RF TEST REPORT

Applicant	Huawei Technologies Co., Ltd.
FCC ID	QISB612-533
Product	LTE CPE
Model	B612-533
Report No.	R1910H0207-R1
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 22H (2018)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Performed by: Peng Tao

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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 22.913(a)(5)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	2.1051 / 22.917(a)	PASS
4	Peak-to-Average Power Ratio	22.913(d)/ KDB 971168 D01(5.7)	PASS
5	Frequency Stability	2.1055 / 22.355	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 / 22.917(a)	PASS
7	Radiates Spurious Emission	2.1053 / 22.917 (a)	PASS
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
City:	Shanghai
Post code:	201201
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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: 1 dBi External Antenna 1: 3 dBi External Antenna 2: 1 dBi		
Test Mode(s)	GSM 850; WCDMA Band V; LTE Band 5;		
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.R.P.	GSM 850:	35.02 dBm	
	WCDMA Band V:	25.58 dBm	
	LTE Band 5:	24.45 dBm	
Rated Power Supply Voltage	12V		
Extreme Voltage	Minimum: 10.8V Maximum: 13.2V		
Extreme Temperature	Lowest: 0°C Highest: +40°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824 ~ 849	869 ~ 894
	WCDMA Band V	824 ~ 849	869 ~ 894

	LTE Band 5	824 ~ 849	869 ~ 894
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: 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 22H (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 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 850	WCDMA Band V
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 as the worst case configuration below for LTE Band 5.

Test items	Bandwidth (MHz)				Modulation		RB		Test Channel		
	1.4	3	5	10	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
Occupied Bandwidth	O	O	O	O	O	O	-	O	O	O	O
Band Edge Compliance	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
Frequency Stability	O	O	O	O	O	O	-	O	O	O	O
Spurious Emissions at Antenna Terminals	O	O	O	O	O	-	-	O	O	O	O
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

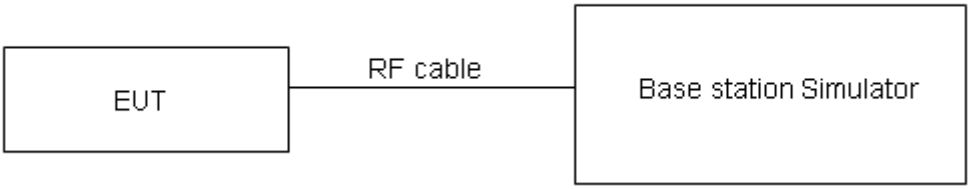
Methods of Measurement

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

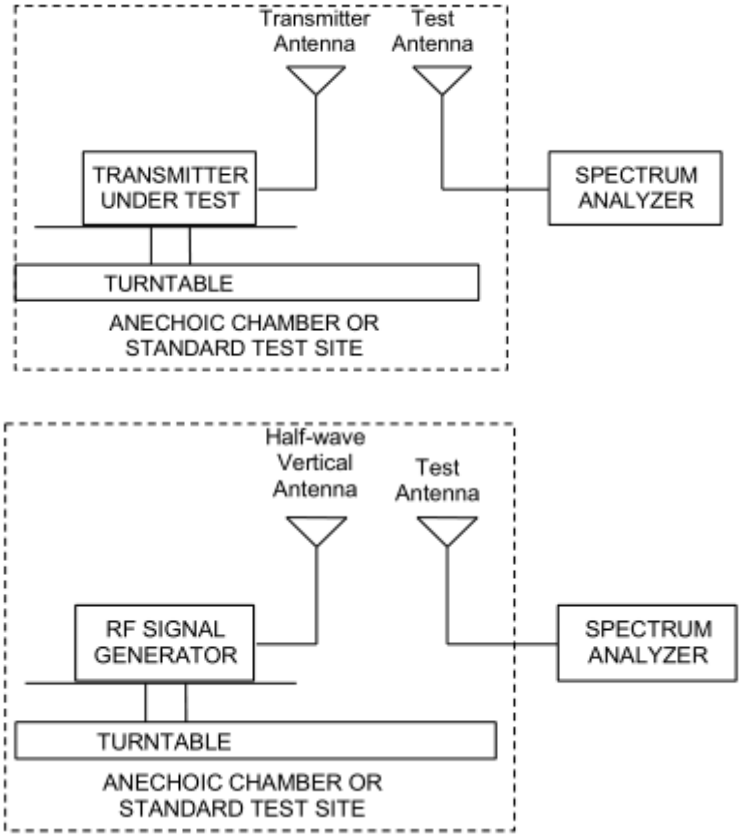
The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).
a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.
b) Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).
c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.
d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading.LOSS = Generator Output Power (dBm) – Analyzer reading (dBm)
e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:ERP (dBm) = LVL (dBm) + LOSS (dB)
f) The maximum ERP is the maximum value determined in the preceding step.
g) When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g.transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:
EIRP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBi)
where:dBd refers to gain relative to an ideal dipole.
EIRP (dBm) = ERP (dBm) + 2.15 (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 22.913(a)(5) specifies that "Mobile/portable stations are limited to 7 watts ERP".

Limit	≤ 7 W (38.45 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 dB for RF power output, *k* = 2, *U*= 1.19 dB for ERP .

Test Results

GSM 850		Conducted Power (dBm)			Internal Antenna ERP (dBm)			External Antenna 1 ERP (dBm)			External Antenna 2 ERP (dBm)		
		Channel 128	Channel 190	Channel 251	Channel 128	Channel 190	Channel 251	Channel 128	Channel 190	Channel 251	Channel 128	Channel 190	Channel 251
		824.2 (MHz)	836.6 (MHz)	848.8 (MHz)	824.2 (MHz)	836.6 (MHz)	848.8 (MHz)	824.2 (MHz)	836.6 (MHz)	848.8 (MHz)	824.2 (MHz)	836.6 (MHz)	848.8 (MHz)
GSM	Results	32.01	31.85	31.81	30.86	30.70	30.66	35.01	34.85	34.81	33.01	32.85	32.81
GPRS/ EGPRS (GMSK)	1TXslot	32.02	31.74	31.74	30.87	30.59	30.59	35.02	34.74	34.74	33.02	32.74	32.74
	2TXslots	29.95	29.67	29.64	28.80	28.52	28.49	32.95	32.67	32.64	30.95	30.67	30.64
	3TXslots	27.27	27.05	27.03	26.12	25.90	25.88	30.27	30.05	30.03	28.27	28.05	28.03
	4TXslots	26.88	26.37	26.45	25.73	25.22	25.30	29.88	29.37	29.45	27.88	27.37	27.45
EGPRS (8PSK)	1TXslot	26.91	26.60	27.00	25.76	25.45	25.85	29.91	29.60	30.00	27.91	27.60	28.00
	2TXslots	23.67	23.41	23.32	22.52	22.26	22.17	26.67	26.41	26.32	24.67	24.41	24.32
	3TXslots	21.74	21.52	21.50	20.59	20.37	20.35	24.74	24.52	24.50	22.74	22.52	22.50
	4TXslots	19.74	19.53	19.47	18.59	18.38	18.32	22.74	22.53	22.47	20.74	20.53	20.47

WCDMA Band V		Conducted Power (dBm)			Internal Antenna ERP (dBm)			External Antenna 1 ERP (dBm)			External Antenna 2 ERP (dBm)		
		Channel 4132	Channel 4183	Channel 4233	Channel 4132	Channel 4183	Channel 4233	Channel 4132	Channel 4183	Channel 4233	Channel 4132	Channel 4183	Channel 4233
		826.4 (MHz)	836.6 (MHz)	846.6 (MHz)	826.4 (MHz)	836.6 (MHz)	846.6 (MHz)	826.4 (MHz)	836.6 (MHz)	846.6 (MHz)	826.4 (MHz)	836.6 (MHz)	846.6 (MHz)
RMC		22.30	22.58	22.26	21.15	21.43	21.11	25.30	25.58	22.26	23.30	23.58	23.26
HSDPA	Sub-Test 1	21.76	22.00	21.70	20.61	20.85	20.55	24.76	25.00	21.70	22.76	23.00	22.70
	Sub-Test 2	21.75	22.02	21.67	20.6	20.87	20.52	24.75	25.02	21.67	22.75	23.02	22.67
	Sub-Test 3	21.22	21.52	21.19	20.07	20.37	20.04	24.22	24.52	21.19	22.22	22.52	22.19
	Sub-Test 4	21.23	21.53	21.17	20.08	20.38	20.02	24.23	24.53	21.17	22.23	22.53	22.17
HSUPA	Sub-Test 1	21.72	21.99	21.65	20.57	20.84	20.5	24.72	24.99	21.65	22.72	22.99	22.65
	Sub-Test 2	20.71	20.97	20.64	19.56	19.82	19.49	23.71	23.97	20.64	21.71	21.97	21.64
	Sub-Test 3	21.18	21.45	21.13	20.03	20.3	19.98	24.18	24.45	21.13	22.18	22.45	22.13
	Sub-Test 4	20.64	20.94	20.61	19.49	19.79	19.46	23.64	23.94	20.61	21.64	21.94	21.61
	Sub-Test 5	21.65	21.92	21.59	20.5	20.77	20.44	24.65	24.92	21.59	22.65	22.92	22.59
DC-HSDPA	Sub-Test 1	21.64	21.94	21.60	20.49	20.79	20.45	24.64	24.94	21.60	22.64	22.94	22.60
	Sub-Test 2	21.63	21.93	21.59	20.48	20.78	20.44	24.63	24.93	21.59	22.63	22.93	22.59
	Sub-Test 3	21.21	21.42	21.10	20.06	20.27	19.95	24.21	24.42	21.10	22.21	22.42	22.10
	Sub-Test 4	21.20	21.41	21.09	20.05	20.26	19.94	24.20	24.41	21.09	22.20	22.41	22.09

LTE Band 5

BAND	Bandwidth	Modulation	Channel	RB Configuration	Conducted Power (dBm)	Internal Antenna ERP	External Antenna 1 ERP	External Antenna 2 ERP
LTE Band 5	1.4M	QPSK	20407	1RB#0	22.86	21.71	23.71	21.71
LTE Band 5	1.4M	QPSK	20407	1RB#2	23.15	22.00	24.00	22.00
LTE Band 5	1.4M	QPSK	20407	1RB#5	23.14	21.99	23.99	21.99
LTE Band 5	1.4M	QPSK	20407	3RB#0	21.84	20.69	22.69	20.69
LTE Band 5	1.4M	QPSK	20407	3RB#2	21.85	20.70	22.70	20.70
LTE Band 5	1.4M	QPSK	20407	3RB#3	22.04	20.89	22.89	20.89
LTE Band 5	1.4M	QPSK	20407	6RB#0	21.85	20.70	22.70	20.70
LTE Band 5	1.4M	QPSK	20525	1RB#0	23.23	22.08	24.08	22.08
LTE Band 5	1.4M	QPSK	20525	1RB#2	23.60	22.45	24.45	22.45
LTE Band 5	1.4M	QPSK	20525	1RB#5	22.38	21.23	23.23	21.23
LTE Band 5	1.4M	QPSK	20525	3RB#0	22.57	21.42	23.42	21.42
LTE Band 5	1.4M	QPSK	20525	3RB#2	22.52	21.37	23.37	21.37
LTE Band 5	1.4M	QPSK	20525	3RB#3	22.11	20.96	22.96	20.96
LTE Band 5	1.4M	QPSK	20525	6RB#0	22.37	21.22	23.22	21.22
LTE Band 5	1.4M	QPSK	20643	1RB#0	22.84	21.69	23.69	21.69
LTE Band 5	1.4M	QPSK	20643	1RB#2	23.04	21.89	23.89	21.89
LTE Band 5	1.4M	QPSK	20643	1RB#5	22.83	21.68	23.68	21.68
LTE Band 5	1.4M	QPSK	20643	3RB#0	21.90	20.75	22.75	20.75
LTE Band 5	1.4M	QPSK	20643	3RB#2	21.94	20.79	22.79	20.79
LTE Band 5	1.4M	QPSK	20643	3RB#3	21.93	20.78	22.78	20.78
LTE Band 5	1.4M	QPSK	20643	6RB#0	21.87	20.72	22.72	20.72
LTE Band 5	1.4M	16QAM	20407	1RB#0	21.91	20.76	22.76	20.76
LTE Band 5	1.4M	16QAM	20407	1RB#2	22.22	21.07	23.07	21.07
LTE Band 5	1.4M	16QAM	20407	1RB#5	22.16	21.01	23.01	21.01
LTE Band 5	1.4M	16QAM	20407	3RB#0	21.80	20.65	22.65	20.65
LTE Band 5	1.4M	16QAM	20407	3RB#2	21.95	20.80	22.80	20.80
LTE Band 5	1.4M	16QAM	20407	3RB#3	22.02	20.87	22.87	20.87
LTE Band 5	1.4M	16QAM	20407	6RB#0	21.84	20.69	22.69	20.69
LTE Band 5	1.4M	16QAM	20525	1RB#0	22.34	21.19	23.19	21.19
LTE Band 5	1.4M	16QAM	20525	1RB#2	22.82	21.67	23.67	21.67
LTE Band 5	1.4M	16QAM	20525	1RB#5	21.68	20.53	22.53	20.53
LTE Band 5	1.4M	16QAM	20525	3RB#0	22.46	21.31	23.31	21.31
LTE Band 5	1.4M	16QAM	20525	3RB#2	22.38	21.23	23.23	21.23
LTE Band 5	1.4M	16QAM	20525	3RB#3	22.00	20.85	22.85	20.85
LTE Band 5	1.4M	16QAM	20525	6RB#0	22.22	21.07	23.07	21.07
LTE Band 5	1.4M	16QAM	20643	1RB#0	22.02	20.87	22.87	20.87

LTE Band 5	1.4M	16QAM	20643	1RB#2	22.18	21.03	23.03	21.03
LTE Band 5	1.4M	16QAM	20643	1RB#5	21.97	20.82	22.82	20.82
LTE Band 5	1.4M	16QAM	20643	3RB#0	21.87	20.72	22.72	20.72
LTE Band 5	1.4M	16QAM	20643	3RB#2	21.92	20.77	22.77	20.77
LTE Band 5	1.4M	16QAM	20643	3RB#3	21.93	20.78	22.78	20.78
LTE Band 5	1.4M	16QAM	20643	6RB#0	21.85	20.70	22.70	20.70
LTE Band 5	3M	QPSK	20415	1RB#0	22.81	21.66	23.66	21.66
LTE Band 5	3M	QPSK	20415	1RB#7	23.09	21.94	23.94	21.94
LTE Band 5	3M	QPSK	20415	1RB#14	23.07	21.92	23.92	21.92
LTE Band 5	3M	QPSK	20415	8RB#0	21.77	20.62	22.62	20.62
LTE Band 5	3M	QPSK	20415	8RB#4	21.81	20.66	22.66	20.66
LTE Band 5	3M	QPSK	20415	8RB#7	21.97	20.82	22.82	20.82
LTE Band 5	3M	QPSK	20415	15RB#0	21.83	20.68	22.68	20.68
LTE Band 5	3M	QPSK	20525	1RB#0	23.10	21.95	23.95	21.95
LTE Band 5	3M	QPSK	20525	1RB#7	23.56	22.41	24.41	22.41
LTE Band 5	3M	QPSK	20525	1RB#14	22.30	21.15	23.15	21.15
LTE Band 5	3M	QPSK	20525	8RB#0	22.53	21.38	23.38	21.38
LTE Band 5	3M	QPSK	20525	8RB#4	22.48	21.33	23.33	21.33
LTE Band 5	3M	QPSK	20525	8RB#7	22.03	20.88	22.88	20.88
LTE Band 5	3M	QPSK	20525	15RB#0	22.29	21.14	23.14	21.14
LTE Band 5	3M	QPSK	20635	1RB#0	22.78	21.63	23.63	21.63
LTE Band 5	3M	QPSK	20635	1RB#7	22.98	21.83	23.83	21.83
LTE Band 5	3M	QPSK	20635	1RB#14	22.73	21.58	23.58	21.58
LTE Band 5	3M	QPSK	20635	8RB#0	21.84	20.69	22.69	20.69
LTE Band 5	3M	QPSK	20635	8RB#4	21.89	20.74	22.74	20.74
LTE Band 5	3M	QPSK	20635	8RB#7	21.94	20.79	22.79	20.79
LTE Band 5	3M	QPSK	20635	15RB#0	21.88	20.73	22.73	20.73
LTE Band 5	3M	16QAM	20415	1RB#0	21.88	20.73	22.73	20.73
LTE Band 5	3M	16QAM	20415	1RB#7	22.20	21.05	23.05	21.05
LTE Band 5	3M	16QAM	20415	1RB#14	22.14	20.99	22.99	20.99
LTE Band 5	3M	16QAM	20415	8RB#0	21.77	20.62	22.62	20.62
LTE Band 5	3M	16QAM	20415	8RB#4	21.92	20.77	22.77	20.77
LTE Band 5	3M	16QAM	20415	8RB#7	21.97	20.82	22.82	20.82
LTE Band 5	3M	16QAM	20415	15RB#0	21.82	20.67	22.67	20.67
LTE Band 5	3M	16QAM	20525	1RB#0	22.31	21.16	23.16	21.16
LTE Band 5	3M	16QAM	20525	1RB#7	22.77	21.62	23.62	21.62
LTE Band 5	3M	16QAM	20525	1RB#14	21.61	20.46	22.46	20.46
LTE Band 5	3M	16QAM	20525	8RB#0	22.43	21.28	23.28	21.28
LTE Band 5	3M	16QAM	20525	8RB#4	22.33	21.18	23.18	21.18
LTE Band 5	3M	16QAM	20525	8RB#7	22.00	20.85	22.85	20.85

