

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

OF

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

Product Name: Clover Flex

Brand Name: clover

Model No.: C403

Model Difference: N/A

Report Number: E2/2020/50040

FCC ID HFS-C403V

FCC Rule Part: 2 , 27 C

Issue Date: Jun. 16, 2020

Date of Test: May 14, 2020 ~ Jun. 10, 2020

Date of EUT Received: May 14, 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:**Jay Lin / Asst. Supervisor**

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Revision History				
Report Number	Revision	Description	Issue Date	Remark
E2/2020/50040	Rev.00	Original.	Jun. 16, 2020	Revised By: Karen Huang

Note:

1、Disclaimer

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

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1 GENERAL PRODUCT INFORMATION

1.1 Product Description

General:

Product Name:	Clover Flex	
Brand Name:	clover	
Model No.:	C403	
Model Difference:	N/A	
Hardware Version:	4.01	
Software Version:	N/A	
Micro Hub:	Model No.: H400, Supplier: clover	
Docking:	Model No.: K400, Supplier: clover	
Power Supply:	7.6V from Li-ion Polymer rechargeable battery or 12V from Adapter	
	Battery:	Model No.: CA355772HV_POS5, Supplier: Zhuhai CosMX Battery Co., Ltd.
	Adapter:	Model No.: FSP040-RHBN3, Supplier: FSP
IMEI:	357648071108550	

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1.2 Operation Frequency Range

LTE Band 4	
BW (MHz)	Operation Frequency (MHz)
1.4	1710.7 - 1754.3
3	1711.5 - 1753.5
5	1712.5 - 1752.5
10	1715.0 - 1750.0
15	1717.5 - 1747.5
20	1720.0 - 1745.0
LTE Band 13	
BW (MHz)	Operation Frequency (MHz)
5	779.5 - 784.5
10	782.0

1.3 Antenna Designation

Vendor	Type	Main / Aux	Antenna Part No.	Modulation	Frequency (MHz)	Peak Antenna Gain (dBi)
SAA	COUPLING	Main	DQ60AYF0007	LTE Band 4	1710 ~ 1755	0.06
				LTE Band 13	777 ~ 787	0.74
	COUPLING	Aux	DQ60AYF0004	LTE Band 4	1710 ~ 1755	N/A
				LTE Band 13	777 ~ 787	N/A

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

LTE Band	BW	Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
4	1.4	QPSK	22.53	EIRP	0.179	1.102	1M10G7D
		16QAM	21.54	EIRP	0.143	1.106	1M11D7W
4	3	QPSK	22.51	EIRP	0.178	2.702	2M70G7D
		16QAM	21.13	EIRP	0.130	2.706	2M71D7W
4	5	QPSK	22.48	EIRP	0.177	4.505	4M50G7D
		16QAM	21.22	EIRP	0.132	4.503	4M50D7W
4	10	QPSK	22.52	EIRP	0.179	9.026	9M03G7D
		16QAM	21.55	EIRP	0.143	8.981	8M98D7W
4	15	QPSK	22.52	EIRP	0.179	13.541	13M5G7D
		16QAM	21.48	EIRP	0.141	13.520	13M5D7W
4	20	QPSK	22.54	EIRP	0.179	18.015	18M0G7D
		16QAM	21.46	EIRP	0.140	18.007	18M0D7W

LTE Band	BW	Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
13	5	QPSK	21.04	ERP	0.127	4.507	4M51G7D
		16QAM	20.04	ERP	0.101	4.504	4M50D7W
13	10	QPSK	20.82	ERP	0.121	8.960	8M96G7D
		16QAM	19.98	ERP	0.100	8.925	8M92D7W

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1.5 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 27C

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03r01

KDB412172 D01 Determining ERP and EIRP v01r01

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

1.6 Test Facility

SGS Taiwan Ltd. Central RF Lab (TAF code 3702)

No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

FCC Designation number: TW00028

1.7 Special Accessories

No special accessories were used during testing.

1.8 Equipment Modifications

There was no modifications incorporated into the EUT.

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

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

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

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Measurement at Antenna Port

The EUT is placed on a table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

2.3.2 Radiated Emissions (ERP/EIRP)

The EUT is placed on a turn table, for emission measurements below 1 GHz is 0.8 m above ground plane, for emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna 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)
Low Band (Below 1GHz)	0.4	13.2	13.60
High Band (Above 1 GHz)	0.6	13.2	13.80

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2.5 Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
LTE Band 4	7.6	363
LTE Band 13		366

2.6 Configuration of Tested System

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

4G

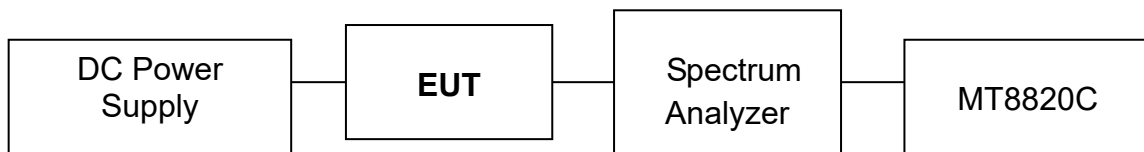


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)

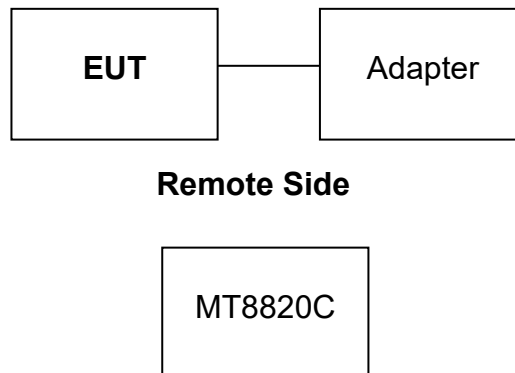


Table 2-1 Equipment Used in

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Universal Radio Communication Tester	Anritsu	MT8820C	6201107337	shielded	Un-shielded

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3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§2.1046(a)	RF Power Output	Compliant
§27.50(b)(10) §27.50(d)(4)	ERP/ EIRP measurement	Compliant
§2.1049(h)	99% & 26dB Occupied Bandwidth	Compliant
§2.1051 §27.53(c) §27.53(h)	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §2.1057(a)(1) §27.53(c)(f) §27.53(h)	Field Strength of Spurious Radiation	Compliant
§27.50(B)	Peak to Average Ratio	Compliant
§2.1055(a)(1) §27.54	Frequency Stability	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case 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 4	V		
LTE Band 13	V		

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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	1	Half	Full
Max. Output Power	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	13	v	v	v	-	-	v	v	-	-	v	v	v	v	v	v
Frequency Stability	4	-	v	-							v	-	-	-	-	v
	13	-	v	-	-	-		v	-	-	v	-	-	-	-	v
Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation			RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full
26dB and 99%	4	v	v	v	v	v	v	v	v	v	v	v	v	-	-	v
	13	v	v	v	-	-	v	v	-	-	v	v	v	-	-	v
Peak-to-Average Ratio	4	v	v	v	v	v	v	v	v	v		v		-	-	v
	13	v	v	v	-	-	v	v	-	-		v		-	-	v
Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation			RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full
Band Edge	4	v	-	v	v	v	v	v	v	v	v	-	-	v	v	v
	13	v	-	v	-	-	v	v	-	-	v	-	-	v	v	v
Conducted Emission	4	v	v	v	v	v	v	v	v	v	v	-	-	v	-	-
	13	v	v	v	-	-	v	v	-	-	v	-	-	v	-	-
Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation			RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full
Radiated Emission	4	v	v	v						v	v			v		
	13	v	v	v	-	-		v	-	-	v			v		

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1.10 dB
ERP/ EIRP measurement	Vertical Polarization = +/- 4.74dB Horizontal Polarization = +/- 4.62dB
99% Occupied Bandwidth	+/- 5.19 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 0.70 dB
Peak to Average Ratio	+/- 0.70 dB
Frequency Stability vs. Temperature	+/- 5.19 Hz
Frequency Stability vs. Voltage	+/- 5.19 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

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

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

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

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6 MAXMUM OUTPUT POWER

6.1 Standard Applicable

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

6.1.1 ERP/EIRP LIMIT

According to FCC §2.1046

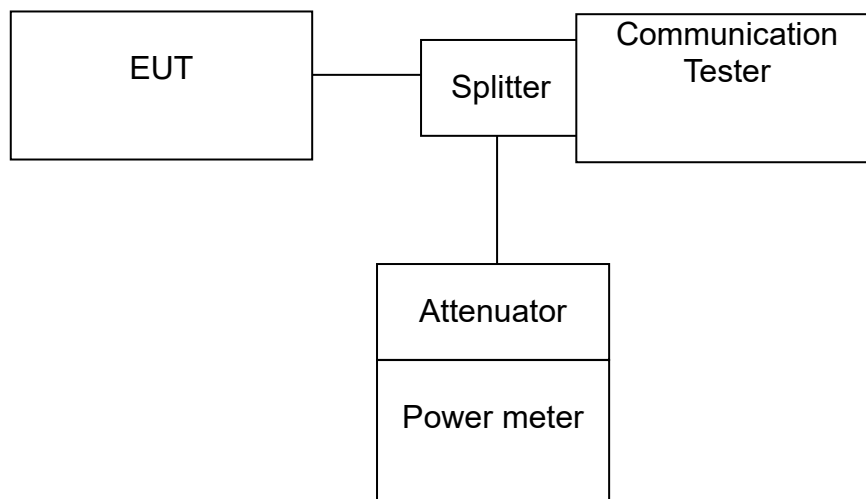
FCC 27.50 (b)

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

FCC 27.50(d)

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

6.2 Test Set-up



Note: Measurement setup for testing on Antenna connector

6.3 Output Power Measurement Applicable Guidance

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading. TS 151 010-1 is reference to conduct the test measurement of output power.

The Procedure of KDB941225 (SAR Measurement Procedures for 3G devices, (WCD-MA/HSPA) was used for EUT and Base station setting. RMC 12.2kps is used for this testing, and KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results.

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

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6.4 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 P_T , 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.

6.5 Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Radio Communication Analyser	Anritsu	MT8820C	6201107337	07/17/2019	07/16/2020

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6.6 LTE Measurement Results:

Antenna gain (dBi) 0.06

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducte d Average	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	19957	1710.7	QPSK	1	0	22.43	22.49	30	-7.51
				1	5	22.47	22.53	30	-7.47
				3	2	22.46	22.52	30	-7.48
				6	0	21.45	21.51	30	-8.49
	20175	1732.5	QPSK	1	0	22.42	22.48	30	-7.52
				1	5	22.41	22.47	30	-7.53
				3	2	22.43	22.49	30	-7.51
				6	0	21.42	21.48	30	-8.52
	20393	1754.3	QPSK	1	0	22.39	22.45	30	-7.55
				1	5	22.33	22.39	30	-7.61
				3	2	22.34	22.40	30	-7.6
				6	0	21.32	21.38	30	-8.62
	19957	1710.7	16QAM	1	0	21.13	21.19	30	-8.81
				1	5	21.09	21.15	30	-8.85
				3	2	20.82	20.88	30	-9.12
				6	0	20.46	20.52	30	-9.48
	20175	1732.5	16QAM	1	0	21.04	21.10	30	-8.9
				1	5	20.99	21.05	30	-8.95
				3	2	21.48	21.54	30	-8.46
				6	0	20.42	20.48	30	-9.52
	20393	1754.3	16QAM	1	0	20.94	21.00	30	-9
				1	5	20.90	20.96	30	-9.04
				3	2	21.35	21.41	30	-8.59
				6	0	20.37	20.43	30	-9.57

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Antenna gain (dBi) 0.06

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducte d Average	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	19965	1711.5	QPSK	1	0	22.45	22.51	30	-7.49
				1	14	22.40	22.46	30	-7.54
				8	4	21.45	21.51	30	-8.49
				15	0	21.46	21.52	30	-8.48
	20175	1732.5	QPSK	1	0	22.41	22.47	30	-7.53
				1	14	22.26	22.32	30	-7.68
				8	4	21.40	21.46	30	-8.54
				15	0	21.37	21.43	30	-8.57
	20385	1753.5	QPSK	1	0	22.36	22.42	30	-7.58
				1	14	22.28	22.34	30	-7.66
				8	4	21.35	21.41	30	-8.59
				15	0	21.33	21.39	30	-8.61
	19965	1711.5	16QAM	1	0	21.07	21.13	30	-8.87
				1	14	20.98	21.04	30	-8.96
				8	4	20.46	20.52	30	-9.48
				15	0	20.47	20.53	30	-9.47
	20175	1732.5	16QAM	1	0	20.99	21.05	30	-8.95
				1	14	20.81	20.87	30	-9.13
				8	4	20.39	20.45	30	-9.55
				15	0	20.39	20.45	30	-9.55
	20385	1753.5	16QAM	1	0	20.88	20.94	30	-9.06
				1	14	20.81	20.87	30	-9.13
				8	4	20.29	20.35	30	-9.65
				15	0	20.33	20.39	30	-9.61

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Antenna gain (dBi) 0.06

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducte d Average	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	19975	1712.5	QPSK	1	0	22.42	22.48	30	-7.52
				1	24	22.39	22.45	30	-7.55
				12	6	21.45	21.51	30	-8.49
				25	0	21.46	21.52	30	-8.48
	20175	1732.5	QPSK	1	0	22.41	22.47	30	-7.53
				1	24	22.23	22.29	30	-7.71
				12	6	21.40	21.46	30	-8.54
				25	0	21.40	21.46	30	-8.54
	20375	1752.5	QPSK	1	0	22.39	22.45	30	-7.55
				1	24	22.27	22.33	30	-7.67
				12	6	21.34	21.40	30	-8.6
				25	0	21.35	21.41	30	-8.59
	19975	1712.5	16QAM	1	0	21.16	21.22	30	-8.78
				1	24	20.98	21.04	30	-8.96
				12	6	20.44	20.50	30	-9.5
				25	0	20.43	20.49	30	-9.51
	20175	1732.5	16QAM	1	0	21.14	21.20	30	-8.8
				1	24	20.89	20.95	30	-9.05
				12	6	20.39	20.45	30	-9.55
				25	0	20.37	20.43	30	-9.57
20375	1752.5	16QAM	1	0	21.00	21.06	30	-8.94	
			1	24	20.87	20.93	30	-9.07	
			12	6	20.29	20.35	30	-9.65	
			25	0	20.27	20.33	30	-9.67	

