

**ELECTROMAGNETIC EMISSIONS  
COMPLIANCE REPORT**

**Applicant:** Motive Technologies, Inc.  
55 Hawthorne St., Suite 400, San Francisco, CA 94105

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

**Product Name:** Asset Gateway

**Brand Name:** Motive

**FCC Model No.:** AG-55

**ISED Model No.:** AG-55C

**Model Difference:** N/A

**Report Number:** TERF2209001659ER

**FCC ID** 2AQM7-AG55C

**IC:** 24516-AG55C

**Date of EUT Received:** Sep. 05, 2022

**Date of Test:** Sep. 13, 2022~Sep. 22, 2022

**Issue Date:** Oct. 04, 2022

Approved By \_\_\_\_\_

**Jim Chang**

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab 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 comply with FCC rule part 2, 22H & 24E & 27 C and ISED RSS-Gen, 130, 132, 133, 139.

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

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## Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TERF2209001659ER	00	Original.	Oct. 04, 2022	Yi-Shan Tsai	

**Note:**

- The remark "" indicates modification of the report upon requests from certification body.

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## 1 GENERAL PRODUCT INFORMATION

### 1.1 Product Description

Product Name:	Asset Gateway
Brand Name:	Motive
FCC Model No.:	AG-55
ISED Model No.:	AG-55C
Model Difference:	N/A
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	A12-3QG-G4C
Power Supply:	3.6Vdc from Rechargeable Li-ion Battery Pack
Test Software (Name/Version)	Default

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## 1.2 Frequency Range

### 1.2.1 Cat. M1

CAT-M1 Band 2			
BW (MHz)	Operation Frequency (MHz)		
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
CAT-M1 Band 4			
BW (MHz)	Operation Frequency (MHz)		
1.4	1710.7	-	1754.3
3	1711.5	-	1753.5
5	1712.5	-	1752.5
10	1715.0	-	1750.0
15	1717.5	-	1747.5
20	1720.0	-	1745.0
CAT-M1 Band 5			
BW (MHz)	Operation Frequency (MHz)		
1.4	824.7	-	848.3
3	825.5	-	847.5
5	826.5	-	846.5
10	829.0	-	844.0
CAT-M1 Band 12			
BW (MHz)	Operation Frequency (MHz)		
1.4	699.7	-	715.3
3	700.5	-	714.5
5	701.5	-	713.5
10	704.0	-	711.0

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### 1.3 Antenna Designation

Antenna Type	Antenna Model No.
Monopole	Ant0
<b>Note:</b> Transmission frequencies in this test report are only available by the above antenna(s).	

Modulation	Frequency (MHz)	Peak Antenna Gain (dBi)
		Ant0
LTE-Band 2	1850 ~ 1910	5.36
LTE-Band 4	1710 ~ 1755	4.3
LTE-Band 5	824 ~ 849	-1.63
LTE-Band 12	699 ~ 716	-0.36

**Note:** Antenna information is provided by the applicant.

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## 1.4 Type of Emission & Max ERP/EIRP Power Measurement Result:

### 1.4.1 Cat. M1

CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
					ERP	EIRP			
2	1.4	1850.7	1909.3	QPSK	28.03	EIRP	<b>0.635</b>	1.0866	1M09G7D
				16QAM	26.83	EIRP	0.482	1.0833	1M08D7W
2	3	1851.5	1908.5	QPSK	28.00	EIRP	0.631	1.1407	1M14G7D
				16QAM	26.34	EIRP	0.431	1.1713	1M17D7W
2	5	1852.5	1907.5	QPSK	27.83	EIRP	0.607	1.1993	1M20G7D
				16QAM	27.25	EIRP	0.531	1.2189	1M22D7W
2	10	1855.0	1905.0	QPSK	27.60	EIRP	0.575	2.0308	2M03G7D
				16QAM	26.95	EIRP	0.495	2.1683	2M17D7W
2	15	1857.5	1902.5	QPSK	27.71	EIRP	0.590	2.293	2M29G7D
				16QAM	27.72	EIRP	0.592	2.187	2M19D7W
2	20	1860.0	1900.0	QPSK	27.74	EIRP	0.594	2.472	2M47G7D
				16QAM	28.14	EIRP	<b>0.652</b>	2.527	2M53D7W
CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
4	1.4	1710.7	1754.3	QPSK	26.78	EIRP	0.476	1.0873	1M09G7D
				16QAM	25.33	EIRP	0.341	1.0837	1M08D7W
4	3	1711.5	1753.5	QPSK	27.17	EIRP	<b>0.521</b>	1.1461	1M15G7D
				16QAM	25.33	EIRP	0.341	1.1659	1M17D7W
4	5	1712.5	1752.5	QPSK	26.73	EIRP	0.471	1.2010	1M20G7D
				16QAM	26.45	EIRP	0.442	1.2178	1M22D7W
4	10	1715.0	1750.0	QPSK	26.71	EIRP	0.469	1.8600	1M86G7D
				16QAM	26.38	EIRP	0.435	2.3099	2M31D7W
4	15	1717.5	1747.5	QPSK	26.86	EIRP	0.485	2.1398	2M14G7D
				16QAM	26.82	EIRP	<b>0.481</b>	2.1005	2M10D7W
4	20	1720.0	1745.0	QPSK	26.86	EIRP	0.485	2.4419	2M44G7D
				16QAM	26.79	EIRP	0.478	2.1964	2M20D7W

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CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
5	1.4	824.7	848.3	QPSK	19.44	ERP	0.088	1.0863	1M09G7D
				16QAM	17.87	ERP	0.061	1.0827	1M08D7W
5	3	825.5	847.5	QPSK	19.53	ERP	<b>0.090</b>	1.1405	1M14G7D
				16QAM	18.09	ERP	0.064	1.1775	1M18D7W
5	5	826.5	846.5	QPSK	19.36	ERP	0.086	1.1993	1M20G7D
				16QAM	18.98	ERP	<b>0.079</b>	1.2186	1M22D7W
5	10	829.0	844.0	QPSK	19.14	ERP	0.082	2.1324	2M13G7D
				16QAM	18.81	ERP	0.076	2.2588	2M26D7W
CAT-M1 Band	BW	Frequency		Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
12	1.4	699.7	715.3	QPSK	21.25	ERP	0.133	1.0866	1M09G7D
				16QAM	19.70	ERP	0.093	1.0837	1M08D7W
12	3	700.5	714.5	QPSK	21.42	ERP	<b>0.139</b>	1.1451	1M15G7D
				16QAM	19.96	ERP	0.099	1.2016	1M20D7W
12	5	701.5	713.5	QPSK	21.16	ERP	0.131	1.2066	1M21G7D
				16QAM	20.71	ERP	<b>0.118</b>	1.2334	1M23D7W
12	10	704.0	711.0	QPSK	21.14	ERP	0.130	2.1994	2M20G7D
				16QAM	20.67	ERP	0.117	2.3336	2M33D7W

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### 1.5 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22H, 24E, 27C.

ISED RSS-130 Issue 2 Feb. 2019,

ISED RSS-132 Issue 3 Jan. 2013

ISED RSS-133 Issue 6, Amendment 1 Jan. 18, 2018

ISED RSS-139 Issue 3 July 16, 2015

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03r01

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

### 1.6 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan.	SAC 1	TW0027	TW3702
		SAC 3		
		Conduction 1		
		Conducted 1		
		Conducted 2		
		Conducted 3		
		Conducted 4		
		Conducted 5		
		Conducted 6		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	Conduction C	TW0028	
		SAC C		
		SAC D		
		SAC G		
		Conducted A		
		Conducted B		
		Conducted C		
		Conducted D		
		Conducted E		
		Conducted F		
Conducted G				

**Note:** Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

### 1.7 Special Accessories

No special accessories were used during testing.

### 1.8 Equipment Modifications

There was no modifications incorporated into the EUT.

### 1.9 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*6m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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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

The EUT is placed on a table which is 0.8 m 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 (ERP/EIRP)

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.

### 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.

#### Note:

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

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## 2.5 Final Amplifier Voltage and Current Information:

### 2.5.1 Cat M1

#### CAT-M1 Band 2

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 2_20M QPSK	3.6	<b>240</b>

#### CAT-M1 Band 4

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 4_20M QPSK	3.6	<b>230</b>

#### CAT-M1 Band 5

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 5_10M QPSK	3.6	<b>250</b>

#### CAT-M1 Band 12

Test mode	DC voltage (V)	DC current (mA)
CAT-M1 Band 5_10M QPSK	3.6	<b>220</b>

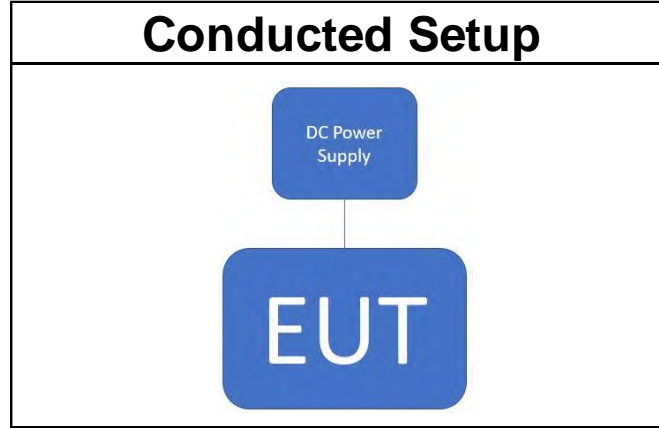
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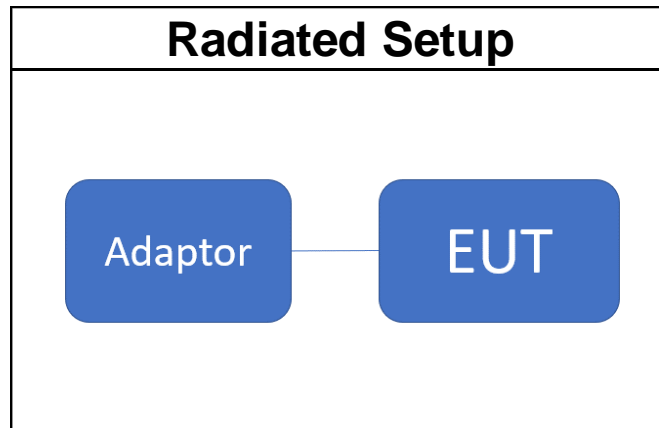
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## 2.6 Test Configuration

### 2.6.1 Conducted Emission at the Antenna Port



### 2.6.2 Radiated Emission



**Note:** Radio Communication Analyzer is placed in remote side for radiated test.

### 2.6.3 Equipment used for test

Conducted Emission Test Site: Conducted 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Software	SGS	Radio Test Software	Ver. 21	N.C.R	N.C.R
Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Software	audix	e3	Ver. 9 210322	N.C.R	N.C.R
Adapter	CLOVER	FSP040-RHBN3	N/A	N/A	N/A

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§2.1046(a)	RSS-GEN §6.12	RF Power Output	Compliant
§22.913(a)(5) §24.232(c) §27.50(a)(3) §27.50(c)(10) §27.50(d)(4) §27.50(h)(2)	RSS-130 §4.6 RSS-132 §5.4 RSS-133 §6.4 RSS-139 §6.5	ERP/ EIRP measurement	Compliant
§2.1049(h)	RSS-GEN §6.7	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)	RSS-GEN §6.13 RSS-130 §4.7 RSS-132 §5.5 RSS-133 §6.5 RSS-139 §6.6	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)	RSS-GEN §6.13 RSS-130 §4.7 RSS-132 §5.5 RSS-133 §6.5 RSS-139 §6.6	Field Strength of Spurious Radiation	Compliant
§24.232(d) §27.50(a)(1)(B)	RSS-130 §4.6.1 RSS-132 §5.4 RSS-133 §6.4 RSS-139 §6.4	Peak to Average Ratio	Compliant
§2.1055(a)(1) §22.355 §24.235 §27.54	RSS-130 §4.5 RSS-132 §5.3 RSS-133 §6.3 RSS-139 §6.5	Frequency Stability	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 The Worst Test Modes and Configuration

1. The EUT has been tested under operating condition.
2. The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

### 4.2 Cat M1

Test Items				Max. Output Power									
Band	Test Channel			Bandwidth (MHz)						Modulation		RB #	
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	1	Full
2	v	v	v	v	v	v	v	v	v	v	v	v	v
4	v	v	v	v	v	v	v	v	v	v	v	v	v
5	v	v	v	v	v	v	v	-	-	v	v	v	v
12	v	v	v	v	v	v	v	-	-	v	v	v	v
Test Items				Frequency Stability									
2	-	v	-	-	-	-	v	-	-	v	-	-	v
4	-	v	-	-	-	-	v	-	-	v	-	-	v
5	-	v	-	-	-	-	v	-	-	v	-	-	v
12	-	v	-	-	-	-	v	-	-	v	-	-	v
Test Items				26dB and 99% Bandwidth									
Band	Test Channel			Bandwidth (MHz)						Modulation		RB #	
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	1	Full
2	v	v	v	v	v	v	v	v	v	v	v	-	v
4	v	v	v	v	v	v	v	v	v	v	v	-	v
5	v	v	v	v	v	v	v	-	-	v	v	-	v
12	v	v	v	v	v	v	v	-	-	v	v	-	v
Test Items				Peak-to-Average Ratio									
2	v	v	v	v	v	v	v	v	v	-	v	-	v
4	v	v	v	v	v	v	v	v	v	-	v	-	v
5	v	v	v	v	v	v	v	-	-	-	v	-	v
12	v	v	v	v	v	v	v	-	-	-	v	-	v
Test Items				Band Edge									
Band	Test Channel			Bandwidth (MHz)						Modulation		RB #	
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	1	Full
2	v	-	v	v	v	v	v	v	v	v	-	v	v
4	v	-	v	v	v	v	v	v	v	v	-	v	v
5	v	-	v	v	v	v	v	-	-	v	-	v	v
12	v	-	v	v	v	v	v	-	-	v	-	v	v
Test Items				Conducted Emission									
2	v	v	v	v	v	v	v	v	v	v	-	v	-
4	v	v	v	v	v	v	v	v	v	v	-	v	-
5	v	v	v	v	v	v	v	-	-	v	-	v	-
12	v	v	v	v	v	v	v	-	-	v	-	v	-

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1 dB
ERP/ EIRP measurement	+/- 3 dB
	+/- 3 dB
Emission Bandwidth	+/- 1.53 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 1.68 dB
Peak to Average Ratio	+/- 1 dB
Frequency Stability vs. Temperature	+/- 1.53 Hz
Frequency Stability vs. Voltage	+/- 1.53 Hz
Temperature	+/- 0.4 °C
Humidity	+/- 3.5 %
DC / AC Power Source	+/- 1 %

Radiated Spurious Emission Measurement Uncertainty		
Polarization: Vertical	+/- 2.57 dB	9kHz~30MHz
	+/- 4.85 dB	30MHz - 1000MHz
	+/- 4.45 dB	1GHz - 18GHz
	+/- 4.24 dB	18GHz - 40GHz
Polarization: Horizontal	+/- 2.57 dB	9kHz~30MHz
	+/- 4.37 dB	30MHz - 1000MHz
	+/- 4.45 dB	1GHz - 18GHz
	+/- 4.24 dB	18GHz - 40GHz

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 MEASUREMENT EQUIPMENT USED

### 6.1 Conducted Measurement

Conducted Emission Test Site: Conducted 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/27/2022	04/26/2023
Radio Communication Analyzer	Anritsu	MT8821C	6262044670	08/19/2022	08/18/2023
Temperature Chamber	Giant Force	GTH-150-40-CP-AR	MAA0512-018	05/24/2022	05/23/2023
DC Power Supply	Gwinstek	SPS-3610	GEV856750	08/01/2022	07/31/2023
Attenuator	Mini-Circuit	BW-S10W2+	2	12/14/2021	12/13/2022
DC Block	Mini-Circuits	BLK-18-S+	1	12/14/2021	12/13/2022
Power Divider	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	12/14/2021	12/13/2022

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## 6.2 Radiated Measurement

Radiated Emission Test Site: SAC 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWARZBECK	VULB9168	378	08/15/2022	08/14/2023
Horn Antenna	SCHWARZBECK	BBHA9120D	1441	09/27/2021	09/26/2022
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/16/2021	12/15/2022
Bi-log Antenna	SCHWARZBECK	VULB9168	300	10/19/2021	10/18/2022
Horn Antenna	SCHWARZBECK	BBHA9120D	603	05/16/2022	05/15/2023
Horn Antenna	SCHWARZBECK	BBHA9170	185	08/22/2022	08/21/2023
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/27/2022	04/26/2023
Signal Generator	R&S	SMBV100A	263084	01/11/2022	01/10/2023
Pre-Amplifier	HP	8449B	3008A00578	12/16/2021	12/15/2022
Pre-Amplifier	HP	8447D	2944A07676	12/16/2021	12/15/2022
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2021	10/26/2022
Filter 635-920	Micro-Tronics	WI	4	12/14/2021	12/13/2022
Filter 800-1000	Micro-Tronics	EWT	M1	12/14/2021	12/13/2022
Filter 1700-2000	Micro-Tronics	EWT	M3	12/14/2021	12/13/2022
Filter 2240-2700	Micro-Tronics	WI	2	12/14/2021	12/13/2022
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	12/14/2021	12/13/2022
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	12/14/2021	12/13/2022
High Pass Filter	WI	WHKX4.0/18G-10SS	22	12/14/2021	12/13/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY2636/2	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 104	340057/4	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 104PEA	800052/2	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY2621/2	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY2617/2	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 104	160125	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 106	76096/6	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY2630/2	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 102	MY22962/2	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	SUCOFLEX 102	SN 520430/2	12/16/2021	12/15/2022
Radio Communication Analyser	Anritsu	MT8821C	6262044670	08/19/2022	08/18/2023
Site Cal	SGS	SAC 3	N/A	01/01/2022	12/31/2022

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## 7 MAXIMUM OUTPUT POWER

### 7.1 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.

### 7.2 FCC 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(c)

Mobile and portable stations are limited to 2 W EIRP.

#### FCC 27.50 (a)

(3) for mobile and portable stations compliant with 3GPP LTE standards transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band are limited to 250 mW/ 5MHz EIRP but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth.

#### FCC 27.50 (b)

(9) Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 30 watts ERP.

(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

#### FCC 27.50(c)

(9) Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP.

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

#### FCC 27.50(d)

(4) Mobile, and portable (hand-held) stations operating in the 1710-1755 MHz, 1695-1710 MHz and 1755-1780 MHz bands are limited to 1W EIRP.

(7) Mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band are limited to 2 watts EIRP.

#### FCC 27, 50(h)

(2) Mobile and other user stations transmitting in the BRS and EBS bands are limited to 2 W EIRP.

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**RSS-130 §4.6**

The e.r.p. shall not exceed 3 watts for mobile equipment, fixed subscriber equipment and portable equipment operating in the Band 617-652 and 663-698MHz.

**RSS-132 §5.4**

The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment in operating in the Bands 824-849 and 869-894MHz shall not exceed 11.5 watts.

**RSS-133 §6.4**

The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510.

According to section 5.1.2 of SRSP-510, Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. The equipment shall employ means to limit the power to the minimum necessary for successful communication.

**RSS-139 §6.5**

The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters in the Bands 1710-1780MHz shall not exceed one watt.

**RSS-130 §4.6**

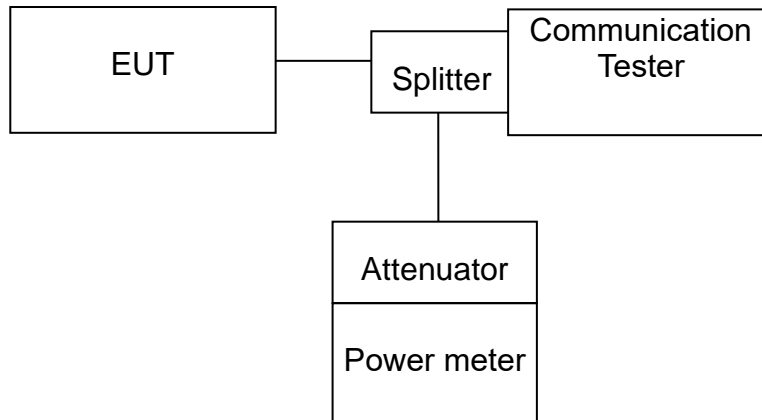
The e.r.p. shall not exceed 3 watts for mobile equipment, fixed subscriber equipment and portable equipment.

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### 7.3 Test Set-up



**Note:** Measurement setup for testing on Antenna connector

### 7.4 Output Power Measurement Applicable Guidance

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

### 7.5 Determining ERP and/or EIRP from conducted RF output power measurements

$$ERP/EIRP = P_{Meas} + GT-LC$$

Where:

- ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as  $P_{Meas}$ , typically dBW or dBm);
- $P_{Meas}$  = 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.

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.