LTE Band 5	3M	16QAM	20525	15RB#0	22.22	21.07	23.07	21.07
LTE Band 5	3M	16QAM	20635	1RB#0	21.97	20.82	22.82	20.82
LTE Band 5	3M	16QAM	20635	1RB#7	22.14	20.99	22.99	20.99
LTE Band 5	3M	16QAM	20635	1RB#14	21.93	20.78	22.78	20.78
LTE Band 5	3M	16QAM	20635	8RB#0	21.83	20.68	22.68	20.68
LTE Band 5	3M	16QAM	20635	8RB#4	21.86	20.71	22.71	20.71
LTE Band 5	3M	16QAM	20635	8RB#7	21.90	20.75	22.75	20.75
LTE Band 5	3M	16QAM	20635	15RB#0	21.83	20.68	22.68	20.68
LTE Band 5	5M	QPSK	20425	1RB#0	22.80	21.65	23.65	21.65
LTE Band 5	5M	QPSK	20425	1RB#13	23.07	21.92	23.92	21.92
LTE Band 5	5M	QPSK	20425	1RB#24	23.04	21.89	23.89	21.89
LTE Band 5	5M	QPSK	20425	12RB#0	21.75	20.60	22.60	20.60
LTE Band 5	5M	QPSK	20425	12RB#6	21.78	20.63	22.63	20.63
LTE Band 5	5M	QPSK	20425	12RB#13	21.94	20.79	22.79	20.79
LTE Band 5	5M	QPSK	20425	25RB#0	21.81	20.66	22.66	20.66
LTE Band 5	5M	QPSK	20525	1RB#0	23.06	21.91	23.91	21.91
LTE Band 5	5M	QPSK	20525	1RB#13	23.55	22.40	24.40	22.40
LTE Band 5	5M	QPSK	20525	1RB#24	22.25	21.10	23.10	21.10
LTE Band 5	5M	QPSK	20525	12RB#0	22.49	21.34	23.34	21.34
LTE Band 5	5M	QPSK	20525	12RB#6	22.43	21.28	23.28	21.28
LTE Band 5	5M	QPSK	20525	12RB#13	22.00	20.85	22.85	20.85
LTE Band 5	5M	QPSK	20525	25RB#0	22.25	21.10	23.10	21.10
LTE Band 5	5M	QPSK	20625	1RB#0	22.76	21.61	23.61	21.61
LTE Band 5	5M	QPSK	20625	1RB#13	22.95	21.80	23.80	21.80
LTE Band 5	5M	QPSK	20625	1RB#24	22.69	21.54	23.54	21.54
LTE Band 5	5M	QPSK	20625	12RB#0	21.81	20.66	22.66	20.66
LTE Band 5	5M	QPSK	20625	12RB#6	21.85	20.70	22.70	20.70
LTE Band 5	5M	QPSK	20625	12RB#13	21.90	20.75	22.75	20.75
LTE Band 5	5M	QPSK	20625	25RB#0	21.83	20.68	22.68	20.68
LTE Band 5	5M	16QAM	20425	1RB#0	21.83	20.68	22.68	20.68
LTE Band 5	5M	16QAM	20425	1RB#13	22.18	21.03	23.03	21.03
LTE Band 5	5M	16QAM	20425	1RB#24	22.11	20.96	22.96	20.96
LTE Band 5	5M	16QAM	20425	12RB#0	21.74	20.59	22.59	20.59
LTE Band 5	5M	16QAM	20425	12RB#6	21.89	20.74	22.74	20.74
LTE Band 5	5M	16QAM	20425	12RB#13	21.95	20.80	22.80	20.80
LTE Band 5	5M	16QAM	20425	25RB#0	21.79	20.64	22.64	20.64
LTE Band 5	5M	16QAM	20525	1RB#0	22.29	21.14	23.14	21.14
LTE Band 5	5M	16QAM	20525	1RB#13	22.74	21.59	23.59	21.59
LTE Band 5	5M	16QAM	20525	1RB#24	21.57	20.42	22.42	20.42
LTE Band 5	5M	16QAM	20525	12RB#0	22.41	21.26	23.26	21.26

LTE Band 5	5M	16QAM	20525	12RB#6	22.28	21.13	23.13	21.13
LTE Band 5	5M	16QAM	20525	12RB#13	21.96	20.81	22.81	20.81
LTE Band 5	5M	16QAM	20525	25RB#0	22.17	21.02	23.02	21.02
LTE Band 5	5M	16QAM	20625	1RB#0	21.95	20.80	22.80	20.80
LTE Band 5	5M	16QAM	20625	1RB#13	22.12	20.97	22.97	20.97
LTE Band 5	5M	16QAM	20625	1RB#24	21.90	20.75	22.75	20.75
LTE Band 5	5M	16QAM	20625	12RB#0	21.80	20.65	22.65	20.65
LTE Band 5	5M	16QAM	20625	12RB#6	21.82	20.67	22.67	20.67
LTE Band 5	5M	16QAM	20625	12RB#13	21.87	20.72	22.72	20.72
LTE Band 5	5M	16QAM	20625	25RB#0	21.79	20.64	22.64	20.64
LTE Band 5	10M	QPSK	20450	1RB#0	22.77	21.62	23.62	21.62
LTE Band 5	10M	QPSK	20450	1RB#25	23.06	21.91	23.91	21.91
LTE Band 5	10M	QPSK	20450	1RB#49	23.02	21.87	23.87	21.87
LTE Band 5	10M	QPSK	20450	25RB#0	21.72	20.57	22.57	20.57
LTE Band 5	10M	QPSK	20450	25RB#13	21.76	20.61	22.61	20.61
LTE Band 5	10M	QPSK	20450	25RB#25	21.91	20.76	22.76	20.76
LTE Band 5	10M	QPSK	20450	50RB#0	21.78	20.63	22.63	20.63
LTE Band 5	10M	QPSK	20525	1RB#0	23.02	21.87	23.87	21.87
LTE Band 5	10M	QPSK	20525	1RB#25	23.51	22.36	24.36	22.36
LTE Band 5	10M	QPSK	20525	1RB#49	22.24	21.09	23.09	21.09
LTE Band 5	10M	QPSK	20525	25RB#0	22.44	21.29	23.29	21.29
LTE Band 5	10M	QPSK	20525	25RB#13	22.39	21.24	23.24	21.24
LTE Band 5	10M	QPSK	20525	25RB#25	21.95	20.80	22.80	20.80
LTE Band 5	10M	QPSK	20525	50RB#0	22.20	21.05	23.05	21.05
LTE Band 5	10M	QPSK	20600	1RB#0	22.73	21.58	23.58	21.58
LTE Band 5	10M	QPSK	20600	1RB#25	22.93	21.78	23.78	21.78
LTE Band 5	10M	QPSK	20600	1RB#49	22.66	21.51	23.51	21.51
LTE Band 5	10M	QPSK	20600	25RB#0	21.77	20.62	22.62	20.62
LTE Band 5	10M	QPSK	20600	25RB#13	21.82	20.67	22.67	20.67
LTE Band 5	10M	QPSK	20600	25RB#25	21.86	20.71	22.71	20.71
LTE Band 5	10M	QPSK	20600	50RB#0	21.79	20.64	22.64	20.64
LTE Band 5	10M	16QAM	20450	1RB#0	21.81	20.66	22.66	20.66
LTE Band 5	10M	16QAM	20450	1RB#25	22.14	20.99	22.99	20.99
LTE Band 5	10M	16QAM	20450	1RB#49	22.09	20.94	22.94	20.94
LTE Band 5	10M	16QAM	20450	25RB#0	21.71	20.56	22.56	20.56
LTE Band 5	10M	16QAM	20450	25RB#13	21.86	20.71	22.71	20.71
LTE Band 5	10M	16QAM	20450	25RB#25	21.92	20.77	22.77	20.77
LTE Band 5	10M	16QAM	20450	50RB#0	21.77	20.62	22.62	20.62
LTE Band 5	10M	16QAM	20525	1RB#0	22.25	21.10	23.10	21.10
LTE Band 5	10M	16QAM	20525	1RB#25	22.72	21.57	23.57	21.57

LTE Band 5	10M	16QAM	20525	1RB#49	21.54	20.39	22.39	20.39
LTE Band 5	10M	16QAM	20525	25RB#0	22.37	21.22	23.22	21.22
LTE Band 5	10M	16QAM	20525	25RB#13	22.26	21.11	23.11	21.11
LTE Band 5	10M	16QAM	20525	25RB#25	21.91	20.76	22.76	20.76
LTE Band 5	10M	16QAM	20525	50RB#0	22.13	20.98	22.98	20.98
LTE Band 5	10M	16QAM	20600	1RB#0	21.90	20.75	22.75	20.75
LTE Band 5	10M	16QAM	20600	1RB#25	22.08	20.93	22.93	20.93
LTE Band 5	10M	16QAM	20600	1RB#49	21.88	20.73	22.73	20.73
LTE Band 5	10M	16QAM	20600	25RB#0	21.77	20.62	22.62	20.62
LTE Band 5	10M	16QAM	20600	25RB#13	21.79	20.64	22.64	20.64
LTE Band 5	10M	16QAM	20600	25RB#25	21.83	20.68	22.68	20.68
LTE Band 5	10M	16QAM	20600	50RB#0	21.76	20.61	22.61	20.61

5.2. Occupied Bandwidth

Ambient condition

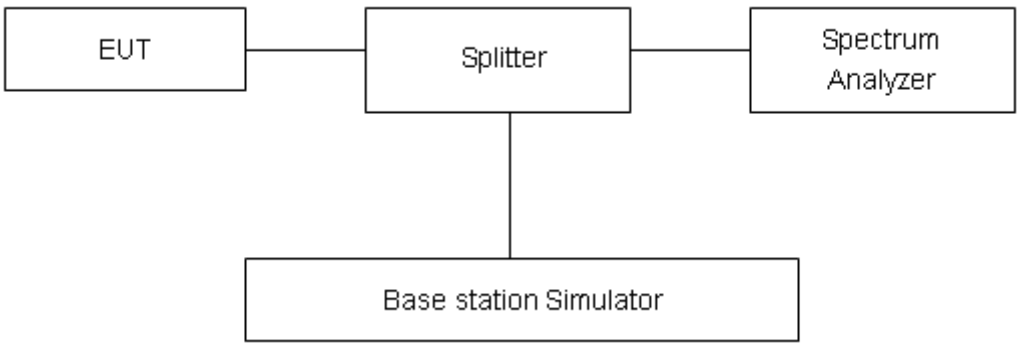
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 850,
RBW is set to 51kHz, VBW is set to 160kHz for WCDMA Band V,
RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 5 (1.4MHz),
RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 5 (3MHz/5MHz),
RBW is set to 300 kHz, VBW is set to 1 MHz for LTE Band 5 (10MHz),

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

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

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

Test Result

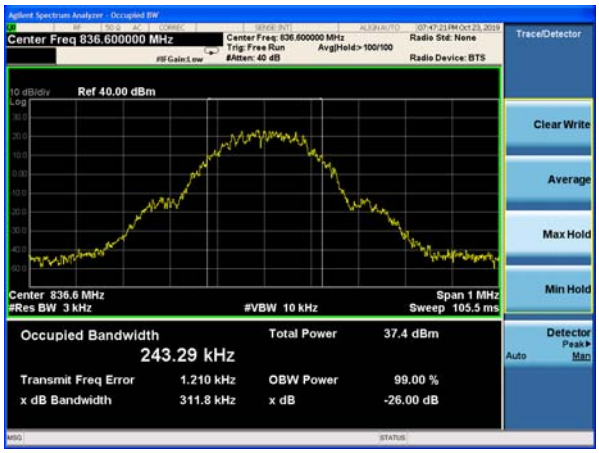
Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GSM 850 (GSM)	128	824.2	0.24361	0.3130
	190	836.6	0.24329	0.3118
	251	848.8	0.24693	0.3159
GPRS 850 (GMSK)	128	824.2	0.24479	0.3107
	190	836.6	0.24477	0.3112
	251	848.8	0.24236	0.3111
EGPRS 850 (8-PSK)	128	824.2	0.25435	0.3292
	190	836.6	0.25711	0.3271
	251	848.8	0.25566	0.3224
WCDMA Band V (RMC)	4132	826.4	4.1530	4.695
	4183	836.6	4.1416	4.665
	4233	846.6	4.1370	4.645

LTE Band 5						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	1.4	20407	824.7	1.1262	1.286
			20525	836.5	1.1243	1.283
			20643	848.3	1.1244	1.287
		3	20415	825.5	2.7386	3.026
			20525	836.5	2.7399	3.049
			20635	847.5	2.7410	3.054
		5	20425	826.5	4.5092	4.955
			20525	836.5	4.5250	4.979
			20625	846.5	4.5237	4.968
		10	20450	829	9.0664	9.998
			20525	836.5	9.0484	10.070
			20600	844	9.0654	9.959
	16QAM	1.4	20407	824.7	1.1318	1.287
			20525	836.5	1.1221	1.278
			20643	848.3	1.1076	1.278
		3	20415	825.5	2.7372	3.026
			20525	836.5	2.7401	3.035
			20635	847.5	2.7549	3.041
		5	20425	826.5	4.5219	4.950
			20525	836.5	4.5086	4.964
			20625	846.5	4.5277	4.975
		10	20450	829	9.0579	10.040
			20525	836.5	9.0534	10.030
			20600	844	9.0495	9.965

