

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

OF

Applicant: Askey Computer Corporation
10F, No 119, JianKang Rd., Zhonghe Dist., New Taipei City, Taiwan 23585

Product Name: Cat 12 Indoor CPE

Brand Name: Verizon

Model No.: ASK-RTL108

Model Difference: N/A

Report Number: E2/2020/10030

FCC ID H8N-ASK-RTL108

FCC Rule Part: 2, 96E

Issue Date: Mar. 09, 2020

Date of Test: Nov. 26, 2019 ~ Jan. 22, 2020

Date of EUT Received: Nov. 26, 2019

We hereby certify that:

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

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

Approved By:

CHUN-CHIEH, CHEN

Chun Chieh Chen / Supervisor

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Revision History

Report Number	Revision	Description	Issue Date	Remark
E2/2020/10030	Rev.00	Original.	Mar. 09, 2020	Revised By: Yuri Tsai

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1. GENERAL PRODUCT INFORMATION

1.1. Product Description

General:

Product Name:	Cat 12 Indoor CPE	
Brand Name:	Verizon	
Model No.:	ASK-RTL108	
Model Difference:	N/A	
Hardware Version:	REV 3.0	
Software Version:	N/A	
Power Supply:	12V from AC/DC Adapter	
	Adapter:	1. Model No.: PS24L120K2000UD, Supplier: FLYPOWER 2. Model No.: WB-24J12FU, Supplier: Asian Power Devices Inc.
IMEI:	359403109903190	

1.2. LTE: Cellular Phone Standards Frequency Range 3500~3700Mhz

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

1.3. Antenna Designation

Internal

Vendor	Type	Model Name	Modulation	Frequency (MHz)			Peak Antenna Gain (dBi)
N/A	PIFA	Main	LTE Band 48	3550	~	3700	3.59

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

LTE Band	BW	Modulation	EIRP (dBm/10MHz)		(W)	Type of Emission
48	5	QPSK	22.94	EIRP	0.197	4M51G7D
		16QAM	22.56	EIRP	0.180	4M51D7W
		64QAM	22.42	EIRP	0.175	4M49D7W
48	10	QPSK	22.92	EIRP	0.196	8M99G7D
		16QAM	22.65	EIRP	0.184	9M01D7W
		64QAM	22.47	EIRP	0.177	9M00D7W
48	15	QPSK	22.88	EIRP	0.194	13M4G7D
		16QAM	22.78	EIRP	0.190	13M5D7W
		64QAM	22.60	EIRP	0.182	13M5D7W
48	20	QPSK	22.95	EIRP	0.197	18M0G7D
		16QAM	22.85	EIRP	0.193	17M9D7W
		64QAM	22.71	EIRP	0.187	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

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

1.6. Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory (TAF code 0513)
No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

FCC Registration Numbers are: TW0002

1.7. Special Accessories

No special accessories were used during testing.

1.8. Equipment Modifications

There were 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

According to measurement procured ANSI C63.26-2015, the EUT is placed on a turn 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)

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

2.4. Measurement Results Explanation Example

For all conducted test items:

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

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation in physical test.

RF cable loss (dB)	Attenuation factor(dB)	offset(dB)
4.2	10	14.2

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2.5. Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
LTE Band B 48	12	405

2.6. Configuration of Tested System

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

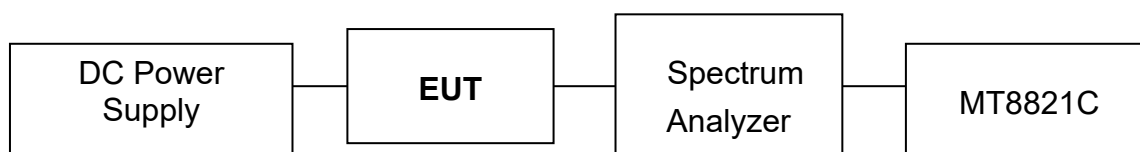
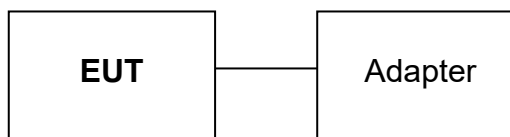


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)



Remote Side

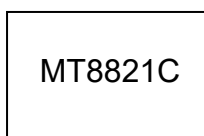


Table 2-1 Equipment Used in

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Radio Communication Analyzer	Anritsu	MT8821C	6261786084	shielded	Un-shielded
2.	Radio Communication Analyzer	Anritsu	MT8821C	6262044739	shielded	Un-shielded

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3. SUMMARY OF TEST RESULTS

3.1. Decision rules

Reported measurement data comply with ANSI C63.26-2015:

Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

3.2. 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 SPU- RIOUS 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
§96.41(g)	Peak to Average Ratio	Compliant

3.3. Reporting statements of conformity

The conformity statement in this report is based solely on the test results, measurement uncertainty is excluded.

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4. DESCRIPTION OF TEST MODES

4.1. The Worst Test Modes and Channel Details

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

BAND	RADIATED EMISSION
LTE Band48	E2-plane

Note: The device does not support MIMO transmitting mode (1T3R).

4.2. Measurement Configuration

LTE Band 48 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
EIRP	56765 to 58215	56765, 55990, 58215	5MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,24 RB Offset
	55290 to 56690	55290, 55990, 56690	10MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,49 RB Offset
	55315 to 56665	55315, 55990, 56665	15MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,74 RB Offset
	55340 to 56640	55340, 55990, 56640	20MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,99 RB Offset
FREQUENCY STABILITY	55290 to 56690	55290, 55990, 56690	10MHz	QPSK	Full RB
OCCUPIED BANDWIDTH	56765 to 58215	56765, 55990, 58215	5MHz	QPSK, 16QAM, 64QAM	Full RB
	55290 to 56690	55290, 55990, 56690	10MHz	QPSK, 16QAM, 64QAM	Full RB
	55315 to 56665	55315, 55990, 56665	15MHz	QPSK, 16QAM, 64QAM	Full RB
	55340 to 56640	55340, 55990, 56640	20MHz	QPSK, 16QAM, 64QAM	Full RB
PEAK TO AVERAGE RATIO	56765 to 58215	56765, 55990, 58215	5MHz	64QAM	Full RB
	55290 to 56690	55290, 55990, 56690	10MHz	64QAM	Full RB
	55315 to 56665	55315, 55990, 56665	15MHz	64QAM	Full RB
	55340 to 56640	55340, 55990, 56640	20MHz	64QAM	Full RB
BAND EDGE	56765 to 58215	56765, 58215	5MHz	QPSK	1 RB/ 0,24 RB Offset Full RB
	55290 to 56690	55290, 56690	10MHz	QPSK	1 RB/ 0,49 RB Offset Full RB
	55315 to 56665	55315, 56665	15MHz	QPSK	1 RB/ 0,74 RB Offset Full RB
	55340 to 56640	55340, 56640	20MHz	QPSK	1 RB/ 0,99 RB Offset Full RB
CONDCUDEDTED EMIS- SION	56765 to 58215	56765, 55990, 58215	5MHz	QPSK	1 RB, 0 RB Offset
	55290 to 56690	55290, 55990, 56690	10MHz	QPSK	1 RB, 0 RB Offset
	55315 to 56665	55315, 55990, 56665	15MHz	QPSK	1 RB, 0 RB Offset
	55340 to 56640	55340, 55990, 56640	20MHz	QPSK	1 RB, 0 RB Offset
RADIATED EMISSION	56765 to 58215	56765, 55990, 58215	5MHz	QPSK	1 RB, 0 RB Offset

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
Maximum Power Output	+/- 1.10 dB
Maximum Power Density	+/- 1.10 dB
Occupied Bandwidth	+/- 5.19 Hz
Out of Band Emissions at Antenna Terminals	+/- 0.70 dB
Frequency Stability vs. Temperature	+/- 5.19 Hz
Frequency Stability vs. Voltage	+/- 5.19 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

Radiated Spurious Emission:

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

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

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6. MAXIMUM OUTPUT POWER MEASUREMENT

6.1. Standard Applicable

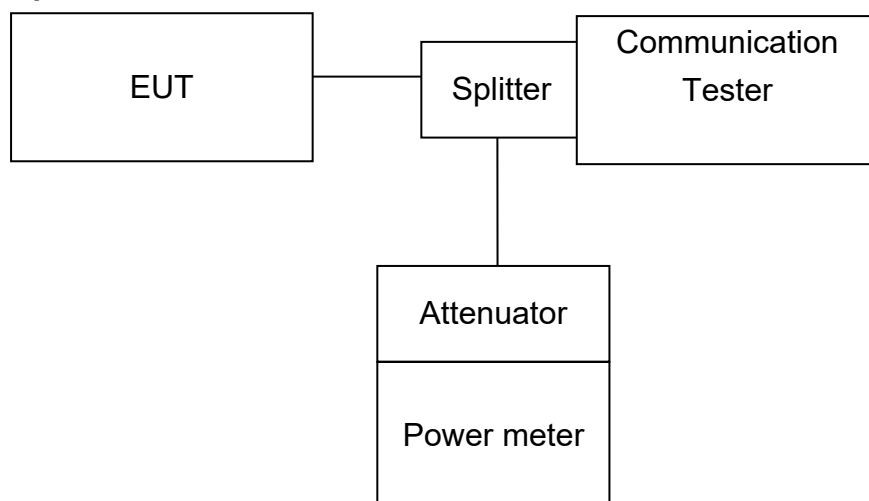
FCC §2.1046 & 96.41

- (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 megahertz)
End User Device	23
Category A CBSD	30
Category B CBSD ¹	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.

6.2. Test Set-up



Note: Measurement setup for testing on Antenna connector

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6.3. Measurement Procedure

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

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

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

Where:

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

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

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

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

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

6.4. Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/06/2019	03/05/2020
DC Power Supply	Agilent	E3640A	MY53140006	05/31/2019	05/30/2020
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/09/2019	01/08/2020
Radio Communication Analyzer	Anritsu	MT8821C	6262044739	12/06/2019	12/05/2020
Splitter	Marvelous	MVE8586	RF265	11/20/2019	11/19/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	WATT-218FS-10	RF268	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF219	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF207	11/20/2019	11/19/2020

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6.5. LTE Measurement Result

Antenna gain (dBi) 3.59

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)	Margin (dBm/10MHz)
5	56765	3552.5	QPSK	1	0	19.35	22.94	23	-0.05979
				1	24	19.31	22.90	23	-0.09979
				12	6	18.40	21.99	23	-1.00979
				25	0	18.43	22.02	23	-0.97979
	55990	3625	QPSK	1	0	19.31	22.90	23	-0.09979
				1	24	19.22	22.81	23	-0.18979
				12	6	18.54	22.13	23	-0.86979
				25	0	18.59	22.18	23	-0.81979
	58215	3697.5	QPSK	1	0	18.90	22.49	23	-0.50979
				1	24	18.71	22.30	23	-0.69979
				12	6	17.82	21.41	23	-1.58979
				25	0	17.85	21.44	23	-1.55979
	56765	3552.5	16QAM	1	0	18.75	22.34	23	-0.65979
				1	24	18.69	22.28	23	-0.71979
				12	6	17.56	21.15	23	-1.84979
				25	0	17.55	21.14	23	-1.85979
	55990	3625	16QAM	1	0	18.97	22.56	23	-0.43979
				1	24	18.84	22.43	23	-0.56979
				12	6	17.75	21.34	23	-1.65979
				25	0	17.74	21.33	23	-1.66979
	58215	3697.5	16QAM	1	0	18.27	21.86	23	-1.13979
				1	24	18.13	21.72	23	-1.27979
				12	6	17.02	20.61	23	-2.38979
				25	0	17.04	20.63	23	-2.36979
	56765	3552.5	64QAM	1	0	18.60	22.19	23	-0.80979
				1	24	18.54	22.13	23	-0.86979
				12	6	17.50	21.09	23	-1.90979
				25	0	17.49	21.08	23	-1.91979
	55990	3625	64QAM	1	0	18.83	22.42	23	-0.57979
				1	24	18.71	22.30	23	-0.69979
				12	6	17.72	21.31	23	-1.68979
				25	0	17.69	21.28	23	-1.71979
	58215	3697.5	64QAM	1	0	18.14	21.73	23	-1.26979
				1	24	18.04	21.63	23	-1.36979
				12	6	16.96	20.55	23	-2.44979
				25	0	16.94	20.53	23	-2.46979

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Antenna gain (dBi) 3.59

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)	Margin (dBm/10MHz)
10	55290	3555	QPSK	1	0	19.33	22.92	23	-0.07979
				1	49	19.29	22.88	23	-0.11979
				25	12	18.42	22.01	23	-0.98979
				50	0	18.45	22.04	23	-0.95979
	55990	3625	QPSK	1	0	19.32	22.91	23	-0.08979
				1	49	19.28	22.87	23	-0.12979
				25	12	18.59	22.18	23	-0.81979
				50	0	18.59	22.18	23	-0.81979
	56690	3695	QPSK	1	0	18.92	22.51	23	-0.48979
				1	49	18.64	22.23	23	-0.76979
				25	12	17.87	21.46	23	-1.53979
				50	0	17.92	21.51	23	-1.48979
	55290	3555	16QAM	1	0	18.83	22.42	23	-0.57979
				1	49	18.70	22.29	23	-0.70979
				25	12	17.59	21.18	23	-1.81979
				50	0	17.58	21.17	23	-1.82979
	55990	3625	16QAM	1	0	19.06	22.65	23	-0.34979
				1	49	18.74	22.33	23	-0.66979
				25	12	17.75	21.34	23	-1.65979
				50	0	17.78	21.37	23	-1.62979
	56690	3695	16QAM	1	0	18.40	21.99	23	-1.00979
				1	49	18.13	21.72	23	-1.27979
				25	12	17.07	20.66	23	-2.33979
				50	0	17.06	20.65	23	-2.34979
	55290	3555	64QAM	1	0	18.69	22.28	23	-0.71979
				1	49	18.50	22.09	23	-0.90979
				25	12	17.48	21.07	23	-1.92979
				50	0	17.51	21.10	23	-1.89979
	55990	3625	64QAM	1	0	18.88	22.47	23	-0.52979
				1	49	18.57	22.16	23	-0.83979
				25	12	17.68	21.27	23	-1.72979
				50	0	17.70	21.29	23	-1.70979
	56690	3695	64QAM	1	0	18.18	21.77	23	-1.22979
				1	49	17.92	21.51	23	-1.48979
				25	12	16.98	20.57	23	-2.42979
				50	0	16.97	20.56	23	-2.43979

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Antenna gain (dBi) 3.59

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)	Margin (dBm/10MHz)
15	55315	3557.5	QPSK	1	0	19.29	22.88	23	-0.11979
				1	74	19.21	22.80	23	-0.19979
				36	18	18.53	22.12	23	-0.87979
				75	0	18.53	22.12	23	-0.87979
	55990	3625	QPSK	1	0	19.26	22.85	23	-0.14979
				1	74	19.23	22.82	23	-0.17979
				36	18	18.61	22.20	23	-0.79979
				75	0	18.60	22.19	23	-0.80979
	56665	3692.5	QPSK	1	0	19.10	22.69	23	-0.30979
				1	74	18.81	22.40	23	-0.59979
				36	18	18.09	21.68	23	-1.31979
				75	0	18.05	21.64	23	-1.35979
	55315	3557.5	16QAM	1	0	19.00	22.59	23	-0.40979
				1	74	18.79	22.38	23	-0.61979
				36	18	17.67	21.26	23	-1.73979
				75	0	17.71	21.30	23	-1.69979
	55990	3625	16QAM	1	0	19.19	22.78	23	-0.21979
				1	74	18.74	22.33	23	-0.66979
				36	18	17.71	21.30	23	-1.69979
				75	0	17.71	21.30	23	-1.69979
	56665	3692.5	16QAM	1	0	18.60	22.19	23	-0.80979
				1	74	18.26	21.85	23	-1.14979
				36	18	17.22	20.81	23	-2.18979
				75	0	17.19	20.78	23	-2.21979
	55315	3557.5	64QAM	1	0	18.85	22.44	23	-0.55979
				1	74	18.71	22.30	23	-0.69979
				36	18	17.66	21.25	23	-1.74979
				75	0	17.70	21.29	23	-1.70979
	55990	3625	64QAM	1	0	19.01	22.60	23	-0.39979
				1	74	18.57	22.16	23	-0.83979
				36	18	17.71	21.30	23	-1.69979
				75	0	17.76	21.35	23	-1.64979
	56665	3692.5	64QAM	1	0	18.43	22.02	23	-0.97979
				1	74	18.08	21.67	23	-1.32979
				36	18	17.21	20.80	23	-2.19979
				75	0	17.18	20.77	23	-2.22979

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BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm/10MHz)	EIRP Average (dBm/10MHz)	EIRP Limit (dBm/10MHz)	Margin (dBm/10MHz)
20	55340	3560	QPSK	1	0	19.36	22.95	23	-0.04979
				1	99	19.31	22.90	23	-0.09979
				50	25	18.55	22.14	23	-0.85979
				100	0	18.58	22.17	23	-0.82979
	55990	3625	QPSK	1	0	19.24	22.83	23	-0.16979
				1	99	19.30	22.89	23	-0.10979
				50	25	18.63	22.22	23	-0.77979
				100	0	18.64	22.23	23	-0.76979
	56640	3690	QPSK	1	0	19.28	22.87	23	-0.12979
				1	99	18.81	22.40	23	-0.59979
				50	25	18.03	21.62	23	-1.37979
				100	0	18.21	21.80	23	-1.19979
	55340	3560	16QAM	1	0	19.05	22.64	23	-0.35979
				1	99	18.83	22.42	23	-0.57979
				50	25	17.67	21.26	23	-1.73979
				100	0	17.73	21.32	23	-1.67979
	55990	3625	16QAM	1	0	19.26	22.85	23	-0.14979
				1	99	18.67	22.26	23	-0.73979
				50	25	17.74	21.33	23	-1.66979
				100	0	17.79	21.38	23	-1.61979
	56640	3690	16QAM	1	0	18.74	22.33	23	-0.66979
				1	99	18.17	21.76	23	-1.23979
				50	25	17.21	20.80	23	-2.19979
				100	0	17.37	20.96	23	-2.03979
	55340	3560	64QAM	1	0	18.86	22.45	23	-0.54979
				1	99	18.66	22.25	23	-0.74979
				50	25	17.62	21.21	23	-1.78979
				100	0	17.75	21.34	23	-1.65979
	55990	3625	64QAM	1	0	19.12	22.71	23	-0.28979
				1	99	18.50	22.09	23	-0.90979
				50	25	17.68	21.27	23	-1.72979
				100	0	17.82	21.41	23	-1.58979
	56640	3690	64QAM	1	0	18.65	22.24	23	-0.75979
				1	99	18.05	21.64	23	-1.35979
				50	25	17.16	20.75	23	-2.24979
				100	0	17.37	20.96	23	-2.03979

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7. MAXIMUM POWER DENSITY 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 PSD (dBm/MHz)
End User Device	n/a
Category A CBSD	20
Category B CBSD ¹	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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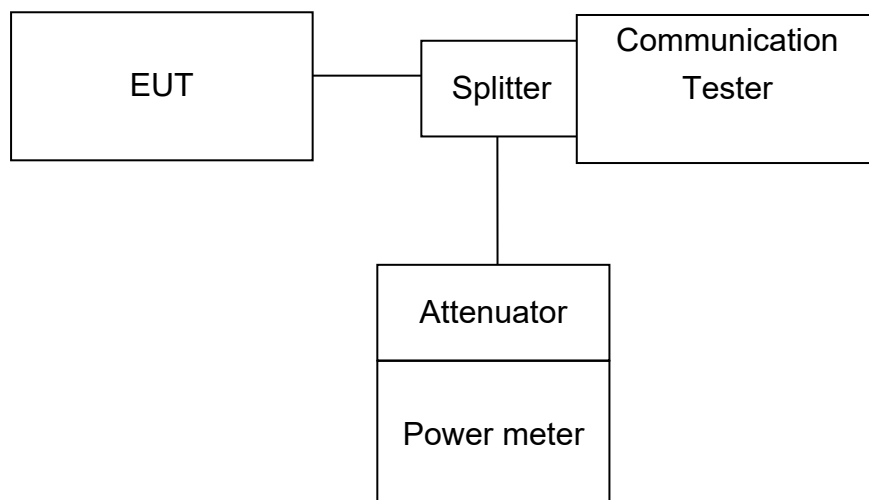
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7.2. Test Set-up



Note: Measurement setup for testing on Antenna connector

7.3. 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.

7.4. Measurement Equipment Used

N/A

7.5. Measurement Result

Peak Power Density Results:

N/A, this is an End user device.

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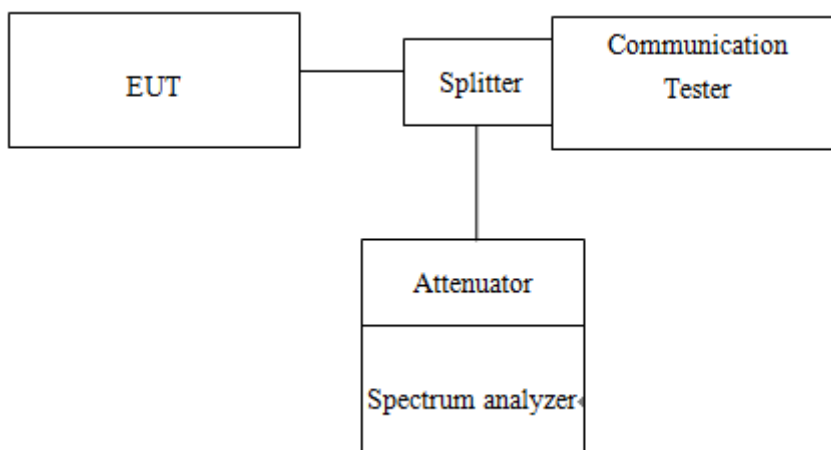
8. OCCUPIED BANDWIDTH MEASUREMENT

8.1. 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.

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%.

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8.4. Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/06/2019	03/05/2020
DC Power Supply	Agilent	E3640A	MY53140006	05/31/2019	05/30/2020
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/09/2019	01/08/2020
Radio Communication Analyzer	Anritsu	MT8821C	6262044739	12/06/2019	12/05/2020
Splitter	Marvelous	MVE8586	RF265	11/20/2019	11/19/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	WATT-218FS-10	RF268	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF219	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF207	11/20/2019	11/19/2020

8.5. Measurement Result

LTE BAND 48 Channel bandwidth: 5MHz							
Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3552.5	56765	4.5058	4.5064	4.4856	4.810	4.805	4.852
3625.0	55990	4.4671	4.4992	4.4856	4.799	4.843	4.769
3697.5	58215	4.4964	4.5067	4.4854	4.984	4.848	4.862

LTE BAND 48 Channel bandwidth: 10MHz							
Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3555.0	55290	8.9869	9.0149	8.9445	9.707	9.6380	9.754
3625.0	55990	8.9446	8.9574	8.9498	9.609	9.5460	9.573
3695.0	56690	8.9943	8.9756	8.9953	9.475	9.5690	9.647

LTE BAND 48 Channel bandwidth: 15MHz							
Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3557.5	55315	13.396	13.544	13.453	14.480	14.170	14.290
3625.0	55990	13.398	13.528	13.424	14.140	14.330	14.230
3692.5	56665	13.369	13.403	13.403	14.290	14.320	14.320

LTE BAND 48 Channel bandwidth: 20MHz							
Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3650.0	55340	17.893	17.874	17.911	18.860	18.970	19.040
3625.0	55990	17.974	17.850	17.826	19.130	19.050	18.970
3690.0	56640	17.944	17.998	17.900	19.080	19.120	19.080

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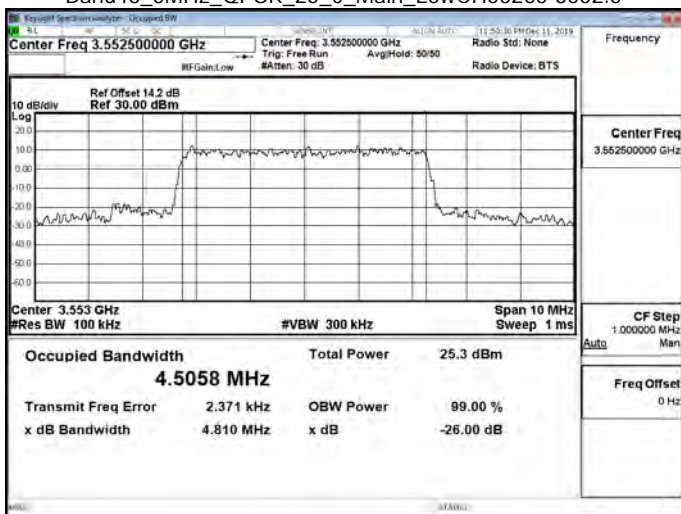
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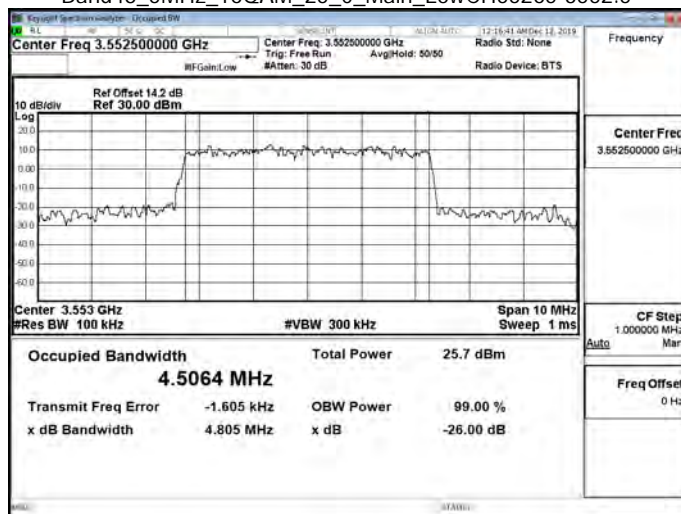
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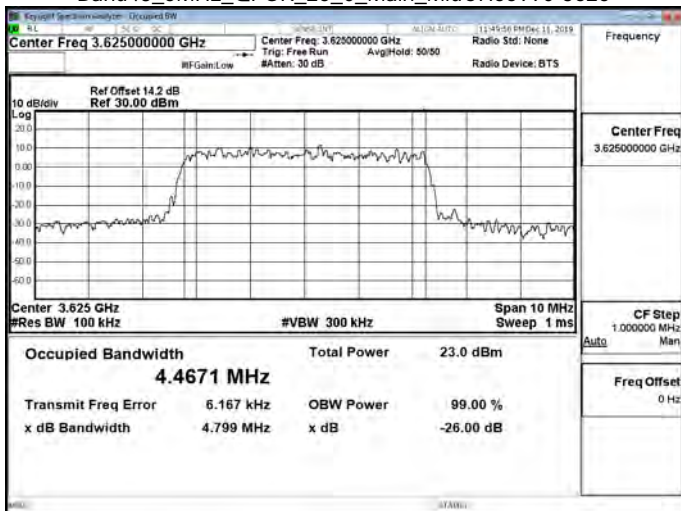
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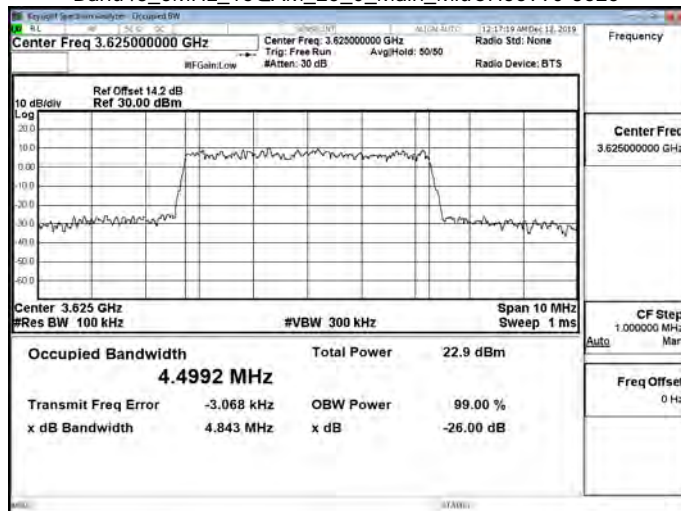
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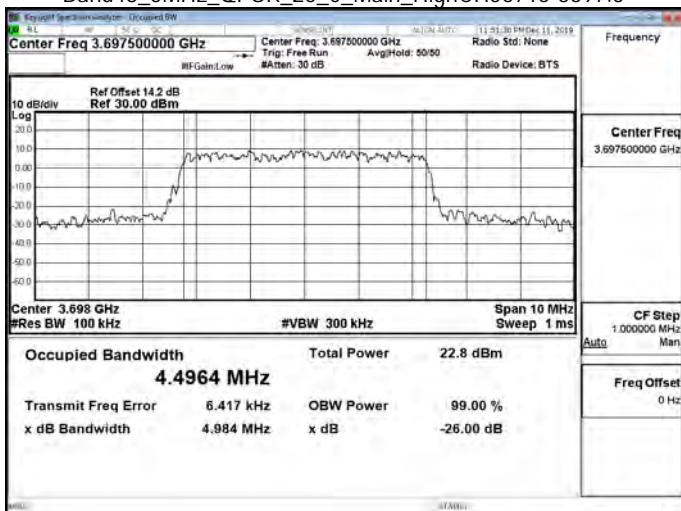
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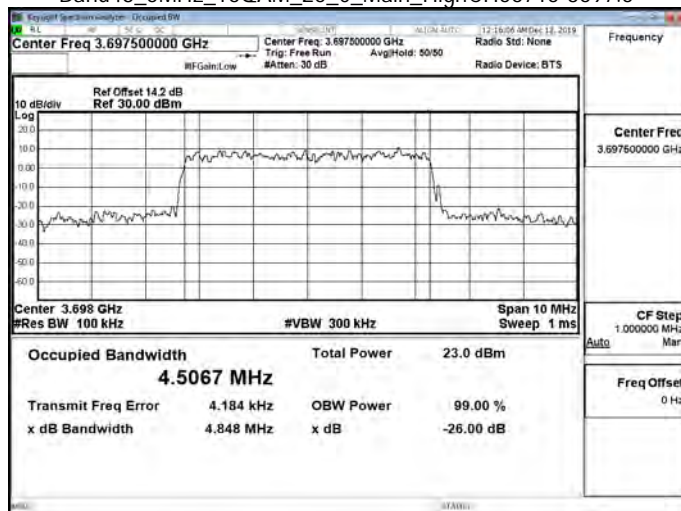
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Band48_5MHz_QPSK_25_0_Main_HighCH56715-3697.5



