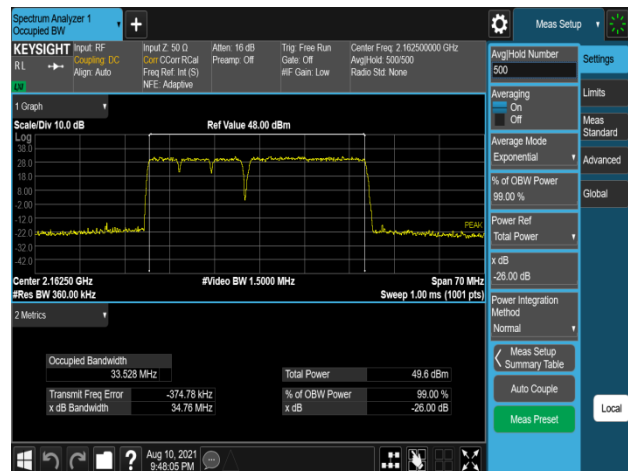
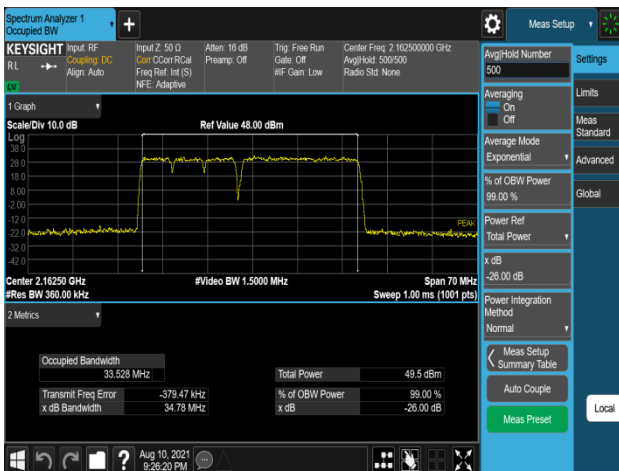
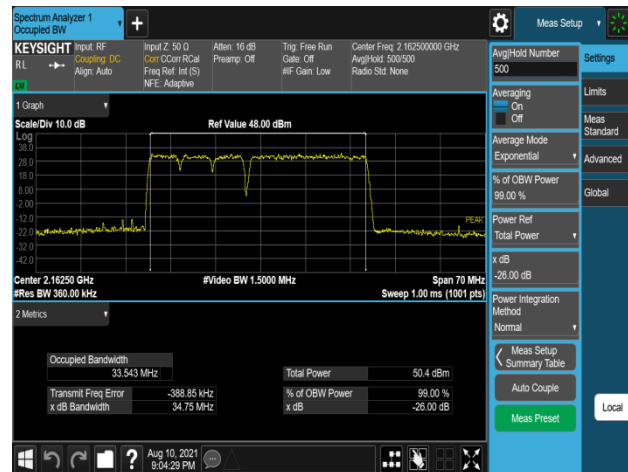
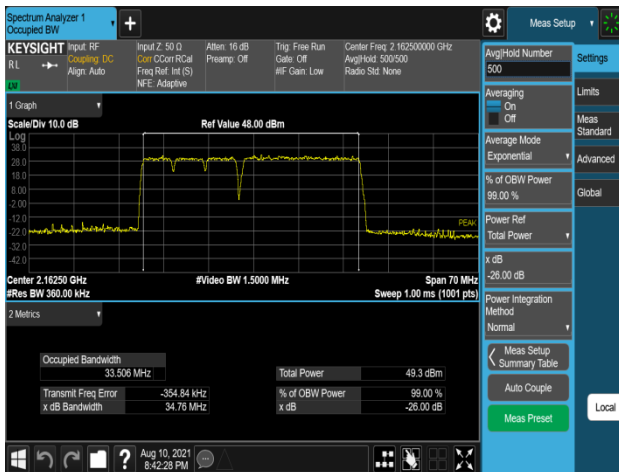
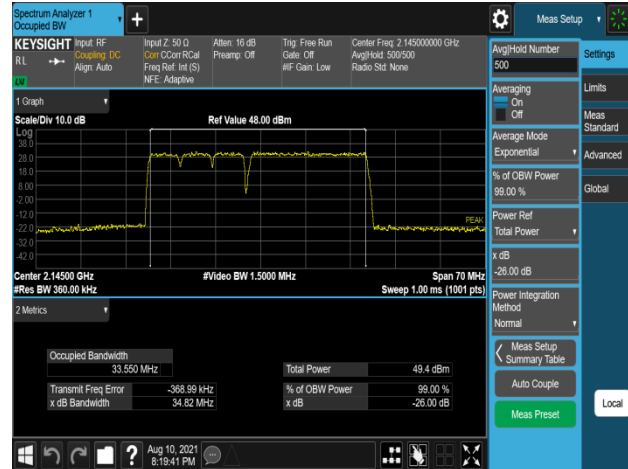
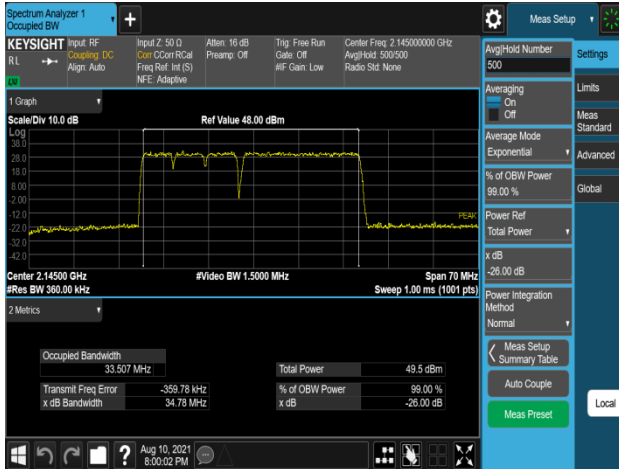


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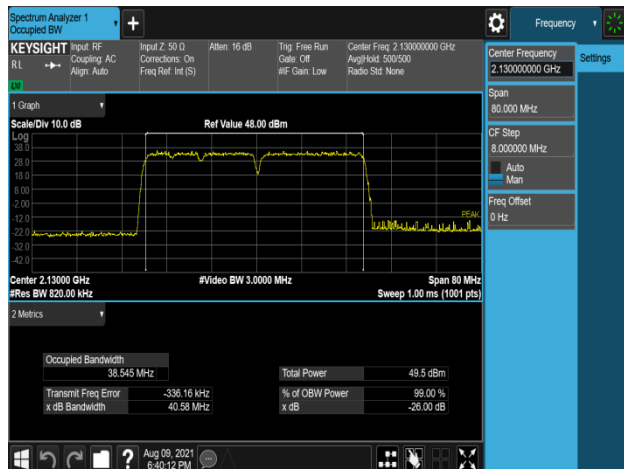
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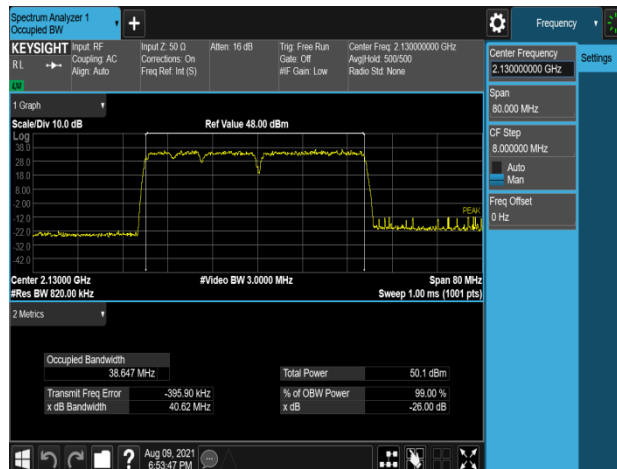
PK-QP-16-14 Rev.01