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## 7.6 Measurement Result

### 7.6.1 Cat M1

Antenna gain (dBi)		5.36							
<b>CAT-M1 Band 2_Uplink frequency band : 1850 to 1910 MHz</b>									
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	22.67	<b>28.03</b>	33	-4.97
				1	5	22.63	27.99	33	-5.01
				6	0	20.26	25.62	33	-7.38
	18900	1880	QPSK	1	0	22.61	27.97	33	-5.03
				1	5	22.51	27.87	33	-5.13
				6	0	20.20	25.56	33	-7.44
	19193	1909.3	QPSK	1	0	22.65	28.01	33	-4.99
				1	5	22.62	27.98	33	-5.02
				6	0	20.27	25.63	33	-7.37
1.4	18607	1850.7	16QAM	1	0	21.01	26.37	33	-6.63
				1	5	20.97	26.33	33	-6.67
				6	0	20.19	25.55	33	-7.45
	18900	1880	16QAM	1	0	20.71	26.07	33	-6.93
				1	5	21.47	<b>26.83</b>	33	-6.17
				6	0	20.19	25.55	33	-7.45
	19193	1909.3	16QAM	1	0	20.75	26.11	33	-6.89
				1	5	20.71	26.07	33	-6.93
				6	0	20.23	25.59	33	-7.41

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Antenna gain (dBi)		5.36							
CAT-M1 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	22.40	27.76	33	-5.24
				1	5	22.43	27.79	33	-5.21
				6	0	22.30	27.66	33	-5.34
	18900	1880	QPSK	1	0	22.33	27.69	33	-5.31
				1	5	22.36	27.72	33	-5.28
				6	0	20.26	25.62	33	-7.38
	19185	1908.5	QPSK	1	0	22.64	<b>28.00</b>	33	-5
				1	5	22.35	27.71	33	-5.29
				6	0	20.33	25.69	33	-7.31
3	18615	1851.5	16QAM	1	0	20.98	<b>26.34</b>	33	-6.66
				1	5	20.96	26.32	33	-6.68
				6	0	20.27	25.63	33	-7.37
	18900	1880	16QAM	1	0	20.92	26.28	33	-6.72
				1	5	20.90	26.26	33	-6.74
				6	0	20.37	25.73	33	-7.27
	19185	1908.5	16QAM	1	0	20.94	26.30	33	-6.7
				1	5	20.92	26.28	33	-6.72
				6	0	20.40	25.76	33	-7.24

Antenna gain (dBi)		5.36							
CAT-M1 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	22.11	27.47	33	-5.53
				1	5	22.47	<b>27.83</b>	33	-5.17
				6	0	21.36	26.72	33	-6.28
	18900	1880	QPSK	1	0	21.93	27.29	33	-5.71
				1	5	21.99	27.35	33	-5.65
				6	0	21.37	26.73	33	-6.27
	19175	1907.5	QPSK	1	0	21.89	27.25	33	-5.75
				1	5	21.95	27.31	33	-5.69
				6	0	21.22	26.58	33	-6.42
5	18625	1852.5	16QAM	1	0	21.74	27.10	33	-5.9
				1	5	21.78	27.14	33	-5.86
				6	0	20.41	25.77	33	-7.23
	18900	1880	16QAM	1	0	21.89	<b>27.25</b>	33	-5.75
				1	5	21.75	27.11	33	-5.89
				6	0	20.40	25.76	33	-7.24
	19175	1907.5	16QAM	1	0	21.54	26.90	33	-6.1
				1	5	21.56	26.92	33	-6.08
				6	0	20.44	25.80	33	-7.2

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Antenna gain (dBi)		5.36							
CAT-M1 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	22.10	27.46	33	-5.54
				1	5	22.24	<b>27.60</b>	33	-5.4
				6	0	21.38	26.74	33	-6.26
	18900	1880	QPSK	1	0	22.03	27.39	33	-5.61
				1	5	21.93	27.29	33	-5.71
				6	0	21.31	26.67	33	-6.33
	19150	1905	QPSK	1	0	21.94	27.30	33	-5.7
				1	5	21.96	27.32	33	-5.68
				6	0	21.28	26.64	33	-6.36
10	18650	1855	16QAM	1	0	21.59	<b>26.95</b>	33	-6.05
				1	5	21.56	26.92	33	-6.08
				6	0	20.30	25.66	33	-7.34
	18900	1880	16QAM	1	0	21.52	26.88	33	-6.12
				1	5	21.50	26.86	33	-6.14
				6	0	20.42	25.78	33	-7.22
	19150	1905	16QAM	1	0	21.51	26.87	33	-6.13
				1	5	21.48	26.84	33	-6.16
				6	0	20.37	25.73	33	-7.27

Antenna gain (dBi)		5.36							
CAT-M1 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	22.04	27.40	33	-5.6
				1	5	22.10	27.46	33	-5.54
				6	0	22.35	<b>27.71</b>	33	-5.29
	18900	1880	QPSK	1	0	22.26	27.62	33	-5.38
				1	5	22.15	27.51	33	-5.49
				6	0	22.30	27.66	33	-5.34
	19125	1902.5	QPSK	1	0	22.26	27.62	33	-5.38
				1	5	22.08	27.44	33	-5.56
				6	0	22.35	<b>27.71</b>	33	-5.29
15	18675	1857.5	16QAM	1	0	21.55	26.91	33	-6.09
				1	5	21.59	26.95	33	-6.05
				6	0	22.36	<b>27.72</b>	33	-5.28
	18900	1880	16QAM	1	0	21.61	26.97	33	-6.03
				1	5	21.53	26.89	33	-6.11
				6	0	22.30	27.66	33	-5.34
	19125	1902.5	16QAM	1	0	22.02	27.38	33	-5.62
				1	5	21.53	26.89	33	-6.11
				6	0	22.32	27.68	33	-5.32

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Antenna gain (dBi)		5.36							
CAT-M1 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	22.11	27.47	33	-5.53
				1	5	22.06	27.42	33	-5.58
				6	0	22.34	27.70	33	-5.3
	18900	1880	QPSK	1	0	22.08	27.44	33	-5.56
				1	5	22.02	27.38	33	-5.62
				6	0	22.31	27.67	33	-5.33
	19100	1900	QPSK	1	0	22.03	27.39	33	-5.61
				1	5	22.09	27.45	33	-5.55
				6	0	22.38	27.74	33	-5.26
20	18700	1860	16QAM	1	0	21.64	27.00	33	-6
				1	5	22.67	28.03	33	-4.97
				6	0	22.34	27.70	33	-5.3
	18900	1880	16QAM	1	0	21.62	26.98	33	-6.02
				1	5	21.53	26.89	33	-6.11
				6	0	22.35	27.71	33	-5.29
	19100	1900	16QAM	1	0	22.78	28.14	33	-4.86
				1	5	22.51	27.87	33	-5.13
				6	0	22.34	27.70	33	-5.3

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Antenna gain (dBi)		4.3							
CAT-M1 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	22.48	<b>26.78</b>	30	-3.22
				1	5	22.47	26.77	30	-3.23
				6	0	20.37	24.67	30	-5.33
	20175	1732.5	QPSK	1	0	22.37	26.67	30	-3.33
				1	5	22.32	26.62	30	-3.38
				6	0	20.28	24.58	30	-5.42
	20393	1754.3	QPSK	1	0	22.35	26.65	30	-3.35
				1	5	22.29	26.59	30	-3.41
				6	0	20.25	24.55	30	-5.45
1.4	19957	1710.7	16QAM	1	0	20.92	25.22	30	-4.78
				1	5	20.90	25.20	30	-4.8
				6	0	20.38	24.68	30	-5.32
	20175	1732.5	16QAM	1	0	21.03	<b>25.33</b>	30	-4.67
				1	5	20.80	25.10	30	-4.9
				6	0	20.22	24.52	30	-5.48
	20393	1754.3	16QAM	1	0	20.77	25.07	30	-4.93
				1	5	20.74	25.04	30	-4.96
				6	0	20.21	24.51	30	-5.49

Antenna gain (dBi)		4.3							
CAT-M1 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	22.87	<b>27.17</b>	30	-2.83
				1	5	22.66	26.96	30	-3.04
				6	0	20.46	24.76	30	-5.24
	20175	1732.5	QPSK	1	0	22.53	26.83	30	-3.17
				1	5	22.56	26.86	30	-3.14
				6	0	20.37	24.67	30	-5.33
	20385	1753.5	QPSK	1	0	22.40	26.70	30	-3.3
				1	5	22.42	26.72	30	-3.28
				6	0	20.34	24.64	30	-5.36
3	19965	1711.5	16QAM	1	0	21.00	25.30	30	-4.7
				1	5	20.89	25.19	30	-4.81
				6	0	20.41	24.71	30	-5.29
	20175	1732.5	16QAM	1	0	21.03	<b>25.33</b>	30	-4.67
				1	5	21.01	25.31	30	-4.69
				6	0	20.23	24.53	30	-5.47
	20385	1753.5	16QAM	1	0	20.99	25.29	30	-4.71
				1	5	20.97	25.27	30	-4.73
				6	0	20.30	24.60	30	-5.4

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Antenna gain (dBi)		4.3							
CAT-M1 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	22.25	26.55	30	-3.45
				1	5	22.43	<b>26.73</b>	30	-3.27
				6	0	21.50	25.80	30	-4.2
	20175	1732.5	QPSK	1	0	22.30	26.60	30	-3.4
				1	5	22.35	26.65	30	-3.35
				6	0	21.42	25.72	30	-4.28
	20375	1752.5	QPSK	1	0	22.17	26.47	30	-3.53
				1	5	22.21	26.51	30	-3.49
				6	0	21.54	25.84	30	-4.16
5	19975	1712.5	16QAM	1	0	21.88	26.18	30	-3.82
				1	5	21.90	26.20	30	-3.8
				6	0	20.56	24.86	30	-5.14
	20175	1732.5	16QAM	1	0	21.75	26.05	30	-3.95
				1	5	21.76	26.06	30	-3.94
				6	0	20.44	24.74	30	-5.26
	20375	1752.5	16QAM	1	0	22.04	26.34	30	-3.66
				1	5	22.15	<b>26.45</b>	30	-3.55
				6	0	20.42	24.72	30	-5.28

Antenna gain (dBi)		4.3							
CAT-M1 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	22.38	26.68	30	-3.32
				1	5	22.41	<b>26.71</b>	30	-3.29
				6	0	21.43	25.73	30	-4.27
	20175	1732.5	QPSK	1	0	22.23	26.53	30	-3.47
				1	5	22.26	26.56	30	-3.44
				6	0	21.39	25.69	30	-4.31
	20350	1750	QPSK	1	0	22.34	26.64	30	-3.36
				1	5	22.35	26.65	30	-3.35
				6	0	21.51	25.81	30	-4.19
10	20000	1715	16QAM	1	0	21.70	26.00	30	-4
				1	5	21.79	26.09	30	-3.91
				6	0	20.41	24.71	30	-5.29
	20175	1732.5	16QAM	1	0	21.74	26.04	30	-3.96
				1	5	21.70	26.00	30	-4
				6	0	20.38	24.68	30	-5.32
	20350	1750	16QAM	1	0	22.01	26.31	30	-3.69
				1	5	22.08	<b>26.38</b>	30	-3.62
				6	0	20.44	24.74	30	-5.26

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Antenna gain (dBi)		4.3							
CAT-M1 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	22.39	26.69	30	-3.31
				1	5	22.28	26.58	30	-3.42
				6	0	22.56	<b>26.86</b>	30	-3.14
	20175	1732.5	QPSK	1	0	22.37	26.67	30	-3.33
				1	5	22.32	26.62	30	-3.38
				6	0	22.34	26.64	30	-3.36
	20325	1747.5	QPSK	1	0	22.30	26.60	30	-3.4
				1	5	22.25	26.55	30	-3.45
				6	0	22.36	26.66	30	-3.34
15	20025	1717.5	16QAM	1	0	21.96	26.26	30	-3.74
				1	5	21.76	26.06	30	-3.94
				6	0	22.52	<b>26.82</b>	30	-3.18
	20175	1732.5	16QAM	1	0	21.73	26.03	30	-3.97
				1	5	21.65	25.95	30	-4.05
				6	0	22.46	26.76	30	-3.24
	20325	1747.5	16QAM	1	0	22.11	26.41	30	-3.59
				1	5	22.13	26.43	30	-3.57
				6	0	22.42	26.72	30	-3.28

Antenna gain (dBi)		4.3							
CAT-M1 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	22.41	26.71	30	-3.29
				1	5	22.36	26.66	30	-3.34
				6	0	22.47	26.77	30	-3.23
	20175	1732.5	QPSK	1	0	22.51	26.81	30	-3.19
				1	5	22.46	26.76	30	-3.24
				6	0	22.45	26.75	30	-3.25
	20300	1745	QPSK	1	0	22.56	<b>26.86</b>	30	-3.14
				1	5	22.51	26.81	30	-3.19
				6	0	22.41	26.71	30	-3.29
20	20050	1720	16QAM	1	0	22.20	26.50	30	-3.5
				1	5	22.12	26.42	30	-3.58
				6	0	22.49	<b>26.79</b>	30	-3.21
	20175	1732.5	16QAM	1	0	21.71	26.01	30	-3.99
				1	5	21.62	25.92	30	-4.08
				6	0	22.45	26.75	30	-3.25
	20300	1745	16QAM	1	0	22.14	26.44	30	-3.56
				1	5	22.15	26.45	30	-3.55
				6	0	22.46	26.76	30	-3.24

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Antenna gain (dBi)		-1.63								
CAT-M1 Band 5_Uplink frequency band : 824 to 849 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
1.4	20407	824.7	QPSK	1	0	23.22	19.44	21.59	38.45	-19.01
				1	5	22.98	19.20	21.35	38.45	-19.25
				6	0	21.07	17.29	19.44	38.45	-21.16
	20525	836.5	QPSK	1	0	23.07	19.29	21.44	38.45	-19.16
				1	5	23.02	19.24	21.39	38.45	-19.21
				6	0	21.15	17.37	19.52	38.45	-21.08
	20643	848.3	QPSK	1	0	23.08	19.30	21.45	38.45	-19.15
				1	5	23.05	19.27	21.42	38.45	-19.18
				6	0	21.15	17.37	19.52	38.45	-21.08
1.4	20407	824.7	16QAM	1	0	21.52	17.74	19.89	38.45	-20.71
				1	5	21.49	17.71	19.86	38.45	-20.74
				6	0	21.04	17.26	19.41	38.45	-21.19
	20525	836.5	16QAM	1	0	21.61	17.83	19.98	38.45	-20.62
				1	5	21.58	17.80	19.95	38.45	-20.65
				6	0	21.06	17.28	19.43	38.45	-21.17
	20643	848.3	16QAM	1	0	21.65	17.87	20.02	38.45	-20.58
				1	5	21.53	17.75	19.90	38.45	-20.70
				6	0	21.17	17.39	19.54	38.45	-21.06

Antenna gain (dBi)		-1.63								
CAT-M1 Band 5_Uplink frequency band : 824 to 849 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
3	20415	825.5	QPSK	1	0	22.96	19.18	21.33	38.45	-19.27
				1	5	22.95	19.17	21.32	38.45	-19.28
				6	0	22.07	18.29	20.44	38.45	-20.16
	20525	836.5	QPSK	1	0	22.97	19.19	21.34	38.45	-19.26
				1	5	22.98	19.20	21.35	38.45	-19.25
				6	0	21.06	17.28	19.43	38.45	-21.17
	20635	847.5	QPSK	1	0	23.31	19.53	21.68	38.45	-18.92
				1	5	23.17	19.39	21.54	38.45	-19.06
				6	0	21.17	17.39	19.54	38.45	-21.06
3	20415	825.5	16QAM	1	0	21.71	17.93	20.08	38.45	-20.52
				1	5	21.70	17.92	20.07	38.45	-20.53
				6	0	21.14	17.36	19.51	38.45	-21.09
	20525	836.5	16QAM	1	0	21.54	17.76	19.91	38.45	-20.69
				1	5	21.53	17.75	19.90	38.45	-20.70
				6	0	21.10	17.32	19.47	38.45	-21.13
	20635	847.5	16QAM	1	0	21.87	18.09	20.24	38.45	-20.36
				1	5	21.84	18.06	20.21	38.45	-20.39
				6	0	21.29	17.51	19.66	38.45	-20.94

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Antenna gain (dBi)		-1.63								
CAT-M1 Band 5_Uplink frequency band : 824 to 849 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
5	20425	826.5	QPSK	1	0	22.89	19.11	21.26	38.45	-19.34
				1	5	23.14	19.36	21.51	38.45	-19.09
				6	0	22.08	18.30	20.45	38.45	-20.15
	20525	836.5	QPSK	1	0	22.80	19.02	21.17	38.45	-19.43
				1	5	22.75	18.97	21.12	38.45	-19.48
				6	0	22.10	18.32	20.47	38.45	-20.13
	20625	846.5	QPSK	1	0	22.99	19.21	21.36	38.45	-19.24
				1	5	23.01	19.23	21.38	38.45	-19.22
				6	0	22.19	18.41	20.56	38.45	-20.04
5	20425	826.5	16QAM	1	0	22.34	18.56	20.71	38.45	-19.89
				1	5	22.37	18.59	20.74	38.45	-19.86
				6	0	21.15	17.37	19.52	38.45	-21.08
	20525	836.5	16QAM	1	0	22.34	18.56	20.71	38.45	-19.89
				1	5	22.38	18.60	20.75	38.45	-19.85
				6	0	21.14	17.36	19.51	38.45	-21.09
	20625	846.5	16QAM	1	0	22.76	18.98	21.13	38.45	-19.47
				1	5	22.54	18.76	20.91	38.45	-19.69
				6	0	22.24	18.46	20.61	38.45	-19.99

Antenna gain (dBi)		-1.63								
CAT-M1 Band 5_Uplink frequency band : 824 to 849 MHz										
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
10	20450	829	QPSK	1	0	22.87	19.09	21.24	38.45	-19.36
				1	5	22.78	19.00	21.15	38.45	-19.45
				6	0	22.17	18.39	20.54	38.45	-20.06
	20525	836.5	QPSK	1	0	22.74	18.96	21.11	38.45	-19.49
				1	5	22.76	18.98	21.13	38.45	-19.47
				6	0	22.04	18.26	20.41	38.45	-20.19
	20600	844	QPSK	1	0	22.92	19.14	21.29	38.45	-19.31
				1	5	22.88	19.10	21.25	38.45	-19.35
				6	0	22.19	18.41	20.56	38.45	-20.04
10	20450	829	16QAM	1	0	22.40	18.62	20.77	38.45	-19.83
				1	5	22.41	18.63	20.78	38.45	-19.82
				6	0	21.12	17.34	19.49	38.45	-21.11
	20525	836.5	16QAM	1	0	22.59	18.81	20.96	38.45	-19.64
				1	5	22.38	18.60	20.75	38.45	-19.85
				6	0	21.08	17.30	19.45	38.45	-21.15
	20600	844	16QAM	1	0	22.47	18.69	20.84	38.45	-19.76
				1	5	22.44	18.66	20.81	38.45	-19.79
				6	0	21.23	17.45	19.60	38.45	-21.00

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Antenna gain (dBi)		-0.36								
CAT-M1 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)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
1.4	23017	699.7	QPSK	1	0	23.76	21.25	23.40	34.77	-13.52
				1	5	23.75	21.24	23.39	34.77	-13.53
				6	0	21.75	19.24	21.39	34.77	-15.53
	23095	707.5	QPSK	1	0	23.55	21.04	23.19	34.77	-13.73
				1	5	23.53	21.02	23.17	34.77	-13.75
				6	0	21.53	19.02	21.17	34.77	-15.75
	23173	715.5	QPSK	1	0	23.53	21.02	23.17	34.77	-13.75
				1	5	23.52	21.01	23.16	34.77	-13.76
				6	0	21.46	18.95	21.10	34.77	-15.82
1.4	23017	699.7	16QAM	1	0	22.21	19.70	21.85	34.77	-15.07
				1	5	22.11	19.60	21.75	34.77	-15.17
				6	0	21.70	19.19	21.34	34.77	-15.58
	23095	707.5	16QAM	1	0	22.05	19.54	21.69	34.77	-15.23
				1	5	21.94	19.43	21.58	34.77	-15.34
				6	0	21.48	18.97	21.12	34.77	-15.80
	23173	715.5	16QAM	1	0	22.01	19.50	21.65	34.77	-15.27
				1	5	21.89	19.38	21.53	34.77	-15.39
				6	0	21.45	18.94	21.09	34.77	-15.83

Antenna gain (dBi)		-0.36								
CAT-M1 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)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
3	23025	700.5	QPSK	1	0	23.89	21.38	23.53	34.77	-13.39
				1	5	23.93	21.42	23.57	34.77	-13.35
				6	0	21.79	19.28	21.43	34.77	-15.49
	23095	707.5	QPSK	1	0	23.69	21.18	23.33	34.77	-13.59
				1	5	23.73	21.22	23.37	34.77	-13.55
				6	0	21.60	19.09	21.24	34.77	-15.68
	23165	714.5	QPSK	1	0	22.66	20.15	22.30	34.77	-14.62
				1	5	23.63	21.12	23.27	34.77	-13.65
				6	0	21.56	19.05	21.20	34.77	-15.72
3	23025	700.5	16QAM	1	0	22.43	19.92	22.07	34.77	-14.85
				1	5	22.47	19.96	22.11	34.77	-14.81
				6	0	21.79	19.28	21.43	34.77	-15.49
	23095	707.5	16QAM	1	0	22.24	19.73	21.88	34.77	-15.04
				1	5	22.27	19.76	21.91	34.77	-15.01
				6	0	21.50	18.99	21.14	34.77	-15.78
	23165	714.5	16QAM	1	0	22.23	19.72	21.87	34.77	-15.05
				1	5	22.00	19.49	21.64	34.77	-15.28
				6	0	21.36	18.85	21.00	34.77	-15.92

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Antenna gain (dBi)		-0.36								
CAT-M1 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)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
5	23035	701.5	QPSK	1	0	23.61	21.10	23.25	34.77	-13.67
				1	5	23.67	21.16	23.31	34.77	-13.61
				6	0	22.79	20.28	22.43	34.77	-14.49
	23095	707.5	QPSK	1	0	23.51	21.00	23.15	34.77	-13.77
				1	5	23.58	21.07	23.22	34.77	-13.70
				6	0	22.69	20.18	22.33	34.77	-14.59
	23155	713.5	QPSK	1	0	23.45	20.94	23.09	34.77	-13.83
				1	5	23.46	20.95	23.10	34.77	-13.82
				6	0	22.56	20.05	22.20	34.77	-14.72
5	23035	701.5	16QAM	1	0	23.15	20.64	22.79	34.77	-14.13
				1	5	23.22	20.71	22.86	34.77	-14.06
				6	0	21.83	19.32	21.47	34.77	-15.45
	23095	707.5	16QAM	1	0	23.03	20.52	22.67	34.77	-14.25
				1	5	23.00	20.49	22.64	34.77	-14.28
				6	0	21.61	19.10	21.25	34.77	-15.67
	23155	713.5	16QAM	1	0	22.95	20.44	22.59	34.77	-14.33
				1	5	23.19	20.68	22.83	34.77	-14.09
				6	0	21.59	19.08	21.23	34.77	-15.69

Antenna gain (dBi)		-0.36								
CAT-M1 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)	EIRP Average (dBm)	ERP Limit (dBm)	Margin (dB)
10	23060	704	QPSK	1	0	23.61	21.10	23.25	34.77	-13.67
				1	5	23.65	21.14	23.29	34.77	-13.63
				6	0	22.84	20.33	22.48	34.77	-14.44
	23095	707.5	QPSK	1	0	23.58	21.07	23.22	34.77	-13.70
				1	5	23.41	20.90	23.05	34.77	-13.87
				6	0	22.67	20.16	22.31	34.77	-14.61
	23130	711	QPSK	1	0	23.38	20.87	23.02	34.77	-13.90
				1	5	23.36	20.85	23.00	34.77	-13.92
				6	0	22.55	20.04	22.19	34.77	-14.73
10	23060	704	16QAM	1	0	23.15	20.64	22.79	34.77	-14.13
				1	5	23.18	20.67	22.82	34.77	-14.10
				6	0	21.74	19.23	21.38	34.77	-15.54
	23095	707.5	16QAM	1	0	23.11	20.60	22.75	34.77	-14.17
				1	5	23.03	20.52	22.67	34.77	-14.25
				6	0	21.61	19.10	21.25	34.77	-15.67
	23130	711	16QAM	1	0	22.89	20.38	22.53	34.77	-14.39
				1	5	22.87	20.36	22.51	34.77	-14.41
				6	0	21.57	19.06	21.21	34.77	-15.71

