RF TEST REPORT

Applicant	Huawei Technologies Co., Ltd.
FCC ID	QISKOB-L09
Brand Name	HUAWEI
Product	Tablet
Model	KOB-L09
Report No.	R1804H0051-R1
Issue Date	May 21, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2017)/ FCC CFR 47 Part 22H (2017)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Performed by: Jiangpeng Lan *Approved by: Kai Xu*

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Summary of measurement results

No.	Test Type	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Radiated Power	22.913(a)(2)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	2.1051 / 22.917(a)	PASS
5	Peak-to-Average Power Ratio	22.913(d)/ KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 22.355	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 22.917(a)	PASS
8	Radiates Spurious Emission	2.1053 / 22.917 (a)	PASS
Date of Testing: April 26, 2018~ May 8, 2018			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard.			

1. Test Laboratory

1.1. Notes of the Test Report

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

1.2. Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

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

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

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

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

1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
Post code:	201201
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2. General Description of Equipment under Test

Client Information

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

General Information

EUT Description			
Model	KOB-L09		
IMEI	864004035494571		
Hardware Version	REACH-V2.0		
Software Version	KOB-L09C127B252CUSTC127D001		
Power Supply	Battery/AC adapter		
Antenna Type	Internal Antenna		
Test Mode(s)	GSM 850: WCDMA Band V;LTE Band 5;		
Test Modulation	(GSM)GMSK,8PSK; (WCDMA)QPSK; (LTE)QPSK 16QAM;		
GPRS Multislot Class	12		
EGPRS Multislot Class	12		
HSDPA UE Category	14		
HSUPA UE Category	6		
DC-HSDPA UE Category	24		
HSPA+ UE Category	14		
LTE Category	4		
Maximum E.R.P.	GSM 850:	21.51dBm	
	WCDMA Band V:	13.62dBm	
	LTE Band 5:	12.28dBm	
Rated Power Supply Voltage	3.8V		
Extreme Voltage	Minimum: 3.5V Maximum: 4.35V		
Extreme Temperature	Lowest: 0°C Highest: +35°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: SHENZHEN HUNTKEY ELECTRIC CO.,LTD Model: HW-050100B01
Adapter 2	Manufacturer: HUIZHOU BYD ELECTRONIC CO.,LTD Model: HW-050100B01
Adapter 3	Manufacturer: DONGGUAN PHITEK ELECTRONICS CO.,LTD Model: HW-050100B01
Adapter 4	Manufacturer: SHENZHEN HUNTKEY ELECTRIC CO.,LTD Model: HW-050100U01
Adapter 5	Manufacturer: HUIZHOU BYD ELECTRONIC CO.,LTD Model: HW-050100U01
Adapter 6	Manufacturer: DONGGUAN PHITEK ELECTRONICS CO.,LTD Model: HW-050100U01
Battery	Manufacturer: Harbin Coslight Power Co., Ltd. Model: HB3080G1EBC
USB Extend Cable 1	Manufacturer: HONGLIN TECHNOLOGY CO.,LTD Model: 130-26654, Length 1.0m, Shielded
USB Extend Cable 2	Manufacturer: FOXCONN INTERCONNECT TECHNOLOGY LIMITED Model: CUBB01M-HC208-DH, Length 1.0m, Shielded
USB Extend Cable 3	Manufacturer: Luxshare Precision Industry Co., Ltd Model: L99U2013-CS-H, Length 1.0m, Shielded
Note: The information of the EUT is declared by the manufacturer. 2. There is more than one Adapter and USB cable, each one should be applied throughout the compliance test respectively, and however, only the worst case (Adapter 1, USB cable 1) will be recorded in this report.	

3. Applied Standards

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

FCC CFR47 Part 2 (2017)

FCC CFR 47 Part 22H (2017)

ANSI/TIA-603-E (2016)

KDB 971168 D01 Power Meas License Digital Systems v03r01

4. Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (X axis, horizontal polarization) and the worst case was recorded.

All mode and data rates 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
Conducted Test cases	RF power output	GPRS EGPRS	RMC HSDPA/HSUPA
	Occupied Bandwidth	GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Band Edge Compliance	GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Peak-to-Average Power Ratio	GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Frequency Stability	GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Spurious Emissions at Antenna Terminals	GPRS	RMC
Radiated Test cases	Effective Radiated Power	GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
	Radiates Spurious Emission	GPRS	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	50%	100%	L	M	H
RF power output	O	O	O	O	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	O	O	O	O	O	O	-	-	O	O	O	O
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	-
Spurious Emissions at Antenna Terminals	O	O	O	O	O	-	O	-	-	O	O	O
Radiates Spurious Emission	O	O	O	O	O	-	O	-	-	O	O	O
Note	1. The mark “O” means that this configuration is chosen for testing. 2. The mark “-” means that this configuration is not testing.											

5. Test Case Results

5.1. RF Power Output

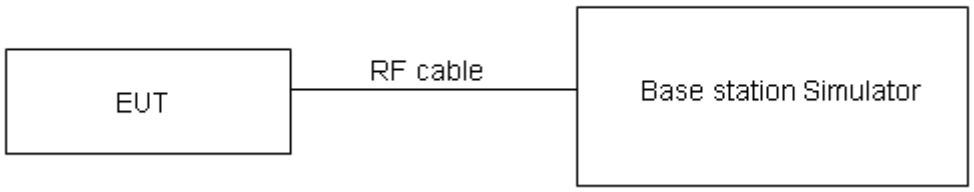
Ambient condition

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

Methods of Measurement

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

Test Setup



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

Limits

No specific RF power output requirements in part 2.1046.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.4 dB.

Test Results

GSM 850		Conducted Power(dBm)		
		Channel 128	Channel 190	Channel 251
		824.2 (MHz)	836.6 (MHz)	848.8 (MHz)
GPRS (GMSK)	1TXslot	25.01	25.10	25.06
	2TXslots	21.92	22.02	21.98
	3TXslots	19.46	19.43	19.57
	4TXslots	18.36	18.32	19.10
EGPRS (8PSK)	1TXslot	24.74	24.81	24.84
	2TXslots	21.54	21.62	21.65
	3TXslots	19.73	19.68	19.89
	4TXslots	18.05	17.99	18.84

WCDMA Band V		Conducted Power(dBm)		
		Channel 4132	Channel 4183	Channel 4233
		826.4(MHz)	836.6(MHz)	846.6(MHz)
RMC		17.01	17.00	17.03
HSDPA	Sub - Test 1	15.95	15.97	15.91
	Sub - Test 2	15.84	15.92	15.86
	Sub - Test 3	15.44	15.53	15.41
	Sub - Test 4	15.35	15.50	15.45
HSUPA	Sub - Test 1	15.91	15.95	16.02
	Sub - Test 2	15.47	15.56	15.53
	Sub - Test 3	15.90	15.97	15.85
	Sub - Test 4	15.86	15.92	15.83
	Sub - Test 5	15.74	15.75	15.71

LTE Band 5				Conducted Power(dBm)		
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20407/824.7	20525/836.5	20643/848.3
1.4MHz	QPSK	1	0	15.13	15.13	15.16
		1	2	15.44	15.31	15.48
		1	5	15.11	15.33	15.07
		3	0	15.40	15.25	15.49
		3	2	15.34	15.37	15.40
		3	3	15.31	15.36	15.20
		6	0	15.17	15.12	15.24
	16QAM	1	0	15.14	15.14	14.86
		1	2	15.13	15.19	15.06
		1	5	15.08	15.18	14.95
		3	0	15.46	15.24	15.48
		3	2	15.52	15.42	15.51
		3	3	15.42	15.40	15.45
		6	0	15.32	15.15	15.34
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20415/825.5	20525/836.5	20635/847.5
3MHz	QPSK	1	0	15.21	15.12	15.24
		1	7	15.56	15.38	15.14
		1	14	15.33	15.19	15.37
		8	0	15.17	15.24	15.22
		8	4	15.38	15.28	15.20
		8	7	15.31	15.31	15.18
		15	0	15.26	15.19	15.09
	16QAM	1	0	14.85	14.82	14.82
		1	7	15.16	15.00	14.92
		1	14	14.95	14.84	14.70
		8	0	15.23	15.19	15.11
		8	4	15.40	15.44	15.24
		8	7	15.44	15.47	15.47
		15	0	15.31	15.35	15.11
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20425/826.5	20525/836.5	20625/846.5
5MHz	QPSK	1	0	15.20	15.04	15.25

		1	13	15.39	15.42	15.38
		1	24	15.33	15.06	15.16
		12	0	15.30	15.08	15.17
		12	6	15.36	15.33	15.06
		12	13	15.39	15.14	14.99
		25	0	15.19	15.16	15.11
	16QAM	1	0	15.35	14.87	14.73
		1	13	15.38	15.15	15.03
		1	24	14.89	14.92	14.76
		12	0	15.08	15.09	14.88
		12	6	15.17	15.18	14.86
		12	13	15.07	15.01	14.91
		25	0	15.22	15.24	15.10
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20450/829	20525/836.5	20600/844
10MHz	QPSK	1	0	15.10	15.08	15.13
		1	25	15.45	15.32	15.48
		1	49	15.08	15.31	15.03
		25	0	15.25	15.08	15.35
		25	13	15.22	15.19	15.24
		25	25	15.15	15.21	15.03
		50	0	15.21	15.08	15.20
	16QAM	1	0	15.09	15.09	14.81
		1	25	15.10	15.21	15.04
		1	49	15.05	15.15	14.92
		25	0	15.32	15.12	15.35
		25	13	15.36	15.27	15.35
		25	25	15.27	15.23	15.31
		50	0	15.31	15.11	15.29

5.2. Effective Radiated Power

Ambient condition

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

Methods of Measurement

The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI/TIA-603-E (2016).

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.

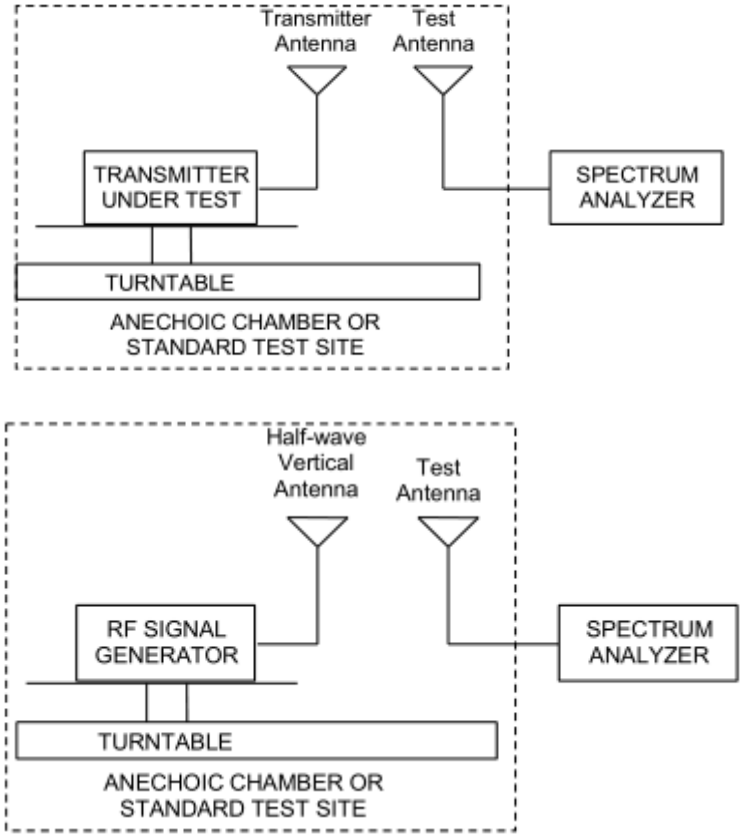
g) When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g.transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:

ERP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBd)

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

EIRP (dBm) = ERP (dBm) + 2.15 (dB.)

Test setup



Limits

Rule Part 22.913(a) 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= 1.19 dB

Test Results:

The measurement is performed for both of horizontal and vertical antenna Polarization, and only the data of worst mode is recorded in this report.

Mode	Channel	Frequency (MHz)	Polarization	ERP (dBm)	Limit (dBm)	Conclusion
GPRS 850	Low	824.2	Horizontal	21.06	38.45	Pass
	Mid	836.6	Horizontal	21.31	38.45	Pass
	High	848.8	Horizontal	21.51	38.45	Pass
EGPRS 850	Low	824.2	Horizontal	20.86	38.45	Pass
	Mid	836.6	Horizontal	21.06	38.45	Pass
	High	848.8	Horizontal	21.28	38.45	Pass
WCDMA Band V	Low	826.4	Horizontal	12.20	38.45	Pass
	Mid	836.6	Horizontal	12.74	38.45	Pass
	High	846.6	Horizontal	13.62	38.45	Pass

LTE Band 5						
bandwidth	Channel	Frequency (MHz)	Polarization	ERP (dBm)	Limit (dBm)	Conclusion
1.4 MHz (QPSK)	Low	824.7	Horizontal	10.41	38.45	Pass
	Mid	836.5	Horizontal	10.98	38.45	Pass
	High	848.3	Horizontal	12.28	38.45	Pass
3 MHz (QPSK)	Low	825.5	Horizontal	9.98	38.45	Pass
	Mid	836.5	Horizontal	10.74	38.45	Pass
	High	847.5	Horizontal	12.16	38.45	Pass
5 MHz (QPSK)	Low	826.5	Horizontal	9.72	38.45	Pass
	Mid	836.5	Horizontal	10.61	38.45	Pass
	High	846.5	Horizontal	11.14	38.45	Pass
10 MHz (QPSK)	Low	829	Horizontal	7.45	38.45	Pass
	Mid	836.5	Horizontal	7.82	38.45	Pass
	High	844	Horizontal	8.57	38.45	Pass
1.4 MHz (16QAM)	Low	824.7	Horizontal	10.05	38.45	Pass
	Mid	836.5	Horizontal	10.62	38.45	Pass
	High	848.3	Horizontal	11.92	38.45	Pass
3 MHz (16QAM)	Low	825.5	Horizontal	9.62	38.45	Pass
	Mid	836.5	Horizontal	10.38	38.45	Pass
	High	847.5	Horizontal	11.80	38.45	Pass
5 MHz (16QAM)	Low	826.5	Horizontal	9.36	38.45	Pass
	Mid	836.5	Horizontal	10.25	38.45	Pass
	High	846.5	Horizontal	10.78	38.45	Pass
10 MHz (16QAM)	Low	829	Horizontal	7.09	38.45	Pass
	Mid	836.5	Horizontal	7.46	38.45	Pass
	High	844	Horizontal	8.21	38.45	Pass

5.3. Occupied Bandwidth

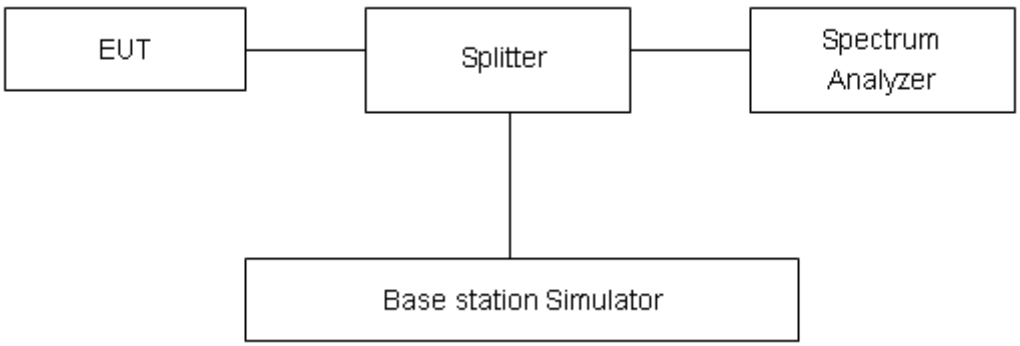
Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.
RBW is set to 3kHz, VBW is set to 10kHz for GSM 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

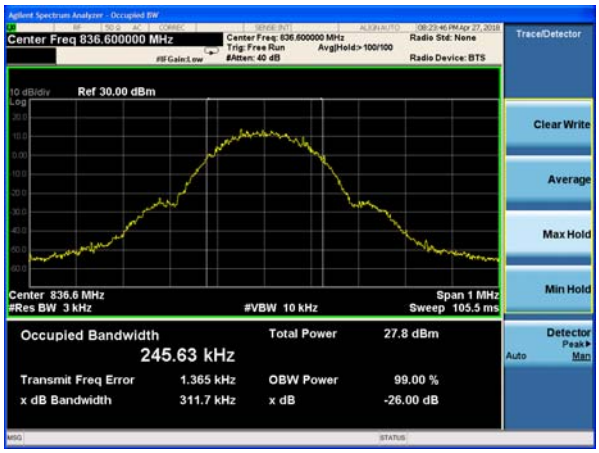
Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GPRS 850 (GMSK)	128	824.2	0.24567	0.3099
	190	836.6	0.24563	0.3117
	251	848.8	0.24345	0.3150
EGPRS 850 (8-PSK)	128	824.2	0.24411	0.3190
	190	836.6	0.24260	0.3105
	251	848.8	0.24210	0.3067
WCDMA Band V (RMC)	4132	826.4	4.1723	4.716
	4183	836.6	4.1567	4.713
	4233	846.6	4.1319	4.713

