



RF TEST REPORT

Applicant Green Packet Berhad, Taiwan
FCC ID W9V-OT235-GP
Product LTE CPE
Brand GreenPacket
Model OT-235
Report No. R1904A0187-R1V1
Issue Date May 21, 2019

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.

Performed by: Peng Tao

Approved by: Kai Xu

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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: April 23, 2019~ May 7, 2019			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard.			

1. Test Laboratory

1.1. Notes of the Test Report

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

1.2. Test facility

CNAS (accreditation number:L2264)

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

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

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

IC (recognition number is 8510A)

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

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

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

A2LA (Certificate Number: 3857.01)

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

1.3. Testing Location

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

Client Information

Applicant	Green Packet Berhad, Taiwan
Applicant address	2F, No. 23, Lane 583, Rueiguang Road, Neihu District, Taipei City 11492 Taiwan, ROC
Manufacturer	Green Packet Berhad, Taiwan
Manufacturer address	2F, No. 23, Lane 583, Rueiguang Road, Neihu District, Taipei City 11492 Taiwan, ROC

General Information

EUT Description			
Model	OT-235		
SN	ZMOT235191200004		
Hardware Version	V1.0		
Software Version	MH-39357-2.0.3-Choice-R1-20190201		
Power Supply	AC adapter		
Antenna Type	Internal Antenna		
Antenna Gain	8.60dBi		
Test Mode(s)	LTE Band 43, LTE Band 48		
Test Modulation	QPSK 16QAM;		
Maximum E.I.R.P.	LTE Band 43:	22.03dBm	
	LTE Band 48:	23.72dBm	
Rated Power Supply Voltage	12V		
Extreme Voltage	Minimum: 11.6V Maximum: 12.6V		
Extreme Temperature	Lowest: -20°C Highest: +55°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	LTE Band 43	3650 ~ 3700	3650 ~ 3700
	LTE Band 48	3650 ~ 3700	3650 ~ 3700
EUT Accessory			
Adapter	Manufacturer: Junction Global Technology Co Ltd Model: ZZU1588-150120		
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 (2018)

FCC CFR 47 Part 90Z (2018)

ANSI C63.26 (2015)

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, vertical 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 43/48

Test items	Band	Bandwidth (MHz)				Modulation		RB			Test Channel		
		5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	LTE 43	O	O	O	O	O	O	O	-	O	O	O	O
	LTE 48	O	O	O	O	O	O	O	-	O	O	O	O
Effective Isotropic Radiated power	LTE 43	O	O	O	O	O	O	O	-	O	O	O	O
	LTE 48	O	O	O	O	O	O	O	-	O	O	O	O
Occupied Bandwidth	LTE 43	O	O	O	O	O	O	-	-	O	O	O	O
	LTE 48	O	O	O	O	O	O	-	-	O	O	O	O
Band Edge Compliance	LTE 43	O	O	O	O	O	O	O	-	O	O	-	O
	LTE 48	O	O	O	O	O	O	O	-	O	O	-	O
Emission Mask	LTE 43	O	O	O	O	O	O	O	-	O	O	-	O
	LTE 48	O	O	O	O	O	O	O	-	O	O	-	O
Frequency Stability	LTE 43	O	O	O	O	O	O	-	-	O	O	-	O
	LTE 48	O	O	O	O	O	O	-	-	O	O	-	O
Spurious Emissions at Antenna Terminals	LTE 43	O	O	O	O	O	-	O	-	-	O	O	O
	LTE 48	O	O	O	O	O	-	O	-	-	O	O	O
Radiates Spurious Emission	LTE 43	O	-	-	O	O	-	O	-	-	O	O	O
	LTE 48	-	-	-	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

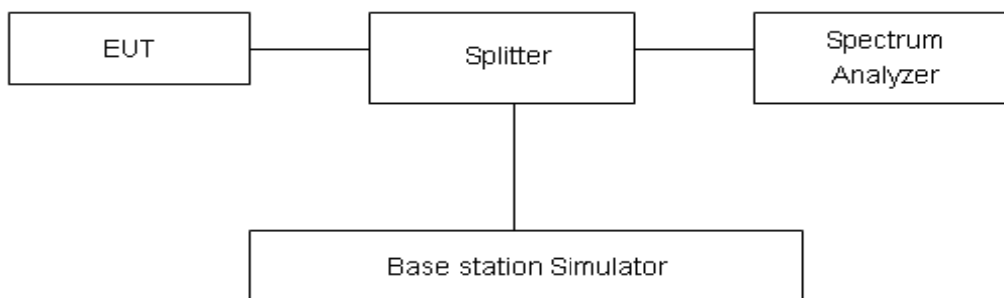
Temperature	Relative humidity
21°C ~25°C	40%~60%

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) /25MHz
BW	Modulation	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	1	0	12.53	13.35	13.40	21.13	21.95	22	129.7179	156.6751	158.4893	25000
	16QAM	1	0	12.43	13.21	13.41	21.03	21.81	22.01	126.7652	151.7050	158.8547	25000
	QPSK	25	0	12.45	13.16	13.29	21.05	21.76	21.89	127.3503	149.9685	154.5254	25000
	16QAM	25	0	12.43	13.07	13.37	21.03	21.67	21.97	126.7652	146.8926	157.3983	25000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44140 /3655	44340 /3675	44540 /3695	44140 /3655	44340 /3675	44540 /3695	44140 /3655	44340 /3675	44540 /3695	/
10MHz	QPSK	1	0	12.55	13.36	13.43	21.15	21.96	22.03	130.3167	157.0363	159.5879	25000
	16QAM	1	0	12.45	13.24	13.43	21.05	21.84	22.03	127.3503	152.7566	159.5879	25000
	QPSK	50	0	12.53	13.18	13.33	21.13	21.78	21.93	129.7179	150.6607	155.9553	25000
	16QAM	50	0	12.46	13.12	13.41	21.06	21.72	22.01	127.6439	148.5936	158.8547	25000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44165 /3657.5	44340 /3675	44515 /3692.5	44165 /3657.5	44340 /3675	44515 /3692.5	44165 /3657.5	44340 /3675	44515 /3692.5	/
15MHz	QPSK	1	0	12.54	13.32	13.41	21.14	21.92	22.01	130.0170	155.5966	158.8547	25000
	16QAM	1	0	12.43	13.22	13.41	21.03	21.82	22.01	126.7652	152.0548	158.8547	25000
	QPSK	75	0	12.51	13.14	13.28	21.11	21.74	21.88	129.1219	149.2794	154.1700	25000
	16QAM	75	0	12.43	13.07	13.37	21.03	21.67	21.97	126.7652	146.8926	157.3983	25000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44190 /3670	44340 /3675	44490 /3690	44190 /3670	44340 /3675	44490 /3690	44190 /3670	44340 /3675	44490 /3690	/
20MHz	QPSK	1	0	12.51	13.28	13.38	21.11	21.88	21.98	129.1219	154.1700	157.7611	25000
	16QAM	1	0	12.38	13.18	13.36	20.98	21.78	21.96	125.3141	150.6607	157.0363	25000
	QPSK	100	0	12.48	13.09	13.24	21.08	21.69	21.84	128.2331	147.5707	152.7566	25000
	16QAM	100	0	12.41	13.03	13.34	21.01	21.63	21.94	126.1828	145.5459	156.3148	25000
Note: EIRP=Conducted Power + Antenna Gain (Antenna Gain =8.6dBi) $EIRP(mW)=10^{(EIRP(dBm)/10)}$													

LTE Band 48				Conducted Power(dBm)			EIRP(dBm)			EIRP(mW)			Limit(mW) /25MHz
BW	Modulation	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	1	0	13.99	14.22	14.29	22.59	22.82	22.89	181.5516	191.4256	194.5360	25000
	16QAM	1	0	14.16	14.26	14.40	22.76	22.86	23	188.7991	193.1968	199.5262	25000
	QPSK	25	0	14.19	14.38	14.41	22.79	22.98	23.01	190.1078	198.6095	199.9862	25000
	16QAM	25	0	14.24	14.37	14.40	22.84	22.97	23	192.3092	198.1527	199.5262	25000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44140 /3655	44340 /3675	44540 /3695	44140 /3655	44340 /3675	44540 /3695	44140 /3655	44340 /3675	44540 /3695	/
10MHz	QPSK	1	0	13.42	13.69	14.05	22.02	22.29	22.65	159.2209	169.4338	184.0772	25000
	16QAM	1	0	13.48	13.55	14.02	22.08	22.15	22.62	161.4359	164.0590	182.8100	25000
	QPSK	50	0	13.91	14.20	14.54	22.51	22.8	23.14	178.2379	190.5461	206.0630	25000
	16QAM	50	0	13.89	14.18	14.60	22.49	22.78	23.2	177.4189	189.6706	208.9296	25000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44165 /3657.5	44340 /3675	44515 /3692.5	44165 /3657.5	44340 /3675	44515 /3692.5	44165 /3657.5	44340 /3675	44515 /3692.5	/
15MHz	QPSK	1	0	12.90	13.09	13.44	21.5	21.69	22.04	141.2538	147.5707	159.9558	25000
	16QAM	1	0	13.01	13.02	13.68	21.61	21.62	22.28	144.8772	145.2112	169.0441	25000
	QPSK	75	0	13.58	13.84	14.17	22.18	22.44	22.77	165.1962	175.3881	189.2344	25000
	16QAM	75	0	13.56	13.81	14.13	22.16	22.41	22.73	164.4372	174.1807	187.4995	25000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44190 /3670	44340 /3675	44490 /3690	44190 /3670	44340 /3675	44490 /3690	44190 /3670	44340 /3675	44490 /3690	/
20MHz	QPSK	1	0	14.85	14.74	14.90	23.45	23.34	23.5	221.3095	215.7744	223.8721	25000
	16QAM	1	0	14.78	14.72	15.12	23.38	23.32	23.72	217.7710	214.7830	235.5049	25000
	QPSK	100	0	14.45	14.54	14.79	23.05	23.14	23.39	201.8366	206.0630	218.2730	25000
	16QAM	100	0	14.39	14.47	14.75	22.99	23.07	23.35	199.0673	202.7683	216.2719	25000

Note: EIRP=Conducted Power + Antenna Gain (Antenna Gain =8.6dBi)

$$EIRP(mW)=10^{(EIRP(dBm)/10)}$$

LTE TDD Band 43				Conducted Power Spectral Density(dBm)/1MHz			EIRP Power Spectral Density(dBm)/1MHz			EIRP Power Spectral Density(mW)/1MHz			Limit (mW) /1MHz
BW	Modulation	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	14.342	14.324	14.402	22.872	22.854	22.932	193.7314	192.9301	196.4265	1000
	16QAM	25	0	13.082	15.864	16.213	21.612	24.394	24.743	144.9439	275.0426	298.0575	1000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44140 /3655	44340 /3675	44540 /3695	44140 /3655	44340 /3675	44540 /3695	44140 /3655	44340 /3675	44540 /3695	/
10MHz	QPSK	50	0	12.709	12.828	12.624	21.239	21.358	21.154	133.0148	136.7099	130.4368	1000
	16QAM	50	0	13.406	13.572	13.462	21.936	22.102	21.992	156.1709	162.2557	158.1976	1000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44165 /3657.5	44340 /3675	44515 /3692.5	44165 /3657.5	44340 /3675	44515 /3692.5	44165 /3657.5	44340 /3675	44515 /3692.5	/
15MHz	QPSK	75	0	11.209	12.249	13.047	19.739	20.779	21.577	94.1673	119.6465	143.7805	1000
	16QAM	75	0	11.833	12.425	13.171	20.363	20.955	21.701	108.7176	124.5948	147.9449	1000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44190 /3660	44340 /3675	44490 /3690	44190 /3660	44340 /3675	44490 /3690	44190 /3660	44340 /3675	44490 /3690	/
20MHz	QPSK	100	0	12.266	11.72	11.644	20.796	20.25	20.174	120.1158	105.9254	104.0878	1000
	16QAM	100	0	11.175	11.598	11.777	19.705	20.128	20.307	93.4329	102.9912	107.3248	1000

LTE TDD Band 48				Conducted Power Spectral Density(dBm)/1MHz			EIRP Power Spectral Density(dBm)/1MHz			EIRP Power Spectral Density(mW)/1MHz			Limit (mW)/1MHz
BW	Modulation	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	14.54	14.72	14.579	23.07	23.25	23.109	202.7683	211.3489	204.5973	1000
	16QAM	25	0	16.082	15.998	16.002	24.612	24.528	24.532	289.2011	283.6612	283.9226	1000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44140 /3655	44340 /3675	44540 /3695	44140 /3655	44340 /3675	44540 /3695	44140 /3655	44340 /3675	44540 /3695	/
10MHz	QPSK	50	0	13.063	12.954	13.368	21.593	21.484	21.898	144.3112	140.7343	154.8104	1000
	16QAM	50	0	14.006	14.262	14.69	22.536	22.792	23.22	179.3081	190.1954	209.8940	1000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44165 /3657.5	44340 /3675	44515 /3692.5	44165 /3657.5	44340 /3675	44515 /3692.5	44165 /3657.5	44340 /3675	44515 /3692.5	/
15MHz	QPSK	75	0	12.414	12.561	11.945	20.944	21.091	20.475	124.2796	128.5583	111.5578	1000
	16QAM	75	0	12.348	12.413	11.937	20.878	20.943	20.467	122.4052	124.2510	111.3525	1000
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)			/
				44190 /3660	44340 /3675	44490 /3690	44190 /3660	44340 /3675	44490 /3690	44190 /3660	44340 /3675	44490 /3690	/
20MHz	QPSK	100	0	11.158	12.385	11.614	19.688	20.915	20.144	93.0679	123.4525	103.3713	1000
	16QAM	100	0	11.664	11.585	11.949	20.194	20.115	20.479	104.5683	102.6833	111.6606	1000



LTE Band 43 QPSK 5MHz CH44115



LTE Band 43 16QAM 5MHz CH44115



LTE Band 43 QPSK 5MHz CH44340



LTE Band 43 16QAM 5MHz CH44340

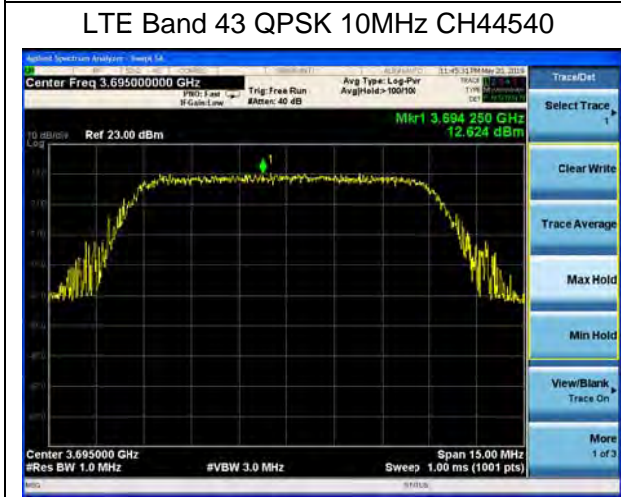
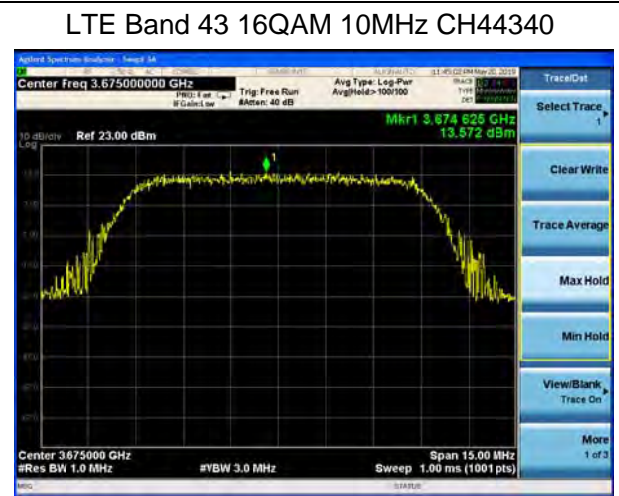
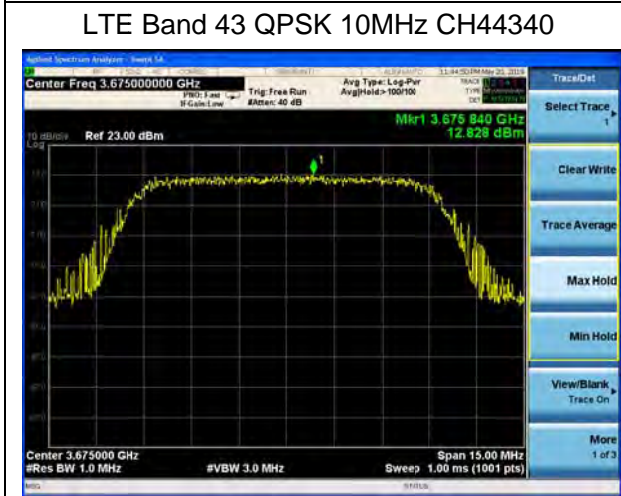
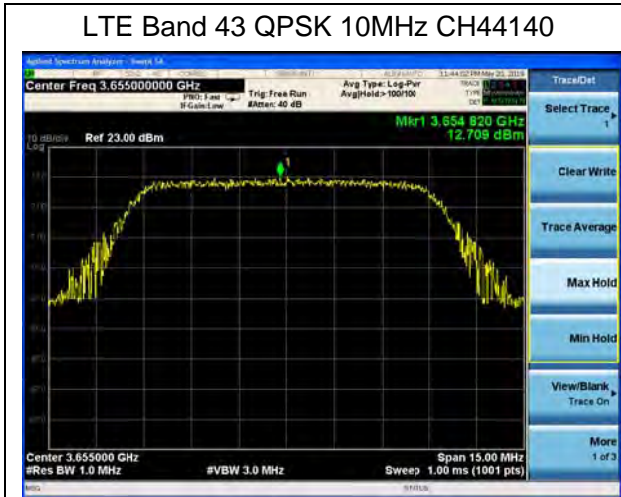


LTE Band 43 QPSK 5MHz CH44565



LTE Band 43 16QAM 5MHz CH44565





LTE Band 43 QPSK 15MHz CH44165



LTE Band 43 16QAM 15MHz CH44165



LTE Band 43 QPSK 15MHz CH44340



LTE Band 43 16QAM 15MHz CH44340

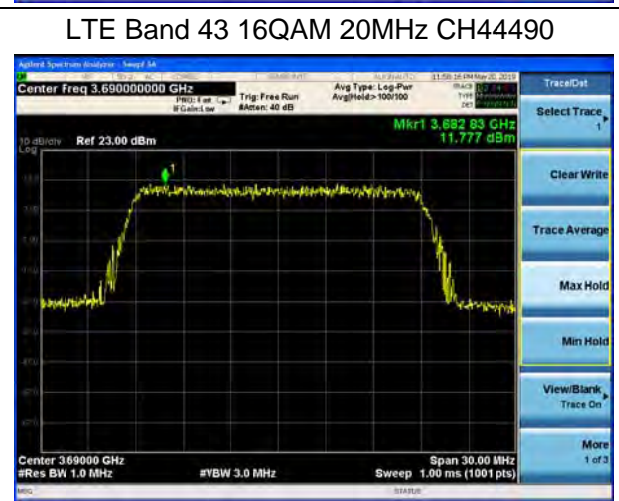
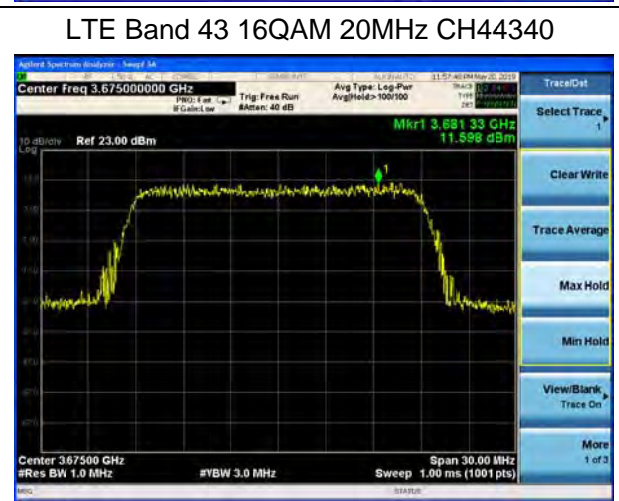
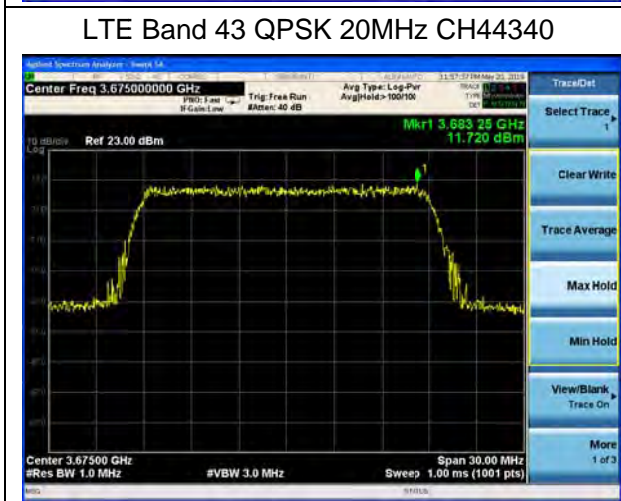


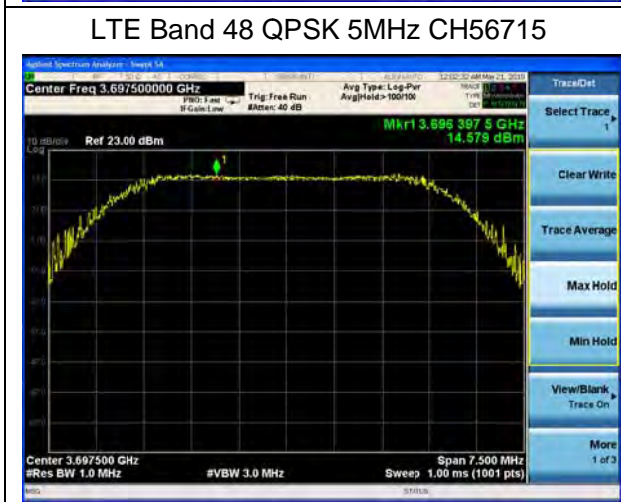
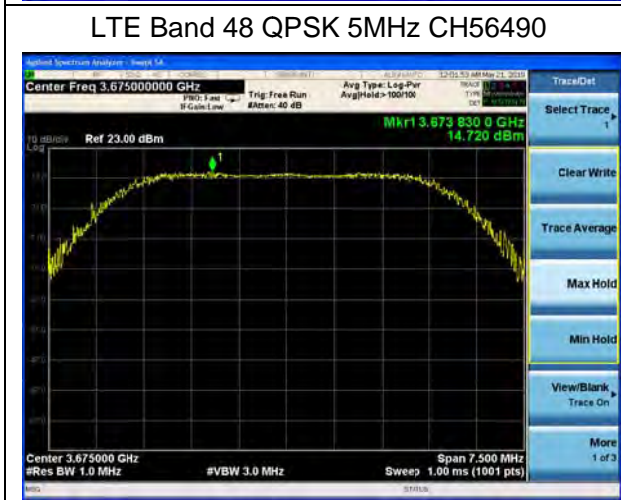
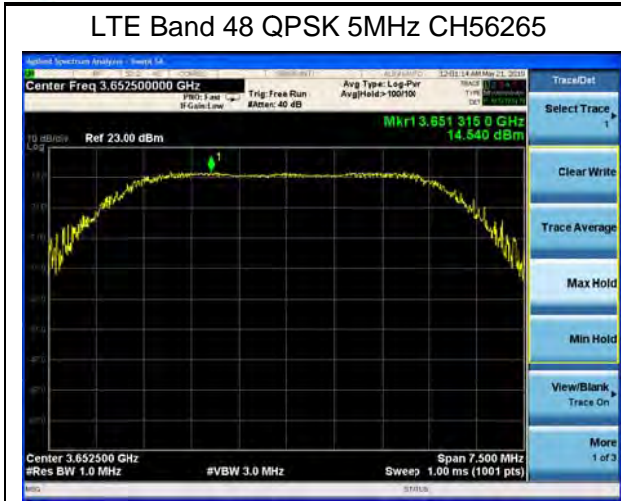
LTE Band 43 QPSK 15MHz CH44515



LTE Band 43 16QAM 15MHz CH44515







LTE Band 48 QPSK 10MHz CH56290



LTE Band 48 16QAM 10MHz CH56290



LTE Band 48 QPSK 10MHz CH56490



LTE Band 48 16QAM 10MHz CH56490



LTE Band 48 QPSK 10MHz CH56690



LTE Band 48 16QAM 10MHz CH56690



LTE Band 48 QPSK 15MHz CH56315



LTE Band 48 16QAM 15MHz CH56315



LTE Band 48 QPSK 15MHz CH56490



LTE Band 48 16QAM 15MHz CH56490



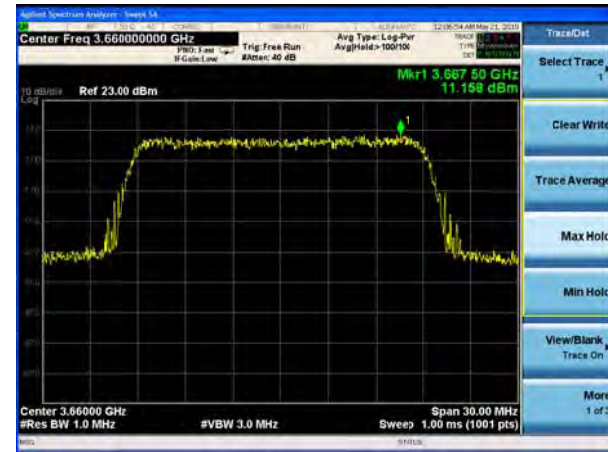
LTE Band 48 QPSK 15MHz CH56665



LTE Band 48 16QAM 15MHz CH56665



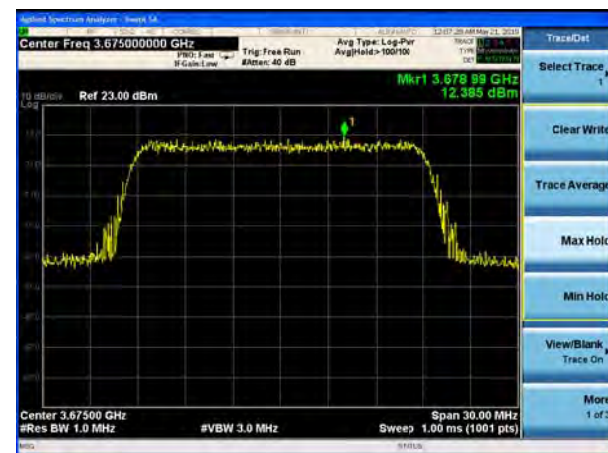
LTE Band 48 QPSK 20MHz CH56340



LTE Band 48 16QAM 20MHz CH56340



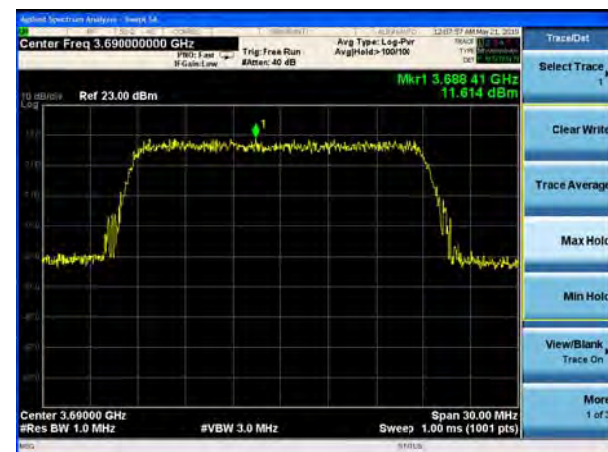
LTE Band 48 QPSK 20MHz CH56490



LTE Band 48 16QAM 20MHz CH56490



LTE Band 48 QPSK 20MHz CH56640



LTE Band 48 16QAM 20MHz CH56640



5.2. Occupied Bandwidth

Ambient condition

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

Method of Measurement

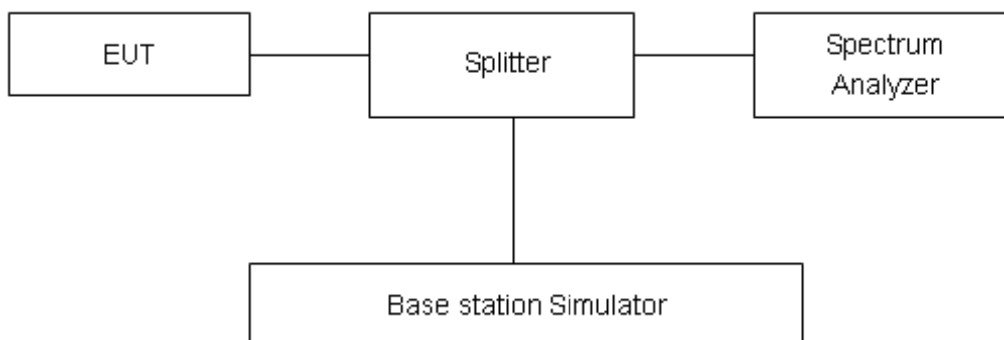
The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 43/48 (5MHz),

RBW is set to 300 kHz, VBW is set to 1MHz for LTE Band 43/48 (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.