Band48_5MHz_16QAM_25_0_Main_HighCH56715-3697.5



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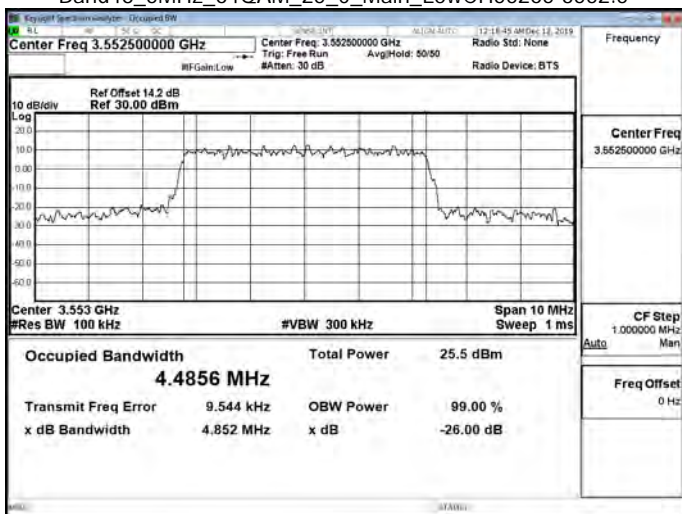
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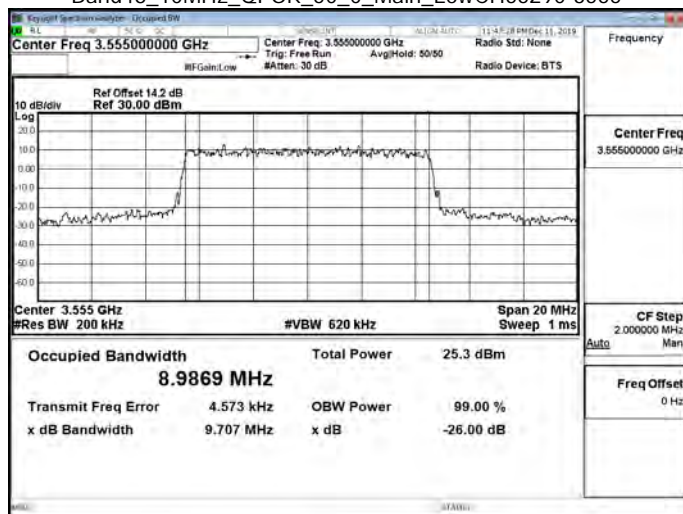
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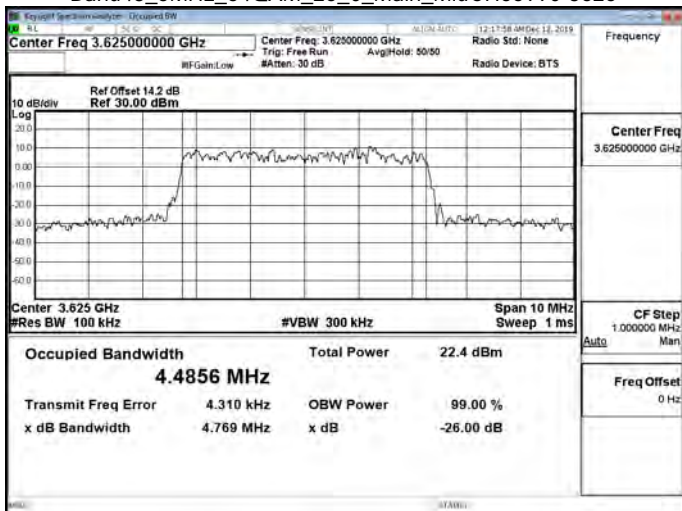
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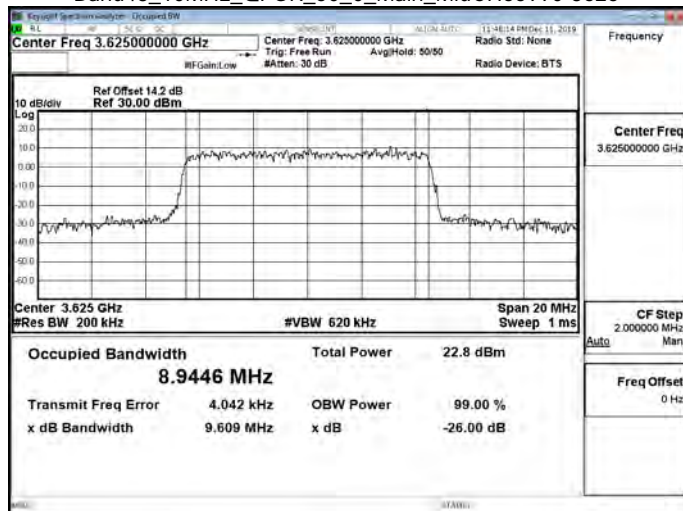
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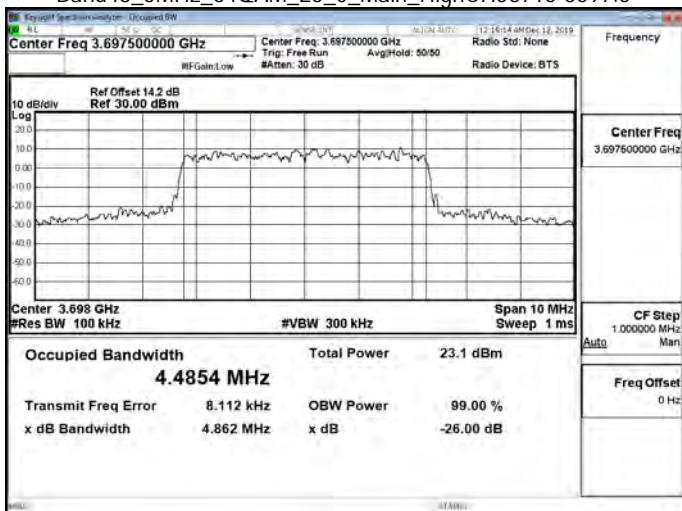
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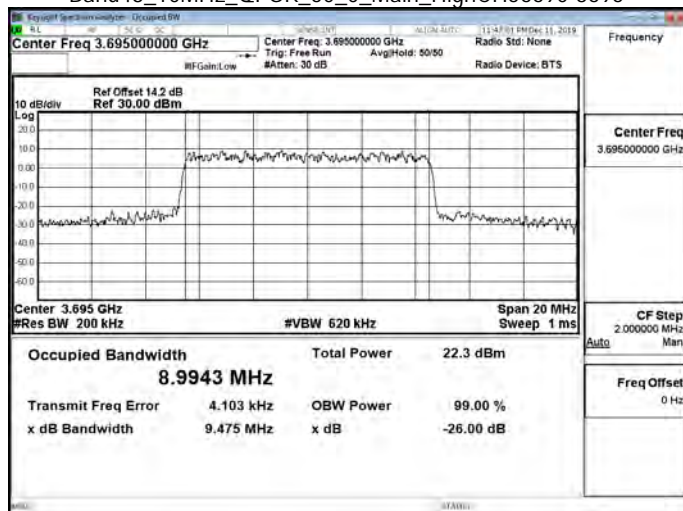
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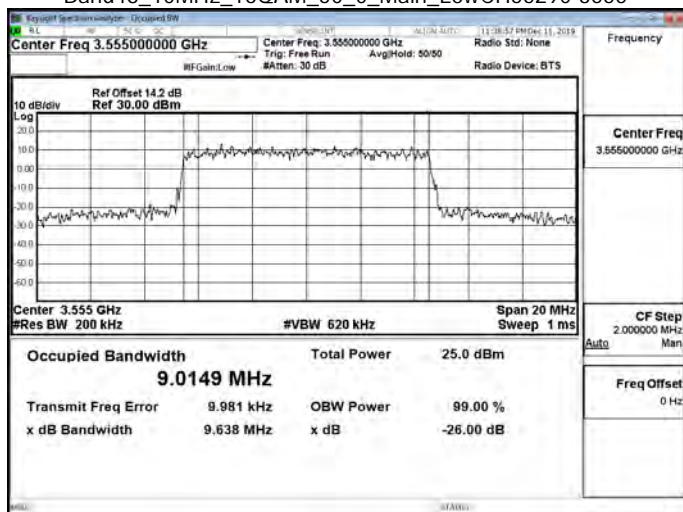


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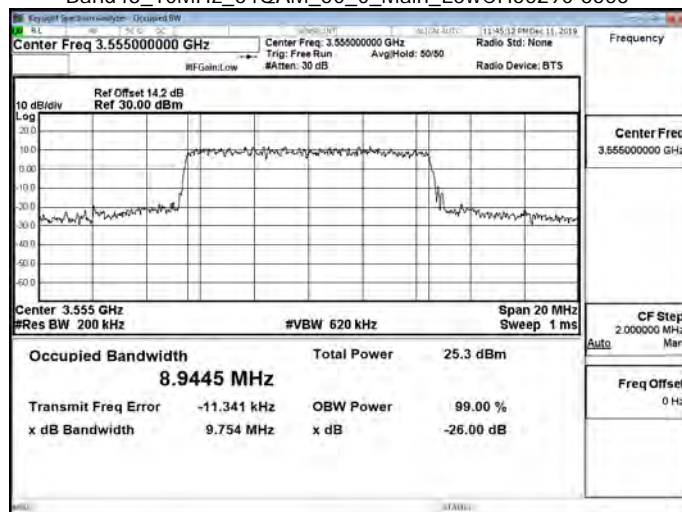
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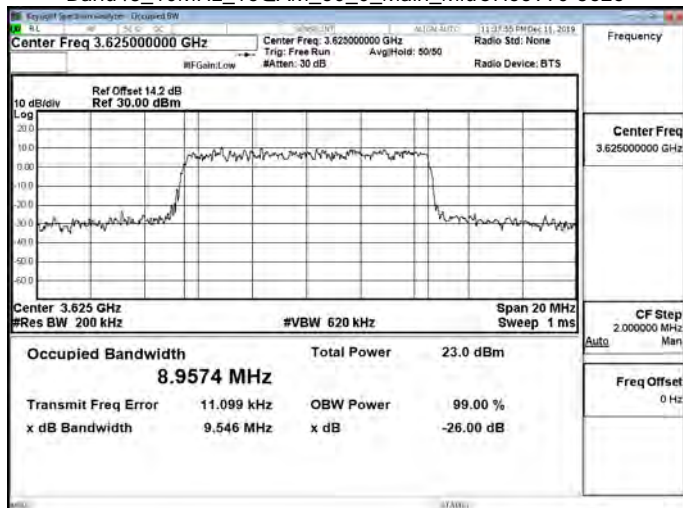
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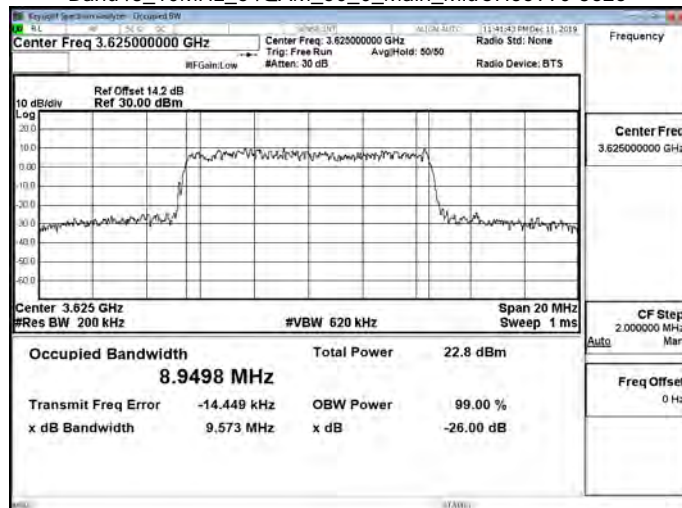
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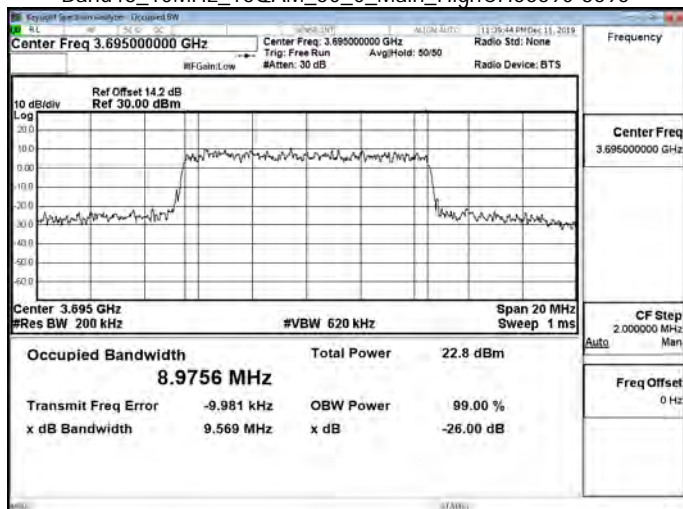
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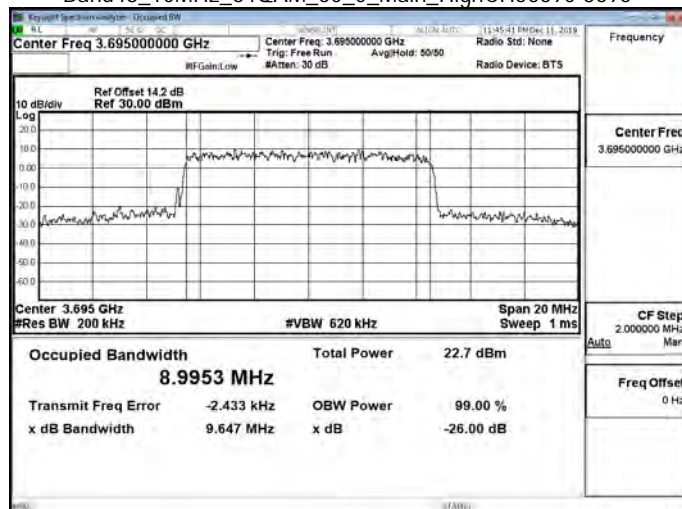
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Band48_10MHz_16QAM_50_0_Main_HighCH56690-3695



Band48_10MHz_64QAM_50_0_Main_HighCH56690-3695



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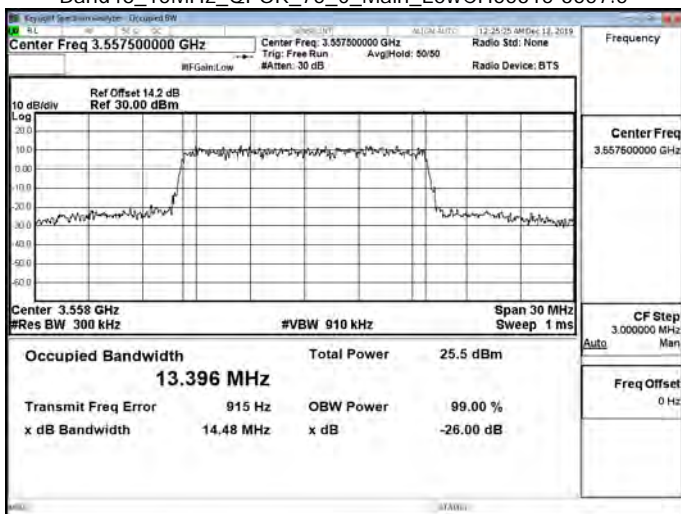
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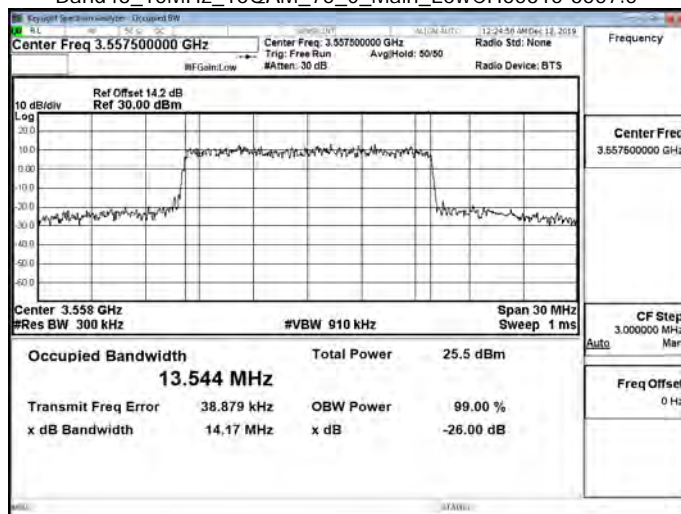
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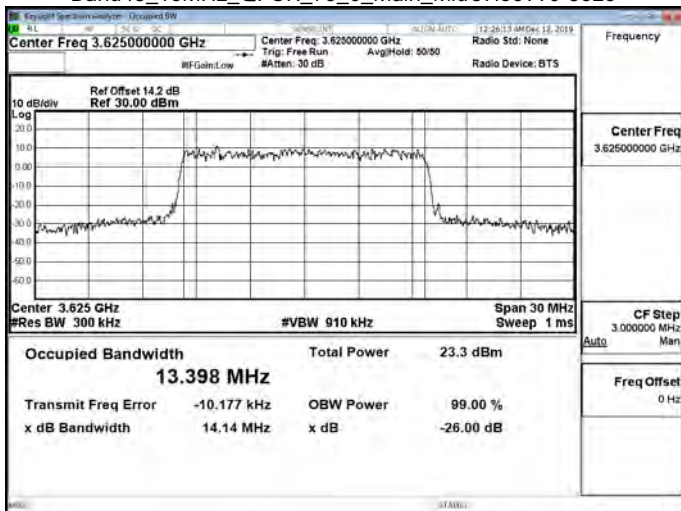
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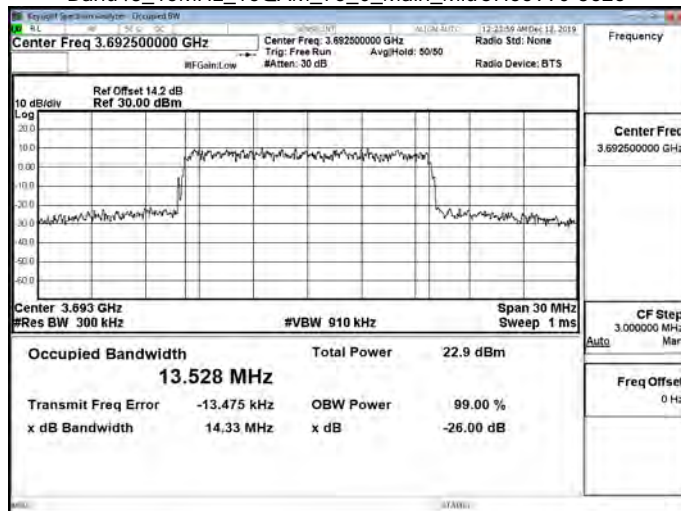
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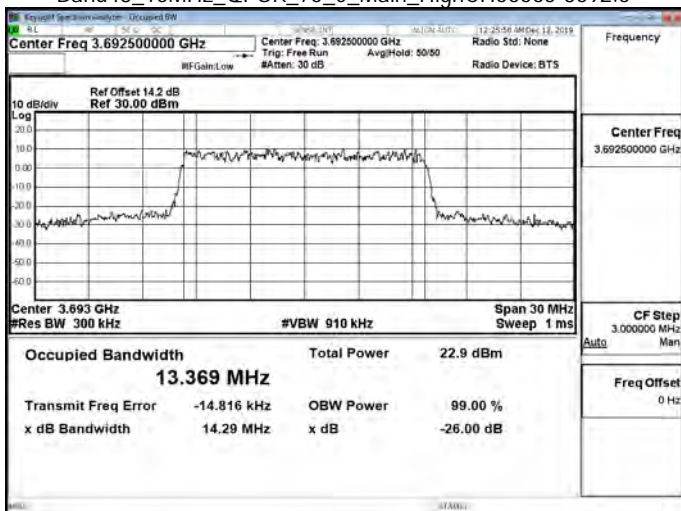
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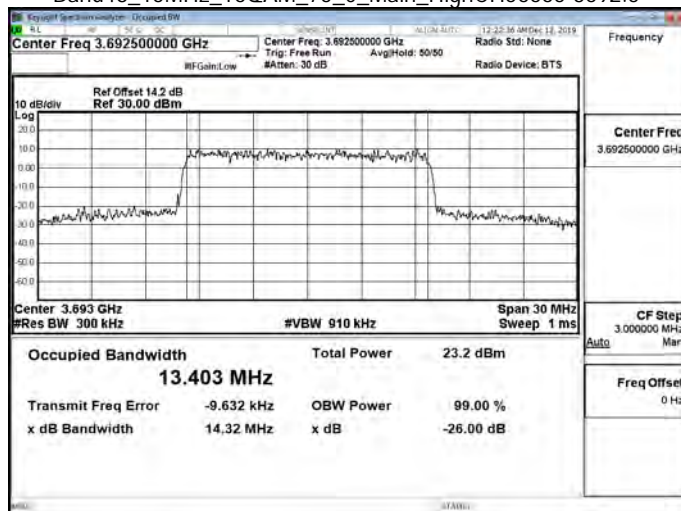
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Band48_15MHz_QPSK_75_0_Main_HighCH56665-3692.5



