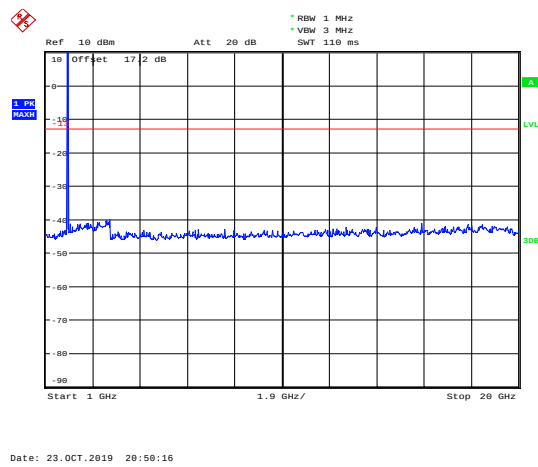
GSM 1900 CH-Low 1GHz~20GHz



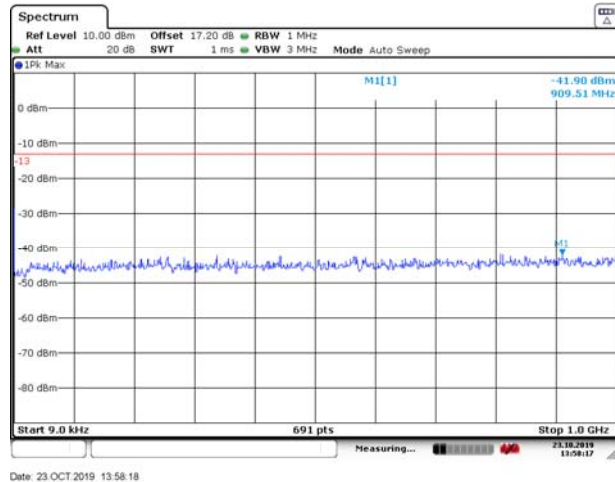
GSM 1900 CH-Middle 9KHz~1GHz



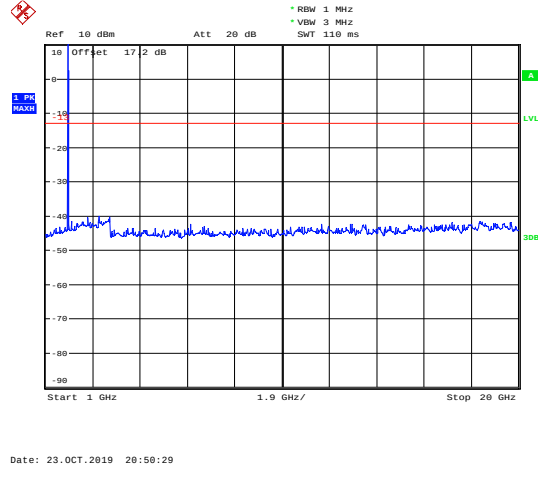
GSM 1900 CH-Middle 1GHz~20GHz



GSM 1900 CH-High 9KHz~1GHz

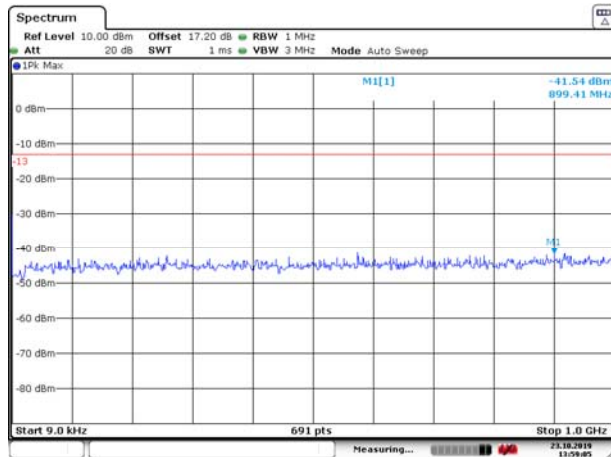


GSM 1900 CH-High 1GHz~20GHz



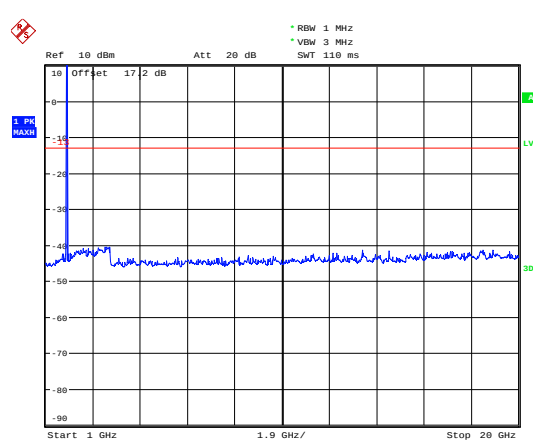


GPRS 1900 CH-Low 9KHz~1GHz



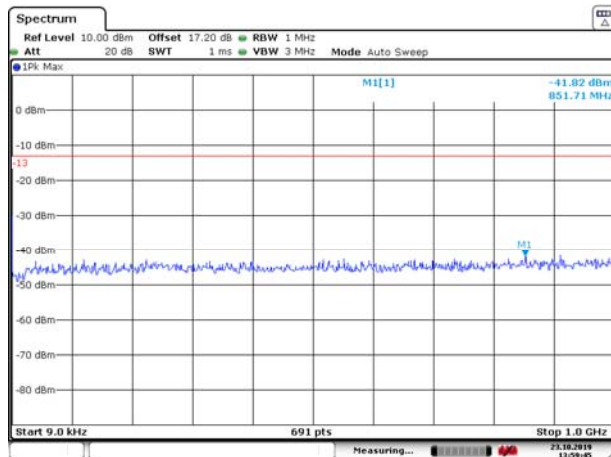
Date: 23.OCT.2019 13:59:06

GPRS 1900 CH-Low 1GHz~20GHz



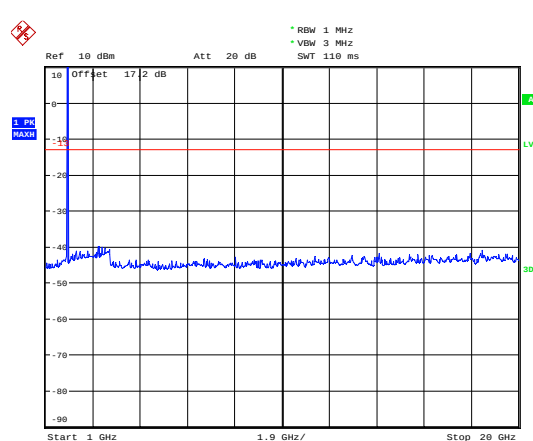
Date: 23.OCT.2019 20:54:07

GPRS 1900 CH-Middle 9KHz~1GHz



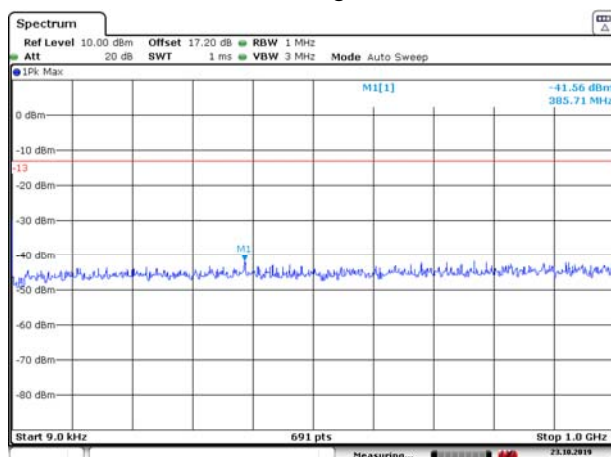
Date: 23.OCT.2019 13:59:45

GPRS 1900 CH-Middle 1GHz~20GHz



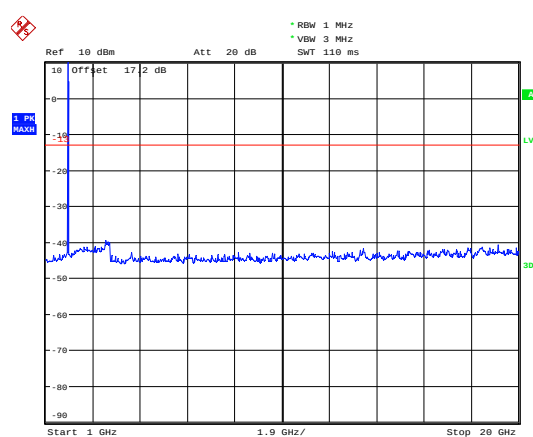
Date: 23.OCT.2019 20:54:21