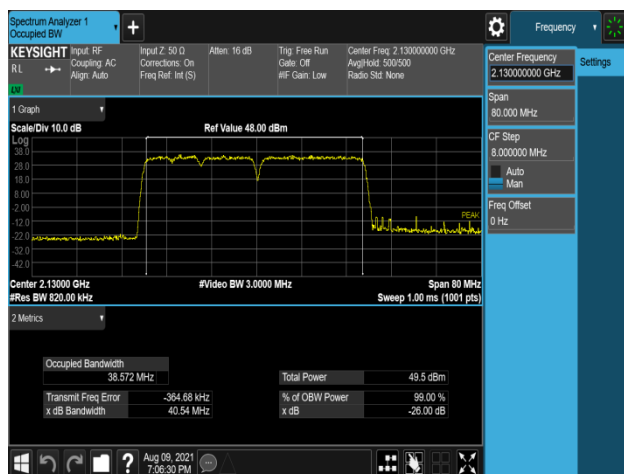
FCC ID: A3LRF4437D-25D	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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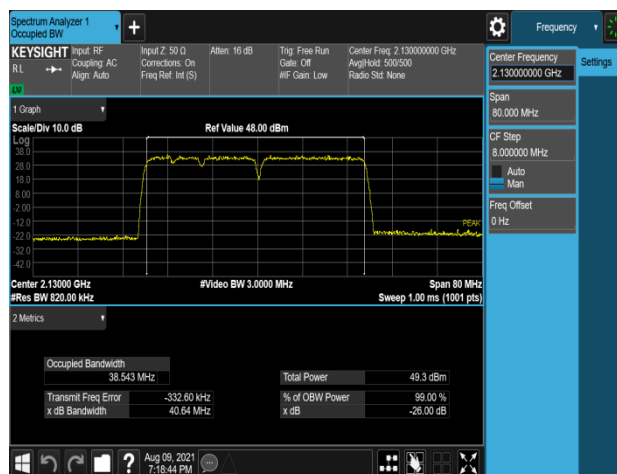
Plot 7-253. Occupied Bandwidth Plot
(B66 5M+5M+10M+20M 4C QPSK - Low Channel, Port 0)



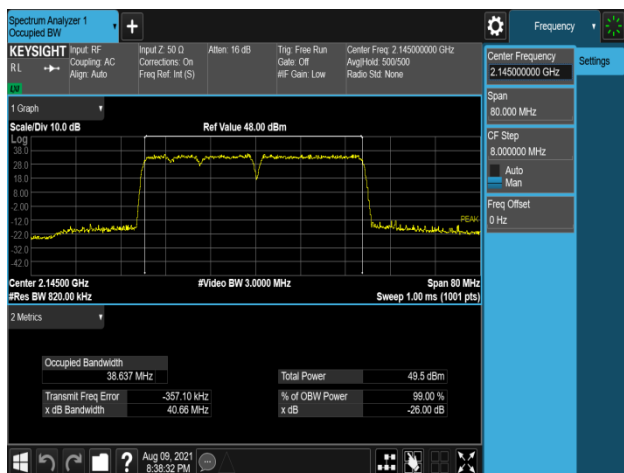
Plot 7-254. Occupied Bandwidth Plot
(B66 5M+5M+10M+20M 4C 16QAM - Low Channel, Port 3)



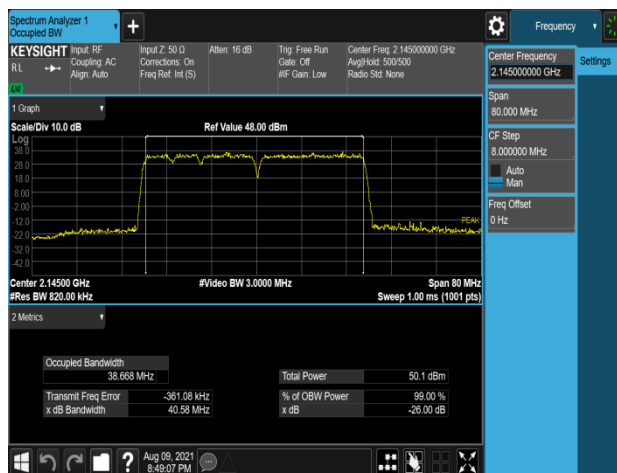
Plot 7-255. Occupied Bandwidth Plot
(B66 5M+5M+10M+20M 4C 64QAM - Low Channel, Port 3)





Plot 7-256. Occupied Bandwidth Plot
(B66 5M+5M+10M+20M 4C 256QAM - Low Channel, Port 1)

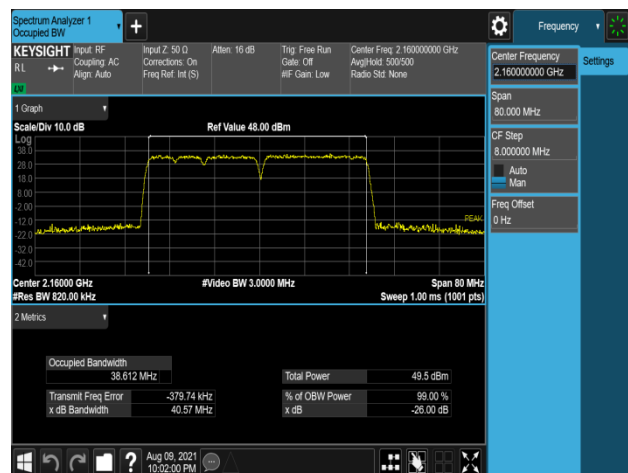
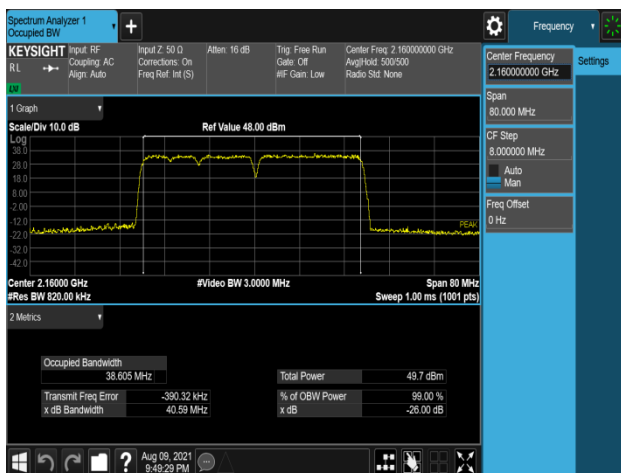
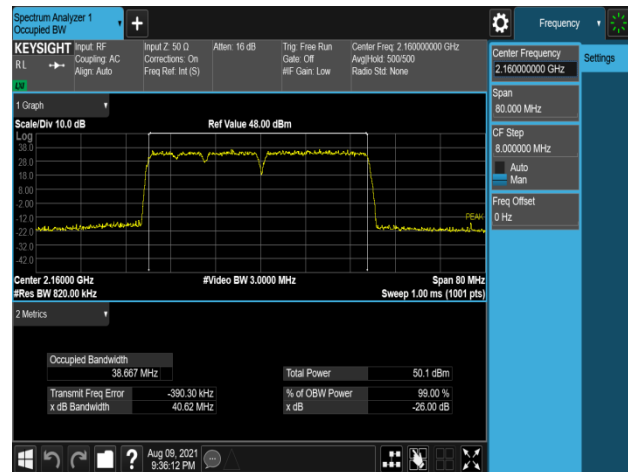
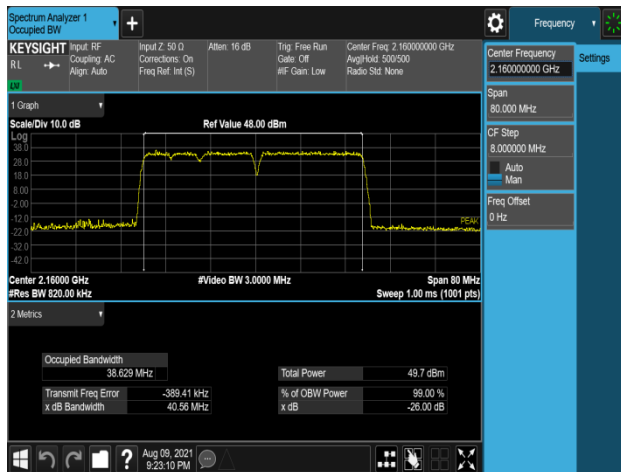
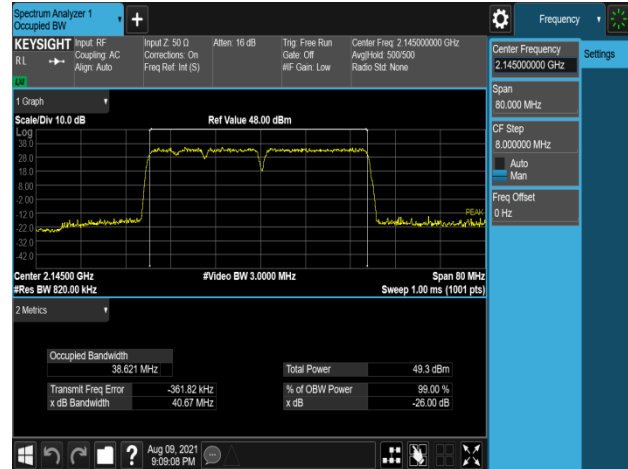
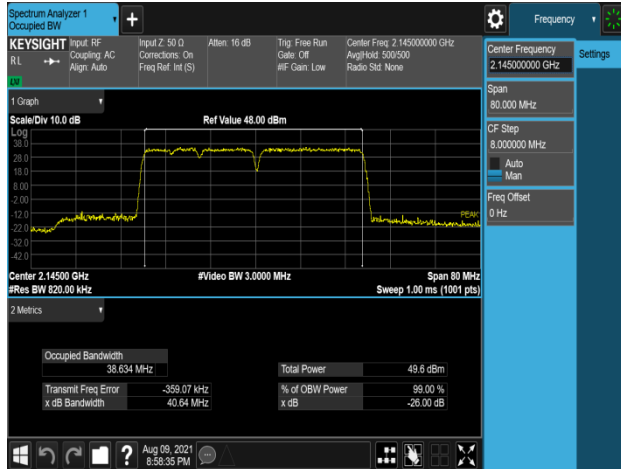