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Antenna gain (dBi) 0.06

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducte d Average	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)	
10	20000	1715	QPSK	1	0	22.39	22.45	30	-7.55	
				1	49	22.39	22.45	30	-7.55	
				25	12	21.42	21.48	30	-8.52	
				50	0	21.47	21.53	30	-8.47	
	20175	1732.5	QPSK	1	0	22.37	22.43	30	-7.57	
				1	49	22.30	22.36	30	-7.64	
				25	12	21.33	21.39	30	-8.61	
	20375	1750	QPSK	50	0	21.40	21.46	30	-8.54	
				1	0	22.46	22.52	30	-7.48	
				1	49	22.22	22.28	30	-7.72	
					25	12	21.28	21.34	30	-8.66
					50	0	21.31	21.37	30	-8.63
					1	0	21.39	21.45	30	-8.55
	20000	1715	16QAM	1	49	21.28	21.34	30	-8.66	
				25	12	20.39	20.45	30	-9.55	
				50	0	20.47	20.53	30	-9.47	
				1	0	21.49	21.55	30	-8.45	
	20175	1732.5	16QAM	1	49	21.21	21.27	30	-8.73	
				25	12	20.31	20.37	30	-9.63	
				50	0	20.36	20.42	30	-9.58	
20375	1750	16QAM	1	0	21.45	21.51	30	-8.49		
			1	49	21.48	21.54	30	-8.46		
			25	12	20.22	20.28	30	-9.72		
			50	0	20.29	20.35	30	-9.65		

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Antenna gain (dBi) 0.06

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducte d Average	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
15	20025	1717.5	QPSK	1	0	22.46	22.52	30	-7.48
				1	74	22.22	22.28	30	-7.72
				36	18	21.45	21.51	30	-8.49
				75	0	21.50	21.56	30	-8.44
	20175	1732.5	QPSK	1	0	22.43	22.49	30	-7.51
				1	74	22.26	22.32	30	-7.68
				36	18	21.40	21.46	30	-8.54
				75	0	21.47	21.53	30	-8.47
	20325	1747.5	QPSK	1	0	22.44	22.50	30	-7.5
				1	74	22.32	22.38	30	-7.62
				36	18	21.42	21.48	30	-8.52
				75	0	21.50	21.56	30	-8.44
	20025	1717.5	16QAM	1	0	21.42	21.48	30	-8.52
				1	74	20.86	20.92	30	-9.08
				36	18	20.41	20.47	30	-9.53
				75	0	20.44	20.50	30	-9.5
	20175	1732.5	16QAM	1	0	21.36	21.42	30	-8.58
				1	74	20.90	20.96	30	-9.04
				36	18	20.34	20.40	30	-9.6
				75	0	20.40	20.46	30	-9.54
	20325	1747.5	16QAM	1	0	21.38	21.44	30	-8.56
				1	74	20.93	20.99	30	-9.01
				36	18	20.35	20.41	30	-9.59
				75	0	20.40	20.46	30	-9.54

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Antenna gain (dBi) 0.06

LTE Band 4_Uplink frequency band : 1710 to 1755 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducte d Average	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
20	20050	1720	QPSK	1	0	22.48	22.54	30	-7.46
				1	99	22.07	22.13	30	-7.87
				50	25	21.38	21.44	30	-8.56
				100	0	21.50	21.56	30	-8.44
	20175	1732.5	QPSK	1	0	22.44	22.50	30	-7.5
				1	99	22.00	22.06	30	-7.94
				50	25	21.31	21.37	30	-8.63
				100	0	21.45	21.51	30	-8.49
	20300	1745	QPSK	1	0	22.39	22.45	30	-7.55
				1	99	22.02	22.08	30	-7.92
				50	25	21.32	21.38	30	-8.62
				100	0	21.46	21.52	30	-8.48
	20050	1720	16QAM	1	0	21.40	21.46	30	-8.54
				1	99	21.40	21.46	30	-8.54
				50	25	20.33	20.39	30	-9.61
				100	0	20.41	20.47	30	-9.53
	20175	1732.5	16QAM	1	0	21.39	21.45	30	-8.55
				1	99	21.33	21.39	30	-8.61
				50	25	20.25	20.31	30	-9.69
				100	0	20.34	20.40	30	-9.6
20300	1745	16QAM	1	0	21.33	21.39	30	-8.61	
			1	99	21.35	21.41	30	-8.59	
			50	25	20.28	20.34	30	-9.66	
			100	0	20.36	20.42	30	-9.58	

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Antenna gain (dBi) 0.74

LTE Band 13_Uplink frequency band : 777 to 787 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducte d Average	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	23205	779.5	QPSK	1	0	22.42	21.01	23.16	34.77	-11.61
				1	24	22.42	21.01	23.16	34.77	-11.61
				12	6	21.32	19.91	22.06	34.77	-12.71
				25	0	21.30	19.89	22.04	34.77	-12.73
	23230	782	QPSK	1	0	22.45	21.04	23.19	34.77	-11.58
				1	24	22.26	20.85	23.00	34.77	-11.77
				12	6	21.30	19.89	22.04	34.77	-12.73
				25	0	21.27	19.86	22.01	34.77	-12.76
	23255	784.5	QPSK	1	0	22.45	21.04	23.19	34.77	-11.58
				1	24	22.23	20.82	22.97	34.77	-11.8
				12	6	21.21	19.80	21.95	34.77	-12.82
				25	0	21.50	20.09	22.24	34.77	-12.53
	23205	779.5	16QAM	1	0	21.35	19.94	22.09	34.77	-12.68
				1	24	21.35	19.94	22.09	34.77	-12.68
				12	6	20.36	18.95	21.10	34.77	-13.67
				25	0	20.36	18.95	21.10	34.77	-13.67
	23230	782	16QAM	1	0	21.40	19.99	22.14	34.77	-12.63
				1	24	21.45	20.04	22.19	34.77	-12.58
				12	6	20.34	18.93	21.08	34.77	-13.69
				25	0	20.34	18.93	21.08	34.77	-13.69
23255	784.5	16QAM	1	0	21.45	20.04	22.19	34.77	-12.58	
			1	24	21.37	19.96	22.11	34.77	-12.66	
			12	6	20.25	18.84	20.99	34.77	-13.78	
			25	0	20.27	18.86	21.01	34.77	-13.76	

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Antenna gain (dBi) 0.74

LTE Band 13_Uplink frequency band : 777 to 787 MHz

BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducte d Average	ERP Average (dBm)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	23230	782	QPSK	1	0	22.23	20.82	22.97	34.77	-11.8
				1	49	21.89	20.48	22.63	34.77	-12.14
				25	12	21.41	20.00	22.15	34.77	-12.62
				50	0	21.45	20.04	22.19	34.77	-12.58
	23230	782	16QAM	1	0	21.39	19.98	22.13	34.77	-12.64
				1	49	21.29	19.88	22.03	34.77	-12.74
				25	12	20.38	18.97	21.12	34.77	-13.65
				50	0	20.49	19.08	21.23	34.77	-13.54

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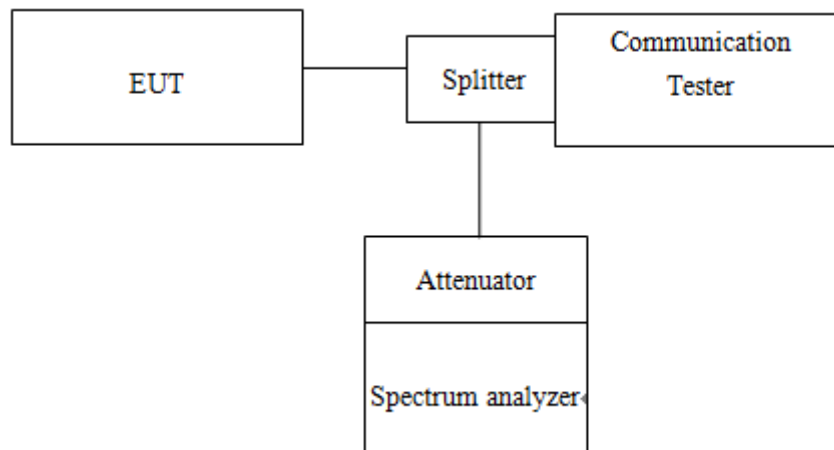
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7 OCCUPIED BANDWIDTH MEASUREMENT

7.1 Standard Applicable

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power.

7.2 Test Set-up



7.3 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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7.4 Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Block	PASTERNAK	PE8210	RF32	11/20/2019	11/19/2020
Spectrum Analyzer	KEYSIGHT	N9010B	MY59070240	04/14/2019	04/13/2021
Temperature Chamber	TERCHY	MHK-120LK	1020582	07/09/2019	07/08/2020
Splitter	Marvelous	MVE8586	RF265	11/20/2019	11/19/2020
Attenuator	Marvelous	MVE2213-10	RF31	11/20/2019	11/19/2020
Radio Communication Analyser	Anritsu	MT8820C	6201107337	07/17/2019	07/16/2020

7.5 Measurement Result

LTE BAND 4 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1710.7	19957	1.102	1.106	1.320	1.362
1732.5	20175	1.102	1.103	1.320	1.348
1754.3	20393	1.102	1.104	1.324	1.354

LTE BAND 4 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1711.5	19965	2.702	2.705	2.988	3.028
1732.5	20175	2.701	2.702	3.010	3.015
1753.5	20385	2.701	2.706	2.992	3.034

LTE BAND 4 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1712.5	19957	4.505	4.500	5.068	5.071
1732.5	20175	4.503	4.503	5.061	5.046
1752.5	20375	4.497	4.495	5.097	5.075

LTE BAND 4 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1715.0	20000	9.003	8.975	10.197	10.120
1732.5	20175	9.026	8.981	10.322	10.151
1750.0	20350	9.021	8.963	10.241	10.083

LTE BAND 4 Channel bandwidth: 15MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1717.5	20025	13.515	13.520	15.711	15.830
1732.5	20175	13.541	13.501	15.775	15.802
1747.5	20325	13.532	13.520	15.632	15.960

LTE BAND 4 Channel bandwidth: 20MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
1720.0	20050	17.979	18.007	20.492	20.546
1732.5	20175	17.975	17.953	20.474	20.389
1745.0	20300	18.015	18.002	20.678	20.704

LTE BAND 13 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
779.5	23205	4.5017	4.4892	5.061	5.096
782.0	23230	4.4844	4.4872	5.079	5.070
784.5	23255	4.5073	4.5040	5.160	5.102

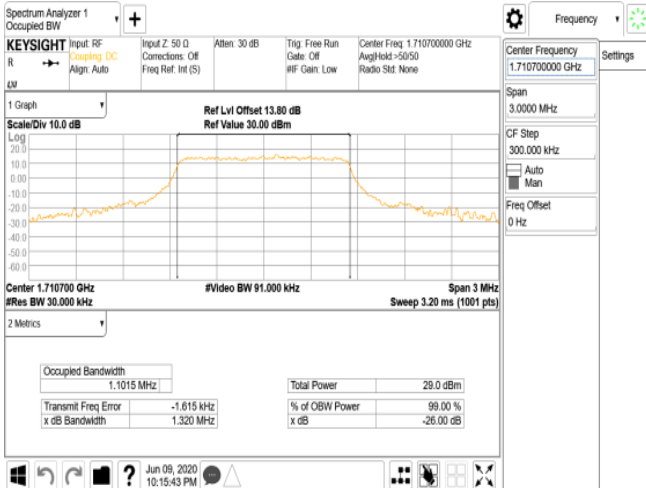
LTE BAND 13 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
782.0	23230	8.960	8.925	10.247	9.923

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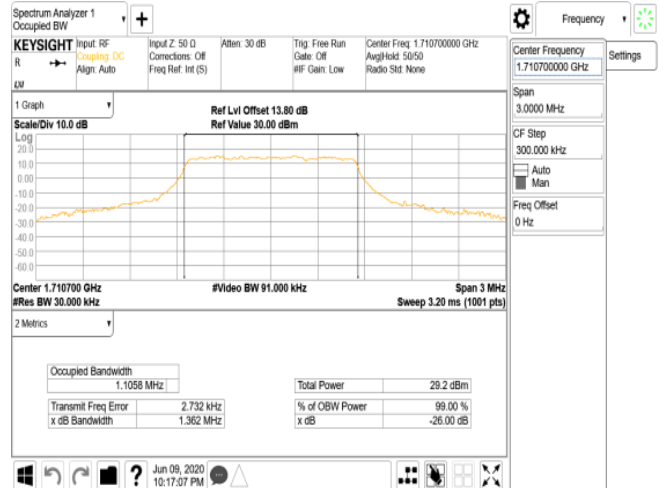
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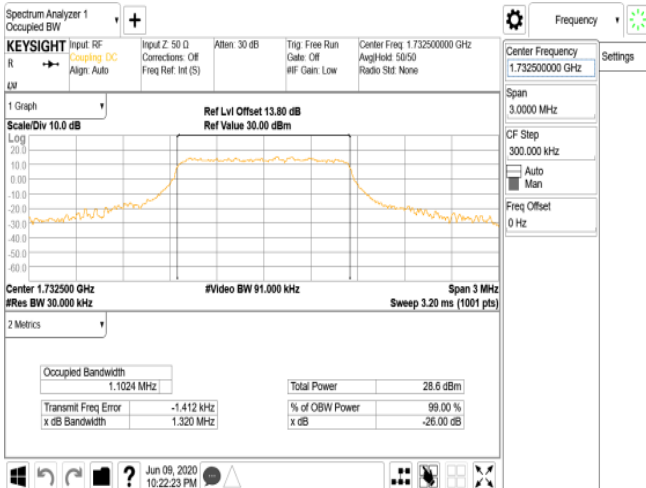
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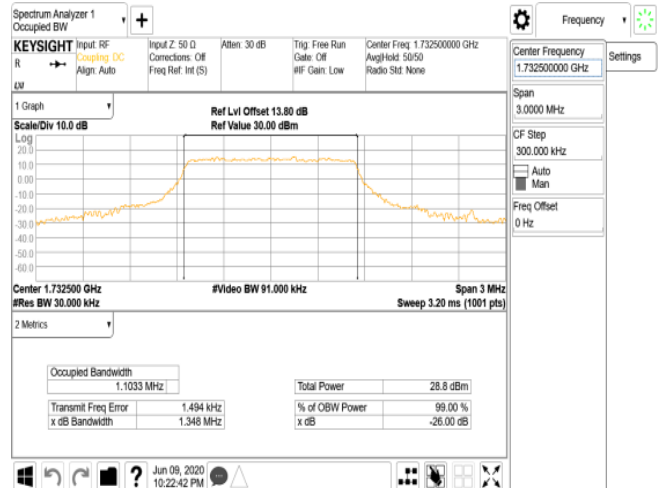
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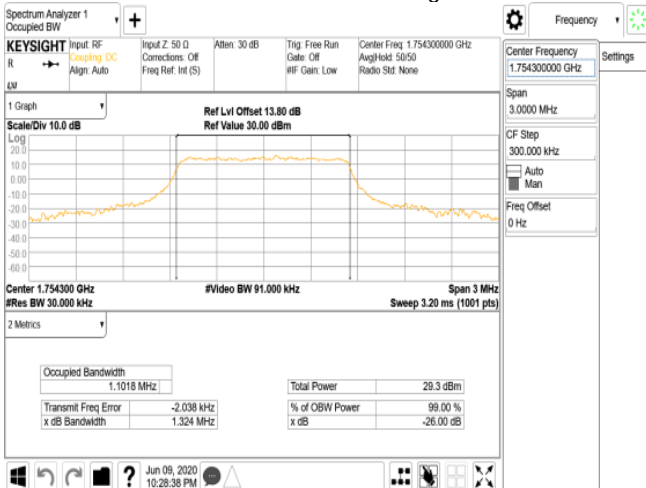
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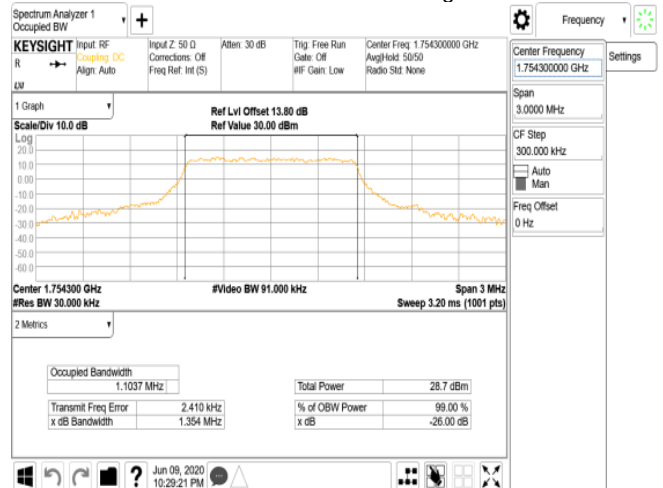
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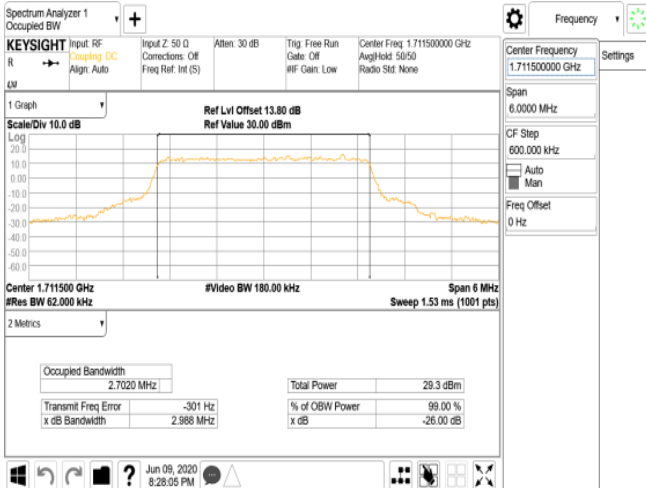


