

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO

FCC PART 24 SUBPART E and PART 27 SUBPART B, C & SUBPART L, AND INDUSTRY CANADA RSS-130, RSS-133, RSS-139 REQUIREMENT

OF

Applicant: Quanta Computer Inc.
No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City
33377, Taiwan

Product Name: Clover Mini

Brand Name: clover

Model No.: C302U

Model Difference: N/A

FCC ID: HFS-C302U

IC: 1787B-C302U

Report Number: E2/2018/80003

FCC Rule Part: 2, 24E & 27B, C & L

IC Rule Part: RSS 130 Issue 1 Oct. 2013,
RSS 133 Issue 6 Jan. 2018, RSS 139 Issue 3 Jul. 2015,

Issue Date: Sep. 10, 2018

Date of Test: Aug. 16, 2018 ~ Sep. 07, 2018

Date of EUT Received: Aug. 16, 2018

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.26-2015 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Tested By:

Vito Pei
Vito Pei / Sr. Engineer

Approved By:

Jim Chang
Jim Chang / Manager



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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/80003	Rev.00	Initial creation of document	All	Sep. 10, 2018	Tiffany Kao

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1. GENERAL PRODUCT INFORMATION

1.1. Product Description

General:

Product Name:	Clover Mini	
Brand Name:	clover	
Model No.:	C302U	
Model Difference:	N/A	
Product SW/HW version:	N/A / 1.0	
Radio SW/HW version:	N/A N/A	
Test SW Version:	N/A	
RF power setting in TEST SW:	N/A	
Power Supply:	12V from AC/DC Adapter	
	Adapter:	1. Model No.: FSP040-RHBN3, Supplier: FSP 2. Model No.: FSP040-RHBN2, Supplier: FSP

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1.2. WCDMA / LTE: Cellular Phone Standards Frequency Range

LTE Band	BW (MHz)	Operation Frequency (MHz)		
2	1.4	1850.7	-	1909.3
	3	1851.5	-	1908.5
	5	1852.5	-	1907.5
	10	1855.0	-	1905.0
	15	1857.5	-	1902.5
	20	1860.0	-	1900.0
4	1.4	1710.7	-	1754.3
	3	1711.5	-	1753.5
	5	1712.5	-	1752.5
	10	1715.0	-	1780.0
	15	1717.5	-	1747.5
	20	1720.0	-	1745.0
12	1.4	699.7	-	715.3
	3	700.5	-	714.5
	5	701.5	-	713.5
	10	704.0	~	711.0
	10	704.0	~	711.0

Antenna Designation

Vendor	Type	Main / Aux	Antenna Part No.	Modulation	Frequency (MHz)	Peak Antenna Gain (dBi)
SAA	PIFA	Main	GD9318-15-001-R	LTE Band 2	1850 ~ 1910	0.01
				LTE Band 4	1710 ~ 1755	0.80
				LTE Band 12	699 ~ 716	-2.98
		Aux	GD9319-15-001-R	LTE Band 2	1850 ~ 1910	N/A
				LTE Band 4	1710 ~ 1755	N/A
				LTE Band 12	699 ~ 716	N/A
Luxshare-ICT		Main	LA81FP019-1H	LTE Band 2	1850 ~ 1910	1.00
				LTE Band 4	1710 ~ 1755	-1.00
				LTE Band 12	699 ~ 716	-5.40
	Aux	LA81FP020-1H	LTE Band 2	1850 ~ 1910	N/A	
			LTE Band 4	1710 ~ 1755	N/A	
			LTE Band 12	699 ~ 716	N/A	

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1.3. Type of Emission & Max ERP/EIRP Power Measurement Result:

LTE Band	BW (MHz)	Modulation	ERP / EIRP (dBm)		(W)	Type of Emission
2	1.4	QPSK	23.68	EIRP	0.233	1M10G7D
	1.4	16QAM	23.16	EIRP	0.207	1M11D7W
	3	QPSK	23.71	EIRP	0.235	2M71G7D
	3	16QAM	23.02	EIRP	0.200	2M70D7W
	5	QPSK	23.68	EIRP	0.233	4M52G7D
	5	16QAM	22.88	EIRP	0.194	4M49D7W
	10	QPSK	24.07	EIRP	0.255	9M00G7D
	10	16QAM	23.50	EIRP	0.224	9M00D7W
	15	QPSK	24.21	EIRP	0.264	13M5G7D
	15	16QAM	22.90	EIRP	0.195	13M5D7W
	20	QPSK	24.30	EIRP	0.269	18M1G7D
	20	16QAM	23.63	EIRP	0.231	18M0D7W
LTE Band	BW (MHz)	Modulation	ERP / EIRP (dBm)		(W)	Type of Emission
12	1.4	QPSK	19.29	ERP	0.085	1M10G7D
	1.4	16QAM	18.39	ERP	0.069	1M10D7W
	3	QPSK	19.41	ERP	0.087	2M71G7D
	3	16QAM	18.57	ERP	0.072	2M70D7W
	5	QPSK	19.38	ERP	0.087	4M51G7D
	5	16QAM	18.23	ERP	0.067	4M50D7W
	10	QPSK	19.33	ERP	0.086	9M03G7D
	10	16QAM	18.73	ERP	0.075	9M04D7W

LTE Band	BW (MHz)	Modulation	ERP / EIRP (dBm)		(W)	Type of Emission
4	1.4	QPSK	23.94	EIRP	0.248	1M10G7D
	1.4	16QAM	23.05	EIRP	0.202	1M10D7W
	3	QPSK	23.92	EIRP	0.247	2M71G7D
	3	16QAM	23.05	EIRP	0.202	2M70D7W
	5	QPSK	24.06	EIRP	0.255	4M52G7D
	5	16QAM	23.40	EIRP	0.219	4M50D7W
	10	QPSK	24.24	EIRP	0.265	9M01G7D
	10	16QAM	23.51	EIRP	0.224	9M00D7W
	15	QPSK	24.50	EIRP	0.282	13M5G7D
	15	16QAM	23.77	EIRP	0.238	13M6D7W
	20	QPSK	24.34	EIRP	0.272	18M1G7D
	20	16QAM	23.77	EIRP	0.238	18M0D7W

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1.4. Test Methodology of Applied Standards

CC 47 CFR Part 2, 24, 27

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03

TS 151 010-1 is used to set, and measure the output power.

RSS Gen Issue 5 Apr. 2018

RSS-130-issue 1 Oct. 2013

RSS-133 Issue 6 Jan. 2018,

RSS-139 Issue 3 Jul. 2015,

Note: All test items have been performed and record as per the above standards.

1.5. Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 code 0513)

FCC Registration Numbers are: 735305 / TW0002

1.6. Special Accessories

AC Adapter is used while the test is conducted and there is no other accessory attached. This is the worst case condition.

1.7. Equipment Modifications

There were no modifications incorporated into the EUT.

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2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

2.3. Test Procedure

2.3.1 Conducted Measurement at Antenna Port

According to measurement procured ANSI C63.26-2015, the EUT is placed on a turn table which is 0.8m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

2.3.2 Radiated Emissions

According to measurement procured ANSI C63.26-2015, The EUT is a placed on as turn table, for emission measurements below 1 GHz is 0.8 m above ground plane, for emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna according to the requirements in Section 8 and 13.

2.4. Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation in physical test.

	RF cable loss (dB)	Attenuation factor(dB)	offset(dB)
Low Band (Below 1GHz)	3.6	10	13.6
High Band (Above 1 GHz)	3.9	10	13.9

2.5. Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
LTE Band 2	12V	0.597
LTE Band 4		0.597
LTE Band 12		0.602

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2.6. Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed Channel-Conducted)

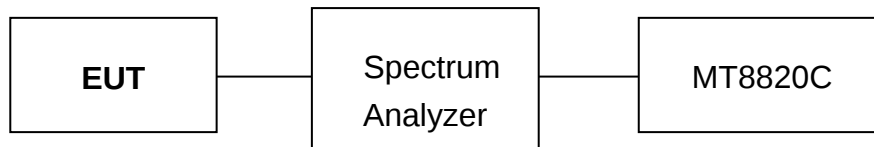


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)

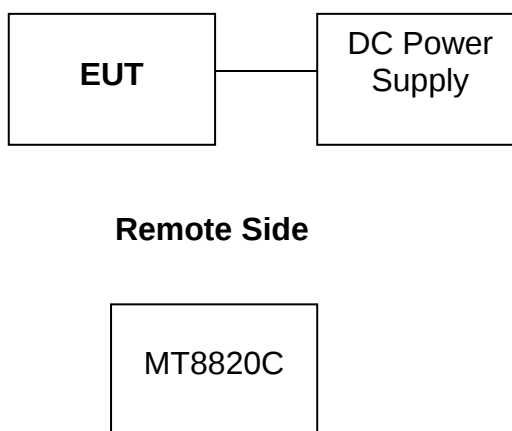


Table 2-1 Equipment Used in

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Universal Radio Communication Tester	Anritsu	MT8820C	6200307563	shielded	Un-shielded

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3. SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§2.1046(a)	N/A	RF Power Output	Compliant
§2.1046(a)) §24.232(c) §27.50(a)(3) §27.50(c)(10) §27.50(d)(4)	§6.8 (RSS-Gen Issue 5) §4.4 (RSS-130) §6.4 (RSS-133) §6.5 (RSS-139)	ERP/ EIRP measurement	Compliant
§2.1049(h)	§6.7 (RSS-Gen Issue 5) §4.6 (RSS-130) §2.3 (RSS-133)	99% & 26dB Occupied Bandwidth	Compliant
§2.1051§24.238(a) §27.53(g) §27.50(c)(5) §27.53(h) §27.53(m)(4)(6)	§6.13 (RSS-Gen Issue 5) §4.6 (RSS-130) §6.5 (RSS-133) §6.6 (RSS-139)	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §24.238(a) §27.53(c)(2),(4) §27.50(c)(5) §27.53(f) §27.53(g) §27.53(h) §27.53(m)(4)	§6.12 (RSS-Gen Issue 5) §4.6 (RSS-130) §6.5 (RSS-133) §6.6 (RSS-139)	Field Strength of Spurious Radiation	Compliant
§27.53(f)	§4.6 (RSS-130)	Spurious emission in 1559 -1610MHz Band	Compliant
§24.232(d) §27.53(d) (5) §27.50(i) (B)	§4.4 (RSS-130) §6.4 (RSS-133) §6.5 (RSS-139)	Peak to Average Ratio	Compliant
§2.1055(a)(1) §24.235 §27.54 §90.213	§6.11 (RSS-Gen Issue 5) §4.3 (RSS-130) §6.3 (RSS-133) §6.4 (RSS-139)	Frequency Stability	Compliant

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4. DESCRIPTION OF TEST MODES

4.1. The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, stand-up position (H, E1 mode) and lie down position (E2 mode) axis and antenna ports. The worst case was found as listed below. Following channel(s) was (were) selected for the final test as listed below:

BAND	RADIATED EMISSION
LTE Band 2	H Mode
LTE Band 4	H Mode
LTE Band 12	H Mode

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LTE Band 2 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
EIRP	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK, 16QAM	1 RB/ 0,14 RB Offest
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK, 16QAM	1 RB/ 0,24 RB Offest
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK, 16QAM	1 RB/ 0,49 RB Offest
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK, 16QAM	1 RB/ 0,74 RB Offest
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK, 16QAM	1 RB/ 0,99 RB Offest
FREQUENCY STA-BILITY	18650 to 19150	18900	10MHz	QPSK,	Full RB
OCCUPIED BAND-WIDTH	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK, 16QAM	Full RB
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK, 16QAM	Full RB
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK, 16QAM	Full RB
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK, 16QAM	Full RB
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK, 16QAM	Full RB
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK, 16QAM	Full RB
PEAK TO AVERAGE RATIO	18607 to 19193	18607, 18900, 19193	1.4MHz	16QAM	Full RB
	18615 to 19185	18615, 18900, 19185	3MHz	16QAM	Full RB
	18625 to 19175	18625, 18900, 19175	5MHz	16QAM	Full RB
	18650 to 19150	18650, 18900, 19150	10MHz	16QAM	Full RB
	18675 to 19125	18675, 18900, 19125	15MHz	16QAM	Full RB
	18700 to 19100	18700, 18900, 19100	20MHz	16QAM	Full RB
BAND EDGE	18607 to 19193	18607, 19193	1.4MHz	QPSK,	1 RB/ 0,5 RB Offes Full RB
	18615 to 19185	18615, 19185	3MHz	QPSK,	1 RB/ 0,14 RB Offest Full RB
	18625 to 19175	18625, 19175	5MHz	QPSK,	1 RB/ 0,24 RB Offest Full RB
	18650 to 19150	18650, 19150	10MHz	QPSK,	1 RB/ 0,49 RB Offest Full RB
	18675 to 19125	18675, 19125	15MHz	QPSK,	1 RB/ 0,74 RB Offest Full RB
	18700 to 19100	18700, 19100	20MHz	QPSK,	1 RB/ 0,99 RB Offest Full RB
CONDCUDED EMISSION	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK,	1 RB, 0 RB Offest
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK,	1 RB, 0 RB Offest
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK,	1 RB, 0 RB Offest
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK,	1 RB, 0 RB Offest
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK,	1 RB, 0 RB Offest
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK,	1 RB, 0 RB Offest
RADIATED EMISSION	18700 to 19100	18700, 18900, 19100	20MHz	QPSK	1 RB, 0 RB Offest

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LTE Band 4 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
EIRP	19957 to 19393	19957, 20175, 19393	1.4MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
	19965 to 22385	19965, 20175, 22385	3MHz	QPSK, 16QAM	1 RB/ 0,14 RB Offest
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB/ 0,24 RB Offest
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB/ 0,49 RB Offest
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB/ 0,74 RB Offest
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB/ 0,99 RB Offest
FREQUENCY STA-BILITY	20000 to 20350	20175	10MHz	QPSK,	Full RB
OCCUPIED BAND-WIDTH	19957 to 19393	19957, 20175, 19393	1.4MHz	QPSK, 16QAM	Full RB
	19965 to 22385	19965, 20175, 22385	3MHz	QPSK, 16QAM	Full RB
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	Full RB
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	Full RB
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	Full RB
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	Full RB
PEAK TO AVERAGE RATIO	19957 to 19393	19957, 20175, 19393	1.4MHz	16QAM	Full RB
	19965 to 22385	19965, 20175, 22385	3MHz	16QAM	Full RB
	19975 to 20375	19975, 20175, 20375	5MHz	16QAM	Full RB
	20000 to 20350	20000, 20175, 20350	10MHz	16QAM	Full RB
	20025 to 20325	20025, 20175, 20325	15MHz	16QAM	Full RB
	20050 to 20300	20050, 20175, 20300	20MHz	16QAM	Full RB
BAND EDGE	19957 to 19393	19957, 19393	1.4MHz	QPSK,	1 RB/ 0,5 RB Offes Full RB
	19965 to 22385	19965, 22385	3MHz	QPSK,	1 RB/ 0,14 RB Offest Full RB
	19975 to 20375	19975, 20375	5MHz	QPSK,	1 RB/ 0,24 RB Offest Full RB
	20000 to 20350	20000, 20350	10MHz	QPSK,	1 RB/ 0,49 RB Offest Full RB
	20025 to 20325	20025, 20325	15MHz	QPSK,	1 RB/ 0,74 RB Offest Full RB
	20050 to 20300	20050, 20300	20MHz	QPSK,	1 RB/ 0,99 RB Offest Full RB
CONDCUDED EMISSION	19957 to 19393	19957, 20175, 19393	1.4MHz	QPSK,	1 RB, 0 RB Offest
	19965 to 22385	19965, 20175, 22385	3MHz	QPSK,	1 RB, 0 RB Offest
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK,	1 RB, 0 RB Offest
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK,	1 RB, 0 RB Offest
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK,	1 RB, 0 RB Offest
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK,	1 RB, 0 RB Offest
RADIATED EMISSION	20025 to 20325	20025, 20175, 20325	15MHz	QPSK,	1 RB, 0 RB Offest

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LTE Band 12 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
ERP	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	1 RB/ 0,14 RB Offest
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	1 RB/ 0,24 RB Offest
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	1 RB/ 0,49 RB Offest
FREQUENCY STABILITY	23060 to 23130	23095	10MHz	QPSK,	Full RB
OCCUPIED BANDWIDTH	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	Full RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	Full RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	Full RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	Full RB
PEAK TO AVERAGE RATIO	23017 to 23173	23017, 23095, 23173	1.4MHz	16QAM	Full RB
	23025 to 23165	23025, 23095, 23165	3MHz	16QAM	Full RB
	23035 to 23155	23035, 23095, 23155	5MHz	16QAM	Full RB
	23060 to 23130	23060, 23095, 23130	10MHz	16QAM	Full RB
BAND EDGE	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK,	1 RB/ 0,5 RB Offes Full RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK,	1 RB/ 0,14 RB Offest Full RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK,	1 RB/ 0,24 RB Offest Full RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK,	1 RB/ 0,49 RB Offest Full RB
CONDCUTED EMISSION	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK,	1 RB, 0 RB Offest
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK,	1 RB, 0 RB Offest
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK,	1 RB, 0 RB Offest
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK,	1 RB, 0 RB Offest
RADIATED EMISSION	23025 to 23165	23025, 23095, 23165	3MHz	QPSK	1 RB, 14 RB Offest

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1.10 dB
ERP/ EIRP measurement	Vertical Polarization = +/- 4.74dB Horizontal Polarization = +/- 4.62dB
99% Occupied Bandwidth	+/- 5.19 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 0.70 dB
Peak to Average Ratio	+/- 0.70 dB
Frequency Stability vs. Temperature	+/- 5.19 Hz
Frequency Stability vs. Voltage	+/- 5.19 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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6. MAXMUM OUTPUT POWER

6.1. Standard Applicable

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

ERP/EIRP LIMIT

According to FCC §2.1046

FCC 24.232(b) Mobile and portable stations are limited to 2 W EIRP.

FCC 27.50(a)(3) Mobile and portable stations (hand-held devices) are limited to 250 mW/ 5MHz EIRP.

FCC 27.50(c)(10) Portable stations (hand-held devices) are limited to 3 watts ERP.

FCC 27.50(d)(4) Fixed, mobile, and portable (hand-held) stations are limited to 1W EIRP.

FCC 27, 50(h)(2) Mobile and other user stations. Mobile stations are limited to 2 W EIRP

According to RSS-130 §4.4

It shall not exceed 5 W for portable equipment or for indoor fixed subscriber equipment.

According to RSS-133 §6.4

The peak e.i.r.p. for transmitters operating in the band 1850-1910 MHz shall not exceed the limits 2W given in SRSP-510.

According to RSS 139 §6.4

The average equivalent isotropically radiated power (e.i.r.p.) for fixed, mobile and portable transmitters in the 1710-1755 MHz shall not exceed 1 watt.

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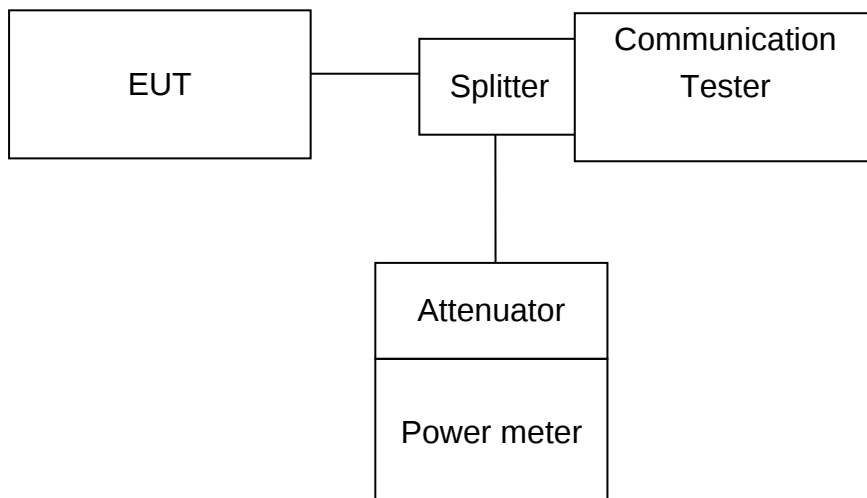
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6.2. Test Set-up



Note: Measurement setup for testing on Antenna connector

6.3. Measurement Procedure

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading. TS 151 010-1 is reference to conduct the test measurement of output power.

The Procedure of KDB941225 (SAR Measurement Procedures for 3G devices, (WCD-MA/HSPA) was used for EUT and Base station setting. RMC 12.2kps is used for this testing, and KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results

All LTE bands conducted average power is obtained from the simulator telecommunication test set.

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP.

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TEST PROCEDURE:

ANSI C63.26:2015

KDB 971168 Section 5.6

$$\text{ERP/EIRP} = \text{PMeas} + \text{GT-LC}$$

where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.2

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

6.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Radio Communication Analyser	Anritsu	MT8820C	6201107337	2018/06/15	2019/06/14
DC Power Supply	Agilent	E3640A	MY53140006	2018/05/30	2019/05/29
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
Splitter	Woken	DOM35LW1 A2	RF36	2017/12/26	2018/12/25

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6.5. Measurement Result

RF Conducted Output Power

Antenna gain (dBi) 1

LTE Band 2_Uplink frequency band : 1850 to 1910 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	18607	1850.7	QPSK	1	0	22.60	23.60	33	-9.4
				1	5	22.57	23.57	33	-9.43
				3	2	22.61	23.61	33	-9.39
				6	0	21.59	22.59	33	-10.41
	18900	1880	QPSK	1	0	22.67	23.67	33	-9.33
				1	5	22.68	23.68	33	-9.32
				3	2	22.41	23.41	33	-9.59
				6	0	21.69	22.69	33	-10.31
	19193	1909.3	QPSK	1	0	22.63	23.63	33	-9.37
				1	5	22.57	23.57	33	-9.43
				3	2	22.55	23.55	33	-9.45
				6	0	21.58	22.58	33	-10.42
	18607	1850.7	16QAM	1	0	21.67	22.67	33	-10.33
				1	5	21.77	22.77	33	-10.23
				3	2	21.34	22.34	33	-10.66
				6	0	20.68	21.68	33	-11.32
	18900	1880	16QAM	1	0	22.16	23.16	33	-9.84
				1	5	22.10	23.10	33	-9.9
				3	2	21.66	22.66	33	-10.34
				6	0	20.91	21.91	33	-11.09
	19193	1909.3	16QAM	1	0	22.00	23.00	33	-10
				1	5	21.99	22.99	33	-10.01
				3	2	21.62	22.62	33	-10.38
				6	0	20.63	21.63	33	-11.37

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Antenna gain (dBi) 1

LTE Band 2_Uplink frequency band : 1850 to 1910 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	18615	1851.5	QPSK	1	0	22.68	23.68	33	-9.32
				1	14	22.48	23.48	33	-9.52
				8	4	21.51	22.51	33	-10.49
				15	0	21.55	22.55	33	-10.45
	18900	1880	QPSK	1	0	22.58	23.58	33	-9.42
				1	14	22.71	23.71	33	-9.29
				8	4	21.62	22.62	33	-10.38
				15	0	21.78	22.78	33	-10.22
	19185	1908.5	QPSK	1	0	22.67	23.67	33	-9.33
				1	14	22.54	23.54	33	-9.46
				8	4	21.56	22.56	33	-10.44
				15	0	21.64	22.64	33	-10.36
	18615	1851.5	16QAM	1	0	21.78	22.78	33	-10.22
				1	14	21.82	22.82	33	-10.18
				8	4	20.64	21.64	33	-11.36
				15	0	20.64	21.64	33	-11.36
	18900	1880	16QAM	1	0	22.02	23.02	33	-9.98
				1	14	22.01	23.01	33	-9.99
				8	4	20.81	21.81	33	-11.19
				15	0	20.88	21.88	33	-11.12
	19185	1908.5	16QAM	1	0	21.58	22.58	33	-10.42
				1	14	21.51	22.51	33	-10.49
				8	4	20.72	21.72	33	-11.28
				15	0	20.67	21.67	33	-11.33

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Antenna gain (dBi) 1

LTE Band 2_Uplink frequency band : 1850 to 1910 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	18625	1852.5	QPSK	1	0	22.68	23.68	33	-9.32
				1	24	22.50	23.50	33	-9.5
				12	6	21.58	22.58	33	-10.42
				25	0	21.56	22.56	33	-10.44
	18900	1880	QPSK	1	0	22.32	23.32	33	-9.68
				1	24	22.34	23.34	33	-9.66
				12	6	21.76	22.76	33	-10.24
				25	0	21.62	22.62	33	-10.38
	19175	1907.5	QPSK	1	0	22.44	23.44	33	-9.56
				1	24	22.54	23.54	33	-9.46
				12	6	21.67	22.67	33	-10.33
				25	0	21.70	22.70	33	-10.3
	18625	1852.5	16QAM	1	0	21.77	22.77	33	-10.23
				1	24	21.28	22.28	33	-10.72
				12	6	20.65	21.65	33	-11.35
				25	0	20.67	21.67	33	-11.33
	18900	1880	16QAM	1	0	21.04	22.04	33	-10.96
				1	24	21.25	22.25	33	-10.75
				12	6	20.89	21.89	33	-11.11
				25	0	20.90	21.90	33	-11.1
	19175	1907.5	16QAM	1	0	21.88	22.88	33	-10.12
				1	24	20.86	21.86	33	-11.14
				12	6	20.73	21.73	33	-11.27
				25	0	20.09	21.09	33	-11.91

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Antenna gain (dBi) 1

LTE Band 2_Uplink frequency band : 1850 to 1910 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	18650	1855	QPSK	1	0	23.07	24.07	33	-8.93
				1	49	21.68	22.68	33	-10.32
				25	12	21.80	22.80	33	-10.2
				50	0	21.82	22.82	33	-10.18
	18900	1880	QPSK	1	0	22.16	23.16	33	-9.84
				1	49	22.84	23.84	33	-9.16
				25	12	21.95	22.95	33	-10.05
				50	0	20.98	21.98	33	-11.02
	19150	1905	QPSK	1	0	21.91	22.91	33	-10.09
				1	49	21.70	22.70	33	-10.3
				25	12	21.82	22.82	33	-10.18
				50	0	20.78	21.78	33	-11.22
	18650	1855	16QAM	1	0	22.48	23.48	33	-9.52
				1	49	21.08	22.08	33	-10.92
				25	12	20.79	21.79	33	-11.21
				50	0	20.85	21.85	33	-11.15
	18900	1880	16QAM	1	0	22.50	23.50	33	-9.5
				1	49	22.18	23.18	33	-9.82
				25	12	20.96	21.96	33	-11.04
				50	0	21.06	22.06	33	-10.94
	19150	1905	16QAM	1	0	21.13	22.13	33	-10.87
				1	49	20.91	21.91	33	-11.09
				25	12	20.90	21.90	33	-11.1
				50	0	20.85	21.85	33	-11.15

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Antenna gain (dBi) 1

LTE Band 2_Uplink frequency band : 1850 to 1910 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15	18675	1857.5	QPSK	1	0	23.21	24.21	33	-8.79
				1	74	21.63	22.63	33	-10.37
				36	18	21.73	22.73	33	-10.27
				75	0	21.87	22.87	33	-10.13
	18900	1880	QPSK	1	0	22.40	23.40	33	-9.6
				1	74	22.81	23.81	33	-9.19
				36	18	20.91	21.91	33	-11.09
				75	0	21.05	22.05	33	-10.95
	19125	1902.5	QPSK	1	0	23.14	24.14	33	-8.86
				1	74	21.64	22.64	33	-10.36
				36	18	21.81	22.81	33	-10.19
				75	0	20.81	21.81	33	-11.19
	18675	1857.5	16QAM	1	0	21.24	22.24	33	-10.76
				1	74	20.78	21.78	33	-11.22
				36	18	19.76	20.76	33	-12.24
				75	0	19.79	20.79	33	-12.21
	18900	1880	16QAM	1	0	21.54	22.54	33	-10.46
				1	74	20.98	21.98	33	-11.02
				36	18	21.01	22.01	33	-10.99
				75	0	21.11	22.11	33	-10.89
	19125	1902.5	16QAM	1	0	21.27	22.27	33	-10.73
				1	74	21.90	22.90	33	-10.1
				36	18	19.73	20.73	33	-12.27
				75	0	19.82	20.82	33	-12.18

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Antenna gain (dBi) 1

LTE Band 2_Uplink frequency band : 1850 to 1910 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20	18700	1860	QPSK	1	0	22.10	23.10	33	-9.9
				1	99	22.62	23.62	33	-9.38
				50	25	21.68	22.68	33	-10.32
				100	0	21.85	22.85	33	-10.15
	18900	1880	QPSK	1	0	23.30	24.30	33	-8.7
				1	99	22.47	23.47	33	-9.53
				50	25	21.82	22.82	33	-10.18
				100	0	22.00	23.00	33	-10
	19100	1900	QPSK	1	0	23.10	24.10	33	-8.9
				1	99	22.42	23.42	33	-9.58
				50	25	20.36	21.36	33	-11.64
				100	0	21.75	22.75	33	-10.25
	18700	1860	16QAM	1	0	22.35	23.35	33	-9.65
				1	99	21.79	22.79	33	-10.21
				50	25	20.70	21.70	33	-11.3
				100	0	19.80	20.80	33	-12.2
	18900	1880	16QAM	1	0	22.63	23.63	33	-9.37
				1	99	20.76	21.76	33	-11.24
				50	25	20.90	21.90	33	-11.1
				100	0	21.01	22.01	33	-10.99
	19100	1900	16QAM	1	0	22.41	23.41	33	-9.59
				1	99	21.84	22.84	33	-10.16
				50	25	20.62	21.62	33	-11.38
				100	0	19.74	20.74	33	-12.26

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Antenna gain (dBi) 0.8

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	19957	1710.7	QPSK	1	0	22.83	23.63	30	-6.37
				1	5	22.51	23.31	30	-6.69
				3	2	23.00	23.80	30	-6.2
				6	0	22.04	22.84	30	-7.16
	20175	1732.5	QPSK	1	0	23.14	23.94	30	-6.06
				1	5	23.10	23.90	30	-6.1
				3	2	23.14	23.94	30	-6.06
				6	0	22.19	22.99	30	-7.01
	20393	1754.3	QPSK	1	0	23.09	23.89	30	-6.11
				1	5	23.09	23.89	30	-6.11
				3	2	23.06	23.86	30	-6.14
				6	0	22.11	22.91	30	-7.09
	19957	1710.7	16QAM	1	0	21.39	22.19	30	-7.81
				1	5	21.47	22.27	30	-7.73
				3	2	21.22	22.02	30	-7.98
				6	0	21.16	21.96	30	-8.04
	20175	1732.5	16QAM	1	0	21.87	22.67	30	-7.33
				1	5	21.75	22.55	30	-7.45
				3	2	22.25	23.05	30	-6.95
				6	0	21.06	21.86	30	-8.14
	20393	1754.3	16QAM	1	0	22.00	22.80	30	-7.2
				1	5	22.23	23.03	30	-6.97
				3	2	21.96	22.76	30	-7.24
				6	0	21.16	21.96	30	-8.04

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Antenna gain (dBi) 0.8

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	19965	1711.5	QPSK	1	0	22.97	23.77	30	-6.23
				1	14	22.73	23.53	30	-6.47
				8	4	22.01	22.81	30	-7.19
				15	0	22.03	22.83	30	-7.17
	20175	1732.5	QPSK	1	0	23.12	23.92	30	-6.08
				1	14	22.88	23.68	30	-6.32
				8	4	22.15	22.95	30	-7.05
				15	0	22.15	22.95	30	-7.05
	20385	1753.5	QPSK	1	0	22.98	23.78	30	-6.22
				1	14	22.95	23.75	30	-6.25
				8	4	22.07	22.87	30	-7.13
				15	0	22.10	22.90	30	-7.1
	19965	1711.5	16QAM	1	0	21.75	22.55	30	-7.45
				1	14	21.97	22.77	30	-7.23
				8	4	21.14	21.94	30	-8.06
				15	0	21.26	22.06	30	-7.94
	20175	1732.5	16QAM	1	0	22.25	23.05	30	-6.95
				1	14	22.15	22.95	30	-7.05
				8	4	21.23	22.03	30	-7.97
				15	0	21.25	22.05	30	-7.95
	20385	1753.5	16QAM	1	0	21.80	22.60	30	-7.4
				1	14	22.04	22.84	30	-7.16
				8	4	21.17	21.97	30	-8.03
				15	0	21.10	21.90	30	-8.1

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Antenna gain (dBi) 0.8

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	19975	1712.5	QPSK	1	0	23.07	23.87	30	-6.13
				1	24	22.79	23.59	30	-6.41
				12	6	21.98	22.78	30	-7.22
				25	0	21.99	22.79	30	-7.21
	20175	1732.5	QPSK	1	0	23.26	24.06	30	-5.94
				1	24	23.01	23.81	30	-6.19
				12	6	22.15	22.95	30	-7.05
				25	0	22.18	22.98	30	-7.02
	20375	1752.5	QPSK	1	0	22.09	22.89	30	-7.11
				1	24	21.93	22.73	30	-7.27
				12	6	21.57	22.37	30	-7.63
				25	0	21.64	22.44	30	-7.56
	19975	1712.5	16QAM	1	0	22.31	23.11	30	-6.89
				1	24	22.07	22.87	30	-7.13
				12	6	21.05	21.85	30	-8.15
				25	0	21.03	21.83	30	-8.17
	20175	1732.5	16QAM	1	0	21.85	22.65	30	-7.35
				1	24	22.34	23.14	30	-6.86
				12	6	21.19	21.99	30	-8.01
				25	0	21.19	21.99	30	-8.01
	20375	1752.5	16QAM	1	0	22.60	23.40	30	-6.6
				1	24	22.40	23.20	30	-6.8
				12	6	21.08	21.88	30	-8.12
				25	0	21.06	21.86	30	-8.14

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Antenna gain (dBi) 0.8

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	20000	1715	QPSK	1	0	23.18	23.98	30	-6.02
				1	49	23.00	23.80	30	-6.2
				25	12	21.07	21.87	30	-8.13
				50	0	21.10	21.90	30	-8.1
	20175	1732.5	QPSK	1	0	23.44	24.24	30	-5.76
				1	49	23.02	23.82	30	-6.18
				25	12	21.22	22.02	30	-7.98
				50	0	21.25	22.05	30	-7.95
	20375	1750	QPSK	1	0	23.31	24.11	30	-5.89
				1	49	23.03	23.83	30	-6.17
				25	12	21.11	21.91	30	-8.09
				50	0	21.16	21.96	30	-8.04
	20000	1715	16QAM	1	0	21.55	22.35	30	-7.65
				1	49	21.35	22.15	30	-7.85
				25	12	21.04	21.84	30	-8.16
				50	0	21.14	21.94	30	-8.06
	20175	1732.5	16QAM	1	0	22.01	22.81	30	-7.19
				1	49	21.65	22.45	30	-7.55
				25	12	21.24	22.04	30	-7.96
				50	0	21.28	22.08	30	-7.92
	20375	1750	16QAM	1	0	21.89	22.69	30	-7.31
				1	49	22.71	23.51	30	-6.49
				25	12	21.16	21.96	30	-8.04
				50	0	21.21	22.01	30	-7.99

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Antenna gain (dBi) 0.8

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15	20025	1717.5	QPSK	1	0	23.43	24.23	30	-5.77
				1	74	23.02	23.82	30	-6.18
				36	18	21.21	22.01	30	-7.99
				75	0	21.30	22.10	30	-7.9
	20175	1732.5	QPSK	1	0	23.56	24.36	30	-5.64
				1	74	23.16	23.96	30	-6.04
				36	18	21.25	22.05	30	-7.95
				75	0	22.32	23.12	30	-6.88
	20325	1747.5	QPSK	1	0	23.70	24.50	30	-5.5
				1	74	22.08	22.88	30	-7.12
				36	18	22.04	22.84	30	-7.16
				75	0	21.23	22.03	30	-7.97
	20025	1717.5	16QAM	1	0	22.97	23.77	30	-6.23
				1	74	22.60	23.40	30	-6.6
				36	18	19.17	19.97	30	-10.03
				75	0	21.29	22.09	30	-7.91
	20175	1732.5	16QAM	1	0	21.84	22.64	30	-7.36
				1	74	22.33	23.13	30	-6.87
				36	18	21.28	22.08	30	-7.92
				75	0	21.30	22.10	30	-7.9
	20325	1747.5	16QAM	1	0	21.75	22.55	30	-7.45
				1	74	21.22	22.02	30	-7.98
				36	18	21.13	21.93	30	-8.07
				75	0	21.18	21.98	30	-8.02

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Antenna gain (dBi) 0.8

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20	20050	1720	QPSK	1	0	23.34	24.14	30	-5.86
				1	99	22.82	23.62	30	-6.38
				50	25	21.07	21.87	30	-8.13
				100	0	22.14	22.94	30	-7.06
	20175	1732.5	QPSK	1	0	23.41	24.21	30	-5.79
				1	99	22.70	23.50	30	-6.5
				50	25	21.12	21.92	30	-8.08
				100	0	22.21	23.01	30	-6.99
	20300	1745	QPSK	1	0	23.54	24.34	30	-5.66
				1	99	22.79	23.59	30	-6.41
				50	25	21.03	21.83	30	-8.17
				100	0	22.15	22.95	30	-7.05
	20050	1720	16QAM	1	0	21.68	22.48	30	-7.52
				1	99	21.11	21.91	30	-8.09
				50	25	21.12	21.92	30	-8.08
				100	0	21.21	22.01	30	-7.99
	20175	1732.5	16QAM	1	0	22.73	23.53	30	-6.47
				1	99	22.04	22.84	30	-7.16
				50	25	21.19	21.99	30	-8.01
				100	0	21.25	22.05	30	-7.95
	20300	1745	16QAM	1	0	22.97	23.77	30	-6.23
				1	99	21.24	22.04	30	-7.96
				50	25	16.92	17.72	30	-12.28
				100	0	21.18	21.98	30	-8.02

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Antenna gain (dBi) -2.98

LTE Band 12_Uplink frequency band : 699 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
1.4	23017	699.7	QPSK	1	0	22.26	19.28	34.77	-15.49
				1	5	22.23	19.25	34.77	-15.52
				3	2	22.27	19.29	34.77	-15.48
				6	0	21.21	18.23	34.77	-16.54
	23095	707.5	QPSK	1	0	21.82	18.84	34.77	-15.93
				1	5	21.91	18.93	34.77	-15.84
				3	2	21.98	19.00	34.77	-15.77
				6	0	21.17	18.19	34.77	-16.58
	23173	715.5	QPSK	1	0	21.22	18.24	34.77	-16.53
				1	5	21.59	18.61	34.77	-16.16
				3	2	19.84	16.86	34.77	-17.91
				6	0	19.43	16.45	34.77	-18.32
	23017	699.7	16QAM	1	0	21.18	18.20	34.77	-16.57
				1	5	21.33	18.35	34.77	-16.42
				3	2	21.13	18.15	34.77	-16.62
				6	0	20.32	17.34	34.77	-17.43
	23095	707.5	16QAM	1	0	20.92	17.94	34.77	-16.83
				1	5	20.85	17.87	34.77	-16.9
				3	2	21.30	18.32	34.77	-16.45
				6	0	20.27	17.29	34.77	-17.48
	23173	715.5	16QAM	1	0	20.22	17.24	34.77	-17.53
				1	5	19.61	16.63	34.77	-18.14
				3	2	21.37	18.39	34.77	-16.38
				6	0	20.27	17.29	34.77	-17.48

