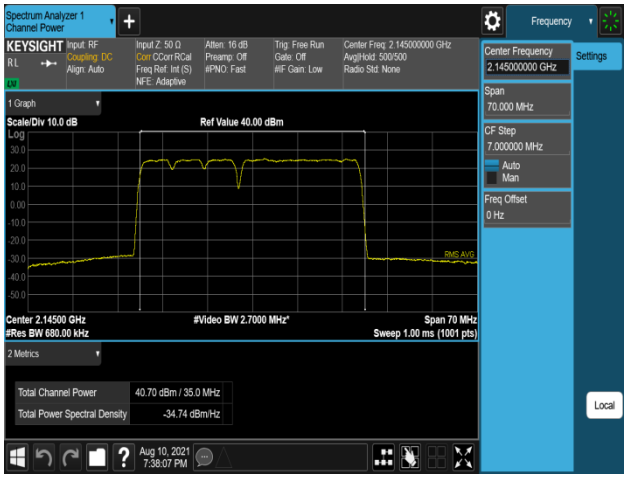
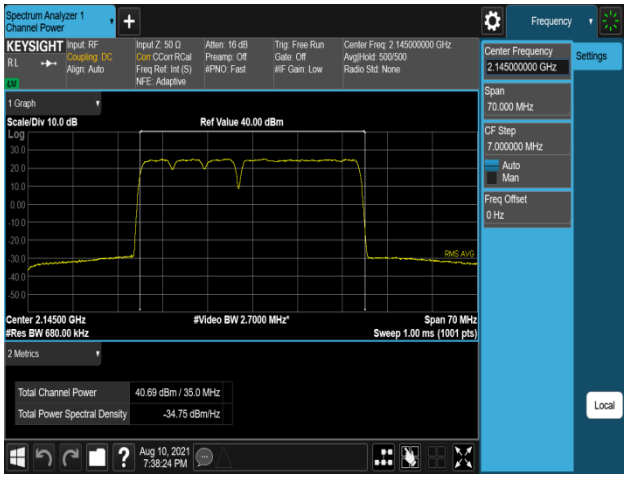
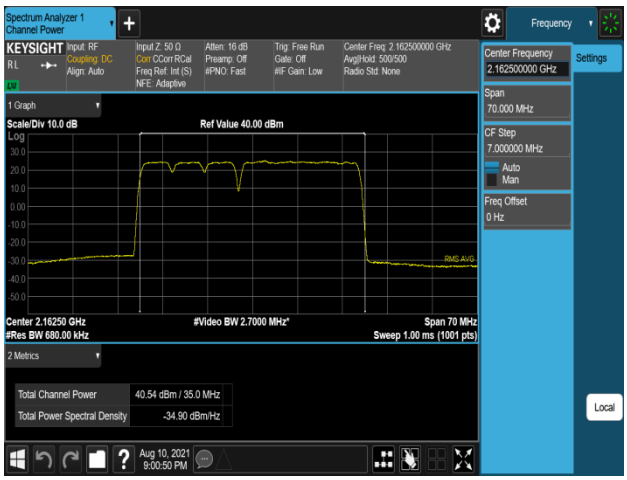


Plot 7-511. Conducted Average Output Power Plot
(B66_5M+5M+5M+20M_4C_16QAM - Mid Channel, Port 2)

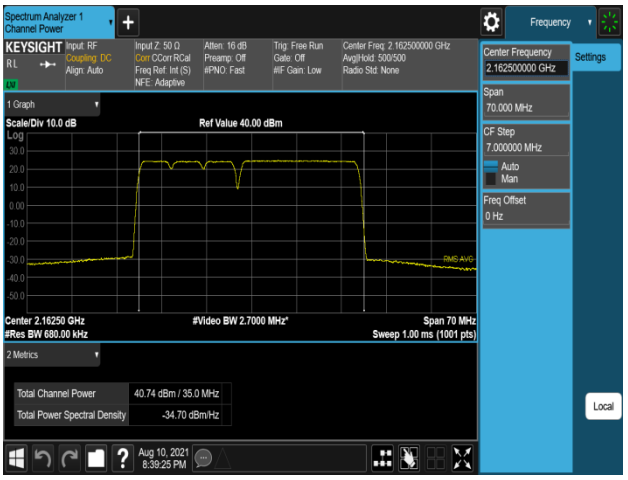


Plot 7-512. Conducted Average Output Power Plot
(B66_5M+5M+5M+20M_4C_16QAM - Mid Channel, Port 3)

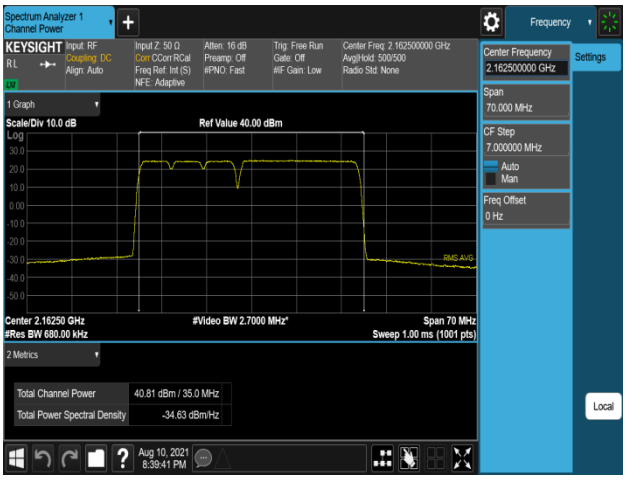
Plot 7-513. Conducted Average Output Power Plot
(B66_5M+5M+5M+20M_4C_QPSK – High Channel, Port 0)



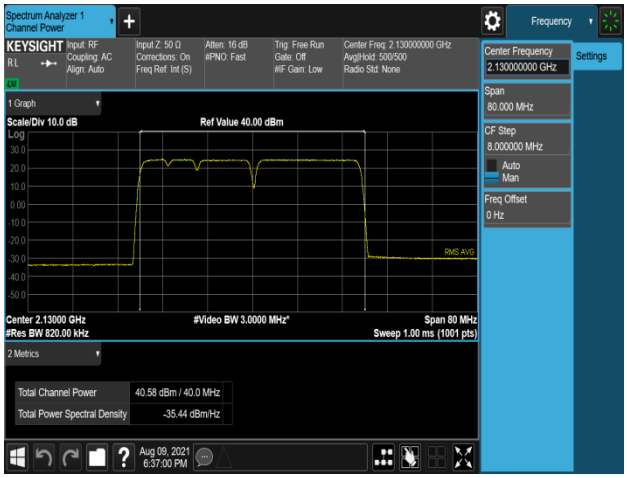
Plot 7-514. Conducted Average Output Power Plot
(B66_5M+5M+5M+20M_4C_QPSK – High Channel, Port 1)



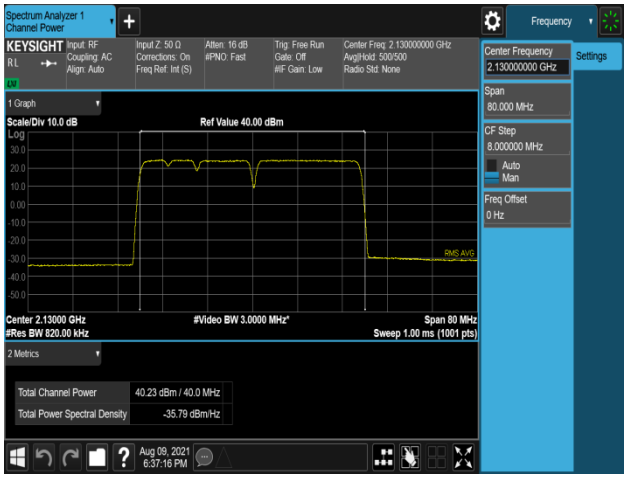
Plot 7-515. Conducted Average Output Power Plot
(B66_5M+5M+5M+20M_4C_QPSK – High Channel, Port 2)



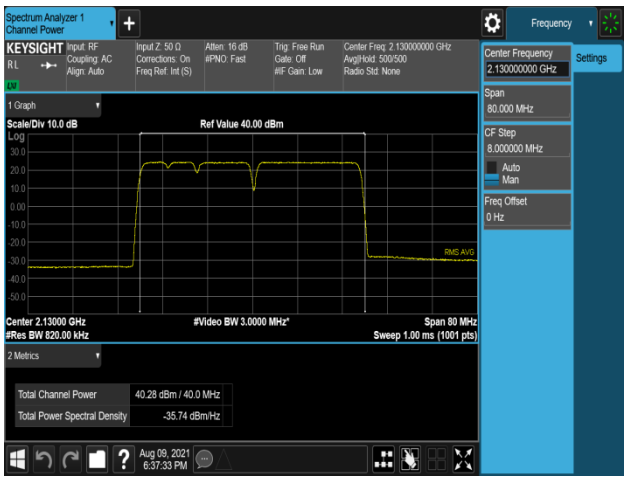
Plot 7-516. Conducted Average Output Power Plot
(B66_5M+5M+5M+20M_4C_QPSK – High Channel, Port 3)



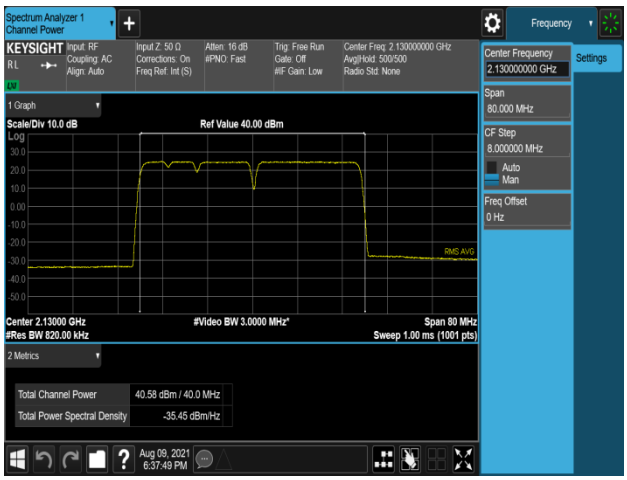
Plot 7-517. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_QPSK - Low Channel, Port 0)



