

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO

FCC PART 22 SUBPART H and FCC PART 24 SUBPART E and PART 27 SUBPART B,
C & SUBPART L, AND INDUSTRY CANADA RSS-130, RSS-132, RSS-133,
RSS-139 REQUIREMENT

OF

Applicant: Moxa Inc.
4F, No.135, Lane 235, BAOQIAO Rd. XINDIAN DIST.,
NEW TAIPEI CITY 231 TAIWAN
Product Name: Arm-based platform
Brand Name: Moxa
Model No.: UC-2116-T-LX, UC-2114-T-LX
Model Difference: UC-2116-T-LX with GPS,
UC-2114-T-LX without GPS
FCC ID: SLE-UC2100W
IC: 9335A-UC2100W
Report Number: E2/2018/A0020
FCC Rule Part: 2, 22H & 24E & 27B, C & L
IC Rule Part: RSS 130 Issue 1 Oct. 2013, RSS 132 Issue 3 Jan. 2013,
RSS 133 Issue 6 Jan. 2018, RSS 139 Issue 3 Jul. 2015,
Issue Date: Dec. 07, 2018
Date of Test: Oct. 17, 2018 ~ Dec. 03, 2018
Date of EUT Received: Oct. 17, 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: Aken Huang
Aken Huang / Engineer

Approved By: Jazz Huang
Jazz Huang / Asst. Supervisor



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Revision History

Report Number	Revision	Description	Effectuated Page	Issue Date	Revised By
E2/2018/A0020	Rev.00	Initial creation of document	All	Dec. 07, 2018	Yuri Tsai

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1. GENERAL PRODUCT INFORMATION

1.1. Product Description

General:

Product Name:	Arm-based platform
Brand Name:	Moxa
Model No.:	UC-2116-T-LX, UC-2114-T-LX
Model Difference:	UC-2116-T-LX with GPS UC-2114-T-LX without GPS
Product SW/HW version:	N/A / N/A
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

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1.2. LTE: Cellular Phone Standards Frequency Range

LTE Band	BW (MHz)	Operation Frequency (MHz)			LTE Band	BW (MHz)	Operation Frequency (MHz)					
2	1.4	1850.7	-	1909.3	13	5	779.5	-	784.5			
	3	1851.5	-	1908.5		10	782					
	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								
5	1.4	824.7	-	848.3								
	3	825.5	-	847.5								
	5	826.5	-	846.5								
	10	829.0	-	844.0								
12	1.4	699.7	-	715.3								
	3	700.5	-	714.5								
	5	701.5	-	713.5								
	10	704.0	~	711.0								

Antenna Designation

Vendor	Type	Antenna Part No.	Modulation	Frequency (MHz)			Peak Antenna Gain (dBi)
MOXA	Dipole	ANT-LTEUS-ASM-01	LTE Band 2	1850	~	1910	2
			LTE Band 4	1710	~	1755	2
			LTE Band 5	824	~	849	1
			LTE Band 12	699	~	716	1
			LTE Band 13	777	~	787	1

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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	24.86	EIRP	0.306	1M08G7D
	1.4	16QAM	24.52	EIRP	0.283	1M10D7W
	3	QPSK	24.69	EIRP	0.294	1M09G7D
	3	16QAM	24.62	EIRP	0.290	1M08D7W
	5	QPSK	24.72	EIRP	0.296	1M10G7D
	5	16QAM	24.71	EIRP	0.296	1M09D7W
	10	QPSK	24.40	EIRP	0.275	1M10G7D
	10	16QAM	24.34	EIRP	0.272	1M11D7W
	15	QPSK	24.68	EIRP	0.294	1M13G7D
	15	16QAM	25.07	EIRP	0.321	1M12D7W
	20	QPSK	24.81	EIRP	0.303	1M12G7D
	20	16QAM	25.02	EIRP	0.318	1M12D7W

LTE Band	BW (MHz)	Modulation	ERP / EIRP (dBm)		(W)	Type of Emission
4	1.4	QPSK	24.67	EIRP	0.293	1M10G7D
	1.4	16QAM	24.61	EIRP	0.289	1M08D7W
	3	QPSK	24.89	EIRP	0.308	1M08G7D
	3	16QAM	24.79	EIRP	0.301	1M08D7W
	5	QPSK	24.78	EIRP	0.301	1M09G7D
	5	16QAM	24.84	EIRP	0.305	1M10D7W
	10	QPSK	24.77	EIRP	0.300	1M10G7D
	10	16QAM	24.92	EIRP	0.310	1M11D7W
	15	QPSK	24.75	EIRP	0.299	1M12G7D
	15	16QAM	25.05	EIRP	0.320	1M12D7W
	20	QPSK	24.91	EIRP	0.310	1M12G7D
	20	16QAM	25.27	EIRP	0.337	1M12D7W

LTE Band	BW (MHz)	Modulation	ERP / EIRP (dBm)		(W)	Type of Emission
5	1.4	QPSK	21.36	ERP	0.137	1M08G7D
	1.4	16QAM	21.31	ERP	0.135	1M08D7W
	3	QPSK	21.47	ERP	0.140	1M08G7D
	3	16QAM	21.33	ERP	0.136	1M08D7W
	5	QPSK	21.31	ERP	0.135	1M09G7D
	5	16QAM	21.39	ERP	0.138	1M09D7W
	10	QPSK	21.35	ERP	0.136	1M10G7D
	10	16QAM	21.31	ERP	0.135	1M11D7W
	5	QPSK	22.10	ERP	0.162	1M09G7D
	5	16QAM	22.04	ERP	0.160	1M10D7W
	10	QPSK	21.84	ERP	0.153	1M09G7D
	10	16QAM	22.02	ERP	0.159	1M12D7W

LTE Band	BW (MHz)	Modulation	ERP / EIRP (dBm)		(W)	Type of Emission
12	1.4	QPSK	21.82	ERP	0.152	1M08G7D
	1.4	16QAM	21.71	ERP	0.148	1M08D7W
	3	QPSK	21.84	ERP	0.153	1M09G7D
	3	16QAM	21.76	ERP	0.150	1M08D7W
	5	QPSK	22.01	ERP	0.159	1M09G7D
	5	16QAM	21.87	ERP	0.154	1M10D7W
	10	QPSK	21.82	ERP	0.152	1M09G7D
	10	16QAM	21.78	ERP	0.151	1M11D7W

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1.4 Test Methodology of Applied Standards

CC 47 CFR Part 2, 22, 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-132 Issue 3 Jan. 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.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333 code 0513)

FCC Registration Numbers are: 735305 / TW0002

Canada Registration Number: 4620E-1

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

2.3 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.

2.4 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.

2.5 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 placed on a 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.

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2.6 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.

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)	3.9	10	13.9
High Band (Above 1 GHz)	3.6	10	13.6

2.7 Final Amplifier Voltage and Current Information:

Cat M1

Test Mode	DC voltage (V)	DC current (mA)
LTE Band 2		0.399
LTE Band 4		0.397
LTE Band 5		0.400
LTE Band 12		0.397
LTE Band 13		0.396

NB-IOT

Test Mode	DC voltage (V)	DC current (mA)
LTE Band 2		0.391
LTE Band 4		0.397
LTE Band 5		0.399
LTE Band 12		0.397
LTE Band 13		0.394

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2.8 Configuration of Tested System

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

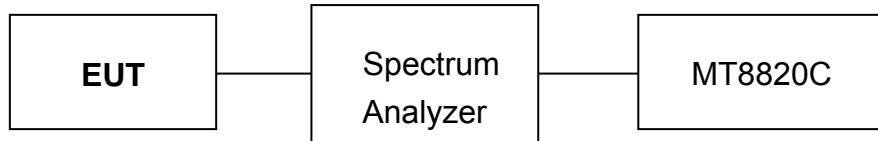
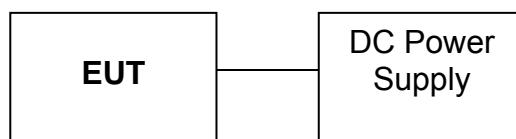


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)



Remote Side



Table 2-1 Equipment Used in

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Radio Communication Analyzer	Anritsu	MT8821C	6261786084	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)) §22.913(a)(5) §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) §5.4 (RSS-132) §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 §22.917(a) §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) §5.4 (RSS-132) §6.5 (RSS-133) §6.6 (RSS-139)	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §22.917(a) §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) §5.4 (RSS-132) §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) §27.50((B)	§4.4 (RSS-130) §5.4 (RSS-132) §6.4 (RSS-133) §6.5 (RSS-139)	Peak to Average Ratio	Compliant
§2.1055(a)(1) §22.355 §24.235 §27.54	§6.11 (RSS-Gen Issue 5) §4.3 (RSS-130) §5.4 (RSS-132) §6.3 (RSS-133) §6.4 (RSS-139)	Frequency Stability	Compliant

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4 DESCRIPTION OF TEST MODES

4.3 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	E2 Mode
LTE Band 4	E2 Mode
LTE Band 5	E2 Mode
LTE Band 12	E2 Mode
LTE Band 13	E2 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 Offset
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offset
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offset
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offset
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offset
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offset
FREQUENCY STABILITY	18650 to 19150	18900	10MHz	QPSK,	Full RB
OCCUPIED BANDWIDTH	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 RB Offes Full RB
	18615 to 19185	18615, 19185	3MHz	QPSK,	1 RB/ 0 RB Offest Full RB
	18625 to 19175	18625, 19175	5MHz	QPSK,	1 RB/ 0 RB Offest Full RB
	18650 to 19150	18650, 19150	10MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	18675 to 19125	18675, 19125	15MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	18700 to 19100	18700, 19100	20MHz	QPSK,	1 RB/ 0 RB Offes Full RB
CONDUCED EMISSION	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK,	1 RB, 0 RB Offset
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK,	1 RB, 0 RB Offset
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK,	1 RB, 0 RB Offset
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK,	1 RB, 0 RB Offset
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK,	1 RB, 0 RB Offset
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK,	1 RB, 0 RB Offset
RADIATED EMISSION	18700 to 19100	18700, 18900, 19100	20MHz	QPSK	1 RB, 0 RB Offset

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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 Offset
	19965 to 22385	19965, 20175, 22385	3MHz	QPSK, 16QAM	1 RB/ 0.5 RB Offset
	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB/ 0.5 RB Offset
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB/ 0.5 RB Offset
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB/ 0.5 RB Offset
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB/ 0.5 RB Offset
FREQUENCY STABILITY	20000 to 20350	20175	10MHz	QPSK,	Full RB
OCCUPIED BANDWIDTH	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 RB Offes Full RB
	19965 to 22385	19965, 22385	3MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	19975 to 20375	19975, 20375	5MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	20000 to 20350	20000, 20350	10MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	20025 to 20325	20025, 20325	15MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	20050 to 20300	20050, 20300	20MHz	QPSK,	1 RB/ 0 RB Offes Full RB
CONDCUDETET 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 5 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
ERP / EIRP	20470 to 20643	20470, 20525, 20643	1.4MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
FREQUENCY STABILITY	20450 to 20600	20525	10MHz	QPSK,	Full RB
OCCUPIED BANDWIDTH	20470 to 20643	20470, 20525, 20643	1.4MHz	QPSK, 16QAM	Full RB
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM	Full RB
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM	Full RB
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK, 16QAM	Full RB
PEAK TO AVERAGE RATIO	20470 to 20643	20470, 20525, 20643	1.4MHz	16QAM	Full RB
	20415 to 20635	20415, 20525, 20635	3MHz	16QAM	Full RB
	20425 to 20625	20425, 20525, 20625	5MHz	16QAM	Full RB
	20450 to 20600	20450, 20525, 20600	10MHz	16QAM	Full RB
BAND EDGE	20470 to 20643	20470, 20643	1.4MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	20415 to 20635	20415, 20635	3MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	20425 to 20625	20425, 20625	5MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	20450 to 20600	20450, 20600	10MHz	QPSK,	1 RB/ 0 RB Offes Full RB
CONDUCTED EMISSION	20470 to 20643	20470, 20525, 20643	1.4MHz	QPSK,	1 RB, 0 RB Offest
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK,	1 RB, 0 RB Offest
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK,	1 RB, 0 RB Offest
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK,	1 RB, 0 RB Offest
RADIATED EMISSION	20450 to 20600	20450, 20525, 20600	10MHz	16QAM	1 RB, 0 RB Offest

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LTE Band 12 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
ERP / EIRP	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/ 0,5 RB Offest
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	1 RB/ 0,5 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 RB Offes Full RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK,	1 RB/ 0 RB Offes Full RB
CONDUCTED 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	23035 to 23155	23035, 23095, 23155	5MHz	QPSK	1 RB, 0 RB Offest

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LTE Band 13 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
ERP / EIRP	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
	23230	23230	10MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
FREQUENCY STABILITY	23230	23230	10MHz	QPSK,	Full RB
OCCUPIED BANDWIDTH	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	Full RB
	23230	23230	10MHz	QPSK, 16QAM	Full RB
PEAK TO AVERAGE RATIO	23205 to 23255	23205, 23230, 23255	5MHz	16QAM	Full RB
	23230	23230	10MHz	16QAM	Full RB
BAND EDGE	23205 to 23255	23205, 23255	5MHz	QPSK,	1 RB/ 0 RB Offes Full RB
	23230	23230	10MHz	QPSK,	1 RB/ 0 RB Offes Full RB
CONDUCTED EMISSION	23205 to 23255	23205, 23230, 23255	5MHz	QPSK,	1 RB, 0 RB Offest
	23230	23230	10MHz	QPSK,	1 RB, 0 RB Offest
RADIATED EMISSION	23205 to 23255	23205, 23230, 23255	5MHz	QPSK	1 RB/ 0 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

6.3 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 22.913(a) (5) mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

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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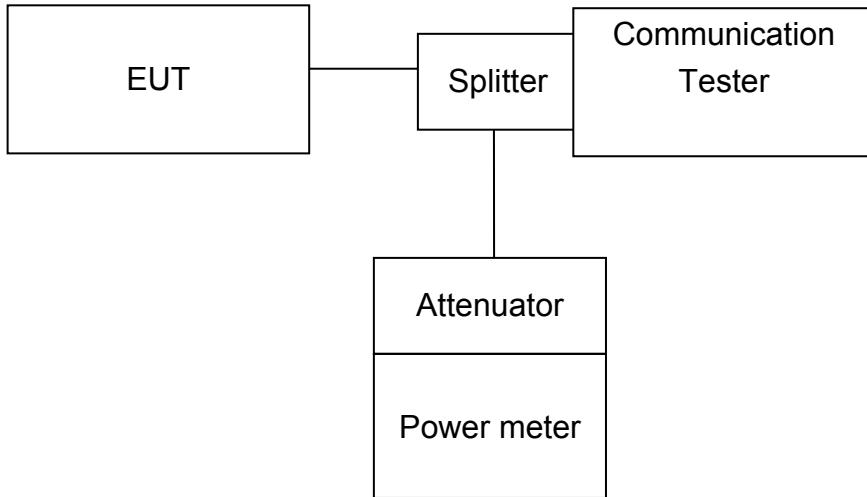
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6.4 Test Set-up



Note: Measurement setup for testing on Antenna connector

6.5 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, (WCDMA/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

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

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

PMes = 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.

6.6 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	MY5144011 3	2018/06/20	2019/06/19
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	2018/01/03	2019/01/02
DC Power Supply	Agilent	E3640A	MY5314000 6	2018/05/30	2019/05/29
Attenuator	Marvelous	MVE2213-1 0	RF30	2017/12/26	2018/12/25
Splitter	Woken	DOM35LW 1A2	RF36	2017/12/26	2018/12/25

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6.7 Measurement Result

RF Conducted Output Power

Cat M1

Antenna gain (dBi) 2

M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	18607	1850.7	QPSK	1	0	0	22.65	24.65	33	-8.35
				1	5	0	22.62	24.62	33	-8.38
				6	0	0	20.75	22.75	33	-10.25
	18900	1880	QPSK	1	0	0	22.86	24.86	33	-8.14
				1	5	0	22.52	24.52	33	-8.48
				6	0	0	20.46	22.46	33	-10.54
	19193	1909.3	QPSK	1	0	0	22.49	24.49	33	-8.51
				1	5	0	22.28	24.28	33	-8.72
				6	0	0	20.49	22.49	33	-10.51
	18607	1850.7	16QAM	1	0	11	21.93	23.93	33	-9.07
				1	5	11	22.52	24.52	33	-8.48
				6	0	11	20.54	22.54	33	-10.46
	18900	1880	16QAM	1	0	11	21.84	23.84	33	-9.16
				1	5	11	21.21	23.21	33	-9.79
				6	0	11	20.48	22.48	33	-10.52
	19193	1909.3	16QAM	1	0	11	21.79	23.79	33	-9.21
				1	5	11	21.88	23.88	33	-9.12
				6	0	11	20.82	22.82	33	-10.18

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Antenna gain (dB) 2

M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	18615	1851.5	QPSK	1	0	0	22.69	24.69	33	-8.31
				1	5	0	22.45	24.45	33	-8.55
				6	0	0	20.70	22.70	33	-10.3
	18900	1880	QPSK	1	0	0	22.60	24.60	33	-8.4
				1	5	0	22.62	24.62	33	-8.38
				6	0	0	20.74	22.74	33	-10.26
	19185	1908.5	QPSK	1	0	0	22.36	24.36	33	-8.64
				1	5	0	22.57	24.57	33	-8.43
				6	0	0	20.50	22.50	33	-10.5
	18615	1851.5	16QAM	1	0	11	21.96	23.96	33	-9.04
				1	5	11	22.62	24.62	33	-8.38
				6	0	11	20.69	22.69	33	-10.31
	18900	1880	16QAM	1	0	11	21.98	23.98	33	-9.02
				1	5	11	21.99	23.99	33	-9.01
				6	0	11	20.55	22.55	33	-10.45
	19185	1908.5	16QAM	1	0	11	21.85	23.85	33	-9.15
				1	5	11	21.48	23.48	33	-9.52
				6	0	11	20.55	22.55	33	-10.45