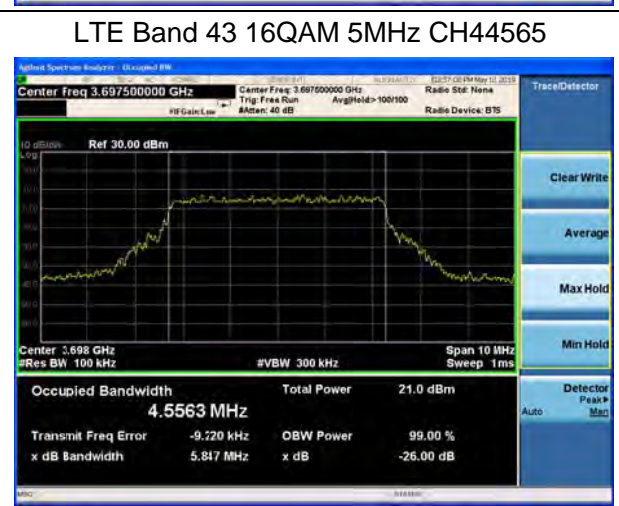
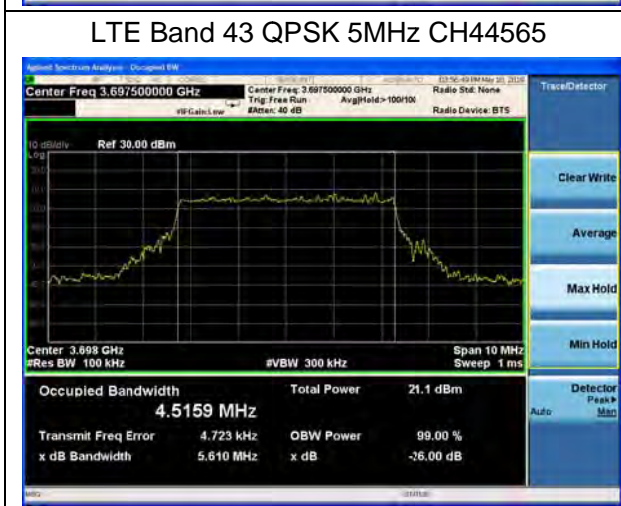
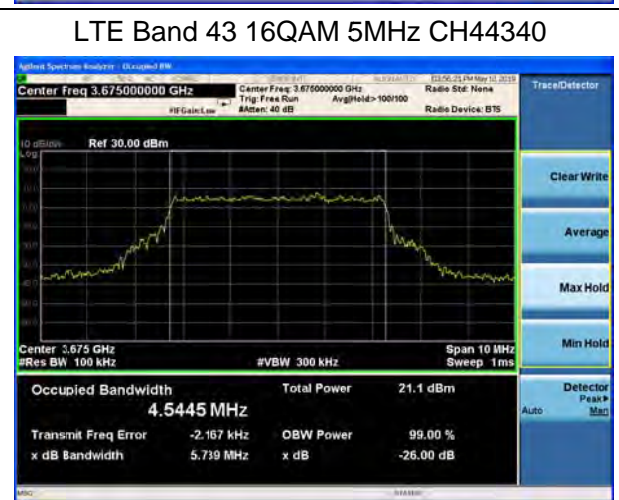
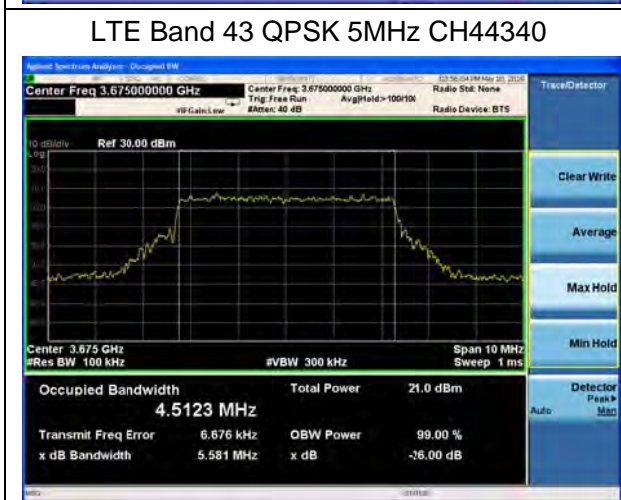
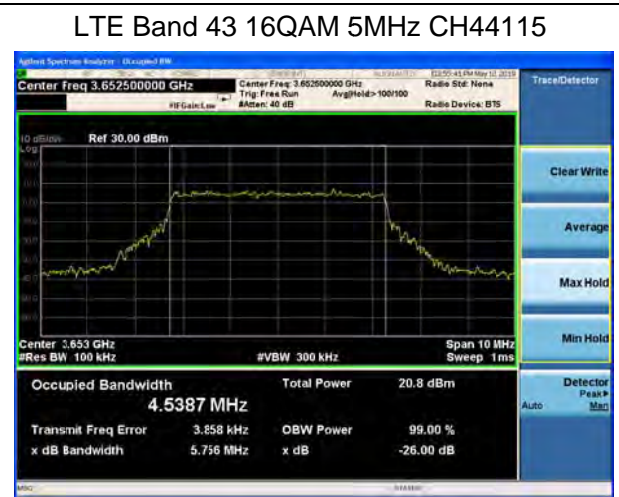
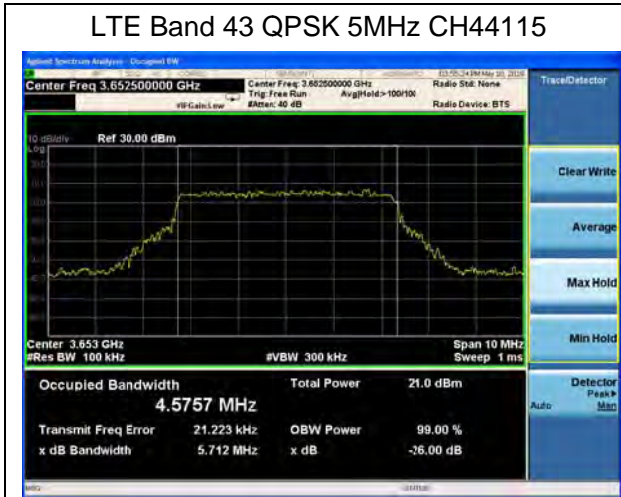
Measurement Uncertainty

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

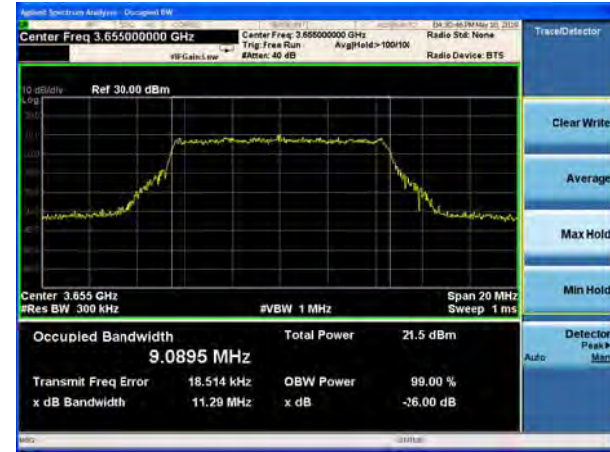
LTE Band 43						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth (MHz)
100%	QPSK	5	44115	3652.5	4.5757	5.712
			44340	3675	4.5123	5.581
			44565	3697.5	4.5159	5.610
		10	44140	3655	9.0895	11.290
			44340	3675	9.0824	11.050
			44540	3695	9.0566	11.190
		15	44165	3657.5	13.5180	15.740
			44340	3675	13.4740	15.490
			44515	3692.5	13.4880	15.644
		20	44190	3660	17.9420	20.310
			44340	3675	17.9210	20.170
			44490	3690	17.9530	19.630
	16QAM	5	44115	3652.5	4.5387	5.756
			44340	3675	4.5445	5.739
			44565	3697.5	4.5563	5.847
		10	44140	3655	9.1353	11.560
			44340	3675	9.0797	11.540
			44540	3695	9.0680	11.340
		15	44165	3657.5	13.4630	15.970
			44340	3675	13.5130	15.730
			44515	3692.5	13.5810	15.930
		20	44190	3660	17.9780	20.350
			44340	3675	17.9760	20.620
			44490	3690	17.9790	20.230

LTE Band 48						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth (MHz)
100%	QPSK	5	56265	3652.5	4.5306	5.484
			56490	3675	4.5263	5.550
			56715	3697.5	4.5274	5.738
		10	56290	3655	9.0591	11.310
			56490	3675	9.0890	11.520
			56690	3695	9.0579	11.340
		15	56315	3657.5	13.4630	15.300
			56490	3675	13.5080	15.450
			56665	3692.5	13.4890	15.750
		20	56340	3660	17.8930	20.150
			56490	3675	17.9290	19.790
			56640	3690	17.9620	20.070
	16QAM	5	56265	3652.5	4.5367	5.725
			56490	3675	4.5414	5.769
			56715	3697.5	4.5335	5.708
		10	56290	3655	9.0629	11.130
			56490	3675	9.0891	11.660
			56690	3695	9.1178	11.440
		15	56315	3657.5	13.4280	15.380
			56490	3675	13.5010	15.780
			56665	3692.5	13.4510	15.660
		20	56340	3660	17.9290	19.970
			56490	3675	18.0050	20.440
			56640	3690	17.9460	20.110