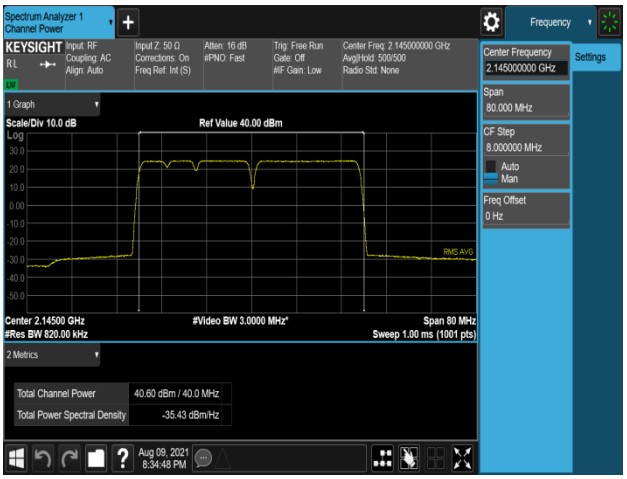
Plot 7-518. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_QPSK - Low Channel, Port 1)



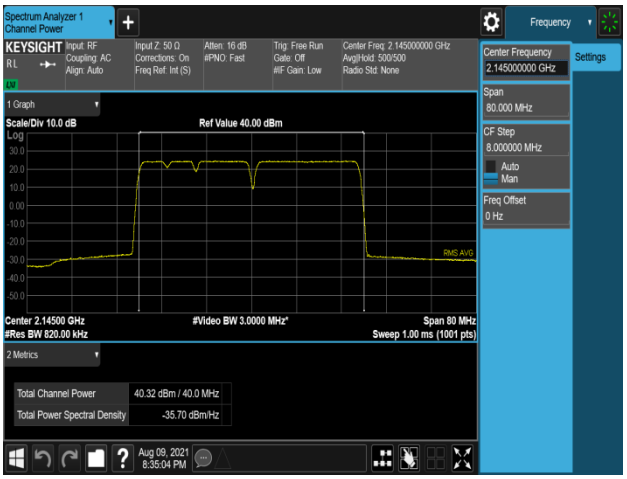
Plot 7-519. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_QPSK - Low Channel, Port 2)



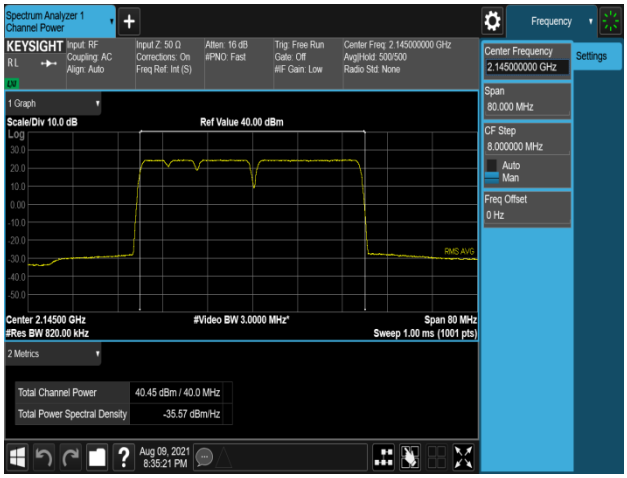
Plot 7-520. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_QPSK - Low Channel, Port 3)



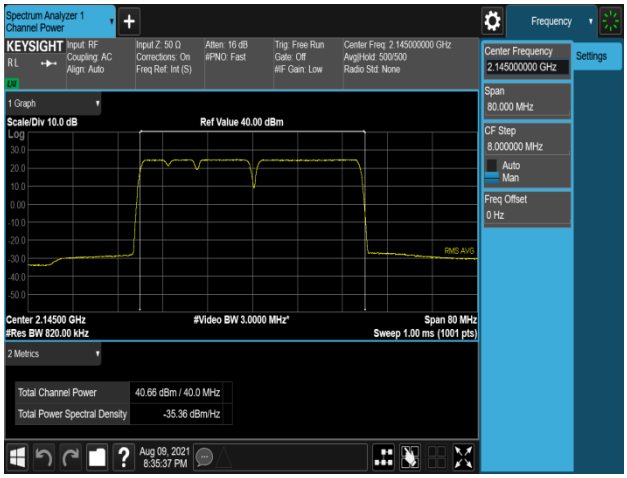
Plot 7-521. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_QPSK - Mid Channel, Port 0)



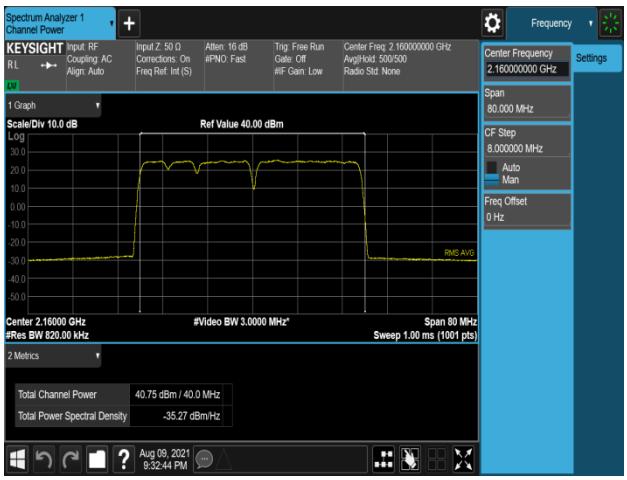
Plot 7-522. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_QPSK - Mid Channel, Port 1)



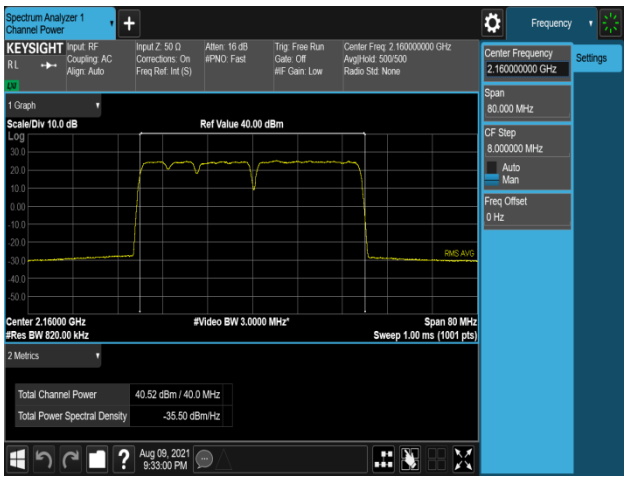
Plot 7-523. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_QPSK - Mid Channel, Port 2)



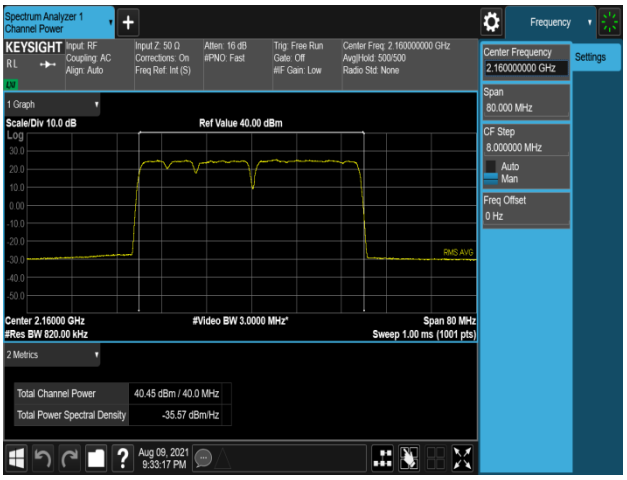
Plot 7-524. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_QPSK - Mid Channel, Port 3)



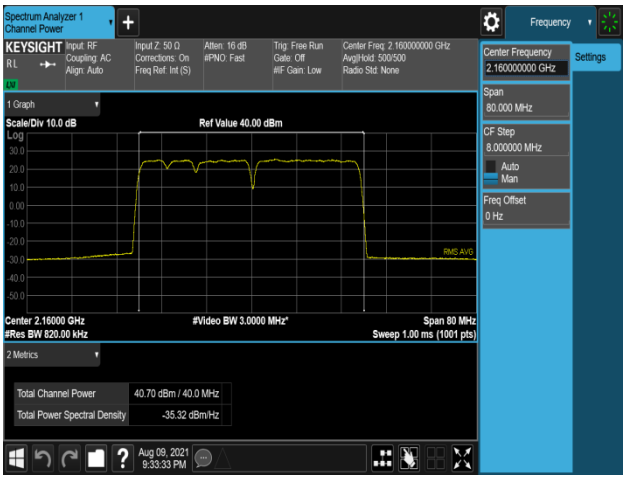
Plot 7-525. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_16QAM – High Channel, Port 0)



Plot 7-526. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_16QAM – High Channel, Port 1)



Plot 7-527. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_16QAM – High Channel, Port 2)



Plot 7-528. Conducted Average Output Power Plot
(B66_5M+5M+10M+20M_4C_16QAM – High Channel, Port 3)

7.4 Peak Power Spectral Density

§ 2.1046

Test Overview

A transmitter port of EUT is connected to the input of a signal analyzer. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedure Used

ANSI C63.26 - Section 5.2.4.5
ANSI C63.26 - Section 5.2.5.5
KDB 971168 D01 v0301 - Section 5.2

ANSI C63.26 - Section 6.4.3.2.3
KDB 662911 D01 v02r01
- Section E)2) In-Band Power Spectral Density (PSD) Measurements
b) Measure and sum spectal maxima across the outputs.