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	1.354
			20525	836.5	1.1299	1.343
			20643	848.3	1.1216	1.343
		3	20415	825.5	2.7472	3.058
			20525	836.5	2.7412	3.065
			20635	847.5	2.7383	3.075
		5	20425	826.5	4.5153	5.040
			20525	836.5	4.5065	4.962
			20625	846.5	4.5169	4.984
		10	20450	829	9.0061	10.070
			20525	836.5	9.0569	9.997
			20600	844	9.0387	10.040
	16QAM	1.4	20407	824.7	1.1133	1.315
			20525	836.5	1.1204	1.337
			20643	848.3	1.1230	1.345
		3	20415	825.5	2.7413	3.036
			20525	836.5	2.7283	3.058
			20635	847.5	2.7466	3.029
		5	20425	826.5	4.5401	4.987
			20525	836.5	4.5423	5.043
			20625	846.5	4.4968	4.968
		10	20450	829	8.9935	9.893
			20525	836.5	9.0263	9.940
			20600	844	9.0571	9.965

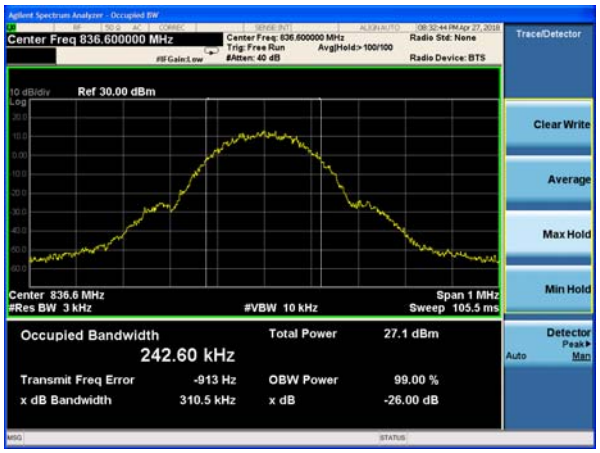
GSM 850 GPRS CH-Low

GSM 850 EGPRS CH-Low

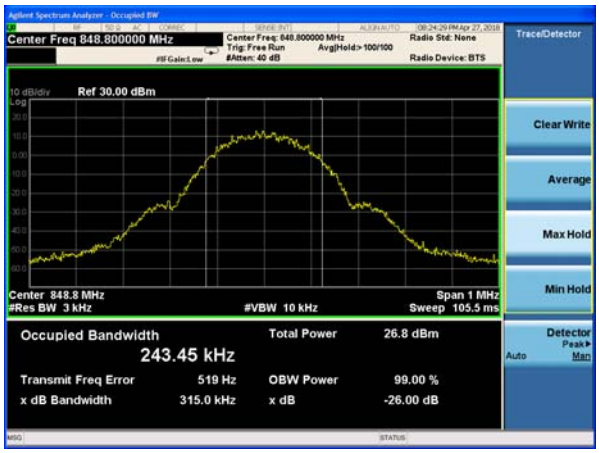
GSM 850 GPRS CH-Middle



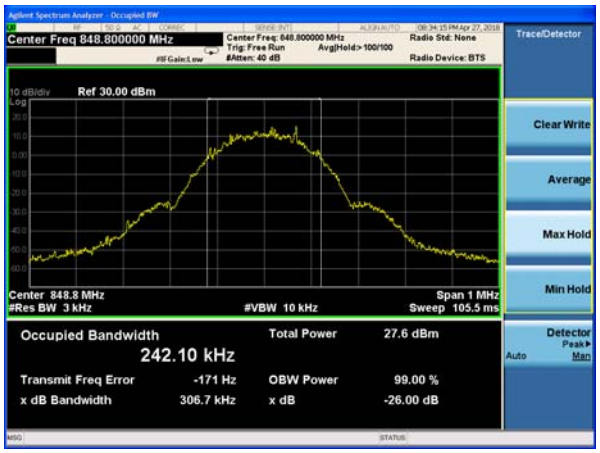
GSM 850 EGPRS CH-Middle



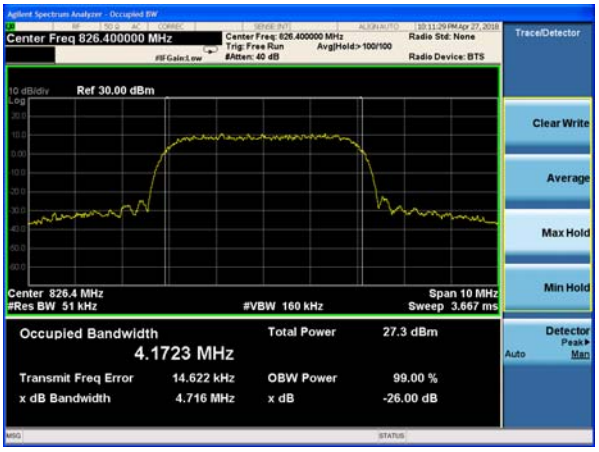
GSM 850 GPRS CH-High



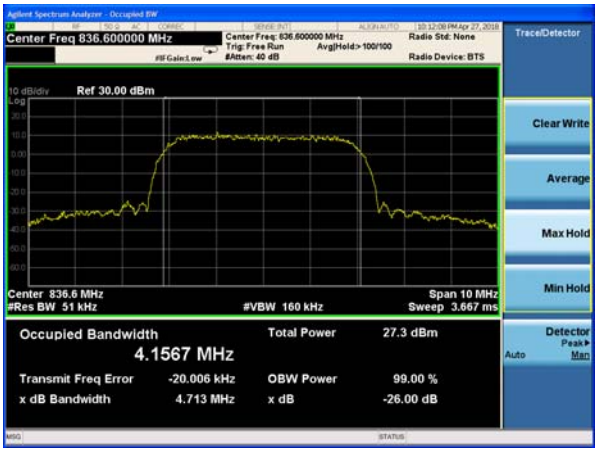
GSM 850 EGPRS CH-High



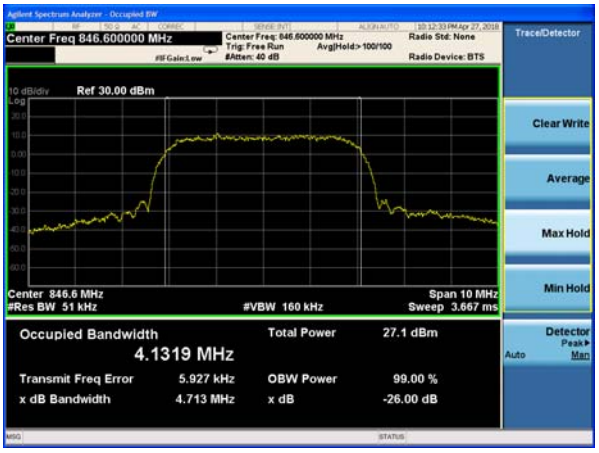
WCDMA Band V CH-Low



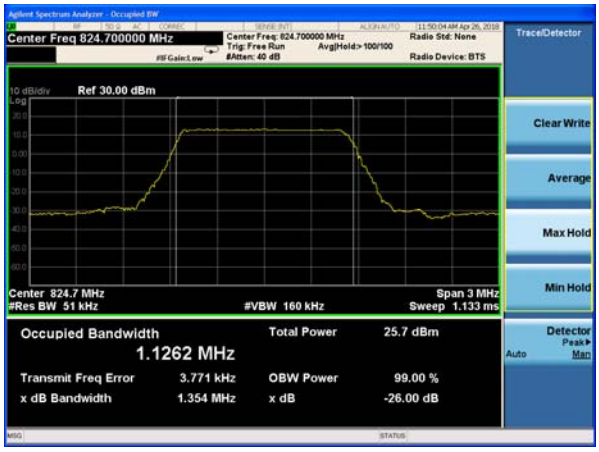
WCDMA Band V CH-Middle



WCDMA Band V CH-High

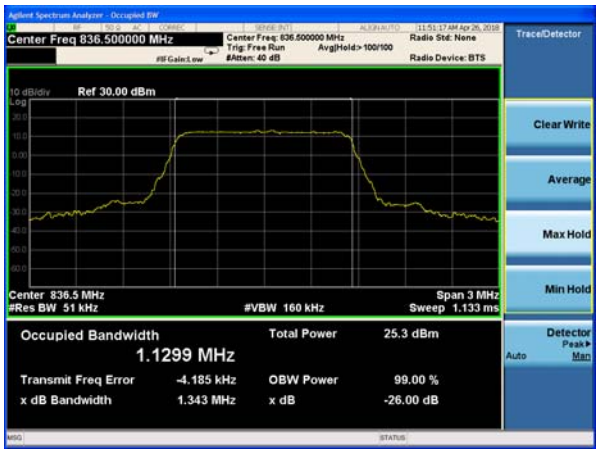


LTE Band 5 QPSK 1.4MHz CH-Low

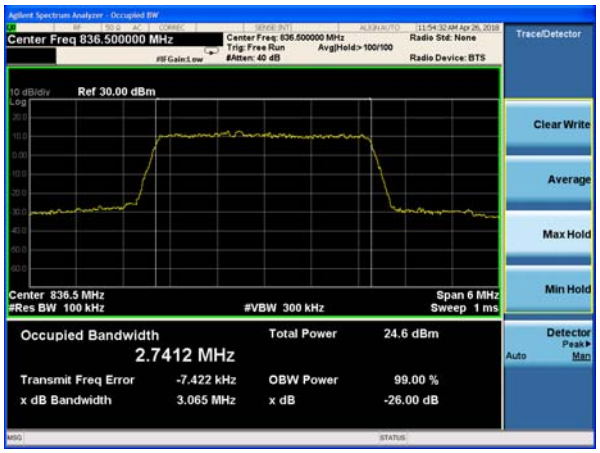


LTE Band 5 QPSK 3MHz CH-Low

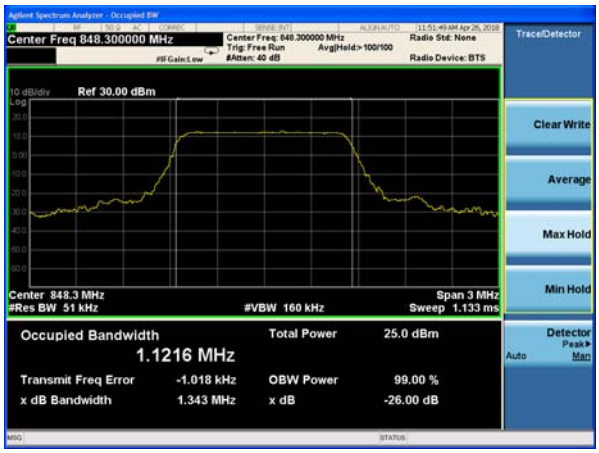
LTE Band 5 QPSK 1.4MHz CH-Middle



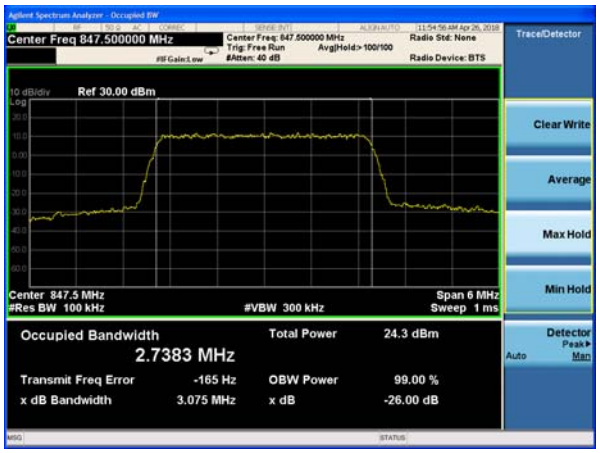
LTE Band 5 QPSK 3MHz CH-Middle



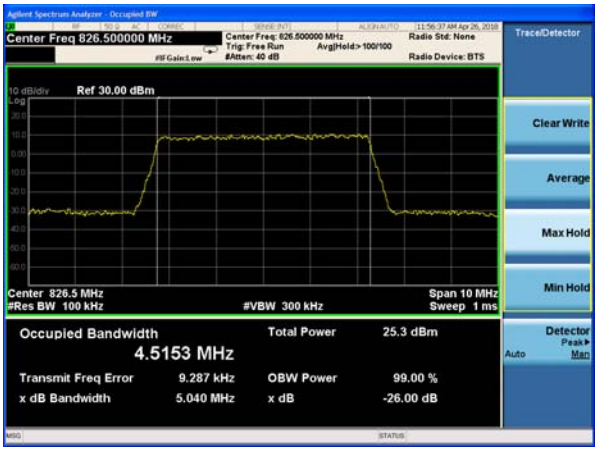
LTE Band 5 QPSK 1.4MHz CH-High