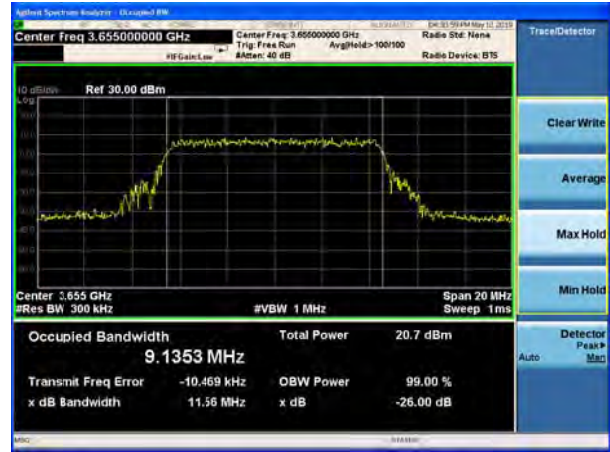




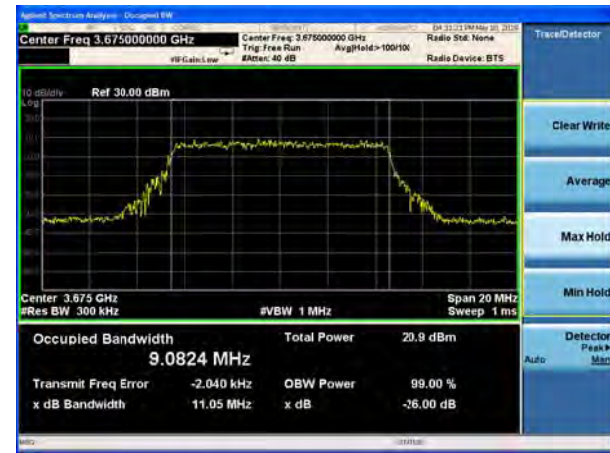
LTE Band 43 QPSK 10MHz CH44140



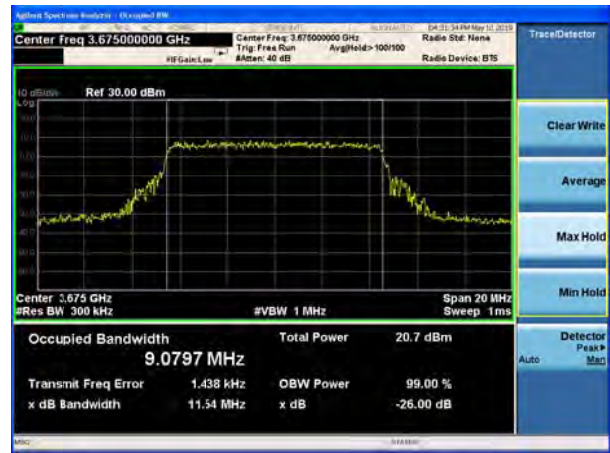
LTE Band 43 16QAM 10MHz CH44140



LTE Band 43 QPSK 10MHz CH44340



LTE Band 43 16QAM 10MHz CH44340



LTE Band 43 QPSK 10MHz CH44540



LTE Band 43 16QAM 10MHz CH44540





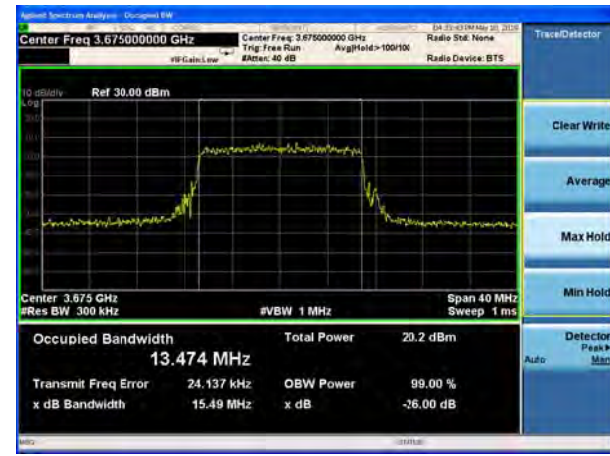
LTE Band 43 QPSK 15MHz CH44165



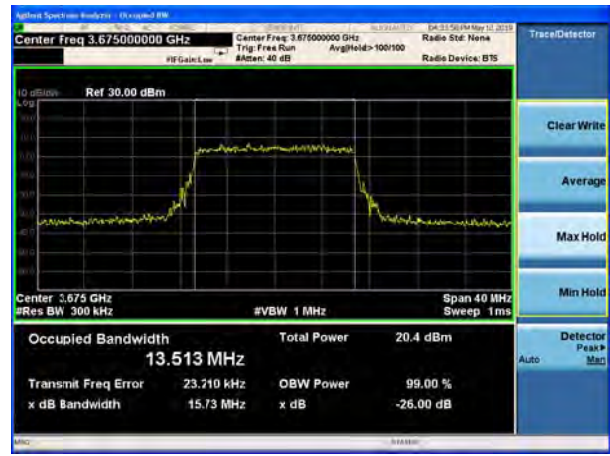
LTE Band 43 16QAM 15MHz CH44165



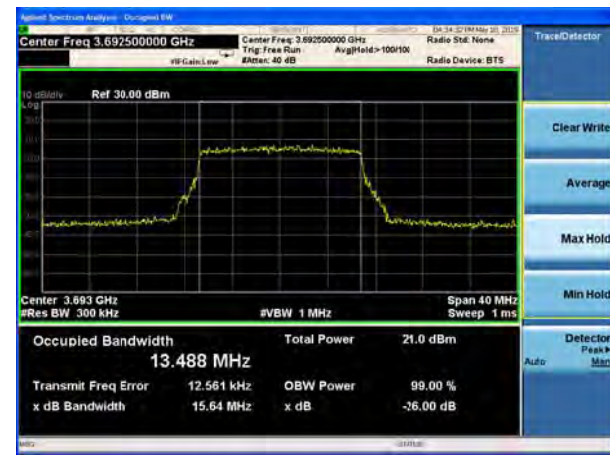
LTE Band 43 QPSK 15MHz CH44340



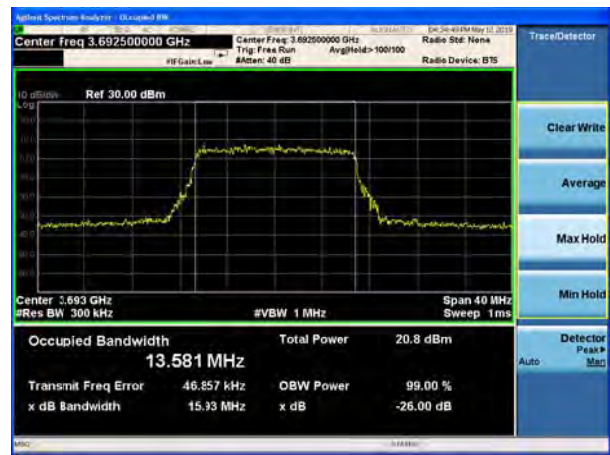
LTE Band 43 16QAM 15MHz CH44340



LTE Band 43 QPSK 15MHz CH44515

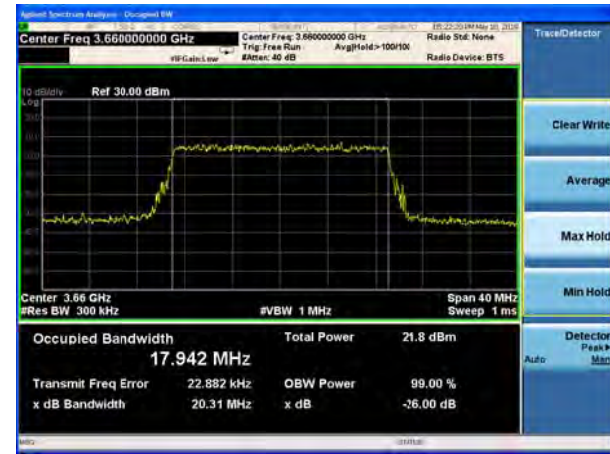


LTE Band 43 16QAM 15MHz CH44515





LTE Band 43 QPSK 20MHz CH44190



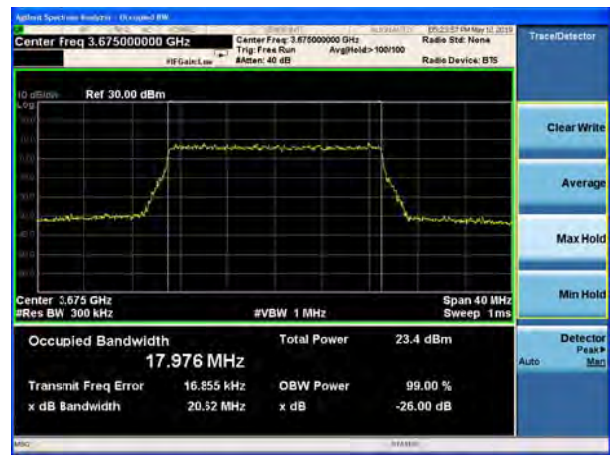
LTE Band 43 16QAM 20MHz CH44190



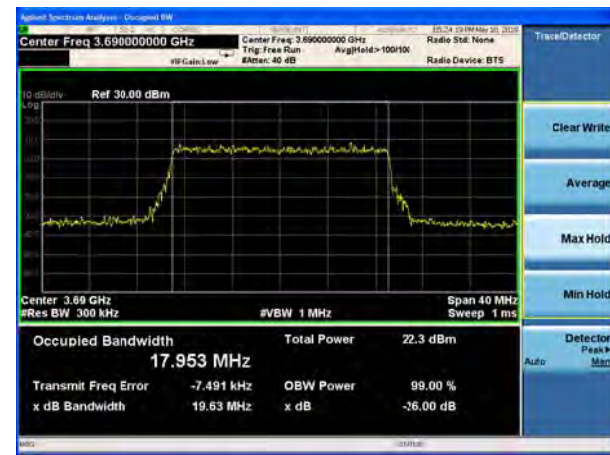
LTE Band 43 QPSK 20MHz CH44340



LTE Band 43 16QAM 20MHz CH44340



LTE Band 43 QPSK 20MHz CH44490

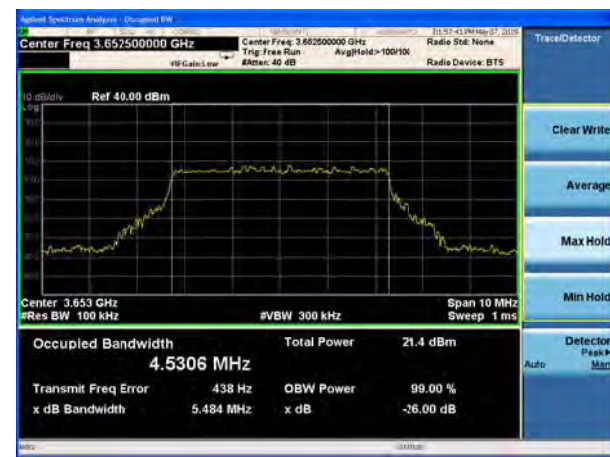


LTE Band 43 16QAM 20MHz CH44490





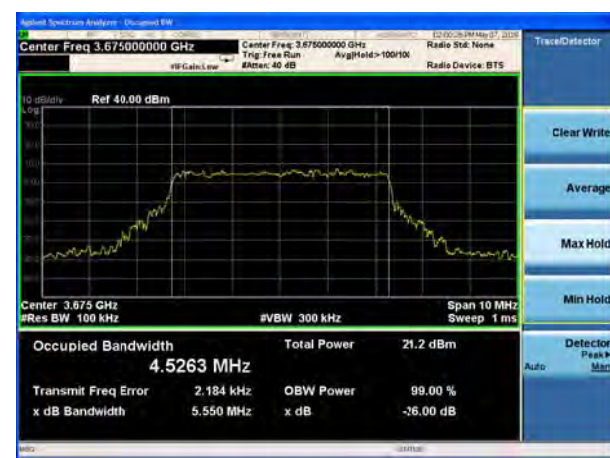
LTE Band 48 QPSK 5MHz CH56265



LTE Band 48 16QAM 5MHz CH56265



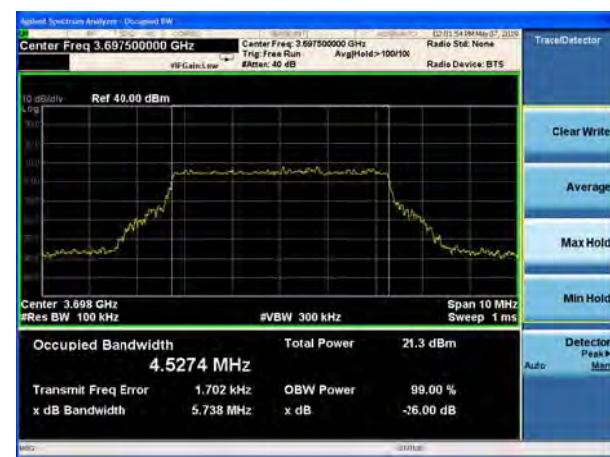
LTE Band 48 QPSK 5MHz CH56490



LTE Band 48 16QAM 5MHz CH56490



LTE Band 48 QPSK 5MHz CH56715

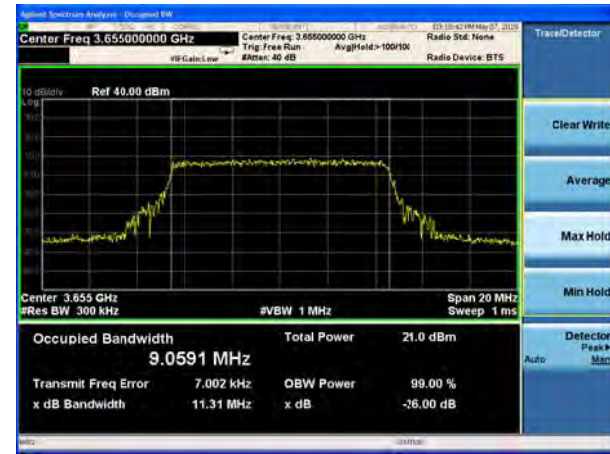


LTE Band 48 16QAM 5MHz CH56715





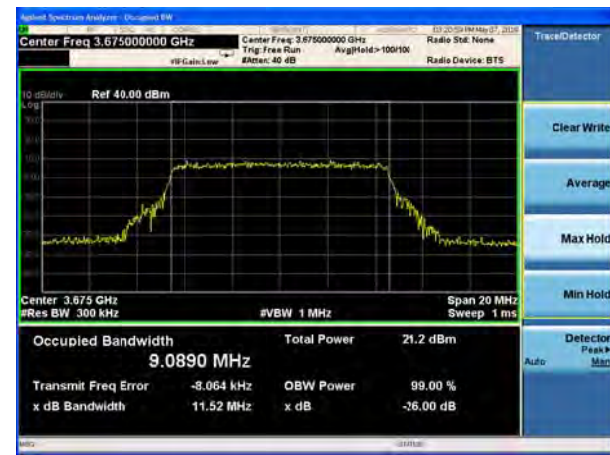
LTE Band 48 QPSK 10MHz CH56290



LTE Band 48 16QAM 10MHz CH56290



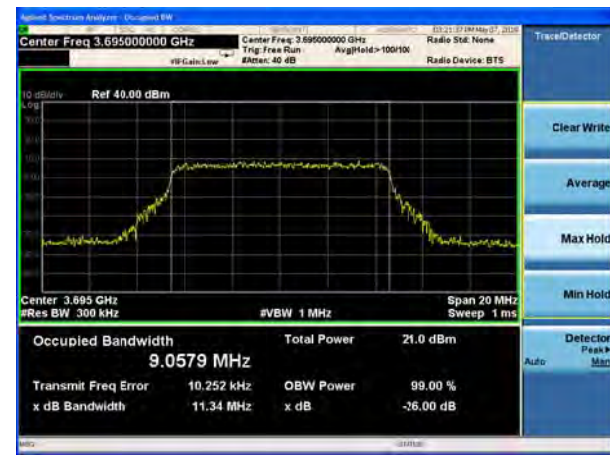
LTE Band 48 QPSK 10MHz CH56490



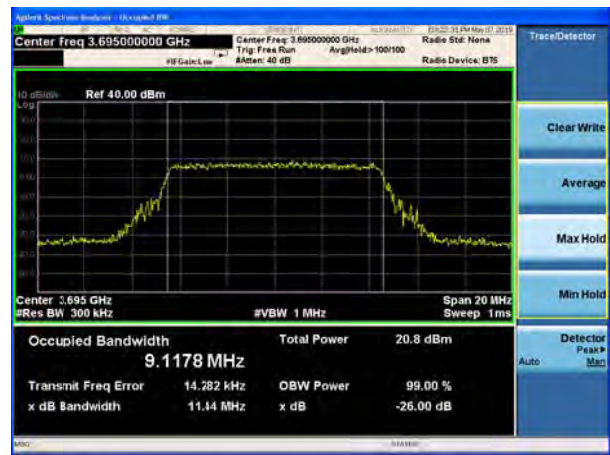
LTE Band 48 16QAM 10MHz CH56490



LTE Band 48 QPSK 10MHz CH56690

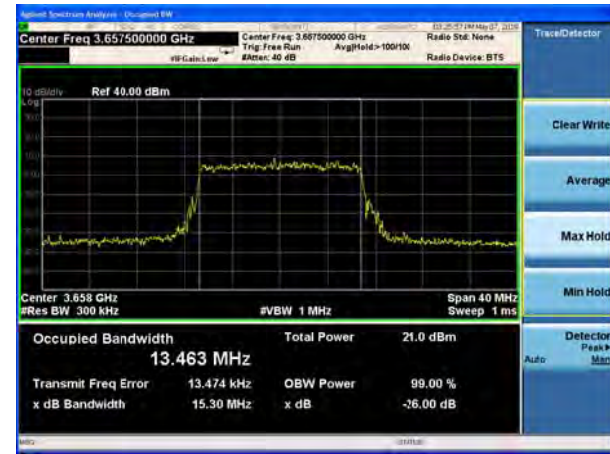


LTE Band 48 16QAM 10MHz CH56690

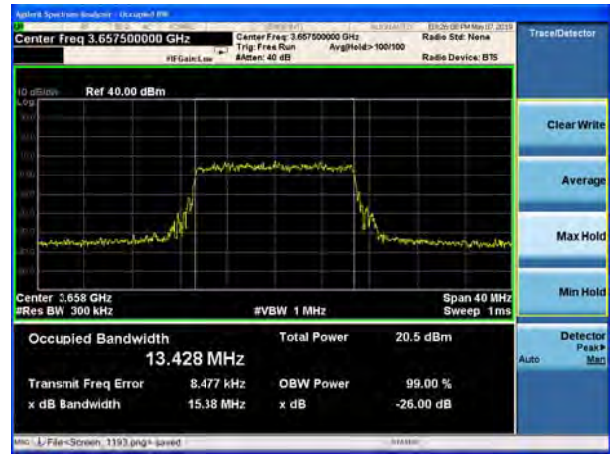




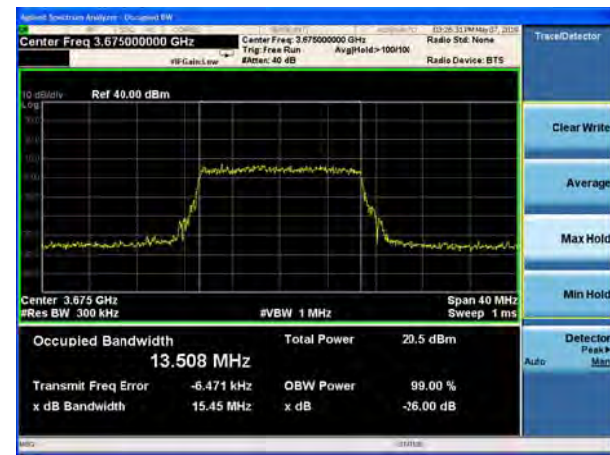
LTE Band 48 QPSK 15MHz CH56315



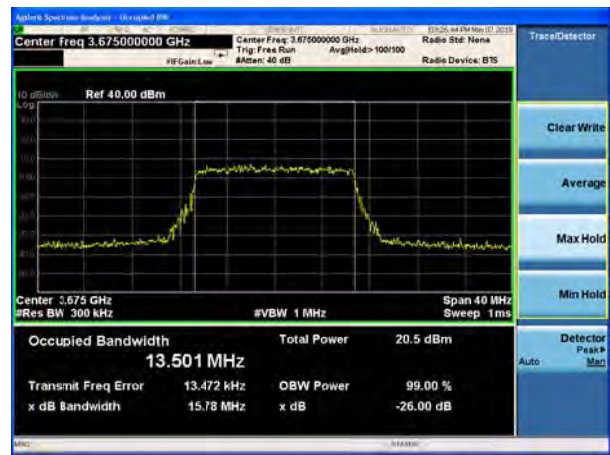
LTE Band 48 16QAM 15MHz CH56315



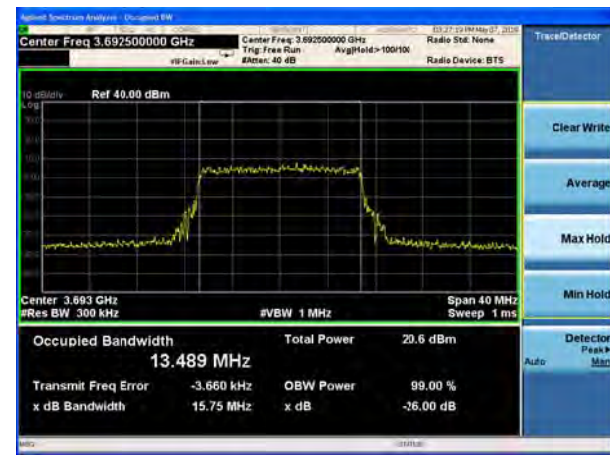
LTE Band 48 QPSK 15MHz CH56490



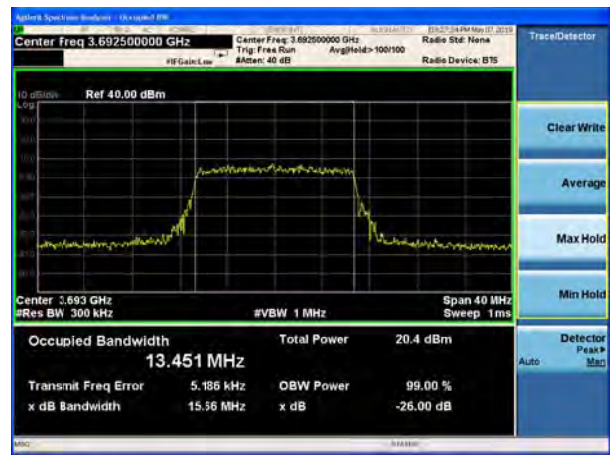
LTE Band 48 16QAM 15MHz CH56490



LTE Band 48 QPSK 15MHz CH56665

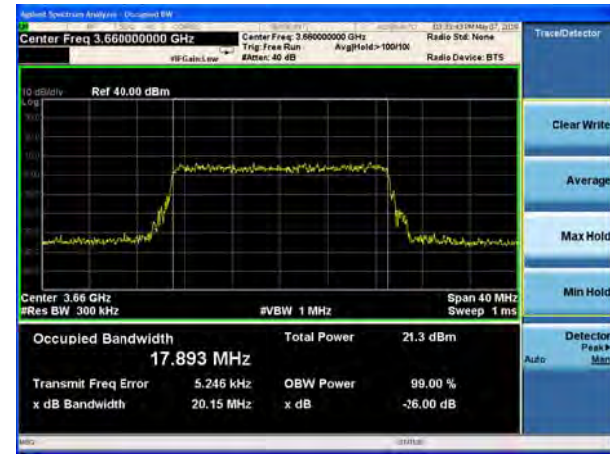


LTE Band 48 16QAM 15MHz CH56665





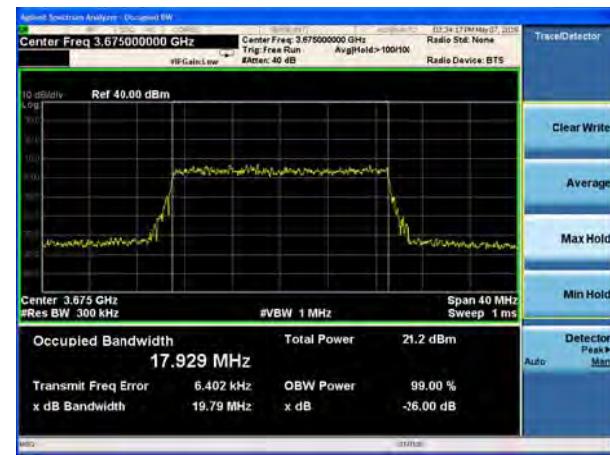
LTE Band 48 QPSK 20MHz CH56340



LTE Band 48 16QAM 20MHz CH56340



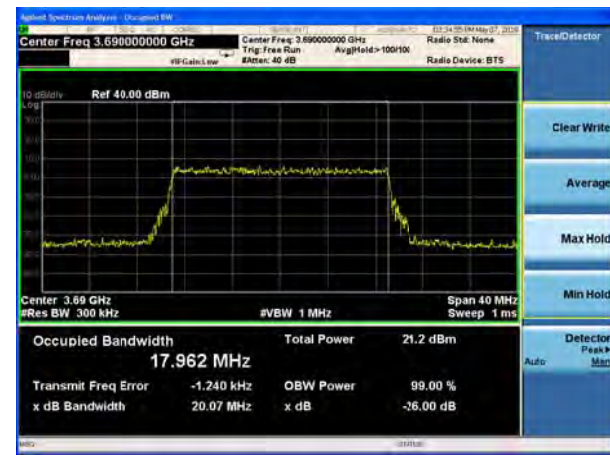
LTE Band 48 QPSK 20MHz CH56490



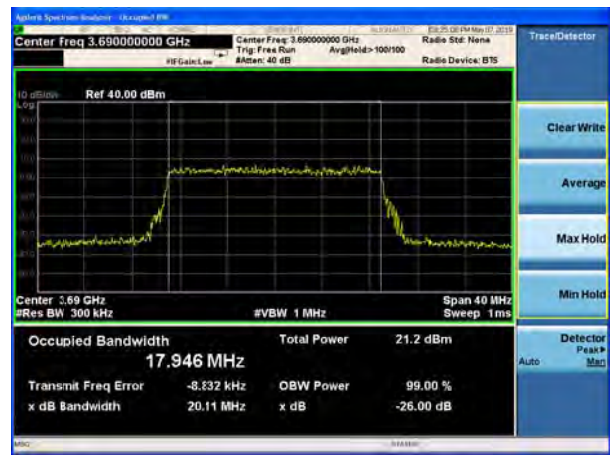
LTE Band 48 16QAM 20MHz CH56490



LTE Band 48 QPSK 20MHz CH56640



LTE Band 48 16QAM 20MHz CH56640



5.3. Band Edge Compliance

Ambient condition

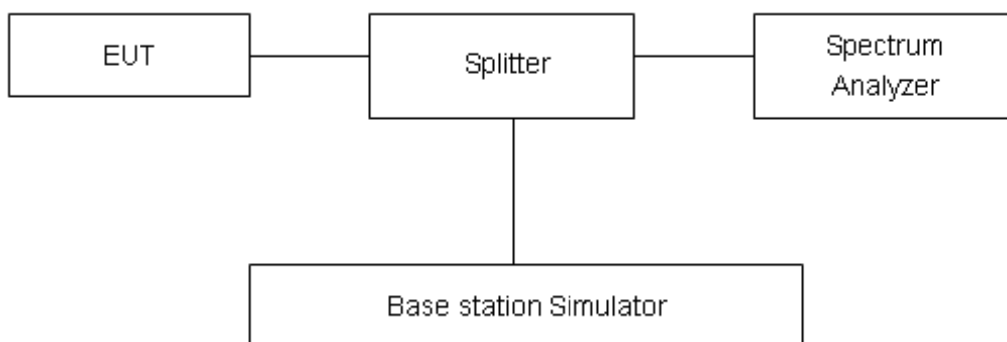
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 43/48 (5MHz).
 RBW is set to 100 kHz, VBW is set to 300kHz for LTE Band 43/48 (10MHz).
 RBW is set to 150 kHz, VBW is set to 510 kHz for LTE Band 43/48 (15MHz).
 RBW is set to 200 kHz, VBW is set to 620 kHz for LTE Band 43/48 (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.”

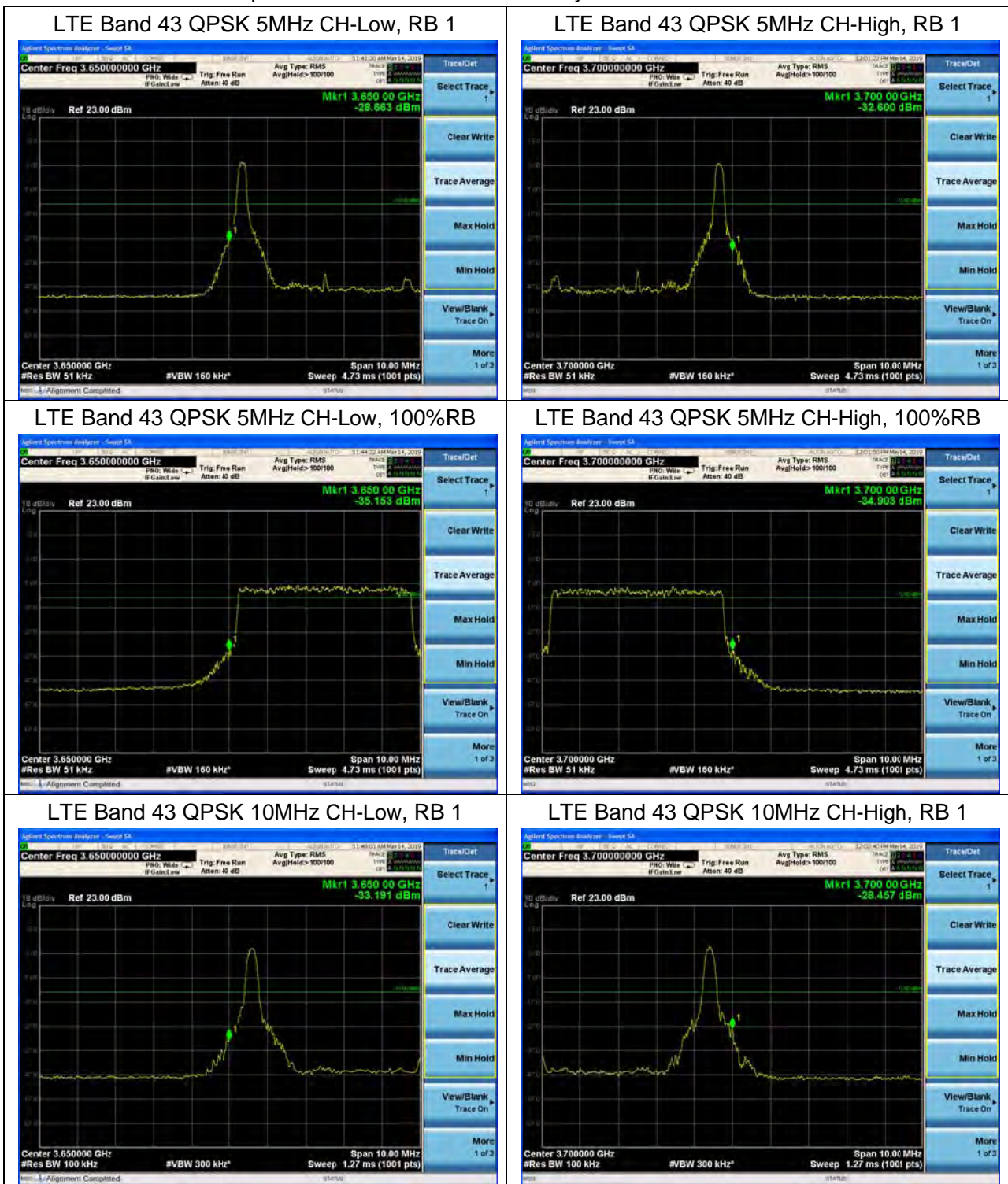
Limit	-13 dBm
-------	---------

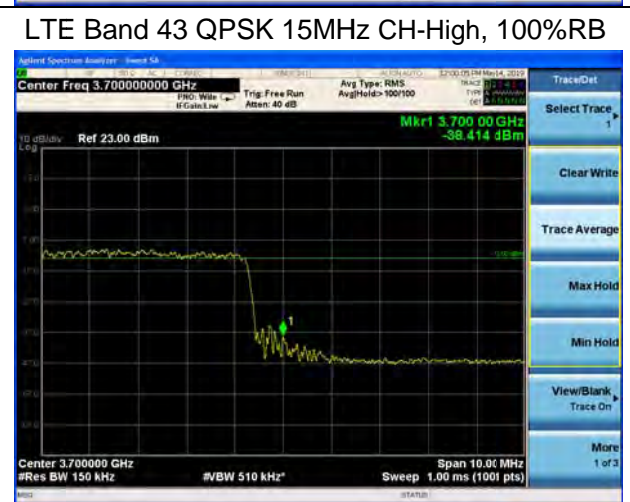
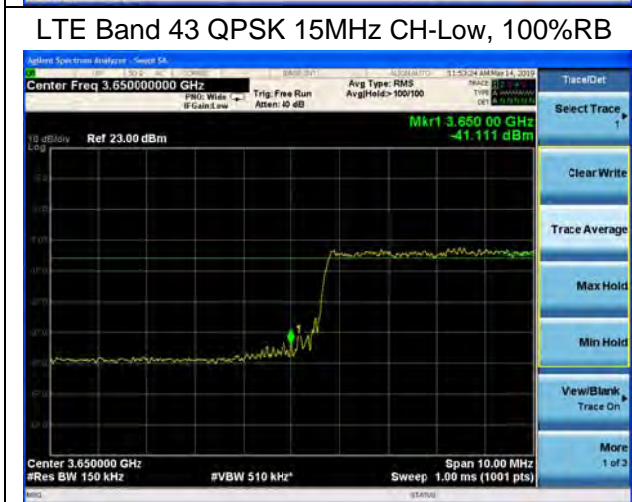
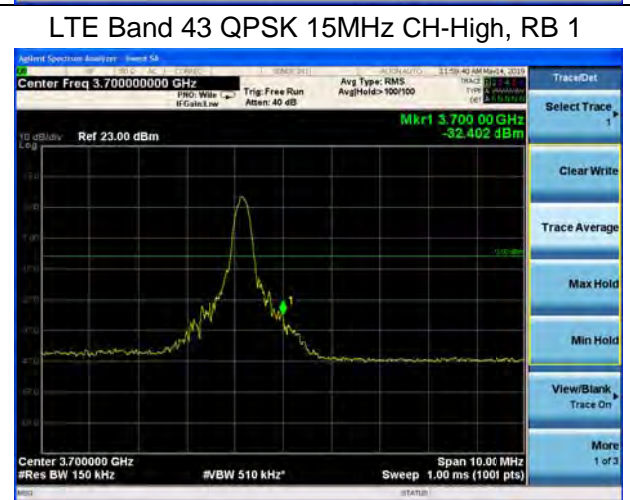
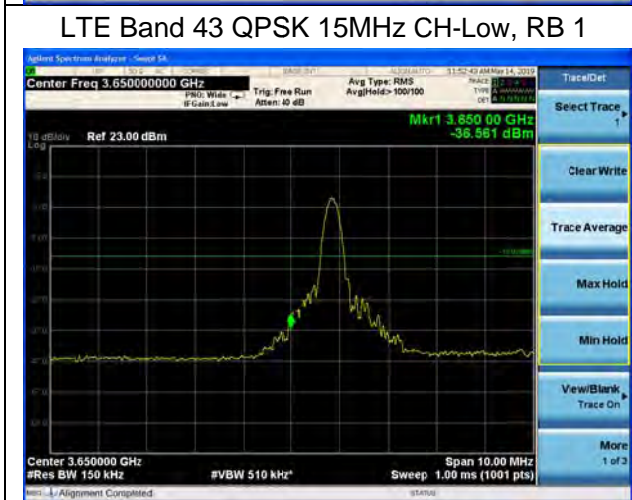
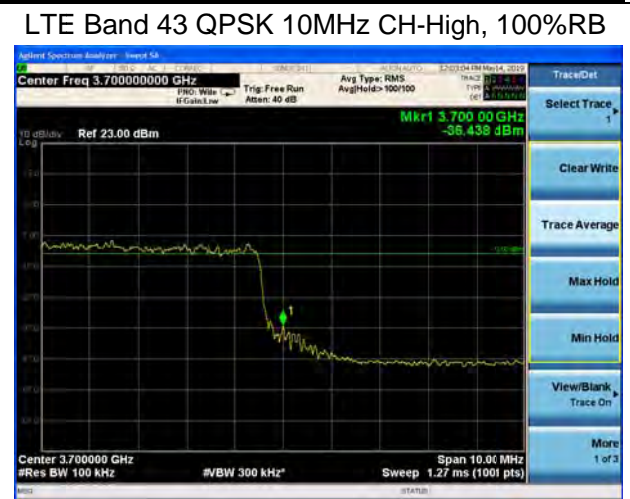
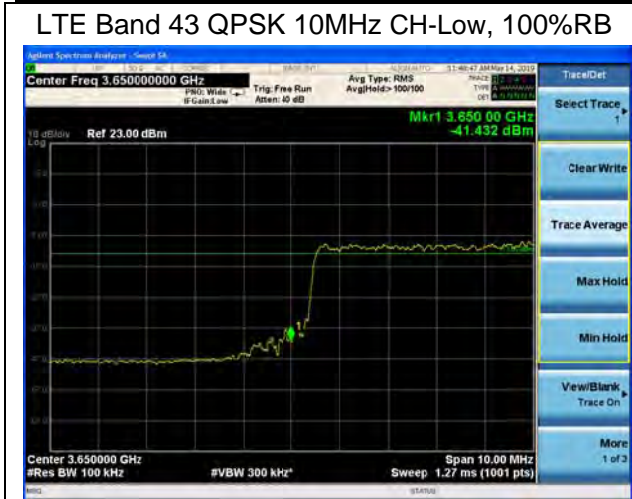
Measurement Uncertainty

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.



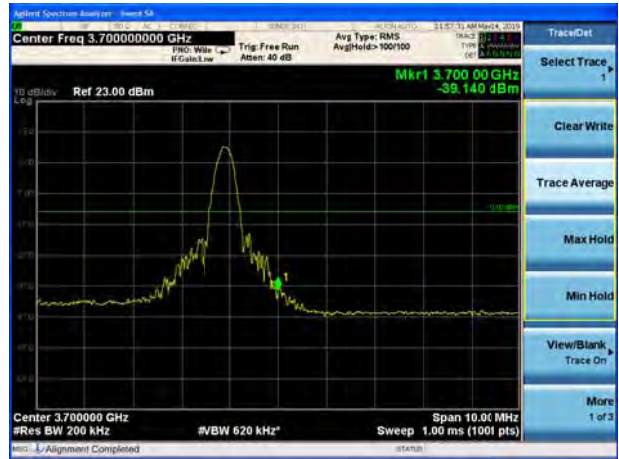




LTE Band 43 QPSK 20MHz CH-Low, RB 1



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, 100%RB



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



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, 100%RB



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





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, 100%RB



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



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



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

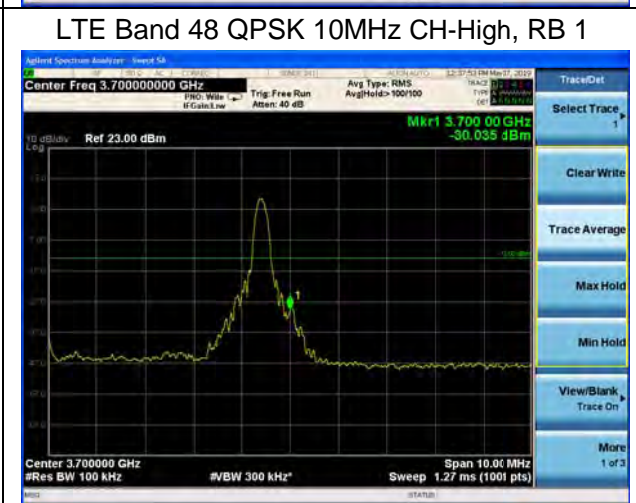
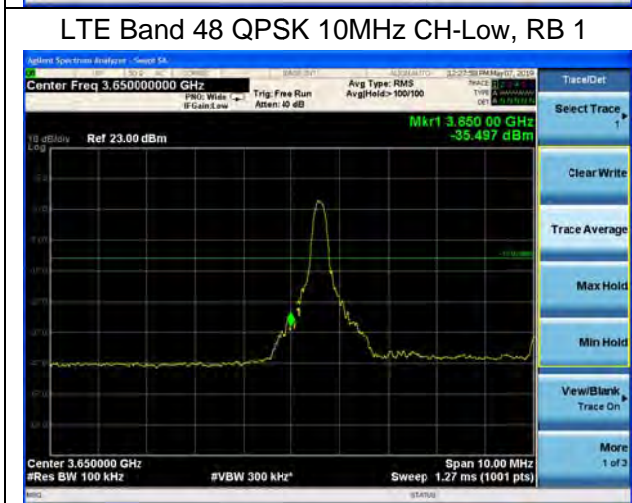
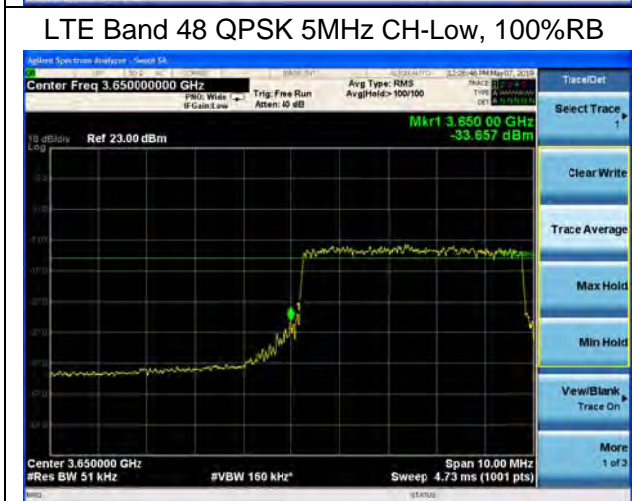
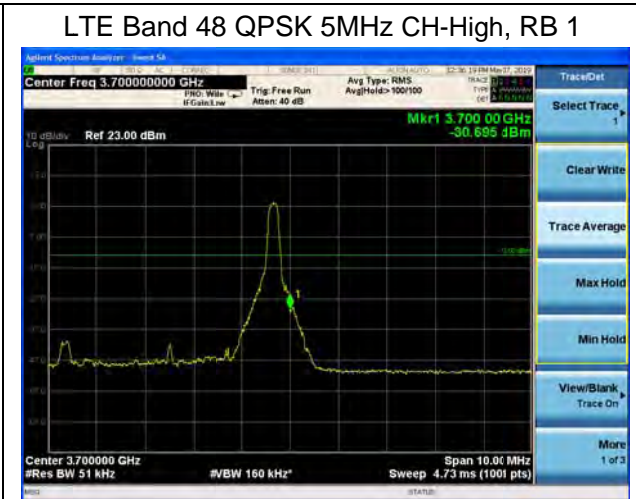
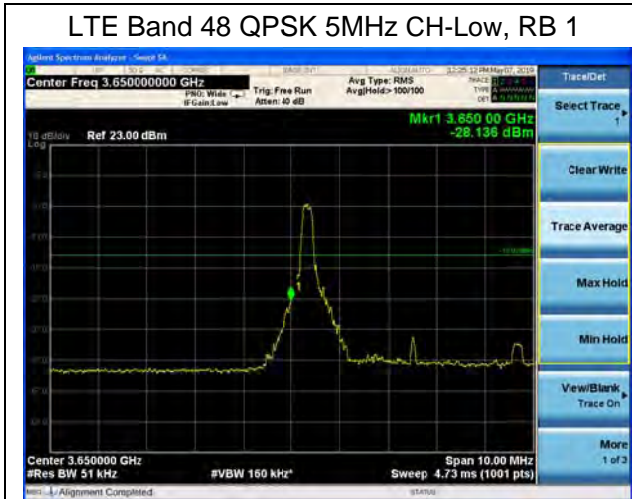


LTE Band 43 16QAM 20MHz CH-Low, 100%RB



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





LTE Band 48 QPSK 10MHz CH-Low, 100%RB



LTE Band 48 QPSK 10MHz CH-High, 100%RB



LTE Band 48 QPSK 15MHz CH-Low, RB 1



LTE Band 48 QPSK 15MHz CH-High, RB 1



LTE Band 48 QPSK 15MHz CH-Low, 100%RB



LTE Band 48 QPSK 15MHz CH-High, 100%RB





LTE Band 48 QPSK 20MHz CH-Low, RB 1



LTE Band 48 QPSK 20MHz CH-High, RB 1



LTE Band 48 QPSK 20MHz CH-Low, RB 100



LTE Band 48 QPSK 20MHz CH-High, RB 100



LTE Band 48 16QAM 5MHz CH-Low, RB 1



LTE Band 48 16QAM 5MHz CH-High, RB 1



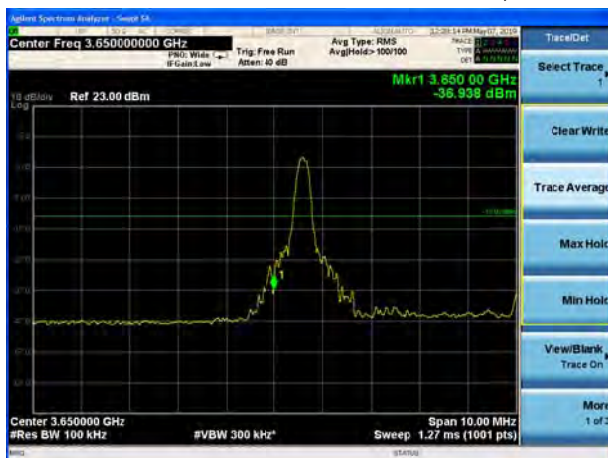
LTE Band 48 16QAM 5MHz CH-Low, 100%RB



LTE Band 48 16QAM 5MHz CH-High, 100%RB



LTE Band 48 16QAM 10MHz CH-Low, RB 1



LTE Band 48 16QAM 10MHz CH-High, RB 1



LTE Band 48 16QAM 10MHz CH-Low, 100%RB



LTE Band 48 16QAM 10MHz CH-High, 100%RB





LTE Band 48 16QAM 15MHz CH-Low, RB 1



LTE Band 48 16QAM 15MHz CH-High, RB 1



LTE Band 48 16QAM 15MHz CH-Low, 100%RB



LTE Band 48 16QAM 15MHz CH-High, 100%RB

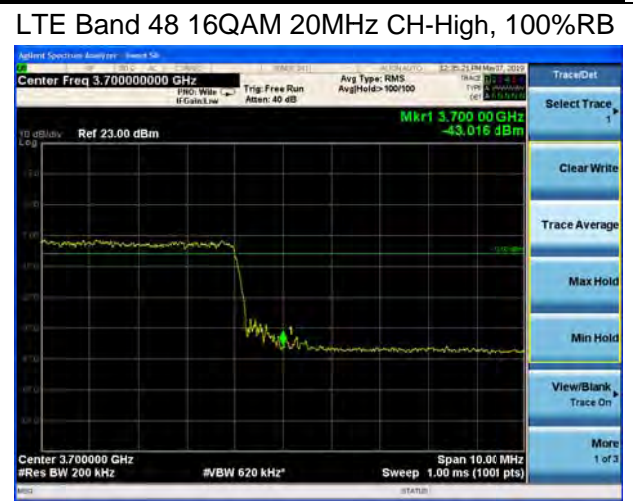
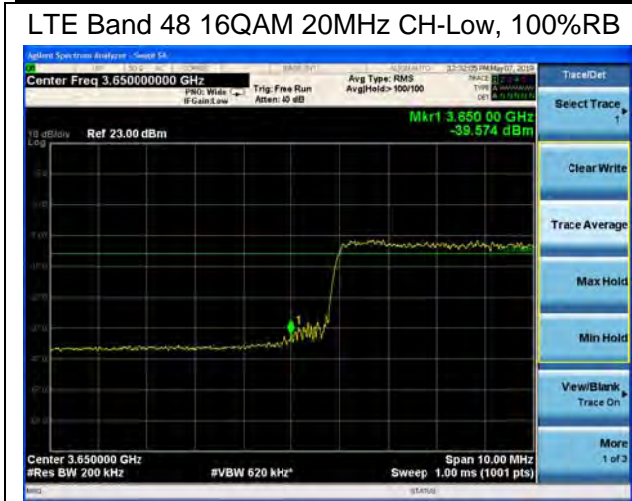


LTE Band 48 16QAM 20MHz CH-Low, RB 1



LTE Band 48 16QAM 20MHz CH-High, RB 1





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 100kHz for 5MHz, .

