



RF TEST REPORT

Applicant Quectel Wireless Solutions Co., Ltd.
FCC ID XMR2020AG525RGL
Product LTE Module
Brand Quectel
Model AG525R-GL
Report No. R2008A0573-R1V1
Issue Date November 13, 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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Version	Revision description	Issue Date
Rev.0	/	October 26, 2020
Rev.1	Update description in Chapter 5.1. Update data in Chapter 5.4. Update data about Chapter 5.1 of CA_5B.	November 13, 2020
Note This revised report (Report No. R2008A0573-R1V1) supersedes and replaces the previously issued report (Report No. R2008A0573-R1). Please discard or destroy the previously issued report and dispose of it accordingly.		



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	Peak-to-Average Power Ratio	22.913(d)/ KDB 971168 D01(5.7)	PASS
5	Frequency Stability	2.1055 / 22.355	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 / 22.917(a)	PASS
7	Radiates Spurious Emission	2.1053 / 22.917 (a)	PASS
Date of Testing: August 24, 2020~ October 29, 2020 and November 10, 2020 ~ November 11, 2020			
Date of Sample Received: August 24, 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.			



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
Post code: 201201
Country: P. R. China
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Website: <http://www.ta-shanghai.com>
E-mail: xukai@ta-shanghai.com

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	AG525R-GL		
IMEI	864228040006472		
Hardware Version	R1.0		
Software Version	AG525RGLAAR01A05M4G		
Power Supply	External Power Supply		
Antenna Type	External Antenna		
Antenna Gain	Frequency(MHz)	Gain (dBi)	
	830	2.71	
	840	2.72	
	850	3.10	
Test Mode(s)	WCDMA Band V;LTE Band 5; CA_5B;		
Test Modulation	(WCDMA) BPSK, QPSK,16QAM; (LTE)QPSK 16QAM 64QAM;		
HSDPA UE Category	24		
HSUPA UE Category	6		
DC-HSDPA UE Category	24		
HSPA+ UE Category	6		
LTE Category	12		
Maximum E.R.P.	WCDMA Band V:	24.19dBm	
	LTE Band 5:	24.13dBm	
	CA_5B:	24.78dBm	
Rated Power Supply Voltage	3.8V		
Extreme Voltage	Minimum: 3.3V Maximum: 4.3V		
Extreme Temperature	Lowest: -30°C Highest: +50°C		
Operating Voltage	Minimum: 3.3V Maximum: 4.3V		
Operating Temperature	Lowest: -40°C Highest: +85°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	WCDMA Band V	824 ~ 849	869 ~ 894



	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.			



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 (Z axis, vertical 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 WCDMA/LTE is set based on the maximum RF Output Power.

Test modes are chosen to be reported as the worst case configuration below:

Test items	Modes/Modulation
	WCDMA Band V
RF Power Output and Effective Radiated power	RMC HSDPA/HSUPA DC-HSDPA/HSPA+
Occupied Bandwidth	RMC
Band Edge Compliance	RMC
Peak-to-Average Power Ratio	RMC
Frequency Stability	RMC
Spurious Emissions at Antenna Terminals	RMC
Radiates Spurious Emission	RMC

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	○	○	○	○	○	○	○	○	○	○	○	○
Occupied Bandwidth	○	○	○	○	○	○	-	-	○	-	○	-
Band Edge Compliance	○	○	○	○	○	○	○	-	○	○	-	○
Peak-to-Average Power Ratio	○	○	○	○	○	○	-	-	○	○	○	○
Frequency Stability	○	○	○	○	○	○	○	○	○	○	○	○
Spurious Emissions at	○	○	○	○	○	-	○	-	-	○	○	○



Antenna Terminals												
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.

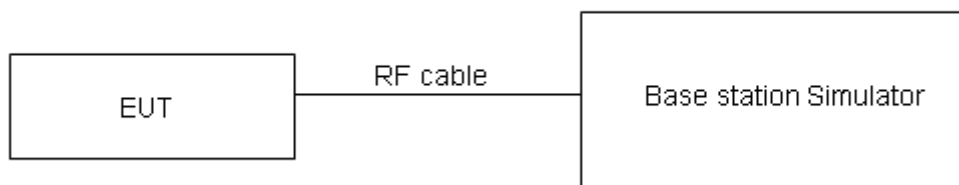
ERP can then be calculated as follows:

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

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

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

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	≤ 7 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 $k = 2$, $U = 0.4$ dB for RF power output, $k = 2$, $U = 1.19$ dB for ERP .

Test Results

WCDMA Band V		Maximum Output Power (dBm)			ERP (dBm)		
		Channel 4132	Channel 4183	Channel 4233	Channel 4132	Channel 4183	Channel 4233
		826.4 (MHz)	836.6 (MHz)	846.6 (MHz)	826.4 (MHz)	836.6 (MHz)	846.6 (MHz)
RMC		23.11	23.20	23.24	23.67	23.77	24.19
HSDPA	Sub - Test 1	22.57	22.62	22.68	23.13	23.19	23.63
	Sub - Test 2	22.56	22.64	22.65	23.12	23.21	23.60
	Sub - Test 3	22.03	22.14	22.17	22.59	22.71	23.12
	Sub - Test 4	22.04	22.15	22.15	22.60	22.72	23.10
HSUPA	Sub - Test 1	22.53	22.61	22.63	23.09	23.18	23.58
	Sub - Test 2	21.52	21.59	21.62	22.08	22.16	22.57
	Sub - Test 3	21.99	22.07	22.11	22.55	22.64	23.06
	Sub - Test 4	21.45	21.56	21.59	22.01	22.13	22.54
	Sub - Test 5	22.46	22.54	22.57	23.02	23.11	23.52
DC-HSDPA	Sub - Test 1	22.45	22.56	22.58	23.01	23.13	23.53
	Sub - Test 2	22.44	22.55	22.57	23.00	23.12	23.52
	Sub - Test 3	22.02	22.04	22.08	22.58	22.61	23.03
	Sub - Test 4	22.01	22.03	22.07	22.57	22.60	23.02
HSPA+	16QAM	22.00	22.11	22.14	22.56	22.68	23.09



Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	ERP (dBm)	Verdict
LTE Band5	1.4	20407	1	#0	QPSK	23.06	23.62	PASS
LTE Band5	1.4	20407	1	#Mid	QPSK	23.20	23.76	PASS
LTE Band5	1.4	20407	1	#Max	QPSK	23.11	23.67	PASS
LTE Band5	1.4	20407	3	#0	QPSK	23.02	23.58	PASS
LTE Band5	1.4	20407	3	#Mid	QPSK	23.03	23.59	PASS
LTE Band5	1.4	20407	3	#Max	QPSK	23.10	23.66	PASS
LTE Band5	1.4	20407	6	#0	QPSK	22.13	22.69	PASS
LTE Band5	1.4	20407	1	#0	QAM16	21.98	22.54	PASS
LTE Band5	1.4	20407	1	#Mid	QAM16	22.12	22.68	PASS
LTE Band5	1.4	20407	1	#Max	QAM16	22.08	22.64	PASS
LTE Band5	1.4	20407	3	#0	QAM16	22.12	22.68	PASS
LTE Band5	1.4	20407	3	#Mid	QAM16	22.11	22.67	PASS
LTE Band5	1.4	20407	3	#Max	QAM16	22.21	22.77	PASS
LTE Band5	1.4	20407	6	#0	QAM16	21.18	21.74	PASS
LTE Band5	1.4	20407	1	#0	QAM64	21.13	21.69	PASS
LTE Band5	1.4	20407	1	#Mid	QAM64	21.00	21.56	PASS
LTE Band5	1.4	20407	1	#Max	QAM64	21.19	21.75	PASS
LTE Band5	1.4	20407	3	#0	QAM64	19.84	20.40	PASS
LTE Band5	1.4	20407	3	#Mid	QAM64	19.74	20.30	PASS
LTE Band5	1.4	20407	3	#Max	QAM64	19.75	20.31	PASS
LTE Band5	1.4	20407	6	#0	QAM64	19.84	20.40	PASS
LTE Band5	1.4	20525	1	#0	QPSK	22.98	23.55	PASS
LTE Band5	1.4	20525	1	#Mid	QPSK	23.19	23.76	PASS
LTE Band5	1.4	20525	1	#Max	QPSK	23.10	23.67	PASS
LTE Band5	1.4	20525	3	#0	QPSK	22.99	23.56	PASS
LTE Band5	1.4	20525	3	#Mid	QPSK	23.00	23.57	PASS
LTE Band5	1.4	20525	3	#Max	QPSK	23.06	23.63	PASS
LTE Band5	1.4	20525	6	#0	QPSK	22.10	22.67	PASS
LTE Band5	1.4	20525	1	#0	QAM16	22.07	22.64	PASS
LTE Band5	1.4	20525	1	#Mid	QAM16	22.28	22.85	PASS
LTE Band5	1.4	20525	1	#Max	QAM16	22.20	22.77	PASS
LTE Band5	1.4	20525	3	#0	QAM16	22.27	22.84	PASS
LTE Band5	1.4	20525	3	#Mid	QAM16	22.29	22.86	PASS
LTE Band5	1.4	20525	3	#Max	QAM16	22.35	22.92	PASS
LTE Band5	1.4	20525	6	#0	QAM16	21.18	21.75	PASS
LTE Band5	1.4	20525	1	#0	QAM64	21.19	21.76	PASS
LTE Band5	1.4	20525	1	#Mid	QAM64	21.00	21.57	PASS
LTE Band5	1.4	20525	1	#Max	QAM64	21.04	21.61	PASS
LTE Band5	1.4	20525	3	#0	QAM64	19.84	20.41	PASS
LTE Band5	1.4	20525	3	#Mid	QAM64	19.80	20.37	PASS



LTE Band5	1.4	20525	3	#Max	QAM64	19.76	20.33	PASS
LTE Band5	1.4	20525	6	#0	QAM64	19.84	20.41	PASS
LTE Band5	1.4	20643	1	#0	QPSK	22.88	23.83	PASS
LTE Band5	1.4	20643	1	#Mid	QPSK	23.00	23.95	PASS
LTE Band5	1.4	20643	1	#Max	QPSK	22.94	23.89	PASS
LTE Band5	1.4	20643	3	#0	QPSK	22.94	23.89	PASS
LTE Band5	1.4	20643	3	#Mid	QPSK	22.94	23.89	PASS
LTE Band5	1.4	20643	3	#Max	QPSK	22.95	23.90	PASS
LTE Band5	1.4	20643	6	#0	QPSK	22.07	23.02	PASS
LTE Band5	1.4	20643	1	#0	QAM16	22.20	23.15	PASS
LTE Band5	1.4	20643	1	#Mid	QAM16	22.25	23.20	PASS
LTE Band5	1.4	20643	1	#Max	QAM16	22.24	23.19	PASS
LTE Band5	1.4	20643	3	#0	QAM16	22.07	23.02	PASS
LTE Band5	1.4	20643	3	#Mid	QAM16	22.07	23.02	PASS
LTE Band5	1.4	20643	3	#Max	QAM16	22.12	23.07	PASS
LTE Band5	1.4	20643	6	#0	QAM16	21.04	21.99	PASS
LTE Band5	1.4	20643	1	#0	QAM64	21.12	22.07	PASS
LTE Band5	1.4	20643	1	#Mid	QAM64	20.87	21.82	PASS
LTE Band5	1.4	20643	1	#Max	QAM64	20.84	21.79	PASS
LTE Band5	1.4	20643	3	#0	QAM64	19.82	20.77	PASS
LTE Band5	1.4	20643	3	#Mid	QAM64	19.72	20.67	PASS
LTE Band5	1.4	20643	3	#Max	QAM64	19.65	20.60	PASS
LTE Band5	1.4	20643	6	#0	QAM64	19.79	20.74	PASS
LTE Band5	3	20415	1	#0	QPSK	22.96	23.52	PASS
LTE Band5	3	20415	1	#Mid	QPSK	23.14	23.70	PASS
LTE Band5	3	20415	1	#Max	QPSK	23.08	23.64	PASS
LTE Band5	3	20415	8	#0	QPSK	22.16	22.72	PASS
LTE Band5	3	20415	8	#Mid	QPSK	22.16	22.72	PASS
LTE Band5	3	20415	8	#Max	QPSK	22.28	22.84	PASS
LTE Band5	3	20415	15	#0	QPSK	22.22	22.78	PASS
LTE Band5	3	20415	1	#0	QAM16	22.38	22.94	PASS
LTE Band5	3	20415	1	#Mid	QAM16	22.59	23.15	PASS
LTE Band5	3	20415	1	#Max	QAM16	22.50	23.06	PASS
LTE Band5	3	20415	8	#0	QAM16	21.20	21.76	PASS
LTE Band5	3	20415	8	#Mid	QAM16	21.20	21.76	PASS
LTE Band5	3	20415	8	#Max	QAM16	21.31	21.87	PASS
LTE Band5	3	20415	15	#0	QAM16	21.22	21.78	PASS
LTE Band5	3	20415	1	#0	QAM64	21.15	21.71	PASS
LTE Band5	3	20415	1	#Mid	QAM64	21.03	21.59	PASS
LTE Band5	3	20415	1	#Max	QAM64	21.22	21.78	PASS
LTE Band5	3	20415	8	#0	QAM64	19.92	20.48	PASS
LTE Band5	3	20415	8	#Mid	QAM64	19.84	20.40	PASS
LTE Band5	3	20415	8	#Max	QAM64	19.83	20.39	PASS



LTE Band5	3	20415	15	#0	QAM64	19.87	20.43	PASS
LTE Band5	3	20525	1	#0	QPSK	22.96	23.53	PASS
LTE Band5	3	20525	1	#Mid	QPSK	23.17	23.74	PASS
LTE Band5	3	20525	1	#Max	QPSK	23.06	23.63	PASS
LTE Band5	3	20525	8	#0	QPSK	22.14	22.71	PASS
LTE Band5	3	20525	8	#Mid	QPSK	22.11	22.68	PASS
LTE Band5	3	20525	8	#Max	QPSK	22.25	22.82	PASS
LTE Band5	3	20525	15	#0	QPSK	22.21	22.78	PASS
LTE Band5	3	20525	1	#0	QAM16	22.25	22.82	PASS
LTE Band5	3	20525	1	#Mid	QAM16	22.45	23.02	PASS
LTE Band5	3	20525	1	#Max	QAM16	22.34	22.91	PASS
LTE Band5	3	20525	8	#0	QAM16	21.13	21.70	PASS
LTE Band5	3	20525	8	#Mid	QAM16	21.13	21.70	PASS
LTE Band5	3	20525	8	#Max	QAM16	21.30	21.87	PASS
LTE Band5	3	20525	15	#0	QAM16	21.14	21.71	PASS
LTE Band5	3	20525	1	#0	QAM64	21.23	21.80	PASS
LTE Band5	3	20525	1	#Mid	QAM64	21.05	21.62	PASS
LTE Band5	3	20525	1	#Max	QAM64	21.09	21.66	PASS
LTE Band5	3	20525	8	#0	QAM64	19.94	20.51	PASS
LTE Band5	3	20525	8	#Mid	QAM64	19.88	20.45	PASS
LTE Band5	3	20525	8	#Max	QAM64	19.85	20.42	PASS
LTE Band5	3	20525	15	#0	QAM64	19.88	20.45	PASS
LTE Band5	3	20635	1	#0	QPSK	22.98	23.93	PASS
LTE Band5	3	20635	1	#Mid	QPSK	23.18	24.13	PASS
LTE Band5	3	20635	1	#Max	QPSK	23.13	24.08	PASS
LTE Band5	3	20635	8	#0	QPSK	22.09	23.04	PASS
LTE Band5	3	20635	8	#Mid	QPSK	22.09	23.04	PASS
LTE Band5	3	20635	8	#Max	QPSK	22.17	23.12	PASS
LTE Band5	3	20635	15	#0	QPSK	22.12	23.07	PASS
LTE Band5	3	20635	1	#0	QAM16	21.96	22.91	PASS
LTE Band5	3	20635	1	#Mid	QAM16	22.09	23.04	PASS
LTE Band5	3	20635	1	#Max	QAM16	22.08	23.03	PASS
LTE Band5	3	20635	8	#0	QAM16	21.12	22.07	PASS
LTE Band5	3	20635	8	#Mid	QAM16	21.12	22.07	PASS
LTE Band5	3	20635	8	#Max	QAM16	21.22	22.17	PASS
LTE Band5	3	20635	15	#0	QAM16	21.13	22.08	PASS
LTE Band5	3	20635	1	#0	QAM64	21.15	22.10	PASS
LTE Band5	3	20635	1	#Mid	QAM64	20.91	21.86	PASS
LTE Band5	3	20635	1	#Max	QAM64	20.88	21.83	PASS
LTE Band5	3	20635	8	#0	QAM64	19.93	20.88	PASS
LTE Band5	3	20635	8	#Mid	QAM64	19.82	20.77	PASS
LTE Band5	3	20635	8	#Max	QAM64	19.73	20.68	PASS
LTE Band5	3	20635	15	#0	QAM64	19.82	20.77	PASS



LTE Band5	5	20425	1	#0	QPSK	23.06	23.62	PASS
LTE Band5	5	20425	1	#Mid	QPSK	23.19	23.75	PASS
LTE Band5	5	20425	1	#Max	QPSK	23.09	23.65	PASS
LTE Band5	5	20425	12	#0	QPSK	22.17	22.73	PASS
LTE Band5	5	20425	12	#Mid	QPSK	22.17	22.73	PASS
LTE Band5	5	20425	12	#Max	QPSK	22.26	22.82	PASS
LTE Band5	5	20425	25	#0	QPSK	22.23	22.79	PASS
LTE Band5	5	20425	1	#0	QAM16	22.46	23.02	PASS
LTE Band5	5	20425	1	#Mid	QAM16	22.60	23.16	PASS
LTE Band5	5	20425	1	#Max	QAM16	22.51	23.07	PASS
LTE Band5	5	20425	12	#0	QAM16	21.18	21.74	PASS
LTE Band5	5	20425	12	#Mid	QAM16	21.16	21.72	PASS
LTE Band5	5	20425	12	#Max	QAM16	21.28	21.84	PASS
LTE Band5	5	20425	25	#0	QAM16	21.29	21.85	PASS
LTE Band5	5	20425	1	#0	QAM64	21.19	21.75	PASS
LTE Band5	5	20425	1	#Mid	QAM64	21.10	21.66	PASS
LTE Band5	5	20425	1	#Max	QAM64	21.28	21.84	PASS
LTE Band5	5	20425	12	#0	QAM64	19.99	20.55	PASS
LTE Band5	5	20425	12	#Mid	QAM64	19.89	20.45	PASS
LTE Band5	5	20425	12	#Max	QAM64	19.90	20.46	PASS
LTE Band5	5	20425	25	#0	QAM64	19.95	20.51	PASS
LTE Band5	5	20525	1	#0	QPSK	23.07	23.64	PASS
LTE Band5	5	20525	1	#Mid	QPSK	23.18	23.75	PASS
LTE Band5	5	20525	1	#Max	QPSK	23.12	23.69	PASS
LTE Band5	5	20525	12	#0	QPSK	22.19	22.76	PASS
LTE Band5	5	20525	12	#Mid	QPSK	22.18	22.75	PASS
LTE Band5	5	20525	12	#Max	QPSK	22.25	22.82	PASS
LTE Band5	5	20525	25	#0	QPSK	22.24	22.81	PASS
LTE Band5	5	20525	1	#0	QAM16	22.36	22.93	PASS
LTE Band5	5	20525	1	#Mid	QAM16	22.47	23.04	PASS
LTE Band5	5	20525	1	#Max	QAM16	22.38	22.95	PASS
LTE Band5	5	20525	12	#0	QAM16	21.15	21.72	PASS
LTE Band5	5	20525	12	#Mid	QAM16	21.18	21.75	PASS
LTE Band5	5	20525	12	#Max	QAM16	21.25	21.82	PASS
LTE Band5	5	20525	25	#0	QAM16	21.22	21.79	PASS
LTE Band5	5	20525	1	#0	QAM64	21.35	21.92	PASS
LTE Band5	5	20525	1	#Mid	QAM64	21.10	21.67	PASS
LTE Band5	5	20525	1	#Max	QAM64	21.16	21.73	PASS
LTE Band5	5	20525	12	#0	QAM64	19.98	20.55	PASS
LTE Band5	5	20525	12	#Mid	QAM64	19.93	20.50	PASS
LTE Band5	5	20525	12	#Max	QAM64	19.95	20.52	PASS
LTE Band5	5	20525	25	#0	QAM64	19.97	20.54	PASS
LTE Band5	5	20625	1	#0	QPSK	22.95	23.90	PASS



LTE Band5	5	20625	1	#Mid	QPSK	23.10	24.05	PASS
LTE Band5	5	20625	1	#Max	QPSK	22.98	23.93	PASS
LTE Band5	5	20625	12	#0	QPSK	22.07	23.02	PASS
LTE Band5	5	20625	12	#Mid	QPSK	22.09	23.04	PASS
LTE Band5	5	20625	12	#Max	QPSK	22.20	23.15	PASS
LTE Band5	5	20625	25	#0	QPSK	22.11	23.06	PASS
LTE Band5	5	20625	1	#0	QAM16	22.36	23.31	PASS
LTE Band5	5	20625	1	#Mid	QAM16	22.48	23.43	PASS
LTE Band5	5	20625	1	#Max	QAM16	22.39	23.34	PASS
LTE Band5	5	20625	12	#0	QAM16	21.17	22.12	PASS
LTE Band5	5	20625	12	#Mid	QAM16	21.17	22.12	PASS
LTE Band5	5	20625	12	#Max	QAM16	21.23	22.18	PASS
LTE Band5	5	20625	25	#0	QAM16	21.16	22.11	PASS
LTE Band5	5	20625	1	#0	QAM64	21.20	22.15	PASS
LTE Band5	5	20625	1	#Mid	QAM64	20.98	21.93	PASS
LTE Band5	5	20625	1	#Max	QAM64	20.97	21.92	PASS
LTE Band5	5	20625	12	#0	QAM64	19.99	20.94	PASS
LTE Band5	5	20625	12	#Mid	QAM64	19.86	20.81	PASS
LTE Band5	5	20625	12	#Max	QAM64	19.73	20.68	PASS
LTE Band5	5	20625	25	#0	QAM64	19.83	20.78	PASS
LTE Band5	10	20450	1	#0	QPSK	23.06	23.62	PASS
LTE Band5	10	20450	1	#Mid	QPSK	22.87	23.43	PASS
LTE Band5	10	20450	1	#Max	QPSK	22.97	23.53	PASS
LTE Band5	10	20450	25	#0	QPSK	22.27	22.83	PASS
LTE Band5	10	20450	25	#Mid	QPSK	22.28	22.84	PASS
LTE Band5	10	20450	25	#Max	QPSK	22.18	22.74	PASS
LTE Band5	10	20450	50	#0	QPSK	22.23	22.79	PASS
LTE Band5	10	20450	1	#0	QAM16	22.41	22.97	PASS
LTE Band5	10	20450	1	#Mid	QAM16	22.30	22.86	PASS
LTE Band5	10	20450	1	#Max	QAM16	22.41	22.97	PASS
LTE Band5	10	20450	25	#0	QAM16	21.37	21.93	PASS
LTE Band5	10	20450	25	#Mid	QAM16	21.36	21.92	PASS
LTE Band5	10	20450	25	#Max	QAM16	21.28	21.84	PASS
LTE Band5	10	20450	50	#0	QAM16	21.25	21.81	PASS
LTE Band5	10	20450	1	#0	QAM64	21.10	21.66	PASS
LTE Band5	10	20450	1	#Mid	QAM64	21.01	21.57	PASS
LTE Band5	10	20450	1	#Max	QAM64	21.16	21.72	PASS
LTE Band5	10	20450	25	#0	QAM64	19.87	20.43	PASS
LTE Band5	10	20450	25	#Mid	QAM64	19.80	20.36	PASS
LTE Band5	10	20450	25	#Max	QAM64	19.77	20.33	PASS
LTE Band5	10	20450	50	#0	QAM64	19.88	20.44	PASS
LTE Band5	10	20525	1	#0	QPSK	23.16	23.73	PASS
LTE Band5	10	20525	1	#Mid	QPSK	22.91	23.48	PASS



