



RF TEST REPORT

Applicant LongSung Technology (Shanghai) Co.,Ltd.
FCC ID XHZU9507E
Product LTE module
Model U9507E
Marketing U9507E
Report No. R1904A0161-R1V1
Issue Date May 6, 2019

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

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Summary of measurement results

No.	Test Type	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Radiated Power	22.913(a)(5)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	2.1051 / 22.917(a)	PASS
5	Peak-to-Average Power Ratio	22.913(d)/ KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 22.355	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 22.917(a)	PASS
8	Radiates Spurious Emission	2.1053 / 22.917 (a)	PASS
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard.			
Date of Testing: April 2, 2019 ~ April 19, 2019			



1. Test Laboratory

1.1. Notes of the Test Report

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

1.2. Test facility

CNAS (accreditation number: L2264)

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

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

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

IC (recognition number is 8510A)

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

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

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

A2LA (Certificate Number: 3857.01)

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



1.3. Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong
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E-mail: xukai@ta-shanghai.com

2. General Description of Equipment under Test

Client Information

Applicant	LongSung Technology (Shanghai) Co.,Ltd.
Applicant address	ROOM 606-A BUILDING A NO.3000 LONGDONG AVENUE FREE TRADE TEST AREA, Pudong District, Shanghai, China
Manufacturer	LongSung Technology (Shanghai) Co.,Ltd.
Manufacturer address	ROOM 606-A BUILDING A NO.3000 LONGDONG AVENUE FREE TRADE TEST AREA, Pudong District, Shanghai, China

General Information

EUT Description			
Model	U9507E		
IMEI	865344030271957		
Hardware Version	QB4MX11A4-1		
Software Version	QB40012.1.1_MX11		
Power Supply	External Power Supply		
Antenna Type	The EUT don't have standard Adapter and Antenna. The adapter and Antenna used for testing in this report is the after-market accessory.		
Antenna Gain	WCDMA Band V: 0.92dBi LTE Band 5: 0.92dBi		
Test Mode(s)	WCDMA Band V, LTE Band 5;		
Test Modulation	(WCDMA) BPSK, QPSK; (LTE)QPSK 16QAM;		
HSDPA UE Category	8		
HSUPA UE Category	6		
DC-HSDPA UE Category	24		
HSPA+ UE Category	6		
LTE Category	4		
Maximum E.R.P.	WCDMA Band V:	22.81dBm	
	LTE Band 5:	22.16dBm	
Rated Power Supply Voltage	3.8V		
Extreme Voltage	Minimum: 3.3V Maximum: 4.2V		
Extreme Temperature	Lowest: -10°C Highest: +55°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: The information of the EUT is declared by the manufacturer.			



3. Applied Standards

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

FCC CFR47 Part 2 (2019)

FCC CFR 47 Part 22H (2019)

ANSI C63.26 (2015)

KDB 971168 D01 Power Meas License Digital Systems v03r01

4. Test Configuration

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

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

The following testing in 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	RMC HSDPA/HSUPA DC-HSDPA
Effective Radiated Power	RMC
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	O	O	O	O	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	O	O	O	O	O	O	O	O	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	-	-	O	O	O	O
Band Edge Compliance	O	O	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	O	-	-	O	O	O	O
Frequency Stability	O	O	O	O	O	O	O	O	O	O	O	O
Spurious Emissions at Antenna Terminals	O	O	O	O	O	-	O	-	-	O	O	O
Radiates Spurious Emission	-	-	-	O	O	-	O	-	-	O	O	O
Note	1. The mark "O" means that this configuration is chosen for testing. 2. The mark "-" means that this configuration is not testing.											

5. Test Case Results

5.1. RF Power Output

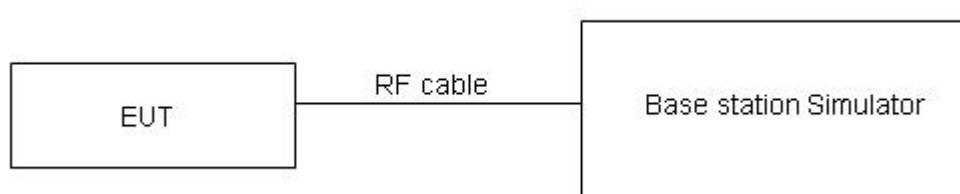
Ambient condition

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

Methods of Measurement

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

Test Setup



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

Limits

No specific RF power output requirements in part 2.1046.

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

WCDMA Band V		Conducted Power(dBm)		
		Channel 4132	Channel 4183	Channel 4233
		826.4(MHz)	836.6(MHz)	846.6(MHz)
RMC	12.2k	22.54	22.50	22.49
HSDPA	Sub - Test 1	22.00	21.92	21.93
	Sub - Test 2	21.99	21.94	21.90
	Sub - Test 3	21.46	21.44	21.42
	Sub - Test 4	21.47	21.45	21.40
HSUPA	Sub - Test 1	21.96	21.91	21.88
	Sub - Test 2	20.95	20.89	20.87
	Sub - Test 3	21.42	21.37	21.36
	Sub - Test 4	20.88	20.86	20.84
	Sub - Test 5	21.89	21.84	21.82
DC-HSDPA	Sub - Test 1	21.88	21.86	21.83
	Sub - Test 2	21.87	21.85	21.82
	Sub - Test 3	21.45	21.34	21.33
	Sub - Test 4	21.44	21.33	21.32

