RF TEST REPORT

Applicant	Hot Pepper, Inc.
FCC ID	2APD4-A81C
Product	4G Smart Phone
Brand	Hot Pepper
Model	HPP-GS1
Report No.	R1905A0224-R1V2
Issue Date	July 4, 2019

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

Peng Tao

Performed by: Peng Tao

Kai Xu

Approved by: Kai Xu

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Summary of measurement results

No.	Test Type	Clause in FCC rules	Verdict
1	RF power output	2.1046/90.635(b)	PASS
2	Effective Radiated Power	90.635(b)	PASS
3	Occupied Bandwidth	2.1049/ 90.209	PASS
4	Emission Masks	2.1051 / 90.691	PASS
5	Peak-to-Average Power Ratio	KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 90.213	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 90.691	PASS
Date of Testing: May 12, 2019~ May 14, 2019			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard.			

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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.

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1.3. Testing Location

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

Client Information

Applicant	Hot Pepper, Inc.
Applicant address	5151 California Ave., Suite 100, Irvine 92617, USA
Manufacturer	Hot Pepper, Inc.
Manufacturer address	5151 California Ave., Suite 100, Irvine 92617, USA

General Information

EUT Description			
Model	HPP-GS1		
SN	21A81C9129000147		
Hardware Version	A81C_MAINBOARD_P1		
Software Version	HPP-GS1-V1.0.4-190121		
Power Supply	Battery/AC adapter		
Antenna Type	Internal Antenna		
Antenna Gain	-3.0 dBi		
Test Mode(s)	LTE Band 26;		
Test Modulation	QPSK 16QAM, 64QAM;		
LTE Release	R11		
Maximum E.R.P.	LTE Band 26:	17.47dBm	
Rated Power Supply Voltage	3.8V		
Extreme Voltage	Minimum: 3.5V Maximum: 4.4V		
Extreme Temperature	Lowest: -15°C Highest: +55°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	LTE Band 26	814 ~ 824	859 ~ 869
EUT Accessory			
Adapter	Manufacturer: Shenzhen Tianyin Electronics Co.,Ltd Model: TPA-23A050200UU01		
Battery 1	Manufacturer: Shenzhen HUATIANTONG TECHNOLOGY CO.LTD Model: H2019GS1		
Battery 2	Manufacturer: Shenzhen Nine Liyuan Electronic Technology Co., Ltd. Model: H2019GS1A		
USB Cable	120cm Cable, Shielded, Type C Micro USB		
Note: The information of the EUT is declared by the manufacturer. 2. There are more than one Battery each one should be applied throughout the compliance test respectively, however, only the worst case (Battery1) will be recorded in this report.			

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3. Applied Standards

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

FCC CFR47 Part 2

FCC CFR 47 Part 90S

ANSI C63.26 (2015)

KDB 971168 D01 Power Meas License Digital Systems v03r01

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4. Test Configuration

There is more than one SIM card slot, each one should be applied throughout the compliance test re spectively, and however, only the worst case (SIM 1) will be recorded in this report.

All mode and data rates and positions were investigated.
The following testing in LTE is set based on the maximum RF Output Power.

Test modes are chosen as the worst case configuration below for LTE Band 26

Test items	Bandwidth (MHz)				Modulation			RB			Test Channel		
	1.4	3	5	10	QPSK	16QAM	64QAM	1	50%	100%	L	M	H
RF power output	O	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	O
Occupied Bandwidth	O	O	O	O	O	O	O	-	-	O	O	O	O
Emission Mask	O	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	O
Frequency Stability	O	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
Note	1. The mark “O” means that this configuration is chosen for testing. 2. The mark “-” means that this configuration is not testing.												

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5. Test Case Results

5.1. RF Power Output

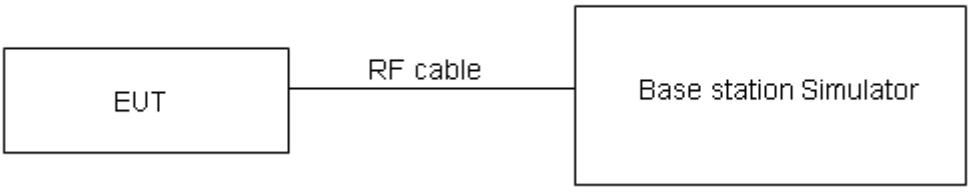
Ambient condition

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

Methods of Measurement

During the process of the testing, The EUT is controlled by the 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

Part 90.635 (b) the maximum output power of the transmitter for mobile stations is 100 watts.

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.

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Test Results

LTE Band 26				Conducted Power(dBm)		
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				26697/814.7	26740/819	26783/823.3
1.4MHz	QPSK	1	0	23.99	24.04	23.96
		1	2	24.07	24.03	24.06
		1	5	23.91	23.98	24.01
		3	0	23.13	23.13	23.14
		3	2	23.10	23.09	23.16
		3	3	23.09	23.06	23.12
		6	0	23.01	23.09	23.10
	16QAM	1	0	22.97	23.34	23.10
		1	2	23.06	23.38	23.19
		1	5	22.88	23.28	23.11
		3	0	22.14	22.15	22.09
		3	2	22.13	22.16	22.10
		3	3	22.11	22.12	22.07
		6	0	22.18	22.13	22.18
	64QAM	1	0	20.94	21.36	21.14
		1	2	21.08	21.43	21.15
		1	5	20.95	21.28	21.01
		3	0	20.22	20.10	20.07
		3	2	20.23	20.08	19.27
		3	3	20.18	20.16	20.01
		6	0	20.16	20.14	20.12
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				26705/815.5	26740/819	26775/822.5
3MHz	QPSK	1	0	23.97	23.99	23.93
		1	7	24.06	24.03	24.04
		1	14	23.87	23.90	23.96
		8	0	23.22	23.09	23.18
		8	4	23.08	23.05	23.11

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		8	7	23.07	23.05	23.09
		15	0	23.05	23.06	23.07
	16QAM	1	0	22.91	23.31	23.07
		1	7	23.04	23.37	23.17
		1	14	22.85	23.24	23.08
		8	0	22.12	22.14	22.07
		8	4	22.11	22.10	22.05
		8	7	22.09	22.08	22.04
		15	0	22.16	22.09	22.13
	64QAM	1	0	20.88	21.33	21.11
		1	7	21.06	21.42	21.13
		1	14	20.92	21.24	20.97
		8	0	20.20	20.09	20.05
		8	4	20.19	20.02	19.22
		8	7	20.16	20.12	19.98
		15	0	20.14	20.10	20.07
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				26715/816.5	26740/819	26765/822.5
5MHz	QPSK	1	0	23.94	23.95	23.90
		1	13	24.05	23.99	24.02
		1	24	23.85	23.89	23.93
		12	0	23.08	23.04	23.07
		12	6	23.06	23.01	23.08
		12	13	23.04	23.00	23.05
		25	0	23.02	23.01	23.03
	16QAM	1	0	22.89	23.27	23.02
		1	13	23.00	23.35	23.13
		1	24	22.83	23.21	23.05
		12	0	22.09	22.10	22.04
		12	6	22.04	22.08	22.02
		12	13	22.06	22.03	22.00
		25	0	22.14	22.05	22.10
	64QAM	1	0	20.86	21.29	21.06
		1	13	21.02	21.40	21.09

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		1	24	20.90	21.21	20.95
		12	0	20.17	20.05	20.02
		12	6	20.16	20.00	19.19
		12	13	20.13	20.07	19.94
		25	0	20.12	20.06	20.04
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				/	26740/819	/
10MHz	QPSK	1	0	/	24.05	/
		1	25	/	24.12	/
		1	49	/	24.00	/
		25	0	/	23.08	/
		25	13	/	23.06	/
		25	25	/	23.04	/
		50	0	/	23.07	/
	16QAM	1	0	/	23.59	/
		1	25	/	23.68	/
		1	49	/	23.53	/
		25	0	/	22.17	/
		25	13	/	22.13	/
		25	25	/	22.12	/
		50	0	/	22.11	/
	64QAM	1	0	/	21.04	/
		1	25	/	21.13	/
		1	49	/	20.95	/
		25	0	/	20.10	/
		25	13	/	20.11	/
		25	25	/	20.15	/
		50	0	/	20.05	/

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5.2. Effective Radiated Power

Ambient condition

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

Methods of Measurement

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

a) 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.

b) 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).

c) 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.

d) 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 = Generator Output Power (dBm) – Analyzer reading (dBm)

e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:ERP (dBm) = LVL (dBm) + LOSS (dB)

f) The maximum ERP is the maximum value determined in the preceding step.

g) 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 (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBi)

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

EIRP (dBm) = ERP (dBm) + 2.15 (dB.)

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

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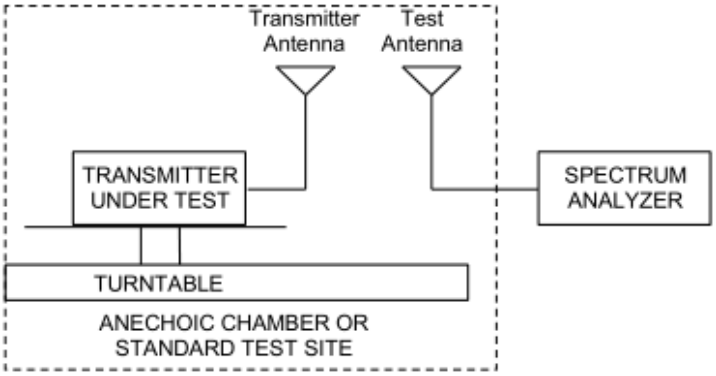
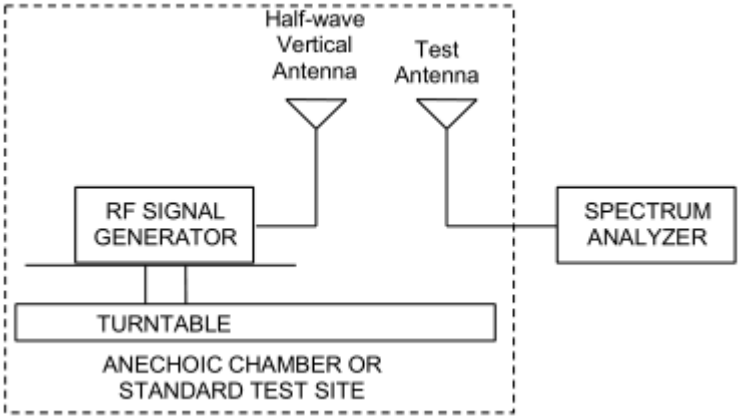
Test configuration

Below 1GHz:





Limits

Rule Part 90.635(b) specifies that “The maximum output power of the transmitter for mobile stations is 100 watts”.

Limit	≤ 100 W (50 dBm)

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 dB

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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.

LTE Band 26						
bandwidth	**Channel**	**Frequency (MHz)**	**Polarization**	**ERP (dBm)**	**Limit (dBm)**	**Conclusion**
1.4 MHz (QPSK)	Low	814.7	Horizontal	16.89	50	Pass
	Mid	819	Horizontal	17.15	50	Pass
	High	823.3	Horizontal	17.47	50	Pass
3 MHz (QPSK)	Low	815.5	Horizontal	16.98	50	Pass
	Mid	819	Horizontal	17.19	50	Pass
	High	822.5	Horizontal	17.43	50	Pass
5 MHz (QPSK)	Low	816.5	Horizontal	17.06	50	Pass
	Mid	819	Horizontal	17.27	50	Pass
	High	821.5	Horizontal	17.31	50	Pass
10 MHz (QPSK)	Mid	819	Horizontal	17.01	50	Pass
1.4 MHz (16QAM)	Low	814.7	Horizontal	16.31	50	Pass
	Mid	819	Horizontal	16.70	50	Pass
	High	823.3	Horizontal	16.88	50	Pass
3 MHz (16QAM)	Low	815.5	Horizontal	16.50	50	Pass
	Mid	819	Horizontal	16.64	50	Pass
	High	822.5	Horizontal	16.87	50	Pass
5 MHz (16QAM)	Low	816.5	Horizontal	16.61	50	Pass
	Mid	819	Horizontal	16.82	50	Pass
	High	821.5	Horizontal	16.71	50	Pass
10 MHz (16QAM)	Mid	819	Horizontal	16.08	50	Pass
1.4 MHz (64QAM)	Low	814.7	Horizontal	15.31	50	Pass
	Mid	819	Horizontal	15.97	50	Pass
	High	823.3	Horizontal	16.20	50	Pass
3 MHz (64QAM)	Low	815.5	Horizontal	15.83	50	Pass
	Mid	819	Horizontal	15.94	50	Pass
	High	822.5	Horizontal	16.09	50	Pass
5 MHz (64QAM)	Low	816.5	Horizontal	15.96	50	Pass
	Mid	819	Horizontal	16.09	50	Pass
	High	821.5	Horizontal	16.20	50	Pass
10 MHz (64QAM)	Mid	819	Horizontal	15.54	50	Pass

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5.3. Occupied Bandwidth

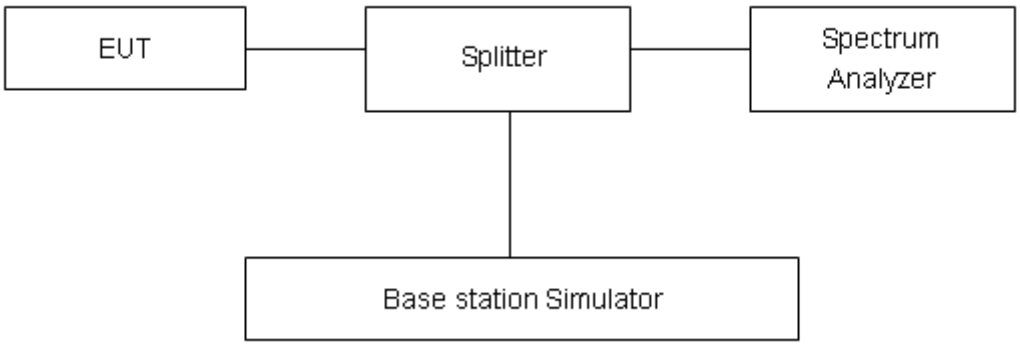
Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.
RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 26 (1.4MHz),
RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 26 (3MHz/5MHz).
RBW is set to 300 kHz, VBW is set to 1MHz for LTE Band 26 (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.
Part 90.209 (a) Each authorization issued to a station licensed under this part will show an emission designator representing the class of emission authorized. The designator will be prefixed by a specified necessary bandwidth. This number does not necessarily indicate the bandwidth occupied by the emission at any instant. In those cases where part 2.202 of this chapter does not provide a formula for the computation of necessary bandwidth, the occupied bandwidth, as defined in part 2 of this chapter, may be used in lieu of the necessary bandwidth.