LTE Band 5 QPSK 3MHz CH-High

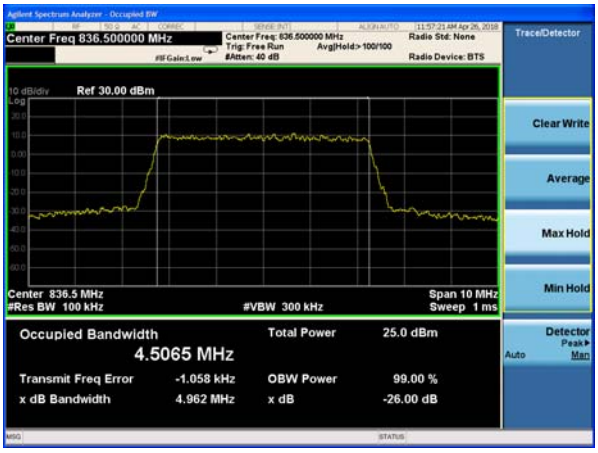


LTE Band 5 QPSK 5MHz CH-Low



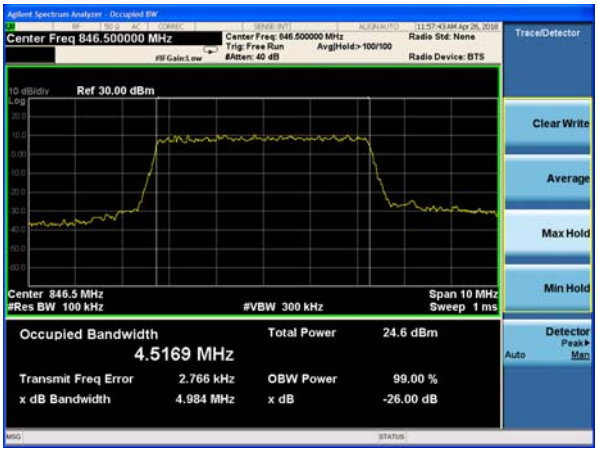
LTE Band 5 QPSK 10MHz CH-Low

LTE Band 5 QPSK 5MHz CH-Middle

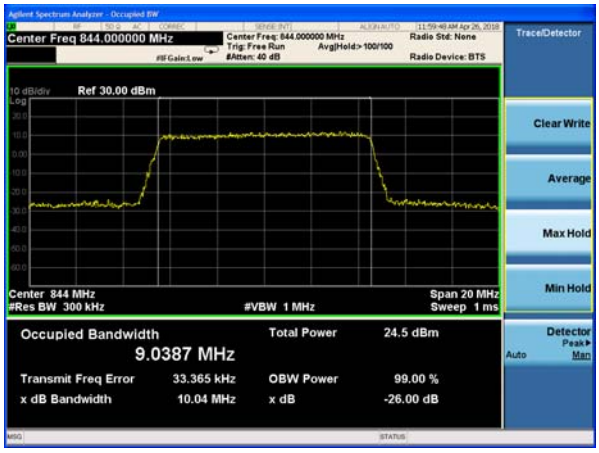


LTE Band 5 QPSK 10MHz CH-Middle

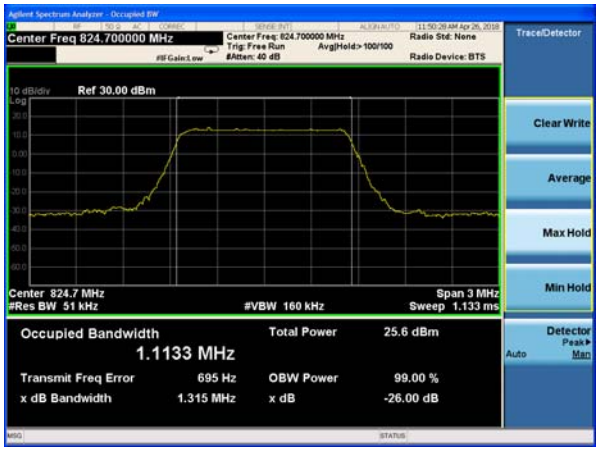
LTE Band 5 QPSK 5MHz CH-High



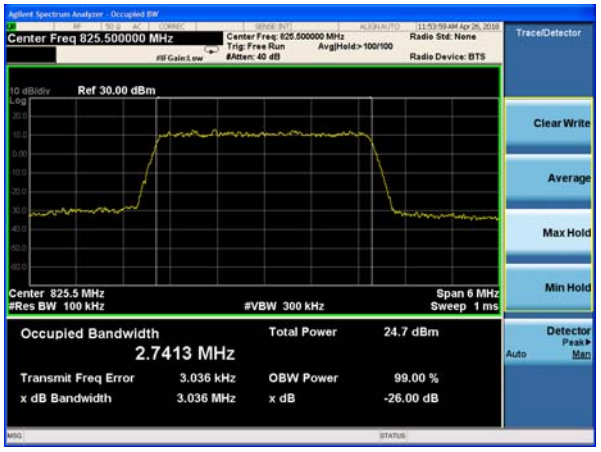
LTE Band 5 QPSK 10MHz CH-High



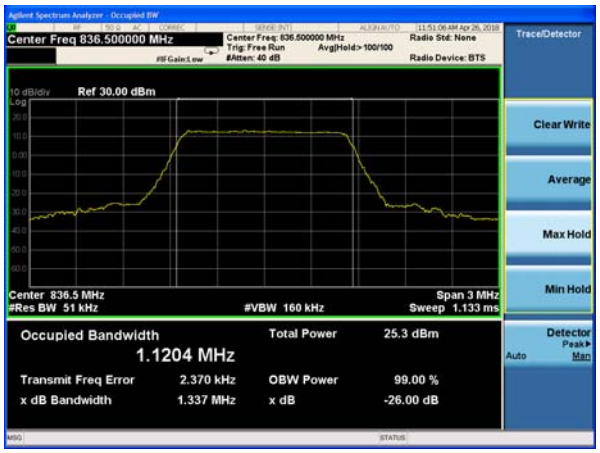
LTE Band 5 16QAM 1.4MHz CH-Low



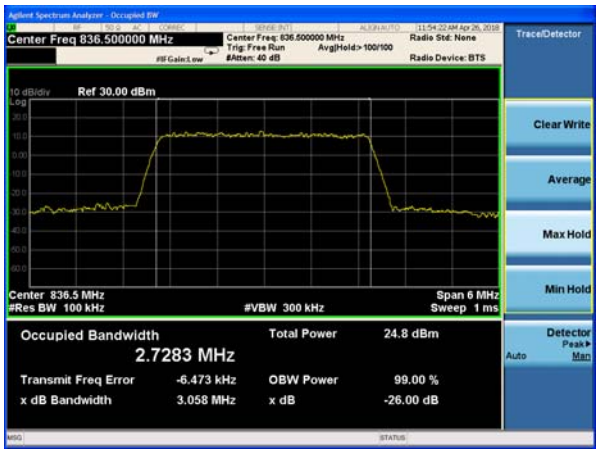
LTE Band 5 16QAM 3MHz CH-Low



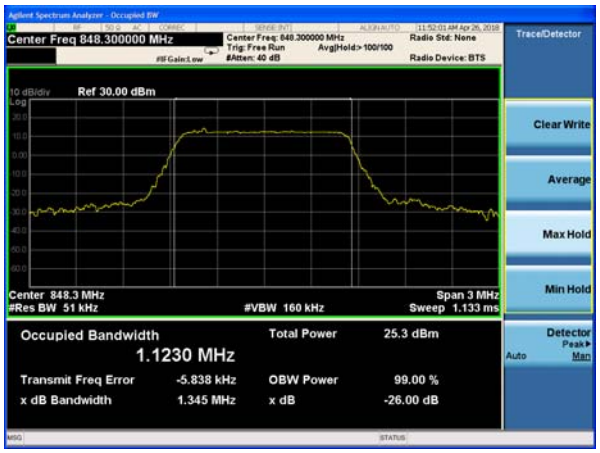
LTE Band 5 16QAM 1.4MHz CH-Middle



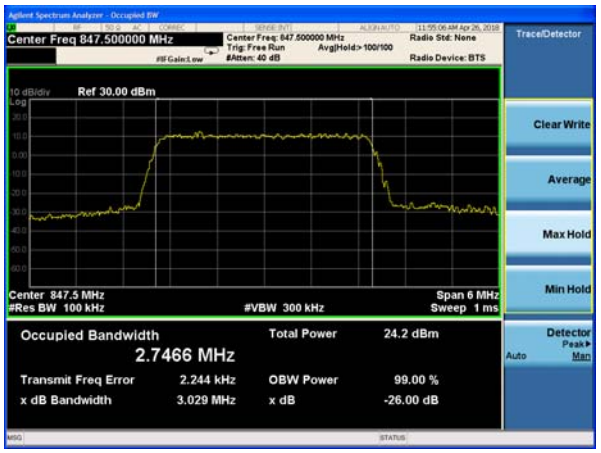
LTE Band 5 16QAM 3MHz CH-Middle



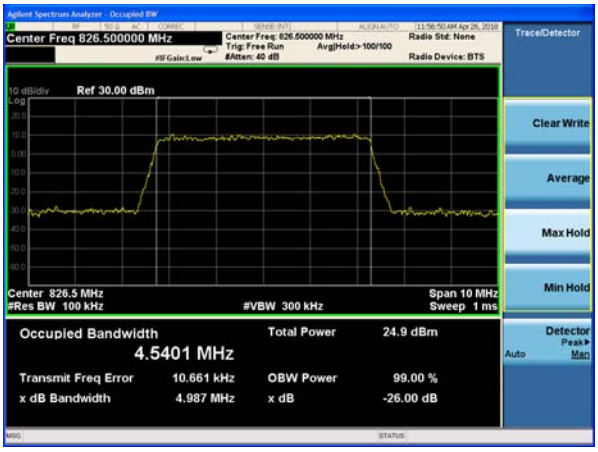
LTE Band 5 16QAM 1.4MHz CH-High



LTE Band 5 16QAM 3MHz CH-High

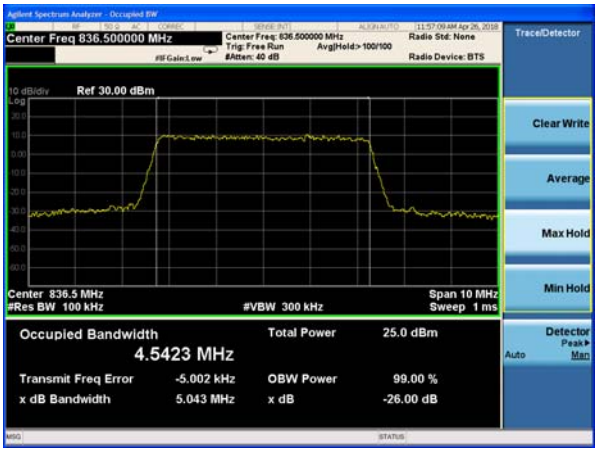


LTE Band 5 16QAM 5MHz CH-Low



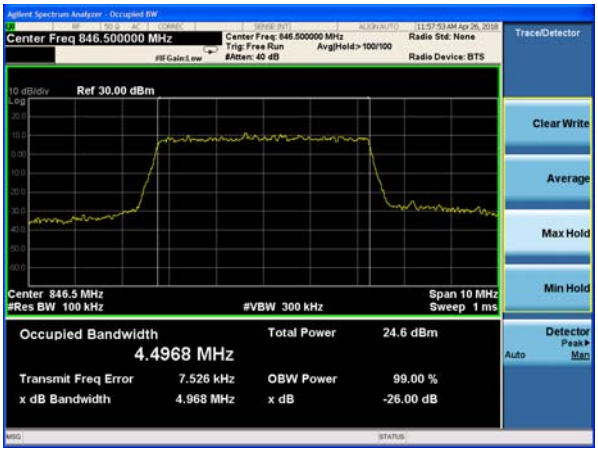
LTE Band 5 16QAM 10MHz CH-Low

LTE Band 5 16QAM 5MHz CH-Middle

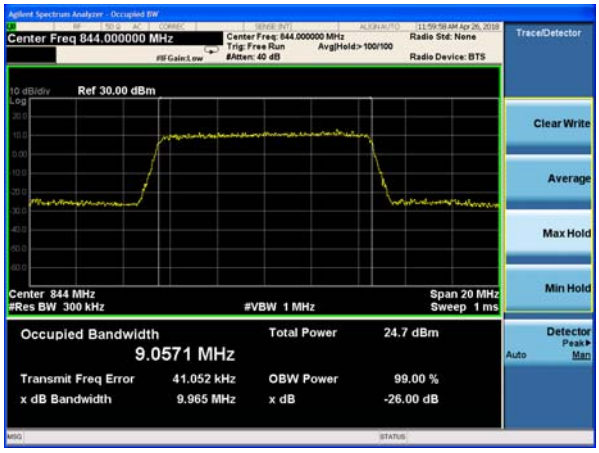


LTE Band 5 16QAM 10MHz CH-Middle

LTE Band 5 16QAM 5MHz CH-High



LTE Band 5 16QAM 10MHz CH-High



5.4. Band Edge Compliance

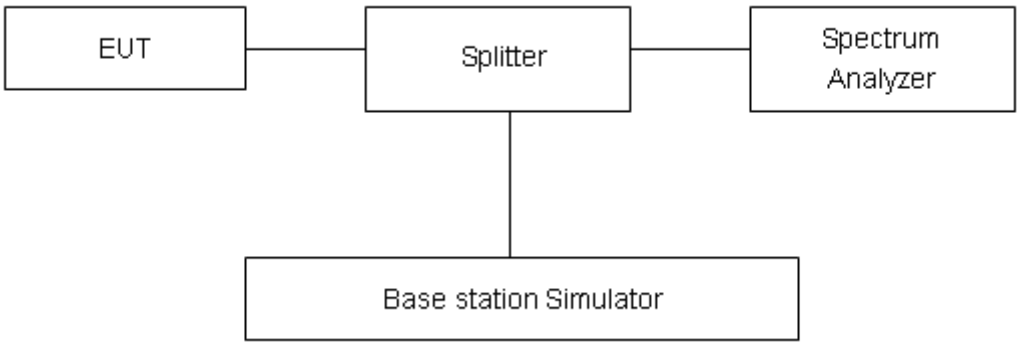
Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The average detector is used.
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.”

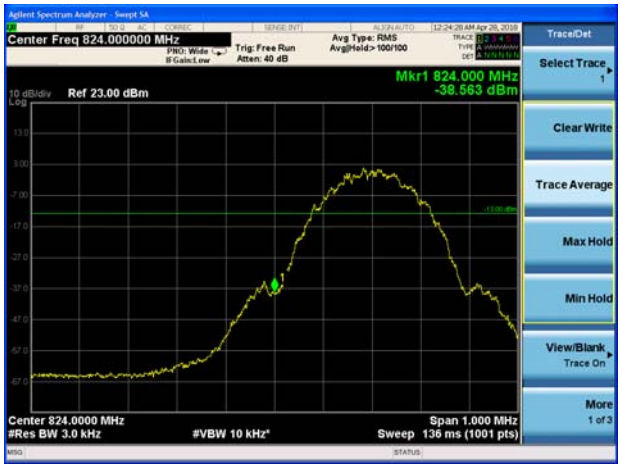
Limit	-13 dBm

Measurement Uncertainty

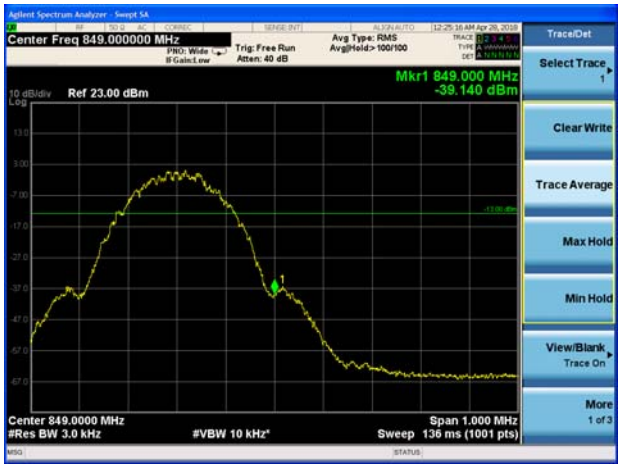
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U=0.684dB.

Test Result:

