



RF TEST REPORT

Applicant	MOBILE DEVICES INGENIERIE
FCC ID	A6GC4D-4GMUSV6
Product	TELEMATICS EMBEDDED SYSTEMS
Brand	MOBILE DEVICES INGENIERIE
Model	C4D-4MUSAA_V6,C4D-4MUSAB_V6
Marketing	C4D-4MUSAA_V6, C4D-4MUSAB_V6
Report No.	R1804A0153-R2V1
Issue Date	May 24, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2017)/ FCC CFR47 Part 27C (2017)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Isotropic Radiated power	27.50(d)(4)/27.50(c)(10)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	27.53(h) /27.53(g)	PASS
5	Peak-to-Average Power Ratio	27.50(d)/KDB971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 27.54	PASS
7	Spurious Emissions at Antenna Terminals	2.1051/ 27.53(h) /27.53(g)	PASS
8	Radiates Spurious Emission	2.1053 /27.53(h) /27.53(g)	PASS
Date of Testing: April 11, 2018 ~ April 17, 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.
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2 General Description of Equipment under Test

Client Information

Applicant	MOBILE DEVICES INGENIERIE
Applicant address	100 AVENUE DE STALINGRAD VILLEJUIF / France
Manufacturer	MOBILE DEVICES INGENIERIE
Manufacturer address	100 AVENUE DE STALINGRAD VILLEJUIF / France

General information

EUT Description			
Model	C4D-4MUSAA_V6, C4D-4MUSAB_V6		
IMEI:	355154080329739		
Hardware Version	SAP00335+SAP00387+SAP00388 SAP00328+SAP00341+SAP00387		
Software Version	V2075		
Power Supply	Battery/ External Power Supply		
Antenna Type	Internal Antenna		
Test Mode(s)	LTE Band 4; LTE Band 12,		
Test Modulation	(LTE)QPSK 16QAM;		
LTE Category	M1		
Maximum E.I.R.P./ E.R.P.	LTE Band 4:	21.98dBm	
	LTE Band 12:	18.72dBm	
Rated Power Supply Voltage:	12 V		
Extreme Voltage	Minimum: 8 V Maximum: 14 V		
Extreme Temperature	Lowest:-20°C Highest: +50°C		
	Mode	Tx (MHz)	Rx (MHz)
Operating Frequency Range(s)	LTE Band 4	1710 ~ 1755	2110 ~ 2155
	LTE Band 12	699 ~ 716	729 ~ 746
EUT Accessory			
Battery	Manufacturer: HOWELL		
	Model: 552535H LION POLYMER		
Note: 1. The information of the EUT is declared by the manufacturer.			



Model	C4D-4MUSAA_V6	C4D-4MUSAB_V6
SN	SAP00335+SAP00387+SAP00388	SAP00328+SAP00341+SAP00387
Difference	additional multiplexed OBD	/
Other	The same	The same
Note: Customer declaration, The difference between C4D-4MUSAA_V6 and C4D-4MUSAB_V6 is the additional multiplexed OBD for C4D-4MUSAA_V6. There are more than one models, each one should be applied throughout the compliance test respectively, however, only the worst case (C4D-4MUSAA_V6) 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:

Test standards

FCC CFR47 Part 2 (2017)

FCC CFR47 Part 27C (2017)

ANSI/TIA-603-E (2016)

KDB 971168 D01 Power Meas License Digital Systems v03

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 and RB size and modulations were investigated.

Subsequently, only the worst case emissions are reported.

The following testing in LTE is set based on the maximum RF Output Power.

The following testing in different Bandwidth is set to detail in the following table:

Test modes are chosen to be reported as the worst case configuration below for LTE Band 4/12:

Test items	Modes	Bandwidth (MHz)						Modulation		RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	LTE 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 12	-	-	O	O	-	-	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	LTE 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 12	-	-	O	O	-	-	O	O	O	O	O	O	O	O
Occupied Bandwidth	LTE 4	O	O	O	O	O	O	O	O	-	-	O	-	O	-
	LTE 12	-	-	O	O	-	-	O	O	-	-	O	-	O	-
Band Edge Compliance	LTE 4	O	O	O	O	O	O	O	O	O	-	O	O	-	O
	LTE 12	-	-	O	O	-	-	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	LTE 4	O	O	O	O	O	O	O	O	-	-	O	-	O	-
	LTE 12	-	-	O	O	-	-	O	O	-	-	O	-	O	-
Frequency Stability	LTE 4	O	O	O	O	O	O	O	O	-	-	O	O	-	O
	LTE 12	-	-	O	O	-	-	O	O	-	-	O	O	-	O
Spurious Emissions at Antenna Terminals	LTE 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 12	-	-	O	O	-	-	O	O	O	O	O	O	O	O
Radiates Spurious Emission	LTE 4	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	LTE 12	-	-	O	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

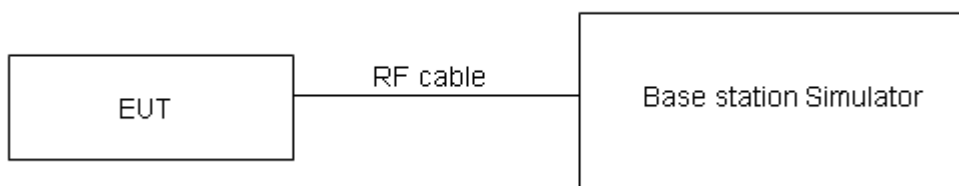
Ambient condition

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

Mode	Bandwidth	Channel/ Frequency(MHz)	RB	Index	Conducted Power (dBm)	
					QPSK	16QAM
LTE Band 4	1.4MHz	19957 1710.7	1#0	0	22.59	20.83
			6#0	0	20.59	20.95
		20175/1732.5	1#0	0	22.46	21.01
			6#0	0	20.50	20.62
		20393/1754.3	1#5	0	22.34	20.89
			6#0	0	20.40	20.78
	3MHz	19965/1711.5	1#0	0	22.75	21.04
			6#0	0	20.56	21.07
		20175/1732.5	1#0	0	22.22	22.01
			6#0	0	20.45	20.32
		20385/1753.5	1#5	1	22.63	21.04
			6#0	1	20.49	20.94
	5MHz	19975/1712.5	1#0	0	22.70	22.51
			6#0	0	21.55	20.58
		20175/1732.5	1#0	0	22.51	22.35
			6#0	0	21.37	20.96
		20375/1752.5	1#5	3	22.55	22.09
			6#0	3	21.49	20.69
	10MHz	20000/1715	1#0	0	22.32	23.21
			4#0	0	22.55	21.34
		20175/1732.5	1#0	0	22.26	23.25
			4#0	0	22.46	21.17
		20350/1750	1#5	7	22.27	22.06
			4#2	7	22.41	21.37
	15MHz	20025/1717.5	1#0	0	22.73	22.59
			6#0	0	22.50	22.50
		20175/1732.5	1#0	0	22.32	22.97
			6#0	0	22.69	22.85
		20325/1747.5	1#5	11	22.48	22.24
			6#0	11	22.44	22.57
	20MHz	20050/1720	1#0	0	22.47	23.18
			6#0	0	22.70	22.94
		20175/1732.5	1#0	0	22.96	22.95
			6#0	0	22.77	22.88
		20300/1745	1#5	15	22.77	22.47
			6#0	15	22.70	22.60

Mode	Bandwidth	Channel/ Frequency(MHz)	RB	Index	Conducted Power (dBm)	
					QPSK	16QAM
LTE Band 12	1.4MHz	23017/699.7	1#0	0	23.70	22.00
			6#0	0	21.74	22.16
		23095/707.5	1#0	0	23.31	22.95
			6#0	0	21.44	21.39
		23173/715.3	1#5	0	23.46	21.87
			6#0	0	21.50	21.88
	3MHz	23025/700.5	1#0	0	23.77	22.01
			6#0	0	21.70	22.21
		23095/707.5	1#0	0	23.39	22.65
			6#0	0	21.67	21.50
		23165/714.5	1#5	1	23.65	22.47
			6#0	1	21.43	21.28
	5MHz	23035/701.5	1#0	0	23.92	23.88
			6#0	0	22.78	21.70
		23095/707.5	1#0	0	23.29	24.08
			6#0	0	22.67	21.90
		23155/713.5	1#5	3	23.48	23.29
			6#0	3	22.47	21.98
	10MHz	23060/704	1#0	0	23.39	22.80
			4#0	0	23.47	22.87
		23095/707.5	1#0	0	23.34	22.94
			4#0	0	23.52	23.01
		23130/711	1#5	7	23.32	22.83
			4#2	7	23.34	22.92

5.2 Effective Isotropic Radiated Power

Ambient condition

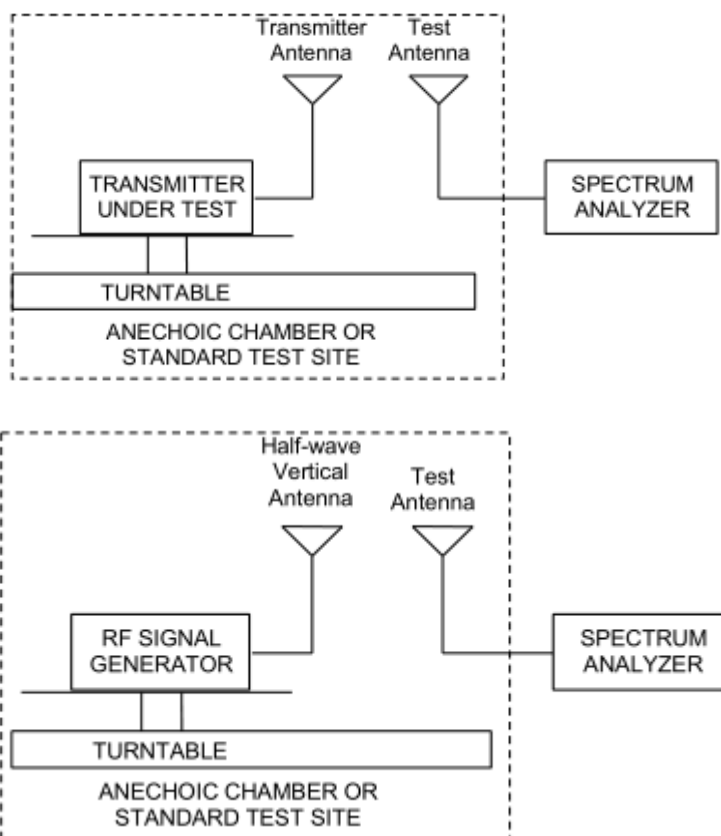
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

1. The testing follows FCC KDB 971168 D01 v03 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. $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$
 - e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation: $ERP \text{ (dBm)} = LVL \text{ (dBm)} + LOSS \text{ (dB)}$
 - 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:
 $ERP \text{ (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBd)}$
 where: dBd refers to gain relative to an ideal dipole.
 $EIRP \text{ (dBm)} = ERP \text{ (dBm)} + 2.15 \text{ (dB.)}$

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

Test setup



Note: Area side:2.4mX3.6m

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.

Limits

Rule Part 27.50(c) (10) specifies that “Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP”

Rule Part 27.50(d) (4) specifies that “Fixed, mobile and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”

Part 27.50(c)(10)Limit	$\leq 3 \text{ W}$ (34.77 dBm)
Part 27.50(d)(4)Limit	$\leq 1 \text{ W}$ (30 dBm)

Measurement Uncertainty

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

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.

LTE Band 4								
Bandwidth	Channel	Frequency (MHz)	Polarization	RB	Index	EIRP (dBm)	Limit (dBm)	Conclusion
1.4MHz (QPSK)	Low	1710.7	Horizontal	1#0	0	21.02	30	Pass
	Mid	1732.5	Horizontal	1#2	0	21.56	30	Pass
	High	1754.3	Horizontal	1#5	0	21.16	30	Pass
3MHz (QPSK)	Low	1711.5	Horizontal	1#0	0	20.31	30	Pass
	Mid	1732.5	Horizontal	1#5	0	20.24	30	Pass
	High	1753.5	Horizontal	1#5	1	20.18	30	Pass
5MHz (QPSK)	Low	1712.5	Horizontal	1#0	0	21.69	30	Pass
	Mid	1732.5	Horizontal	1#5	1	21.51	30	Pass
	High	1752.5	Horizontal	1#5	3	21.89	30	Pass
10MHz (QPSK)	Low	1715	Horizontal	4#0	0	21.31	30	Pass
	Mid	1732.5	Horizontal	4#2	3	21.65	30	Pass
	High	1750	Horizontal	4#2	7	21.98	30	Pass
15MHz (QPSK)	Low	1717.5	Horizontal	1#0	0	21.32	30	Pass
	Mid	1732.5	Horizontal	1#5	5	21.40	30	Pass
	High	1747.5	Horizontal	1#5	11	21.49	30	Pass
20MHz (QPSK)	Low	1720	Horizontal	6#0	0	21.61	30	Pass
	Mid	1732.5	Horizontal	6#0	7	21.75	30	Pass
	High	1745	Horizontal	6#0	15	21.03	30	Pass
1.4MHz (16QAM)	Low	1710.7	Horizontal	1#0	0	20.69	30	Pass
	Mid	1732.5	Horizontal	1#2	0	21.23	30	Pass
	High	1754.3	Horizontal	1#5	0	20.83	30	Pass
3MHz (16QAM)	Low	1711.5	Horizontal	1#0	0	19.98	30	Pass
	Mid	1732.5	Horizontal	1#5	0	19.91	30	Pass
	High	1753.5	Horizontal	1#5	1	19.85	30	Pass
5MHz (16QAM)	Low	1712.5	Horizontal	1#0	0	21.36	30	Pass
	Mid	1732.5	Horizontal	1#5	1	21.18	30	Pass
	High	1752.5	Horizontal	1#5	3	21.56	30	Pass
10MHz (16QAM)	Low	1715	Horizontal	4#0	0	20.98	30	Pass
	Mid	1732.5	Horizontal	4#2	3	21.32	30	Pass
	High	1750	Horizontal	4#2	7	21.65	30	Pass
15MHz (16QAM)	Low	1717.5	Horizontal	1#0	0	20.99	30	Pass
	Mid	1732.5	Horizontal	1#5	5	21.07	30	Pass
	High	1747.5	Horizontal	1#5	11	21.16	30	Pass
20MHz (16QAM)	Low	1720	Horizontal	6#0	0	21.28	30	Pass
	Mid	1732.5	Horizontal	6#0	7	21.42	30	Pass
	High	1745	Horizontal	6#0	15	21.00	30	Pass

LTE Band 12								
Bandwidth	Channel	Frequency (MHz)	Polarization	RB	Index	ERP (dBm)	Limit (dBm)	Conclusion
1.4 MHz (QPSK)	Low	699.7	Horizontal	1#0	0	17.98	34.77	Pass
	Mid	707.5	Horizontal	1#2	0	18.42	34.77	Pass
	High	715.3	Horizontal	1#5	0	18.72	34.77	Pass
3 MHz (QPSK)	Low	700.5	Horizontal	1#0	0	16.84	34.77	Pass
	Mid	707.5	Horizontal	1#5	0	16.83	34.77	Pass
	High	714.5	Horizontal	1#5	1	16.52	34.77	Pass
5 MHz (QPSK)	Low	701.5	Horizontal	1#0	0	16.86	34.77	Pass
	Mid	707.5	Horizontal	1#5	1	16.43	34.77	Pass
	High	713.5	Horizontal	1#5	3	17.04	34.77	Pass
10 MHz (QPSK)	Low	704	Horizontal	4#0	0	16.72	34.77	Pass
	Mid	707.5	Horizontal	4#2	3	16.52	34.77	Pass
	High	711	Horizontal	4#2	7	16.17	34.77	Pass
1.4 MHz (16QAM)	Low	699.7	Horizontal	1#0	0	17.77	34.77	Pass
	Mid	707.5	Horizontal	1#2	0	18.21	34.77	Pass
	High	715.3	Horizontal	1#5	0	18.51	34.77	Pass
3 MHz (16QAM)	Low	700.5	Horizontal	1#0	0	16.63	34.77	Pass
	Mid	707.5	Horizontal	1#5	0	16.62	34.77	Pass
	High	714.5	Horizontal	1#5	1	16.31	34.77	Pass
5 MHz (16QAM)	Low	701.5	Horizontal	1#0	0	16.65	34.77	Pass
	Mid	707.5	Horizontal	1#5	1	16.22	34.77	Pass
	High	713.5	Horizontal	1#5	3	16.83	34.77	Pass
10 MHz (16QAM)	Low	704	Horizontal	4#0	0	16.51	34.77	Pass
	Mid	707.5	Horizontal	4#2	3	16.31	34.77	Pass
	High	711	Horizontal	4#2	7	15.96	34.77	Pass

Note: 1. EIRP= E.R.P+2.15

5.3 Occupied Bandwidth

Ambient condition

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

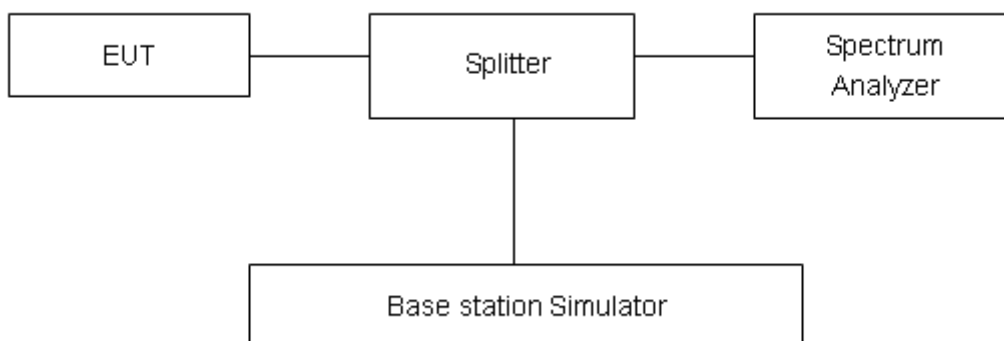
Method of Measurement

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 51 kHz, VBW is set to 160 kHz for LTE Band 4/12.

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

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

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

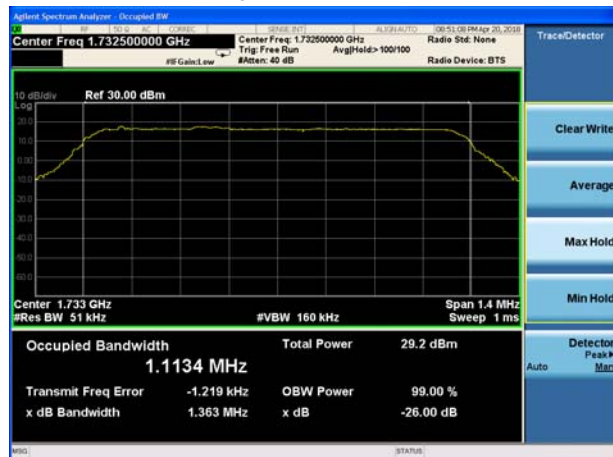
Test Result

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	Bandwidth(MHz)	
						99% Power	-26dBc
Band 4	1.4MHz	QPSK	20175/1732.5	6#0	0	1.1134	1.363
		16QAM	20175/1732.5	6#0	0	0.9491	1.295
	3MHz	QPSK	20175/1732.5	6#0	0	1.1712	2.076
		16QAM	20175/1732.5	6#0	0	0.9888	1.354
	5MHz	QPSK	20175/1732.5	6#0	0	1.1598	1.763
		16QAM	20175/1732.5	6#0	0	1.0209	1.663
	10MHz	QPSK	20175/1732.5	6#0	0	1.2173	1.871
		16QAM	20175/1732.5	6#0	0	1.0526	1.642
	15MHz	QPSK	20175/1732.5	6#0	0	1.2148	1.941
		16QAM	20175/1732.5	6#0	0	1.1020	1.754
	20MHz	QPSK	20175/1732.5	6#0	0	1.2360	1.939
		16QAM	20175/1732.5	6#0	0	1.1146	1.961

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	Bandwidth(MHz)	
						99% Power	-26dBc
Band 12	1.4MHz	QPSK	23095/707.5	6#0	0	1.1095	1.335
		16QAM	23095/707.5	6#0	0	0.9390	1.219
	3MHz	QPSK	23095/707.5	6#0	0	1.1752	2.117
		16QAM	23095/707.5	6#0	0	0.9944	1.334
	5MHz	QPSK	23095/707.5	6#0	0	1.1667	2.086
		16QAM	23095/707.5	6#0	0	1.0338	1.384
	10MHz	QPSK	23095/707.5	6#0	0	1.2252	2.071
		16QAM	23095/707.5	6#0	0	1.0452	1.546



LTE Band 4 QPSK 1.4MHz CH-Middle



LTE Band 4 16QAM 1.4MHz CH-Middle



LTE Band 4 QPSK 3MHz CH-Middle



LTE Band 4 16QAM 3MHz CH-Middle



LTE Band 4 QPSK 5MHz CH-Middle



LTE Band 4 16QAM 5MHz CH-Middle





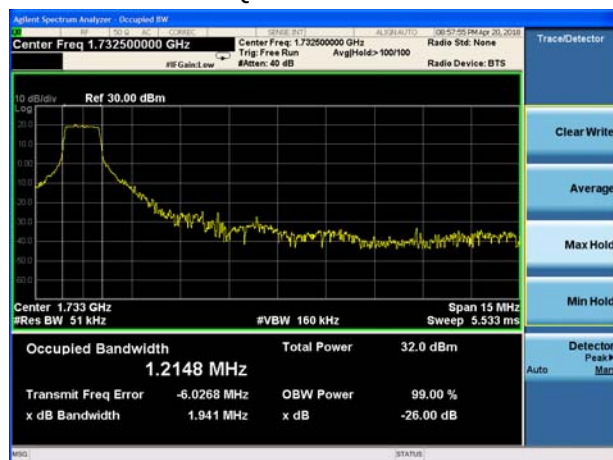
LTE Band 4 QPSK 10MHz CH-Middle



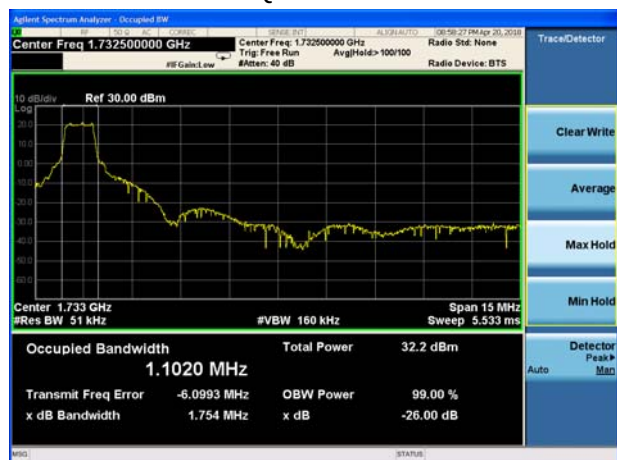
LTE Band 4 16QAM 10MHz CH-Middle



LTE Band 4 QPSK 15MHz CH-Middle



LTE Band 4 16QAM 15MHz CH-Middle



LTE Band 4 QPSK 20MHz CH-Middle

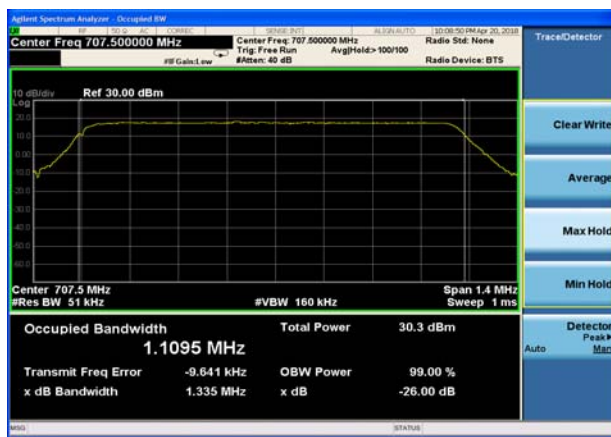


LTE Band 4 16QAM 20MHz CH-Middle





LTE Band 12 QPSK 1.4MHz CH-Middle



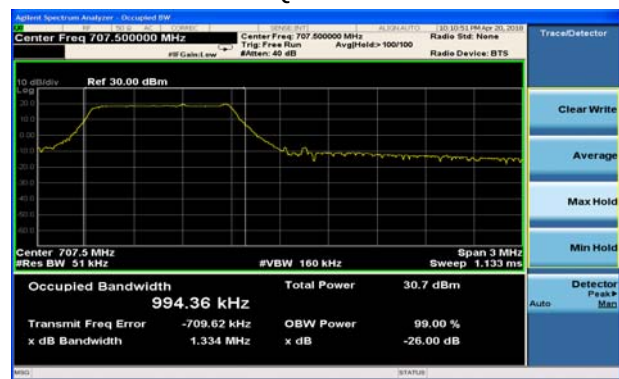
LTE Band 12 16QAM 1.4MHz CH-Middle



LTE Band 12 QPSK 3MHz CH-Middle



LTE Band 12 16QAM 3MHz CH-Middle



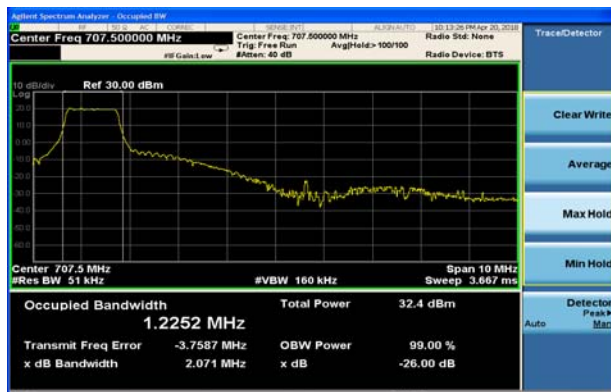
LTE Band 12 QPSK 5MHz CH-Middle



LTE Band 12 16QAM 5MHz CH-Middle



LTE Band 12 QPSK 10MHz CH-Middle



LTE Band 12 16QAM 10MHz CH-Middle



5.4 Band Edge Compliance

Ambient condition

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

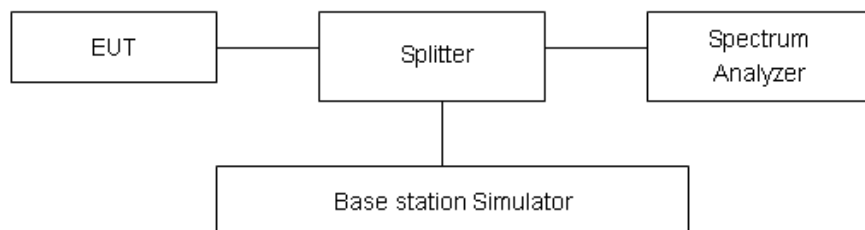
Method of Measurement

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 testing follows KDB 971168 D01 v03 Section 6.0

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured.
3. RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 4/12 on spectrum analyzer.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. Checked that all the results comply with the emission limit line.

