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Report On

FCC and ISED Testing of the Ericsson Dot 2274 B25 B66, KRY 901 468/1 and Dot 2284 B25 B66, KRY 901 468/2, LTE, NR, WCDMA, LTE + NR, LTE + WCDMA, (2100 MHz), with compatible Main Unit in a Base Station configuration in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 27, ISED RSS-GEN and Industry Canada RSS-139, RSS-170

COMMERCIAL-IN-CONFIDENCE

FCC: TA8AKRY901468-1 and TA8AKRY901468-2
ISED: 287AB-AS9014681 and 287AB-AS9014682

PREPARED BY	APPROVED BY	DATED
Glen Westwell	Scott Drysdale	Nov 12th 2020

Document 7169008619 Report 02 Issue 1 **November 2020**

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SECTION 1

REPORT INFORMATION

1.1 REPORT DETAILS

Manufacturer	Ericsson
Address	Torshamnsgatan 23 Kista SE-16480 Stockholm Sweden
Product Name & Product Number	Dot 2284 B25 B66, KRY 901 468/2
IC Model Name	AS9014681
Serial Number(s)	TD3W005261
Software Version	CXP9013268/25-R84EF
Hardware Version	R1A
Non-Tested Variant	Dot 2274 B25 B66, KRY 901 468/1
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2019 FCC CFR 47 Part 27: 2019 ISED RSS-GEN: Issue 5: March 2019 Amendment 1 Industry Canada RSS-139: Issue 3: 2015 / RSS-170 Issue 3 2020.
Test Plan	Dot 2274 B25B66_RA_testplan_NR_LTE_WCDMA
Start of Test	20 October 2020
Finish of Test	23 October 2020
Name of Engineer(s)	Glen Westwell
Related Document(s)	KDB 971168 D01 v02r02 KDB 662911 D01 v02r01

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate compliance with FCC CFR 47 Part 2: 2019, FCC CFR 47 Part 27: 2019, ISED RSS-GEN: Issue 5: March 2019 Amendment 1, Industry Canada RSS-139: Issue 3: 2015 The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

Glen Westwell

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 27, Industry Canada RSS-GEN and Industry Canada RSS-139, & RSS-170, is shown below.

Section	Specification Clause					Test Description	Result
	FCC CFR 47 Part 2		RSS-GEN				
-		FCC CFR 47 Part 27		RSS-139	RSS-170	Equivalent Isotopically Radiated Power (EIRP)	N/A[1]
2.1	2.1046	27.50	-	6.4	5.3	Maximum Peak Output Power and Peak to Average Ratio - Conducted	Pass
2.2	2.1049	27.53	6.7	-	-	Occupied Bandwidth	Pass
2.3	2.1051	27.53 (h)	-	6.5	5.4	Band Edge	Pass
2.4	2.1051	27.53 (h)	7.4	6.5	5.4	Transceiver Spurious Emissions	Pass
2.5	2.1055	27.54	-	6.3	5.2	Frequency Stability	Pass

N/A[1] – Not Applicable, due to no integral antenna
N/A – Not Applicable

Testing in this Report covers only B66 (2100MHz).

For additional configurations and test cases not contained within this test report, refer to the following reports:

7169008619 Report 01 – Dot 2274 B25 B66, DOT 2284 B25 B66 LTE, NR, WCDMA, LTE + NR, LTE + WCDMA (B25).

This unit was tested without an antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible IC Bureau(s). Licensees are required to take into account the maximum allowed antenna gain used in combination with the power settings to prevent the radiated output power exceeding the limits.

1.3 CONFIGURATION DESCRIPTION

Configuration A					
RAT	N0. Of Carriers	Carrier Bandwidth	Carrier Frequency Configuration (MHz)		
			Bottom	Middle	Top
LTE NR	1	5 MHz	2112.5	2155.0	2197.5
		10 MHz	2115.0	2155.0	2195.0
		15 MHz	2117.5	2155.0	2192.5
		20 MHz	2120.0	2155.0	2190.0

Configuration B					
RAT	N0. of Carriers	Carrier Bandwidth	Carrier Frequency Configuration (MHz)		
			Bottom	Middle	Top
LTE NR LTE+NR	3	5 MHz	2112.5+2117.5+2122.5	2150.0+2155.0+2160.0	2187.5+2192.5+2197.5
		10 MHz	2115.0+2125.0+2135.0	2145.0+2155.0+2165.0	2175.0+2185.0+2195.0
		15 MHz	2117.5+2132.5+2147.5	2140.0+2155.0+2170.0	2162.5+2177.5+2192.5
		20 MHz	2120.0+2140.0+2160.0	2135.0+2155.0+2175.0	2150.0+21670.0+2190.0

Configuration C					
RAT	No. of Carriers	Carrier Bandwidth	Carrier Frequency Configuration (MHz)		
			Bottom	Middle	Top
WCDMA	6	5 MHz	2112.5+2117.5+2122.5	2142.5+2147.5+2152.5	2172.5+2177.5+2182.5
			+2127.5+2132.5+2137.5	+2157.5+2162.5+2167.5	+2187.5+2192.5+2197.5
LTE + WCDMA		10+5 MHz	2115.0+2125.0+2135.0	2130.0+2140.0+2150.0	2160.0+2170.0+2180.0
			+2142.5+2147.5+2152.5	+2157.5+2162.5+2167.5	+2187.5+2192.5+2197.5

1.4 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Dot 2274 B25B66 and Dot 2284 B25B66
MANUFACTURER	Ericsson
TYPE	Remote Radio Base Station
PART NUMBER	Dot 2274 B25B66: KRY 901 468/1 (internal antennas) Dot 2284 B25B66: KRY 901 468/2 (RF ports for external antennas)
SERIAL NUMBER	TD3W005261 (for the Dot 2284 B25B66 test sample)
HARDWARE VERSION	R1A
SOFTWARE VERSION	CXP9013268/25-R84EF
TRANSMITTER OPERATING RANGE	B25: 1930-1995 MHz, B66: 2110-2200MHz
RECEIVER OPERATING RANGE	B25: 1850-1915 MHz, B66: 1710-1780MHz
COUNTRY OF ORIGIN	China
INTERMEDIATE FREQUENCIES	None
EMISSION DESIGNATOR(S): **(i.e. G1D, GXW)**	**WCDMA:** 5M00F9W **LTE:** 5M00W7D, 10M0W7D, 15M0W7D, 20M0W7D **NBIoT Guardband:** 10M0W7D, 15M0W7D, 20M0W7D **NR:** 5M00F9W, 10M0F9W, 15M0F9W, 20M0F9W
MODULATION TYPES: **(i.e. GMSK, QPSK)**	WCDMA: QPSK, 16QAM, 64QAM LTE: QPSK, 16QAM, 64QAM, 256QAM NR: QPSK, 16QAM, 64QAM, 256QAM
HIGHEST INTERNALLY GENERATED FREQUENCY	2.2 GHz
OUTPUT POWER (W or dBm)	B25: 2 x 0.200W (23dBm/port) B66: 2 x 0.200W (23dBm/port)
ANTENNA GAIN	**Dot 2274 B25:** 2 port (MIMO) omni-directional (1850-1995 MHz) with 1.3 dBi maximum gain. **Dot 2274 B66:** 2 port (MIMO) omni-directional (1710-2200 MHz) with 1.1 dBi maximum gain. **Dot 2284:** This product includes no internal antennas. External antennas used on this product must have gains smaller or equal to the gains of the internal antenna variant of this product (Dot 2274 B25B66).
FCC ID	TA8AKRY901468-1 and TA8AKRY901468-2
INDUSTRY CANADA ID	287AB-AS9014681 and 287AB-AS9014682
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The Dot 2274 B25B66 (KRY 901 468/1) and Dot 2284 B25B66 (KRY 901 468/2) are dual band Remote Radio Units forming part of the Ericsson Radio Base Station (RBS) equipment. The products provides radio access for mobile and fixed devices and are intended for the indoor environment. The radio operates over 4 Transmit ports in MRO;Single, Multi-Carrier, and MIMO transmission with a maximum rated RF Output of 0.200W per port over an operational temperature of 5°C to +40°C. The unit is designed to be ceiling or wall mounted.

Signature:

.....

Denis Lalonde

Date: 9 November 2020

Declaration of Build Status Serial Number: TD3W005261

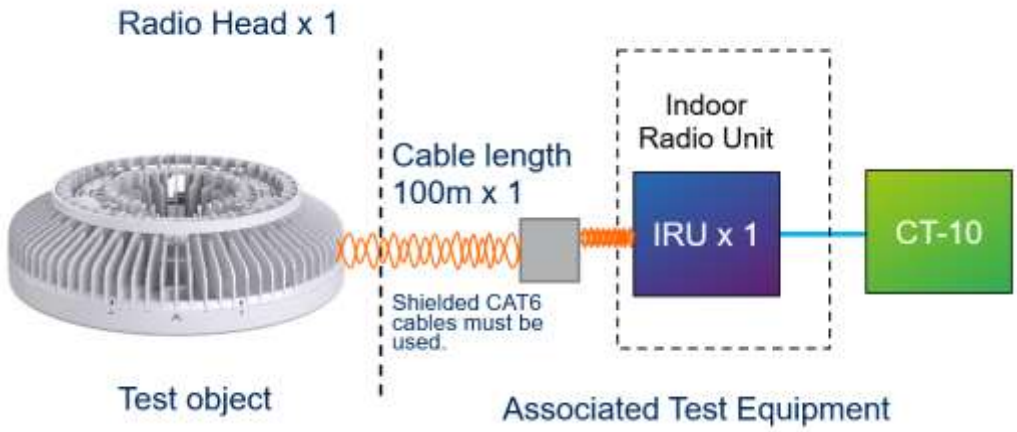
1.5 PRODUCT INFORMATION

1.5.1 Technical Description

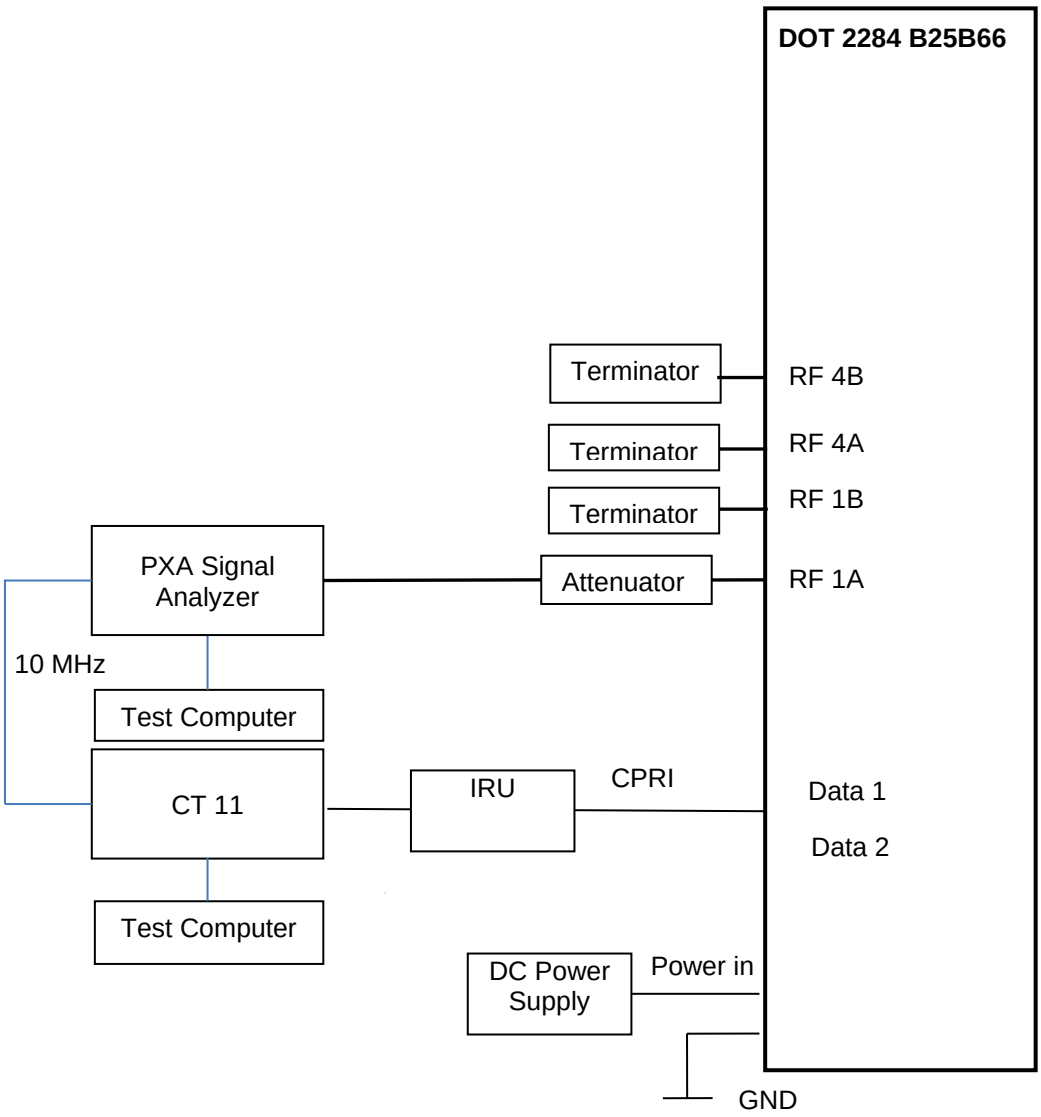
The Equipment Under Test (EUT) Dot 2284 B25 B66 is an Ericsson AB Radio Unit working in the public mobile service 2100 MHz band which provides communication connections to 2100 MHz network. The Dot 2284 B25 B66 operates from a -48V DC supply (POE).

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.

Equipment Under Test



1.6 TEST SETUP



1.7 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated as described in the Test Method for each Test.

The EUT was powered from a -48V DC supply.

FCC Measurement Facility Registration Number: CA4810

ISED Accreditation
ISED#24015, TUV SUD, Ottawa, Canada

Under our group A2LA Accreditation, TÜV SÜD conducted the following tests at Ericsson, Ottawa.

Test Name	Name of Engineer(s)
Maximum Peak Output Power and Peak to Average Ratio - Conducted	Glen Westwell
Occupied Bandwidth	Glen Westwell
Band Edge	Glen Westwell
Transmitter Spurious Emissions	Glen Westwell
Frequency Stability	Glen Westwell

1.8 DEVIATION FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.9 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.10 ADDITIONAL INFORMATION

1. Transmitter performance was measured for top, mid & bottom channels across all 4 antenna ports as presented in the average power measurement tables. Maximum power performance was determined to be, antenna port A, Mid band.
These worst-case results from antenna port A are presented in this report to demonstrate compliance.

2. The 10MHz LTE carrier contains a NB-IoT GB carrier where possible for evaluation as part of this submission.

SECTION 2

TEST DETAILS

2.1 MAXIMUM PEAK OUTPUT POWER AND PEAK TO AVERAGE RATIO - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046
FCC CFR 47 Part 27, Clause 27.50
Industry Canada RSS-139, Clause 6.4
Industry Canada RSS-170, Clause 5.3

2.1.2 Date of Test and Modification State

20 October 2020 - Modification State 0

2.1.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.4 Environmental Conditions

Ambient Temperature	24.1°C
Relative Humidity	33.4%

2.1.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01, clause 5.2.1 and summed in accordance with FCC KDB 662911 D01.

Measurements were performed with a Spectrum Analyser using the Band Power measurement function. The detector was set to RMS with an RBW of at least 1 % of the carrier bandwidth and a VBW of at least 3 times the RBW. The integration bandwidth was configured to be wider than the total bandwidth of the carrier or combinations of carriers, (multi-carrier). Using a sweep time of auto, measurements were performed over 200 samples, with the average measurement recorded.

Due to Average measurements being recorded, an additional Peak to Average measurement was made in all single carrier configurations. This was achieved using the CCDF function of the Spectrum Analyser with the RBW being set to a value wider than the largest signal being measured – in this case – 20 MHz.

The declared Maximum Antenna Gain to be used with this product, as Declared by the Manufacturer is 1.1 dBi. The EIRP is calculated as the sum of the measured power plus the antenna gain.

Using a power meter and attenuator(s), the output power of the EUT was measured at the antenna terminal. The path loss between the EUT and the power sensor was measured and recorded for the test band. The path loss was entered as an offset into the power meter and spectrum analyzer.

The EUT was configured to transmit on maximum power on the configurations defined in the tables below. Since the EUT transmits on two antennas simultaneously in the same frequency range for MIMO devices, i.e., TX MIMO mode, using the Measure-and-Sum approach, the output power at both antennas were tested, and the total output power were then summed mathematically in linear power units according to FCC KDB 662911 D01.

The peak to average ratio measurement was performed at the conducted ports of the EUT. The spectrum analyzer's Complementary Cumulative Distribution Function (CCDF) was used and 0.1% probability value recorded.

The RMS Power and Peak to Average Ratio were measured and recorded with the results being compared with the limits.

2.1.6 Test Results

Configuration A

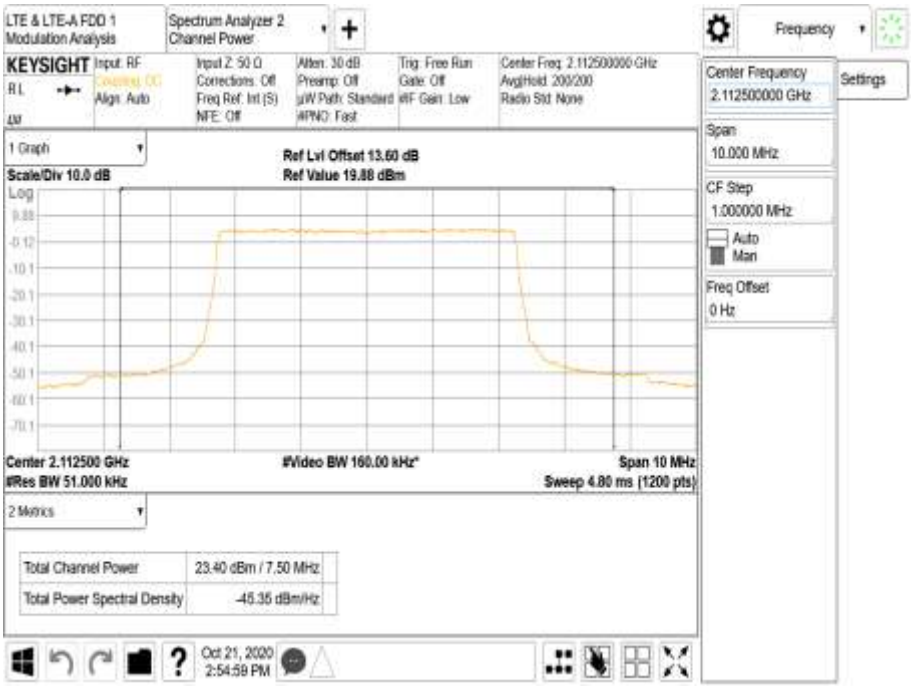
Maximum Output Power 23 dBm

Antenna	Modulation	Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power			
			Channel Position B			
			PAR (dB)	Average Power		
				dBm	EIRP	dBm/MHz
A	LTE: QPSK	5.0 MHz	9.26	23.40	-	17.69
B	LTE: QPSK	5.0 MHz	-	22.33	-	17.69
Total			-	25.91	27.01	20.70
A	LTE: QPSK	10.0 MHz	9.43	23.35	-	13.44
B	LTE: QPSK	10.0 MHz	-	22.21	-	13.44
Total			-	25.83	26.93	16.45
A	LTE: QPSK	15.0 MHz	9.36	23.28	-	12.91
B	LTE: QPSK	15.0 MHz	-	22.45	-	12.91
Total			-	25.90	27.0	15.92
A	LTE: QPSK	20.0 MHz	9.42	23.31	-	11.88
B	LTE: QPSK	20.0 MHz	-	22.65	-	11.88
Total			-	26.00	27.1	14.89
A	NR: QPSK	5.0 MHz	9.13	23.37	-	17.71
B	NR: QPSK	5.0 MHz	-	22.12	-	17.71
Total			-	25.80	26.90	20.72
A	NR: QPSK	10.0 MHz	9.27	23.43	-	14.73
B	NR: QPSK	10.0 MHz	-	22.36	-	14.73
Total			-	25.94	27.04	17.74
A	NR: QPSK	15.0 MHz	9.35	23.33	-	12.93
B	NR: QPSK	15.0 MHz	-	22.59	-	12.93
Total			-	25.99	27.09	15.94
A	NR: QPSK	20.0 MHz	10.13	22.55	-	10.96
B	NR: QPSK	20.0 MHz	-	22.28	-	10.96
Total			-	25.43	26.53	13.97
A	WCDMA: QPSK	5.0 MHz	9.23	23.44	-	18.27
B	WCDMA: QPSK	5.0 MHz	-	22.26	-	18.27
Total			-	25.90	27.0	21.28

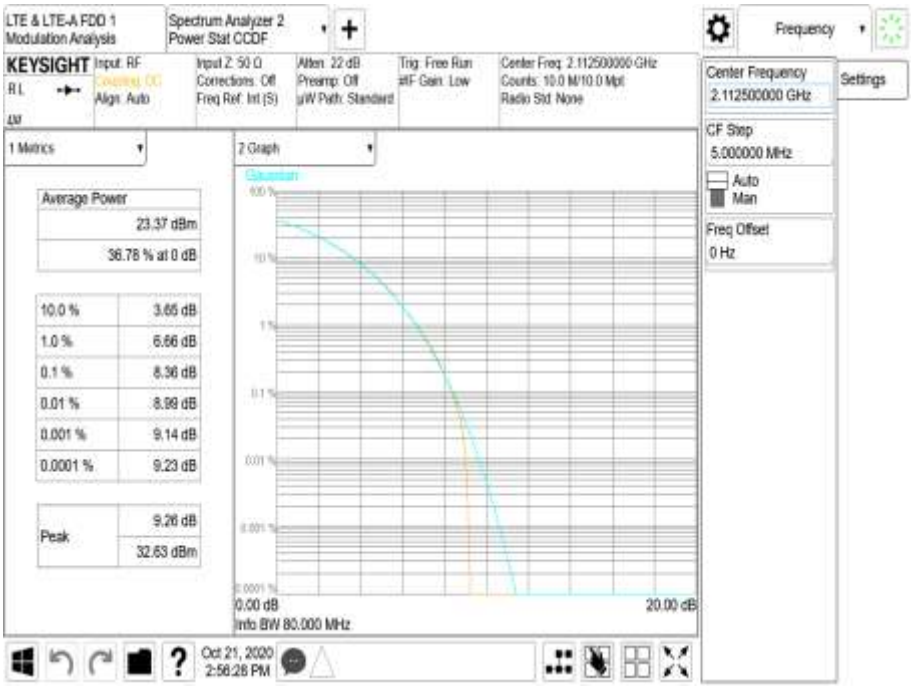
Remarks

1. Transmitter performance was measured for top, mid, bottom channels across both antenna ports as represented in the average power measurement tables. Maximum power performance was determined to be antenna port A.
2. The plot results presented represent typical performance for all bands and antenna ports based on transmitter port A performance.
3. Plot data performance are on file and available on request.
4. An NB-IoT GB carrier is included in the 10MHz LTE RAT for evaluation as part of this submission.
5. The integral Antenna gain for this Dot 2274 B66 is 1.1 dBi.
6. External Antenna gain for this Dot 2284 B66 shall be no greater than 1.1 dBi.

Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B

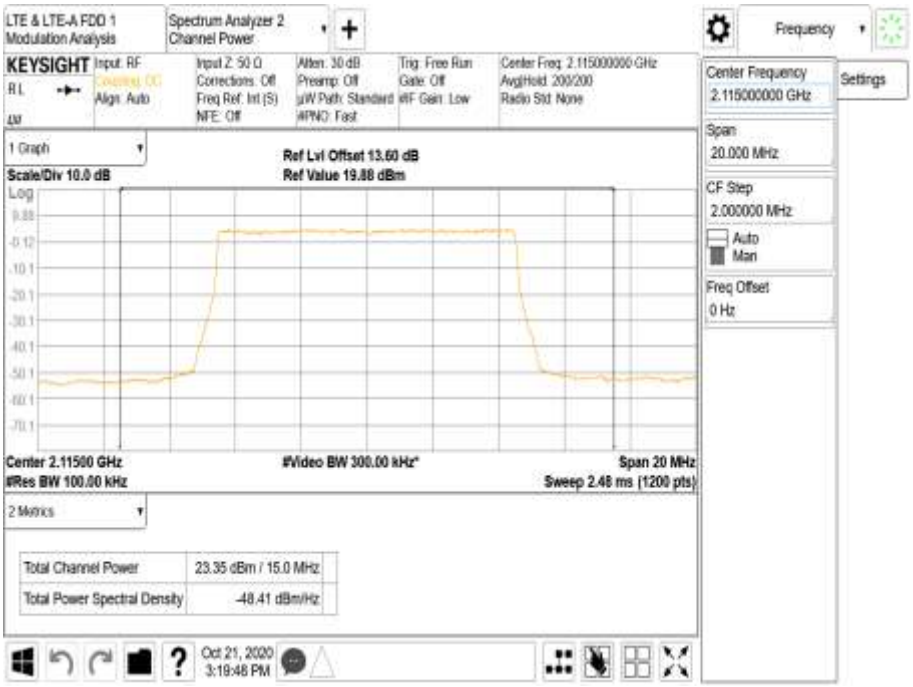


Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B

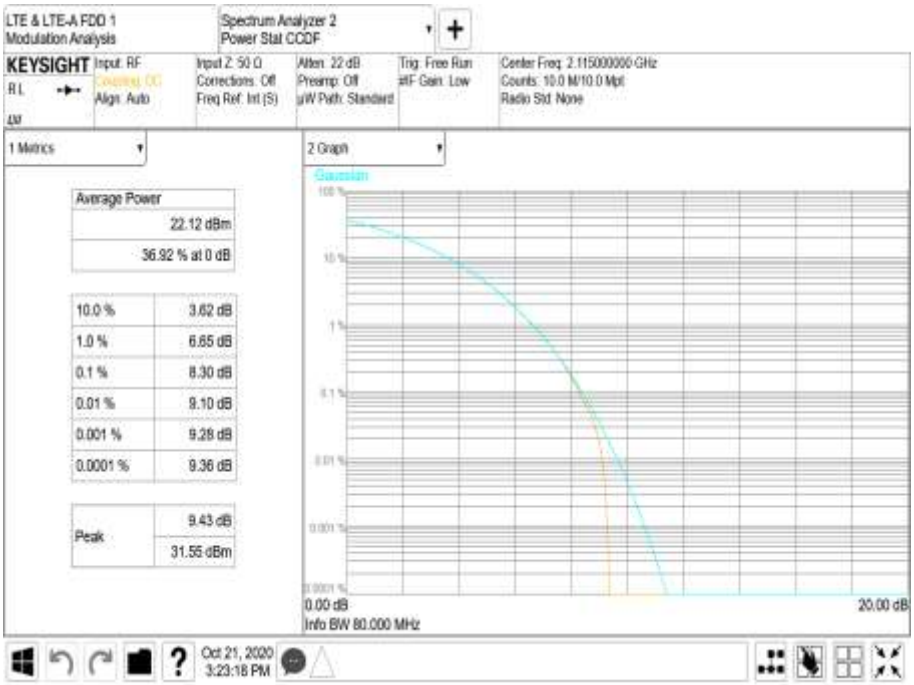


Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B

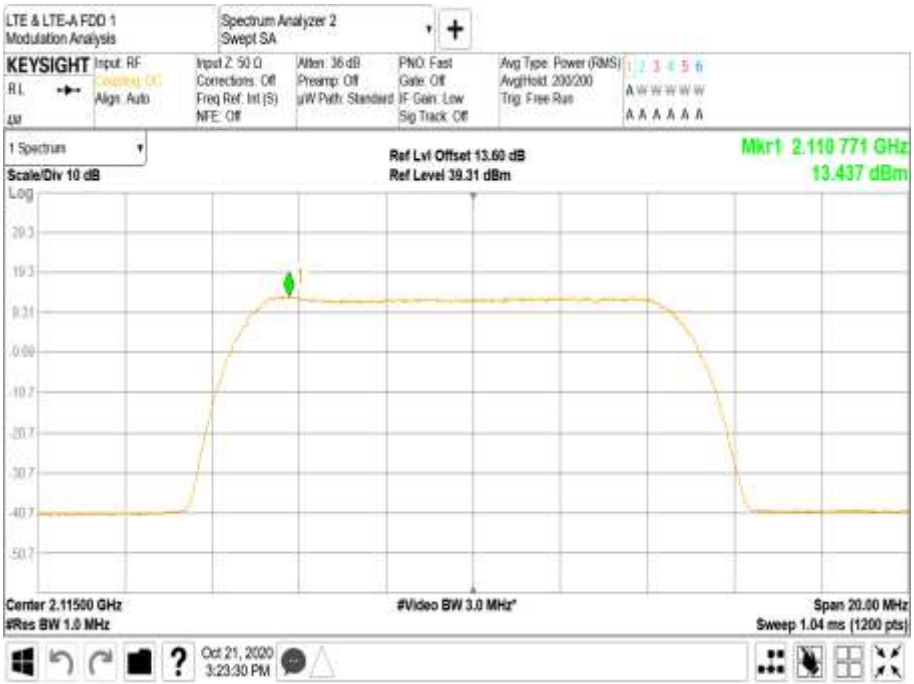
Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B



Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B

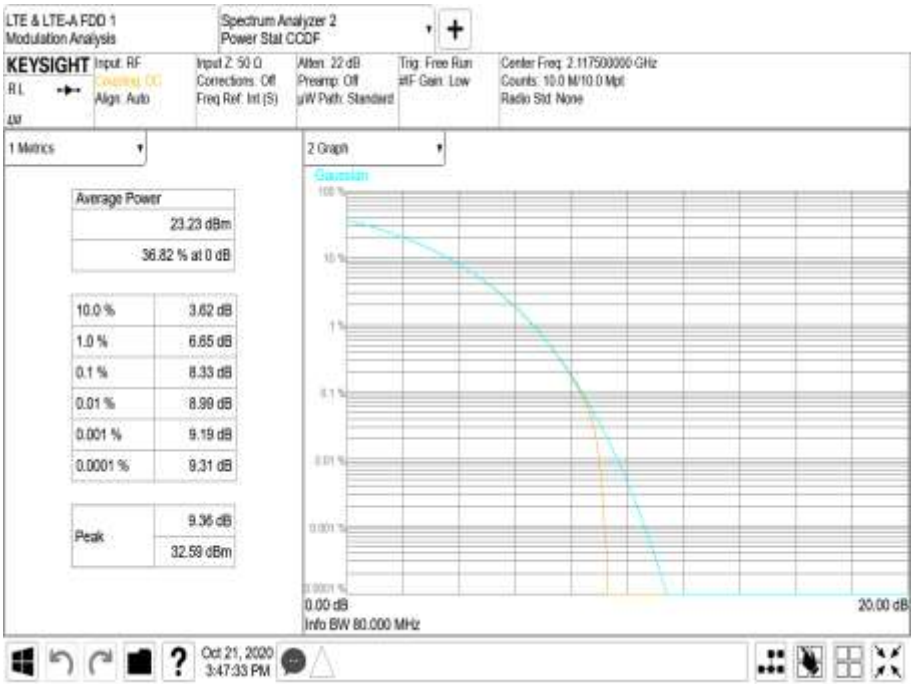


Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B

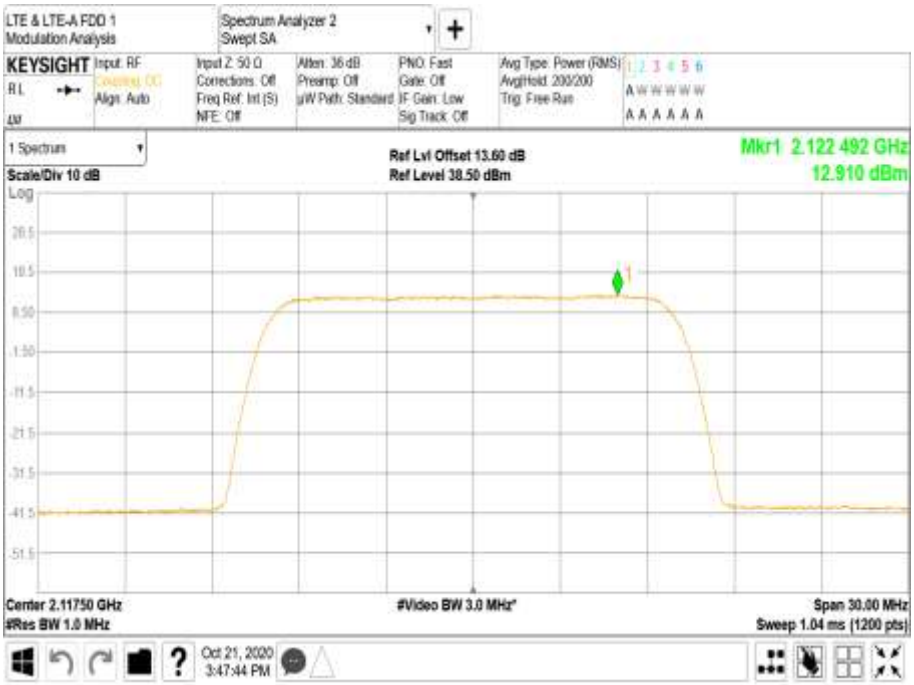


Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position B

Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position B

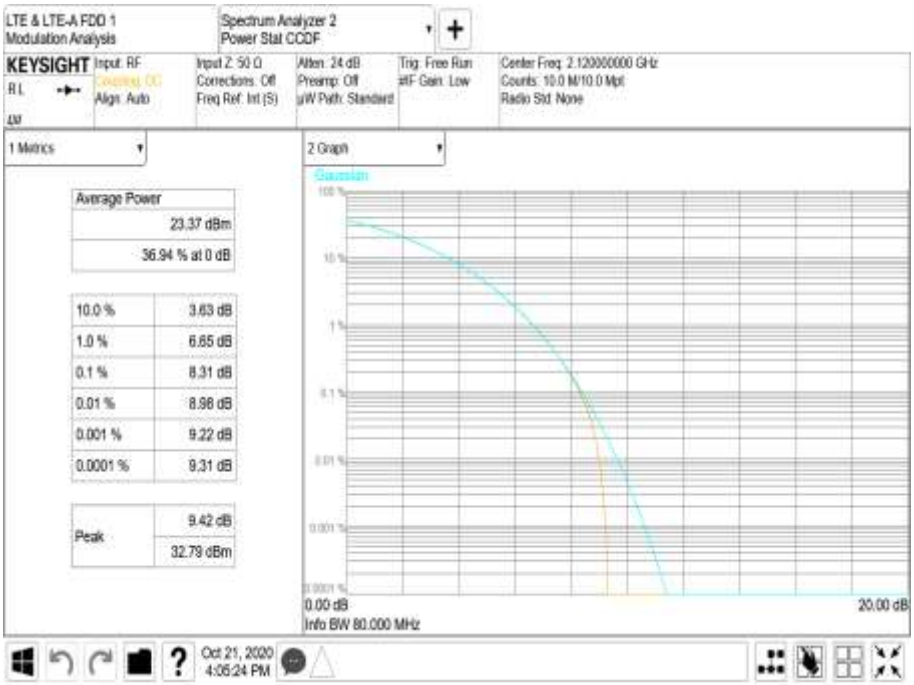


Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position B

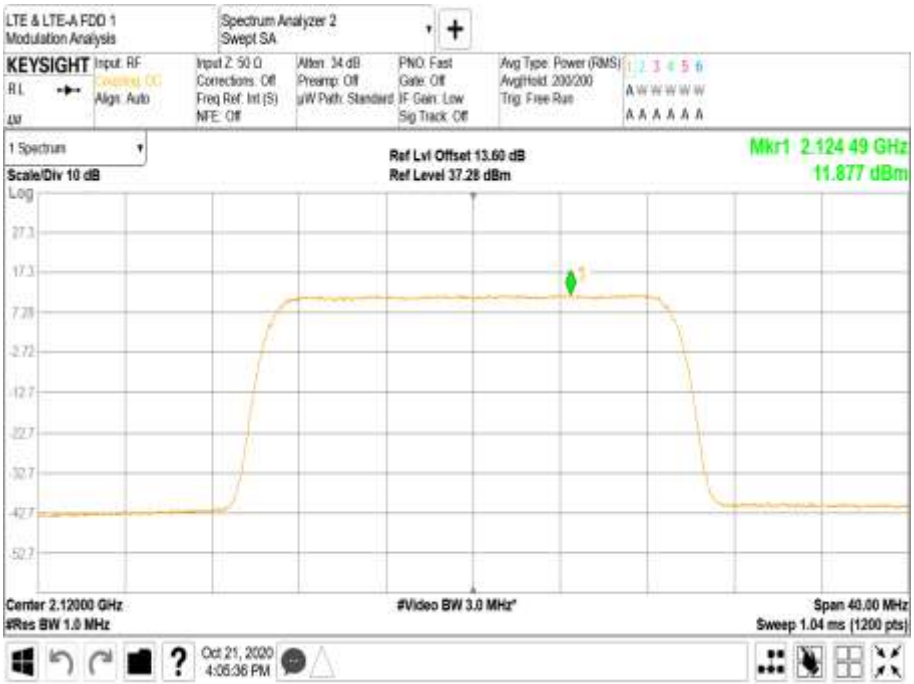


Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position B

Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position B

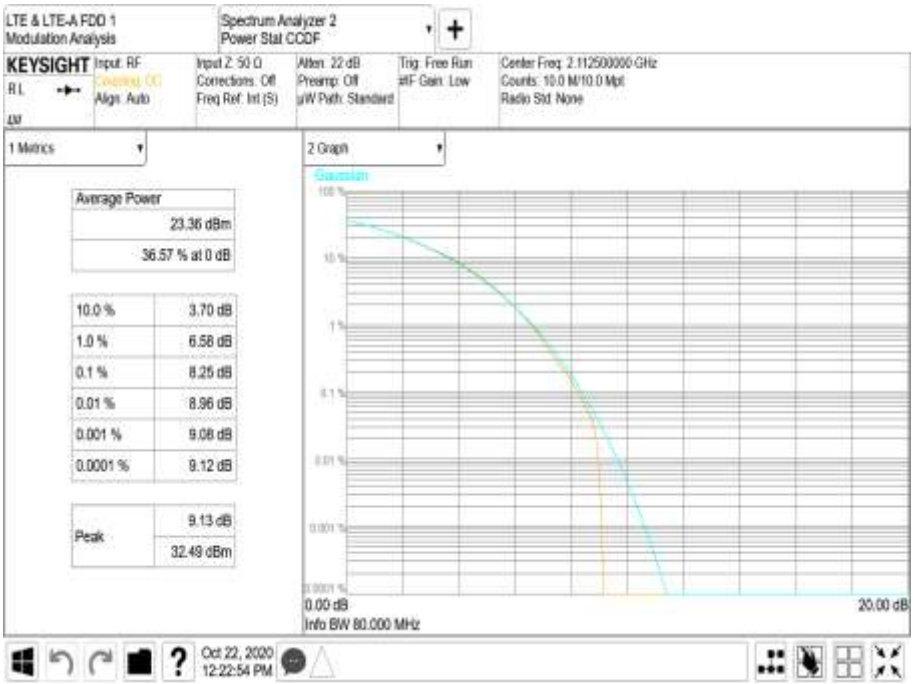


Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position B



Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B

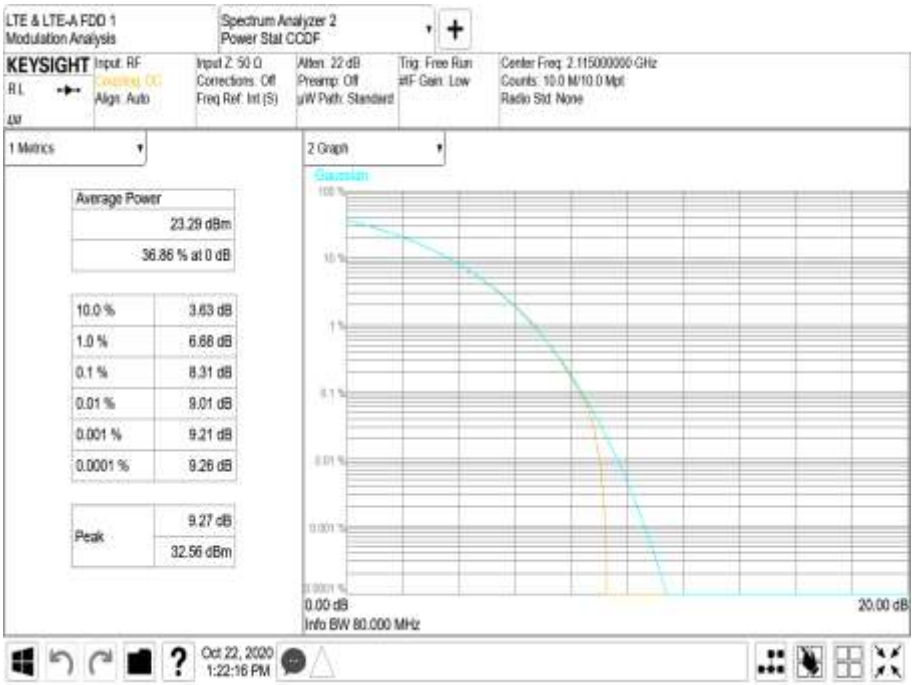
Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B



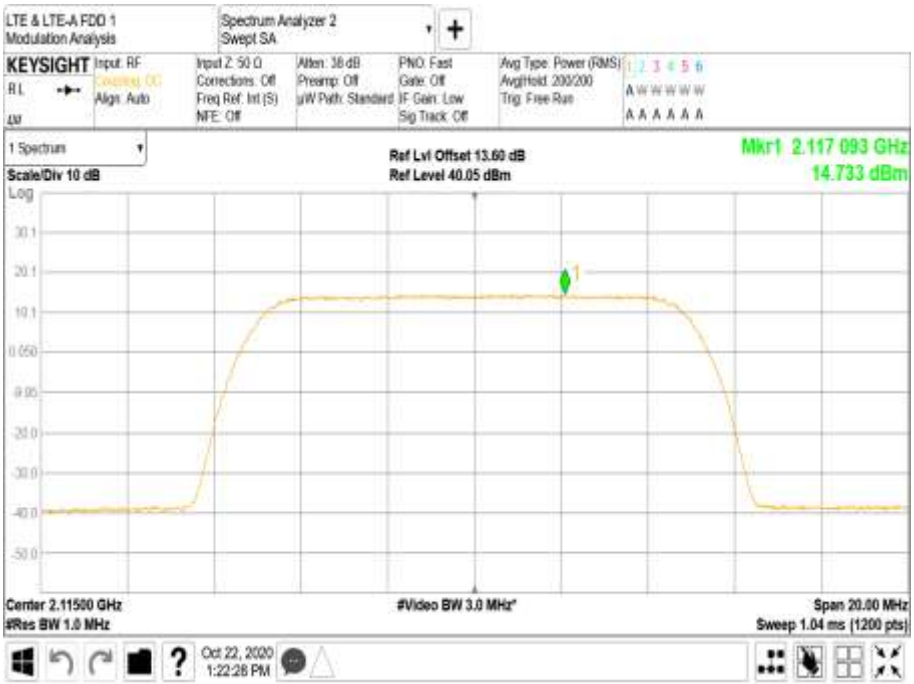
Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B

Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B

Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B

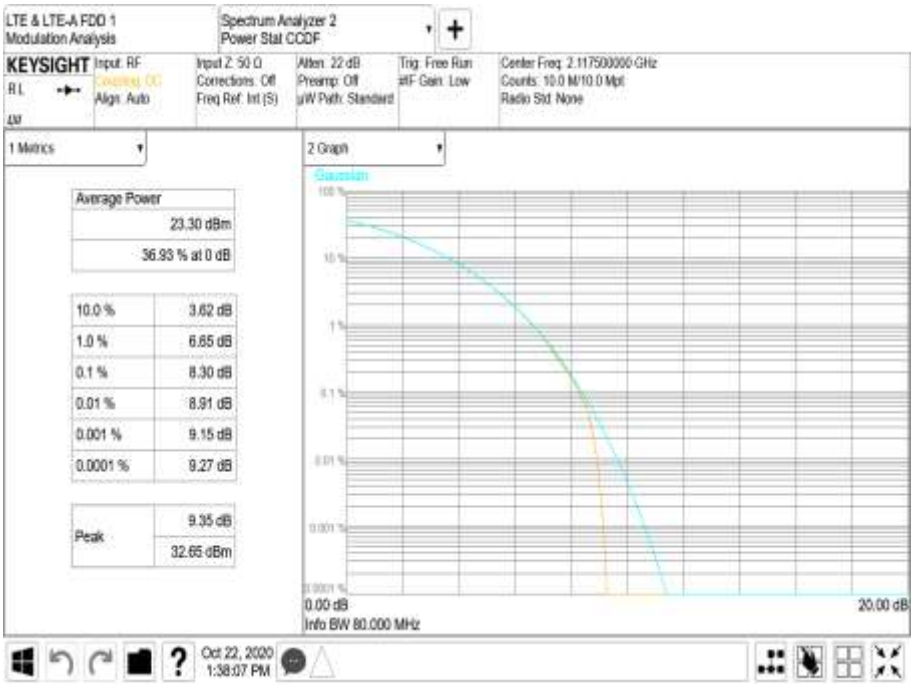


Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position B

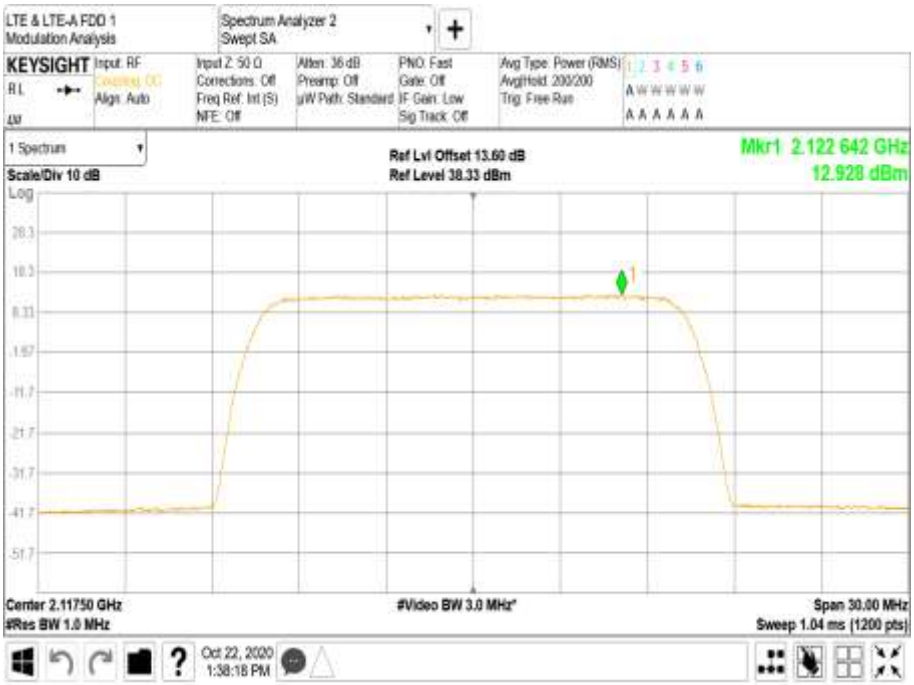


Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position B

Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position B



Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position B

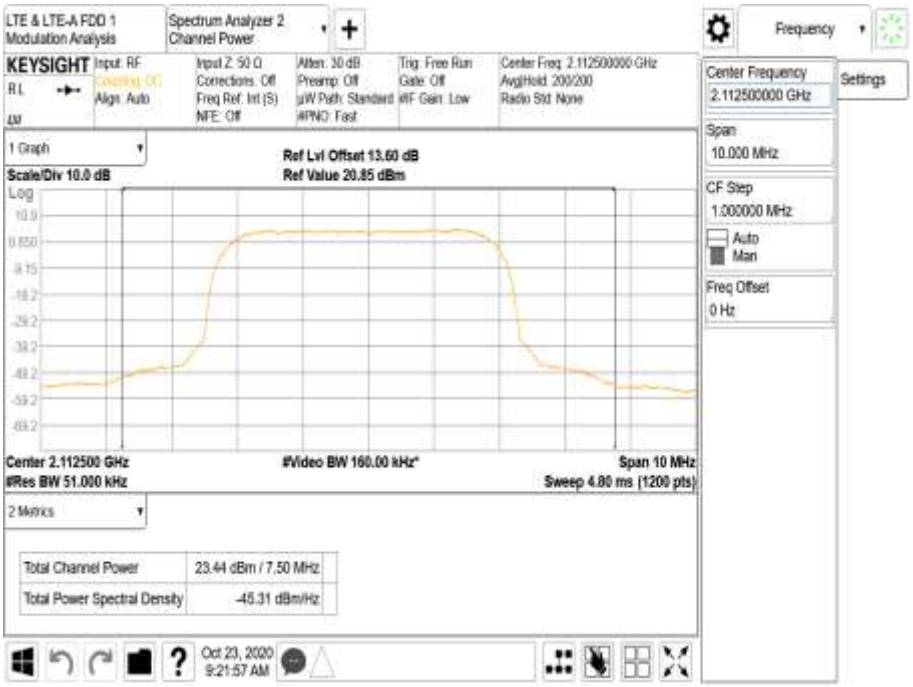


Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position B

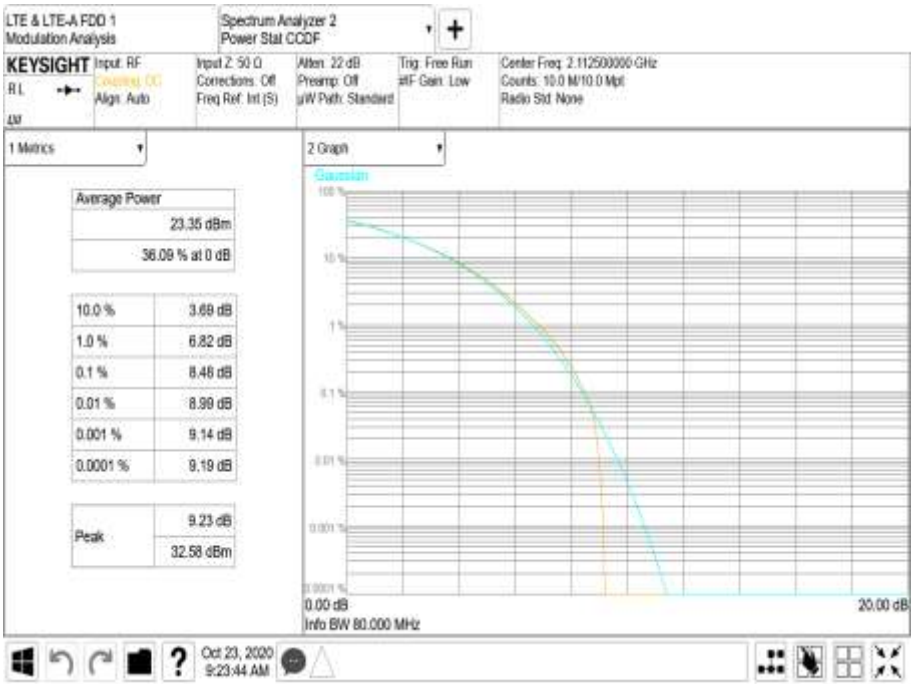
Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position B

Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position B

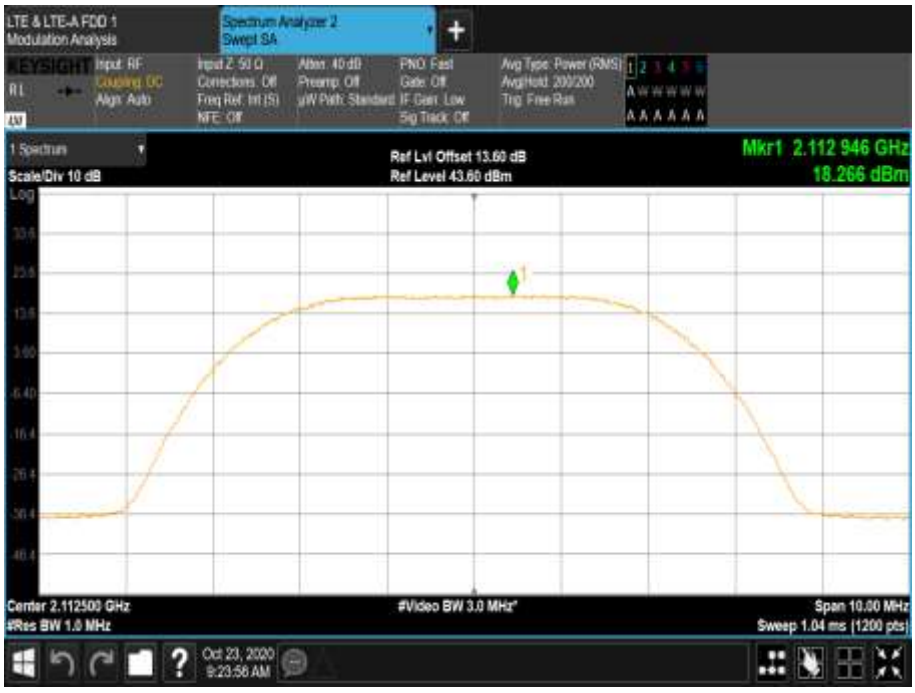
Antenna Port A Carrier Power - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B



Antenna Port A Pk-Av Ratio - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B



Antenna Port A PSD - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position B

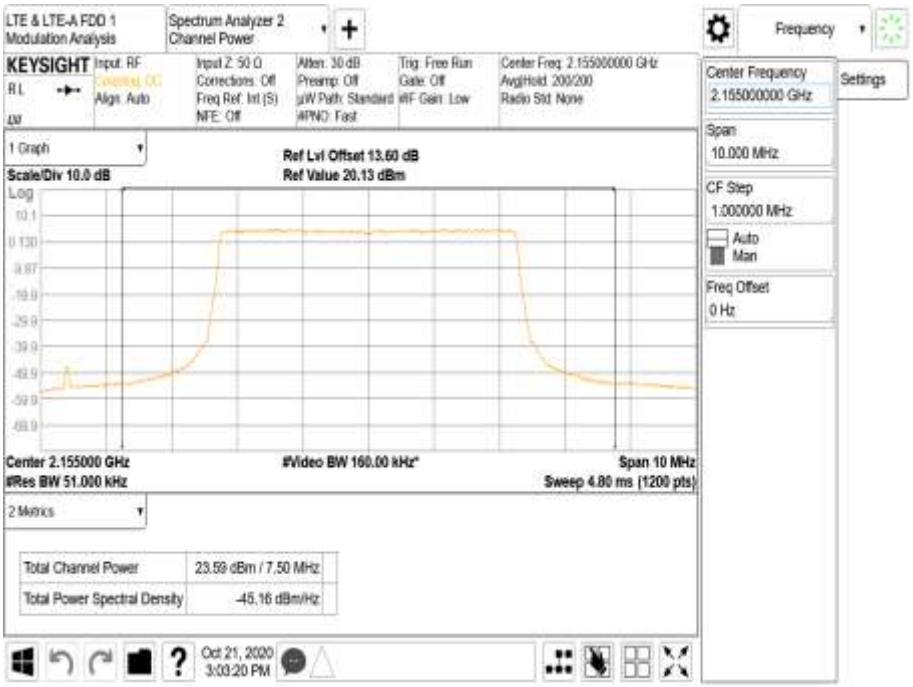


Configuration A

Maximum Output Power 23 dBm

Antenna	Modulation	Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power			
			Channel Position M			
			PAR (dB)	Average Power		
				dBm	EIRP	dBm/MHz
A	LTE: QPSK	5.0 MHz	9.10	23.59	-	17.90
B	LTE: QPSK	5.0 MHz	-	23.58	-	17.90
Total			-	26.60	27.7	20.91
A	LTE: QPSK	10.0 MHz	9.56	23.52	-	14.93
B	LTE: QPSK	10.0 MHz	-	23.39	-	14.93
Total			-	26.47	27.57	17.94
A	LTE: QPSK	15.0 MHz	9.37	23.41	-	12.98
B	LTE: QPSK	15.0 MHz	-	23.44	-	12.98
Total			-	26.44	27.54	15.99
A	LTE: QPSK	20.0 MHz	9.33	23.43	-	11.79
B	LTE: QPSK	20.0 MHz	-	23.38	-	11.79
Total			-	26.42	27.52	14.80
A	NR: QPSK	5.0 MHz	9.10	23.66	-	17.90
B	NR: QPSK	5.0 MHz	-	23.60	-	17.90
Total			-	26.64	27.74	20.91
A	NR: QPSK	10.0 MHz	9.56	23.54	-	14.93
B	NR: QPSK	10.0 MHz	-	23.63	-	14.93
Total			-	26.60	27.70	17.94
A	NR: QPSK	15.0 MHz	9.37	23.48	-	12.98
B	NR: QPSK	15.0 MHz	-	23.51	-	12.98
Total			-	26.51	27.61	15.99
A	NR: QPSK	20.0 MHz	9.33	22.88	-	11.79
B	NR: QPSK	20.0 MHz	-	22.88	-	11.79
Total			-	25.89	26.99	14.80
A	WCDMA: QPSK	5.0 MHz	9.35	23.56	-	18.59
B	WCDMA: QPSK	5.0 MHz	-	23.51	-	18.59
Total			-	26.55	27.65	21.60

Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M

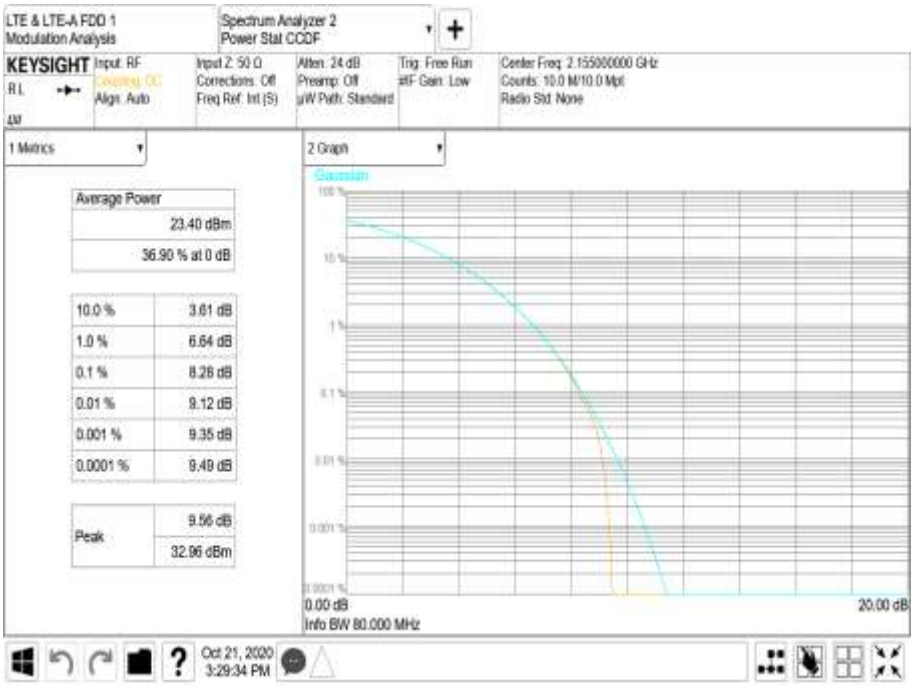


Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M

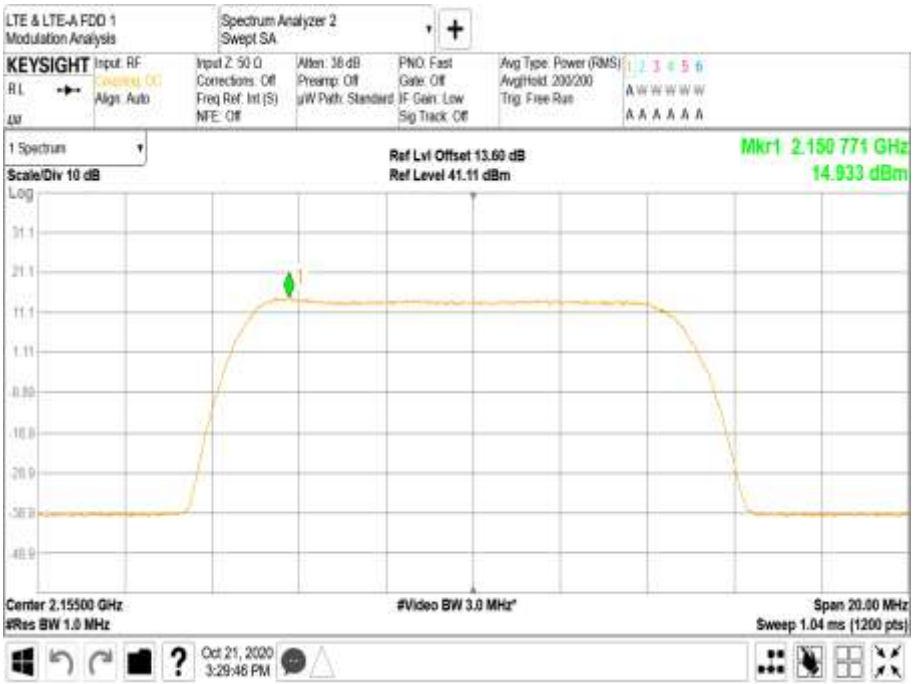
Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M

Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M

Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M

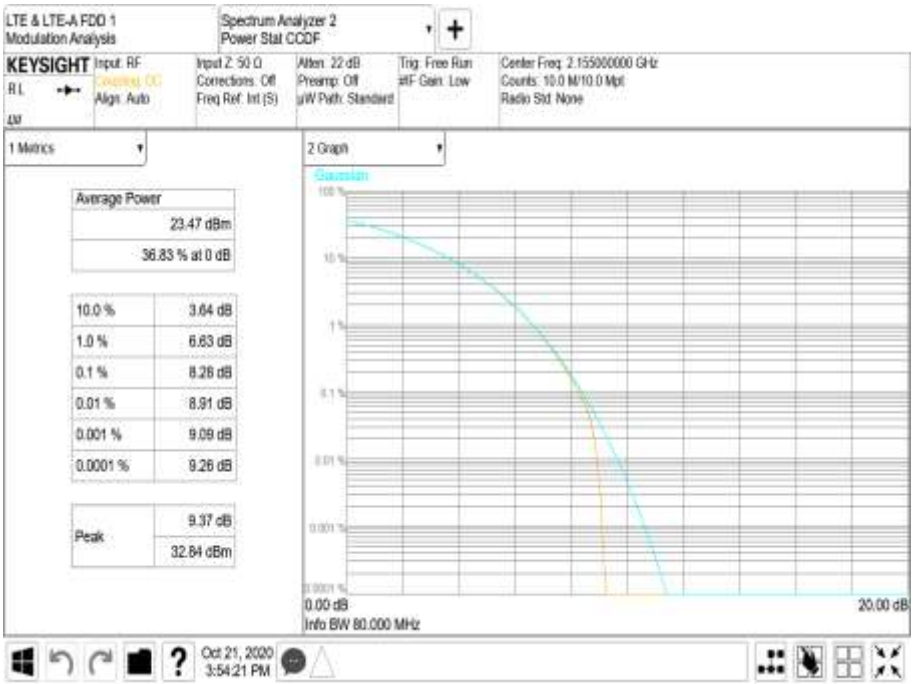


Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M

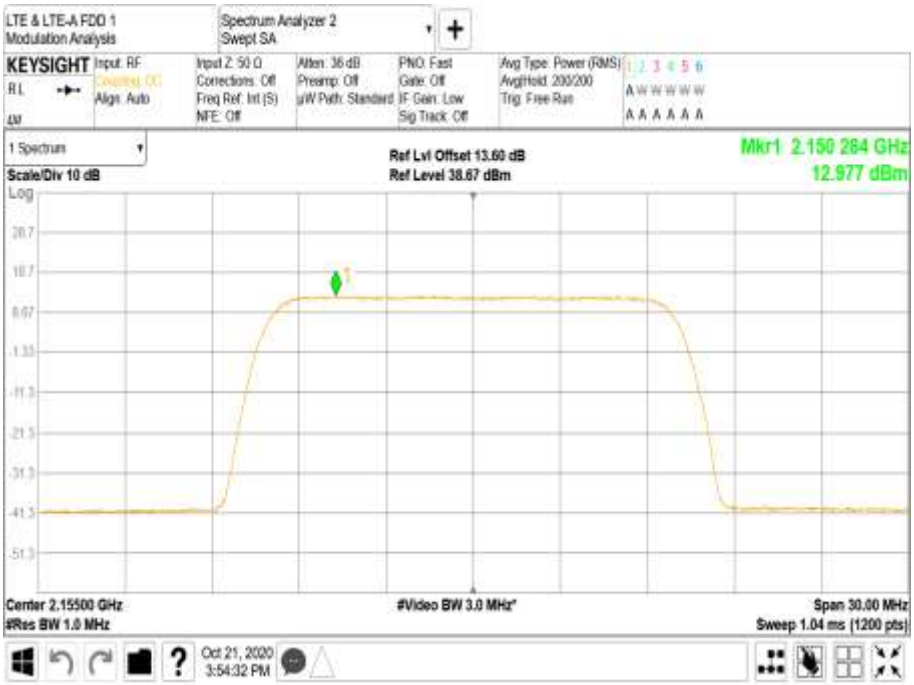


Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position M

Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position M

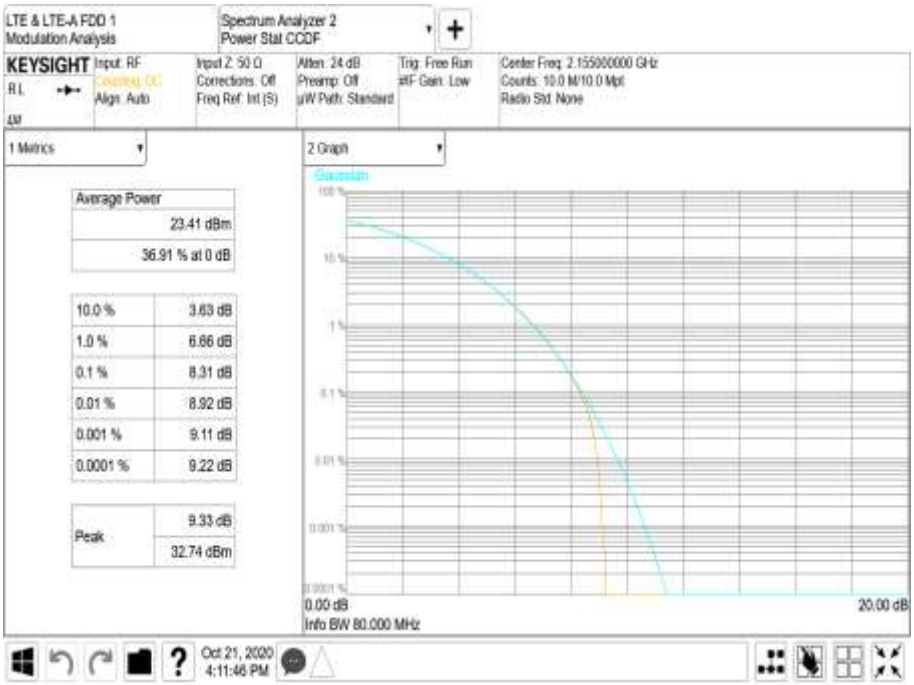


Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position M

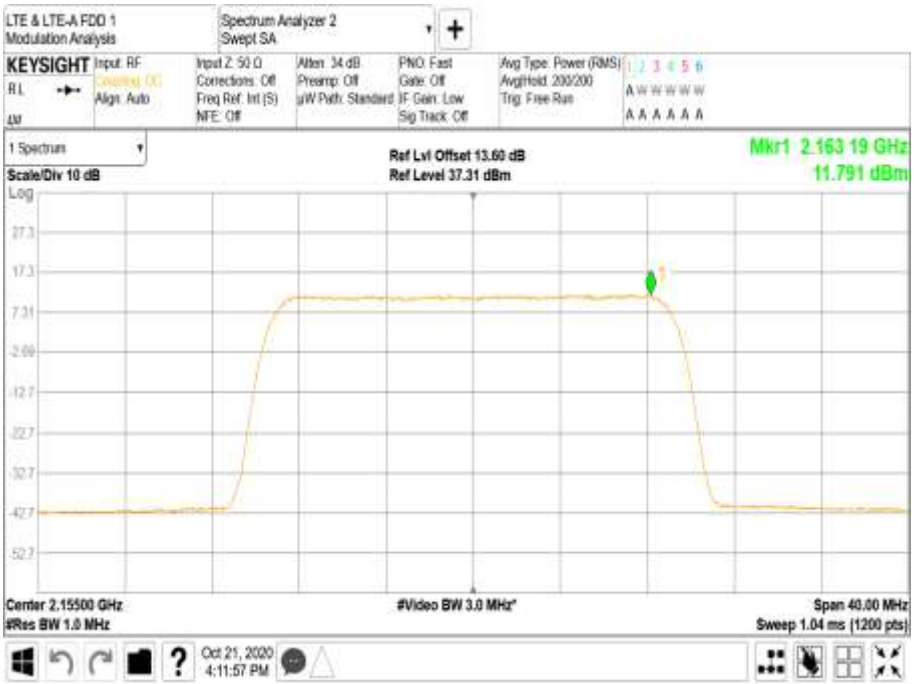


Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position M

Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position M

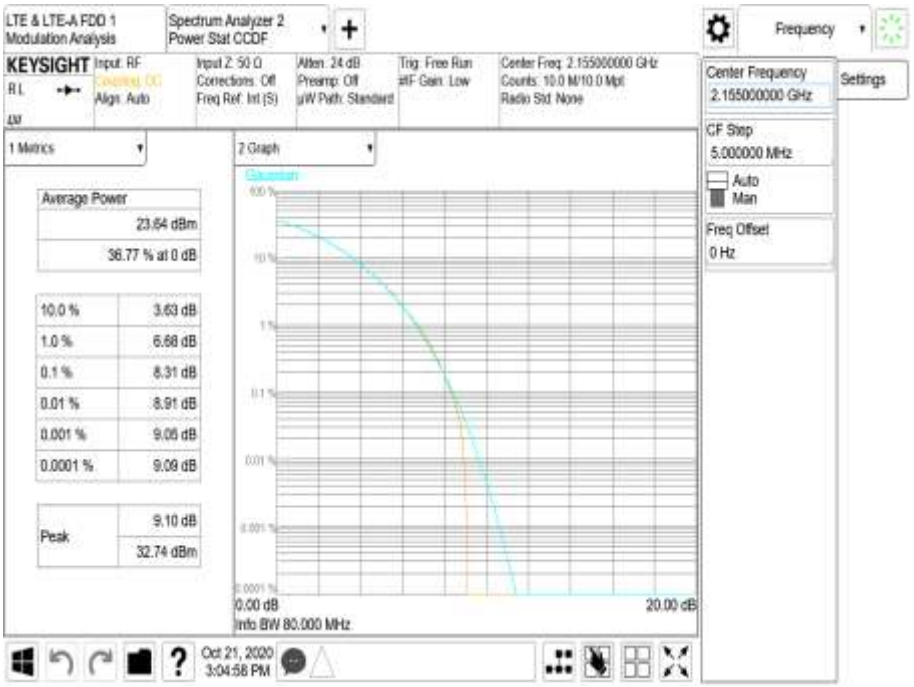


Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position M



Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M

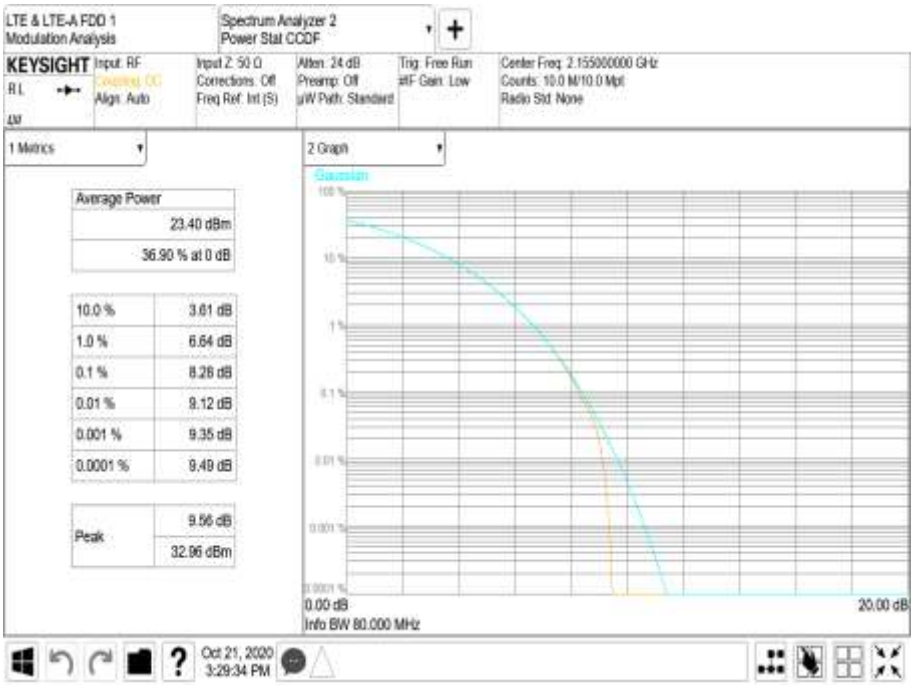
Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M



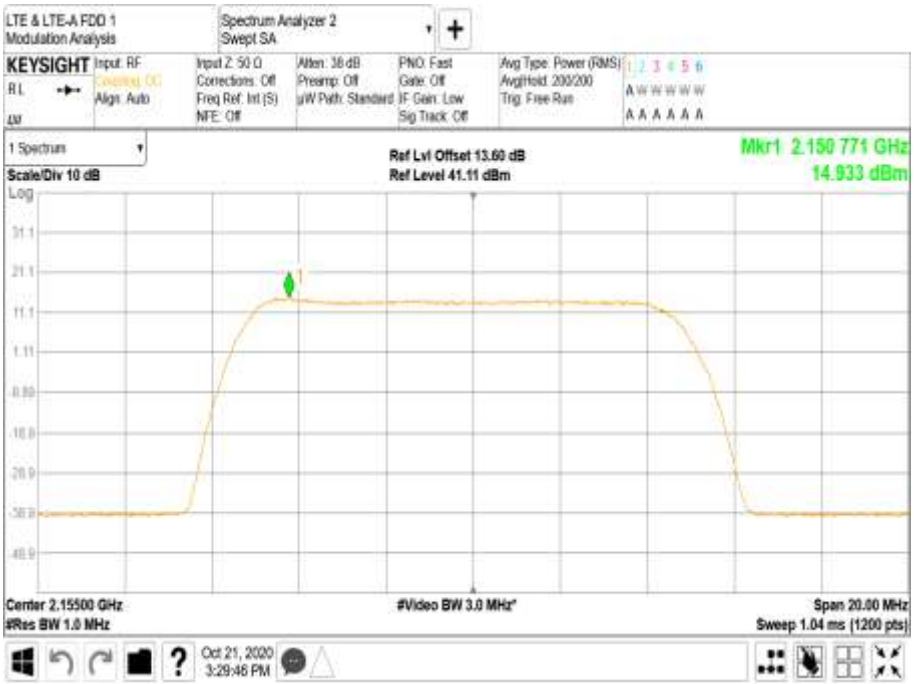
Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M

Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M

Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M

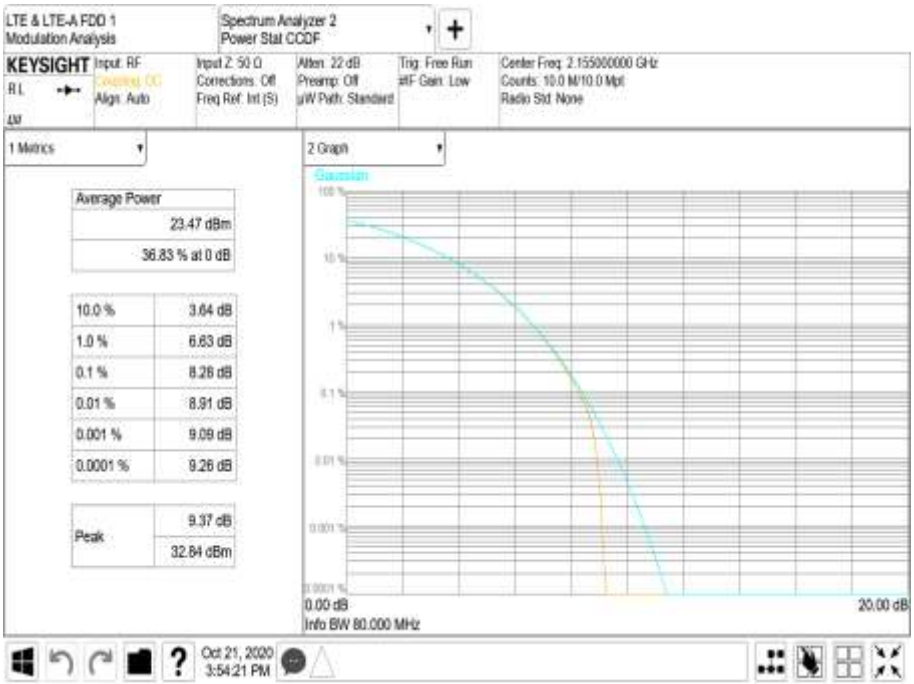


Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position M

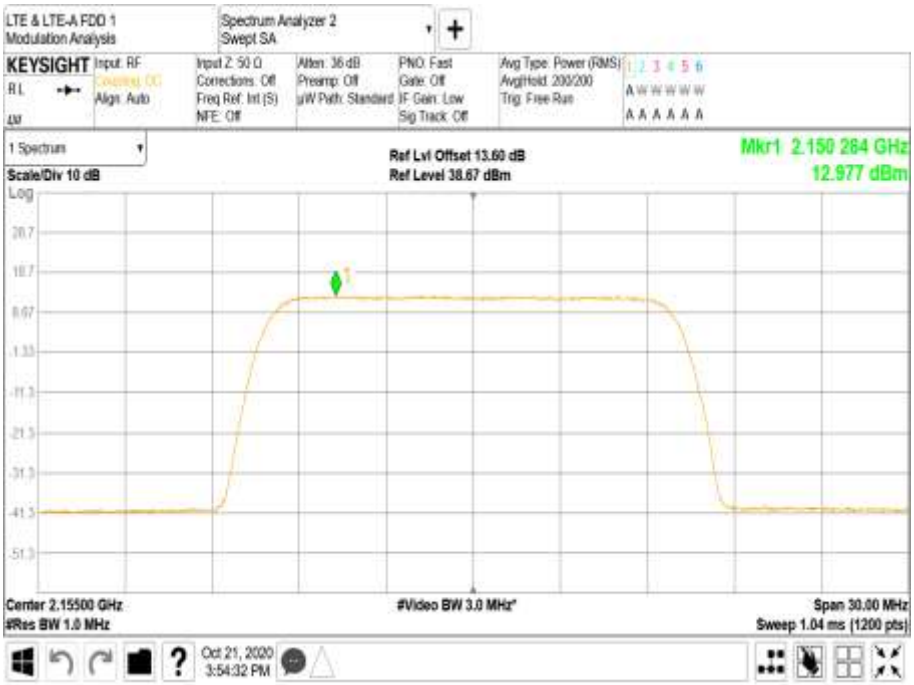


Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position M

Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position M

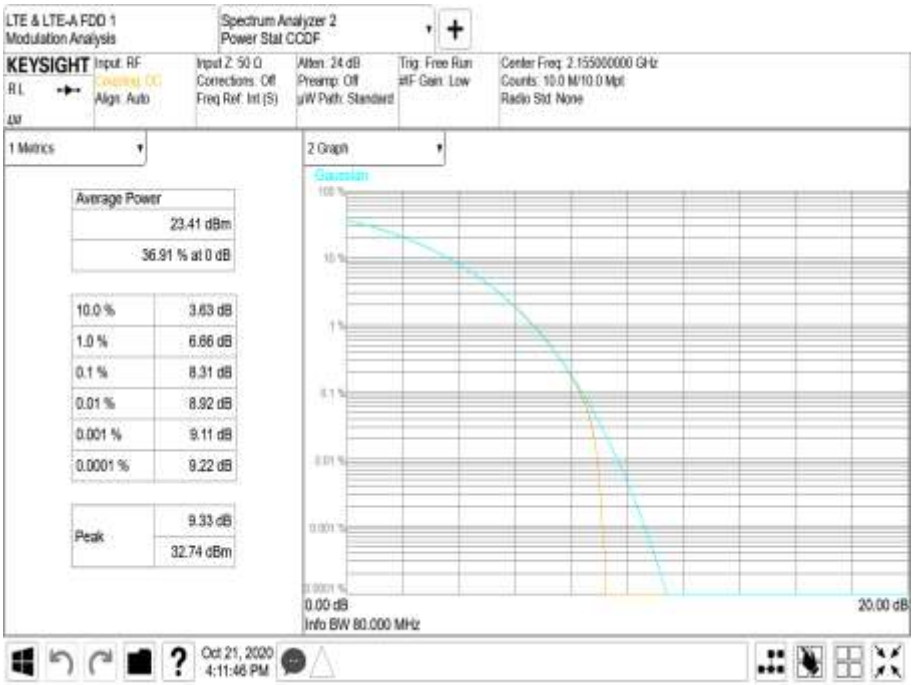


Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position M

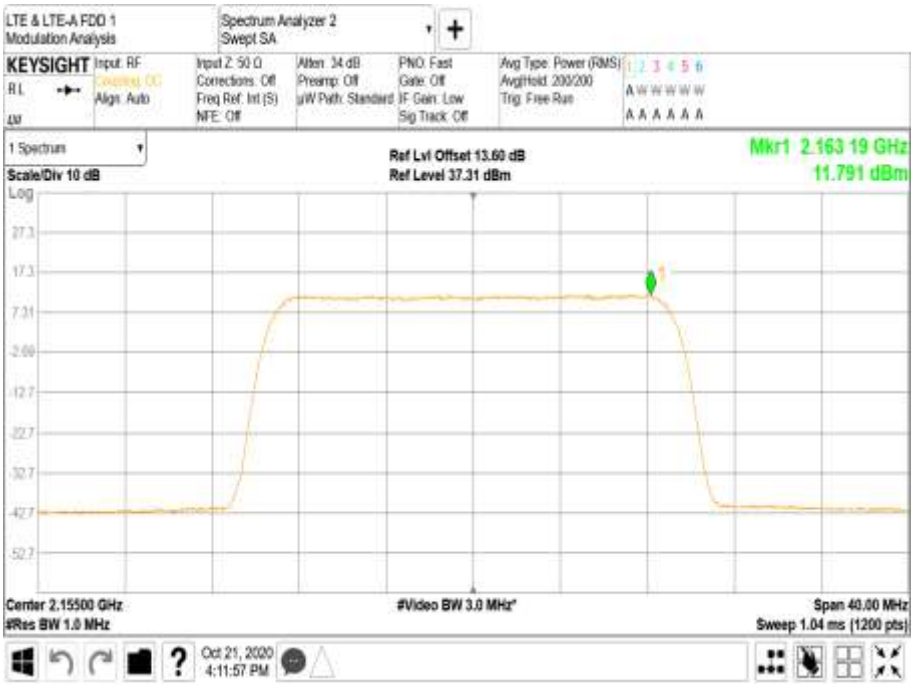


Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position M

Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position M

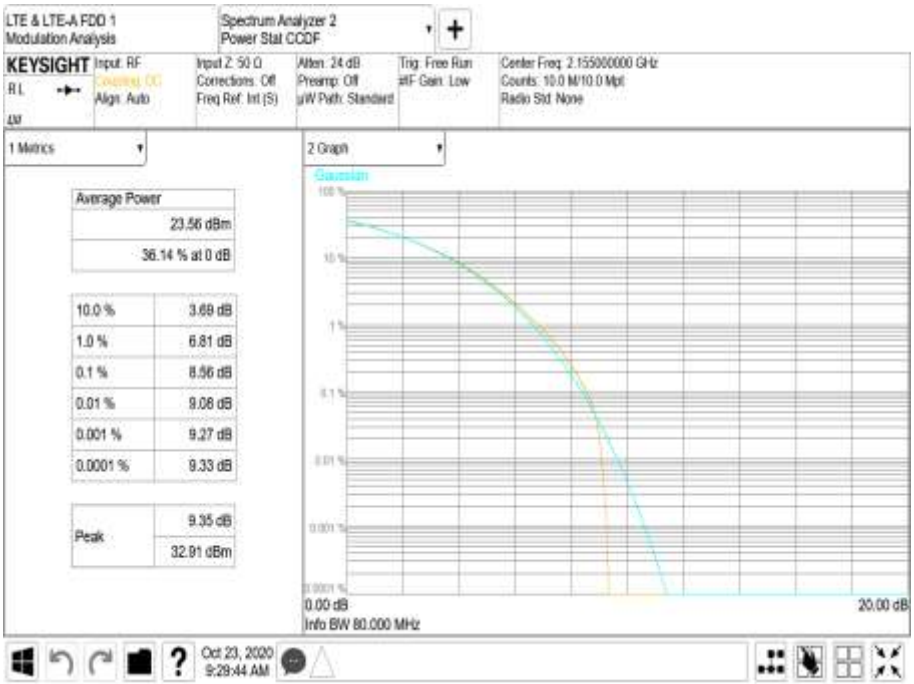


Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position M

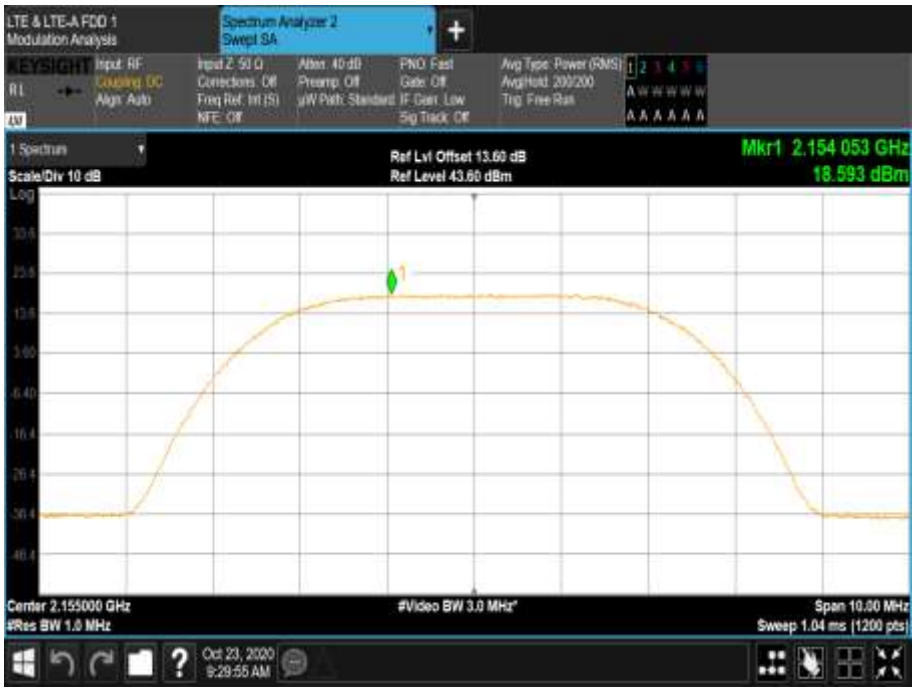


Antenna Port A Carrier Power - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M

Antenna Port A Pk-Av Ratio - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M



Antenna Port A PSD - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M

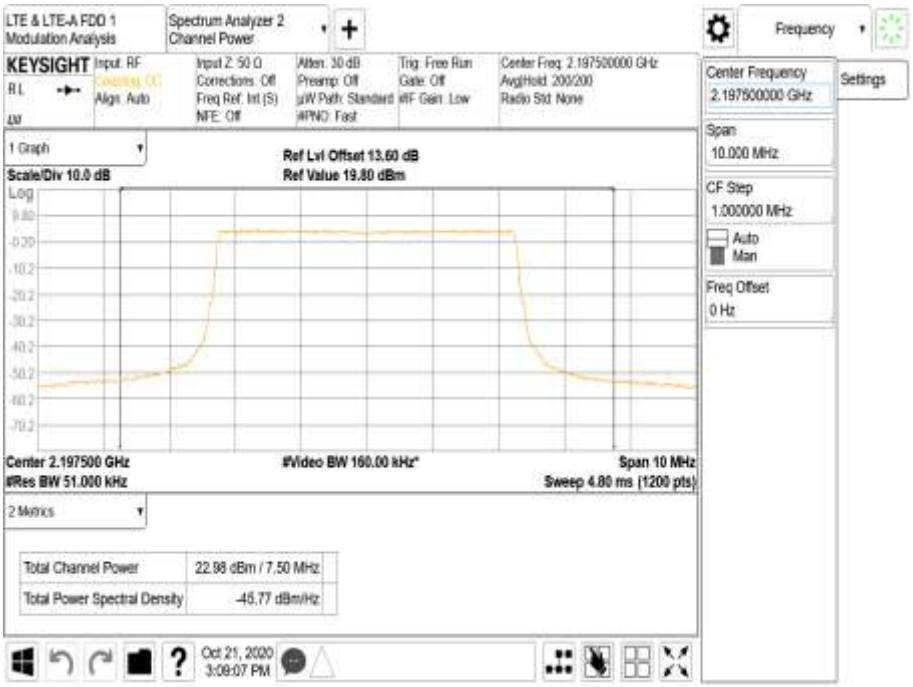


Configuration A

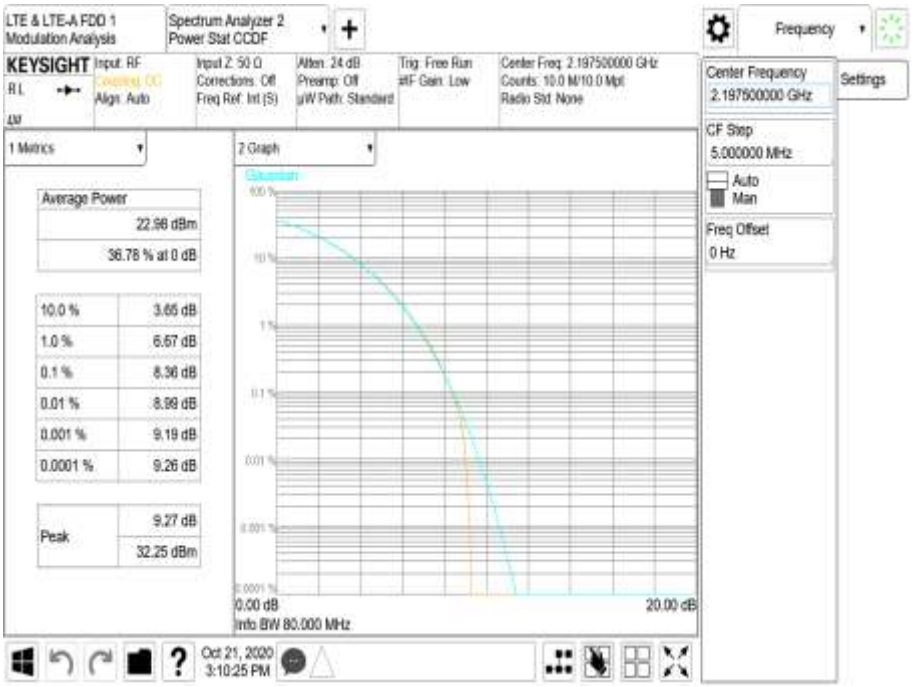
Maximum Output Power 23 dBm

Antenna	Modulation	Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power			
			Channel Position T			
			PAR (dB)	Average Power		
				dBm	EIRP	dBm/MHz
A	LTE: QPSK	5.0 MHz	9.27	22.98	-	17.42
B	LTE: QPSK	5.0 MHz	-	22.38	-	17.42
Total			-	25.70	26.8	20.43
A	LTE: QPSK	10.0 MHz	9.44	23.06	-	14.96
B	LTE: QPSK	10.0 MHz	-	22.42	-	14.96
Total			-	25.76	26.86	17.97
A	LTE: QPSK	15.0 MHz	9.40	23.15	-	12.87
B	LTE: QPSK	15.0 MHz	-	22.82	-	12.87
Total			-	26.00	27.10	15.88
A	LTE: QPSK	20.0 MHz	9.43	23.34	-	11.82
B	LTE: QPSK	20.0 MHz	-	23.00	-	11.82
Total			-	26.18	27.28	14.83
A	NR: QPSK	5.0 MHz	9.11	23.05	-	17.44
B	NR: QPSK	5.0 MHz	-	22.39	-	17.44
Total			-	25.74	26.84	20.45
A	NR: QPSK	10.0 MHz	9.30	23.18	-	14.31
B	NR: QPSK	10.0 MHz	-	22.72	-	14.31
Total			-	25.97	27.07	17.32
A	NR: QPSK	15.0 MHz	9.32	23.24	-	12.84
B	NR: QPSK	15.0 MHz	-	22.97	-	12.84
Total			-	26.12	27.22	15.85
A	NR: QPSK	20.0 MHz	10.03	22.58	-	10.95
B	NR: QPSK	20.0 MHz	-	22.41	-	10.95
Total			-	25.51	26.61	13.96
A	WCDMA: QPSK	5.0 MHz	9.25	23.12	-	18.32
B	WCDMA: QPSK	5.0 MHz	-	22.50	-	18.32
Total			-	25.83	26.93	21.33

Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T



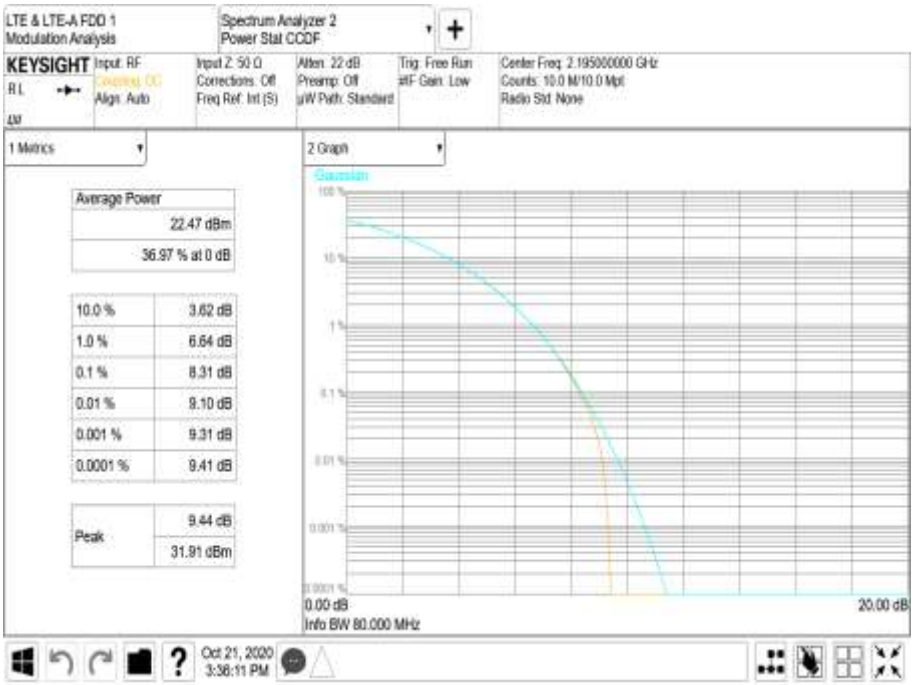
Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T



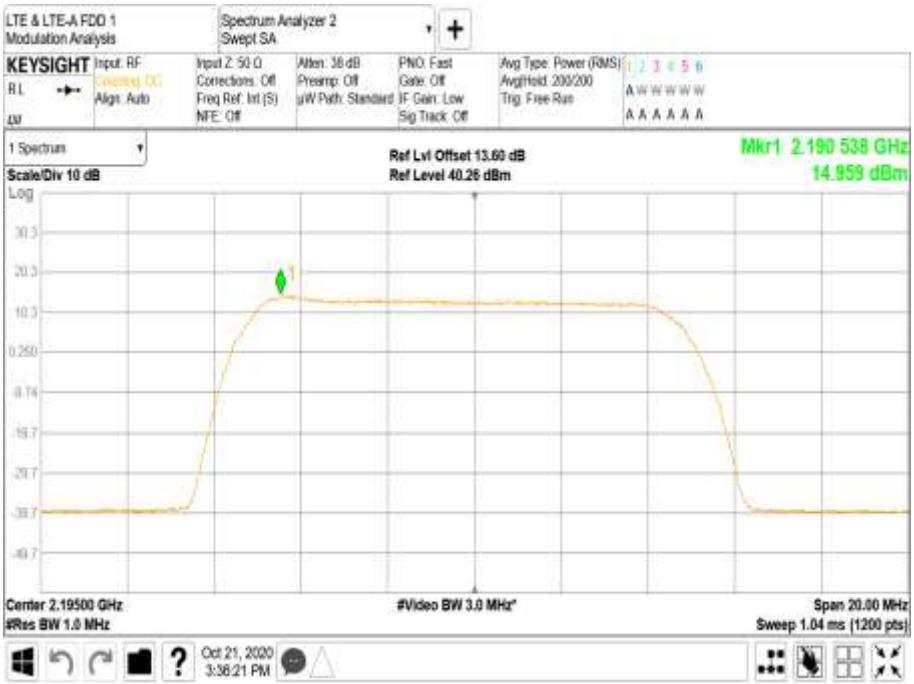
Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T

Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T

Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T

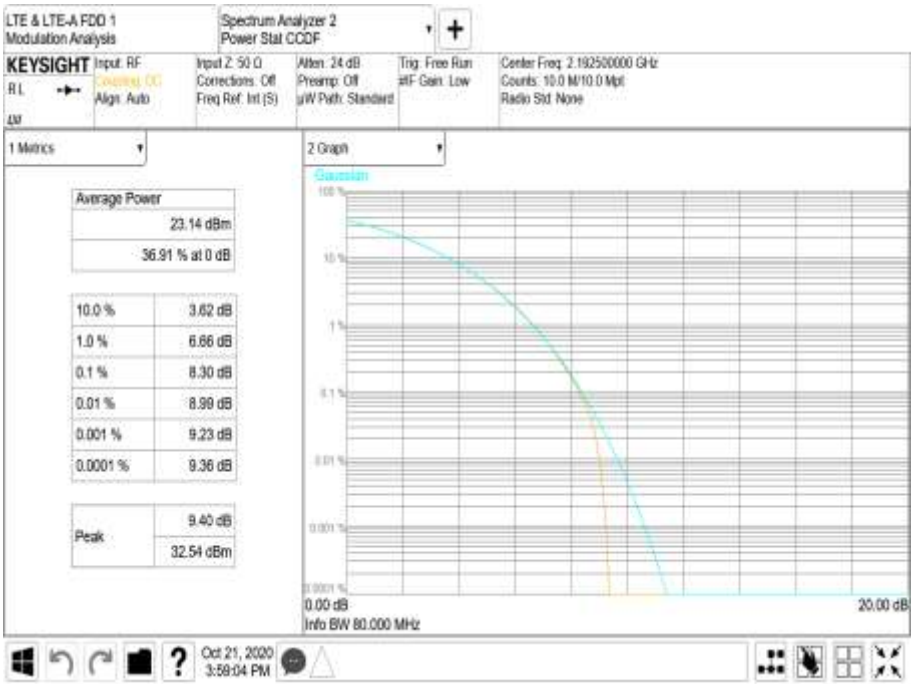


Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T



Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position T

Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position T



Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position T

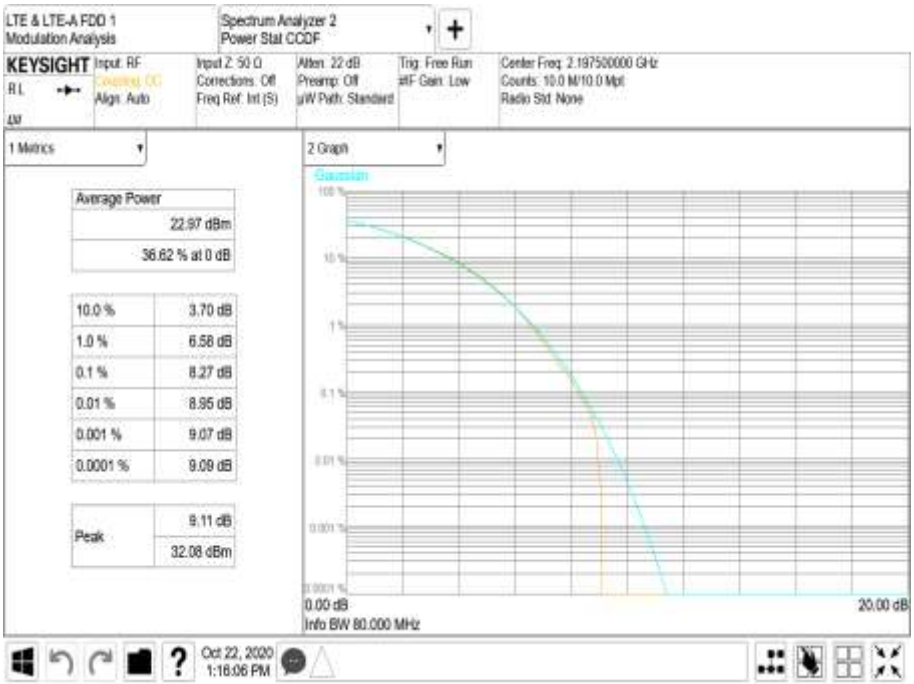
Antenna Port A Carrier Power - Modulation LTE: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position T

Antenna Port A Pk-Av Ratio - Modulation LTE: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position T

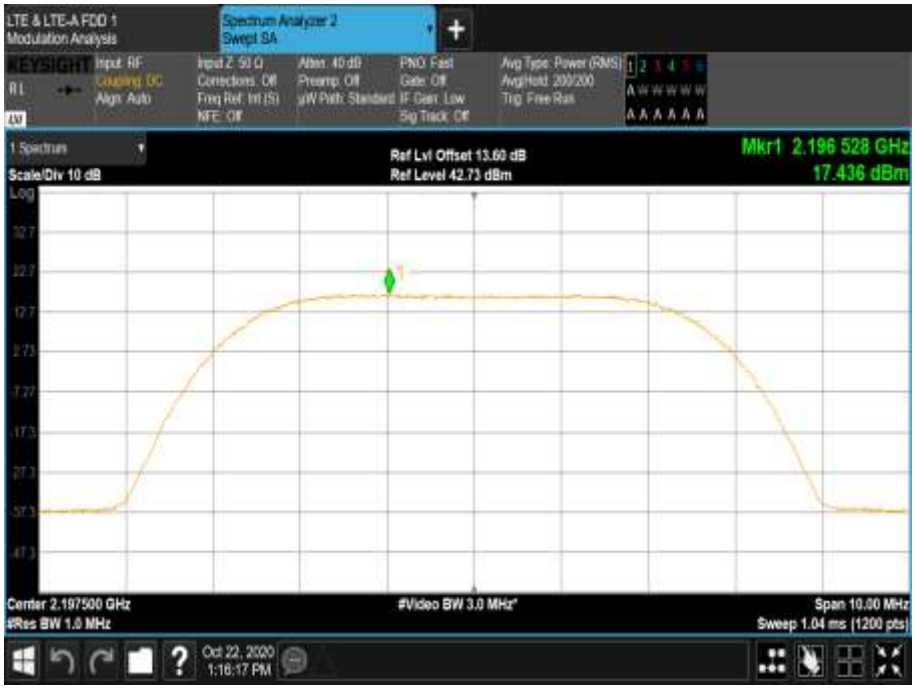
Antenna Port A PSD - Modulation LTE: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position T

Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T

Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T

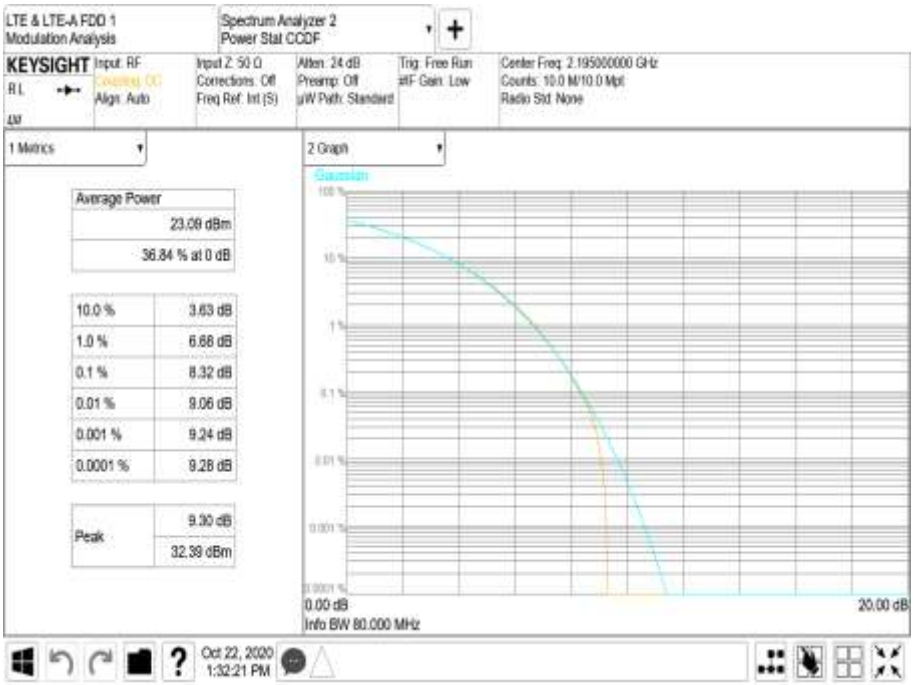


Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T

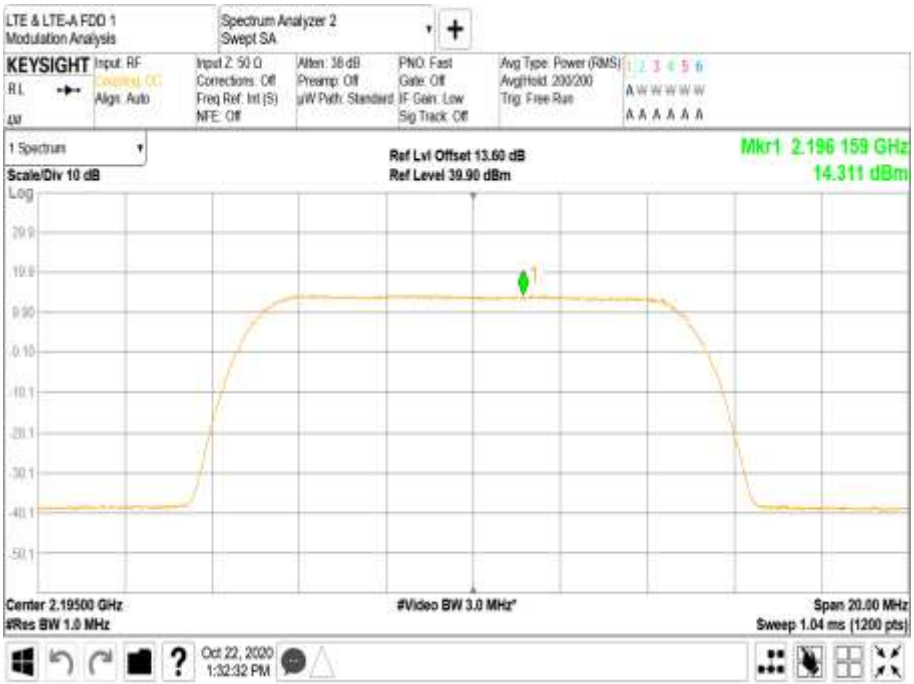


Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T

Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T

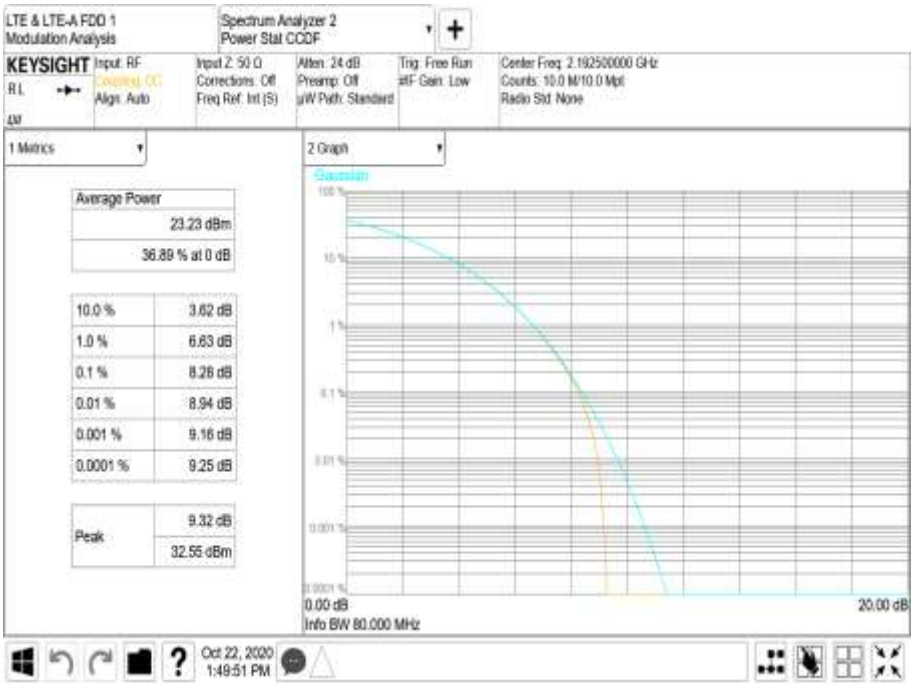


Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position T



Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position T

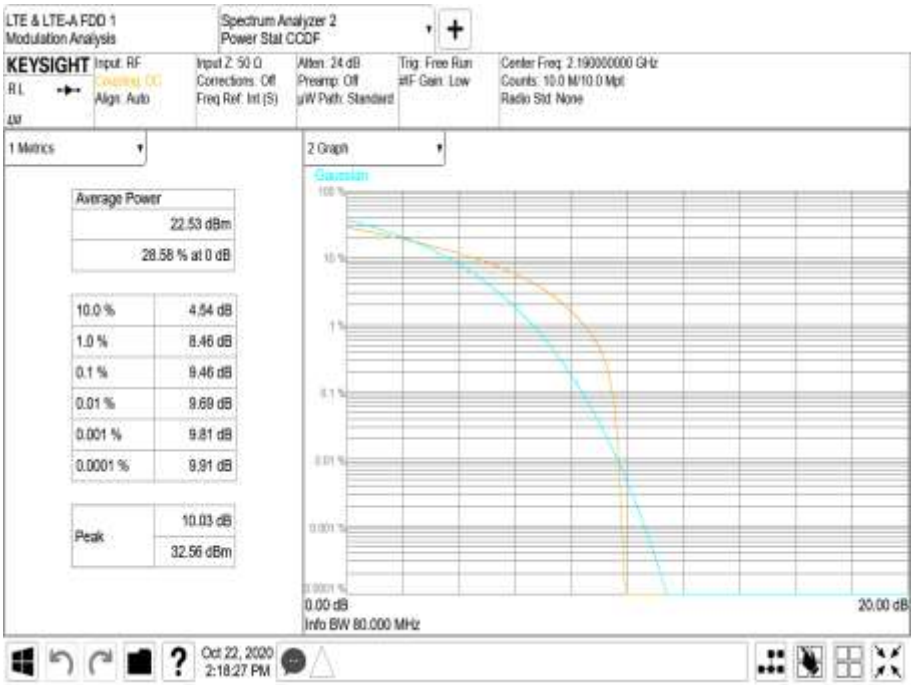
Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position T



Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 15.0 MHz - Channel Position T

Antenna Port A Carrier Power - Modulation NR: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position T

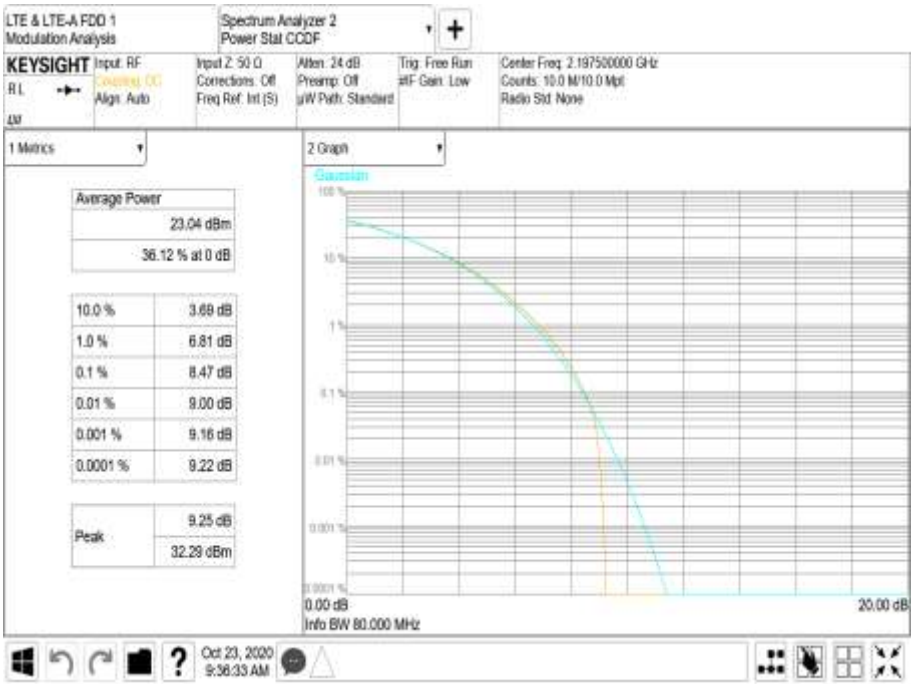
Antenna Port A Pk-Av Ratio - Modulation NR: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position T



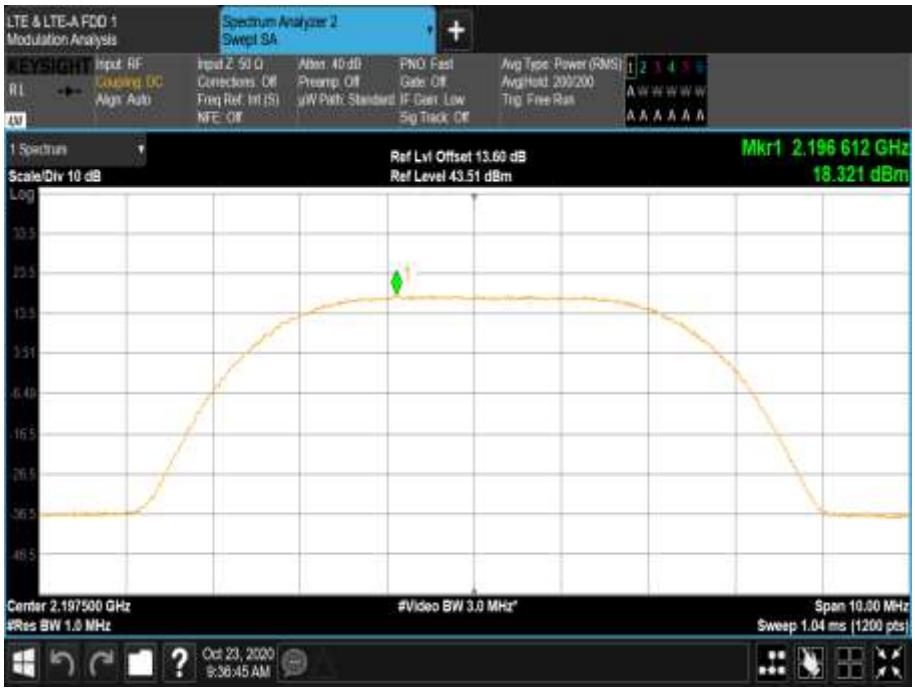
Antenna Port A PSD - Modulation NR: QPSK - Carrier Bandwidth 20.0 MHz - Channel Position T

Antenna Port A Carrier Power - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T

Antenna Port A Pk-Av Ratio - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T



Antenna Port A PSD - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position T



Configuration B

Maximum Output Power 23 dBm

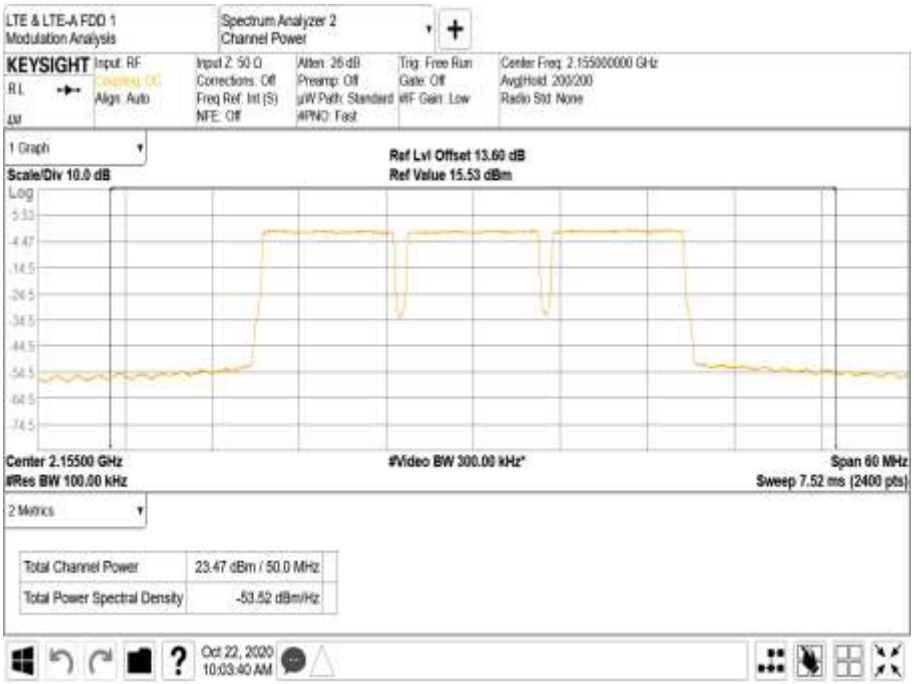
Antenna	Modulation	Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
			Channel Position M		
			PAR (dB)	Average Power	
				dBm	EIRP
A	LTE: QPSK	5.0+5.0+5.0 MHz	-	23.51	-
B	LTE: QPSK	5.0+5.0+5.0 MHz	-	23.52	-
Total			-	26.53	27.63
A	LTE: QPSK	10.0+10.0+10.0 MHz	-	23.47	-
B	LTE: QPSK	10.0+10.0+10.0 MHz	-	23.45	-
Total			-	26.47	27.57
A	LTE: QPSK	15.0+15.0+15.0 MHz	-	23.47	-
B	LTE: QPSK	15.0+15.0+15.0 MHz	-	23.40	-
Total			-	26.45	27.55
A	LTE: QPSK	20.0+20.0+20.0 MHz	-	23.45	-
B	LTE: QPSK	20.0+20.0+20.0 MHz	-	23.28	-
Total			-	26.38	27.48
A	NR: QPSK	5.0+5.0+5.0 MHz	-	23.43	-
B	NR: QPSK	5.0+5.0+5.0 MHz	-	23.43	-
Total			-	26.44	27.54
A	NR: QPSK	10.0+10.0+10.0 MHz	-	23.50	-
B	NR: QPSK	10.0+10.0+10.0 MHz	-	23.50	-
Total			-	26.51	27.61
A	NR: QPSK	15.0+15.0+15.0 MHz	-	23.52	-
B	NR: QPSK	15.0+15.0+15.0 MHz	-	23.38	-
Total			-	26.46	27.56
A	NR: QPSK	20.0+20.0+20.0 MHz	-	22.91	-
B	NR: QPSK	20.0+20.0+20.0 MHz	-	22.57	-
Total			-	25.75	26.85
A	LTE + NR: QPSK	5.0+5.0+5.0 MHz	-	23.43	-
B	LTE + NR: QPSK	5.0+5.0+5.0 MHz	-	23.40	-
Total			-	26.43	27.53
A	LTE + NR: QPSK	10.0+10.0+10.0 MHz	-	23.32	-
B	LTE + NR: QPSK	10.0+10.0+10.0 MHz	-	23.26	-
Total			-	26.30	27.40
A	LTE + NR: QPSK	15.0+15.0+15.0 MHz	-	23.49	-
B	LTE + NR: QPSK	15.0+15.0+15.0 MHz	-	23.44	-
Total			-	26.48	27.58
A	LTE + NR: QPSK	20.0+20.0+20.0 MHz	-	23.45	-
B	LTE + NR: QPSK	20.0+20.0+20.0 MHz	-	23.27	-
Total			-	26.37	27.47

Remarks

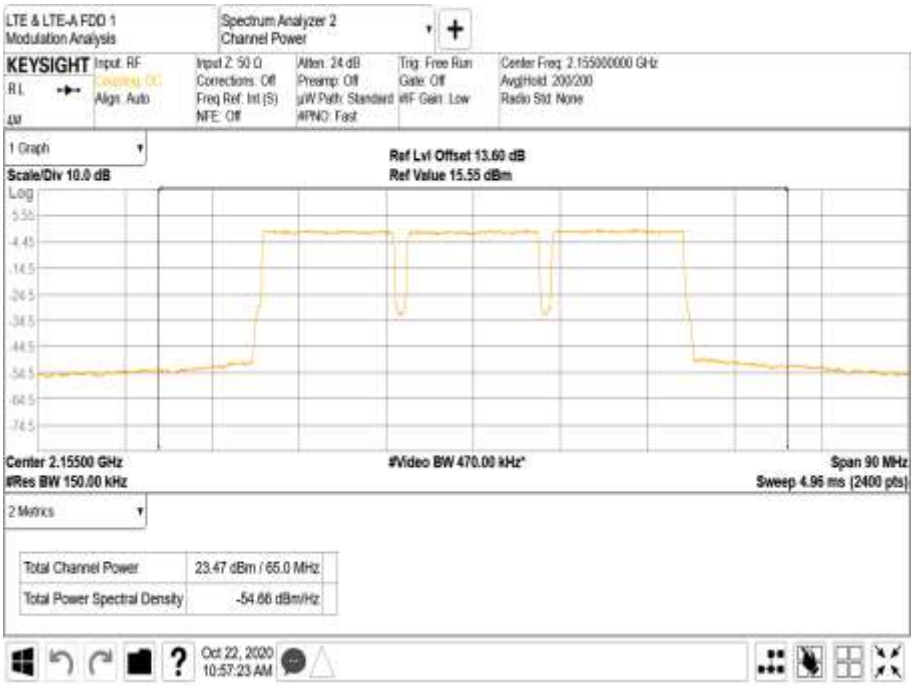
1. Three carrier transmitter performance is presented.
2. The plot results represent typical radio performance across all channels.
3. The highest power transmitter configuration is presented for compliance.
4. Plot data performance for all transmitter ports and channels are available on request.

Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position M

Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 10.0+10.0+10.0 MHz - Channel Position M



Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 15.0+15.0+15.0 MHz - Channel Position M

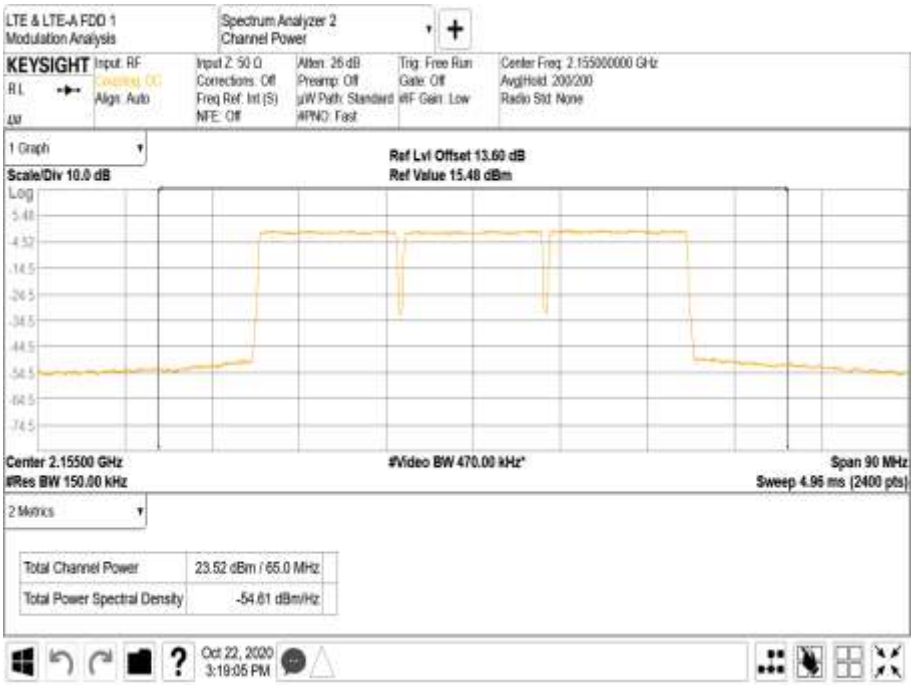


Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 20.0+20.0+20.0 MHz - Channel Position M

Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position M

Antenna A - Modulation NR: QPSK - Carrier Bandwidth 10.0+10.0+10.0 MHz - Channel Position M

Antenna A - Modulation NR: QPSK - Carrier Bandwidth 15.0+15.0+15.0 MHz - Channel Position M

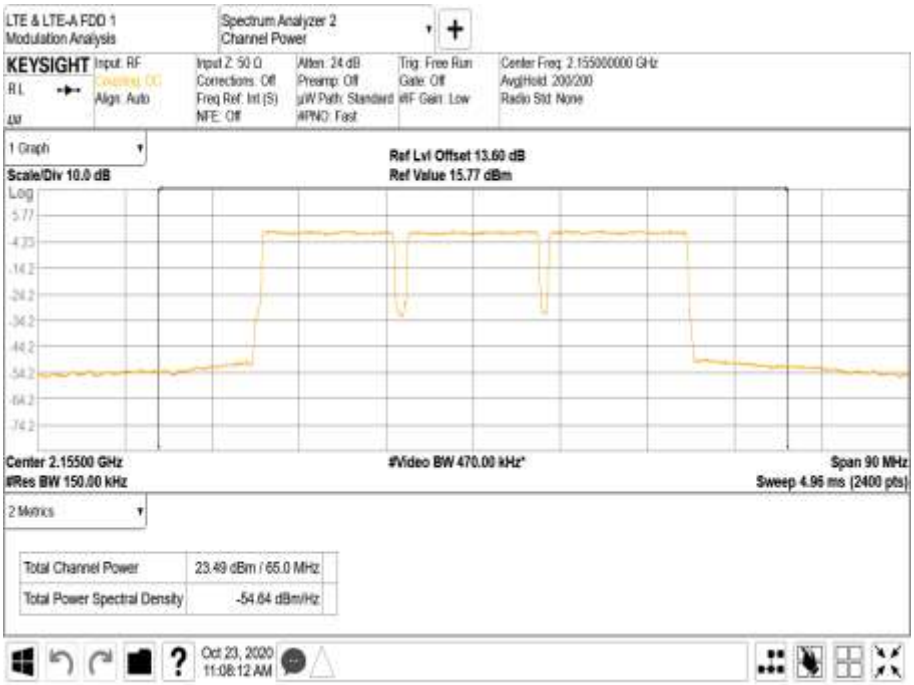


Antenna A - Modulation NR: QPSK - Carrier Bandwidth 20.0+20.0+20.0 MHz - Channel Position M

Antenna A - Modulation LTE+NR: QPSK - Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position M

Antenna A - Modulation LTE+NR: QPSK - Carrier Bandwidth 10.0+10.0+10.0 MHz - Channel Position M

Antenna A - Modulation LTE+NR: QPSK - Carrier Bandwidth 15.0+15.0+15.0 MHz - Channel Position M



Antenna A - Modulation LTE+NR: QPSK - Carrier Bandwidth 20.0+20.0+20.0 MHz - Channel Position M

Configuration C

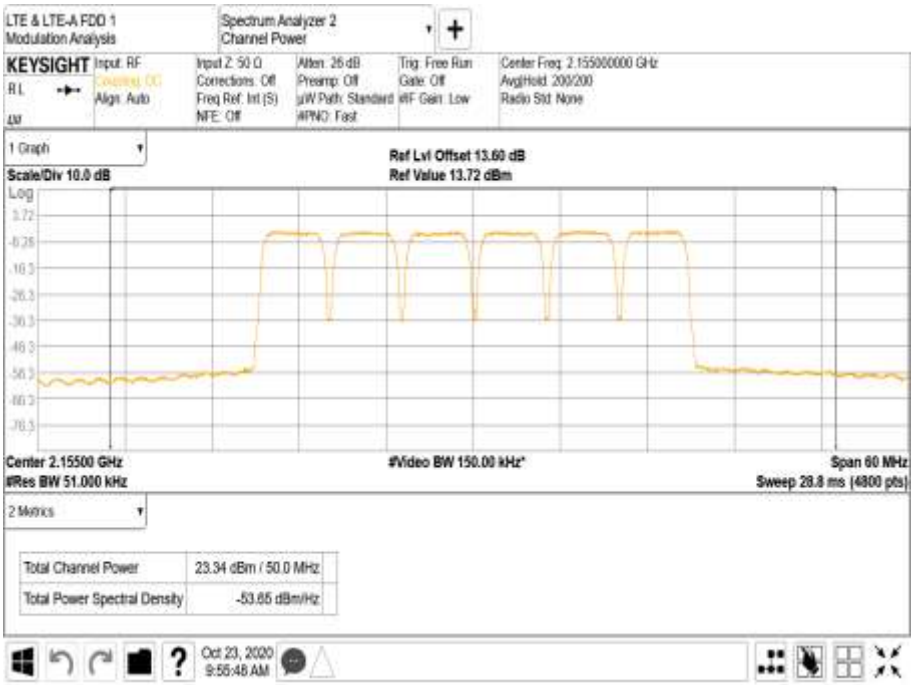
Maximum Output Power 23 dBm

Antenna	Modulation	Carrier Bandwidth	Peak to Average Ratio (PAR) / Output Power		
			Channel Position M		
			PAR (dB)	Average Power	
				dBm	EIRP
A	WCDMA: QPSK	5.0+5.0+5.0+5.0+5.0+5.0 MHz	-	23.34	-
B	WCDMA: QPSK	5.0+5.0+5.0+5.0+5.0+5.0 MHz	-	23.37	-
Total			-	26.37	27.47
A	LTE + WCDMA: QPSK	5.0+5.0+5.0+5.0+5.0+5.0 MHz	-	23.47	-
B	LTE + WCDMA: QPSK	5.0+5.0+5.0+5.0+5.0+5.0 MHz	-	23.42	-
Total			-	26.46	27.56
A	LTE + WCDMA: QPSK	10.0+10.0+10.0+5.0+5.0+5.0 MHz	-	23.48	-
B	LTE + WCDMA: QPSK	10.0+10.0+10.0+5.0+5.0+5.0 MHz	-	23.34	-
Total			-	26.42	27.52

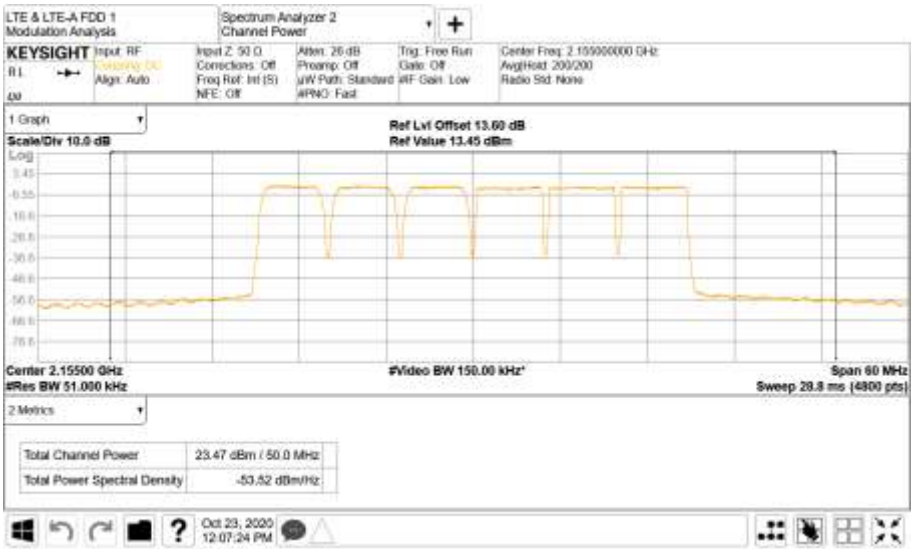
Remarks

1. Six carrier transmitter performance is presented.
2. The plot results represent typical radio performance across all channels.
3. The highest power transmitter configuration is presented for compliance.
4. Plot data performance for all transmitter ports and channels are available on request.

