Test Report for ISED

Report Number		ESTRGC2304-005		
Applicant	Company name	LG Electronics Inc.		
	Address	128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea		
	Telephone	201-470-2696		
Product	Product name	NAD Module		
	Model No.	TM15FNNAHD0	Manufacturer	LG Electronics Inc.
	Serial No.	NONE	Country of origin	KOREA
Test date	18-Sep-23 ~ 22-Nov-23		Date of issue	23-Nov-23
Testing location	140-16, Eongmalli-ro, Majang-myeon, Icheon-si, Gyeonggi-do, Rep. of Korea			
ISED Requlation(s)	RSS-Gen Issue 5, RSS-192 Issue 5			
Test Method	KDB971168 D01v03, ANSI/TIA-603-E-2016, ANSI C63.26-2015			
Test result				Complied
MRA Registration number		KR0019		
Tested by	Engineer J.G. Lee			(Signature)
Reviewed by	Engineering Manager I.K. Hong			(Signature)
Abbreviation	OK, Pass = Complied, Fail = Failed, N/A = not applicable			

* Note
- This test report is not permitted to copy partly without our permission
- This test result is dependent on only equipment to be used
- This test report is not related to KOLAS accreditation
- This product is tested in a single channel at the request of the company.
- This is the reissue report due to the change of the applicant

Contents

1. LABORATORY INFORMATION

Corporation Name : ESTECH Co., Ltd.

Head Office : Suite 1015 World Meridian II, 123 Gasan Digital 2-ro, Geumcheon-gu, Seoul 153-759, R. O. Korea

EMC/Telecom/Safety Test Lab : 140-16, Eongmalli-ro, Majang-myeon, Icheon-si, Gyeonggi-do, Rep. of Korea

Official Qualification(s)

MSIP : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC

FCC : Filed Laboratory at Federal Communications Commission
VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE
ISED : Accredited Lab By Canada Laboratory Accreditation

2. EUT DESCRIPTION

2.1 GENERAL INFORMATION

Product : NAD Module
FCC ID : BEJTM15FNNAHD0
Model Number : TM15FNNAHD0
Add Model Name : -
Serial Number : NONE
Hardware Version Id Number (HVIN): TM15FNNAHD0
Firmware Version Id Number (FVIN): N/A
Product Marketing Name (PMN): TM15FNNAHD0
Manufacturer : LG Electronics Inc. :
Country of origin : KOREA
Modulation Type : π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM
Channel Bandwidth(MHz) : 100, 90, 80, 70, 60, 50, 40, 30, 20
Supply Voltage to product: 3.9 V

2.2 DESCRIPTION OF EUT

This device supports the following capabilities:
Multi-Band LTE and 5G NR(FR1)
5G NR supports SCS 15 kHz for FDD Band and SCS 30 kHz for TDD Band.

2.3 ANTENNA INFORMATION

Antenna type	PIFA Antenna	
Antenna gain	Ant1 NR Band n77 : 2.75 dBi	Ant2 NR Band n77 : 2.60 dBi

2.4 EMISSION DESIGNATOR AND MAX POWER

band	Frequecny (MHz)	modulation	Emission Designator	Conducted Output Power		ERP/EIRP	
				Max power (dBm)	Max power (W)	Max power (dBm)	Max power (W)
Band 77	3 500.01 ~ 3 849.99	π/2 BPSK	96M29G7D	23.80	0.240	21.36	0.137
Band 77	3 500.01 ~ 3 849.99	QPSK	96M30G7D	23.80	0.240	19.82	0.096
Band 77	3 500.01 ~ 3 849.99	16QAM	96M23W7D	22.87	0.194	18.88	0.077
Band 77	3 500.01 ~ 3 849.99	64QAM	96M22W7D	21.38	0.137	17.75	0.060
Band 77	3 500.01 ~ 3 849.99	256QAM	96M38W7D	19.45	0.088	15.17	0.033
Band 77	3 495 ~ 3 855	π/2 BPSK	86M84G7D	23.72	0.236	21.34	0.136
Band 77	3 495 ~ 3 855	QPSK	86M82G7D	23.74	0.237	19.76	0.095
Band 77	3 495 ~ 3 855	16QAM	86M76W7D	22.69	0.186	18.20	0.066
Band 77	3 495 ~ 3 855	64QAM	86M78W7D	21.25	0.133	17.57	0.057
Band 77	3 495 ~ 3 855	256QAM	86M75W7D	20.38	0.109	16.07	0.040
Band 77	3 490.02 ~ 3 859.99	π/2 BPSK	77M02G7D	23.72	0.236	21.51	0.142
Band 77	3 490.02 ~ 3 859.99	QPSK	77M01G7D	23.71	0.235	20.32	0.108
Band 77	3 490.02 ~ 3 859.99	16QAM	77M14W7D	22.69	0.186	19.46	0.088
Band 77	3 490.02 ~ 3 859.99	64QAM	77M08W7D	21.31	0.135	18.88	0.077
Band 77	3 490.02 ~ 3 859.99	256QAM	77M03W7D	20.35	0.108	16.56	0.045
Band 77	3 485.01 ~ 3 864.99	π/2 BPSK	64M23G7D	23.79	0.239	22.05	0.160
Band 77	3 485.01 ~ 3 864.99	QPSK	64M20G7D	23.87	0.244	21.39	0.138
Band 77	3 485.01 ~ 3 864.99	16QAM	64M27W7D	22.72	0.187	20.18	0.104
Band 77	3 485.01 ~	64QAM	64M19W7D	21.39	0.138	19.09	0.081

	3 864.99						
Band 77	3 485.01 ~ 3 864.99	256QAM	64M43W7D	20.35	0.108	15.87	0.039
Band 77	3 480 ~ 3 870	π/2 BPSK	57M69G7D	23.79	0.239	20.58	0.114
Band 77	3 480 ~ 3 870	QPSK	57M77G7D	23.78	0.239	20.24	0.106
Band 77	3 480 ~ 3 870	16QAM	57M64W7D	22.81	0.191	18.91	0.078
Band 77	3 480 ~ 3 870	64QAM	57M72W7D	21.35	0.136	18.58	0.072
Band 77	3 480 ~ 3 870	256QAM	57M77W7D	20.26	0.106	15.90	0.039
Band 77	3 475.02 ~ 3 874.99	π/2 BPSK	45M61G7D	23.65	0.232	20.38	0.109
Band 77	3 475.02 ~ 3 874.99	QPSK	45M56G7D	23.69	0.234	20.15	0.104
Band 77	3 475.02 ~ 3 874.99	16QAM	45M52W7D	22.68	0.185	19.01	0.080
Band 77	3 475.02 ~ 3 874.99	64QAM	45M62W7D	21.24	0.133	18.35	0.068
Band 77	3 475.02 ~ 3 874.99	256QAM	45M64W7D	20.21	0.105	16.35	0.043
Band 77	3 470.01 ~ 3 879.99	π/2 BPSK	35M74G7D	23.72	0.236	20.50	0.112
Band 77	3 470.01 ~ 3 879.99	QPSK	35M68G7D	23.69	0.234	20.41	0.110
Band 77	3 470.01 ~ 3 879.99	16QAM	35M68W7D	22.72	0.187	19.13	0.082
Band 77	3 470.01 ~ 3 879.99	64QAM	35M78W7D	21.22	0.132	17.88	0.061
Band 77	3 470.01 ~ 3 879.99	256QAM	35M72W7D	20.35	0.108	15.54	0.036
Band 77	3 465 ~ 3 885	π/2 BPSK	26M81G7D	23.79	0.239	21.20	0.132
Band 77	3 465 ~ 3 885	QPSK	26M79G7D	23.72	0.236	20.63	0.116
Band 77	3 465 ~ 3 885	16QAM	26M81W7D	22.77	0.189	19.07	0.081
Band 77	3 465 ~ 3 885	64QAM	26M80W7D	21.28	0.134	18.19	0.066
Band 77	3 465 ~ 3 885	256QAM	26M79W7D	19.62	0.092	16.56	0.045

Band 77	3 460.01 ~ 3 889.99	π/2 BPSK	17M82G7D	23.382	0.241	20.20	0.105
Band 77	3 460.01 ~ 3 889.99	QPSK	17M84G7D	23.80	0.240	20.02	0.100
Band 77	3 460.01 ~ 3 889.99	16QAM	17M84W7D	23.66	0.232	18.50	0.071
Band 77	3 460.01 ~ 3 889.99	64QAM	17M83W7D	21.39	0.138	17.19	0.052
Band 77	3 460.01 ~ 3 889.99	256QAM	17M83W7D	19.55	0.090	15.95	0.039

3. TEST ENVIRONMENT

Temperature : +21 ℃ ~ +24 ℃

Humidity : 42 % ~ 46 %

Extreme Test Temperature : -10 ℃ ~ +55 ℃

Measurement Uncertainty

Item	Measurement Uncertainty
Conducted Output Power	±3.2 %
Occupied Channel Bandwidth	±0.87dB
Unwanted Emission, Conducted	±0.86dB
Emissions, Radiated (Below 1GHz)	±3.54dB
Emissions, Radiated (1GHz-18GHz)	±4.22dB
Emissions, Radiated (18GHz-25GHz)	±4.81dB

3.3 SUMMARY OF TEST RESULTS

Test Description	RSS Section(s)	Test Limit	Test Condition	Test Result
Occupied Bandwidth	RSS-Gen[6.7]	N/A	Conducted	C
Peak to Average Ratio	RSS-192[5.5]	< 13 dB	Conducted	C
Band Edge / Conducted Spurious Emissions	RSS-192[5.6.3]	< -13 dBm/MHz	Conducted	C
Frequency Stability	RSS-192[5.4]	Fundamental emissions must stay within Authorized frequency block	Conducted	C
Radiated Output Power	RSS-192[5.5]	< 30 dBm EIRP	Radiated	C
Undesirable Emissions	RSS-192[5.6.3]	< -13 dBm/MHz	Radiated	C

Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable

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3.4 WORST CASE(RADIATED TEST)

- Waveform : All Waveform of operation were investigated and the worst case configuration results are reported.
(Worst case: DFT-S-OFDM)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.

- All modes of operation were investigated and the worst case configuration results are reported.
Mode: NSA. SA
Worst case: SA

- We were performed the RSE test in condition of co-location.
Mode : Stand alone, Simultaneous transmission scenarios
Worst case : Stand alone

- Radiated Spurious emissions are measured while operating in EN-DC mode with Sub 6 NR carrier as well as an LTE carrier (anchor).
All EN-DC mode of operation were investigated and the worst case configuration results are reported.
(Worst case: 2A-n77 (100 MHz))

- All RB sizes, offsets of operation were investigated and the worst case configuration results are reported.
Please refer to the table below.

- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth
results are reported.
(Worst case : 100 MHz)

[Worst case]

Test Description	Modulation	RB size	RB offset
Effective Radiated Power	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	See Section 14	
Radiated Spurious Emissions	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	See Section 15	

WORST CASE(CONDUCTED TEST)

- Waveform : All Waveform of operation were investigated and the worst case configuration results are reported.
(Worst case: DFT-S-OFDM)

- Modulation : All Modulation of operation were investigated and the worst case configuration results are reported.
(Worst case: PI/2 BPSK)

All modes of operation were investigated and the worst case configuration results are reported.
Mode: NSA, SA
Worst case: SA

- All RB sizes, offsets of operation were investigated and the worst case configuration results are reported.
Please refer to the table below.

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth Peak- to- Average Ratio	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM	20, 30, 40, 50, 60, 70, 80, 90, 100	Mid	Full RB	0
Band Edge	PI/2 BPSK	20, 30, 40, 50, 60, 70, 80, 90, 100	Low	Full RB	0
		20, 30, 40, 50, 60, 70, 80, 90, 100	High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	I/2 BPSK	20, 30, 40, 50, 60, 70, 80, 90, 100	Low	Full RB	0
		20, 30, 40, 50, 60, 70, 80, 90, 100	Mid	Full RB	0
		20, 30, 40, 50, 60, 70, 80, 90, 100	High	Full RB	0

3.5 Sample Calculation

NR Band n77(π/2 BPSK)
Emission Designator = 96M23G7D
OBW = 96.232 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

NR Band n77(QPSK)
Emission Designator = 96W18G7D
OBW = 96.179 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

NR Band n77(16QAM)
Emission Designator = 96M26W7D
OBW = 96.264 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

NR Band n77(64QAM)
Emission Designator = 96M24W7D
OBW = 96.237 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

NR Band n77(256QAM)
Emission Designator = 96M27W7D
OBW = 96.273 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission
For substitution method

1) The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1 GHz respectively above ground.
2) The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3) During the test, the turn table is rotated until the maximum signal is found.
4) Record the field strength meter's level.
5) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
6) Increase the signal generator output till the field strength meter's level is equal to the item (4).
7) Record the level at substituted antenna terminal.
8) The result is calculated as below;

EIRP(dBm) = LEVLE@ANTENNA TERMINAL + TX Antenna Gain (dBi)
ERP(dBm) = LEVLE@ANTENNA TERMINAL + TX Antenna Gain (dBd)
Where, TX Antenna Gain (dBd) = TX Antenna Gain (dBi) - 2.15 dB

4. TEST EQUIPMENT

4.1 Measurement equipment

Equipment Name	Type	Manufacturer	Serial No.	Cal. Date	Cal. Due Date
Radio Communication Test Station	MT8000A	Anritsu	6261867318	2022-11-30	2023-11-30
Radio Communication Analyzer	MT8821C	Anritsu	6262116716	2022-11-29	2023-11-29
UXA Signal Analyzer	N9040B	Keysight	US57212216	2022-11-29	2023-11-29
Power divider	K240C	Anritsu	2143005	2023-03-13	2024-03-13
UXA Signal Analyzer	N9040B	Keysight	US57212216	2022-11-29	2023-11-29
SPECTRUM ANALYZER	MS2840A	Anritsu	MS2840A	2023-04-19	2024-04-19
Attenuator	A-4010.2902.2	ACE RF COMM	A-1	2023-04-17	2024-04-17
Power Meter	N1912A	Agilent	MY45100570	2022-11-28	2023-11-28
Power Sensor	A1921A	Agilent	MY45240427	2022-11-28	2023-11-28
TEST Receiver	ESCI7	ROHDE & SCHWARZ	100916	2023-06-12	2024-06-12
LOOP Antenna	HFH2-Z2	ROHDE & SCHWARZ	100188	2023-08-24	2024-08-24
Logbicon Antenna	VULB 9168	SCHWARZBECK	193	2022-12-09	2023-12-09
Turn Table	DT3000-2t	Innco System GmbH	N/A	-	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-	-
PREAMPLIFIER	8449B	HP	3008A00581	2023-06-12	2024-06-12
Horn Antenna	LB-42-15-C-SF	A-INFOMF	J2020079000055	2022-11-11	2023-11-11
Horn Antenna	BBHA9120D	SCHWARZBECK	469	2022-11-08	2023-11-08
TEST Receiver	ESU	ROHDE & SCHWARZ	100529	2023-06-12	2024-06-12
Turn Table	DT1500-S	Innco System GmbH	N/A	-	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-	-
Antenna Mast	SW-AM-EMF	SIWON	-	-	-
Antenna Master & Turn table controller	CO2000-P	Innco System GmbH	CO2000/642 /28051111/L	-	-

TEST Receiver	ESHS 30	Rohde & Schwarz	828765/002	2023-06-28	2024-06-28
Log-Periodic Antenna	UHALP9107	SCHWARZBECK	1562	2023-05-19	2024-05-19
Signal Generator	SMB 100A	ROHDE & SCHWARZ	177653	2022-11-29	2023-11-29
Horn Antenna	BBHA 9170	SCHWARZBECK	732	2023-06-15	2024-06-15
AMPLIFER	TK-PA1840H	TESTEK	N/A	2023-06-15	2024-06-15
DC Power supply	AK3010	VUPOWER	01020516	2022-11-28	2023-11-28
DC Power supply	HMP2020	ROHDE & SCHWARZ	120957	2023-08-18	2024-08-18
Temp./Humidity Chamber	SH-642	ESPEC	93016326	2022-11-28	2023-11-28
Radio Communication Test Station	MT8000A	Anritsu	6272354124	2023-10-17	2024-10-17
Radio Communication Analyzer	MT8821C	Anritsu	6272348668	2022-11-29	2023-11-29

5. OUTPUT POWER

5.1 Test Procedure

- KDB971168 D01v03 - Section 5.2.4

- ANSI C63.26-2015 – Section 5.2.4.2

5.2 Test settings

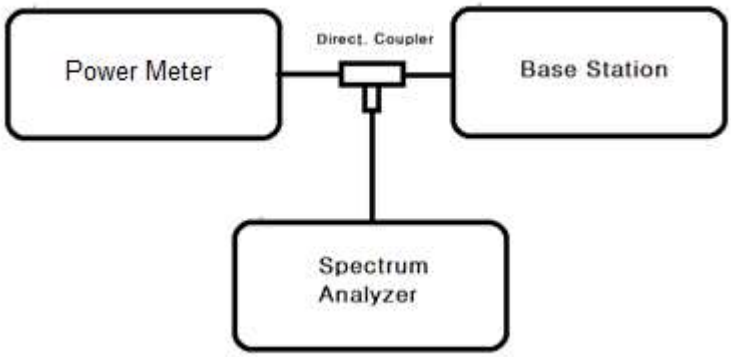
When an average power meter is used to perform RF output power measurements, the fundamental condition that measurements be performed only over durations of active transmissions at maximum output power level applies. Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.

If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98%), then the following options can be implemented to facilitate measurement of the average power with an average power meter:

a) A gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only during active transmission bursts at maximum output power levels.

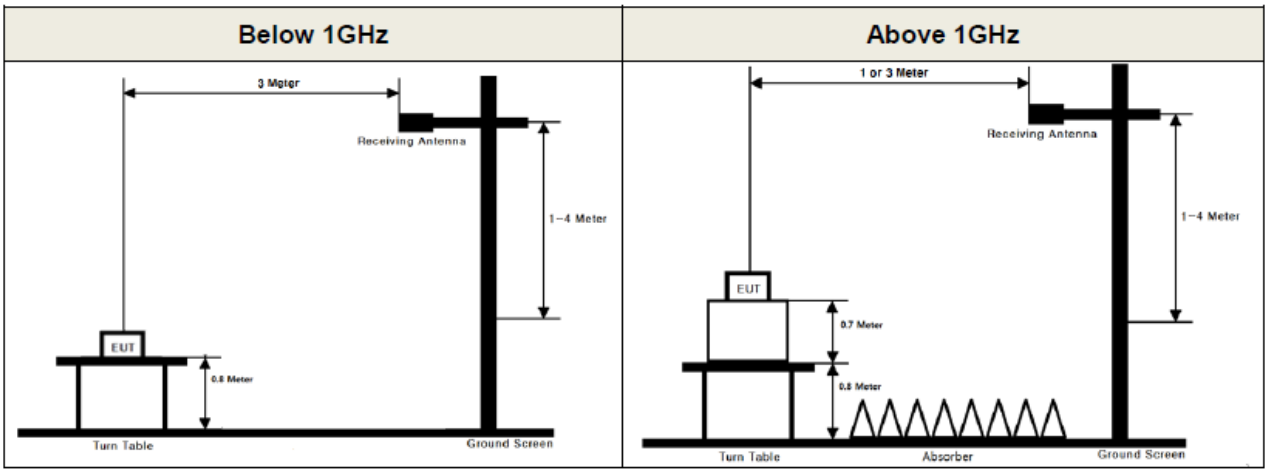
b) A conventional average power meter with no signal gating capability can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than or equal to ±2%) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to [10 log (1/duty cycle)]. See 5.2.4.3.4 for guidance with respect to measuring the transmitter duty cycle.

5.3 Test Setup



6. ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)

6.1Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

6.2 Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.17
- KDB971168 D01v03 - Section 5.4
- ANSI C63.26-2015 – Section 5.2.4.4.1

6.3 Test setting

1. Set span to 2 x to 3 x the OBW.

2. Set RBW = 1 % to 5 % of the OBW.

3. Set VBW ≥ 3 x RBW.
4. Set number of points in sweep ≥ 2 × span / RBW.

5. Sweep time:
1) Set = auto-couple, or
2) Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible)
measurement. Transmission period is the on and off time of the transmitter.

6. Detector = power averaging (rms).

7. If the EUT can be configured to transmit continuously, then set the trigger to free run.

8. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active fullpower transmissions).

9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.

10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The receiver antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

The ERP/EIRP is calculated using the following formula:

ERP/EIRP = The conducted power at the substitute antenna`s terminal [dBm] + Substitute Antenna gain [dBd for ERP , dBi for EIRP]

For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference Between the gain of the horn antenna and an isotropic antenna are taken into consideration.

limit

Subscriber equipment other than fixed subscriber equipment : 30 dBm e.i.r.p./channel bandwidth

7. PEAK TO AVERAGE RATIO

7.1 Test Procedure

- KDB971168 D01v03 – section 5.7.2

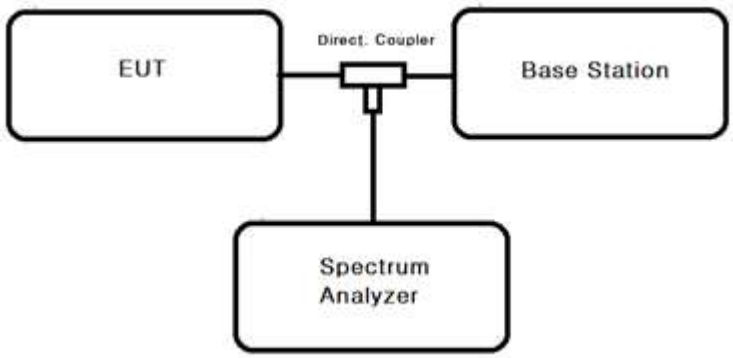
- ANSI C63.26-2015 – Section 5.2.3.4

7.2 Test settings

he spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The present of time the signal spends at or above the level defines the probability for that particular power level.

a) The spectrum Analyzer`s CCDF measurement function is enabled.
b) Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth.
c) Set the number of counts to a value that stabilizes the measured CCDF curve.
d) Set the measurement interval as follows:
1) For continuous transmissions, set to the greater of [10 × (number of points in sweep) ×(transmission symbol period)] or 1 ms.
2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual
carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated
from the sum of the individual carrier peak powers.
e) Record the maximum PAPR level associated with a probability of 0.1 %.
f) The peak power level is calculated form the sum of the PAPR value from step d) to the measured average power.

7.3 Test Setup



limit

The peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time

8. OCCUPIED BANDWIDTH

8.1 Test Procedure

- KDB971168 D01v03 – section 4.3
- ANSI C63.26-2015 – Section 5.4.4

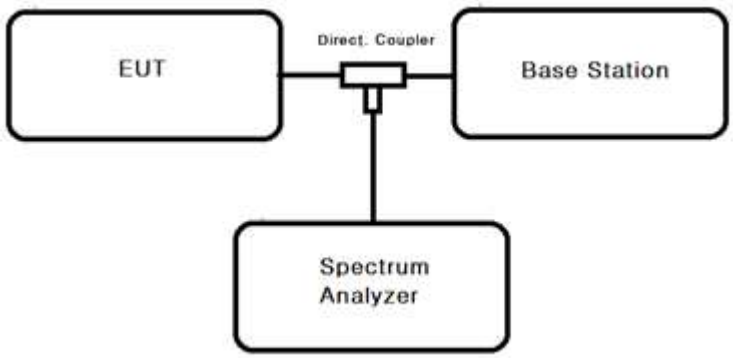
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

8.2 Test settings

• The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.

• RBW = 1 ~ 5% of the expected OBW. and the VBW shall be set ≥ 3 × RBW
• Set the detection mode to peak, and the trace mode to max-hold.
• Sweep point to Auto couple
• The trace was allowed to stabilize.
• If necessary, steps were repeated after changing the RBW such that it would be within 1 ~ 5% of the 99% occupied bandwidth observed in Step

8.3 Test Setup



Limit

The occupied bandwidth shall not exceed the equipment's channel bandwidth, which is declared by the manufacturer.

9. BAND EDGE EMISSIONS AT ANTENNA TERMINAL

9.1 Test Procedure

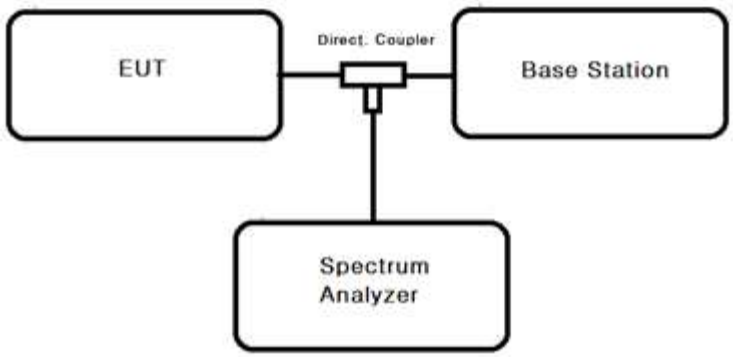
- KDB971168 D01v03 – section 6

- ANSI C63.26-2015 – Section 5.7

9.2 Test settings

- Start and stop frequency were set such that the band edge would be placed in the center of the plot
- Span was set large enough so as to capture all out of band emissions near the band edge
- RBW ≥ BW as specified in the limit table above
- VBW ≥ 3 X RBW
- Detector = RMS & Trace mode = power averaging (rms)
- Sweep time = Auto couple or 1 s for band edge
- Number of sweep point ≥ 2 X span / RBW
- The trace was allowed to stabilize

9.3 Test Setup



Test Note

All out of band emissions are measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its lowest and highest channel with all bandwidths, modulations and RB configurations.

Limit

Table: Unwanted emission limits for subscriber equipment

Frequency block group (B)	ffset frequency from the edge of the frequency block group (MHz)			
	0-1	1-5	5-B	>B
10 MHz, 20MHz, 30 MHz and 40 MHz	-13 dBm/1% of B	-10 dBm/MHz	-13 dBm/MHz	-25 dBm/MHz
> 40 MHz	-13 dBm/400 kHz	-10 dBm/MHz	-13 dBm/MHz	-25 dBm/MHz

10. FREQUENCY STABILITY

10.1 Test Procedure

- KDB971168 D01v03 – section 9

- ANSI/TIA-603-E-2016

10.2 Test settings

he frequency stability of the transmitter is measured by:

a.) Temperature:

The temperature is varied from -30 °C to +50 °C using an environmental chamber.

b.) Primary Supply Voltage:

The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification:

1. The carrier frequency of the transmitter is measured at room temperature.

(20 °C to provide a reference)

2. The equipment is turned on in a "standby" condition for one minute before applying power to

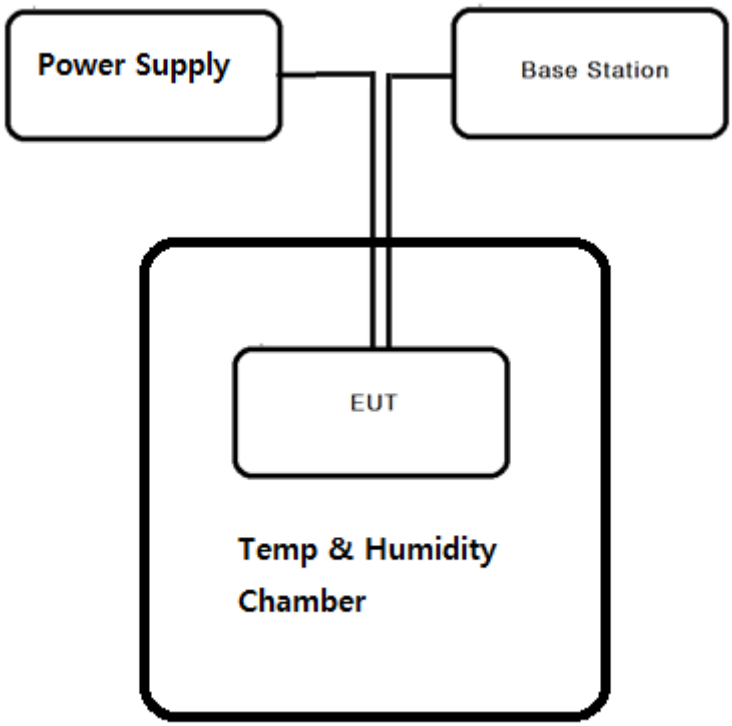
the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C.

A period of at least one half-hour is provided to allow stabilization of the equipment at each

temperature level.

10.3 Test Setup



Limit

The occupied bandwidth remain within each frequency block group when tested at the temperature and supply voltage variations specified in RSS-Gen.

11. SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL

11.1 Test Procedure

- KDB971168 D01v03 – section 6

- ANSI C63.26-2015 – Section 5.7

11.2 Test settings

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths, modulations and RB configurations. The spectrum is scanned from 9 kHz up to a frequency including its 10th harmonic.

If the device cannot be configured to transmit continuously (duty cycle < 98%) and a free- running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).

• RBW = 1 MHz & VBW ≥ 3 X RBW

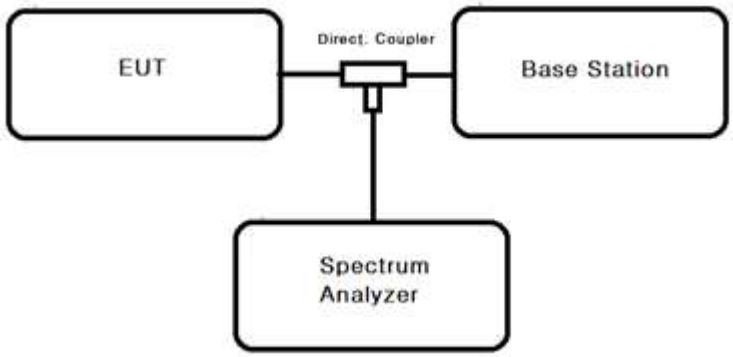
• Detector = RMS & Trace mode = power averaging (rms).

• Sweep time = Auto couple

• Number of sweep point ≥ 2 X span / RBW

• The trace was allowed to stabilize

11.3 Test Setup

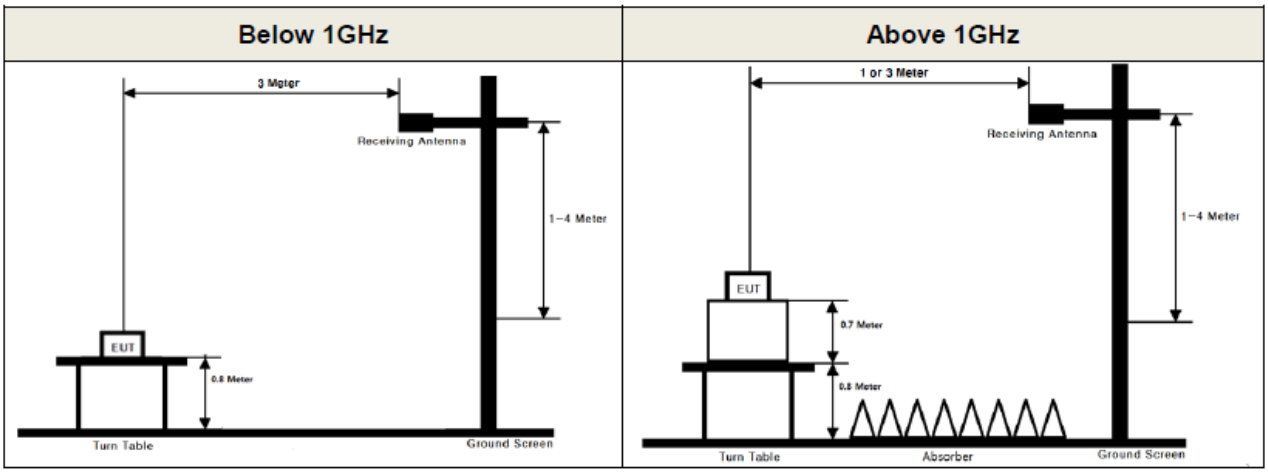


Limit

A limit of -30 dBm/MHz the frequency rage greater than (B+5) MHz from the edge of the frequency band.

12. RADIATED SPURIOUS EMISSIONS

12.1Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

12.2 Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.12
- KDB971168 D01v03 - Section 6
- ANSI C63.26-2015 – Section 5.5

12.3 Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW ≥ 3 X RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.
For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT.

This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.
For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.
This measurement was performed with the EUT oriented in 3 orthogonal axis.