Test Setting

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The spectrum analyzer settings were as follows:

The PSD is measured following the same procedures described in 5.2.4.4 of ANSI C63.26 for measuring the total average power, but with the RBW set to the reference bandwidth specified by the applicable regulatory requirement, and by using the marker function to identify the maximum PSD instead of summing the power across the OBW. If the fundamental measurement condition cannot be realized, then one of the alternative procedures in 5.2.4.4.2 or 5.2.4.4.3 should be selected, based on whether the transmitter duty cycle is constant (variations ≤ ±2%) or non-constant (variations > ±2%), respectively.

1. Conducted power measurements are performed using the signal analyzer's "SA mode" measurement capability for signals with continuous operation.
2. Set span to 2 × to 3 × the OBW.
3. Set RBW = 1 MHz (the reference bandwidth)
4. Set VBW ≥ 3 × RBW.
5. Set number of measurement points in sweep ≥ 2 × span / RBW.
6. Sweep time:
   a) Set ≥ auto-couple, and enable trace averaging, or
   b) Set ≥ [10 × (number of points in sweep) × (transmission symbol period)] and enable a single sweep (automation-compatible) measurement. The sweep time should never be faster than the auto-coupled sweep time.
7. Detector = power averaging (rms).
8. Set sweep trigger to "free run.".
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 the on and off time of the transmitter, 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. Use the peak marker function to determine the maximum amplitude level. (=P_{Meas})

11. The relevant equation for determining the maximum EIRP from the measured RF output power is given in Equation as follows:
    EIRP = P_{Meas} + G_T
    where
    GT: gain of the transmitting antenna, in dBi (EIRP).

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

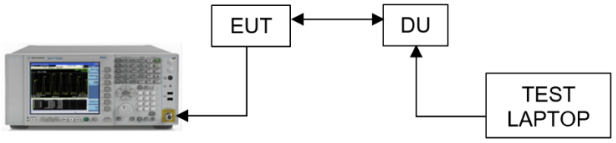


Figure 7-3. Test Instrument & Measurement Setup

Limit

Base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

Test Notes

1. All the measurement has been tested but test plots are referred from the highest of value of each of modulation of each antenna ports.
2. Consider the following factors for MIMO Power Spectral Density:
   The power spectal density is meausred as dBm / MHz, with the resolution bandwidth of 1 MHz PSDs are summed up in linear using the measure-and-sum technique defined in KDB 971168 D01 v03r01 - Section E) 2).
3. PSD per port (dBm / MHz) is converted to a linear value (mW). A summation of linear powers for all ports gives us the total MIMO cunducted Power (mW). We convert this back to logarithmic scale for further PSD calcuations.
4. Antenna Gains (dBi) are provided by the client.
5. All transmit signals from different antennas are completely uncorrelated with eath other. So the the e.i.r.p. shall be calculated based on the aggregate power conducted across all antennas and maximum antenna gain G_{max}
6. Sample Calculation:
   Let us assume the following numbers:
   a) Total MIMO Conducted Power as 8549.18 milliWatts.
   b) Antenna Gain = 12.50 dBi

Factors		Value	Unit
Summed MIMO Conducted Power (linear sum)		8549.18	mW / 1 MHz
Summed MIMO Conducted Power (dBm)	= 10 * log (8549.18) =	39.32	dBm / 1 MHz
Antenna Gain		12.50	dBi
Total MIMO EIRP		51.82	dBm / 1 MHz
Limit	= 1640 mW/ 1 MHz =	62.15	dBm / 1 MHz
Margin = Limit - Total MIMO EIRP	= 51.82 - 62.15 =	-10.33	dB

Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	33.28	33.72	33.35	33.36
	1	33.25	33.64	33.31	33.36
	2	33.33	33.84	33.48	33.40
	3	33.34	33.86	33.48	33.48
Total MIMO Conducted Power (mW/1MHz)		8549.18	9520.22	8759.49	8749.59
Total MIMO Conducted Power (dBm/1MHz)		39.32	39.79	39.42	39.42
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		51.82	**52.29**	51.92	51.92
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-10.33	-9.86	-10.22	-10.23

Table 7-90. Peak Power Spectral Density Table (B2_5M_1C - Low Channel)

Mid Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	33.22	33.63	33.27	33.21
	1	33.18	33.55	33.18	33.12
	2	33.30	33.63	33.31	33.12
	3	33.50	33.78	33.46	33.37
Total MIMO Conducted Power (mW/1MHz)		8555.19	9265.90	8559.99	8369.29
Total MIMO Conducted Power (dBm/1MHz)		39.32	39.67	39.32	39.23
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		51.82	**52.17**	51.82	51.73
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-10.33	-9.98	-10.32	-10.42

Table 7-91. Peak Power Spectral Density Table (B2_5M_1C - Mid Channel)

High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	33.32	33.62	33.29	33.33
	1	33.25	33.47	33.22	33.30
	2	33.27	33.78	33.28	33.43
	3	31.83	33.75	33.41	33.36
Total MIMO Conducted Power (mW/1MHz)		7911.13	9285.47	8548.98	8657.88
Total MIMO Conducted Power (dBm/1MHz)		38.98	39.68	39.32	39.37
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		51.48	**52.18**	51.82	51.87
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-10.67	-9.97	-10.33	-10.27

Table 7-92. Peak Power Spectral Density Table (B2_5M_1C - High Channel)

Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	30.64	30.97	30.70	30.63
	1	30.56	30.96	30.57	30.81
	2	30.52	31.00	30.66	30.68
	3	30.69	31.21	30.91	30.95
Total MIMO Conducted Power (mW/1MHz)		4596.33	5078.68	4710.57	4772.97
Total MIMO Conducted Power (dBm/1MHz)		36.62	37.06	36.73	36.79
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		49.12	**49.56**	49.23	49.29
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-13.02	-12.59	-12.92	-12.86

Table 7-93. Peak Power Spectral Density Table (B2_10M_1C - Low Channel)

Mid Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	30.51	30.86	30.51	30.52
	1	30.30	30.75	30.44	30.32
	2	30.47	30.90	30.56	30.56
	3	30.55	30.95	30.67	30.64
Total MIMO Conducted Power (mW/1MHz)		4445.39	4881.71	4534.66	4500.86
Total MIMO Conducted Power (dBm/1MHz)		36.48	36.89	36.57	36.53
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		48.98	**49.39**	49.07	49.03
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-13.17	-12.76	-13.08	-13.12

Table 7-94. Peak Power Spectral Density Table (B2_10M_1C - Mid Channel)

High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	30.65	29.19	28.67	30.45
	1	30.53	30.68	30.39	30.47
	2	30.64	30.86	30.58	30.65
	3	30.65	30.94	30.72	30.69
Total MIMO Conducted Power (mW/1MHz)		4613.85	4458.44	4151.78	4558.64
Total MIMO Conducted Power (dBm/1MHz)		36.64	36.49	36.18	36.59
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		**49.14**	48.99	48.68	49.09
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-13.01	-13.16	-13.47	-13.06

Table 7-95. Peak Power Spectral Density Table (B2_10M_1C - High Channel)

Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	29.17	29.92	29.19	29.11
	1	29.24	29.94	29.21	29.29
	2	29.08	29.69	29.06	29.10
	3	29.30	29.76	29.35	29.28
Total MIMO Conducted Power (mW/1MHz)		3326.68	3845.38	3329.10	3321.67
Total MIMO Conducted Power (dBm/1MHz)		35.22	35.85	35.22	35.21
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		47.72	**48.35**	47.72	47.71
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-14.43	-13.80	-14.43	-14.43

Table 7-96. Peak Power Spectral Density Table (B2_15M_1C - Low Channel)

Mid Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	28.70	29.49	28.86	28.74
	1	28.75	29.89	28.92	29.02
	2	28.78	29.58	28.95	28.83
	3	28.92	29.77	28.91	28.95
Total MIMO Conducted Power (mW/1MHz)		3025.74	3719.83	3111.70	3093.07
Total MIMO Conducted Power (dBm/1MHz)		34.81	35.71	34.93	34.90
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		47.31	**48.21**	47.43	47.40
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-14.84	-13.94	-14.72	-14.74

Table 7-97. Peak Power Spectral Density Table (B2_15M_1C - Mid Channel)

High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	28.77	29.72	28.83	28.68
	1	29.01	29.54	28.79	28.86
	2	28.84	29.49	28.85	28.89
	3	28.81	29.54	28.89	28.86
Total MIMO Conducted Power (mW/1MHz)		3074.38	3624.92	3062.66	3051.49
Total MIMO Conducted Power (dBm/1MHz)		34.88	35.59	34.86	34.85
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		47.38	**48.09**	47.36	47.35
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-14.77	-14.06	-14.79	-14.80

Table 7-98. Peak Power Spectral Density Table (B2_15M_1C - High Channel)

Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	27.55	27.90	27.72	27.76
	1	27.51	27.86	27.61	27.64
	2	27.55	27.91	27.75	27.67
	3	27.72	27.94	27.91	27.76
Total MIMO Conducted Power (mW/1MHz)		2292.89	2468.56	2381.58	2359.90
Total MIMO Conducted Power (dBm/1MHz)		33.60	33.92	33.77	33.73
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		46.10	**46.42**	46.27	46.23
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-16.04	-15.72	-15.88	-15.92

