

## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT



**Applicant:** FIH CO., LTD.  
No.4, Minsheng St., Tu-Cheng Dist., New Taipei City 23679,  
Taiwan

**Manufacturer:** FIH CO., LTD.  
No.4, Minsheng St., Tu-Cheng Dist., New Taipei City 23679,  
Taiwan

**Product Name:** Internet Gateway

**Brand Name:** FIH

**Model No.:** FSNO21VA

**Model Difference:** N/A

**Report Number:** ER/2022/30086

**FCC ID** RYQFSNO21VA

**Issue Date:** June 7, 2022

**Date of Test:** April 7, 2022 ~ May 9, 2022

**Date of EUT Received:** March 30, 2022

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



Blue Yang

### 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, 96.

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
ER/2022/30086	00	Original	May 30, 2022	Yuri Tsai	
ER/2022/30086	01	Updated antenna type	June 7, 2022	Yuri Tsai	*

**Note:**

- 1、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:	Internet Gateway
Brand Name:	FIH
Model No.:	FSNO21VA
Model Difference:	N/A
Hardware Version:	1.0
Firmware Version:	V0.15A_1KUS
EUT Series No.:	356405430000450
Power Supply:	12Vdc from AC/DC Adapter
Test Software (Name/Version)	default

### 1.2 Antenna Designation

Antenna Type	Antenna No.
Monopole	Ant4

Note: Transmission frequencies in this test report are only available by the above antenna(s).

Modulation	Frequency (MHz)	Peak Antenna Gain (dBi)
LTE-Band 48	3550 ~ 3700	-0.85709

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

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### 1.3 Operation Frequencies

LTE Band 48			
BW (MHz)	Operation Frequency (MHz)		
5	3552.5	-	3697.5
10	3555.0	-	3695.0
15	3557.5	-	3692.5
20	3560.0	-	3690.0

### 1.4 Maximum ERP/EIRP

LTE Band	BW	Frequency	Modulation	ERP / EIRP (dBm/10MHz)	(W)	99%	Type of Emission
48	5	3552.5	QPSK	22.90	EIRP 0.195	4.4932	4M49G7D
			16QAM	22.46	EIRP 0.176	4.4988	4M50D7W
			64QAM	21.37	EIRP 0.137	4.4968	4M50D7W
			256QAM	18.32	EIRP 0.068	4.5002	4M50D7W
48	10	3555.0	QPSK	22.94	EIRP 0.197	8.9796	8M98G7D
			16QAM	22.55	EIRP 0.180	8.9754	8M98D7W
			64QAM	21.57	EIRP 0.143	8.9931	8M99D7W
			256QAM	18.29	EIRP 0.067	8.9639	8M96D7W
48	15	3557.5	QPSK	22.92	EIRP 0.196	13.4510	13M5G7D
			16QAM	22.23	EIRP 0.167	13.4680	13M5D7W
			64QAM	21.25	EIRP 0.133	13.4430	13M4D7W
			256QAM	18.27	EIRP 0.067	13.4230	13M4D7W
48	20	3560.0	QPSK	22.95	EIRP 0.197	17.9520	18M0G7D
			16QAM	22.14	EIRP 0.164	17.9300	17M9D7W
			64QAM	21.19	EIRP 0.131	17.9240	17M9D7W
			256QAM	18.24	EIRP 0.067	17.8890	17M9D7W

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## 1.5 Test Methodology of Applied Standards

FCC 47 CFR Part 2, Part 96E

ANSI C63.26-2015

ANSI/ITA C603-E.2016

KDB 971168 D01 Power Meas license Digital System v03r01

KDB 940660 D01 Part 96 CBRS Eqpt v02

KDB 412172 D01 Determining ERP and EIRP V01r01

## 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		
		Conduction C		
		SAC C		
		SAC D		
		SAC G		
	No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333	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\*9m\*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.

Following shows an offset computation in physical test.

Frequency	RF cable loss (dB)	Attenuation (dB)	offset(dB)
High Band (Above 1 GHz)	4.72	10	14.72

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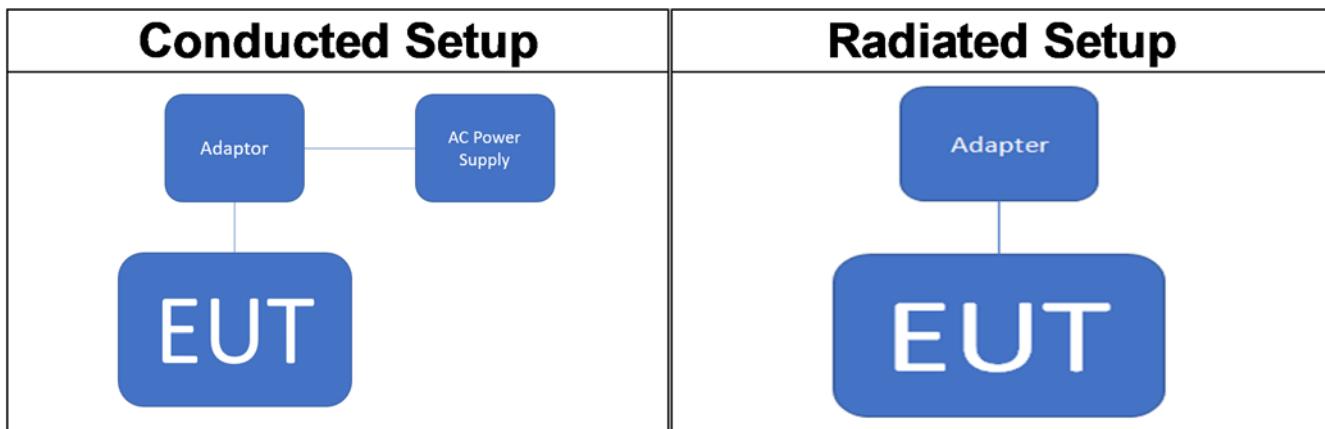
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## 2.5 Final Amplifier Voltage and Current Information:

### LTE Band 48

Test Mode	AC voltage (V)	AC current (mA)
LTE Band 48_20M QPSK	120	67

## 2.6 Test Configuration



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

## 2.7 Control Unit(s)

Conducted Emission Test Site: Conducted 3					
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
Switching Adapter	Jiangxi JianAohai Technology	A929-120300W-US1	N/A	N/A	N/A
Radiated Emission Test Site: SAC 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
SWITCHING ADAPTER	Jiangxi JianAohai Technology Co.,Ltd	A929-120300W-US1	N/A	N/A	N/A
Test Software	Audix	e3	Ver. 9.210322	N.C.R	N.C.R

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§2.1046(a) §96.41(b)	Maximum Power Output	Compliant
§2.1046, §96.41(b)	Maximum Power Density	Compliant
§2.1053, §96.41(e)	FIELD STRENGTH OF SPURIOUS RADIATION	Compliant
§2.1051 §96.41(e)	OUT OF BAND EMISSION AT ANTENNA	Compliant
§2.1049,(h)	OCCUPIED BANDWIDTH	Compliant
§2.1055(a)	Frequency Stability	Compliant

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## 4 DESCRIPTION OF TEST MODES

### 4.1 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case scenario from all possible combinations among available modulations, data rates and antenna ports, the worst case configurations listed below for the final test.
3. 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 Measurement Configuration

#### LTE Band 48 MODE

Test Items			Max. Output Power														
Band	Test Channel			Bandwidth (MHz)						Modulation				RB #			
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full	
48	V	V	V	-	-	V	V	V	V	V	V	V	V	V	V	V	
Test Items			Frequency Stability														
48	-	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	64QAM	256QAM	1	Half	Full	
48	V	V	V	-	-	V	V	V	V	V	V	V	V	-	-	V	
Test Items			Peak-to-Average Ratio														
48	V	V	V	-	-	V	V	V	V	-	-	-	V	-	-	V	
Test Items			Emission Mask														
Band	Test Channel			Bandwidth (MHz)						Modulation				RB #			
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full	
48	V	V	V	-	-	V	V	V	V	V	V	V	V	-	-	V	
Test Items			Conducted Emission														
48	V	V	V	-	-	-	-	-	-	V	V	-	-	-	V	-	-
Test Items			Radiated Emission														
Band	Test Channel			Bandwidth (MHz)						Modulation				RB #			
	L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full	
48	V	V	V	-	-	-	-	-	-	V	V	-	-	V	-	-	

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
Output Power measurement	+/- 1 dB
ERP/ EIRP measurement	+/- 3 dB
	+/- 3 dB
Emission Bandwidth	+/- 1.53 Hz
Undesignable radiated emission measurement	+/- 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 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	10/13/2021	10/12/2022
Radio Communication Analyer	Anritsu	MT8821C	6261786084	01/18/2022	01/17/2023
Temperature Chamber	Giant Force	GTH-150-40-CP-AR	MAA0512-018	05/19/2021	05/18/2022
AC Power Source	Gwinstek	APS-7050E	GEV171679	09/28/2021	09/27/2022
Attenuator	Mini-Circuit	BW-S10W2+	4	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-JSPF412-020	12/14/2021	12/13/2022

### 6.2 Radiated Measurement

Radiated Emission Test Site: SAC 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWARZBECK	VULB9168	300	10/19/2021	10/18/2022
Horn Antenna	SCHWARZBECK	BBHA9120D	D803	12/20/2021	12/19/2022
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	01/03/2022	01/02/2023
Horn Antenna	SCHWARZBECK	BBHA9120D	603	05/18/2021	05/17/2022
Horn Antenna	SCHWARZBECK	BBHA9170	184	12/16/2021	12/15/2022
Horn Antenna	SCHWARZBECK	BBHA9170	185	08/06/2021	08/05/2022
Site Cal	SGS	SAC I chamber	N/A	01/01/2022	12/31/2022
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY59071541	07/14/2021	07/13/2022
Signal Generator	R&S	SMBV100A	263084	01/11/2022	01/10/2023
Radio Communication Analyer	Anritsu	MT8821C	6261786084	01/18/2022	01/17/2023
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/27/2021	10/26/2022
Pre-Amplifier	HP	8449B	3008A01973	12/16/2021	12/15/2022
Pre-Amplifier	HP	8447D	2944A09469	12/16/2021	12/15/2022
4GHz High Pass Filter	WI	WHKX4.0/18G-10SS	WHKX4.0/18G-10SS	12/14/2021	12/13/2022
Coaxial Cable	Huber Suhner	succoflex 102	MY2622/2	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	succoflex 104A	800086/4a	12/16/2021	12/15/2022
Coaxial Cable	Huber Suhner	EMC 104-SM-SM-2000	160123	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

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## 7 MAXIMUM OUTPUT POWER MEASUREMENT

### 7.1 Standard Applicable

FCC §2.1046 & 96.41

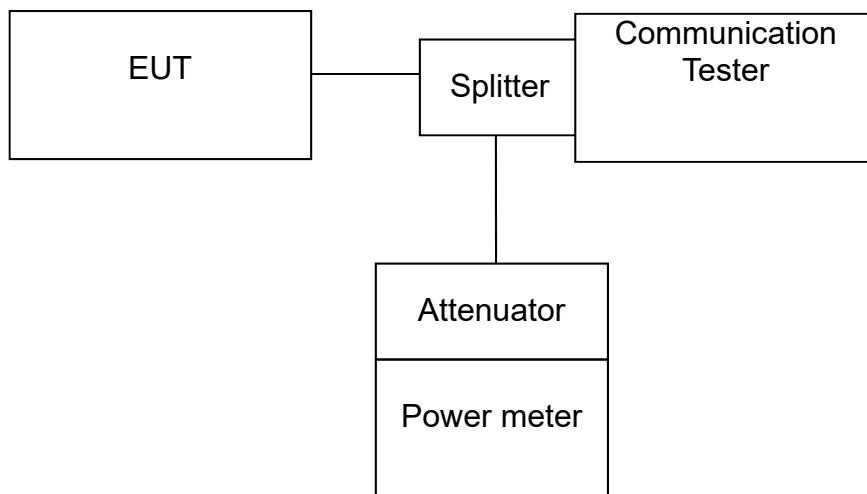
(a) FCC 96.41(a) Digital modulation. Systems operating in the Citizens Broadband Radio Service must use digital modulation techniques.

(b) FCC 96.41(b) Power limits. Unless otherwise specified in this section, the maximum effective isotropic radiated power (EIRP) of any CBSD and End User Device must comply with the limits shown in the table in this paragraph (b):

Device	Maximum EIRP (dBm/10 MHz)
End User Device	23
Category A CBSD	30
Category B CBSD <sup>1</sup>	47

Category B CBSDs will only be authorized for use after an ESC is approved and commercially deployed consistent with §§96.15 and 96.67.

### 7.2 Test Set-up



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

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### 7.3 Measurement Procedure

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

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

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

Where:

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

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

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

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

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

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## 7.4 Measurement Result:

Antenna gain (dBi)	-0.85709								
LTE Band 48_Uplink frequency band : 3550 to 3700 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm/10MHz)	EIRP Average (dBm/10MHz)	EIRP Limit (dBm/10MHz)	
5	55265	3552.5	QPSK	1	0	23.15	22.29	23	-0.70709
				1	24	23.18	22.32	23	-0.67709
				12	6	22.36	21.50	23	-1.49709
				25	0	22.35	21.49	23	-1.50709
	55990	3625	QPSK	1	0	23.17	22.31	23	-0.68709
				1	24	23.17	22.31	23	-0.68709
				12	6	22.39	21.53	23	-1.46709
				25	0	22.39	21.53	23	-1.46709
	56715	3697.5	QPSK	1	0	23.21	22.35	23	-0.64709
				1	24	23.17	22.31	23	-0.68709
				12	6	22.48	21.62	23	-1.37709
				25	0	22.44	21.58	23	-1.41709
5	55265	3552.5	16QAM	1	0	22.54	21.68	23	-1.31709
				1	24	22.64	21.78	23	-1.21709
				12	6	21.40	20.54	23	-2.45709
				25	0	21.34	20.48	23	-2.51709
	55990	3625	16QAM	1	0	22.55	21.69	23	-1.30709
				1	24	22.53	21.67	23	-1.32709
				12	6	21.49	20.63	23	-2.36709
				25	0	21.36	20.50	23	-2.49709
	56715	3697.5	16QAM	1	0	22.74	21.88	23	-1.11709
				1	24	22.77	21.91	23	-1.08709
				12	6	21.51	20.65	23	-2.34709
				25	0	21.48	20.62	23	-2.37709
5	55265	3552.5	64QAM	1	0	21.43	20.57	23	-2.42709
				1	24	21.51	20.65	23	-2.34709
				12	6	20.36	19.50	23	-3.49709
				25	0	20.35	19.49	23	-3.50709
	55990	3625	64QAM	1	0	21.52	20.66	23	-2.33709
				1	24	21.63	20.77	23	-2.22709
				12	6	20.49	19.63	23	-3.36709
				25	0	20.39	19.53	23	-3.46709
	56715	3697.5	64QAM	1	0	21.59	20.73	23	-2.26709
				1	24	21.68	20.82	23	-2.17709
				12	6	20.47	19.61	23	-3.38709
				25	0	20.45	19.59	23	-3.40709
5	55265	3552.5	256QAM	1	0	18.36	17.50	23	-5.49709
				1	24	18.43	17.57	23	-5.42709
				12	6	18.45	17.59	23	-5.40709
				25	0	18.34	17.48	23	-5.51709
	55990	3625	256QAM	1	0	18.44	17.58	23	-5.41709
				1	24	18.32	17.46	23	-5.53709
				12	6	18.45	17.59	23	-5.40709
				25	0	18.41	17.55	23	-5.44709
	56715	3697.5	256QAM	1	0	18.50	17.64	23	-5.35709
				1	24	18.63	17.77	23	-5.22709
				12	6	18.49	17.63	23	-5.36709
				25	0	18.38	17.52	23	-5.47709

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Antenna gain (dBi)		-0.85709							
LTE Band 48_Uplink frequency band : 3550 to 3700 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm/10MHz)	EIRP Average (dBm/10MHz)	EIRP Limit (dBm/10MHz)	
10	55290	3555	QPSK	1	0	23.19	22.33	23	-0.66709
				1	49	23.17	22.31	23	-0.68709
				25	12	22.34	21.48	23	-1.51709
				50	0	22.35	21.49	23	-1.50709
	55990	3625	QPSK	1	0	23.19	22.33	23	-0.66709
				1	49	23.15	22.29	23	-0.70709
				25	12	22.42	21.56	23	-1.43709
				50	0	22.38	21.52	23	-1.47709
	56690	3695	QPSK	1	0	23.24	22.38	23	-0.61709
				1	49	23.25	22.39	23	-0.60709
				25	12	22.55	21.69	23	-1.30709
				50	0	22.49	21.63	23	-1.36709
10	55290	3555	16QAM	1	0	22.46	21.60	23	-1.39709
				1	49	22.56	21.70	23	-1.29709
				25	12	21.35	20.49	23	-2.50709
				50	0	21.36	20.50	23	-2.49709
	55990	3625	16QAM	1	0	22.47	21.61	23	-1.38709
				1	49	22.62	21.76	23	-1.23709
				25	12	21.42	20.56	23	-2.43709
				50	0	21.41	20.55	23	-2.44709
	56690	3695	16QAM	1	0	22.58	21.72	23	-1.27709
				1	49	22.86	22.00	23	-0.99709
				25	12	21.60	20.74	23	-2.25709
				50	0	21.54	20.68	23	-2.31709
10	55290	3555	64QAM	1	0	21.52	20.66	23	-2.33709
				1	49	21.58	20.72	23	-2.27709
				25	12	20.36	19.50	23	-3.49709
				50	0	20.32	19.46	23	-3.53709
	55990	3625	64QAM	1	0	21.62	20.76	23	-2.23709
				1	49	21.66	20.80	23	-2.19709
				25	12	20.41	19.55	23	-3.44709
				50	0	20.38	19.52	23	-3.47709
	56690	3695	64QAM	1	0	21.84	20.98	23	-2.01709
				1	49	21.88	21.02	23	-1.97709
				25	12	20.60	19.74	23	-3.25709
				50	0	20.52	19.66	23	-3.33709
10	55290	3555	256QAM	1	0	18.46	17.60	23	-5.39709
				1	49	18.38	17.52	23	-5.47709
				25	12	18.44	17.58	23	-5.41709
				50	0	18.39	17.53	23	-5.46709
	55990	3625	256QAM	1	0	18.37	17.51	23	-5.48709
				1	49	18.38	17.52	23	-5.47709
				25	12	18.46	17.60	23	-5.39709
				50	0	18.40	17.54	23	-5.45709
	56690	3695	256QAM	1	0	18.48	17.62	23	-5.37709
				1	49	18.60	17.74	23	-5.25709
				25	12	18.55	17.69	23	-5.30709
				50	0	18.52	17.66	23	-5.33709