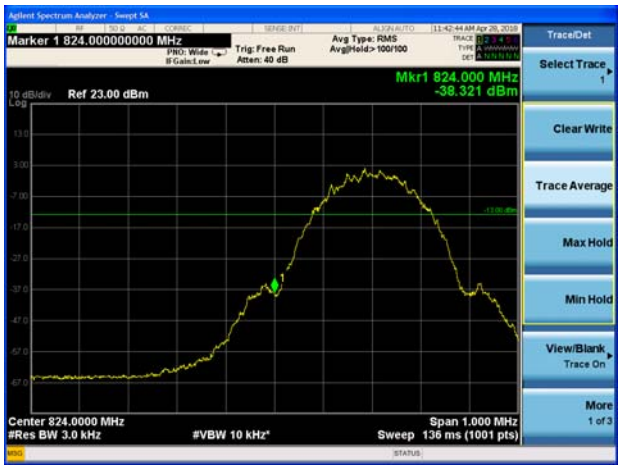
GSM 850 GPRS CH-Low



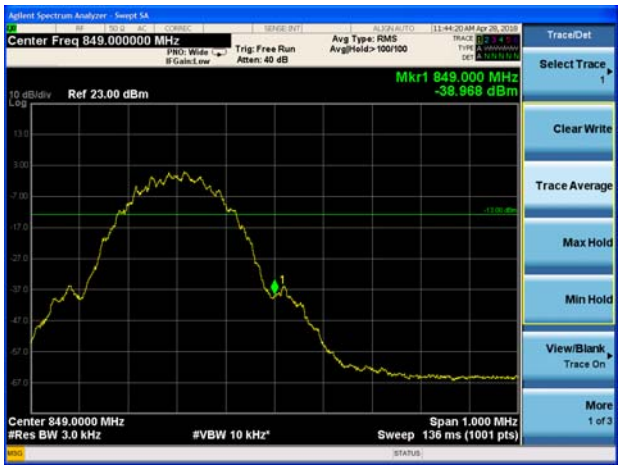
GSM 850 GPRS CH-High



GSM 850 EGPRS CH-Low



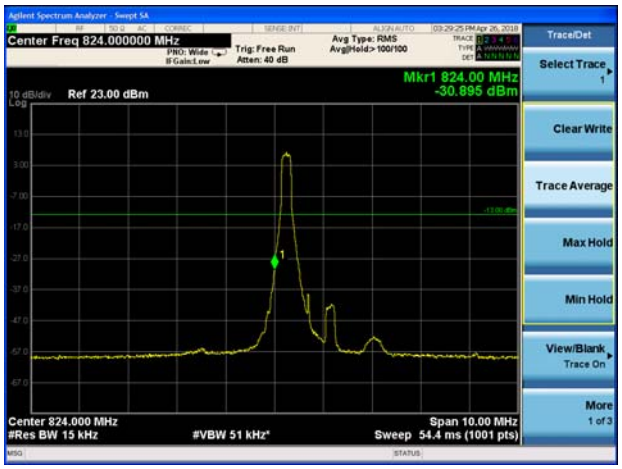
GSM 850 EGPRS CH-High



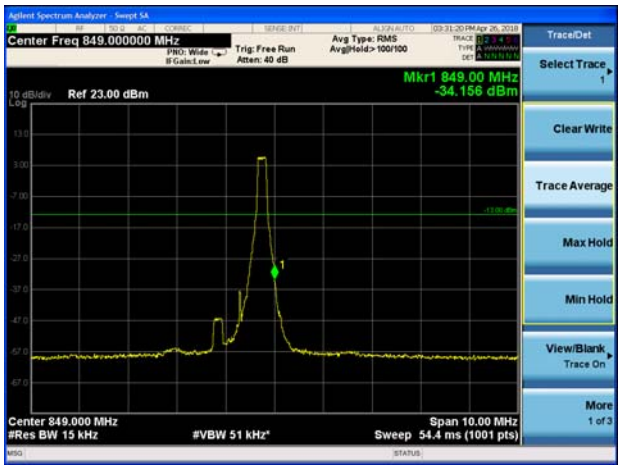
WCDMA Band V CH-Low

WCDMA Band V CH-High

LTE Band 5 QPSK 1.4MHz CH-Low 1RB

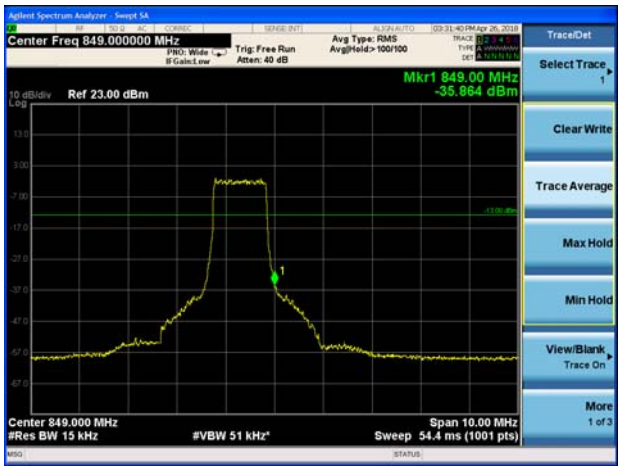


LTE Band 5 QPSK 1.4MHz CH-High 1RB

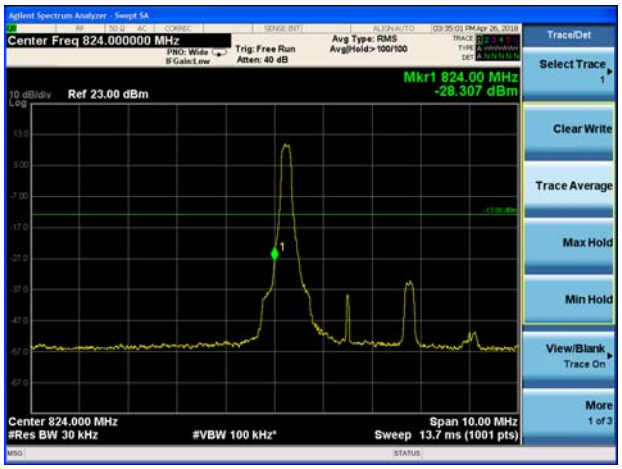


LTE Band 5 QPSK 1.4MHz CH-Low 100%RB

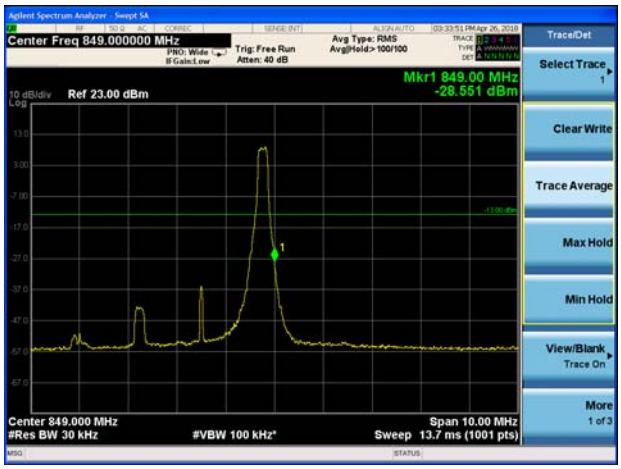
LTE Band 5 QPSK 1.4MHz CH-High 100%RB



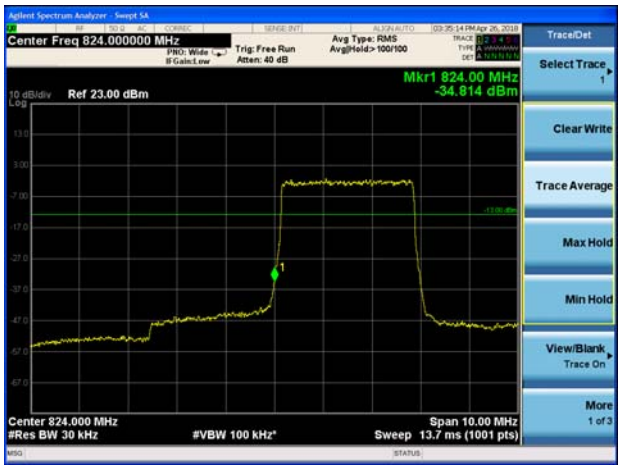
LTE Band 5 QPSK 3MHz CH-Low 1RB



LTE Band 5 QPSK 3MHz CH-High 1RB

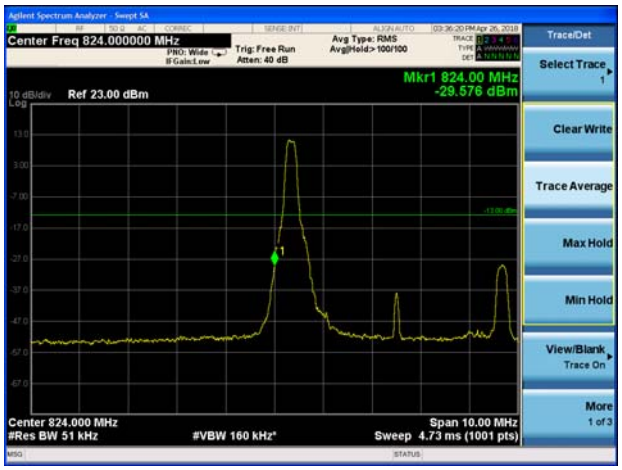


LTE Band 5 QPSK 3MHz CH-Low 100%RB

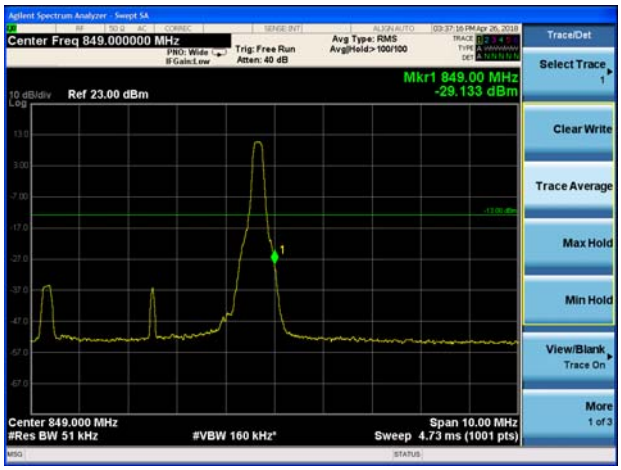


LTE Band 5 QPSK 3MHz CH-High 100%RB

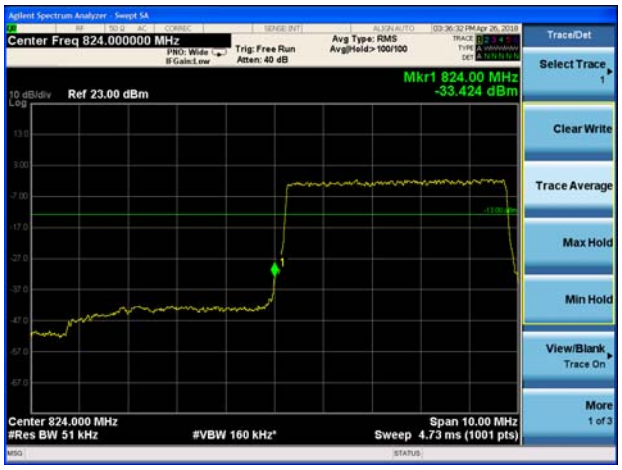
LTE Band 5 QPSK 5MHz CH-Low 1RB



LTE Band 5 QPSK 5MHz CH-High 1RB

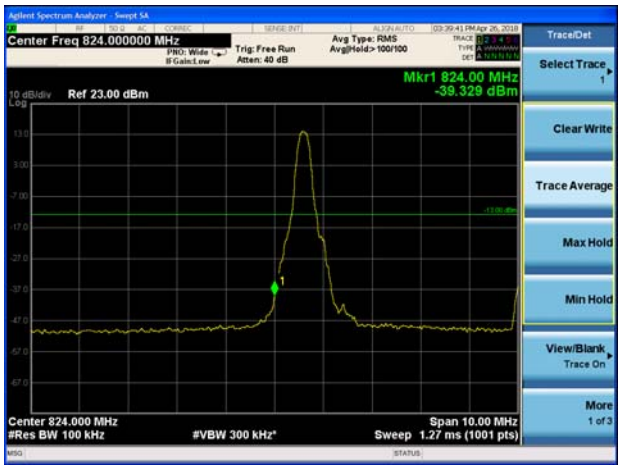


LTE Band 5 QPSK 5MHz CH-Low 100%RB

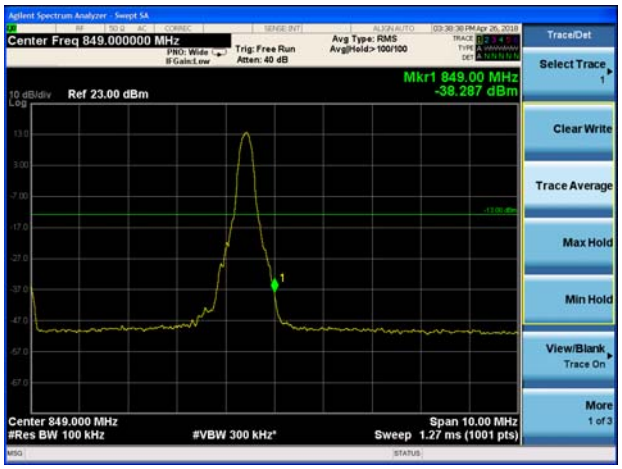


LTE Band 5 QPSK 5MHz CH-High 100%RB

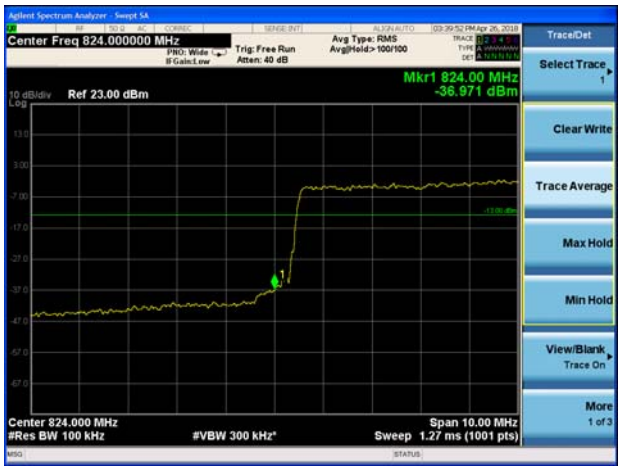
LTE Band 5 QPSK 10MHz CH-Low 1RB



LTE Band 5 QPSK 10MHz CH-High 1RB

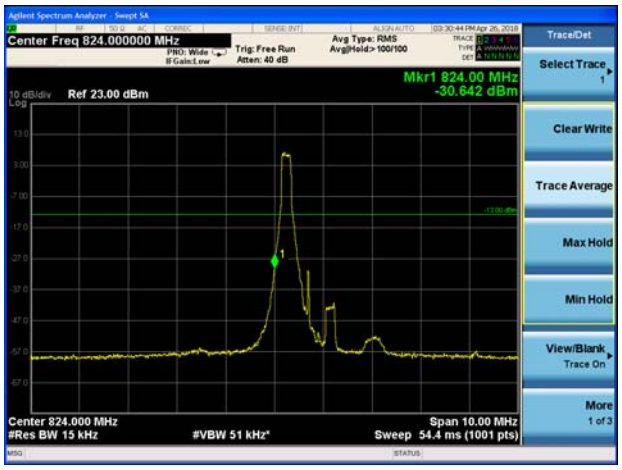


LTE Band 5 QPSK 10MHz CH-Low 100%RB

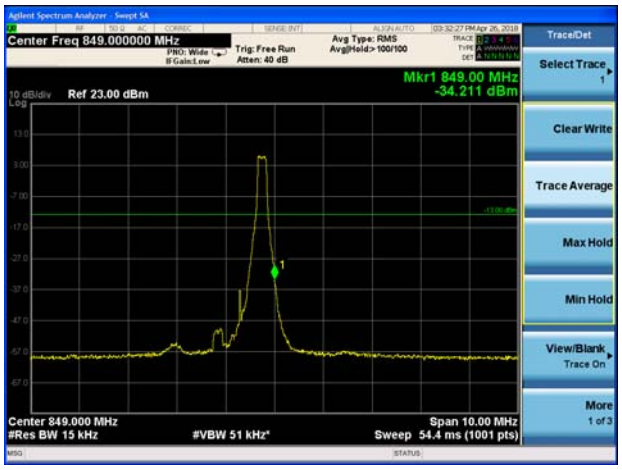


LTE Band 5 QPSK 10MHz CH-High 100%RB

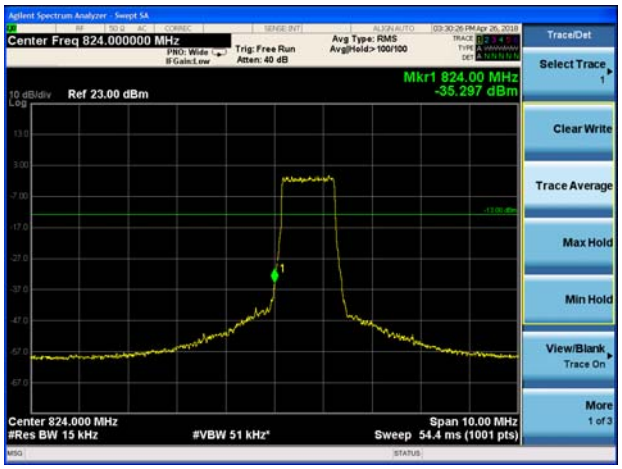
LTE Band 5 16QAM 1.4MHz CH-Low 1RB



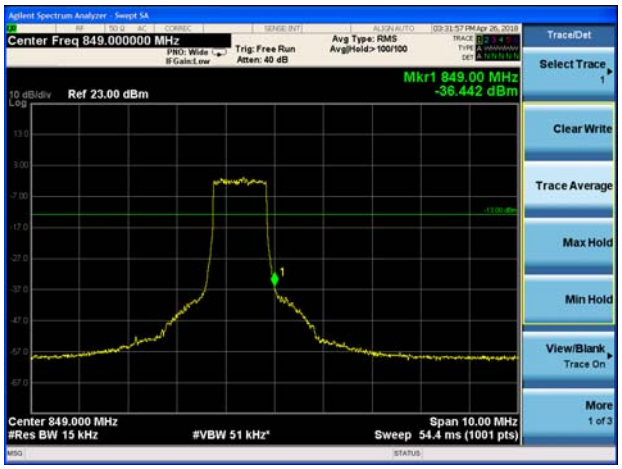
LTE Band 5 16QAM 1.4MHz CH-High 1RB



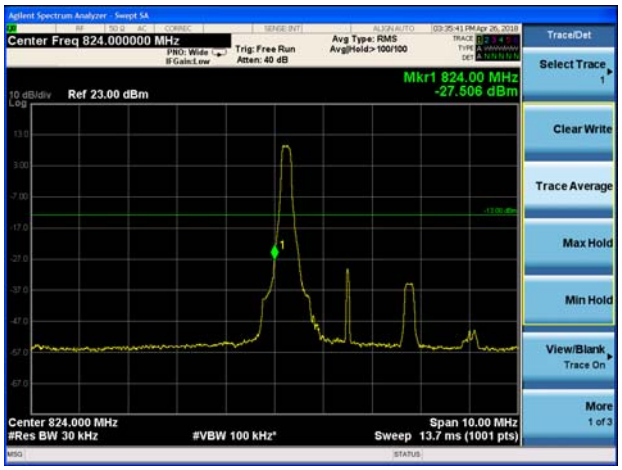
LTE Band 5 16QAM 1.4MHz CH-Low 100%RB



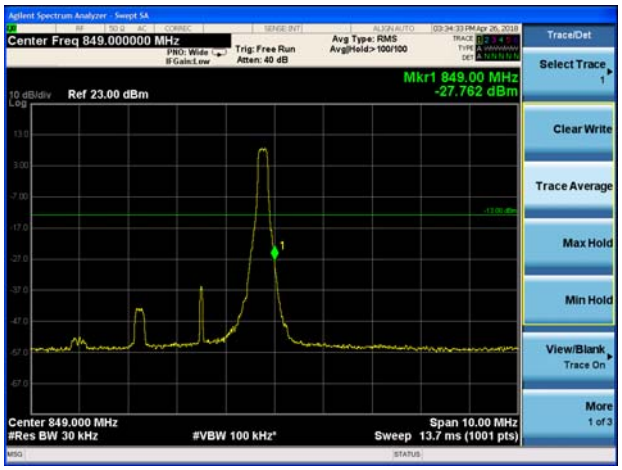
LTE Band 5 16QAM 1.4MHz CH-High 100%RB



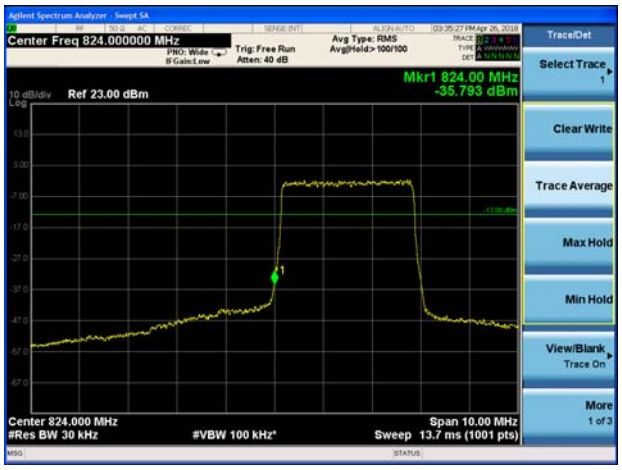
LTE Band 5 16QAM 3MHz CH-Low 1RB



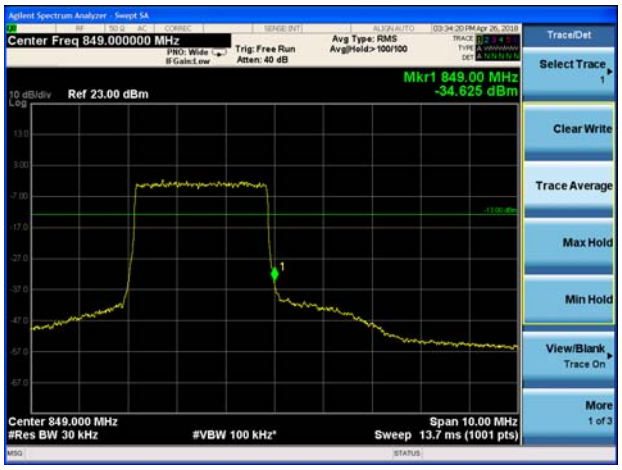
LTE Band 5 16QAM 3MHz CH-High 1RB



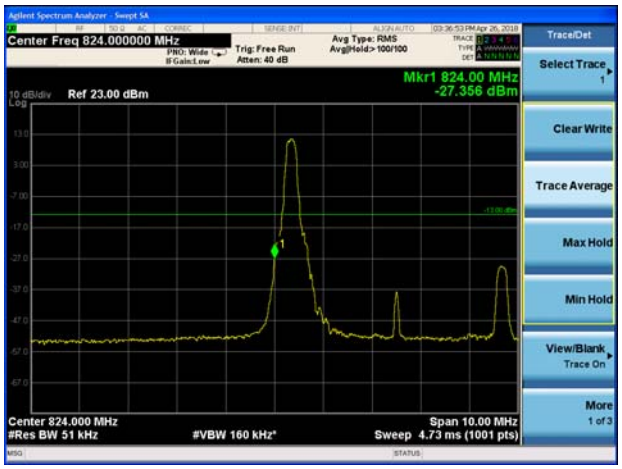
LTE Band 5 16QAM 3MHz CH-Low 100%RB



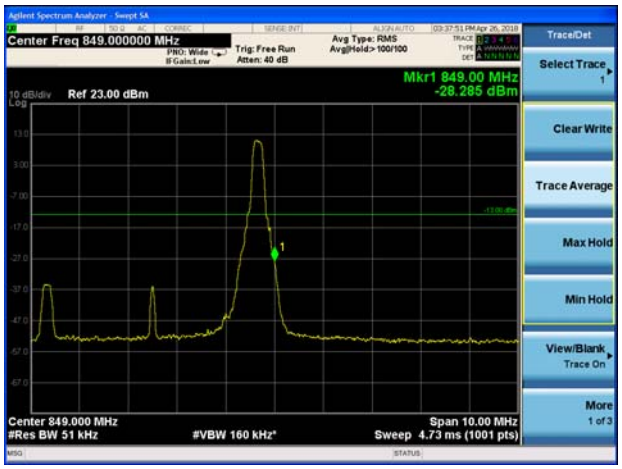
LTE Band 5 16QAM 3MHz CH-High 100%RB



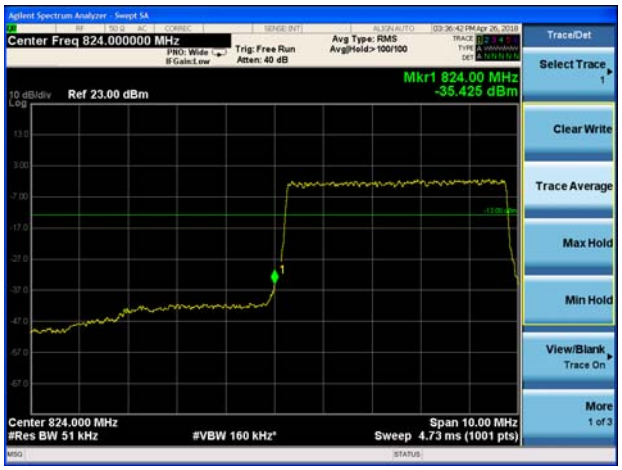
LTE Band 5 16QAM 5MHz CH-Low 1RB



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

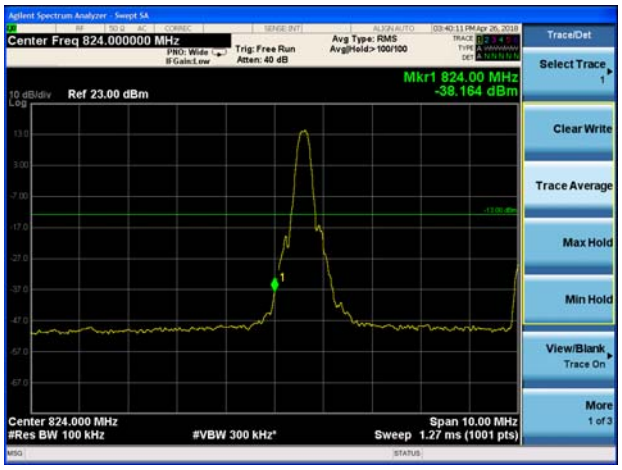


LTE Band 5 16QAM 5MHz CH-Low 100%RB

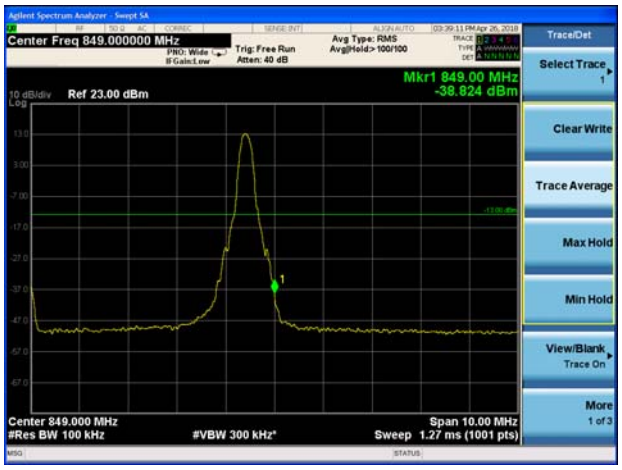


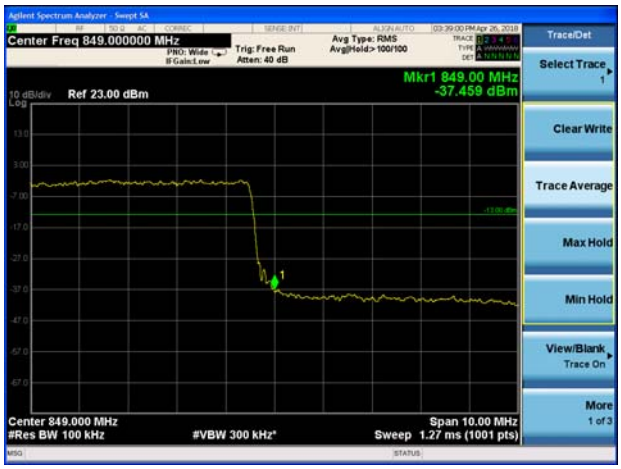
LTE Band 5 16QAM 5MHz CH-High 100%RB

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
	

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

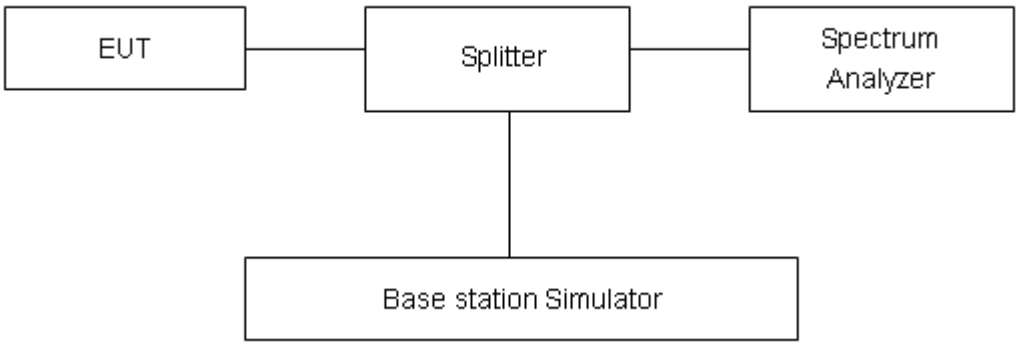
Ambient condition

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
GPRS 850 (GMSK)	128	824.2	19.39	18.36	1.03	≤13	PASS
	190	836.6	19.43	18.32	1.11	≤13	PASS
	251	848.8	20.18	19.10	1.08	≤13	PASS
EGPRS 850 (8-PSK)	128	824.2	19.18	18.05	1.13	≤13	PASS
	190	836.6	19.17	17.99	1.18	≤13	PASS
	251	848.8	19.94	18.84	1.10	≤13	PASS
WCDMA Band V (RMC)	4132	826.4	20.02	17.01	3.01	≤13	PASS
	4183	836.6	19.89	17.00	2.89	≤13	PASS
	4233	846.6	20.04	17.03	3.01	≤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	20.25	15.17	5.08	≤13	PASS
		20525	836.5	20.02	15.12	4.90	≤13	PASS
		20643	848.3	20.03	15.24	4.79	≤13	PASS
	3	20415	825.5	20.51	15.26	5.25	≤13	PASS
		20525	836.5	20.24	15.19	5.05	≤13	PASS
		20635	847.5	20.07	15.09	4.98	≤13	PASS
	5	20425	826.5	20.45	15.19	5.26	≤13	PASS
		20525	836.5	20.23	15.16	5.07	≤13	PASS
		20625	846.5	20.13	15.11	5.02	≤13	PASS
	10	20450	829	20.21	15.21	5.00	≤13	PASS
		20525	836.5	20.20	15.08	5.12	≤13	PASS
		20600	844	20.33	15.20	5.13	≤13	PASS
16QAM	1.4	20407	824.7	21.20	15.32	5.88	≤13	PASS
		20525	836.5	20.92	15.15	5.77	≤13	PASS
		20643	848.3	20.98	15.34	5.64	≤13	PASS
	3	20415	825.5	21.36	15.31	6.05	≤13	PASS
		20525	836.5	21.19	15.35	5.84	≤13	PASS
		20635	847.5	20.93	15.11	5.82	≤13	PASS
	5	20425	826.5	21.27	15.22	6.05	≤13	PASS
		20525	836.5	21.04	15.24	5.80	≤13	PASS
		20625	846.5	20.96	15.10	5.86	≤13	PASS
	10	20450	829	21.17	15.31	5.86	≤13	PASS
		20525	836.5	20.97	15.11	5.86	≤13	PASS
		20600	844	21.29	15.29	6.00	≤13	PASS

5.6. Frequency Stability

Ambient condition

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

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -30°C to +50°C in 10°C step size,

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