13. CONDUCTED OUTPUT POWER (TEST DATA)

- All modes of operation were investigated, and the worst-case configuration results are reported in this section

channel obw	Frequency	Modulation	1RB					MID RB			
			edge left	inner left	Mid	inner right	edge right	Low	MID	HI	Full RB
20	3460.02	BPSK	23.15	23.75	23.66	23.82	23.31	23.20	23.63	23.21	23.14
		QPSK	22.69	23.73	23.64	23.80	22.80	22.70	23.60	22.71	22.65
		16QAM	21.69	22.71	22.64	22.82	21.81	21.69	22.67	21.70	21.66
		64QAM	21.23	21.20	21.18	21.38	21.35	21.15	21.17	21.18	21.15
		256QAM	19.48	19.45	19.38	19.34	19.37	19.48	19.37	19.38	19.35
	3675.00	BPSK	23.22	23.71	23.62	23.68	23.13	23.22	23.62	23.15	23.18
		QPSK	22.71	23.70	23.62	23.69	22.61	22.72	23.64	22.61	22.69
		16QAM	21.86	22.77	22.59	23.66	21.63	21.74	22.66	21.65	21.70
		64QAM	21.39	21.29	21.14	21.15	21.12	21.24	21.27	21.16	21.21
		256QAM	19.53	19.55	19.42	19.40	19.42	19.52	19.45	19.44	19.37
	3889.98	BPSK	23.19	23.68	23.55	23.57	23.05	23.19	23.58	23.07	23.13
		QPSK	22.66	23.60	23.57	23.50	22.56	22.67	23.57	22.56	22.61
		16QAM	21.69	22.62	22.50	22.52	21.50	21.66	22.60	21.54	21.61
		64QAM	21.22	21.18	21.05	21.04	21.06	21.18	21.08	21.05	21.13
		256QAM	19.06	19.05	19.04	19.05	19.06	19.04	19.05	19.05	19.07
30	3465.00	BPSK	23.13	23.61	23.47	23.64	23.15	23.16	23.59	23.13	23.20
		QPSK	22.47	23.59	23.45	23.58	22.72	22.20	23.57	22.62	22.72
		16QAM	21.54	22.57	22.42	22.71	21.71	21.51	22.59	21.61	21.75
		64QAM	21.01	21.09	20.92	21.24	21.24	21.02	21.03	21.15	21.23
		256QAM	19.55	19.62	19.46	19.43	19.41	19.55	19.48	19.53	19.48
	3675.00	BPSK	23.01	23.51	23.21	23.71	23.21	23.19	23.79	23.21	23.18
		QPSK	22.50	23.52	22.67	23.68	22.72	22.71	23.72	22.78	22.69
		16QAM	21.52	22.51	21.64	22.68	21.71	21.72	22.77	21.73	21.70
		64QAM	21.11	21.04	21.21	21.22	21.28	21.21	21.28	21.27	21.20
		256QAM	19.51	19.57	19.42	19.38	19.39	19.53	19.46	19.47	19.49
	3885.00	BPSK	23.15	23.61	23.54	23.74	23.24	23.09	23.61	23.09	23.07
		QPSK	22.61	23.59	23.51	23.71	22.75	22.59	23.58	22.57	22.61
		16QAM	21.62	22.65	22.52	22.75	21.73	21.61	22.59	21.52	21.59
		64QAM	21.12	21.21	21.09	21.27	21.27	21.19	21.07	21.07	21.11

		256QAM	19.56	19.61	19.44	19.43	19.44	19.55	19.47	19.45	19.43
40	3470.01	BPSK	23.22	23.70	23.51	23.72	23.28	23.18	23.60	23.16	23.07
		QPSK	22.50	23.64	23.34	23.67	22.71	22.51	23.41	22.51	22.57
		16QAM	21.65	22.59	22.28	22.65	21.65	21.55	22.42	21.50	21.60
		64QAM	21.21	21.19	20.85	21.15	21.14	21.02	20.94	21.00	21.10
		256QAM	20.30	20.27	20.21	20.31	20.35	20.25	20.27	20.25	20.25
	3675.00	BPSK	22.91	23.42	23.47	23.71	23.18	23.01	23.55	23.12	23.17
		QPSK	22.38	23.45	23.48	23.69	22.67	22.52	23.52	22.64	22.69
		16QAM	21.41	22.41	22.42	22.72	21.65	21.49	22.59	21.63	21.68
		64QAM	20.92	20.93	21.04	21.01	21.22	21.02	21.08	21.16	21.19
		256QAM	20.26	20.24	20.16	20.28	20.28	20.26	20.26	20.26	20.27
	3879.99	BPSK	22.82	23.27	23.11	23.19	22.68	22.75	23.22	22.67	21.19
		QPSK	22.33	23.31	23.10	23.21	22.21	22.24	23.19	22.17	22.68
		16QAM	21.27	22.31	22.08	22.21	21.16	21.23	22.21	21.21	21.69
		64QAM	20.85	20.85	20.65	20.71	20.73	20.72	20.72	20.69	21.18
		256QAM	20.31	20.29	20.19	20.32	20.33	20.29	20.28	20.29	20.27
50	3475.02	BPSK	22.98	23.47	23.30	23.61	23.14	22.95	23.51	23.03	23.13
		QPSK	22.35	23.31	23.17	23.48	22.45	22.31	23.31	22.37	22.63
		16QAM	21.33	22.28	22.15	22.41	21.42	21.31	22.33	21.42	21.64
		64QAM	20.85	20.84	20.71	20.96	20.93	20.81	20.82	20.88	21.14
		256QAM	20.12	20.15	20.19	20.08	20.14	20.21	20.15	20.21	20.17
	3675.00	BPSK	22.63	23.25	23.52	23.57	23.05	22.88	23.63	23.02	23.20
		QPSK	22.16	23.22	23.57	23.54	22.54	22.41	23.57	22.51	22.71
		16QAM	21.18	22.21	22.43	22.52	21.51	21.39	22.63	21.53	21.73
		64QAM	20.65	20.78	21.02	21.06	21.06	20.92	21.09	21.03	21.24
		256QAM	20.08	20.12	20.14	20.05	20.11	20.18	20.20	20.17	20.15
	3874.98	BPSK	23.12	23.63	23.56	23.51	22.97	23.16	23.65	23.11	23.21
		QPSK	22.62	23.69	23.57	23.48	22.48	22.63	23.63	22.57	22.69
		16QAM	21.60	22.58	22.53	22.42	21.47	21.72	22.68	21.58	21.70
		64QAM	21.15	21.14	21.12	20.97	21.01	21.21	21.13	21.03	21.20
		256QAM	20.11	20.16	20.17	20.07	20.16	20.19	20.15	20.18	20.16
60	3480.00	BPSK	23.02	23.47	23.54	23.71	23.21	23.01	23.64	23.17	23.28
		QPSK	22.57	23.41	23.51	23.67	22.79	22.56	23.57	22.80	22.82
		16QAM	21.59	22.38	22.48	22.61	21.75	21.59	22.55	21.78	21.81
		64QAM	21.08	20.93	21.01	21.15	21.29	21.08	21.07	21.25	21.31
		256QAM	20.05	20.09	20.26	20.07	20.08	20.19	20.25	20.19	20.15

	3675.00	BPSK	22.95	23.42	23.54	23.77	23.21	23.17	23.74	23.19	23.18
		QPSK	22.37	23.40	23.62	23.75	22.71	22.68	23.76	22.70	22.68
		16QAM	21.43	22.37	22.53	22.68	21.72	21.67	22.77	21.72	21.70
		64QAM	21.01	20.94	21.11	21.21	21.24	21.17	21.29	21.21	21.20
		256QAM	20.03	20.06	20.22	20.02	20.01	20.16	20.22	20.17	20.13
	3870.00	BPSK	23.01	23.53	23.70	23.77	23.25	23.22	23.79	23.31	23.22
		QPSK	22.52	23.52	23.69	23.75	22.75	22.75	23.78	22.83	22.76
		16QAM	21.50	22.52	22.68	22.73	21.77	21.73	22.81	21.81	21.78
		64QAM	21.05	20.99	21.19	21.29	21.27	21.24	21.33	21.35	21.29
		256QAM	20.06	20.09	20.25	20.04	20.06	20.19	20.25	20.18	20.18
70	3485.01	BPSK	22.92	23.41	23.58	23.79	23.23	23.08	23.11	23.24	23.25
		QPSK	22.45	23.49	23.62	23.77	22.71	22.51	22.59	22.67	22.76
		16QAM	21.38	22.38	22.56	22.69	21.72	21.45	21.57	21.65	21.73
		64QAM	21.01	20.98	21.11	21.21	21.21	21.02	21.01	21.21	21.26
		256QAM	20.13	20.11	20.29	20.01	20.03	20.27	20.25	20.17	20.21
	3675.00	BPSK	23.05	23.51	23.79	23.79	23.26	23.18	23.21	23.31	23.20
		QPSK	22.57	23.49	23.81	23.87	22.75	22.67	22.72	22.73	22.72
		16QAM	21.48	22.51	22.72	22.72	21.79	21.68	21.78	21.78	21.69
		64QAM	21.09	21.08	21.29	21.35	21.39	21.19	21.19	21.29	21.19
		256QAM	20.15	20.13	20.32	20.04	20.05	20.30	20.29	20.20	20.24
	3864.99	BPSK	23.04	23.45	23.68	23.51	23.09	23.07	23.19	23.15	23.20
		QPSK	22.54	23.44	23.74	23.53	22.58	22.57	22.64	22.67	22.72
		16QAM	21.54	22.51	22.69	22.57	21.57	21.49	21.68	21.75	21.71
		64QAM	21.15	21.04	21.22	21.06	21.16	20.98	21.18	21.18	21.24
		256QAM	20.17	20.16	20.35	20.07	20.08	20.35	20.31	20.25	20.27
80	3490.02	BPSK	23.07	23.53	23.57	23.61	23.11	23.08	23.65	23.21	23.29
		QPSK	22.57	23.50	23.54	23.59	22.58	22.54	23.65	22.73	22.77
		16QAM	21.58	22.48	22.53	22.53	21.59	21.55	22.64	21.71	21.77
		64QAM	21.08	21.01	21.09	21.03	21.11	21.04	21.13	21.24	21.31
		256QAM	20.30	20.26	20.33	20.07	20.05	20.31	20.32	20.24	19.29
	3675.00	BPSK	23.03	23.55	23.65	23.65	23.15	23.68	23.72	23.22	23.16
		QPSK	22.65	23.57	23.64	23.67	22.62	23.66	23.71	22.67	22.70
		16QAM	21.58	22.52	22.62	22.69	21.40	22.65	22.69	21.69	21.71
		64QAM	21.08	21.08	21.16	21.15	21.21	21.17	21.15	21.20	21.19
		256QAM	20.20	20.21	20.35	20.08	20.05	20.31	20.33	20.21	19.28
	3859.98	BPSK	23.09	23.62	23.63	23.32	22.81	22.99	23.62	23.04	23.15

		QPSK	22.59	23.61	23.59	23.36	22.35	22.46	23.54	22.52	22.67
		16QAM	21.63	22.36	22.57	22.31	21.31	21.47	22.63	21.61	21.68
		64QAM	21.03	20.96	21.11	20.82	20.85	20.98	21.15	21.07	21.20
		256QAM	20.10	20.23	20.32	20.04	20.02	20.27	20.31	20.20	19.15
90	3495.00	BPSK	23.05	23.52	23.50	23.72	23.20	23.10	23.71	23.35	23.16
		QPSK	22.45	23.51	23.44	23.70	22.65	22.51	23.65	22.77	22.68
		16QAM	21.42	22.50	22.37	22.68	21.63	21.58	22.61	21.75	21.67
		64QAM	21.01	21.04	21.01	21.19	21.14	21.08	21.13	21.25	21.20
		256QAM	20.19	20.20	20.29	20.31	20.25	20.35	20.38	20.37	20.24
	3675.00	BPSK	23.11	23.65	23.44	23.71	23.21	23.01	23.67	23.25	23.12
		QPSK	22.63	23.64	23.48	23.74	22.72	22.48	23.64	22.72	22.65
		16QAM	21.59	22.55	22.49	22.69	21.64	21.55	22.69	21.74	21.68
		64QAM	21.12	21.14	20.95	21.24	21.19	21.01	21.21	21.24	21.20
		256QAM	20.18	20.19	20.18	20.08	20.08	20.27	20.32	20.22	19.16
	3855.00	BPSK	23.15	23.67	23.62	23.24	22.75	23.07	23.49	23.01	23.12
		QPSK	22.64	23.72	23.59	23.25	22.28	22.55	23.47	22.57	22.62
		16QAM	21.69	22.68	22.54	22.28	21.28	21.57	22.46	21.59	21.64
		64QAM	21.18	21.21	21.12	20.81	20.29	21.08	21.01	21.09	21.13
		256QAM	19.95	19.98	19.84	20.20	20.25	20.12	20.10	20.29	20.14
100	3500.01	BPSK	23.20	23.66	23.73	23.80	23.17	23.32	23.78	23.30	23.21
		QPSK	22.66	23.62	23.74	23.80	22.80	22.85	23.72	23.30	22.74
		16QAM	21.65	22.62	22.72	22.81	21.80	21.90	22.87	21.78	21.77
		64QAM	21.16	21.16	21.33	21.37	21.37	21.38	21.37	21.36	21.27
		256QAM	19.12	19.20	19.25	19.36	19.34	19.45	19.33	19.45	19.34
	3675.00	BPSK	23.19	23.64	23.58	23.69	23.19	23.19	23.75	23.19	23.14
		QPSK	22.71	23.64	23.59	23.68	22.67	22.69	23.73	22.70	22.65
		16QAM	21.70	22.66	22.58	22.67	21.69	21.69	22.74	21.70	21.67
		64QAM	21.22	21.23	21.10	21.24	21.19	21.20	21.23	21.16	21.14
		256QAM	19.20	19.23	19.16	19.22	19.16	19.28	19.26	19.16	19.19
	3849.99	BPSK	23.12	23.57	23.45	23.61	23.09	23.13	23.75	23.31	23.13
		QPSK	22.60	23.57	23.41	23.63	22.60	22.65	23.73	22.81	22.65
		16QAM	21.59	22.55	22.45	22.61	21.57	21.66	22.74	21.82	21.68
		64QAM	21.10	21.13	21.00	21.13	21.15	21.16	21.25	21.27	21.19
		256QAM	19.13	19.07	19.03	19.12	19.18	19.20	19.26	19.34	19.12

14. EFFECTIVE RADIATED POWER (TEST DATA)

- All modes of operation were investigated, and the worst-case configuration results are reported in this section

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB Size/ Offset	Pol (H/V)	Measured Level (dBm)	Ant Gain(dBI)	ERP (dBm)	ERP (W)
20	3 460.01	π/2 BPSK	1/1	H	3.61	12.71	16.32	0.043
		QPSK	1/1	H	4.07	12.71	16.78	0.048
		16QAM	1/1	H	2.95	12.71	15.66	0.037
		64QAM	1/1	H	2.08	12.71	14.79	0.030
		256QAM	1/1	H	0.74	12.71	13.45	0.022
	3 675.00	π/2 BPSK	1/1	H	7.38	12.72	20.10	0.102
		QPSK	1/1	H	7.30	12.72	20.02	0.100
		16QAM	1/1	H	5.78	12.72	18.50	0.071
		64QAM	1/1	H	4.47	12.72	17.19	0.052
		256QAM	1/1	H	3.23	12.72	15.95	0.039
	3 889.99	π/2 BPSK	1/1	H	7.50	12.70	20.20	0.105
		QPSK	1/1	H	7.09	12.70	19.79	0.095
		16QAM	1/1	H	5.43	12.70	18.13	0.065
		64QAM	1/1	H	4.05	12.70	16.75	0.047
		256QAM	1/1	H	1.91	12.70	14.61	0.029
30	3 465.00	π/2 BPSK	1/1	H	4.66	12.70	17.36	0.054
		QPSK	1/1	H	4.16	12.70	16.86	0.049
		16QAM	1/1	H	3.05	12.70	15.75	0.038
		64QAM	1/1	H	2.18	12.70	14.88	0.031
		256QAM	1/1	H	0.93	12.70	13.63	0.023
	3 675.00	π/2 BPSK	1/1	H	7.11	12.72	19.83	0.096
		QPSK	1/1	H	6.55	12.72	19.27	0.085
		16QAM	1/1	H	5.49	12.72	18.21	0.066
		64QAM	1/1	H	4.60	12.72	17.32	0.054
		256QAM	1/1	H	3.84	12.72	16.56	0.045
	3 885.00	π/2 BPSK	1/1	H	8.50	12.70	21.20	0.132
		QPSK	1/1	H	7.93	12.70	20.63	0.116
		16QAM	1/1	H	6.37	12.70	19.07	0.081
		64QAM	1/1	H	5.49	12.70	18.19	0.066

		256QAM	1/1	H	2.83	12.70	15.53	0.036
40	3 470.01	π/2 BPSK	1/1	H	5.17	12.68	17.85	0.061
		QPSK	1/1	H	4.87	12.68	17.55	0.057
		16QAM	1/1	H	4.29	12.68	16.97	0.050
		64QAM	1/1	H	3.36	12.68	16.04	0.040
		256QAM	1/1	H	1.01	12.68	13.69	0.023
	3 675.00	π/2 BPSK	1/1	H	7.44	12.72	20.16	0.104
		QPSK	1/1	H	6.57	12.72	19.29	0.085
		16QAM	1/1	H	5.48	12.72	18.20	0.066
		64QAM	1/1	H	3.73	12.72	16.45	0.044
		256QAM	1/1	H	2.82	12.72	15.54	0.036
	3 879.99	π/2 BPSK	1/1	H	7.80	12.70	20.50	0.112
		QPSK	1/1	H	7.71	12.70	20.41	0.110
		16QAM	1/1	H	6.43	12.70	19.13	0.082
		64QAM	1/1	H	5.18	12.70	17.88	0.061
		256QAM	1/1	H	2.56	12.70	15.26	0.034
50	3 475.02	π/2 BPSK	1/1	H	5.47	12.67	18.14	0.065
		QPSK	1/1	H	4.84	12.67	17.51	0.056
		16QAM	1/1	H	3.66	12.67	16.33	0.043
		64QAM	1/1	H	3.07	12.67	15.74	0.037
		256QAM	1/1	H	0.86	12.67	13.53	0.023
	3 675.00	π/2 BPSK	1/1	H	7.66	12.72	20.38	0.109
		QPSK	1/1	H	7.43	12.72	20.15	0.104
		16QAM	1/1	H	6.29	12.72	19.01	0.080
		64QAM	1/1	H	5.63	12.72	18.35	0.068
		256QAM	1/1	H	3.63	12.72	16.35	0.043
	3 3874.99	π/2 BPSK	1/1	H	7.20	12.70	19.90	0.098
		QPSK	1/1	H	6.76	12.70	19.46	0.088
		16QAM	1/1	H	5.43	12.70	18.13	0.065
		64QAM	1/1	H	4.06	12.70	16.76	0.047
		256QAM	1/1	H	2.57	12.70	15.27	0.034
60	3 480.00	π/2 BPSK	1/1	H	5.44	12.66	18.10	0.065
		QPSK	1/1	H	4.94	12.66	17.60	0.058
		16QAM	1/1	H	3.21	12.66	15.87	0.039
		64QAM	1/1	H	2.17	12.66	14.83	0.030
		256QAM	1/1	H	0.91	12.66	13.57	0.023

	3 675.00	π/2 BPSK	1/1	H	7.68	12.72	20.40	0.110
		QPSK	1/1	H	7.52	12.72	20.24	0.106
		16QAM	1/1	H	6.19	12.72	18.91	0.078
		64QAM	1/1	H	5.86	12.72	18.58	0.072
		256QAM	1/1	H	3.18	12.72	15.90	0.039
	3 780.00	π/2 BPSK	1/1	H	7.88	12.70	20.58	0.114
		QPSK	1/1	H	7.42	12.70	20.12	0.103
		16QAM	1/1	H	5.48	12.70	18.18	0.066
		64QAM	1/1	H	4.39	12.70	17.09	0.051
		256QAM	1/1	H	2.57	12.70	15.27	0.034
70	3 485.01	π/2 BPSK	1/1	H	4.95	12.64	17.59	0.057
		QPSK	1/1	H	4.83	12.64	17.47	0.056
		16QAM	1/1	H	3.46	12.64	16.10	0.041
		64QAM	1/1	H	3.32	12.64	15.96	0.039
		256QAM	1/1	H	1.18	12.64	13.82	0.024
	3 675.00	π/2 BPSK	1/1	H	7.26	12.72	19.98	0.100
		QPSK	1/1	H	7.13	12.72	19.85	0.097
		16QAM	1/1	H	6.20	12.72	18.92	0.078
		64QAM	1/1	H	5.70	12.72	18.42	0.070
		256QAM	1/1	H	2.87	12.72	15.59	0.036
	3 859.9	π/2 BPSK	1/1	H	9.35	12.70	22.05	0.160
		QPSK	1/1	H	8.69	12.70	21.39	0.138
		16QAM	1/1	H	7.48	12.70	20.18	0.104
		64QAM	1/1	H	6.39	12.70	19.09	0.081
		256QAM	1/1	H	3.17	12.70	15.87	0.039
80	3 490.02	π/2 BPSK	1/0	H	4.69	12.62	17.31	0.054
		QPSK	1/0	H	4.14	12.62	16.76	0.047
		16QAM	1/0	H	3.19	12.62	15.81	0.038
		64QAM	1/0	H	2.49	12.62	15.11	0.032
		256QAM	1/0	H	1.13	12.62	13.75	0.024
	3 675.00	π/2 BPSK	1/0	H	7.83	12.72	20.55	0.114
		QPSK	1/0	H	7.60	12.72	20.32	0.108
		16QAM	1/0	H	6.74	12.72	19.46	0.088
		64QAM	1/0	H	6.16	12.72	18.88	0.077
		256QAM	1/0	H	3.84	12.72	16.56	0.045
	3 859.99	π/2 BPSK	1/0	H	8.81	12.70	21.51	0.142

		QPSK	1/0	H	6.54	12.70	19.24	0.084
		16QAM	1/0	H	5.85	12.70	18.55	0.072
		64QAM	1/0	H	5.07	12.70	17.77	0.060
		256QAM	1/0	H	3.60	12.70	16.30	0.043
90	3 495.00	π/2 BPSK	1/243	H	5.57	12.61	18.18	0.066
		QPSK	1/243	H	5.25	12.61	17.86	0.061
		16QAM	1/243	H	4.16	12.61	16.77	0.048
		64QAM	1/243	H	3.50	12.61	16.11	0.041
		256QAM	1/243	H	1.29	12.61	13.90	0.025
	3 675.00	π/2 BPSK	1/243	H	7.68	12.72	20.40	0.110
		QPSK	1/243	H	7.04	12.72	19.76	0.095
		16QAM	1/243	H	5.48	12.72	18.20	0.066
		64QAM	1/243	H	4.85	12.72	17.57	0.057
		256QAM	1/243	H	1.32	12.72	14.04	0.025
	3 855.00	π/2 BPSK	1/243	H	8.64	12.70	21.34	0.136
		QPSK	1/243	H	6.24	12.70	18.94	0.078
		16QAM	1/243	H	5.22	12.70	17.92	0.062
		64QAM	1/243	H	4.79	12.70	17.49	0.056
		256QAM	1/243	H	3.37	12.70	16.07	0.040
100	3 500.01	π/2 BPSK	1/136	H	6.09	12.59	18.68	0.074
		QPSK	1/136	H	4.30	12.59	16.89	0.049
		16QAM	1/136	H	3.46	12.59	16.05	0.040
		64QAM	1/136	H	3.05	12.59	15.64	0.037
		256QAM	1/136	H	1.29	12.59	13.88	0.024
	3 675.00	π/2 BPSK	1/136	H	7.31	12.72	20.03	0.101
		QPSK	1/136	H	7.06	12.72	19.78	0.095
		16QAM	1/136	H	5.95	12.72	18.67	0.074
		64QAM	1/136	H	4.32	12.72	17.04	0.051
		256QAM	1/136	H	0.90	12.72	13.62	0.023
	3 849.99	π/2 BPSK	1/136	H	8.66	12.70	21.36	0.137
		QPSK	1/136	H	7.12	12.70	19.82	0.096
		16QAM	1/136	H	6.18	12.70	18.88	0.077
		64QAM	1/136	H	5.05	12.70	17.75	0.060
		256QAM	1/136	H	2.47	12.70	15.17	0.033

15. RADIATED SPURIOUS EMISSIONS (TEST DATA)

- All modes of operation were investigated, and the worst-case configuration results are reported in this section

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB size/ offset	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
100	3 485.01 (632334)	π/2 BPSK	1/136	6 872.93	V	-61.68	12.44	-49.24	-13.00	36.24
		QPSK		6 872.67	V	-61.47	12.44	-49.03	-13.00	36.03
		16QAM		6 872.93	V	-61.09	12.44	-48.65	-13.00	35.65
		64QAM		6 872.67	V	-61.28	12.44	-48.84	-13.00	35.84
		256QAM		6 872.53	V	-61.73	12.44	-49.29	-13.00	36.29
	3 675.00 (645000)	π/2 BPSK	1/136	7 252.87	V	-59.57	11.57	-48.00	-13.00	35.00
		QPSK		7 252.87	V	-59.16	11.57	-47.59	-13.00	34.59
		16QAM		7 252.95	V	-59.44	11.57	-47.87	-13.00	34.87
		64QAM		7 253.00	V	-60.97	11.57	-49.40	-13.00	36.40
		256QAM		7 252.53	V	-61.60	11.57	-50.03	-13.00	37.03
	3 864.99 (657666)	π/2 BPSK	1/136	7 632.60	V	-60.67	11.93	-48.74	-13.00	35.74
		QPSK		7 632.53	V	-61.42	11.93	-49.49	-13.00	36.49
		16QAM		7 633.27	V	-60.89	11.93	-48.96	-13.00	35.96
		64QAM		7 633.07	V	-60.82	11.93	-48.89	-13.00	35.89
		256QAM		7 632.80	V	-60.97	11.93	-49.04	-13.00	36.04

ENDC MODE: NR n77 + LTE B2

Channel Bandwidth (MHz)	Frequency (MHz)	Modulation	RB size/ offset	Freq.(MHz)	Ant Pol (H/V)	Level at Antenna Terminal(dBm)	Substitute Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
100	3 675.00 (645000)	π/2 BPSK	1/136	5 620.35	V	-61.10	11.52	-49.58	-13.00	36.58
				7 250.32	V	-61.15	11.52	-49.63	-13.00	36.63
		QPSK		5 620.53	V	-64.16	11.52	-52.64	-13.00	39.64
				7 250.20	V	-61.80	11.52	-50.28	-13.00	37.28
		16QAM		5 619.98	V	-64.03	11.52	-52.51	-13.00	39.51
				7 250.31	V	-61.12	11.52	-49.60	-13.00	36.60
		64QAM		5 620.32	V	-63.98	11.52	-52.46	-13.00	39.46
				7 250.29	V	-61.30	11.52	-49.78	-13.00	36.78
		256QAM		5 620.32	V	-64.00	11.52	-52.48	-13.00	39.48
				7 250.22	V	-68.33	11.52	-56.81	-13.00	43.81

16. FREQUENCY STABILITY (TEST DATA)

Operting Frequency :	3 675.00 MHz
Reference Voltage :	3.90 Vd.c.
Deviatin Limit :	Emission must remain in Band

Voltage (%)	Power (Vdc)	Temperature (℃)	Frequency (Hz)	Deviation (%)
100	3.90	+20 ℃(Ref)	3674.999986	-0.000000381
100		-20	3674.999984	-0.000000435
100		-10	3674.999992	-0.000000218
100		**0**	3674.999998	-0.000000054
100		10	3675.000001	0.000000027
100		20	3674.999977	-0.000000626
100		30	3674.999996	-0.000000109
100		40	3674.999998	-0.000000054
100		50	3674.999987	-0.000000354
85	3.315	20	3674.999996	-0.000000109
115	4.485	20	3674.999989	-0.000000299

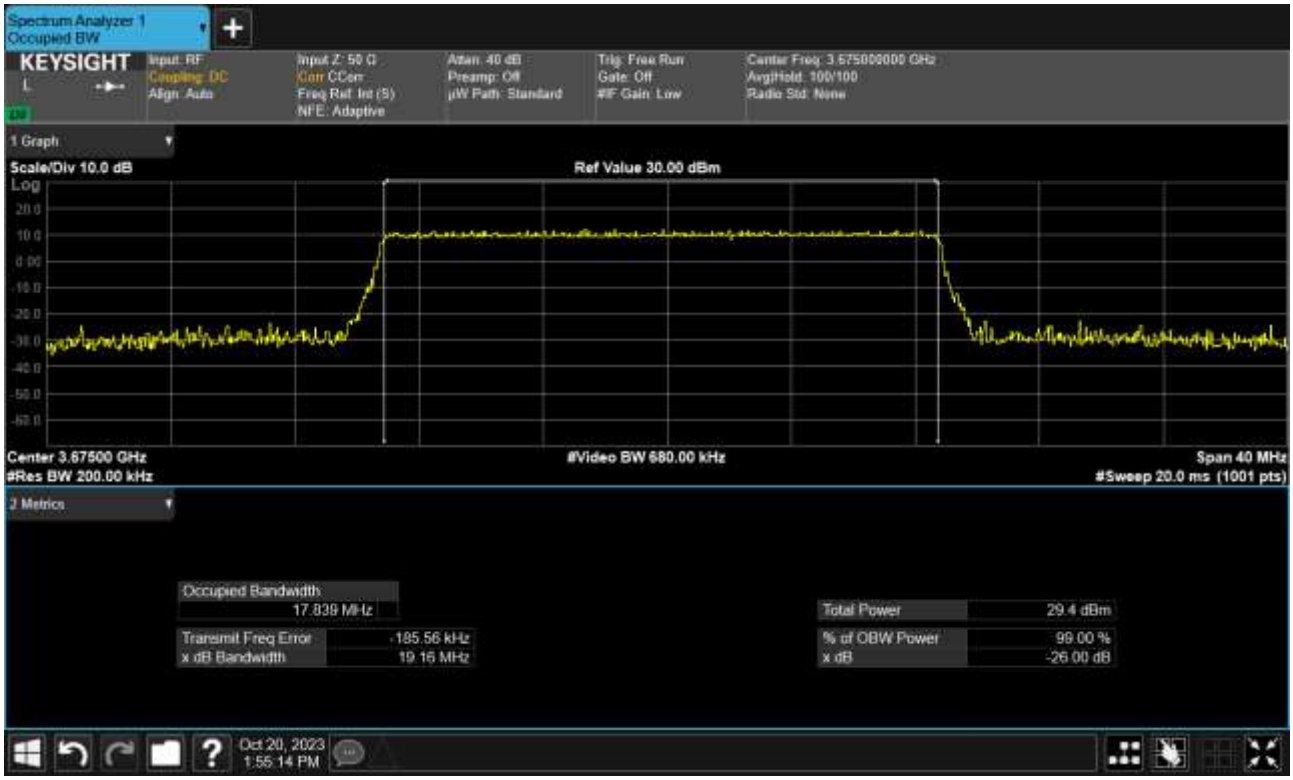
17. OCCUPIED BANDWIDTH (TEST DATA)

- All modes of operation were investigated, and the worst-case configuration results are reported in this section

BAND 77 Occupied Bandwidth Plot (20 MHz, 3 675.00 MHz, BPSK, Full RB)

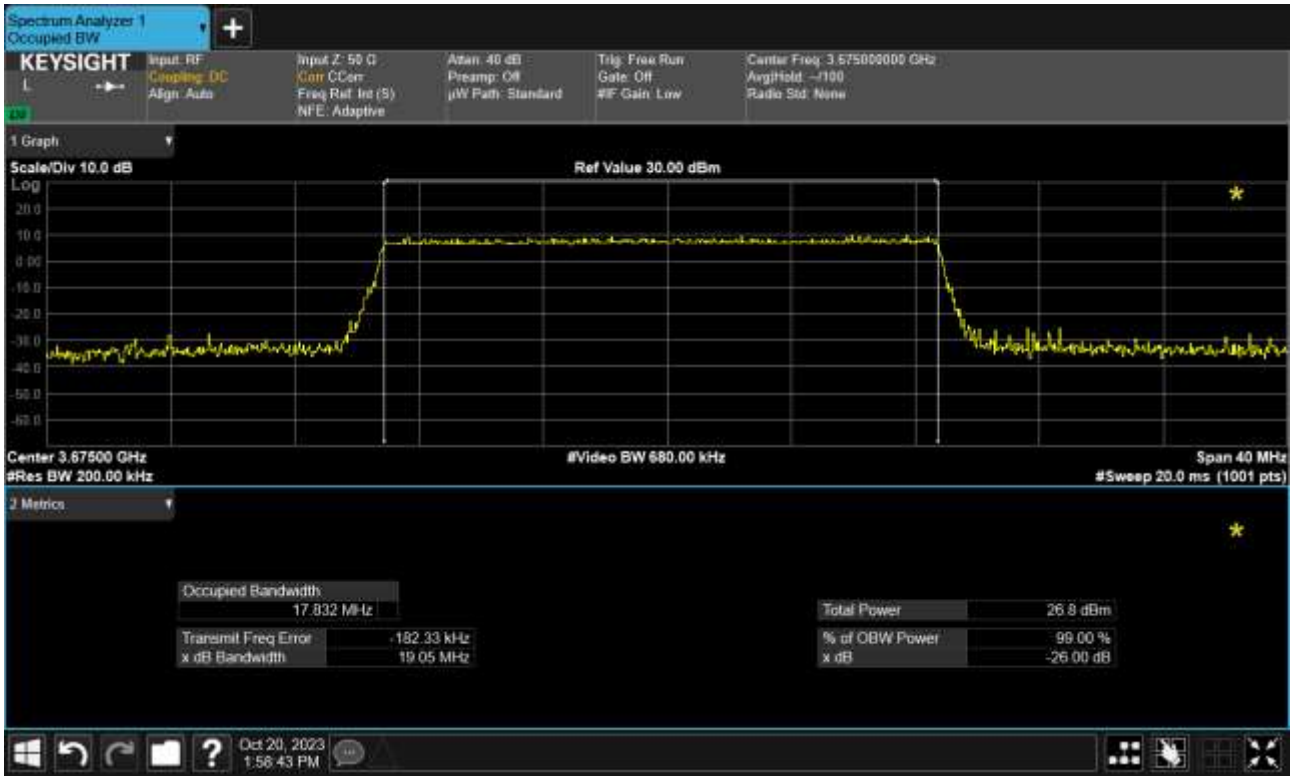
BAND 77 Occupied Bandwidth Plot (20 MHz, 3 675.00 MHz, QPSK, Full RB)

BAND 77 Occupied Bandwidth Plot (20 MHz, 3 675.00 MHz, 16QAM, Full RB)



BAND 77 Occupied Bandwidth Plot (20 MHz, 3 675.00 MHz, 64QAM, Full RB)