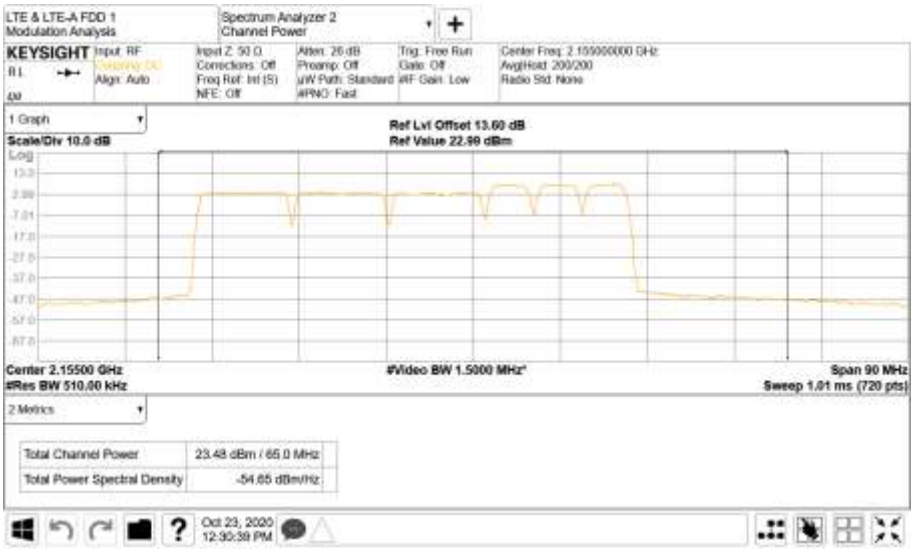
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0+5.0+5.0+5.0+5.0+5.0 MHz - Channel Position M



Antenna A - Modulation LTE+WCDMA: QPSK - Carrier Bandwidth 5.0+5.0+5.0+5.0+5.0+5.0 MHz - Channel Position M



Antenna A - Modulation LTE + WCDMA: QPSK - Carrier Bandwidth 10.0+10.0+10.0+5.0+5.0+5.0 MHz - Channel Position M



Limit	
Peak Power	≤ 1640 W/MHz or ≤+62.15 dBm RSS-139 1710-1780 MHz ≤ 1W RSS-139 2110-2180MHz ≤ 1640 W/MHz or ≤+62.15 dBm RSS-170 ≤ 2W, ATC Equipment.
Peak to Average Ratio	13 dB

The radio unit was tested with maximum output power and without an antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/ISED Bureau(s). Licensees are required to take into account maximum allowed antenna gain used in combination with the above power settings to prevent the radiated output power exceeding the limits.

2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 27, Clause 27.53
ISED RSS-GEN, Clause 6.6

2.2.2 Date of Test and Modification State

20 October 2020 - Modification State 0

2.2.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.4 Environmental Conditions

Ambient Temperature	24.1°C
Relative Humidity	33.4%

2.2.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

2.2.6 Test Results

Configuration A

Maximum Output Power 23 dBm

Modulation	Carrier Bandwidth	Result (MHz)	
		Channel Bandwidth	
		Occupied Bandwidth	-26 dB Bandwidth
LTE: QPSK	LTE: 5.0 MHz	4.48	4.72
LTE: QPSK	LTE: 10.0 MHz	9.17	9.47
LTE: QPSK	LTE: 15.0 MHz	13.40	13.99
LTE: QPSK	LTE: 20.0 MHz	17.85	18.62
NR: QPSK	NR: 5.0 MHz	4.46	4.72
NR: QPSK	NR: 10.0 MHz	9.28	9.65
NR: QPSK	NR: 15.0 MHz	14.10	14.61
NR: QPSK	NR: 20.0 MHz	19.28	20.12
WCDMA: QPSK	LTE: 5.0 MHz	4.17	4.66

Remarks

Representative occupied bandwidth performance results presented. Plot data performance for all transmitter ports and channel positions are on file and available on request.

2.3 BAND EDGE

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 27, Clause 27.53 (h)
Industry Canada RSS-139, Clause 6.5
Industry Canada RSS-170, Clause 5.4

2.3.2 Date of Test and Modification State

21 and 22 October 2020 - Modification State 0

2.3.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.4 Environmental Conditions

Ambient Temperature	°C
Relative Humidity	33.0 - 33.6%

2.3.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

Each of the 2 bands of the EUT has 2 transmit ports, therefore, the test limits used were calculated on a worst-case basis accounting for an effective 2 port MIMO configuration. Testing was performed on this port with a test limit of 43+10log(P) - 10log (2) = -16 dBm

2.3.6 Test Results

Configuration A

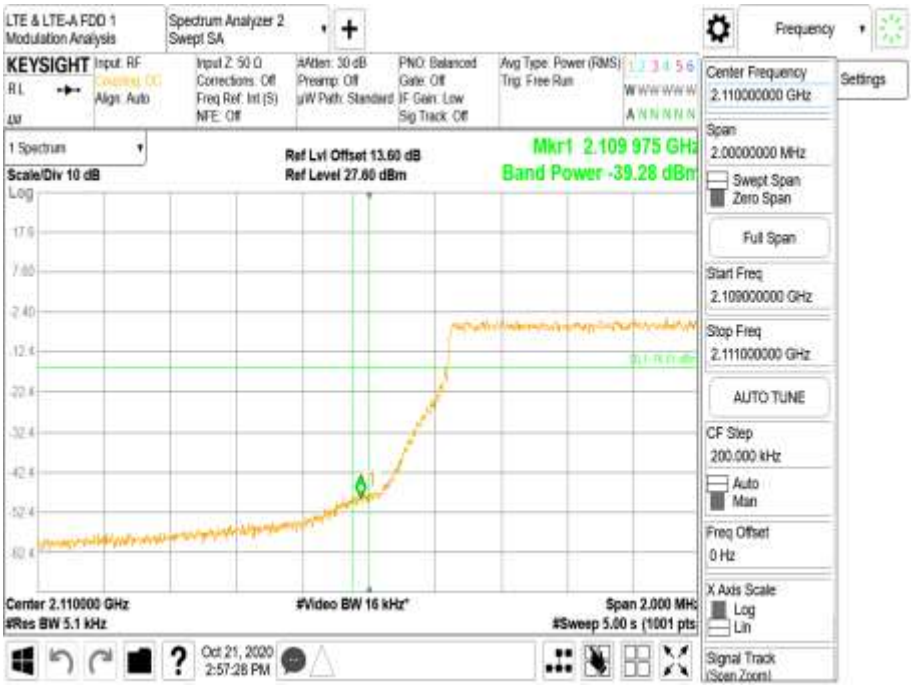
Maximum Output Power 23 dBm

Modulation	Carrier Bandwidth	Band Edge (MHz)	
		Channel Position B	Channel Position T
LTE: QPSK	LTE: 5.0 MHz	2,112.5	2,197.5
LTE: QPSK	LTE: 10.0 MHz	2,115.0	2,195.0
LTE: QPSK	LTE: 15.0 MHz	2,117.5	2,192.5
LTE: QPSK	LTE: 20.0 MHz	2,120.0	2,190.0
NR: QPSK	NR: 5.0 MHz	2,112.5	2,197.5
NR: QPSK	NR: 10.0 MHz	2,115.0	2,195.0
NR: QPSK	NR: 15.0 MHz	2,117.5	2,192.5
NR: QPSK	NR: 20.0 MHz	2,120.0	2,190.0
WCDMA: QPSK	WCDMA: 5.0 MHz	2,112.5	2,197.5

Remarks

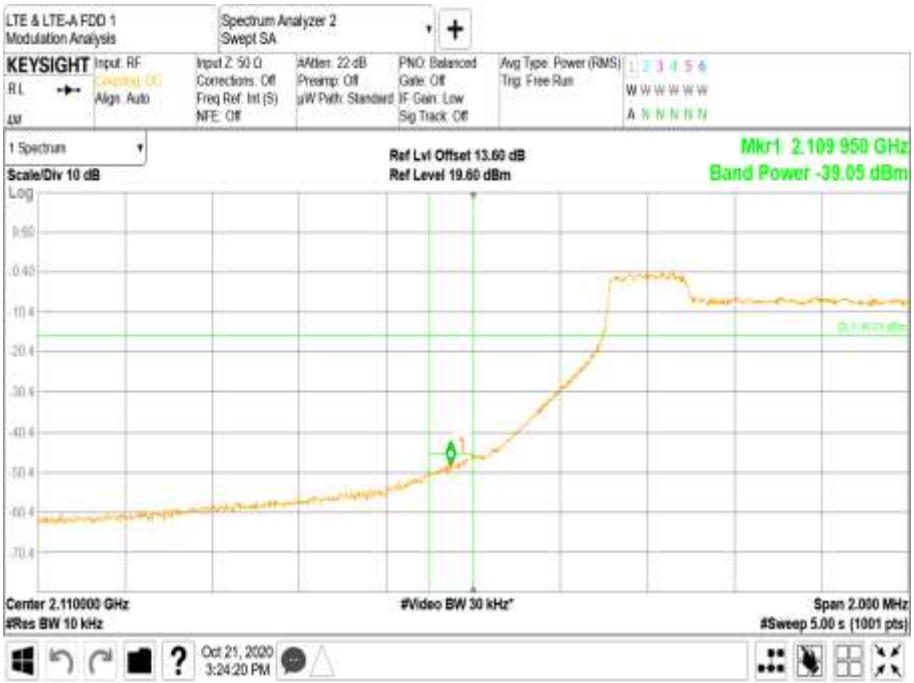
1. Band edge data was captured from the transmit port with maximum measured power. 2. Worst case band edge data presented.

Modulation LTE: QPSK - Carrier Bandwidth LTE: 5.0 MHz - Channel Position B

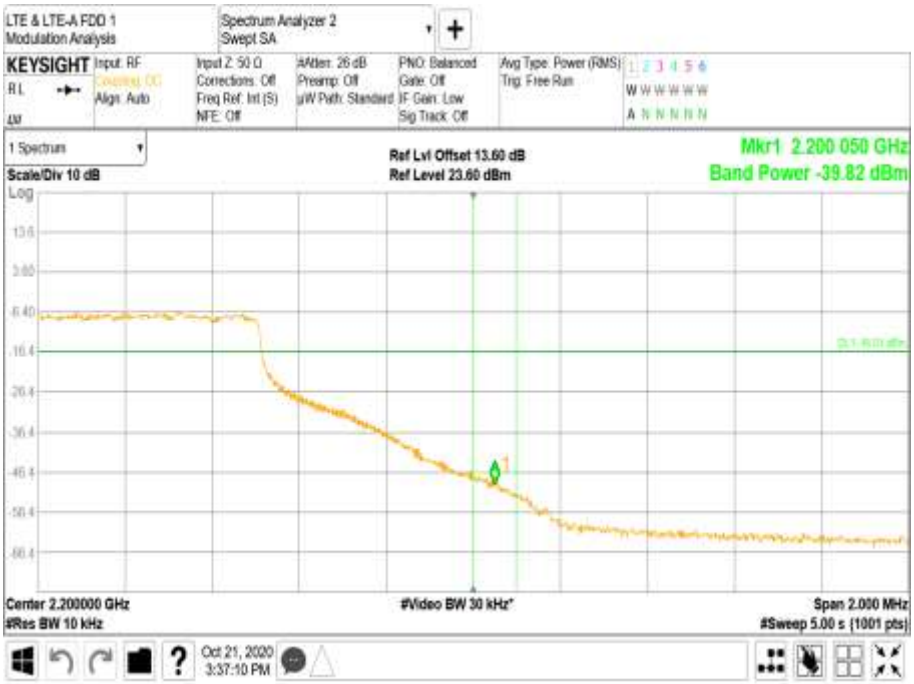


Modulation LTE: QPSK - Carrier Bandwidth LTE: 5.0 MHz - Channel Position T

Modulation LTE: QPSK - Carrier Bandwidth LTE: 10.0 MHz - Channel Position B

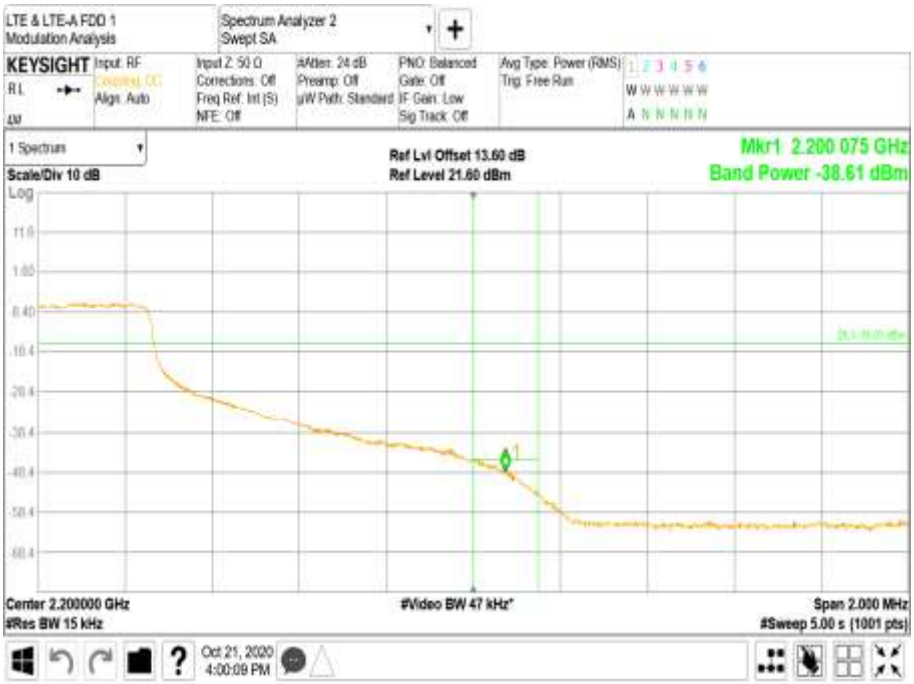


Modulation LTE: QPSK - Carrier Bandwidth LTE: 10.0 MHz - Channel Position T

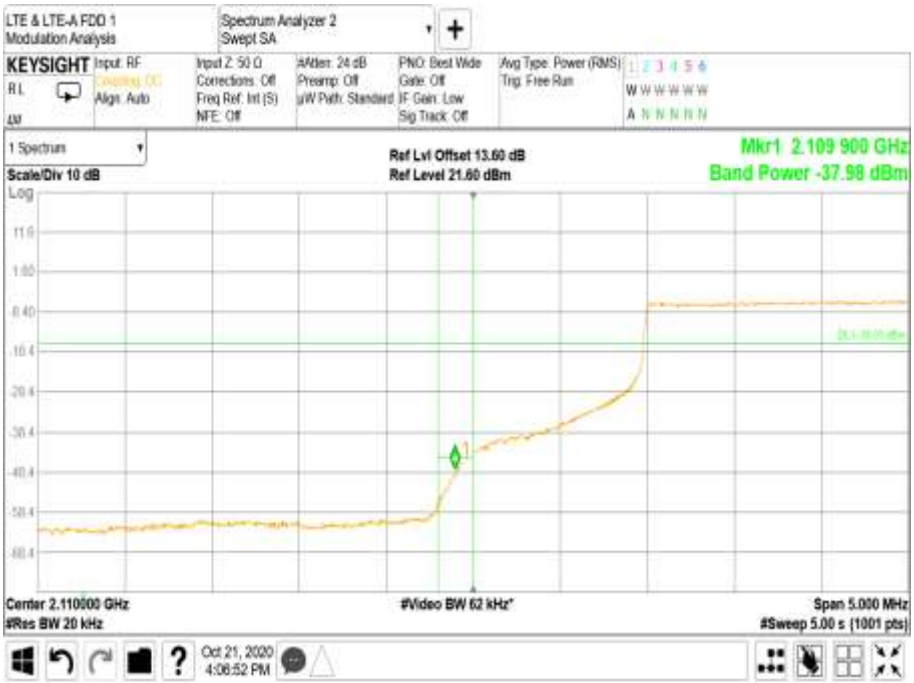


Modulation LTE: QPSK - Carrier Bandwidth LTE: 15.0 MHz - Channel Position B

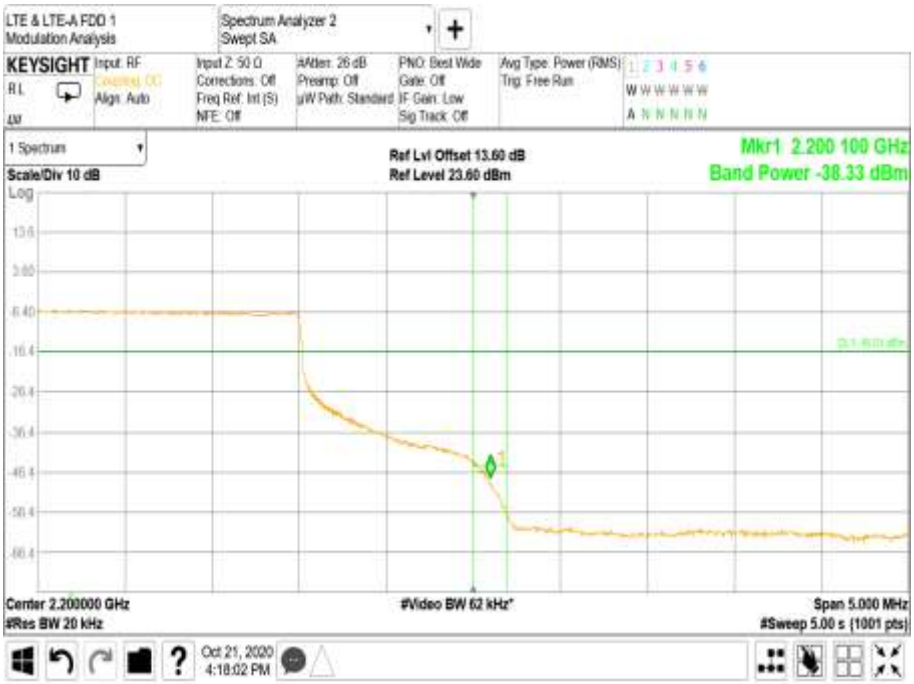
Modulation LTE: QPSK - Carrier Bandwidth LTE: 15.0 MHz - Channel Position T



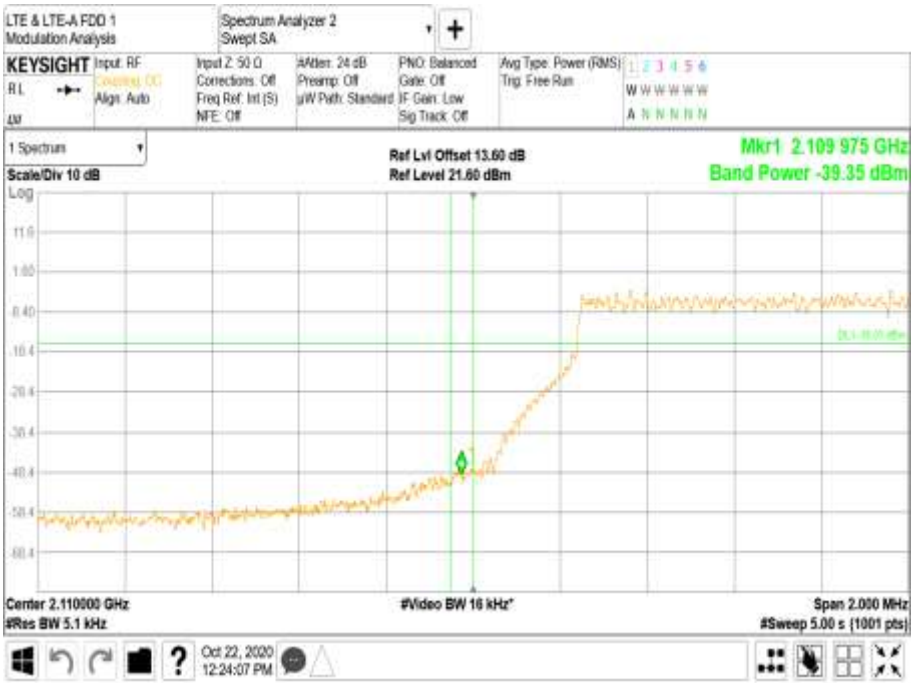
Modulation LTE: QPSK - Carrier Bandwidth LTE: 20.0 MHz - Channel Position B



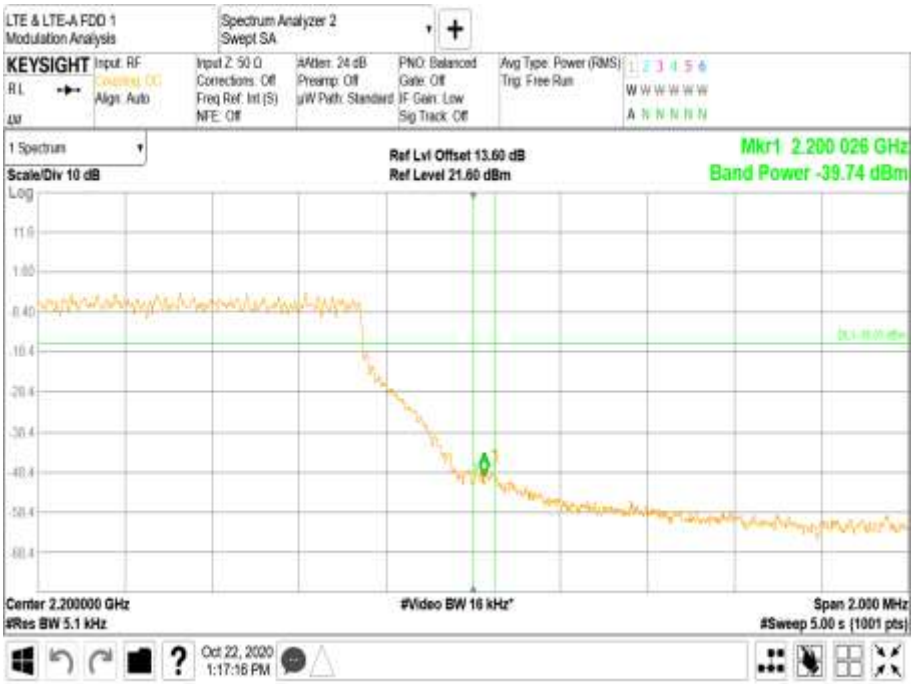
Modulation LTE: QPSK - Carrier Bandwidth LTE: 20.0 MHz - Channel Position T



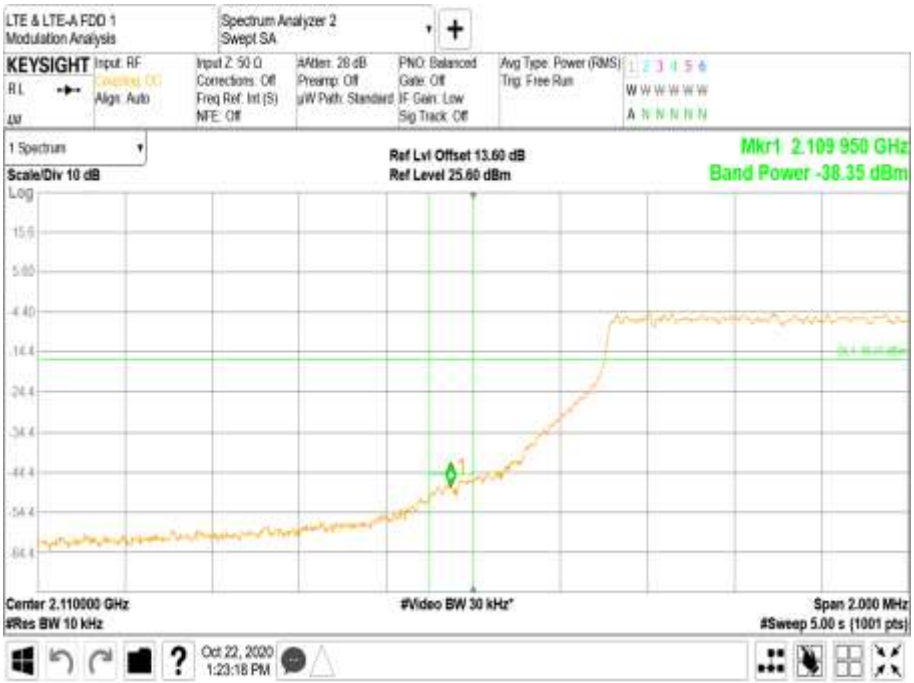
Modulation NR: QPSK - Carrier Bandwidth NR: 5.0 MHz - Channel Position B



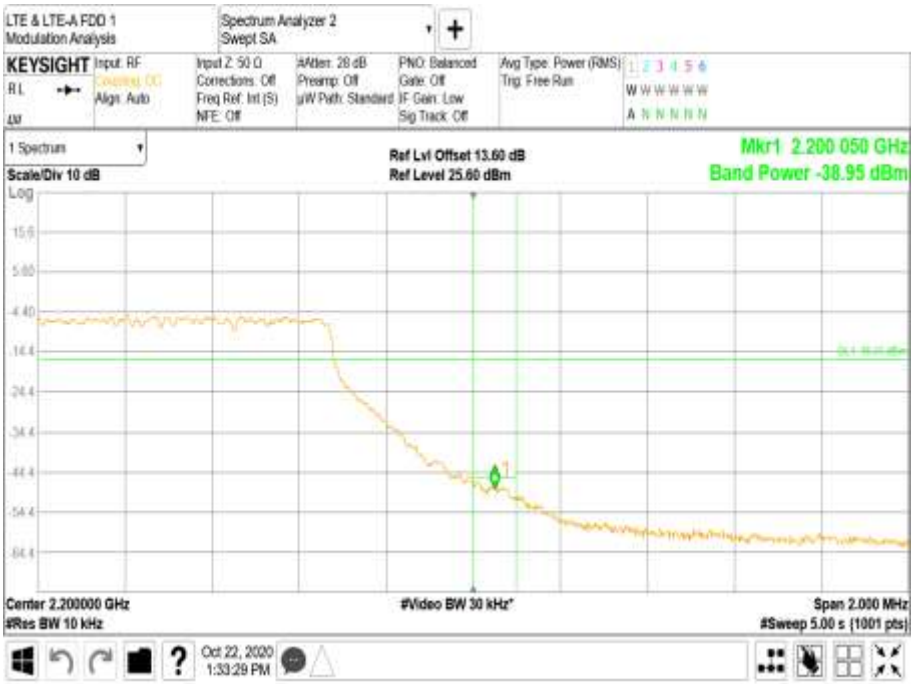
Modulation NR: QPSK - Carrier Bandwidth NR: 5.0 MHz - Channel Position T



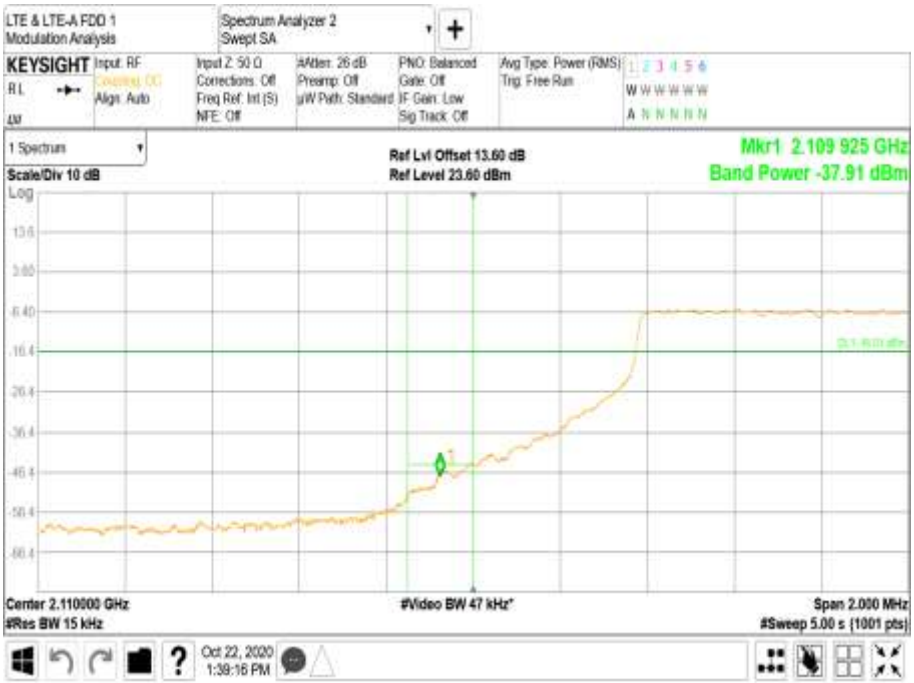
Modulation NR: QPSK - Carrier Bandwidth NR: 10.0 MHz - Channel Position B



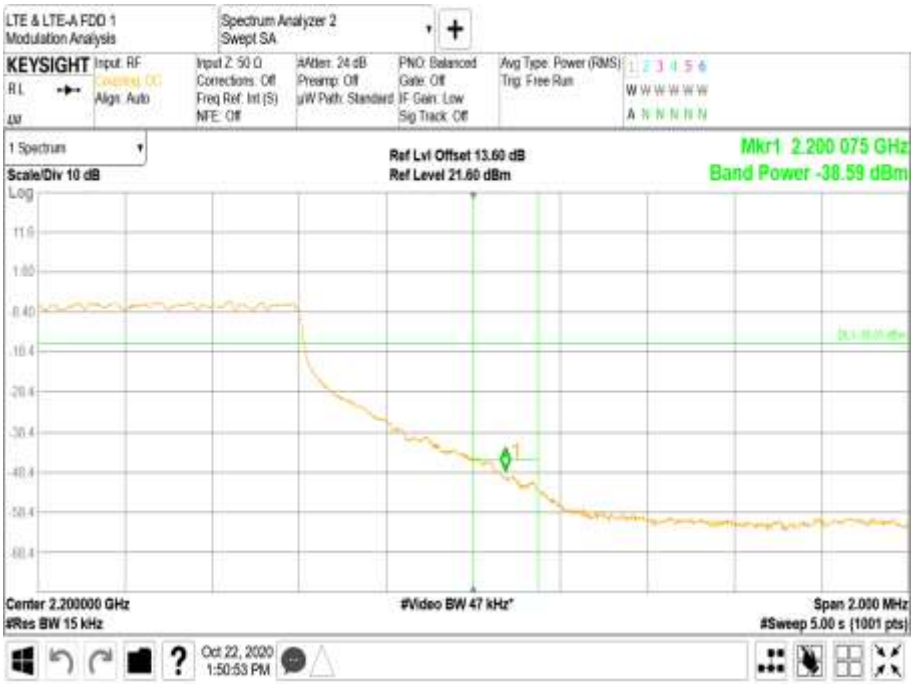
Modulation NR: QPSK - Carrier Bandwidth NR: 10.0 MHz - Channel Position T



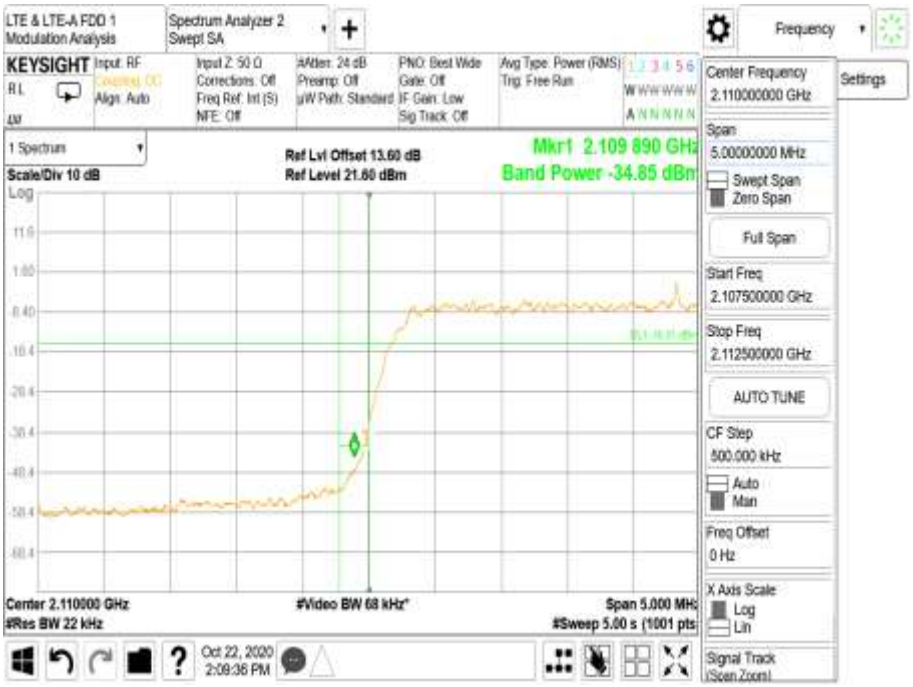
Modulation NR: QPSK - Carrier Bandwidth NR: 15.0 MHz - Channel Position B