Band48_15MHz_16QAM_75_0_Main_HighCH56665-3692.5



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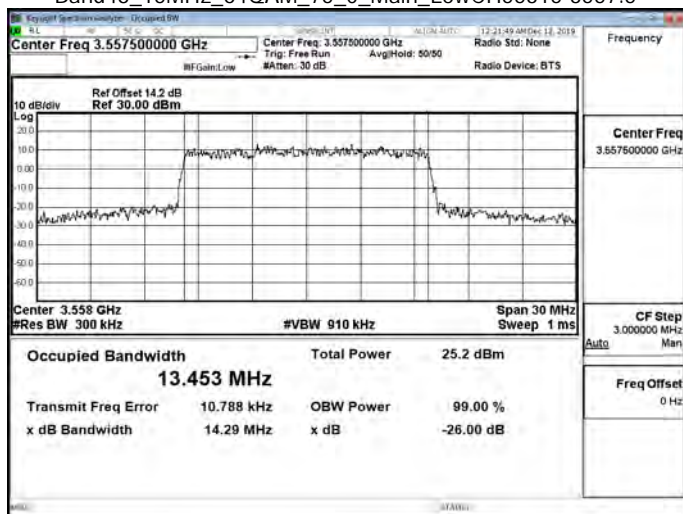
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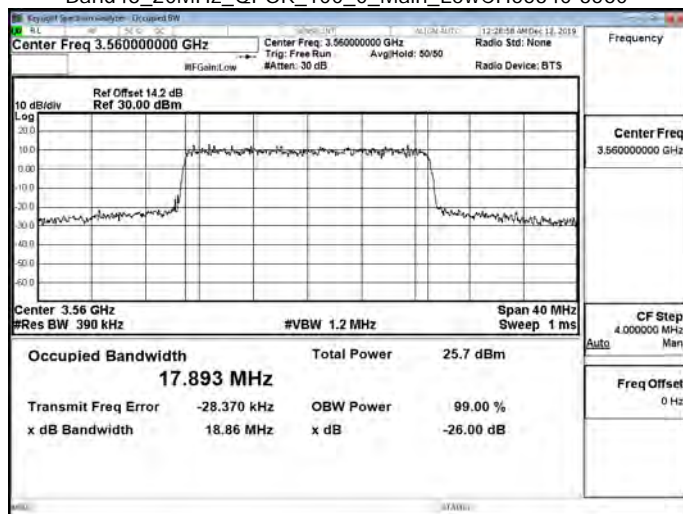
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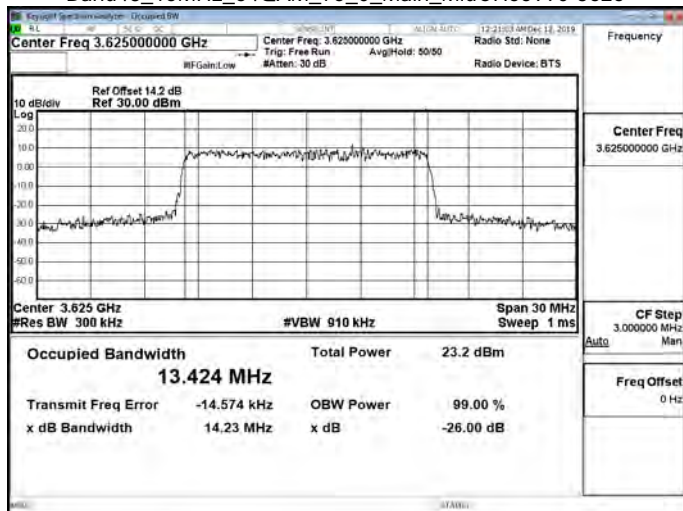
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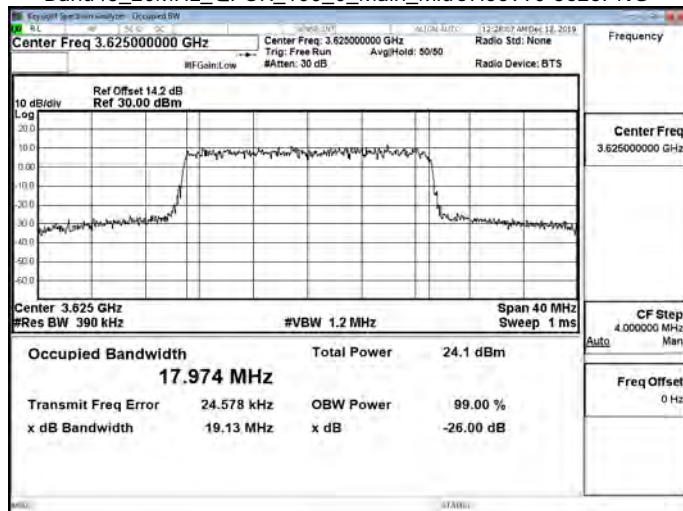
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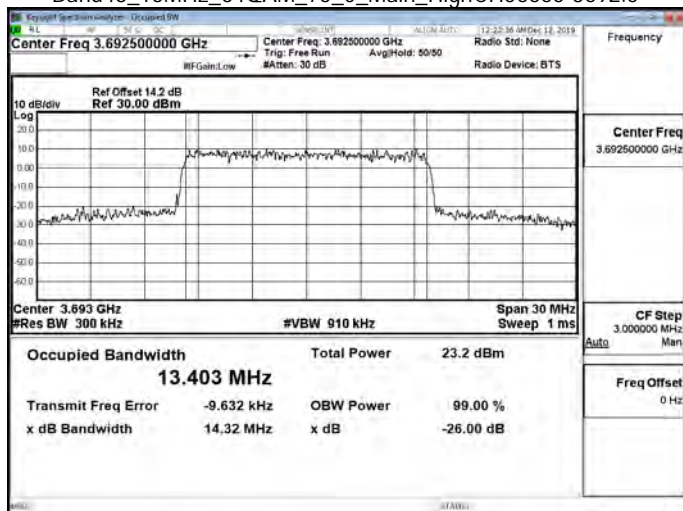
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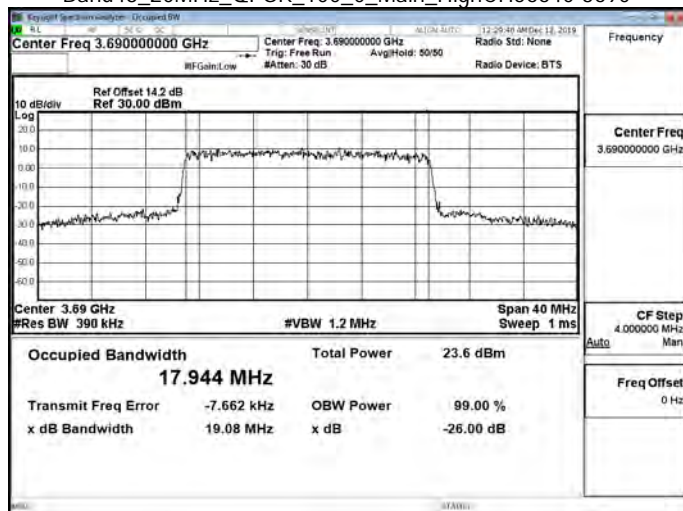
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Band48_15MHz_64QAM_75_0_Main_HighCH56665-3692.5



Band48_20MHz_QPSK_100_0_Main_HighCH56640-3690



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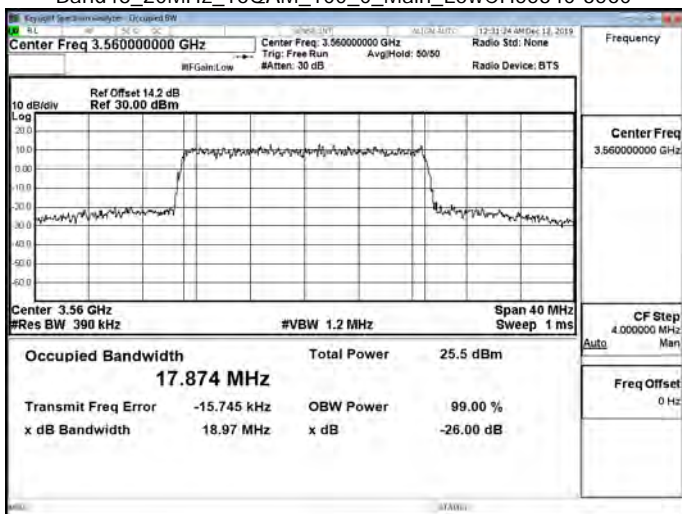
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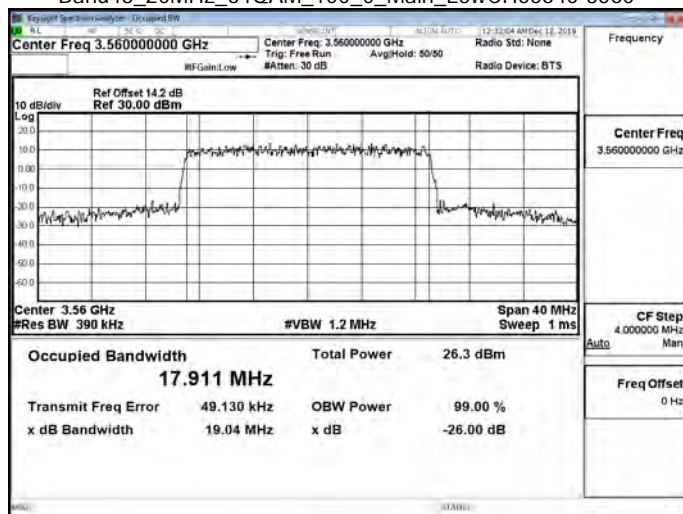
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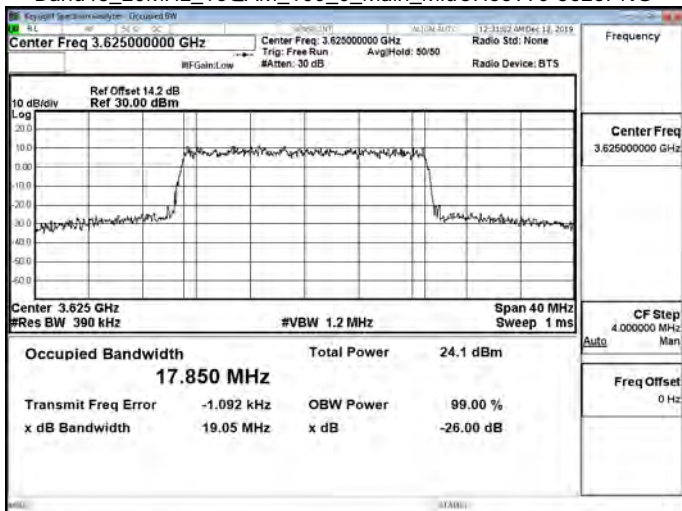
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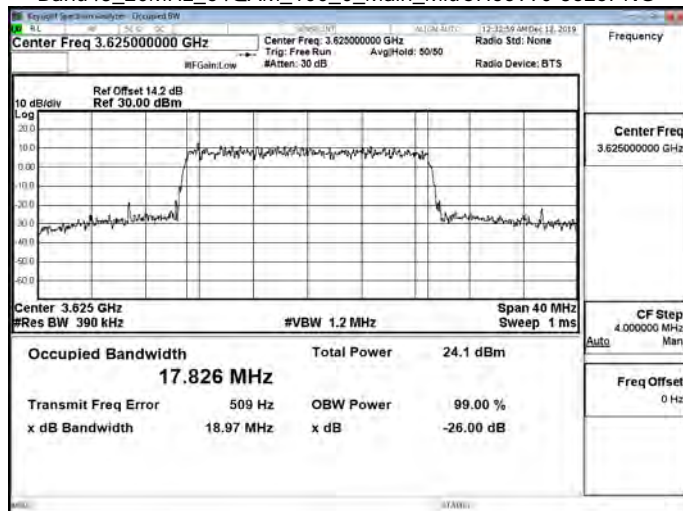
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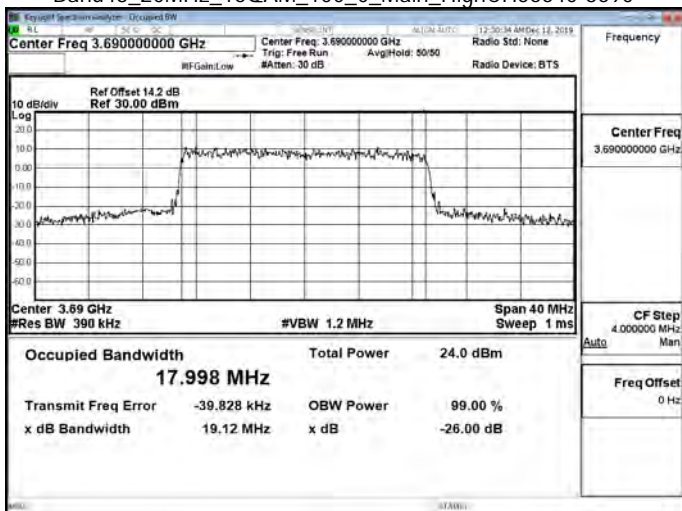
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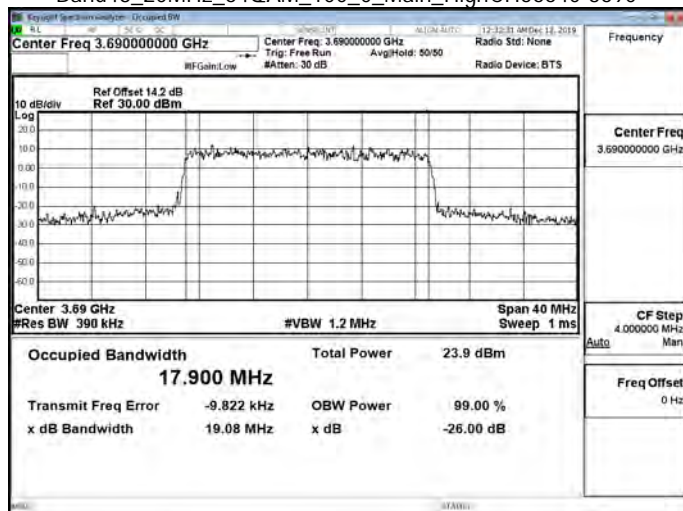
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Band48_20MHz_16QAM_100_0_Main_HighCH56640-3690



Band48_20MHz_64QAM_100_0_Main_HighCH56640-3690



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9. OUT OF BAND EMISSION AT ANTENNA TERMINALS

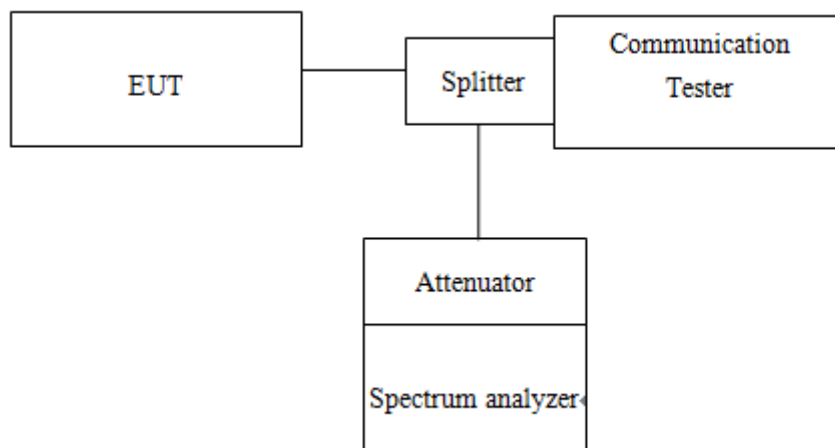
9.1. Standard Applicable

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.

9.2. Test SET-UP



9.3. Measurement Procedure

Conducted Emission

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

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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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 Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/06/2019	03/05/2020
DC Power Supply	Agilent	E3640A	MY53140006	05/31/2019	05/30/2020
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/09/2019	01/08/2020
Radio Communication Analyzer	Anritsu	MT8821C	6262044739	12/06/2019	12/05/2020
Splitter	Marvelous	MVE8586	RF265	11/20/2019	11/19/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	WATT-218FS-10	RF268	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF219	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF207	11/20/2019	11/19/2020

9.5. Measurement Result:

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

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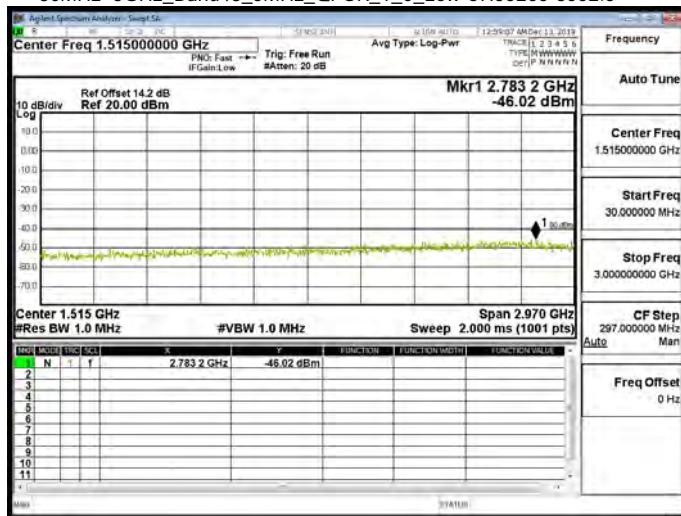
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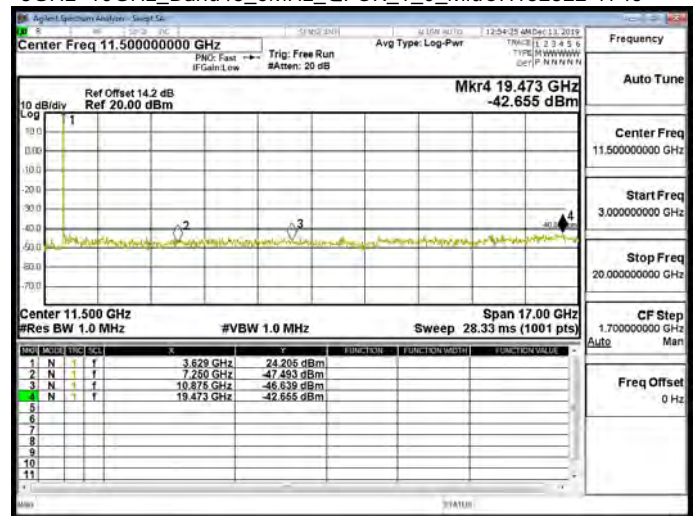
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Conducted Emission:

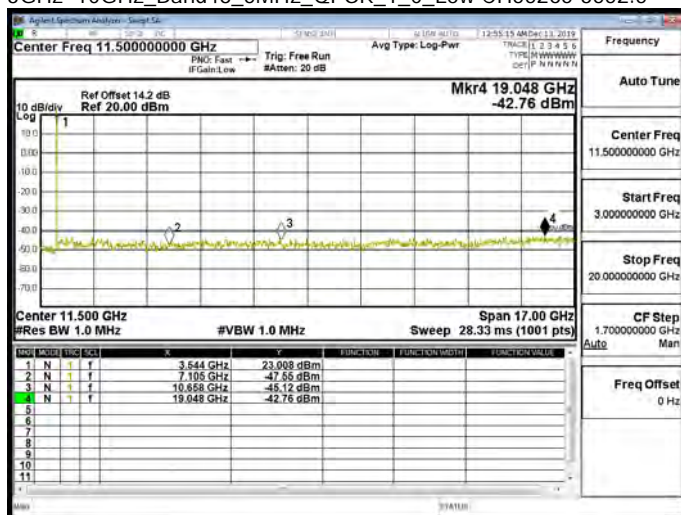
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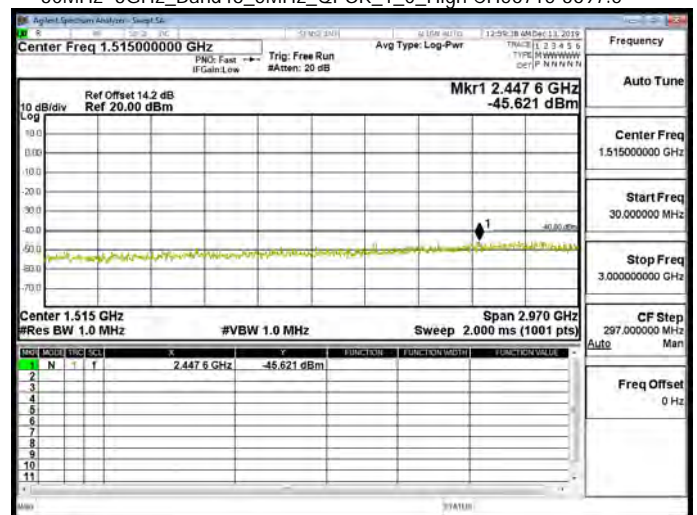
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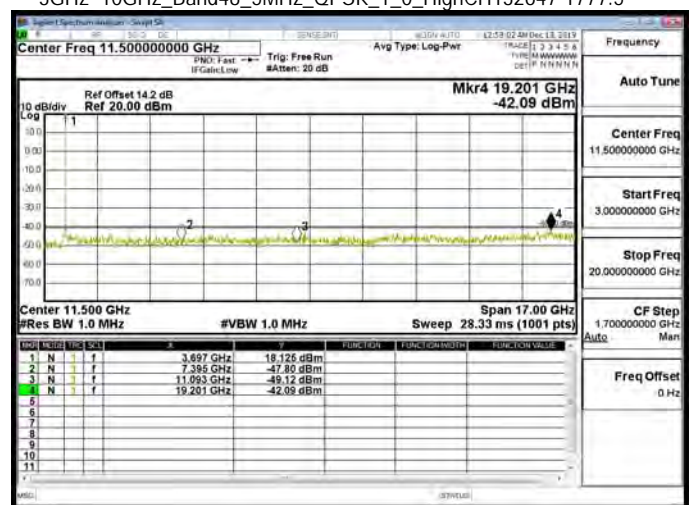
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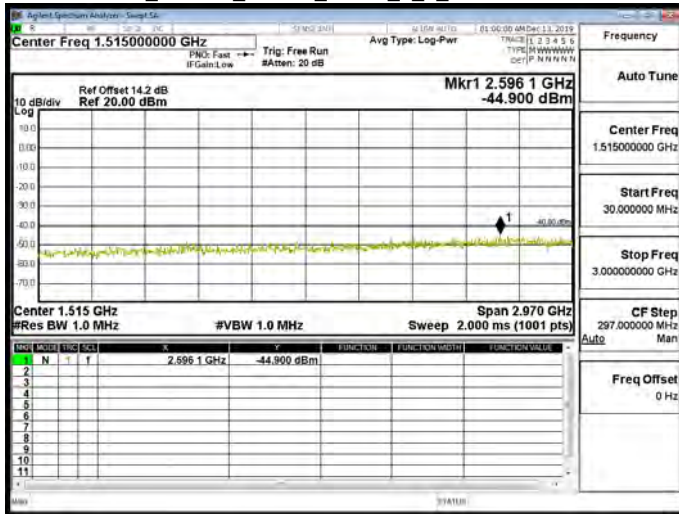


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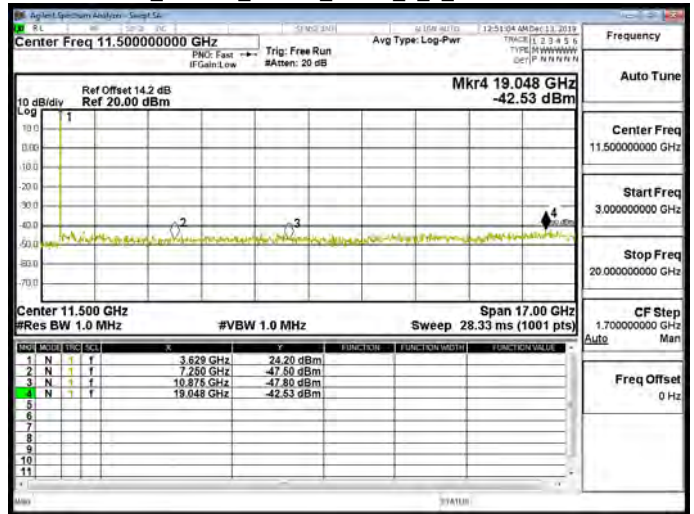
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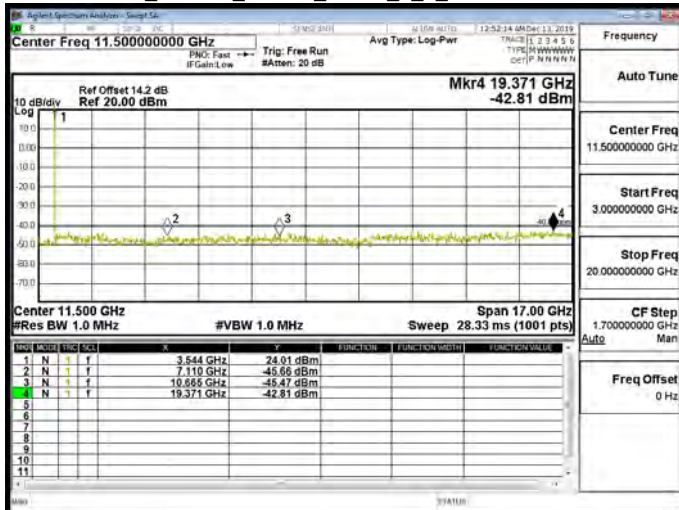
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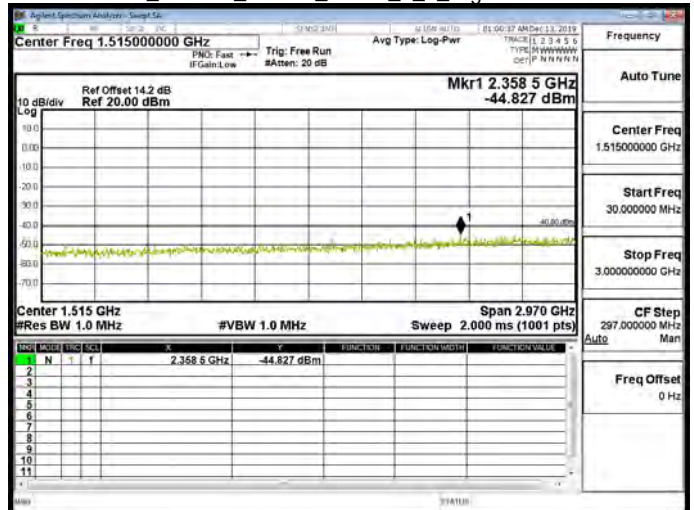
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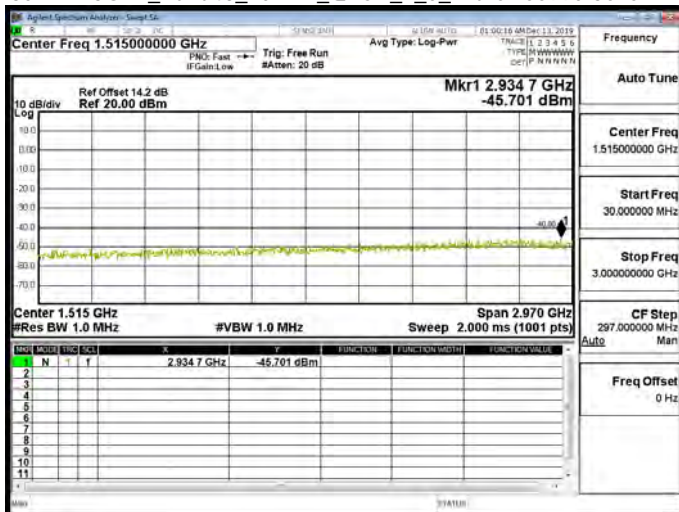
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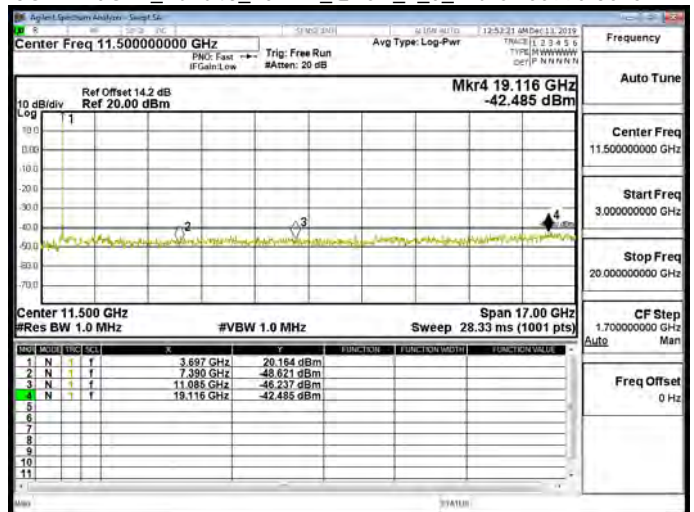
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30MHz-3GHz_Band48_10MHz_QPSK_1_0_Mid CH55990-3625