GPRS 1900 CH-High 9KHz~1GHz



Date: 23.OCT.2019 13:59:57

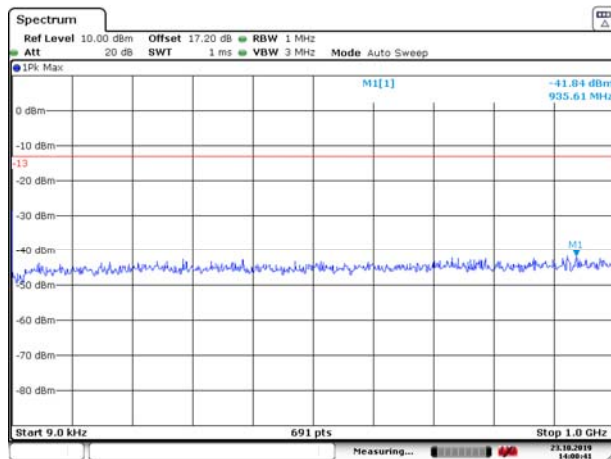
GPRS 1900 CH-High 1GHz~20GHz



Date: 23.OCT.2019 20:54:37

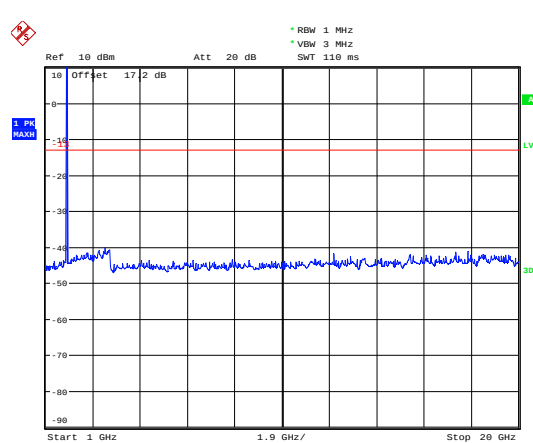


EGPRS 1900 CH-Low 9KHz~1GHz



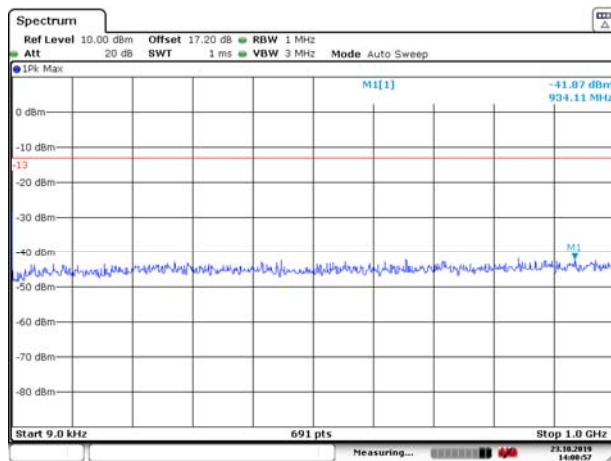
Date: 23.OCT.2019 14:00:42

EGPRS 1900 CH-Low 1GHz~20GHz



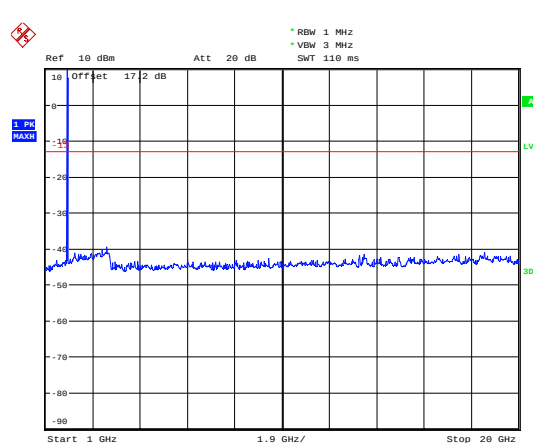
Date: 23.OCT.2019 20:56:32

EGPRS 1900 CH-Middle 9KHz~1GHz



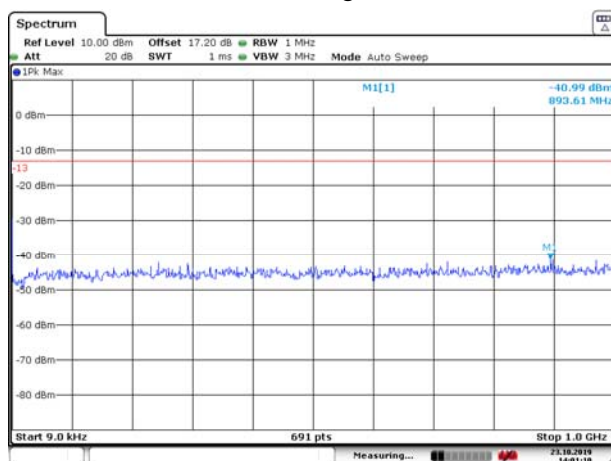
Date: 23.OCT.2019 14:00:57

EGPRS 1900 CH-Middle 1GHz~20GHz



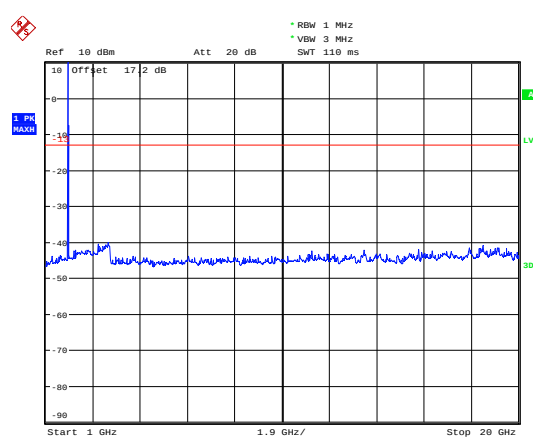
Date: 23.OCT.2019 20:56:50

EGPRS 1900 CH-High 9KHz~1GHz



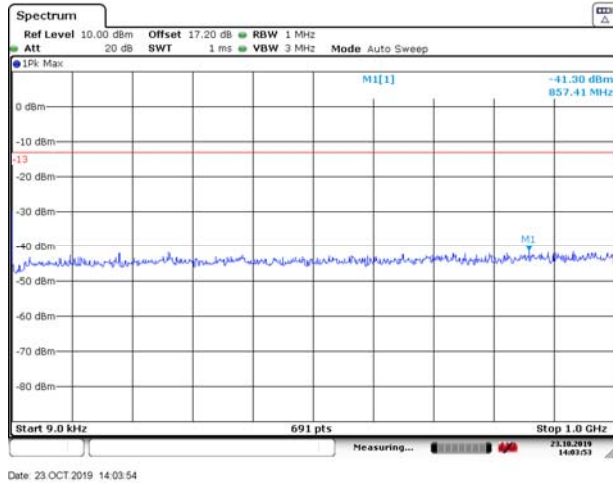
Date: 23.OCT.2019 14:01:10

EGPRS 1900 CH-High 1GHz~20GHz

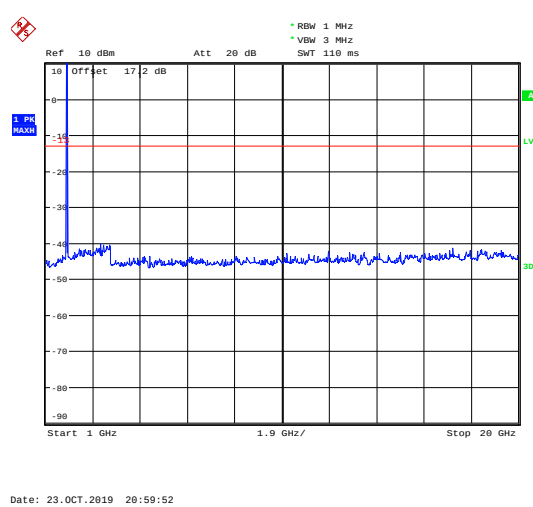


