

TEST REPORT



DT&C Co., Ltd.

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1. Report No : DRTFCC1804-0086
2. Customer
 - Name : LG Electronics USA
 - Address : 1000 Sylvan Avenue, Englewood Cliffs, New Jersey, United States, 07632
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : Telematics / TL19BNN
FCC ID : BEJTL19BNN
5. Test Method Used : KDB971168 D01v03r01, ANSI C63.26-2015, ANSI/TIA-603-E-2016
Test Specification : §2, §22(H), §90
6. Date of Test : 2018.01.15 ~ 2018.03.23
7. Testing Environment : Refer to appended test report.
8. Test Result : Refer to the attached test result.

Affirmation	Tested by	Reviewed by
	Name : JungWoo Kim  (Signature)	Name : GeunKi Son  (Signature)

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2018 . 04 . 23 .

DT&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1804-0086	Apr. 23, 2018	Initial issue

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1 GENERAL INFORMATION

Applicant Name : LG Electronics USA
Address : 1000 Sylvan Avenue, Englewood Cliffs, New Jersey, United States, 07632
FCC ID : BEJTL19BNN
FCC Classification : PCS Licensed Transmitter (PCB)
EUT Type : Telematics
Model Name : TL19BNN
Add Model Name : NA
Supplying power : DC 12 V
Antenna Information : External antenna

Mode	TX Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max power (dBm)	Max power (W)
LTE Band 26	821.5	13M4G7D	QPSK	19.77	0.095
LTE Band 26	821.5	13M4W7D	16QAM	18.54	0.071
LTE Band 26	819.0	8M96G7D	QPSK	20.05	0.101
LTE Band 26	819.0	8M92W7D	16QAM	18.76	0.075
LTE Band 26	816.5 ~ 821.5	4M50G7D	QPSK	20.44	0.111
LTE Band 26	816.5 ~ 821.5	4M49W7D	16QAM	19.17	0.083
LTE Band 26	815.5 ~ 822.5	2M71G7D	QPSK	20.37	0.109
LTE Band 26	815.5 ~ 822.5	2M70W7D	16QAM	19.28	0.085
LTE Band 26	814.7 ~ 823.3	1M09G7D	QPSK	20.59	0.115
LTE Band 26	814.7 ~ 823.3	1M09W7D	16QAM	19.38	0.087

2 INTRODUCTION

2.1 EUT DESCRIPTION

The Equipment under Test (EUT) supports WCDMA, LTE.

2.2 EUT CAPABILITIES

This ETU contains the following capabilities:
850/1700/1900 WCDMA/HSUPA, Multi-band LTE.

2.3 TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+21 °C ~ +24 °C
▪ Relative Humidity	41 % ~ 44 %

2.4 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.5 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Radiated Disturbance (Below 1 GHz)	± 5.1 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	± 5.4 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (Above 18 GHz)	± 5.3 dB (The confidence level is about 95 %, $k = 2$)

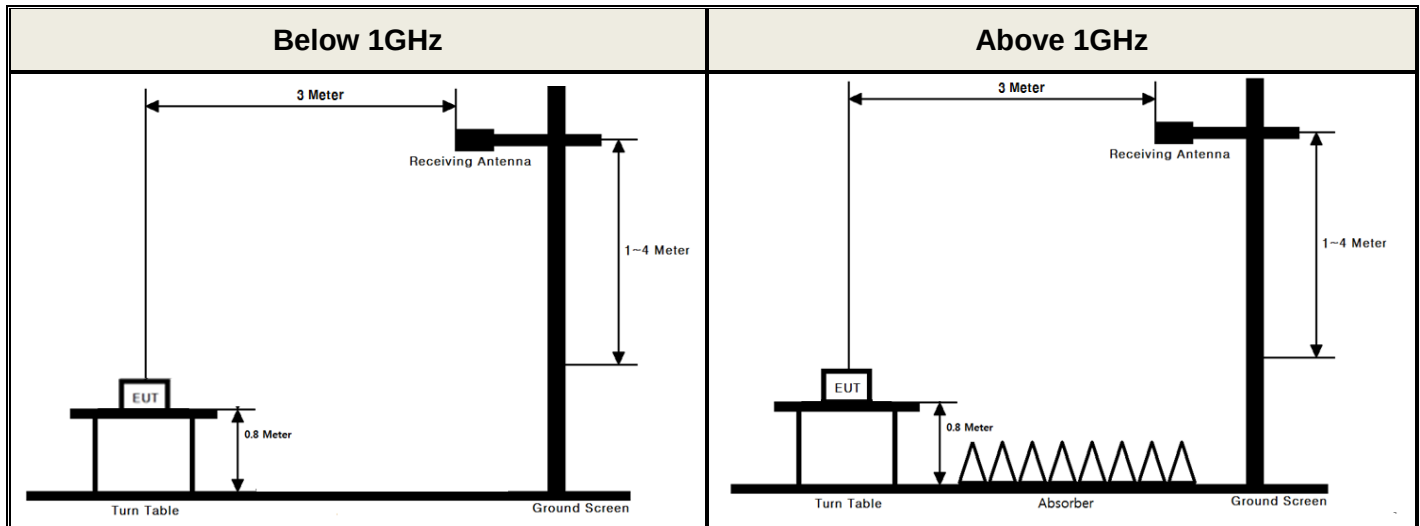
2.6 TEST FACILITY

DT&C Co., Ltd.		
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The site is constructed in conformance with the requirements.		
- FCC MRA Accredited Test Firm No. : KR0034		
www.dtnet.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

3 DESCRIPTION OF TESTS

3.1 ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)

Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.17
- KDB971168 D01v03 - Section 5.2.2
- ANSI C63.26-2015 – Section 5.2.4.4.1

Test setting

1. Set span to 2 x to 3 x the OBW.
2. Set RBW = 1% to 5% of the OBW.
3. Set VBW $\geq$ 3 x RBW.
4. Set number of points in sweep $\geq$ 2 x span / RBW.
5. Sweep time:
 - 1) Set = auto-couple, or
 - 2) Set $\geq$ $[10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6. Detector = power averaging (rms).
7. If the EUT can be configured to transmit continuously, then set the trigger to free run.
8. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.

10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The receiver antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

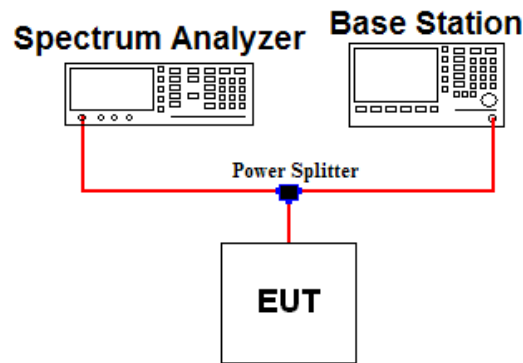
The ERP/EIRP is calculated using the following formula:

ERP/EIRP = The conducted power at the substitute antenna's terminal [dBm] + Substitute Antenna gain [dBd for ERP , dBi for EIRP]

For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn antenna and an isotropic antenna are taken into consideration.

3.2 OCCUPIED BANDWIDTH.

Test set-up



Test Procedure

- KDB971168 D01v03 - Section 4.3
- ANSI C63.26-2015 – Section 5.4.4

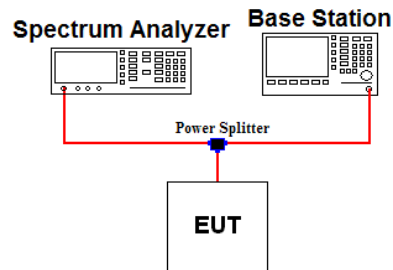
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

Test setting

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. $RBW = 1 \sim 5 \%$ of the expected OBW & $VBW \geq 3 \times RBW$
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within 1 ~ 5 % of the 99 % occupied bandwidth observed in step 6.

3.3 BAND EDGE EMISSIONS AT ANTENNA TERMINAL

Test set-up



Test Procedure

- KDB971168 D01v03 - Section 6
- ANSI C63.26-2015 – Section 5.7

All out of band emissions are measured by means of a calibrated spectrum analyzer. Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The EUT was setup to maximum output power at its lowest and highest channel with all bandwidths, modulations and RB configurations.

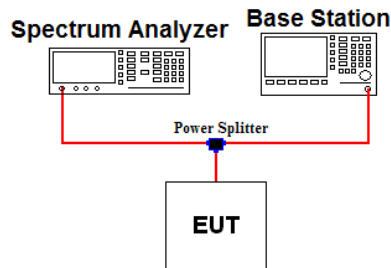
For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser 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.

Test setting

1. Span was set large enough so as to capture all out of band emissions near the band edge
2. RBW = 100 KHz & VBW $\geq 3 \times$ RBW
3. Detector = RMS & Trace mode = Average
4. Sweep time = Auto couple
5. The trace was allowed to stabilize

3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL

Test set-up



Test Procedure

- KDB971168 D01v03 - Section 6
- ANSI C63.26-2015 – Section 5.7

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths, modulations and RB configurations. The spectrum is scanned from 9 kHz up to a frequency including its 10th harmonic.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

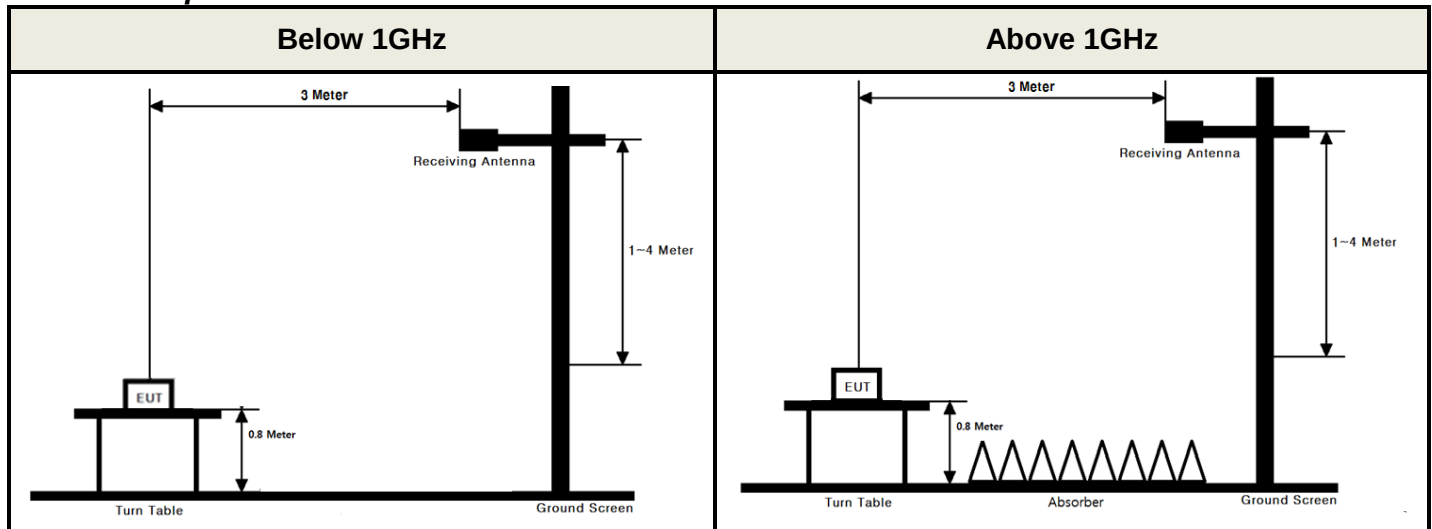
Test setting

1. RBW = 100 kHz(Below 1 GHz) or 1 MHz(Above 1 GHz) & VBW $\geq 3 \times$ RBW (Refer to Note 1)
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point $\geq 2 \times$ span / RBW
5. The trace was allowed to stabilize

Note 1: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1GHz and 1MHz or greater for frequencies greater than 1GHz.