LTE Band 5				Conducted Power(dBm)		
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20407/824.7	20525/836.5	20643/848.3
1.4MHz	QPSK	1	0	21.84	21.60	21.50
		1	2	21.61	21.52	21.45
		1	5	21.59	21.52	21.51
		3	0	20.61	20.58	20.38
		3	2	20.55	20.56	20.40
		3	3	20.53	20.54	20.51
		6	0	20.50	20.55	20.52
	16QAM	1	0	20.55	20.75	20.89
		1	2	20.28	21.46	21.63
		1	5	20.04	20.65	20.95
		3	0	19.60	19.53	19.39
		3	2	19.58	19.48	19.40
		3	3	19.53	19.38	19.47
		6	0	19.51	19.52	19.48



BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20415/825.5	20525/836.5	20635/847.5
3MHz	QPSK	1	0	21.86	21.61	21.53
		1	7	21.63	21.57	21.49
		1	14	21.60	21.56	21.54
		8	0	20.64	20.63	20.42
		8	4	20.58	20.61	20.44
		8	7	20.55	20.59	20.56
		15	0	20.58	20.57	20.56
	16QAM	1	0	20.57	20.78	20.91
		1	7	20.31	21.50	21.66
		1	14	20.07	20.67	20.98
		8	0	19.63	19.58	19.43
		8	4	19.62	19.52	19.41
		8	7	19.56	19.43	19.51
		15	0	19.54	19.57	19.52
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20425/826.5	20525/836.5	20625/846.5
5MHz	QPSK	1	0	21.85	21.57	21.51
		1	13	21.61	21.56	21.46
		1	24	21.58	21.50	21.50
		12	0	20.62	20.59	20.39
		12	6	20.55	20.56	20.40
		12	13	20.52	20.53	20.52
		25	0	20.56	20.53	20.51
	16QAM	1	0	20.52	20.76	20.89
		1	13	20.29	21.47	21.64
		1	24	20.04	20.63	20.95
		12	0	19.60	19.56	19.40
		12	6	19.59	19.47	19.39
		12	13	19.54	19.39	19.48
		25	0	19.51	19.52	19.48
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20450/829	20525/836.5	20600/844
10MHz	QPSK	1	0	21.82	21.53	21.48
		1	25	21.60	21.52	21.44
		1	49	21.56	21.50	21.47



		25	0	20.59	20.54	20.35
		25	13	20.53	20.52	20.37
		25	25	20.49	20.51	20.48
		50	0	20.53	20.48	20.47
	16QAM	1	0	20.50	20.72	20.84
		1	25	20.25	21.45	21.60
		1	49	20.02	20.60	20.93
		25	0	19.57	19.52	19.37
		25	13	19.56	19.45	19.36
		25	25	19.51	19.34	19.44
		50	0	19.49	19.48	19.45

5.2. Effective Radiated Power

Ambient condition

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

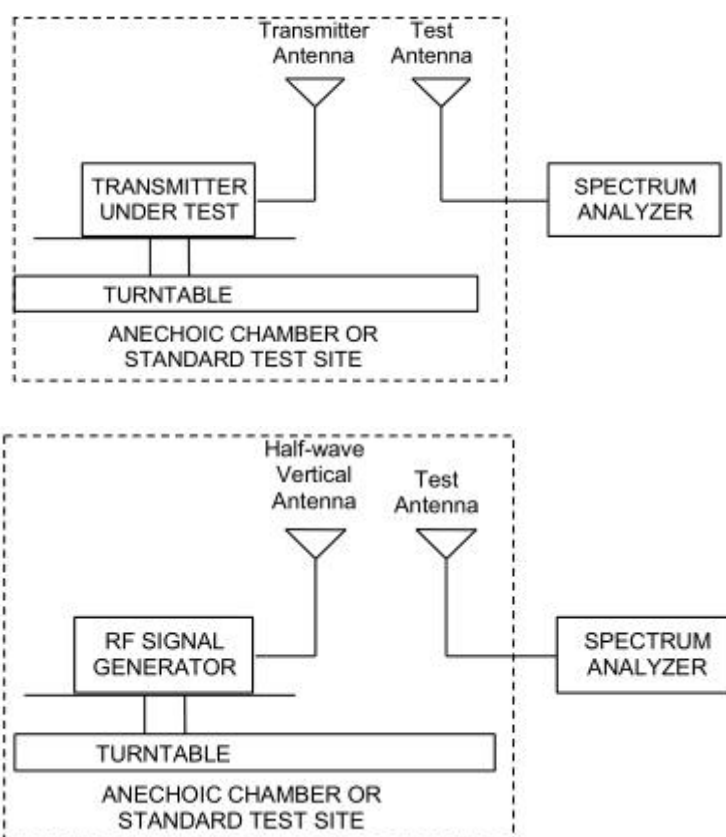
Methods of Measurement

The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).

- Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.
- Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).
- Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.
- Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading. $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$
- Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation: $ERP \text{ (dBm)} = LVL \text{ (dBm)} + LOSS \text{ (dB)}$
- The maximum ERP is the maximum value determined in the preceding step.
- When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g. transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:
 $EIRP \text{ (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBi)}$
 where: dBd refers to gain relative to an ideal dipole.
 $EIRP \text{ (dBm)} = ERP \text{ (dBm)} + 2.15 \text{ (dB.)}$

The RB allocation refers to section 5.1, using the maximum output power configuration.