Antenna gain (dB) 2

M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	18625	1852.5	QPSK	1	0	0	22.67	24.67	33	-8.33
				1	5	0	22.72	24.72	33	-8.28
				6	0	0	21.83	23.83	33	-9.17
	18900	1880	QPSK	1	0	0	22.45	24.45	33	-8.55
				1	5	0	22.51	24.51	33	-8.49
				6	0	0	20.73	22.73	33	-10.27
	19175	1907.5	QPSK	1	0	0	22.27	24.27	33	-8.73
				1	5	0	22.36	24.36	33	-8.64
				6	0	0	21.45	23.45	33	-9.55
	18625	1852.5	16QAM	1	0	11	22.71	24.71	33	-8.29
				1	5	11	22.51	24.51	33	-8.49
				6	0	11	21.06	23.06	33	-9.94
	18900	1880	16QAM	1	0	11	22.56	24.56	33	-8.44
				1	5	11	22.47	24.47	33	-8.53
				6	0	11	20.95	22.95	33	-10.05
	19175	1907.5	16QAM	1	0	11	22.28	24.28	33	-8.72
				1	5	11	22.34	24.34	33	-8.66
				6	0	11	20.87	22.87	33	-10.13

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Antenna gain (dB)

2

M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	18650	1855	QPSK	1	0	0	22.40	24.40	33	-8.6
				1	5	0	22.29	24.29	33	-8.71
				6	0	0	21.48	23.48	33	-9.52
	18900	1880	QPSK	1	0	0	22.26	24.26	33	-8.74
				1	5	0	22.28	24.28	33	-8.72
				6	0	0	21.59	23.59	33	-9.41
	19150	1905	QPSK	1	0	0	22.29	24.29	33	-8.71
				1	5	0	22.16	24.16	33	-8.84
				6	0	0	21.45	23.45	33	-9.55
	18650	1855	16QAM	1	0	11	22.31	24.31	33	-8.69
				1	5	11	22.28	24.28	33	-8.72
				6	0	11	21.87	23.87	33	-9.13
	18900	1880	16QAM	1	0	11	22.31	24.31	33	-8.69
				1	5	11	22.33	24.33	33	-8.67
				6	0	11	21.72	23.72	33	-9.28
	19150	1905	16QAM	1	0	11	22.34	24.34	33	-8.66
				1	5	11	22.16	24.16	33	-8.84
				6	0	11	21.74	23.74	33	-9.26

Antenna gain (dB)

2

M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15	18675	1857.5	QPSK	1	0	0	22.68	24.68	33	-8.32
				1	5	0	22.63	24.63	33	-8.37
				6	0	0	22.64	24.64	33	-8.36
	18900	1880	QPSK	1	0	0	22.35	24.35	33	-8.65
				1	5	0	22.31	24.31	33	-8.69
				6	0	0	22.48	24.48	33	-8.52
	19125	1902.5	QPSK	1	0	0	22.23	24.23	33	-8.77
				1	5	0	22.33	24.33	33	-8.67
				6	0	0	22.50	24.50	33	-8.5
	18675	1857.5	16QAM	1	0	11	22.60	24.60	33	-8.4
				1	5	11	22.31	24.31	33	-8.69
				6	0	11	23.07	25.07	33	-7.93
	18900	1880	16QAM	1	0	11	22.32	24.32	33	-8.68
				1	5	11	22.49	24.49	33	-8.51
				6	0	11	22.96	24.96	33	-8.04
	19125	1902.5	16QAM	1	0	11	22.24	24.24	33	-8.76
				1	5	11	22.30	24.30	33	-8.7
				6	0	11	22.92	24.92	33	-8.08

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Antenna gain (dB) 2

M1 Band 2_Uplink frequency band : 1850 to 1910 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20	18700	1860	QPSK	1	0	0	22.61	24.61	33	-8.39
				1	5	0	22.57	24.57	33	-8.43
				6	0	0	22.81	24.81	33	-8.19
	18900	1880	QPSK	1	0	0	22.49	24.49	33	-8.51
				1	5	0	22.76	24.76	33	-8.24
				6	0	0	22.67	24.67	33	-8.33
	19100	1900	QPSK	1	0	0	21.87	23.87	33	-9.13
				1	5	0	22.28	24.28	33	-8.72
				6	0	0	22.49	24.49	33	-8.51
	18700	1860	16QAM	1	0	11	22.66	24.66	33	-8.34
				1	5	11	22.76	24.76	33	-8.24
				6	0	11	23.02	25.02	33	-7.98
	18900	1880	16QAM	1	0	11	22.49	24.49	33	-8.51
				1	5	11	22.23	24.23	33	-8.77
				6	0	11	22.83	24.83	33	-8.17
	19100	1900	16QAM	1	0	11	22.30	24.30	33	-8.7
				1	5	11	22.25	24.25	33	-8.75
				6	0	11	22.58	24.58	33	-8.42

Antenna gain (dB) 2

M1 Band 4_Uplink frequency band : 1710 to 1755 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	19957	1710.7	QPSK	1	0	0	22.41	24.41	30	-5.59
				1	5	0	22.53	24.53	30	-5.47
				6	0	0	20.52	22.52	30	-7.48
	20175	1732.5	QPSK	1	0	0	22.67	24.67	30	-5.33
				1	5	0	22.61	24.61	30	-5.39
				6	0	0	20.71	22.71	30	-7.29
	20393	1754.3	QPSK	1	0	0	22.67	24.67	30	-5.33
				1	5	0	22.67	24.67	30	-5.33
				6	0	0	20.74	22.74	30	-7.26
	19957	1710.7	16QAM	1	0	11	21.99	23.99	30	-6.01
				1	5	11	22.61	24.61	30	-5.39
				6	0	11	20.48	22.48	30	-7.52
	20175	1732.5	16QAM	1	0	11	21.65	23.65	30	-6.35
				1	5	11	21.69	23.69	30	-6.31
				6	0	11	20.61	22.61	30	-7.39
	20393	1754.3	16QAM	1	0	11	21.92	23.92	30	-6.08
				1	5	11	21.64	23.64	30	-6.36
				6	0	11	20.61	22.61	30	-7.39

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Antenna gain (dBi)

2

M1 Band 4_Uplink frequency band : 1710 to 1755 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	19965	1711.5	QPSK	1	0	0	22.51	24.51	30	-5.49
				1	5	0	22.42	24.42	30	-5.58
				6	0	0	20.55	22.55	30	-7.45
	20175	1732.5	QPSK	1	0	0	22.79	24.79	30	-5.21
				1	5	0	22.79	24.79	30	-5.21
				6	0	0	20.76	22.76	30	-7.24
	20385	1753.5	QPSK	1	0	0	22.89	24.89	30	-5.11
				1	5	0	22.78	24.78	30	-5.22
				6	0	0	20.80	22.80	30	-7.2
	19965	1711.5	16QAM	1	0	11	21.99	23.99	30	-6.01
				1	5	11	22.79	24.79	30	-5.21
				6	0	11	20.35	22.35	30	-7.65
	20175	1732.5	16QAM	1	0	11	21.96	23.96	30	-6.04
				1	5	11	22.16	24.16	30	-5.84
				6	0	11	20.64	22.64	30	-7.36
	20385	1753.5	16QAM	1	0	11	21.95	23.95	30	-6.05
				1	5	11	21.92	23.92	30	-6.08
				6	0	11	20.58	22.58	30	-7.42

Antenna gain (dBi)

2

M1 Band 4_Uplink frequency band : 1710 to 1755 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	19975	1712.5	QPSK	1	0	0	22.33	24.33	30	-5.67
				1	5	0	22.39	24.39	30	-5.61
				6	0	0	21.54	23.54	30	-6.46
	20175	1732.5	QPSK	1	0	0	22.61	24.61	30	-5.39
				1	5	0	22.67	24.67	30	-5.33
				6	0	0	21.85	23.85	30	-6.15
	20375	1752.5	QPSK	1	0	0	22.73	24.73	30	-5.27
				1	5	0	22.78	24.78	30	-5.22
				6	0	0	21.90	23.90	30	-6.1
	19975	1712.5	16QAM	1	0	11	22.41	24.41	30	-5.59
				1	5	11	22.67	24.67	30	-5.33
				6	0	11	20.78	22.78	30	-7.22
	20175	1732.5	16QAM	1	0	11	22.59	24.59	30	-5.41
				1	5	11	22.64	24.64	30	-5.36
				6	0	11	20.74	22.74	30	-7.26
	20375	1752.5	16QAM	1	0	11	22.81	24.81	30	-5.19
				1	5	11	22.84	24.84	30	-5.16
				6	0	11	21.12	23.12	30	-6.88

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Antenna gain (dBi)

2

M1 Band 4_Uplink frequency band : 1710 to 1755 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	20000	1715	QPSK	1	0	0	22.33	24.33	30	-5.67
				1	5	0	22.34	24.34	30	-5.66
				6	0	0	21.55	23.55	30	-6.45
	20175	1732.5	QPSK	1	0	0	22.56	24.56	30	-5.44
				1	5	0	22.57	24.57	30	-5.43
				6	0	0	21.80	23.80	30	-6.2
	20375	1750	QPSK	1	0	0	22.68	24.68	30	-5.32
				1	5	0	22.77	24.77	30	-5.23
				6	0	0	21.84	23.84	30	-6.16
	20000	1715	16QAM	1	0	11	22.40	24.40	30	-5.6
				1	5	11	22.57	24.57	30	-5.43
				6	0	11	21.71	23.71	30	-6.29
	20175	1732.5	16QAM	1	0	11	22.54	24.54	30	-5.46
				1	5	11	22.55	24.55	30	-5.45
				6	0	11	21.94	23.94	30	-6.06
	20375	1750	16QAM	1	0	11	22.72	24.72	30	-5.28
				1	5	11	22.92	24.92	30	-5.08
				6	0	11	22.05	24.05	30	-5.95

Antenna gain (dBi)

2

M1 Band 4_Uplink frequency band : 1710 to 1755 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15	20025	1717.5	QPSK	1	0	0	22.65	24.65	30	-5.35
				1	5	0	22.28	24.28	30	-5.72
				6	0	0	22.57	24.57	30	-5.43
	20175	1732.5	QPSK	1	0	0	22.61	24.61	30	-5.39
				1	5	0	22.57	24.57	30	-5.43
				6	0	0	22.63	24.63	30	-5.37
	20325	1747.5	QPSK	1	0	0	22.71	24.71	30	-5.29
				1	5	0	22.75	24.75	30	-5.25
				6	0	0	22.63	24.63	30	-5.37
	20025	1717.5	16QAM	1	0	11	22.51	24.51	30	-5.49
				1	5	11	22.57	24.57	30	-5.43
				6	0	11	22.73	24.73	30	-5.27
	20175	1732.5	16QAM	1	0	11	22.49	24.49	30	-5.51
				1	5	11	22.62	24.62	30	-5.38
				6	0	11	23.05	25.05	30	-4.95
	20325	1747.5	16QAM	1	0	11	22.76	24.76	30	-5.24
				1	5	11	22.80	24.80	30	-5.2
				6	0	11	22.83	24.83	30	-5.17

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Antenna gain (dBi)

2

M1 Band 4_Uplink frequency band : 1710 to 1755 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20	20050	1720	QPSK	1	0	0	22.38	24.38	30	-5.62
				1	5	0	22.43	24.43	30	-5.57
				6	0	0	22.66	24.66	30	-5.34
	20175	1732.5	QPSK	1	0	0	22.90	24.90	30	-5.1
				1	5	0	22.84	24.84	30	-5.16
				6	0	0	22.77	24.77	30	-5.23
	20300	1745	QPSK	1	0	0	22.87	24.87	30	-5.13
				1	5	0	22.91	24.91	30	-5.09
				6	0	0	22.72	24.72	30	-5.28
	20050	1720	16QAM	1	0	11	22.35	24.35	30	-5.65
				1	5	11	22.84	24.84	30	-5.16
				6	0	11	22.75	24.75	30	-5.25
	20175	1732.5	16QAM	1	0	11	23.27	25.27	30	-4.73
				1	5	11	23.01	25.01	30	-4.99
				6	0	11	22.96	24.96	30	-5.04
	20300	1745	16QAM	1	0	11	22.93	24.93	30	-5.07
				1	5	11	22.96	24.96	30	-5.04
				6	0	11	22.92	24.92	30	-5.08

Antenna gain (dBi)

1

M1 Band 5_Uplink frequency band : 824 to 849 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	20407	824.7	QPSK	1	0	0	22.32	21.17	23.32	38.45	-15.13
				1	5	0	22.28	21.13	23.28	38.45	-15.17
				6	0	0	20.53	19.38	21.53	38.45	-16.92
	20525	836.5	QPSK	1	0	0	22.36	21.21	23.36	38.45	-15.09
				1	5	0	22.46	21.31	23.46	38.45	-14.99
				6	0	0	20.56	19.41	21.56	38.45	-16.89
	20643	848.3	QPSK	1	0	0	22.51	21.36	23.51	38.45	-14.94
				1	5	0	22.47	21.32	23.47	38.45	-14.98
				6	0	0	20.61	19.46	21.61	38.45	-16.84
	20407	824.7	16QAM	1	0	11	21.30	20.15	22.30	38.45	-16.15
				1	5	11	22.46	21.31	23.46	38.45	-14.99
				6	0	11	20.39	19.24	21.39	38.45	-17.06
	20525	836.5	16QAM	1	0	11	21.34	20.19	22.34	38.45	-16.11
				1	5	11	21.69	20.54	22.69	38.45	-15.76
				6	0	11	20.51	19.36	21.51	38.45	-16.94
	20643	848.3	16QAM	1	0	11	21.77	20.62	22.77	38.45	-15.68
				1	5	11	21.74	20.59	22.74	38.45	-15.71
				6	0	11	20.58	19.43	21.58	38.45	-16.87

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Antenna gain (dB)

1

M1 Band 5_Uplink frequency band : 824 to 849 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	20415	825.5	QPSK	1	0	0	22.51	21.36	23.51	38.45	-14.94
				1	5	0	22.42	21.27	23.42	38.45	-15.03
				6	0	0	20.59	19.44	21.59	38.45	-16.86
	20525	836.5	QPSK	1	0	0	22.46	21.31	23.46	38.45	-14.99
				1	5	0	22.48	21.33	23.48	38.45	-14.97
				6	0	0	20.58	19.43	21.58	38.45	-16.87
	20635	847.5	QPSK	1	0	0	22.62	21.47	23.62	38.45	-14.83
				1	5	0	22.54	21.39	23.54	38.45	-14.91
				6	0	0	20.72	19.57	21.72	38.45	-16.73
	20415	825.5	16QAM	1	0	11	21.66	20.51	22.66	38.45	-15.79
				1	5	11	22.48	21.33	23.48	38.45	-14.97
				6	0	11	20.50	19.35	21.50	38.45	-16.95
	20525	836.5	16QAM	1	0	11	21.72	20.57	22.72	38.45	-15.73
				1	5	11	21.91	20.76	22.91	38.45	-15.54
				6	0	11	20.53	19.38	21.53	38.45	-16.92
	20635	847.5	16QAM	1	0	11	21.89	20.74	22.89	38.45	-15.56
				1	5	11	21.87	20.72	22.87	38.45	-15.58
				6	0	11	20.48	19.33	21.48	38.45	-16.97

Antenna gain (dB)

1

M1 Band 5_Uplink frequency band : 824 to 849 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	20425	826.5	QPSK	1	0	0	22.34	21.19	23.34	38.45	-15.11
				1	5	0	22.31	21.16	23.31	38.45	-15.14
				6	0	0	21.52	20.37	22.52	38.45	-15.93
	20525	836.5	QPSK	1	0	0	22.38	21.23	23.38	38.45	-15.07
				1	5	0	22.35	21.20	23.35	38.45	-15.1
				6	0	0	21.57	20.42	22.57	38.45	-15.88
	20625	846.5	QPSK	1	0	0	22.46	21.31	23.46	38.45	-14.99
				1	5	0	22.42	21.27	23.42	38.45	-15.03
				6	0	0	21.62	20.47	22.62	38.45	-15.83
	20425	826.5	16QAM	1	0	11	22.40	21.25	23.40	38.45	-15.05
				1	5	11	22.35	21.20	23.35	38.45	-15.1
				6	0	11	20.73	19.58	21.73	38.45	-16.72
	20525	836.5	16QAM	1	0	11	22.46	21.31	23.46	38.45	-14.99
				1	5	11	22.42	21.27	23.42	38.45	-15.03
				6	0	11	20.80	19.65	21.80	38.45	-16.65
	20625	846.5	16QAM	1	0	11	22.54	21.39	23.54	38.45	-14.91
				1	5	11	22.39	21.24	23.39	38.45	-15.06
				6	0	11	20.93	19.78	21.93	38.45	-16.52

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Antenna gain (dB)

1

M1 Band 5_Uplink frequency band : 824 to 849 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	20450	829	QPSK	1	0	0	22.34	21.19	23.34	38.45	-15.11
				1	5	0	22.35	21.20	23.35	38.45	-15.1
				6	0	0	21.23	20.08	22.23	38.45	-16.22
	20525	836.5	QPSK	1	0	0	20.91	19.76	21.91	38.45	-16.54
				1	5	0	22.41	21.26	23.41	38.45	-15.04
				6	0	0	21.58	20.43	22.58	38.45	-15.87
	20600	844	QPSK	1	0	0	22.38	21.23	23.38	38.45	-15.07
				1	5	0	22.50	21.35	23.50	38.45	-14.95
				6	0	0	21.56	20.41	22.56	38.45	-15.89
	20450	829	16QAM	1	0	11	22.39	21.24	23.39	38.45	-15.06
				1	5	11	22.41	21.26	23.41	38.45	-15.04
				6	0	11	21.75	20.60	22.75	38.45	-15.7
	20525	836.5	16QAM	1	0	11	22.46	21.31	23.46	38.45	-14.99
				1	5	11	22.37	21.22	23.37	38.45	-15.08
				6	0	11	21.80	20.65	22.80	38.45	-15.65
	20600	844	16QAM	1	0	11	22.34	21.19	23.34	38.45	-15.11
				1	5	11	22.46	21.31	23.46	38.45	-14.99
				6	0	11	21.38	20.23	22.38	38.45	-16.07

Antenna gain (dB)