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Antenna gain (dBi) -2.98

LTE Band 12_Uplink frequency band : 699 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
3	23025	700.5	QPSK	1	0	21.71	18.73	34.77	-16.04
				1	14	22.22	19.24	34.77	-15.53
				8	4	21.19	18.21	34.77	-16.56
				15	0	21.17	18.19	34.77	-16.58
	23095	707.5	QPSK	1	0	21.77	18.79	34.77	-15.98
				1	14	22.24	19.26	34.77	-15.51
				8	4	21.20	18.22	34.77	-16.55
				15	0	21.25	18.27	34.77	-16.5
	23165	714.5	QPSK	1	0	22.19	19.21	34.77	-15.56
				1	14	22.39	19.41	34.77	-15.36
				8	4	21.33	18.35	34.77	-16.42
				15	0	21.34	18.36	34.77	-16.41
	23025	700.5	16QAM	1	0	21.50	18.52	34.77	-16.25
				1	14	21.55	18.57	34.77	-16.2
				8	4	20.18	17.20	34.77	-17.57
				15	0	20.25	17.27	34.77	-17.5
	23095	707.5	16QAM	1	0	21.23	18.25	34.77	-16.52
				1	14	21.29	18.31	34.77	-16.46
				8	4	20.32	17.34	34.77	-17.43
				15	0	20.31	17.33	34.77	-17.44
	23165	714.5	16QAM	1	0	21.28	18.30	34.77	-16.47
				1	14	20.77	17.79	34.77	-16.98
				8	4	20.20	17.22	34.77	-17.55
				15	0	20.34	17.36	34.77	-17.41

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Antenna gain (dBi) -2.98

LTE Band 12_Uplink frequency band : 699 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
5	23035	701.5	QPSK	1	0	21.70	18.72	34.77	-16.05
				1	24	22.11	19.13	34.77	-15.64
				12	6	21.16	18.18	34.77	-16.59
				25	0	21.23	18.25	34.77	-16.52
	23095	707.5	QPSK	1	0	22.27	19.29	34.77	-15.48
				1	24	22.19	19.21	34.77	-15.56
				12	6	21.28	18.30	34.77	-16.47
				25	0	21.19	18.21	34.77	-16.56
	23155	713.5	QPSK	1	0	22.22	19.24	34.77	-15.53
				1	24	22.36	19.38	34.77	-15.39
				12	6	21.20	18.22	34.77	-16.55
				25	0	21.24	18.26	34.77	-16.51
	23035	701.5	16QAM	1	0	20.81	17.83	34.77	-16.94
				1	24	21.21	18.23	34.77	-16.54
				12	6	20.25	17.27	34.77	-17.5
				25	0	20.21	17.23	34.77	-17.54
	23095	707.5	16QAM	1	0	20.69	17.71	34.77	-17.06
				1	24	20.39	17.41	34.77	-17.36
				12	6	20.29	17.31	34.77	-17.46
				25	0	20.27	17.29	34.77	-17.48
	23155	713.5	16QAM	1	0	20.56	17.58	34.77	-17.19
				1	24	20.72	17.74	34.77	-17.03
				12	6	20.22	17.24	34.77	-17.53
				25	0	20.20	17.22	34.77	-17.55

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Antenna gain (dBi) -2.98

LTE Band 12_Uplink frequency band : 699 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
10	23060	704	QPSK	1	0	22.24	19.26	34.77	-15.51
				1	49	22.23	19.25	34.77	-15.52
				25	12	20.19	17.21	34.77	-17.56
				50	0	21.24	18.26	34.77	-16.51
	23095	707.5	QPSK	1	0	21.20	18.22	34.77	-16.55
				1	49	22.31	19.33	34.77	-15.44
				25	12	21.22	18.24	34.77	-16.53
				50	0	20.21	17.23	34.77	-17.54
	23130	711	QPSK	1	0	21.26	18.28	34.77	-16.49
				1	49	21.29	18.31	34.77	-16.46
				25	12	20.29	17.31	34.77	-17.46
				50	0	21.28	18.30	34.77	-16.47
	23060	704	16QAM	1	0	21.71	18.73	34.77	-16.04
				1	49	21.62	18.64	34.77	-16.13
				25	12	20.23	17.25	34.77	-17.52
				50	0	20.25	17.27	34.77	-17.5
	23095	707.5	16QAM	1	0	21.56	18.58	34.77	-16.19
				1	49	21.68	18.70	34.77	-16.07
				25	12	20.19	17.21	34.77	-17.56
				50	0	20.27	17.29	34.77	-17.48
	23130	711	16QAM	1	0	21.45	18.47	34.77	-16.3
				1	49	21.57	18.59	34.77	-16.18
				25	12	20.43	17.45	34.77	-17.32
				50	0	20.35	17.37	34.77	-17.4

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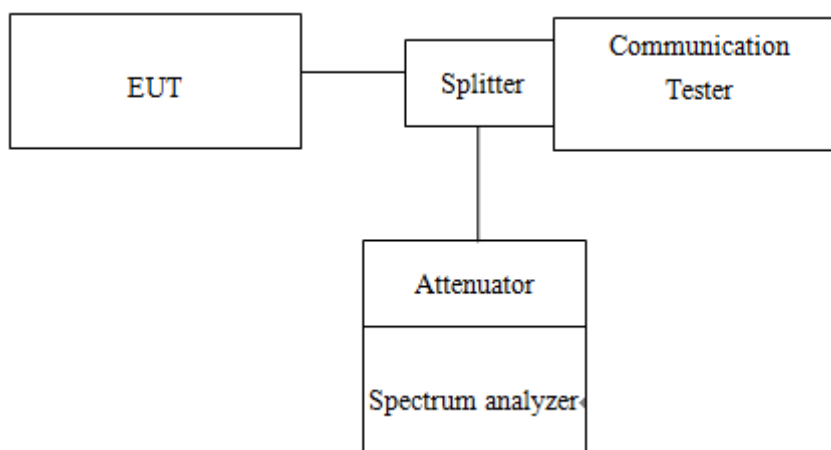
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7. OCCUPIED BANDWIDTH MEASUREMENT

7.1. Standard Applicable

The occupied bandwidth 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.

7.2. Test Set-up



7.3. Measurement Procedure

99% &26dB Bandwidth with detector peak

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW= 3 times RBW, -26dBc display line was placed on the screen (or 26dB bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace. Then set RBW to 99% bandwidth, RBW= 1%, VBW= 3 RBW, with span > 2 * Signal BW, set % Power = 99%.

99% Bandwidth with detector sample

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% ~ 5% of emission BW, VBW= 3 times RBW, -20dBc display line was placed on the screen (or 20dB bandwidth). Set RBW to 99% bandwidth, RBW= 1% ~ 5%, VBW= 3 RBW, with span > 2 * Signal BW, set % Power = 99%.

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7.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Radio Communication Analyser	Anritsu	MT8820C	6201107337	2018/06/15	2019/06/14
DC Power Supply	Agilent	E3640A	MY53140006	2018/05/30	2019/05/29
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
Splitter	Woken	DOM35LW1 A2	RF36	2017/12/26	2018/12/25

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7.5. Measurement Result

LTE BAND 2 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1850.7	18607	1.1029	1.1046	1.330	1.373
1880.0	18900	1.1037	1.1070	1.335	1.375
1909.3	19193	1.1039	1.1072	1.336	1.566

LTE BAND 2 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1851.5	18615	2.7123	2.7005	3.063	3.003
1880.0	18900	2.7122	2.7007	3.070	2.983
1908.5	19185	2.7115	2.6998	3.058	2.997

LTE BAND 2 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1852.5	18625	4.5107	4.4918	5.097	5.076
1880.0	18900	4.5164	4.4830	5.040	5.065
1907.5	19175	4.5130	4.4946	5.067	5.071

LTE BAND 2 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1855.0	18650	8.9954	8.9860	10.384	10.203
1880.0	18900	9.0048	8.9951	10.363	10.309
1905.0	19150	8.9986	8.9926	10.347	10.387

LTE BAND 2 Channel bandwidth: 15MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1857.5	18675	13.492	13.506	15.688	15.782
1880.0	18900	13.544	13.532	15.858	15.761
1902.5	19125	13.532	13.535	15.913	15.818

LTE BAND 2 Channel bandwidth: 20MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1860.0	18700	18.034	17.953	20.558	20.271
1880.0	18900	18.140	18.000	20.775	20.525
1900.0	19100	18.082	17.985	20.552	20.134

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LTE BAND 4 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1710.7	19957	1.1029	1.1011	1.336	1.327
1732.5	20175	1.1011	1.1042	1.335	1.387
1754.3	20393	1.1011	1.1033	1.343	1.362

LTE BAND 4 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1711.5	19965	2.7087	2.7002	3.045	2.999
1732.5	20175	2.7105	2.7008	3.042	2.980
1753.5	20385	2.7130	2.7018	3.058	2.990

LTE BAND 4 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1712.5	19957	4.5087	4.4961	5.010	5.028
1732.5	20175	4.5078	4.4872	5.065	4.995
1752.5	20375	4.5158	4.4984	5.047	5.043

LTE BAND 4 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1715.0	20000	9.0099	9.0087	10.334	10.358
1732.5	20175	8.9905	9.0061	10.327	10.341
1750.0	20350	9.0122	9.0034	10.341	10.183

LTE BAND 4 Channel bandwidth: 15MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1717.5	20025	13.520	13.557	16.069	15.719
1732.5	20175	13.515	13.514	15.916	15.648
1747.5	20325	13.533	13.532	15.923	15.849

LTE BAND 4 Channel bandwidth: 20MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1720.0	20050	18.126	18.003	20.753	20.474
1732.5	20175	18.031	17.947	20.694	20.211
1745.0	20300	18.087	17.960	20.860	20.220

LTE BAND 12 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
699.7	23017	1.0999	1.1017	1.325	1.353
707.5	23095	1.1012	1.1015	1.326	1.341
715.3	23173	1.1013	1.1012	1.334	1.346

LTE BAND 12 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
700.5	23025	2.7078	2.6942	3.018	2.983
707.5	23095	2.7108	2.7013	3.041	3.001
714.5	23165	2.7085	2.6988	3.035	3.011

LTE BAND 12 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
701.5	23035	4.5056	4.4797	5.100	4.960
707.5	23095	4.5149	4.4977	5.033	5.045
713.5	23155	4.5056	4.4852	5.023	5.028

LTE BAND 12 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
704.0	23060	8.9847	8.9720	10.295	10.262
707.5	23095	9.0258	9.0400	10.335	10.317
711.0	23130	8.9836	8.9930	10.194	10.251

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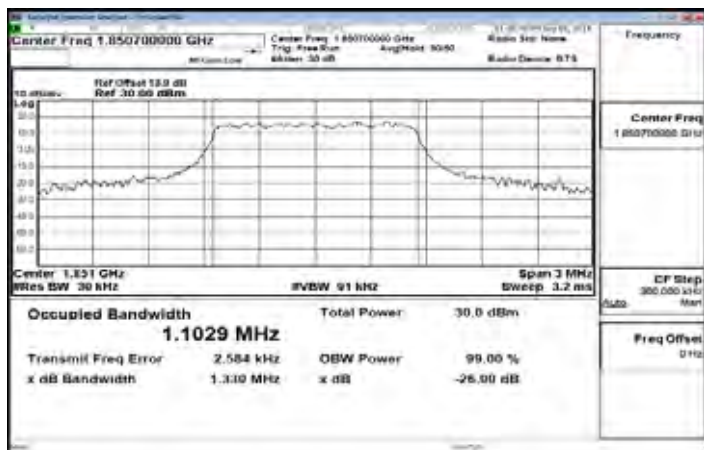
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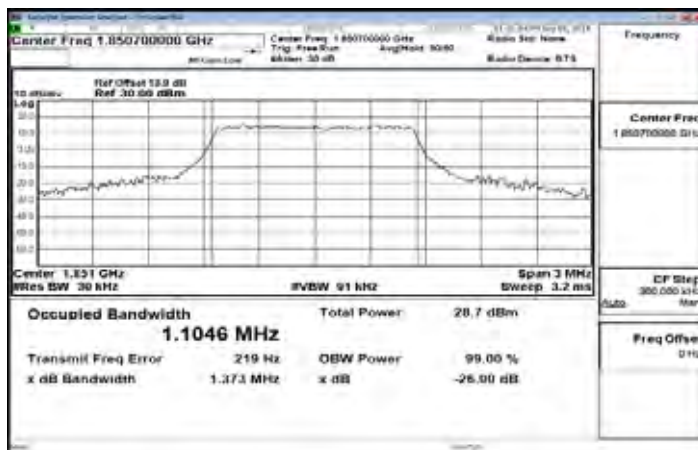
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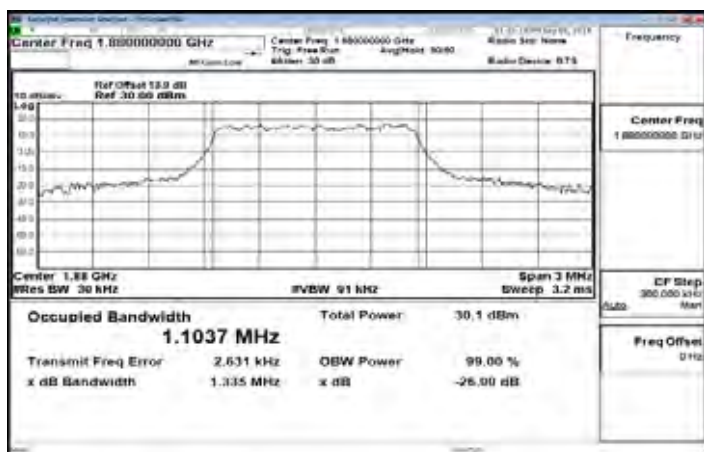
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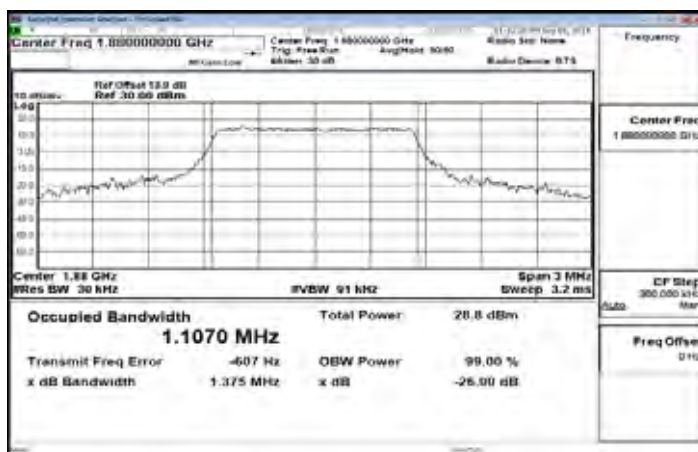
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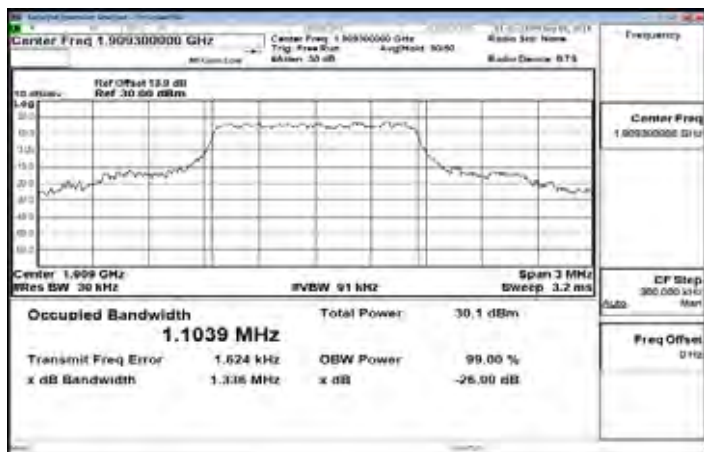
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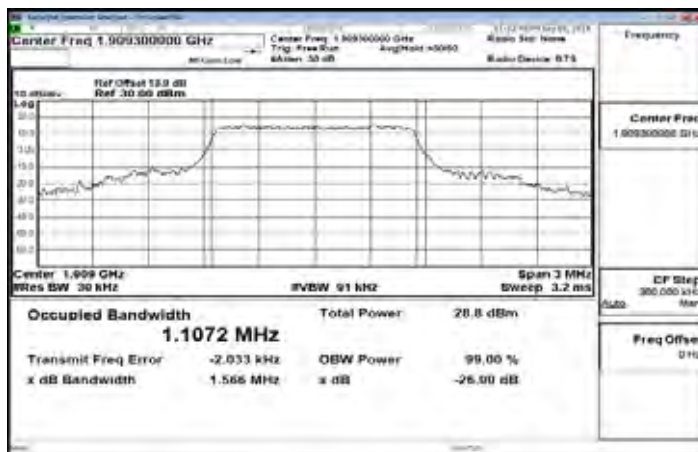
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Band2_1_4MHz_QPSK_6_0_HighCH19193-1909.3



Band2_1_4MHz_16QAM_6_0_HighCH19193-1909.3



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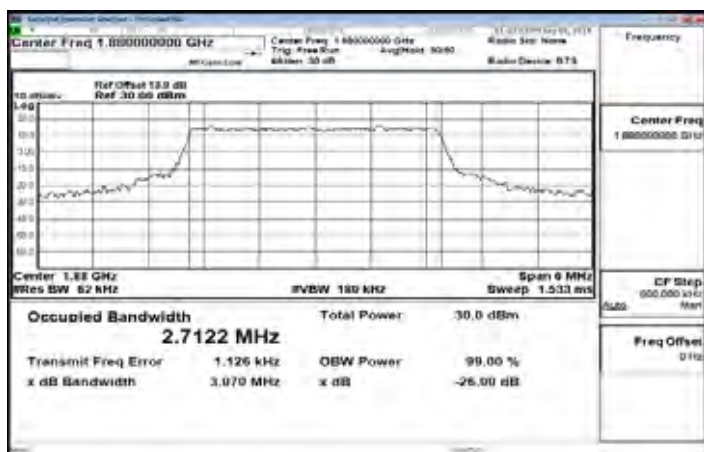
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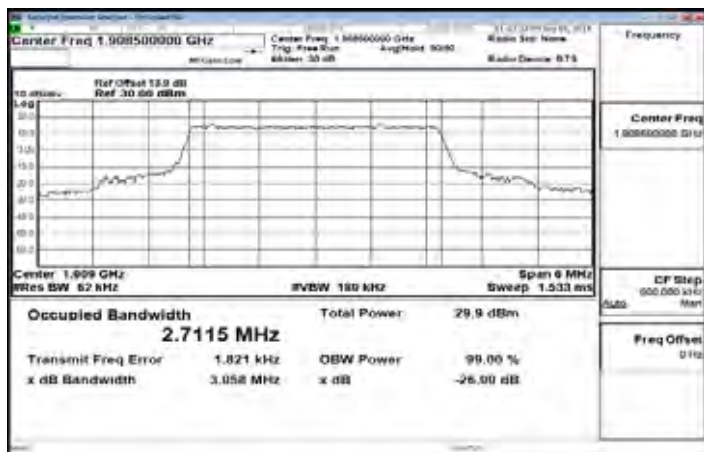
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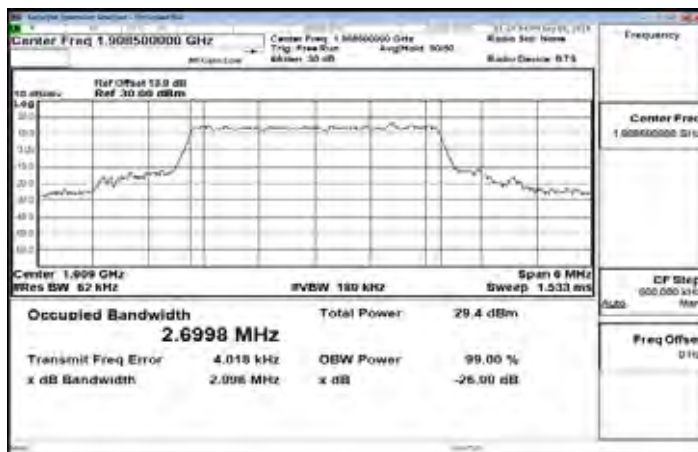
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Band2_3MHz_QPSK_15_0_HighCH19185-1908.5



Band2_3MHz_16QAM_15_0_HighCH19185-1908.5



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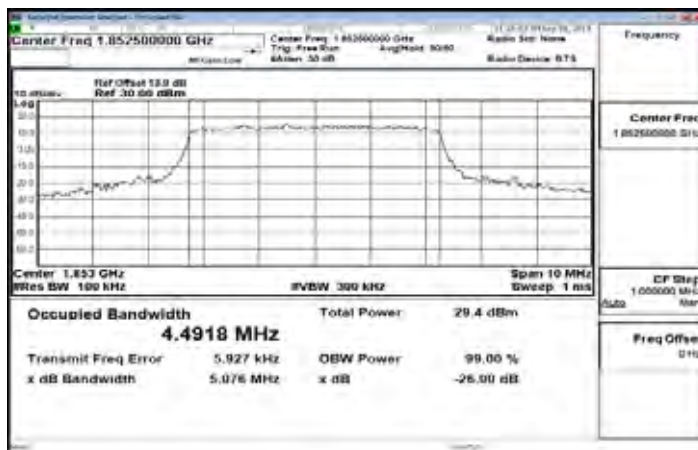
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Band2_5MHz_QPSK_25_0_LowCH18625-1852.5



Band2_5MHz_16QAM_25_0_LowCH18625-1852.5



Band2_5MHz_QPSK_25_0_MidCH18900-1880



Band2_5MHz_16QAM_25_0_MidCH18900-1880



Band2_5MHz_QPSK_25_0_HighCH19175-1907.5



Band2_5MHz_16QAM_25_0_HighCH19175-1907.5



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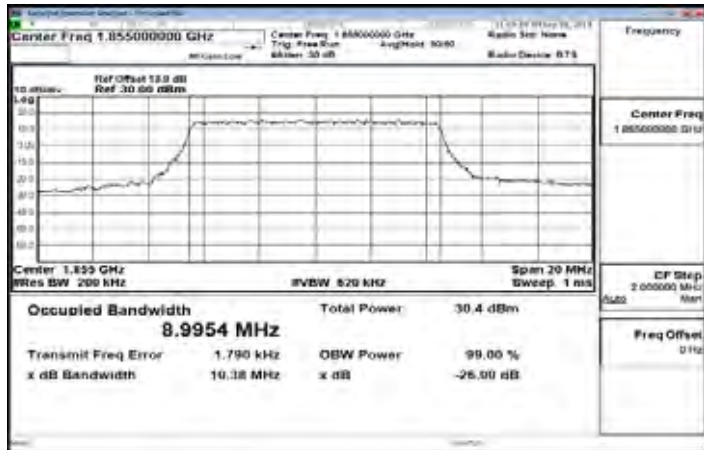
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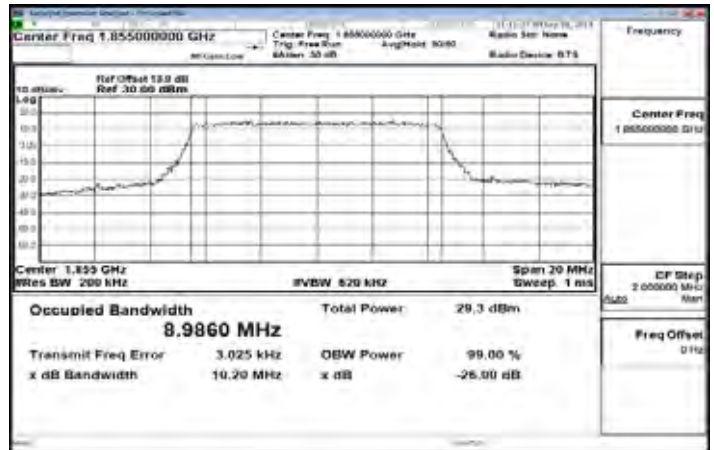
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Band2_10MHz_QPSK_50_0_LowCH18650-1855



Band2_10MHz_16QAM_50_0_LowCH18650-1855



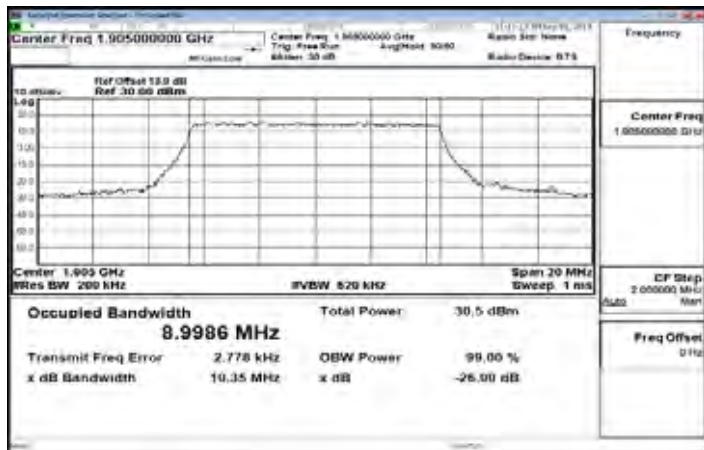
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Band2_10MHz_QPSK_50_0_HighCH19150-1905



Band2_10MHz_16QAM_50_0_HighCH19150-1905



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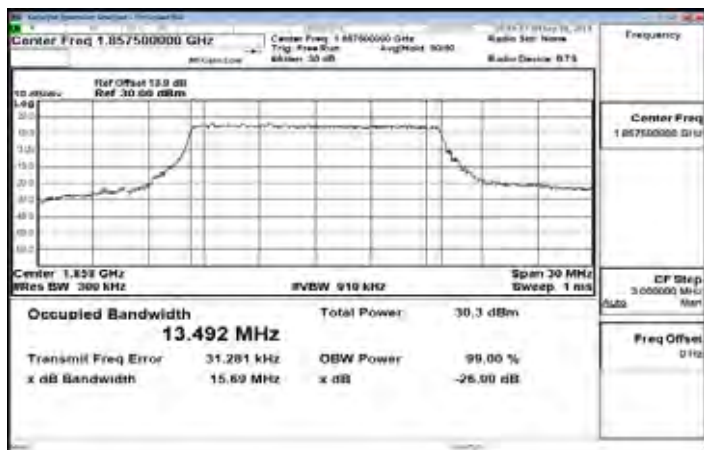
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Band2_15MHz_QPSK_75_0_LowCH18675-1857.5



Band2_15MHz_16QAM_75_0_LowCH18675-1857.5



Band2_15MHz_QPSK_75_0_MidCH18900-1880



Band2_15MHz_16QAM_75_0_MidCH18900-1880



Band2_15MHz_QPSK_75_0_HighCH19125-1902.5



Band2_15MHz_16QAM_75_0_HighCH19125-1902.5



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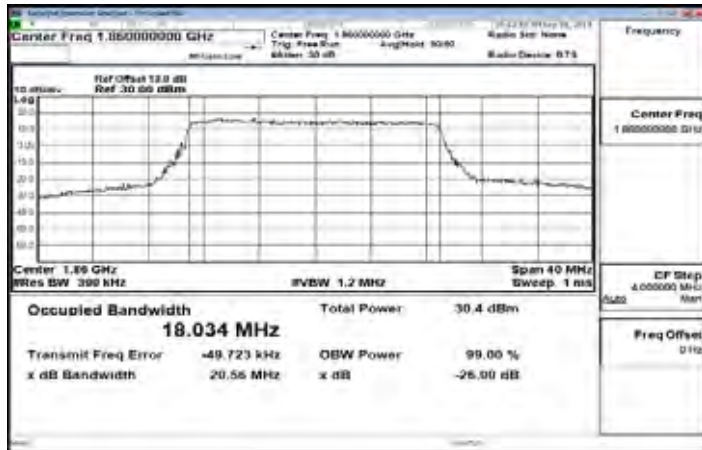
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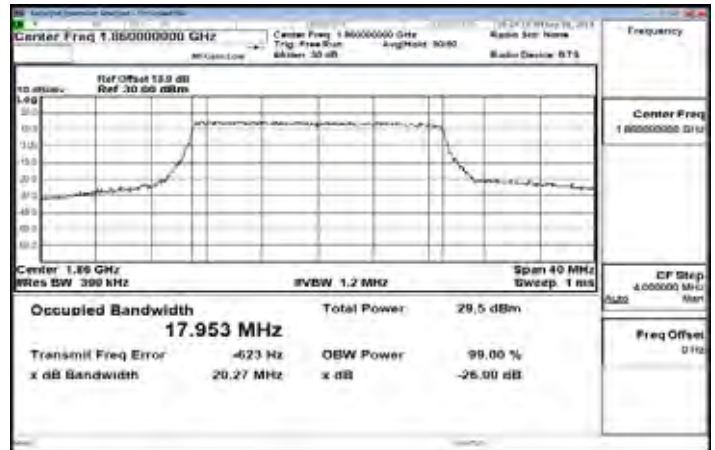
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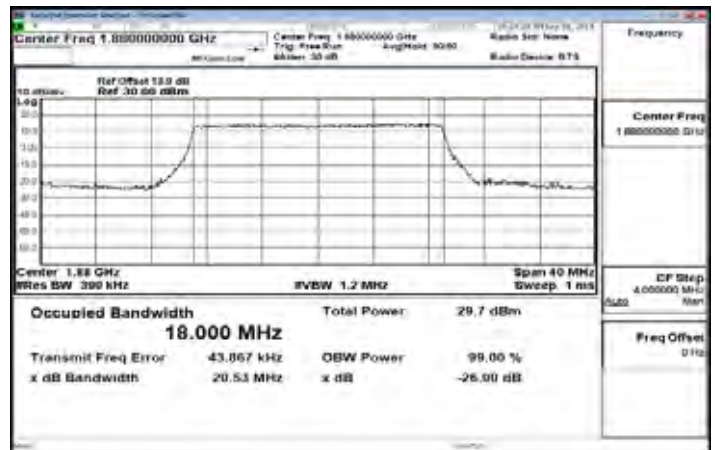
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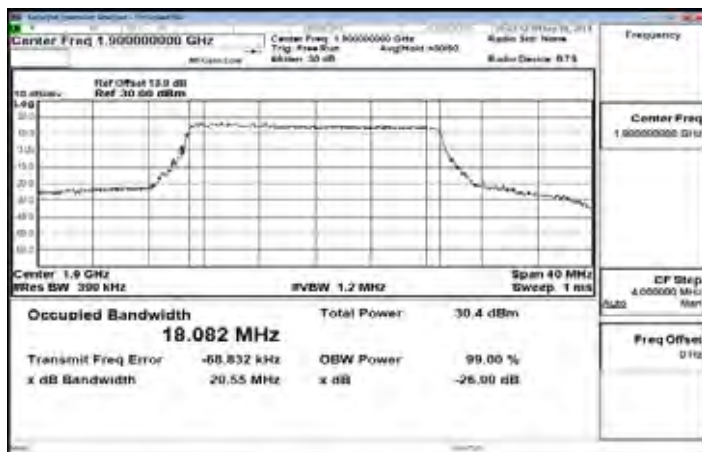
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Band2_20MHz_16QAM_100_0_MidCH18900-1880



Band2_20MHz_QPSK_100_0_HighCH19100-1900



Band2_20MHz_16QAM_100_0_HighCH19100-1900



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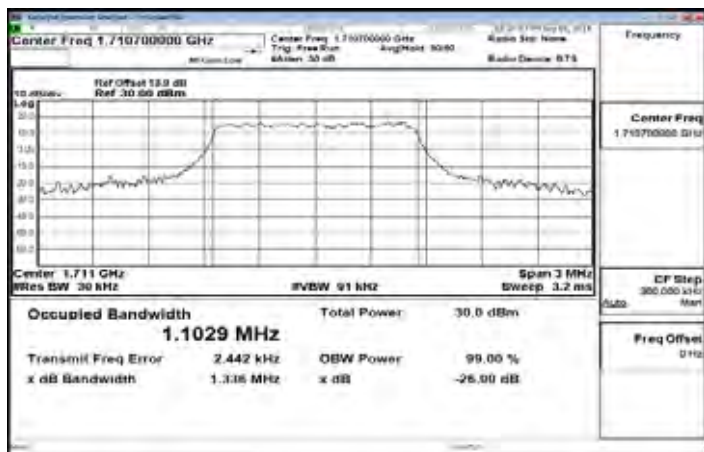
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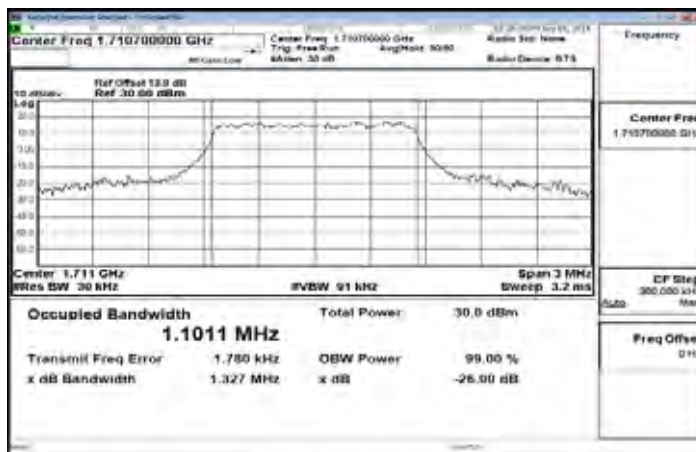
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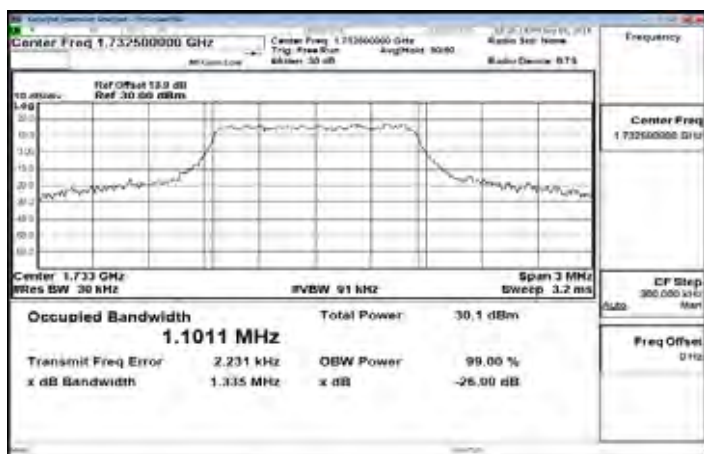
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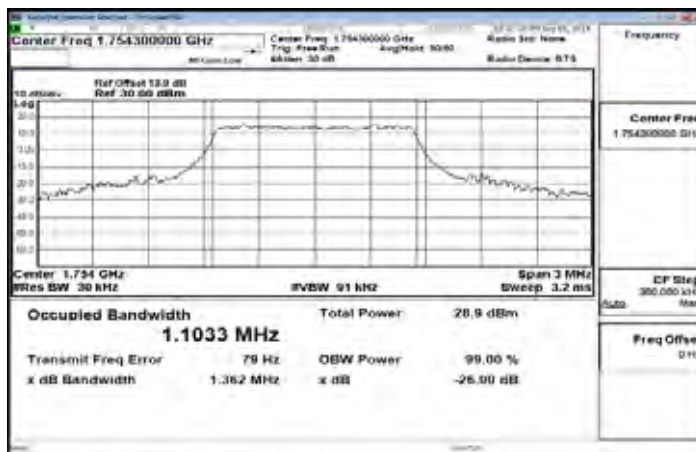
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Band4_1_4MHz_16QAM_6_0_HighCH20393-1754.3



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Band4_3MHz_QPSK_15_0_LowCH19965-1711.5



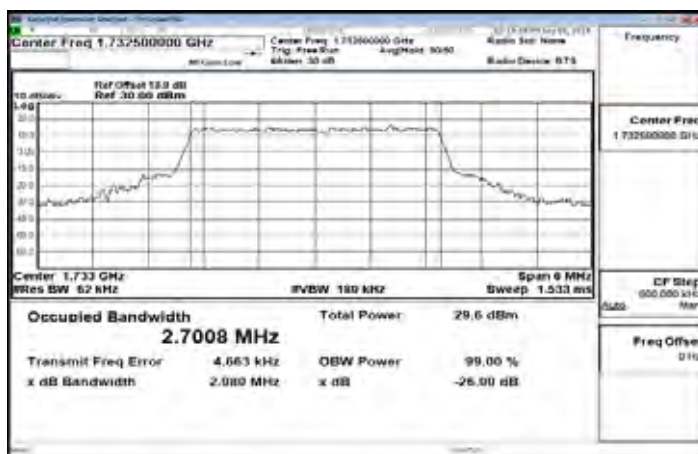
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Band4_3MHz_QPSK_15_0_MidCH20175-1732.5



Band4_3MHz_16QAM_15_0_MidCH20175-1732.5



Band4_3MHz_QPSK_15_0_HighCH20385-1753.5



Band4_3MHz_16QAM_15_0_HighCH20385-1753.5



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Band4_5MHz_16QAM_25_0_LowCH19975-1712.5



Band4_5MHz_QPSK_25_0_MidCH20175-1732.5



Band4_5MHz_16QAM_25_0_MidCH20175-1732.5



Band4_5MHz_QPSK_25_0_HighCH20375-1752.5



Band4_5MHz_16QAM_25_0_HighCH20375-1752.5



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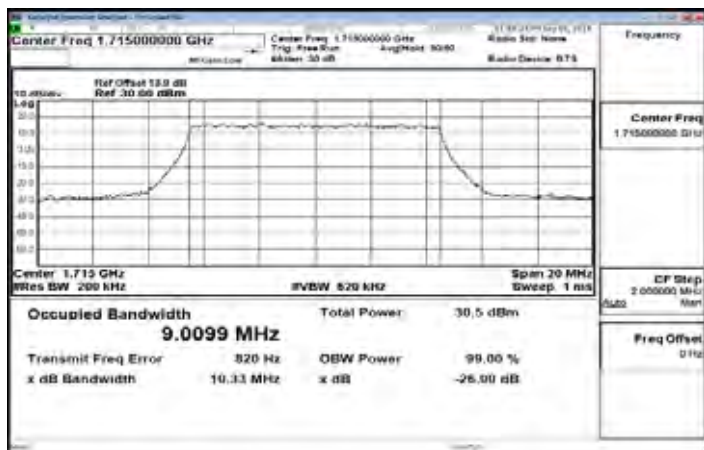
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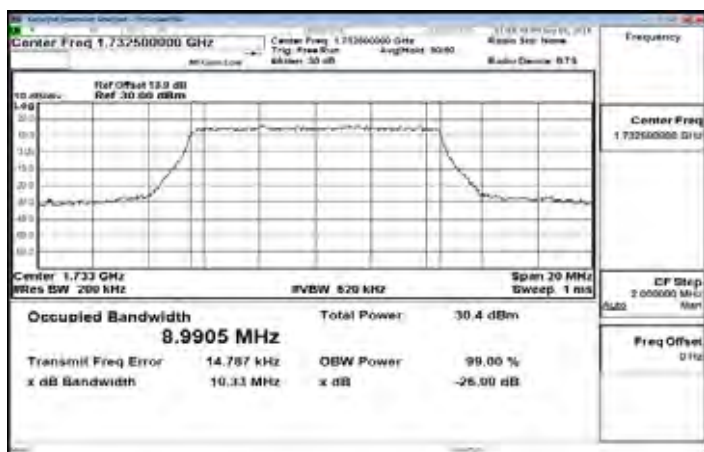
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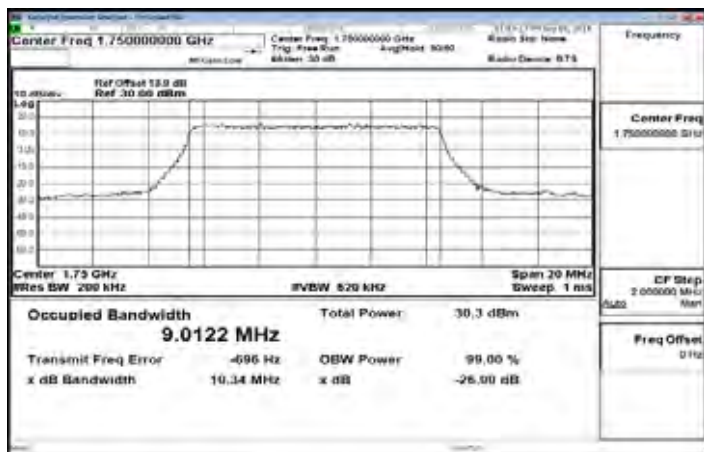
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Band4_10MHz_16QAM_50_0_MidCH20175-1732.5