Test setup



Limits

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

Limit	$\leq 7 \text{ W}$ (38.45 dBm)
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 1.19 \text{ dB}$

Test Results: The measurement is performed for both of horizontal and vertical antenna Polarization, and only the data of worst mode is recorded in this report.

Mode	Channel	Frequency (MHz)	Polarization	ERP (dBm)	Limit (dBm)	Conclusion
WCDMA Band V	Low	826.4	Horizontal	22.81	38.45	Pass
	Mid	836.6	Horizontal	22.75	38.45	Pass
	High	846.6	Horizontal	22.49	38.45	Pass

LTE Band 5						
bandwidth	Channel	Frequency (MHz)	Polarization	ERP (dBm)	Limit (dBm)	Conclusion
1.4 MHz (QPSK)	Low	824.7	Horizontal	21.83	38.45	Pass
	Mid	836.5	Horizontal	21.55	38.45	Pass
	High	848.3	Horizontal	21.30	38.45	Pass
3 MHz (QPSK)	Low	825.5	Horizontal	21.78	38.45	Pass
	Mid	836.5	Horizontal	21.63	38.45	Pass
	High	847.5	Horizontal	21.42	38.45	Pass
5 MHz (QPSK)	Low	826.5	Horizontal	21.88	38.45	Pass
	Mid	836.5	Horizontal	21.74	38.45	Pass
	High	846.5	Horizontal	21.60	38.45	Pass
10 MHz (QPSK)	Low	829	Horizontal	22.16	38.45	Pass
	Mid	836.5	Horizontal	21.71	38.45	Pass
	High	844	Horizontal	21.35	38.45	Pass
1.4 MHz (16QAM)	Low	824.7	Horizontal	21.20	38.45	Pass
	Mid	836.5	Horizontal	21.01	38.45	Pass
	High	848.3	Horizontal	20.82	38.45	Pass
3 MHz (16QAM)	Low	825.5	Horizontal	21.28	38.45	Pass
	Mid	836.5	Horizontal	21.17	38.45	Pass
	High	847.5	Horizontal	20.90	38.45	Pass
5 MHz (16QAM)	Low	826.5	Horizontal	21.43	38.45	Pass
	Mid	836.5	Horizontal	21.17	38.45	Pass
	High	846.5	Horizontal	21.04	38.45	Pass
10 MHz (16QAM)	Low	829	Horizontal	21.64	38.45	Pass
	Mid	836.5	Horizontal	21.21	38.45	Pass
	High	844	Horizontal	20.92	38.45	Pass

5.3. 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,

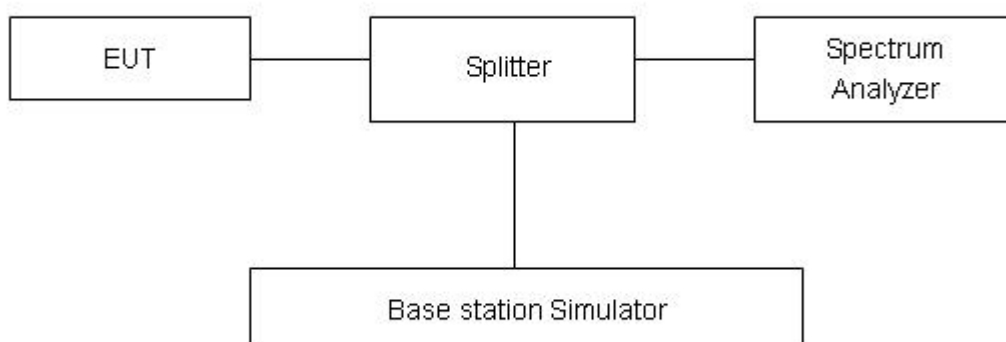
RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 5 (1.4MHz),

RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 5 (3MHz/5MHz),

RBW is set to 300 kHz, VBW is set to 1 MHz for LTE Band 5 (10MHz),

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

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

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

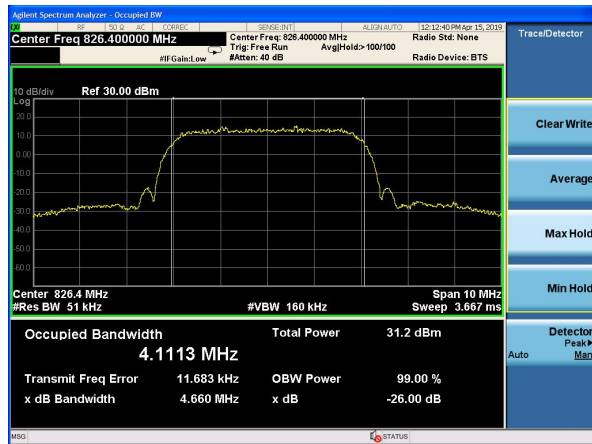
Test Result

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
WCDMA Band V (RMC)	4132	826.4	4.1113	4.660
	4183	836.6	4.1184	4.684
	4233	846.6	4.1238	4.689