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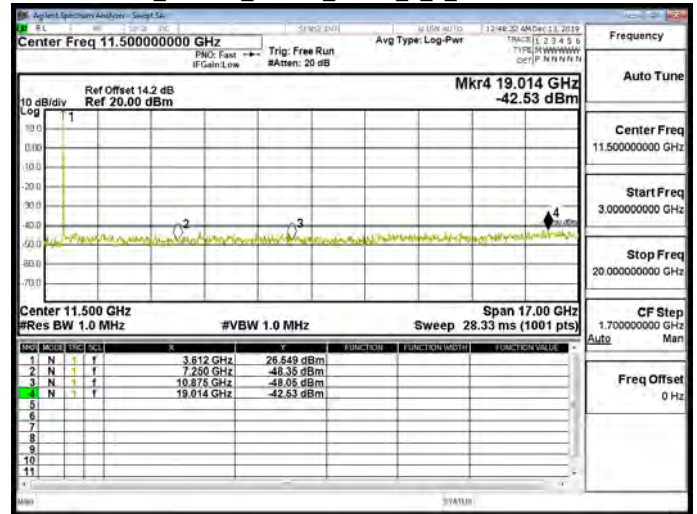
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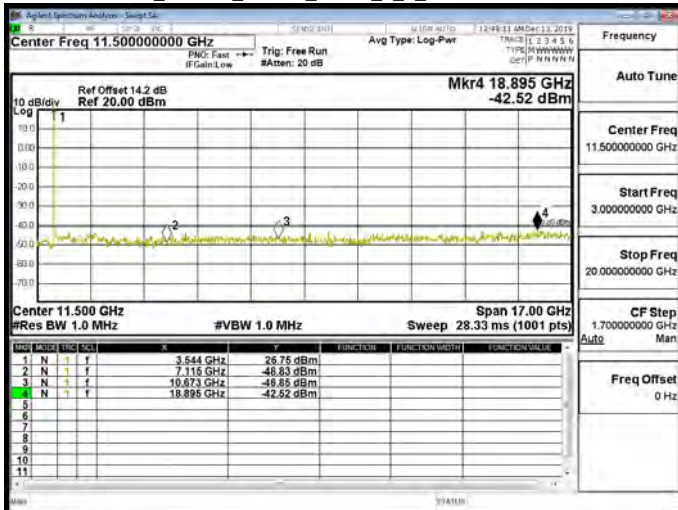
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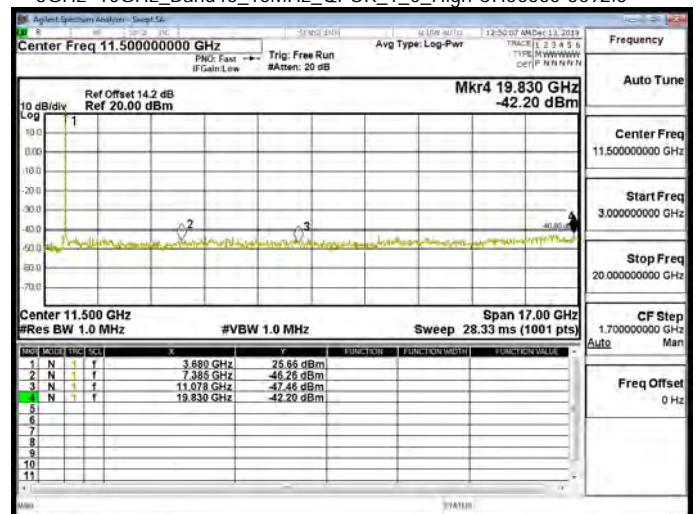
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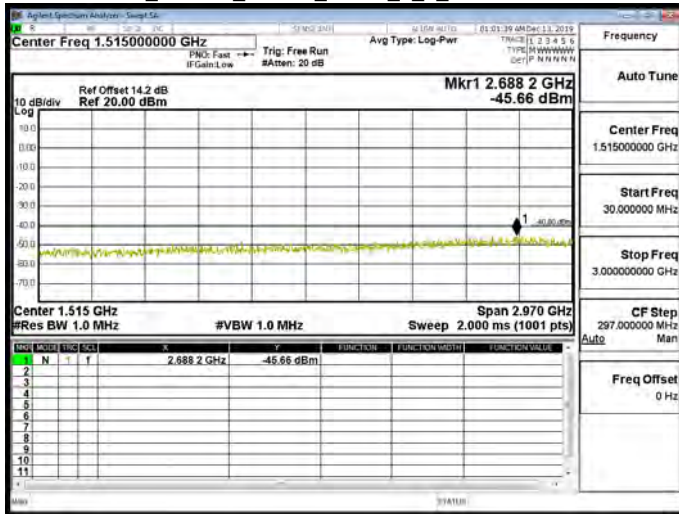
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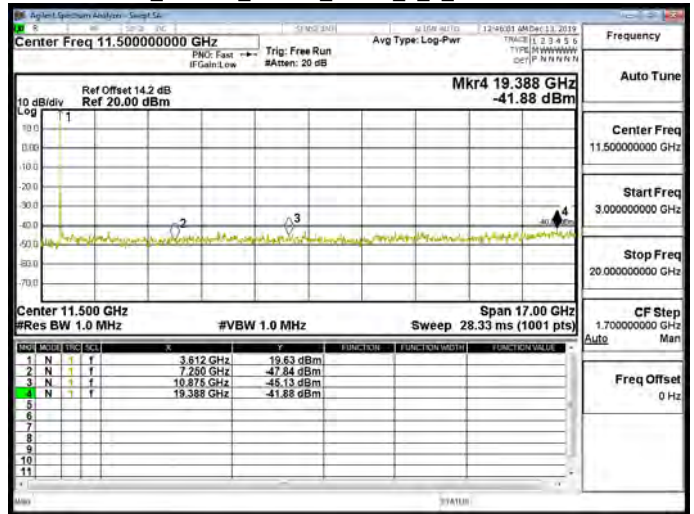
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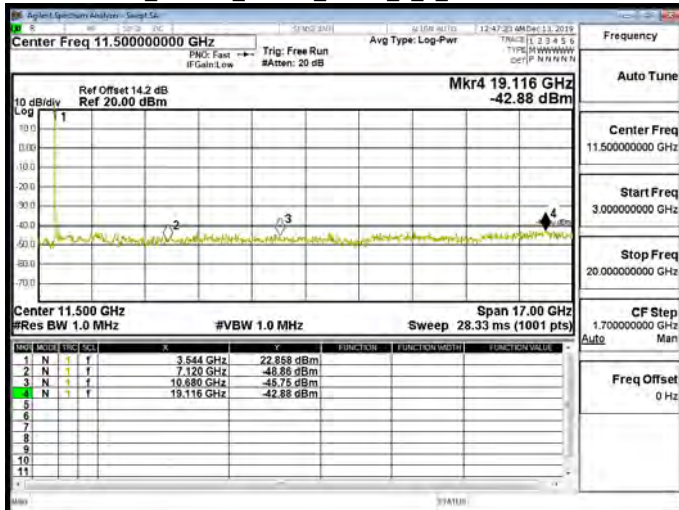
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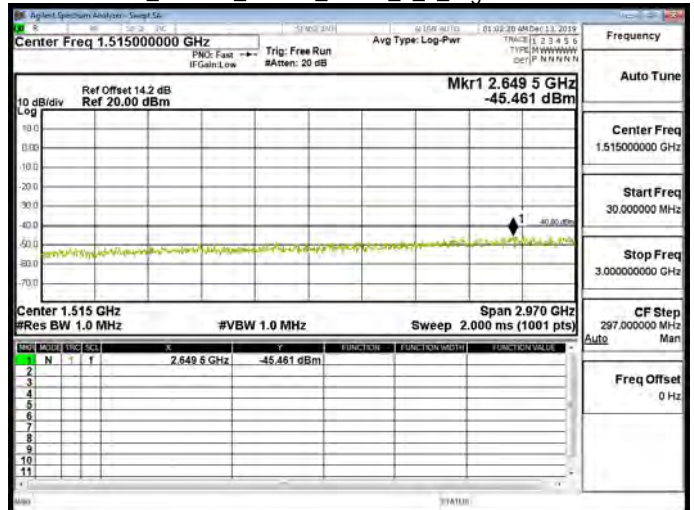
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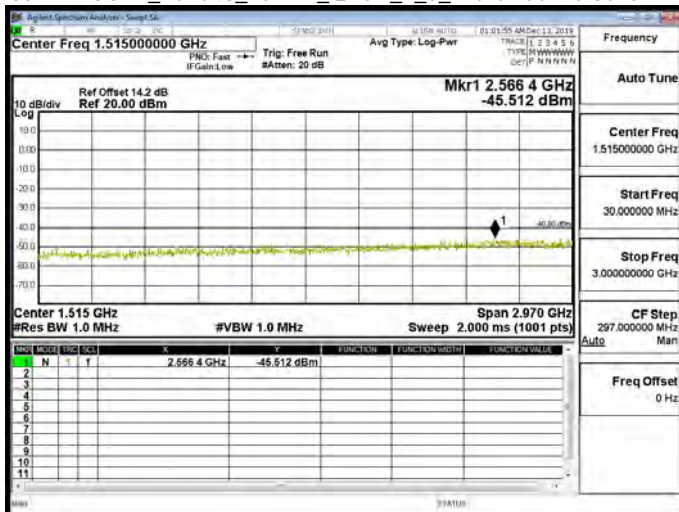
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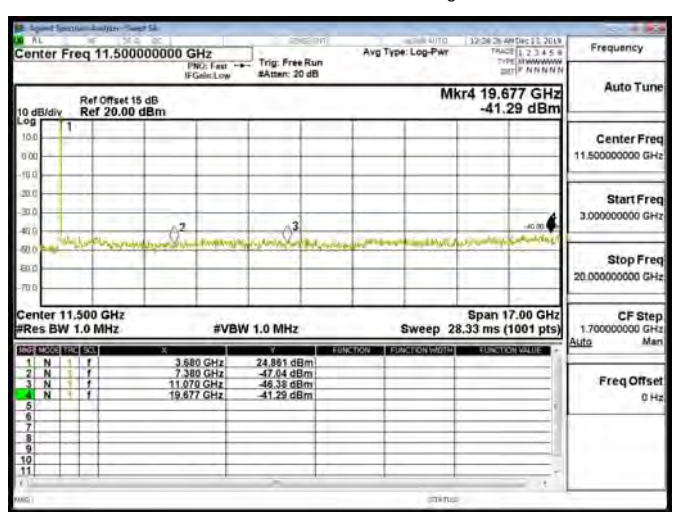
30MHz~3GHz_Band48_20MHz_QPSK_1_0_High CH56640-3690



30MHz~3GHz_Band48_20MHz_QPSK_1_0_Mid CH55990-3625



3GHz~10GHz_Band48_20MHz_QPSK_1_0_High CH56640-3690



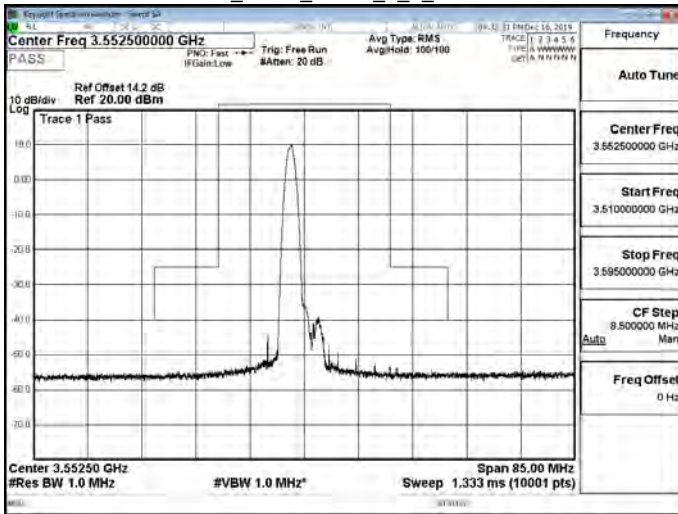
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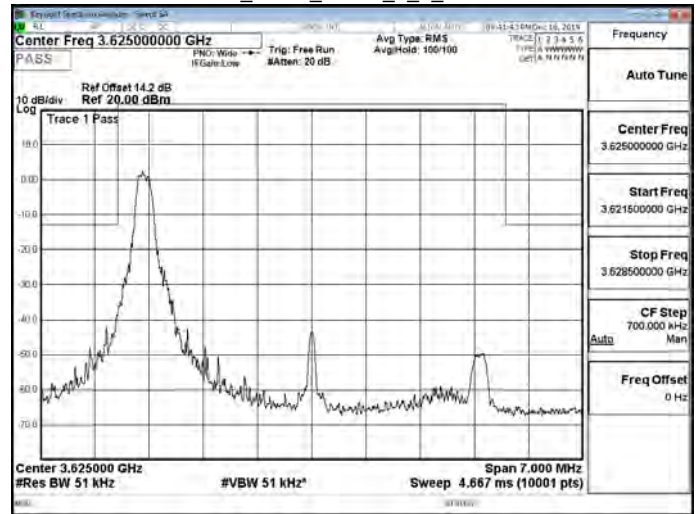
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Band Edge or Emission Mask:

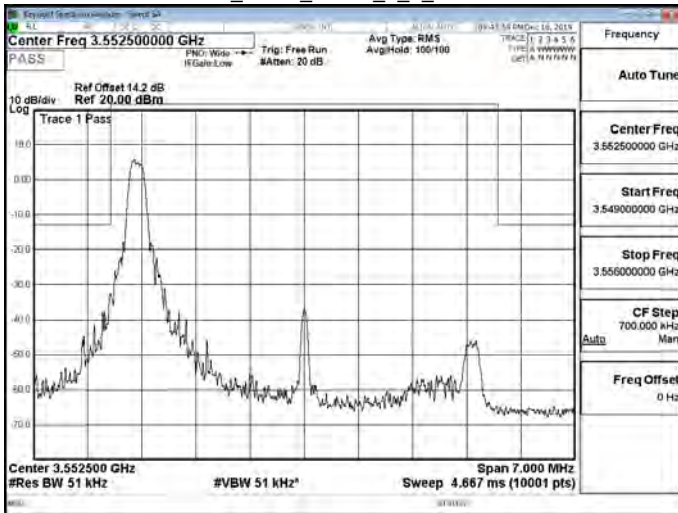
Band48_5MHz_QPSK_1_0_Low-1



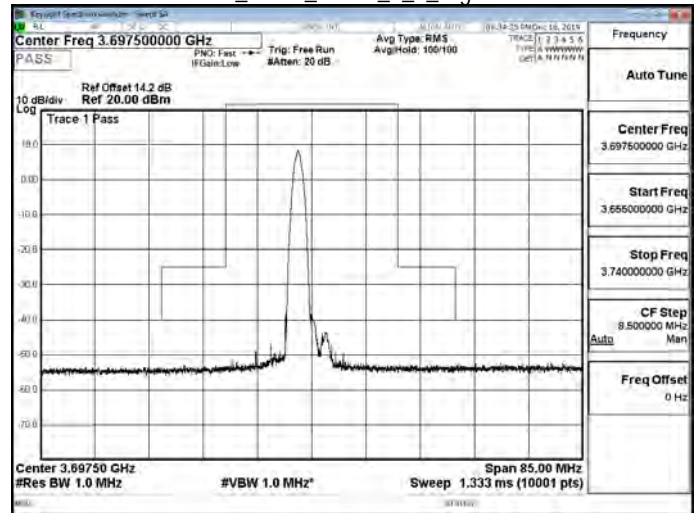
Band48_5MHz_QPSK_1_0_Mid-2



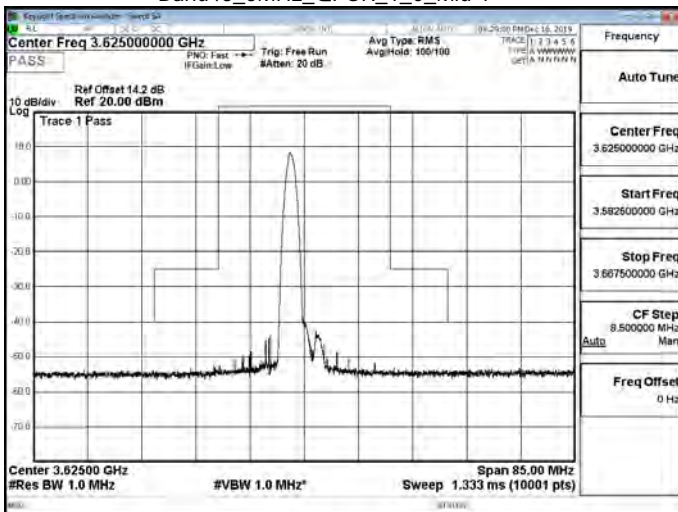
Band48_5MHz_QPSK_1_0_Low-2



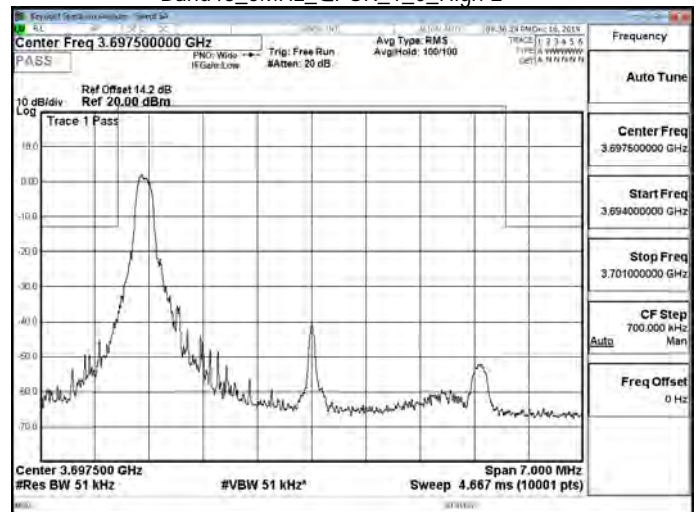
Band48_5MHz_QPSK_1_0_High-1



Band48_5MHz_QPSK_1_0_Mid-1



Band48_5MHz_QPSK_1_0_High-2

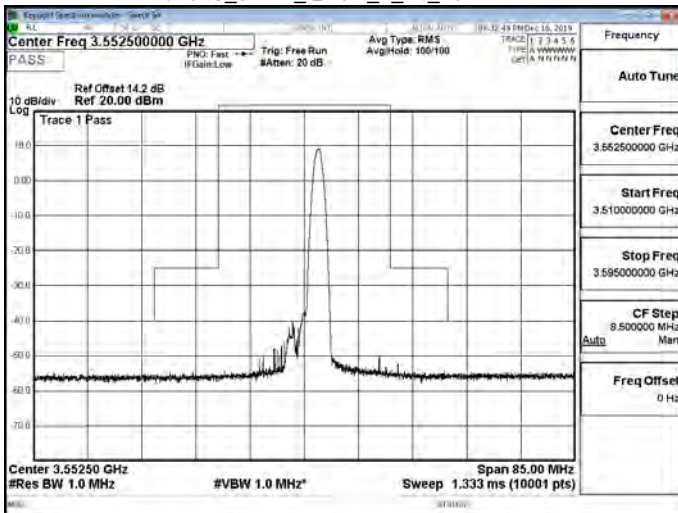


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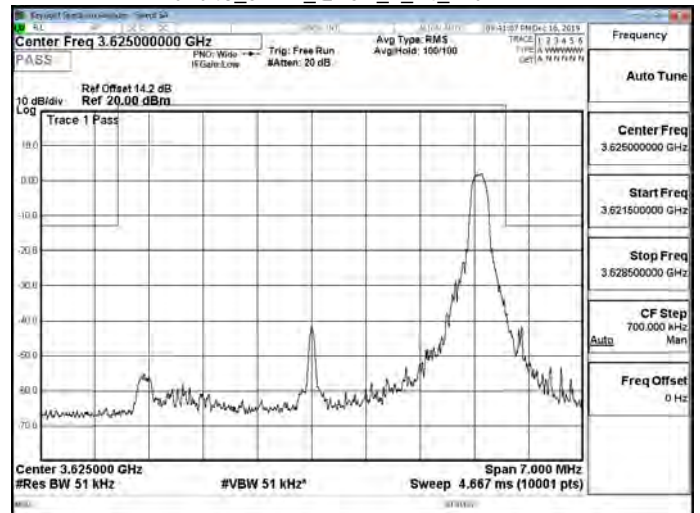
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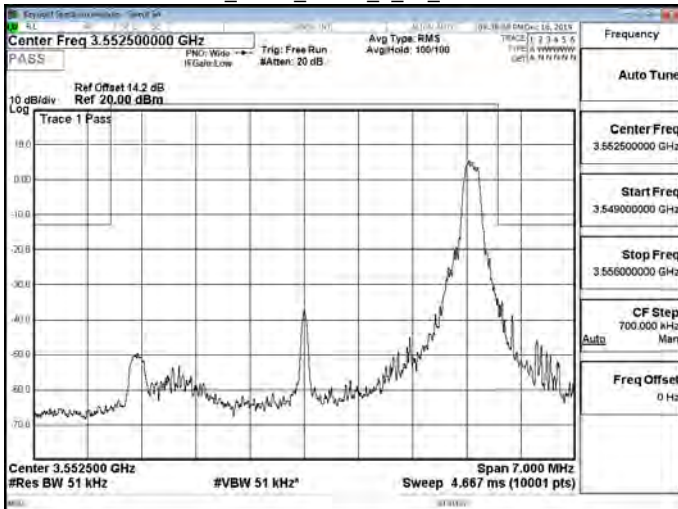
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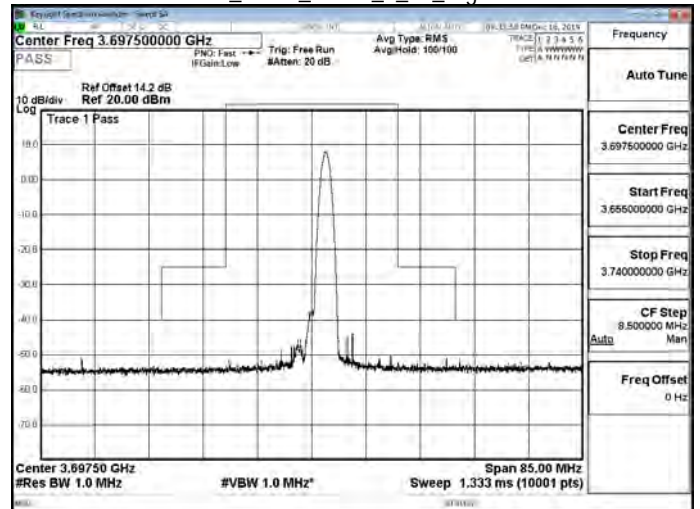
Band48_5MHz_QPSK_1_24_Mid-2



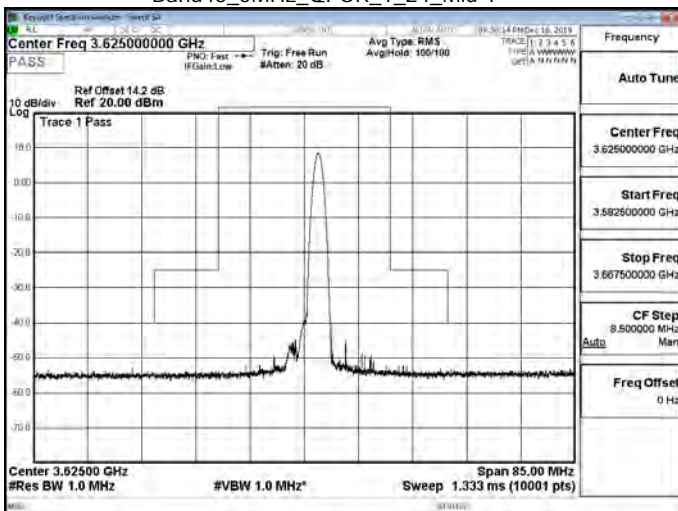
Band48_5MHz_QPSK_1_24_Low-2



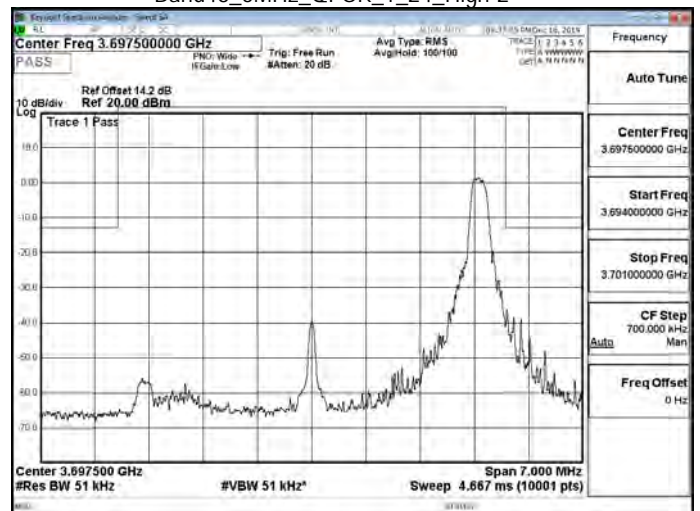
Band48_5MHz_QPSK_1_24_High-1



Band48_5MHz_QPSK_1_24_Mid-1



Band48_5MHz_QPSK_1_24_High-2

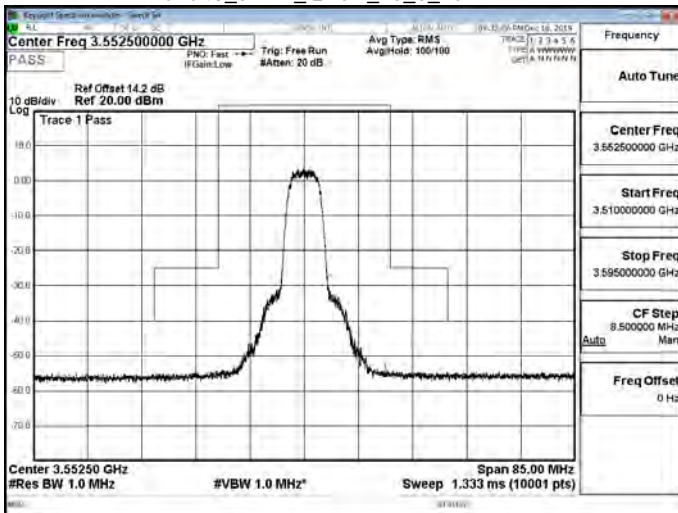


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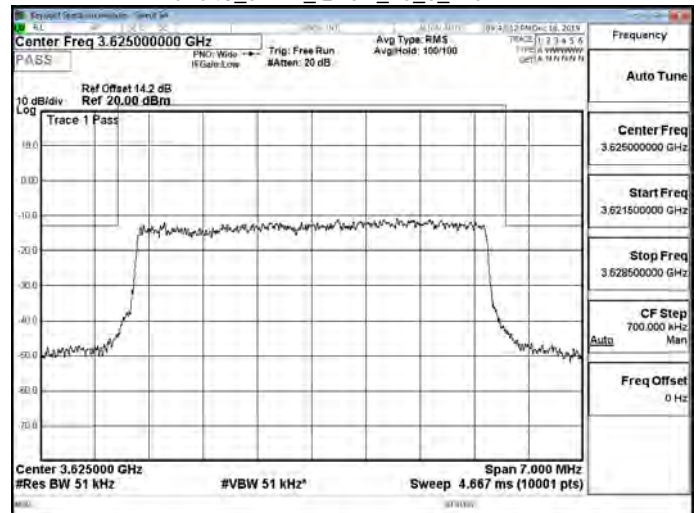
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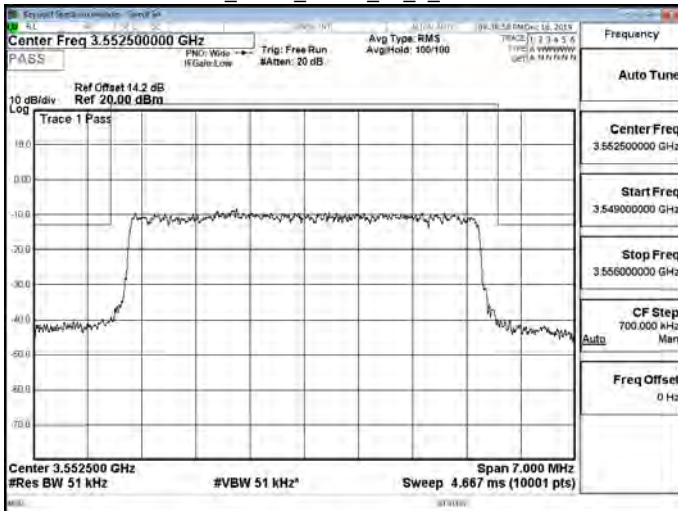
Band48_5MHz_QPSK_25_0_Low-1