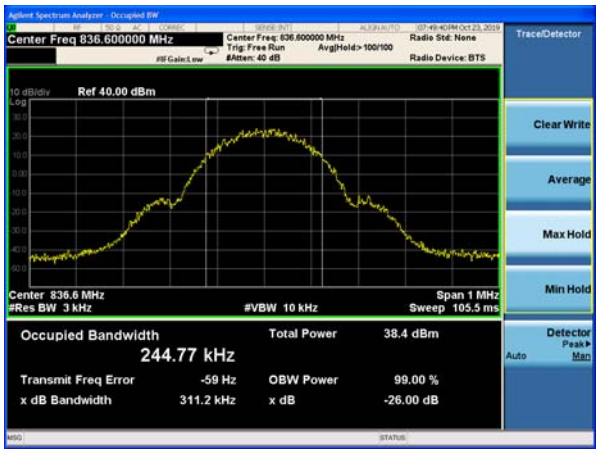
GSM 850 CH-Low

GSM 850 GPRS CH-Low

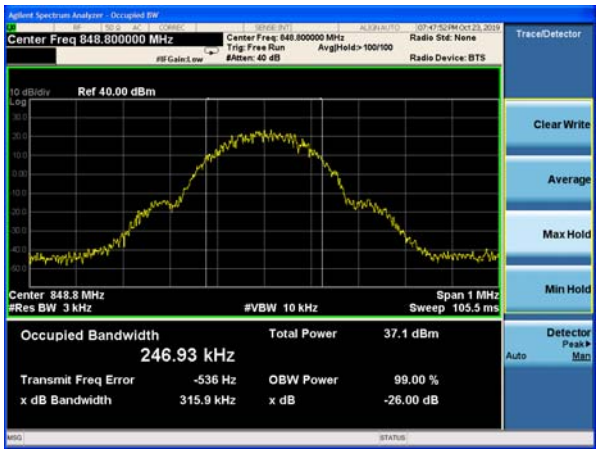
GSM 850 CH-Middle



GSM 850 GPRS CH-Middle

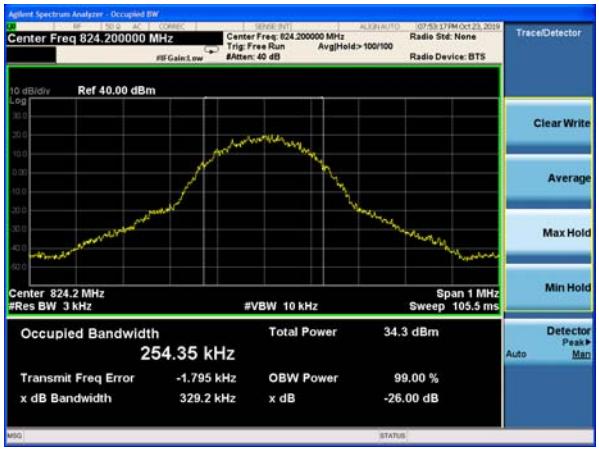


GSM 850 CH-High



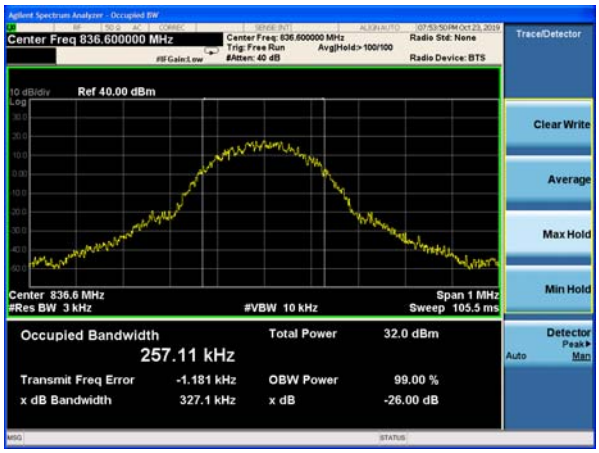
GSM 850 GPRS CH-High

GSM 850 EGPRS CH-Low

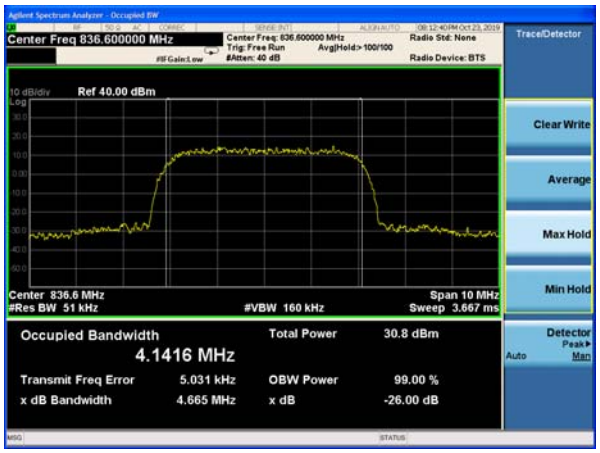


WCDMA Band V CH-Low

GSM 850 EGPRS CH-Middle

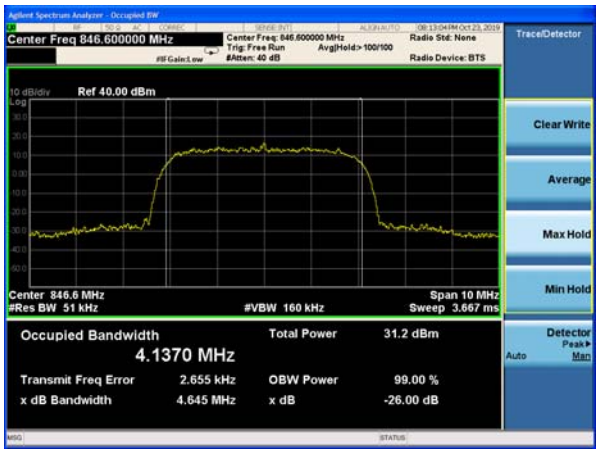


WCDMA Band V CH-Middle



GSM 850 EGPRS CH-High

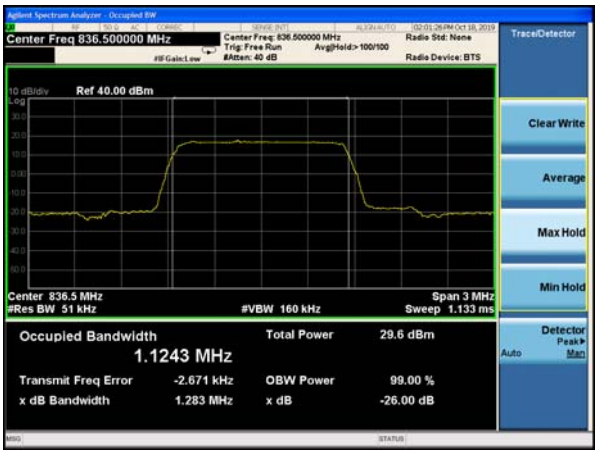
WCDMA Band V CH-High



LTE Band 5 QPSK 1.4MHz CH-Low

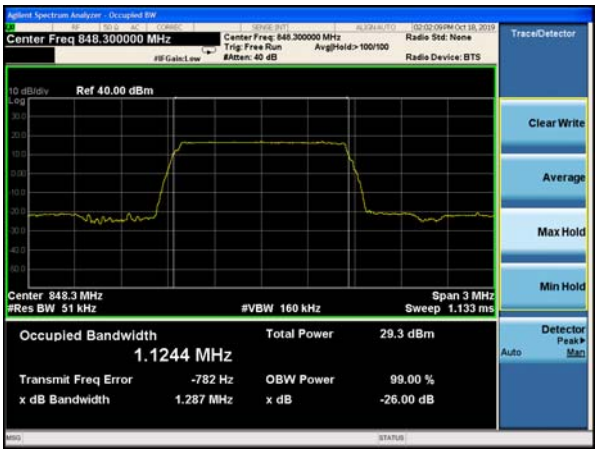
LTE Band 5 QPSK 3MHz CH-Low

LTE Band 5 QPSK 1.4MHz CH-Middle



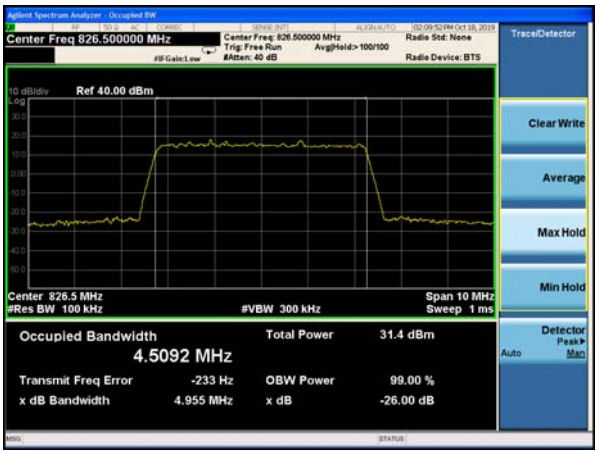
LTE Band 5 QPSK 3MHz CH-Middle

LTE Band 5 QPSK 1.4MHz CH-High

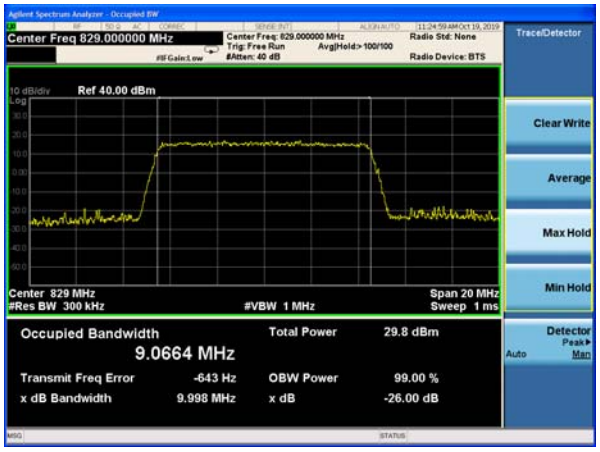


LTE Band 5 QPSK 3MHz CH-High

LTE Band 5 QPSK 5MHz CH-Low

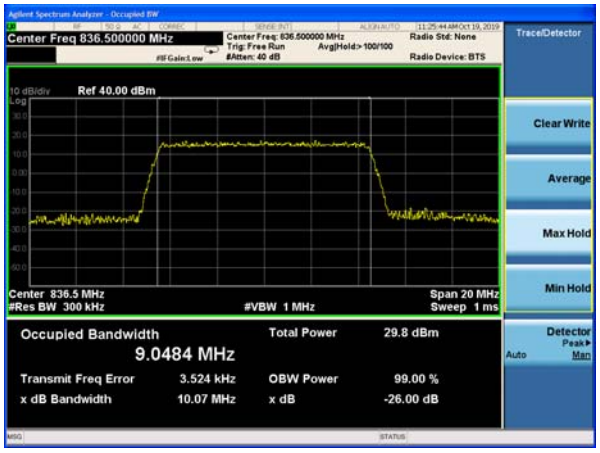


LTE Band 5 QPSK 10MHz CH-Low

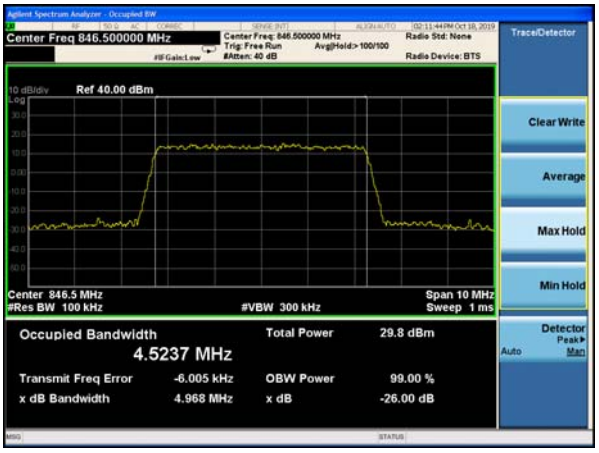


LTE Band 5 QPSK 5MHz CH-Middle

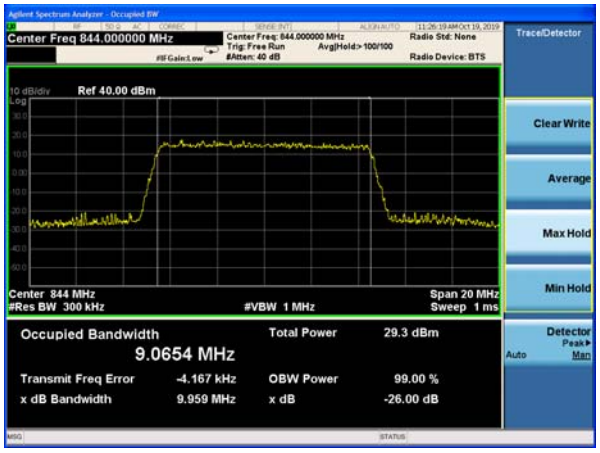
LTE Band 5 QPSK 10MHz CH-Middle



LTE Band 5 QPSK 5MHz CH-High



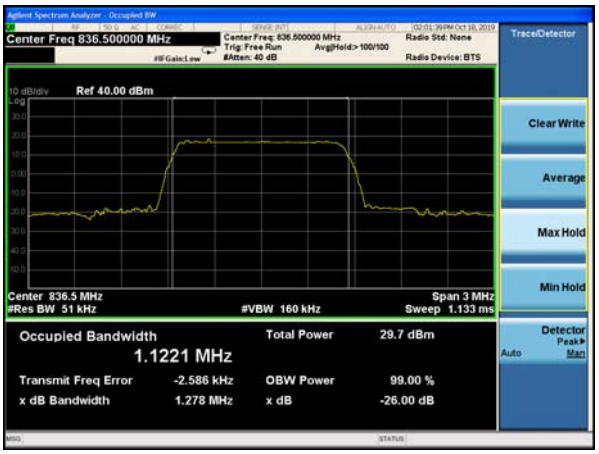
LTE Band 5 QPSK 10MHz CH-High



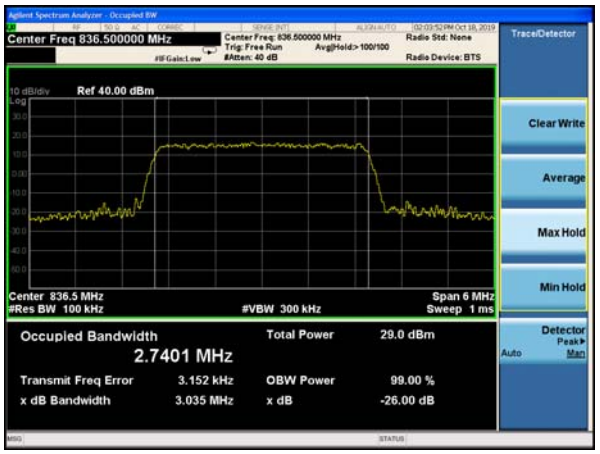
LTE Band 5 16QAM 1.4MHz CH-Low

LTE Band 5 16QAM 3MHz CH-Low

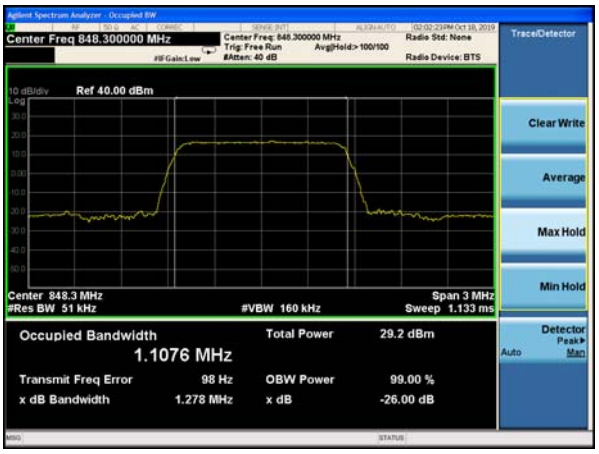
LTE Band 5 16QAM 1.4MHz CH-Middle



LTE Band 5 16QAM 3MHz CH-Middle

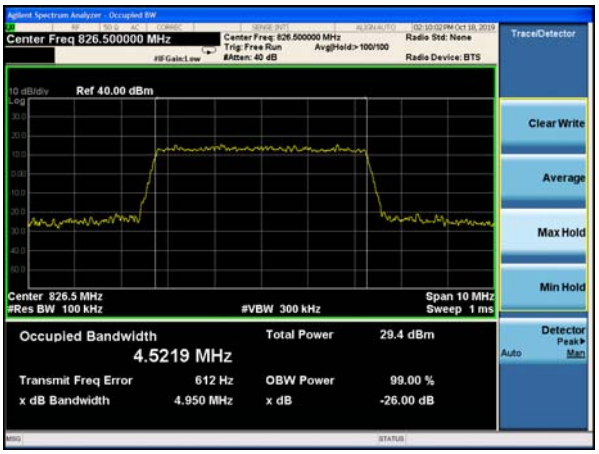


LTE Band 5 16QAM 1.4MHz CH-High



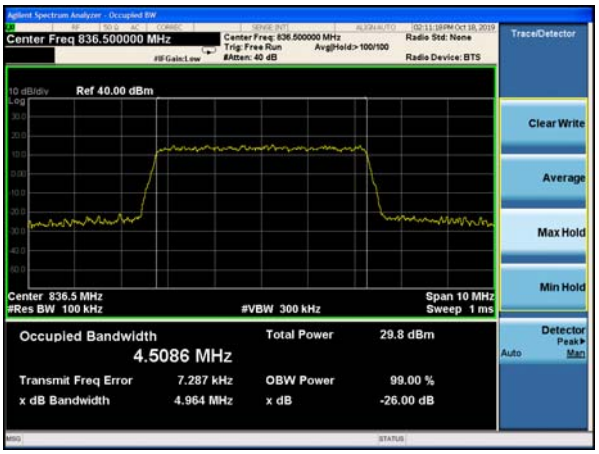
LTE Band 5 16QAM 3MHz CH-High

LTE Band 5 16QAM 5MHz CH-Low

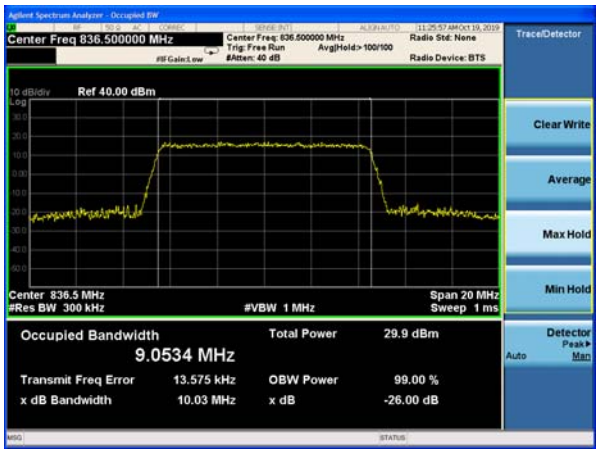


LTE Band 5 16QAM 10MHz CH-Low

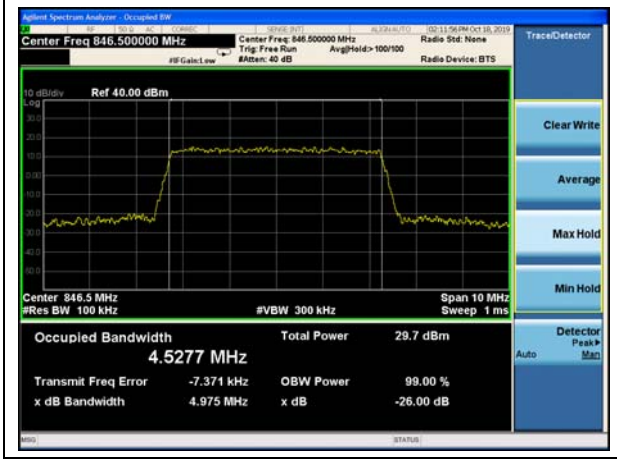
LTE Band 5 16QAM 5MHz CH-Middle



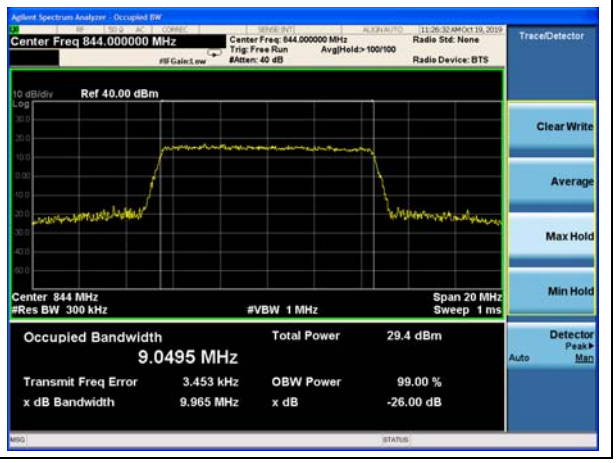
LTE Band 5 16QAM 10MHz CH-Middle



LTE Band 5 16QAM 5MHz CH-High



LTE Band 5 16QAM 10MHz CH-High



5.3. Band Edge Compliance

Ambient condition

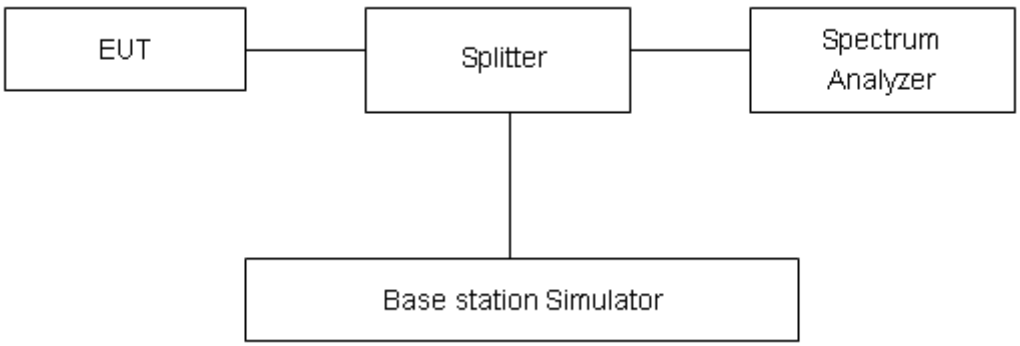
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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.
RBW is set to 3kHz,VBW is set to 10kHz for GSM 850,
RBW is set to 51kHz,VBW is set to 160kHz for WCDMA Band V,
RBW is set to 15 kHz, VBW is set to 51 kHz for LTE Band 5 (1.4MHz),
RBW is set to 30 kHz, VBW is set to 100 kHz for LTE Band 5 (3MHz),
RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 5 (5MHz),
RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 5 (10MHz),

Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.”

Limit	-13 dBm

Measurement Uncertainty

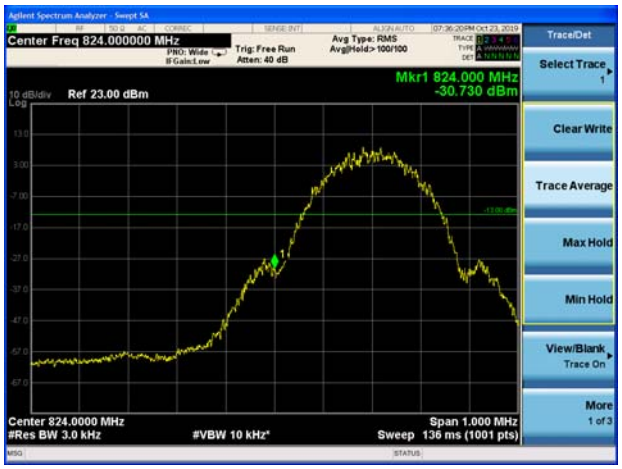
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U=0.684dB.

