ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant:	ASUSTeK COMPUTER INC. 1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan
Product Name:	ASUS Phone (Mobile Phone)
Brand Name:	ASUS
Model No.:	ASUS_I003D
Model Difference:	N/A
Report Number:	ER/2020/30144
FCC ID:	GKRRXMG1
FCC Rule Part:	2, 96E
Issue Date:	Sep. 02, 2020
Date of Test:	Jun. 01, 2020 ~ Jul. 21, 2020
Date of EUT Received:	May 06, 2020

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 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: Jazz Huang

Jazz Huang / Asst. Supervisor

Testing Laboratory
3702

Revision History				
Report Number	**Revision**	**Description**	**Issue Date**	**Remark**
ER/2020/30144	Rev.00	Original.	Sep. 02, 2020	Revised By: Violetta Tang

Note:

1、Disclaimer
Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

Contents

1. GENERAL PRODUCT INFORMATION

1.1. Product Description

General:

Product Name:	ASUS Phone (Mobile Phone)	
Brand Name:	ASUS	
Model No.:	ASUS_I003D	
Model Difference:	N/A	
Hardware Version:	R2.0B	
Software Version:	Android Q	
AJ Dongle:	Model No.: F370002, Supplier: MEILU	
Fan Dongle:	Model No.: I003, Supplier: ASUS	
USB Cable:	Model No.: LA9U2015-CS-R, Supplier: ASAP	
Power Supply:	3.85Vdc from Rechargeable Li-polymer Battery or 5V / 9V / 12V / 15V / 20V from AC/DC Adapter	
	Battery:	Model No.: C11P1903, Supplier: SCUD
	Adapter:	Model No.: A299-200150U-US, Supplier: AOHAI
IMEI:	355306110093970 / 355306110093988 (Conducted) 355306110094390 (Radiated)	

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

Antenna Type	Antenna Model No.
PIFA	Ant12
Note: The EUT equipped with 7 WWAN antennas, however, transmission of LTE Band 48 are available by Ant12.	

Operating Frequency (MHz)		Ant 12 Peak Gain (dBi)
LTE Band 48	3552 ~ 3690	-1.8

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

LTE Band	BW	Modulation	ERP / EIRP (dBm/10MHz)		(W)	99%	Type of Emission
48	5	QPSK	21.86	EIRP	0.153	4.5007	4M50G7D
		16QAM	21.06	EIRP	0.128	4.4957	4M50D7W
		64QAM	20.69	EIRP	0.117	4.5149	4M51D7W
		256QAM	17.46	EIRP	0.056	4.4765	4M48D7W
48	10	QPSK	21.90	EIRP	0.155	8.9914	8M99G7D
		16QAM	21.31	EIRP	0.135	8.9711	8M97D7W
		64QAM	20.69	EIRP	0.117	8.9809	8M98D7W
		256QAM	17.51	EIRP	0.056	8.9740	8M97D7W
48	15	QPSK	22.14	EIRP	0.164	13.476	13M5G7D
		16QAM	21.26	EIRP	0.134	13.486	13M5D7W
		64QAM	20.68	EIRP	0.117	13.480	13M5D7W
		256QAM	17.62	EIRP	0.058	13.464	13M5D7W
48	20	QPSK	22.19	EIRP	0.166	17.944	17M9G7D
		16QAM	21.10	EIRP	0.129	17.915	17M9D7W
		64QAM	20.68	EIRP	0.117	17.930	17M9D7W
		256QAM	17.64	EIRP	0.058	17.926	17M9D7W

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. Central RF Lab (TAF code 3702)
No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803
FCC Registration Numbers: TW0027

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.

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.

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)
4.8	10	14.8

2.5. Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
LTE Band B48	3.8	588

2.6. Configuration of Tested System

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

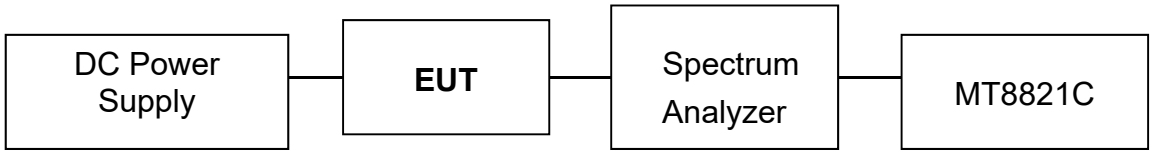
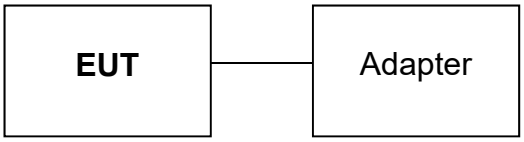


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)



Remote Side

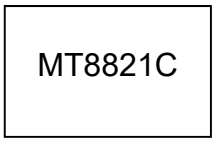


Table 2-1 Equipment Used in

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

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	N/A
§2.1053, §96.41(e)	FIELD STRENGTH OF SPURI-OUS 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.

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	H PLAN	E1 PLAN	E2 PLAN
LTE Band 48		V	

4.2. Measurement Configuration

Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation				RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full
Max. Output Power	48	v	v	v	-	-	v	v	v	v	v	v	v	v	v	v	v
Freqency Stability	48	-	v	-	-	-	v				v	-	-	-	-	-	v
26dB and 99% Band-width	48	v	v	v	-	-	v	v	v	v	v	v	v	v	-	-	v
Peak-to-Average Ratio	48	v	v	v	-	-	v	v	v	v				v	-	-	v
Band Edge	48	v	-	v	-	-	v	v	v	v	v	-	-	-	v	v	v
Con-ducted Emission	48	v	v	v	-	-	v	v	v	v	v	-	-	-	v	-	-
Radiated Emission	48	v	v	v	-	-	v				v				v		

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

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

6. MAXIMUM OUTPUT POWER MEASUREMENT

6.1. Standard Applicable

FCC §2.1046 & 96.41

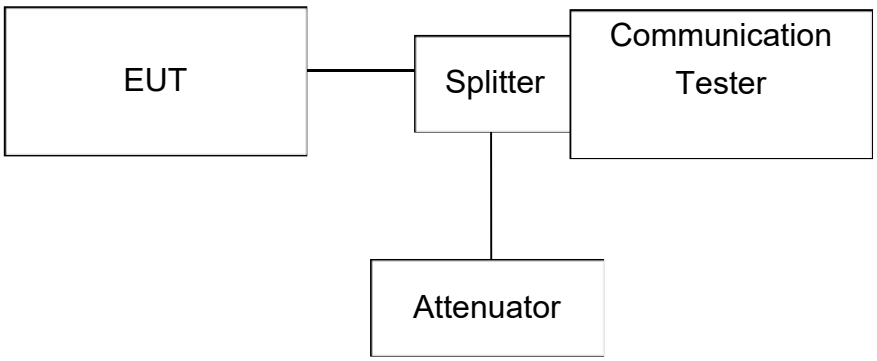
(a) FCC 96.41(a) Digital modulation. Systems operating in the Citizens Broadband Radio Service must use digital modulation techniques.

(b) FCC 96.41(b) Power limits. Unless otherwise specified in this section, the maximum effective iso tropic 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*

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

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$,

$ERP = EIRP - 2.15$,

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power (expressed in the same units as PT, typically dBW, dBm, or power spectral density (PSD)2), relative to either a dipole antenna (ERP) or an isotropic antenna (EIRP);

P_T = transmitter output power, expressed in dBW, dBm, or PSD;

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

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

6.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/18/2020	01/17/2021
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021

6.5. Measurement Result

RF Conducted Output Power

Antenna gain (dBi) -1.8

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	55265	3552.5	QPSK	1	0	23.55	21.75	23	-1.25
				1	24	23.44	21.64	23	-1.36
				12	6	22.73	20.93	23	-2.07
				25	0	22.36	20.56	23	-2.44
	55990	3625	QPSK	1	0	23.52	21.72	23	-1.28
				1	24	23.54	21.74	23	-1.26
				12	6	22.57	20.77	23	-2.23
				25	0	22.65	20.85	23	-2.15
	56715	3697.5	QPSK	1	0	23.66	21.86	23	-1.14
				1	24	23.66	21.86	23	-1.14
				12	6	22.56	20.76	23	-2.24
				25	0	22.66	20.86	23	-2.14
	55265	3552.5	16QAM	1	0	22.67	20.87	23	-2.13
				1	24	22.45	20.65	23	-2.35
				12	6	21.49	19.69	23	-3.31
				25	0	21.42	19.62	23	-3.38
	55990	3625	16QAM	1	0	22.86	21.06	23	-1.94
				1	24	22.78	20.98	23	-2.02
				12	6	21.60	19.80	23	-3.2
				25	0	21.72	19.92	23	-3.08
	56715	3697.5	16QAM	1	0	22.40	20.60	23	-2.4
				1	24	22.54	20.74	23	-2.26
				12	6	21.65	19.85	23	-3.15
				25	0	21.54	19.74	23	-3.26
	55265	3552.5	64QAM	1	0	22.48	20.68	23	-2.32
				1	24	22.49	20.69	23	-2.31
				12	6	20.62	18.82	23	-4.18
				25	0	20.54	18.74	23	-4.26
	55990	3625	64QAM	1	0	21.55	19.75	23	-3.25
				1	24	21.61	19.81	23	-3.19
				12	6	20.67	18.87	23	-4.13
				25	0	20.70	18.90	23	-4.1
	56715	3697.5	64QAM	1	0	22.37	20.57	23	-2.43
				1	24	22.17	20.37	23	-2.63
				12	6	20.78	18.98	23	-4.02
				25	0	20.82	19.02	23	-3.98
	55265	3552.5	256QAM	1	0	19.26	17.46	23	-5.54
				1	24	19.22	17.42	23	-5.58
				12	6	18.51	16.71	23	-6.29
				25	0	18.56	16.76	23	-6.24
	55990	3625	256QAM	1	0	18.71	16.91	23	-6.09
				1	24	18.67	16.87	23	-6.13
				12	6	18.78	16.98	23	-6.02
				25	0	18.72	16.92	23	-6.08
	56715	3697.5	256QAM	1	0	19.09	17.29	23	-5.71
				1	24	19.04	17.24	23	-5.76
				12	6	18.49	16.69	23	-6.31
				25	0	18.29	16.49	23	-6.51