Plot 7-257. Occupied Bandwidth Plot
(B66_5M+5M+10M+20M_4C_QPSK - Mid Channel, Port 2)



Plot 7-258. Occupied Bandwidth Plot
(B66_5M+5M+10M+20M_4C_16QAM – Mid Channel, Port 3)

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7.3 Conducted Average Output Power

§ 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 Procedures Used

KDB 971168 D01 v03r01 – Section 5



KDB 662911 D01 v02r01 – Section E)1) In-Band Power Measurements

ANSI C63.26-2015 – Section 5.2.4.4.1

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:

1. Conducted average output power measurements are performed using the signal analyzer's "channel power mode" measurement capability for signals with continuous operation.
2. Set span to $2 \times$ to $3 \times$ the OBW.
3. Set RBW = 1 – 5% of the expected OBW
4. Set VBW $\geq 3 \times$ RBW.
5. Set number of measurement points in sweep $\geq 2 \times$ span / RBW.
6. Sweep time: auto-couple
7. Detector = power averaging (rms).
8. Set sweep trigger to "free run."
9. The integration bandwidth was set equal to transmission bandwidth i.e. 20MHz for 1CC and 40MHz for 2CC measurements.
10. 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.
11. 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.

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Test Setup

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

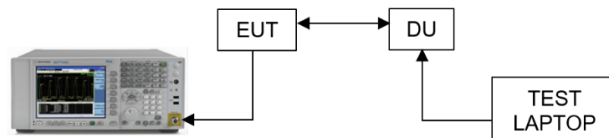




Figure 7-2. Test Instrument & Measurement Setup

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 Output Power:
 - a) Conducted power for each port is measured in dBm.
 - b) Powers are summed up in linear using the measure-and-sum technique defined in KDB 662911 D01 v02r01-Section D.
 - c) Conducted power per port (dBm) is converted to a linear value (mW). A summation of linear powers for all ports gives us the total MIMO conducted power in milliWatts (mW). We convert this back to logarithmic scale (dBm).
3. Sample MIMO Calculation:
 - a. Conducted Average Power for Antenna 1: 39.38 dBm
 Conducted Average Power for Antenna 2: 39.35 dBm
 Conducted Average Power for Antenna 3: 39.42 dBm
 Conducted Average Power for Antenna 4: 39.50 dBm
 - b. $(39.38 \text{ dBm} + 39.35 \text{ dBm} + 39.42 \text{ dBm} + 39.50 \text{ dBm}) = (8669.62 \text{ mW} + 8609.94 \text{ mW} + 8749.84 \text{ mW} + 8912.1 \text{ mW}) = 34941.90 \text{ mW} = 45.43 \text{ dBm}$
 - c. Total MIMO Conducted Power as 34941.90 milliWatts.

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Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.38	39.44	39.45	39.44
	1	39.35	39.41	39.43	39.43
	2	39.42	39.47	39.51	39.49
	3	39.50	39.60	39.67	39.55
Total MIMO Conducted Power (mW)		34941.90	35491.20	35781.85	35467.96
Total MIMO Conducted Power (dBm)		45.43	45.50	45.54	45.50



Table 7-24. Conducted Average Output Power Table (B2_5M_1C - Low Channel)

Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.44	39.42	39.42	39.36
	1	41.58	39.37	39.41	39.25
	2	39.47	39.44	39.49	39.35
	3	39.65	39.58	39.65	39.63
Total MIMO Conducted Power (mW)		41255.08	35267.95	35597.28	34837.00
Total MIMO Conducted Power (dBm)		46.15	45.47	45.51	45.42

Table 7-25. Conducted Average Output Power Table (B2_5M_1C - Middle Channel)

High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.49	39.46	39.49	39.49
	1	39.42	39.36	39.42	39.42
	2	39.46	39.52	39.47	39.56
	3	39.48	39.58	39.57	39.50
Total MIMO Conducted Power (mW)		35344.21	35492.44	35550.33	35590.85
Total MIMO Conducted Power (dBm)		45.48	45.50	45.51	45.51

Table 7-26. Conducted Average Output Power Table (B2_5M_1C - High Channel)

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Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.37	39.43	39.43	39.48
	1	39.33	39.44	39.38	39.50
	2	39.37	39.47	39.44	39.48
	3	39.47	39.61	39.60	39.60
Total MIMO Conducted Power (mW)		34720.89	35552.52	35349.96	35775.74
Total MIMO Conducted Power (dBm)		45.41	45.51	45.48	45.54



Table 7-27. Conducted Average Output Power Table (B2_10M_1C - Low Channel)

Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.37	39.35	39.43	39.39
	1	39.28	39.23	39.30	39.34
	2	39.44	39.45	39.46	39.43
	3	39.50	39.57	39.58	39.67
Total MIMO Conducted Power (mW)		34824.69	34853.05	35190.39	35318.05
Total MIMO Conducted Power (dBm)		45.42	45.42	45.46	45.48

Table 7-28. Conducted Average Output Power Table (B2_10M_1C - Middle Channel)

High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.38	39.38	39.30	39.38
	1	39.34	39.37	39.29	39.37
	2	39.49	39.49	39.47	39.41
	3	39.53	39.53	39.50	39.49
Total MIMO Conducted Power (mW)		35126.05	35185.60	34766.85	34941.02
Total MIMO Conducted Power (dBm)		45.46	45.46	45.41	45.43

Table 7-29. Conducted Average Output Power Table (B2_10M_1C - High Channel)

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Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.65	39.63	39.60	39.60
	1	39.75	39.66	39.72	39.76
	2	39.68	39.63	39.61	39.62
	3	39.76	39.73	39.79	39.77
Total MIMO Conducted Power (mW)		37418.36	37010.87	37164.82	37228.87
Total MIMO Conducted Power (dBm)		45.73	45.68	45.70	45.71



Table 7-30. Conducted Average Output Power Table (B2_15M_1C - Low Channel)

Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.38	39.42	39.47	39.44
	1	39.47	39.56	39.56	39.61
	2	39.46	39.49	39.56	39.45
	3	39.61	39.64	39.69	39.58
Total MIMO Conducted Power (mW)		35492.71	35882.84	36235.22	35820.05
Total MIMO Conducted Power (dBm)		45.50	45.55	45.59	45.54

Table 7-31. Conducted Average Output Power Table (B2_15M_1C - Middle Channel)

High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.35	39.42	39.40	39.33
	1	39.59	39.50	39.56	39.49
	2	39.53	39.48	39.51	39.48
	3	39.50	39.52	39.62	39.51
Total MIMO Conducted Power (mW)		35595.87	35487.55	35841.39	35267.00
Total MIMO Conducted Power (dBm)		45.51	45.50	45.54	45.47

Table 7-32. Conducted Average Output Power Table (B2_15M_1C - High Channel)