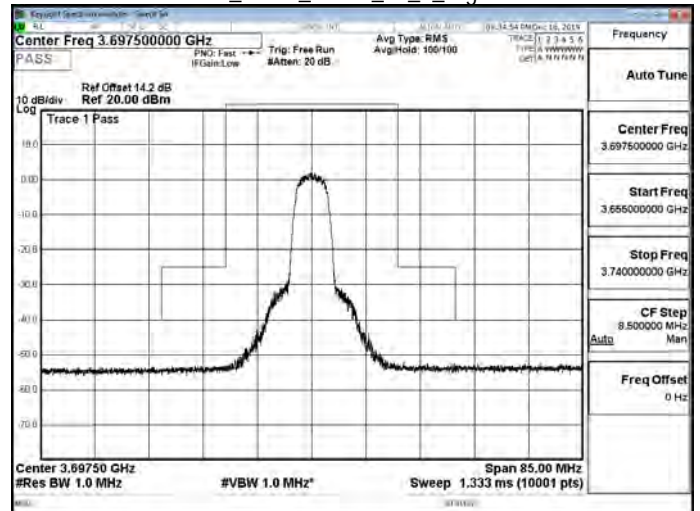
Band48_5MHz_QPSK_25_0_Mid-2



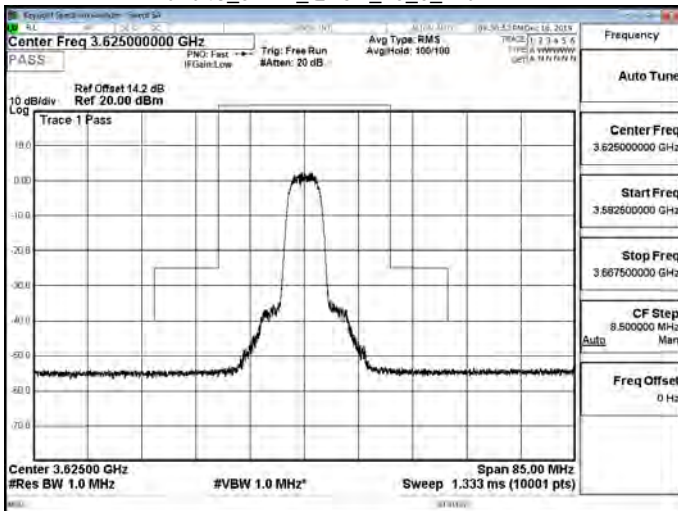
Band48_5MHz_QPSK_25_0_Low-2



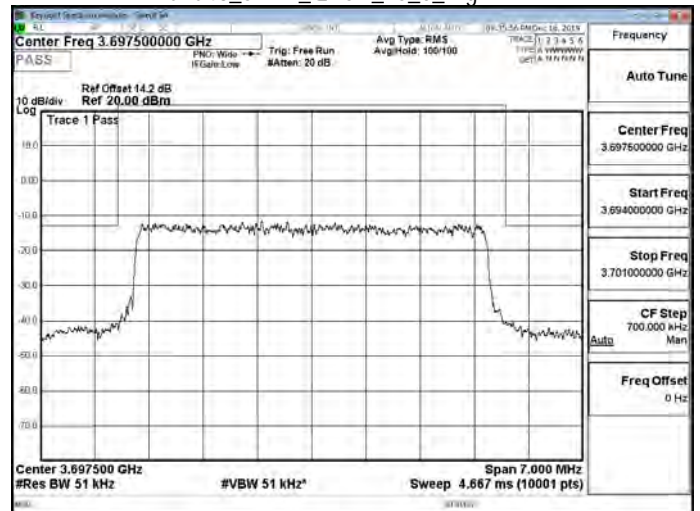
Band48_5MHz_QPSK_25_0_High-1



Band48_5MHz_QPSK_25_0_Mid-1



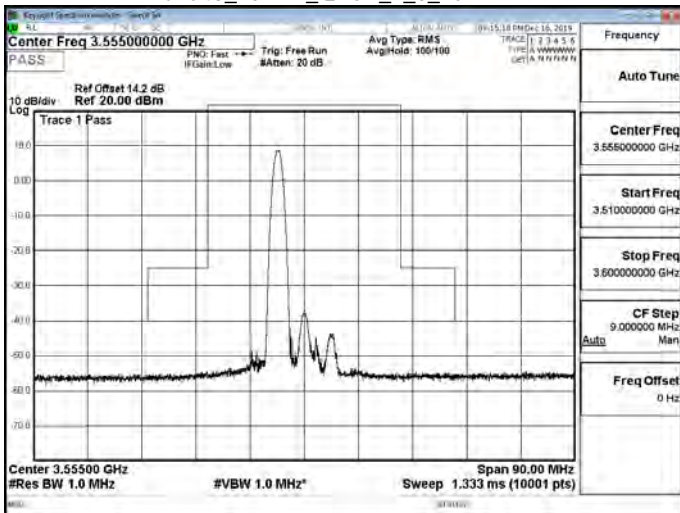
Band48_5MHz_QPSK_25_0_High-2



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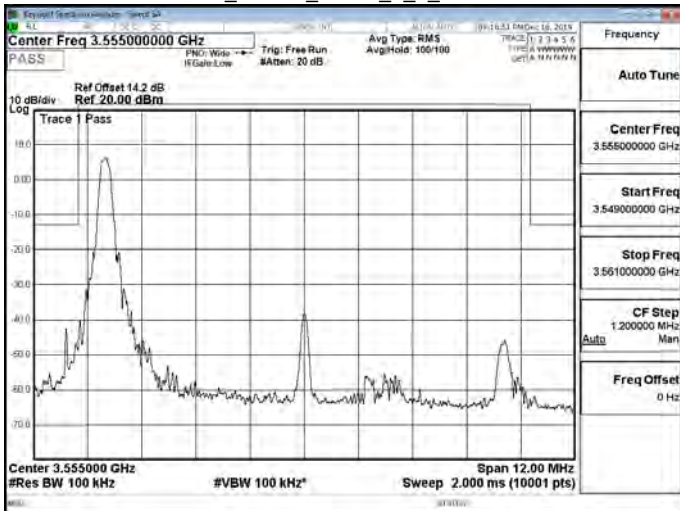
Band48_10MHz_QPSK_1_0_Low-1



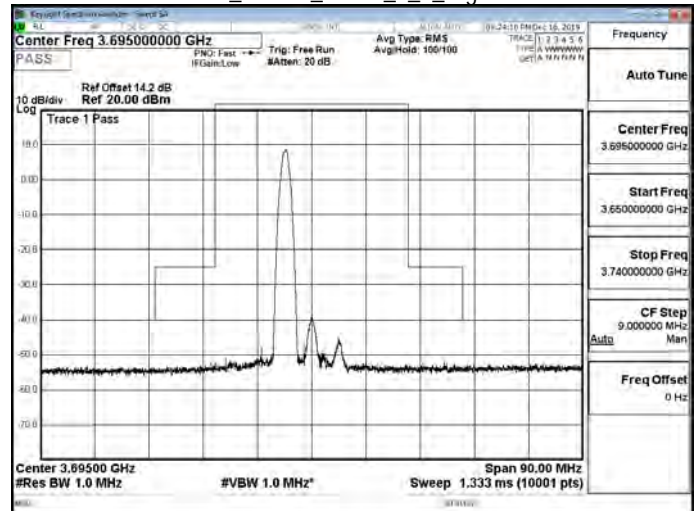
Band48_10MHz_QPSK_1_0_Mid-2



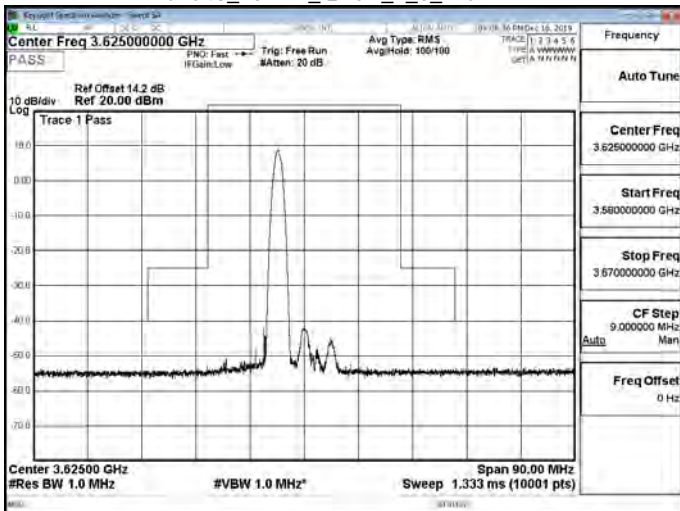
Band48_10MHz_QPSK_1_0_Low-2



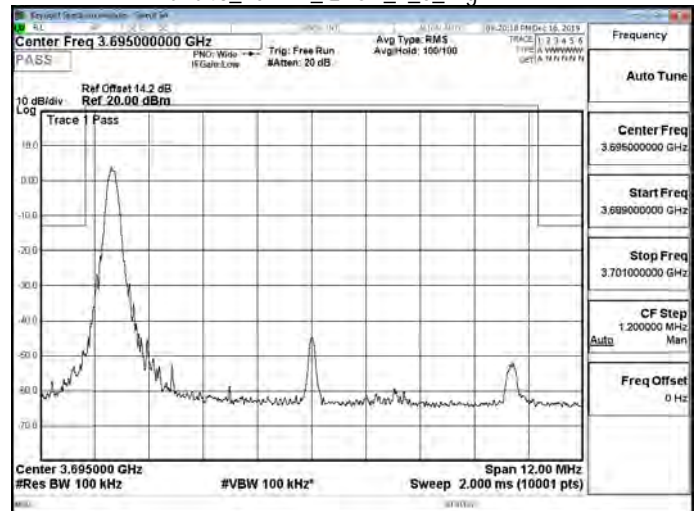
Band48_10MHz_QPSK_1_0_High-1



Band48_10MHz_QPSK_1_0_Mid-1



Band48_10MHz_QPSK_1_0_High-2

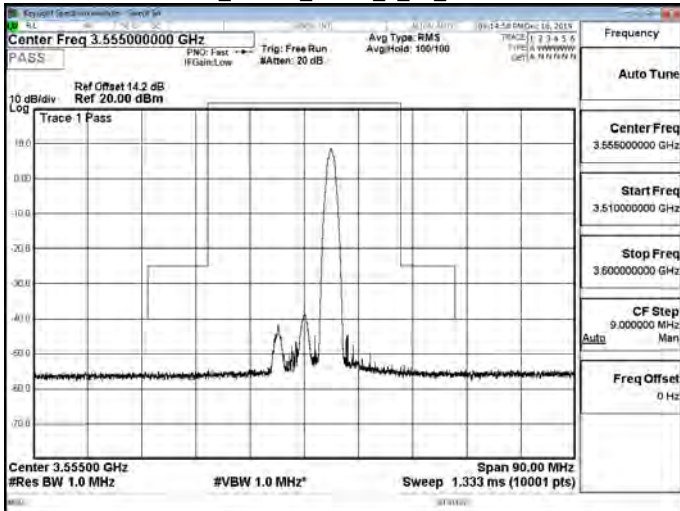


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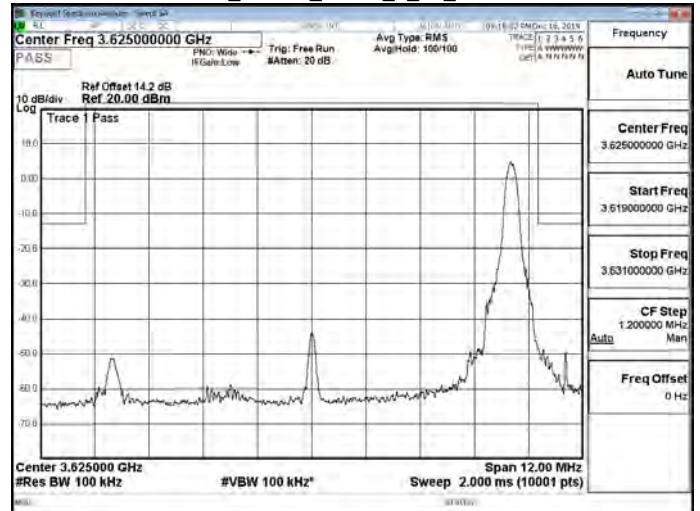
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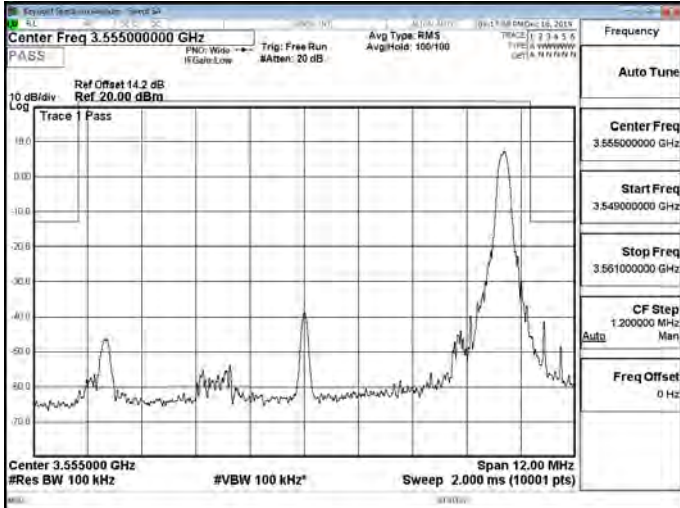
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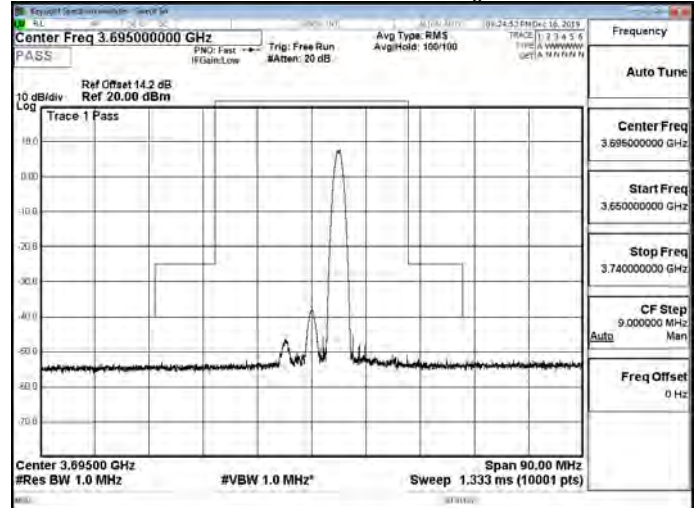
Band48_10MHz_QPSK_1_49_Mid-2



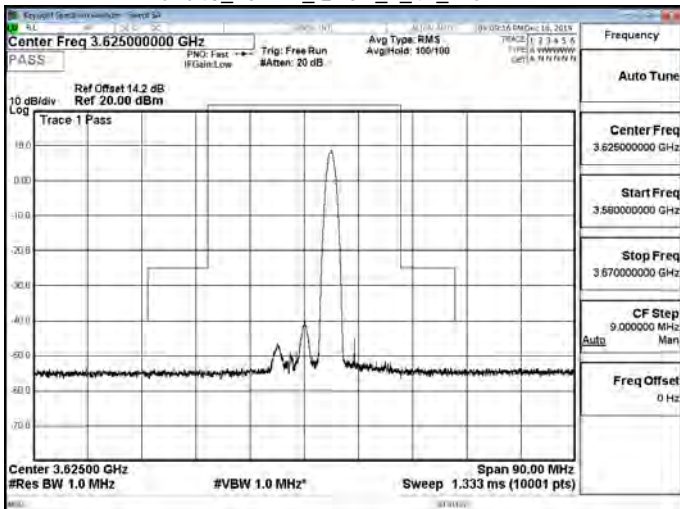
Band48_10MHz_QPSK_1_49_Low-2



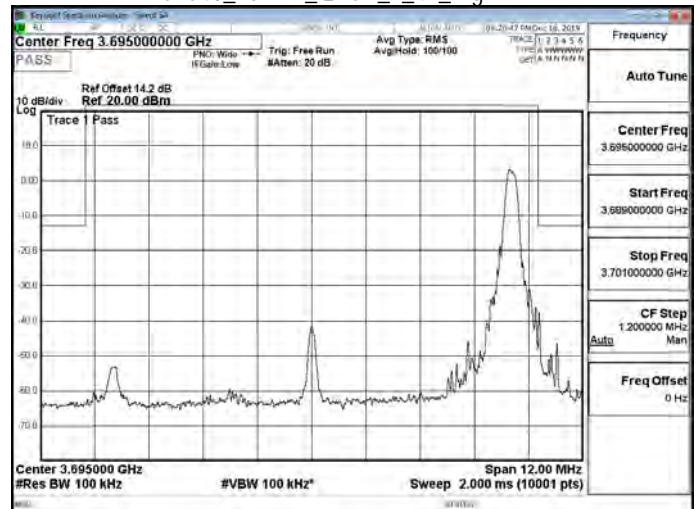
Band48_10MHz_QPSK_1_49_High-1



Band48_10MHz_QPSK_1_49_Mid-1



Band48_10MHz_QPSK_1_49_High-2

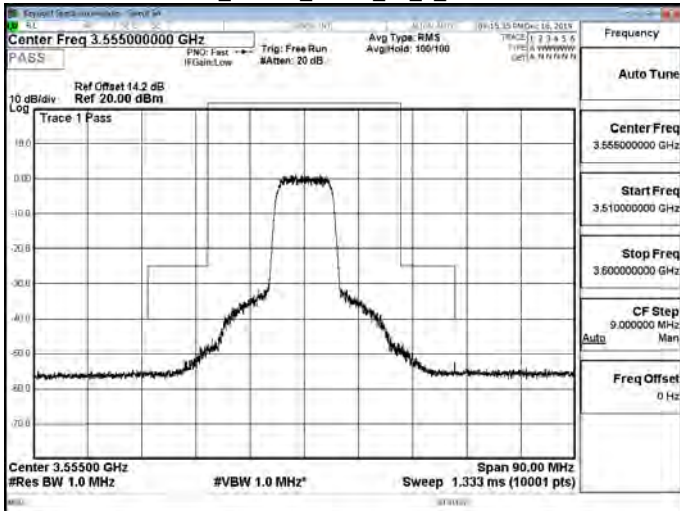


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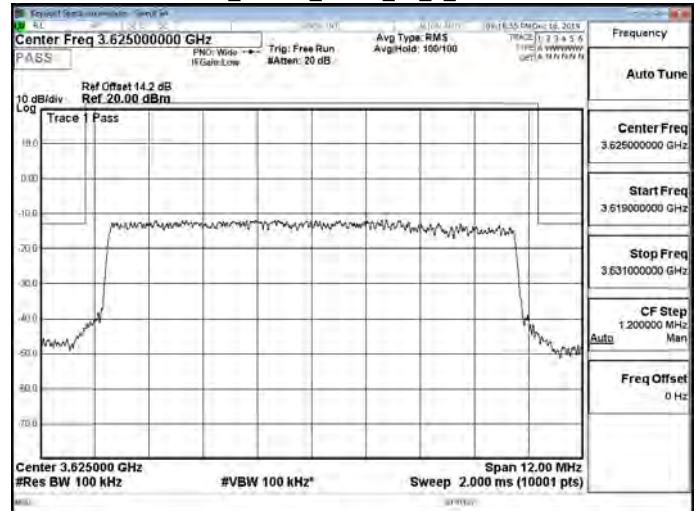
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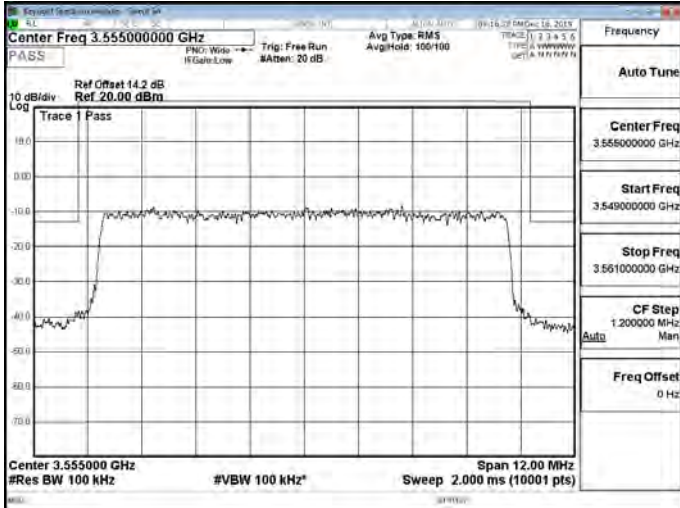
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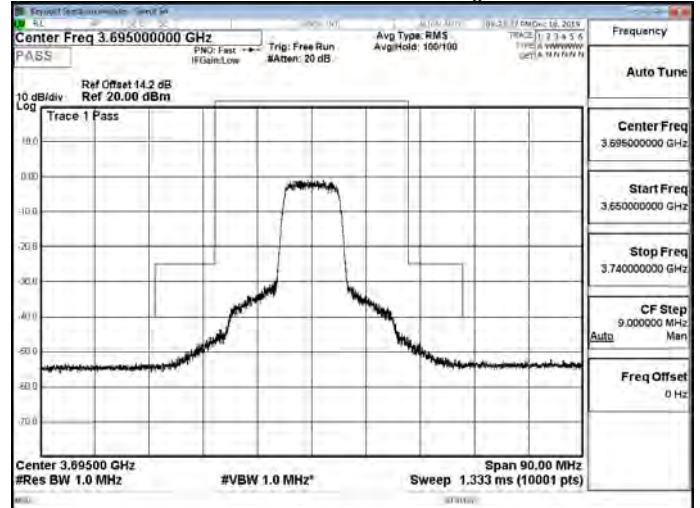
Band48_10MHz_QPSK_50_0_Mid-2



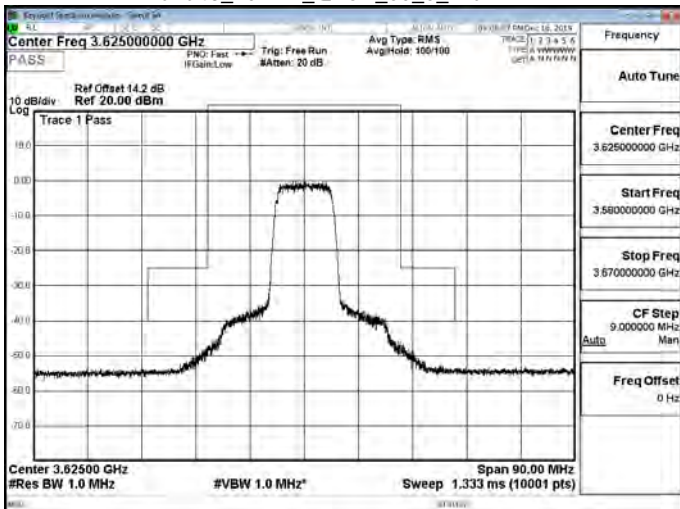
Band48_10MHz_QPSK_50_0_Low-2



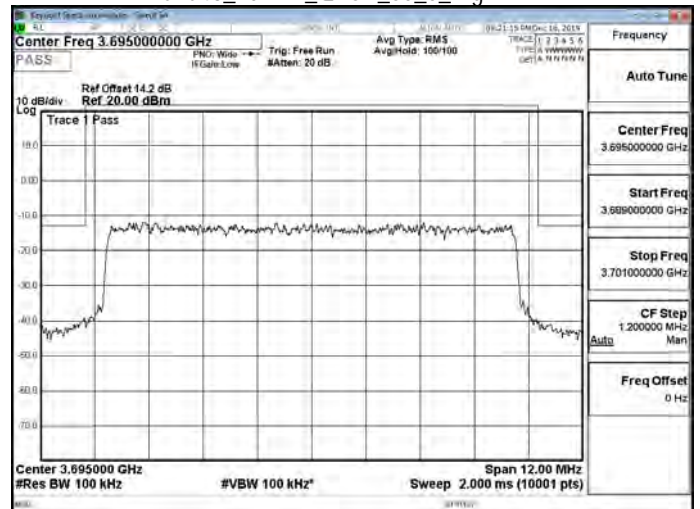
Band48_10MHz_QPSK_50_0_High-1



Band48_10MHz_QPSK_50_0_Mid-1



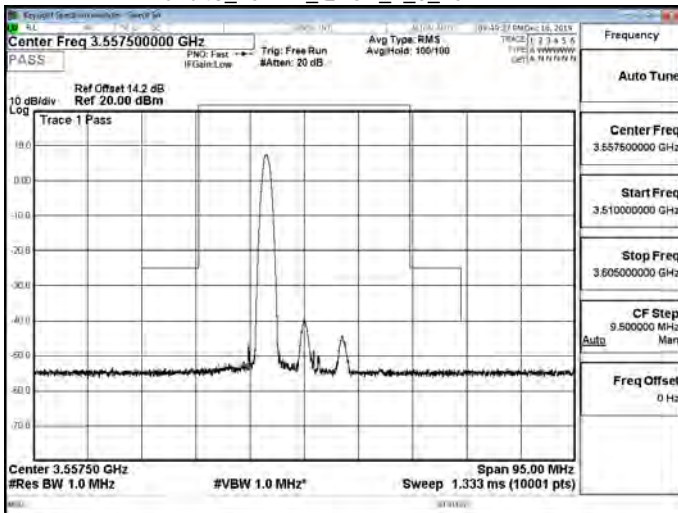
Band48_10MHz_QPSK_50_0_High-2



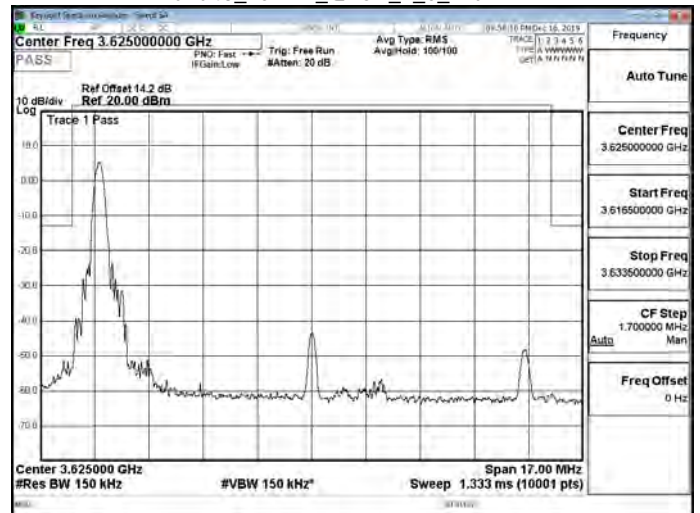
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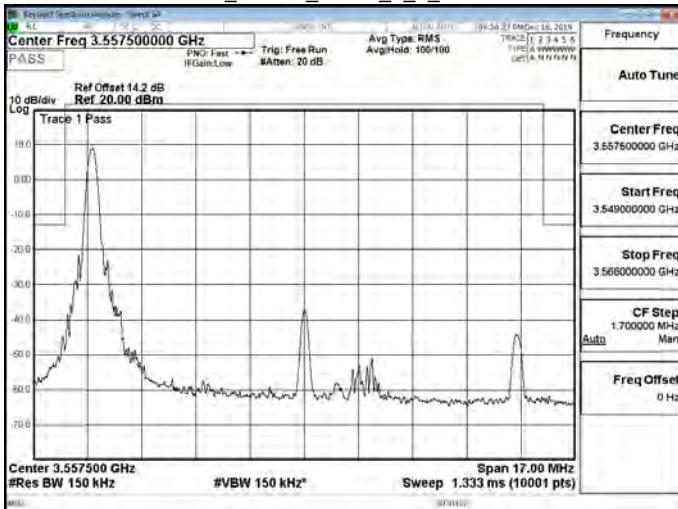
Band48_15MHz_QPSK_1_0_Low-1