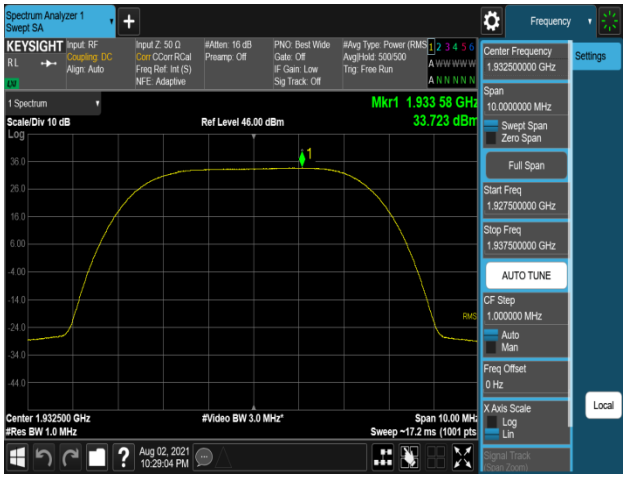
Table 7-99. Peak Power Spectral Density Table (B2_20M_1C - Low Channel)

Mid Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	27.47	27.75	27.53	27.61
	1	27.33	27.59	27.33	27.54
	2	27.47	27.93	27.67	27.66
	3	27.64	27.99	27.74	27.70
Total MIMO Conducted Power (mW/1MHz)		2238.50	2419.20	2286.88	2316.88
Total MIMO Conducted Power (dBm/1MHz)		33.50	33.84	33.59	33.65
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		46.00	**46.34**	46.09	46.15
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-16.15	-15.81	-16.06	-16.00

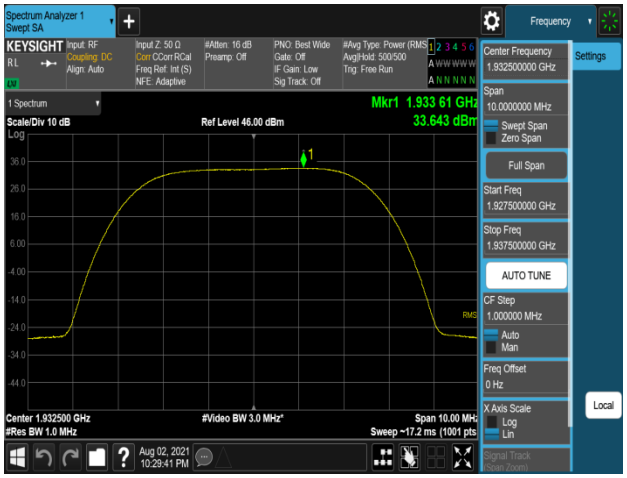
Table 7-100. Peak Power Spectral Density Table (B2_20M_1C - Mid Channel)

High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Power (dBm/1MHz)	0	27.70	27.91	27.51	27.49
	1	27.27	27.81	27.35	27.46
	2	27.48	27.89	27.57	27.61
	3	27.56	28.15	27.64	27.72
Total MIMO Conducted Power (mW/1MHz)		2252.21	2489.17	2257.81	2285.76
Total MIMO Conducted Power (dBm/1MHz)		33.53	33.96	33.54	33.59
Ant. Gain (dBi)		12.50	12.50	12.50	12.50
MIMO EIRP(dBm/1MHz)		46.03	**46.46**	46.04	46.09
EIRP Limit(W/1MHz)		1640.00	1640.00	1640.00	1640.00
EIRP Limit(dBm/1MHz)		62.15	62.15	62.15	62.15
Margin (dB)		-16.12	-15.69	-16.11	-16.06

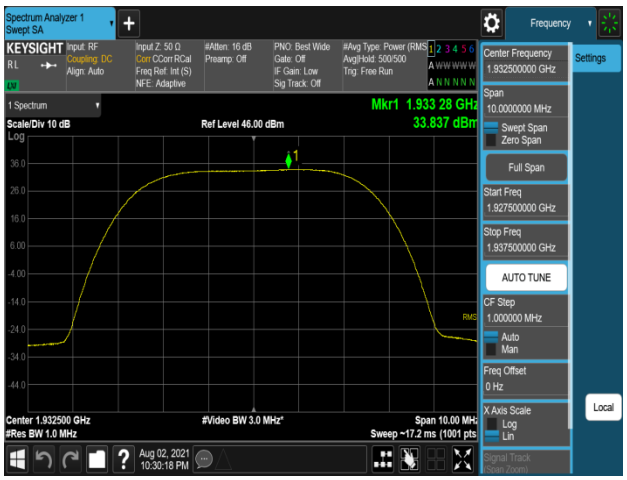
Table 7-101. Peak Power Spectral Density Table (B2_20M_1C - High Channel)



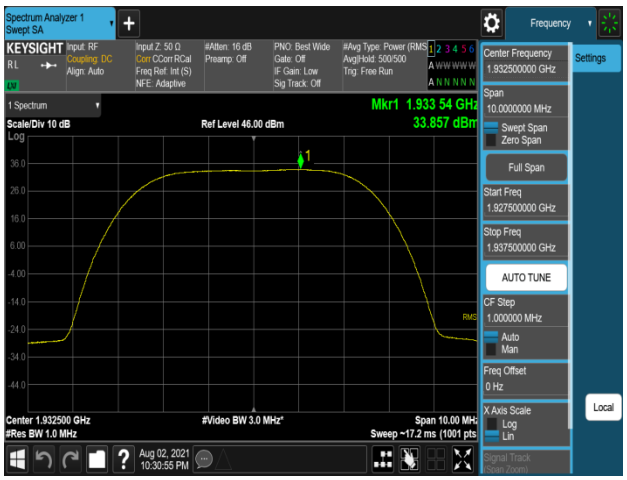
Plot 7-529. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM - Low Channel, Port 0)



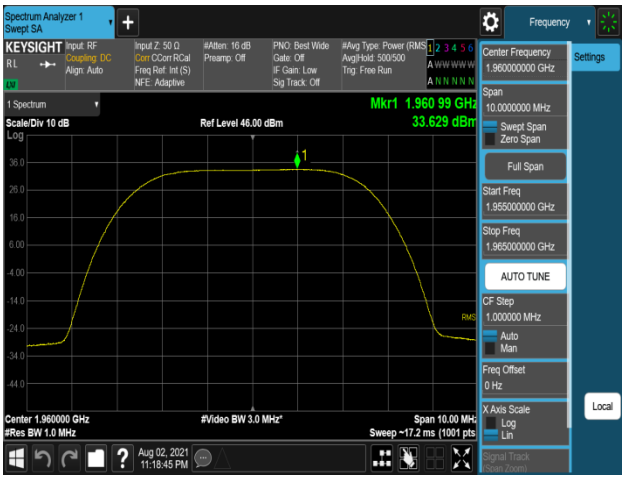
Plot 7-530. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM - Low Channel, Port 1)



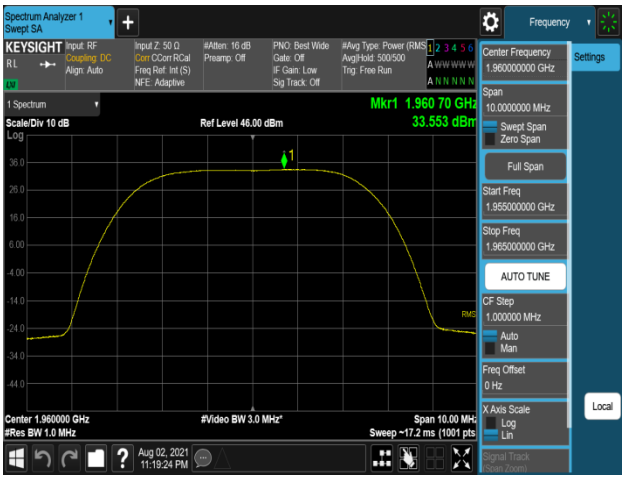
Plot 7-531. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM - Low Channel, Port 2)



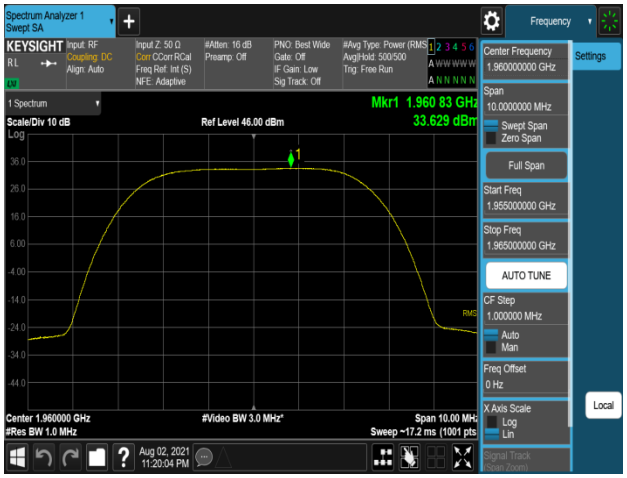
Plot 7-532. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM - Low Channel, Port 3)



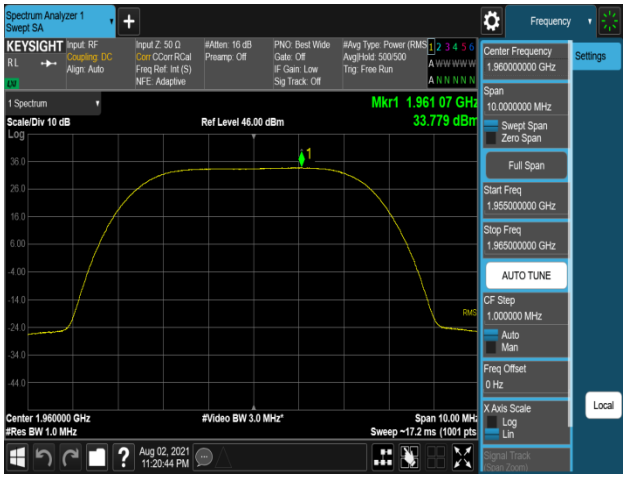
Plot 7-533. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM – Mid Channel, Port 0)