3.5 UNDESIRABLE EMISSIONS

Test Set-up



These measurements were performed at 3 test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.12
- KDB971168 D01v03 - Section 5.8
- ANSI C63.26-2015 – Section 5.5

Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW $\geq 3 \times$ RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point $\geq 2 \times$ span / RBW
5. The trace was allowed to stabilize

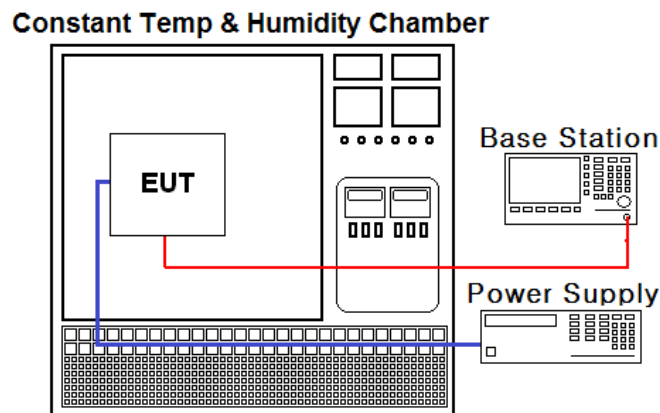
The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.

For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.

3.6 FREQUENCY STABILITY

Test Set-up



Test Procedure

- ANSI/TIA-603-E-2016
- KDB971168 D01v03 - Section 9

The frequency stability of the transmitter is measured by:

a.) **Temperature:**

The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **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.

Specification:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block for Part 24, 27. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency for Part 22.

Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature.
(20 °C to provide a reference)
2. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C.
A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

4 LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	17/09/05	18/09/05	MY46471251
Spectrum Analyzer	Agilent Technologies	N9020A	17/09/06	18/09/06	MY48011075
EMI Test Receiver	Rohde Schwarz	ESR7	17/02/16	18/02/16	101061
			18/02/13	19/02/13	
DC power supply	Agilent Technologies	66332A	17/09/05	18/09/05	US37473422
Multimeter	FLUKE	17B	17/04/12	18/04/12	26030065WS
Power Splitter	Anritsu	K241B	17/12/27	18/12/27	1301183
Temp & Humi Test Chamber	SJ Science	SJ-TH-S50	17/09/07	18/09/07	U5542113
Thermohygrometer	BODYCOM	BJ5478	18/01/03	19/01/03	120612-2
Radio Communication Analyzer	Anritsu	MT8820C	17/09/07	18/09/07	6201127429
Signal Generator	Rohde Schwarz	SMBV100A	17/12/27	18/12/27	255571
Signal Generator	Rohde Schwarz	SMF100A	17/12/27	18/12/27	102341
Loop Antenna	Schwarzbeck	FMZB1513	16/04/22	18/04/22	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	16/08/05	18/08/05	9160-3362
Dipole Antenna	Schwarzbeck	VHA9103	17/03/14	19/03/14	2116
Dipole Antenna	Schwarzbeck	VHA9103	16/04/15	18/04/15	2117
Dipole Antenna	Schwarzbeck	UHA9105	17/03/14	19/03/14	2261
Dipole Antenna	Schwarzbeck	UHA9105	16/04/15	18/04/15	2262
HORN ANT	ETS	3117	16/05/13	18/05/13	00140394
HORN ANT	ETS	3117	17/08/02	19/08/02	00154312
Amplifier	EMPOWER	BBS3Q7ELU	17/09/06	18/09/06	1020
PreAmplifier	TSJ	MLA-010K01-B01-27	17/03/06	18/03/06	1844539
			18/03/05	19/03/05	
PreAmplifier	Agilent	8449B	17/09/05	18/09/05	3008A02108
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	17/09/05	18/09/05	7

Note: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

5 SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Status Note 1
2.1046 90.635	Conducted Output Power	< 100 Watts	Conducted	C Note3
2.1049	Occupied Bandwidth	N/A		C Note4
2.1051 90.691	Band Edge / Conducted Spurious Emissions	> 43 + 10log ₁₀ (P) dB for all out-of-band emissions except > 50 + 10log ₁₀ (P) dB at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge		C Note4
2.1055 90.213	Frequency Stability	< 2.5 ppm		C Note4
22.913(a.5)	Radiated Output Power	< 7 Watts max. ERP	Radiated	C Note3
2.1053 90.691	Undesirable Emissions	> 43 + 10log ₁₀ (P) dB for all out-of-band emissions except		C Note3

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: This device supports the dynamic antenna switching that allows for radiated transmission from one of two antennas. But two antennas cannot transmit simultaneously.

Note 3: This test item was performed for each antenna.(Ant 1, 2)

(The antenna was connected to the device with the provided cable by applicant.)

Note 4: This test item was performed at the antenna configuration that provides highest conducted output power.
(Antenna 1)

6 SAMPLE CALCULATION

A. Emission Designator

LTE Band 26(QPSK)

Emission Designator = **13M4G7D**

LTE OBW = 13.386 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data Transmission

LTE Band 26(16QAM)

Emission Designator = **13M4W7D**

LTE OBW = 13.369 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data Transmission

B. For substitution method

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Spectrum Reading Value(dBm)	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
1.4	814.7	QPSK	1/2	-15.38	X	H	19.35	1.24	20.59	0.115

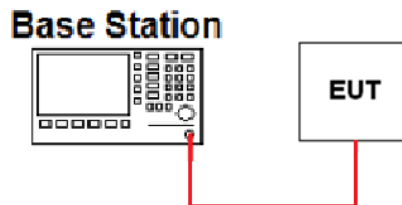
ERP or EIRP = Level @ Ant Terminal LEVEL(dBm) + Tx Ant. Gain

- 1) The EUT mounted on a non-conductive turntable is 0.8 meter above test site ground level.
- 2) During the test, the turn table is rotated until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with substituted antenna gain is the rating of ERP, EIRP or Radiated spurious emission.

7 TEST DATA

7.1 CONDUCTED OUPTUP POWER

A base station simulator was used to establish communication with the EUT. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



Note 1: The conducted output power was measured using the Anritsu MT8820C.

▪ Band 26

<ANT 1>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
15	821.5	QPSK	22.77	22.63	22.60	21.56	21.43	21.60	21.59
		16QAM	22.02	21.93	21.68	20.61	20.58	20.66	20.73
10	819	QPSK	22.87	22.86	22.93	21.68	21.51	21.57	21.60
		16QAM	22.00	22.04	22.03	20.80	20.66	20.72	20.66
5	816.5	QPSK	22.65	22.66	22.68	21.63	21.59	21.68	21.66
		16QAM	21.98	21.86	21.81	20.87	20.73	20.82	20.76
	821.5	QPSK	22.71	22.63	22.73	21.41	21.48	21.53	21.49
		16QAM	21.74	21.71	21.84	20.62	20.68	20.76	20.68
3	815.5	QPSK	22.76	22.60	22.62	21.69	21.62	21.61	21.72
		16QAM	21.88	21.97	21.80	20.88	20.83	20.82	20.84
	819	QPSK	22.78	22.55	22.60	21.52	21.51	21.45	21.56
		16QAM	21.77	21.86	21.85	20.74	20.70	20.60	20.67
	822.5	QPSK	22.52	22.71	22.71	21.50	21.64	21.71	21.46
		16QAM	21.64	21.74	21.78	20.71	20.70	20.74	20.66
1.4	814.7	QPSK	22.63	22.78	22.57	22.57	22.58	22.60	21.67
		16QAM	22.06	22.03	21.84	21.91	21.98	21.93	20.82
	819	QPSK	22.63	22.78	22.60	22.51	22.62	22.53	21.44
		16QAM	21.90	22.14	21.73	21.80	21.94	21.84	20.70
	823.3	QPSK	22.64	22.80	22.73	22.49	22.58	22.60	21.47
		16QAM	21.86	21.98	21.84	21.85	21.90	21.96	20.62

<ANT 2>

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
15	821.5	QPSK	21.95	22.01	21.93	20.95	20.91	20.91	20.97
		16QAM	21.12	21.13	21.09	19.97	19.98	19.95	20.01
10	819	QPSK	22.06	22.08	22.24	21.06	20.93	21.05	21.07
		16QAM	21.32	21.46	21.34	20.08	20.04	20.08	20.12
5	816.5	QPSK	22.02	22.15	21.88	21.01	21.05	21.01	21.12
		16QAM	21.05	21.44	21.15	20.18	20.28	20.13	20.14
	821.5	QPSK	21.89	22.01	22.08	20.86	21.03	21.09	20.97
		16QAM	20.95	21.15	21.15	20.07	20.17	20.08	20.08
3	815.5	QPSK	22.09	22.11	22.08	21.03	21.09	21.05	21.07
		16QAM	21.20	21.19	21.20	20.25	20.22	20.19	20.23
	819	QPSK	22.03	21.91	21.96	20.88	20.98	20.96	20.96
		16QAM	21.18	21.01	21.16	20.05	20.01	20.04	20.04
	822.5	QPSK	21.95	22.14	22.16	20.97	21.07	21.08	21.01
		16QAM	21.09	21.35	21.37	20.10	20.18	20.25	20.17
1.4	814.7	QPSK	21.97	22.21	22.10	21.86	21.92	21.93	21.02
		16QAM	21.48	21.38	21.29	21.20	21.37	21.38	20.19
	819	QPSK	21.92	22.05	21.89	21.78	21.90	21.86	20.93
		16QAM	21.06	21.15	21.08	21.10	21.31	21.20	20.11
	823.3	QPSK	22.11	22.36	22.13	21.92	21.90	21.93	21.08
		16QAM	21.30	21.41	21.24	21.31	21.35	21.26	20.21