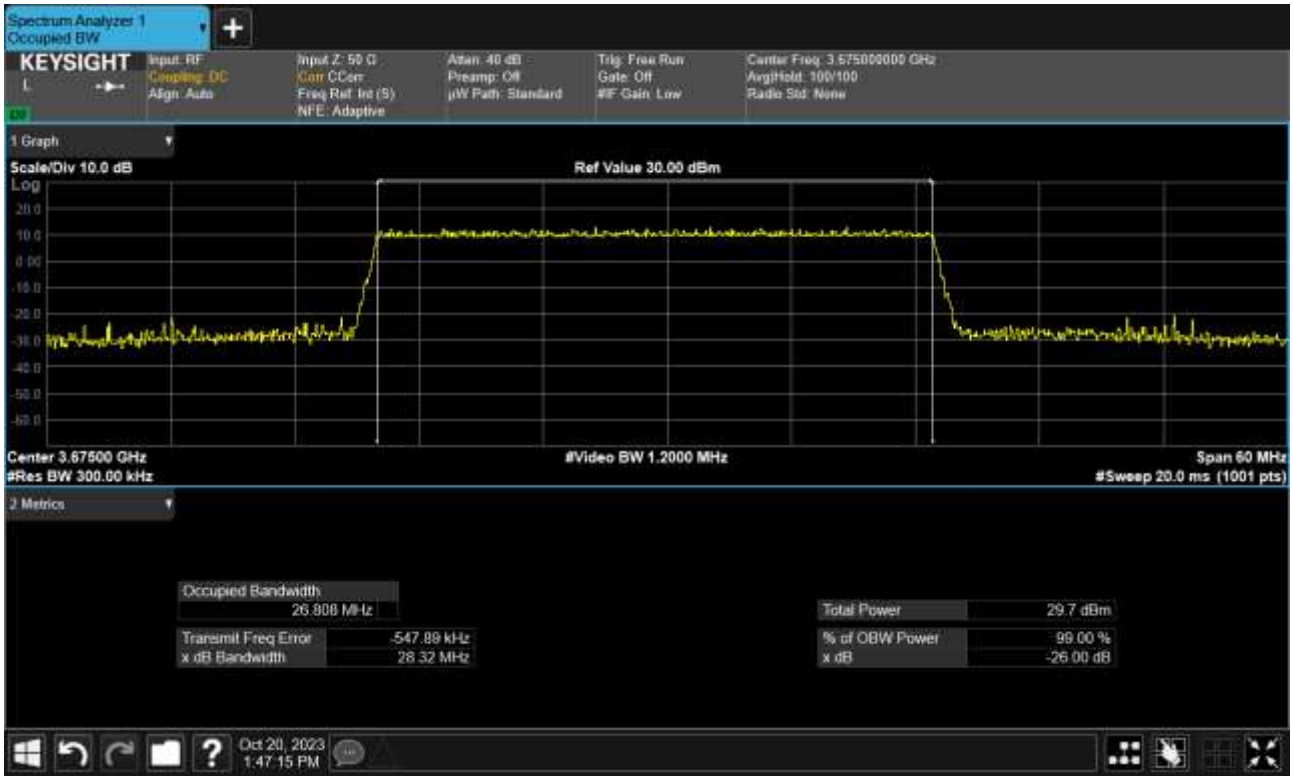
BAND 77 Occupied Bandwidth Plot (20 MHz, 3 675.00 MHz, 256QAM, Full RB)



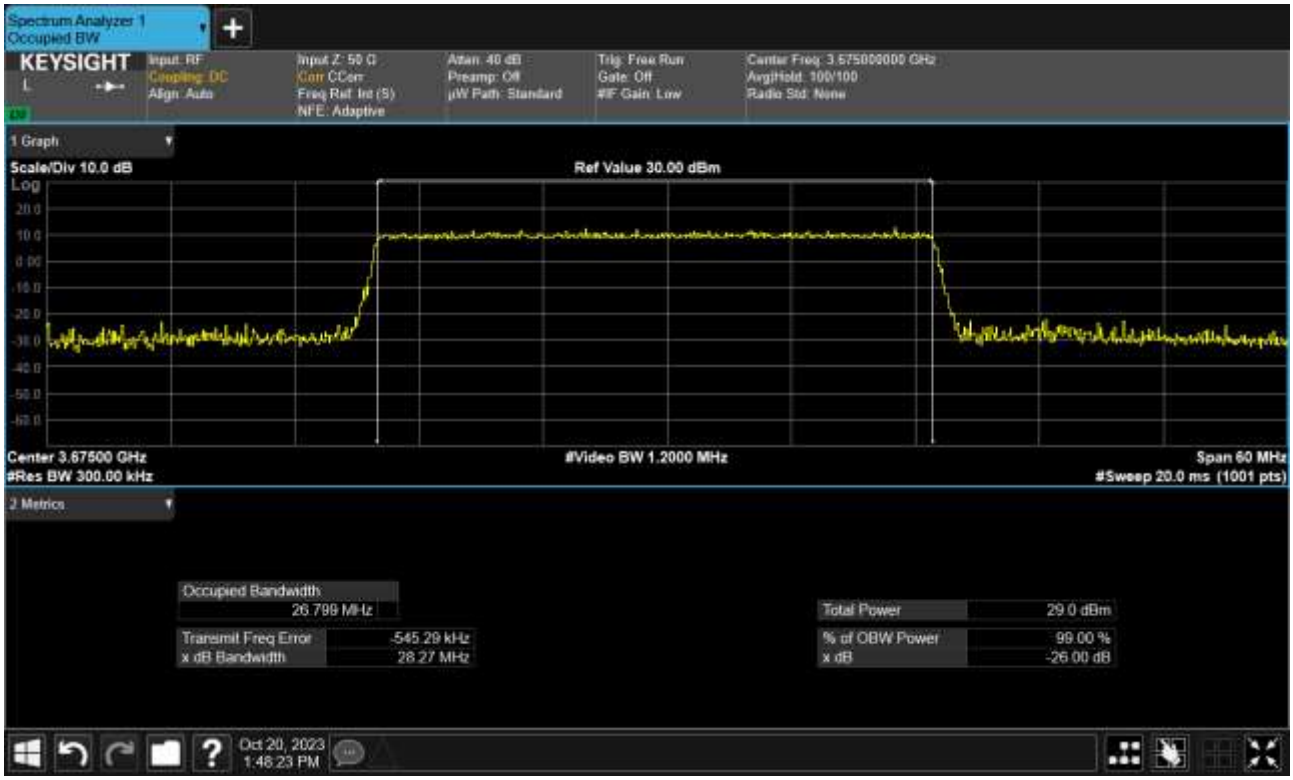
BAND 77 Occupied Bandwidth Plot (30 MHz, 3 675.00 MHz, BPSK, Full RB)

BAND 77 Occupied Bandwidth Plot (30 MHz, 3 675.00 MHz, QPSK, Full RB)

BAND 77 Occupied Bandwidth Plot (30 MHz, 3 675.00 MHz, 16QAM, Full RB)

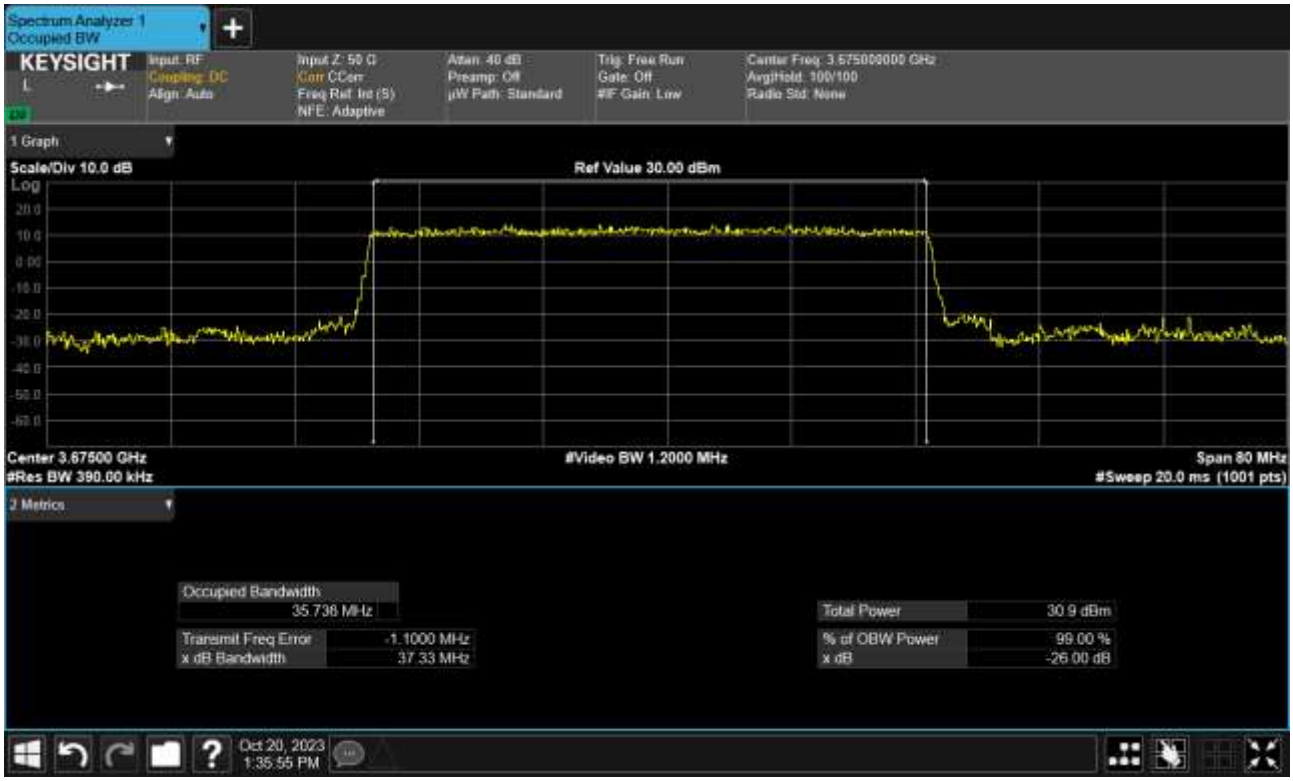


BAND 77 Occupied Bandwidth Plot (30 MHz, 3 675.00 MHz, 64QAM, Full RB)



BAND 77 Occupied Bandwidth Plot (30 MHz, 3 675.00 MHz, 256QAM, Full RB)

BAND 77 Occupied Bandwidth Plot (40 MHz, 3 675.00 MHz, BPSK, Full RB)



BAND 77 Occupied Bandwidth Plot (40 MHz, 3 675.00 MHz, QPSK, Full RB)

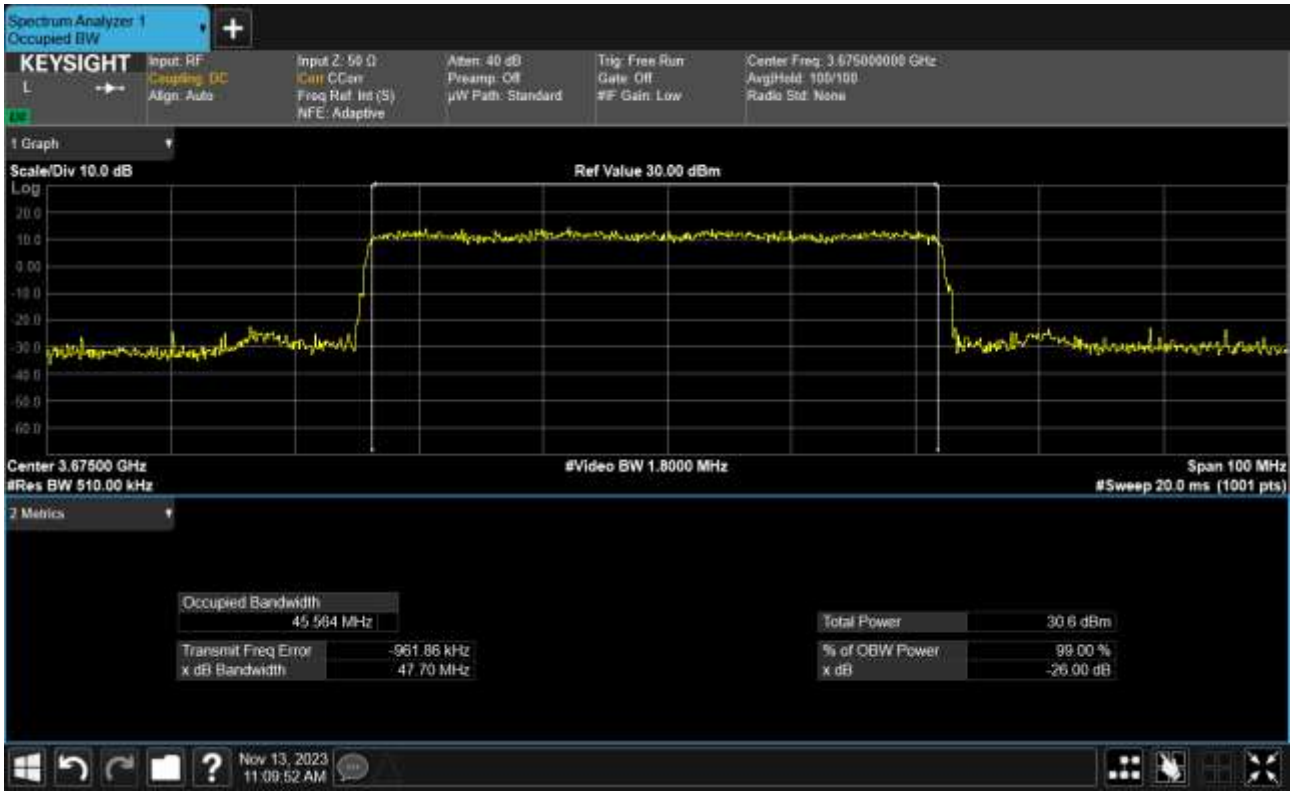
BAND 77 Occupied Bandwidth Plot (40 MHz, 3 675.00 MHz, 16QAM, Full RB)

BAND 77 Occupied Bandwidth Plot (40 MHz, 3 675.00 MHz, 64QAM, Full RB)

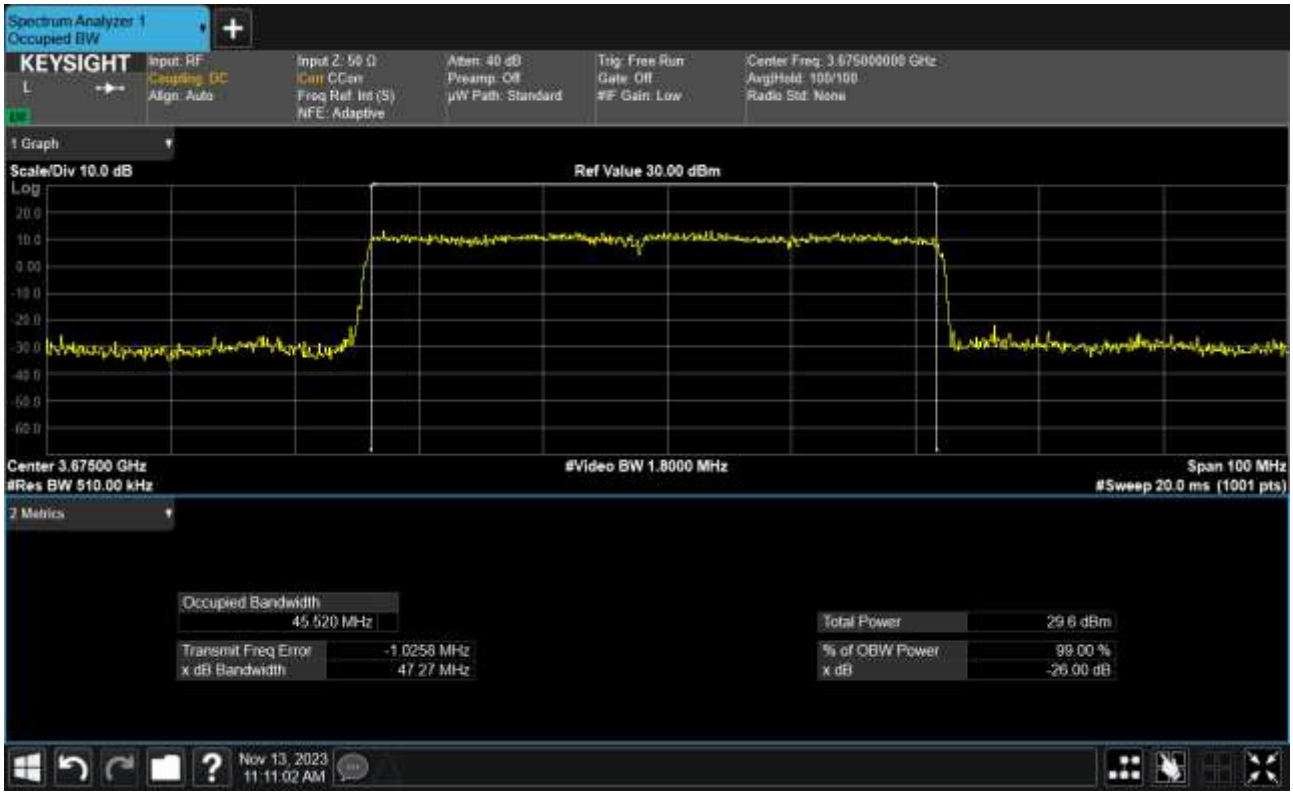
BAND 77 Occupied Bandwidth Plot (40 MHz, 3 675.00 MHz, 256QAM, Full RB)

BAND 77 Occupied Bandwidth Plot (50 MHz, 3 675.00 MHz, BPSK, Full RB)

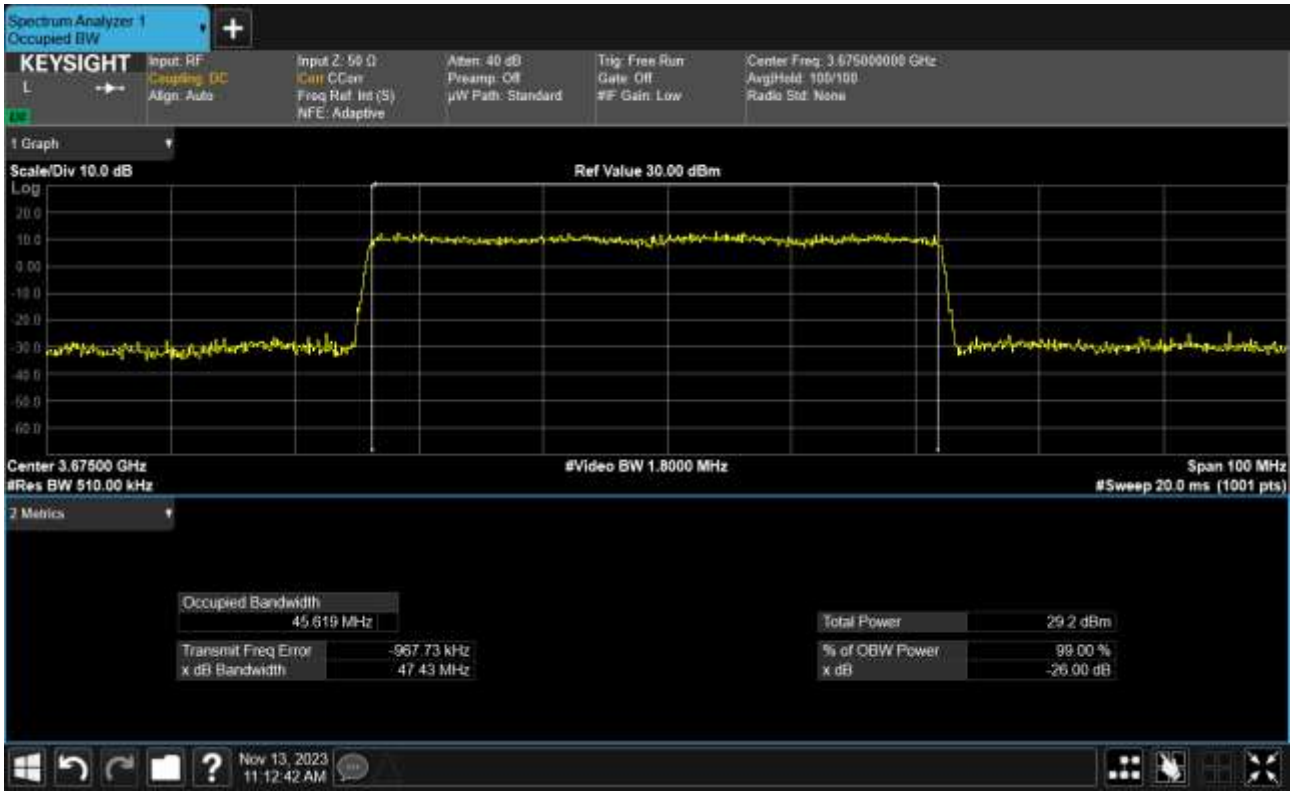
BAND 77 Occupied Bandwidth Plot (50 MHz, 3 675.00 MHz, QPSK, Full RB)



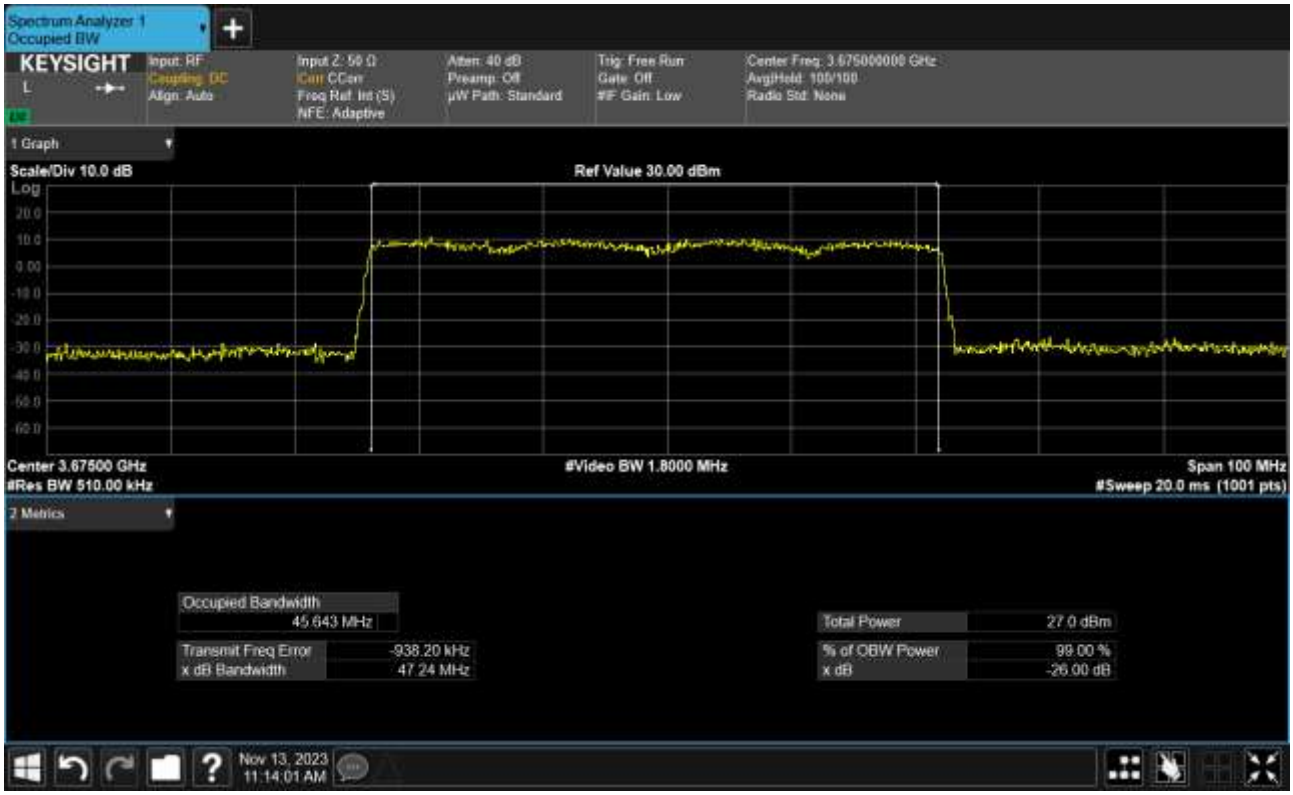
BAND 77 Occupied Bandwidth Plot (50 MHz, 3 675.00 MHz, 16QAM, Full RB)



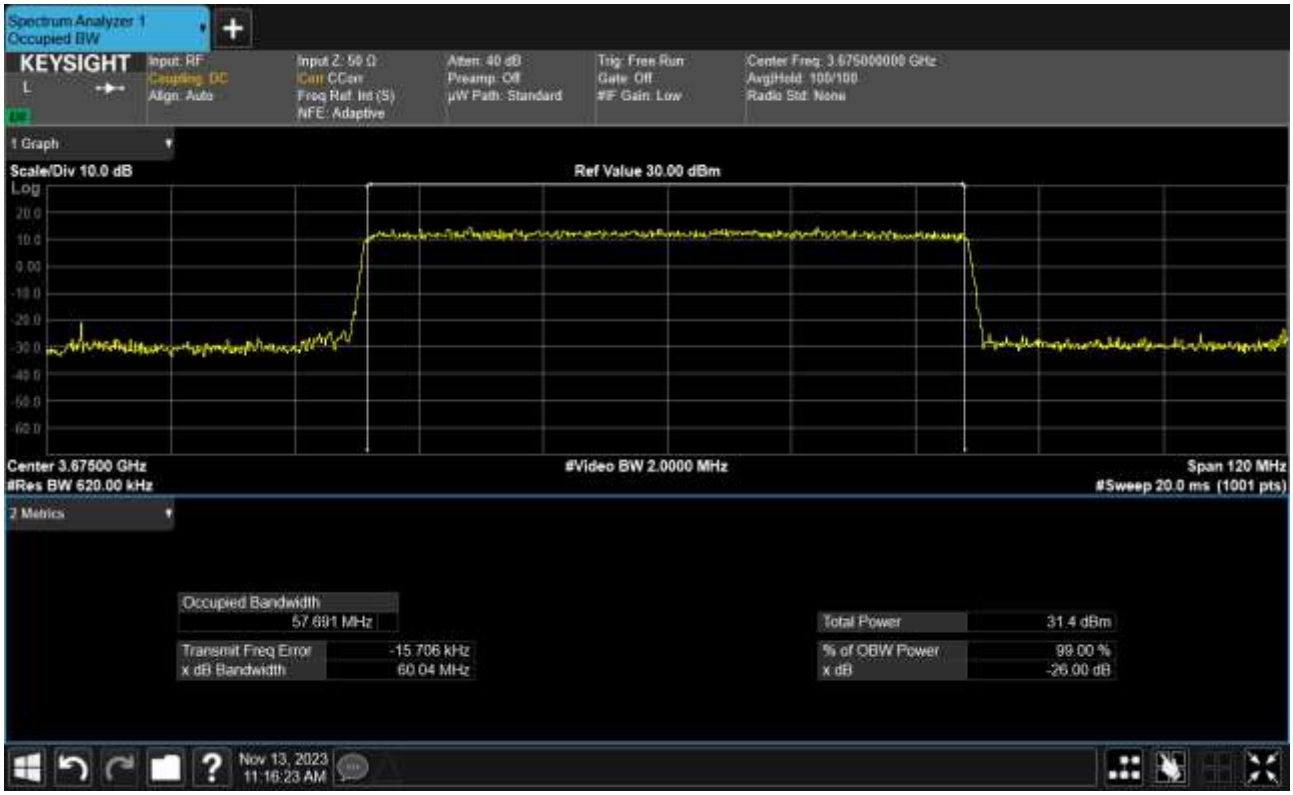
BAND 77 Occupied Bandwidth Plot (50 MHz, 3 675.00 MHz, 64QAM, Full RB)



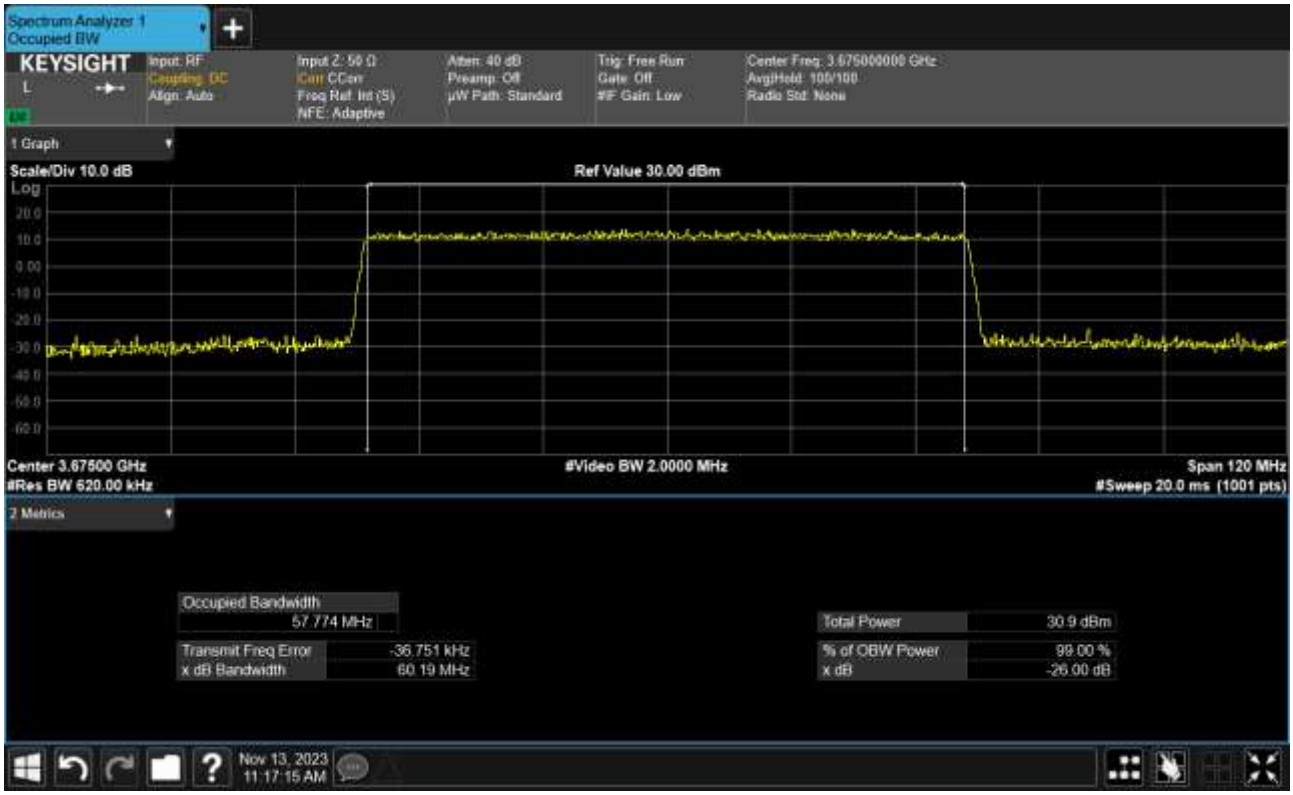
BAND 77 Occupied Bandwidth Plot (50 MHz, 3 675.00 MHz, 256QAM, Full RB)



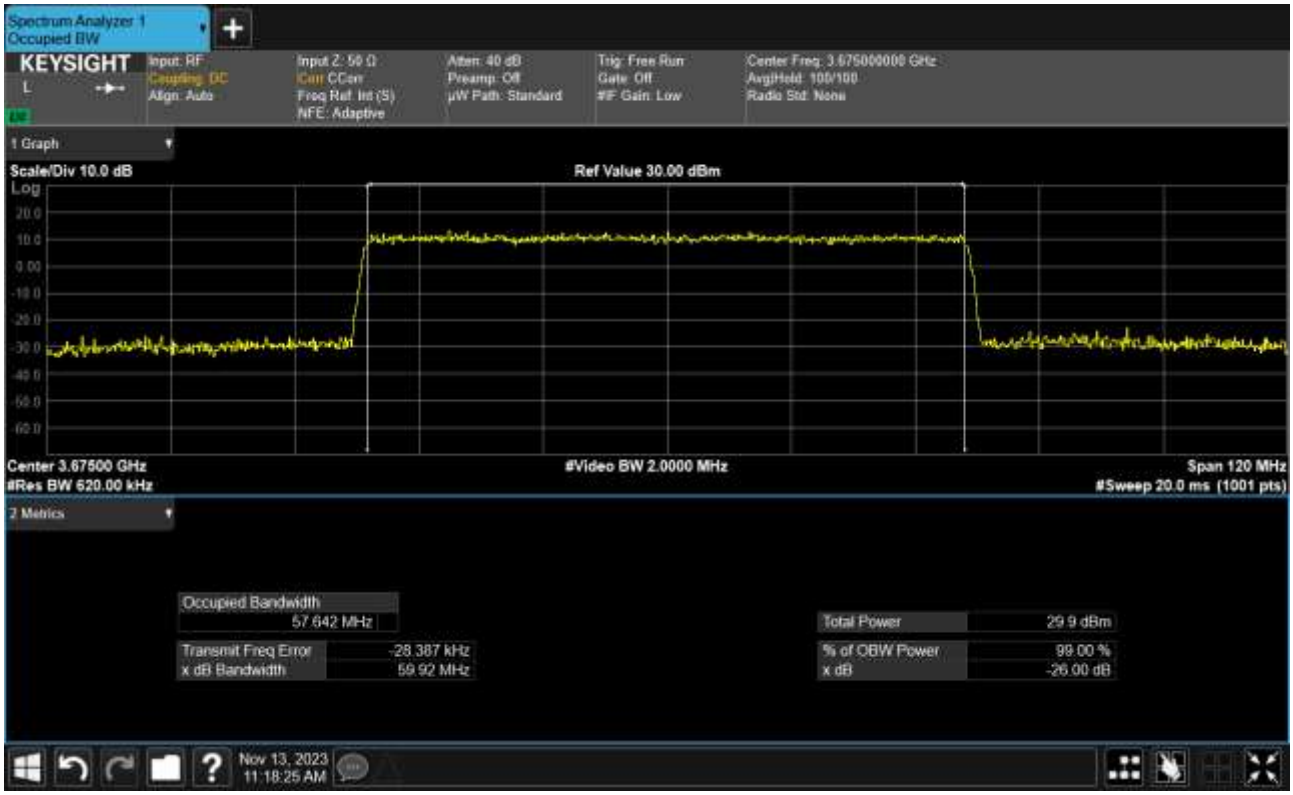
BAND 77 Occupied Bandwidth Plot (60 MHz, 3 675.00 MHz, BPSK, Full RB)