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Antenna gain (dBi)		-0.85709							
LTE Band 48_Uplink frequency band : 3550 to 3700 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm/10MHz)	EIRP Average (dBm/10MHz)	EIRP Limit (dBm/10MHz)	
15	55315	3557.5	QPSK	1	0	23.09	22.23	23	-0.76709
				1	74	23.08	22.22	23	-0.77709
				36	18	22.22	21.36	23	-1.63709
				75	0	22.24	21.38	23	-1.61709
	55990	3625	QPSK	1	0	23.15	22.29	23	-0.70709
				1	74	23.08	22.22	23	-0.77709
				36	18	22.27	21.41	23	-1.58709
				75	0	22.27	21.41	23	-1.58709
	56665	3692.5	QPSK	1	0	23.23	22.37	23	-0.62709
				1	74	23.22	22.36	23	-0.63709
				36	18	22.30	21.44	23	-1.55709
				75	0	22.28	21.42	23	-1.57709
15	55315	3557.5	16QAM	1	0	22.42	21.56	23	-1.43709
				1	74	22.27	21.41	23	-1.58709
				36	18	21.21	20.35	23	-2.64709
				75	0	21.21	20.35	23	-2.64709
	55990	3625	16QAM	1	0	22.29	21.43	23	-1.56709
				1	74	22.39	21.53	23	-1.46709
				36	18	21.26	20.40	23	-2.59709
				75	0	21.25	20.39	23	-2.60709
	56665	3692.5	16QAM	1	0	22.41	21.55	23	-1.44709
				1	74	22.54	21.68	23	-1.31709
				36	18	21.29	20.43	23	-2.56709
				75	0	21.29	20.43	23	-2.56709
15	55315	3557.5	64QAM	1	0	21.22	20.36	23	-2.63709
				1	74	21.51	20.65	23	-2.34709
				36	18	20.28	19.42	23	-3.57709
				75	0	20.21	19.35	23	-3.64709
	55990	3625	64QAM	1	0	21.30	20.44	23	-2.55709
				1	74	21.41	20.55	23	-2.44709
				36	18	20.25	19.39	23	-3.60709
				75	0	20.27	19.41	23	-3.58709
	56665	3692.5	64QAM	1	0	21.35	20.49	23	-2.50709
				1	74	21.56	20.70	23	-2.29709
				36	18	20.32	19.46	23	-3.53709
				75	0	20.31	19.45	23	-3.54709
15	55315	3557.5	256QAM	1	0	18.18	17.32	23	-5.67709
				1	74	18.31	17.45	23	-5.54709
				36	18	18.16	17.30	23	-5.69709
				75	0	18.21	17.35	23	-5.64709
	55990	3625	256QAM	1	0	18.21	17.35	23	-5.64709
				1	74	18.53	17.67	23	-5.32709
				36	18	18.28	17.42	23	-5.57709
				75	0	18.31	17.45	23	-5.54709
	56665	3692.5	256QAM	1	0	18.35	17.49	23	-5.50709
				1	74	18.58	17.72	23	-5.27709
				36	18	18.36	17.50	23	-5.49709
				75	0	18.30	17.44	23	-5.55709

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Antenna gain (dBi)		-0.85709							
LTE Band 48_Uplink frequency band : 3550 to 3700 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm/10MHz)	EIRP Average (dBm/10MHz)	EIRP Limit (dBm/10MHz)	
20	55340	3560	QPSK	1	0	23.26	22.40	23	-0.59709
				1	99	23.22	22.36	23	-0.63709
				50	25	22.21	21.35	23	-1.64709
				100	0	22.22	21.36	23	-1.63709
	55990	3625	QPSK	1	0	23.13	22.27	23	-0.72709
				1	99	23.24	22.38	23	-0.61709
				50	25	22.24	21.38	23	-1.61709
				100	0	22.23	21.37	23	-1.62709
	56640	3690	QPSK	1	0	23.25	22.39	23	-0.60709
				1	99	23.19	22.33	23	-0.66709
				50	25	22.35	21.49	23	-1.50709
				100	0	22.35	21.49	23	-1.50709
20	55340	3560	16QAM	1	0	22.22	21.36	23	-1.63709
				1	99	22.36	21.50	23	-1.49709
				50	25	21.18	20.32	23	-2.67709
				100	0	21.19	20.33	23	-2.66709
	55990	3625	16QAM	1	0	22.34	21.48	23	-1.51709
				1	99	22.34	21.48	23	-1.51709
				50	25	21.27	20.41	23	-2.58709
				100	0	21.25	20.39	23	-2.60709
	56640	3690	16QAM	1	0	22.41	21.55	23	-1.44709
				1	99	22.45	21.59	23	-1.40709
				50	25	21.41	20.55	23	-2.44709
				100	0	21.33	20.47	23	-2.52709
20	55340	3560	64QAM	1	0	21.28	20.42	23	-2.57709
				1	99	21.30	20.44	23	-2.55709
				50	25	20.18	19.32	23	-3.67709
				100	0	20.23	19.37	23	-3.62709
	55990	3625	64QAM	1	0	21.36	20.50	23	-2.49709
				1	99	21.50	20.64	23	-2.35709
				50	25	20.25	19.39	23	-3.60709
				100	0	20.20	19.34	23	-3.65709
	56640	3690	64QAM	1	0	21.47	20.61	23	-2.38709
				1	99	21.42	20.56	23	-2.43709
				50	25	20.37	19.51	23	-3.48709
				100	0	20.39	19.53	23	-3.46709
20	55340	3560	256QAM	1	0	18.23	17.37	23	-5.62709
				1	99	18.26	17.40	23	-5.59709
				50	25	18.19	17.33	23	-5.66709
				100	0	18.17	17.31	23	-5.68709
	55990	3625	256QAM	1	0	18.27	17.41	23	-5.58709
				1	99	18.37	17.51	23	-5.48709
				50	25	18.32	17.46	23	-5.53709
				100	0	18.26	17.40	23	-5.59709
	56640	3690	256QAM	1	0	18.34	17.48	23	-5.51709
				1	99	18.55	17.69	23	-5.30709
				50	25	18.43	17.57	23	-5.42709
				100	0	18.38	17.52	23	-5.47709

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## 8 MAXIMUM POWER DENSITY MEASUREMENT

### 8.1 Standard Applicable

FCC §2.1046 & 96.41

(a) FCC 96.41(a) Digital modulation. Systems operating in the Citizens Broadband Radio Service must use digital modulation techniques.

(b) FCC 96.41(b) Power limits. Unless otherwise specified in this section, the maximum effective isotropic radiated power (EIRP) of any CBSD and End User Device must comply with the limits shown in the table in this paragraph (b):

Device	Maximum PSD (dBm/MHz)
End User Device	n/a
Category A CBSD	20
Category B CBSD <sup>1</sup>	37

Category B CBSDs will only be authorized for use after an ESC is approved and commercially deployed consistent with §§96.15 and 96.67.

(c) Power management. CBSDs and End User Devices shall limit their operating power to the minimum necessary for successful operations

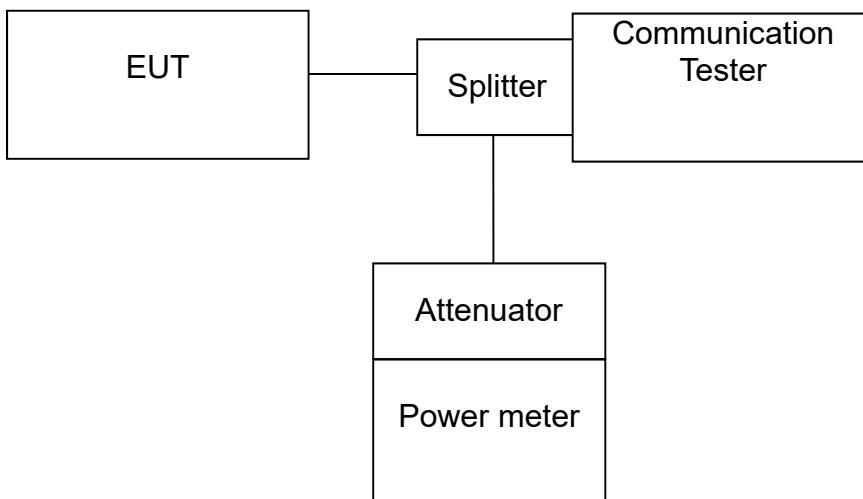
(1) CBSDs must support transmit power control capability and the capability to limit their maximum EIRP and the maximum EIRP of associated End User Devices in response to instructions from an SAS.

(2) End User Devices shall include transmit power control capability and the capability to limit their maximum EIRP in response to instructions from their associated CBSDs.

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## 8.2 Test Set-up



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

## 8.3 Measurement Procedure

1. Set instrument center frequency to OBW center frequency.
2. Set span to at least 1.5 times the OBW.
3. Set the RBW to the specified reference bandwidth (often 1 MHz).
4. Set VBW  $\geq 3 \times$  RBW.
5. Detector = RMS (power averaging).
6. Ensure that the number of measurement points in the sweep  $\geq 2 \times$  span/RBW.
7. Sweep time = auto couple.
8. Employ trace averaging (RMS) mode over a minimum of 100 traces.
9. Use the peak marker function to determine the maximum amplitude level within the reference bandwidth (PSD).
10. Determine the EIRP by adding the effective antenna gain to the adjusted power level.

## 8.4 Measurement Result

### Peak Power Density Results:

N/A, this is an End user device.

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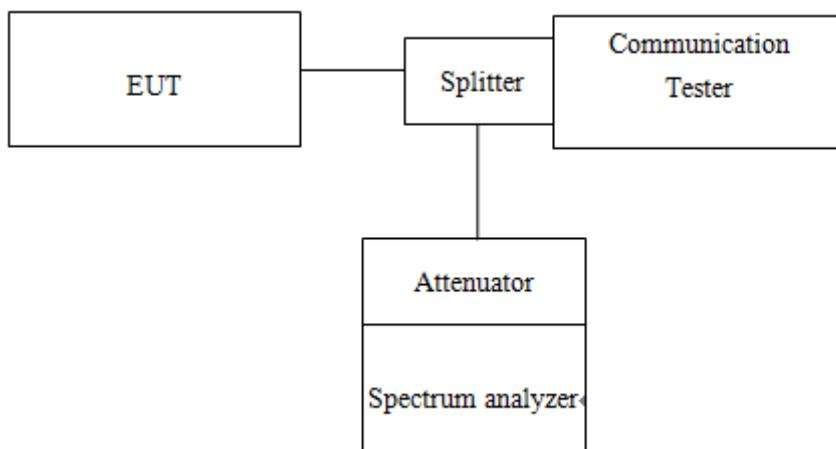
## 9 OCCUPIED BANDWIDTH MEASUREMENT

### 9.1 Standard Applicable

FCC Part 2.1049(h)

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.

### 9.2 Test Set-up



### 9.3 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%.

### 9.4 Measurement Result

LTE BAND 48 Channel bandwidth: 5MHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
3552.5	55265	4.4932	4.4988	4.4968	4.5002	5.165	5.327	5.112	5.128
3625.0	55990	4.4708	4.4837	4.4577	4.4667	4.997	5.152	4.818	5.010
3697.5	56715	4.4785	4.4718	4.4859	4.4745	4.986	4.918	5.033	5.030

LTE BAND 48 Channel bandwidth: 10MHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
3555.0	55290	8.9796	8.9754	8.9931	8.9639	9.923	10.260	10.290	9.997
3625.0	55990	8.9349	8.9654	8.9305	8.9586	9.365	9.734	9.516	9.438
3695.0	56690	8.9213	8.9515	8.9174	8.9304	9.679	9.545	9.761	9.616

LTE BAND 48 Channel bandwidth: 15MHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
3557.5	55315	13.451	13.455	13.443	13.417	14.88	14.97	15.10	15.32
3625.0	55990	13.446	13.377	13.393	13.410	14.11	14.18	14.00	14.21
3692.5	56665	13.390	13.468	13.402	13.423	14.38	14.03	14.62	14.29

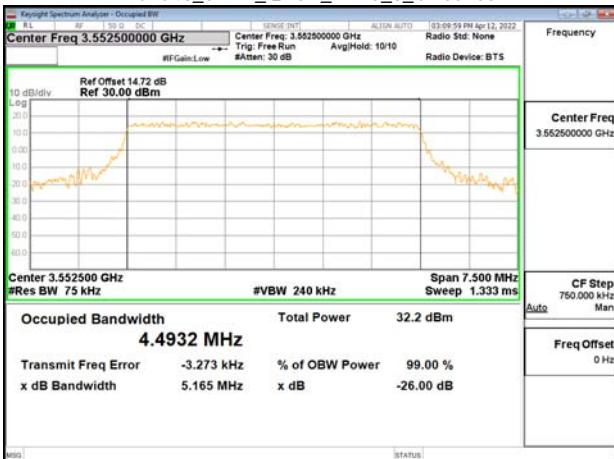
LTE BAND 48 Channel bandwidth: 20MHz									
Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
3650.0	55340	17.952	17.904	17.924	17.889	19.83	19.61	20.07	20.98
3625.0	55990	17.815	17.893	17.840	17.813	18.68	18.72	19.01	18.68
3690.0	56640	17.882	17.930	17.838	17.831	18.76	18.85	18.75	18.92

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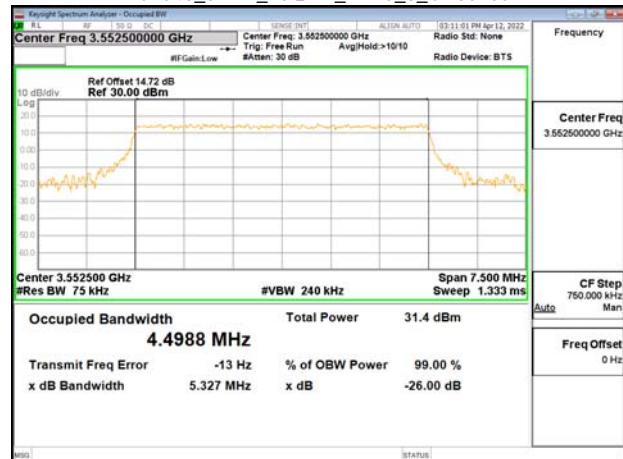
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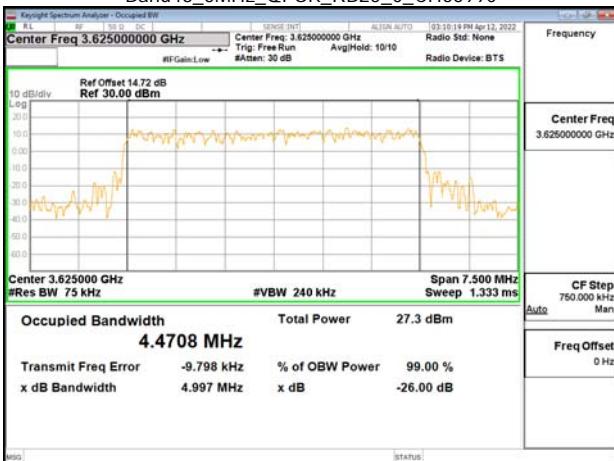
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Band48\_5MHz\_16QAM\_RB25\_0\_CH55265



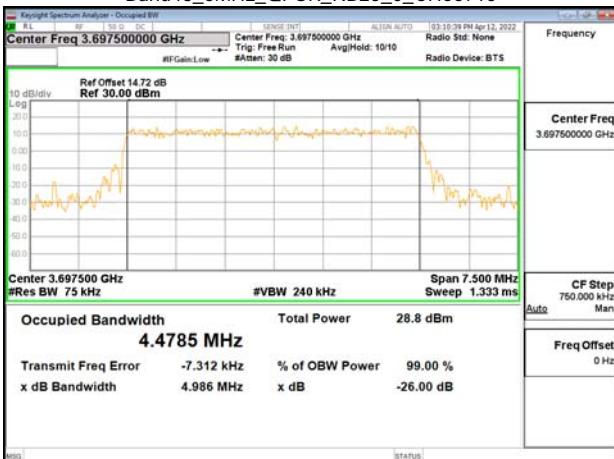
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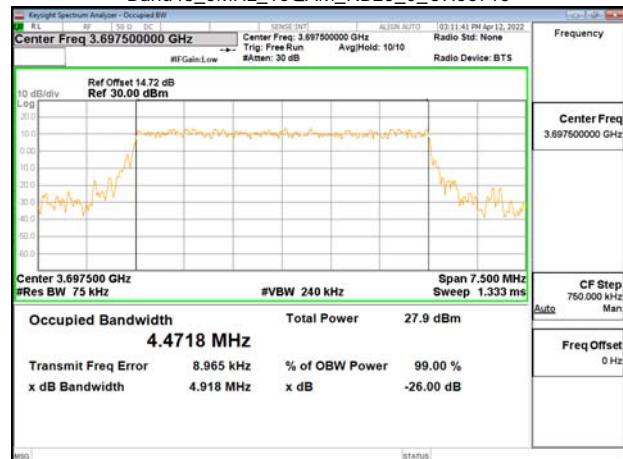
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Band48\_5MHz\_QPSK\_RB25\_0\_CH56715