1

M1 Band 12_Uplink frequency band : 699 to 716 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	23017	699.7	QPSK	1	0	0	22.83	21.68	23.83	34.77	-10.94
				1	5	0	22.93	21.78	23.93	34.77	-10.84
				6	0	0	20.86	19.71	21.86	34.77	-12.91
	23095	707.5	QPSK	1	0	0	22.89	21.74	23.89	34.77	-10.88
				1	5	0	22.86	21.71	23.86	34.77	-10.91
				6	0	0	20.94	19.79	21.94	34.77	-12.83
	23173	715.5	QPSK	1	0	0	22.97	21.82	23.97	34.77	-10.8
				1	5	0	22.94	21.79	23.94	34.77	-10.83
				6	0	0	21.04	19.89	22.04	34.77	-12.73
	23017	699.7	16QAM	1	0	11	22.21	21.06	23.21	34.77	-11.56
				1	5	11	22.86	21.71	23.86	34.77	-10.91
				6	0	11	20.83	19.68	21.83	34.77	-12.94
	23095	707.5	16QAM	1	0	11	22.16	21.01	23.16	34.77	-11.61
				1	5	11	22.21	21.06	23.21	34.77	-11.56
				6	0	11	20.77	19.62	21.77	34.77	-13
	23173	715.5	16QAM	1	0	11	22.34	21.19	23.34	34.77	-11.43
				1	5	11	22.28	21.13	23.28	34.77	-11.49
				6	0	11	20.79	19.64	21.79	34.77	-12.98

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Antenna gain (dB)

1

M1 Band 12_Uplink frequency band : 699 to 716 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	23025	700.5	QPSK	1	0	0	22.86	21.71	23.86	34.77	-10.91
				1	5	0	22.90	21.75	23.90	34.77	-10.87
				6	0	0	20.92	19.77	21.92	34.77	-12.85
	23095	707.5	QPSK	1	0	0	22.88	21.73	23.88	34.77	-10.89
				1	5	0	22.91	21.76	23.91	34.77	-10.86
				6	0	0	21.05	19.90	22.05	34.77	-12.72
	23165	714.5	QPSK	1	0	0	22.95	21.80	23.95	34.77	-10.82
				1	5	0	22.99	21.84	23.99	34.77	-10.78
				6	0	0	20.94	19.79	21.94	34.77	-12.83
	23025	700.5	16QAM	1	0	11	22.20	21.05	23.20	34.77	-11.57
				1	5	11	22.91	21.76	23.91	34.77	-10.86
				6	0	11	20.86	19.71	21.86	34.77	-12.91
	23095	707.5	16QAM	1	0	11	22.24	21.09	23.24	34.77	-11.53
				1	5	11	22.24	21.09	23.24	34.77	-11.53
				6	0	11	20.80	19.65	21.80	34.77	-12.97
	23165	714.5	16QAM	1	0	11	22.32	21.17	23.32	34.77	-11.45
				1	5	11	22.31	21.16	23.31	34.77	-11.46
				6	0	11	20.89	19.74	21.89	34.77	-12.88

Antenna gain (dB)

1

M1 Band 12_Uplink frequency band : 699 to 716 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	23035	701.5	QPSK	1	0	0	22.76	21.61	23.76	34.77	-11.01
				1	5	0	22.86	21.71	23.86	34.77	-10.91
				6	0	0	21.91	20.76	22.91	34.77	-11.86
	23095	707.5	QPSK	1	0	0	22.89	21.74	23.89	34.77	-10.88
				1	5	0	22.88	21.73	23.88	34.77	-10.89
				6	0	0	22.04	20.89	23.04	34.77	-11.73
	23155	713.5	QPSK	1	0	0	22.88	21.73	23.88	34.77	-10.89
				1	5	0	23.16	22.01	24.16	34.77	-10.61
				6	0	0	22.01	20.86	23.01	34.77	-11.76
	23035	701.5	16QAM	1	0	11	22.76	21.61	23.76	34.77	-11.01
				1	5	11	22.88	21.73	23.88	34.77	-10.89
				6	0	11	21.21	20.06	22.21	34.77	-12.56
	23095	707.5	16QAM	1	0	11	23.01	21.86	24.01	34.77	-10.76
				1	5	11	22.95	21.80	23.95	34.77	-10.82
				6	0	11	21.23	20.08	22.23	34.77	-12.54
	23155	713.5	16QAM	1	0	11	22.96	21.81	23.96	34.77	-10.81
				1	5	11	23.02	21.87	24.02	34.77	-10.75
				6	0	11	21.21	20.06	22.21	34.77	-12.56

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Antenna gain (dB)

1

M1 Band 12_Uplink frequency band : 699 to 716 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	23060	704	QPSK	1	0	0	22.80	21.65	23.80	34.77	-10.97
				1	5	0	22.84	21.69	23.84	34.77	-10.93
				6	0	0	22.05	20.90	23.05	34.77	-11.72
	23095	707.5	QPSK	1	0	0	22.78	21.63	23.78	34.77	-10.99
				1	5	0	22.91	21.76	23.91	34.77	-10.86
				6	0	0	22.02	20.87	23.02	34.77	-11.75
	23130	711	QPSK	1	0	0	22.94	21.79	23.94	34.77	-10.83
				1	5	0	22.97	21.82	23.97	34.77	-10.8
				6	0	0	21.98	20.83	22.98	34.77	-11.79
	23060	704	16QAM	1	0	11	22.78	21.63	23.78	34.77	-10.99
				1	5	11	22.91	21.76	23.91	34.77	-10.86
				6	0	11	22.19	21.04	23.19	34.77	-11.58
	23095	707.5	16QAM	1	0	11	22.65	21.50	23.65	34.77	-11.12
				1	5	11	22.79	21.64	23.79	34.77	-10.98
				6	0	11	22.26	21.11	23.26	34.77	-11.51
	23130	711	16QAM	1	0	11	22.91	21.76	23.91	34.77	-10.86
				1	5	11	22.93	21.78	23.93	34.77	-10.84
				6	0	11	22.23	21.08	23.23	34.77	-11.54

Antenna gain (dB)

1

M1 Band 13_Uplink frequency band : 777 to 787 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	23205	779.5	QPSK	1	0	0	22.90	21.75	23.90	34.77	-10.87
				1	5	0	22.93	21.78	23.93	34.77	-10.84
				6	0	0	21.97	20.82	22.97	34.77	-11.8
	23230	782	QPSK	1	0	0	23.01	21.86	24.01	34.77	-10.76
				1	5	0	23.05	21.90	24.05	34.77	-10.72
				6	0	0	22.10	20.95	23.10	34.77	-11.67
	23255	784.5	QPSK	1	0	0	23.01	21.86	24.01	34.77	-10.76
				1	5	0	23.25	22.10	24.25	34.77	-10.52
				6	0	0	22.11	20.96	23.11	34.77	-11.66
	23205	779.5	16QAM	1	0	11	23.17	22.02	24.17	34.77	-10.6
				1	5	11	23.05	21.90	24.05	34.77	-10.72
				6	0	11	21.27	20.12	22.27	34.77	-12.5
	23230	782	16QAM	1	0	11	23.19	22.04	24.19	34.77	-10.58
				1	5	11	23.12	21.97	24.12	34.77	-10.65
				6	0	11	21.43	20.28	22.43	34.77	-12.34
	23255	784.5	16QAM	1	0	11	23.19	22.04	24.19	34.77	-10.58
				1	5	11	23.12	21.97	24.12	34.77	-10.65
				6	0	11	21.11	19.96	22.11	34.77	-12.66

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Antenna gain (dBi)

1

M1 Band 13_Uplink frequency band : 777 to 787 MHz											
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB allocation	RB Start	Index	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	23230	782	QPSK	1	0	0	22.99	21.84	23.99	34.77	-10.78
				1	5	0	22.98	21.83	23.98	34.77	-10.79
				6	0	0	21.97	20.82	22.97	34.77	-11.8
	23230	782	16QAM	1	0	11	23.17	22.02	24.17	34.77	-10.6
				1	5	11	23.04	21.89	24.04	34.77	-10.73
				6	0	11	22.29	21.14	23.29	34.77	-11.48

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NBIoT

Gain: 2

LTE NB-IoT Band 2

Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure	
					Power(Avg)	EIRP(dBm)
18601	1850.1	BPSK	3.75	1@0	21.7	23.7
				1@47	21.73	23.73
		BPSK	15	1@11	22.03	22.03
		QPSK	15	1@0	21.89	23.89
				1@11	21.99	23.99
				12@0	20.23	22.23
18900	1880	BPSK	3.75	1@0	21.75	23.75
				1@47	21.77	23.77
		BPSK	15	1@11	22.25	22.25
		QPSK	15	1@0	22.16	24.16
				1@11	22.2	24.2
				12@0	20.43	22.43
19199	1909.9	BPSK	3.75	1@0	21.61	23.61
				1@47	21.64	23.64
		BPSK	15	1@11	22.37	22.37
		QPSK	15	1@0	21.95	23.95
				1@11	22.27	24.27
				12@0	20.37	22.37

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Gain: 2

LTE NB-IoT Band 4

Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure	
					Power	EIRP(W)
19951	1710.1	BPSK	3.75	1@0	21.92	23.92
				1@47	21.89	23.89
		BPSK	15	1@11	22.34	22.34
		QPSK	15	1@0	22.14	24.14
				1@11	22.23	24.23
				12@0	20.52	22.52
20175	1732.5	BPSK	3.75	1@0	21.94	23.94
				1@47	21.96	23.96
		BPSK	15	1@11	22.31	22.31
		QPSK	15	1@0	22.24	24.24
				1@11	22.18	24.18
				12@0	20.56	22.56
20399	1754.9	BPSK	3.75	1@0	21.8	23.8
				1@47	21.87	23.87
		BPSK	15	1@11	22.07	22.07
		QPSK	15	1@0	21.89	23.89
				1@11	21.94	23.94
				12@0	20.35	22.35

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Gain: 1

LTE NB-IoT Band 5						
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure	
					Power	EIRP(W)
20401	824.1	BPSK	3.75	1@0	21.91	22.91
				1@47	21.9	22.9
		BPSK	15	1@11	22.17	22.17
		QPSK	15	1@0	22.04	23.04
				1@11	22.09	23.09
				12@0	20.24	21.24
20525	836.5	BPSK	3.75	1@0	21.89	22.89
				1@47	21.92	22.92
		BPSK	15	1@11	22.46	22.46
		QPSK	15	1@0	22.24	23.24
				1@11	22.3	23.3
				12@0	20.45	21.45
20649	848.9	BPSK	3.75	1@0	22.05	23.05
				1@47	22.1	23.1
		BPSK	15	1@11	22.47	22.47
		QPSK	15	1@0	22.7	23.7
				1@11	22.32	23.32
				12@0	20.47	21.47

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Gain: 1

LTE NB-IoT Band 12						
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure	
					Power	EIRP(W)
23011	699.1	BPSK	3.75	1@0	22.38	23.38
				1@47	22.38	23.38
		BPSK	15	1@11	22.71	22.71
		QPSK	15	1@0	22.55	23.55
				1@11	22.6	23.6
				12@0	20.95	21.95
23095	707.5	BPSK	3.75	1@0	22.37	23.37
				1@47	22.39	23.39
		BPSK	15	1@11	22.73	22.73
		QPSK	15	1@0	22.6	23.6
				1@11	22.66	23.66
				12@0	20.97	21.97
23179	715.9	BPSK	3.75	1@0	22.57	23.57
				1@47	22.57	23.57
		BPSK	15	1@11	22.82	22.82
		QPSK	15	1@0	22.65	23.65
				1@11	22.75	23.75
				12@0	21.03	22.03

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Gain: 1

LTE NB-IoT Band 13

Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure	
					Power	EIRP(W)
23181	777.1	BPSK	3.75	1@0	22.35	23.35
				1@47	22.33	23.33
		BPSK	15	1@11	22.57	22.57
		QPSK	15	1@0	22.59	23.59
				1@11	22.44	23.59
				12@0	20.58	21.58
23230	782	BPSK	3.75	1@0	22.35	23.35
				1@47	22.36	23.36
		BPSK	15	1@11	22.41	22.41
		QPSK	15	1@0	22.34	23.34
				1@11	22.37	23.37
				12@0	20.63	21.63
23279	786.9	BPSK	3.75	1@0	22.21	23.21
				1@47	22.21	23.21
		BPSK	15	1@11	22.39	22.39
		QPSK	15	1@0	22.32	23.32
				1@11	22.29	23.29
				12@0	20.51	21.51

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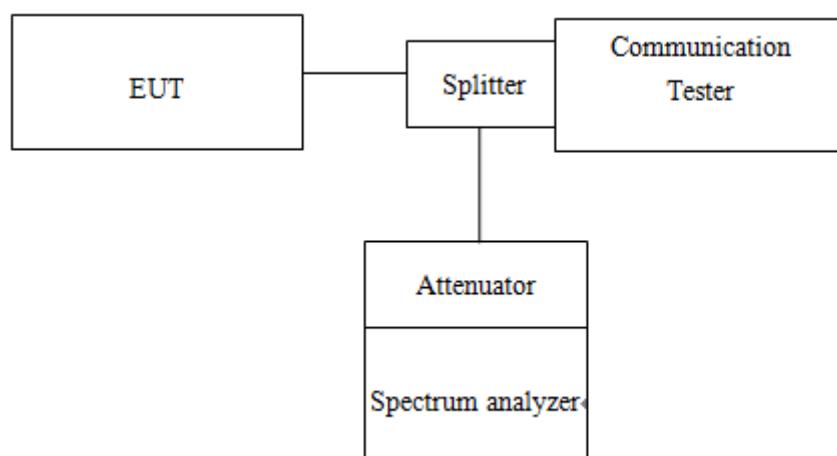
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7 OCCUPIED BANDWIDTH MEASUREMENT

7.3 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.

7.4 Test Set-up



7.5 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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7.6 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	MY5144011 3	2018/06/20	2019/06/19
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	2018/01/03	2019/01/02
DC Power Supply	Agilent	E3640A	MY5314000 6	2018/05/30	2019/05/29
Attenuator	Marvelous	MVE2213-1 0	RF30	2017/12/26	2018/12/25
Splitter	Woken	DOM35LW 1A2	RF36	2017/12/26	2018/12/25

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7.7 Measurement Result

Cat M1

M1 BAND 2 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1850.7	18607	1.0790	1.0775	1.235	1.249
1880.0	18900	1.0794	1.0960	1.237	1.247
1909.3	19193	1.0798	1.0787	1.230	1.244

M1 BAND 2 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1851.5	18615	1.0891	1.0843	1.333	1.336
1880.0	18900	1.0817	1.0827	1.282	1.322
1908.5	19185	1.0783	1.0838	1.301	1.338

M1 BAND 2 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1852.5	18625	1.0909	1.0911	1.341	1.358
1880.0	18900	1.0980	1.0910	1.374	1.378
1907.5	19175	1.0874	1.0873	1.344	1.357

M1 BAND 2 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1855.0	18650	1.0947	1.1102	1.352	1.454
1880.0	18900	1.0972	1.1086	1.414	1.507
1905.0	19150	1.0959	1.1052	1.350	1.500

M1 BAND 2 Channel bandwidth: 15MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1857.5	18675	1.1181	1.1193	1.502	1.643
1880.0	18900	1.1078	1.1090	1.564	1.652
1902.5	19125	1.1250	1.1088	1.597	1.583

M1 BAND 2 Channel bandwidth: 20MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1860.0	18700	1.1155	1.1187	1.528	1.613
1880.0	18900	1.1173	1.1236	1.525	1.687
1900.0	19100	1.1132	1.1188	1.522	1.506

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M1 BAND 4 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1710.7	19957	1.0743	1.0786	1.226	1.254
1732.5	20175	1.0974	1.0780	1.244	1.239
1754.3	20393	1.0747	1.0776	1.228	1.233

M1 BAND 4 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1711.5	19965	1.0807	1.0833	1.293	1.350
1732.5	20175	1.0803	1.0837	1.318	1.350
1753.5	20385	1.0827	1.0839	1.317	1.340

M1 BAND 4 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1712.5	19975	1.0891	1.0897	1.368	1.389
1732.5	20175	1.0860	1.0952	1.315	1.365
1752.5	20375	1.0878	1.0914	1.332	1.370

M1 BAND 4 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1715.0	20000	1.0954	1.1092	1.421	1.502
1732.5	20175	1.0953	1.1077	1.320	1.516
1750.0	20350	1.0952	1.0999	1.409	1.498

M1 BAND 4 Channel bandwidth: 15MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1717.5	20025	1.1224	1.1145	1.582	1.571
1732.5	20175	1.1116	1.1074	1.511	1.694
1747.5	20325	1.1223	1.1188	1.596	1.552

M1 BAND 4 Channel bandwidth: 20MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1720.0	20050	1.1157	1.1185	1.475	1.635
1732.5	20175	1.1151	1.1188	1.523	1.618
1745.0	20300	1.1148	1.1174	1.462	1.636

M1 BAND 5 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
824.7	20407	1.0779	1.0769	1.220	1.240
836.5	20525	1.0752	1.0769	1.230	1.251
848.3	20643	1.0715	1.0790	1.219	1.237

M1 BAND 5 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
825.5	20415	1.0829	1.0820	1.277	1.322
836.5	20525	1.0815	1.0822	1.277	1.324
847.5	20635	1.0825	1.0810	1.271	1.335

M1 BAND 5 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
826.5	20425	1.0914	1.0942	1.336	1.361
836.5	20525	1.0899	1.0927	1.324	1.364
846.5	20625	1.0907	1.0871	1.334	1.337

M1 BAND 5 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
829.0	20450	1.0947	1.1055	1.370	1.517
836.5	20525	1.0963	1.1003	1.354	1.464
844.0	20600	1.0927	1.0995	1.343	1.483

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M1 BAND 12 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
699.7	23017	1.0741	1.0765	1.222	1.261
707.5	23095	1.0757	1.0813	1.206	1.255
715.3	23173	1.0780	1.0788	1.227	1.255

M1 BAND 12 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
700.5	23025	1.0858	1.0828	1.292	1.322
707.5	23095	1.0816	1.0797	1.291	1.334
714.5	23165	1.0843	1.0823	1.277	1.311

M1 BAND 12 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
701.5	23035	1.0927	1.0927	1.323	1.358
707.5	23095	1.0913	1.0920	1.318	1.364
713.5	23155	1.0887	1.1017	1.319	1.361

M1 BAND 12 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
704.0	23060	1.0940	1.1065	1.348	1.468
707.5	23095	1.0946	1.1042	1.310	1.485
711.0	23130	1.0937	1.1084	1.343	1.499

M1 BAND 13 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
779.5	23205	1.0923	1.1011	1.333	1.366
782.0	23230	1.0938	1.0971	1.303	1.413
784.5	23255	1.0924	1.0977	1.337	1.337

M1 BAND 13 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
782.0	23230	1.095	1.118	1.303	1.529

