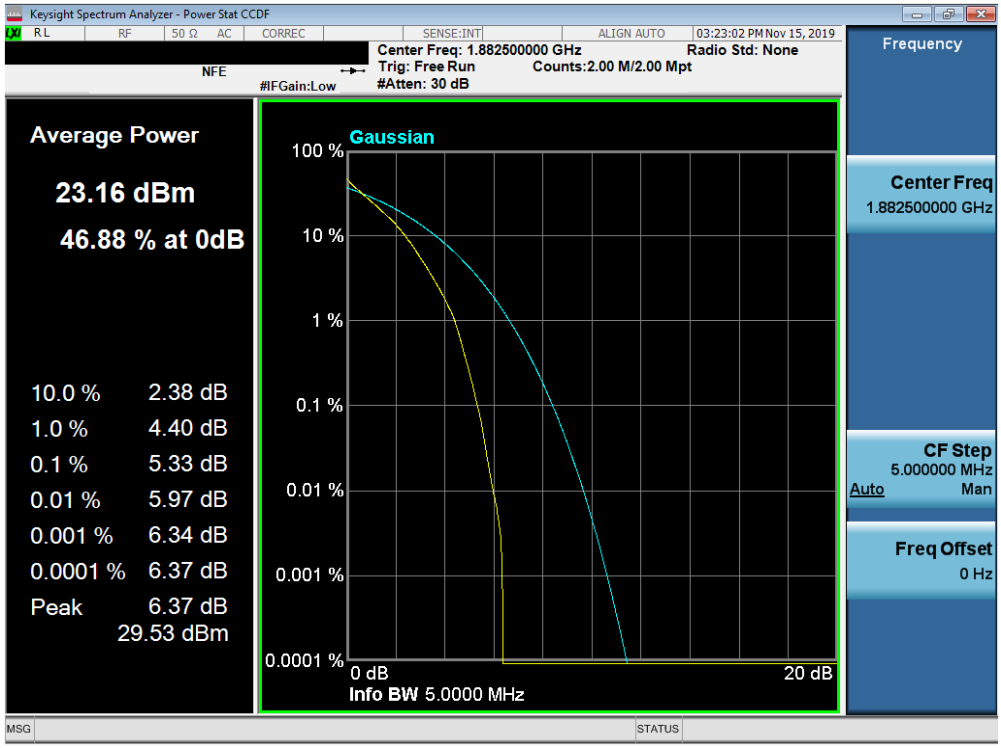
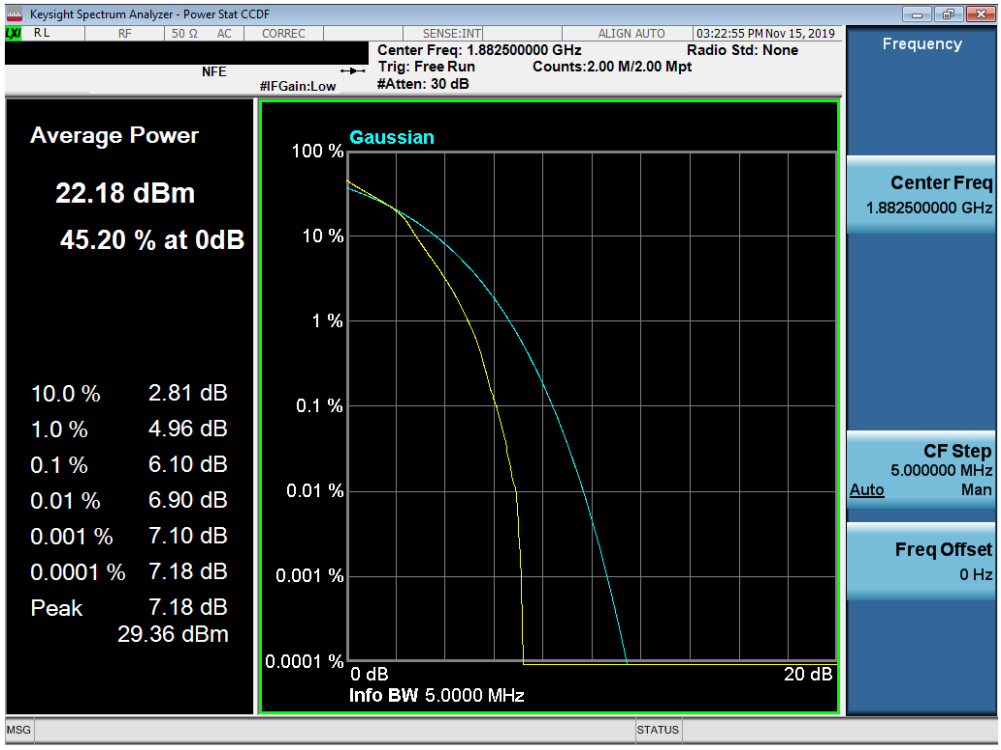