Antenna gain (dBi)	-1.8								
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	23.60	21.80	23	-1.2
				1	49	23.63	21.83	23	-1.17
				25	12	22.74	20.94	23	-2.06
				50	0	22.49	20.69	23	-2.31
	55990	3625	QPSK	1	0	23.51	21.71	23	-1.29
				1	49	23.50	21.70	23	-1.3
				25	12	22.64	20.84	23	-2.16
				50	0	22.59	20.79	23	-2.21
	56690	3695	QPSK	1	0	23.50	21.70	23	-1.3
				1	49	23.70	21.90	23	-1.1
				25	12	22.63	20.83	23	-2.17
				50	0	22.77	20.97	23	-2.03
	55290	3555	16QAM	1	0	22.69	20.89	23	-2.11
				1	49	22.42	20.62	23	-2.38
				25	12	22.63	20.83	23	-2.17
				50	0	22.58	20.78	23	-2.22
	55990	3625	16QAM	1	0	23.11	21.31	23	-1.69
				1	49	22.90	21.10	23	-1.9
				25	12	21.65	19.85	23	-3.15
				50	0	21.61	19.81	23	-3.19
	56690	3695	16QAM	1	0	22.58	20.78	23	-2.22
				1	49	22.65	20.85	23	-2.15
				25	12	21.66	19.86	23	-3.14
				50	0	21.55	19.75	23	-3.25
	55290	3555	64QAM	1	0	22.49	20.69	23	-2.31
				1	49	22.48	20.68	23	-2.32
				25	12	20.74	18.94	23	-4.06
				50	0	20.73	18.93	23	-4.07
	55990	3625	64QAM	1	0	21.57	19.77	23	-3.23
				1	49	21.68	19.88	23	-3.12
				25	12	20.68	18.88	23	-4.12
				50	0	20.61	18.81	23	-4.19
	56690	3695	64QAM	1	0	22.48	20.68	23	-2.32
				1	49	22.36	20.56	23	-2.44
				25	12	20.79	18.99	23	-4.01
				50	0	20.88	19.08	23	-3.92
	55290	3555	256QAM	1	0	19.26	17.46	23	-5.54
				1	49	19.31	17.51	23	-5.49
				25	12	18.60	16.80	23	-6.2
				50	0	18.61	16.81	23	-6.19
	55990	3625	256QAM	1	0	18.66	16.86	23	-6.14
				1	49	18.74	16.94	23	-6.06
				25	12	18.76	16.96	23	-6.04
				50	0	18.65	16.85	23	-6.15
	56690	3695	256QAM	1	0	19.12	17.32	23	-5.68
				1	49	19.18	17.38	23	-5.62
				25	12	18.67	16.87	23	-6.13
				50	0	18.38	16.58	23	-6.42

Antenna gain (dBi)	-1.8								
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	23.74	21.94	23	-1.06
				1	74	23.67	21.87	23	-1.13
				36	18	22.85	21.05	23	-1.95
				75	0	22.68	20.88	23	-2.12
	55990	3625	QPSK	1	0	23.53	21.73	23	-1.27
				1	74	23.47	21.67	23	-1.33
				36	18	22.47	20.67	23	-2.33
				75	0	22.50	20.70	23	-2.3
	56665	3692.5	QPSK	1	0	23.94	22.14	23	-0.86
				1	74	23.78	21.98	23	-1.02
				36	18	22.82	21.02	23	-1.98
				75	0	22.91	21.11	23	-1.89
	55315	3557.5	16QAM	1	0	22.85	21.05	23	-1.95
				1	74	22.69	20.89	23	-2.11
				36	18	21.78	19.98	23	-3.02
				75	0	21.50	19.70	23	-3.3
	55990	3625	16QAM	1	0	22.88	21.08	23	-1.92
				1	74	23.06	21.26	23	-1.74
				36	18	21.46	19.66	23	-3.34
				75	0	21.49	19.69	23	-3.31
	56665	3692.5	16QAM	1	0	22.72	20.92	23	-2.08
				1	74	22.80	21.00	23	-2
				36	18	21.73	19.93	23	-3.07
				75	0	21.64	19.84	23	-3.16
	55315	3557.5	64QAM	1	0	22.46	20.66	23	-2.34
				1	74	22.48	20.68	23	-2.32
				36	18	20.75	18.95	23	-4.05
				75	0	20.92	19.12	23	-3.88
	55990	3625	64QAM	1	0	21.56	19.76	23	-3.24
				1	74	21.51	19.71	23	-3.29
				36	18	20.54	18.74	23	-4.26
				75	0	20.60	18.80	23	-4.2
	56665	3692.5	64QAM	1	0	22.47	20.67	23	-2.33
				1	74	22.42	20.62	23	-2.38
				36	18	20.87	19.07	23	-3.93
				75	0	20.91	19.11	23	-3.89
	55315	3557.5	256QAM	1	0	19.40	17.60	23	-5.4
				1	74	19.42	17.62	23	-5.38
				36	18	18.72	16.92	23	-6.08
				75	0	18.68	16.88	23	-6.12
	55990	3625	256QAM	1	0	18.50	16.70	23	-6.3
				1	74	18.59	16.79	23	-6.21
				36	18	18.63	16.83	23	-6.17
				75	0	18.65	16.85	23	-6.15
	56665	3692.5	256QAM	1	0	19.22	17.42	23	-5.58
				1	74	19.27	17.47	23	-5.53
				36	18	18.73	16.93	23	-6.07
				75	0	18.55	16.75	23	-6.25

Antenna gain (dBi)	-1.8								
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)
20	55340	3560	QPSK	1	0	23.83	22.03	23	-0.97
				1	99	23.76	21.96	23	-1.04
				50	25	22.87	21.07	23	-1.93
				100	0	22.84	21.04	23	-1.96
	55990	3625	QPSK	1	0	23.59	21.79	23	-1.21
				1	99	23.43	21.63	23	-1.37
				50	25	22.52	20.72	23	-2.28
				100	0	22.54	20.74	23	-2.26
	56640	3690	QPSK	1	0	23.99	22.19	23	-0.81
				1	99	23.85	22.05	23	-0.95
				50	25	22.87	21.07	23	-1.93
				100	0	22.99	21.19	23	-1.81
	55340	3560	16QAM	1	0	22.86	21.06	23	-1.94
				1	99	22.69	20.89	23	-2.11
				50	25	21.87	20.07	23	-2.93
				100	0	21.65	19.85	23	-3.15
	55990	3625	16QAM	1	0	22.90	21.10	23	-1.9
				1	99	22.77	20.97	23	-2.03
				50	25	21.51	19.71	23	-3.29
				100	0	21.52	19.72	23	-3.28
	56640	3690	16QAM	1	0	22.85	21.05	23	-1.95
				1	99	22.88	21.08	23	-1.92
				50	25	21.79	19.99	23	-3.01
				100	0	21.83	20.03	23	-2.97
	55340	3560	64QAM	1	0	22.47	20.67	23	-2.33
				1	99	22.48	20.68	23	-2.32
				50	25	20.85	19.05	23	-3.95
				100	0	20.96	19.16	23	-3.84
	55990	3625	64QAM	1	0	21.52	19.72	23	-3.28
				1	99	21.50	19.70	23	-3.3
				50	25	20.62	18.82	23	-4.18
				100	0	20.63	18.83	23	-4.17
	56640	3690	64QAM	1	0	22.47	20.67	23	-2.33
				1	99	22.45	20.65	23	-2.35
				50	25	20.97	19.17	23	-3.83
				100	0	20.96	19.16	23	-3.84
	55340	3560	256QAM	1	0	19.44	17.64	23	-5.36
				1	99	19.43	17.63	23	-5.37
				50	25	18.71	16.91	23	-6.09
				100	0	18.72	16.92	23	-6.08
	55990	3625	256QAM	1	0	18.60	16.80	23	-6.2
				1	99	18.56	16.76	23	-6.24
				50	25	18.63	16.83	23	-6.17
				100	0	18.56	16.76	23	-6.24
	56640	3690	256QAM	1	0	19.33	17.53	23	-5.47
				1	99	19.39	17.59	23	-5.41
				50	25	18.74	16.94	23	-6.06
				100	0	18.61	16.81	23	-6.19

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 iso tropic 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

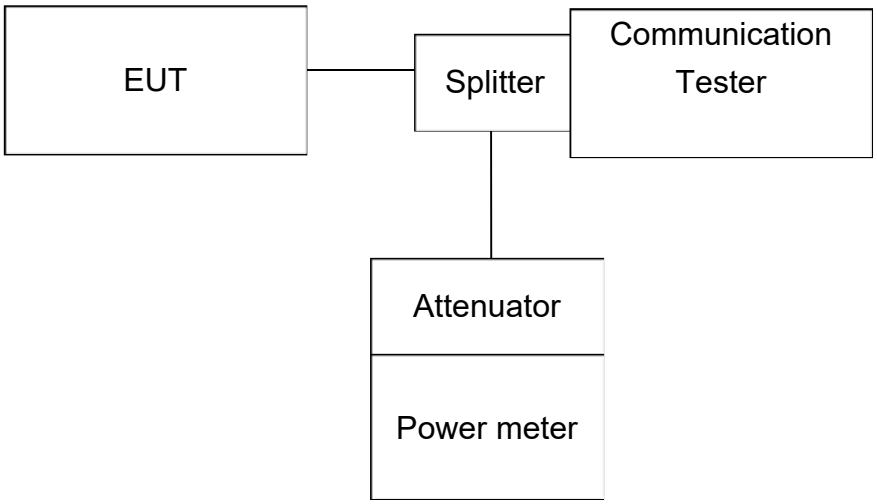
Category B CBSDs will only be authorized for use after an ESC is approved and commercially deployed consistent with §§96.15 and 96.67.

(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.

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 ≥ 3 × RBW.
5. Detector = RMS (power averaging).
6. Ensure that the number of measurement points in the sweep ≥ 2 × 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.

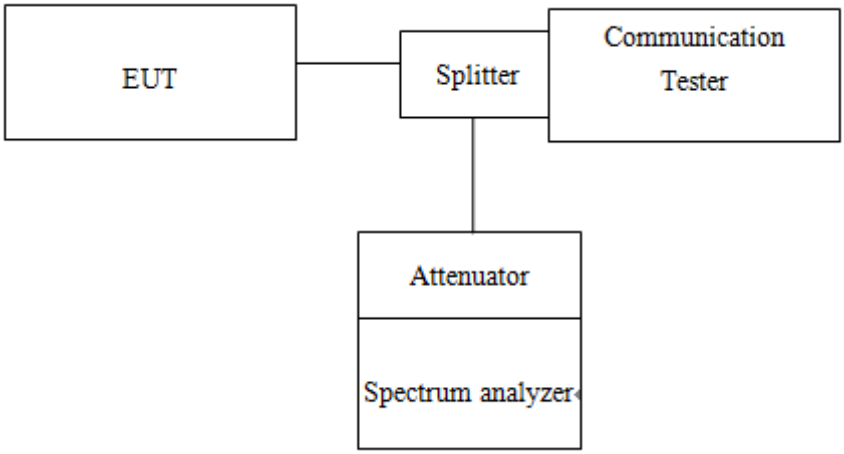
8. OCCUPIED BANDWIDTH MEASUREMENT

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%.

