

# FCC TEST REPORT

Product : Mobile Phone  
Trade mark : MI  
Model/Type reference : 2016102  
Report Number : 1610280464RFM-1  
Date of Issue : Dec. 09, 2016  
FCC ID : 2AFZZ-RT6102  
Test Standards : FCC 47 CFR Part 22 Subpart H  
FCC 47 CFR Part 2 Subpart J  
Test result : PASS

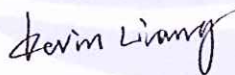
Prepared for:

**Xiaomi Communications Co., Ltd.**  
The Rainbow City of China Resources, NO.68, Qinghe Middle Street,  
Haidian District, Beijing, China

Prepared by:

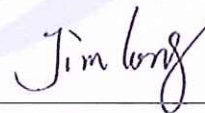
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**Version**

<b>Version No.</b>	<b>Date</b>	<b>Description</b>
V1.0	Dec. 09, 2016	Original



## Content

	Page
<b>1 GENERAL INFORMATION .....</b>	<b>4</b>
<b>1.1 CLIENT INFORMATION .....</b>	<b>4</b>
<b>1.2 GENERAL DESCRIPTION OF EUT .....</b>	<b>4</b>
<b>1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD .....</b>	<b>4</b>
<b>1.4 DESCRIPTION OF SUPPORT UNITS .....</b>	<b>5</b>
<b>1.5 TEST LOCATION .....</b>	<b>5</b>
<b>1.6 TEST FACILITY .....</b>	<b>5</b>
<b>1.7 DEVIATION FROM STANDARDS .....</b>	<b>6</b>
<b>1.8 ABNORMALITIES FROM STANDARD CONDITIONS .....</b>	<b>6</b>
<b>1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER .....</b>	<b>6</b>
<b>1.10 MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS, K=2).....</b>	<b>6</b>
<b>2 TEST SUMMARY .....</b>	<b>7</b>
<b>3 EQUIPMENT LIST .....</b>	<b>8</b>
<b>4 TEST REQUIREMENT .....</b>	<b>10</b>
<b>4.1 TEST SETUP .....</b>	<b>10</b>
4.1.1 For Conducted test setup.....	10
4.1.2 For Radiated Emissions test setup.....	11
<b>4.2 TEST ENVIRONMENT .....</b>	<b>11</b>
<b>4.3 SYSTEM TEST CONFIGURATION .....</b>	<b>11</b>
<b>4.4 TEST CONDITION .....</b>	<b>12</b>
4.4.1 Test channel .....	12
4.4.2 Test mode .....	12
<b>5 RADIO TECHNICAL REQUIREMENTS SPECIFICATION .....</b>	<b>16</b>
<b>5.1 EFFECTIVE RADIATED POWER .....</b>	<b>16</b>
<b>5.2 CONDUCTED OUTPUT POWER.....</b>	<b>19</b>
<b>5.3 99%&amp;26DB OCCUPIED BANDWIDTH .....</b>	<b>20</b>
<b>5.4 BAND EDGE AT ANTENNA TERMINALS.....</b>	<b>27</b>
<b>5.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS .....</b>	<b>36</b>
<b>5.6 FIELD STRENGTH OF SPURIOUS RADIATION .....</b>	<b>43</b>
5.6.1 Spurious Emission Test Data (9 KHz ~ 30 MHz) .....	44
5.6.2 Spurious Emission Test Data (30 MHz ~ 1 GHz).....	44
5.6.3 Spurious Emission Test Data (Above 1 GHz).....	58
<b>5.7 FREQUENCY STABILITY .....</b>	<b>72</b>
<b>APPENDIX 1 PHOTOGRAPHS OF TEST SETUP.....</b>	<b>74</b>
<b>APPENDIX 2 PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS.....</b>	<b>74</b>

# 1 General Information

## 1.1 Client Information

Applicant:	Xiaomi Communications Co., Ltd.
Address of Applicant:	The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China
Manufacturer:	Xiaomi Communications Co., Ltd.
Address of Manufacturer:	The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

## 1.2 General Description of EUT

Product Name:	Mobile Phone	
Model No.(EUT):	2016102	
Add. Mode No.:	N/A	
Trade Mark:	MI	
EUT Supports Radios application:	GSM850/900/1800/1900 WCDMA Band I/Band II/Band V/Band VIII LTE FDD Band 1 /Band 3 /Band 4 /Band 5 /Band 7 /Band 8 /Band 20 LTE TDD Band 38 /Band 40 Wlan 2400MHz-2483.5MHz 802.11b/g/n(HT20&HT40) Wlan 5150MHz-5350MHz, 5470MHz-5725MHz, 5725MHz-5850MHz only support 802.11a Bluetooth V3.0+EDR&Bluetooth V4.0 BLE GPS, Glonass	
Power Supply:	AC adapter	Model: MDY-08-EF Input: 100-240V~50/60Hz 0.35A MAX Output: DC 5.0V = 2000mA
	Battery	Model: BN43 Brand: MI Rated Voltage: 3.85Vdc Battery Capacity: 4000mAh(Li-on Rechargeable)
USB Micro-B Plug cable:	117cm(Shielded without ferrite)	
Sample Received Date:	Sep. 12, 2016	
Sample Tested Date:	Nov. 10, 2016 ~ Dec. 08, 2016	

## 1.3 Product Specification subjective to this standard

Support Networks:	GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA,DC-HSDPA,HSPA+, LTE	
Type of Modulation:	GSM/GPRS:	GMSK
	EDGE:	GMSK, 8PSK
	WCDMA:	BPSK, QPSK, 16QAM
	LTE:	QPSK, 16QAM
Frequency Range:	GSM/GPRS/EDGE:	824.2-848.8 MHz
	WCDMA:	826.4-846.6 MHz
	LTE Band 5(Channel Bandwidth: 1.4 MHz):	824.7-848.3 MHz
	LTE Band 5 (Channel Bandwidth: 3 MHz):	825.5-847.5MHz
	LTE Band 5 (Channel Bandwidth: 5 MHz):	826.5-846.5 MHz
	LTE Band 5 (Channel Bandwidth: 10 MHz):	829-844 MHz

Max RF Output Power:	GSM/GPRS:	32.59dBm
	EDGE:	26.31dBm
	WCDMA	22.86dBm
	LTE Band 5(Channel Bandwidth: 1.4 MHz):	22.57dBm
	LTE Band 5 (Channel Bandwidth: 3 MHz):	22.61dBm
	LTE Band 5 (Channel Bandwidth: 5 MHz):	22.67dBm
	LTE Band 5 (Channel Bandwidth: 10 MHz):	22.70dBm
Type of Emission:	GSM/GPRS:	245KGXW
	EDGE:	245KG7W
	WCDMA	4M11F9W
	LTE Band 5(Channel Bandwidth: 1.4 MHz):	1M09G7D, 1M10W7D
	LTE Band 5 (Channel Bandwidth: 3 MHz):	2M74G7D, 2M73W7D
	LTE Band 5 (Channel Bandwidth: 5 MHz):	4M51G7D, 4M50W7D
	LTE Band 5 (Channel Bandwidth: 10 MHz):	9M05G7D, 9M04W7D
IEMI:	SIM1: 863195030012201	
	SIM2: 863195030012219	
Type of Antenna:	LDS Antenna	
Antenna Gain:	-2.23 dBi	
GPRS/EDGE Class:	Class 33	
Sample Type:	Portable device	
Normal Test voltage:	3.85Vdc	
Extreme Test voltage:	3.6 ~ 4.4Vdc	
Extreme Test Temperature:	-30°C to +50°C	
Software Version:	MIUI8	
Hardware Version:	P3	

### 1.4 Description of Support Units

The EUT has been tested independently

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
N/A	N/A	N/A	N/A	N/A

2) Cable

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
1	Antenna Cable	SMA	30cm	UnionTrust

### 1.5 Test Location

All tests were performed at:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109

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### 1.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### **Shenzhen UnionTrust Quality and Technology Co., Ltd.**

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 Tel: +86-755-28230888 Fax: +86-755-28230886 E-mail: info@uttlab.com [Http://www.uttlab.com](http://www.uttlab.com)

**CNAS-Lab Code: L9069**

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

**1.7 Deviation from Standards**

None.

**1.8 Abnormalities from Standard Conditions**

None.

**1.9 Other Information Requested by the Customer**

None.

**1.10 Measurement Uncertainty (95% confidence levels, k=2)**

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 6.3 \times 10^{-8}$
2	RF power, conducted	$\pm 0.52$ dB
3	Spurious emissions, radiated (Below 1GHz)	$\pm 5.3$ dB
	Spurious emissions, radiated (Above 1GHz)	$\pm 5.1$ dB
4	Conduction emission (9KHz~150KHz)	$\pm 3.8$ dB
	Conduction emission (150KHz~30MHz)	$\pm 3.4$ dB
5	Temperature	$\pm 0.64$ °C
6	Humidity	$\pm 2.8$ %
7	Supply voltages	$\pm 0.49$ %

## 2 Test Summary

Test Item	Test Requirement	Test method	Result
Effective Radiated Power(ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
99%&26dB Occupied Bandwidth	FCC 47 CFR Part 2.1049(h)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 22.917(a)(b)	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02	PASS

Remark:

- Tx: In this whole report Tx (or tx) means Transmitter.  
 Rx: In this whole report Rx (or rx) means Receiver.  
 RF: In this whole report RF means Radiated Frequency.  
 CH: In this whole report CH means channel.

### 3 Equipment List

3M Semi/full-anechoic Chamber						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
<input checked="" type="checkbox"/>	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	12-20-2015	12-19-2018
<input type="checkbox"/>	Receiver	R&S	ESR7	1316.3003K07-101181-K3	02-23-2016	02-22-2017
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	08-06-2015	08-05-2017
<input type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	01-27-2016	01-26-2017
<input checked="" type="checkbox"/>	Loop Antenna	ETS-LINDGREN	6502	00202525	06-24-2015	06-23-2018
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	07-24-2015	07-23-2018
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	02-05-2016	02-04-2017
<input checked="" type="checkbox"/>	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	07-24-2015	07-23-2017
<input type="checkbox"/>	Horn Antenna	ETS-LINDGREN	3117	00164202	07-24-2015	07-23-2018
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	07-29-2015	07-28-2017
<input type="checkbox"/>	Horn Antenna	ETS-LINDGREN	3116C	00200180	07-28-2015	07-27-2018
<input type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	07-29-2015	07-28-2018
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input type="checkbox"/>	Band rejection filter (5150MHz~5880MHz)	micro-tronics	BRM50716	G1868	06-15-2016	06-14-2017
<input type="checkbox"/>	Band rejection filter (2400MHz~2500MHz)	micro-tronics	BRM50702	G248	06-21-2016	06-20-2017
<input checked="" type="checkbox"/>	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	01-08-2016	01-07-2017

RF test system/ Conducted RF test						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	01-27-2016	01-26-2017
<input checked="" type="checkbox"/>	Receiver	R&S	ESR7	1316.3003K07-101181-K3	02-23-2016	02-22-2017
<input type="checkbox"/>	Receiver	R&S	ESIB26	100114	08-06-2015	08-05-2017
<input type="checkbox"/>	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	01-09-2016	01-08-2017
<input type="checkbox"/>	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	12-16-2015	12-15-2017
<input type="checkbox"/>	EXG-B RF Analog Signal Generator	KEYSIGHT	N5171B	MY53051777	01-09-2016	01-08-2017
<input type="checkbox"/>	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	01-08-2016	01-07-2017

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<input type="checkbox"/>	4ch. Simultaneous Sampling 14 Bits 2MS/s	KEYSIGHT	U2531A	TW55193502	11-09-2015	11-08-2017
<input checked="" type="checkbox"/>	DC Source	KIKUSUI	PWR400L	LK003024	09-21-2016	09-20-2017
<input checked="" type="checkbox"/>	Temp & Humidity chamber	Ispec	GL(U)04K A(W)	1692H201P3	09-21-2016	09-20-2017
<input checked="" type="checkbox"/>	Communication test set	R&S	CMW500	130805	08-10-2016	08-09-2017