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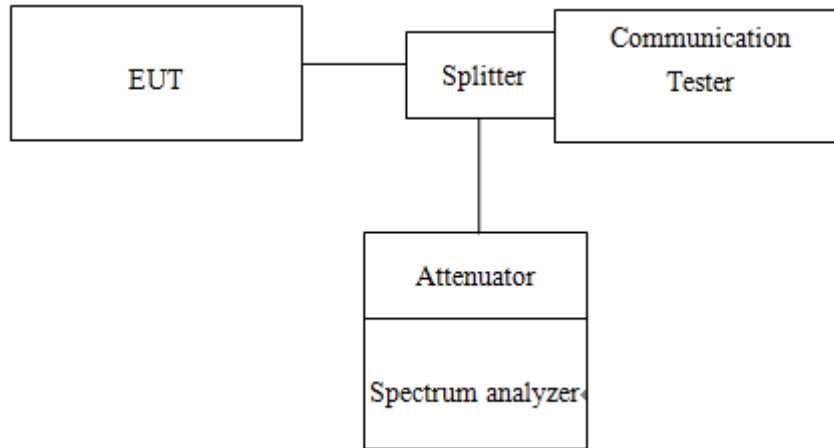
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## 8 OCCUPIED BANDWIDTH MEASUREMENT

### 8.1 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.

### 8.2 Test Set-up



### 8.3 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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## 8.4 Measurement Result

### 8.4.1 Cat M1

CAT-M1 BAND 2 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1850.7	18607	1.0850	1.0798	<b>1.258</b>	1.240
1880.0	18900	<b>1.0866</b>	1.0822	1.255	1.234
1909.3	19193	1.0847	<b>1.0833</b>	1.256	<b>1.244</b>

CAT-M1 BAND 2 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1851.5	18615	1.1376	1.1642	1.465	1.877
1880.0	18900	<b>1.1407</b>	1.1567	<b>1.491</b>	1.937
1908.5	19185	1.1378	<b>1.1713</b>	1.473	<b>2.025</b>

CAT-M1 BAND 2 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1852.5	18625	<b>1.1993</b>	<b>1.2189</b>	1.531	1.566
1880.0	18900	1.1932	1.2012	<b>1.538</b>	1.571
1907.5	19175	1.1985	1.2107	1.529	<b>2.076</b>

CAT-M1 BAND 2 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1855.0	18650	1.8761	<b>2.1683</b>	3.948	3.702
1880.0	18900	1.9118	2.1446	3.543	3.937
1905.0	19150	<b>2.0308</b>	1.6805	<b>4.282</b>	<b>4.067</b>

CAT-M1 BAND 2 Channel bandwidth: 15MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1857.5	18675	2.1343	2.1214	3.835	3.803
1880.0	18900	2.0760	1.9844	3.778	3.748
1902.5	19125	<b>2.2925</b>	<b>2.1866</b>	<b>4.406</b>	<b>4.108</b>

CAT-M1 BAND 2 Channel bandwidth: 20MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1860.0	18700	2.2757	2.2309	4.238	4.058
1880.0	18900	2.2454	2.1240	3.747	3.680
1900.0	19100	<b>2.4723</b>	<b>2.5271</b>	<b>4.326</b>	<b>4.427</b>

CAT-M1 BAND 4 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1710.7	19957	1.0838	1.0826	1.258	1.248
1732.5	20175	1.0867	1.0799	1.261	<b>1.258</b>
1754.3	20393	<b>1.0873</b>	<b>1.0837</b>	<b>1.266</b>	1.242

CAT-M1 BAND 4 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1711.5	19965	1.1372	<b>1.1659</b>	1.511	<b>1.856</b>
1732.5	20175	<b>1.1461</b>	1.1540	<b>1.519</b>	1.745
1753.5	20385	1.1440	1.1554	1.444	1.828

CAT-M1 BAND 4 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1712.5	19975	<b>1.2010</b>	1.2134	<b>1.533</b>	1.608
1732.5	20175	1.1965	1.2058	1.521	1.565
1752.5	20375	1.1956	<b>1.2178</b>	1.493	<b>1.856</b>

CAT-M1 BAND 4 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1715.0	20000	<b>1.8600</b>	<b>2.3099</b>	<b>4.184</b>	3.973
1732.5	20175	1.8360	1.5683	3.910	3.560
1750.0	20350	1.8510	1.9254	3.748	<b>4.023</b>

CAT-M1 BAND 4 Channel bandwidth: 15MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1717.5	20025	<b>2.1398</b>	<b>2.1005</b>	3.771	3.839
1732.5	20175	2.0534	2.0589	3.922	3.879
1747.5	20325	2.0300	2.0505	<b>4.237</b>	<b>4.222</b>

CAT-M1 BAND 4 Channel bandwidth: 20MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1720.0	20050	2.2789	2.0948	3.771	<b>3.818</b>
1732.5	20175	2.3390	<b>2.1964</b>	4.054	3.731
1745.0	20300	<b>2.4419</b>	2.0297	<b>4.556</b>	3.725

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CAT-M1 BAND 5 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
824.7	20407	1.0831	1.0821	1.248	1.232
836.5	20525	1.0859	1.0820	1.253	<b>1.234</b>
848.3	20643	<b>1.0863</b>	<b>1.0827</b>	<b>1.258</b>	<b>1.234</b>

CAT-M1 BAND 5 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
825.5	20415	1.1382	1.1537	<b>1.457</b>	1.905
836.5	20525	<b>1.1405</b>	1.1558	1.451	1.889
847.5	20635	1.1333	<b>1.1775</b>	1.443	<b>2.054</b>

CAT-M1 BAND 5 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
826.5	20425	1.1961	1.2051	<b>1.542</b>	<b>1.737</b>
836.5	20525	1.1797	1.2170	1.521	1.710
846.5	20625	<b>1.1993</b>	<b>1.2186</b>	1.506	1.562

CAT-M1 BAND 5 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
829.0	20450	1.7741	1.9718	3.770	3.977
836.5	20525	1.9750	2.1387	3.730	3.897
844.0	20600	<b>2.1324</b>	<b>2.2588</b>	<b>3.829</b>	<b>4.083</b>

CAT-M1 BAND 12 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
699.7	23017	1.0839	1.0830	1.252	1.231
707.5	23095	<b>1.0866</b>	1.0836	1.252	<b>1.236</b>
715.3	23173	1.0833	<b>1.0837</b>	<b>1.254</b>	1.232

CAT-M1 BAND 12 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
700.5	23025	1.1386	1.1644	<b>1.451</b>	2.283
707.5	23095	1.1426	1.1659	1.445	<b>2.322</b>
714.5	23165	<b>1.1451</b>	<b>1.2016</b>	1.442	2.306

CAT-M1 BAND 12 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
701.5	23035	1.2049	1.2231	1.496	<b>2.653</b>
707.5	23095	1.2008	1.2280	<b>1.517</b>	1.838
713.5	23155	<b>1.2066</b>	<b>1.2334</b>	1.513	1.816

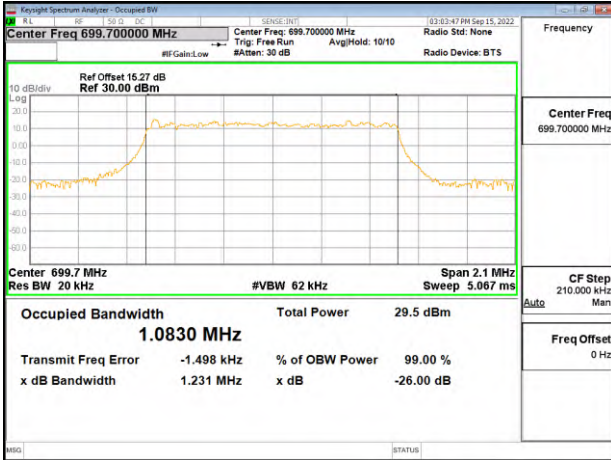
CAT-M1 BAND 12 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
704.0	23060	1.9895	2.0504	<b>3.967</b>	<b>4.088</b>
707.5	23095	1.9168	<b>2.3336</b>	3.933	4.021
711.0	23130	<b>2.1994</b>	2.2147	3.920	3.918

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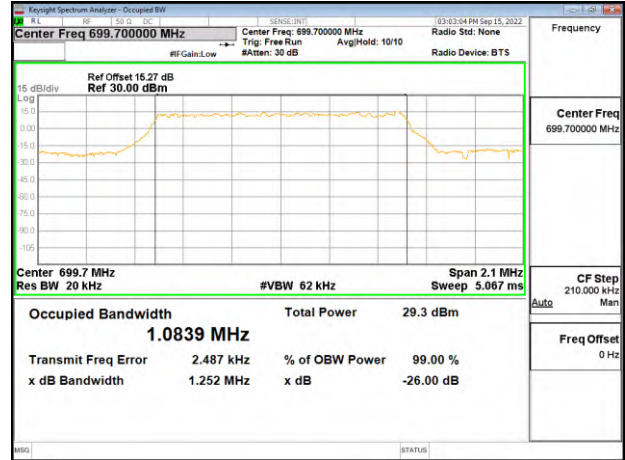
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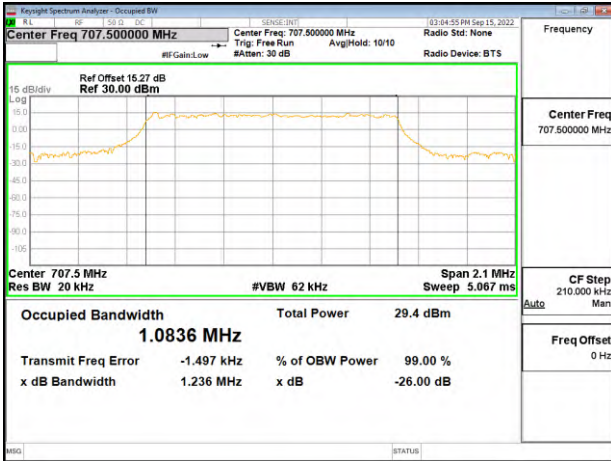
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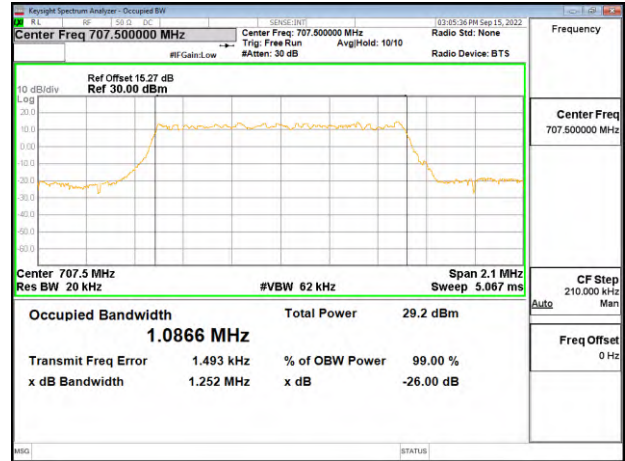
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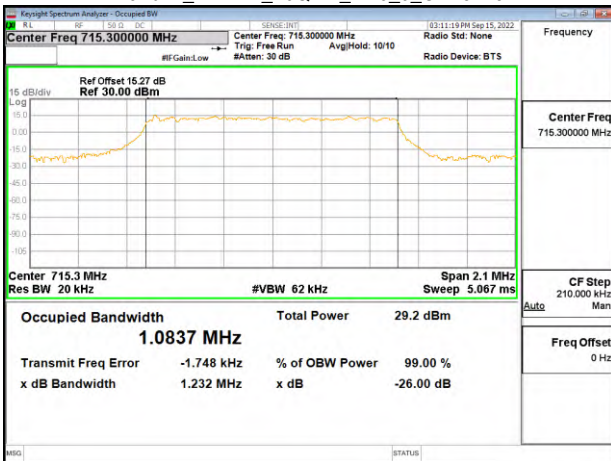
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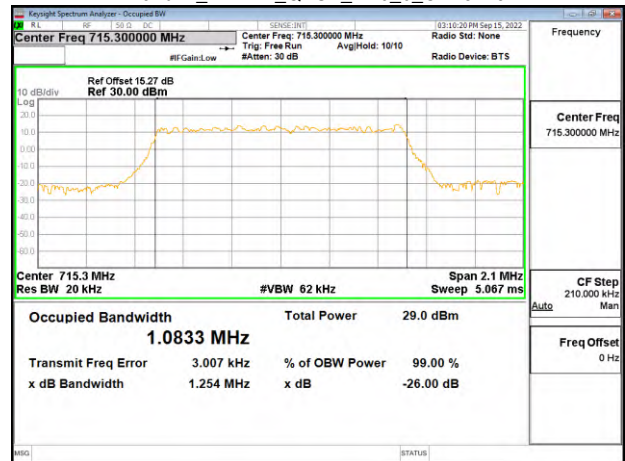
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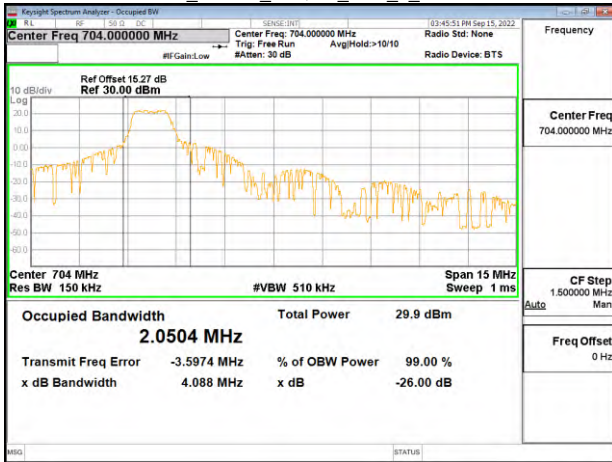


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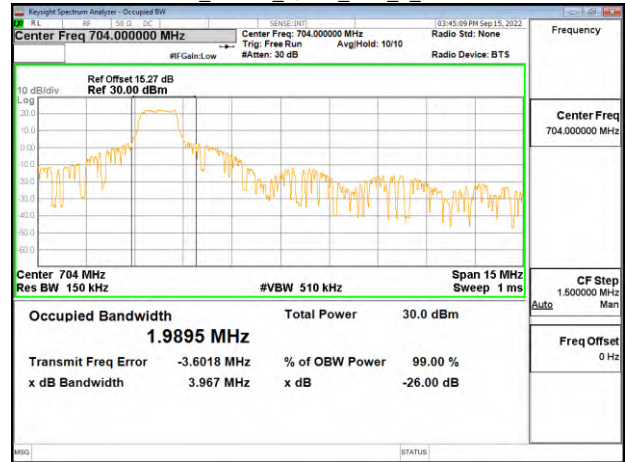
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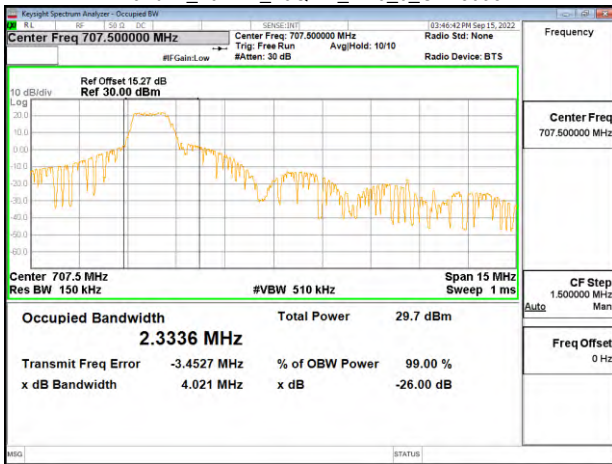
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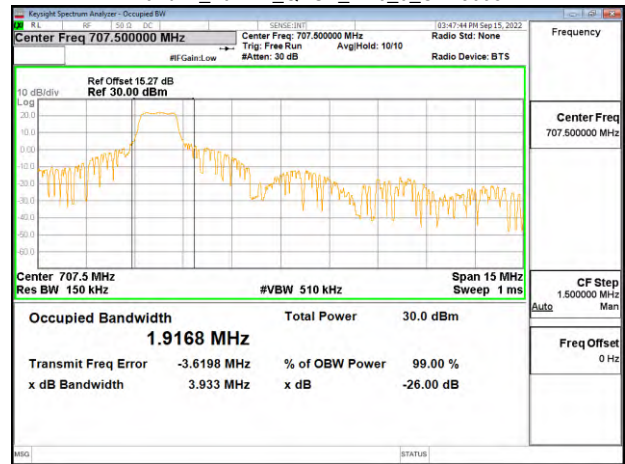
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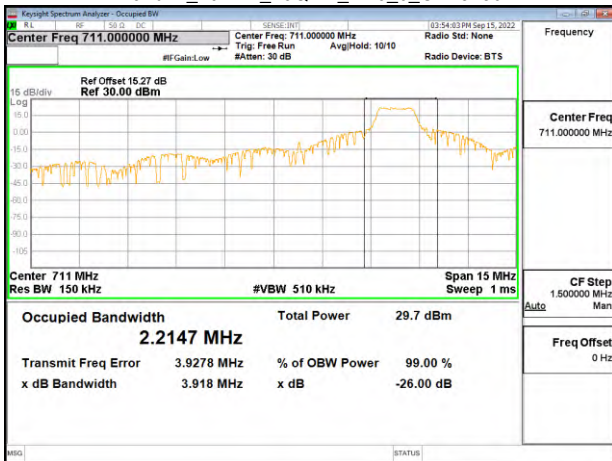
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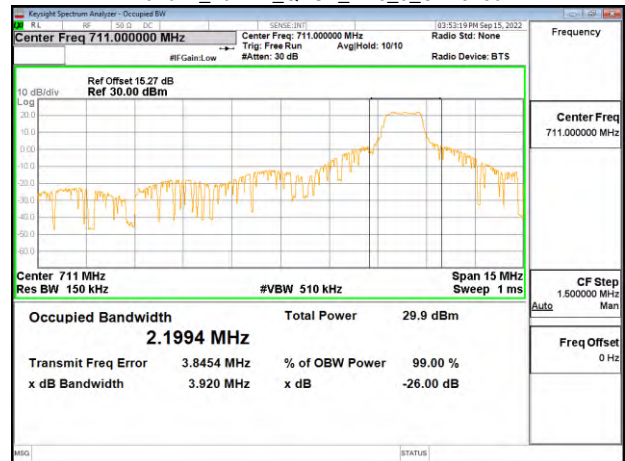
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Band12\_10MHz\_QPSK\_RB6\_0\_CH23130

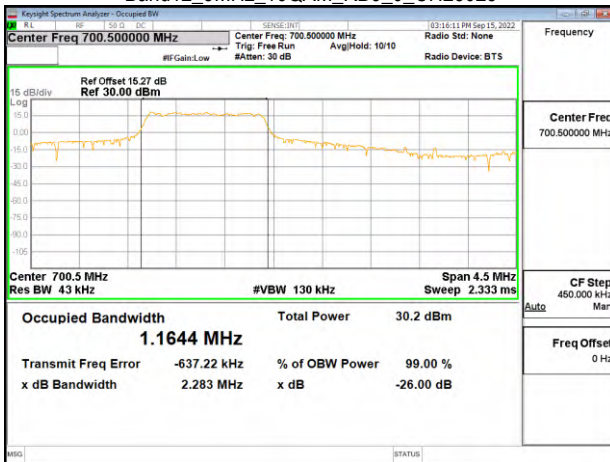


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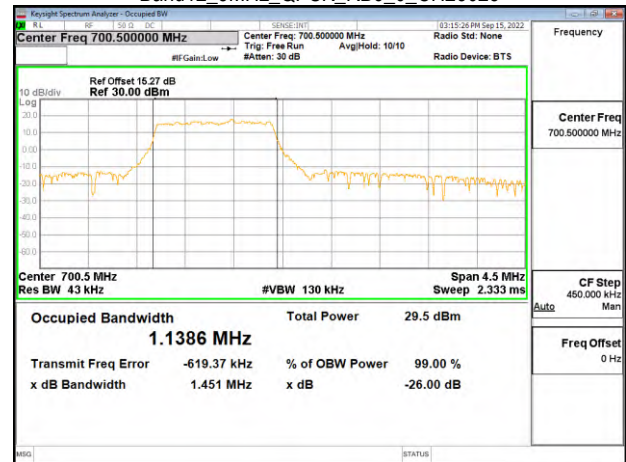
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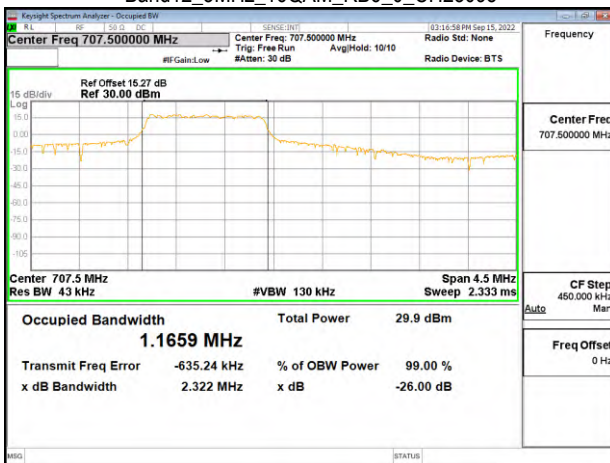
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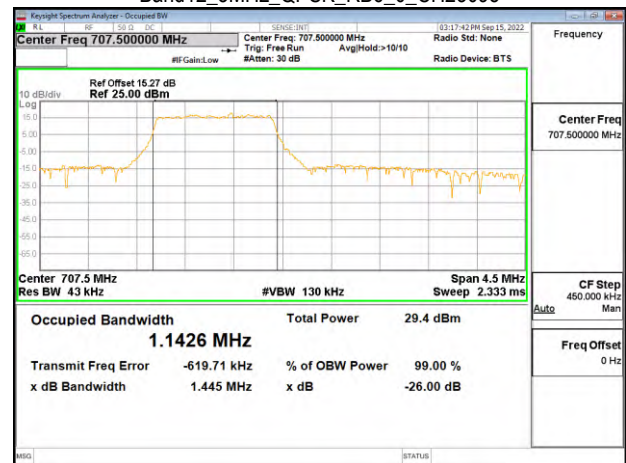
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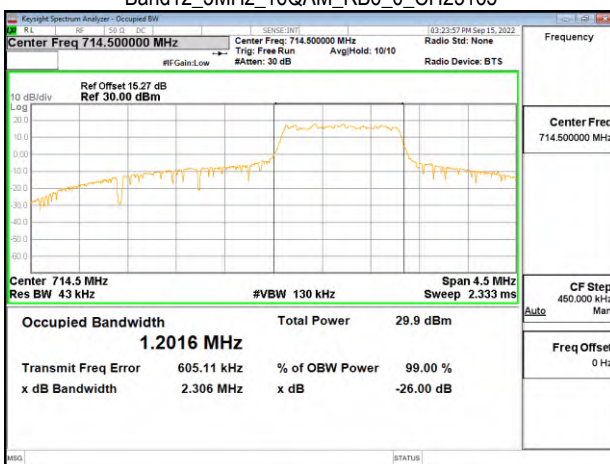
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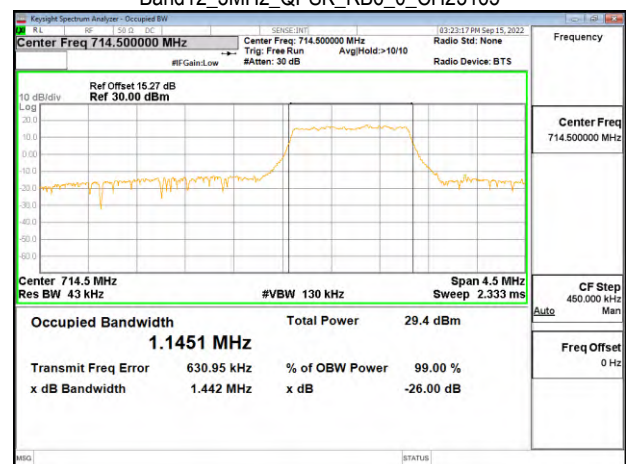
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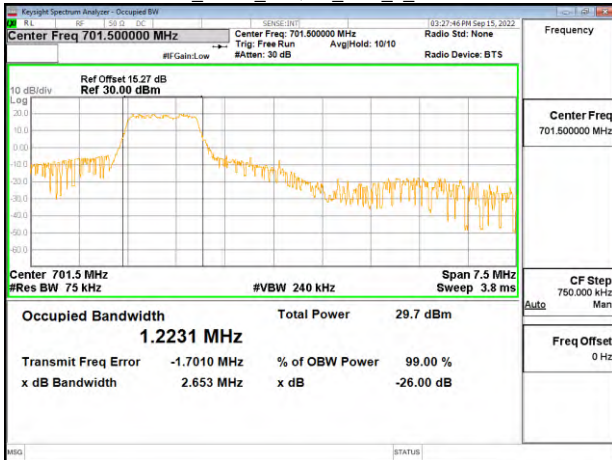