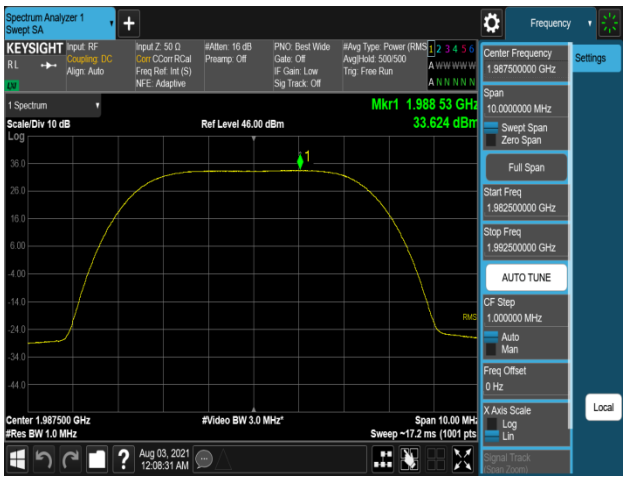
Plot 7-534. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM – Mid Channel, Port 1)



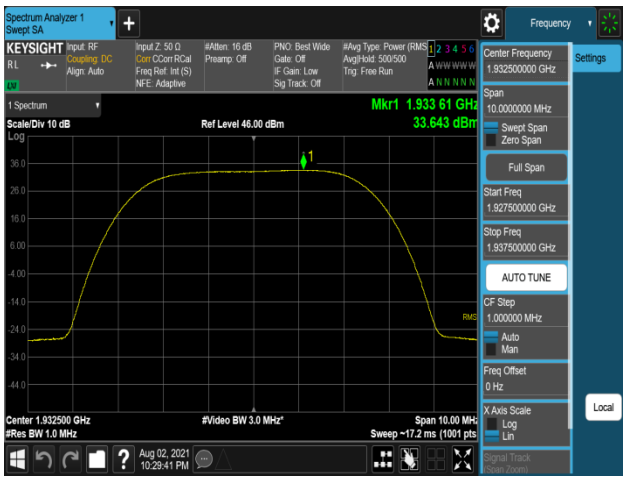
Plot 7-535. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM – Mid Channel, Port 2)



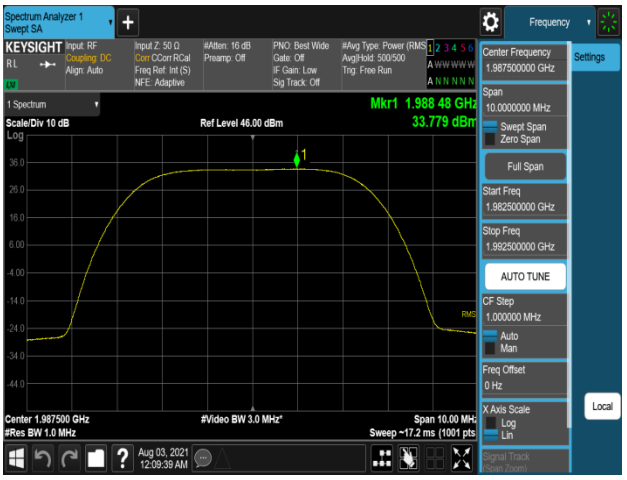
Plot 7-536. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM – Mid Channel, Port 3)



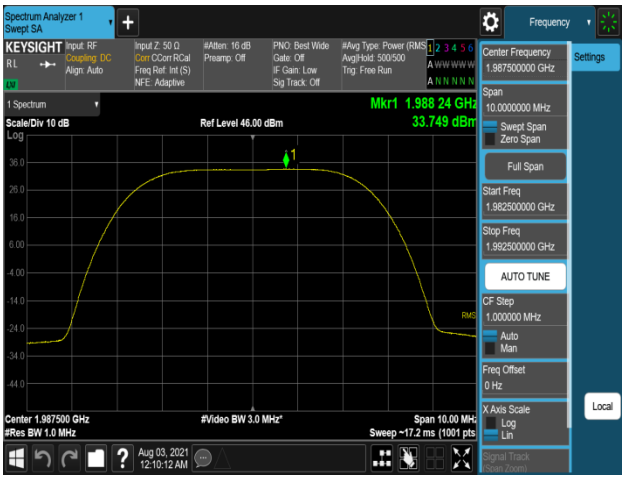
Plot 7-537. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM – High Channel, Port 0)



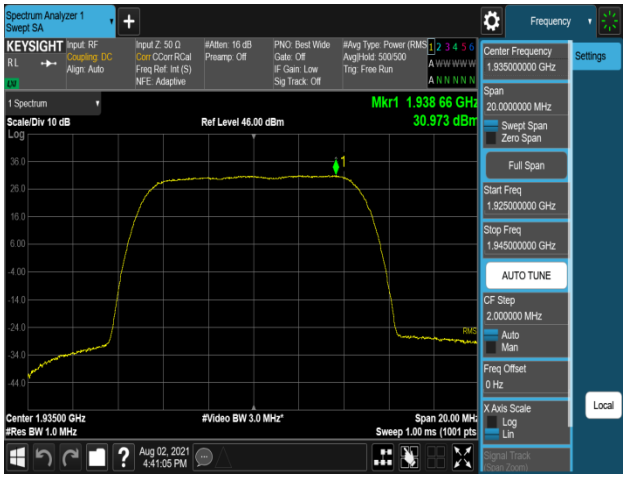
Plot 7-538. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM – High Channel, Port 1)



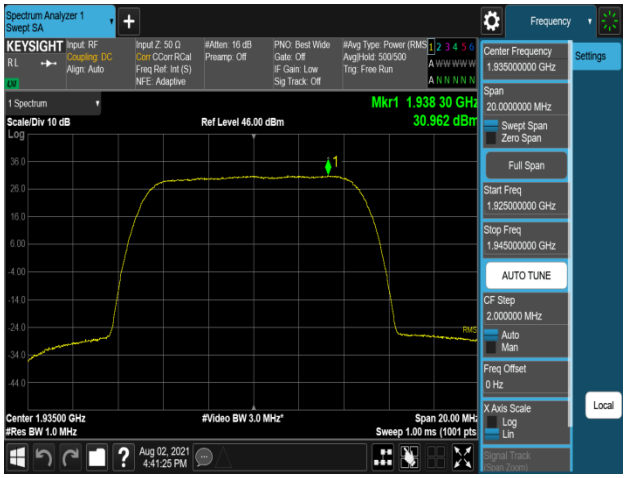
Plot 7-539. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM – High Channel, Port 2)



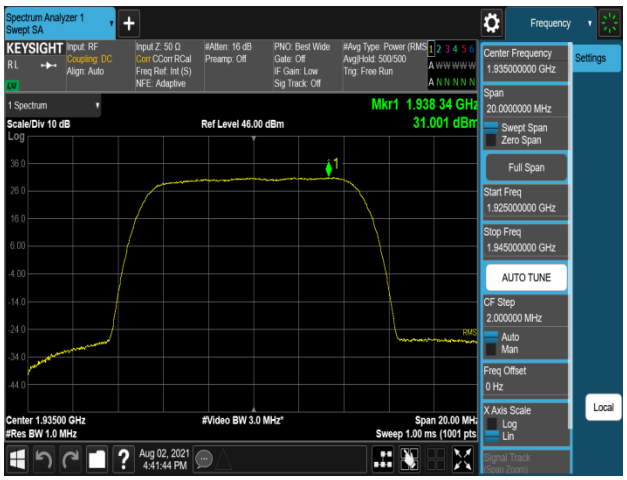
Plot 7-540. Peak Power Spectral Density Plot
(B2_5M_1C_16QAM – High Channel, Port 3)



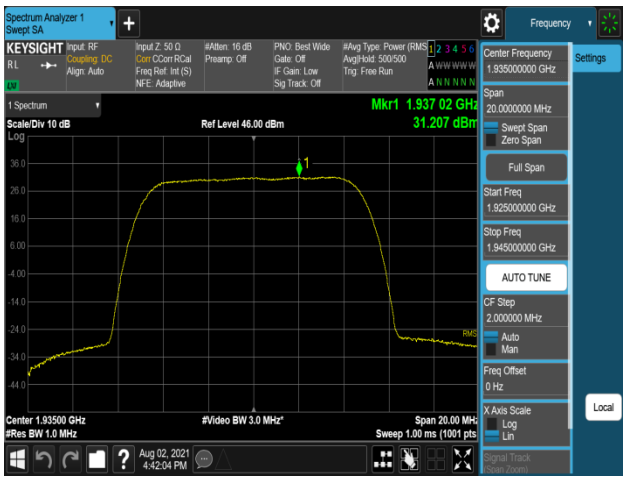
Plot 7-541. Peak Power Spectral Density Plot
(B2_10M_1C_16QAM - Low Channel, Port 0)