Plot 7-424. PAR Plot (Band 25/2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-425. PAR Plot (Band 25/2 - 5.0MHz 16-QAM - Full RB Configuration)

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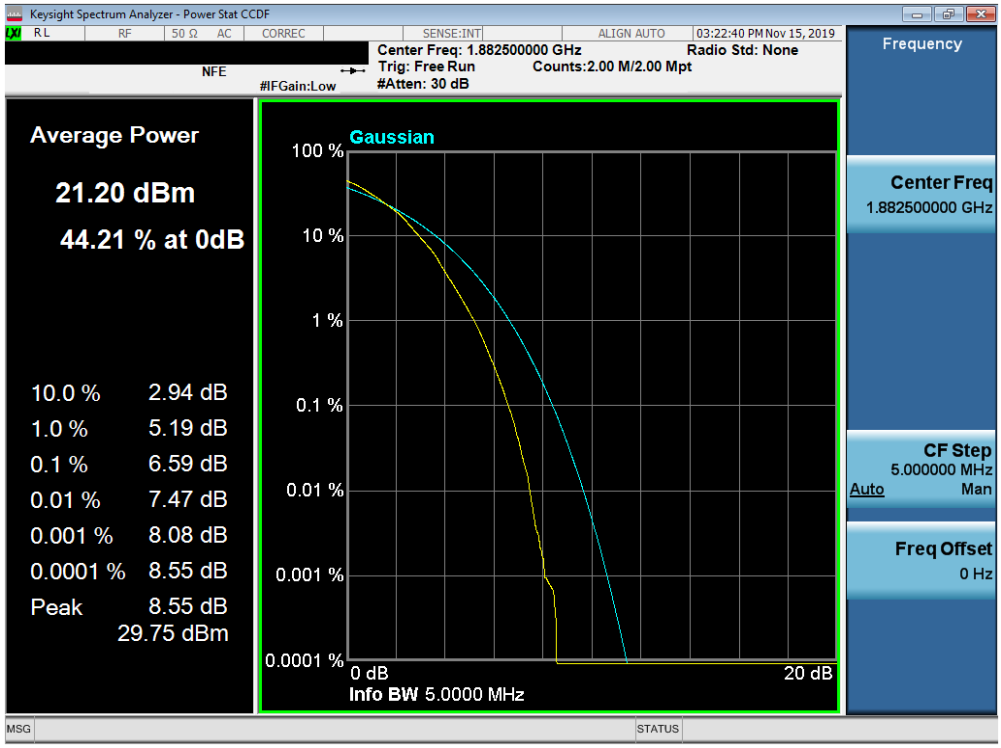
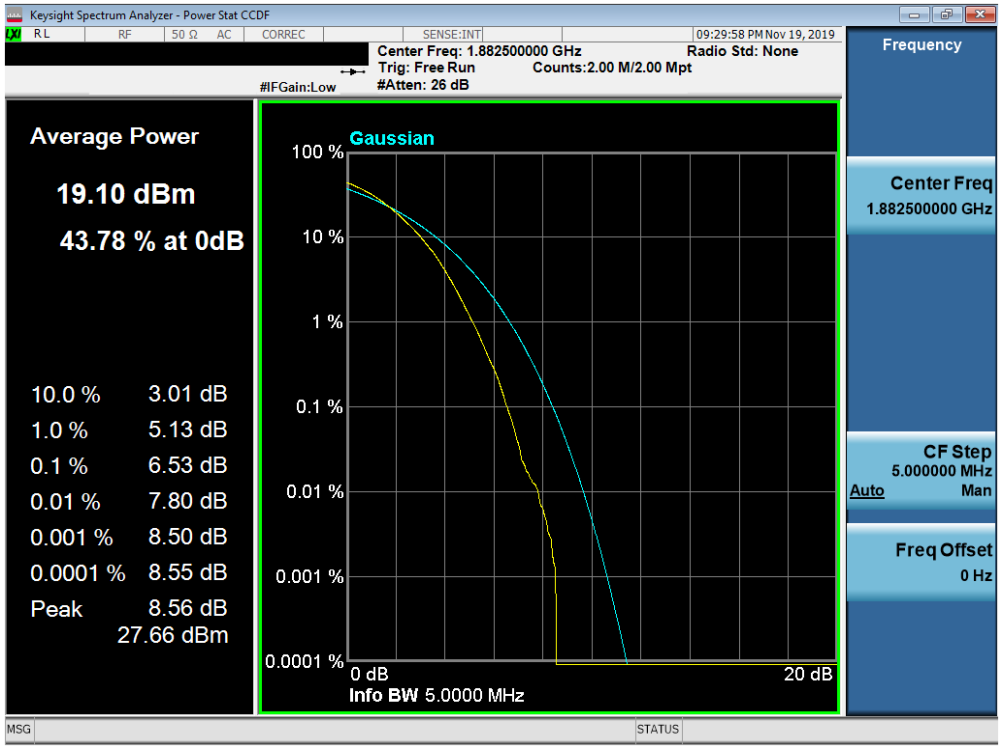


