



# RF TEST REPORT

**Applicant** Green Packet Berhad, Taiwan  
**FCC ID** W9V-OH735-GP  
**Product** OH-735 LTE Cat. 6 Outdoor Gateway  
**Brand** Greenpacket  
**Model** OH-735  
**Report No.** R1805A0253-R2  
**Issue Date** July 4, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2/FCC CFR 47 Part 90Z**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

*Jiang peng Lan*

*Kai Xu*

*Performed by: Jiang Peng Lan*

*Approved by: Kai Xu*

## TA Technology (Shanghai) Co., Ltd.

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### Summary of measurement results

No.	Test Type	Clause in FCC rules	Verdict
1	RF Power Output & Effective Isotropic Radiated Power	2.1046/90.1321(a)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edges Compliance	2.1051/ 90.1323	PASS
4	Emission Mask	90.210(b)	PASS
5	Frequency Stability	2.1055	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 / 90.1323	PASS
7	Field Strength of Spurious Radiation / Radiated Spurious Emissions	2.1053/ 90.1323	PASS
Date of Testing: June 9, 2018~ June 22, 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. TestingLocation

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

### Client Information

Applicant	Green Packet Berhad, Taiwan
Applicant address	6F, No.21, Lane 583, Rueiguang Rd. Neihu District, Taipei City 11492, Taiwan
Manufacturer	Green Packet Berhad, Taiwan
Manufacturer address	6F, No.21, Lane 583, Rueiguang Rd. Neihu District, Taipei City 11492, Taiwan

### General Information

EUT Description			
Model	OH-735		
Product IMEI	351918068945060		
Hardware Version	V2.0		
Software Version	MG6_0.3.2.14_V0.5-ODU-GP		
Power Supply	AC adapter		
Antenna Type	Internal Antenna		
Antenna Gain	8.5dBi		
Test Mode(s)	LTE Band 43		
Test Modulation	QPSK,16QAM;		
LTE Category	6		
Maximum E.I.R.P.	LTE Band 43:	25.52 dBm	
Rated Power Supply Voltage	24V		
Extreme Voltage	Minimum: 21V    Maximum: 27V		
Extreme Temperature	Lowest: -40°C    Highest: +60°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	LTE Band 43	3650 ~ 3700	3650 ~ 3700
EUT Accessory			
Adapter 1	Manufacturer: Aquilstar Precision Industry (Shenzhen) Co., Ltd. Model: ASSA67A-240100		
Adapter 2	Manufacturer: Aquilstar Precision Industry (Shenzhen) Co., Ltd. Model: ASSA107A-240050		
Note: The information of the EUT is declared by the manufacturer.			

### 3. Applied Standards

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

**FCC CFR47 Part 2 (2017)**

**FCC CFR 47 Part 90Z (2017)**

**ANSI/TIA-603-E (2016)**

**FCC KDB 971168 D01 Power Meas License Digital Systems v03r01**

**FCC KDB 552295 D01 CBP Guidance for 3650 3700 Band 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 (Z axis, horizontal polarization) and the worst case was recorded.

All mode and data rates and positions were investigated.

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

Test modes are chosen as the worst case configuration below for LTE Band 43

Test items	Bandwidth (MHz)				Modulation		RB			Test Channel		
	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	O	O	O	O	O	O	-	-	O	O	O	O
Effective Isotropic Radiated power	O	O	O	O	O	O	-	-	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	-	-	O	O	O	O
Band Edge Compliance	O	O	O	O	O	O	O	-	O	O	-	O
Emission Mask	O	O	O	O	O	O	O	-	O	O	-	O
Frequency Stability	O	O	O	O	O	O	-	-	O	O	-	O
Spurious Emissions at Antenna Terminals	O	O	O	O	O	-	O	-	-	O	O	O
Field Strength of Spurious Radiation/ Radiates Spurious Emission	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 & Effective Isotropic Radiated Power & the Peak EIRP Density

#### Ambient condition

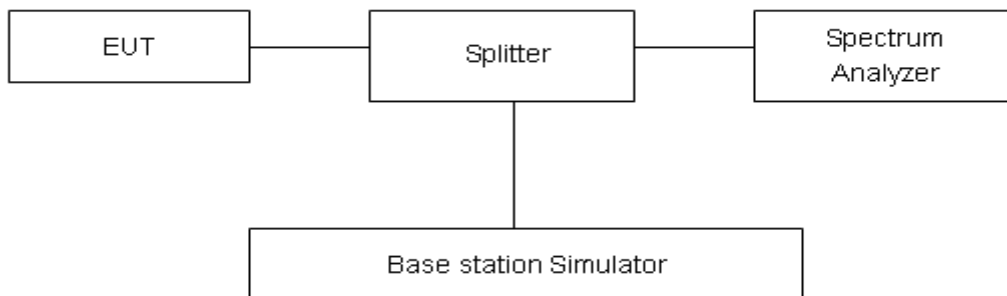
Temperature	Relative humidity
21°C ~25°C	40%~60%

#### Methods of Measurement

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

Since this procedure utilizes a conducted measurement it does not directly result in EIRP levels for comparison to the output power limits. In order to determine the EIRP level, the effective antenna gain must be added to the corrected (for external test set-up factors) measurement result.

#### Test Setup



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

#### Limits

According to FCC §2.1046 & 90.1321(a) Base and fixed stations are limited to 25 watts/25 MHz equivalent isotropically radiated power (EIRP). In any event, the peak EIRP power density shall not exceed 1 Watt in any one-megahertz slice of spectrum.

(c) Mobile and portable stations are limited to 1 watt/25 MHz EIRP. In any event, the peak EIRP density shall not exceed 40 milliwatts in any one-megahertz slice of spectrum.

Limit	Limit
Base Station/ Fixed Station	25 watts/25 MHz
Mobile and portable stations	1 watt/25 MHz

## 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**

LTE Band 43				Conducted Power(dBm)			EIRP(dBm)			EIRP(mW)			Limit (mW)	EIRP(mW)/25MHz			Limit (mW)
BW	Mddulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)				Channel/Frequency(MHz)			
				44115 /3652.5	44340 /3675	44565 /3697.5	44115 /3652.5	44340 /3675	44565 /3697.5	44115 /3652.5	44340 /3675	44565 /3697.5		44115 /3652.5	44340 /3675	44565 /3697.5	
5MHz	QPSK	25	0	16.83	15.50	15.79	25.33	24.00	24.29	341.193	251.189	268.534	1000	1705.96	1255.94	1342.67	25000
	16QAM	25	0	15.69	14.95	14.49	24.19	23.45	22.99	262.422	221.309	199.067	1000	1312.11	1106.55	995.337	25000
10MHz	QPSK	50	0	16.58	15.71	15.65	25.08	24.21	24.15	322.107	263.633	260.016	1000	805.267	659.083	650.04	25000
	16QAM	50	0	15.65	16.01	14.76	24.15	24.51	23.26	260.016	282.488	211.836	1000	650.04	706.22	529.59	25000
15MHz	QPSK	75	0	16.85	16.25	16.56	25.35	24.75	25.06	342.768	298.538	320.627	1000	571.28	497.564	534.378	25000
	16QAM	75	0	15.80	15.01	14.63	24.30	23.51	23.13	269.153	224.388	205.589	1000	448.589	373.98	342.648	25000
20MHz	QPSK	100	0	16.98	16.81	17.02	25.48	25.31	25.52	353.183	339.625	356.451	1000	441.479	424.532	445.564	25000
	16QAM	100	0	16.02	15.91	16.19	24.52	24.41	24.69	283.139	276.058	294.442	1000	353.924	345.072	368.053	25000

Note: EIRP=Conducted Power + Antenna Gain (Antenna Gain =8.5dBi)  
 $EIRP(mW)=10^{(EIRP(dBm)/10)}$   
 $EIRP(mW)/25MHz= 25 * EIRP(mW) / BW$



LTE Band 43 QPSK 5MHz CH44115



LTE Band 43 16QAM 5MHz CH44115



LTE Band 43 QPSK 5MHz CH44340



LTE Band 43 16QAM 5MHz CH44340



LTE Band 43 QPSK 5MHz CH44565



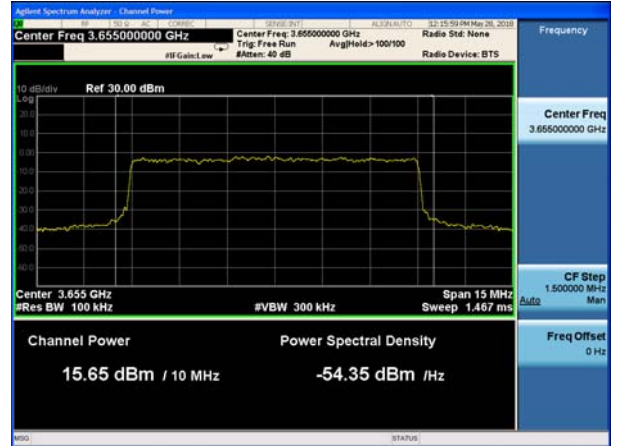
LTE Band 43 16QAM 5MHz CH44565



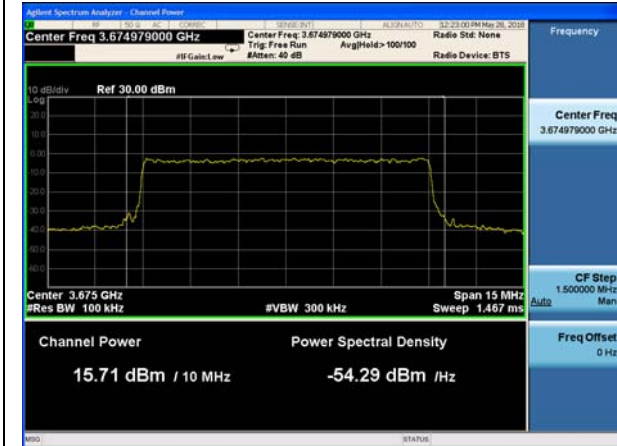
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LTE Band 43 16QAM 10MHz CH44140



LTE Band 43 QPSK 10MHz CH44340



LTE Band 43 16QAM 10MHz CH44340



LTE Band 43 QPSK 10MHz CH44540



LTE Band 43 16QAM 10MHz CH44540



LTE Band 43 QPSK 15MHz CH44165



LTE Band 43 16QAM 15MHz CH44165



LTE Band 43 QPSK 15MHz CH44340



LTE Band 43 16QAM 15MHz CH44340



LTE Band 43 QPSK 15MHz CH44515



LTE Band 43 16QAM 15MHz CH44515



LTE Band 43 QPSK 20MHz CH44190



LTE Band 43 16QAM 20MHz CH44190



LTE Band 43 QPSK 20MHz CH44340



LTE Band 43 16QAM 20MHz CH44340



LTE Band 43 QPSK 20MHz CH44490



LTE Band 43 16QAM 20MHz CH44490

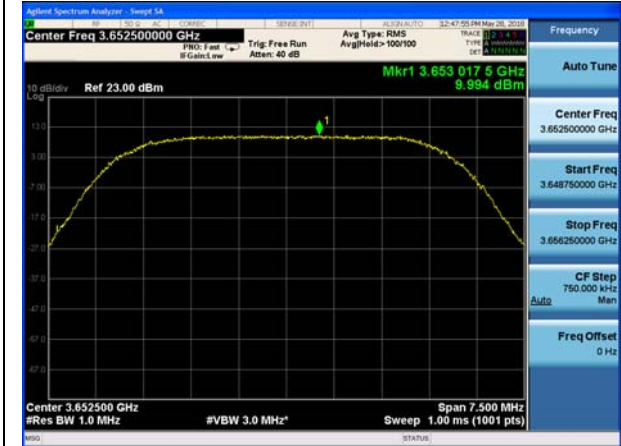


LTE Band 43				Conducted Power Spectral Density(dBm)/1MHz			EIRP Power Spectral Density(dBm)/1MHz			EIRP Power Spectral Density(mW)/1MHz			Limit(mW)/1MHz
BW	Mddulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			
				44115 /3652.5	44340 /3675	44565 /3697.5	44115 /3652.5	44340 /3675	44565 /3697.5	44115 /3652.5	44340 /3675	44565 /3697.5	
5MHz	QPSK	25	0	9.994	9.686	9.470	18.494	18.186	17.970	70.6968	65.8567	62.6614	1000
	16QAM	25	0	8.835	8.994	8.696	17.335	17.494	17.196	54.1377	56.1565	52.4324	1000
10MHz	QPSK	50	0	7.452	7.097	6.072	15.952	15.597	14.572	39.3731	36.2827	28.655	1000
	16QAM	50	0	6.087	6.256	5.707	14.587	14.756	14.207	28.7541	29.8951	26.3451	1000
15MHz	QPSK	75	0	5.642	5.201	7.978	14.142	13.701	16.478	25.9537	23.4477	44.4427	1000
	16QAM	75	0	3.908	3.883	5.035	12.408	12.383	13.535	17.41	17.3101	22.5684	1000
20MHz	QPSK	100	0	5.192	5.619	2.962	13.692	14.119	11.462	23.3991	25.8167	14.0023	1000
	16QAM	100	0	3.765	3.898	3.191	12.265	12.398	11.691	16.8461	17.37	14.7605	1000

NOTE: EIRP PSD(dBm)=conducted PSD(dBm)+ Antenna Gain (Antenna Gain =8.5dBi)  
 EIRP PSD(mW)= 10<sup>(EIRP PSD(dBm)/10)</sup>



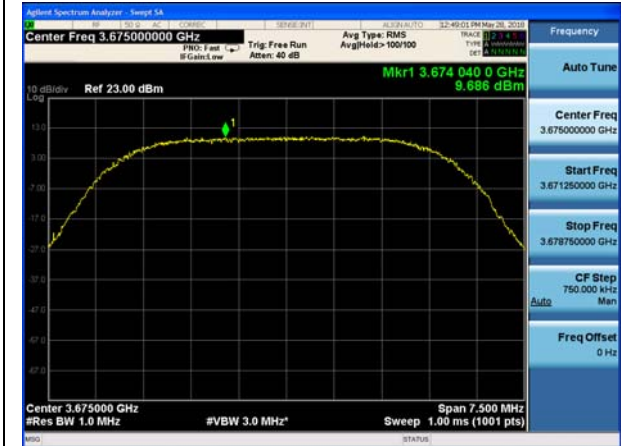
LTE Band 43 QPSK 5MHz CH44115



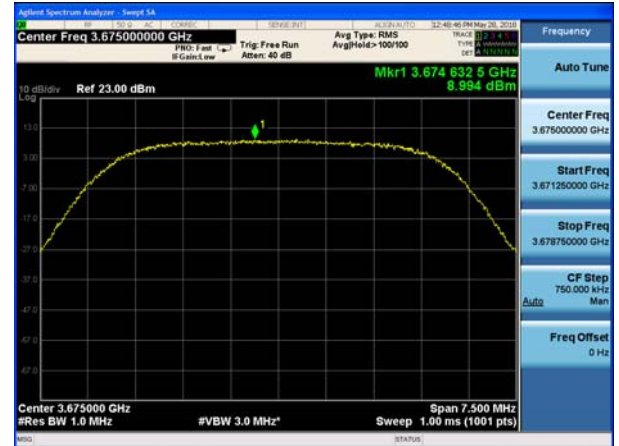
LTE Band 43 16QAM 5MHz CH44115



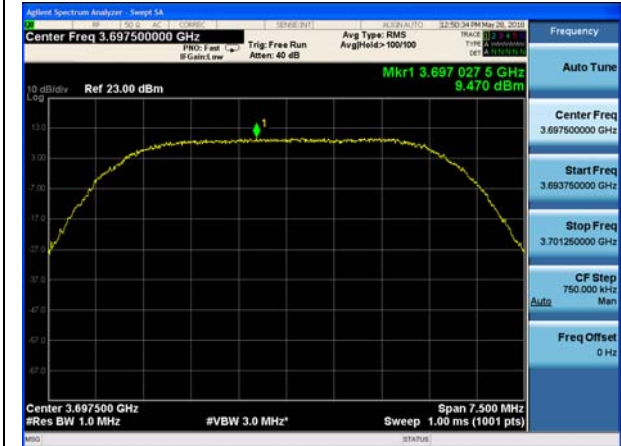
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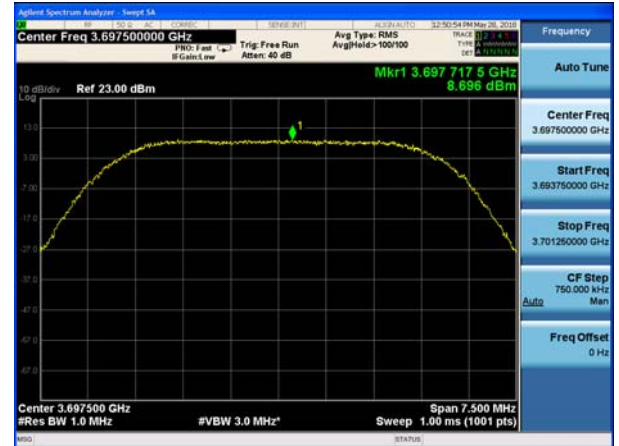
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LTE Band 43 QPSK 5MHz CH44565



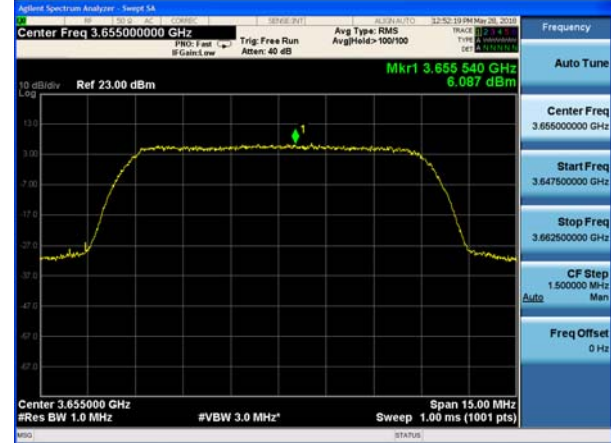
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LTE Band 43 QPSK 10MHz CH44140



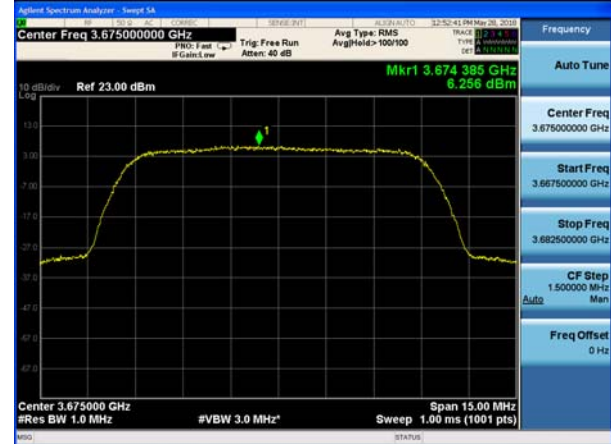
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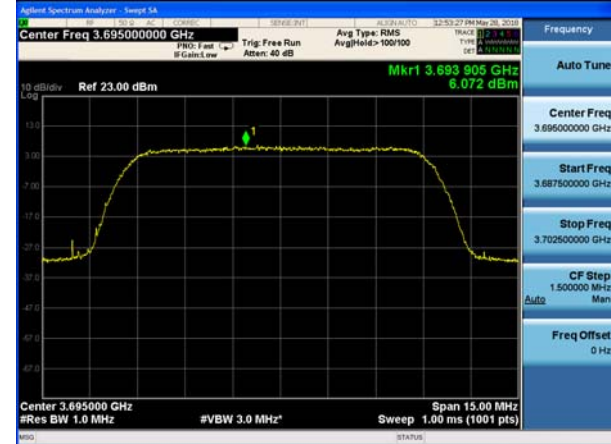
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LTE Band 43 16QAM 10MHz CH44340



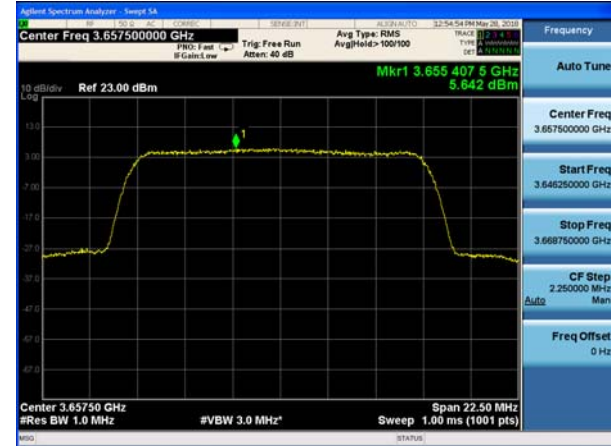
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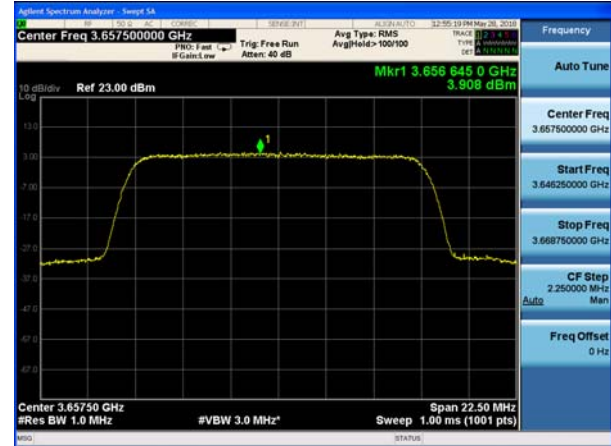
LTE Band 43 16QAM 10MHz CH44540



