



RF TEST REPORT

Applicant Quectel Wireless Solutions Co., Ltd.

FCC ID XMR202012EC25T

Product LTE Module

Brand Quectel

Model EC25-T, EC25-T MINIPCIE

Marketing Quectel EC25-T, Quectel EC25-T MINIPCIE

Report No. R2011A0762-R1

Issue Date December 11, 2020

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2019)/ FCC CFR 47 Part 22H (2019)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of measurement results

No.	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Radiated Power	2.1046 22.913(a)(5)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	2.1051 / 22.917(a)	PASS
4	Radiates Spurious Emission	2.1053 / 22.917 (a)	PASS
Date of Testing: November 26, 2020 ~ December 7, 2020			
Date of Sample Received: November 25, 2020			
Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

EC25-T, EC25-T MINIPCIE (Report No.: R2011A0762-R1) is a variant model of EC25-AF, EC25-AF MINIPCIE (Report No.: R1806A0301-R1V1). There is only tested RF Power Output and Effective Radiated Power, Occupied Bandwidth, Band Edge Compliance and Radiates Spurious Emission for variant in this report. Other test items please refer to the model of EC25-AF, EC25-AF MINIPCIE (Report No.: R1806A0301-R1V1). The detailed product change description please refers to following ANNEX C.



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

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.

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

2.3. Applicant and Manufacturer Information

Applicant	Quectel Wireless Solutions Co., Ltd.
Applicant address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

2.4. General Information

EUT Description				
Model	EC25-T, EC25-T MINIPCIE			
IMEI	EC25-T: 861041050000597 EC25-T MINIPCIE: 861041050001272			
Hardware Version	R1.0			
Software Version	EC25TFAR11A01M4G			
Power Supply	External power supply			
Antenna Type	The EUT don't have standard Antenna, The Antenna used for testing in this report is the after-market accessory (Dipole Antenna)			
Antenna Gain	Frequency (MHz)	Antenna Gain (dBi)	Frequency (MHz)	Antenna Gain (dBi)
	820	2.53	840	1.89
	830	2.13	850	2.29
Test Mode(s)	LTE Band 5;			
Test Modulation	QPSK 16QAM;			
LTE Category	4			
Maximum E.R.P.	LTE Band 5:	23.79dBm		
Rated Power Supply Voltage	3.8V			
Extreme Voltage	3.23V ~ 4.37V			
Extreme Temperature	-30°C ~ +50°C			
Operating Voltage	3.3V ~ 4.3V			
Operating Temperature	-40°C ~ 85°C			
Operating Frequency Range(s)	Band	Tx (MHz)		Rx (MHz)
	LTE Band 5	824 ~ 849		869 ~ 894
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.				



Note: The detailed model difference description please refers to the ANNEX D, There are more than one model, each one should be applied throughout the compliance test respectively, however, only the worst case (EC25-T) will be recorded for conducted parts in this report.



3. Applied Standards

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

Test standards:

FCC CFR 47 Part 22H (2019)

ANSI C63.26 (2015)

Reference standard:

FCC CFR47 Part 2 (2019)

KDB 971168 D01 Power Meas License Digital Systems v03r01

4. Test Configuration

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

All mode and data rates and positions were investigated. Subsequently, only the worst case emissions are reported.

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

Test modes are chosen as the worst case configuration below for LTE Band 5.

Test items	Bandwidth (MHz)				Modulation		RB			Test Channel		
	1.4	3	5	10	QPSK	16QAM	1	50%	100%	L	M	H
RF power output and Effective Radiated power	O	O	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
Radiates Spurious Emission	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 and Effective Radiated Power

Ambient condition

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

Methods of Measurement

During the process of the testing, The EUT was connected to the Base Station Simulator with a known loss. The EUT is controlled by the Base Station Simulator test set to ensure max power transmission with proper modulation.

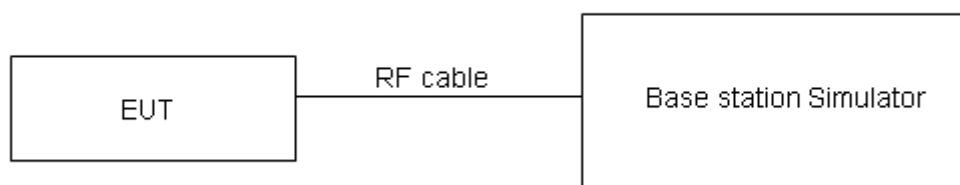
ERP can then be calculated as follows:

$EIRP \text{ (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBi)}$

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

$EIRP \text{ (dBm)} = ERP \text{ (dBm)} + 2.15 \text{ (dB)}$.

Test Setup



Limits

No specific RF power output requirements in part 2.1046.

Rule Part 22.913(a)(5) specifies that "Mobile/portable stations are limited to 7 watts ERP".

Limit	$\leq 7 \text{ W}$ (38.45 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 $k = 2$, $U = 0.4 \text{ dB}$ for RF power output, $k = 2$, $U = 1.19 \text{ dB}$ for ERP.



Test Results

Band	Bandwidth (MHz)	Modulation	Channel	RB Configuration	Maximum Output Power (dBm)	ERP (dBm)	Verdict
LTE Band 5	1.4	QPSK	20407	1RB#0	23.61	23.59	PASS
LTE Band 5	1.4	QPSK	20407	1RB#2	23.80	23.78	PASS
LTE Band 5	1.4	QPSK	20407	1RB#5	23.63	23.61	PASS
LTE Band 5	1.4	QPSK	20407	3RB#0	22.67	22.65	PASS
LTE Band 5	1.4	QPSK	20407	3RB#2	22.66	22.64	PASS
LTE Band 5	1.4	QPSK	20407	3RB#3	22.62	22.60	PASS
LTE Band 5	1.4	QPSK	20407	6RB#0	22.61	22.59	PASS
LTE Band 5	1.4	QPSK	20525	1RB#0	23.58	23.32	PASS
LTE Band 5	1.4	QPSK	20525	1RB#2	23.82	23.56	PASS
LTE Band 5	1.4	QPSK	20525	1RB#5	23.42	23.16	PASS
LTE Band 5	1.4	QPSK	20525	3RB#0	22.64	22.38	PASS
LTE Band 5	1.4	QPSK	20525	3RB#2	22.62	22.36	PASS
LTE Band 5	1.4	QPSK	20525	3RB#3	22.62	22.36	PASS
LTE Band 5	1.4	QPSK	20525	6RB#0	22.65	22.39	PASS
LTE Band 5	1.4	QPSK	20643	1RB#0	23.65	23.79	PASS
LTE Band 5	1.4	QPSK	20643	1RB#2	23.52	23.66	PASS
LTE Band 5	1.4	QPSK	20643	1RB#5	23.49	23.63	PASS
LTE Band 5	1.4	QPSK	20643	3RB#0	22.60	22.74	PASS
LTE Band 5	1.4	QPSK	20643	3RB#2	22.51	22.65	PASS
LTE Band 5	1.4	QPSK	20643	3RB#3	22.58	22.72	PASS
LTE Band 5	1.4	QPSK	20643	6RB#0	22.54	22.68	PASS
LTE Band 5	1.4	16QAM	20407	1RB#0	22.48	22.46	PASS
LTE Band 5	1.4	16QAM	20407	1RB#2	22.61	22.59	PASS
LTE Band 5	1.4	16QAM	20407	1RB#5	22.44	22.42	PASS
LTE Band 5	1.4	16QAM	20407	3RB#0	21.67	21.65	PASS



LTE Band 5	1.4	16QAM	20407	3RB#2	21.62	21.60	PASS
LTE Band 5	1.4	16QAM	20407	3RB#3	21.58	21.56	PASS
LTE Band 5	1.4	16QAM	20407	6RB#0	21.60	21.58	PASS
LTE Band 5	1.4	16QAM	20525	1RB#0	22.54	22.28	PASS
LTE Band 5	1.4	16QAM	20525	1RB#2	22.52	22.26	PASS
LTE Band 5	1.4	16QAM	20525	1RB#5	22.51	22.25	PASS
LTE Band 5	1.4	16QAM	20525	3RB#0	21.48	21.22	PASS
LTE Band 5	1.4	16QAM	20525	3RB#2	21.78	21.52	PASS
LTE Band 5	1.4	16QAM	20525	3RB#3	21.56	21.30	PASS
LTE Band 5	1.4	16QAM	20525	6RB#0	21.65	21.39	PASS
LTE Band 5	1.4	16QAM	20643	1RB#0	22.28	22.42	PASS
LTE Band 5	1.4	16QAM	20643	1RB#2	22.45	22.59	PASS
LTE Band 5	1.4	16QAM	20643	1RB#5	22.53	22.67	PASS
LTE Band 5	1.4	16QAM	20643	3RB#0	21.55	21.69	PASS
LTE Band 5	1.4	16QAM	20643	3RB#2	21.64	21.78	PASS
LTE Band 5	1.4	16QAM	20643	3RB#3	21.57	21.71	PASS
LTE Band 5	1.4	16QAM	20643	6RB#0	21.47	21.61	PASS
LTE Band 5	3	QPSK	20415	1RB#0	23.56	23.54	PASS
LTE Band 5	3	QPSK	20415	1RB#7	23.74	23.72	PASS
LTE Band 5	3	QPSK	20415	1RB#14	23.56	23.54	PASS
LTE Band 5	3	QPSK	20415	8RB#0	22.60	22.58	PASS
LTE Band 5	3	QPSK	20415	8RB#4	22.62	22.60	PASS
LTE Band 5	3	QPSK	20415	8RB#7	22.55	22.53	PASS
LTE Band 5	3	QPSK	20415	15RB#0	22.59	22.57	PASS
LTE Band 5	3	QPSK	20525	1RB#0	23.45	23.19	PASS
LTE Band 5	3	QPSK	20525	1RB#7	23.78	23.52	PASS
LTE Band 5	3	QPSK	20525	1RB#14	23.34	23.08	PASS
LTE Band 5	3	QPSK	20525	8RB#0	22.60	22.34	PASS