Measurement Uncertainty

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

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Test Result

LTE Band 26						
RB	Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
100%	QPSK	1.4	26697	814.7	1.1214	1.338
			26740	819	1.1100	1.343
			26783	823.3	1.1234	1.335
		3	26705	815.5	2.7274	3.006
			26740	819	2.7187	2.982
			26775	822.5	2.7265	2.991
		5	26715	816.5	4.5124	4.898
			26740	819	4.5082	4.938
			26765	821.5	4.5004	4.919
		10	26740	819	9.0385	9.987
	16QAM	1.4	26697	814.7	1.1242	1.341
			26740	819	1.1073	1.312
			26783	823.3	1.1115	1.331
		3	26705	815.5	2.7235	2.985
			26740	819	2.7253	2.992
			26775	822.5	2.7169	2.997
		5	26715	816.5	4.5022	4.959
			26740	819	4.5012	4.938
			26765	821.5	4.5139	4.971
		10	26740	819	9.0188	9.894
	64QAM	1.4	26697	814.7	1.1226	1.335
			26740	819	1.1113	1.316
			26783	823.3	1.1196	1.325
		3	26705	815.5	2.7205	3.015
			26740	819	2.7178	2.978
			26775	822.5	2.7166	2.994
		5	26715	816.5	4.4974	4.921
			26740	819	4.5164	4.923
			26765	821.5	4.5041	4.971
		10	26740	819	9.0232	9.881

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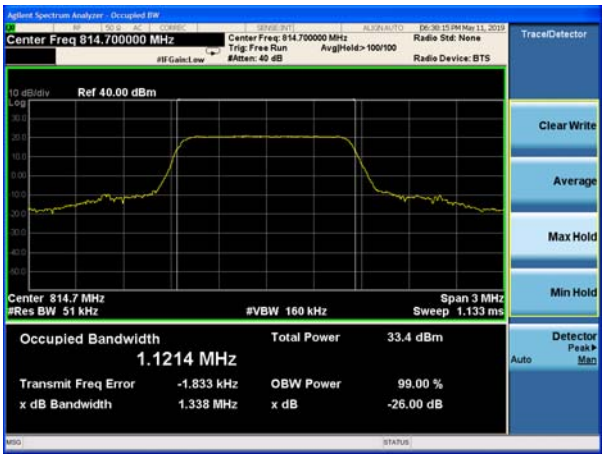
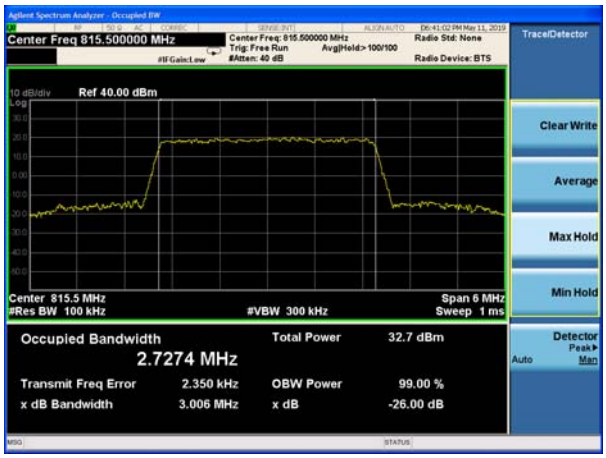
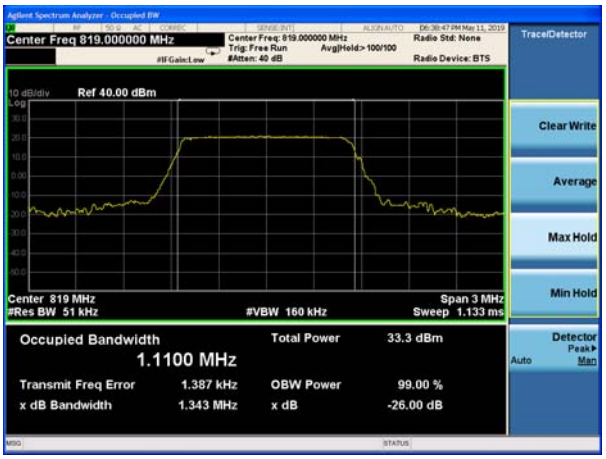
LTE Band 26 QPSK 1.4MHz CH Low



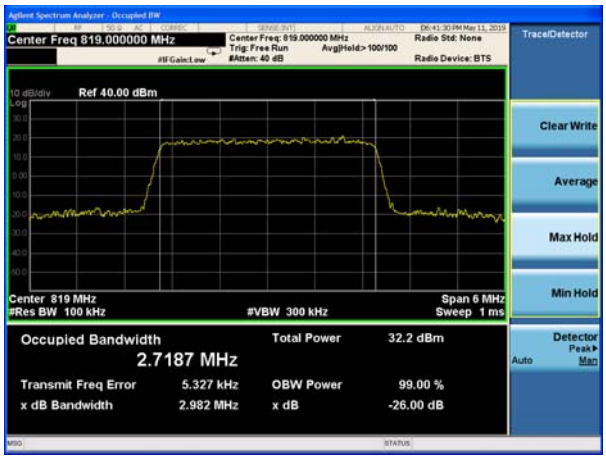
LTE Band 26 QPSK 3MHz CH Low



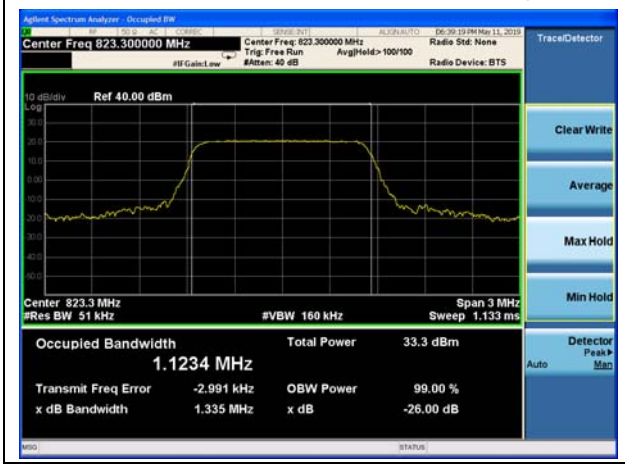
LTE Band 26 QPSK 1.4MHz CH Middle



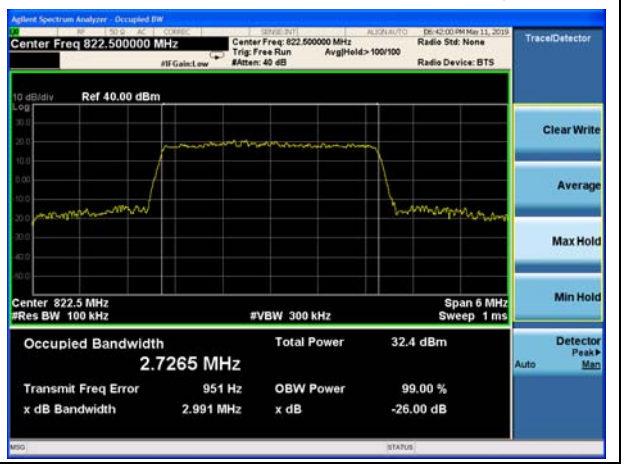
LTE Band 26 QPSK 3MHz CH Middle



LTE Band 26 QPSK 1.4MHz CH High



LTE Band 26 QPSK 3MHz CH High



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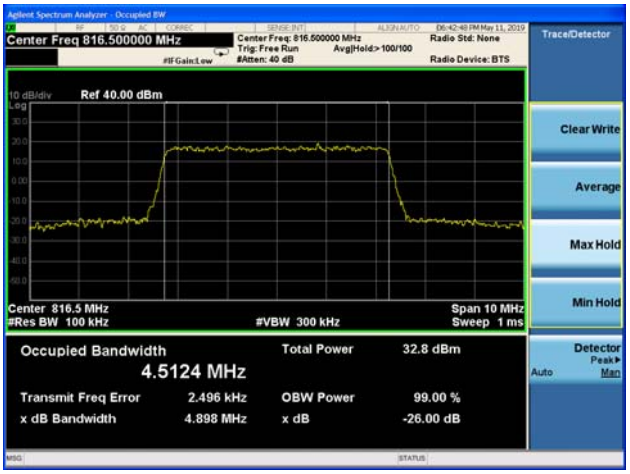
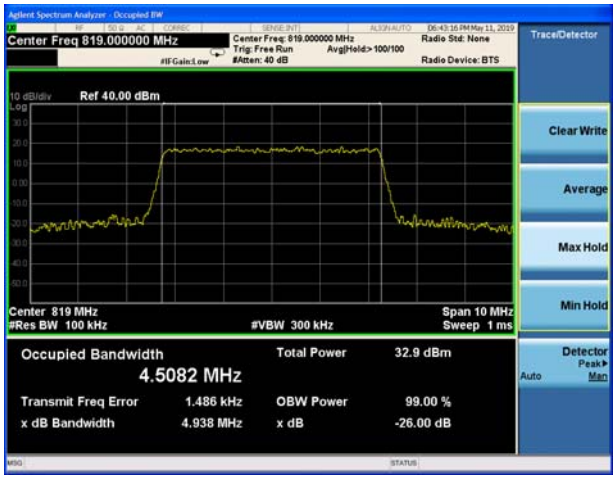
LTE Band 26 QPSK 5MHz CH Low



LTE Band 26 QPSK 5MHz CH Middle



LTE Band 26 QPSK 5MHz CH High

LTE Band 26 QPSK 10MHz CH Middle

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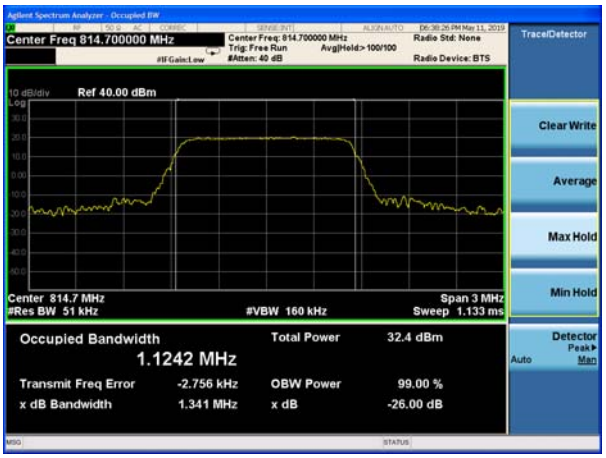
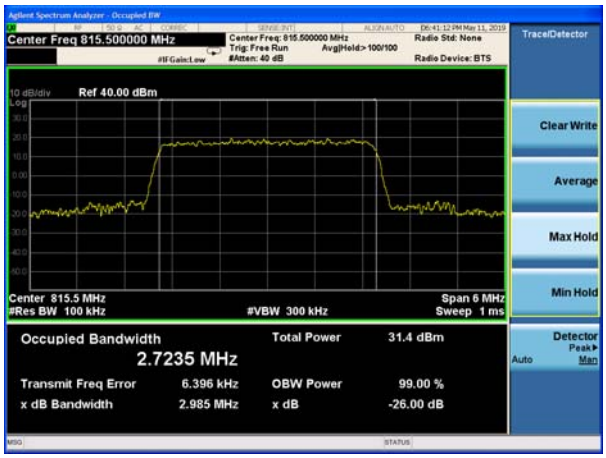
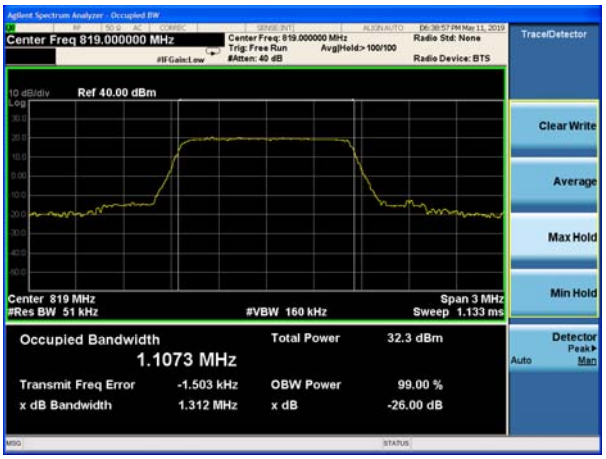
LTE Band 26 16QAM 1.4MHz CH Low