8.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/18/2020	01/17/2021
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021

8.5. 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	56765	4.5007	4.4957	4.5149	4.4765	4.971	4.925	4.951	4.893
3625.0	55990	4.4894	4.4921	4.4974	4.4744	4.937	4.940	4.941	4.887
3697.5	58215	4.4930	4.4764	4.4824	4.4615	4.899	4.940	4.924	4.896

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	8.9914	8.9711	8.9750	8.9740	9.718	9.800	9.757	9.728
3625.0	55990	8.9300	8.9614	8.9809	8.9237	9.748	9.515	9.810	9.515
3695.0	56690	8.9879	8.9341	8.9708	8.9556	9.708	9.612	9.758	9.573

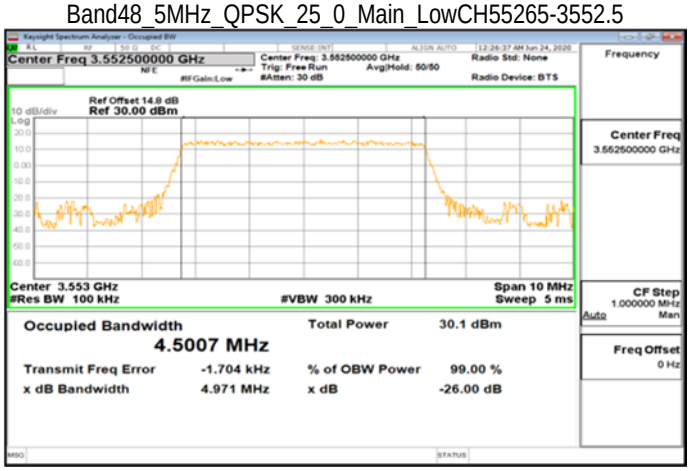
LTE BAND 48 Channel bandwidth: 15MHz

Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
3557.5	55315	13.476	13.477	13.480	13.464	14.60	14.70	14.65	14.72
3625.0	55990	13.424	13.486	13.448	13.449	14.30	14.38	14.34	14.14
3692.5	56665	13.423	13.434	13.449	13.445	14.43	14.47	14.58	14.40

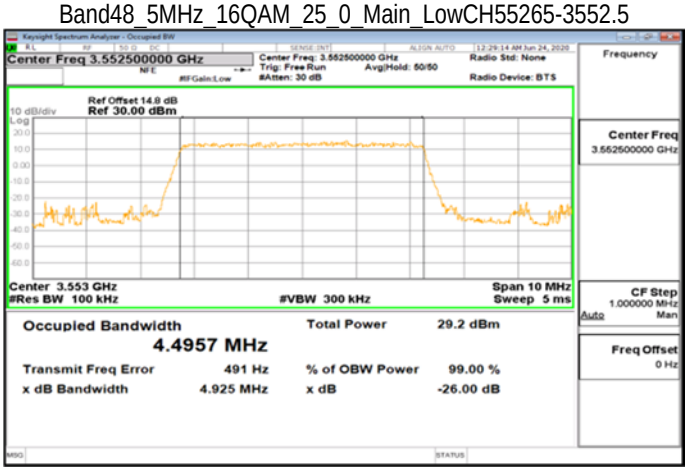
LTE BAND 48 Channel bandwidth: 20MHz

Freq. (MHz)	CH	99% BW (MHz)				26 dB BW (MHz)			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
3650.0	55340	17.944	17.911	17.921	17.926	19.45	19.34	19.53	19.20
3625.0	55990	17.911	17.915	17.859	17.869	19.26	19.15	19.13	19.23
3690.0	56640	17.899	17.914	17.930	17.910	19.21	19.07	19.25	19.21

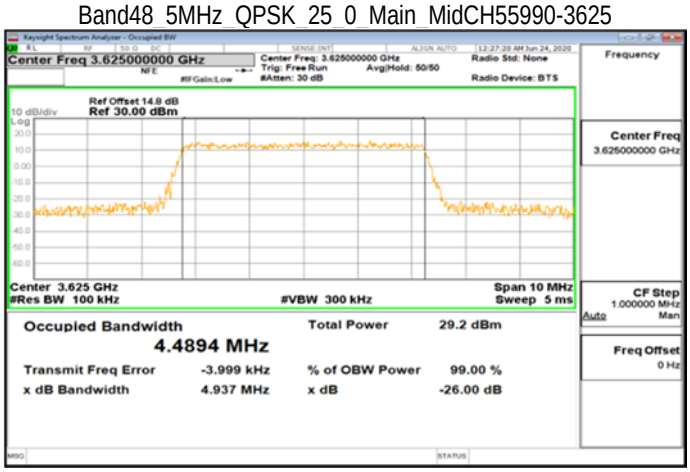
Band48_5MHz_QPSK_25_0_Main_LowCH55265-3552.5



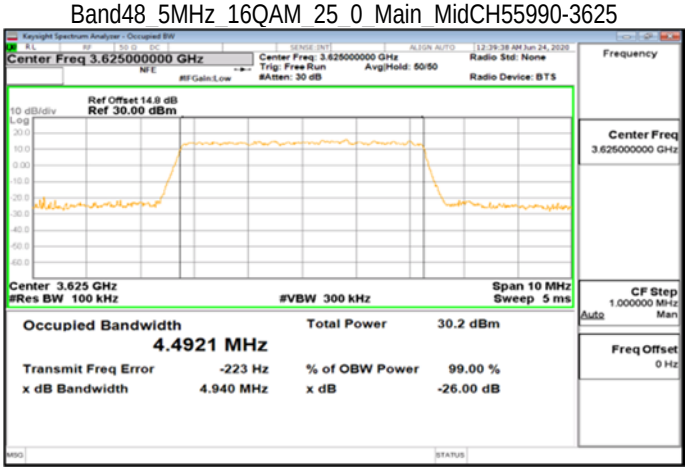
Band48_5MHz_16QAM_25_0_Main_LowCH55265-3552.5



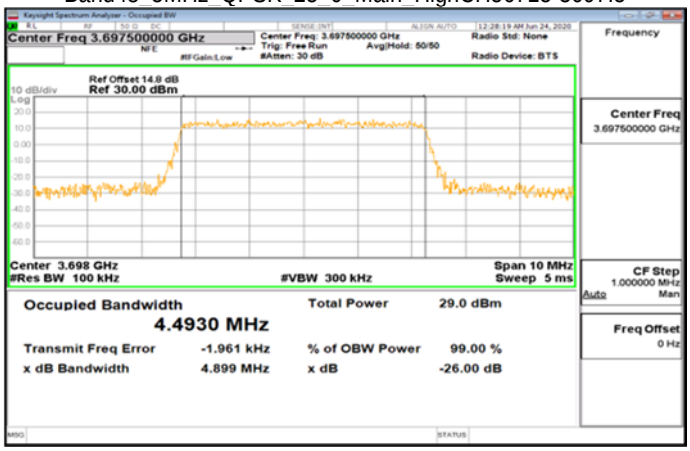
Band48_5MHz_QPSK_25_0_Main_MidCH55990-3625



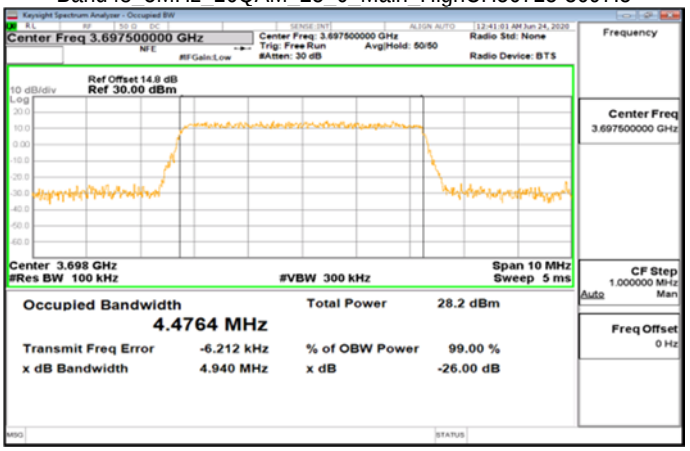
Band48_5MHz_16QAM_25_0_Main_MidCH55990-3625



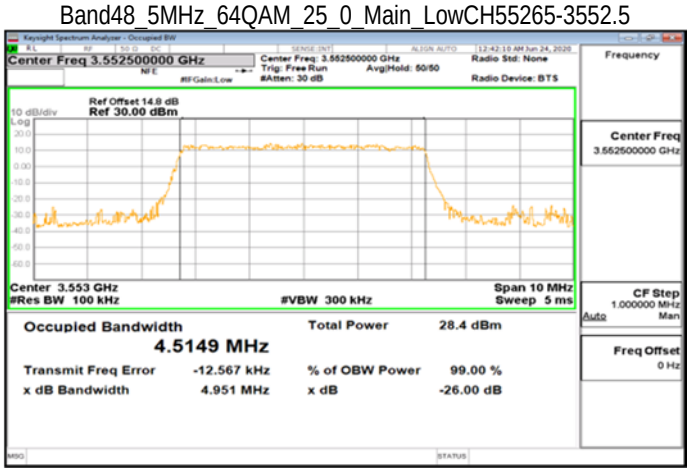
Band48_5MHz_QPSK_25_0_Main_HighCH56715-3697.5



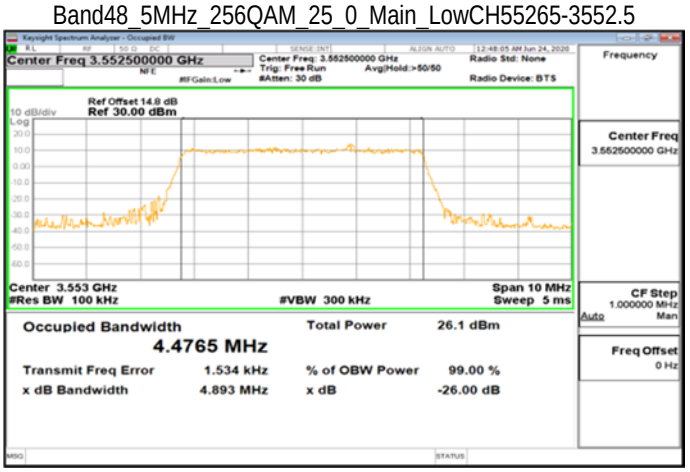
Band48_5MHz_16QAM_25_0_Main_HighCH56715-3697.5