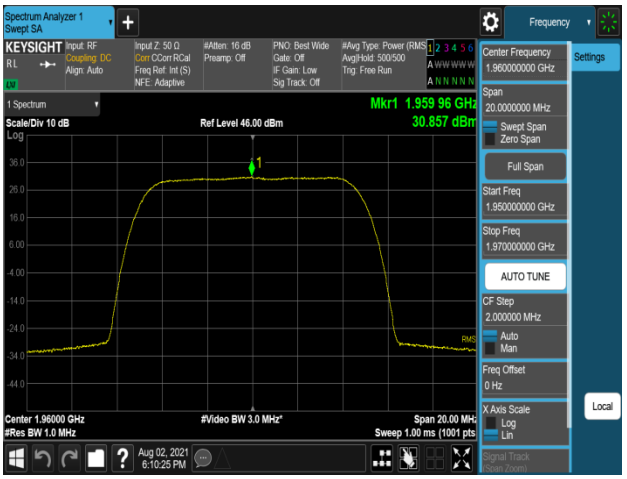
Plot 7-542. Peak Power Spectral Density Plot
(B2_10M_1C_16QAM - Low Channel, Port 1)



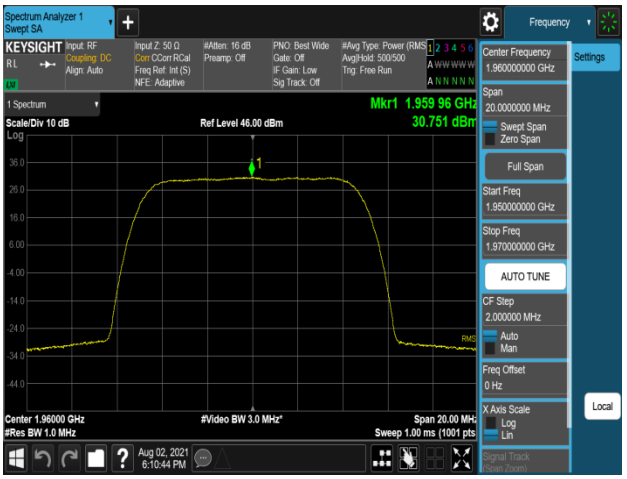
Plot 7-543. Peak Power Spectral Density Plot
(B2_10M_1C_16QAM - Low Channel, Port 2)



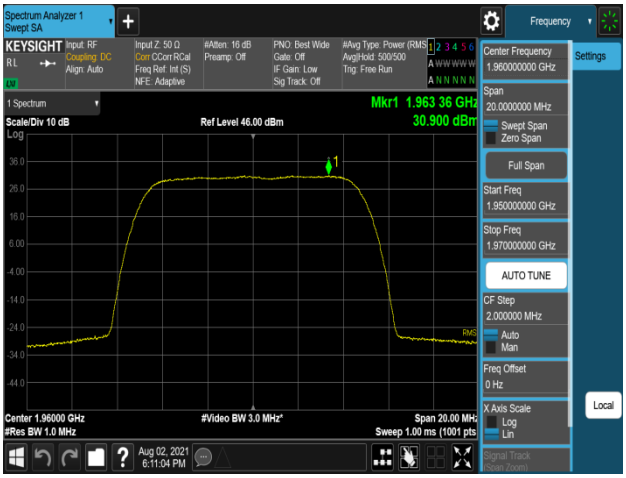
Plot 7-544. Peak Power Spectral Density Plot
(B2_10M_1C_16QAM - Low Channel, Port 3)



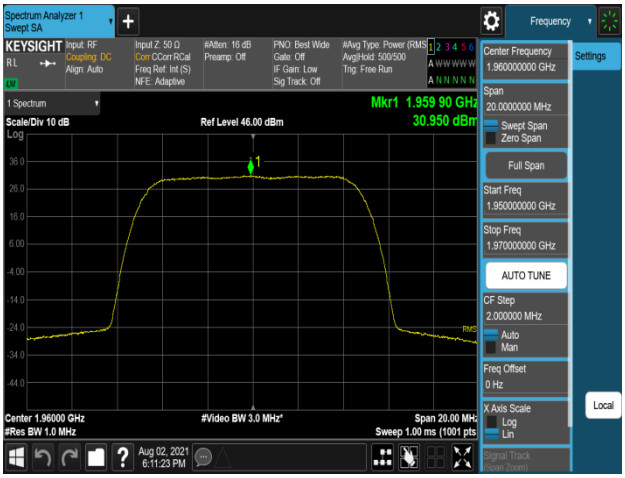
Plot 7-545. Peak Power Spectral Density Plot
(B2_10M_1C_16QAM – Mid Channel, Port 0)



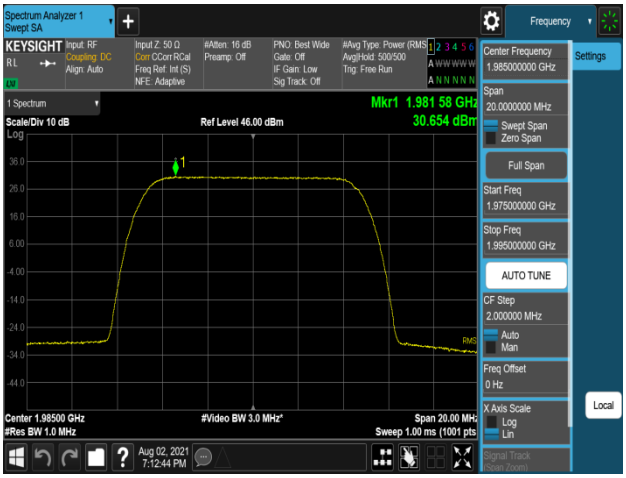
Plot 7-546. Peak Power Spectral Density Plot
(B2_10M_1C_16QAM – Mid Channel, Port 1)



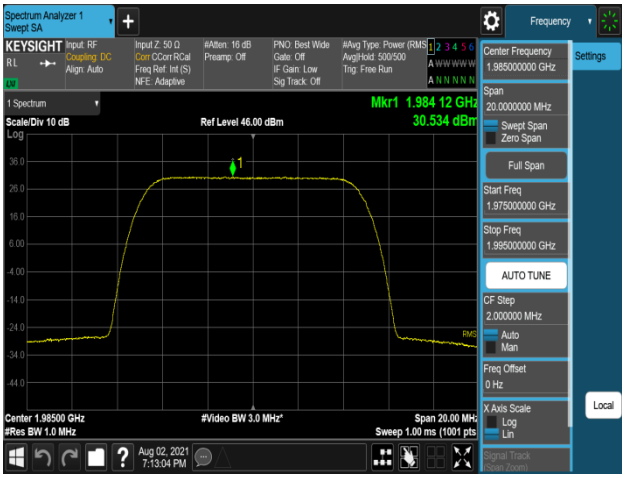
Plot 7-547. Peak Power Spectral Density Plot
(B2_10M_1C_16QAM – Mid Channel, Port 2)



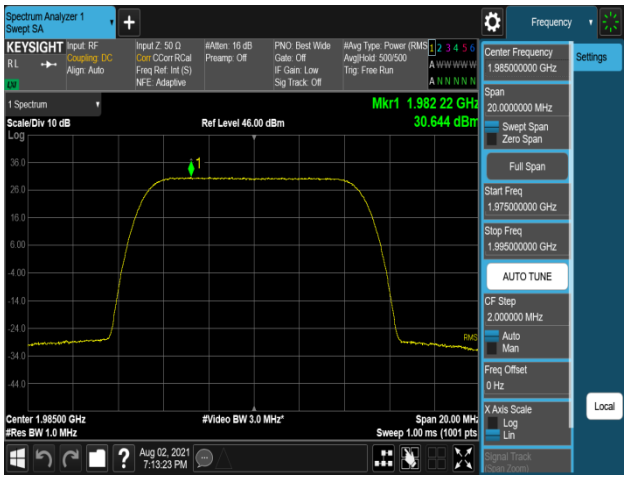
Plot 7-548. Peak Power Spectral Density Plot
(B2_10M_1C_16QAM – Mid Channel, Port 3)



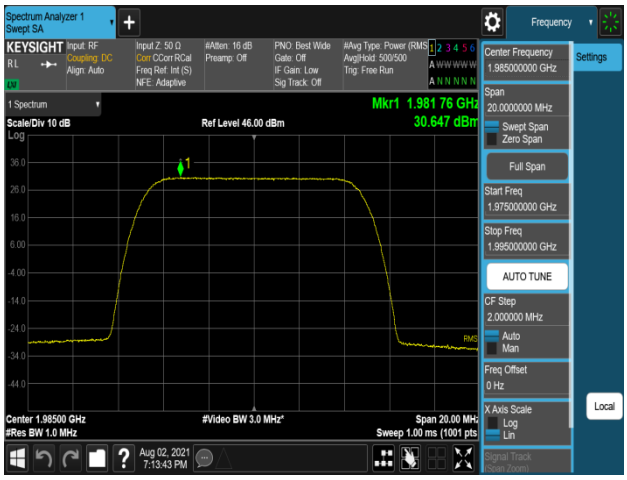
Plot 7-549. Peak Power Spectral Density Plot
(B2_10M_1C_QPSK - High Channel, Port 0)



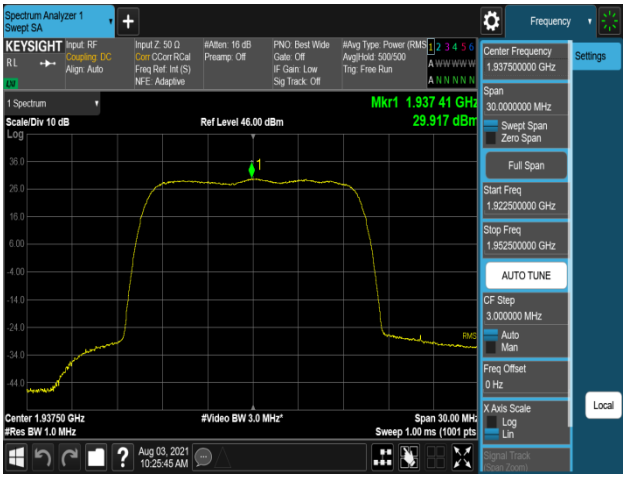
Plot 7-550. Peak Power Spectral Density Plot
(B2_10M_1C_QPSK - High Channel, Port 1)