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NBIoT

LTE NB-IoT Band 2						
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure Result (kHz)	
					26dB BW	99% BW
18601	1850.1	BPSK	3.75	1@47	69.6	67.459
		QPSK	15	1@11	239.7	208.65
		QPSK	15	12@0	228.5	195.2
18900	1880	BPSK	3.75	1@47	71.18	69.393
		QPSK	15	1@11	241.4	206.8
		QPSK	15	12@0	222.7	196.85
19199	1909.9	BPSK	3.75	1@47	69.82	68.249
		QPSK	15	1@11	240	201.24
		QPSK	15	12@0	222.8	193.61

LTE NB-IoT Band 4						
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure Result (kHz)	
					26dB BW	99% BW
19951	1710.1	BPSK	3.75	1@47	131.5	78.034
		QPSK	15	1@11	238.3	209.23
		QPSK	15	12@0	229.6	197.2
20175	1732.5	BPSK	3.75	1@47	71.49	69.378
		QPSK	15	1@11	241.5	208.93
		QPSK	15	12@0	217	195.78
20399	1754.9	BPSK	3.75	1@47	70.44	69.154
		QPSK	15	1@11	239.8	208.48
		QPSK	15	12@0	224.9	196.86

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LTE NB-IoT Band 5						
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure Result (kHz)	
					26dB BW	99% BW
20401	824.1	BPSK	3.75	1@47	73.8	64.021
		QPSK	15	1@11	239.4	207.13
		QPSK	15	12@0	227.3	195.01
20525	836.5	BPSK	3.75	1@47	70.47	62.256
		QPSK	15	1@11	240.9	206.8
		QPSK	15	12@0	221.6	196.39
20649	848.9	BPSK	3.75	1@47	73.37	63.26
		QPSK	15	1@11	240	208.27
		QPSK	15	12@0	221.6	196.18

LTE NB-IoT Band 12						
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure Result (kHz)	
					26dB BW	99% BW
23011	699.1	BPSK	3.75	1@47	70.7	61.836
		QPSK	15	1@11	242.1	208.36
		QPSK	15	12@0	216	197.13
23095	707.5	BPSK	3.75	1@47	70.07	62.991
		QPSK	15	1@11	240.7	207.91
		QPSK	15	12@0	214.3	194.86
23719	715.9	BPSK	3.75	1@47	71.2	63.203
		QPSK	15	1@11	241.3	209.62
		QPSK	15	12@0	210.7	192.66

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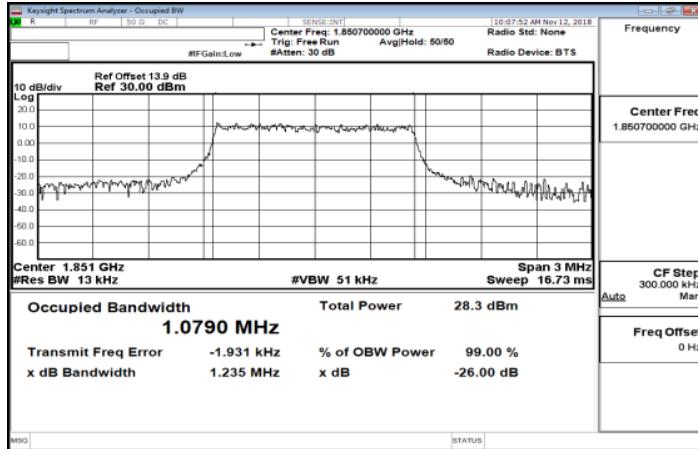
LTE NB-IoT Band 13						
Channel	Freq. (MHz)	Modulation	Subcarrier Spacing (kHz)	N _{tones}	Measure Result (kHz)	
					26dB BW	99% BW
23181	777.1	BPSK	3.75	1@47	74.15	63.767
		QPSK	15	1@11	227.3	207.42
		QPSK	15	12@0	213.9	194.33
23230	782	BPSK	3.75	1@47	70.8	63.12
		QPSK	15	1@11	238.8	206.16
		QPSK	15	12@0	202.6	188.31
23279	786.9	BPSK	3.75	1@47	69.49	63.352
		QPSK	15	1@11	228.8	206.94
		QPSK	15	12@0	229.8	195.01

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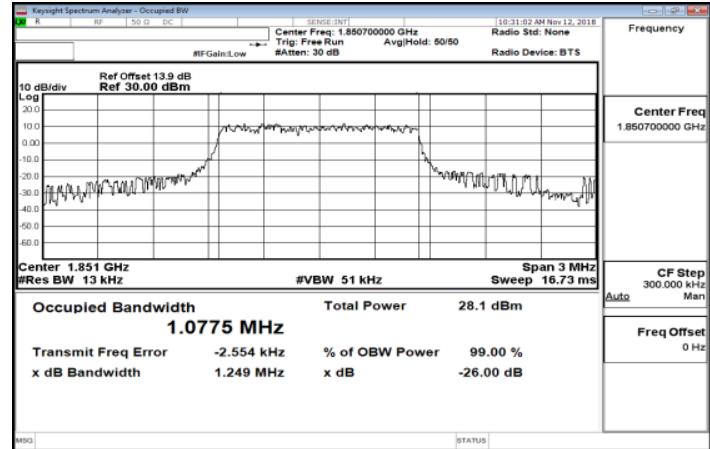
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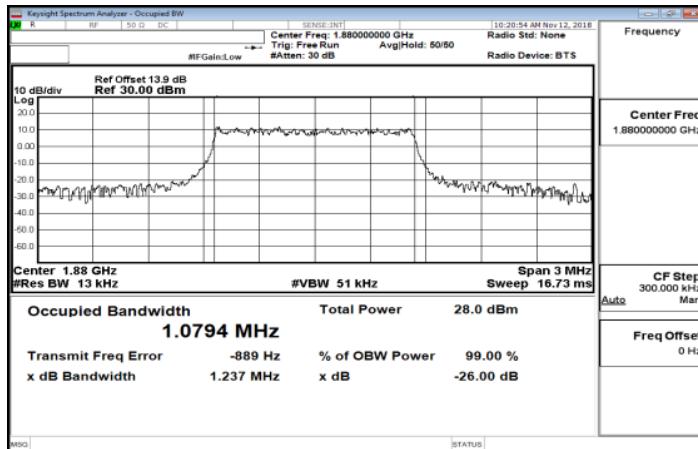
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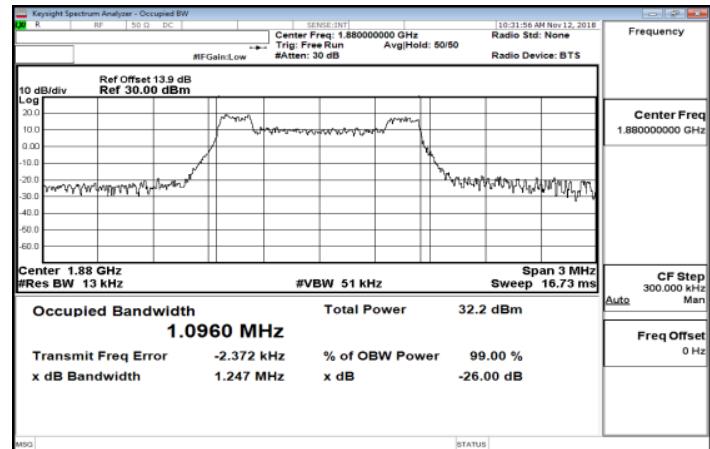
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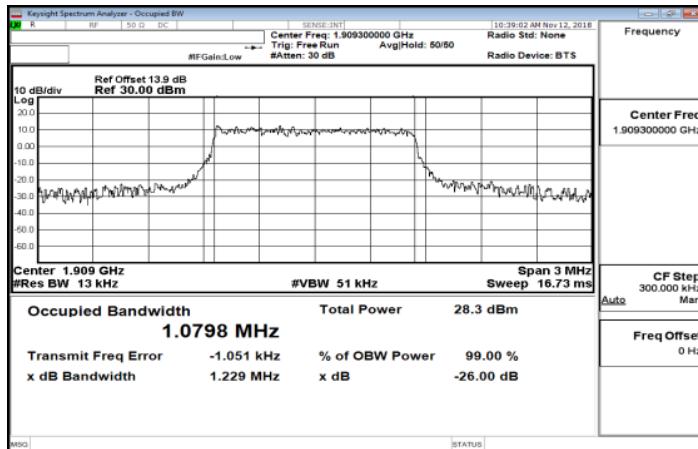
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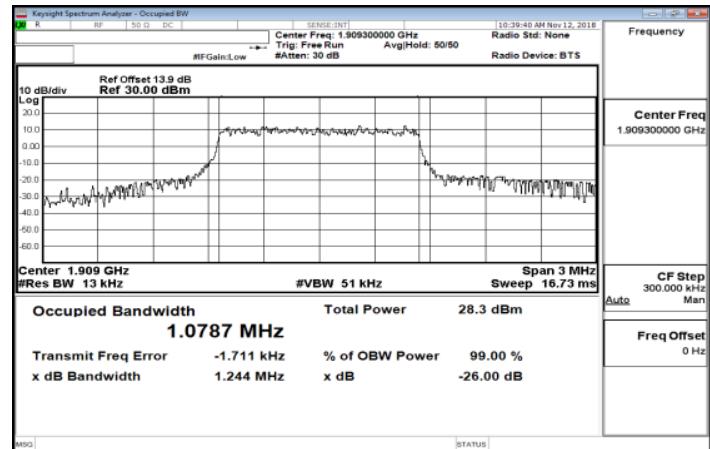
Band2_1_4MHz_16QAM_6_0_MidCH18900-1880



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Band2_1_4MHz_16QAM_6_0_HighCH19193-1909.3

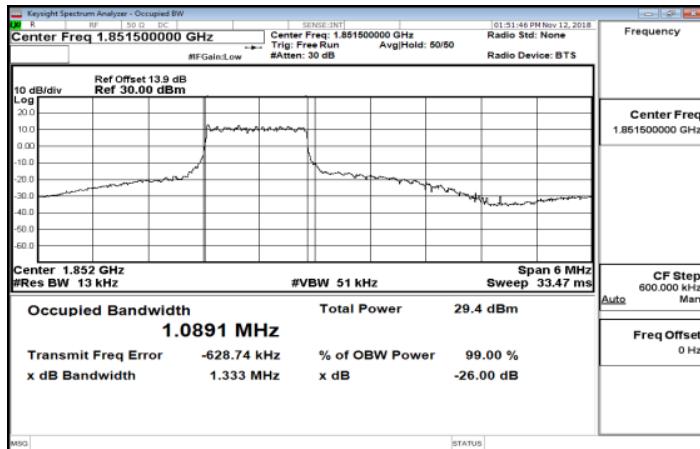


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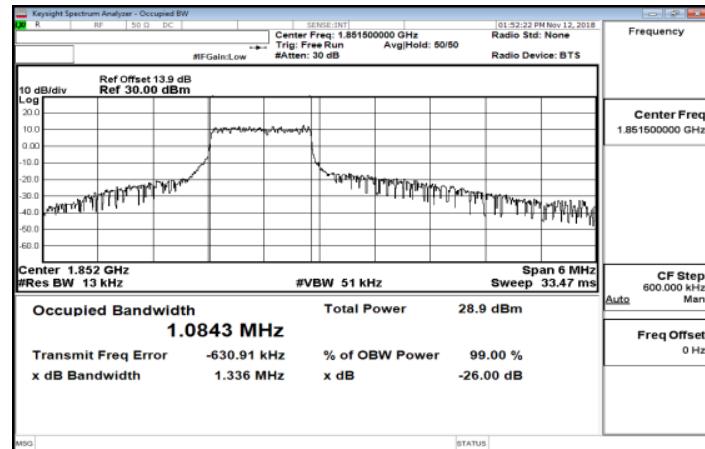
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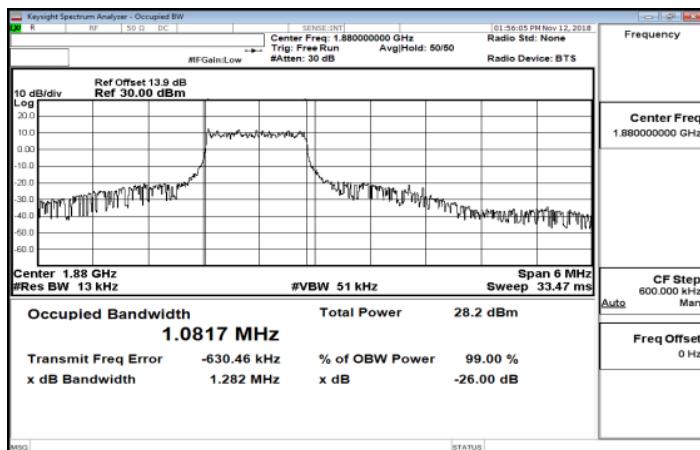
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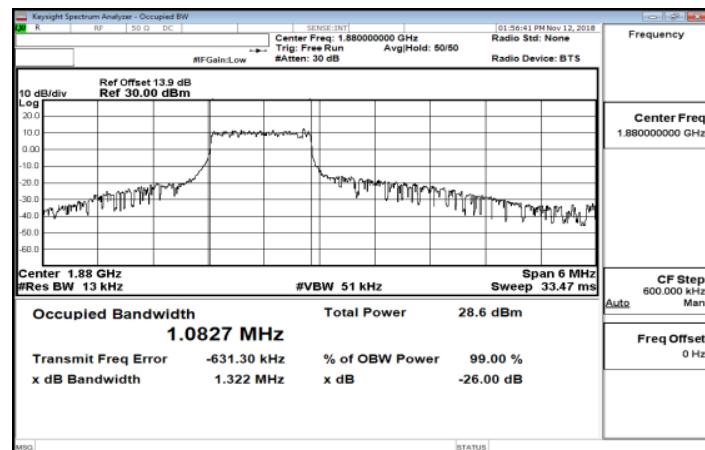
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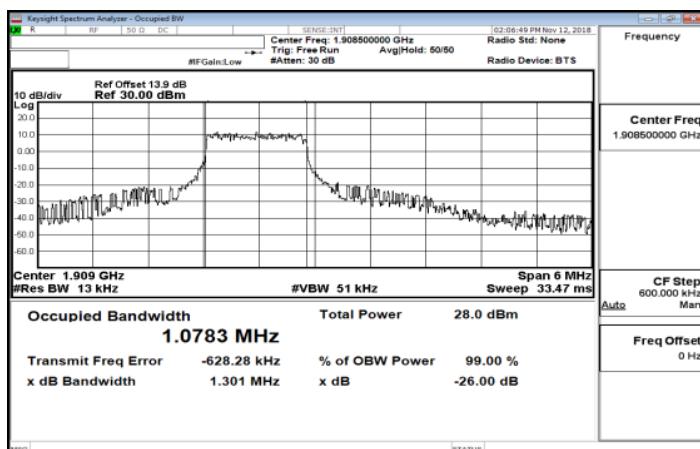
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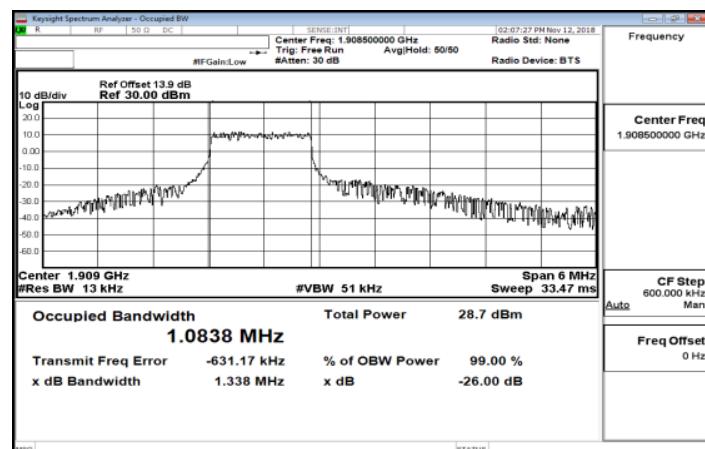
Band2_3MHz_16QAM_6_0_MidCH18900-1880