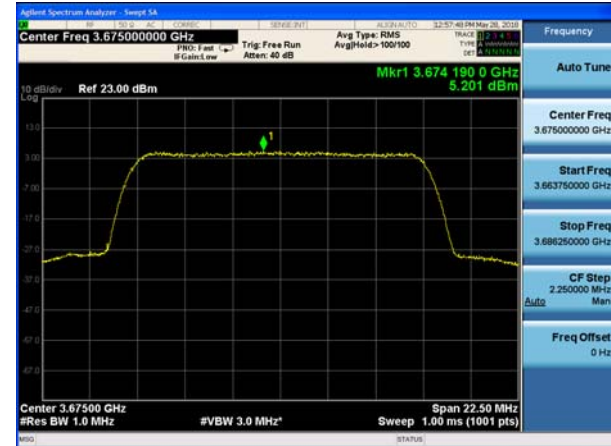
LTE Band 43 QPSK 15MHz CH44165



LTE Band 43 16QAM 15MHz CH44165



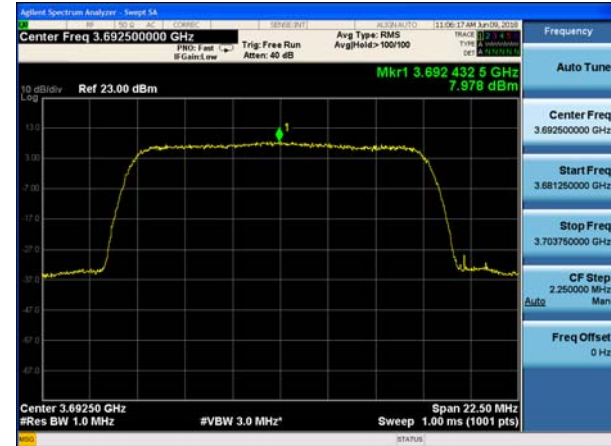
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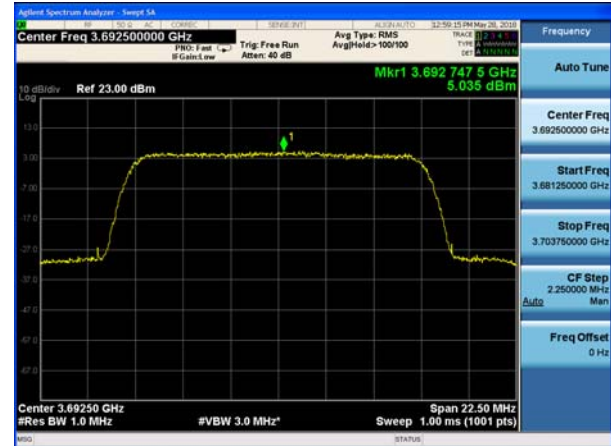
LTE Band 43 16QAM 15MHz CH44340



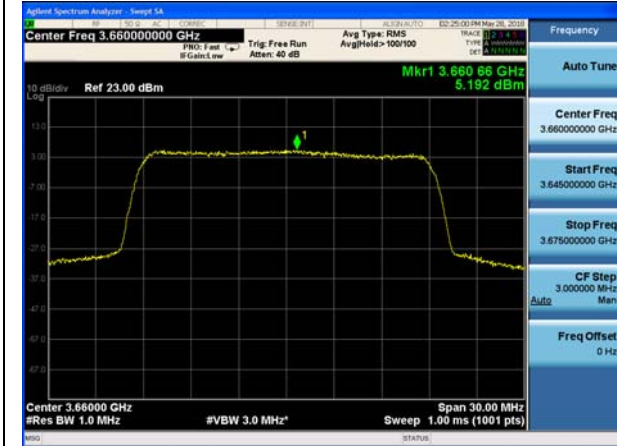
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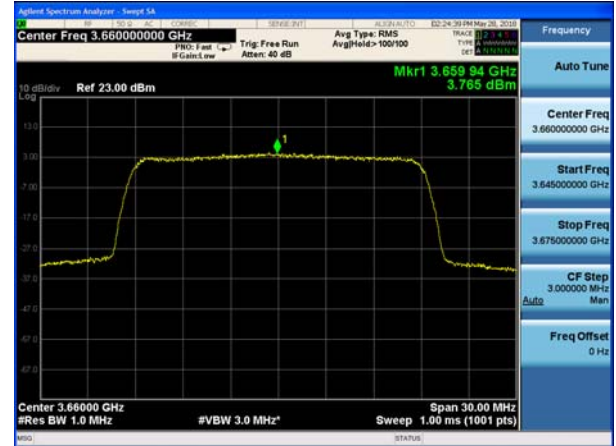
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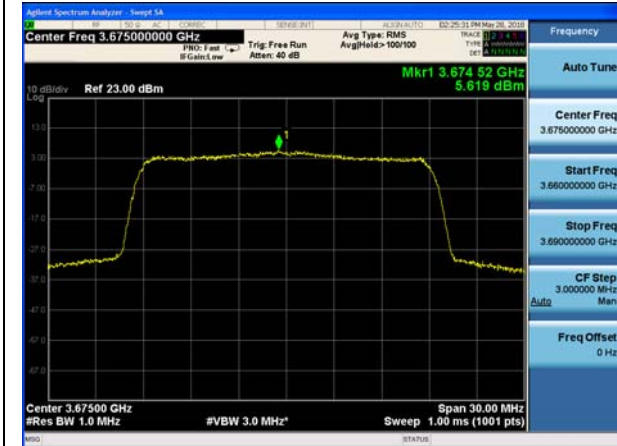
LTE Band 43 QPSK 20MHz CH44190



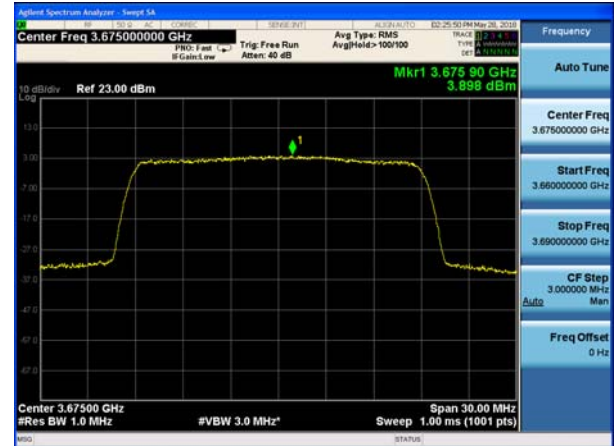
LTE Band 43 16QAM 20MHz CH44190



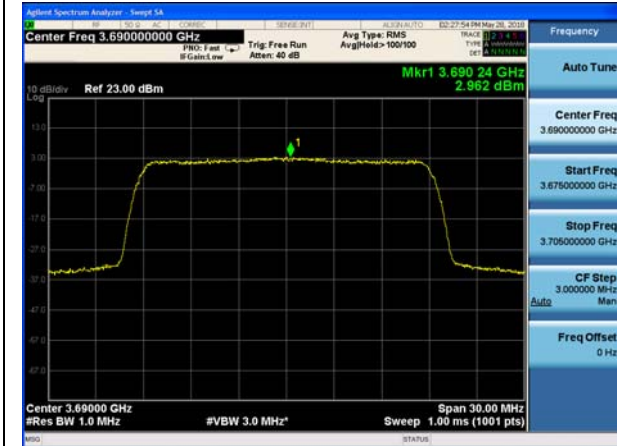
LTE Band 43 QPSK 20MHz CH44340



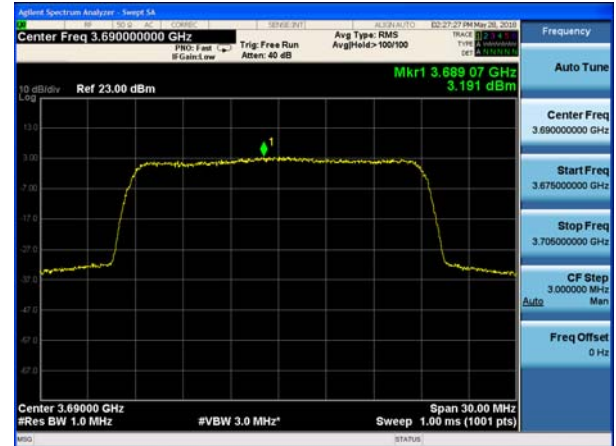
LTE Band 43 16QAM 20MHz CH44340



LTE Band 43 QPSK 20MHz CH44490



LTE Band 43 16QAM 20MHz CH44490



## 5.2. Occupied Bandwidth

### Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

### Method of Measurement

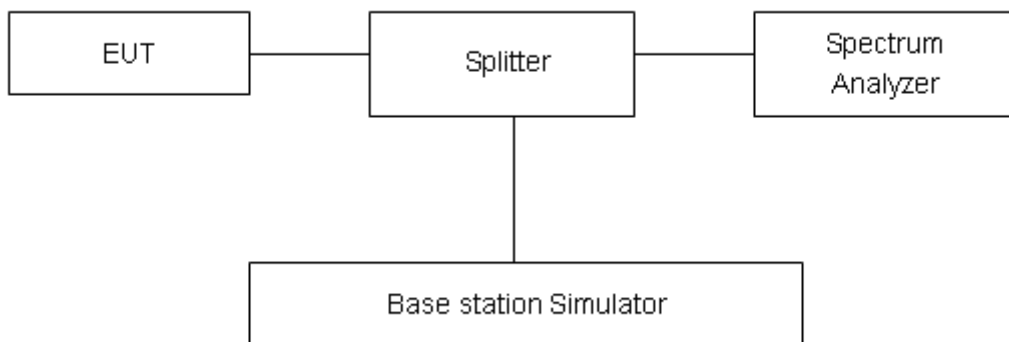
The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 43 (5MHz),

RBW is set to 300 kHz, VBW is set to 1MHz for LTE Band 43 (10MHz/15MHz/20MHz).

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

### Test Setup



### Limits

No specific occupied bandwidth requirements.

### Measurement Uncertainty

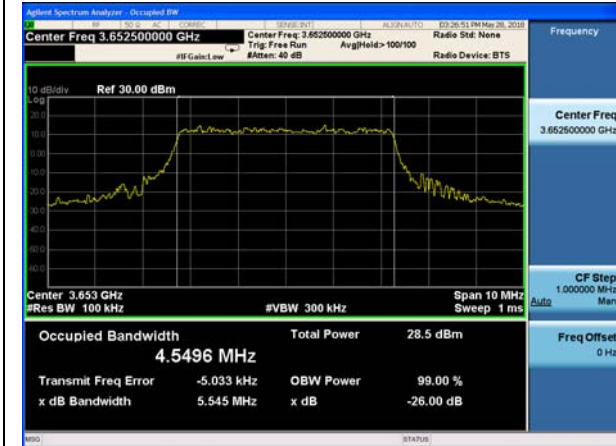
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2$ ,  $U=624\text{Hz}$ .

**Test Result**

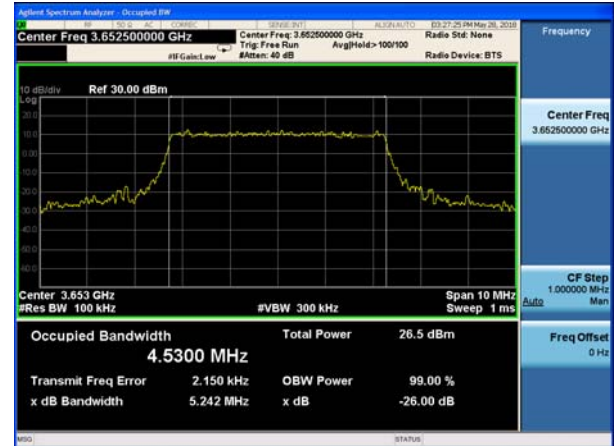
LTE Band 43						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth (MHz)
100%	QPSK	5	44115	3652.5	4.5496	5.545
			44340	3675	4.5385	5.487
			44565	3697.5	4.5280	5.225
		10	44140	3655	9.0672	10.050
			44340	3675	9.0667	10.780
			44540	3695	9.0784	10.710
		15	44165	3657.5	13.4830	14.410
			44340	3675	13.5230	15.160
			44515	3692.5	13.4920	14.720
		20	44190	3660	17.9170	18.910
			44340	3675	17.8680	18.930
			44490	3690	17.8640	19.080
	16QAM	5	44115	3652.5	4.5300	5.242
			44340	3675	4.5218	5.318
			44565	3697.5	4.5207	5.174
		10	44140	3655	9.0534	10.330
			44340	3675	9.0224	10.250
			44540	3695	9.0656	10.140
		15	44165	3657.5	13.4950	14.870
			44340	3675	13.4790	15.110
			44515	3692.5	13.4800	14.620
		20	44190	3660	17.8580	19.420
			44340	3675	17.8860	19.150
			44490	3690	17.8910	19.130