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

(3) Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements. Frequency Stability (Voltage Variation)

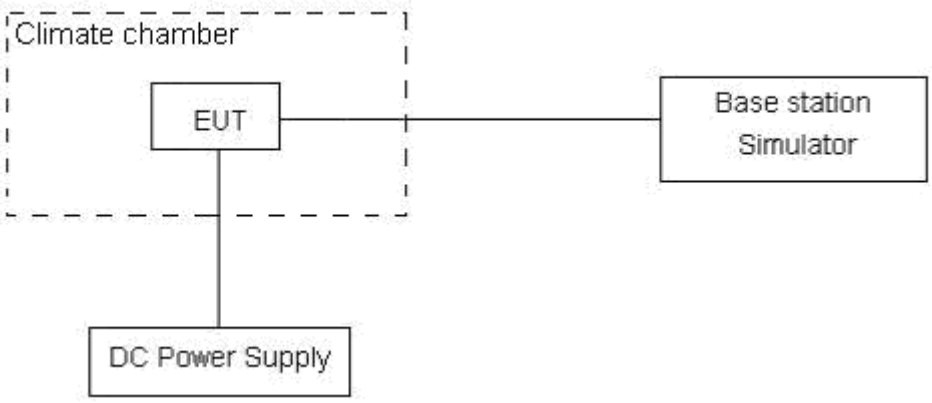
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.5 V and 4.35 V, with a nominal voltage of 3.8V.

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

GPRS 850					
Condition		824	849	Delta (Hz)	Frequency Stability (ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal（25°C）	Normal	824.0789	848.9641	29.30	0.03503
Extreme（50°C）		824.0788	848.9643	10.72	0.01281
Extreme（40°C）		824.0786	848.9638	36.03	0.04307
Extreme（30°C）		824.0783	848.9635	-19.99	-0.02390
Extreme（20°C）		824.0791	848.9642	8.54	0.01021
Extreme（10C）		824.0787	848.9639	30.95	0.03700
Extreme（0°C）		824.0785	848.9637	-12.97	-0.01550
Extreme（-10°C）		824.0784	848.9636	23.64	0.02826
Extreme（-20°C）		824.0781	848.9632	32.54	0.03890
Extreme（-30°C）		824.0778	848.9632	21.95	0.02623
25°C	LV	824.0793	848.9645	-7.25	-0.00867
	HV	824.0791	848.9643	19.34	0.02312
EGPRS 850					
Condition		824	849	Delta (Hz)	Frequency Stability (ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal（25°C）	Normal	824.0809	848.9383	26.60	0.03180
Extreme（50°C）		824.0812	848.9384	17.44	0.02085
Extreme（40°C）		824.0812	848.9386	31.90	0.03813
Extreme（30°C）		824.0815	848.9389	-8.65	-0.01034
Extreme（20°C）		824.0808	848.9382	13.18	0.01575
Extreme（10C）		824.0811	848.9385	19.90	0.02379
Extreme（0°C）		824.0813	848.9387	-24.00	-0.02869
Extreme（-10°C）		824.0814	848.9388	17.28	0.02066
Extreme（-20°C）		824.0818	848.9392	-4.45	-0.00532
Extreme（-30°C）		824.0821	848.9394	-11.23	-0.01343
25°C	LV	824.0804	848.9387	25.52	0.03050
	HV	824.0801	848.9382	-23.70	-0.02833

WCDMA Band 5					
Condition		824	849	Delta (Hz)	Frequency Stability (ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal（25°C）	Normal	824.0347	848.9632	19.34	0.02312
Extreme（50°C）		824.0345	848.9634	17.30	0.02068
Extreme（40°C）		824.0346	848.9633	18.25	0.02181
Extreme（30°C）		824.0348	848.9631	19.22	0.02297
Extreme（20°C）		824.0343	848.9636	-1.94	-0.00232
Extreme（10C）		824.0344	848.9635	-1.71	-0.00204
Extreme（0°C）		824.0349	848.9632	35.44	0.04236
Extreme（-10°C）		824.0351	848.9629	35.39	0.04230
Extreme（-20°C）		824.0342	848.9637	38.12	0.04556
Extreme（-30°C）		824.0352	848.9627	35.74	0.04272
25C	LV	824.0354	848.9625	-15.65	-0.01870
	HV	824.0356	848.9623	6.97	0.00834

LTE Band 5					
(QPSK, 10MHz BANDWIDTH)					
Condition		824	849	Delta (Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal（25°C）	Normal	824.2325	848.7915	1.91	0.00228
Extreme（50°C）		824.2323	848.7917	6.81	0.00814
Extreme（40°C）		824.2324	848.7916	1.24	0.00148
Extreme（30°C）		824.2326	848.7914	4.49	0.00537
Extreme（20°C）		824.2321	848.7919	3.67	0.00439
Extreme（10C）		824.2322	848.7918	1.32	0.00158
Extreme（0°C）		824.2327	848.7913	0.60	0.00072
Extreme（-10°C）		824.2328	848.7912	11.60	0.01387
Extreme（-20°C）		824.2320	848.7927	-6.07	-0.00726
Extreme（-30°C）		824.2330	848.7918	9.98	0.01193
25°C	LV	824.2332	848.7908	1.87	0.00224
	HV	824.2334	848.7906	4.96	0.00593
(16QAM,10MHz BANDWIDTH)					
Condition		824	849	Delta (Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal（25°C）	Normal	824.3627	848.7237	-2.66	-0.00318
Extreme（50°C）		824.3625	848.7239	2.42	0.00289
Extreme（40°C）		824.3626	848.7238	-2.65	-0.00317
Extreme（30°C）		824.3628	848.7236	-4.57	-0.00546
Extreme（20°C）		824.3623	848.7241	-2.11	-0.00252
Extreme（10C）		824.3624	848.7245	-2.78	-0.00332
Extreme（0°C）		824.3629	848.7235	-1.34	-0.00160
Extreme（-10°C）		824.3635	848.7234	3.70	0.00442
Extreme（-20°C）		824.3622	848.7242	-0.62	-0.00074
Extreme（-30°C）		824.3632	848.7232	-1.18	-0.00141
25°C	LV	824.3634	848.7236	-2.14	-0.00256
	HV	824.3636	848.7228	-1.25	-0.00149

5.7. Spurious Emissions at Antenna Terminals

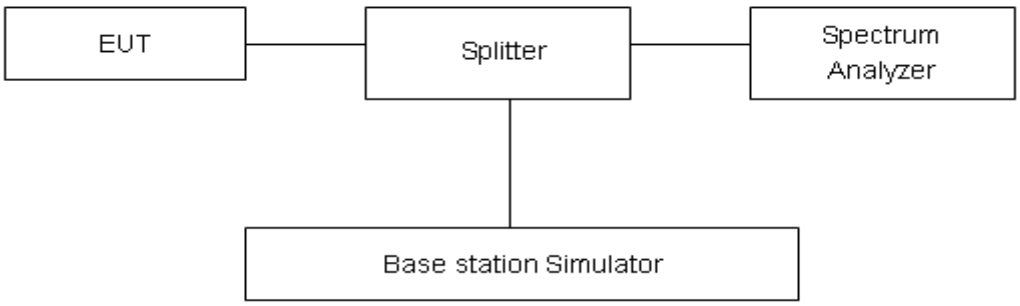
Ambient condition

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

Method of Measurement

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

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

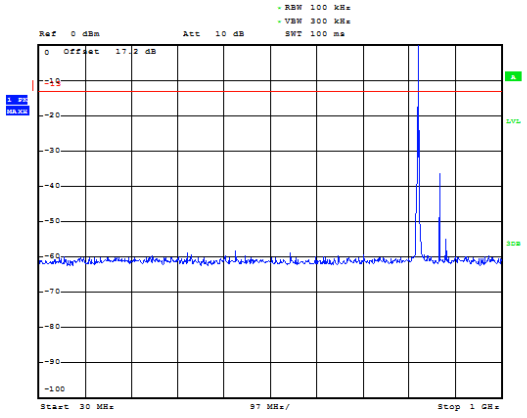
Test Result

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

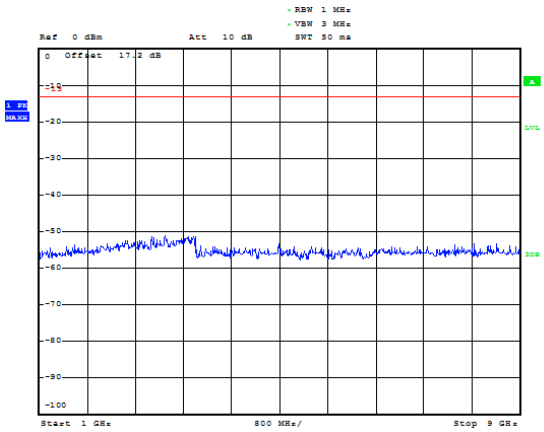
If disturbances were found more than 20dB below limit line, the mark is not required for the EUT.