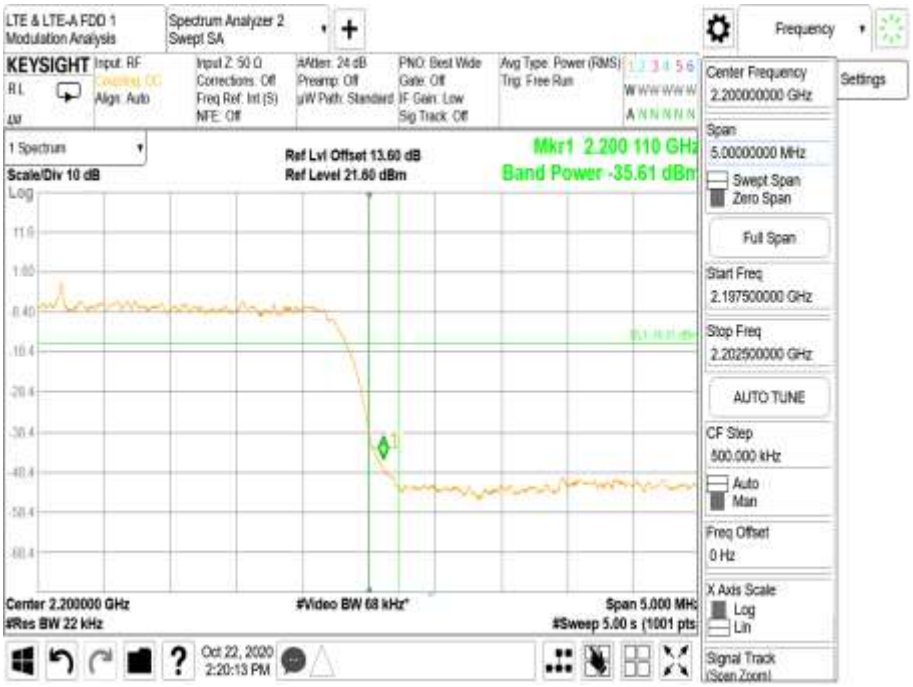
Modulation NR: QPSK - Carrier Bandwidth NR: 15.0 MHz - Channel Position T



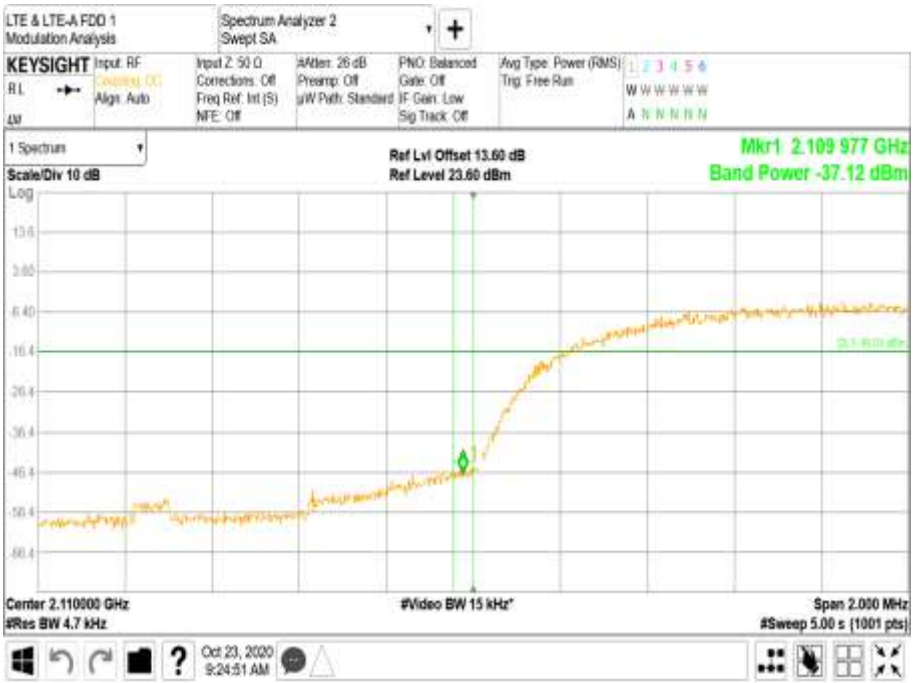
Modulation NR: QPSK - Carrier Bandwidth NR: 20.0 MHz - Channel Position B



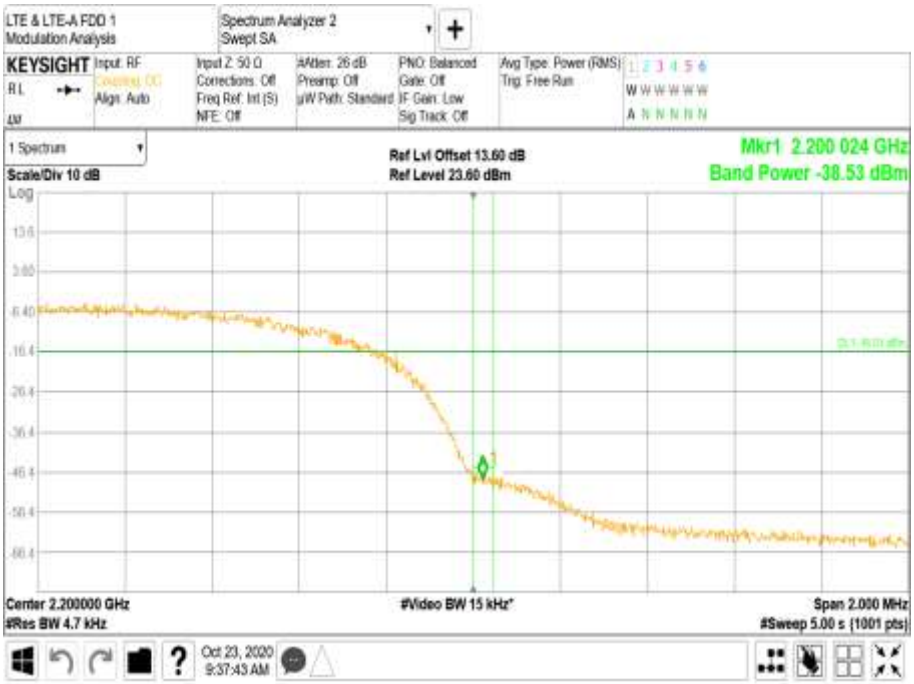
Modulation NR: QPSK - Carrier Bandwidth NR: 20.0 MHz - Channel Position T



Modulation WCDMA: QPSK - Carrier Bandwidth WCDMA: 5.0 MHz - Channel Position B



Modulation WCDMA: QPSK - Carrier Bandwidth WCDMA: 5.0 MHz - Channel Position T



Configuration B

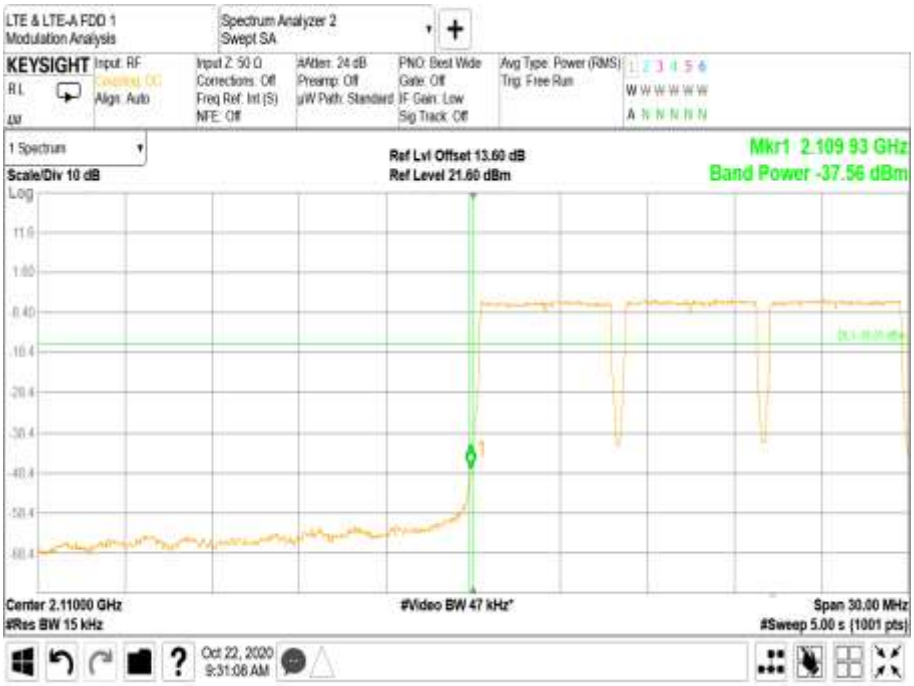
Maximum Output Power 22 dBm

Antenna	Modulation	Carrier Bandwidth	Band Edge (MHz)	
			Channel Position B	Channel Position T
A	LTE: QPSK	5.0+5.0+5.0 MHz	2112.5+2117.5+2122.5	2187.5+2192.5+2197.5
A	LTE: QPSK	10.0+10.0+10.0 MHz	2115.0+2125.0+2135.0	2175.0+2185.0+2195.0
A	LTE: QPSK	15.0+15.0+15.0 MHz	2117.5+2132.5+2147.5	2162.5+2177.5+2192.5
A	LTE: QPSK	20.0+20.0+20.0 MHz	2120.0+2140.0+2160.0	2150.0+21670.0+2190.0
A	NR: QPSK	5.0+5.0+5.0 MHz	2112.5+2117.5+2122.5	2187.5+2192.5+2197.5
A	NR: QPSK	10.0+10.0+10.0 MHz	2115.0+2125.0+2135.0	2175.0+2185.0+2195.0
A	NR: QPSK	15.0+15.0+15.0 MHz	2117.5+2132.5+2147.5	2162.5+2177.5+2192.5
A	NR: QPSK	20.0+20.0+20.0 MHz	2120.0+2140.0+2160.0	2150.0+21670.0+2190.0
A	LTE + NR QPSK	5.0+5.0+5.0 MHz	2112.5+2117.5+2122.5	2187.5+2192.5+2197.5
A	LTE + NR QPSK	10.0+10.0+10.0 MHz	2115.0+2125.0+2135.0	2175.0+2185.0+2195.0
A	LTE + NR QPSK	15.0+15.0+15.0 MHz	2117.5+2132.5+2147.5	2162.5+2177.5+2192.5
A	LTE + NR QPSK	20.0+20.0+20.0 MHz	2120.0+2140.0+2160.0	2150.0+21670.0+2190.0

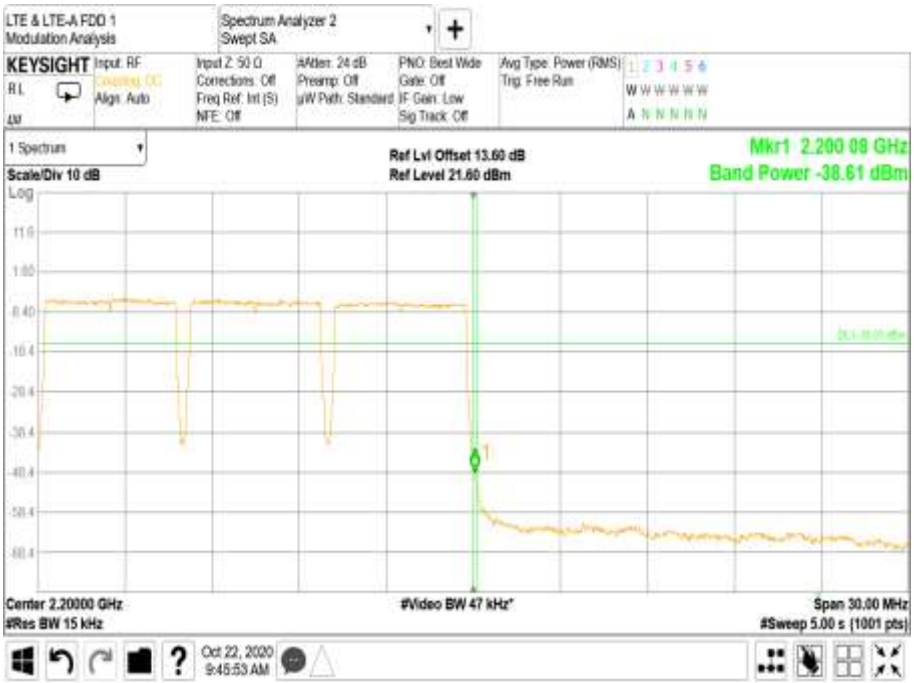
Remarks

Three carrier transmitter performance is presented. The plot results represent typical radio performance. Plot data performance for all transmitter ports and channels are on file and available on request.

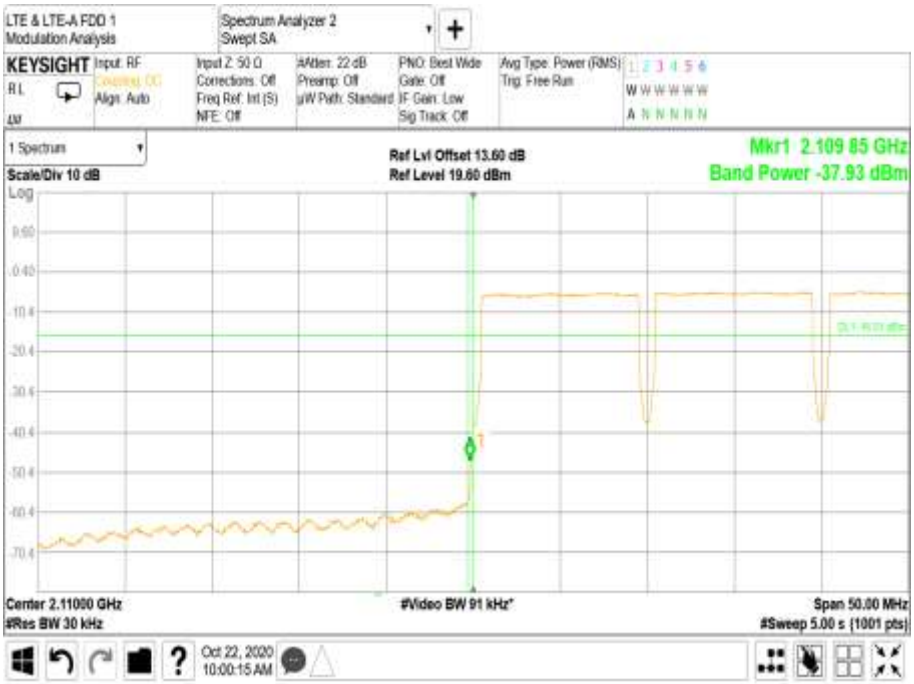
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position B



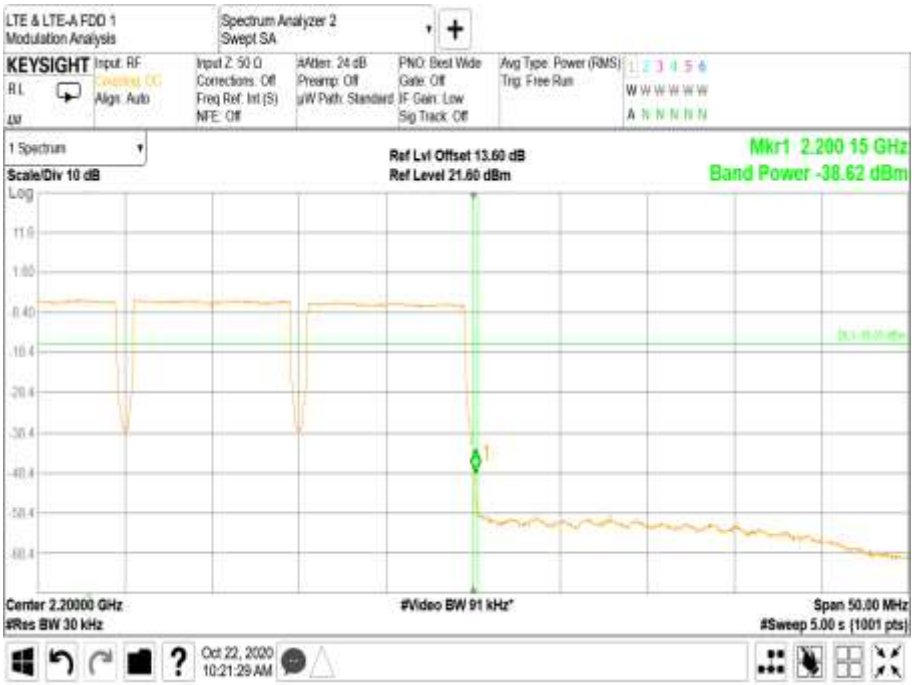
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position T



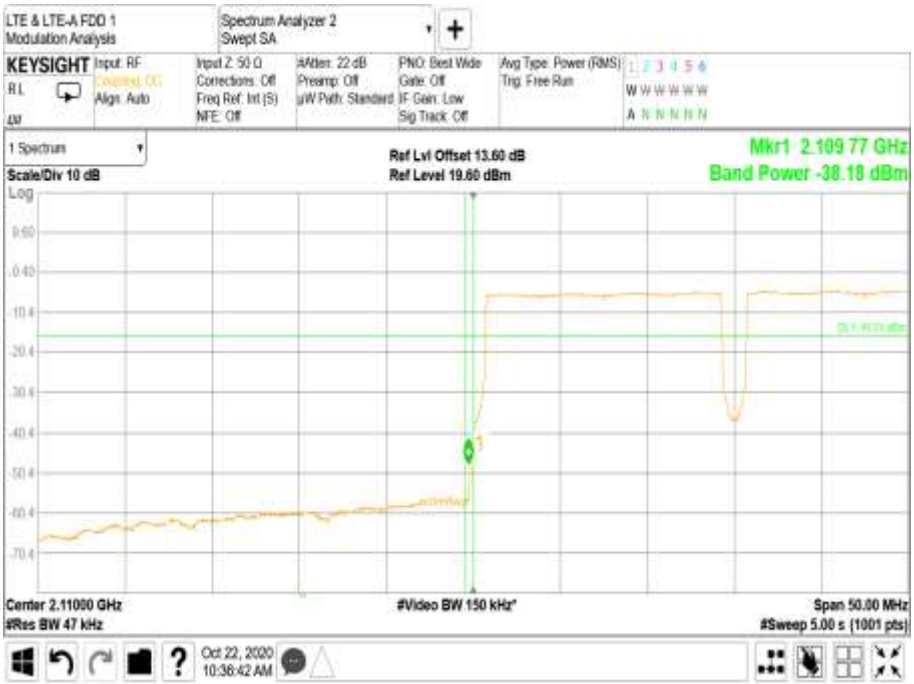
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 10.0+10.0+10.0 MHz - Channel Position B



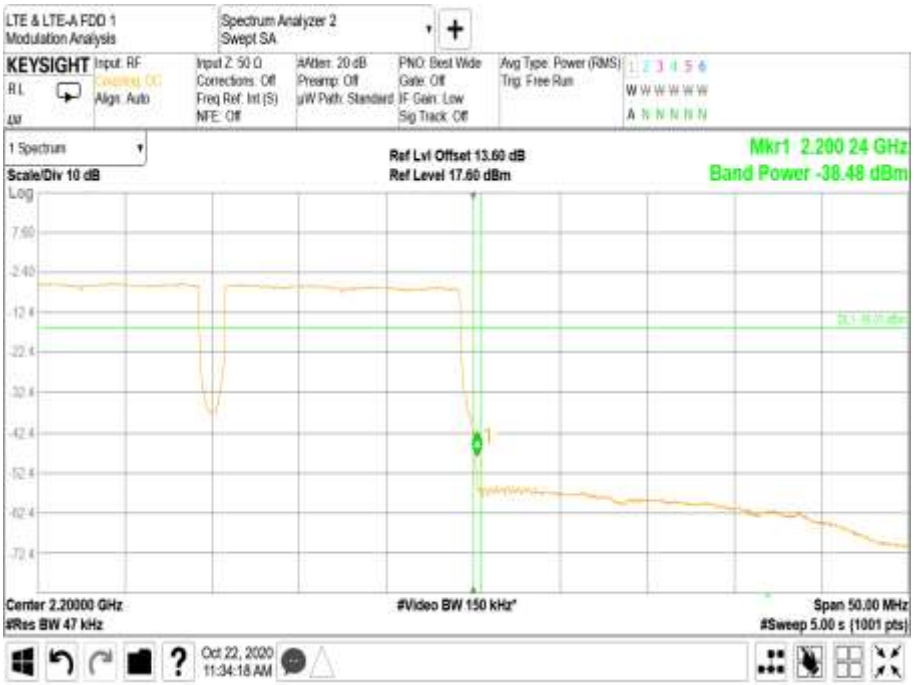
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 10.0+10.0+10.0 MHz - Channel Position T



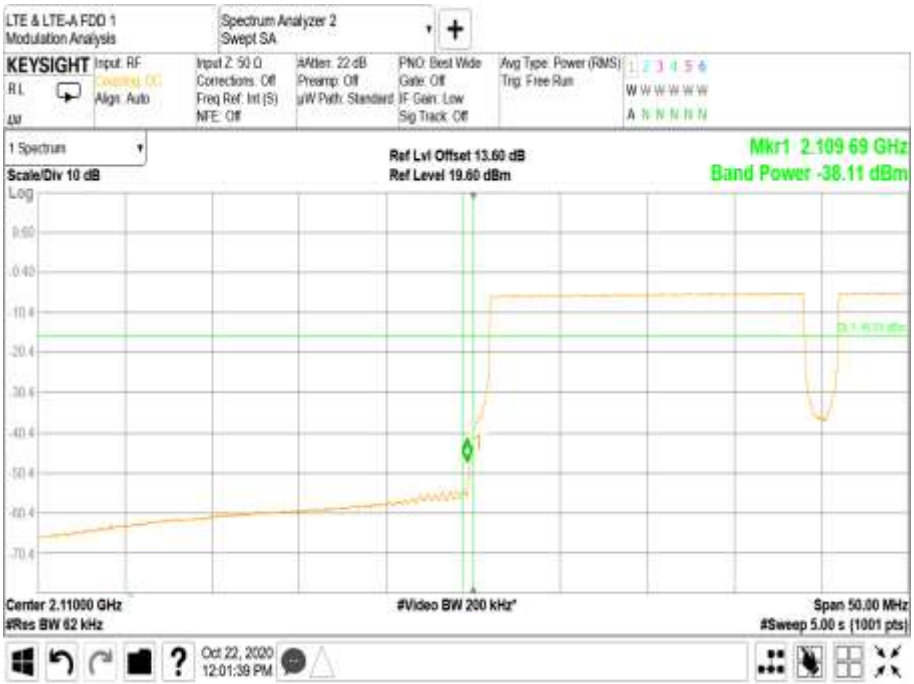
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 15.0+15.0+15.0 MHz - Channel Position B



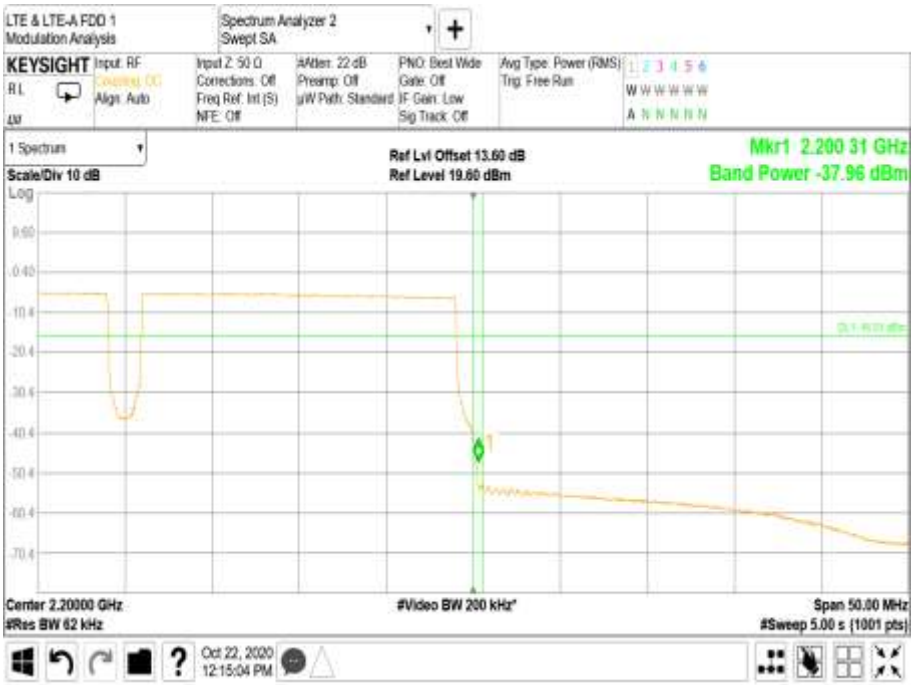
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 15.0+15.0+15.0 MHz - Channel Position T



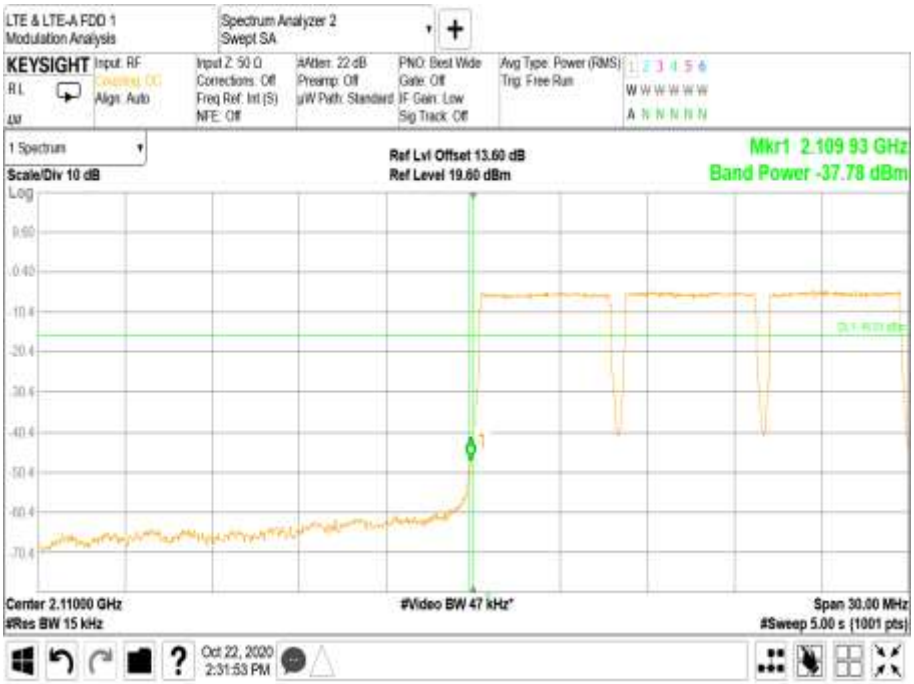
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 20.0+20.0+20.0 MHz - Channel Position B



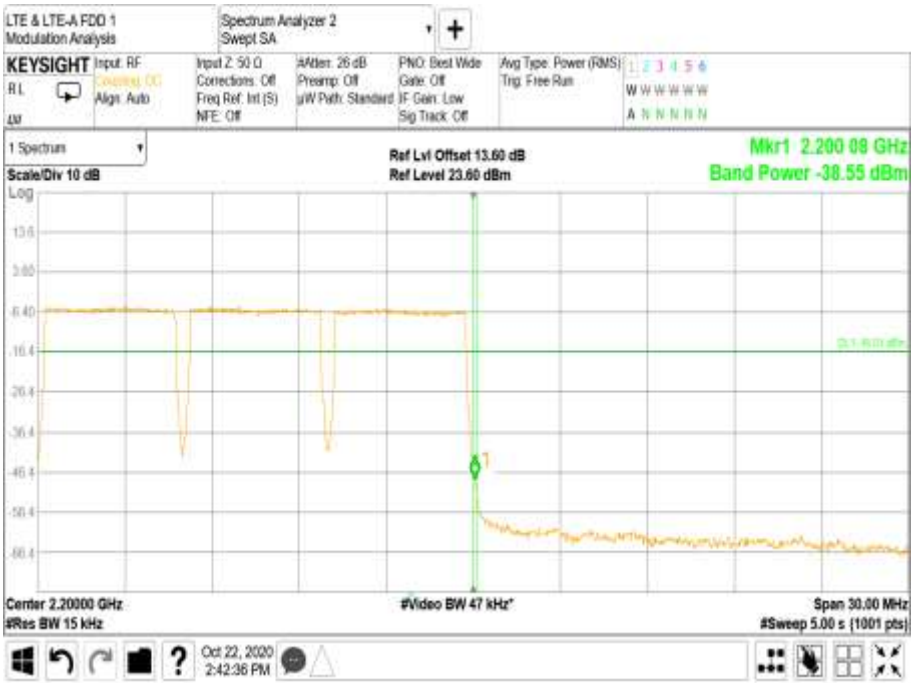
Antenna A - Modulation LTE: QPSK - Carrier Bandwidth 20.0+20.0+20.0 MHz - Channel Position T



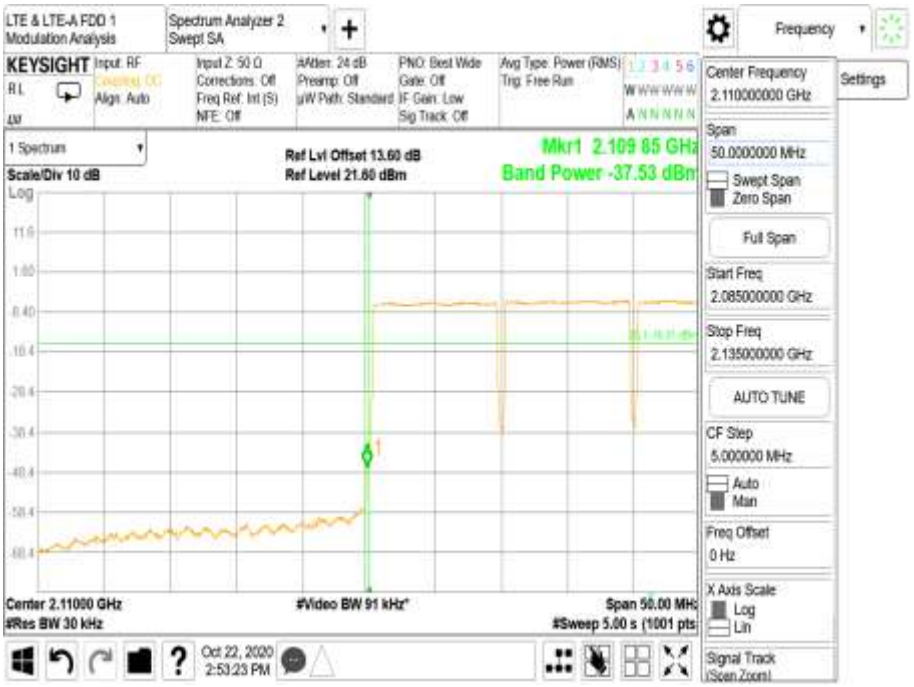
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position B



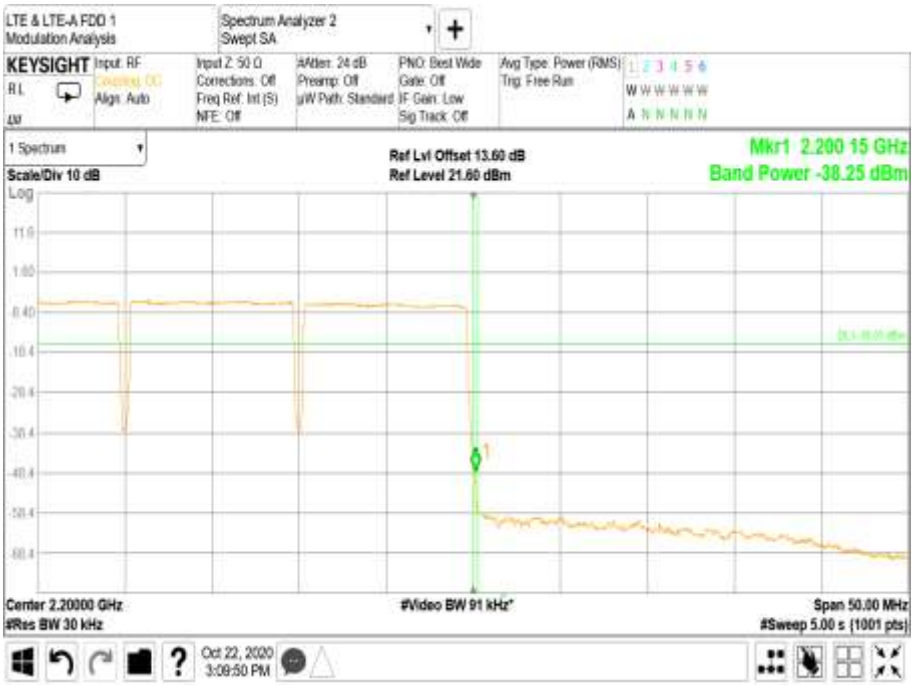
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position T