Band4_10MHz_QPSK_50_0_HighCH20350-1750



Band4_10MHz_16QAM_50_0_HighCH20350-1750



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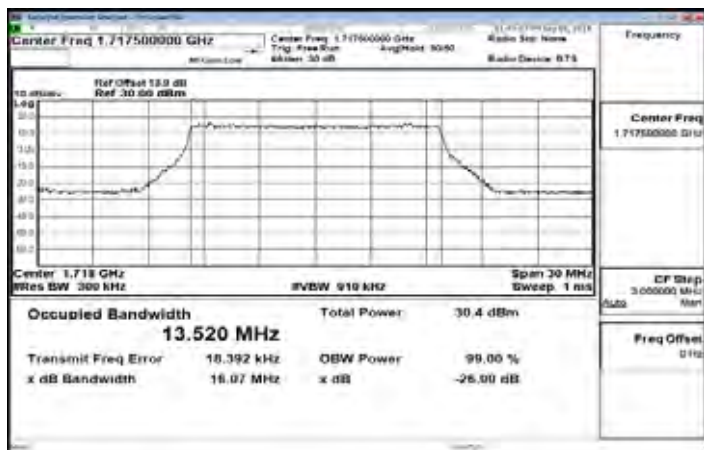
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Band4_15MHz_QPSK_75_0_LowCH20025-1717.5



Band4_15MHz_16QAM_75_0_LowCH20025-1717.5



Band4_15MHz_QPSK_75_0_MidCH20175-1732.5



Band4_15MHz_16QAM_75_0_MidCH20175-1732.5



Band4_15MHz_QPSK_75_0_HighCH20325-1747.5



Band4_15MHz_16QAM_75_0_HighCH20325-1747.5



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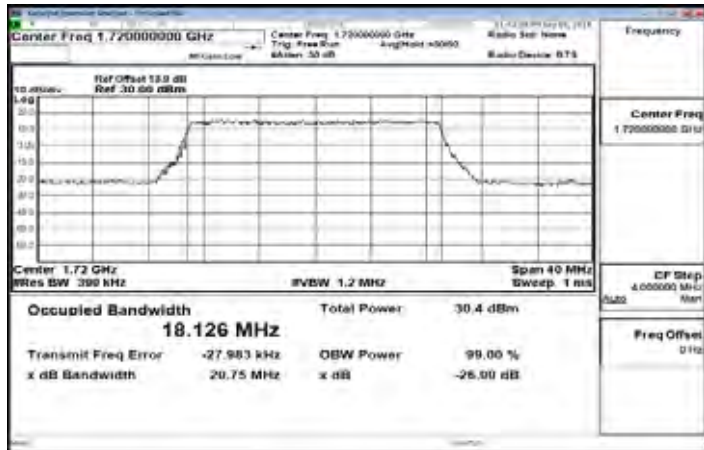
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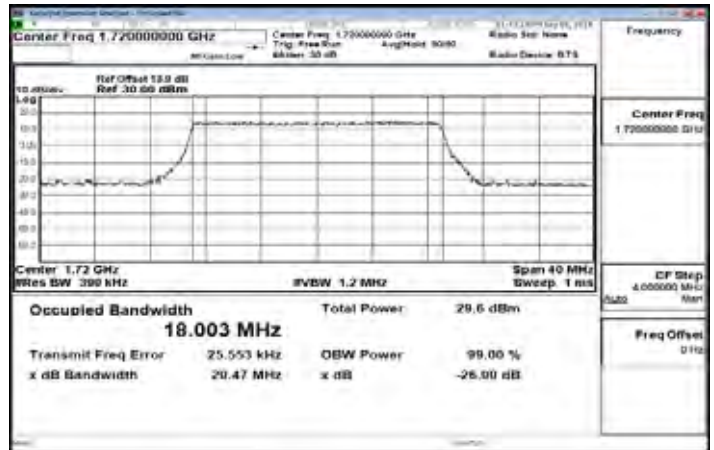
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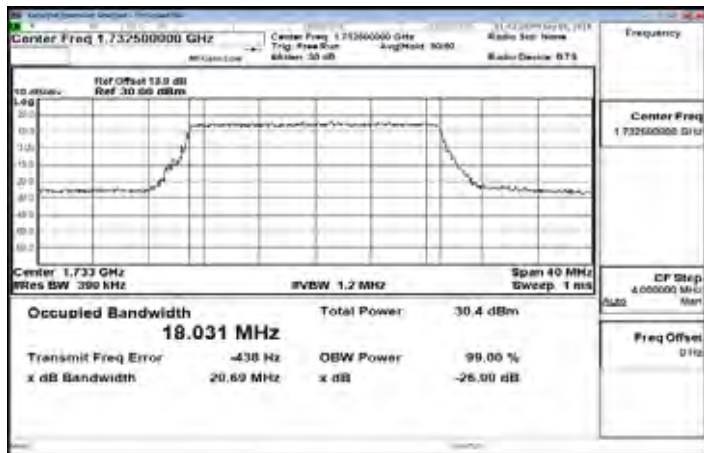
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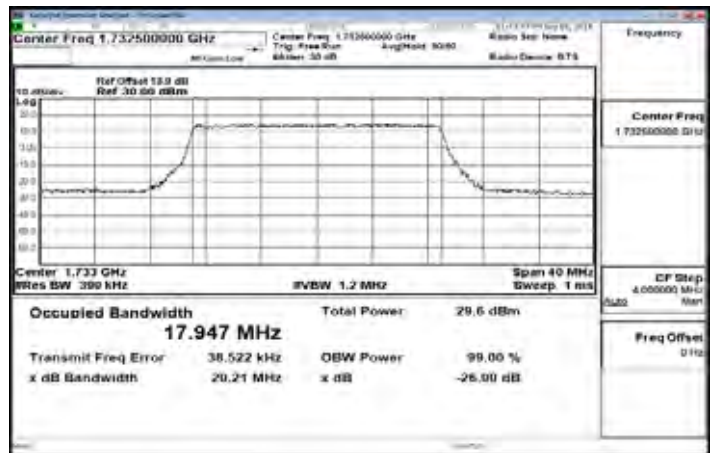
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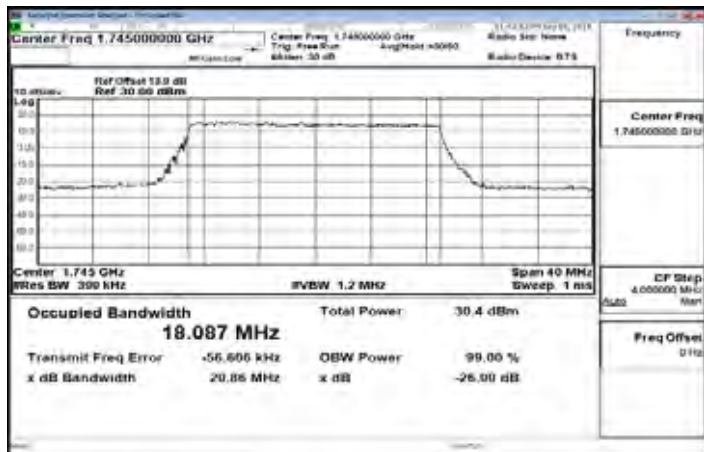
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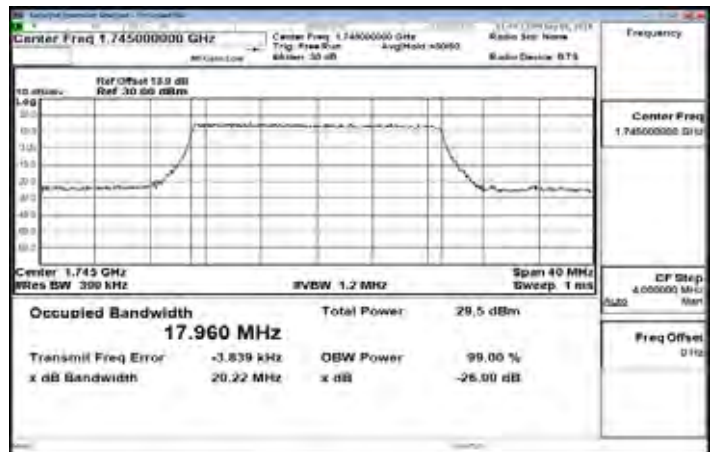
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Band4_20MHz_QPSK_100_0_HighCH20300-1745



Band4_20MHz_16QAM_100_0_HighCH20300-1745



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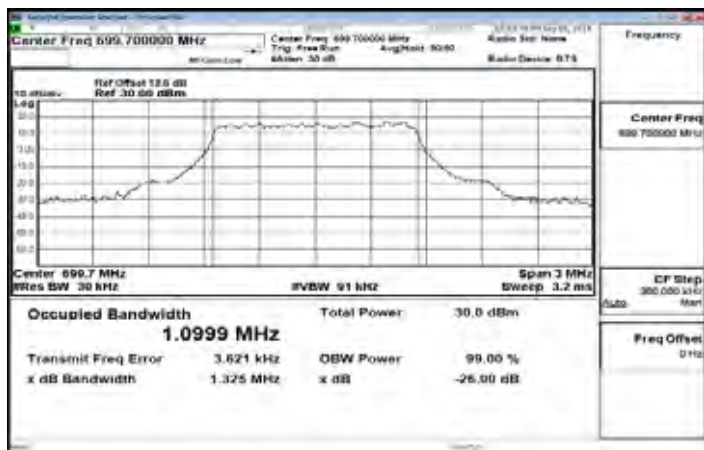
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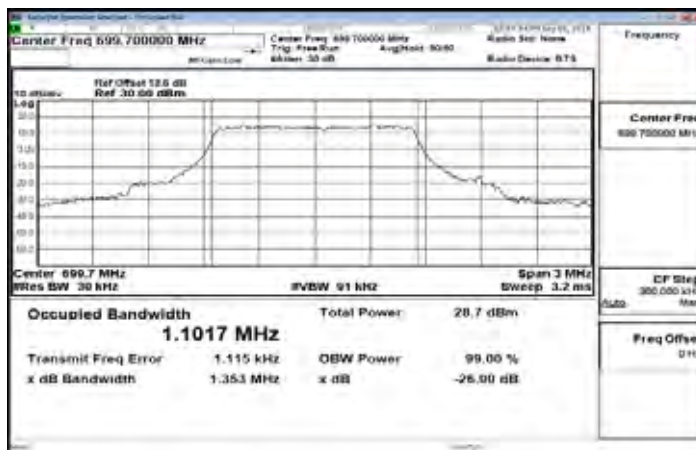
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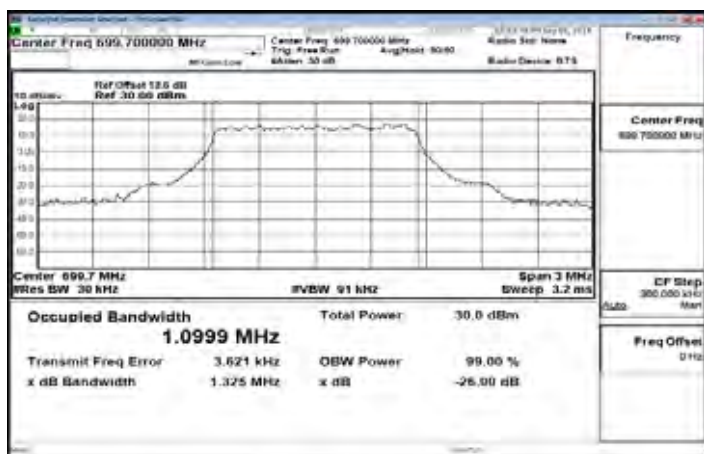
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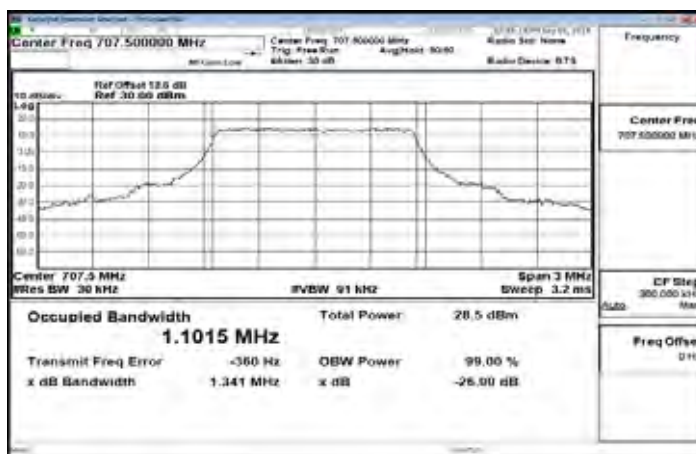
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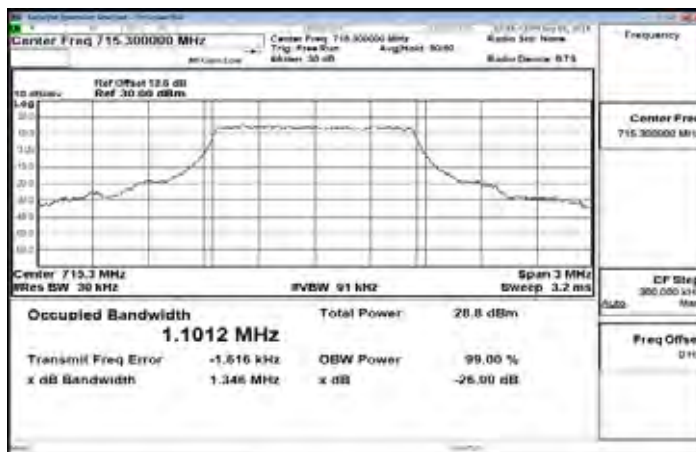
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Band12_1_4MHz_16QAM_6_0_HighCH23173-715.3



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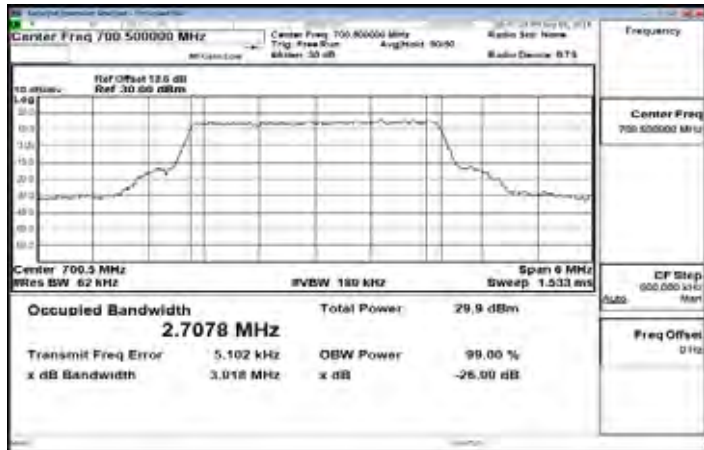
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Band12_3MHz_QPSK_15_0_LowCH23025-700.5



Band12_3MHz_16QAM_15_0_LowCH23025-700.5



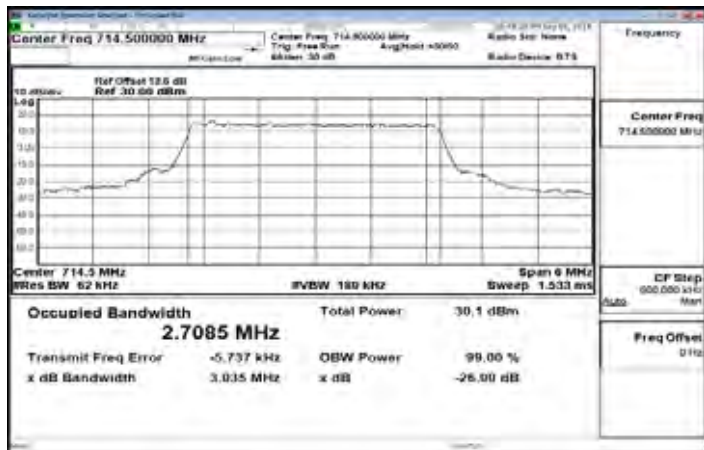
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Band12_3MHz_16QAM_15_0_MidCH23095-707.5



Band12_3MHz_QPSK_15_0_HighCH23165-714.5



Band12_3MHz_16QAM_15_0_HighCH23165-714.5



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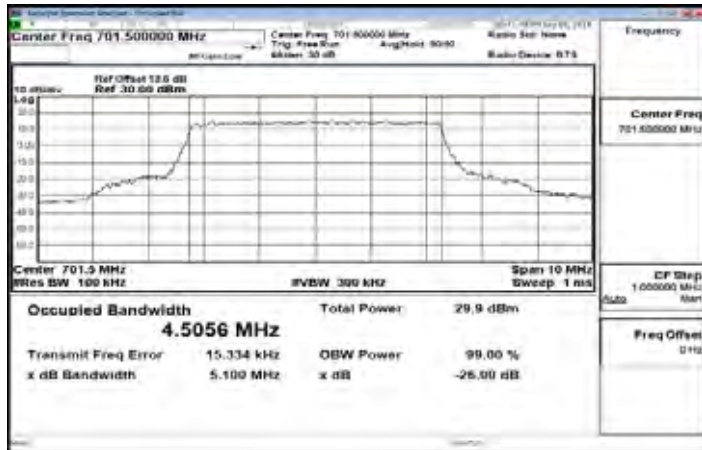
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Band12_5MHz_16QAM_25_0_LowCH23035-701.5



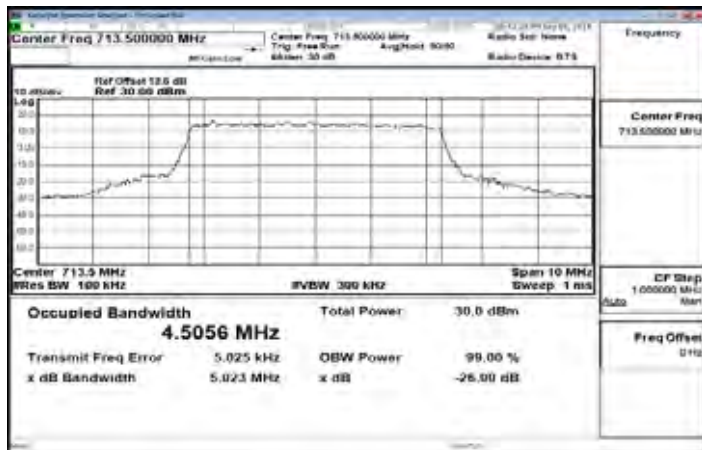
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Band12_5MHz_QPSK_25_0_HighCH23155-713.5



Band12_5MHz_16QAM_25_0_HighCH23155-713.5



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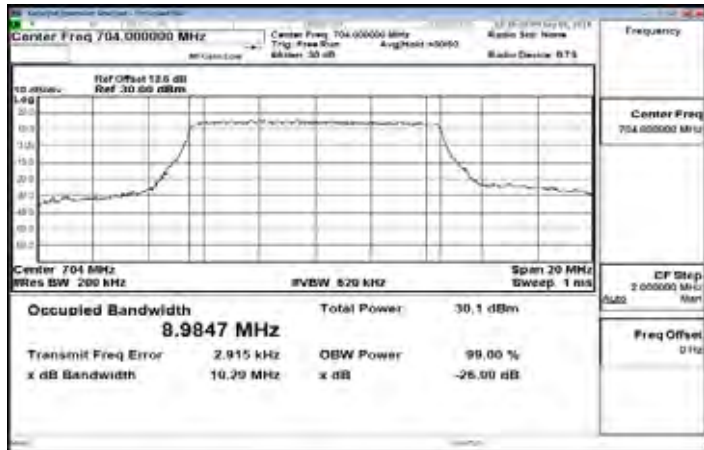
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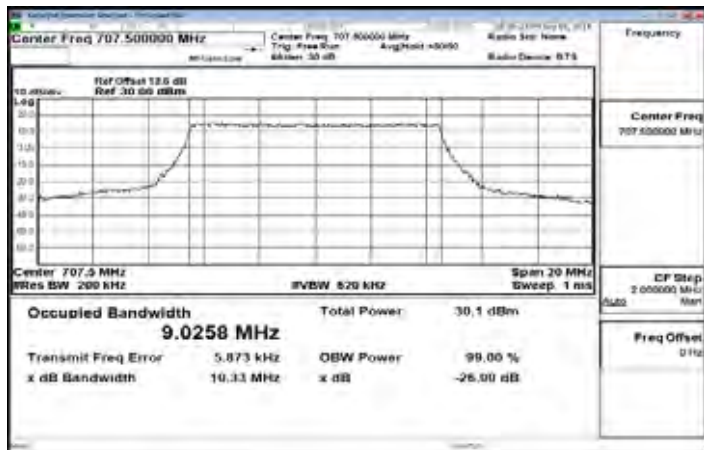
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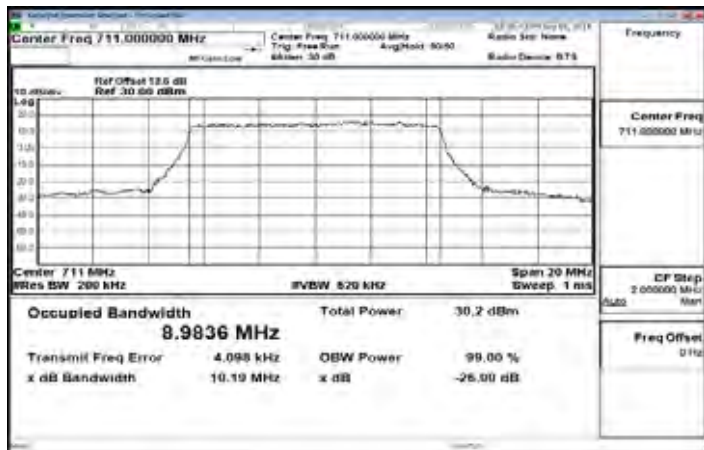
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Band12_10MHz_16QAM_50_0_MidCH23095-707.5



Band12_10MHz_QPSK_50_0_HighCH23130-711



Band12_10MHz_16QAM_50_0_HighCH23130-711



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8. OUT OF BAND EMISSION AT ANTENNA TERMINALS

8.1. Standard Applicable

FCC§24.238(a), §27.53(h), Out of band emissions. 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.

FCC §27.53(c)

(c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776– 788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB (-13dBm)

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

§27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC §27.53(c) (5) & FCC §27.53(g)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

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FCC §27.53(h) (3)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

FCC §27.53(m) (4) (6)

For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

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According to RSS-130 §4.6

The power of any unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.

In addition to the limit outlined in Section 4.6.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

(a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:

- (i) $76 + 10 \log_{10} p$ (watts), dB, for base and fixed equipment, and
- (ii) $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment.

According to RSS-133 §6.5

6.5.1 Out-of-Block Emissions

Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

According to RSS-139 §6.5

For Operation Band 1710-1755MHz and 2110-2155MHz

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB. Limit = 13dBm

(ii) After the first 1.0 MHz outside the equipment's operating frequency block, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB. Limit = -13dBm

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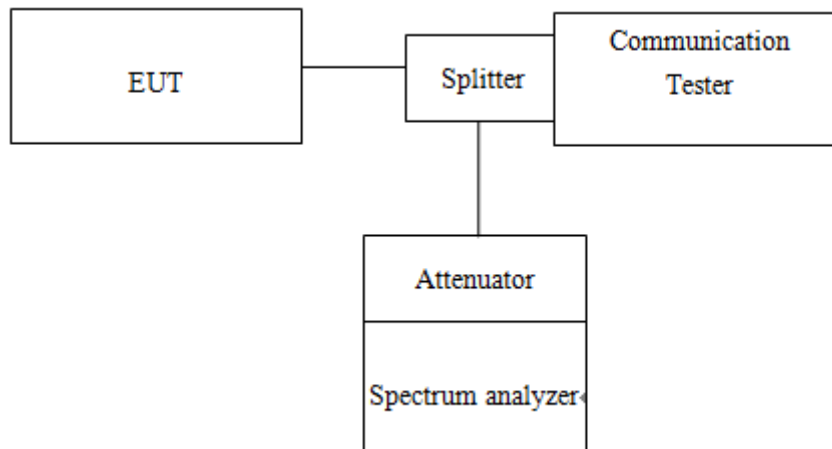
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8.2. Test SET-UP



8.3. Measurement Procedure

Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting $RBW \geq 1\% \text{ EBW}$.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

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8.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Radio Communication Analyer	Anritsu	MT8820C	6201107337	2018/06/15	2019/06/14
DC Power Supply	Agilent	E3640A	MY53140006	2018/05/30	2019/05/29
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
Splitter	Woken	DOM35LW1 A2	RF36	2017/12/26	2018/12/25

8.5. Measurement Result:

Refer to next pages.

NOTE: The occurrence of the spike on the conducted emission is the signal of the fundamental emission.

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Band Edge

Band2 1 4MHz QPSK 1 0 LowCH18607-1850.7



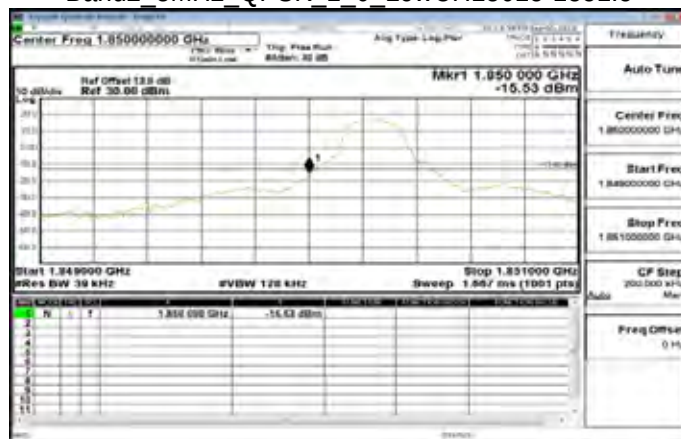
Band2 1 4MHz QPSK 6 0 HighCH19193-1909.3



Band2 1 4MHz QPSK 1 5 HighCH19193-1909.3



Band2 3MHz QPSK 1 0 LowCH18615-1851.5



Band2 1 4MHz QPSK 6 0 LowCH18607-1850.7



Band2 3MHz QPSK 1 14 HighCH19185-1908.5



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Band2 3MHz QPSK 15 0 LowCH18615-1851.5



Band2 5MHz QPSK 1 24 HighCH19175-1907.5



Band2 3MHz QPSK 15 0 HighCH19185-1908.5



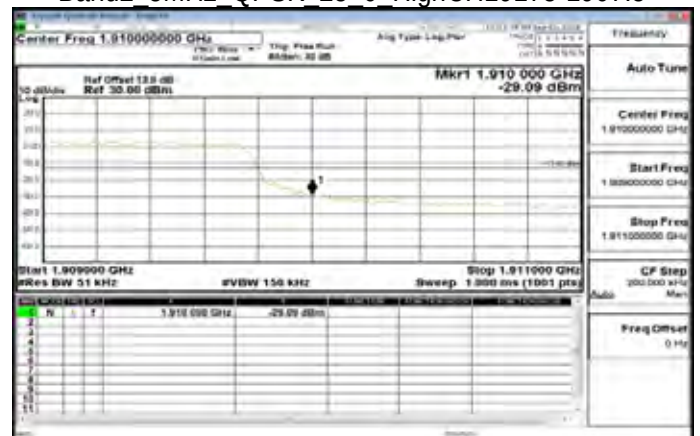
Band2 5MHz QPSK 25 0 LowCH18625-1852.5



Band2 5MHz QPSK 1 0 LowCH18625-1852.5



Band2 5MHz QPSK 25 0 HighCH19175-1907.5



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Band2 10MHz QPSK 1 0 LowCH18650-1855



Band2 10MHz QPSK 50 0 HighCH19150-1905



Band2 10MHz QPSK 1 49 HighCH19150-1905



Band2 15MHz QPSK 1 0 LowCH18675-1857.5



Band2 10MHz QPSK 50 0 LowCH18650-1855



Band2 15MHz QPSK 1 74 HighCH19125-1902.5



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Band2 15MHz QPSK 75 0 LowCH18675-1857.5



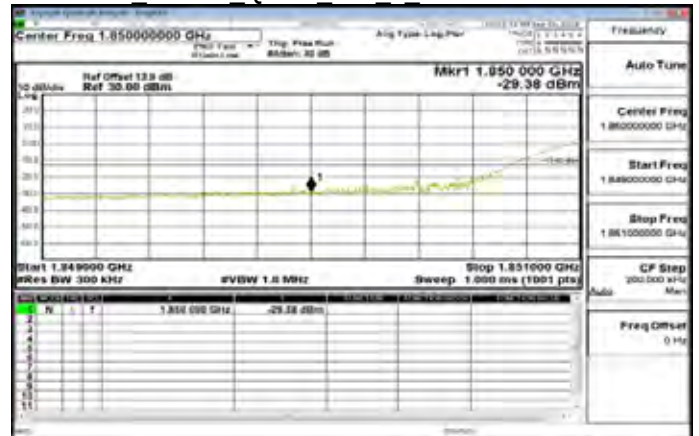
Band2 20MHz QPSK 1 99 HighCH19100-1900



Band2 15MHz QPSK 75 0 HighCH19125-1902.5



Band2 20MHz QPSK 100 0 LowCH18700-1860



Band2 20MHz QPSK 1 0 LowCH18700-1860



Band2 20MHz QPSK 100 0 HighCH19100-1900



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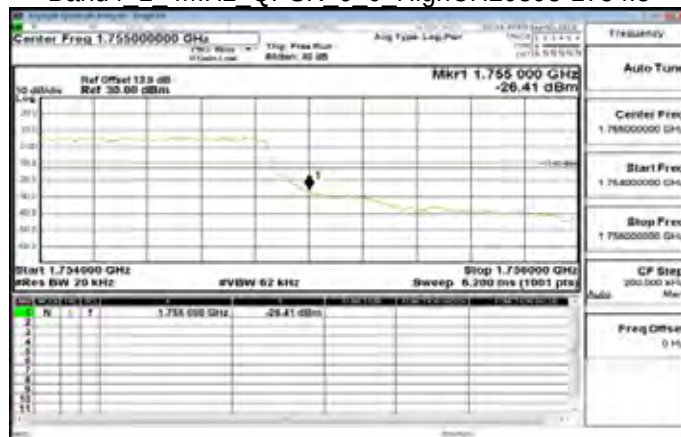
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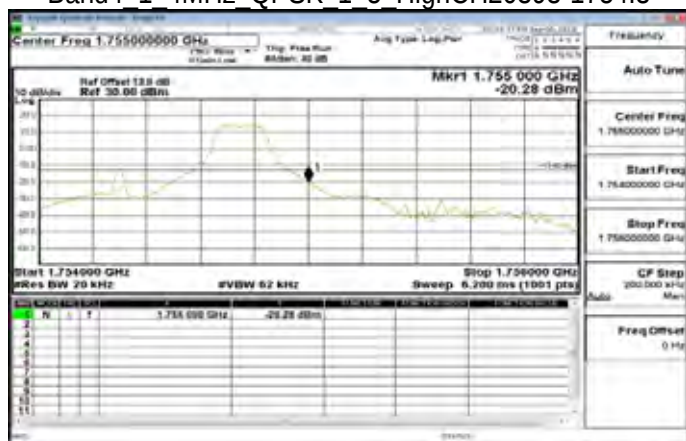
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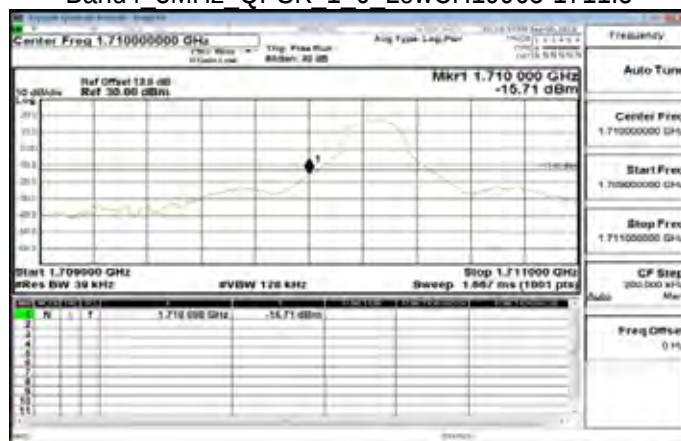
Band4 1 4MHz QPSK 6 0 HighCH20393-1754.3



Band4 1 4MHz QPSK 1 5 HighCH20393-1754.3



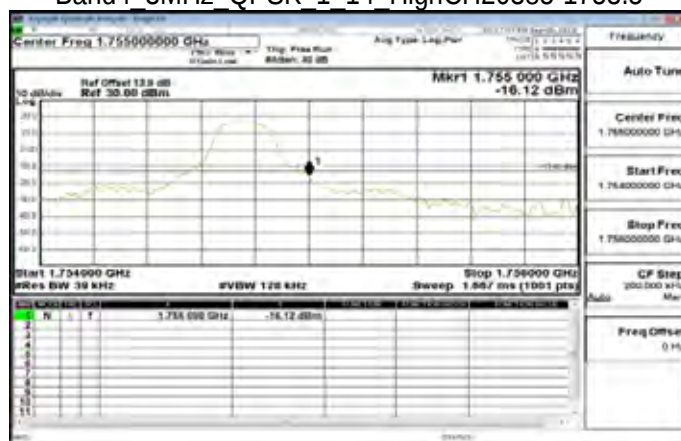
Band4 3MHz QPSK 1 0 LowCH19965-1711.5



Band4 1 4MHz QPSK 6 0 LowCH19957-1710.7



Band4 3MHz QPSK 1 14 HighCH20385-1753.5



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Band4 3MHz QPSK 15 0 LowCH19965-1711.5



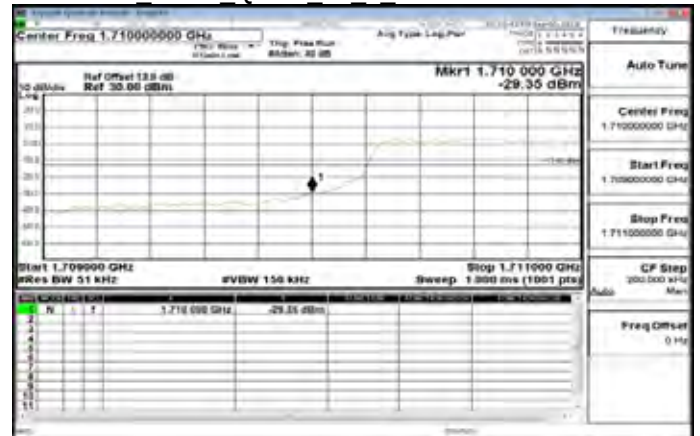
Band4 5MHz QPSK 1 24 HighCH20375-1752.5



Band4 3MHz QPSK 15 0 HighCH20385-1753.5



Band4 5MHz QPSK 25 0 LowCH19975-1712.5



Band4 5MHz QPSK 1 0 LowCH19975-1712.5



Band4 5MHz QPSK 25 0 HighCH20375-1752.5



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Band4 10MHz QPSK 1 0 LowCH20000-1715



Band4 10MHz QPSK 50 0 HighCH20350-1750



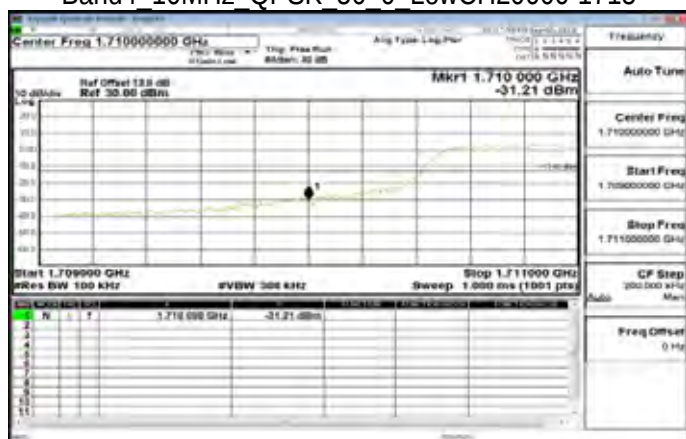
Band4 10MHz QPSK 1 49 HighCH20350-1750



Band4 15MHz QPSK 1 0 LowCH20025-1717.5



Band4 10MHz QPSK 50 0 LowCH20000-1715



Band4 15MHz QPSK 1 74 HighCH20325-1747.5



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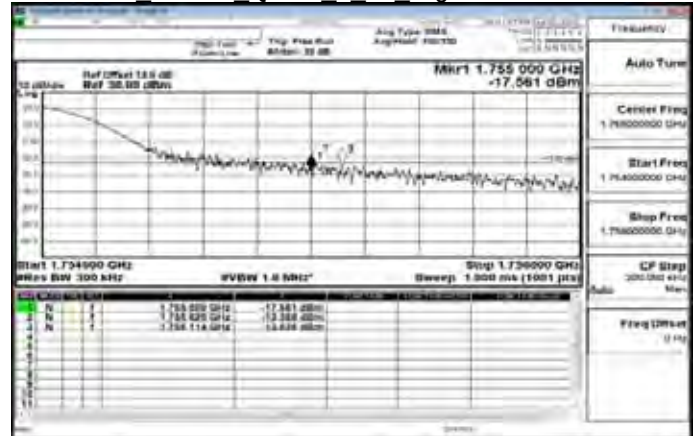
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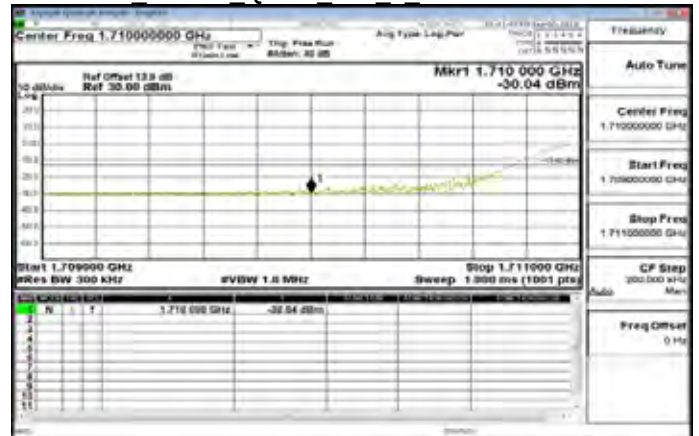
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Band4 15MHz QPSK 75 0 HighCH20325-1747.5