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Low Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.40	39.42	39.42	39.55
	1	39.26	39.29	39.38	39.37
	2	39.36	39.43	39.51	39.50
	3	39.48	39.55	39.63	39.69
Total MIMO Conducted Power (mW)		34644.33	35027.36	35535.84	35888.98
Total MIMO Conducted Power (dBm)		45.40	45.44	45.51	45.55



Table 7-33. Conducted Average Output Power Table (B2_20M_1C - Low Channel)

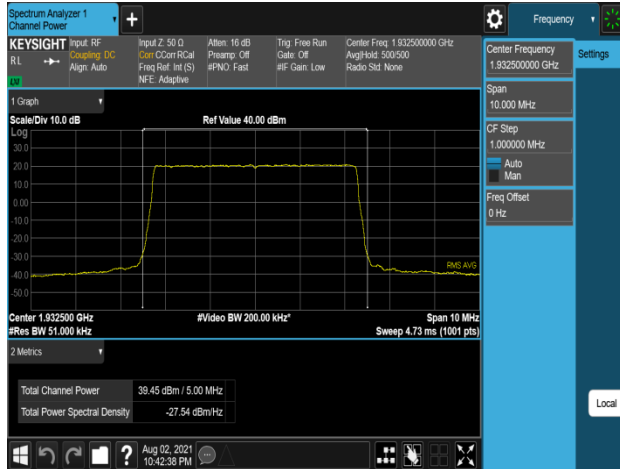
Middle Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.32	39.32	39.33	39.46
	1	39.19	39.22	39.25	39.37
	2	39.40	39.40	39.48	39.52
	3	39.57	39.59	39.60	39.66
Total MIMO Conducted Power (mW)		34616.14	34715.47	34976.00	35681.11
Total MIMO Conducted Power (dBm)		45.39	45.41	45.44	45.52

Table 7-34. Conducted Average Output Power Table (B2_20M_1C - Middle Channel)

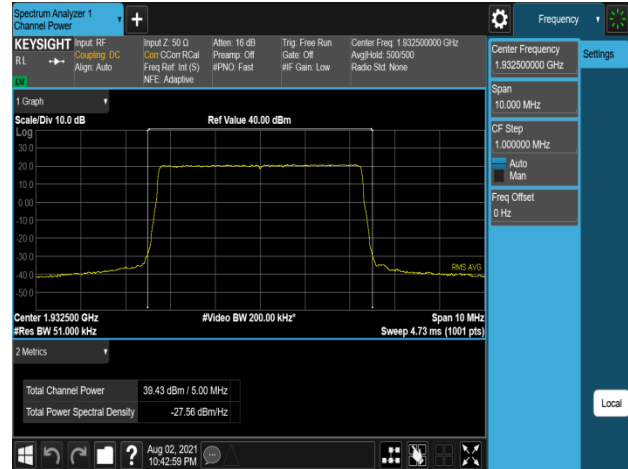
High Channel	Port	QPSK	16QAM	64QAM	256QAM
Conducted Average Power (dBm)	0	39.43	39.37	39.43	39.38
	1	39.22	39.22	39.28	39.23
	2	39.43	39.46	39.45	39.53
	3	39.47	39.54	39.50	39.56
Total MIMO Conducted Power (mW)		34747.20	34831.48	34965.28	35055.69
Total MIMO Conducted Power (dBm)		45.41	45.42	45.44	45.45

Table 7-35. Conducted Average Output Power Table (B2_20M_1C - High Channel)

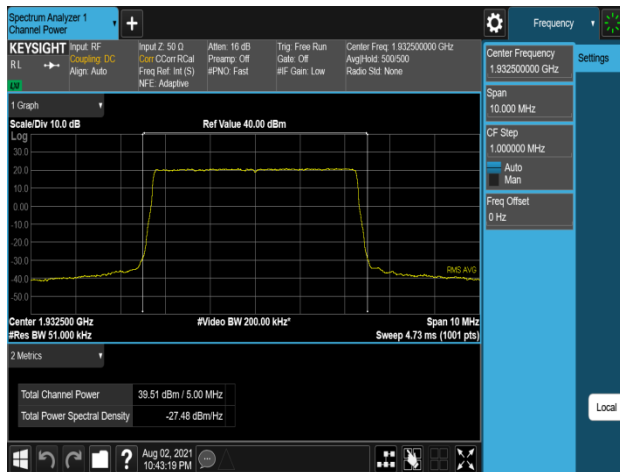
FCC ID: A3LRF4437D-25D		MEASUREMENT REPORT			Approved by: Technical Manager
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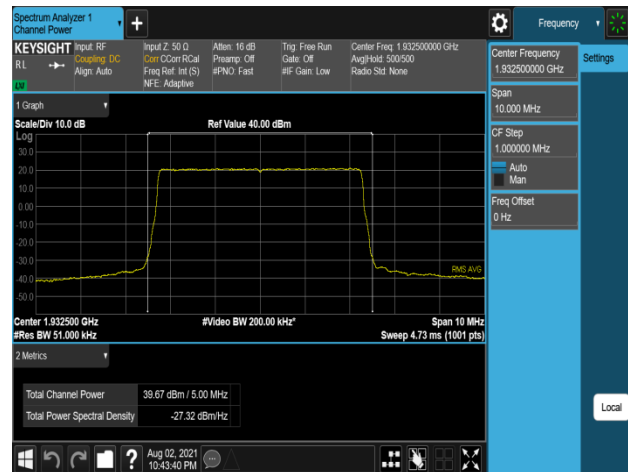
Plot 7-265. Conducted Average Output Power Plot
(B2_5M_1C_64QAM - Low Channel, Port 0)



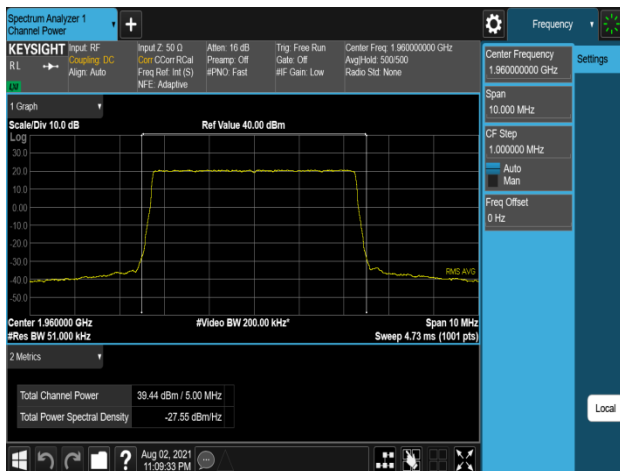
Plot 7-266. Conducted Average Output Power Plot
(B2_5M_1C_64QAM - Low Channel, Port 1)



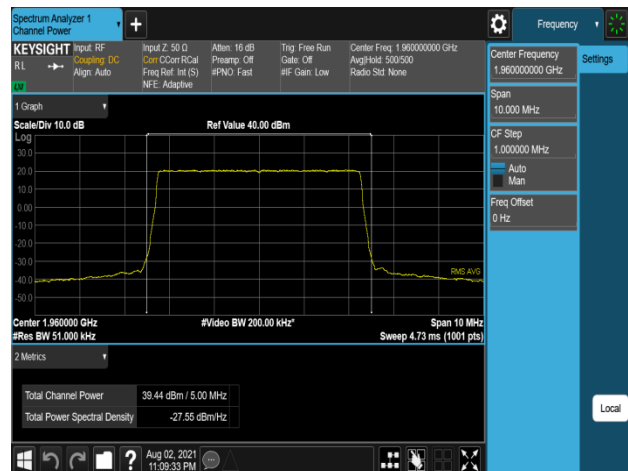
Plot 7-267. Conducted Average Output Power Plot
(B2_5M_1C_64QAM - Low Channel, Port 2)



Plot 7-268. Conducted Average Output Power Plot
(B2_5M_1C_64QAM - Low Channel, Port 3)

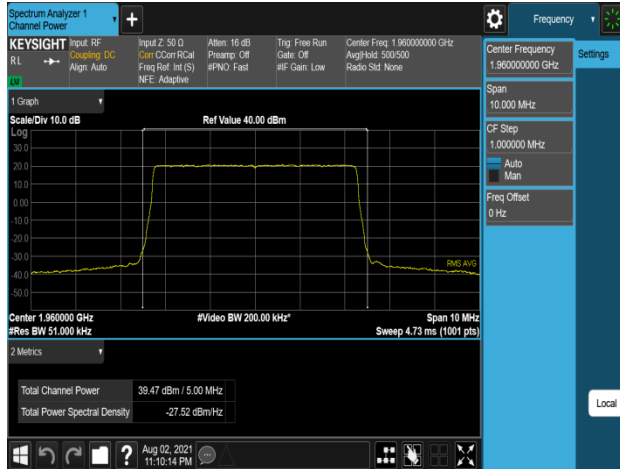


Plot 7-269. Conducted Average Output Power Plot
(B2_5M_1C_QPSK - Mid Channel, Port 0)