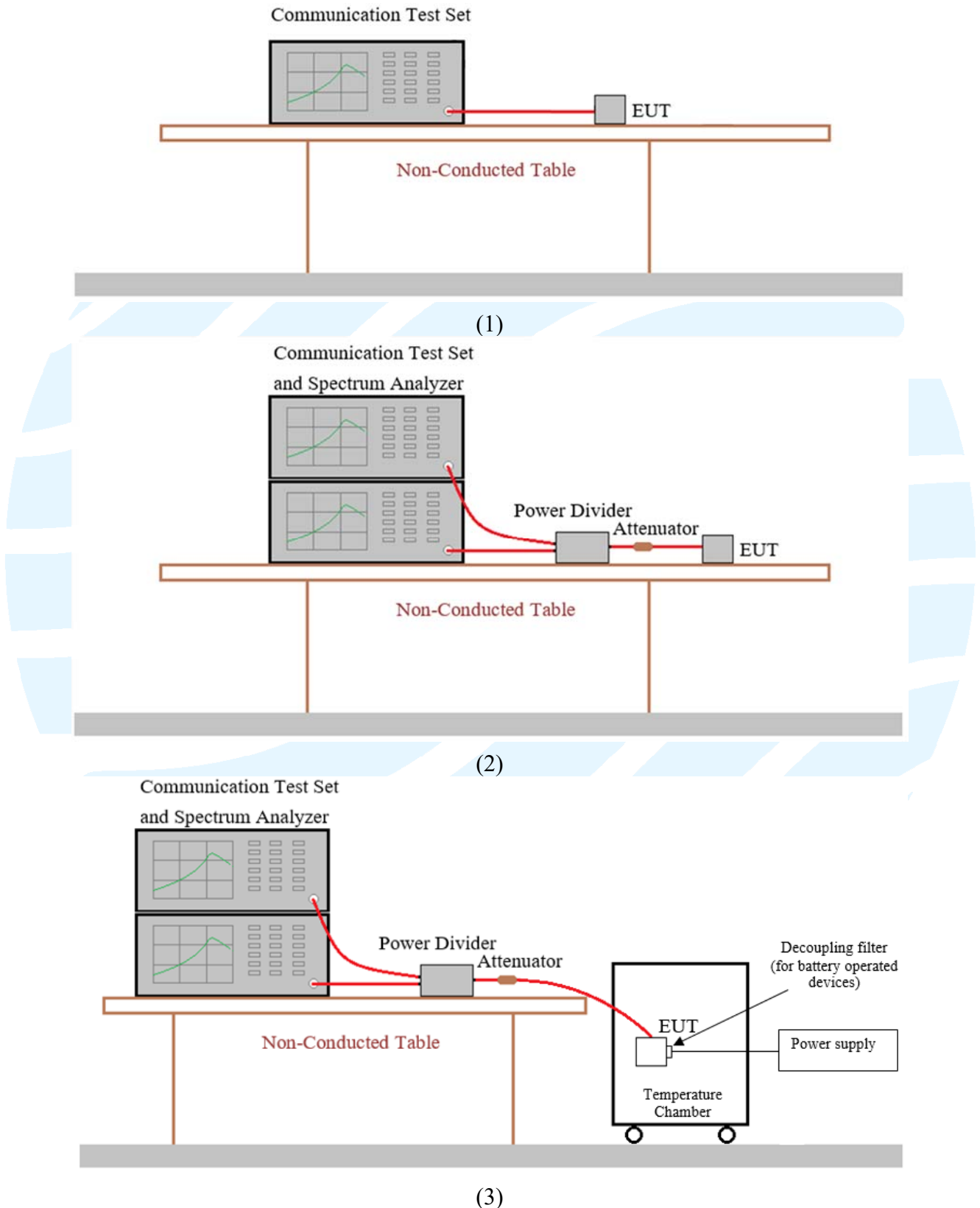
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## 4 Test Requirement

### 4.1 Test setup

#### 4.1.1 For Conducted test setup



### 4.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

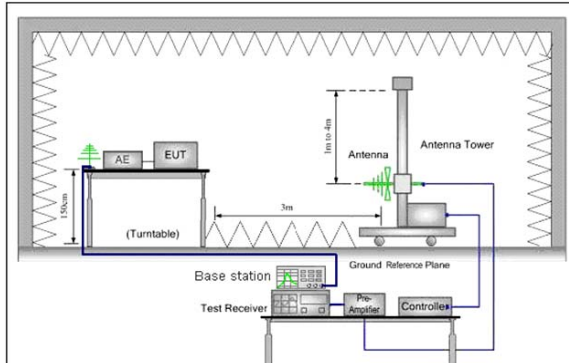


Figure 1.30MHz to 1GHz

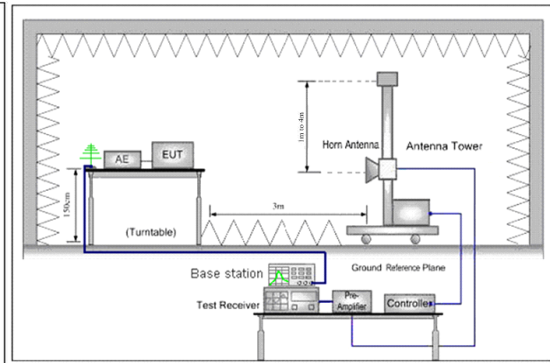


Figure 2. above 1GHz

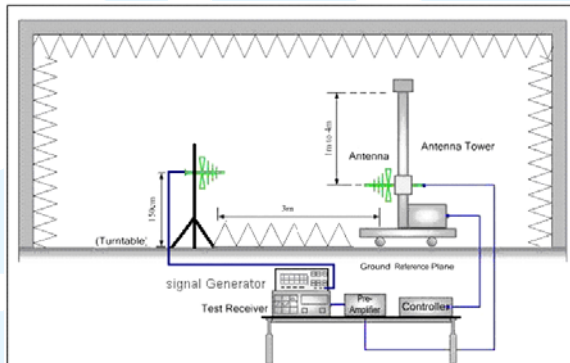


Figure 3. 30MHz to 1GHz

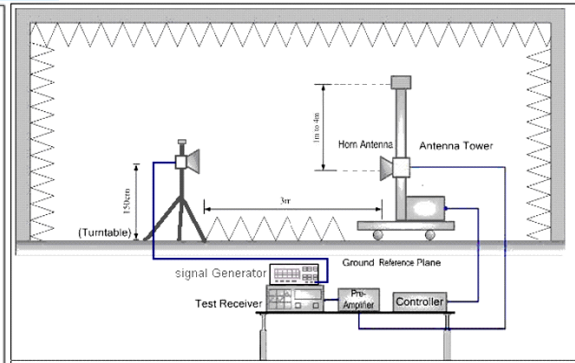


Figure 4. above 1GHz

## 4.2 Test Environment

<b>Operating Environment:</b>	
Temperature:	24.3 °C
Humidity:	58 % RH
Atmospheric Pressure:	100.29kpa

## 4.3 System Test Configuration

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 3.85Vdc rechargeable Li-on battery. Only the worst case data were recorded in this test report.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X, Y, Z axis, and antenna ports.

The worst case was found when positioned as the table below.

Band	Worst-case Orientation		Radiated Emission
	ERP		
	Horizontal	Vertical	
GSM	Z axis	Y axis	Z axis
EDGE	Z axis	Y axis	Z axis
WCDMA Band V	Z axis	Y axis	Z axis

LTE Band 5	Z axis	Y axis	Z axis
------------	--------	--------	--------

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

## 4.4 Test Condition

### 4.4.1 Test channel

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/ EDGE850	Tx (824 MHz ~ 849 MHz)	Channel 128	Channel 190	Channel 251
		824.2MHz	836.6 MHz	848.8 MHz
	Rx (869 MHz ~ 894 MHz)	Channel 128	Channel 190	Channel 251
		869.2 MHz	881.6 MHz	893.8 MHz
WCDMA band V	Tx (824 MHz ~ 849 MHz)	Channel 4132	Channel 4182	Channel 4233
		826.4 MHz	836.4 MHz	846.6 MHz
	Rx (869 MHz ~ 894 MHz)	Channel 4357	Channel 4407	Channel 4458
		871.4 MHz	881.4 MHz	891.6 MHz

Test Mode	Test Frequency ID	Bandwidth (MHz)	Number [UL]	Frequency of Uplink (MHz)	Number [DL]	Frequency of Downlink (MHz)
LTE band 5 TX:824– 849 MHz RX: 869– 894MHz	Low Range	1.4	20407	824.7	2407	869.7
		3	20415	825.5	2415	870.5
		5	20425	826.5	2425	871.5
		10	20450	829	2450	874
	Middle Range	1.4/3/5/10	20525	836.5	2525	881.5
	High Range	1.4	20643	848.3	2643	893.3
		3	20635	847.5	2635	892.5
		5	20625	846.5	2625	891.5
		10	20600	844	2600	889

### 4.4.2 Test mode

Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below:  
SIM 1 Card Conducted transmitter power measurement result (Units: dBm).

Band	GSM850		
Channel	128	190	251
Frequency(MHz)	824.2MHz	836.6MHz	848.8MHz
GSM (GMSK, 1Tx-slot)	32.50	32.53	32.59
GPRS (GMSK, 1Tx-slot)	32.47	32.52	32.57

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GPRS (GMSK, 2Tx-slot)	29.70	29.83	29.84
GPRS (GMSK, 3Tx-slot)	28.01	28.03	28.23
GPRS (GMSK, 4Tx-slot)	26.81	27.02	27.03
EDGE (8PSK, 1Tx-slot)	26.24	26.23	<b>26.31</b>
EDGE (8PSK, 2Tx-slot)	24.17	24.21	24.24
EDGE (8PSK, 3Tx-slot)	22.57	22.62	22.58
EDGE (8PSK, 4Tx-slot)	21.65	21.71	21.78

Band	WCDMA Band V		
Channel	4132	4182	4233
Frequency(MHz)	826.4MHz	836.4MHz	846.6MHz
RMC 12.2K	<b>22.86</b>	22.51	22.73
HSDPA Subtest-1	22.22	22.25	22.43
HSDPA Subtest-2	22.15	22.17	22.21
HSDPA Subtest-3	22.02	22.06	22.11
HSDPA Subtest-4	21.92	21.94	21.97
HSUPA Subtest-1	21.77	21.69	21.99
HSUPA Subtest-2	20.65	20.58	20.72
HSUPA Subtest-3	21.43	21.55	21.62
HSUPA Subtest-4	20.22	20.38	20.32
HSUPA Subtest-5	21.12	21.13	21.21
DC-HSDPA Subtest-1	22.52	22.56	22.61
DC-HSDPA Subtest-2	22.43	22.41	22.51
DC-HSDPA Subtest-3	22.35	22.31	22.39
DC-HSDPA Subtest-4	22.15	22.18	22.13
HSPA+	22.15	22.24	22.34

LTE Band 5									
Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
Channel	RB Configuration		Average Power [dBm]		Channel	RB Configuration		Average Power [dBm]	
	Size	Offset	QPSK	16QAM		Size	Offset	QPSK	16QAM
LCH	1	0	22.50	<b>21.28</b>	LCH	1	0	22.54	<b>21.32</b>
	1	2	22.52	21.13		1	7	22.56	21.17
	1	5	22.40	20.98		1	14	22.44	21.02
	3	0	22.48	21.27		8	0	21.68	20.69
	3	1	22.50	21.12		8	3	21.73	20.82
	3	3	22.38	20.97		8	7	21.69	20.69
	6	0	21.53	20.54		15	0	21.57	20.58
MCH	1	0	22.49	20.97	MCH	1	0	22.53	21.01
	1	2	<b>22.57</b>	21.18		1	7	<b>22.61</b>	21.22
	1	5	22.53	20.94		1	14	22.57	20.98
	3	0	22.47	20.96		8	0	21.59	20.76
	3	1	22.55	21.17		8	3	21.54	20.79
	3	3	22.51	20.93		8	7	21.61	20.67
	6	0	21.51	20.65		15	0	21.55	20.69
HCH	1	0	22.42	21.19	HCH	1	0	22.46	21.23
	1	2	22.55	21.20		1	7	22.59	21.24