LTE Band5	10	20525	1	#Max	QPSK	22.96	23.53	PASS
LTE Band5	10	20525	25	#0	QPSK	22.26	22.83	PASS
LTE Band5	10	20525	25	#Mid	QPSK	22.29	22.86	PASS
LTE Band5	10	20525	25	#Max	QPSK	22.16	22.73	PASS
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LTE Band5	10	20525	1	#0	QAM16	22.43	23.00	PASS
LTE Band5	10	20525	1	#Mid	QAM16	22.20	22.77	PASS
LTE Band5	10	20525	1	#Max	QAM16	22.19	22.76	PASS
LTE Band5	10	20525	25	#0	QAM16	21.29	21.86	PASS
LTE Band5	10	20525	25	#Mid	QAM16	21.27	21.84	PASS
LTE Band5	10	20525	25	#Max	QAM16	21.16	21.73	PASS
LTE Band5	10	20525	50	#0	QAM16	21.18	21.75	PASS
LTE Band5	10	20525	1	#0	QAM64	21.14	21.71	PASS
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LTE Band5	10	20525	1	#Max	QAM64	21.02	21.59	PASS
LTE Band5	10	20525	25	#0	QAM64	19.85	20.42	PASS
LTE Band5	10	20525	25	#Mid	QAM64	19.80	20.37	PASS
LTE Band5	10	20525	25	#Max	QAM64	19.79	20.36	PASS
LTE Band5	10	20525	50	#0	QAM64	19.80	20.37	PASS
LTE Band5	10	20600	1	#0	QPSK	23.18	23.75	PASS
LTE Band5	10	20600	1	#Mid	QPSK	22.98	23.55	PASS
LTE Band5	10	20600	1	#Max	QPSK	22.99	23.56	PASS
LTE Band5	10	20600	25	#0	QPSK	22.18	22.75	PASS
LTE Band5	10	20600	25	#Mid	QPSK	22.21	22.78	PASS
LTE Band5	10	20600	25	#Max	QPSK	22.09	22.66	PASS
LTE Band5	10	20600	50	#0	QPSK	22.16	22.73	PASS
LTE Band5	10	20600	1	#0	QAM16	22.07	22.64	PASS
LTE Band5	10	20600	1	#Mid	QAM16	21.91	22.48	PASS
LTE Band5	10	20600	1	#Max	QAM16	21.84	22.41	PASS
LTE Band5	10	20600	25	#0	QAM16	21.24	21.81	PASS
LTE Band5	10	20600	25	#Mid	QAM16	21.25	21.82	PASS
LTE Band5	10	20600	25	#Max	QAM16	21.12	21.69	PASS
LTE Band5	10	20600	50	#0	QAM16	21.18	21.75	PASS
LTE Band5	10	20600	1	#0	QAM64	21.09	21.66	PASS
LTE Band5	10	20600	1	#Mid	QAM64	20.87	21.44	PASS
LTE Band5	10	20600	1	#Max	QAM64	20.80	21.37	PASS
LTE Band5	10	20600	25	#0	QAM64	19.86	20.43	PASS
LTE Band5	10	20600	25	#Mid	QAM64	19.74	20.31	PASS
LTE Band5	10	20600	25	#Max	QAM64	19.66	20.23	PASS
LTE Band5	10	20600	50	#0	QAM64	19.75	20.32	PASS



CA_5B	PCC	SCC	PCC RB		SCC1 RB		Maximum Output Power (dBm)			ERP (dBm)		
	Frequency (MHz)	Frequency (MHz)	Size	Offset	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3MHz+5MHz	825.6	829.5	1	14	1	0	20.89	20.27	19.21	21.45	20.83	19.77
			15	0	25	0	20.97	20.02	20.12	21.53	20.58	20.68
	834.1	838	1	14	1	0	20.83	19.81	18.84	21.40	20.38	19.41
			15	0	25	0	21.02	20.04	19.93	21.59	20.61	20.50
	842.6	846.5	1	14	1	0	20.79	20.19	19.36	21.74	21.14	20.31
			15	0	25	0	20.91	20.03	19.93	21.86	20.98	20.88
5MHz+3MHz	835	838.9	1	24	1	0	21.54	21.09	20.01	22.10	21.65	20.57
			25	0	15	0	21.09	20.14	20.12	21.65	20.70	20.68
	843.5	847.4	1	24	1	0	21.55	20.89	19.76	22.50	21.84	20.71
			25	0	15	0	21.02	20.08	19.98	21.97	21.03	20.93
5MHz+10MHz	826.8	834	1	24	1	0	23.62	22.73	21.59	24.18	23.29	22.15
			25	0	50	0	20.94	20.23	19.92	21.50	20.79	20.48
	831.8	839	1	24	1	0	23.67	22.81	21.79	24.24	23.38	22.36
			25	0	50	0	20.95	20.03	19.94	21.52	20.60	20.51
	836.8	844	1	24	1	0	23.62	22.82	21.85	24.57	23.77	22.80
			25	0	50	0	20.89	19.98	19.91	21.84	20.93	20.86
10MHz+5MHz	829	836.2	1	49	1	0	23.84	23.16	21.91	24.40	23.72	22.47
			50	0	25	0	21.21	20.26	20.19	21.77	20.82	20.75
	834	841.2	1	49	1	0	23.87	23.13	22.32	24.44	23.70	22.89
			50	0	25	0	21.28	20.33	20.27	21.85	20.90	20.84
	839	846.2	1	49	1	0	23.83	23.08	22.01	24.78	24.03	22.96
			50	0	25	0	21.23	20.25	20.24	22.18	21.20	21.19
10MHz+10MHz	829	838.9	1	49	1	0	23.84	23.15	22.19	24.40	23.71	22.75
			50	0	50	0	20.92	19.96	19.89	21.48	20.52	20.45
	831.6	841.5	1	49	1	0	23.85	23.12	22.21	24.42	23.69	22.78
			50	0	50	0	20.93	19.97	19.91	21.50	20.54	20.48
	834.1	844	1	49	1	0	23.79	23.08	22.15	24.74	24.03	23.10
			50	0	50	0	20.97	19.96	19.87	21.92	20.91	20.82

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 51kHz, VBW is set to 160kHz for WCDMA Band V,

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),

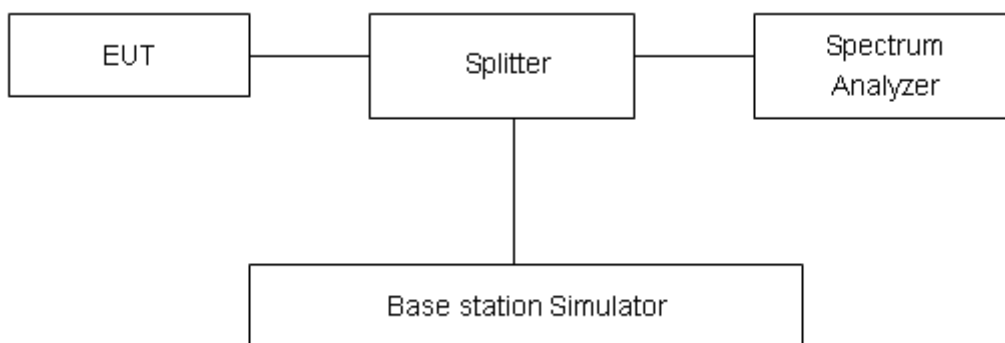
RBW is set to 150kHz, VBW is set to 470kHz for CA_5B (3MHz+5MHz, 5MHz+3MHz),

RBW is set to 300kHz, VBW is set to 910kHz for CA_5B (5MHz+10MHz, 10MHz+5MHz),

RBW is set to 390kHz, VBW is set to 1.2MHz for CA_5B (10MHz+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

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
WCDMA Band V (RMC)	4132	826.4	4.1314	4.663
	4183	836.6	4.1401	4.665
	4233	846.6	4.1385	4.690

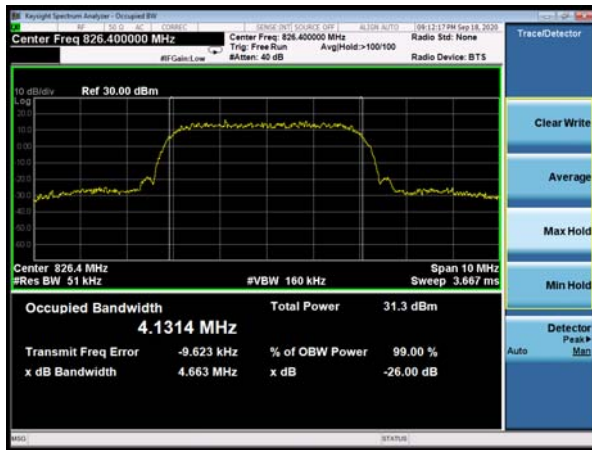
LTE Band 5						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	1.4	20407	824.7	1.0968	1.235
			20525	836.5	1.0946	1.236
			20643	848.3	1.0944	1.248
		3	20415	825.5	2.7023	2.997
			20525	836.5	2.7022	2.998
			20635	847.5	2.7103	2.958
		5	20425	826.5	4.5158	5.007
			20525	836.5	4.5160	4.929
			20625	846.5	4.5019	4.928
		10	20450	829	8.9932	9.801
			20525	836.5	8.9823	9.715
			20600	844	8.9720	9.779
	16QAM	1.4	20407	824.7	1.0953	1.242
			20525	836.5	1.0960	1.236
			20643	848.3	1.0884	1.216
		3	20415	825.5	2.7042	2.993
			20525	836.5	2.6971	2.988
			20635	847.5	2.6997	3.026
		5	20425	826.5	4.4968	4.922
			20525	836.5	4.5357	4.993
			20625	846.5	4.5105	4.925
		10	20450	829	9.0027	9.776
			20525	836.5	8.9902	9.600



			20600	844	8.9695	9.717
64QAM	1.4		20407	824.7	1.0937	1.245
			20525	836.5	1.0940	1.238
			20643	848.3	1.0937	1.215
	3		20415	825.5	2.7010	2.989
			20525	836.5	2.6996	3.016
			20635	847.5	2.7014	3.005
	5		20425	826.5	4.5044	4.906
			20525	836.5	4.5267	4.983
			20625	846.5	4.5092	4.931
	10		20450	829	8.9827	9.793
			20525	836.5	8.9761	9.761
			20600	844	8.9628	9.746

CA_5B	PCC		SCC1		PCC RB	SCC1 RB	Bandwidth(MHz)	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)			99% Power	-26dBc
CA_5B_3MHz+5MHz_QPSK	20501	834.1	20540	838	15#0	25#0	7.4902	7.996
CA_5B_3MHz+5MHz_16QAM	20501	834.1	20540	838	15#0	25#0	7.4724	8.579
CA_5B_3MHz+5MHz_64QAM	20501	834.1	20540	838	15#0	25#0	7.4772	7.955
CA_5B_5MHz+3MHz_QPSK	20510	835	20549	838.9	25#0	15#0	7.4681	7.954
CA_5B_5MHz+3MHz_16QAM	20510	835	20549	838.9	25#0	15#0	7.4878	7.993
CA_5B_5MHz+3MHz_64QAM	20510	835	20549	838.9	25#0	15#0	7.4901	7.979
CA_5B_5MHz+10MHz_QPSK	20478	831.8	20550	839	25#0	50#0	13.875	14.71
CA_5B_5MHz+10MHz_16QAM	20478	831.8	20550	839	25#0	50#0	13.855	14.72
CA_5B_5MHz+10MHz_64QAM	20478	831.8	20550	839	25#0	50#0	13.880	14.74
CA_5B_10MHz+5MHz_QPSK	20500	834	20572	841.2	50#0	25#0	13.941	14.72
CA_5B_10MHz+5MHz_16QAM	20500	834	20572	841.2	50#0	25#0	13.894	14.67
CA_5B_10MHz+5MHz_64QAM	20500	834	20572	841.2	50#0	25#0	13.871	14.70
CA_5B_10MHz+10MHz_QPSK	20476	831.6	20575	841.5	50#0	50#0	18.840	19.94
CA_5B_10MHz+10MHz_16QAM	20476	831.6	20575	841.5	50#0	50#0	18.804	20.00
CA_5B_10MHz+10MHz_64QAM	20476	831.6	20575	841.5	50#0	50#0	18.820	20.00

WCDMA Band V CH-Low

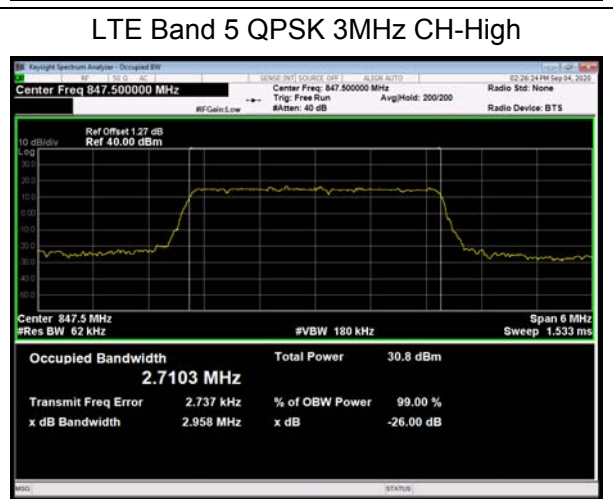
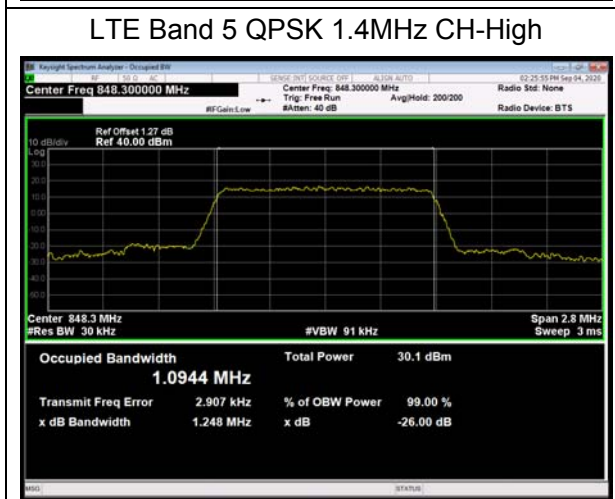
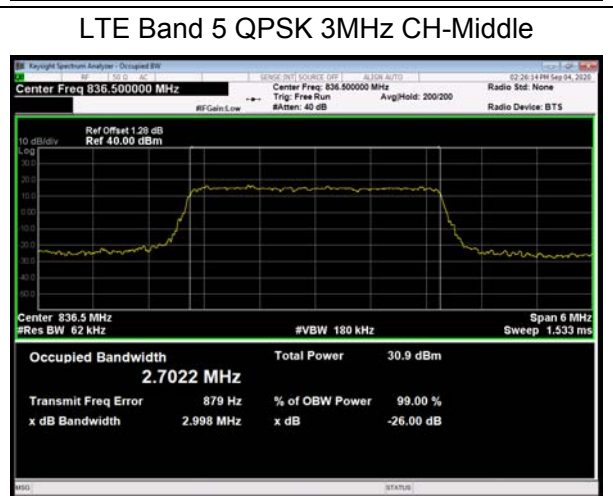
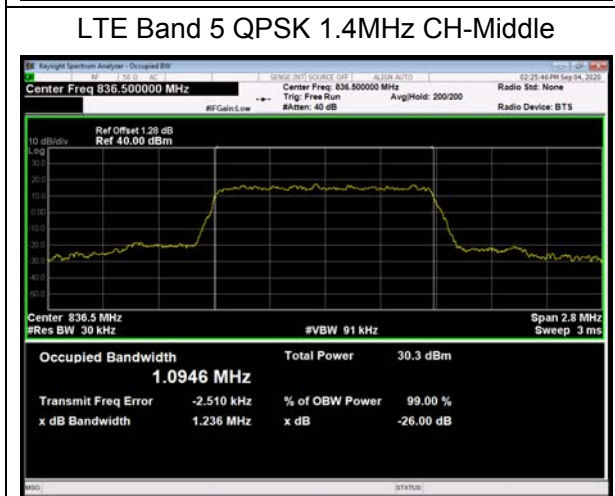
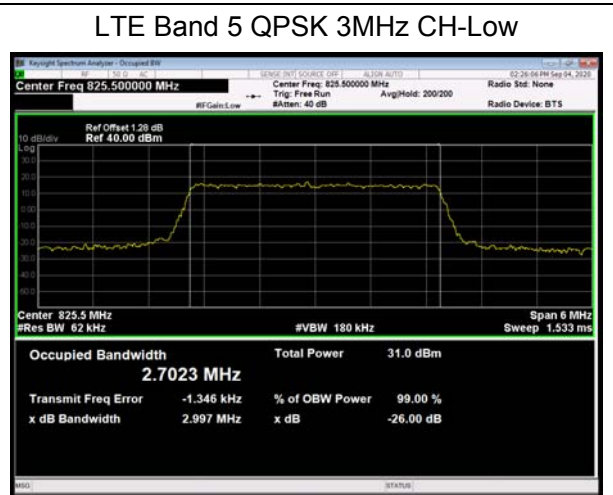
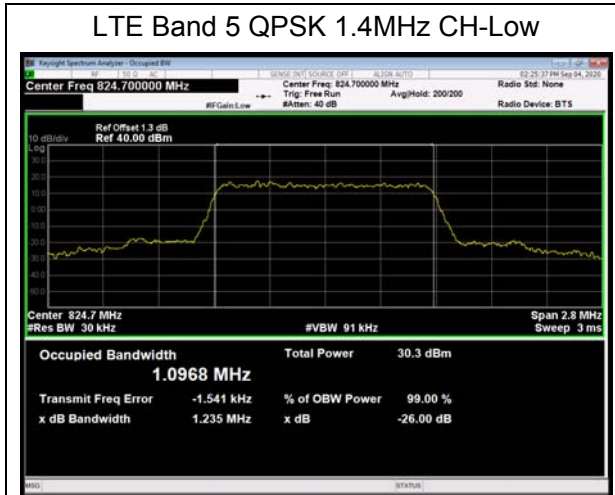


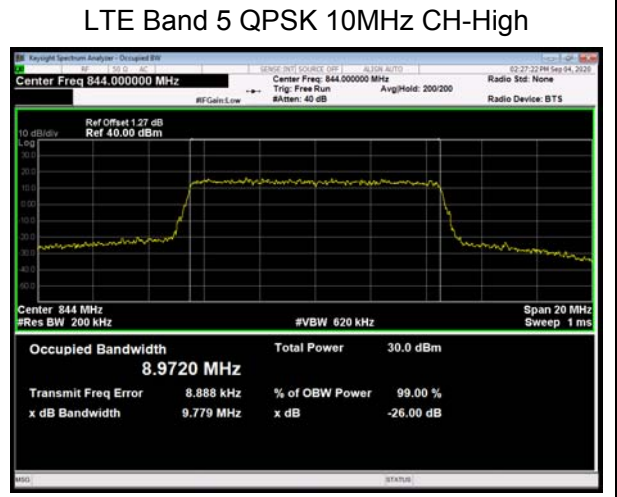
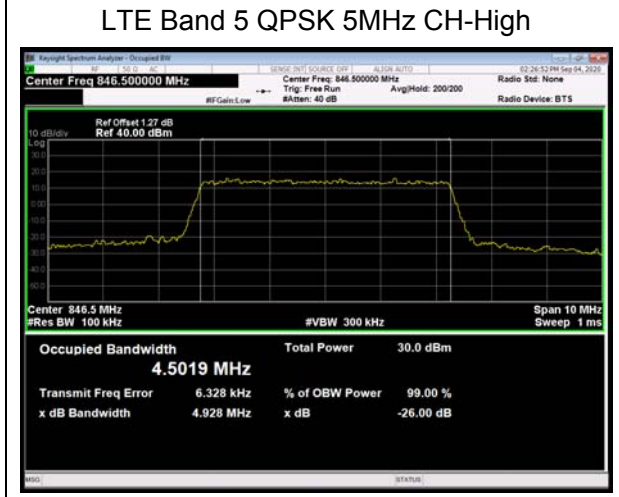
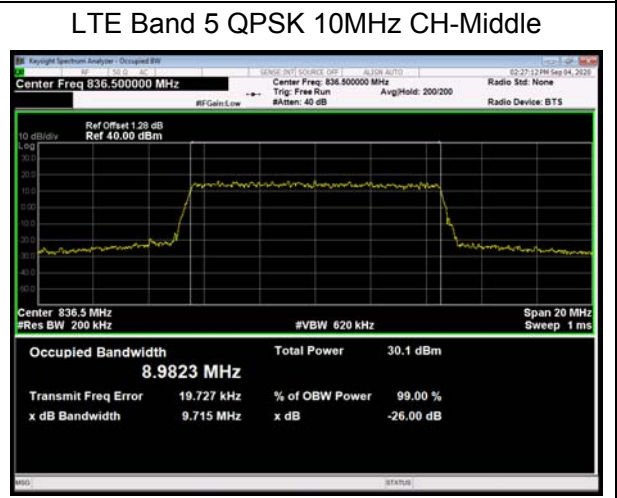
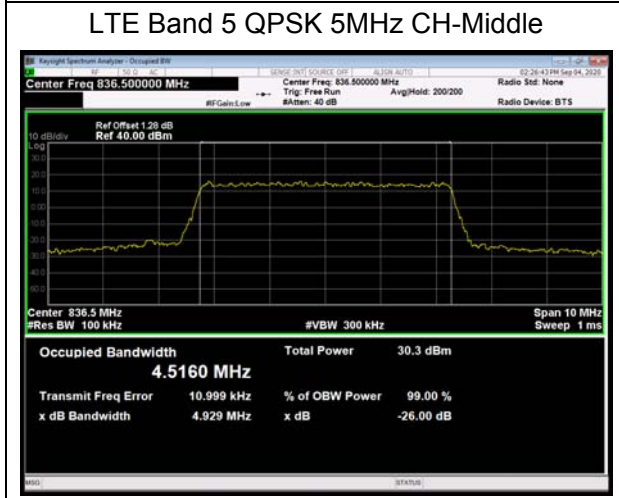
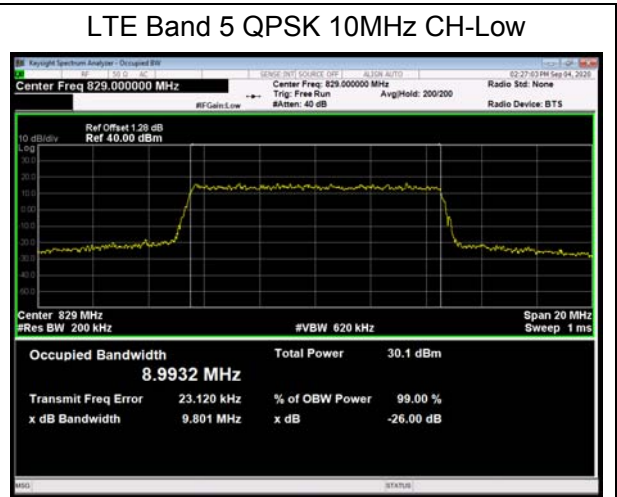
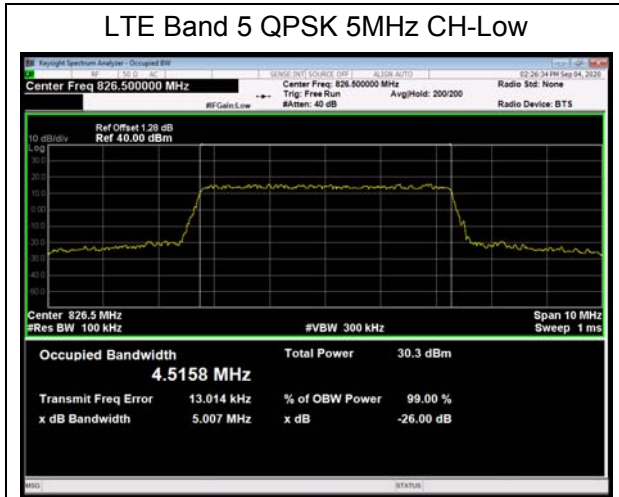
WCDMA Band V CH-Middle