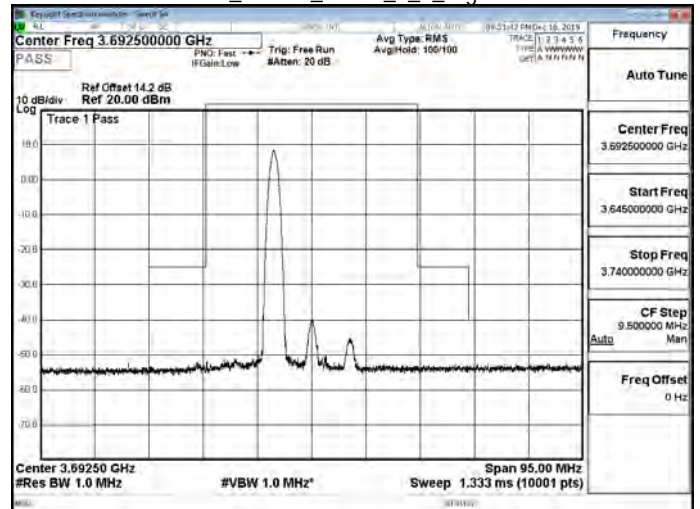
Band48_15MHz_QPSK_1_0_Mid-2



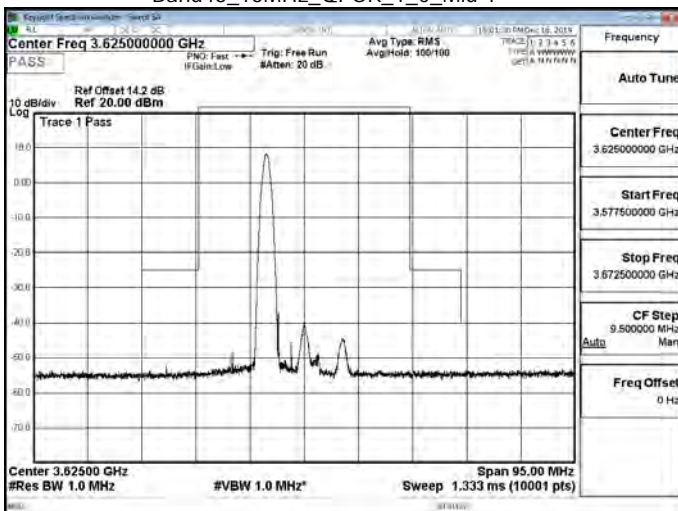
Band48_15MHz_QPSK_1_0_Low-2



Band48_15MHz_QPSK_1_0_High-1



Band48_15MHz_QPSK_1_0_Mid-1



Band48_15MHz_QPSK_1_0_High-2

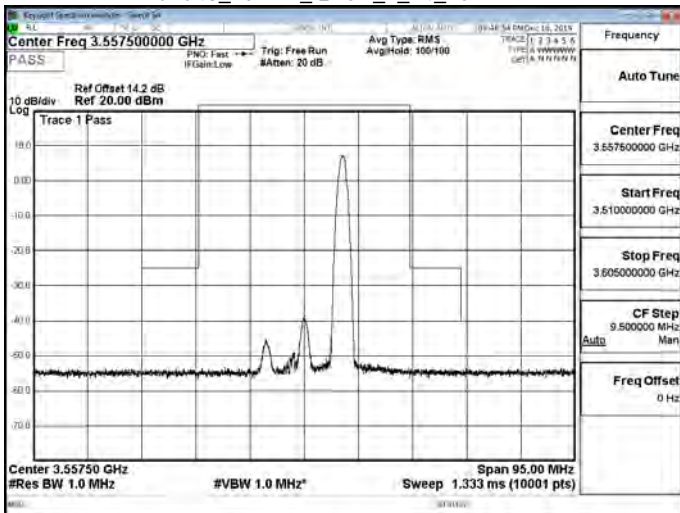


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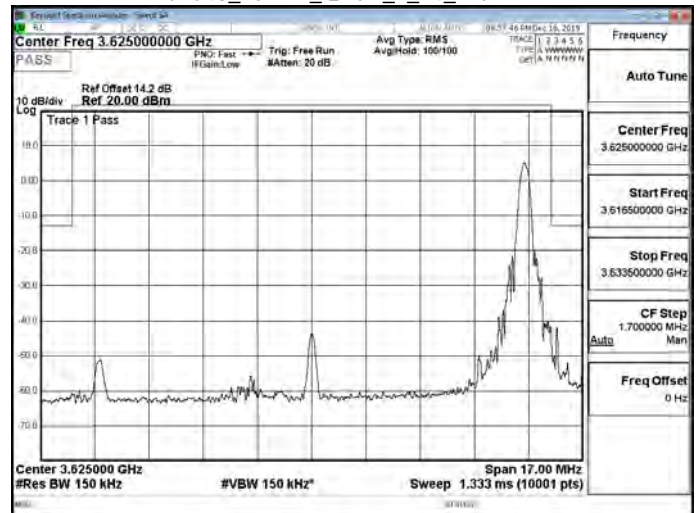
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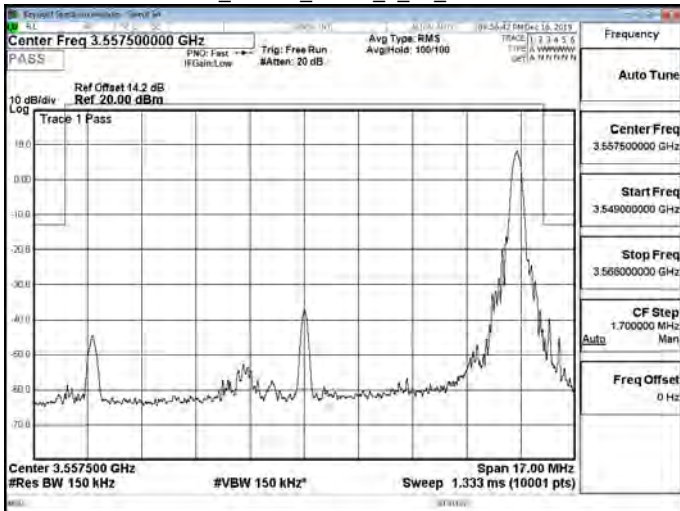
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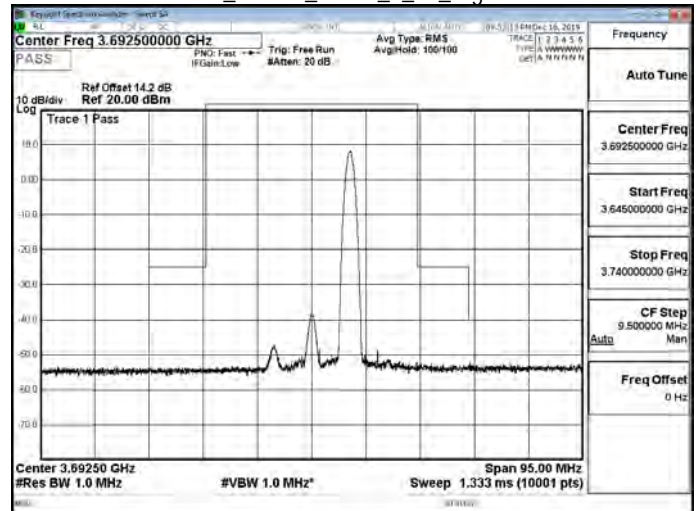
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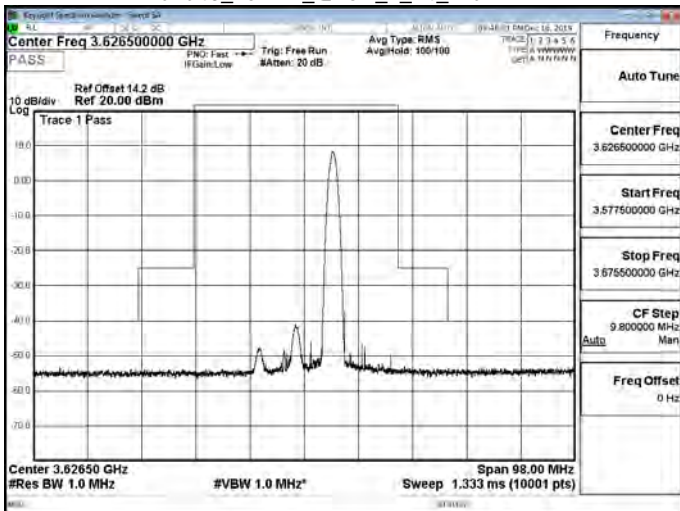
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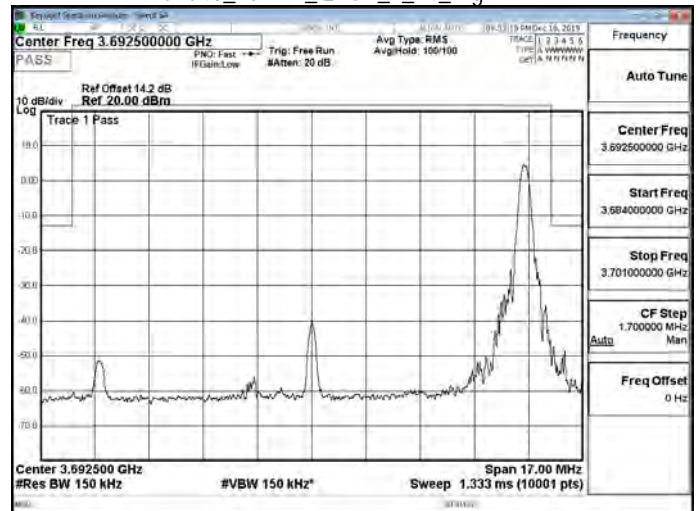
Band48_15MHz_QPSK_1_74_High-1



Band48_15MHz_QPSK_1_74_Mid-1



Band48_15MHz_QPSK_1_74_High-2

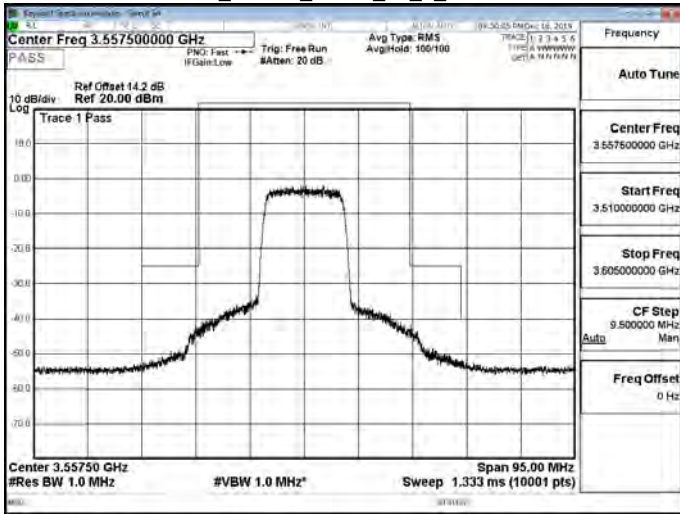


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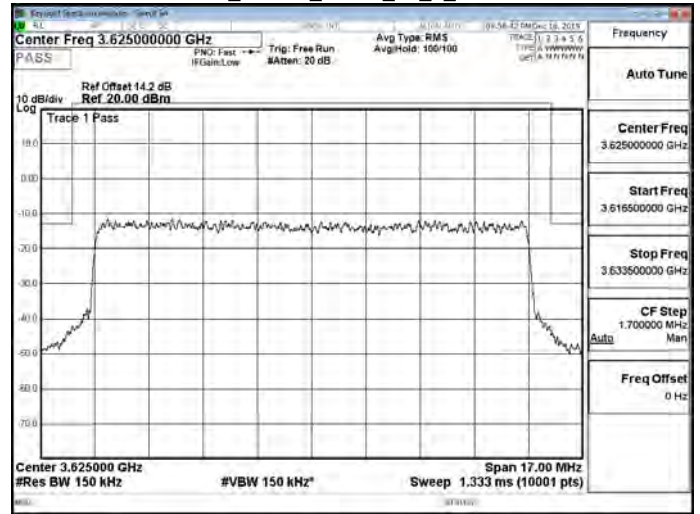
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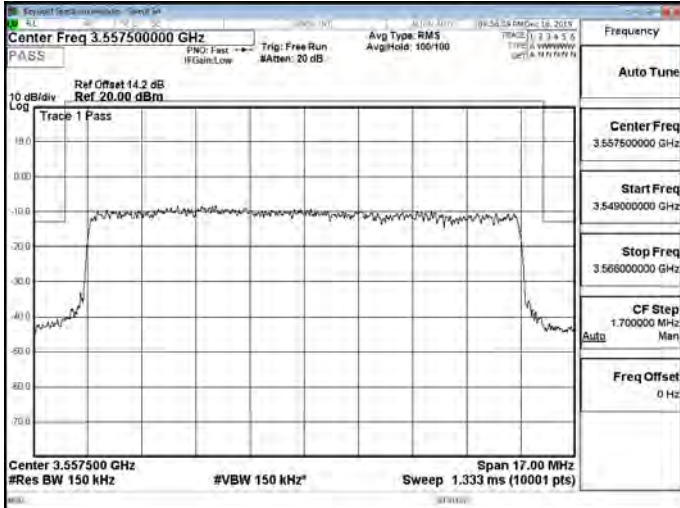
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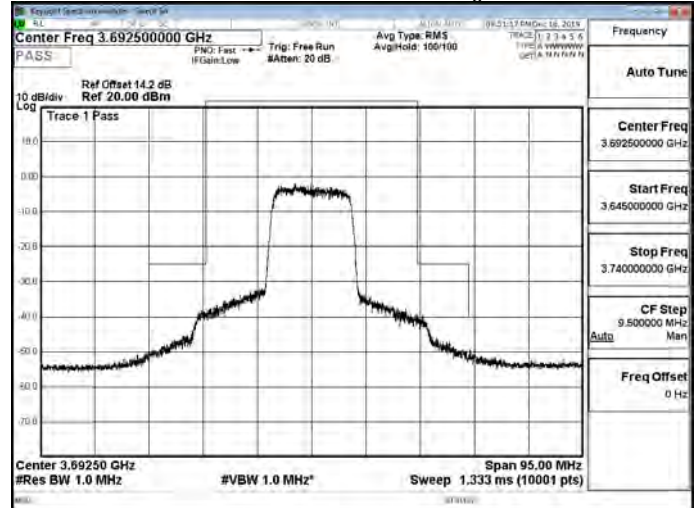
Band48_15MHz_QPSK_75_0_Mid-2



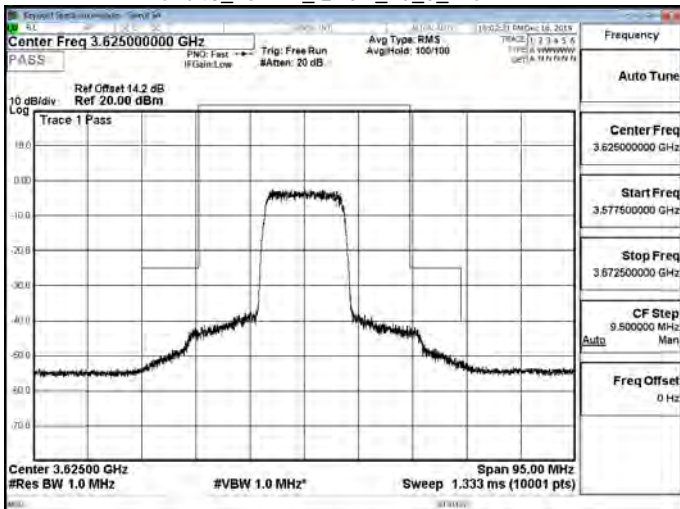
Band48_15MHz_QPSK_75_0_Low-2



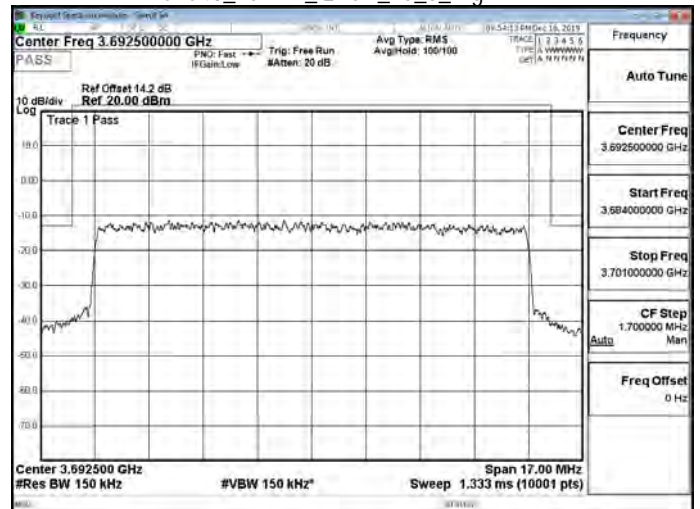
Band48_15MHz_QPSK_75_0_High-1



Band48_15MHz_QPSK_75_0_Mid-1



Band48_15MHz_QPSK_75_0_High-2

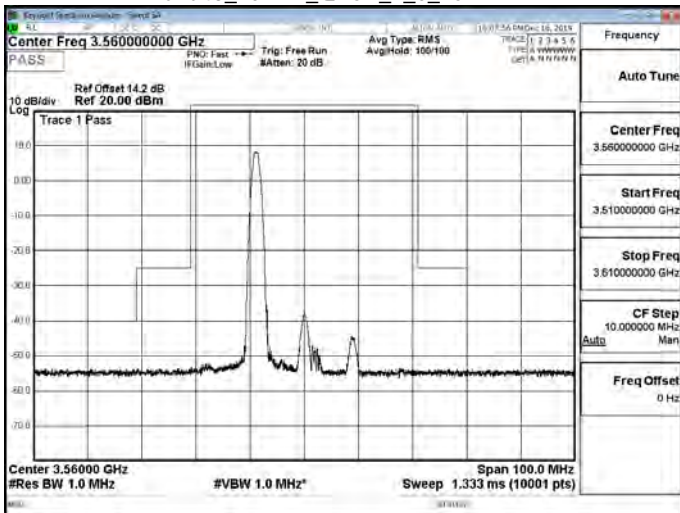


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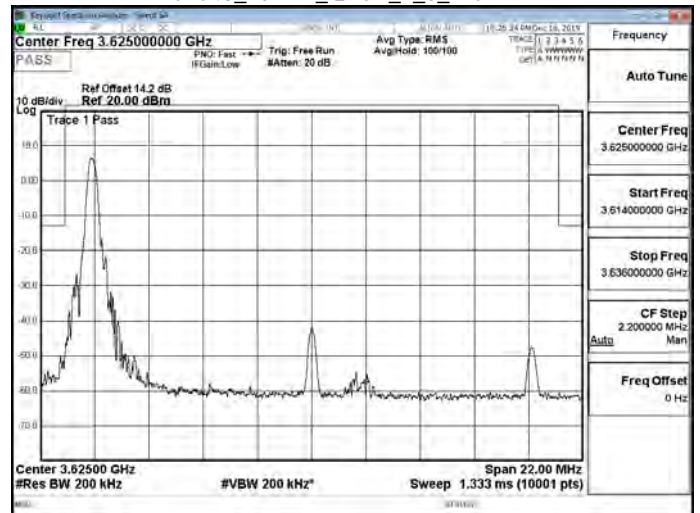
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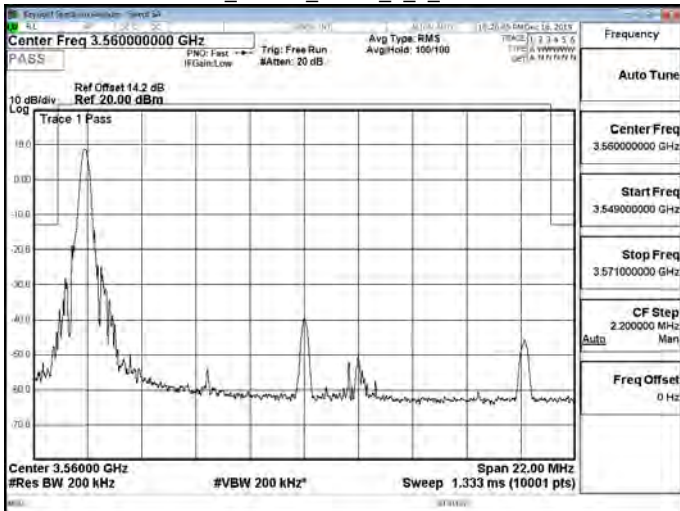
Band48_20MHz_QPSK_1_0_Low-1



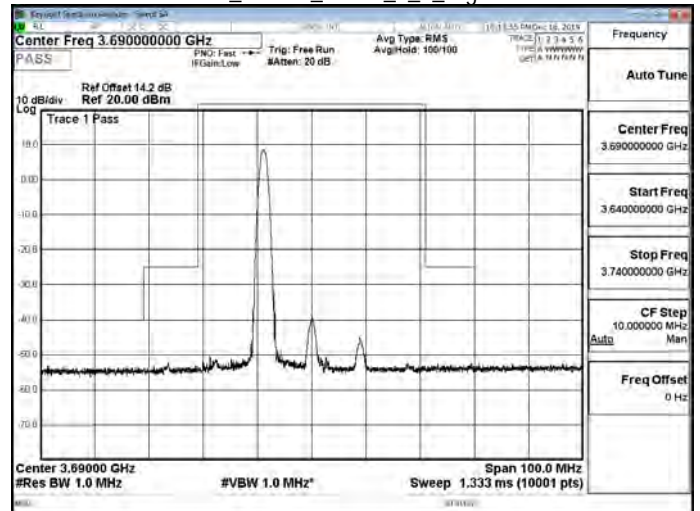
Band48_20MHz_QPSK_1_0_Mid-2



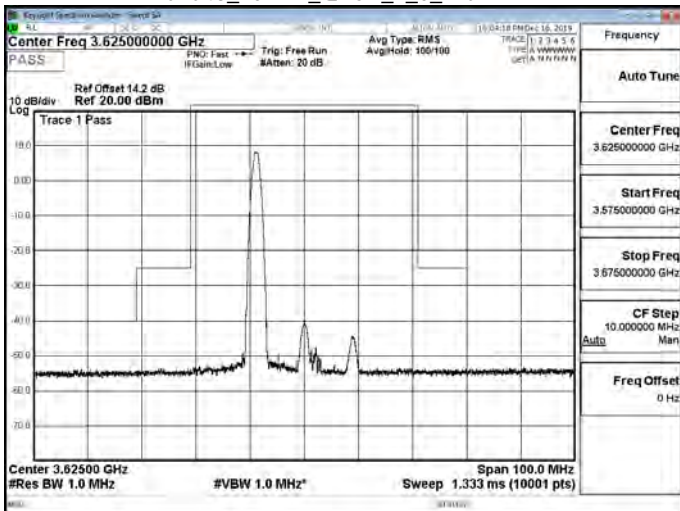
Band48_20MHz_QPSK_1_0_Low-2



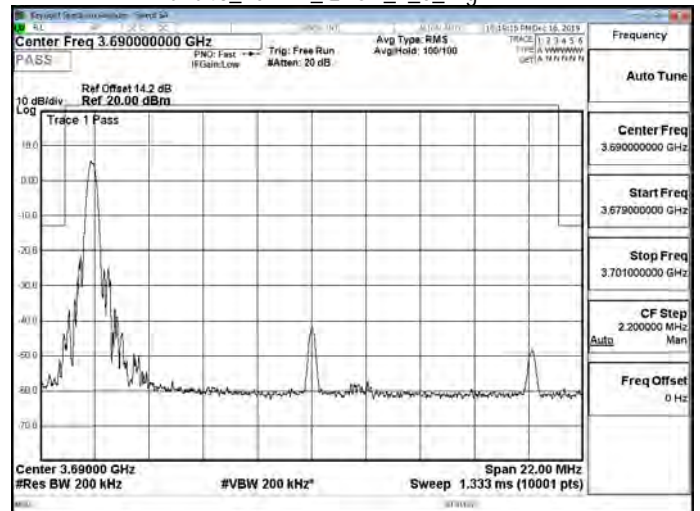
Band48_20MHz_QPSK_1_0_High-1



Band48_20MHz_QPSK_1_0_Mid-1



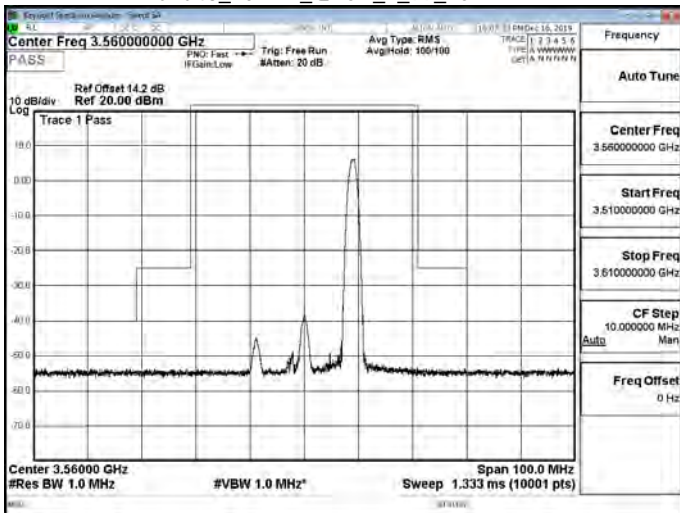
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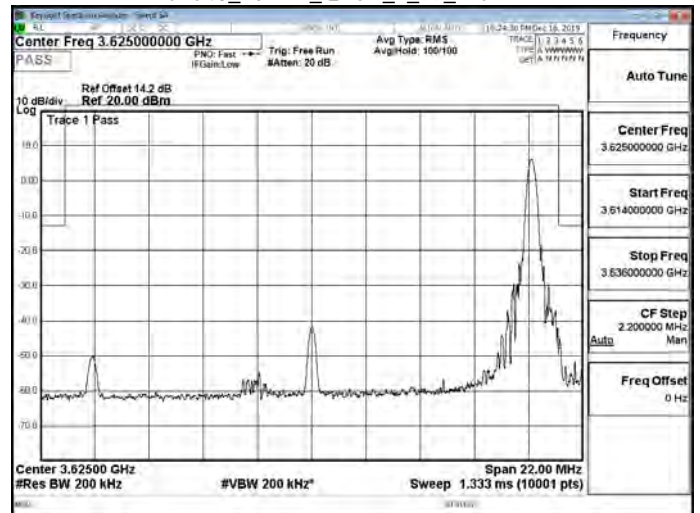
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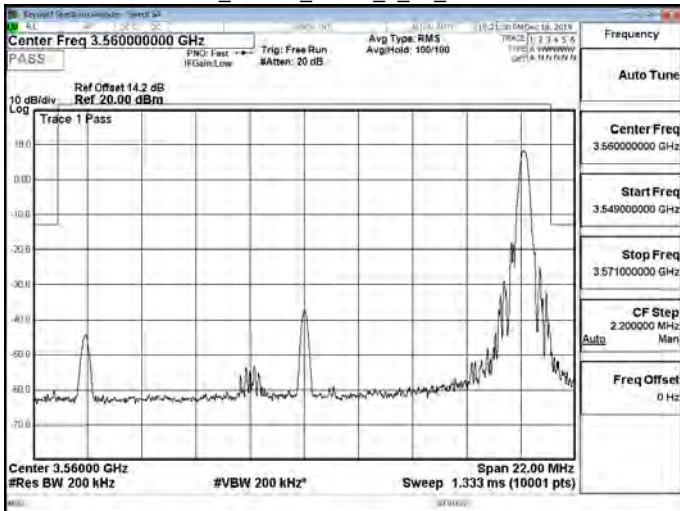
Band48_20MHz_QPSK_1_99_Low-1