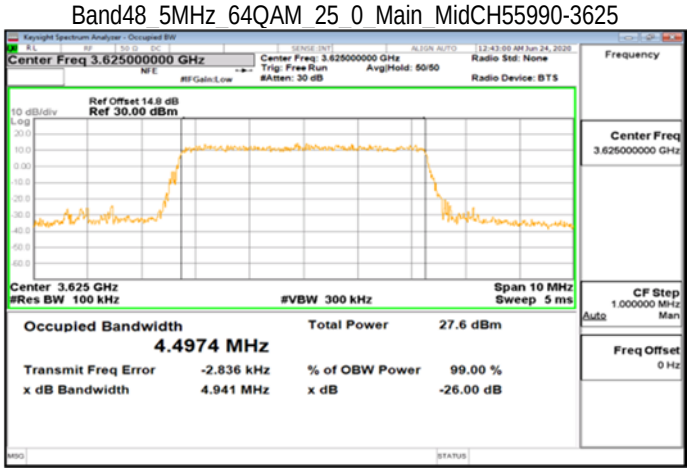
Band48_5MHz_64QAM_25_0_Main_LowCH55265-3552.5



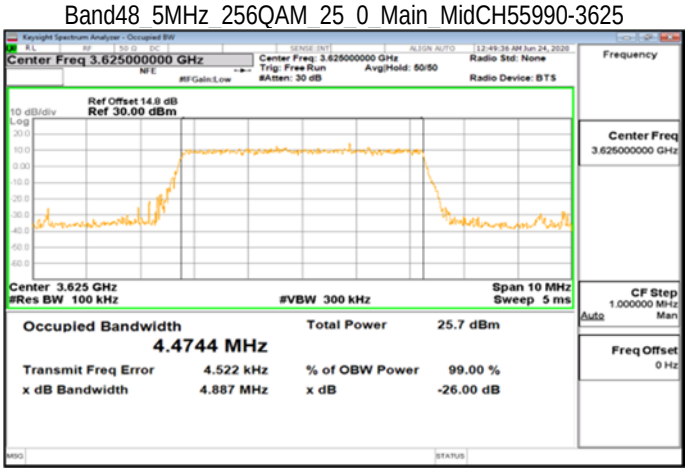
Band48_5MHz_256QAM_25_0_Main_LowCH55265-3552.5



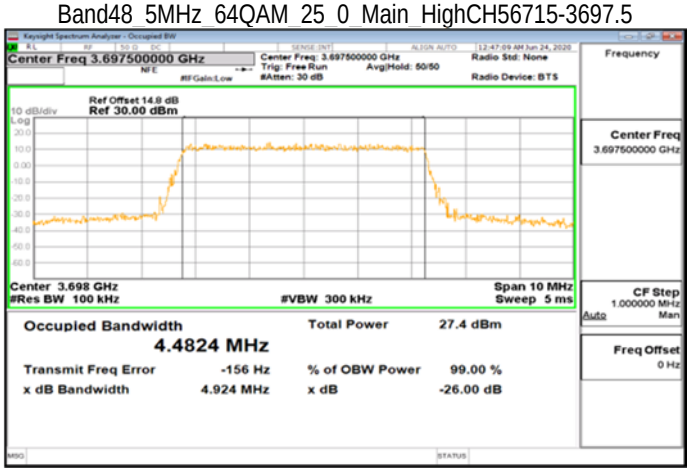
Band48_5MHz_64QAM_25_0_Main_MidCH55990-3625



Band48_5MHz_256QAM_25_0_Main_MidCH55990-3625



Band48_5MHz_64QAM_25_0_Main_HighCH56715-3697.5



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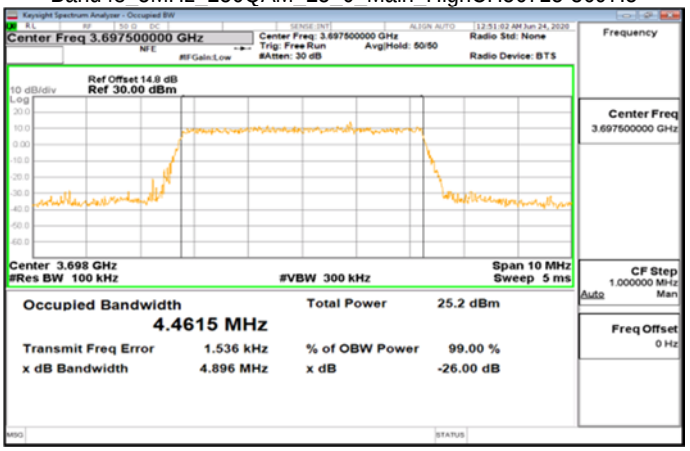
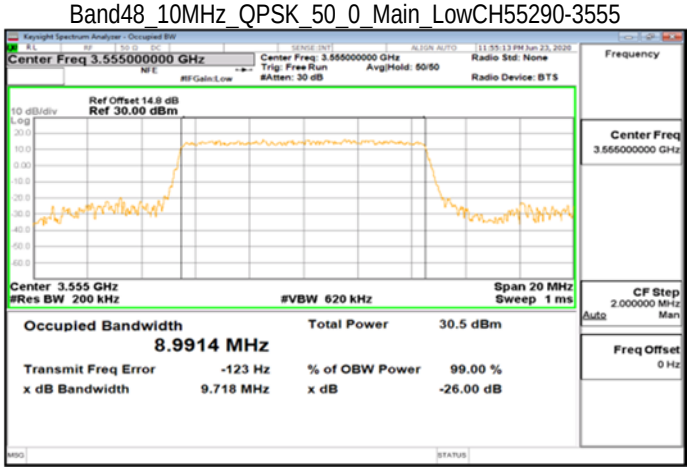
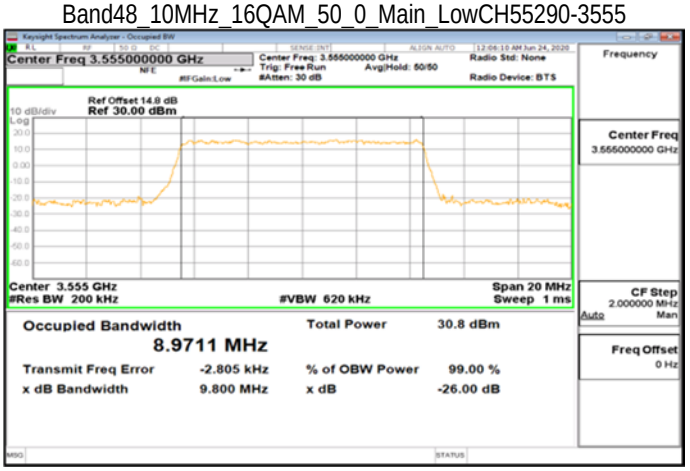


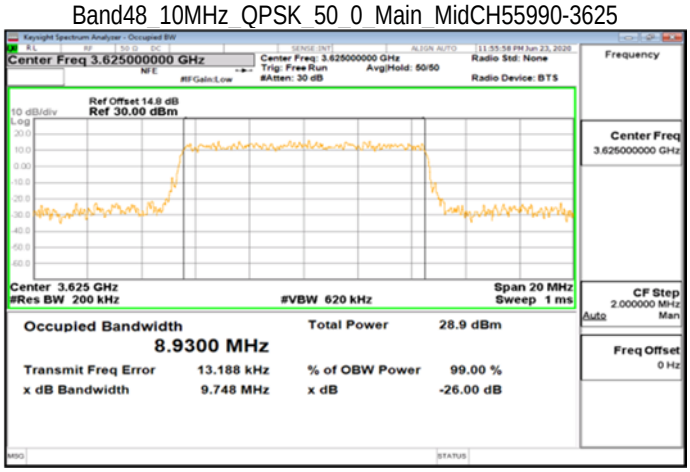
Band48_10MHz_QPSK_50_0_Main_LowCH55290-3555



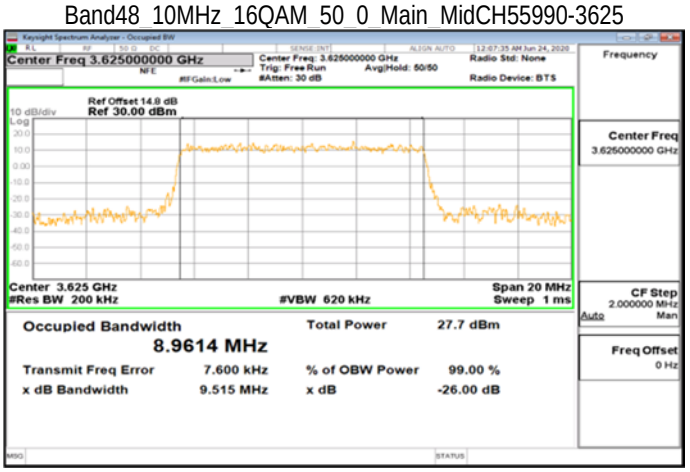
Band48_10MHz_16QAM_50_0_Main_LowCH55290-3555



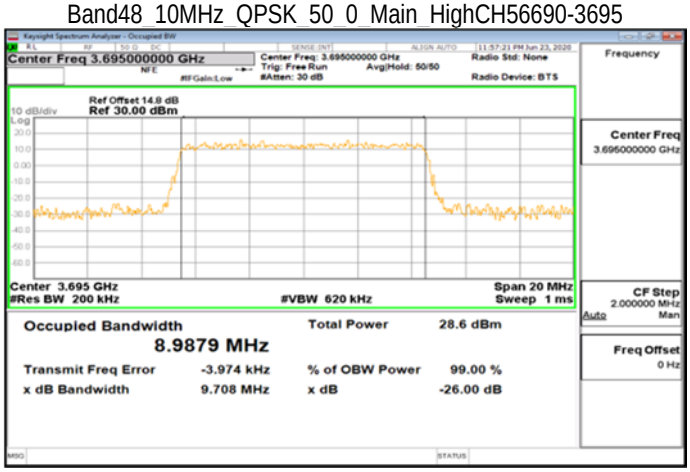
Band48_10MHz_QPSK_50_0_Main_MidCH55990-3625



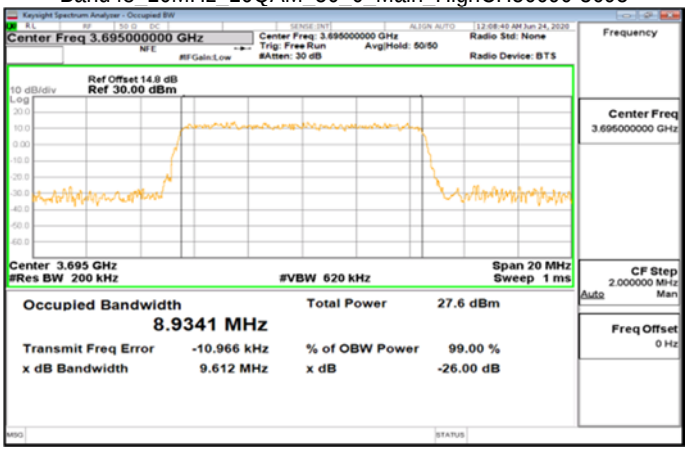
Band48_10MHz_16QAM_50_0_Main_MidCH55990-3625