Band48\_5MHz\_16QAM\_RB25\_0\_CH56715

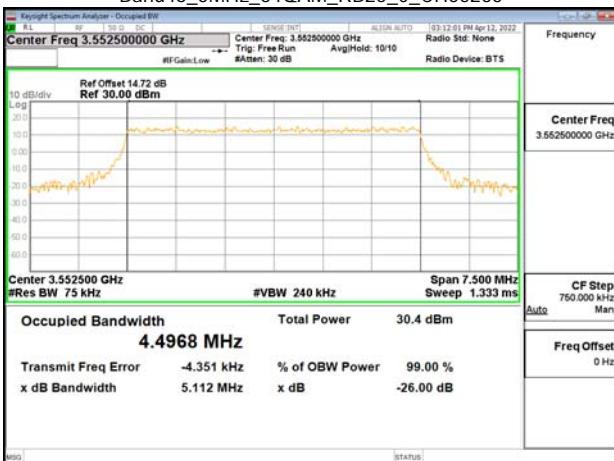


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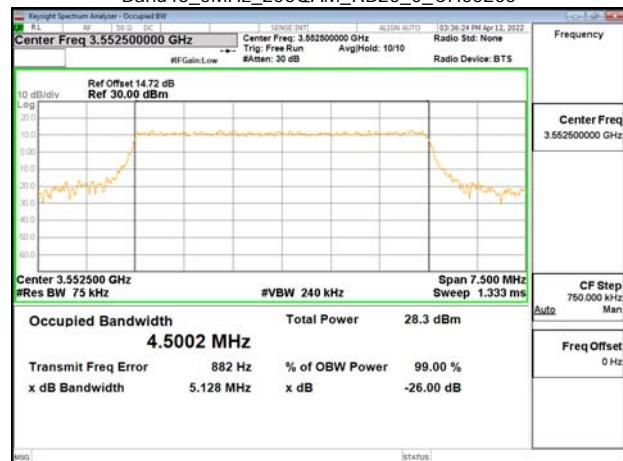
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Band48\_5MHz\_64QAM\_RB25\_0\_CH55265



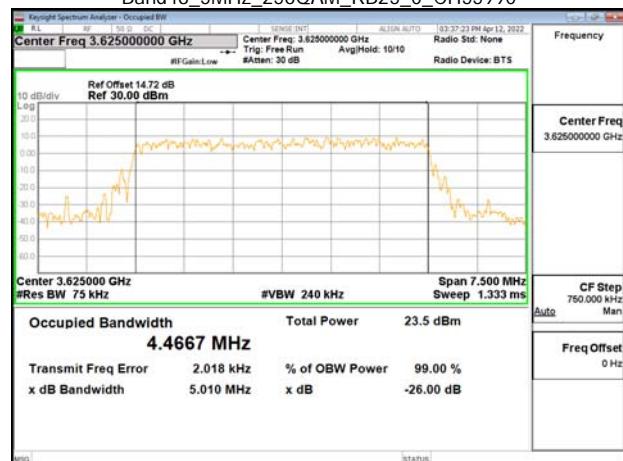
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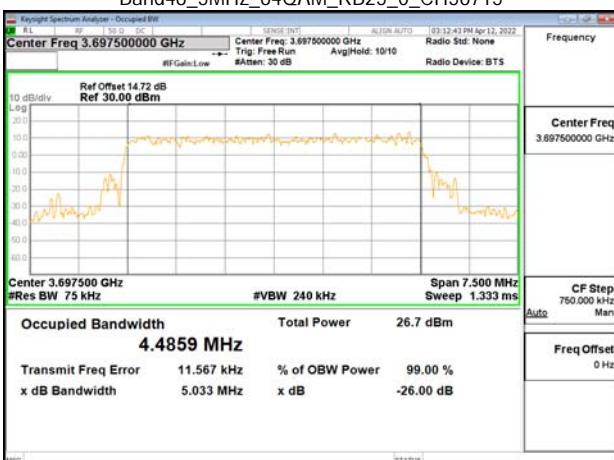
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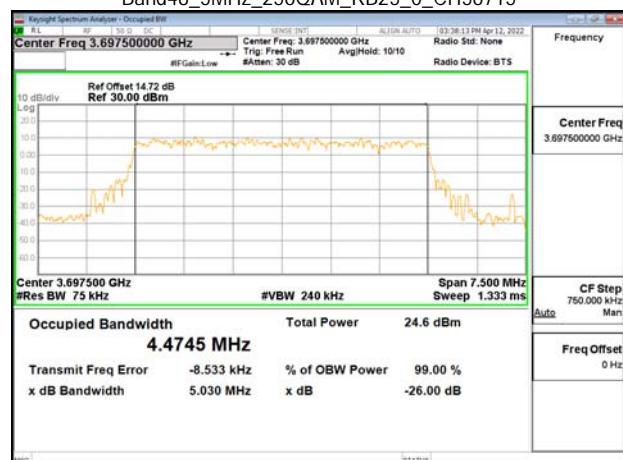
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Band48\_5MHz\_64QAM\_RB25\_0\_CH56715



Band48\_5MHz\_256QAM\_RB25\_0\_CH56715



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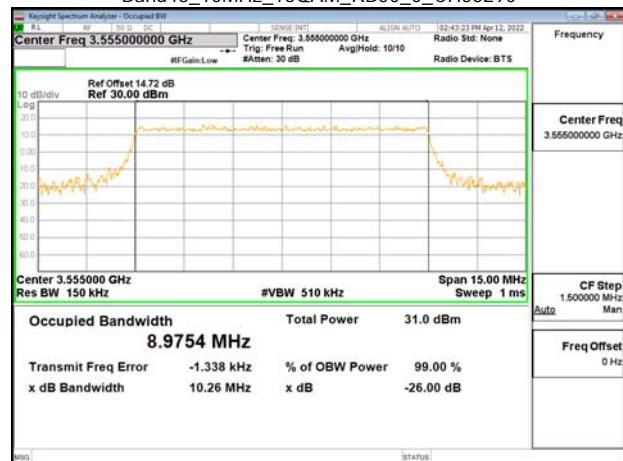
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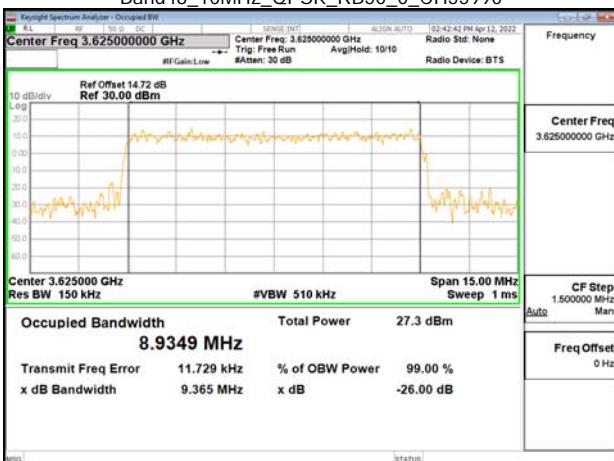
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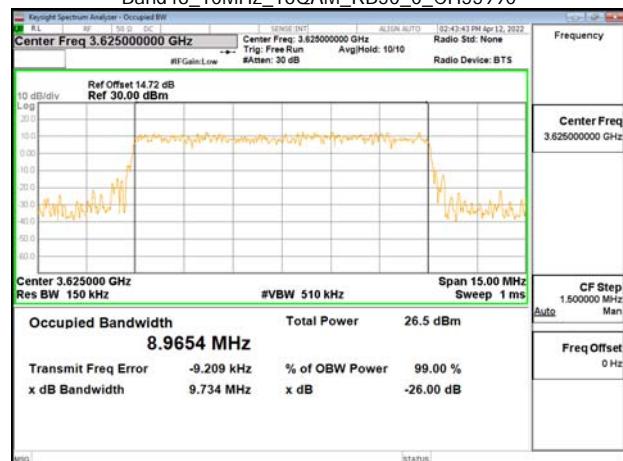
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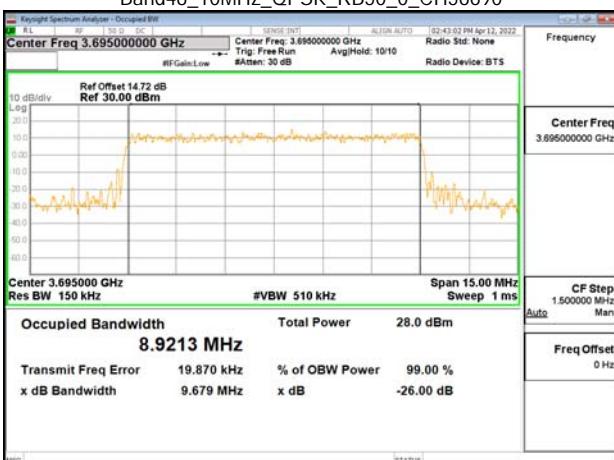
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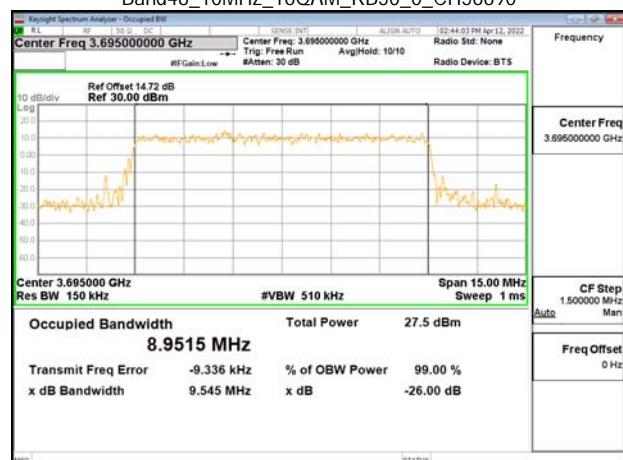
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Band48\_10MHz\_QPSK\_RB50\_0\_CH56690



Band48\_10MHz\_16QAM\_RB50\_0\_CH56690

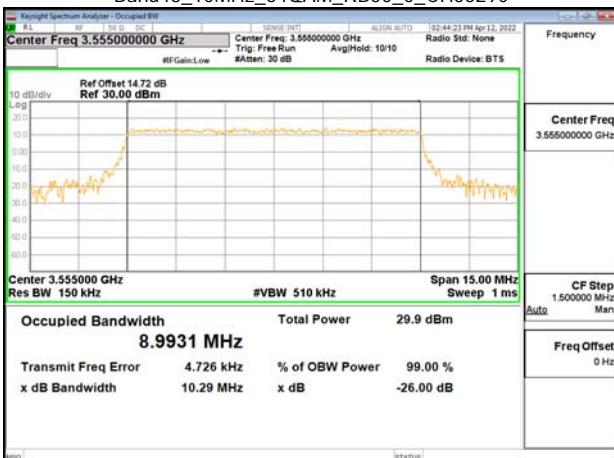


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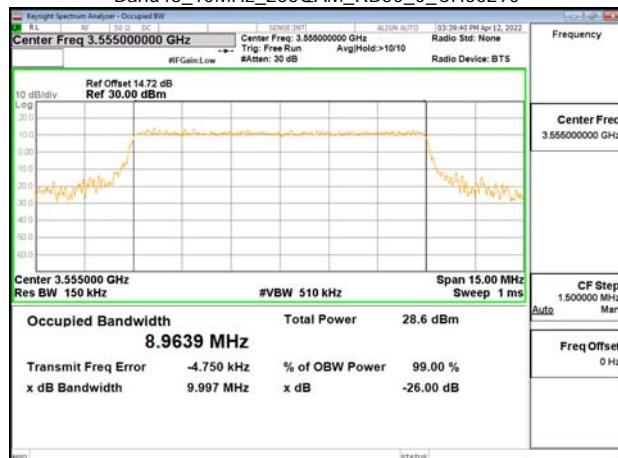
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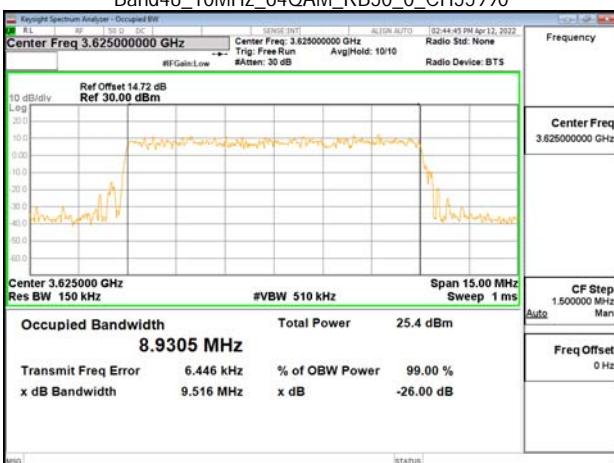
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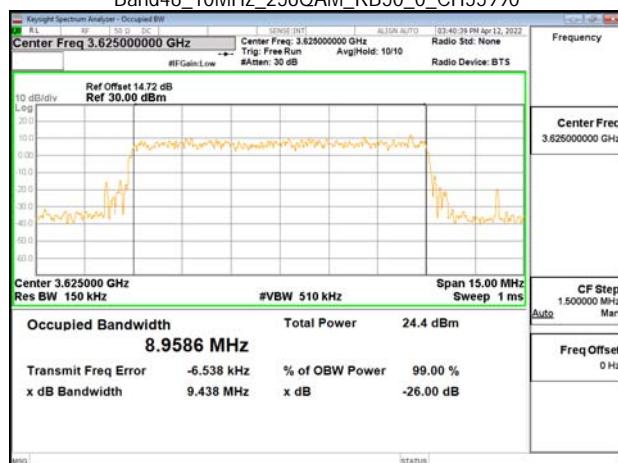
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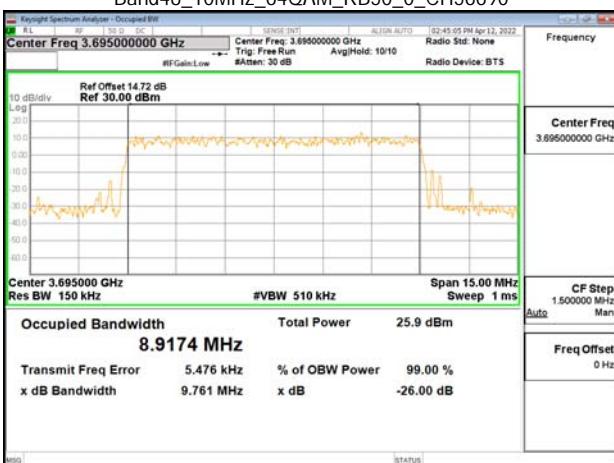
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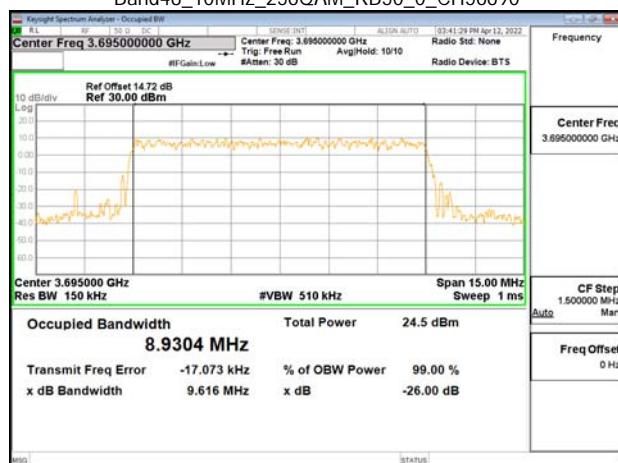
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Band48\_10MHz\_64QAM\_RB50\_0\_CH56690



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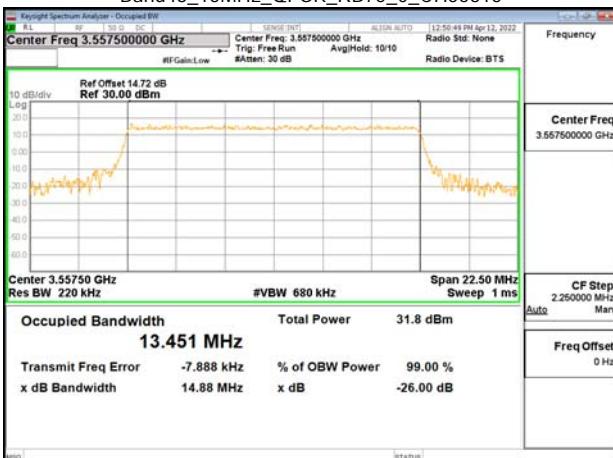