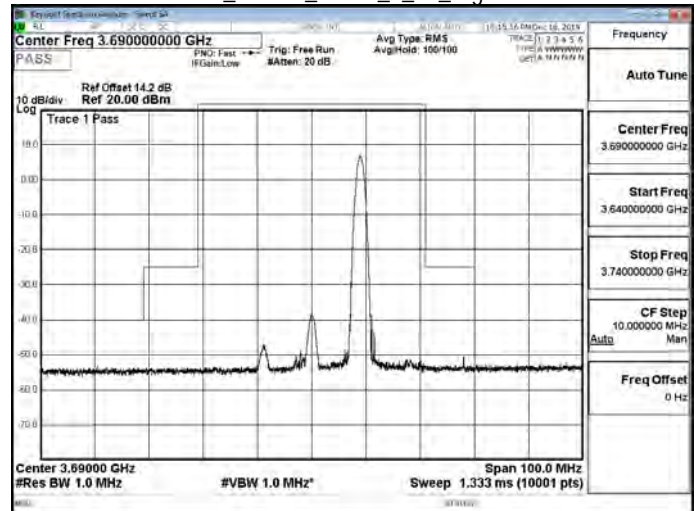
Band48_20MHz_QPSK_1_99_Mid-2



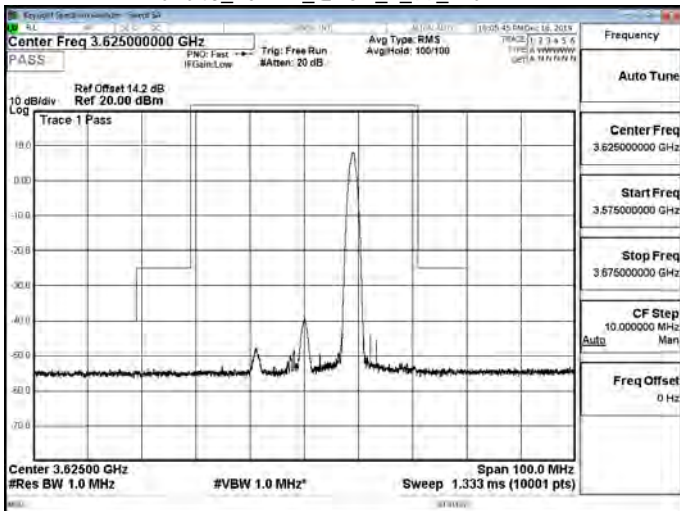
Band48_20MHz_QPSK_1_99_Low-2



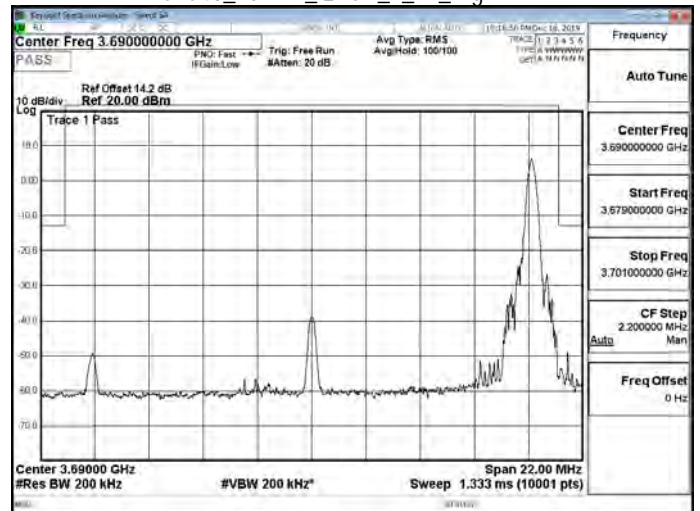
Band48_20MHz_QPSK_1_99_High-1



Band48_20MHz_QPSK_1_99_Mid-1



Band48_20MHz_QPSK_1_99_High-2

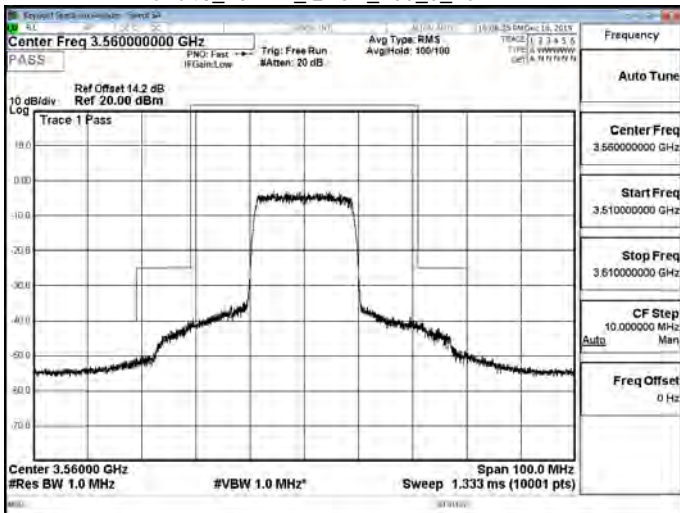


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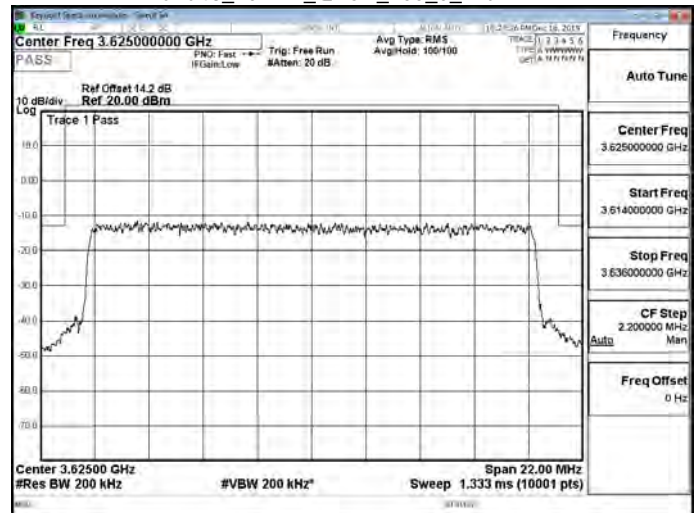
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Band48_20MHz_QPSK_100_0_Low-1



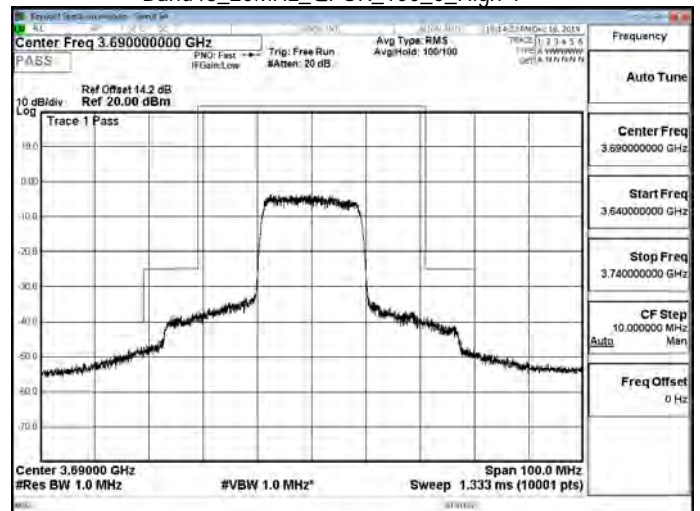
Band48_20MHz_QPSK_100_0_Mid-2



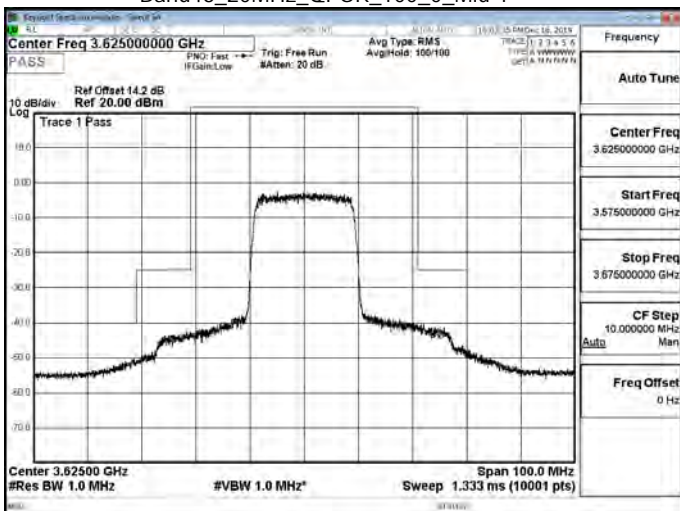
Band48_20MHz_QPSK_100_0_Low-2



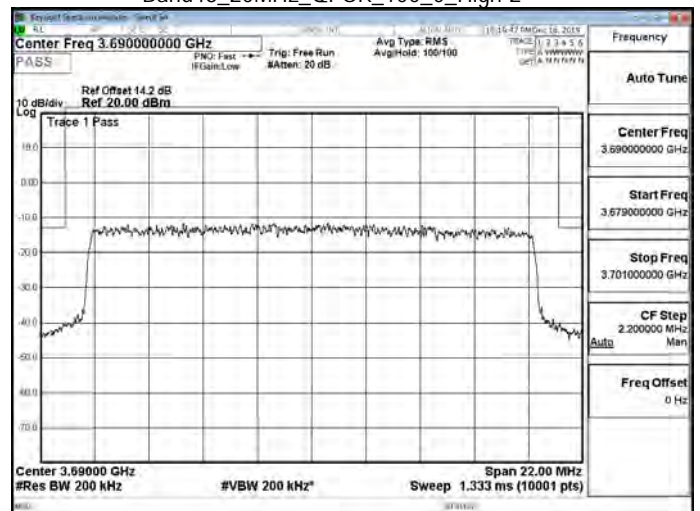
Band48_20MHz_QPSK_100_0_High-1



Band48_20MHz_QPSK_100_0_Mid-1



Band48_20MHz_QPSK_100_0_High-2



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10. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

10.1. 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** ≤ -13 dBm/MHz
2. greater than 10 MHz above and below the **assigned channel** ≤ -25 dBm/MHz
3. any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz

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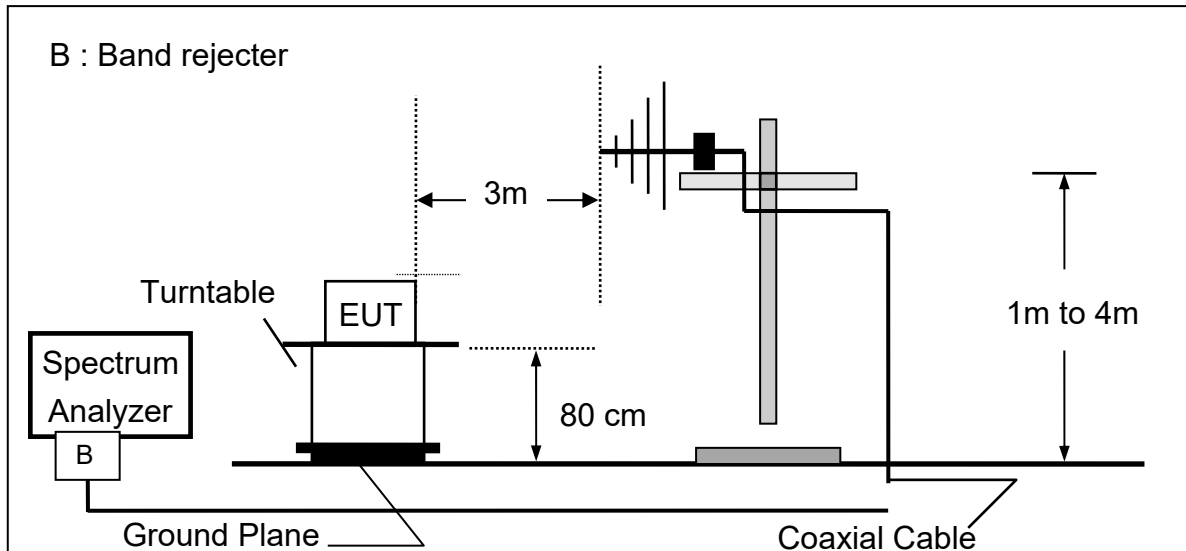
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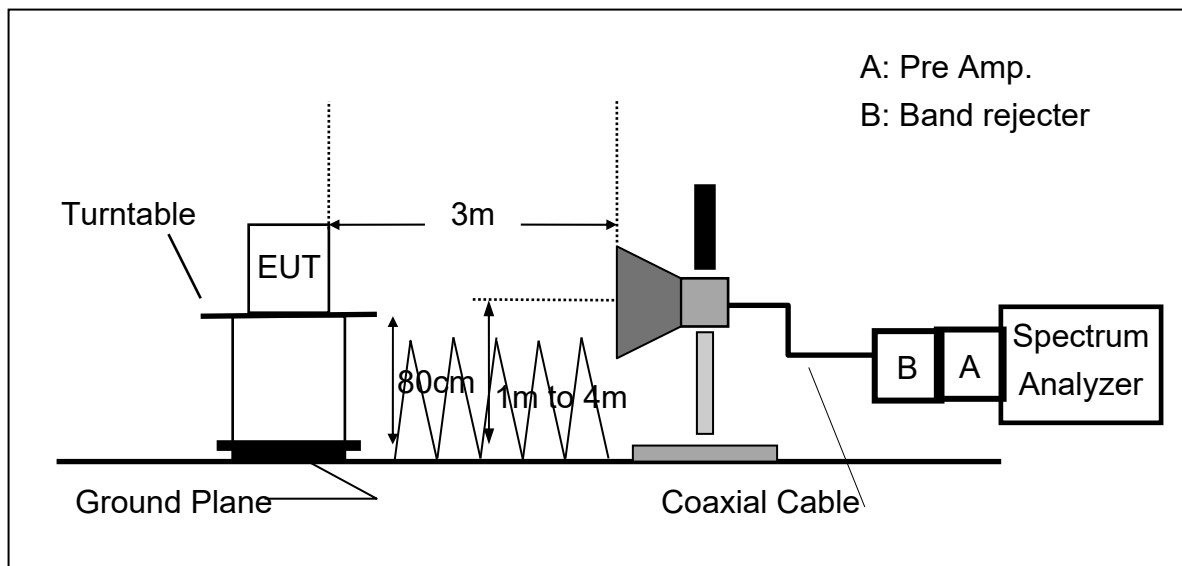
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10.2. EUT Setup

Radiated Emission Test Set-Up, Frequency Below 1000MHz



Radiated Emission Test Set-UP Frequency Over 1 GHz



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10.3. Measurement Procedure:

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

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

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

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

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

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10.4. Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	SCHWAZBECK	VULB 9168	9168-617	11/04/2019	11/03/2020
Broadband Antenna	TESEQ	CBL 6112D	35240	09/09/2019	09/08/2020
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/09/2019	01/08/2020
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/10/2020	01/09/2021
Horn Antenna	Schwarzbeck	BBHA9170	185	08/07/2019	08/06/2020
Horn Antenna	Schwarzbeck	BBHA9120D	1341	06/12/2019	06/11/2020
3m Site NSA	SGS	966 chamber D	N/A	07/12/2019	07/11/2020
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	06/10/2019	06/09/2020
Pre-Amplifier	EMC Instruments	EMC330	980096	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC184045B	980135	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC9135	980234	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC12630SE	980271	11/20/2019	11/19/2020
Highpass Filter	Micro Tronics	BRM50701-01	G008	11/20/2019	11/19/2020
High Pass Filter	Micro-Tronics	G003	RF99	11/20/2019	11/19/2020
Notch Filter	Woken	EWT-54-0037	RF54	11/20/2019	11/19/2020
Notch Filter	Woken	EWT-54-0038	RF55	11/20/2019	11/19/2020
Lowpass Filter	Woken	EWT-56-0019	RF46	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17413/4	11/20/2019	11/19/2020
Radio Communication Analyzer	Anritsu	MT8821C	6262044739	12/06/2019	12/05/2020

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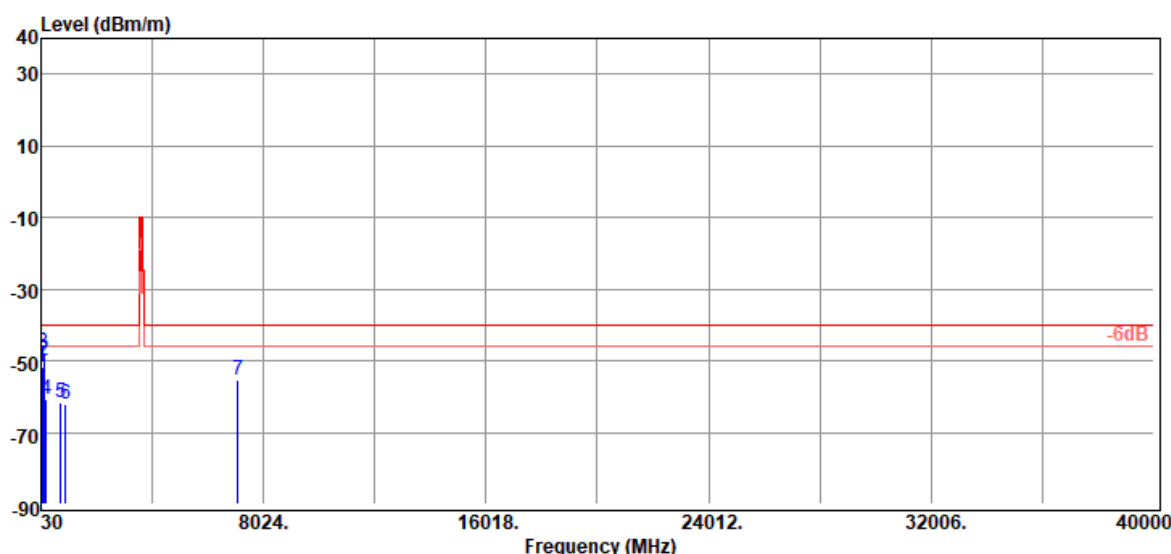
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10.5. Measurement Result:

Radiated Spurious Emission Measurement Result: LTE Band 48 Mode

Report Number	:E2/2019/B0012	Test Date	:2019-12-31
Operation Mode	:LTE B48	Temp./Humi.	:23.2/53
Test Mode	:TX CH LOW	Antenna Pol.	:VERTICAL
EUT Pol	:E2 Plan	Engineer	:Kailin
Test Channel	:3552.5 MHz		



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
68.80	-51.70	-43.41	-7.41	-0.88	-40.00	-11.70
119.24	-49.90	-40.56	-8.01	-1.33	-40.00	-9.90
139.61	-47.64	-39.82	-6.28	-1.54	-40.00	-7.64
209.45	-60.80	-58.64	-0.32	-1.84	-40.00	-20.80
731.31	-61.73	-59.74	0.72	-2.71	-40.00	-21.73
905.91	-62.24	-60.66	1.50	-3.08	-40.00	-22.24
7105.00	-55.56	-57.73	11.26	-9.09	-40.00	-15.56

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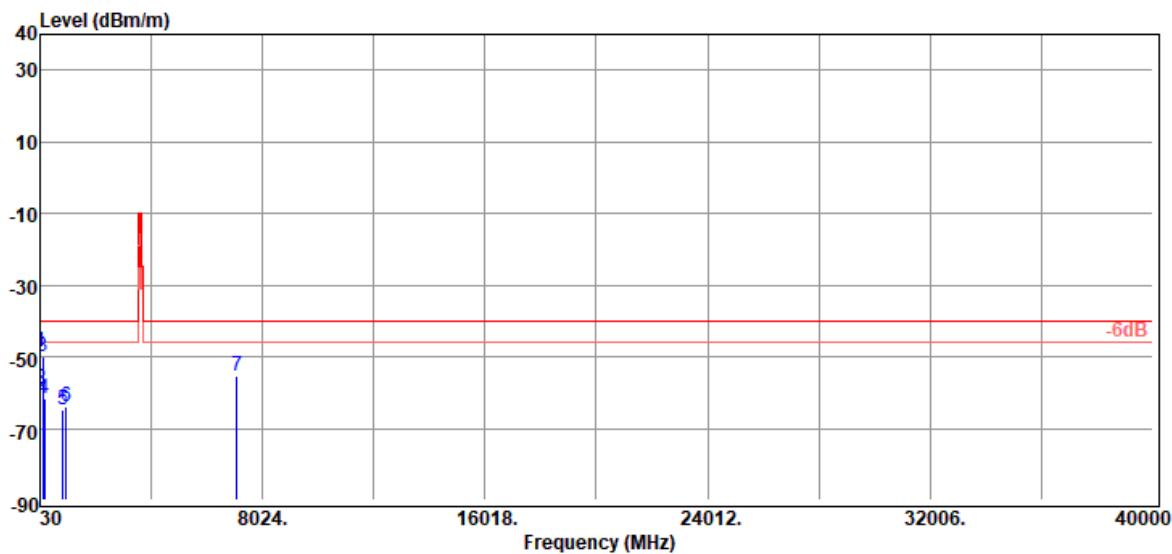
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Report Number :E2/2019/B0012
Operation Mode :LTE B48
Test Mode :TX CH LOW
EUT Pol :E2 Plan
Test Channel :3552.5 MHz

Test Date :2019-12-31
Temp./Humi. :23.2/53
Antenna Pol. :HORIZONTAL
Engineer :Kailin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
31.94	-48.80	-18.98	-29.28	-0.54	-40.00	-8.80
44.55	-59.07	-40.00	-18.33	-0.74	-40.00	-19.07
120.21	-50.10	-40.85	-7.92	-1.33	-40.00	-10.10
183.26	-61.48	-58.94	-0.88	-1.66	-40.00	-21.48
861.29	-64.77	-63.13	1.34	-2.98	-40.00	-24.77
982.54	-63.70	-61.88	1.51	-3.33	-40.00	-23.70
7105.00	-55.54	-57.71	11.26	-9.09	-40.00	-15.54

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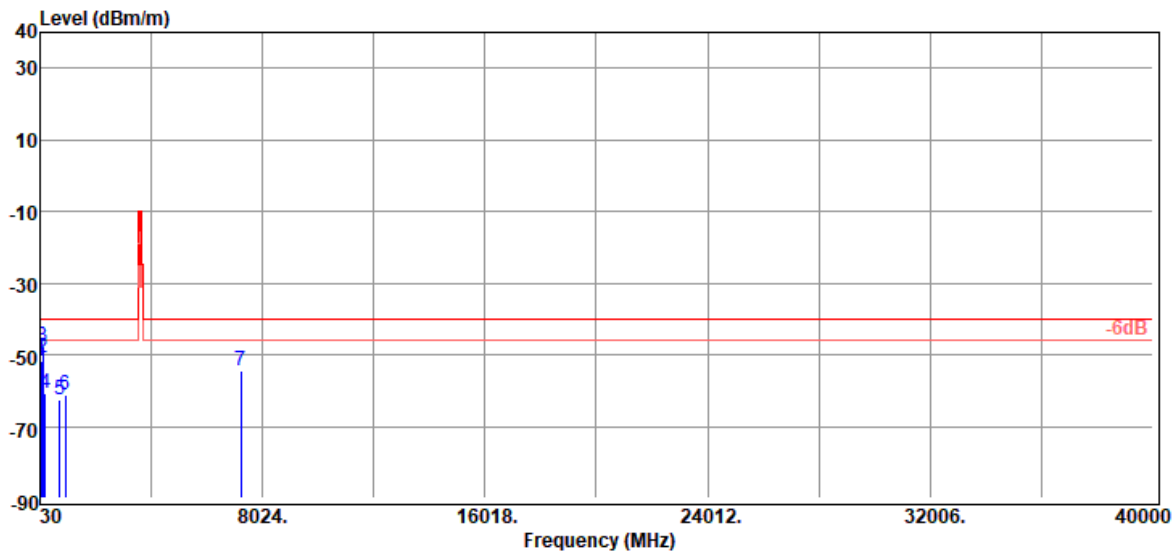
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Report Number :E2/2019/B0012
Operation Mode :LTE B48
Test Mode :TX CH MID
EUT Pol :E2 Plan
Test Channel :3625 MHz

Test Date :2019-12-31
Temp./Humi. :23.2/53
Antenna Pol. :VERTICAL
Engineer :Kailin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
70.74	-51.61	-43.33	-7.39	-0.89	-40.00	-11.61
120.21	-50.84	-41.59	-7.92	-1.33	-40.00	-10.84
141.55	-47.61	-40.00	-6.07	-1.54	-40.00	-7.61
212.36	-60.75	-58.87	-0.01	-1.87	-40.00	-20.75
736.16	-62.51	-60.53	0.68	-2.66	-40.00	-22.51
943.74	-61.32	-59.91	1.81	-3.22	-40.00	-21.32
7250.00	-54.46	-55.88	10.70	-9.28	-40.00	-14.46

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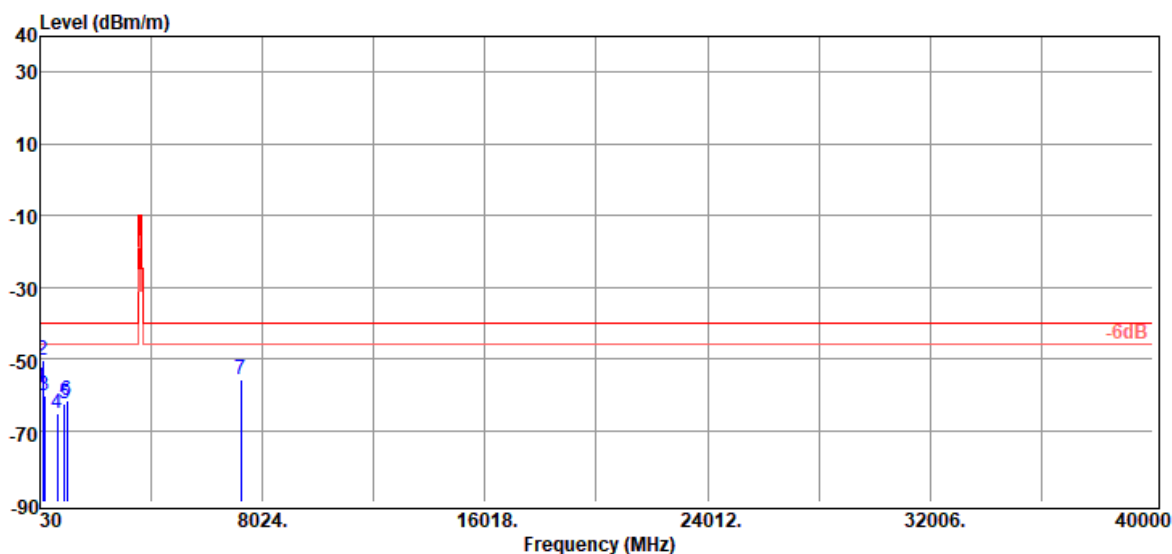
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Report Number :E2/2019/B0012
 Operation Mode :LTE B48
 Test Mode :TX CH MID
 EUT Pol :E2 Plan
 Test Channel :3625 MHz