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	1	5	22.40	21.08		1	14	22.44	21.12
	3	0	22.40	21.18		8	0	21.61	20.66
	3	1	22.53	21.19		8	3	21.65	20.76
	3	3	22.38	21.07		8	7	21.75	20.76
	6	0	21.69	20.58		15	0	21.73	20.62
<b>Channel Bandwidth: 5 MHz</b>					<b>Channel Bandwidth: 10 MHz</b>				
LCH	1	0	22.60	<b>21.38</b>	LCH	1	0	22.63	<b>21.41</b>
	1	12	22.62	21.23		1	24	22.65	21.26
	1	24	22.50	21.08		1	49	22.53	21.11
	12	0	21.74	20.75		25	0	21.77	20.78
	12	6	21.79	20.88		25	12	21.82	20.91
	12	13	21.75	20.75		25	25	21.78	20.78
MCH	25	0	21.63	20.64	MCH	50	0	21.66	20.67
	1	0	22.59	21.07		1	0	22.62	21.10
	1	12	<b>22.67</b>	21.28		1	24	<b>22.70</b>	21.31
	1	24	22.63	21.04		1	49	22.66	21.07
	12	0	21.65	20.82		25	0	21.68	20.85
	12	6	21.60	20.85		25	12	21.63	20.88
HCH	12	13	21.67	20.73	HCH	25	25	21.70	20.76
	25	0	21.61	20.75		50	0	21.64	20.78
	1	0	22.52	21.29		1	0	22.55	21.32
	1	12	22.65	21.30		1	24	22.68	21.33
	1	24	22.50	21.18		1	49	22.53	21.21
	12	0	21.67	20.72		25	0	21.70	20.75
HCH	12	6	21.71	20.82	HCH	25	12	21.74	20.85
	12	13	21.81	20.82		25	25	21.84	20.85
	25	0	21.79	20.68		50	0	21.82	20.71

Pre-scan all mode and data rates and positions, find worse case mode are chosen to the report, the worse mode as below:

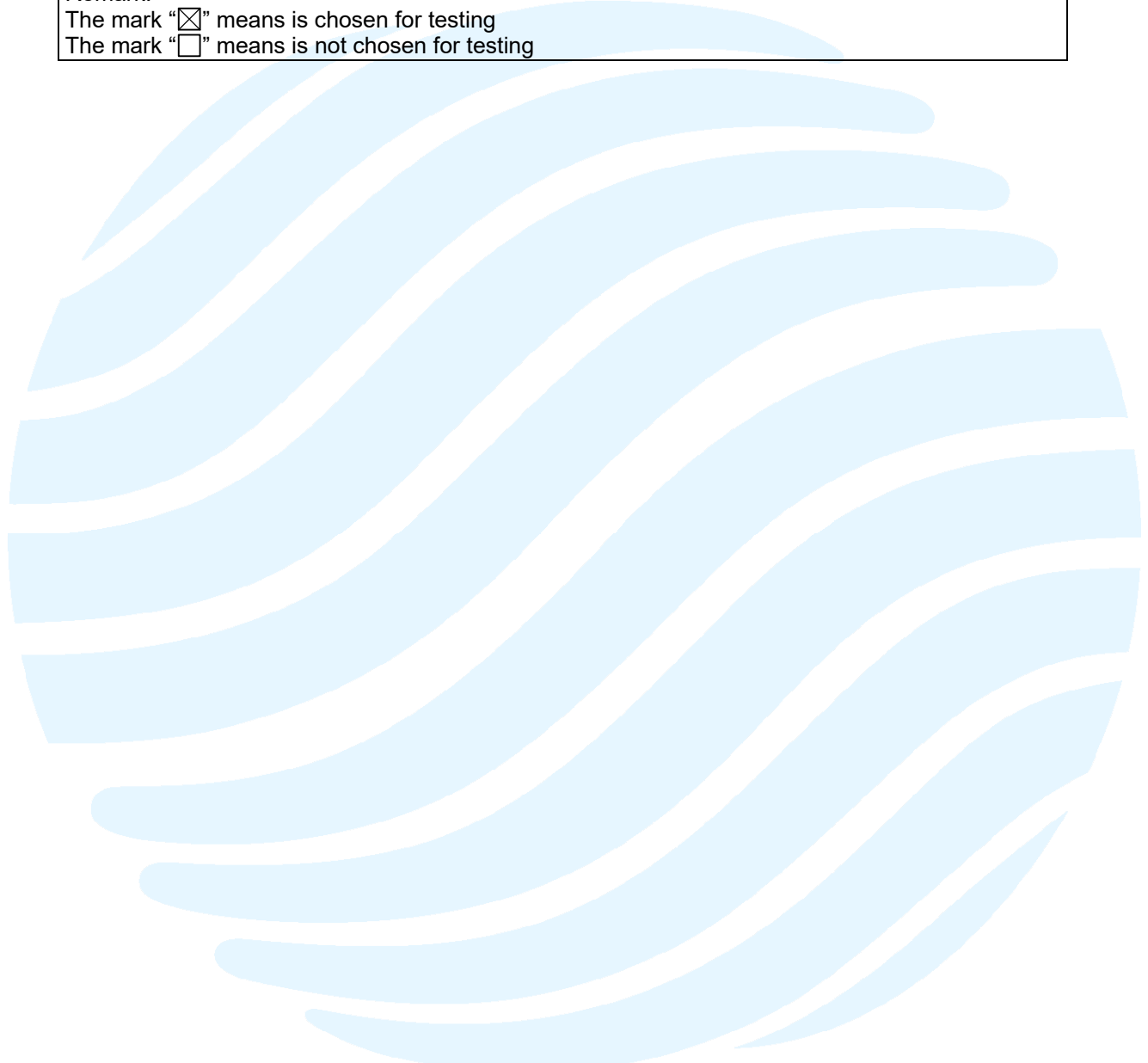
Band	Radiated	Conducted
GSM/GPRS/EDGE 850	1) GSM (GMSK, 1Tx-slot ) Link 2) GPRS (GMSK, 1Tx-slot ) Link 3) EDGE (8PSK, 1Tx-slot ) Link	1) GSM (GMSK, 1Tx-slot ) Link 2) GPRS (GMSK, 1Tx-slot ) Link 3) EDGE (8PSK, 1Tx-slot) Link
WCDMA Band V	RMC 12.2Kbps Link	RMC 12.2Kbps Link

LTE worse mode applicability and tested channel detail as below:

Item	LTE-Band 5											
	Bandwidth(MHz)				Modulation		RB #			Test Channel		
	1.4	3	5	10	QPSK	16QAM	1	Half	Ful	L	M	H
ERP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Conducted output power	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
99% &26dB Occupied Bandwidth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Band Edge at antenna terminals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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Spurious emissions at antenna terminals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Field strength of spurious radiation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Frequency stability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>Remark:                      The mark "<input checked="" type="checkbox"/>" means is chosen for testing                      The mark "<input type="checkbox"/>" means is not chosen for testing</p>												



## 5 Radio Technical Requirements Specification

### Reference documents for testing:

No.	Identity	Document Title
1	FCC 47 CFR Part 22 Subpart H	PART 22 – PUBLIC MOBILE SERVICES Subpart H – Cellular Radiotelephone Service
2	47 CFR Part 2 Subpart J	Frequency allocations and radio treaty matters; general rules and regulations
3	ANSI/TIA/EIA-603-D 2010	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
4	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v02r02

### 5.1 Effective Radiated Power

**Test Requirement:** FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)

**Test Method:** KDB 971168 D01v02r02 & ANSI/TIA/EIA-603-D 2010

**Limit:** The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

**Test Procedure:** Test procedure as below:

- 1) The EUT was powered ON and placed on a 0.8m high table at a 3 meter fully Anechoic Chamber. The antenna of the transmitter was extended to its maximum length. Modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- 2) The EUT was set 3 meters (above 18GHz the distance is 1 meter) away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 3) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- 4) Steps 1) to 3) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 5) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
- 6) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 3) is obtained for this set of conditions.
- 7) The output power into the substitution antenna was then measured.
- 8) Steps 6) and 7) were repeated with both antennas polarized.
- 9) Calculate power in dBm by the following formula:
 
$$\text{ERP(dBm)} = \text{Pg(dBm)} - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

$$\text{EIRP(dBm)} = \text{Pg(dBm)} - \text{cable loss (dB)} + \text{antenna gain (dBi)}$$

$$\text{EIRP} = \text{ERP} + 2.15\text{dB}$$
 where:  
Pg is the generator output power into the substitution antenna.
- 10) Test the EUT in the lowest channel, the middle channel the Highest channel
- 11) The radiation measurements are performed in X, Y, Z axis positioning for EUT operation mode, and found the Z axis positioning which it is worse case.
- 12) Repeat above procedures until all frequencies measured was complete.

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**Receiver Setup:**

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Peak	100kHz	300kHz	Peak
Above 1GHz	Peak	1MHz	3MHz	Peak

**Test Setup:**

Refer to section 4.1.2 for details.

**Instruments Used:**

Refer to section 3 for details

**Test Mode:**

Link mode

**Test Results:**

Pass

**Test Data:**

Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Result	Antenna Polaxis.
<b>GSM 1Tx-slot</b>					
128	824.2	28.12	38.45	Pass	H
		27.21	38.45	Pass	V
190	836.6	28.78	38.45	Pass	H
		27.07	38.45	Pass	V
251	848.8	28.69	38.45	Pass	H
		27.49	38.45	Pass	V
<b>EDGE 1Tx-slot</b>					
128	824.2	23.49	38.45	Pass	H
		21.65	38.45	Pass	V
190	836.6	23.78	38.45	Pass	H
		22.71	38.45	Pass	V
251	848.8	24.00	38.45	Pass	H
		23.36	38.45	Pass	V
<b>WCDMA RMC 12.2Kbps</b>					
4132	826.4	19.73	38.45	Pass	H
		16.77	38.45	Pass	V
4182	836.6	19.76	38.45	Pass	H
		17.30	38.45	Pass	V
4233	846.6	19.90	38.45	Pass	H
		17.64	38.45	Pass	V

Channel	Frequency (MHz)	ERP (dBm)		Limit (dBm)	Result	Antenna Polaxis.
		QPSK; RB:1	16QAM; RB:1			
<b>LTE Band 5; Bandwidth 1.4MHz</b>						
20407	824.7	22.53	22.03	33.01	Pass	H
		22.60	22.31		Pass	V
20525	836.5	21.95	21.62	33.01	Pass	H
		22.12	21.63		Pass	V
20643	848.3	21.28	20.75	33.01	Pass	H
		22.02	21.25		Pass	V
<b>LTE Band 5; Bandwidth 3MHz</b>						
20415	825.5	22.52	21.73	33.01	Pass	H
		22.93	22.33		Pass	V
20525	836.5	22.34	21.21	33.01	Pass	H
		22.26	21.51		Pass	V
20635	847.5	21.76	20.78	33.01	Pass	H
		21.90	21.18		Pass	V
<b>LTE Band 5; Bandwidth 5MHz</b>						
20425	826.5	22.37	21.74	33.01	Pass	H
		22.98	22.06		Pass	V
20525	836.5	22.14	21.48	33.01	Pass	H
		22.17	21.44		Pass	V
20625	846.5	21.31	21.11	33.01	Pass	H
		22.04	21.20		Pass	V
<b>LTE Band 5; Bandwidth 10MHz</b>						
20450	829	22.45	21.78	33.01	Pass	H
		22.60	22.13		Pass	V
20525	836.5	22.15	21.71	33.01	Pass	H
		21.94	21.37		Pass	V
20600	844	22.02	21.37	33.01	Pass	H
		21.70	20.82		Pass	V

## 5.2 Conducted Output Power

**Test Requirement:** FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)  
**Test Method:** ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02  
**Limit:** The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

**Test Procedure:** The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

**Test Setup:** Refer to section 4.1.1(1) for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Link mode

**Test Results:** Pass

### Test Data:

Note: The following is the worst conducted output power (Units: dBm), the full result can be also refer to section 4.4.2 for details.