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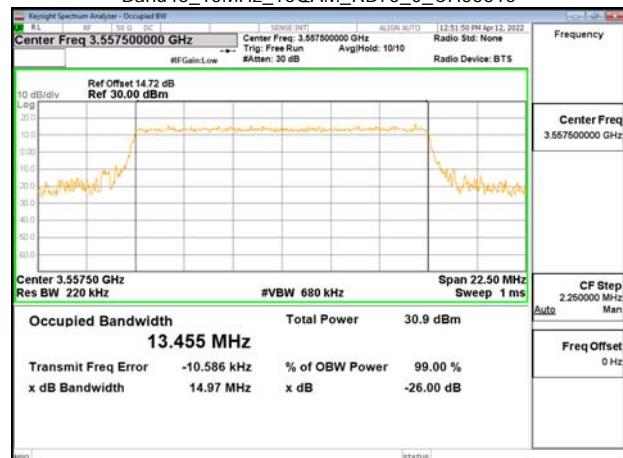
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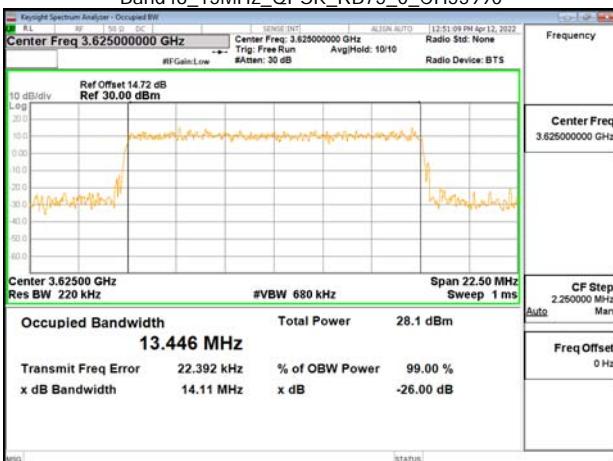
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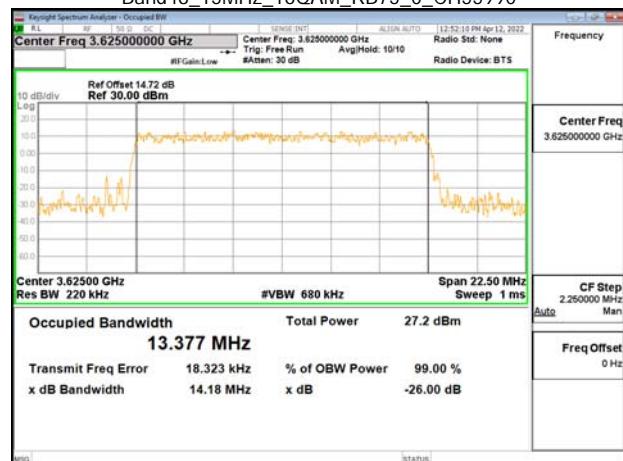
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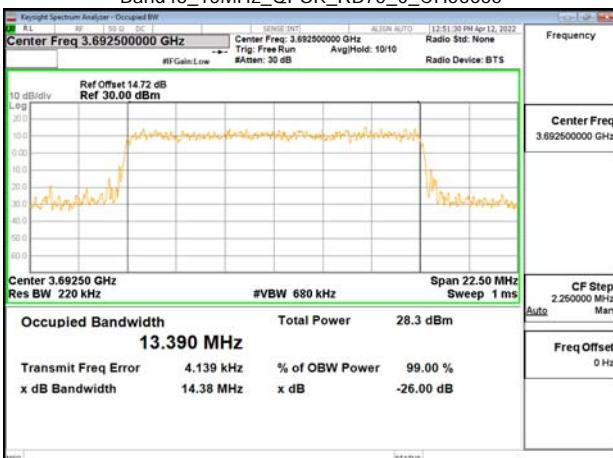
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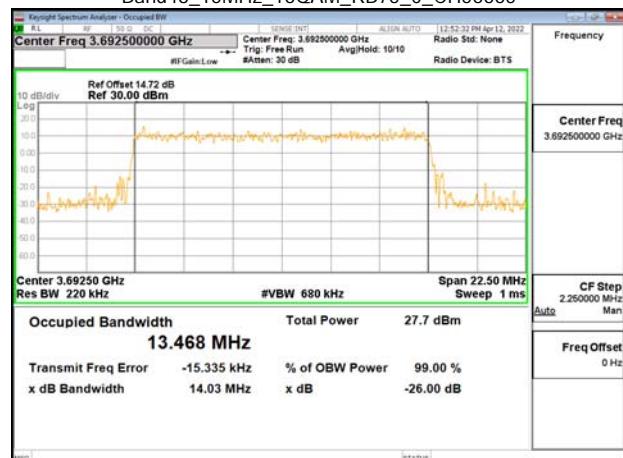
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Band48\_15MHz\_QPSK\_RB75\_0\_CH56665



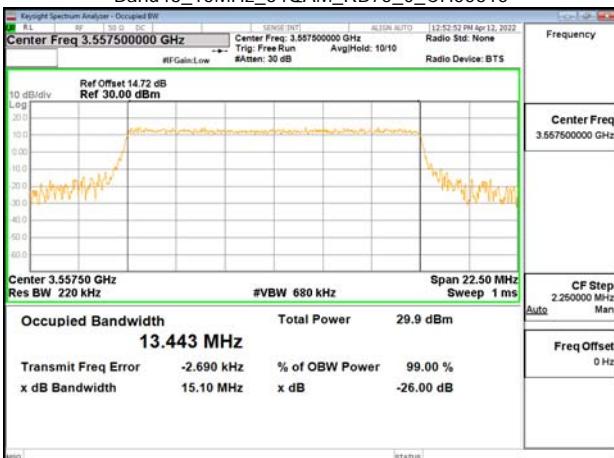
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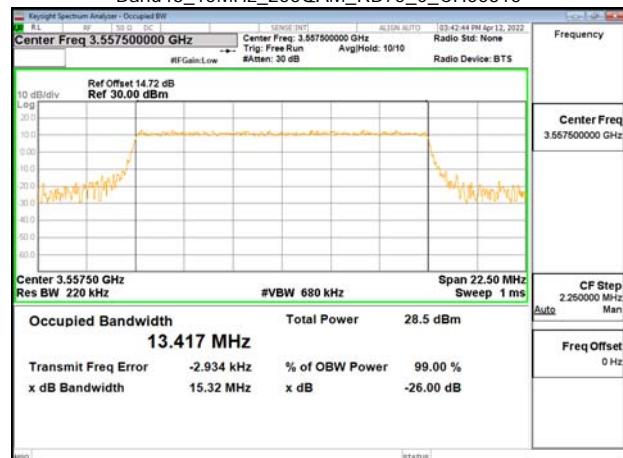
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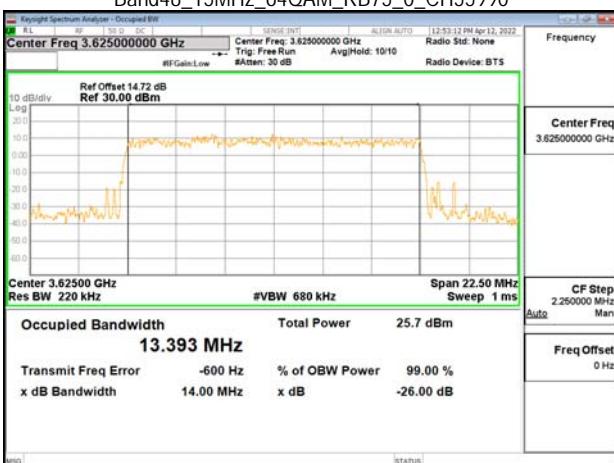
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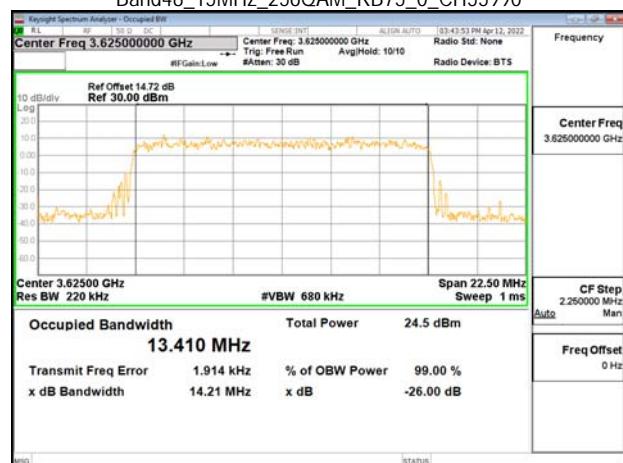
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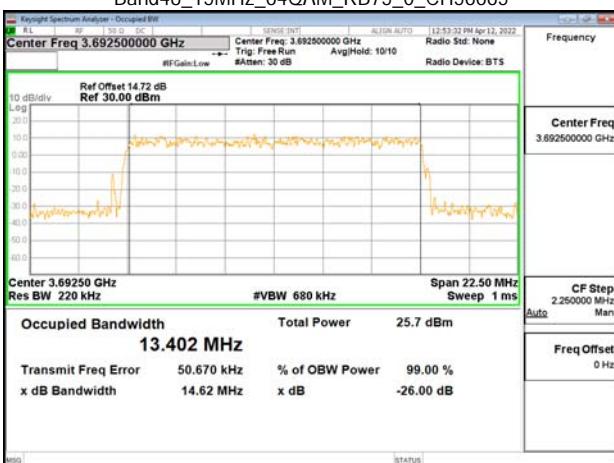
Band48\_15MHz\_64QAM\_RB75\_0\_CH55990



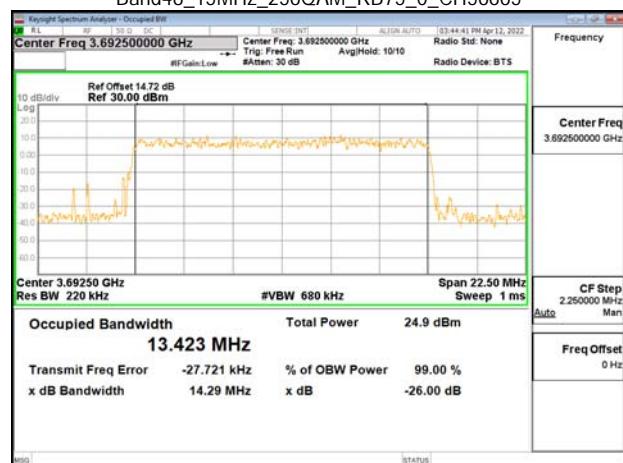
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Band48\_15MHz\_64QAM\_RB75\_0\_CH56665



Band48\_15MHz\_256QAM\_RB75\_0\_CH56665

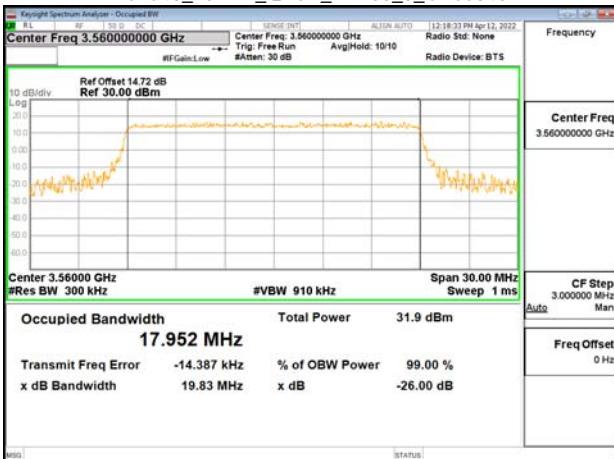


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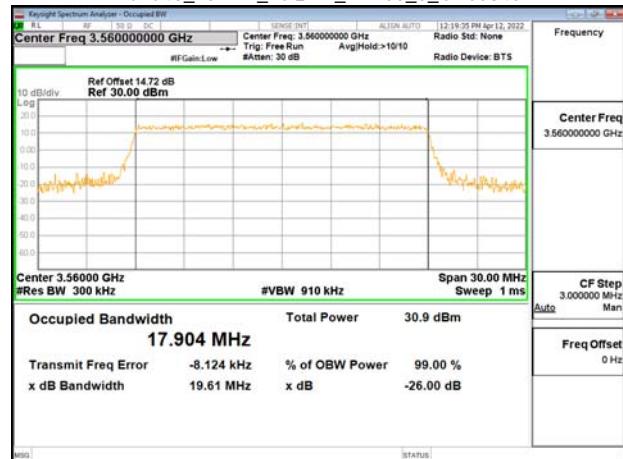
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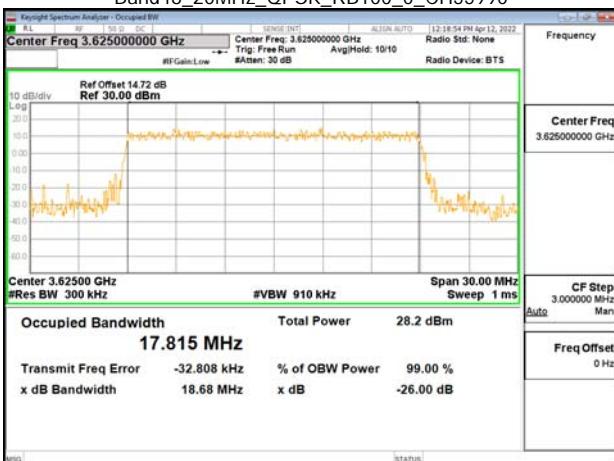
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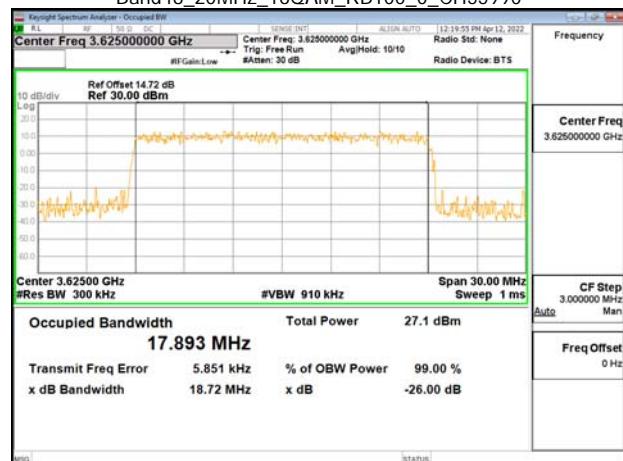
Band48\_20MHz\_16QAM\_RB100\_0\_CH55340



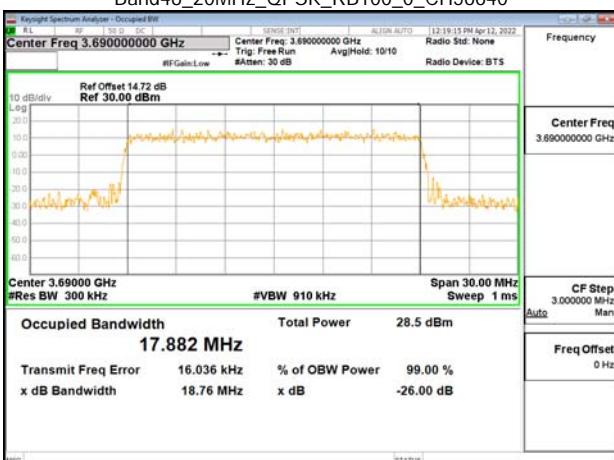
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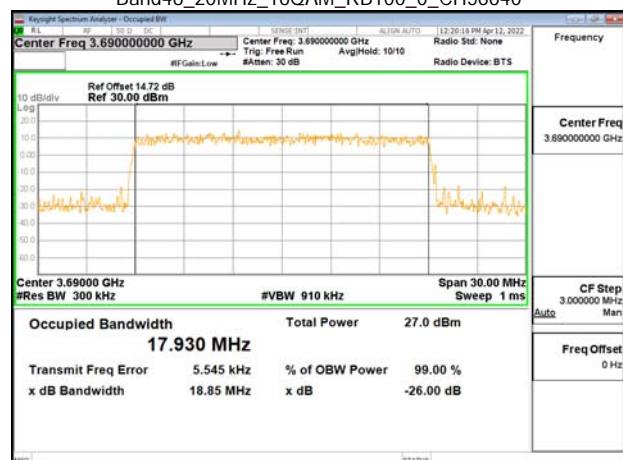
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Band48\_20MHz\_QPSK\_RB100\_0\_CH56640



Band48\_20MHz\_16QAM\_RB100\_0\_CH56640

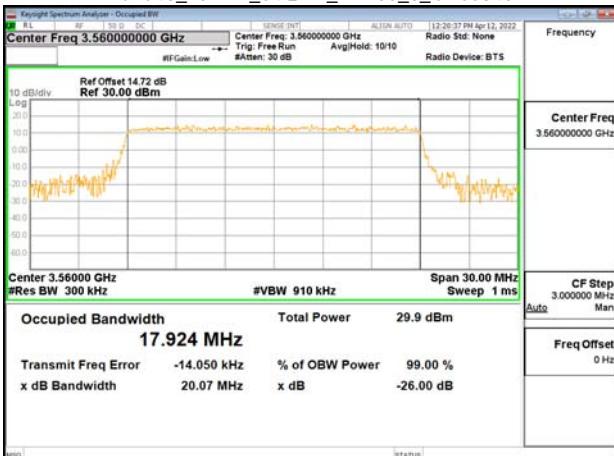


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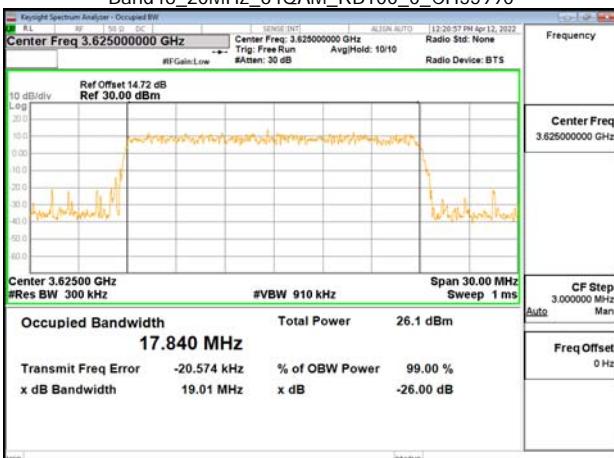
Band48\_20MHz\_64QAM\_RB100\_0\_CH55340



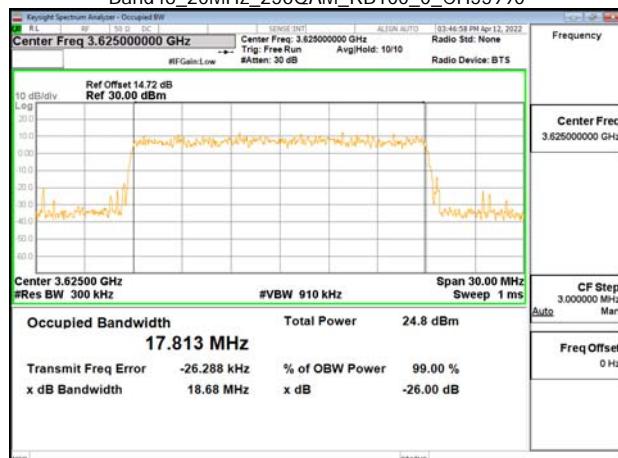
Band48\_20MHz\_256QAM\_RB100\_0\_CH55340