Test Setup



Limits

Rule Part 27.53(h)/ specifies that “ for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB”

Part 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Measurement Uncertainty

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

Test Result

All the test traces in the plots shows the test results clearly.

LTE Band 4 QPSK 1.4MHz CH-Low, 1 RB



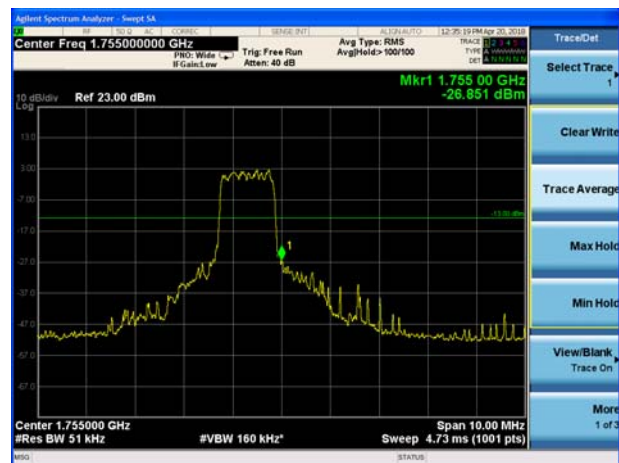
LTE Band 4 QPSK 1.4MHz CH-High, 1 RB



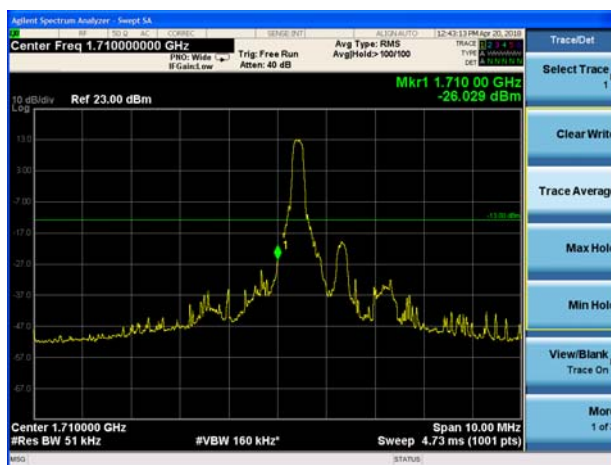
LTE Band 4 QPSK 1.4MHz CH-Low, 100%RB



LTE Band 4 QPSK 1.4MHz CH-High, 100%RB



LTE Band 4 QPSK 3MHz CH-Low, 1 RB



LTE Band 4 QPSK 3MHz CH-High, 1 RB

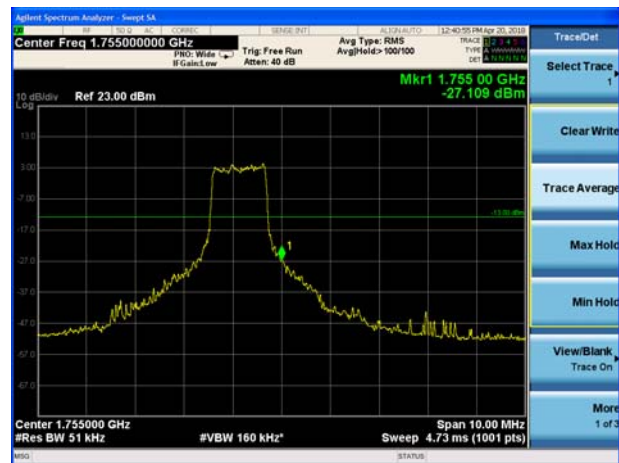




LTE Band 4 QPSK 3MHz CH-Low, 100%RB



LTE Band 4 QPSK 3MHz CH-High, 100%RB



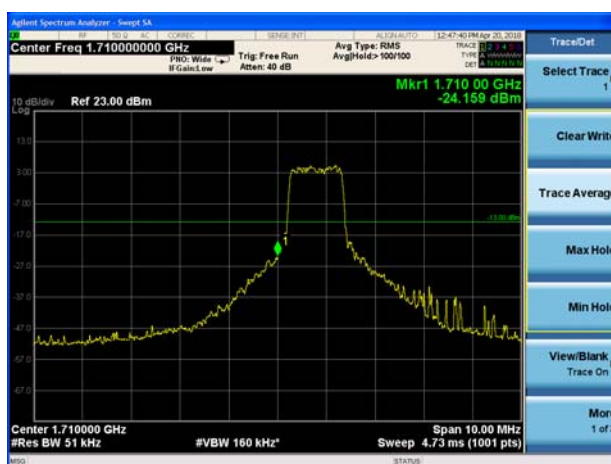
LTE Band 4 QPSK 5MHz CH-Low, 1 RB



LTE Band 4 QPSK 5MHz CH-High, 1 RB



LTE Band 4 QPSK 5MHz CH-Low, 100%RB



LTE Band 4 QPSK 5MHz CH-High, 100%RB





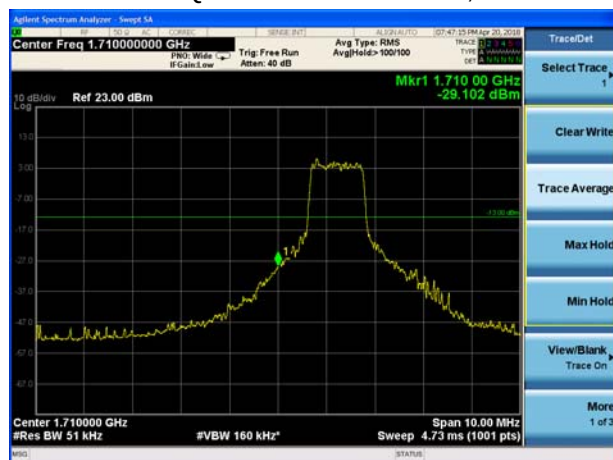
LTE Band 4 QPSK 10MHz CH-Low, 1 RB



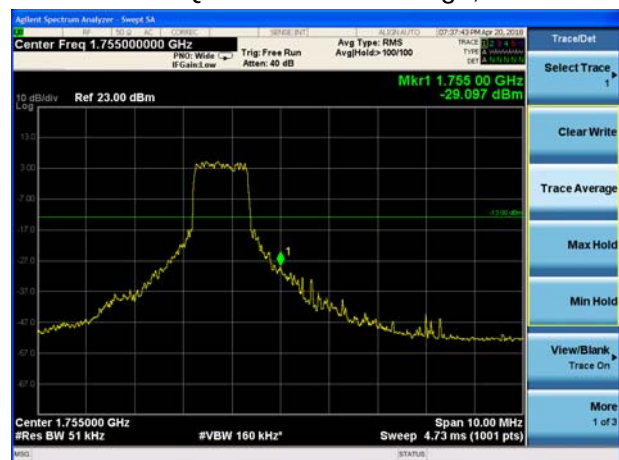
LTE Band 4 QPSK 10MHz CH-High, 1 RB



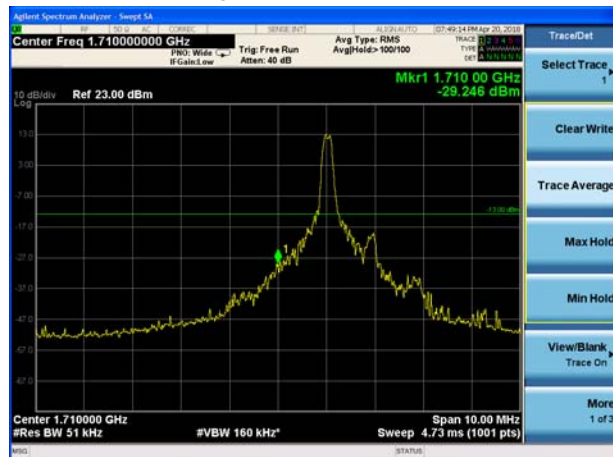
LTE Band 4 QPSK 10MHz CH-Low, 100%RB



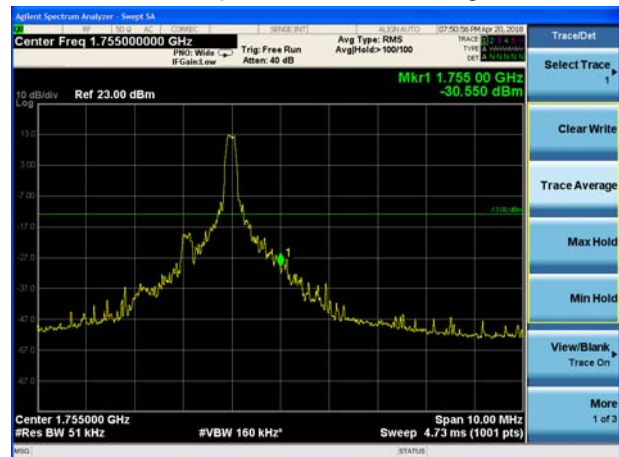
LTE Band 4 QPSK 10MHz CH-High, 100%RB



LTE Band 4 QPSK 15MHz CH-Low, 1 RB

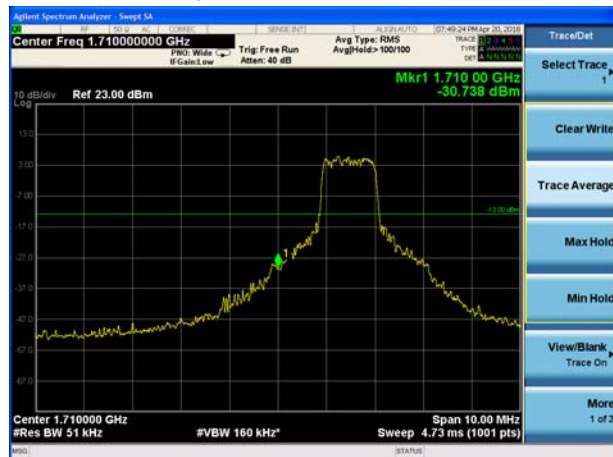


LTE Band 4 QPSK 15MHz CH-High, 1 RB





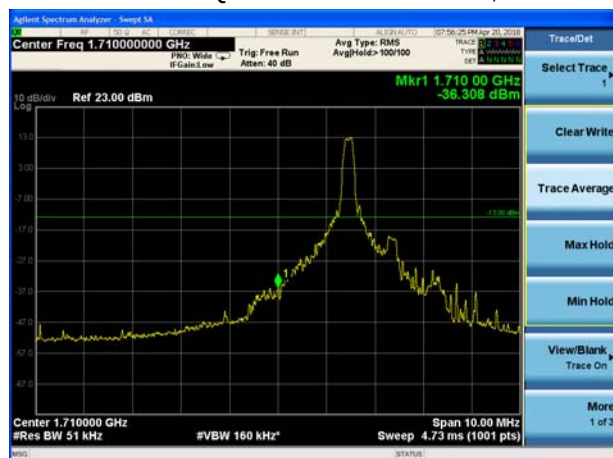
LTE Band 4 QPSK 15MHz CH-Low, 100%RB



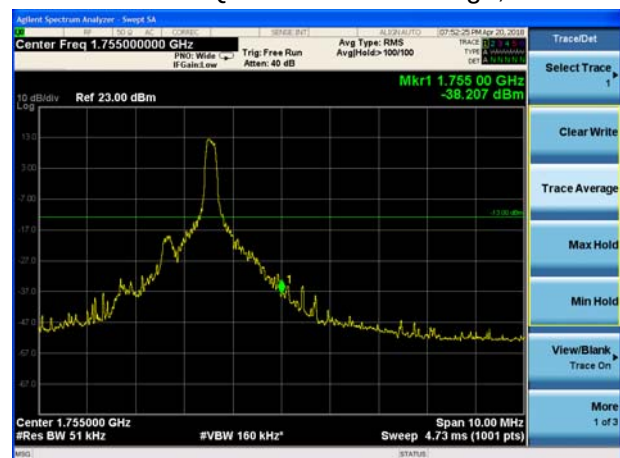
LTE Band 4 QPSK 15MHz CH-High, 100%RB



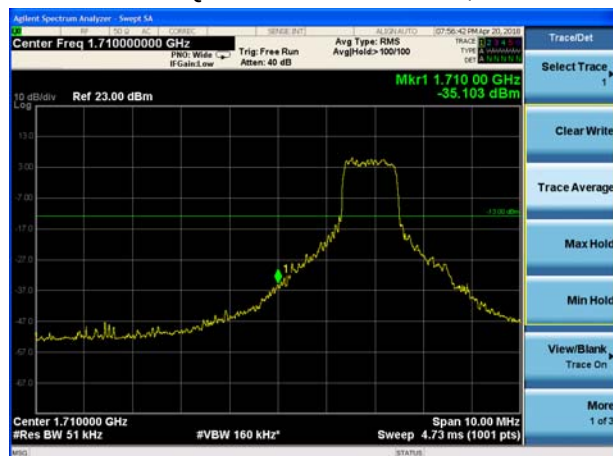
LTE Band 4 QPSK 20MHz CH-Low, 1 RB



LTE Band 4 QPSK 20MHz CH-High, 1 RB



LTE Band 4 QPSK 20MHz CH-Low, 100%RB



LTE Band 4 QPSK 20MHz CH-High, 100%RB





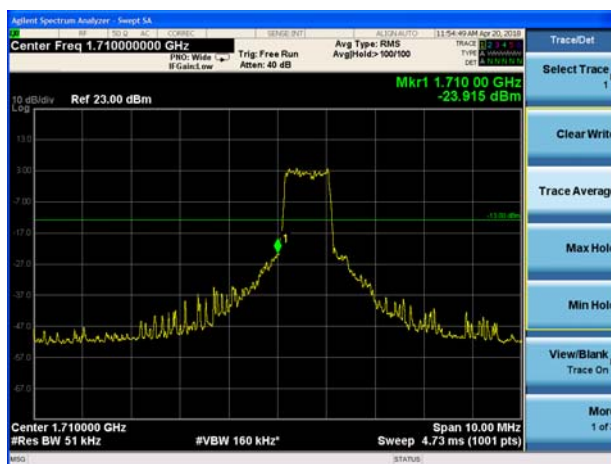
LTE Band 4 16QAM 1.4MHz CH-Low, 1 RB



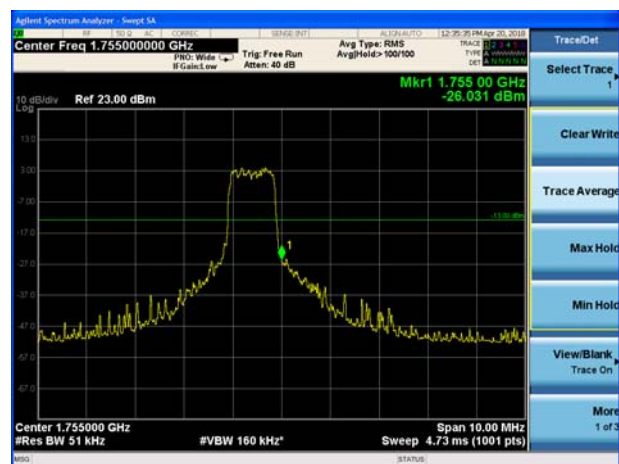
LTE Band 4 16QAM 1.4MHz CH-High, 1 RB



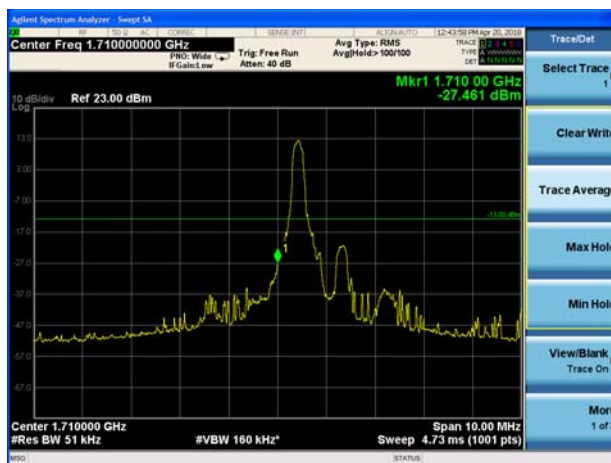
LTE Band 4 16QAM 1.4MHz CH-Low, 100%RB



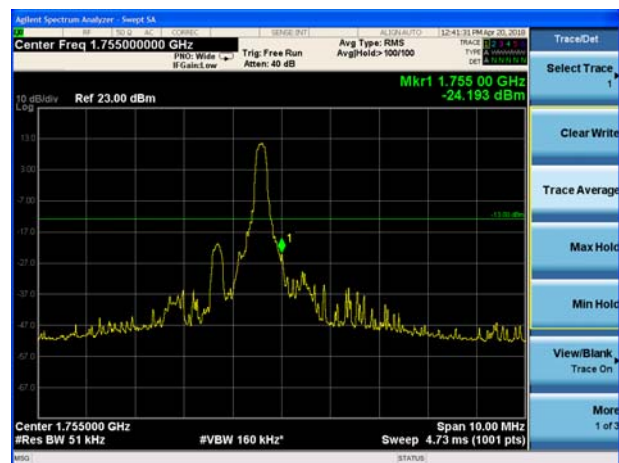
LTE Band 4 16QAM 1.4MHz CH-High, 100%RB



LTE Band 4 16QAM 3MHz CH-Low, 1 RB

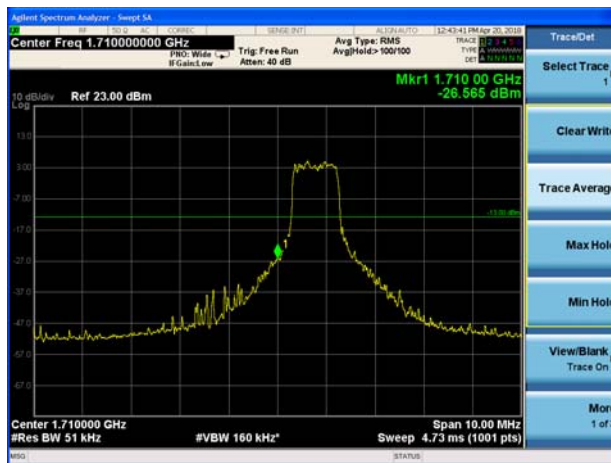


LTE Band 4 16QAM 3MHz CH-High, 1 RB

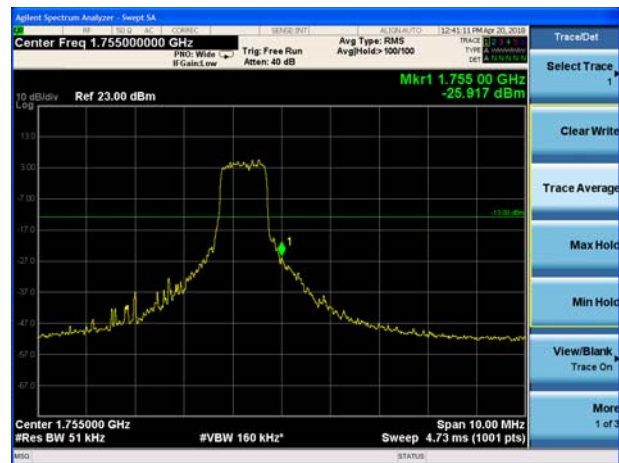




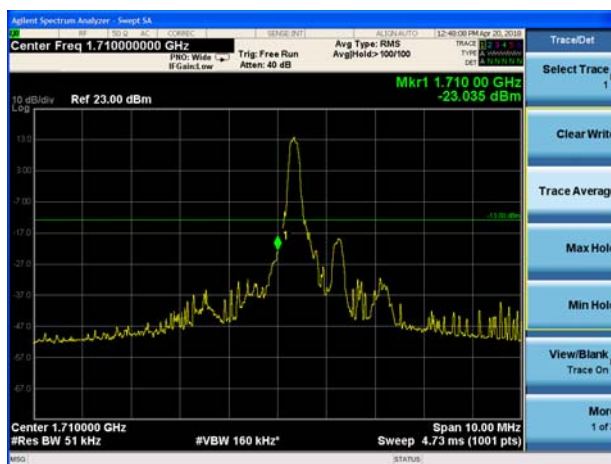
LTE Band 4 16QAM 3MHz CH-Low, 100%RB



LTE Band 4 16QAM 3MHz CH-High, 100%RB



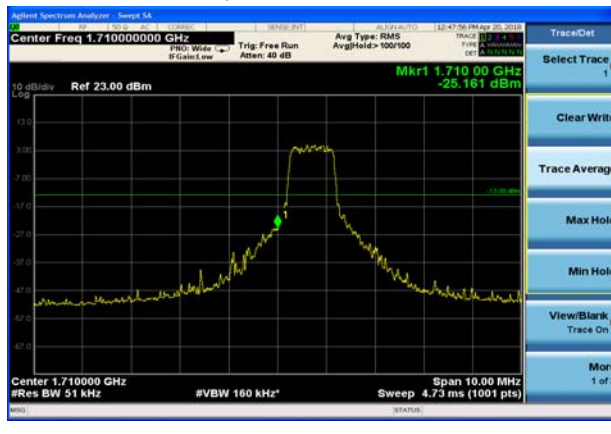
LTE Band 4 16QAM 5MHz CH-Low, 1 RB



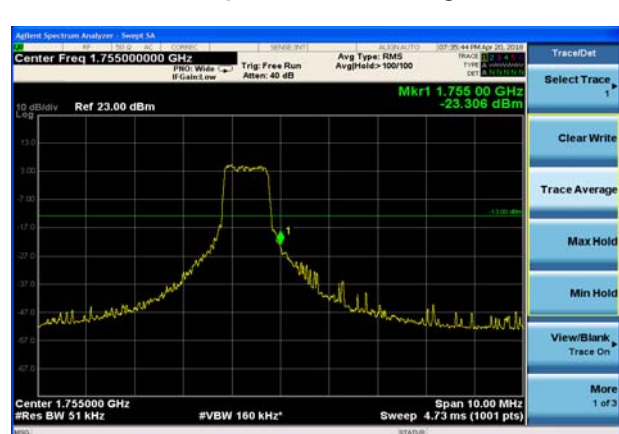
LTE Band 4 16QAM 5MHz CH-High, 1 RB



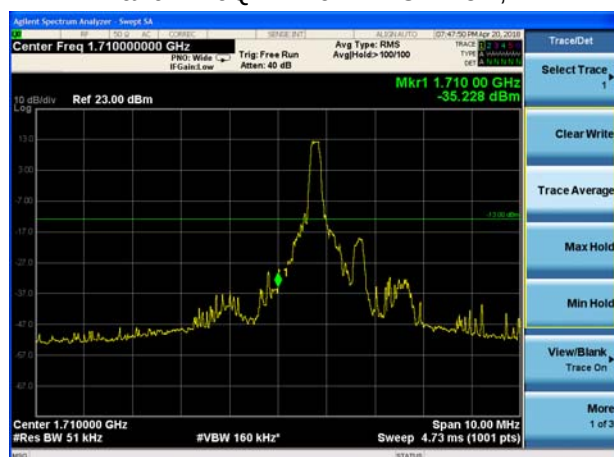
LTE Band 4 16QAM 5MHz CH-Low, 100%RB



LTE Band 4 16QAM 5MHz CH-High, 100%RB



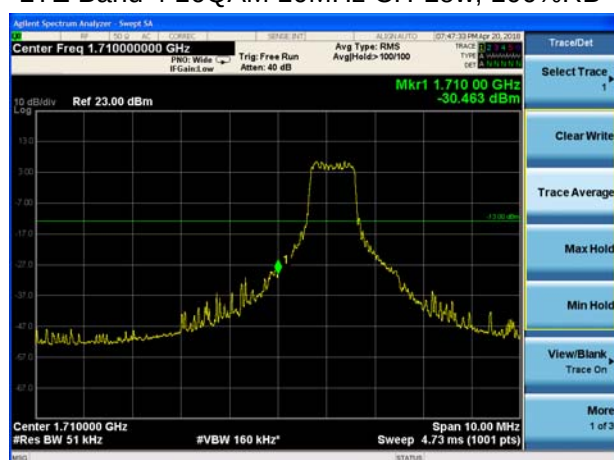
LTE Band 4 16QAM 10MHz CH-Low, 1 RB



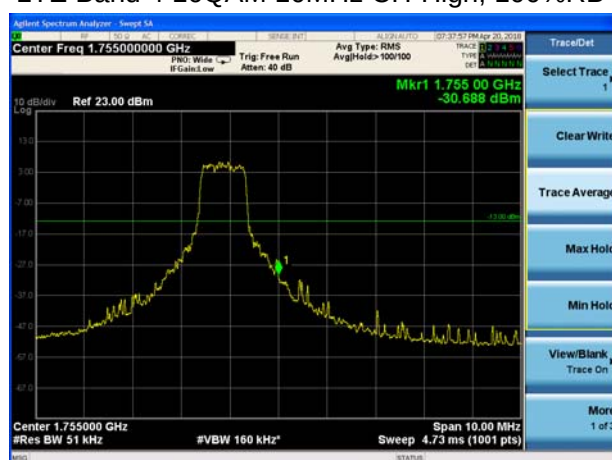
LTE Band 4 16QAM 10MHz CH-High, 1 RB



LTE Band 4 16QAM 10MHz CH-Low, 100%RB



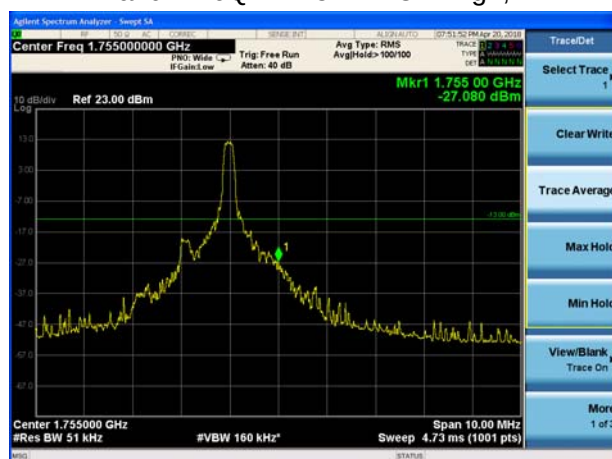
LTE Band 4 16QAM 10MHz CH-High, 100%RB



LTE Band 4 16QAM 15MHz CH-Low, 1 RB



LTE Band 4 16QAM 15MHz CH-High, 1 RB

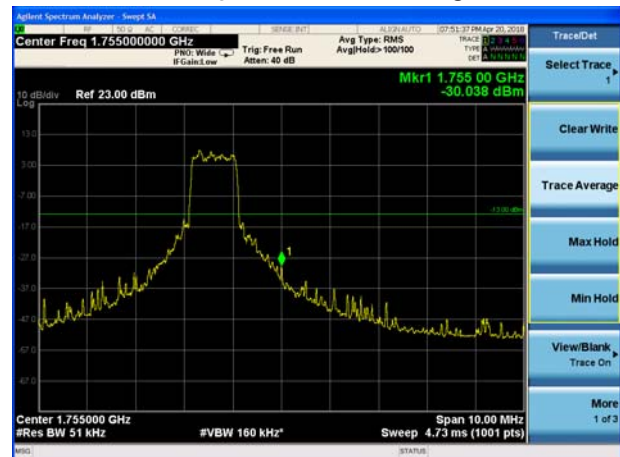




LTE Band 4 16QAM 15MHz CH-Low, 100%RB



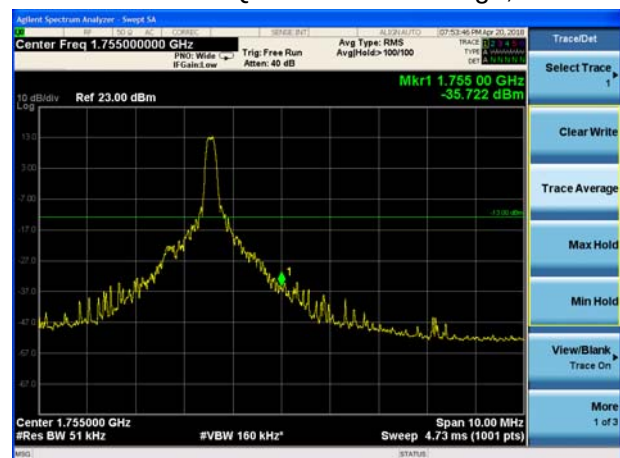
LTE Band 4 16QAM 15MHz CH-High, 100%RB



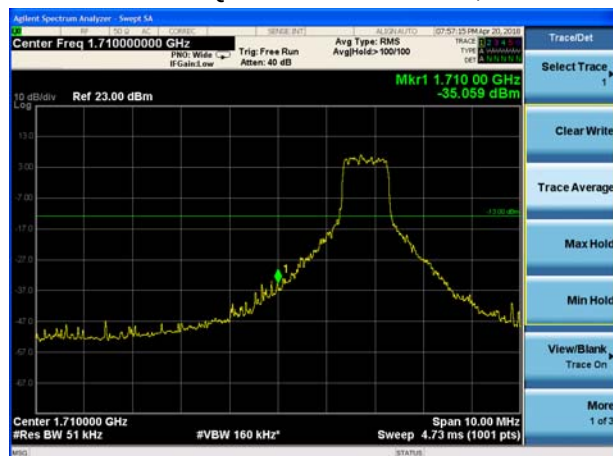
LTE Band 4 16QAM 20MHz CH-Low, 1 RB



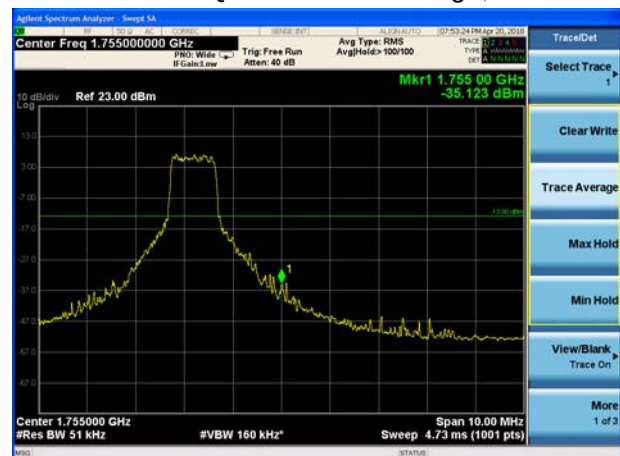
LTE Band 4 16QAM 20MHz CH-High, 1 RB



LTE Band 4 16QAM 20MHz CH-Low, 100%RB

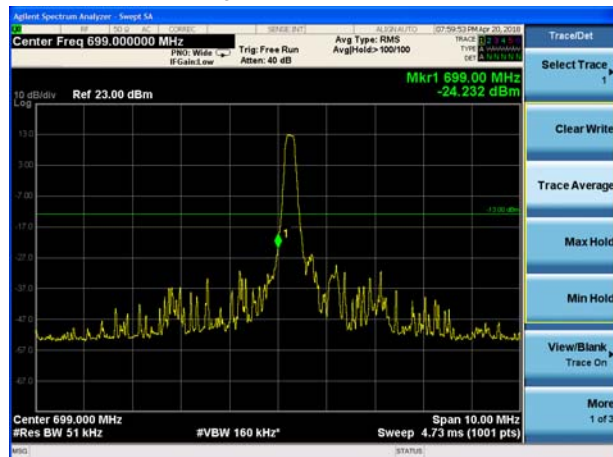


LTE Band 4 16QAM 20MHz CH-High, 100%RB

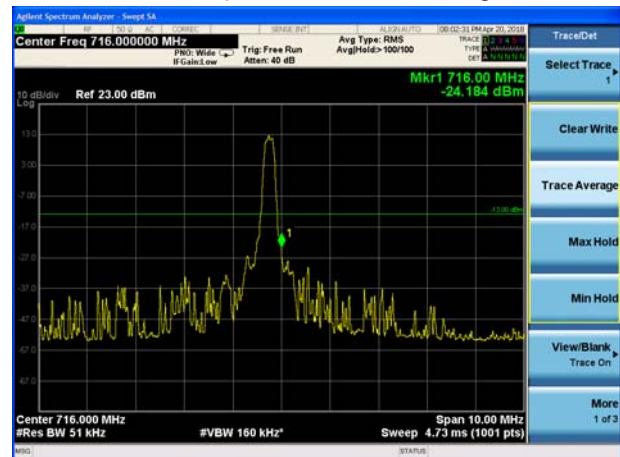




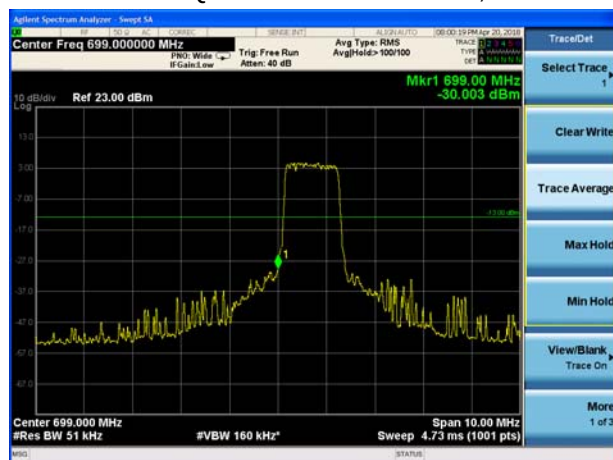
LTE Band 12 QPSK 1.4MHz CH-Low, 1 RB



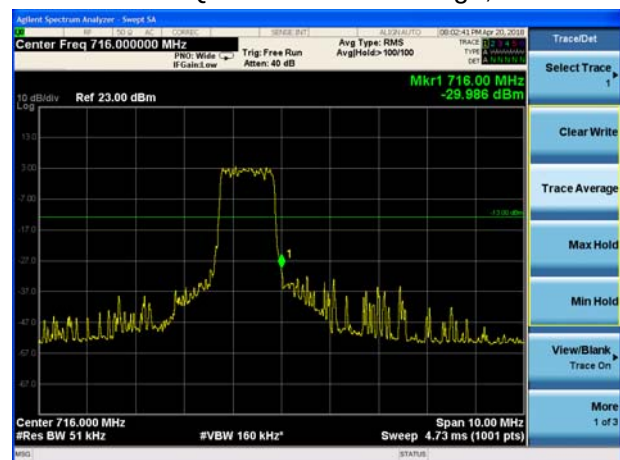
LTE Band 12 QPSK 1.4MHz CH-High, 1 RB



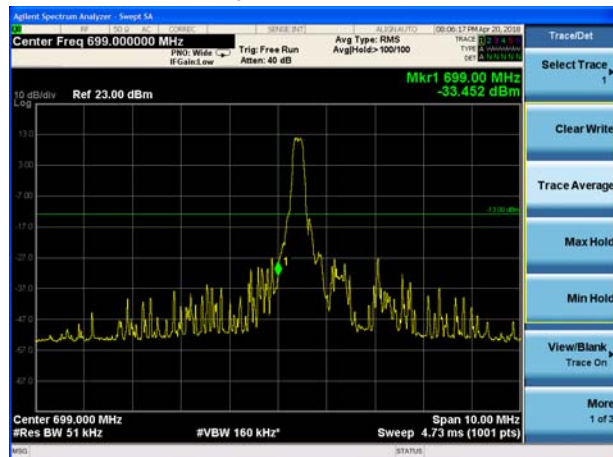
LTE Band 12 QPSK 1.4MHz CH-Low, 100%RB



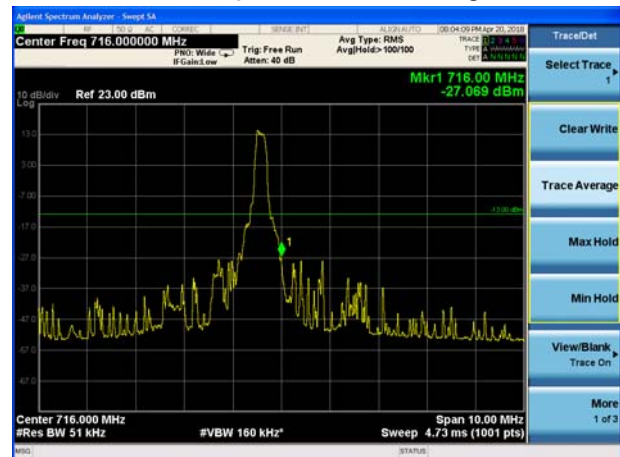
LTE Band 12 QPSK 1.4MHz CH-High, 100%RB



LTE Band 12 QPSK 3MHz CH-Low, 1 RB

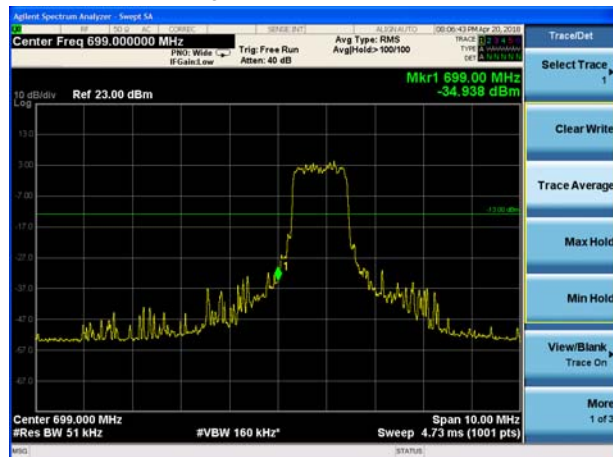


LTE Band 12 QPSK 3MHz CH-High, 1 RB