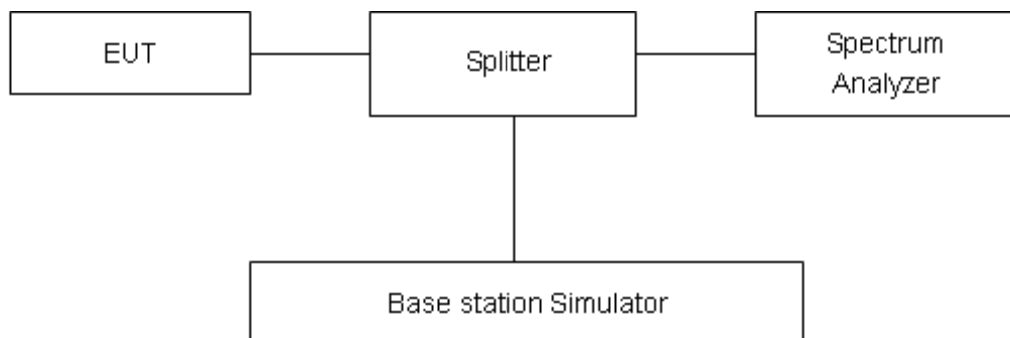
RBW is set to 100kHz, VBW is set to 300kHz for 10MHz,

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.

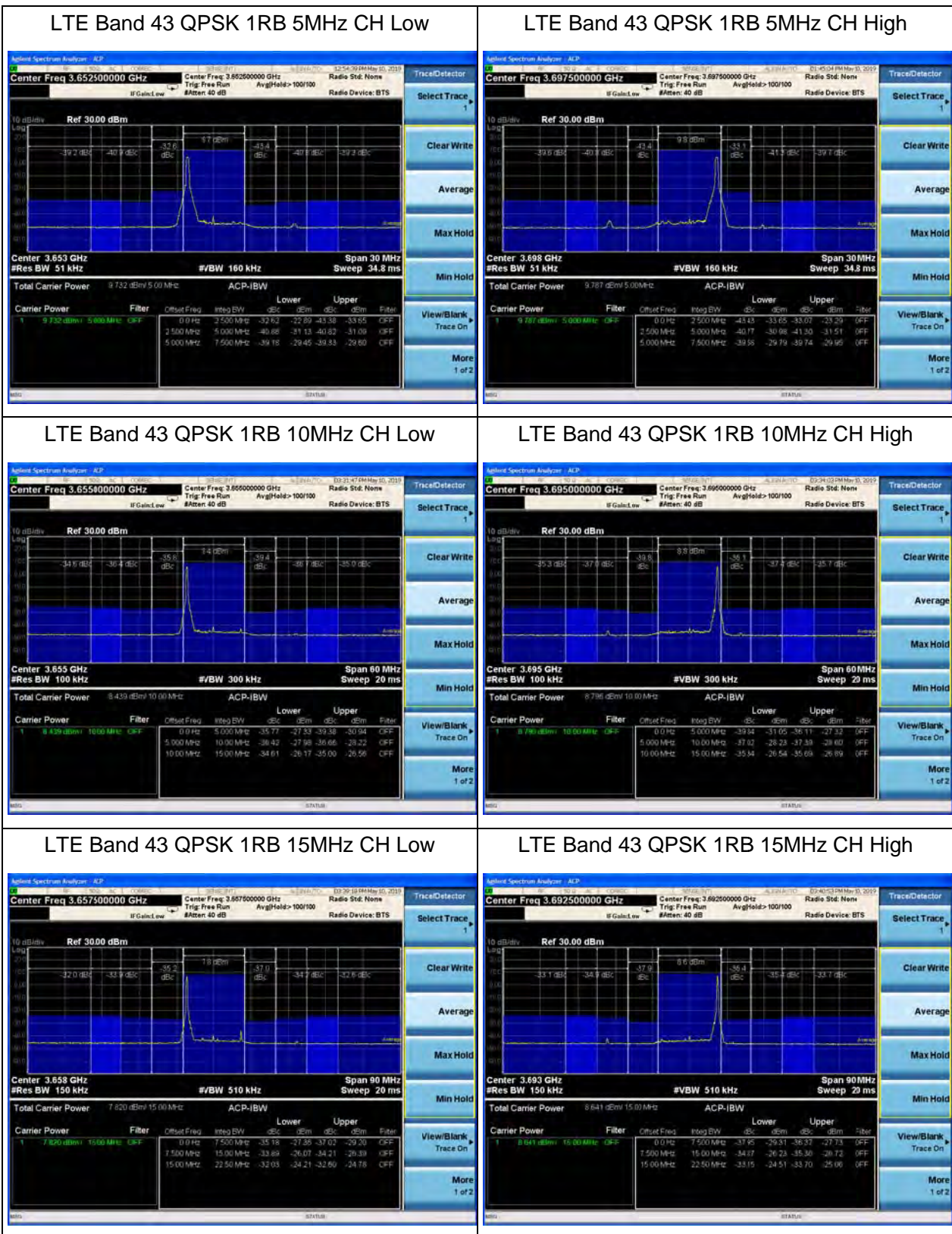
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.

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.

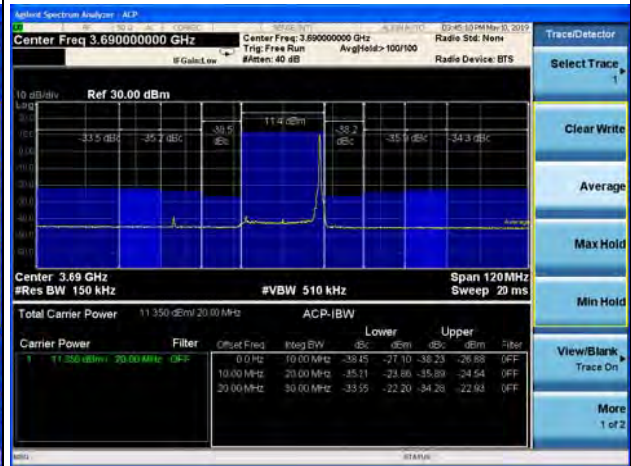
Test Result:



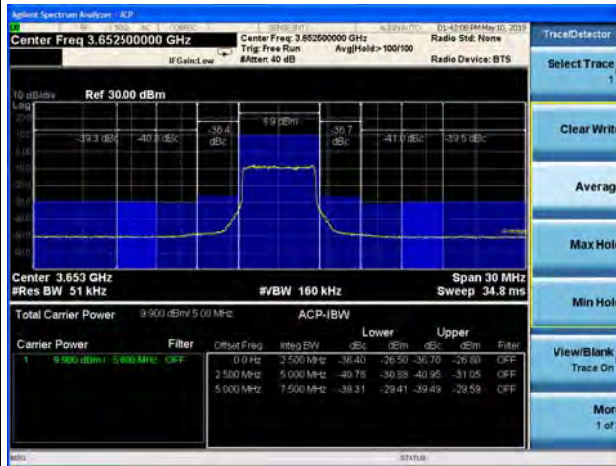
LTE Band 43 QPSK 1RB 20MHz CH Low



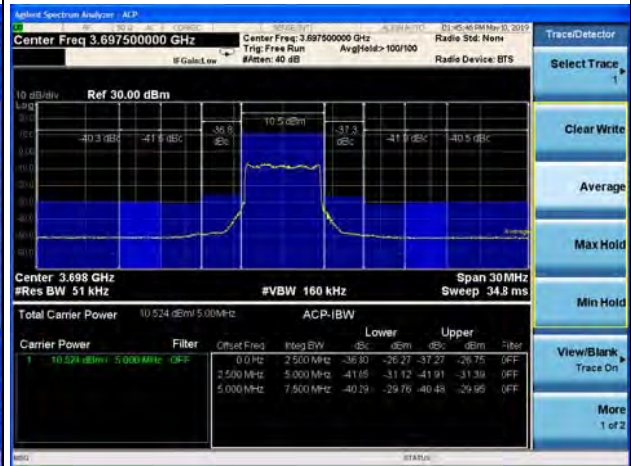
LTE Band 43 16QAM 1RB 20MHz CH High



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



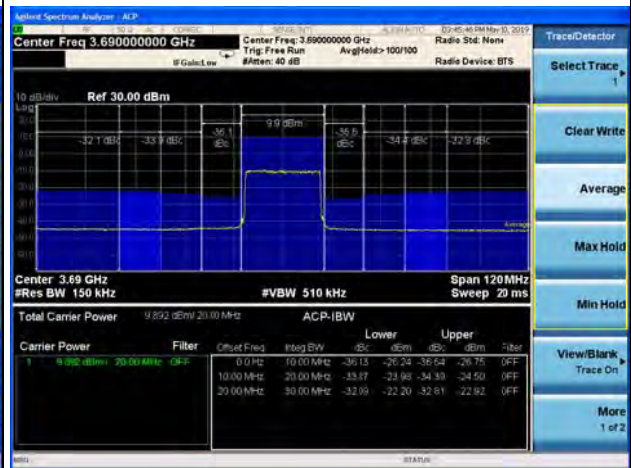
LTE Band 43 QPSK 100%RB 15MHz CH High



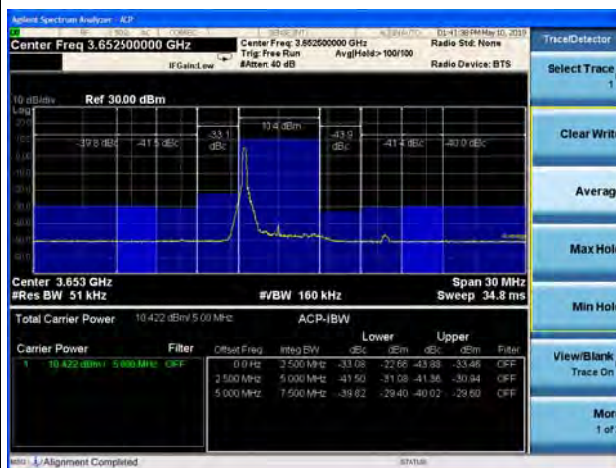
LTE Band 43 QPSK 100%RB 20MHz CH Low



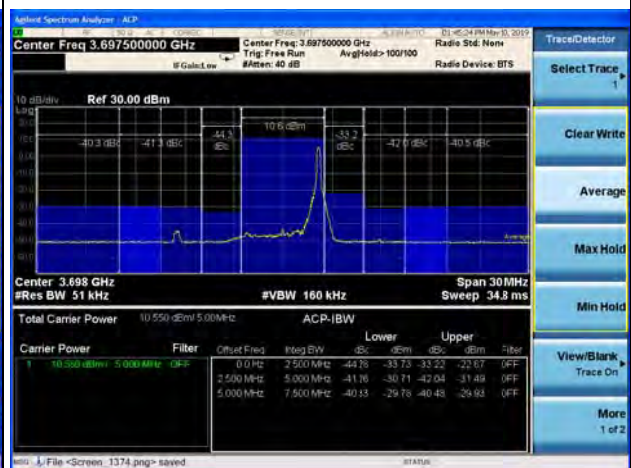
LTE Band 43 QPSK 100%RB 20MHz CH High



LTE Band 43 16QAM 1RB 5MHz CH Low



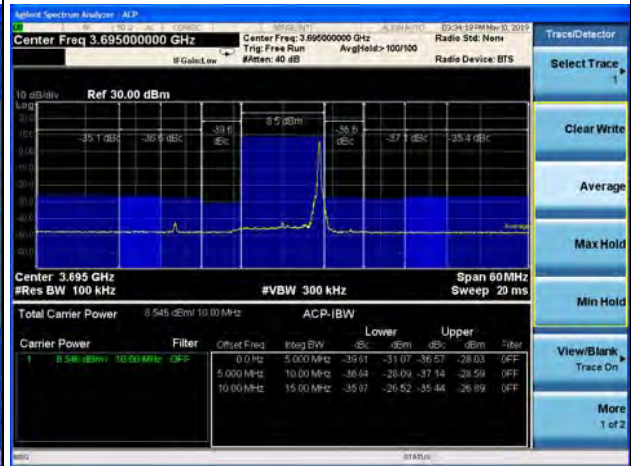
LTE Band 43 16QAM 1RB 5MHz CH High



LTE Band 43 16QAM 1RB 10MHz CH Low



LTE Band 43 16QAM 1RB 10MHz CH High



LTE Band 43 16QAM 1RB 15MHz CH Low



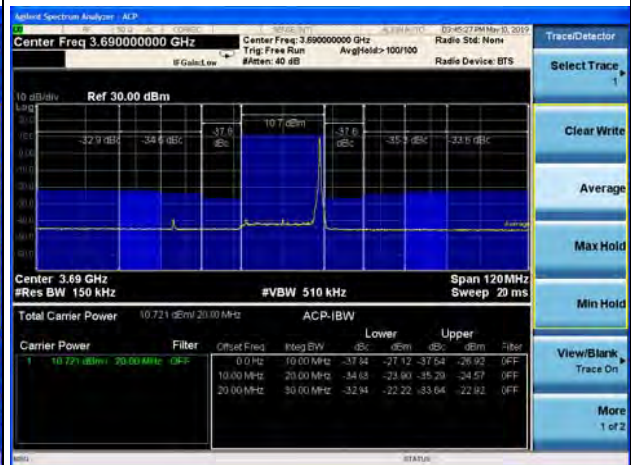
LTE Band 43 16QAM 1RB 15MHz CH High



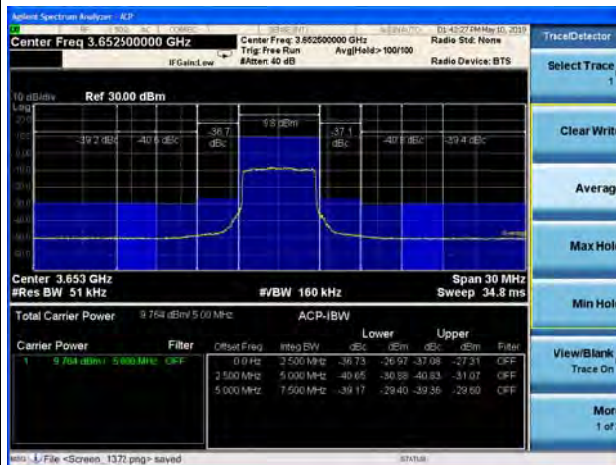
LTE Band 43 16QAM 1RB 20MHz CH Low



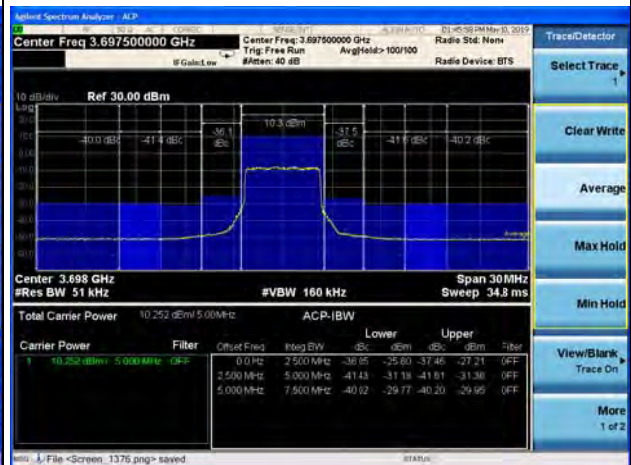
LTE Band 43 16QAM 1RB 20MHz CH High



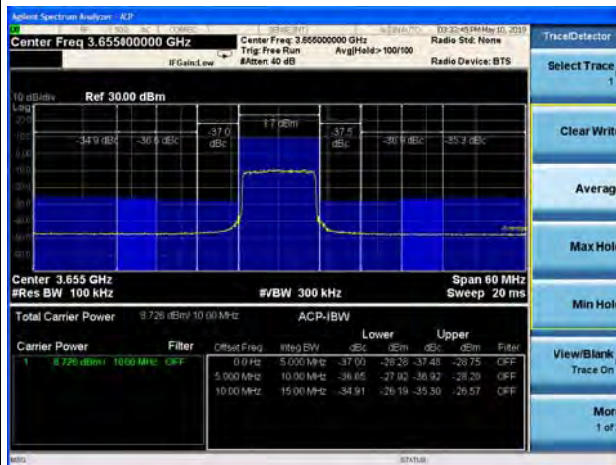
LTE Band 43 16QAM 100%RB 5MHz CH Low



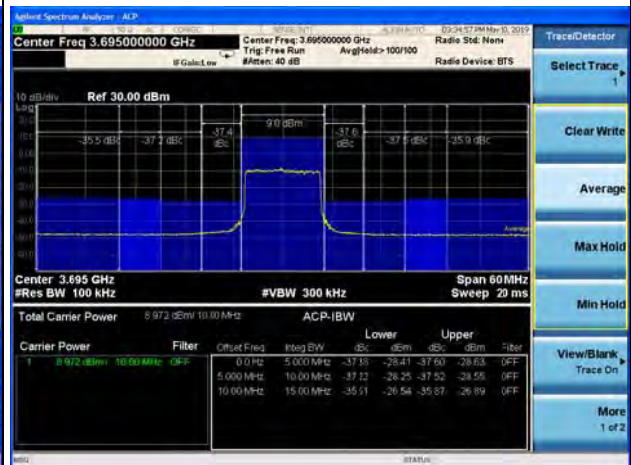
LTE Band 43 16QAM 100%RB 5MHz CH High



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



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

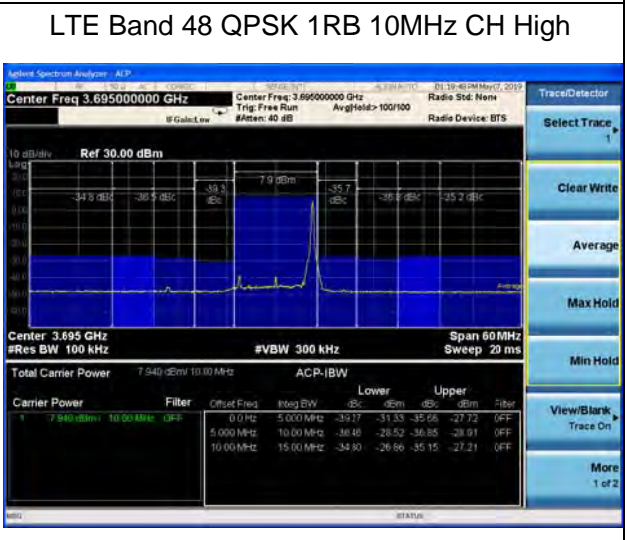
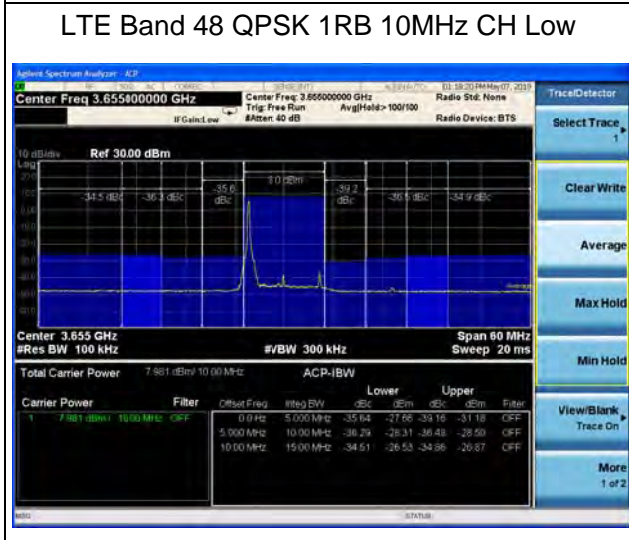
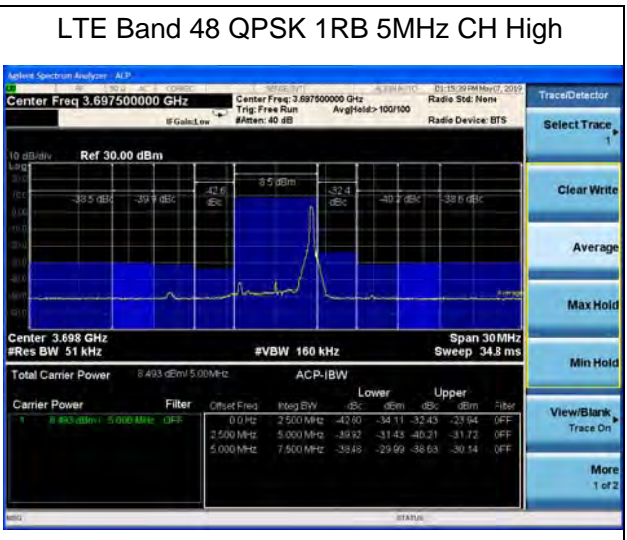
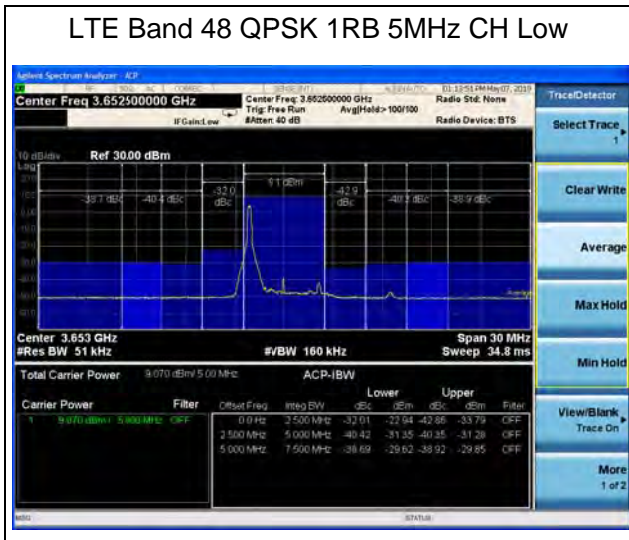
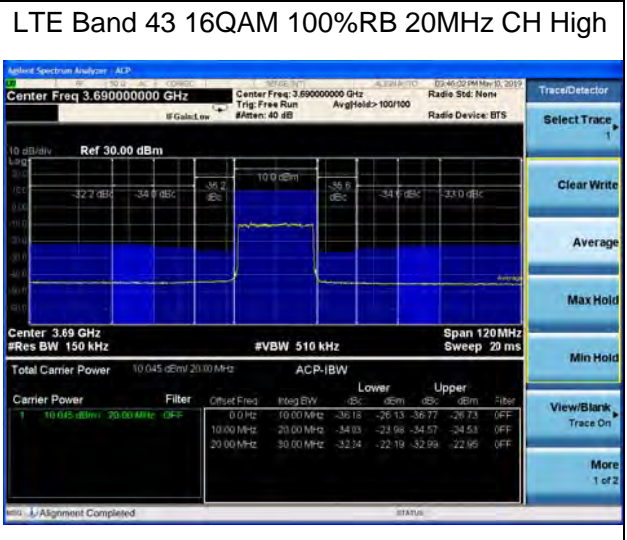
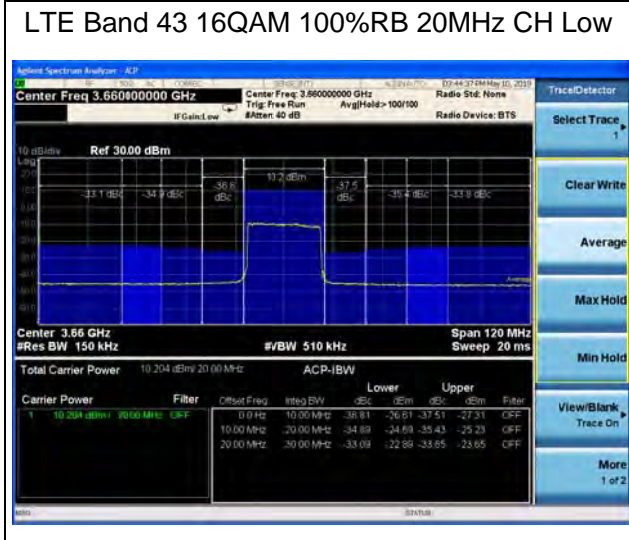