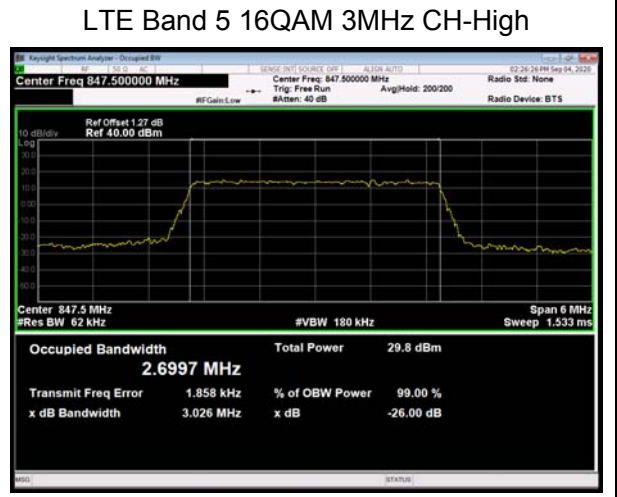
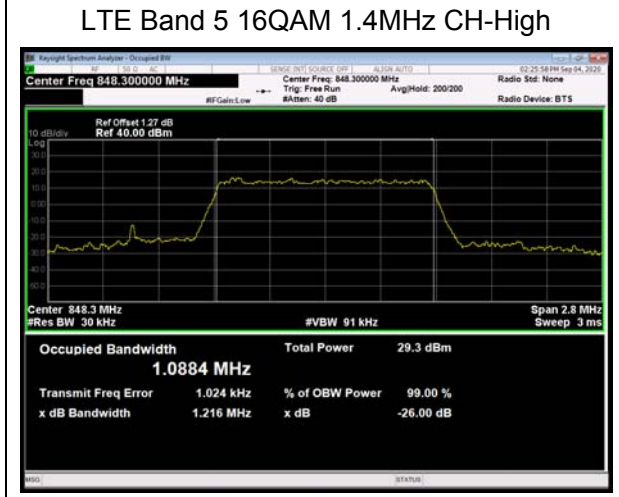
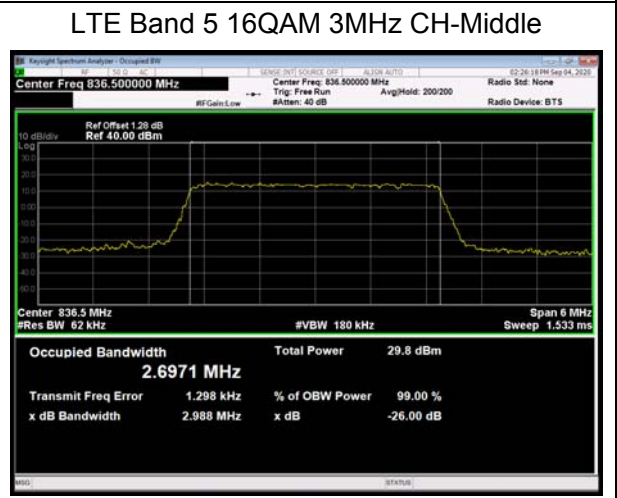
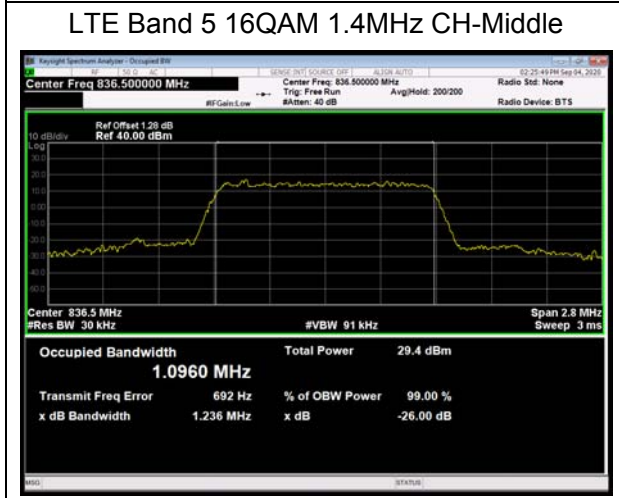
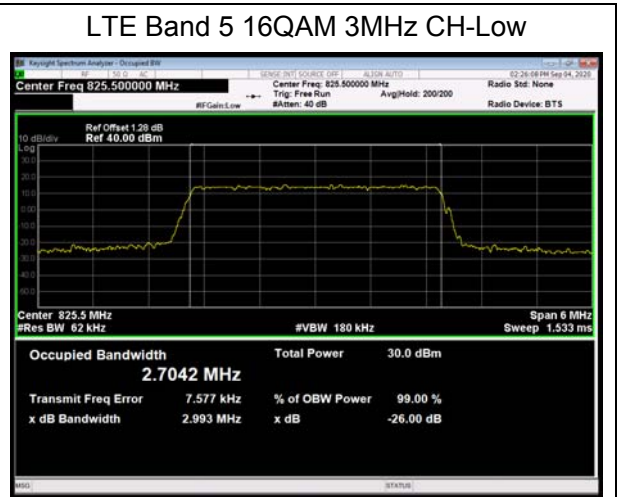
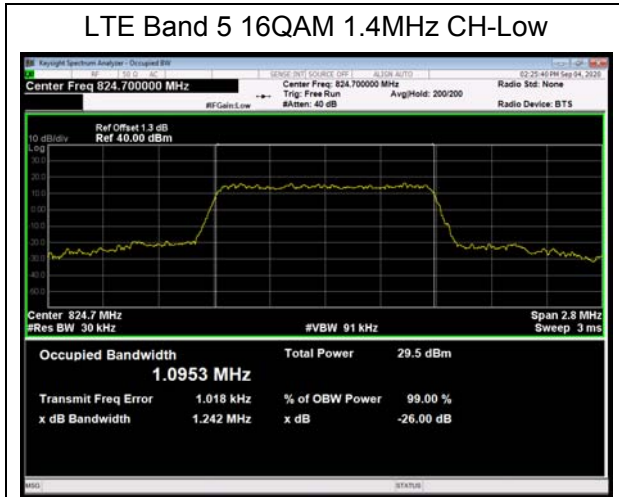


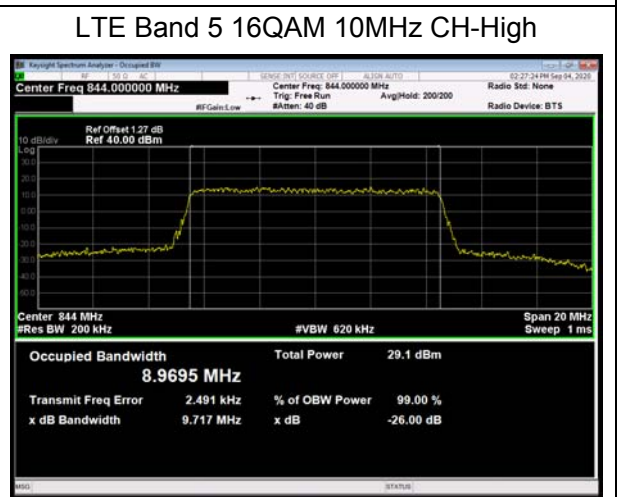
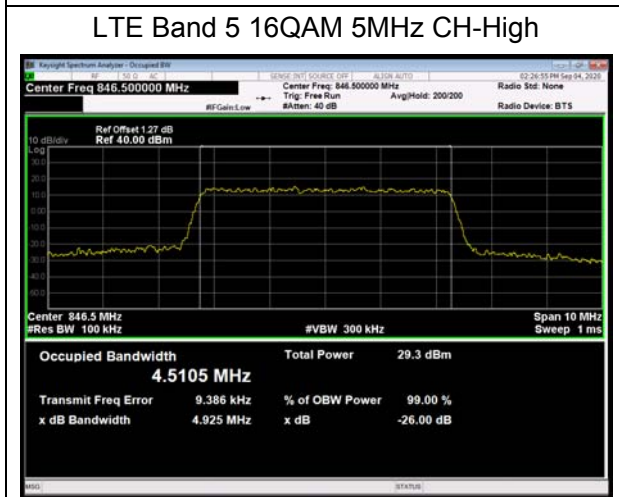
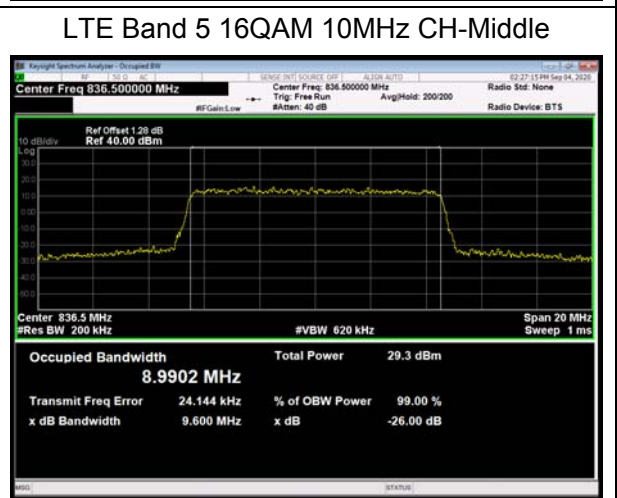
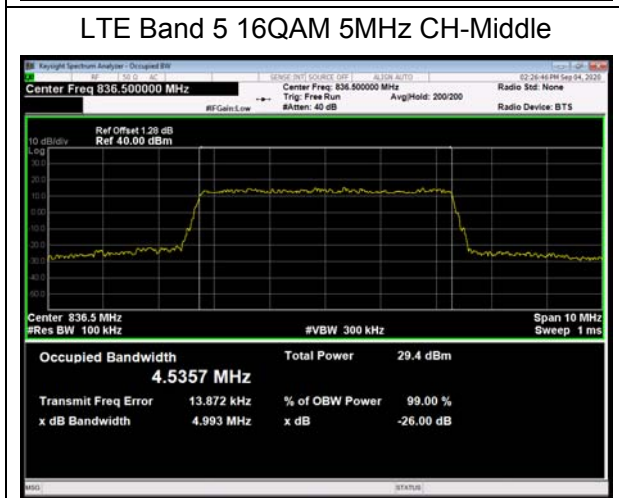
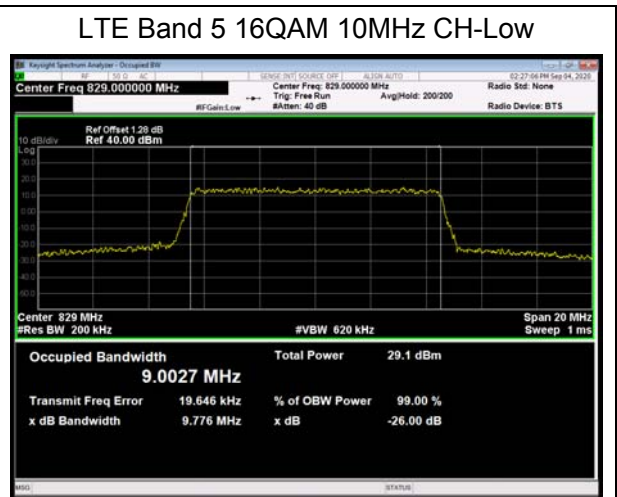
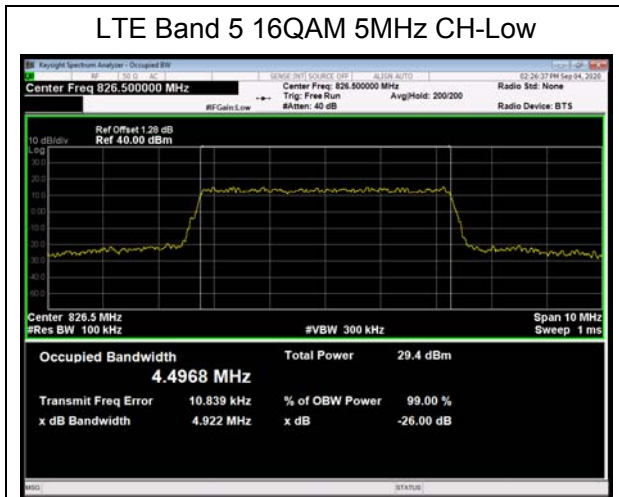
WCDMA Band V CH-High

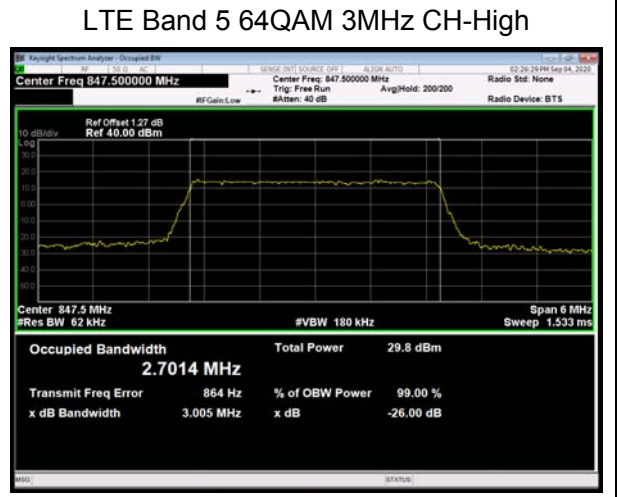
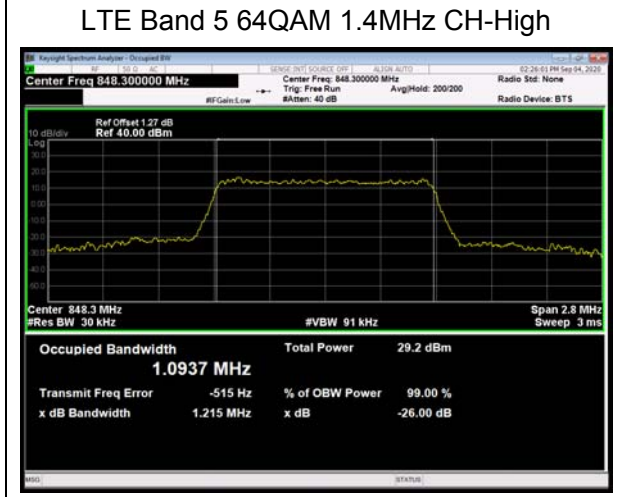
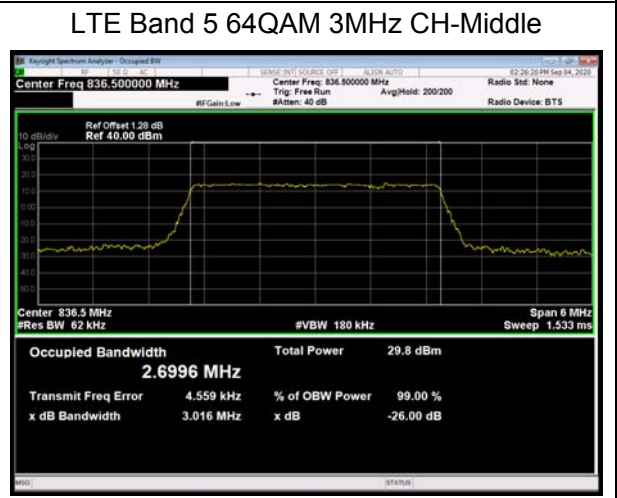
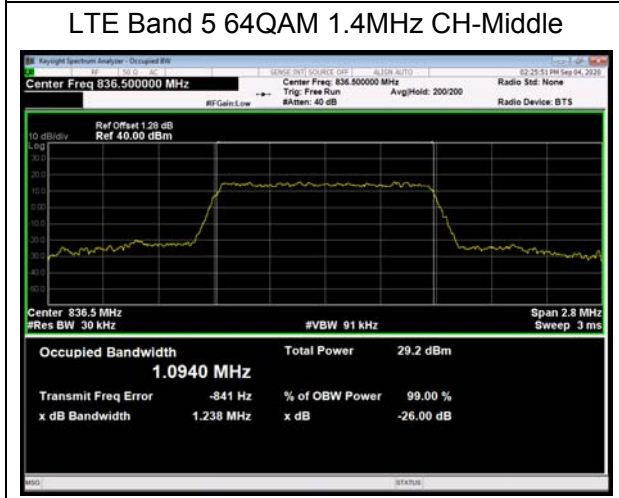
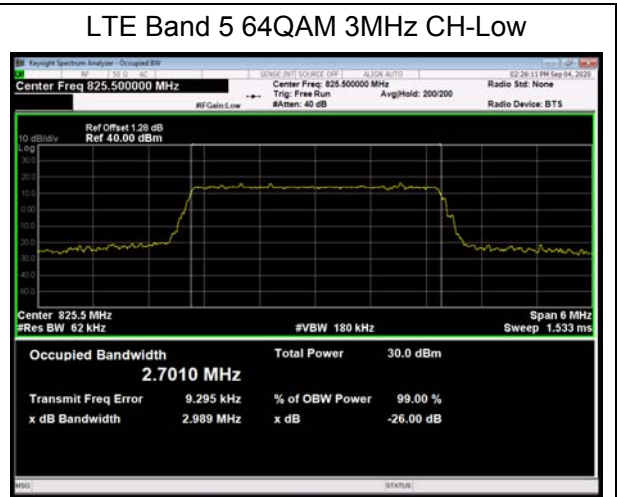
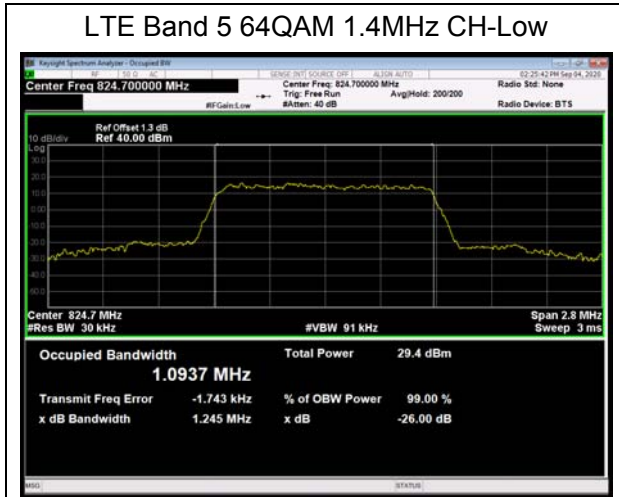


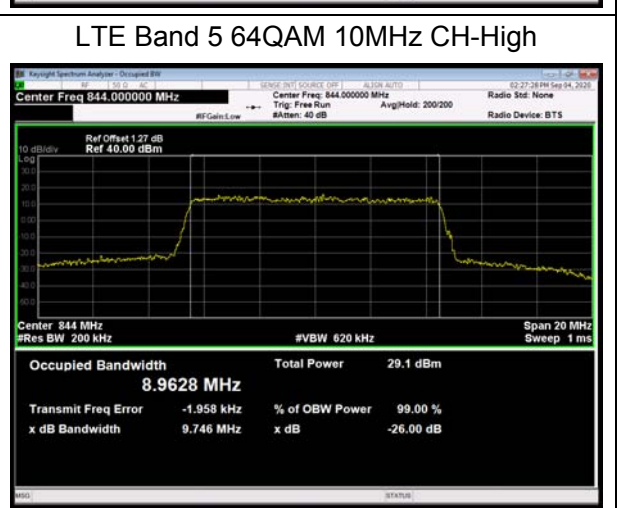
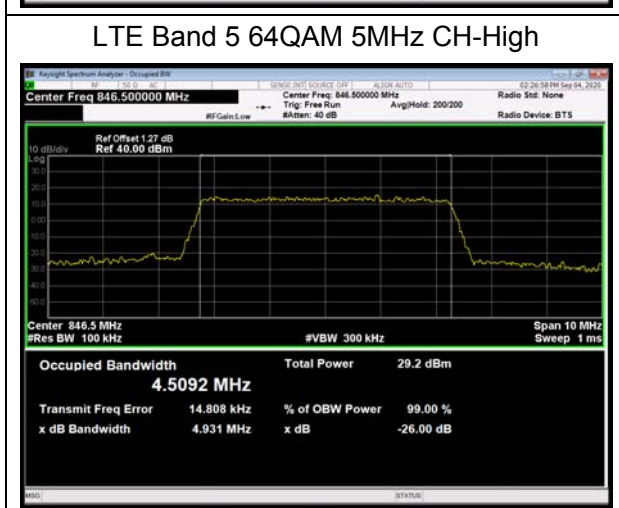
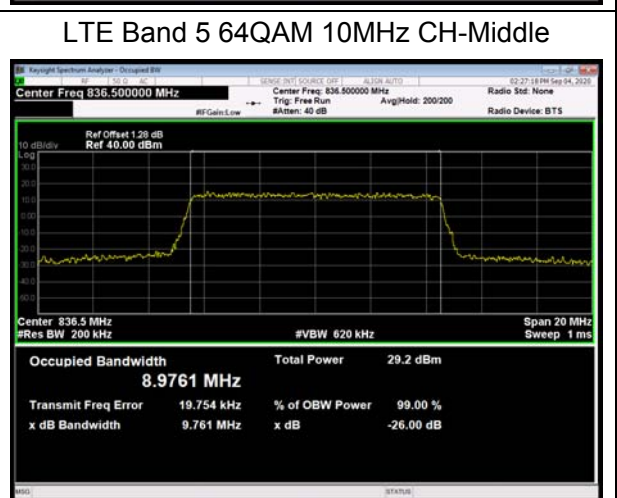
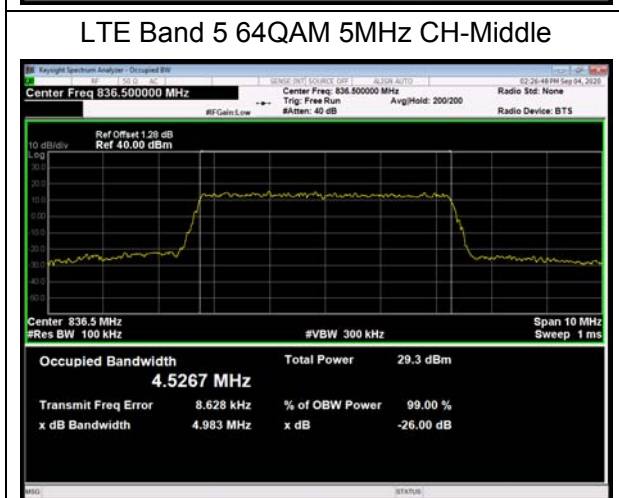
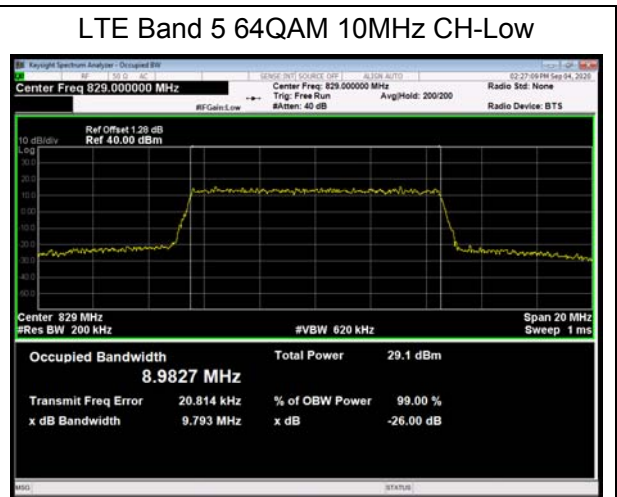
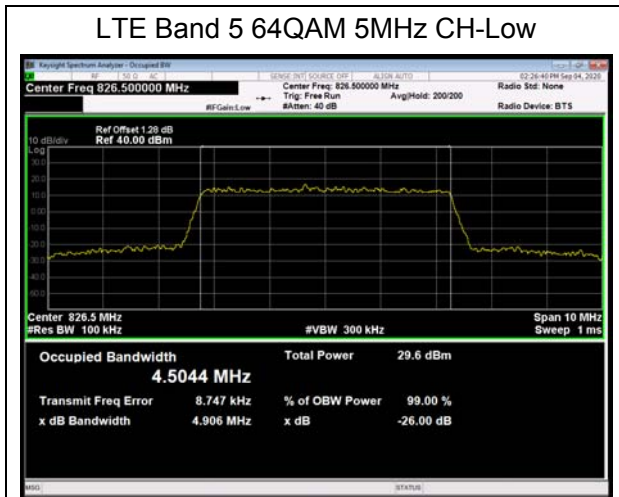