For Cellular Band			
Channel	128	190	251
Frequency(MHz)	824.2MHz	836.6MHz	848.8MHz
GSM 1Tx-slot	32.50	32.53	32.59
GPRS 1Tx-slot	32.47	32.52	32.57
EDGE 1Tx-slot	26.24	26.23	26.31

WCDMA			
Channel	4132	4182	4233
Frequency(MHz)	826.4MHz	836.4MHz	846.6MHz
RMC 12.2Kbps	22.86	22.51	22.73

LTE Band 5									
Channel	RB Configuration		Average Power [dBm]		Channel	RB Configuration		Average Power [dBm]	
	Size	Offset	QPSK	16QAM		Size	Offset	QPSK	16QAM
Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
LCH	1	2	22.52	21.13	LCH	1	7	22.56	21.17
MCH	1	2	<b>22.57</b>	21.18	MCH	1	7	<b>22.61</b>	21.22
HCH	1	2	22.55	21.20	HCH	1	7	22.59	21.24
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
LCH	1	12	22.62	21.23	LCH	1	24	22.65	21.26
MCH	1	12	<b>22.67</b>	21.28	MCH	1	24	<b>22.70</b>	21.31
HCH	1	12	22.65	21.30	HCH	1	24	22.68	21.33

### 5.3 99%&26dB Occupied Bandwidth

**Test Requirement:** FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 22.917(b)  
**Test Method:** ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02  
**Test Procedure:** The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

**Test Setup:** Refer to section 4.1.1(2) for details.

**Instruments Used:** Refer to section 3 for details

**Test Mode:** Link mode

**Test Results:** Pass

**Test Data:**

For Cellular Band				
Test Mode	Channel	Frequency (MHz)	26 dB BW (kHz)	99% BW (kHz)
GSM 1Tx-slot	128	824.2	313.1	244.50
	190	836.6	312.1	243.63
	251	848.8	309.5	242.73
EDGE 1Tx-slot	128	824.2	294.6	240.07
	190	836.6	300.3	244.93
	251	848.8	302.1	241.27

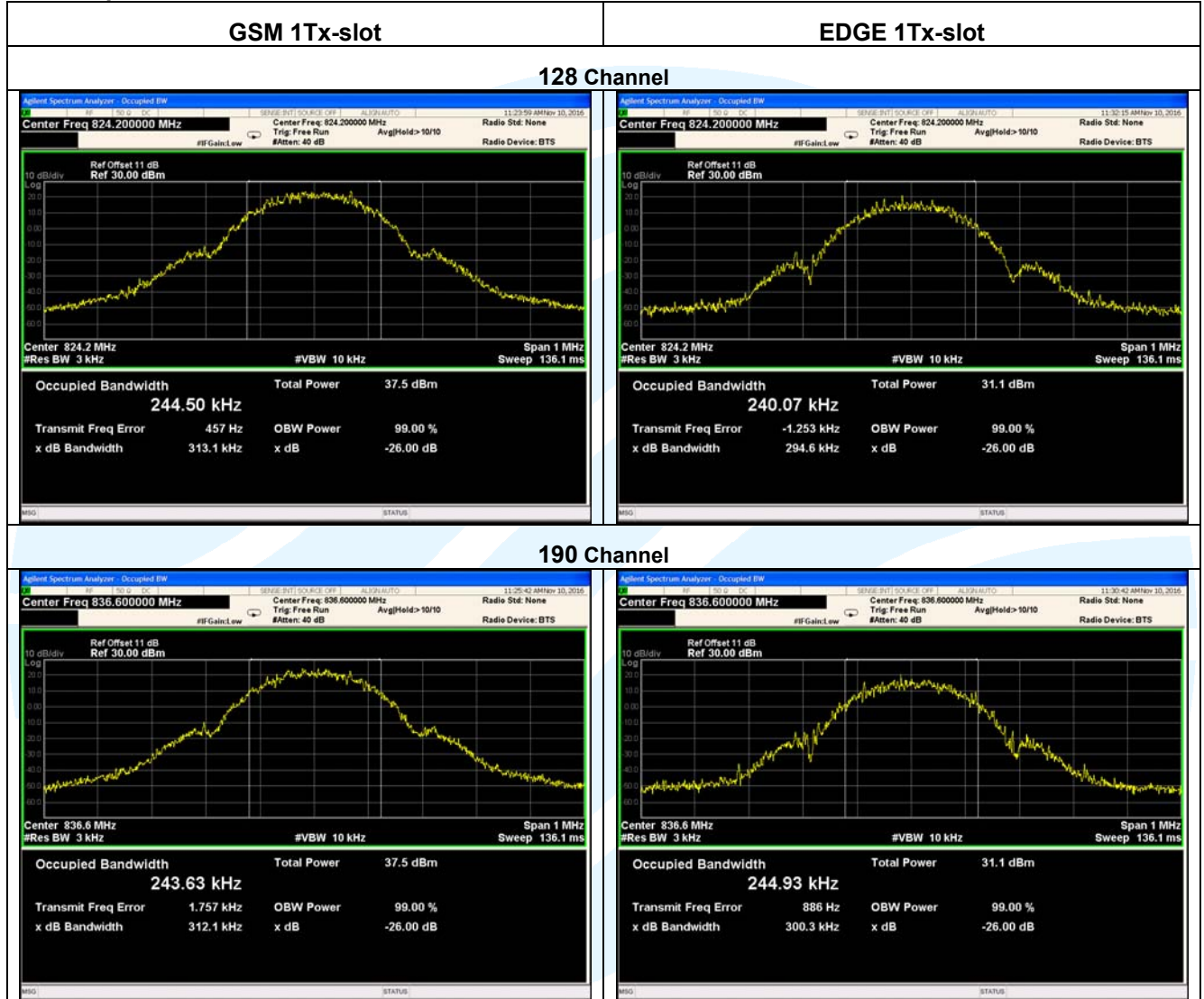
For WCDMA				
Test Mode	Channel	Frequency (MHz)	26 dB BW (MHz)	99% BW (MHz)
RMC 12.2Kbps	4132	826.4	4.677	4.1109
	4182	836.4	4.684	4.1121
	4233	846.6	4.695	4.1071

For LTE Band 5						
Channel Bandwidth: 1.4 MHz						
Channel	RB Configuration		26 dB BW (MHz)		99% BW (MHz)	
	Size	Offset	QPSK	16QAM	QPSK	16QAM
LCH	6	0	1.280	1.298	1.0905	1.1015
MCH	6	0	1.279	1.295	1.0893	1.1009
HCH	6	0	1.284	1.301	1.0899	1.1017
Channel Bandwidth: 3 MHz						
LCH	15	0	3.046	3.060	2.7356	2.7283
MCH	15	0	3.060	3.058	2.7378	2.7279
HCH	15	0a	3.047	3.052	2.7345	2.7273
Channel Bandwidth: 5 MHz						
LCH	25	0	5.027	5.036	4.5053	4.4959
MCH	25	0	4.952	4.991	4.4823	4.4938
HCH	25	0	5.002	5.029	4.5099	4.4967

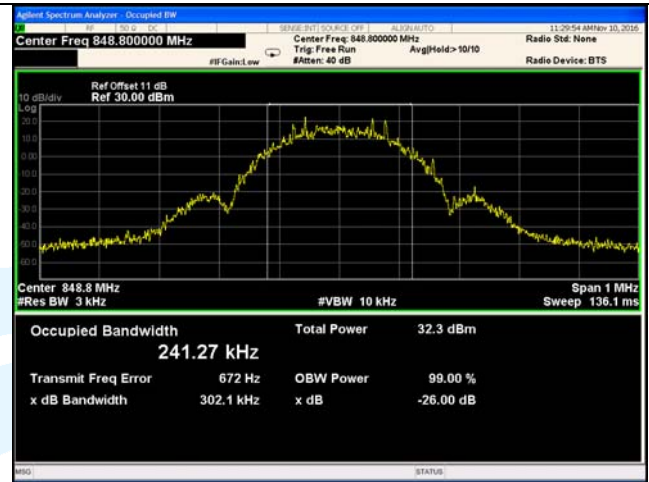
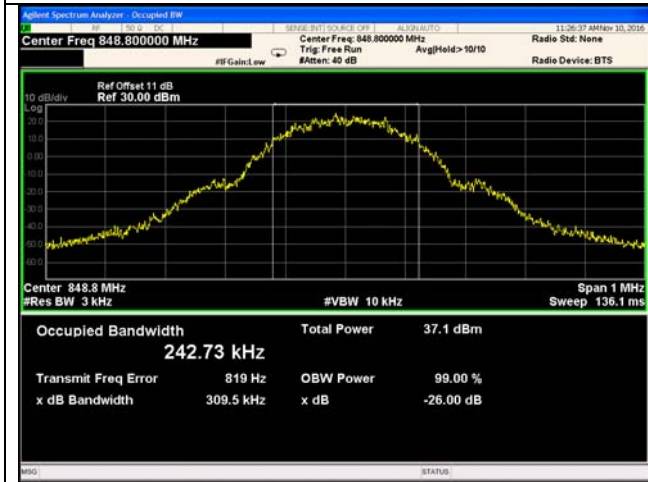
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Channel Bandwidth: 10 MHz						
LCH	50	0	10.01	9.969	9.0503	8.9920
MCH	50	0	10.07	9.979	9.0195	9.0449
HCH	50	0	10.03	9.957	9.0428	8.9997

The test plot as follows:

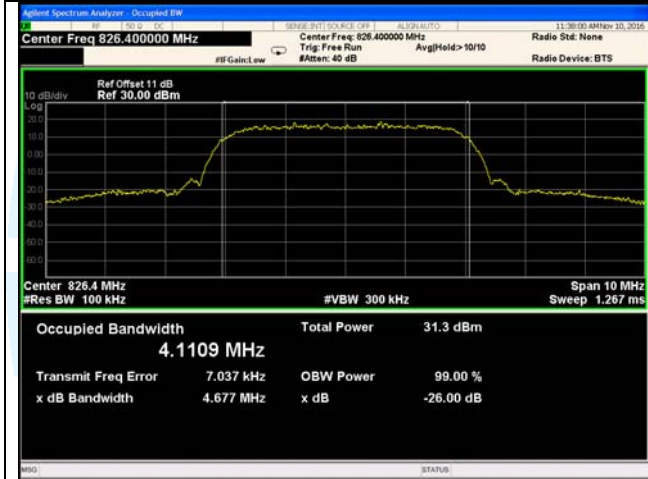


### 251 Channel



### WCDMARMC 12.2Kbps

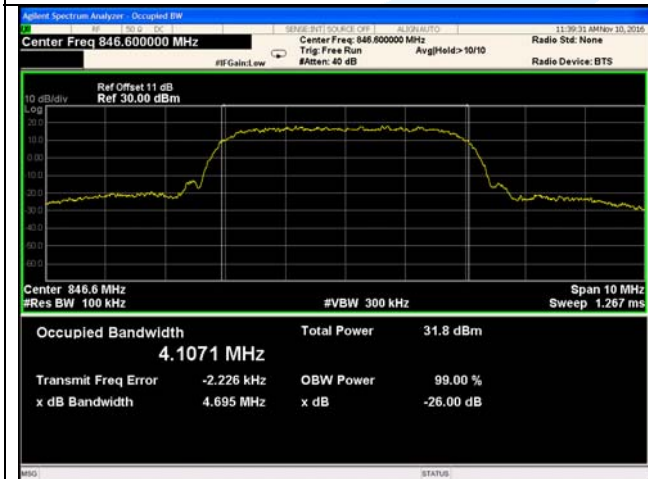
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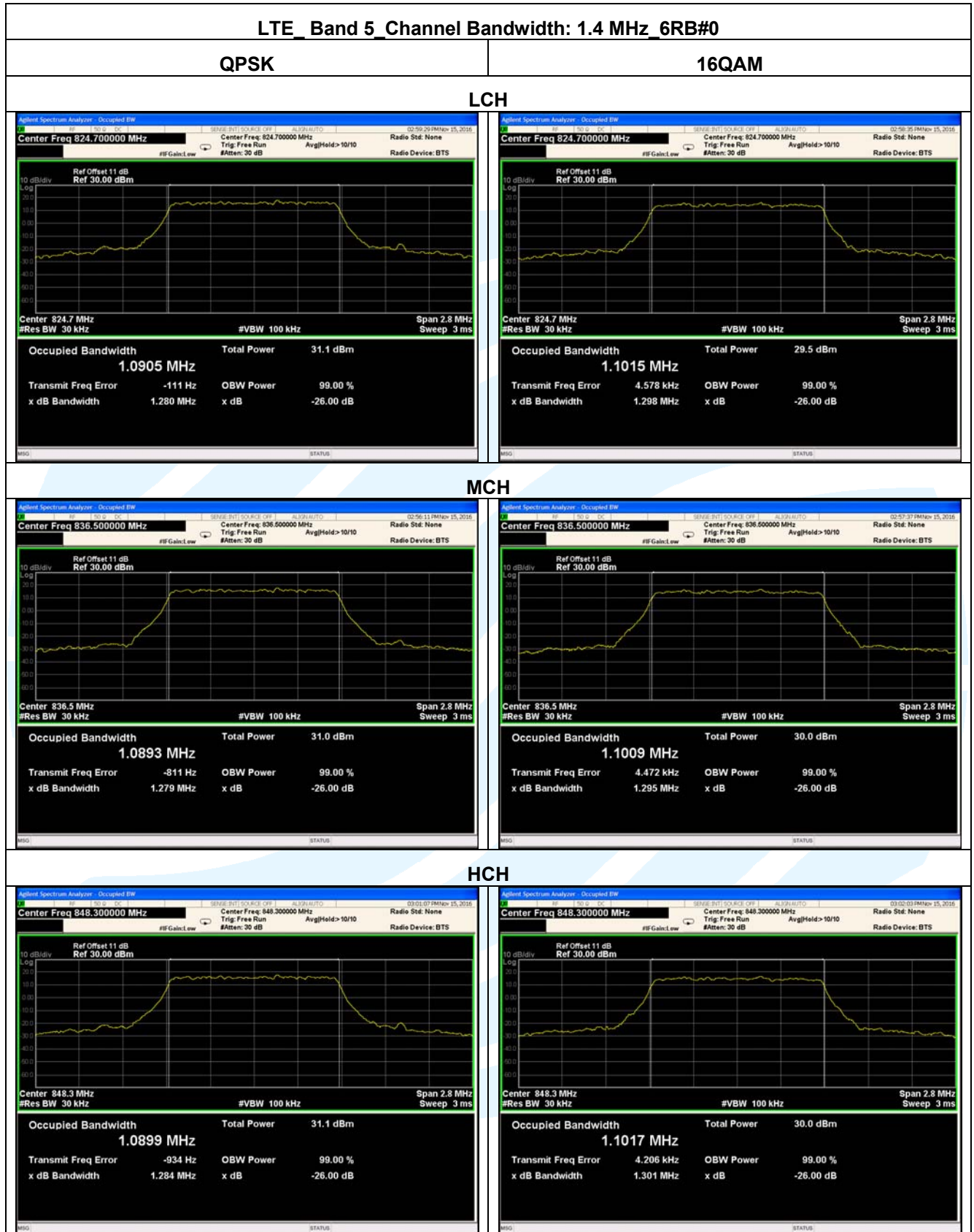


#### 4182 Channel



#### 4233 Channel

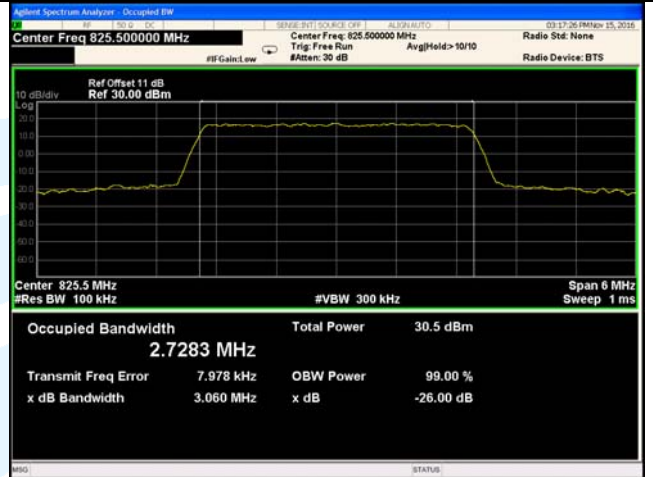
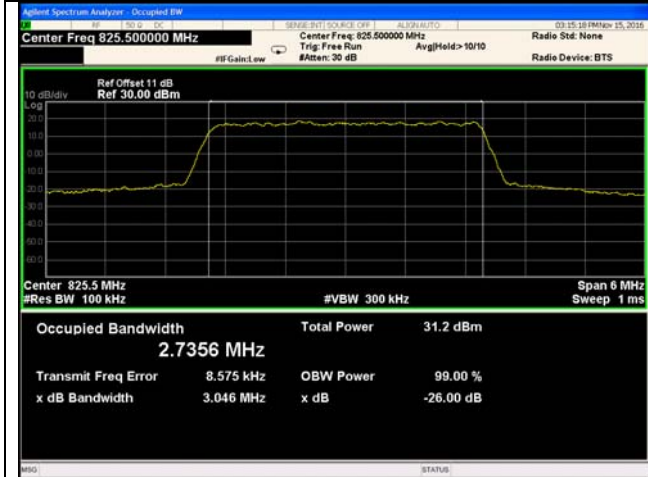




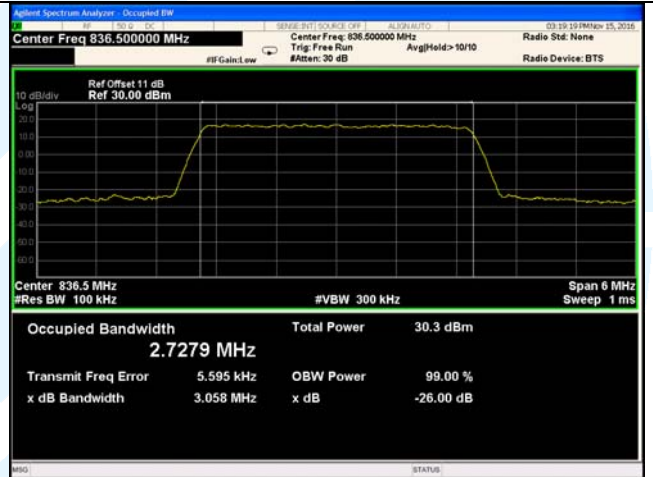
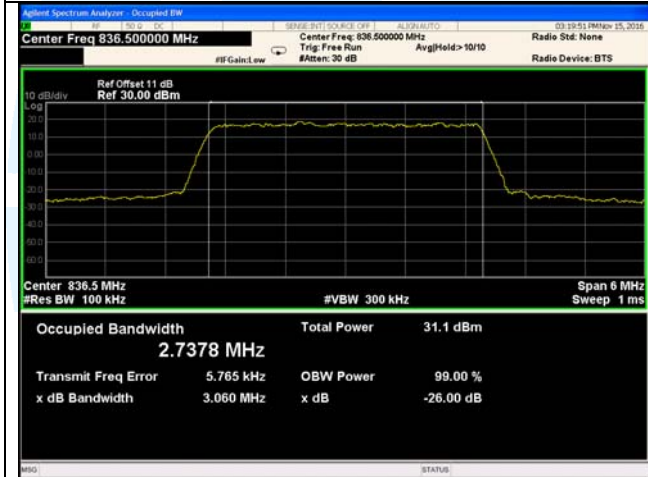
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**QPSK** **16QAM**

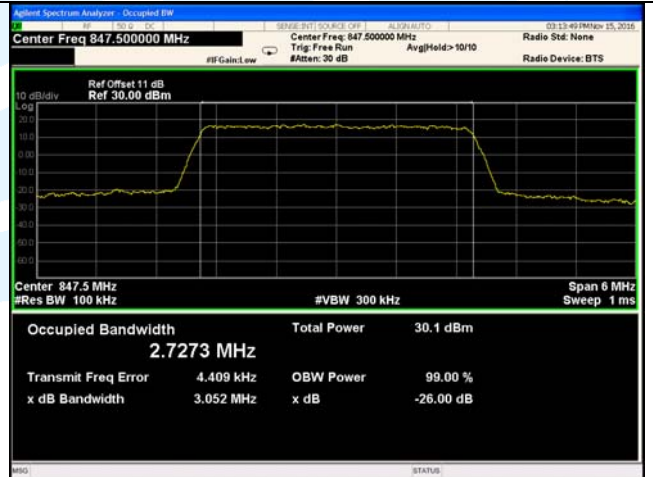
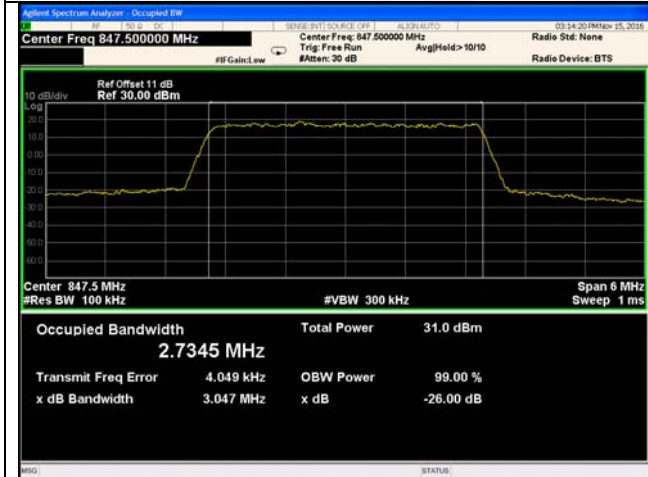
**LCH**