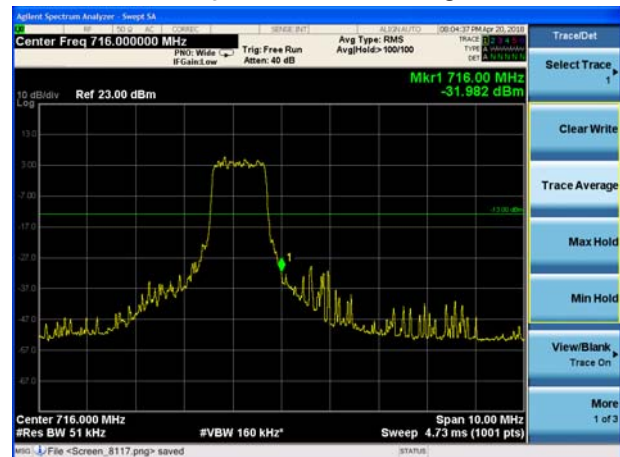




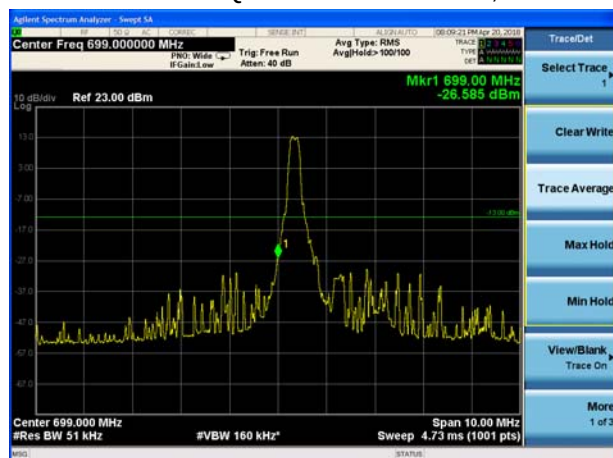
LTE Band 12 QPSK 3MHz CH-Low, 100%RB



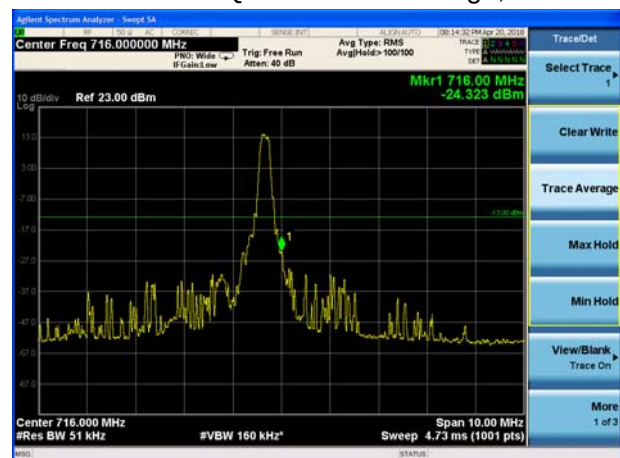
LTE Band 12 QPSK 3MHz CH-High, 100%RB



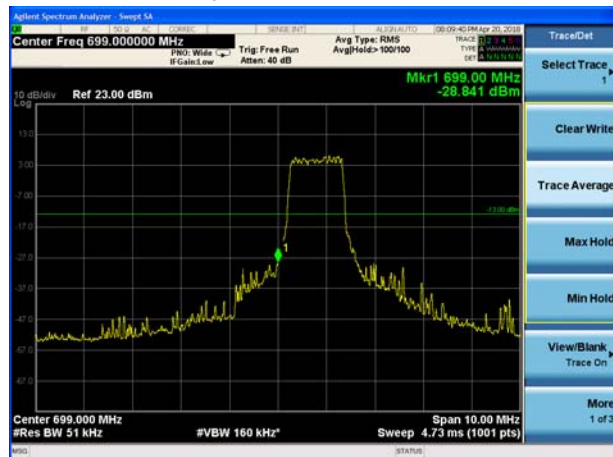
LTE Band 12 QPSK 5MHz CH-Low, 1 RB



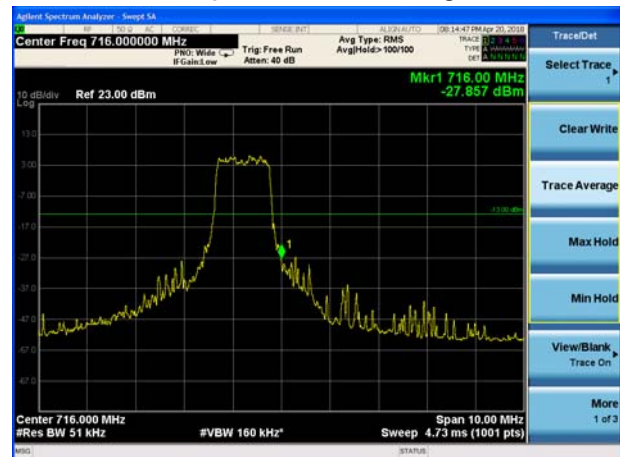
LTE Band 12 QPSK 5MHz CH-High, 1 RB



LTE Band 12 QPSK 5MHz CH-Low, 100%RB

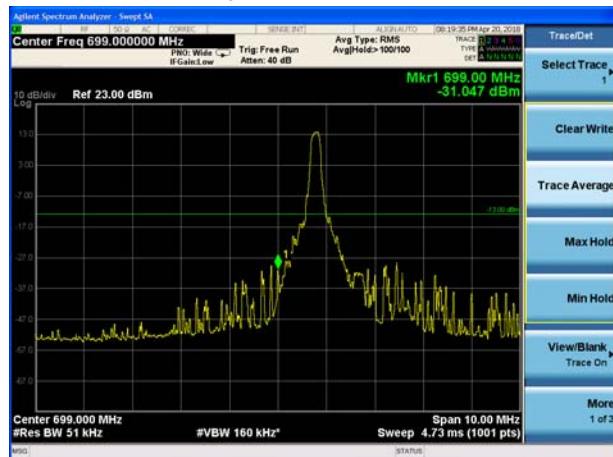


LTE Band 12 QPSK 5MHz CH-High, 100%RB

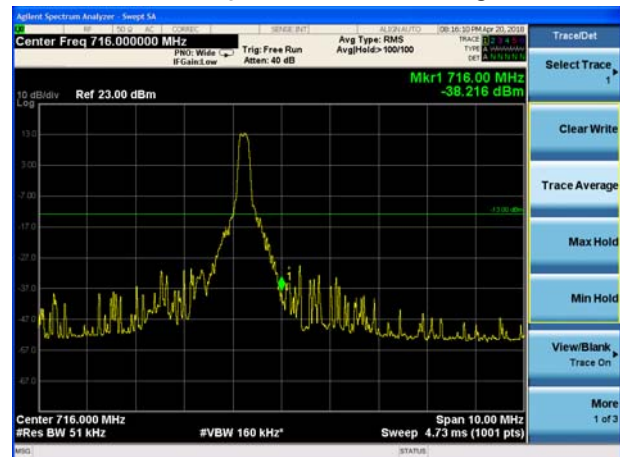




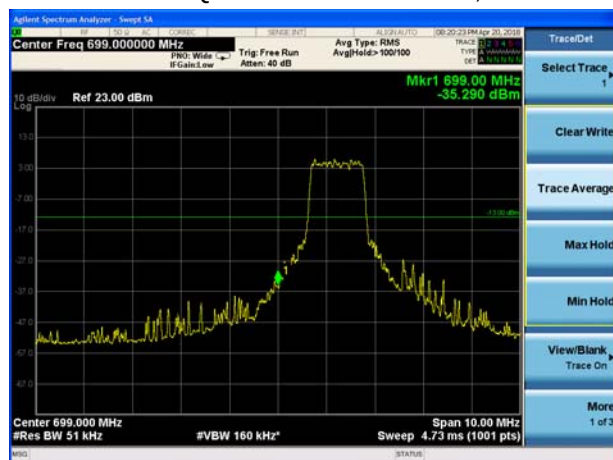
LTE Band 12 QPSK 10MHz CH-Low, 1 RB



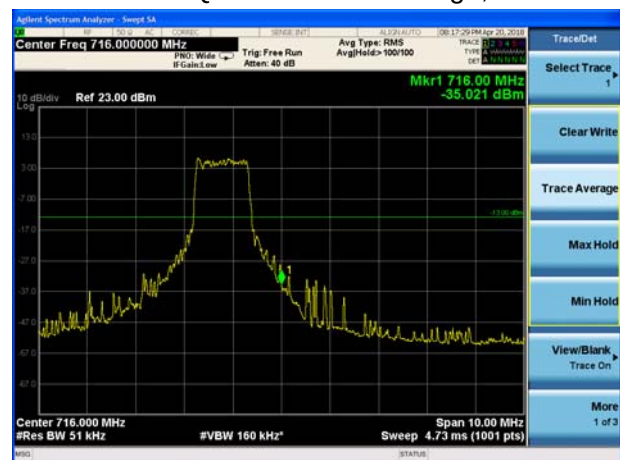
LTE Band 12 QPSK 10MHz CH-High, 1 RB



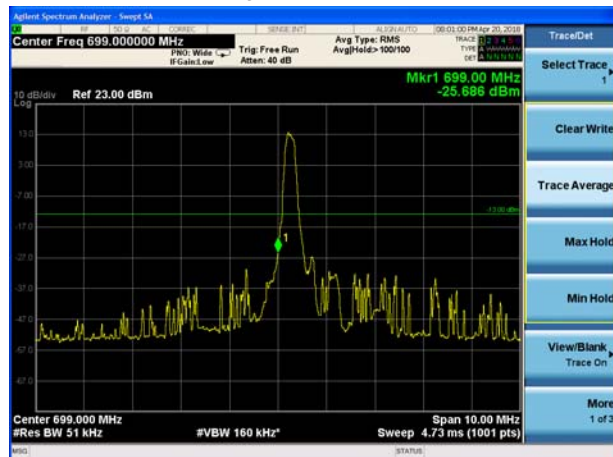
LTE Band 12 QPSK 10MHz CH-Low, 100%RB



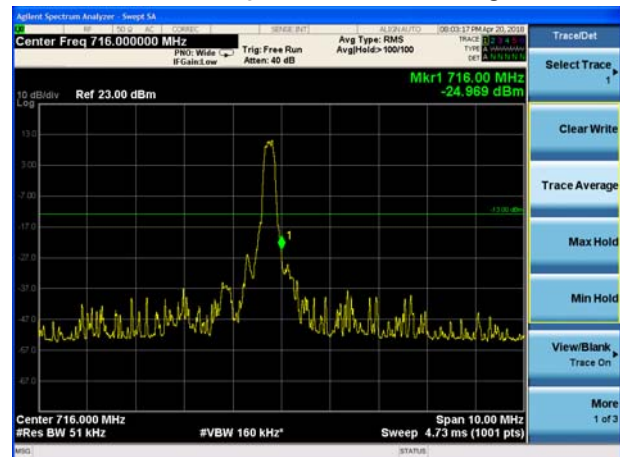
LTE Band 12 QPSK 10MHz CH-High, 100%RB



LTE Band 12 16QAM 1.4MHz CH-Low, 1 RB

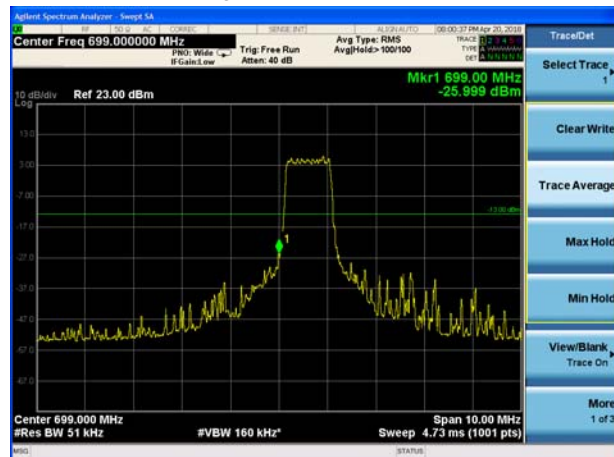


LTE Band 12 16QAM 1.4MHz CH-High, 1 RB

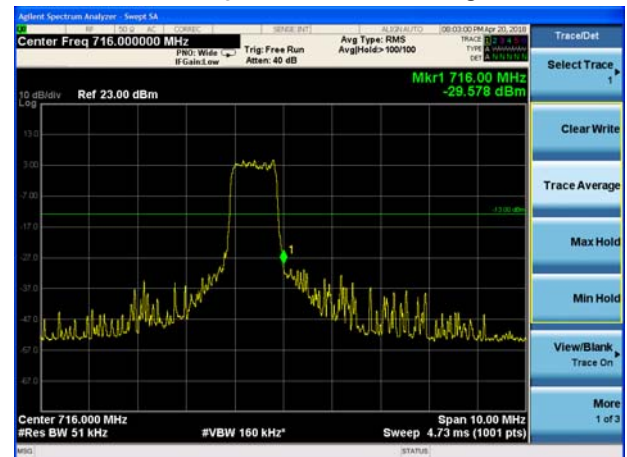




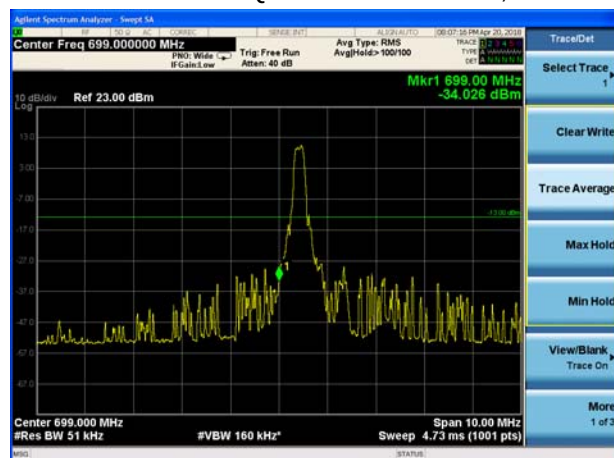
LTE Band 12 16QAM 1.4MHz CH-Low, 100%RB



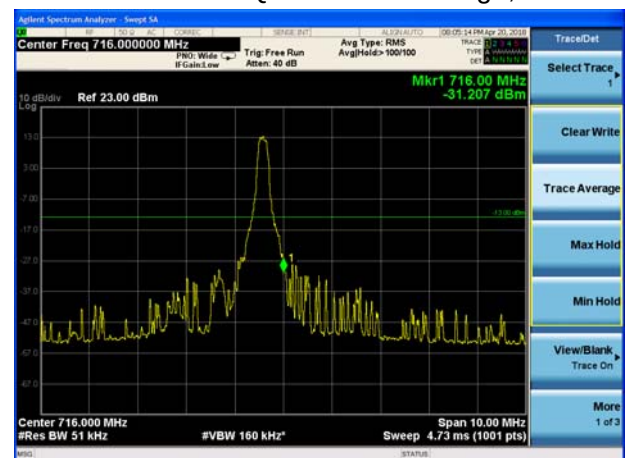
LTE Band 12 16QAM 1.4MHz CH-High, 100%RB



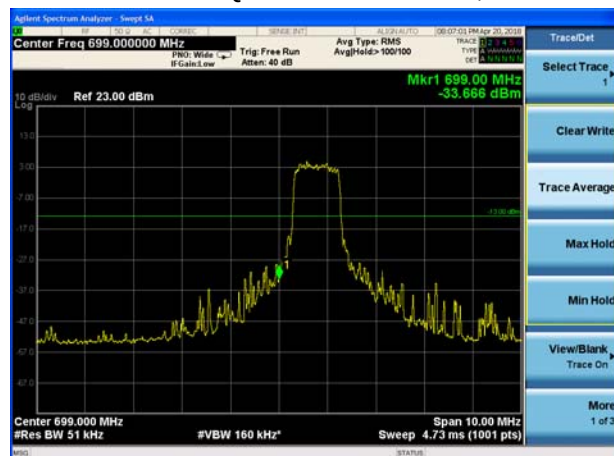
LTE Band 12 16QAM 3MHz CH-Low, 1 RB



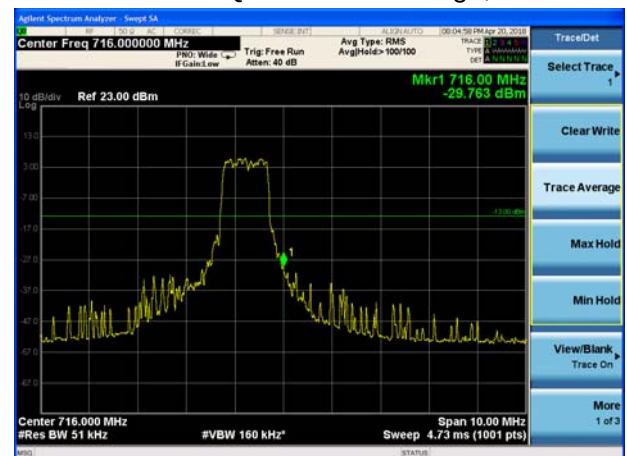
LTE Band 12 16QAM 3MHz CH-High, 1 RB



LTE Band 12 16QAM 3MHz CH-Low, 100%RB

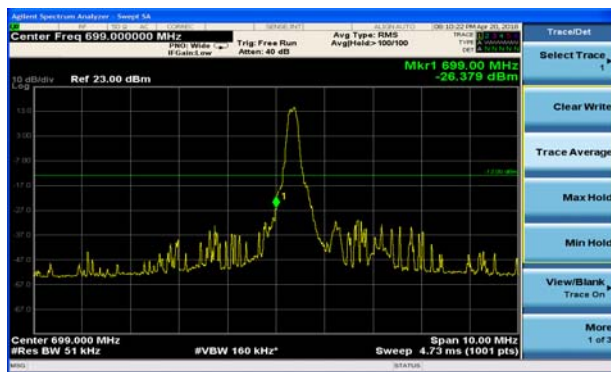


LTE Band 12 16QAM 3MHz CH-High, 100%RB

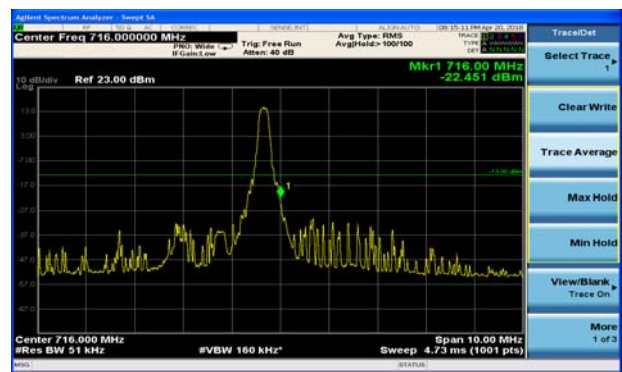




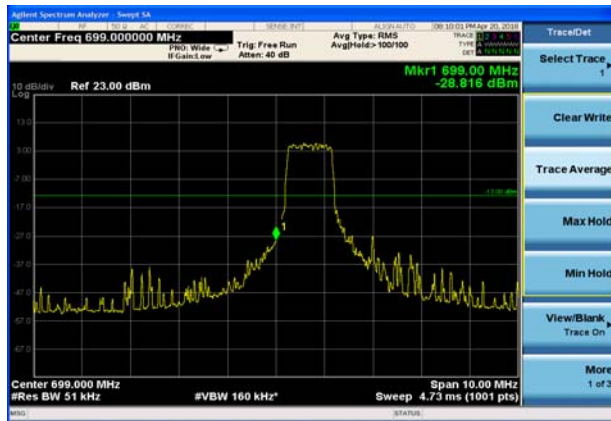
LTE Band 12 16QAM 5MHz CH-Low, 1 RB



LTE Band 12 16QAM 5MHz CH-High, 1 RB



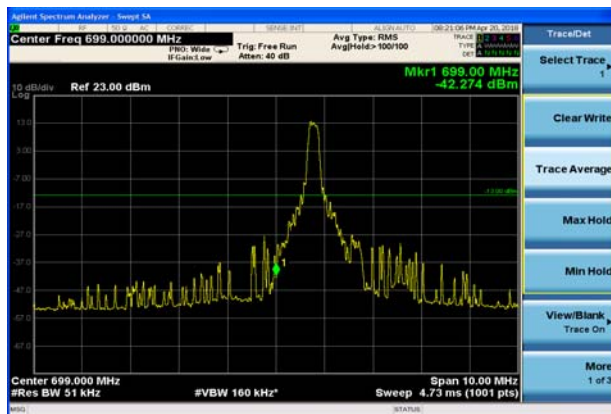
LTE Band 12 16QAM 5MHz CH-Low, 100%RB



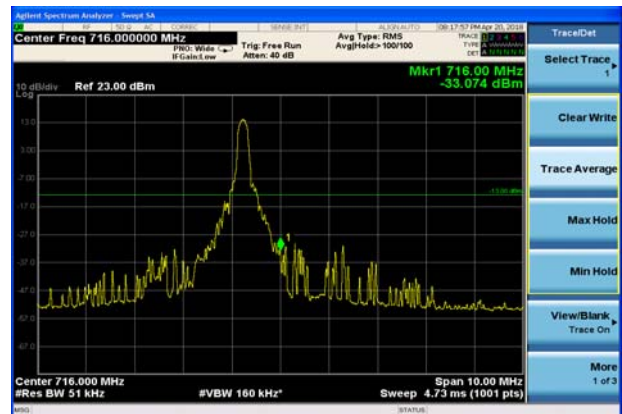
LTE Band 12 16QAM 5MHz CH-High, 100%RB



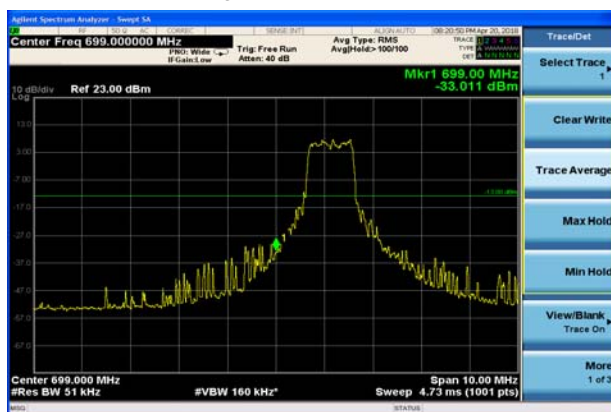
LTE Band 12 16QAM 10MHz CH-Low, 1 RB



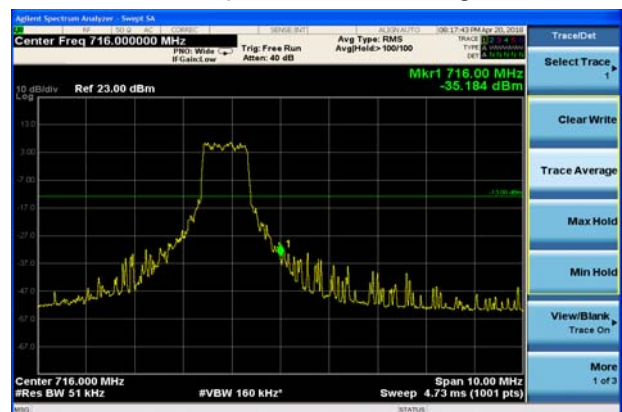
LTE Band 12 16QAM 10MHz CH-High, 1 RB



LTE Band 12 16QAM 10MHz CH-Low, 100%RB



LTE Band 12 16QAM 10MHz CH-High, 100%RB



5.5 Peak-to-Average Power Ratio (PAPR)

Ambient condition

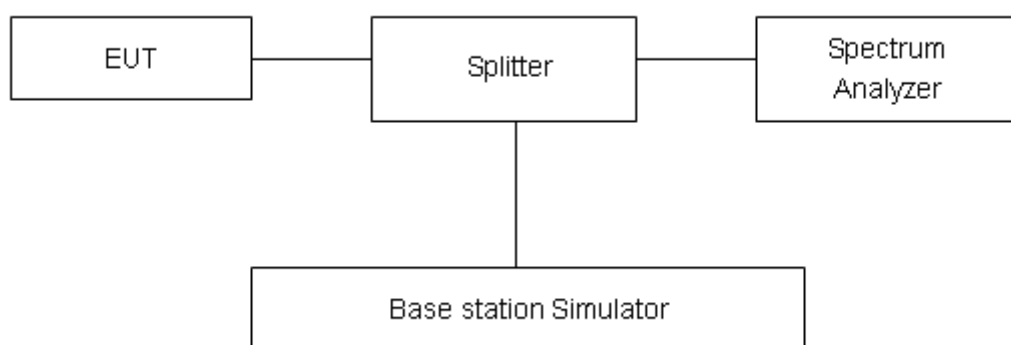
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

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

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

Test Setup



Limits

Rule Part 27.50(a) (3)

Rule Part 27.50(d)(5) Equipment employed must be authorized in accordance with the provisions of 24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

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	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
LTE Band4	1.4MHz	QPSK	20175/1732.5	29.96	20.50	9.46
		16QAM	20175/1732.5	29.61	20.62	8.99
	3MHz	QPSK	20175/1732.5	27.23	20.45	6.78
		16QAM	20175/1732.5	28.80	20.32	8.48
	5MHz	QPSK	20175/1732.5	27.84	21.37	6.47
		16QAM	20175/1732.5	30.52	20.96	9.56
	10MHz	QPSK	20175/1732.5	30.86	22.46	8.40
		16QAM	20175/1732.5	30.05	21.17	8.88
	15MHz	QPSK	20175/1732.5	30.23	22.50	7.73
		16QAM	20175/1732.5	28.99	22.50	6.49
	20MHz	QPSK	20175/1732.5	29.36	22.77	6.59
		16QAM	20175/1732.5	31.23	22.88	8.35

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
LTE Band12	1.4MHz	QPSK	23095/707.5	29.64	21.44	8.20
		16QAM	23095/707.5	29.23	21.39	7.84
	3MHz	QPSK	23095/707.5	28.56	21.67	6.89
		16QAM	23095/707.5	29.95	21.50	8.45
	5MHz	QPSK	23095/707.5	34.12	22.67	11.45
		16QAM	23095/707.5	32.76	21.90	10.86
	10MHz	QPSK	23095/707.5	32.78	23.52	9.26
		16QAM	23095/707.5	32.67	23.01	9.66

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 -10°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)

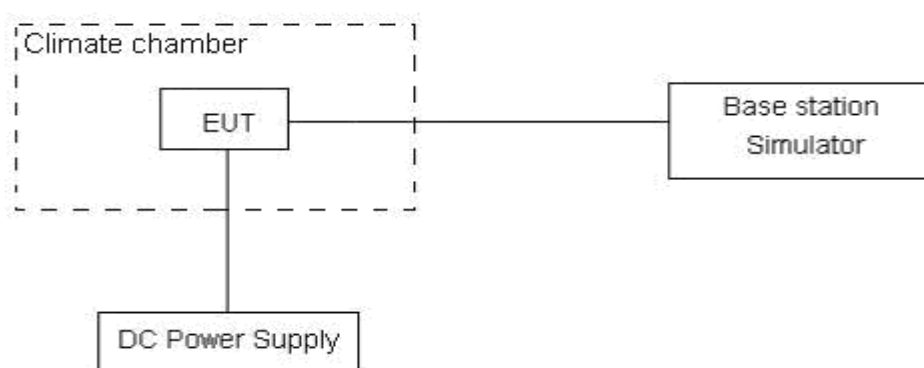
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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 8 V and 14 V, with a nominal voltage of 12V.

Test setup



Limits

No specific frequency stability requirements in part 27.54

Measurement Uncertainty

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