Plot 7-426. PAR Plot (Band 25/2 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-427. PAR Plot (Band 25/2 - 5.0MHz 256-QAM - Full RB Configuration)

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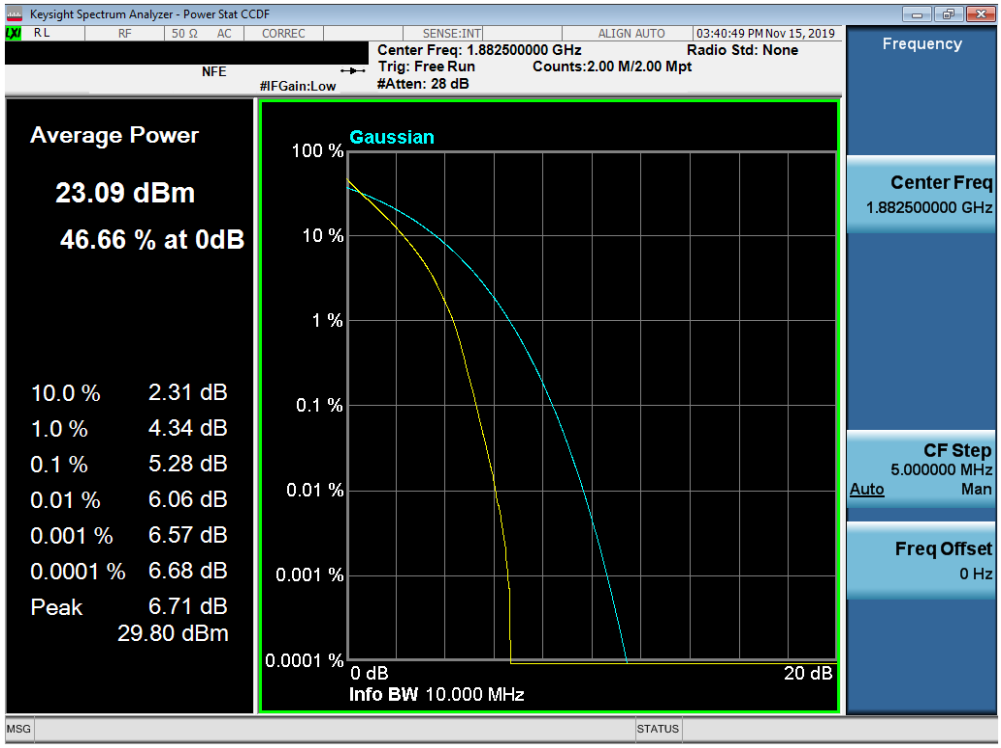
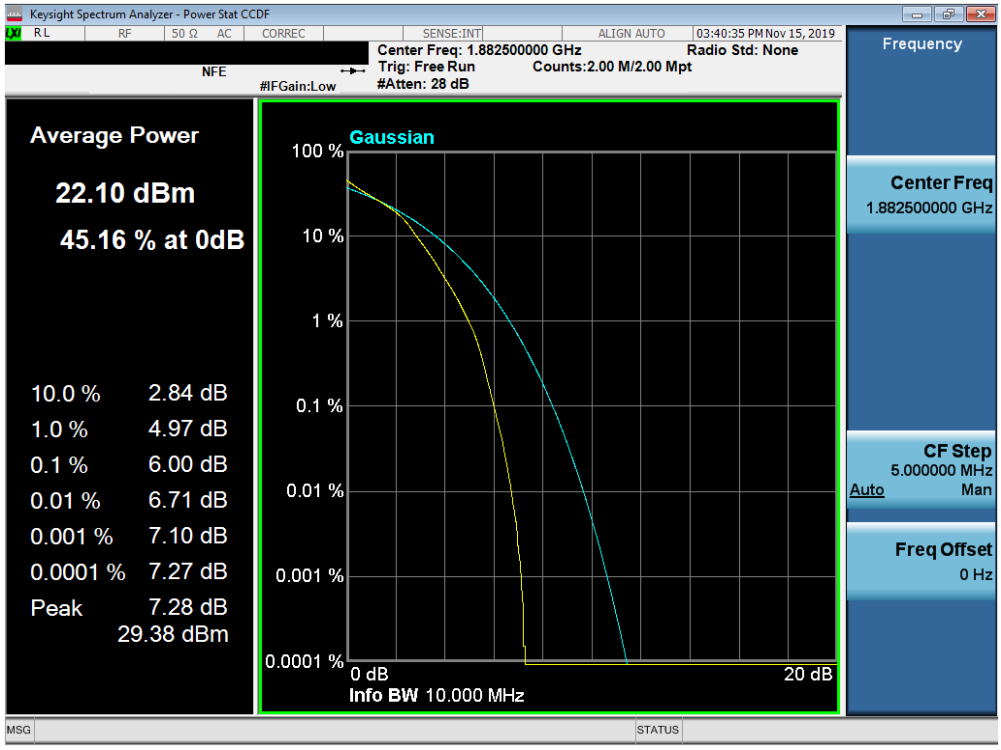