LTE Band 43 16QAM 100%RB 15MHz CH Low



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

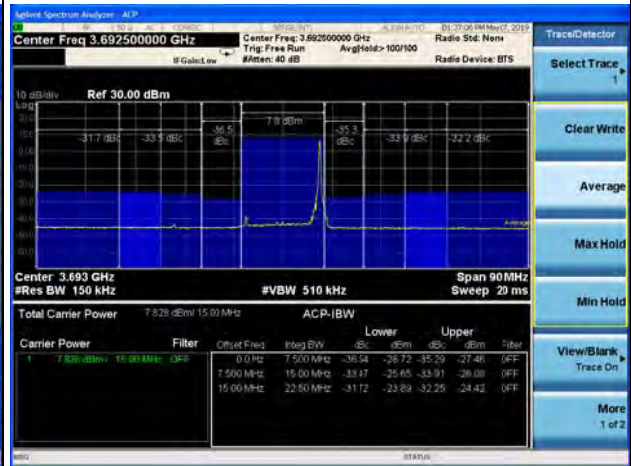




LTE Band 48 QPSK 1RB 15MHz CH Low



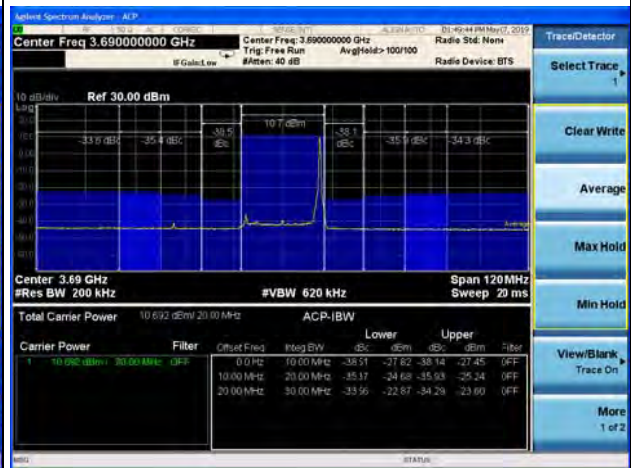
LTE Band 48 QPSK 1RB 15MHz CH High



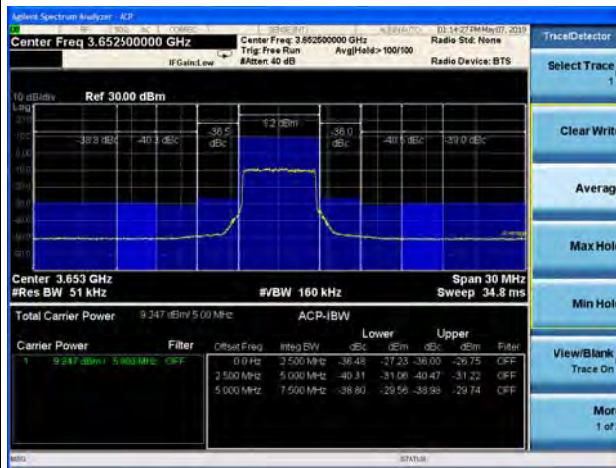
LTE Band 48 QPSK 1RB 20MHz CH Low



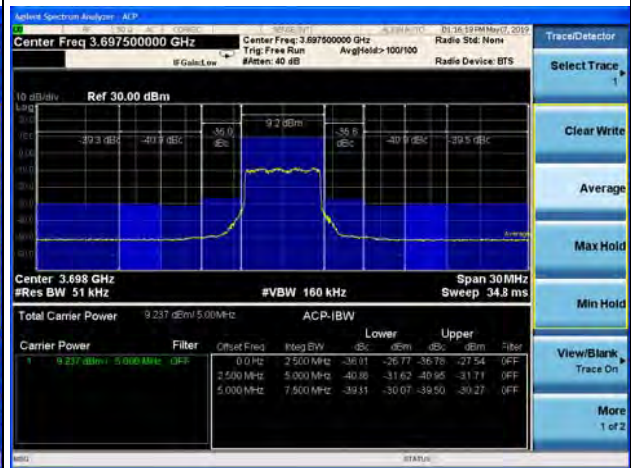
LTE Band 48 16QAM 1RB 20MHz CH High



LTE Band 48 QPSK 100%RB 5MHz CH Low



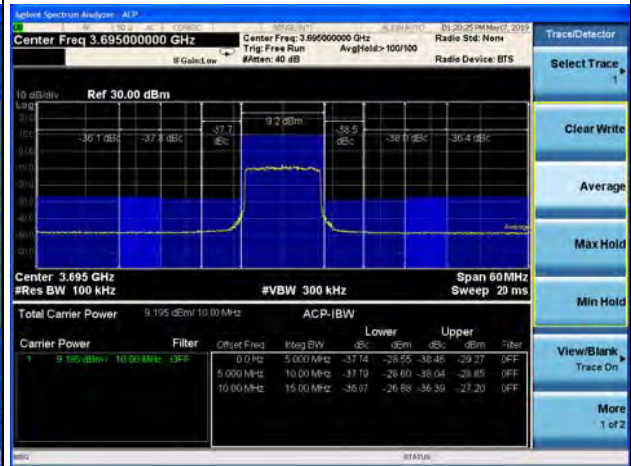
LTE Band 48 QPSK 100%RB 5MHz CH High



LTE Band 48 QPSK 100%RB 10MHz CH Low



LTE Band 48 QPSK 100%RB 10MHz CH High



LTE Band 48 QPSK 100%RB 15MHz CH Low



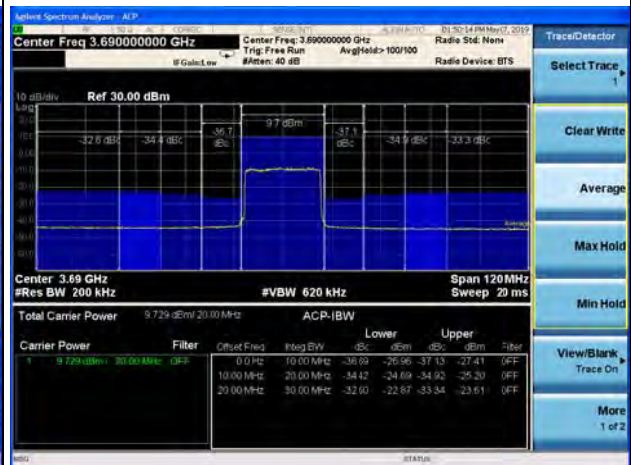
LTE Band 48 QPSK 100%RB 15MHz CH High



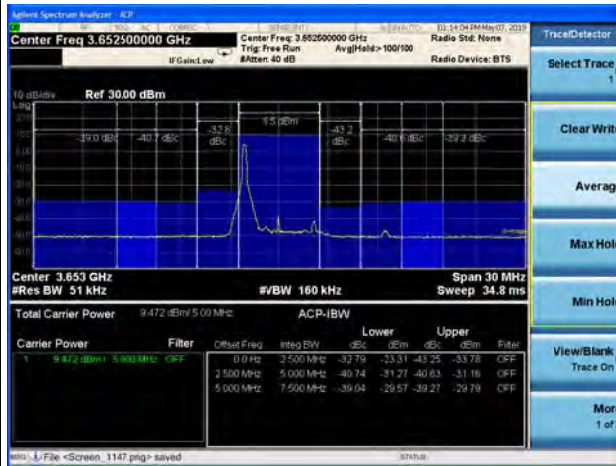
LTE Band 48 QPSK 100%RB 20MHz CH Low



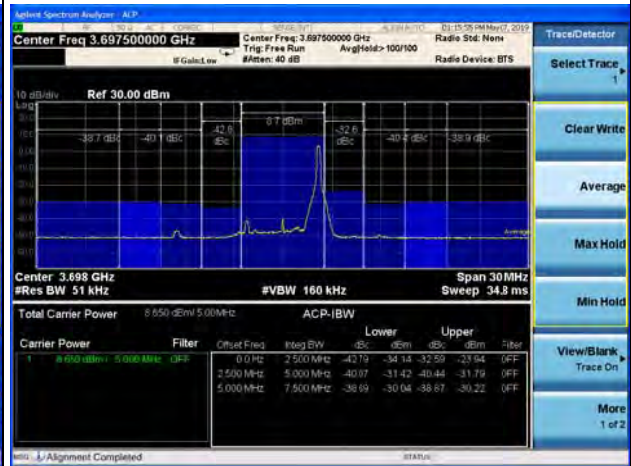
LTE Band 48 QPSK 100%RB 20MHz CH High



LTE Band 48 16QAM 1RB 5MHz CH Low



LTE Band 48 16QAM 1RB 5MHz CH High



LTE Band 48 16QAM 1RB 10MHz CH Low



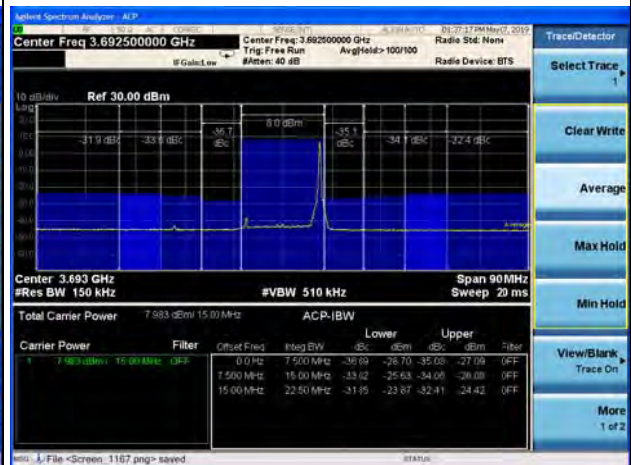
LTE Band 48 16QAM 1RB 10MHz CH High



LTE Band 48 16QAM 1RB 15MHz CH Low



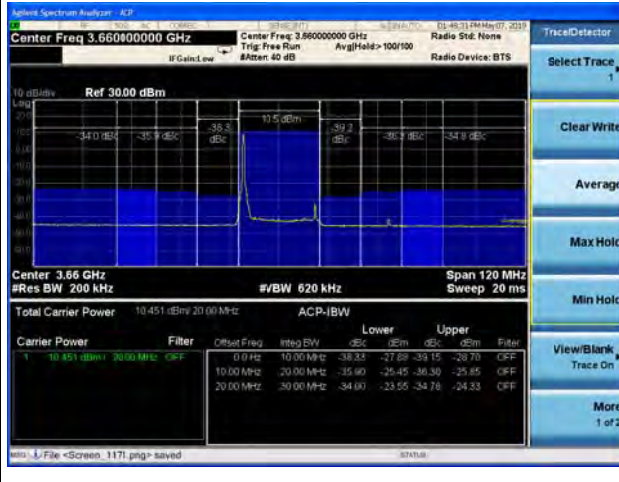
LTE Band 48 16QAM 1RB 15MHz CH High



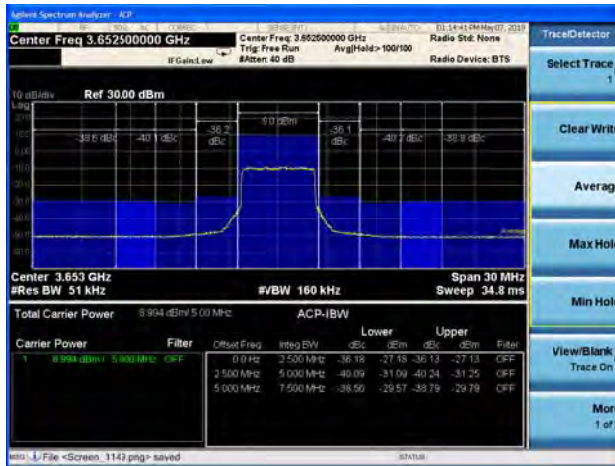


LTE Band 48 16QAM 1RB 20MHz CH Low

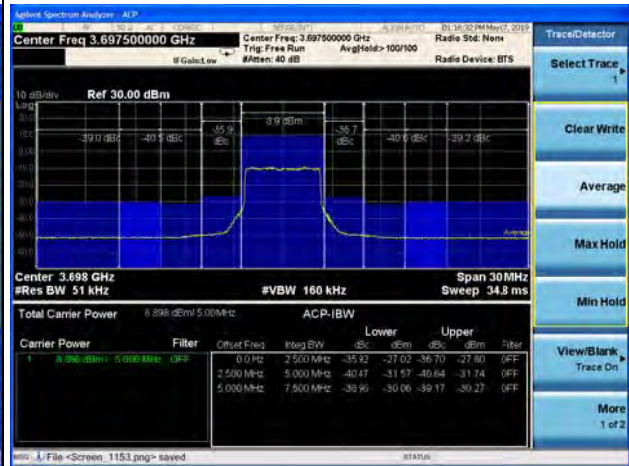
LTE Band 48 16QAM 1RB 20MHz CH High



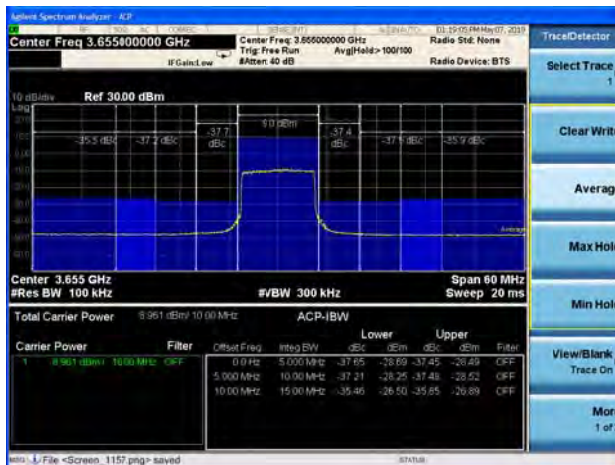
LTE Band 48 16QAM 100%RB 5MHz CH Low



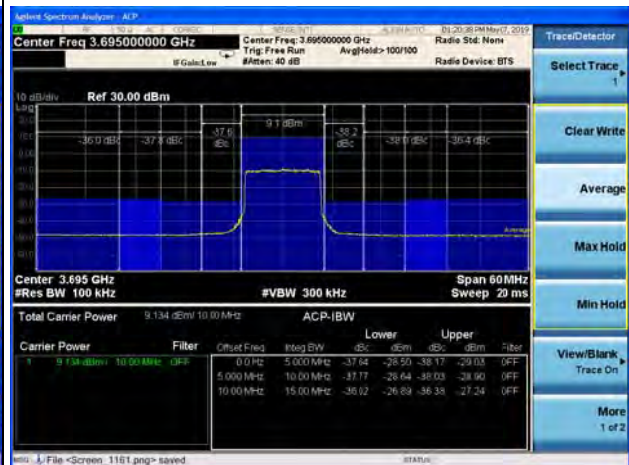
LTE Band 48 16QAM 100%RB 5MHz CH High



LTE Band 48 16QAM 100%RB 10MHz CH Low



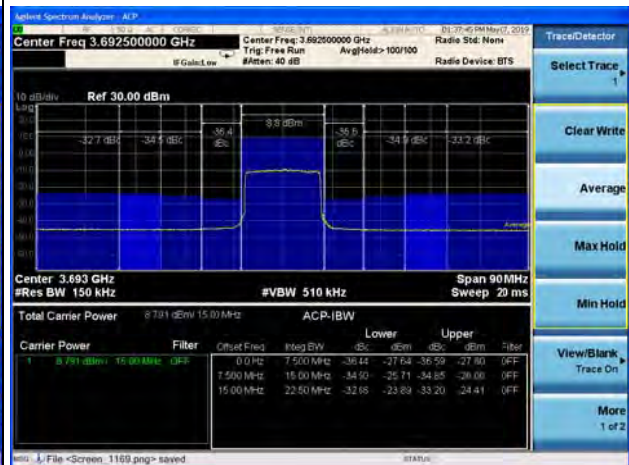
LTE Band 48 16QAM 100%RB 10MHz CH High

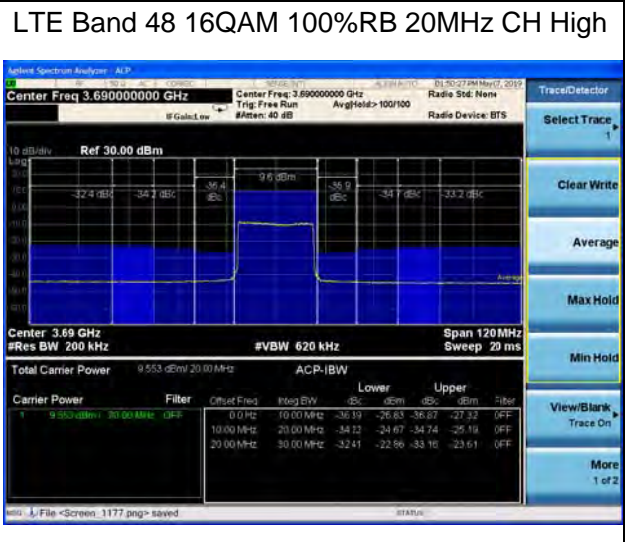
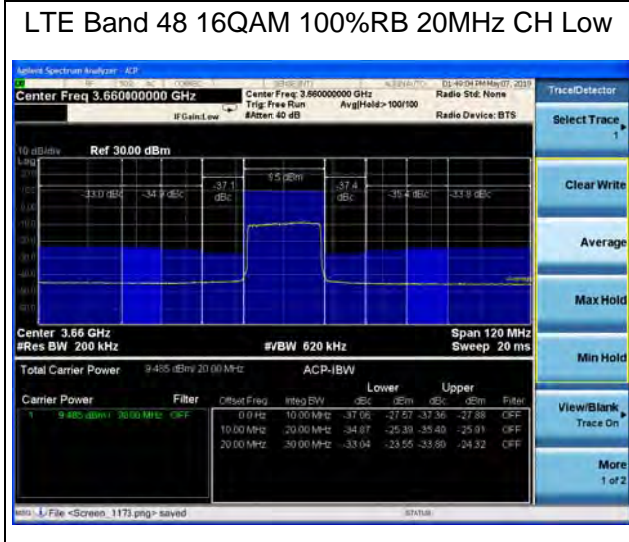


LTE Band 48 16QAM 100%RB 15MHz CH Low



LTE Band 48 16QAM 100%RB 15MHz CH High





5.5. Frequency Stability

Ambient condition

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

Method of Measurement

1. Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -30°C to +55°C in 10°C step size,

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

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

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

2. Frequency Stability (Voltage Variation)

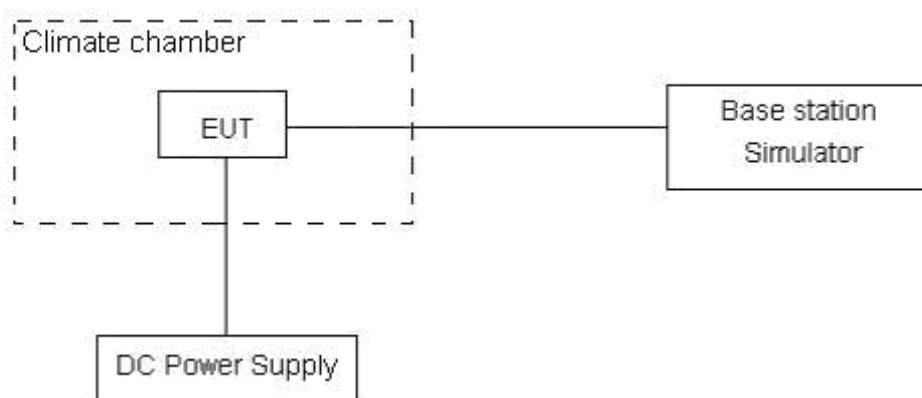
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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 11.6V and 12.6 V, with a nominal voltage of 12V.

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						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	4.93	11.08	0.00262	0.00590	PASS
Extreme (55°C)		6.94	3.53	0.00369	0.00188	PASS
Extreme (50°C)		7.73	11.43	0.00411	0.00608	PASS
Extreme (40°C)		16.12	1.31	0.00858	0.00069	PASS
Extreme (30°C)		9.76	7.02	0.00519	0.00373	PASS
Extreme (20°C)		7.84	17.58	0.00417	0.00935	PASS
Extreme (10°C)		7.23	3.98	0.00384	0.00212	PASS
Extreme (0°C)		11.87	10.63	0.00631	0.00565	PASS
Extreme (-10°C)		17.30	9.55	0.00920	0.00508	PASS
Extreme (-20°C)		12.61	4.39	0.00671	0.00234	PASS
Extreme (-30°C)		7.79	3.70	0.00414	0.00197	PASS
25°C	LV	9.72	9.46	0.00517	0.00503	PASS
	HV	12.89	11.14	0.00686	0.00593	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	4.62	5.04	0.00246	0.00268	PASS
Extreme (55°C)		1.84	12.91	0.00098	0.00687	PASS
Extreme (50°C)		4.29	13.42	0.00228	0.00714	PASS
Extreme (40°C)		17.60	4.61	0.00936	0.00245	PASS
Extreme (30°C)		10.11	7.43	0.00538	0.00395	PASS
Extreme (20°C)		2.72	10.92	0.00145	0.00581	PASS
Extreme (10°C)		5.33	2.81	0.00283	0.00149	PASS
Extreme (0°C)		18.00	12.53	0.00957	0.00667	PASS
Extreme (-10°C)		1.01	10.47	0.00054	0.00557	PASS
Extreme (-20°C)		3.87	2.26	0.00206	0.00120	PASS
Extreme (-30°C)		3.57	9.12	0.00190	0.00485	PASS
25°C	LV	7.63	6.36	0.00406	0.00338	PASS
	HV	3.34	8.09	0.00178	0.00430	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	15MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	12.95	17.40	0.00689	0.00925	PASS
Extreme (55°C)		5.78	4.65	0.00308	0.00247	PASS

Extreme (50°C)		3.13	7.47	0.00166	0.00397	PASS
Extreme (40°C)		6.15	3.04	0.00327	0.00162	PASS
Extreme (30°C)		11.42	13.32	0.00607	0.00709	PASS
Extreme (20°C)		8.87	14.48	0.00472	0.00770	PASS
Extreme (10°C)		7.60	13.85	0.00404	0.00737	PASS
Extreme (0°C)		4.68	10.05	0.00249	0.00535	PASS
Extreme (-10°C)		16.36	2.22	0.00870	0.00118	PASS
Extreme (-20°C)		6.80	13.95	0.00362	0.00742	PASS
Extreme (-30°C)		13.71	15.36	0.00729	0.00817	PASS
25°C	LV	9.93	8.21	0.00528	0.00437	PASS
	HV	13.88	13.15	0.00738	0.00699	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	1.16	9.78	0.00062	0.00520	PASS
Extreme (55°C)		4.47	2.01	0.00238	0.00107	PASS
Extreme (50°C)		1.40	6.80	0.00075	0.00362	PASS
Extreme (40°C)		6.71	16.58	0.00357	0.00882	PASS
Extreme (30°C)		4.84	13.95	0.00257	0.00742	PASS
Extreme (20°C)		2.23	6.98	0.00119	0.00371	PASS
Extreme (10°C)		15.94	7.69	0.00848	0.00409	PASS
Extreme (0°C)		14.87	6.26	0.00791	0.00333	PASS
Extreme (-10°C)		1.80	14.47	0.00096	0.00770	PASS
Extreme (-20°C)		7.98	1.84	0.00425	0.00098	PASS
Extreme (-30°C)	5.66	2.04	0.00301	0.00108	PASS	
25°C	LV	17.92	17.48	0.00953	0.00930	PASS
	HV	7.01	1.78	0.00373	0.00095	PASS

LTE Band 48						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	14.80	5.19	0.00787	0.00276	PASS
Extreme (55°C)		3.86	13.88	0.00205	0.00738	PASS
Extreme (50°C)		15.56	8.16	0.00828	0.00434	PASS
Extreme (40°C)		17.27	17.62	0.00919	0.00937	PASS
Extreme (30°C)		4.79	17.52	0.00255	0.00932	PASS
Extreme (20°C)		3.15	9.14	0.00167	0.00486	PASS
Extreme (10°C)		7.76	11.65	0.00413	0.00620	PASS

Extreme (0°C)		9.06	7.34	0.00482	0.00391	PASS
Extreme (-10°C)		11.11	12.35	0.00591	0.00657	PASS
Extreme (-20°C)		4.89	17.98	0.00260	0.00956	PASS
Extreme (-30°C)		11.93	10.14	0.00634	0.00539	PASS
25°C	LV	10.96	13.69	0.00583	0.00728	PASS
	HV	7.48	11.57	0.00398	0.00616	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	17.37	7.84	0.00924	0.00417	PASS
Extreme (55°C)		7.31	6.32	0.00389	0.00336	PASS
Extreme (50°C)		11.87	10.28	0.00632	0.00547	PASS
Extreme (40°C)		4.47	4.41	0.00238	0.00235	PASS
Extreme (30°C)		2.69	1.22	0.00143	0.00065	PASS
Extreme (20°C)		5.76	12.98	0.00306	0.00690	PASS
Extreme (10°C)		6.11	8.23	0.00325	0.00438	PASS
Extreme (0°C)		7.87	15.33	0.00419	0.00816	PASS
Extreme (-10°C)		1.85	9.87	0.00099	0.00525	PASS
Extreme (-20°C)		15.78	10.06	0.00839	0.00535	PASS
Extreme (-30°C)		7.05	13.54	0.00375	0.00720	PASS
25°C		LV	1.14	2.29	0.00061	0.00122
	HV	7.87	5.87	0.00418	0.00312	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	15MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	3.92	3.59	0.00208	0.00191	PASS
Extreme (55°C)		9.42	7.07	0.00501	0.00376	PASS
Extreme (50°C)		8.04	17.09	0.00427	0.00909	PASS
Extreme (40°C)		16.73	13.34	0.00890	0.00709	PASS
Extreme (30°C)		8.34	12.48	0.00443	0.00664	PASS
Extreme (20°C)		16.91	7.50	0.00899	0.00399	PASS
Extreme (10°C)		10.26	2.56	0.00546	0.00136	PASS
Extreme (0°C)		8.71	11.87	0.00463	0.00632	PASS
Extreme (-10°C)		14.06	10.36	0.00748	0.00551	PASS
Extreme (-20°C)		7.15	11.61	0.00380	0.00618	PASS
Extreme (-30°C)		2.13	16.30	0.00113	0.00867	PASS
25°C		LV	13.47	12.22	0.00717	0.00650
	HV	3.91	5.28	0.00208	0.00281	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability	Frequency Stability	Verdict



BANDWIDTH	20MHz			(ppm)	(ppm)	
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25°C)	Normal	3.92	3.59	0.00208	0.00191	PASS
Extreme (55°C)		9.42	7.07	0.00501	0.00376	PASS
Extreme (50°C)		8.04	17.09	0.00427	0.00909	PASS
Extreme (40°C)		16.73	13.34	0.00890	0.00709	PASS
Extreme (30°C)		8.34	12.48	0.00443	0.00664	PASS
Extreme (20°C)		16.91	7.50	0.00899	0.00399	PASS
Extreme (10°C)		10.26	2.56	0.00546	0.00136	PASS
Extreme (0°C)		8.71	11.87	0.00463	0.00632	PASS
Extreme (-10°C)		14.06	10.36	0.00748	0.00551	PASS
Extreme (-20°C)		7.15	11.61	0.00380	0.00618	PASS
Extreme (-30°C)		2.13	16.30	0.00113	0.00867	PASS
25°C	LV	13.47	12.22	0.00717	0.00650	PASS
	HV	3.91	5.28	0.00208	0.00281	PASS

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.