Test Result

QPSK,(20MHz Bandwidth)		LTE Band 4			
Condition		1710	1755	Delta (Hz)	Frequency Stability (ppm)
		F low@-13dBm (MHz)	F high@-13dBm (MHz)		
Temperature	Voltage				
Normal (25℃)	Normal	1711.2716	1753.8034	5.43	0.00314
Extreme (50℃)		1711.2649	1753.7963	2.38	0.00137
Extreme (40℃)		1711.2731	1753.8045	-6.65	-0.00384
Extreme (30℃)		1711.278	1753.8094	6.16	0.00355
Extreme (20℃)		1711.2663	1753.7977	-19.61	-0.01132
Extreme (10℃)		1711.2639	1753.7953	0.35	0.00020
Extreme (0℃)		1711.2666	1753.7981	6.48	0.00374
Extreme (-10℃)		1711.2658	1753.7972	-6.12	-0.00353
Extreme (-20℃)		1711.2606	1753.7927	-8.14	-0.00470
Extreme (-30℃)		1711.2711	1753.8025	-6.40	-0.00370
25℃	LV	1711.2698	1753.8012	-6.45	-0.00372
	HV	1711.2744	1753.8058	-7.07	-0.00408

16QAM,(20MHz Bandwidth)		LTE Band 4			
Condition		1710	1755	Delta (Hz)	Frequency Stability (ppm)
		F low@-13dBm (MHz)	F high@-13dBm (MHz)		
Temperature	Voltage				
Normal (25℃)	Normal	1711.2469	1753.7616	-6.88	-0.00397
Extreme (50℃)		1711.2536	1753.7753	-3.89	-0.00224
Extreme (40℃)		1711.2454	1753.7586	-1.15	-0.00066
Extreme (30℃)		1711.2405	1753.7488	-10.99	-0.00634
Extreme (20℃)		1711.2522	1753.7722	9.93	0.00573
Extreme (10℃)		1711.2546	1753.7775	-2.28	-0.00132
Extreme (0℃)		1711.2519	1753.7716	-1.49	-0.00086
Extreme (-10℃)		1711.2527	1753.7732	-5.49	-0.00317
Extreme (-20℃)		1711.2579	1753.7836	1.54	0.00089
Extreme (-30℃)		1711.2474	1753.7626	-3.59	-0.00207
25℃	LV	1711.2487	1753.7652	5.16	0.00298
	HV	1711.2441	1753.7563	-8.28	-0.00478

QPSK,(10MHz Bandwidth)		LTE Band 12			
Condition		699	716	Delta (Hz)	Frequency Stability (ppm)
		F low@-13dBm (MHz)	F high@-13dBm (MHz)		
Temperature	Voltage				
Normal (25°C)	Normal	699.6016	715.4251	-1.63	-0.00231
Extreme (50°C)		699.5949	715.4184	3.33	0.00471
Extreme (40°C)		699.6031	715.4266	-2.31	-0.00326
Extreme (30°C)		699.6080	715.4315	-0.88	-0.00124
Extreme (20°C)		699.5963	715.4198	-3.46	-0.00489
Extreme (10°C)		699.5939	715.4174	-2.70	-0.00381
Extreme (0°C)		699.5966	715.4201	-0.47	-0.00066
Extreme (-10°C)		699.5958	715.4193	1.58	0.00224
Extreme (-20°C)		699.5906	715.4141	-3.47	-0.00490
Extreme (-30°C)		699.6011	715.4246	-2.22	-0.00313
25°C	LV	699.5998	715.4233	2.58	0.00364
	HV	699.6044	715.4279	0.81	0.00115

16QAM,(10MHz Bandwidth)		LTE Band 12			
Condition		699	716	Delta (Hz)	Frequency Stability (ppm)
		F low@-13dBm (MHz)	F high@-13dBm (MHz)		
Temperature	Voltage				
Normal (25°C)	Normal	699.5748	715.3983	-4.22	-0.00596
Extreme (50°C)		699.5815	715.4053	-4.48	-0.00633
Extreme (40°C)		699.5733	715.3968	1.13	0.00160
Extreme (30°C)		699.5684	715.3919	-2.66	-0.00376
Extreme (20°C)		699.5801	715.4036	1.13	0.00160
Extreme (10°C)		699.5825	715.4061	-1.61	-0.00227
Extreme (0°C)		699.5798	715.4033	-0.67	-0.00095
Extreme (-10°C)		699.5806	715.4041	0.10	0.00014
Extreme (-20°C)		699.5858	715.4093	-1.63	-0.00230
Extreme (-30°C)		699.5753	715.3988	-3.75	-0.00529
25°C	LV	699.5766	715.4001	-3.53	-0.00499
	HV	699.5720	715.3955	-1.72	-0.00243

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.

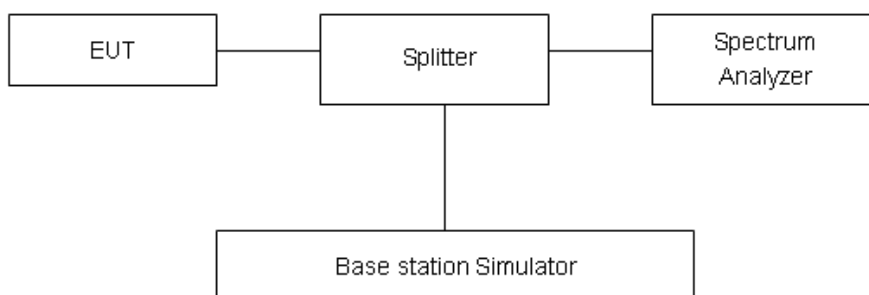
RBW is set to 100kHz, VBW is set to 300kHz for 30MHz~1GHz

RBW is set to 1MHz, VBW is set to 3MHz for above 1GHz, Sweep is set to ATUO.

Of those disturbances below (limit – 20 dB), the mark is not required for the EUT.

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

Test setup



Limits

Rule Part 27.53(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB..”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Part 27.53(h)/(g) Limit	-13 dBm
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Measurement Uncertainty

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

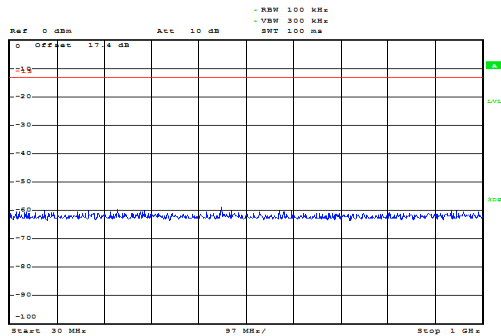
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-26GHz	1.407 dB

Test Result

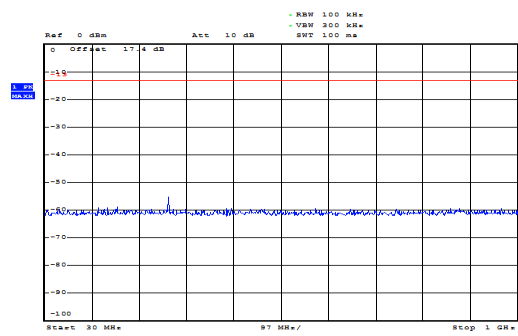
Sweep from 9 kHz to 30MHz, and the emissions more than 20 dB below the permissible value are not reported.

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.