Date: 23.OCT.2019 20:57:01

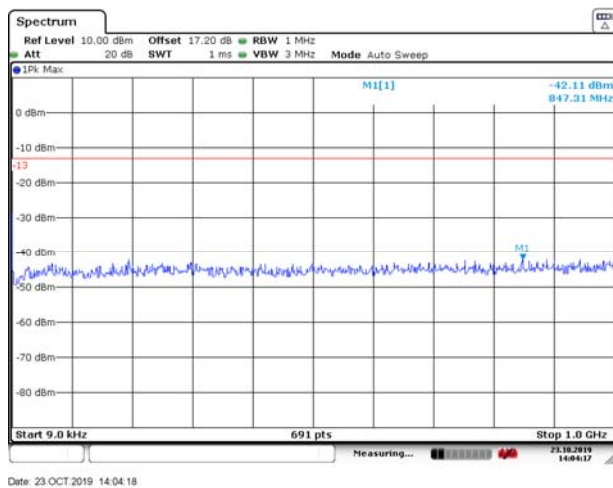
WCDMA Band II CH- CH-Low 9KHz~1GHz



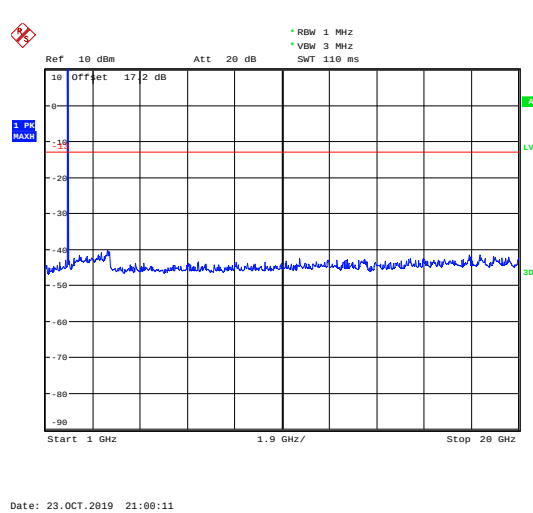
WCDMA Band II CH- CH-Low 1GHz~20GHz



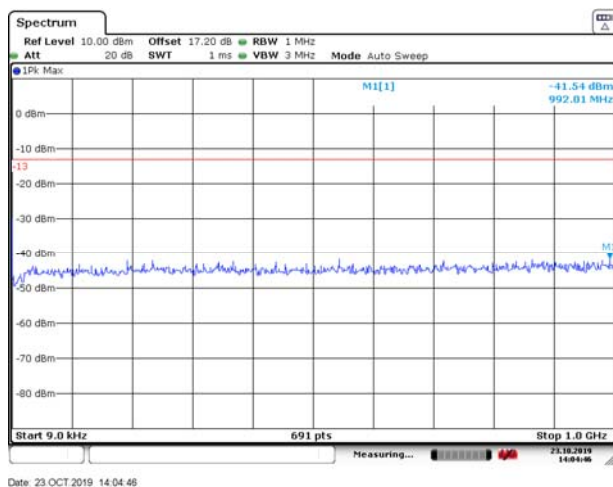
WCDMA BAND II CH-Middle 9KHz~1GHz



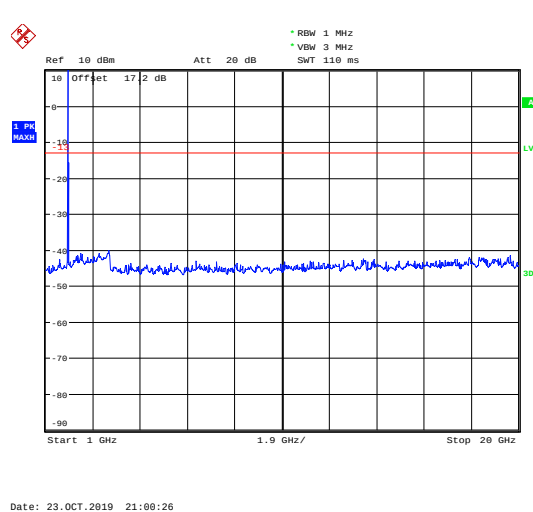
WCDMA BAND II CH-Middle 1GHz~20GHz



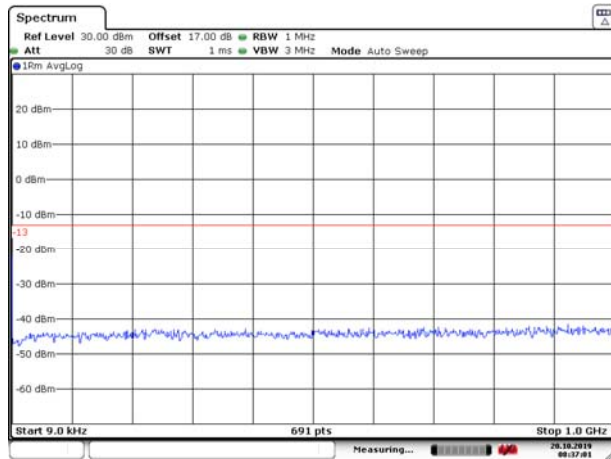
WCDMA BAND II CH-High 9KHz~1GHz



WCDMA BAND II CH-High 1GHz~20GHz

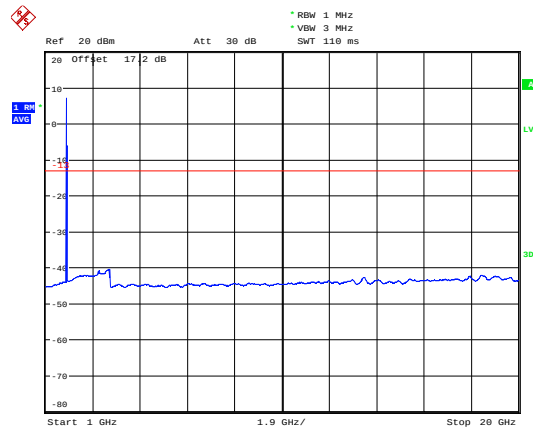


LTE Band 2 1.4MHz CH-Low 9KHz~1GHz



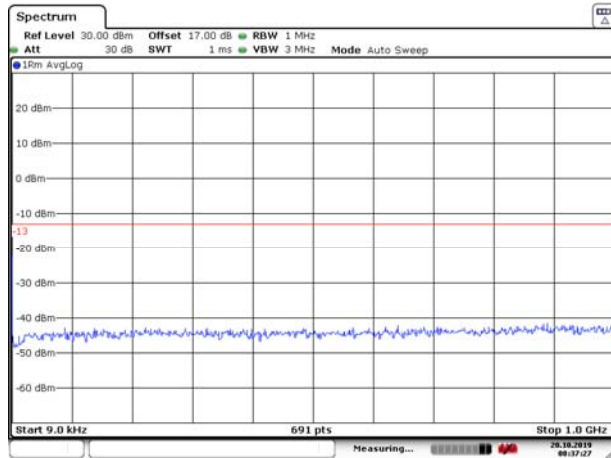
Date: 20 OCT 2019 08:37:02

LTE Band 2 1.4MHz CH-Low 1GHz~20GHz



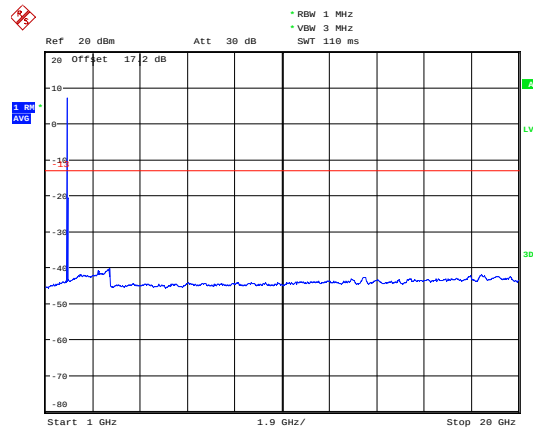
Date: 23.OCT.2019 16:00:08

LTE Band 2 1.4MHz CH- Middle 9KHz~1GHz