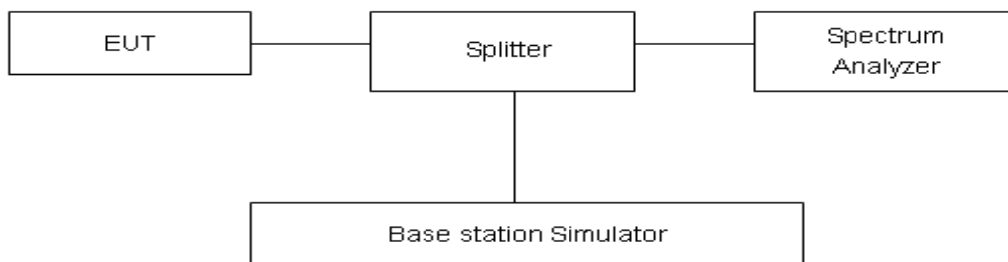
RBW =0.001MHz, VBW=0.003MHz for 9kHz-150kHz;

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

Measurement Uncertainty

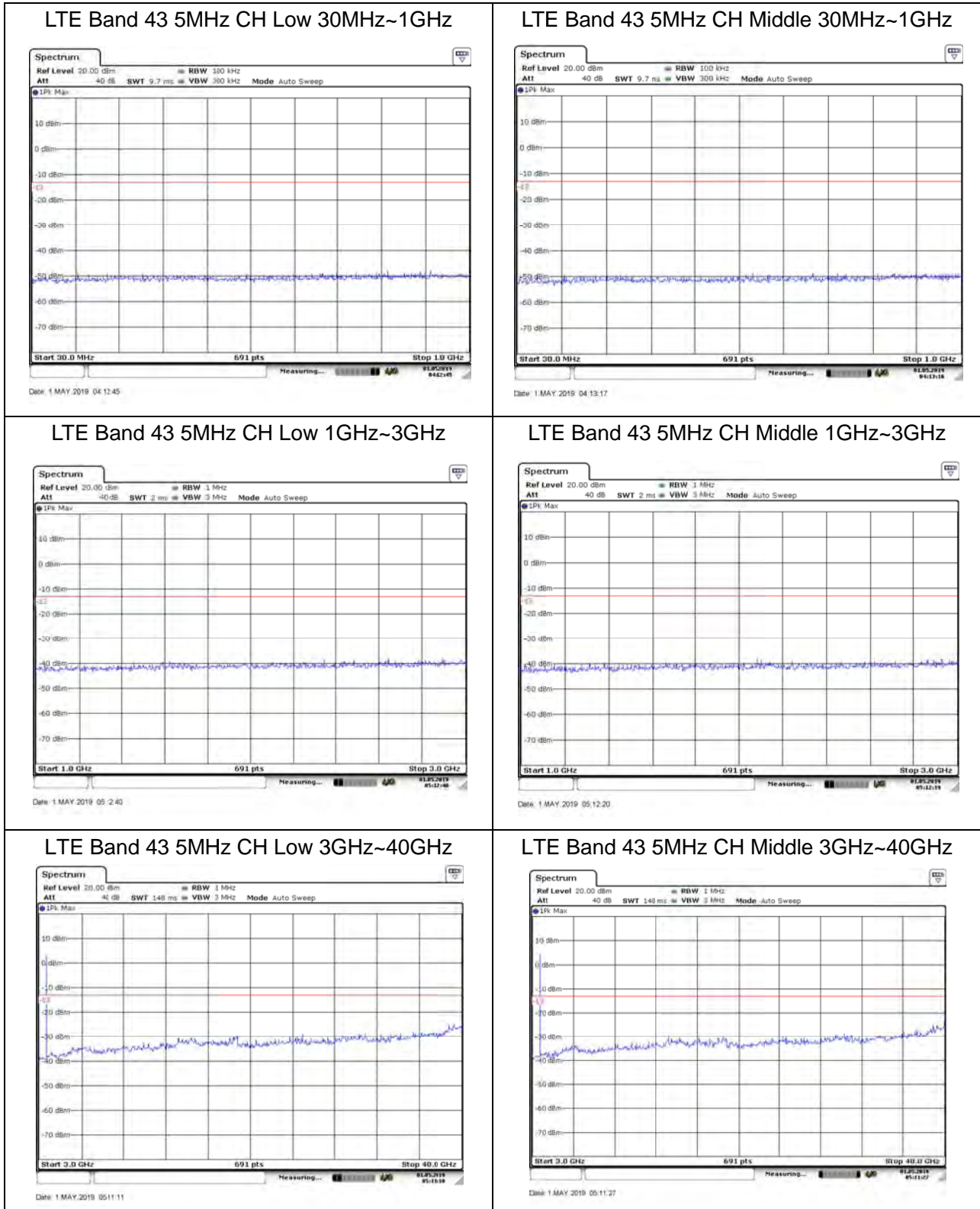
The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

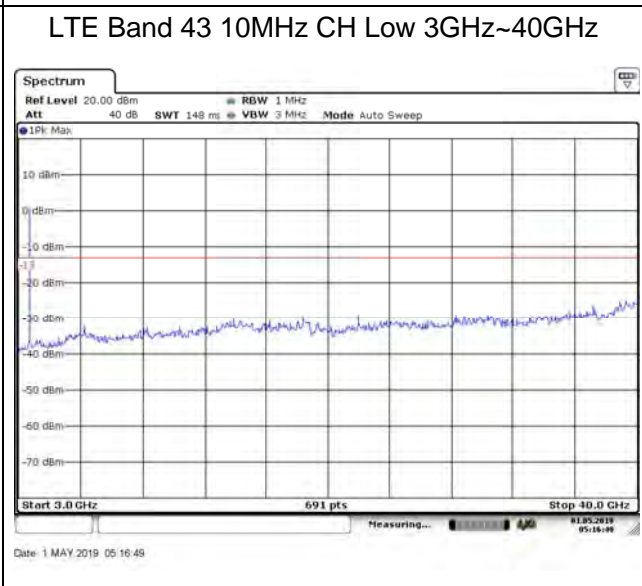
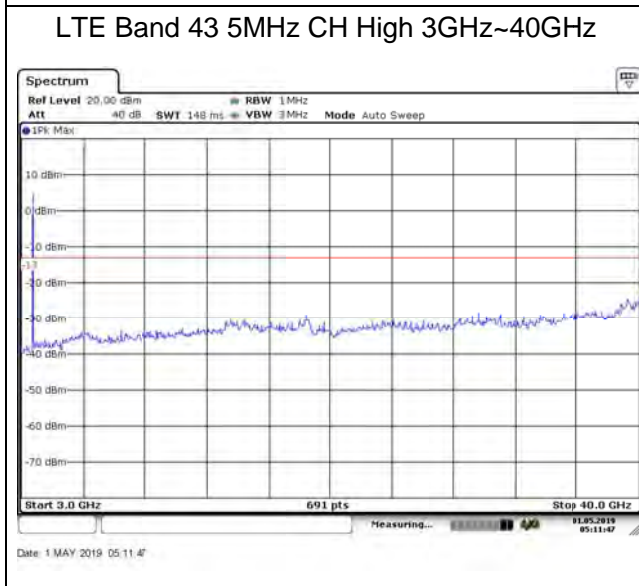
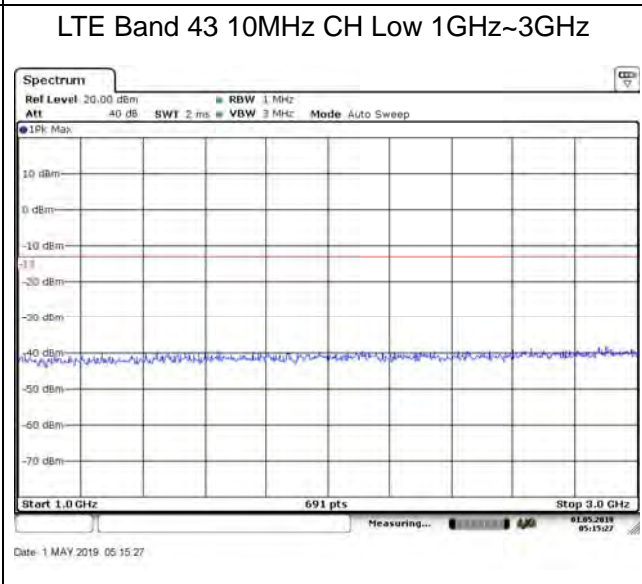
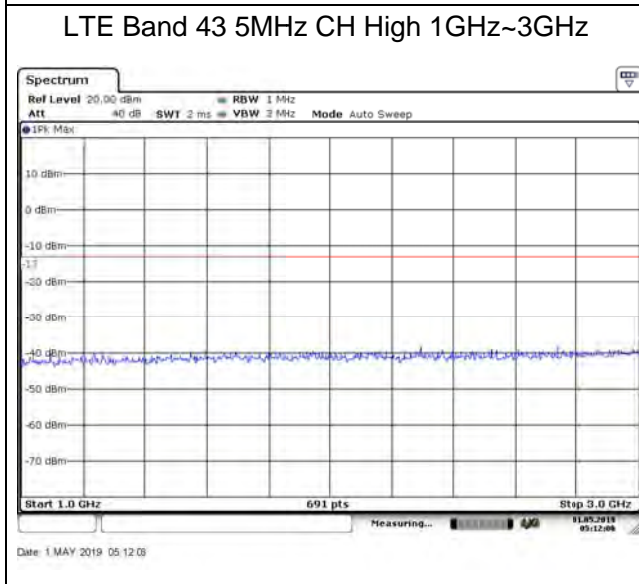
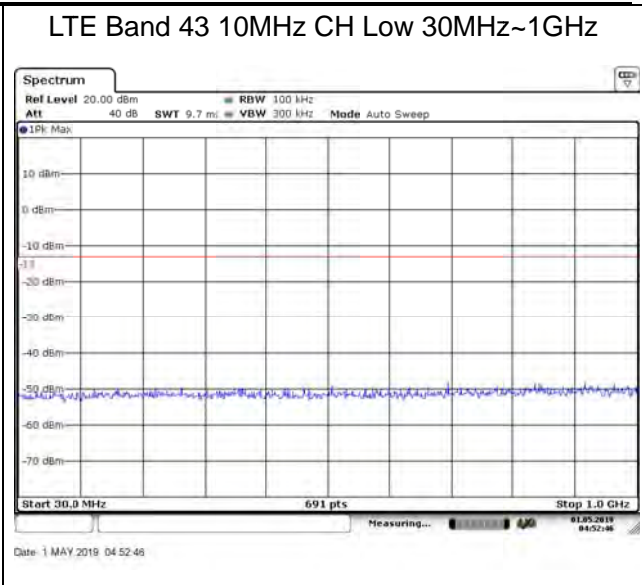
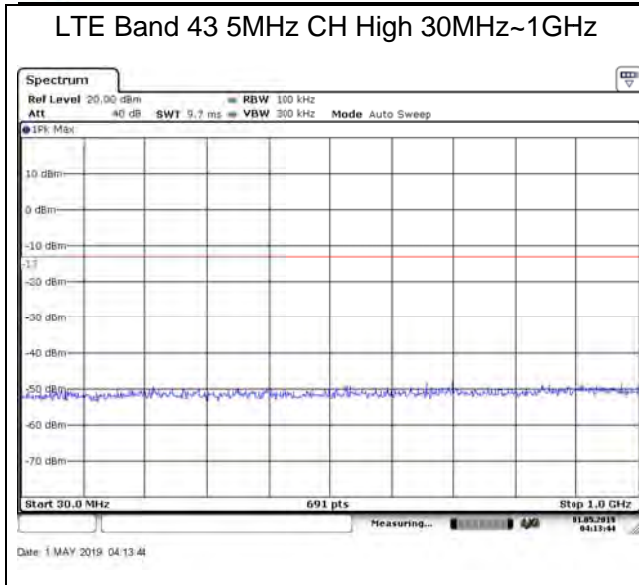
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-3GHz	1.407 dB
3GHz-40GHz	1.815 dB

Test Result:

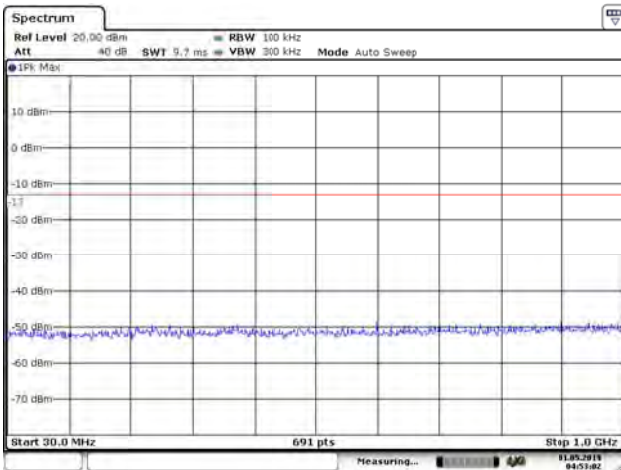
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier in the following plots.