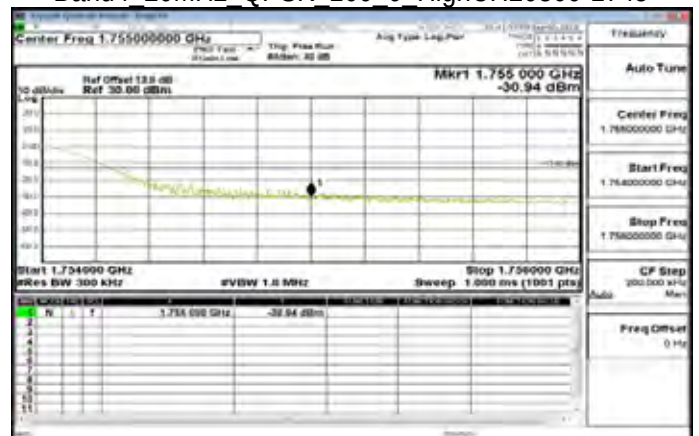
Band4 20MHz QPSK 100 0 LowCH20050-1720



Band4 20MHz QPSK 1 0 LowCH20050-1720



Band4 20MHz QPSK 100 0 HighCH20300-1745



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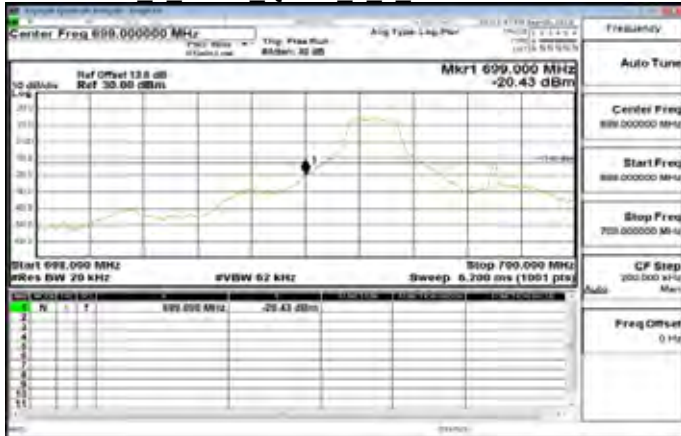
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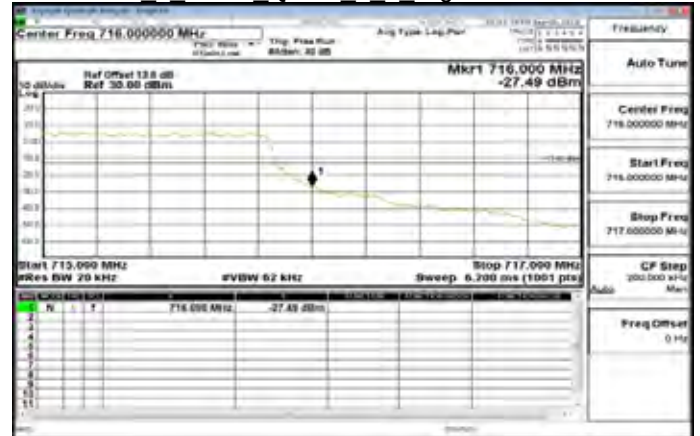
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Band12 1 4MHz QPSK 1 0 LowCH23017-699.7



Band12 1 4MHz QPSK 6 0 HighCH23173-715.3



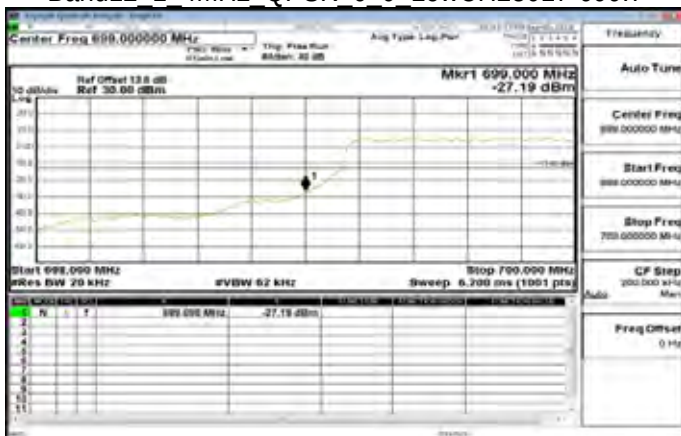
Band12 1 4MHz QPSK 1 5 HighCH23173-715.3



Band12 3MHz QPSK 1 0 LowCH23025-700.5



Band12 1 4MHz QPSK 6 0 LowCH23017-699.7



Band12 3MHz QPSK 1 14 HighCH23165-714.5



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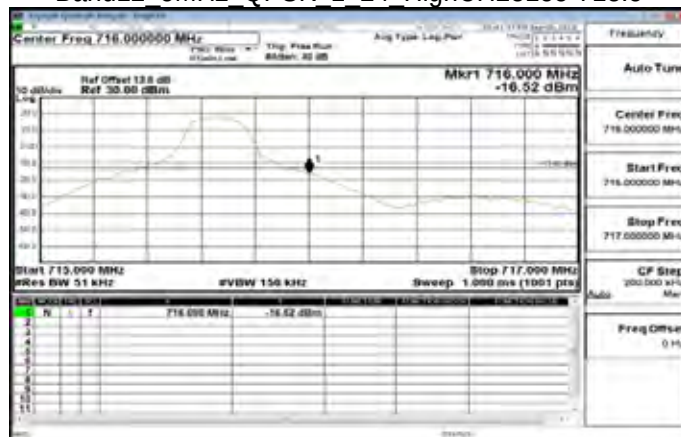
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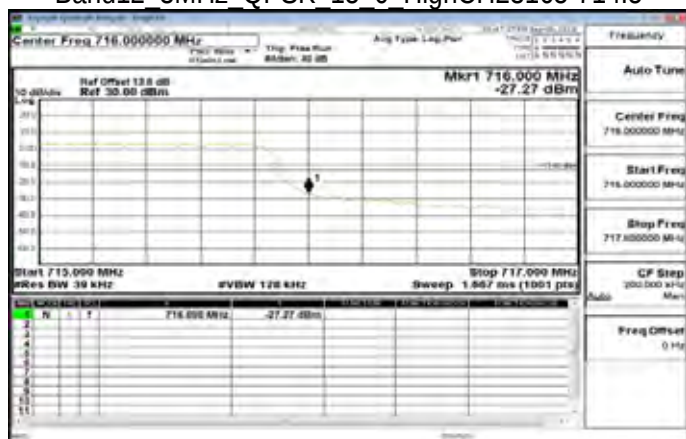
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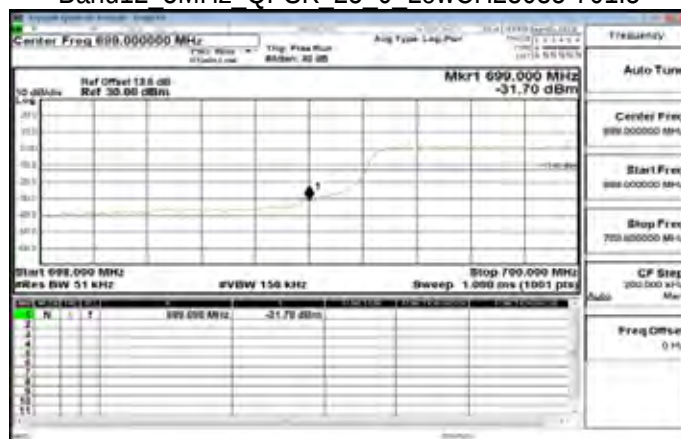
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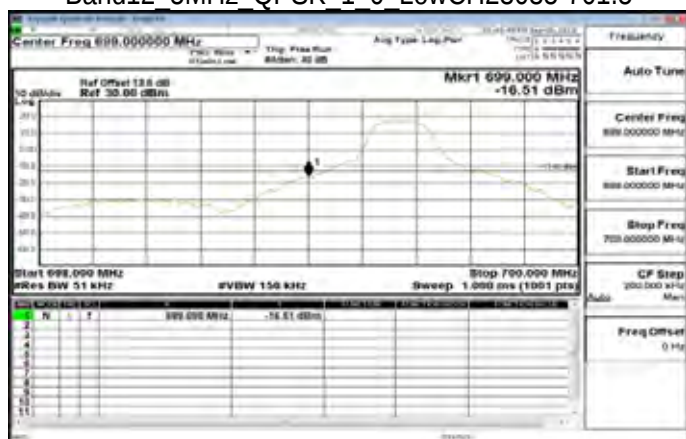
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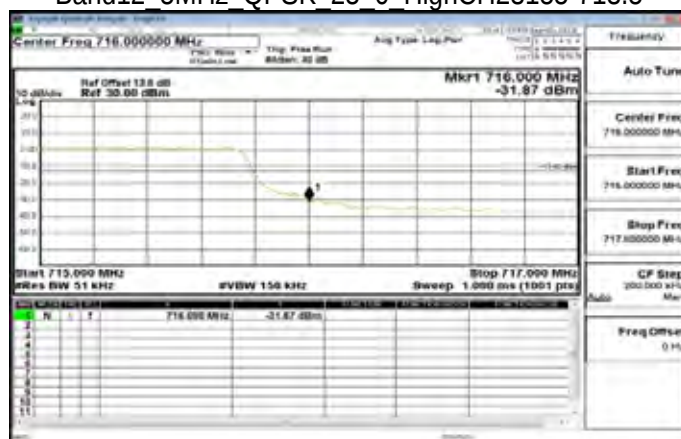
Band12 5MHz QPSK 25 0 LowCH23035-701.5



Band12 5MHz QPSK 1 0 LowCH23035-701.5



Band12 5MHz QPSK 25 0 HighCH23155-713.5



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Band12 10MHz QPSK 1 0 LowCH23060-704



Band12 10MHz QPSK 50 0 HighCH23130-711



Band12 10MHz QPSK 1 49 HighCH23130-711



Band12 10MHz QPSK 50 0 LowCH23060-704



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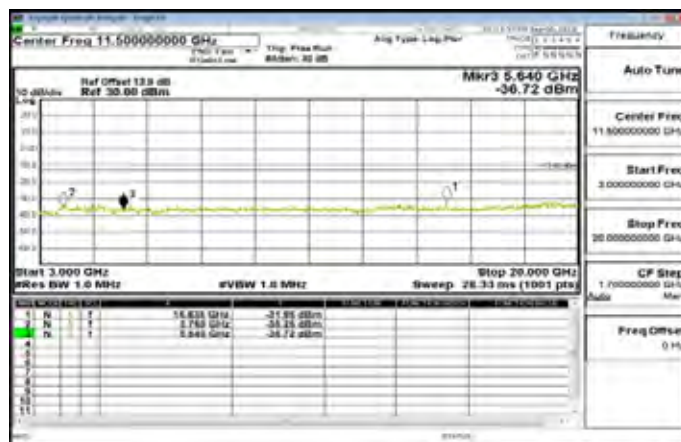
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Out of Band Emission

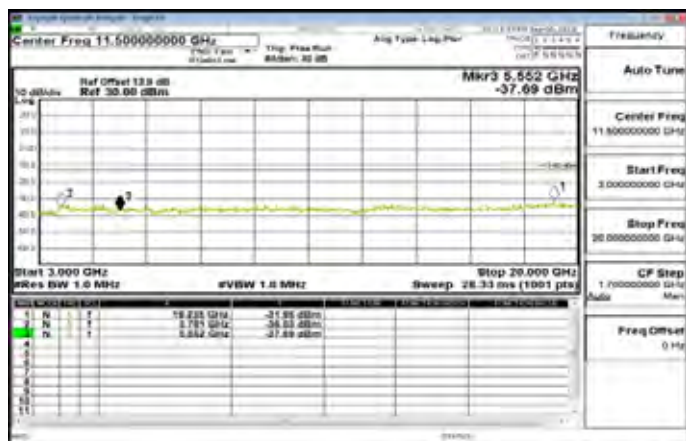
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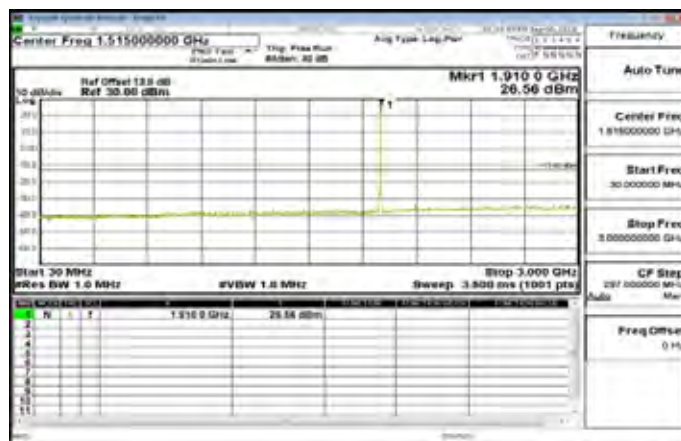
3GHz~20GHz_Band2_1_4MHz_QPSK_1_0_MidCH18900-1880



3GHz~20GHz_Band2_1_4MHz_QPSK_1_0_LowCH18607-1850.7



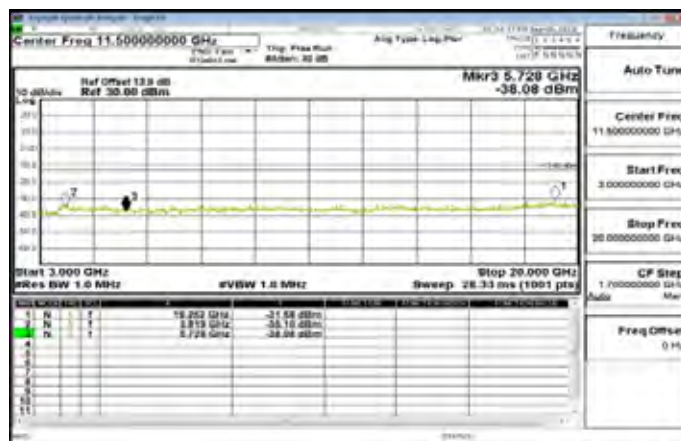
30MHz~3GHz_Band2_1_4MHz_QPSK_1_0_HighCH19193-1909.3



30MHz~3GHz_Band2_1_4MHz_QPSK_1_0_MidCH18900-1880



3GHz~20GHz_Band2_1_4MHz_QPSK_1_0_HighCH19193-1909.3



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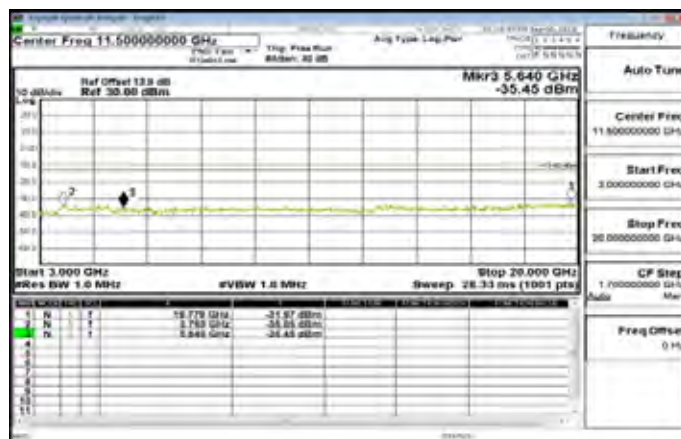
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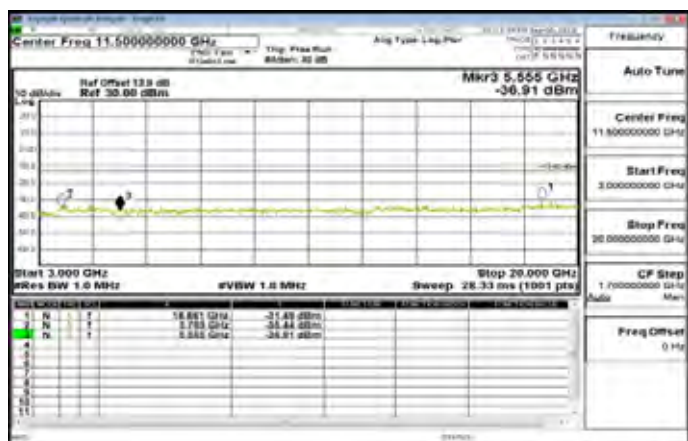
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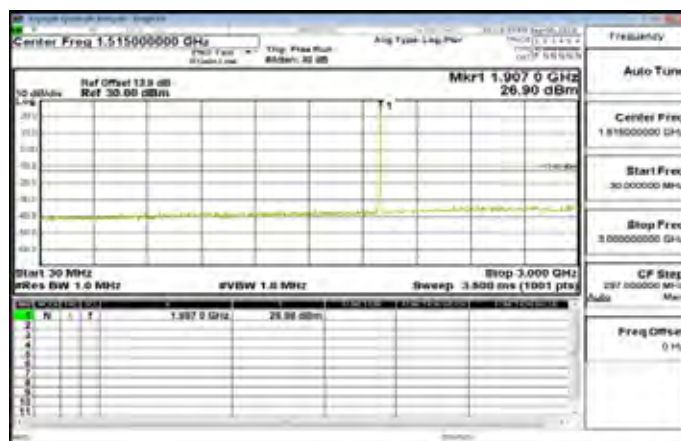
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3GHz~20GHz_Band2_3MHz_QPSK_1_0_LowCH18615-1851.5



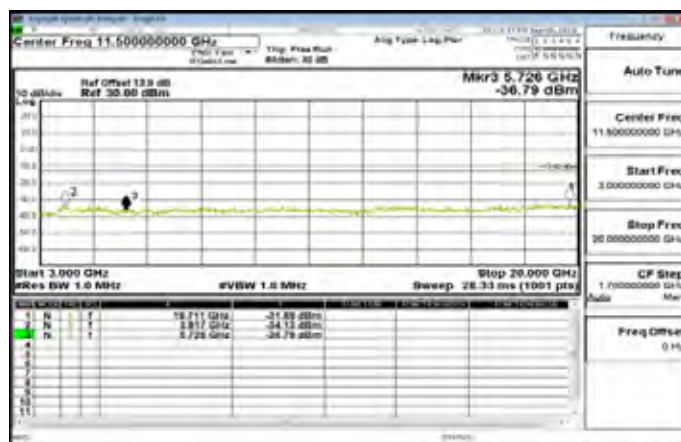
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30MHz~3GHz_Band2_3MHz_QPSK_1_0_MidCH18900-1880



3GHz~20GHz_Band2_3MHz_QPSK_1_0_HighCH19185-1908.5



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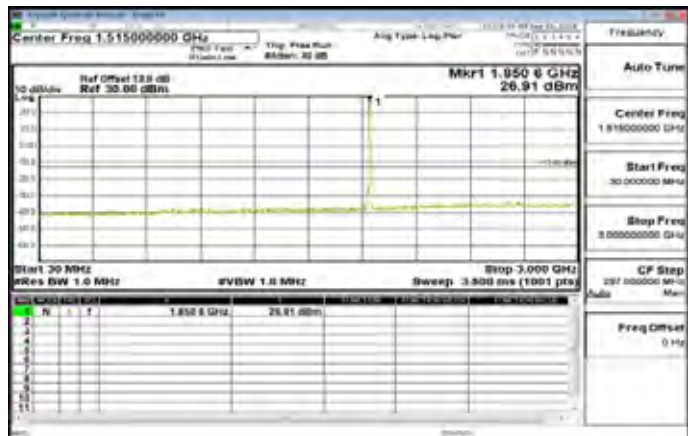
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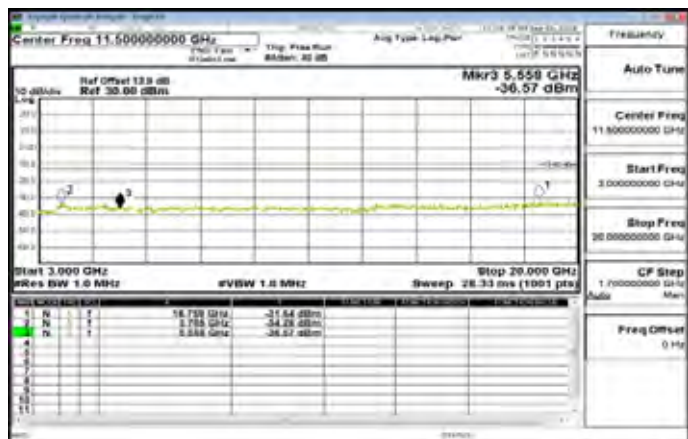
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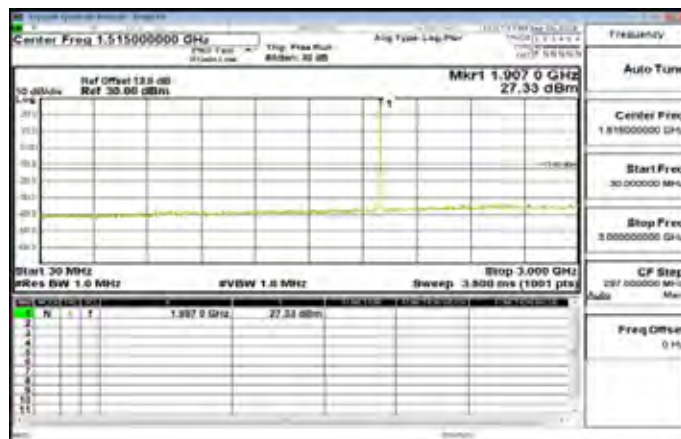
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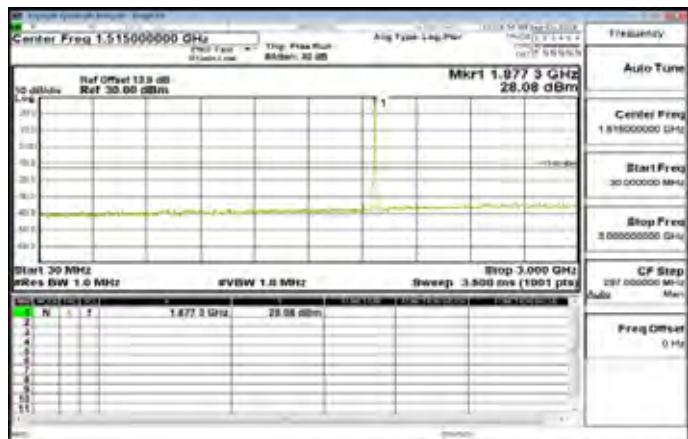
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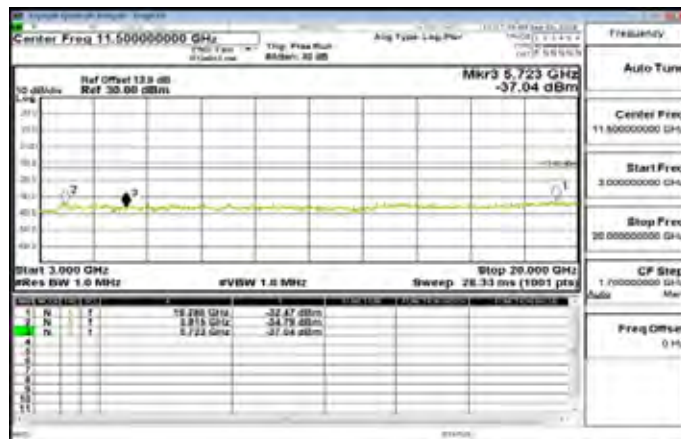
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30MHz~3GHz_Band2_5MHz_QPSK_1_0_MidCH18900-1880



3GHz~20GHz_Band2_5MHz_QPSK_1_0_HighCH19175-1907.5



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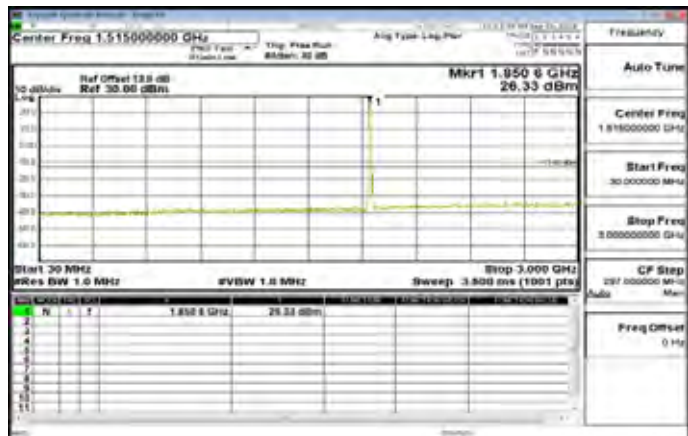
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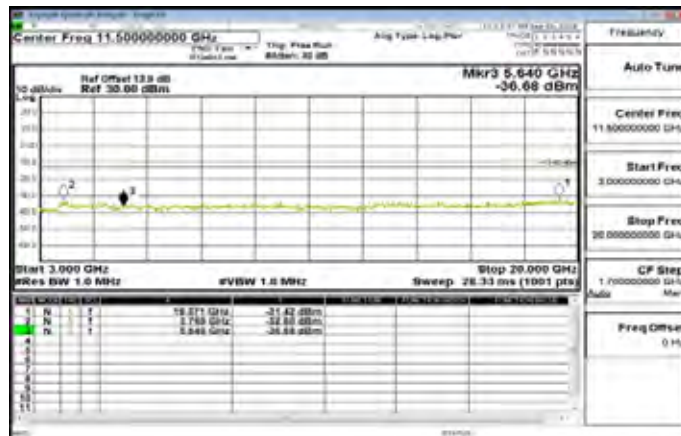
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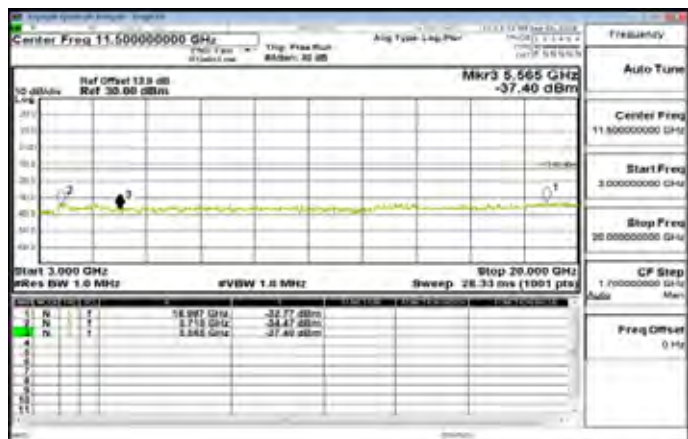
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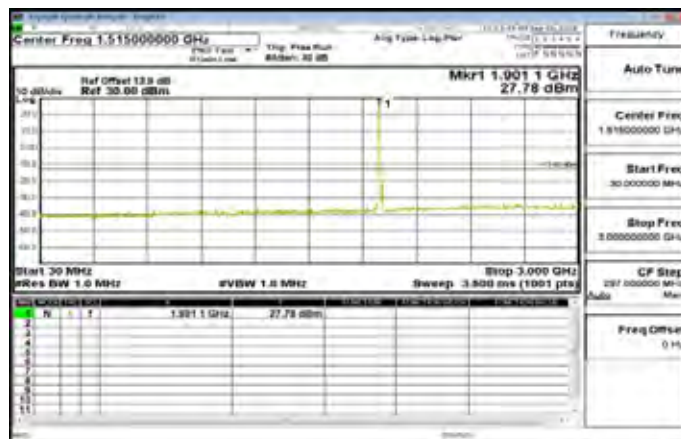
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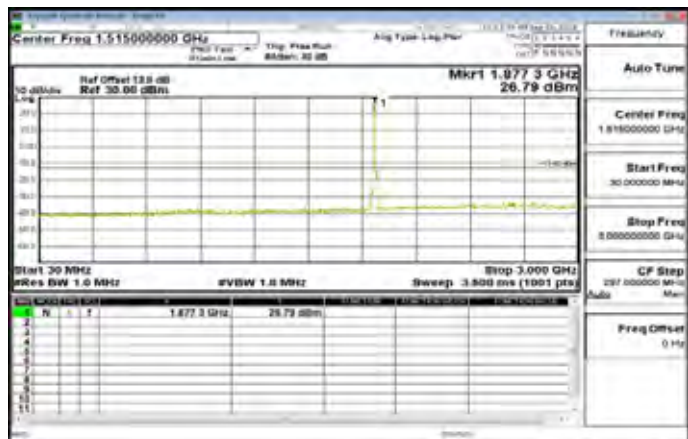
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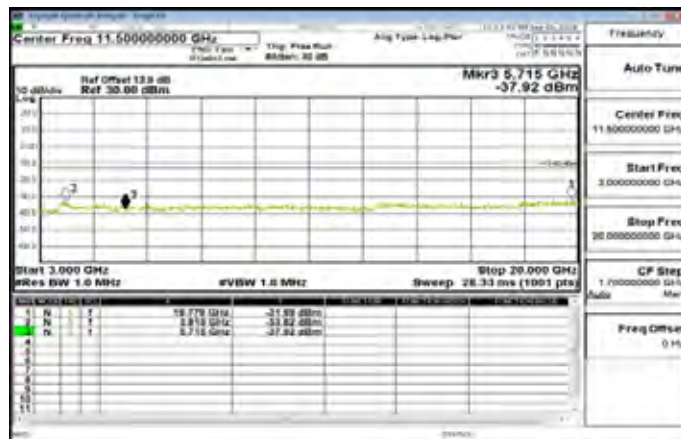
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3GHz~20GHz_Band2_10MHz_QPSK_1_0_HighCH19150-1905



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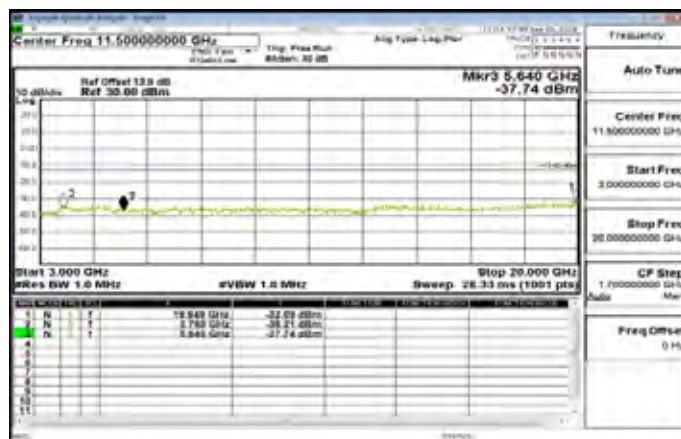
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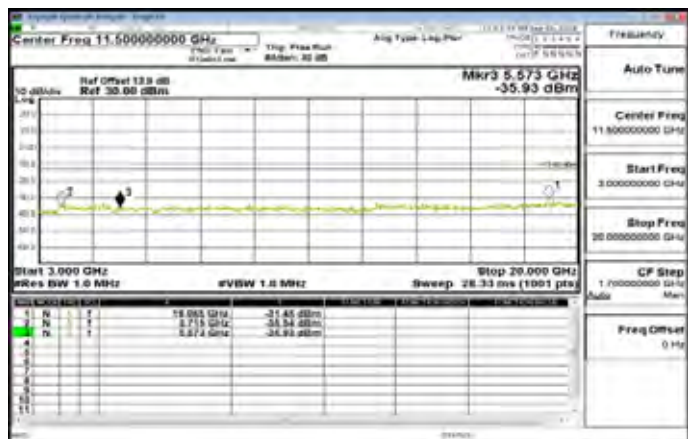
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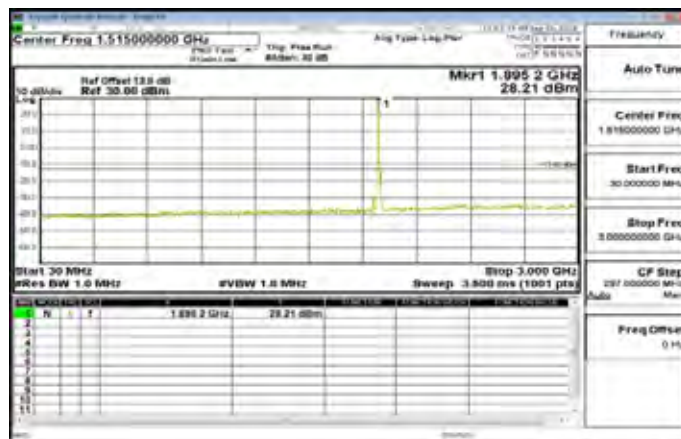
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30MHz~3GHz_Band2_15MHz_QPSK_1_0_HighCH19125-1902.5



30MHz~3GHz_Band2_15MHz_QPSK_1_0_MidCH18900-1880



3GHz~20GHz_Band2_15MHz_QPSK_1_0_HighCH19125-1902.5



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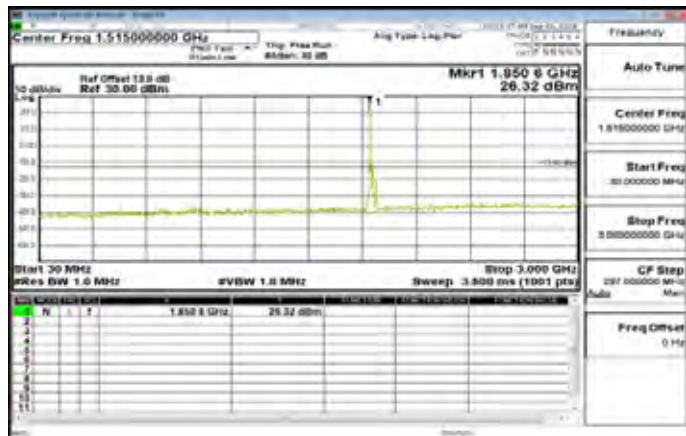
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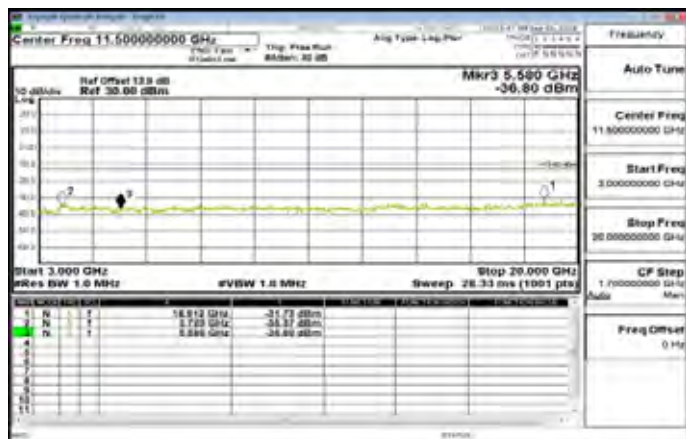
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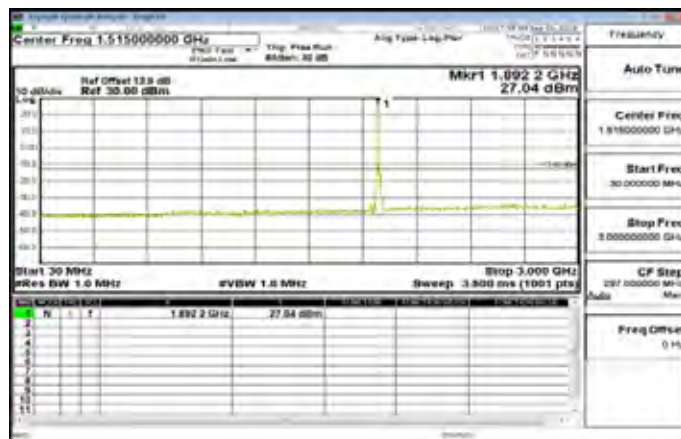
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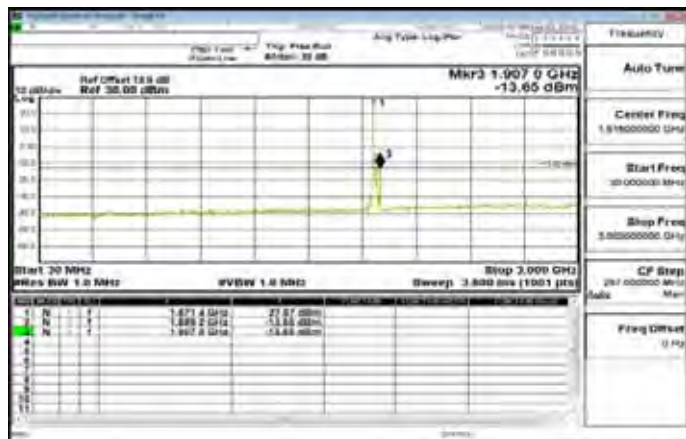
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30MHz~3GHz_Band2_20MHz_QPSK_1_0_HighCH19100-1900



30MHz~3GHz_Band2_20MHz_QPSK_1_0_MidCH18900-1880



3GHz~20GHz_Band2_20MHz_QPSK_1_0_HighCH19100-1900



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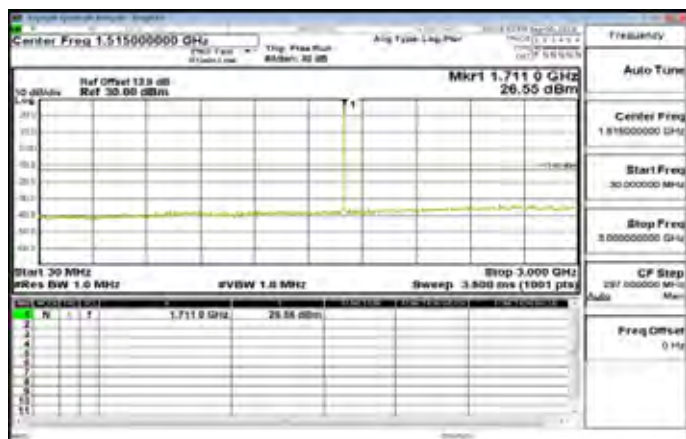
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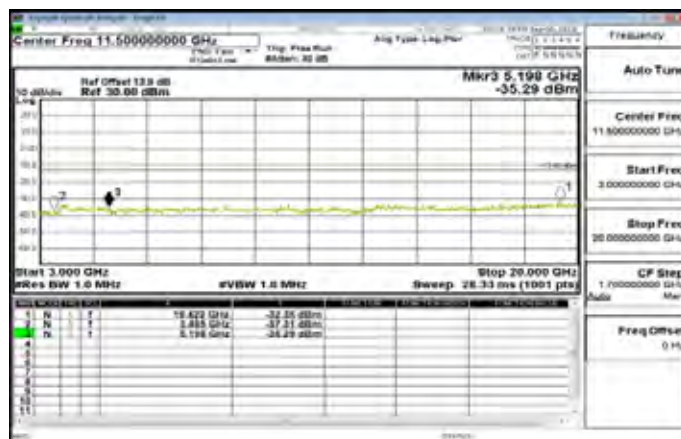
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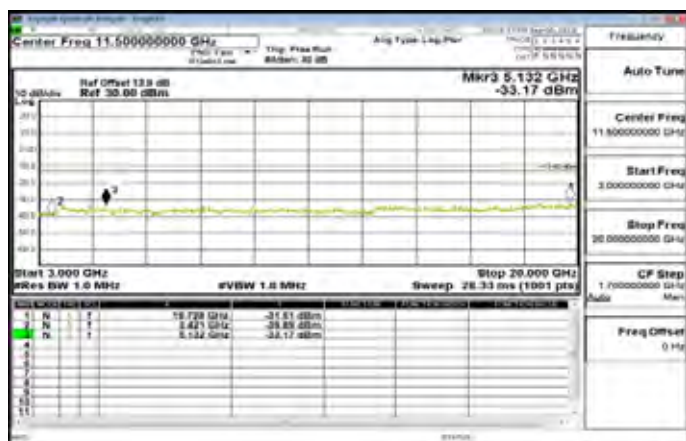
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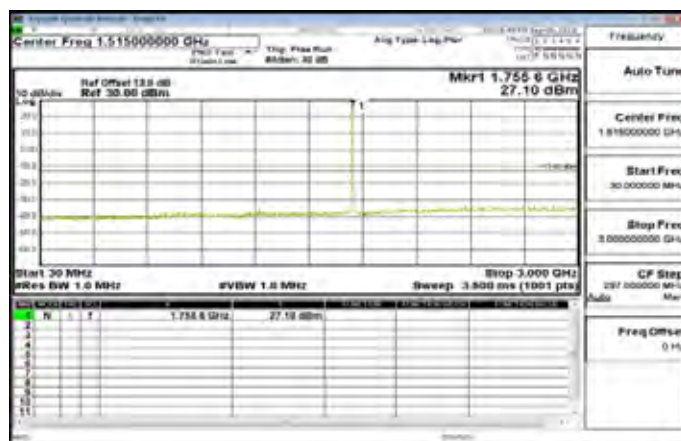
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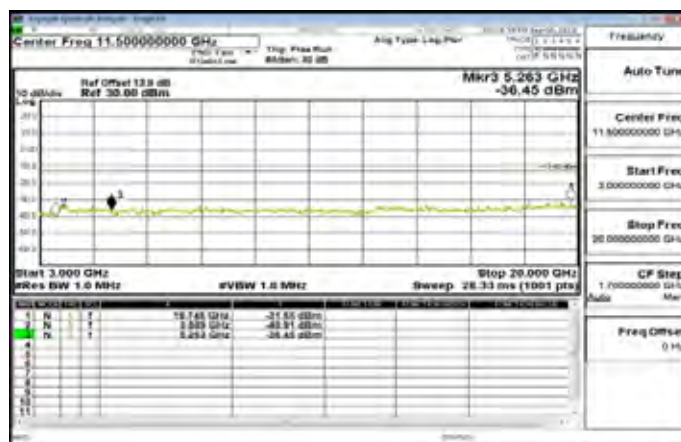
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3GHz-20GHz_Band4_1_4MHz_QPSK_1_0_HighCH20393-1754.3