The signal beyond the limit is carrier.

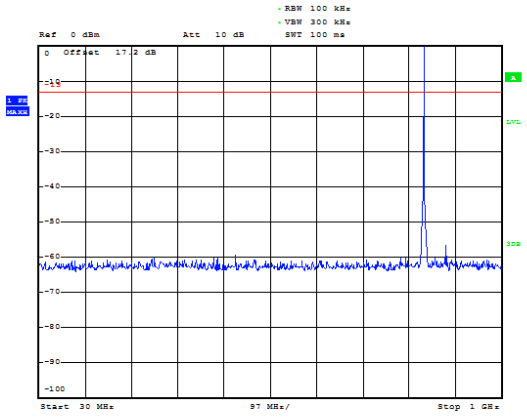
GSM 850 CH-Low 30MHz ~ 1GHz



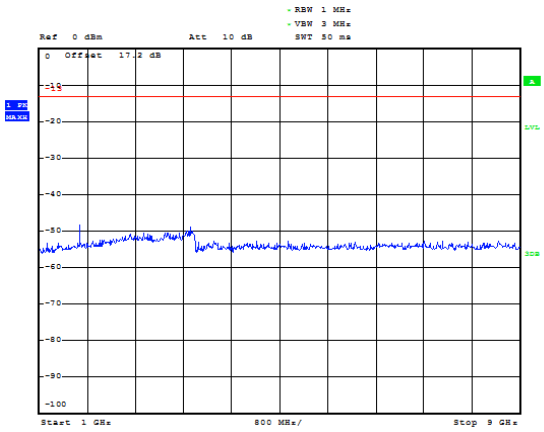
GSM 850 CH-Low 1GHz ~ 9GHz



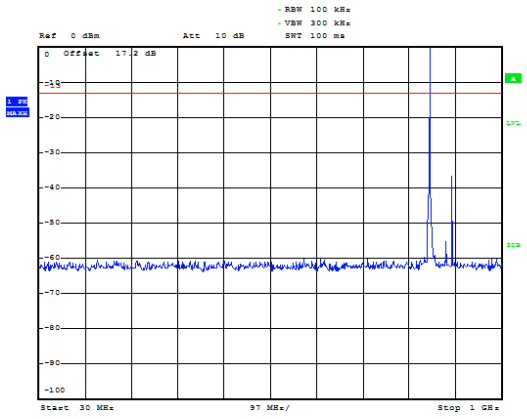
GSM 850 CH-Middle 30MHz ~ 1GHz



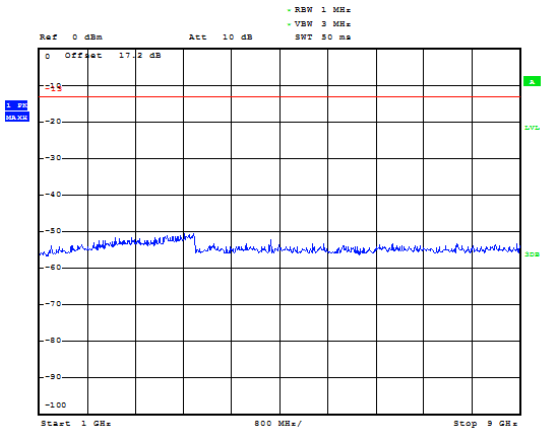
GSM 850 CH-Middle 1GHz ~ 9GHz



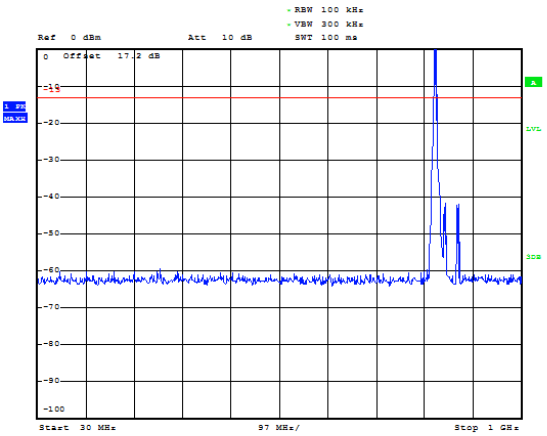
GSM 850 CH-High 30MHz ~ 1GHz



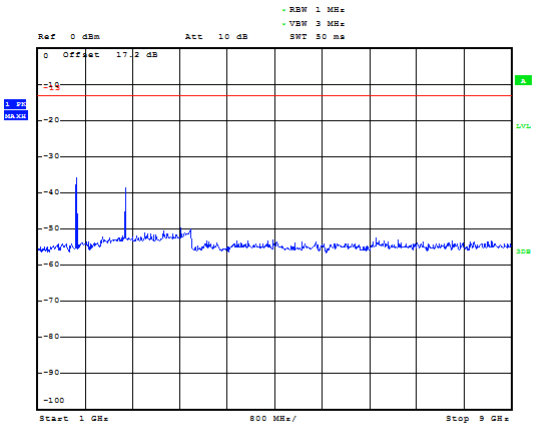
GSM 850 CH-High 1GHz ~ 9GHz



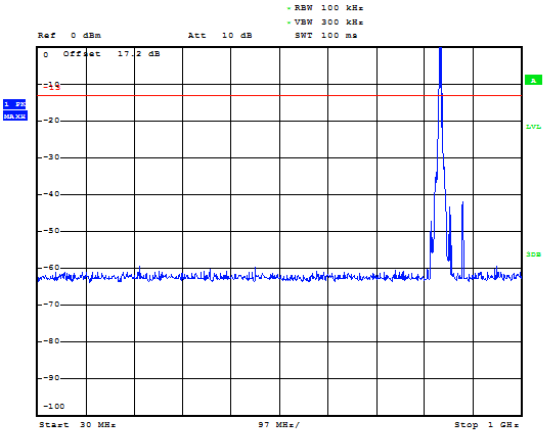
WCDMA Band V CH-Low 30MHz ~ 1GHz



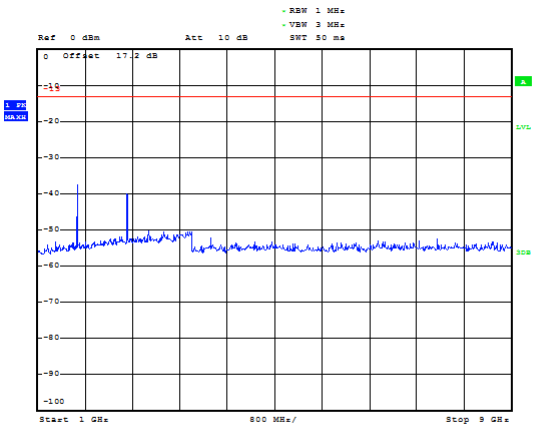
WCDMA Band V CH-Low 1GHz ~ 9GHz



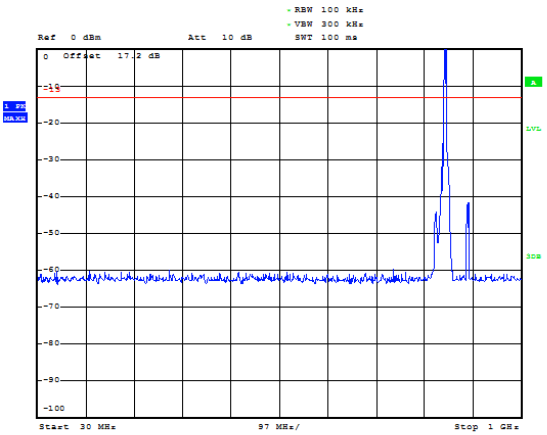
WCDMA Band V CH-Middle 30MHz ~ 1GHz



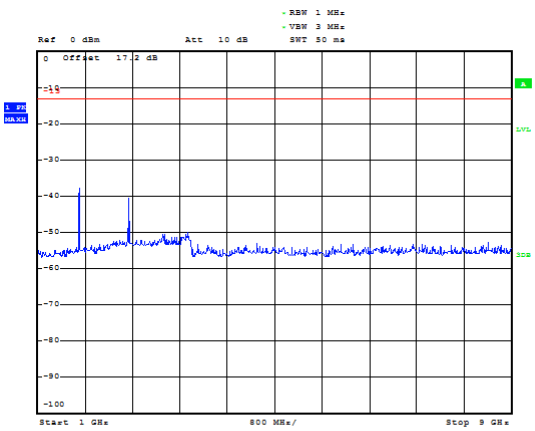
WCDMA Band V CH-Middle 1GHz ~ 9GHz



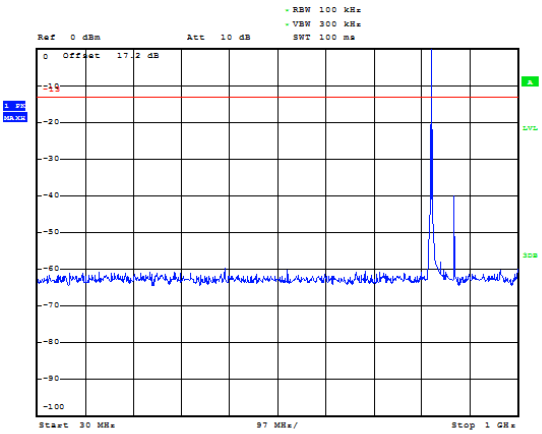
WCDMA Band V CH-High 30MHz ~ 1GHz



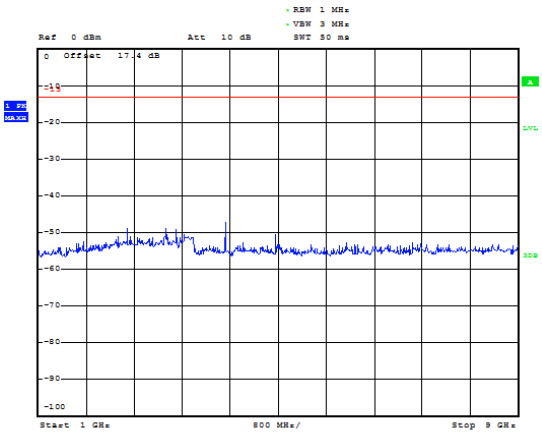
WCDMA Band V CH-High 1GHz ~ 9GHz



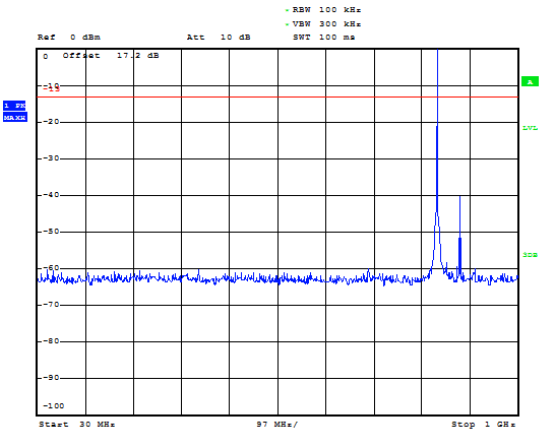
LTE Band 5 1.4MHz CH-Low 30MHz~1GHz



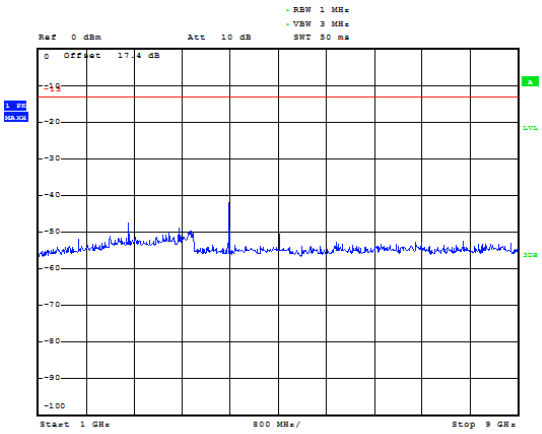
LTE Band 5 1.4MHz CH-Low 1GHz~9GHz



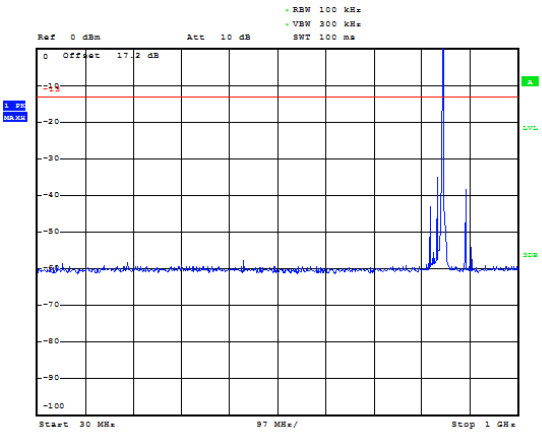
LTE Band 5 1.4MHz CH-Middle 30MHz~1GHz



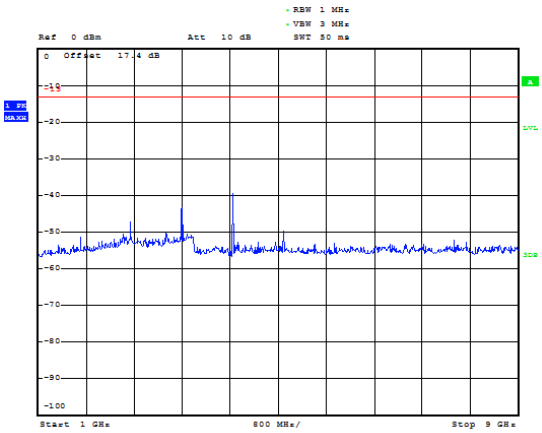
LTE Band 5 1.4MHz CH-Middle 1GHz~9GHz



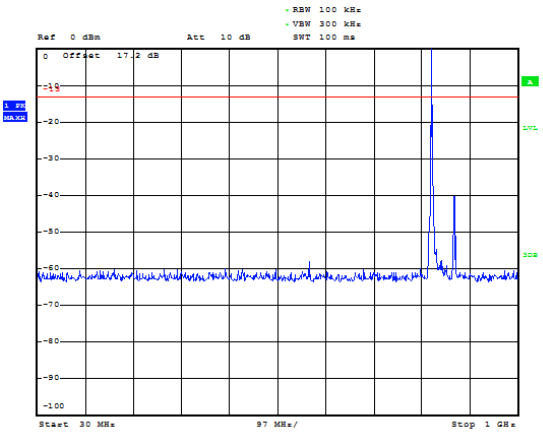
LTE Band 5 1.4MHz CH-High 30MHz~1GHz



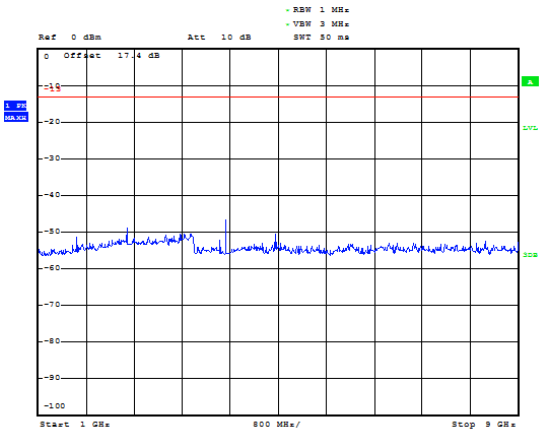
LTE Band 5 1.4MHz CH-High 1GHz~9GHz



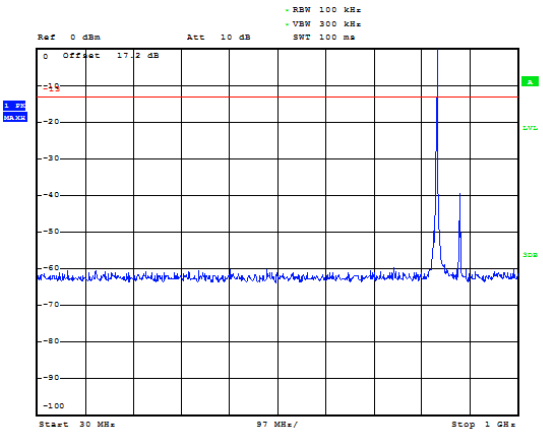
LTE Band 5 3MHz CH-Low 30MHz~1GHz



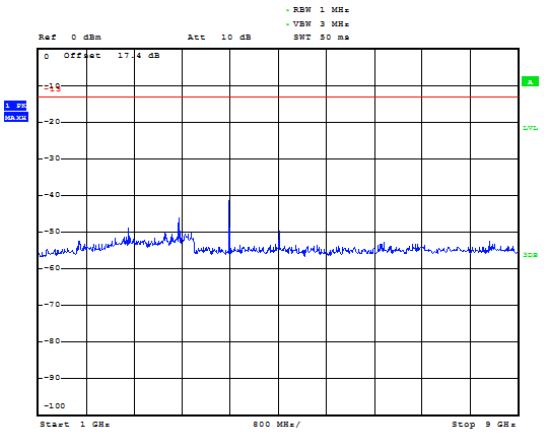
LTE Band 5 3MHz CH-Low 1GHz~9GHz



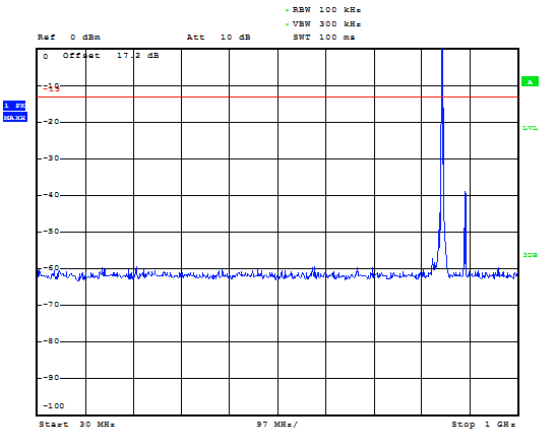
LTE Band 5 3MHz CH-Middle 30MHz~1GHz



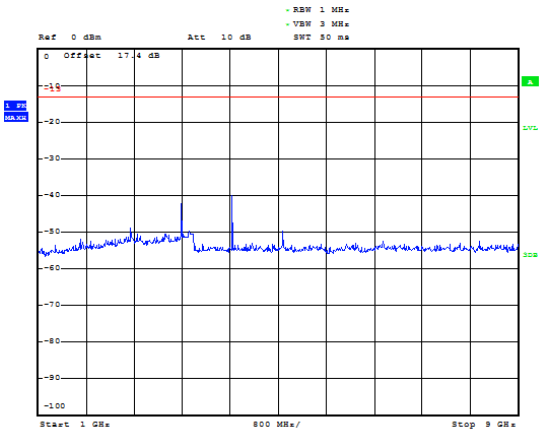
LTE Band 5 3MHz CH-Middle 1GHz~9GHz



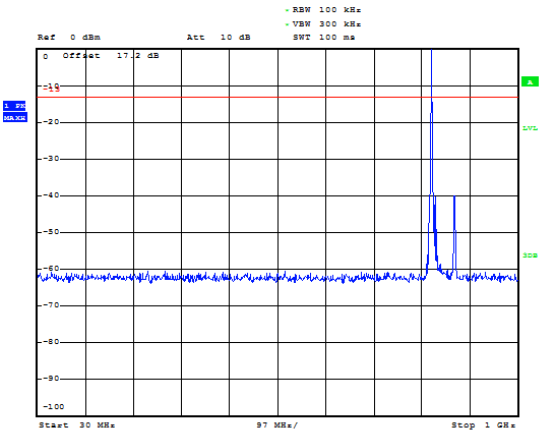
LTE Band 5 3MHz CH-High 30MHz~1GHz



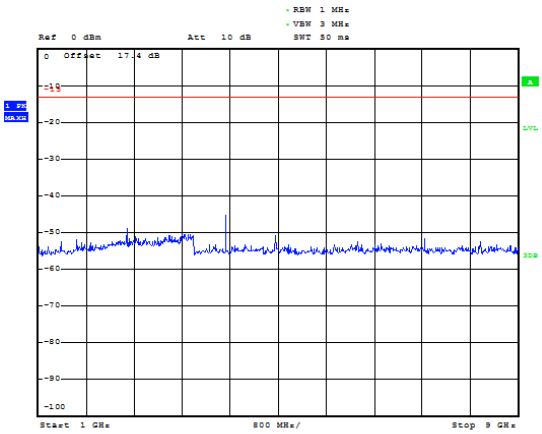
LTE Band 5 3MHz CH-High 1GHz~9GHz



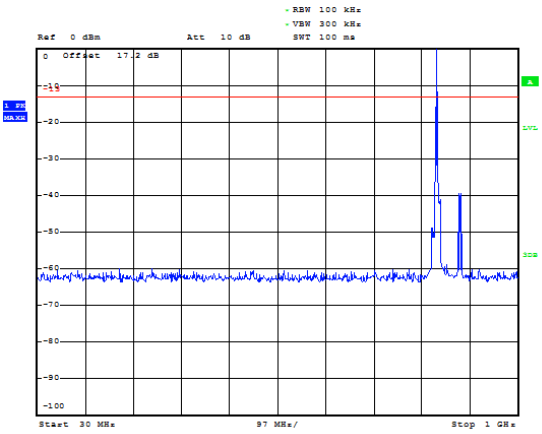
LTE Band 5 5MHz CH-Low 30MHz~1GHz



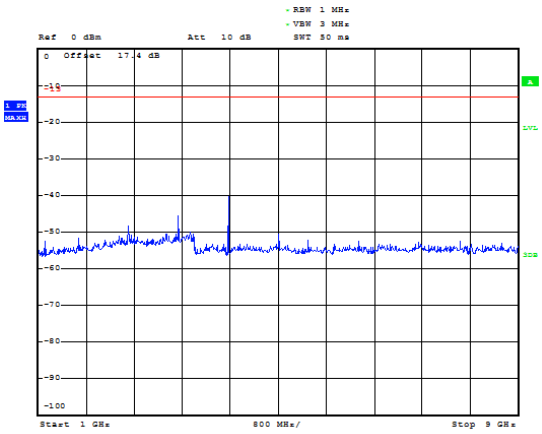
LTE Band 5 5MHz CH-Low 1GHz~9GHz