7.2 OCCUPIED BANDWIDTH

- Plots of the EUT's Occupied Bandwidth are shown in Clause 8.1

7.3 BAND EDGE EMISSIONS (Conducted)

- Plots of the EUT's Band Edge Emissions are shown in Clause 8.2

7.4 SPURIOUS AND HARMONICS EMISSIONS (Conducted)

- Plots of the EUT's Spurious Emissions are shown in Clause 8.3

7.5 ERP

<ANT 1>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
15	821.5	QPSK	1/0	H	18.54	1.23	19.77	0.095
		16QAM	1/0	H	17.31	1.23	18.54	0.071
10	819.0	QPSK	1/0	H	18.82	1.23	20.05	0.101
		16QAM	1/0	H	17.53	1.23	18.76	0.075
5	816.5	QPSK	1/12	H	19.20	1.24	20.44	0.111
		16QAM	1/12	H	17.93	1.24	19.17	0.083
	821.5	QPSK	1/12	H	18.83	1.23	20.06	0.101
		16QAM	1/12	H	17.56	1.23	18.79	0.076
3	815.5	QPSK	1/0	H	19.13	1.24	20.37	0.109
		16QAM	1/0	H	18.04	1.24	19.28	0.085
	819	QPSK	1/0	H	18.86	1.23	20.09	0.102
		16QAM	1/0	H	17.69	1.23	18.92	0.078
	822.5	QPSK	1/14	H	18.97	1.23	20.20	0.105
		16QAM	1/14	H	17.86	1.23	19.09	0.081
1.4	814.7	QPSK	1/2	H	19.35	1.24	20.59	0.115
		16QAM	1/2	H	18.14	1.24	19.38	0.087
	819	QPSK	1/0	H	19.08	1.23	20.31	0.107
		16QAM	1/0	H	17.76	1.23	18.99	0.079
	823.3	QPSK	1/0	H	19.32	1.23	20.55	0.114
		16QAM	1/0	H	18.03	1.23	19.26	0.084

<ANT 2>

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
15	821.5	QPSK	1/74	H	17.64	1.23	18.87	0.077
		16QAM	1/74	H	16.36	1.23	17.59	0.057
10	819.0	QPSK	1/0	H	17.40	1.23	18.63	0.073
		16QAM	1/0	H	15.99	1.23	17.22	0.053
5	816.5	QPSK	1/0	H	17.45	1.24	18.69	0.074
		16QAM	1/0	H	16.30	1.24	17.54	0.057
	821.5	QPSK	1/0	H	17.91	1.23	19.14	0.082
		16QAM	1/0	H	16.66	1.23	17.89	0.062
3	815.5	QPSK	1/7	H	17.42	1.24	18.66	0.073
		16QAM	1/7	H	16.00	1.24	17.24	0.053
	819	QPSK	1/7	H	17.46	1.23	18.69	0.074
		16QAM	1/7	H	16.05	1.23	17.28	0.053
	822.5	QPSK	1/7	H	17.76	1.23	18.99	0.079
		16QAM	1/7	H	16.64	1.23	17.87	0.061
1.4	814.7	QPSK	1/2	H	16.79	1.24	18.03	0.064
		16QAM	1/2	H	15.52	1.24	16.76	0.047
	819	QPSK	1/0	H	16.30	1.23	17.53	0.057
		16QAM	1/0	H	15.09	1.23	16.32	0.043
	823.3	QPSK	1/0	H	16.46	1.23	17.69	0.059
		16QAM	1/0	H	15.20	1.23	16.43	0.044

7.6 UNDESIRABLE EMISSIONS (Radiated)

<ANT 1>

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
15	821.5	1/0	QPSK	1629.94	V	-55.35	3.77	-51.58	71.35	32.77
				2444.89	V	-51.13	4.06	-47.07	66.84	
		1/0	16QAM	1629.83	V	-55.23	3.77	-51.46	70.00	31.54
				2444.94	V	-51.01	4.06	-46.95	65.49	
10	819	1/0	QPSK	1629.04	V	-55.53	3.77	-51.76	71.81	33.05
				2443.49	V	-51.40	4.06	-47.34	67.39	
		1/0	16QAM	1629.15	V	-55.38	3.77	-51.61	70.37	31.76
				2443.38	V	-51.24	4.06	-47.18	65.94	
5	816.5	1/12	QPSK	1633.21	V	-54.66	3.77	-50.89	71.33	33.44
				2449.64	V	-50.84	4.06	-46.78	67.22	
		1/12	16QAM	1633.18	V	-54.56	3.77	-50.79	69.96	32.17
				2449.59	V	-50.69	4.06	-46.63	65.80	
	821.5	1/12	QPSK	1643.24	V	-54.62	3.77	-50.85	70.91	33.06
				2464.54	V	-50.60	4.05	-46.55	66.61	
		1/12	16QAM	1643.34	V	-54.12	3.77	-50.35	69.14	31.79
				2464.38	V	-50.41	4.05	-46.36	65.15	
3	815.5	1/0	QPSK	1628.61	V	-54.46	3.77	-50.69	71.06	33.37
				2442.90	V	-50.01	4.06	-45.95	66.32	
		1/0	16QAM	1628.53	V	-54.21	3.77	-50.44	69.72	32.28
				2442.87	V	-49.89	4.06	-45.83	65.11	
	819	1/0	QPSK	1635.71	V	-54.20	3.77	-50.43	70.52	33.09
				2453.35	V	-49.93	4.06	-45.87	65.96	
		1/0	16QAM	1635.77	V	-53.87	3.77	-50.10	69.02	31.92
				2453.48	V	-49.71	4.06	-45.65	64.57	
	822.5	1/14	QPSK	1647.64	V	-54.19	3.77	-50.42	70.62	33.20
				2471.33	V	-49.86	4.05	-45.81	66.01	
		1/14	16QAM	1647.61	V	-53.74	3.77	-49.97	69.06	32.09
				2471.39	V	-49.83	4.05	-45.78	64.87	
1.4	814.7	1/2	QPSK	1629.40	V	-53.87	3.77	-50.10	70.69	33.59
				2444.15	V	-50.17	4.06	-46.11	66.70	
		1/2	16QAM	1629.52	V	-53.74	3.77	-49.97	69.35	32.38
				2444.23	V	-50.05	4.06	-45.99	65.37	
	819	1/0	QPSK	1636.74	V	-53.70	3.77	-49.93	70.24	33.31
				2455.17	V	-50.21	4.06	-46.15	66.46	
		1/0	16QAM	1636.77	V	-53.48	3.77	-49.71	68.70	31.99
				2455.08	V	-49.91	4.06	-45.85	64.84	
	823.3	1/0	QPSK	1645.51	V	-53.77	3.77	-50.00	70.55	33.55
				2468.08	V	-50.12	4.05	-46.07	66.62	
		1/0	16QAM	1645.44	V	-53.45	3.77	-49.68	68.94	32.26
				2468.01	V	-49.86	4.05	-45.81	65.07	

Note 1: Limit Calculation = $43 + 10\log_{10}(P[\text{Watts}])$

Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

<ANT 2>

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
15	821.5	1/74	QPSK	1656.22	V	-49.07	3.78	-45.29	64.16	31.87
				2484.41	V	-49.14	4.05	-45.09	63.96	
		1/74	16QAM	1656.41	V	-49.25	3.78	-45.47	63.06	30.59
				2484.11	V	-48.72	4.05	-44.67	62.26	
10	819	1/0	QPSK	1629.30	V	-49.58	3.77	-45.81	64.44	31.63
				2443.78	V	-48.76	4.06	-44.70	63.33	
		1/0	16QAM	1629.15	V	-49.80	3.77	-46.03	63.25	30.22
				2443.64	V	-48.63	4.06	-44.57	61.79	
5	816.5	1/0	QPSK	1628.79	V	-49.04	3.77	-45.27	63.96	31.69
				2443.03	V	-49.09	4.06	-45.03	63.72	
		1/0	16QAM	1638.60	V	-50.06	3.77	-46.29	65.43	32.14
				2457.74	V	-49.26	4.06	-45.20	64.34	
	821.5	1/0	QPSK	1628.57	V	-48.82	3.77	-45.05	62.59	30.54
				2442.95	V	-48.98	4.06	-44.92	62.46	
		1/0	16QAM	1638.54	V	-49.79	3.77	-46.02	63.91	30.89
				2457.47	V	-48.90	4.06	-44.84	62.73	
3	815.5	1/7	QPSK	1631.11	V	-48.75	3.77	-44.98	63.64	31.66
				2446.55	V	-49.15	4.06	-45.09	63.75	
		1/7	16QAM	1630.85	V	-48.79	3.77	-45.02	62.26	30.24
				2446.68	V	-48.74	4.06	-44.68	61.92	
	819	1/7	QPSK	1638.54	V	-48.99	3.77	-45.22	63.91	31.69
				2457.02	V	-49.23	4.06	-45.17	63.86	
		1/7	16QAM	1638.26	V	-49.29	3.77	-45.52	62.80	30.28
				2457.11	V	-48.93	4.06	-44.87	62.15	
	822.5	1/7	QPSK	1645.08	V	-49.93	3.77	-46.16	65.15	31.99
				2467.70	V	-49.53	4.05	-45.48	64.47	
		1/7	16QAM	1645.27	V	-50.00	3.77	-46.23	64.10	30.87
				2467.54	V	-49.13	4.05	-45.08	62.95	
1.4	814.7	1/2	QPSK	1629.45	V	-48.45	3.77	-44.68	62.71	31.03
				2444.02	V	-48.61	4.06	-44.55	62.58	
		1/2	16QAM	1629.35	V	-48.50	3.77	-44.73	61.49	29.76
				2443.92	V	-48.16	4.06	-44.10	60.86	
	819	1/0	QPSK	1636.80	V	-48.79	3.77	-45.02	62.55	30.53
				2455.13	V	-49.22	4.06	-45.16	62.69	
		1/0	16QAM	1636.80	V	-49.18	3.77	-45.41	61.73	29.32
				2455.25	V	-49.12	4.06	-45.06	61.38	
	823.3	1/0	QPSK	1645.21	V	-49.93	3.77	-46.16	63.85	30.69
				2468.03	V	-49.73	4.05	-45.68	63.37	
		1/0	16QAM	1645.24	V	-50.06	3.77	-46.29	62.72	29.43
				2468.21	V	-49.43	4.05	-45.38	61.81	