LTE Band 5	3	QPSK	20525	8RB#4	22.58	22.32	PASS
LTE Band 5	3	QPSK	20525	8RB#7	22.54	22.28	PASS
LTE Band 5	3	QPSK	20525	15RB#0	22.57	22.31	PASS
LTE Band 5	3	QPSK	20635	1RB#0	23.59	23.73	PASS
LTE Band 5	3	QPSK	20635	1RB#7	23.46	23.60	PASS
LTE Band 5	3	QPSK	20635	1RB#14	23.39	23.53	PASS
LTE Band 5	3	QPSK	20635	8RB#0	22.54	22.68	PASS
LTE Band 5	3	QPSK	20635	8RB#4	22.46	22.60	PASS
LTE Band 5	3	QPSK	20635	8RB#7	22.59	22.73	PASS
LTE Band 5	3	QPSK	20635	15RB#0	22.55	22.69	PASS
LTE Band 5	3	16QAM	20415	1RB#0	22.45	22.43	PASS
LTE Band 5	3	16QAM	20415	1RB#7	22.59	22.57	PASS
LTE Band 5	3	16QAM	20415	1RB#14	22.42	22.40	PASS
LTE Band 5	3	16QAM	20415	8RB#0	21.64	21.62	PASS
LTE Band 5	3	16QAM	20415	8RB#4	21.59	21.57	PASS
LTE Band 5	3	16QAM	20415	8RB#7	21.53	21.51	PASS
LTE Band 5	3	16QAM	20415	15RB#0	21.58	21.56	PASS
LTE Band 5	3	16QAM	20525	1RB#0	22.51	22.25	PASS
LTE Band 5	3	16QAM	20525	1RB#7	22.47	22.21	PASS
LTE Band 5	3	16QAM	20525	1RB#14	22.44	22.18	PASS
LTE Band 5	3	16QAM	20525	8RB#0	21.45	21.19	PASS
LTE Band 5	3	16QAM	20525	8RB#4	21.73	21.47	PASS
LTE Band 5	3	16QAM	20525	8RB#7	21.56	21.30	PASS
LTE Band 5	3	16QAM	20525	15RB#0	21.65	21.39	PASS
LTE Band 5	3	16QAM	20635	1RB#0	22.23	22.37	PASS
LTE Band 5	3	16QAM	20635	1RB#7	22.41	22.55	PASS
LTE Band 5	3	16QAM	20635	1RB#14	22.49	22.63	PASS
LTE Band 5	3	16QAM	20635	8RB#0	21.51	21.65	PASS



LTE Band 5	3	16QAM	20635	8RB#4	21.58	21.72	PASS
LTE Band 5	3	16QAM	20635	8RB#7	21.54	21.68	PASS
LTE Band 5	3	16QAM	20635	15RB#0	21.45	21.59	PASS
LTE Band 5	5	QPSK	20425	1RB#0	23.55	23.53	PASS
LTE Band 5	5	QPSK	20425	1RB#13	23.72	23.70	PASS
LTE Band 5	5	QPSK	20425	1RB#24	23.53	23.51	PASS
LTE Band 5	5	QPSK	20425	12RB#0	22.58	22.56	PASS
LTE Band 5	5	QPSK	20425	12RB#6	22.59	22.57	PASS
LTE Band 5	5	QPSK	20425	12RB#13	22.52	22.50	PASS
LTE Band 5	5	QPSK	20425	25RB#0	22.57	22.55	PASS
LTE Band 5	5	QPSK	20525	1RB#0	23.41	23.15	PASS
LTE Band 5	5	QPSK	20525	1RB#13	23.77	23.51	PASS
LTE Band 5	5	QPSK	20525	1RB#24	23.29	23.03	PASS
LTE Band 5	5	QPSK	20525	12RB#0	22.56	22.30	PASS
LTE Band 5	5	QPSK	20525	12RB#6	22.53	22.27	PASS
LTE Band 5	5	QPSK	20525	12RB#13	22.51	22.25	PASS
LTE Band 5	5	QPSK	20525	25RB#0	22.53	22.27	PASS
LTE Band 5	5	QPSK	20625	1RB#0	23.57	23.71	PASS
LTE Band 5	5	QPSK	20625	1RB#13	23.43	23.57	PASS
LTE Band 5	5	QPSK	20625	1RB#24	23.35	23.49	PASS
LTE Band 5	5	QPSK	20625	12RB#0	22.51	22.65	PASS
LTE Band 5	5	QPSK	20625	12RB#6	22.42	22.56	PASS
LTE Band 5	5	QPSK	20625	12RB#13	22.55	22.69	PASS
LTE Band 5	5	QPSK	20625	25RB#0	22.50	22.64	PASS
LTE Band 5	5	16QAM	20425	1RB#0	22.40	22.38	PASS
LTE Band 5	5	16QAM	20425	1RB#13	22.57	22.55	PASS
LTE Band 5	5	16QAM	20425	1RB#24	22.39	22.37	PASS
LTE Band 5	5	16QAM	20425	12RB#0	21.61	21.59	PASS



LTE Band 5	5	16QAM	20425	12RB#6	21.56	21.54	PASS
LTE Band 5	5	16QAM	20425	12RB#13	21.51	21.49	PASS
LTE Band 5	5	16QAM	20425	25RB#0	21.55	21.53	PASS
LTE Band 5	5	16QAM	20525	1RB#0	22.49	22.23	PASS
LTE Band 5	5	16QAM	20525	1RB#13	22.44	22.18	PASS
LTE Band 5	5	16QAM	20525	1RB#24	22.40	22.14	PASS
LTE Band 5	5	16QAM	20525	12RB#0	21.43	21.17	PASS
LTE Band 5	5	16QAM	20525	12RB#6	21.68	21.42	PASS
LTE Band 5	5	16QAM	20525	12RB#13	21.52	21.26	PASS
LTE Band 5	5	16QAM	20525	25RB#0	21.60	21.34	PASS
LTE Band 5	5	16QAM	20625	1RB#0	22.21	22.35	PASS
LTE Band 5	5	16QAM	20625	1RB#13	22.39	22.53	PASS
LTE Band 5	5	16QAM	20625	1RB#24	22.46	22.60	PASS
LTE Band 5	5	16QAM	20625	12RB#0	21.48	21.62	PASS
LTE Band 5	5	16QAM	20625	12RB#6	21.54	21.68	PASS
LTE Band 5	5	16QAM	20625	12RB#13	21.51	21.65	PASS
LTE Band 5	5	16QAM	20625	25RB#0	21.41	21.55	PASS
LTE Band 5	10	QPSK	20450	1RB#0	23.52	23.50	PASS
LTE Band 5	10	QPSK	20450	1RB#25	23.71	23.69	PASS
LTE Band 5	10	QPSK	20450	1RB#49	23.51	23.49	PASS
LTE Band 5	10	QPSK	20450	25RB#0	22.55	22.53	PASS
LTE Band 5	10	QPSK	20450	25RB#13	22.57	22.55	PASS
LTE Band 5	10	QPSK	20450	25RB#25	22.49	22.47	PASS
LTE Band 5	10	QPSK	20450	50RB#0	22.54	22.52	PASS
LTE Band 5	10	QPSK	20525	1RB#0	23.37	23.11	PASS
LTE Band 5	10	QPSK	20525	1RB#25	23.73	23.47	PASS
LTE Band 5	10	QPSK	20525	1RB#49	23.28	23.02	PASS
LTE Band 5	10	QPSK	20525	25RB#0	22.51	22.25	PASS



LTE Band 5	10	QPSK	20525	25RB#13	22.49	22.23	PASS
LTE Band 5	10	QPSK	20525	25RB#25	22.46	22.20	PASS
LTE Band 5	10	QPSK	20525	50RB#0	22.48	22.22	PASS
LTE Band 5	10	QPSK	20600	1RB#0	23.54	23.68	PASS
LTE Band 5	10	QPSK	20600	1RB#25	23.41	23.55	PASS
LTE Band 5	10	QPSK	20600	1RB#49	23.32	23.46	PASS
LTE Band 5	10	QPSK	20600	25RB#0	22.47	22.61	PASS
LTE Band 5	10	QPSK	20600	25RB#13	22.39	22.53	PASS
LTE Band 5	10	QPSK	20600	25RB#25	22.51	22.65	PASS
LTE Band 5	10	QPSK	20600	50RB#0	22.46	22.60	PASS
LTE Band 5	10	16QAM	20450	1RB#0	22.38	22.36	PASS
LTE Band 5	10	16QAM	20450	1RB#25	22.53	22.51	PASS
LTE Band 5	10	16QAM	20450	1RB#49	22.37	22.35	PASS
LTE Band 5	10	16QAM	20450	25RB#0	21.58	21.56	PASS
LTE Band 5	10	16QAM	20450	25RB#13	21.53	21.51	PASS
LTE Band 5	10	16QAM	20450	25RB#25	21.48	21.46	PASS
LTE Band 5	10	16QAM	20450	50RB#0	21.53	21.51	PASS
LTE Band 5	10	16QAM	20525	1RB#0	22.45	22.19	PASS
LTE Band 5	10	16QAM	20525	1RB#25	22.42	22.16	PASS
LTE Band 5	10	16QAM	20525	1RB#49	22.37	22.11	PASS
LTE Band 5	10	16QAM	20525	25RB#0	21.39	21.13	PASS
LTE Band 5	10	16QAM	20525	25RB#13	21.66	21.40	PASS
LTE Band 5	10	16QAM	20525	25RB#25	21.47	21.21	PASS
LTE Band 5	10	16QAM	20525	50RB#0	21.56	21.30	PASS
LTE Band 5	10	16QAM	20600	1RB#0	22.16	22.30	PASS
LTE Band 5	10	16QAM	20600	1RB#25	22.35	22.49	PASS
LTE Band 5	10	16QAM	20600	1RB#49	22.44	22.58	PASS
LTE Band 5	10	16QAM	20600	25RB#0	21.45	21.59	PASS



LTE Band 5	10	16QAM	20600	25RB#13	21.51	21.65	PASS
LTE Band 5	10	16QAM	20600	25RB#25	21.47	21.61	PASS
LTE Band 5	10	16QAM	20600	50RB#0	21.38	21.52	PASS

5.2. Occupied Bandwidth

Ambient condition

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

Method of Measurement

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

RBW is set to 30 kHz, VBW is set to 91kHz for LTE Band 5 (1.4MHz),

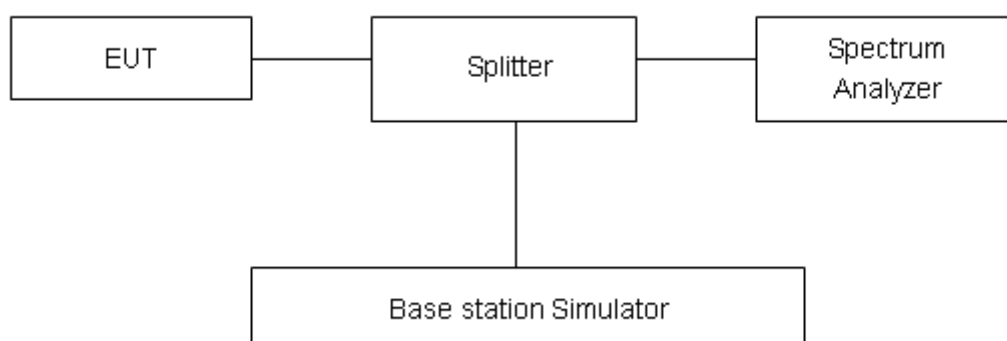
RBW is set to 62 kHz, VBW is set to 180kHz for LTE Band 5 (3MHz),