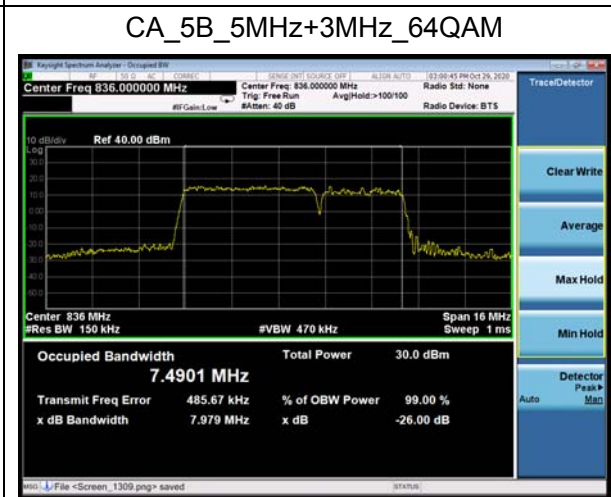
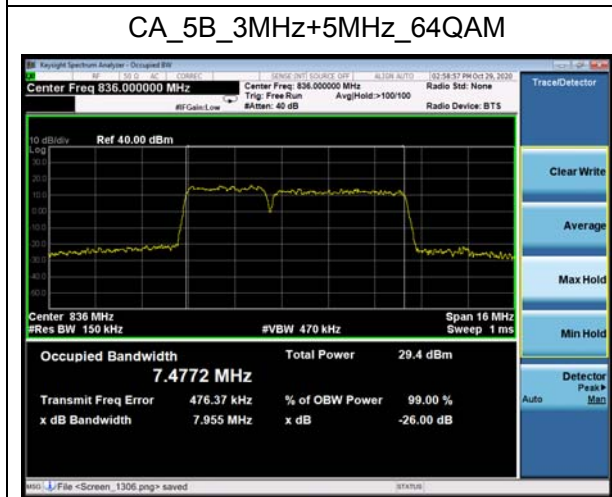
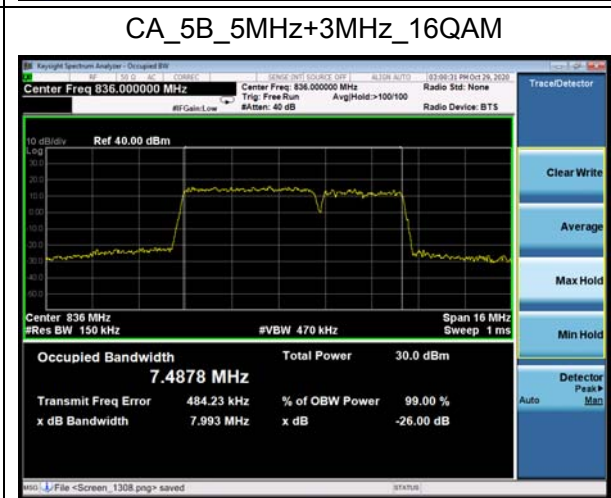
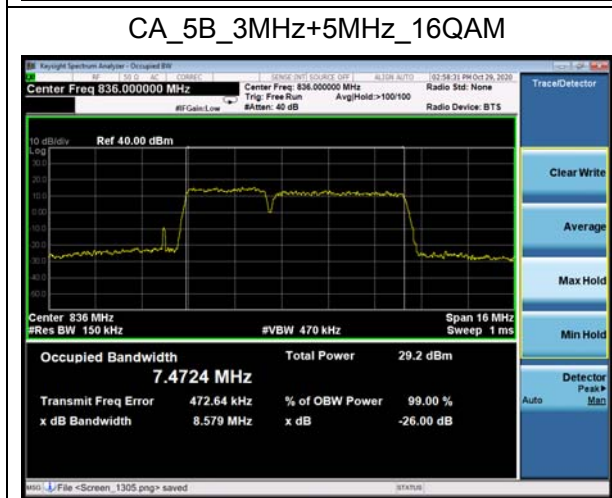
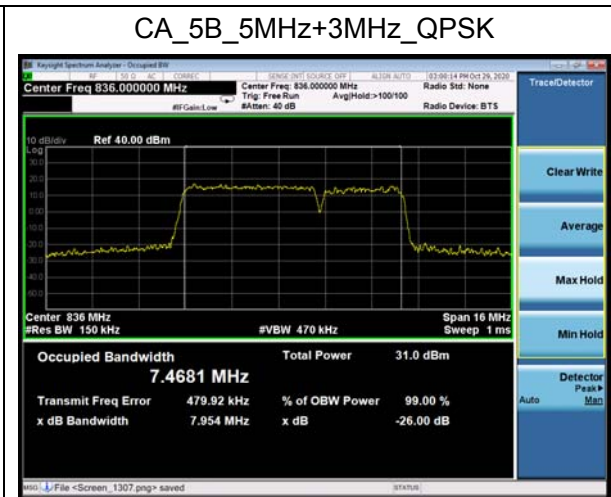
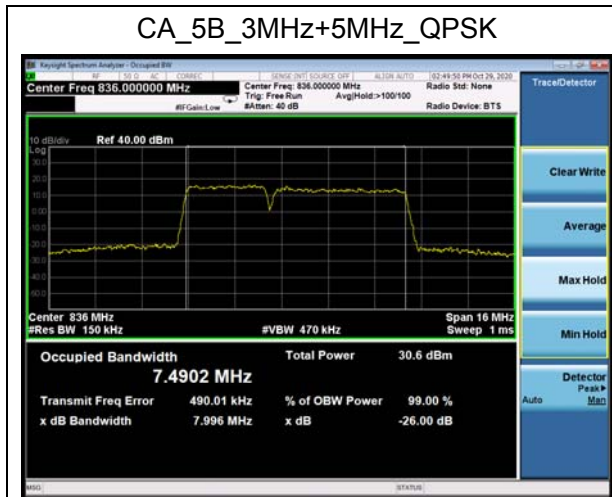


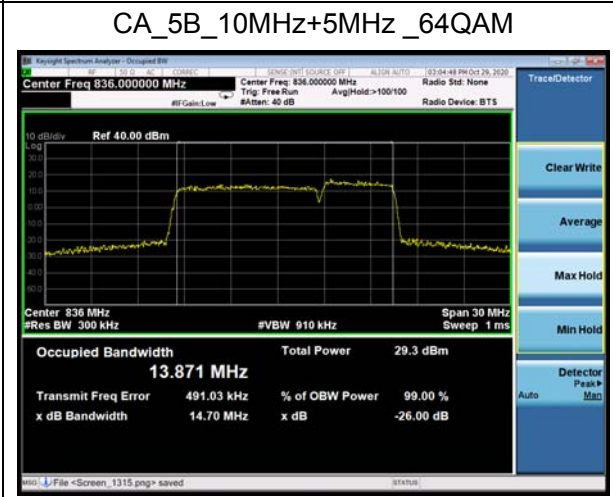
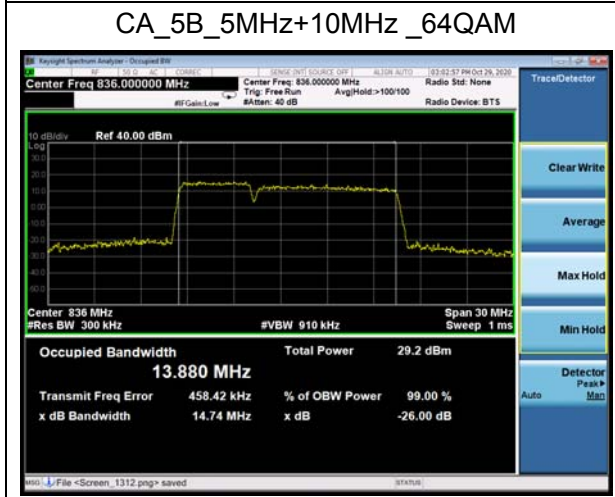
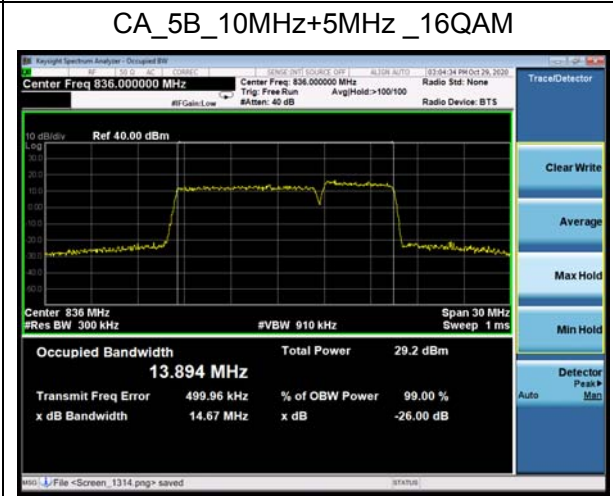
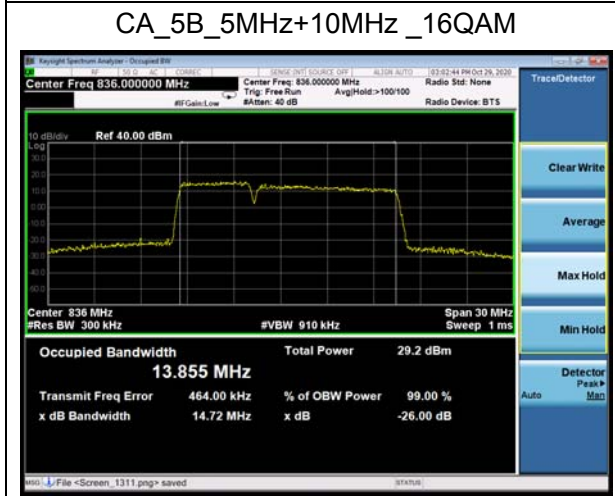
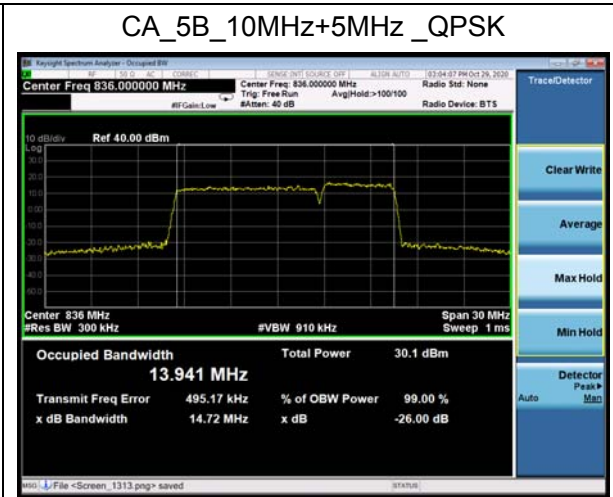
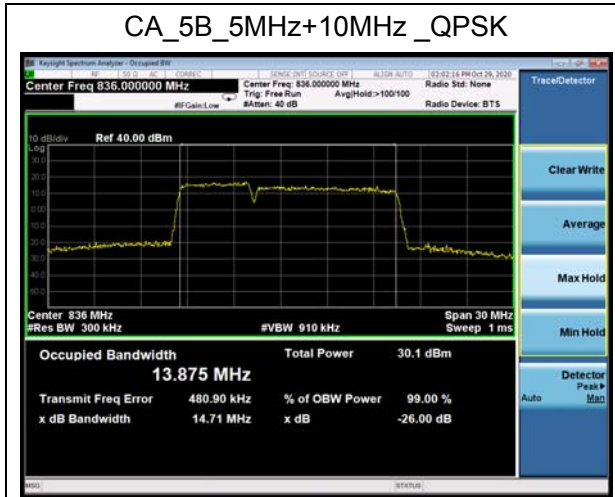












CA_5B_10MHz+10MHz_QPSK



CA_5B_10MHz+10MHz_16QAM



CA_5B_10MHz+10MHz_64QAM



5.3. Band Edge Compliance

Ambient condition

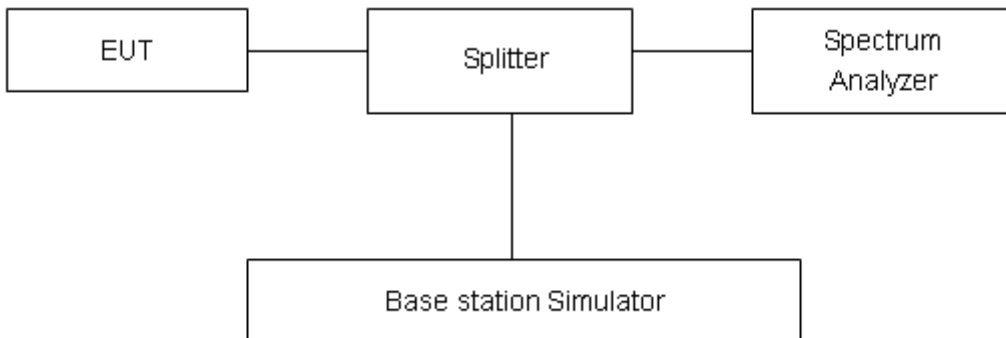
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 51kHz,VBW is set to 160kHz for WCDMA Band V, 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), RBW is set to 100kHz,VBW is set to 300kHz for CA_5B(3MHz+5MHz), RBW is set to 220kHz,VBW is set to 680kHz for CA_5B(10MHz+10Hz),

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:

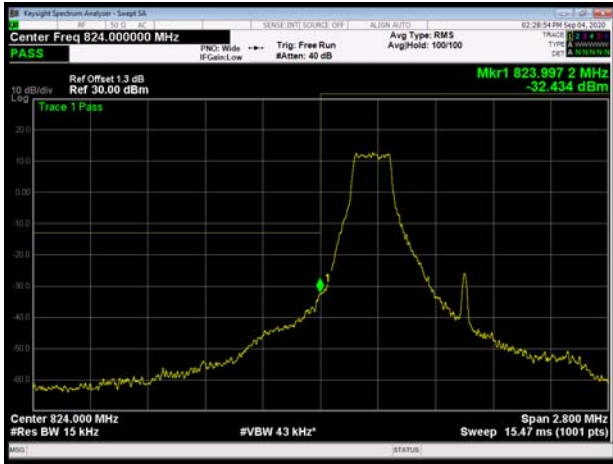
WCDMA Band V CH-Low



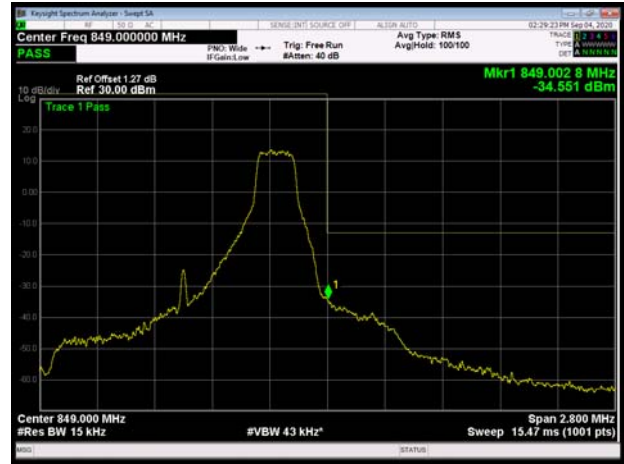
WCDMA Band V CH-High



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

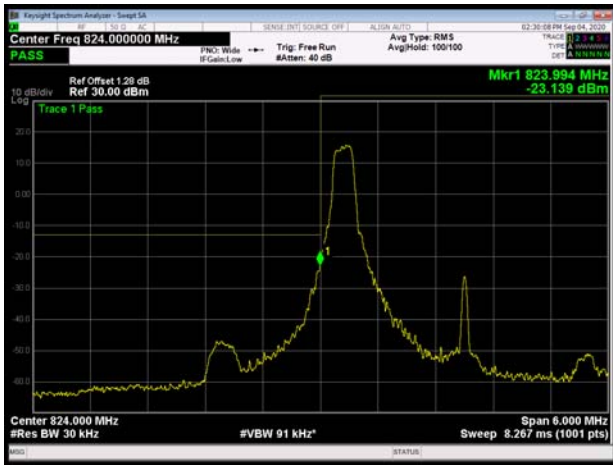


LTE Band 5 QPSK 1.4MHz CH-High 100%RB

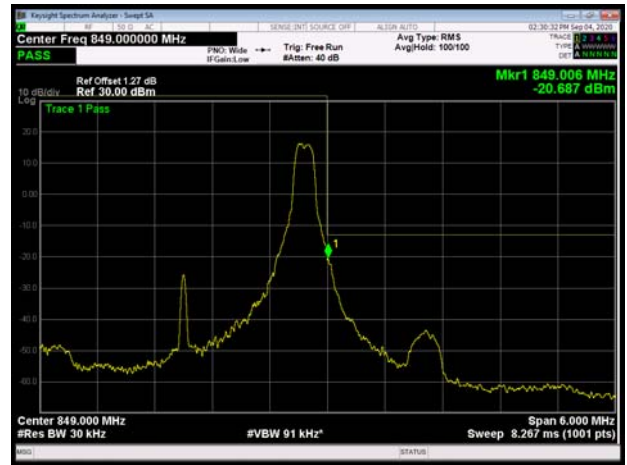




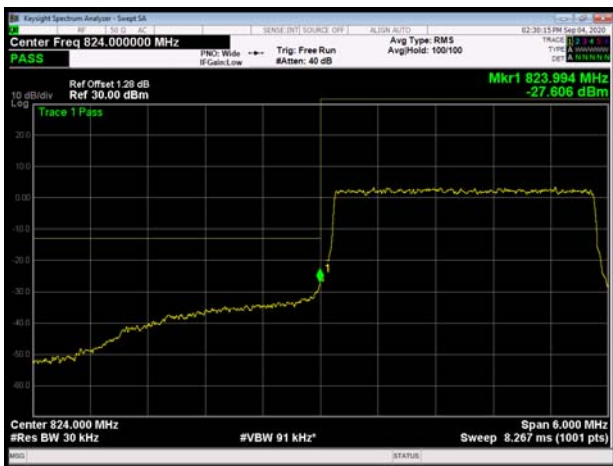
LTE Band 5 QPSK 3MHz CH-Low 1RB



LTE Band 5 QPSK 3MHz CH-High 1RB



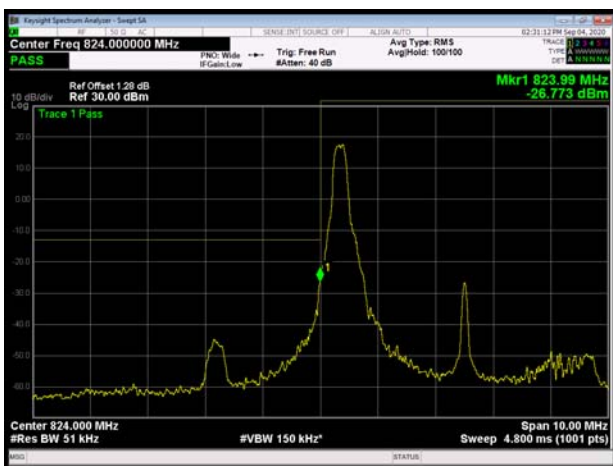
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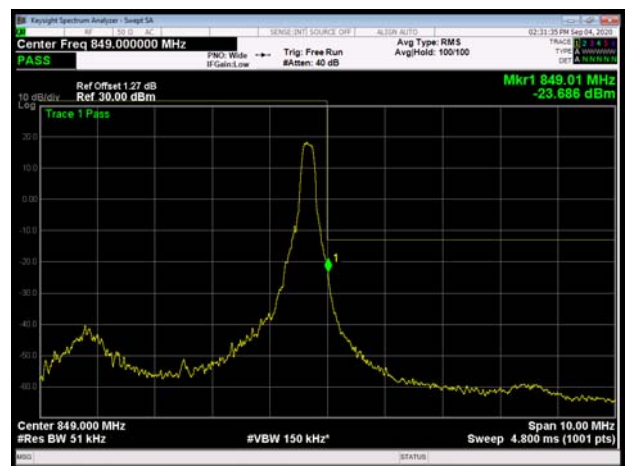
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LTE Band 5 QPSK 5MHz CH-Low 1RB

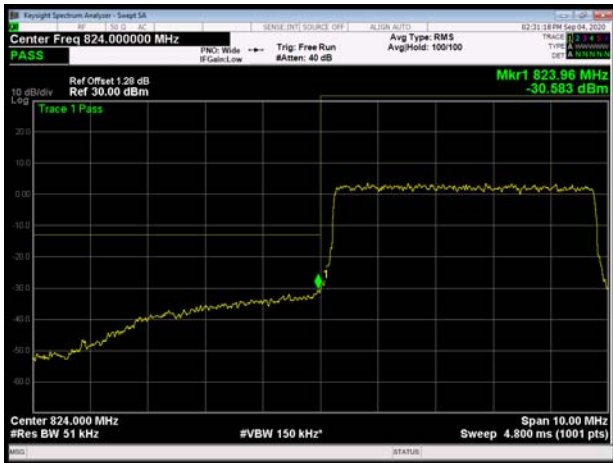


LTE Band 5 QPSK 5MHz CH-High 1RB





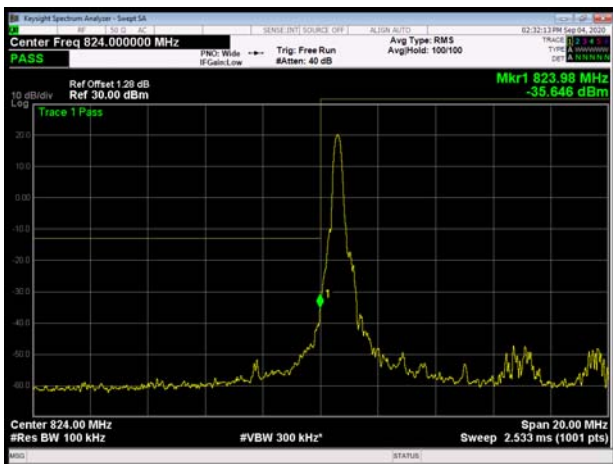
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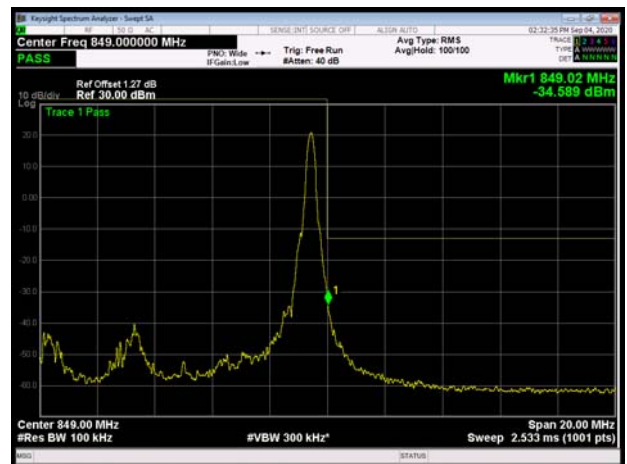
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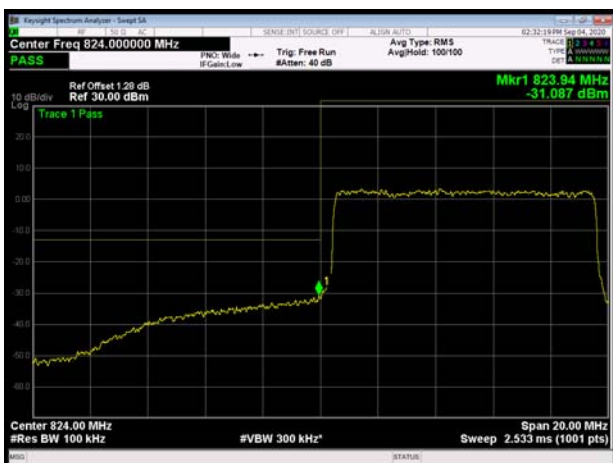
LTE Band 5 QPSK 10MHz CH-Low 1RB



LTE Band 5 QPSK 10MHz CH-High 1RB



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

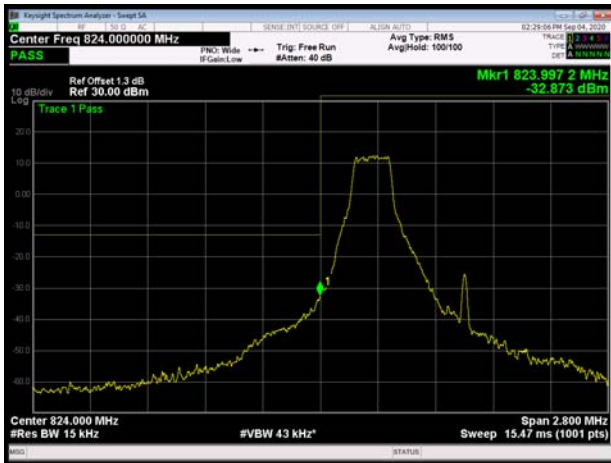


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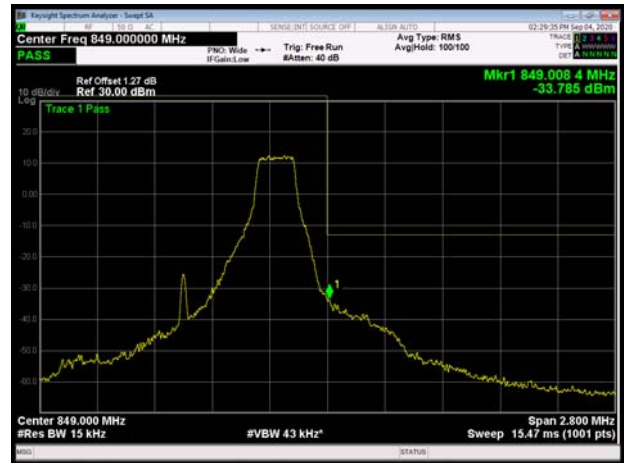




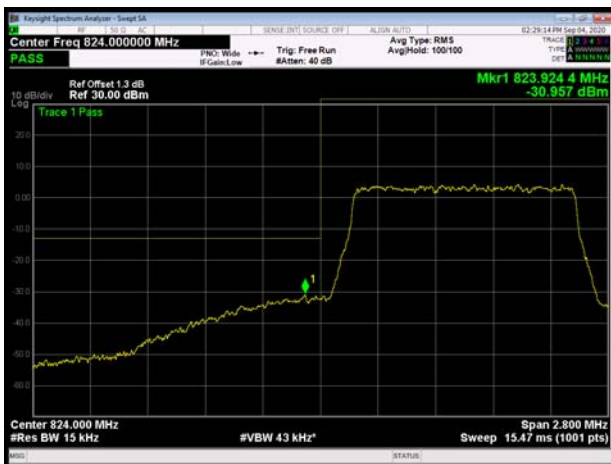
LTE Band 5 16QAM 1.4MHz CH-Low 1RB



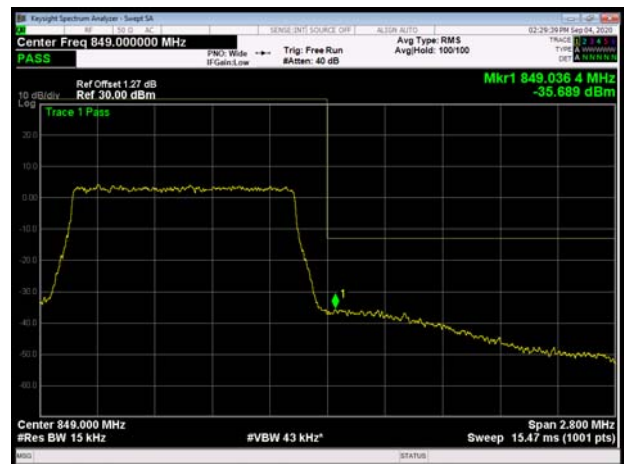
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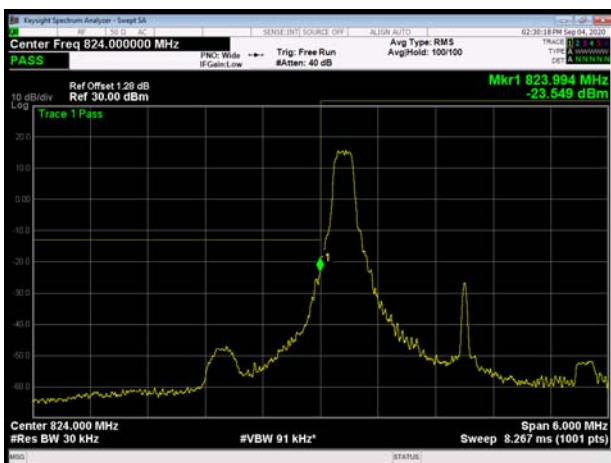
LTE Band 5 16QAM 1.4MHz CH-Low 100%RB