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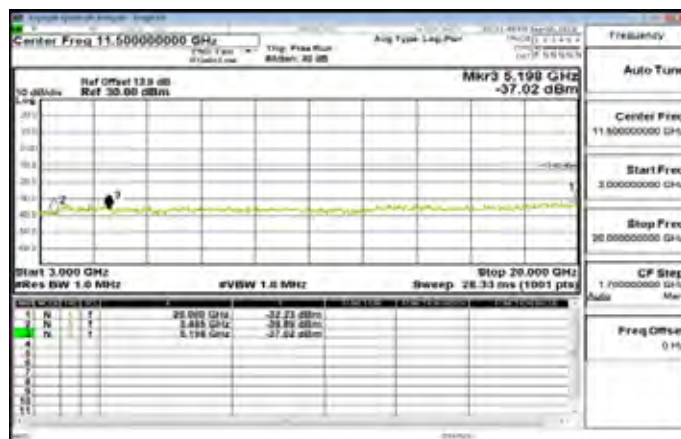
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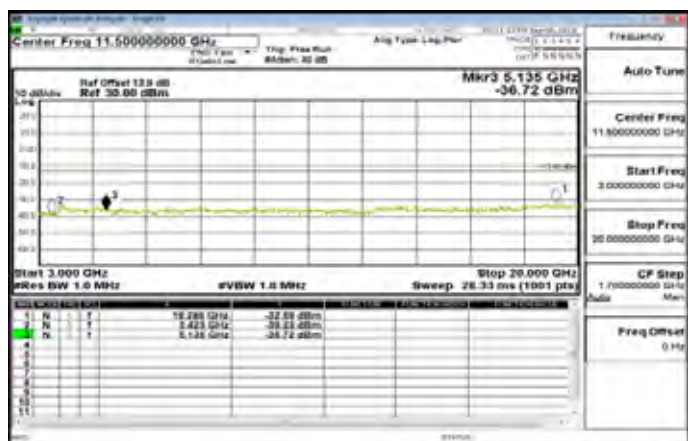
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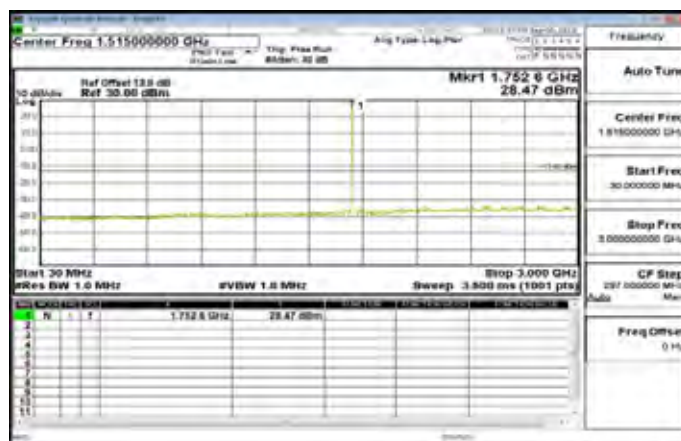
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3GHz-20GHz_Band4_3MHz_QPSK_1_0_LowCH19965-1711.5



30MHz-3GHz_Band4_3MHz_QPSK_1_0_HighCH20385-1753.5



30MHz-3GHz_Band4_3MHz_QPSK_1_0_MidCH20175-1732.5



3GHz-20GHz_Band4_3MHz_QPSK_1_0_HighCH20385-1753.5



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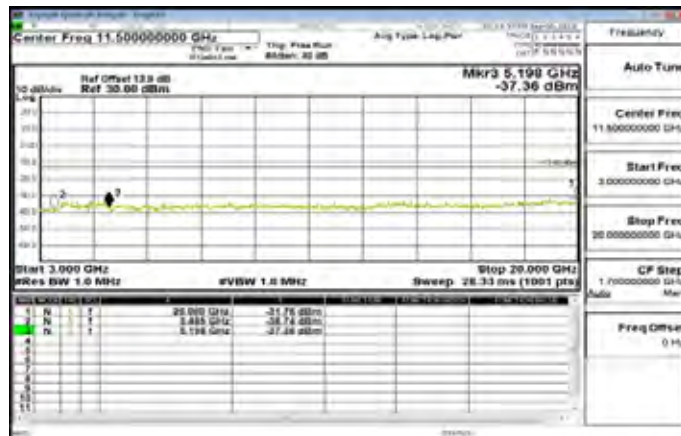
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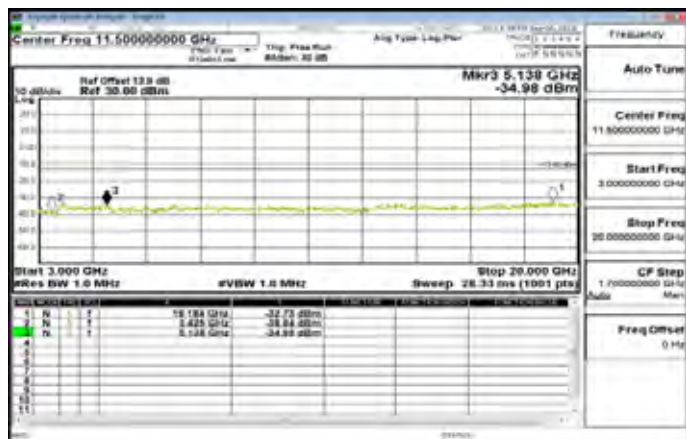
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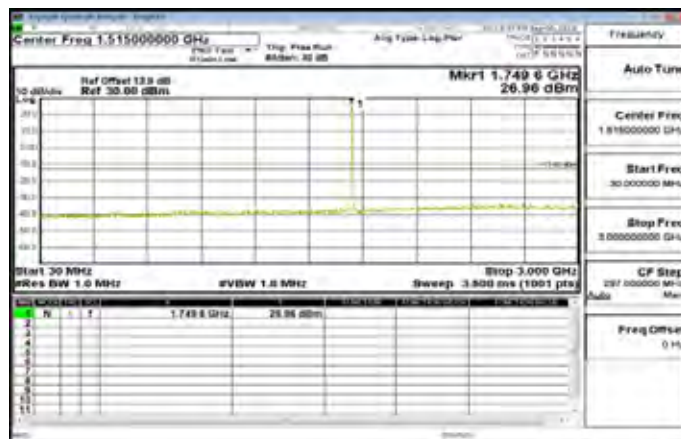
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3GHz-20GHz_Band4_5MHz_QPSK_1_0_LowCH19975-1712.5



30MHz-3GHz_Band4_5MHz_QPSK_1_0_HighCH20375-1752.5



30MHz-3GHz_Band4_5MHz_QPSK_1_0_MidCH20175-1732.5



3GHz-20GHz_Band4_5MHz_QPSK_1_0_HighCH20375-1752.5



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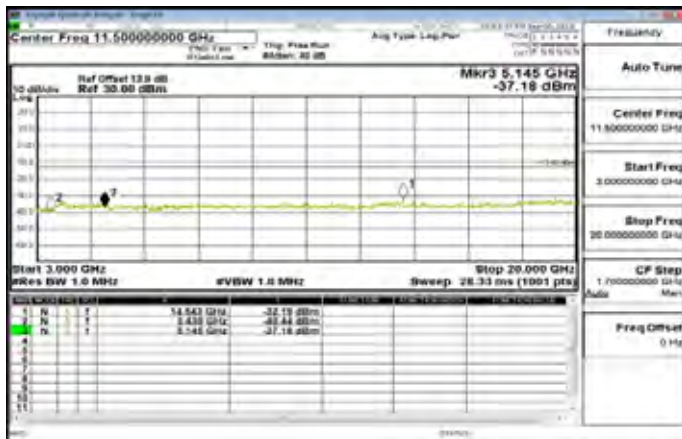
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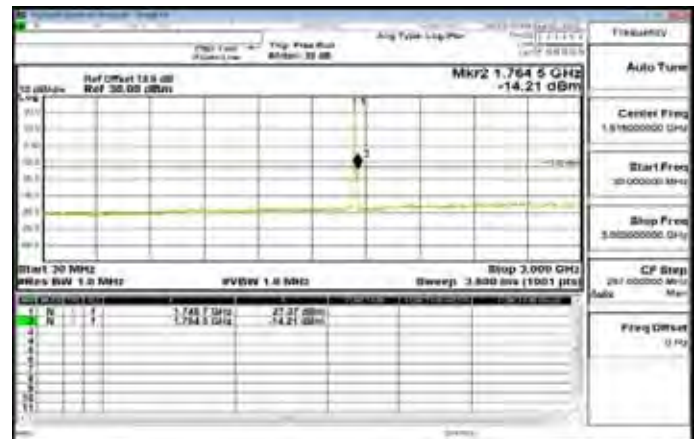
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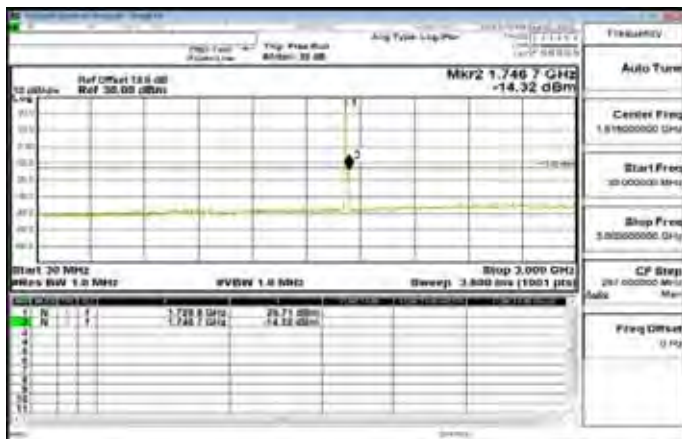
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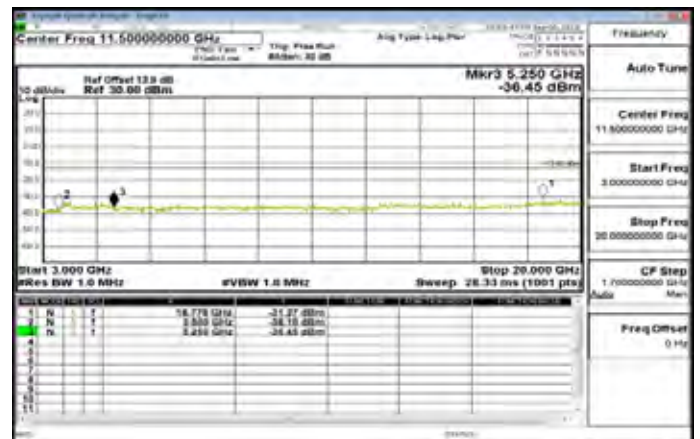
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30MHz~3GHz_Band4_10MHz_QPSK_1_0_MidCH20175-1732.5



3GHz~20GHz_Band4_10MHz_QPSK_1_0_HighCH20350-1750



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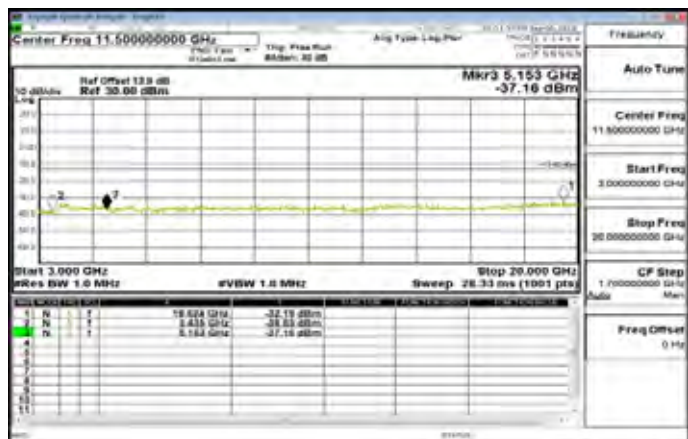
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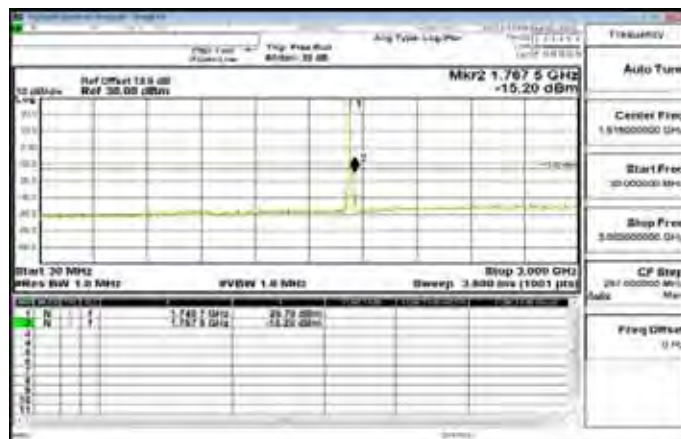
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3GHz~20GHz_Band4_15MHz_QPSK_1_0_LowCH20025-1717.5



30MHz~3GHz_Band4_15MHz_QPSK_1_0_HighCH20325-1747.5



30MHz~3GHz_Band4_15MHz_QPSK_1_0_MidCH20175-1732.5



3GHz~20GHz_Band4_15MHz_QPSK_1_0_HighCH20325-1747.5



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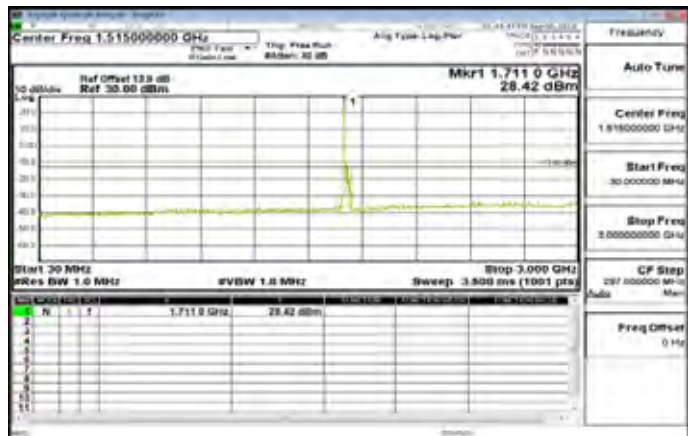
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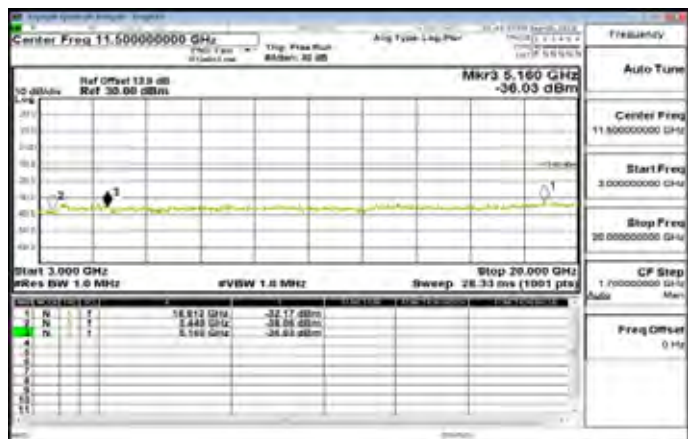
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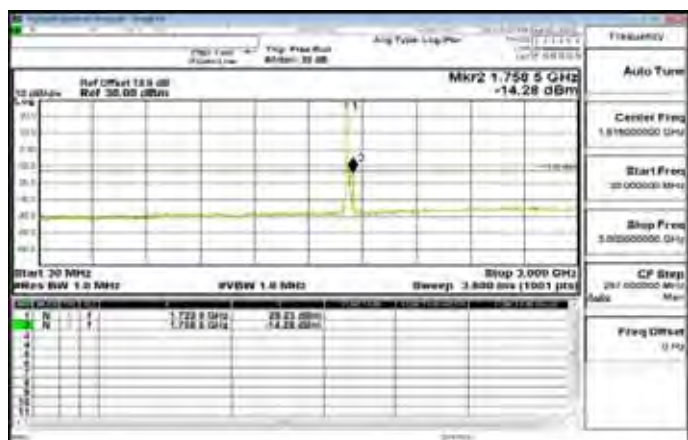
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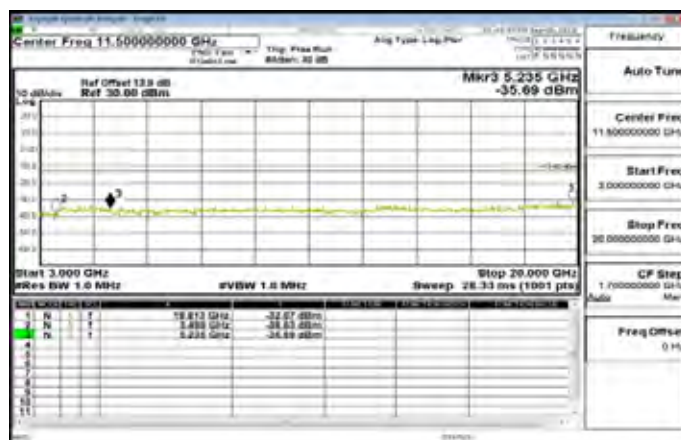
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30MHz~3GHz_Band4_20MHz_QPSK_1_0_MidCH20175-1732.5



3GHz~20GHz_Band4_20MHz_QPSK_1_0_HighCH20300-1745



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30MHz~3GHz_Band12_1_4MHz_QPSK_1_0_LowCH23017-699.7



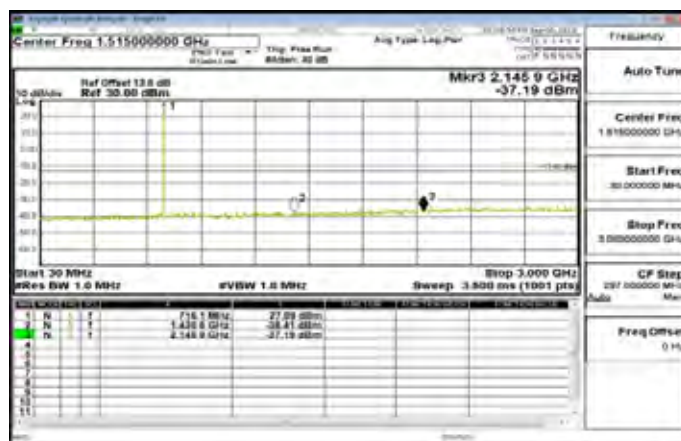
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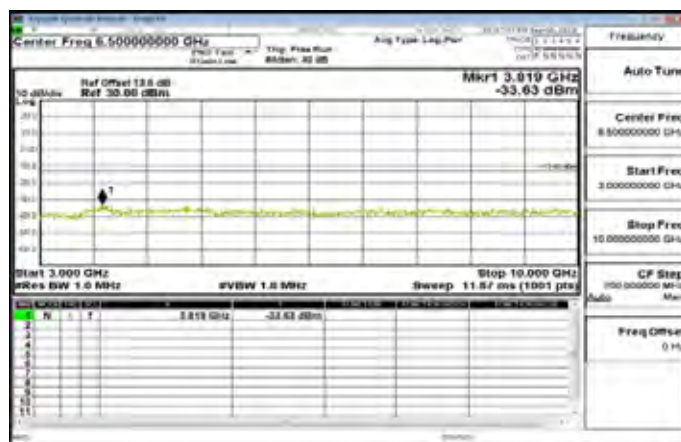
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3GHz~20GHz_Band12_1_4MHz_QPSK_1_0_HighCH23173-715.3



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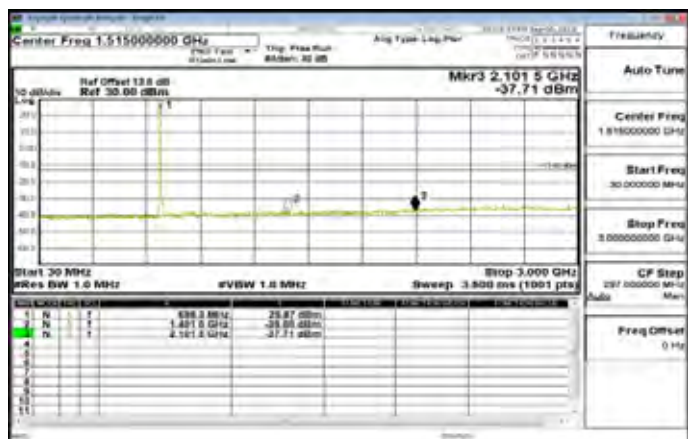
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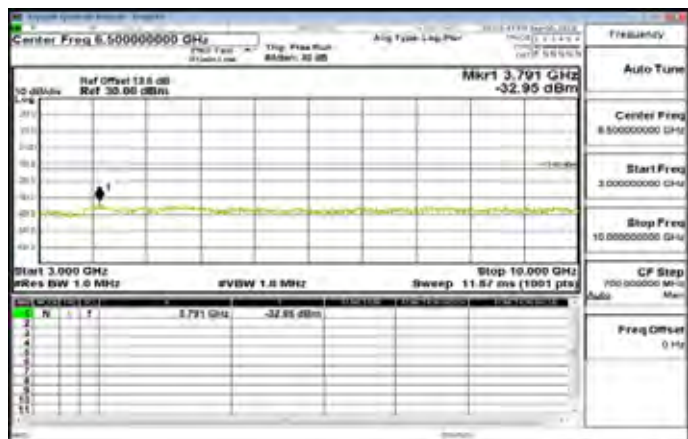
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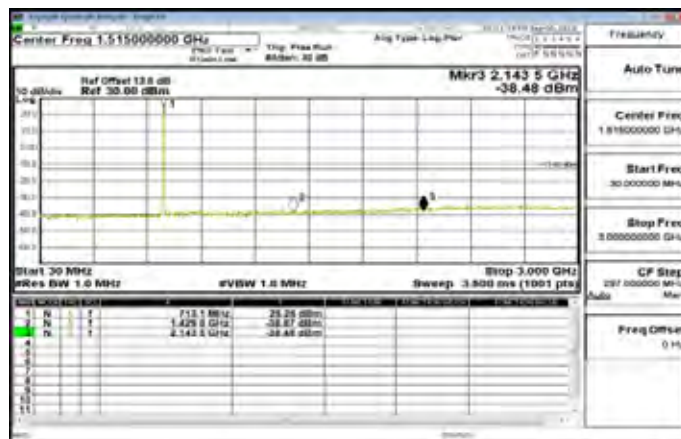
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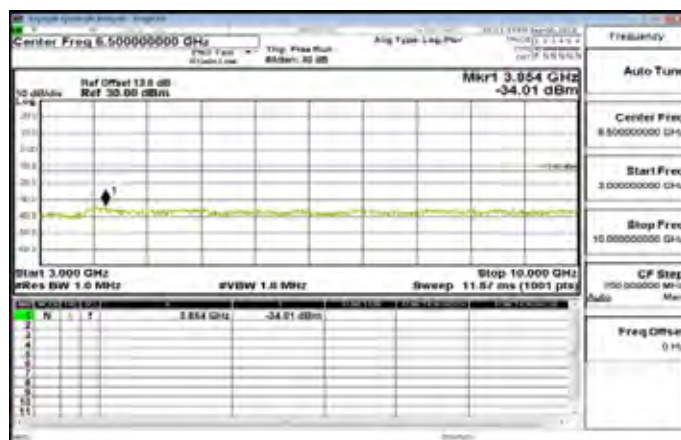
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3GHz-20GHz_Band12_3MHz_QPSK_1_0_HighCH23165-714.5



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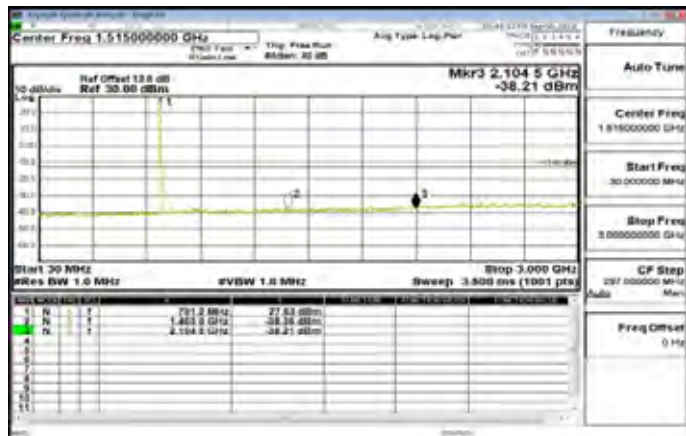
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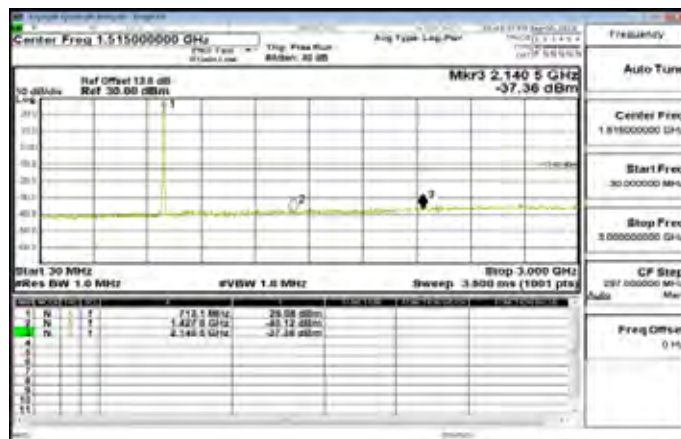
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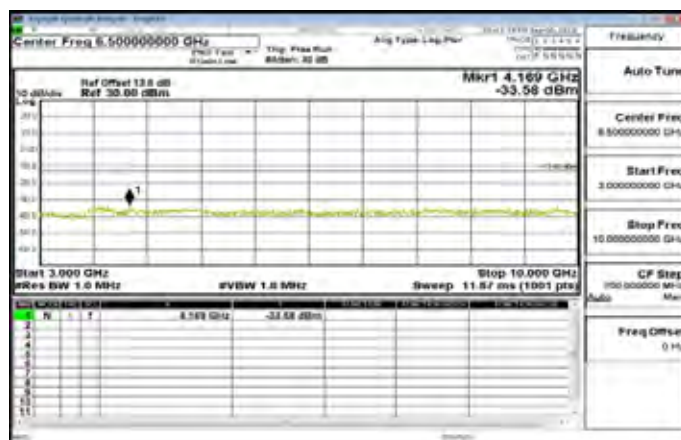
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3GHz-20GHz_Band12_5MHz_QPSK_1_0_HighCH23155-713.5



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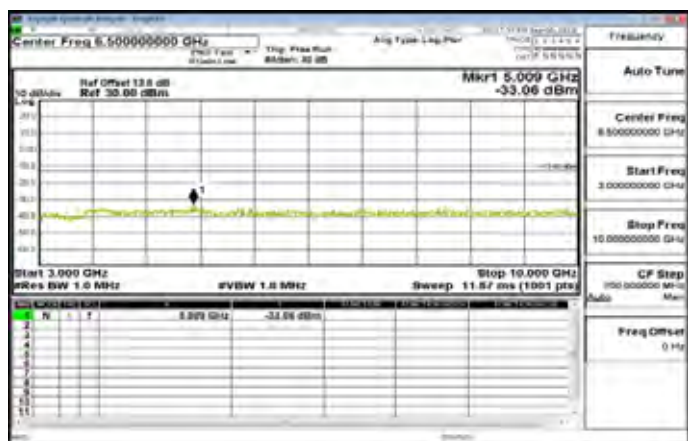
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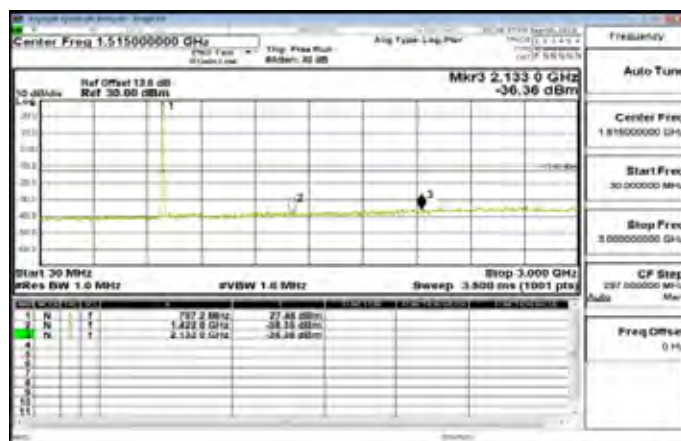
3GHz~20GHz_Band12_10MHz_QPSK_1_0_MidCH23095-707.5



3GHz~20GHz_Band12_10MHz_QPSK_1_0_LowCH23060-704



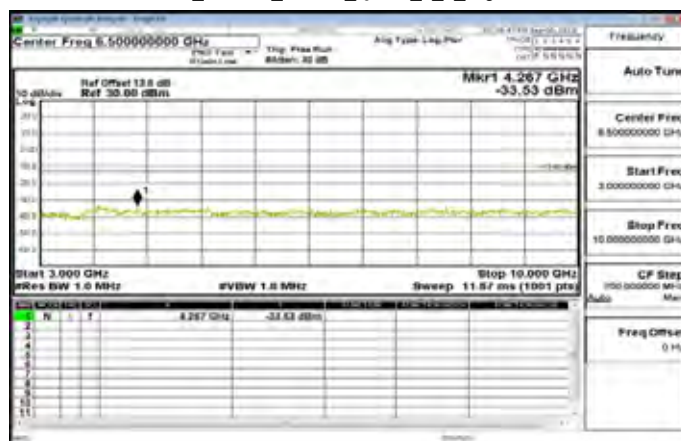
30MHz~3GHz_Band12_10MHz_QPSK_1_0_HighCH23130-711



30MHz~3GHz_Band12_10MHz_QPSK_1_0_MidCH23095-707.5



3GHz~20GHz_Band12_10MHz_QPSK_1_0_HighCH23130-711



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9. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

9.1. Standard Applicable

According to FCC §2.1053,

FCC§24.238(a) , §27.53 (h) , the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than $43 + 10 \log$ (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm).

§27.53 (c)

(2) On any frequency outside the 776– 788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB (-13dBm)

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

§27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC §27.53(c) (5) & FCC §27.53(g)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC §27.53(h) (3)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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FCC §27.53(m) (4) (6)

For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

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According to RSS-130 §4.6

The power of any unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.

In addition to the limit outlined in Section 4.6.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

(a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power,

P (dBW), by at least:

- (i) $76 + 10 \log_{10} p$ (watts), dB, for base and fixed equipment, and
- (ii) $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment.

According to RSS-133 §6.5.1

Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

According to RSS-139 §6.5

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB.

(ii) After the first 1.0 MHz outside the equipment's operating frequency block, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB.

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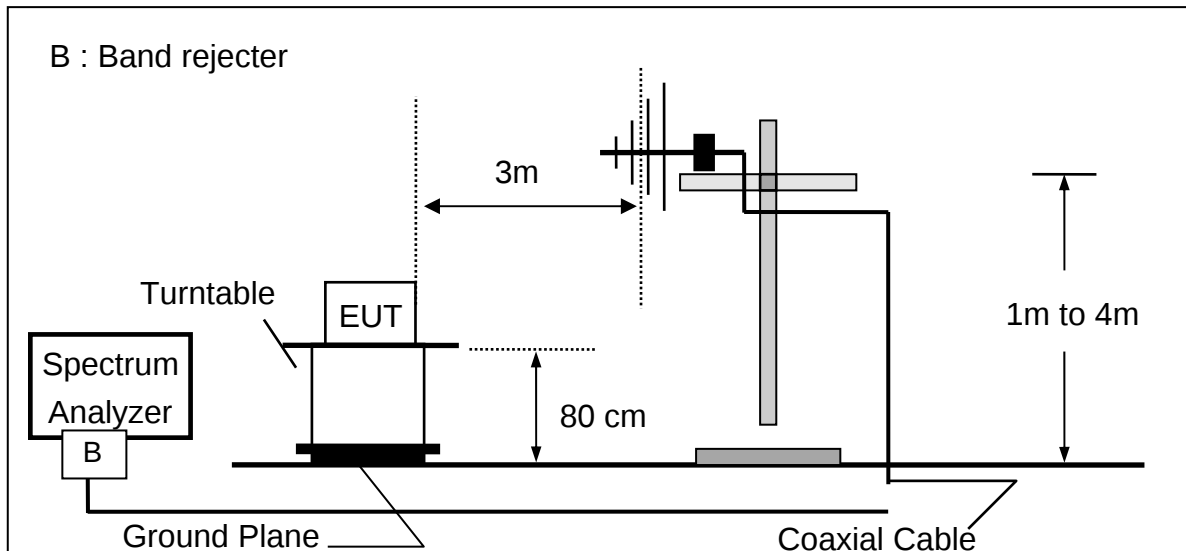
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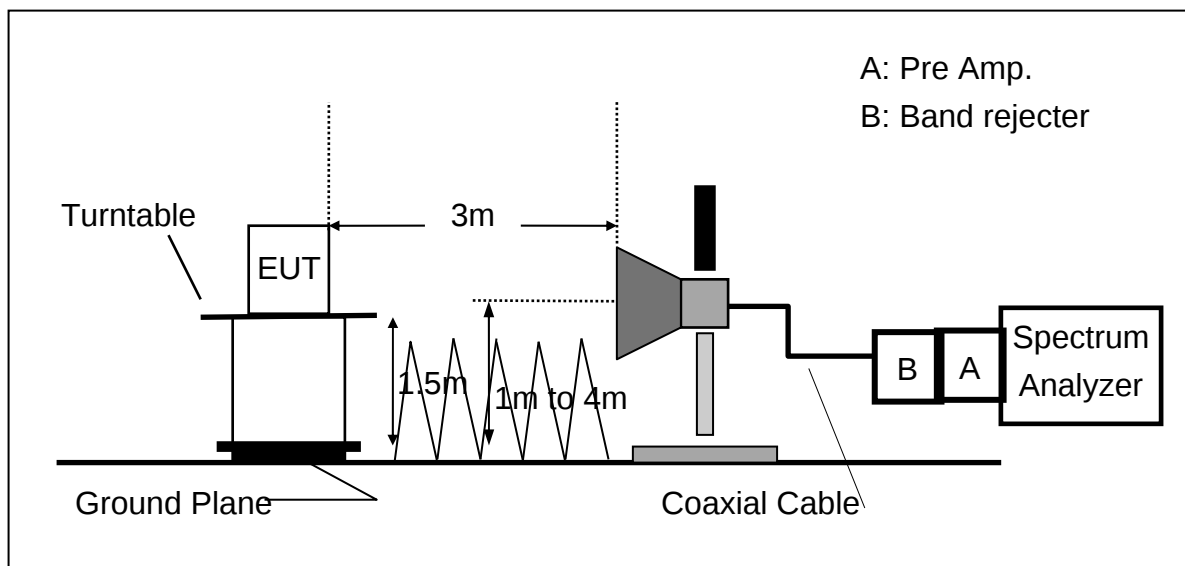
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9.2. EUT Setup

Radiated Emission Test Set-Up, Frequency Below 1000MHz



Radiated Emission Test Set-UP Frequency Over 1 GHz



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9.3. Measurement Procedure:

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$ERP \text{ (dBm)} = SG \text{ Level(dBm)} + \text{Antenna Gain(dBd)} + \text{Cable Loss(dB)}$

$EIRP \text{ (dBm)} = SG \text{ Level(dBm)} + \text{Antenna Gain(dBi)} + \text{Cable Loss(dB)}$

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9.4. Measurement Equipment Used:

ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	TESEQ	CBL 6112D	35243	2017/11/10	2018/11/09
Horn Antenna	Schwarzbeck	BBHA9120D	1341	2018/06/07	2019/06/06
Horn Antenna	SCHWAZBECK	BBHA9170	184	2017/12/12	2018/12/11
EMI Test Receiver	R&S	ESU 40	100363	2018/04/11	2019/04/10
Radio Communication Analyzer	Anritsu	MT8820C	6201107337	2018/06/15	2019/06/14
Pre-Amplifier	EMC Instruments	EMC330	980096	2017/12/26	2018/12/25
Pre-Amplifier	EMC Instruments	EMC0011830	980199	2017/12/26	2018/12/25
Pre-Amplifier	EMC Instruments	EMC184045B	980135	2017/10/27	2018/10/26
Attenuator	Marvelous	MVE2213-30	RF28	2017/12/26	2018/12/25
Notch Filter	Woken	EWT-54-0037	RF54	2017/12/26	2018/12/25
Notch Filter	Woken	EWT-54-0038	RF55	2017/12/26	2018/12/25
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	EMC106-SM-SM-7 200	150703	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	EMC106-SM-SM-9 100	150704	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17413/4	2017/12/26	2018/12/25