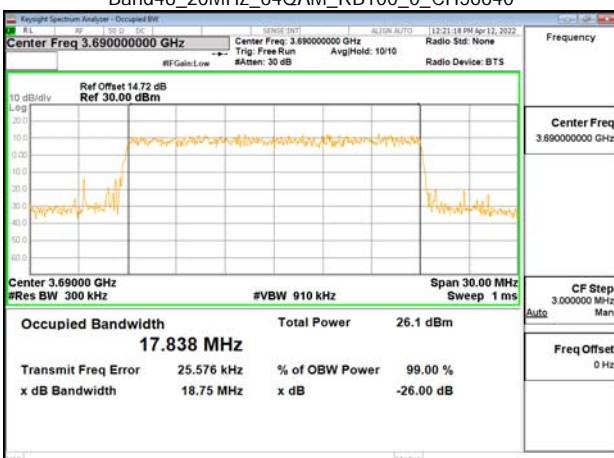
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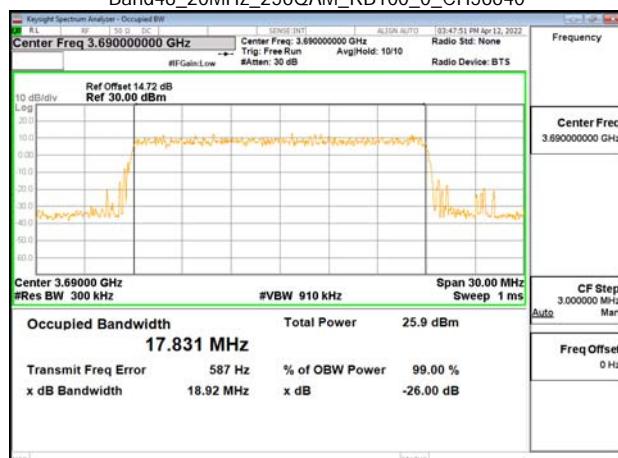
Band48\_20MHz\_256QAM\_RB100\_0\_CH55990



Band48\_20MHz\_64QAM\_RB100\_0\_CH56640



Band48\_20MHz\_256QAM\_RB100\_0\_CH56640



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## 10 OUT OF BAND EMISSION AT ANTENNA TERMINALS

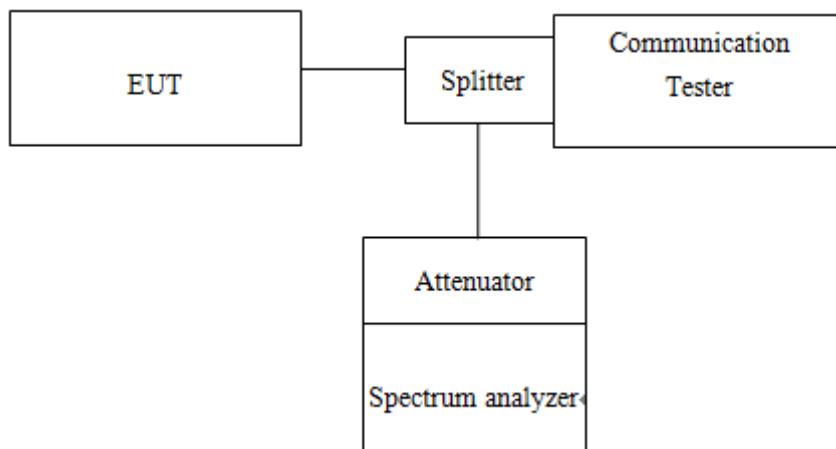
### 10.1 Standard Applicable

FCC Part 2.1051, Part 96.41 , C63.26 Clause 5.7.

For channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed  $-13$  dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed  $-25$  dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

For CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed  $-25$  dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed  $-40$  dBm/MHz.

### 10.2 Test SET-UP



### 10.3 Measurement Procedure

#### 10.3.1 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.

To connect Antenna Port of EUT to Spectrum.

Set RBW = 1MHz & VBW = 1MHz on Spectrum.

Allow trace to fully stabilize

Repeat above procedures until all default test channel measured were complete.

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### 10.3.2 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.

### 10.4 Test Results:

Refer to next page for test plots.

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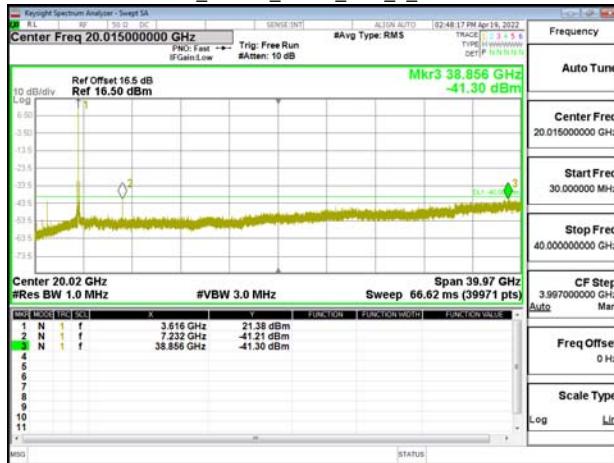
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### 10.4.1 Unwanted Emission

Band48\_20MHz\_QPSK\_RB1\_0\_CH55340



Band48\_20MHz\_QPSK\_RB1\_0\_CH55990



Band48\_20MHz\_QPSK\_RB1\_0\_CH56640



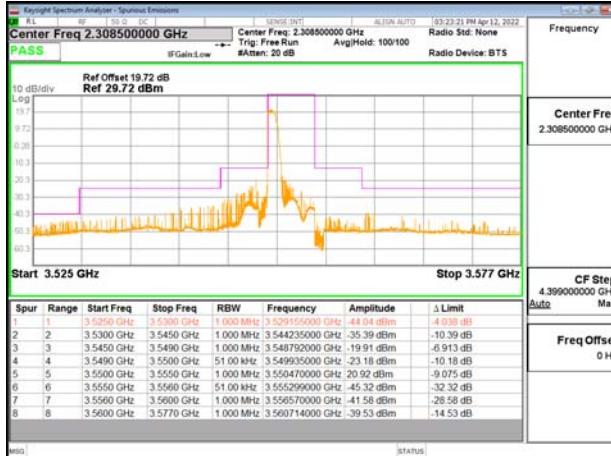
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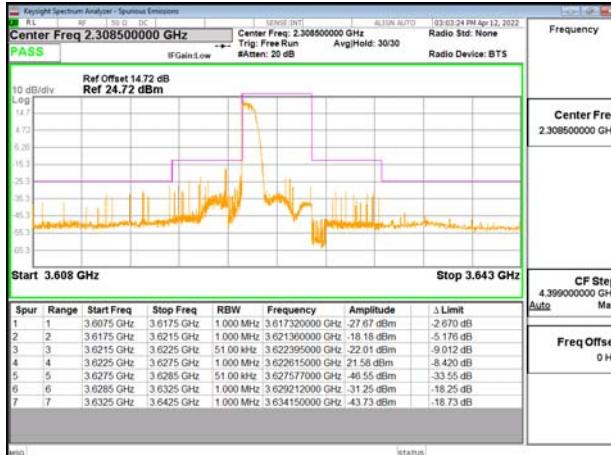
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## 10.4.2 Band Edge:

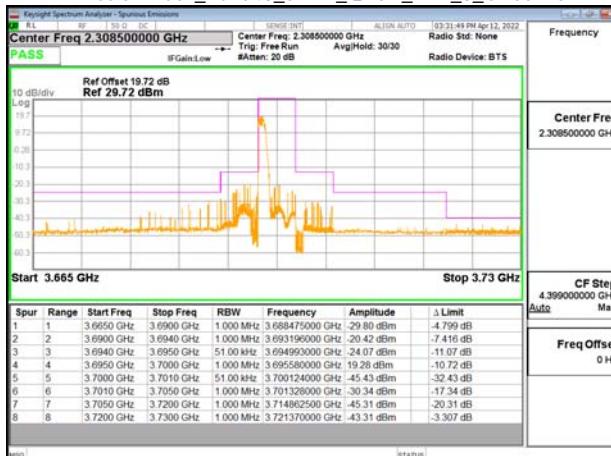
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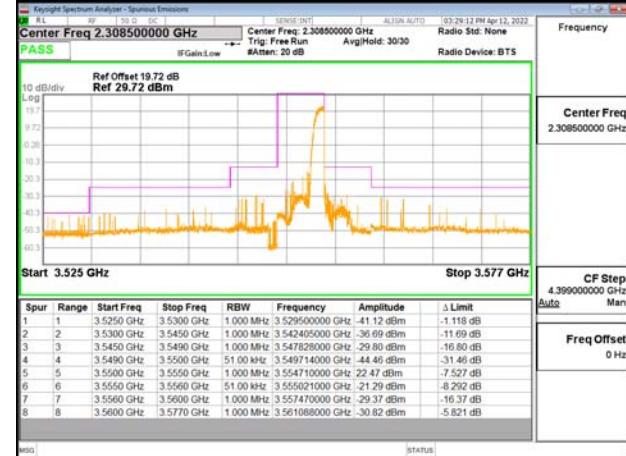
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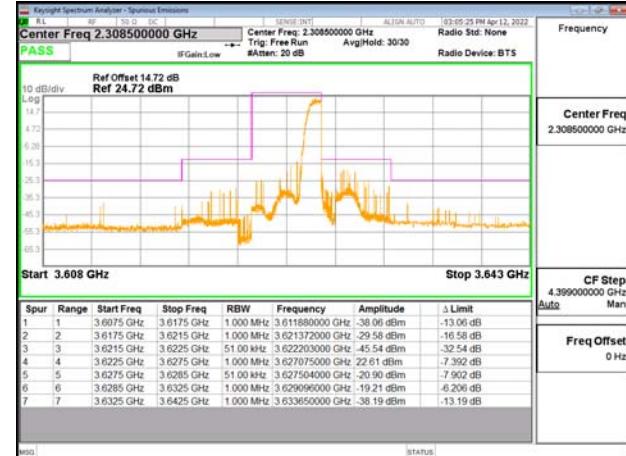
### Emission Mask\_Band48\_5MHz\_QPSK\_RB1\_0\_CH56715



### Emission Mask\_Band48\_5MHz\_QPSK\_RB1\_24\_CH55265



### Emission Mask\_Band48\_5MHz\_QPSK\_RB1\_24\_CH55990



### Emission Mask\_Band48\_5MHz\_QPSK\_RB1\_24\_CH56715

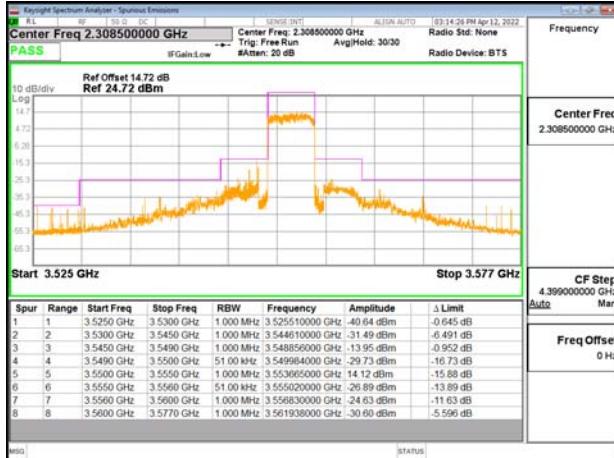


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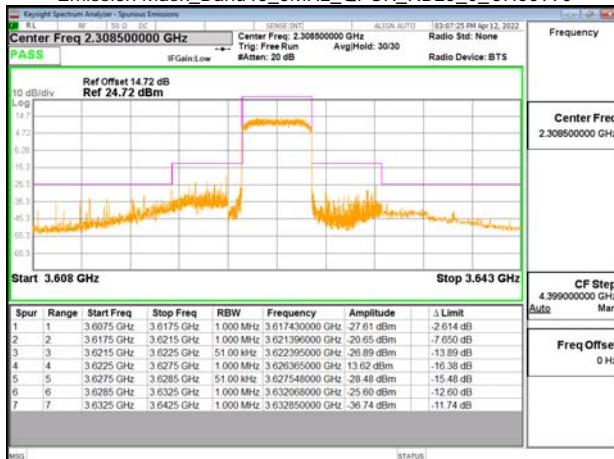
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### Emission Mask\_Band48\_5MHz\_QPSK\_RB25\_0\_CH55265



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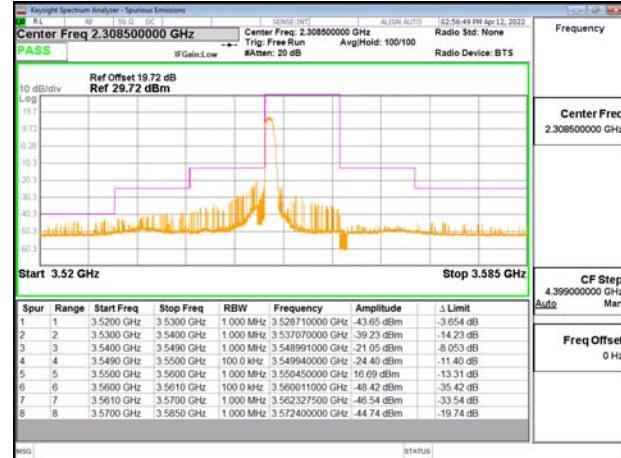
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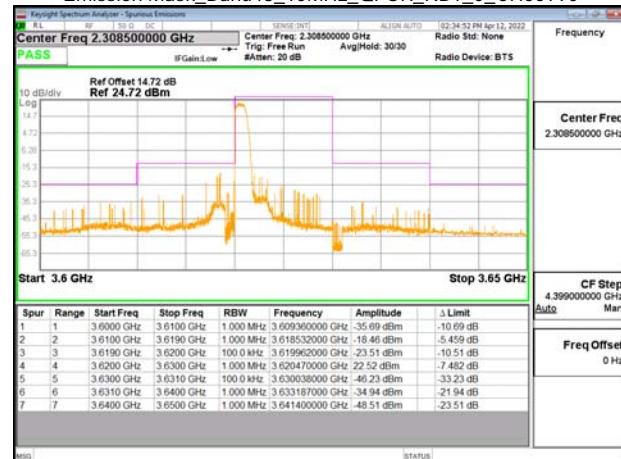
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Page: 34 of 52

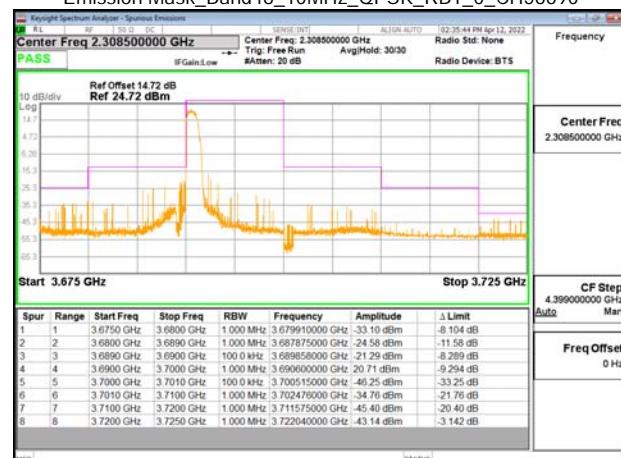
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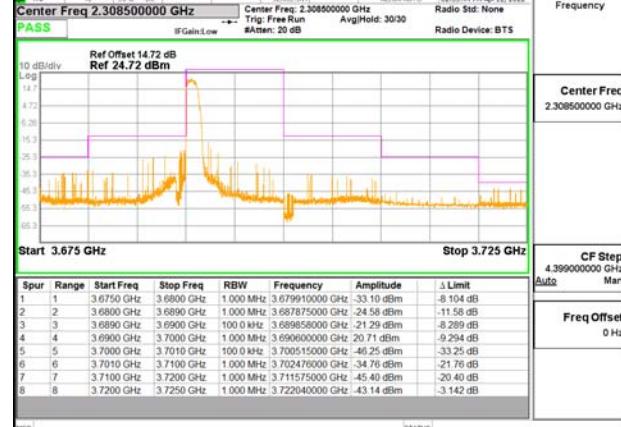
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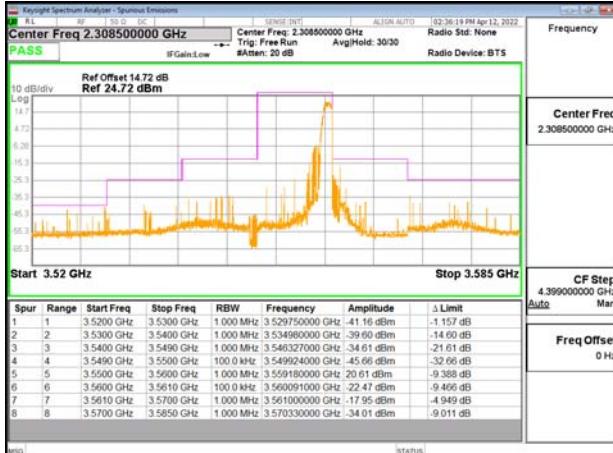