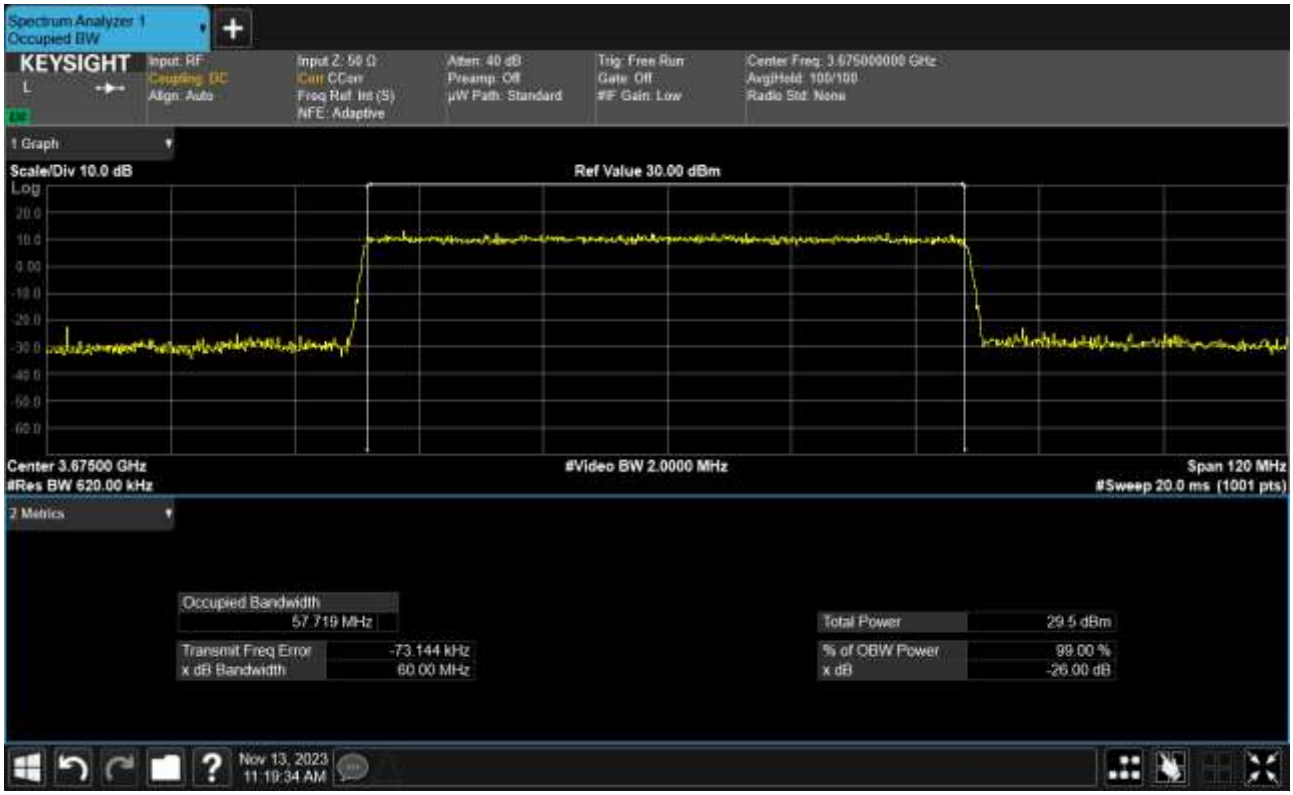
BAND 77 Occupied Bandwidth Plot (60 MHz, 3 675.00 MHz, QPSK, Full RB)



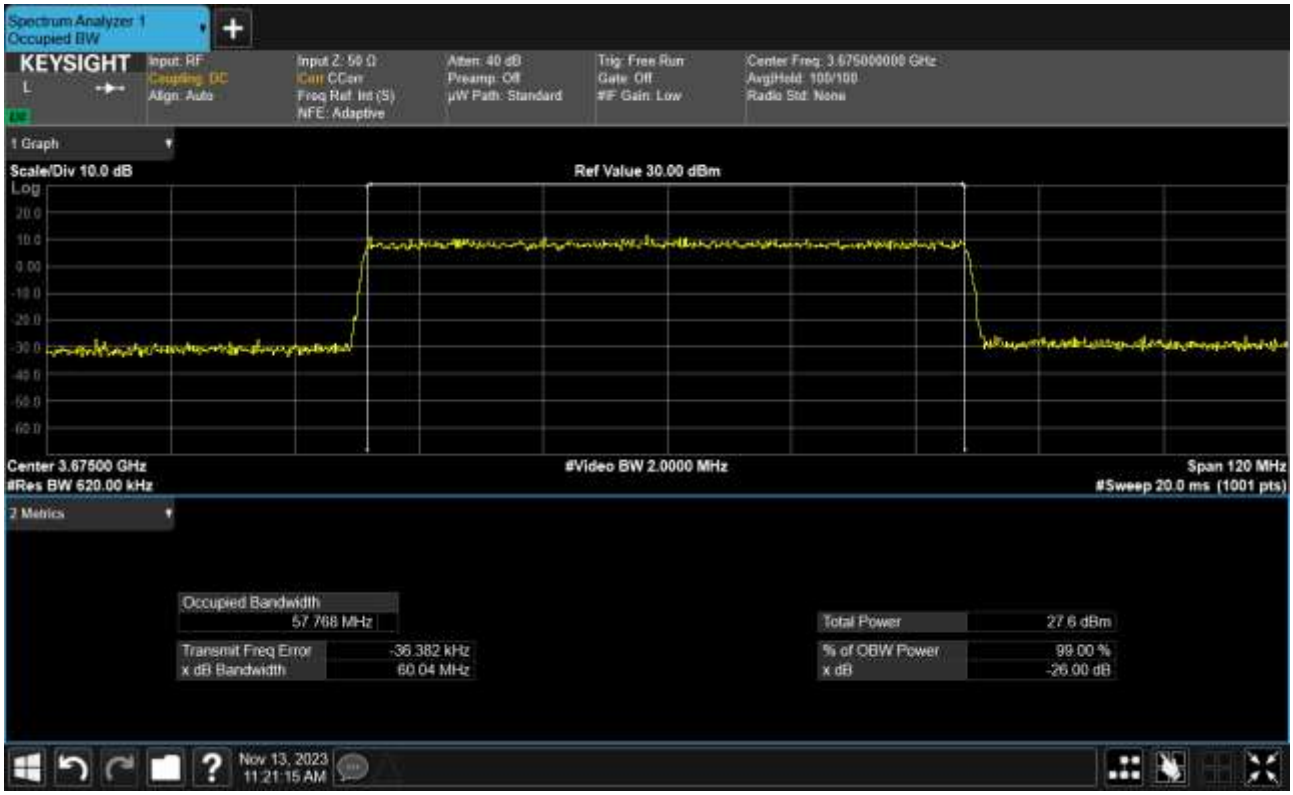
BAND 77 Occupied Bandwidth Plot (60 MHz, 3 675.00 MHz, 16QAM, Full RB)



BAND 77 Occupied Bandwidth Plot (60 MHz, 3 675.00 MHz, 64QAM, Full RB)



BAND 77 Occupied Bandwidth Plot (60 MHz, 3 675.00 MHz, 256QAM, Full RB)



BAND 77 Occupied Bandwidth Plot (70 MHz, 3 675.00 MHz, BPSK, Full RB)

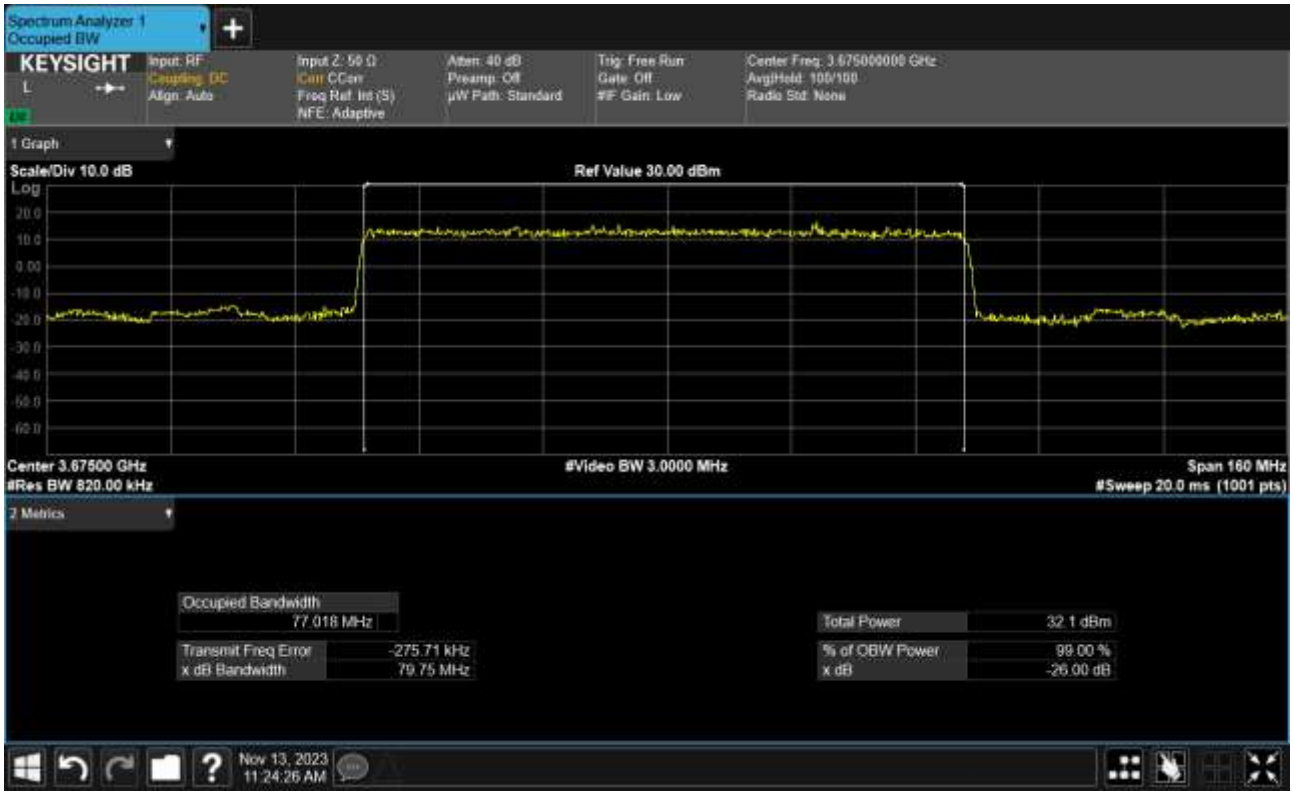
BAND 77 Occupied Bandwidth Plot (70 MHz, 3 675.00 MHz, QPSK, Full RB)

BAND 77 Occupied Bandwidth Plot (70 MHz, 3 675.00 MHz, 16QAM, Full RB)

BAND 77 Occupied Bandwidth Plot (70 MHz, 3 675.00 MHz, 64QAM, Full RB)

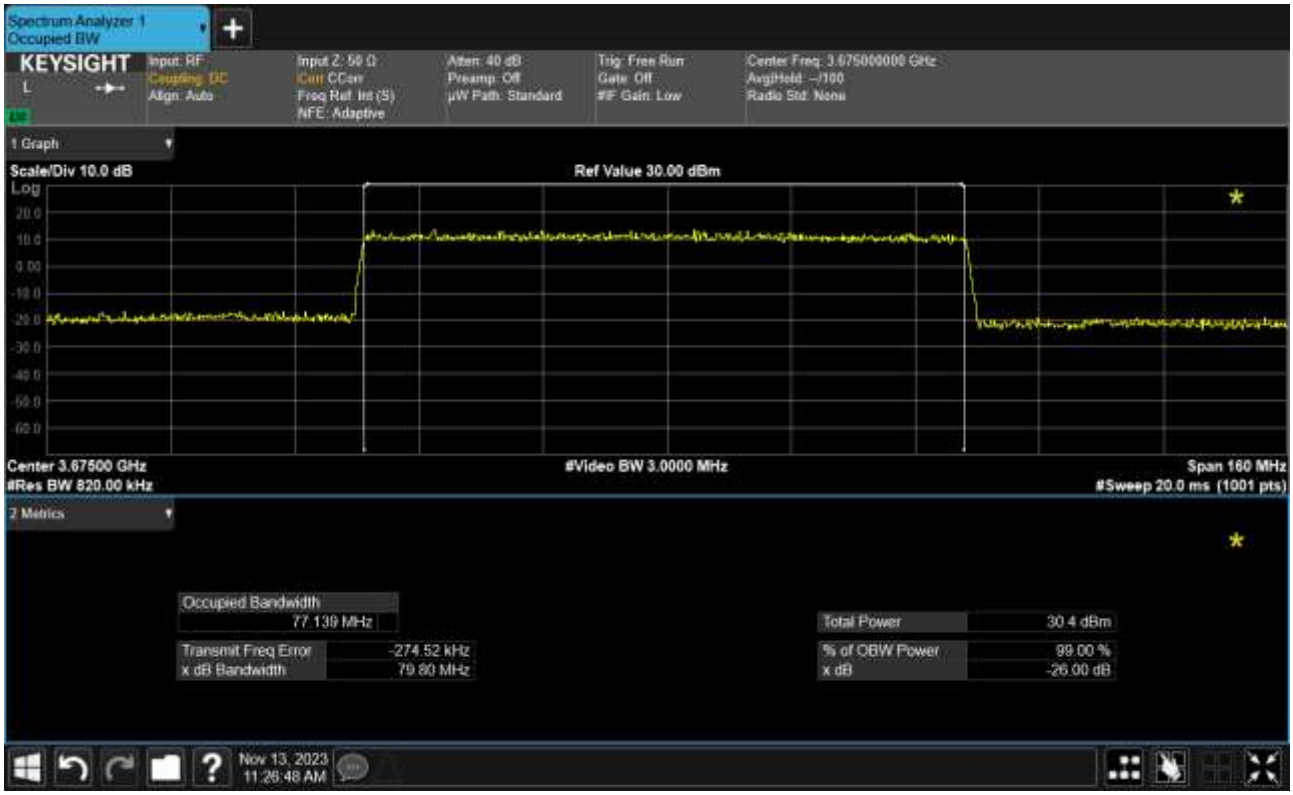
BAND 77 Occupied Bandwidth Plot (70 MHz, 3 675.00 MHz, 256QAM, Full RB)

BAND 77 Occupied Bandwidth Plot (80 MHz, 3 675.00 MHz, BPSK, Full RB)



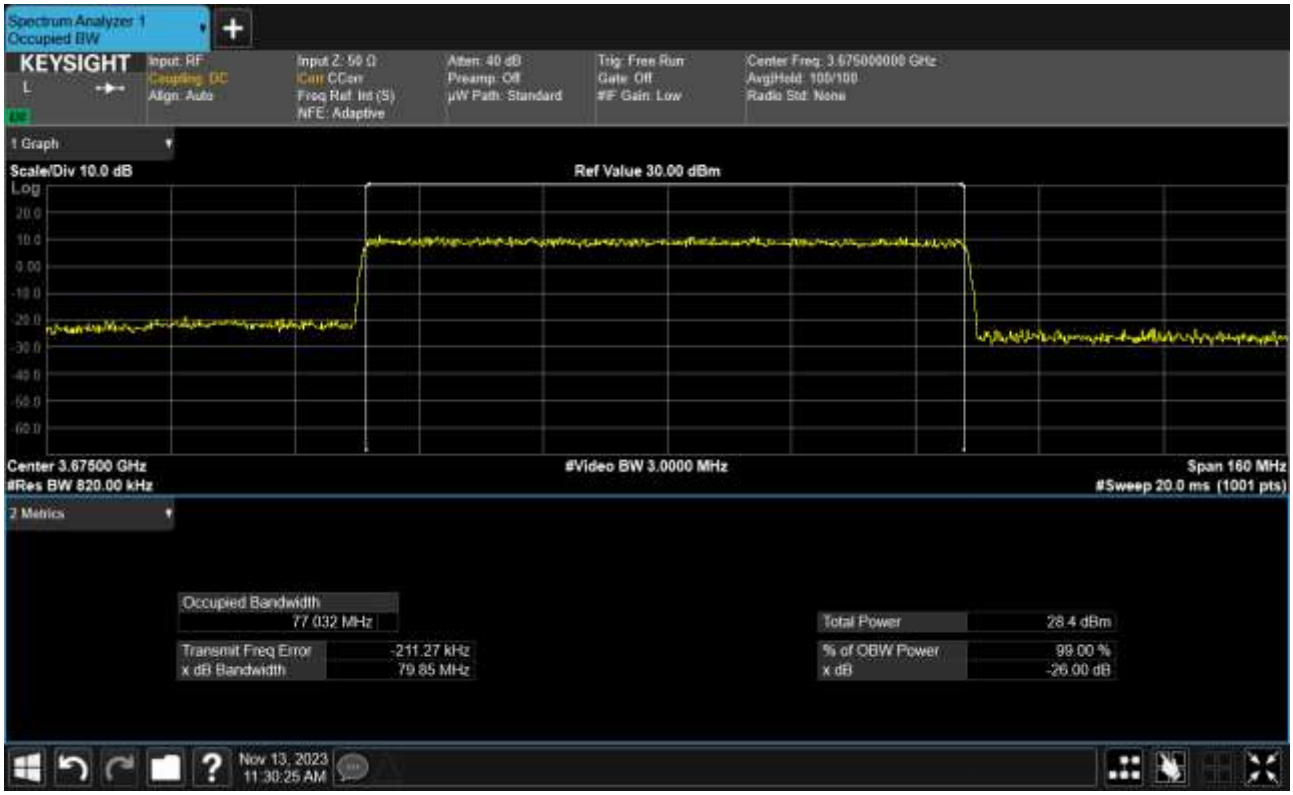
BAND 77 Occupied Bandwidth Plot (80 MHz, 3 675.00 MHz, QPSK, Full RB)

BAND 77 Occupied Bandwidth Plot (80 MHz, 3 675.00 MHz, 16QAM, Full RB)



BAND 77 Occupied Bandwidth Plot (80 MHz, 3 675.00 MHz, 64QAM, Full RB)

BAND 77 Occupied Bandwidth Plot (80 MHz, 3 675.00 MHz, 256QAM, Full RB)



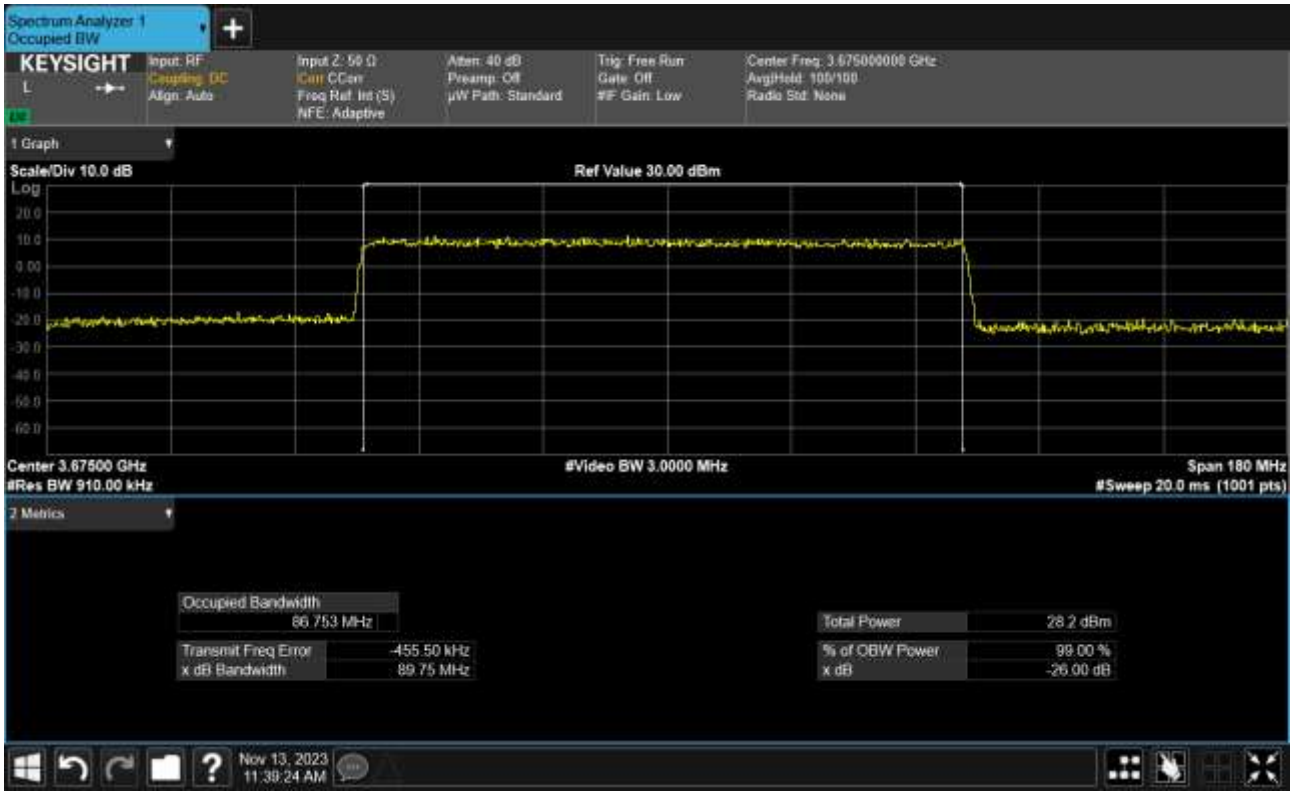
BAND 77 Occupied Bandwidth Plot (90 MHz, 3 675.00 MHz, BPSK, Full RB)

BAND 77 Occupied Bandwidth Plot (90 MHz, 3 675.00 MHz, QPSK, Full RB)

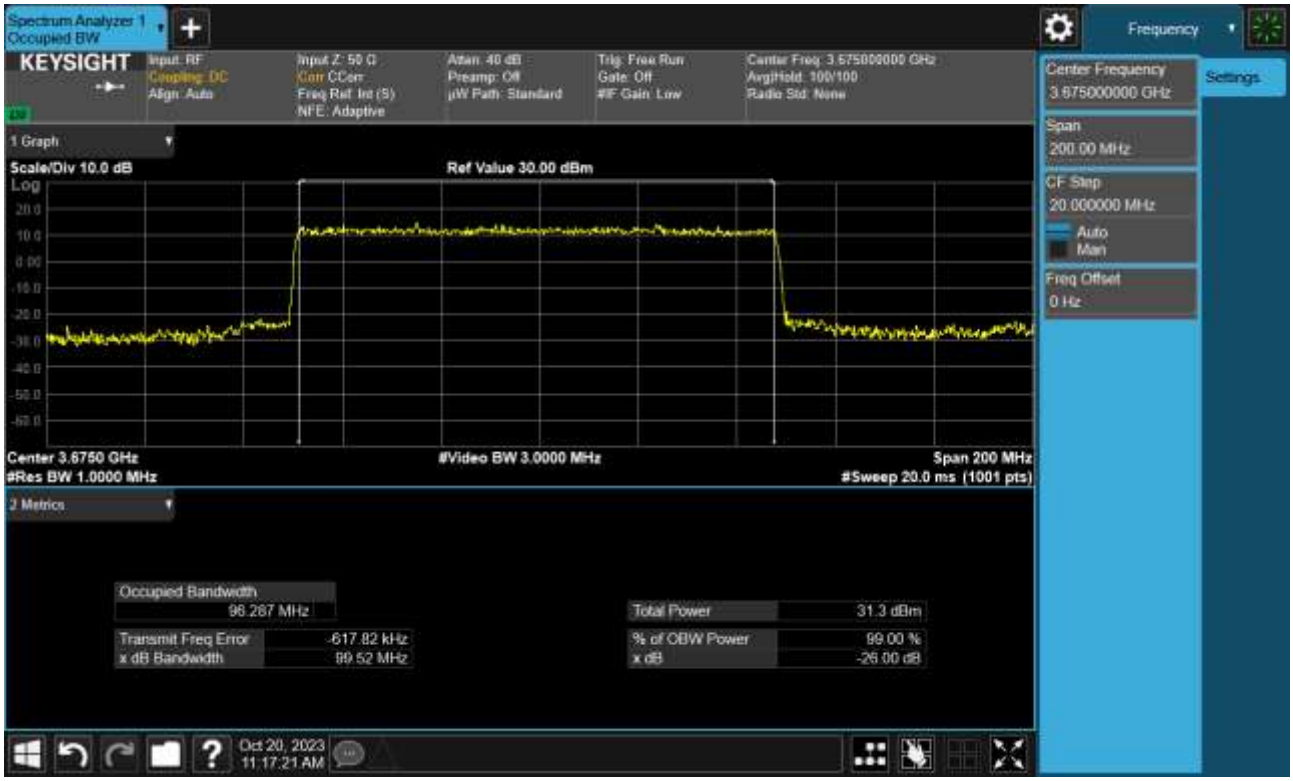
BAND 77 Occupied Bandwidth Plot (90 MHz, 3 675.00 MHz, 16QAM, Full RB)

BAND 77 Occupied Bandwidth Plot (90 MHz, 3 675.00 MHz, 64QAM, Full RB)

BAND 77 Occupied Bandwidth Plot (90 MHz, 3 675.00 MHz, 256QAM, Full RB)



BAND 77 Occupied Bandwidth Plot (100 MHz, 3 675.00 MHz, BPSK, Full RB)



BAND 77 Occupied Bandwidth Plot (100 MHz, 3 675.00 MHz, QPSK, Full RB)

BAND 77 Occupied Bandwidth Plot (100 MHz, 3 675.00 MHz, 16QAM, Full RB)

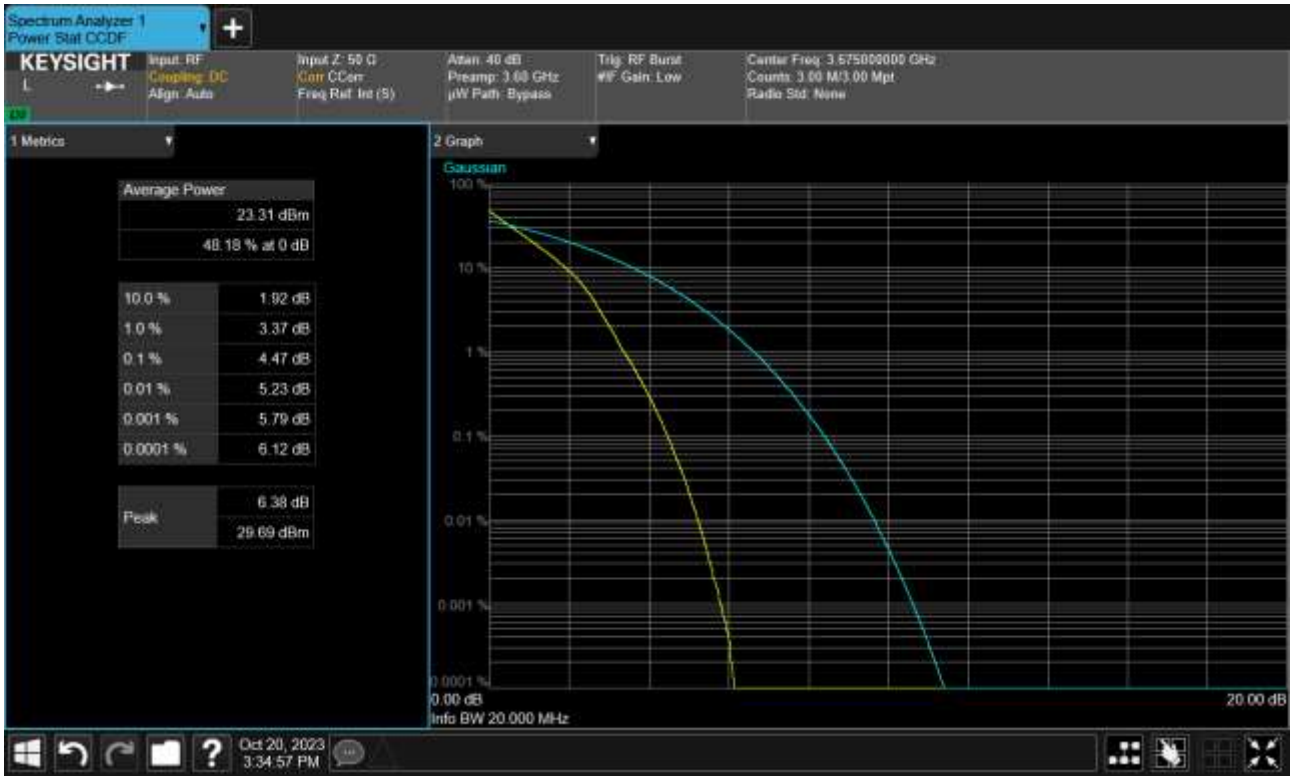
BAND 77 Occupied Bandwidth Plot (100 MHz, 3 675.00 MHz, 64QAM, Full RB)

BAND 77 Occupied Bandwidth Plot (100 MHz, 3 675.00 MHz, 256QAM, Full RB)

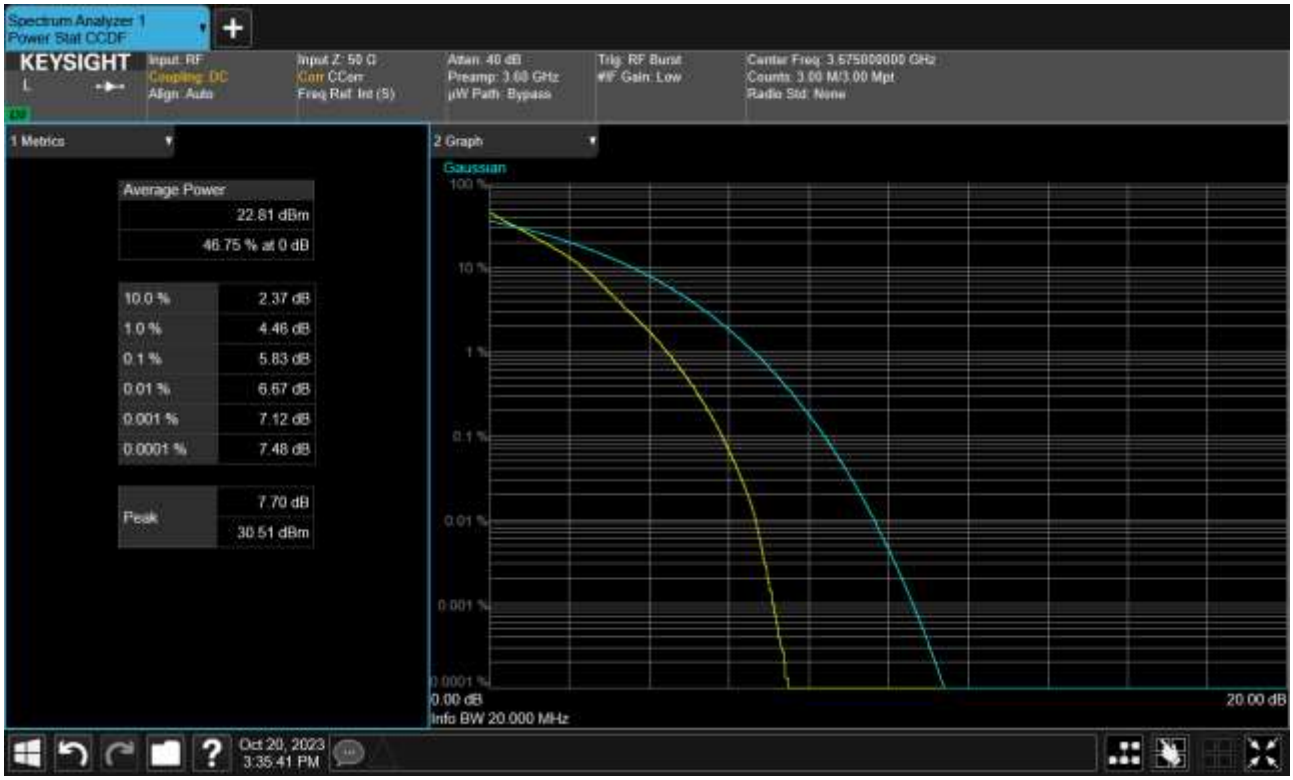
18. PEAK TO AVERAGE RATIO (TEST DATA)

- All modes of operation were investigated, and the worst-case configuration results are reported in this section

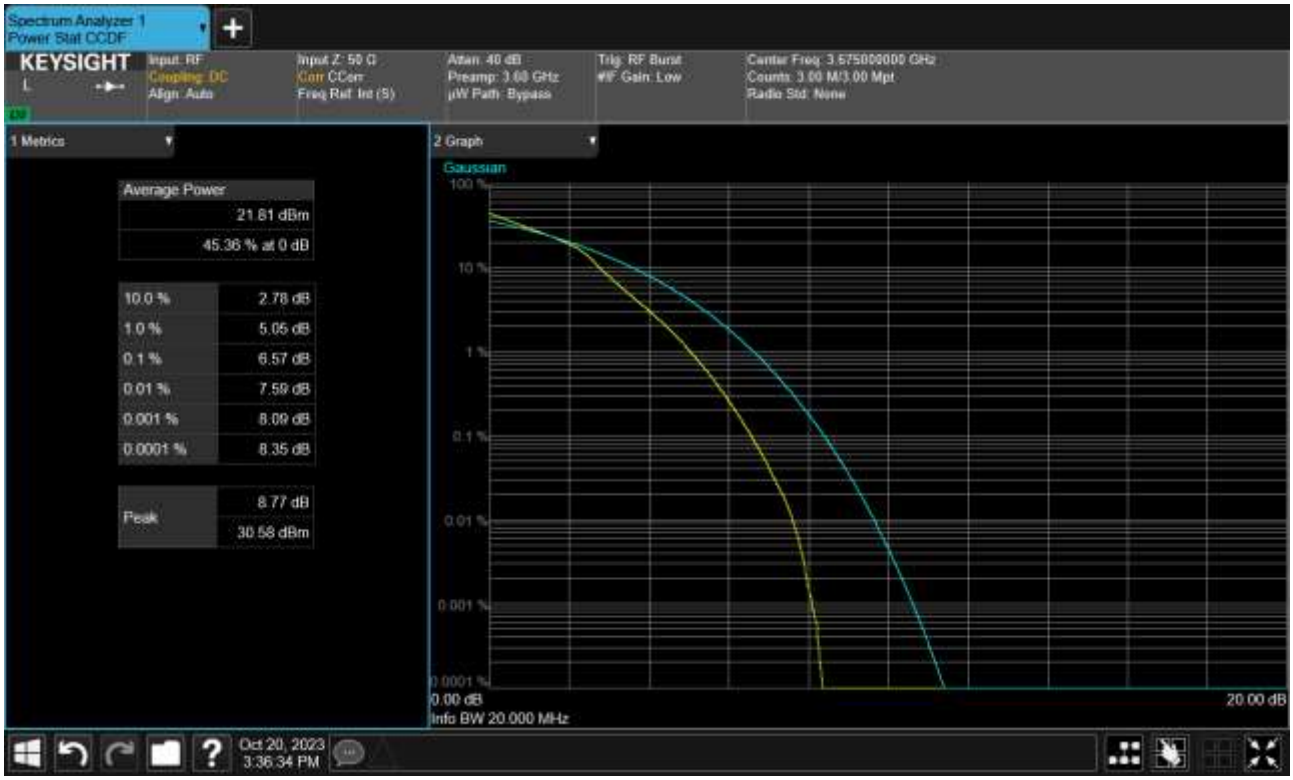
BAND 77 Peak To Average Ratio Plot (20 MHz, 3 675.00 MHz, BPSK, Full RB)