Band2_3MHz_QPSK_6_0_HighCH19185-1908.5



Band2_3MHz_16QAM_6_0_HighCH19185-1908.5

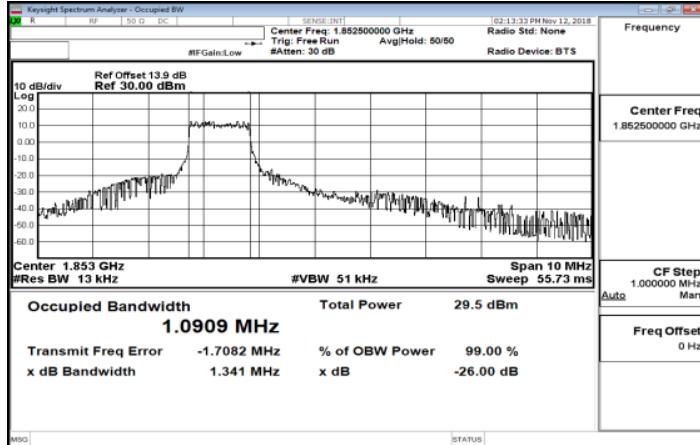


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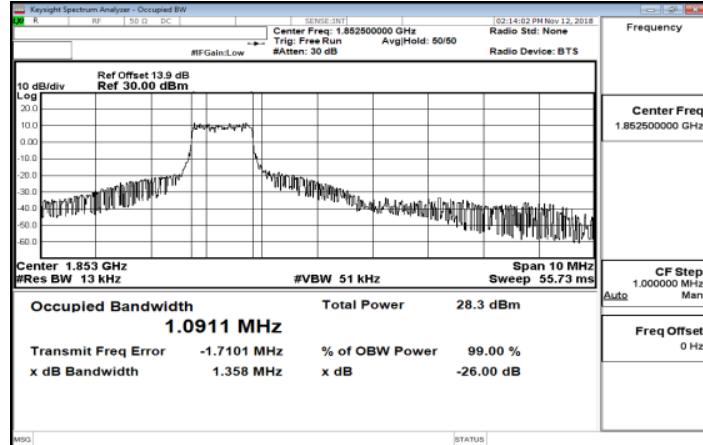
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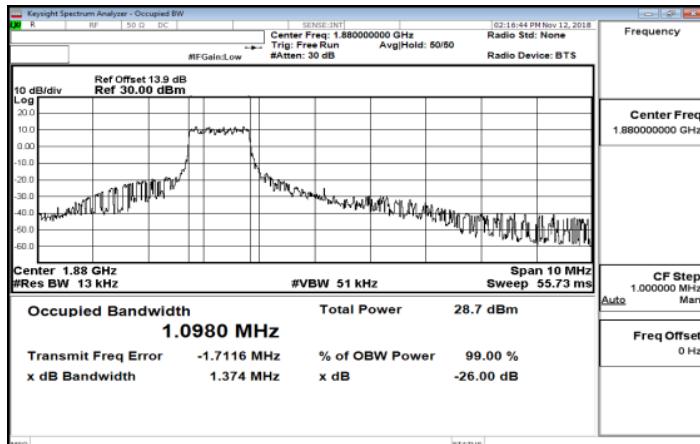
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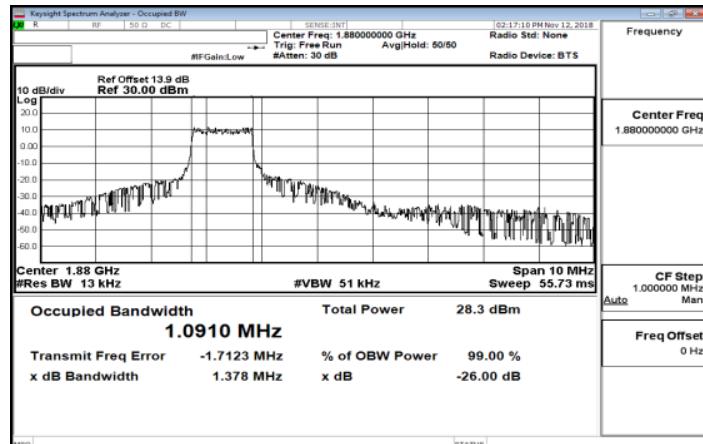
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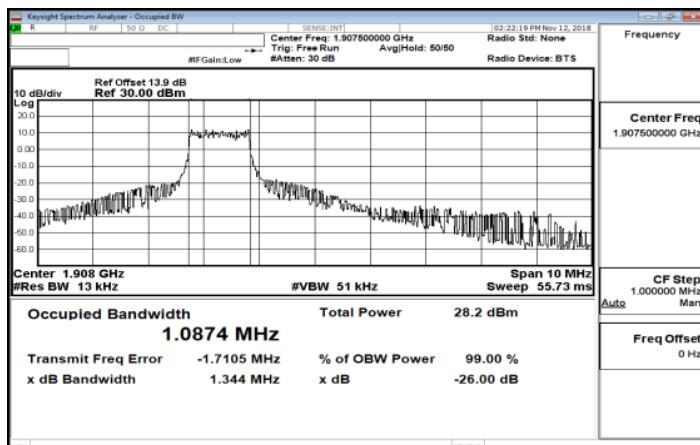
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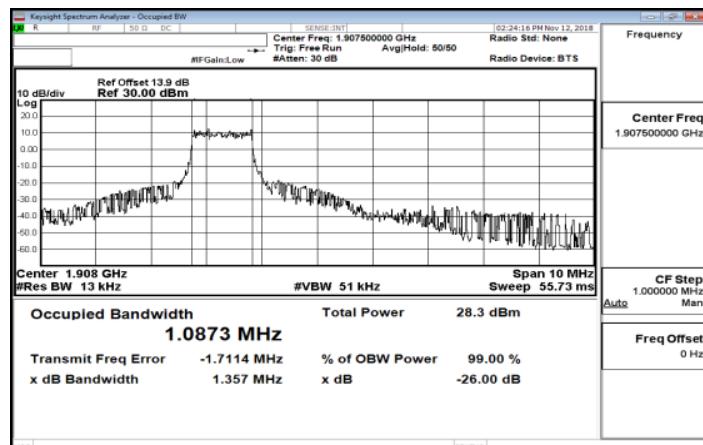
Band2_5MHz_16QAM_6_0_MidCH18900-1880



Band2_5MHz_QPSK_6_0_HighCH19175-1907.5



Band2_5MHz_16QAM_6_0_HighCH19175-1907.5

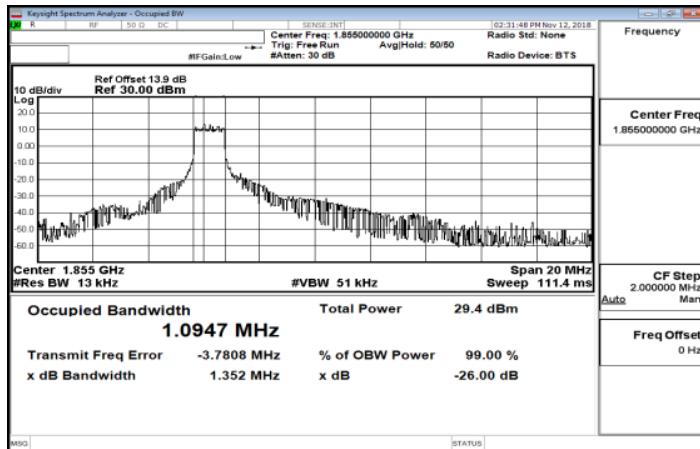


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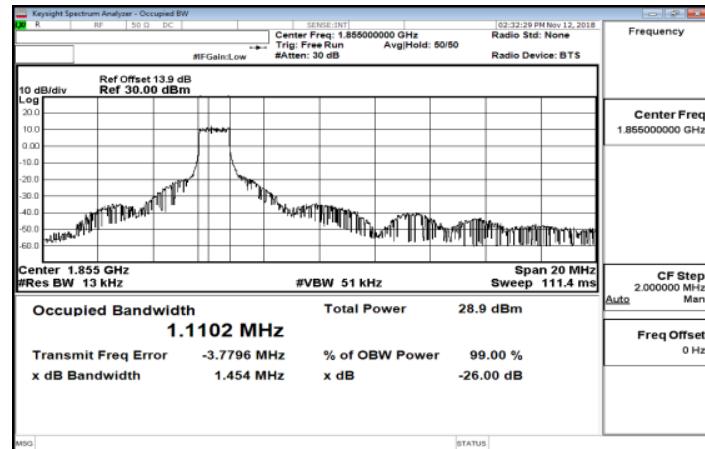
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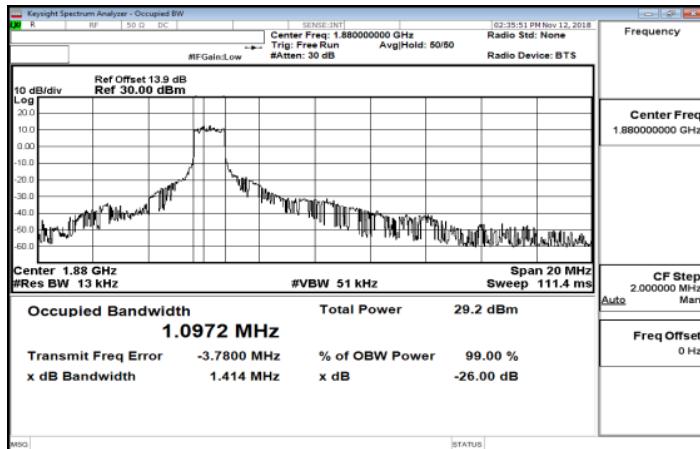
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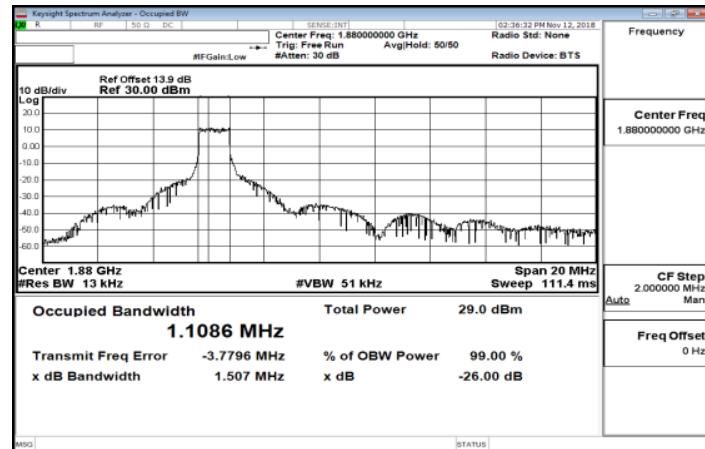
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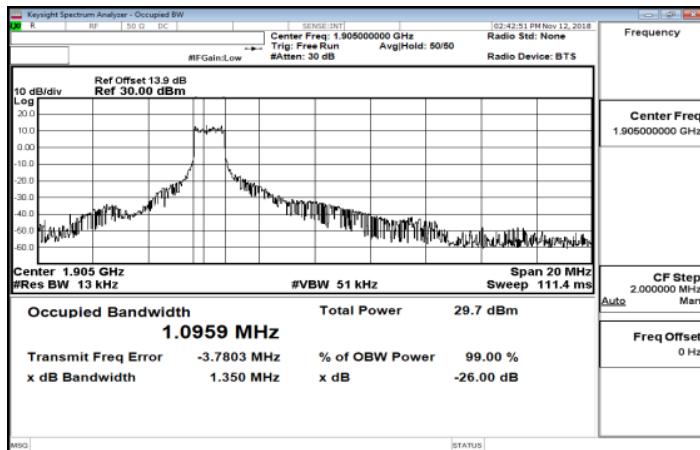
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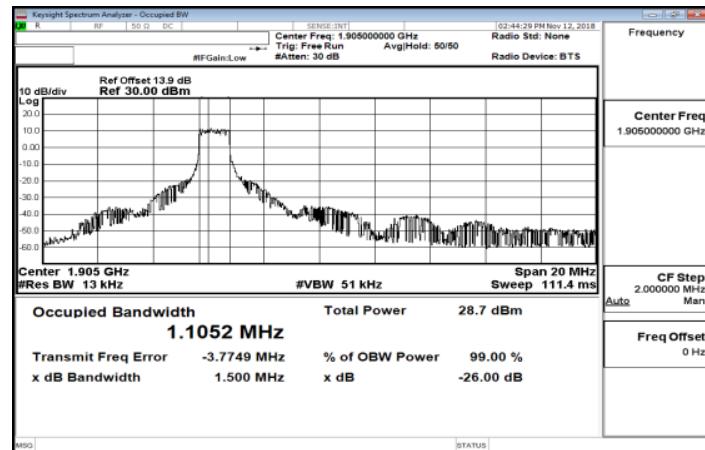
Band2_10MHz_16QAM_6_0_MidCH18900-1880



Band2_10MHz_QPSK_6_0_HighCH19150-1905



Band2_10MHz_16QAM_6_0_HighCH19150-1905

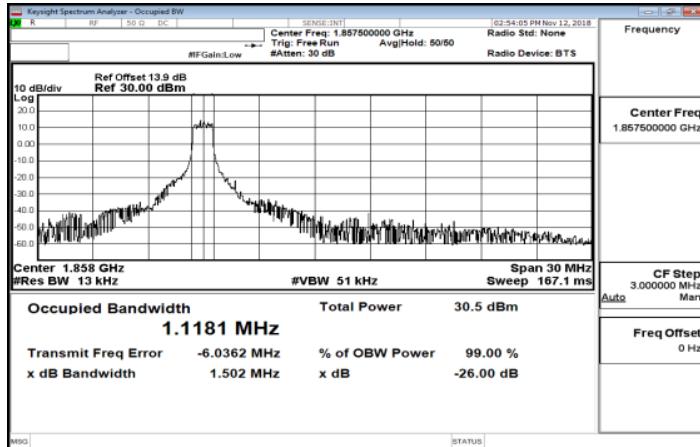


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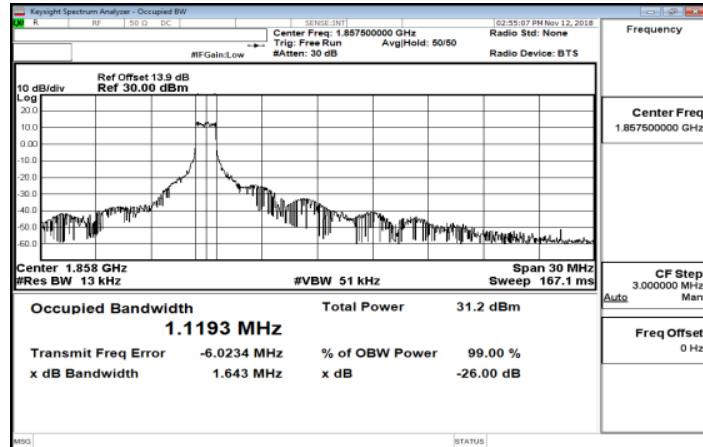
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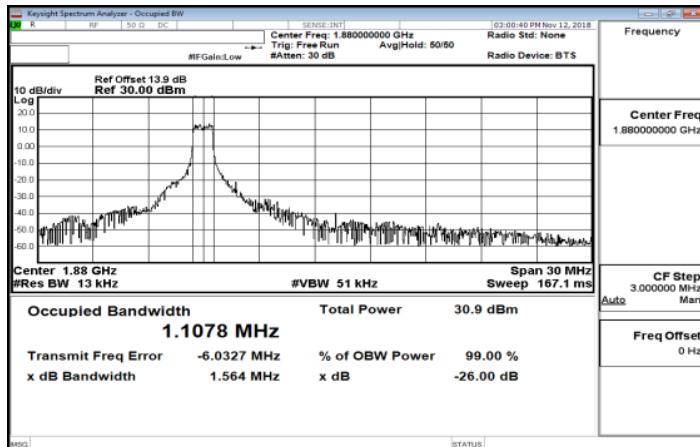
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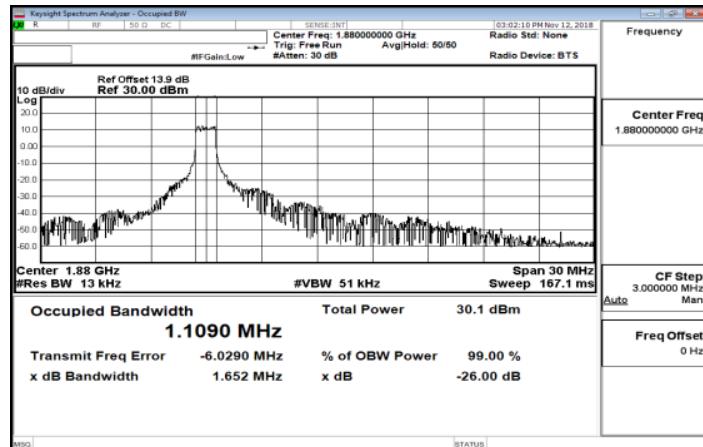
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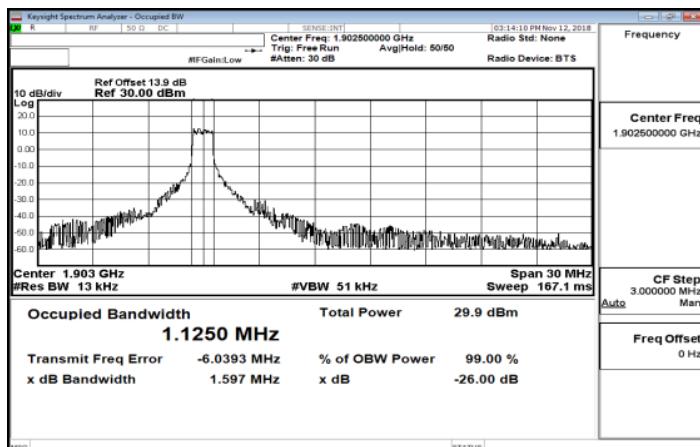
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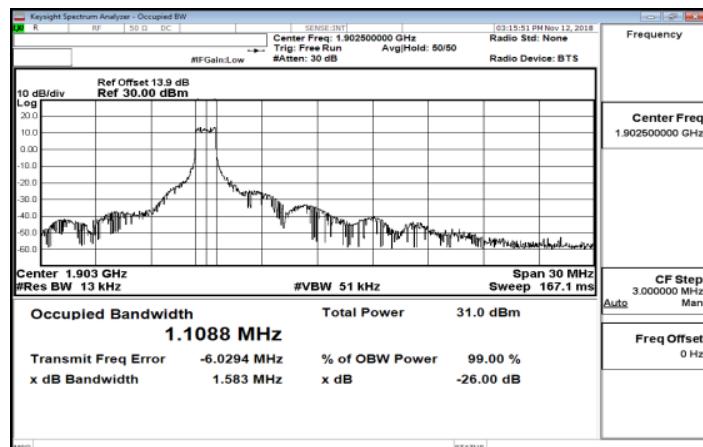
Band2_15MHz_16QAM_6_0_MidCH18900-1880