**MCH**



**HCH**

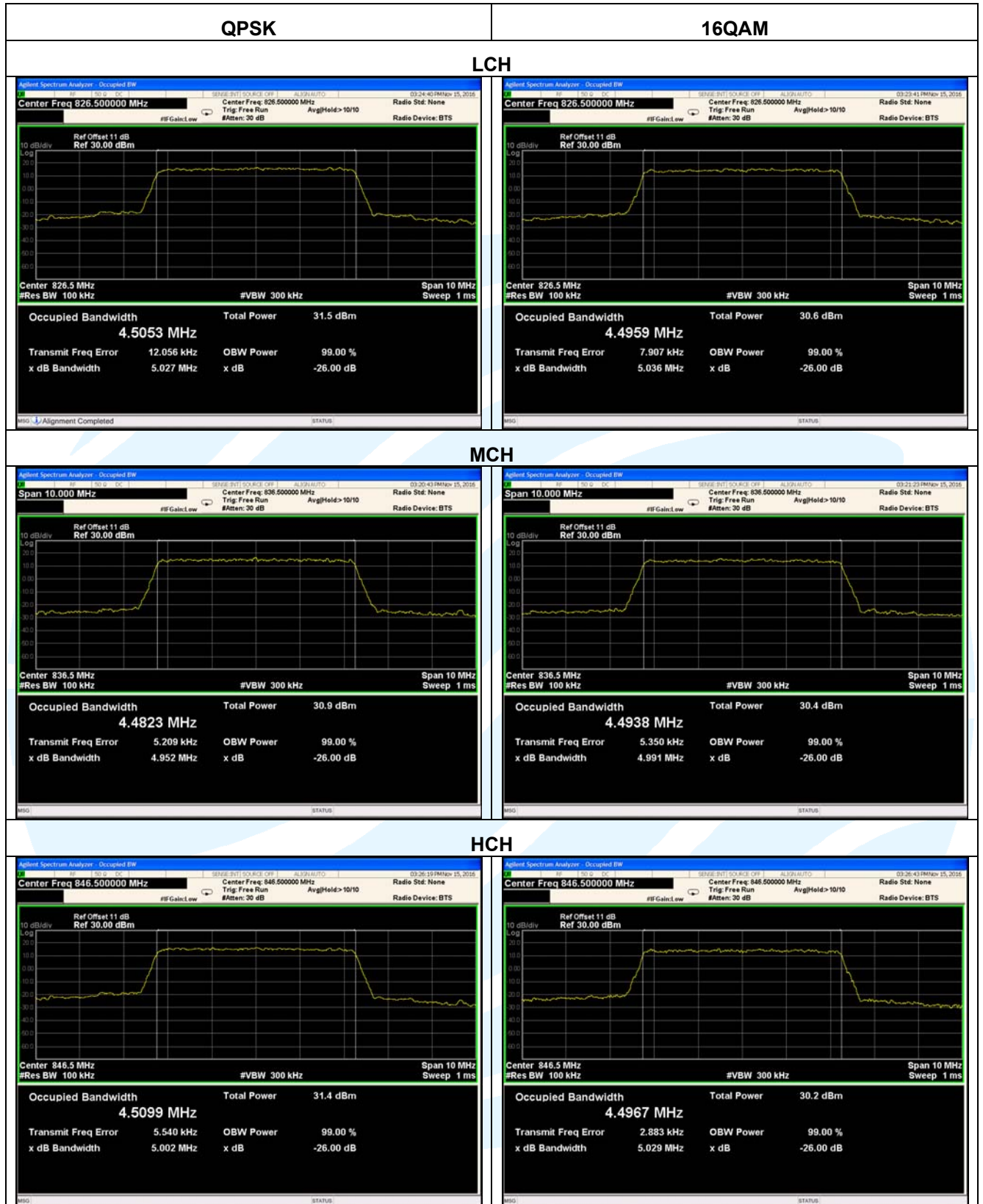


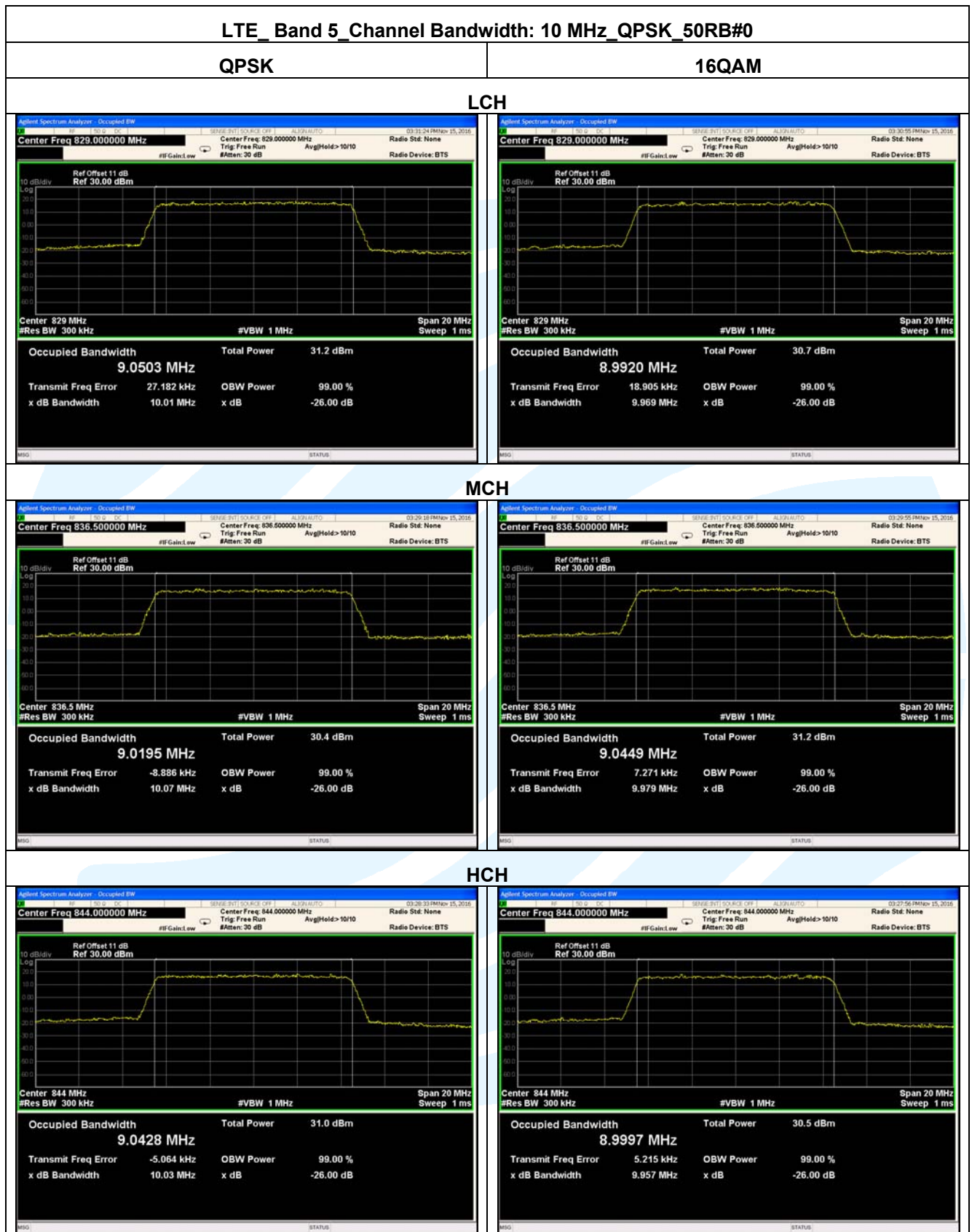
**LTE\_Band 5\_Channel Bandwidth: 5 MHz\_25RB#0**

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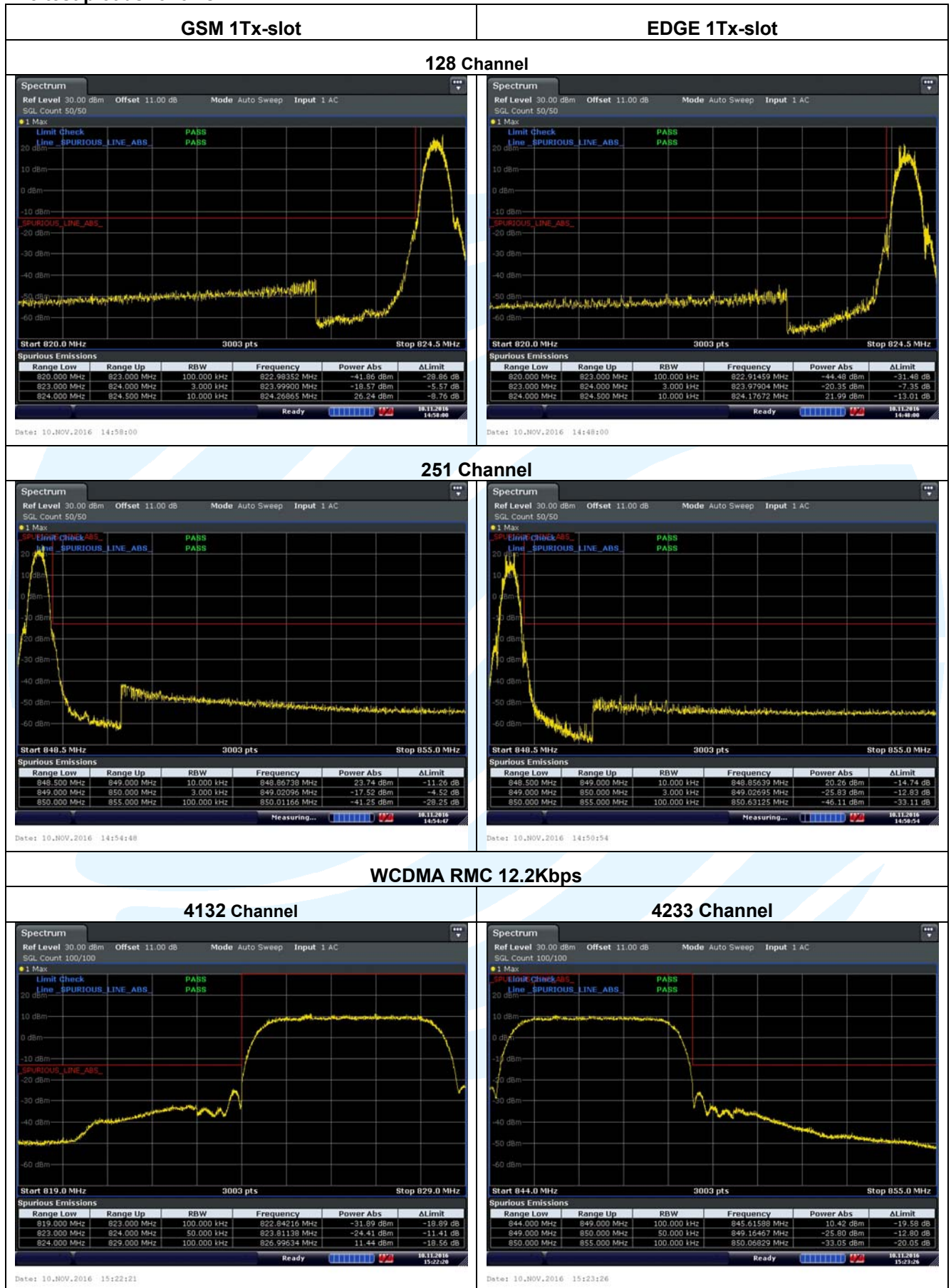




## 5.4 Band Edge at antenna terminals

<b>Test Requirement:</b>	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)
<b>Test Method:</b>	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02
<b>Limit:</b>	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to $-13$ dBm.
<b>Test Procedure:</b>	<p>The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.</p> <p>For each band edge measurement:</p> <ol style="list-style-type: none"><li>1) Set the spectrum analyzer span to include the block edge frequency.</li><li>2) Set a marker to point the corresponding band edge frequency in each test case.</li><li>3) Set display line at <math>-13</math> dBm</li><li>4) Set resolution bandwidth to at least 1% of emission bandwidth.</li></ol> <p>Such as:</p> <ol style="list-style-type: none"><li>a) The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 3 kHz and VB of the spectrum is 10 kHz (GSM/GPRS/EDGE).</li><li>b) The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (WCDMA).</li><li>c) The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 20 kHz and VB of the spectrum is 20 kHz (LTE Bandwidth 1.4 MHz).</li><li>d) The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 30 kHz (LTE Bandwidth 3 MHz).</li><li>e) The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 50 kHz and VB of the spectrum is 50 kHz (LTE Bandwidth 5 MHz)</li><li>f) The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 10 MHz)</li></ol> <ol style="list-style-type: none"><li>5) Record the max trace plot into the test report</li></ol> <p>Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.</p>
<b>Test Setup:</b>	Refer to section 4.1.1(2) for details.
<b>Instruments Used:</b>	Refer to section 3 for details
<b>Test Mode:</b>	Link mode
<b>Test Results:</b>	Pass

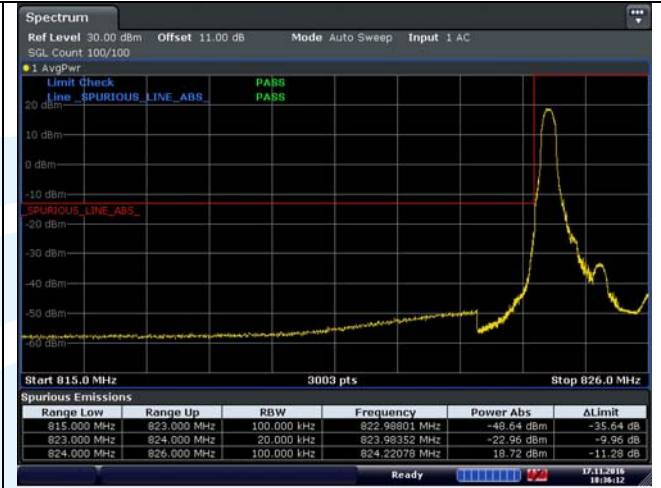
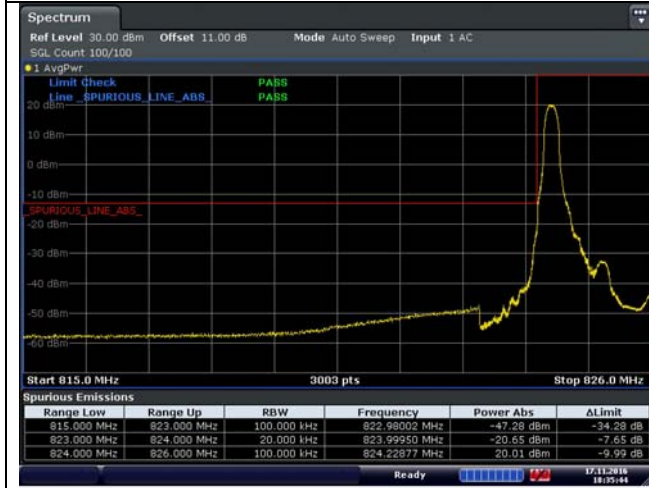
The test plot as follows:



<b>QPSK</b>	<b>16QAM</b>
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**LTE\_Band 5\_Channel Bandwidth: 1.4 MHz\_1RB#0**

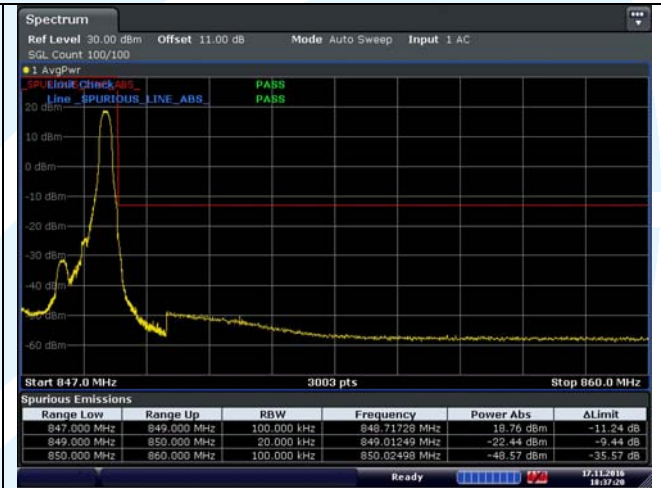
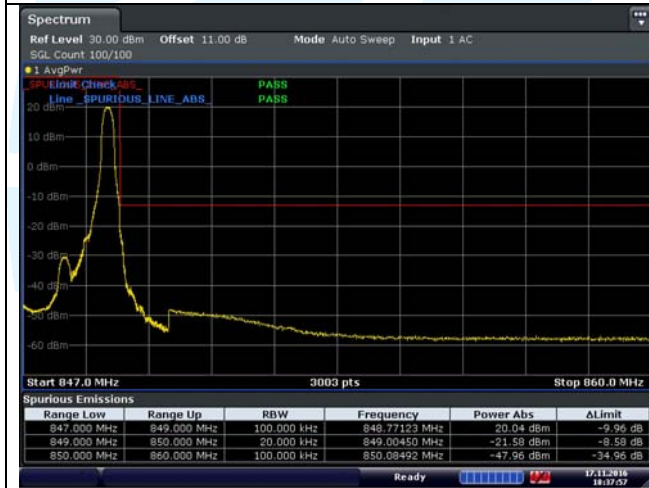
**LCH**



Date: 17.NOV.2016 18:35:44

Date: 17.NOV.2016 18:36:12

**HCH**

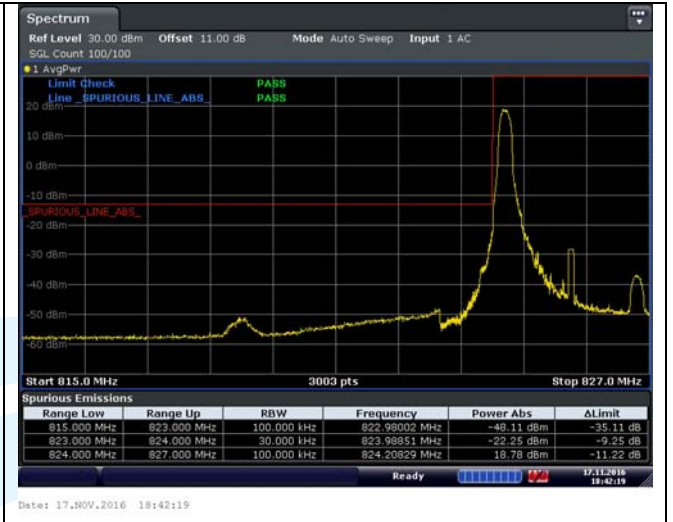
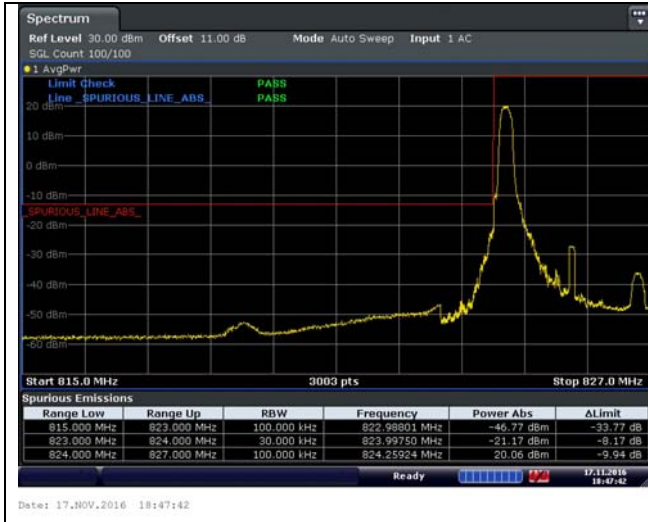


Date: 17.NOV.2016 18:37:57

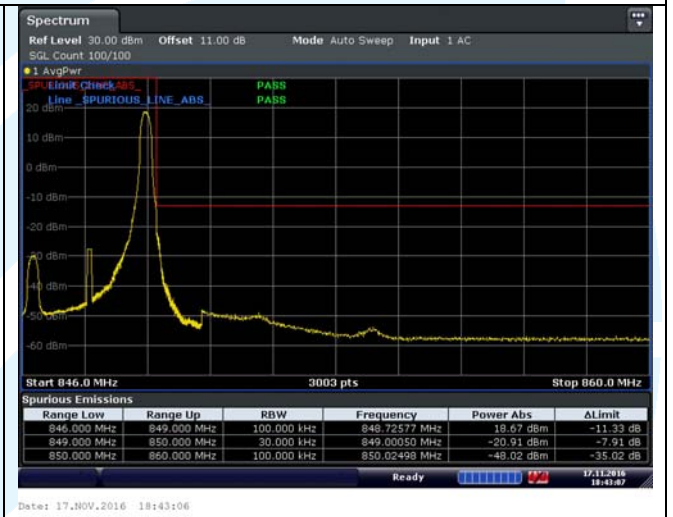
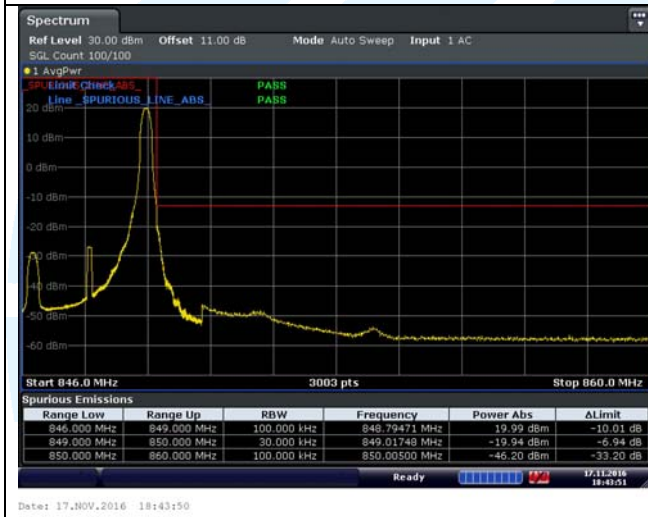
Date: 17.NOV.2016 18:37:19

**LTE\_Band 5\_Channel Bandwidth: 3 MHz\_1RB#0**

**LCH**

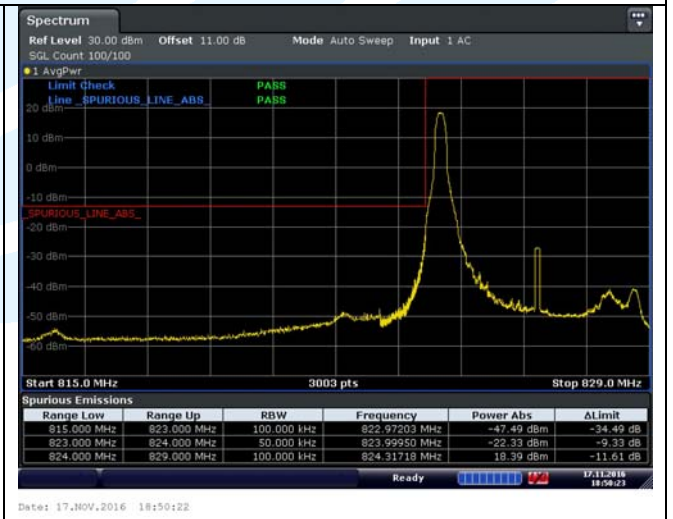
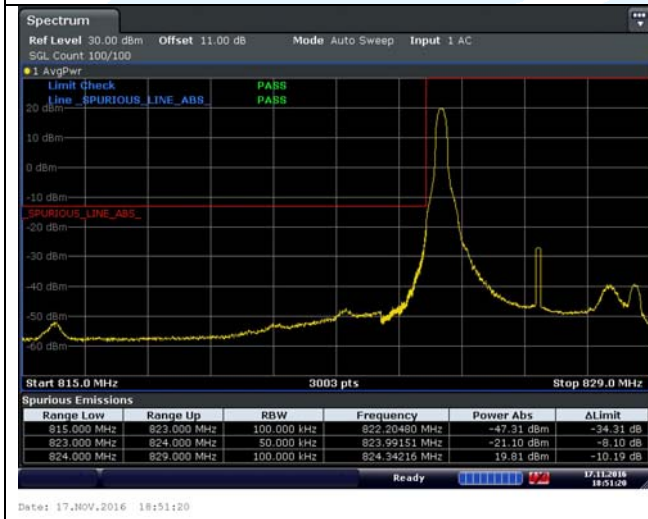


### HCH

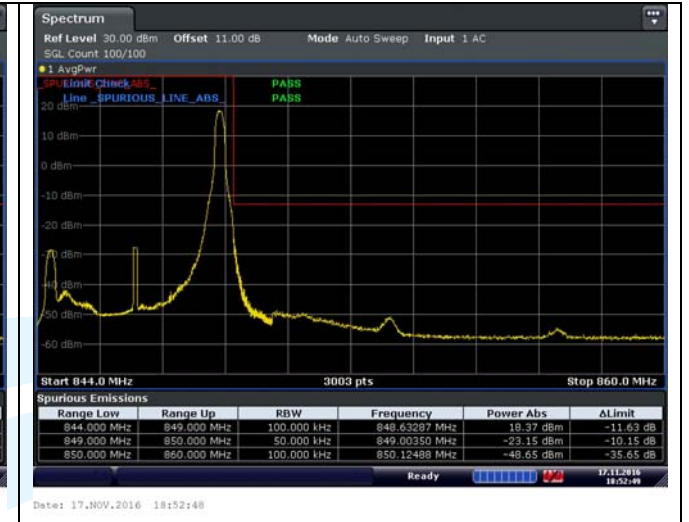


### LTE\_Band 5\_Channel Bandwidth: 5 MHz\_1RB#0

### LCH



### HCH

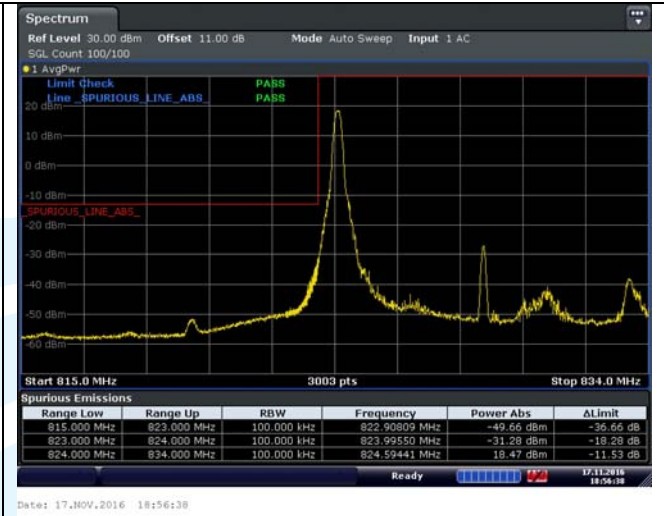
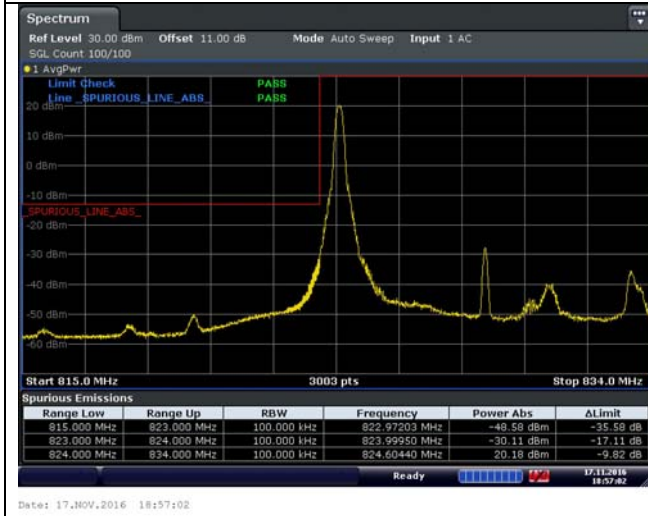