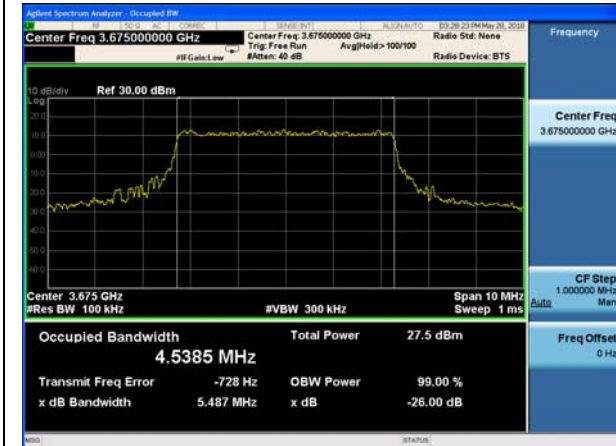
LTE Band 43 QPSK 5MHz CH44115



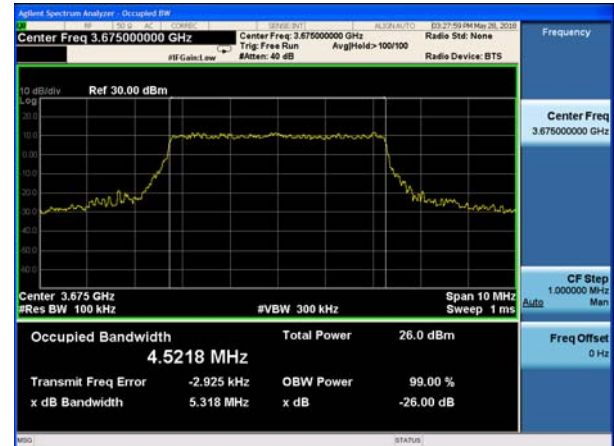
LTE Band 43 16QAM 5MHz CH44115



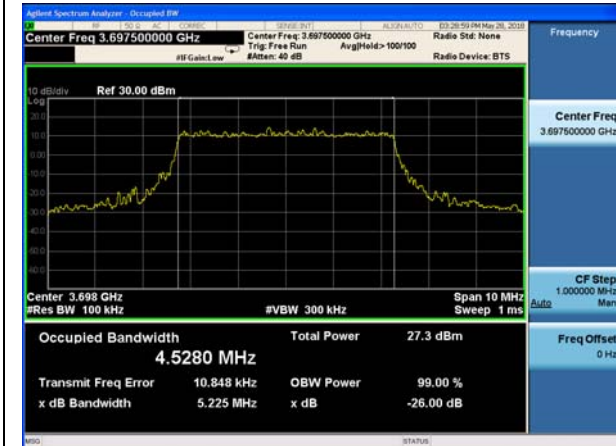
LTE Band 43 QPSK 5MHz CH44340



LTE Band 43 16QAM 5MHz CH44340



LTE Band 43 QPSK 5MHz CH44565

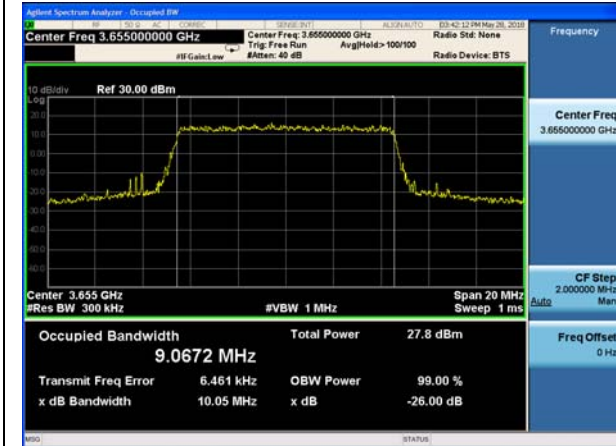


LTE Band 43 16QAM 5MHz CH44565

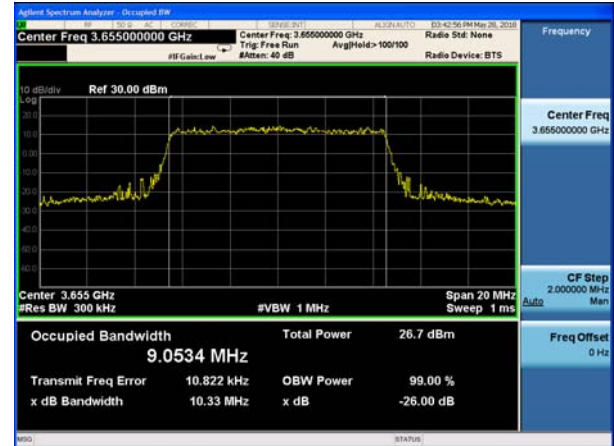




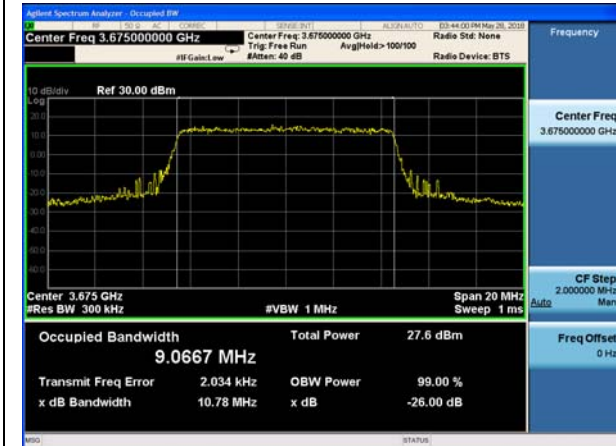
LTE Band 43 QPSK 10MHz CH44140



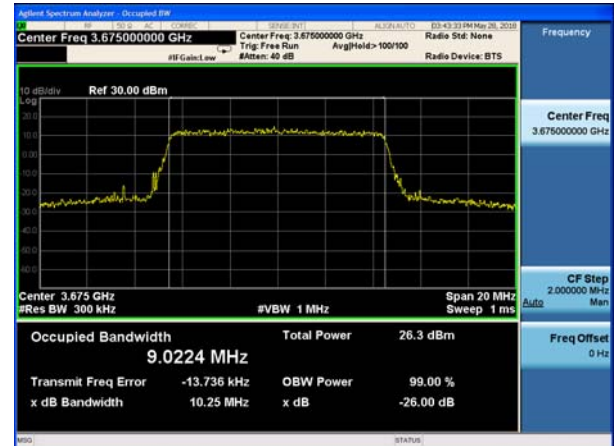
LTE Band 43 16QAM 10MHz CH44140



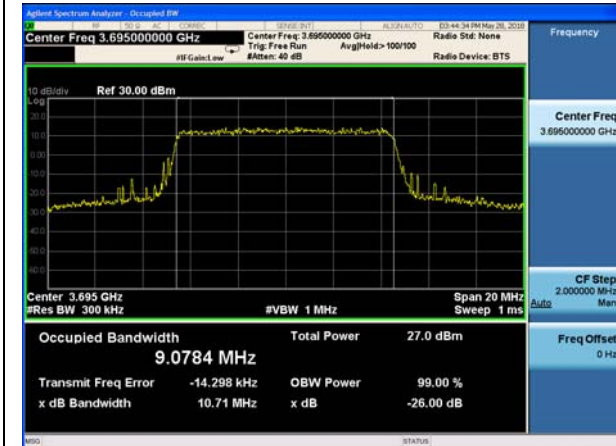
LTE Band 43 QPSK 10MHz CH44340



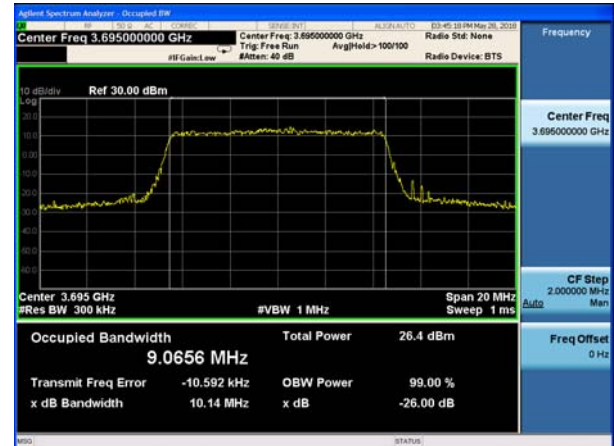
LTE Band 43 16QAM 10MHz CH44340



LTE Band 43 QPSK 10MHz CH44540



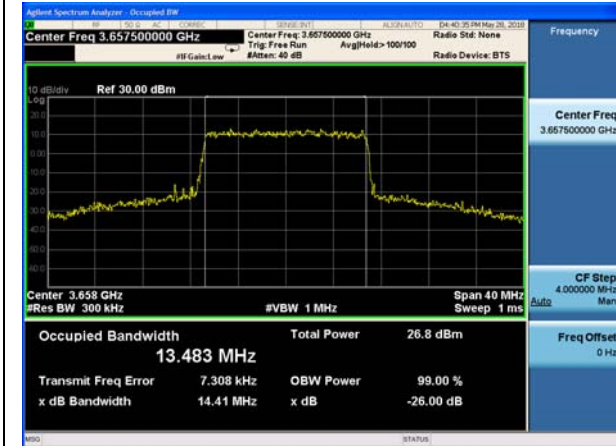
LTE Band 43 16QAM 10MHz CH44540



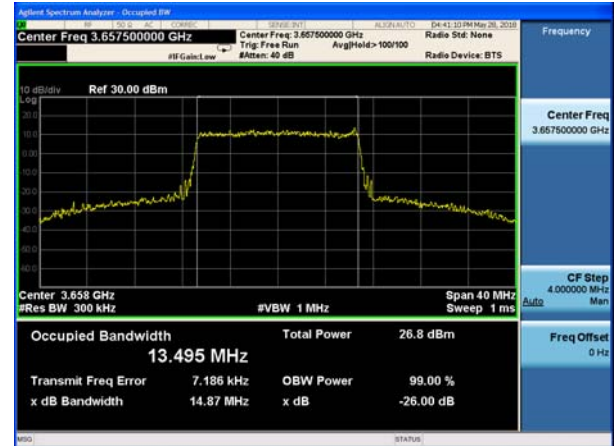




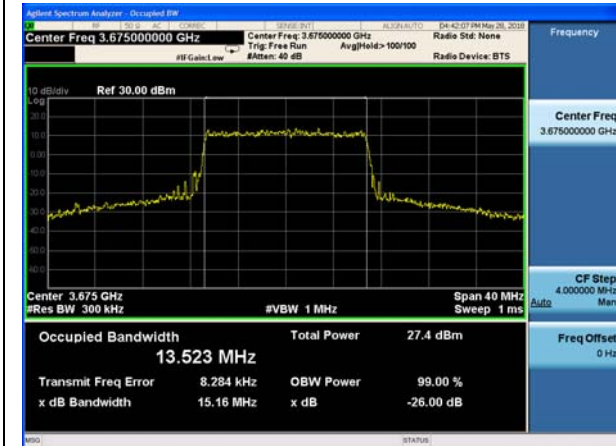
LTE Band 43 QPSK 15MHz CH44165



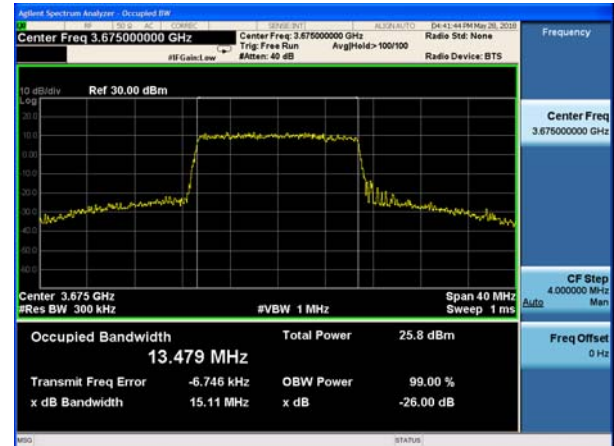
LTE Band 43 16QAM 15MHz CH44165



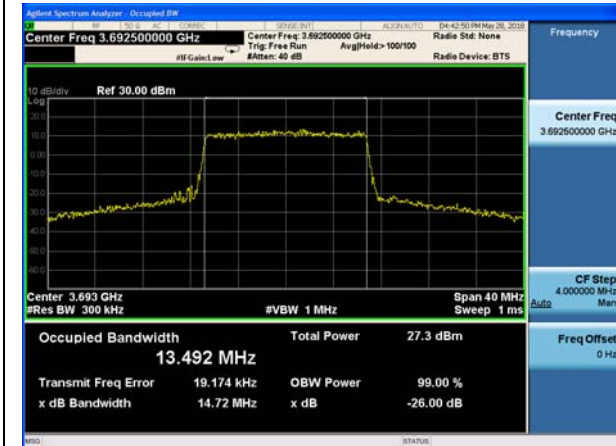
LTE Band 43 QPSK 15MHz CH44340



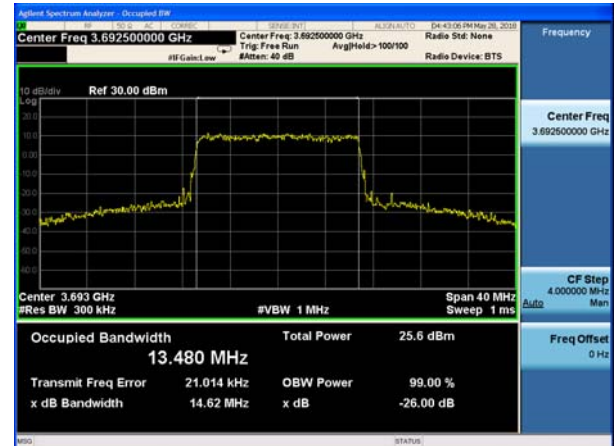
LTE Band 43 16QAM 15MHz CH44340



LTE Band 43 QPSK 15MHz CH44515

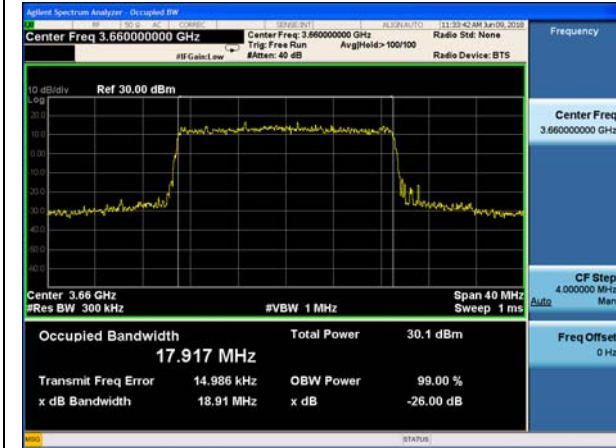


LTE Band 43 16QAM 15MHz CH44515

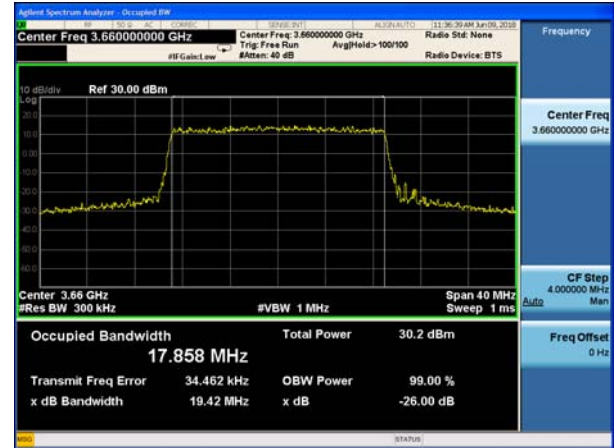




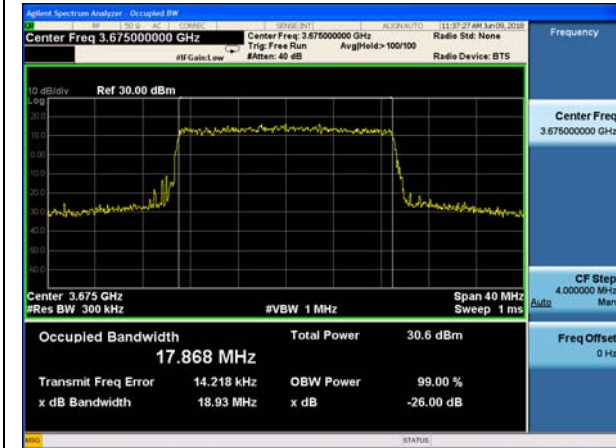
LTE Band 43 QPSK 20MHz CH44190



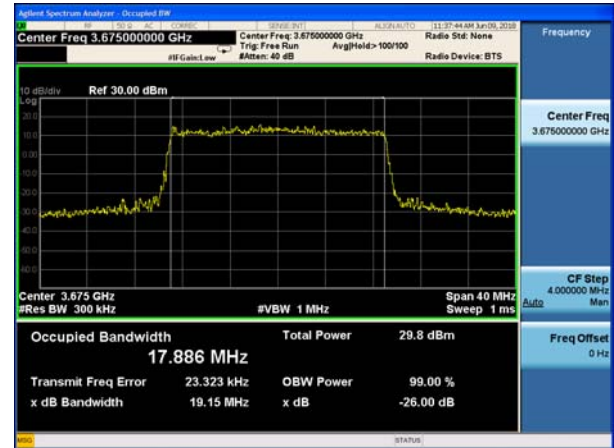
LTE Band 43 16QAM 20MHz CH44190



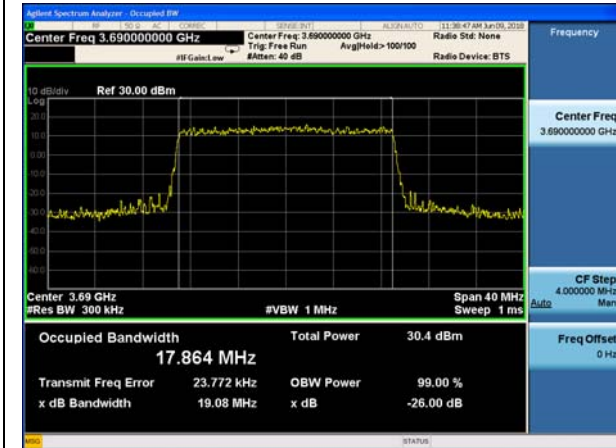
LTE Band 43 QPSK 20MHz CH44340



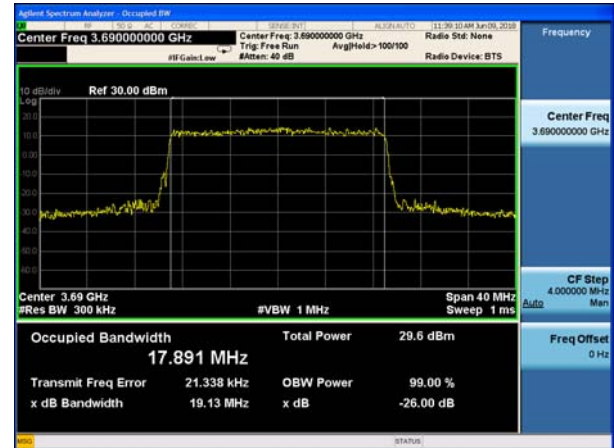
LTE Band 43 16QAM 20MHz CH44340



LTE Band 43 QPSK 20MHz CH44490



LTE Band 43 16QAM 20MHz CH44490



### 5.3. Band Edge Compliance

#### Ambient condition

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

#### Method of Measurement

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

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. For LTE Band 43 Set RBW  $\geq$  1% EBW in the 1MHz band immediately outside and adjacent to the band edge. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.

RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 43 (5MHz).

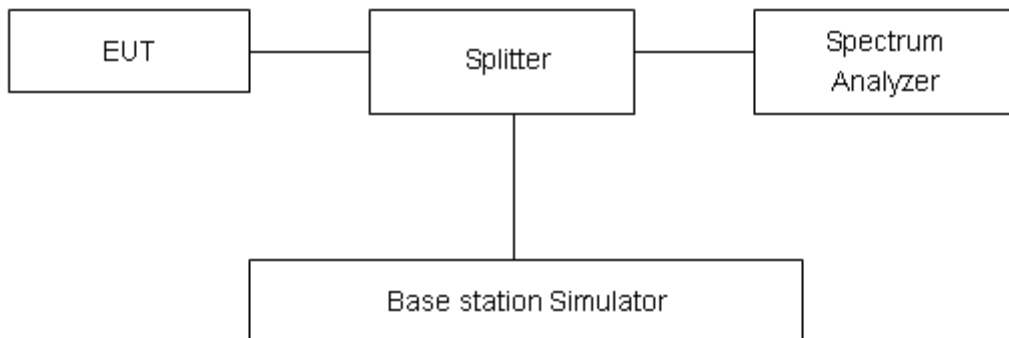
RBW is set to 100 kHz, VBW is set to 300kHz for LTE Band 43 (10MHz).

RBW is set to 150 kHz, VBW is set to 510 kHz for LTE Band 43 (15MHz).

RBW is set to 200 kHz, VBW is set to 620 kHz for LTE Band 43 (20MHz) 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 2.1051&90.1323 specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.”

Limit	-13 dBm
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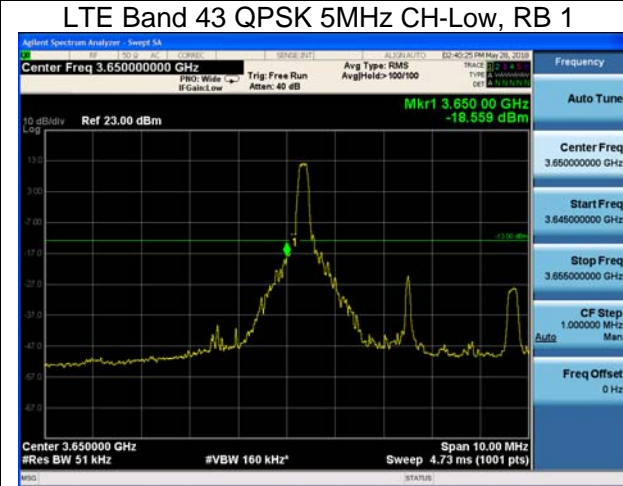
**Measurement Uncertainty**