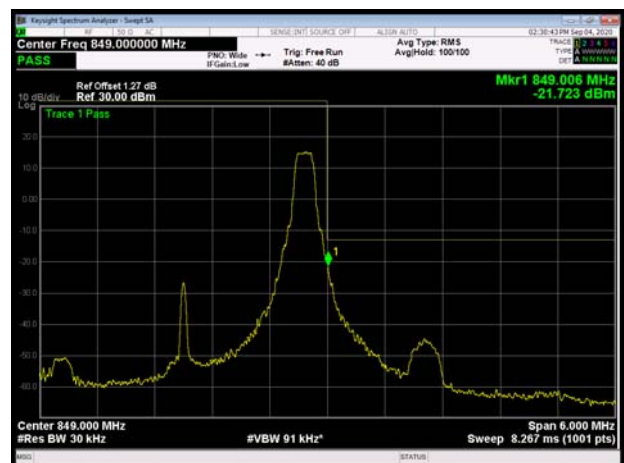
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LTE Band 5 16QAM 3MHz CH-Low 1RB



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





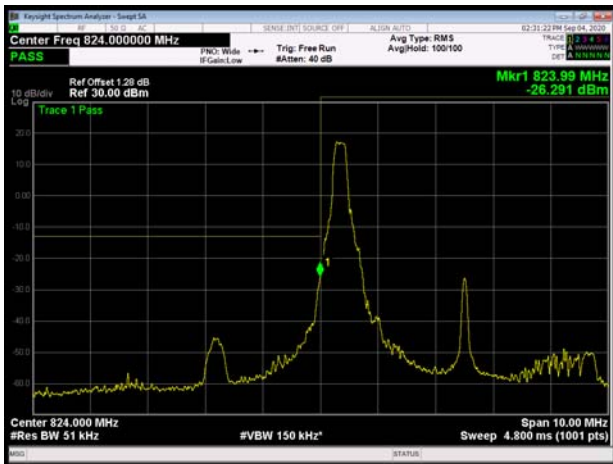
LTE Band 5 16QAM 3MHz CH-Low 100%RB



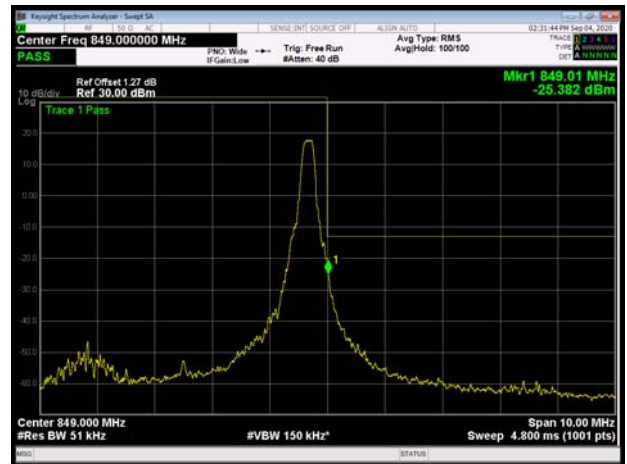
LTE Band 5 16QAM 3MHz CH-High 100%RB



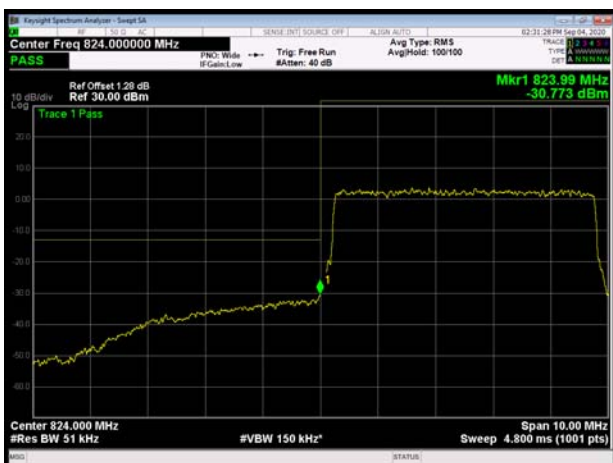
LTE Band 5 16QAM 5MHz CH-Low 1RB



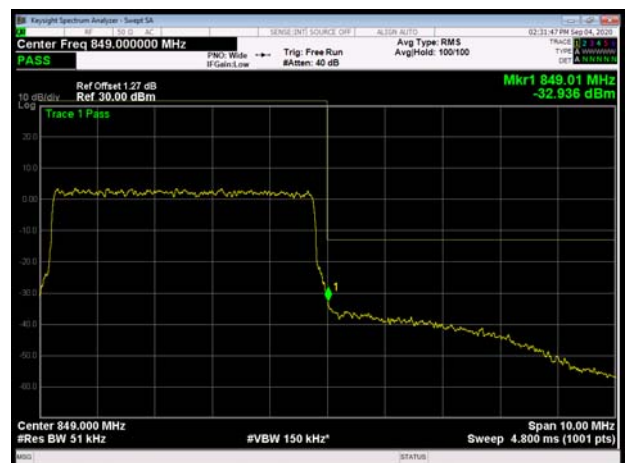
LTE Band 5 16QAM 5MHz CH-High 1RB



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

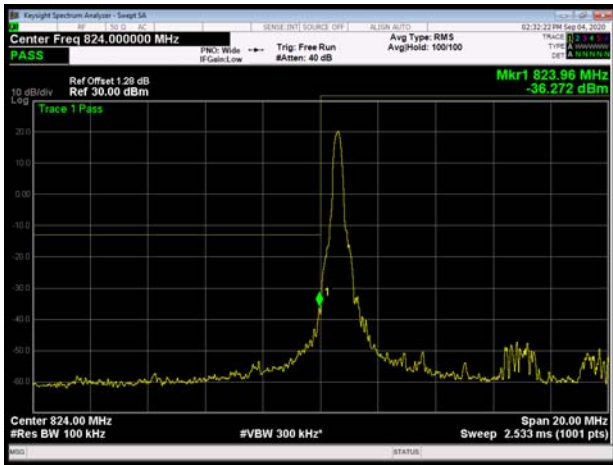


LTE Band 5 16QAM 5MHz CH-High 100%RB

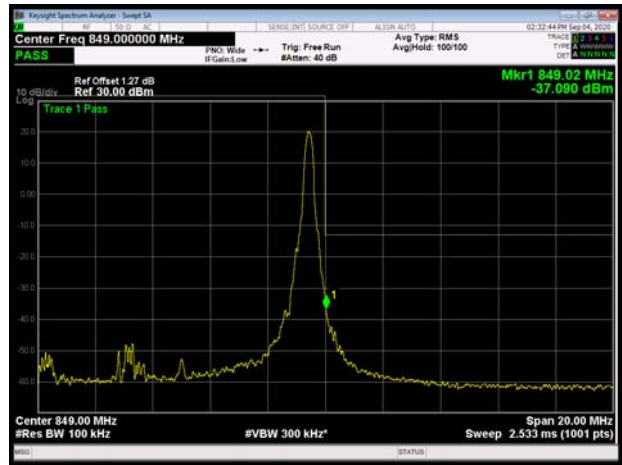




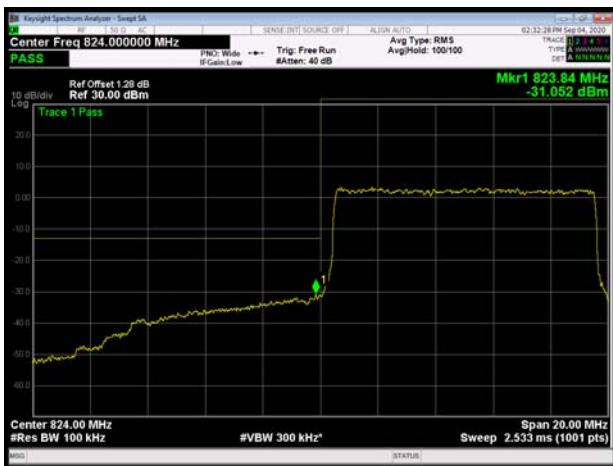
LTE Band 5 16QAM 10MHz CH-Low 1RB



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



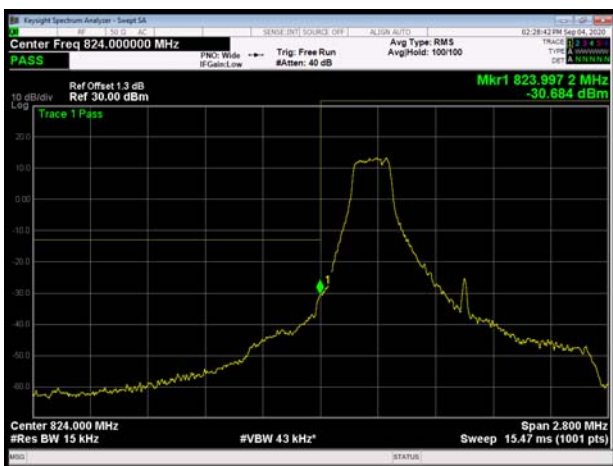
LTE Band 5 16QAM 10MHz CH-Low 100%RB



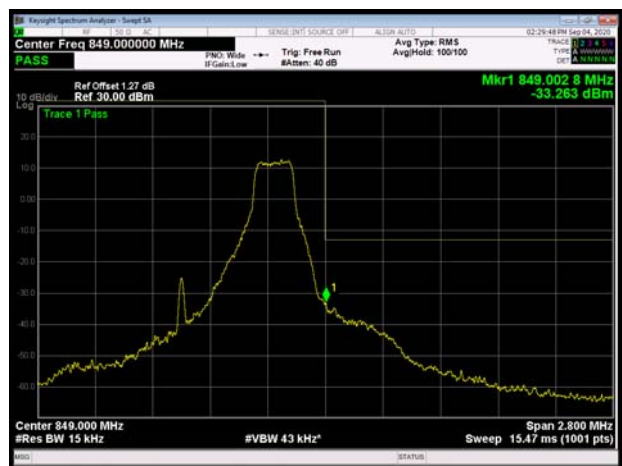
LTE Band 5 16QAM 10MHz CH-High 100%RB



LTE Band 5 64QAM 1.4MHz CH-Low 1RB

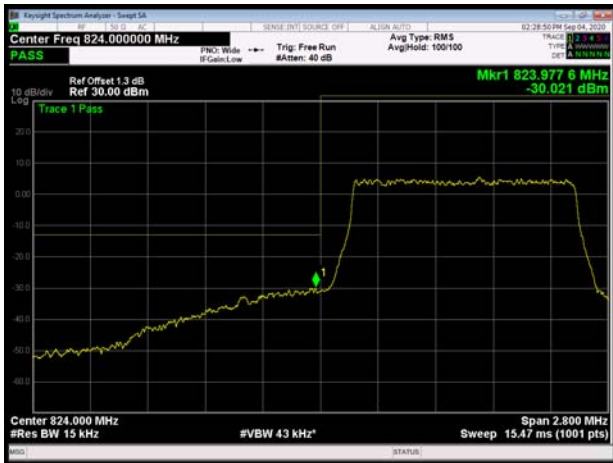


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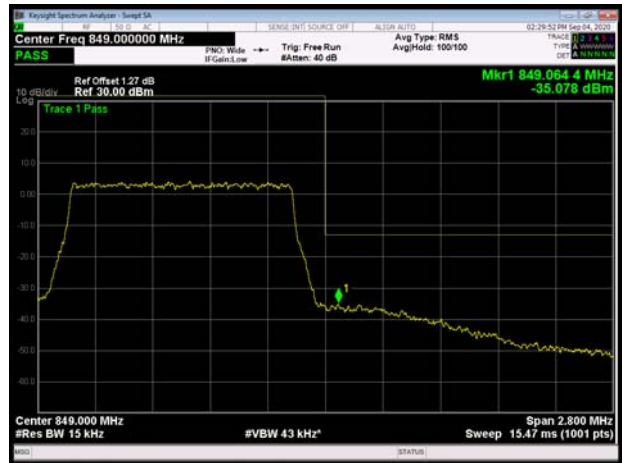




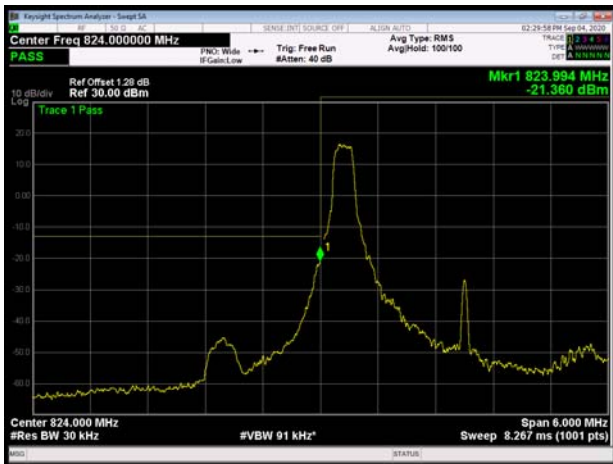
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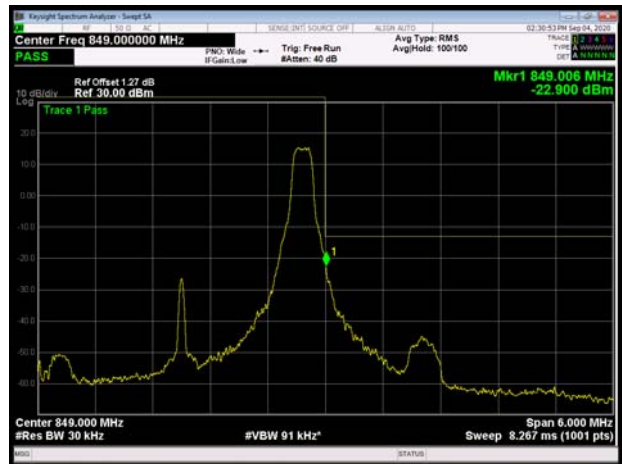
LTE Band 5 64QAM 1.4MHz CH-High 100%RB



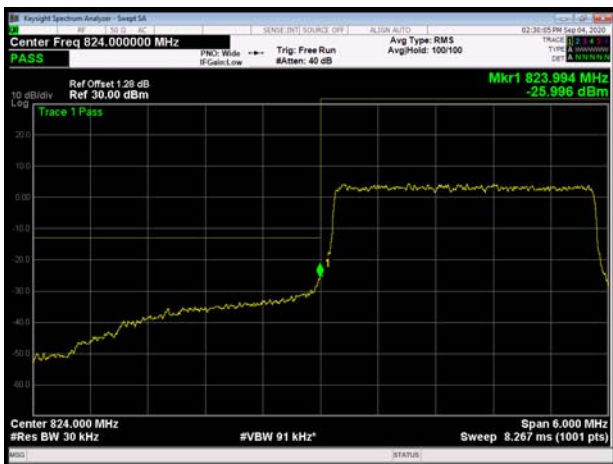
LTE Band 5 64QAM 3MHz CH-Low 1RB



LTE Band 5 64QAM 3MHz CH-High 1RB



LTE Band 5 64QAM 3MHz CH-Low 100%RB

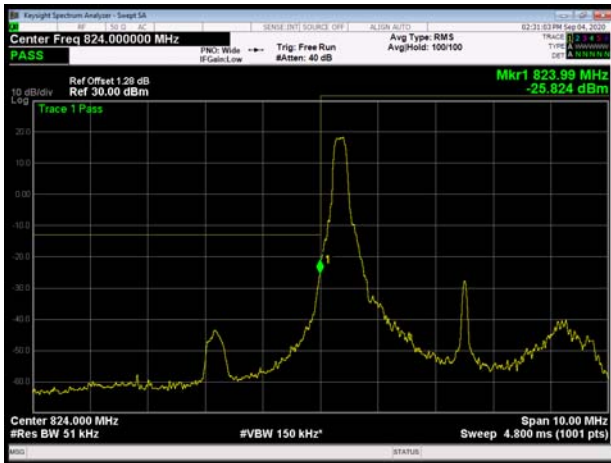


LTE Band 5 64QAM 3MHz CH-High 100%RB

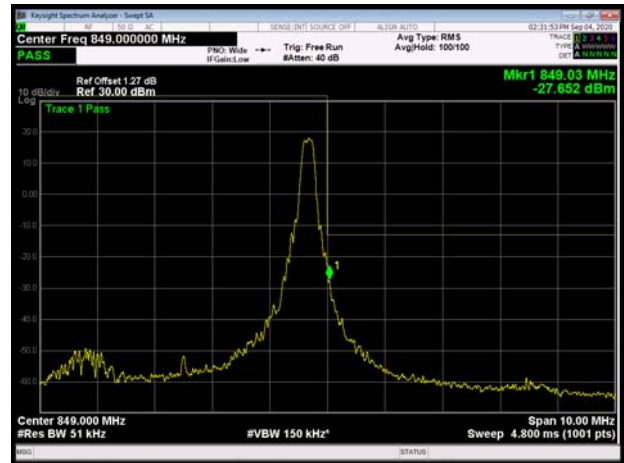




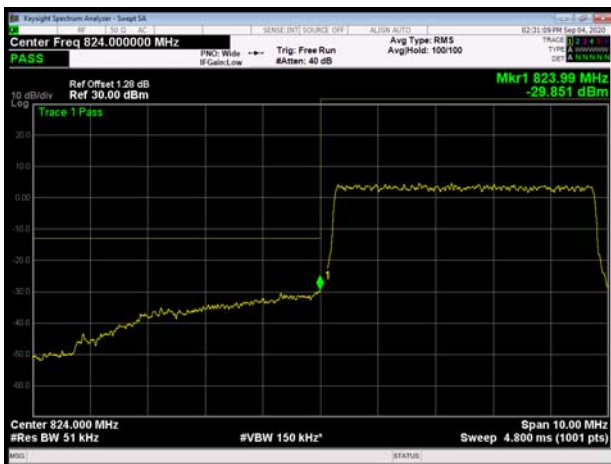
LTE Band 5 64QAM 5MHz CH-Low 1RB



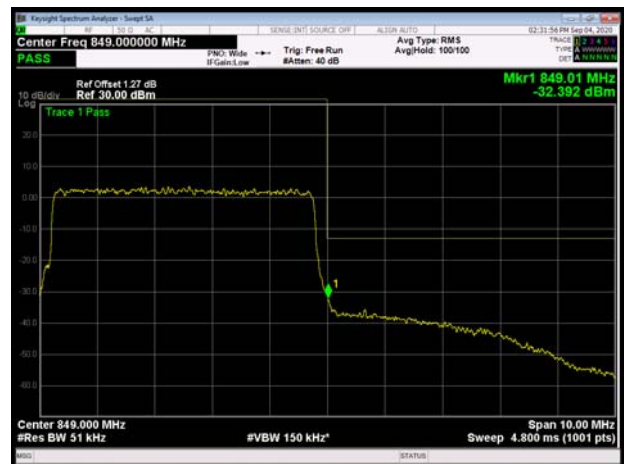
LTE Band 5 64QAM 5MHz CH-High 1RB



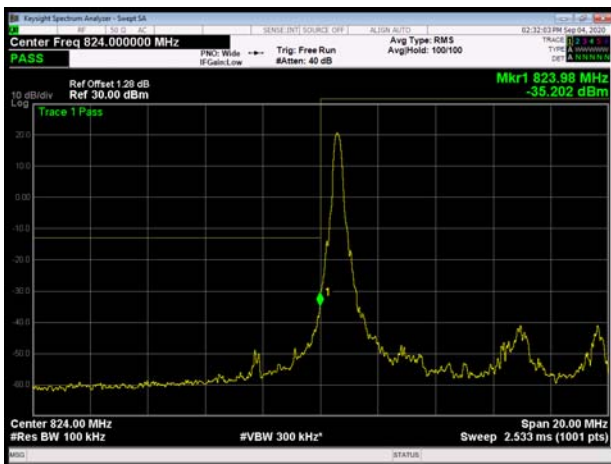
LTE Band 5 64QAM 5MHz CH-Low 100%RB



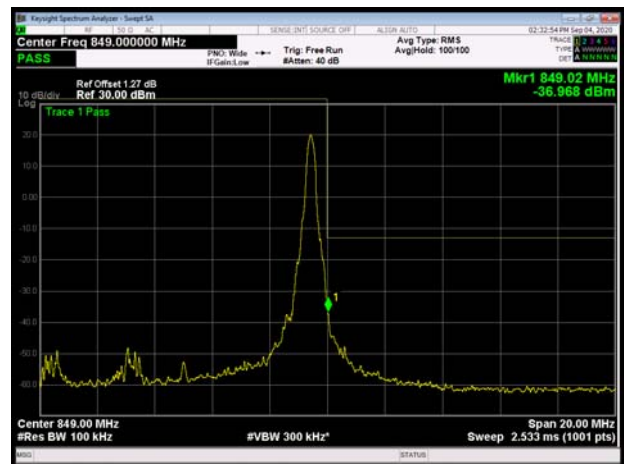
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LTE Band 5 64QAM 10MHz CH-Low 1RB