Plot 7-428. PAR Plot (Band 25/2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-429. PAR Plot (Band 25/2 - 10.0MHz 16-QAM - Full RB Configuration)

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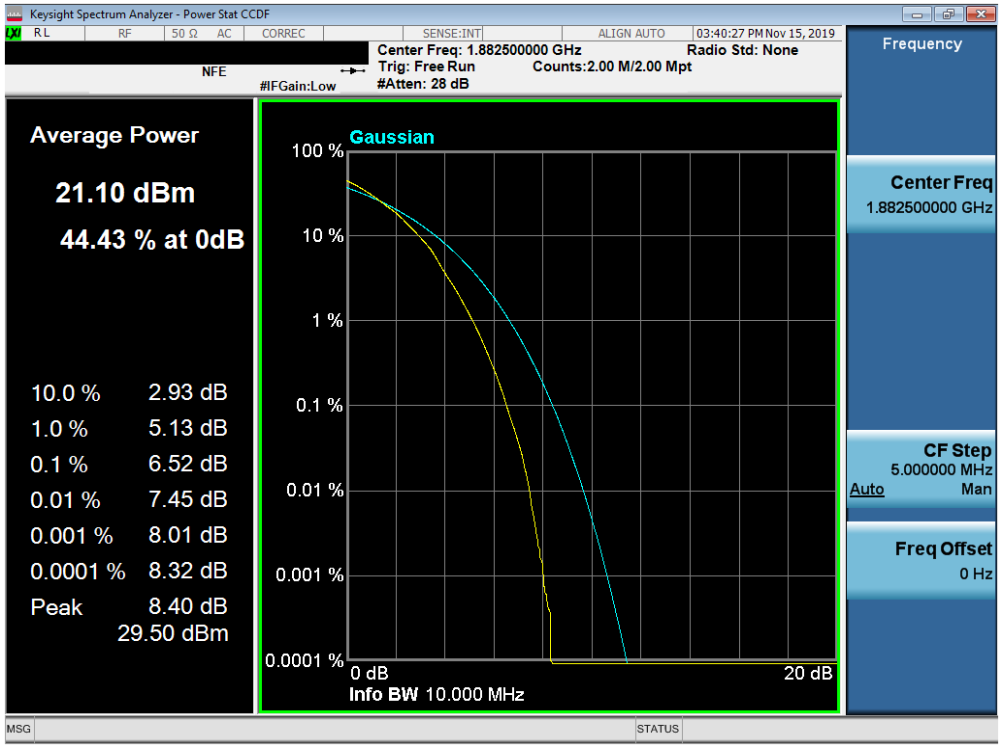