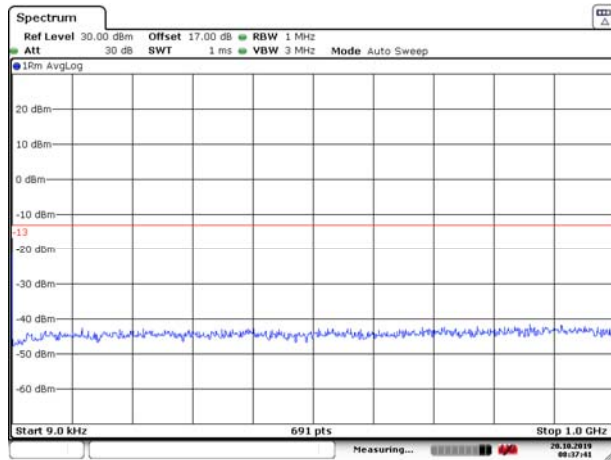
Date: 20 OCT 2019 08:37:27

LTE Band 2 1.4MHz CH- Middle 1GHz~20GHz



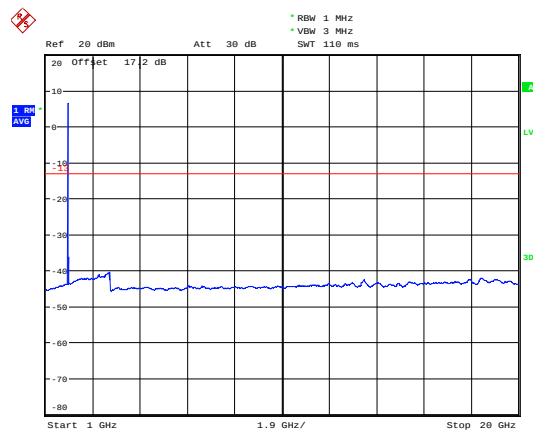
Date: 23.OCT.2019 16:00:22

LTE Band 2 1.4MHz CH- High 9KHz~1GHz



Date: 20 OCT 2019 08:37:41

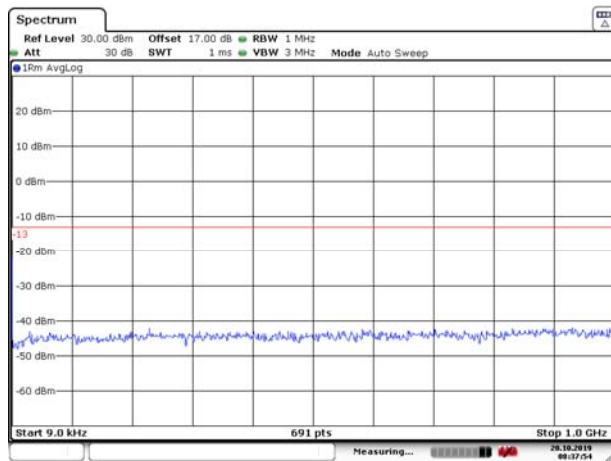
LTE Band 2 1.4MHz CH- High 1GHz~20GHz



Date: 23.OCT.2019 16:00:38

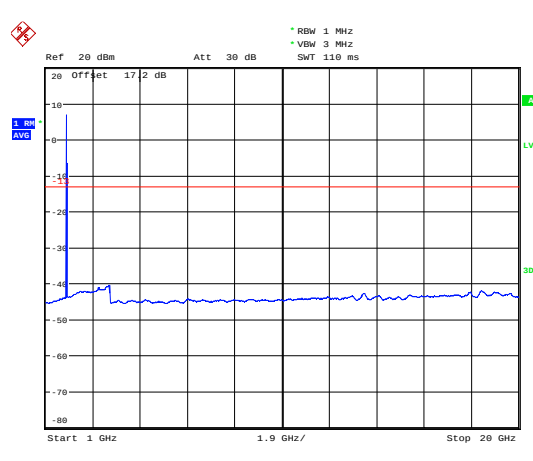


LTE Band 2 3MHz CH-Low 9KHz~1GHz



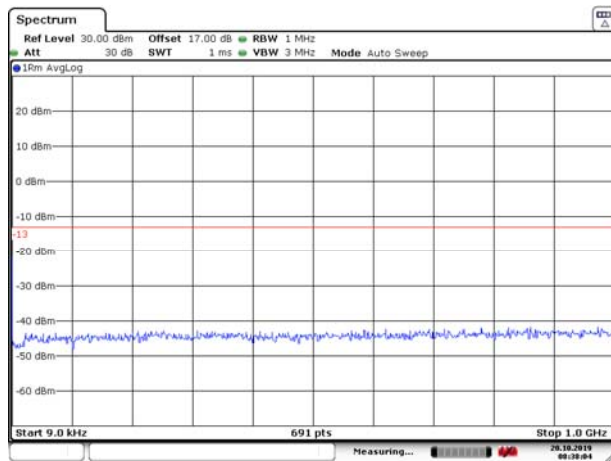
Date: 20 OCT 2019 08:37:55

LTE Band 2 3MHz CH-Low 1GHz~20GHz



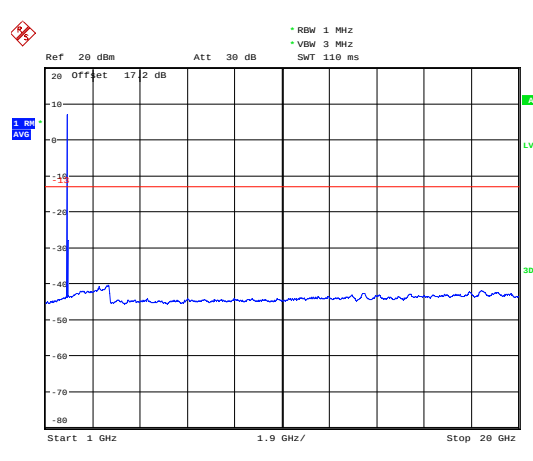
Date: 23 OCT 2019 16:03:45

LTE Band 2 3MHz CH- Middle 9KHz~1GHz



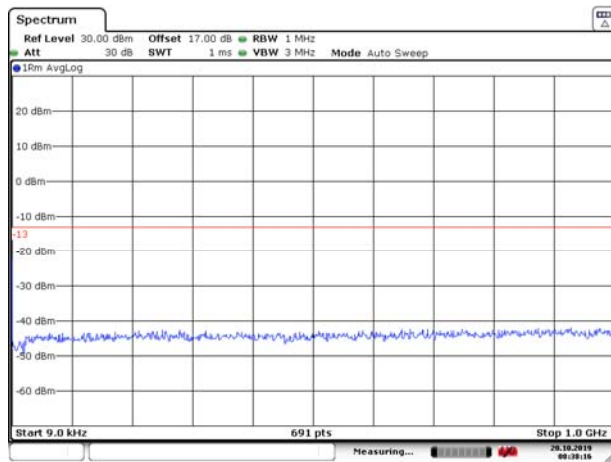
Date: 20 OCT 2019 08:38:05

LTE Band 2 3MHz CH- Middle 1GHz~20GHz