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

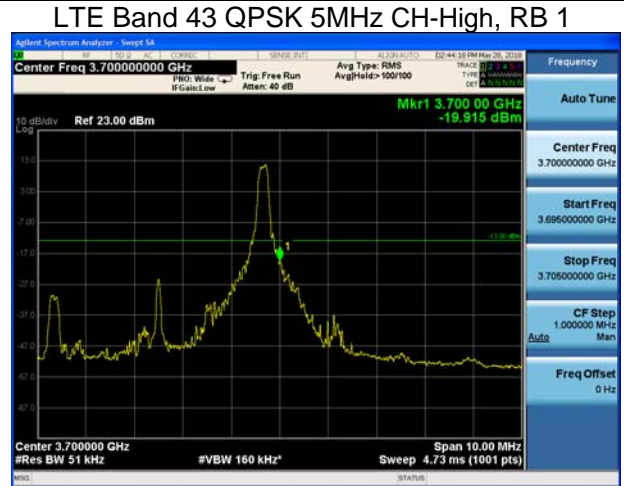
**Test Result**

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

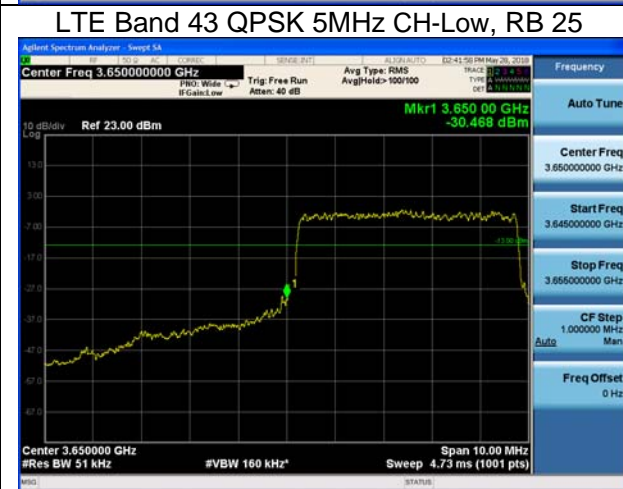
LTE Band 43 QPSK 5MHz CH-Low, RB 1



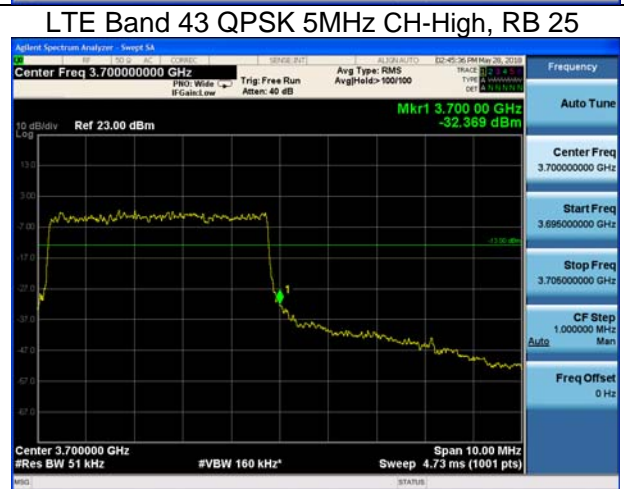
LTE Band 43 QPSK 5MHz CH-High, RB 1



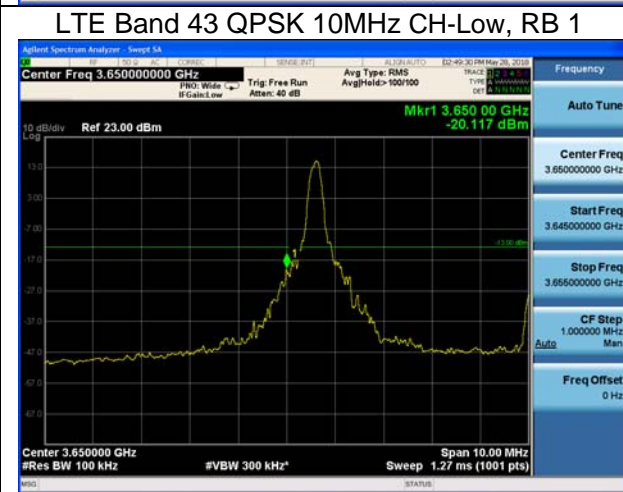
LTE Band 43 QPSK 5MHz CH-Low, RB 25



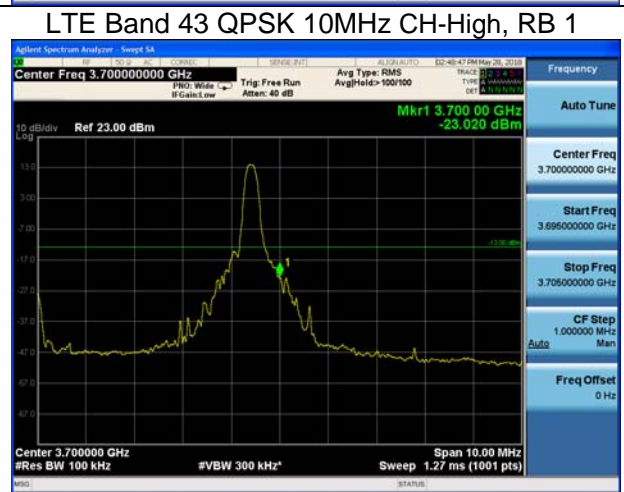
LTE Band 43 QPSK 5MHz CH-High, RB 25



LTE Band 43 QPSK 10MHz CH-Low, RB 1



LTE Band 43 QPSK 10MHz CH-High, RB 1



LTE Band 43 QPSK 10MHz CH-Low, RB 50



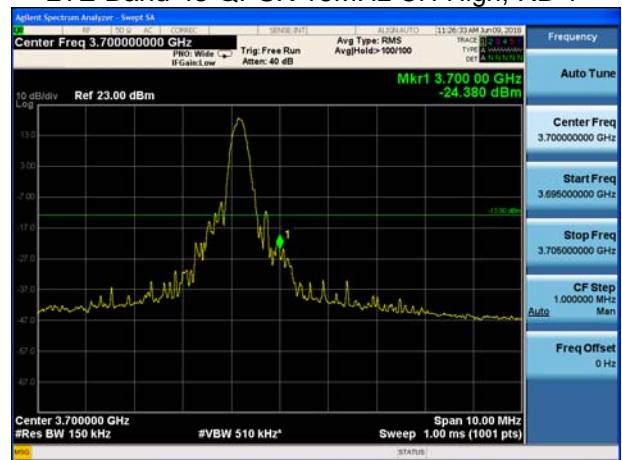
LTE Band 43 QPSK 10MHz CH-High, RB 50



LTE Band 43 QPSK 15MHz CH-Low, RB 1



LTE Band 43 QPSK 15MHz CH-High, RB 1



LTE Band 43 QPSK 15MHz CH-Low, RB 75

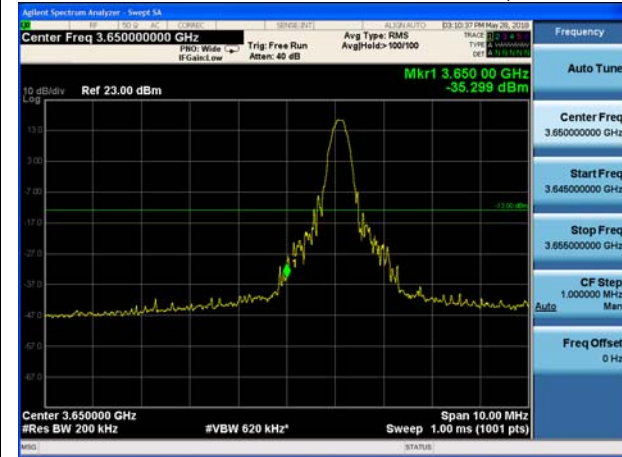


LTE Band 43 QPSK 15MHz CH-High, RB 75





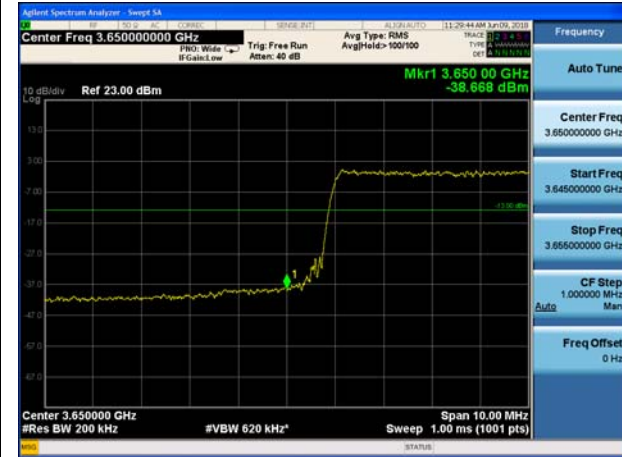
LTE Band 43 QPSK 20MHz CH-Low, RB 1



LTE Band 43 QPSK 20MHz CH-High, RB 1



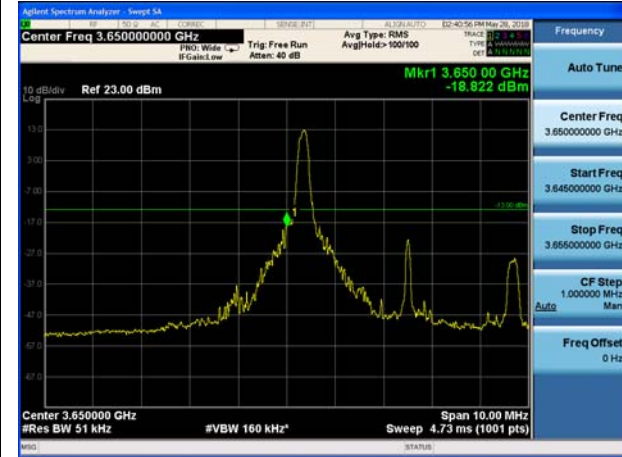
LTE Band 43 QPSK 20MHz CH-Low, RB 100



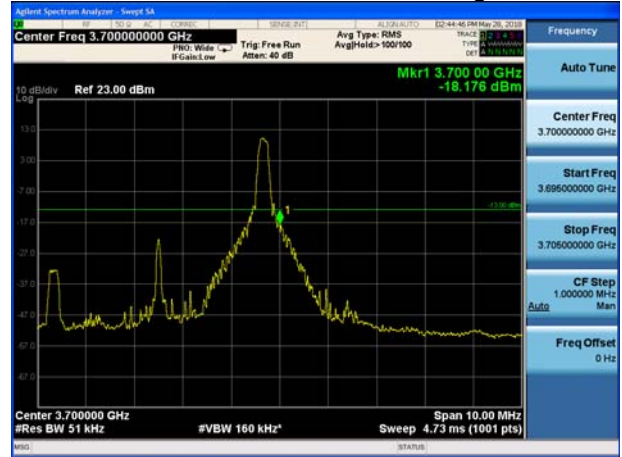
LTE Band 43 QPSK 20MHz CH-High, RB 100



LTE Band 43 16QAM 5MHz CH-Low, RB 1



LTE Band 43 16QAM 5MHz CH-High, RB 1





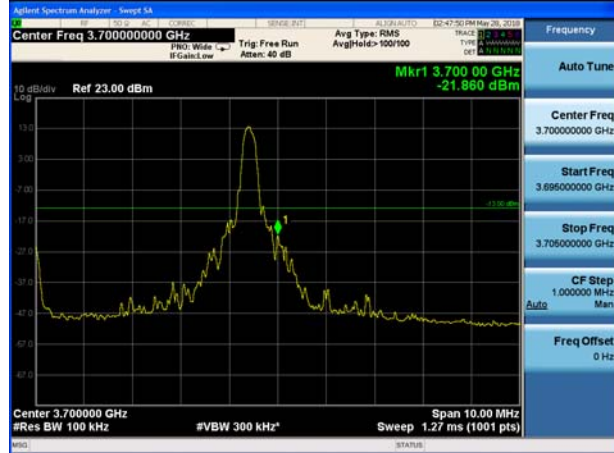
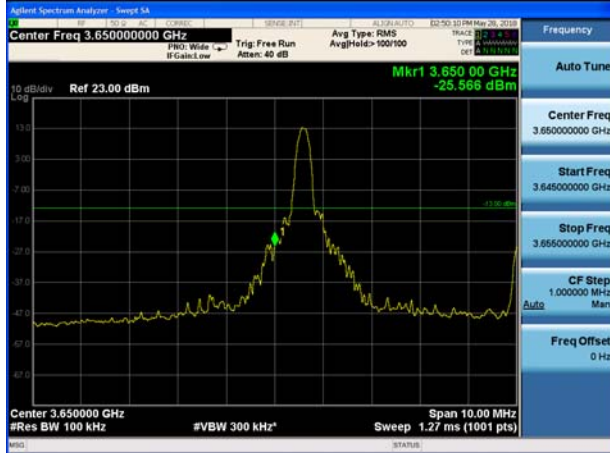
LTE Band 43 16QAM 5MHz CH-Low, RB 25

LTE Band 43 16QAM 5MHz CH-High, RB 25



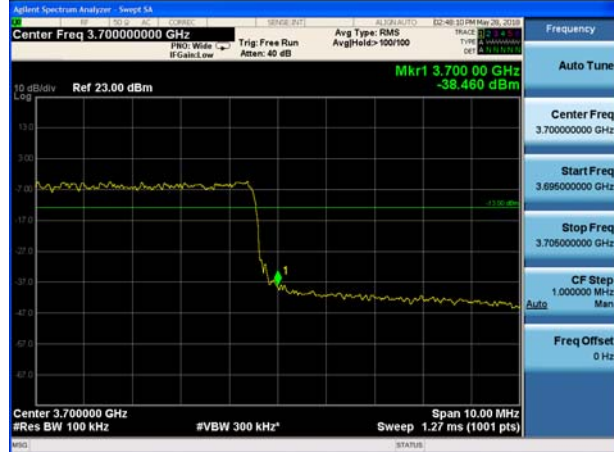
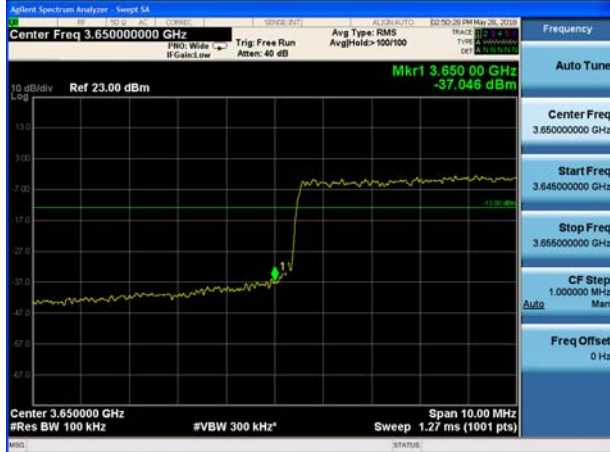
LTE Band 43 16QAM 10MHz CH-Low, RB 1

LTE Band 43 16QAM 10MHz CH-High, RB 1



LTE Band 43 16QAM 10MHz CH-Low, RB 50

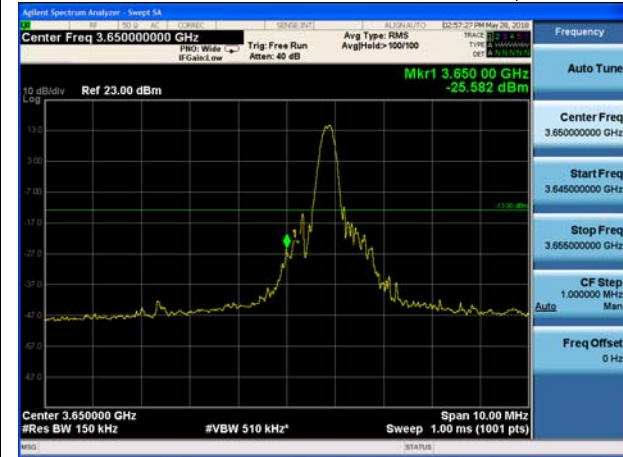
LTE Band 43 16QAM 10MHz CH-High, RB 50







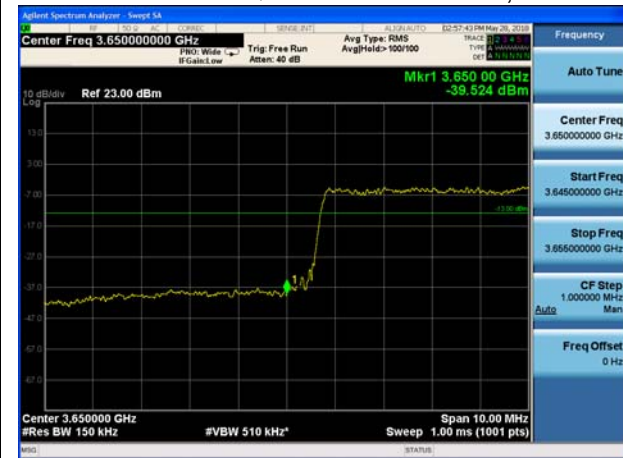
LTE Band 43 16QAM 15MHz CH-Low, RB 1



LTE Band 43 16QAM 15MHz CH-High, RB 1



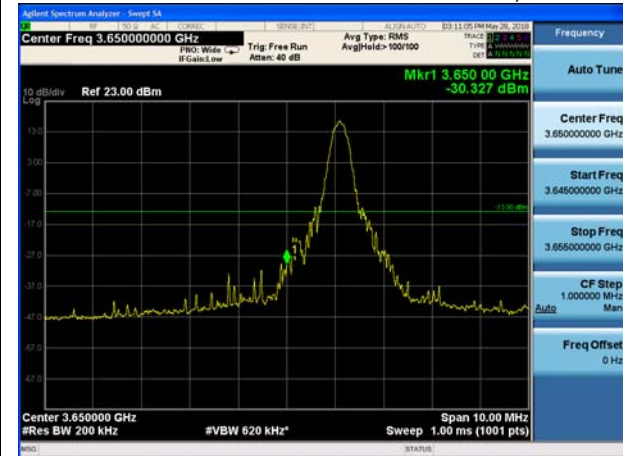
LTE Band 43 16QAM 15MHz CH-Low, RB 75



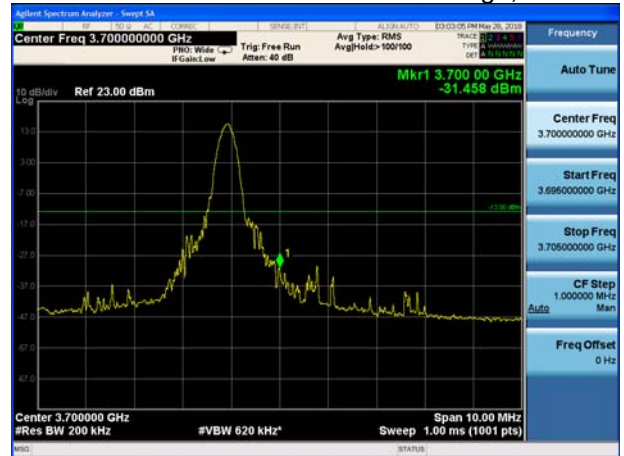
LTE Band 43 16QAM 15MHz CH-High, RB 75



LTE Band 43 16QAM 20MHz CH-Low, RB 1

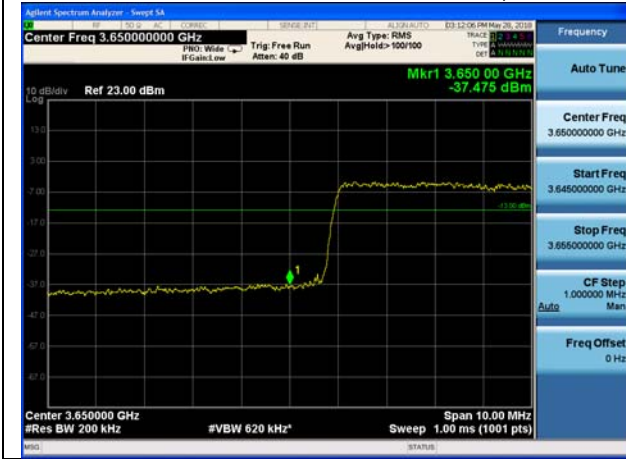


LTE Band 43 16QAM 20MHz CH-High, RB 1





LTE Band 43 16QAM 20MHz CH-Low, RB 100



LTE Band 43 16QAM 20MHz CH-High, RB 100



## 5.4. Emission Mask

### Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

### Method of Measurement

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

RBW is set to 51kHz, VBW is set to 160kHz for 5MHz, .

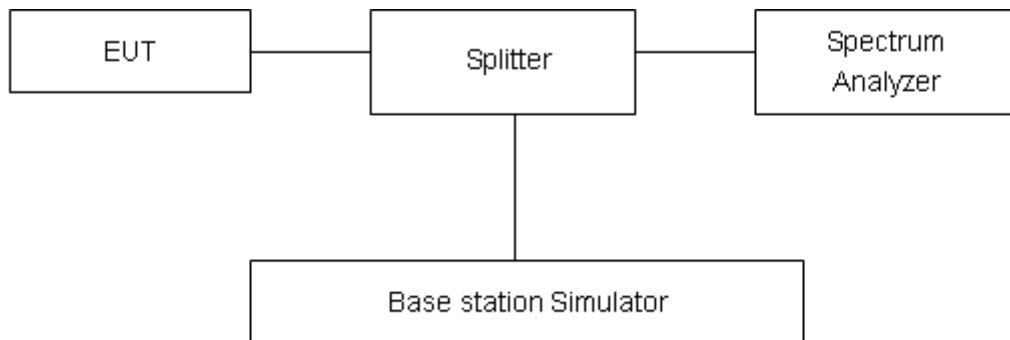
RBW is set to 100kHz, VBW is set to 300kHz for 10MHz,

RBW is set to 150kHz, VBW is set to 510kHz for 15MHz,

RBW is set to 200kHz, VBW is set to 620kHz for 20MHz.

Spectrum analyzer plots are included on the following pages.

### Test Setup



### Limits

Rule Part 90.210(b) For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

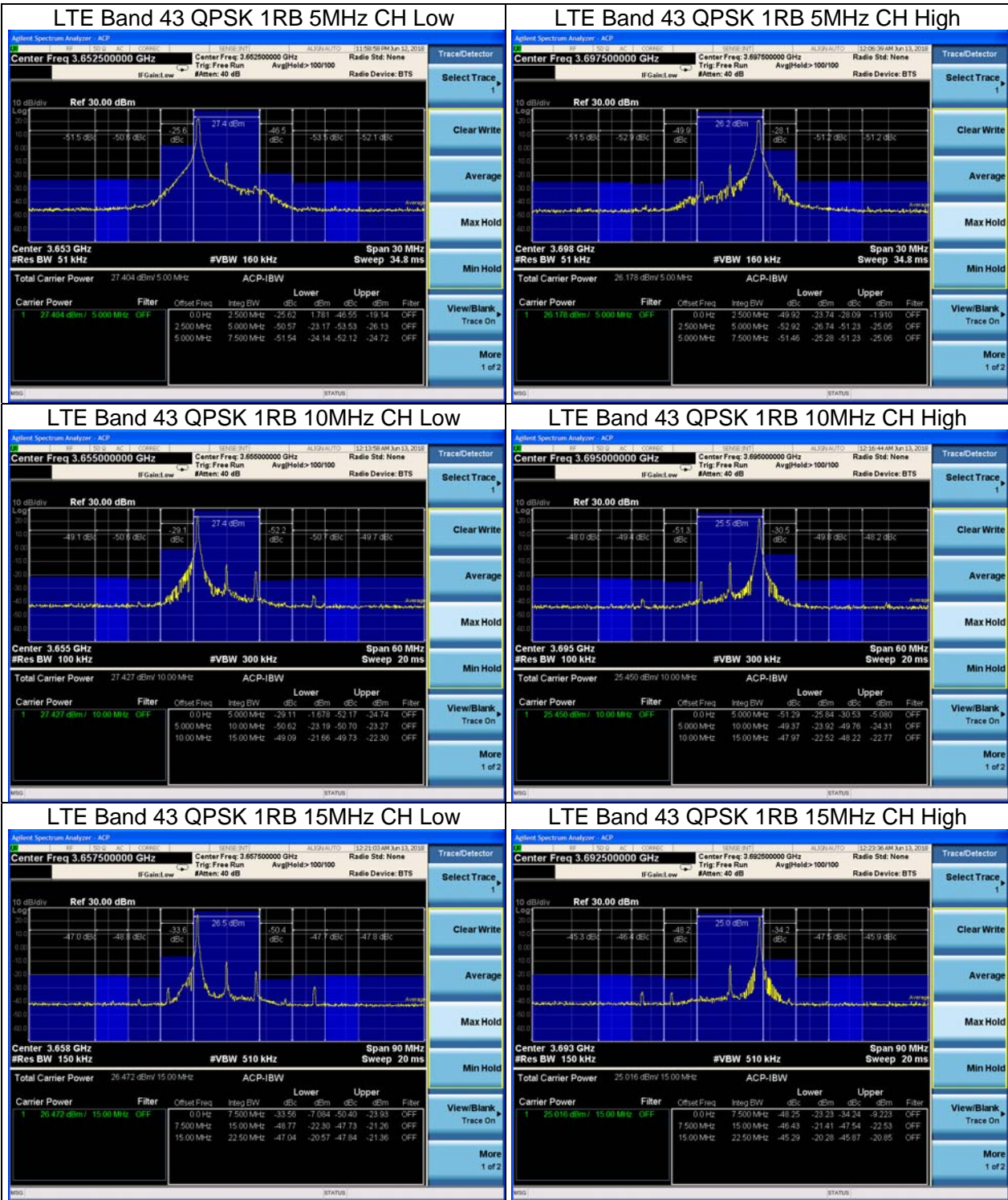
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log (P)$  dB.

Rule Part 90.1323(a) 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.

### Measurement Uncertainty

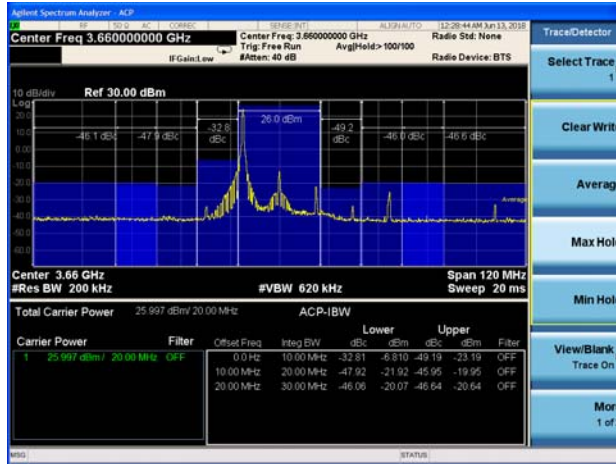
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ ,  $U=0.684$ dB.