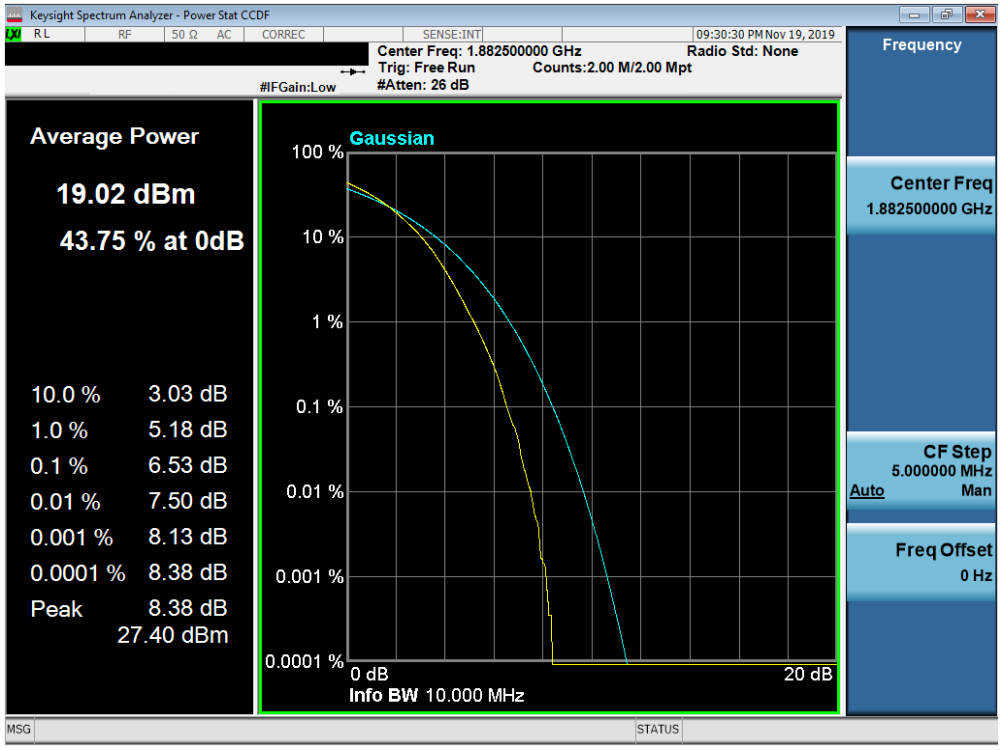


Plot 7-430. PAR Plot (Band 25/2 - 10.0MHz 64-QAM - Full RB Configuration)



Plot 7-431. PAR Plot (Band 25/2 - 10.0MHz 256-QAM - Full RB Configuration)