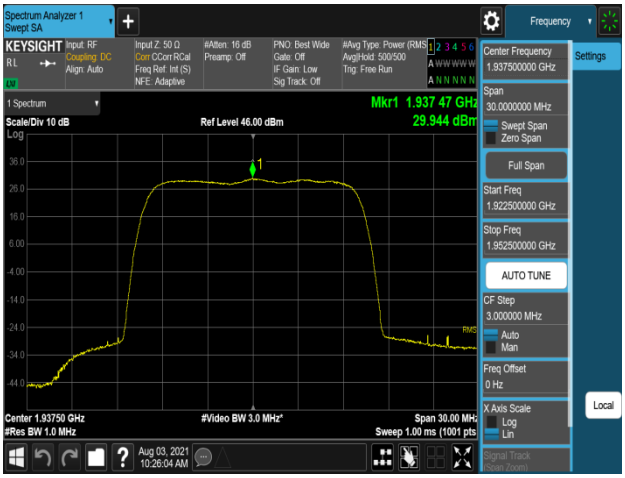
Plot 7-551. Peak Power Spectral Density Plot
(B2_10M_1C_QPSK - High Channel, Port 2)



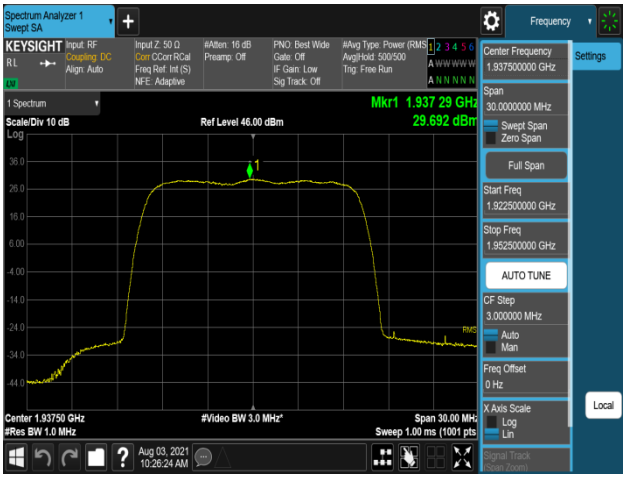
Plot 7-552. Peak Power Spectral Density Plot
(B2_10M_1C_QPSK - High Channel, Port 3)



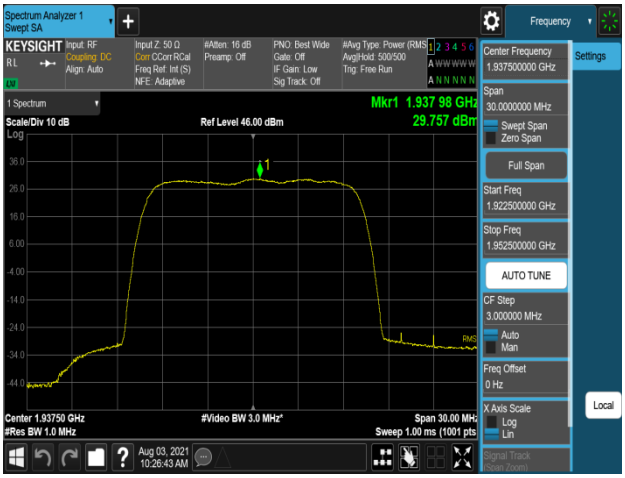
Plot 7-553. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM - Low Channel, Port 0)



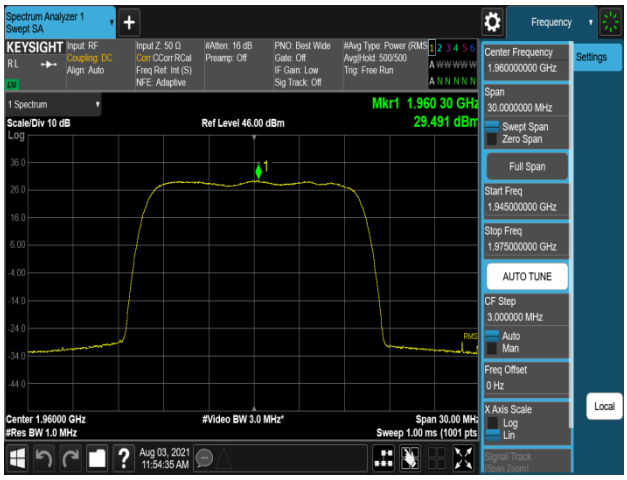
Plot 7-554. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM - Low Channel, Port 1)



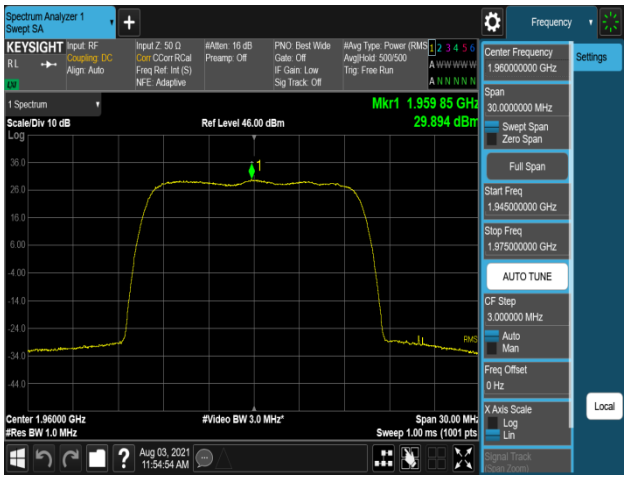
Plot 7-555. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM - Low Channel, Port 2)



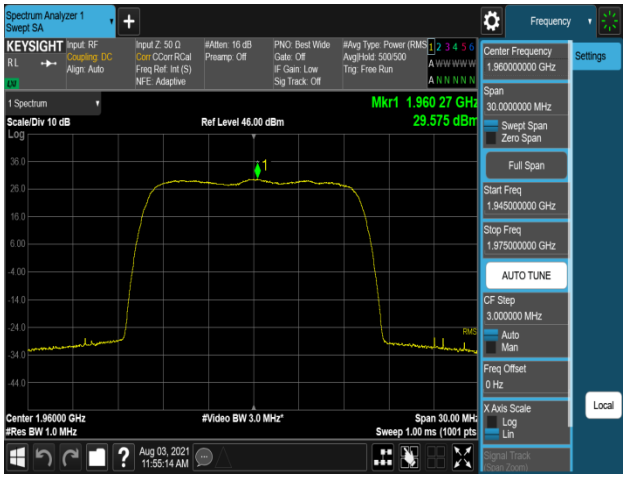
Plot 7-556. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM - Low Channel, Port 3)



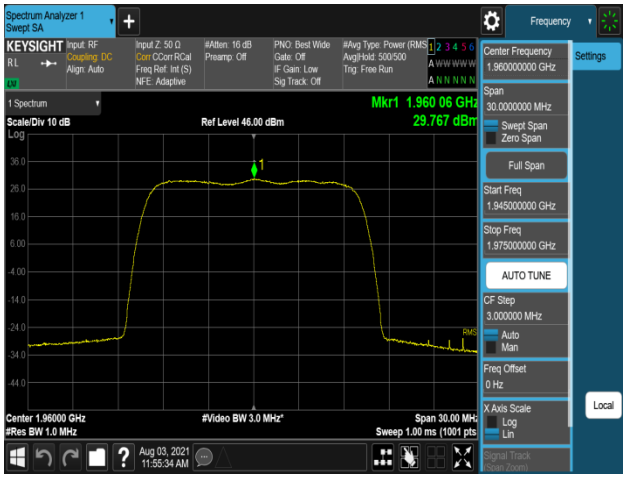
Plot 7-557. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM – Mid Channel, Port 0)



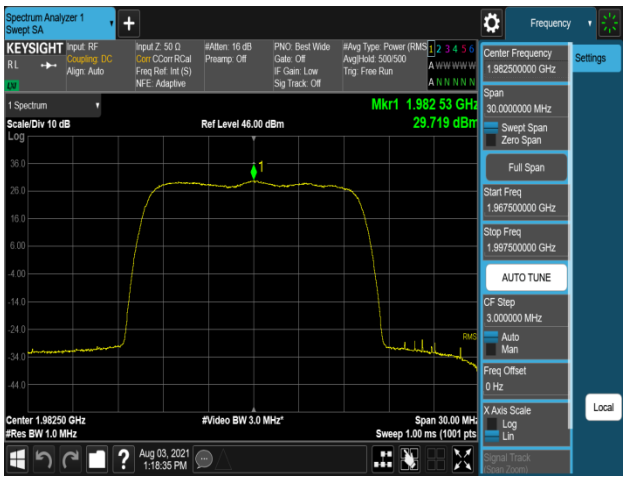
Plot 7-558. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM – Mid Channel, Port 1)



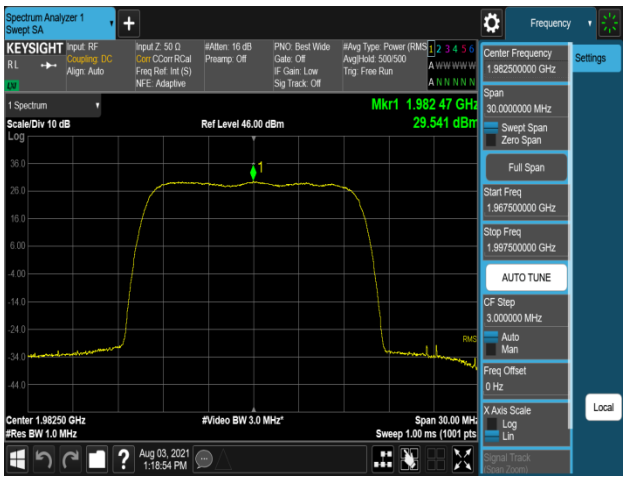
Plot 7-559. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM – Mid Channel, Port 2)