Test Date :2019-12-31
 Temp./Humi. :23.2/53
 Antenna Pol. :HORIZONTAL
 Engineer :Kailin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
47.46	-58.27	-41.93	-15.60	-0.74	-40.00	-18.27
121.18	-50.39	-41.23	-7.80	-1.36	-40.00	-10.39
182.29	-60.45	-57.87	-0.93	-1.65	-40.00	-20.45
660.50	-65.21	-63.07	0.08	-2.22	-40.00	-25.21
902.03	-62.68	-61.09	1.46	-3.05	-40.00	-22.68
991.27	-61.85	-60.03	1.53	-3.35	-40.00	-21.85
7250.00	-55.76	-57.18	10.70	-9.28	-40.00	-15.76

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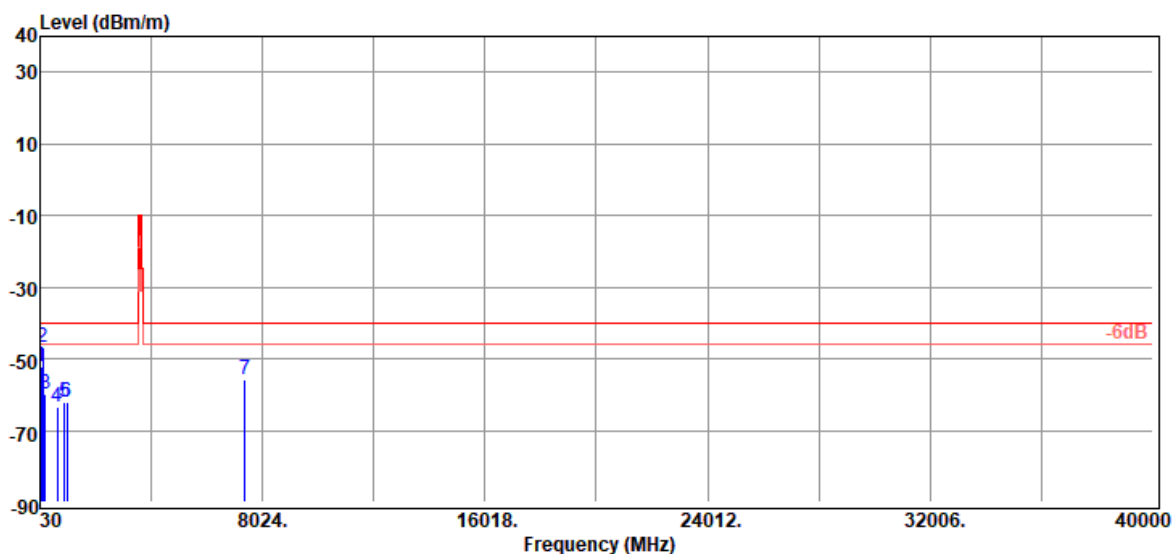
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Report Number :E2/2019/B0012
Operation Mode :LTE B48
Test Mode :TX CH HIGH
EUT Pol :E2 Plan
Test Channel :3697.5 MHz

Test Date :2019-12-31
Temp./Humi. :23.2/53
Antenna Pol. :VERTICAL
Engineer :Kailin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
70.74	-52.23	-43.95	-7.39	-0.89	-40.00	-12.23
135.73	-46.68	-38.33	-6.81	-1.54	-40.00	-6.68
209.45	-59.65	-57.49	-0.32	-1.84	-40.00	-19.65
663.41	-63.40	-61.36	0.23	-2.27	-40.00	-23.40
920.46	-61.92	-60.25	1.64	-3.31	-40.00	-21.92
988.36	-62.08	-60.24	1.49	-3.33	-40.00	-22.08
7395.00	-55.94	-57.28	10.98	-9.64	-40.00	-15.94

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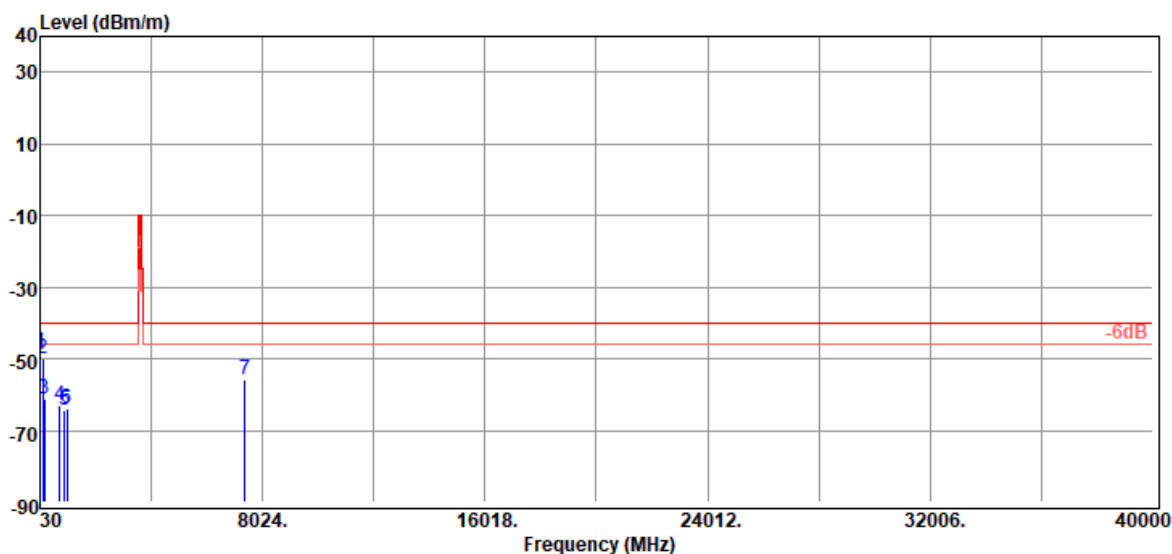
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Report Number :E2/2019/B0012
Operation Mode :LTE B48
Test Mode :TX CH HIGH
EUT Pol :E2 Plan
Test Channel :3697.5 MHz

Test Date :2019-12-31
Temp./Humi. :23.2/53
Antenna Pol. :HORIZONTAL
Engineer :Kailin



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
31.94	-48.13	-18.31	-29.28	-0.54	-40.00	-8.13
121.18	-50.04	-40.88	-7.80	-1.36	-40.00	-10.04
182.29	-61.22	-58.64	-0.93	-1.65	-40.00	-21.22
736.16	-63.12	-61.14	0.68	-2.66	-40.00	-23.12
915.61	-64.38	-62.76	1.60	-3.22	-40.00	-24.38
987.39	-63.97	-62.14	1.50	-3.33	-40.00	-23.97
7395.00	-55.84	-57.18	10.98	-9.64	-40.00	-15.84

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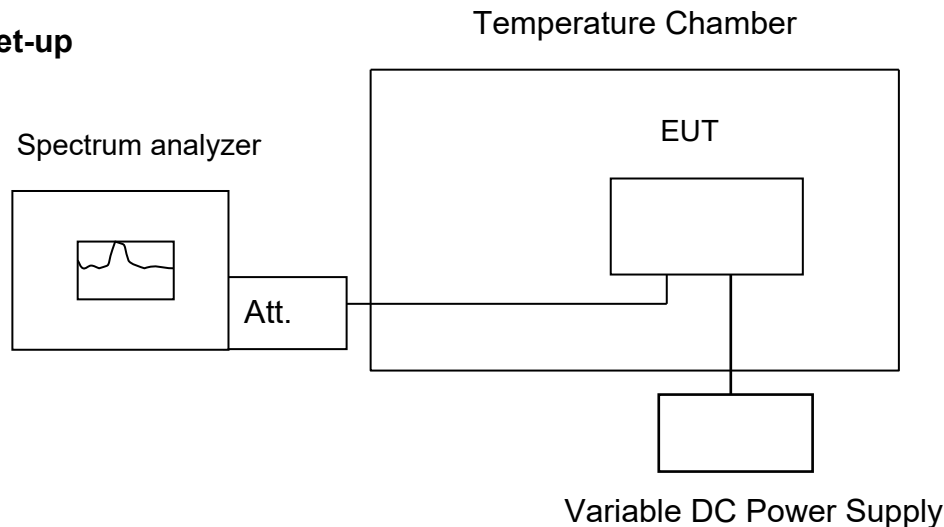
11. FREQUENCY STABILITY MEASUREMENT

11.1. 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 $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

11.2. Test Set-up



Note: Measurement setup for testing on Antenna connector

11.3. 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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11.4. Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY57120200	03/06/2019	03/05/2020
DC Power Supply	Agilent	E3640A	MY53140006	05/31/2019	05/30/2020
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/09/2019	01/08/2020
Radio Communication Analyzer	Anritsu	MT8821C	6262044739	12/06/2019	12/05/2020
Splitter	Marvelous	MVE8586	RF265	11/20/2019	11/19/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	WATT-218FS-10	RF268	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF219	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF207	11/20/2019	11/19/2020

11.5. Measurement Result

Reference Freq.: LTE B48 Mid Channel 3625 MHz 10M QPSK CH 55990				
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)
Freq. ERROR vs. VOLTAGE				
13.8	25	3625.000011	11	6488
12	25	3625.000007	7	6488
10.2	25	3625.000004	4	6488
10 (End Point)	25	3625.000002	2	6488
Freq. ERROR vs. Temp.				
12	-30	3625.000010	10	6488
12	-20	3625.000007	7	6488
12	-10	3625.000003	3	6488
12	0	3625.000000	0	6488
12	10	3624.999998	-2	6488
12	20	3624.999993	-7	6488
12	30	3624.999997	-3	6488
12	40	3625.000000	0	6488
12	50	3624.999999	-1	6488

Note: The battery is rated 12Vdc.

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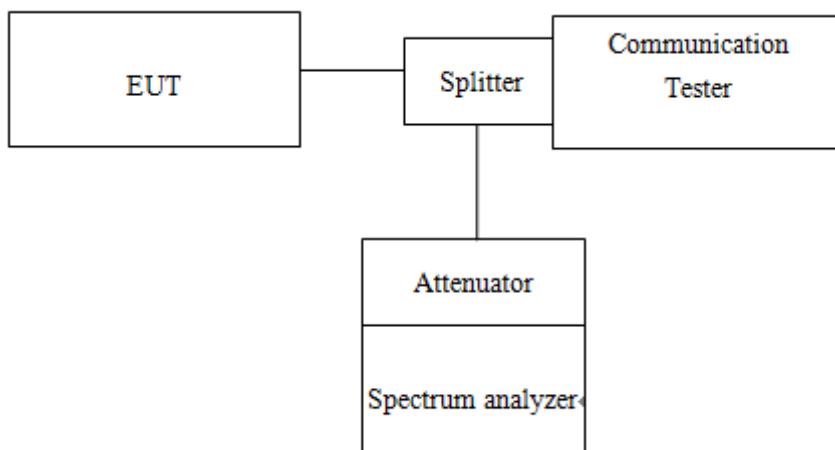
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12. PEAK TO AVERAGE RATIO

12.1. Standard Applicable

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

12.2. Test SET-UP



12.3. 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.

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12.4. Measurement Equipment Used

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DC Power Supply	Agilent	E3640A	MY53140006	05/31/2019	05/30/2020
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/09/2019	01/08/2020
Radio Communication Analyzer	Anritsu	MT8821C	6262044739	12/06/2019	12/05/2020
Splitter	Marvelous	MVE8586	RF265	11/20/2019	11/19/2020
DC Block	PASTERNAK	PE8210	RF256	11/20/2019	11/19/2020
Attenuator	Marvelous	WATT-218FS-10	RF268	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF219	11/20/2019	11/19/2020
Coaxial Cables	Woken	00100A1F1A185C	RF207	11/20/2019	11/19/2020

12.5. Measurement Result

LTE BAND 48							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		64QAM	Limit			64QAM	Limit
3552.5	56765	8.40	13	3555.0	55290	8.02	13
3625.0	55990	7.17	13	3625.0	55990	6.60	13
3697.5	58215	8.45	13	3695.0	56690	8.23	13

LTE BAND 48							
Channel bandwidth: 15MHz				Channel bandwidth: 20MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		64QAM	Limit			64QAM	Limit
3557.5	55315	8.37	13	3650.0	55340	8.14	13
3625.0	55990	8.51	13	3625.0	55990	7.90	13
3692.5	56665	8.29	13	3690.0	56640	8.05	13

Please refer to next page.

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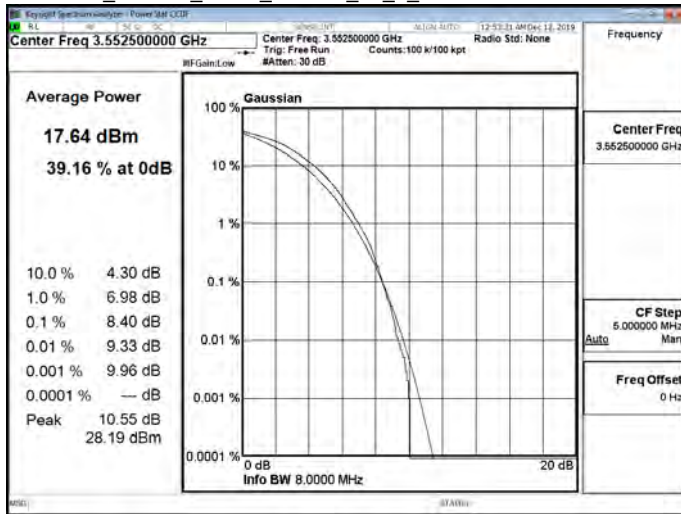
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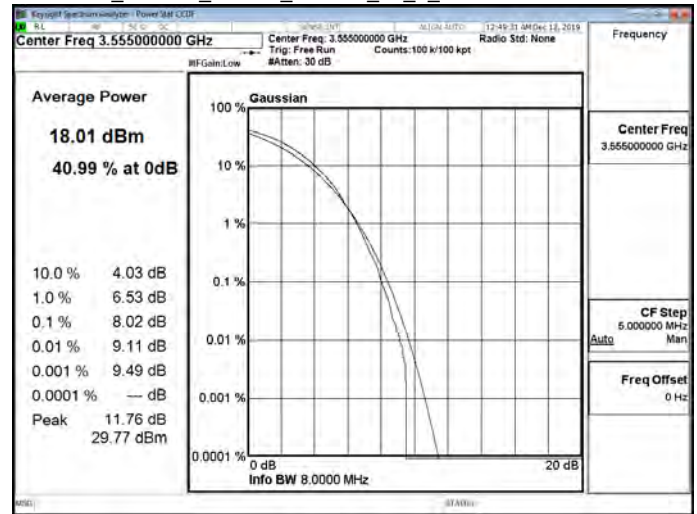
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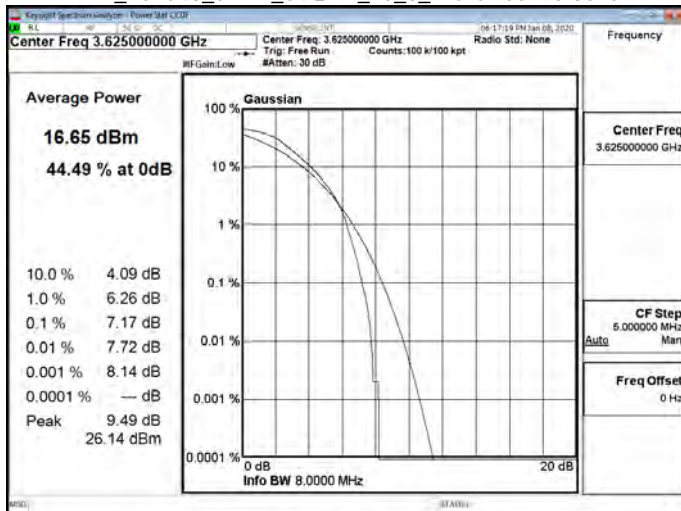
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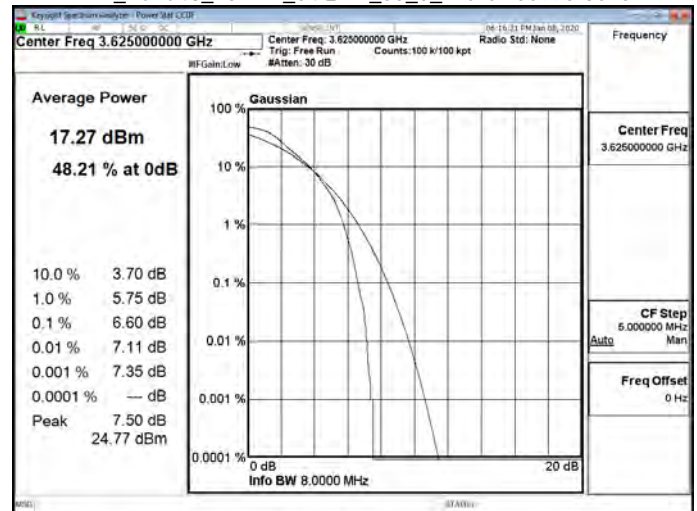
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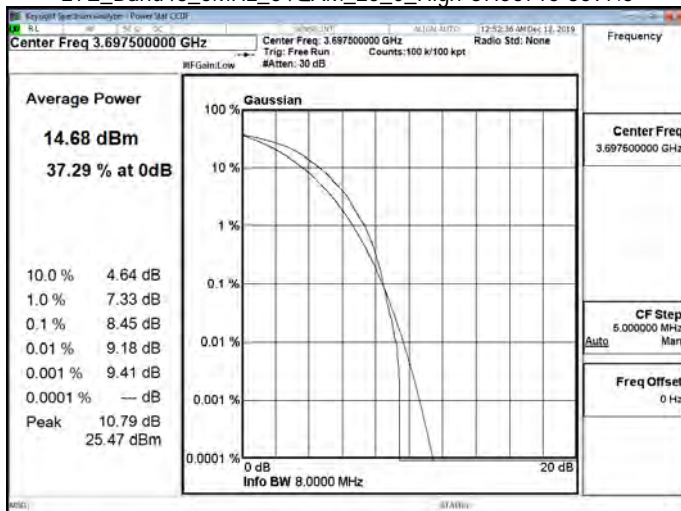
LTE_Band48_5MHz_64QAM_25_0_Mid CH55990-3625



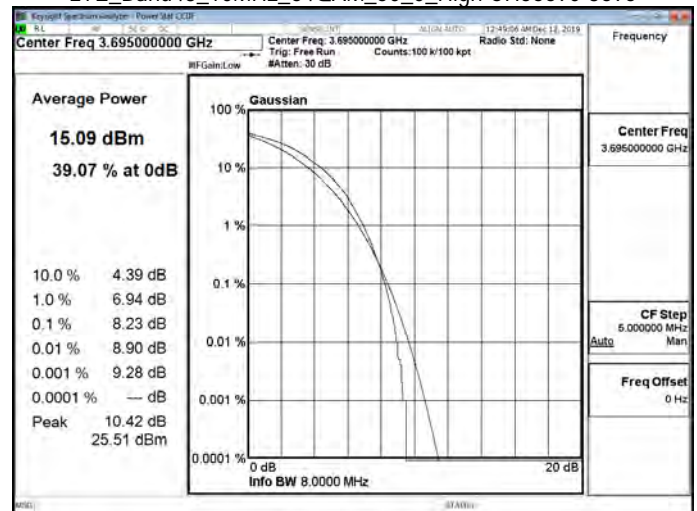
LTE_Band48_10MHz_64QAM_50_0_Mid CH55990-3625



LTE_Band48_5MHz_64QAM_25_0_High CH56715-3697.5



LTE_Band48_10MHz_64QAM_50_0_High CH56690-3695



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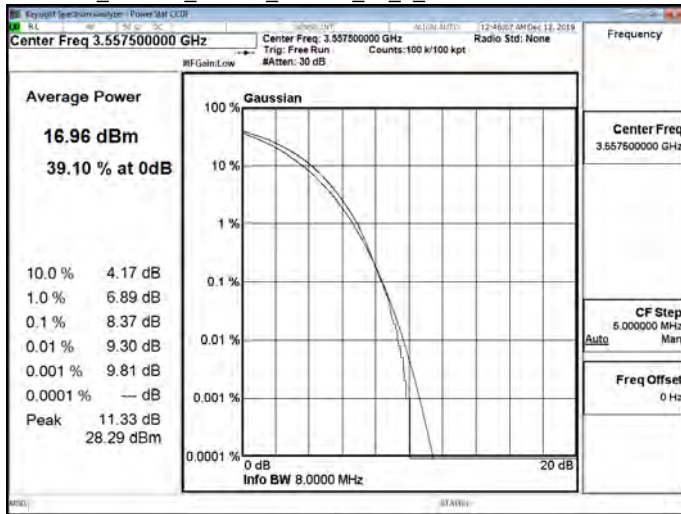
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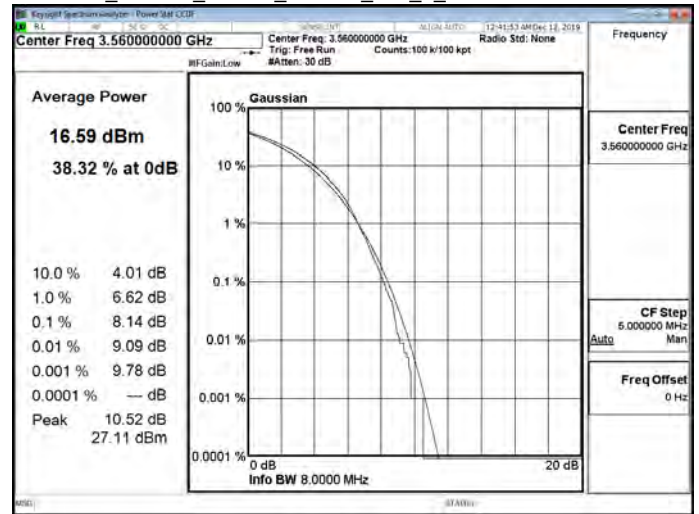
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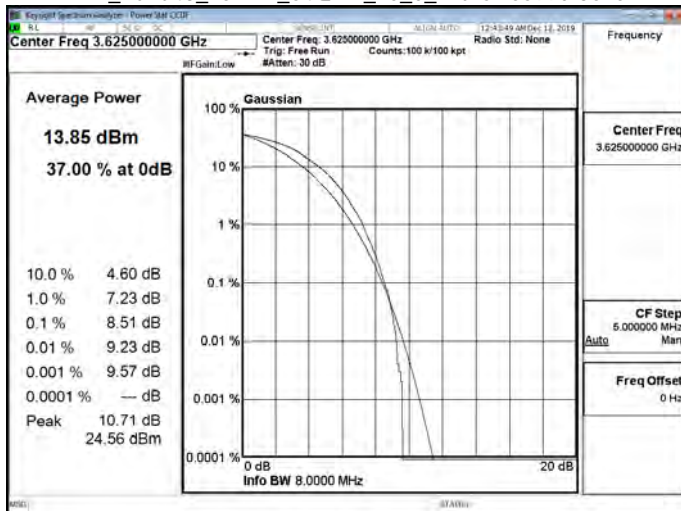
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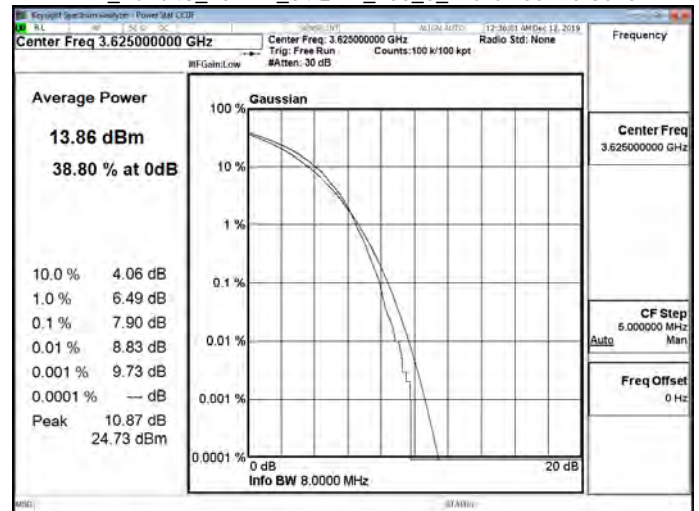
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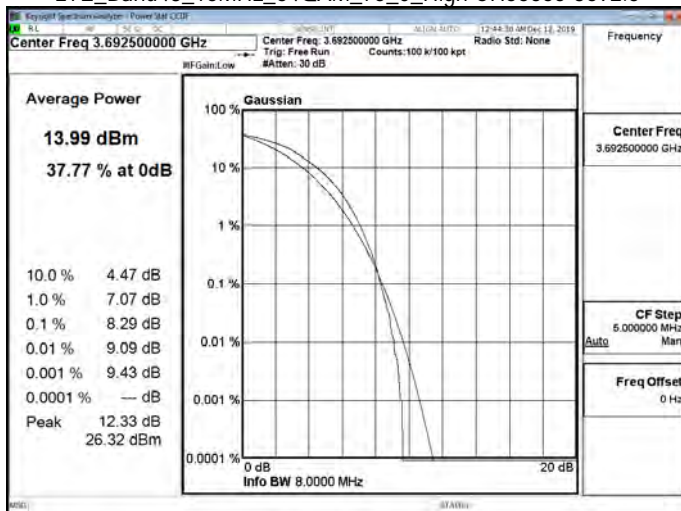
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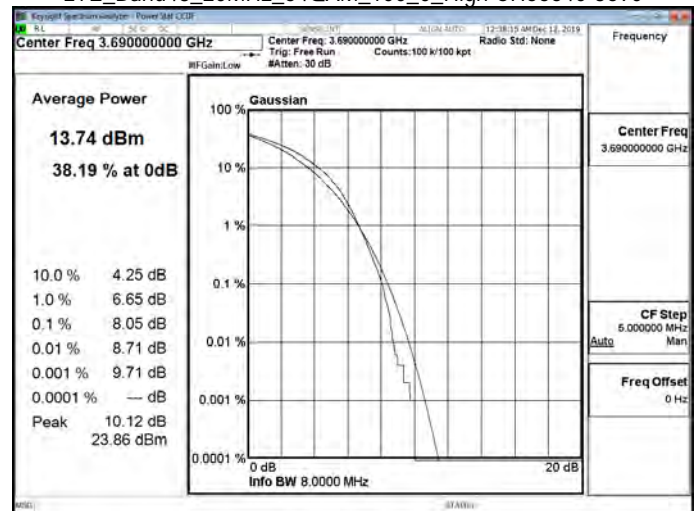
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LTE_Band48_15MHz_64QAM_75_0_High CH56665-3692.5



LTE_Band48_20MHz_64QAM_100_0_High CH56640-3690



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