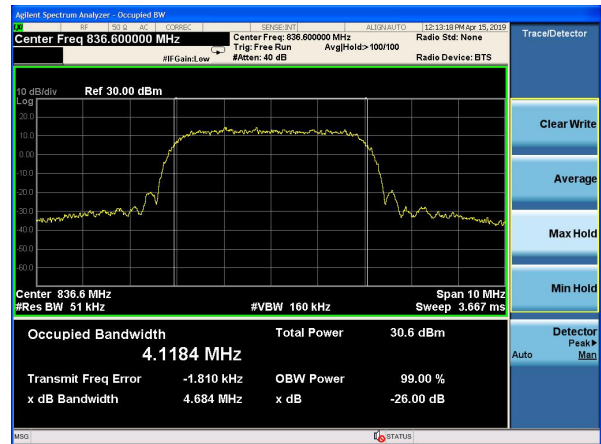
LTE Band 5						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	1.4	20407	824.7	1.1202	1.328
			20525	836.5	1.1198	1.336
			20643	848.3	1.1138	1.330
		3	20415	825.5	2.7445	3.064
			20525	836.5	2.7516	3.053
			20635	847.5	2.7392	3.044
		5	20425	826.5	4.5138	4.987
			20525	836.5	4.5155	4.997
			20625	846.5	4.5068	4.978
		10	20450	829	9.0109	10.110
			20525	836.5	9.0130	9.963
			20600	844	9.0284	10.060
	16QAM	1.4	20407	824.7	1.1246	1.327
			20525	836.5	1.1155	1.314
			20643	848.3	1.1201	1.348
		3	20415	825.5	2.7412	3.057
			20525	836.5	2.7337	3.053
			20635	847.5	2.7363	3.058
		5	20425	826.5	4.5091	4.993
			20525	836.5	4.5273	5.014
			20625	846.5	4.5300	5.027
		10	20450	829	9.0356	9.958
			20525	836.5	9.0139	10.010
			20600	844	9.0334	9.996