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

RBW is set to 200 kHz, VBW is set to 620kHz for LTE Band 5 (10MHz),

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

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

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



Test Result

LTE Band 5						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	1.4	20407	824.7	1.0895	1.300
			20525	836.5	1.0958	1.289
			20643	848.3	1.1042	1.275
		3	20415	825.5	2.6989	2.977
			20525	836.5	2.7106	2.989
			20635	847.5	2.7109	2.991
		5	20425	826.5	4.5099	4.989
			20525	836.5	4.5181	4.938
			20625	846.5	4.5064	4.993
		10	20450	829	8.9767	9.844
			20525	836.5	8.9663	9.952
			20600	844	8.9567	9.862
	16QAM	1.4	20407	824.7	1.0972	1.294
			20525	836.5	1.0923	1.266
			20643	848.3	1.0936	1.289
		3	20415	825.5	2.6899	2.992
			20525	836.5	2.6901	2.962
			20635	847.5	2.7066	3.016
		5	20425	826.5	4.5048	4.987
			20525	836.5	4.5200	5.015
			20625	846.5	4.5246	4.976
		10	20450	829	8.9723	9.806
			20525	836.5	8.9737	9.810
			20600	844	8.9835	9.808

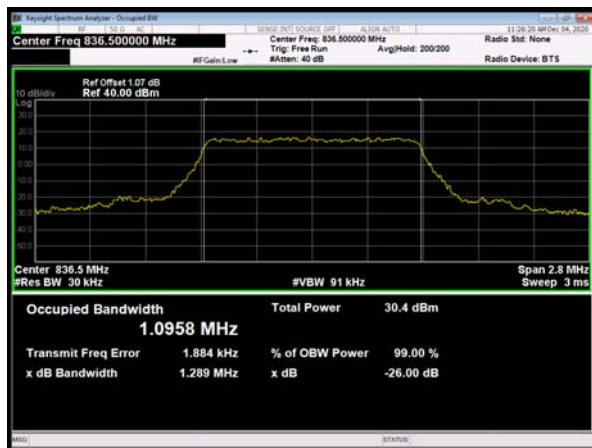
LTE Band 5 QPSK 1.4MHz CH-Low



LTE Band 5 QPSK 3MHz CH-Low



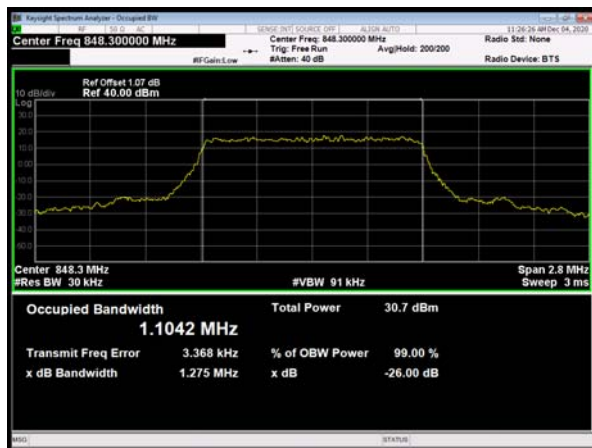
LTE Band 5 QPSK 1.4MHz CH-Middle



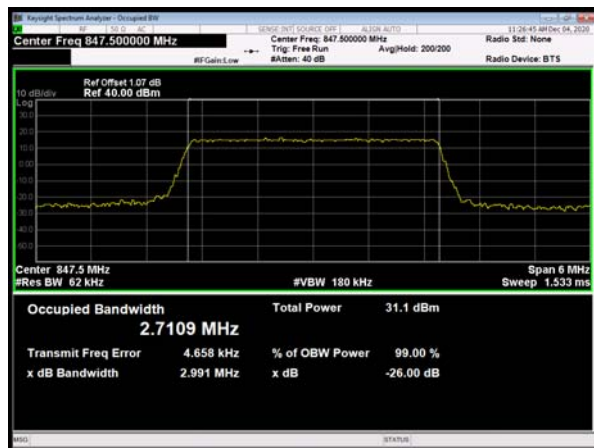
LTE Band 5 QPSK 3MHz CH-Middle



LTE Band 5 QPSK 1.4MHz CH-High

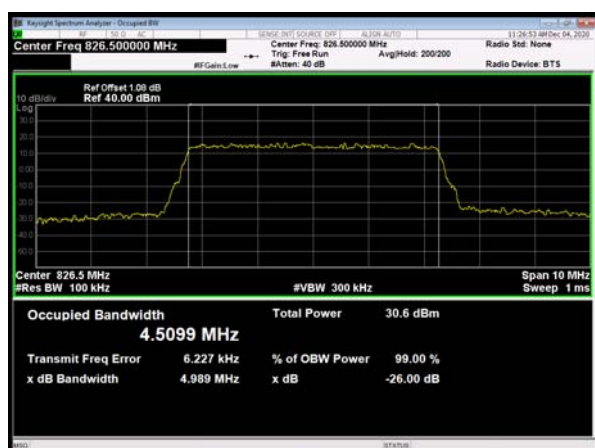


LTE Band 5 QPSK 3MHz CH-High

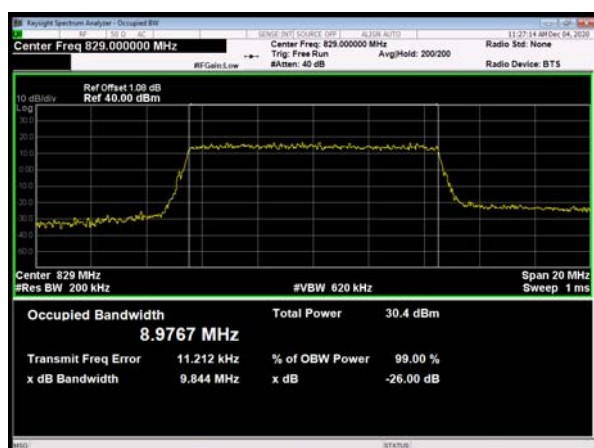




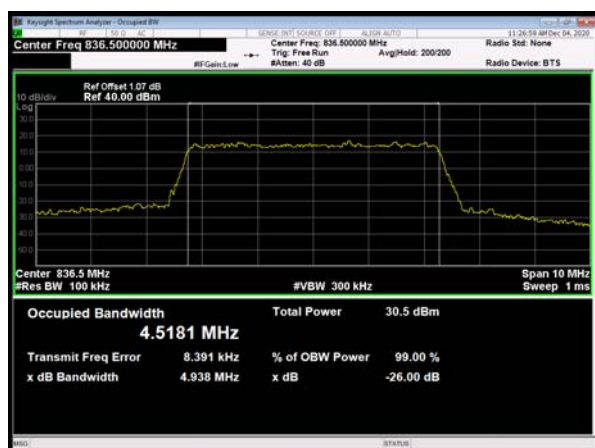
LTE Band 5 QPSK 5MHz CH-Low



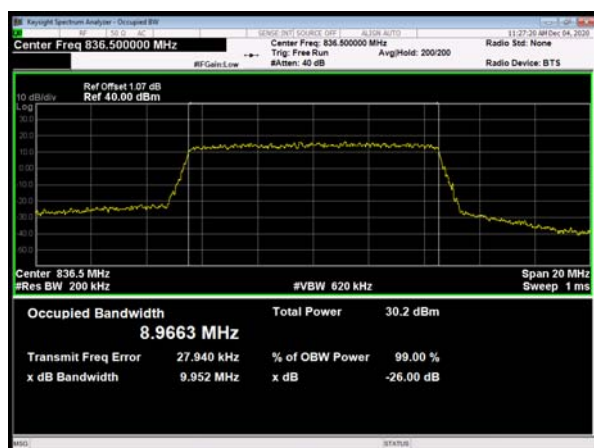