Test Result:

GSM 850 CH-Low

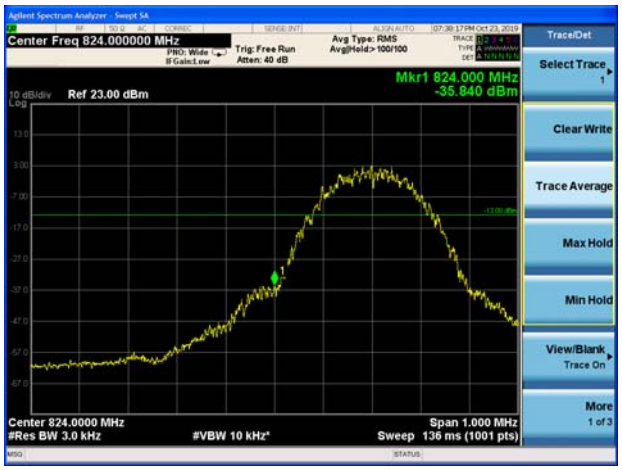
GSM 850 CH-High

GSM 850 GPRS CH-Low



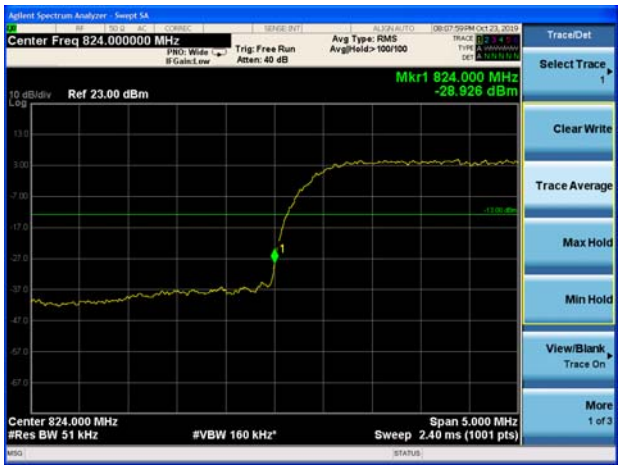
GSM 850 GPRS CH-High

GSM 850 EGPRS CH-Low



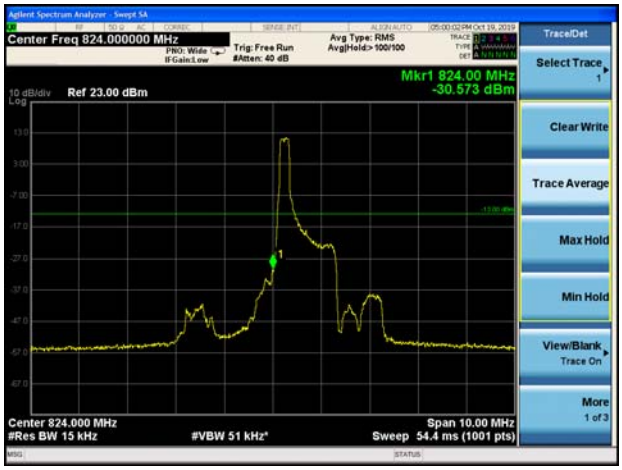
GSM 850 EGPRS CH-High

WCDMA Band V CH-Low

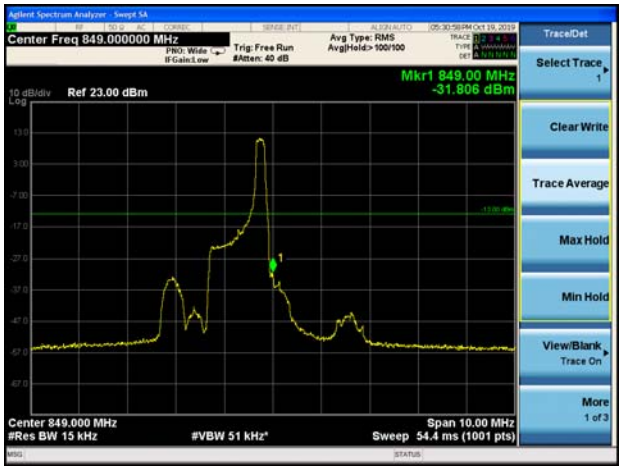


WCDMA Band V CH-High

LTE Band 5 QPSK 1.4MHz CH-Low 1RB



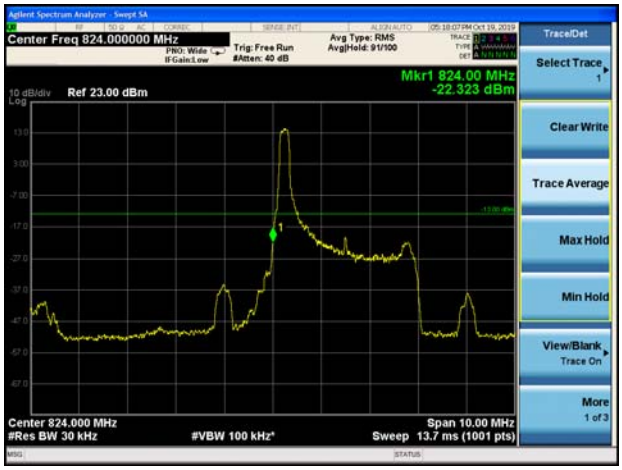
LTE Band 5 QPSK 1.4MHz CH-High 1RB



LTE Band 5 QPSK 1.4MHz CH-Low 100%RB

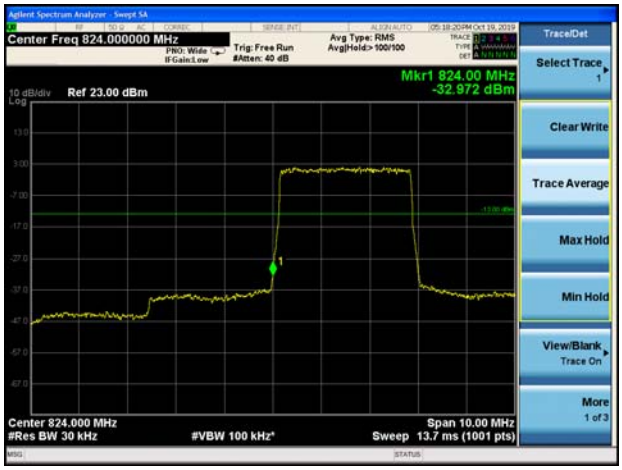
LTE Band 5 QPSK 1.4MHz CH-High 100%RB

LTE Band 5 QPSK 3MHz CH-Low 1RB

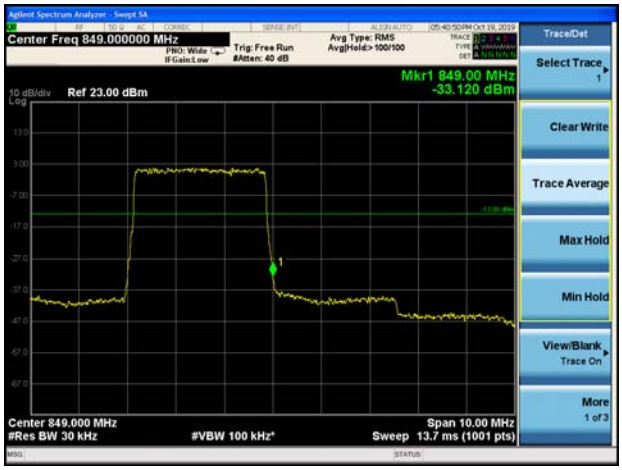


LTE Band 5 QPSK 3MHz CH-High 1RB

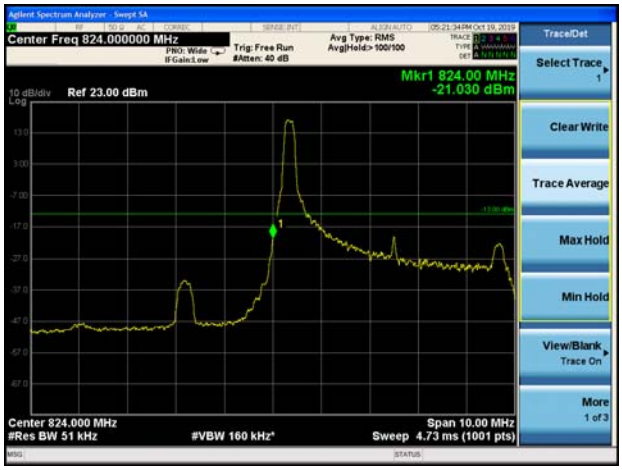
LTE Band 5 QPSK 3MHz CH-Low 100%RB



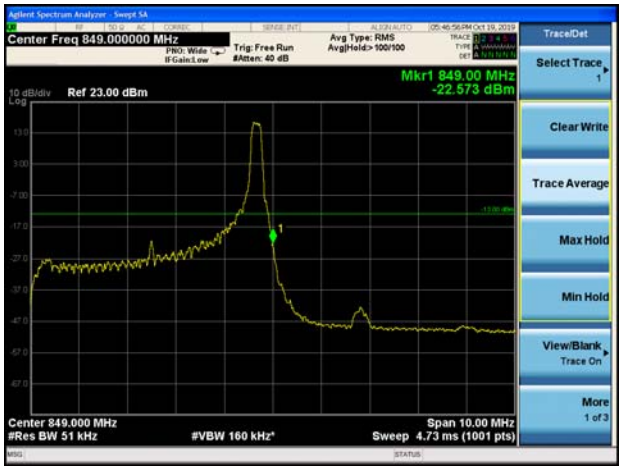
LTE Band 5 QPSK 3MHz CH-High 100%RB



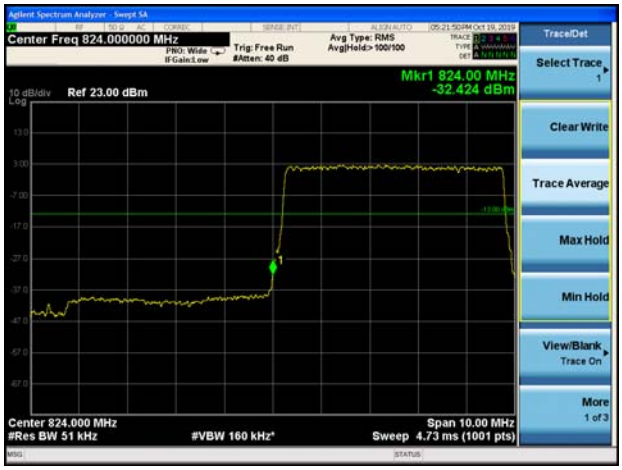
LTE Band 5 QPSK 5MHz CH-Low 1RB



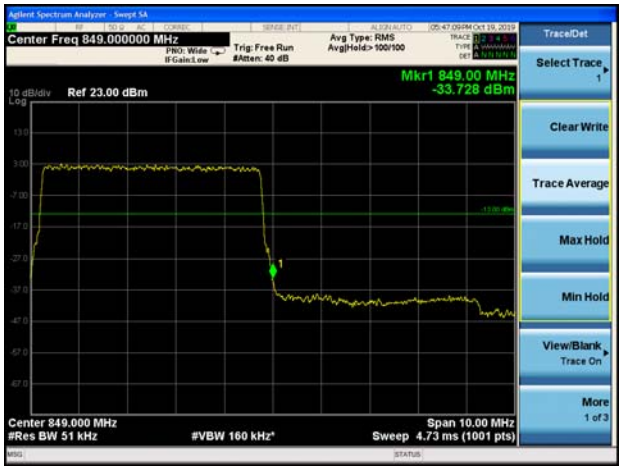
LTE Band 5 QPSK 5MHz CH-High 1RB



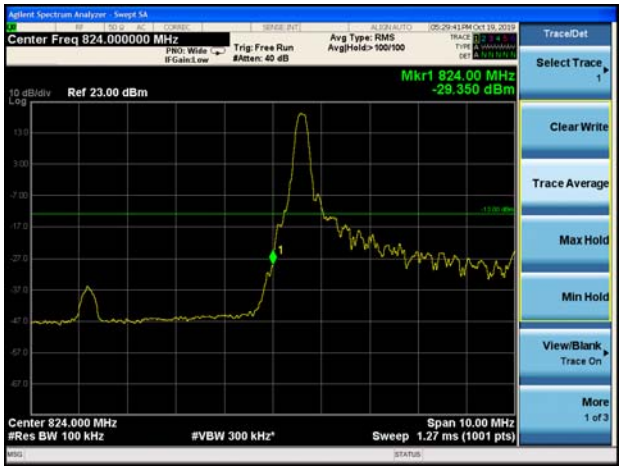
LTE Band 5 QPSK 5MHz CH-Low 100%RB



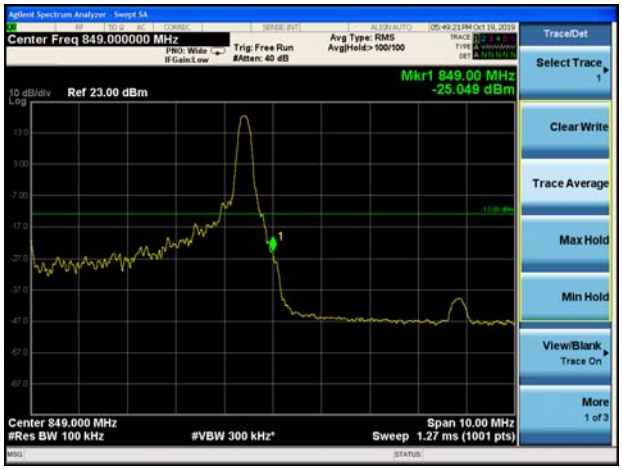
LTE Band 5 QPSK 5MHz CH-High 100%RB



LTE Band 5 QPSK 10MHz CH-Low 1RB



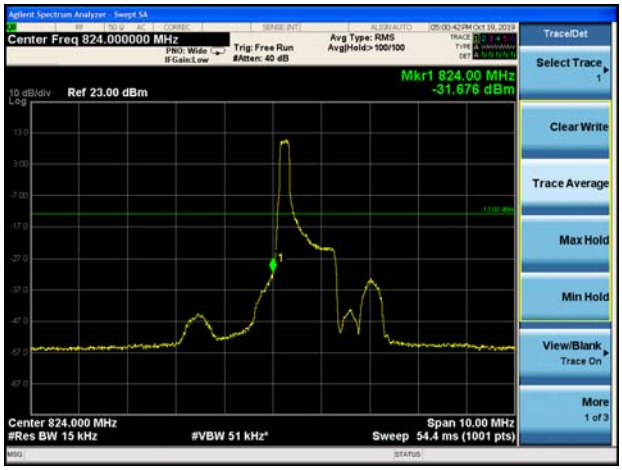
LTE Band 5 QPSK 10MHz CH-High 1RB



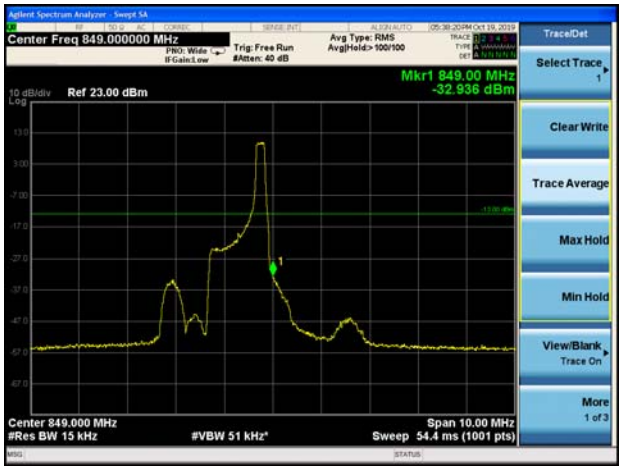
LTE Band 5 QPSK 10MHz CH-Low 100%RB

LTE Band 5 QPSK 10MHz CH-High 100%RB

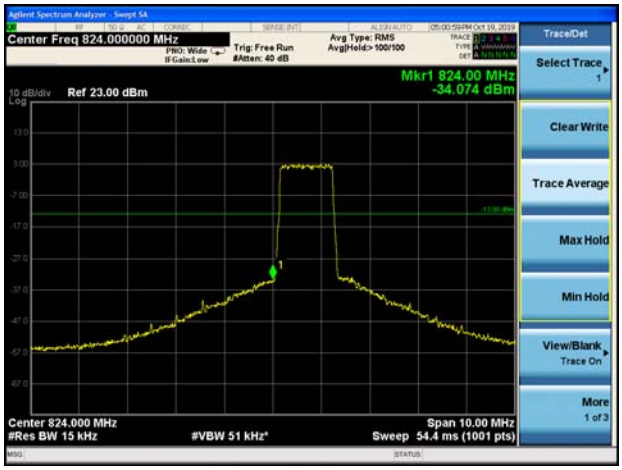
LTE Band 5 16QAM 1.4MHz CH-Low 1RB



LTE Band 5 16QAM 1.4MHz CH-High 1RB

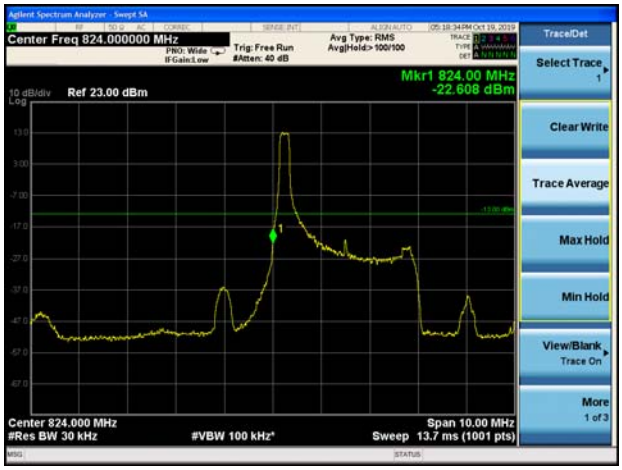


LTE Band 5 16QAM 1.4MHz CH-Low 100%RB

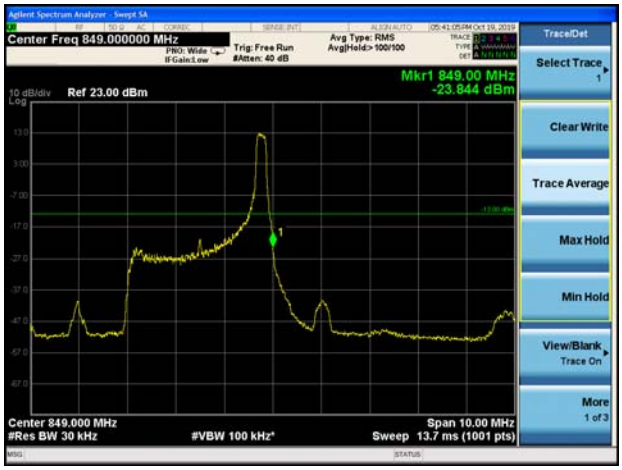


LTE Band 5 16QAM 1.4MHz CH-High 100%RB

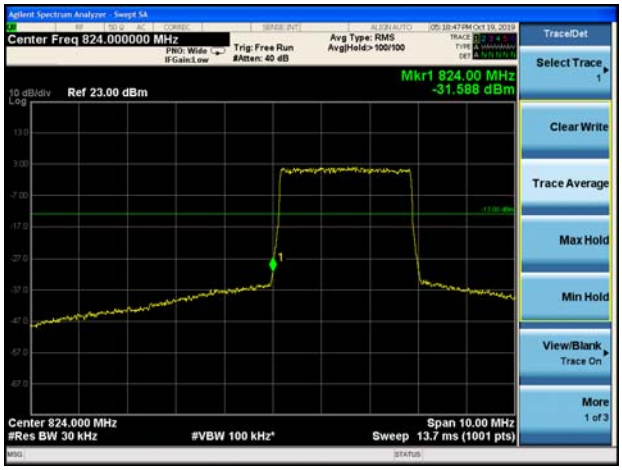
LTE Band 5 16QAM 3MHz CH-Low 1RB



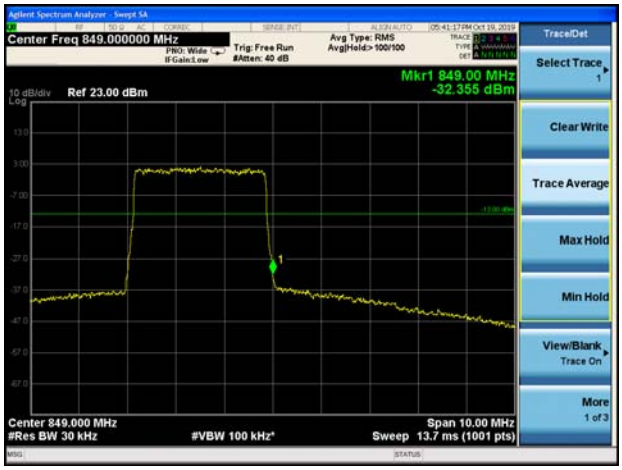
LTE Band 5 16QAM 3MHz CH-High 1RB



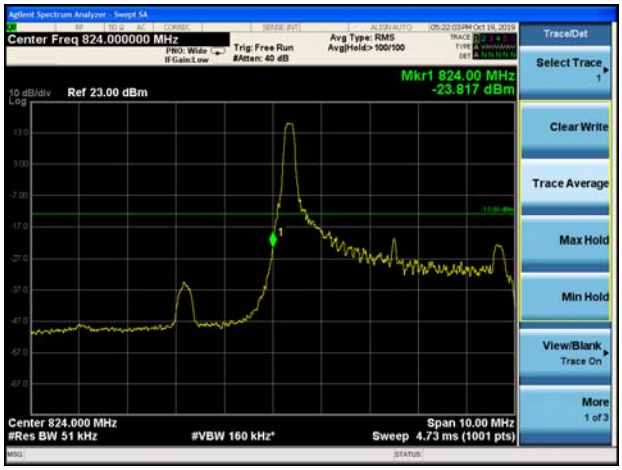
LTE Band 5 16QAM 3MHz CH-Low 100%RB



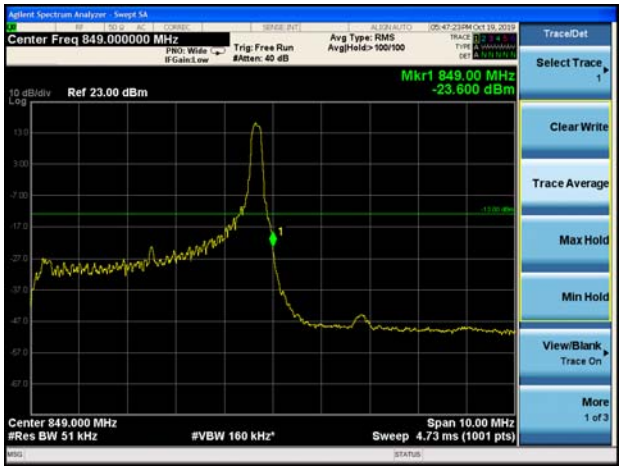
LTE Band 5 16QAM 3MHz CH-High 100%RB



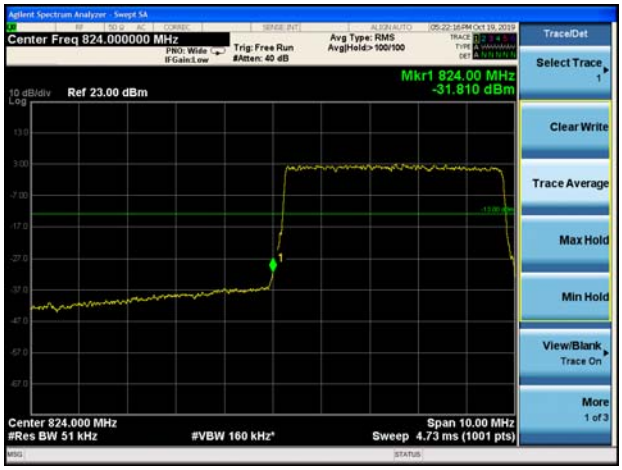
LTE Band 5 16QAM 5MHz CH-Low 1RB



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

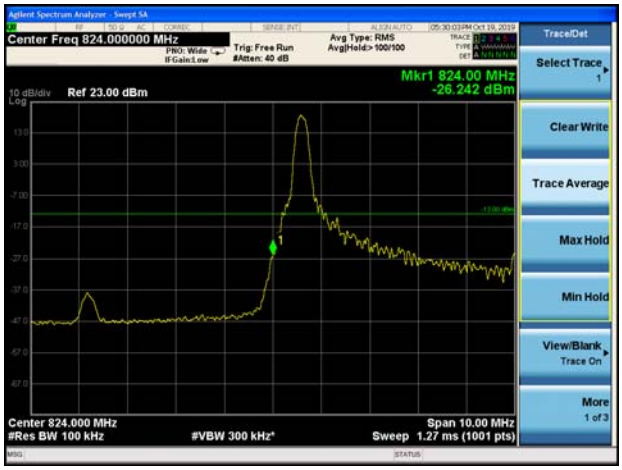


LTE Band 5 16QAM 5MHz CH-Low 100%RB

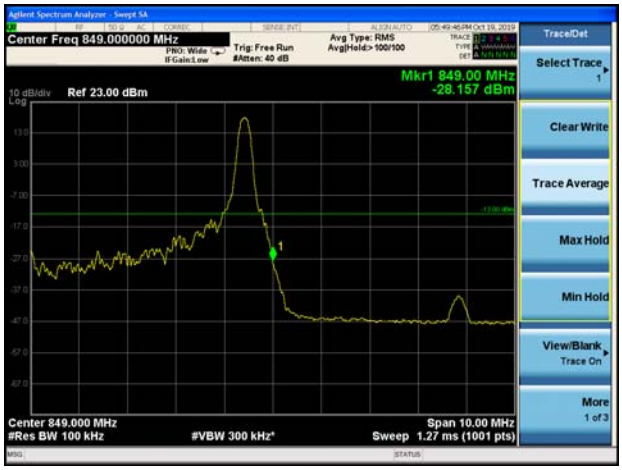


LTE Band 5 16QAM 5MHz CH-High 100%RB

LTE Band 5 16QAM 10MHz CH-Low 1RB



LTE Band 5 16QAM 10MHz CH-High 1RB



LTE Band 5 16QAM 10MHz CH-Low 100%RB

LTE Band 5 16QAM 10MHz CH-High 100%RB

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

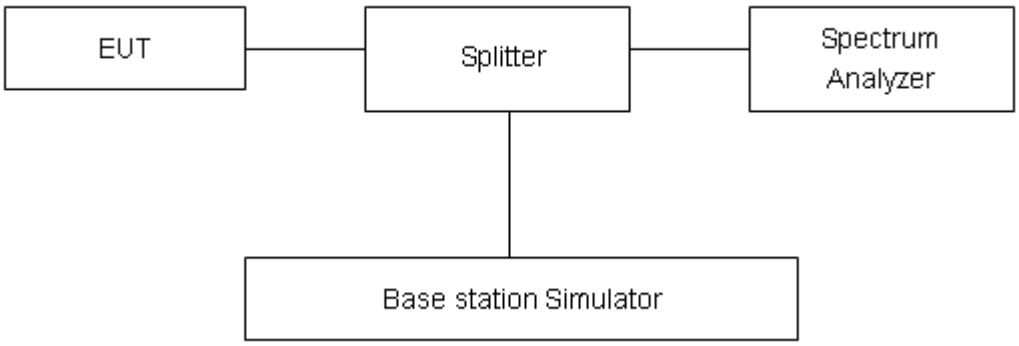
Ambient condition

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

Methods of Measurement

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

Test Setup



Limits

According to the Sec. 22.913(d), The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

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 850 (GSM)	128	824.2	33.07	32.01	1.06	≤13	PASS
	190	836.6	33.09	31.85	1.24	≤13	PASS
	251	848.8	33.13	31.81	1.32	≤13	PASS
GPRS 850 (GMSK)	128	824.2	33.23	32.02	1.21	≤13	PASS
	190	836.6	32.99	31.74	1.25	≤13	PASS
	251	848.8	32.93	31.74	1.19	≤13	PASS
EGPRS 850 (8PSK)	128	824.2	29.55	26.91	2.64	≤13	PASS
	190	836.6	29.13	26.60	2.53	≤13	PASS
	251	848.8	29.61	27.00	2.61	≤13	PASS
WCDMA Band V (RMC)	4132	826.4	25.44	22.32	3.12	≤13	PASS
	4183	836.6	25.64	22.58	3.06	≤13	PASS
	4233	846.6	25.41	22.24	3.17	≤13	PASS

LTE Band 5								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	1.4	20407	824.7	25.83	20.33	5.50	≤13	PASS
		20525	836.5	26.14	20.52	5.62	≤13	PASS
		20643	848.3	26.18	20.52	5.66	≤13	PASS
	3	20415	825.5	25.76	20.18	5.58	≤13	PASS
		20525	836.5	26.07	20.46	5.61	≤13	PASS
		20635	847.5	26.07	20.41	5.66	≤13	PASS
	5	20425	826.5	26.48	20.80	5.68	≤13	PASS
		20525	836.5	27.03	21.08	5.95	≤13	PASS
		20625	846.5	26.72	21.06	5.66	≤13	PASS
	10	20450	829	26.41	20.75	5.66	≤13	PASS
		20525	836.5	26.54	20.91	5.63	≤13	PASS
		20600	844	26.49	20.82	5.67	≤13	PASS
16QAM	1.4	20407	824.7	26.33	20.30	6.03	≤13	PASS
		20525	836.5	26.51	20.46	6.05	≤13	PASS
		20643	848.3	26.69	20.50	6.19	≤13	PASS
	3	20415	825.5	26.30	20.14	6.16	≤13	PASS
		20525	836.5	26.54	20.41	6.13	≤13	PASS
		20635	847.5	26.72	20.39	6.33	≤13	PASS
	5	20425	826.5	27.00	20.78	6.22	≤13	PASS
		20525	836.5	27.27	21.06	6.21	≤13	PASS
		20625	846.5	27.26	21.05	6.21	≤13	PASS
	10	20450	829	26.89	20.67	6.22	≤13	PASS
		20525	836.5	27.08	20.88	6.20	≤13	PASS
		20600	844	27.05	20.77	6.28	≤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 step size,

(1) With all power removed, the temperature was decreased to 0°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -30°C to +55°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements. Frequency Stability (Voltage Variation)

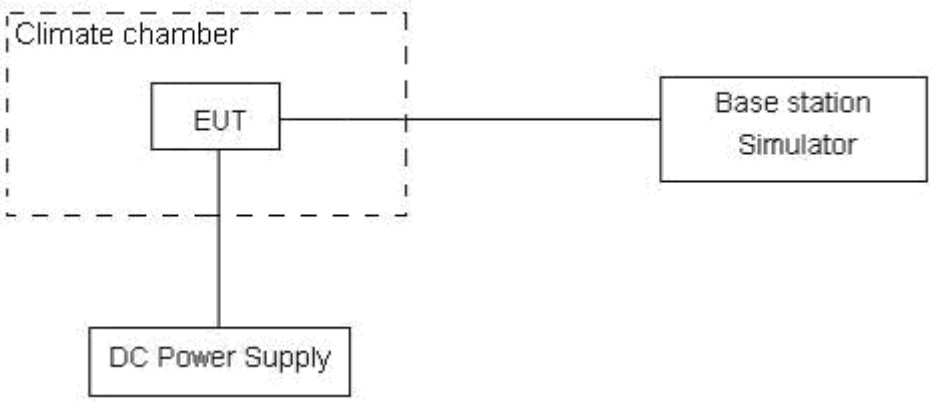