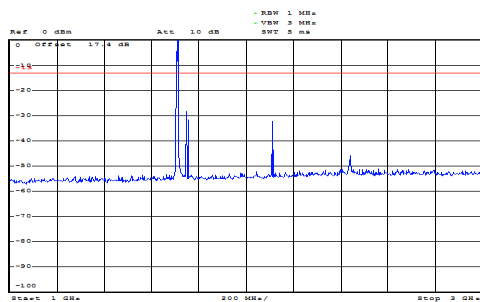
LTE Band 4 1.4MHz CH-Low 30MHz~1GHz



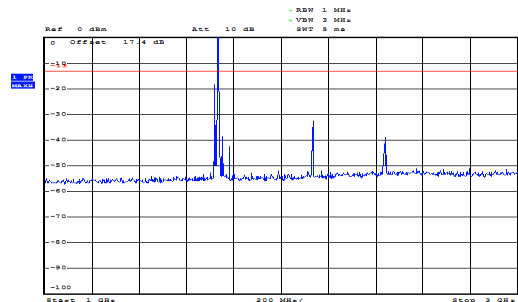
LTE Band 4 1.4MHz CH-Middle 30MHz~1GHz



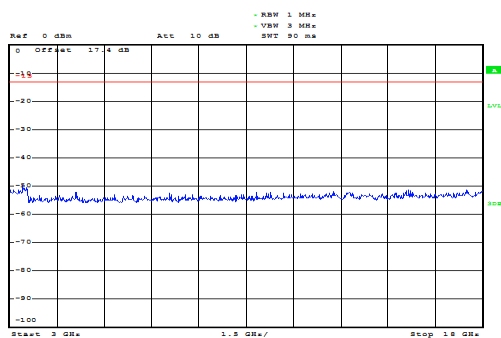
LTE Band 4 1.4MHz CH-Low 1GHz~3GHz



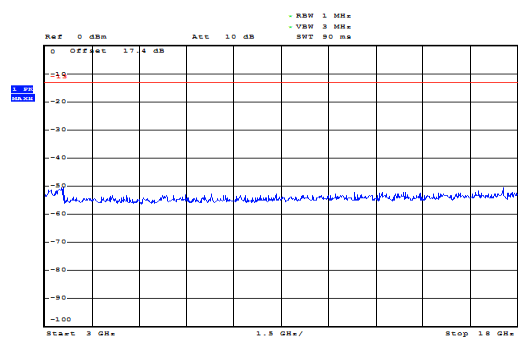
LTE Band 4 1.4MHz CH-Middle 1GHz~3GHz



LTE Band 4 1.4MHz CH-Low 3GHz~18GHz

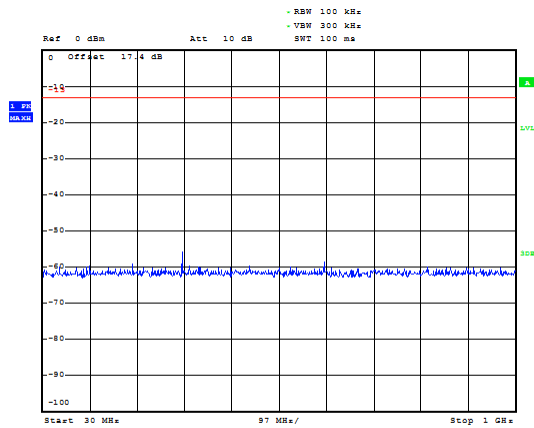


LTE Band 4 1.4MHz CH-Middle 3GHz~18GHz

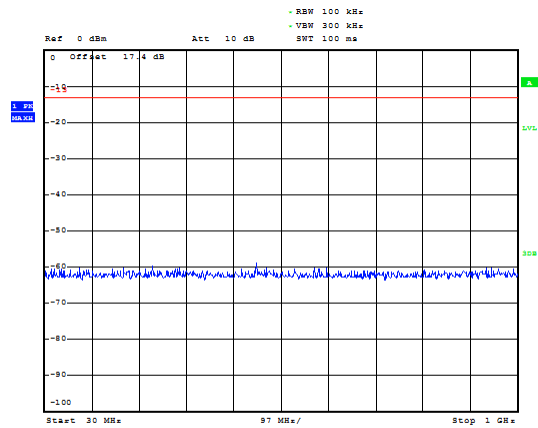




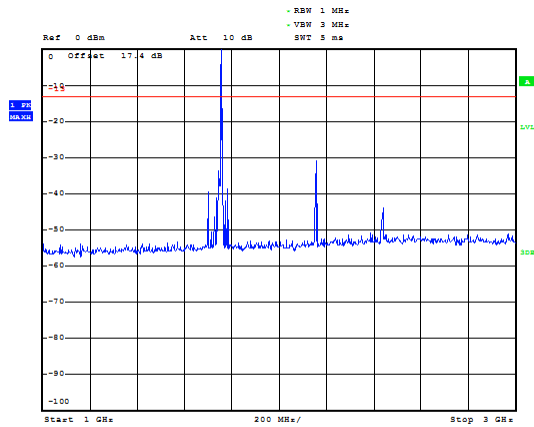
LTE Band 4 1.4MHz CH-High 30MHz~1GHz



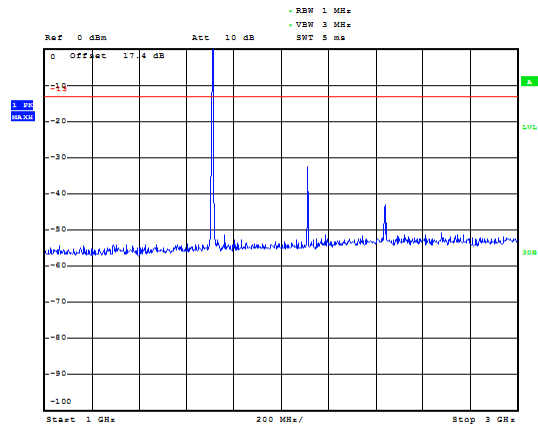
LTE Band 4 3MHz CH-Low 30MHz~1GHz



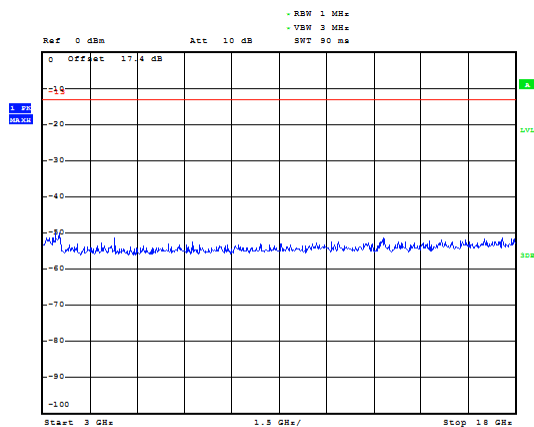
LTE Band 4 1.4MHz CH-High 1GHz~3GHz



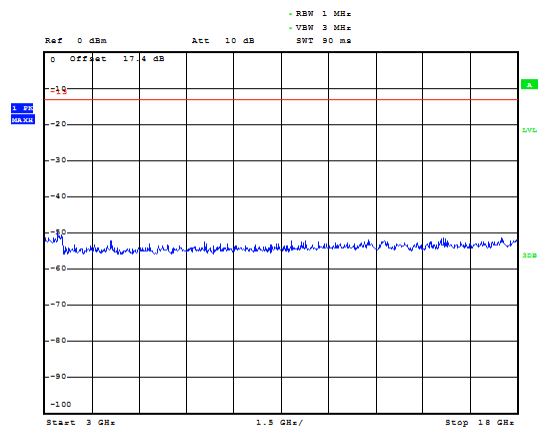
LTE Band 4 3MHz CH-Low 1GHz~3GHz



LTE Band 4 1.4MHz CH-High 3GHz~18GHz

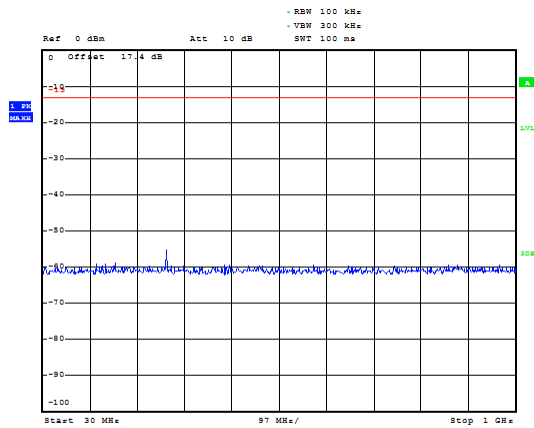


LTE Band 4 3MHz CH-Low 3GHz~18GHz

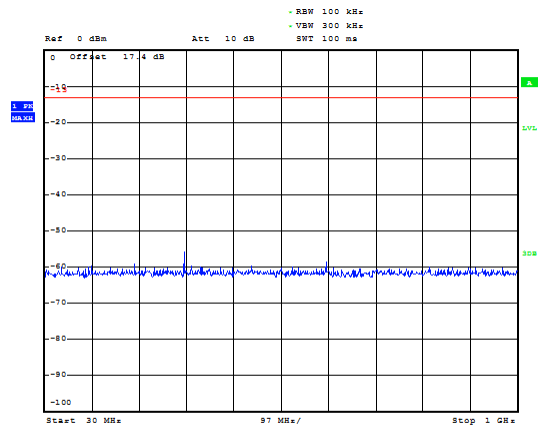




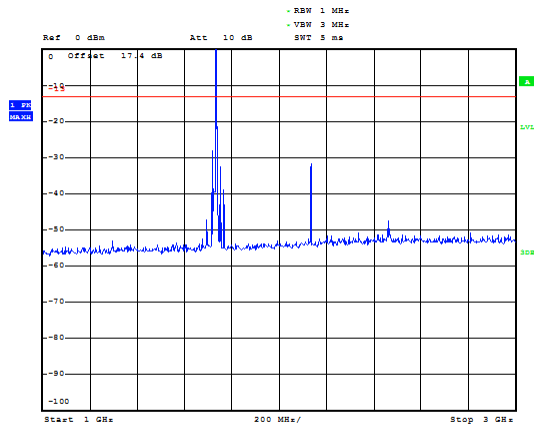
LTE Band 4 3MHz CH-Middle 30MHz~1GHz



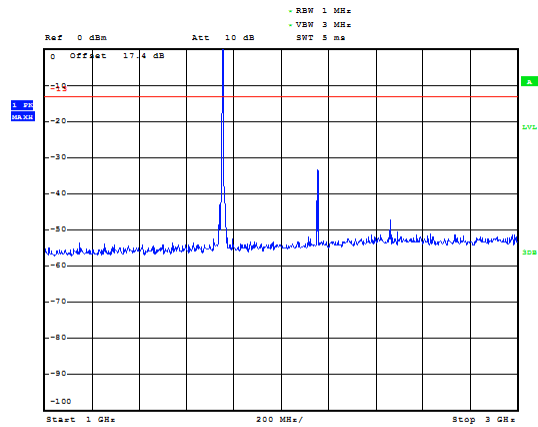
LTE Band 4 3MHz CH-High 30MHz~1GHz



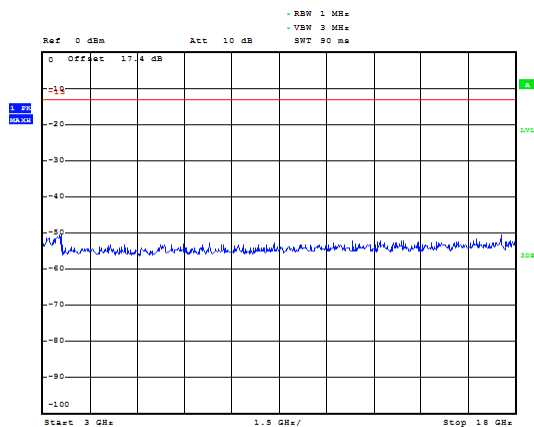
LTE Band 4 3MHz CH-Middle 1GHz~3GHz



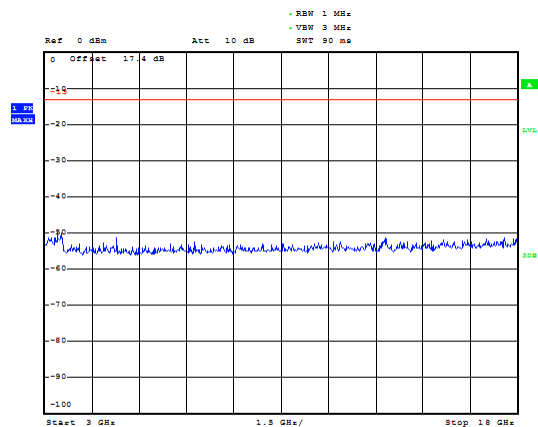
LTE Band 4 3MHz CH-High 1GHz~3GHz



LTE Band 4 3MHz CH-Middle 3GHz~18GHz

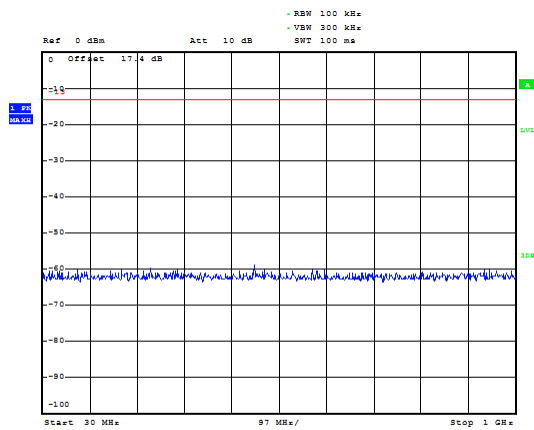


LTE Band 4 3MHz CH-High 3GHz~18GHz

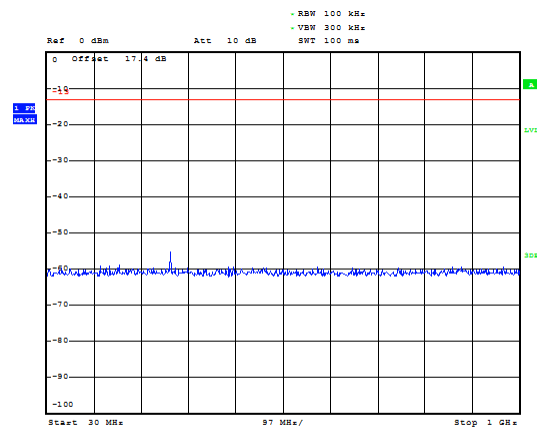




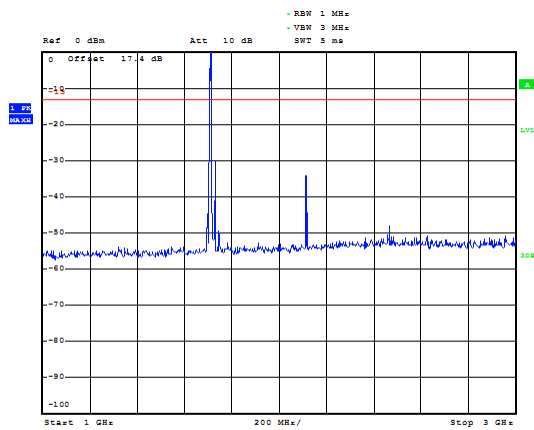
LTE Band 4 5MHz CH-Low 30MHz~1GHz



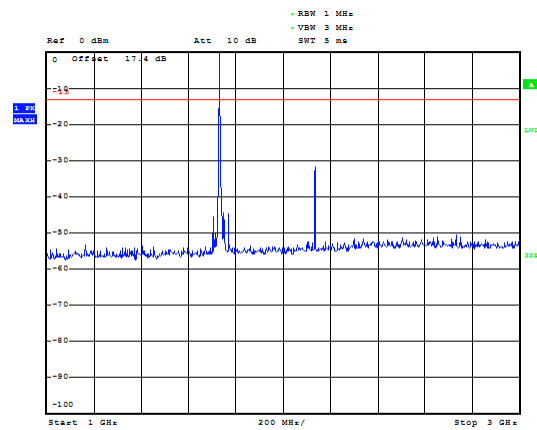
LTE Band 4 5MHz CH-Middle 30MHz~1GHz



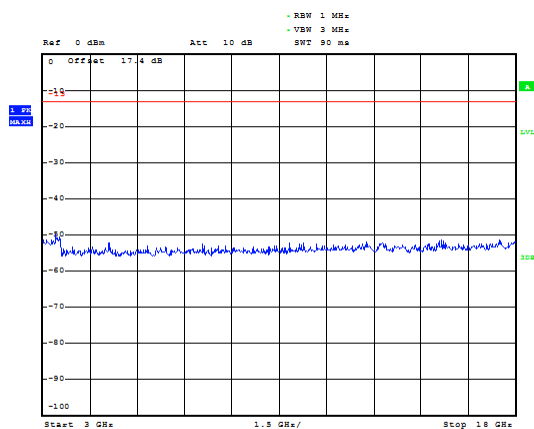
LTE Band 4 5MHz CH-Low 1GHz~3GHz



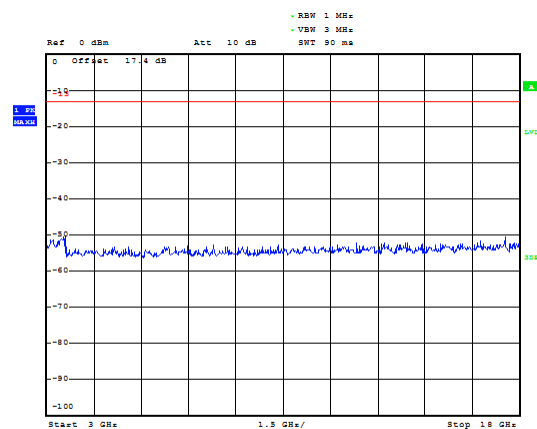
LTE Band 4 5MHz CH-Middle 1GHz~3GHz



LTE Band 4 5MHz CH-Low 3GHz~18GHz

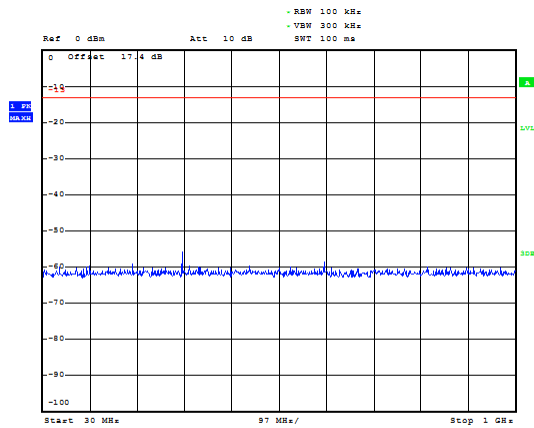


LTE Band 4 5MHz CH-Middle 3GHz~18GHz

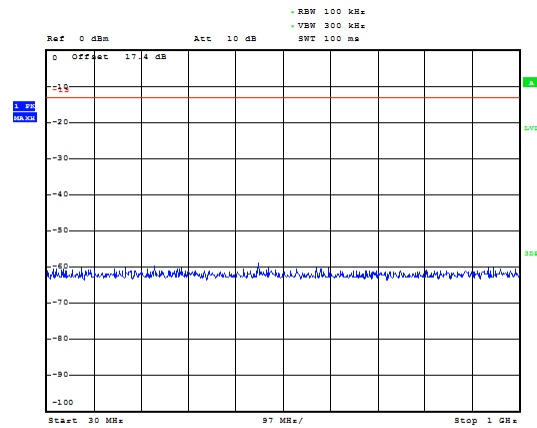




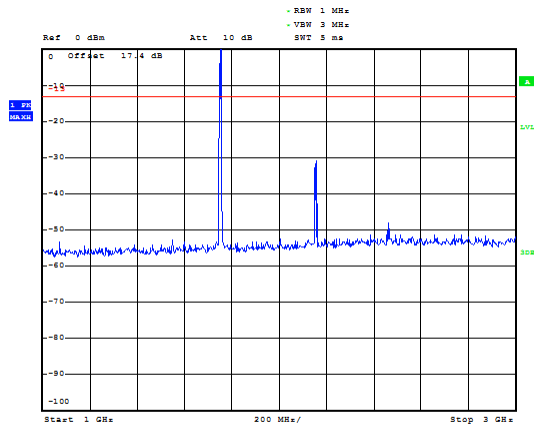
LTE Band 4 5MHz CH-High 30MHz~1GHz



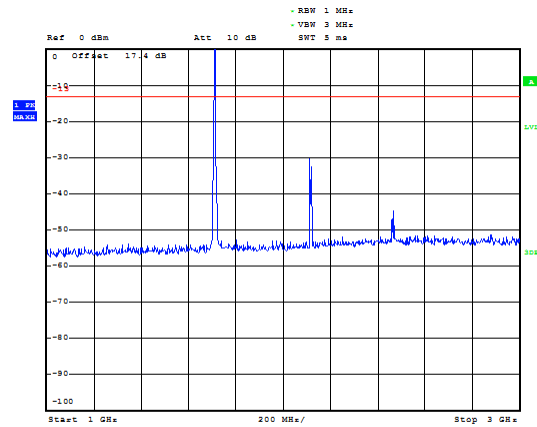
LTE Band 4 10MHz CH-Low 30MHz~1GHz



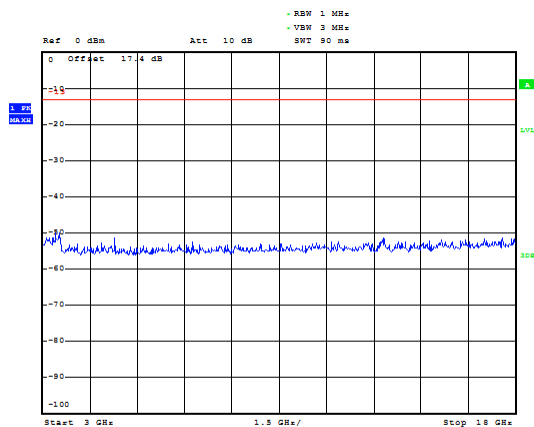
LTE Band 4 5MHz CH-High 1GHz~3GHz



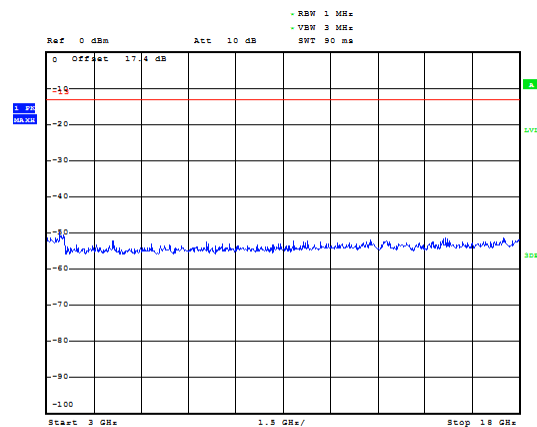
LTE Band 4 10MHz CH-Low 1GHz~3GHz



LTE Band 4 5MHz CH-High 3GHz~18GHz