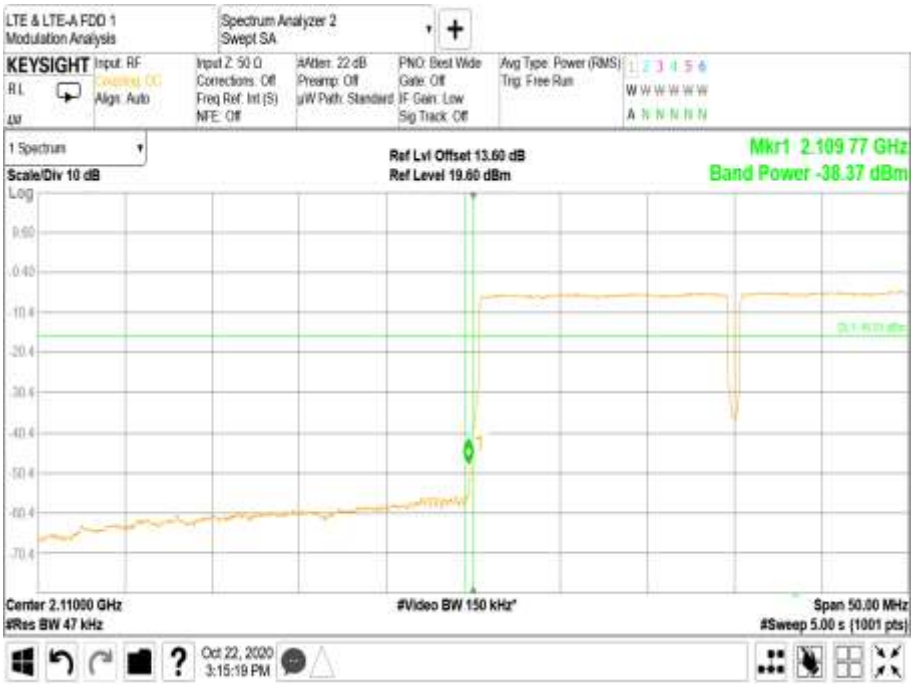
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 10.0+10.0+10.0 MHz - Channel Position B



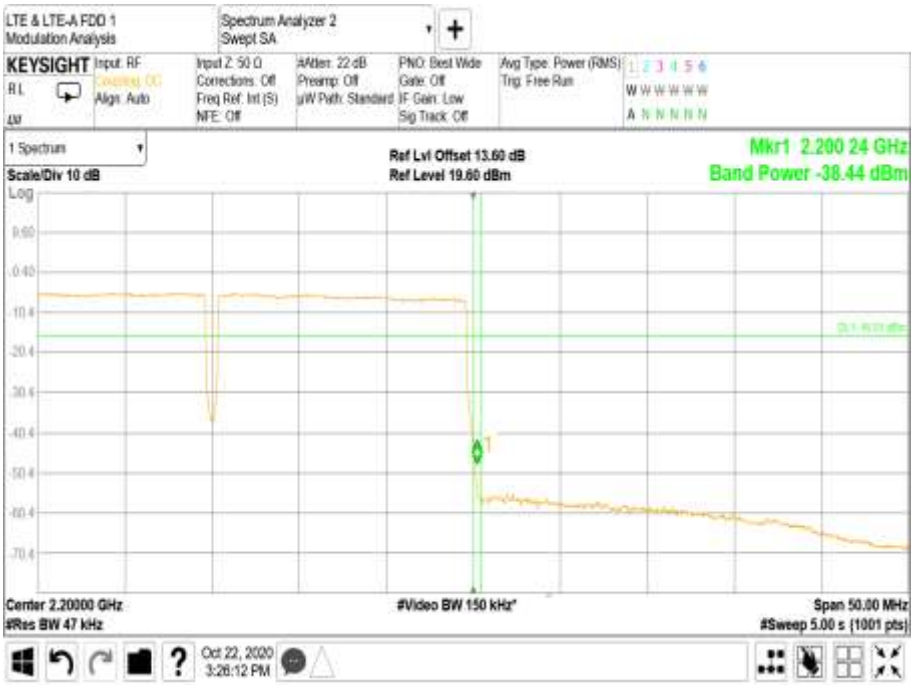
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 10.0+10.0+10.0 MHz - Channel Position T



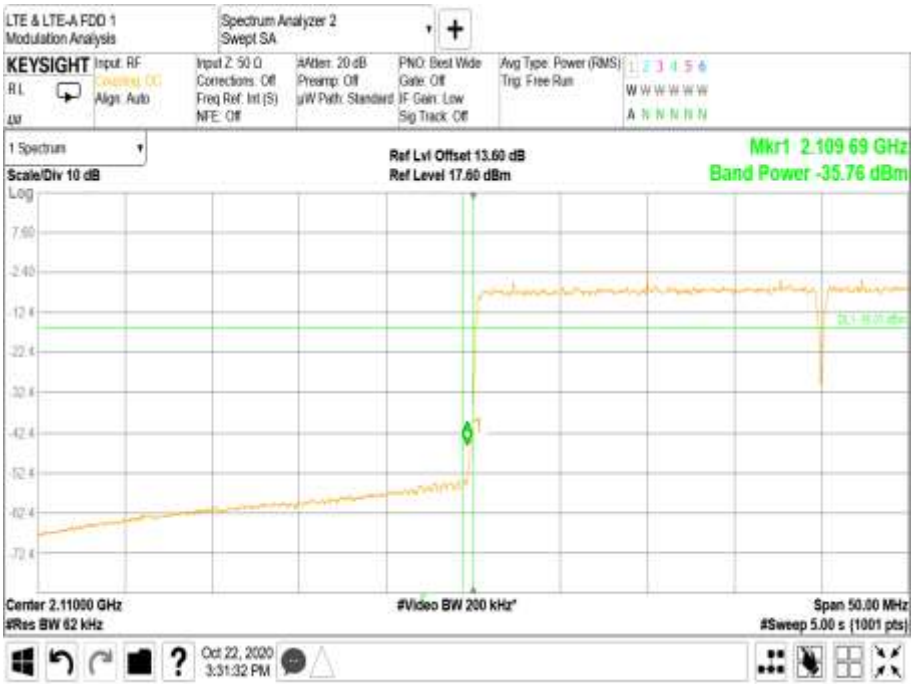
Antenna A - Modulation NR: QPSK - Carrier Bandwidth 15.0+15.0+15.0 MHz - Channel Position B



Antenna A - Modulation NR: QPSK - Carrier Bandwidth 15.0+15.0+15.0 MHz - Channel Position T

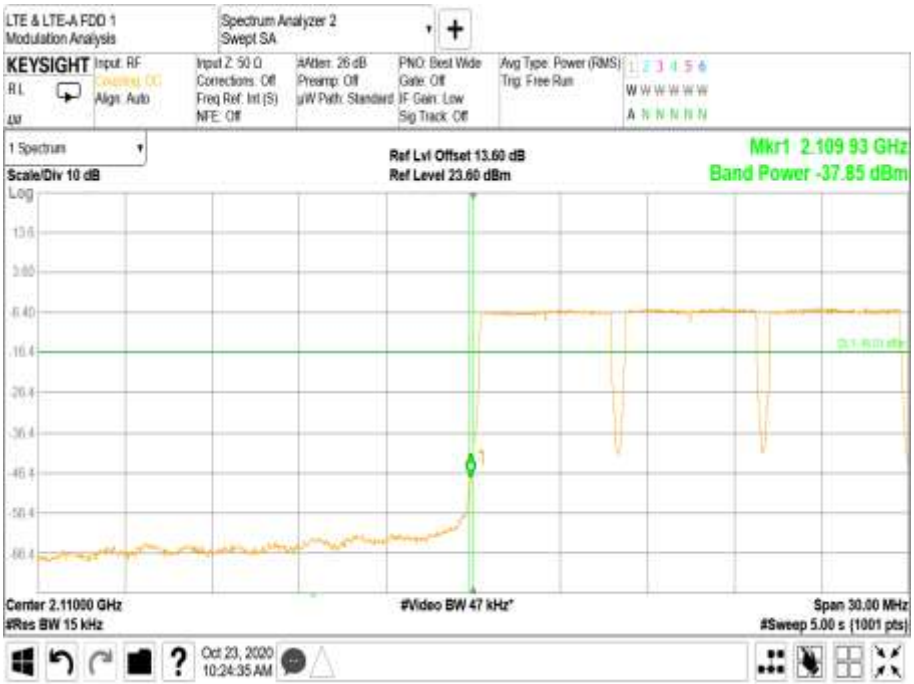


Antenna A - Modulation NR: QPSK - Carrier Bandwidth 20.0+20.0+20.0 MHz - Channel Position B

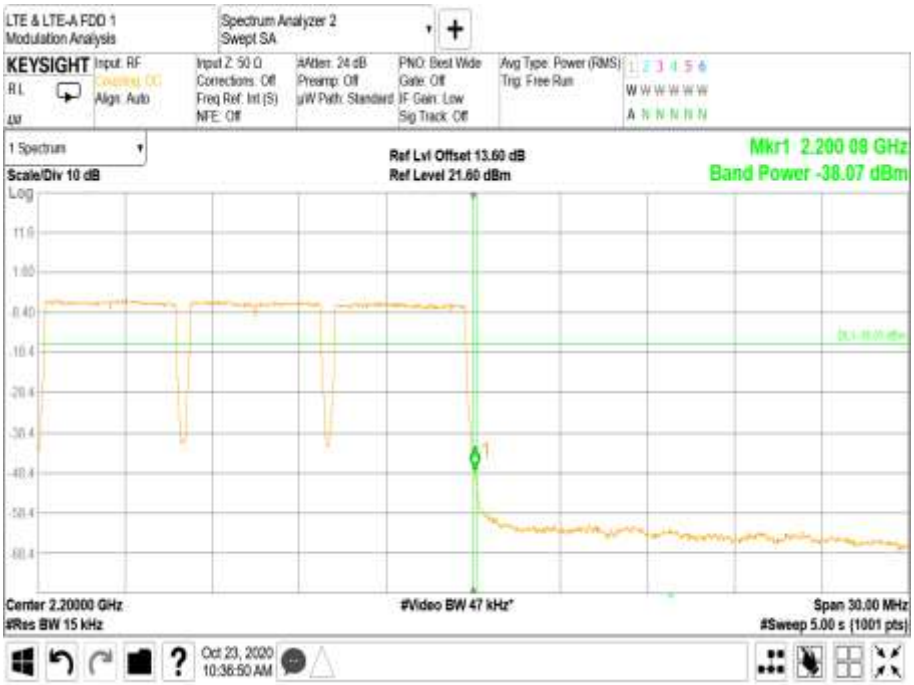


Antenna A - Modulation NR: QPSK - Carrier Bandwidth 20.0+20.0+20.0 MHz - Channel Position T

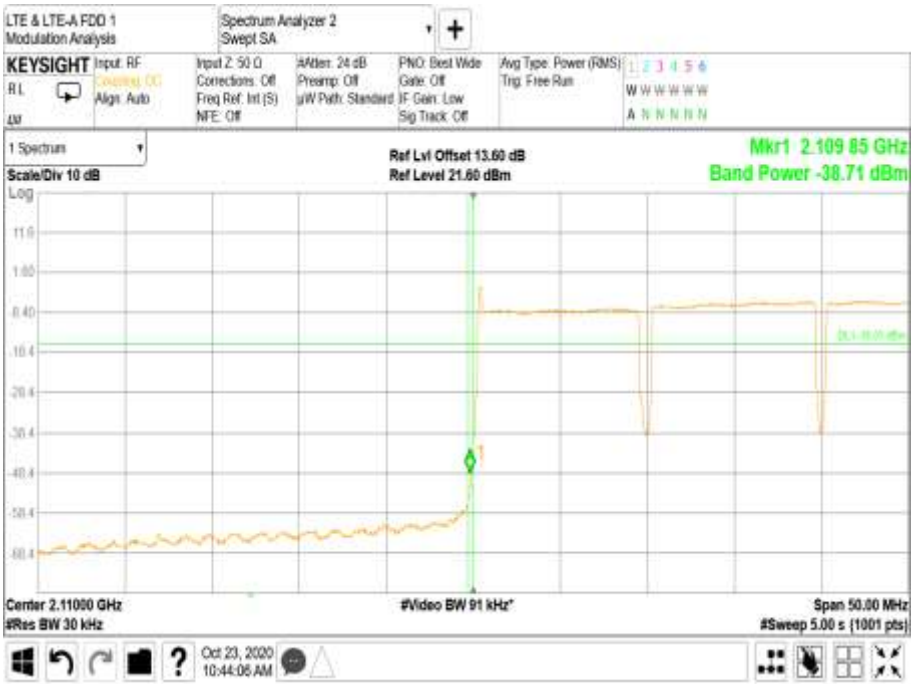
Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position B



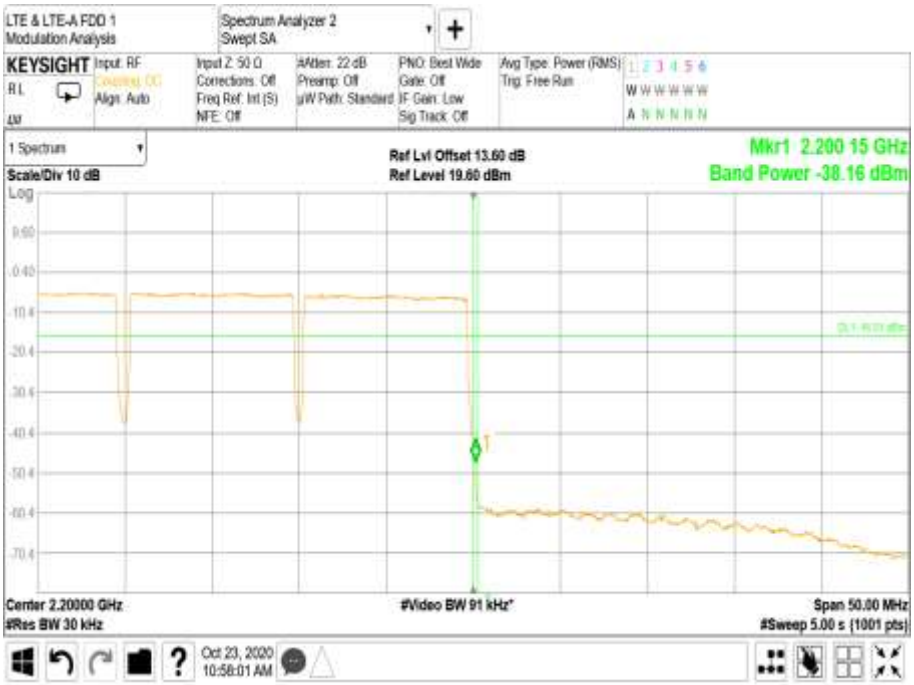
Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth 5.0+5.0+5.0 MHz - Channel Position T



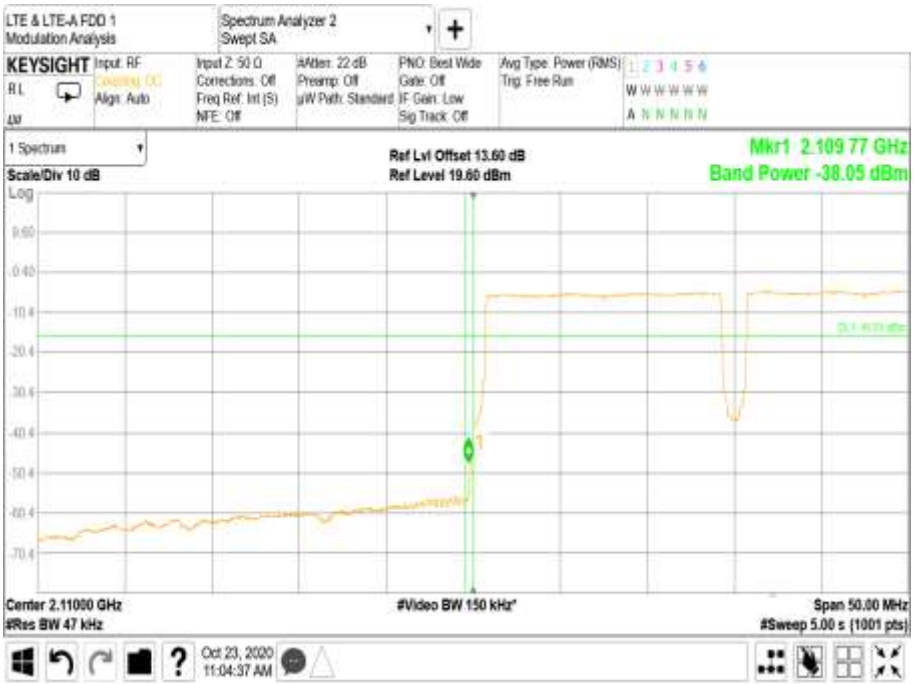
Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth 10.0+10.0+10.0 MHz - Channel Position B



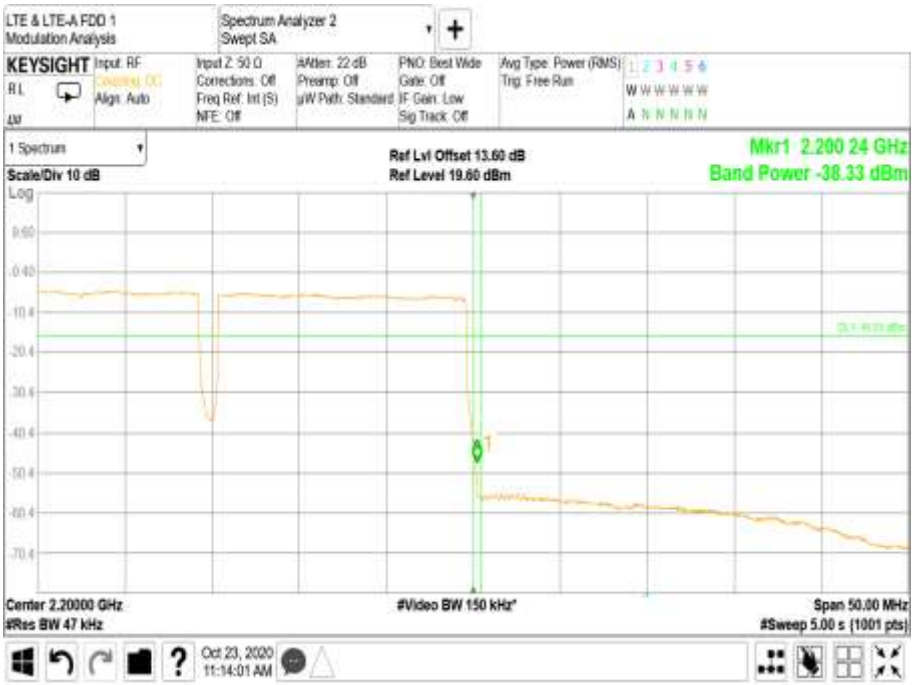
Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth 10.0+10.0+10.0 MHz - Channel Position T



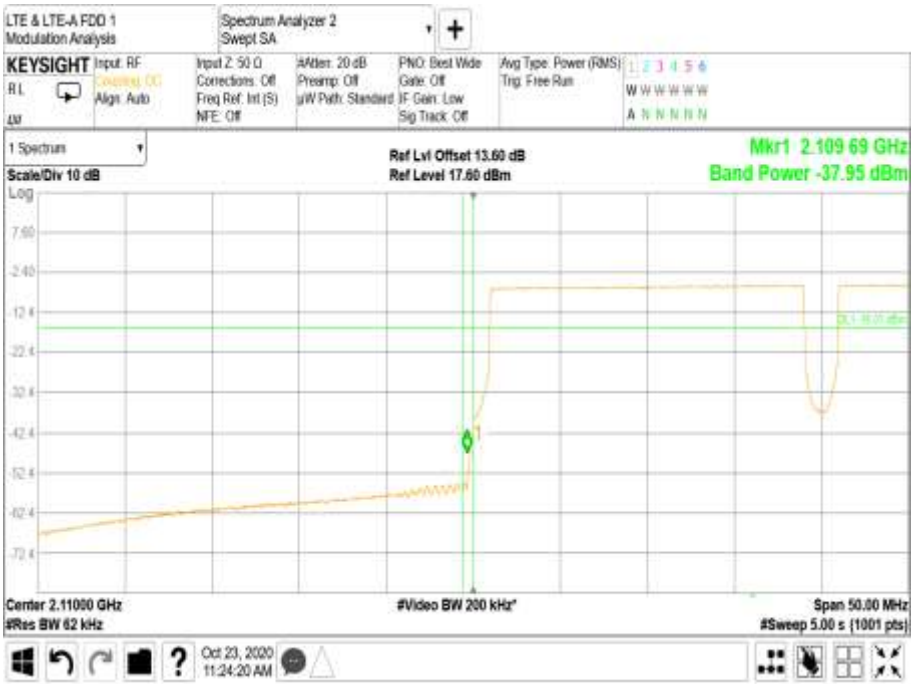
Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth 15.0+15.0+15.0 MHz - Channel Position B



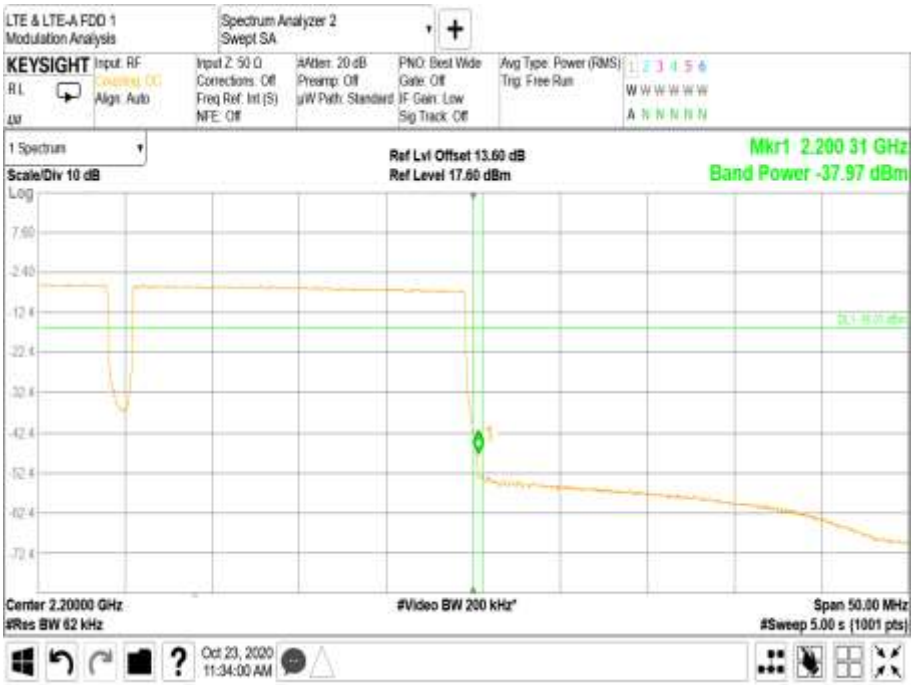
Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth 15.0+15.0+15.0 MHz - Channel Position T



Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth 20.0+20.0+20.0 MHz - Channel Position B



Antenna A - Modulation LTE + NR QPSK - Carrier Bandwidth 20.0+20.0+20.0 MHz - Channel Position T



Configuration C

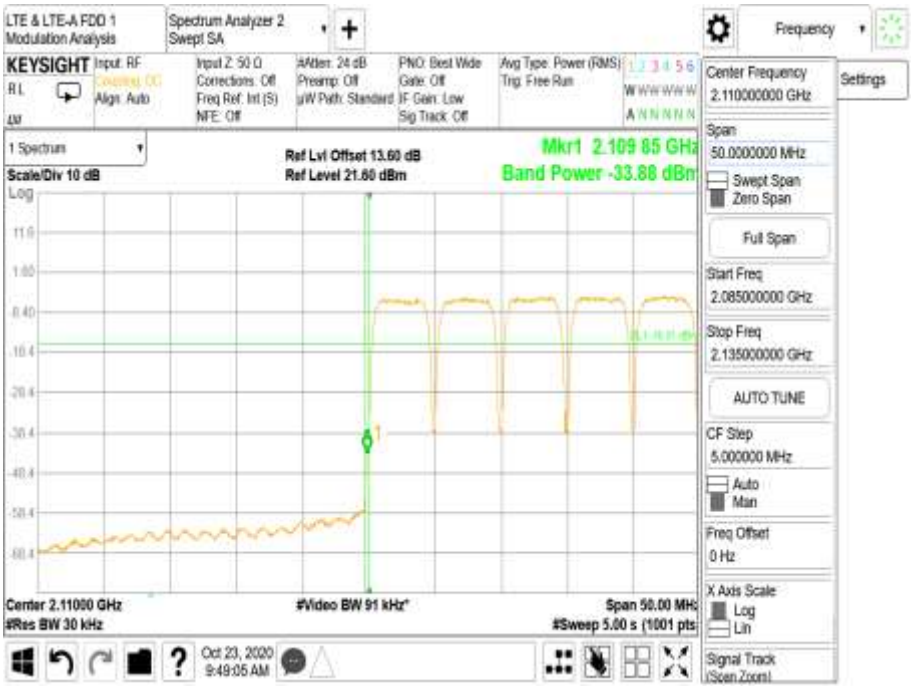
Maximum Output Power 22 dBm

Antenna	Modulation	Carrier Bandwidth	Band Edge (MHz)	
			Channel Position B	Channel Position T
A	WCDMA: QPSK	5.0+5.0+5.0+5.0 +5.0+5.0 MHz	2112.5+2117.5+2122.5+2127.5 +2132.5+2137.5	2172.5+2177.5+2182.5+2187.5+2 192.5+2197.5
A	LTE + WCDMA: QPSK	5.0+5.0+5.0+5.0 +5.0+5.0 MHz	2112.5+2117.5+2122.5+2127.5 +2132.5+2137.5	2172.5+2177.5+2182.5+2187.5+2 192.5+2197.5
A	LTE + WCDMA: QPSK	10.0+10.0+10.0 +5.0+5.0+5.0 MHz	2115.0+2125.0+2135.0+2142.5 +2147.5+2152.5	2160.0+2170.0+2180.0+2187.5+2 192.5+2197.5

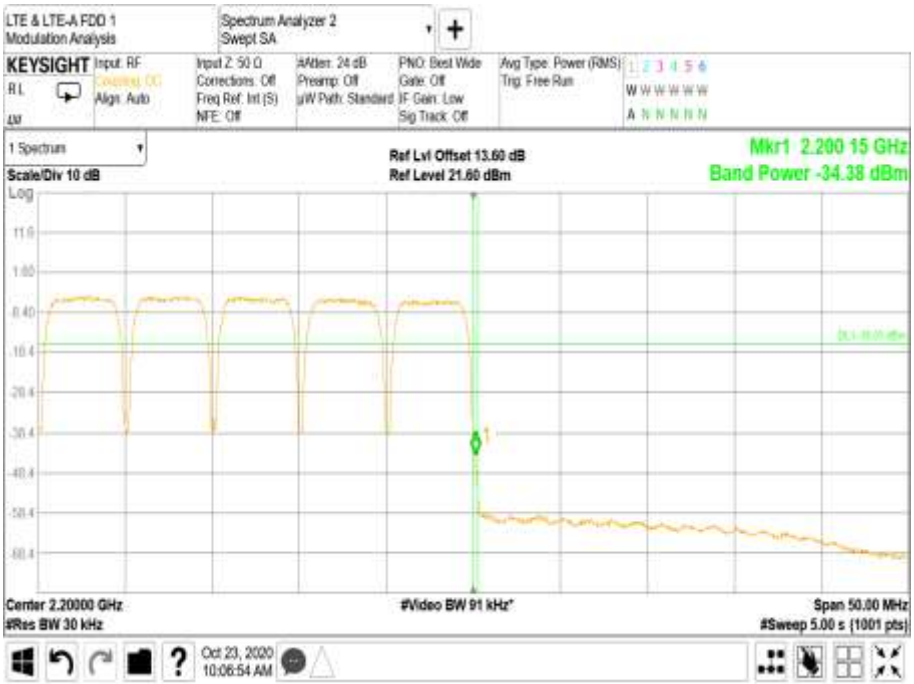
Remarks

Six carrier transmitter performance is presented. The plot results represent typical radio performance. Plot data performance for all transmitter ports and channels are on file and available on request.