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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

According to the Sec. 22.355, the frequency stability of the carrier shall be accurate to within 2.5 ppm of the received frequency for mobile stations.

Limits	≤ 2.5 ppm

Measurement Uncertainty

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

Test Result

GSM850						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
Temperature	Voltage	GMSK	8PSK	GMSK	8PSK	
Normal（25℃）	Normal	3.09	15.89	0.00164	0.00845	PASS
Extreme（55℃）		3.78	15.90	0.00201	0.00846	PASS
Extreme（50℃）		16.07	5.26	0.00855	0.00280	PASS
Extreme（40℃）		12.42	11.53	0.00661	0.00613	PASS
Extreme（30℃）		16.99	3.01	0.00904	0.00160	PASS
Extreme（20℃）		17.44	5.01	0.00927	0.00266	PASS
Extreme（10℃）		2.89	6.19	0.00154	0.00329	PASS
Extreme（0℃）		4.36	17.45	0.00232	0.00928	PASS
Extreme（-10℃）		9.79	12.87	0.00521	0.00684	PASS
Extreme（-20℃）		14.19	16.85	0.00755	0.00896	PASS
Extreme（-30℃）		12.69	15.06	0.00675	0.00801	PASS
25℃	LV	4.72	14.99	0.00251	0.00797	PASS
	HV	6.10	11.21	0.00325	0.00597	PASS

WCDMA Band 5						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal（25℃）	Normal	4.10	13.58	0.00218	0.00722	PASS
Extreme（55℃）		15.51	1.49	0.00825	0.00079	PASS
Extreme（50℃）		16.36	9.64	0.00870	0.00513	PASS
Extreme（40℃）		14.43	7.10	0.00768	0.00378	PASS
Extreme（30℃）		3.18	14.35	0.00169	0.00763	PASS
Extreme（20℃）		14.22	17.38	0.00756	0.00925	PASS
Extreme（10℃）		12.11	10.17	0.00644	0.00541	PASS
Extreme（0℃）		10.83	13.46	0.00576	0.00716	PASS
Extreme（-10℃）		7.05	15.42	0.00375	0.00820	PASS
Extreme（-20℃）		6.25	6.40	0.00332	0.00340	PASS
Extreme（-30℃）		1.52	10.57	0.00081	0.00562	PASS
25℃	LV	7.97	14.59	0.00424	0.00776	PASS
	HV	3.44	6.36	0.00183	0.00338	PASS

LTE Band 5						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
BANDWIDTH	1.4MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal（25℃）	Normal	14.12	10.92	0.00751	0.00581	PASS
Extreme（55℃）		11.95	16.43	0.00636	0.00874	PASS
Extreme（50℃）		10.14	15.33	0.00539	0.00816	PASS
Extreme（40℃）		17.45	13.28	0.00928	0.00706	PASS
Extreme（30℃）		15.77	12.81	0.00839	0.00681	PASS
Extreme（20℃）		15.61	15.35	0.00830	0.00816	PASS
Extreme（10℃）		5.37	15.02	0.00286	0.00799	PASS
Extreme（0℃）		14.09	2.24	0.00749	0.00119	PASS
Extreme（-10℃）		4.61	10.81	0.00245	0.00575	PASS
Extreme（-20℃）		7.43	14.37	0.00395	0.00765	PASS
Extreme（-30℃）		8.75	2.75	0.00465	0.00147	PASS
25℃	LV	2.82	9.34	0.00150	0.00497	PASS
	HV	4.30	14.08	0.00229	0.00749	PASS

LTE Band 5						
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	16.60	2.32	0.00883	0.00124	PASS
Extreme（55℃）		2.00	10.73	0.00107	0.00571	PASS
Extreme（50℃）		14.52	14.33	0.00772	0.00762	PASS
Extreme（40℃）		6.99	11.67	0.00372	0.00621	PASS
Extreme（30℃）		8.45	15.03	0.00450	0.00800	PASS
Extreme（20℃）		10.99	3.23	0.00584	0.00172	PASS
Extreme（10℃）		7.67	10.84	0.00408	0.00577	PASS
Extreme（0℃）		5.65	14.67	0.00301	0.00780	PASS
Extreme（-10℃）		12.08	2.06	0.00642	0.00110	PASS
Extreme（-20℃）		9.71	10.14	0.00516	0.00539	PASS
Extreme（-30℃）		1.94	3.27	0.00103	0.00174	PASS
25℃	LV	6.80	7.33	0.00362	0.00390	PASS
	HV	1.76	15.98	0.00094	0.00850	PASS

LTE Band 5						
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	7.19	12.73	0.00382	0.00677	PASS
Extreme（55℃）		15.27	11.63	0.00812	0.00619	PASS
Extreme（50℃）		7.44	3.37	0.00396	0.00179	PASS
Extreme（40℃）		7.21	10.58	0.00384	0.00563	PASS
Extreme（30℃）		8.78	7.70	0.00467	0.00410	PASS
Extreme（20℃）		14.09	7.94	0.00750	0.00422	PASS
Extreme（10℃）		10.61	8.29	0.00564	0.00441	PASS
Extreme（0℃）		12.68	2.78	0.00674	0.00148	PASS
Extreme（-10℃）		14.54	1.76	0.00774	0.00093	PASS
Extreme（-20℃）		16.93	8.40	0.00900	0.00447	PASS
Extreme（-30℃）		5.14	17.28	0.00274	0.00919	PASS
25℃	LV	9.52	2.52	0.00506	0.00134	PASS
	HV	10.18	16.22	0.00541	0.00863	PASS

LTE Band 5						
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	5.18	15.24	0.00276	0.00811	PASS
Extreme（55℃）		2.79	13.19	0.00149	0.00701	PASS
Extreme（50℃）		3.88	10.37	0.00206	0.00552	PASS
Extreme（40℃）		16.32	13.34	0.00868	0.00709	PASS
Extreme（30℃）		3.27	9.23	0.00174	0.00491	PASS
Extreme（20℃）		4.32	1.77	0.00230	0.00094	PASS
Extreme（10℃）		10.81	7.81	0.00575	0.00415	PASS
Extreme（0℃）		5.49	17.90	0.00292	0.00952	PASS
Extreme（-10℃）		15.18	14.87	0.00807	0.00791	PASS
Extreme（-20℃）		11.49	13.57	0.00611	0.00722	PASS
Extreme（-30℃）		11.56	3.04	0.00615	0.00162	PASS
25℃	LV	8.88	11.58	0.00472	0.00616	PASS
	HV	2.73	3.33	0.00145	0.00177	PASS

5.6. Spurious Emissions at Antenna Terminals

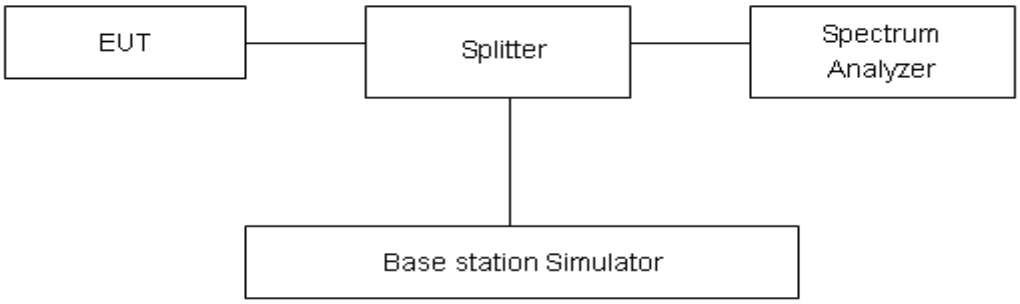
Ambient condition

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 are set to 100 kHz and VBW are set to 300 kHz for below 1G, RBW are set to 1MHz and VBW are set to 3MHz for above 1G, 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 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (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.