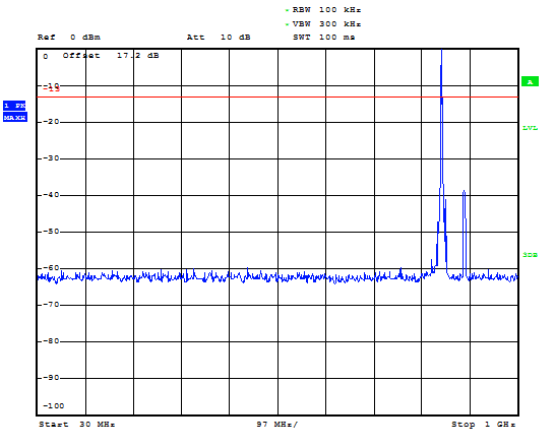
LTE Band 5 5MHz CH-Middle 30MHz~1GHz



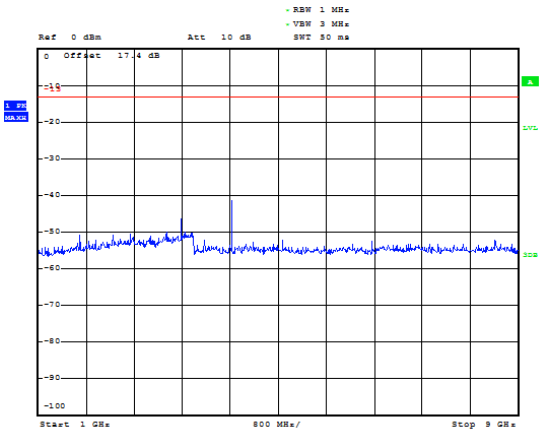
LTE Band 5 5MHz CH-Middle 1GHz~9GHz



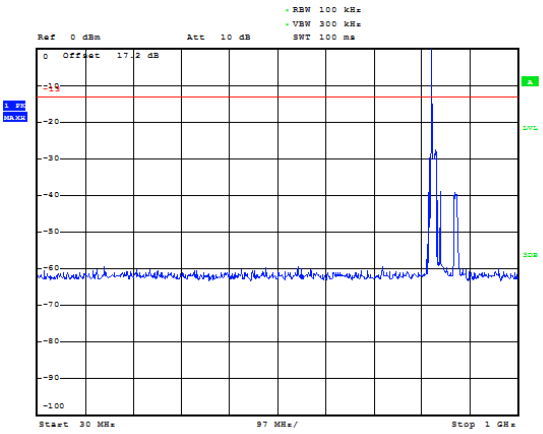
LTE Band 5 5MHz CH-High 30MHz~1GHz



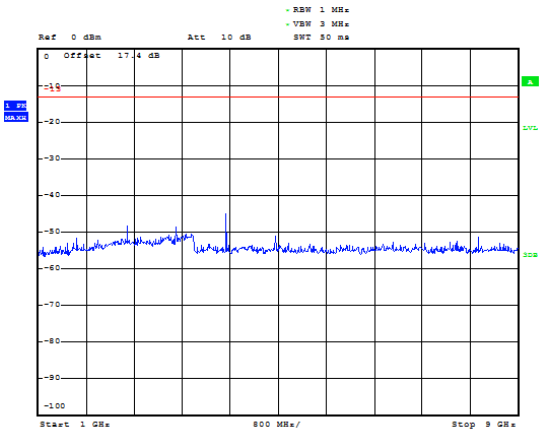
LTE Band 5 5MHz CH-High 1GHz~9GHz



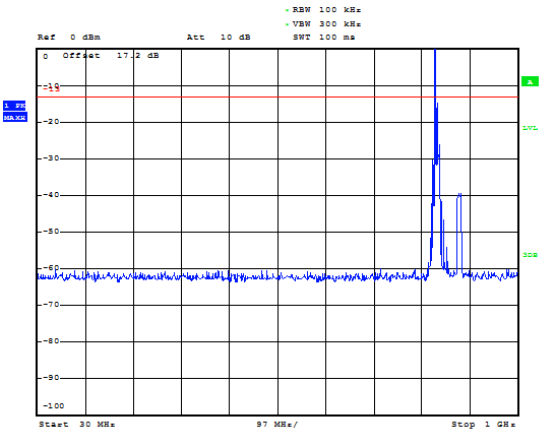
LTE Band 5 10MHz CH-Low 30MHz~1GHz



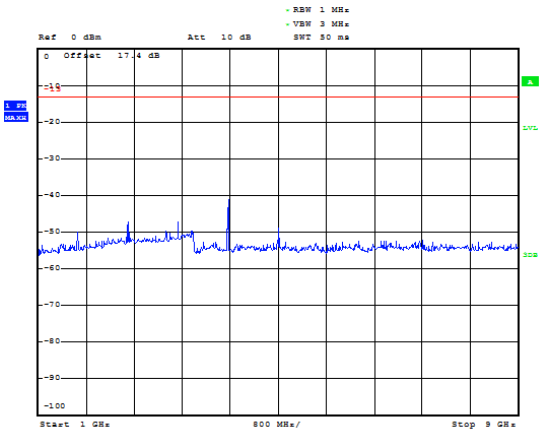
LTE Band 5 10MHz CH-Low 1GHz~9GHz



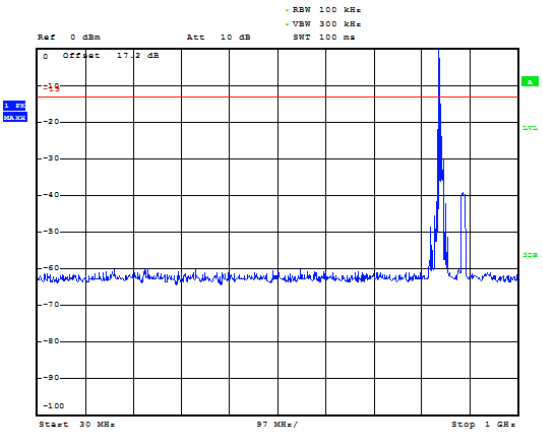
LTE Band 5 10MHz CH-Middle 30MHz~1GHz



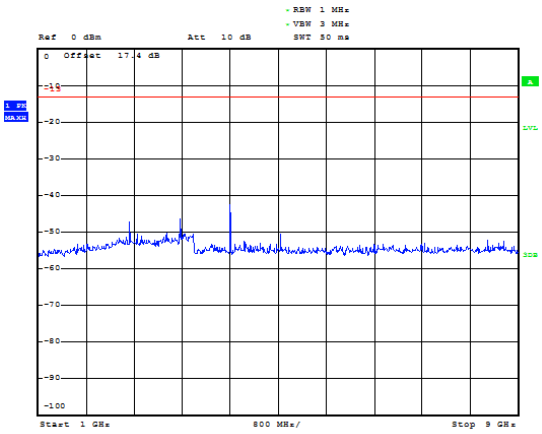
LTE Band 5 10MHz CH-Middle 1GHz~9GHz



LTE Band 5 10MHz CH-High 30MHz~1GHz



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



5.8. Radiates Spurious Emission

Ambient condition

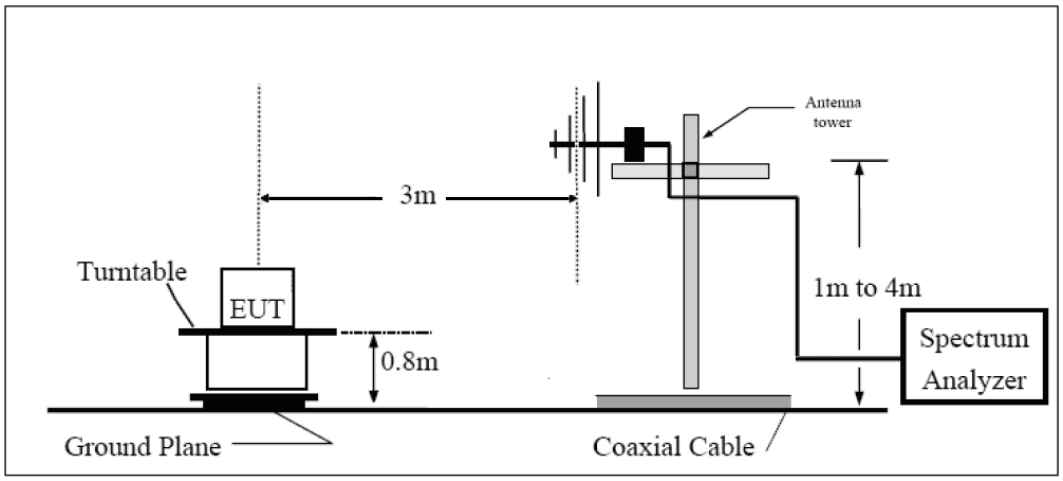
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

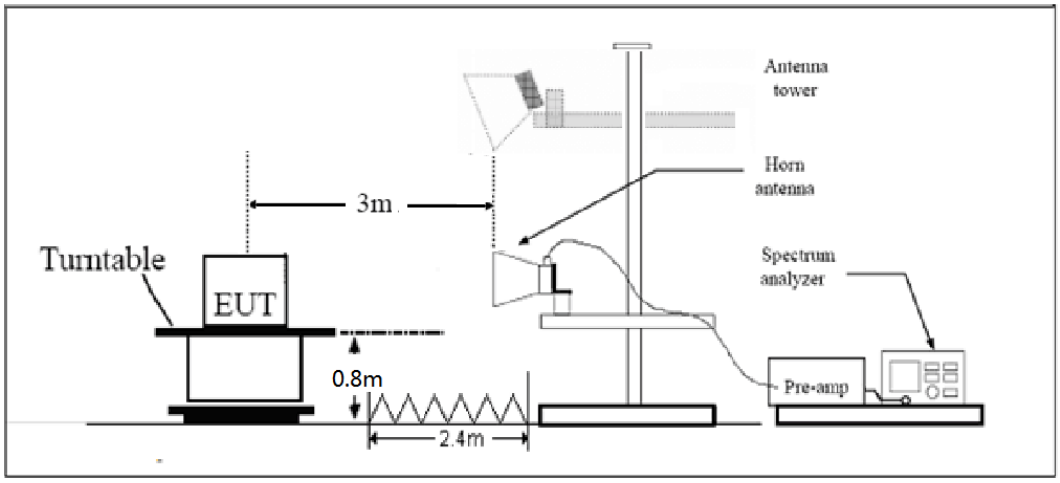
1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI/TIA-603-E (2016).
2. The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. 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).
3. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and RBW=100kHz,VBW=300kHz for 30MHz to 1GHz,, And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + Ga
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.

Test setup

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

GSM 850 CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1648.3	-57.46	2	10.15	Horizontal	-51.46	-13.00	38.46	315
3	2472.8	-59.22	2.51	11.35	Horizontal	-52.53	-13.00	39.53	180
4	3296.2	-56.17	4.2	10.85	Horizontal	-51.67	-13.00	38.67	180
5	4121.0	-54.34	5.2	11.35	Horizontal	-50.34	-13.00	37.34	45
6	4945.2	-53.10	5.5	11.95	Horizontal	-48.80	-13.00	35.80	225
7	5769.4	-53.04	5.7	13.55	Horizontal	-47.34	-13.00	34.34	135
8	6593.6	-48.93	6.3	13.75	Horizontal	-43.63	-13.00	30.63	90
9	7417.8	-46.64	6.8	13.85	Horizontal	-41.74	-13.00	28.74	135
10	8242.0	-45.68	6.9	14.25	Horizontal	-40.48	-13.00	27.48	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.