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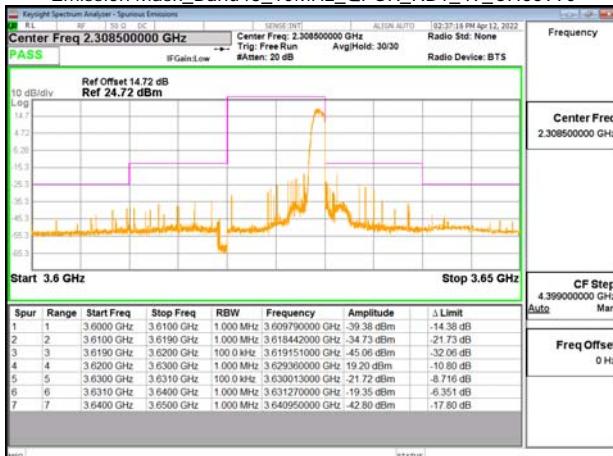
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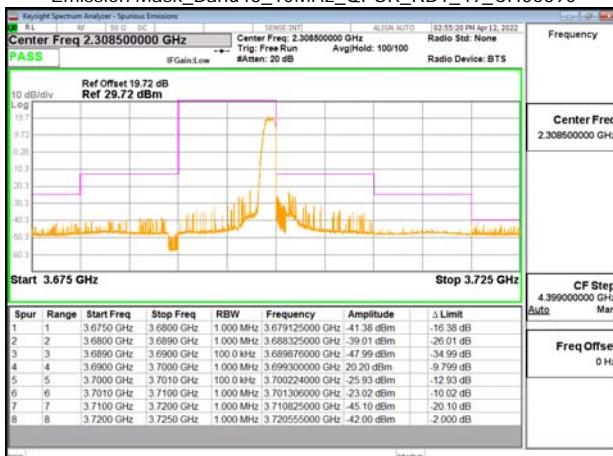
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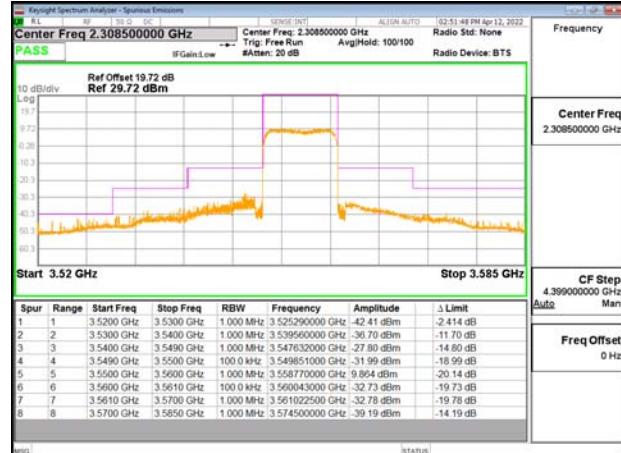
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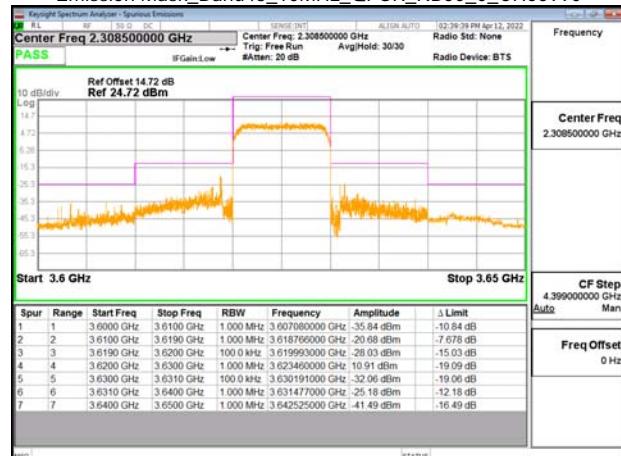
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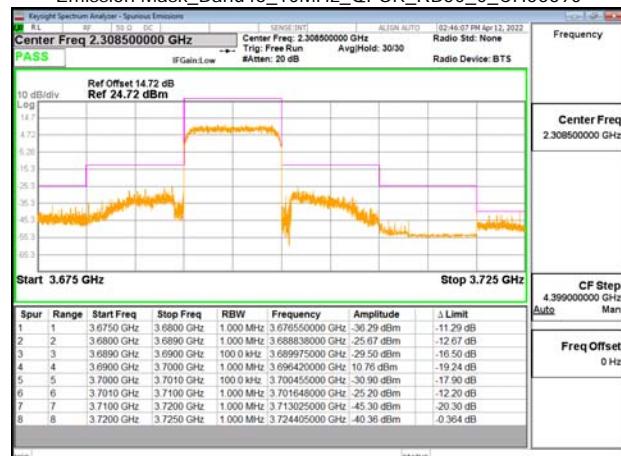
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Emission Mask\_Band48\_10MHz\_QPSK\_RB50\_0\_CH55990



Emission Mask\_Band48\_10MHz\_QPSK\_RB50\_0\_CH56690



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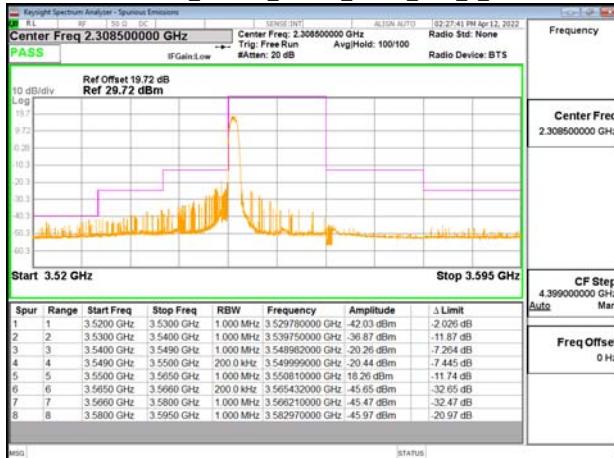
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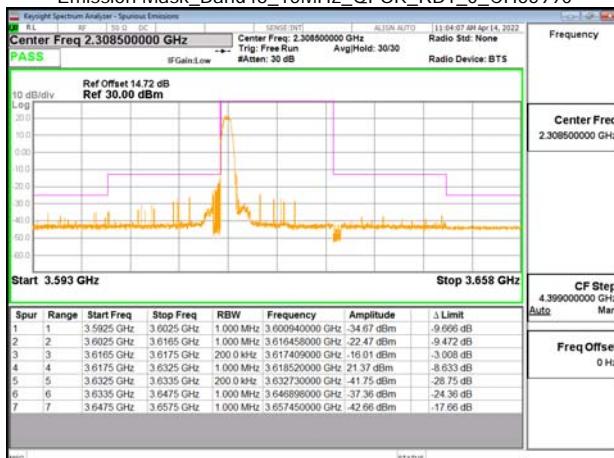
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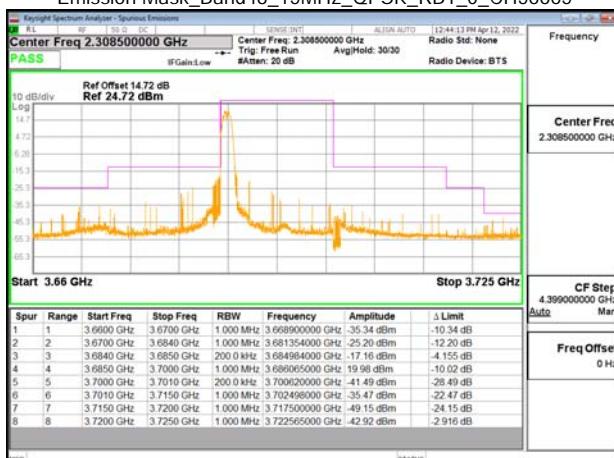
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### Emission Mask\_Band48\_15MHz\_QPSK\_RB1\_0\_CH55990



### Emission Mask\_Band48\_15MHz\_QPSK\_RB1\_0\_CH56665

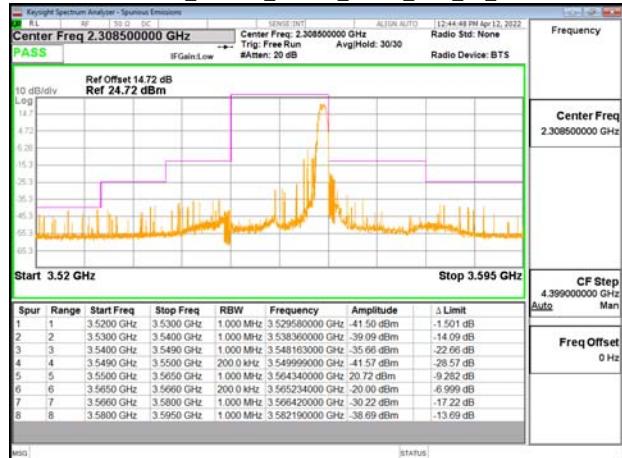


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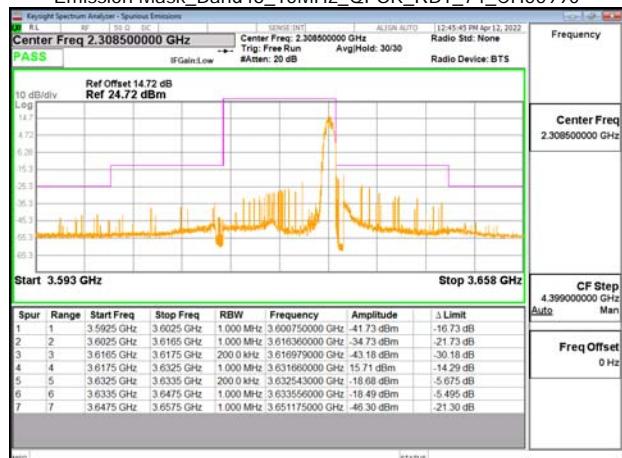
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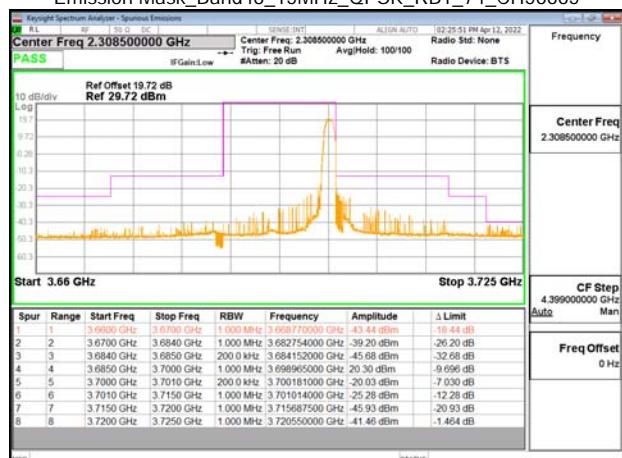
### Emission Mask\_Band48\_15MHz\_QPSK\_RB1\_74\_CH55315

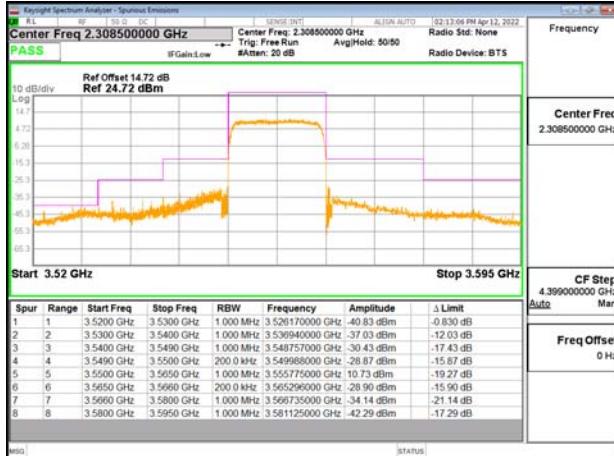
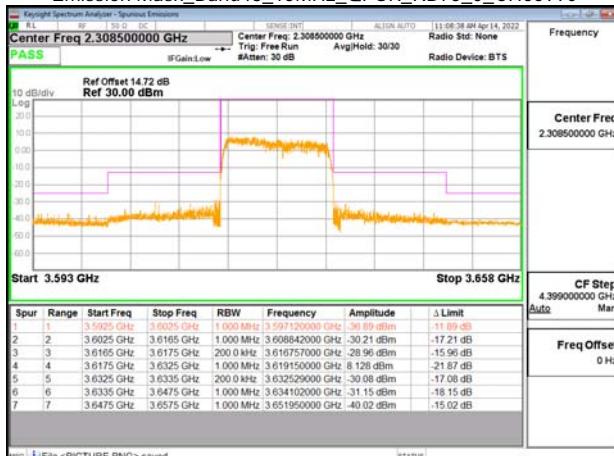
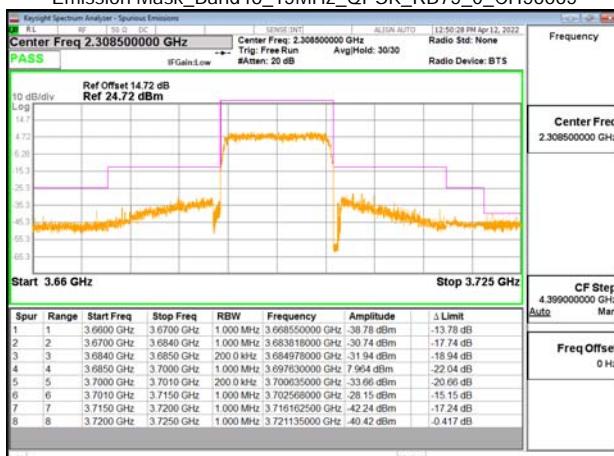
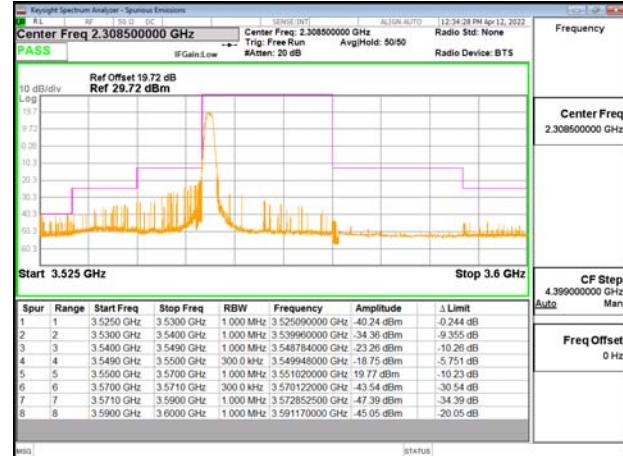
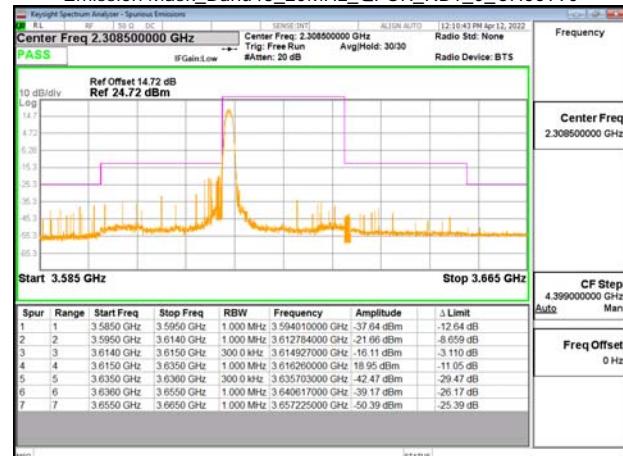
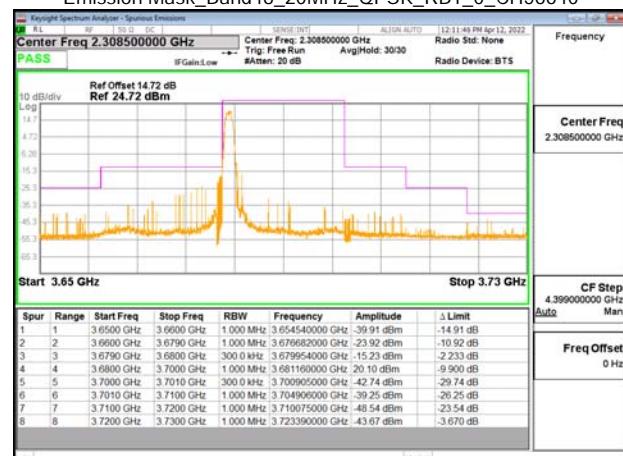


### Emission Mask\_Band48\_15MHz\_QPSK\_RB1\_74\_CH55990



### Emission Mask\_Band48\_15MHz\_QPSK\_RB1\_74\_CH56665



**Emission Mask\_Band48\_15MHz\_QPSK\_RB75\_0\_CH55315**

**Emission Mask\_Band48\_15MHz\_QPSK\_RB75\_0\_CH55990**

**Emission Mask\_Band48\_15MHz\_QPSK\_RB75\_0\_CH56665**

**Report No.: ER/2022/30086**
**Page: 37 of 52**
**Emission Mask\_Band48\_20MHz\_QPSK\_RB1\_0\_CH55340**

**Emission Mask\_Band48\_20MHz\_QPSK\_RB1\_0\_CH55990**

**Emission Mask\_Band48\_20MHz\_QPSK\_RB1\_0\_CH56640**


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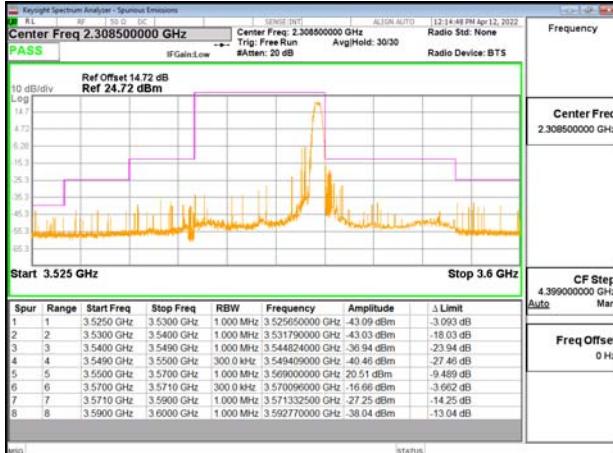
t (886-2) 2299-3279

f (886-2) 2298-0488

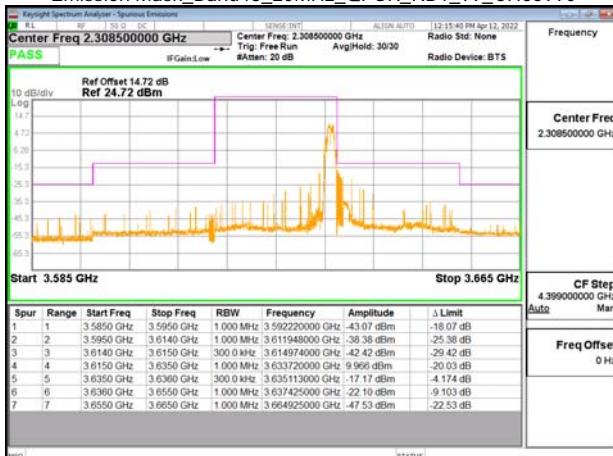
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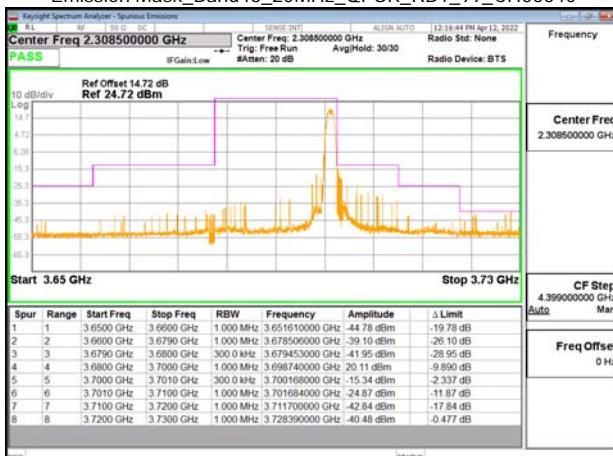
## Emission Mask\_Band48\_20MHz\_QPSK\_RB1\_99\_CH55340