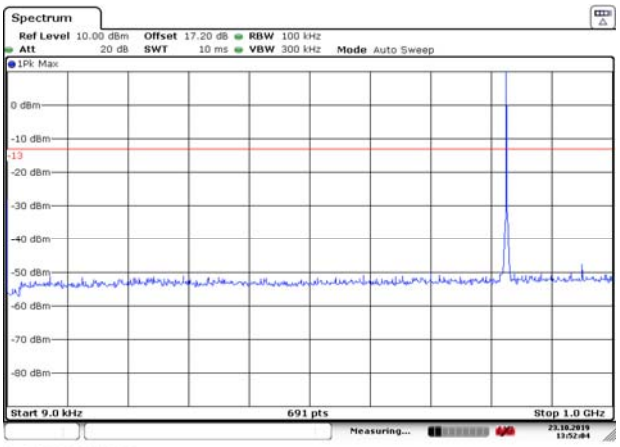
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-18GHz	1.407 dB

Test Result

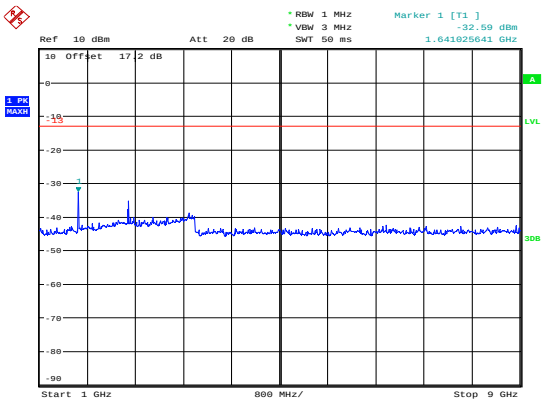
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