Note 1: Limit Calculation = $43 + 10\log_{10}(P[\text{Watts}])$

Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

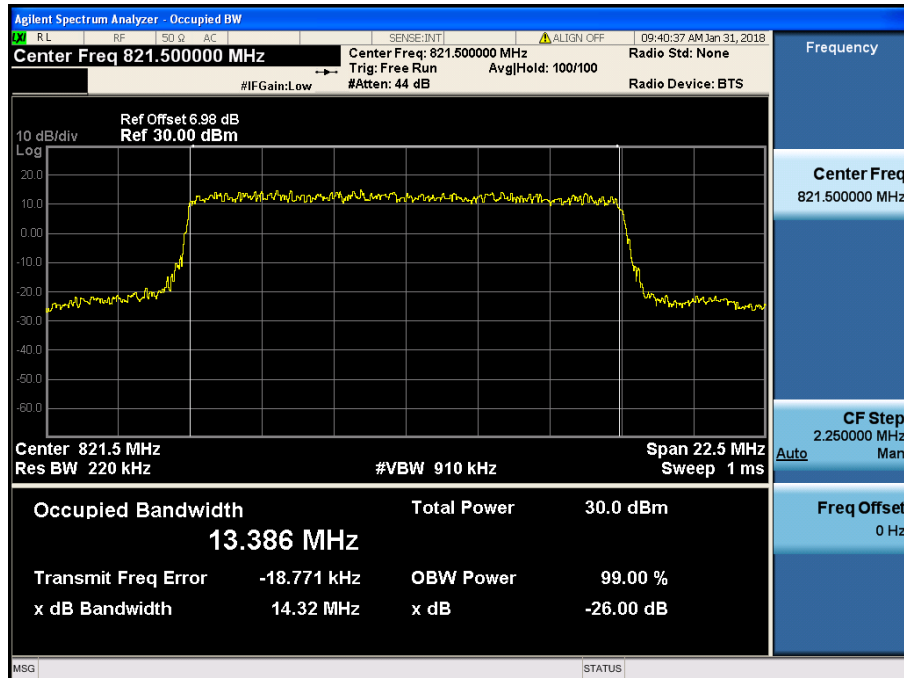
7.7 FREQUENCY STABILITY

OPERATING FREQUENCY : 819 MHz
 REFERENCE VOLTAGE : 12 VDC
 LIMIT : 2.5 ppm

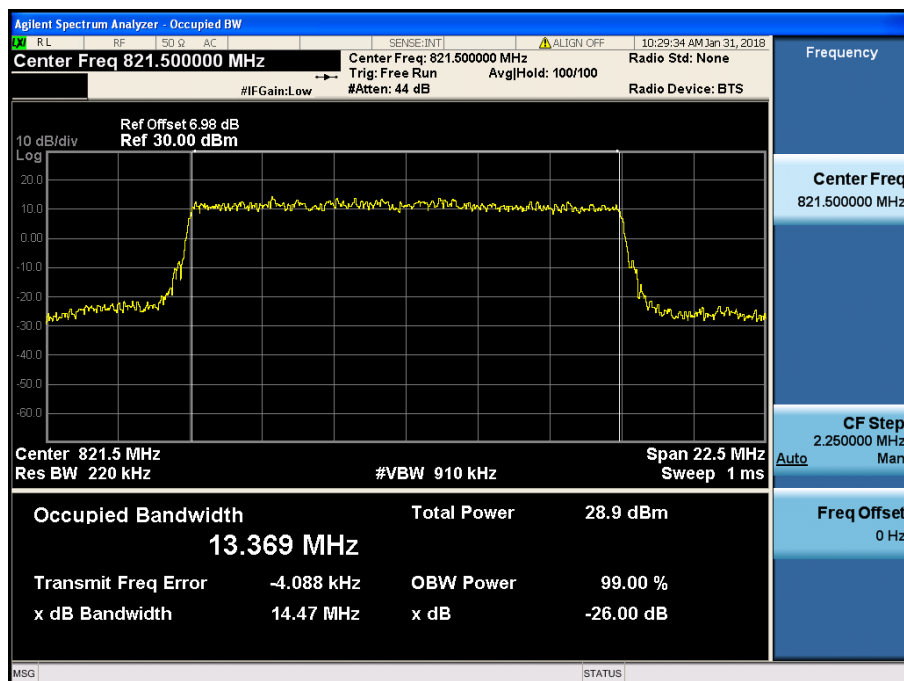
VOLTAGE (%)	POWER (V DC)	TEMP (°C)	FREQUENCY (Hz)	FREQ.Dev (Hz)	Deviation	
					(ppm)	(%)
100%	12.00	+20(Ref)	819,000,006	6	0.0073	0.000000733
100%		-30	819,000,005	5	0.0061	0.000000611
100%		-20	819,000,014	14	0.0171	0.000001709
100%		-10	819,000,004	4	0.0049	0.000000488
100%		0	819,000,003	3	0.0037	0.000000366
100%		+10	819,000,004	4	0.0049	0.000000488
100%		+20	819,000,006	6	0.0073	0.000000733
100%		+30	819,000,011	11	0.0134	0.000001343
100%		+40	819,000,003	3	0.0037	0.000000366
100%		+50	819,000,007	7	0.0085	0.000000855
115%	13.80	+20	819,000,005	5	0.0061	0.000000611
85%	10.20	+20	819,000,003	3	0.0037	0.000000366

8. TEST PLOTS

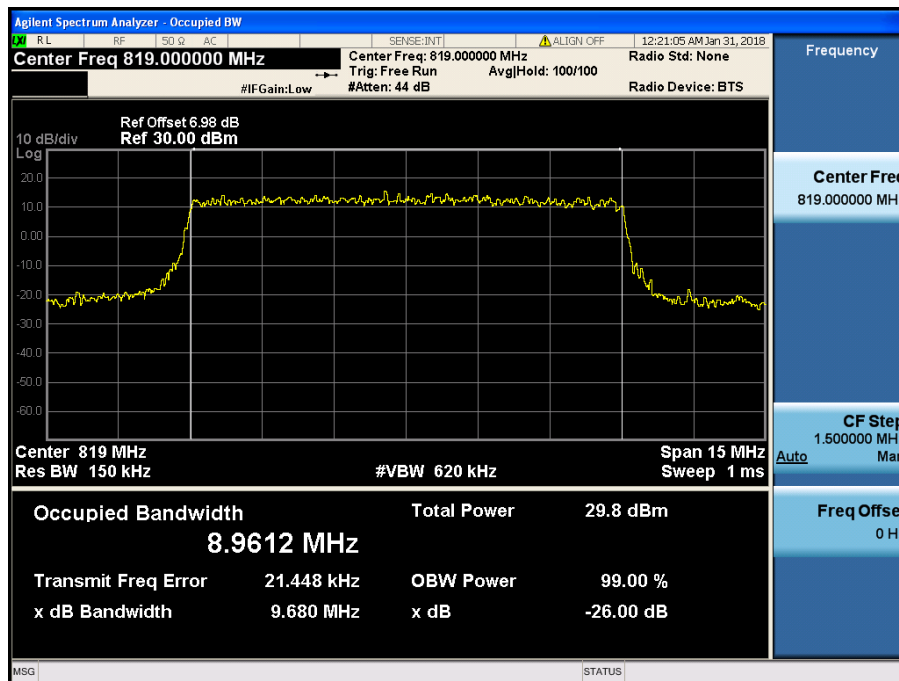
8.1 OCCUPIED BANDWIDTH



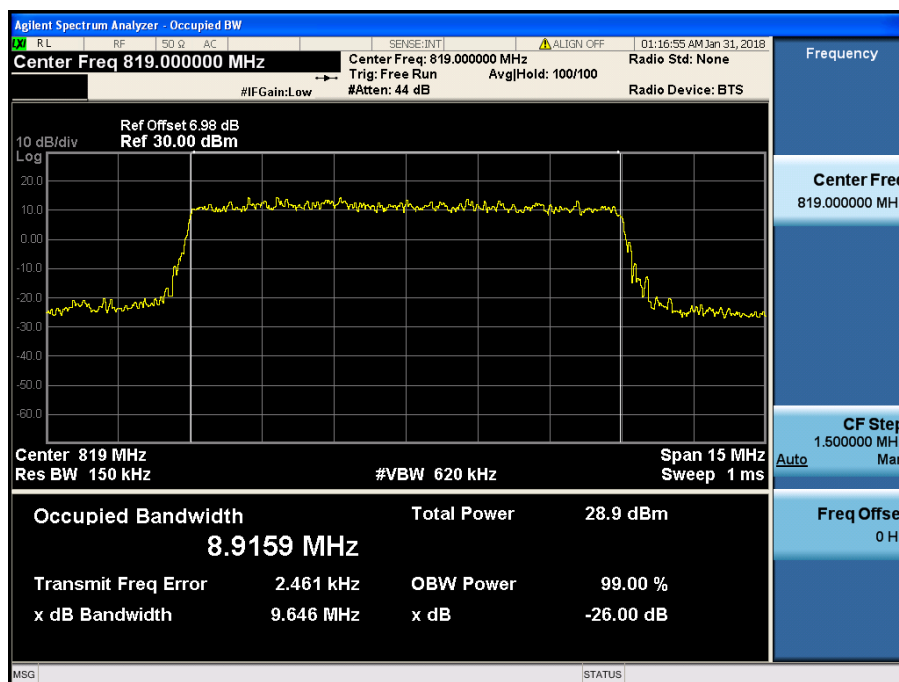
LTE Band 26 / 15 MHz / QPSK - RB Size 50



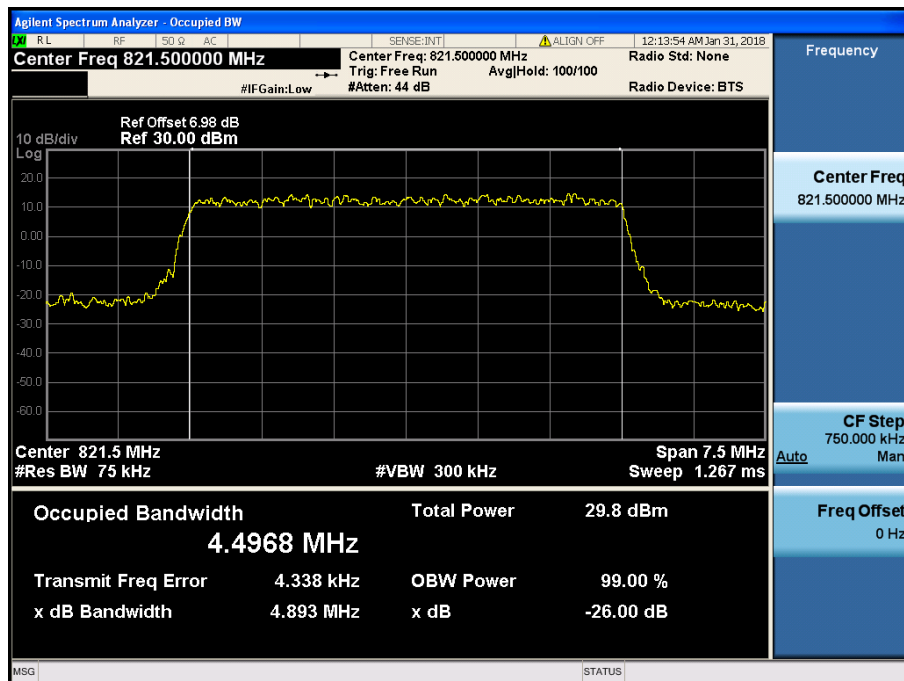
LTE Band 26 / 15 MHz / 16QAM - RB Size 50