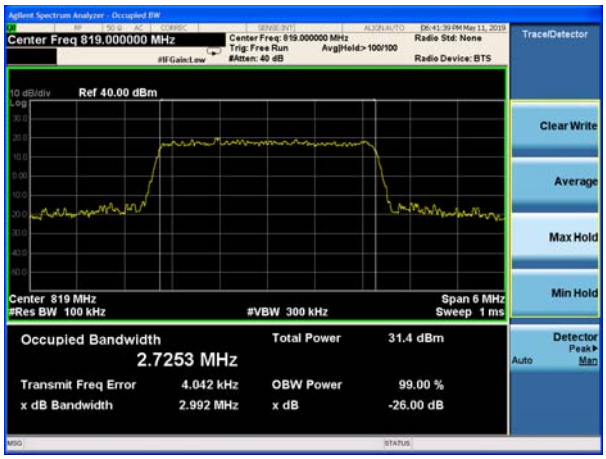
LTE Band 26 16QAM 3MHz CH Low



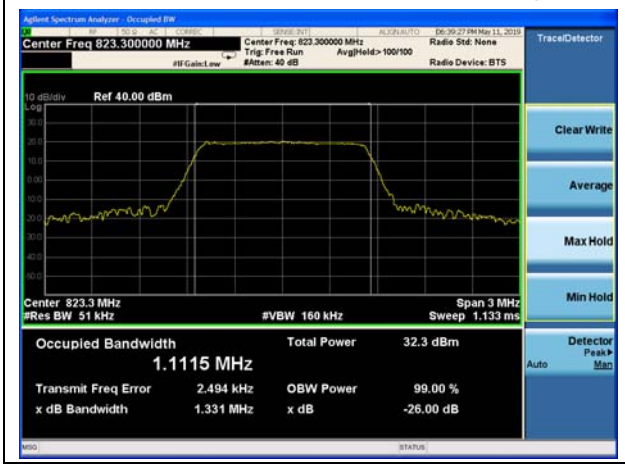
LTE Band 26 16QAM 1.4MHz CH Middle



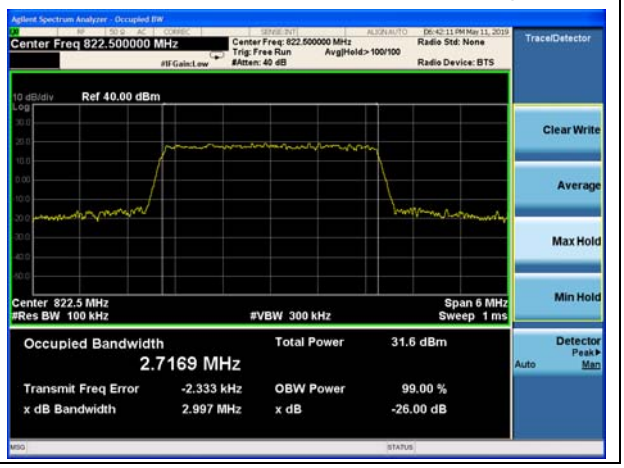
LTE Band 26 16QAM 3MHz CH Middle



LTE Band 26 16QAM 1.4MHz CH High



LTE Band 26 16QAM 3MHz CH High



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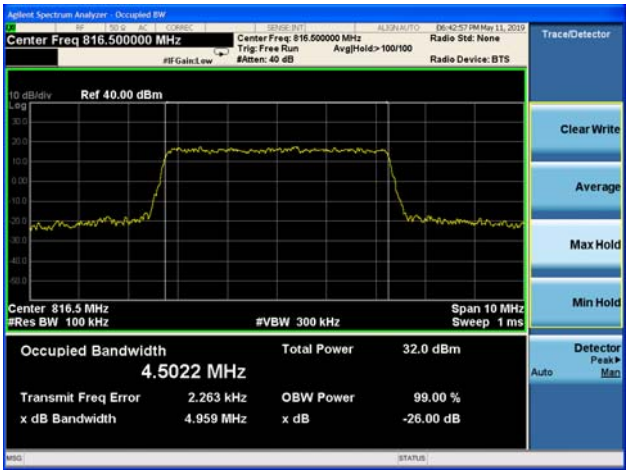
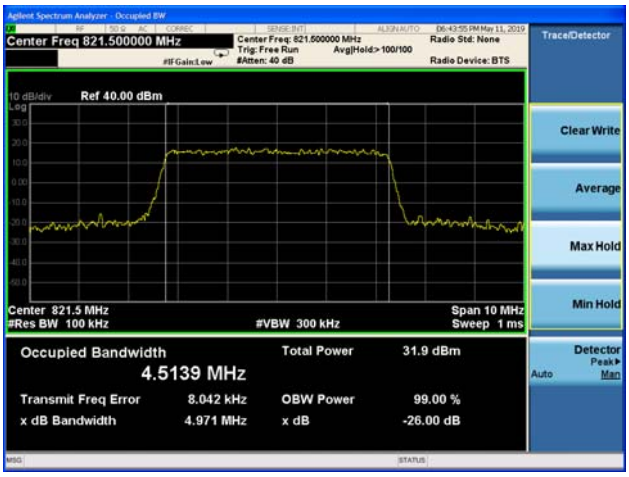
LTE Band 26 16QAM 5MHz CH Low



LTE Band 26 16QAM 5MHz CH Middle

LTE Band 26 16QAM 5MHz CH High



LTE Band 26 16QAM 10MHz CH Middle

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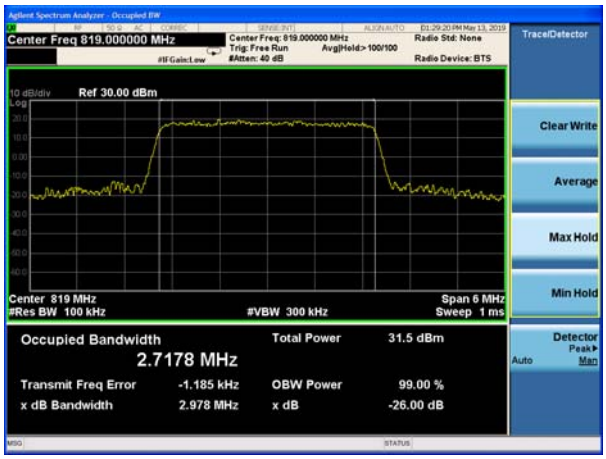
LTE Band 26 64QAM 1.4MHz CH Low

LTE Band 26 64QAM 3MHz CH Low

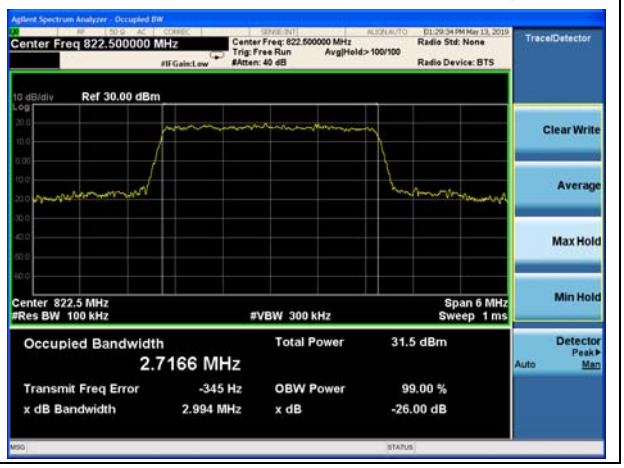
LTE Band 26 64QAM 1.4MHz CH Middle

LTE Band 26 64QAM 3MHz CH Middle



LTE Band 26 64QAM 1.4MHz CH High

LTE Band 26 64QAM 3MHz CH High



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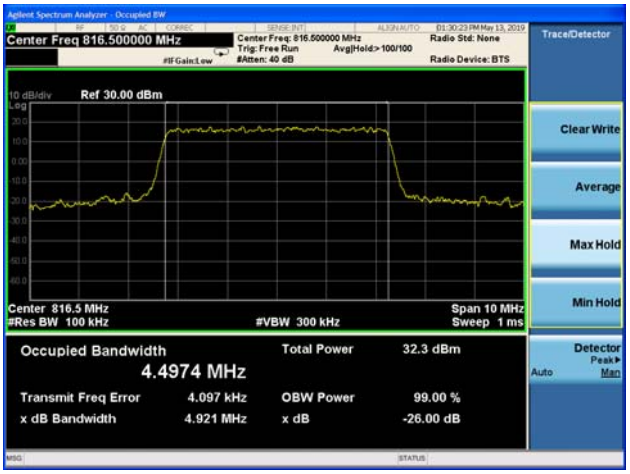
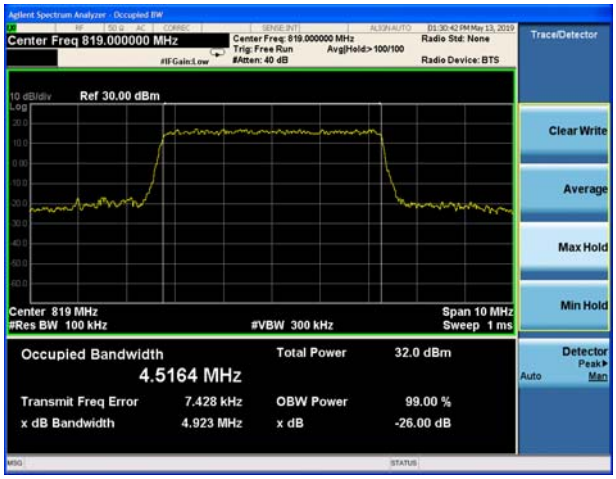
LTE Band 26 64QAM 5MHz CH Low

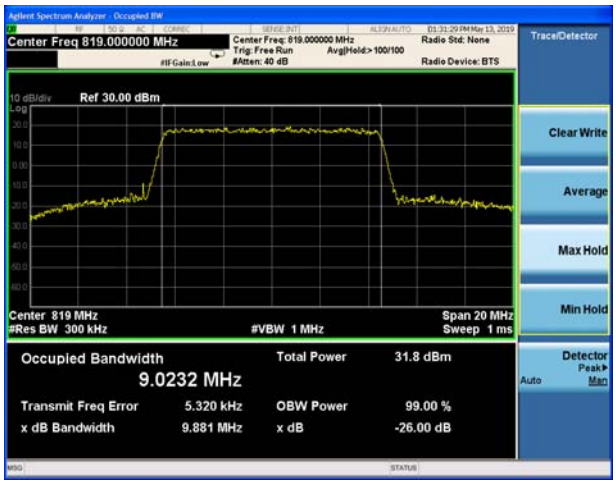


LTE Band 26 64QAM 5MHz CH Middle



LTE Band 26 64QAM 5MHz CH High

LTE Band 26 64QAM 10MHz CH Middle



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5.4. Emission Mask

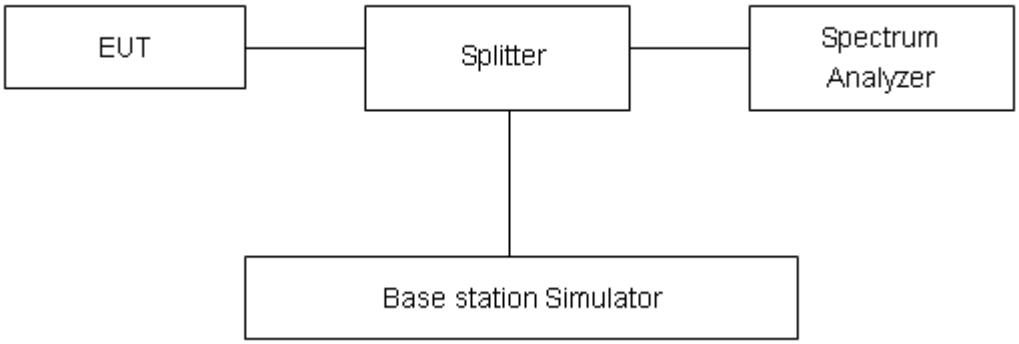
Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The average detector is used.
RBW is set to 15 kHz, VBW is set to 51 kHz for LTE Band 26 (1.4MHz),
RBW is set to 30 kHz, VBW is set to 100 kHz for LTE Band 26 (3MHz).
RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 26 (5MHz).
RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 26 (10MHz).
Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 90.691(a) specifies that " For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}(f/6.1)$ decibels or 50 + 10 $Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz."