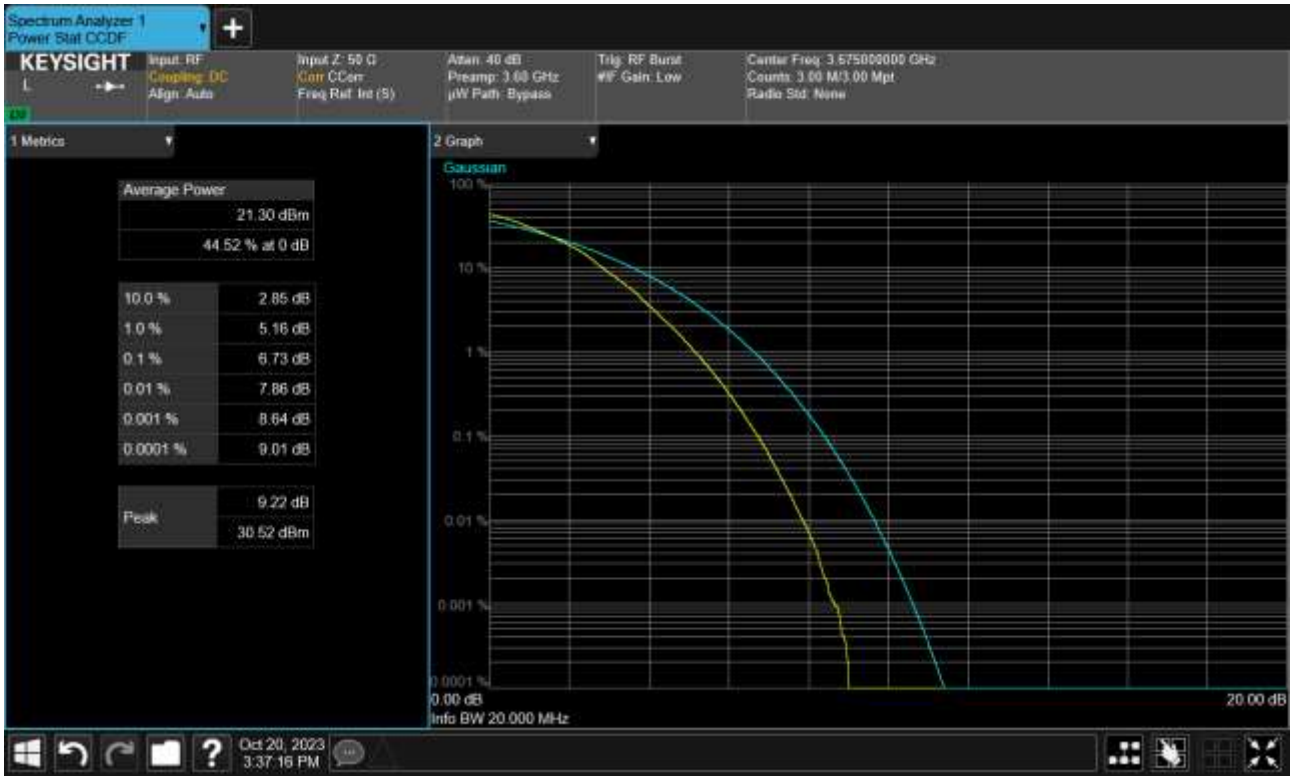
BAND 77 Peak To Average Ratio Plot (20 MHz, 3 675.00 MHz, QPSK, Full RB)



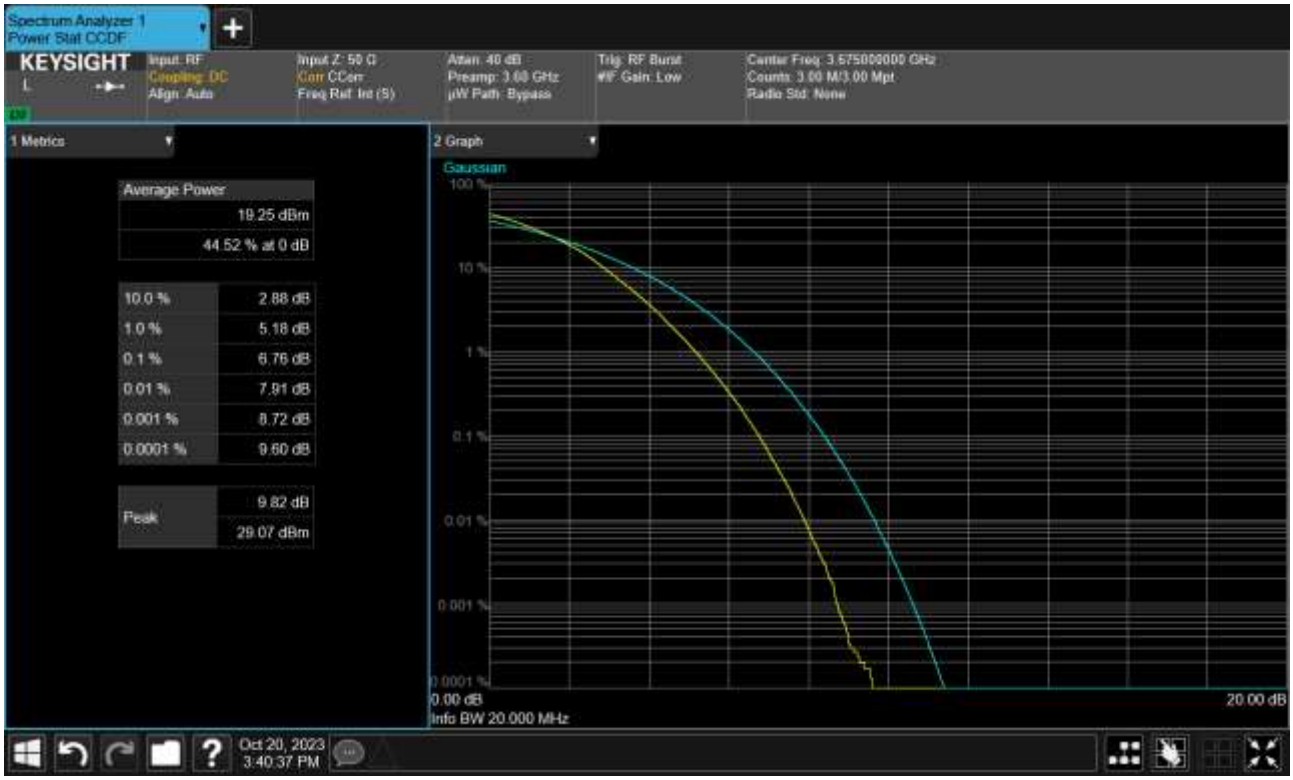
BAND 77 Peak To Average Ratio Plot (20 MHz, 3 675.00 MHz, 16QAM, Full RB)



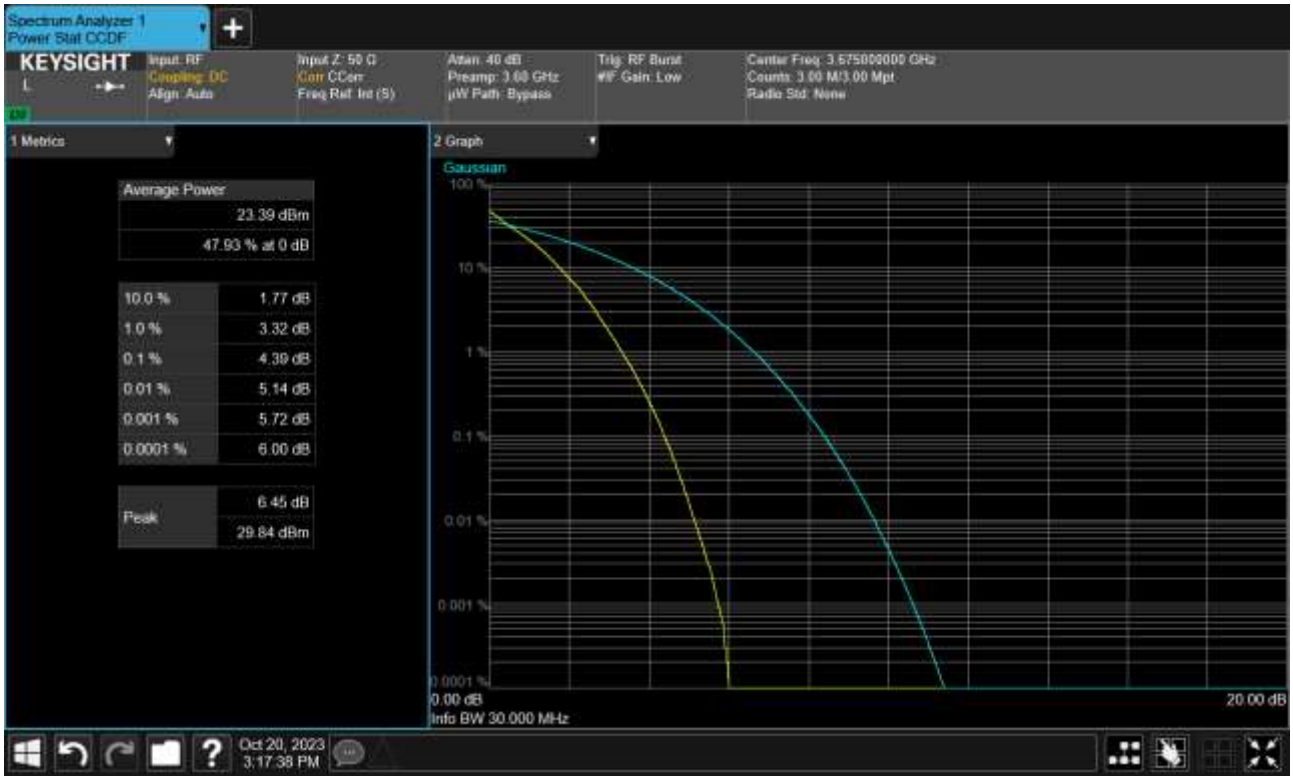
BAND 77 Peak To Average Ratio Plot (20 MHz, 3 675.00 MHz, 64QAM, Full RB)



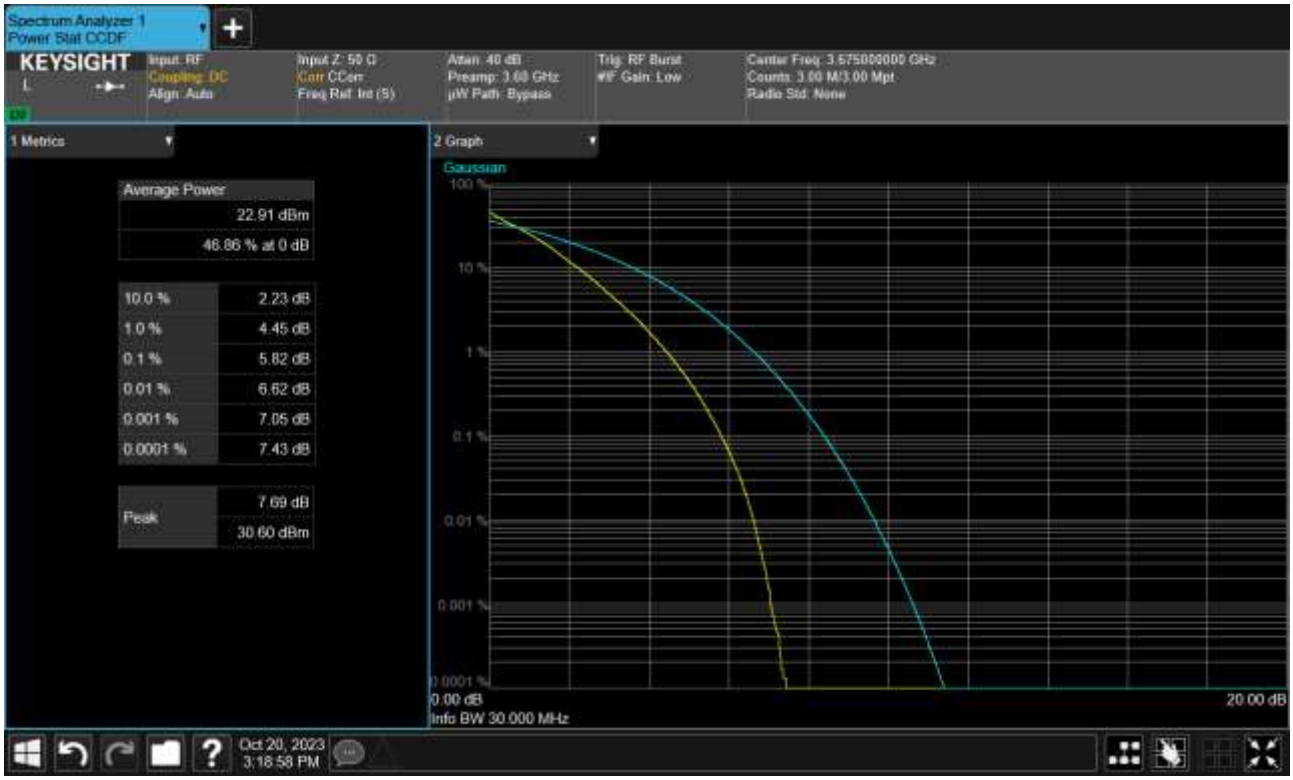
BAND 77 Peak To Average Ratio Plot (20 MHz, 3 675.00 MHz, 256QAM, Full RB)



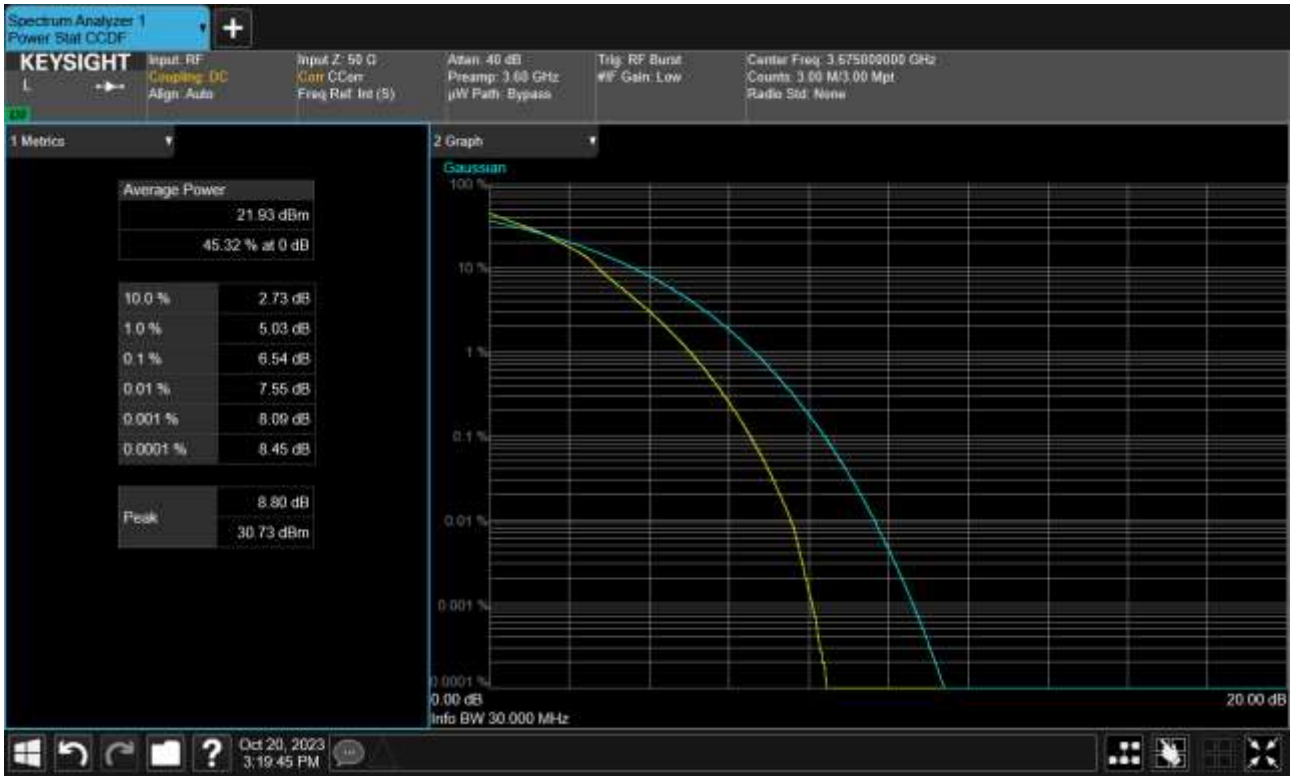
BAND 77 Peak To Average Ratio Plot (30 MHz, 3 675.00 MHz, BPSK, Full RB)



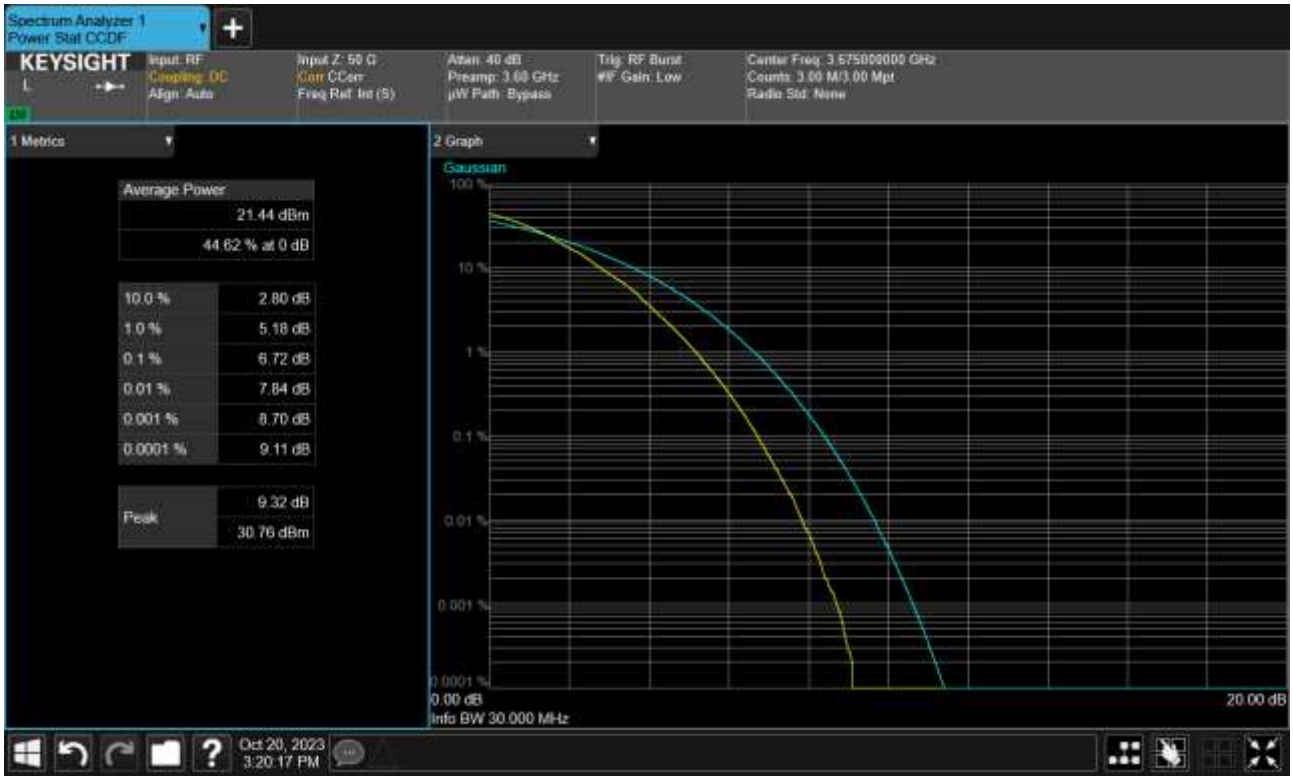
BAND 77 Peak To Average Ratio Plot (30 MHz, 3 675.00 MHz, QPSK, Full RB)



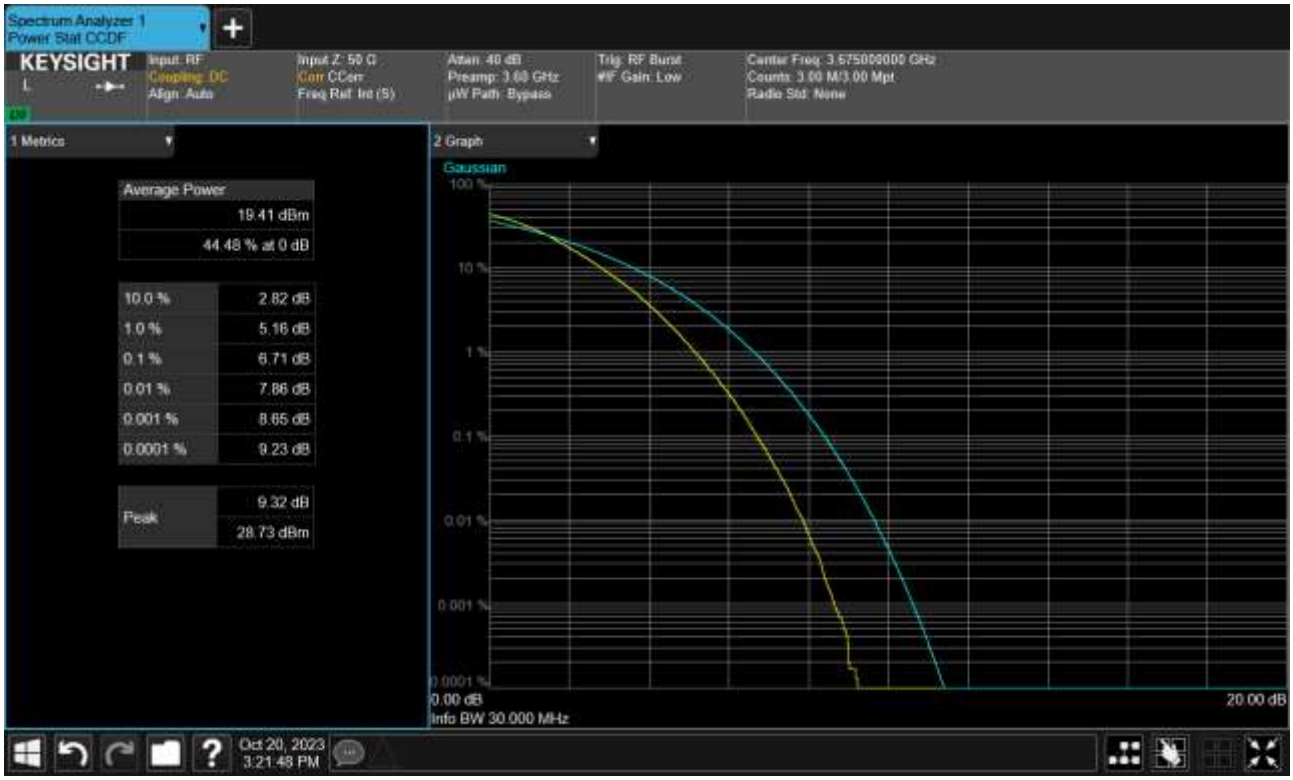
BAND 77 Peak To Average Ratio Plot (30 MHz, 3 675.00 MHz, 16QAM, Full RB)



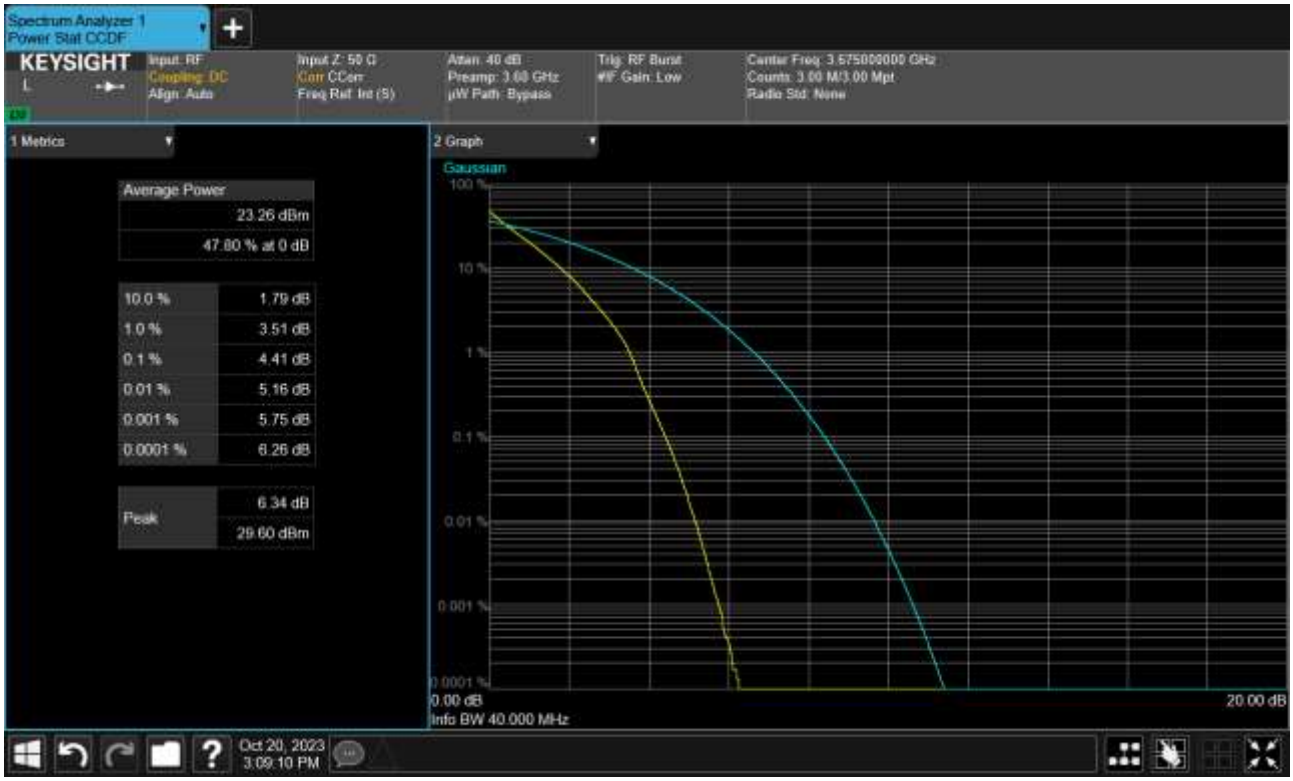
BAND 77 Peak To Average Ratio Plot (30 MHz, 3 675.00 MHz, 64QAM, Full RB)



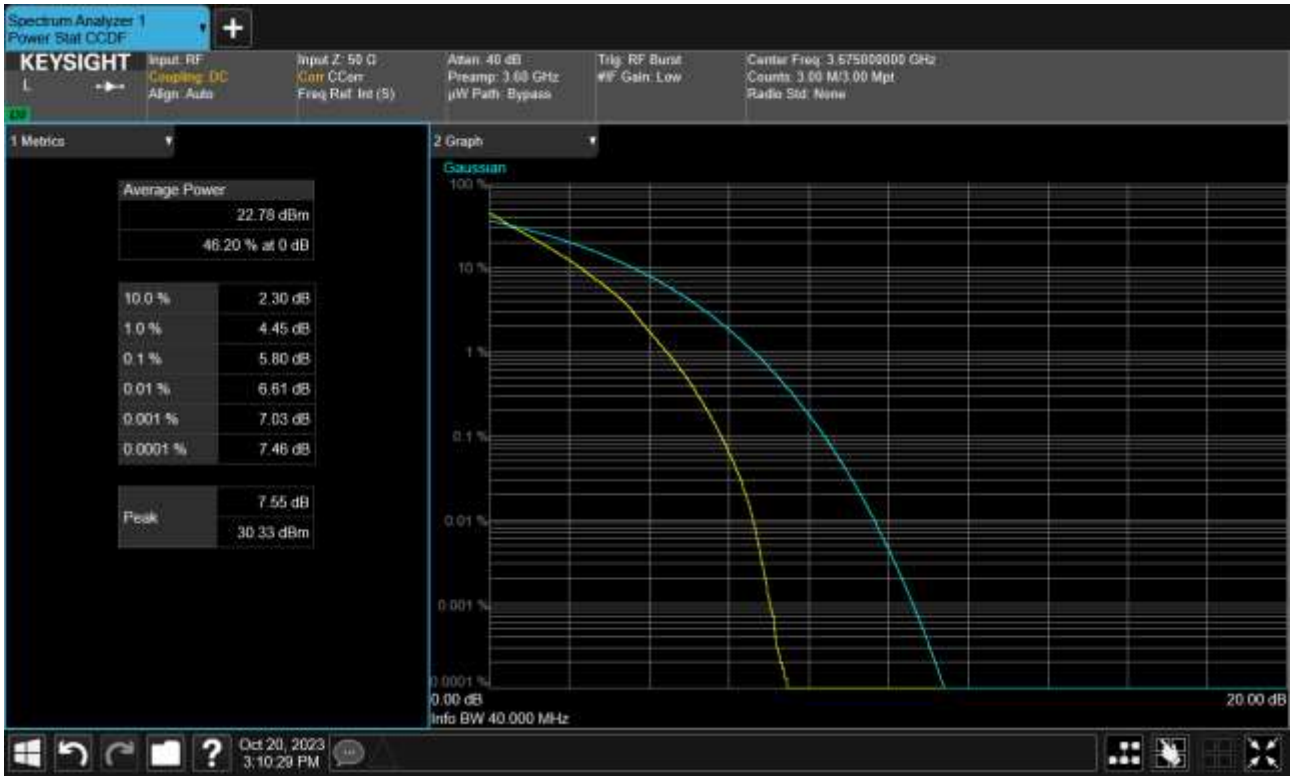
BAND 77 Peak To Average Ratio Plot (30 MHz, 3 675.00 MHz, 256QAM, Full RB)



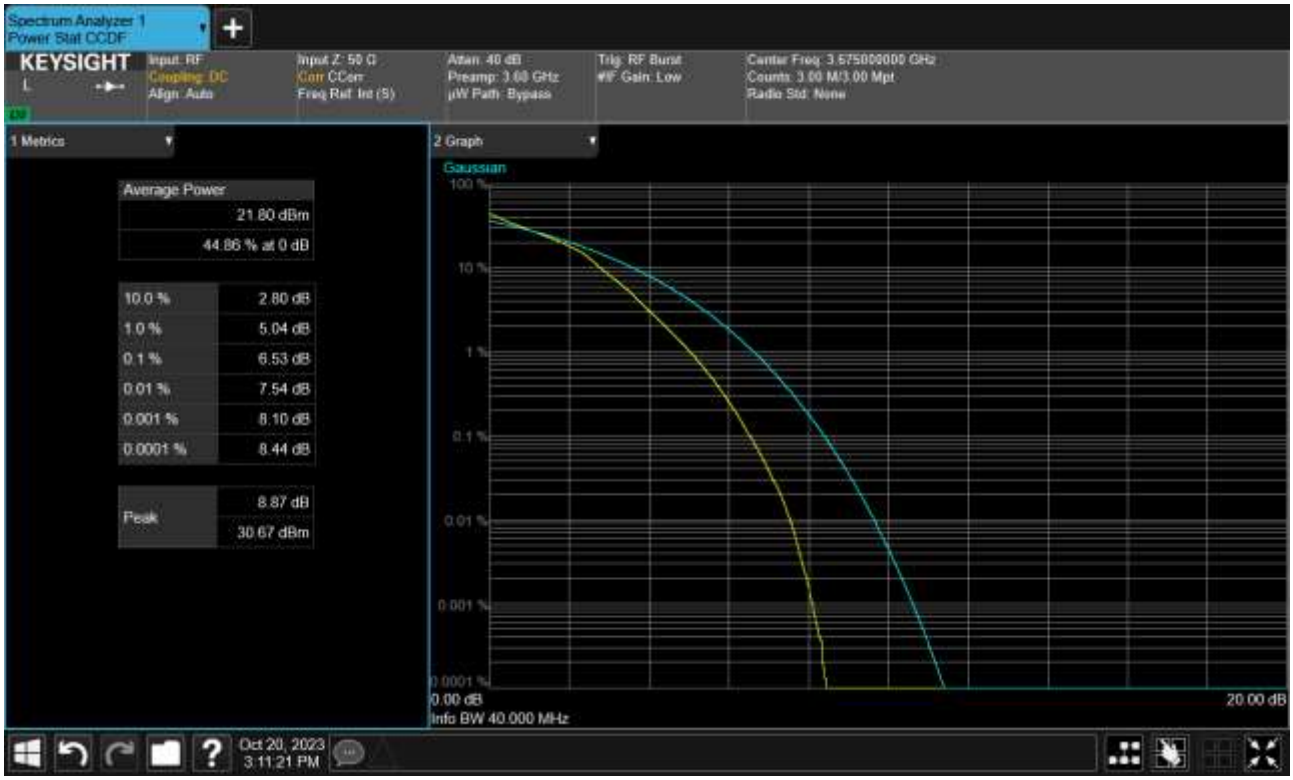
BAND 77 Peak To Average Ratio Plot (40 MHz, 3 675.00 MHz, BPSK, Full RB)