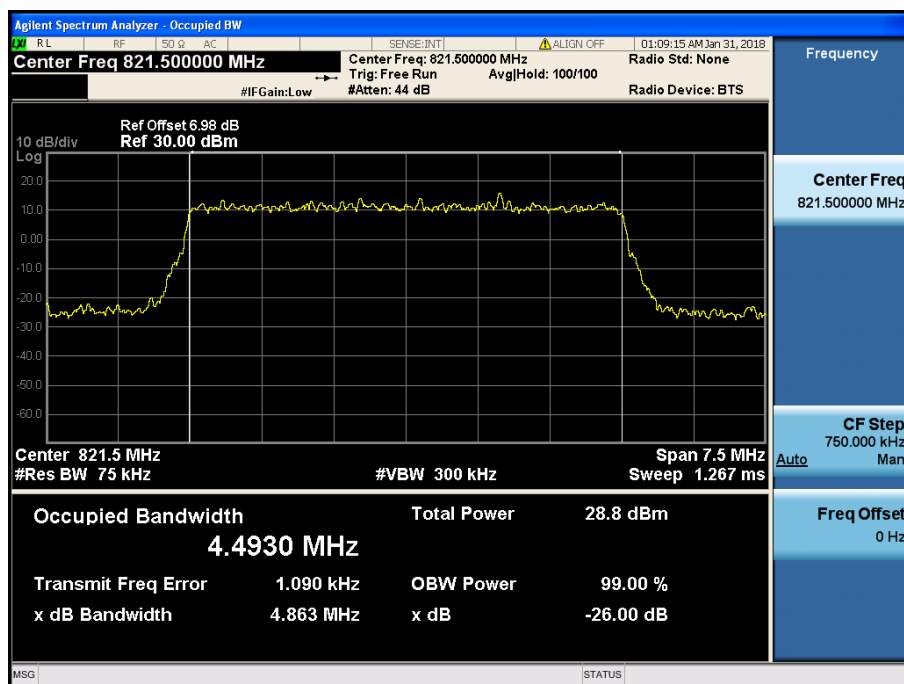
LTE Band 26 / 10 MHz / QPSK - RB Size 50



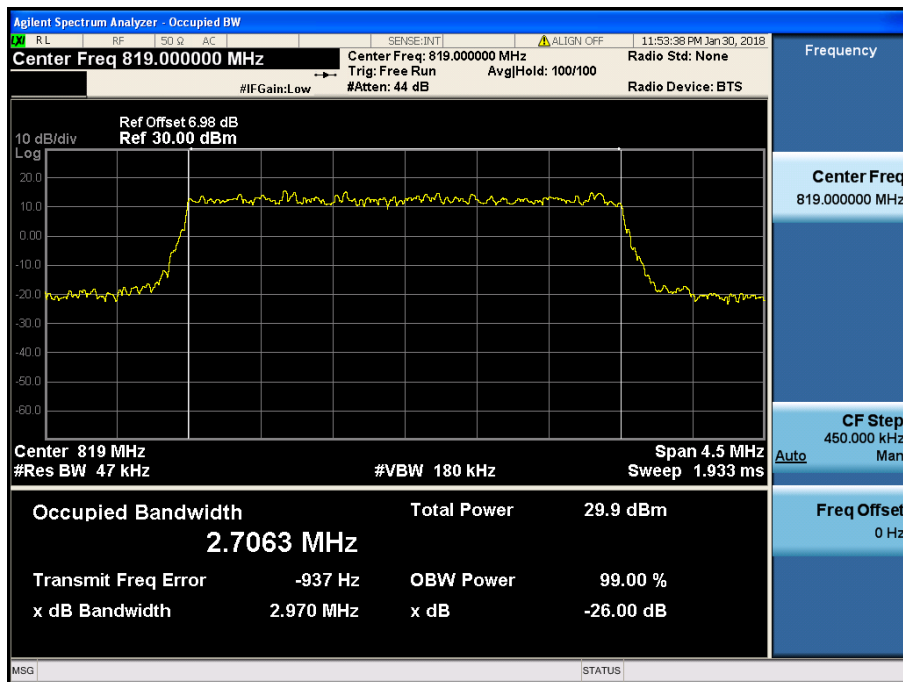
LTE Band 26 / 10 MHz / 16QAM - RB Size 50



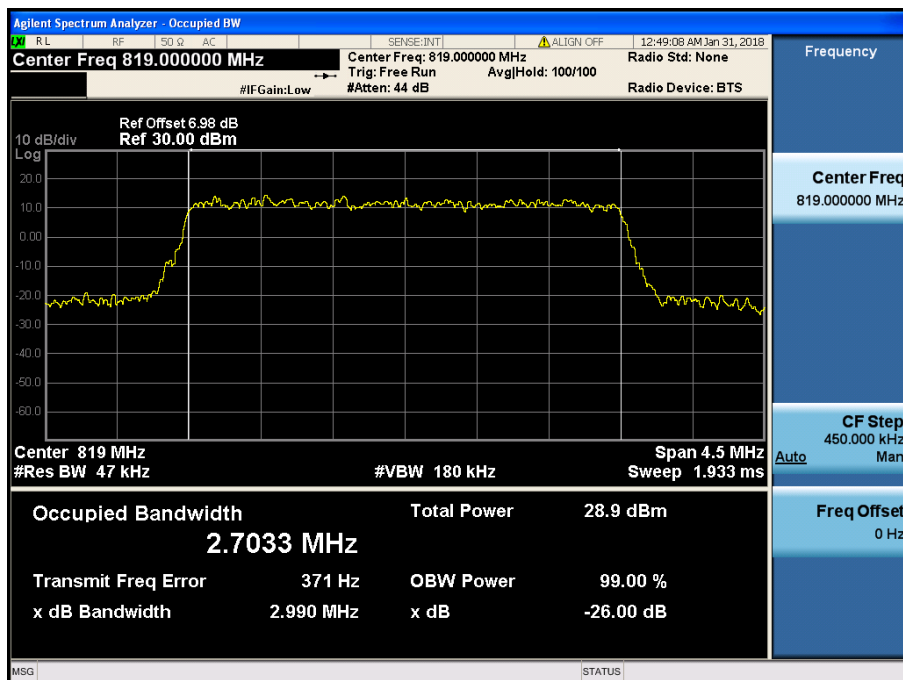
LTE Band 26 / 5 MHz / QPSK - RB Size 25



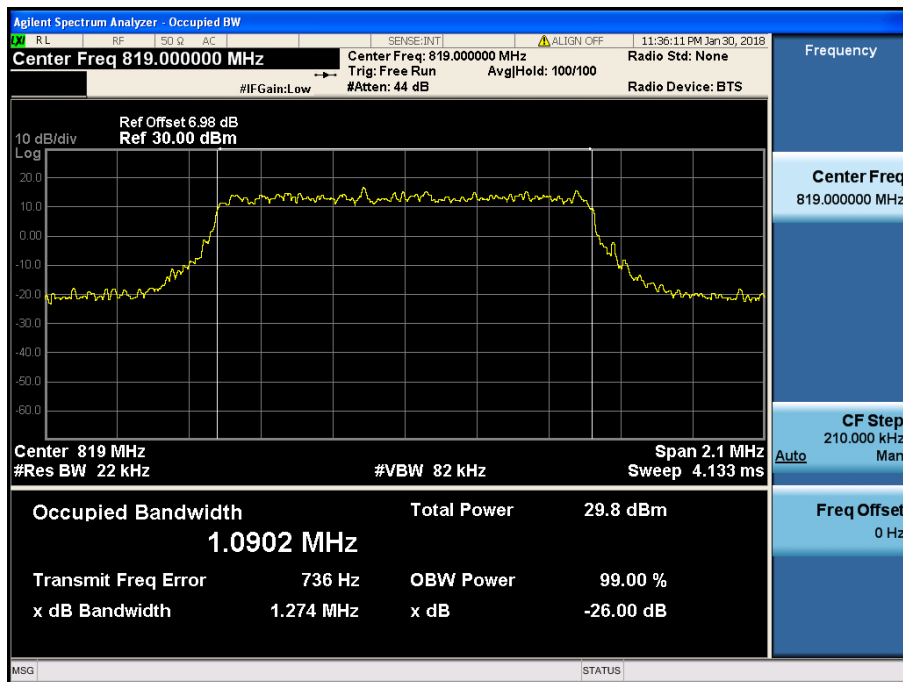
LTE Band 26 / 5 MHz / 16QAM - RB Size 25