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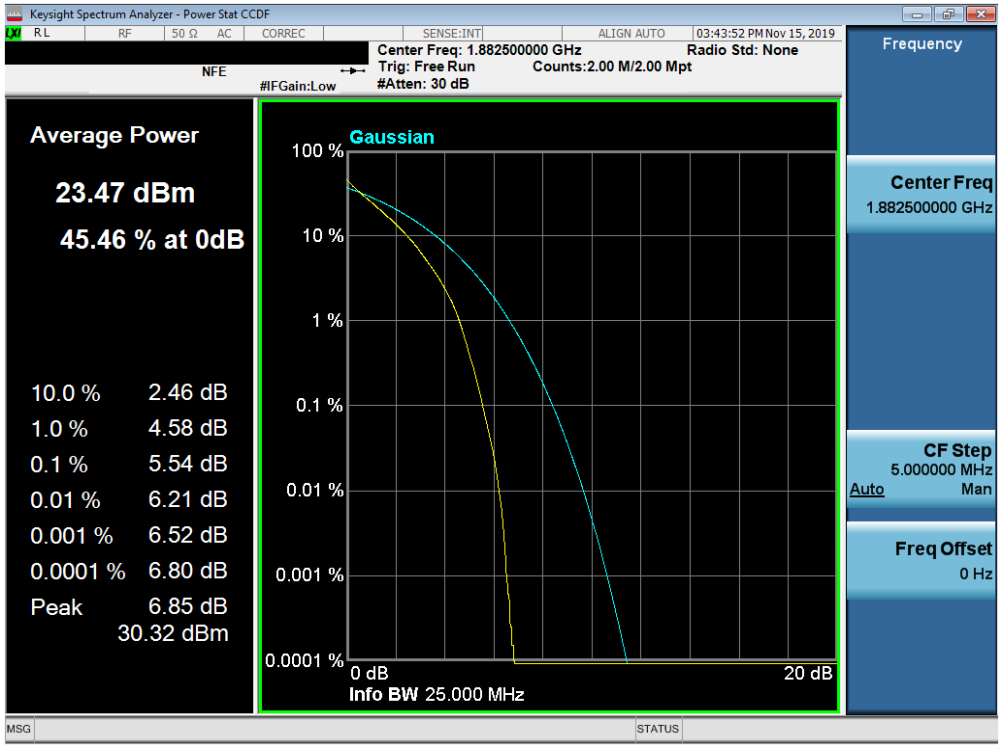
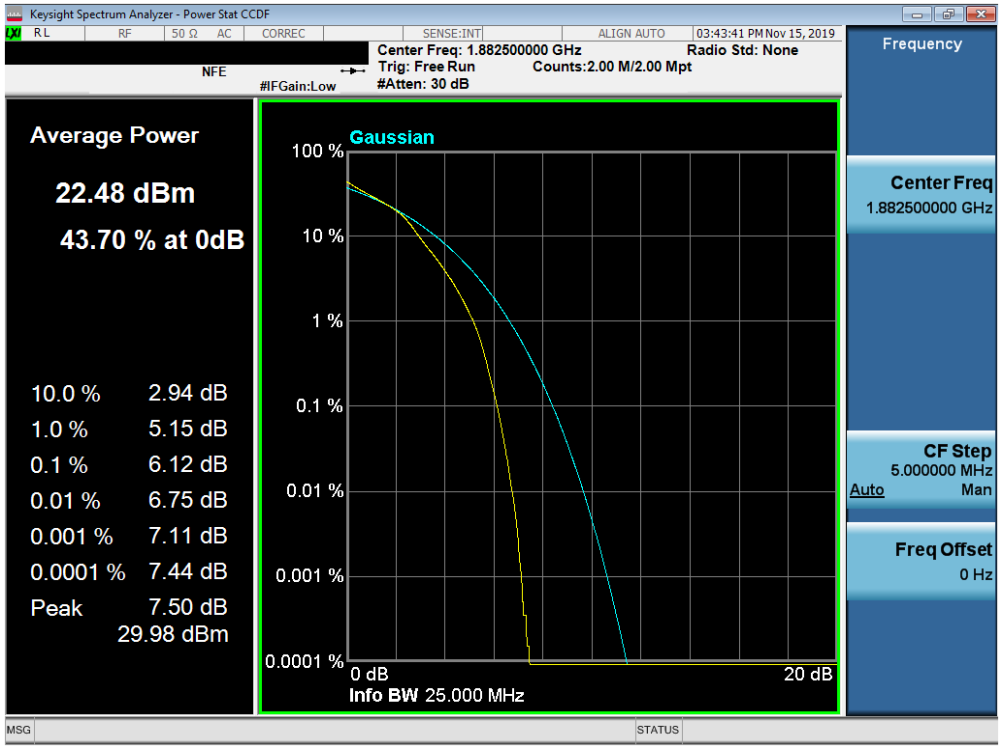


Plot 7-432. PAR Plot (Band 25/2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-433. PAR Plot (Band 25/2 - 15.0MHz 16-QAM - Full RB Configuration)