Test Result:

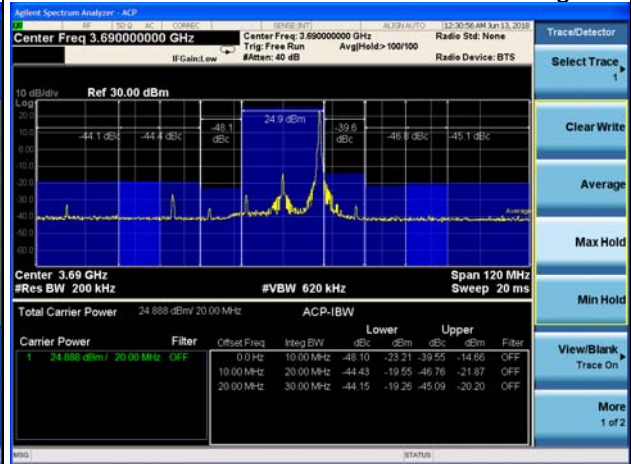




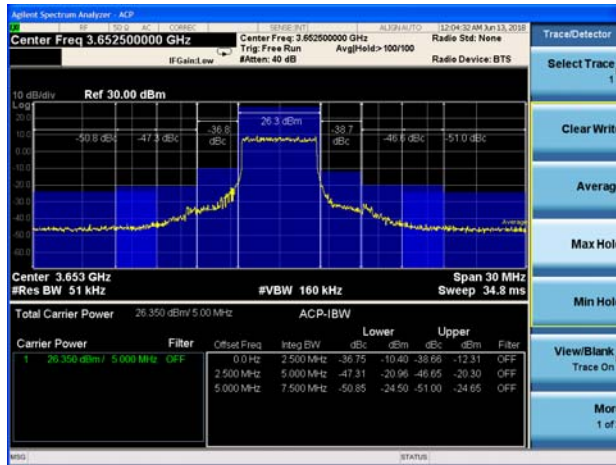
### LTE Band 43 QPSK 1RB 20MHz CH Low



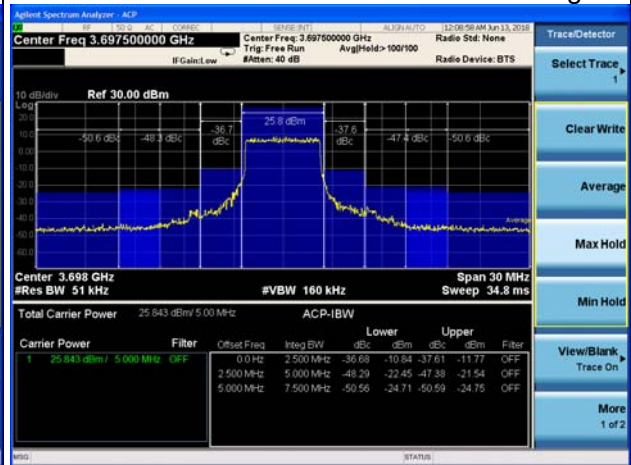
### LTE Band 43 16QAM 1RB 20MHz CH High



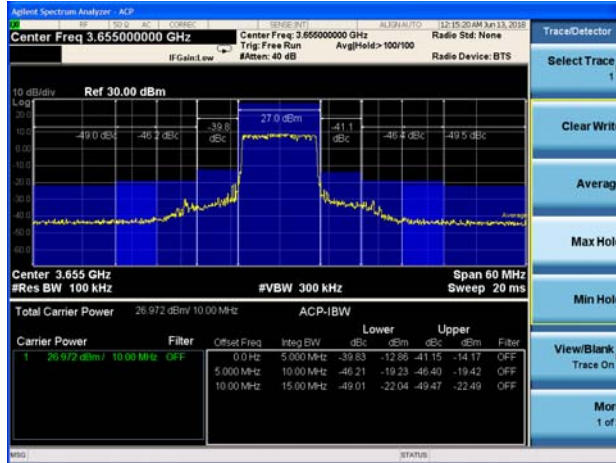
### LTE Band 43 QPSK 100%RB 5MHz CH Low



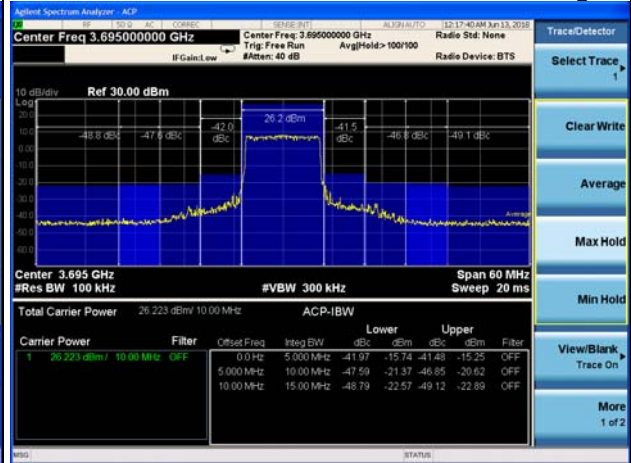
### LTE Band 43 QPSK 100%RB 5MHz CH High



### LTE Band 43 QPSK 100%RB 10MHz CH Low

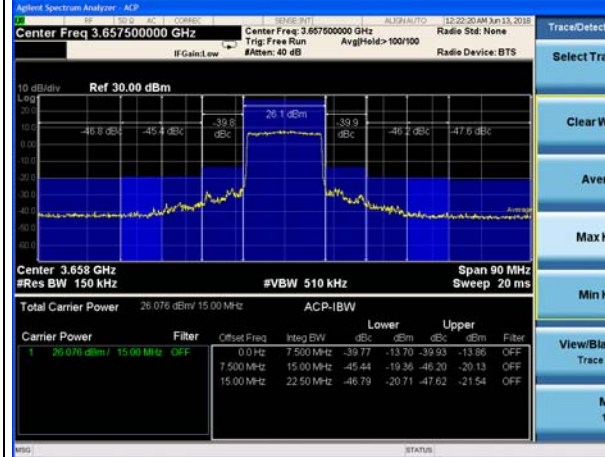


### LTE Band 43 QPSK 100%RB 10MHz CH High

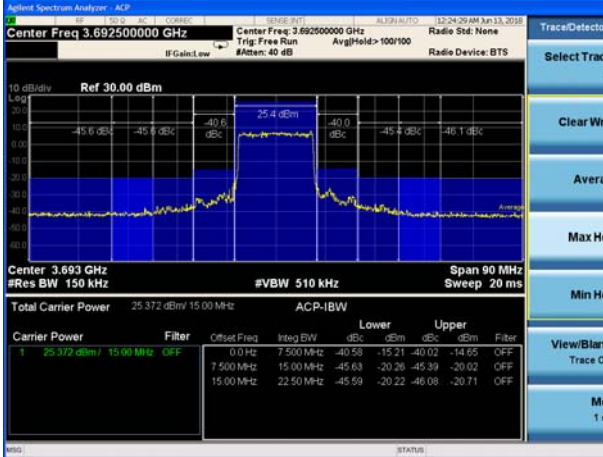




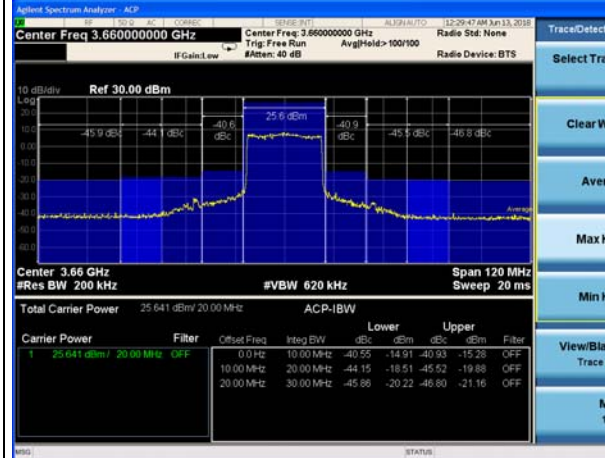
LTE Band 43 QPSK 100%RB 15MHz CH Low



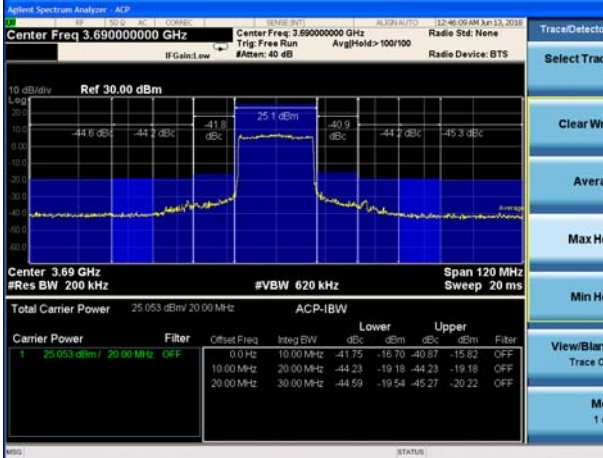
LTE Band 43 QPSK 100%RB 15MHz CH High



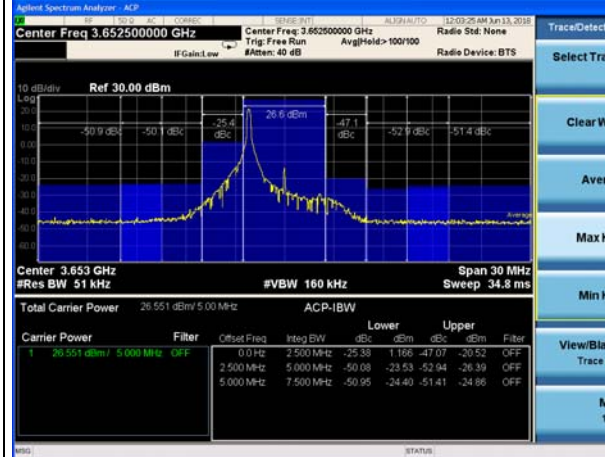
LTE Band 43 QPSK 100%RB 20MHz CH Low



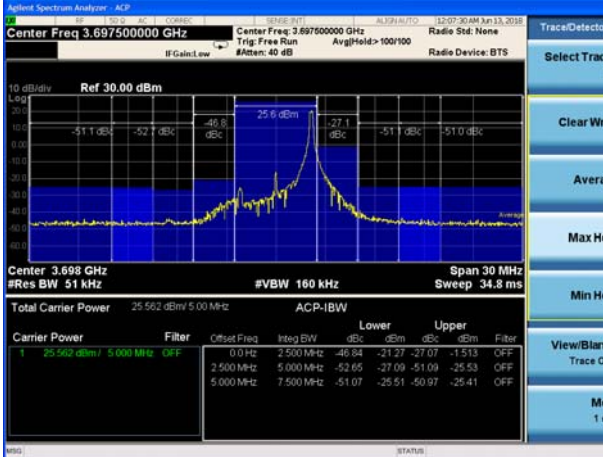
LTE Band 43 QPSK 100%RB 20MHz CH High

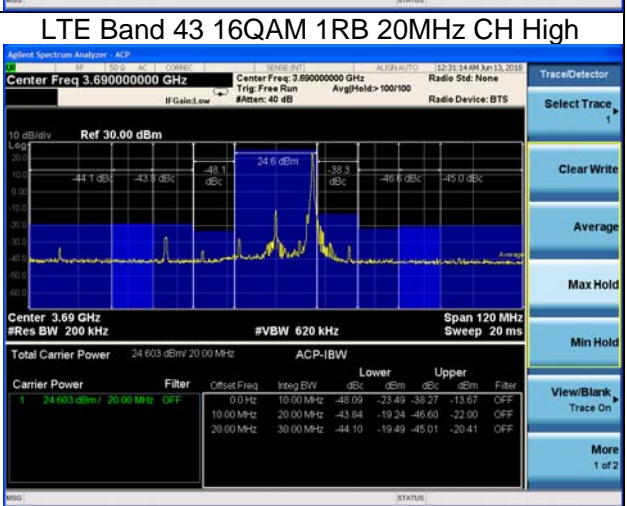
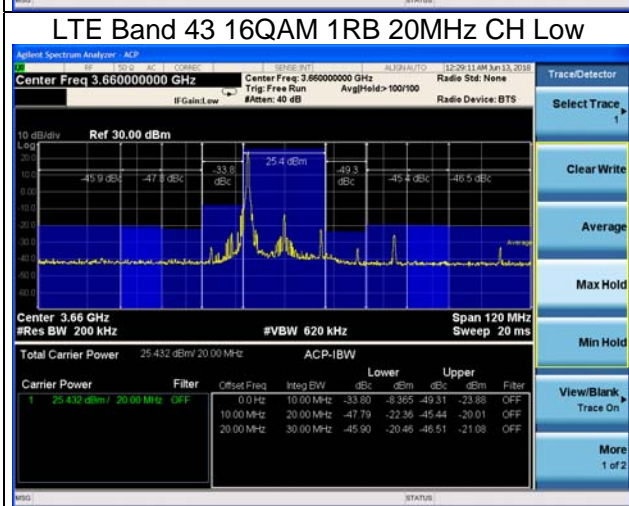
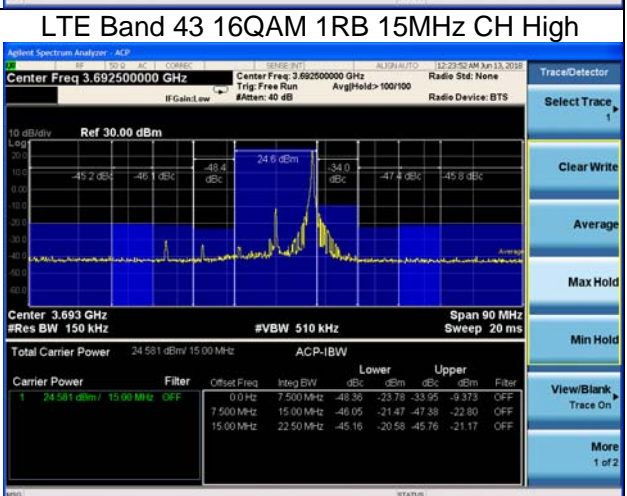
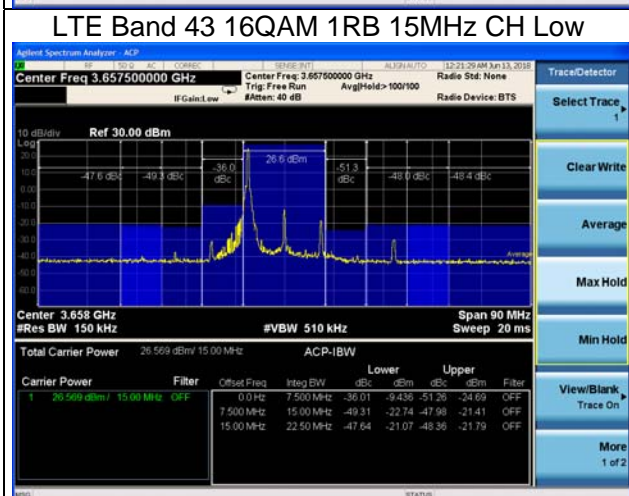
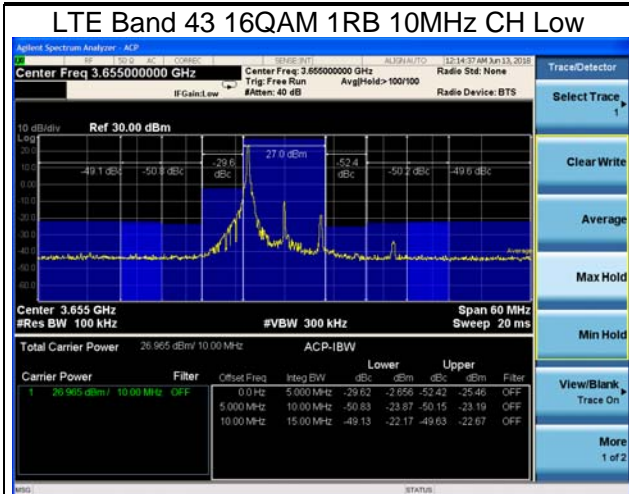


LTE Band 43 16QAM 1RB 5MHz CH Low



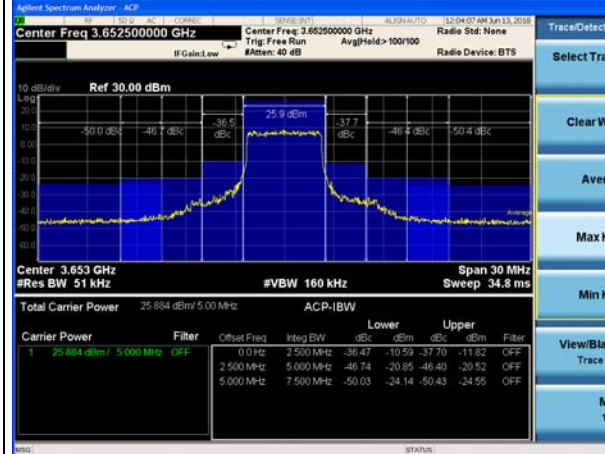
LTE Band 43 16QAM 1RB 5MHz CH High



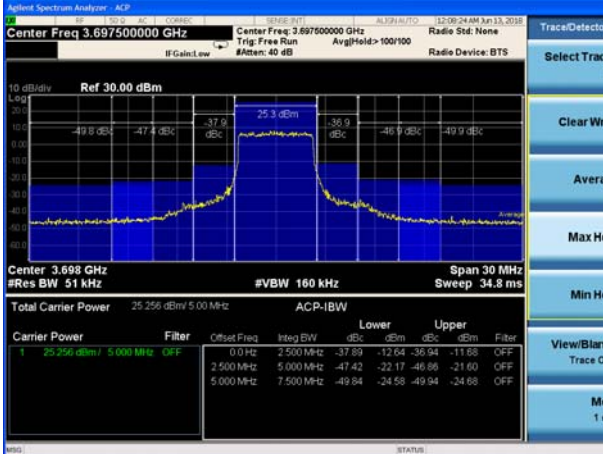




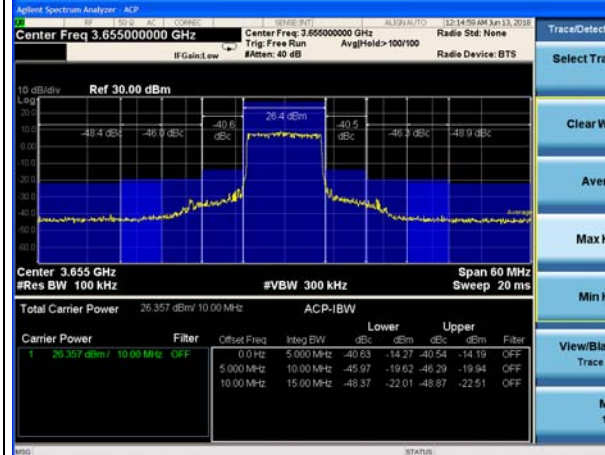
LTE Band 43 16QAM 100%RB 5MHz CH Low



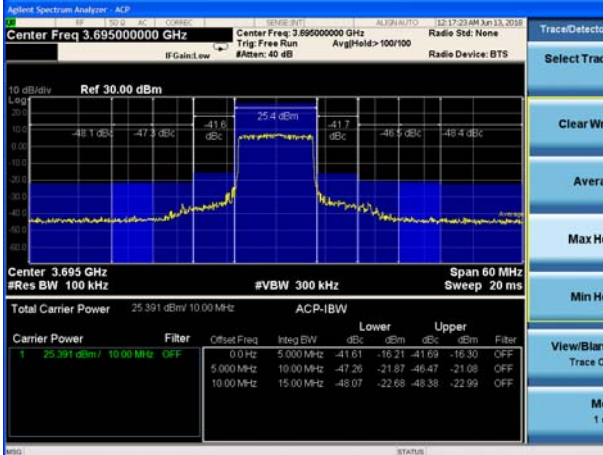
LTE Band 43 16QAM 100%RB 5MHz CH High



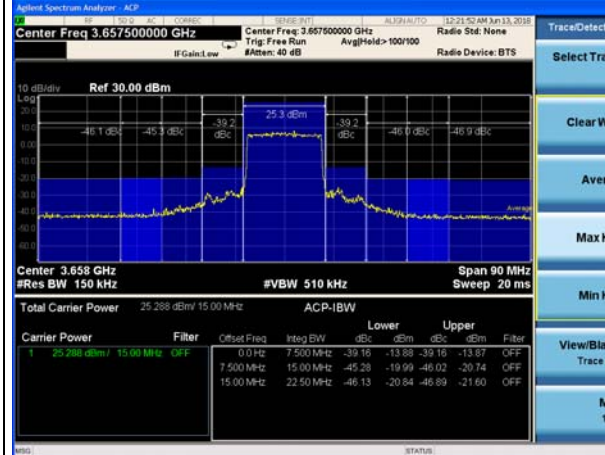
LTE Band 43 16QAM 100%RB 10MHz CH Low



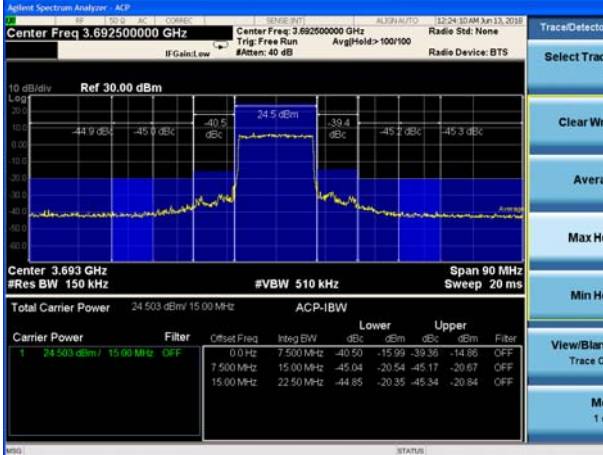
LTE Band 43 16QAM 100%RB 10MHz CH High



LTE Band 43 16QAM 100%RB 15MHz CH Low



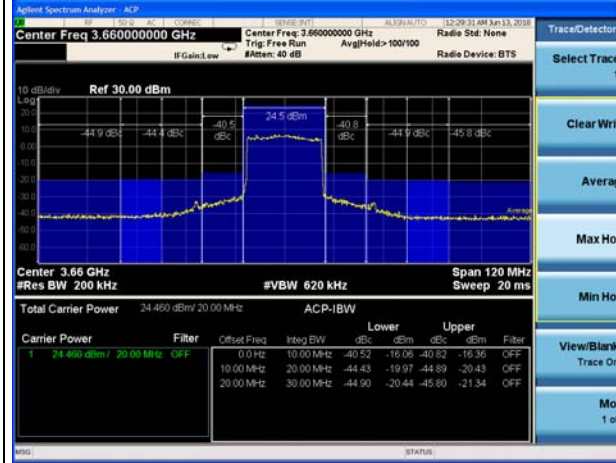
LTE Band 43 16QAM 100%RB 15MHz CH High



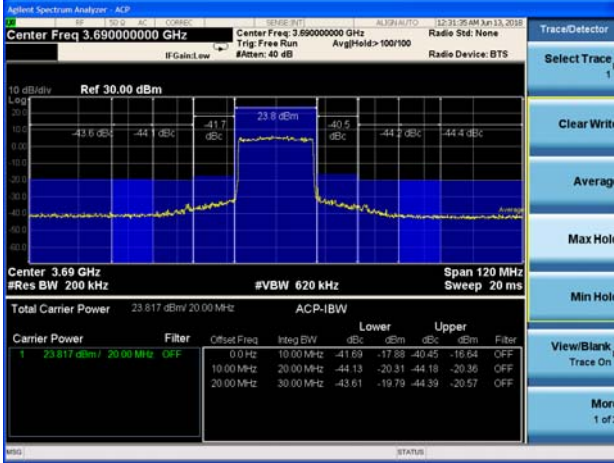




LTE Band 43 16QAM 100%RB 20MHz CH Low



LTE Band 43 16QAM 100%RB 20MHz CH High



### 5.5. Frequency Stability

**Ambient condition**

Temperature	Relative humidity
21°C ~25°C	40%~60%

**Method of Measurement**

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -40°C to +60°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 -40°C to +60°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