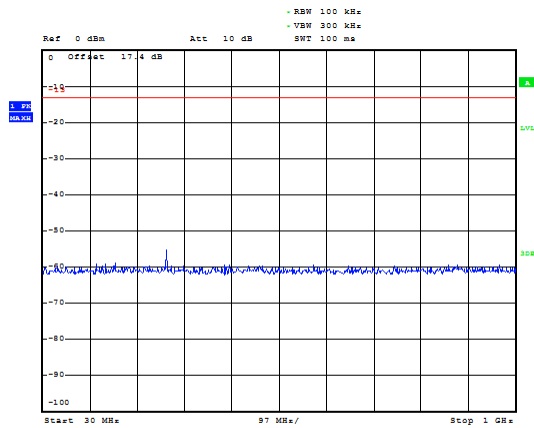


LTE Band 4 10MHz CH-Low 3GHz~18GHz

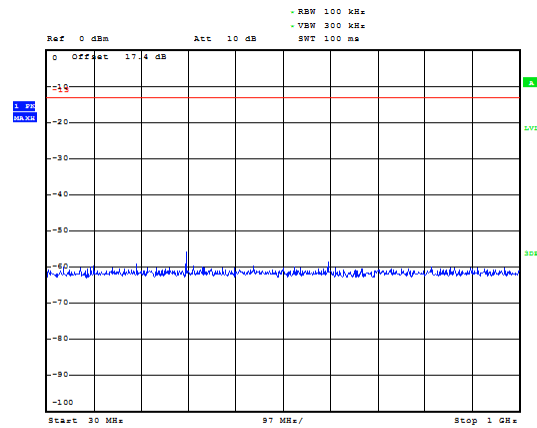




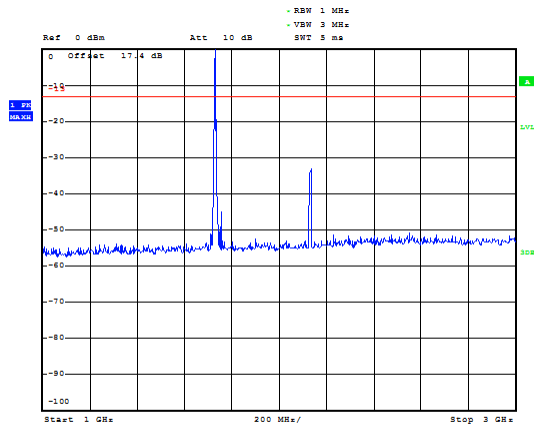
LTE Band 4 10MHz CH-Middle 30MHz~1GHz



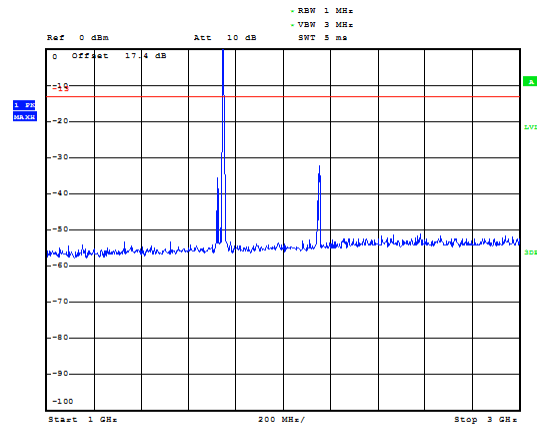
LTE Band 4 10MHz CH-High 30MHz~1GHz



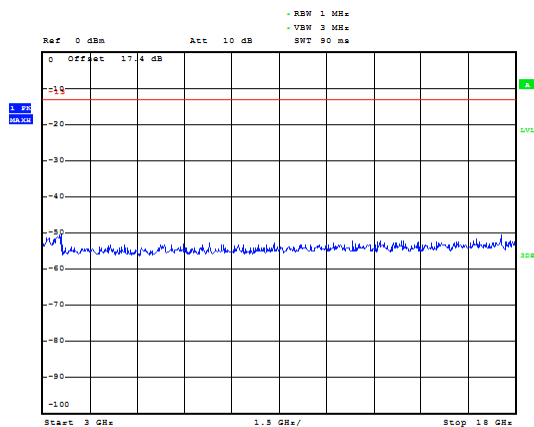
LTE Band 4 10MHz CH-Middle 1GHz~3GHz



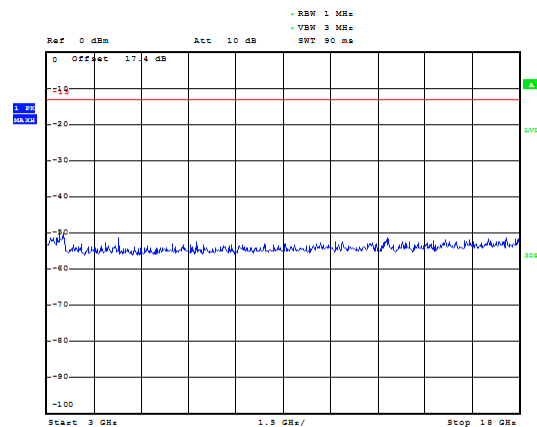
LTE Band 4 10MHz CH-High 1GHz~3GHz



LTE Band 4 10MHz CH-Middle 3GHz~18GHz

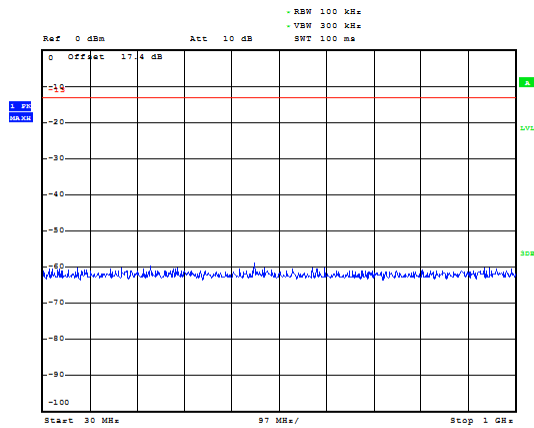


LTE Band 4 10MHz CH-High 3GHz~18GHz

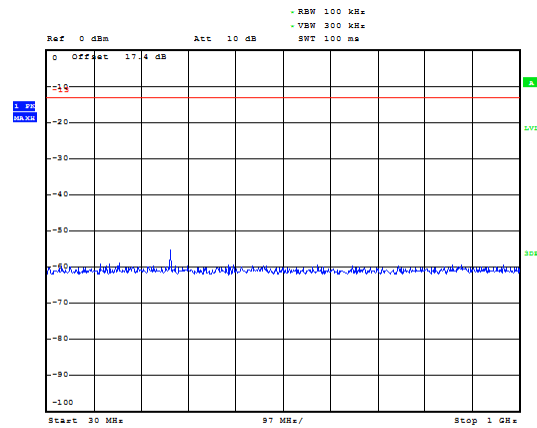




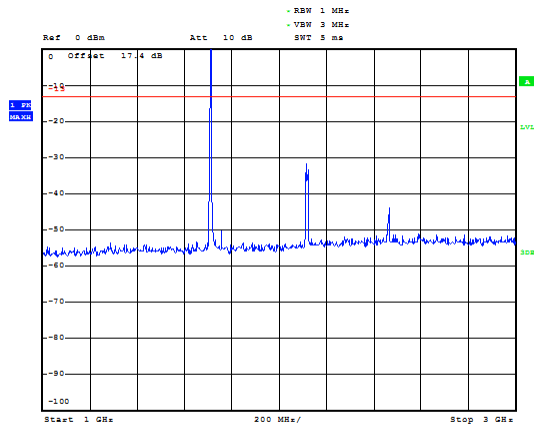
LTE Band 4 15MHz CH-Low 30MHz~1GHz



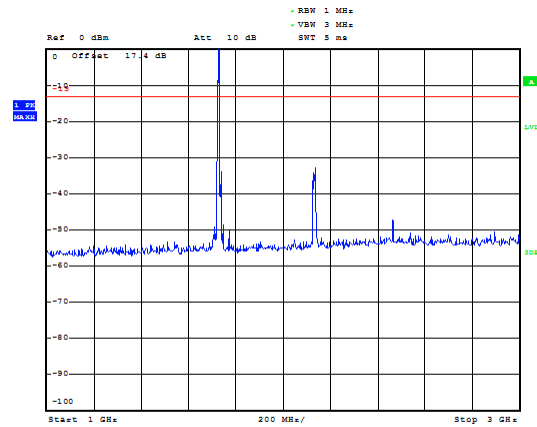
LTE Band 4 15MHz CH-Middle 30MHz~1GHz



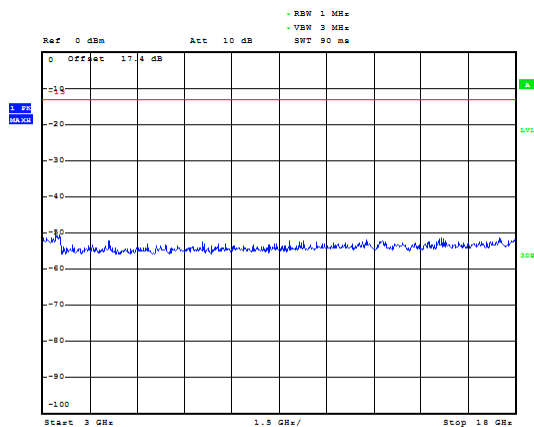
LTE Band 4 15MHz CH-Low 1GHz~3GHz



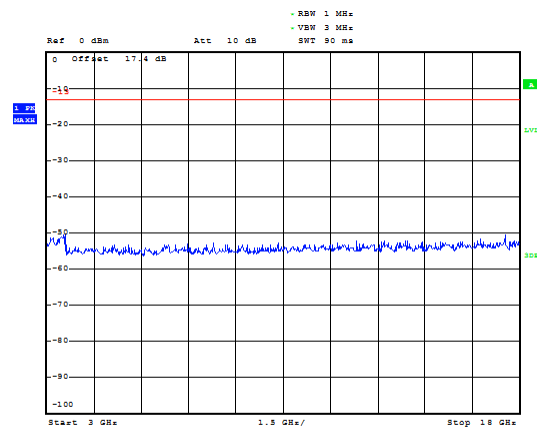
LTE Band 4 15MHz CH-Middle 1GHz~3GHz



LTE Band 4 15MHz CH-Low 3GHz~18GHz

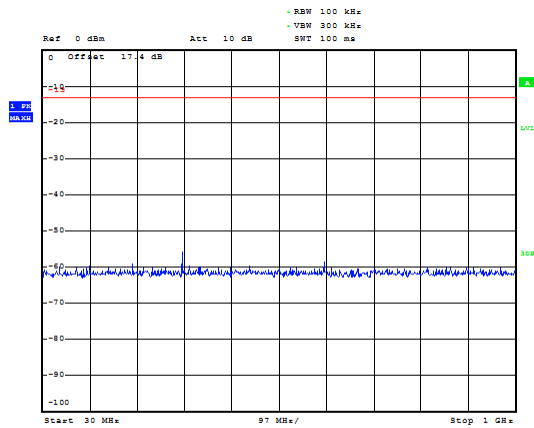


LTE Band 4 15MHz CH-Middle 3GHz~18GHz

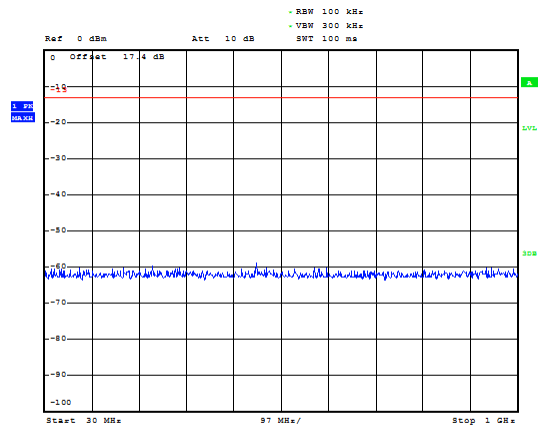




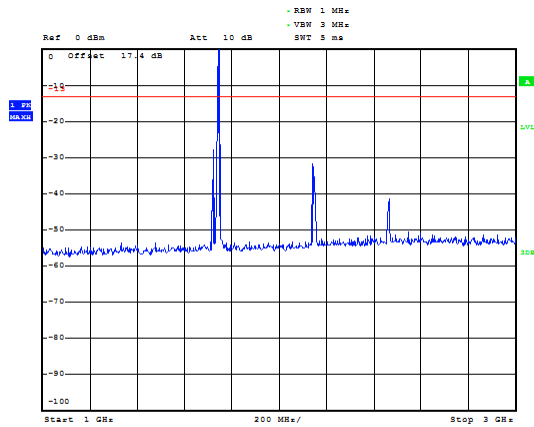
LTE Band 4 15MHz CH-High 30MHz~1GHz



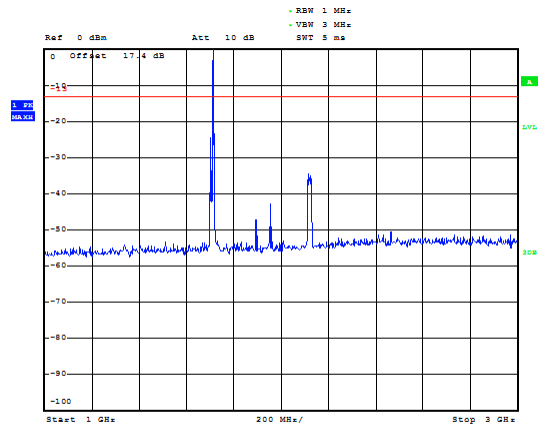
LTE Band 4 20MHz CH-Low 30MHz~1GHz



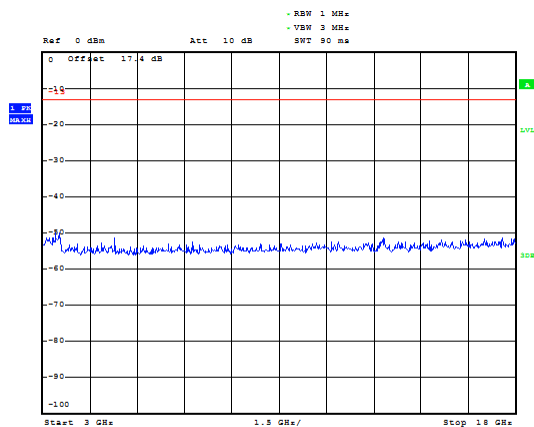
LTE Band 4 15MHz CH-High 1GHz~3GHz



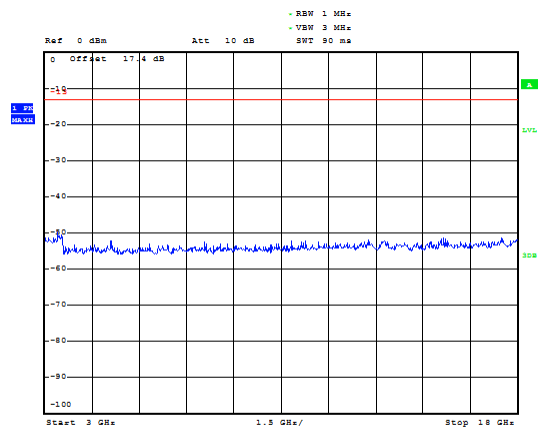
LTE Band 4 20MHz CH-Low 1GHz~3GHz



LTE Band 4 15MHz CH-High 3GHz~18GHz

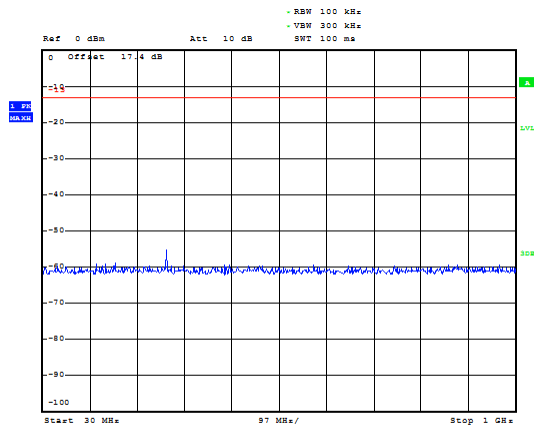


LTE Band 4 20MHz CH-Low 3GHz~18GHz

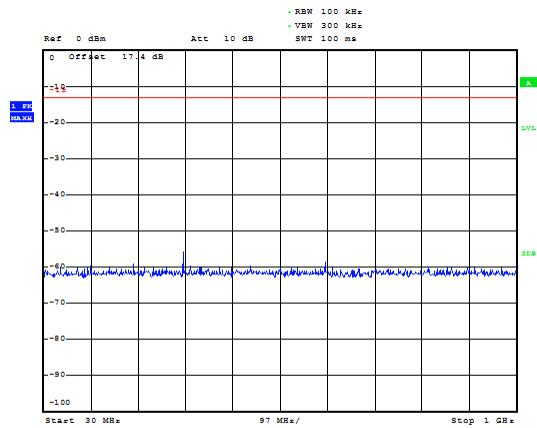




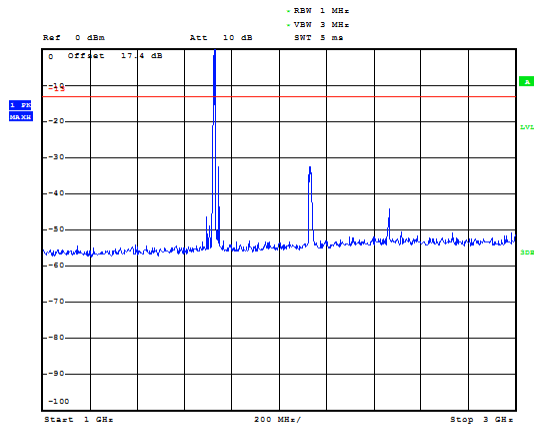
LTE Band 4 20MHz CH- Middle 30MHz~1GHz



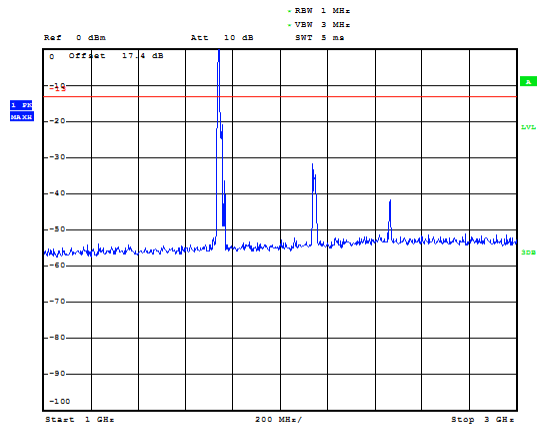
LTE Band 4 20MHz CH-High 30MHz~1GHz



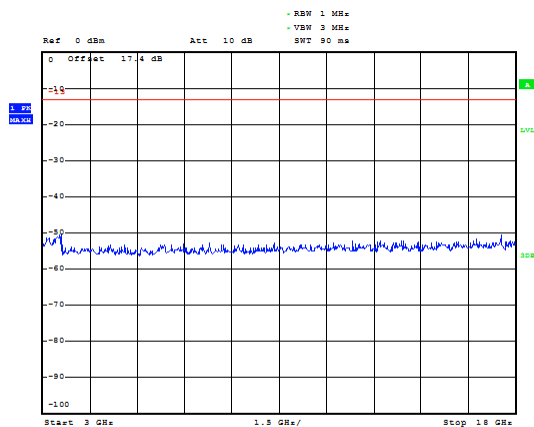
LTE Band 4 20MHz CH- Middle 1GHz~3GHz



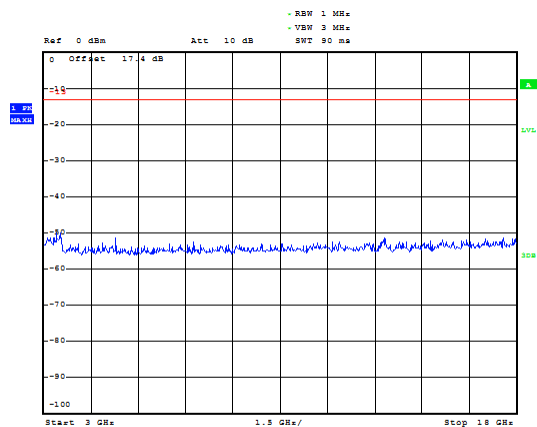
LTE Band 4 20MHz CH-High 1GHz~3GHz



LTE Band 4 20MHz CH- Middle 3GHz~18GHz

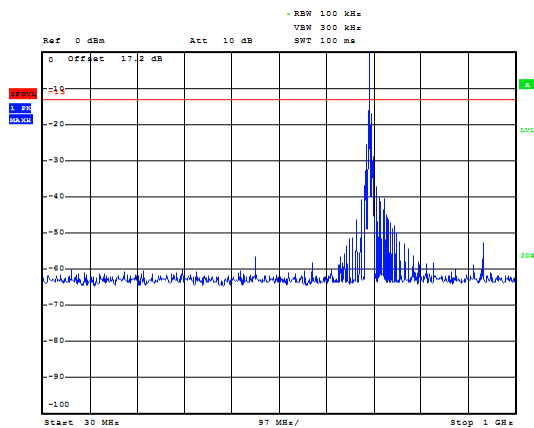


LTE Band 4 20MHz CH-High 3GHz~18GHz

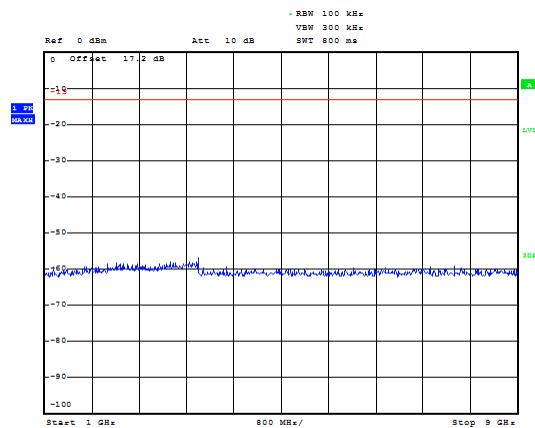




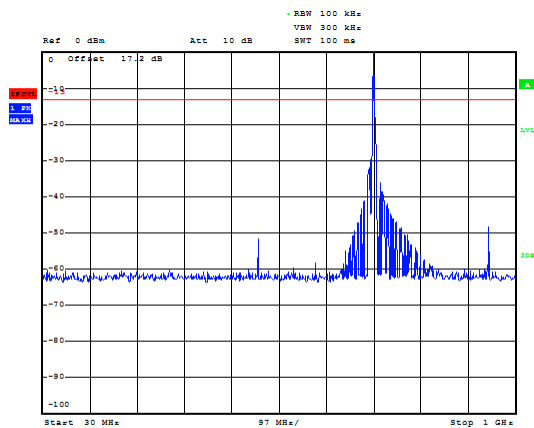
LTE Band 12 1.4MHz CH-Low 30MHz~1GHz



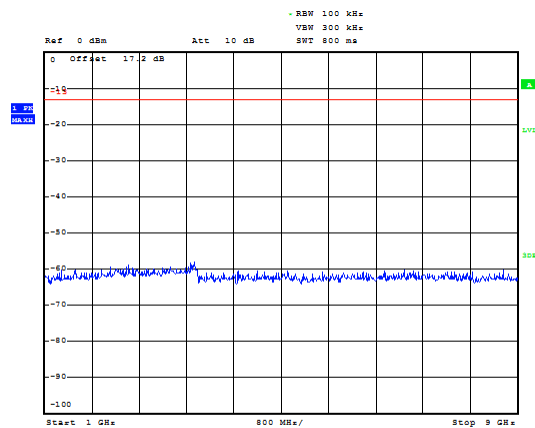
LTE Band 12 1.4MHz CH-Low 1GHz~9GHz



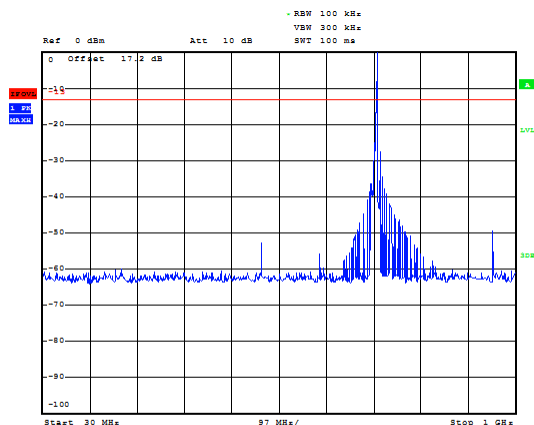
LTE Band 12 1.4MHz CH- Middle 30MHz~1GHz