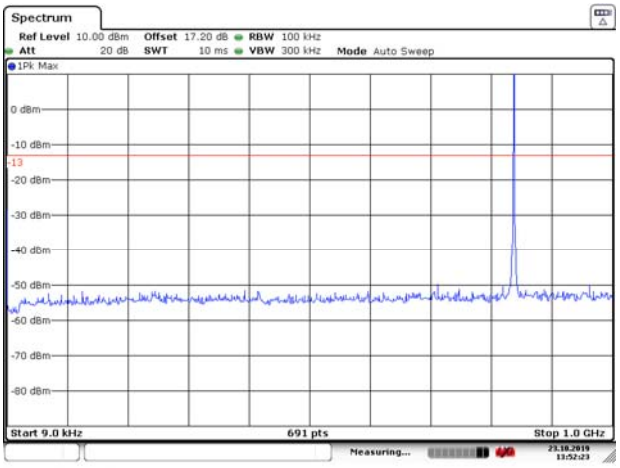
GSM 850 CH-Low 9KHz ~ 1GHz



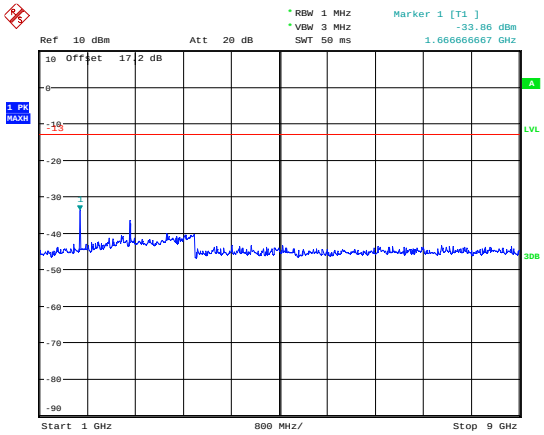
GSM 850 CH-Low 1GHz ~ 9GHz



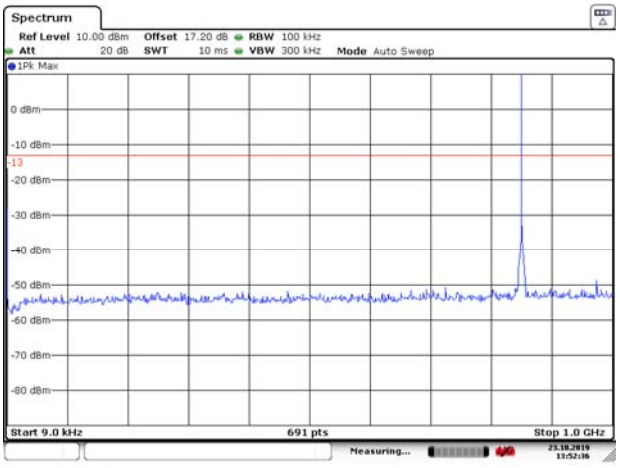
GSM 850 CH-Middle 9KHz ~ 1GHz



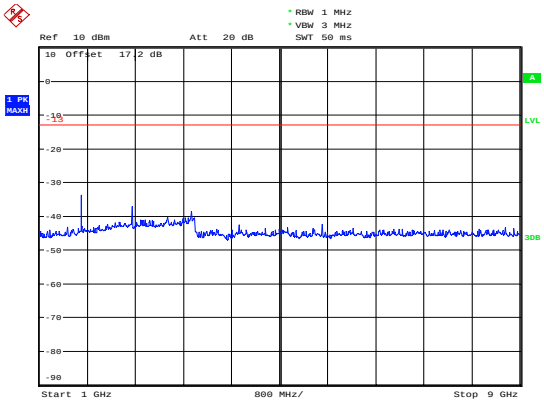
GSM 850 CH-Middle 1GHz ~ 9GHz



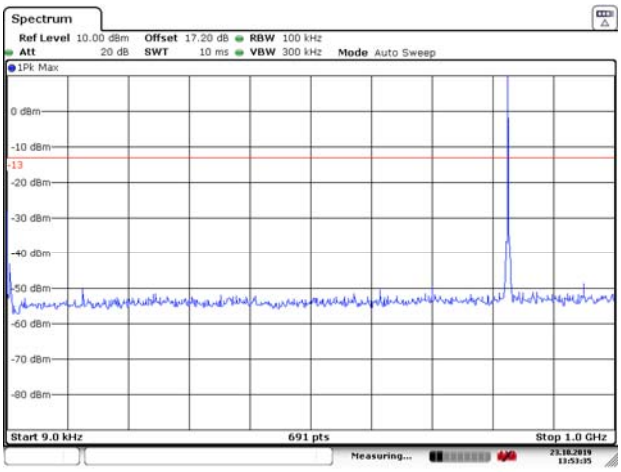
GSM 850 CH-High 9KHz ~ 1GHz



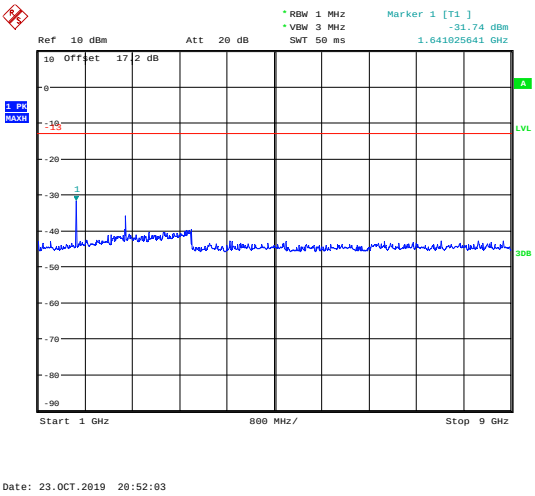
GSM 850 CH-High 1GHz ~ 9GHz



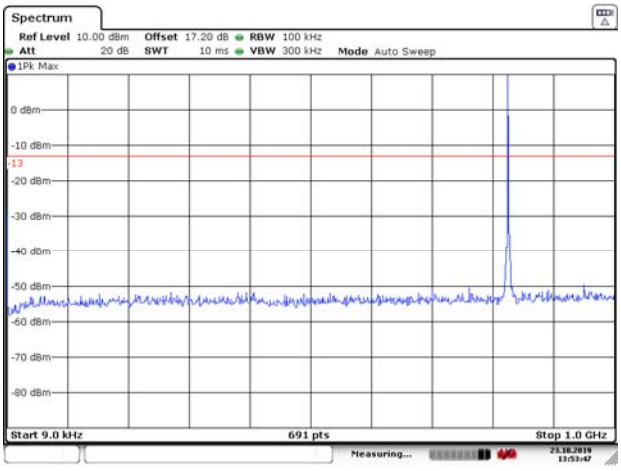
GPRS 850 CH-Low 9KHz ~ 1GHz



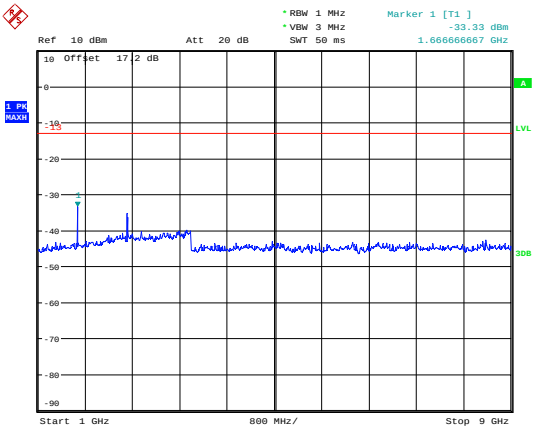
GPRS 850 CH-Low 1GHz ~ 9GHz



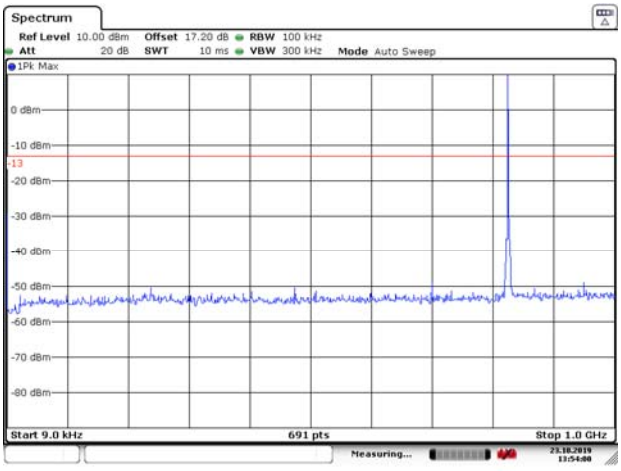
GPRS 850 CH-Middle 9KHz ~ 1GHz



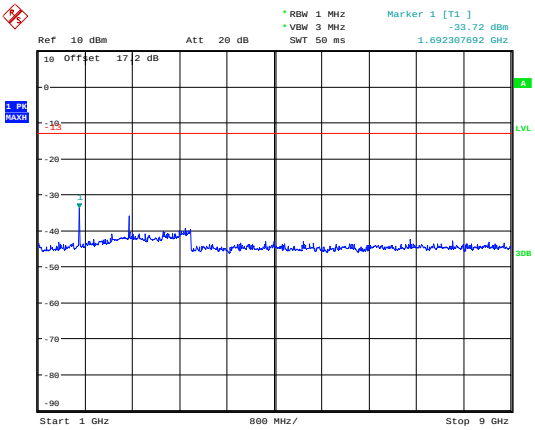
GPRS 850 CH-Middle 1GHz ~ 9GHz



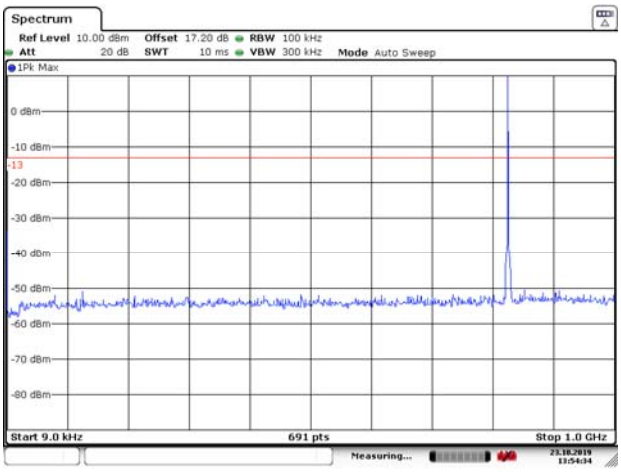
GPRS 850 CH-High 9KHz ~ 1GHz



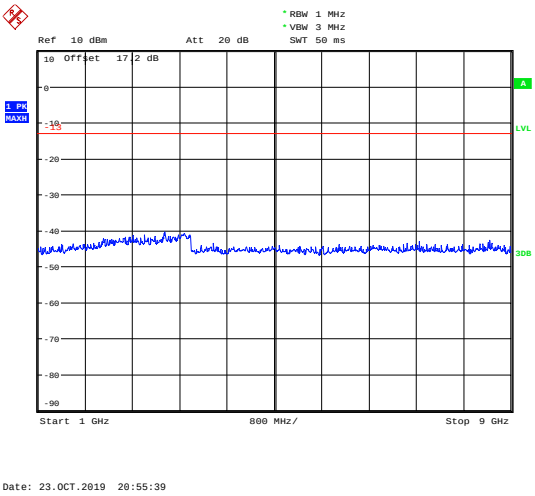
GPRS 850 CH-High 1GHz ~ 9GHz



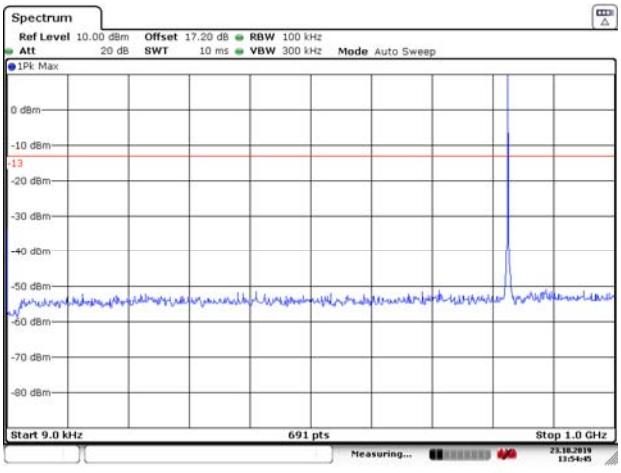
EGPRS 850 CH-Low 9KHz ~ 1GHz



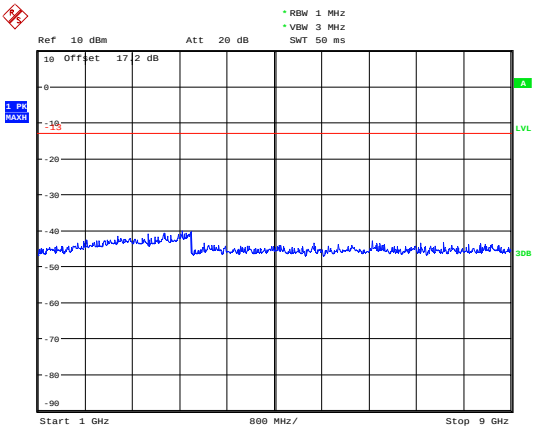
EGPRS 850 CH-Low 1GHz ~ 9GHz



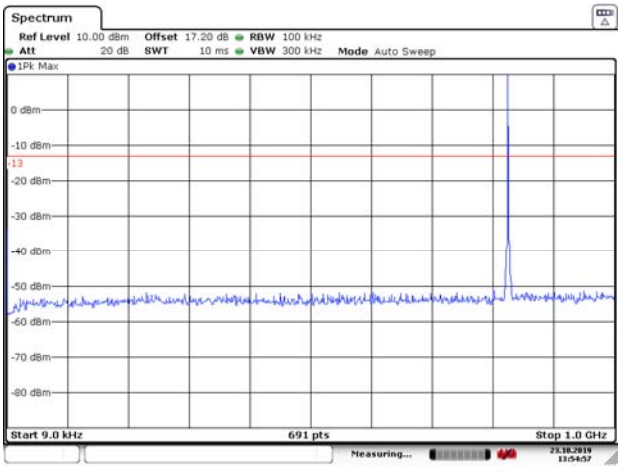
EGPRS 850 CH-Middle 9KHz ~ 1GHz



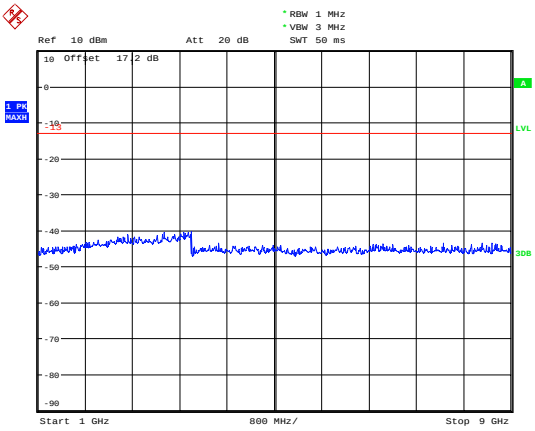
EGPRS 850 CH-Middle 1GHz ~ 9GHz



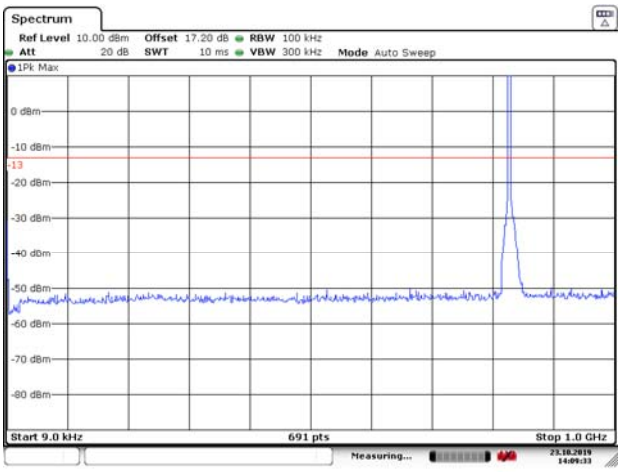
EGPRS 850 CH-High 9KHz ~ 1GHz



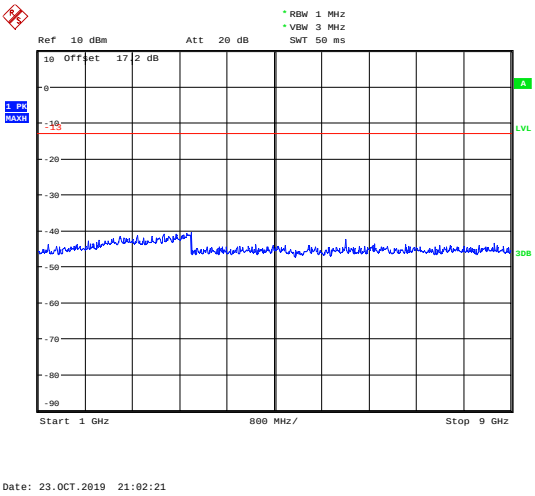
EGPRS 850 CH-High 1GHz ~ 9GHz



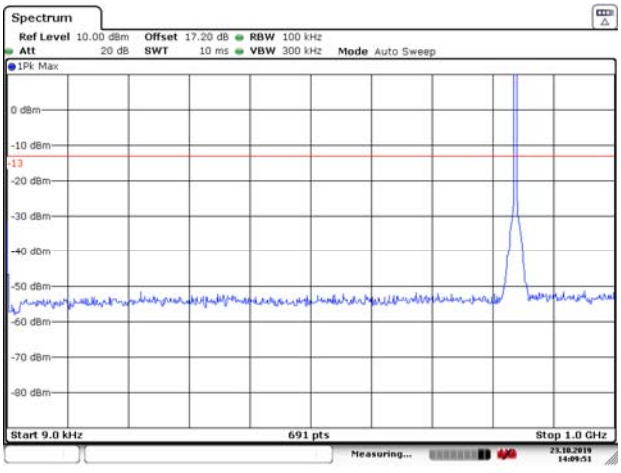
WCDMA Band V CH-Low 9KHz ~ 1GHz



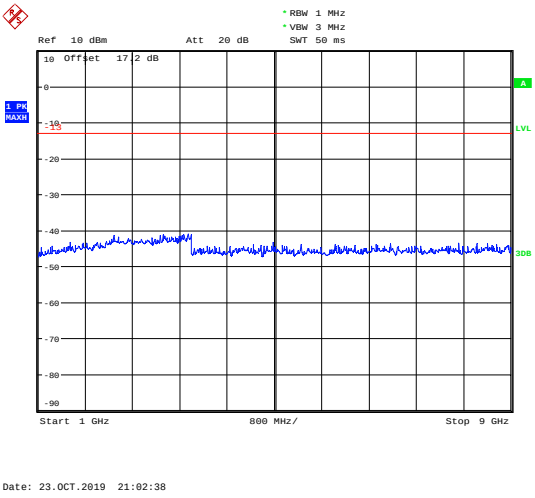
WCDMA Band V CH-Low 1GHz ~ 9GHz



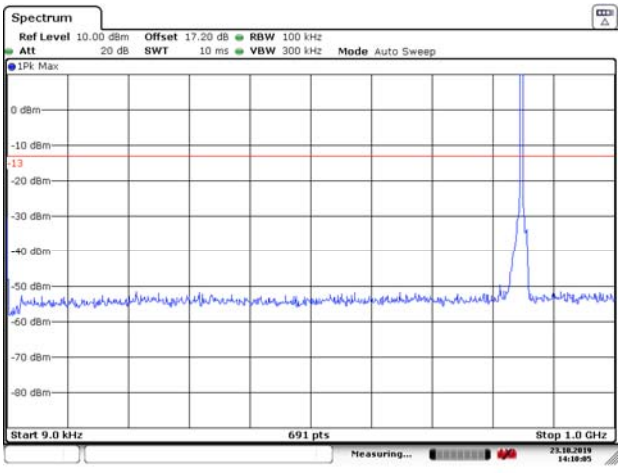
WCDMA Band V CH-Middle9KHz ~ 1GHz



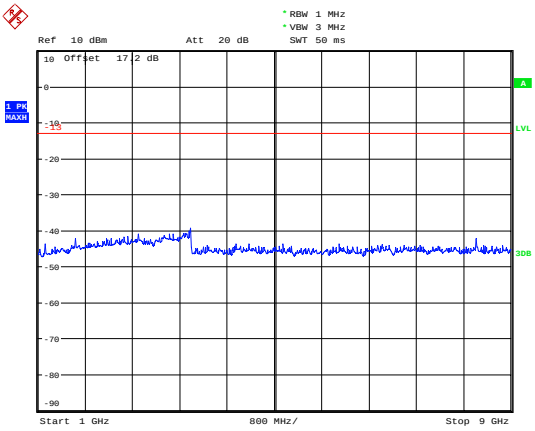
WCDMA Band V CH-Middle 1GHz ~ 9GHz



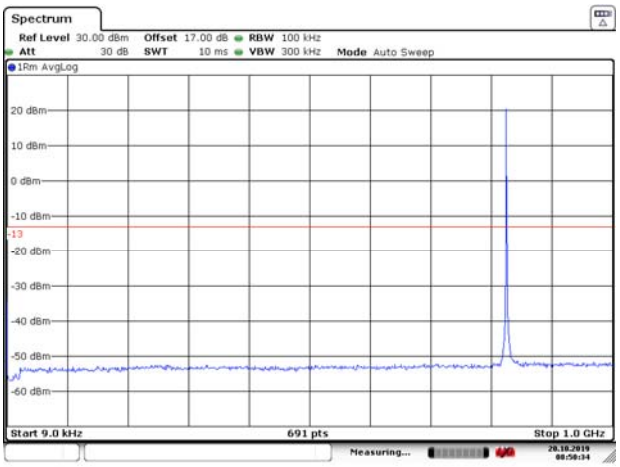
WCDMA Band V CH-High 9KHz ~ 1GHz



WCDMA Band V CH-High 1GHz ~ 9GHz



LTE Band 5 1.4MHz CH-Low 9KHz~1GHz



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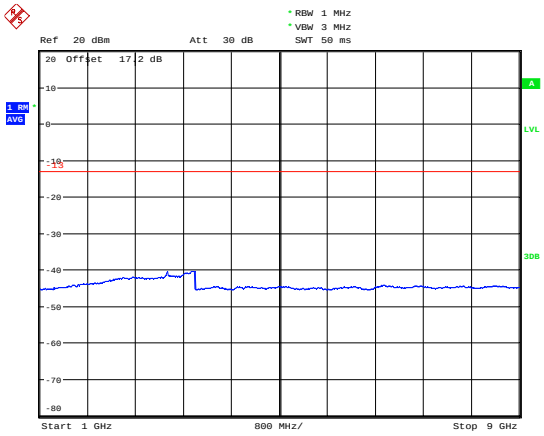
LTE Band 5 1.4MHz CH-Low 1GHz~9GHz



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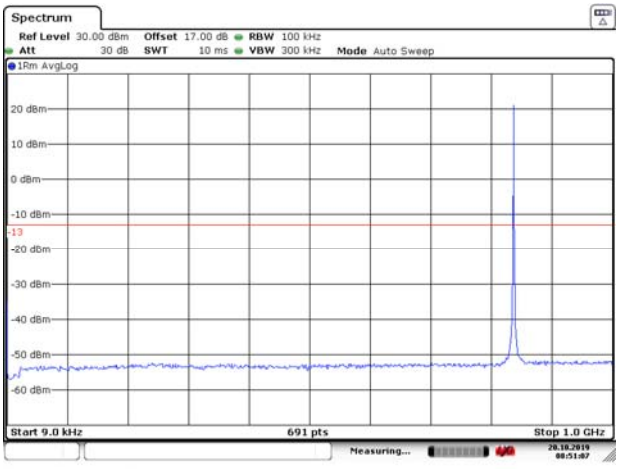
LTE Band 5 1.4MHz CH-Middle 9KHz~1GHz



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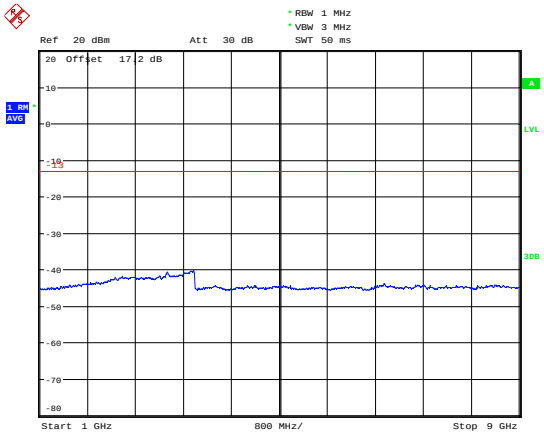
LTE Band 5 1.4MHz CH-Middle 1GHz~9GHz



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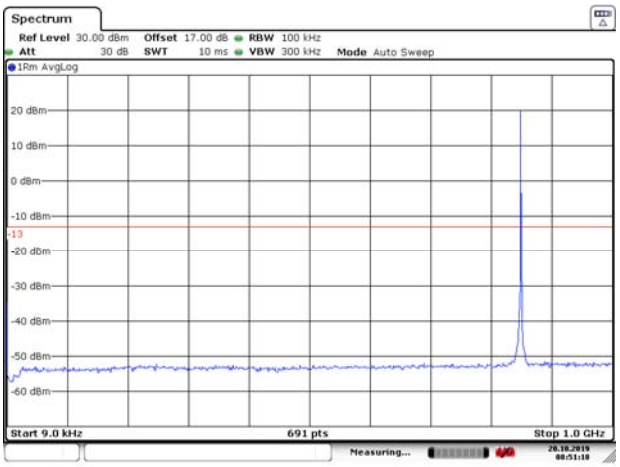
LTE Band 5 1.4MHz CH-High 9KHz~1GHz



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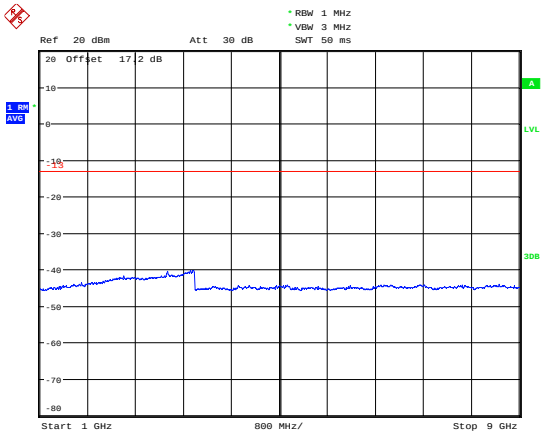
LTE Band 5 1.4MHz CH-High 1GHz~9GHz



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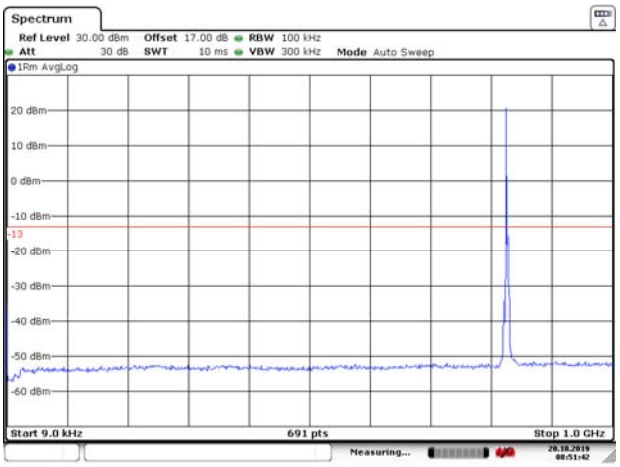
LTE Band 5 3MHz CH-Low 9KHz~1GHz



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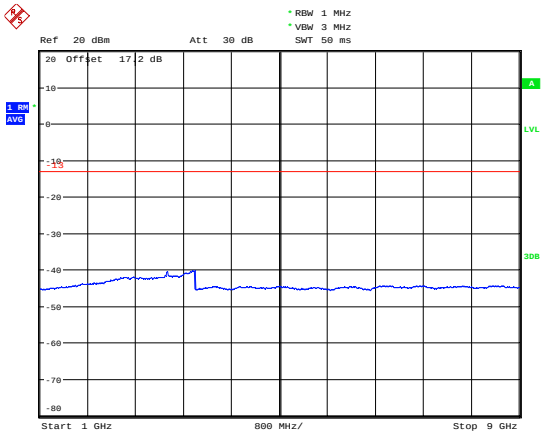
LTE Band 5 3MHz CH-Low 1GHz~9GHz



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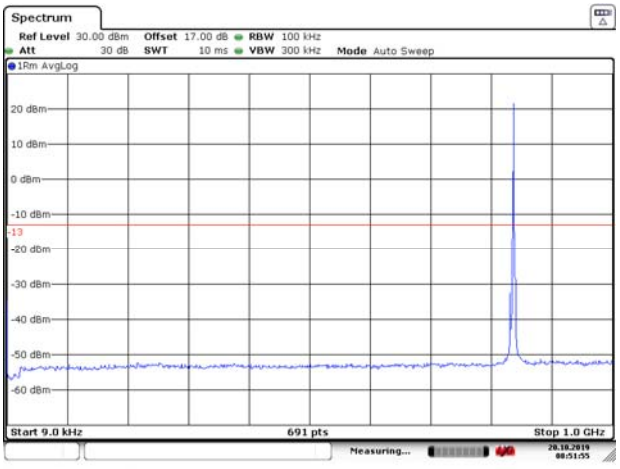
LTE Band 5 3MHz CH-Middle 9KHz~1GHz



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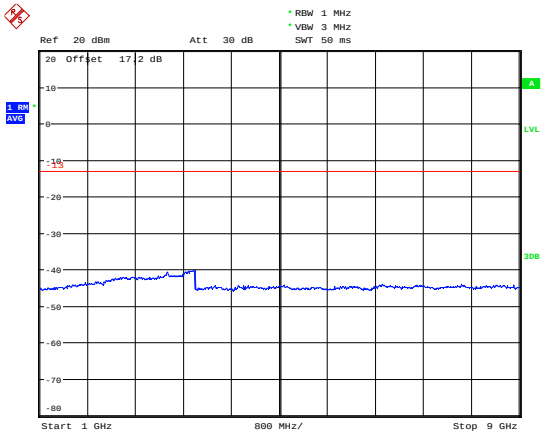
LTE Band 5 3MHz CH-Middle 1GHz~9GHz



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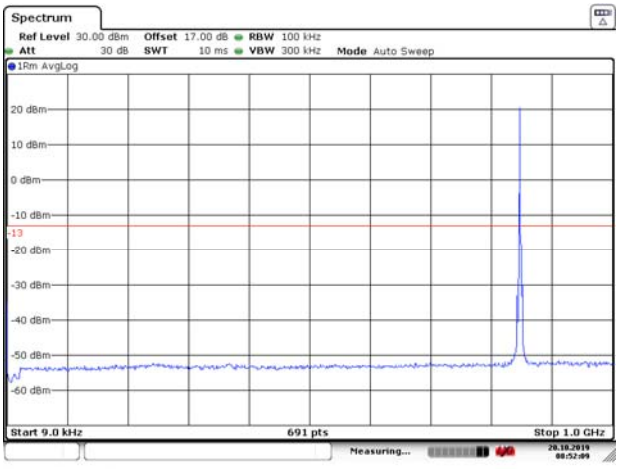
LTE Band 5 3MHz CH-High 9KHz~1GHz



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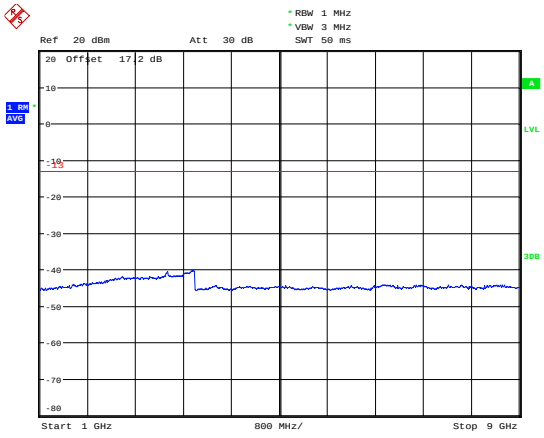
LTE Band 5 3MHz CH-High 1GHz~9GHz



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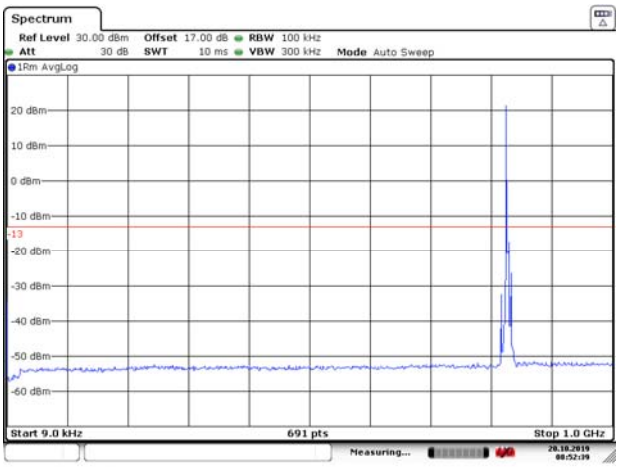
LTE Band 5 5MHz CH-Low 9KHz~1GHz



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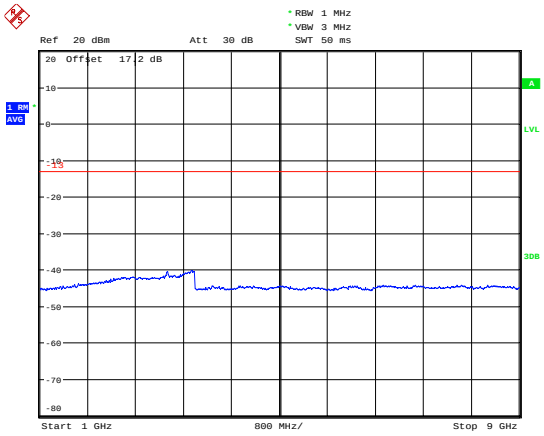
LTE Band 5 5MHz CH-Low 1GHz~9GHz



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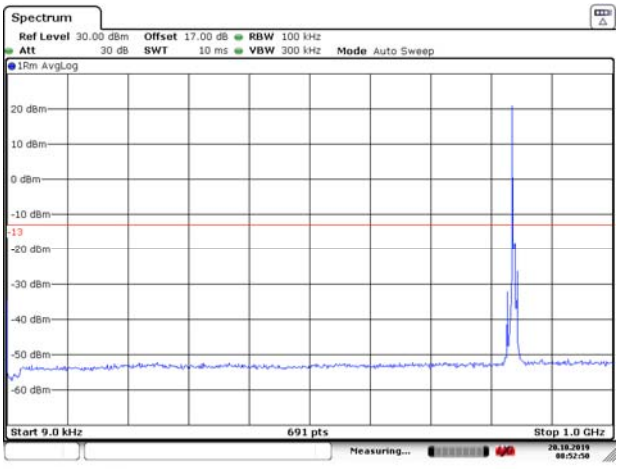
LTE Band 5 5MHz CH-Middle 9KHz~1GHz