LTE Band 5 64QAM 10MHz CH-High 1RB





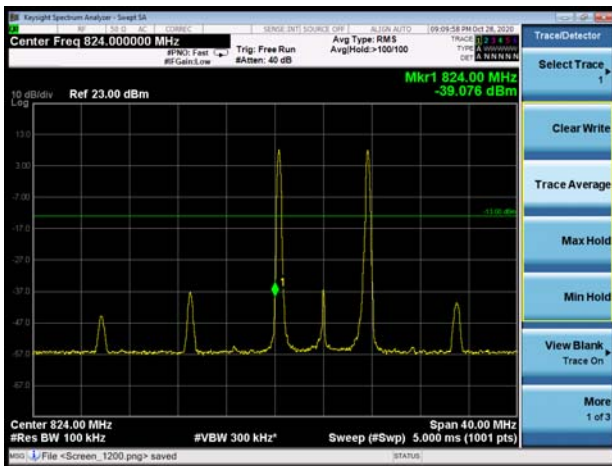
LTE Band 5 64QAM 10MHz CH-Low 100%RB



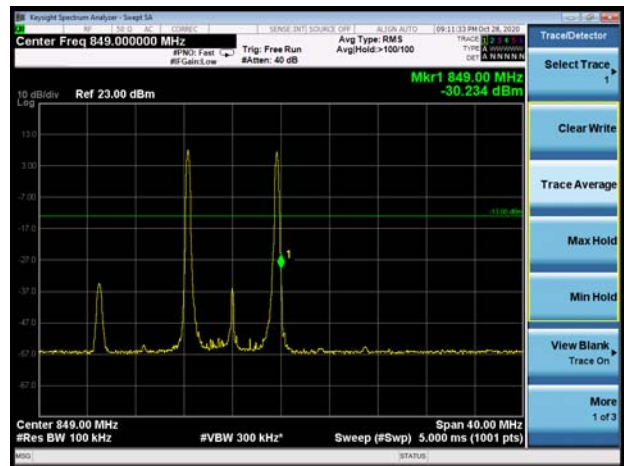
LTE Band 5 64QAM 10MHz CH-High 100%RB



CA_5B_3MHz+5MHz_QPSK CH-Low 1RB



CA_5B_3MHz+5MHz_QPSK CH-High 1RB



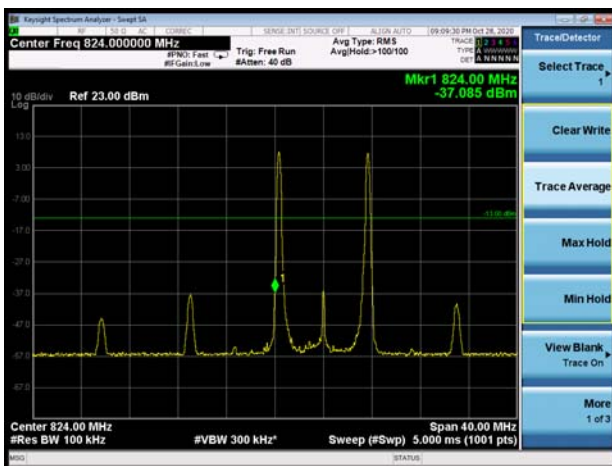
CA_5B_3MHz+5MHz_QPSK CH-Low 100%RB



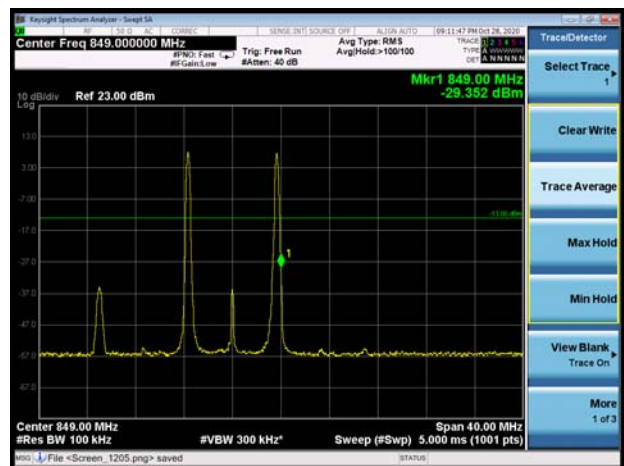
CA_5B_3MHz+5MHz_QPSK CH-High 100%RB



CA_5B_3MHz+5MHz_16QAM CH-Low 1RB

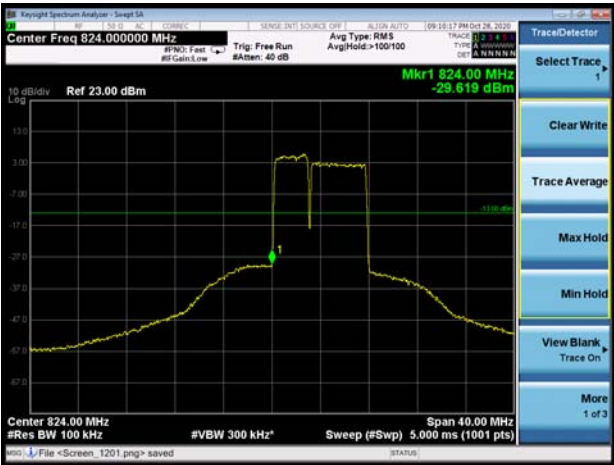


CA_5B_3MHz+5MHz_16QAM CH-High 1RB

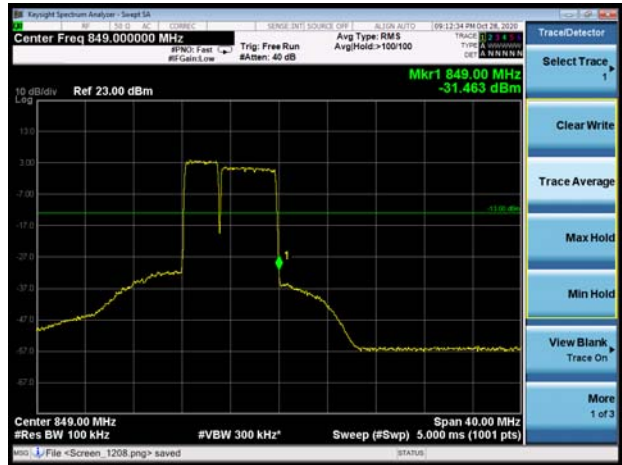




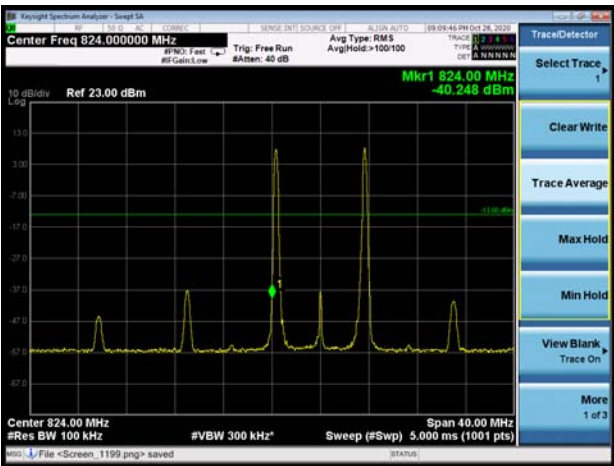
CA_5B_3MHz+5MHz_16QAM CH-Low 100%RB



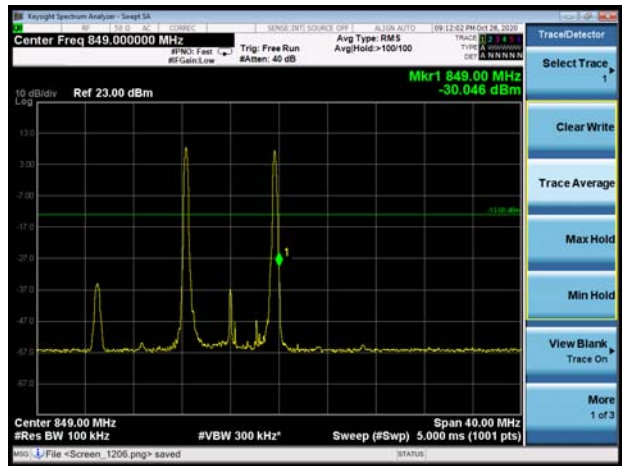
CA_5B_3MHz+5MHz_16QAM CH-High 100%RB



CA_5B_3MHz+5MHz_64QAM CH-Low 1RB



CA_5B_3MHz+5MHz_64QAM CH-High 1RB



CA_5B_3MHz+5MHz_64QAM CH-Low 100%RB

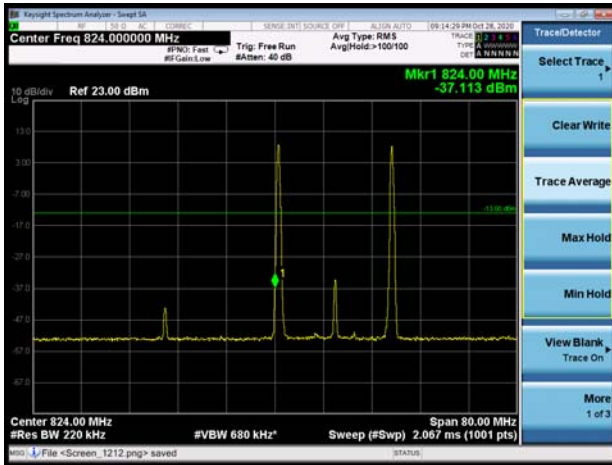


CA_5B_3MHz+5MHz_64QAM CH-High 100%RB

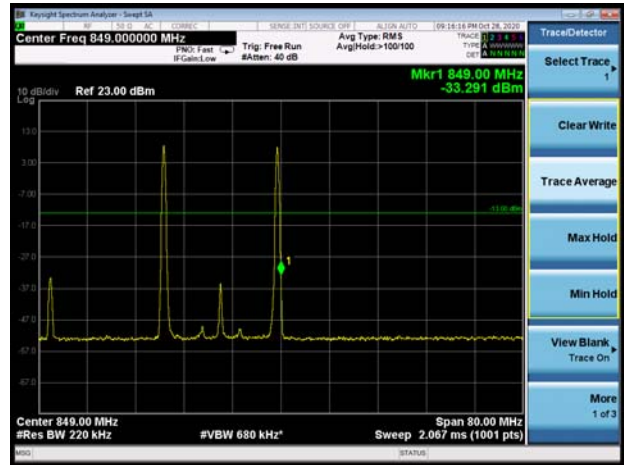




CA_5B_10MHz+10Hz_QPSK CH-Low 1RB



CA_5B_10MHz+10Hz_QPSK CH-High 1RB



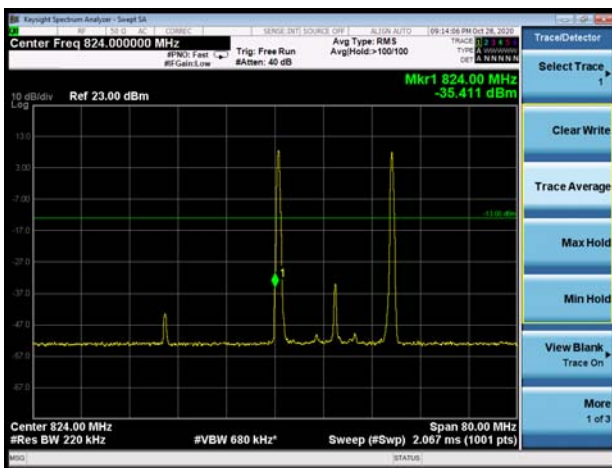
CA_5B_10MHz+10Hz_QPSK CH-Low 100%RB



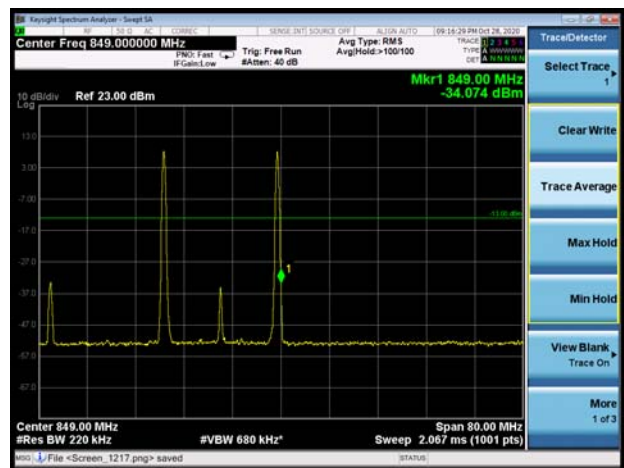
CA_5B_10MHz+10Hz_QPSK CH-High 100%RB



CA_5B_10MHz+10Hz_16QAM CH-Low 1RB



CA_5B_10MHz+10Hz_16QAM CH-High 1RB



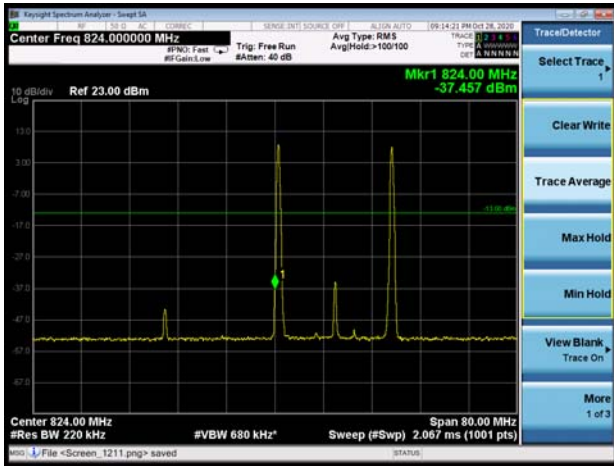
CA_5B_10MHz+10Hz_16QAM CH-Low 100%RB



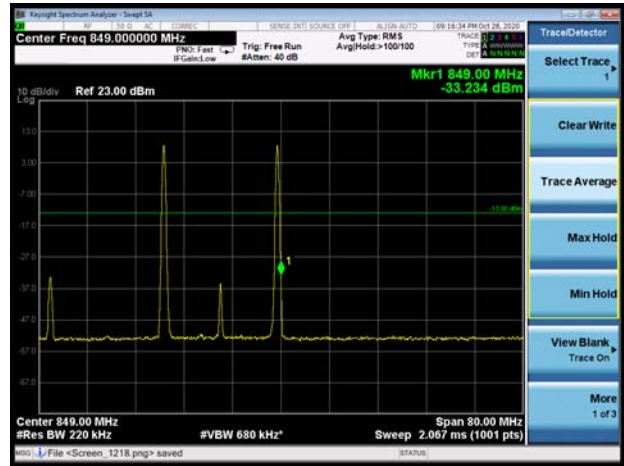
CA_5B_10MHz+10Hz_16QAM CH-High 100%RB



CA_5B_10MHz+10Hz_64QAM CH-Low 1RB



CA_5B_10MHz+10Hz_64QAM CH-High 1RB



CA_5B_10MHz+10Hz_64QAM CH-Low 100%RB



CA_5B_10MHz+10Hz_64QAM CH-High 100%RB



5.4. Peak-to-Average Power Ratio (PAPR)

Ambient condition

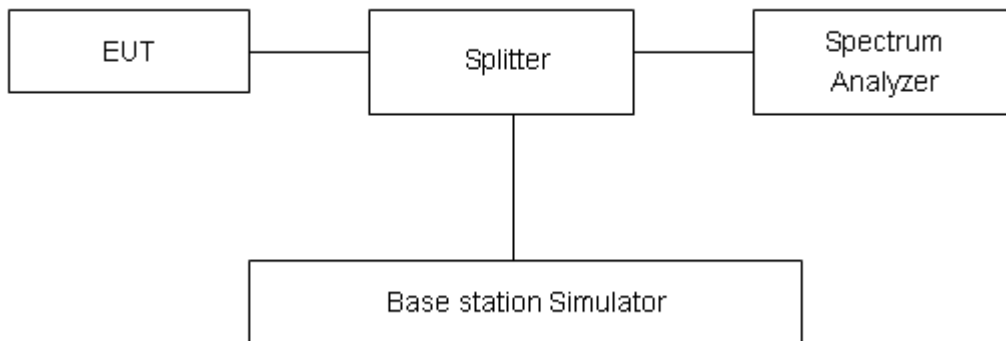
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

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

$$PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).$$

Test Setup



Limits

According to the Sec. 22.913(d), The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.4$ dB.



Test Results

Mode	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
WCDMA Band V (RMC)	4132	826.4	26.05	22.94	3.11	≤13	PASS
	4183	836.6	25.99	22.93	3.06	≤13	PASS
	4233	846.6	25.89	22.82	3.07	≤13	PASS

LTE Band 5								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	1.4	20407	824.7	27.61	22.29	5.32	≤13	PASS
		20525	836.5	27.44	22.27	5.17	≤13	PASS
		20643	848.3	27.07	22.19	4.88	≤13	PASS
	3	20415	825.5	27.63	22.40	5.23	≤13	PASS
		20525	836.5	27.42	22.37	5.05	≤13	PASS
		20635	847.5	27.15	22.23	4.92	≤13	PASS
	5	20425	826.5	27.76	22.40	5.36	≤13	PASS
		20525	836.5	27.50	22.35	5.15	≤13	PASS
		20625	846.5	27.33	22.23	5.10	≤13	PASS
	10	20450	829	27.68	22.37	5.31	≤13	PASS
		20525	836.5	27.57	22.34	5.23	≤13	PASS
		20600	844	27.49	22.28	5.21	≤13	PASS
16QAM	1.4	20407	824.7	27.45	21.31	6.14	≤13	PASS
		20525	836.5	27.23	21.27	5.96	≤13	PASS
		20643	848.3	27.04	21.27	5.77	≤13	PASS
	3	20415	825.5	27.52	21.44	6.08	≤13	PASS
		20525	836.5	27.32	21.38	5.94	≤13	PASS
		20635	847.5	27.06	21.27	5.79	≤13	PASS
	5	20425	826.5	27.58	21.44	6.14	≤13	PASS
		20525	836.5	27.32	21.39	5.93	≤13	PASS
		20625	846.5	27.13	21.25	5.88	≤13	PASS
	10	20450	829	27.51	21.39	6.12	≤13	PASS
		20525	836.5	27.38	21.35	6.03	≤13	PASS
		20600	844	27.30	21.27	6.03	≤13	PASS
QAM	1.4	20407	824.7	26.30	19.68	6.62	≤13	PASS
		20525	836.5	26.11	19.49	6.62	≤13	PASS
		20643	848.3	25.73	19.27	6.46	≤13	PASS
	3	20415	825.5	26.41	19.77	6.64	≤13	PASS



		20525	836.5	25.94	19.54	6.40	≤13	PASS
		20635	847.5	25.65	19.35	6.30	≤13	PASS
	5	20425	826.5	26.28	19.74	6.54	≤13	PASS
		20525	836.5	25.85	19.39	6.46	≤13	PASS
		20625	846.5	25.66	19.34	6.32	≤13	PASS
	10	20450	829	26.05	19.53	6.52	≤13	PASS
		20525	836.5	26.01	19.55	6.46	≤13	PASS
		20600	844	25.92	19.42	6.50	≤13	PASS

Mode	Bandwidth	PCC		SCC1		Modulation	Peak-to-Average Power Ratio (PAPR)		
		Channel	Frequency (MHz)	Channel	Frequency (MHz)		Peak (dBm)	Avg (dBm)	PAPR (dB)
CA_5B	CA_5B_3MHz+5MHz_QPSK	20501	834.1	20540	838	QPSK	27.09	20.59	6.50
	CA_5B_3MHz+5MHz_16QAM	20501	834.1	20540	838	16QAM	26.45	20.24	6.21
	CA_5B_3MHz+5MHz_64QAM	20501	834.1	20540	838	64QAM	25.37	19.17	6.20
	CA_5B_5MHz+3MHz_QPSK	20510	835	20549	838.9	QPSK	27.24	21.46	5.78
	CA_5B_5MHz+3MHz_16QAM	20510	835	20549	838.9	16QAM	27.04	20.54	6.50
	CA_5B_5MHz+3MHz_64QAM	20510	835	20549	838.9	64QAM	26.75	20.19	6.56
	CA_5B_5MHz+10MHz_QPSK	20478	831.8	20550	839	QPSK	27.48	21.49	5.99
	CA_5B_5MHz+10MHz_16QAM	20478	831.8	20550	839	16QAM	27.20	20.57	6.63
	CA_5B_5MHz+10MHz_64QAM	20478	831.8	20550	839	64QAM	26.96	20.14	6.82
	CA_5B_10MHz+5MHz_QPSK	20500	834	20572	841.2	QPSK	27.39	21.51	5.88
	CA_5B_10MHz+5MHz_16QAM	20500	834	20572	841.2	16QAM	27.11	20.53	6.58
	CA_5B_10MHz+5MHz_64QAM	20500	834	20572	841.2	64QAM	26.89	20.13	6.76
	CA_5B_10MHz+10MHz_QPSK	20476	831.6	20575	841.5	QPSK	27.50	21.42	6.08
	CA_5B_10MHz+10MHz_16QAM	20476	831.6	20575	841.5	16QAM	27.16	20.44	6.72
CA_5B_10MHz+10MHz_64QAM	20476	831.6	20575	841.5	64QAM	27.00	20.10	6.90	

5.5. Frequency Stability

Ambient condition

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

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -30°C to +50°C in 10°C step size,

(1) With all power removed, the temperature was decreased to 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 +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

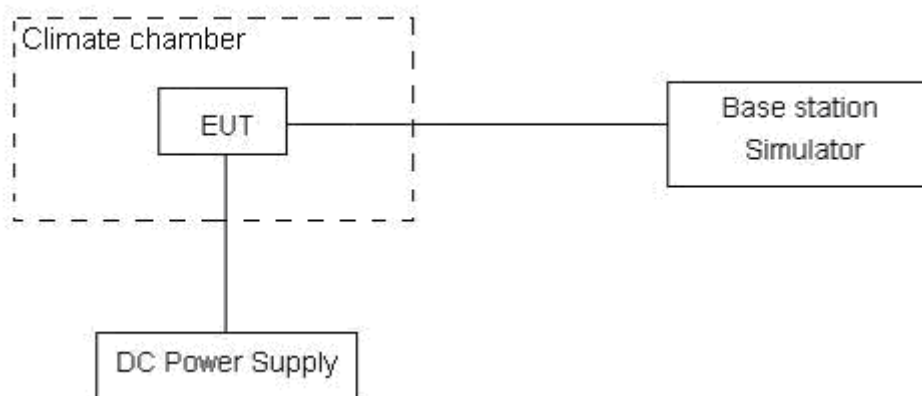
Frequency Stability (Voltage Variation)

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

Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced 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 3.6 V and 4.3 V, with a nominal voltage of 3.8V.

Test setup



**Limits**

According to the Sec. 22.355, the frequency stability of the carrier shall be accurate to within 2.5 ppm of the received frequency for mobile stations.

Limits	≤ 2.5 ppm
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Measurement Uncertainty

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



Test Result

WCDMA Band V						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal (25°C)	Normal	4.27	7.46	0.00227	0.00397	PASS
Extreme (50°C)		15.69	10.73	0.00835	0.00571	PASS
Extreme (40°C)		17.97	16.75	0.00956	0.00891	PASS
Extreme (30°C)		7.59	6.83	0.00404	0.00363	PASS
Extreme (20°C)		12.04	15.51	0.00641	0.00825	PASS
Extreme (10°C)		5.87	4.01	0.00312	0.00213	PASS
Extreme (0°C)		4.63	13.49	0.00246	0.00718	PASS
Extreme (-10°C)		17.99	15.57	0.00957	0.00828	PASS
Extreme (-20°C)		12.99	4.38	0.00691	0.00233	PASS
Extreme (-30°C)		8.22	1.44	0.00437	0.00077	PASS
25°C	LV	13.88	14.96	0.00738	0.00796	PASS
	HV	4.16	7.49	0.00221	0.00398	PASS

LTE Band 5								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	13.64	7.57	6.17	0.00726	0.00403	0.00328	PASS
Extreme (50°C)		15.47	10.82	12.01	0.00823	0.00576	0.00639	PASS
Extreme (40°C)		5.94	11.96	9.90	0.00316	0.00636	0.00527	PASS
Extreme (30°C)		4.64	12.58	7.02	0.00247	0.00669	0.00373	PASS
Extreme (20°C)		14.22	4.02	10.98	0.00757	0.00214	0.00584	PASS
Extreme (10°C)		17.02	1.33	11.94	0.00905	0.00071	0.00635	PASS
Extreme (0°C)		1.45	2.84	9.87	0.00077	0.00151	0.00525	PASS
Extreme (-10°C)		14.67	5.44	6.18	0.00780	0.00289	0.00329	PASS
Extreme (-20°C)		17.21	1.34	13.07	0.00915	0.00071	0.00695	PASS
Extreme (-30°C)		9.35	1.84	11.45	0.00497	0.00098	0.00609	PASS
25°C	LV	1.10	1.97	12.79	0.00059	0.00105	0.00680	PASS
	HV	6.36	2.55	14.68	0.00338	0.00136	0.00781	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	3MHz							



Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	1.28	1.60	10.37	0.00068	0.00085	0.00551	PASS
Extreme (50°C)		17.92	12.83	7.34	0.00953	0.00683	0.00391	PASS
Extreme (40°C)		7.63	2.95	4.24	0.00406	0.00157	0.00226	PASS
Extreme (30°C)		5.94	3.15	3.35	0.00316	0.00168	0.00178	PASS
Extreme (20°C)		16.18	7.27	8.82	0.00860	0.00387	0.00469	PASS
Extreme (10°C)		8.06	1.72	7.14	0.00429	0.00091	0.00380	PASS
Extreme (0°C)		15.10	11.47	4.94	0.00803	0.00610	0.00263	PASS
Extreme (-10°C)		10.51	1.53	3.08	0.00559	0.00082	0.00164	PASS
Extreme (-20°C)		14.67	10.09	13.97	0.00780	0.00537	0.00743	PASS
Extreme (-30°C)		4.96	4.77	15.31	0.00264	0.00254	0.00814	PASS
25°C	LV	2.98	7.50	12.10	0.00158	0.00399	0.00644	PASS
	HV	1.08	17.86	9.87	0.00057	0.00950	0.00525	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	4.39	1.36	14.33	0.00233	0.00072	0.00762	PASS
Extreme (50°C)		2.91	15.61	2.01	0.00155	0.00830	0.00107	PASS
Extreme (40°C)		17.45	11.25	8.98	0.00928	0.00599	0.00478	PASS
Extreme (30°C)		4.52	15.68	16.18	0.00241	0.00834	0.00860	PASS
Extreme (20°C)		3.13	1.34	15.56	0.00167	0.00071	0.00827	PASS
Extreme (10°C)		1.09	8.68	6.50	0.00058	0.00462	0.00346	PASS
Extreme (0°C)		4.76	16.88	17.99	0.00253	0.00898	0.00957	PASS
Extreme (-10°C)		14.43	1.82	15.56	0.00768	0.00097	0.00828	PASS
Extreme (-20°C)		16.54	17.94	7.89	0.00880	0.00954	0.00420	PASS
Extreme (-30°C)		7.01	3.01	16.53	0.00373	0.00160	0.00879	PASS
25°C	LV	7.12	6.58	11.71	0.00379	0.00350	0.00623	PASS
	HV	15.84	14.31	2.01	0.00842	0.00761	0.00107	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	16.59	1.60	9.08	0.00883	0.00085	0.00483	PASS
Extreme (50°C)		17.94	8.54	6.03	0.00954	0.00454	0.00321	PASS
Extreme (40°C)		15.64	1.72	17.97	0.00832	0.00092	0.00956	PASS
Extreme (30°C)		14.78	13.04	2.67	0.00786	0.00694	0.00142	PASS
Extreme (20°C)		9.43	16.42	10.46	0.00502	0.00874	0.00556	PASS
Extreme (10°C)		14.41	4.56	5.26	0.00766	0.00242	0.00280	PASS
Extreme (0°C)		7.66	2.20	11.21	0.00407	0.00117	0.00596	PASS
Extreme (-10°C)		16.10	15.60	7.32	0.00856	0.00830	0.00389	PASS



Extreme (-20°C)		3.29	11.97	12.16	0.00175	0.00637	0.00647	PASS
Extreme (-30°C)		6.13	17.07	16.37	0.00326	0.00908	0.00871	PASS
25°C	LV	1.65	16.32	10.01	0.00088	0.00868	0.00533	PASS
	HV	14.30	16.39	10.05	0.00761	0.00872	0.00535	PASS

CA_5B_QPSK		20MHz+10MHz (Bandwidth)		20MHz+20MHz (Bandwidth)		Verdict
Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					
Normal (25°C)	Normal	16.83	0.00148	7.34	0.00390	PASS
Extreme (50°C)		17.84	0.00233	15.71	0.00836	PASS
Extreme (40°C)		16.42	0.00829	8.65	0.00460	PASS
Extreme (30°C)		6.02	0.00880	15.76	0.00838	PASS
Extreme (20°C)		14.95	0.00523	9.01	0.00479	PASS
Extreme (10°C)		11.30	0.00629	1.35	0.00072	PASS
Extreme (0°C)		18.00	0.00214	4.10	0.00218	PASS
Extreme (-10°C)		10.71	0.00765	13.95	0.00742	PASS
Extreme (-20°C)		12.33	0.00791	8.50	0.00452	PASS
Extreme (-30°C)		16.54	0.00731	6.06	0.00322	PASS
25°C	LV	8.06	0.00053	7.51	0.00399	PASS
	HV	1.34	0.00765	6.80	0.00361	PASS
CA_5B_16QAM		20MHz+10MHz (Bandwidth)		20MHz+20MHz (Bandwidth)		Verdict
Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					
Normal (25°C)	Normal	4.06	0.00216	9.66	0.00514	PASS
Extreme (50°C)		14.27	0.00759	2.74	0.00146	PASS
Extreme (40°C)		10.81	0.00575	3.19	0.00170	PASS
Extreme (30°C)		1.76	0.00094	16.42	0.00873	PASS
Extreme (20°C)		5.62	0.00299	8.72	0.00464	PASS
Extreme (10°C)		11.53	0.00613	4.14	0.00220	PASS
Extreme (0°C)		11.12	0.00592	5.61	0.00298	PASS
Extreme (-10°C)		11.90	0.00633	6.13	0.00326	PASS
Extreme (-20°C)		6.06	0.00322	4.35	0.00231	PASS
Extreme (-30°C)		12.64	0.00673	9.30	0.00495	PASS
25°C	LV	14.40	0.00766	10.72	0.00570	PASS
	HV	10.76	0.00572	3.14	0.00167	PASS
CA_5B_64QAM		20MHz+10MHz (Bandwidth)		20MHz+20MHz (Bandwidth)		Verdict
Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					



Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					
Normal (25°C)	Normal	4.24	0.00226	3.34	0.00178	PASS
Extreme (50°C)		17.67	0.00940	13.19	0.00702	PASS
Extreme (40°C)		17.35	0.00923	6.36	0.00338	PASS
Extreme (30°C)		8.92	0.00475	4.87	0.00259	PASS
Extreme (20°C)		11.33	0.00602	12.41	0.00660	PASS
Extreme (10°C)		9.83	0.00523	6.89	0.00367	PASS
Extreme (0°C)		11.37	0.00605	5.13	0.00273	PASS
Extreme (-10°C)		7.80	0.00415	17.28	0.00919	PASS
Extreme (-20°C)		14.05	0.00748	17.34	0.00922	PASS
Extreme (-30°C)		5.65	0.00300	14.34	0.00763	PASS
25°C	LV	5.07	0.00270	15.12	0.00804	PASS
	HV	9.18	0.00488	4.70	0.00250	PASS

5.6. Spurious Emissions at Antenna Terminals

Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier.