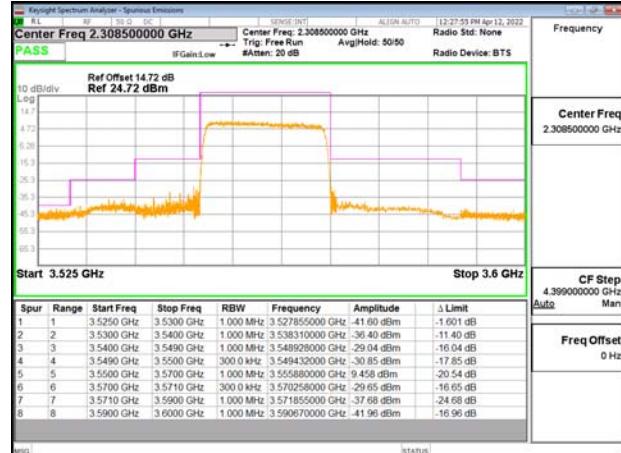
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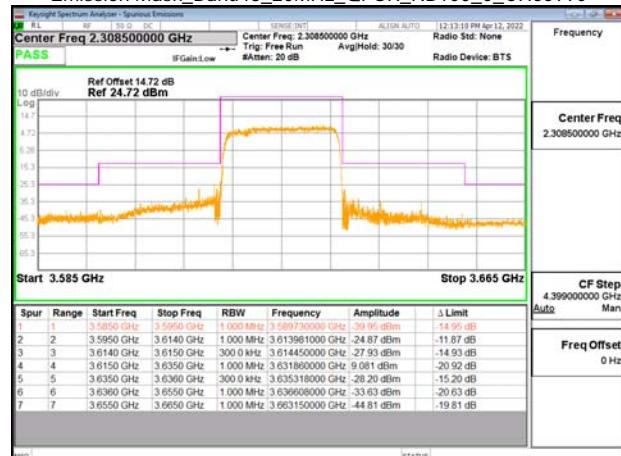
## Emission Mask\_Band48\_20MHz\_QPSK\_RB1\_99\_CH56640



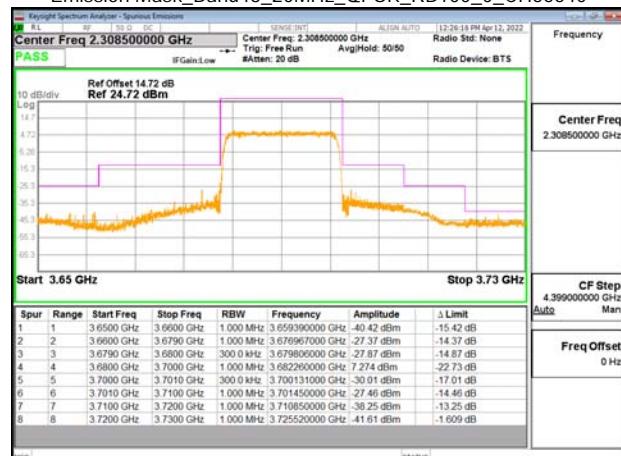
## Emission Mask\_Band48\_20MHz\_QPSK\_RB100\_0\_CH55340



## Emission Mask\_Band48\_20MHz\_QPSK\_RB100\_0\_CH55990



## Emission Mask\_Band48\_20MHz\_QPSK\_RB100\_0\_CH56640



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## 11 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

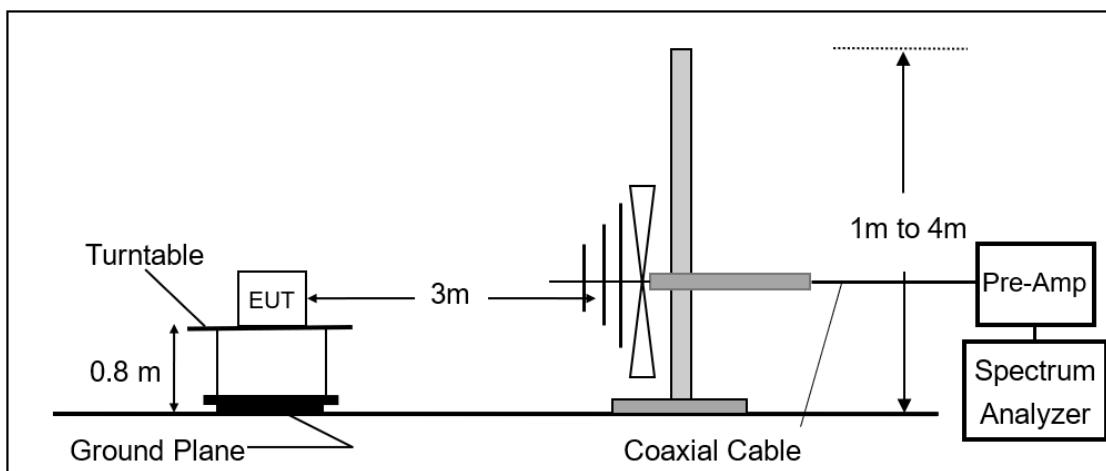
### 11.1 Standard Applicable

FCC Part 2.1053, Part 96.41 , C63.26 Clause 5.7

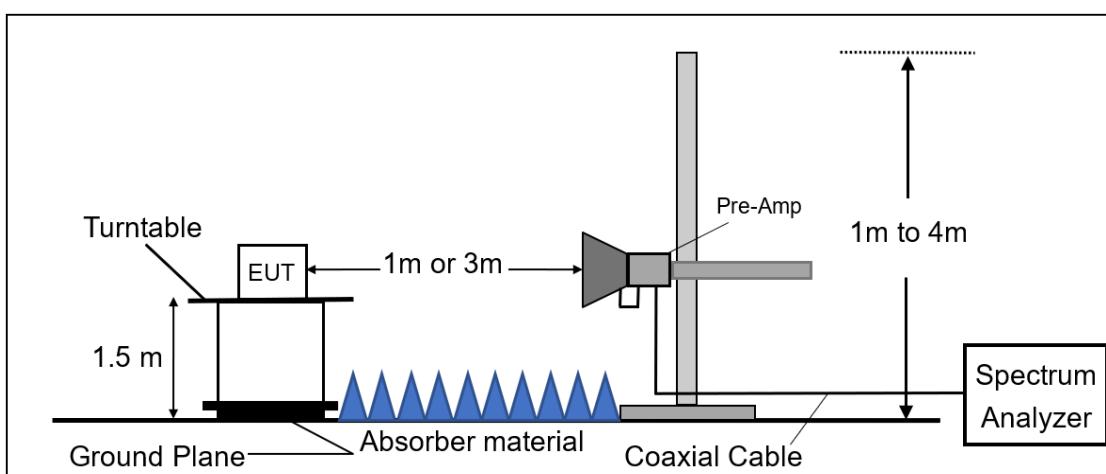
1. within 0 MHz to 10 MHz above and below the **assigned channel**  $\leq -13$  dBm/MHz
2. greater than 10 MHz above and below the **assigned channel**  $\leq -25$  dBm/MHz
3. any emission below 3530 MHz and above 3720 MHz  $\leq -40$  dBm/MHz

### 11.2 EUT Setup

Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



Radiated Emission Test Set-Up, Frequency Above 1GHz.



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### 11.3 Measurement Procedure:

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

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

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

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

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

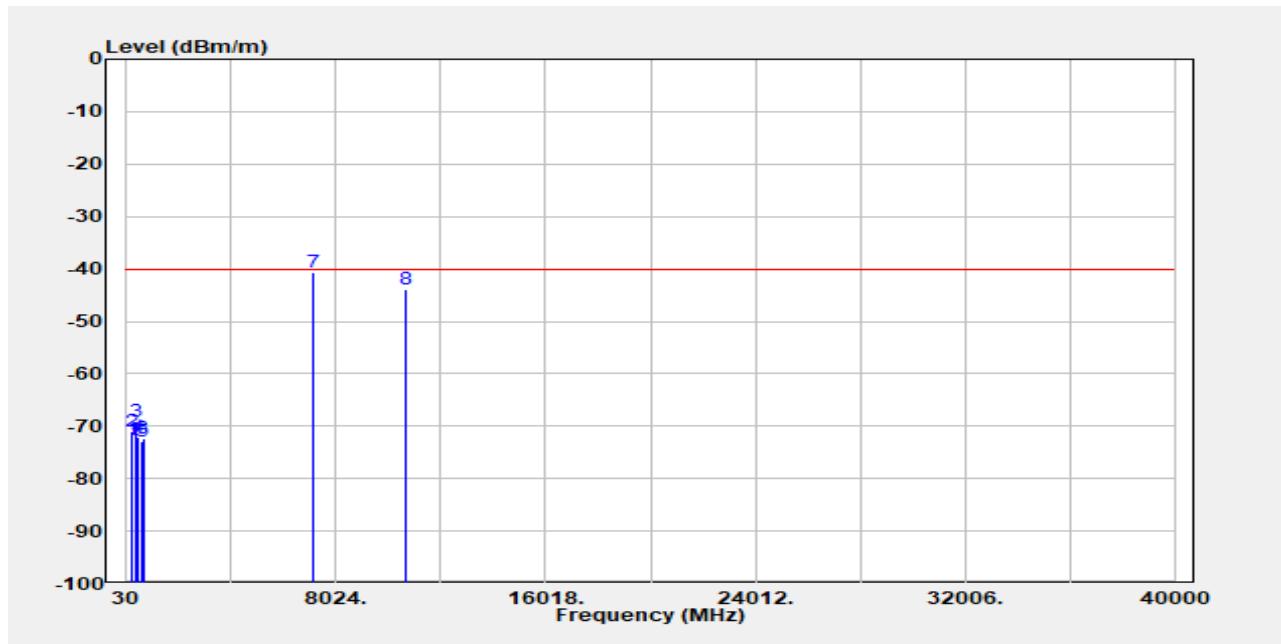
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## 11.4 Measurement Result:

Report Number	:ER/2022/30086	Test Site	:SAC 1
Operation Mode	:LTE B48	Test Date	:2022-05-09
Test Mode	:Tx CH Low	Temp./Humi.	:22.7/70
EUT Pol	:H Plane	Antenna Pol.	:Vertical
Test Frequency	:3560 MHz	Engineer	:GN Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
194.90	-72.57	-75.01	3.88	-1.43	-40.00	-32.57
253.10	-70.96	-73.67	4.32	-1.60	-40.00	-30.96
396.66	-69.01	-71.22	4.32	-2.10	-40.00	-29.01
480.08	-72.22	-73.98	4.21	-2.44	-40.00	-32.22
600.36	-72.85	-73.85	3.64	-2.64	-40.00	-32.85
654.68	-72.49	-73.69	3.61	-2.41	-40.00	-32.49
7120.00	-40.57	-41.97	11.22	-9.82	-40.00	-0.57
10680.00	-43.81	-43.36	11.10	-11.55	-40.00	-3.81

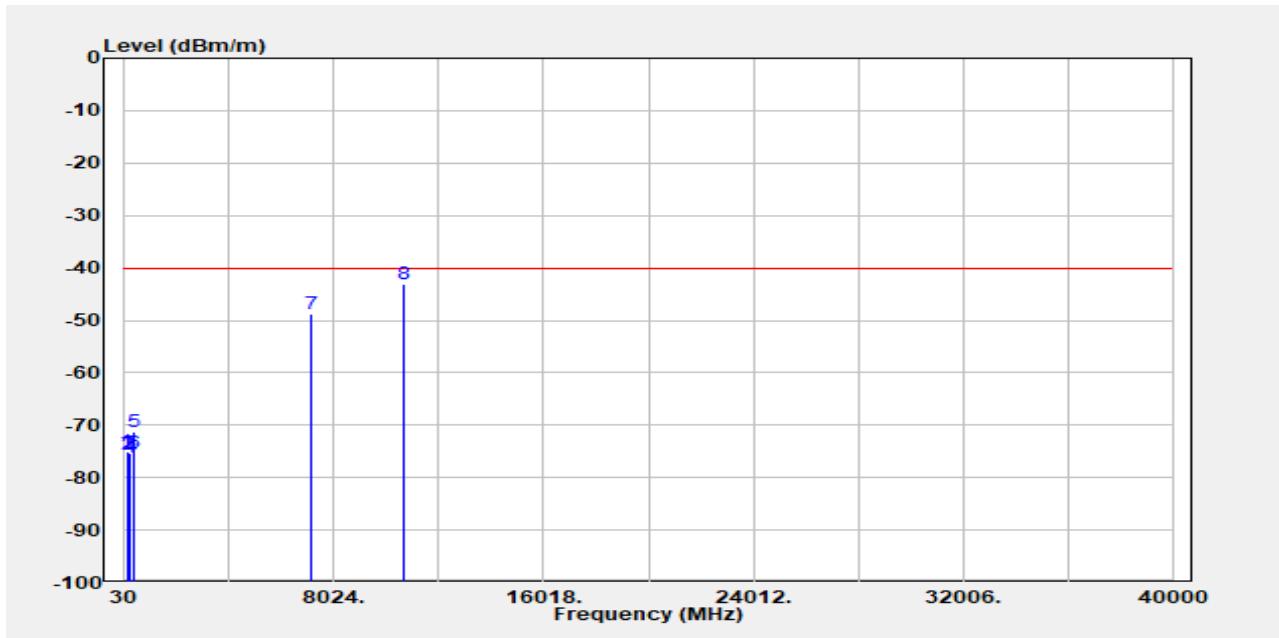
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Report Number :ER/2022/30086  
 Operation Mode :LTE B48  
 Test Mode :Tx CH Low  
 EUT Pol :H Plane  
 Test Frequency :3560 MHz

Test Site :SAC 1  
 Test Date :2022-05-09  
 Temp./Humi. :22.7/70  
 Antenna Pol. :Horizontal  
 Engineer :GN Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
115.36	-75.01	-72.21	-1.71	-1.10	-40.00	-35.01
128.94	-75.50	-72.34	-2.00	-1.17	-40.00	-35.50
196.84	-75.33	-77.96	4.06	-1.43	-40.00	-35.33
252.13	-76.04	-78.77	4.33	-1.60	-40.00	-36.04
396.66	-71.27	-73.48	4.32	-2.10	-40.00	-31.27
414.12	-75.43	-77.93	4.36	-1.86	-40.00	-35.43
7120.00	-48.88	-50.02	10.96	-9.82	-40.00	-8.88
10680.00	-43.02	-42.69	11.22	-11.55	-40.00	-3.02

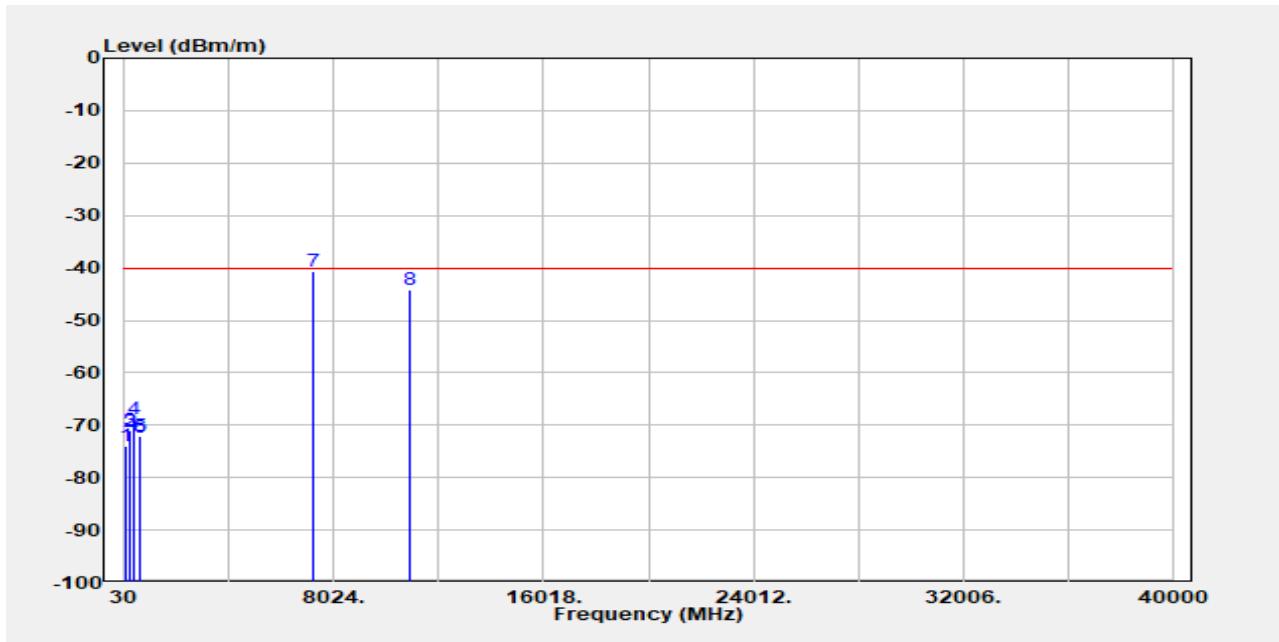
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Report Number :ER/2022/30086  
 Operation Mode :LTE B48  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane  
 Test Frequency :3625 MHz

Test Site :SAC 1  
 Test Date :2022-05-09  
 Temp./Humi. :22.7/70  
 Antenna Pol. :Vertical  
 Engineer :GN Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
48.43	-73.87	-61.04	-12.13	-0.70	-40.00	-33.87
195.87	-71.31	-73.89	4.01	-1.43	-40.00	-31.31
253.10	-71.05	-73.77	4.32	-1.60	-40.00	-31.05
394.72	-68.84	-71.07	4.32	-2.08	-40.00	-28.84
606.18	-72.12	-73.15	3.58	-2.56	-40.00	-32.12
644.98	-72.22	-73.49	3.57	-2.31	-40.00	-32.22
7230.00	-40.64	-41.56	10.80	-9.55	-40.00	-0.64
10875.00	-44.24	-42.93	10.95	-12.26	-40.00	-4.24