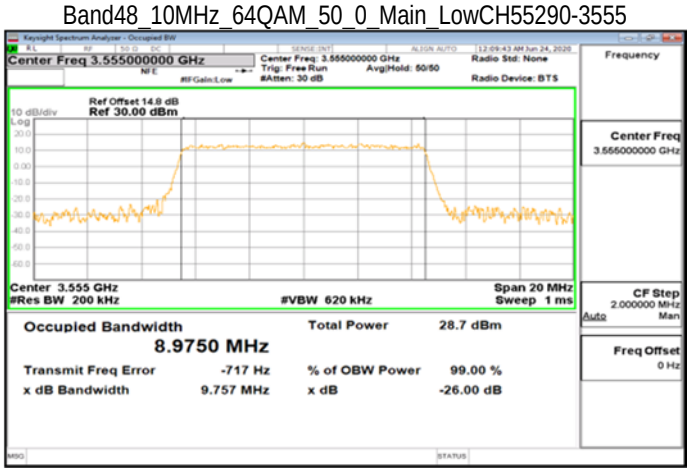
Band48_10MHz_QPSK_50_0_Main_HighCH56690-3695



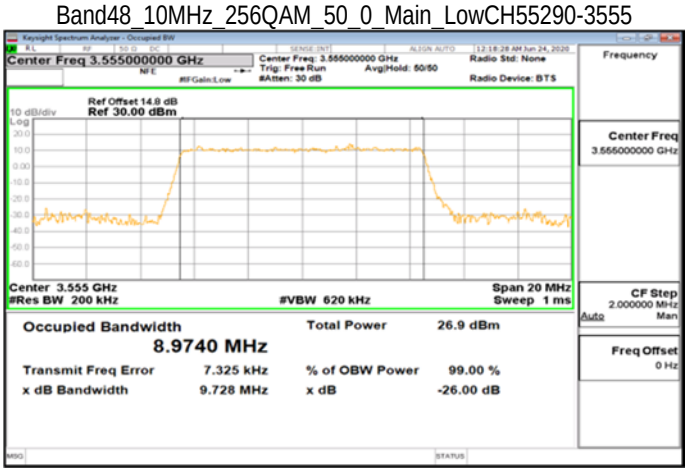
Band48_10MHz_16QAM_50_0_Main_HighCH56690-3695



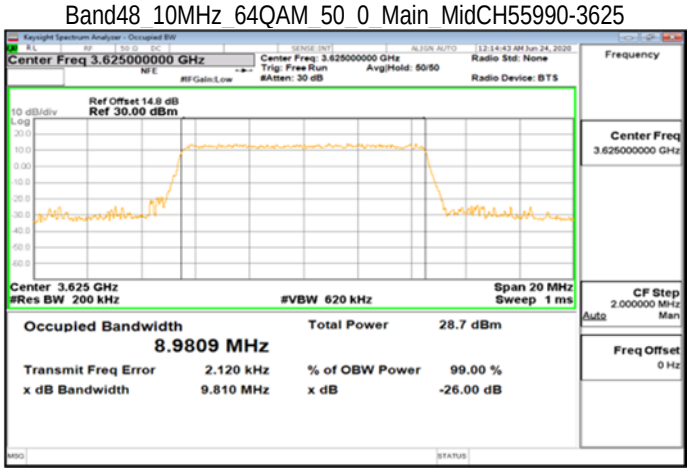
Band48_10MHz_64QAM_50_0_Main_LowCH55290-3555



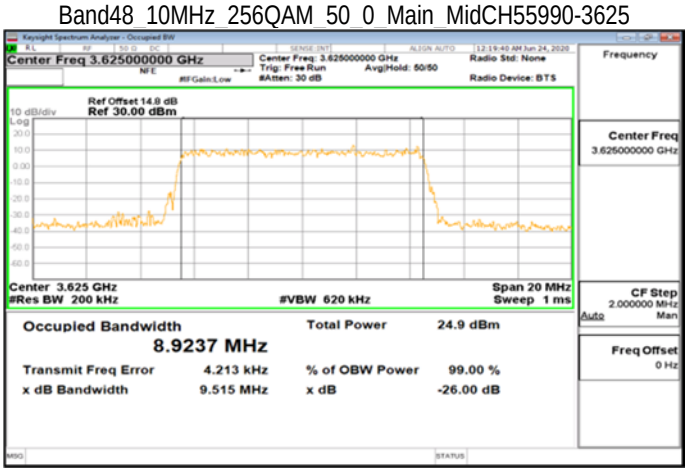
Band48_10MHz_256QAM_50_0_Main_LowCH55290-3555



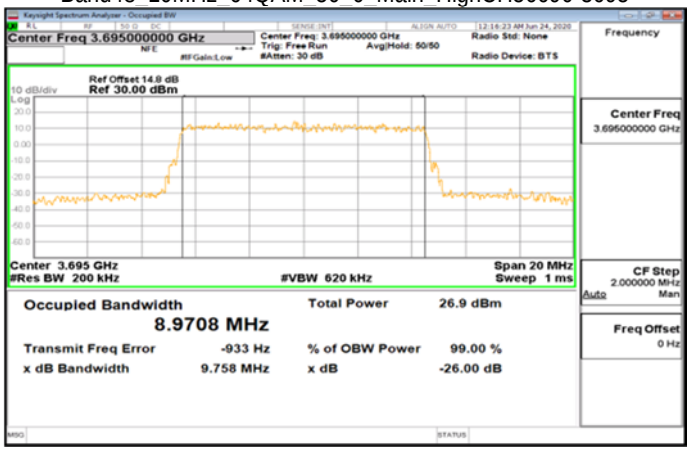
Band48_10MHz_64QAM_50_0_Main_MidCH55990-3625



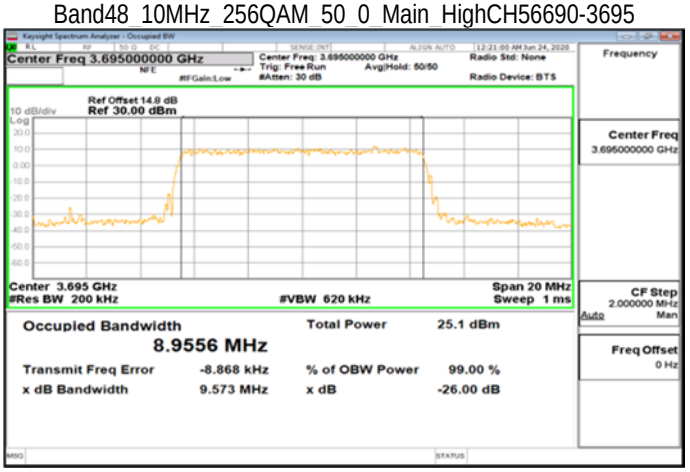
Band48_10MHz_256QAM_50_0_Main_MidCH55990-3625



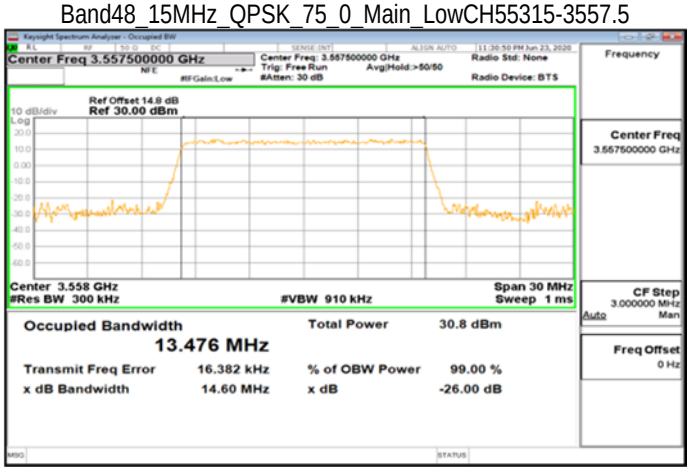
Band48_10MHz_64QAM_50_0_Main_HighCH56690-3695



Band48_10MHz_256QAM_50_0_Main_HighCH56690-3695



Band48_15MHz_QPSK_75_0_Main_LowCH55315-3557.5



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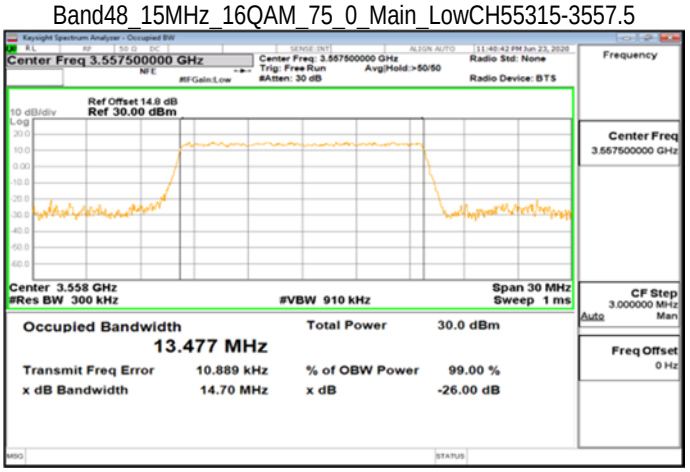