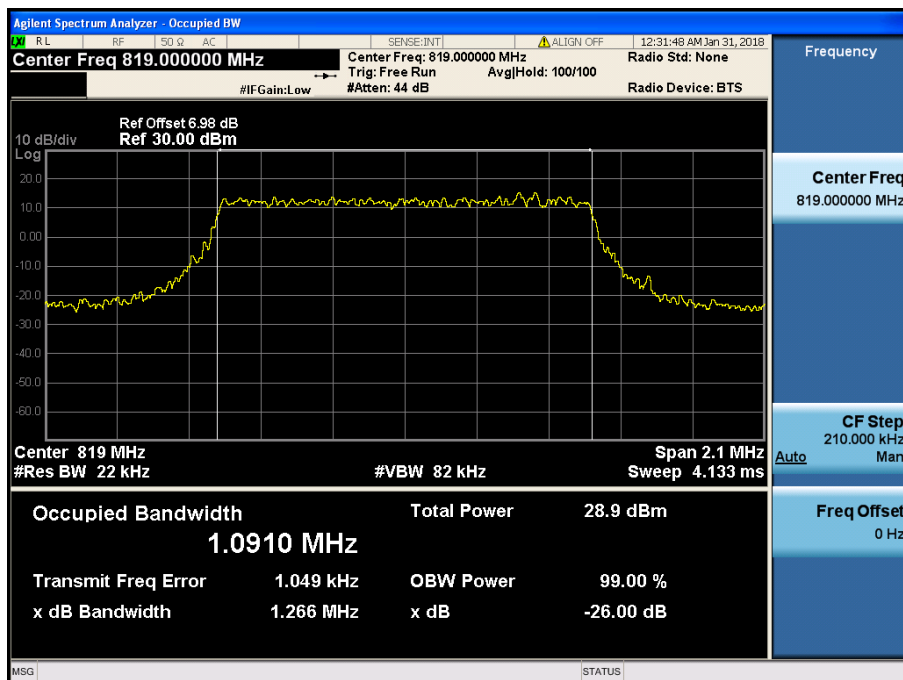
LTE Band 26 / 3 MHz / QPSK - RB Size 15



LTE Band 26 / 3 MHz / 16QAM - RB Size 15



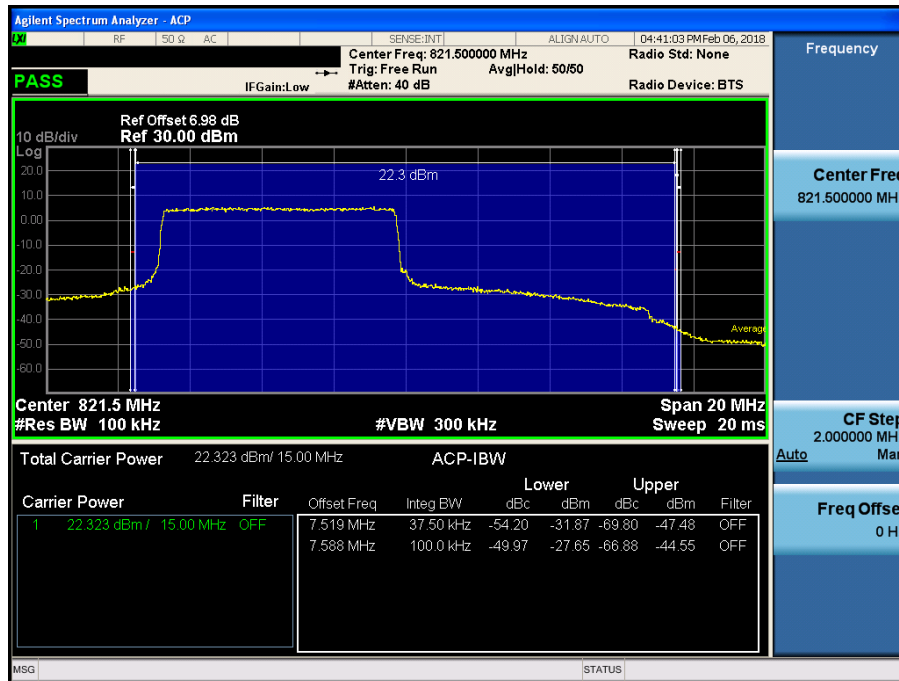
LTE Band 26 / 1.4 MHz / QPSK - RB Size 6



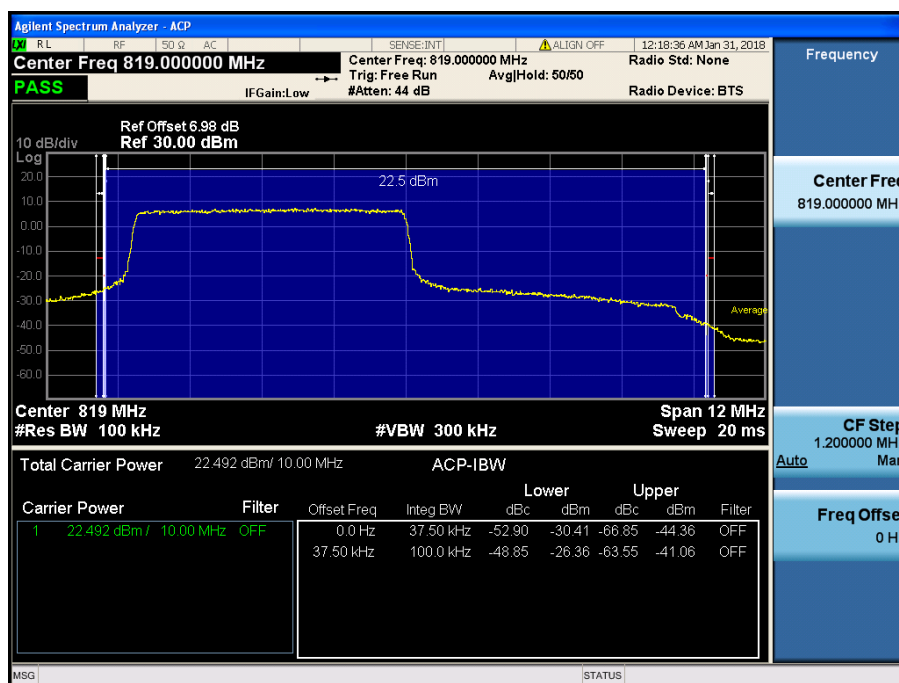
LTE Band 26 / 1.4 MHz / 16QAM - RB Size 6

8.2 BAND EDGE EMISSIONS(Conducted)

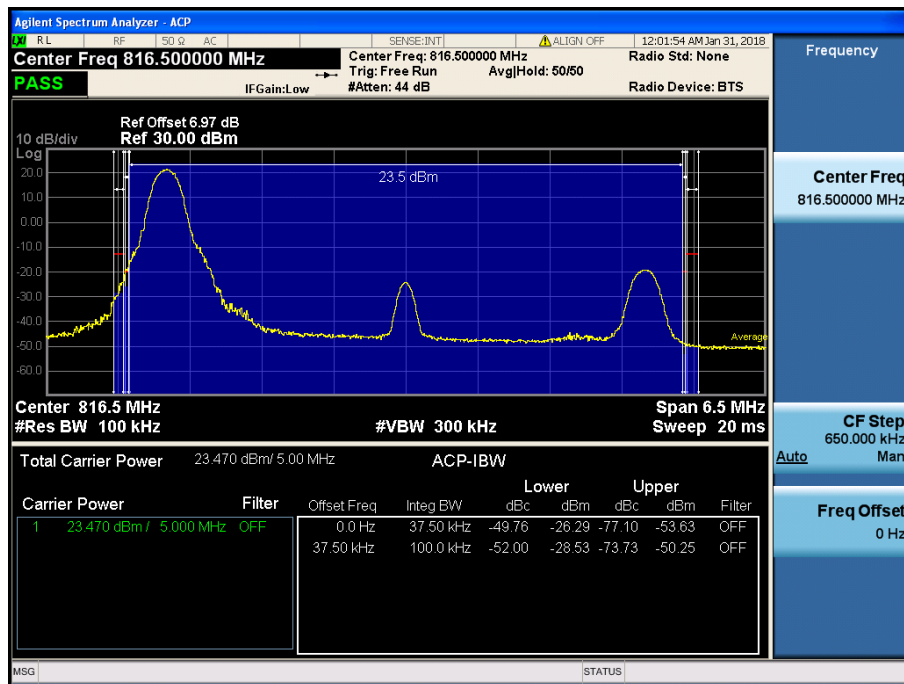
- Band Edge & Extended Band Edge



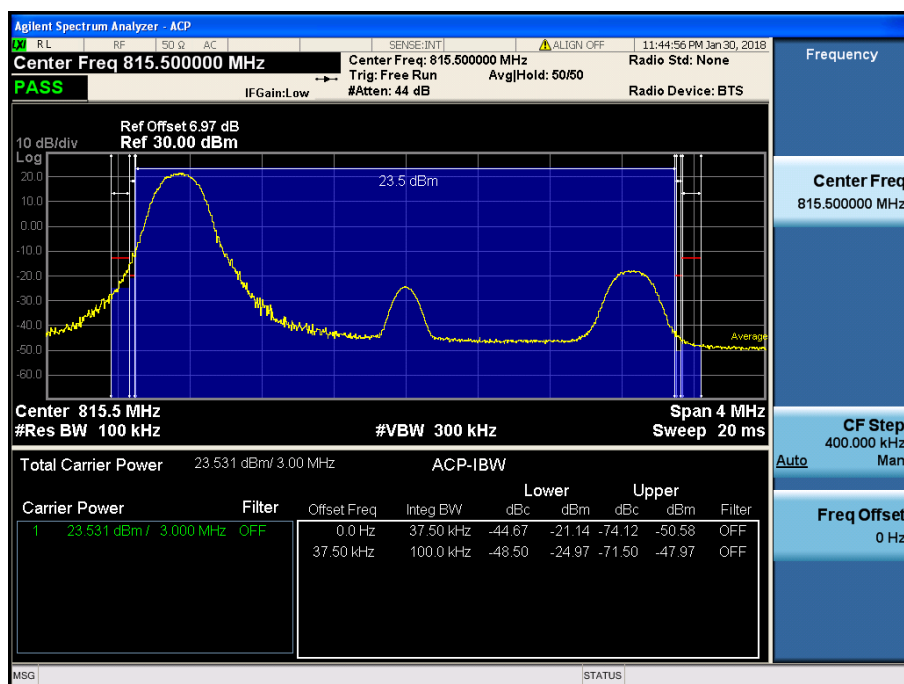
LTE Band 26 / 15MHz / QPSK - RB Size/Offset (36/0)



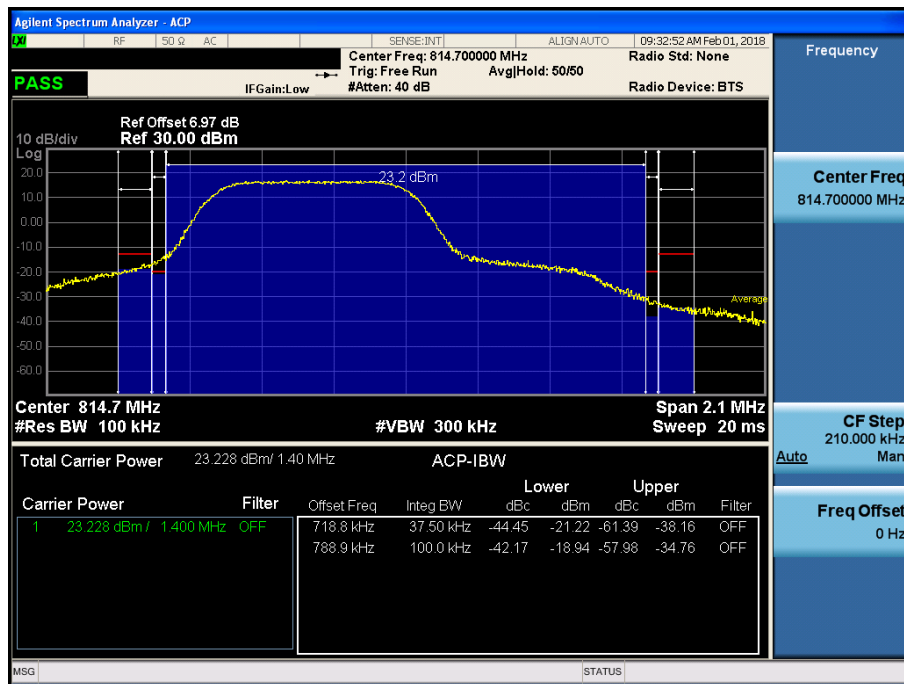
LTE Band 26 / 10MHz / QPSK - RB Size/Offset (25/0)



LTE Band 26 / 5MHz / QPSK Offset/Size (1/0)