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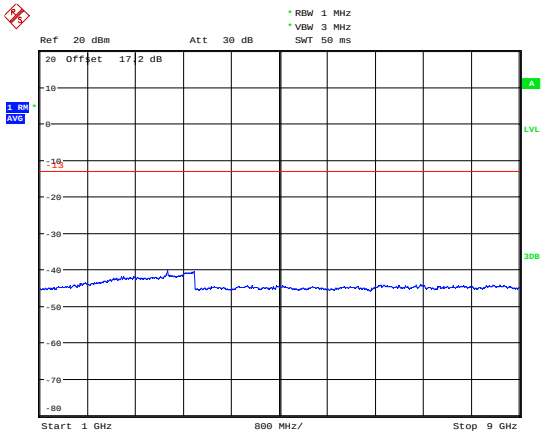
LTE Band 5 5MHz CH-Middle 1GHz~9GHz



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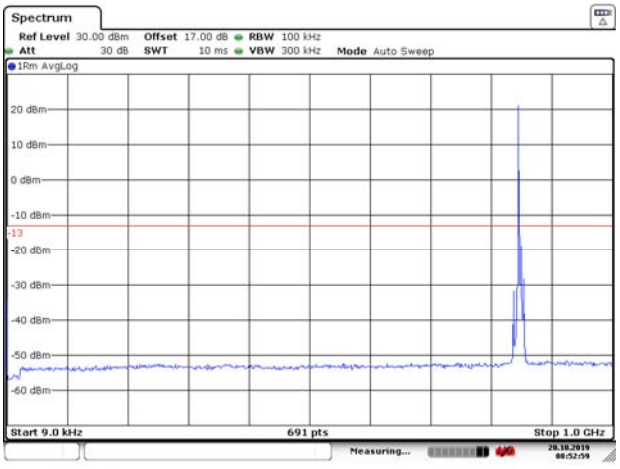
LTE Band 5 5MHz CH-High 9KHz~1GHz



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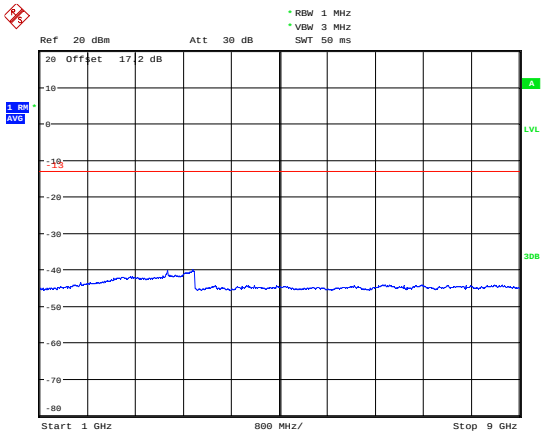
LTE Band 5 5MHz CH-High 1GHz~9GHz



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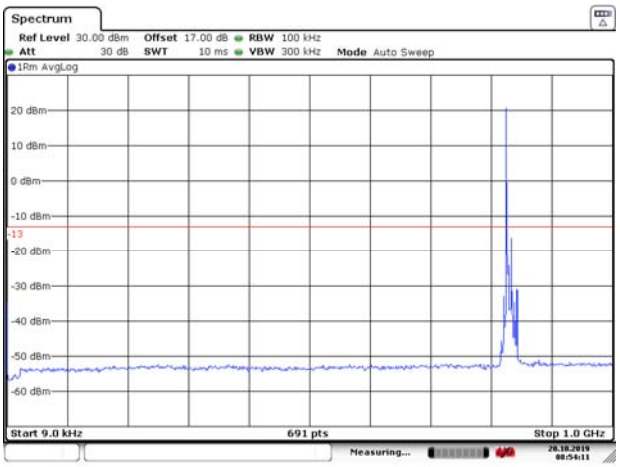
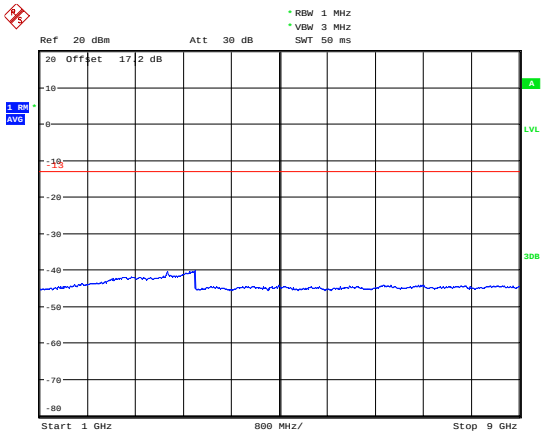
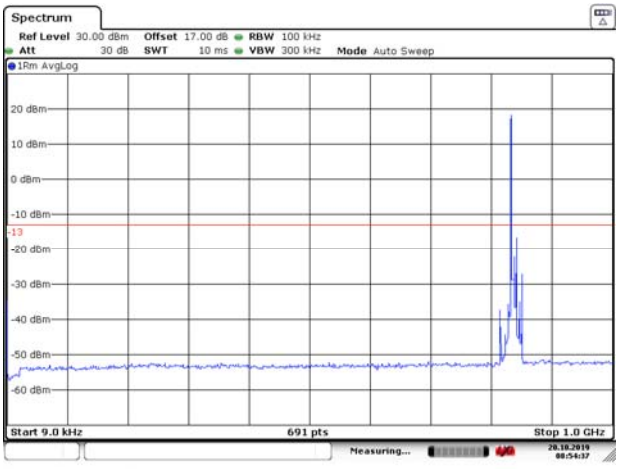
LTE Band 5 10MHz CH-Low 9KHz~1GHz



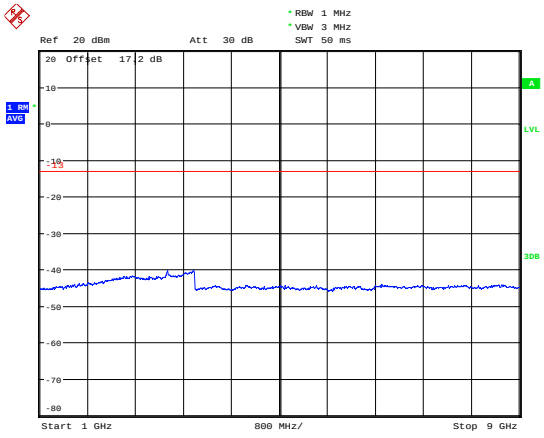
LTE Band 5 10MHz CH-Low 1GHz~9GHz



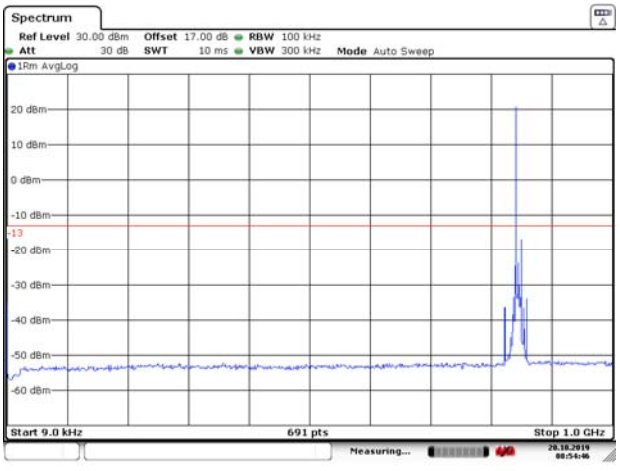
LTE Band 5 10MHz CH-Middle 9KHz~1GHz



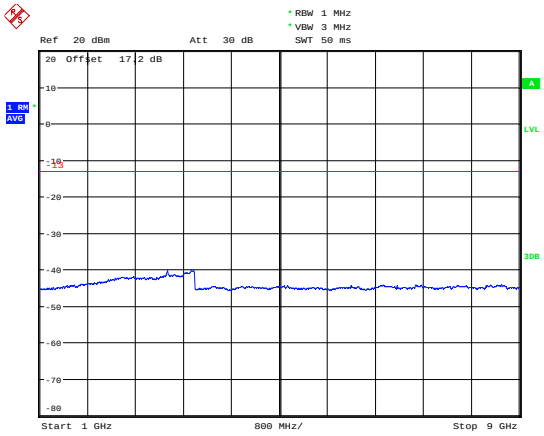
LTE Band 5 10MHz CH-Middle 1GHz~9GHz



LTE Band 5 10MHz CH-High 9KHz~1GHz



LTE Band 5 10MHz CH-High 1GHz~9GHz



5.7. Radiates Spurious Emission

Ambient condition

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

Method of Measurement

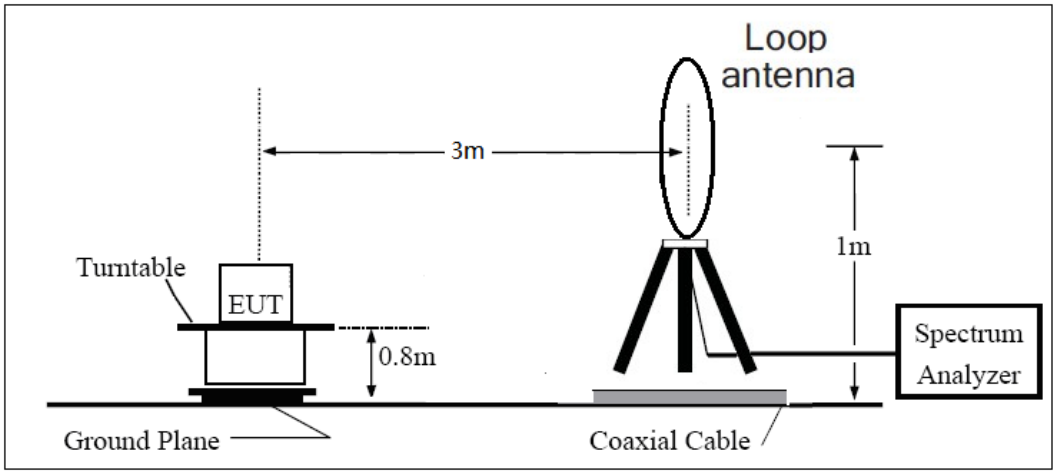
1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable 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:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + Ga
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi)

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

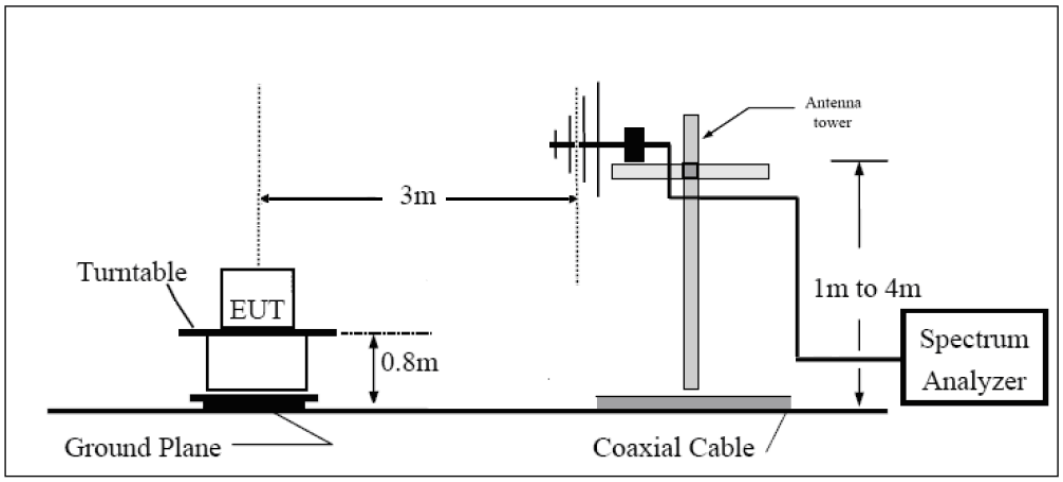
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

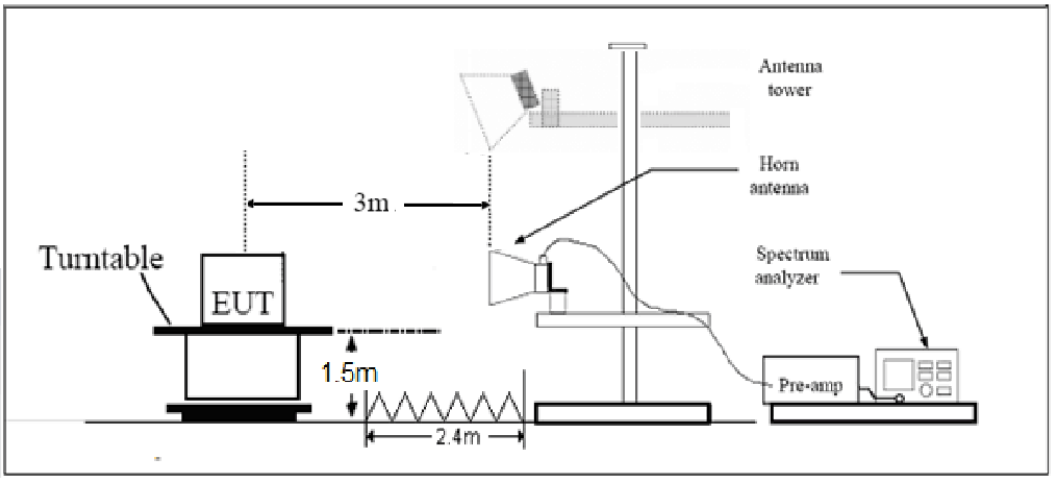
9KHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.”

Limit	-13 dBm

Measurement Uncertainty

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

Test Result

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

GSM 850 CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.3	-56.66	2.00	10.75	Horizontal	-50.06	-13.00	37.06	45
3	2509.9	-51.25	2.51	11.05	Horizontal	-44.86	-13.00	31.86	180
4	3346.4	-53.59	4.20	11.15	Horizontal	-48.79	-13.00	35.79	0
5	4183.0	-59.87	5.20	11.15	Horizontal	-56.07	-13.00	43.07	90
6	5019.6	-59.29	5.50	11.95	Horizontal	-54.99	-13.00	41.99	270
7	5856.2	-58.82	5.70	13.55	Horizontal	-53.12	-13.00	40.12	315
8	6692.8	-56.66	6.30	13.75	Horizontal	-51.36	-13.00	38.36	135
9	7529.4	-55.05	6.80	13.85	Horizontal	-50.15	-13.00	37.15	180
10	8366.0	-54.32	6.90	14.25	Horizontal	-49.12	-13.00	36.12	45
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

WCDMA Band V CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.2	-70.93	2.00	10.75	Horizontal	-64.33	-13.00	51.33	45
3	2509.8	-66.32	2.51	11.05	Horizontal	-59.93	-13.00	46.93	0
4	3346.4	-62.37	4.20	11.15	Horizontal	-57.57	-13.00	44.57	315
5	4183.0	-60.70	5.20	11.15	Horizontal	-56.90	-13.00	43.90	90
6	5019.6	-58.82	5.50	11.95	Horizontal	-54.52	-13.00	41.52	225
7	5856.2	-61.10	5.70	13.55	Horizontal	-55.40	-13.00	42.40	180
8	6692.8	-58.84	6.30	13.75	Horizontal	-53.54	-13.00	40.54	135
9	7529.4	-56.02	6.80	13.85	Horizontal	-51.12	-13.00	38.12	270
10	8366.0	-56.01	6.90	14.25	Horizontal	-50.81	-13.00	37.81	45
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

LTE Band 5 1.4MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-67.12	2.00	10.75	Horizontal	-60.52	-13.00	47.52	90
3	2509.5	-66.98	2.51	11.05	Horizontal	-60.59	-13.00	47.59	135
4	3346.0	-64.63	4.20	11.15	Horizontal	-59.83	-13.00	46.83	90
5	4182.5	-61.58	5.20	11.15	Horizontal	-57.78	-13.00	44.78	45
6	5019.0	-60.29	5.50	11.95	Horizontal	-55.99	-13.00	42.99	315
7	5855.5	-60.51	5.70	13.55	Horizontal	-54.81	-13.00	41.81	225
8	6692.0	-58.98	6.30	13.75	Horizontal	-53.68	-13.00	40.68	270
9	7528.5	-56.24	6.80	13.85	Horizontal	-51.34	-13.00	38.34	90
10	8365.0	-55.51	6.90	14.25	Horizontal	-50.31	-13.00	37.31	135
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

LTE Band 5 5MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-68.92	2.00	10.75	Horizontal	-62.32	-13.00	49.32	0
3	2509.5	-66.82	2.51	11.05	Horizontal	-60.43	-13.00	47.43	180
4	3466.2	-64.26	4.20	11.15	Horizontal	-59.46	-13.00	46.46	225
5	4215.9	-60.88	5.20	11.15	Horizontal	-57.08	-13.00	44.08	180
6	5165.6	-59.44	5.50	11.95	Horizontal	-55.14	-13.00	42.14	45
7	5815.3	-61.78	5.70	13.55	Horizontal	-56.08	-13.00	43.08	270
8	6765.0	-58.77	6.30	13.75	Horizontal	-53.47	-13.00	40.47	0
9	7614.7	-56.29	6.80	13.85	Horizontal	-51.39	-13.00	38.39	135
10	8464.4	-57.05	6.90	14.25	Horizontal	-51.85	-13.00	38.85	225
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 5 10MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-69.22	2.00	10.75	Horizontal	-62.62	-13.00	49.62	45
3	2509.5	-67.08	2.51	11.05	Horizontal	-60.69	-13.00	47.69	0
4	3346.0	-64.88	4.20	11.15	Horizontal	-60.08	-13.00	47.08	315
5	4182.5	-62.12	5.20	11.15	Horizontal	-58.32	-13.00	45.32	180
6	5019.0	-60.03	5.50	11.95	Horizontal	-55.73	-13.00	42.73	225
7	5855.5	-60.90	5.70	13.55	Horizontal	-55.20	-13.00	42.20	270
8	6692.0	-59.03	6.30	13.75	Horizontal	-53.73	-13.00	40.73	315
9	7528.5	-57.21	6.80	13.85	Horizontal	-52.31	-13.00	39.31	90
10	8365.0	-55.60	6.90	14.25	Horizontal	-50.40	-13.00	37.40	45

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

6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
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
Preampflier	R&S	SCU18	102327	2019-05-19	2020-05-18
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2019-05-20	2020-05-21
RF Cable	Agilent	SMA 15cm	0001	2019-06-14	2019-12-13
Software	R&S	EMC32	9.26.0	/	/

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