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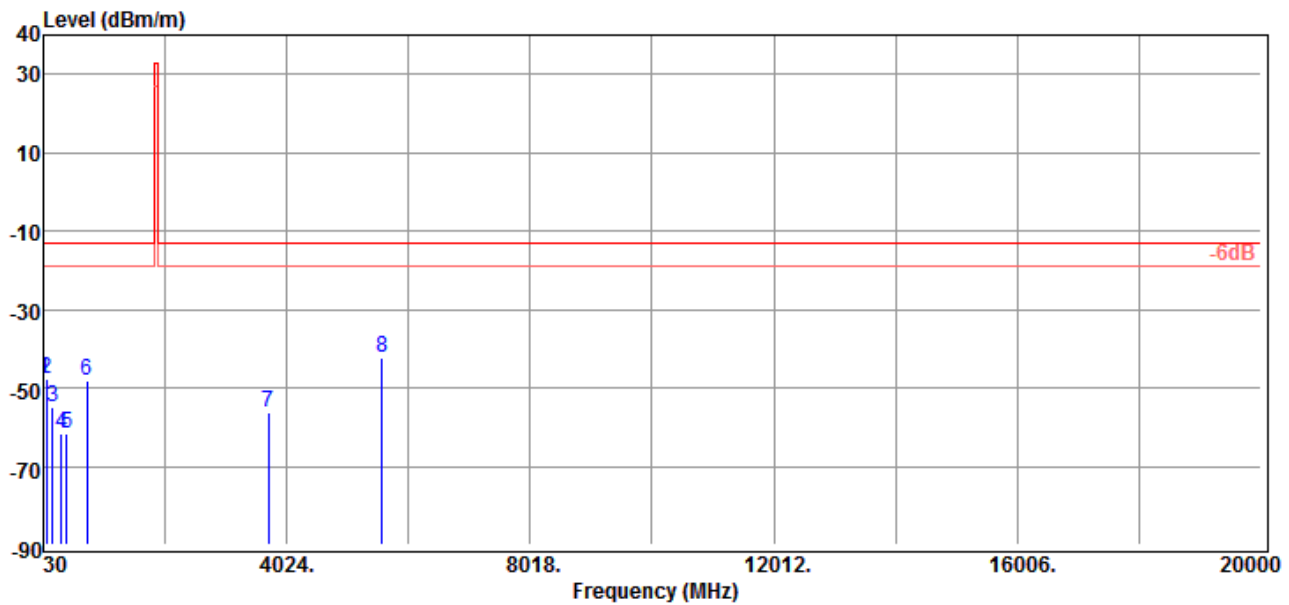
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9.5. Measurement Result:

Radiated Spurious Emission Measurement Result: LTE-Band 2 (The Worst Case)

Operation Mode	:LTEB2 20M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH LOW	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:1860 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
32.91	-47.76	-29.83	-17.44	-0.49	-13.00	-34.76
84.32	-47.91	-47.49	0.37	-0.79	-13.00	-34.91
187.14	-54.94	-58.83	5.07	-1.18	-13.00	-41.94
320.03	-61.63	-65.70	5.82	-1.75	-13.00	-48.63
416.06	-61.54	-65.21	5.72	-2.05	-13.00	-48.54
747.80	-48.18	-53.53	7.41	-2.06	-13.00	-35.18
3720.00	-56.28	-62.00	12.44	-6.72	-13.00	-43.28
5580.00	-42.10	-48.63	13.02	-6.49	-13.00	-29.10

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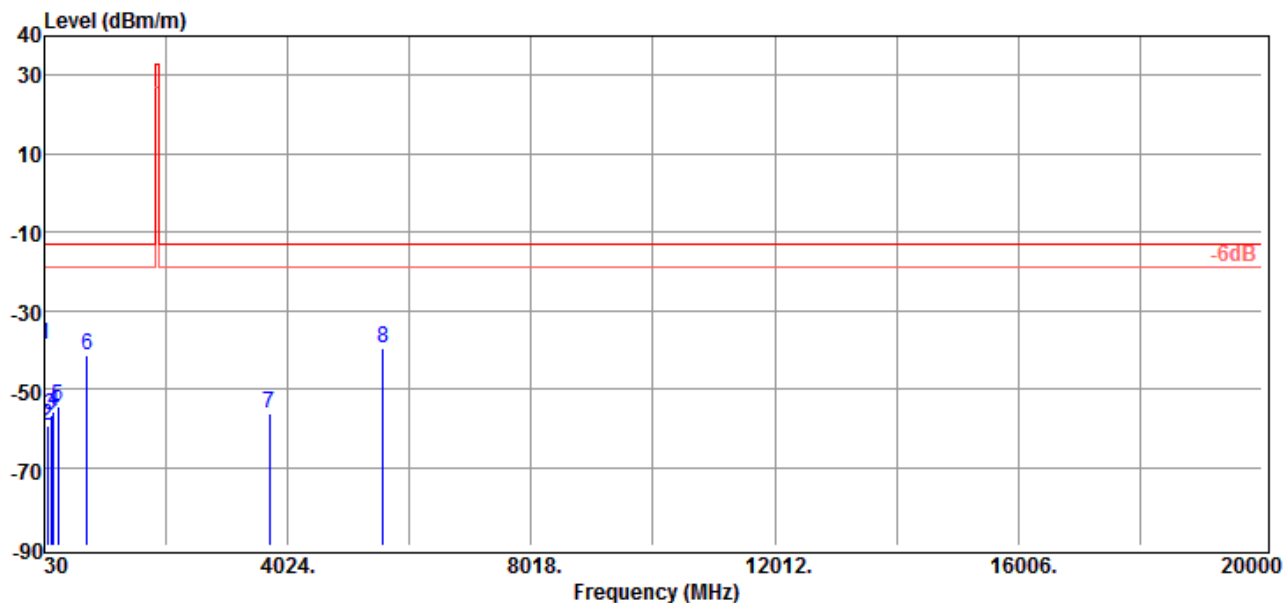
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Operation Mode	:LTEB2 20M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH LOW	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:1860 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
35.82	-38.75	-23.16	-15.06	-0.53	-13.00	-25.75
83.35	-59.48	-59.12	0.43	-0.79	-13.00	-46.48
143.49	-56.92	-58.10	2.16	-0.98	-13.00	-43.92
180.35	-55.87	-59.36	4.64	-1.15	-13.00	-42.87
254.07	-54.67	-58.45	5.23	-1.45	-13.00	-41.67
731.31	-41.45	-46.68	7.37	-2.14	-13.00	-28.45
3720.00	-56.10	-61.82	12.44	-6.72	-13.00	-43.10
5580.00	-39.77	-46.30	13.02	-6.49	-13.00	-26.77

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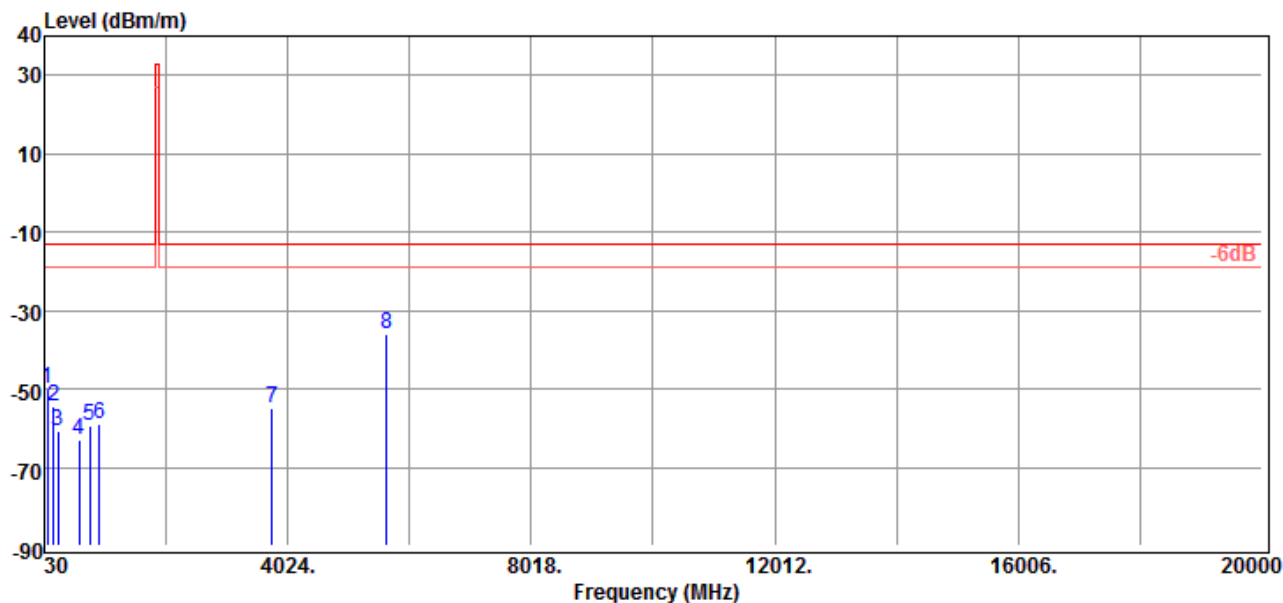
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Operation Mode	:LTEB2 20M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:1880 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
82.38	-50.11	-49.82	0.50	-0.79	-13.00	-37.11
185.20	-54.58	-58.36	4.95	-1.17	-13.00	-41.58
247.28	-60.75	-64.52	5.20	-1.43	-13.00	-47.75
598.42	-63.03	-67.56	6.66	-2.13	-13.00	-50.03
769.14	-59.59	-64.86	7.47	-2.20	-13.00	-46.59
937.92	-58.97	-63.95	7.64	-2.66	-13.00	-45.97
3760.00	-54.99	-60.78	12.46	-6.67	-13.00	-41.99
5640.00	-35.96	-42.39	13.03	-6.60	-13.00	-22.96

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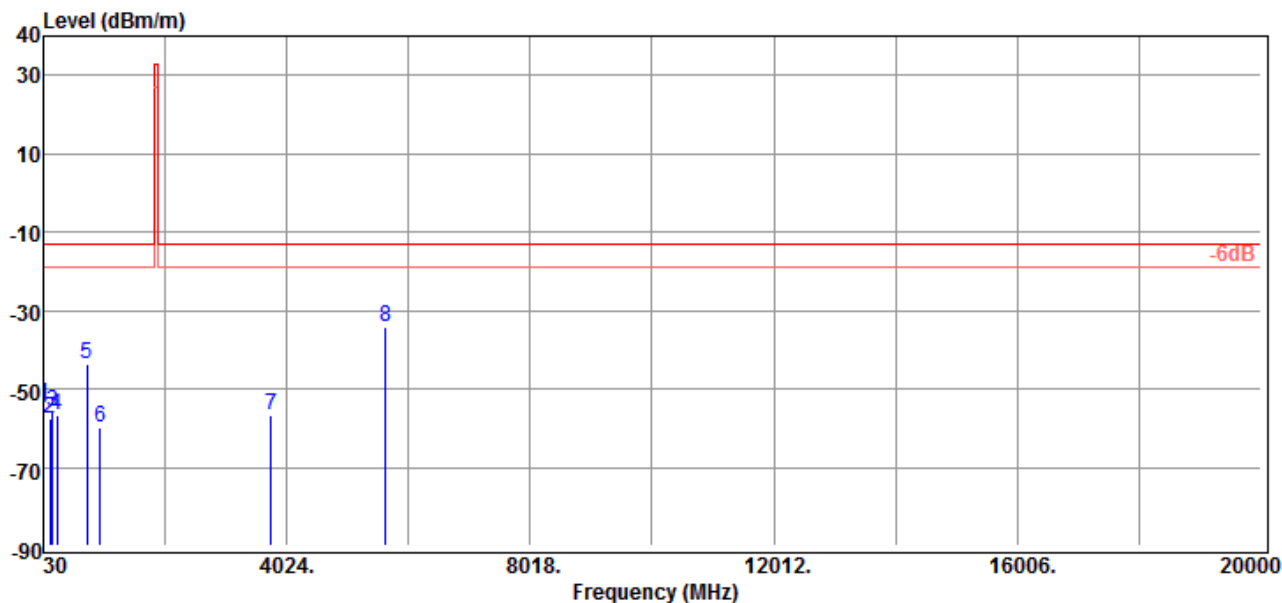
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Operation Mode	:LTEB2 20M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:1880 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
35.82	-53.81	-38.22	-15.06	-0.53	-13.00	-40.81
136.70	-57.67	-58.46	1.75	-0.96	-13.00	-44.67
179.38	-55.64	-59.08	4.58	-1.14	-13.00	-42.64
255.04	-56.76	-60.54	5.24	-1.46	-13.00	-43.76
746.83	-43.57	-48.90	7.40	-2.07	-13.00	-30.57
961.20	-59.98	-64.88	7.69	-2.79	-13.00	-46.98
3760.00	-56.71	-62.50	12.46	-6.67	-13.00	-43.71
5640.00	-34.23	-40.66	13.03	-6.60	-13.00	-21.23

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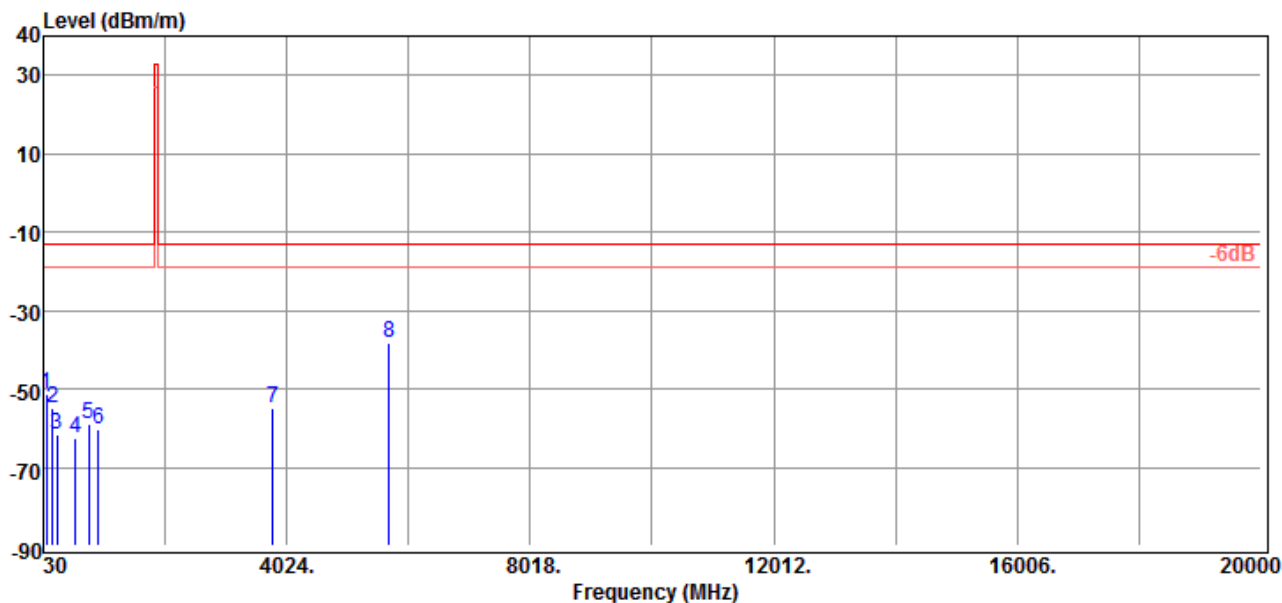
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Operation Mode	:LTEB2 20M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH HIGH	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:1900 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
83.35	-51.29	-50.93	0.43	-0.79	-13.00	-38.29
186.17	-54.83	-58.67	5.01	-1.17	-13.00	-41.83
251.16	-61.71	-65.46	5.19	-1.44	-13.00	-48.71
553.80	-62.59	-66.52	6.26	-2.33	-13.00	-49.59
769.14	-59.01	-64.28	7.47	-2.20	-13.00	-46.01
934.04	-60.39	-65.39	7.64	-2.64	-13.00	-47.39
3800.00	-55.04	-60.91	12.48	-6.61	-13.00	-42.04
5700.00	-38.22	-44.54	13.04	-6.72	-13.00	-25.22

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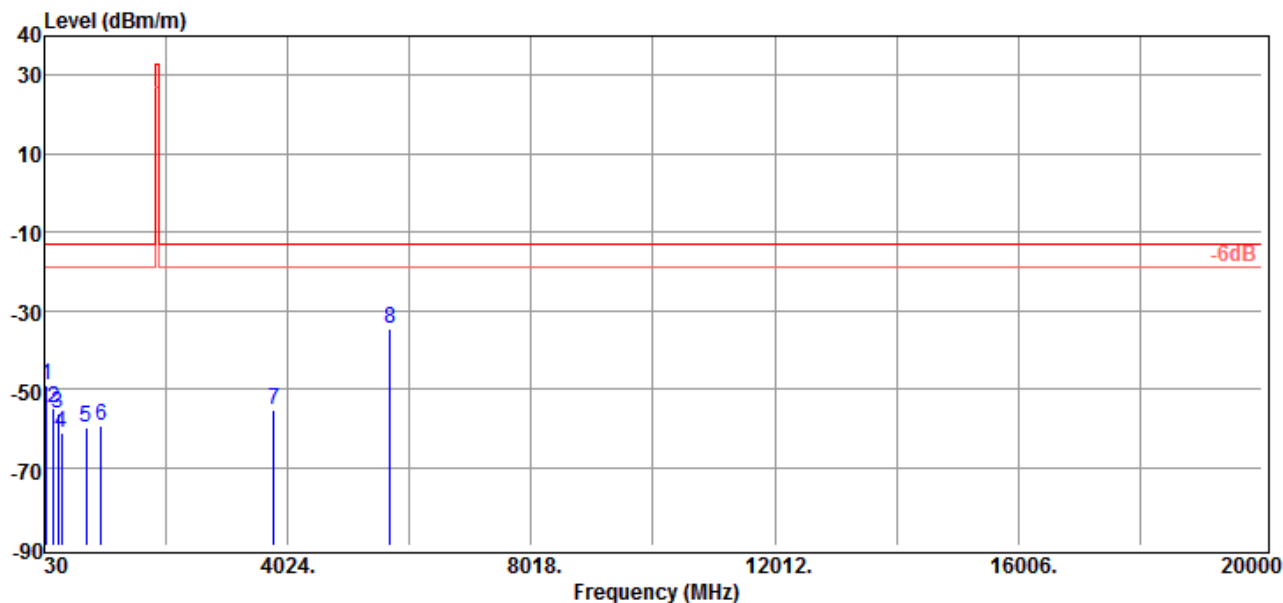
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Operation Mode	:LTEB2 20M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH HIGH	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:1900 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
60.07	-49.28	-47.81	-0.82	-0.65	-13.00	-36.28
180.35	-55.11	-58.60	4.64	-1.15	-13.00	-42.11
253.10	-56.32	-60.09	5.22	-1.45	-13.00	-43.32
318.09	-61.18	-65.27	5.83	-1.74	-13.00	-48.18
719.67	-59.69	-64.84	7.35	-2.20	-13.00	-46.69
961.20	-59.26	-64.16	7.69	-2.79	-13.00	-46.26
3800.00	-55.46	-61.33	12.48	-6.61	-13.00	-42.46
5700.00	-34.81	-41.13	13.04	-6.72	-13.00	-21.81

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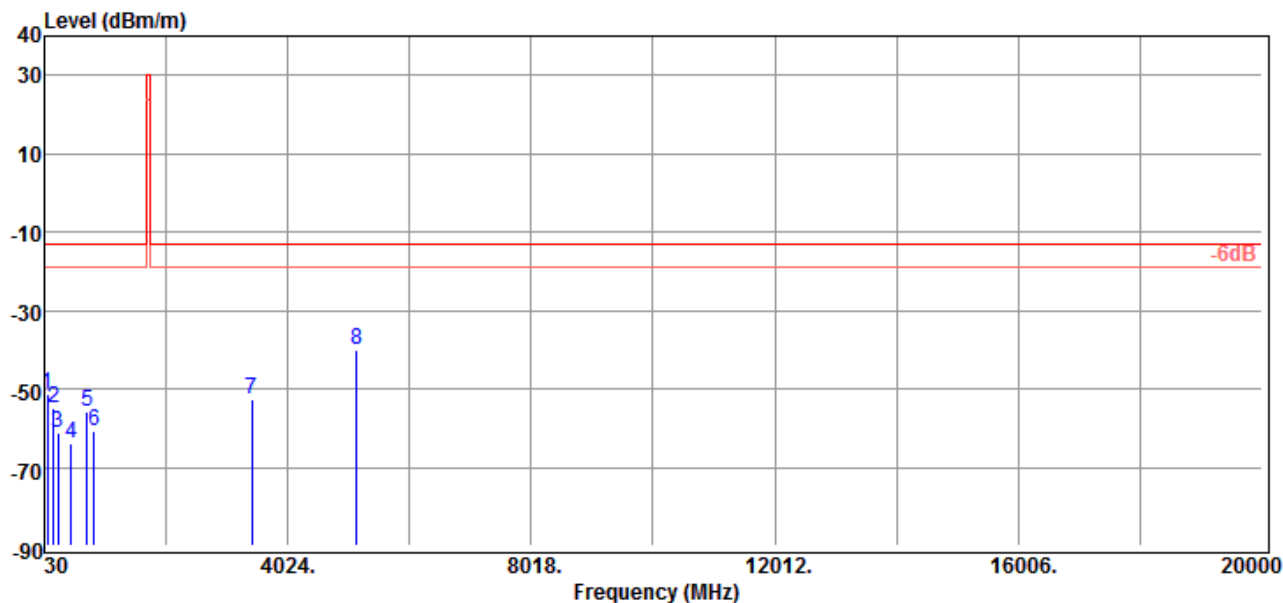
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Radiated Spurious Emission Measurement Result: LTE-Band 4 (The Worst Case)

Operation Mode	:LTEB4 15M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH LOW	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:1717.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
81.41	-51.26	-51.05	0.57	-0.78	-13.00	-38.26
185.20	-54.71	-58.49	4.95	-1.17	-13.00	-41.71
254.07	-61.03	-64.81	5.23	-1.45	-13.00	-48.03
465.53	-63.86	-67.77	6.14	-2.23	-13.00	-50.86
729.37	-55.99	-61.21	7.37	-2.15	-13.00	-42.99
851.59	-60.63	-65.77	7.50	-2.36	-13.00	-47.63
3435.00	-52.48	-57.97	12.18	-6.69	-13.00	-39.48
5152.50	-40.29	-46.27	12.66	-6.68	-13.00	-27.29

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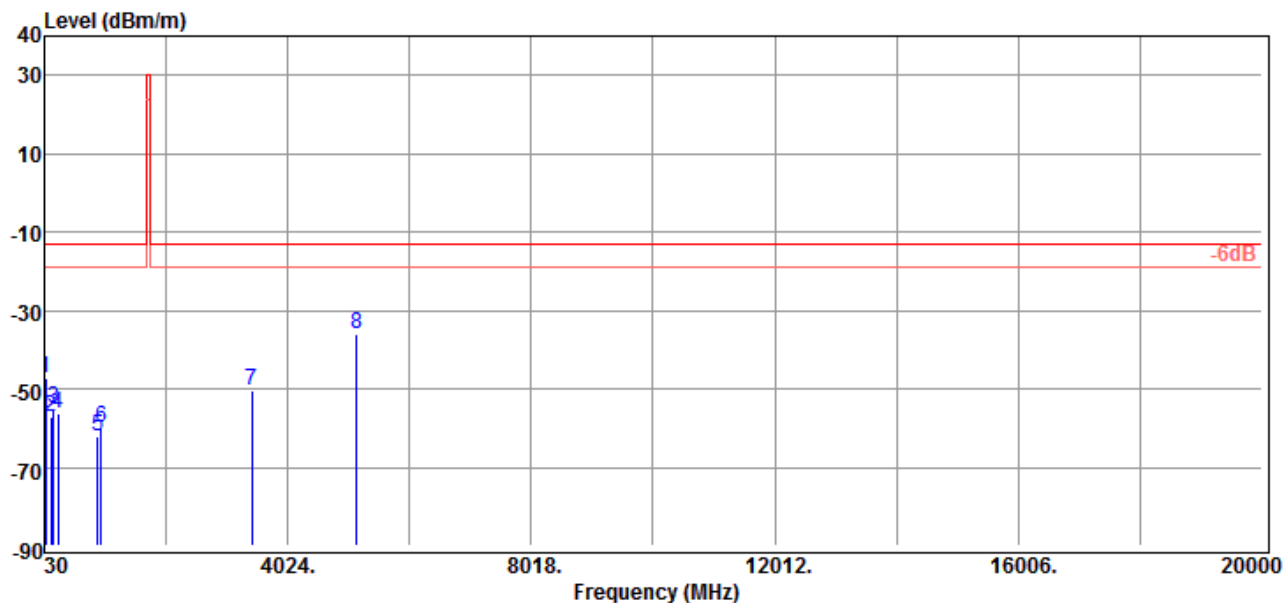
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Operation Mode	:LTEB4 15M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH LOW	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:1717.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
58.13	-47.23	-45.08	-1.50	-0.65	-13.00	-34.23
143.49	-57.16	-58.34	2.16	-0.98	-13.00	-44.16
179.38	-54.88	-58.32	4.58	-1.14	-13.00	-41.88
255.04	-56.05	-59.83	5.24	-1.46	-13.00	-43.05
897.18	-62.05	-67.20	7.59	-2.44	-13.00	-49.05
961.20	-59.98	-64.88	7.69	-2.79	-13.00	-46.98
3435.00	-50.36	-55.85	12.18	-6.69	-13.00	-37.36
5152.50	-36.15	-42.13	12.66	-6.68	-13.00	-23.15

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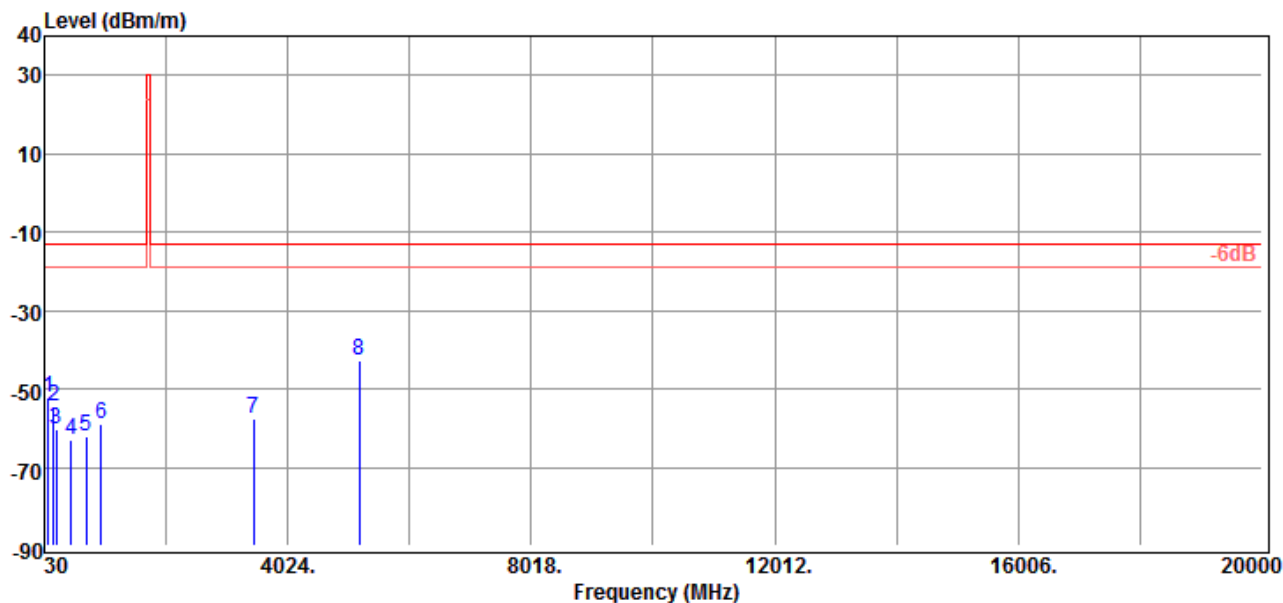
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Operation Mode	:LTEB4 15M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:1732.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
89.17	-52.31	-51.54	0.04	-0.81	-13.00	-39.31
184.23	-54.26	-57.99	4.89	-1.16	-13.00	-41.26
219.15	-60.33	-64.57	5.56	-1.32	-13.00	-47.33
464.56	-63.21	-67.13	6.14	-2.22	-13.00	-50.21
715.79	-61.95	-67.08	7.34	-2.21	-13.00	-48.95
957.32	-59.14	-64.05	7.68	-2.77	-13.00	-46.14
3465.00	-57.59	-62.98	12.23	-6.84	-13.00	-44.59
5197.50	-42.96	-49.03	12.70	-6.63	-13.00	-29.96

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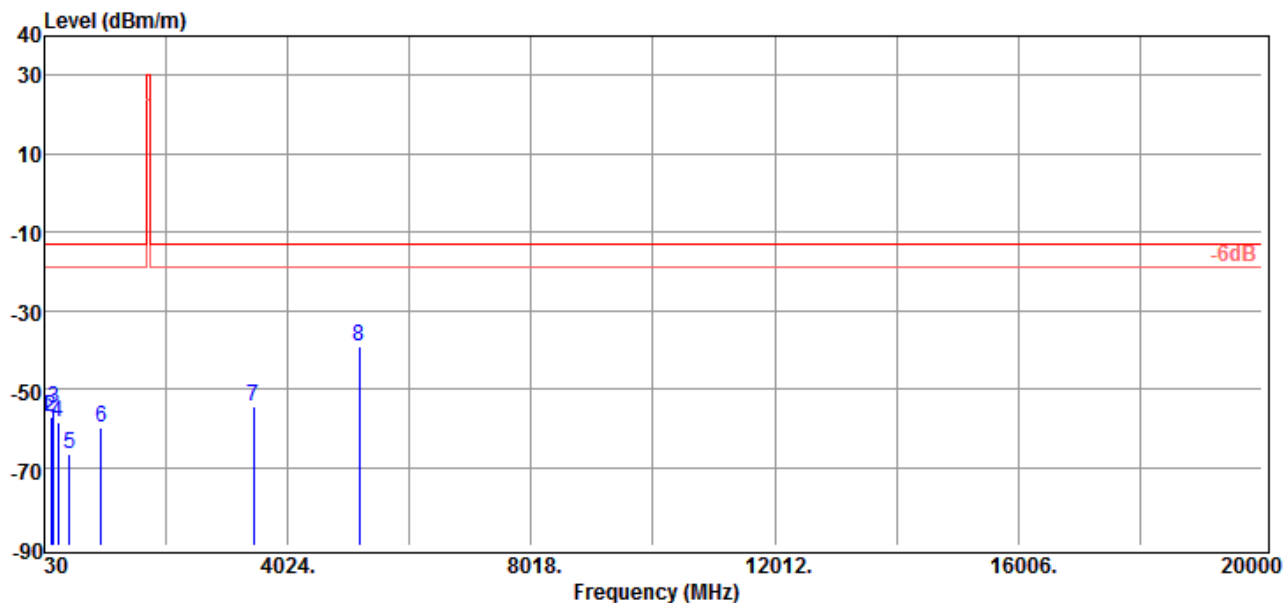
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Operation Mode	:LTEB4 15M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:1732.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-57.16	-36.67	-20.05	-0.44	-13.00	-44.16
141.55	-57.35	-58.41	2.04	-0.98	-13.00	-44.35
177.44	-55.09	-58.42	4.46	-1.13	-13.00	-42.09
256.01	-58.43	-62.23	5.26	-1.46	-13.00	-45.43
446.13	-66.42	-70.39	6.03	-2.06	-13.00	-53.42
961.20	-59.75	-64.65	7.69	-2.79	-13.00	-46.75
3465.00	-54.31	-59.70	12.23	-6.84	-13.00	-41.31
5197.50	-39.10	-45.17	12.70	-6.63	-13.00	-26.10

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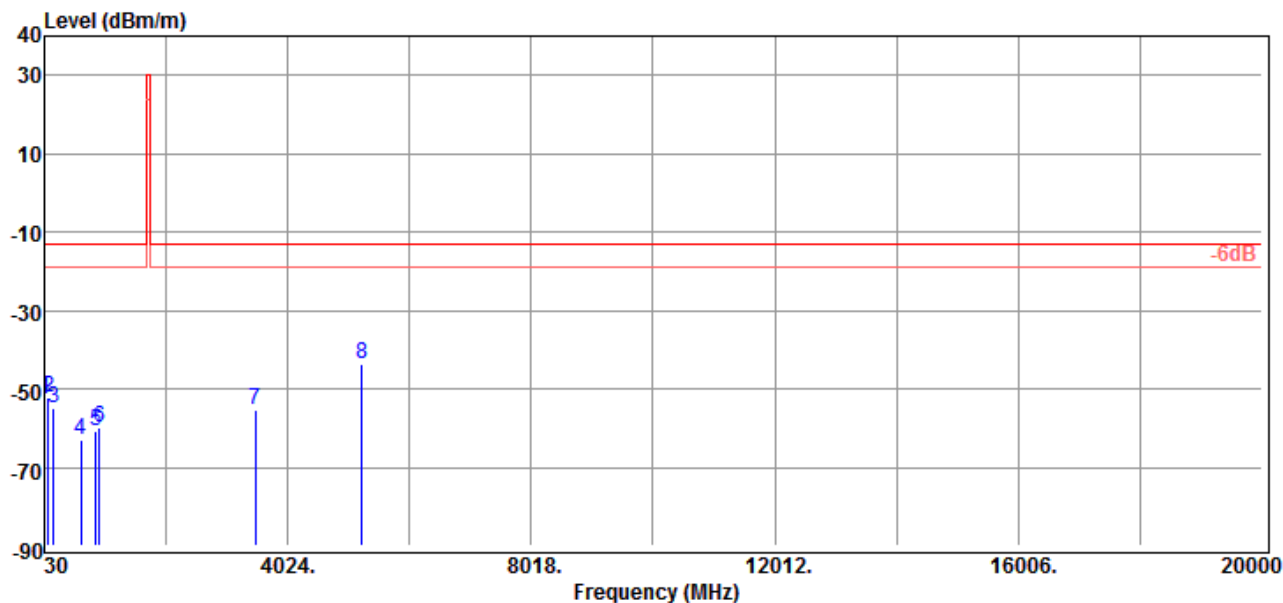
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Operation Mode	:LTEB4 15M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH HIGH	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:1747.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
32.91	-52.87	-34.94	-17.44	-0.49	-13.00	-39.87
89.17	-52.19	-51.42	0.04	-0.81	-13.00	-39.19
182.29	-54.73	-58.35	4.77	-1.15	-13.00	-41.73
631.40	-63.13	-67.55	6.80	-2.38	-13.00	-50.13
869.05	-60.59	-65.73	7.53	-2.39	-13.00	-47.59
937.92	-59.88	-64.86	7.64	-2.66	-13.00	-46.88
3495.00	-55.17	-60.47	12.29	-6.99	-13.00	-42.17
5242.50	-43.59	-49.75	12.75	-6.59	-13.00	-30.59

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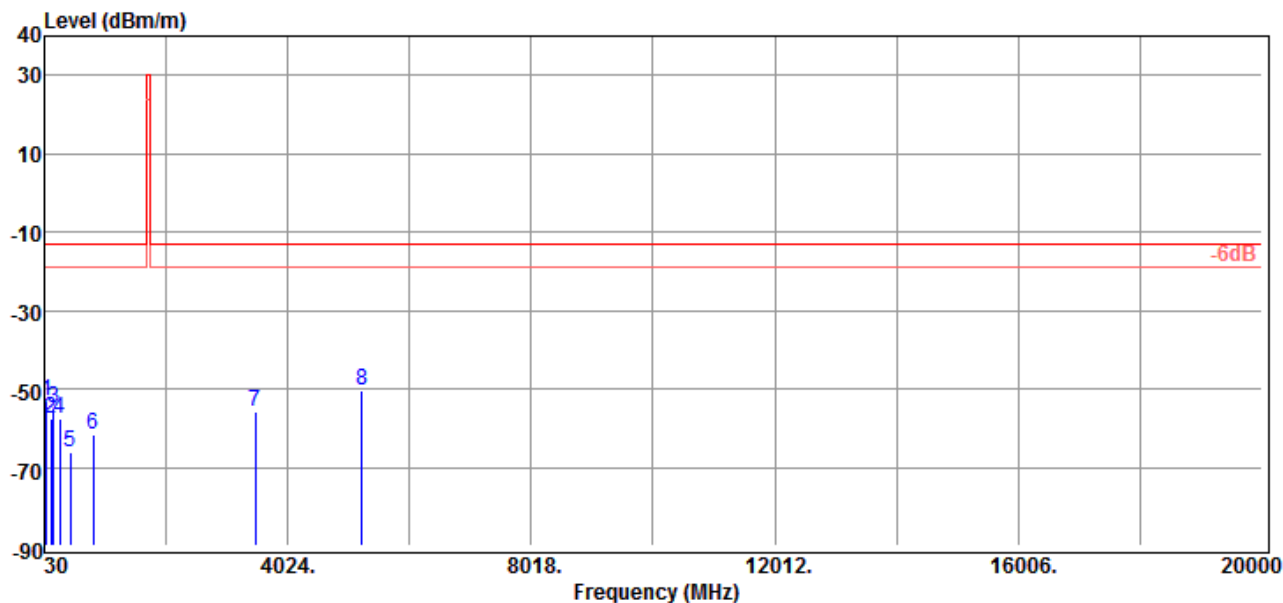
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Operation Mode	:LTEB4 15M QPSK RB1,0	Test Date	:2018-08-29
Test Mode	:TX CH HIGH	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:1747.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
64.92	-53.26	-52.43	-0.14	-0.69	-13.00	-40.26
136.70	-57.43	-58.22	1.75	-0.96	-13.00	-44.43
179.38	-54.74	-58.18	4.58	-1.14	-13.00	-41.74
283.17	-57.48	-61.55	5.63	-1.56	-13.00	-44.48
450.01	-66.30	-70.31	6.07	-2.06	-13.00	-53.30
832.19	-61.58	-66.71	7.52	-2.39	-13.00	-48.58
3495.00	-56.04	-61.34	12.29	-6.99	-13.00	-43.04
5242.50	-50.24	-56.40	12.75	-6.59	-13.00	-37.24

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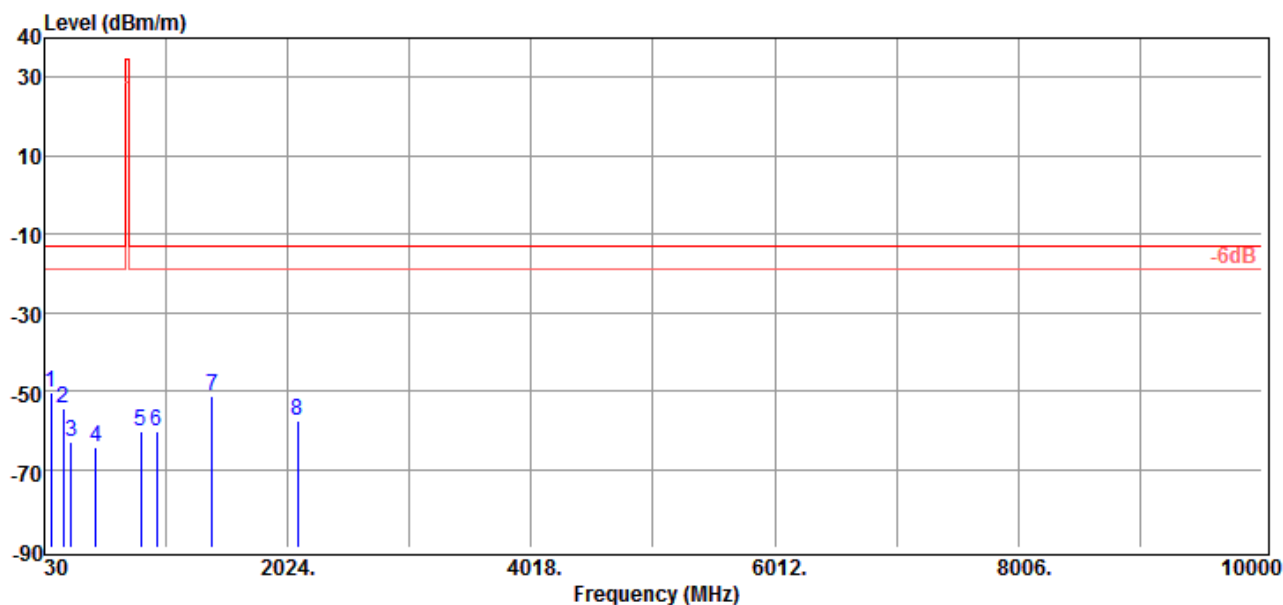
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Radiated Spurious Emission Measurement Result: LTE-Band 12 (The Worst Case)