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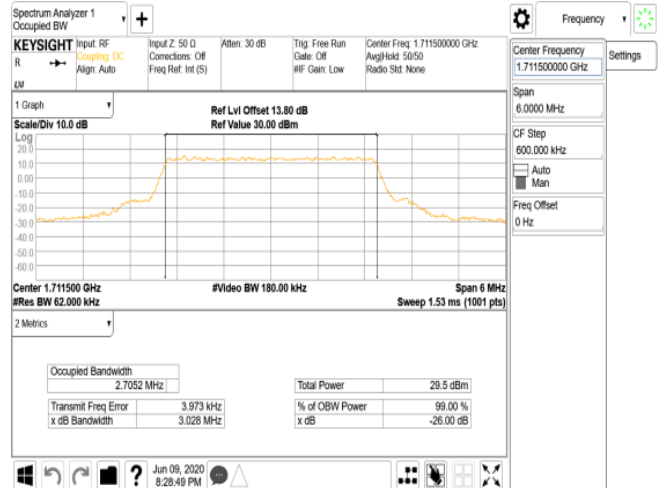
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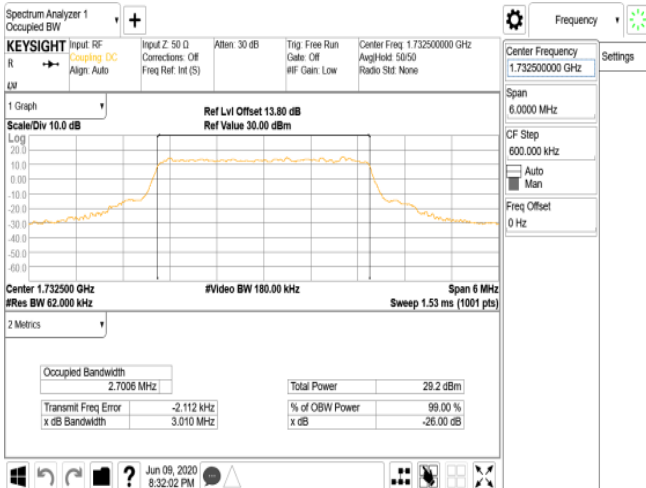
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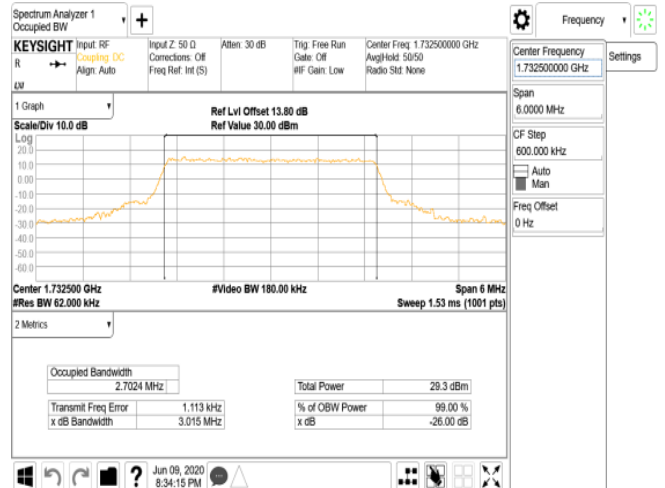
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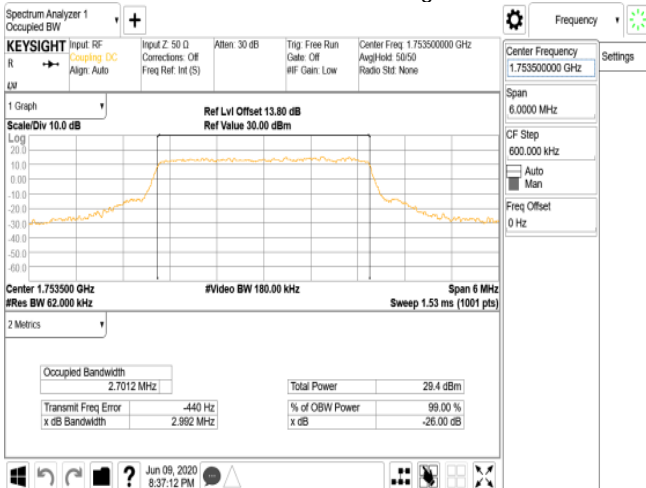
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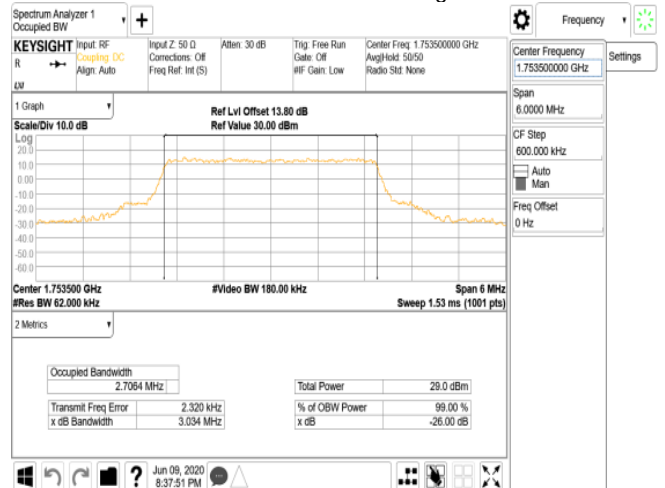
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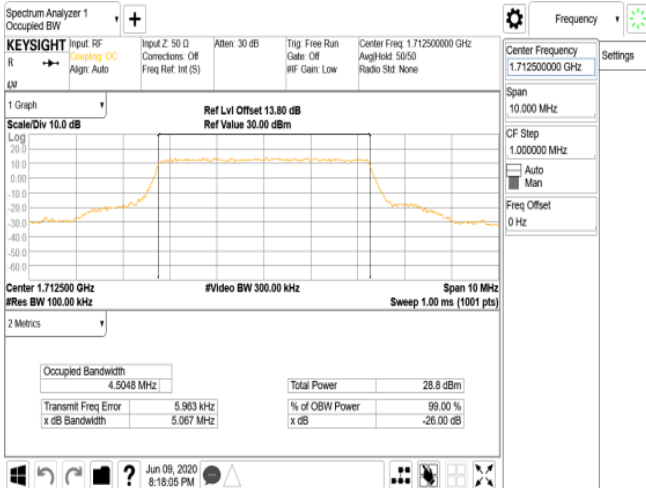


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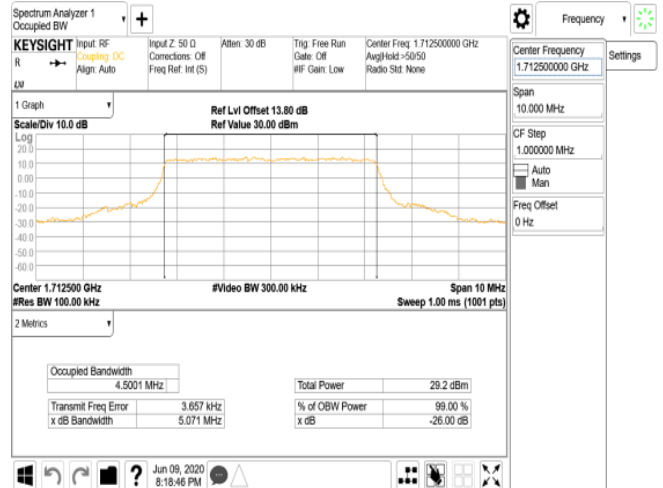
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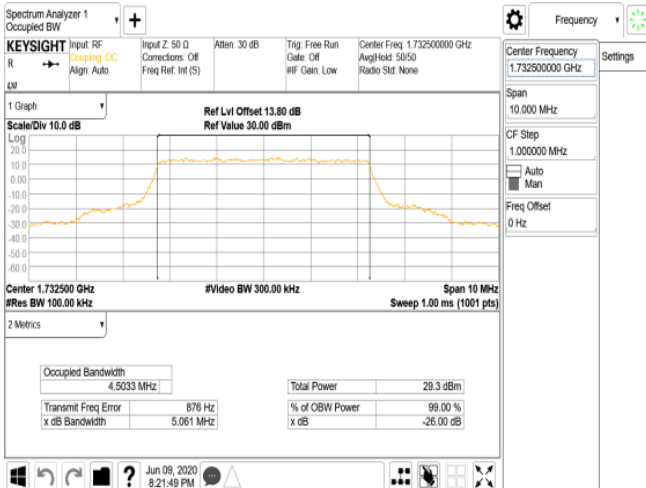
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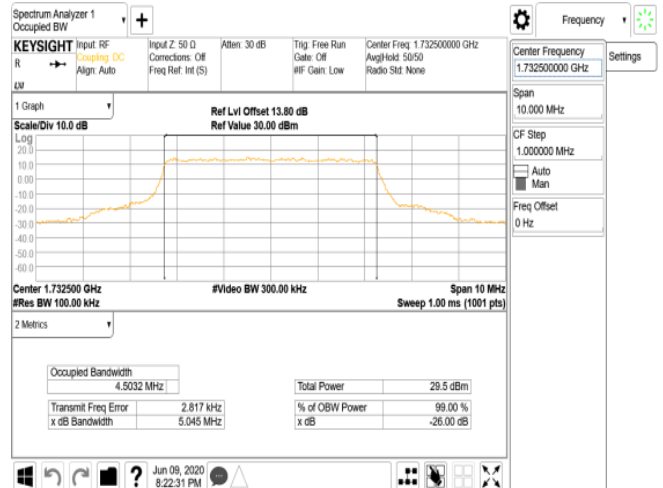
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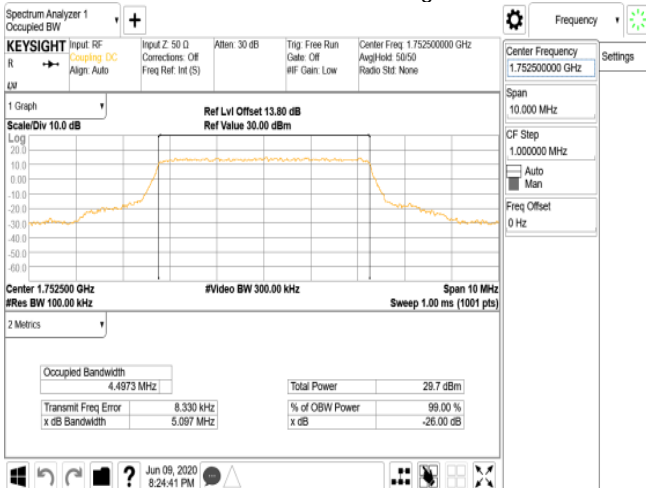
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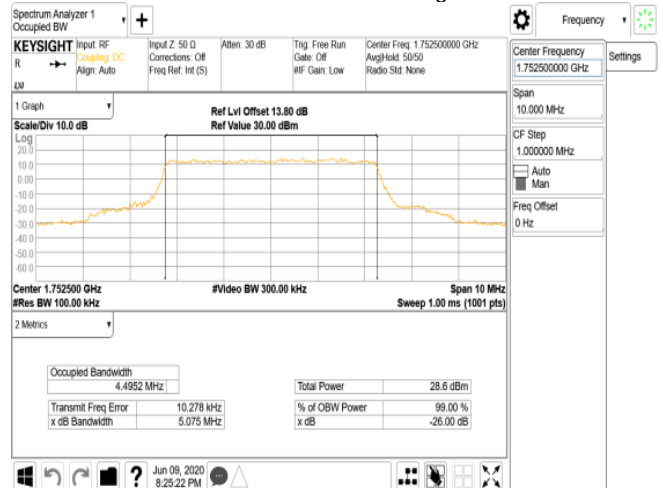
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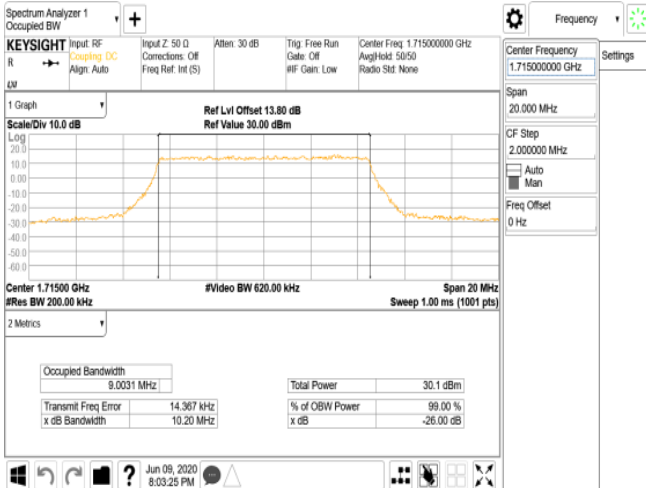