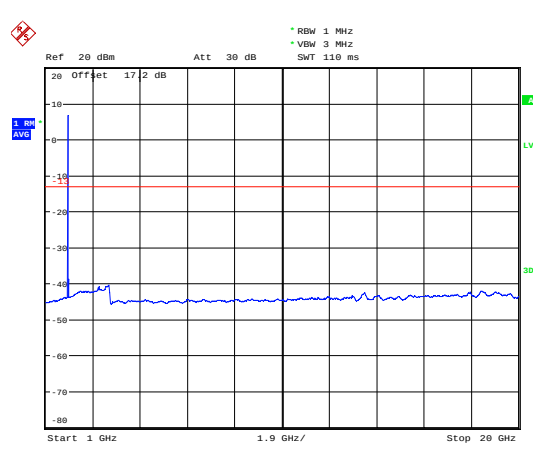
Date: 23 OCT 2019 16:04:05

LTE Band 2 3MHz CH- High 9KHz~1GHz



Date: 20 OCT 2019 08:38:17

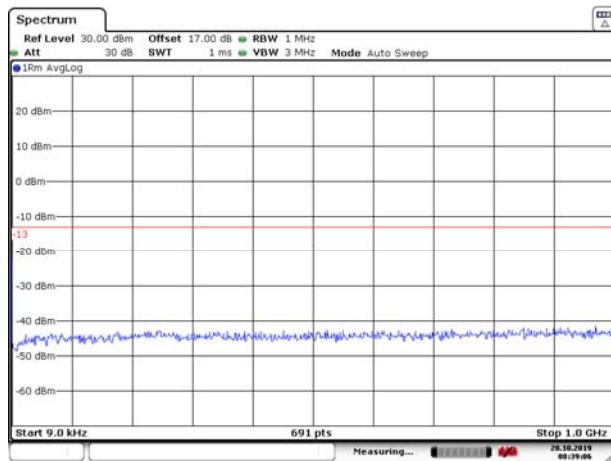
LTE Band 2 3MHz CH- High 1GHz~20GHz



Date: 23 OCT 2019 16:04:21

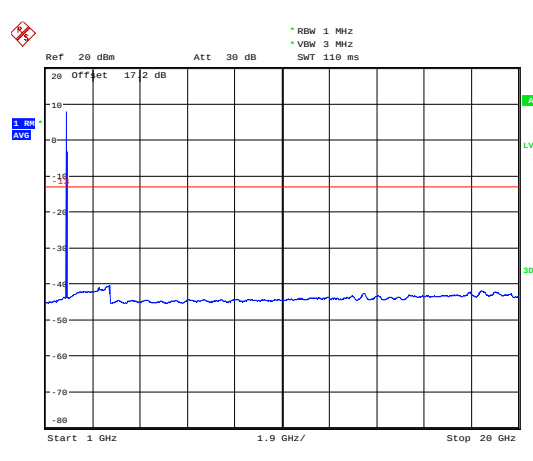


LTE Band 2 5MHz CH-Low 9KHz~1GHz



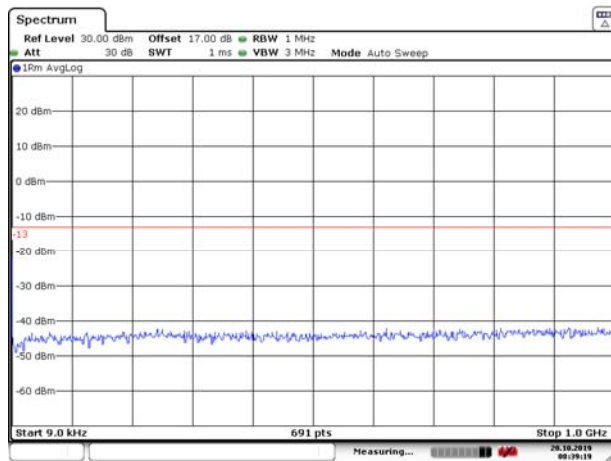
Date: 20 OCT 2019 08:39:06

LTE Band 2 5MHz CH-Low 1GHz~20GHz



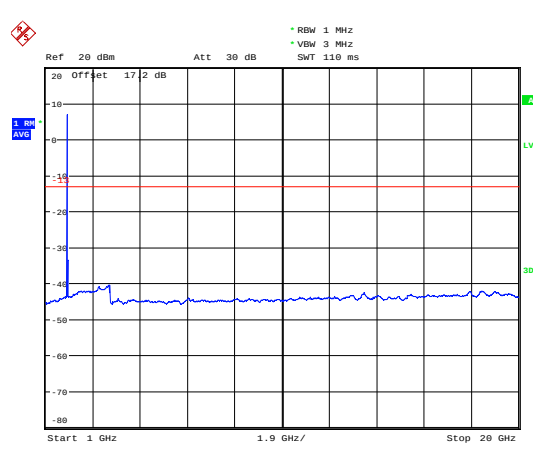
Date: 23 OCT 2019 16:05:59

LTE Band 2 5MHz CH- Middle 9KHz~1GHz



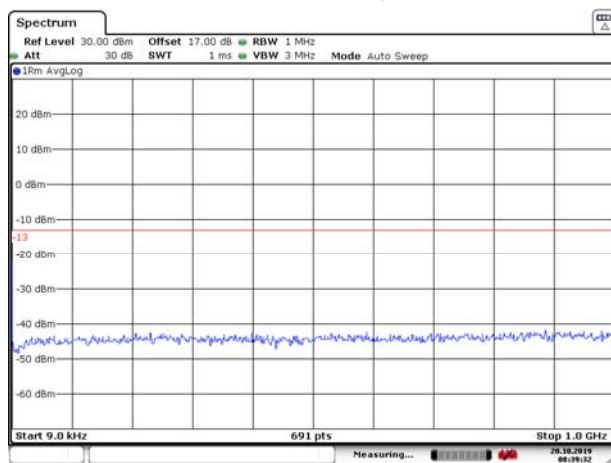
Date: 20 OCT 2019 08:39:20

LTE Band 2 5MHz CH- Middle 1GHz~20GHz



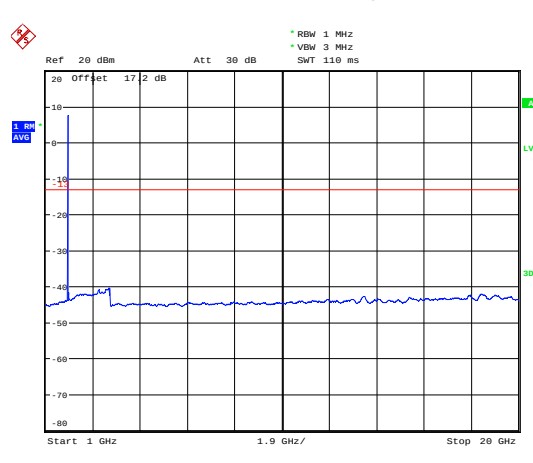
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LTE Band 2 5MHz CH- High 9KHz~1GHz