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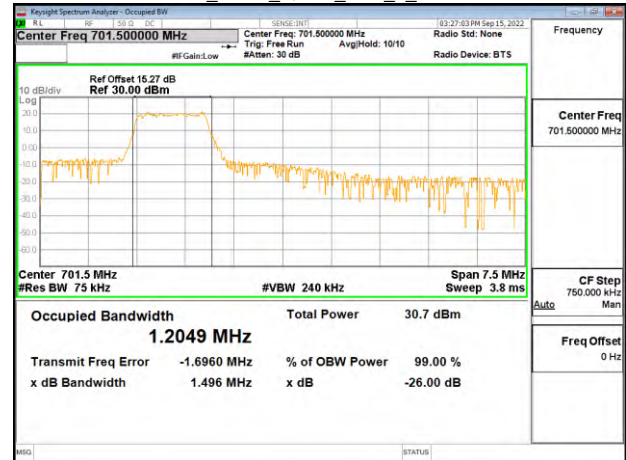
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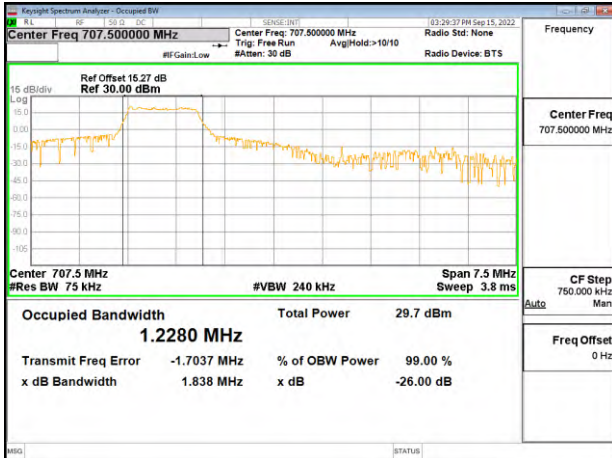
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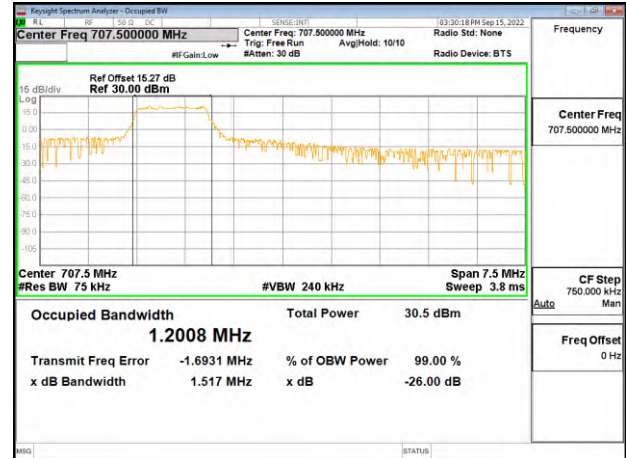
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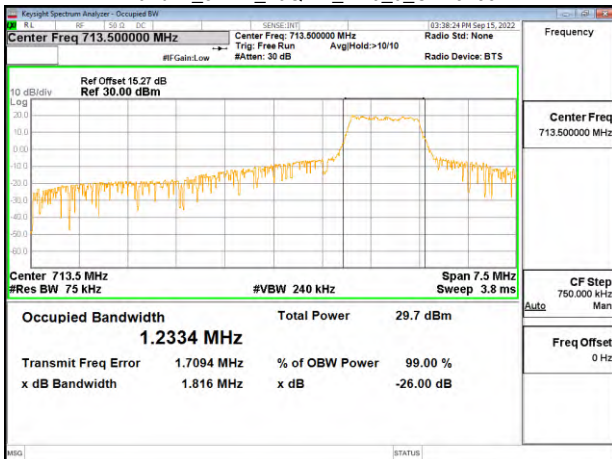
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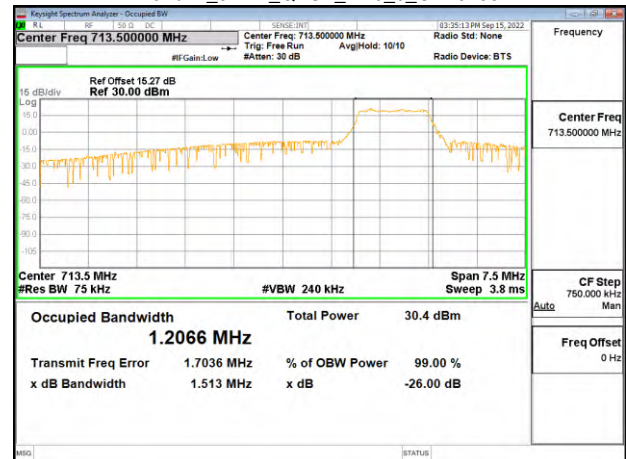
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Band12\_5MHz\_16QAM\_RB6\_0\_CH23155



Band12\_5MHz\_QPSK\_RB6\_0\_CH23155

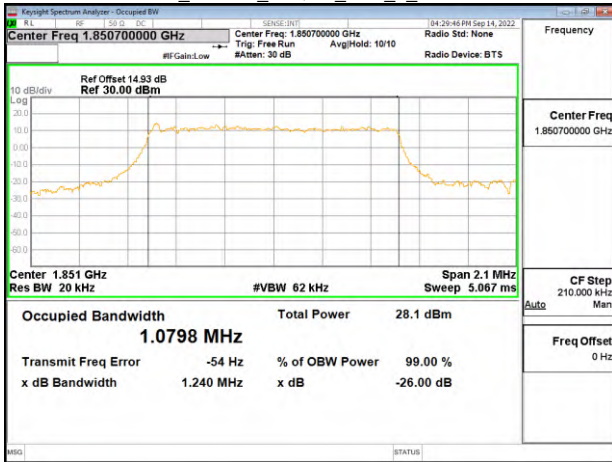


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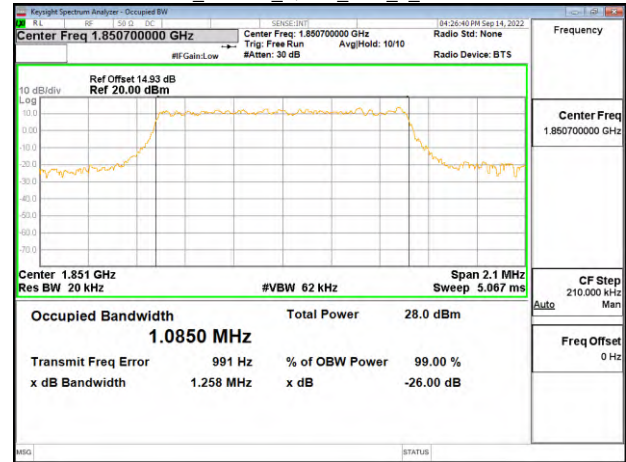
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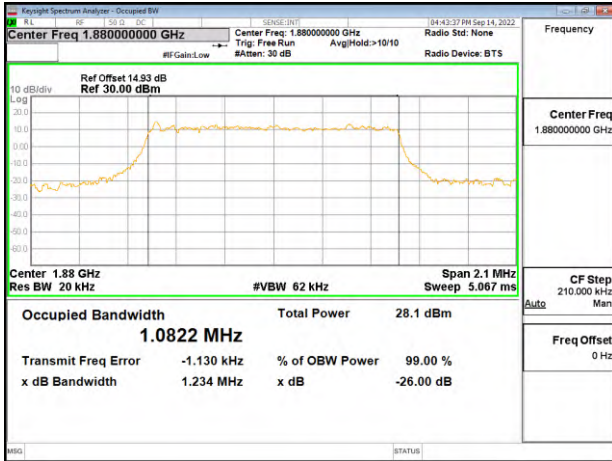
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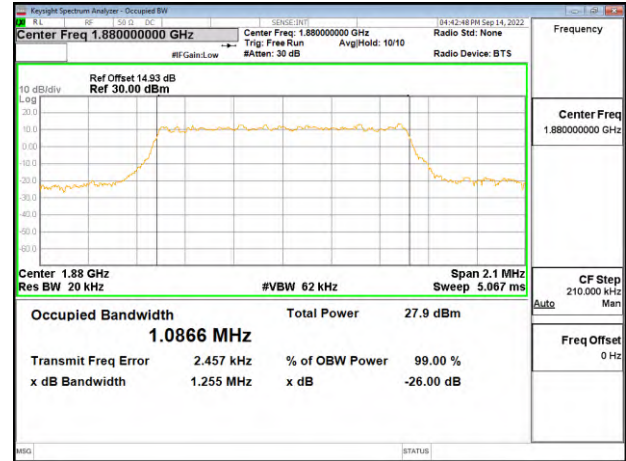
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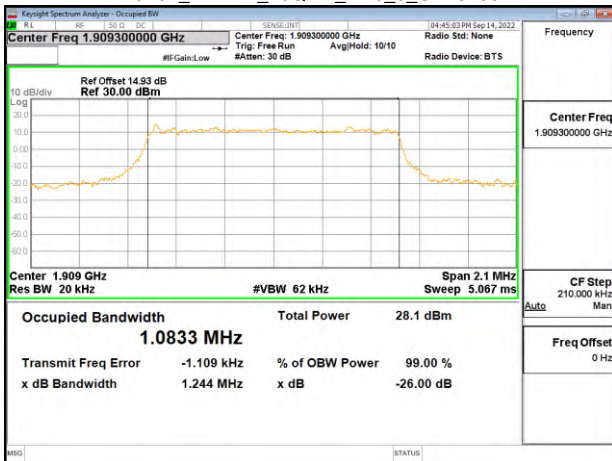
Band2\_1.4MHz\_16QAM\_RB6\_0\_CH18900



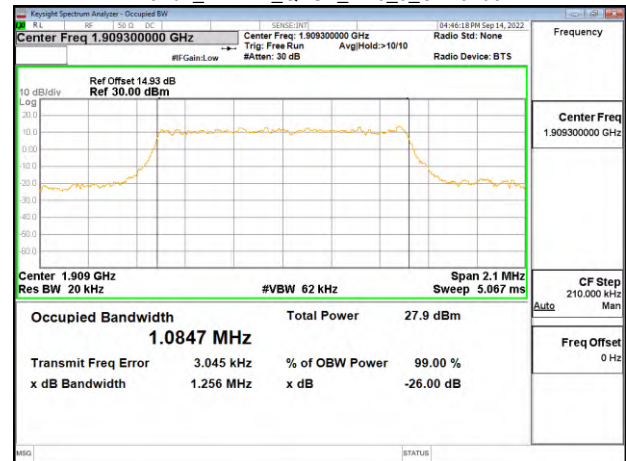
Band2\_1.4MHz\_QPSK\_RB6\_0\_CH18900



Band2\_1.4MHz\_16QAM\_RB6\_0\_CH19193



Band2\_1.4MHz\_QPSK\_RB6\_0\_CH19193

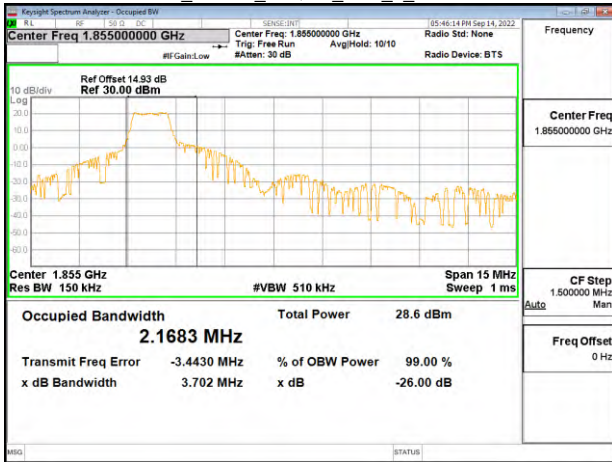


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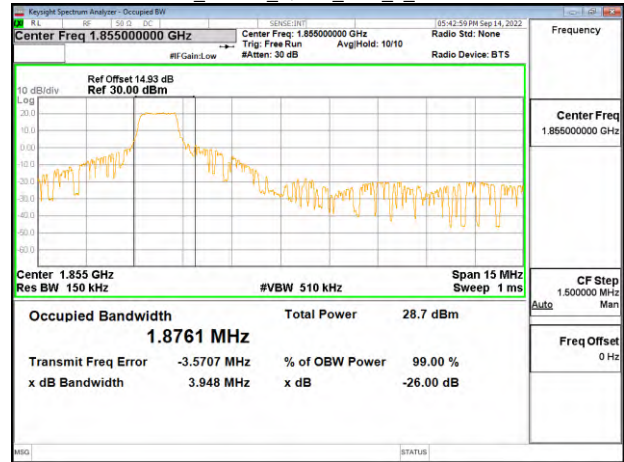
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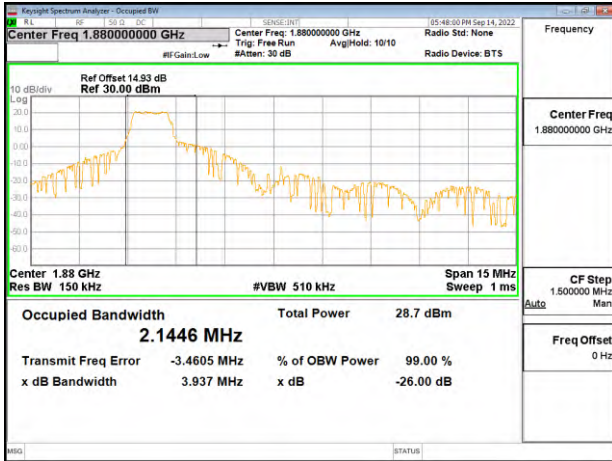
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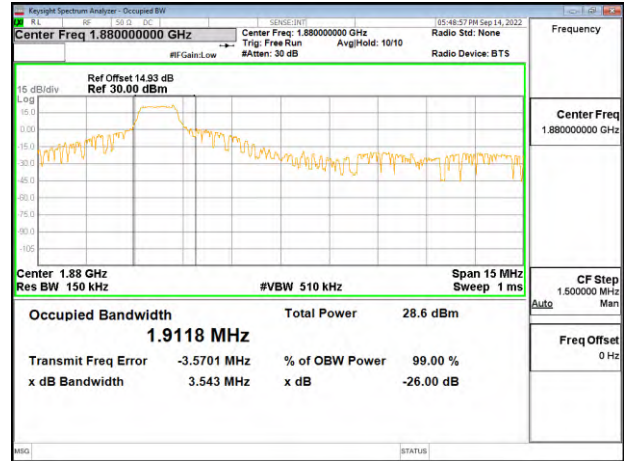
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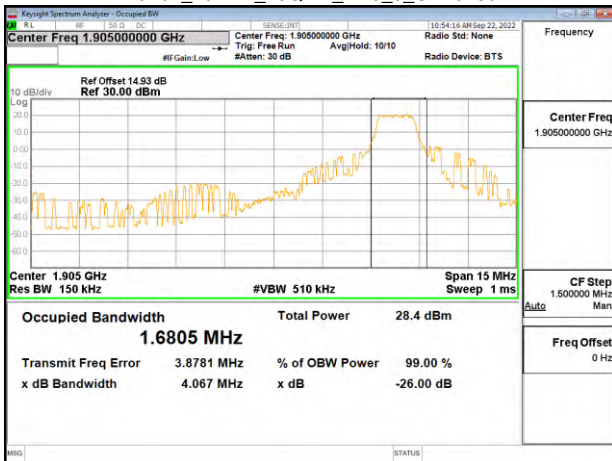
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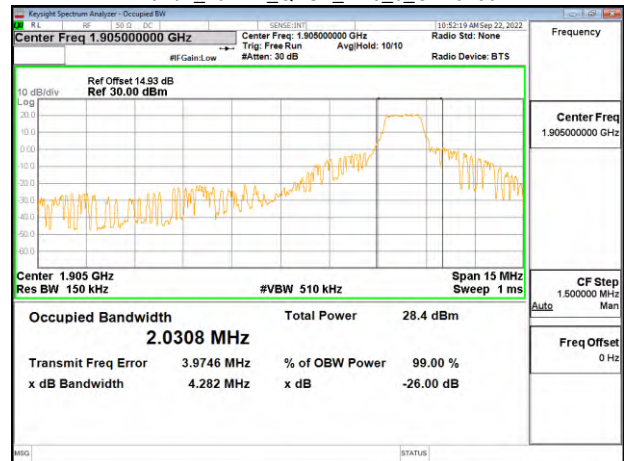
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Band2\_10MHz\_16QAM\_RB6\_0\_CH19150



Band2\_10MHz\_QPSK\_RB6\_0\_CH19150



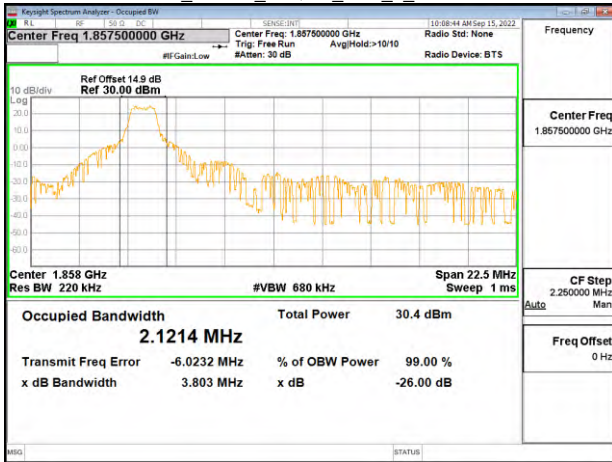
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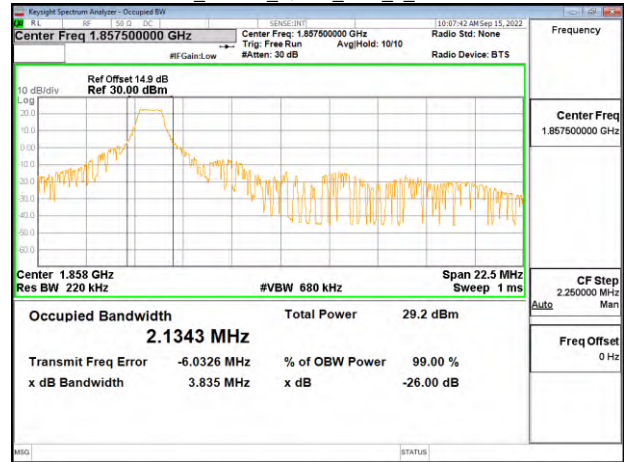
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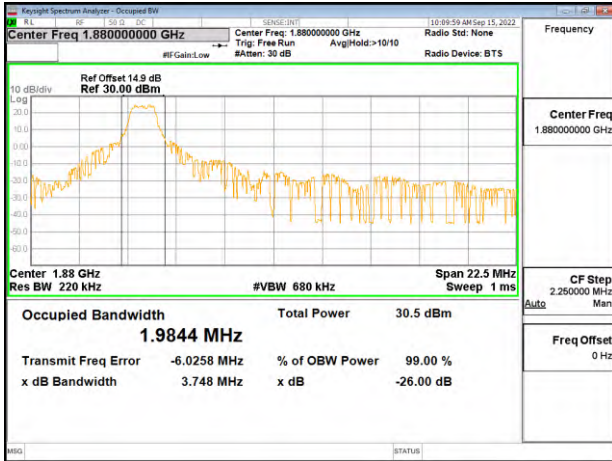
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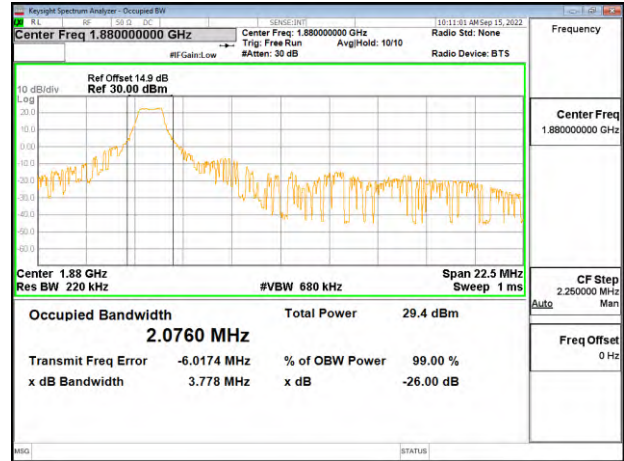
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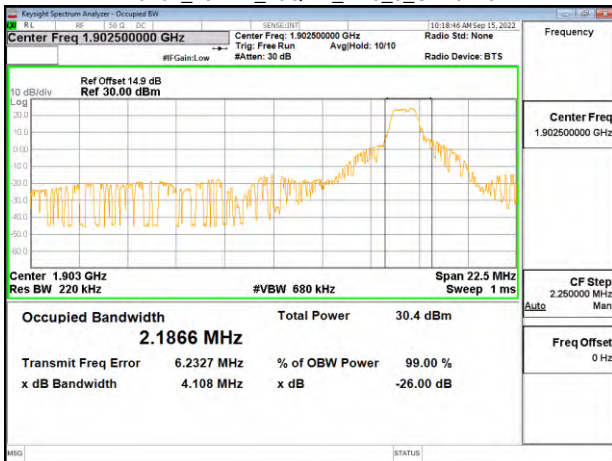
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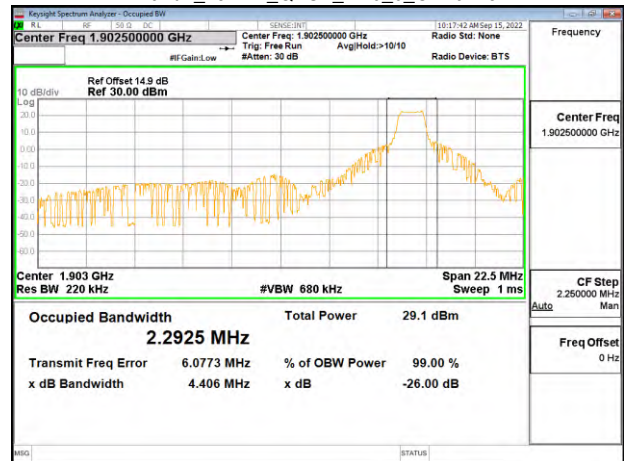
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Band2\_15MHz\_16QAM\_RB6\_0\_CH19125