Measurement Uncertainty

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

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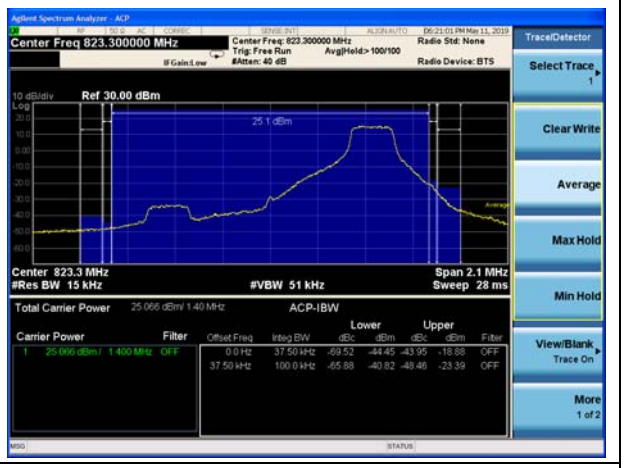
Test Result:

LTE Band 26 QPSK 1RB 1.4MHz CH Low

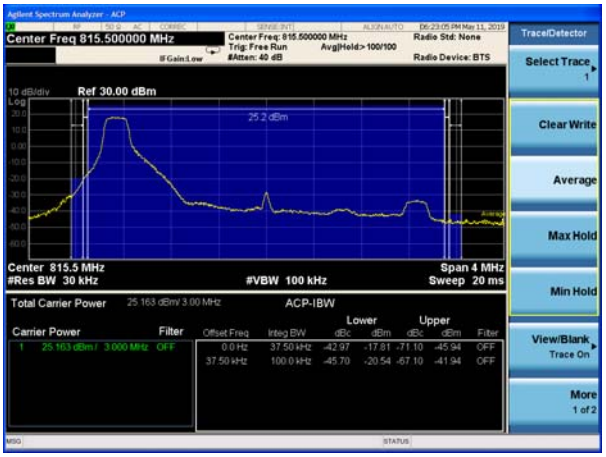
LTE Band 26 QPSK 1RB 1.4MHz CH High



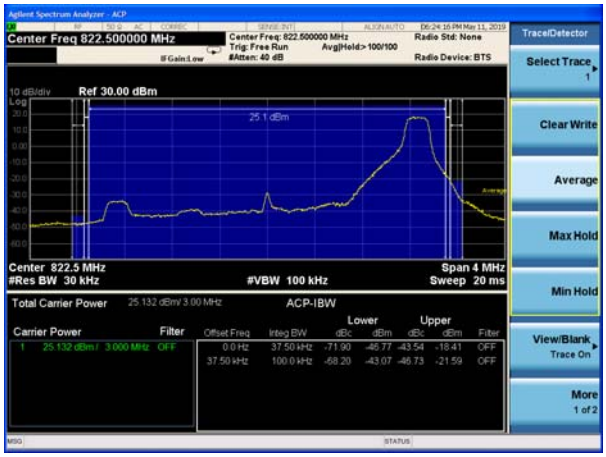
LTE Band 26 QPSK 100%RB 1.4MHz CH Low

LTE Band 26 QPSK 100%RB 1.4MHz CH High

LTE Band 26 QPSK 1RB 3MHz CH Low



LTE Band 26 QPSK 1RB 3MHz CH High



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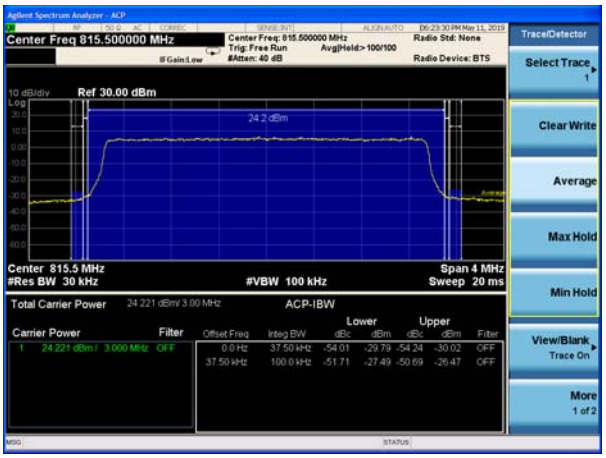
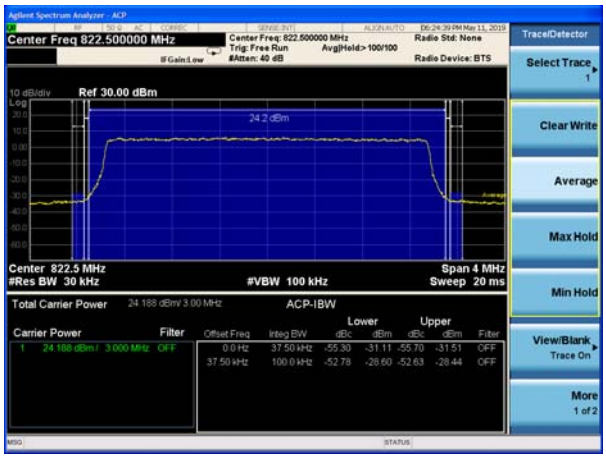
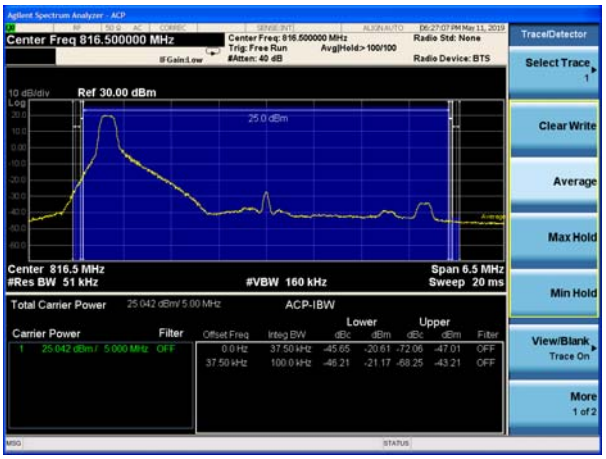
LTE Band 26 QPSK 100%RB 3MHz CH Low



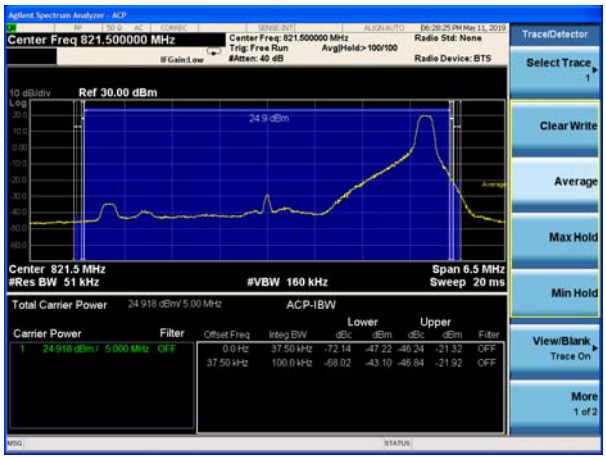
LTE Band 26 QPSK 100%RB 3MHz CH High



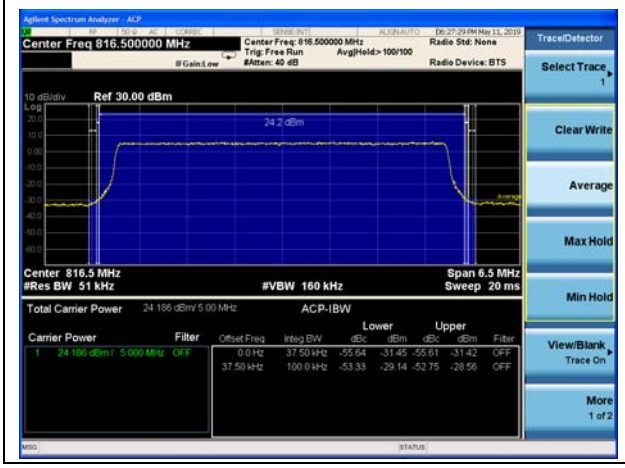
LTE Band 26 QPSK 1RB 5MHz CH Low



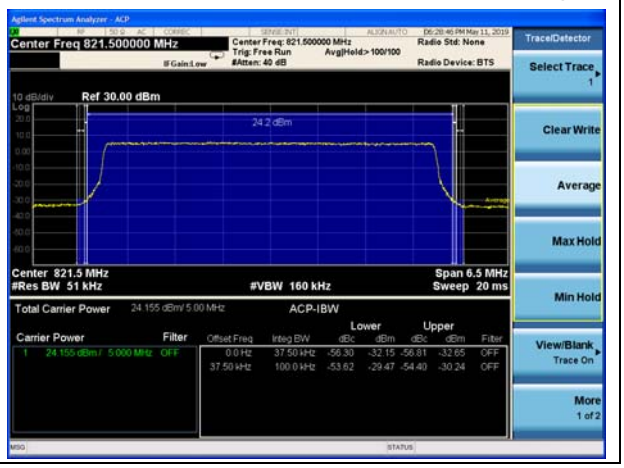
LTE Band 26 QPSK 1RB 5MHz CH High



LTE Band 26 QPSK 100%RB 5MHz CH Low



LTE Band 26 QPSK 100%RB 5MHz CH High



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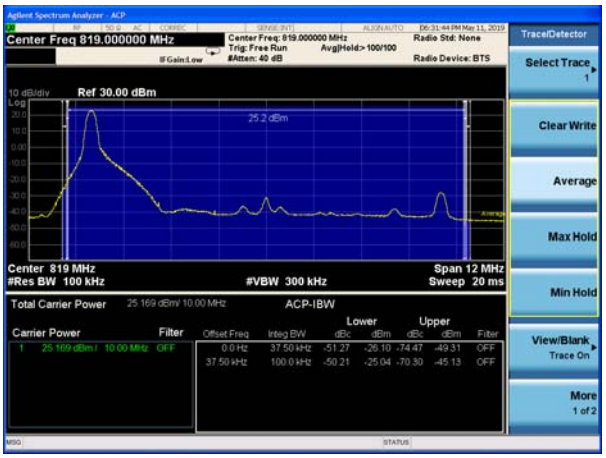
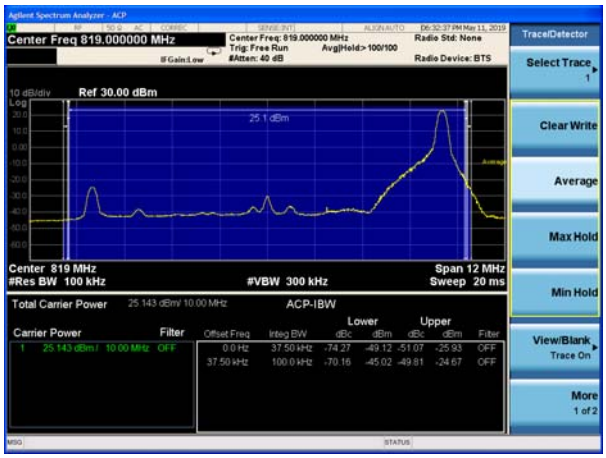
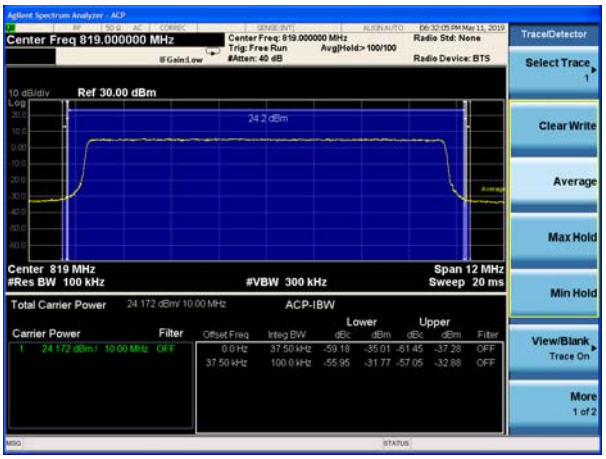
LTE Band 26 QPSK 1RB 10MHz CH Low



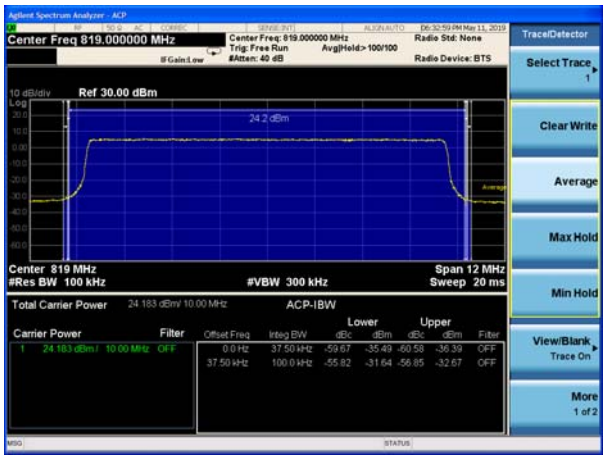
LTE Band 26 QPSK 1RB 10MHz CH High



LTE Band 26 QPSK 100%RB 10MHz CH Low

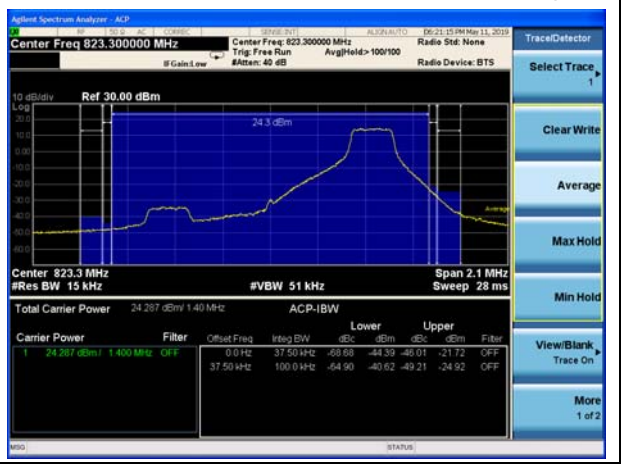


LTE Band 26 QPSK 100%RB 10MHz CH High



LTE Band 26 16QAM 1RB 1.4MHz CH Low

LTE Band 26 16QAM 1RB 1.4MHz CH High



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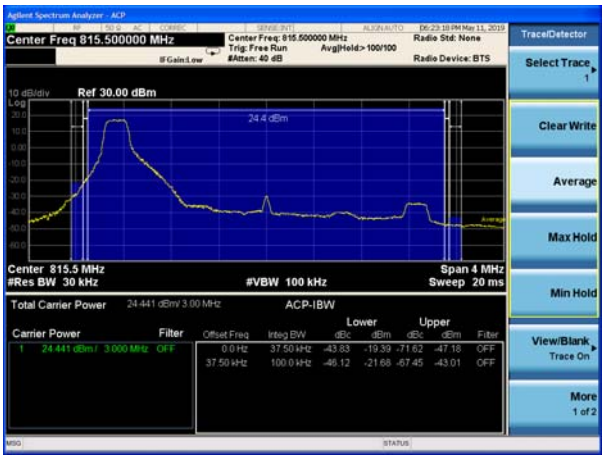
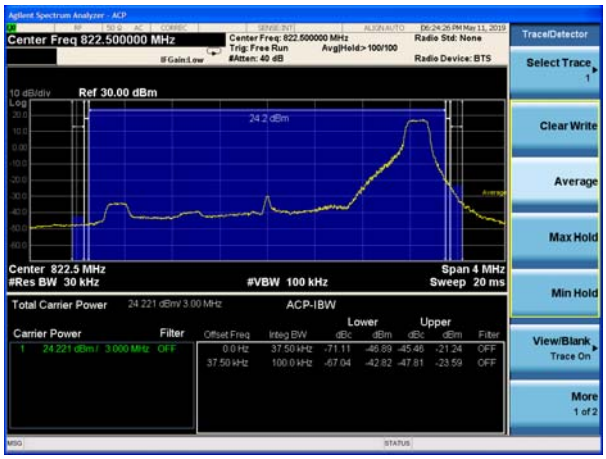
LTE Band 26 16QAM 100%RB 1.4MHz CH Low