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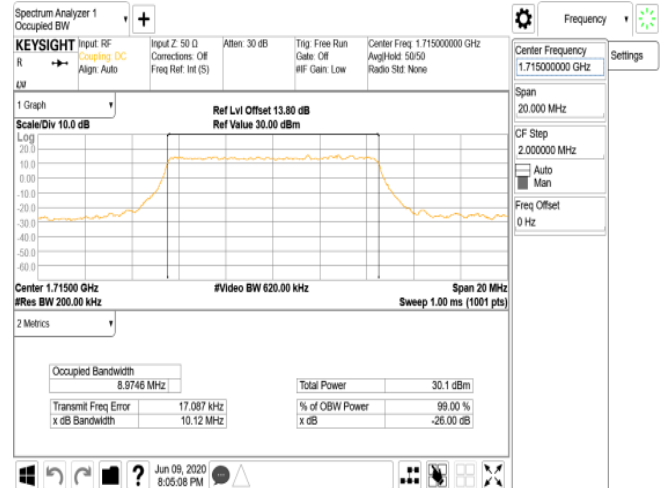
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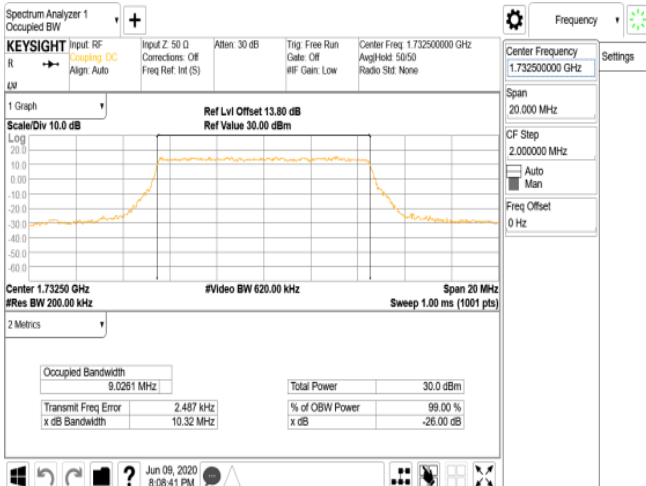
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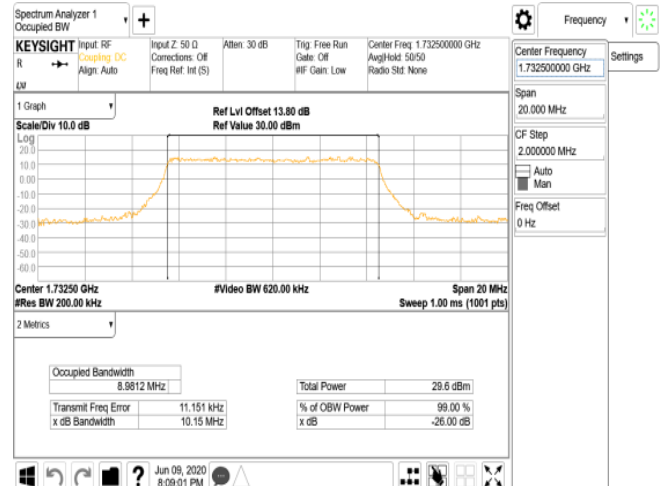
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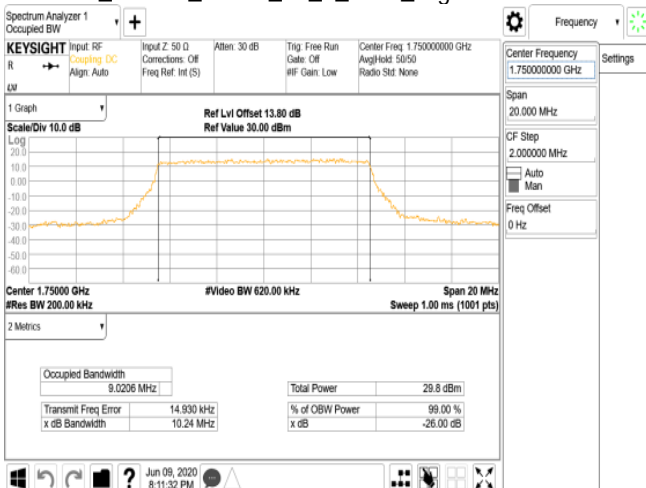
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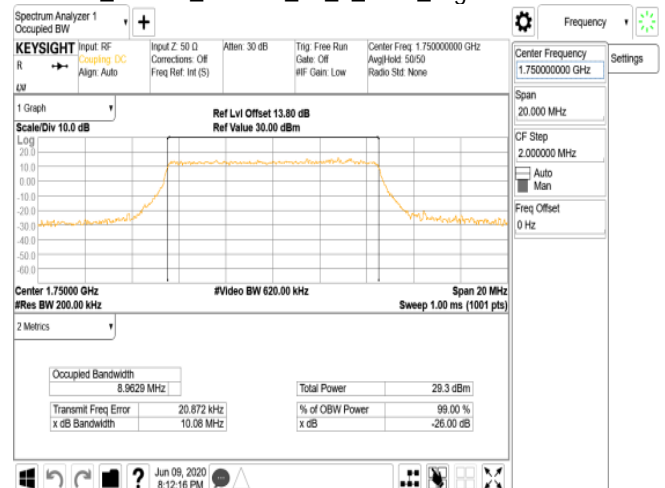
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Band4_10MHz_QPSK_50_0_Main_HighCH20350-1750



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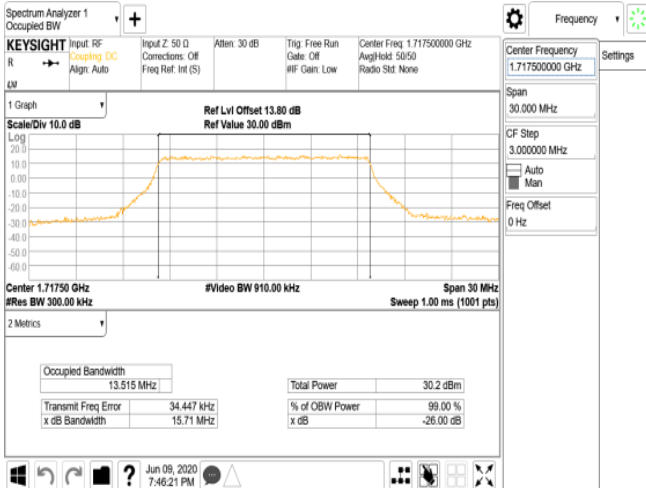


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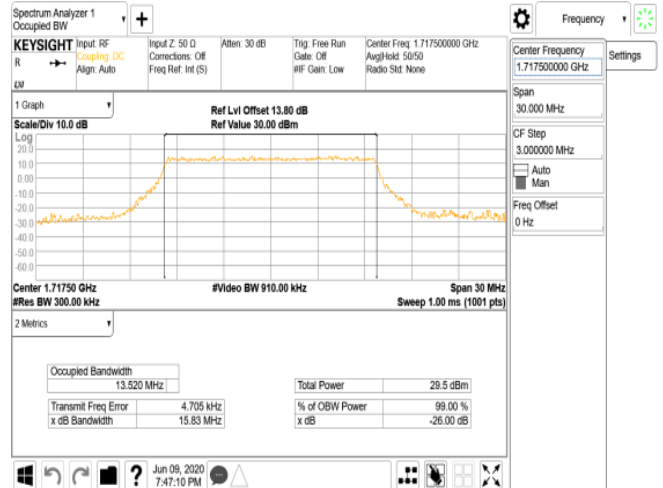
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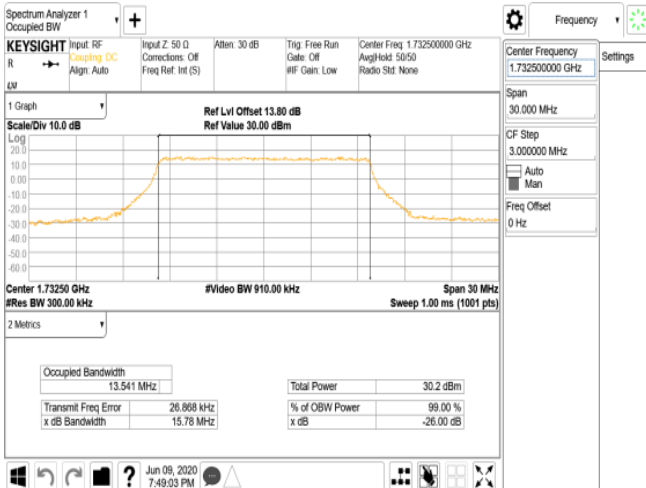
Band4_15MHz_QPSK_75_0_Main_LowCH20025-1717.5



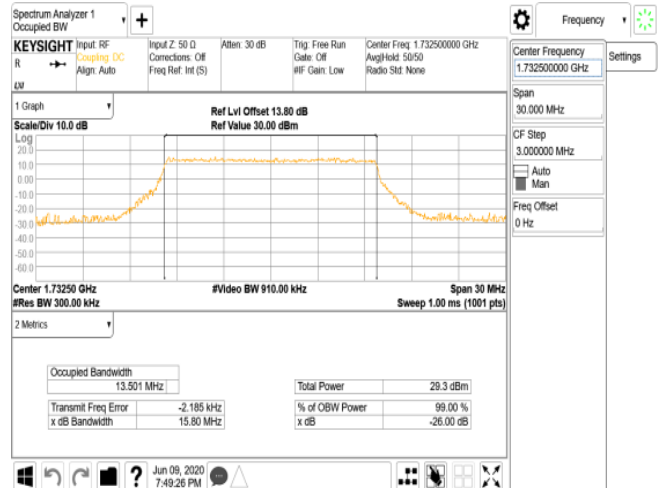
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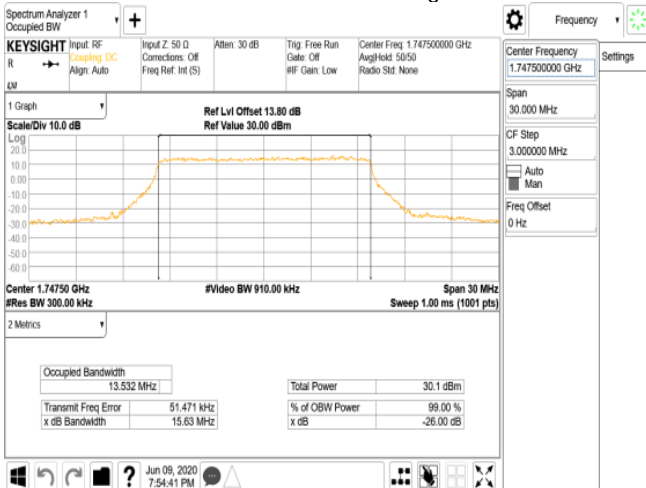
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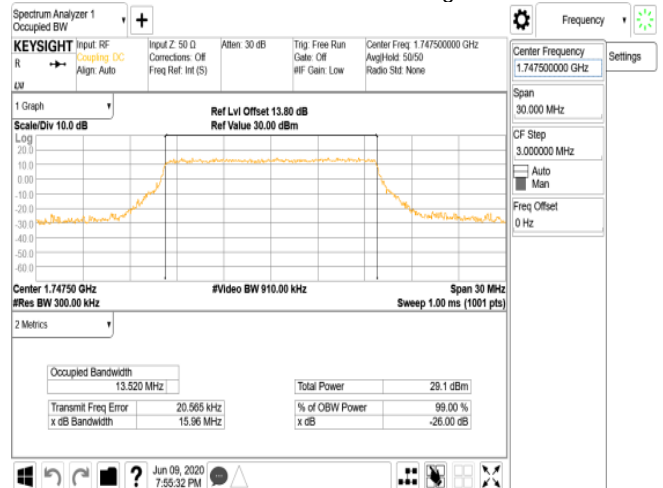
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Band4_15MHz_16QAM_75_0_Main_HighCH20325-1747.5