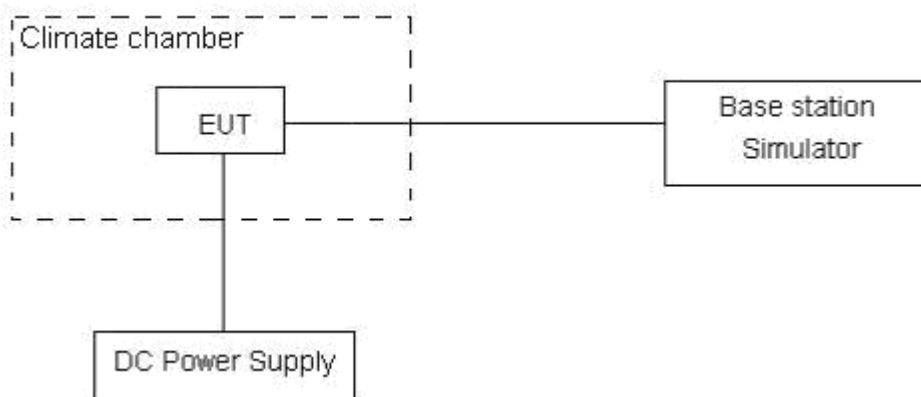
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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 21 V and 27 V, with a nominal voltage of 24V.

**Test setup**



**Limits**

Requirements: FCC § 2.1055 (a)(d), The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

**Measurement Uncertainty**

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

**Test Result**

LTE Band 43					
QPSK,(20MHz BANDWIDTH)					
Condition		3650	3700	Delta (Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	3650.3155	3699.7824	8.73	0.00238
Extreme (60°C)		3650.3148	3699.7831	10.36	0.00282
Extreme (50°C)		3650.3151	3699.7828	-4.67	-0.00127
Extreme (40°C)		3650.3149	3699.7831	1.02	0.00028
Extreme (30°C)		3650.3147	3699.7832	6.71	0.00183
Extreme (20°C)		3650.3154	3699.7825	2.66	0.00072
Extreme (10C)		3650.3151	3699.7829	1.11	0.00030
Extreme (0°C)		3650.3153	3699.7826	0.54	0.00015
Extreme (-10°C)		3650.3156	3699.7823	0.15	0.00004
Extreme (-20°C)		3650.3159	3699.7823	9.72	0.00264
Extreme (-30°C)		3650.3152	3699.7827	5.89	0.00160
Extreme (-40°C)		3650.3154	3699.7826	4.23	0.00115
25°C	LV	3650.3152	3699.7827	-8.51	-0.00232
	HV	3650.3154	3699.7825	4.04	0.00110
16QAM,(20MHz BANDWIDTH)					
Condition		3650	3700	Delta (Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	3650.3681	3699.7242	9.92	0.00270
Extreme (60°C)		3650.3674	3699.7247	12.74	0.00347
Extreme (50°C)		3650.3677	3699.7244	-2.29	-0.00062
Extreme (40°C)		3650.3675	3699.7246	3.40	0.00093
Extreme (30°C)		3650.3673	3699.7248	9.09	0.00247
Extreme (20°C)		3650.3682	3699.7241	5.04	0.00137
Extreme (10C)		3650.3676	3699.7245	2.30	0.00063
Extreme (0°C)		3650.3679	3699.7242	1.73	0.00047
Extreme (-10°C)		3650.3682	3699.7239	1.34	0.00036
Extreme (-20°C)		3650.3685	3699.7236	10.91	0.00297
Extreme (-30°C)		3650.3678	3699.7243	7.08	0.00193
Extreme (-40°C)		3650.3674	3699.7242	4.68	0.00127
25°C	LV	3650.3678	3699.7243	-7.32	-0.00199
	HV	3650.3683	3699.7241	5.23	0.00142

### 5.6. Spurious Emissions at Antenna Terminals

**Ambient condition**

Temperature	Relative humidity
21°C ~25°C	40%~60%

**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.

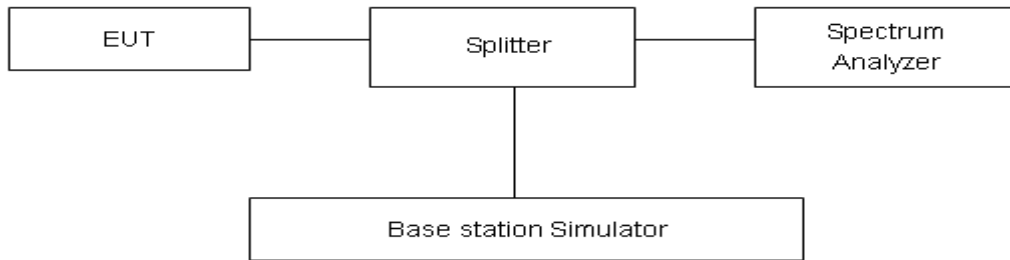
RBW =0.001MHz, VBW=0.003MHz for 9kHz-150kHz;

RBW =0.01MHz, VBW=0.03MHz for 150kHz-30MHz;

RBW =0.1MHz, VBW=0.3MHz for 30MHz-1GHz;

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

**Test setup**



**Limits**

Rule Part 2.1051&90.1323 specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.”

Limit	-13 dBm
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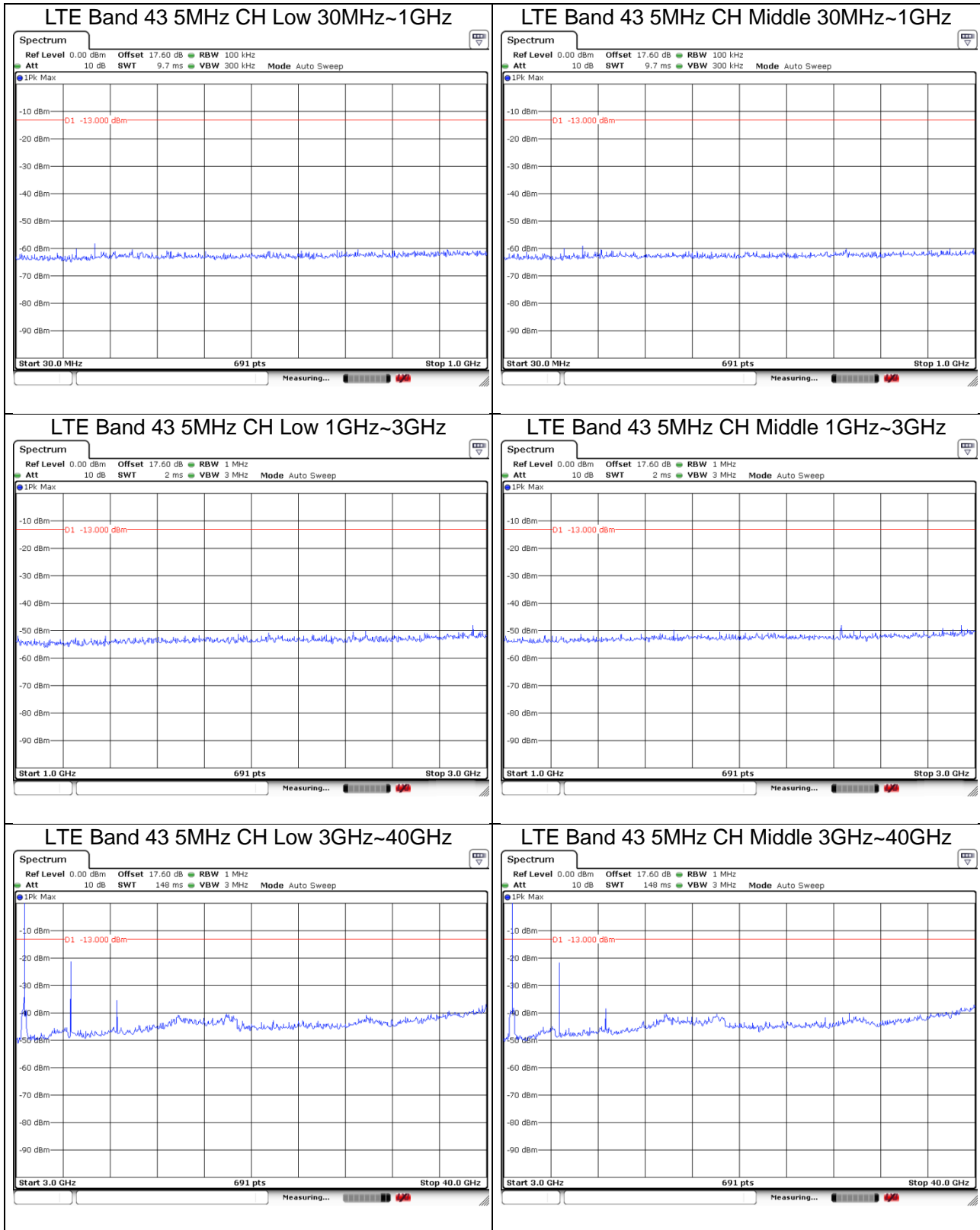
**Measurement Uncertainty**

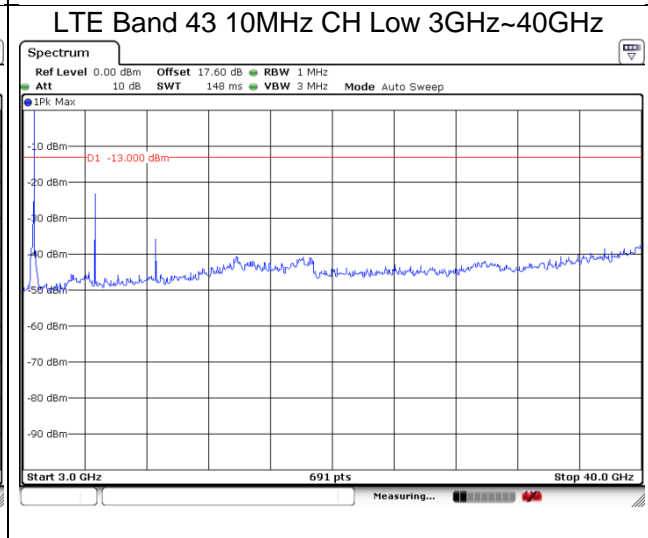
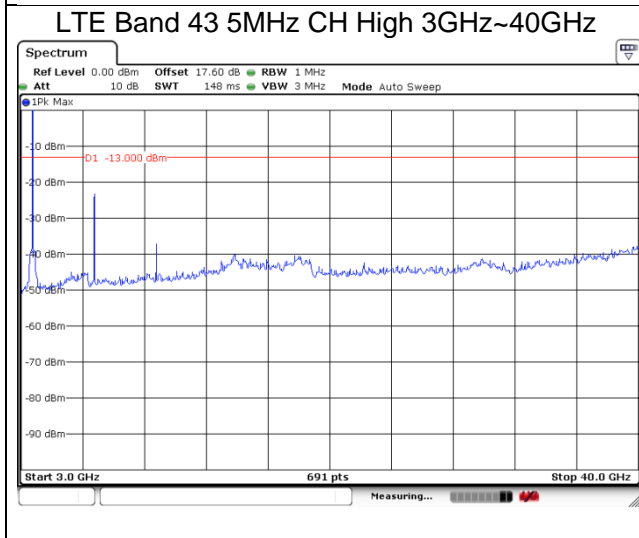
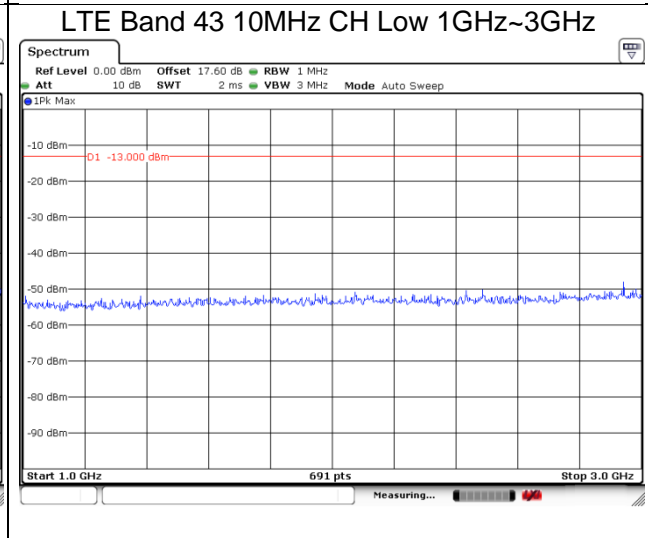
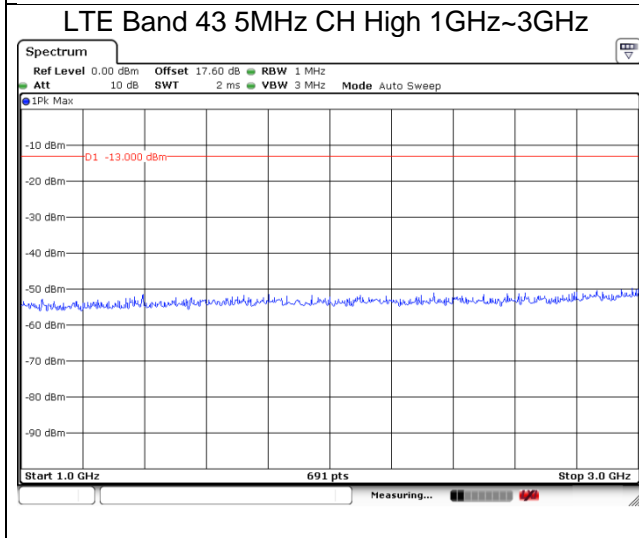
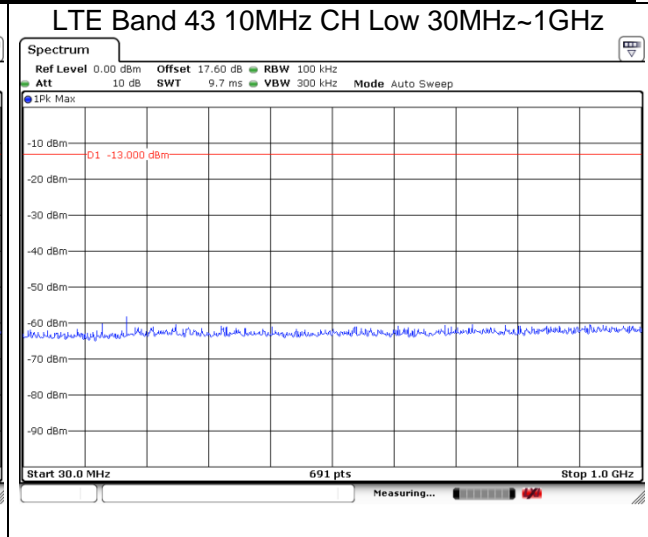
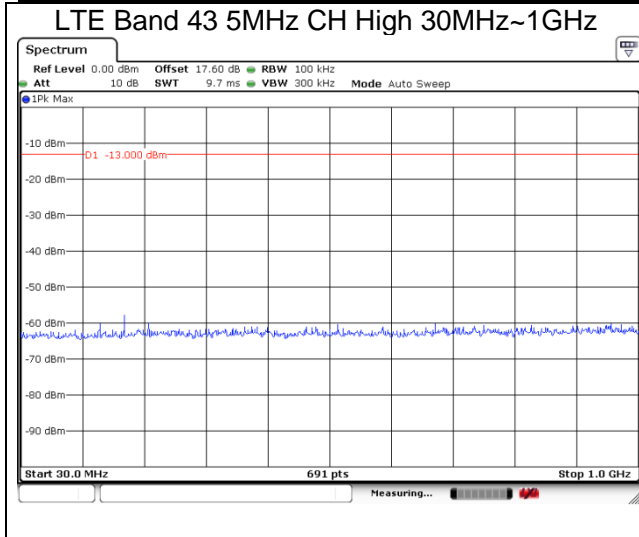
The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ .

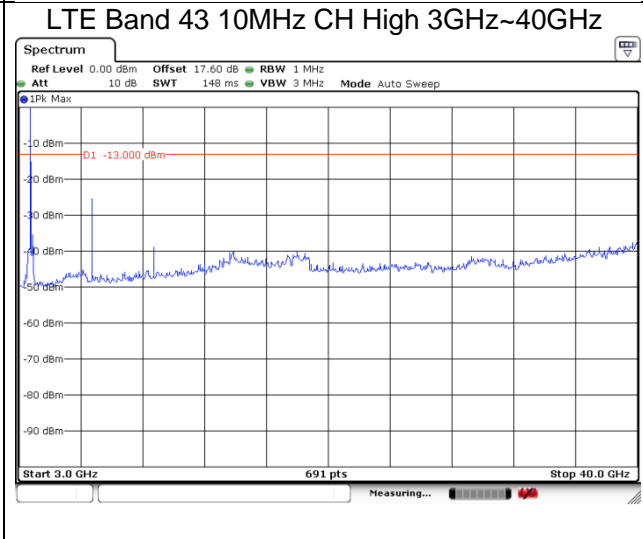
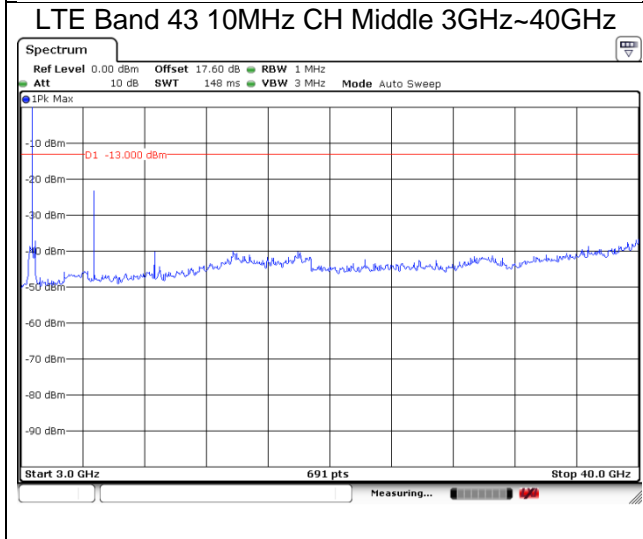
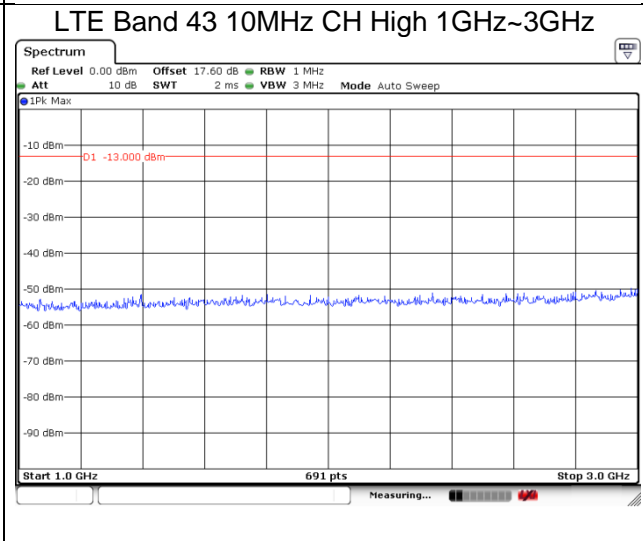
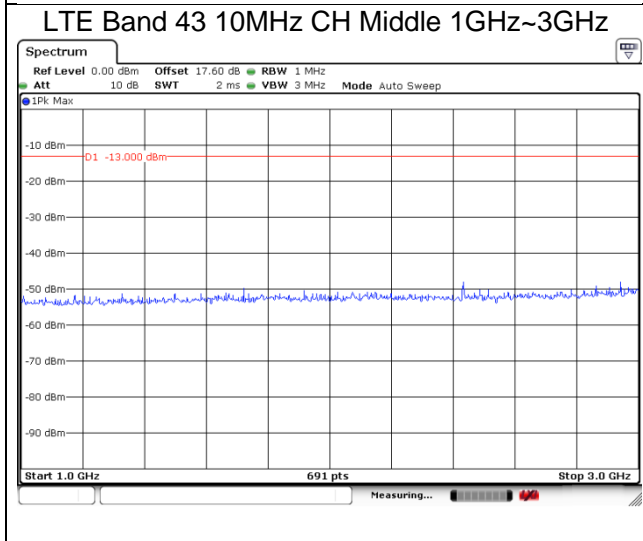
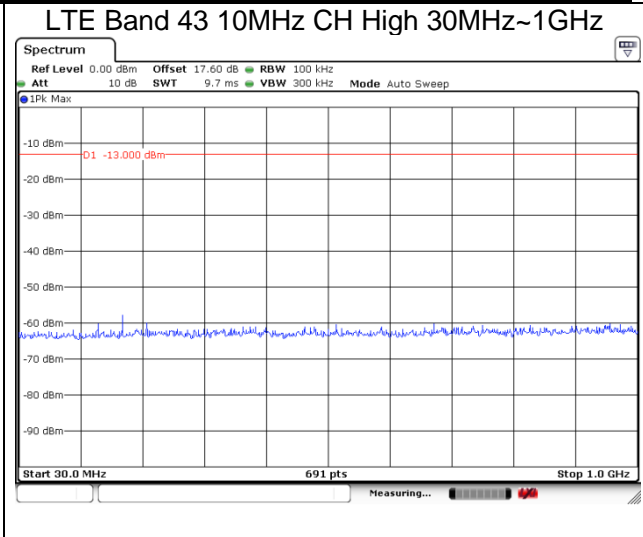
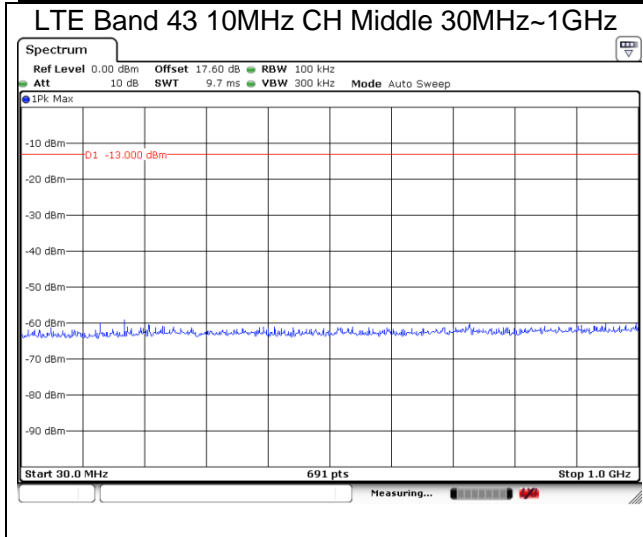
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-3GHz	1.407 dB
3GHz-40GHz	1.815 dB

**Test Result:**

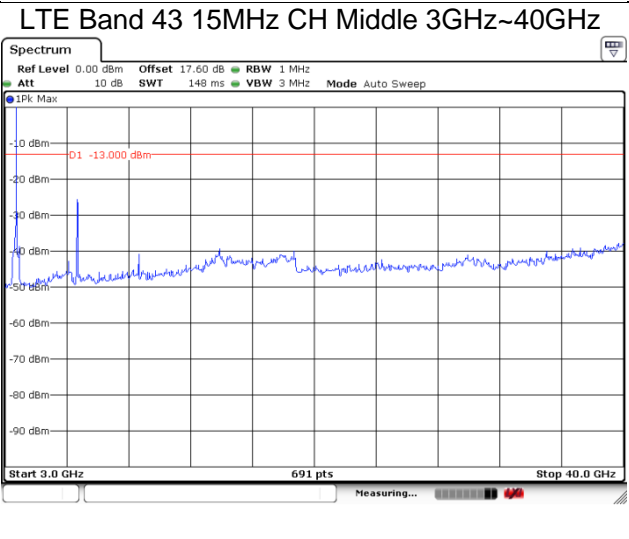
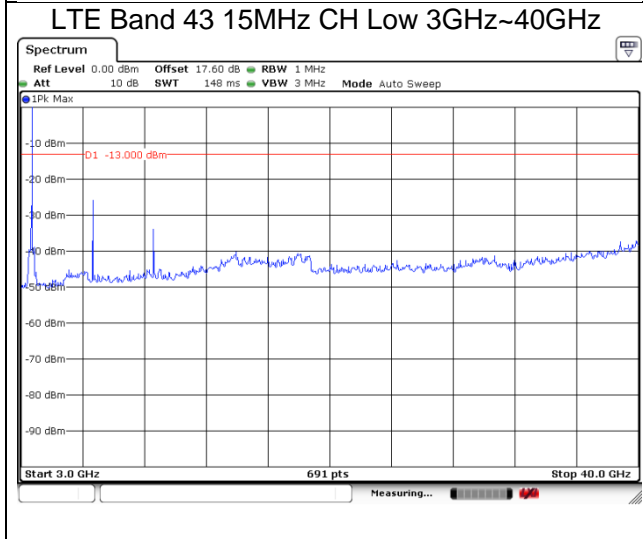
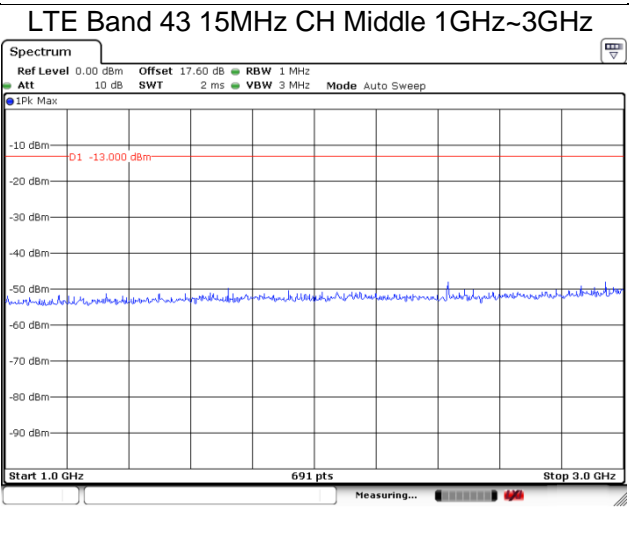
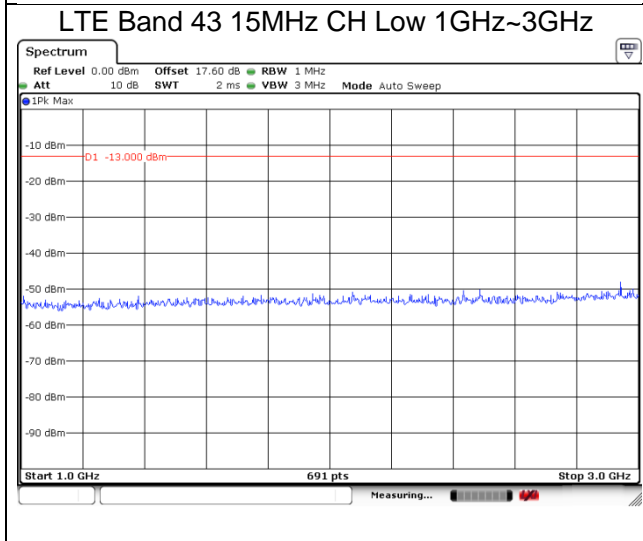
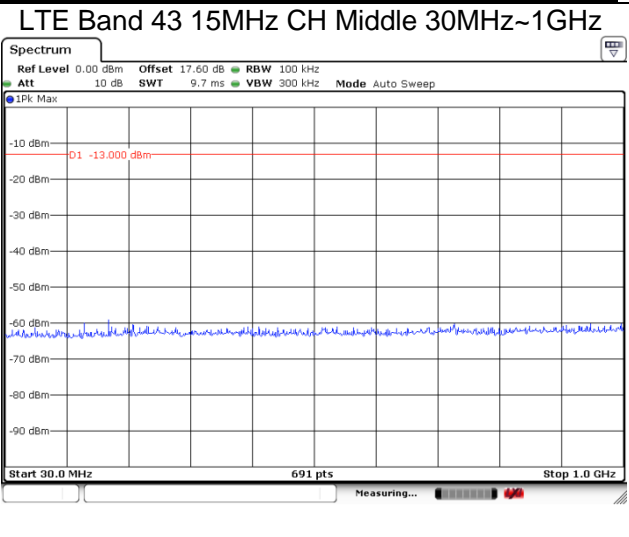
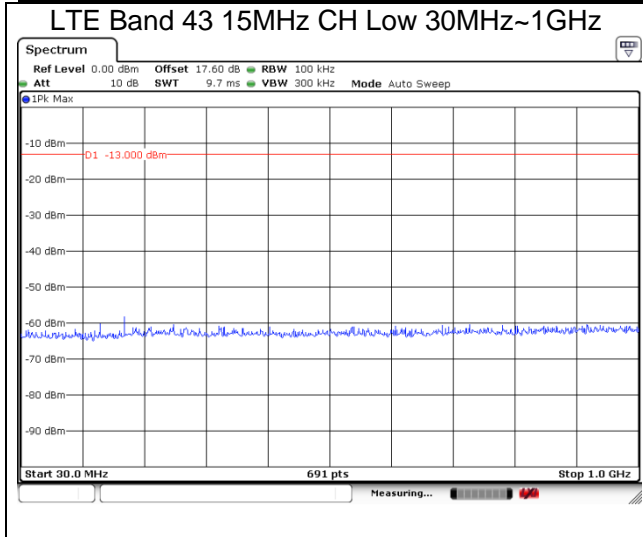
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported. The signal beyond the limit is carrier in the following plots.

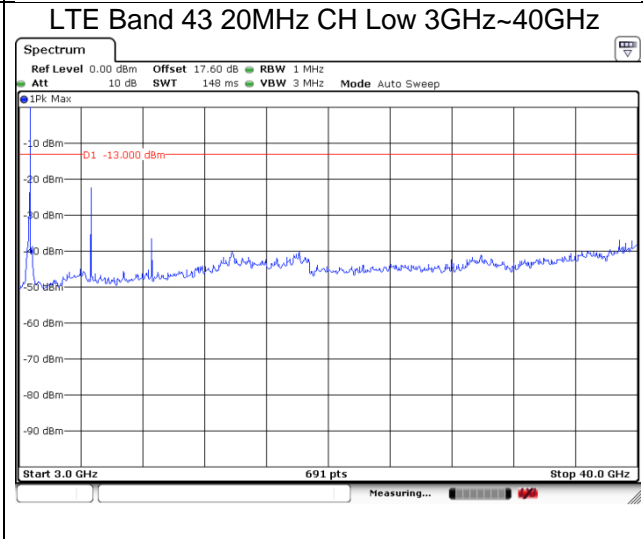
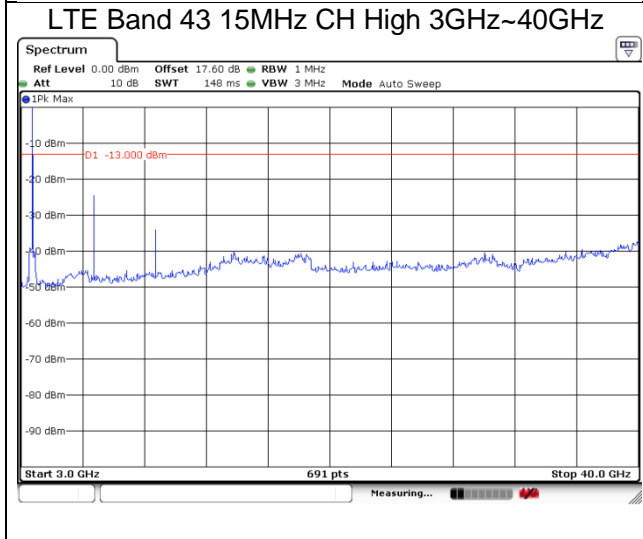
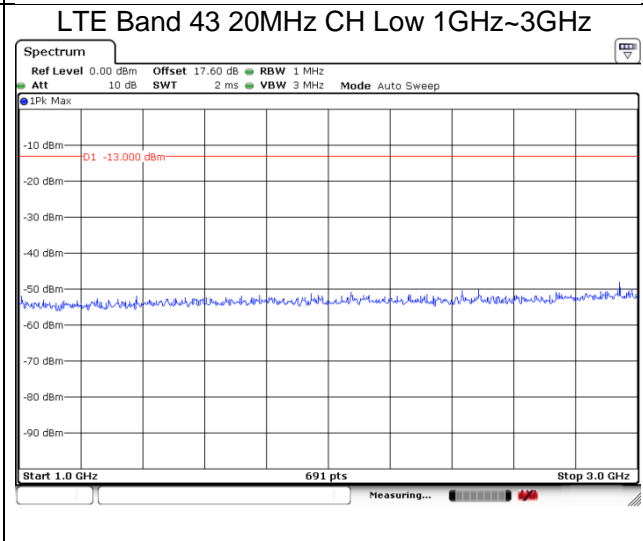
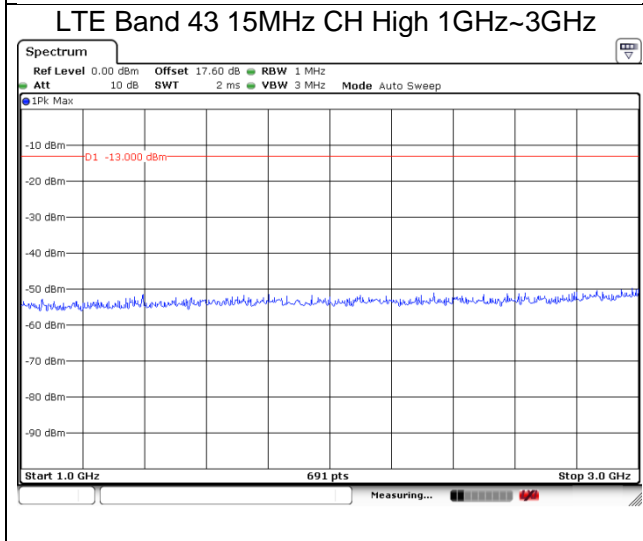
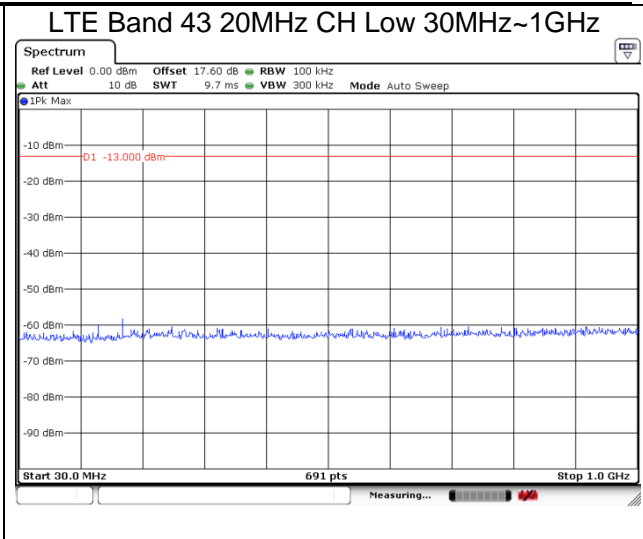
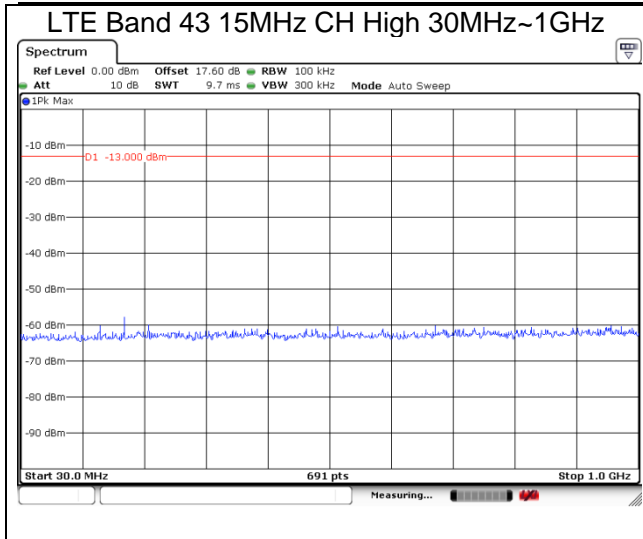