Band2\_15MHz\_QPSK\_RB6\_0\_CH19125

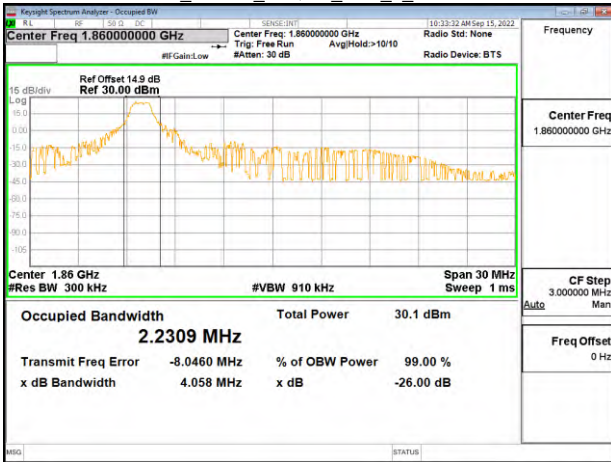


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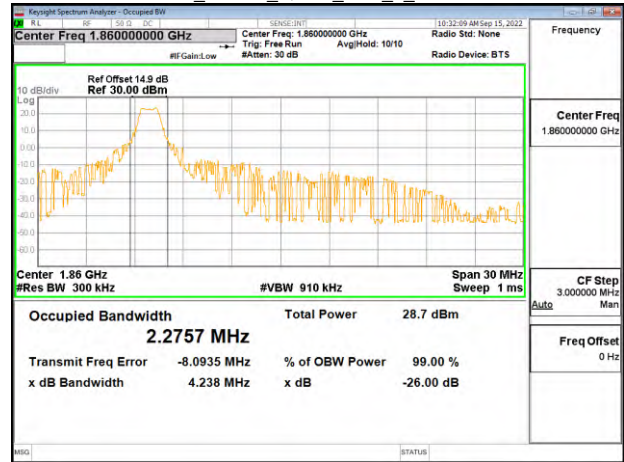
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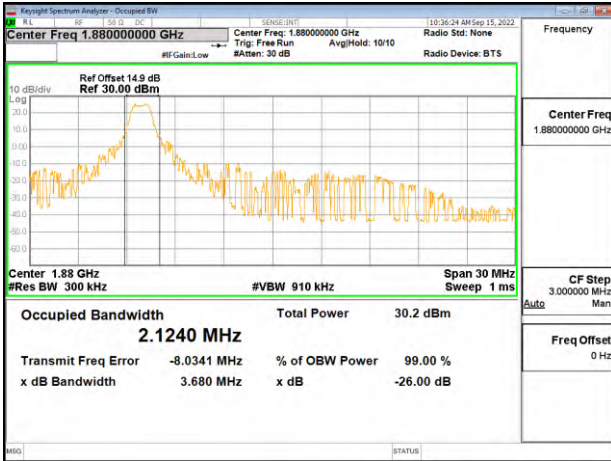
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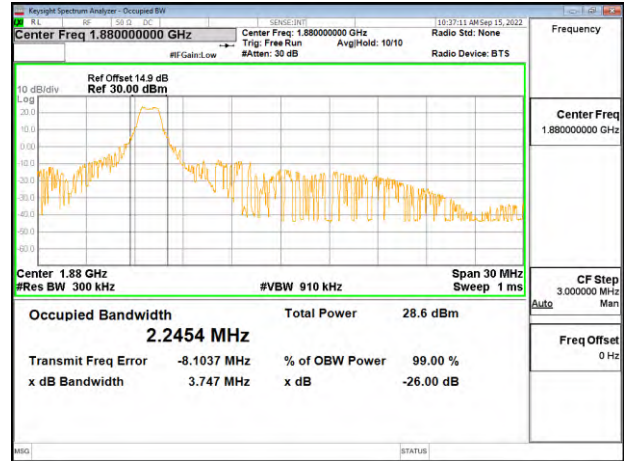
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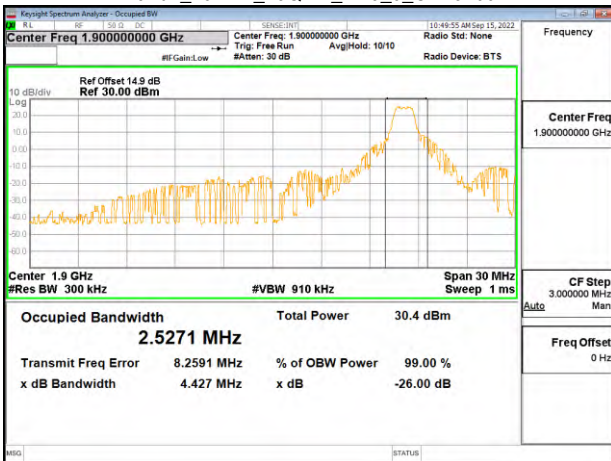
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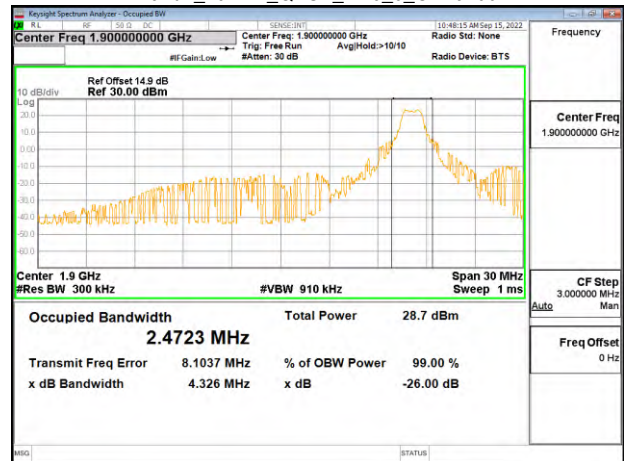
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Band2\_20MHz\_16QAM\_RB6\_0\_CH19100



Band2\_20MHz\_QPSK\_RB6\_0\_CH19100

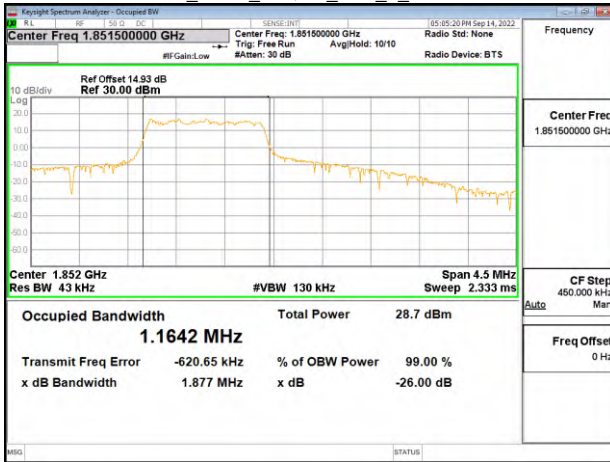


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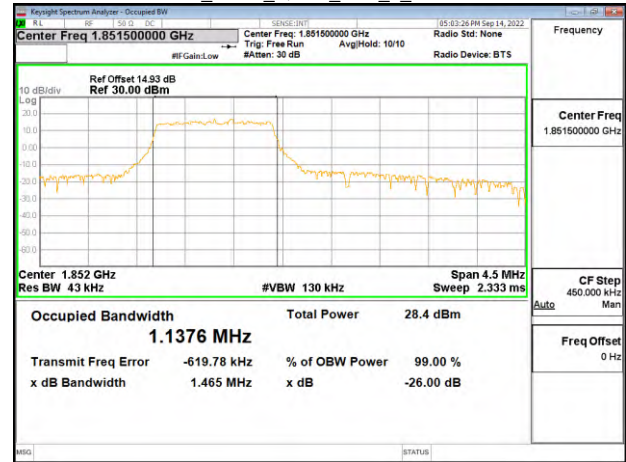
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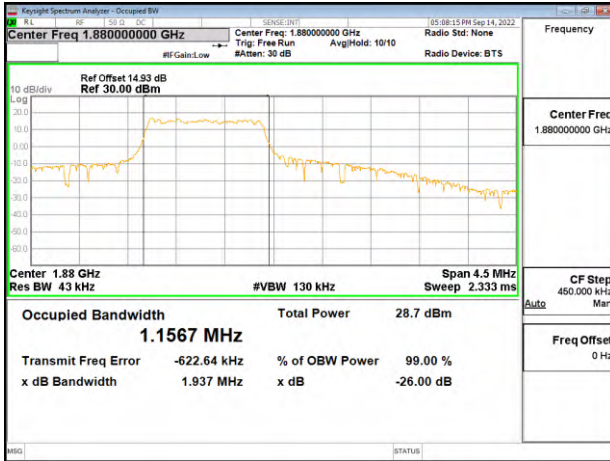
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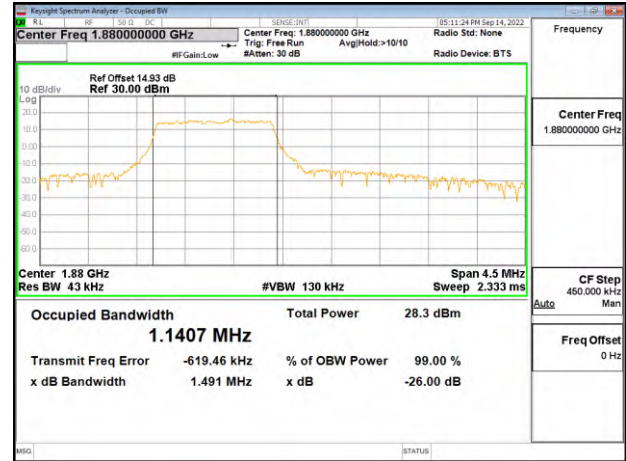
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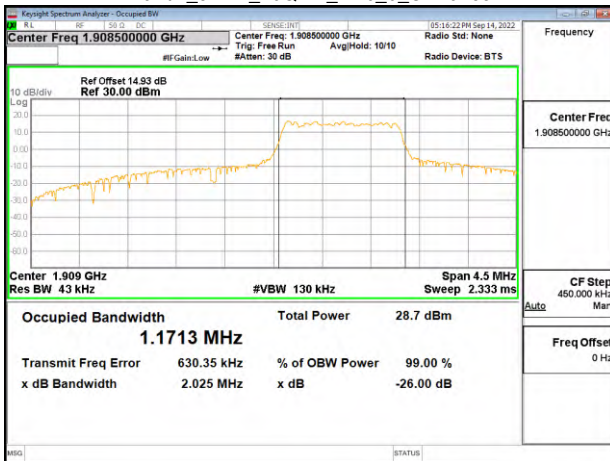
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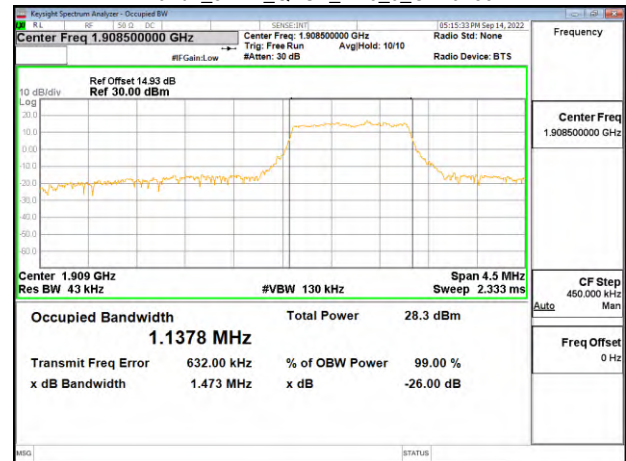
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Band2\_3MHz\_16QAM\_RB6\_0\_CH19185



Band2\_3MHz\_QPSK\_RB6\_0\_CH19185

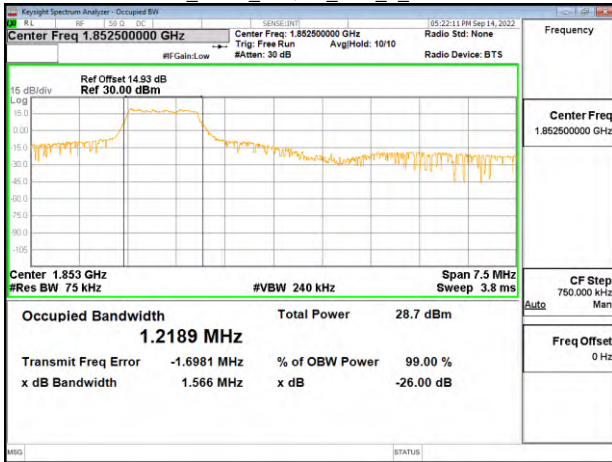


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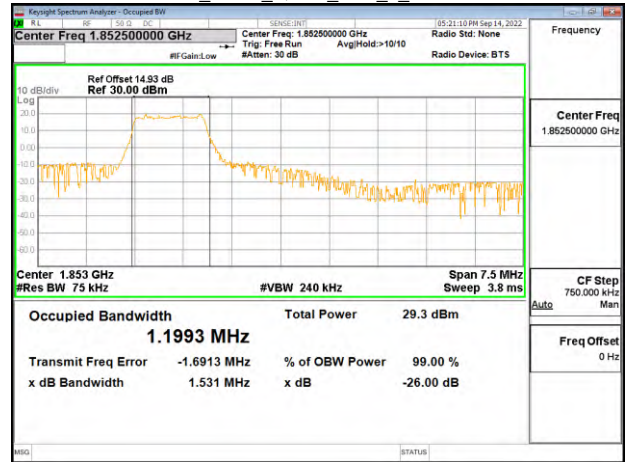
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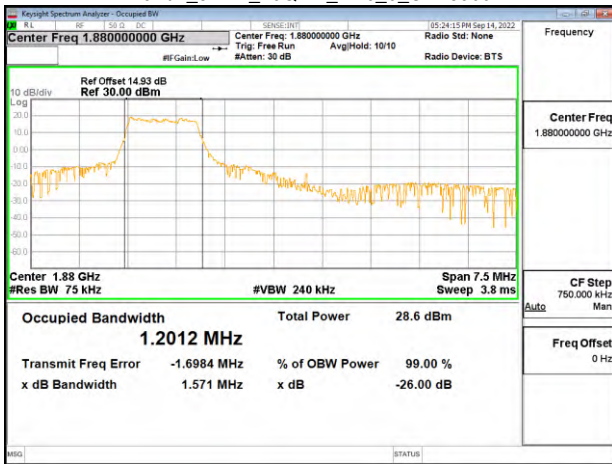
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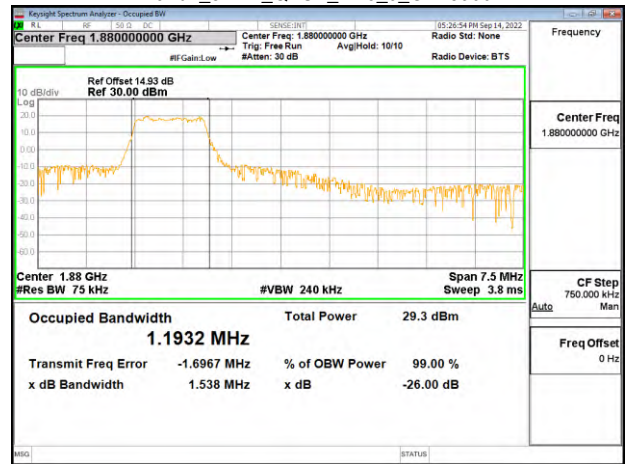
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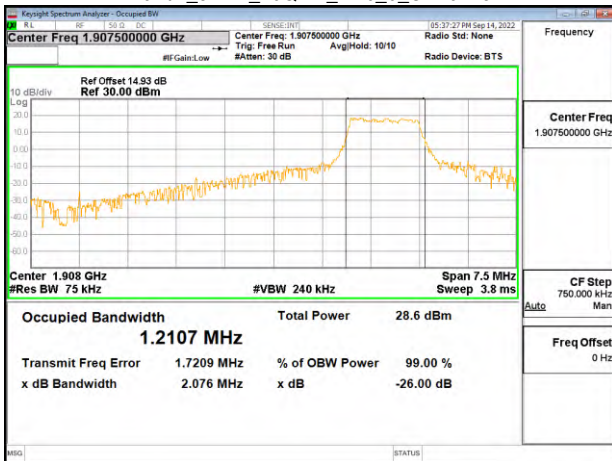
Band2\_5MHz\_16QAM\_RB6\_0\_CH18900



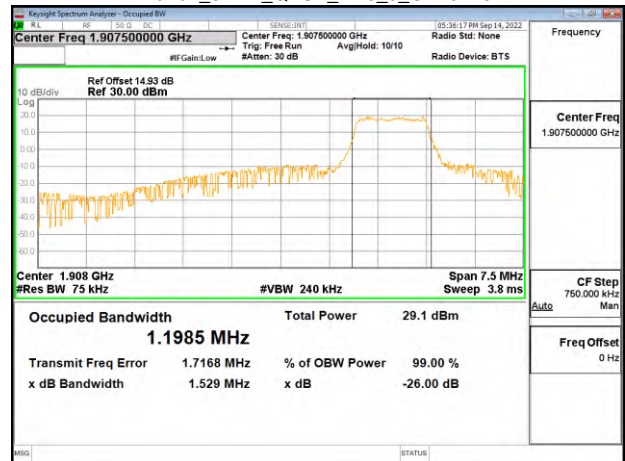
Band2\_5MHz\_QPSK\_RB6\_0\_CH18900



Band2\_5MHz\_16QAM\_RB6\_0\_CH19175



Band2\_5MHz\_QPSK\_RB6\_0\_CH19175

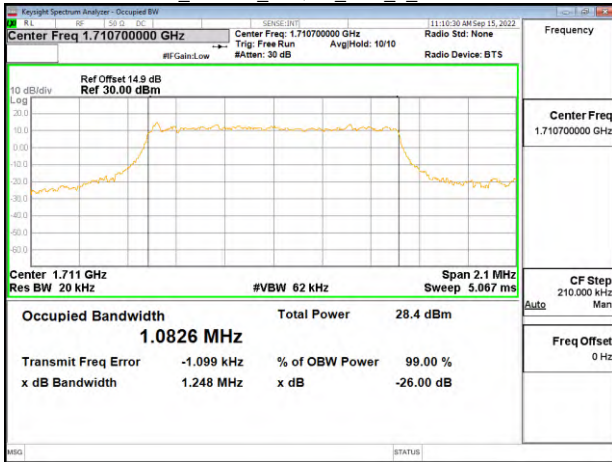


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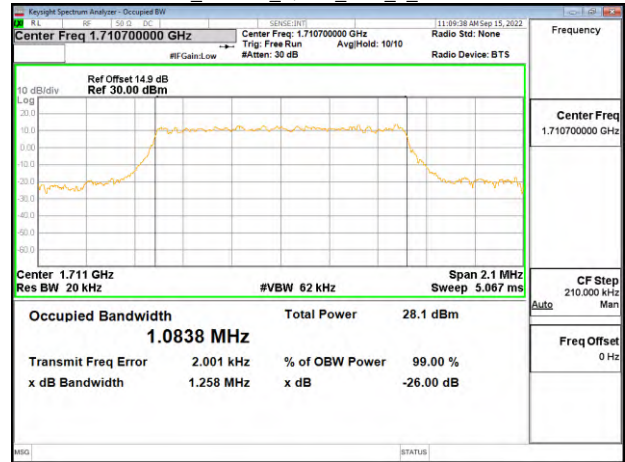
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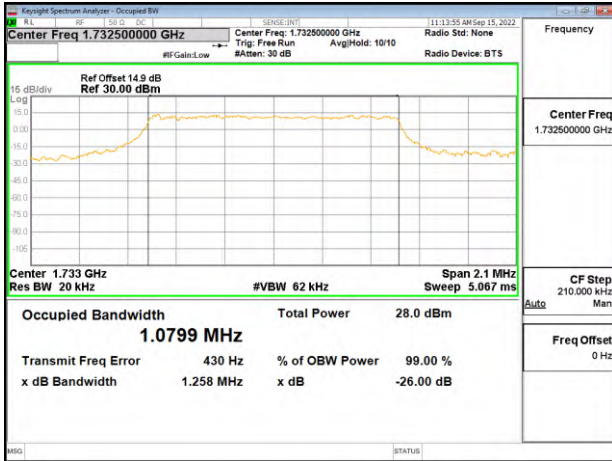
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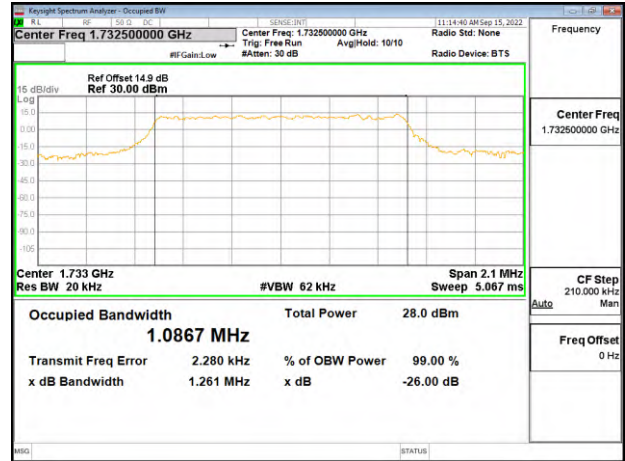
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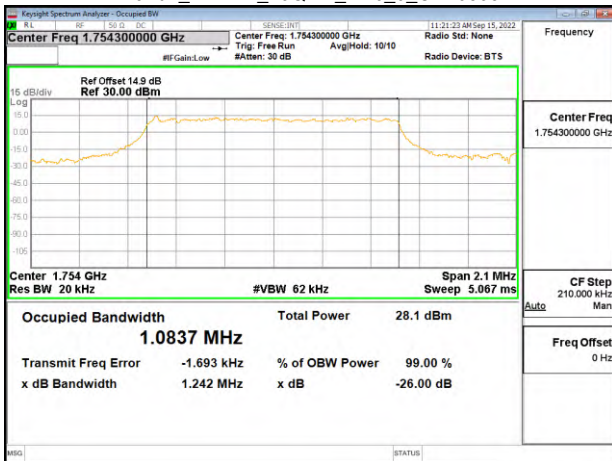
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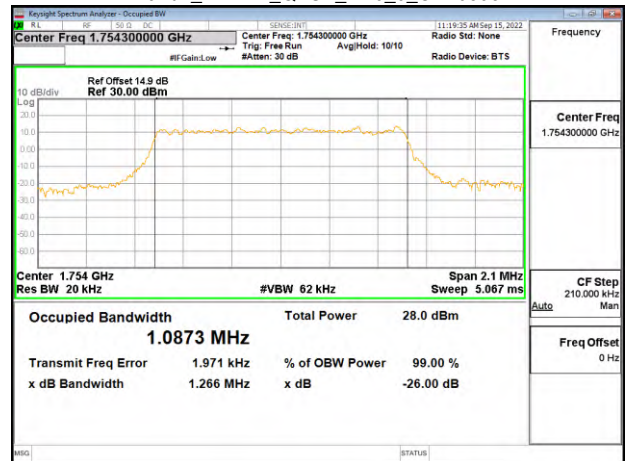
Band4\_1.4MHz\_QPSK\_RB6\_0\_CH20175