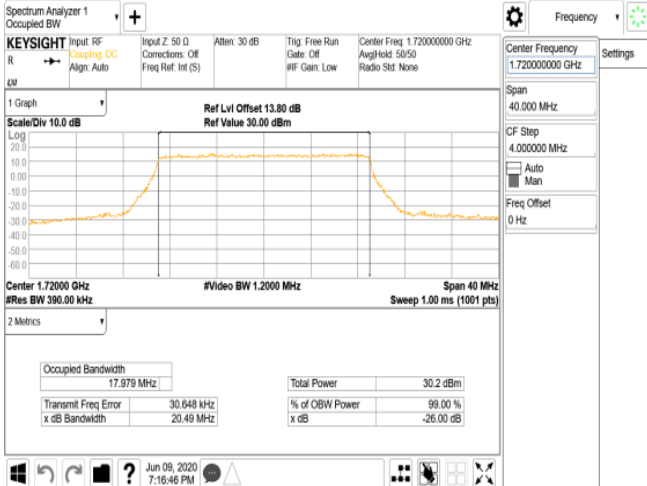


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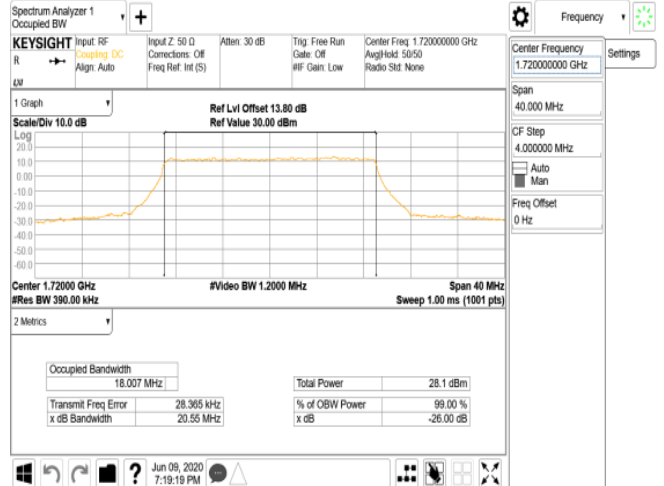
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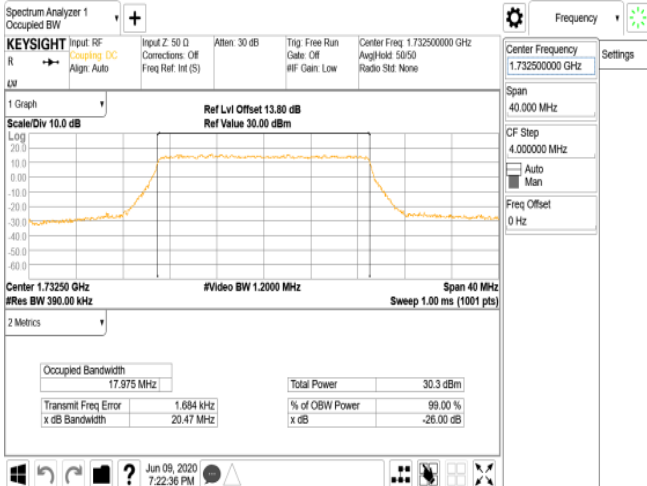
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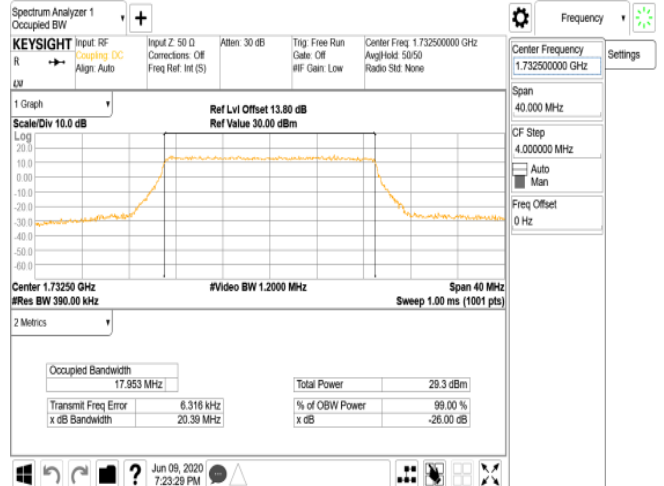
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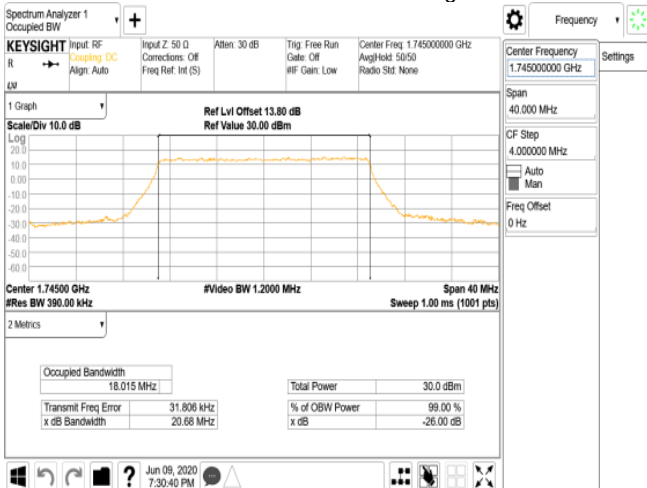
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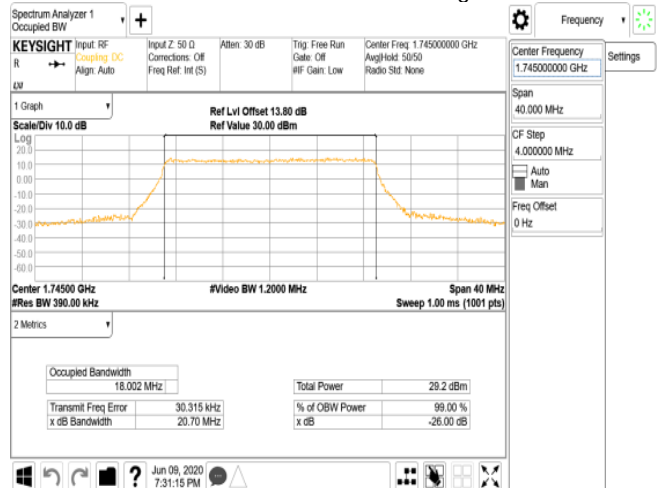
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Band4_20MHz_QPSK_100_0_Main_HighCH20300-1745



Band4_20MHz_16QAM_100_0_Main_HighCH20300-1745

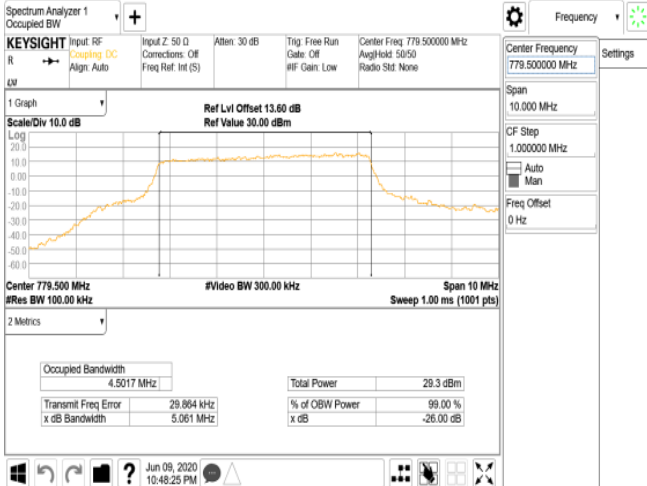


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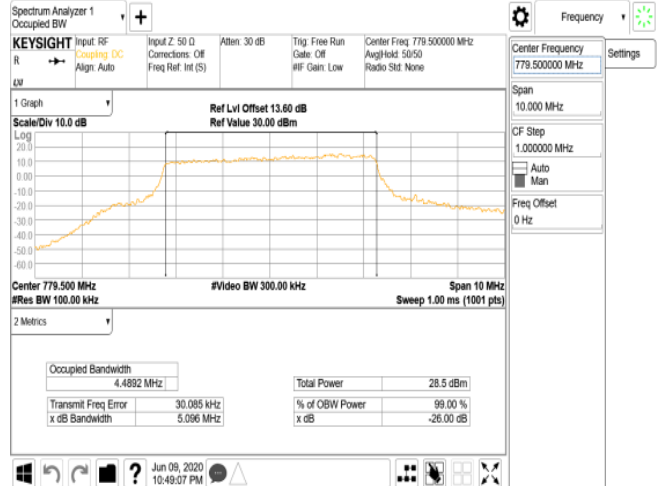
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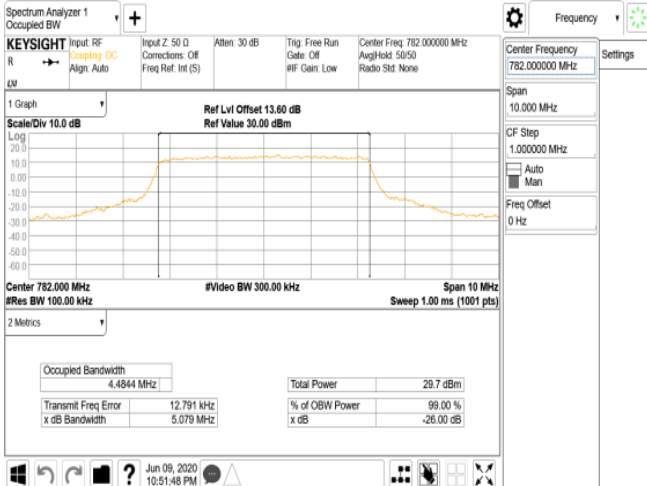
Band13_5MHz_QPSK_25_0_Main_LowCH23205-779.5



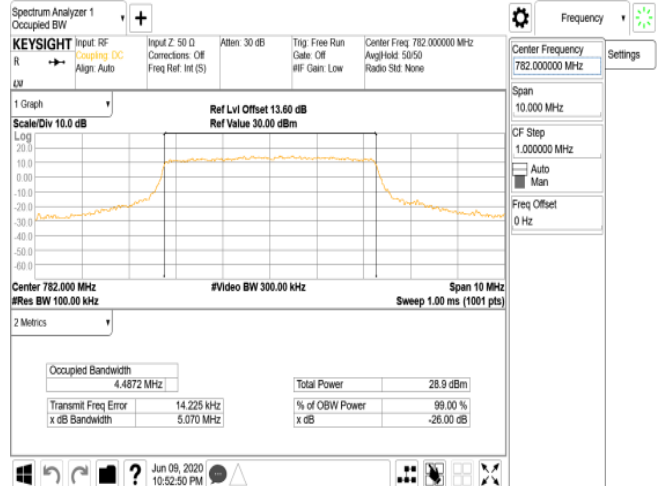
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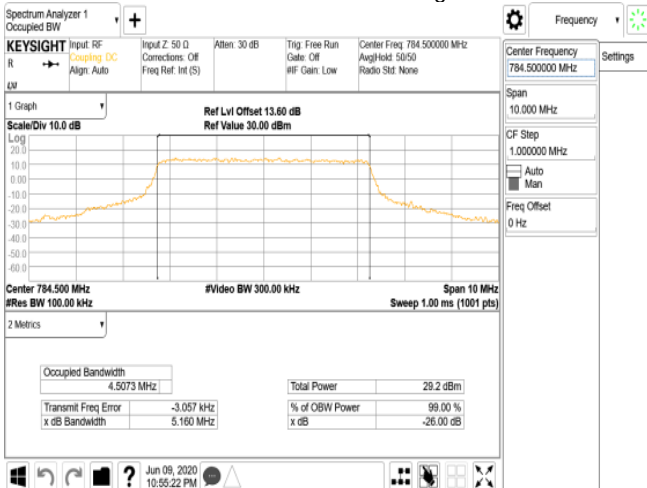
Band13_5MHz_QPSK_25_0_Main_MidCH23230-782



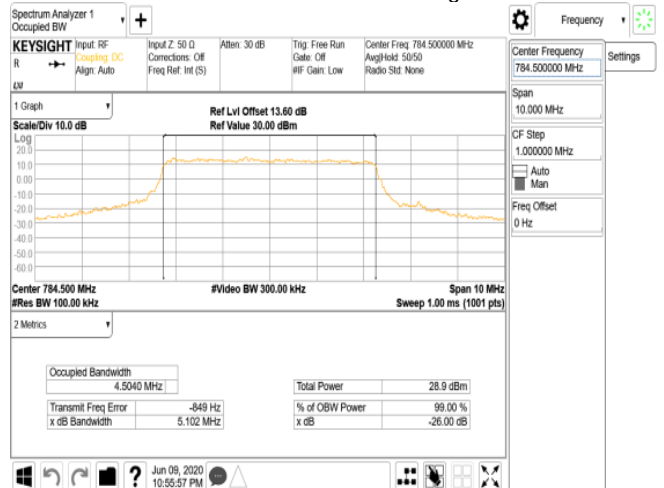
Band13_5MHz_16QAM_25_0_Main_MidCH23230-782



Band13_5MHz_QPSK_25_0_Main_HighCH23255-784.5



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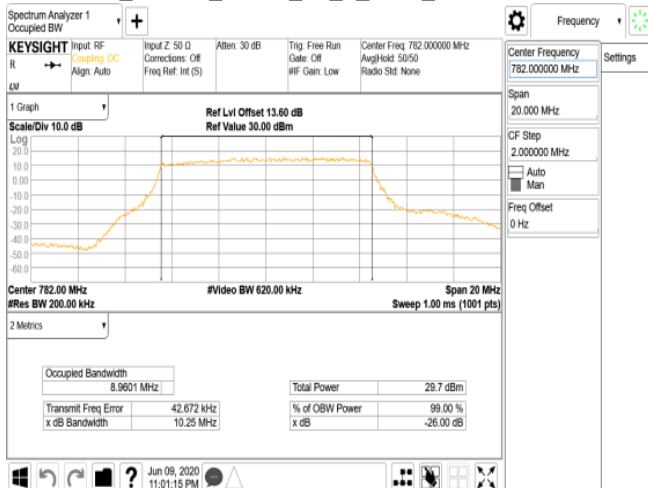


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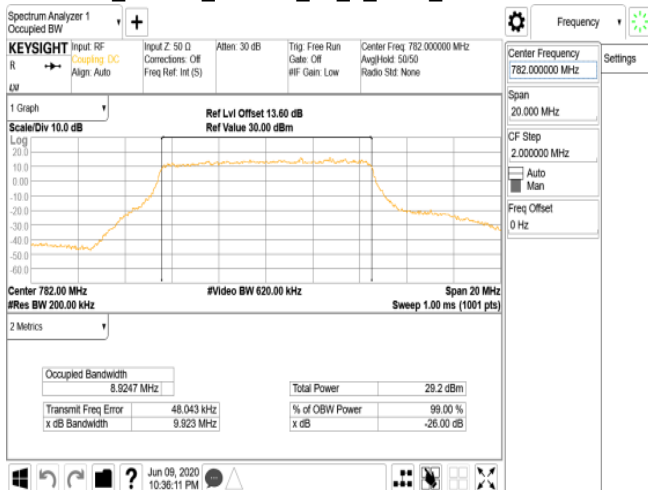
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Band13_10MHz_QPSK_50_0_Main_MidCH23230-782



Band13_10MHz_16QAM_50_0_Main_MidCH23230-782



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8 OUT OF BAND EMISSION AT ANTENNA TERMINALS

8.1 Standard Applicable

FCC §27.53 (c) (h)

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

FCC §27.53(c) for LTE B13

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee’s frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

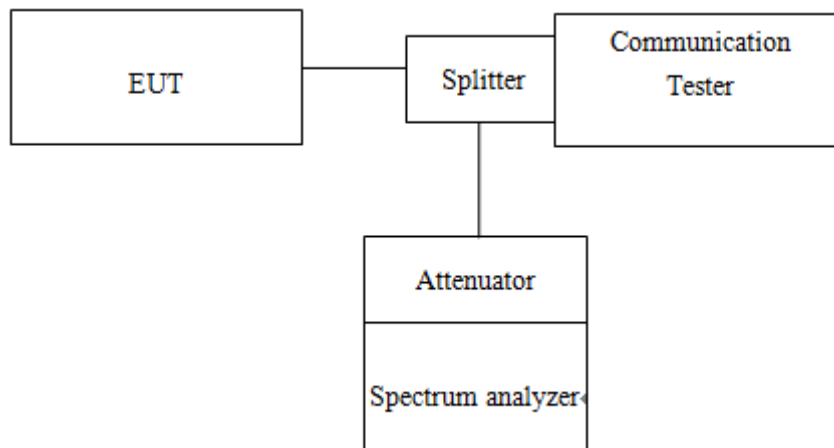
(2) On any frequency outside the 776– 788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB (-13dBm)

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

FCC §27.53(h)(3) for LTE B4

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee’s frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

8.2 Test SET-UP



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8.3 Measurement Procedure

8.3.1 Conducted Emission

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

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

8.3.2 Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting RBW \geq 1% EBW.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

8.4 Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Block	PASTERNAK	PE8210	RF32	11/20/2019	11/19/2020
Spectrum Analyzer	KEYSIGHT	N9010B	MY59070240	04/14/2019	04/13/2021
Temperature Chamber	TERCHY	MHK-120LK	1020582	07/09/2019	07/08/2020
Splitter	Marvelous	MVE8586	RF265	11/20/2019	11/19/2020
Attenuator	Marvelous	MVE2213-10	RF31	11/20/2019	11/19/2020
Radio Communication Analyser	Anritsu	MT8820C	6201107337	07/17/2019	07/16/2020

8.5 Measurement Result:

Refer to next pages.