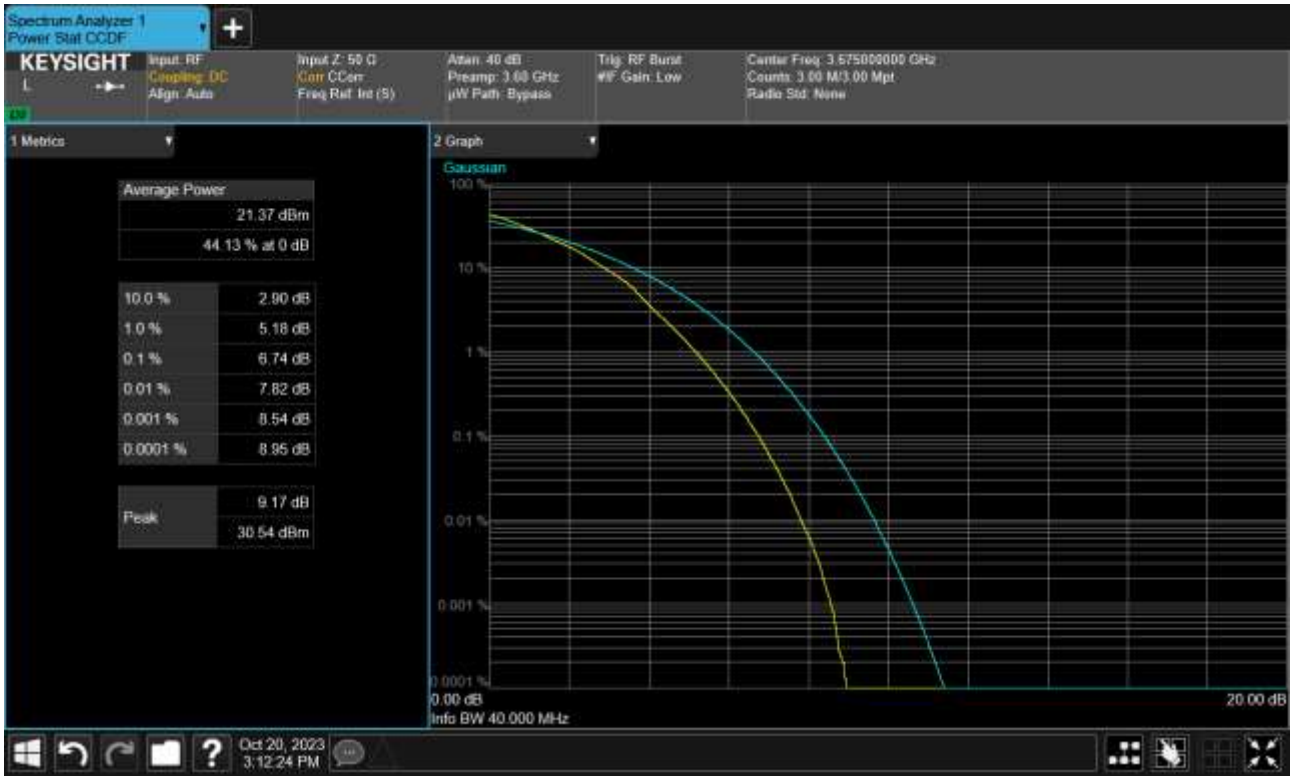
BAND 77 Peak To Average Ratio Plot (40 MHz, 3 675.00 MHz, QPSK, Full RB)



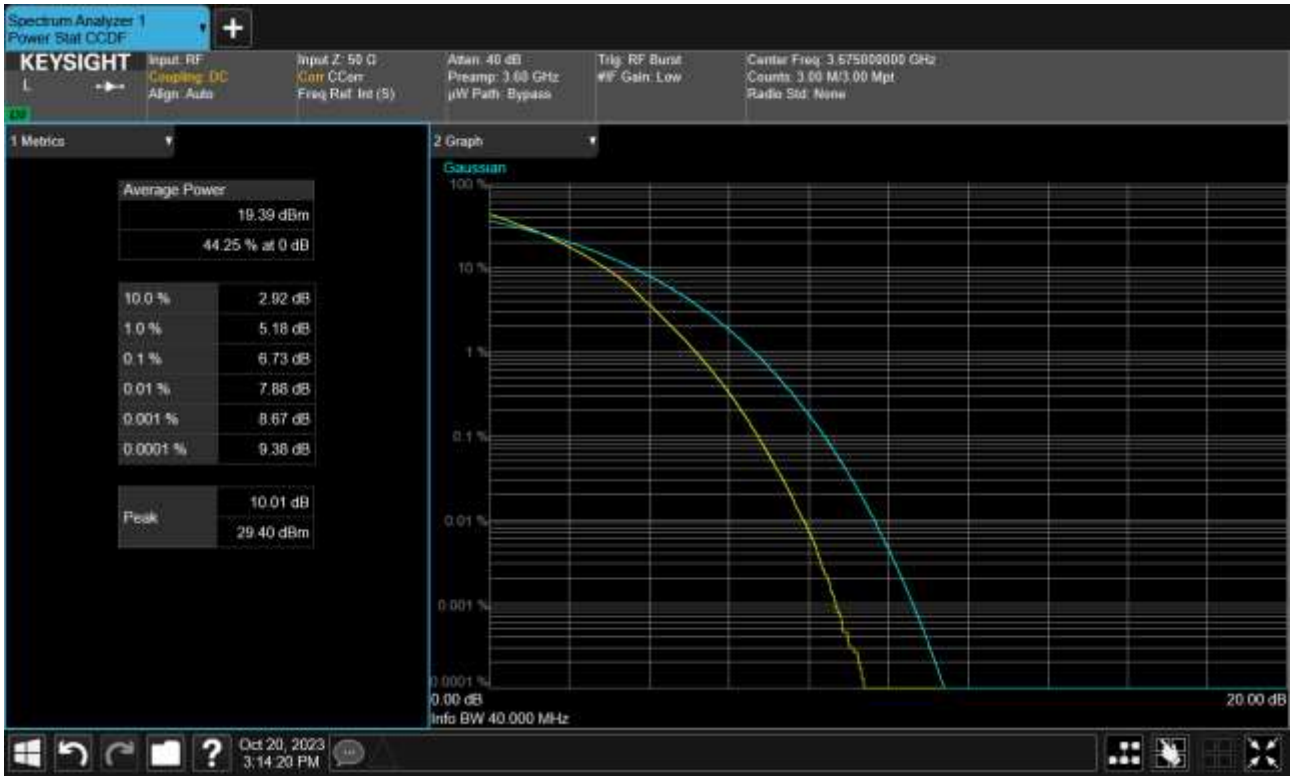
BAND 77 Peak To Average Ratio Plot (40 MHz, 3 675.00 MHz, 16QAM, Full RB)



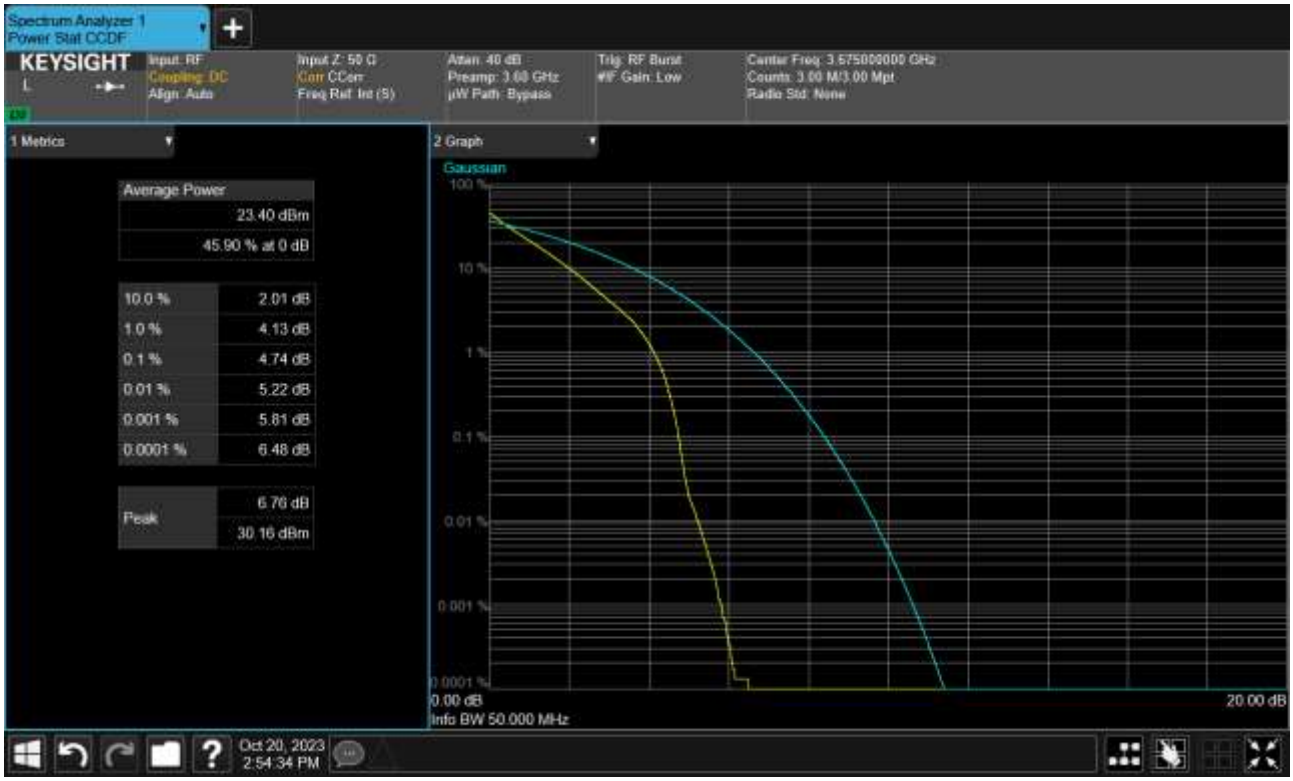
BAND 77 Peak To Average Ratio Plot (40 MHz, 3 675.00 MHz, 64QAM, Full RB)



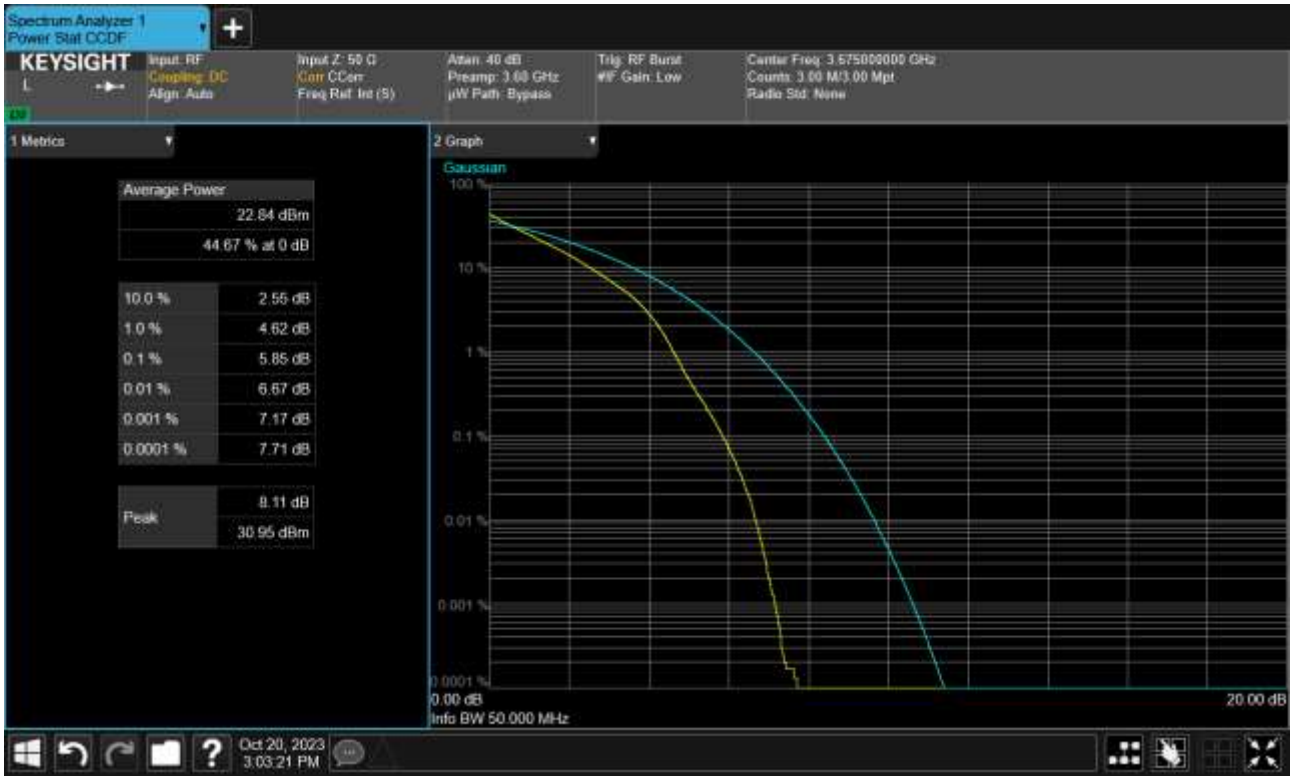
BAND 77 Peak To Average Ratio Plot (40 MHz, 3 675.00 MHz, 256QAM, Full RB)



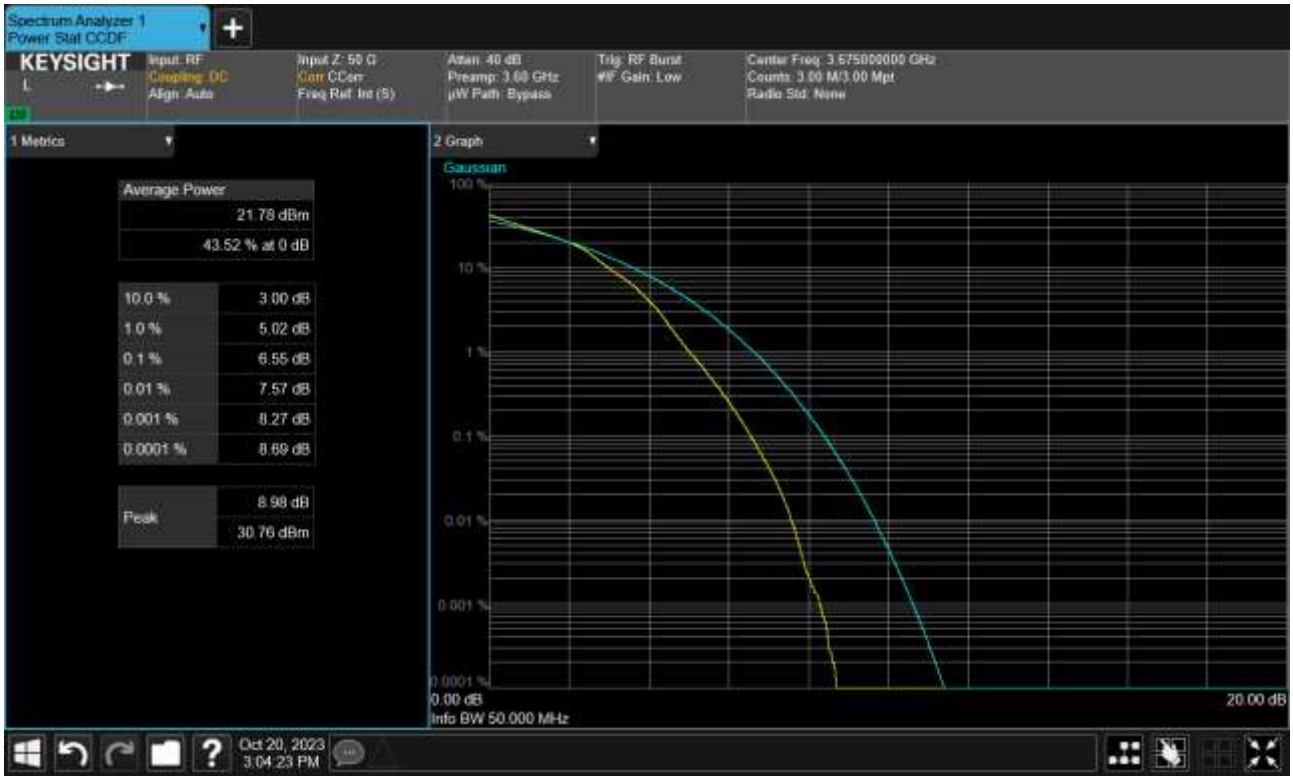
BAND 77 Peak To Average Ratio Plot (50 MHz, 3 675.00 MHz, BPSK, Full RB)



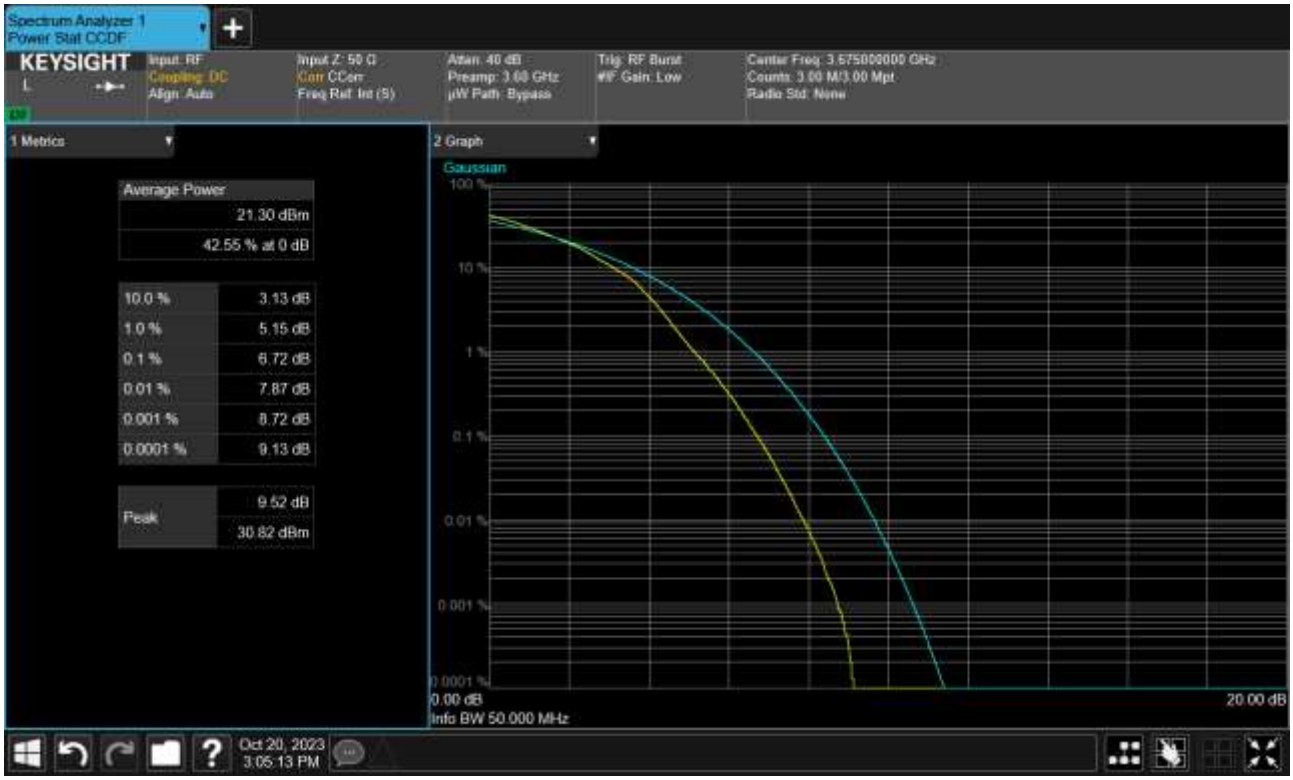
BAND 77 Peak To Average Ratio Plot (50 MHz, 3 675.00 MHz, QPSK, Full RB)



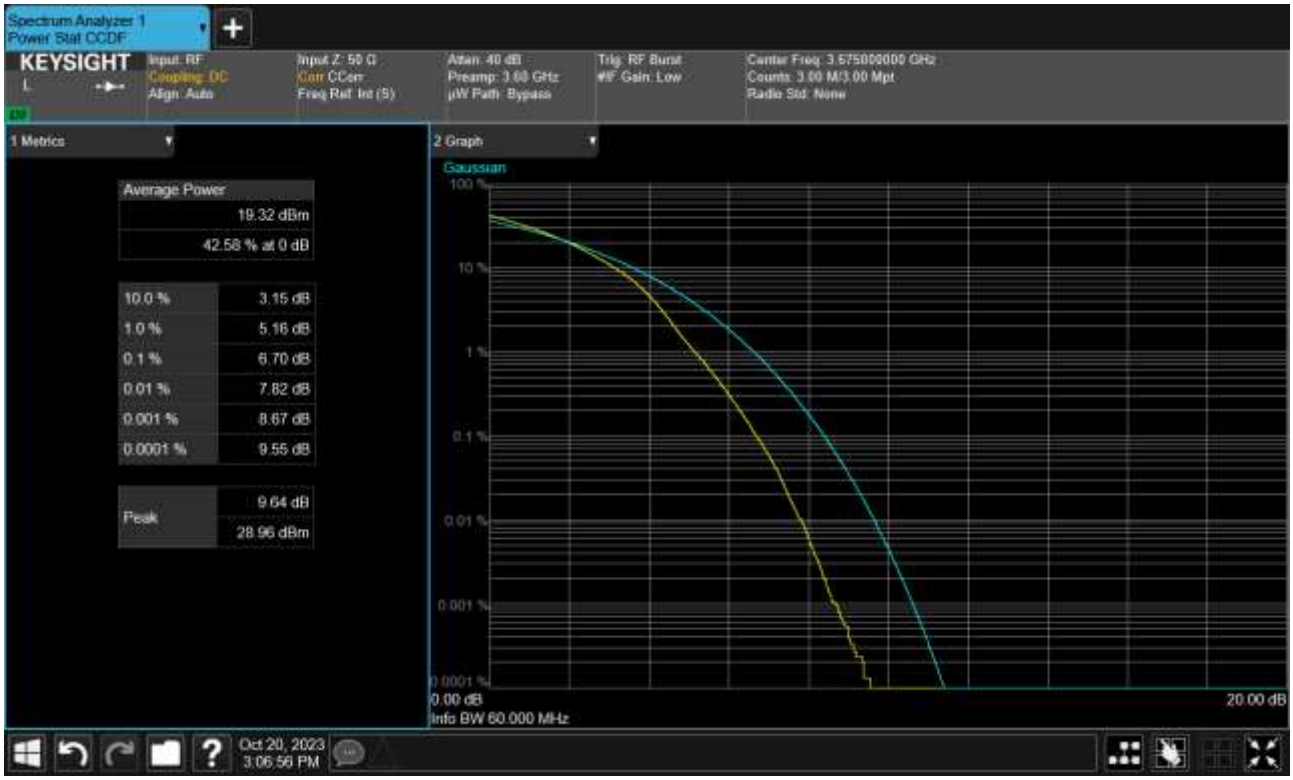
BAND 77 Peak To Average Ratio Plot (50 MHz, 3 675.00 MHz, 16QAM, Full RB)



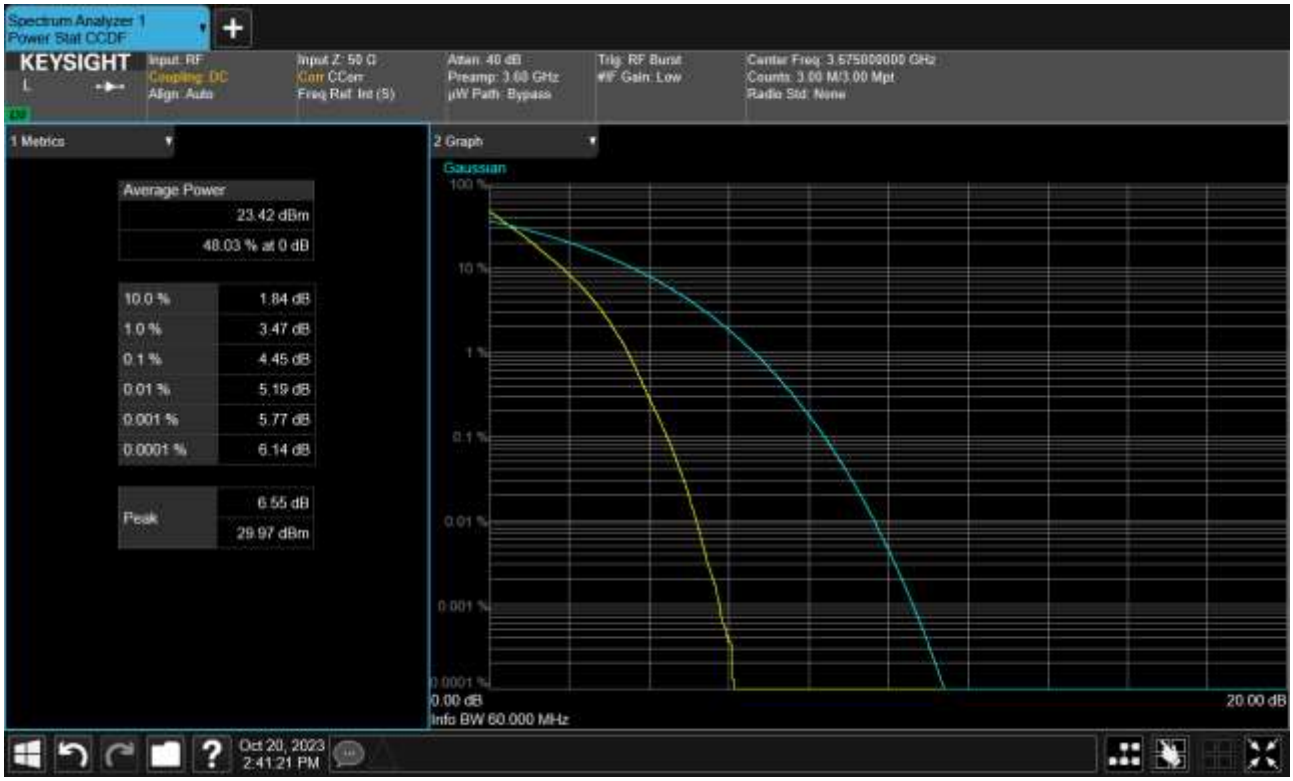
BAND 77 Peak To Average Ratio Plot (50 MHz, 3 675.00 MHz, 64QAM, Full RB)



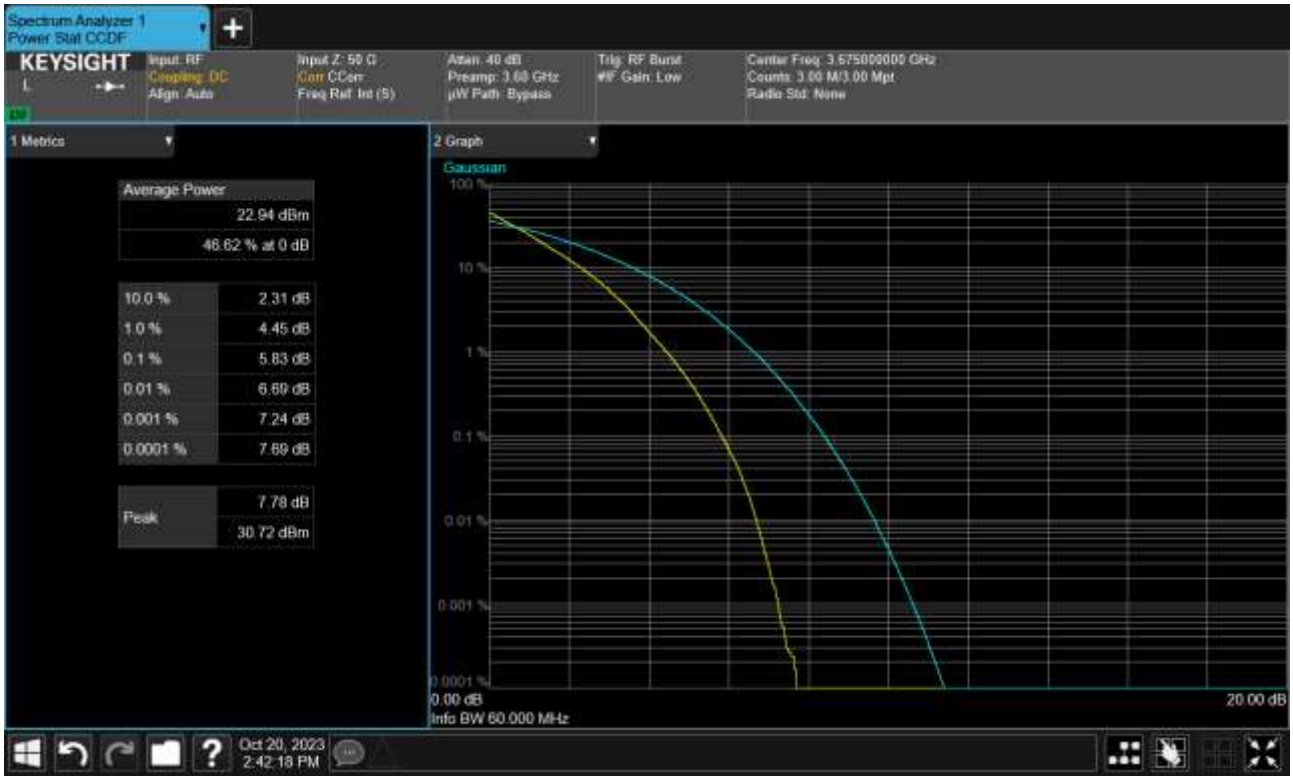
BAND 77 Peak To Average Ratio Plot (50 MHz, 3 675.00 MHz, 256QAM, Full RB)



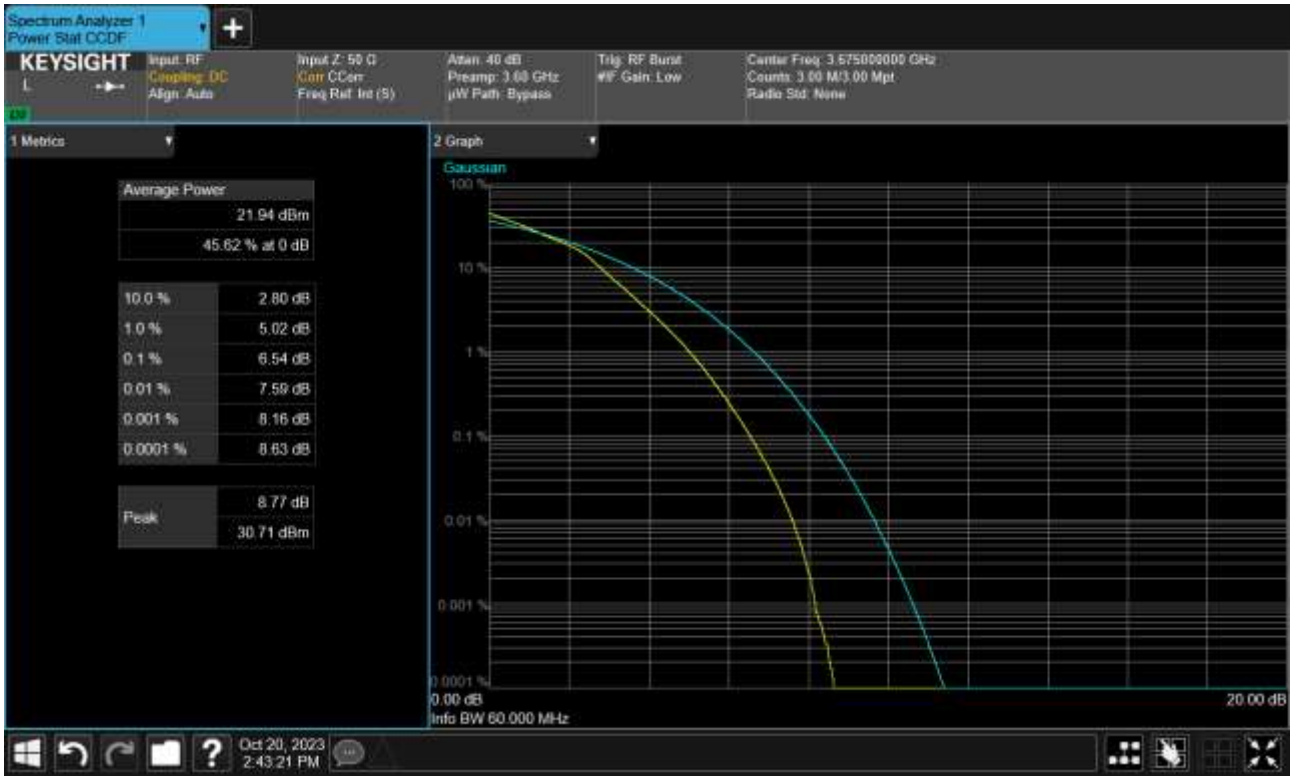
BAND 77 Peak To Average Ratio Plot (60 MHz, 3 675.00 MHz, BPSK, Full RB)