Band4\_1.4MHz\_16QAM\_RB6\_0\_CH20393



Band4\_1.4MHz\_QPSK\_RB6\_0\_CH20393

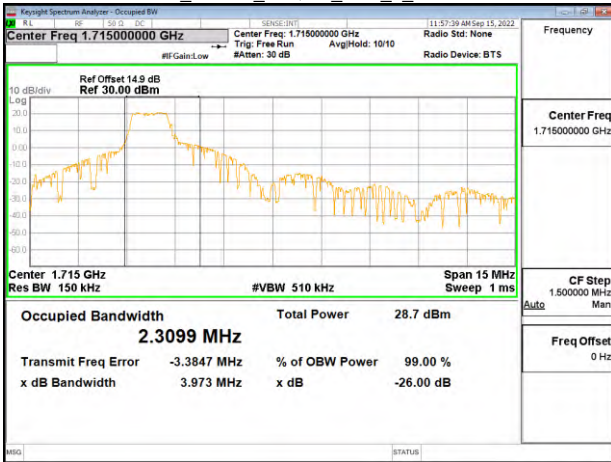


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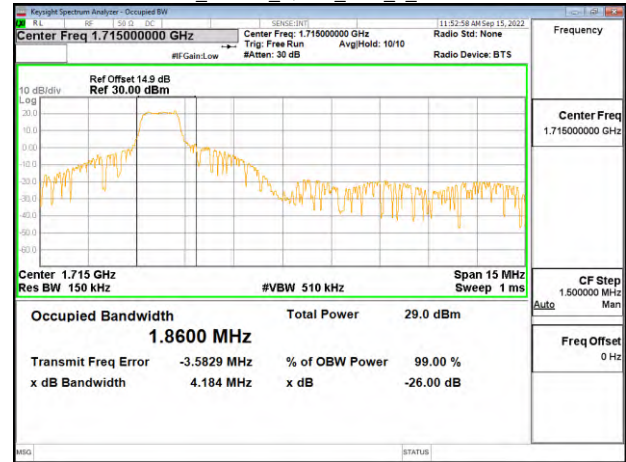
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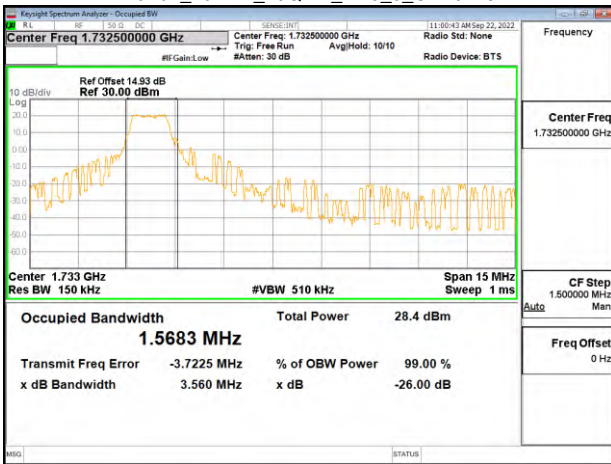
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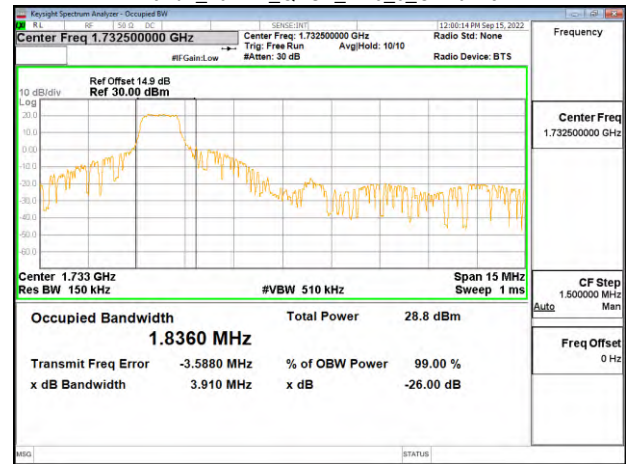
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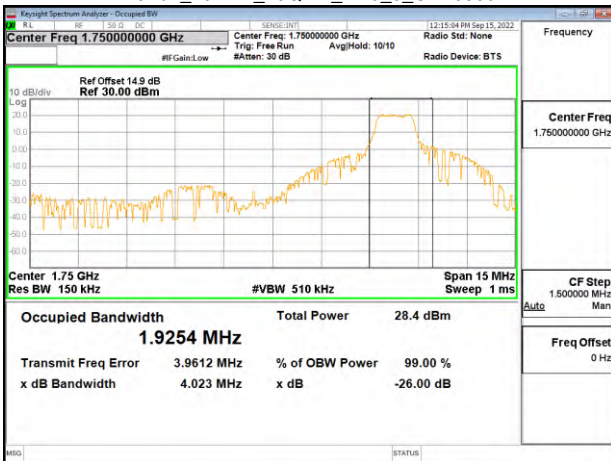
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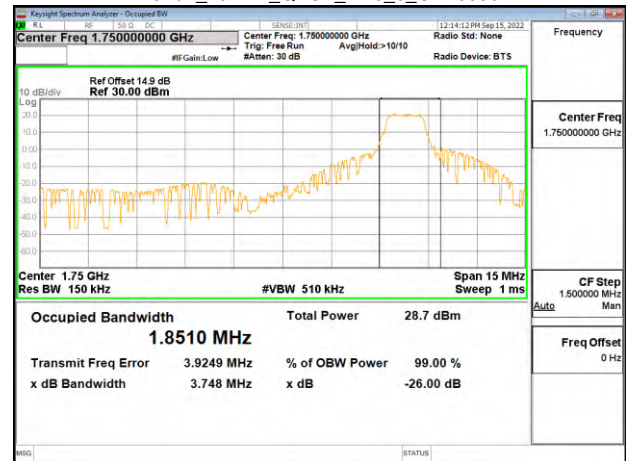
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Band4\_10MHz\_16QAM\_RB6\_0\_CH20350



Band4\_10MHz\_QPSK\_RB6\_0\_CH20350

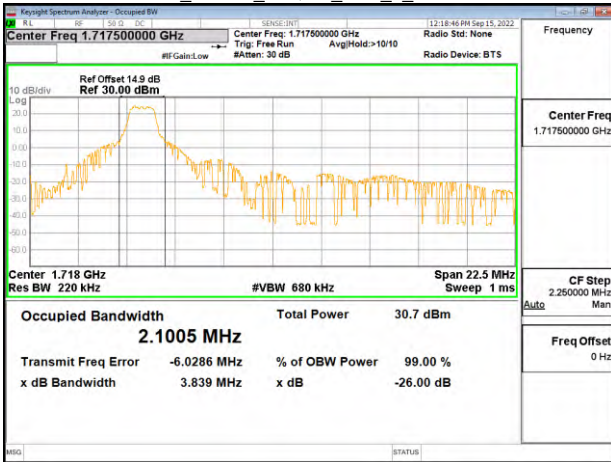


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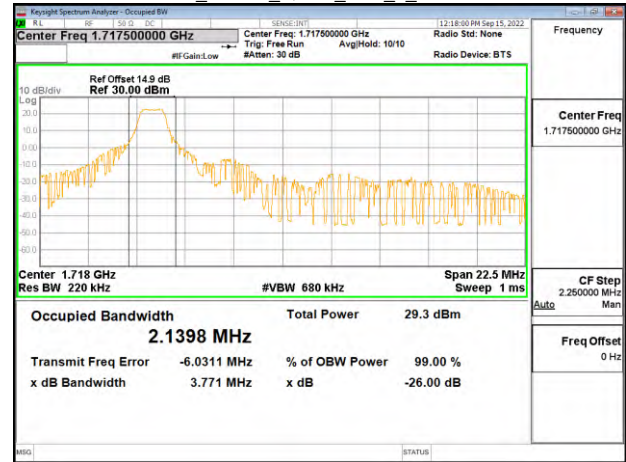
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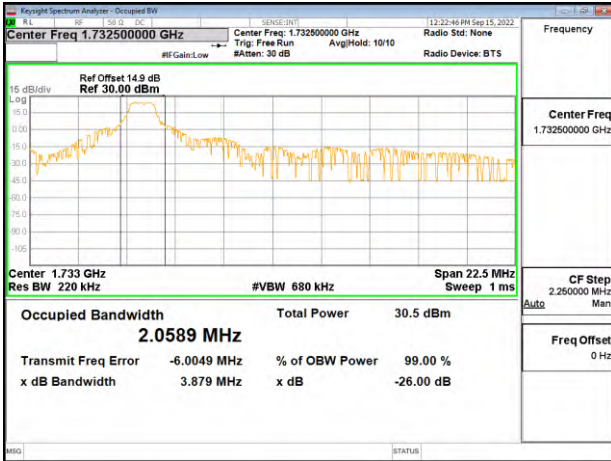
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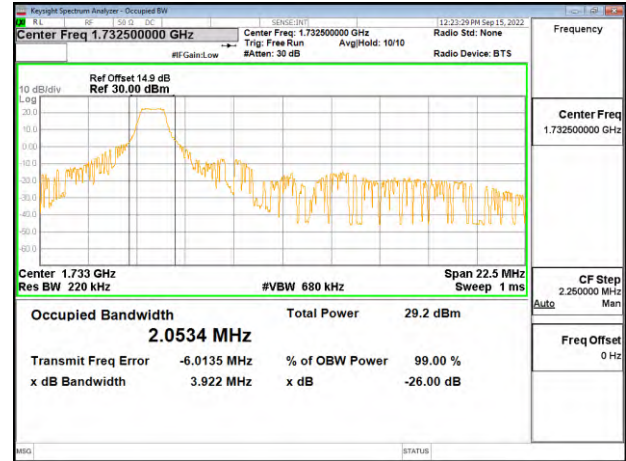
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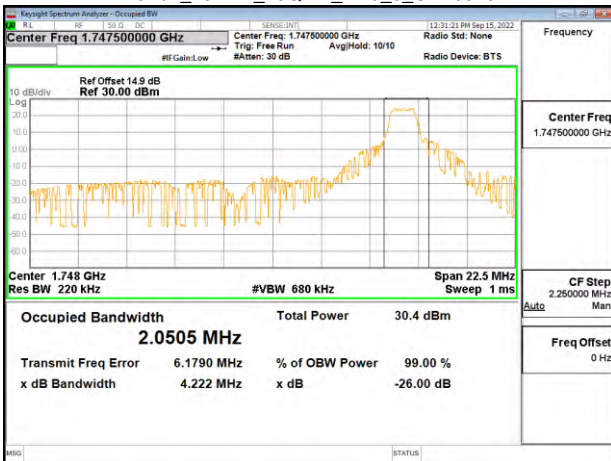
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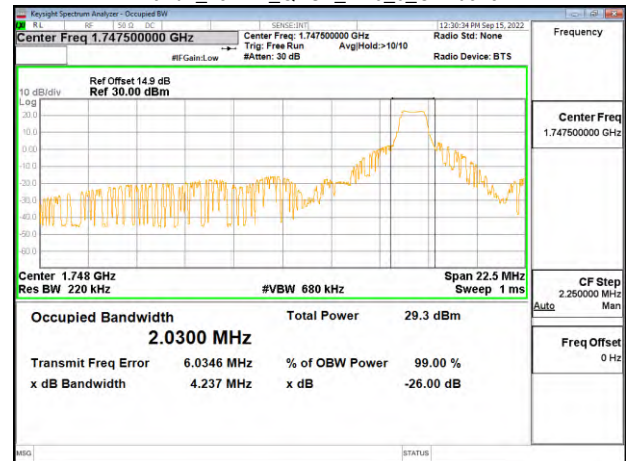
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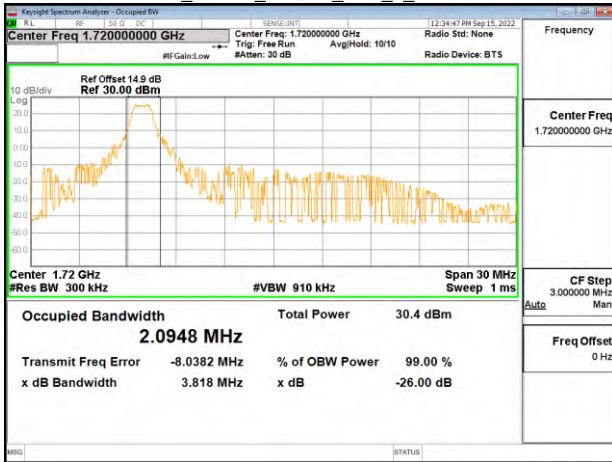


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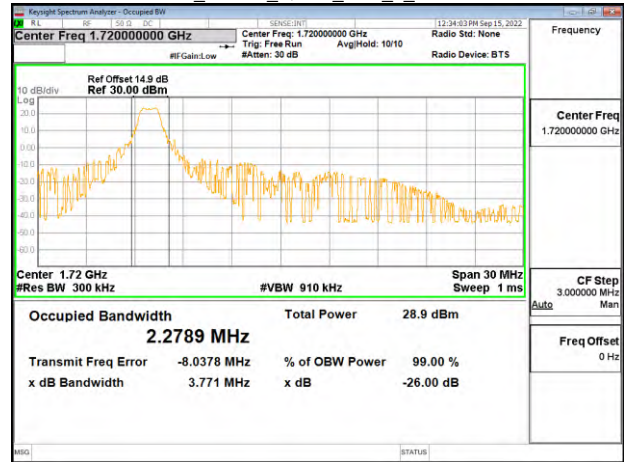
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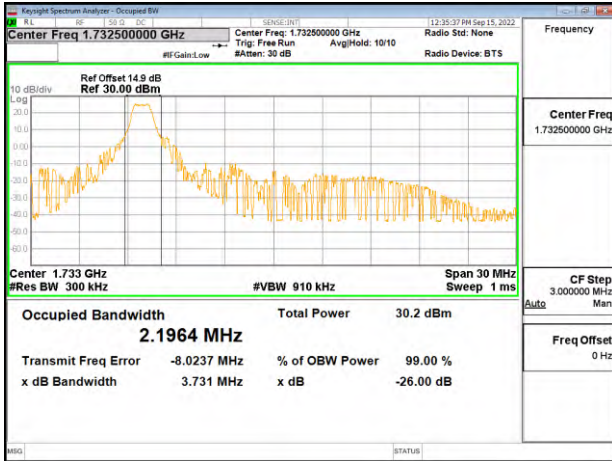
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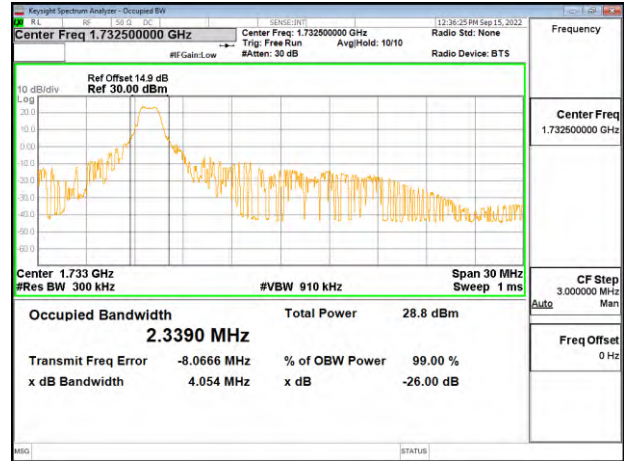
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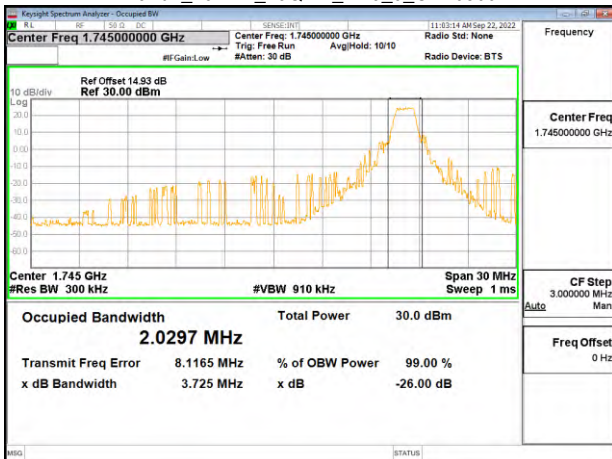
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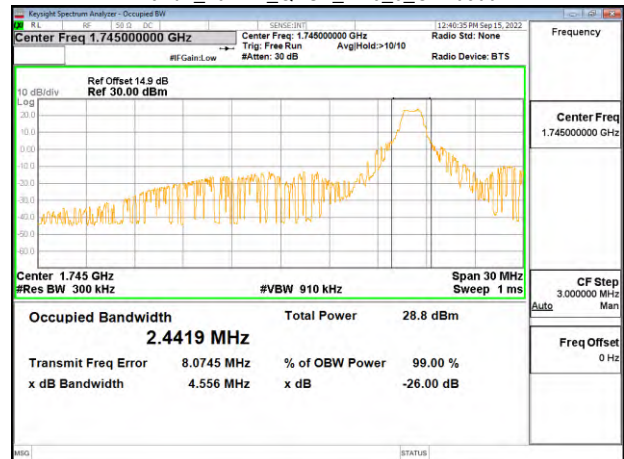
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Band4\_20MHz\_16QAM\_RB6\_0\_CH20300