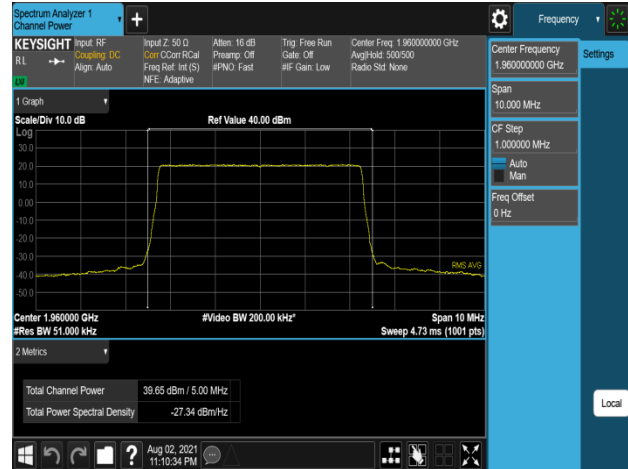


Plot 7-270. Conducted Average Output Power Plot
(B2_5M_1C_QPSK - Mid Channel, Port 1)

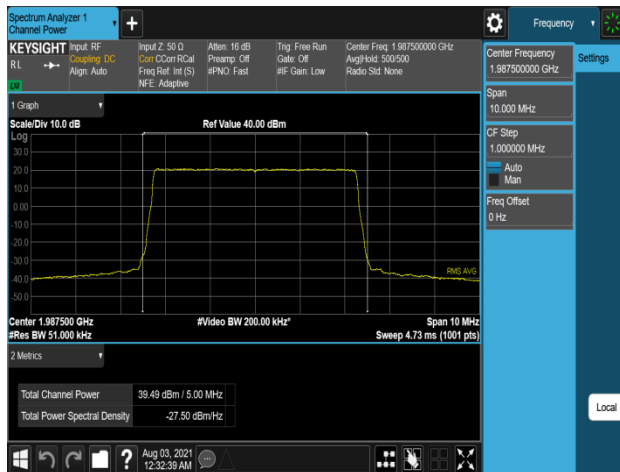
FCC ID: A3LRF4437D-25D	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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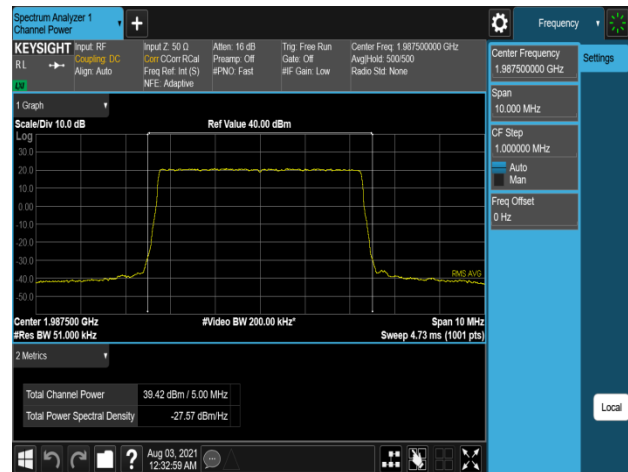
Plot 7-271. Conducted Average Output Power Plot
(B2_5M_1C_QPSK - Mid Channel, Port 2)



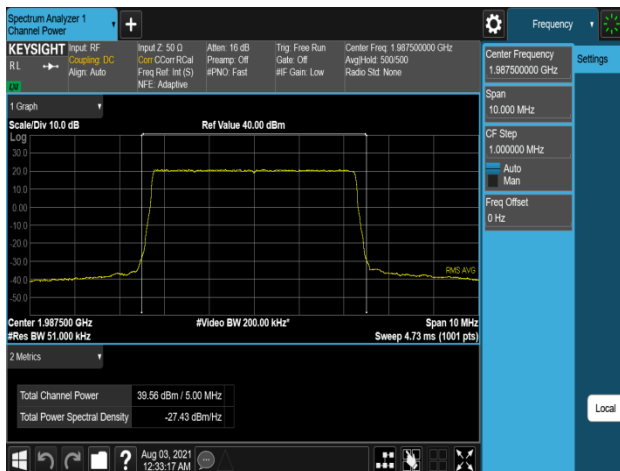
Plot 7-272. Conducted Average Output Power Plot
(B2_5M_1C_QPSK - Mid Channel, Port 3)



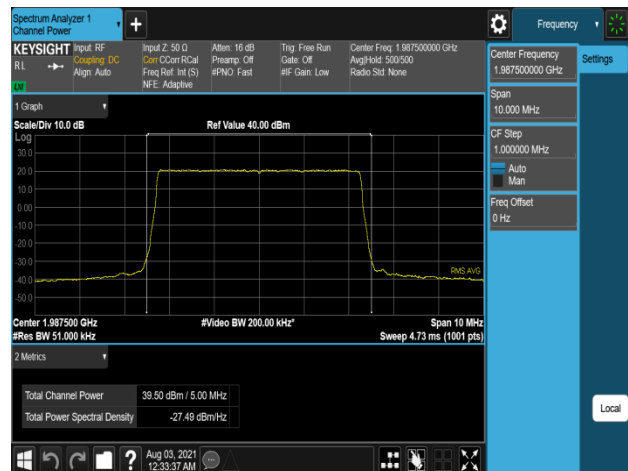
Plot 7-273. Conducted Average Output Power Plot
(B2_5M_1C_256QAM - High Channel, Port 0)



Plot 7-274. Conducted Average Output Power Plot
(B2_5M_1C_256QAM - High Channel, Port 1)

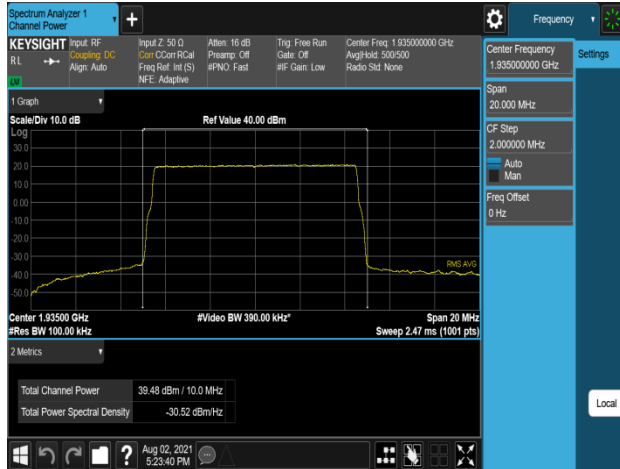


Plot 7-275. Conducted Average Output Power Plot
(B2_5M_1C_256QAM - High Channel, Port 2)

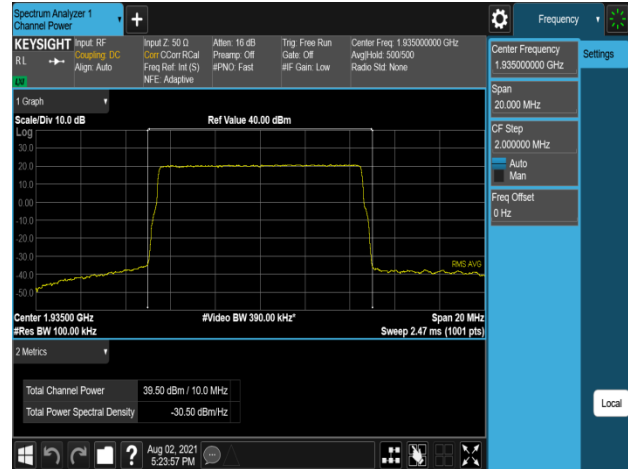


Plot 7-276. Conducted Average Output Power Plot
(B2_5M_1C_256QAM - High Channel, Port 3)