Date: 20 OCT 2019 08:39:32

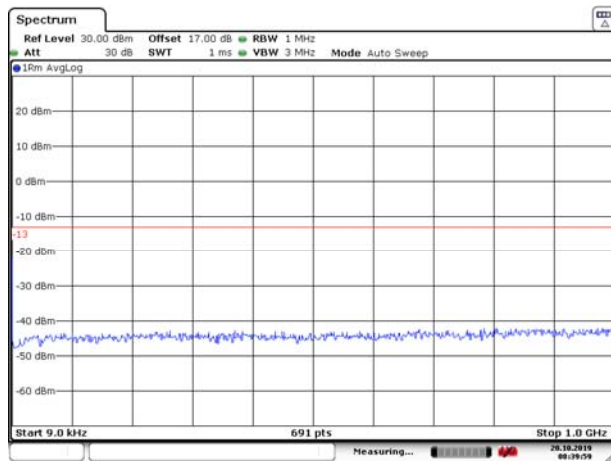
LTE Band 2 5MHz CH- High 1GHz~20GHz



Date: 23 OCT 2019 16:06:34

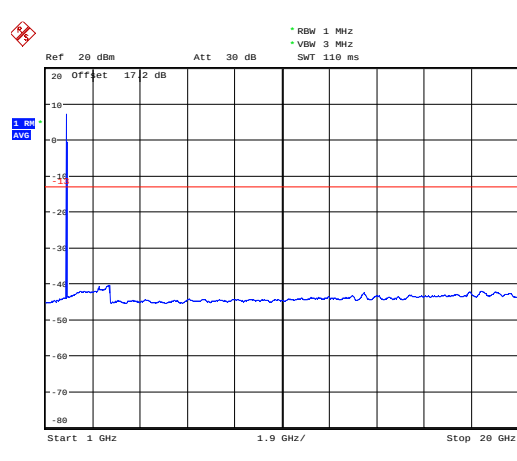


LTE Band 2 10MHz CH-Low 9KHz~1GHz



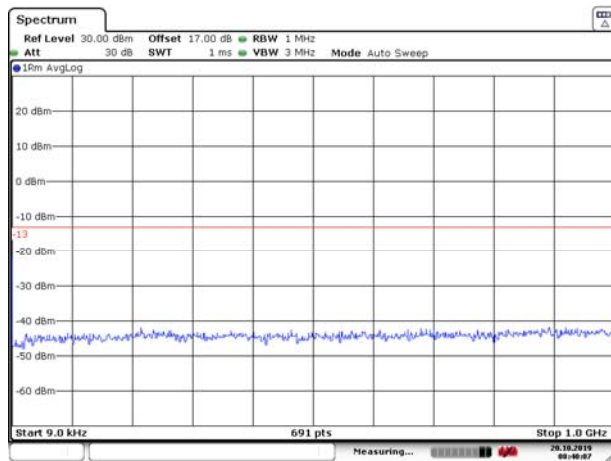
Date: 20 OCT 2019 08:39:59

LTE Band 2 10MHz CH-Low 1GHz~20GHz



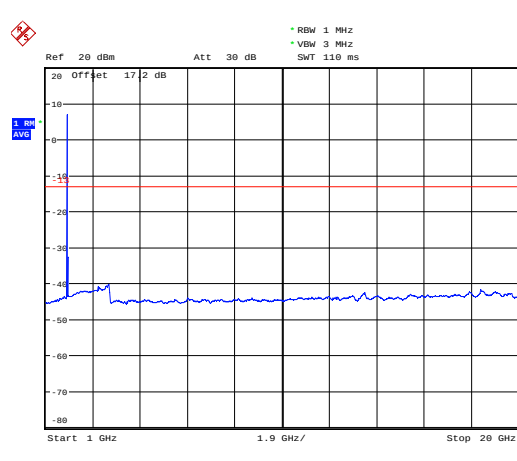
Date: 23 OCT 2019 16:07:59

LTE Band 2 10MHz CH- Middle 9KHz~1GHz



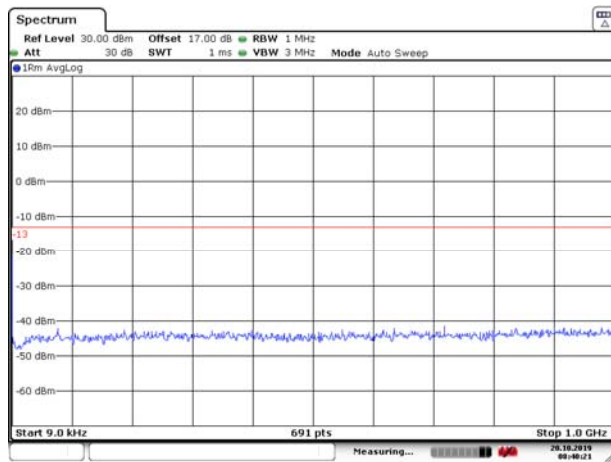
Date: 20 OCT 2019 08:40:07

LTE Band 2 10MHz CH- Middle 1GHz~20GHz



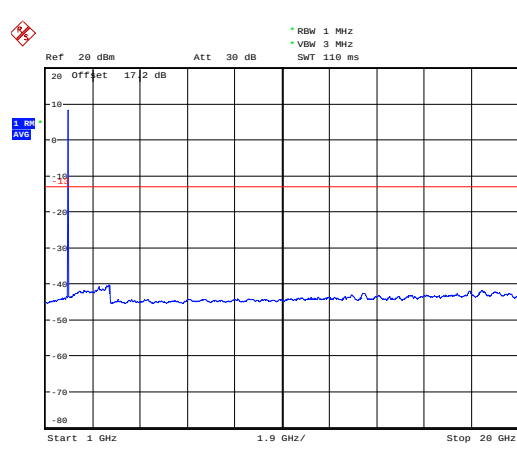
Date: 23 OCT 2019 16:08:10

LTE Band 2 10MHz CH- High 9KHz~1GHz



Date: 20 OCT 2019 08:40:21

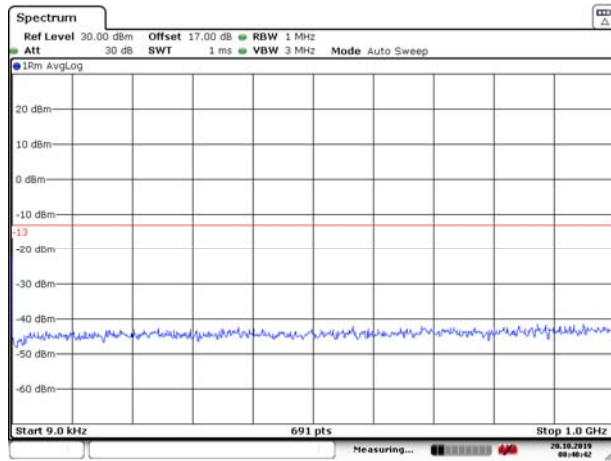
LTE Band 2 10MHz CH- High 1GHz~20GHz



Date: 23 OCT 2019 16:08:27

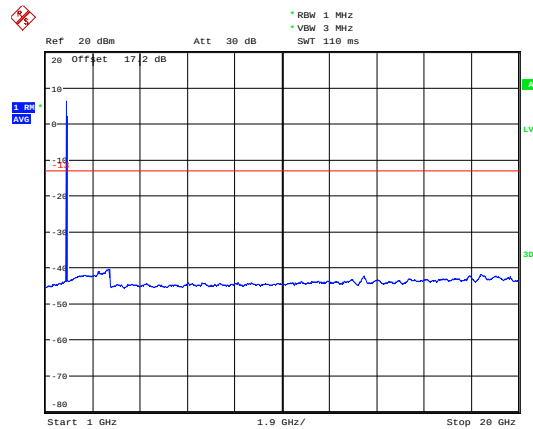


LTE Band 2 15MHz CH-Low 9KHz~1GHz



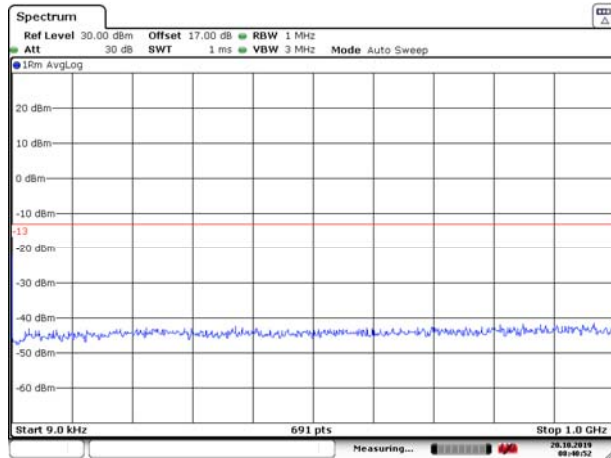
Date: 20.OCT.2019 08:40:43

LTE Band 2 15MHz CH-Low 1GHz~20GHz



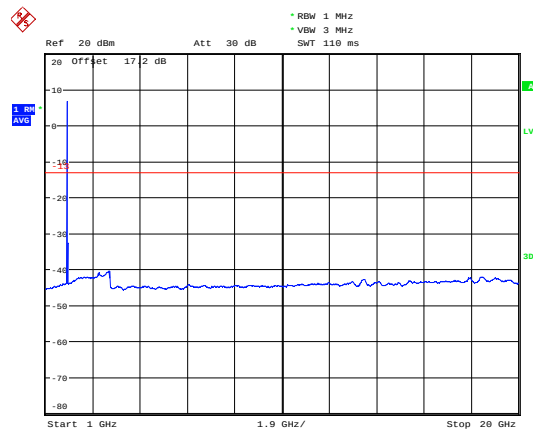
Date: 23.OCT.2019 16:18:07

LTE Band 2 15MHz CH- Middle 9KHz~1GHz



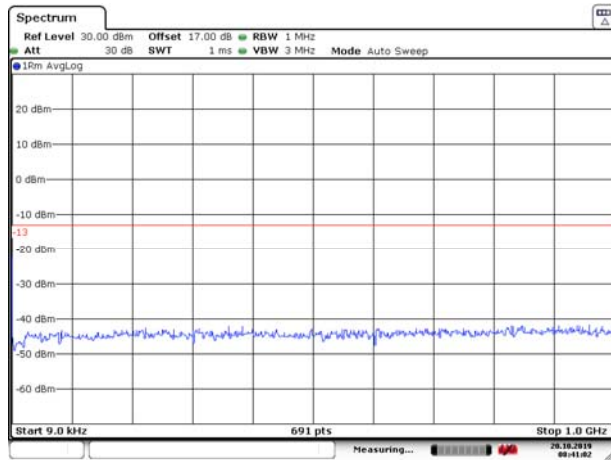
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LTE Band 2 15MHz CH- Middle 1GHz~20GHz