Operation Mode	:LTEB12 3M QPSK RB1,14	Test Date	:2018-08-29
Test Mode	:TX CH LOW	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:700.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
84.32	-50.19	-49.77	0.37	-0.79	-13.00	-37.19
183.26	-54.66	-58.33	4.83	-1.16	-13.00	-41.66
252.13	-62.83	-66.58	5.20	-1.45	-13.00	-49.83
453.89	-64.32	-68.31	6.09	-2.10	-13.00	-51.32
820.55	-60.38	-65.51	7.54	-2.41	-13.00	-47.38
949.56	-60.29	-65.22	7.66	-2.73	-13.00	-47.29
1401.00	-51.14	-55.37	7.70	-3.47	-13.00	-38.14
2101.50	-57.65	-63.66	10.31	-4.30	-13.00	-44.65

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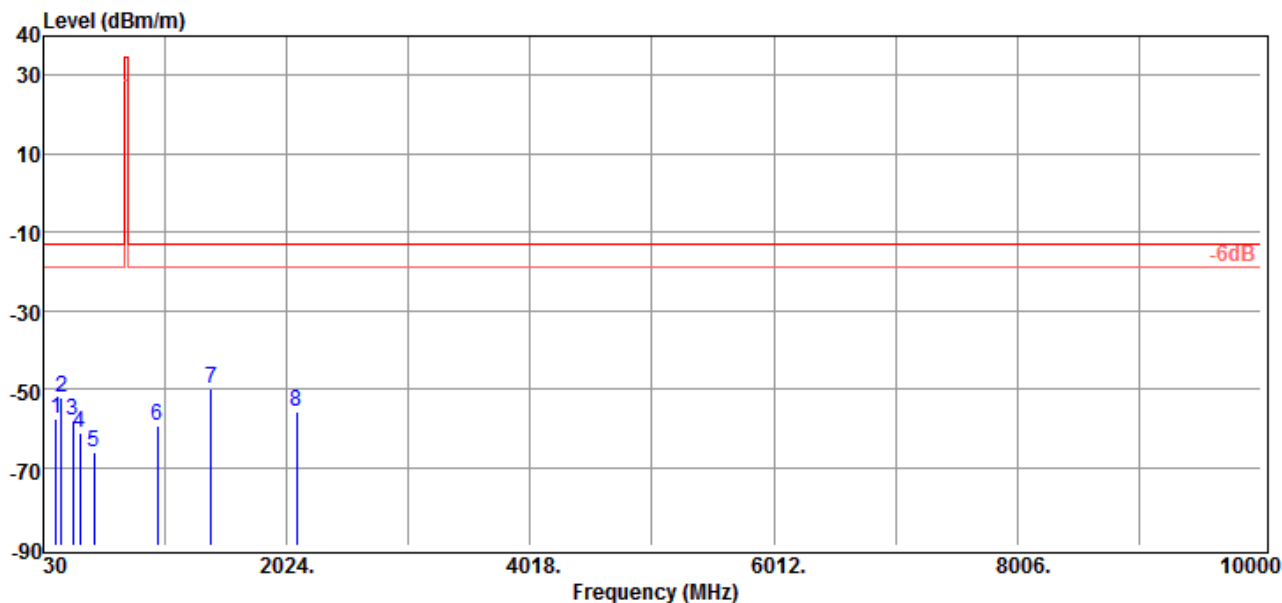
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Operation Mode	:LTEB12 3M QPSK RB1,14	Test Date	:2018-08-29
Test Mode	:TX CH LOW	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:700.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
137.67	-57.56	-58.40	1.81	-0.97	-13.00	-44.56
174.53	-52.12	-55.27	4.27	-1.12	-13.00	-39.12
270.56	-58.10	-62.05	5.46	-1.51	-13.00	-45.10
332.64	-61.08	-65.05	5.81	-1.84	-13.00	-48.08
446.13	-66.05	-70.02	6.03	-2.06	-13.00	-53.05
961.20	-59.37	-64.27	7.69	-2.79	-13.00	-46.37
1401.00	-49.81	-54.04	7.70	-3.47	-13.00	-36.81
2101.50	-55.76	-61.77	10.31	-4.30	-13.00	-42.76

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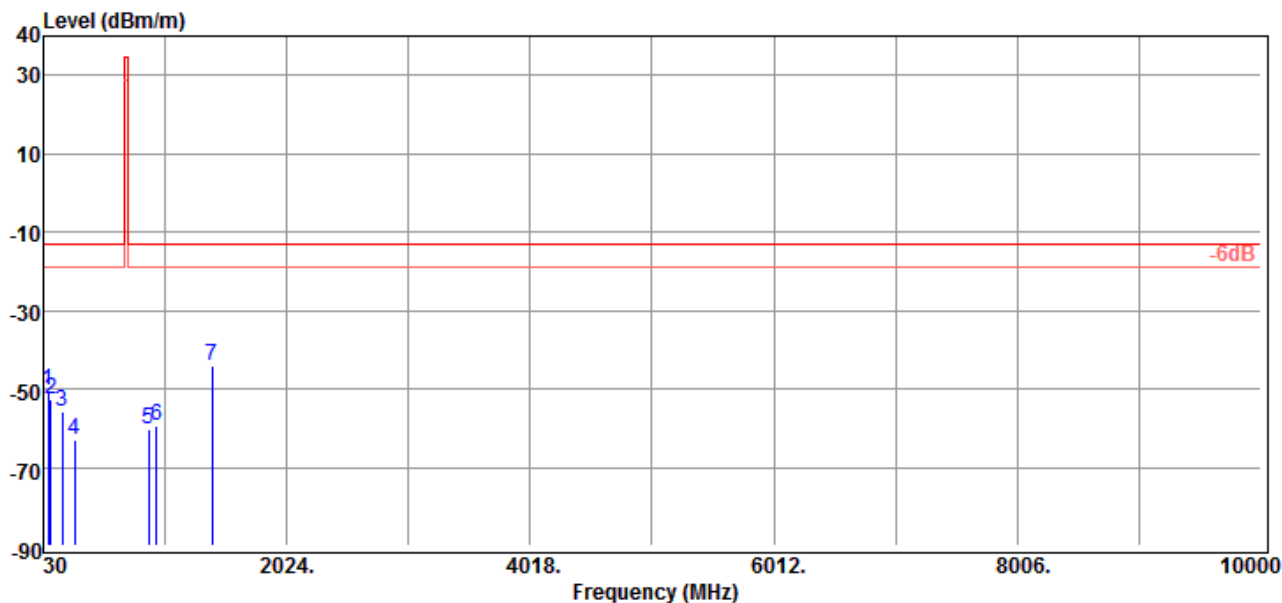
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Operation Mode	:LTEB12 3M QPSK RB1,14	Test Date	:2018-08-29
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:707.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
68.80	-50.31	-49.95	0.36	-0.72	-13.00	-37.31
90.14	-52.75	-51.92	-0.02	-0.81	-13.00	-39.75
186.17	-55.99	-59.83	5.01	-1.17	-13.00	-42.99
288.02	-62.83	-66.95	5.70	-1.58	-13.00	-49.83
894.27	-60.42	-65.57	7.58	-2.43	-13.00	-47.42
960.23	-59.46	-64.37	7.69	-2.78	-13.00	-46.46
1415.00	-44.03	-48.28	7.75	-3.50	-13.00	-31.03

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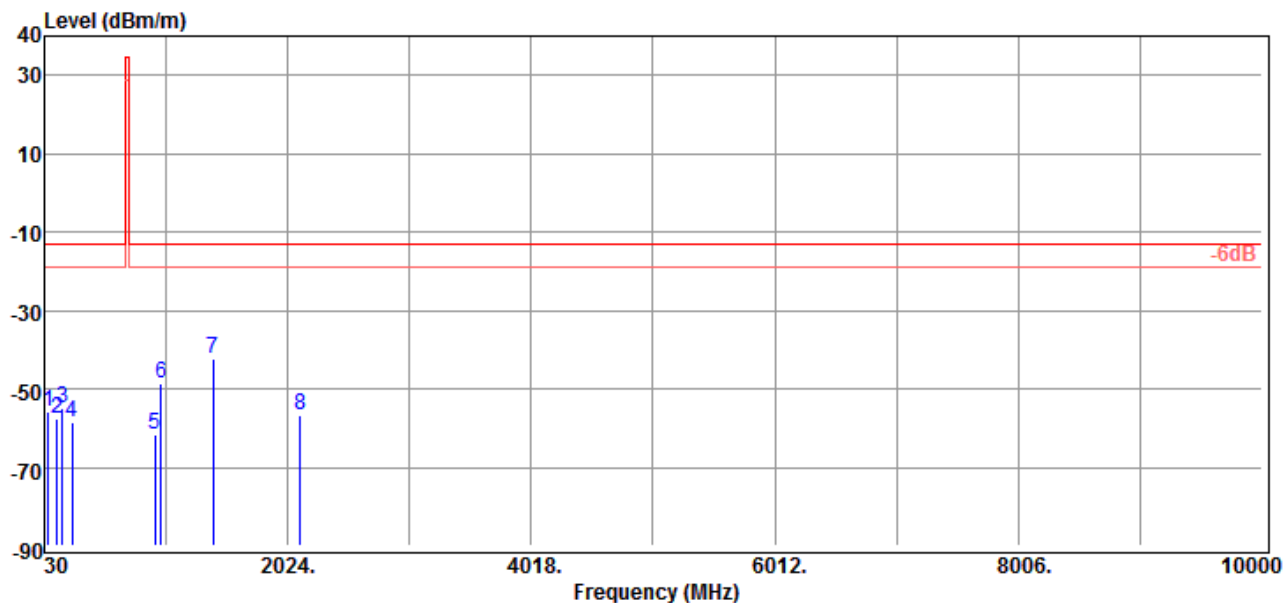
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Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:707.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
62.98	-55.76	-54.68	-0.41	-0.67	-13.00	-42.76
136.70	-57.64	-58.43	1.75	-0.96	-13.00	-44.64
177.44	-54.81	-58.14	4.46	-1.13	-13.00	-41.81
254.07	-58.40	-62.18	5.23	-1.45	-13.00	-45.40
936.95	-61.76	-66.75	7.64	-2.65	-13.00	-48.76
983.51	-48.67	-53.53	7.76	-2.90	-13.00	-35.67
1415.00	-42.47	-46.72	7.75	-3.50	-13.00	-29.47
2122.50	-56.52	-62.54	10.33	-4.31	-13.00	-43.52

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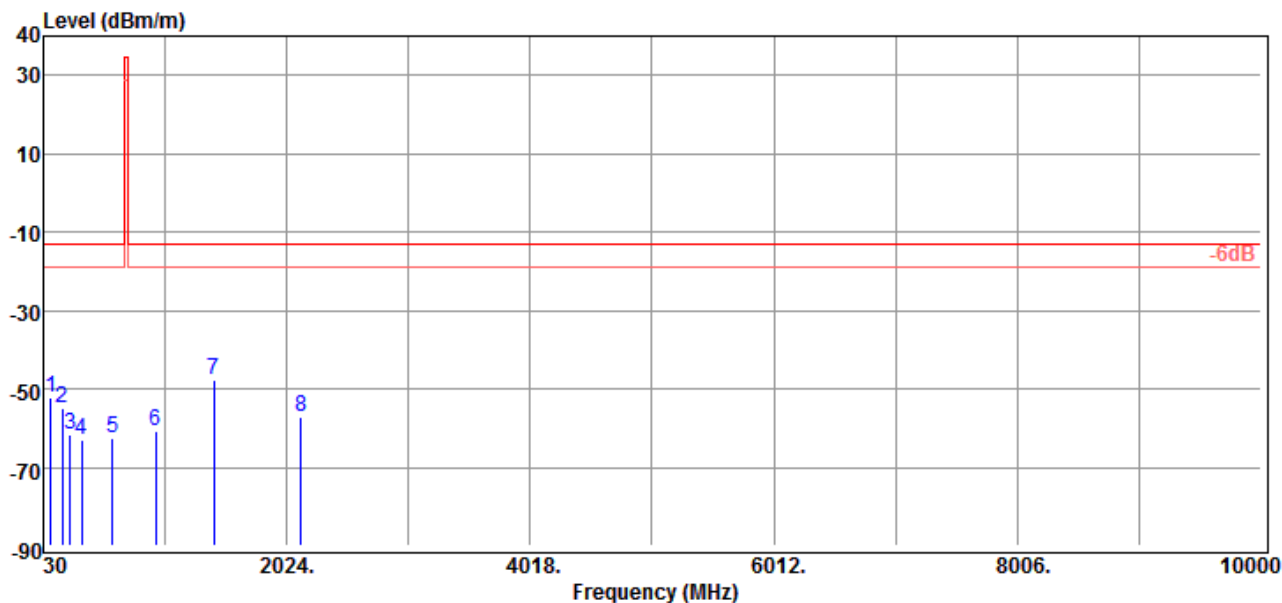
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Operation Mode	:LTEB12 3M QPSK RB1,14	Test Date	:2018-08-29
Test Mode	:TX CH HIGH	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:714.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
89.17	-52.18	-51.41	0.04	-0.81	-13.00	-39.18
184.23	-54.71	-58.44	4.89	-1.16	-13.00	-41.71
253.10	-61.73	-65.50	5.22	-1.45	-13.00	-48.73
342.34	-63.02	-66.92	5.80	-1.90	-13.00	-50.02
598.42	-62.52	-67.05	6.66	-2.13	-13.00	-49.52
947.62	-60.75	-65.69	7.66	-2.72	-13.00	-47.75
1429.00	-47.60	-51.89	7.81	-3.52	-13.00	-34.60
2143.50	-57.04	-63.09	10.36	-4.31	-13.00	-44.04

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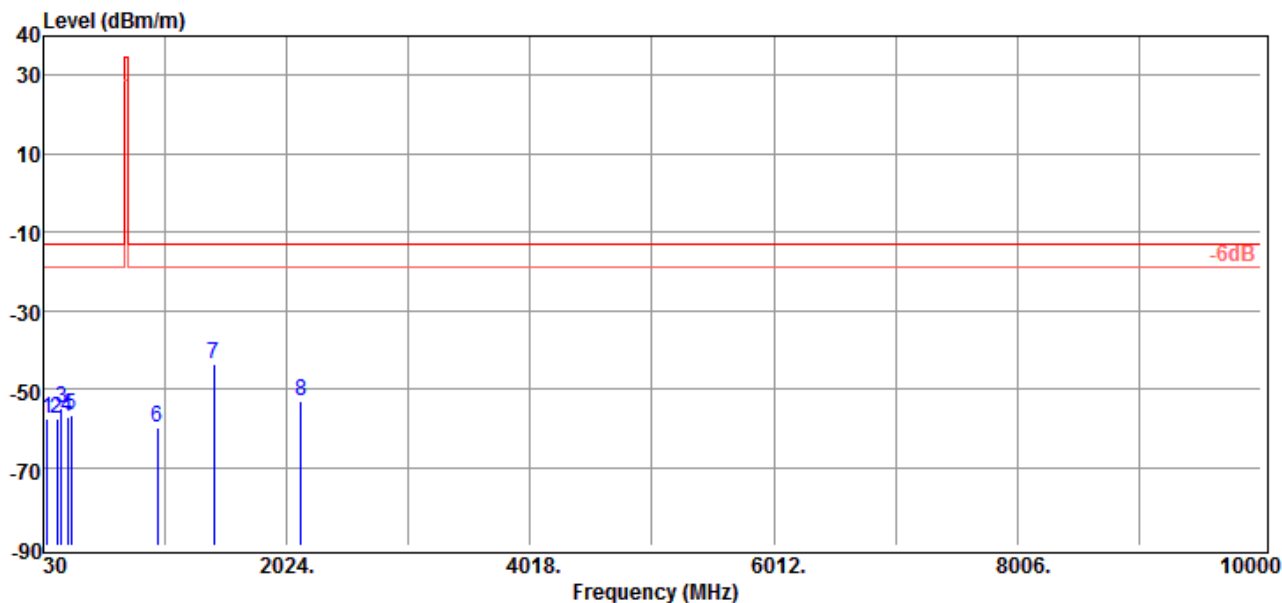
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Test Mode	:TX CH HIGH	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:714.5 MHz	Engineer	:Enzo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
62.01	-57.60	-56.40	-0.54	-0.66	-13.00	-44.60
138.64	-57.62	-58.52	1.87	-0.97	-13.00	-44.62
176.47	-55.09	-58.35	4.39	-1.13	-13.00	-42.09
225.94	-57.25	-61.38	5.47	-1.34	-13.00	-44.25
259.89	-56.62	-60.45	5.31	-1.48	-13.00	-43.62
961.20	-59.86	-64.76	7.69	-2.79	-13.00	-46.86
1429.00	-43.50	-47.79	7.81	-3.52	-13.00	-30.50
2143.50	-53.29	-59.34	10.36	-4.31	-13.00	-40.29

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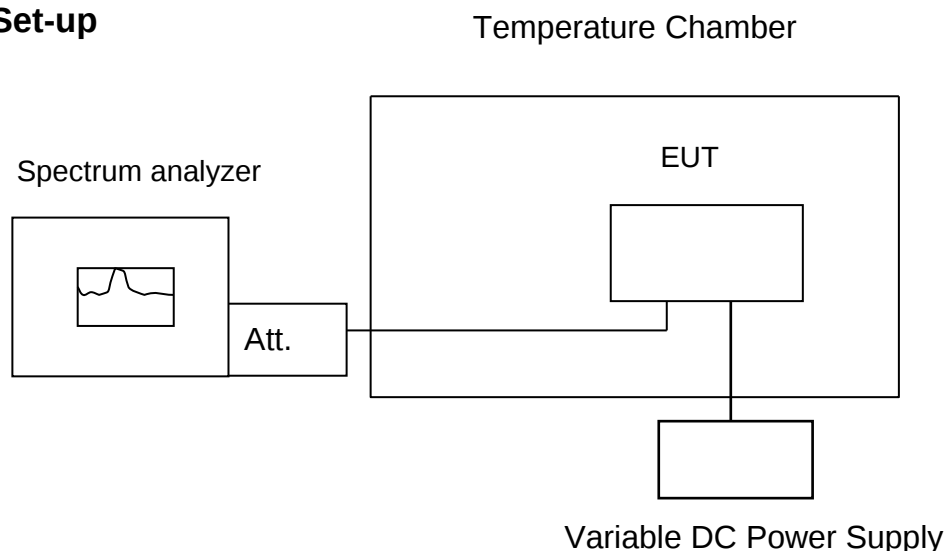
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10. FREQUENCY STABILITY MEASUREMENT

10.1. Standard Applicabl

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

10.2. Test Set-up



Note: Measurement setup for testing on Antenna connector

10.3. Measurement Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25 . Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint as declared by the manufacturer, record the maximum frequency change.

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10.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Radio Communication Analyser	Anritsu	MT8820C	6201107337	2018/06/15	2019/06/14
DC Power Supply	Agilent	E3640A	MY53140006	2018/05/30	2019/05/29
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
Splitter	Woken	DOM35LW1 A2	RF36	2017/12/26	2018/12/25

10.5. Measurement Result

Reference Freq.:		LTE B2 Mid Channel		1880	MHz 20M QPSK CH 18900
Power Supply Vdc	Temp. ()	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)	
Freq. ERROR vs. VOLTAGE					
13.8	25	1880.000009	9.00	4700	
12	25	1880.000018	18.00	4700	
10.2	25	1880.000016	16.00	4700	
10 (End Point)	25	1879.999982	-18.00	4700	
Freq. ERROR vs. Temp.					
12	-30	1879.999997	-3.00	4700	
12	-20	1879.999978	-22.00	4700	
12	-10	1879.999988	-12.00	4700	
12	0	1880.000009	9.00	4700	
12	10	1880.000013	13.00	4700	
12	20	1879.999995	-5.00	4700	
12	30	1879.999990	-10.00	4700	
12	40	1879.999980	-20.00	4700	
12	50	1880.000022	22.00	4700	

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Reference Freq.: LTE B4 Mid Channel 1732.5 MHz 20M QPSK CH 20175				
Power Supply Vdc	Temp. ()	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)
Freq. ERROR vs. VOLTAGE				
13.8	25	1732.499982	-18.00	4331
12	25	1732.500010	10.00	4331
10.2	25	1732.500002	2.00	4331
10 (End Point)	25	1732.499998	-2.00	4331
Freq. ERROR vs. Temp.				
12	-30	1732.499992	-8.00	4331
12	-20	1732.500017	17.00	4331
12	-10	1732.500016	16.00	4331
12	0	1732.499984	-16.00	4331
12	10	1732.500006	6.00	4331
12	20	1732.500020	20.00	4331
12	30	1732.499996	-4.00	4331
12	40	1732.500024	24.00	4331
12	50	1732.500003	3.00	4331

Reference Freq.: LTE B12 Mid Channel 707.5 MHz 10M QPSK CH 23095				
Power Supply Vdc	Temp. ()	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)
Freq. ERROR vs. VOLTAGE				
13.8	25	707.499982	-18.00	1769
12	25	707.500009	9.00	1769
10.2	25	707.500004	4.00	1769
10 (End Point)	25	707.499982	-18.00	1769
Freq. ERROR vs. Temp.				
12	-30	707.500007	7.00	1769
12	-20	707.499995	-5.00	1769
12	-10	707.500010	10.00	1769
12	0	707.500014	14.00	1769
12	10	707.499996	-4.00	1769
12	20	707.500001	1.00	1769
12	30	707.500024	24.00	1769
12	40	707.499985	-15.00	1769
12	50	707.500011	11.00	1769

Note: The power supply is rated 12V.

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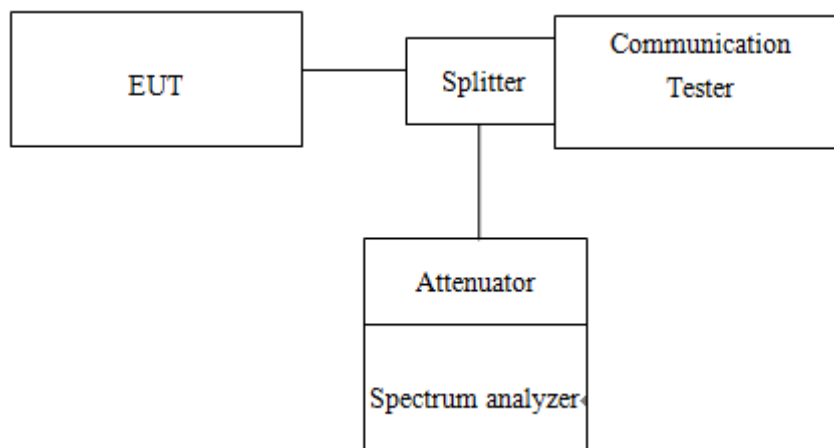
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11. PEAK TO AVERAGE RATIO

11.1. Standard Applicable

The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

11.2. Test SET-UP



11.3. Measurement Procedure

1. KDB 971168 D01 is employed as the following procedure is proper adjusted accordingly:
2. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth; & internal =1ms
3. Set the number of counts to a value that stabilizes the measured CCDF curve.

11.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/06/19
Radio Communication Analyer	Anritsu	MT8820C	6201107337	2018/06/15	2019/06/14
DC Power Supply	Agilent	E3640A	MY53140006	2018/05/30	2019/05/29
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
Splitter	Woken	DOM35LW1 A2	RF36	2017/12/26	2018/12/25

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11.5. Measurement Result

Tabular Results:

LTE BAND 2							
Channel bandwidth: 1.4MHz				Channel bandwidth: 3MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1850.7	18607	6.33	13	1851.5	18615	6.01	13
1880.0	18900	6.65	13	1880.0	18900	6.41	13
1909.3	19193	6.31	13	1908.5	19185	6.42	13

LTE BAND 2							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1852.5	18625	6.11	13	1855.0	18650	6.05	13
1880.0	18900	6.36	13	1880.0	18900	6.45	13
1907.5	19175	6.34	13	1905.0	19150	6.42	13

LTE BAND 2							
Channel bandwidth: 15MHz				Channel bandwidth: 20MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1857.5	18675	6.13	13	1860.0	18700	6.65	13
1880.0	18900	6.35	13	1880.0	18900	6.72	13
1902.5	19125	6.24	13	1900.0	19100	6.67	13

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LTE BAND 4							
Channel bandwidth: 1.4MHz				Channel bandwidth: 3MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1710.7	19957	6.50	13	1711.5	19965	6.47	13
1732.5	20175	6.54	13	1732.5	20175	6.72	13
1754.3	20393	6.80	13	1753.5	20385	6.68	13

LTE BAND 4							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1712.5	19957	6.44	13	1715.0	20000	6.47	13
1732.5	20175	6.45	13	1732.5	20175	6.56	13
1752.5	20375	6.68	13	1750.0	20350	6.56	13

LTE BAND 4							
Channel bandwidth: 15MHz				Channel bandwidth: 20MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1717.5	20025	6.36	13	1720.0	20050	6.71	13
1732.5	20175	6.31	13	1732.5	20175	6.71	13
1747.5	20325	6.31	13	1745.0	20300	6.65	13

LTE BAND 12							
Channel bandwidth: 1.4MHz				Channel bandwidth: 3MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
699.7	23017	6.63	13	700.5	23025	6.31	13
707.5	23095	6.39	13	707.5	23095	6.34	13
715.3	23173	6.22	13	714.5	23165	6.00	13

LTE BAND 12							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
701.5	23035	6.19	13	704.0	23060	6.21	13
707.5	23095	6.22	13	707.5	23095	6.31	13
713.5	23155	6.03	13	711.0	23130	6.23	13

Please refer to next page for test plots.

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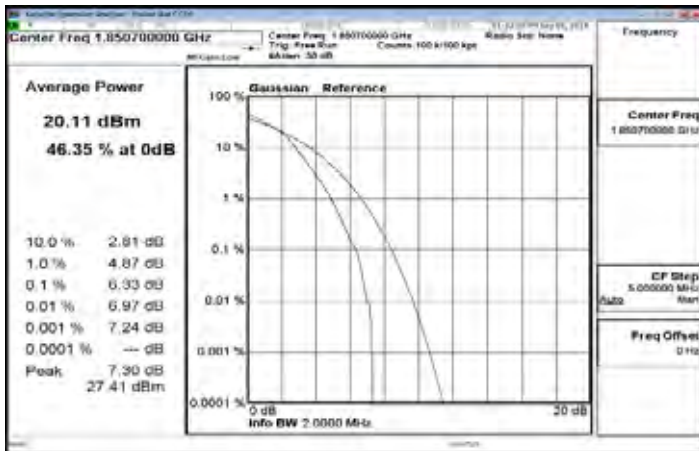
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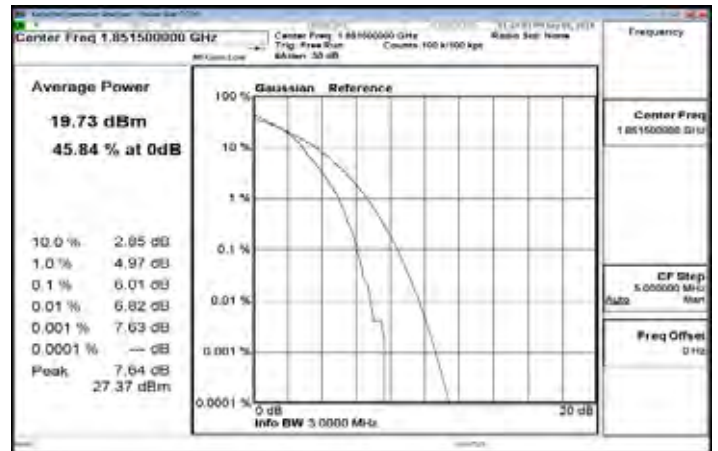
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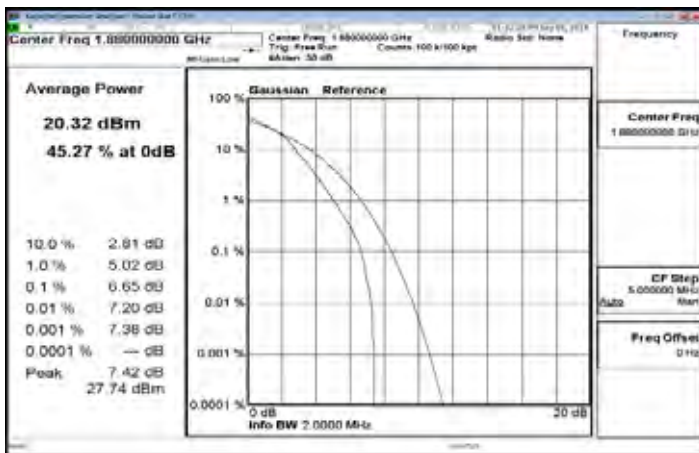
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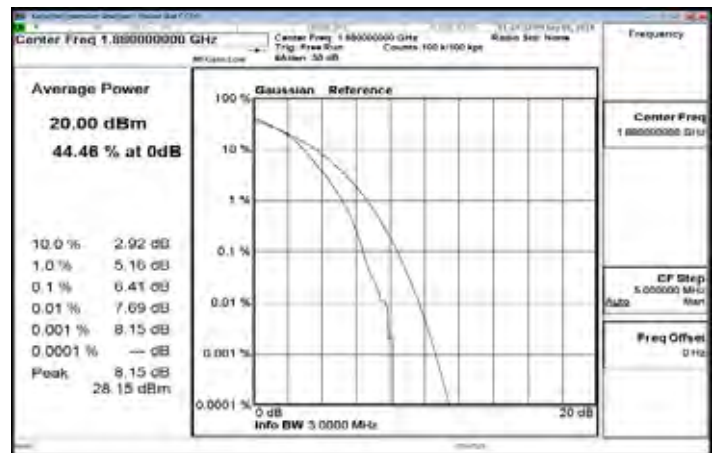
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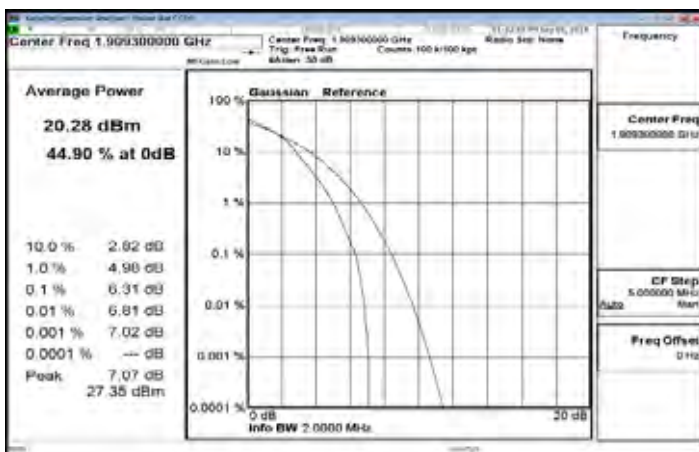
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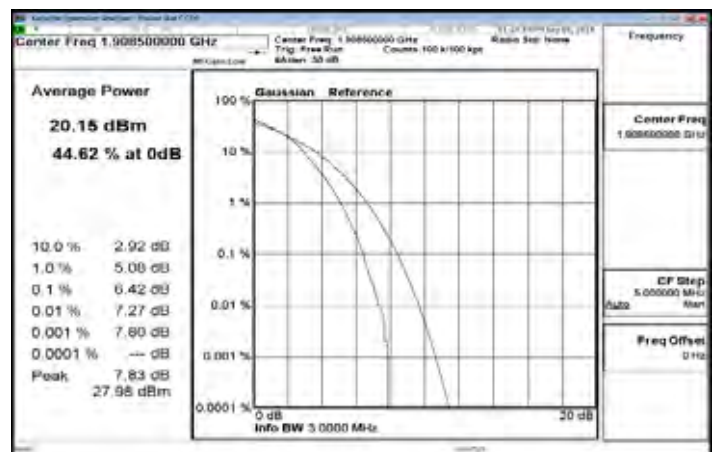
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LTE_Band2_1_4MHz_16QAM_6_0_HighCH19193-1909.3



LTE_Band2_3MHz_16QAM_15_0_HighCH19185-1908.5



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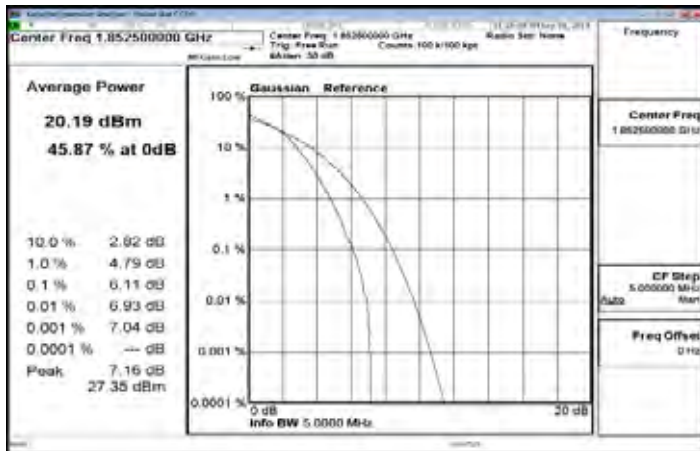
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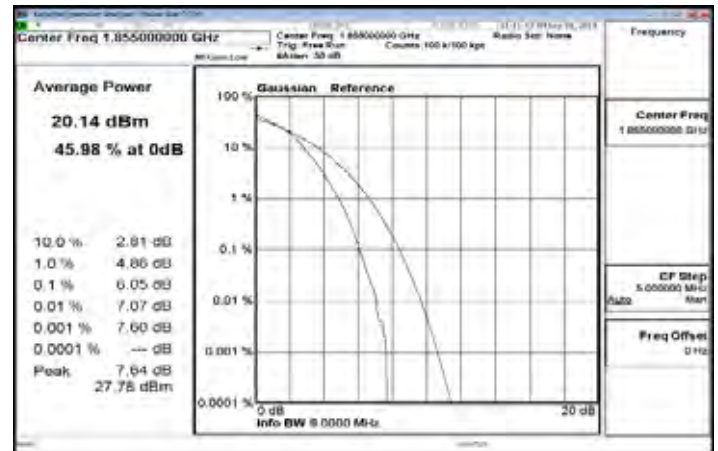
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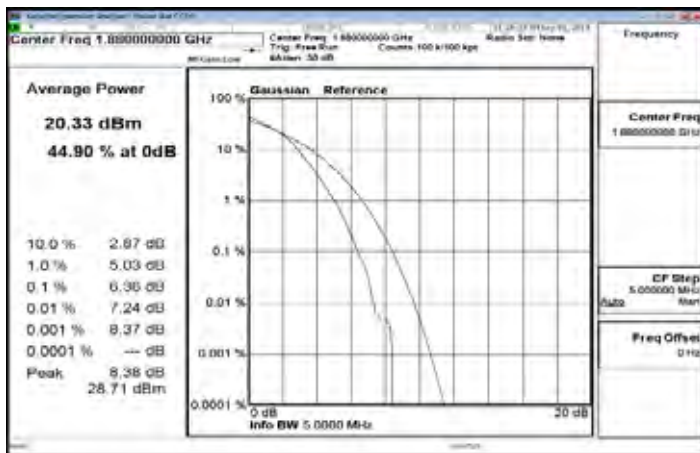
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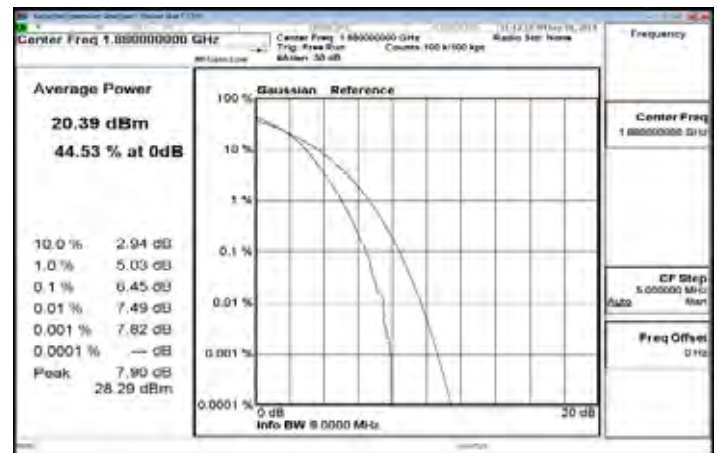
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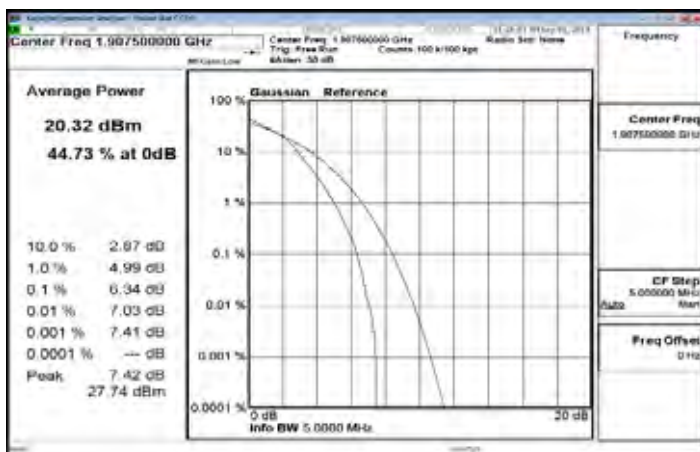
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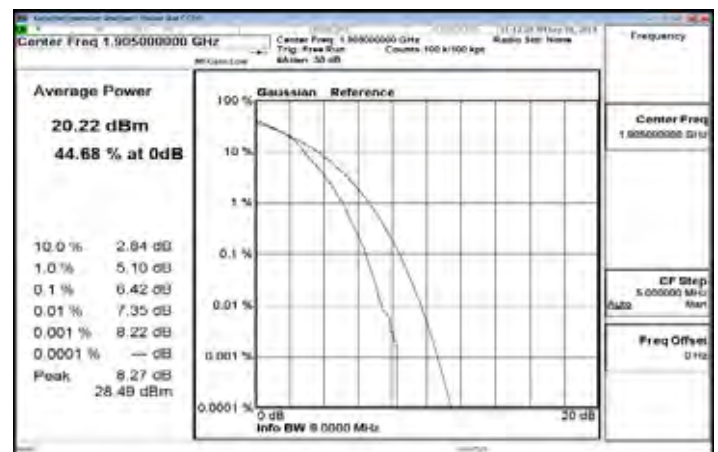
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LTE_Band2_5MHz_16QAM_25_0_HighCH19175-1907.5