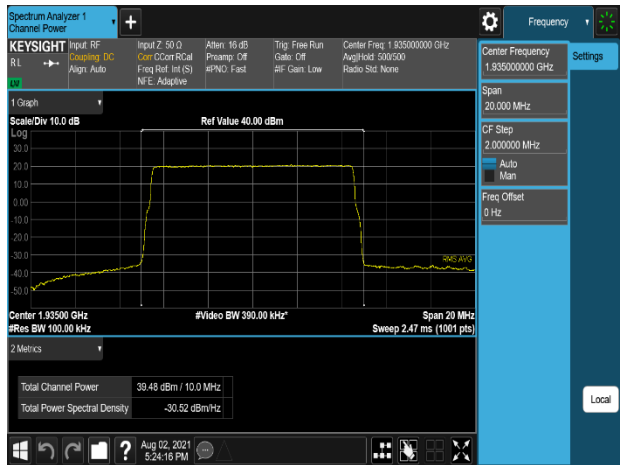
FCC ID: A3LRF4437D-25D	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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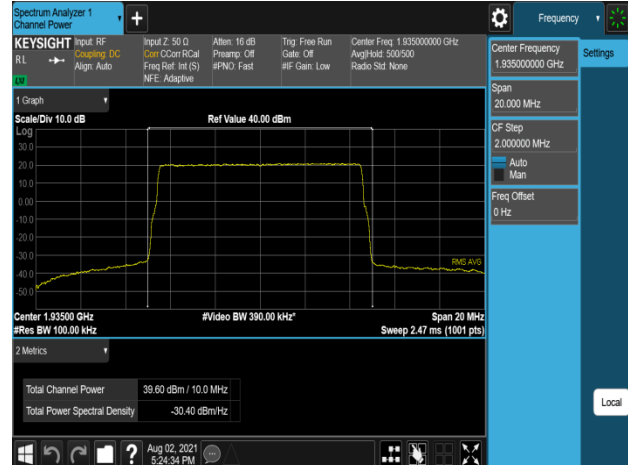
Plot 7-277. Conducted Average Output Power Plot
(B2_10M_1C_256QAM - Low Channel, Port 0)



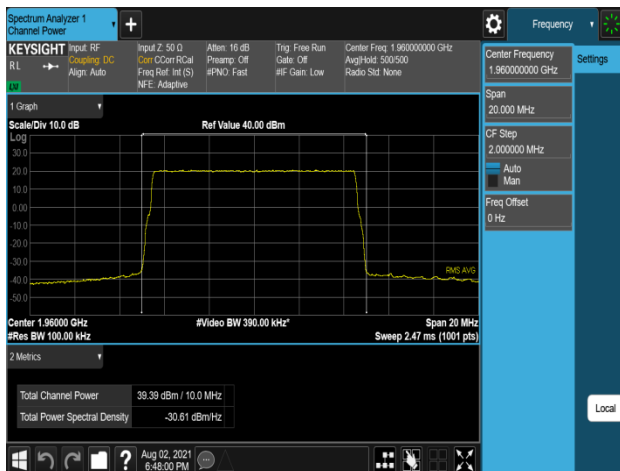
Plot 7-278. Conducted Average Output Power Plot
(B2_10M_1C_256QAM - Low Channel, Port 1)



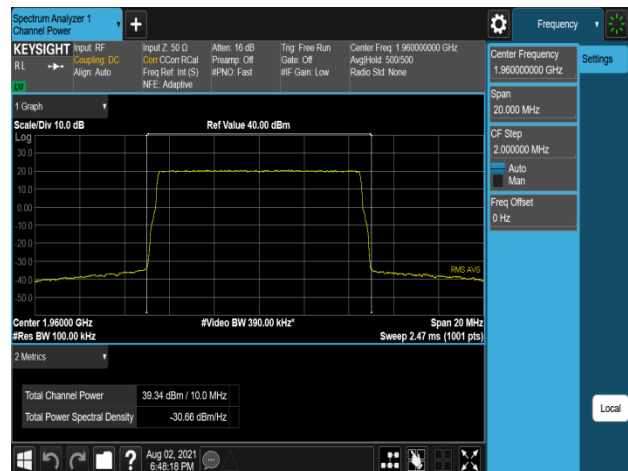
Plot 7-279. Conducted Average Output Power Plot
(B2_10M_1C_256QAM - Low Channel, Port 2)



Plot 7-280. Conducted Average Output Power Plot
(B2_10M_1C_256QAM - Low Channel, Port 3)



Plot 7-281. Conducted Average Output Power Plot
(B2_10M_1C_256QAM - Mid Channel, Port 0)

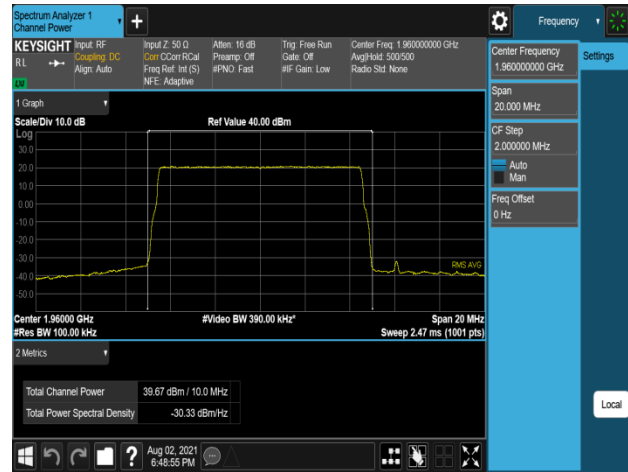


Plot 7-282. Conducted Average Output Power Plot
(B2_10M_1C_256QAM - Mid Channel, Port 1)

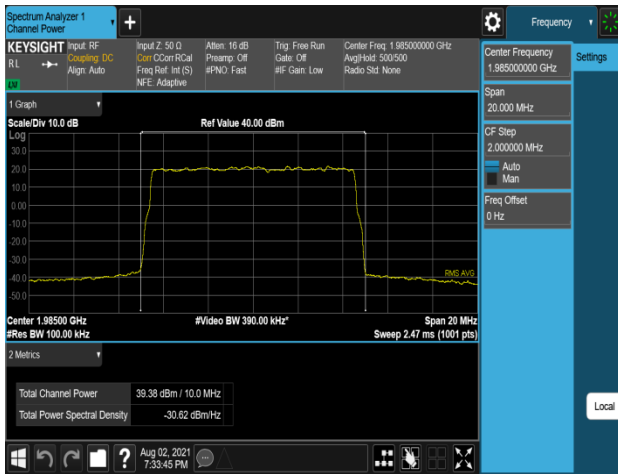
FCC ID: A3LRF4437D-25D	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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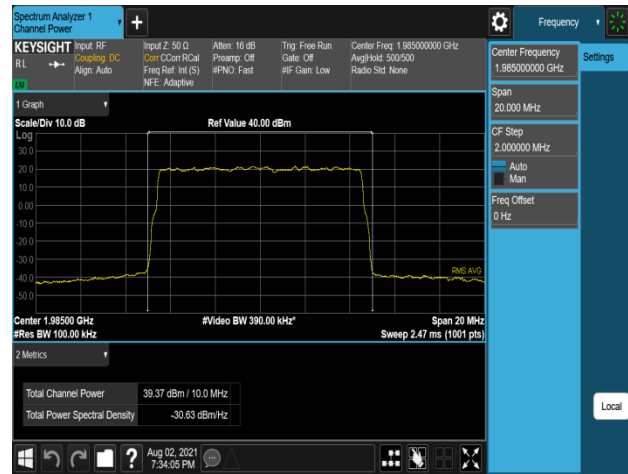
Plot 7-283. Conducted Average Output Power Plot
(B2_10M_1C_256QAM – Mid Channel, Port 2)



Plot 7-284. Conducted Average Output Power Plot
(B2_10M_1C_256QAM – Mid Channel, Port 3)



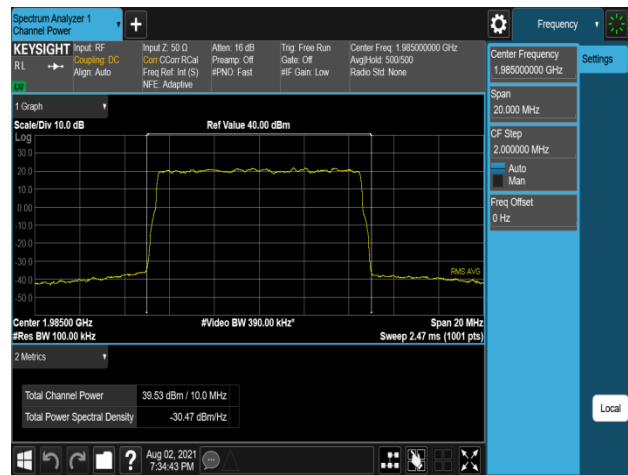
Plot 7-285. Conducted Average Output Power Plot
(B2_10M_1C_16QAM – High Channel, Port 0)