LTE Band 5 QPSK 10MHz CH-Low



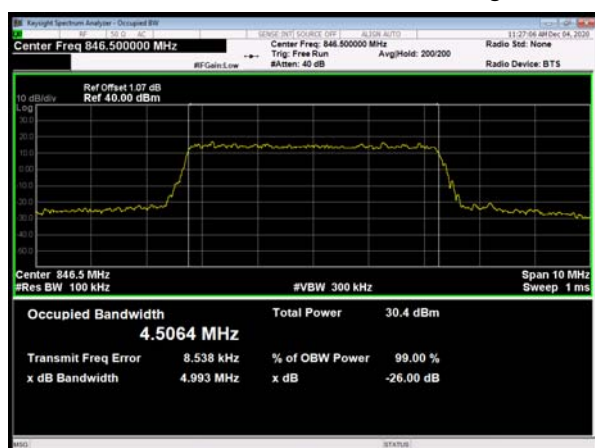
LTE Band 5 QPSK 5MHz CH-Middle



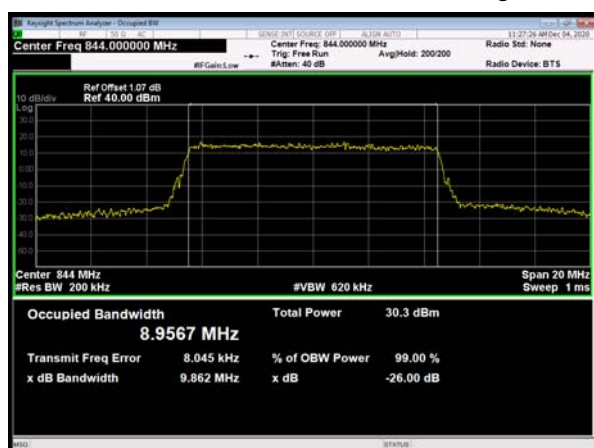
LTE Band 5 QPSK 10MHz CH-Middle



LTE Band 5 QPSK 5MHz CH-High

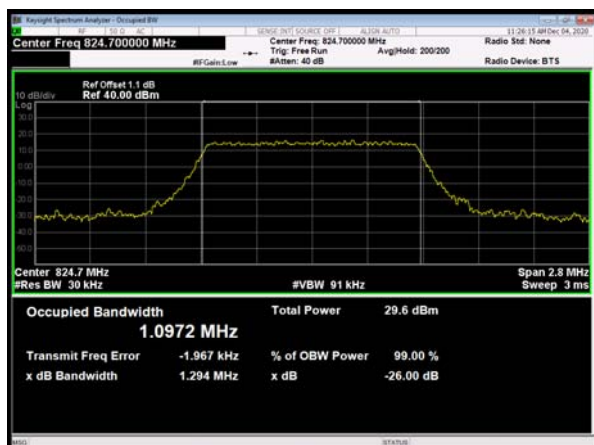


LTE Band 5 QPSK 10MHz CH-High

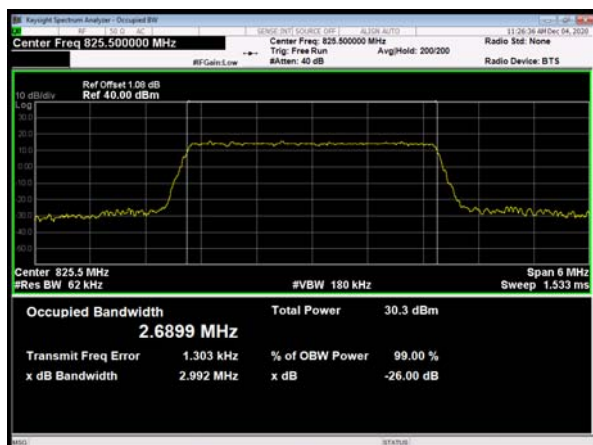




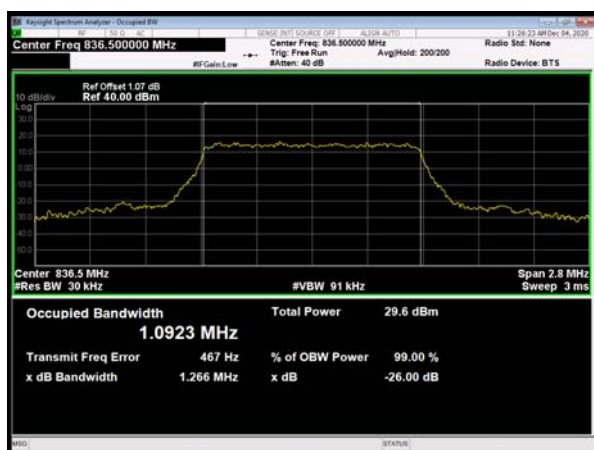
LTE Band 5 16QAM 1.4MHz CH-Low



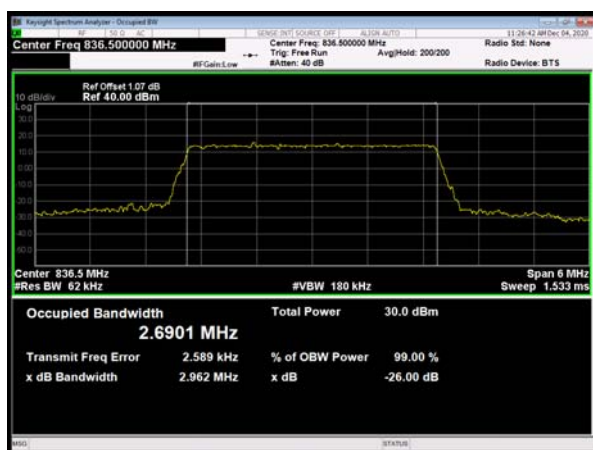
LTE Band 5 16QAM 3MHz CH-Low



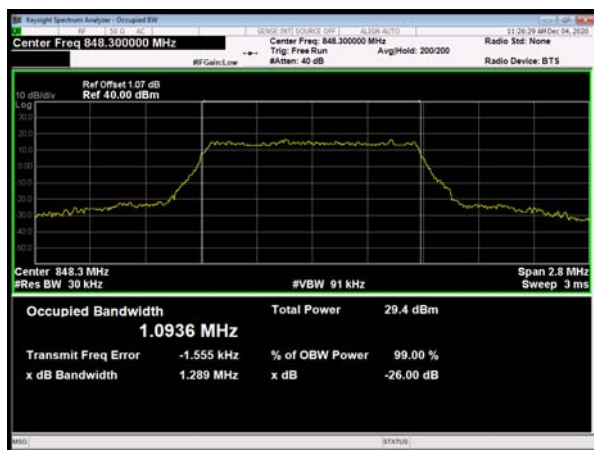
LTE Band 5 16QAM 1.4MHz CH-Middle



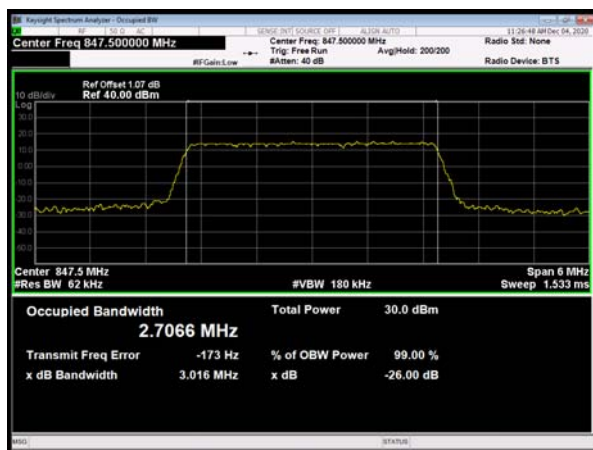
LTE Band 5 16QAM 3MHz CH-Middle



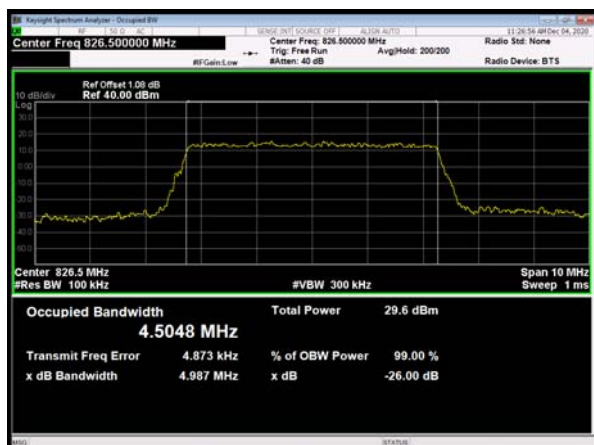
LTE Band 5 16QAM 1.4MHz CH-High



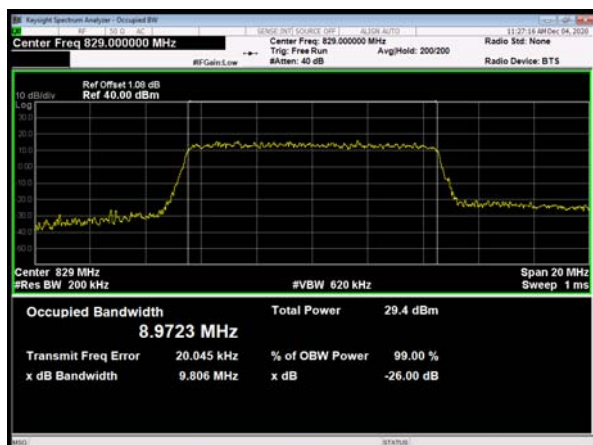
LTE Band 5 16QAM 3MHz CH-High



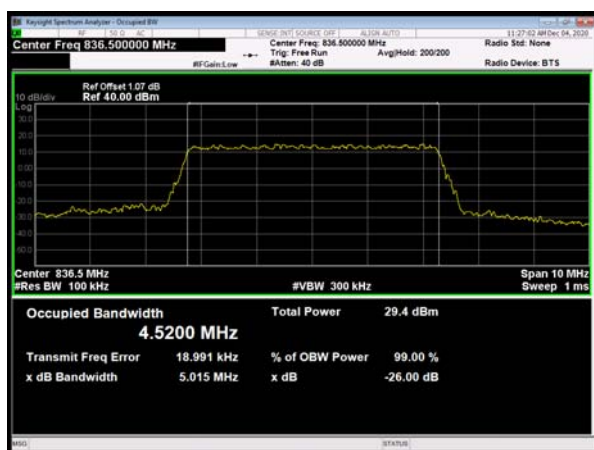
LTE Band 5 16QAM 5MHz CH-Low



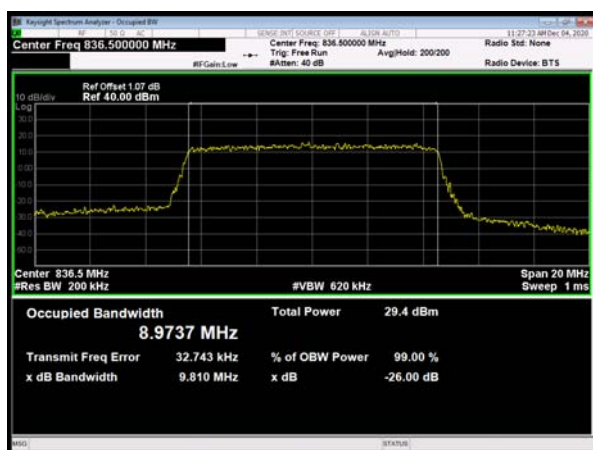
LTE Band 5 16QAM 10MHz CH-Low



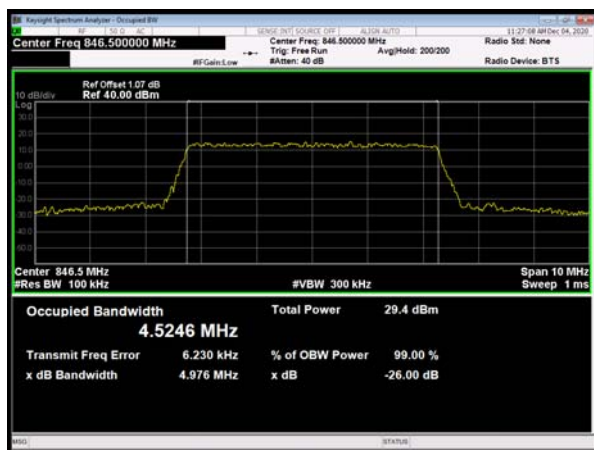
LTE Band 5 16QAM 5MHz CH-Middle



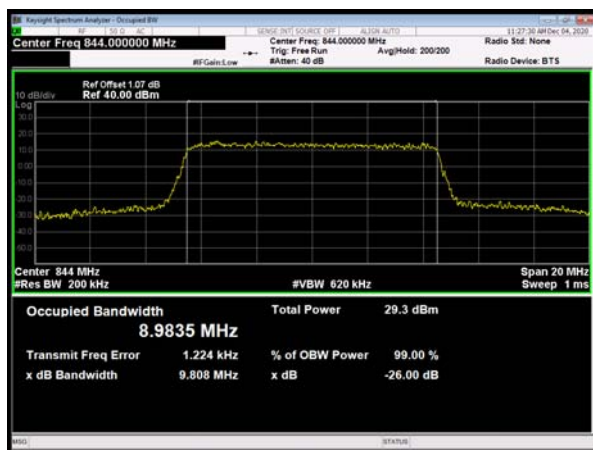
LTE Band 5 16QAM 10MHz CH-Middle



LTE Band 5 16QAM 5MHz CH-High



LTE Band 5 16QAM 10MHz CH-High



5.3. 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.

RBW is set to 15kHz, VBW is set to 43kHz for LTE Band 5 (1.4MHz),

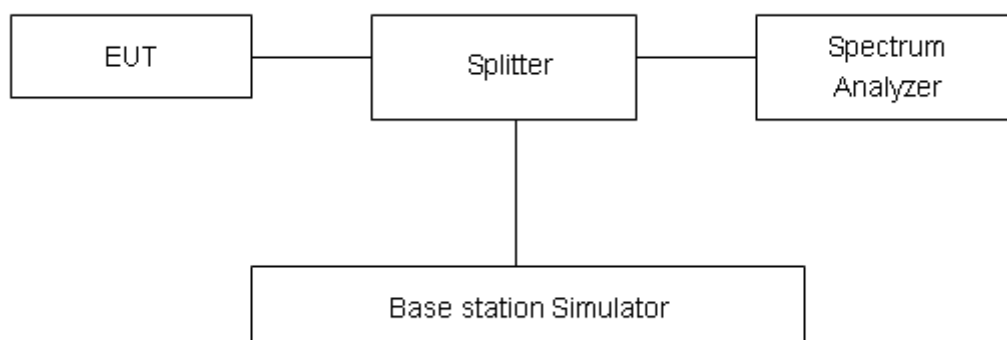
RBW is set to 30kHz,VBW is set to 91kHz for LTE Band 5 (3MHz),

RBW is set to 51kHz,VBW is set to 150kHz for LTE Band 5 (5MHz),

RBW is set to 100kHz,VBW is set to 300kHz for LTE Band 5 (10MHz),

Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.”