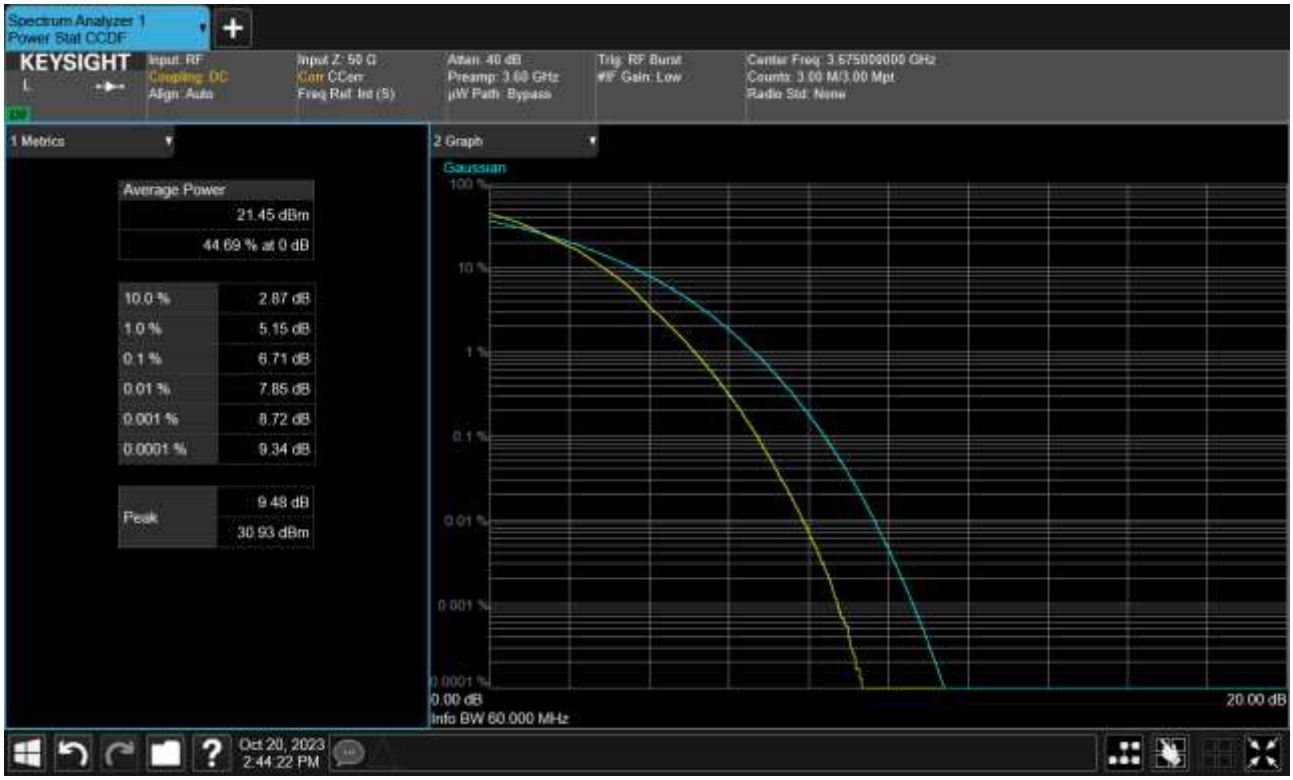
BAND 77 Peak To Average Ratio Plot (60 MHz, 3 675.00 MHz, QPSK, Full RB)



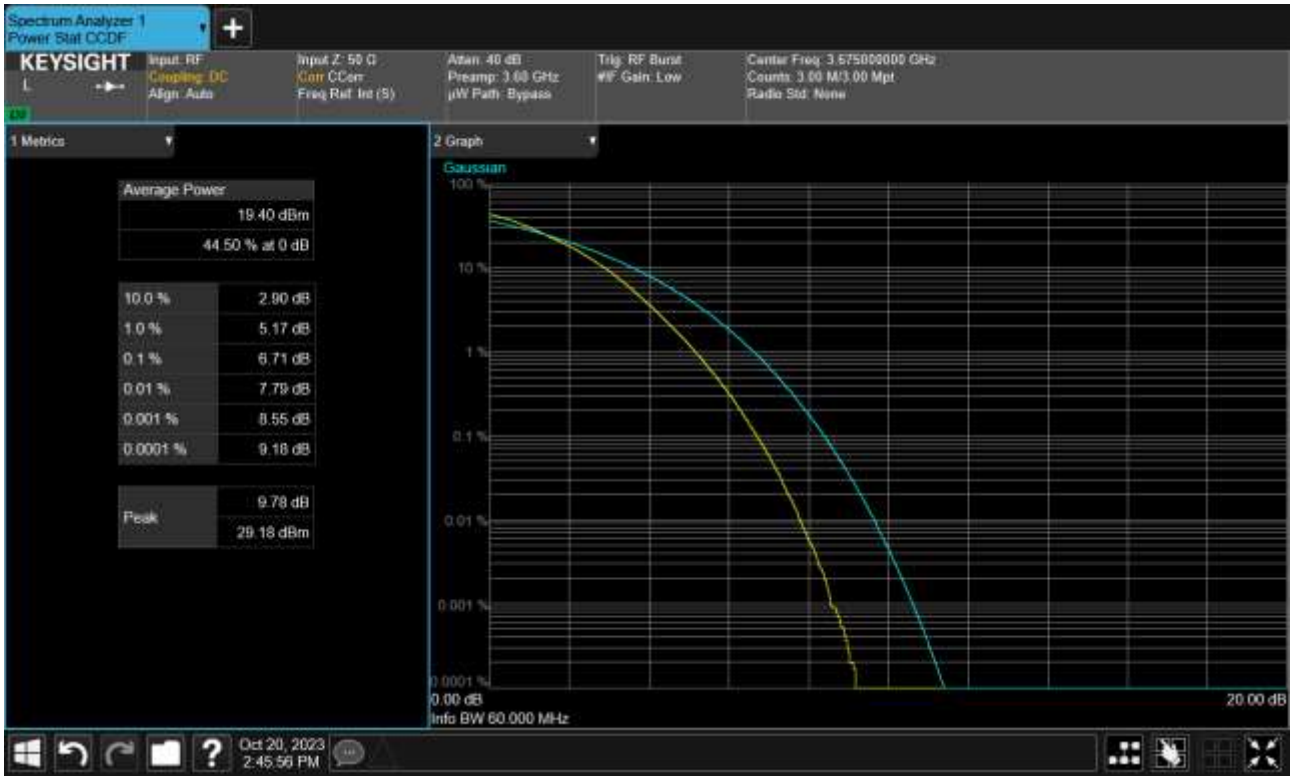
BAND 77 Peak To Average Ratio Plot (60 MHz, 3 675.00 MHz, 16QAM, Full RB)



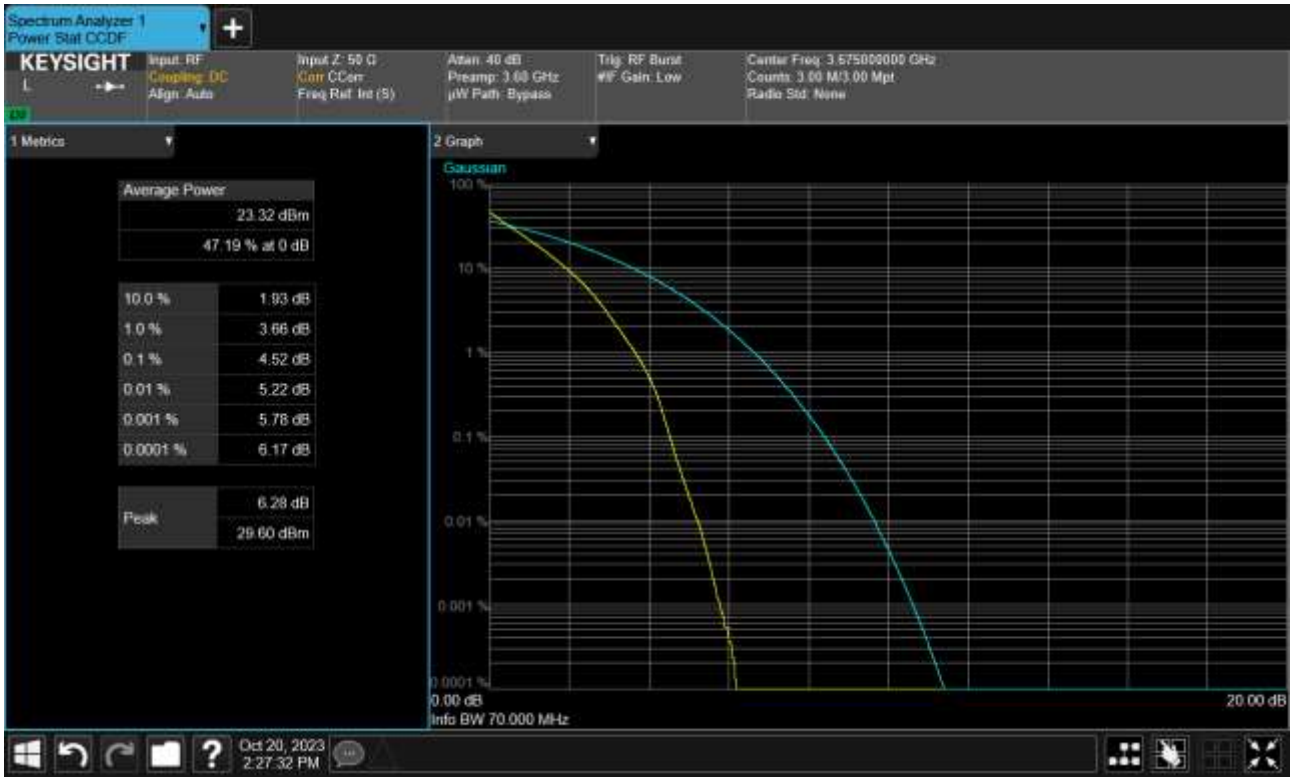
BAND 77 Peak To Average Ratio Plot (60 MHz3 675.00 MHz, 64QAM, Full RB)



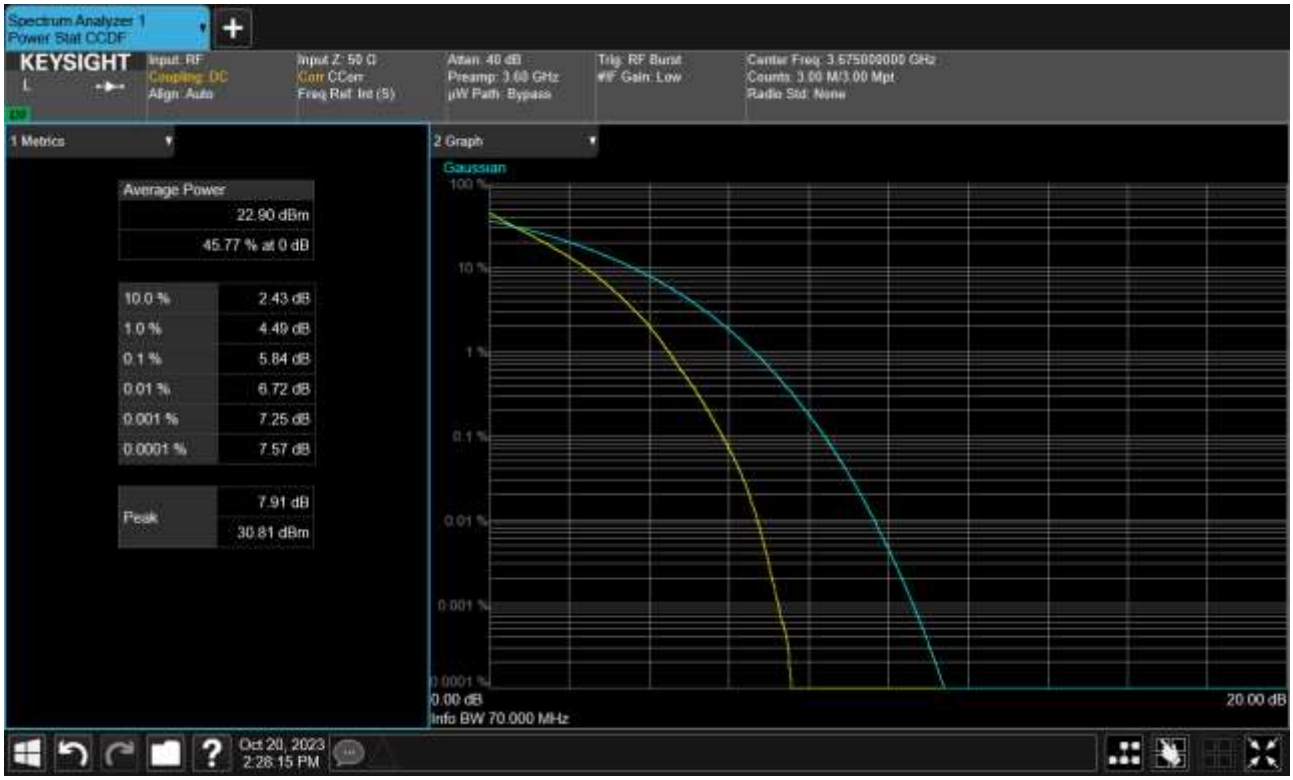
BAND 77 Peak To Average Ratio Plot (60 MHz, 3 675.00 MHz, 256QAM, Full RB)



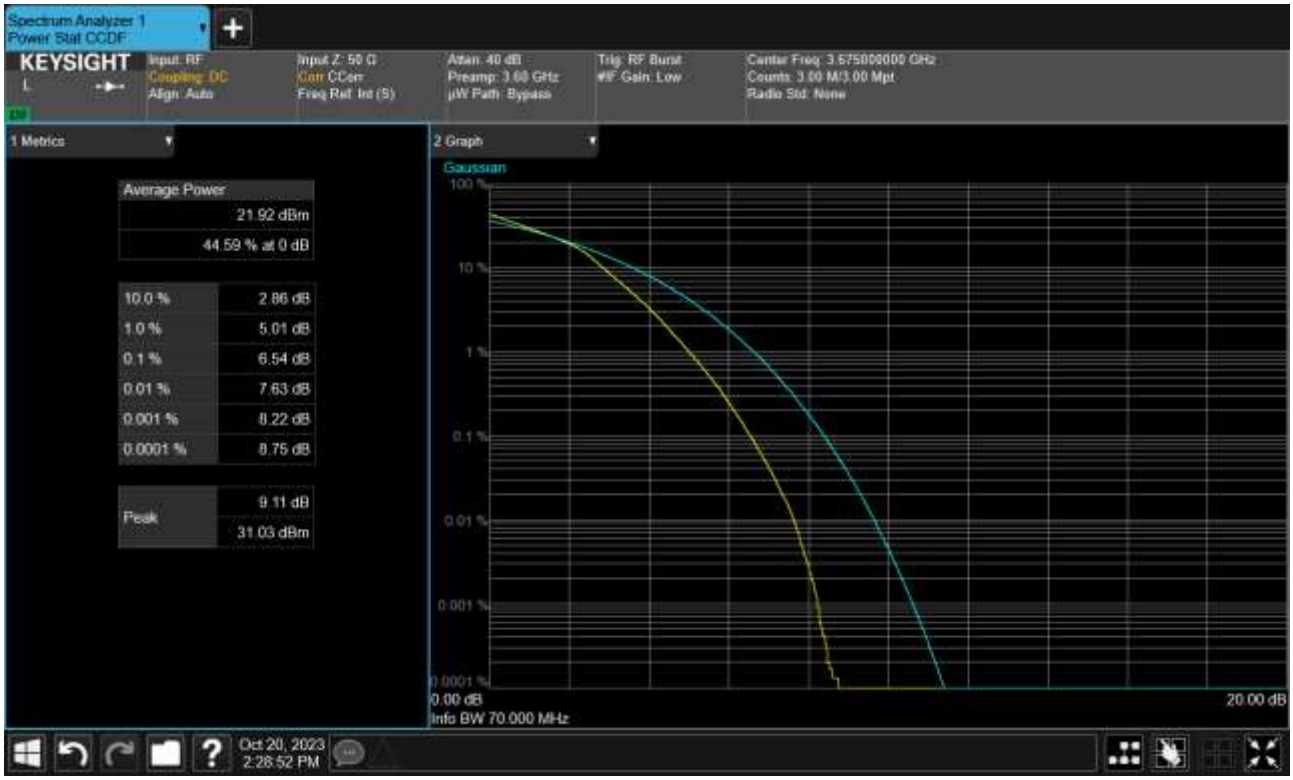
BAND 77 Peak To Average Ratio Plot (70 MHz, 3 675.00 MHz, BPSK, Full RB)



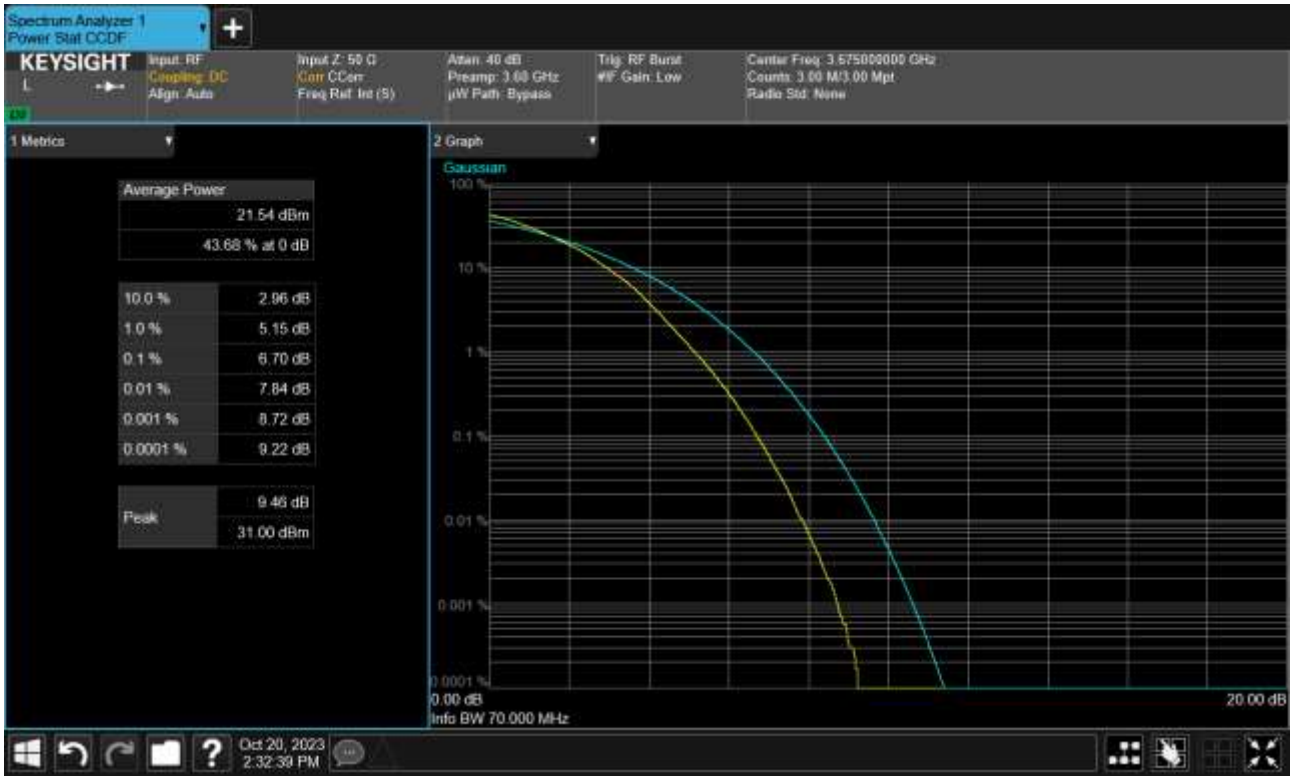
BAND 77 Peak To Average Ratio Plot (70 MHz, 3 675.00 MHz, QPSK, Full RB)



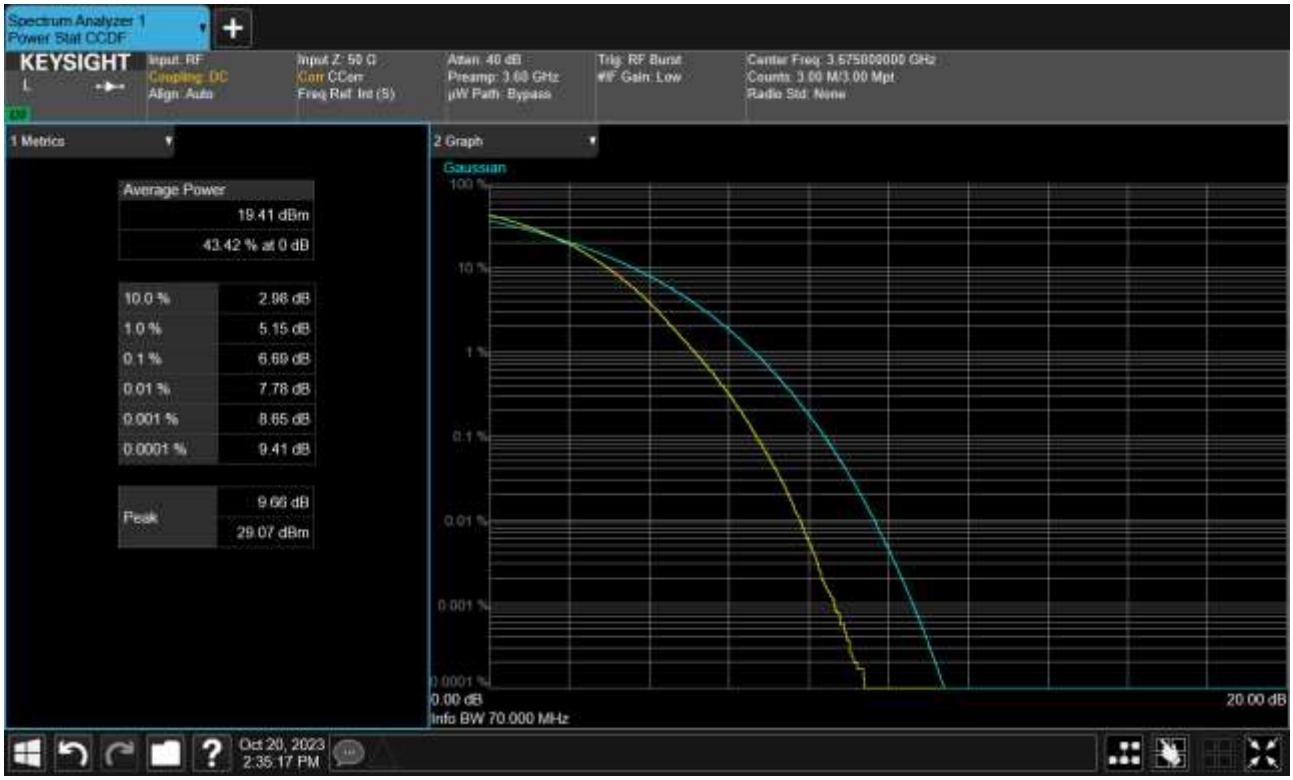
BAND 77 Peak To Average Ratio Plot (70 MHz3 675.00 MHz, 16QAM, Full RB)



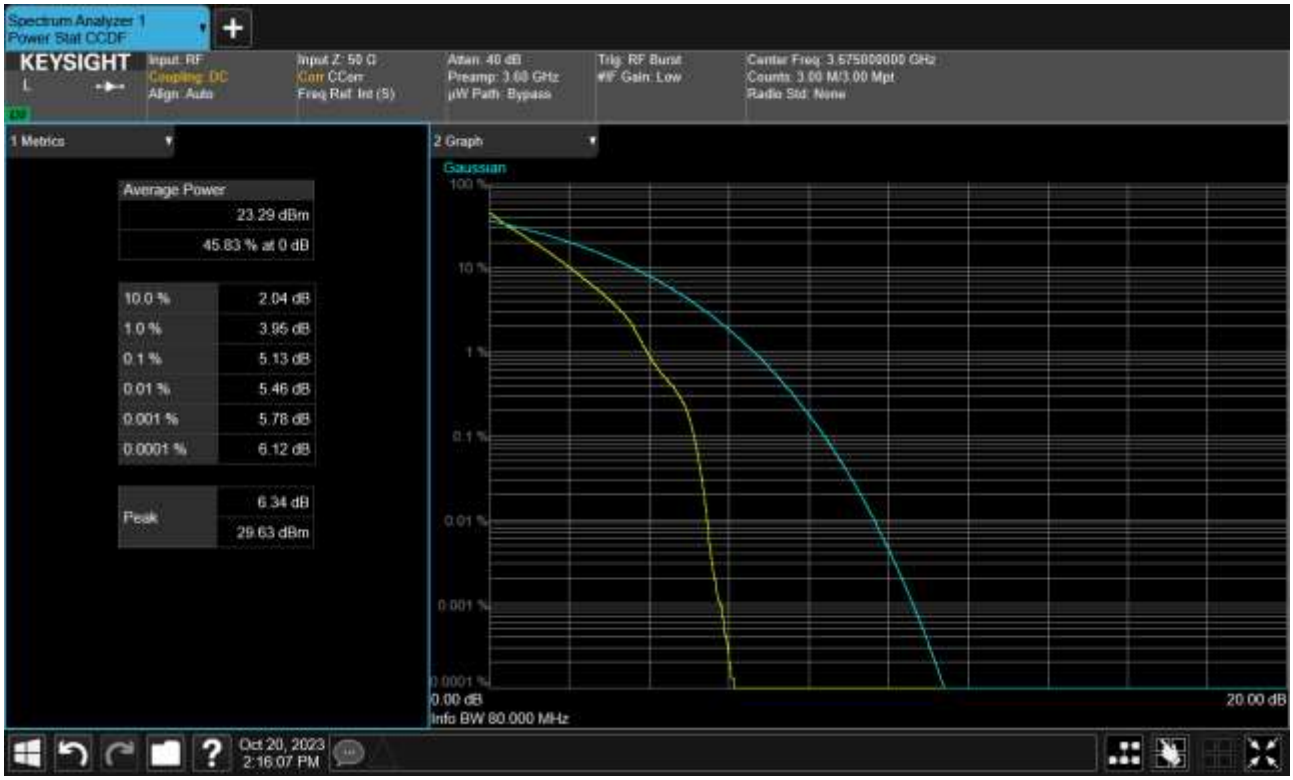
BAND 77 Peak To Average Ratio Plot (70 MHz, 3 675.00 MHz, 64QAM, Full RB)



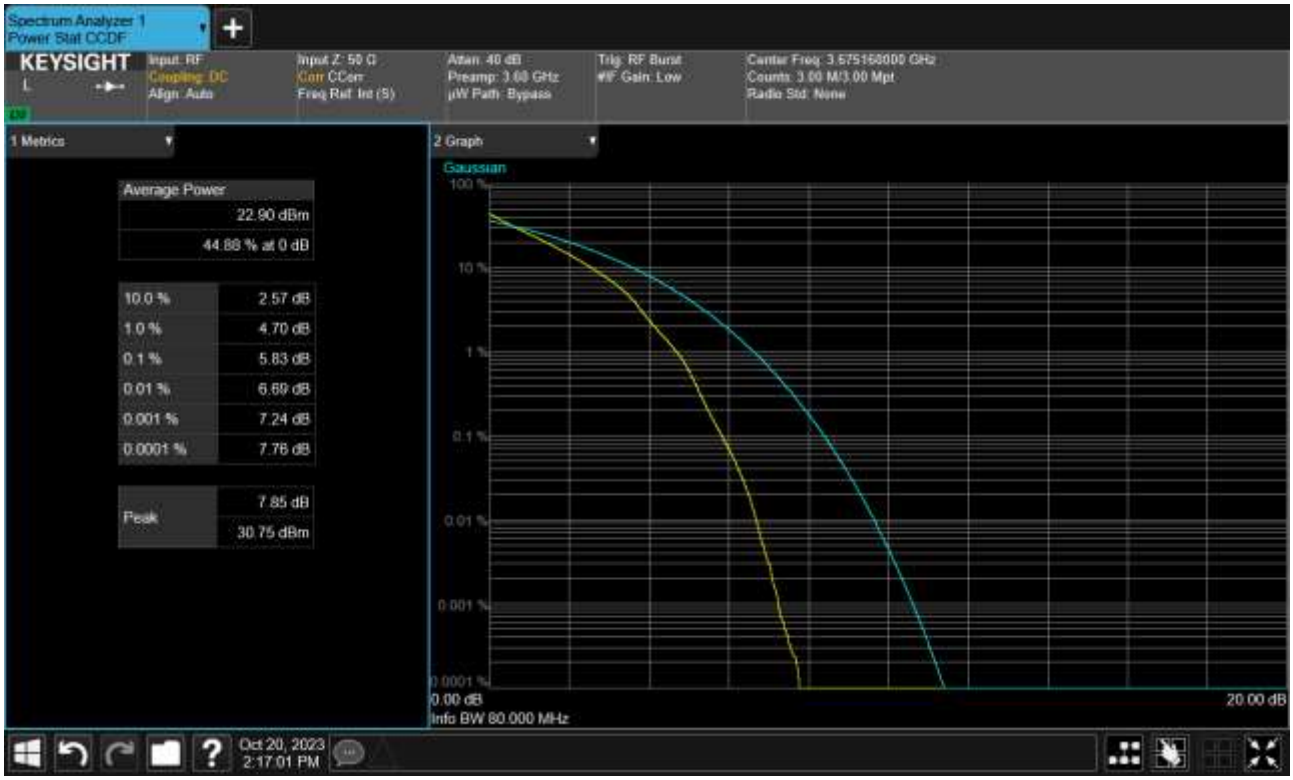
BAND 77 Peak To Average Ratio Plot (70 MHz, 3 675.00 MHz, 256QAM, Full RB)



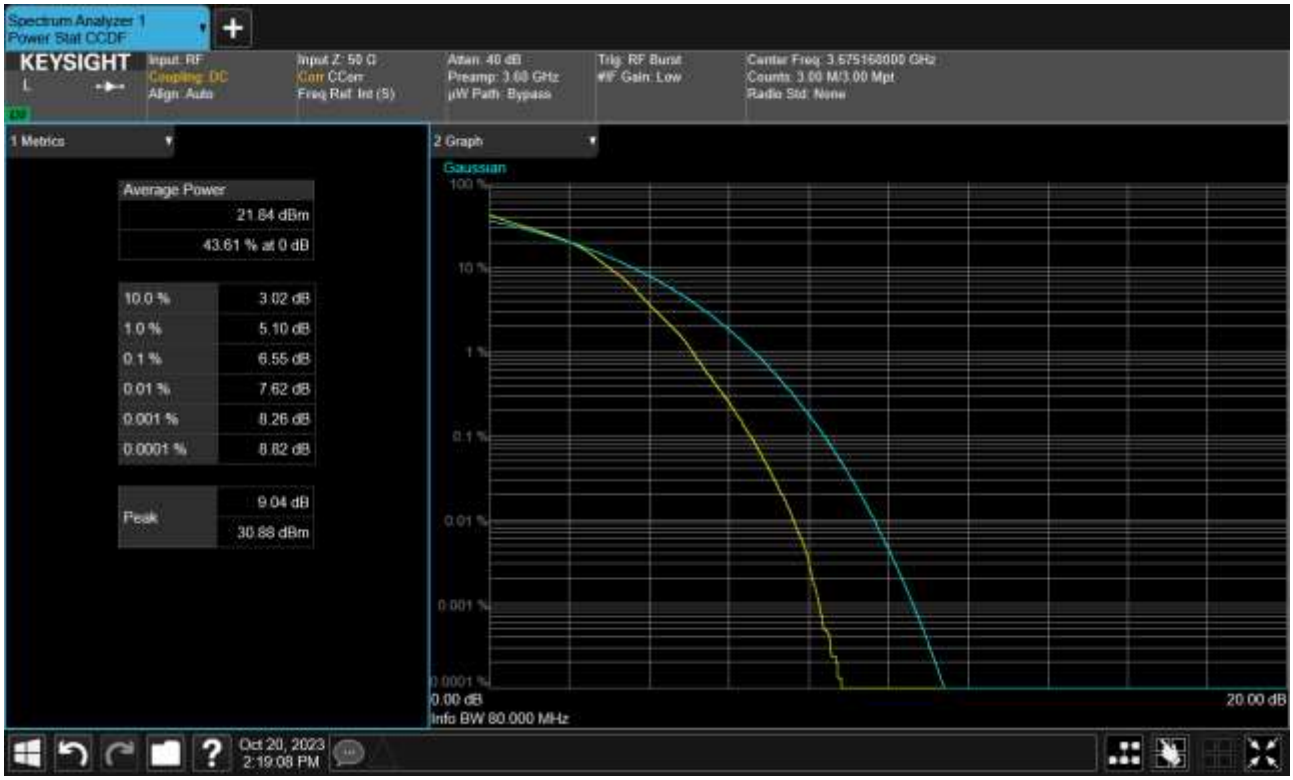
BAND 77 Peak To Average Ratio Plot (80 MHz, 3 675.00 MHz, BPSK, Full RB)



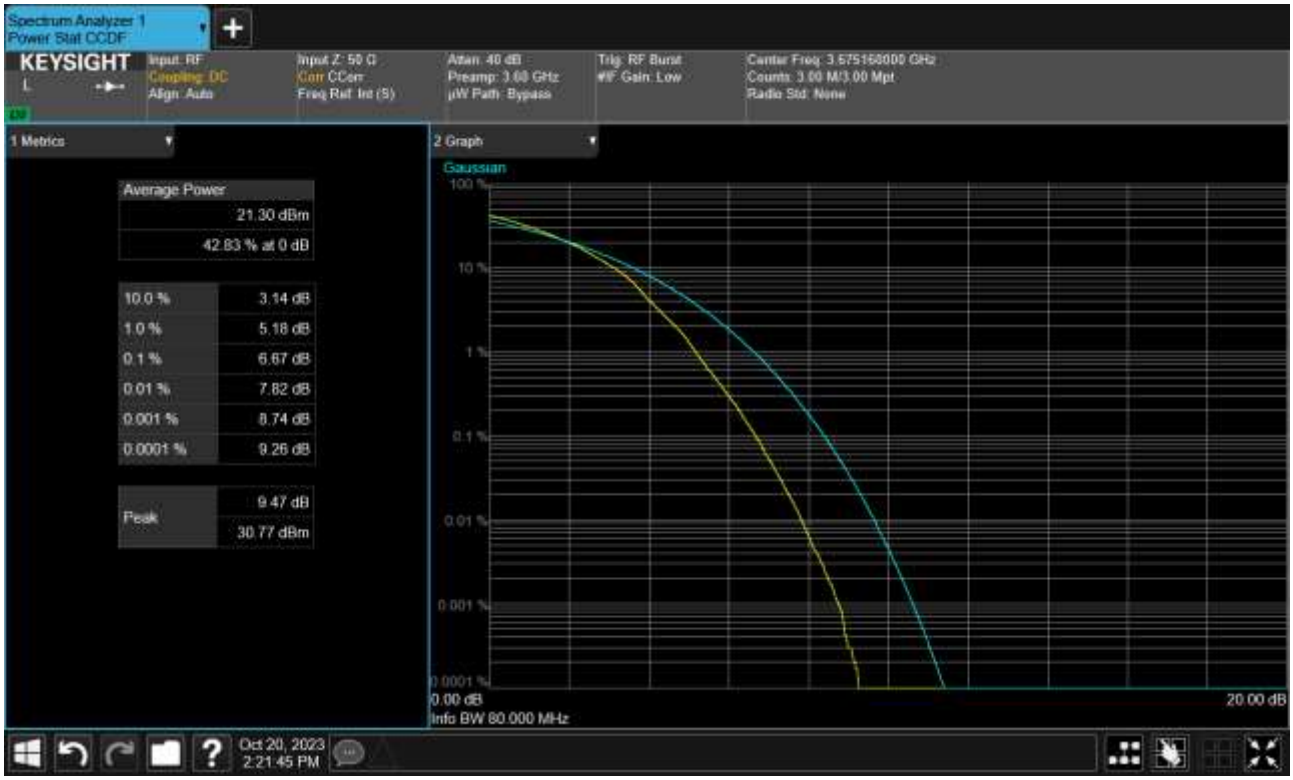
BAND 77 Peak To Average Ratio Plot (80 MHz, 3 675.00 MHz, QPSK, Full RB)