LTE Band 26 16QAM 100%RB 1.4MHz CH High

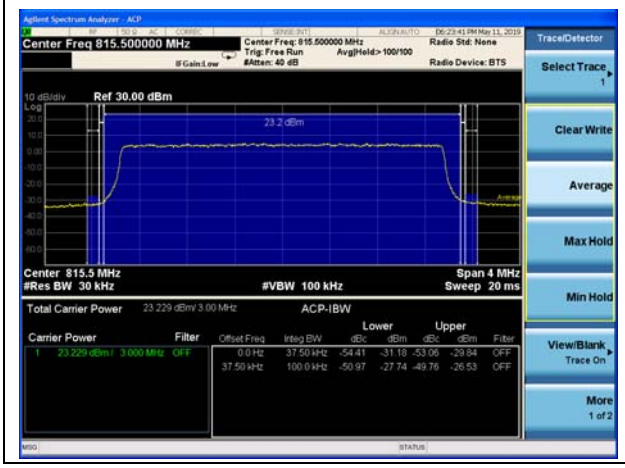
LTE Band 26 16QAM 1RB 3MHz CH Low



LTE Band 26 16QAM 1RB 3MHz CH High



LTE Band 26 16QAM 100%RB 3MHz CH Low



LTE Band 26 16QAM 100%RB 3MHz CH High

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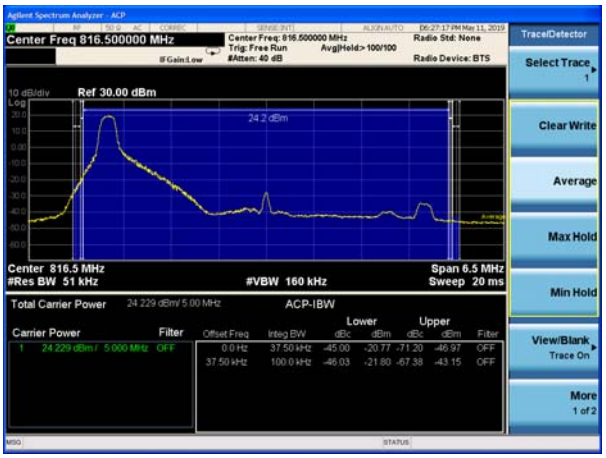
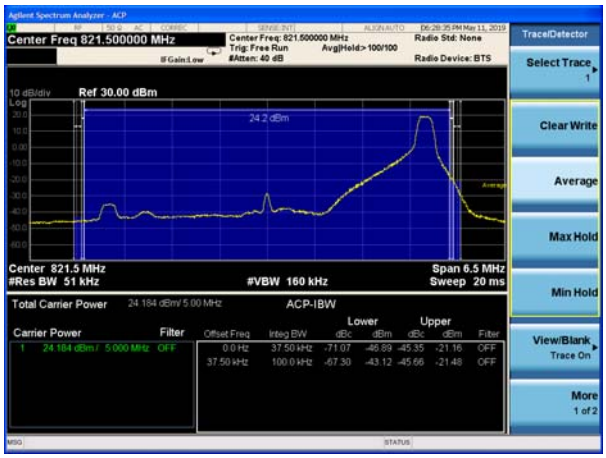
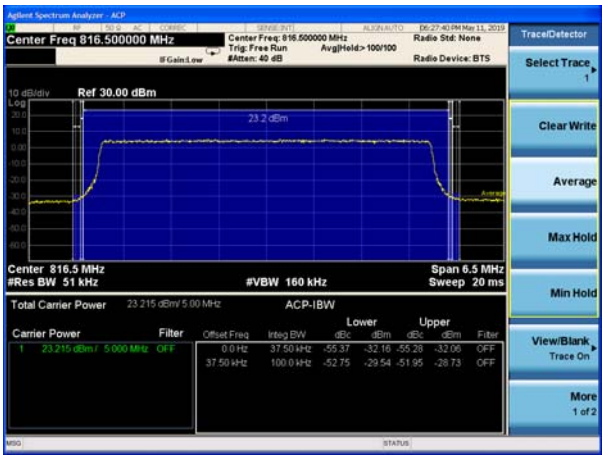
LTE Band 26 16QAM 1RB 5MHz CH Low



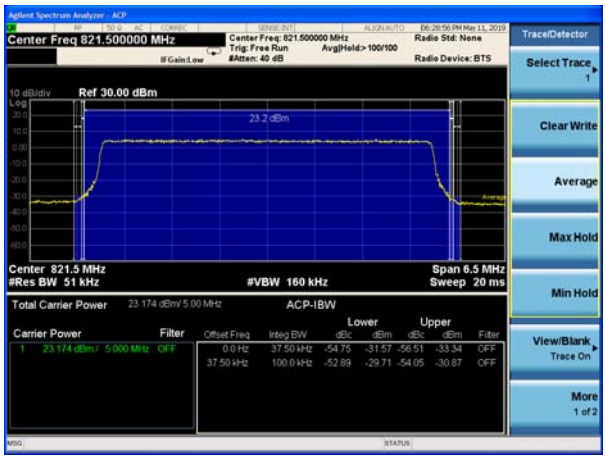
LTE Band 26 16QAM 1RB 5MHz CH High



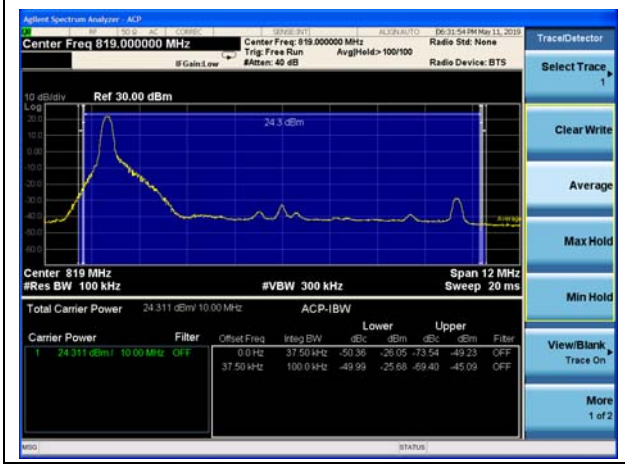
LTE Band 26 16QAM 100%RB 5MHz CH Low



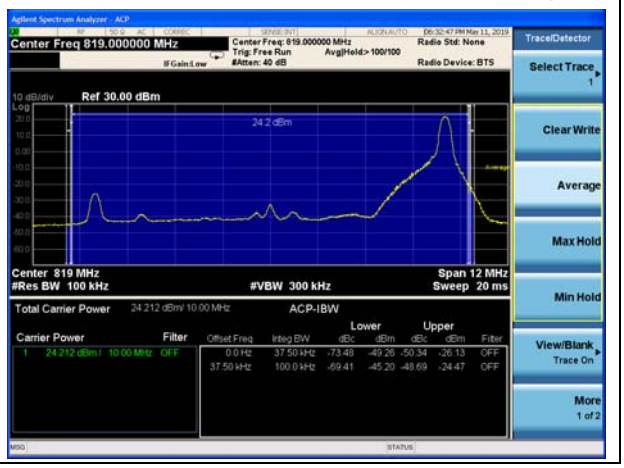
LTE Band 26 16QAM 100%RB 5MHz CH High



LTE Band 26 16QAM 1RB 10MHz CH Low



LTE Band 26 16QAM 1RB 10MHz CH High



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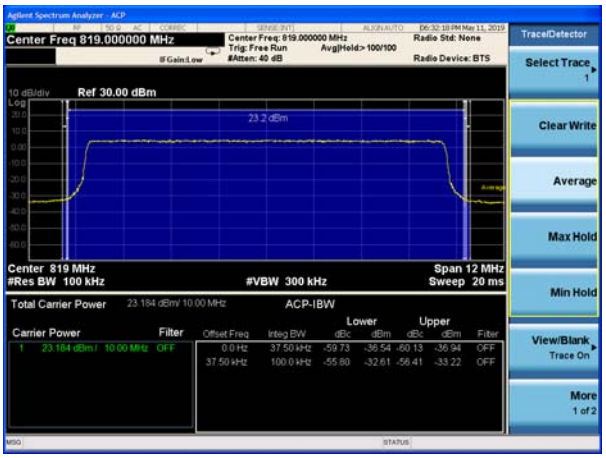
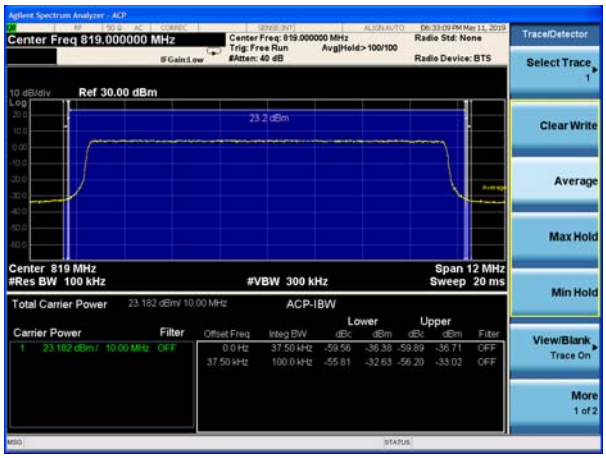
LTE Band 26 16QAM 100%RB 10MHz CH Low

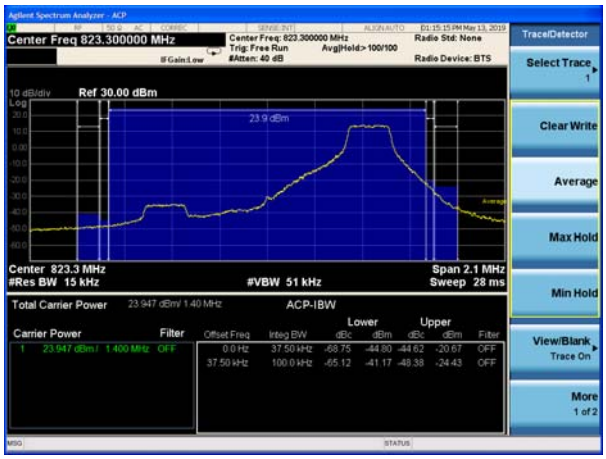


LTE Band 26 16QAM 100%RB 10MHz CH High



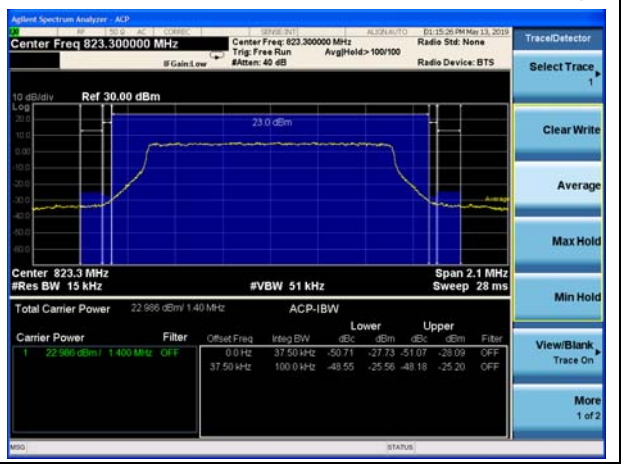
LTE Band 26 64QAM 1RB 1.4MHz CH Low

LTE Band 26 64QAM 1RB 1.4MHz CH High



LTE Band 26 64QAM 100%RB 1.4MHz CH Low

LTE Band 26 64QAM 100%RB 1.4MHz CH High



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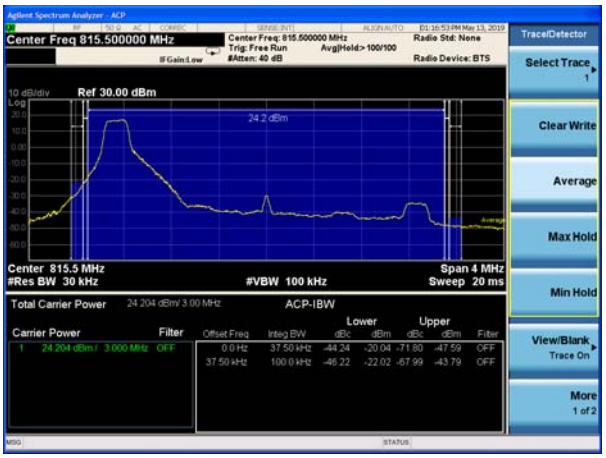
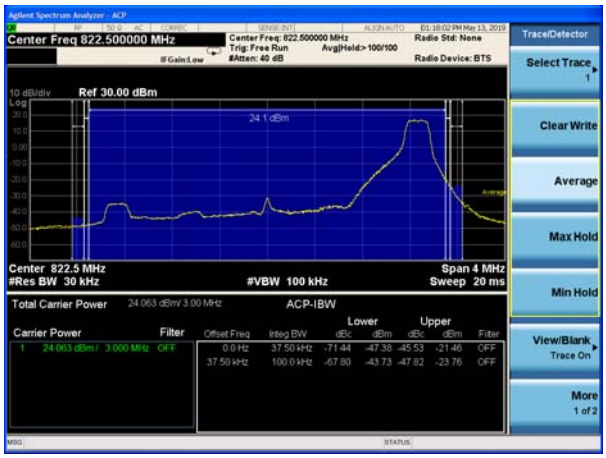
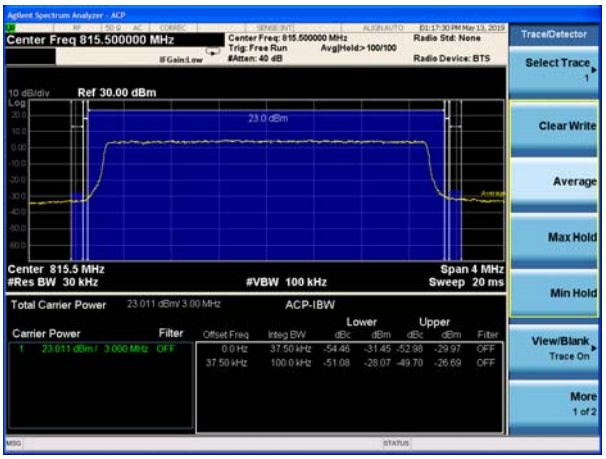
LTE Band 26 64QAM 1RB 3MHz CH Low