The peak detector is used. RBW are set to 100 kHz and VBW are set to 300 kHz for below 1G, RBW are set to 1MHz and VBW are set to 3MHz for above 1G, Sweep is set to ATUO.

RBW is set to 1 kHz (0.009MHz~ 0.15 MHz),

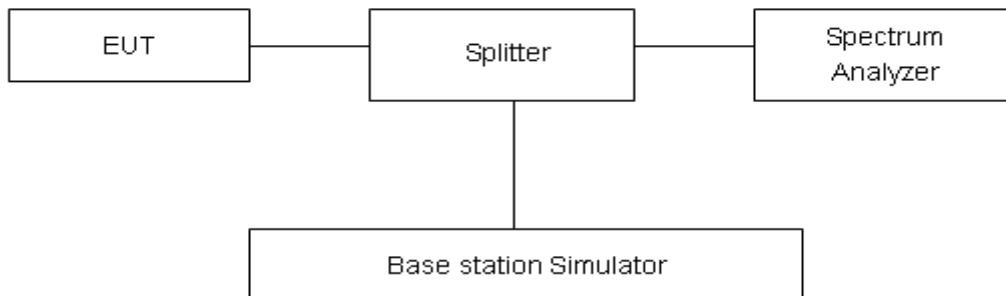
RBW is set to 10 kHz (0.15 MHz~ 30 MHz)

RBW is set to 100 kHz (30MHz~1000 MHz)

RBW is set to 1000 kHz (above 1000MHz)

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

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

Measurement Uncertainty

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

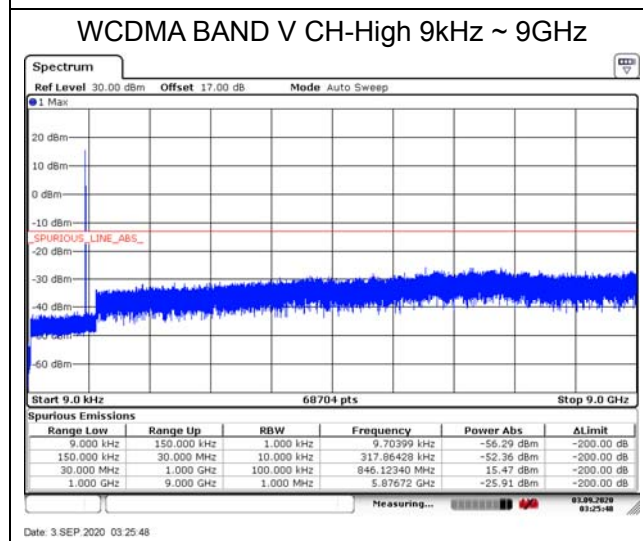
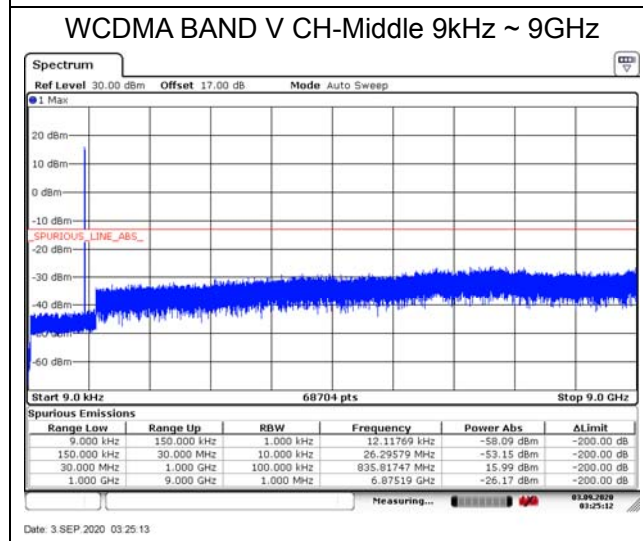
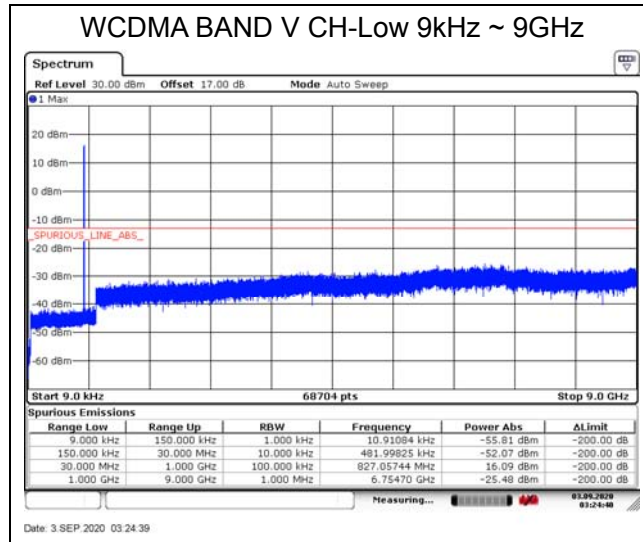
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-18GHz	1.407 dB



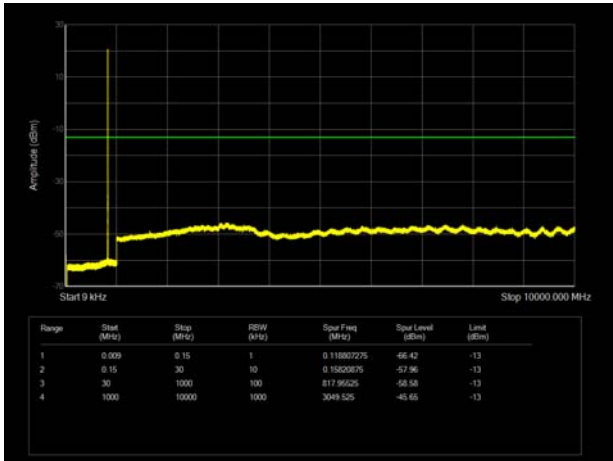
Test Result

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.

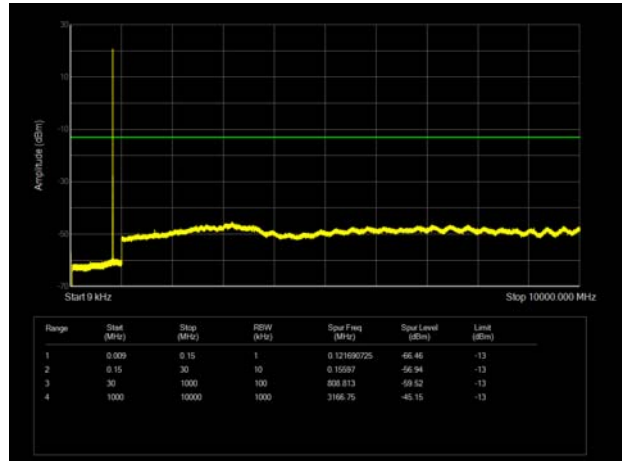
The signal beyond the limit is carrier.