Limit	-13 dBm
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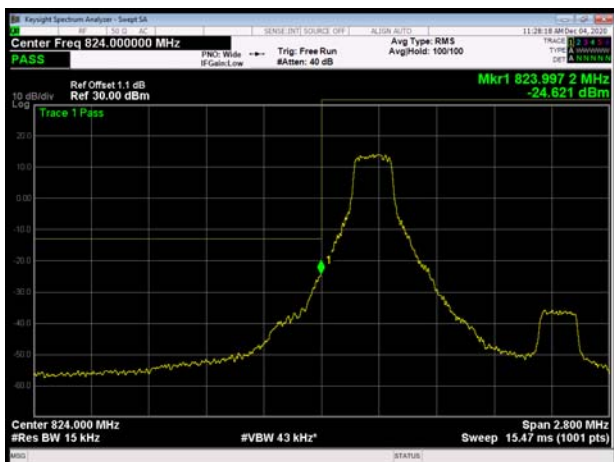
Measurement Uncertainty

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.

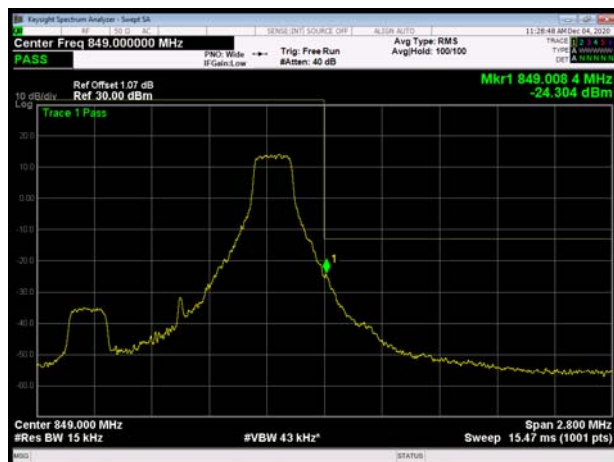


Test Result:

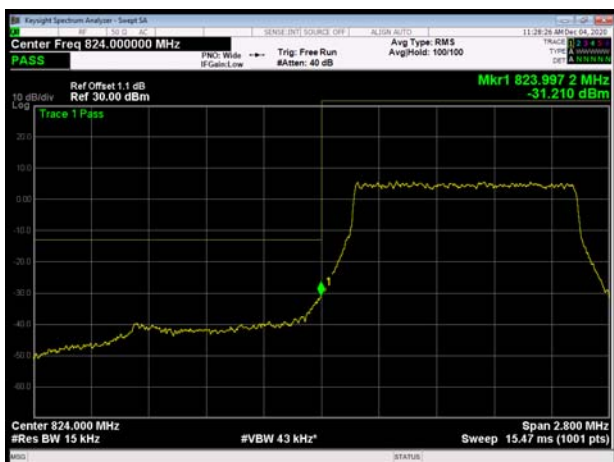
LTE Band 5 QPSK 1.4MHz CH-Low 1RB



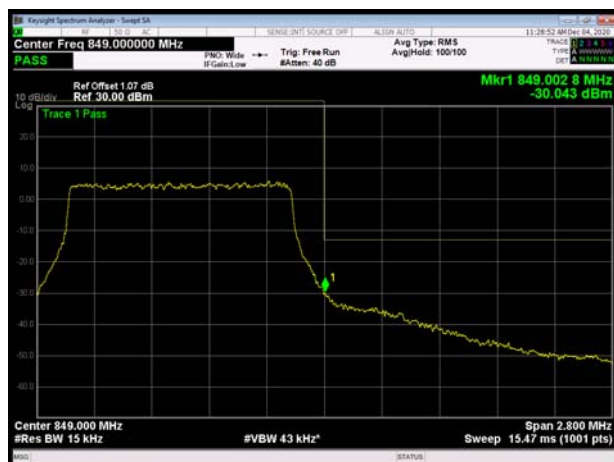
LTE Band 5 QPSK 1.4MHz CH-High 1RB



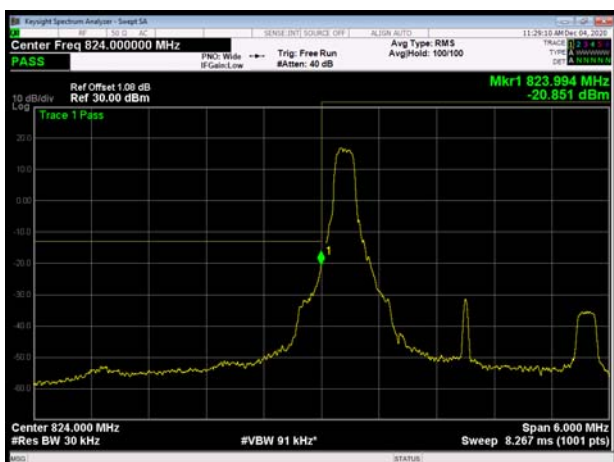
LTE Band 5 QPSK 1.4MHz CH-Low 100%RB



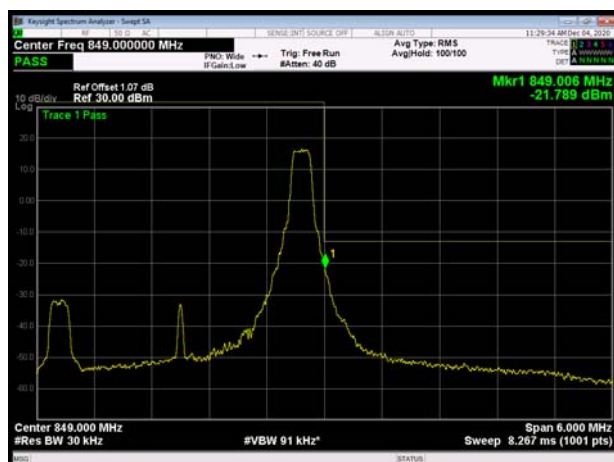
LTE Band 5 QPSK 1.4MHz CH-High 100%RB



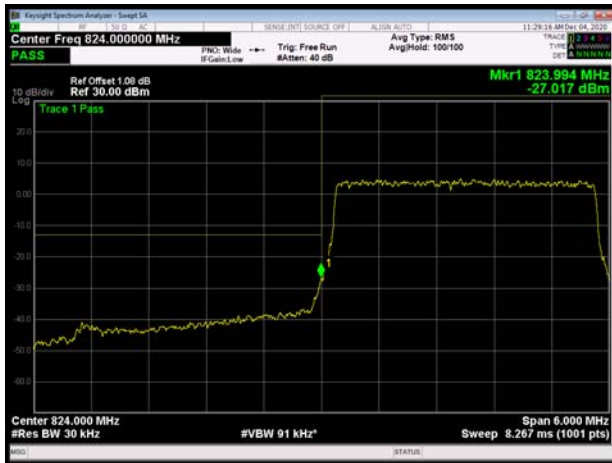
LTE Band 5 QPSK 3MHz CH-Low 1RB



LTE Band 5 QPSK 3MHz CH-High 1RB



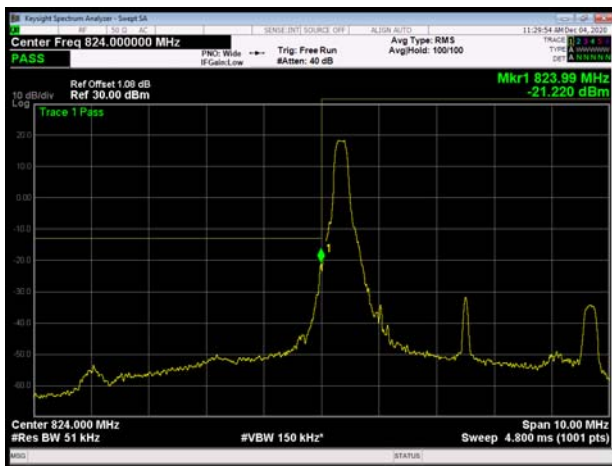
LTE Band 5 QPSK 3MHz CH-Low 100%RB



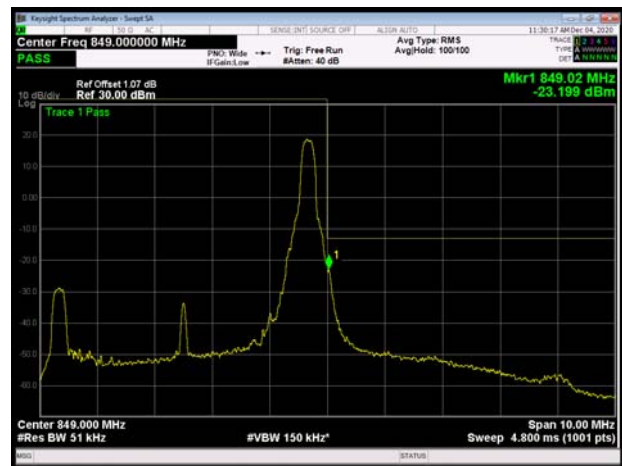
LTE Band 5 QPSK 3MHz CH-High 100%RB



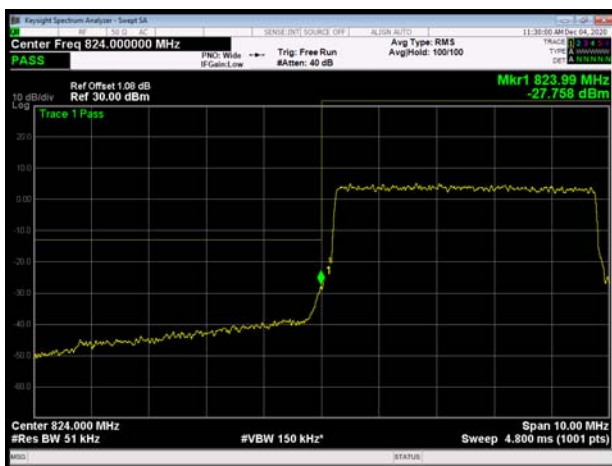
LTE Band 5 QPSK 5MHz CH-Low 1RB



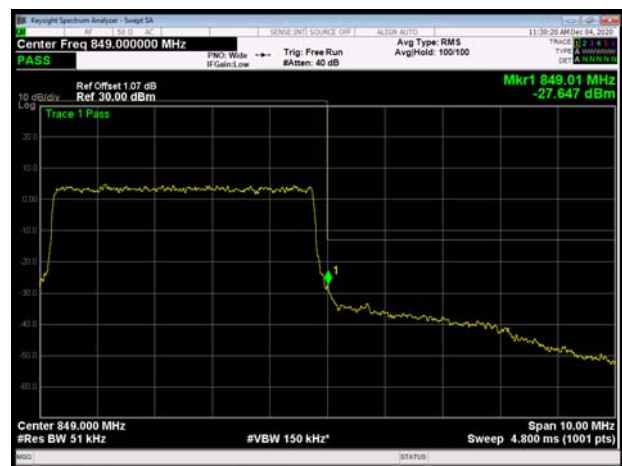
LTE Band 5 QPSK 5MHz CH-High 1RB



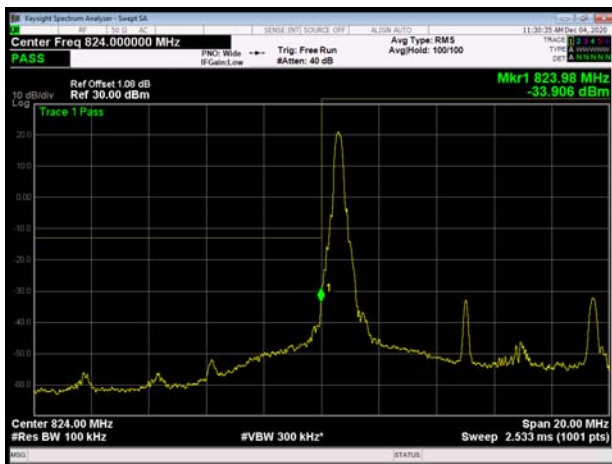
LTE Band 5 QPSK 5MHz CH-Low 100%RB



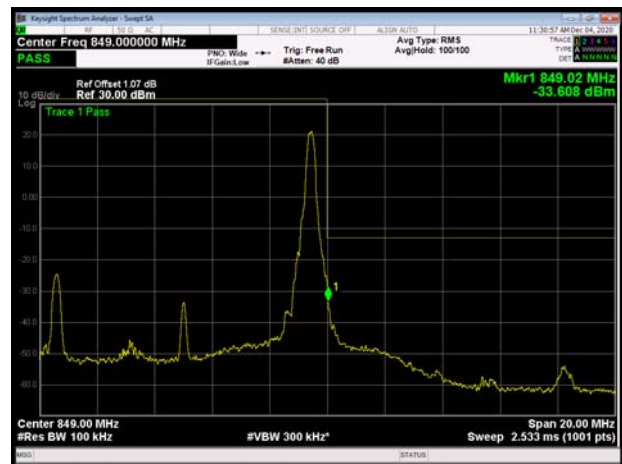
LTE Band 5 QPSK 5MHz CH-High 100%RB



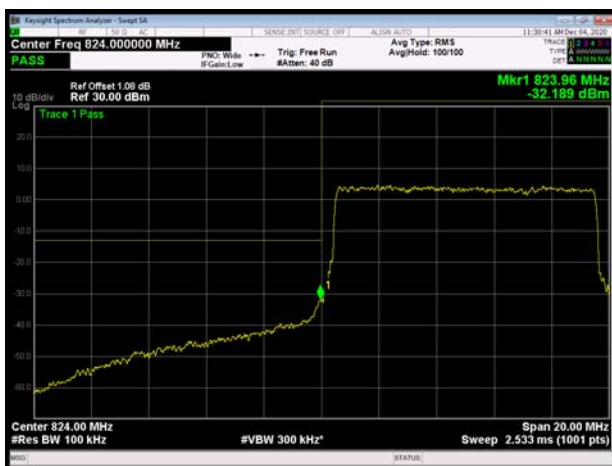
LTE Band 5 QPSK 10MHz CH-Low 1RB



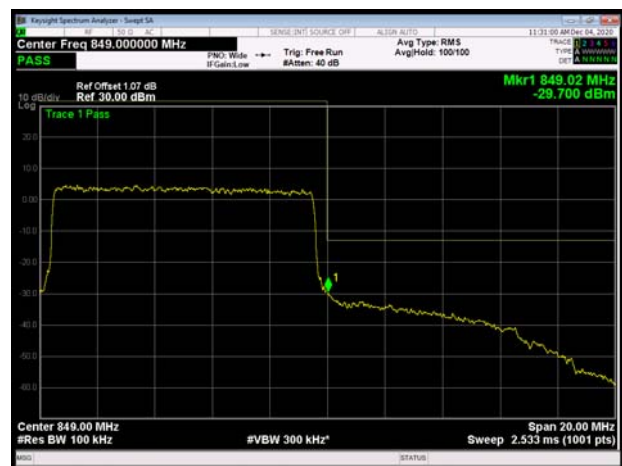
LTE Band 5 QPSK 10MHz CH-High 1RB



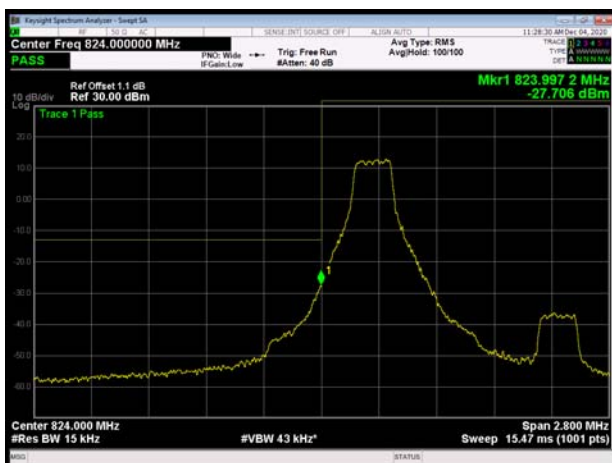
LTE Band 5 QPSK 10MHz CH-Low 100%RB



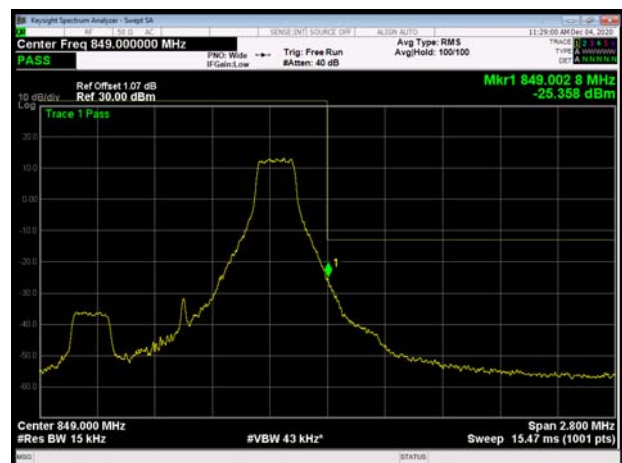
LTE Band 5 QPSK 10MHz CH-High 100%RB



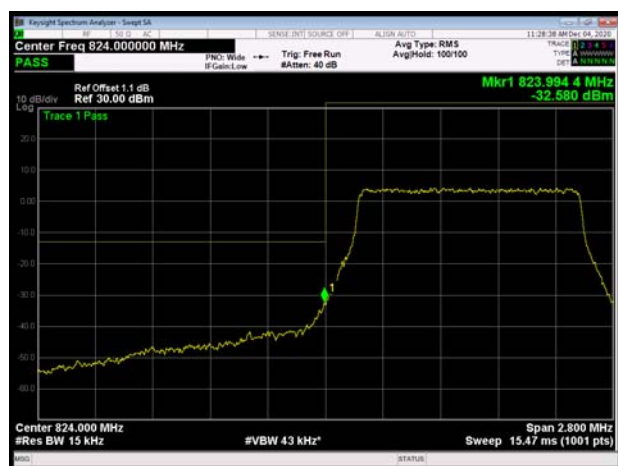
LTE Band 5 16QAM 1.4MHz CH-Low 1RB



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



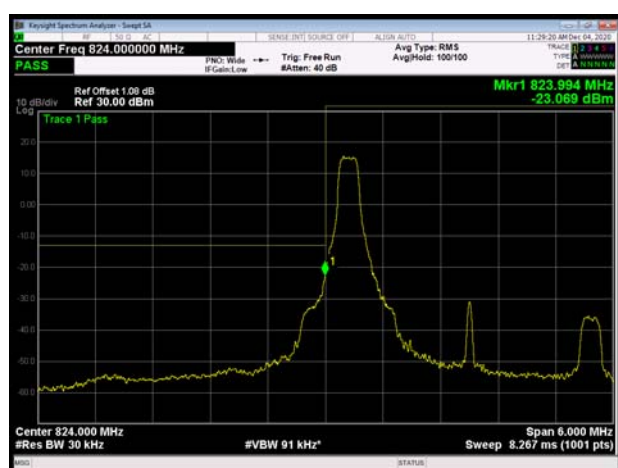
LTE Band 5 16QAM 1.4MHz CH-Low 100%RB



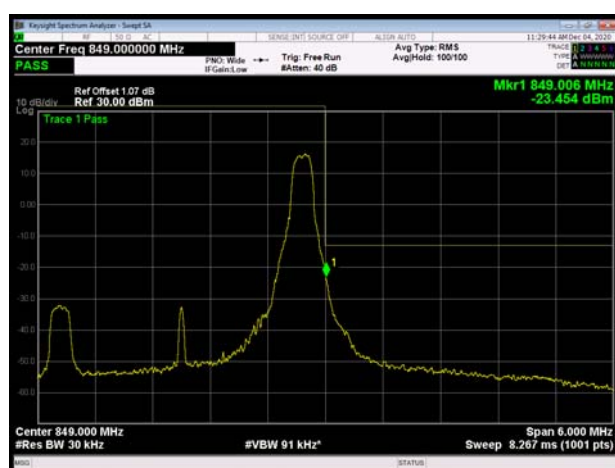
LTE Band 5 16QAM 1.4MHz CH-High 100%RB



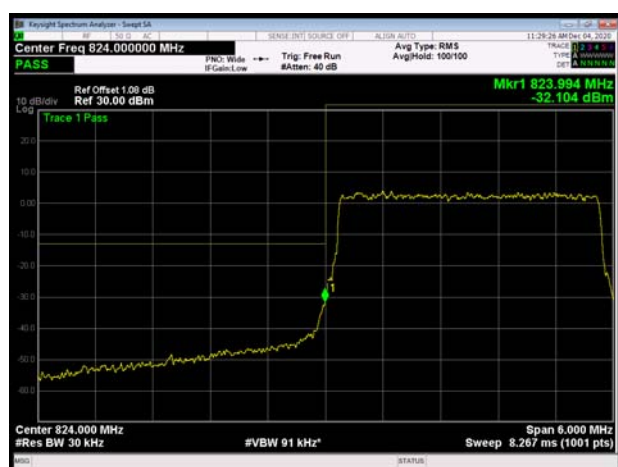
LTE Band 5 16QAM 3MHz CH-Low 1RB