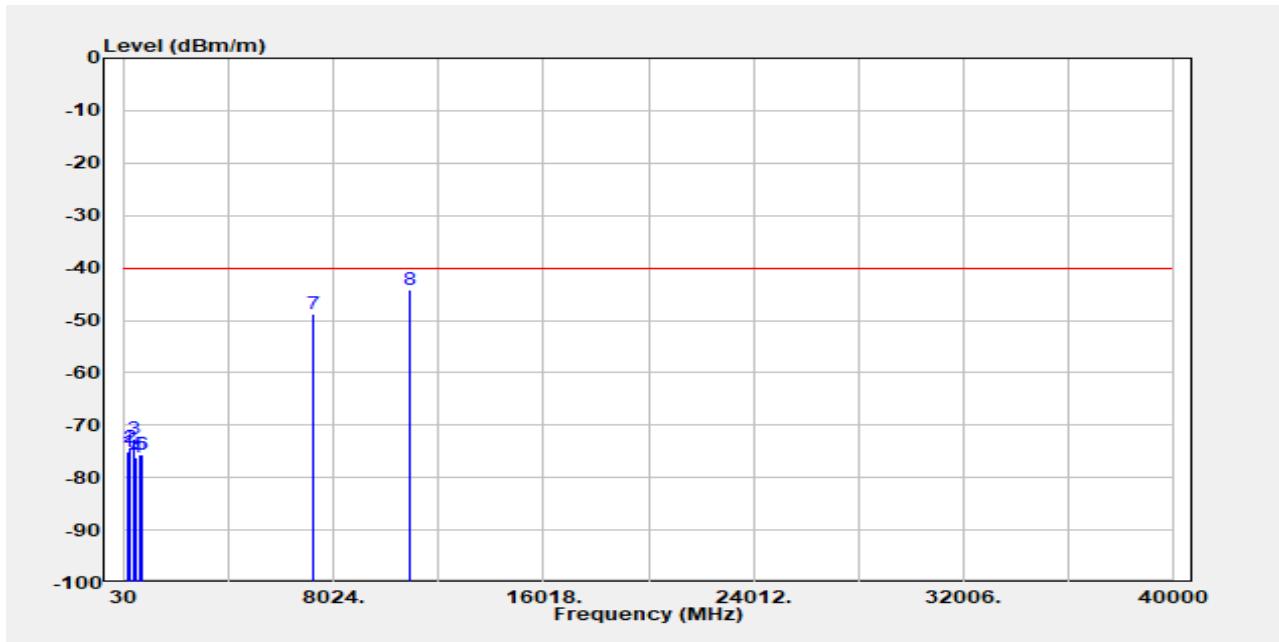
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Report Number :ER/2022/30086  
 Operation Mode :LTE B48  
 Test Mode :Tx CH Mid  
 EUT Pol :H Plane  
 Test Frequency :3625 MHz

Test Site :SAC 1  
 Test Date :2022-05-09  
 Temp./Humi. :22.7/70  
 Antenna Pol. :Horizontal  
 Engineer :GN Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
130.88	-75.15	-71.98	-1.99	-1.18	-40.00	-35.15
252.13	-74.37	-77.09	4.33	-1.60	-40.00	-34.37
395.69	-72.63	-74.85	4.31	-2.09	-40.00	-32.63
443.22	-76.10	-78.00	4.11	-2.21	-40.00	-36.10
604.24	-75.73	-76.76	3.62	-2.58	-40.00	-35.73
686.69	-75.52	-76.33	3.78	-2.97	-40.00	-35.52
7250.00	-48.75	-50.11	10.80	-9.44	-40.00	-8.75
10875.00	-44.05	-42.74	10.95	-12.26	-40.00	-4.05

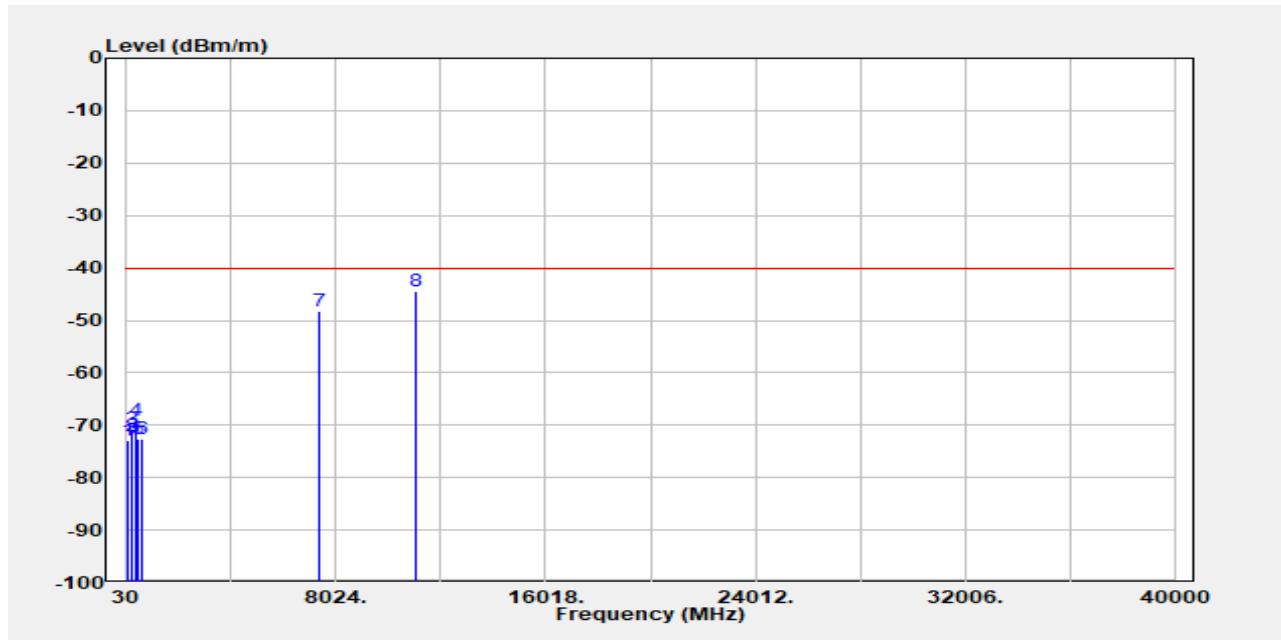
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Report Number :ER/2022/30086  
 Operation Mode :LTE B48  
 Test Mode :Tx CH High  
 EUT Pol :H Plane  
 Test Frequency :3690 MHz

Test Site :SAC 1  
 Test Date :2022-05-09  
 Temp./Humi. :22.7/70  
 Antenna Pol. :Vertical  
 Engineer :GN Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
48.43	-72.93	-60.10	-12.13	-0.70	-40.00	-32.93
195.87	-72.21	-74.79	4.01	-1.43	-40.00	-32.21
253.10	-70.81	-73.52	4.32	-1.60	-40.00	-30.81
396.66	-69.08	-71.29	4.32	-2.10	-40.00	-29.08
480.08	-72.74	-74.51	4.21	-2.44	-40.00	-32.74
599.39	-72.70	-73.71	3.66	-2.64	-40.00	-32.70
7380.00	-48.12	-50.06	10.96	-9.02	-40.00	-8.12
11070.00	-44.31	-43.03	11.25	-12.53	-40.00	-4.31

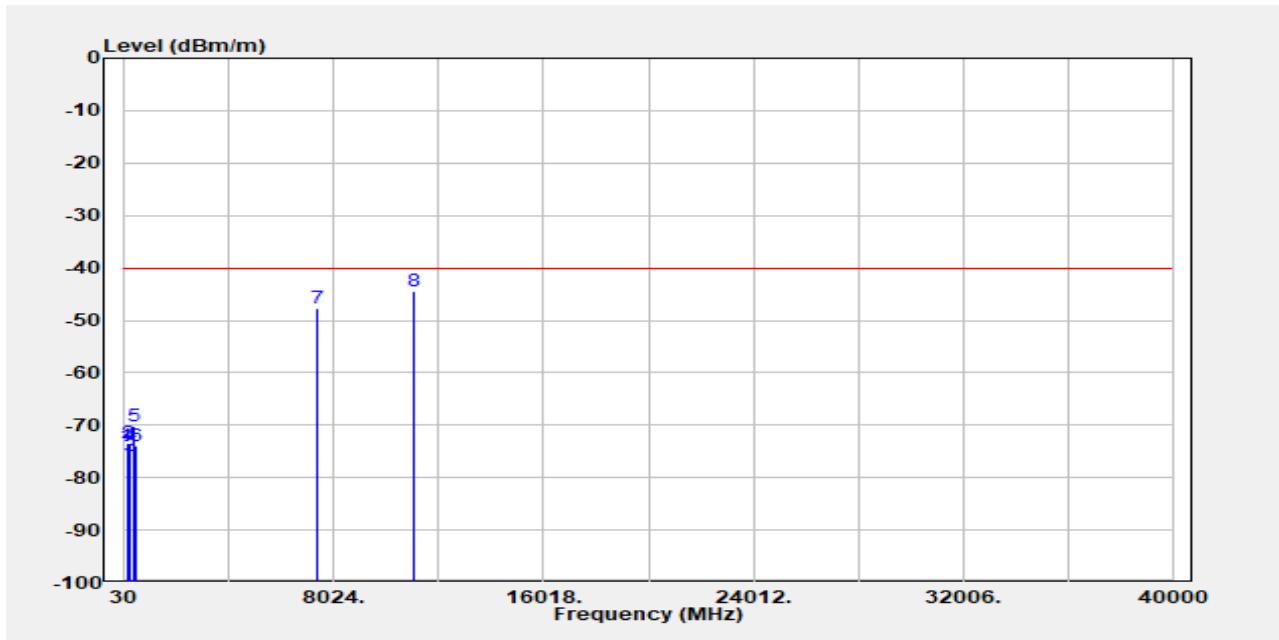
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Report Number :ER/2022/30086  
 Operation Mode :LTE B48  
 Test Mode :Tx CH High  
 EUT Pol :H Plane  
 Test Frequency :3690 MHz

Test Site :SAC 1  
 Test Date :2022-05-09  
 Temp./Humi. :22.7/70  
 Antenna Pol. :Horizontal  
 Engineer :GN Lin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
116.33	-73.98	-71.27	-1.61	-1.10	-40.00	-33.98
127.97	-73.57	-70.52	-1.88	-1.16	-40.00	-33.57
194.90	-76.01	-78.45	3.88	-1.43	-40.00	-36.01
252.13	-73.65	-76.38	4.33	-1.60	-40.00	-33.65
395.69	-70.20	-72.42	4.31	-2.09	-40.00	-30.20
480.08	-73.93	-75.69	4.21	-2.44	-40.00	-33.93
7380.00	-47.78	-49.72	10.96	-9.02	-40.00	-7.78
11070.00	-44.41	-43.13	11.25	-12.53	-40.00	-4.41

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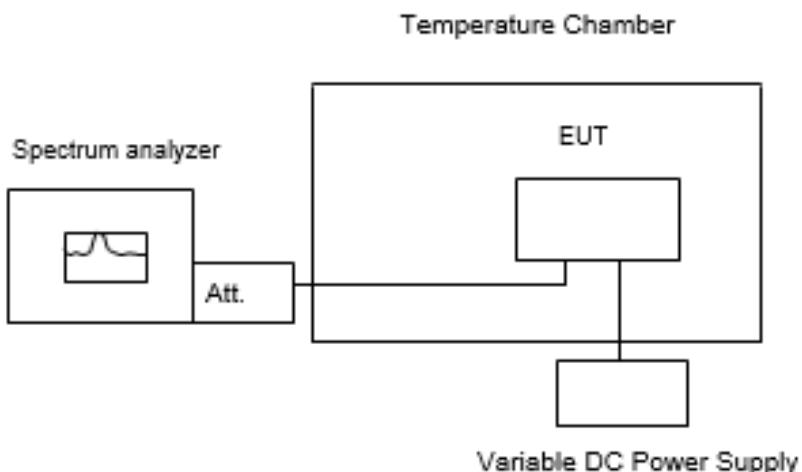
## 12 FREQUENCY STABILITY MEASUREMENT

### 12.1 Standard Applicable

FCC §2.1055(a)

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency band. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency.

### 12.2 Test Set-up



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

### 12.3 Measurement Procedure

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

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

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

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## 12.4 Measurement Result

Reference Freq.:		LTE B48 Mid Channel		3625.0000	MHz 10M QPSK CH 55990
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	(ppm)	Limit	
Freq. ERROR vs. VOLTAGE					
138	25	3624.999992	-0.0021	+/- 2.5 ppm	
120	25	3625.000004	0.0010		
102	25	3625.000009	0.0024		
62 (End Point)	25	3624.999990	-0.0027		
Freq. ERROR vs. Temp.					
120	-30	3625.000017	0.0046	+/- 2.5 ppm	
120	-20	3625.000000	0.0000		
120	-10	3624.999996	-0.0010		
120	0	3624.999989	-0.0030		
120	10	3624.999989	-0.0030		
120	20	3624.999990	-0.0028		
120	30	3625.000011	0.0030		
120	40	3624.999992	-0.0021		
120	50	3624.999988	-0.0033		

**Note:** The power is rated 120V

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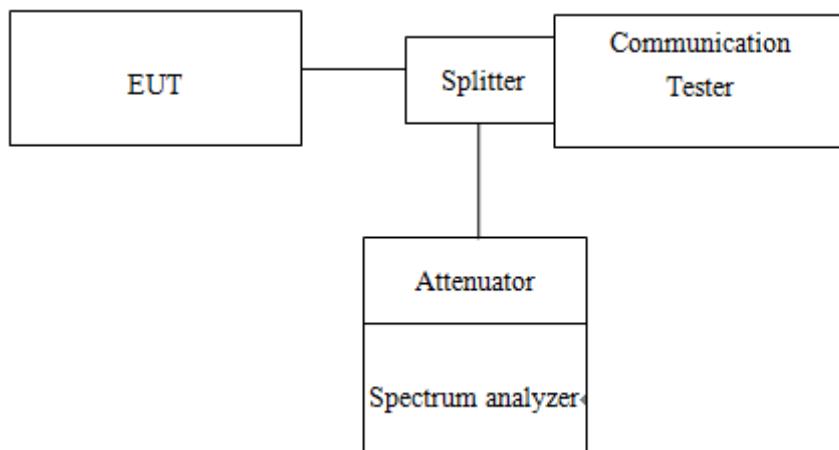
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## 13 PEAK TO AVERAGE RATIO

### 13.1 Standard Applicable

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

### 13.2 Test SET-UP



### 13.3 Measurement Procedure

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

### 13.4 Measurement Result

LTE BAND 48							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		256QAM	Limit			256QAM	Limit
3552.5	55265	9.06	13	3555.0	55290	8.79	13
3625.0	55990	12.87	13	3625.0	55990	7.48	13
3697.5	56715	11.66	13	3695.0	56690	8.14	13

LTE BAND 48							
Channel bandwidth: 15MHz				Channel bandwidth: 20MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		256QAM	Limit			256QAM	Limit
3557.5	55315	10.53	13	3650.0	55340	6.72	13
3625.0	55990	7.06	13	3625.0	55990	6.87	13
3692.5	56665	10.43	13	3690.0	56640	7.06	13

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Band48\_5MHz\_256QAM\_RB25\_0\_CH55265



Band48\_5MHz\_256QAM\_RB25\_0\_CH55990



Band48\_5MHz\_256QAM\_RB25\_0\_CH56715



Band48\_10MHz\_256QAM\_RB50\_0\_CH55290



Band48\_10MHz\_256QAM\_RB50\_0\_CH55990



Band48\_5MHz\_256QAM\_RB25\_0\_CH56690



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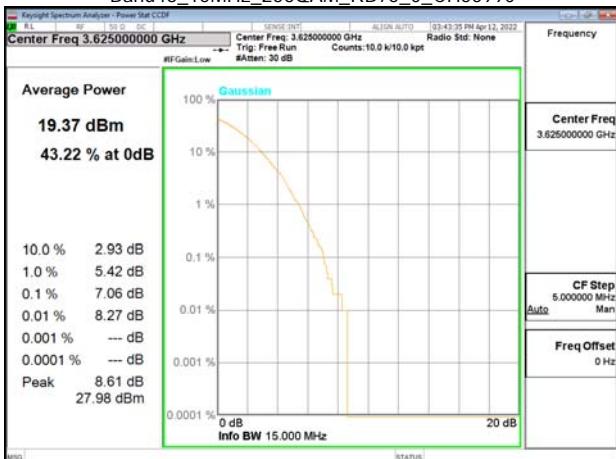
Band48\_15MHz\_256QAM\_RB75\_0\_CH55315



Band48\_20MHz\_256QAM\_RB100\_0\_CH55340



Band48\_15MHz\_256QAM\_RB75\_0\_CH55990



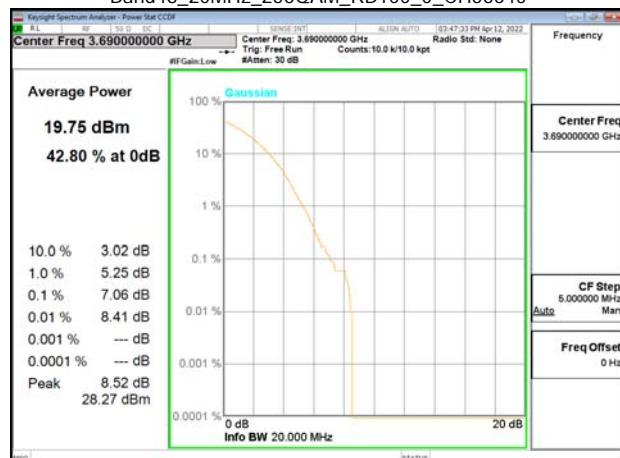
Band48\_20MHz\_256QAM\_RB100\_0\_CH55990



Band48\_15MHz\_256QAM\_RB75\_0\_CH56665



Band48\_20MHz\_256QAM\_RB100\_0\_CH56640



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~ *End of Report* ~

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