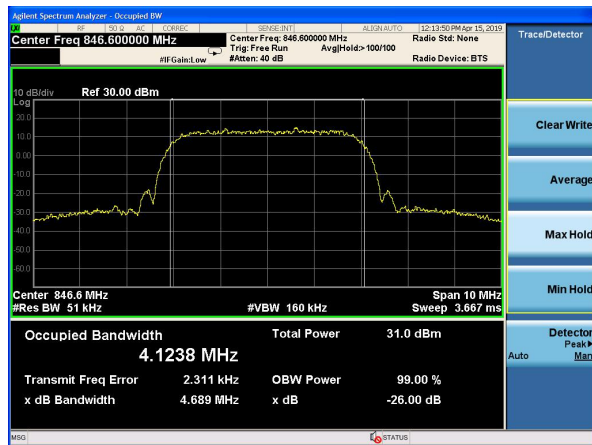
WCDMA Band V CH-Low



WCDMA Band V CH-Middle



WCDMA Band V CH-High

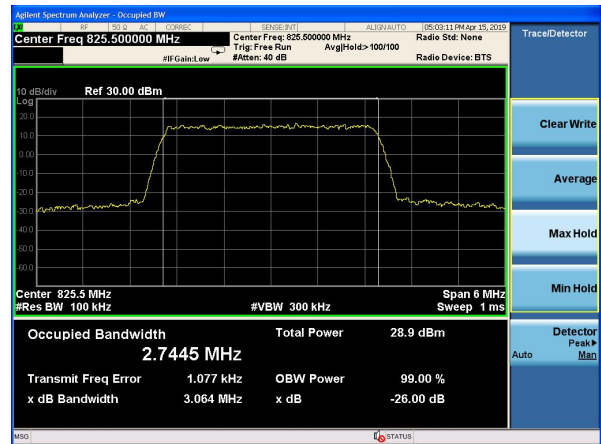




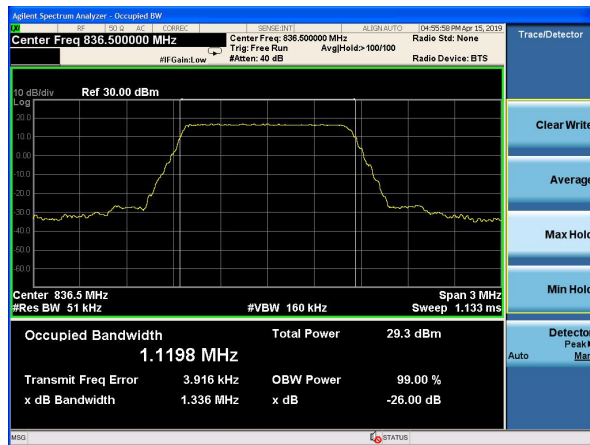
LTE Band 5 QPSK 1.4MHz CH-Low



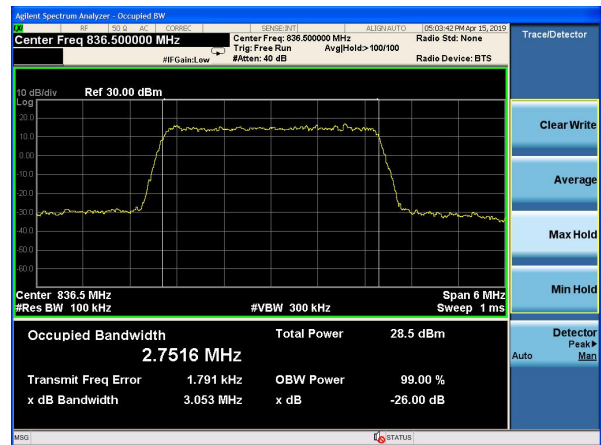
LTE Band 5 QPSK 3MHz CH-Low



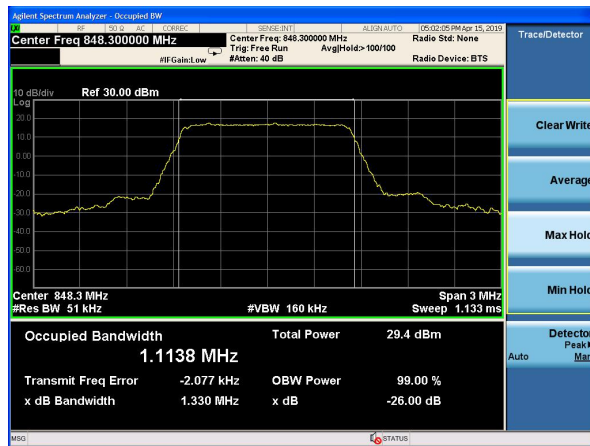
LTE Band 5 QPSK 1.4MHz CH-Middle



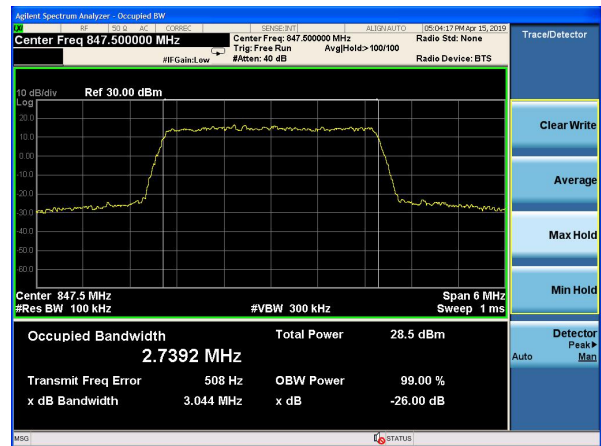
LTE Band 5 QPSK 3MHz CH-Middle



LTE Band 5 QPSK 1.4MHz CH-High

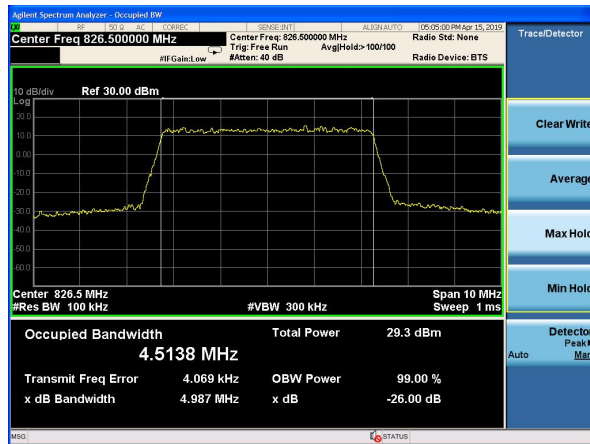


LTE Band 5 QPSK 3MHz CH-High

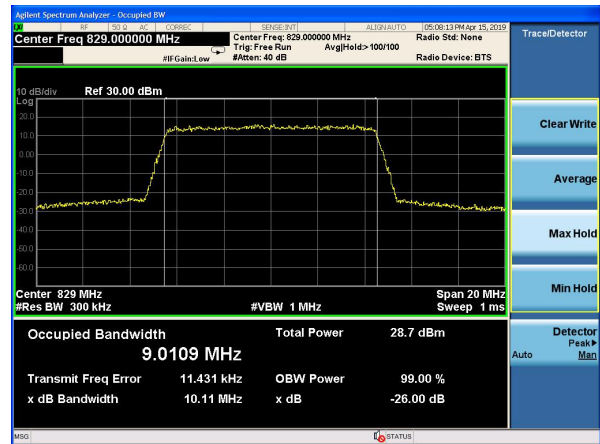




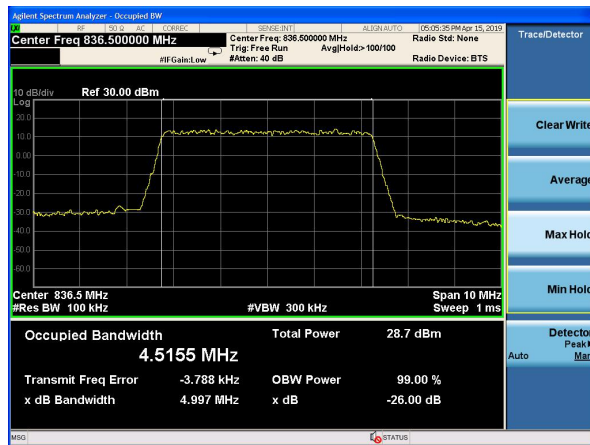
LTE Band 5 QPSK 5MHz CH-Low