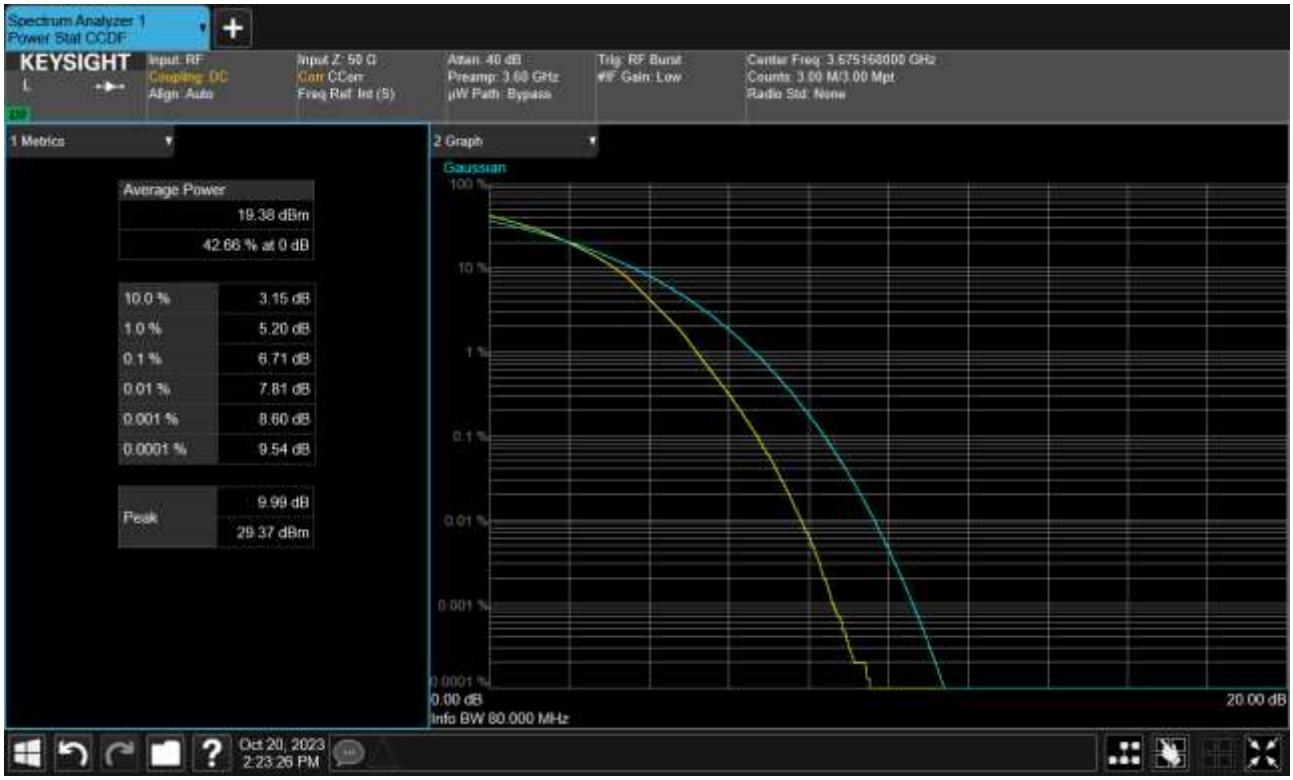
BAND 77 Peak To Average Ratio Plot (80 MHz, 3 675.00 MHz, 16QAM, Full RB)



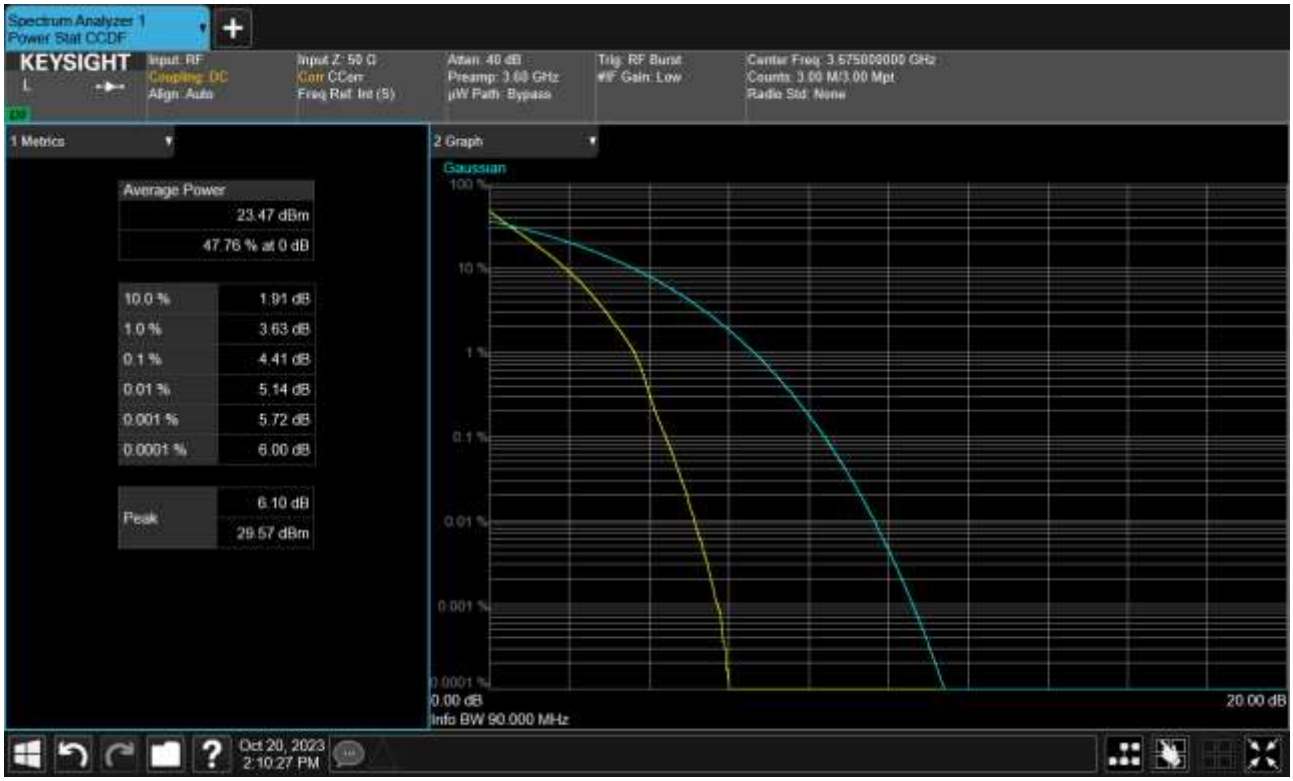
BAND 77 Peak To Average Ratio Plot (80 MHz, 3 675.00 MHz, 64QAM, Full RB)



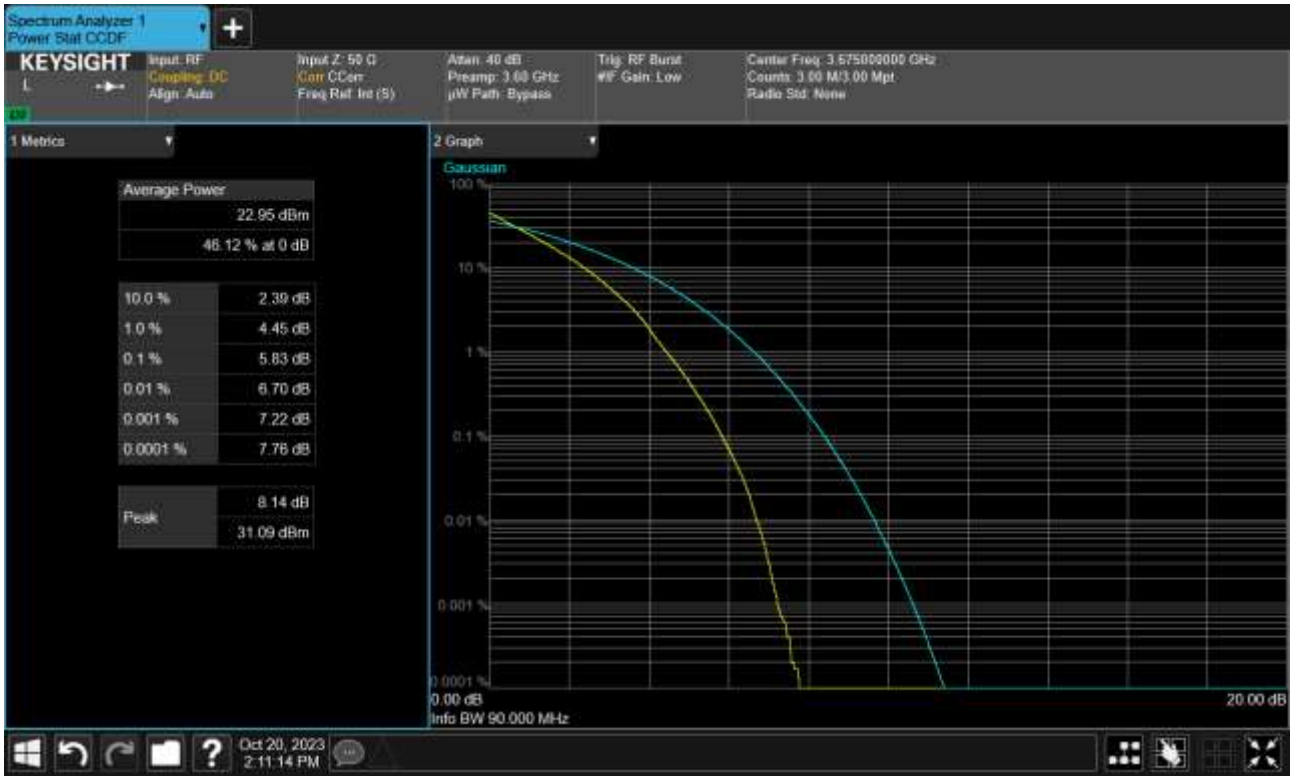
BAND 77 Peak To Average Ratio Plot (80 MHz, 3 675.00 MHz, 256QAM, Full RB)



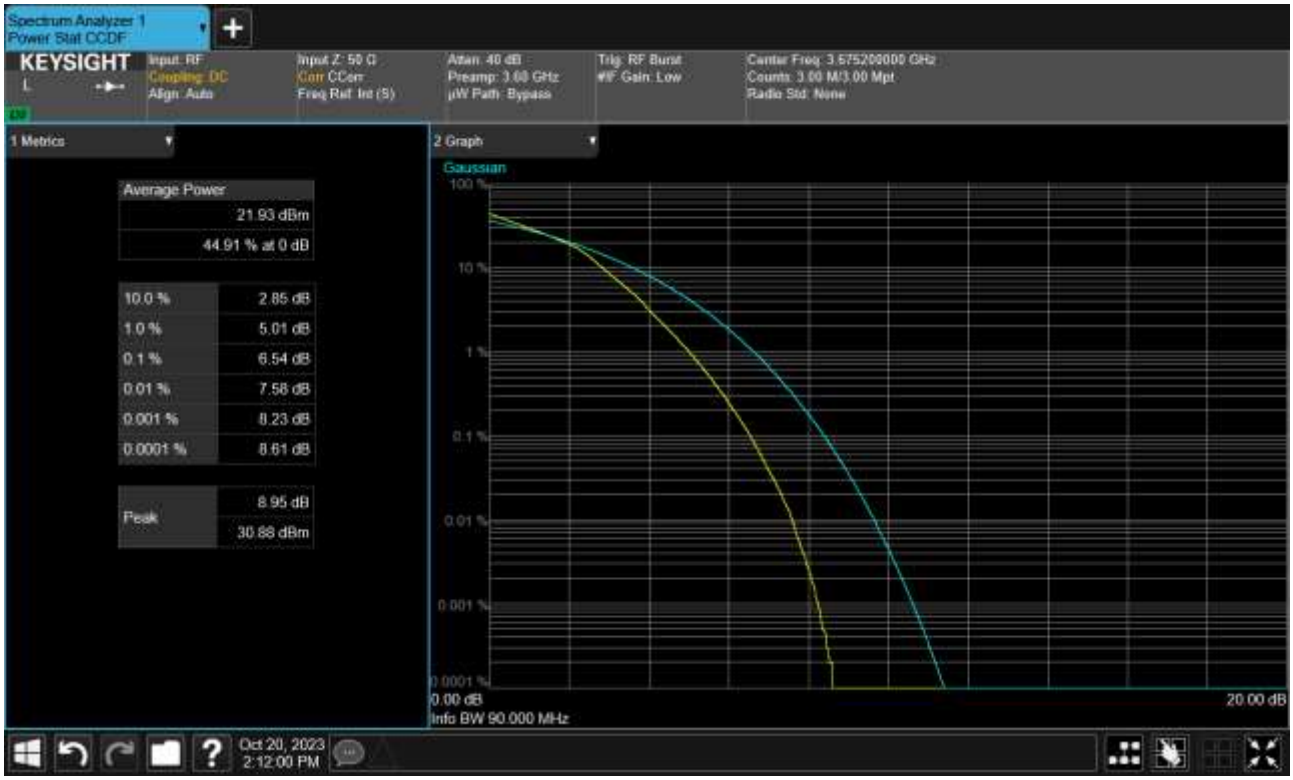
BAND 77 Peak To Average Ratio Plot (90 MHz, 3 675.00 MHz, BPSK, Full RB)



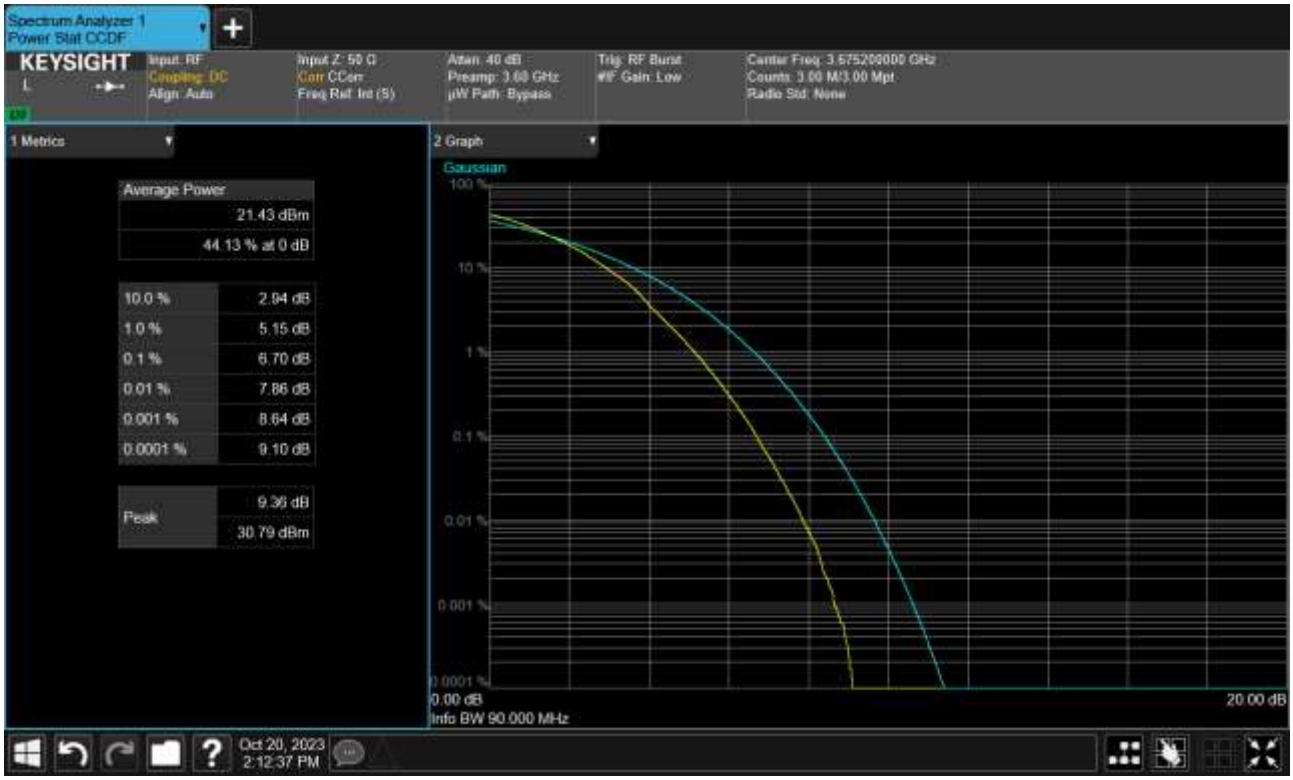
BAND 77 Peak To Average Ratio Plot (90 MHz, 3 675.00 MHz, QPSK, Full RB)



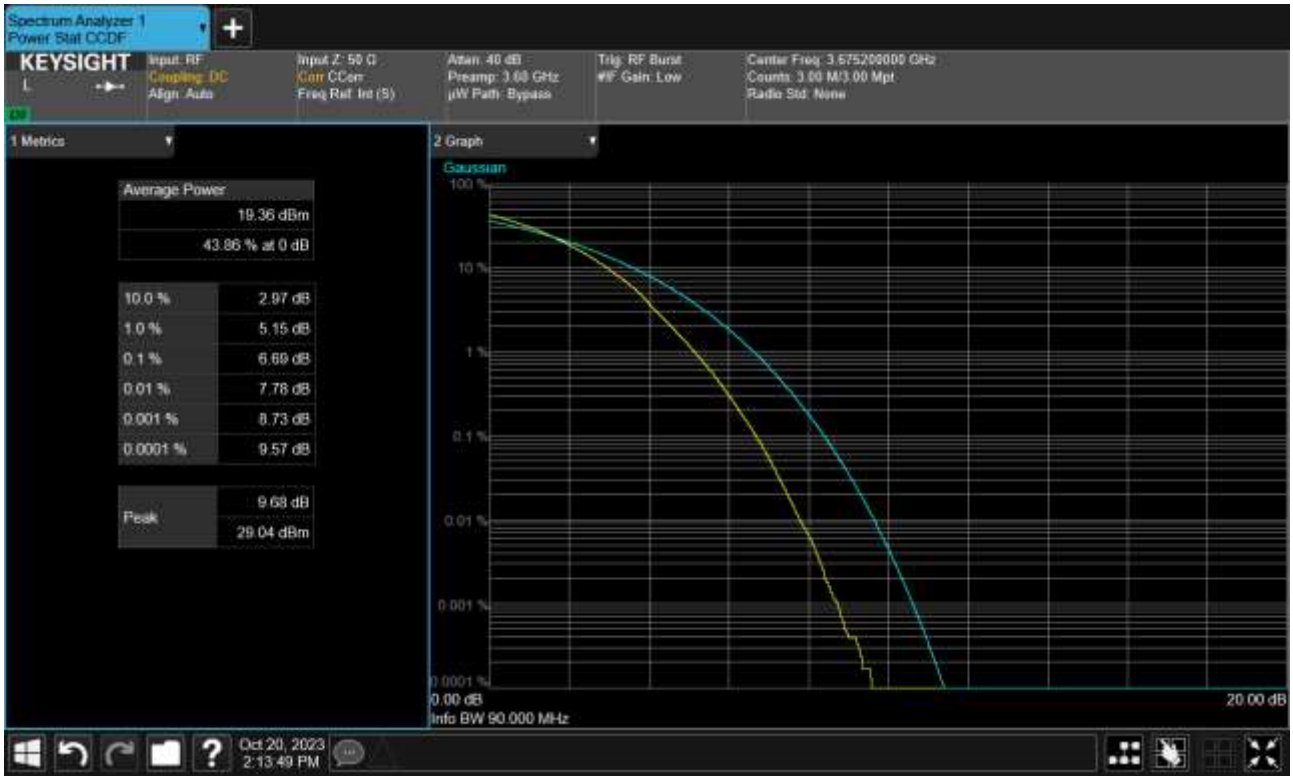
BAND 77 Peak To Average Ratio Plot (90 MHz, 3 675.00 MHz, 16QAM, Full RB)



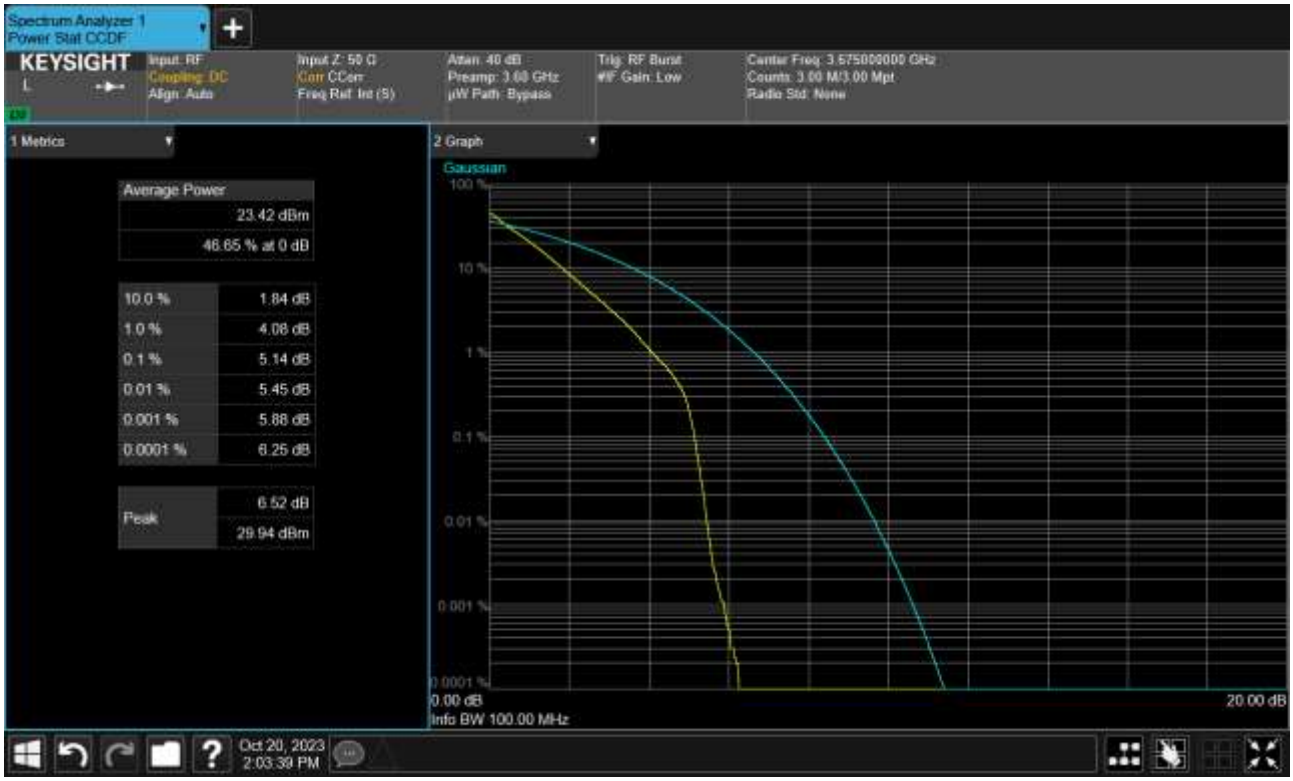
BAND 77 Peak To Average Ratio Plot (90 MHz, 3 675.00 MHz, 64QAM, Full RB)



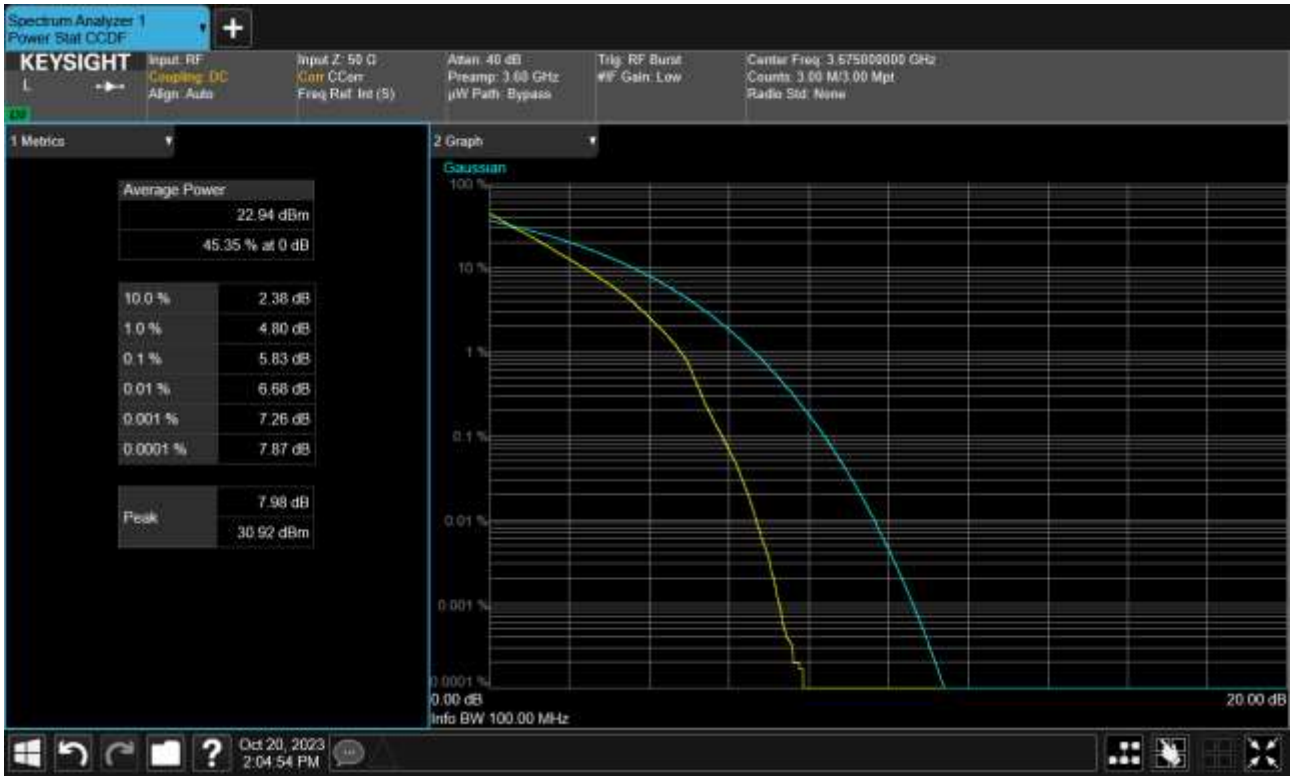
BAND 77 Peak To Average Ratio Plot (90 MHz, 3 675.00 MHz, 256QAM, Full RB)



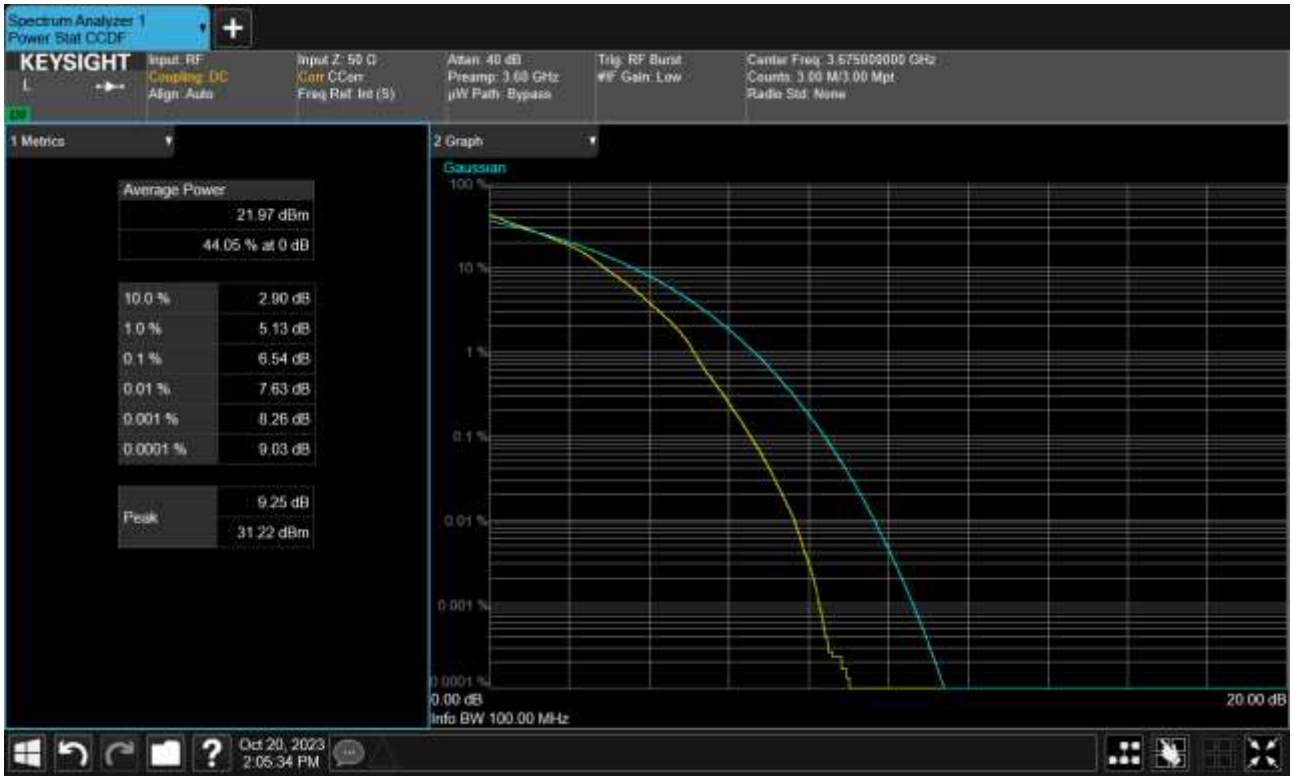
BAND 77 Peak To Average Ratio Plot (100 MHz, 3 675.00 MHz, BPSK, Full RB)



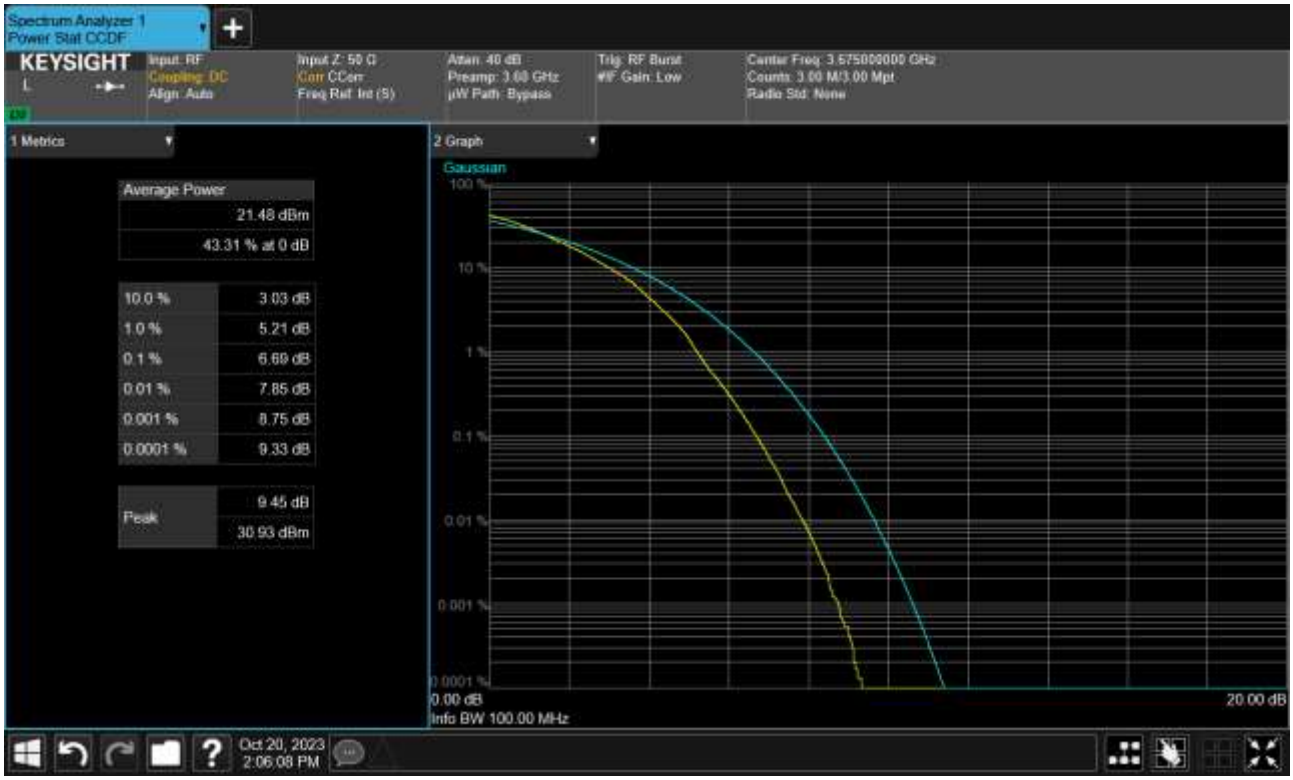
BAND 77 Peak To Average Ratio Plot (100 MHz, 3 675.00 MHz, QPSK, Full RB)



BAND 77 Peak To Average Ratio Plot (100 MHz, 3 675.00 MHz, 16QAM, Full RB)



BAND 77 Peak To Average Ratio Plot (100 MHz, 3 675.00 MHz, 64QAM, Full RB)



BAND 77 Peak To Average Ratio Plot (100 MHz, 3 675.00 MHz, 256QAM, Full RB)