LTE_Band2_10MHz_16QAM_50_0_HighCH19150-1905



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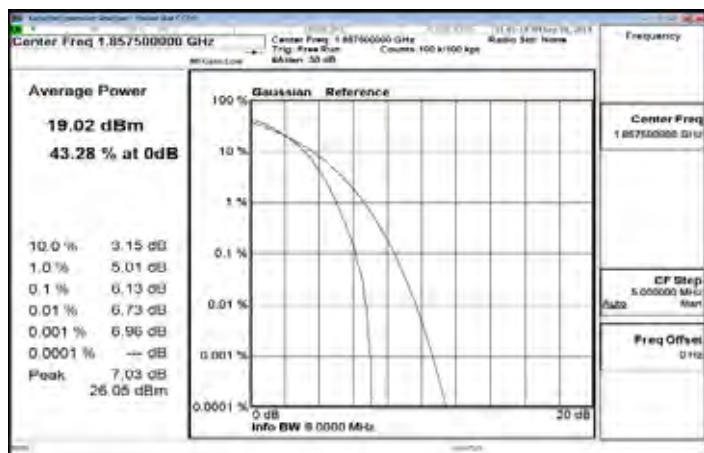
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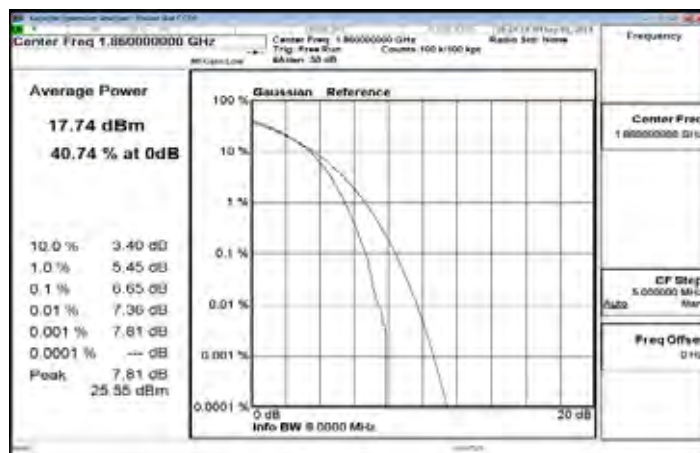
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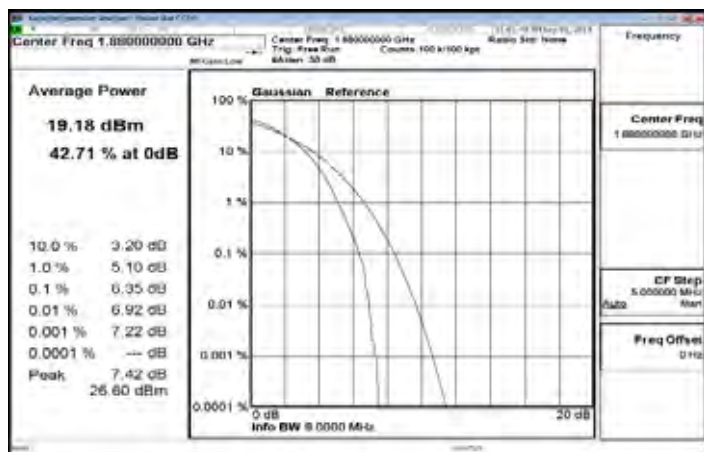
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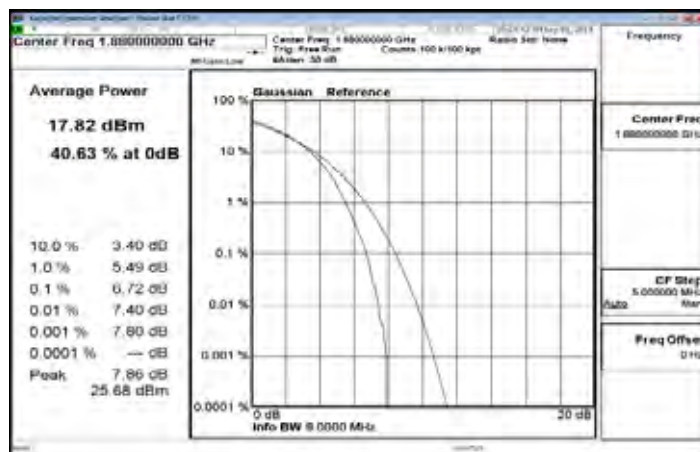
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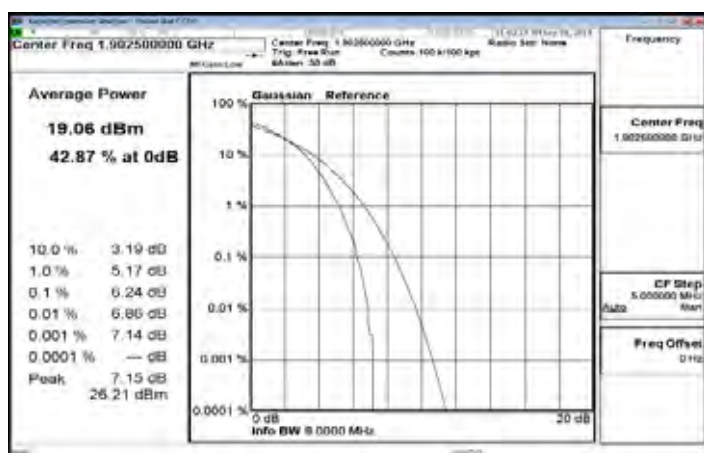
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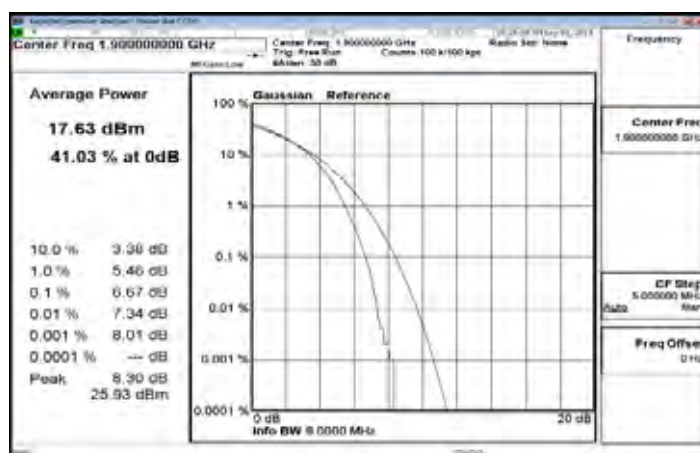
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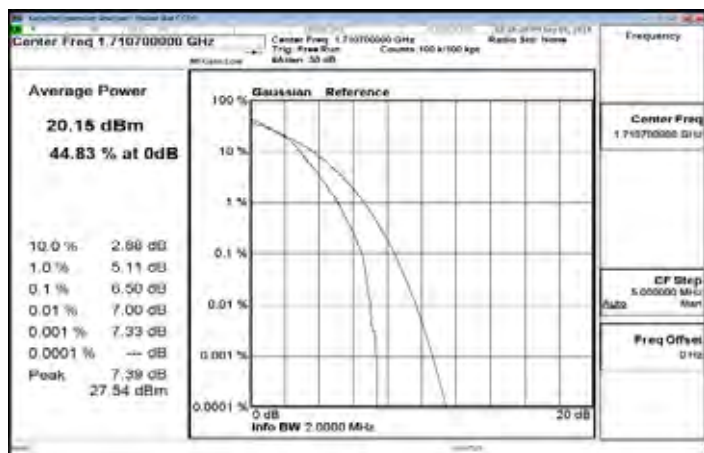
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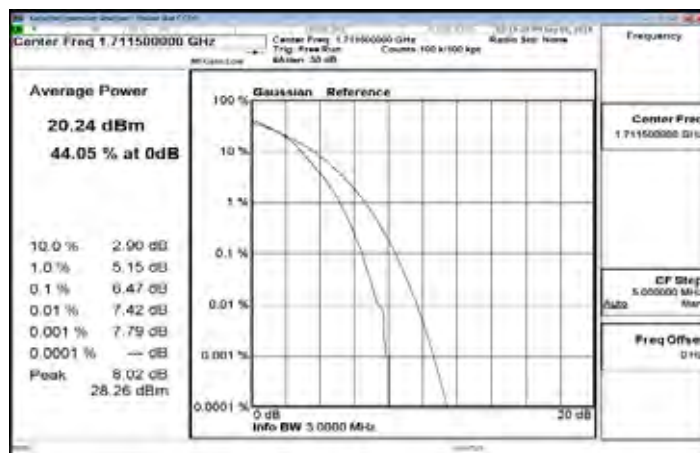
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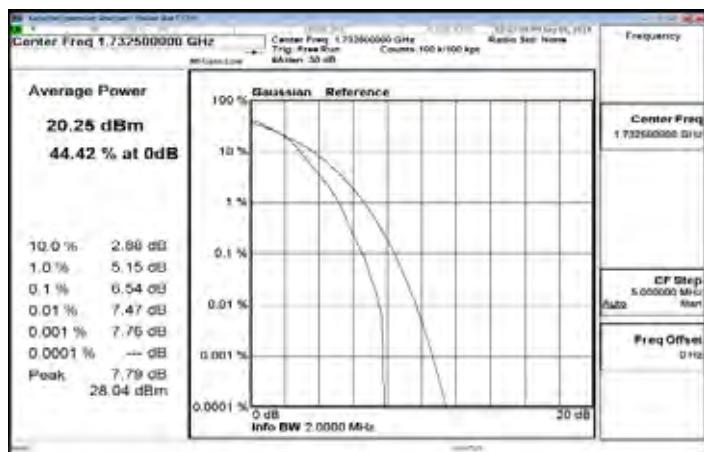
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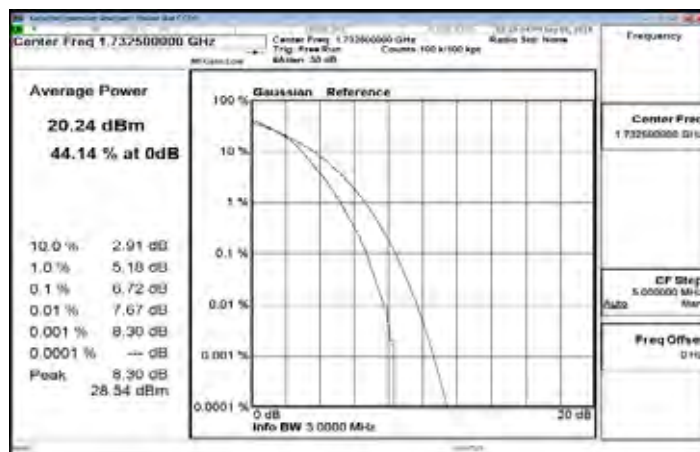
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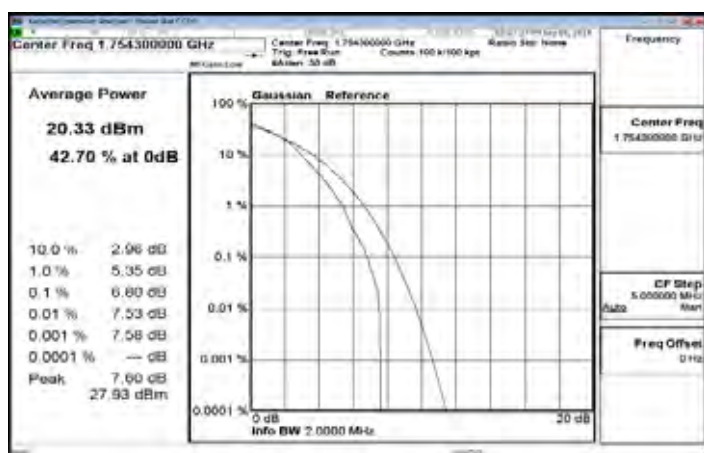
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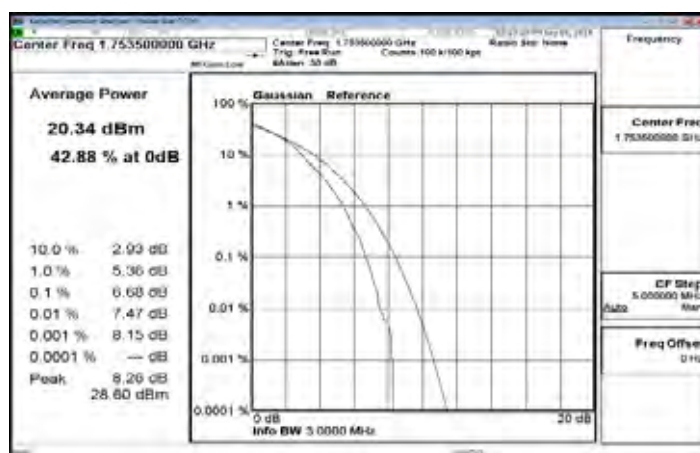
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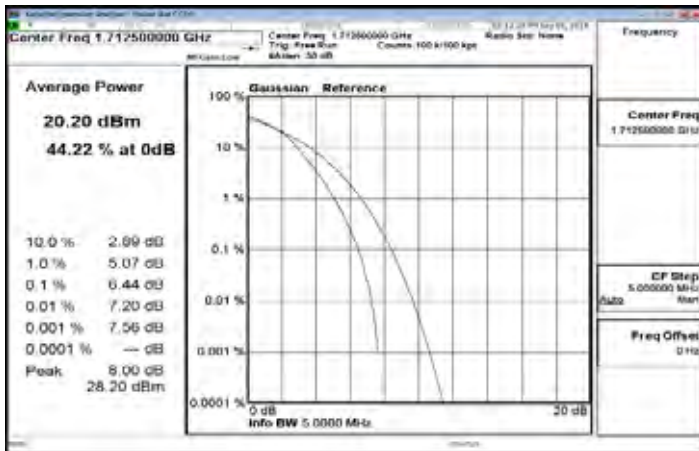
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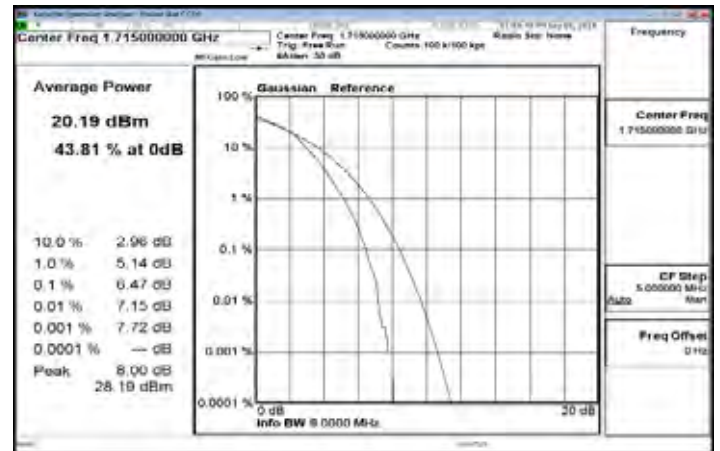
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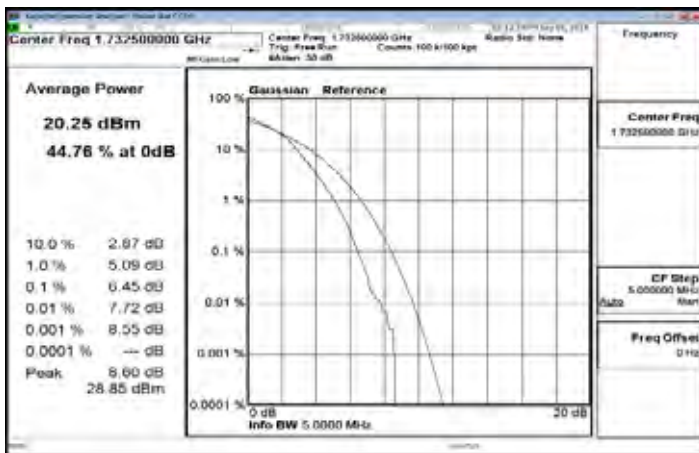
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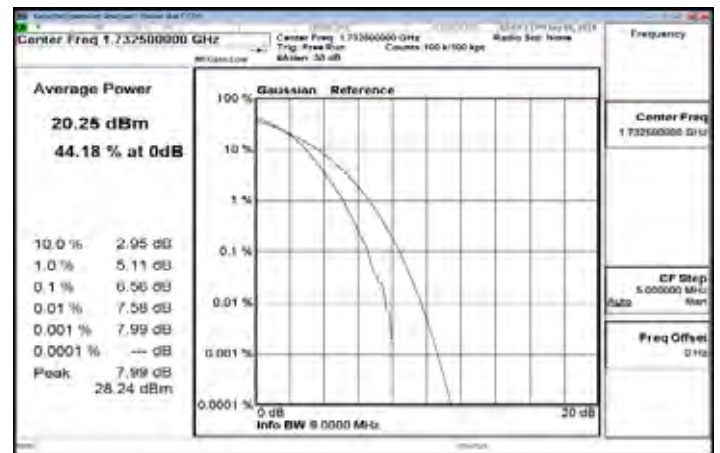
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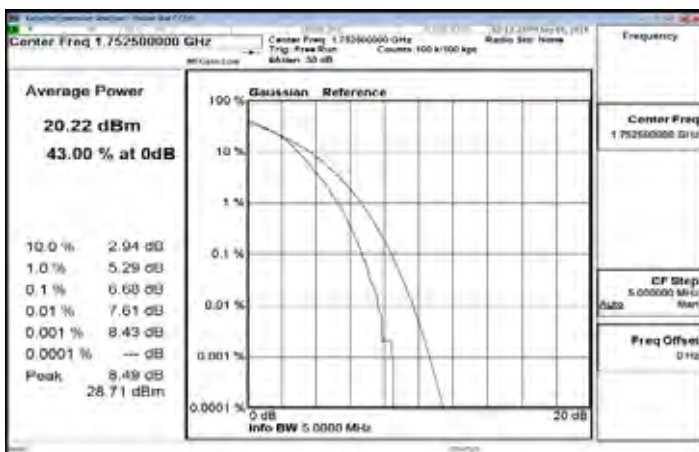
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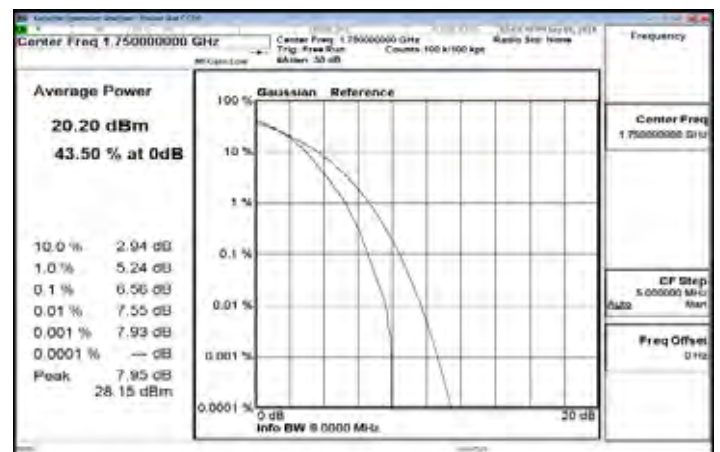
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LTE_Band4_10MHz_16QAM_50_0_HighCH20350-1750



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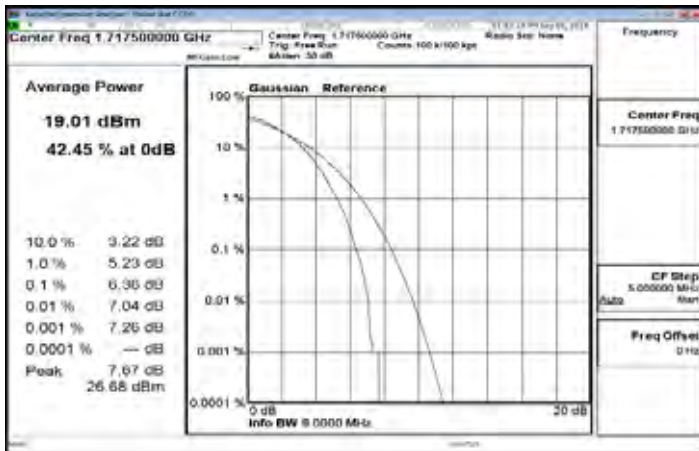
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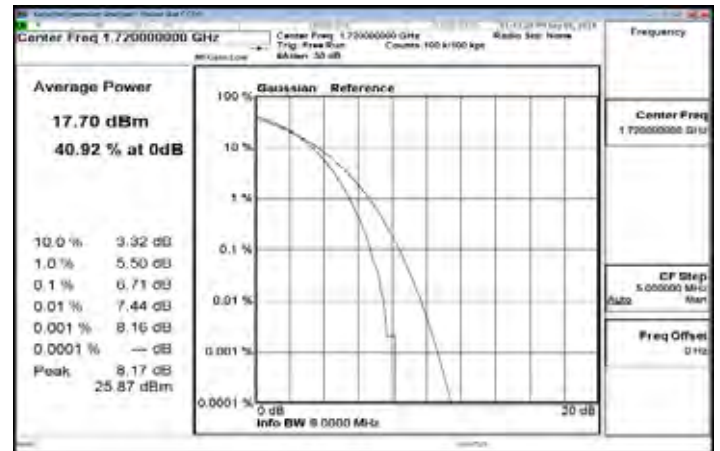
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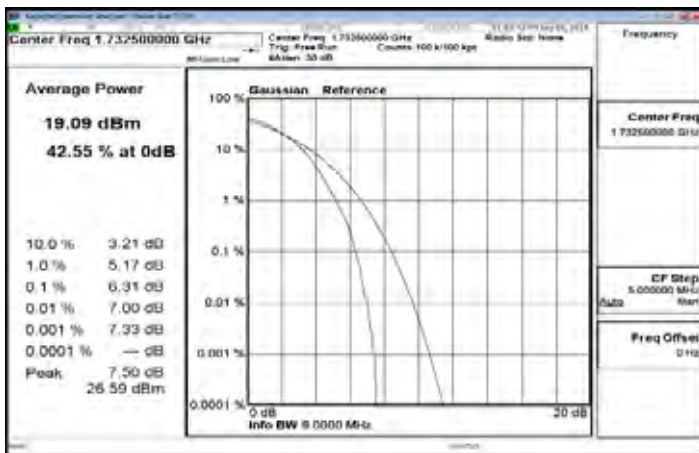
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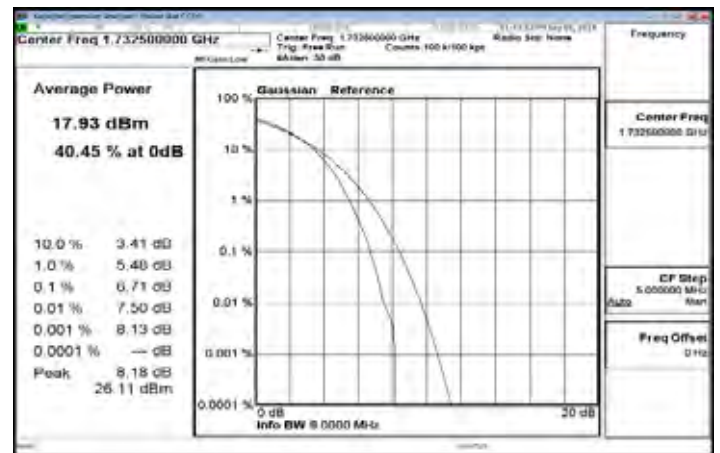
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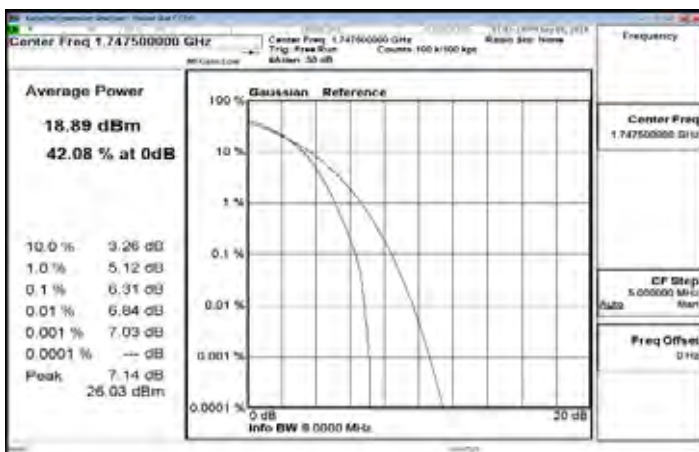
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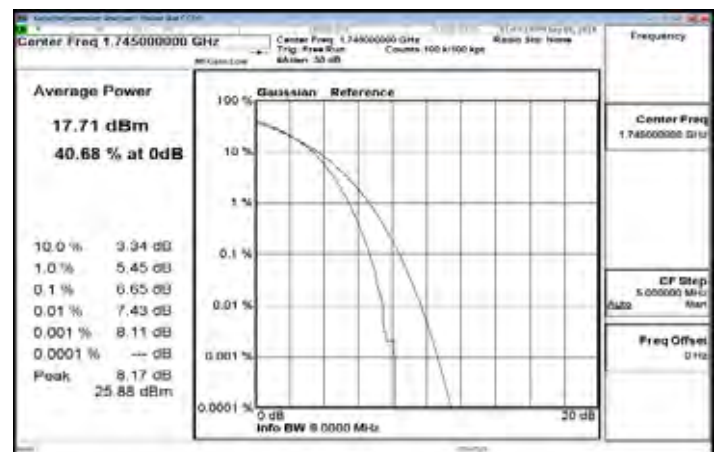
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LTE_Band4_20MHz_16QAM_100_0_HighCH20300-1745



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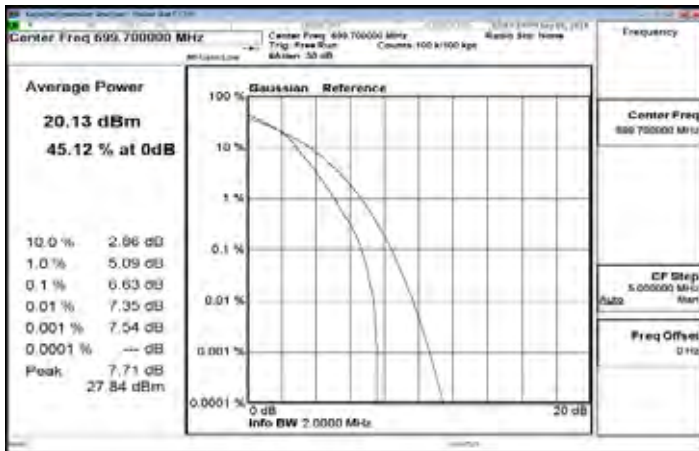
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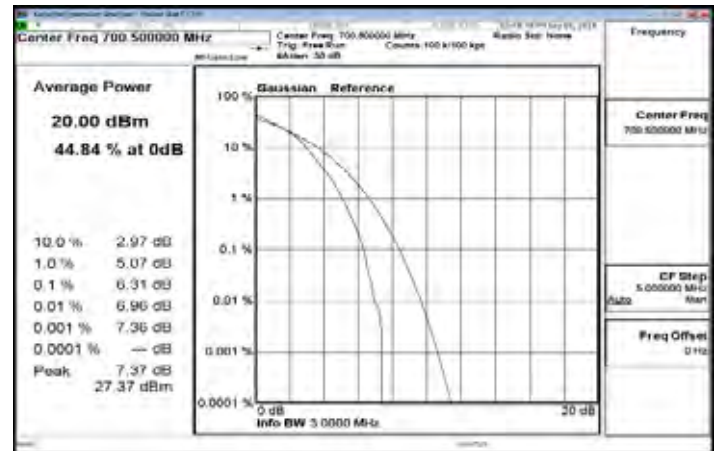
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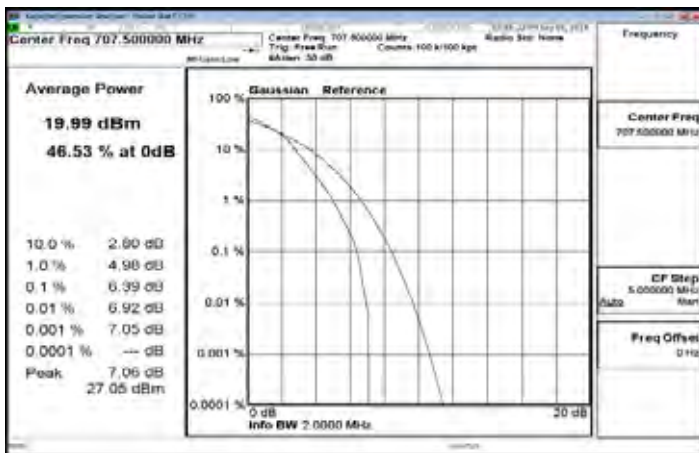
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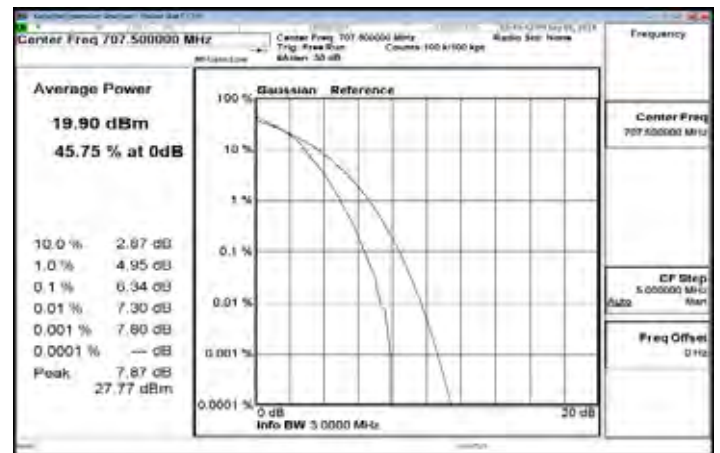
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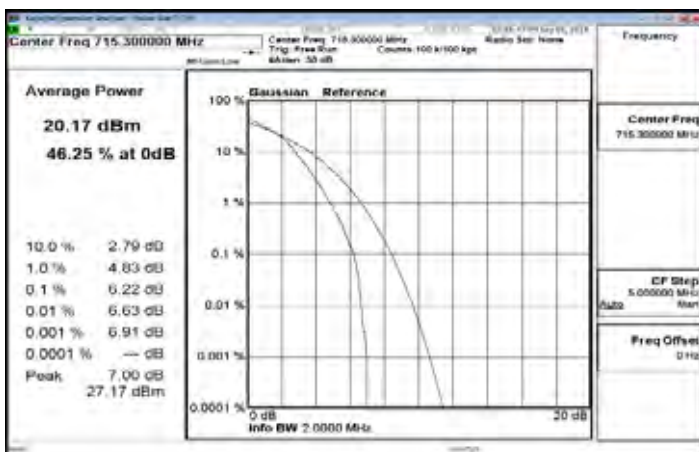
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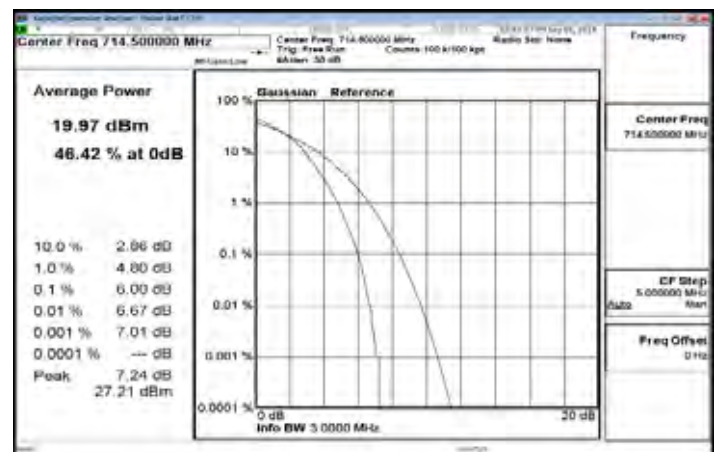
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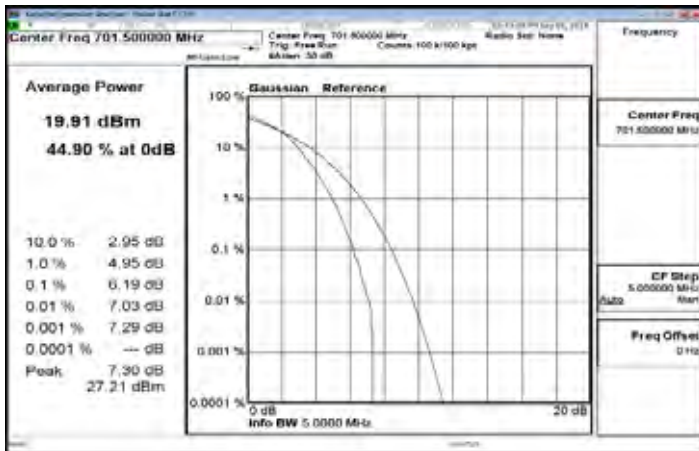
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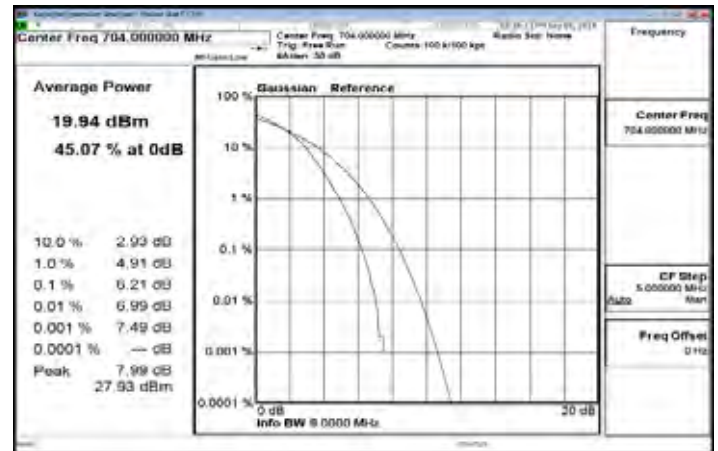
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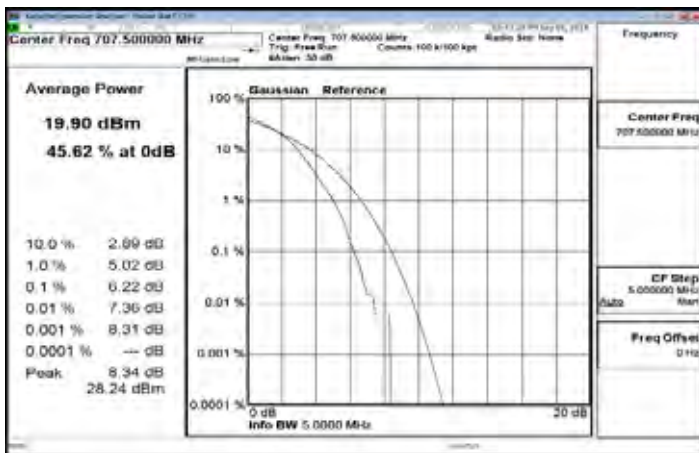
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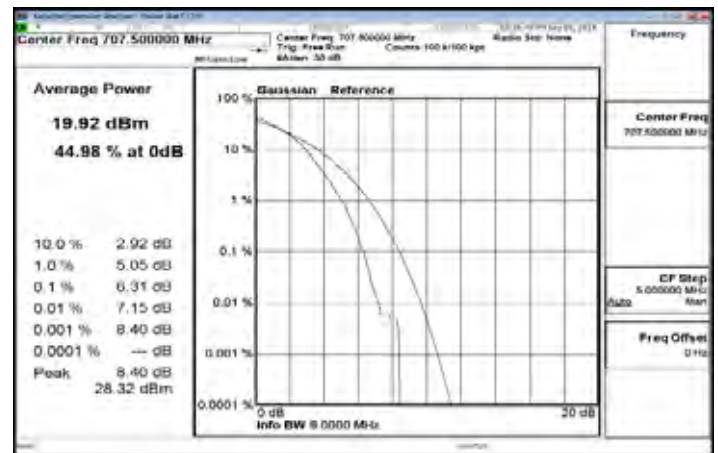
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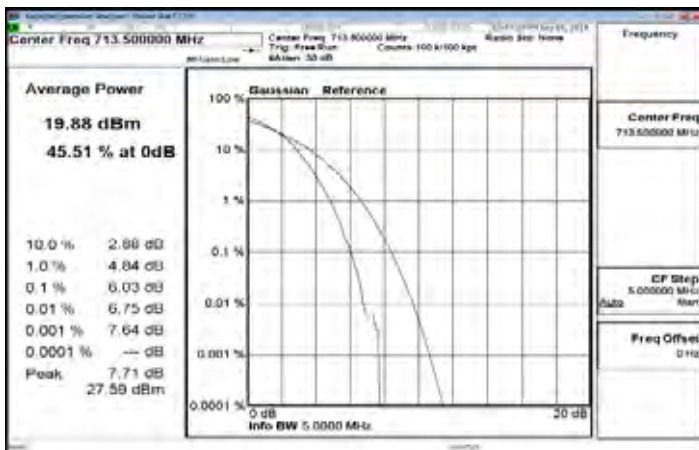
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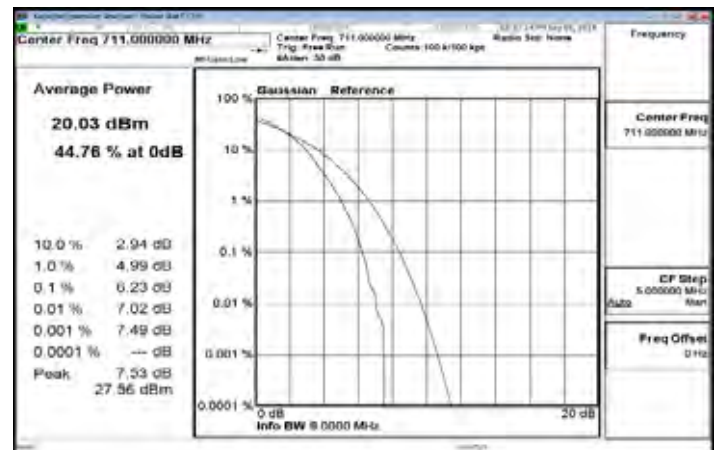
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LTE_Band12_10MHz_16QAM_50_0_HighCH23130-711



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12. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

12.1. FCC Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-15000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equipment power density

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12.2. ISED Standard Applicable

This submittal(s) (test report) is intended to comply with RSS-102 issue 5 Radio frequency Radiation Exposure requirement.

This is a Mobile device, the MPE is required.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field Strength (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10 ⁻⁴ $f^{0.5}$	6.67 x 10 ⁻⁵ f	616000/ $f^{1.2}$

F = frequency in MHz

* = Based on nerve stimulation (NS).

** = Based on specific absorption rate (SAR)

Maximum Permissible Exposure (MPE) Evaluation

Prediction of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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12.3. Power Density Calculation (Worst Case)

FCC								ISED		
Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Output Power EIRP (dBm)	Output Power EIRP (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Pass / Fail	Power Density (W/cm ²)	Limit (W/cm ²)	Pass / Fail
LTE B2	1880.00	20	24.30	269.15	0.043	1.000	Pass	0.426	4.526	Pass
LTE B4	1747.50	20	24.50	281.84	0.047	1.000	Pass	0.467	4.305	Pass
LTE B12	714.50	20	19.41	87.30	0.035	1.000	Pass	0.345	2.336	Pass

Note: WWAN and WLAN may not transmit simultaneously, and Bluetooth and WLAN Aux share the same antenna path, however BT and WLAN transmitter can't be operating at the same time. Collocated/coexisted MPE is exclude for MPE evaluation.

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