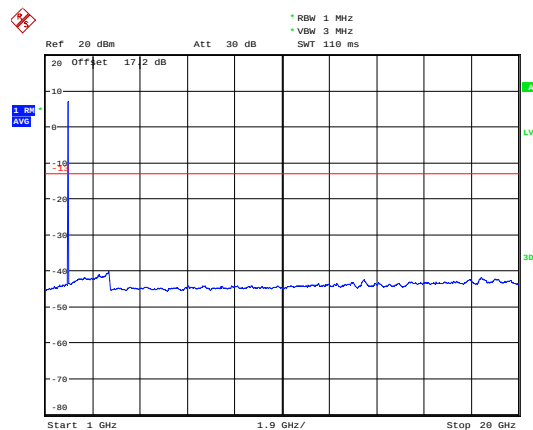
Date: 23.OCT.2019 16:18:20

LTE Band 2 15MHz CH- High 9KHz~1GHz



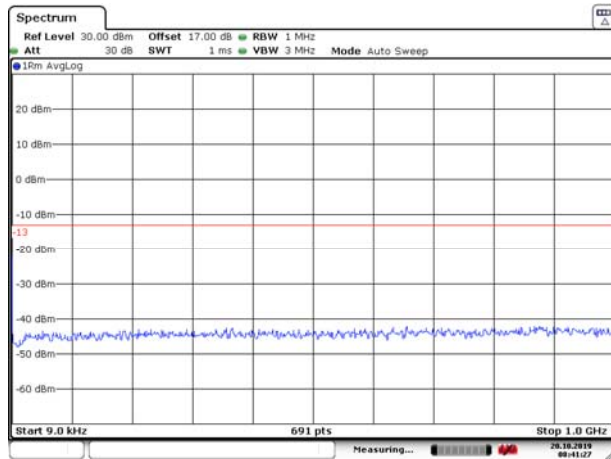
Date: 20.OCT.2019 08:41:02

LTE Band 2 15MHz CH- High 1GHz~20GHz



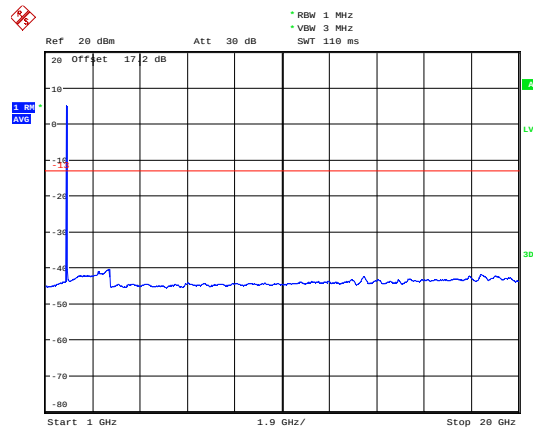
Date: 23.OCT.2019 16:18:37

LTE Band 2 20MHz CH-Low 9KHz~1GHz



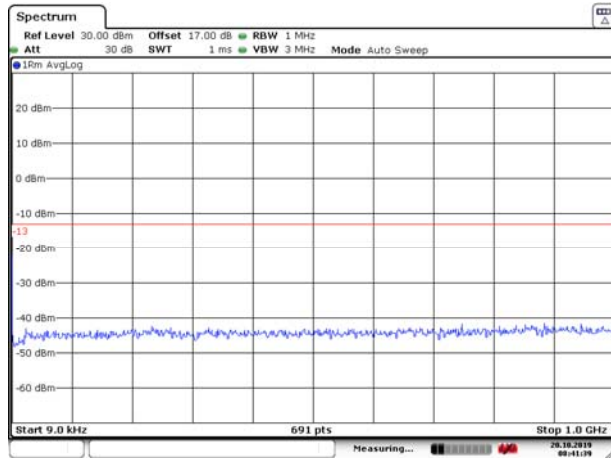
Date: 20.OCT.2019 08:41:27

LTE Band 2 20MHz CH-Low 1GHz~20GHz



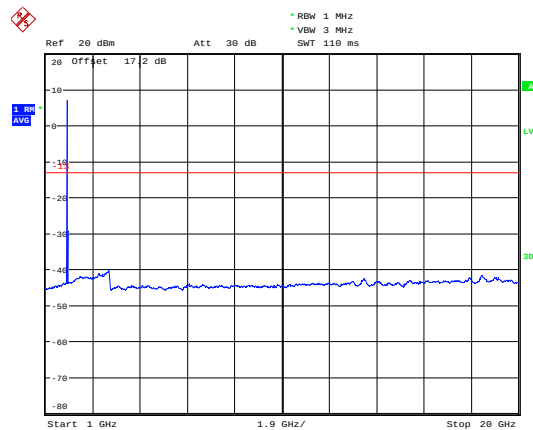
Date: 23.OCT.2019 16:11:56

LTE Band 2 20MHz CH- Middle 9KHz~1GHz



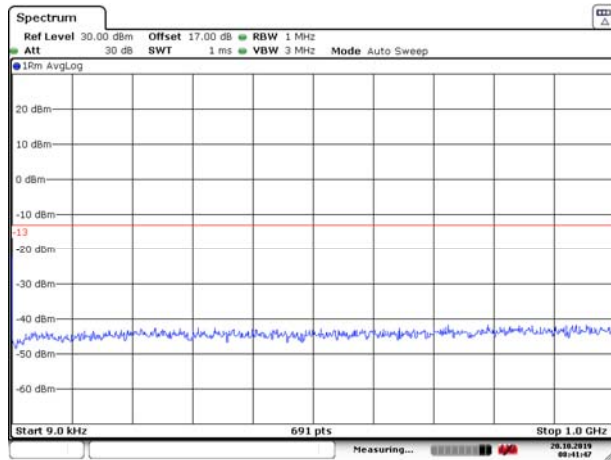
Date: 20.OCT.2019 08:41:39

LTE Band 2 20MHz CH- Middle 1GHz~20GHz



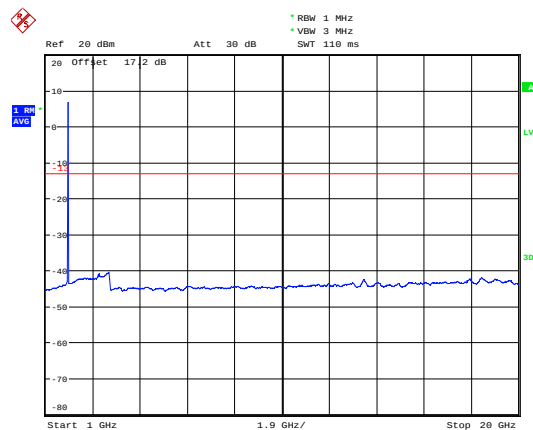
Date: 23.OCT.2019 16:12:10

LTE Band 2 20MHz CH- High 9KHz~1GHz



Date: 20.OCT.2019 08:41:48

LTE Band 2 20MHz CH- High 1GHz~20GHz



Date: 23.OCT.2019 16:12:24

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 9kHz150kHz , 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:

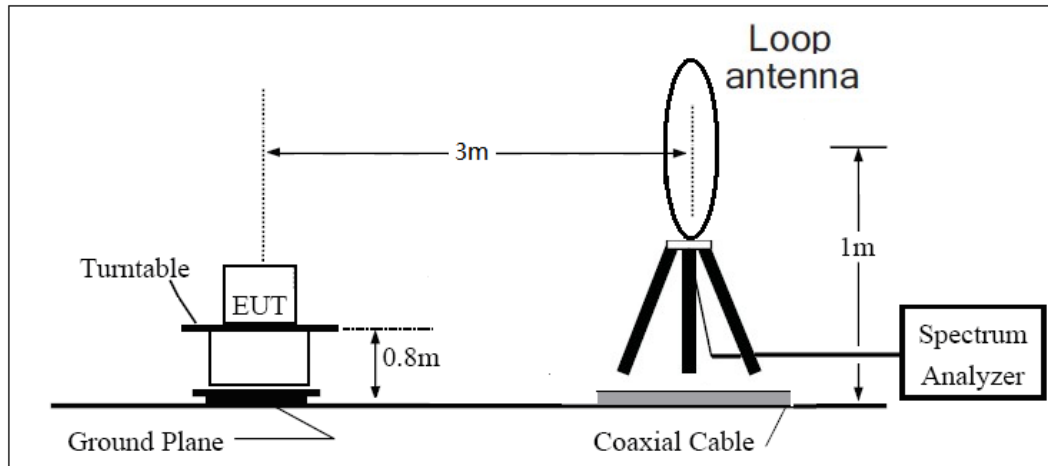
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi)