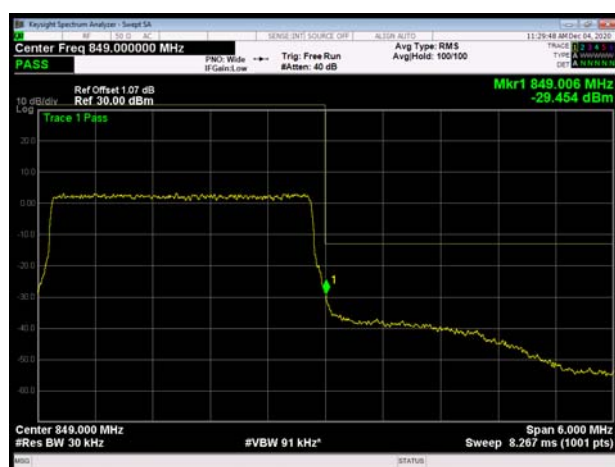
LTE Band 5 16QAM 3MHz CH-High 1RB



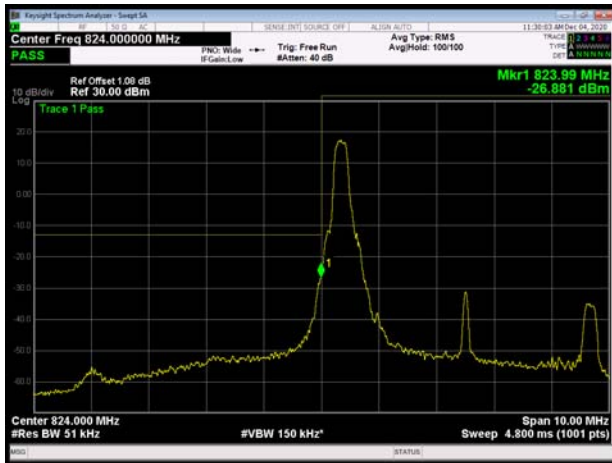
LTE Band 5 16QAM 3MHz CH-Low 100%RB



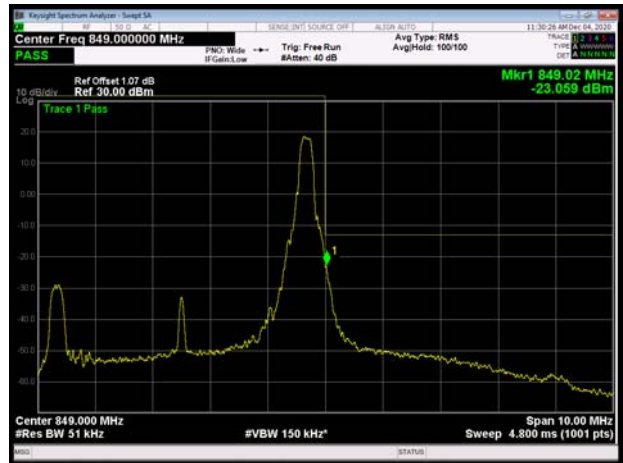
LTE Band 5 16QAM 3MHz CH-High 100%RB



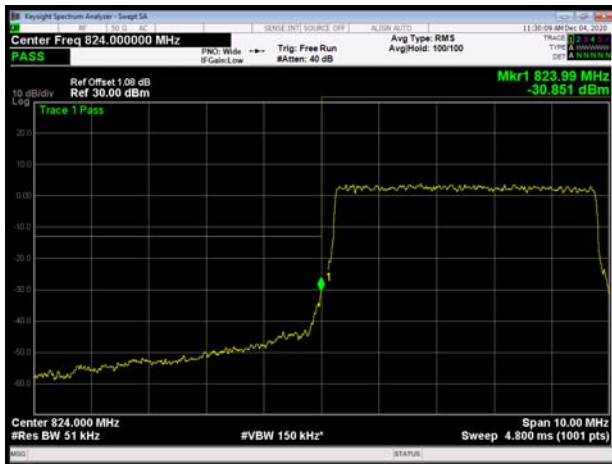
LTE Band 5 16QAM 5MHz CH-Low 1RB



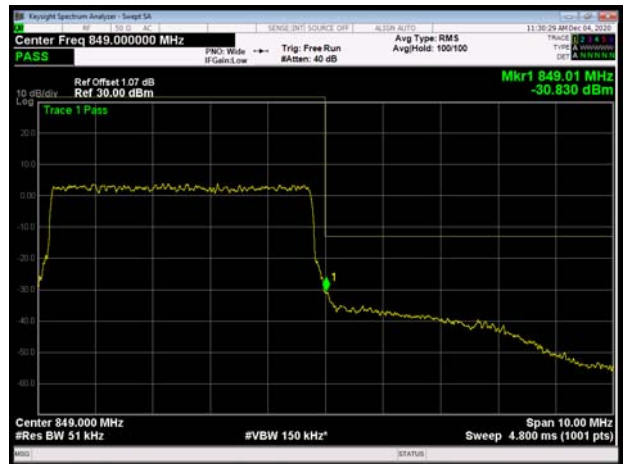
LTE Band 5 16QAM 5MHz CH-High 1RB



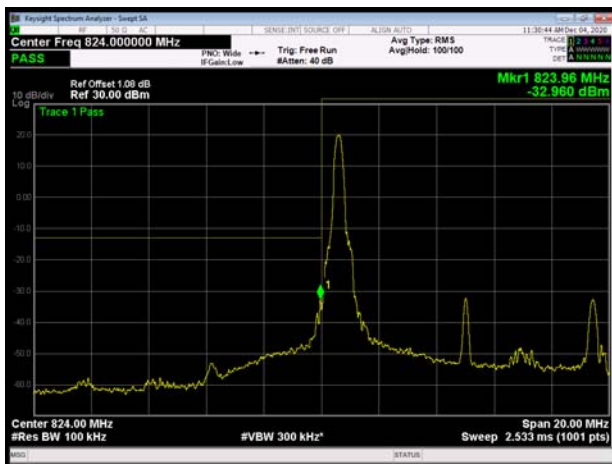
LTE Band 5 16QAM 5MHz CH-Low 100%RB



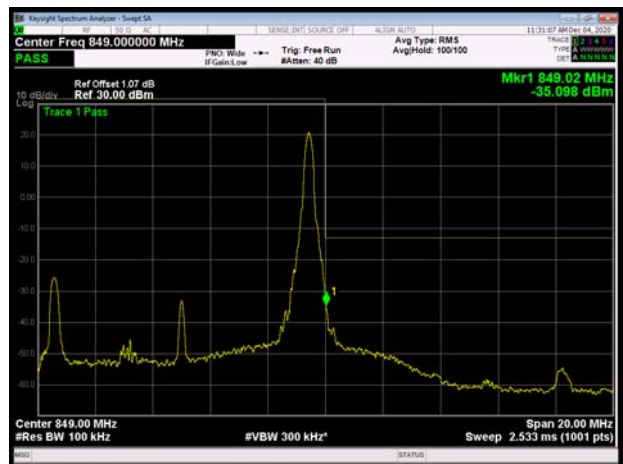
LTE Band 5 16QAM 5MHz CH-High 100%RB



LTE Band 5 16QAM 10MHz CH-Low 1RB

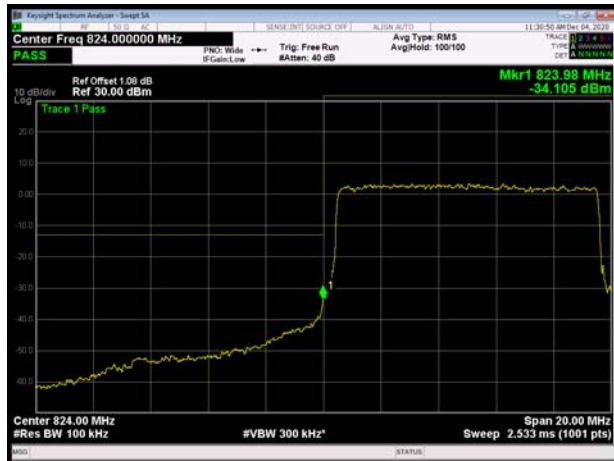


LTE Band 5 16QAM 10MHz CH-High 1RB





LTE Band 5 16QAM 10MHz CH-Low 100%RB



LTE Band 5 16QAM 10MHz CH-High 100%RB



5.4. Radiates Spurious Emission

Ambient condition

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

Method of Measurement

1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI 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 9kHz-150kHz , 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:
$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$

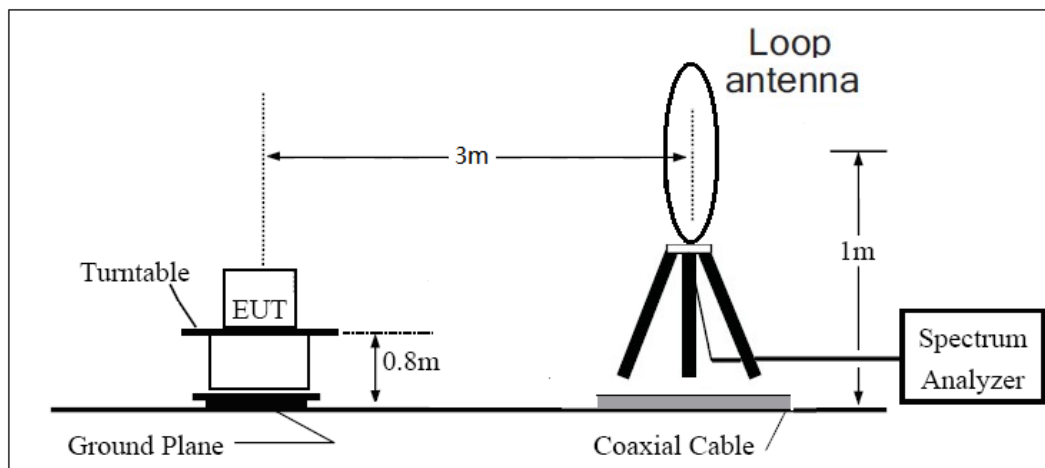
The measurement results are amend as described below:
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi)

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

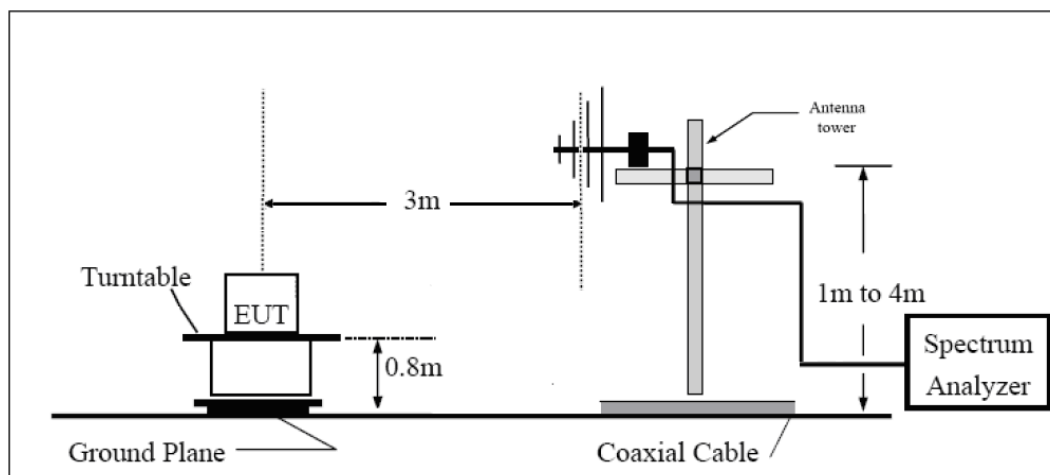
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

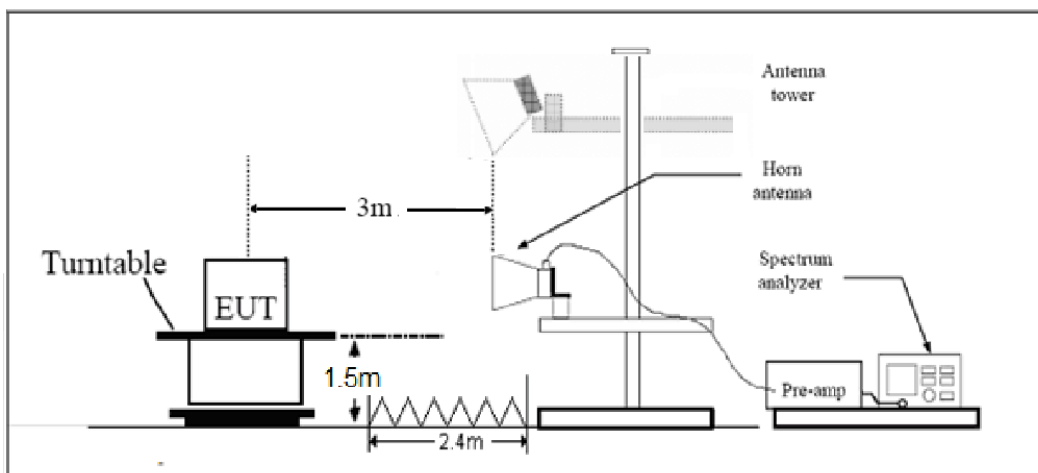
9KHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz





Note: Area side:2.4mX3.6m

Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.”