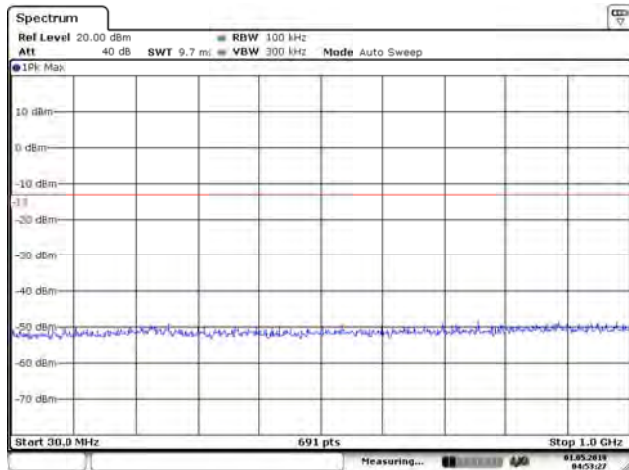


LTE Band 43 10MHz CH Middle 30MHz~1GHz



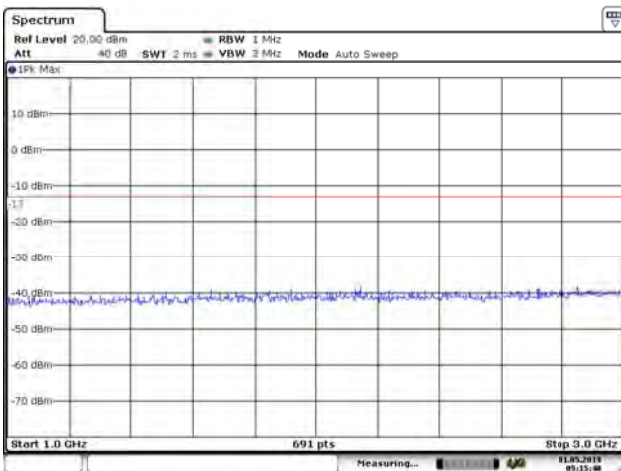
Date: 1 MAY 2019 04:53:03

LTE Band 43 10MHz CH High 30MHz~1GHz



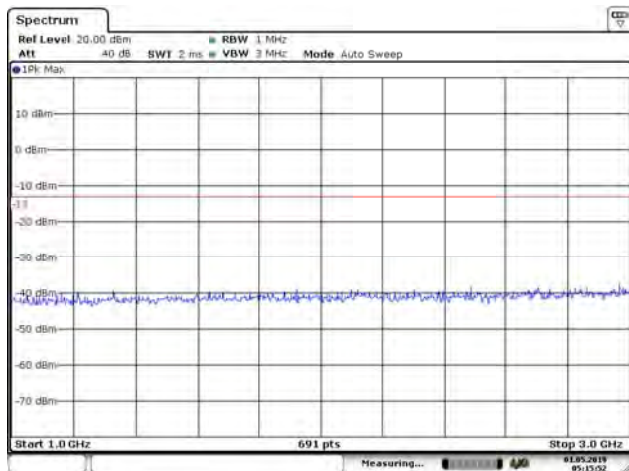
Date: 1 MAY 2019 04:53:27

LTE Band 43 10MHz CH Middle 1GHz~3GHz



Date: 1 MAY 2019 05:15:41

LTE Band 43 10MHz CH High 1GHz~3GHz



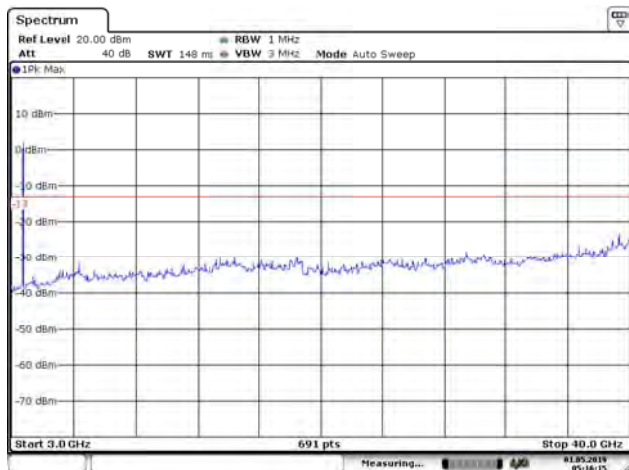
Date: 1 MAY 2019 05:15:53

LTE Band 43 10MHz CH Middle 3GHz~40GHz



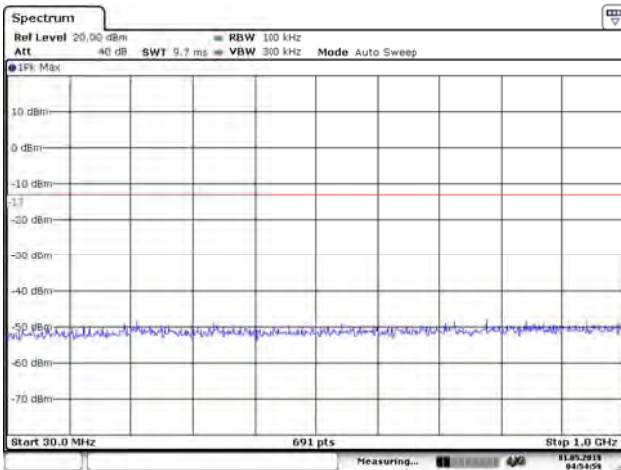
Date: 1 MAY 2019 05:16:31

LTE Band 43 10MHz CH High 3GHz~40GHz



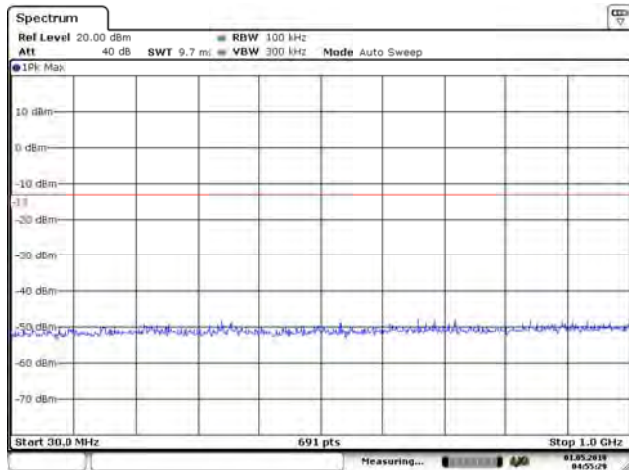
Date: 1 MAY 2019 05:16:15

LTE Band 43 15MHz CH Low 30MHz~1GHz



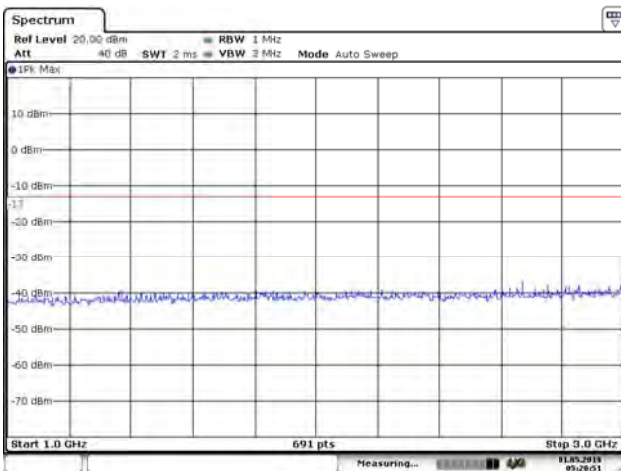
Date: 1 MAY 2019 04:54:59

LTE Band 43 15MHz CH Middle 30MHz~1GHz



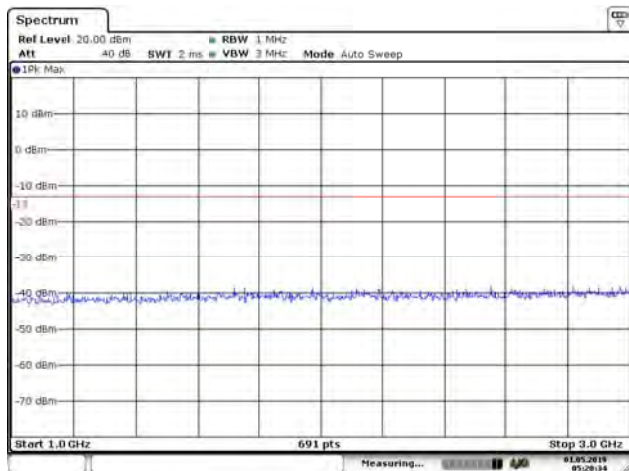
Date: 1 MAY 2019 04:55:30

LTE Band 43 15MHz CH Low 1GHz~3GHz



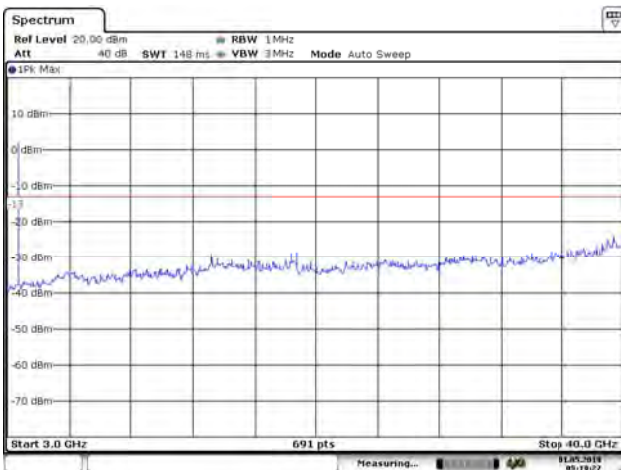
Date: 1 MAY 2019 05:20:52

LTE Band 43 15MHz CH Middle 1GHz~3GHz



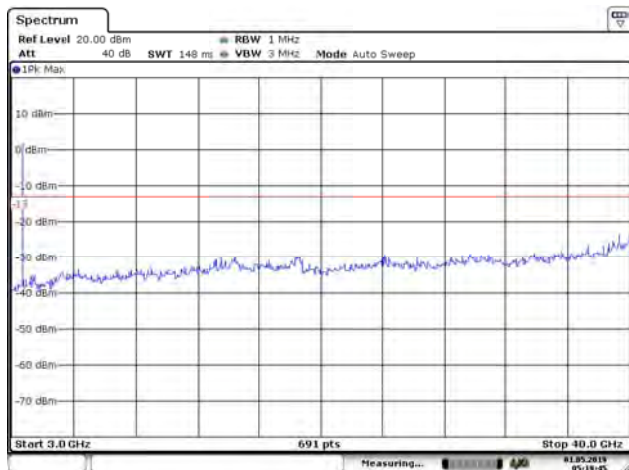
Date: 1 MAY 2019 05:20:55

LTE Band 43 15MHz CH Low 3GHz~40GHz



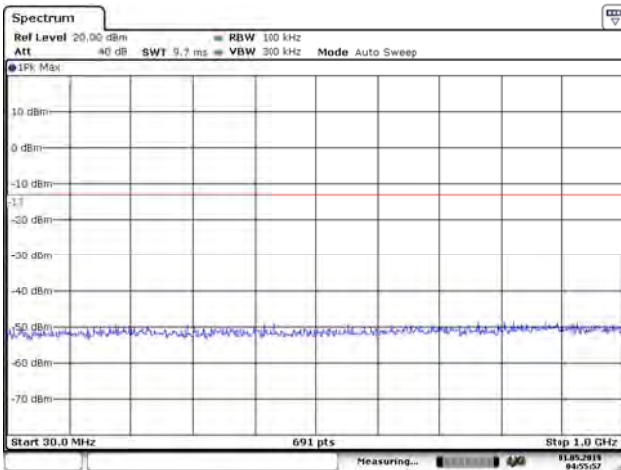
Date: 1 MAY 2019 05:19:27

LTE Band 43 15MHz CH Middle 3GHz~40GHz



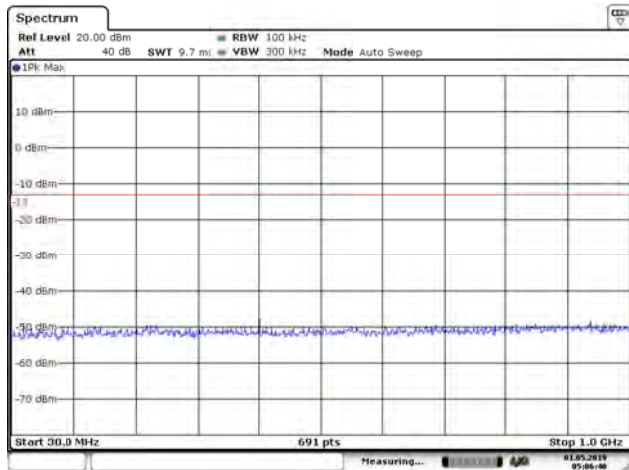
Date: 1 MAY 2019 05:19:45

LTE Band 43 15MHz CH High 30MHz~1GHz



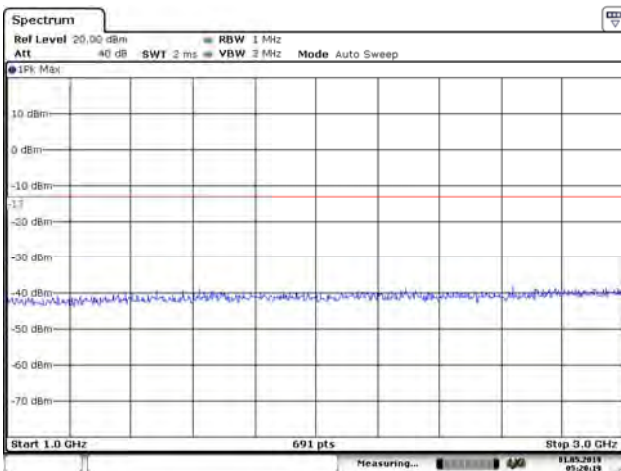
Date: 1 MAY 2019 04:55:57

LTE Band 43 20MHz CH Low 30MHz~1GHz



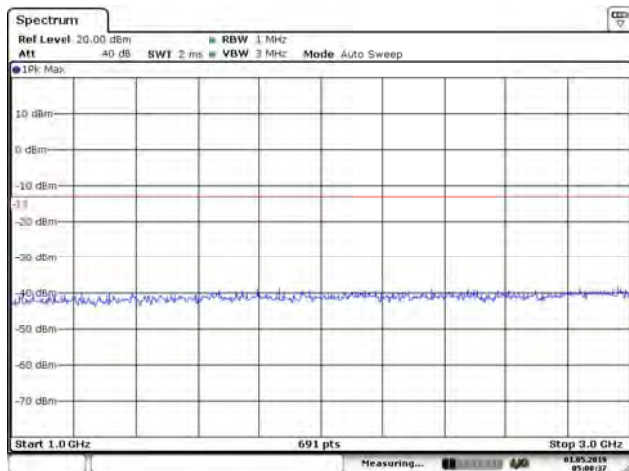
Date: 1 MAY 2019 05:06:40

LTE Band 43 15MHz CH High 1GHz~3GHz



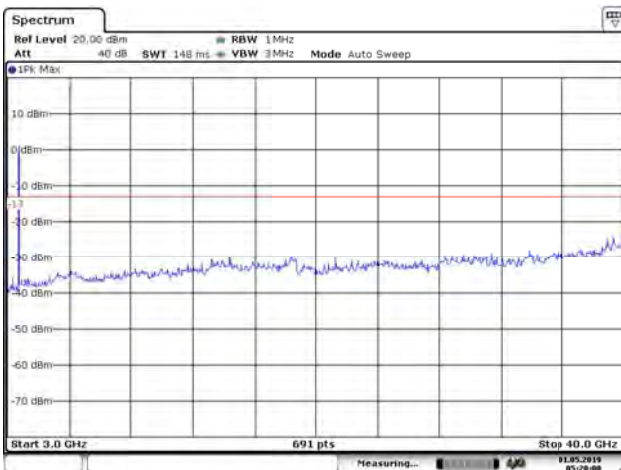
Date: 1 MAY 2019 05:20:19

LTE Band 43 20MHz CH Low 1GHz~3GHz



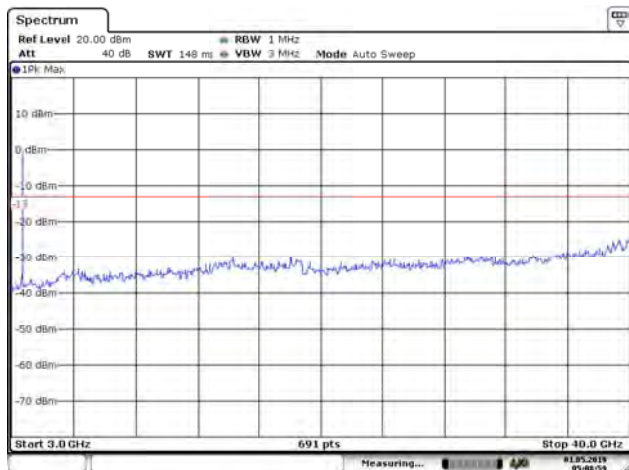
Date: 1 MAY 2019 05:08:38

LTE Band 43 15MHz CH High 3GHz~40GHz



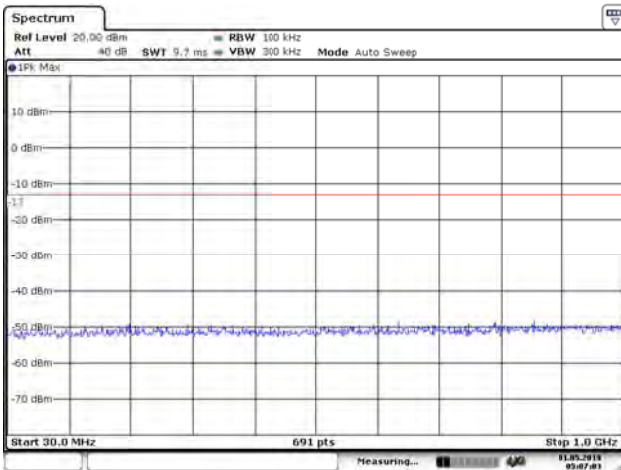
Date: 1 MAY 2019 05:20:00

LTE Band 43 20MHz CH Low 3GHz~40GHz

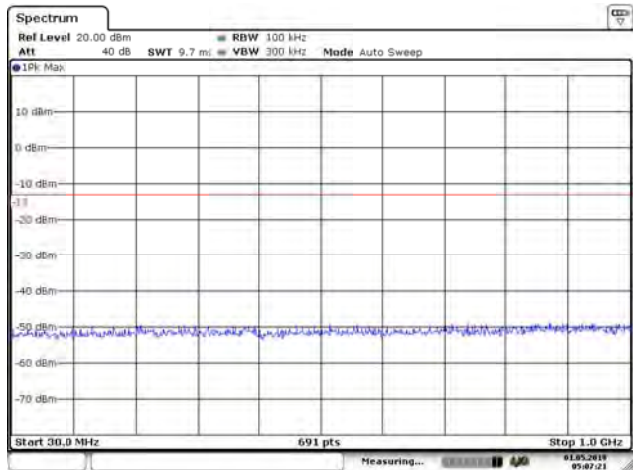


Date: 1 MAY 2019 05:08:59

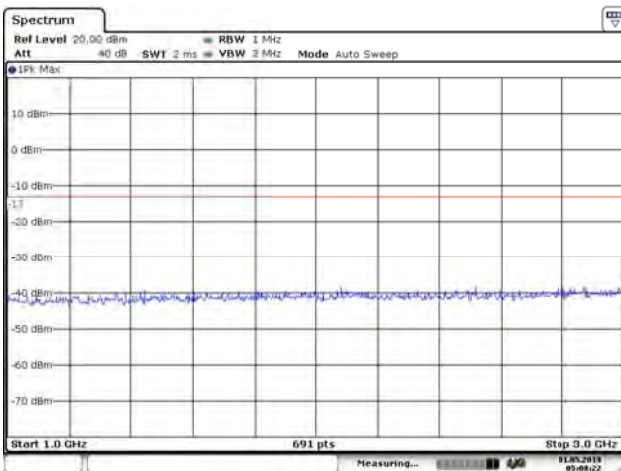
LTE Band 43 20MHz CH Middle 30MHz~1GHz



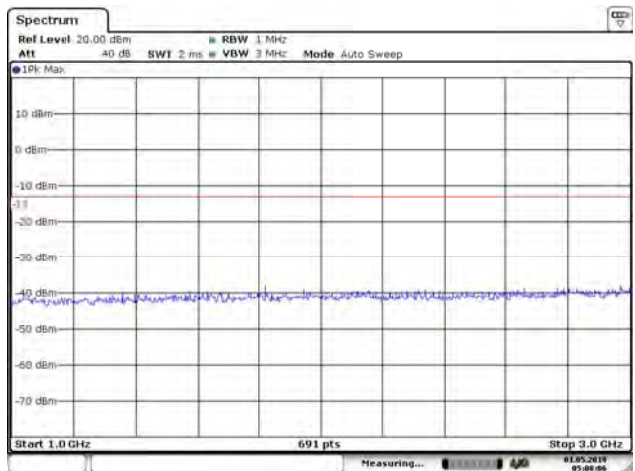
LTE Band 43 20MHz CH High 30MHz~1GHz



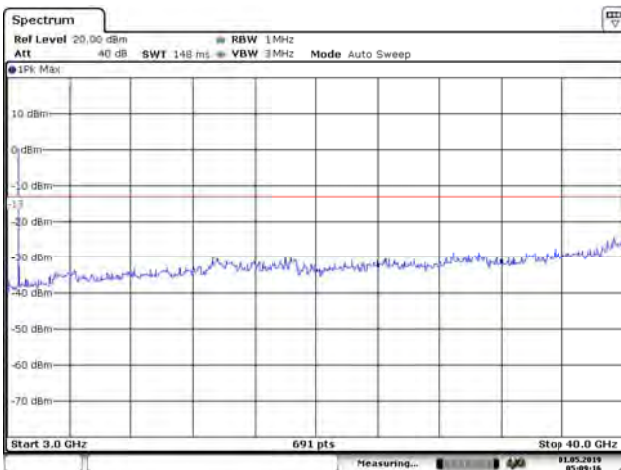
LTE Band 43 20MHz CH Middle 1GHz~3GHz



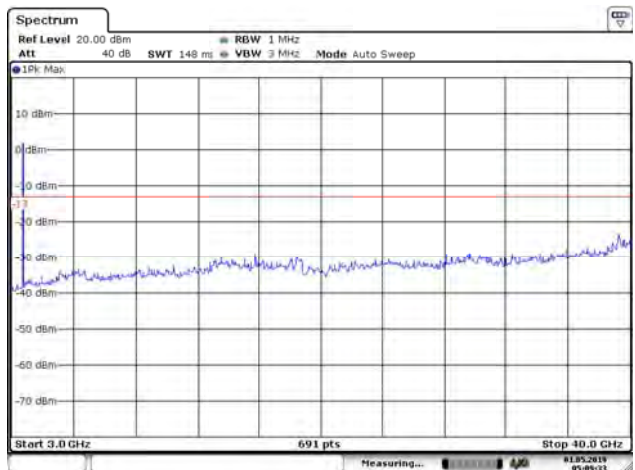
LTE Band 43 20MHz CH High 1GHz~3GHz

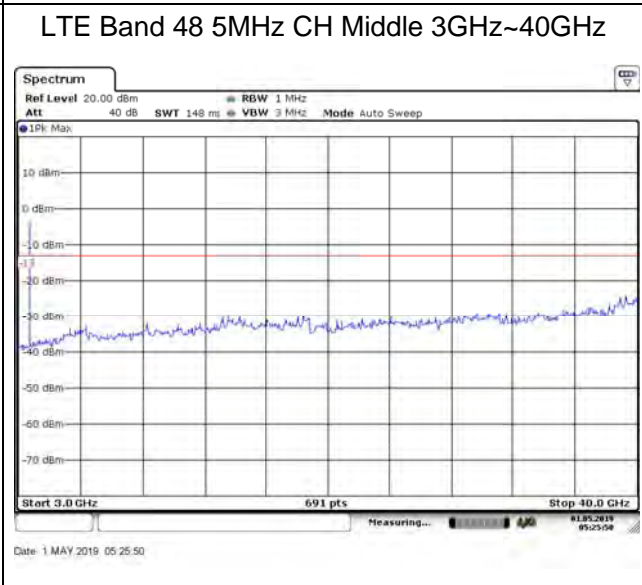
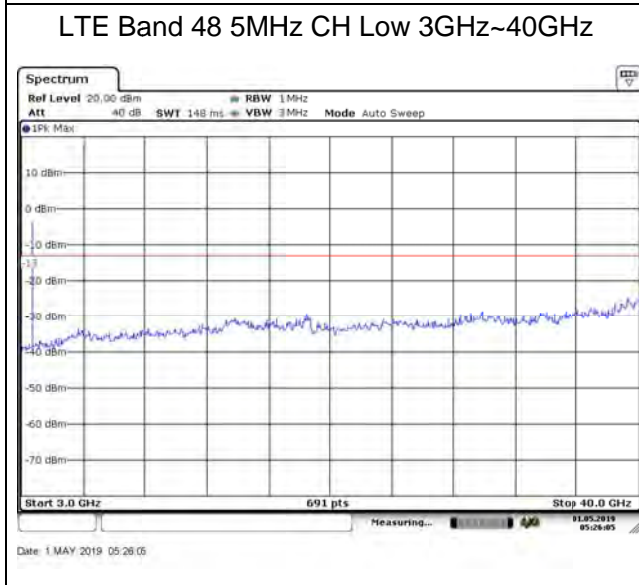
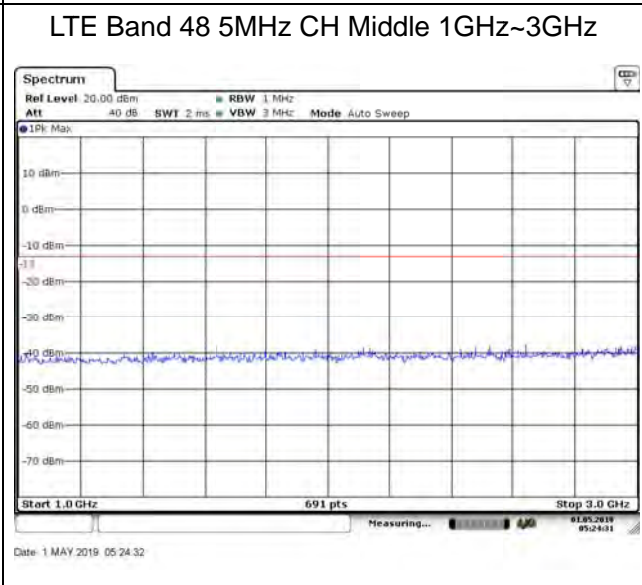
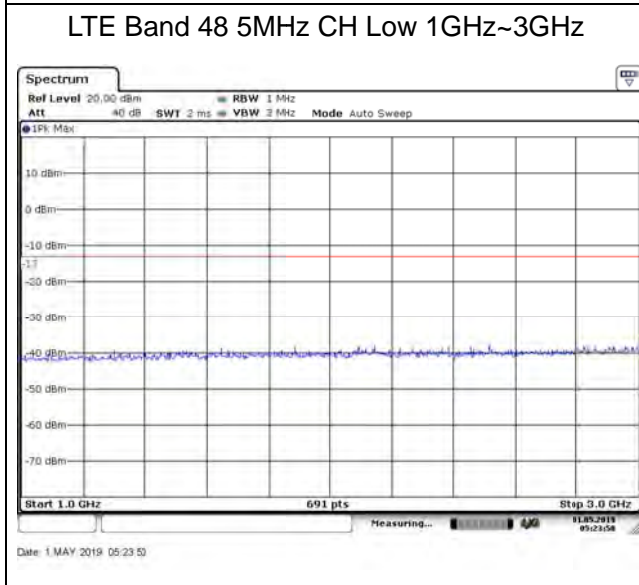
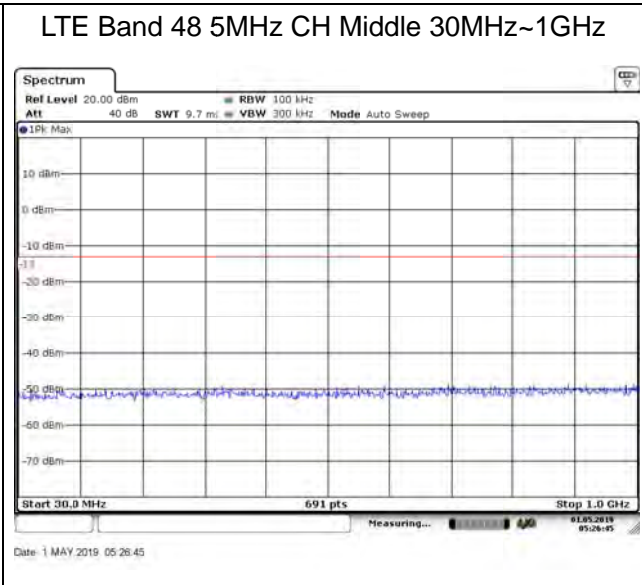
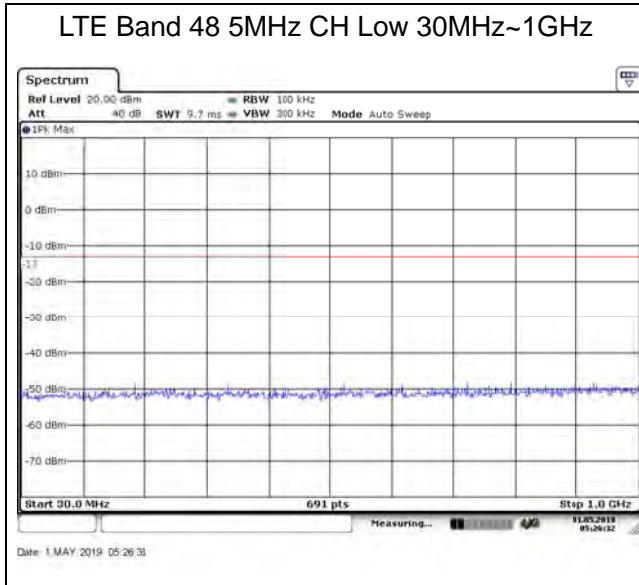