Band4\_20MHz\_QPSK\_RB6\_0\_CH20300



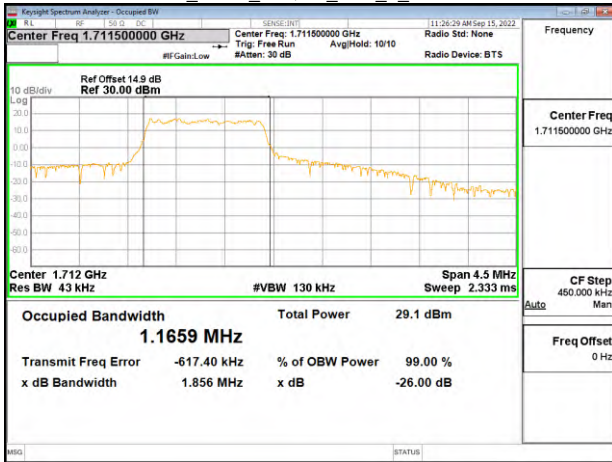
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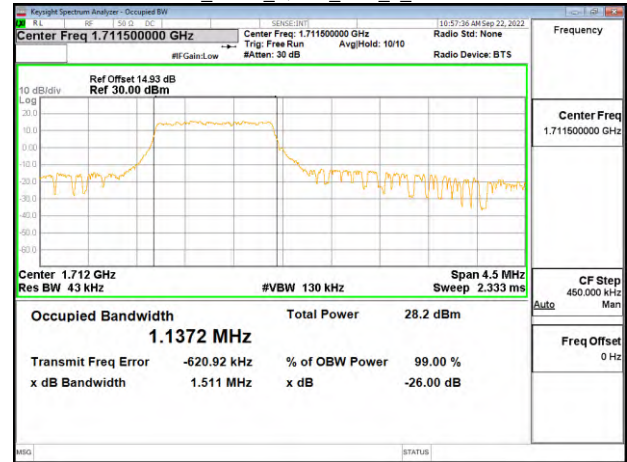
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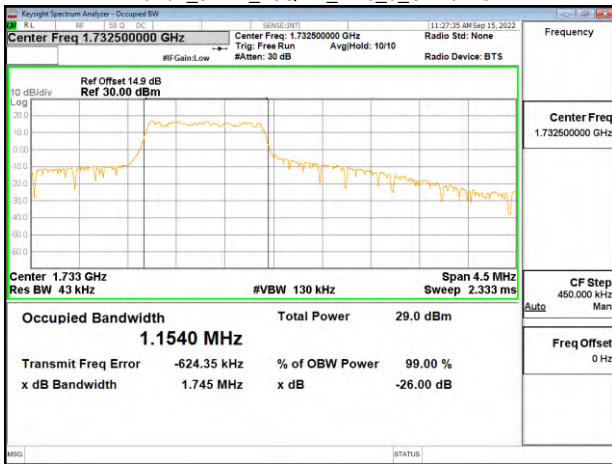
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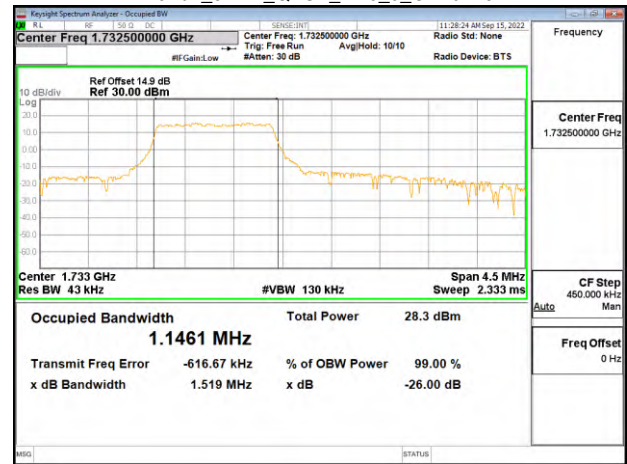
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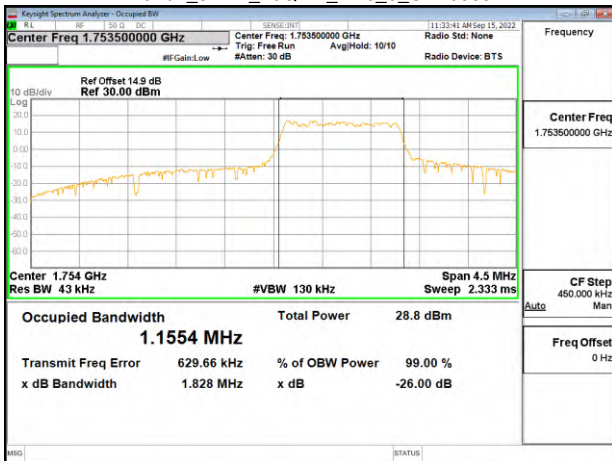
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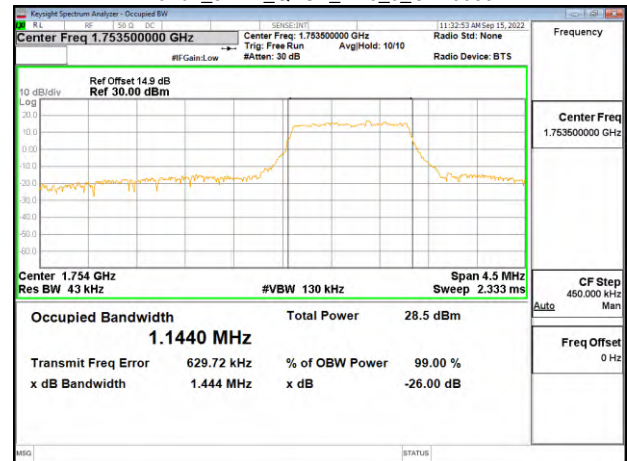
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Band4\_3MHz\_QPSK\_RB6\_0\_CH20385

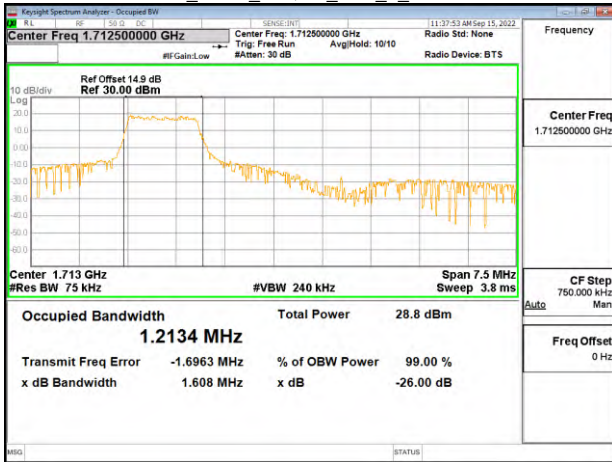


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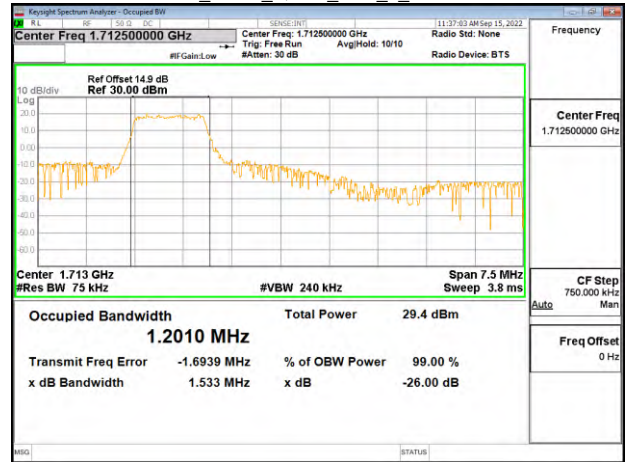
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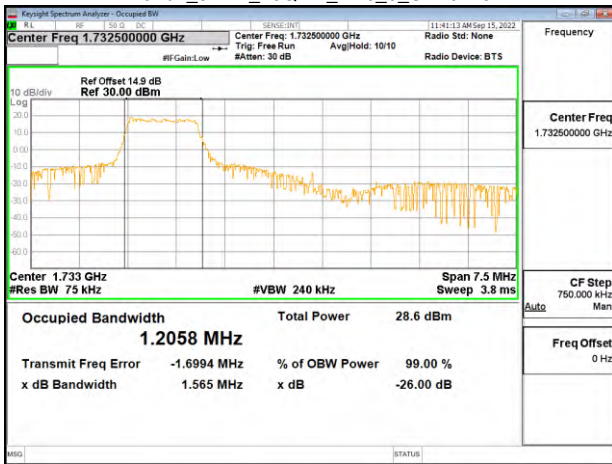
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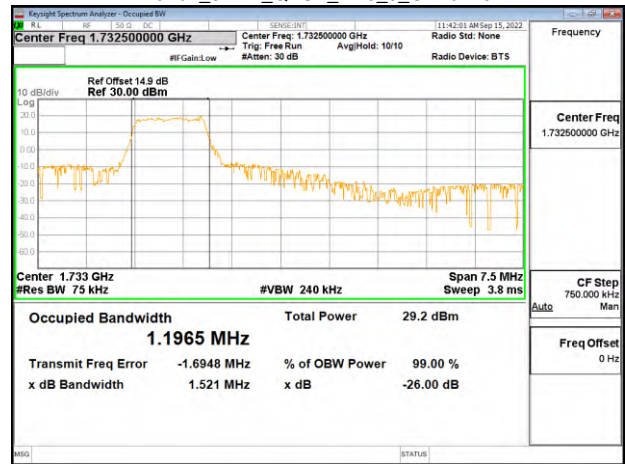
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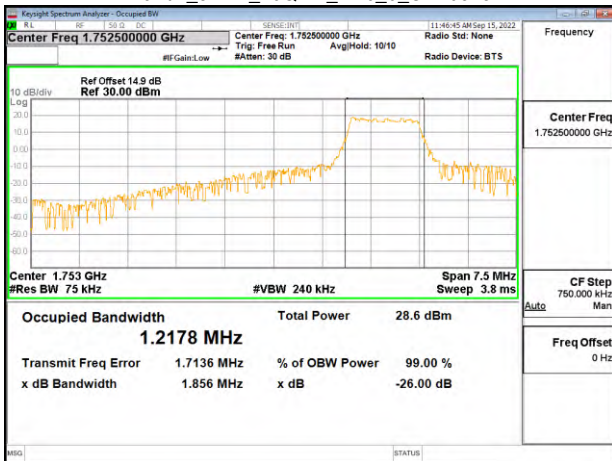
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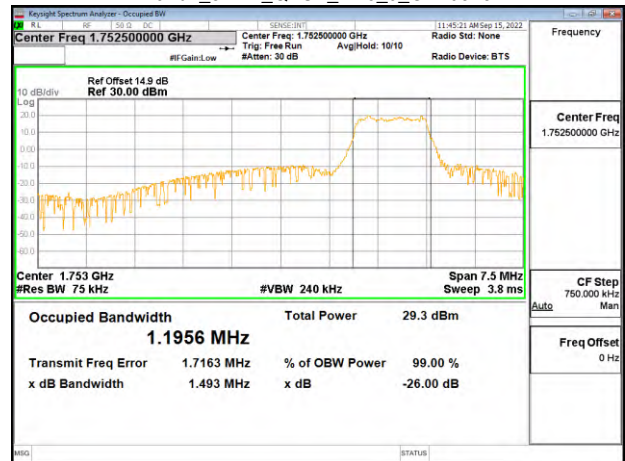
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Band4\_5MHz\_16QAM\_RB6\_0\_CH20375



Band4\_5MHz\_QPSK\_RB6\_0\_CH20375

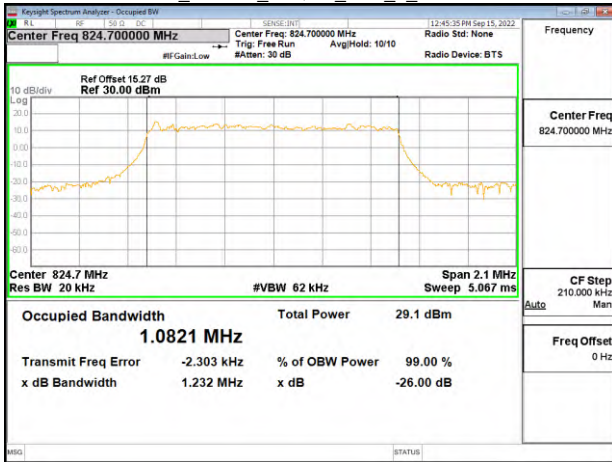


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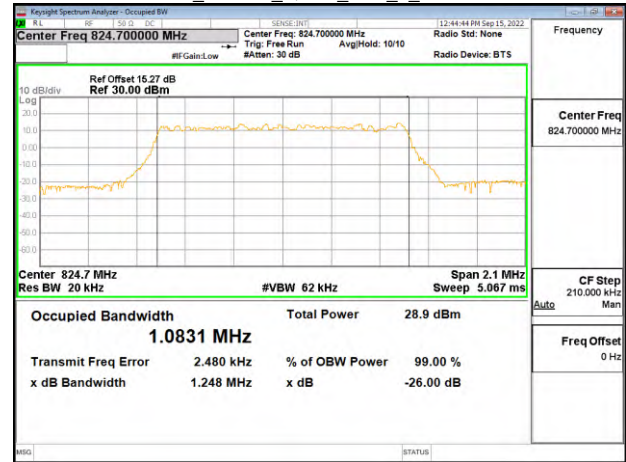
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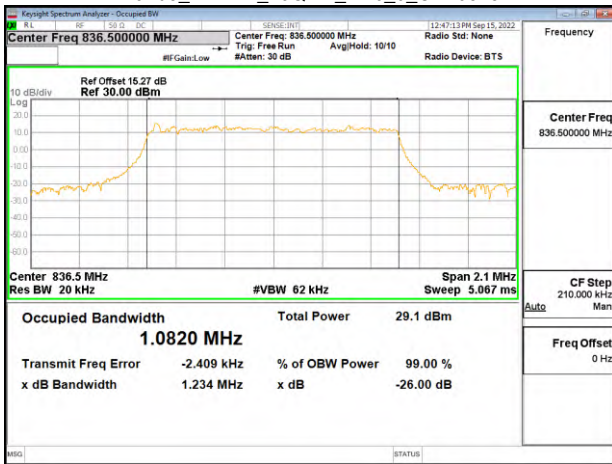
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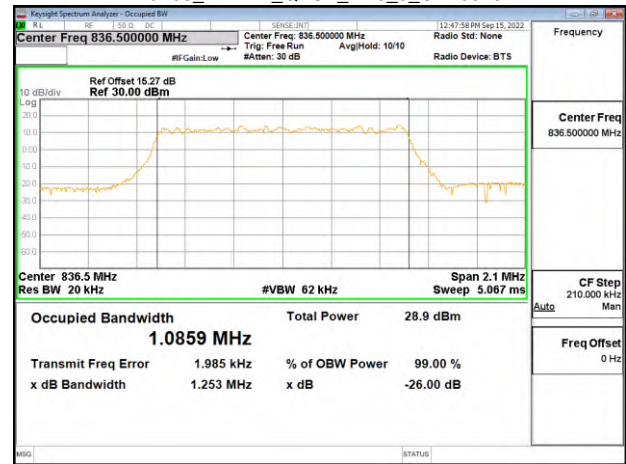
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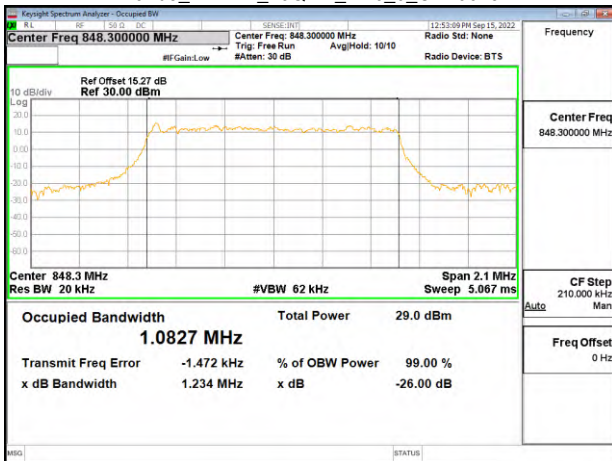
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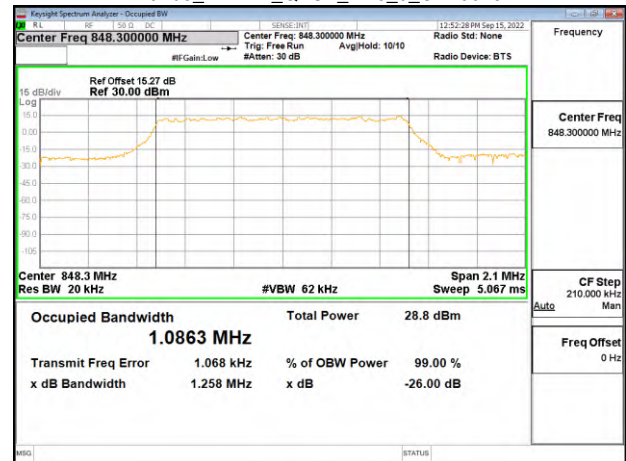
Band5\_1.4MHz\_QPSK\_RB6\_0\_CH20525



Band5\_1.4MHz\_16QAM\_RB6\_0\_CH20643



Band5\_1.4MHz\_QPSK\_RB6\_0\_CH20643

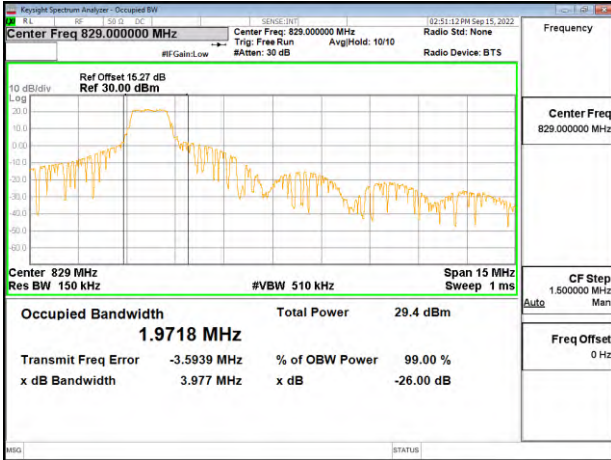


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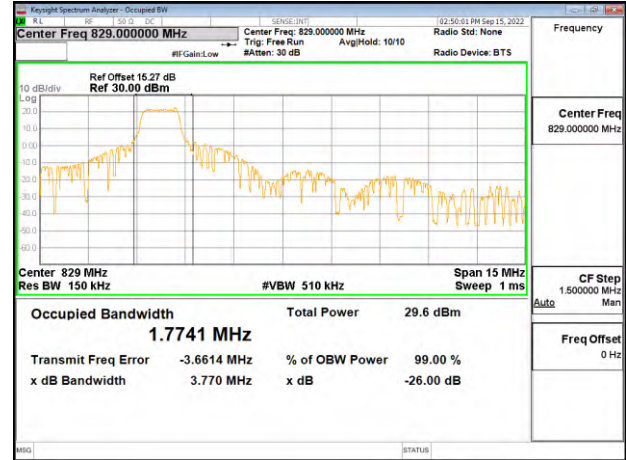
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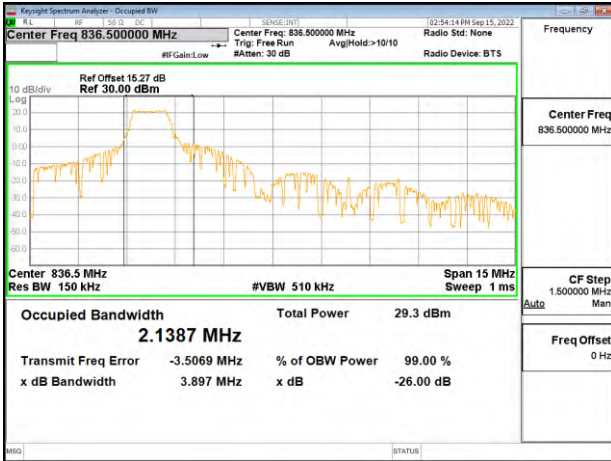
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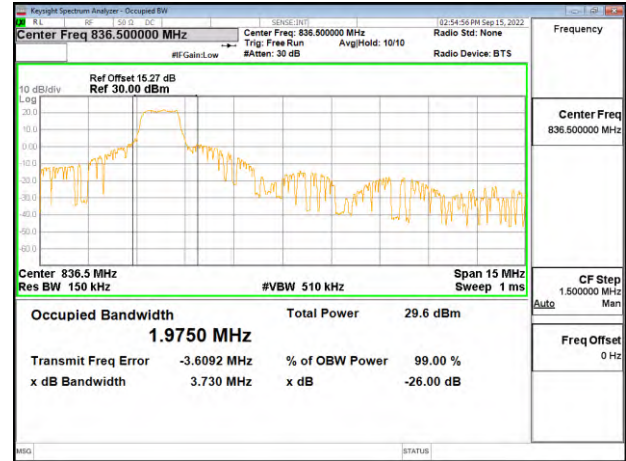
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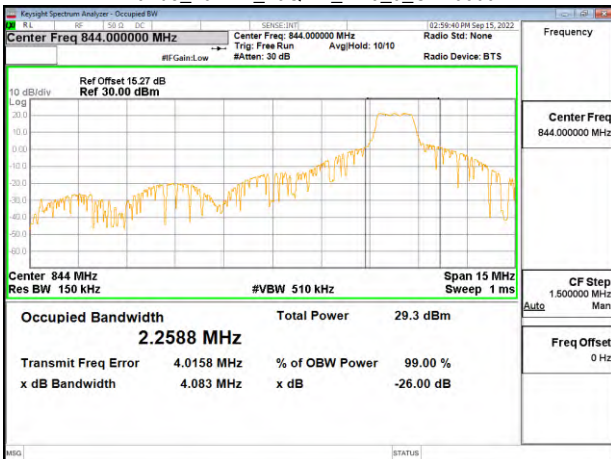
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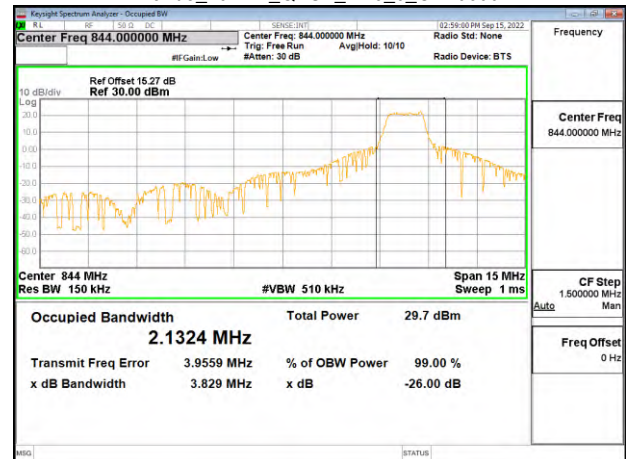
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Band5\_10MHz\_16QAM\_RB6\_0\_CH20600