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

Measurement Uncertainty

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

**Test Result**

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

EC25-T:

LTE Band 5 1.4MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-47.93	2.00	10.75	Horizontal	-41.33	-13.00	28.33	225
3	2509.5	-50.14	2.51	11.05	Horizontal	-43.75	-13.00	30.75	45
4	3346.0	-55.32	4.20	11.15	Horizontal	-50.52	-13.00	37.52	45
5	4182.5	-60.15	5.20	11.15	Horizontal	-56.35	-13.00	43.35	270
6	5019.0	-55.07	5.50	11.95	Horizontal	-50.77	-13.00	37.77	180
7	5855.5	-59.89	5.70	13.55	Horizontal	-54.19	-13.00	41.19	90
8	6692.0	-57.67	6.30	13.75	Horizontal	-52.37	-13.00	39.37	315
9	7528.5	-54.36	6.80	13.85	Horizontal	-49.46	-13.00	36.46	45
10	8365.0	-54.29	6.90	14.25	Horizontal	-49.09	-13.00	36.09	0

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

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

LTE Band 5 5MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-54.08	2.00	10.75	Horizontal	-47.48	-13.00	34.48	0
3	2509.5	-50.84	2.51	11.05	Horizontal	-44.45	-13.00	31.45	315
4	3337.5	-55.32	4.20	11.15	Horizontal	-50.52	-13.00	37.52	45
5	4171.9	-60.49	5.20	11.15	Horizontal	-56.69	-13.00	43.69	270
6	5006.3	-55.27	5.50	11.95	Horizontal	-50.97	-13.00	37.97	180
7	5840.6	-60.81	5.70	13.55	Horizontal	-55.11	-13.00	42.11	0
8	6675.0	-58.17	6.30	13.75	Horizontal	-52.87	-13.00	39.87	45
9	7509.4	-54.54	6.80	13.85	Horizontal	-49.64	-13.00	36.64	315
10	8343.8	-54.83	6.90	14.25	Horizontal	-49.63	-13.00	36.63	0

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

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



LTE Band 5 10MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-55.37	2.00	10.75	Horizontal	-48.77	-13.00	35.77	0
3	2509.5	-51.67	2.51	11.05	Horizontal	-45.28	-13.00	32.28	180
4	3346.0	-56.56	4.20	11.15	Horizontal	-51.76	-13.00	38.76	180
5	4182.5	-59.66	5.20	11.15	Horizontal	-55.86	-13.00	42.86	45
6	5019.0	-58.17	5.50	11.95	Horizontal	-53.87	-13.00	40.87	270
7	5855.5	-61.18	5.70	13.55	Horizontal	-55.48	-13.00	42.48	180
8	6692.0	-58.77	6.30	13.75	Horizontal	-53.47	-13.00	40.47	0
9	7528.5	-55.59	6.80	13.85	Horizontal	-50.69	-13.00	37.69	45
10	8365.0	-55.12	6.90	14.25	Horizontal	-49.92	-13.00	36.92	315

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

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

**EC25-T MINIPCIE:**

LTE Band 5 1.4MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-38.83	2.00	10.75	Horizontal	-32.23	-13.00	19.23	45
3	2509.5	-31.21	2.51	11.05	Horizontal	-24.82	-13.00	11.82	0
4	3346.0	-51.79	4.20	11.15	Horizontal	-46.99	-13.00	33.99	0
5	4182.5	-60.76	5.20	11.15	Horizontal	-56.96	-13.00	43.96	45
6	5019.0	-53.75	5.50	11.95	Horizontal	-49.45	-13.00	36.45	270
7	5855.5	-59.67	5.70	13.55	Horizontal	-53.97	-13.00	40.97	180
8	6692.0	-56.84	6.30	13.75	Horizontal	-51.54	-13.00	38.54	0
9	7528.5	-55.25	6.80	13.85	Horizontal	-50.35	-13.00	37.35	45
10	8365.0	-54.60	6.90	14.25	Horizontal	-49.40	-13.00	36.40	315

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

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

LTE Band 5 5MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-38.76	2.00	10.75	Horizontal	-32.16	-13.00	19.16	225
3	2509.5	-32.06	2.51	11.05	Horizontal	-25.67	-13.00	12.67	315
4	3337.5	-51.49	4.20	11.15	Horizontal	-46.69	-13.00	33.69	0
5	4171.9	-57.69	5.20	11.15	Horizontal	-53.89	-13.00	40.89	45
6	5006.3	-53.92	5.50	11.95	Horizontal	-49.62	-13.00	36.62	315
7	5840.6	-61.68	5.70	13.55	Horizontal	-55.98	-13.00	42.98	45
8	6675.0	-56.72	6.30	13.75	Horizontal	-51.42	-13.00	38.42	270
9	7509.4	-55.50	6.80	13.85	Horizontal	-50.60	-13.00	37.60	180
10	8343.8	-53.86	6.90	14.25	Horizontal	-48.66	-13.00	35.66	0

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

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



LTE Band 5 10MHz CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-38.10	2.00	10.75	Horizontal	-31.50	-13.00	18.50	0
3	2509.5	-31.39	2.51	11.05	Horizontal	-25.00	-13.00	12.00	45
4	3346.0	-53.26	4.20	11.15	Horizontal	-48.46	-13.00	35.46	45
5	4182.5	-59.72	5.20	11.15	Horizontal	-55.92	-13.00	42.92	0
6	5019.0	-56.17	5.50	11.95	Horizontal	-51.87	-13.00	38.87	270
7	5855.5	-59.22	5.70	13.55	Horizontal	-53.52	-13.00	40.52	180
8	6692.0	-57.01	6.30	13.75	Horizontal	-51.71	-13.00	38.71	0
9	7528.5	-54.55	6.80	13.85	Horizontal	-49.65	-13.00	36.65	45
10	8365.0	-54.68	6.90	14.25	Horizontal	-49.48	-13.00	36.48	315

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

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

6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	113824	2020-05-18	2021-05-17
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Key sight	N9010A	MY50210259	2020-05-18	2021-05-17
Universal Radio Communication Tester	Key sight	E5515C	MY48367192	2020-05-27	2021-05-26
Signal Analyzer	R&S	FSV30	100815	2019-12-15	2020-12-14
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2020-04-02	2023-04-01
TRILOG Broadband Antenna	SCHWARZBECK	VULB 9163	391	2019-12-16	2021-12-15
Horn Antenna	R&S	HF907	102723	2018-08-11	2021-08-10
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2021-06-19
Signal generator	R&S	SMB 100A	102594	2020-05-18	2021-05-17
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
Preamplifier	R&S	SCU18	102327	2020-05-18	2021-05-17
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2020-05-18	2021-05-17
RF Cable	Agilent	SMA 15cm	0001	2020-06-12	2020-12-11
Software	R&S	EMC32	9.26.0	/	/



ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.



ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.

ANNEX C: Statement of Product Change

Quectel Wireless Solutions Co., Ltd

Statement

We Quectel Wireless Solutions Co., Ltd declare the following models.

Product Name: LTE Module

Model Number: EC25-AF, EC25-AF MINIPCIE

Variant Model: EC25-T, EC25-T MINIPCIE

Hardware Version: R1.0

Module	Category	Supported Band
EC25-AF EC25-AF MINIPCIE	CAT4	WCDMA: B2/B4/B5 LTE: B2/B4/B5/B12/B13/B14/B66/B71
EC25-T EC25-T MINIPCIE	CAT4	LTE: B2/B4/B5/B12/B66/B71

EC25-AF&EC25-AF MINIPCIE and EC25-T&EC25-T MINIPCIE share the same HW design, EC25-T&EC25-T MINIPCIE reduce B13and B14 and GPSIC on the basis of EC25-AF&EC25-AF MINIPCIE. The details are shown as following pictures and table.





Quectel Wireless Solutions Co., Ltd

Designator	EC25-AF EC25-AF MINIPCIE (Part Description)	EC25-T EC25-T MINIPCIE (Part Description)
U1102	IC RF Rx filter UNBalance B14 15dBm 1.1x0.9mm H0.5mm RO	NM
U0906	IC RF DPX LTE UNBalance B14 1.8x1.4mm H0.475mm RO	NM
U0908 U0909	IC RF TX LPF 699-960MHz 1.6x0.8mm H0.6mm RO	NM
U0805	IC RF GNSS RECEIVER WGR7640 17- VLNSP 0.4pitch 2.07x1.51mm H0.63mm RO	NM
U0806	IC RF RX filter GPS/ GLONASS /BEIDOU Balance 13dBm 1.1x0.9mm H0.5mm RO	NM
U0907	IC RF DPX LTE Unbalance B13 1.8x1.4mm H0.5mm RO	NM

EC25-T & EC25-T MINIPCIE also disabled WCDMA bands through SW.

These changes will not impact RF performance for other original LTE bands.

Your assistance on this matter is highly appreciated.

Sincerely,

Name: Jean Hu

Title: Certification Section

ANNEX D: Statement of Model Difference

Quectel Wireless Solutions Co., Ltd

Statement

We Quectel Wireless Solutions Co., Ltd declare the following models as series application.

Name: LTE Module

Parent Model: EC25-T

Variant Model: EC25-T MINIPCIE

EC25-T and EC25-T MINIPCIE are same LTE modules. They have the same frequency and use the same chipset and share the same software & hardware design.

EC25-T MINIPCIE makes up of EC25-T module and PCIe carrier board. The carrier board switches EC25-T module to follow PCI Express Mini Card standard connector protocol. No any other internal changes in EC25-T module. We hereby state that two models are identical in interior structure and components, and just connector interface is different for the marketing requirement.

Your assistance on this matter is highly appreciated.

Sincerely,

Name: Jean Hu

Title: Certification Section

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