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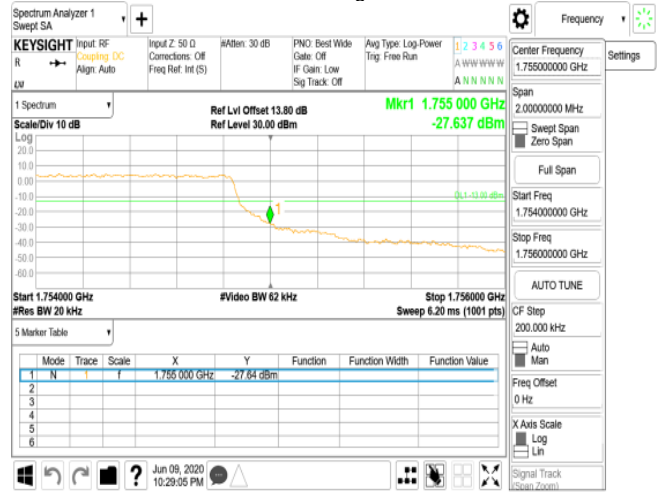
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Band4_1_4MHz_QPSK_1_0_LowCH19957-1710.7



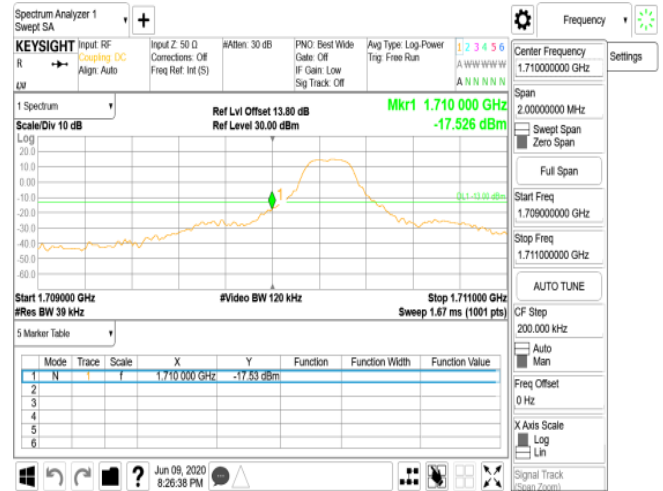
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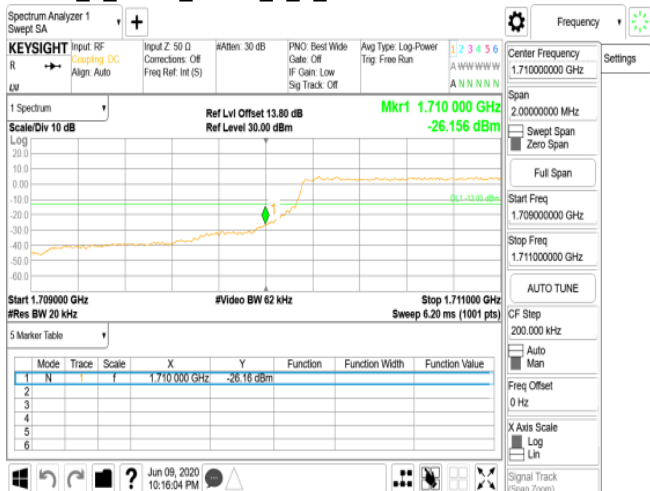
Band4_1_4MHz_QPSK_1_5_HighCH20393-1754.3



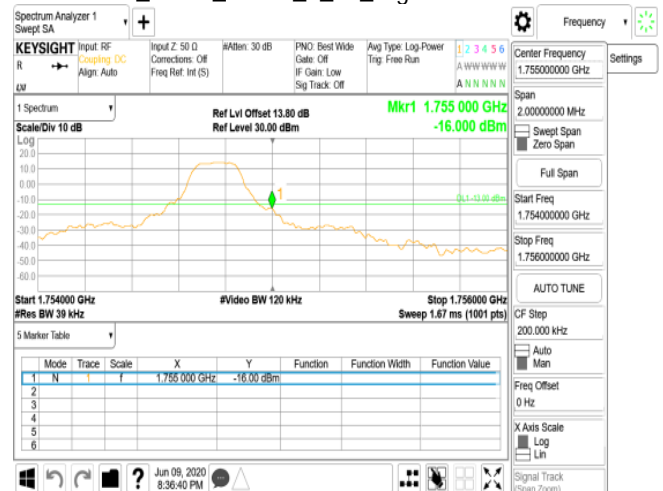
Band4_3MHz_QPSK_1_0_LowCH19965-1711.5



Band4_1_4MHz_QPSK_6_0_LowCH19957-1710.7



Band4_3MHz_QPSK_1_14_HighCH20385-1753.5

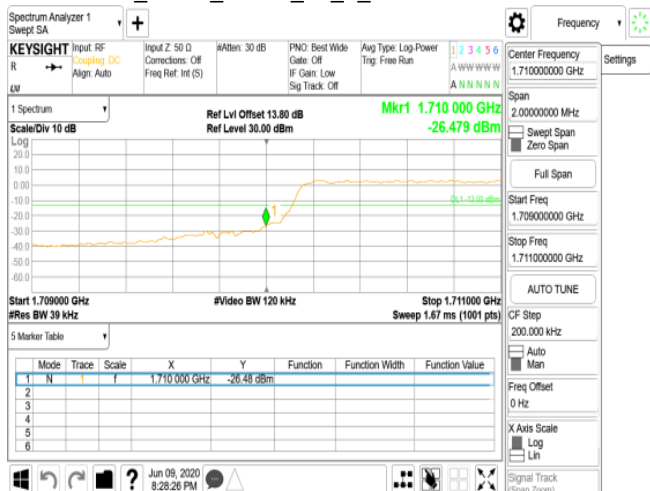


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Band4_5MHz_QPSK_1_24_HighCH20375-1752.5



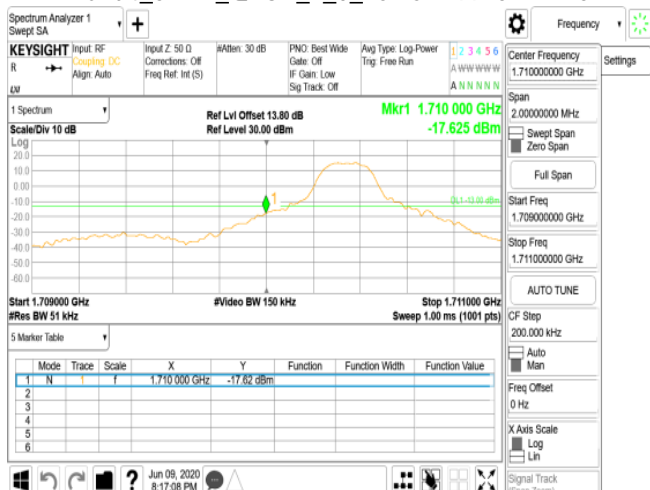
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Band4_5MHz_QPSK_25_0_LowCH19975-1712.5



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Band4_5MHz_QPSK_25_0_HighCH20375-1752.5

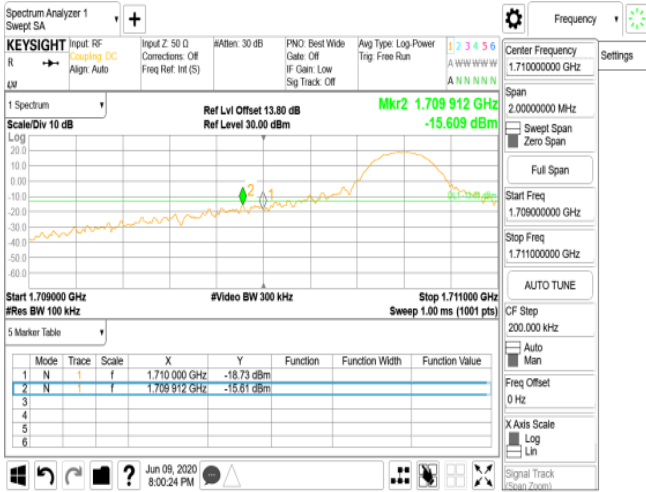


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Band4_10MHz_QPSK_50_0_HighCH20350-1750



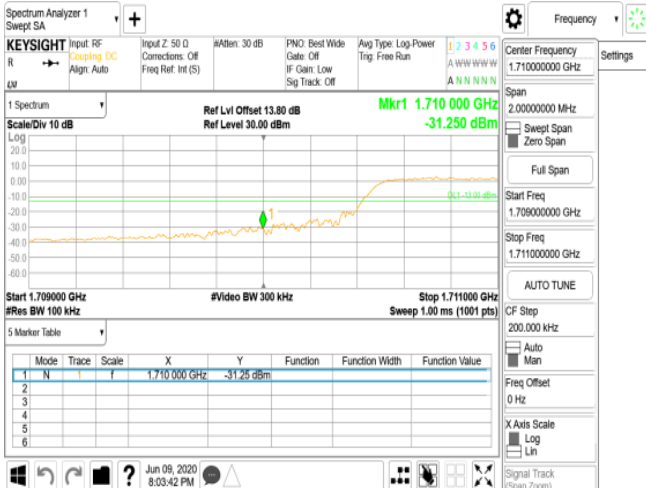
Band4_10MHz_QPSK_1_49_HighCH20350-1750



Band4_15MHz_QPSK_1_0_LowCH20025-1717.5



Band4_10MHz_QPSK_50_0_LowCH2000-1715



Band4_15MHz_QPSK_1_74_HighCH20325-1747.5

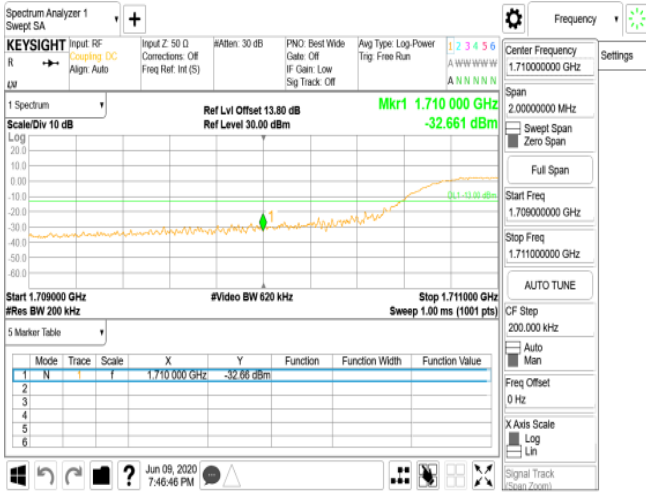


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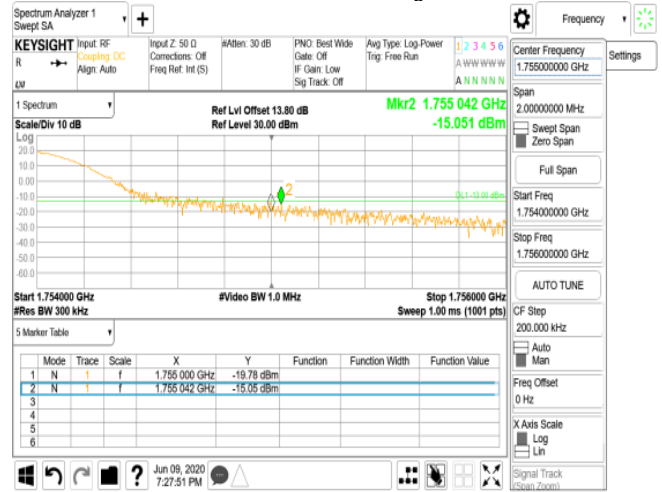
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Band4_15MHz_QPSK_75_0_LowCH20025-1717.5



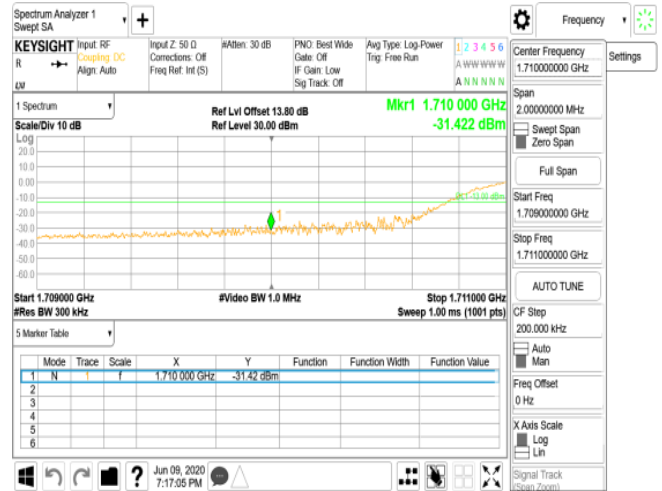
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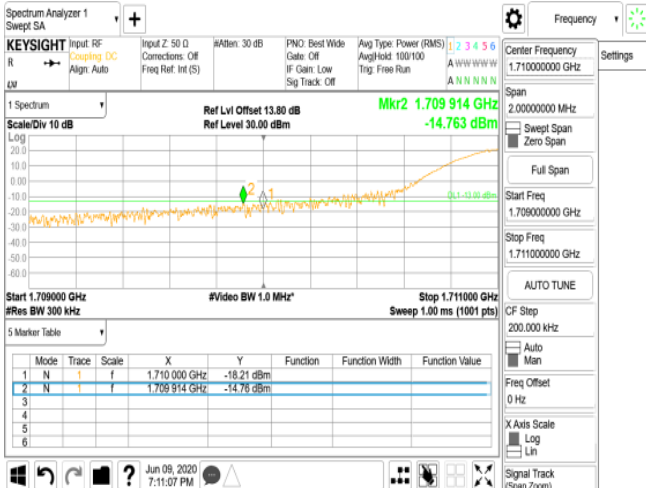
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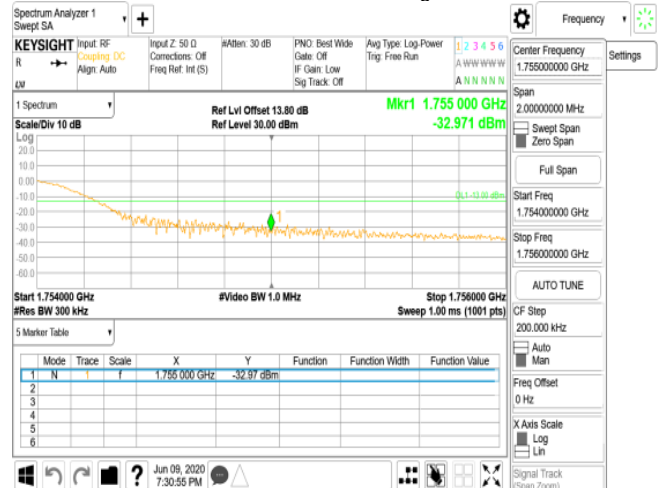
Band4_20MHz_QPSK_100_0_LowCH20050-1720