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	1672.9	-51.55	2	10.75	Horizontal	-44.95	-13.00	31.95	45
3	2509.8	-45.36	2.51	11.05	Horizontal	-38.97	-13.00	25.97	180
4	3345.7	-53.11	4.2	11.15	Horizontal	-48.31	-13.00	35.31	45
5	4183.0	-51.23	5.2	11.15	Horizontal	-47.43	-13.00	34.43	90
6	5019.6	-54.64	5.5	11.95	Horizontal	-50.34	-13.00	37.34	180
7	5856.2	-53.22	5.7	13.55	Horizontal	-47.52	-13.00	34.52	45
8	6692.8	-49.81	6.3	13.75	Horizontal	-44.51	-13.00	31.51	90
9	7529.4	-47.60	6.8	13.85	Horizontal	-42.70	-13.00	29.70	225
10	8366.0	-45.61	6.9	14.25	Horizontal	-40.41	-13.00	27.41	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.

GSM 850 CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1697.4	-60.03	2	10.15	Horizontal	-54.03	-13.00	41.03	225
3	2546.1	-64.88	2.51	11.05	Horizontal	-58.49	-13.00	45.49	270
4	3395.2	-57.29	4.2	11.15	Horizontal	-52.49	-13.00	39.49	45
5	4244.0	-49.19	5.2	11.15	Horizontal	-45.39	-13.00	32.39	90
6	5092.8	-52.72	5.5	11.95	Horizontal	-48.42	-13.00	35.42	180
7	5941.6	-52.72	5.7	13.55	Horizontal	-47.02	-13.00	34.02	225
8	6790.4	-50.76	6.3	13.75	Horizontal	-45.46	-13.00	32.46	135
9	7639.2	-48.53	6.8	13.85	Horizontal	-43.63	-13.00	30.63	180
10	8488.0	-47.61	6.9	14.25	Horizontal	-42.41	-13.00	29.41	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-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1726.5	-51.40	2	10.15	Horizontal	-45.40	-13.00	32.40	180
3	2482.6	-47.53	2.51	11.35	Horizontal	-40.84	-13.00	27.84	225
4	3302.2	-53.75	4.2	10.85	Horizontal	-49.25	-13.00	36.25	90
5	4136.6	-47.33	5.2	11.35	Horizontal	-43.33	-13.00	30.33	135
6	4958.4	-50.83	5.5	11.95	Horizontal	-46.53	-13.00	33.53	180
7	5784.8	-51.46	5.7	13.55	Horizontal	-45.76	-13.00	32.76	0
8	6611.2	-50.20	6.3	13.75	Horizontal	-44.90	-13.00	31.90	45
9	7437.6	-46.73	6.8	13.85	Horizontal	-41.83	-13.00	28.83	225
10	8264.0	-47.06	6.9	14.25	Horizontal	-41.86	-13.00	28.86	90
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	1674.9	-63.73	2	10.75	Horizontal	-57.13	-13.00	44.13	135
3	2505.9	-49.63	2.51	11.05	Horizontal	-43.24	-13.00	30.24	45
4	3349.1	-54.26	4.2	11.15	Horizontal	-49.46	-13.00	36.46	135
5	4188.7	-46.52	5.2	11.15	Horizontal	-42.72	-13.00	29.72	0
6	5019.6	-50.99	5.5	11.95	Horizontal	-46.69	-13.00	33.69	45
7	5856.2	-51.23	5.7	13.55	Horizontal	-45.53	-13.00	32.53	225
8	6692.8	-48.37	6.3	13.75	Horizontal	-43.07	-13.00	30.07	315
9	7529.4	-45.74	6.8	13.85	Horizontal	-40.84	-13.00	27.84	180
10	8366.0	-46.76	6.9	14.25	Horizontal	-41.56	-13.00	28.56	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 V CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1693.5	-65.13	2	10.15	Horizontal	-59.13	-13.00	46.13	135
3	2540.8	-52.31	2.51	11.05	Horizontal	-45.92	-13.00	32.92	180
4	3381.3	-56.63	4.2	11.15	Horizontal	-51.83	-13.00	38.83	135
5	4227.0	-48.88	5.2	11.15	Horizontal	-45.08	-13.00	32.08	90
6	5079.6	-50.81	5.5	11.95	Horizontal	-46.51	-13.00	33.51	45
7	5926.2	-50.56	5.7	13.55	Horizontal	-44.86	-13.00	31.86	135
8	6772.8	-48.95	6.3	13.75	Horizontal	-43.65	-13.00	30.65	0
9	7619.4	-46.22	6.8	13.85	Horizontal	-41.32	-13.00	28.32	225
10	8466.0	-47.78	6.9	14.25	Horizontal	-42.58	-13.00	29.58	315
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

LTE Band 5 1.4MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1648.5	-55.86	2.00	10.75	Horizontal	-49.26	-13.00	36.26	135
3	2472.5	-51.31	2.51	11.05	Horizontal	-44.92	-13.00	31.92	225
4	3297.0	-49.40	4.20	11.15	Horizontal	-44.60	-13.00	31.60	45
5	4120.8	-42.88	5.20	11.15	Horizontal	-39.08	-13.00	26.08	315
6	4948.2	-53.82	5.50	11.95	Horizontal	-49.52	-13.00	36.52	90
7	5772.9	-54.81	5.70	13.55	Horizontal	-49.11	-13.00	36.11	135
8	6597.6	-50.83	6.30	13.75	Horizontal	-45.53	-13.00	32.53	180
9	7422.3	-48.74	6.80	13.85	Horizontal	-43.84	-13.00	30.84	45
10	8247.0	-48.51	6.90	14.25	Horizontal	-43.31	-13.00	30.31	90
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	1671.9	-58.16	2.00	10.75	Horizontal	-51.56	-13.00	38.56	90
3	2508.0	-43.59	2.51	11.05	Horizontal	-37.20	-13.00	24.20	180
4	3343.8	-47.70	4.20	11.15	Horizontal	-42.90	-13.00	29.90	135
5	4180.1	-42.52	5.20	11.15	Horizontal	-38.72	-13.00	25.72	225
6	5019.0	-54.53	5.50	11.95	Horizontal	-50.23	-13.00	37.23	90
7	5855.5	-55.21	5.70	13.55	Horizontal	-49.51	-13.00	36.51	0
8	6692.0	-52.40	6.30	13.75	Horizontal	-47.10	-13.00	34.10	45
9	7528.5	-47.91	6.80	13.85	Horizontal	-43.01	-13.00	30.01	135
10	8365.0	-48.82	6.90	14.25	Horizontal	-43.62	-13.00	30.62	180
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

LTE Band 5 1.4MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1695.7	-60.40	2.00	10.75	Horizontal	-53.80	-13.00	40.80	135
3	2543.8	-45.12	2.51	11.05	Horizontal	-38.73	-13.00	25.73	225
4	3391.1	-55.07	4.20	11.15	Horizontal	-50.27	-13.00	37.27	45
5	4239.3	-46.11	5.20	11.15	Horizontal	-42.31	-13.00	29.31	90
6	5089.8	-54.22	5.50	11.95	Horizontal	-49.92	-13.00	36.92	90
7	5938.1	-55.52	5.70	13.55	Horizontal	-49.82	-13.00	36.82	180
8	6786.4	-52.19	6.30	13.75	Horizontal	-46.89	-13.00	33.89	135
9	7634.7	-49.52	6.80	13.85	Horizontal	-44.62	-13.00	31.62	90
10	8483.0	-47.89	6.90	14.25	Horizontal	-42.69	-13.00	29.69	315
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

LTE Band 5 3MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1648.5	-55.56	2.00	10.75	Horizontal	-48.96	-13.00	35.96	45
3	2473.1	-53.03	2.51	11.05	Horizontal	-46.64	-13.00	33.64	315
4	3296.6	-49.25	4.20	11.15	Horizontal	-44.45	-13.00	31.45	225
5	4120.8	-42.95	5.20	11.15	Horizontal	-39.15	-13.00	26.15	90
6	5008.1	-54.12	5.50	11.95	Horizontal	-49.82	-13.00	36.82	180
7	5935.5	-54.93	5.70	13.55	Horizontal	-49.23	-13.00	36.23	225
8	6739.5	-53.52	6.30	13.75	Horizontal	-48.22	-13.00	35.22	135
9	7543.5	-50.13	6.80	13.85	Horizontal	-45.23	-13.00	32.23	0
10	8347.5	-47.15	6.90	14.25	Horizontal	-41.95	-13.00	28.95	180
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

LTE Band 5 3MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1670.2	-59.55	2.00	10.75	Horizontal	-52.95	-13.00	39.95	0
3	2505.7	-44.17	2.51	11.05	Horizontal	-37.78	-13.00	24.78	90
4	3341.2	-48.91	4.20	11.15	Horizontal	-44.11	-13.00	31.11	90
5	4176.0	-42.50	5.20	11.15	Horizontal	-38.70	-13.00	25.70	135
6	4983.4	-55.32	5.50	11.95	Horizontal	-51.02	-13.00	38.02	0
7	5911.9	-56.58	5.70	13.55	Horizontal	-50.88	-13.00	37.88	180
8	6840.4	-53.96	6.30	13.75	Horizontal	-48.66	-13.00	35.66	225
9	7768.9	-49.23	6.80	13.85	Horizontal	-44.33	-13.00	31.33	90
10	8697.4	-47.46	6.90	14.25	Horizontal	-42.26	-13.00	29.26	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 5 3MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1692.1	-62.19	2.00	10.75	Horizontal	-55.59	-13.00	42.59	225
3	2538.5	-46.86	2.51	11.05	Horizontal	-40.47	-13.00	27.47	45
4	3384.7	-54.86	4.20	11.15	Horizontal	-50.06	-13.00	37.06	45
5	4231.1	-45.46	5.20	11.15	Horizontal	-41.66	-13.00	28.66	180
6	5001.8	-54.54	5.50	11.95	Horizontal	-50.24	-13.00	37.24	225
7	5967.8	-55.59	5.70	13.55	Horizontal	-49.89	-13.00	36.89	135
8	6792.8	-53.89	6.30	13.75	Horizontal	-48.59	-13.00	35.59	180
9	7669.5	-49.26	6.80	13.85	Horizontal	-44.36	-13.00	31.36	90
10	8546.2	-49.83	6.90	14.25	Horizontal	-44.63	-13.00	31.63	180
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

LTE Band 5 5MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1648.6	-55.28	2.00	10.75	Horizontal	-48.68	-13.00	35.68	90
3	2472.9	-53.35	2.51	11.05	Horizontal	-46.96	-13.00	33.96	0
4	3297.0	-49.55	4.20	11.15	Horizontal	-44.75	-13.00	31.75	90
5	4121.2	-43.05	5.20	11.15	Horizontal	-39.25	-13.00	26.25	45
6	4994.3	-54.94	5.50	11.95	Horizontal	-50.64	-13.00	37.64	135
7	5961.8	-54.76	5.70	13.55	Horizontal	-49.06	-13.00	36.06	90
8	6796.8	-53.51	6.30	13.75	Horizontal	-48.21	-13.00	35.21	315
9	7631.8	-47.21	6.80	13.85	Horizontal	-42.31	-13.00	29.31	225
10	8466.8	-47.23	6.90	14.25	Horizontal	-42.03	-13.00	29.03	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 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	1668.5	-60.38	2.00	10.75	Horizontal	-53.78	-13.00	40.78	135
3	2502.9	-46.37	2.51	11.05	Horizontal	-39.98	-13.00	26.98	315
4	3337.1	-49.65	4.20	11.15	Horizontal	-44.85	-13.00	31.85	135
5	4171.5	-43.77	5.20	11.15	Horizontal	-39.97	-13.00	26.97	90
6	5165.6	-54.98	5.50	11.95	Horizontal	-50.68	-13.00	37.68	225
7	5815.3	-54.49	5.70	13.55	Horizontal	-48.79	-13.00	35.79	180
8	6765.0	-52.66	6.30	13.75	Horizontal	-47.36	-13.00	34.36	90
9	7614.7	-47.85	6.80	13.85	Horizontal	-42.95	-13.00	29.95	45
10	8464.4	-47.84	6.90	14.25	Horizontal	-42.64	-13.00	29.64	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 5MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1689.0	-58.59	2.00	10.75	Horizontal	-51.99	-13.00	38.99	225
3	2533.1	-52.96	2.51	11.05	Horizontal	-46.57	-13.00	33.57	90
4	3377.2	-53.16	4.20	11.15	Horizontal	-48.36	-13.00	35.36	90
5	4221.8	-42.96	5.20	11.15	Horizontal	-39.16	-13.00	26.16	45
6	5079.0	-54.26	5.50	11.95	Horizontal	-49.96	-13.00	36.96	180
7	5925.5	-54.68	5.70	13.55	Horizontal	-48.98	-13.00	35.98	225
8	6772.0	-52.31	6.30	13.75	Horizontal	-47.01	-13.00	34.01	0
9	7618.5	-47.76	6.80	13.85	Horizontal	-42.86	-13.00	29.86	315
10	8465.0	-48.02	6.90	14.25	Horizontal	-42.82	-13.00	29.82	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 10MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1649.2	-55.75	2.00	10.75	Horizontal	-49.15	-13.00	36.15	45
3	2473.8	-53.02	2.51	11.05	Horizontal	-46.63	-13.00	33.63	180
4	3298.1	-48.85	4.20	11.15	Horizontal	-44.05	-13.00	31.05	90
5	4123.1	-41.89	5.20	11.15	Horizontal	-38.09	-13.00	25.09	45
6	4974.0	-54.93	5.50	11.95	Horizontal	-50.63	-13.00	37.63	135
7	5803.0	-54.93	5.70	13.55	Horizontal	-49.23	-13.00	36.23	90
8	6632.0	-52.62	6.30	13.75	Horizontal	-47.32	-13.00	34.32	135
9	7461.0	-48.53	6.80	13.85	Horizontal	-43.63	-13.00	30.63	225
10	8290.0	-48.40	6.90	14.25	Horizontal	-43.20	-13.00	30.20	180
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

LTE Band 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	1664.40	-62.16	2.00	10.75	Horizontal	-55.56	-13.00	42.56	225
3	2496.3	-54.32	2.51	11.05	Horizontal	-47.93	-13.00	34.93	315
4	3328.1	-54.83	4.20	11.15	Horizontal	-50.03	-13.00	37.03	90
5	-42.1	-45.94	5.20	11.15	Horizontal	-42.14	-13.00	29.14	180
6	5019.0	-54.63	5.50	11.95	Horizontal	-50.33	-13.00	37.33	45
7	5855.5	-55.22	5.70	13.55	Horizontal	-49.52	-13.00	36.52	0
8	6692.0	-52.76	6.30	13.75	Horizontal	-47.46	-13.00	34.46	315
9	7528.5	-48.53	6.80	13.85	Horizontal	-43.63	-13.00	30.63	225
10	8365.0	-49.02	6.90	14.25	Horizontal	-43.82	-13.00	30.82	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 10MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1679.0	-57.04	2.00	10.75	Horizontal	-50.44	-13.00	37.44	45
3	2518.6	-45.08	2.51	11.05	Horizontal	-38.69	-13.00	25.69	180
4	3358.5	-49.28	4.20	11.15	Horizontal	-44.48	-13.00	31.48	45
5	4197.7	-41.60	5.20	11.15	Horizontal	-37.80	-13.00	24.80	180
6	5064.0	-54.66	5.50	11.95	Horizontal	-50.36	-13.00	37.36	90
7	5908.0	-53.38	5.70	13.55	Horizontal	-47.68	-13.00	34.68	45
8	6752.0	-51.66	6.30	13.75	Horizontal	-46.36	-13.00	33.36	135
9	7596.0	-48.16	6.80	13.85	Horizontal	-43.26	-13.00	30.26	0
10	8440.0	-48.31	6.90	14.25	Horizontal	-43.11	-13.00	30.11	180
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2.The worst emission was found in the antenna is Horizontal position.									

6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	113645	2017-05-14	2018-05-13
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	2017-05-14	2018-05-13
Spectrum Analyzer	Agilent	N9010A	MY47191109	2017-05-20	2018-05-19
Universal Radio Communication Tester	Agilent	E5515C	MY48367192	2017-05-20	2018-05-19
Signal Analyzer	R&S	FSV30	100815	2017-12-17	2018-12-16
EMI Test Receiver	R&S	ESCI	100948	2017-05-20	2018-05-19
Signal generator	R&S	SMB 100A	102594	2017-05-14	2018-05-13
Signal generator	R&S	SMR27	100365	2017-05-14	2018-05-13
Trilog Antenna	SCHWARZBECK	VUBL 9163	9163-201	2017-11-18	2020-11-17
Horn Antenna	R&S	HF907	100126	2014-12-06	2019-12-05
Horn Antenna	ETS-Lindgren	3160-09	00102644	2015-01-30	2020-01-29
Climatic Chamber	Re Ce	PT-30B	20101891	2015-07-18	2018-07-17
RF Cable	Agilent	SMA 15cm	0001	2018-02-03	2018-08-02
Preampflier	R&S	SCU18	102327	2017-06-18	2018-06-17
Software	R&S	EMC32	V 8.52.0	NA	NA
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2017-05-14	2018-05-13

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