Plot 7-286. Conducted Average Output Power Plot
(B2_10M_1C_16QAM – High Channel, Port 1)

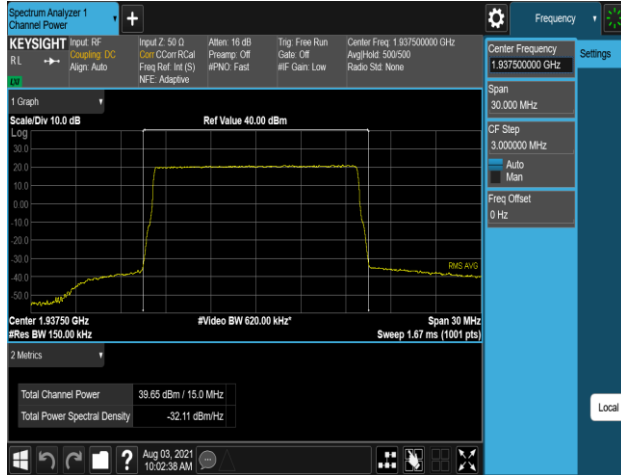


Plot 7-287. Conducted Average Output Power Plot
(B2_10M_1C_16QAM – High Channel, Port 2)

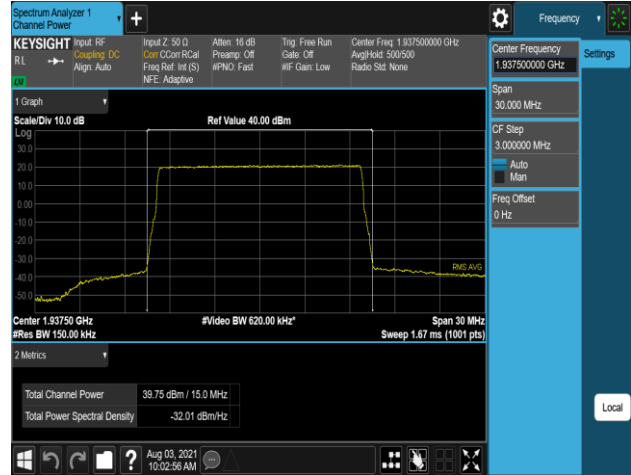


Plot 7-288. Conducted Average Output Power Plot
(B2_10M_1C_16QAM – High Channel, Port 3)

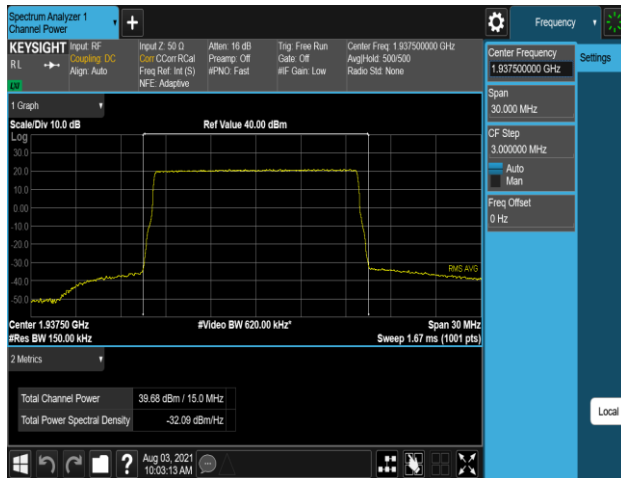
FCC ID: A3LRF4437D-25D	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 8K21071202-02-R2.A3L	Test Dates: 07/19/2021-08/18/2021	EUT Type: RRU(RF4437d)		Page 83 of 430



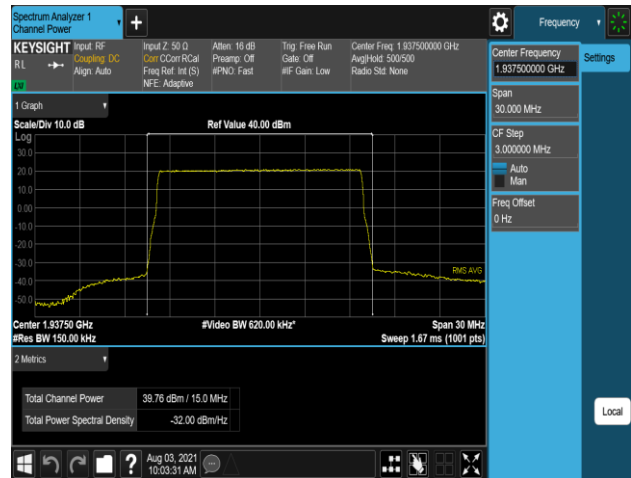
Plot 7-289. Conducted Average Output Power Plot
(B2_15M_1C_QPSK - Low Channel, Port 0)



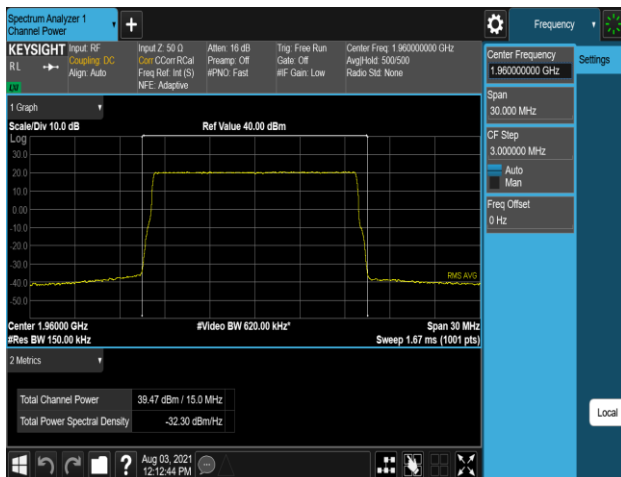
Plot 7-290. Conducted Average Output Power Plot
(B2_15M_1C_QPSK - Low Channel, Port 1)



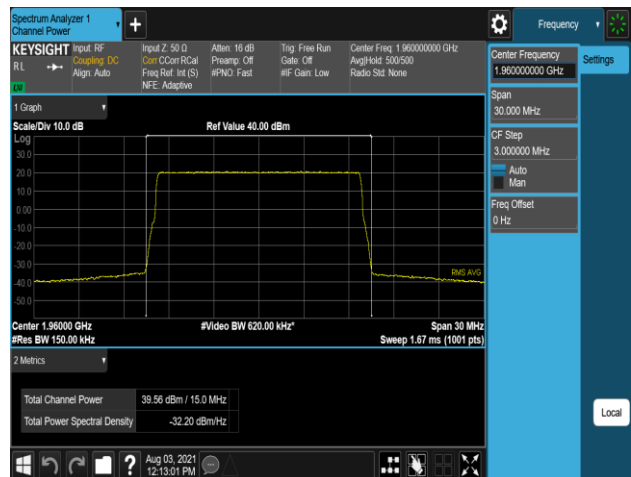
Plot 7-291. Conducted Average Output Power Plot
(B2_15M_1C_QPSK - Low Channel, Port 2)



Plot 7-292. Conducted Average Output Power Plot
(B2_15M_1C_QPSK - Low Channel, Port 3)

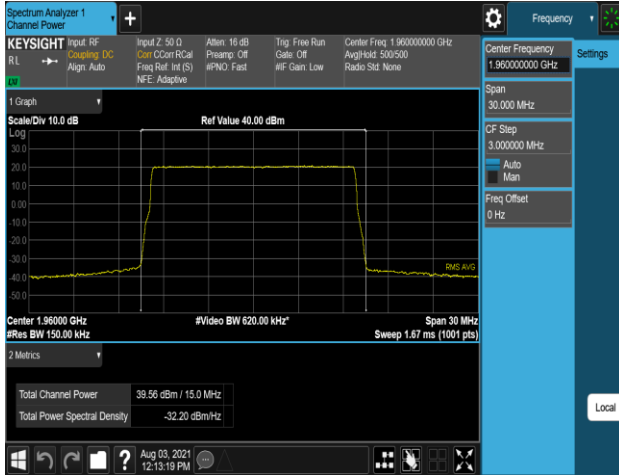


Plot 7-293. Conducted Average Output Power Plot
(B2_15M_1C_64QAM - Mid Channel, Port 0)