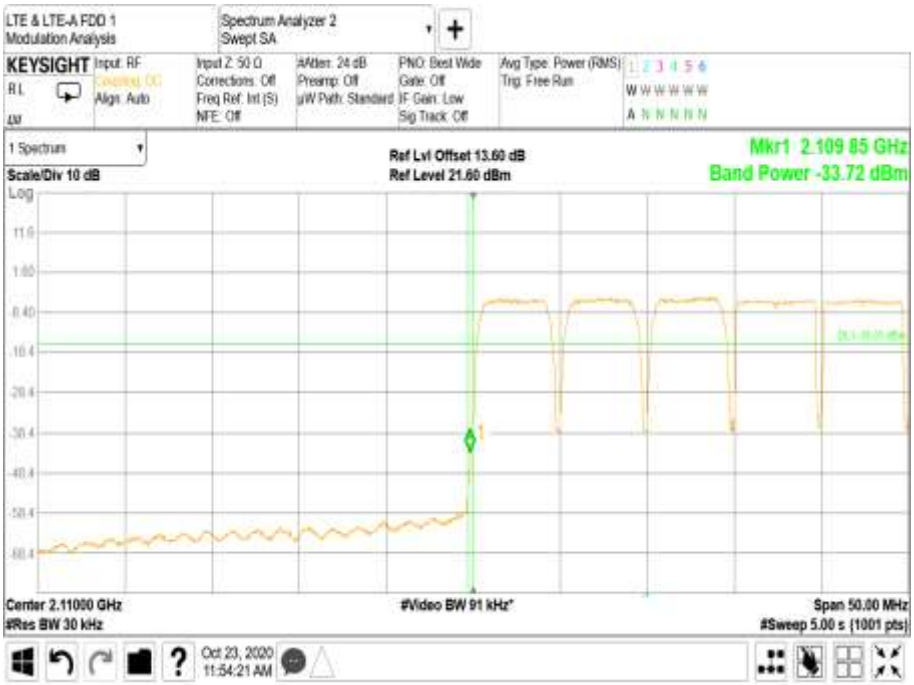
Antenna A - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0+5.0+5.0+5.0+5.0+5.0 MHz - Channel Position B



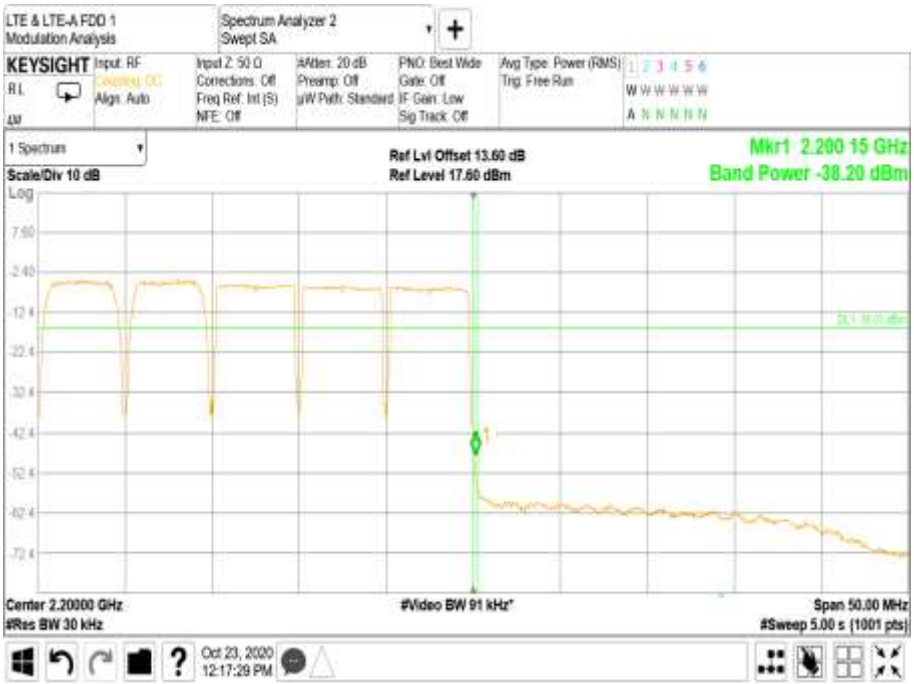
Antenna A - Modulation WCDMA: QPSK - Carrier Bandwidth 5.0+5.0+5.0+5.0+5.0+5.0 MHz - Channel Position T



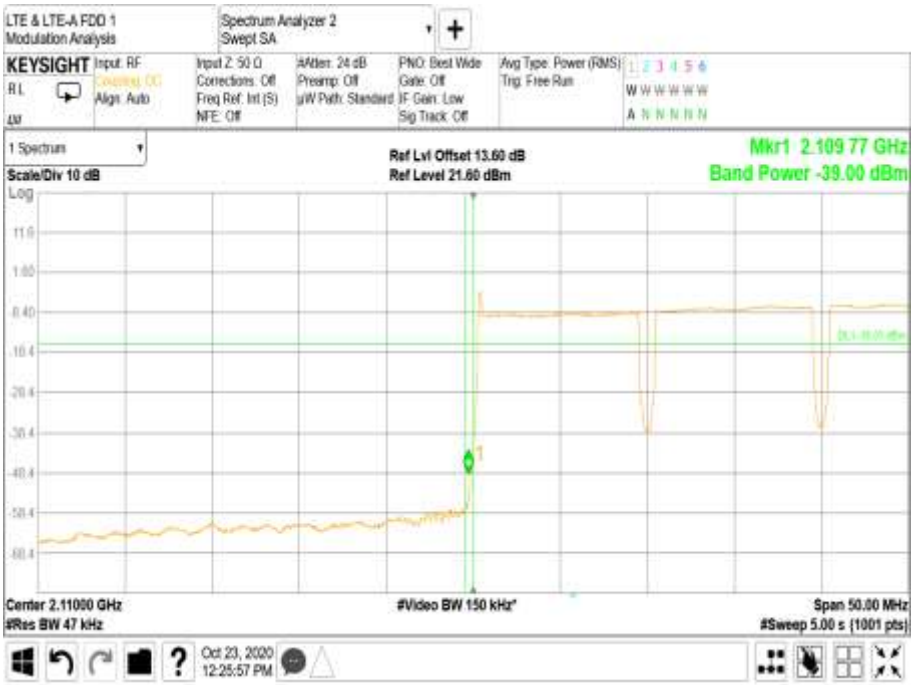
Antenna A - Modulation LTE + WCDMA: QPSK - Carrier Bandwidth 5.0+5.0+5.0+5.0+5.0+5.0 MHz - Channel Position B



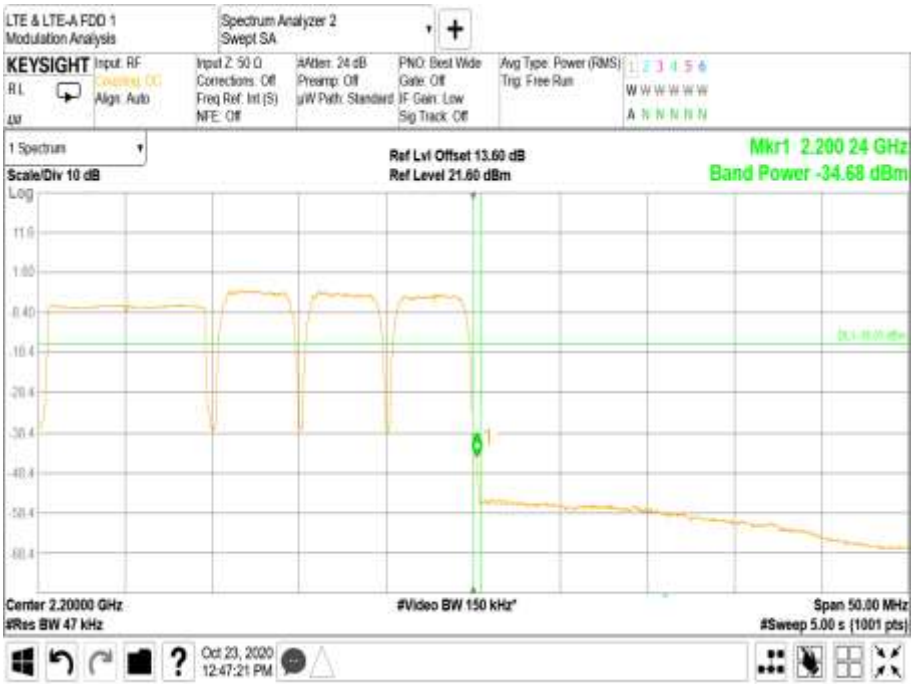
Antenna A - Modulation LTE + WCDMA: QPSK - Carrier Bandwidth 5.0+5.0+5.0+5.0+5.0+5.0 MHz - Channel Position T



Antenna A - Modulation LTE + WCDMA: QPSK - Carrier Bandwidth 10.0+10.0+10.0+5.0+5.0+5.0 MHz - Channel Position B



Antenna A - Modulation LTE + WCDMA: QPSK - Carrier Bandwidth 10.0+10.0+10.0+5.0+5.0+5.0 MHz - Channel Position T



Limit	
Peak Power	≤ 1640 W/MHz or ≤+62.15 dBm RSS-139 1710-1780 MHz ≤ 1W RSS-139 2110-2180MHz ≤ 1640 W/MHz or ≤+62.15 dBm

Limit	-16 dBm

2.4 TRANSCEIVER SPURIOUS EMISSIONS

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 27, Clause 27.53 (h)
Industry Canada RSS-139, Clause 6.5
Industry Canada RSS-170, Clause 5.4

2.4.2 Date of Test and Modification State

21 and 22 October 2020 - Modification State 0

2.4.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.4 Environmental Conditions

Ambient Temperature	°C
Relative Humidity	31.7 - 33.0%

2.4.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

Each of the 2 bands of the EUT has 2 transmit ports, therefore, the test limits used were calculated on a worst-case basis accounting for an effective 2 port MIMO configuration. Testing was performed on this port with a test limit of 43+10log(P) - 10log (2) = -16 dBm

2.4.6 Test Results

Configuration A

Maximum Output Power 23 dBm

Remarks

1. Transceiver spurious emissions have been searched for all channel bandwidths and antenna ports.
2. Representative spurious emissions performance has been presented for all modulations.
3. Plot data performance for all transmitter ports, channel bandwidths, and channel positions are on file and available on request.

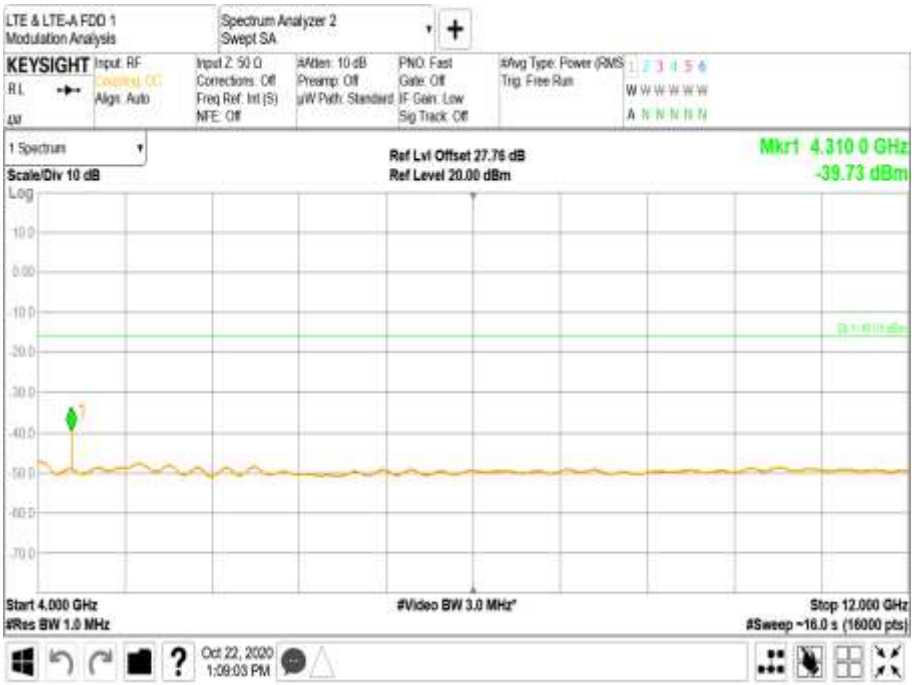
Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 0.009 to 4000 MHz

Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 4000 to 12000 MHz

Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 3 - Range 12000 to 22000 MHz

Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 0.009 to 4000 MHz

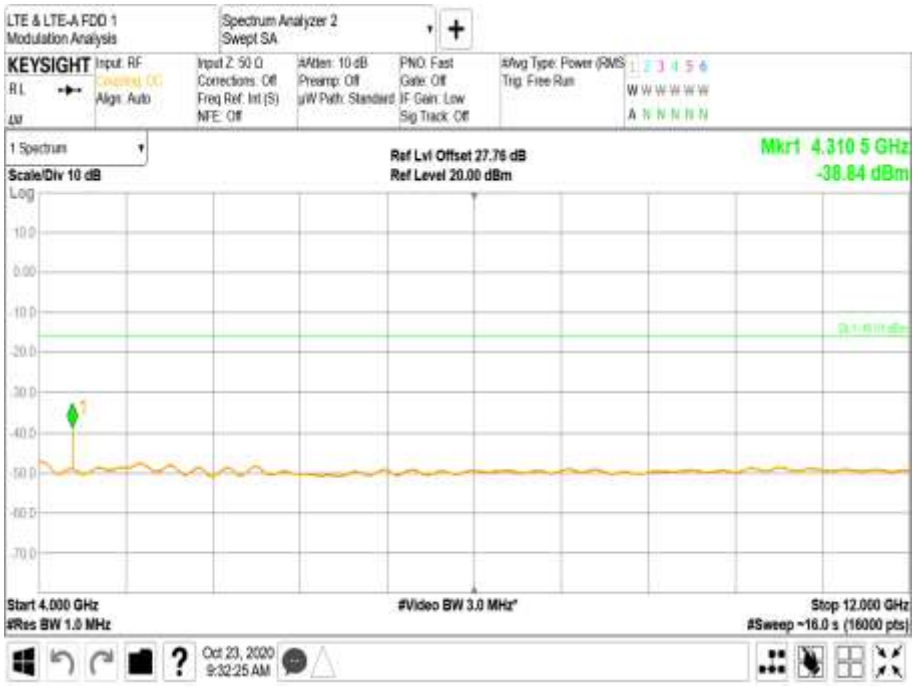
Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 4000 to 12000 MHz



Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 3 - Range 12000 to 22000 MHz

Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 0.009 to 4000 MHz

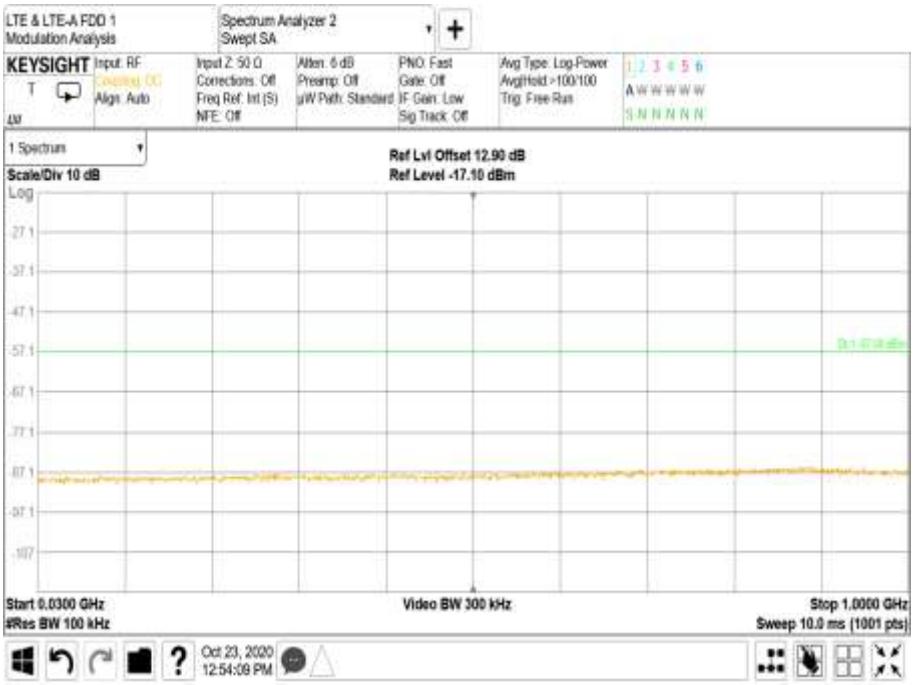
Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 4000 to 12000 MHz



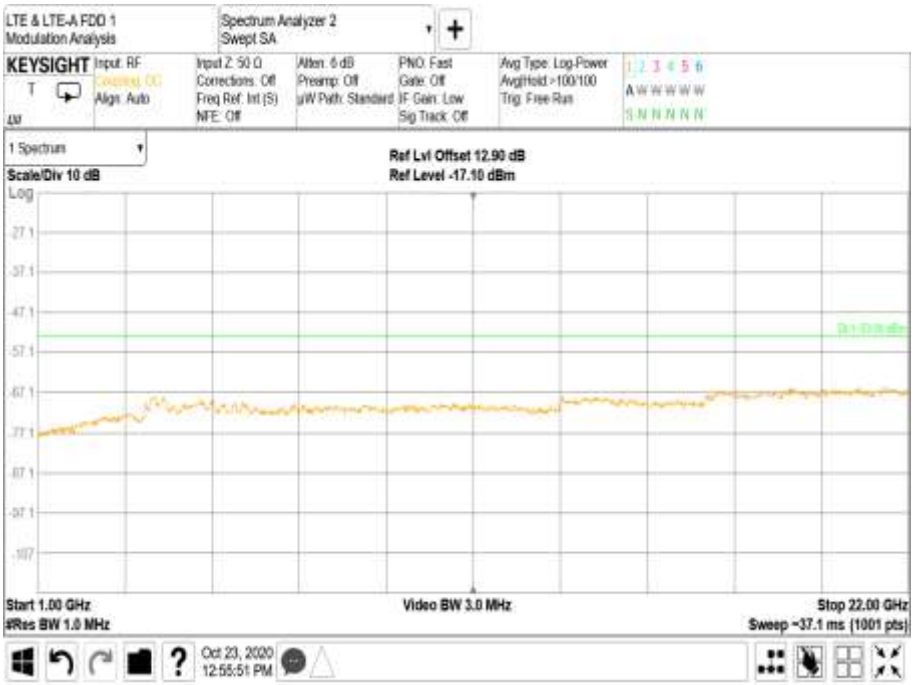
Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 3 - Range 12000 to 22000 MHz

Limit	-16dBm

Modulation Receiver Spurious - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 30 MHz to 1000 MHz



Modulation Receiver Spurious - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 1000 to 22000 MHz



Limit	-57 dBm (<1 GHz), -53 dBm (> 1GHz)

Configuration B

Maximum Output Power 23 dBm

Remarks

1. Transceiver spurious emissions have been searched for all channel bandwidths and antenna ports.
2. Representative spurious emissions performance has been presented for all modulations.
3. Plot data performance for all transmitter ports, channel bandwidths, and channel positions are on file and available on request.

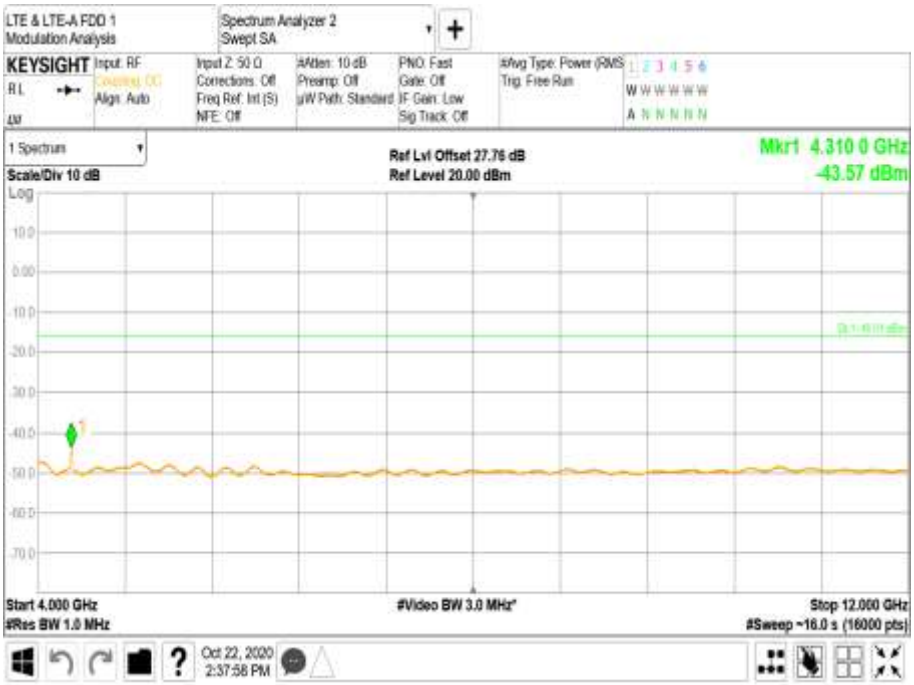
Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 0.009 to 4000 MHz

Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 4000 to 12000 MHz

Modulation LTE: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 3 - Range 12000 to 22000 MHz

Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 0.009 to 4000 MHz

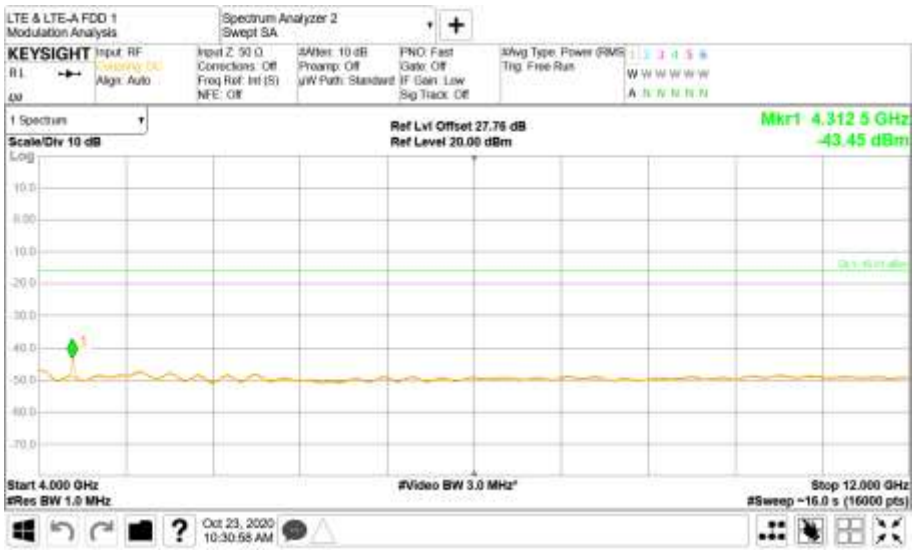
Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 4000 to 12000 MHz



Modulation NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 3 - Range 12000 to 22000 MHz

Modulation LTE+NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 0.009 to 4000 MHz

Modulation LTE+NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 4000 to 12000 MHz

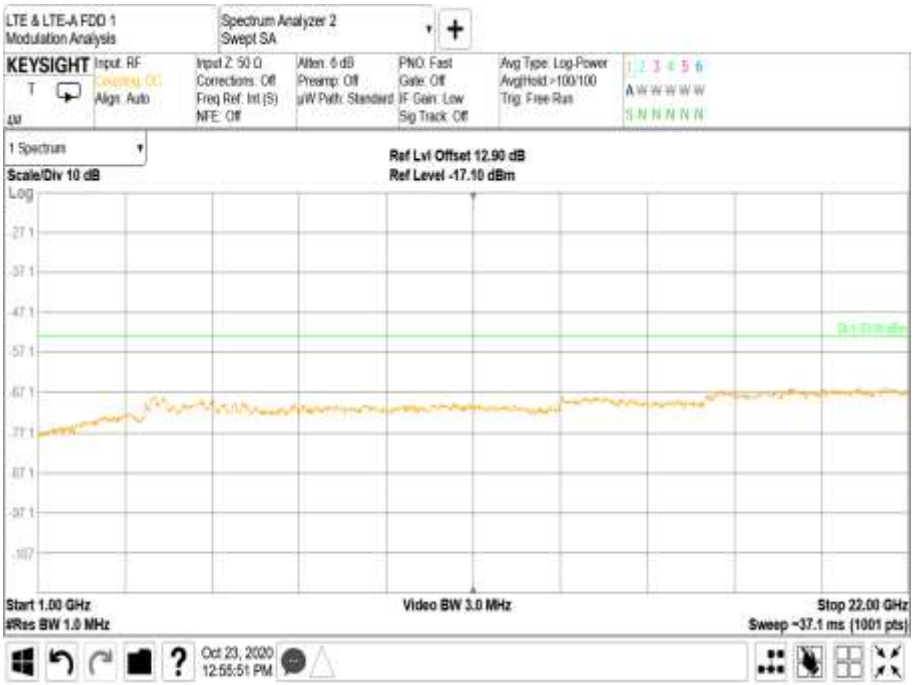


Modulation LTE+NR: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 3 - Range 12000 to 22000 MHz

Limit	-16dBm

Modulation Receiver Spurious - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 30 MHz to 1000 MHz

Modulation Receiver Spurious - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 1000 to 20000 MHz



Limit	-16dBm

Configuration C

Maximum Output Power 23 dBm

Remarks

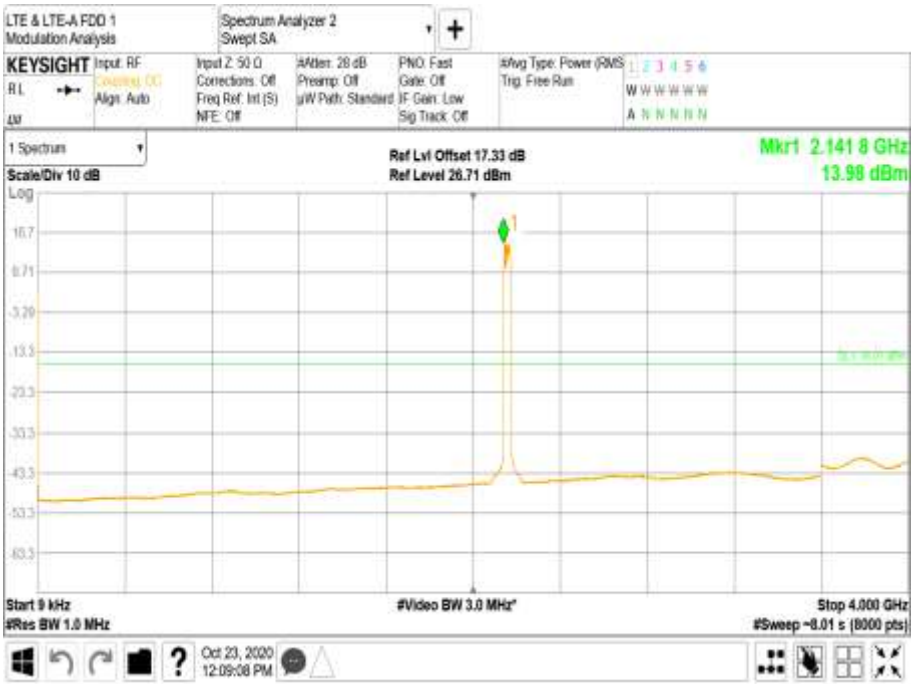
1. Transceiver spurious emissions have been searched for all channel bandwidths and antenna ports.
2. Representative spurious emissions performance has been presented for all modulations.
3. Plot data performance for all transmitter ports, channel bandwidths, and channel positions are on file and available on request.

Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 0.009 to 4000 MHz

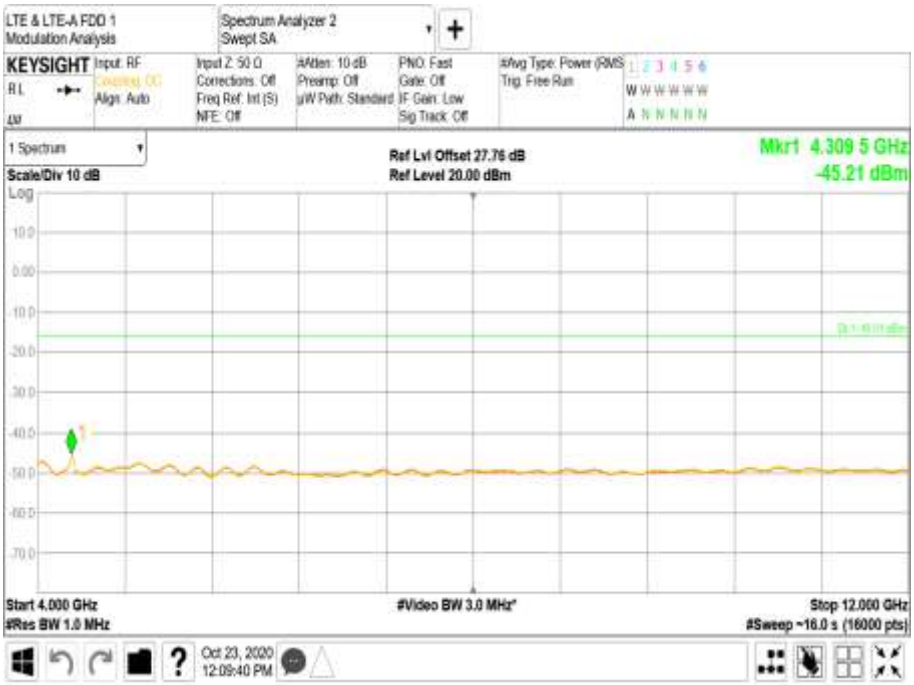
Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 4000 to 12000 MHz

Modulation WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 3 - Range 12000 to 22000 MHz

Modulation LTE + WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 0.009 to 4000 MHz



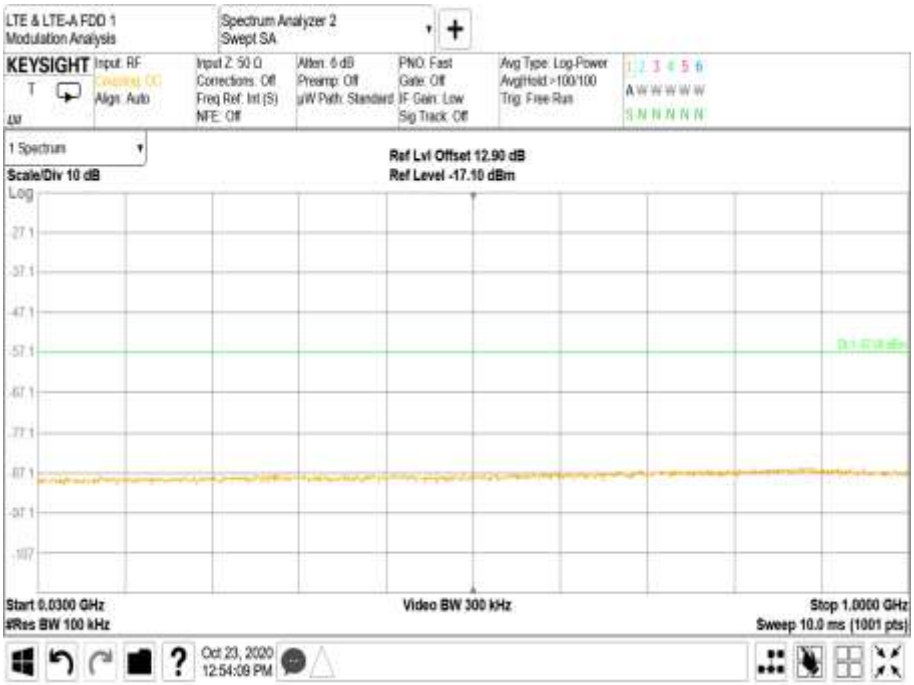
Modulation LTE + WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 4000 to 12000 MHz



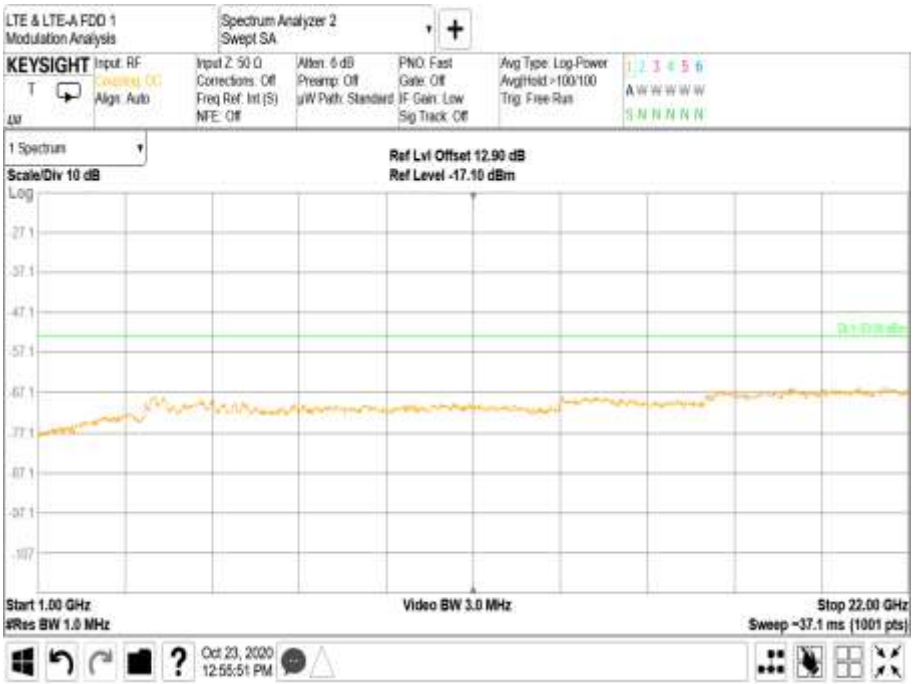
Modulation LTE + WCDMA: QPSK - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 3 - Range 12000 to 22000 MHz

Limit	-16dBm

Modulation Receiver Spurious - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 1 - Range 30 MHz to 1000 MHz



Modulation Receiver Spurious - Carrier Bandwidth 5.0 MHz - Channel Position M - Band 2 - Range 1000 to 22000 MHz



Limit	-57 dBm / -53 dBm

2.5 FREQUENCY STABILITY

2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 27, Clause 27.54
Industry Canada RSS-139, Clause 5.2

2.5.2 Date of Test and Modification State

23 October 2020 - Modification State 0

2.5.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.4 Environmental Conditions

Ambient Temperature	26.7°C
Relative Humidity	32.2%

2.5.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

2.5.6 Test Results

Configuration A

Maximum Output Power 23 dBm

Temperature	Voltage	Frequency Error (Hz)
		Channel Position M - 2155.0 MHz
-30°C	-48.0 V DC	N/A
-20°C	-48.0 V DC	N/A
-10°C	-48.0 V DC	42.10
0°C	-48.0 V DC	41.40
+10°C	-48.0 V DC	40.10
+20°C	-40.5 V DC	41.70
+20°C	-48.0 V DC	41.40
+20°C	-57.5 V DC	41.50
+30°C	-48.0 V DC	41.20
+40°C	-48.0 V DC	41.50
+50°C	-48.0 V DC	41.60

Limit	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Keysight	PXA N9030B	MY57144347	24	24/04/2022
Digital Multimeter	Fluke	75	54041218	24	16/11/2020
Thermometer	VWR	61161-364	192595396	24	25/10/2021
PSU	Xantrex	XKW60-50	E00109862	-	O/P Mon
Attenuator (10dB)	Mini-Circuits	BW-K10-2W44+	-	-	O/P Mon
RF Switch	Ericsson	RARSFW 4x1	1	-	O/P Mon
Switching Control Unit	HP	11713A	3748A060876	-	O/P Mon
Climate Chamber	Burnsco	RTC-37P-3-3	-07-07	-	O/P Mon

N/A – Not Applicable
O/P Mon – Output Monitored with Calibrated Equipment

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter		MU
Conducted Maximum Peak Output Power	30 MHz to 20 GHz Amplitude		± 0.7 dB
Conducted Emissions	30 MHz to 20 GHz Amplitude		± 2.1 dB
Frequency Stability	30 MHz to 2 GHz		± 5.0 Hz
Occupied Bandwidth	Up to 20 MHz Bandwidth	5 MHz Bandwidth	± 11547 Hz
		10 MHz Bandwidth	± 23094 Hz
		15 MHz Bandwidth	± 34641 Hz
		20 MHz Bandwidth	± 46188 Hz
Band Edge	30 MHz to 20 GHz Amplitude		±0.8 dB
Radiated Spurious Emissions	30 MHz to 1 GHz		± 5.2 dB
	1 GHz to 40GHz		± 6.3 dB

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Testing Laboratory
Certificate #2955.19

This report relates only to the actual item/items tested.

This report does not imply product endorsement by any government, accreditation agency, or TÜV SÜD Canada Inc.

Opinions or interpretations expressed in this report, if any, are outside the scope of TÜV SÜD Canada Inc. accreditations. Any opinions expressed do not necessarily reflect the opinions of TÜV SÜD Canada Inc., unless otherwise stated.

This report relates only to the actual item/items tested.

ANNEX A

MODULE LIST

Configuration A			
Product	Product No	R-State	Serial No
CT11	LPC 102 494/1	R2A	T01G4955060
DOT 2284 B25B66	KRY 901 468/2	R1A	TD3W005261
IRU 8848	KRC 161 889/1	R1C	TD3F064190
Software Version:			
	CXP 901 3268/25	R84EF	