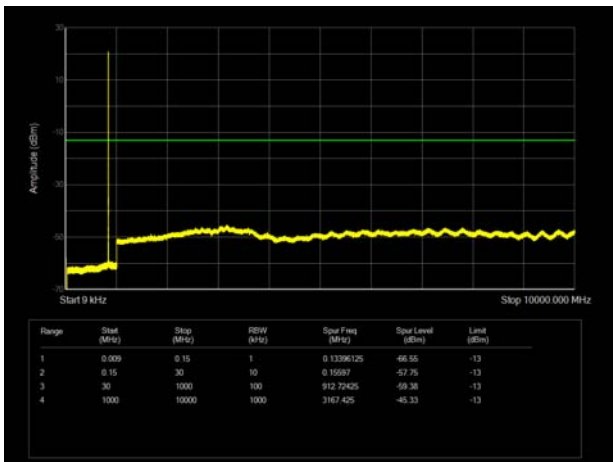
LTE Band 5 1.4MHz CH-Low 9kHz~10GHz



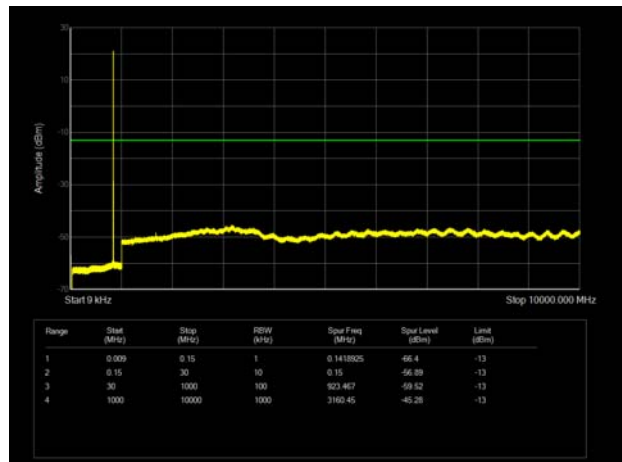
LTE Band 5 3MHz CH-Low 9kHz~10GHz



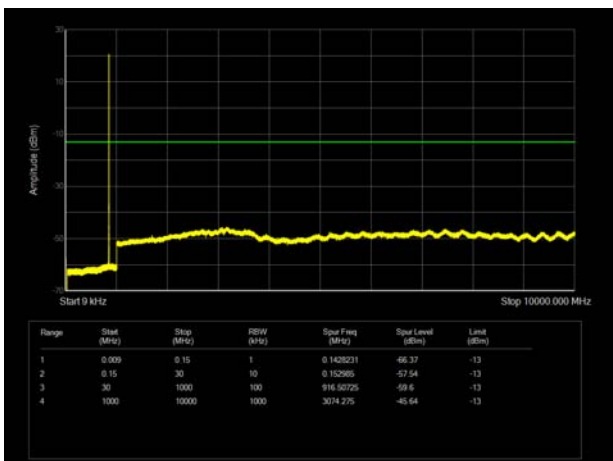
LTE Band 5 1.4MHz CH-Middle 9kHz~10GHz



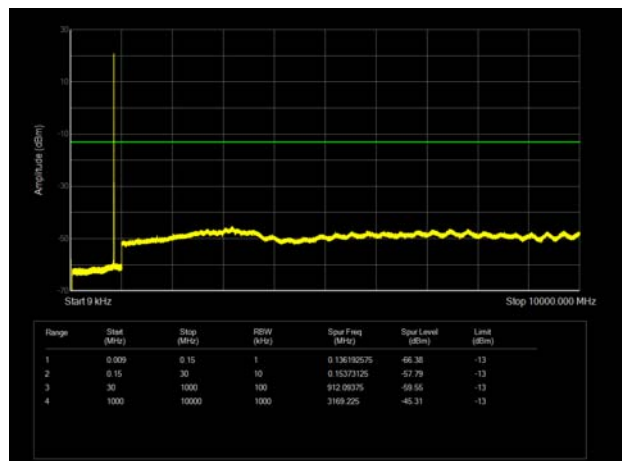
LTE Band 5 3MHz CH-Middle 9kHz~10GHz



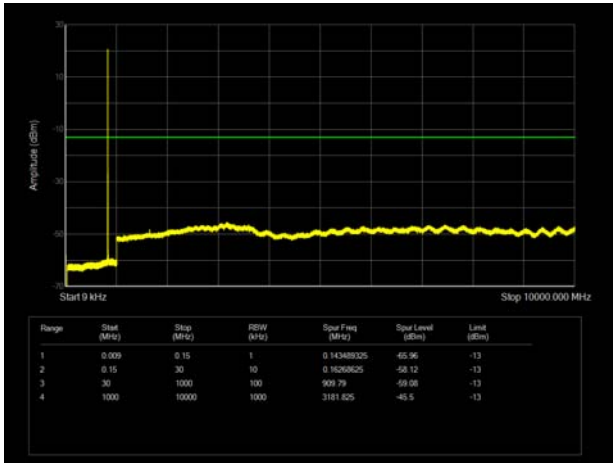
LTE Band 5 1.4MHz CH-High 9kHz~10GHz



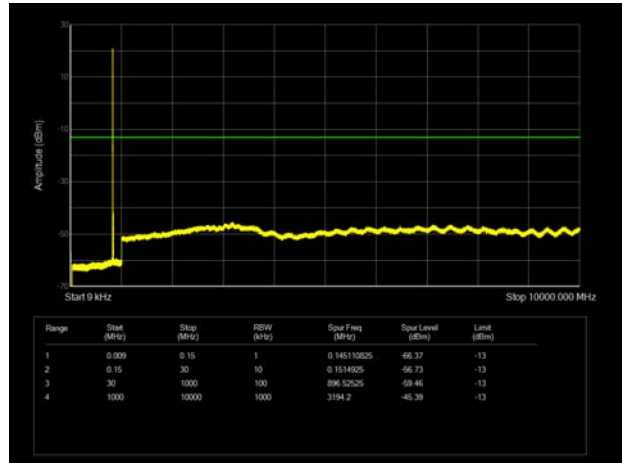
LTE Band 5 3MHz CH-High 9kHz~10GHz



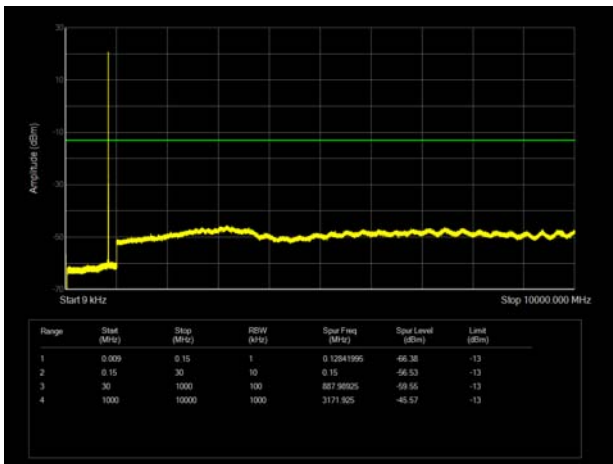
LTE Band 5 5MHz CH-Low 9kHz~10GHz



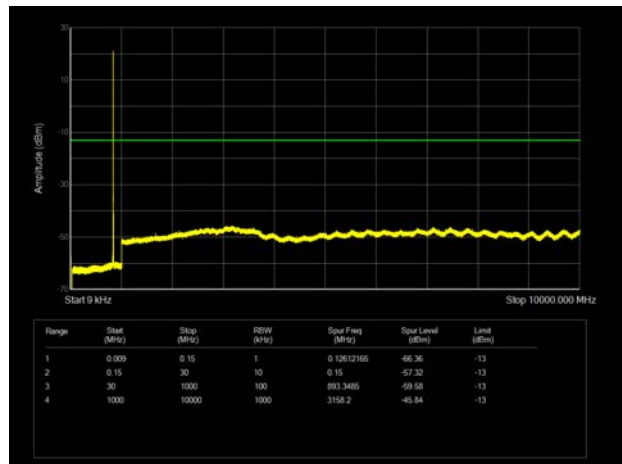
LTE Band 5 10MHz CH-Low 9kHz~10GHz



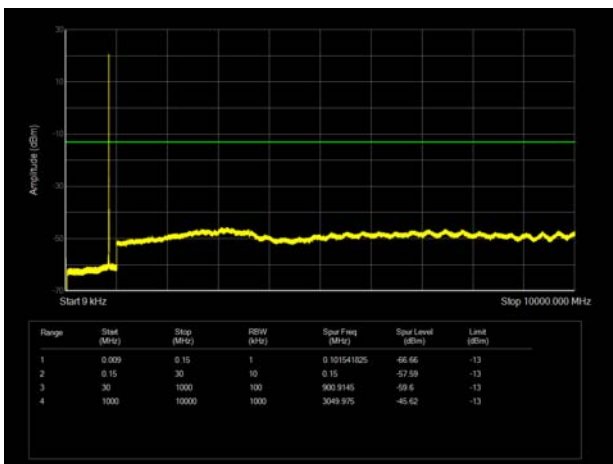
LTE Band 5 5MHz CH-Middle 9kHz~10GHz



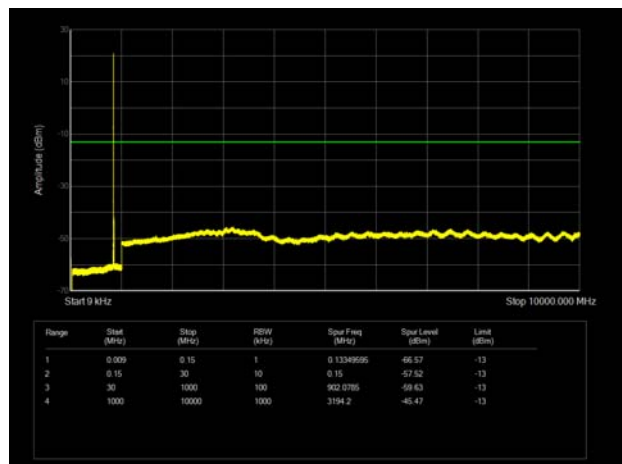
LTE Band 5 10MHz CH-Middle 9kHz~10GHz



LTE Band 5 5MHz CH-High 9kHz~10GHz

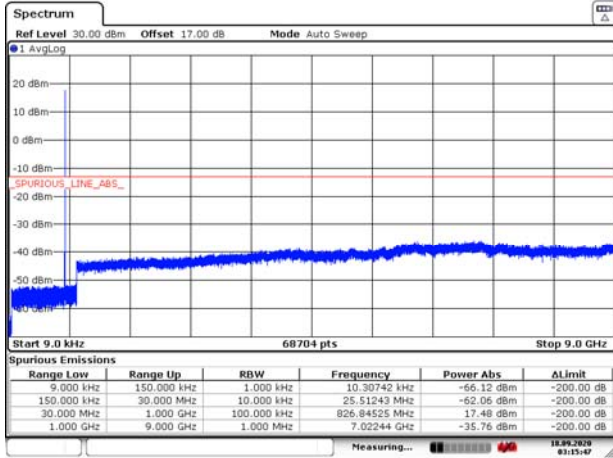


LTE Band 5 10MHz CH-High 9kHz~10GHz



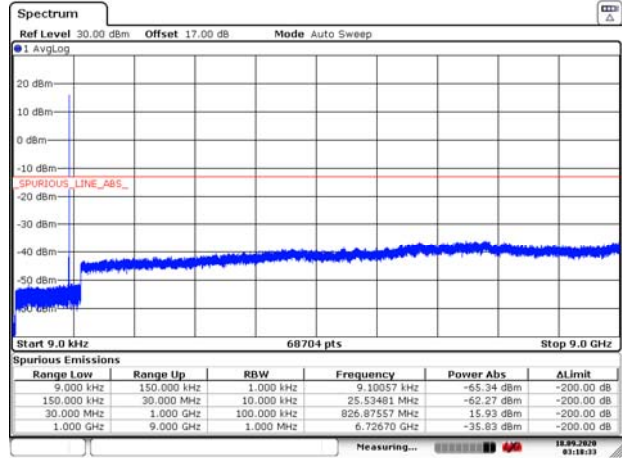


CA_5B_3MHz+5MHz_QPSK CH-Low 9kHz~9GHz



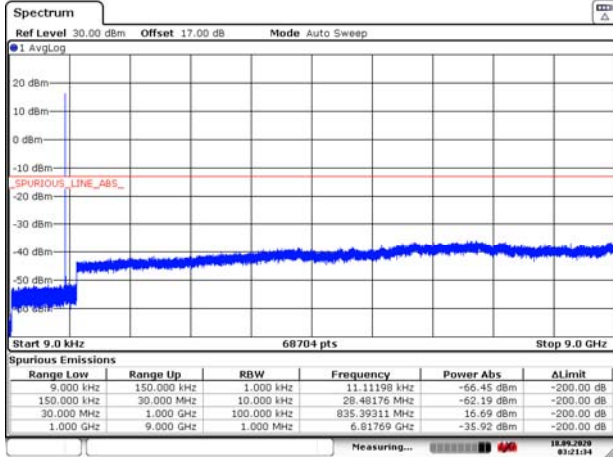
Date: 18 SEP 2020 03:15:47

CA_5B_3MHz+5MHz_16QAM CH-Low 9kHz~9GHz



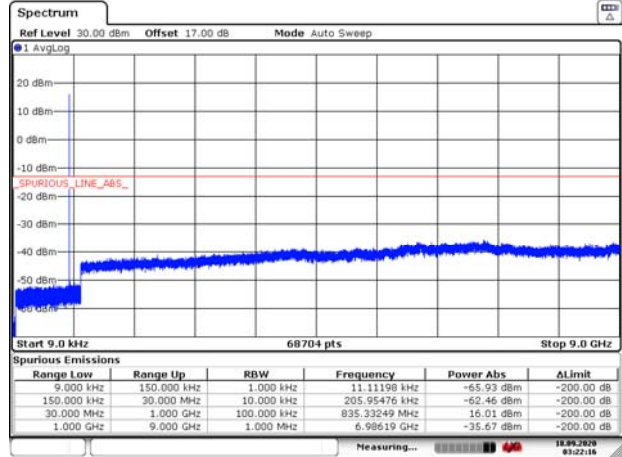
Date: 18 SEP 2020 03:18:33

CA_5B_3MHz+5MHz_QPSK CH-Middle 9kHz~9GHz



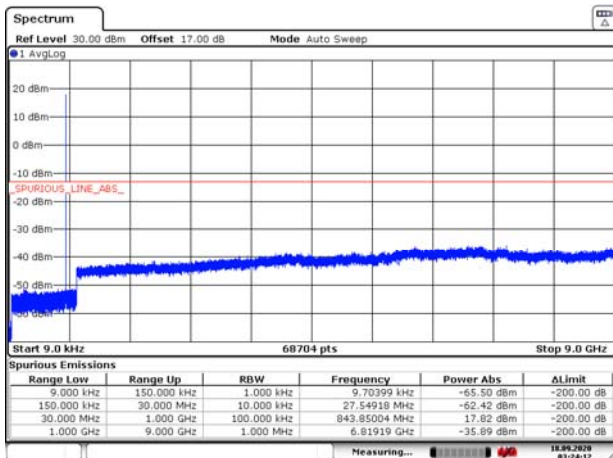
Date: 18 SEP 2020 03:21:34

CA_5B_3MHz+5MHz_16QAM CH-Middle 9kHz~9GHz



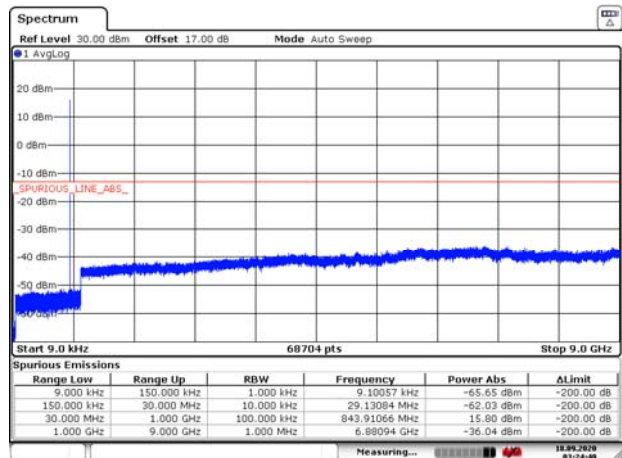
Date: 18 SEP 2020 03:22:15

CA_5B_3MHz+5MHz_QPSK CH-High 9kHz~9GHz



Date: 18 SEP 2020 03:24:12

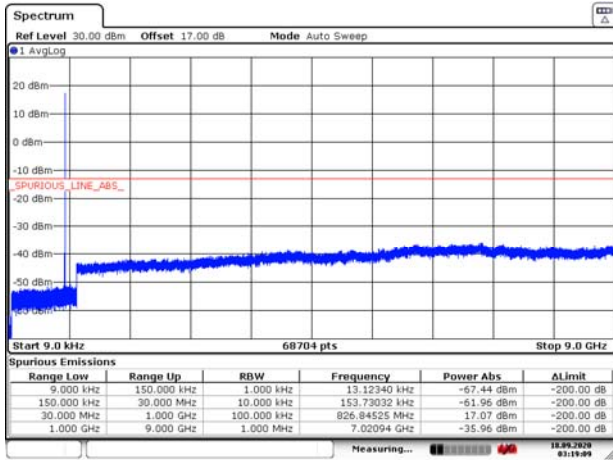
CA_5B_3MHz+5MHz_16QAM CH-High 9kHz~9GHz



Date: 18 SEP 2020 03:24:49

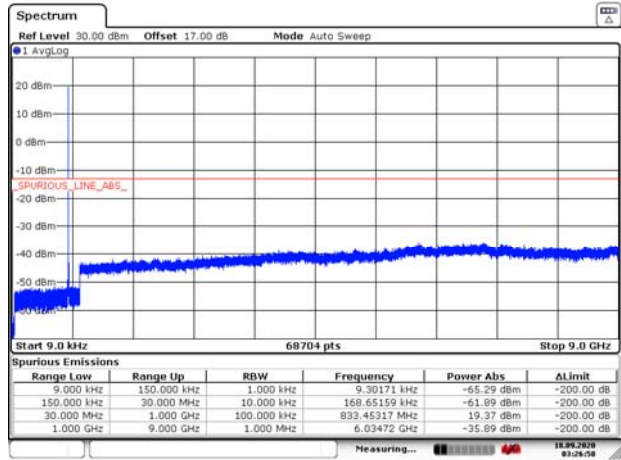


CA_5B_3MHz+5MHz_64QAM CH-Low 9kHz~9GHz



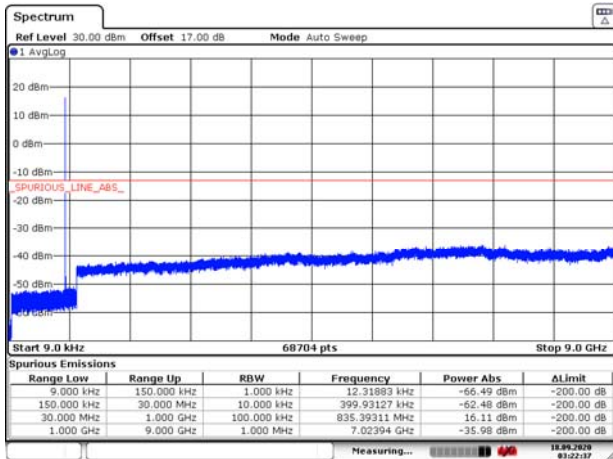
Date: 18 SEP 2020 03:19:09

CA_5B_10MHz+10Hz_QPSK CH-Low 9kHz~9GHz



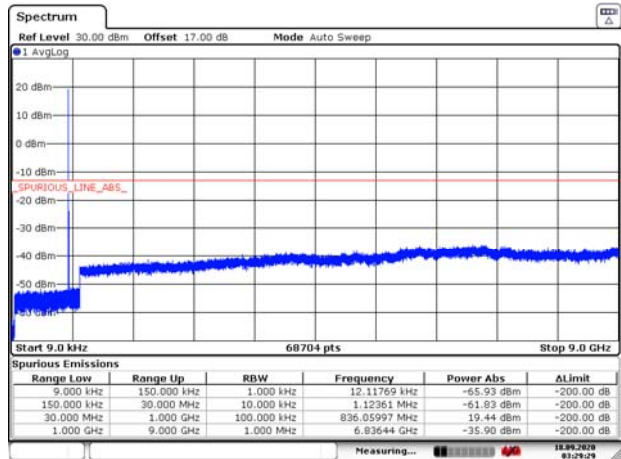
Date: 18 SEP 2020 03:26:59

CA_5B_3MHz+5MHz_64QAM CH-Middle 9kHz~9GHz



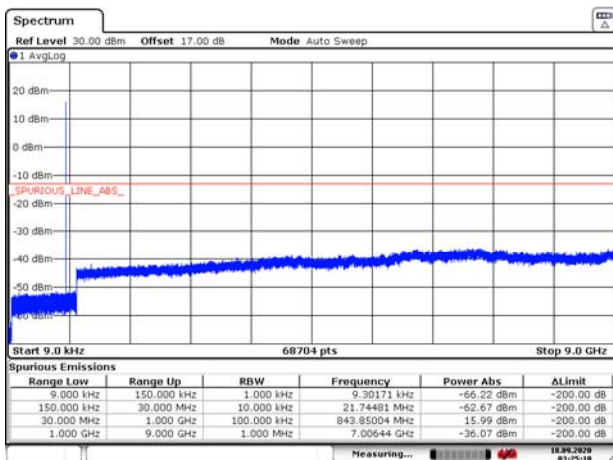
Date: 18 SEP 2020 03:22:37

CA_5B_10MHz+10Hz_QPSK CH-Middle 9kHz~9GHz



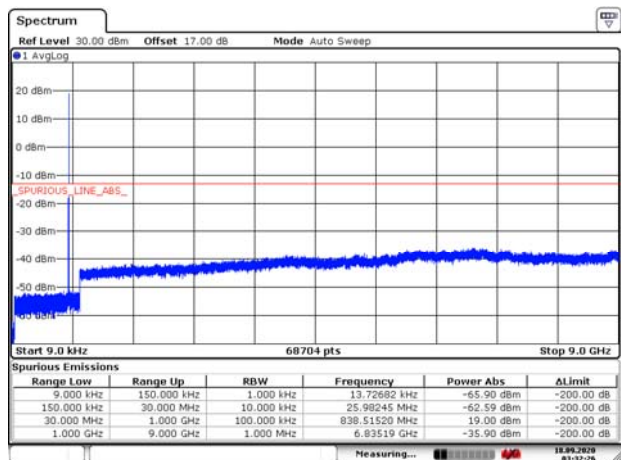
Date: 18 SEP 2020 03:29:29

CA_5B_3MHz+5MHz_64QAM CH-High 9kHz~9GHz



Date: 18 SEP 2020 03:25:10

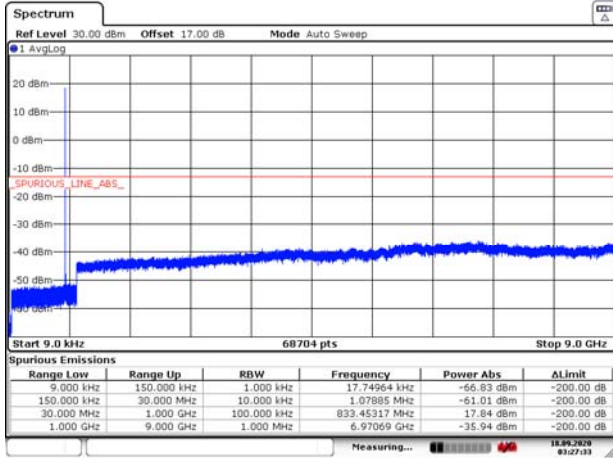
CA_5B_10MHz+10Hz_QPSK CH-High 9kHz~9GHz



Date: 18 SEP 2020 03:32:26

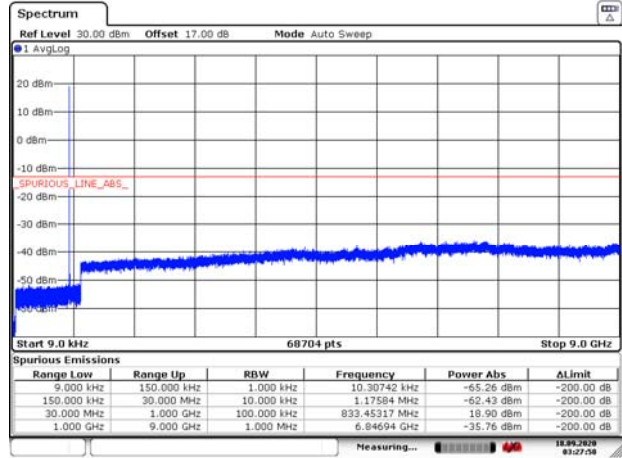


CA_5B_10MHz+10Hz_16QAM CH-Low 9kHz~9GHz



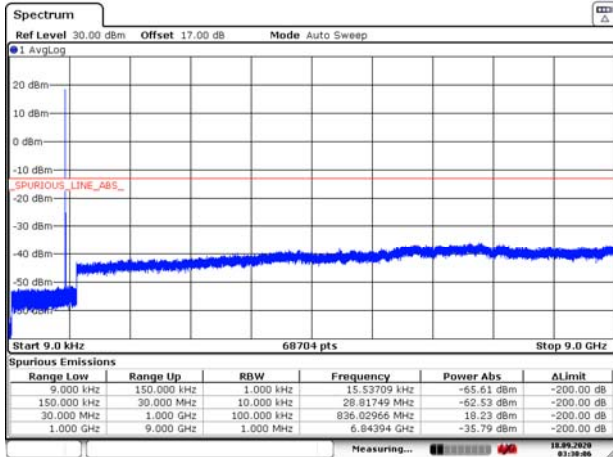
Date: 18 SEP 2020 03:27:33

CA_5B_10MHz+10Hz_64QAM CH-Low 9kHz~9GHz



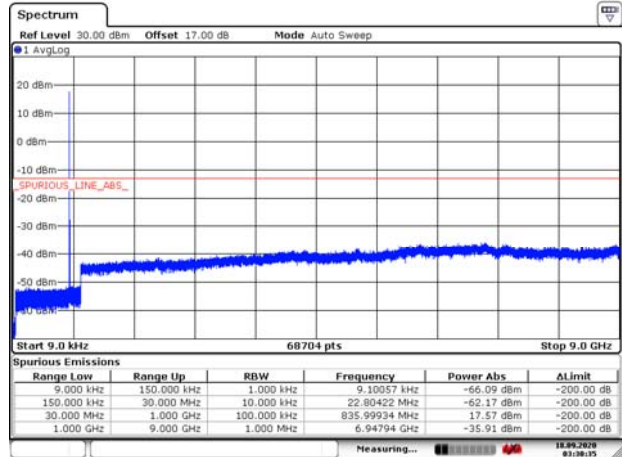
Date: 18 SEP 2020 03:27:58

CA_5B_10MHz+10Hz_16QAM CH-Middle 9kHz~9GHz



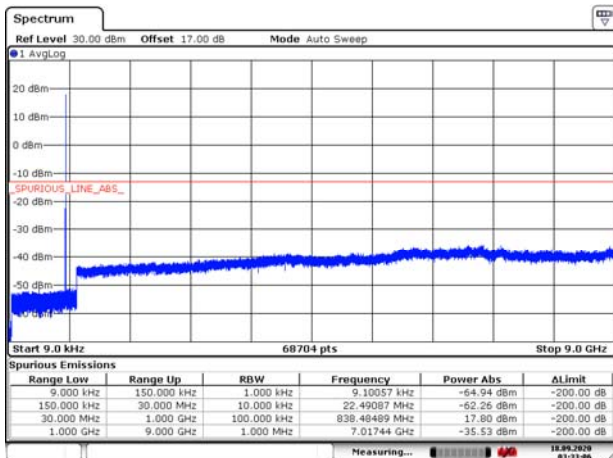
Date: 18 SEP 2020 03:30:06

CA_5B_10MHz+10Hz_64QAM CH-Middle 9kHz~9GHz



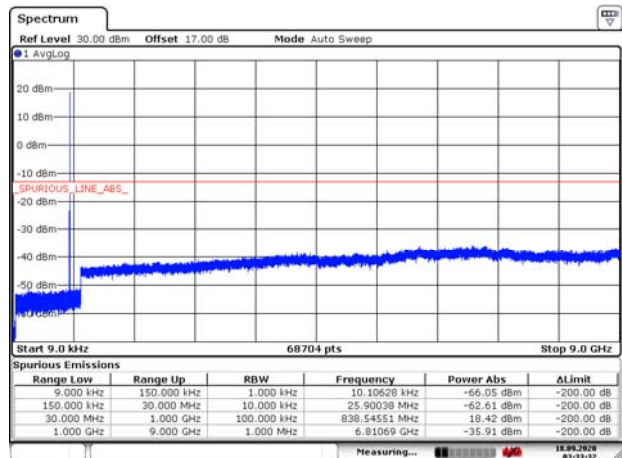
Date: 18 SEP 2020 03:30:35

CA_5B_10MHz+10Hz_16QAM CH-High 9kHz~9GHz



Date: 18 SEP 2020 03:33:06

CA_5B_10MHz+10Hz_64QAM CH-High 9kHz~9GHz



Date: 18 SEP 2020 03:33:32

5.7. Radiates Spurious Emission

Ambient condition

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

Method of Measurement

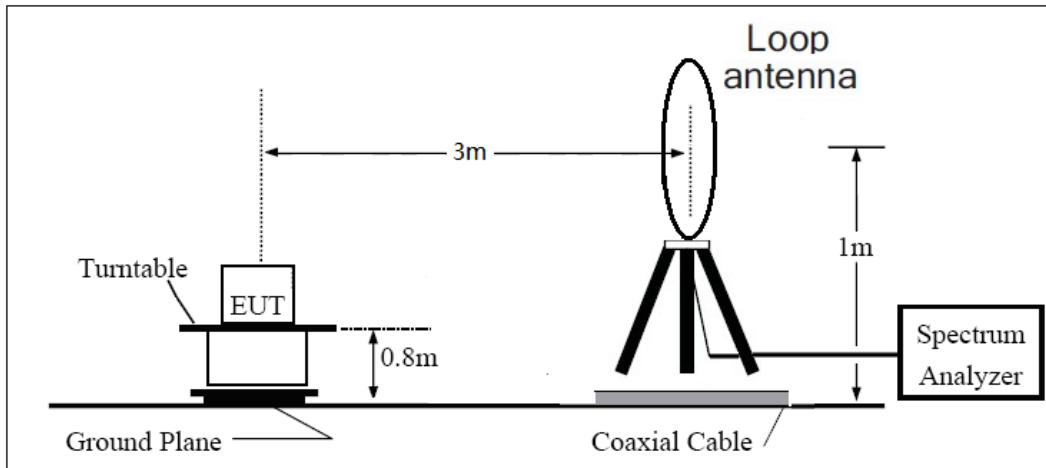
1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable 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:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + 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, $ERP = EIRP - 2.15\text{dBi}$.

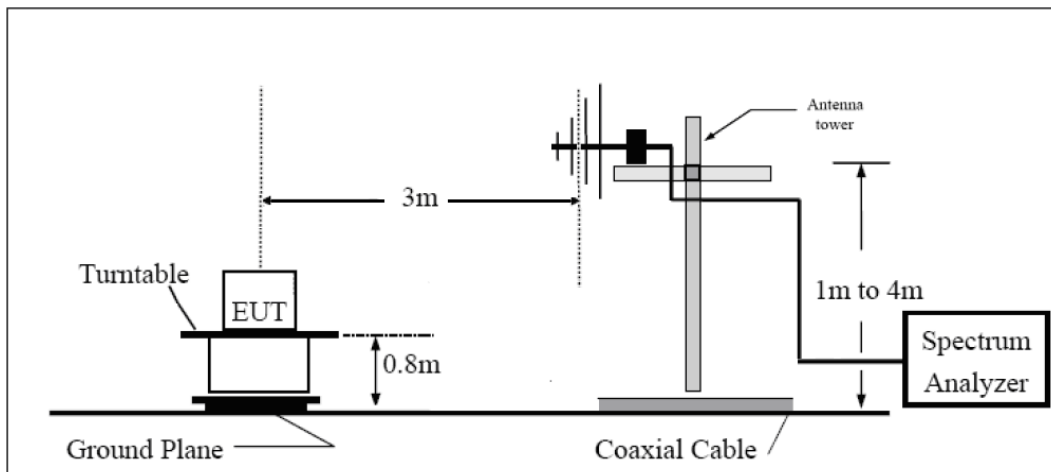
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

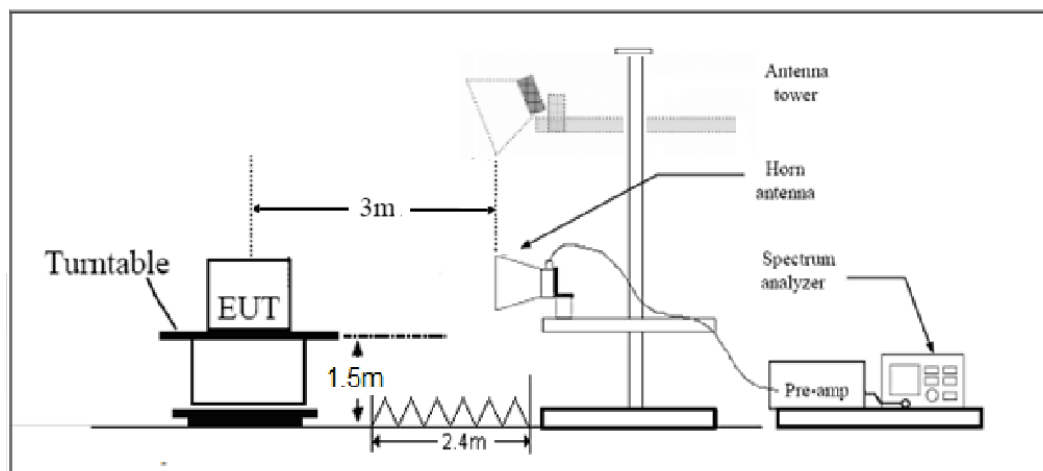
9KHz ~ 30MHz



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
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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 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

WCDMA Band V CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.20	-67.50	2.00	10.75	Horizontal	-60.90	-13.00	47.90	315
3	2509.80	-62.74	2.51	11.05	Horizontal	-56.35	-13.00	43.35	180
4	3346.40	-58.30	4.20	11.15	Horizontal	-53.50	-13.00	40.50	45
5	4183.00	-56.32	5.20	11.15	Horizontal	-52.52	-13.00	39.52	270
6	5019.60	-55.67	5.50	11.95	Horizontal	-51.37	-13.00	38.37	90
7	5856.20	-56.57	5.70	13.55	Horizontal	-50.87	-13.00	37.87	315
8	6692.80	-58.94	6.30	13.75	Horizontal	-53.64	-13.00	40.64	90
9	7529.40	-54.21	6.80	13.85	Horizontal	-49.31	-13.00	36.31	180
10	8366.00	-54.94	6.90	14.25	Horizontal	-49.74	-13.00	36.74	45

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

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

LTE Band 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	1673.00	-67.16	2.00	10.75	Horizontal	-60.56	-13.00	47.56	45
3	2509.50	-61.31	2.51	11.05	Horizontal	-54.92	-13.00	41.92	315
4	3346.00	-57.69	4.20	11.15	Horizontal	-52.89	-13.00	39.89	45
5	4182.50	-55.57	5.20	11.15	Horizontal	-51.77	-13.00	38.77	315
6	5019.00	-52.73	5.50	11.95	Horizontal	-48.43	-13.00	35.43	270
7	5855.50	-55.84	5.70	13.55	Horizontal	-50.14	-13.00	37.14	180
8	6692.00	-57.23	6.30	13.75	Horizontal	-51.93	-13.00	38.93	225
9	7528.50	-52.88	6.80	13.85	Horizontal	-47.98	-13.00	34.98	0
10	8365.00	-53.67	6.90	14.25	Horizontal	-48.47	-13.00	35.47	45

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

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



LTE Band 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	1668.60	-66.76	2.00	10.75	Horizontal	-60.16	-13.00	47.16	45
3	2503.30	-62.89	2.51	11.05	Horizontal	-56.50	-13.00	43.50	225
4	3466.20	-58.49	4.20	11.15	Horizontal	-53.69	-13.00	40.69	315
5	4215.90	-54.78	5.20	11.15	Horizontal	-50.98	-13.00	37.98	90
6	5165.60	-53.46	5.50	11.95	Horizontal	-49.16	-13.00	36.16	45
7	5815.30	-56.22	5.70	13.55	Horizontal	-50.52	-13.00	37.52	270
8	6765.00	-57.48	6.30	13.75	Horizontal	-52.18	-13.00	39.18	90
9	7614.70	-53.99	6.80	13.85	Horizontal	-49.09	-13.00	36.09	45
10	8464.40	-52.21	6.90	14.25	Horizontal	-47.01	-13.00	34.01	135

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

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

LTE Band 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	1664.40	-57.05	2.00	10.75	Horizontal	-50.45	-13.00	37.45	45
3	2496.60	-55.16	2.51	11.05	Horizontal	-48.77	-13.00	35.77	315
4	3346.00	-57.50	4.20	11.15	Horizontal	-52.70	-13.00	39.70	0
5	4182.50	-55.35	5.20	11.15	Horizontal	-51.55	-13.00	38.55	0
6	5019.00	-54.11	5.50	11.95	Horizontal	-49.81	-13.00	36.81	45
7	5855.50	-56.22	5.70	13.55	Horizontal	-50.52	-13.00	37.52	315
8	6692.00	-56.81	6.30	13.75	Horizontal	-51.51	-13.00	38.51	90
9	7528.50	-54.07	6.80	13.85	Horizontal	-49.17	-13.00	36.17	45
10	8365.00	-53.21	6.90	14.25	Horizontal	-48.01	-13.00	35.01	135

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

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



CA 5B_3M+5M CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1668.66	-67.51	2.00	10.75	Horizontal	-60.91	-13.00	47.91	45
3	2502.99	-66.63	2.51	11.05	Horizontal	-60.24	-13.00	47.24	135
4	3337.32	-62.14	4.20	11.15	Horizontal	-57.34	-13.00	44.34	45
5	4171.65	-61.01	5.20	11.15	Horizontal	-57.21	-13.00	44.21	180
6	50005.98	-59.29	5.50	11.95	Horizontal	-54.99	-13.00	41.99	90
7	5840.31	-59.39	5.70	13.55	Horizontal	-53.69	-13.00	40.69	225
8	6674.64	-57.50	6.30	13.75	Horizontal	-52.20	-13.00	39.20	135
9	7508.97	-54.58	6.80	13.85	Horizontal	-49.68	-13.00	36.68	270
10	8343.00	-54.11	6.90	14.25	Horizontal	-48.91	-13.00	35.91	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.

CA 5B_5M+3M CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1670.46	-67.28	2.00	10.75	Horizontal	-60.68	-13.00	47.68	90
3	2505.69	-66.26	2.51	11.05	Horizontal	-59.87	-13.00	46.87	135
4	3340.92	-63.00	4.20	11.15	Horizontal	-58.20	-13.00	45.20	270
5	4176.15	-60.79	5.20	11.15	Horizontal	-56.99	-13.00	43.99	135
6	5011.38	-59.20	5.50	11.95	Horizontal	-54.90	-13.00	41.90	45
7	5846.61	-60.33	5.70	13.55	Horizontal	-54.63	-13.00	41.63	90
8	6681.84	-58.43	6.30	13.75	Horizontal	-53.13	-13.00	40.13	180
9	7517.07	-56.19	6.80	13.85	Horizontal	-51.29	-13.00	38.29	0
10	8352.30	-55.82	6.90	14.25	Horizontal	-50.62	-13.00	37.62	225

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2.The worst emission was found in the antenna is Horizontal position.

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 Antenna	SCHWARZBECK	VUBL 9163	9163-201	2017-11-18	2020-11-17
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	/	/

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



ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.



ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.