Band2_15MHz_QPSK_6_0_HighCH19125-1902.5



Band2_15MHz_16QAM_6_0_HighCH19125-1902.5

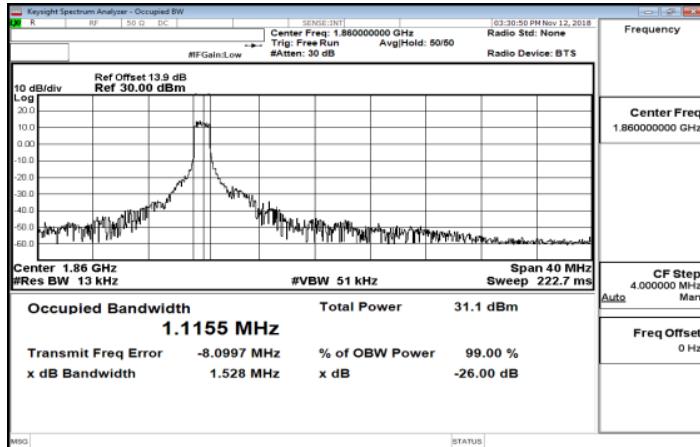


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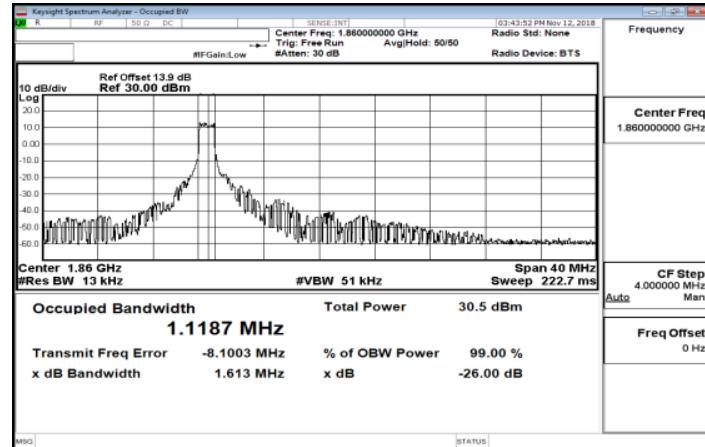
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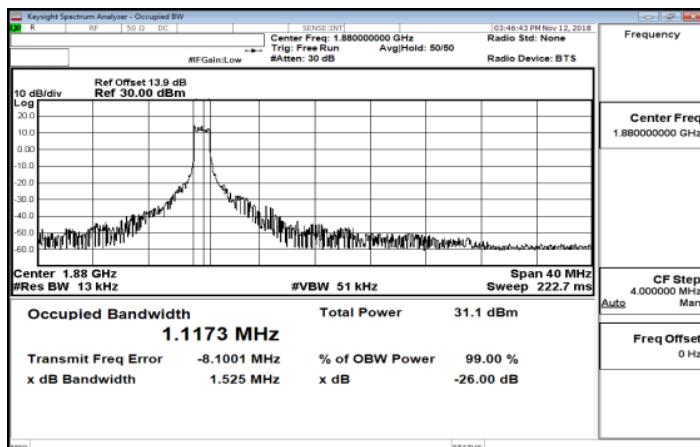
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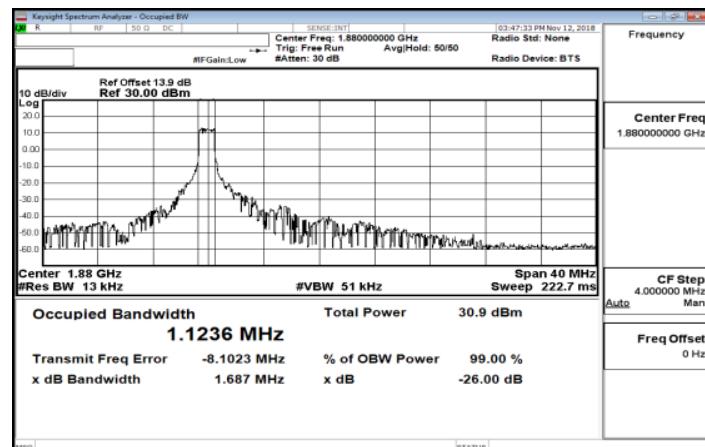
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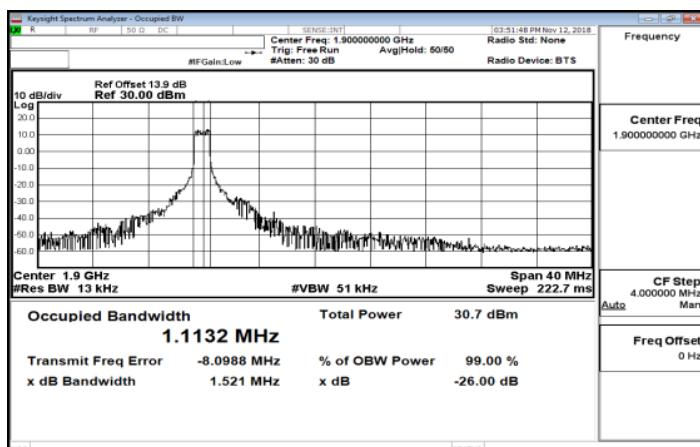
Band2 20MHz QPSK 6 0 MidCH18900-18800



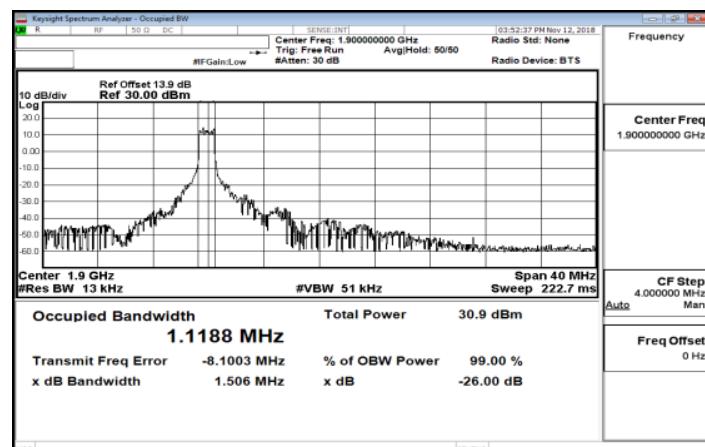
Band2 20MHz 16QAM 6 0 MidCH18900-1880



Band2 20MHz OPSK 6 0 HighCH19100-1900



Band2 20MHz 16QAM 6 0 HighCH19100-1900



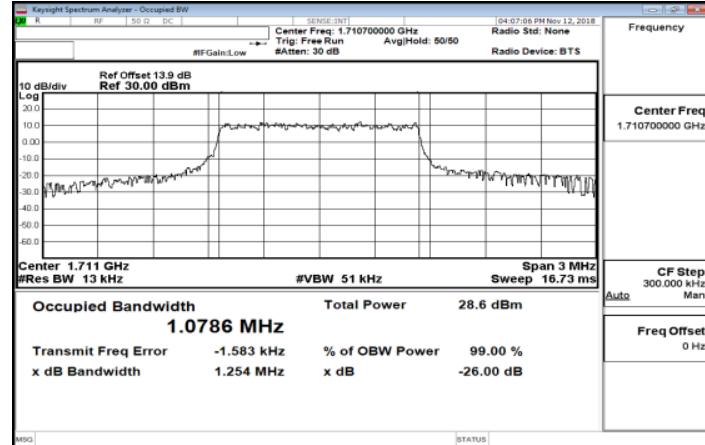
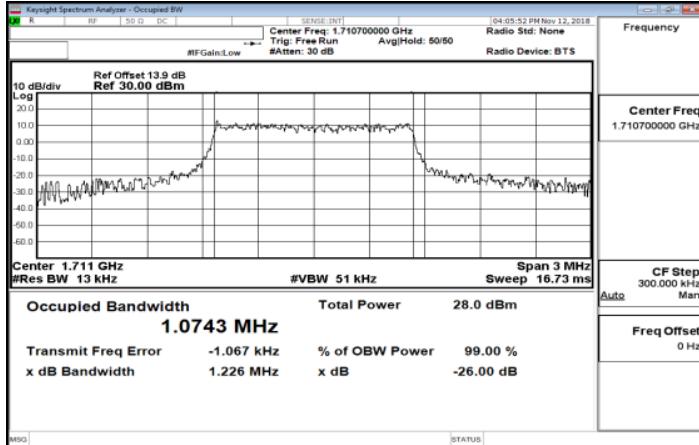
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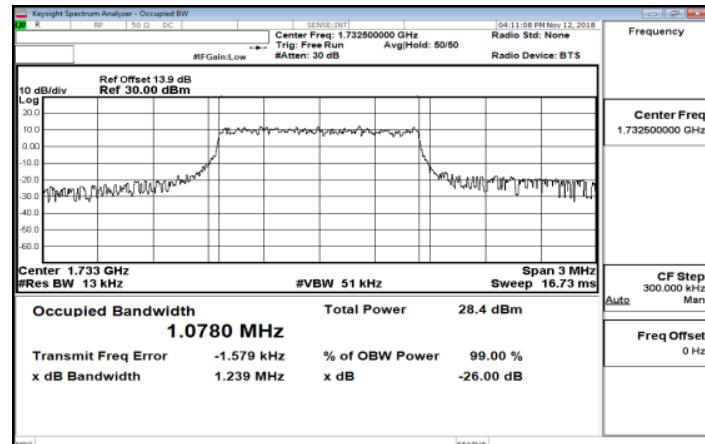
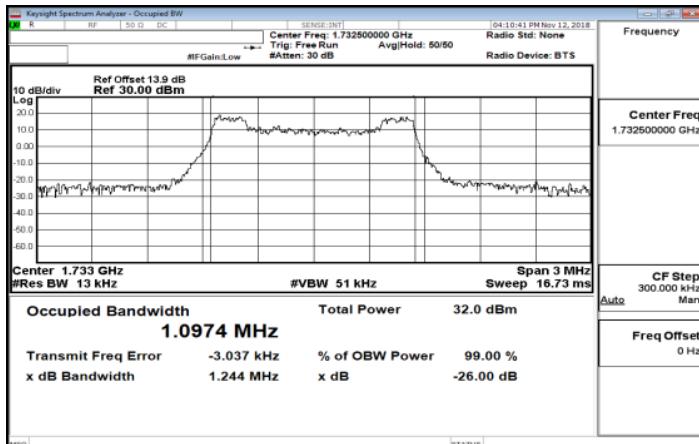
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Band4_1_4MHz_QPSK_6_0_LowCH19957-1710.7

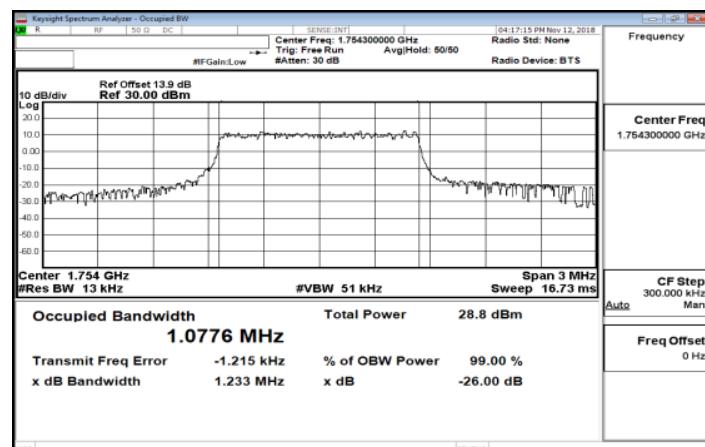
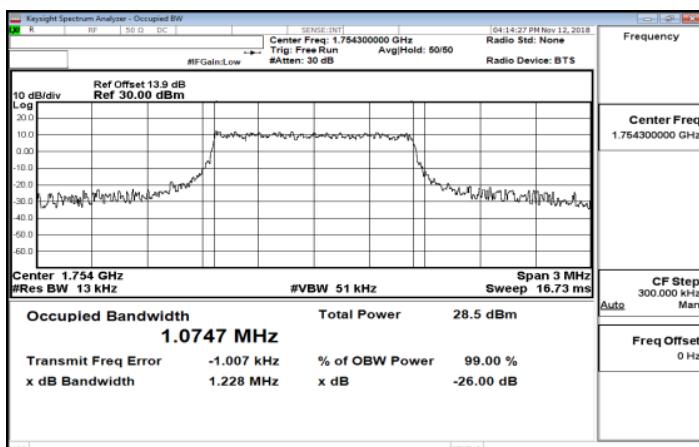
Band4_1_4MHz_16QAM_6_0_LowCH19957-1710.7



Band4_1_4MHz_QPSK_6_0_MidCH20175-1732.5



Band4_1_4MHz_QPSK_6_0_HighCH20393-1754.3

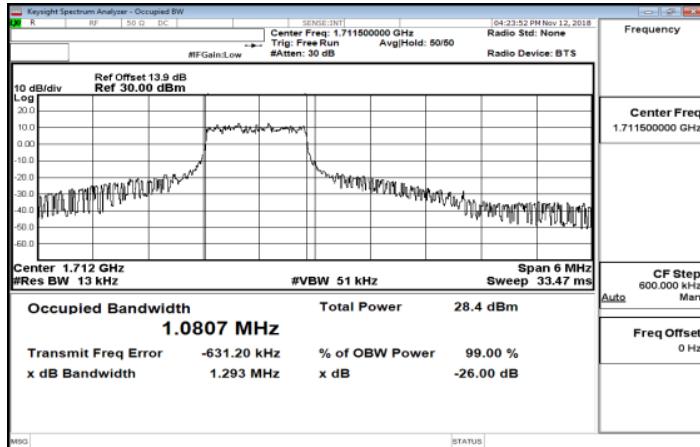


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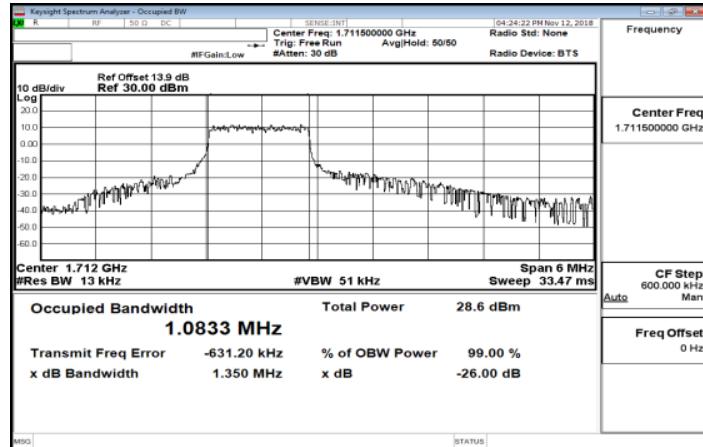
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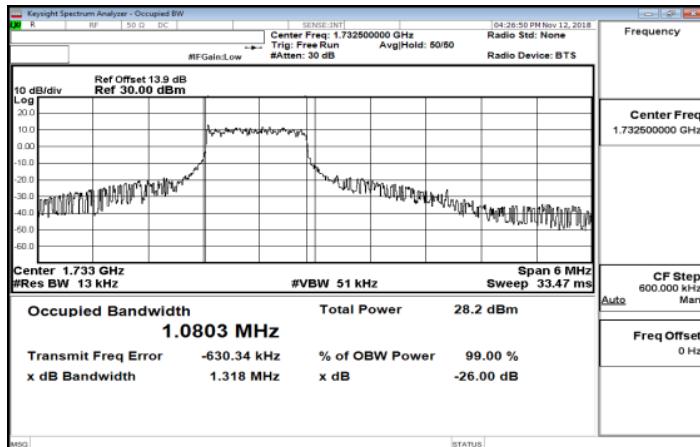
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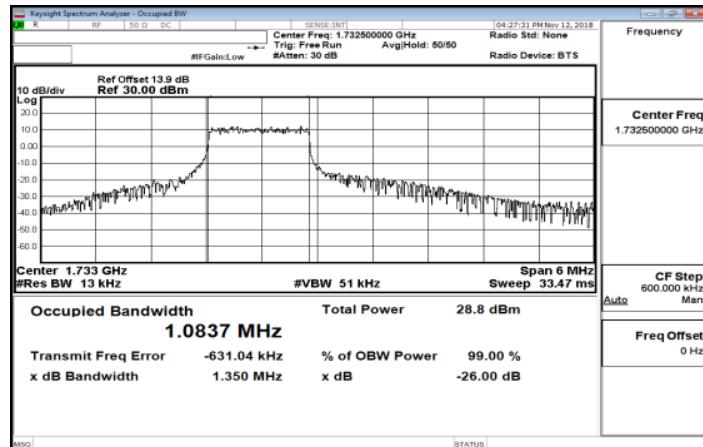
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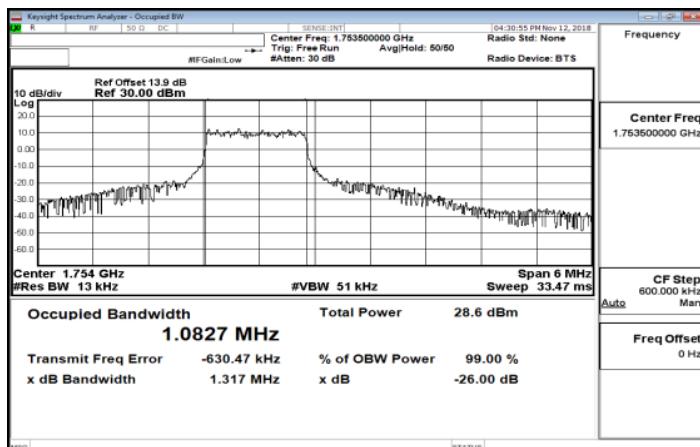
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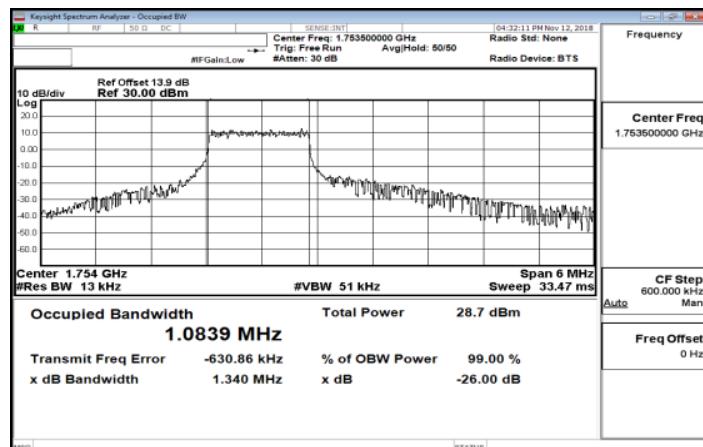
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Band4_3MHz_QPSK_6_0_HighCH20385-1753.5



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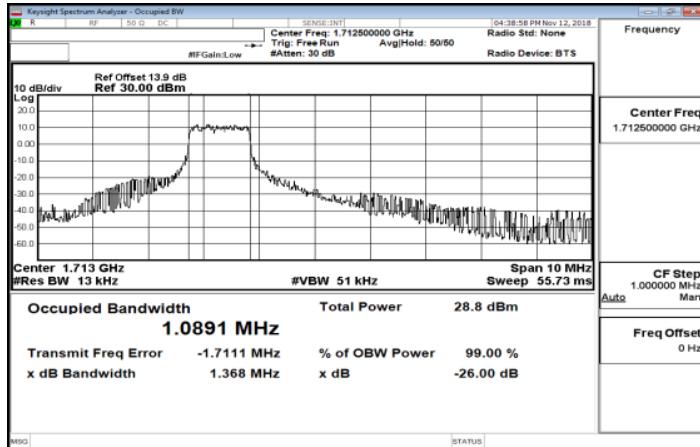