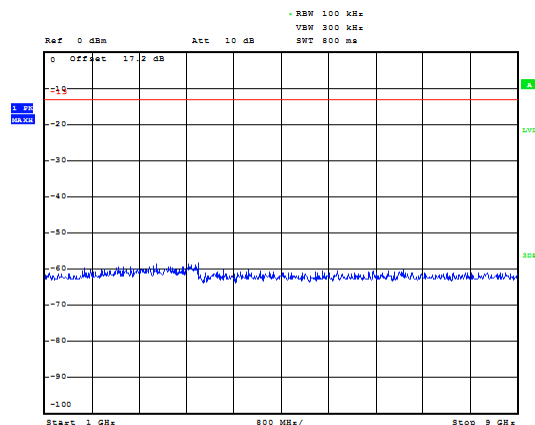
LTE Band 12 1.4MHz CH- Middle 1GHz~9GHz



LTE Band 12 1.4MHz CH-High 30MHz~1GHz

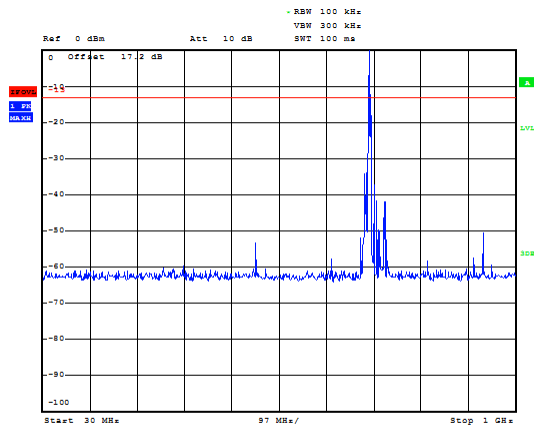


LTE Band 12 1.4MHz CH-High 1GHz~9GHz

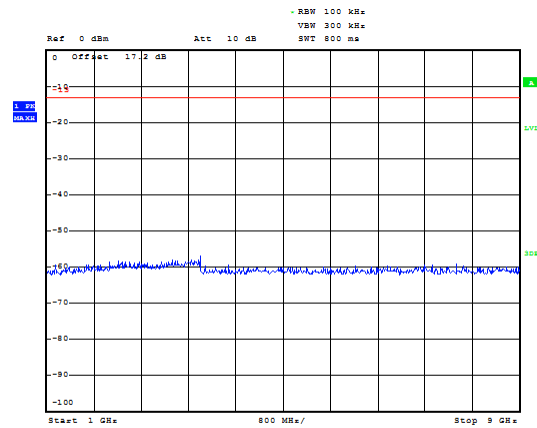




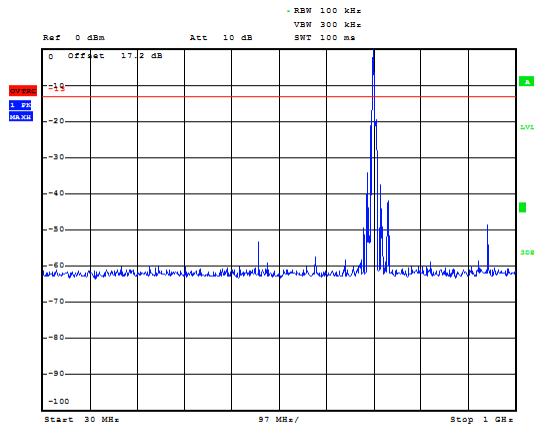
LTE Band 12 3MHz CH-Low 30MHz~1GHz



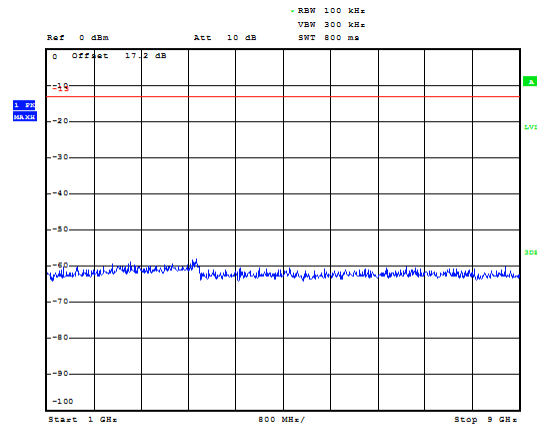
LTE Band 12 3MHz CH-Low 1GHz~9GHz



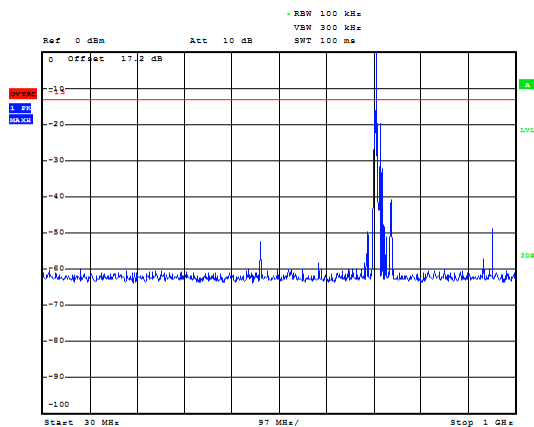
LTE Band 12 3MHz CH- Middle 30MHz~1GHz



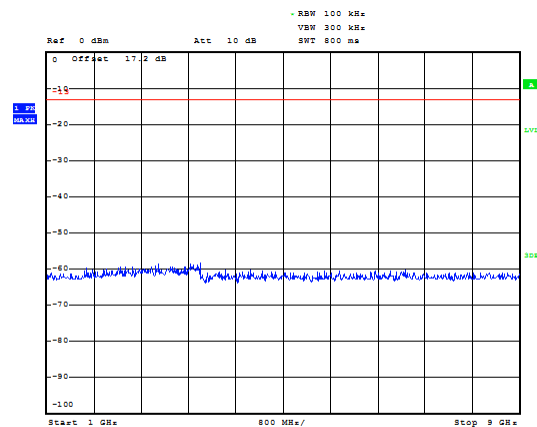
LTE Band 12 3MHz CH- Middle 1GHz~9GHz



LTE Band 12 3MHz CH-High 30MHz~1GHz

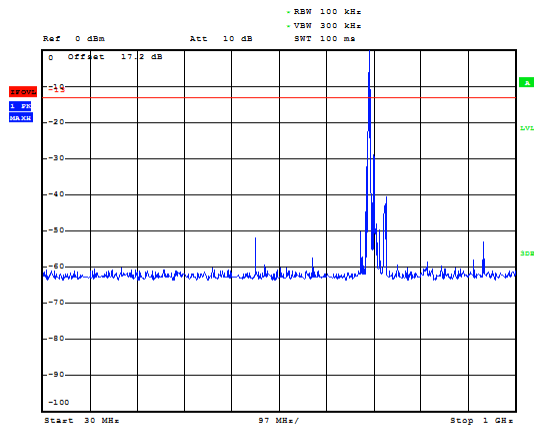


LTE Band 12 3MHz CH-High 1GHz~9GHz

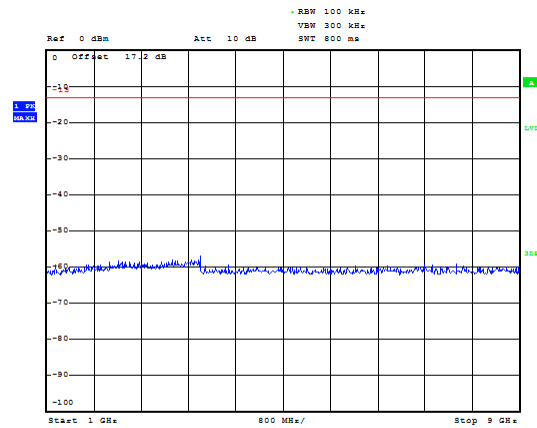




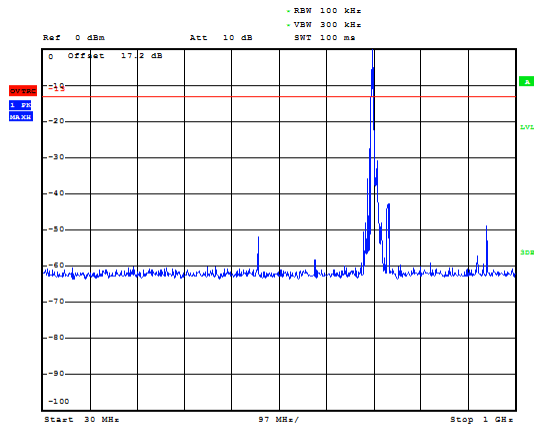
LTE Band 12 5MHz CH-Low 30MHz~1GHz



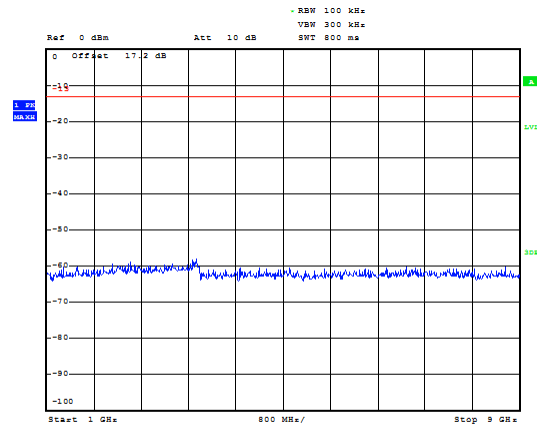
LTE Band 12 5MHz CH-Low 1GHz~9GHz



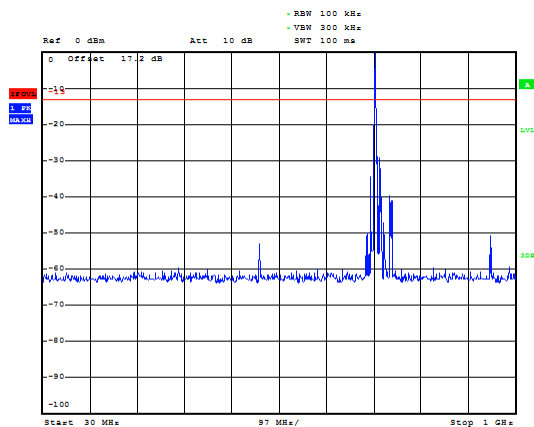
LTE Band 12 5MHz CH- Middle 30MHz~1GHz



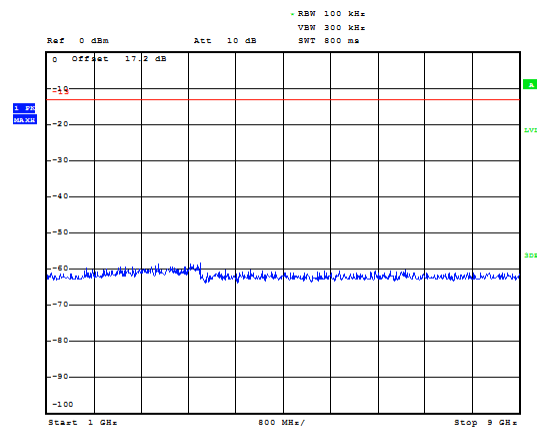
LTE Band 12 5MHz CH- Middle 1GHz~9GHz



LTE Band 12 5MHz CH-High 30MHz~1GHz

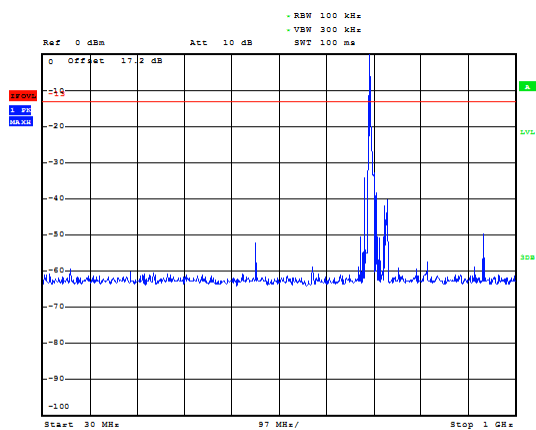


LTE Band 12 5MHz CH-High 1GHz~9GHz

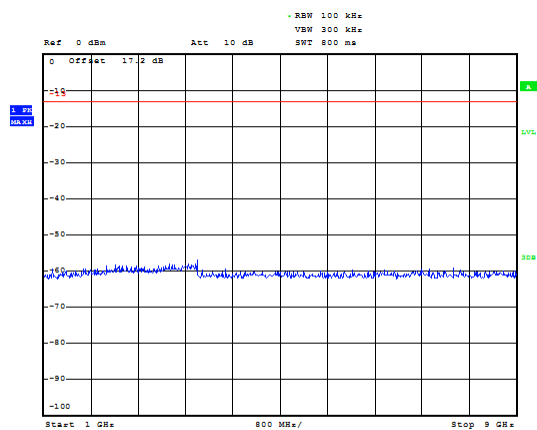




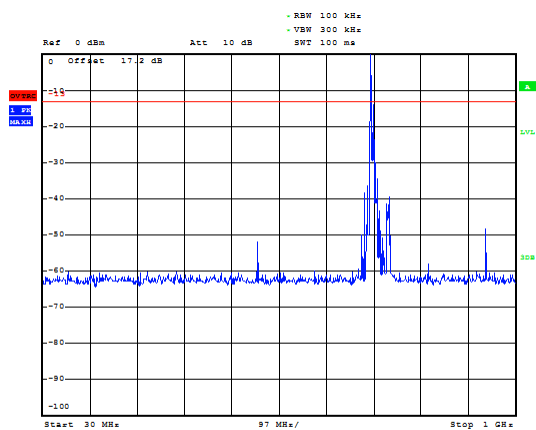
LTE Band 12 10MHz CH-Low 30MHz~1GHz



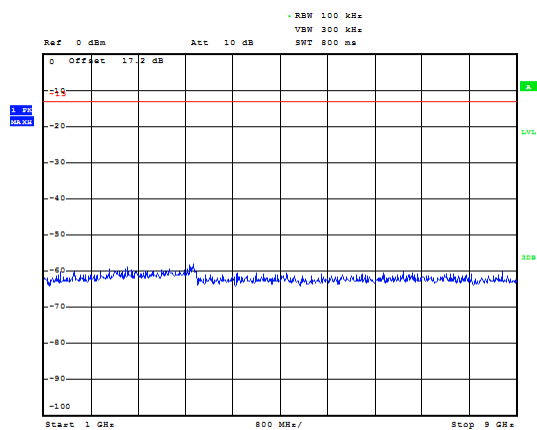
LTE Band 12 10MHz CH-Low 1GHz~9GHz



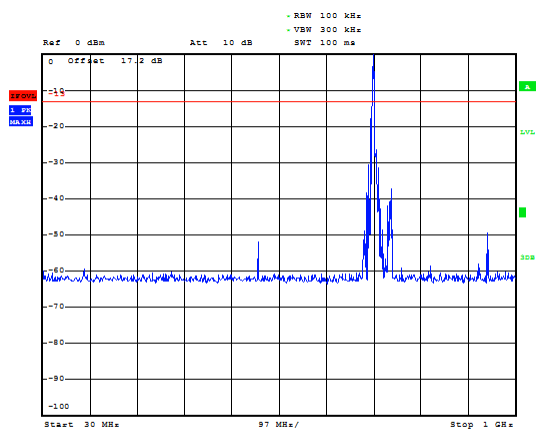
LTE Band 12 10MHz CH- Middle 30MHz~1GHz



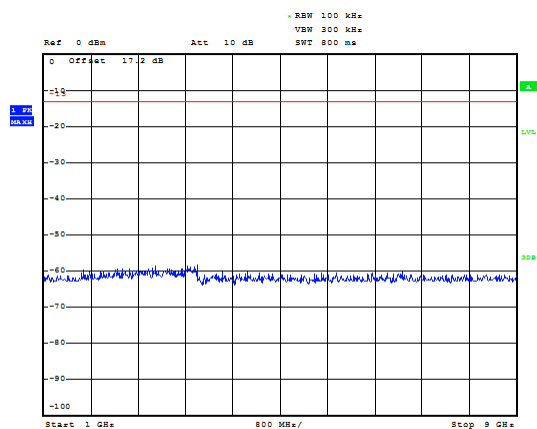
LTE Band 12 10MHz CH- Middle 1GHz~9GHz



LTE Band 12 10MHz CH-High 30MHz~1GHz



LTE Band 12 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 D01 v03 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, And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:

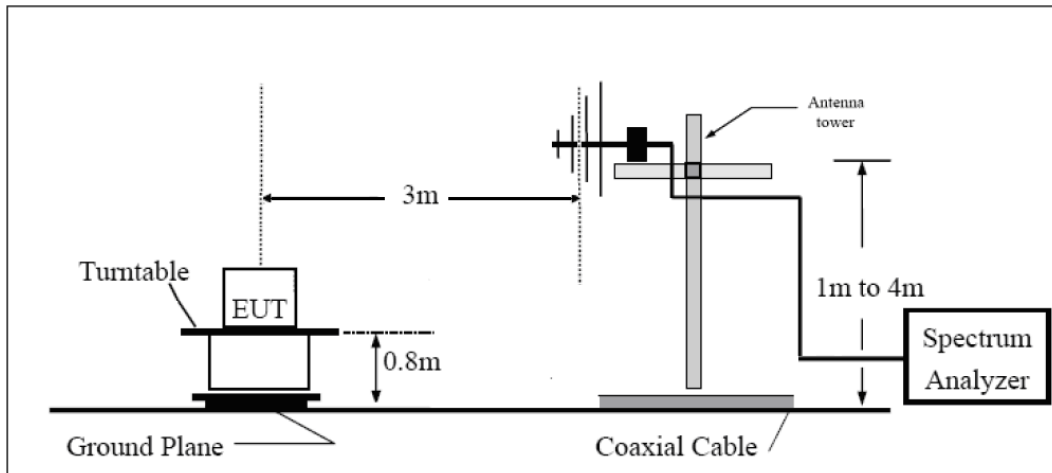
$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$
The measurement results are amend as described below:

$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$.

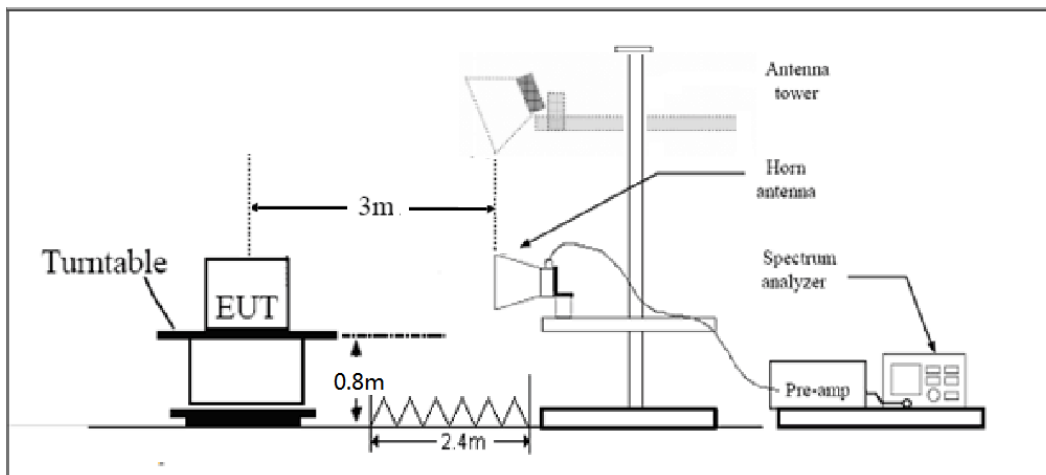
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

30MHz~~~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

Limits

Rule Part 27.53(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB..”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands



immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Part 27.53(h)/(g) Limit	-13 dBm
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Measurement Uncertainty

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

Test Result

LTE Band 4, 1.4MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3421.4	-56.45	2.6	10.15	Horizontal	-48.9	-13.0	35.9	180
3	5131.1	-54.25	2.4	11.35	Horizontal	-45.3	-13.0	32.3	225
4	6842.8	-50.15	4.5	10.85	Horizontal	-43.8	-13.0	30.8	45
5	8553.5	-47.95	5.1	11.35	Horizontal	-41.7	-13.0	28.7	180
6	10264.2	-46.45	5.3	11.95	Horizontal	-39.8	-13.0	26.8	270
7	11974.9	-46.55	5.5	13.55	Horizontal	-38.5	-13.0	25.5	135
8	13685.6	-43.85	6.3	13.75	Horizontal	-36.4	-13.0	23.4	180
9	15396.3	-45.35	6.7	13.85	Horizontal	-38.2	-13.0	25.2	225
10	17107.0	-43.85	6.8	14.25	Horizontal	-36.4	-13.0	23.4	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 4, 1.4MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3465.0	-56.15	2.6	10.75	Horizontal	-48.0	-13.0	35.0	135
3	5197.5	-54.35	2.4	11.05	Horizontal	-45.7	-13.0	32.7	180
4	6930.0	-50.45	4.5	11.15	Horizontal	-43.8	-13.0	30.8	90
5	8662.5	-47.95	5.1	11.35	Horizontal	-41.7	-13.0	28.7	45
6	10395.0	-46.25	5.3	11.95	Horizontal	-39.6	-13.0	26.6	180
7	12127.5	-45.25	5.5	13.55	Horizontal	-37.2	-13.0	24.2	270
8	13860.0	-43.65	6.3	13.75	Horizontal	-36.2	-13.0	23.2	45
9	15592.5	-45.25	6.7	13.85	Horizontal	-38.1	-13.0	25.1	180
10	17325.0	-41.85	6.8	14.25	Horizontal	-34.4	-13.0	21.4	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 4, 1.4MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3508.6	-56.85	2.6	10.15	Horizontal	-49.3	-13.0	36.3	225
3	5262.9	-55.55	2.4	11.05	Horizontal	-46.9	-13.0	33.9	45
4	7017.2	-50.75	4.5	11.15	Horizontal	-44.1	-13.0	31.1	90
5	8771.5	-46.55	5.1	11.35	Horizontal	-40.3	-13.0	27.3	180
6	10525.8	-45.55	5.3	11.95	Horizontal	-38.9	-13.0	25.9	180
7	12280.1	-46.85	5.5	13.55	Horizontal	-38.8	-13.0	25.8	270
8	14034.4	-42.95	6.3	13.75	Horizontal	-35.5	-13.0	22.5	135
9	15788.7	-44.15	6.7	13.85	Horizontal	-37.0	-13.0	24.0	180
10	17543.0	-43.45	6.8	14.25	Horizontal	-36.0	-13.0	23.0	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 4, 3MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3423.0	-52.95	2.6	10.15	Horizontal	-45.4	-13.0	32.4	225
3	5134.5	-52.45	2.4	11.35	Horizontal	-43.5	-13.0	30.5	45
4	6846.0	-51.35	4.5	10.85	Horizontal	-45.0	-13.0	32.0	180
5	8557.5	-45.85	5.1	11.35	Horizontal	-39.6	-13.0	26.6	270
6	10269.0	-45.15	5.3	11.95	Horizontal	-38.5	-13.0	25.5	135
7	11980.5	-48.55	5.5	13.55	Horizontal	-40.5	-13.0	27.5	180
8	13692.0	-46.85	6.3	13.75	Horizontal	-39.4	-13.0	26.4	225
9	15403.5	-46.15	6.7	13.85	Horizontal	-39.0	-13.0	26.0	90
10	17115.0	-44.45	6.8	14.25	Horizontal	-37.0	-13.0	24.0	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 4, 3MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3465.0	-57.35	2.6	10.75	Horizontal	-49.2	-13.0	36.2	45
3	5197.5	-55.85	2.4	11.05	Horizontal	-47.2	-13.0	34.2	180
4	6930.0	-52.25	4.5	11.15	Horizontal	-45.6	-13.0	32.6	270
5	8662.5	-46.15	5.1	11.35	Horizontal	-39.9	-13.0	26.9	135
6	10395.0	-44.45	5.3	11.95	Horizontal	-37.8	-13.0	24.8	180
7	12127.5	-49.35	5.5	13.55	Horizontal	-41.3	-13.0	28.3	225
8	13860.0	-45.65	6.3	13.75	Horizontal	-38.2	-13.0	25.2	45
9	15592.5	-46.05	6.7	13.85	Horizontal	-38.9	-13.0	25.9	90
10	17325.0	-44.45	6.8	14.25	Horizontal	-37.0	-13.0	24.0	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 4, 3MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3507.0	-55.35	2.6	10.15	Horizontal	-47.8	-13.0	34.8	45
3	5260.5	-57.75	2.4	11.05	Horizontal	-49.1	-13.0	36.1	180
4	7014.0	-51.75	4.5	11.15	Horizontal	-45.1	-13.0	32.1	225
5	8767.5	-46.55	5.1	11.35	Horizontal	-40.3	-13.0	27.3	45
6	10521.0	-44.25	5.3	11.95	Horizontal	-37.6	-13.0	24.6	90
7	12274.5	-49.85	5.5	13.55	Horizontal	-41.8	-13.0	28.8	180
8	14028.0	-46.25	6.3	13.75	Horizontal	-38.8	-13.0	25.8	270
9	15781.5	-45.35	6.7	13.85	Horizontal	-38.2	-13.0	25.2	180
10	17535.0	-45.15	6.8	14.25	Horizontal	-37.7	-13.0	24.7	270