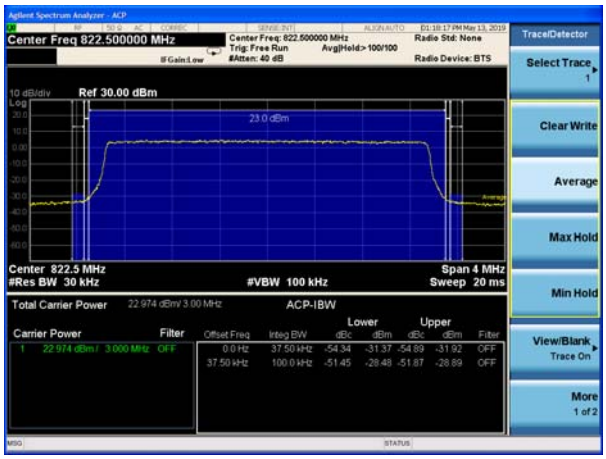
LTE Band 26 64QAM 1RB 3MHz CH High



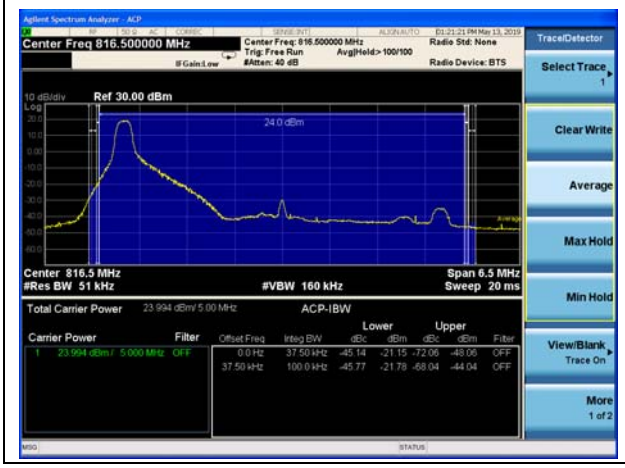
LTE Band 26 64QAM 100%RB 3MHz CH Low



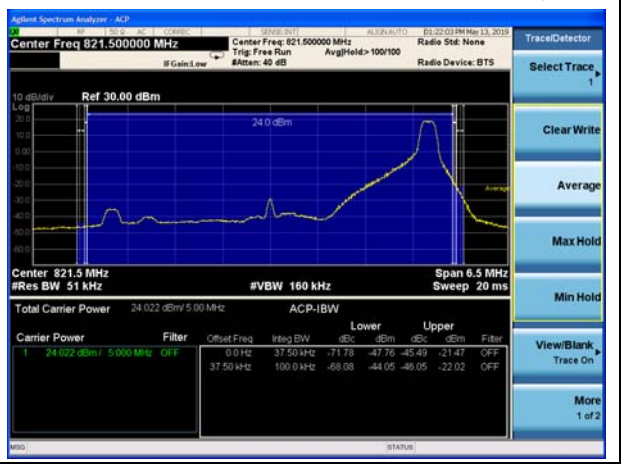
LTE Band 26 64QAM 100%RB 3MHz CH High



LTE Band 26 64QAM 1RB 5MHz CH Low



LTE Band 26 64QAM 1RB 5MHz CH High



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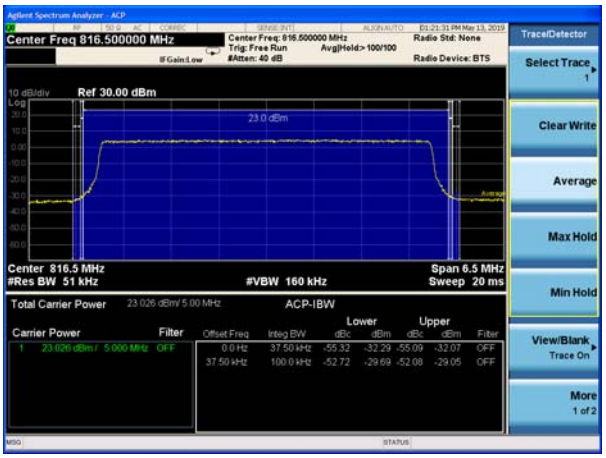
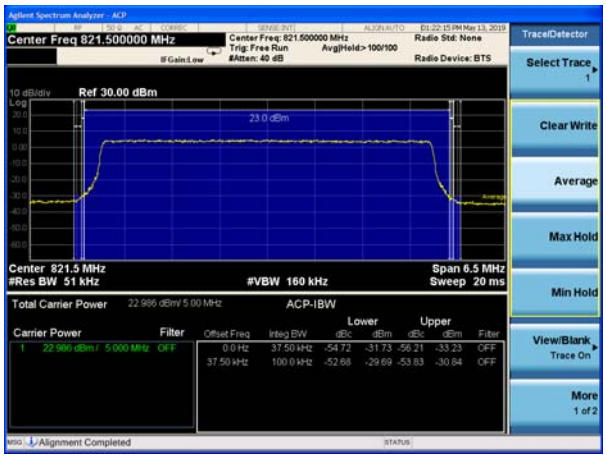
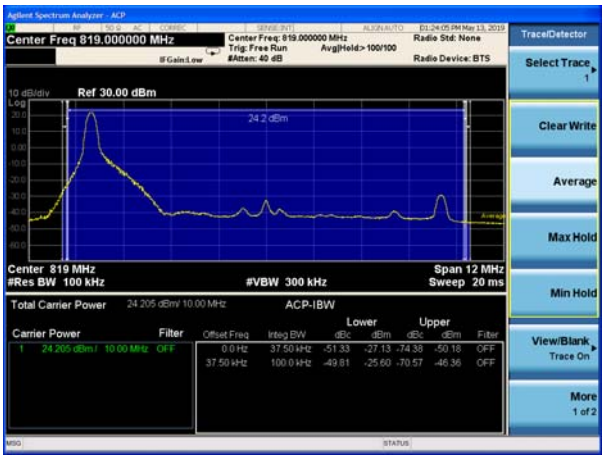
LTE Band 26 64QAM 100%RB 5MHz CH Low



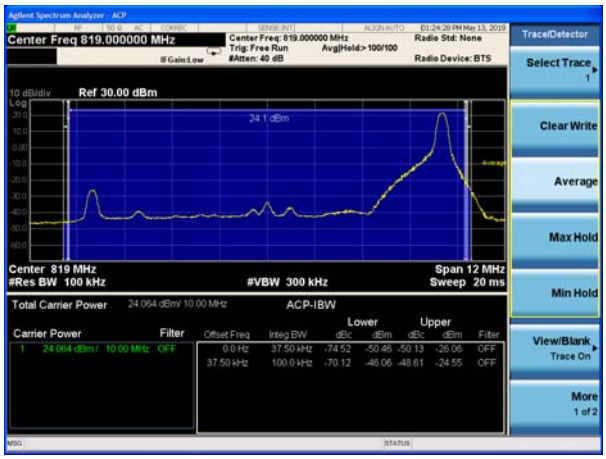
LTE Band 26 64QAM 100%RB 5MHz CH High



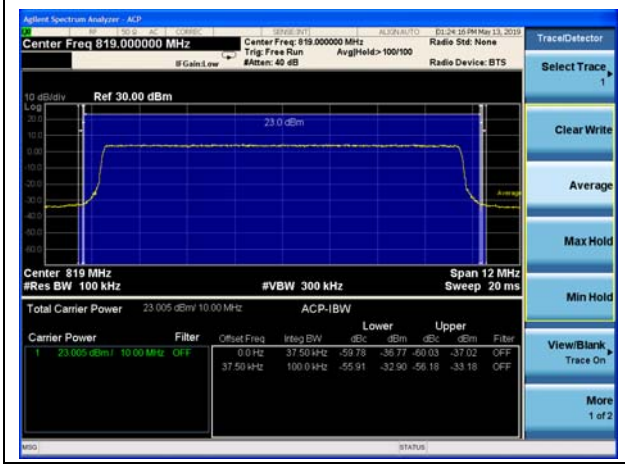
LTE Band 26 64QAM 1RB 10MHz CH Low



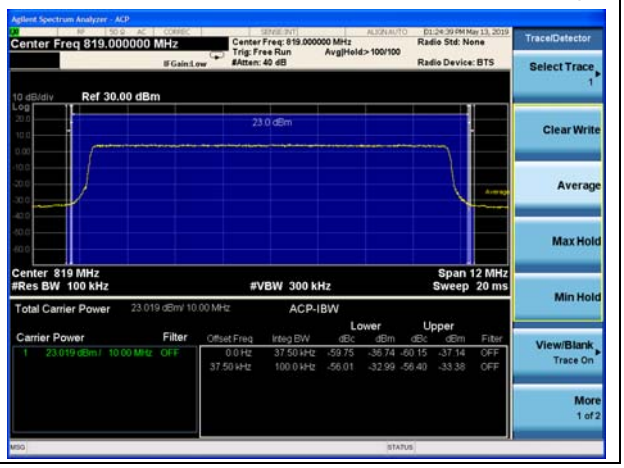
LTE Band 26 64QAM 1RB 10MHz CH High



LTE Band 26 64QAM 100%RB 10MHz CH Low



LTE Band 26 64QAM 100%RB 10MHz CH High



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

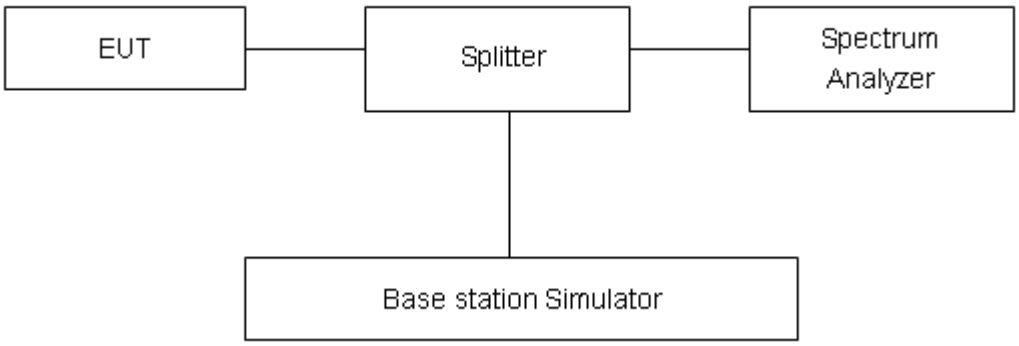
Ambient condition

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

Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (*e.g.*, dBm). Determine the PAPR from:
PAPR (dB) = PPk (dBm) - PAvg (dBm).

Test Setup



Limits

In measuring transmissions in this band using an average power technique, the peakto-average ratio (PAR) of the transmission may not exceed 13 dB in 24.232(d).

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.

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Test Results

LTE Band 26							
Mode	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
1.4 MHz (QPSK)	26697	814.7	29.10	24.23	4.87	13	PASS
	26740	819	29.32	24.15	5.17	13	PASS
	26783	823.3	29.08	24.17	4.91	13	PASS
3 MHz (QPSK)	26697	814.7	29.36	24.20	5.16	13	PASS
	26740	819	29.40	24.14	5.26	13	PASS
	26783	823.3	29.23	24.14	5.09	13	PASS
5 MHz (QPSK)	26697	814.7	29.43	24.17	5.26	13	PASS
	26740	819	29.47	24.14	5.33	13	PASS
	26783	823.3	29.32	24.14	5.18	13	PASS
10 MHz (QPSK)	26740	819	29.38	24.17	5.21	13	PASS
Mode	Channel	Frequency (MHz)	Peak(dBm)	Avg(dBm)	PAPR(dB)	Limit(dB)	Conclusion
1.4 MHz (16QAM)	26697	814.7	28.83	23.21	5.62	13	PASS
	26740	819	29.23	23.20	6.03	13	PASS
	26783	823.3	28.85	23.13	5.72	13	PASS
3 MHz (16QAM)	26697	814.7	29.19	23.22	5.97	13	PASS
	26740	819	29.30	23.16	6.14	13	PASS
	26783	823.3	29.07	23.18	5.89	13	PASS
5 MHz (16QAM)	26697	814.7	29.23	23.21	6.02	13	PASS
	26740	819	29.24	23.18	6.06	13	PASS
	26783	823.3	29.13	23.17	5.96	13	PASS
10 MHz (16QAM)	26740	819	29.17	23.17	6.00	13	PASS
Mode	Channel	Frequency (MHz)	Peak(dBm)	Avg(dBm)	PAPR(dB)	Limit(dB)	Conclusion
1.4 MHz (64QAM)	26697	814.7	28.72	23.11	5.61	13	PASS
	26740	819	29.09	23.07	6.02	13	PASS
	26783	823.3	28.69	23.00	5.69	13	PASS
3 MHz (64QAM)	26697	814.7	29.05	23.09	5.96	13	PASS
	26740	819	29.12	23.01	6.11	13	PASS