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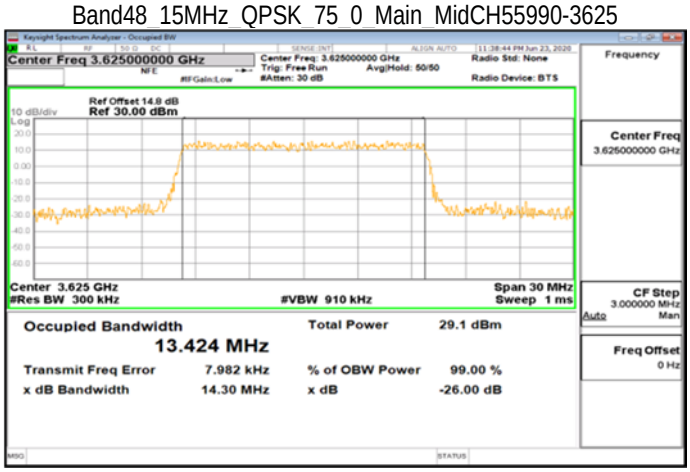
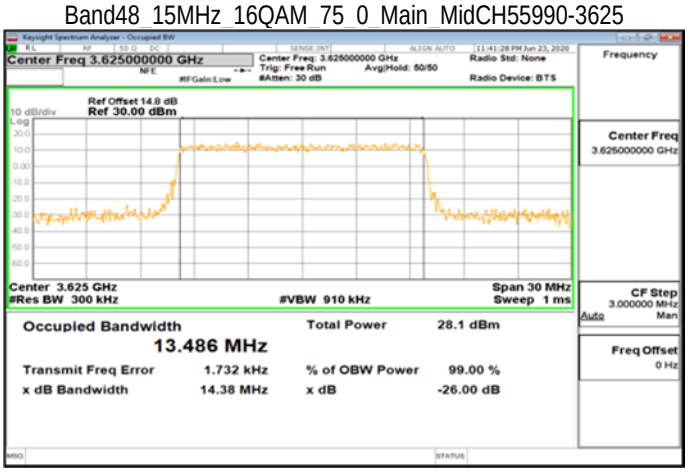
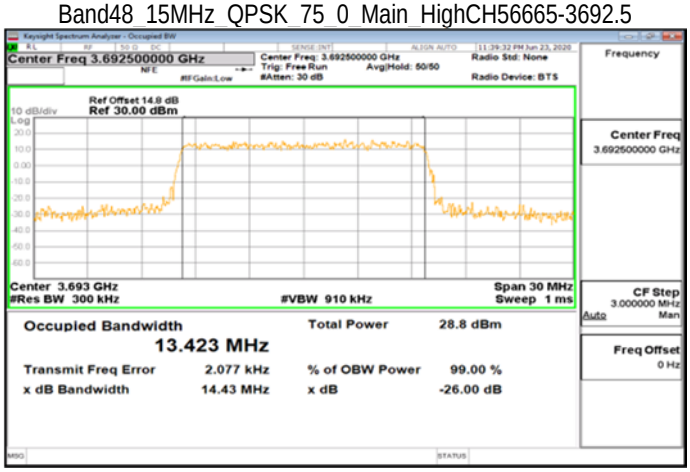


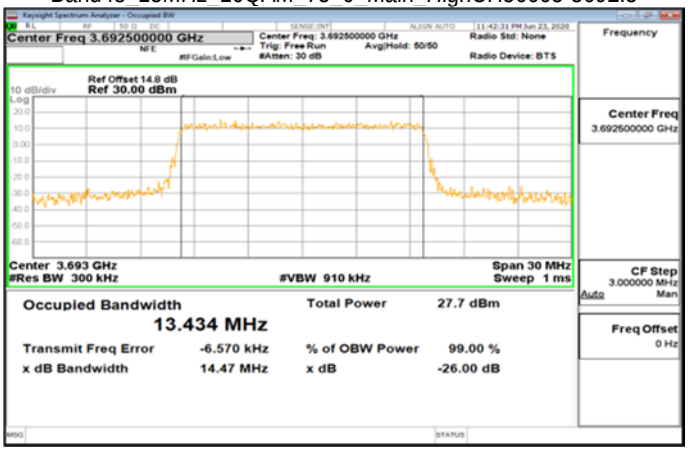
Band48_15MHz_16QAM_75_0_Main_MidCH55990-3625



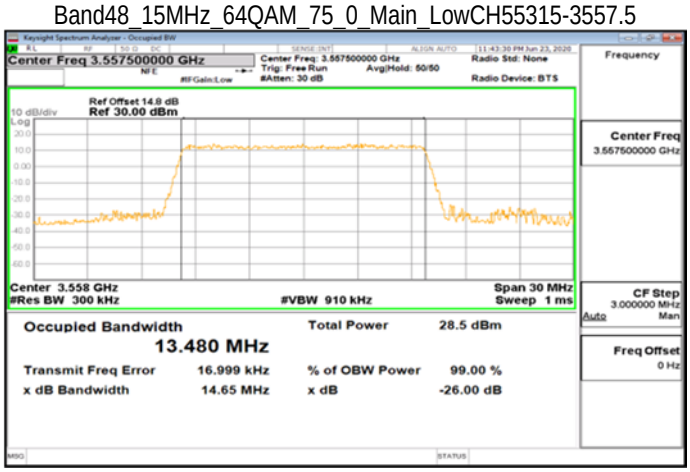
Band48_15MHz_QPSK_75_0_Main_HighCH56665-3692.5



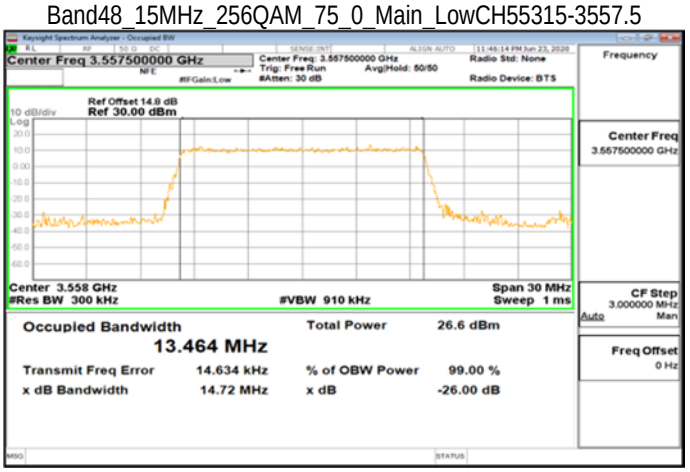
Band48_15MHz_16QAM_75_0_Main_HighCH56665-3692.5



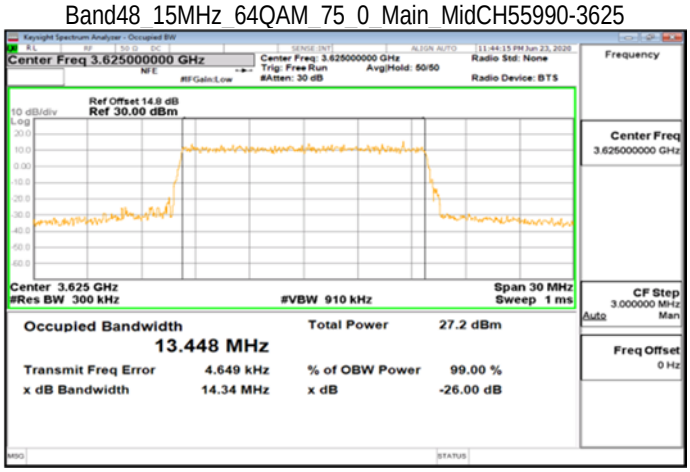
Band48_15MHz_64QAM_75_0_Main_LowCH55315-3557.5



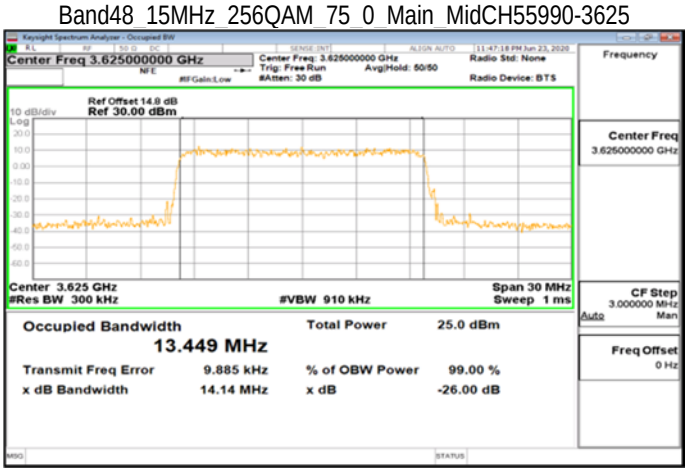
Band48_15MHz_256QAM_75_0_Main_LowCH55315-3557.5



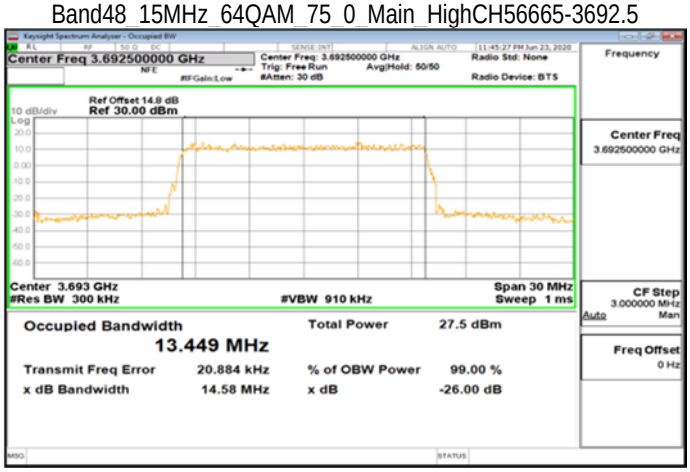
Band48_15MHz_64QAM_75_0_Main_MidCH55990-3625



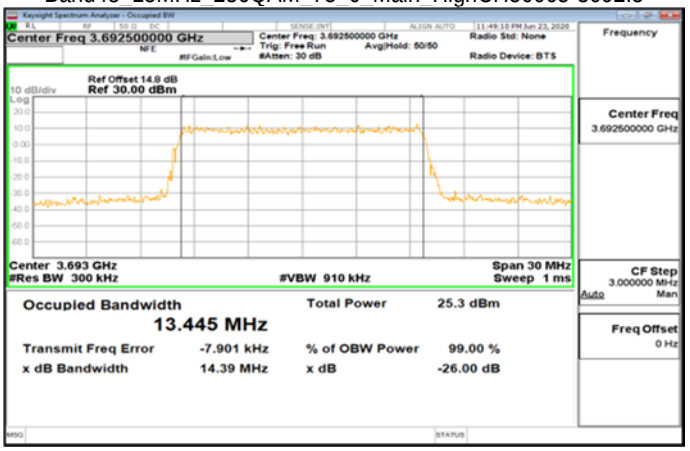
Band48_15MHz_256QAM_75_0_Main_MidCH55990-3625



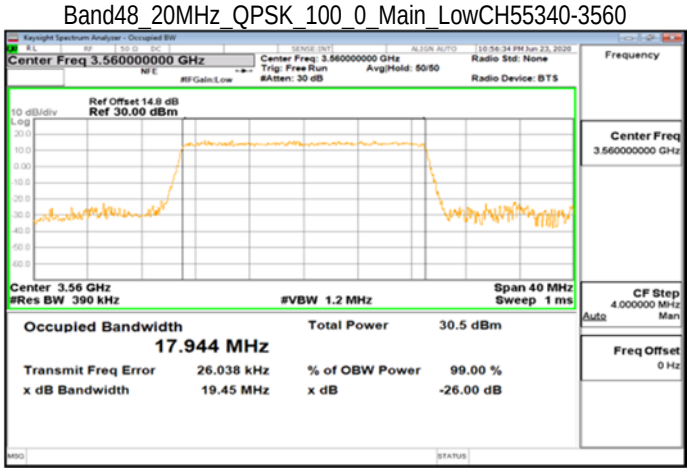
Band48_15MHz_64QAM_75_0_Main_HighCH56665-3692.5