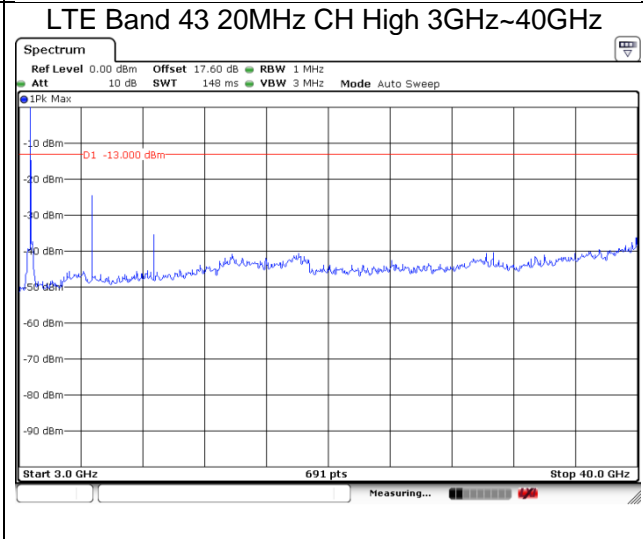
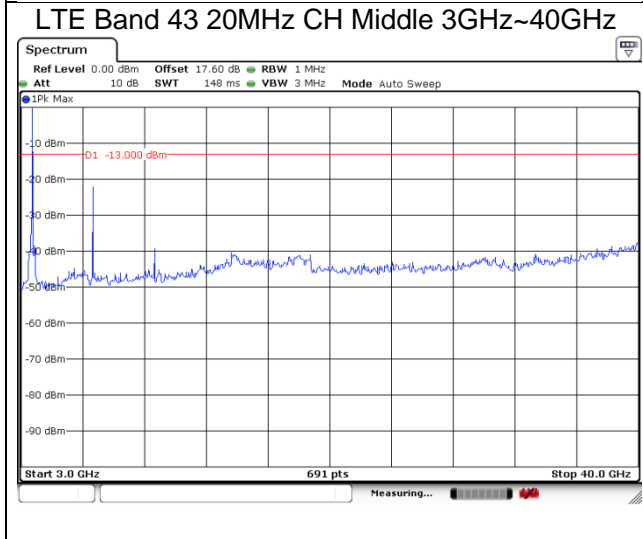
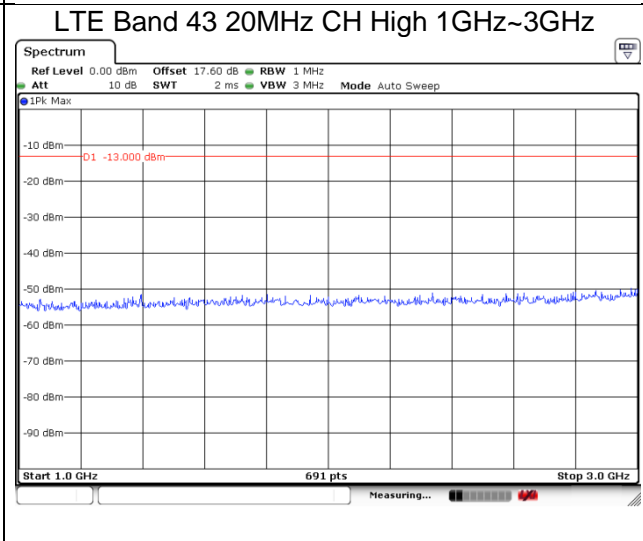
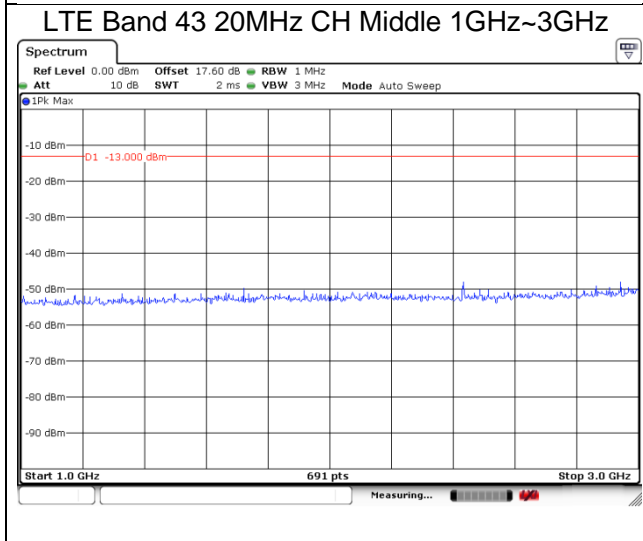
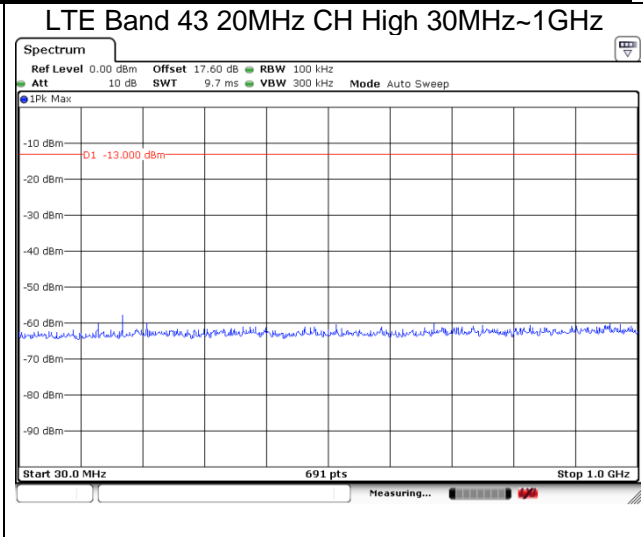
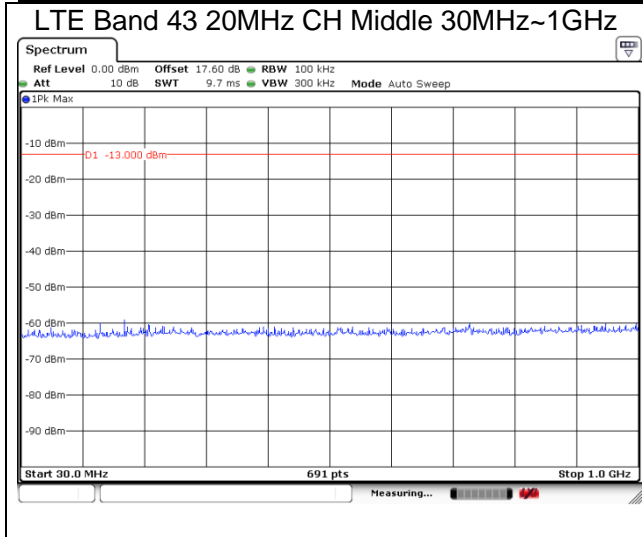












## 5.7. Field Strength of Spurious Radiation/ Radiated Spurious Emissions

### Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

### Method of Measurement

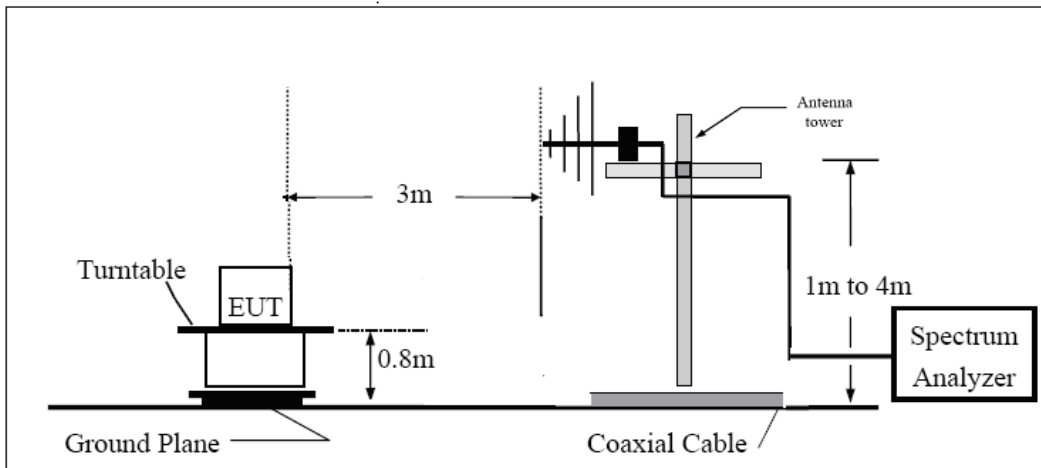
1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI/TIA-603-E (2016).
2. The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:  

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

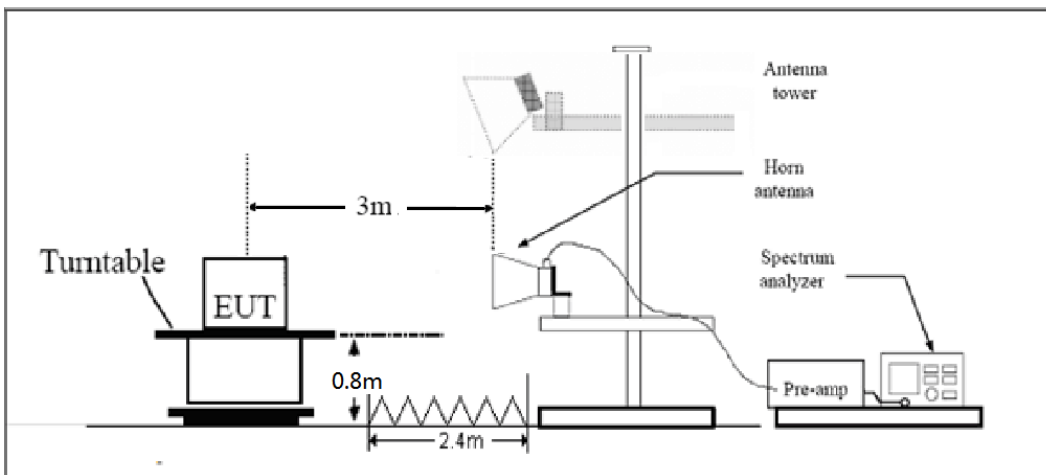
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

**Test setup**

**30MHz~~~ 1GHz**



**Above 1GHz**



Note: Area side: 2.4mX3.6m

**Limits**

Rule Part 90.1323 specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.”

Limit	-13 dBm
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### Measurement Uncertainty

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

**Test Result**

Sweep the whole frequency band through the range from 30MHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

**LTE Band 43 QPSK 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	7200.8	-52.15	2.50	11.35	horizontal	-43.30	-13.00	30.30	180
3	10801.1	-26.85	4.20	12.05	horizontal	-19.00	-13.00	6.00	315
4	14402.3	-46.33	5.50	14.23	horizontal	-37.60	-13.00	24.60	225
5	18012.5	--	--	--	--	--	--	--	--
6	21615.0	--	--	--	--	--	--	--	--
7	25217.5	--	--	--	--	--	--	--	--
8	28820.0	--	--	--	--	--	--	--	--
9	32422.5	--	--	--	--	--	--	--	--
10	36025.0	--	--	--	--	--	--	--	--

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 43 QPSK 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	7396.0	-48.65	2.50	11.35	horizontal	-39.80	-13.00	26.80	180
3	11093.6	-39.45	4.20	12.05	horizontal	-31.60	-13.00	18.60	180
4	14791.5	-47.73	5.50	14.23	horizontal	-39.00	-13.00	26.00	315
5	18500.0	--	--	--	--	--	--	--	--
6	22200.0	--	--	--	--	--	--	--	--
7	25900.0	--	--	--	--	--	--	--	--
8	29600.0	--	--	--	--	--	--	--	--
9	33300.0	--	--	--	--	--	--	--	--
10	37000.0	--	--	--	--	--	--	--	--

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 43 QPSK 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	7590.8	-41.75	2.50	11.35	horizontal	-32.90	-13.00	19.90	180
3	11386.1	-39.75	4.20	12.05	horizontal	-31.90	-13.00	18.90	225
4	15181.9	-49.83	5.50	14.23	horizontal	-41.10	-13.00	28.10	225
5	18987.5	--	--	--	--	--	--	--	--
6	22785.0	--	--	--	--	--	--	--	--
7	26582.5	--	--	--	--	--	--	--	--
8	30380.0	--	--	--	--	--	--	--	--
9	34177.5	--	--	--	--	--	--	--	--
10	37975.0	--	--	--	--	--	--	--	--

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 43 QPSK 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	7201.8	-52.35	2.50	11.35	horizontal	-43.50	-13.00	30.50	180
3	10802.3	-35.65	4.20	12.05	horizontal	-27.80	-13.00	14.80	315
4	14403.4	-46.83	5.50	14.23	horizontal	-38.10	-13.00	25.10	225
5	18037.5	--	--	--	--	--	--	--	--
6	21645.0	--	--	--	--	--	--	--	--
7	25252.5	--	--	--	--	--	--	--	--
8	28860.0	--	--	--	--	--	--	--	--
9	32467.5	--	--	--	--	--	--	--	--
10	36075.0	--	--	--	--	--	--	--	--

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 43 QPSK 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	7386.8	-48.85	2.50	11.35	horizontal	-40.00	-13.00	27.00	180
3	11080.1	-31.55	4.20	12.05	horizontal	-23.70	-13.00	10.70	315
4	14773.5	-46.83	5.50	14.23	horizontal	-38.10	-13.00	25.10	180
5	18500.0	--	--	--	--	--	--	--	--
6	22200.0	--	--	--	--	--	--	--	--
7	25900.0	--	--	--	--	--	--	--	--
8	29600.0	--	--	--	--	--	--	--	--
9	33300.0	--	--	--	--	--	--	--	--
10	37000.0	--	--	--	--	--	--	--	--

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 43 QPSK 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	7572.0	-40.65	2.50	11.35	horizontal	-31.80	-13.00	18.80	180
3	11358.0	-32.35	4.20	12.05	horizontal	-24.50	-13.00	11.50	225
4	15142.5	-50.53	5.50	14.23	horizontal	-41.80	-13.00	28.80	225
5	18962.5	--	--	--	--	--	--	--	--
6	22755.0	--	--	--	--	--	--	--	--
7	26547.5	--	--	--	--	--	--	--	--
8	30340.0	--	--	--	--	--	--	--	--
9	34132.5	--	--	--	--	--	--	--	--
10	37925.0	--	--	--	--	--	--	--	--

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 43 QPSK 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	7202.0	-51.05	2.50	11.35	horizontal	-42.20	-13.00	29.20	180
3	10803.4	-39.15	4.20	12.05	horizontal	-31.30	-13.00	18.30	180
4	14404.5	-47.13	5.50	14.23	horizontal	-38.40	-13.00	25.40	225
5	18050.0	--	--	--	--	--	--	--	--
6	21660.0	--	--	--	--	--	--	--	--
7	25270.0	--	--	--	--	--	--	--	--
8	28880.0	--	--	--	--	--	--	--	--
9	32490.0	--	--	--	--	--	--	--	--
10	36100.0	--	--	--	--	--	--	--	--

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 43 QPSK 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	7382.0	-48.65	2.50	11.35	horizontal	-39.80	-13.00	26.80	180
3	11073.4	-26.75	4.20	12.05	horizontal	-18.90	-13.00	5.90	180
4	14800.0	-48.93	5.50	14.23	horizontal	-40.20	-13.00	27.20	45
5	18950.0	--	--	--	--	--	--	--	--
6	22200.0	--	--	--	--	--	--	--	--
7	25900.0	--	--	--	--	--	--	--	--
8	29600.0	--	--	--	--	--	--	--	--
9	33300.0	--	--	--	--	--	--	--	--
10	37000.0	--	--	--	--	--	--	--	--

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 43 QPSK 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	7562.3	-42.05	2.50	11.35	horizontal	-33.20	-13.00	20.20	180
3	11343.4	-35.15	4.20	12.05	horizontal	-27.30	-13.00	14.30	315
4	15124.5	-50.53	5.50	14.23	horizontal	-41.80	-13.00	28.80	225
5	18950.0	--	--	--	--	--	--	--	--
6	22740.0	--	--	--	--	--	--	--	--
7	26530.0	--	--	--	--	--	--	--	--
8	30320.0	--	--	--	--	--	--	--	--
9	34110.0	--	--	--	--	--	--	--	--
10	37900.0	--	--	--	--	--	--	--	--

Note: 1. The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

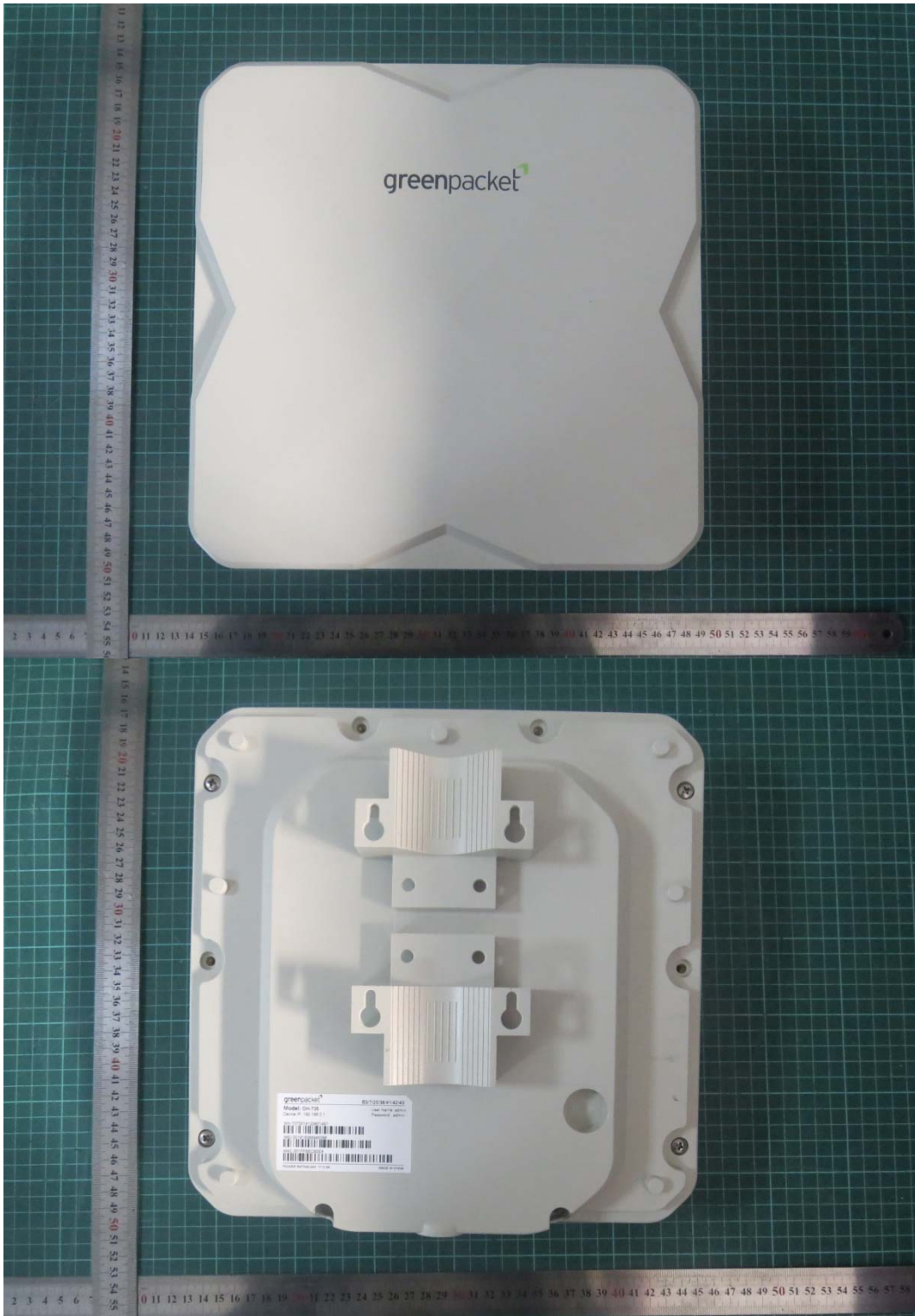
## 6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	113645	2018-05-20	2019-05-19
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	NA	NA
Spectrum Analyzer	Agilent	N9010A	MY47191109	2018-05-20	2019-05-19
Signal Analyzer	R&S	FSV40	15195-01-00	2018-05-13	2019-05-12
EMI Test Receiver	R&S	ESCI	100948	2017-12-17	2018-12-16
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
Horn Antenna	STEATITE	QSH-SL-26-40-K-15	16779	2016-03-21	2019-03-20
Climatic Chamber	Re Ce	PT-30B	20101891	2015-07-18	2018-07-17
RF Cable	Agilent	SMA 15cm	0001	NA	NA

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

# ANNEX A:EUT Appearanceand Test Setup

## A.1 EUT Appearance



a: EUT



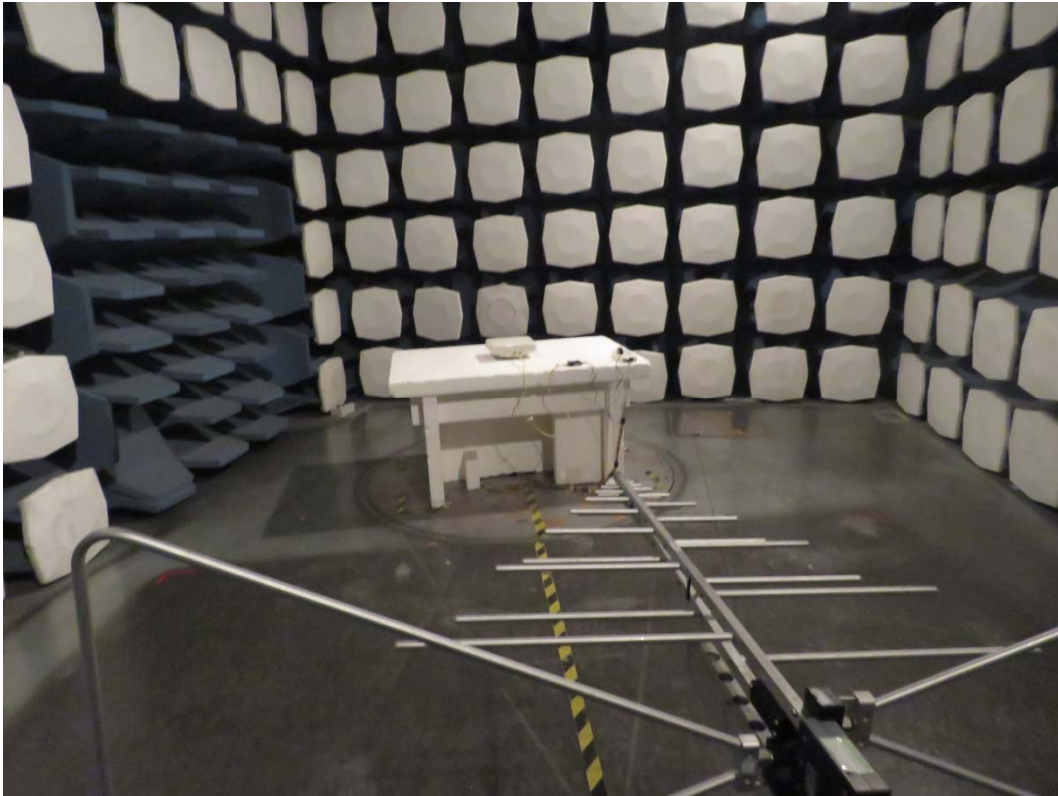
Adapter 1



Adapter 2  
b:Adapter

Picture 1: EUT and Auxiliary

## A.2 Test Setup



**Picture 2: Radiated Spurious Emissions Test setup**