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	26783	823.3	28.93	23.04	5.89	13	PASS
5 MHz (64QAM)	26697	814.7	29.06	23.07	5.99	13	PASS
	26740	819	29.11	23.04	6.07	13	PASS
	26783	823.3	28.97	23.03	5.94	13	PASS
10 MHz (64QAM)	26740	819	29.02	23.02	6.00	13	PASS

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5.6. Frequency Stability

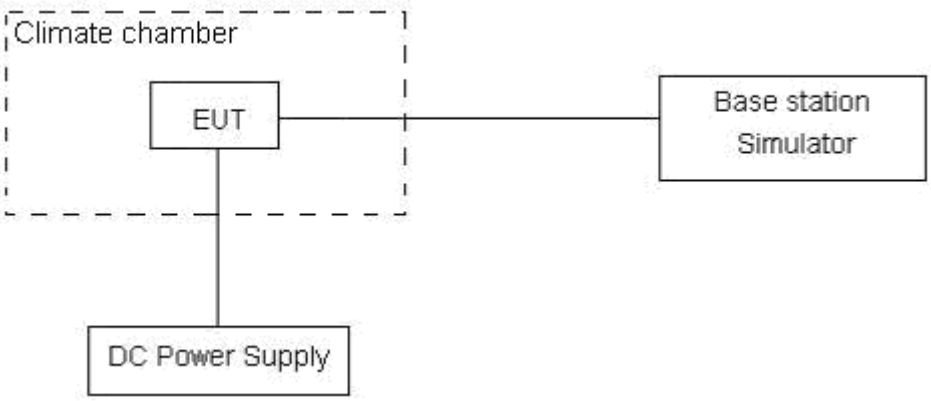
Ambient condition

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

Method of Measurement

1. Frequency Stability (Temperature Variation)
   The temperature inside the climate chamber is varied from -30°C to +55°C in 10°C step size,
   (1) With all power removed, the temperature was decreased to 0°C and permitted to stabilize for three hours.
   (2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.
   (3) Repeat the above measurements at 10°C increments from -30°C to +55°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.
2. Frequency Stability (Voltage Variation)
   The frequency stability shall be measured with variation of primary supply voltage as follows:
   (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
   (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.
   This transceiver is specified to operate with an input voltage of between 3.5 V and 4.4 V, with a nominal voltage of 3.8V.

Test setup



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Limits

According to the Sec. 90.213.(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.
Minimum Frequency Stability
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
809-824	1.5	2.5	2.5

Measurement Uncertainty

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

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Test Result

LTE Band 26								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability（ppm）	Frequency Stability（ppm）	Frequency Stability（ppm）	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal（25℃）	Normal	9.75	10.74	9.34	0.00519	0.00571	0.00497	PASS
Extreme（55℃）		10.99	14.13	16.21	0.00585	0.00751	0.00862	PASS
Extreme（50℃）		8.43	3.47	10.35	0.00448	0.00185	0.00550	PASS
Extreme（40℃）		10.84	4.14	6.04	0.00577	0.00220	0.00321	PASS
Extreme（30℃）		7.60	8.20	13.60	0.00404	0.00436	0.00723	PASS
Extreme（20℃）		16.14	8.85	9.04	0.00859	0.00471	0.00481	PASS
Extreme（10℃）		12.65	10.67	11.78	0.00673	0.00568	0.00627	PASS
Extreme（0℃）		9.75	12.03	2.29	0.00519	0.00640	0.00122	PASS
Extreme（-10℃）		14.19	14.65	6.76	0.00755	0.00779	0.00359	PASS
Extreme（-20℃）		16.45	13.20	8.77	0.00875	0.00702	0.00466	PASS
Extreme（-30℃）		1.27	5.26	7.61	0.00067	0.00280	0.00405	PASS
25℃	LV	2.08	14.80	1.64	0.00111	0.00787	0.00087	PASS
	HV	17.47	17.17	11.26	0.00929	0.00913	0.00599	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℃）	Normal	2.60	5.54	13.22	0.00138	0.00295	0.00703	PASS
Extreme（55℃）		14.99	11.16	1.54	0.00797	0.00594	0.00082	PASS
Extreme（50℃）		11.97	11.28	9.38	0.00637	0.00600	0.00499	PASS
Extreme（40℃）		7.31	10.66	8.54	0.00389	0.00567	0.00454	PASS
Extreme（30℃）		2.59	9.50	12.37	0.00138	0.00505	0.00658	PASS
Extreme（20℃）		9.97	12.18	17.86	0.00530	0.00648	0.00950	PASS
Extreme（10℃）		15.35	16.66	2.35	0.00817	0.00886	0.00125	PASS
Extreme（0℃）		10.49	15.97	1.27	0.00558	0.00849	0.00068	PASS
Extreme（-10℃）		15.51	9.53	10.71	0.00825	0.00507	0.00570	PASS
Extreme（-20℃）		16.59	17.64	3.39	0.00883	0.00938	0.00180	PASS
Extreme（-30℃）		13.68	7.35	5.62	0.00728	0.00391	0.00299	PASS
25℃	LV	1.31	17.76	7.15	0.00069	0.00944	0.00380	PASS
	HV	12.29	11.37	14.82	0.00654	0.00605	0.00788	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℃）	Normal	10.22	1.86	9.01	0.00544	0.00099	0.00479	PASS

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Extreme（55℃）		5.77	1.91	12.47	0.00307	0.00101	0.00663	PASS
Extreme（50℃）		10.72	11.88	15.50	0.00570	0.00632	0.00825	PASS
Extreme（40℃）		10.49	2.78	10.50	0.00558	0.00148	0.00559	PASS
Extreme（30℃）		17.27	7.53	12.01	0.00919	0.00401	0.00639	PASS
Extreme（20℃）		15.87	12.88	11.78	0.00844	0.00685	0.00627	PASS
Extreme（10℃）		1.37	5.44	11.40	0.00073	0.00289	0.00606	PASS
Extreme（0℃）		1.22	4.23	1.49	0.00065	0.00225	0.00079	PASS
Extreme（-10℃）		4.44	13.90	4.90	0.00236	0.00739	0.00261	PASS
Extreme（-20℃）		14.32	15.56	13.07	0.00761	0.00828	0.00695	PASS
Extreme（-30℃）		1.98	9.45	2.49	0.00105	0.00503	0.00133	PASS
25℃	LV	6.37	12.71	10.74	0.00339	0.00676	0.00571	PASS
	HV	15.96	17.44	12.12	0.00849	0.00928	0.00644	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℃）	Normal	13.59	8.54	8.95	0.00723	0.00455	0.00476	PASS
Extreme（55℃）		1.32	16.24	14.51	0.00070	0.00864	0.00772	PASS
Extreme（50℃）		16.28	9.72	17.45	0.00866	0.00517	0.00928	PASS
Extreme（40℃）		6.84	7.32	12.02	0.00364	0.00389	0.00639	PASS
Extreme（30℃）		3.05	3.88	9.59	0.00162	0.00206	0.00510	PASS
Extreme（20℃）		9.82	11.69	11.08	0.00522	0.00622	0.00589	PASS
Extreme（10℃）		13.44	5.69	10.76	0.00715	0.00303	0.00572	PASS
Extreme（0℃）		14.47	10.61	11.05	0.00770	0.00565	0.00588	PASS
Extreme（-10℃）		9.70	4.70	17.19	0.00516	0.00250	0.00914	PASS
Extreme（-20℃）		11.41	2.49	1.61	0.00607	0.00133	0.00085	PASS
Extreme（-30℃）		17.22	3.27	6.77	0.00916	0.00174	0.00360	PASS
25℃	LV	2.17	1.45	2.09	0.00115	0.00077	0.00111	PASS
	HV	14.39	10.58	4.84	0.00765	0.00563	0.00258	PASS

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5.7. Spurious Emissions at Antenna Terminals

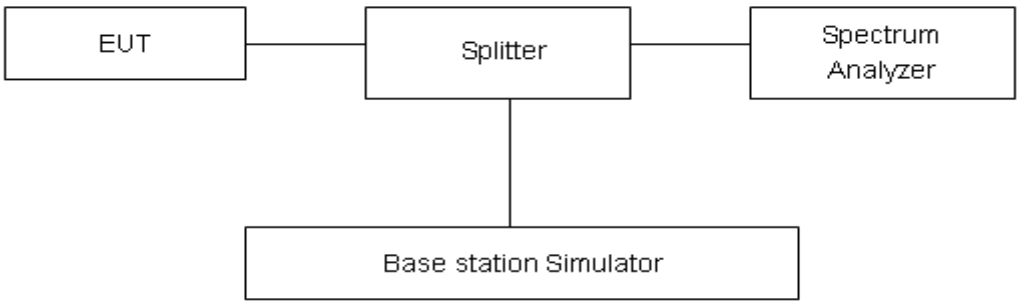
Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. RBW set to 100 kHz and VBW set to 300 kHz, Sweep is set to ATUO.

Test setup



Limits

Rule Part 90.691 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
100kHz-1GHz	0.684 dB
1GHz-12.75GHz	1.407 dB

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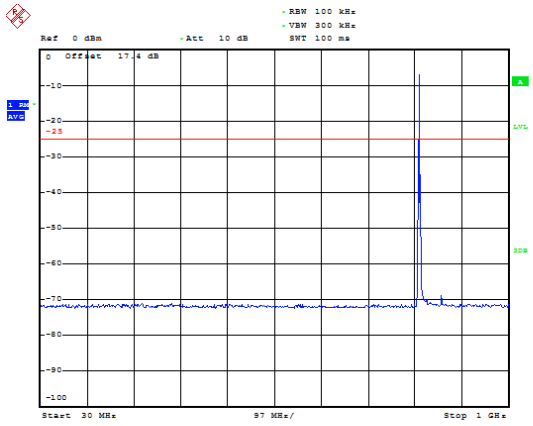
Test Result

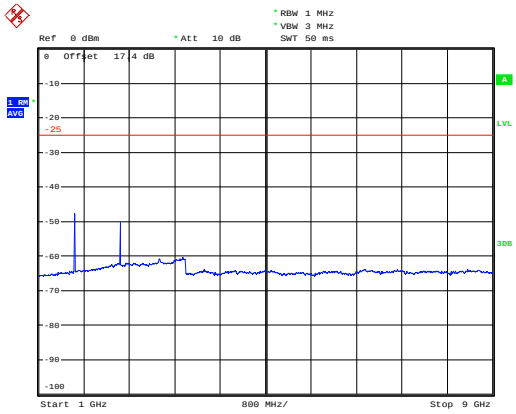
If disturbances were found more than 20dB below limit line, the mark is not required for the EUT.
The signal beyond the limit is carrier.