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

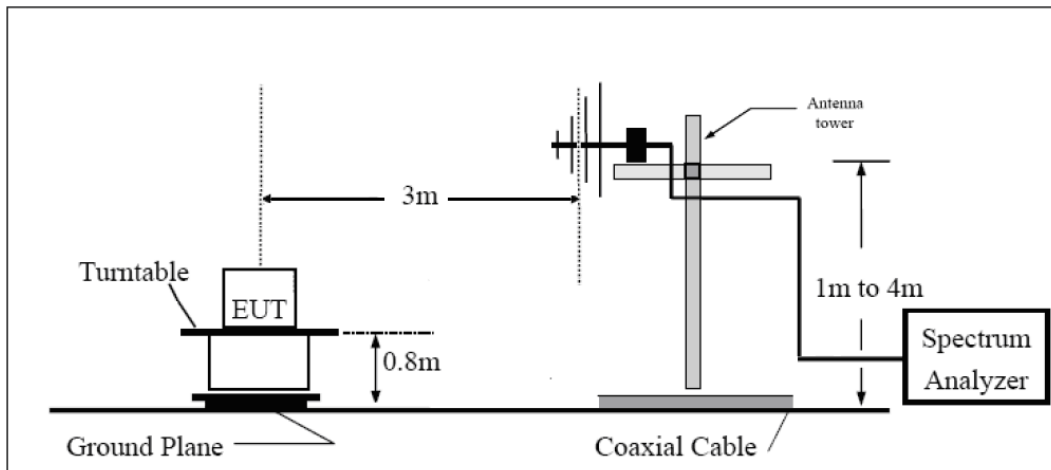
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

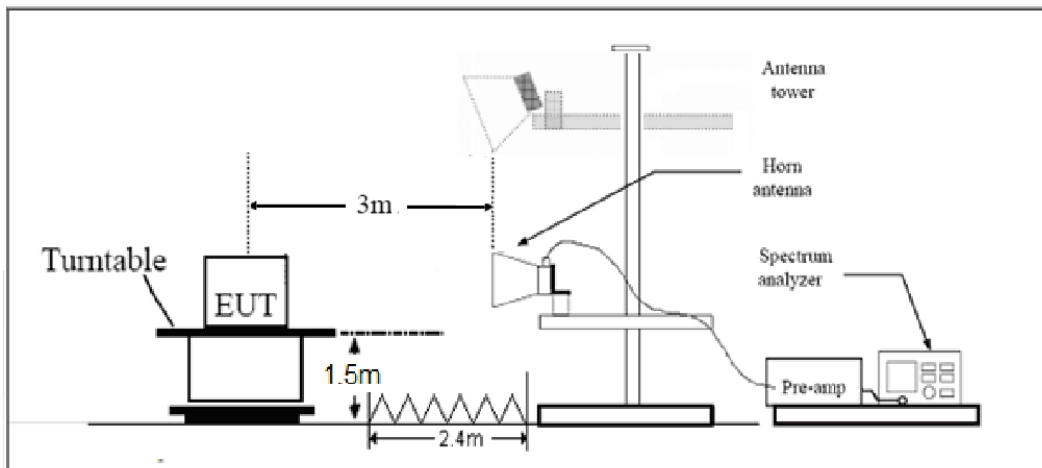
9KHz ~ 30MHz



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
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U = 3.55$ 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	3760.0	-61.05	5.10	11.05	Horizontal	-55.10	-13.00	42.10	45
3	5640.0	-60.75	5.42	12.65	Horizontal	-53.52	-13.00	40.52	225
4	7520.0	-57.22	6.70	13.85	Horizontal	-50.07	-13.00	37.07	0
5	9400.0	-56.36	7.01	14.75	Horizontal	-48.62	-13.00	35.62	90
6	11280.0	-54.84	7.48	15.95	Horizontal	-46.37	-13.00	33.37	315
7	13160.0	-54.19	7.51	16.55	Horizontal	-45.15	-13.00	32.15	180
8	15040.0	-52.48	8.24	15.35	Horizontal	-45.37	-13.00	32.37	270
9	16920.0	-46.34	8.41	14.95	Horizontal	-39.80	-13.00	26.80	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.

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	-66.84	5.10	11.05	Horizontal	-60.89	-13.00	47.89	225
3	5640.0	-73.64	5.42	12.65	Horizontal	-66.41	-13.00	53.41	0
4	7520.0	-68.17	6.70	13.85	Horizontal	-61.02	-13.00	48.02	315
5	9400.0	-65.55	7.01	14.75	Horizontal	-57.81	-13.00	44.81	180
6	11280.0	-64.96	7.48	15.95	Horizontal	-56.49	-13.00	43.49	90
7	13160.0	-65.35	7.51	16.55	Horizontal	-56.31	-13.00	43.31	135
8	15040.0	-63.37	8.24	15.35	Horizontal	-56.26	-13.00	43.26	45
9	16920.0	-60.86	8.41	14.95	Horizontal	-54.32	-13.00	41.32	270
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	3759.0	-56.06	5.10	11.05	Horizontal	-50.11	-13.00	37.11	0
3	5638.9	-64.04	5.42	12.65	Horizontal	-56.81	-13.00	43.81	135
4	7520.0	-59.51	6.70	13.85	Horizontal	-52.36	-13.00	39.36	180
5	9400.0	-55.58	7.01	14.75	Horizontal	-47.84	-13.00	34.84	90
6	11280.0	-56.97	7.48	15.95	Horizontal	-48.50	-13.00	35.50	315
7	13160.0	-56.85	7.51	16.55	Horizontal	-47.81	-13.00	34.81	270
8	15040.0	-52.80	8.24	15.35	Horizontal	-45.69	-13.00	32.69	225
9	16920.0	-51.28	8.41	14.95	Horizontal	-44.74	-13.00	31.74	45
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 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	3755.6	-58.45	5.10	11.05	Horizontal	-52.50	-13.00	39.50	135
3	5633.6	-64.71	5.42	12.65	Horizontal	-57.48	-13.00	44.48	225
4	7520.0	-60.25	6.70	13.85	Horizontal	-53.10	-13.00	40.10	180
5	9400.0	-55.96	7.01	14.75	Horizontal	-48.22	-13.00	35.22	0
6	11280.0	-56.61	7.48	15.95	Horizontal	-48.14	-13.00	35.14	90
7	13160.0	-56.93	7.51	16.55	Horizontal	-47.89	-13.00	34.89	315
8	15040.0	-54.68	8.24	15.35	Horizontal	-47.57	-13.00	34.57	270
9	16920.0	-51.38	8.41	14.95	Horizontal	-44.84	-13.00	31.84	90
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 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	3742.1	-58.87	5.10	11.05	Horizontal	-52.92	-13.00	39.92	135
3	5613.4	-63.91	5.42	12.65	Horizontal	-56.68	-13.00	43.68	180
4	7484.6	-59.86	6.70	13.85	Horizontal	-52.71	-13.00	39.71	45
5	9400.0	-55.90	7.01	14.75	Horizontal	-48.16	-13.00	35.16	225
6	11280.0	-56.35	7.48	15.95	Horizontal	-47.88	-13.00	34.88	180
7	13160.0	-56.78	7.51	16.55	Horizontal	-47.74	-13.00	34.74	315
8	15040.0	-54.98	8.24	15.35	Horizontal	-47.87	-13.00	34.87	225
9	16920.0	-51.79	8.41	14.95	Horizontal	-45.25	-13.00	32.25	180
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.

6 Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMU200	118133	2019-05-19	2020-05-18
Base Station Simulator	R&S	CMW500	113824	2019-05-19	2020-05-18
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Key sight	N9010A	MY50210259	2019-05-19	2020-05-18
Universal Radio Communication Tester	Key sight	E5515C	MY48367192	2019-05-19	2020-05-18
Signal Analyzer	R&S	FSV30	100815	2018-12-16	2019-12-15
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2017-09-26	2020-09-25
Trilog Antenna	SCHWARZBECK	VUBL 9163	9163-201	2017-11-18	2019-11-17
Horn Antenna	R&S	HF907	100126	2018-07-07	2020-07-06
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2020-06-19
Signal generator	R&S	SMB 100A	102594	2019-05-19	2020-05-18
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
Preamplifier	R&S	SCU18	102327	2019-05-19	2020-05-18
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2019-05-19	2020-05-18
RF Cable	Agilent	SMA 15cm	0001	2019-06-14	2019-12-13
Software	R&S	EMC32	9.26.0	/	/

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