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 4, 5MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3425.0	-56.35	2.6	10.15	Horizontal	-48.8	-13.0	35.8	270
3	5137.5	-54.55	2.4	11.35	Horizontal	-45.6	-13.0	32.6	135
4	6850.0	-50.15	4.5	10.85	Horizontal	-43.8	-13.0	30.8	90
5	8562.5	-45.95	5.1	11.35	Horizontal	-39.7	-13.0	26.7	135
6	10275.0	-43.65	5.3	11.95	Horizontal	-37.0	-13.0	24.0	180
7	11987.5	-45.25	5.5	13.55	Horizontal	-37.2	-13.0	24.2	270
8	13700.0	-42.25	6.3	13.75	Horizontal	-34.8	-13.0	21.8	180
9	15412.5	-46.15	6.7	13.85	Horizontal	-39.0	-13.0	26.0	225
10	17125.0	-42.25	6.8	14.25	Horizontal	-34.8	-13.0	21.8	270
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 4, 5MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3465.0	-57.35	2.6	10.75	Horizontal	-49.2	-13.0	36.2	45
3	5197.5	-53.05	2.4	11.05	Horizontal	-44.4	-13.0	31.4	45
4	6930.0	-50.25	4.5	11.15	Horizontal	-43.6	-13.0	30.6	45
5	8662.5	-45.05	5.1	11.35	Horizontal	-38.8	-13.0	25.8	315
6	10395.0	-45.65	5.3	11.95	Horizontal	-39.0	-13.0	26.0	315
7	12127.5	-46.25	5.5	13.55	Horizontal	-38.2	-13.0	25.2	180
8	13860.0	-42.45	6.3	13.75	Horizontal	-35.0	-13.0	22.0	225
9	15592.5	-45.95	6.7	13.85	Horizontal	-38.8	-13.0	25.8	135
10	17325.0	-42.75	6.8	14.25	Horizontal	-35.3	-13.0	22.3	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 4, 5MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3505.0	-56.45	2.6	10.15	Horizontal	-48.9	-13.0	35.9	90
3	5257.5	-56.35	2.4	11.05	Horizontal	-47.7	-13.0	34.7	45
4	7010.0	-50.35	4.5	11.15	Horizontal	-43.7	-13.0	30.7	225
5	8762.5	-47.05	5.1	11.35	Horizontal	-40.8	-13.0	27.8	0
6	10515.0	-44.35	5.3	11.95	Horizontal	-37.7	-13.0	24.7	180
7	12267.5	-45.75	5.5	13.55	Horizontal	-37.7	-13.0	24.7	180
8	14020.0	-42.45	6.3	13.75	Horizontal	-35.0	-13.0	22.0	315
9	15772.5	-45.05	6.7	13.85	Horizontal	-37.9	-13.0	24.9	0
10	17525.0	-42.45	6.8	14.25	Horizontal	-35.0	-13.0	22.0	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 4, 10MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3430.0	-54.55	2.6	10.15	Horizontal	-47.0	-13.0	34.0	225
3	5145.0	-50.05	2.4	11.35	Horizontal	-41.1	-13.0	28.1	90
4	6860.0	-48.85	4.5	10.85	Horizontal	-42.5	-13.0	29.5	315
5	8575.0	-46.85	5.1	11.35	Horizontal	-40.6	-13.0	27.6	270
6	10290.0	-44.35	5.3	11.95	Horizontal	-37.7	-13.0	24.7	315
7	12005.0	-45.55	5.5	13.55	Horizontal	-37.5	-13.0	24.5	180
8	13720.0	-41.45	6.3	13.75	Horizontal	-34.0	-13.0	21.0	225
9	15435.0	-46.55	6.7	13.85	Horizontal	-39.4	-13.0	26.4	225
10	17150.0	-42.85	6.8	14.25	Horizontal	-35.4	-13.0	22.4	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 4,10MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3465.0	-55.15	2.6	10.75	Horizontal	-47.0	-13.0	34.0	135
3	5197.5	-54.95	2.4	11.05	Horizontal	-46.3	-13.0	33.3	315
4	6930.0	-49.55	4.5	11.15	Horizontal	-42.9	-13.0	29.9	180
5	8662.5	-47.65	5.1	11.35	Horizontal	-41.4	-13.0	28.4	0
6	10395.0	-43.65	5.3	11.95	Horizontal	-37.0	-13.0	24.0	90
7	12127.5	-44.95	5.5	13.55	Horizontal	-36.9	-13.0	23.9	180
8	13860.0	-42.35	6.3	13.75	Horizontal	-34.9	-13.0	21.9	90
9	15592.5	-45.15	6.7	13.85	Horizontal	-38.0	-13.0	25.0	135
10	17325.0	-42.25	6.8	14.25	Horizontal	-34.8	-13.0	21.8	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 4,10MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3500.0	-57.15	2.6	10.15	Horizontal	-49.6	-13.0	36.6	135
3	5250.0	-55.15	2.4	11.05	Horizontal	-46.5	-13.0	33.5	180
4	7000.0	-49.55	4.5	11.15	Horizontal	-42.9	-13.0	29.9	180
5	8750.0	-46.75	5.1	11.35	Horizontal	-40.5	-13.0	27.5	315
6	10500.0	-43.45	5.3	11.95	Horizontal	-36.8	-13.0	23.8	180
7	12250.0	-45.05	5.5	13.55	Horizontal	-37.0	-13.0	24.0	315
8	14000.0	-42.15	6.3	13.75	Horizontal	-34.7	-13.0	21.7	270
9	15750.0	-46.05	6.7	13.85	Horizontal	-38.9	-13.0	25.9	315
10	17500.0	-42.75	6.8	14.25	Horizontal	-35.3	-13.0	22.3	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 4,15MHz CH Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3435.0	-54.35	2.6	10.15	Horizontal	-46.8	-13.0	33.8	45
3	5152.5	-54.95	2.4	11.35	Horizontal	-46.0	-13.0	33.0	90
4	6870.0	-48.85	4.5	10.85	Horizontal	-42.5	-13.0	29.5	45
5	8587.5	-47.65	5.1	11.35	Horizontal	-41.4	-13.0	28.4	270
6	10305.0	-44.15	5.3	11.95	Horizontal	-37.5	-13.0	24.5	270
7	12022.5	-44.55	5.5	13.55	Horizontal	-36.5	-13.0	23.5	0
8	13740.0	-41.25	6.3	13.75	Horizontal	-33.8	-13.0	20.8	315
9	15457.5	-46.05	6.7	13.85	Horizontal	-38.9	-13.0	25.9	90
10	17175.0	-43.55	6.8	14.25	Horizontal	-36.1	-13.0	23.1	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 4, 15MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3465.0	-57.75	2.6	10.75	Horizontal	-49.6	-13.0	36.6	225
3	5197.5	-55.15	2.4	11.05	Horizontal	-46.5	-13.0	33.5	45
4	6930.0	-50.05	4.5	11.15	Horizontal	-43.4	-13.0	30.4	90
5	8662.5	-47.15	5.1	11.35	Horizontal	-40.9	-13.0	27.9	135
6	10395.0	-43.25	5.3	11.95	Horizontal	-36.6	-13.0	23.6	180
7	12127.5	-44.45	5.5	13.55	Horizontal	-36.4	-13.0	23.4	90
8	13860.0	-42.95	6.3	13.75	Horizontal	-35.5	-13.0	22.5	270
9	15592.5	-45.35	6.7	13.85	Horizontal	-38.2	-13.0	25.2	225
10	17325.0	-41.95	6.8	14.25	Horizontal	-34.5	-13.0	21.5	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 4, 15MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3495.0	-56.45	2.6	10.15	Horizontal	-48.9	-13.0	35.9	45
3	5242.5	-55.15	2.4	11.05	Horizontal	-46.5	-13.0	33.5	180
4	6990.0	-49.95	4.5	11.15	Horizontal	-43.3	-13.0	30.3	225
5	8737.5	-46.15	5.1	11.35	Horizontal	-39.9	-13.0	26.9	270
6	10485.0	-43.65	5.3	11.95	Horizontal	-37.0	-13.0	24.0	315
7	12232.5	-45.75	5.5	13.55	Horizontal	-37.7	-13.0	24.7	180
8	13980.0	-42.75	6.3	13.75	Horizontal	-35.3	-13.0	22.3	270
9	15727.5	-46.75	6.7	13.85	Horizontal	-39.6	-13.0	26.6	90
10	17475.0	-42.95	6.8	14.25	Horizontal	-35.5	-13.0	22.5	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 4, 20MHz CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3440.0	-56.95	2.6	10.15	Horizontal	-49.4	-13.0	36.4	90
3	5160.0	-55.25	2.4	11.35	Horizontal	-46.3	-13.0	33.3	270
4	6880.0	-48.95	4.5	10.85	Horizontal	-42.6	-13.0	29.6	0
5	8600.0	-46.55	5.1	11.35	Horizontal	-40.3	-13.0	27.3	135
6	10320.0	-43.65	5.3	11.95	Horizontal	-37.0	-13.0	24.0	180
7	12040.0	-44.45	5.5	13.55	Horizontal	-36.4	-13.0	23.4	0
8	13760.0	-41.75	6.3	13.75	Horizontal	-34.3	-13.0	21.3	90
9	15480.0	-45.35	6.7	13.85	Horizontal	-38.2	-13.0	25.2	270
10	17200.0	-43.05	6.8	14.25	Horizontal	-35.6	-13.0	22.6	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 4, 20MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3465.0	-56.85	2.6	10.75	Horizontal	-48.7	-13.0	35.7	135
3	5197.5	-55.25	2.4	11.05	Horizontal	-46.6	-13.0	33.6	180
4	6930.0	-50.35	4.5	11.15	Horizontal	-43.7	-13.0	30.7	270
5	8662.5	-46.25	5.1	11.35	Horizontal	-40.0	-13.0	27.0	90
6	10395.0	-43.45	5.3	11.95	Horizontal	-36.8	-13.0	23.8	90
7	12127.5	-44.55	5.5	13.55	Horizontal	-36.5	-13.0	23.5	315
8	13860.0	-42.25	6.3	13.75	Horizontal	-34.8	-13.0	21.8	0
9	15592.5	-45.45	6.7	13.85	Horizontal	-38.3	-13.0	25.3	90
10	17325.0	-41.95	6.8	14.25	Horizontal	-34.5	-13.0	21.5	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 4, 20MHz CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3490.0	-58.15	2.6	10.15	Horizontal	-50.6	-13.0	37.6	135
3	5235.0	-55.85	2.4	11.05	Horizontal	-47.2	-13.0	34.2	315
4	6980.0	-49.75	4.5	11.15	Horizontal	-43.1	-13.0	30.1	0
5	8725.0	-47.45	5.1	11.35	Horizontal	-41.2	-13.0	28.2	0
6	10470.0	-43.95	5.3	11.95	Horizontal	-37.3	-13.0	24.3	135
7	12215.0	-45.45	5.5	13.55	Horizontal	-37.4	-13.0	24.4	315
8	13960.0	-41.55	6.3	13.75	Horizontal	-34.1	-13.0	21.1	0
9	15705.0	-46.45	6.7	13.85	Horizontal	-39.3	-13.0	26.3	0
10	17450.0	-42.85	6.8	14.25	Horizontal	-35.4	-13.0	22.4	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 12, 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	1399.40	-42.00	2.00	10.15	Horizontal	-36.0	-13.0	23.0	270
3	2099.10	-59.00	2.50	11.35	Horizontal	-52.3	-13.0	39.3	45
4	2798.80	-55.20	4.20	10.85	Horizontal	-50.7	-13.0	37.7	45
5	3498.50	-52.90	5.20	11.35	Horizontal	-48.9	-13.0	35.9	45
6	4198.20	-52.30	5.50	11.95	Horizontal	-48.0	-13.0	35.0	180
7	4897.90	-52.50	5.70	13.55	Horizontal	-46.8	-13.0	33.8	270
8	5597.60	-50.80	6.30	13.75	Horizontal	-45.5	-13.0	32.5	0
9	6297.30	-48.20	6.80	13.85	Horizontal	-43.3	-13.0	30.3	45
10	6997.00	-45.80	6.90	14.25	Horizontal	-40.6	-13.0	27.6	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 12, 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	1415.00	-46.20	2.00	10.75	Horizontal	-39.6	-13.0	26.6	180
3	2122.50	-58.09	2.51	11.05	Horizontal	-51.7	-13.0	38.7	135
4	2830.00	-56.50	4.20	11.15	Horizontal	-51.7	-13.0	38.7	225
5	3537.50	-52.70	5.20	11.15	Horizontal	-48.9	-13.0	35.9	270
6	4245.00	-51.20	5.50	11.95	Horizontal	-46.9	-13.0	33.9	315
7	4952.50	-52.70	5.70	13.55	Horizontal	-47.0	-13.0	34.0	180
8	5660.00	-52.10	6.30	13.75	Horizontal	-46.8	-13.0	33.8	45
9	6367.50	-47.90	6.80	13.85	Horizontal	-43.0	-13.0	30.0	135
10	7075.00	-44.80	6.90	14.25	Horizontal	-39.6	-13.0	26.6	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 12, 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	1430.60	-44.50	2.00	10.15	Horizontal	-38.5	-13.0	25.5	90
3	2145.90	-58.09	2.51	11.05	Horizontal	-51.7	-13.0	38.7	270
4	2861.20	-56.40	4.20	11.15	Horizontal	-51.6	-13.0	38.6	270
5	3576.50	-53.10	5.20	11.15	Horizontal	-49.3	-13.0	36.3	270
6	4291.80	-51.60	5.50	11.95	Horizontal	-47.3	-13.0	34.3	180
7	5007.10	-53.30	5.70	13.55	Horizontal	-47.6	-13.0	34.6	90
8	5722.40	-52.20	6.30	13.75	Horizontal	-46.9	-13.0	33.9	90
9	6437.70	-47.20	6.80	13.85	Horizontal	-42.3	-13.0	29.3	225
10	7153.00	-45.00	6.90	14.25	Horizontal	-39.8	-13.0	26.8	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 12, 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	1401.00	-42.90	2.00	10.15	Horizontal	-36.9	-13.0	23.9	315
3	2101.50	-58.69	2.51	11.35	Horizontal	-52.0	-13.0	39.0	225
4	2802.00	-56.10	4.20	10.85	Horizontal	-51.6	-13.0	38.6	90
5	3502.50	-52.50	5.20	11.35	Horizontal	-48.5	-13.0	35.5	135
6	4203.00	-50.80	5.50	11.95	Horizontal	-46.5	-13.0	33.5	45
7	4903.50	-52.50	5.70	13.55	Horizontal	-46.8	-13.0	33.8	45
8	5604.00	-51.20	6.30	13.75	Horizontal	-45.9	-13.0	32.9	0
9	6304.50	-47.60	6.80	13.85	Horizontal	-42.7	-13.0	29.7	90
10	7005.00	-44.60	6.90	14.25	Horizontal	-39.4	-13.0	26.4	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 12, 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	1415.00	-45.70	2.00	10.75	Horizontal	-39.1	-13.0	26.1	225
3	2122.50	-58.19	2.51	11.05	Horizontal	-51.8	-13.0	38.8	180
4	2830.00	-56.70	4.20	11.15	Horizontal	-51.9	-13.0	38.9	135
5	3537.50	-53.70	5.20	11.15	Horizontal	-49.9	-13.0	36.9	315
6	4245.00	-51.30	5.50	11.95	Horizontal	-47.0	-13.0	34.0	0
7	4952.50	-52.00	5.70	13.55	Horizontal	-46.3	-13.0	33.3	270
8	5660.00	-50.40	6.30	13.75	Horizontal	-45.1	-13.0	32.1	0
9	6367.50	-47.60	6.80	13.85	Horizontal	-42.7	-13.0	29.7	0
10	7075.00	-44.10	6.90	14.25	Horizontal	-38.9	-13.0	25.9	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 12, 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	1429.00	-44.20	2.00	10.15	Horizontal	-38.2	-13.0	25.2	225
3	2143.50	-56.59	2.51	11.05	Horizontal	-50.2	-13.0	37.2	90
4	2858.00	-55.70	4.20	11.15	Horizontal	-50.9	-13.0	37.9	225
5	3572.50	-53.10	5.20	11.15	Horizontal	-49.3	-13.0	36.3	135
6	4287.00	-52.30	5.50	11.95	Horizontal	-48.0	-13.0	35.0	315
7	5001.50	-53.50	5.70	13.55	Horizontal	-47.8	-13.0	34.8	315
8	5716.00	-50.90	6.30	13.75	Horizontal	-45.6	-13.0	32.6	135
9	6430.50	-47.10	6.80	13.85	Horizontal	-42.2	-13.0	29.2	135
10	7145.00	-44.10	6.90	14.25	Horizontal	-38.9	-13.0	25.9	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 12, 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	1403.00	-41.80	2.00	10.15	Horizontal	-35.8	-13.0	22.8	45
3	2104.50	-58.40	2.50	11.35	Horizontal	-51.7	-13.0	38.7	45
4	2806.00	-55.40	4.20	10.85	Horizontal	-50.9	-13.0	37.9	45
5	3507.50	-53.70	5.20	11.35	Horizontal	-49.7	-13.0	36.7	270
6	4209.00	-50.60	5.50	11.95	Horizontal	-46.3	-13.0	33.3	315
7	4910.50	-51.60	5.70	13.55	Horizontal	-45.9	-13.0	32.9	135
8	5612.00	-50.50	6.30	13.75	Horizontal	-45.2	-13.0	32.2	270
9	6313.50	-48.30	6.80	13.85	Horizontal	-43.4	-13.0	30.4	225
10	7015.00	-45.70	6.90	14.25	Horizontal	-40.5	-13.0	27.5	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 12, 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	1415.00	-45.50	2.00	10.75	Horizontal	-38.9	-13.0	25.9	270
3	2122.50	-59.09	2.51	11.05	Horizontal	-52.7	-13.0	39.7	135
4	2830.00	-55.70	4.20	11.15	Horizontal	-50.9	-13.0	37.9	90
5	3537.50	-52.90	5.20	11.15	Horizontal	-49.1	-13.0	36.1	270
6	4245.00	-51.40	5.50	11.95	Horizontal	-47.1	-13.0	34.1	180
7	4952.50	-52.60	5.70	13.55	Horizontal	-46.9	-13.0	33.9	225
8	5660.00	-51.40	6.30	13.75	Horizontal	-46.1	-13.0	33.1	135
9	6367.50	-47.60	6.80	13.85	Horizontal	-42.7	-13.0	29.7	180
10	7075.00	-45.10	6.90	14.25	Horizontal	-39.9	-13.0	26.9	270
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 12, 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	1427.00	-43.90	2.00	10.15	Horizontal	-37.9	-13.0	24.9	315
3	2140.50	-58.19	2.51	11.05	Horizontal	-51.8	-13.0	38.8	315
4	2854.00	-55.70	4.20	11.15	Horizontal	-50.9	-13.0	37.9	180
5	3567.50	-53.40	5.20	11.15	Horizontal	-49.6	-13.0	36.6	0
6	4281.00	-51.50	5.50	11.95	Horizontal	-47.2	-13.0	34.2	45
7	4994.50	-51.90	5.70	13.55	Horizontal	-46.2	-13.0	33.2	180
8	5708.00	-52.20	6.30	13.75	Horizontal	-46.9	-13.0	33.9	270
9	6421.50	-46.70	6.80	13.85	Horizontal	-41.8	-13.0	28.8	45
10	7135.00	-45.90	6.90	14.25	Horizontal	-40.7	-13.0	27.7	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 12, 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	1408.00	-41.20	2.00	10.15	Horizontal	-35.2	-13.0	22.2	270
3	2112.00	-58.39	2.51	11.35	Horizontal	-51.7	-13.0	38.7	45
4	2816.00	-56.20	4.20	10.85	Horizontal	-51.7	-13.0	38.7	225
5	3520.00	-53.90	5.20	11.35	Horizontal	-49.9	-13.0	36.9	0
6	4224.00	-51.80	5.50	11.95	Horizontal	-47.5	-13.0	34.5	0
7	4928.00	-52.60	5.70	13.55	Horizontal	-46.9	-13.0	33.9	270
8	5632.00	-52.20	6.30	13.75	Horizontal	-46.9	-13.0	33.9	225
9	6336.00	-48.60	6.80	13.85	Horizontal	-43.7	-13.0	30.7	225
10	7040.00	-44.70	6.90	14.25	Horizontal	-39.5	-13.0	26.5	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 12, 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	1415.00	-42.60	2.00	10.75	Horizontal	-36.0	-13.0	23.0	315
3	2122.50	-58.09	2.51	11.05	Horizontal	-51.7	-13.0	38.7	180
4	2830.00	-56.30	4.20	11.15	Horizontal	-51.5	-13.0	38.5	270
5	3537.50	-53.80	5.20	11.15	Horizontal	-50.0	-13.0	37.0	180
6	4245.00	-51.10	5.50	11.95	Horizontal	-46.8	-13.0	33.8	45
7	4952.50	-52.60	5.70	13.55	Horizontal	-46.9	-13.0	33.9	90
8	5660.00	-50.70	6.30	13.75	Horizontal	-45.4	-13.0	32.4	135
9	6367.50	-47.80	6.80	13.85	Horizontal	-42.9	-13.0	29.9	45
10	7075.00	-44.30	6.90	14.25	Horizontal	-39.1	-13.0	26.1	270
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 12, 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	1422.00	-45.10	2.00	10.15	Horizontal	-39.1	-13.0	26.1	0
3	2133.00	-57.99	2.51	11.05	Horizontal	-51.6	-13.0	38.6	0
4	2844.00	-56.20	4.20	11.15	Horizontal	-51.4	-13.0	38.4	135
5	3555.00	-53.20	5.20	11.15	Horizontal	-49.4	-13.0	36.4	135
6	4266.00	-50.70	5.50	11.95	Horizontal	-46.4	-13.0	33.4	270
7	4977.00	-52.90	5.70	13.55	Horizontal	-47.2	-13.0	34.2	45
8	5688.00	-52.00	6.30	13.75	Horizontal	-46.7	-13.0	33.7	0
9	6399.00	-46.70	6.80	13.85	Horizontal	-41.8	-13.0	28.8	270
10	7110.00	-45.00	6.90	14.25	Horizontal	-39.8	-13.0	26.8	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.									

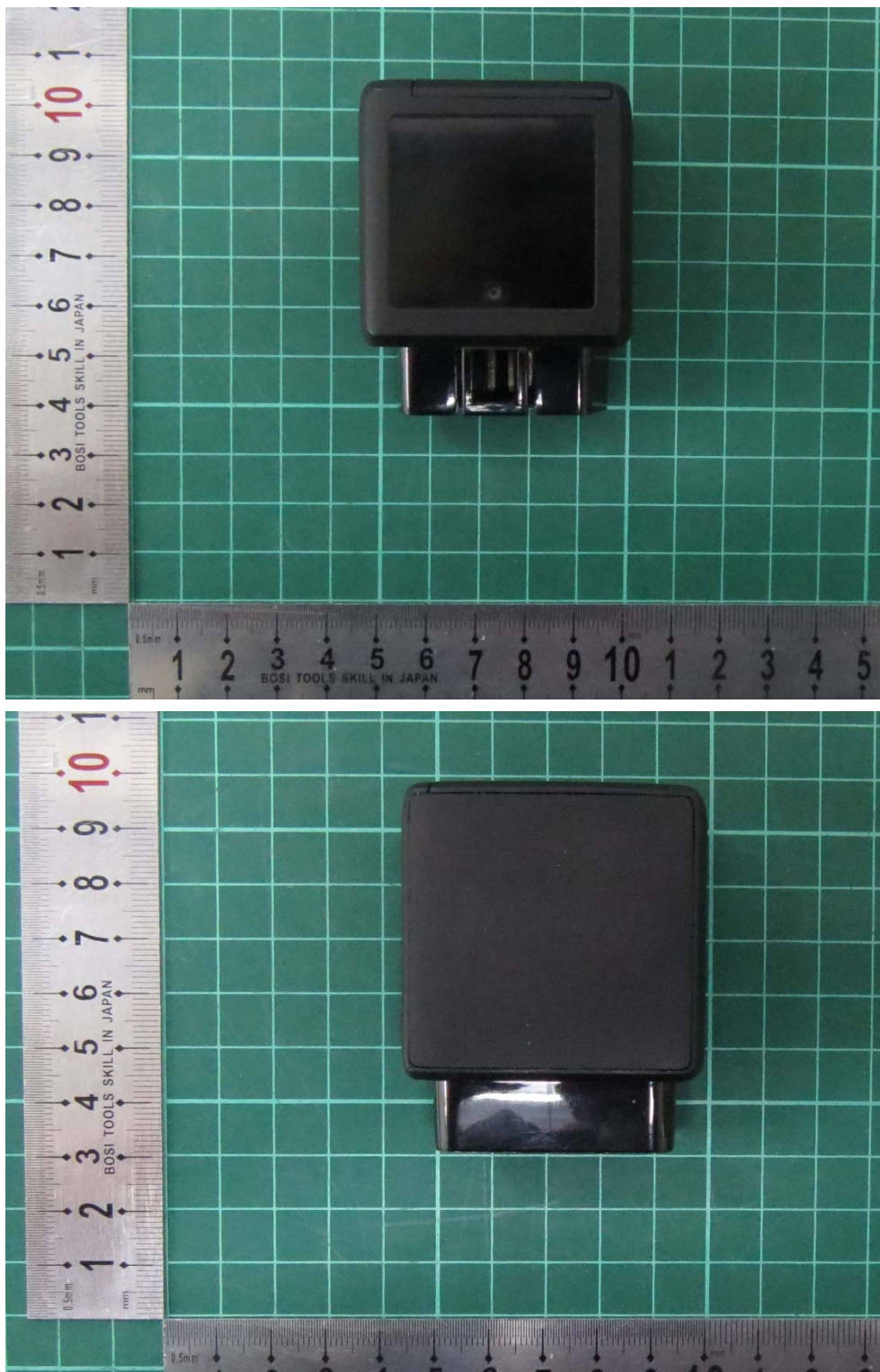
6 Main Test Instruments

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	2017-05-14	2018-05-13
Signal Analyzer	R&S	FSV30	100815	2017-12-17	2018-12-16
Signal generator	R&S	SMB 100A	102594	2017-05-14	2018-05-13
EMI Test Receiver	R&S	ESCI	100948	2017-05-20	2018-05-19
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	00102643	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	NA	NA
Preamplifier	R&S	SCU18	102327	2017-06-18	2018-06-17
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2017-05-14	2018-05-13
Software	R&S	EMC32	V 8.52.0	NA	NA

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

ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance



Picture 1 EUT

A.2 Test Setup



Picture 2: Radiated Spurious Emissions Test setup