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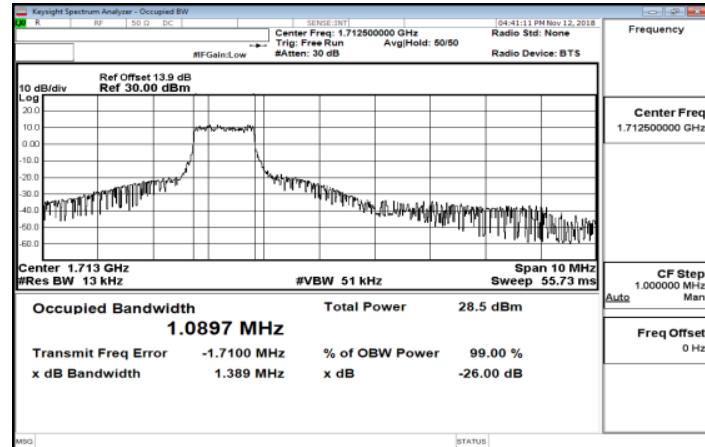
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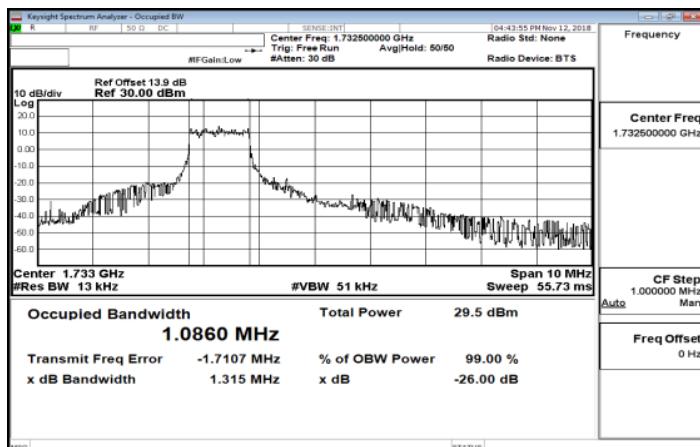
Band4_5MHz_QPSK_6_0_LowCH19975-1712.5



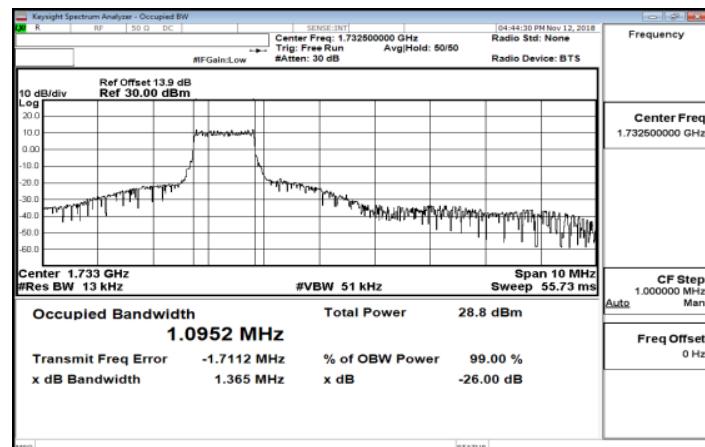
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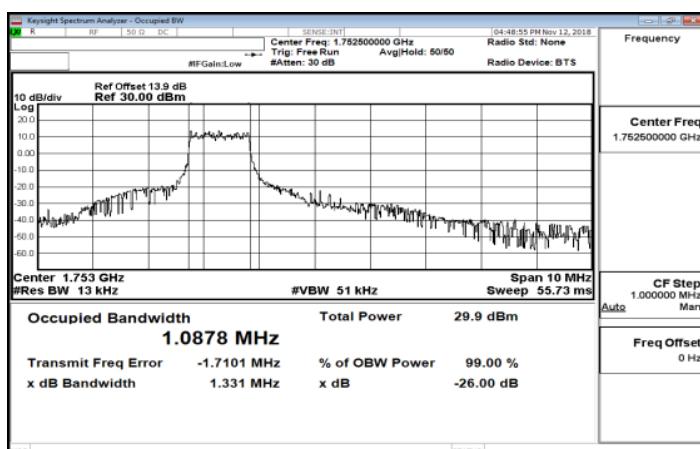
Band4_5MHz_QPSK_6_0_MidCH20175-1732.5



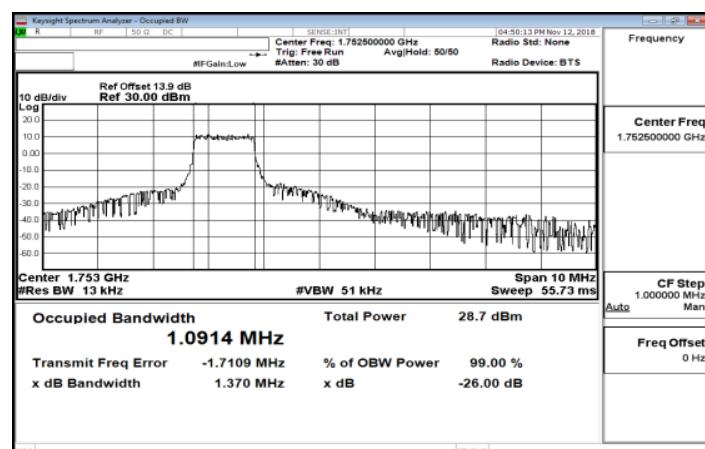
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Band4_5MHz_QPSK_6_0_HighCH20375-1752.5



Band4_5MHz_16QAM_6_0_HighCH20375-1752.5

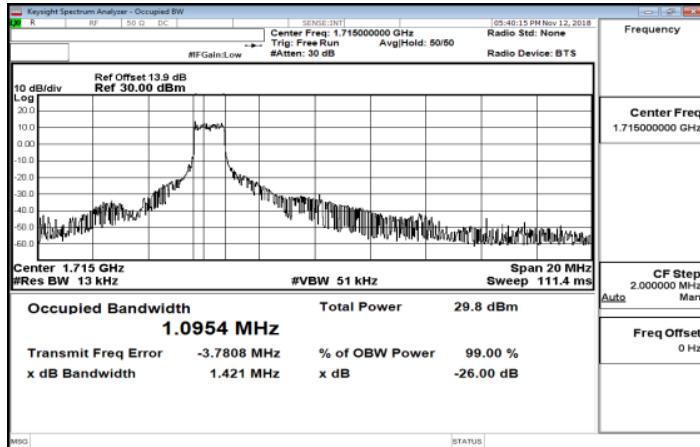


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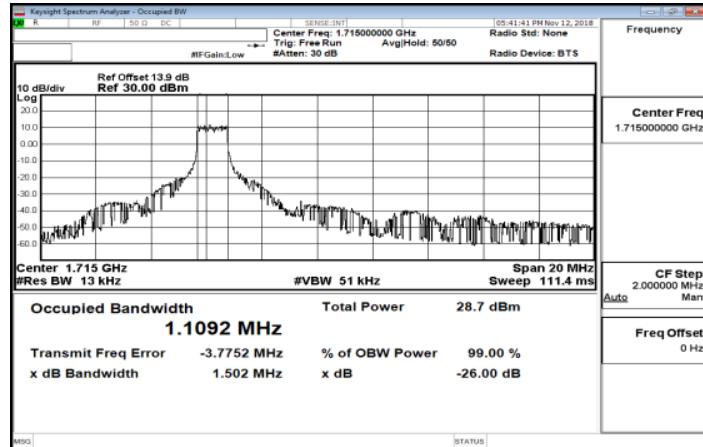
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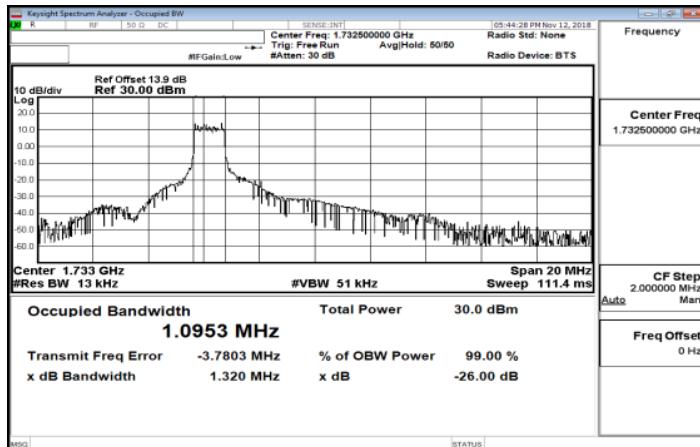
Band4_10MHz_QPSK_6_0_LowCH20000-1715



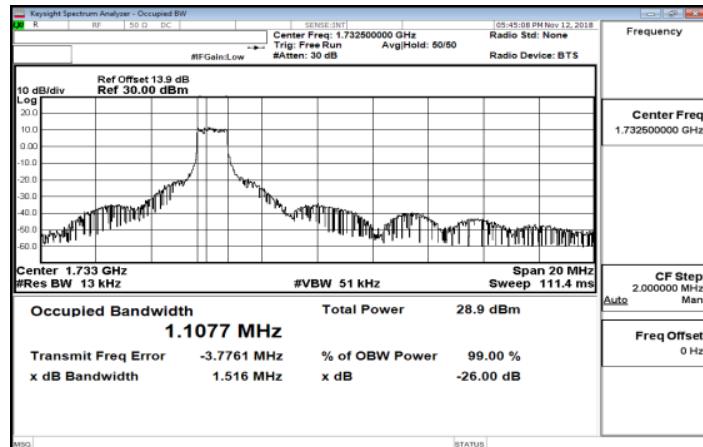
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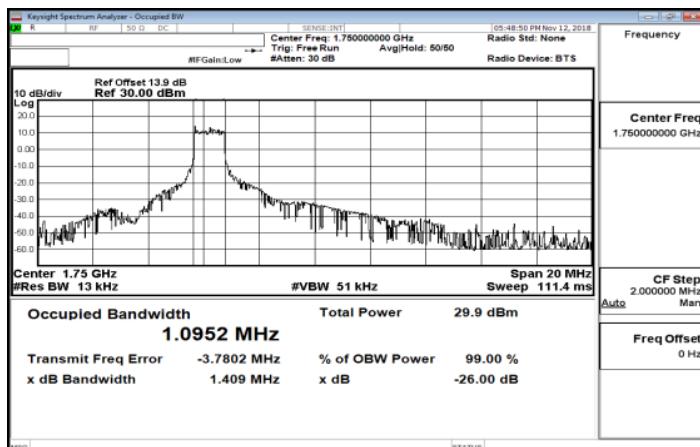
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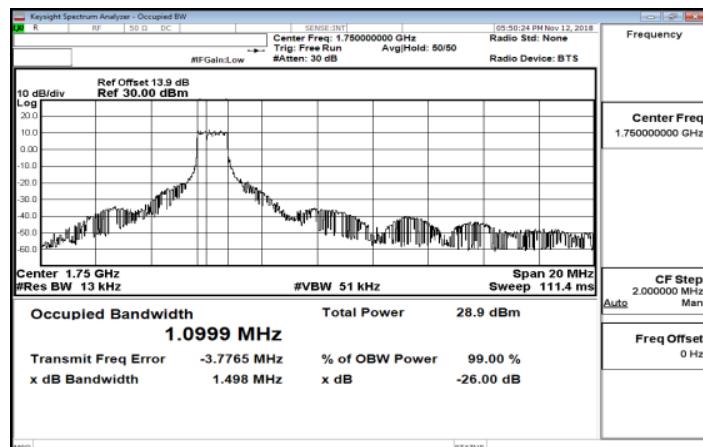
Band4_10MHz_16QAM_6_0_MidCH20175-1732.5



Band4_10MHz_QPSK_6_0_HighCH20350-1750



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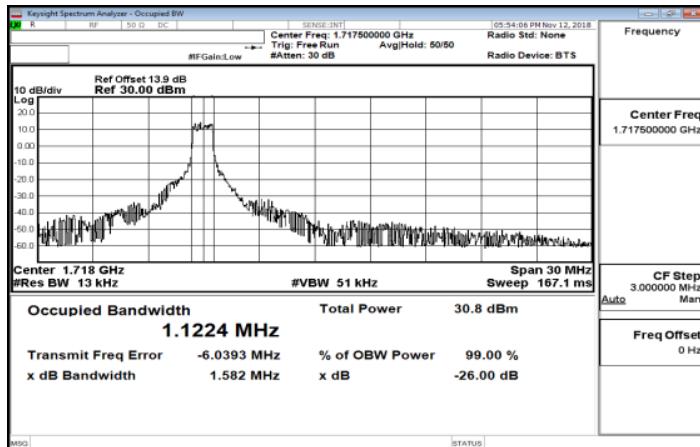


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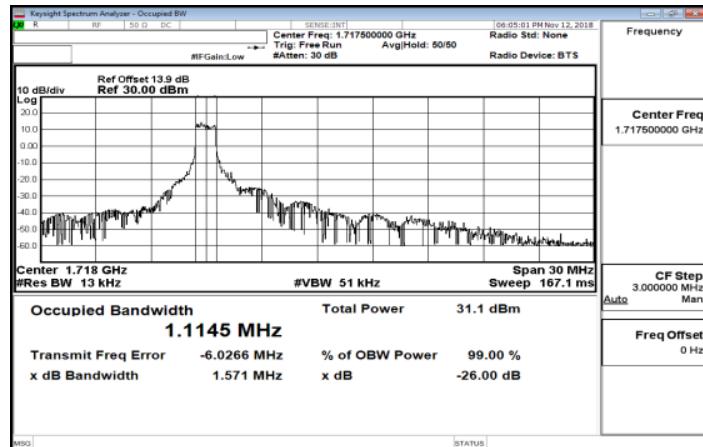
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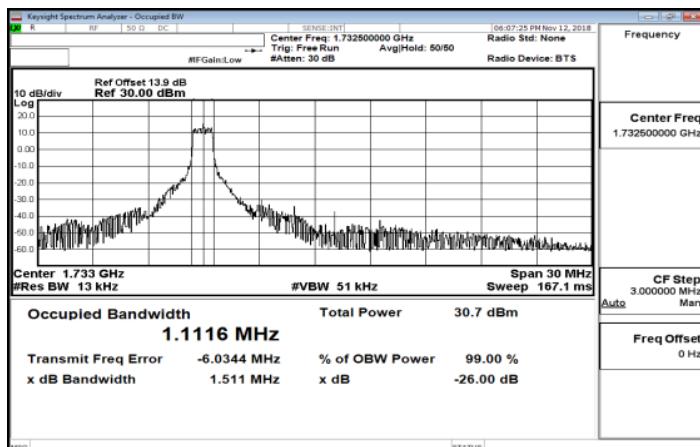
Band4_15MHz_QPSK_6_0_LowCH20025-1717.5



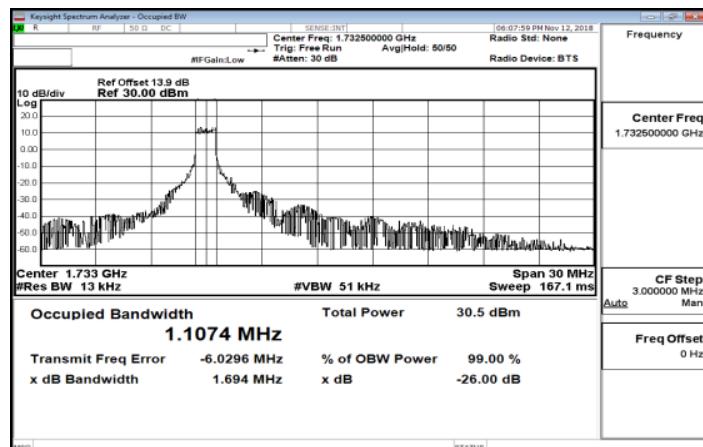
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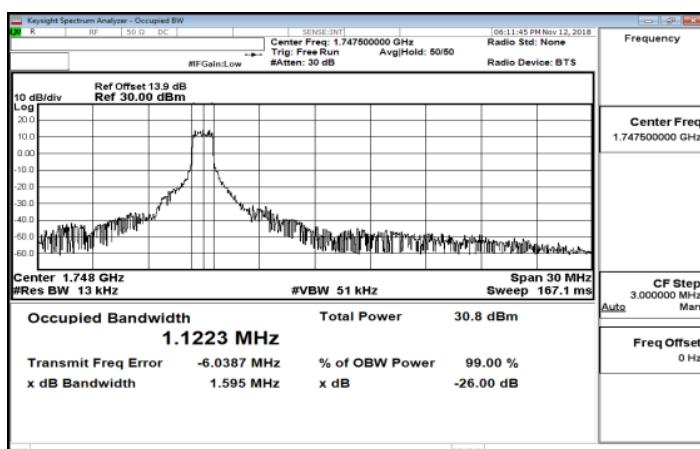
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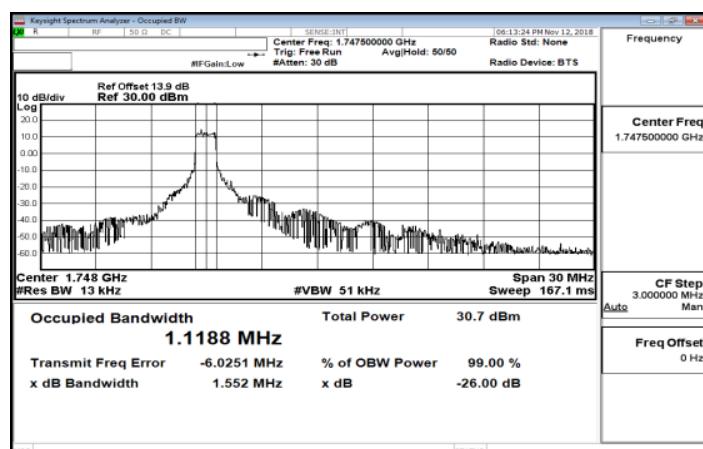
Band4_15MHz_16QAM_6_0_MidCH20175-1732.5