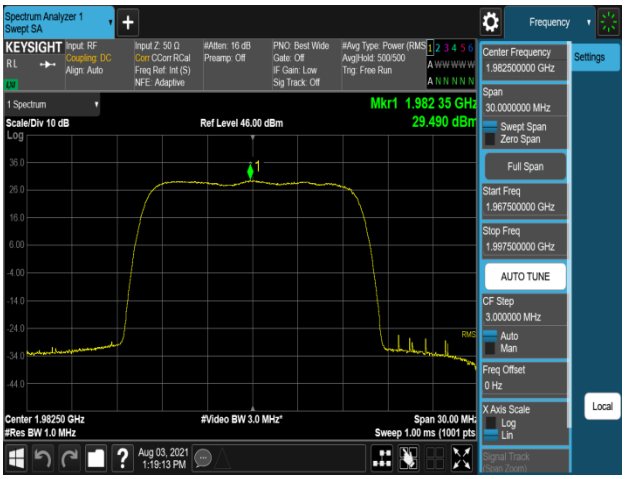
Plot 7-560. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM – Mid Channel, Port 3)



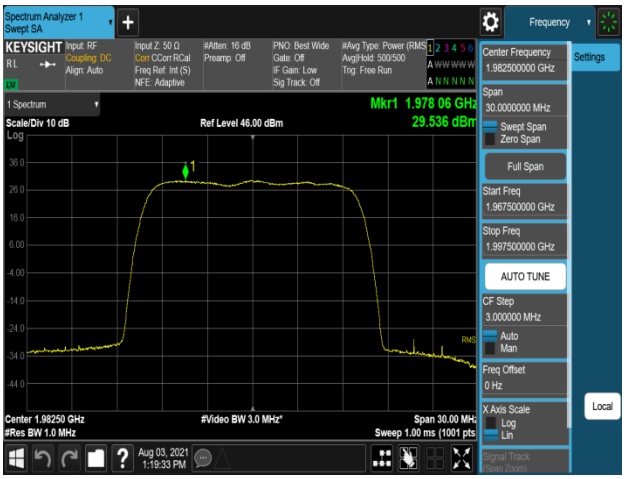
Plot 7-561. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM – High Channel, Port 0)



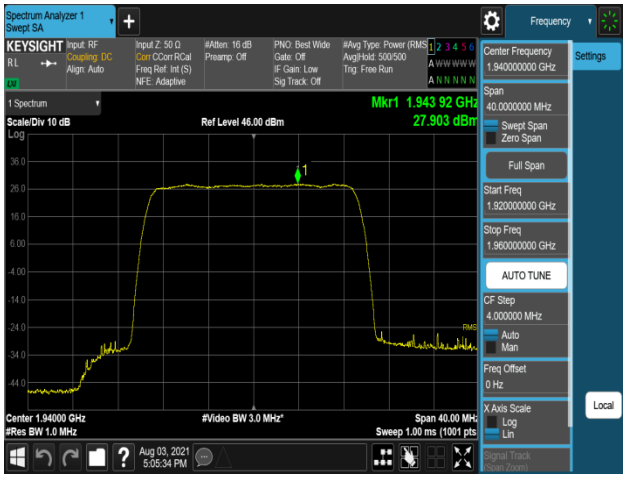
Plot 7-562. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM – High Channel, Port 1)



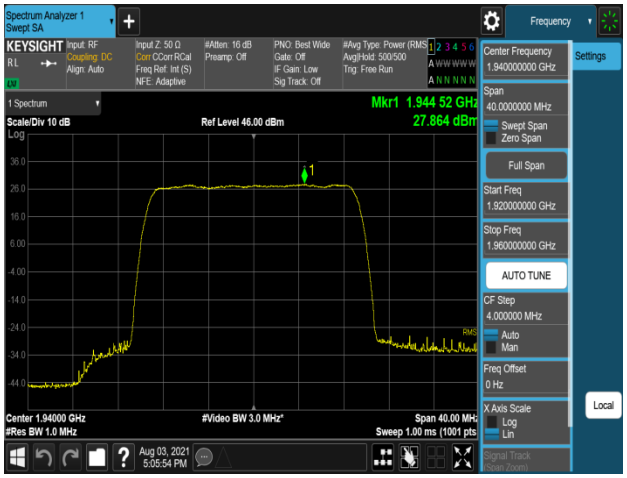
Plot 7-563. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM – High Channel, Port 2)



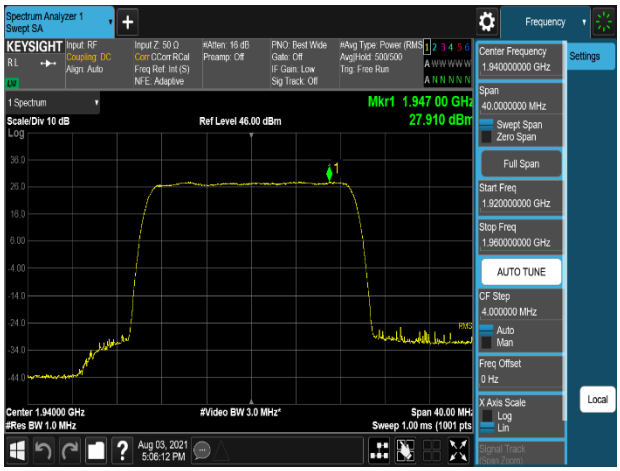
Plot 7-564. Peak Power Spectral Density Plot
(B2_15M_1C_16QAM – High Channel, Port 3)



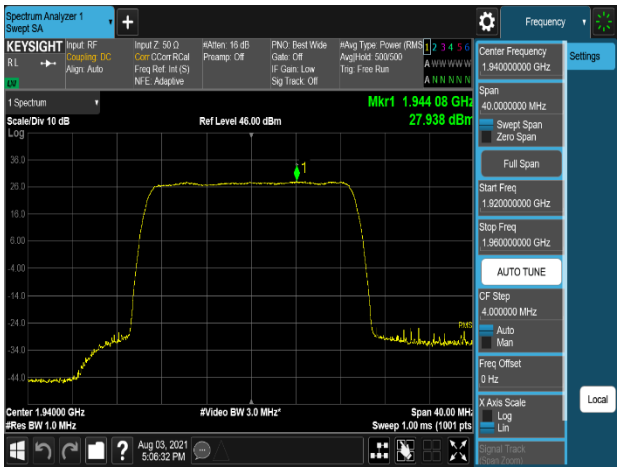
Plot 7-565. Peak Power Spectral Density Plot
(B2_20M_16QAM - Low Channel, Port 0)



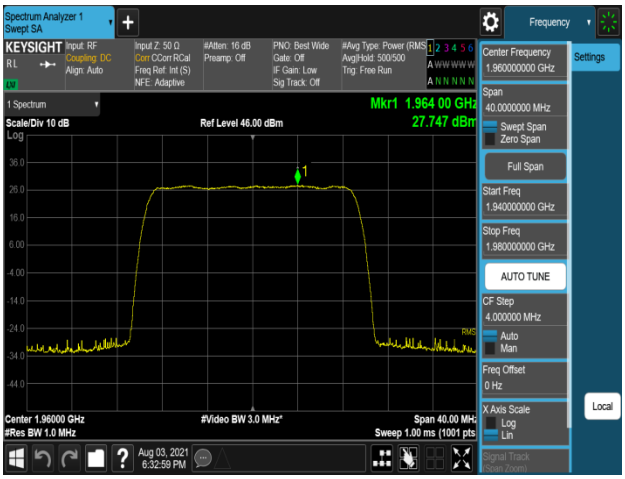
Plot 7-566. Peak Power Spectral Density Plot
(B2_20M_1C_16QAM - Low Channel, Port 1)



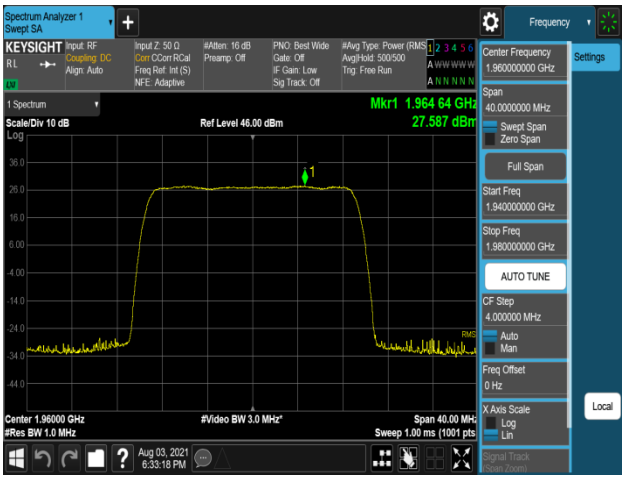
Plot 7-567. Peak Power Spectral Density Plot
(B2_20M_1C_16QAM - Low Channel, Port 2)



Plot 7-568. Peak Power Spectral Density Plot
(B2_20M_1C_16QAM - Low Channel, Port 3)



Plot 7-569. Peak Power Spectral Density Plot
(B2_20M_1C_16QAM – Mid Channel, Port 0)



Plot 7-570. Peak Power Spectral Density Plot
(B2_20M_1C_16QAM – Mid Channel, Port 1)