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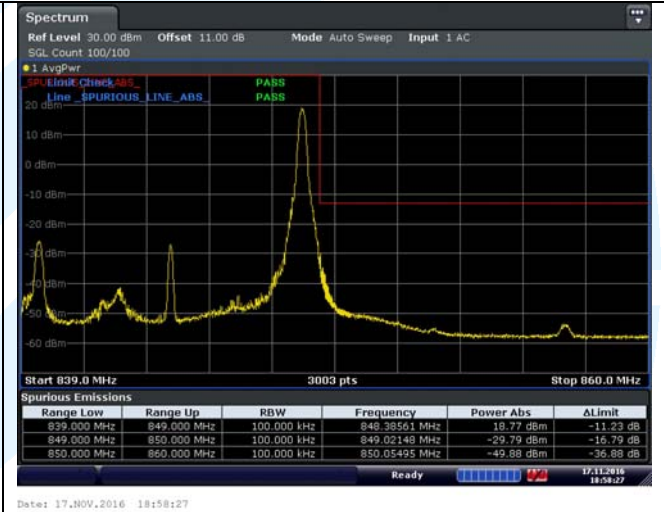
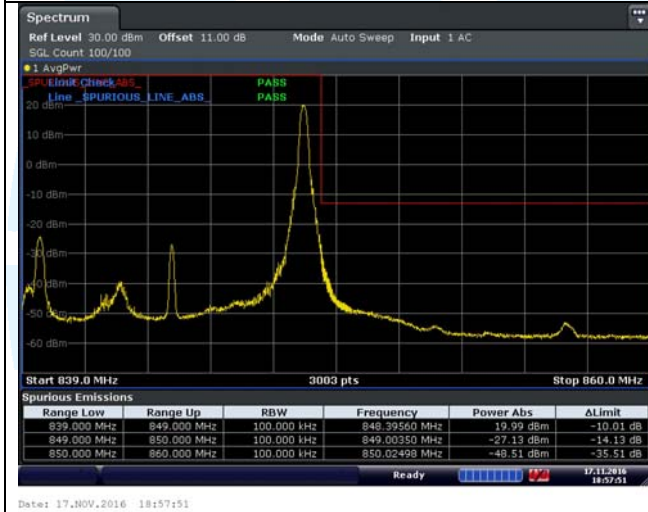
Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China  
 Tel: +86-755-28230888 Fax: +86-755-28230886 E-mail: info@uttlab.com [Http://www.uttlab.com](http://www.uttlab.com)

## LTE\_Band 5\_Channel Bandwidth: 10 MHz\_1RB#0

### LCH



### HCH

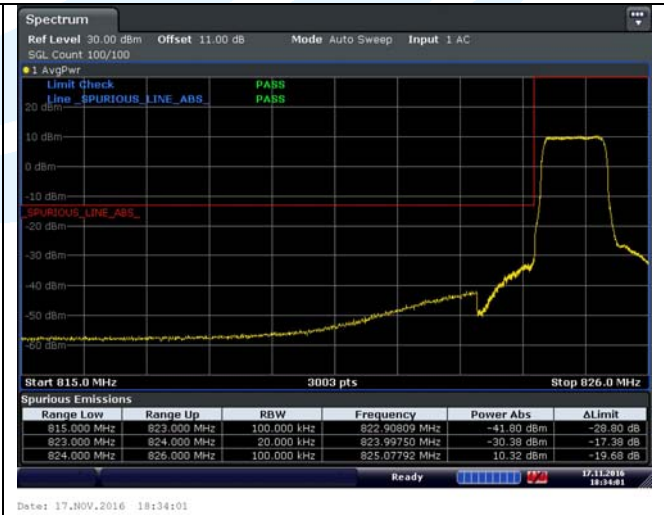


QPSK

16QAM

## LTE\_Band 5\_Channel Bandwidth: 1.4 MHz\_6RB#0

### LCH



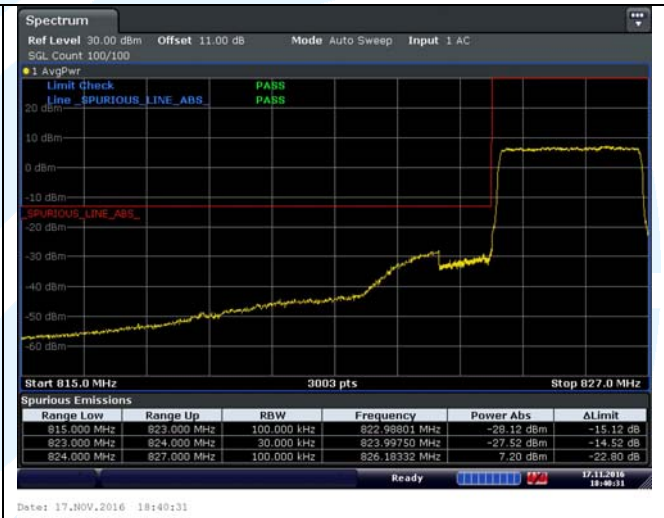


## HCH



## LTE\_Band 5\_Channel Bandwidth: 3 MHz\_15RB#0

## LCH



## HCH



## LTE\_Band 5\_Channel Bandwidth: 5 MHz\_25RB#0

### LCH

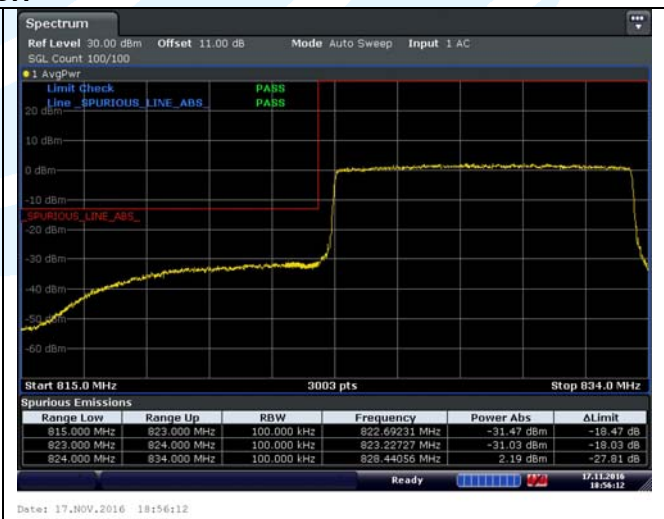
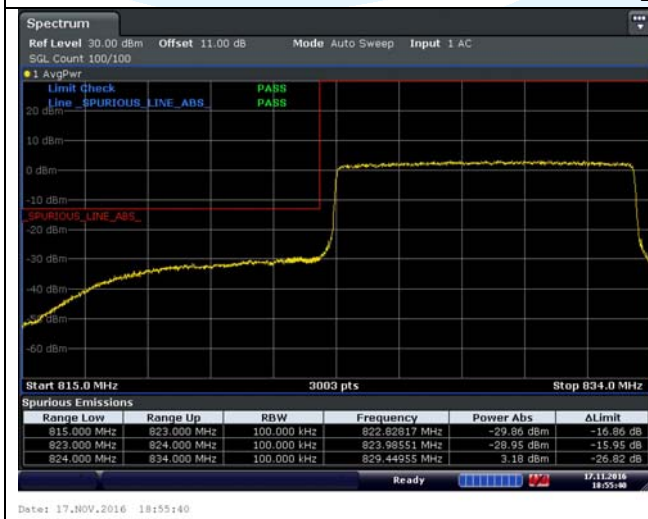


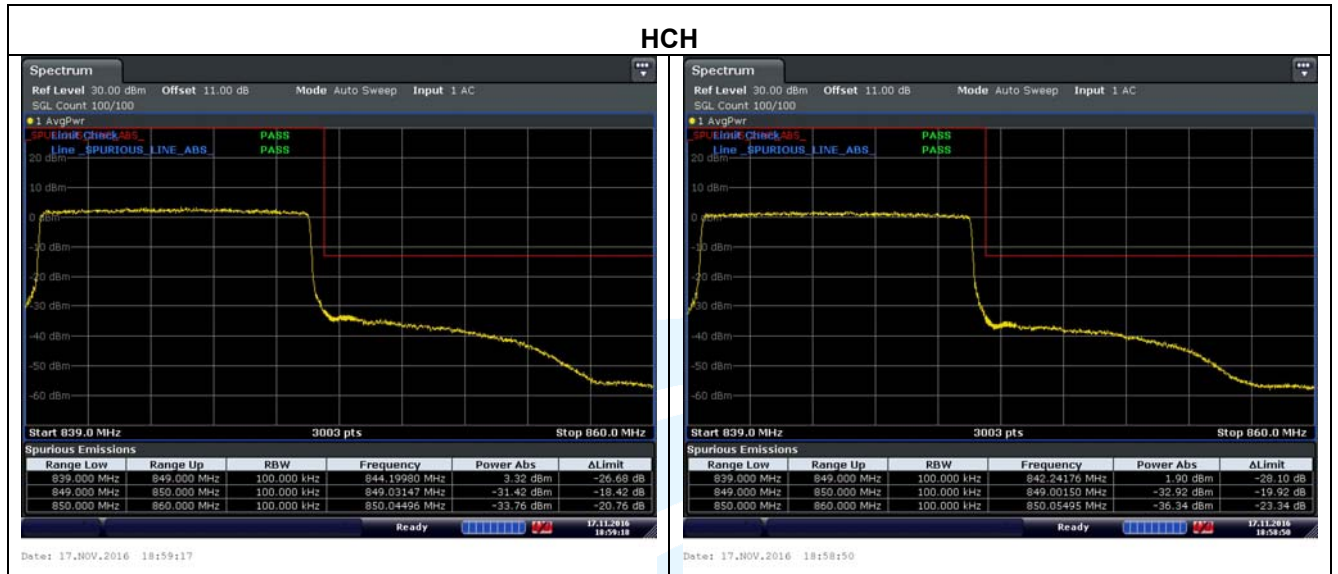
### HCH



## LTE\_Band 5\_Channel Bandwidth: 10 MHz\_50RB#0

### LCH





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## 5.5 Spurious emissions at antenna terminals

<b>Test Requirement:</b>	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)(b)
<b>Test Method:</b>	ANSI/TIA/EIA-603-D 2010 & KDB 971168 D01v02r02
<b>Limit:</b>	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to $-13$ dBm.
<b>Test Procedure:</b>	The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 9 kHz to 9 GHz. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

<b>Test Setup:</b>	Refer to section 4.1.1(2) for details.
<b>Instruments Used:</b>	Refer to section 3 for details
<b>Test Mode:</b>	Link mode
<b>Test Results:</b>	Pass

The test plot as follows:

### Spurious Emission Test Data (9 KHz ~ 30 MHz):

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

Spurious Emission Test Data (30 MHz ~ 9 GHz):