LTE Band 43 20MHz CH Middle 3GHz~40GHz

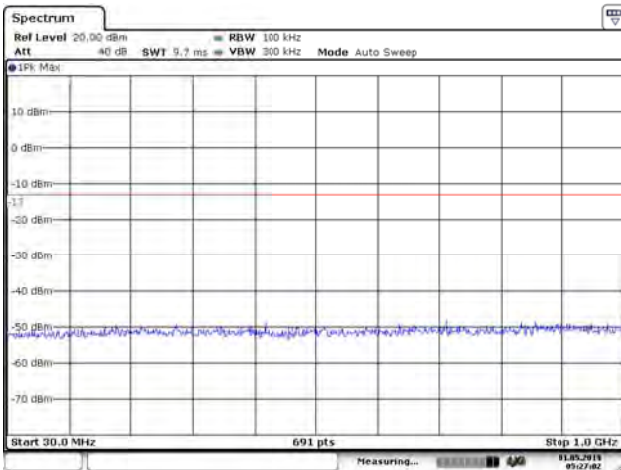


LTE Band 43 20MHz CH High 3GHz~40GHz

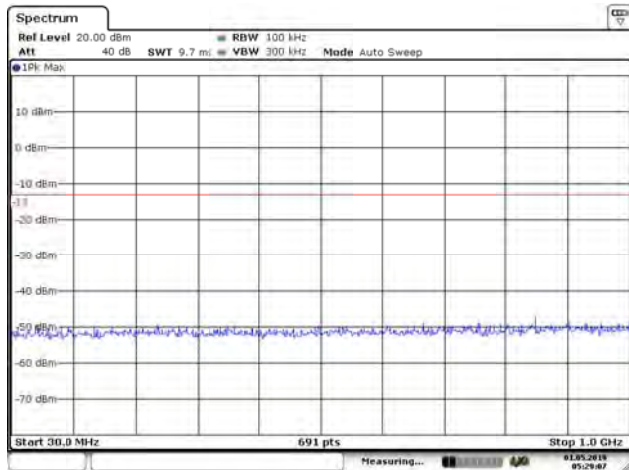




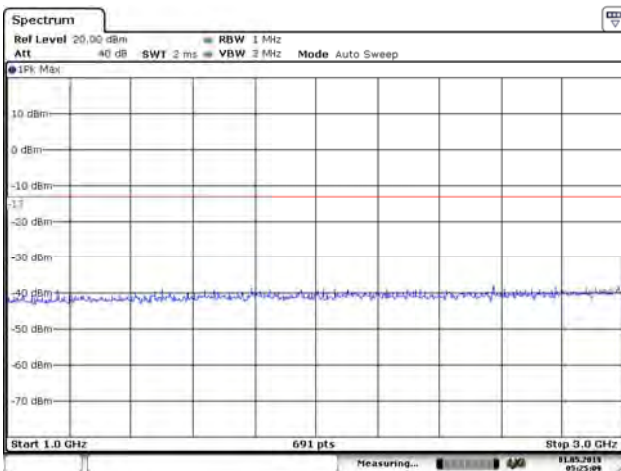
LTE Band 48 5MHz CH High 30MHz~1GHz



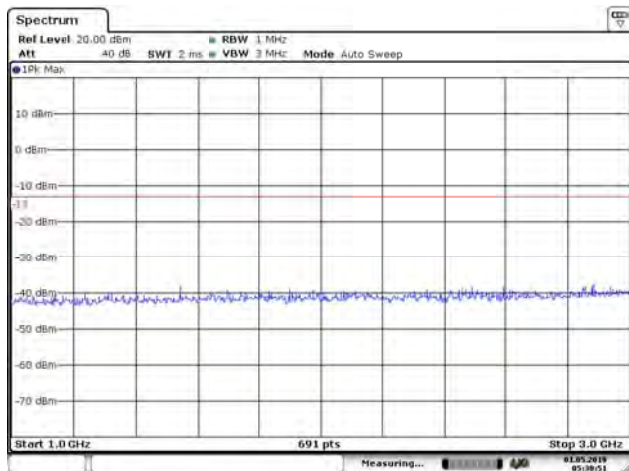
LTE Band 48 10MHz CH Low 30MHz~1GHz



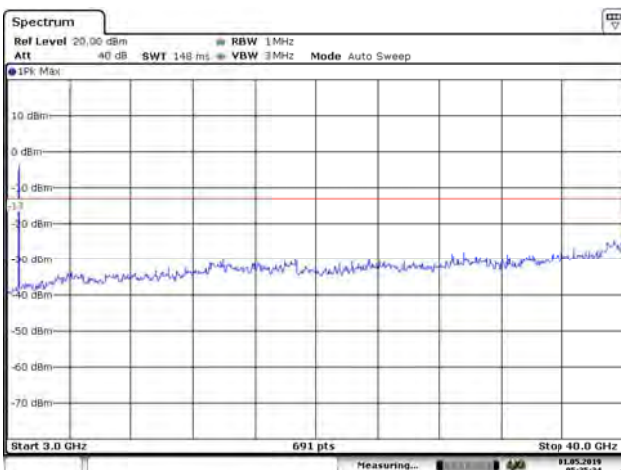
LTE Band 48 5MHz CH High 1GHz~3GHz



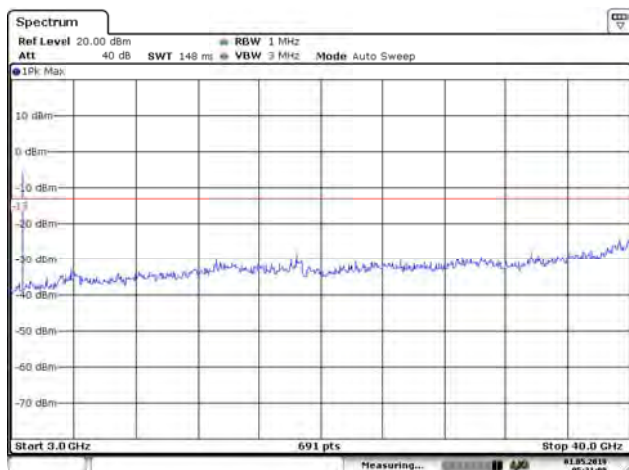
LTE Band 48 10MHz CH Low 1GHz~3GHz



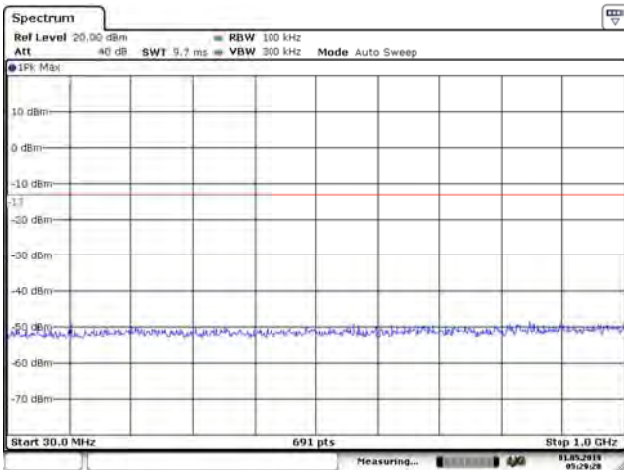
LTE Band 48 5MHz CH High 3GHz~40GHz



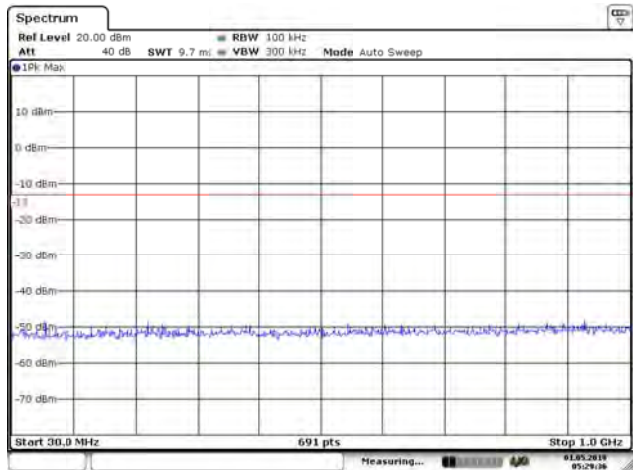
LTE Band 48 10MHz CH Low 3GHz~40GHz



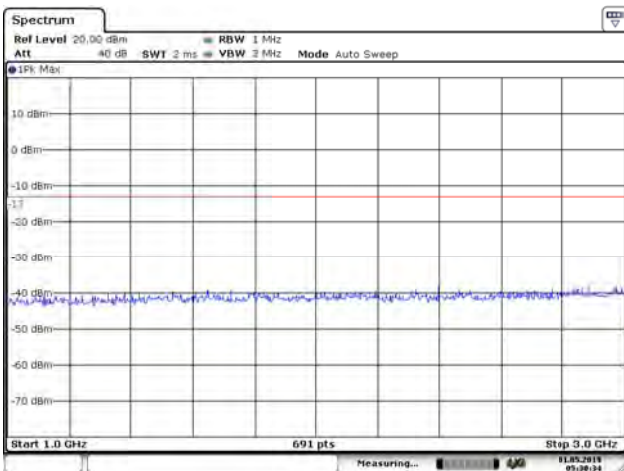
LTE Band 48 10MHz CH Middle 30MHz~1GHz



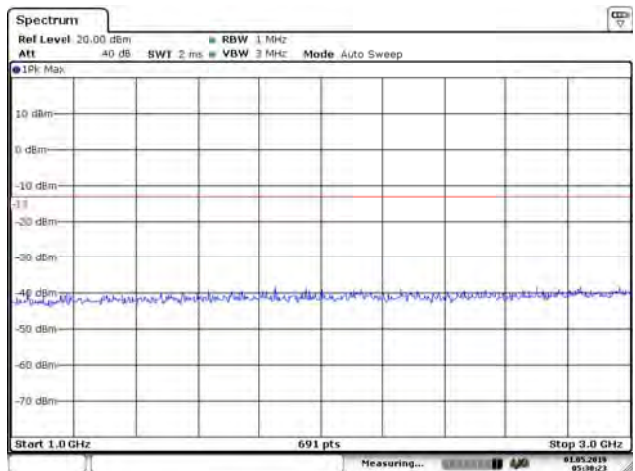
LTE Band 48 10MHz CH High 30MHz~1GHz



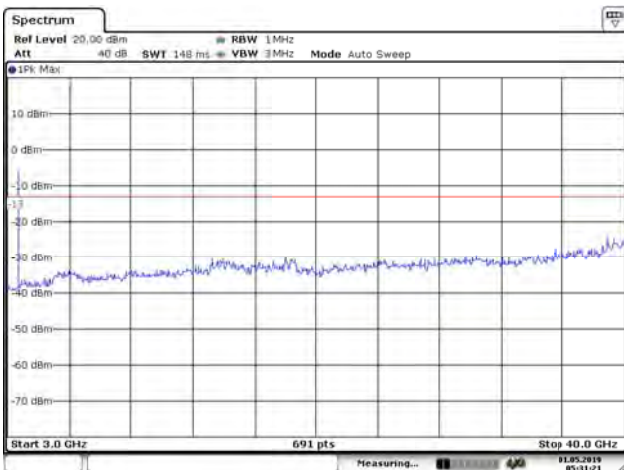
LTE Band 48 10MHz CH Middle 1GHz~3GHz



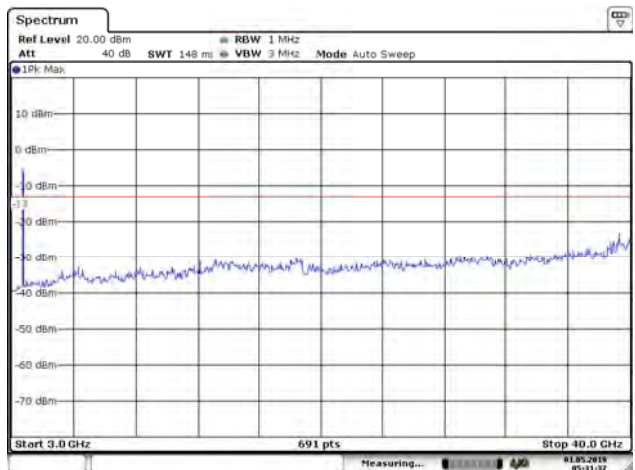
LTE Band 48 10MHz CH High 1GHz~3GHz

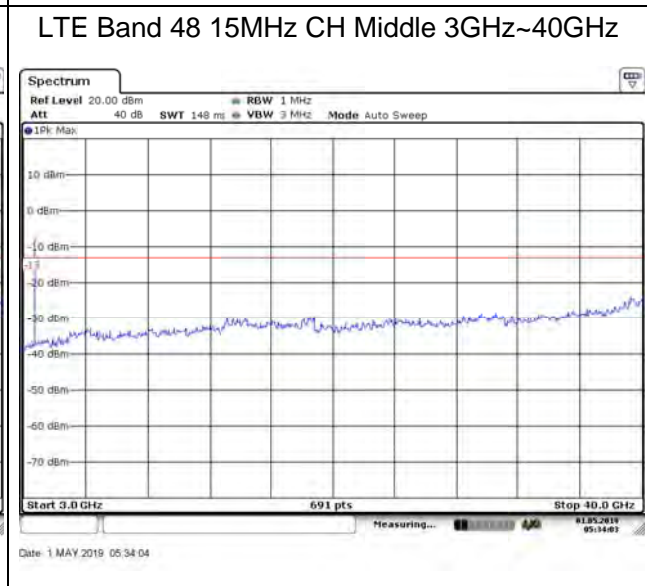
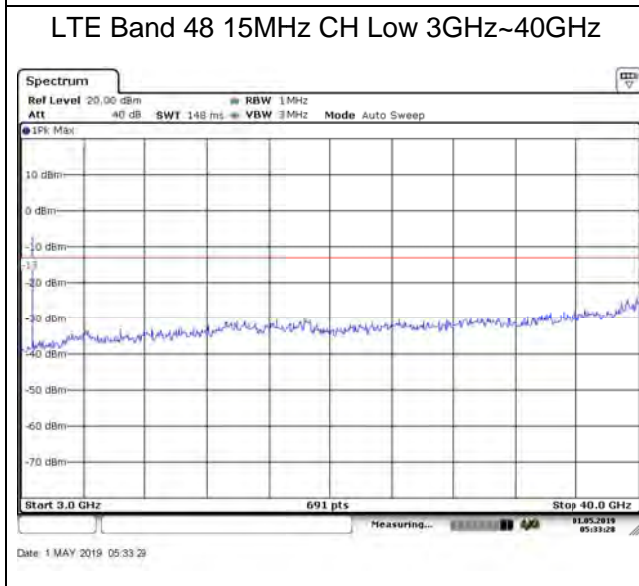
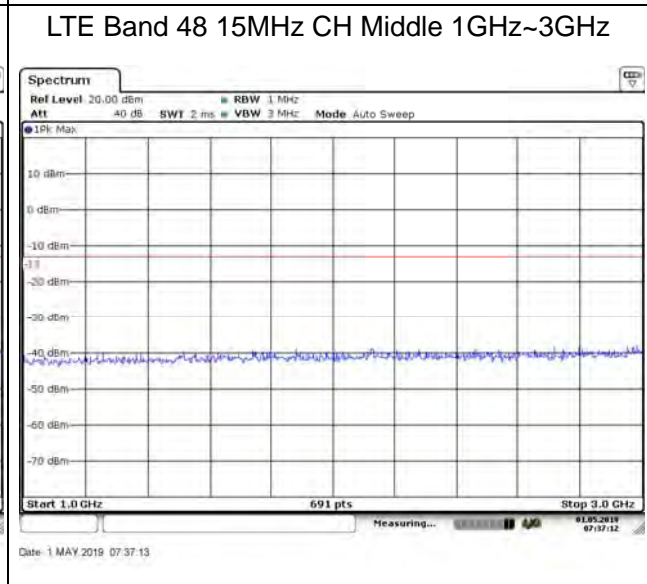
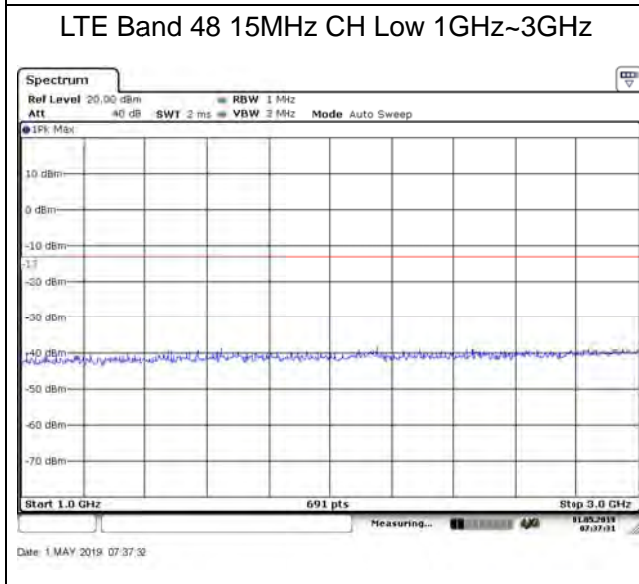
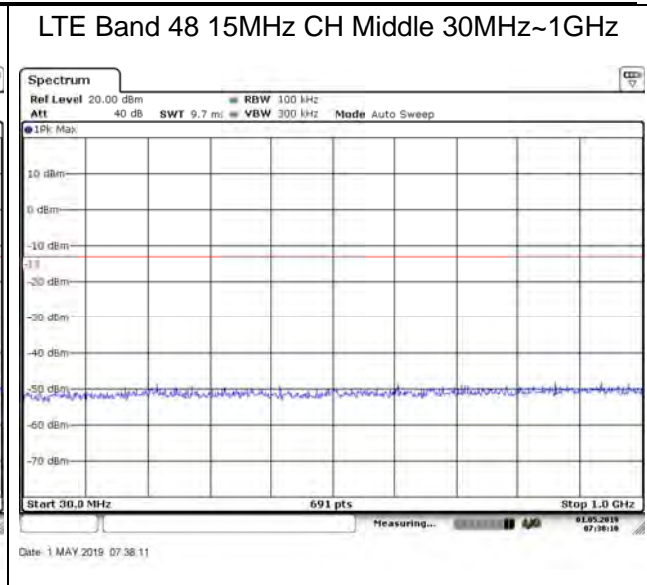
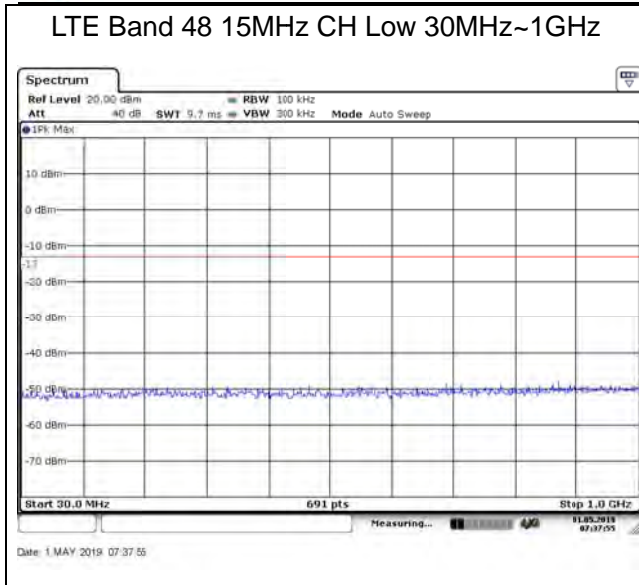


LTE Band 48 10MHz CH Middle 3GHz~40GHz

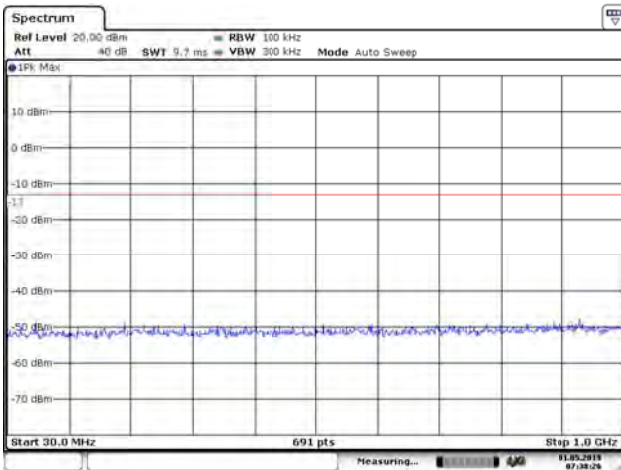


LTE Band 48 10MHz CH High 3GHz~40GHz



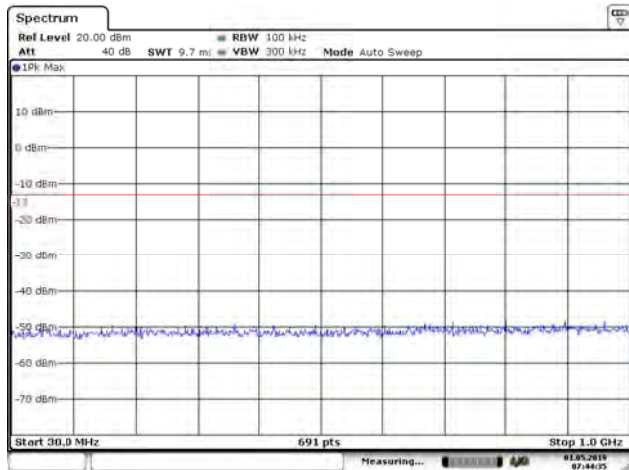


LTE Band 48 15MHz CH High 30MHz~1GHz



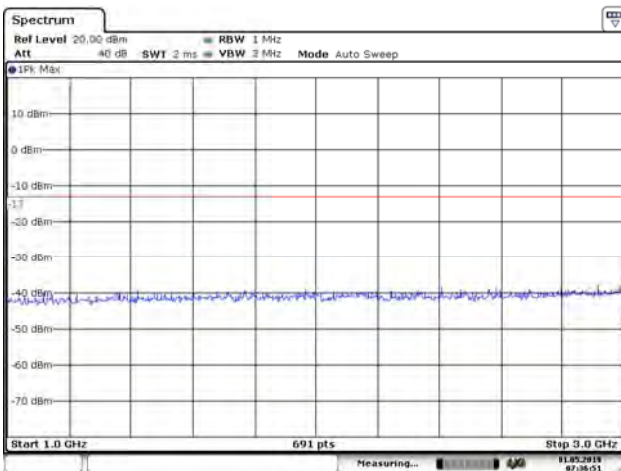
Date: 1 MAY 2019 07:38:27

LTE Band 48 20MHz CH Low 30MHz~1GHz



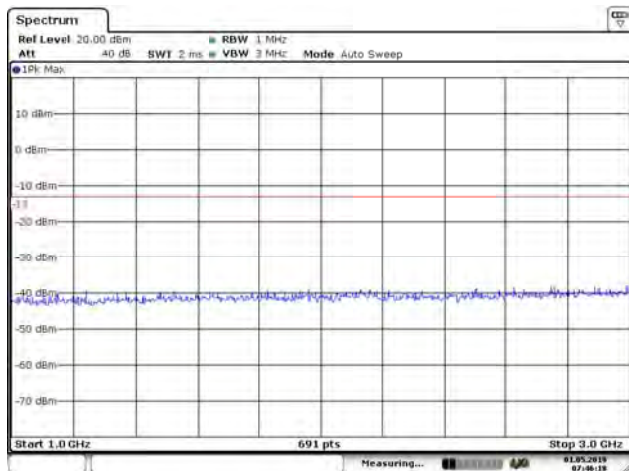
Date: 1 MAY 2019 07:44:35

LTE Band 48 15MHz CH High 1GHz~3GHz



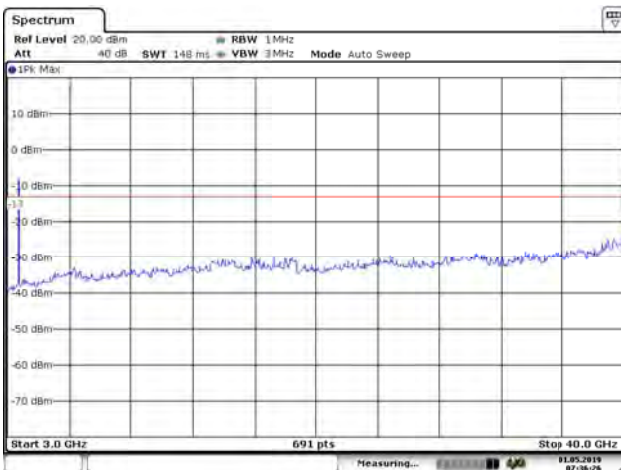
Date: 1 MAY 2019 07:36:52

LTE Band 48 20MHz CH Low 1GHz~3GHz



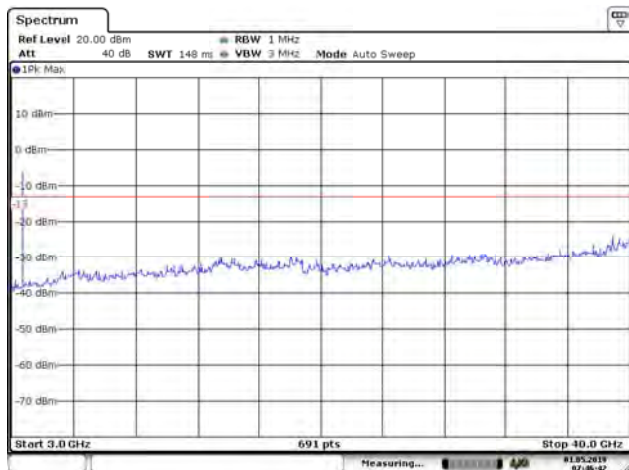
Date: 1 MAY 2019 07:46:19

LTE Band 48 15MHz CH High 3GHz~40GHz



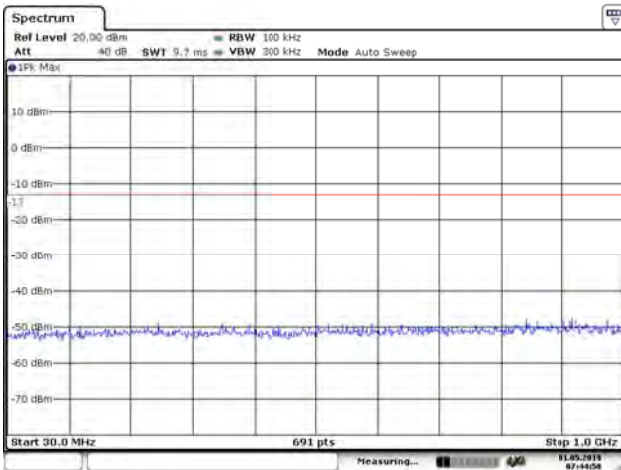
Date: 1 MAY 2019 07:39:23

LTE Band 48 20MHz CH Low 3GHz~40GHz

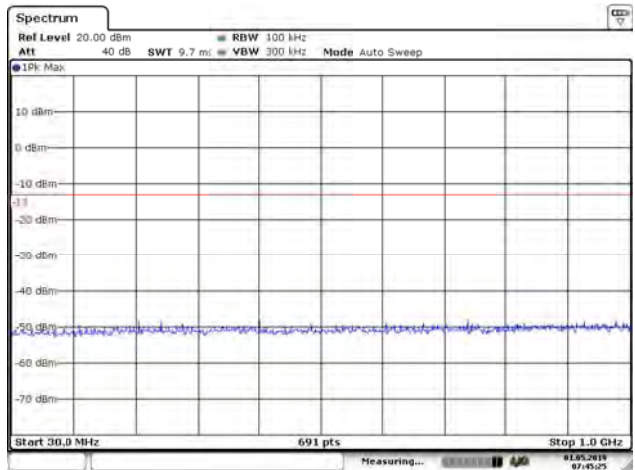


Date: 1 MAY 2019 07:46:43

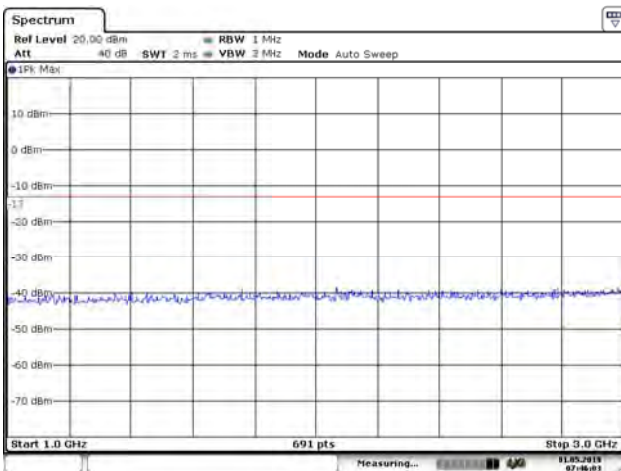
LTE Band 48 20MHz CH Middle 30MHz~1GHz



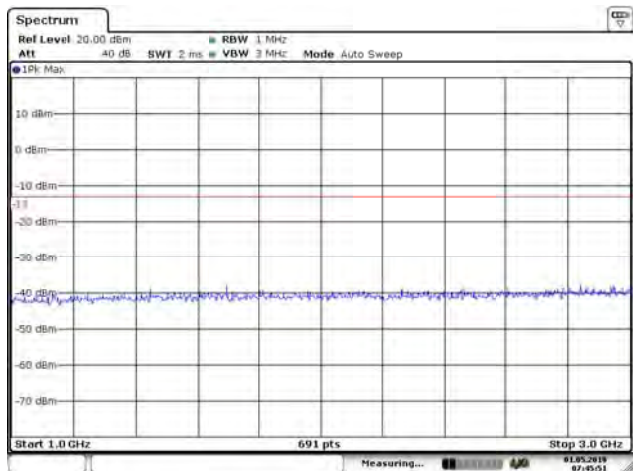
LTE Band 48 20MHz CH High 30MHz~1GHz



LTE Band 48 20MHz CH Middle 1GHz~3GHz



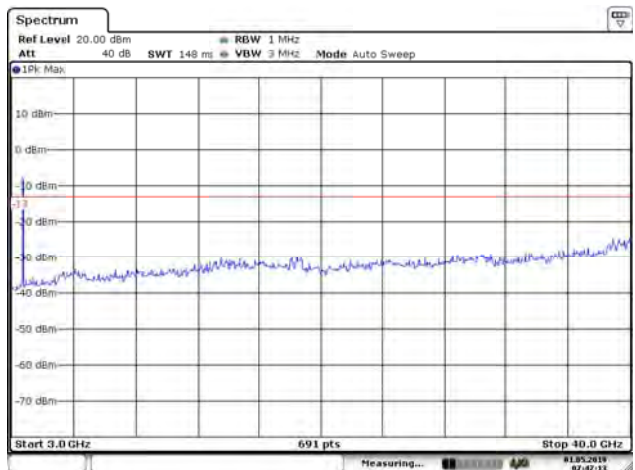
LTE Band 48 20MHz CH High 1GHz~3GHz



LTE Band 48 20MHz CH Middle 3GHz~40GHz



LTE Band 48 20MHz CH High 3GHz~40GHz



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 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A loop antenna, A log-periodic antenna or horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=200Hz,VBW=600Hz for 9kHz150kHz , RBW=10kHz, VBW=30kHz 150kHz-30MHz , RBW=100kHz,VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 1GHz, And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAG) should be recorded after test.
7. The measurement results are obtained as described below:

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

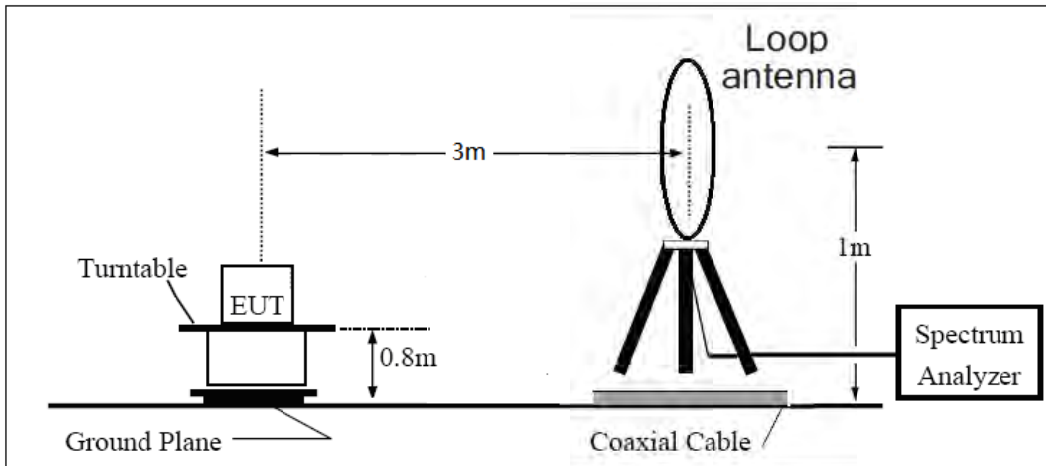
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi)

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

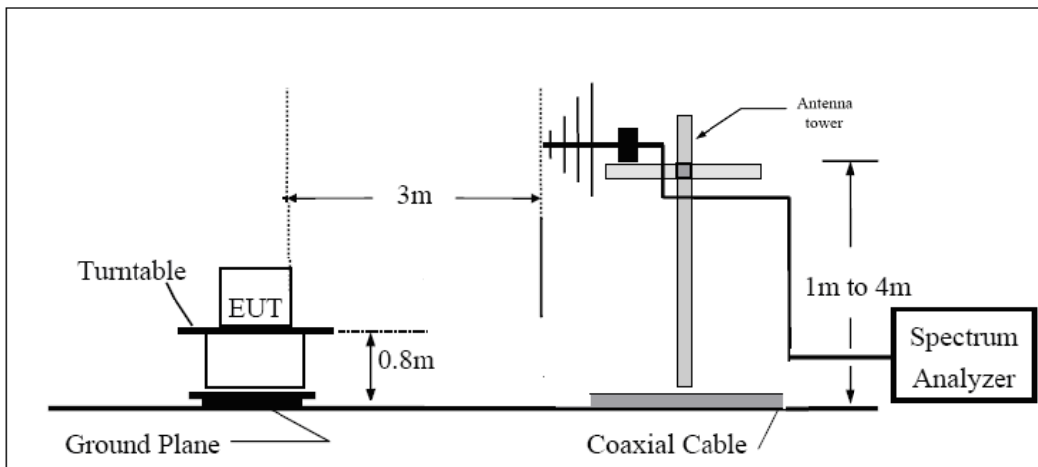
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

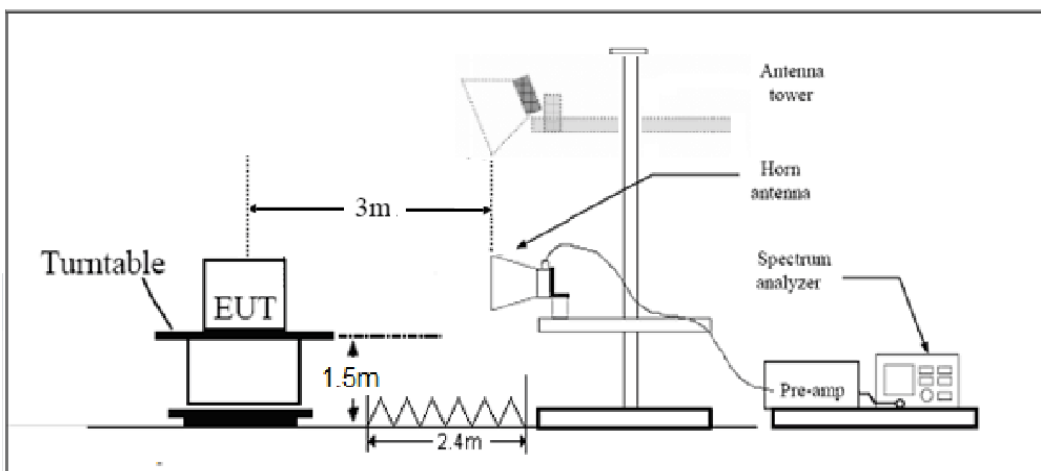
9KHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz





Note: Area side: 2.4mX3.6m

Limits

Rule Part 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 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	7382.25	-50.55	2.50	11.35	horizontal	-41.70	-13.00	28.70	135
3	11073.75	-40.26	4.20	12.05	horizontal	-32.41	-13.00	19.41	315
4	14764.50	-41.58	5.50	14.23	horizontal	-32.85	-13.00	19.85	180
5	18500.00	--	--	--	--	--	--	--	--
6	22200.00	--	--	--	--	--	--	--	--
7	25900.00	--	--	--	--	--	--	--	--
8	29600.00	--	--	--	--	--	--	--	--
9	33300.00	--	--	--	--	--	--	--	--
10	37000.00	--	--	--	--	--	--	--	--

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 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	7382.25	-39.96	2.50	11.35	horizontal	-31.11	-13.00	18.11	180
3	11073.75	-24.84	4.20	12.05	horizontal	-16.99	-13.00	3.99	45
4	14764.50	-48.08	5.50	14.23	horizontal	-39.35	-13.00	26.35	225
5	18500.00	--	--	--	--	--	--	--	--
6	22200.00	--	--	--	--	--	--	--	--
7	25900.00	--	--	--	--	--	--	--	--
8	29600.00	--	--	--	--	--	--	--	--
9	33300.00	--	--	--	--	--	--	--	--
10	37000.00	--	--	--	--	--	--	--	--

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 48 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	7302.00	-55.64	2.50	11.35	horizontal	-46.79	-13.00	33.79	90
3	10953.75	-37.11	4.20	12.05	horizontal	-29.26	-13.00	16.26	270
4	14604.00	-39.78	5.50	14.23	horizontal	-31.05	-13.00	18.05	180
5	18300.00	--	--	--	--	--	--	--	--
6	21960.00	--	--	--	--	--	--	--	--
7	25620.00	--	--	--	--	--	--	--	--
8	29280.00	--	--	--	--	--	--	--	--
9	32940.00	--	--	--	--	--	--	--	--
10	36600.00	--	--	--	--	--	--	--	--

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

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

6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	113824	2018-05-20	2019-05-19
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Agilent	N9010A	MY50210259	2018-05-20	2019-05-19
Signal Analyzer	R&S	FSV40	15195-01-00	2018-05-20	2019-05-19
Trilog Antenna	SCHWARZBECK	VUBL 9163	9163-201	2017-11-18	2019-11-17
Horn Antenna	R&S	HF907	100126	2018-07-07	2020-07-06
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2020-06-19
Horn Antenna	STEATITE	QSH-SL-26-40-K-15	16779	2017-07-20	2019-07-19
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
RF Cable	Agilent	SMA 15cm	0001	/	/
Software	R&S	EMC32	9.26.0	/	/

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

ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance



a: EUT



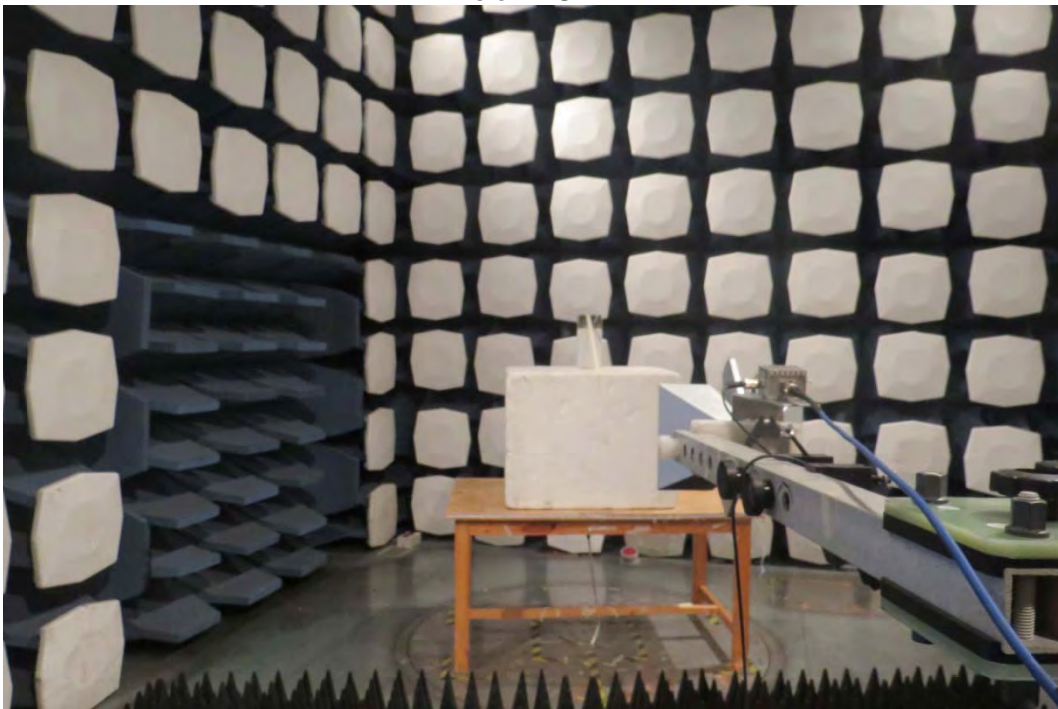
b: Adapter

Picture 1: EUT and Auxiliary

A.2 Test Setup



Below 1GHz



Above 1GHz

Picture 2: Radiated Spurious Emissions Test setup