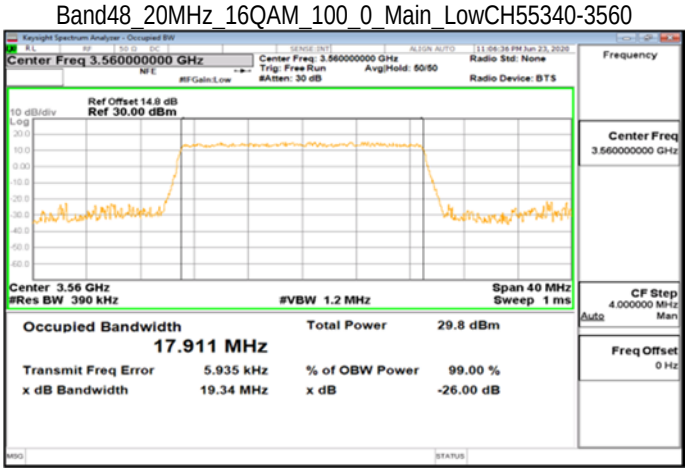
Band48_15MHz_256QAM_75_0_Main_HighCH56665-3692.5



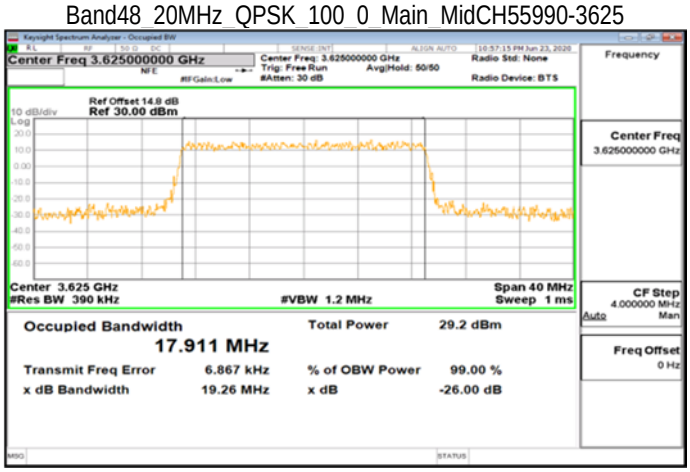
Band48_20MHz_QPSK_100_0_Main_LowCH55340-3560



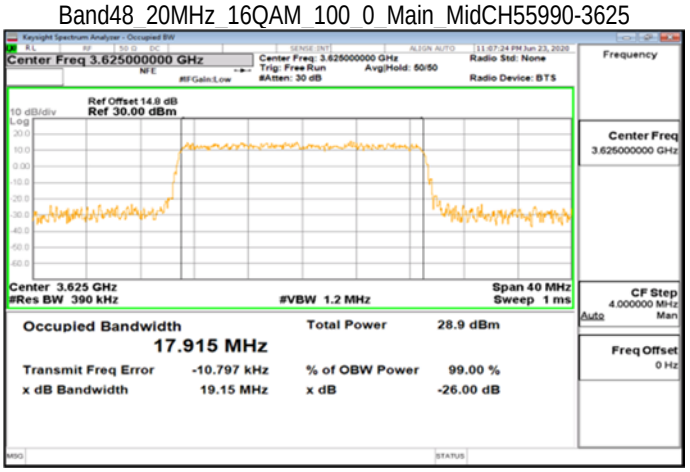
Band48_20MHz_16QAM_100_0_Main_LowCH55340-3560



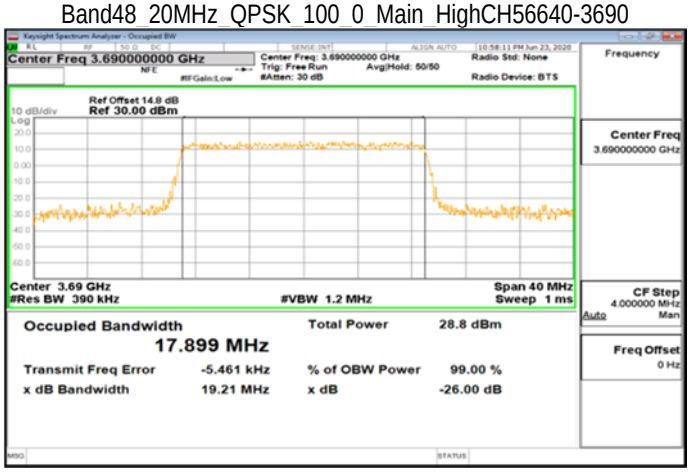
Band48_20MHz_QPSK_100_0_Main_MidCH55990-3625



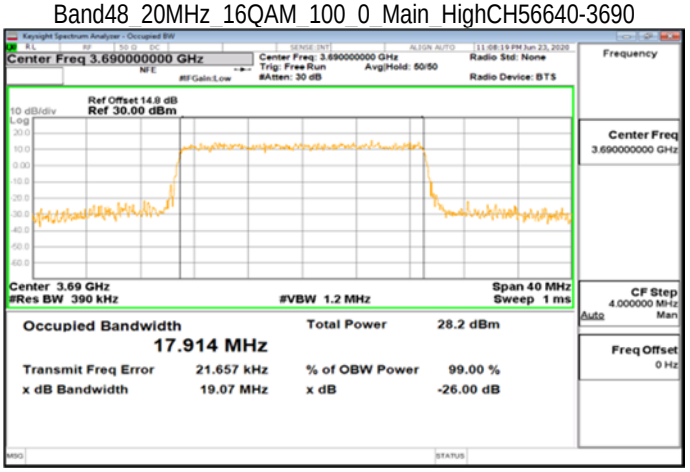
Band48_20MHz_16QAM_100_0_Main_MidCH55990-3625



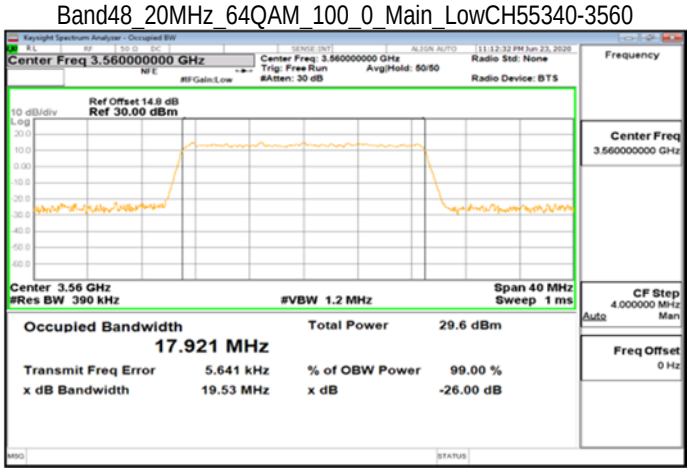
Band48_20MHz_QPSK_100_0_Main_HighCH56640-3690



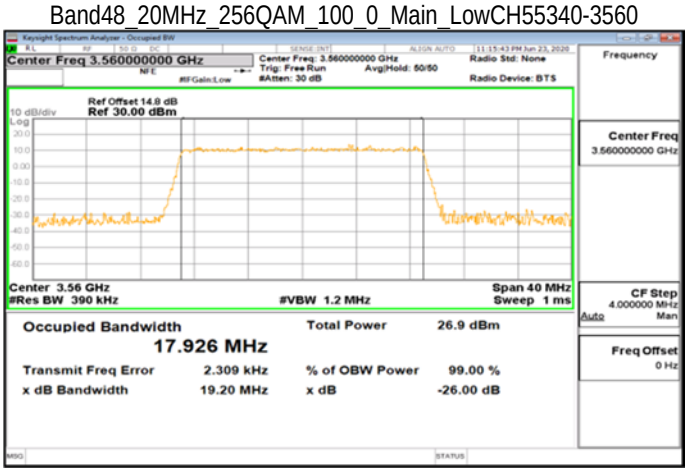
Band48_20MHz_16QAM_100_0_Main_HighCH56640-3690



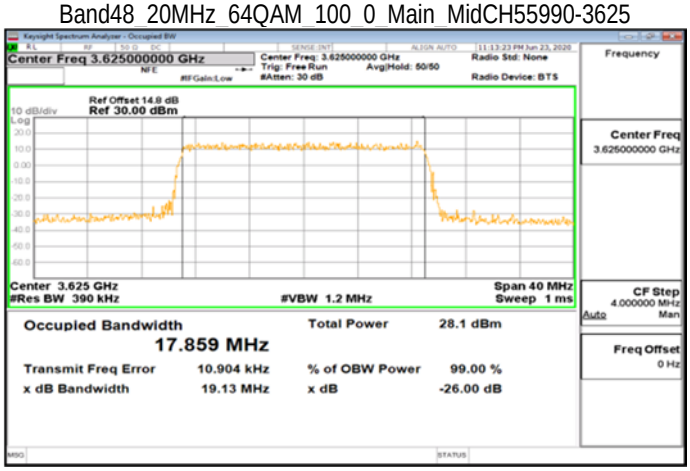
Band48_20MHz_64QAM_100_0_Main_LowCH55340-3560



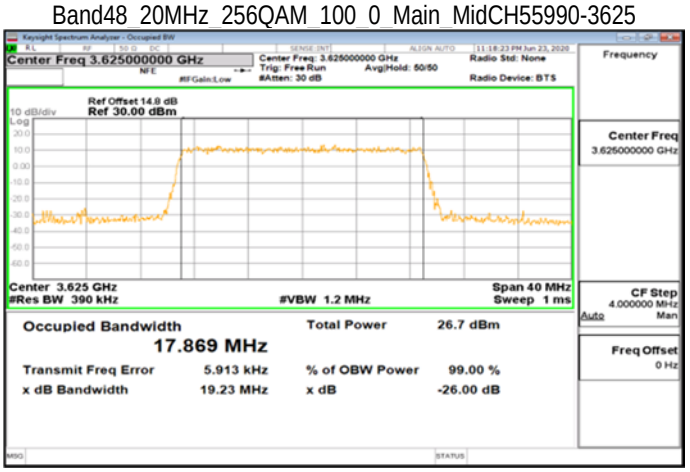
Band48_20MHz_256QAM_100_0_Main_LowCH55340-3560