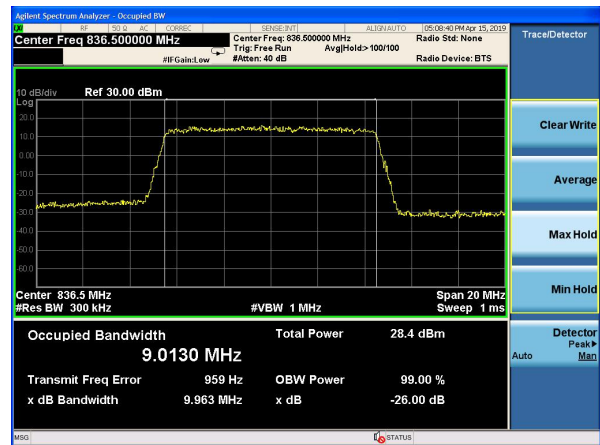
LTE Band 5 QPSK 10MHz CH-Low



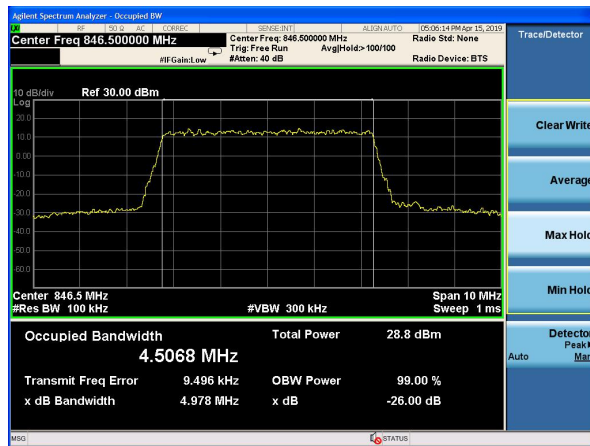
LTE Band 5 QPSK 5MHz CH-Middle



LTE Band 5 QPSK 10MHz CH-Middle



LTE Band 5 QPSK 5MHz CH-High



LTE Band 5 QPSK 10MHz CH-High

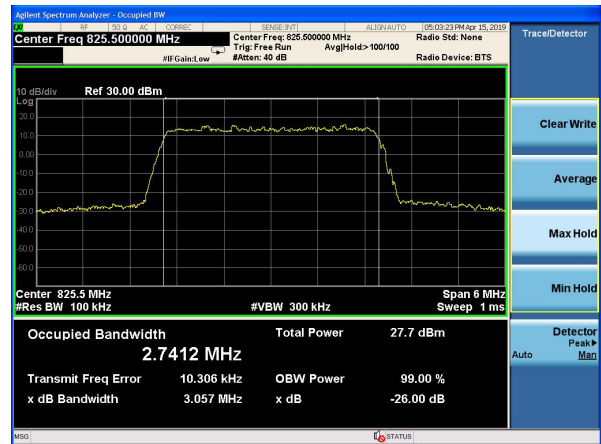




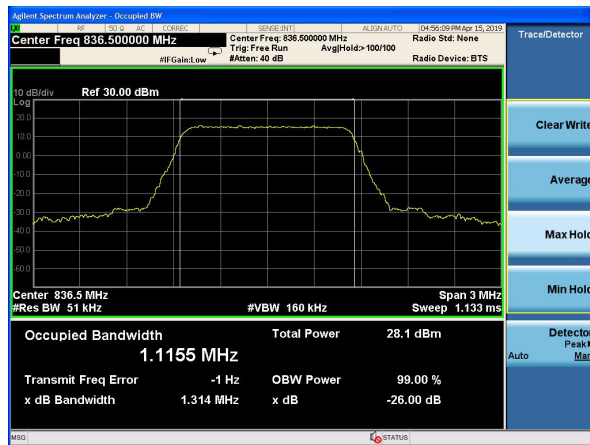
LTE Band 5 16QAM 1.4MHz CH-Low



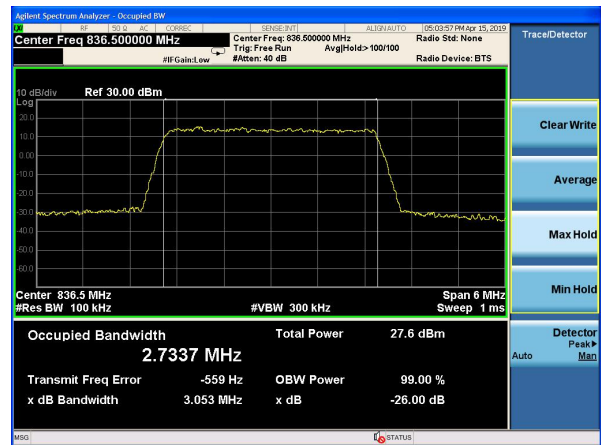
LTE Band 5 16QAM 3MHz CH-Low



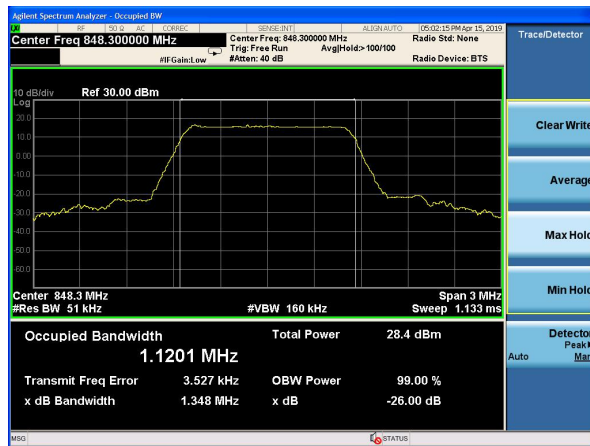
LTE Band 5 16QAM 1.4MHz CH-Middle



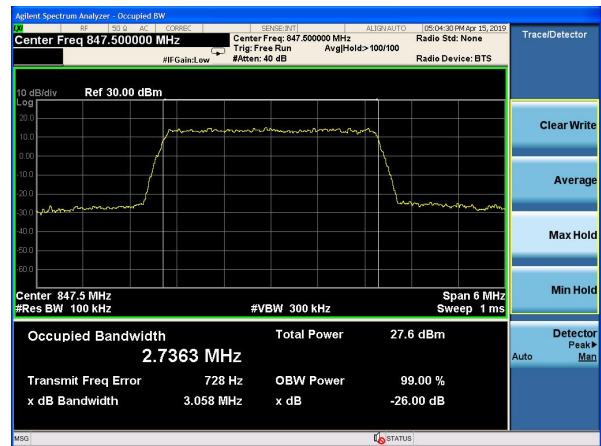
LTE Band 5 16QAM 3MHz CH-Middle



LTE Band 5 16QAM 1.4MHz CH-High

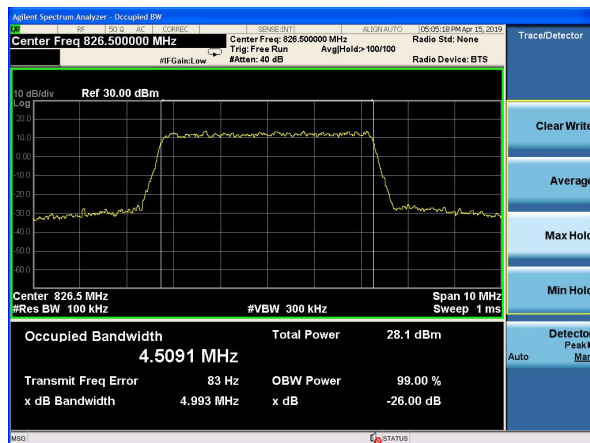