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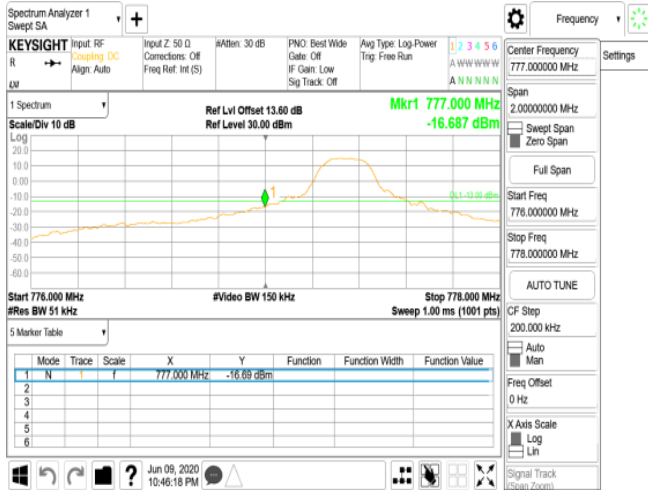


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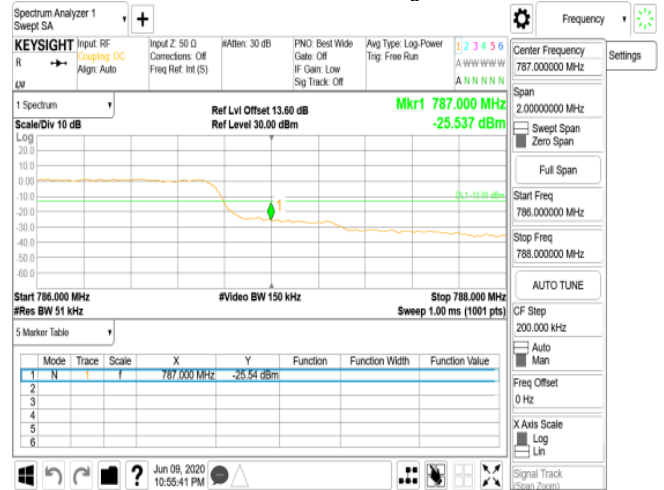
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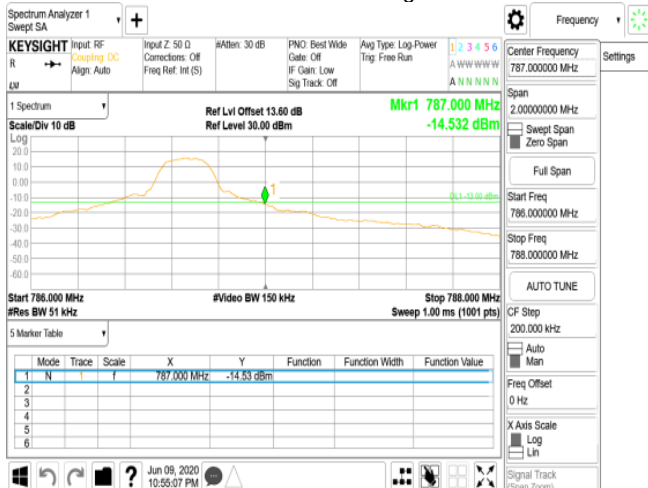
Band13_5MHz_QPSK_1_0_LowCH23205-779.5



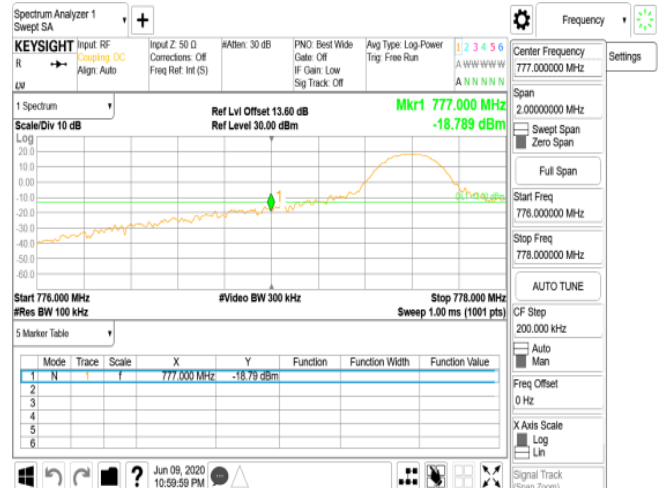
Band13_5MHz_QPSK_25_0_HighCH23255-784.5



Band13_5MHz_QPSK_1_24_HighCH23255-784.5



Band13_10MHz_QPSK_1_0_LowCH23230-782



Band13_5MHz_QPSK_25_0_LowCH23205-779.5



Band13_10MHz_QPSK_1_49_HighCH23230-782

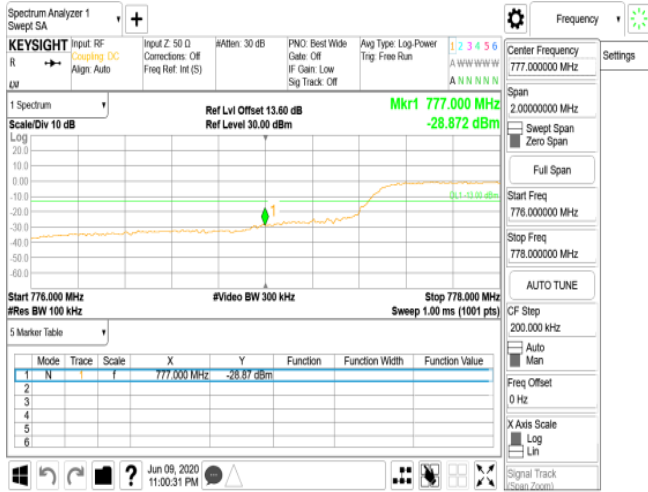


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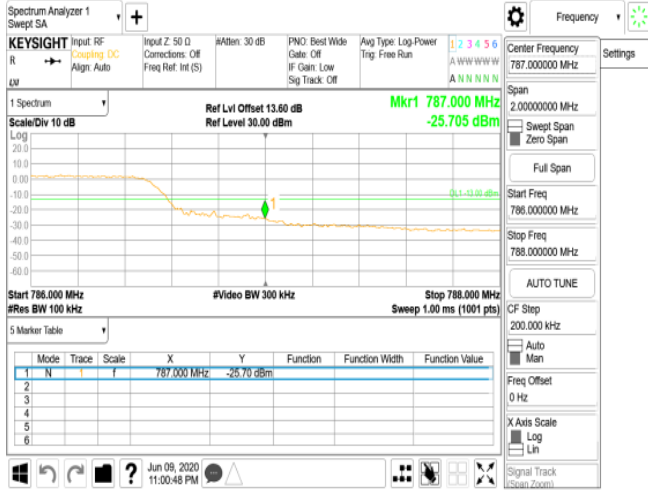
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Band13_10MHz_QPSK_50_0_LowCH23230-782

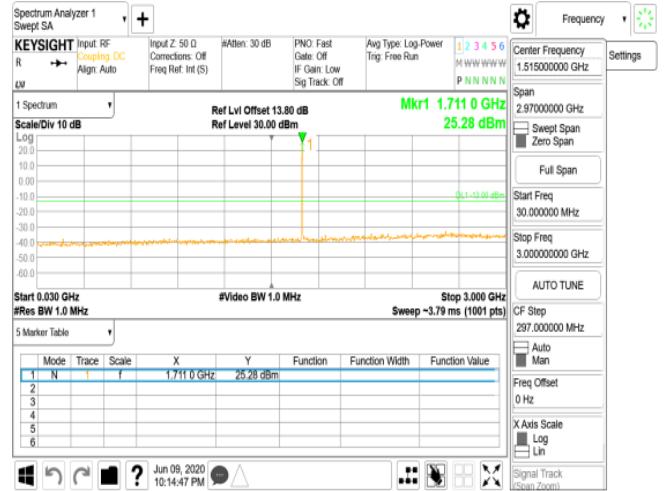


Band13_10MHz_QPSK_50_0_HighCH23230-782

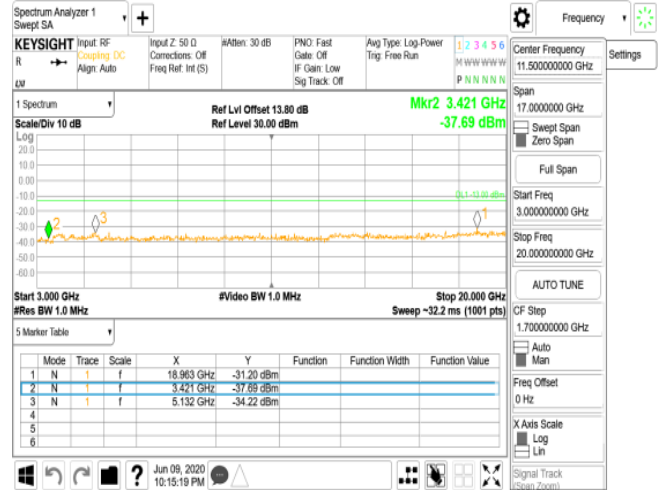


Spurious Emission

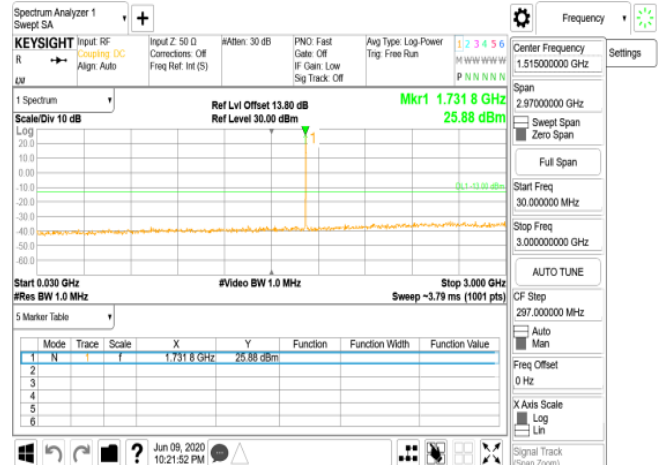
30MHz~3GHz_Band4_1_4MHz_QPSK_1_0_LowCH19957-1710.7



3GHz~10GHz_Band4_1_4MHz_QPSK_1_0_LowCH19957-1710.7



30MHz~3GHz_Band4_1_4MHz_QPSK_1_0_MidCH20175-1732.5

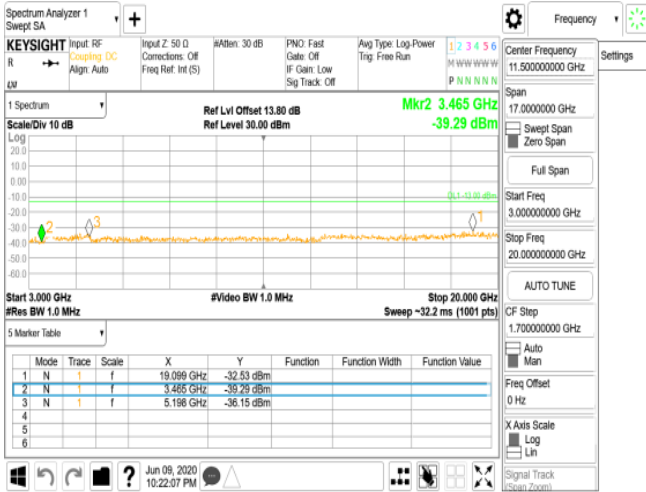


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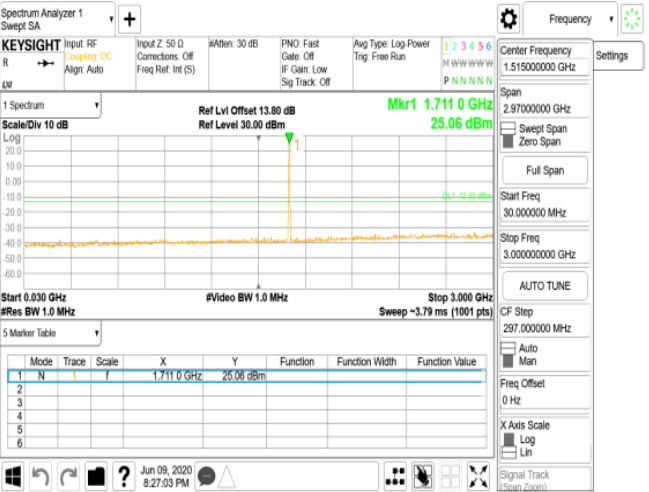
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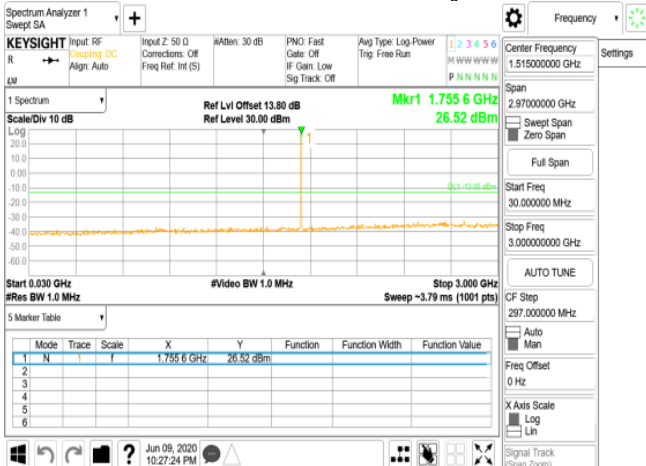
3GHz-10GHz_Band4_1_4MHz_QPSK_1_0_MidCH20175-1732.5