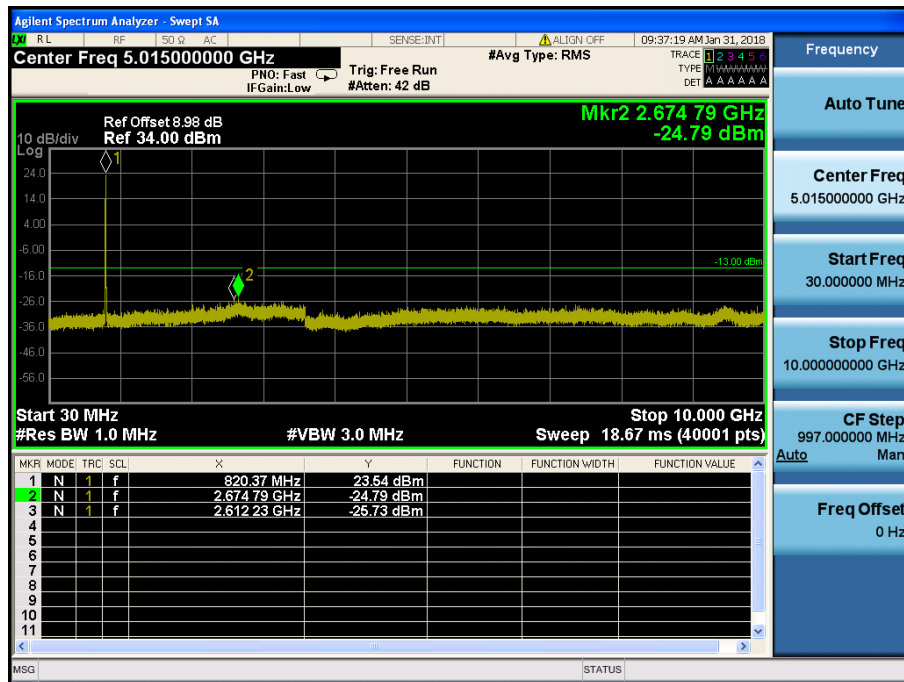


LTE Band 26 / 3MHz / QPSK - RB Size/Offset (1/0)

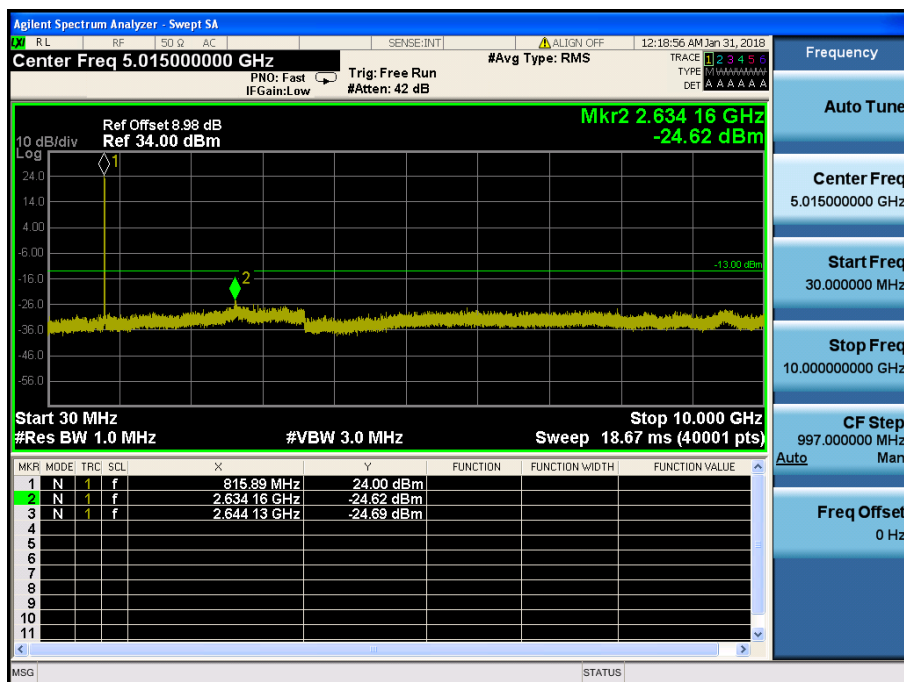


LTE Band 26 / 1.4MHz / QPSK - RB Size/Offset (3/0)

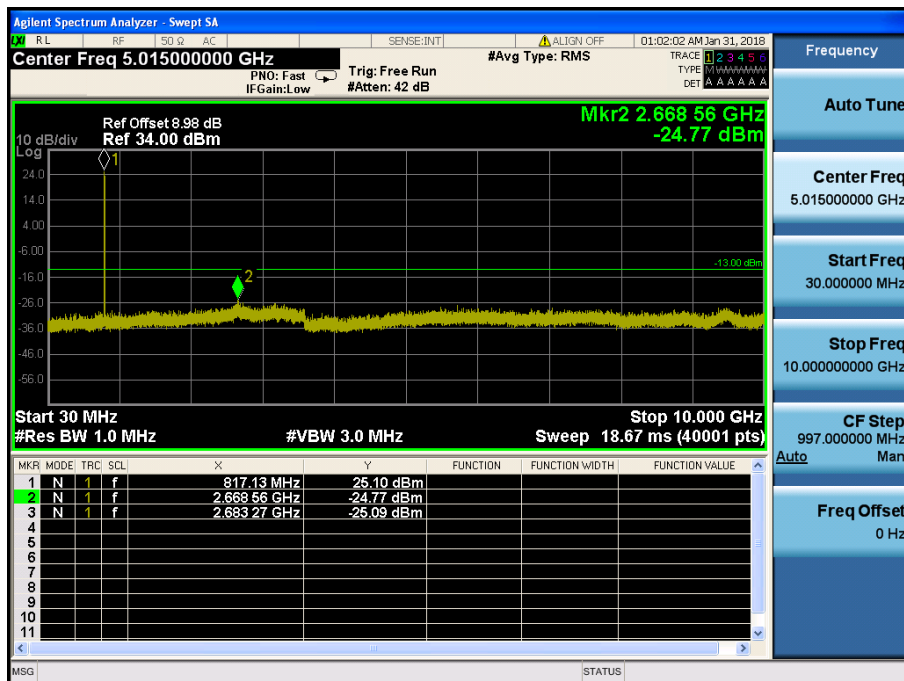
8.3 SPURIOUS AND HARMONICS EMISSIONS(Conducted)



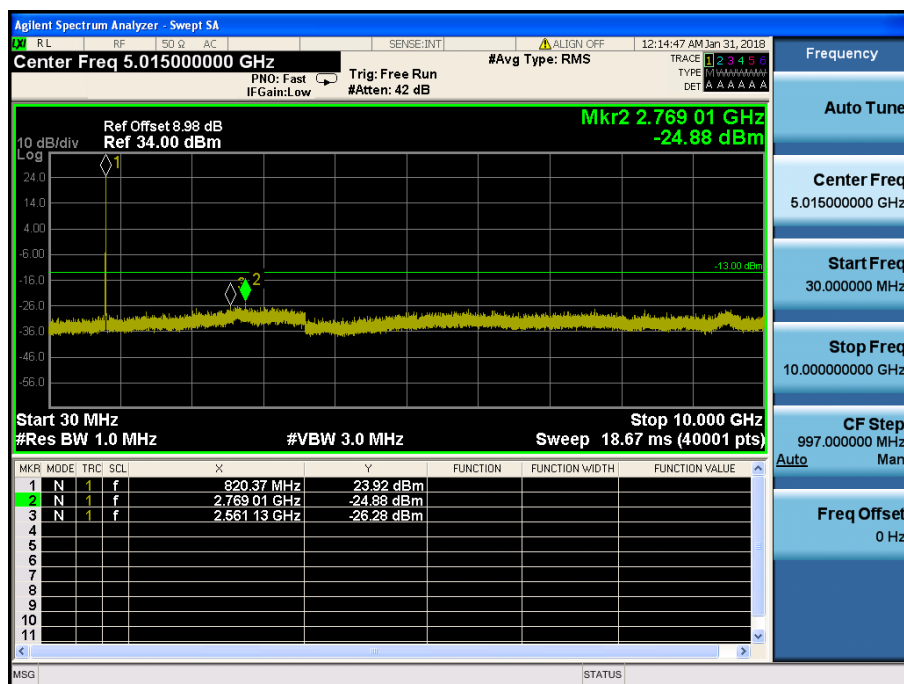
LTE Band 26 / 15MHz / QPSK - RB Size/Offset (36/18) - Low Channel



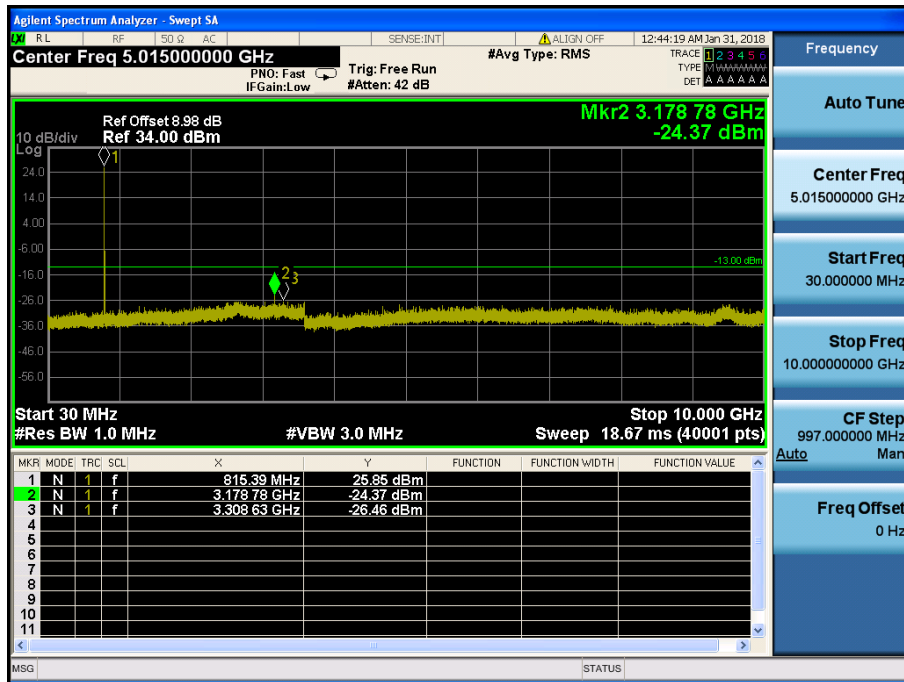
LTE Band 26 / 10MHz / QPSK - RB Size/Offset (25/0) - Low Channel