LTE Band 5 16QAM 3MHz CH-High

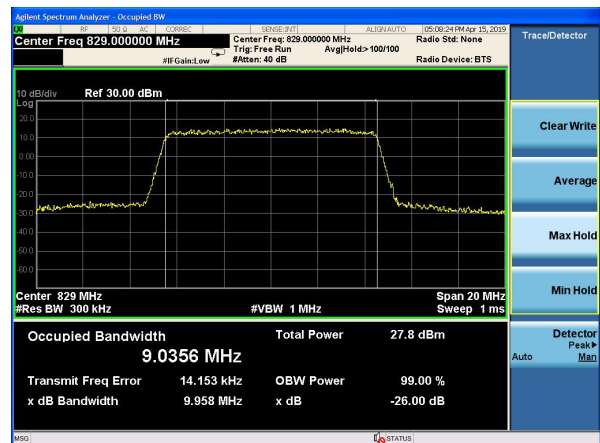




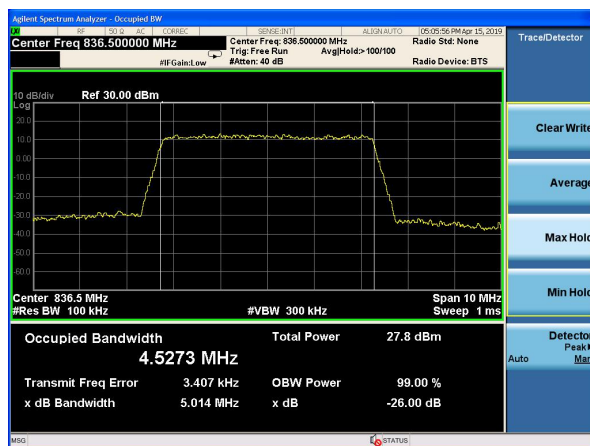
LTE Band 5 16QAM 5MHz CH-Low



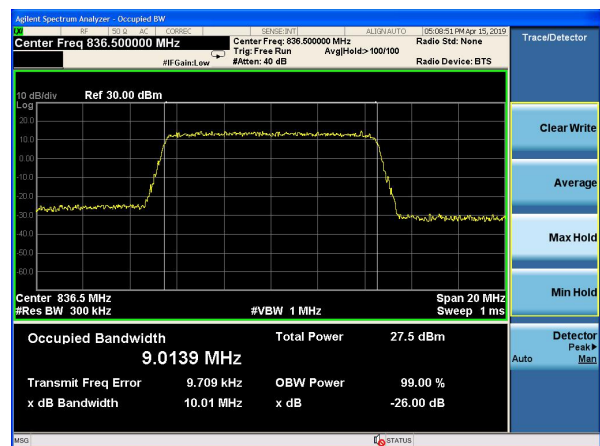
LTE Band 5 16QAM 10MHz CH-Low



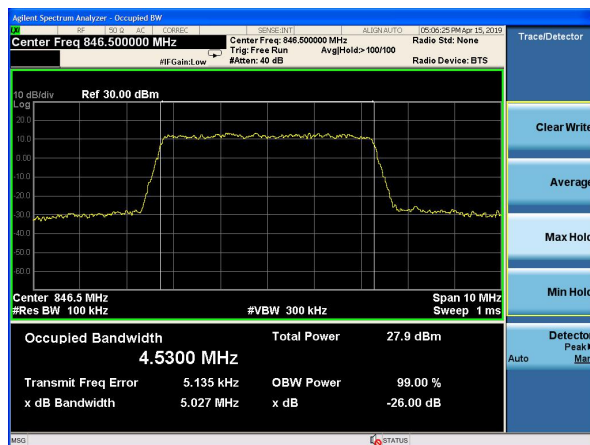
LTE Band 5 16QAM 5MHz CH-Middle



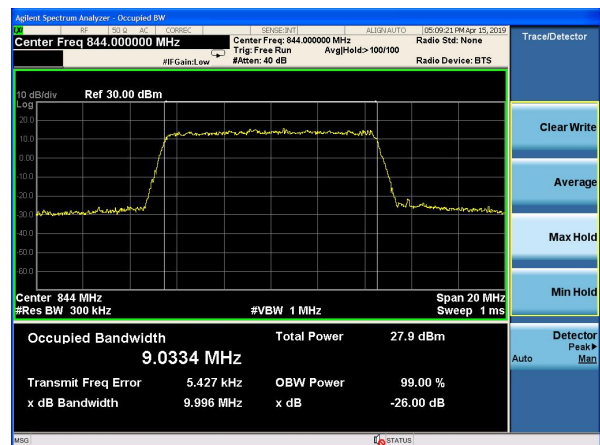
LTE Band 5 16QAM 10MHz CH-Middle



LTE Band 5 16QAM 5MHz CH-High



LTE Band 5 16QAM 10MHz CH-High



5.4. 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 15 kHz, VBW is set to 51 kHz for LTE Band 5 (1.4MHz),

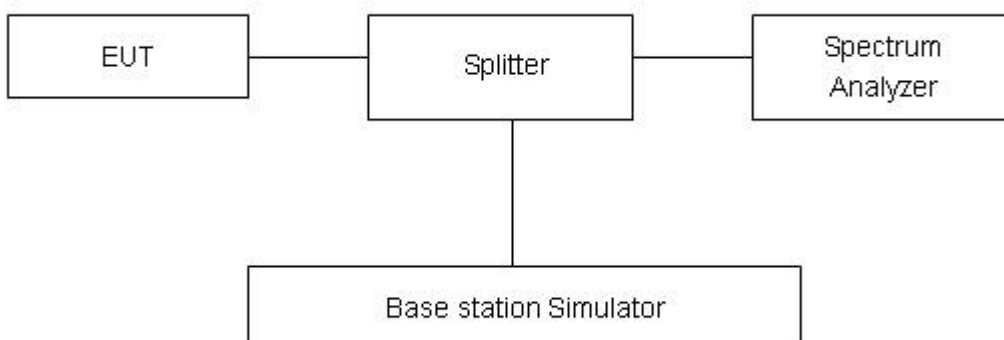
RBW is set to 30 kHz, VBW is set to 100 kHz for LTE Band 5(3MHz),