Band4_15MHz_QPSK_6_0_HighCH20325-1747.5



Band4_15MHz_16QAM_6_0_HighCH20325-1747.5

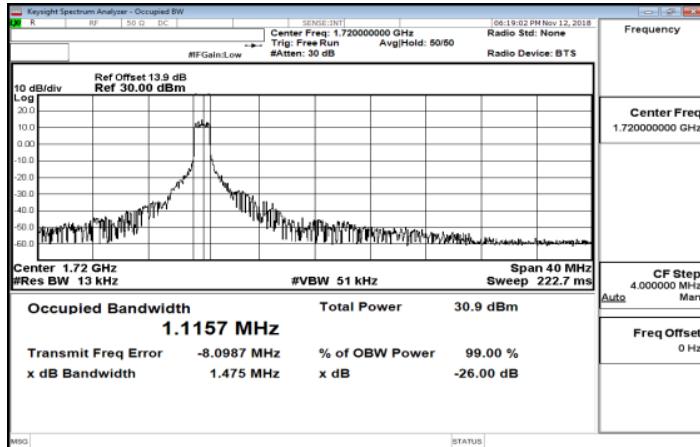


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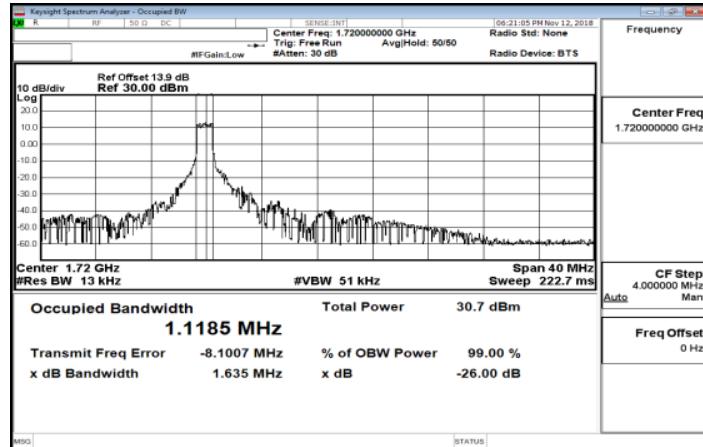
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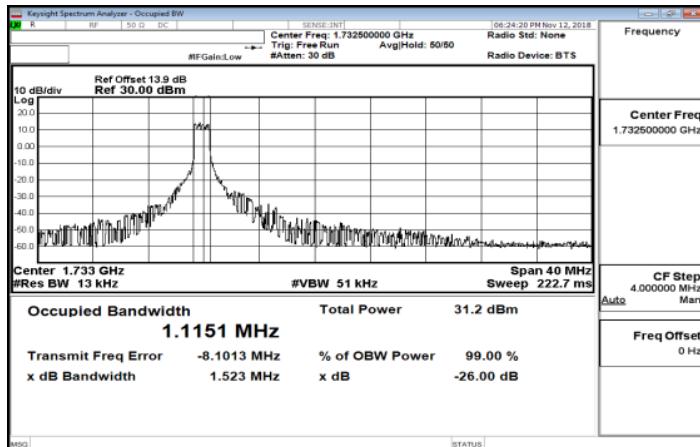
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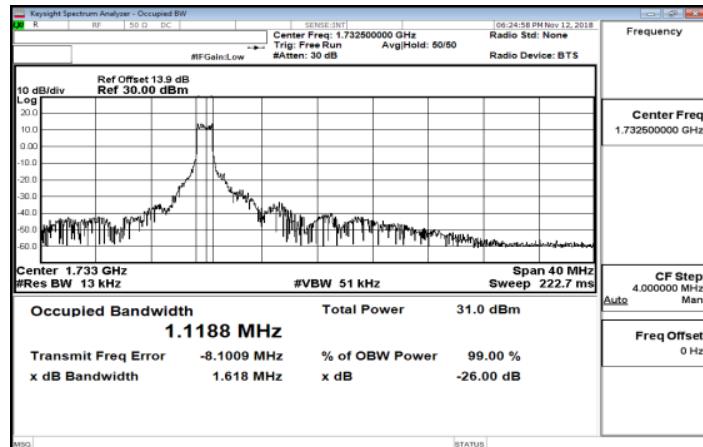
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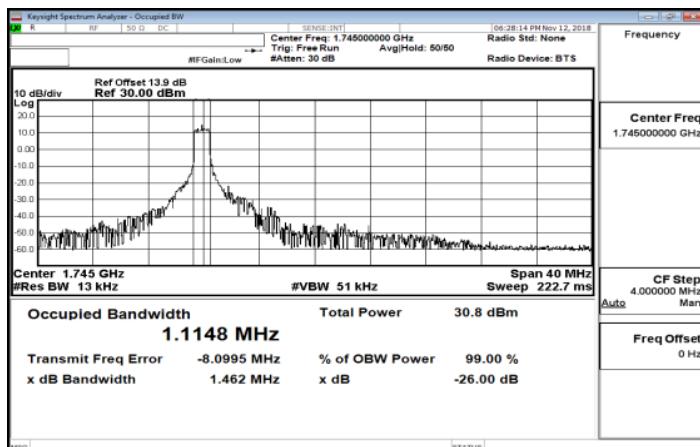
Band4_20MHz_QPSK_6_0_MidCH20175-1732.5



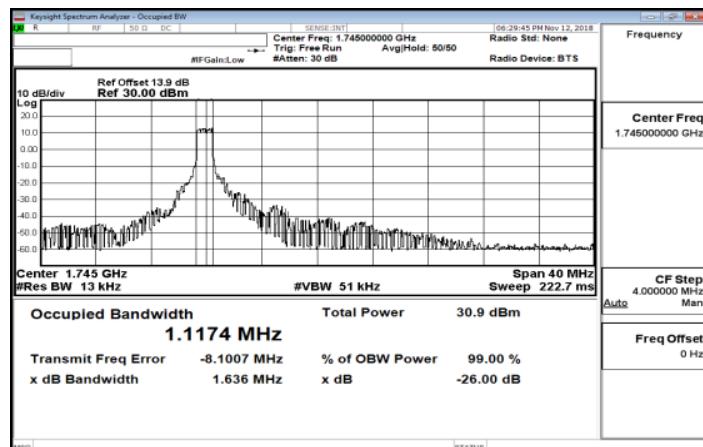
Band4_20MHz_16QAM_6_0_MidCH20175-1732.5



Band4_20MHz_QPSK_6_0_HighCH20300-1745



Band4_20MHz_16QAM_6_0_HighCH20300-1745

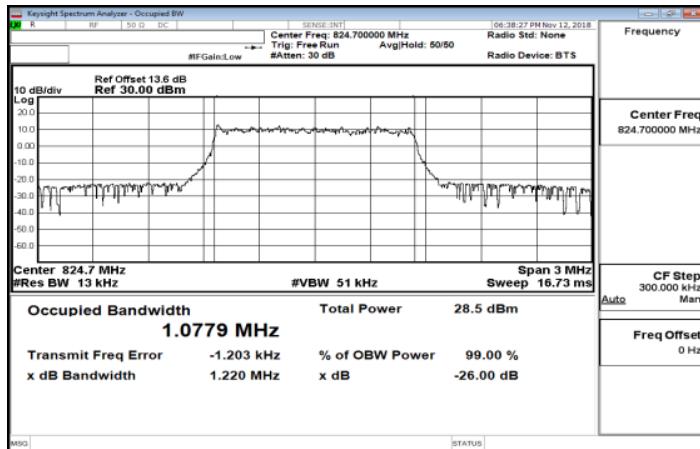


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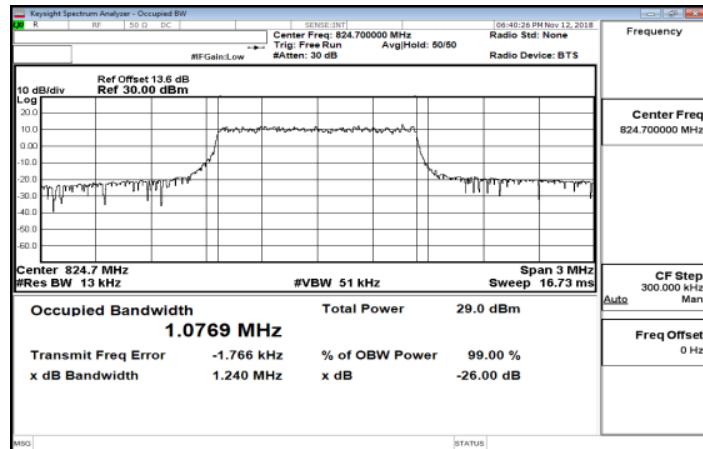
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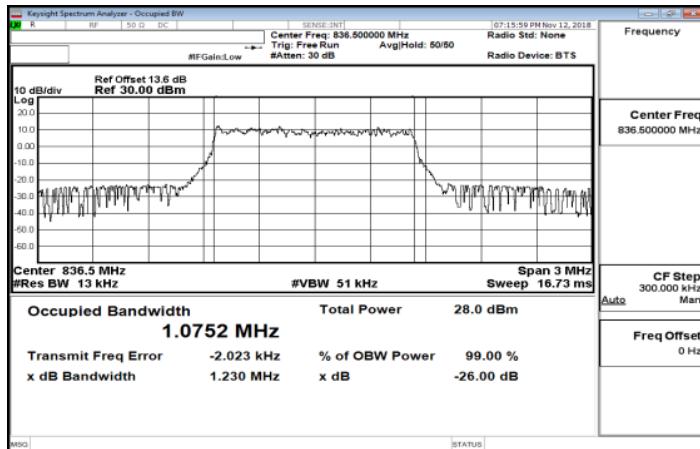
Band5_1_4MHz_QPSK_6_0_LowCH20407-824.7



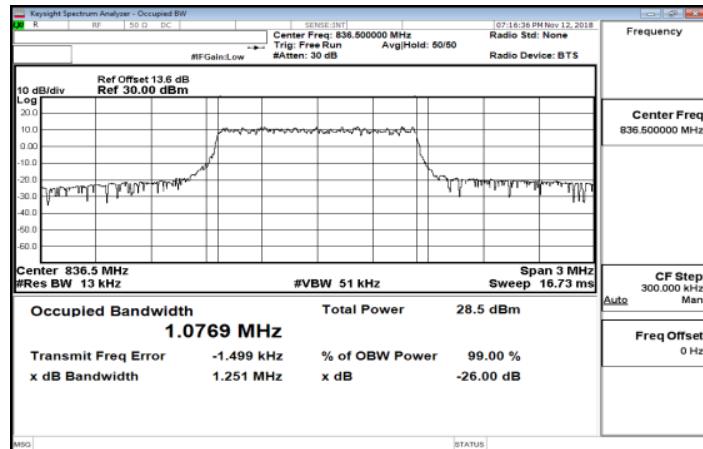
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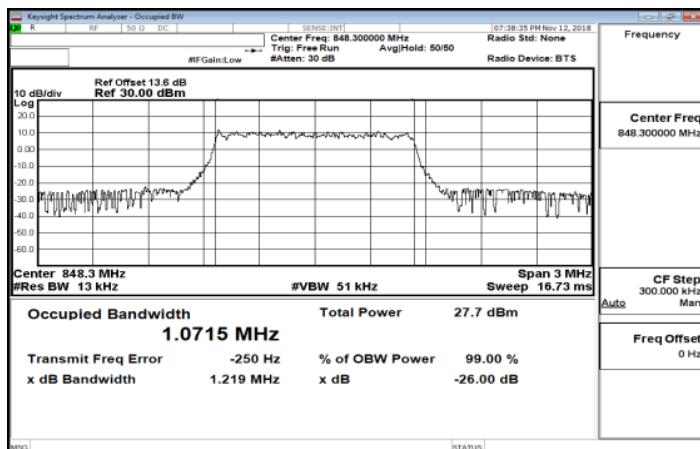
Band5_1_4MHz_QPSK_6_0_MidCH20525-836.5



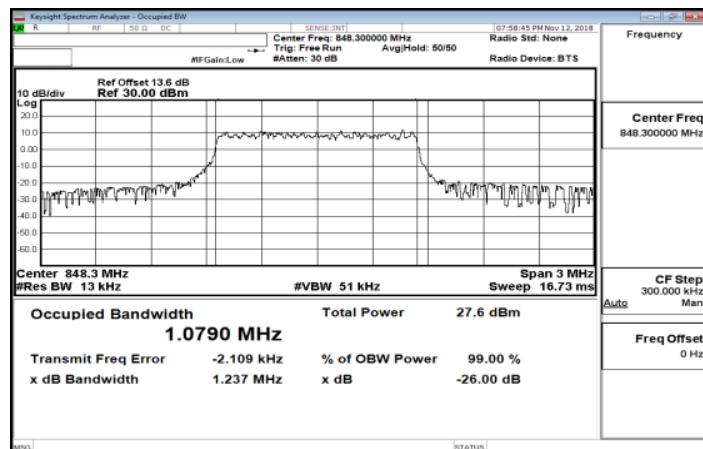
Band5_1_4MHz_16QAM_6_0_MidCH20525-836.5



Band5_1_4MHz_QPSK_6_0_HighCH20643-848.3



Band5_1_4MHz_16QAM_6_0_HighCH20643-848.3

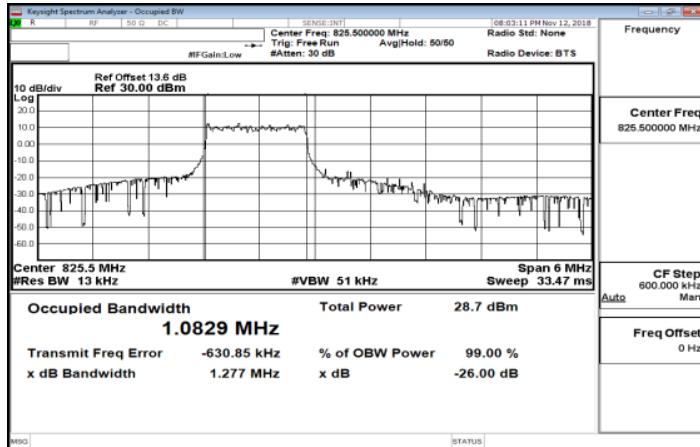


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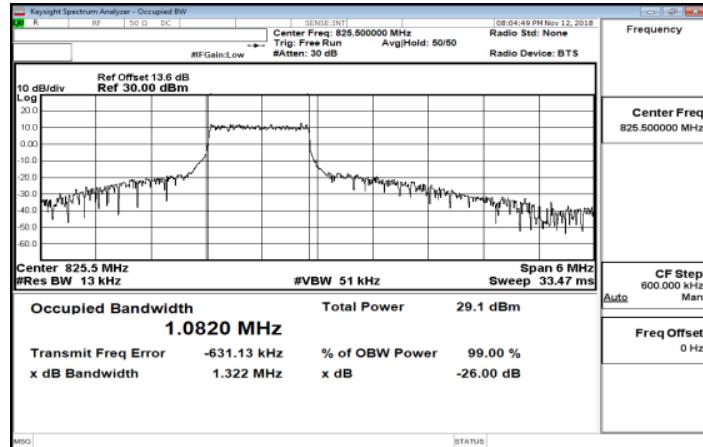
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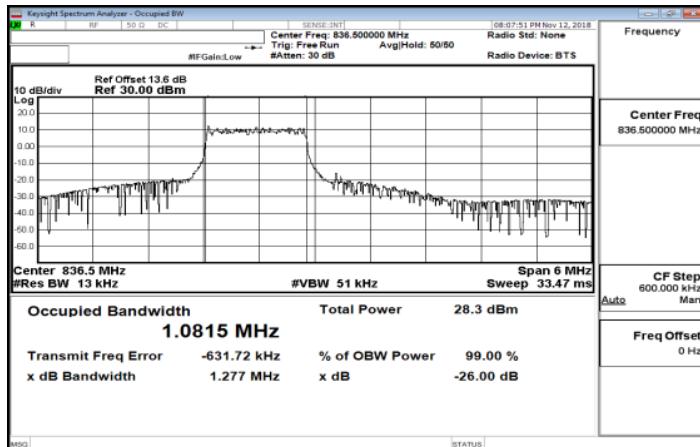
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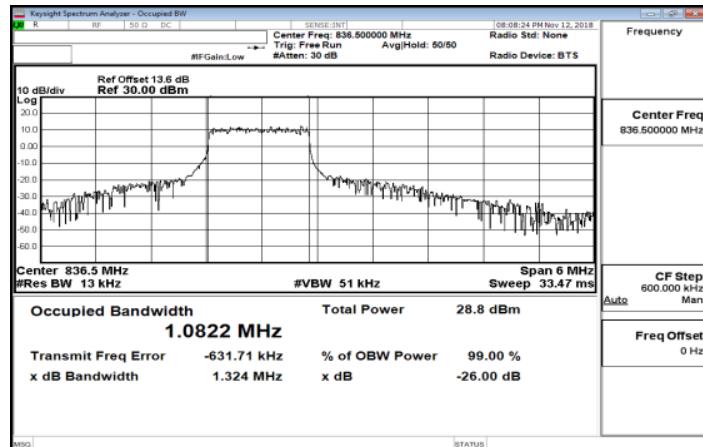
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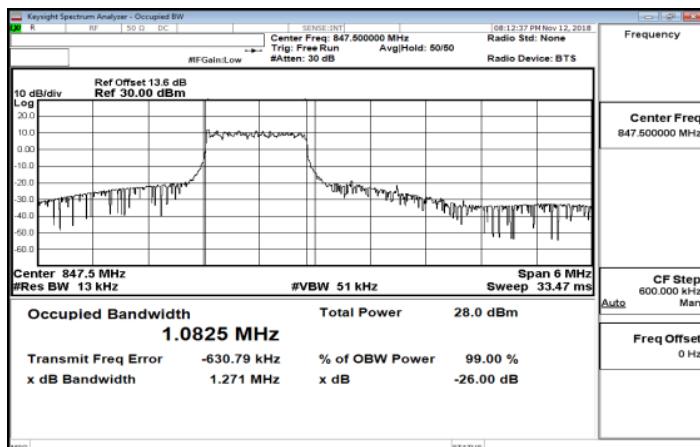
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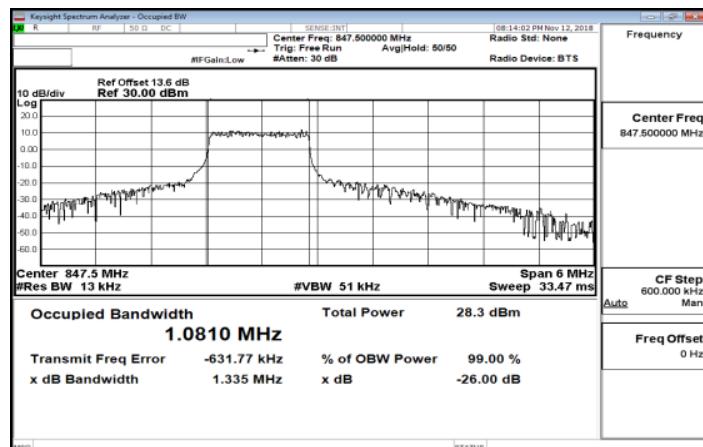
Band5_3MHz_16QAM_6_0_MidCH20525-836.5



Band5_3MHz_QPSK_6_0_HighCH20635-847.5



Band5_3MHz_16QAM_6_0_HighCH20635-847.5



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