Band5\_10MHz\_QPSK\_RB6\_0\_CH20600

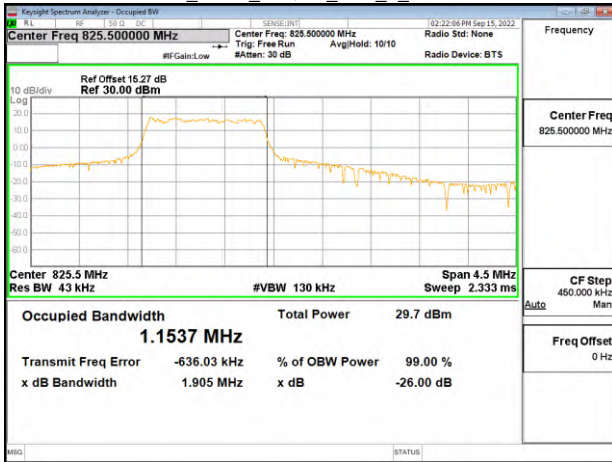


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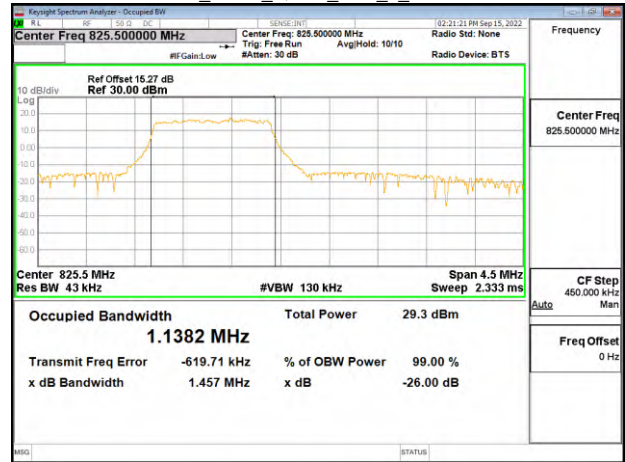
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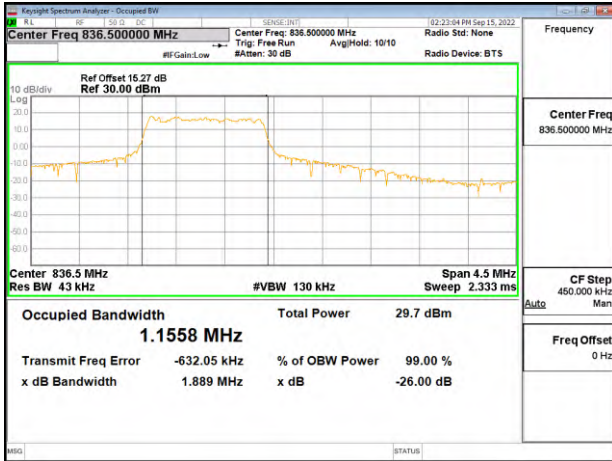
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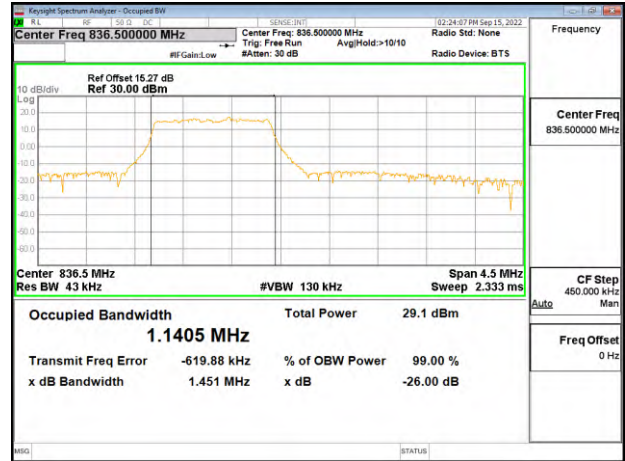
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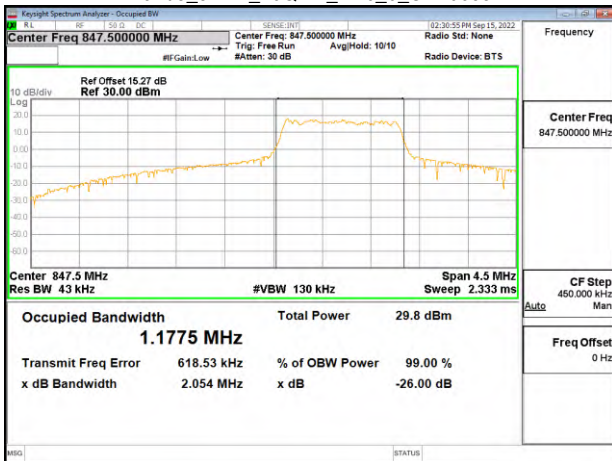
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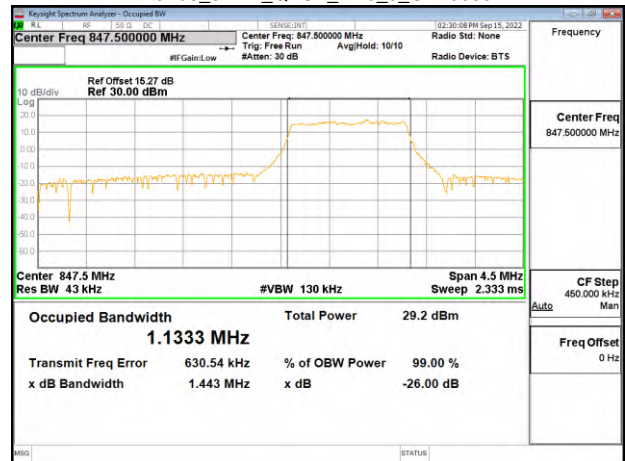
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Band5\_3MHz\_16QAM\_RB6\_0\_CH20635



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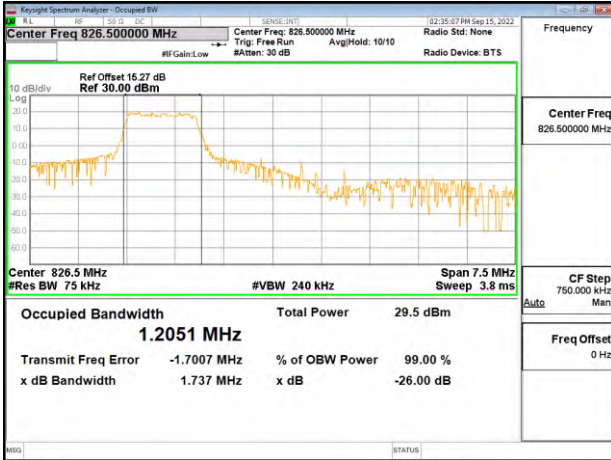


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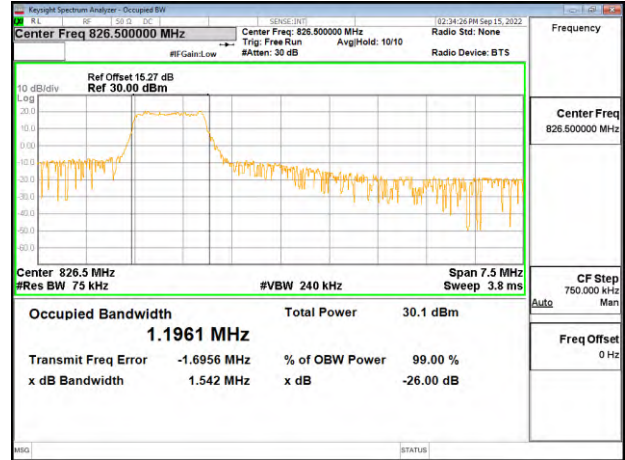
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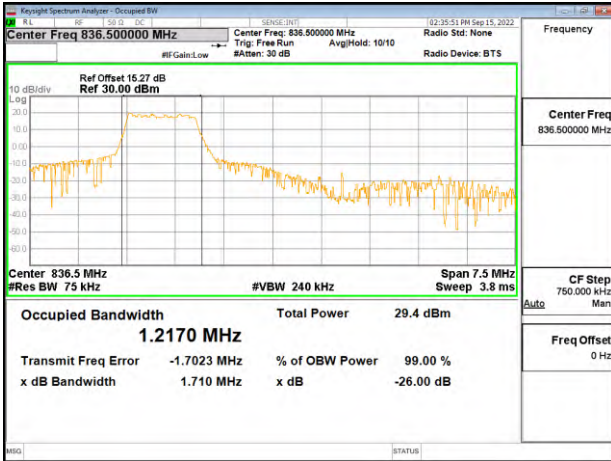
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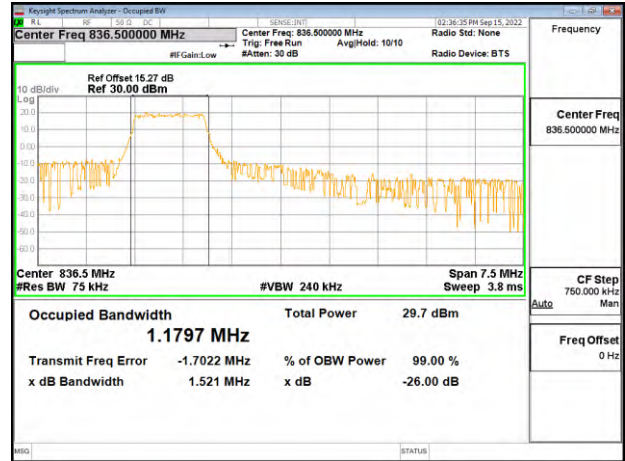
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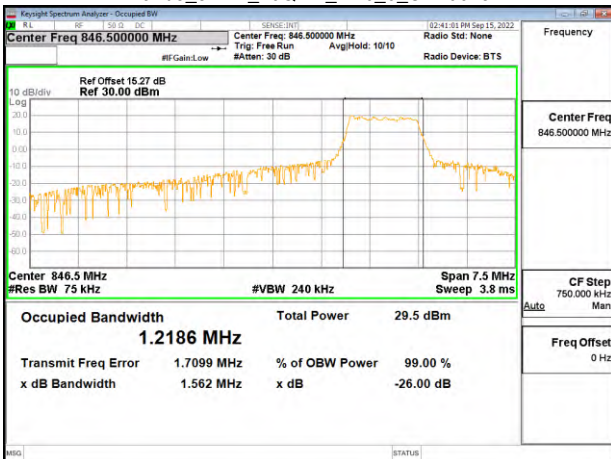
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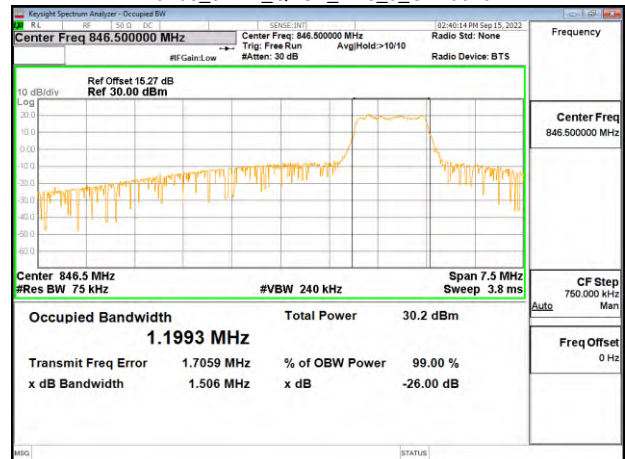
Band5\_5MHz\_QPSK\_RB6\_0\_CH20525



Band5\_5MHz\_16QAM\_RB6\_0\_CH20625



Band5\_5MHz\_QPSK\_RB6\_0\_CH20625



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## 9 OUT OF BAND EMISSION AT ANTENNA TERMINALS

### 9.1 Standard Applicable

**FCC §22.917(a), §24.238(a), §27.53(h)**

**RSS-130 §4.7, RSS-132 §5.5, RSS-133 §6.5.1, RSS-139 §6.6**

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(g) LTE B12**

Compliance for operations in the 600 MHz, 698-746 MHz, 746-758 MHz and the 776-788 MHz band 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.

- (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;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $76 + 10 \log(P)$  dB in a 6.25 kHz band segment, for base and fixed stations;
- (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;

**ISED RSS-130 §4.7.1 for LTE B12**

Compliance for operations in the 617-652 MHz, 663-698 MHz, 698-756 MHz and the 777-787 MHz band, the unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), 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 of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

**ISED RSS-132 §5.5 for LTE B5**

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

- i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied 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 immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz 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 occupied bandwidth, power integration over 100 kHz is required.

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**ISED RSS-133 §6.5.1 for LTE B2**

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  $43 + 10 \log_{10}(\text{watts})$ .
- 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  $43 + 10 \log_{10}(\text{watts})$ . If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

**FCC §27.53(h)(1) for LTE B4**

(h) *AWS emission limits*—(1) *General protection levels*. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.

**RSS-139 §6.6 for LTE B4**

In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote 2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

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

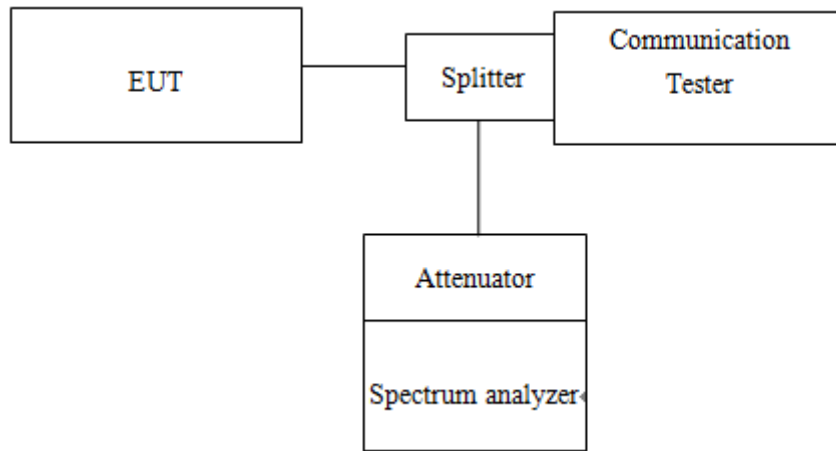
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## 9.2 Test SET-UP



## 9.3 Measurement Procedure

### 9.3.1 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.

### 9.3.2 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% EBW.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

## 9.4 Measurement Result:

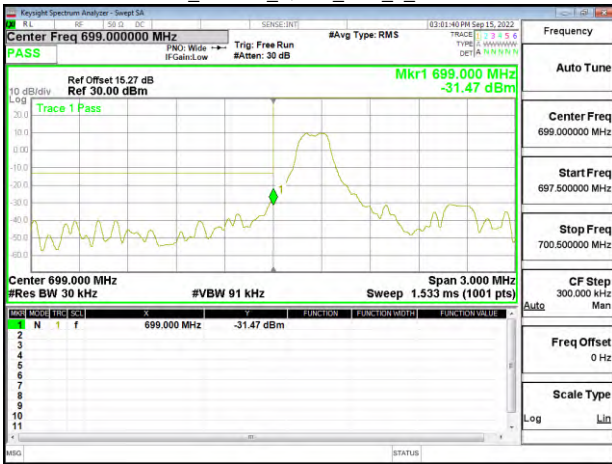
Refer to next pages.

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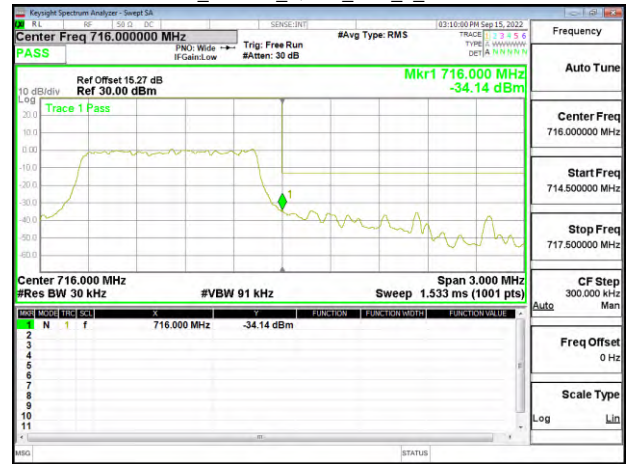
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## 9.4.1 Bandedge

Band12\_1.4MHz\_QPSK\_RB1\_0\_CH23017



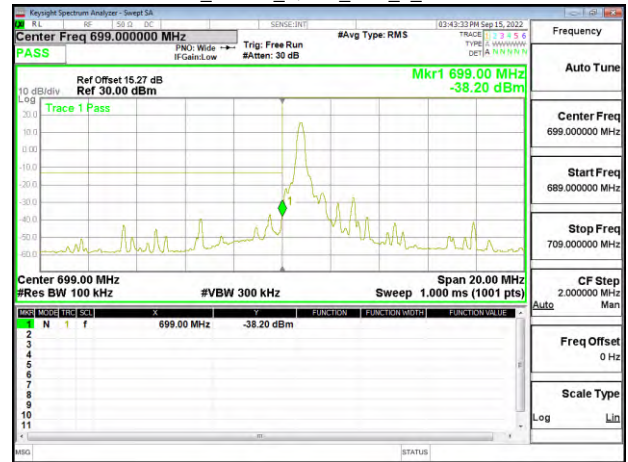
Band12\_1.4MHz\_QPSK\_RB6\_0\_CH23173



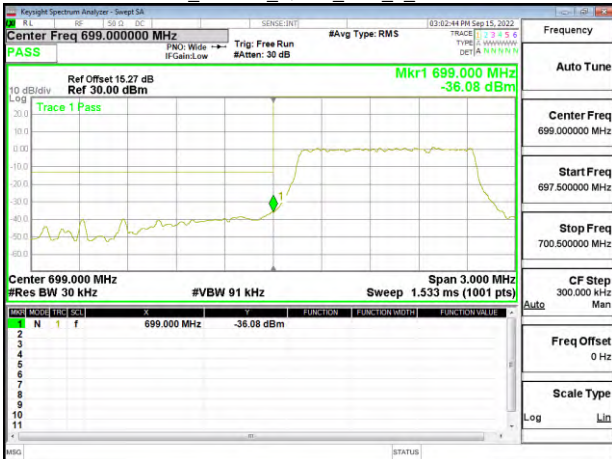
Band12\_1.4MHz\_QPSK\_RB1\_5\_CH23173



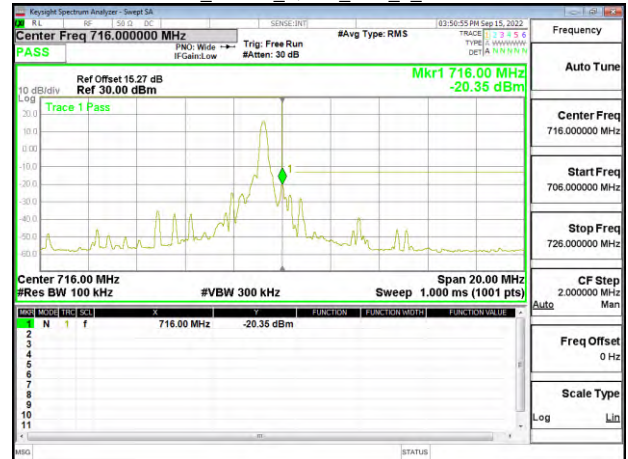
Band12\_10MHz\_QPSK\_RB1\_0\_CH23060



Band12\_1.4MHz\_QPSK\_RB6\_0\_CH23017



Band12\_10MHz\_QPSK\_RB1\_5\_CH23130

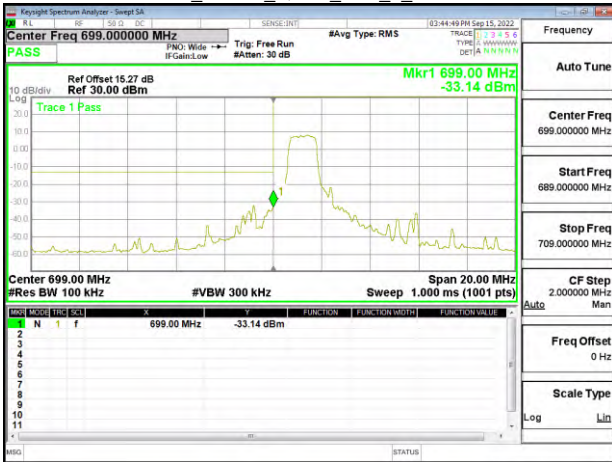


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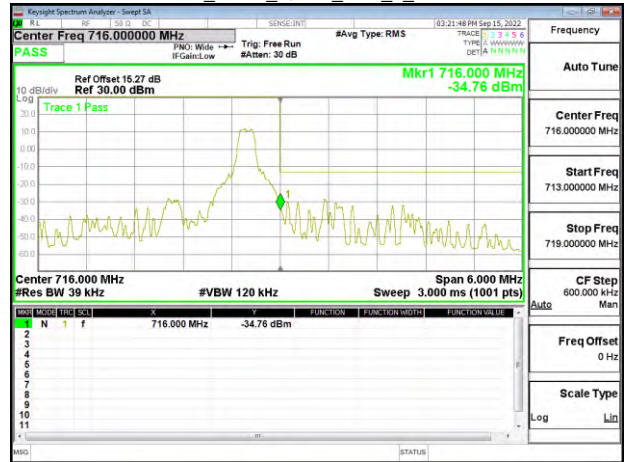
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Band12\_10MHz\_QPSK\_RB6\_0\_CH23060



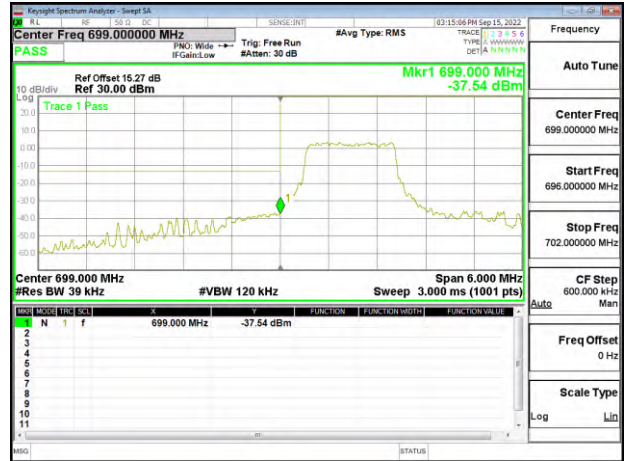
Band12\_3MHz\_QPSK\_RB1\_5\_CH23165



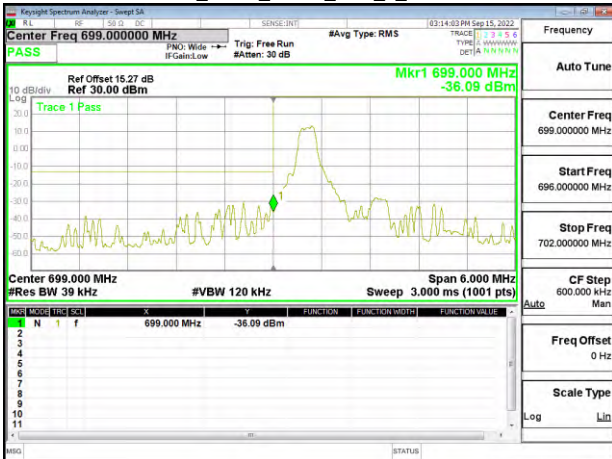
Band12\_10MHz\_QPSK\_RB6\_0\_CH23130



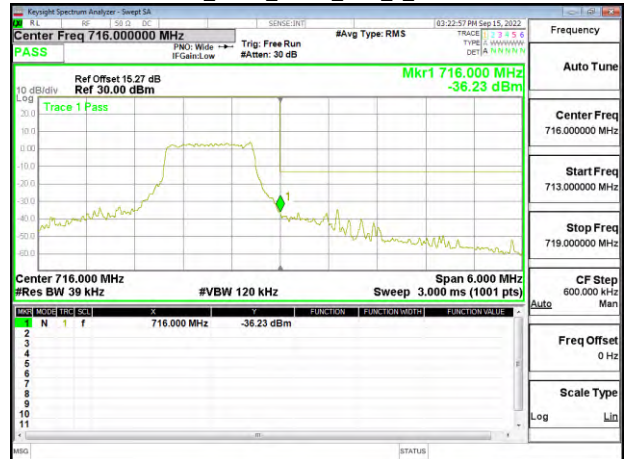
Band12\_3MHz\_QPSK\_RB6\_0\_CH23025



Band12\_3MHz\_QPSK\_RB1\_0\_CH23025



Band12\_3MHz\_QPSK\_RB6\_0\_CH23165



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