Plot 7-294. Conducted Average Output Power Plot
(B2_15M_1C_64QAM - Mid Channel, Port 1)

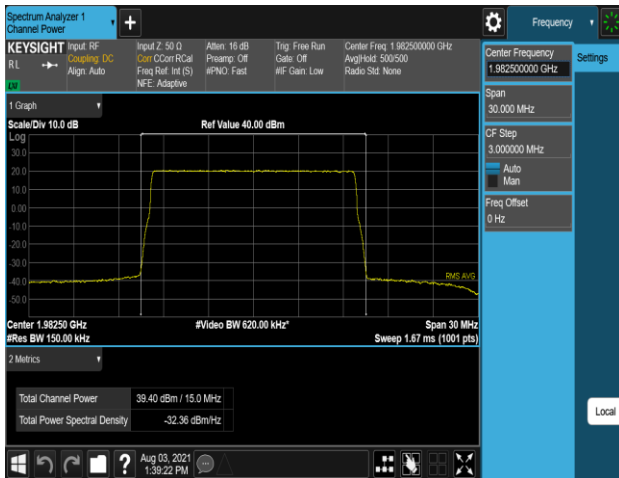
FCC ID: A3LRF4437D-25D	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 8K21071202-02-R2.A3L	Test Dates: 07/19/2021-08/18/2021	EUT Type: RRU(RF4437d)		Page 84 of 430



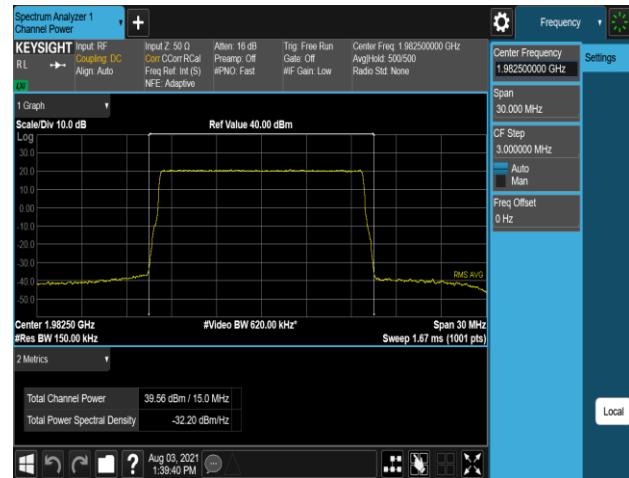
Plot 7-295. Conducted Average Output Power Plot
(B2_15M_1C_64QAM - Mid Channel, Port 2)



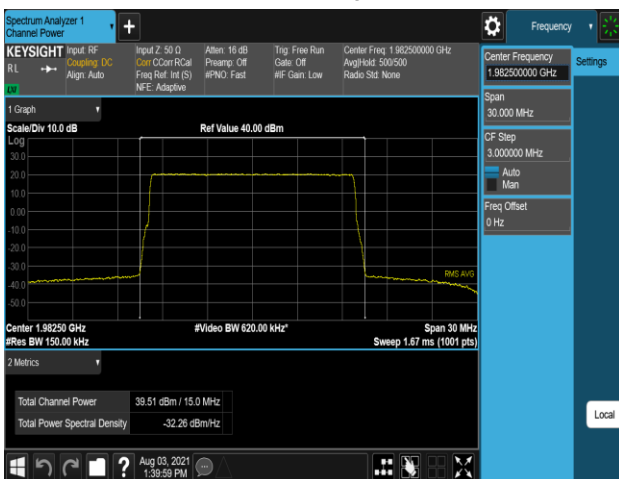
Plot 7-296. Conducted Average Output Power Plot
(B2_15M_1C_64QAM - Mid Channel, Port 3)



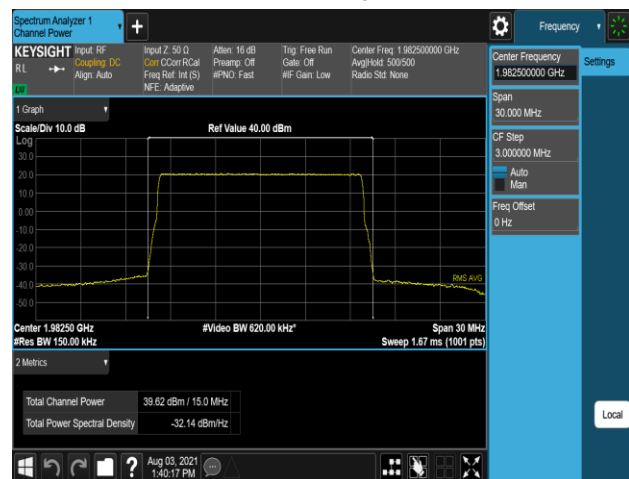
Plot 7-297. Conducted Average Output Power Plot
(B2_15M_1C_64QAM - High Channel, Port 0)



Plot 7-298. Conducted Average Output Power Plot
(B2_15M_1C_64QAM - High Channel, Port 1)



Plot 7-299. Conducted Average Output Power Plot
(B2_15M_1C_64QAM - High Channel, Port 2)



Plot 7-300. Conducted Average Output Power Plot
(B2_15M_1C_64QAM - High Channel, Port 3)

FCC ID: A3LRF4437D-25D	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT	SAMSUNG	Approved by: Technical Manager
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Plot 7-301. Conducted Average Output Power Plot
(B2_20M_1C_256QAM - Low Channel, Port 0)



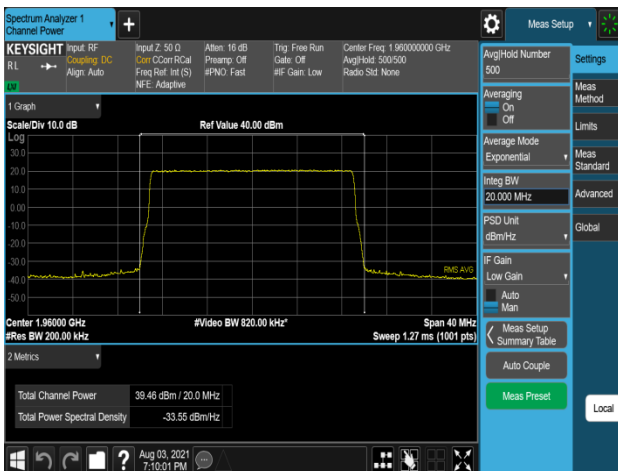
Plot 7-302. Conducted Average Output Power Plot
(B2_20M_1C_256QAM - Low Channel, Port 1)



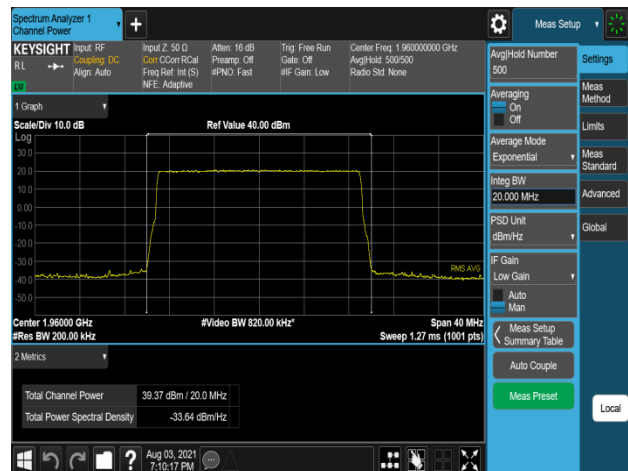
Plot 7-303. Conducted Average Output Power Plot
(B2_20M_1C_256QAM - Low Channel, Port 2)





Plot 7-304. Conducted Average Output Power Plot
(B2_20M_1C_256QAM - Low Channel, Port 3)



Plot 7-305. Conducted Average Output Power Plot
(B2_20M_1C_256QAM - Mid Channel, Port 0)



Plot 7-306. Conducted Average Output Power Plot
(B2_20M_1C_256QAM - Mid Channel, Port 1)

FCC ID: A3LRF4437D-25D		MEASUREMENT REPORT		Approved by: Technical Manager
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