LTE Band 26 1.4MHz CH Low 30MHz~1GHz



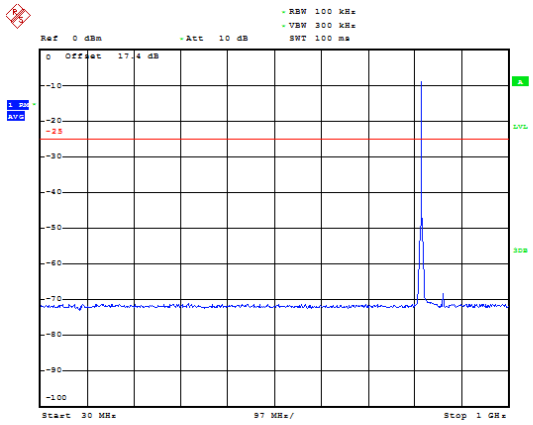
Date: 13.MAY.2019 15:29:02

LTE Band 26 1.4MHz CH Low 1GHz~9GHz



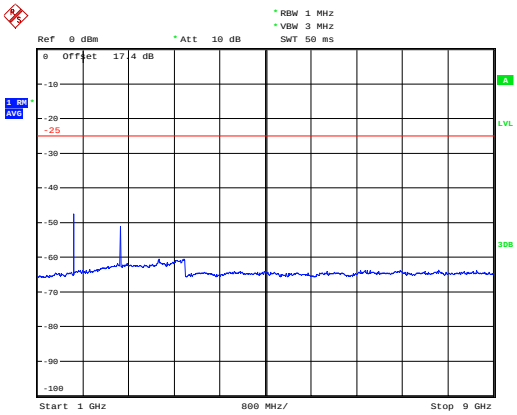
Date: 13.MAY.2019 15:34:49

LTE Band 26 1.4MHz CH Middle 30MHz~1GHz



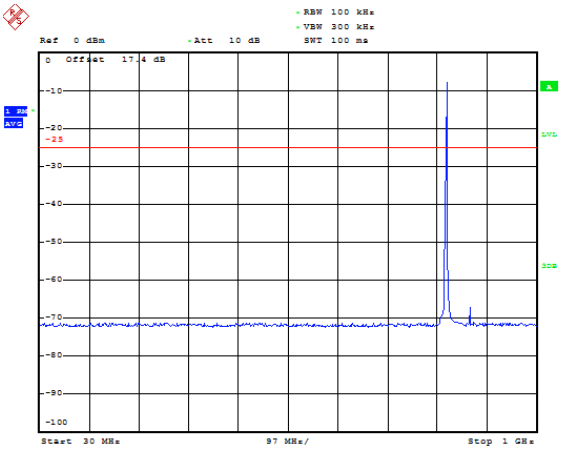
Date: 13.MAY.2019 15:29:28

LTE Band 26 1.4MHz CH Middle 1GHz~9GHz



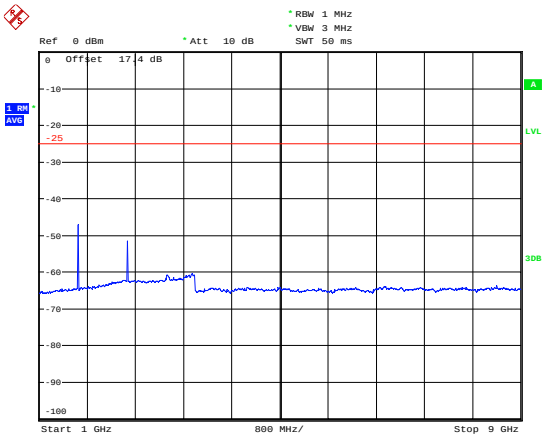
Date: 13.MAY.2019 15:35:02

LTE Band 26 1.4MHz CH High 30MHz~1GHz



Date: 13.MAY.2019 15:29:50

LTE Band 26 1.4MHz CH High 1GHz~9GHz



Date: 13.MAY.2019 15:35:14

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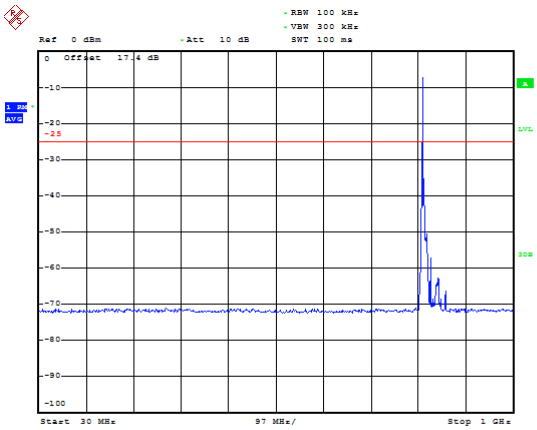
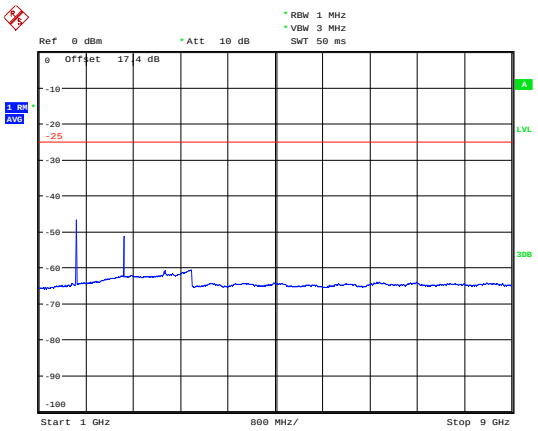
LTE Band 26 3MHz CH Low 30MHz~1GHz



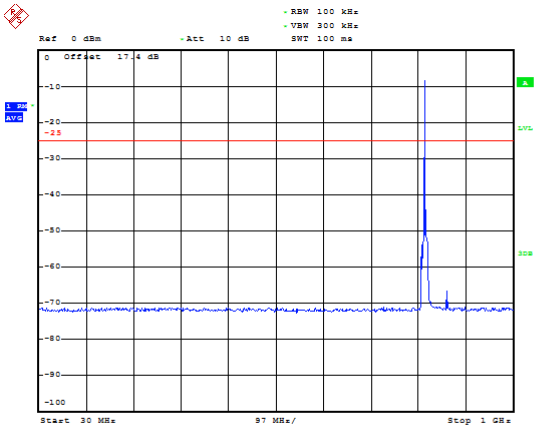
Date: 13.MAY.2019 15:30:32

LTE Band 26 3MHz CH Low 1GHz~9GHz



Date: 13.MAY.2019 15:36:09

LTE Band 26 3MHz CH Middle 30MHz~1GHz



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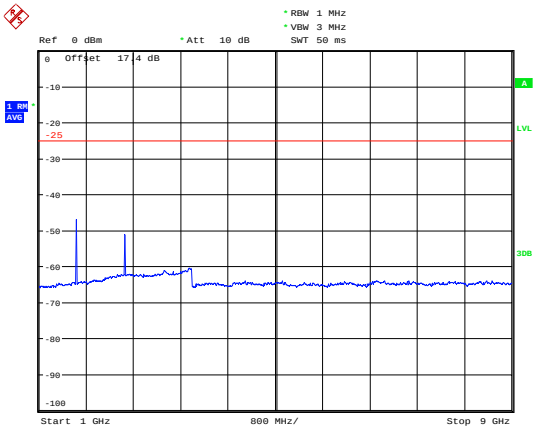
LTE Band 26 3MHz CH Middle 1GHz~9GHz



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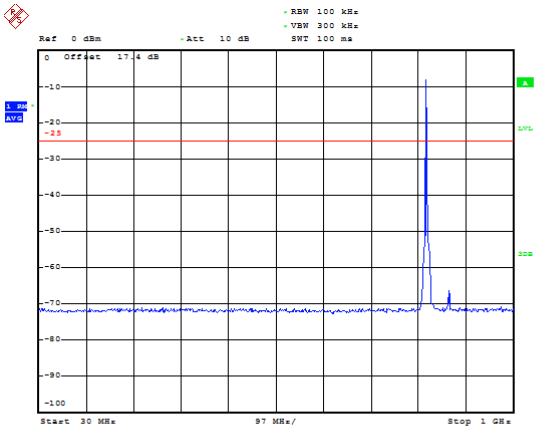
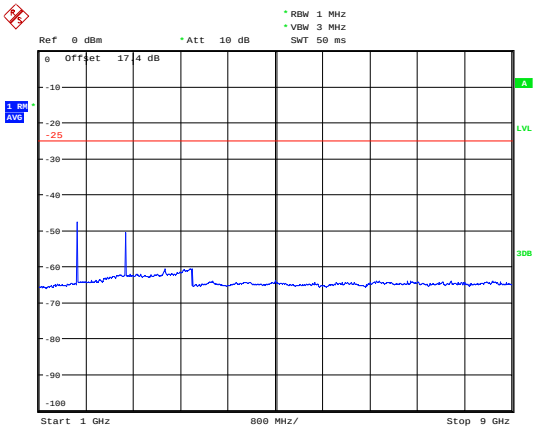
LTE Band 26 3MHz CH High 30MHz~1GHz



Date: 13.MAY.2019 15:33:32

LTE Band 26 3MHz CH High 1GHz~9GHz



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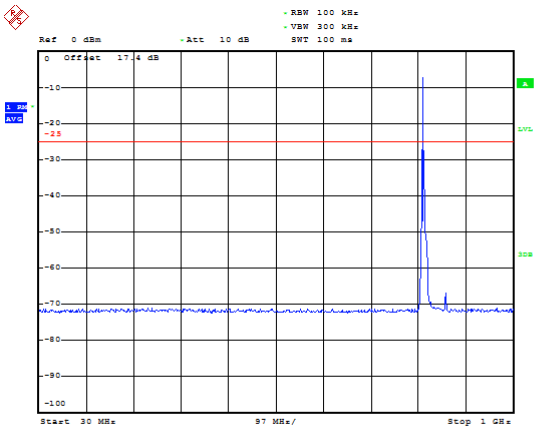
LTE Band 26 5MHz CH Low 30MHz~1GHz



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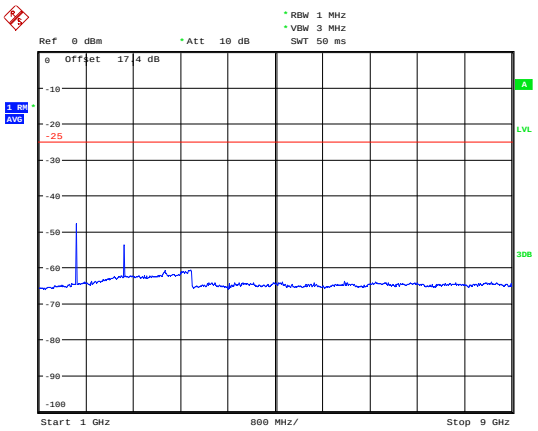
LTE Band 26 5MHz CH Low 1GHz~9GHz



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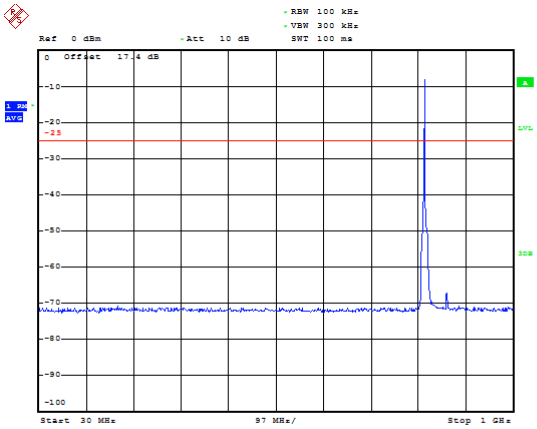
LTE Band 26 5MHz CH Middle 30MHz~1GHz



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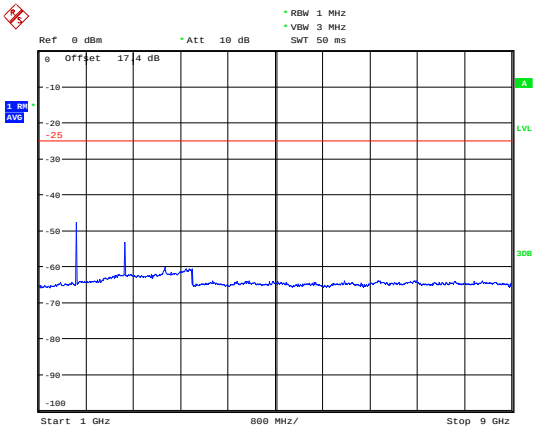
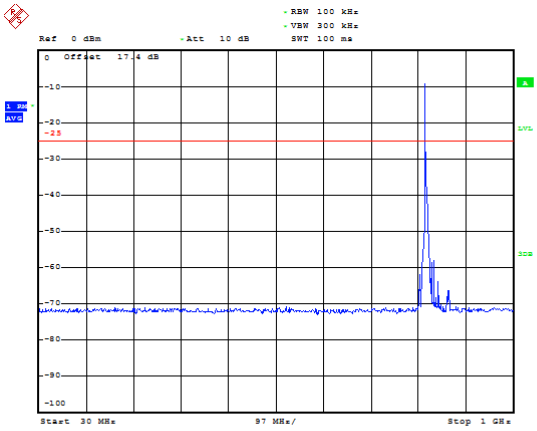
LTE Band 26 5MHz CH Middle 1GHz~9GHz



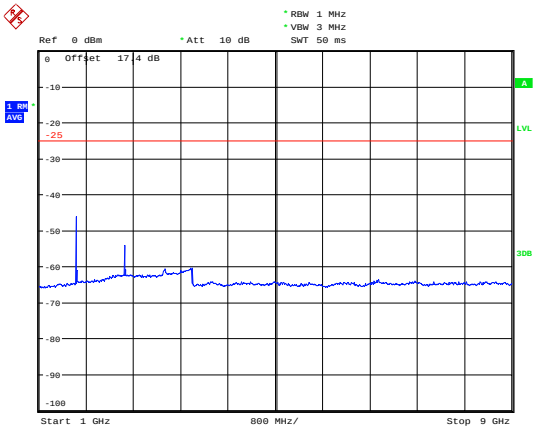
Date: 13.MAY.2019 15:37:14

LTE Band 26 5MHz CH High 30MHz~1GHz



Date: 13.MAY.2019 15:33:05

LTE Band 26 5MHz CH High 1GHz~9GHz



Date: 13.MAY.2019 15:37:26

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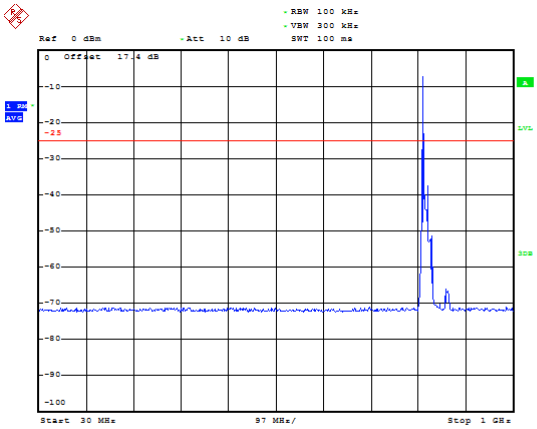
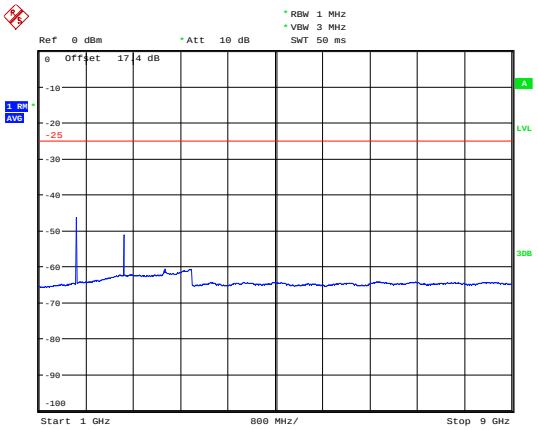
LTE Band 26 10MHz CH Middle 30MHz~1GHz



Date: 13.MAY.2019 15:34:03

LTE Band 26 10MHz CH Middle 1GHz~9GHz



Date: 13.MAY.2019 15:34:27

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6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	113824	2018-05-20	2019-05-19
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Agilent	N9010A	MY50210259	2018-05-20	2019-05-19
Signal Analyzer	R&S	FSV30	100815	2018-12-16	2019-12-15
Trilog Antenna	SCHWARZBECK	VUBL 9163	9163-201	2017-11-18	2020-11-17
Horn Antenna	R&S	HF907	100126	2018-07-07	2020-07-06
Signal generator	R&S	SMF 100A	102235	2018-05-20	2019-05-19
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
RF Cable	Agilent	SMA 15cm	0001	/	/
Software	R&S	EMC32	9.26.0	/	/

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

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ANNEX A: EUT Appearance and Test Setup

The Detailed EUT Appearance and Test Configuration refer to *EUT Appearance* and *Part90 Test Setup*.

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