30MHz-3GHz_Band4_3MHz_QPSK_1_0_LowCH19965-1711.5



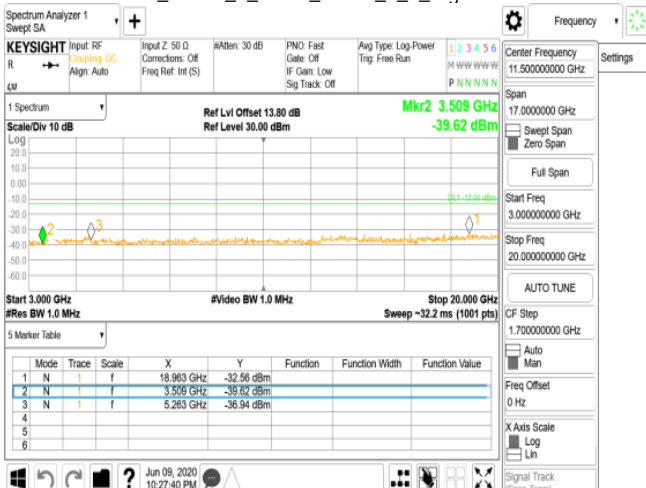
30MHz-3GHz_Band4_1_4MHz_QPSK_1_0_HighCH20393-1754.3



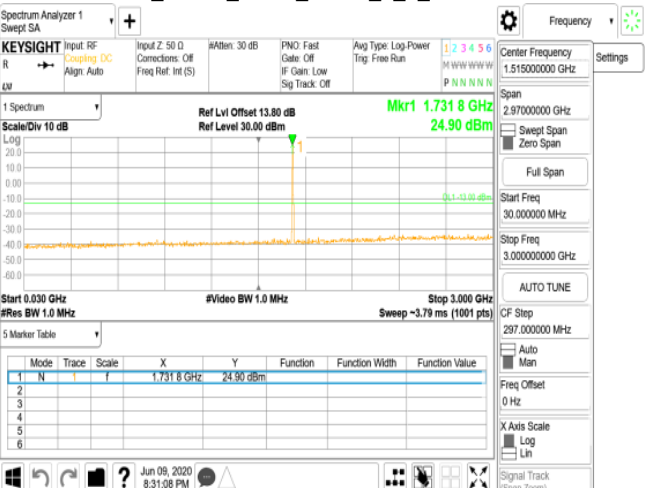
3GHz-10GHz_Band4_3MHz_QPSK_1_0_LowCH19965-1711.5



3GHz-10GHz_Band4_1_4MHz_QPSK_1_0_HighCH20393-1754.3



30MHz-3GHz_Band4_3MHz_QPSK_1_0_MidCH20175-1732.5

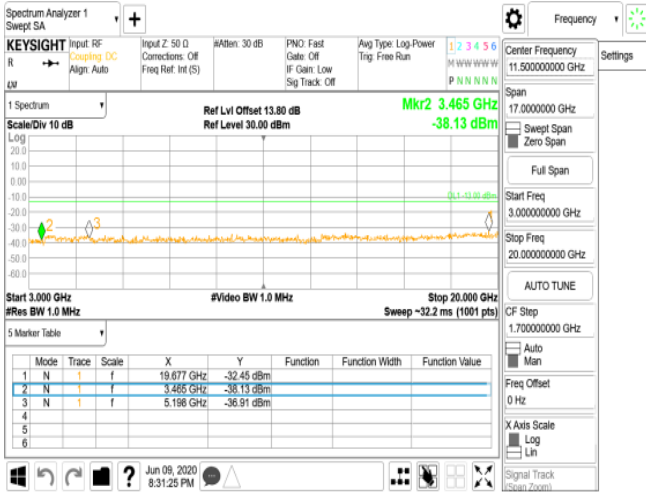


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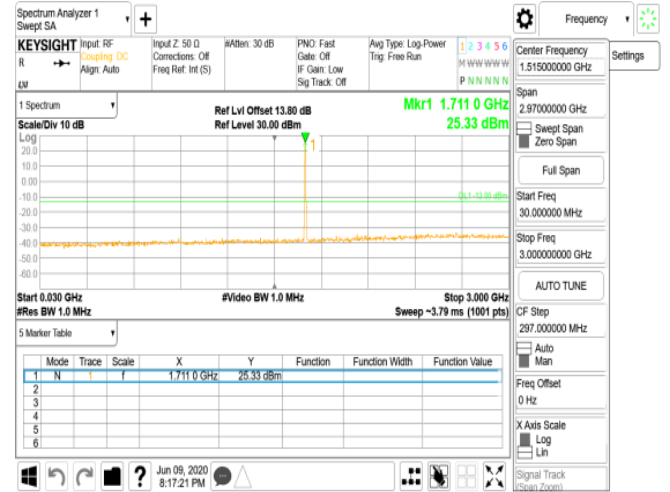
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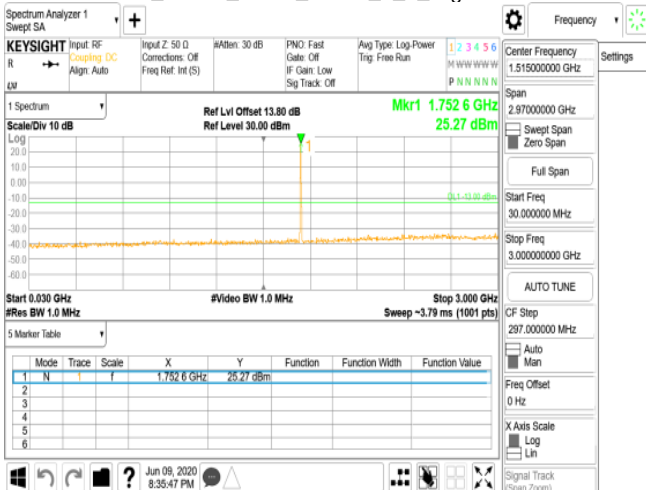
3GHz~10GHz_Band4_3MHz_QPSK_1_0_MidCH20175-1732.5



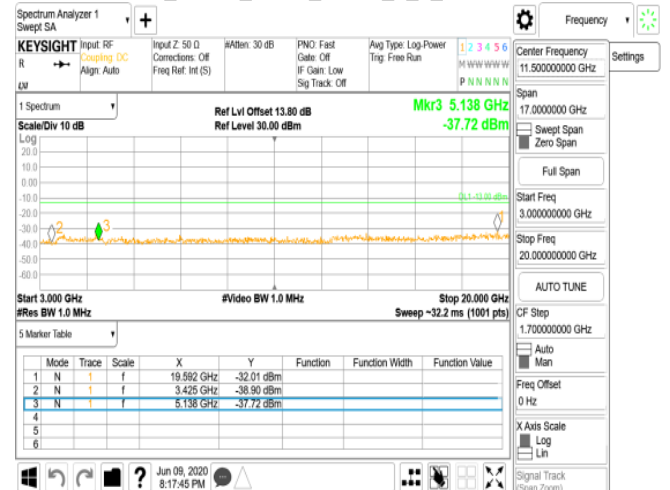
30MHz~3GHz_Band4_5MHz_QPSK_1_0_LowCH19975-1712.5



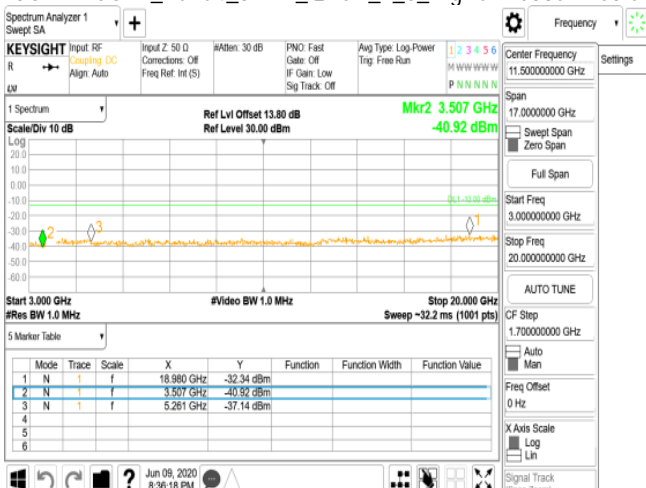
30MHz~3GHz_Band4_3MHz_QPSK_1_0_HighCH20385-1753.5



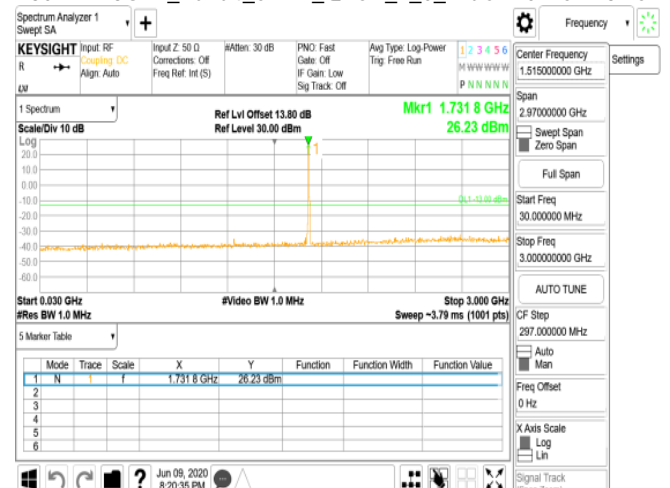
3GHz~10GHz_Band4_5MHz_QPSK_1_0_LowCH19975-1712.5



3GHz~10GHz_Band4_3MHz_QPSK_1_0_HighCH20385-1753.5



30MHz~3GHz_Band4_5MHz_QPSK_1_0_MidCH20175-1732.5

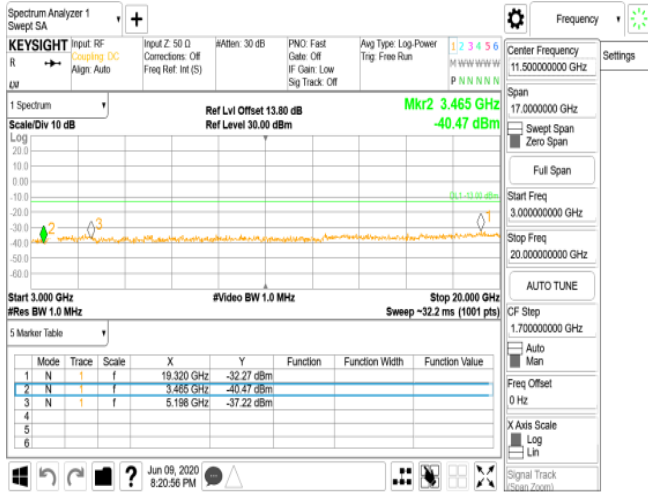


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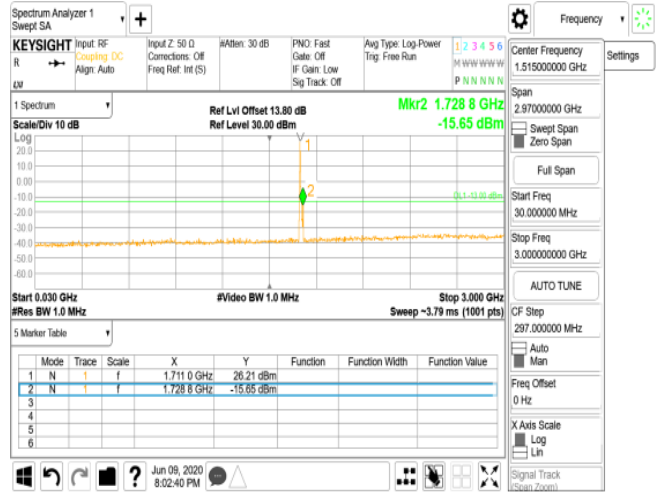
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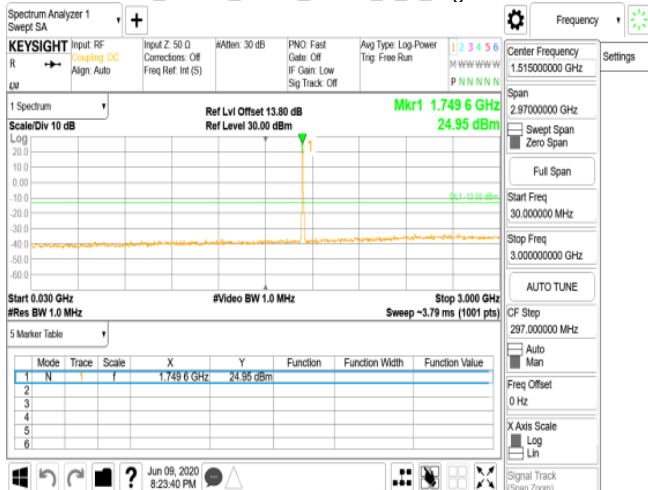
3GHz~10GHz_Band4_5MHz_QPSK_1_0_MidCH20175-1732.5



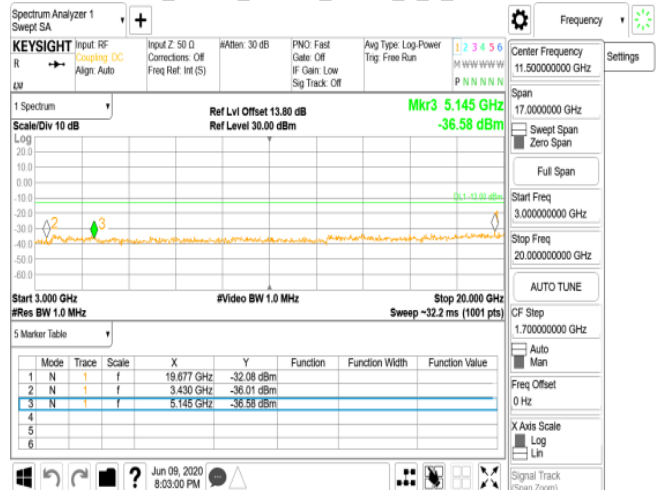
30MHz~3GHz_Band4_10MHz_QPSK_1_0_LowCH20000-1715



30MHz~3GHz_Band4_5MHz_QPSK_1_0_HighCH20375-1752.5



3GHz~10GHz_Band4_10MHz_QPSK_1_0_LowCH20000-1715



3GHz~10GHz_Band4_5MHz_QPSK_1_0_HighCH20375-1752.5



30MHz~3GHz_Band4_10MHz_QPSK_1_0_MidCH20175-1732.5



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