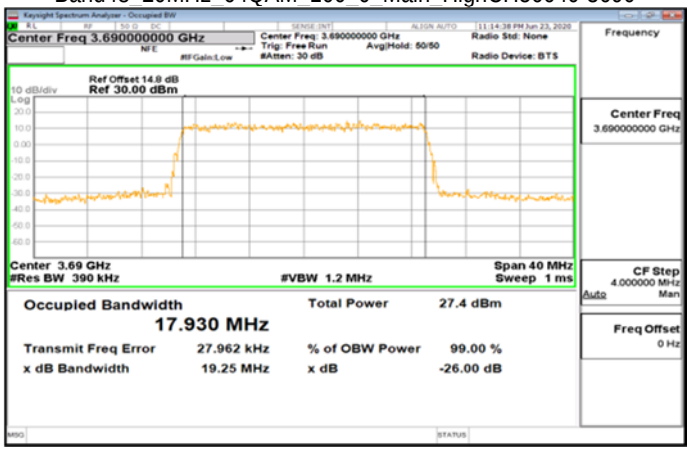
Band48_20MHz_64QAM_100_0_Main_MidCH55990-3625



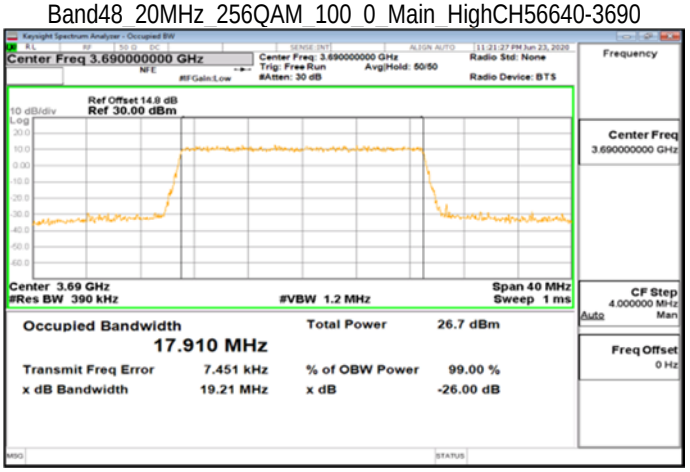
Band48_20MHz_256QAM_100_0_Main_MidCH55990-3625



Band48_20MHz_64QAM_100_0_Main_HighCH56640-3690



Band48_20MHz_256QAM_100_0_Main_HighCH56640-3690



9. OUT OF BAND EMISSION AT ANTENNA TERMINALS

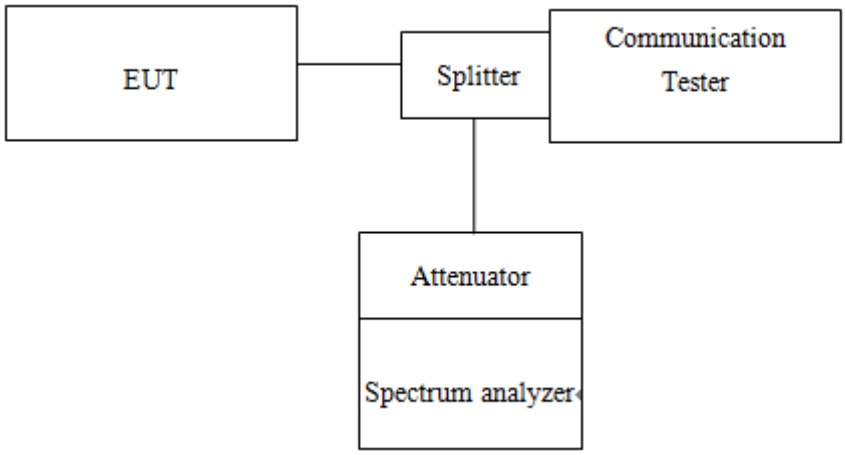
9.1. Standard Applicable

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 −40dBm/MHz.

9.2. Test SET-UP



9.3. Measurement Procedure

9.3.1. Conducted Emission

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

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.

9.3.2. Band Edge/Emission Mask

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 ≥ 1% EBW.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

Note:

For emission outside of the fundamental emission within 0 to B megahaertz which shall not exceed -13dBm/MHz, the RB is set to 51kHz and correction factor in section 5.7.2 a) of ANSI C63.26-2015 is adopted as

10log [(reference bandwidth) / (resolution bandwidth)]

correction factor = 10log [(1MHz) / (51kHz)] = -13dB

and apply to the limit of the fundamental emission within 0 to B megahaertz as

-13dBm/MHz – 13dB = -26dBm/MHz

9.4. Measurement Equipment Used

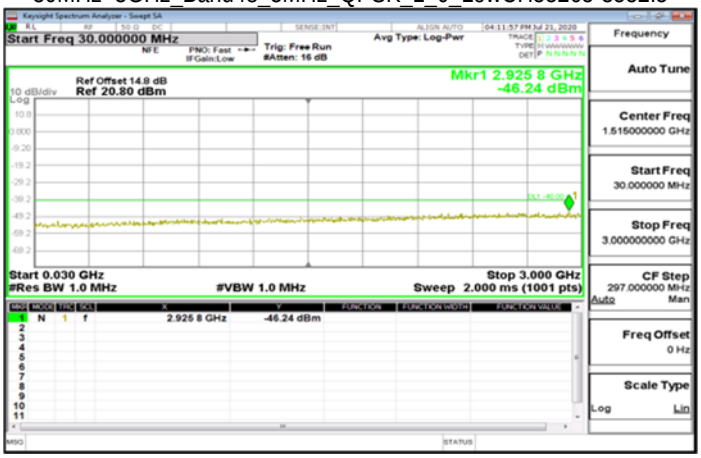
Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/18/2020	01/17/2021
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021

9.5. Measurement Result:

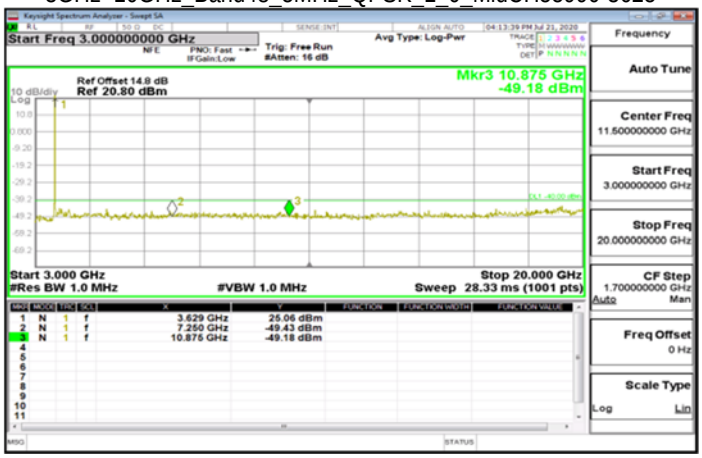
NOTE: The occurrence of the spike on the conducted emission is the signal of the fundamental emission.

Out of Band Emission

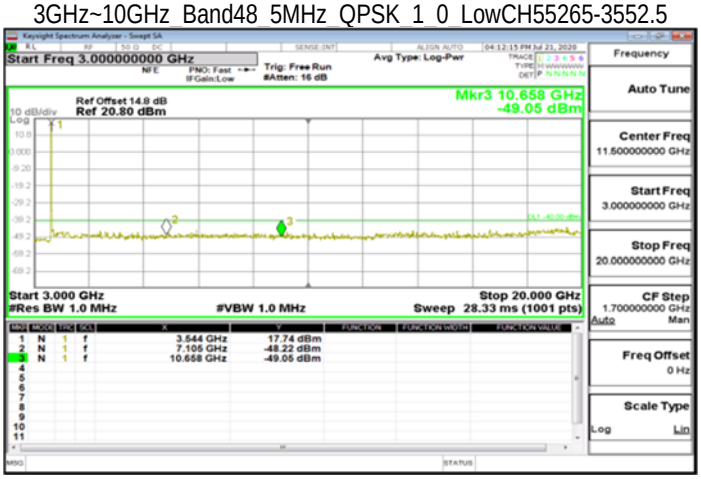
30MHz~3GHz_Band48_5MHz_QPSK_1_0_LowCH55265-3552.5



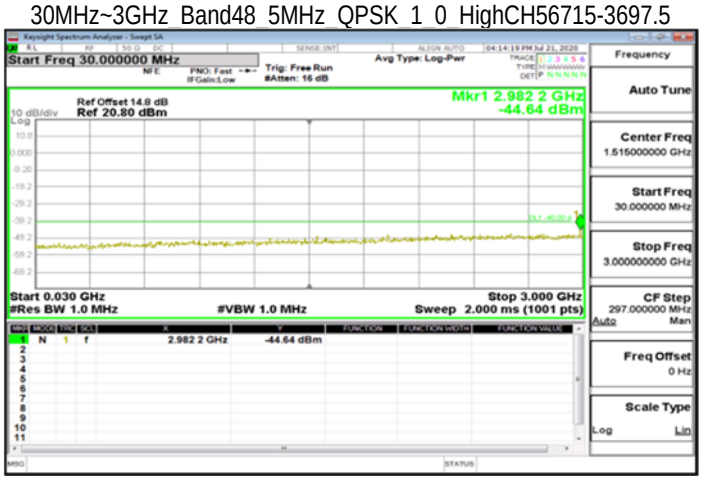
3GHz~10GHz_Band48_5MHz_QPSK_1_0_MidCH55990-3625



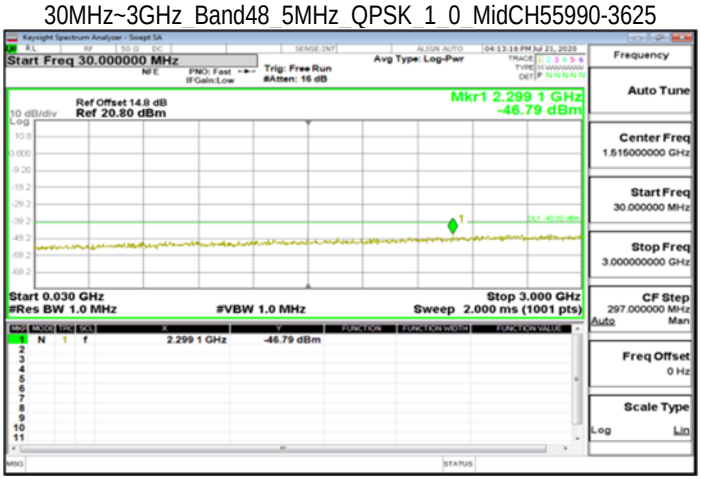
3GHz~10GHz_Band48_5MHz_QPSK_1_0_LowCH55265-3552.5



30MHz~3GHz_Band48_5MHz_QPSK_1_0_HighCH56715-3697.5



30MHz~3GHz_Band48_5MHz_QPSK_1_0_MidCH55990-3625



3GHz~10GHz_Band48_5MHz_QPSK_1_0_HighCH56715-3697.5