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

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

Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

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

Limit	-13 dBm
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Measurement Uncertainty

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



Test Result:

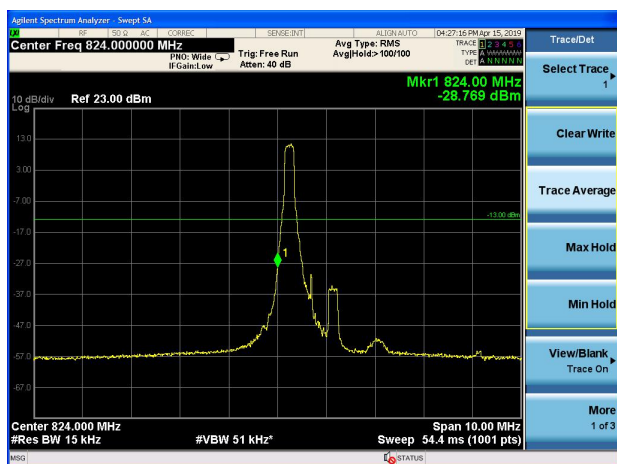
WCDMA Band V CH-Low



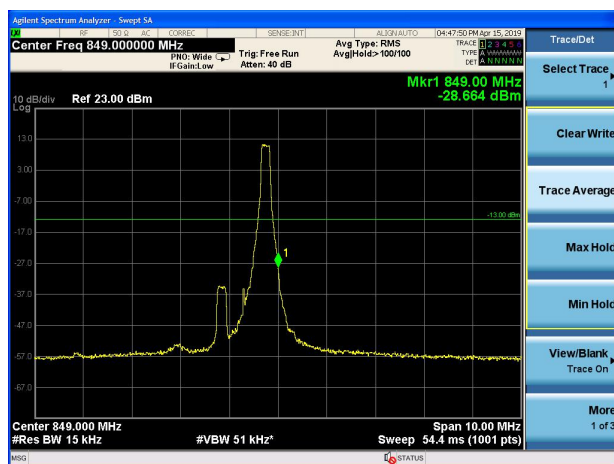
WCDMA Band V CH-High



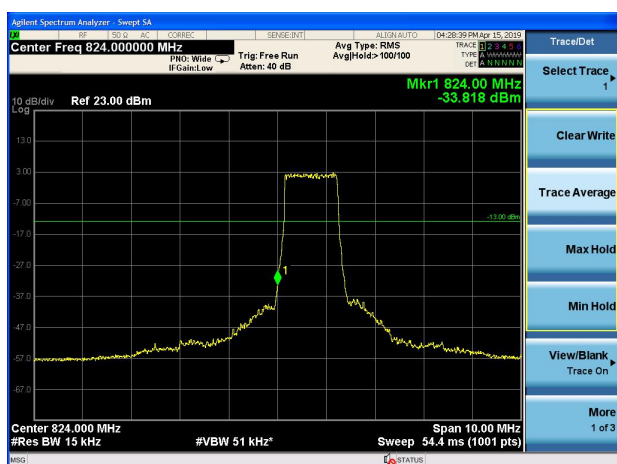
LTE Band 5 QPSK 1.4MHz CH-Low 1RB



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