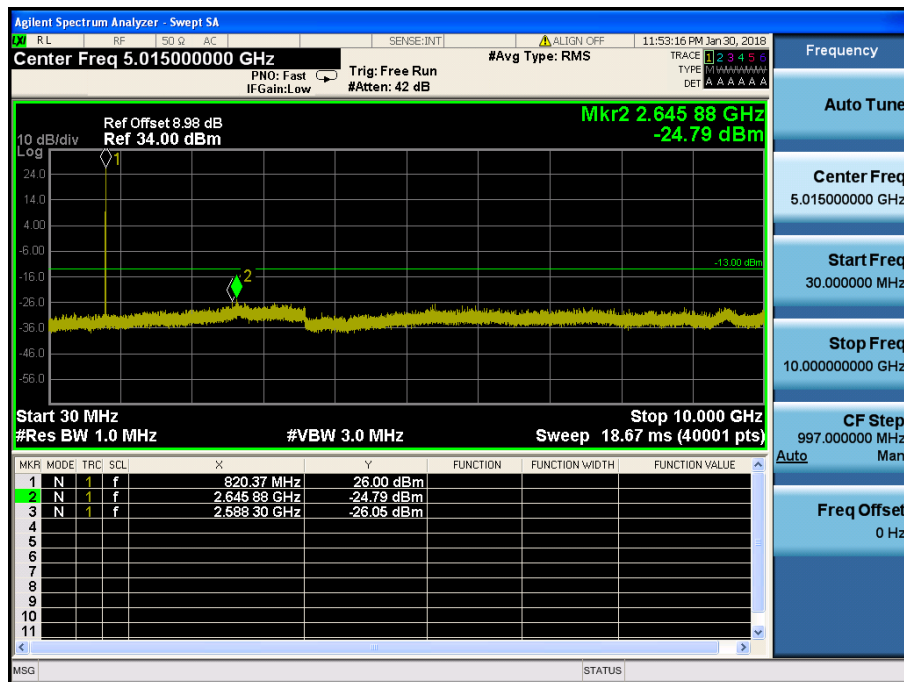
LTE Band 26 / 5MHz / 16QAM - RB Size/Offset (12/13) - Low Channel



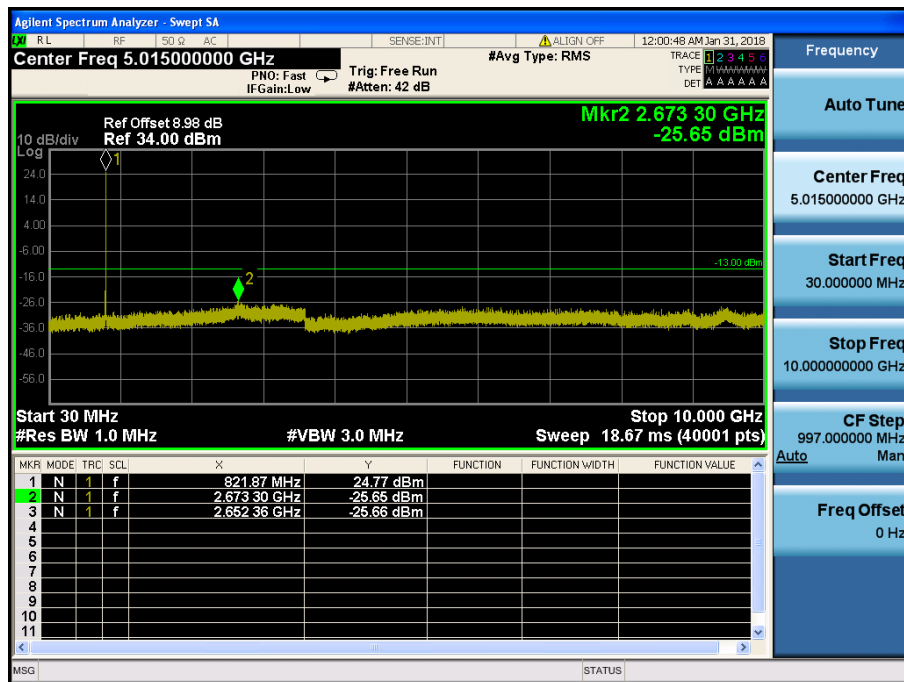
LTE Band 26 / 5MHz / QPSK - RB Size/Offset (25/0) - High Channel



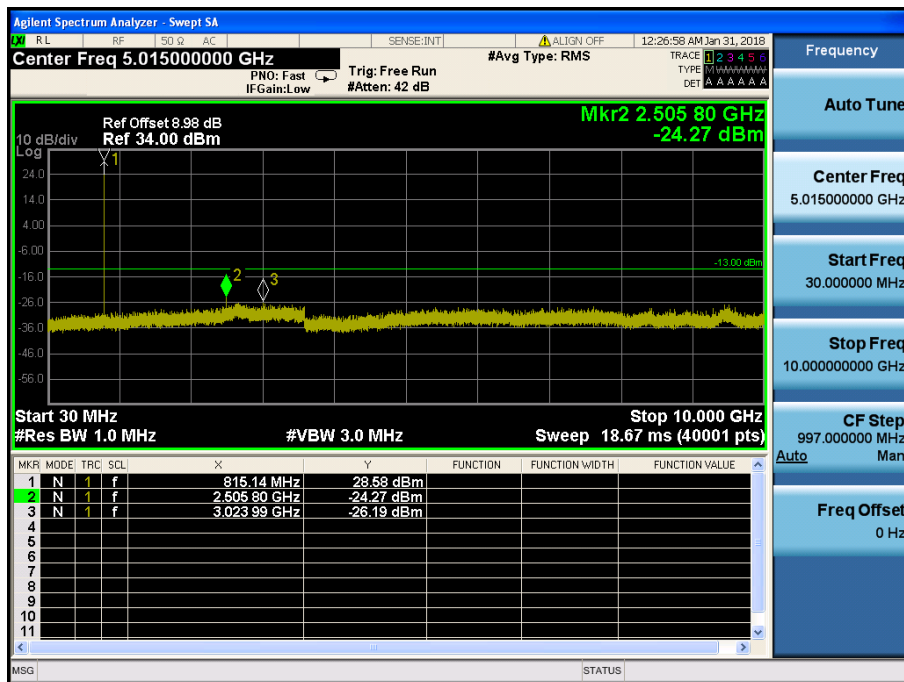
LTE Band 26 / 3MHz / 16QAM - RB Size/Offset (8/4) - Low Channel



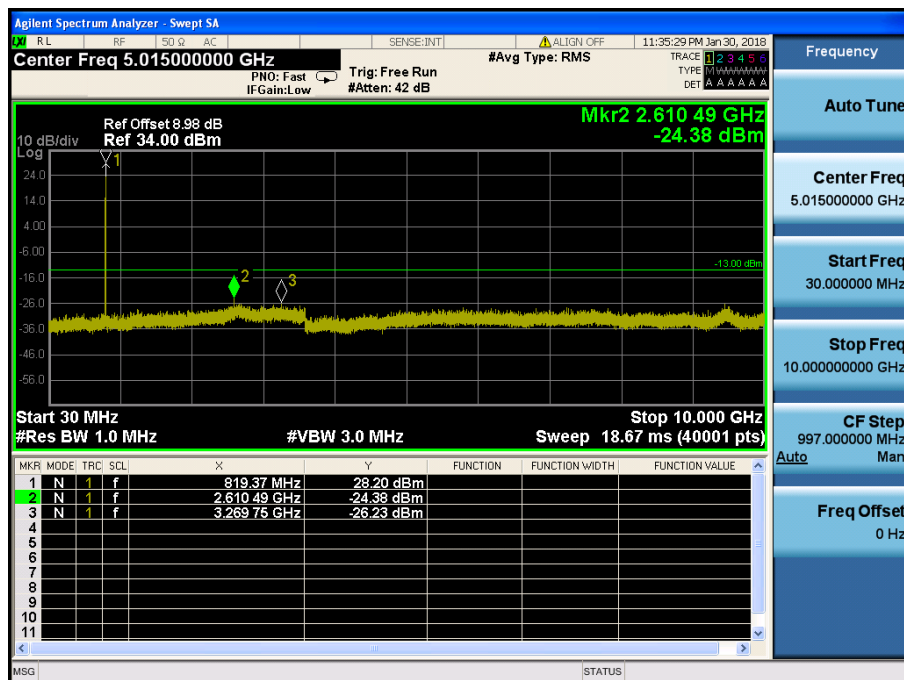
LTE Band 26 / 3MHz / QPSK - RB Size/Offset (8/7) - Mid Channel



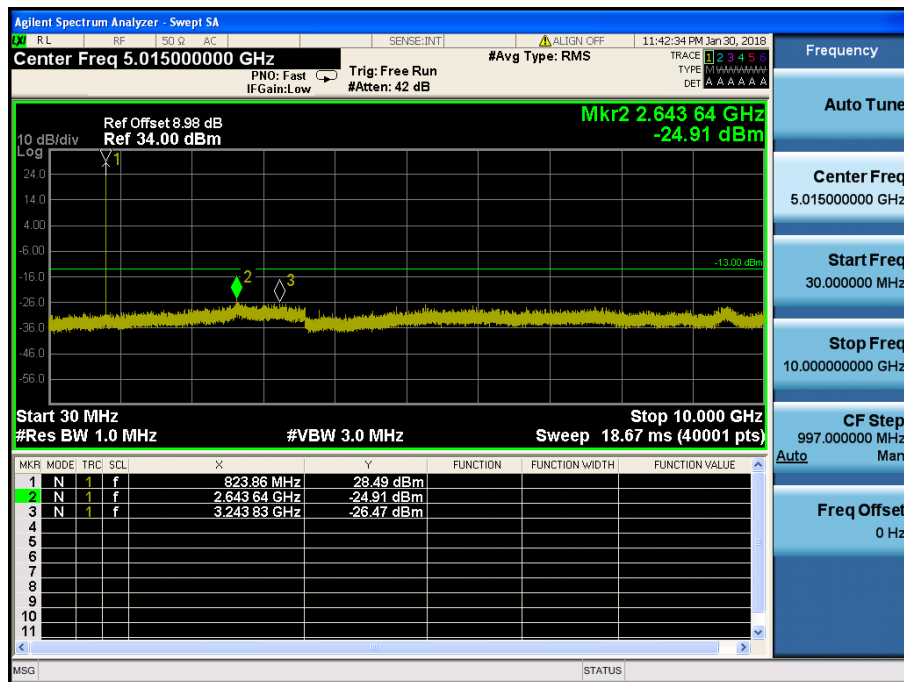
LTE Band 26 / 3MHz / QPSK - RB Size/Offset (15/0) - High Channel



LTE Band 26 / 1.4MHz / 16QAM - RB Size/Offset (3/2) – Low Channel



LTE Band 26 / 1.4MHz / QPSK - RB Size/Offset (3/2) – Mid Channel



LTE Band 26 / 1.4MHz / QPSK - RB Size/Offset (3/3) – High Channel