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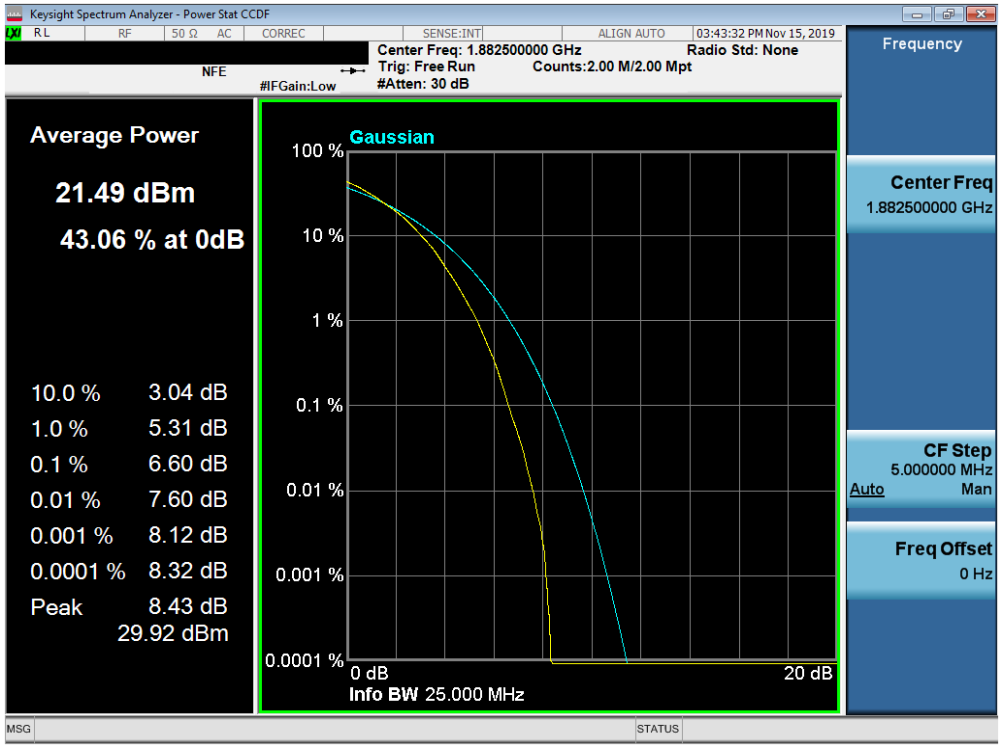
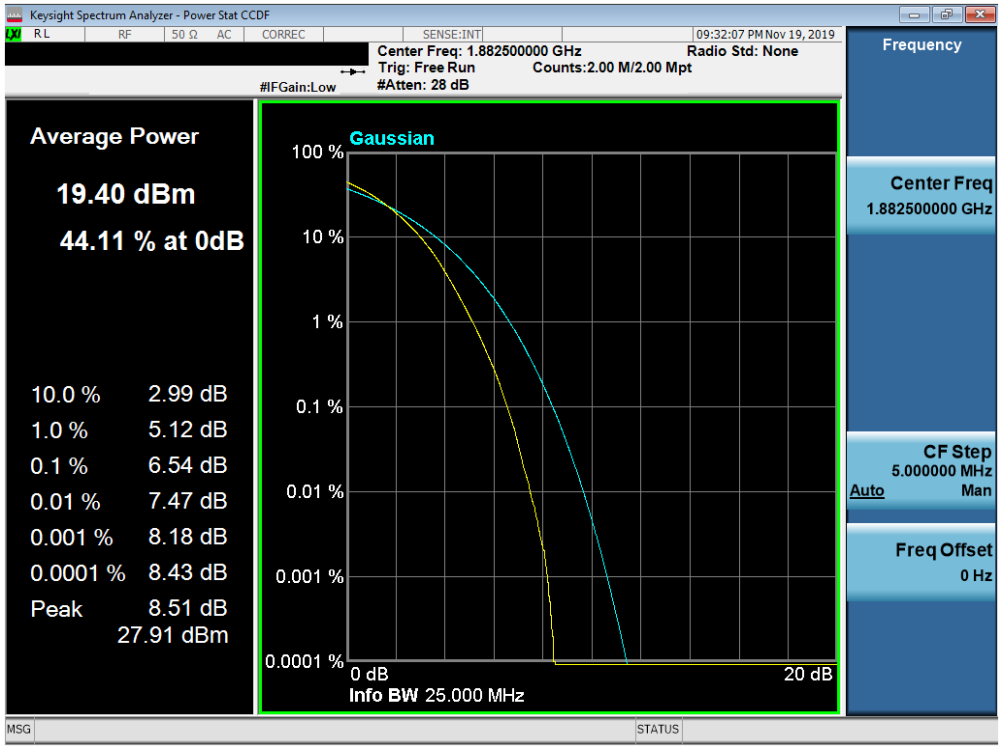


Plot 7-434. PAR Plot (Band 25/2 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-435. PAR Plot (Band 25/2 - 15.0MHz 256-QAM - Full RB Configuration)

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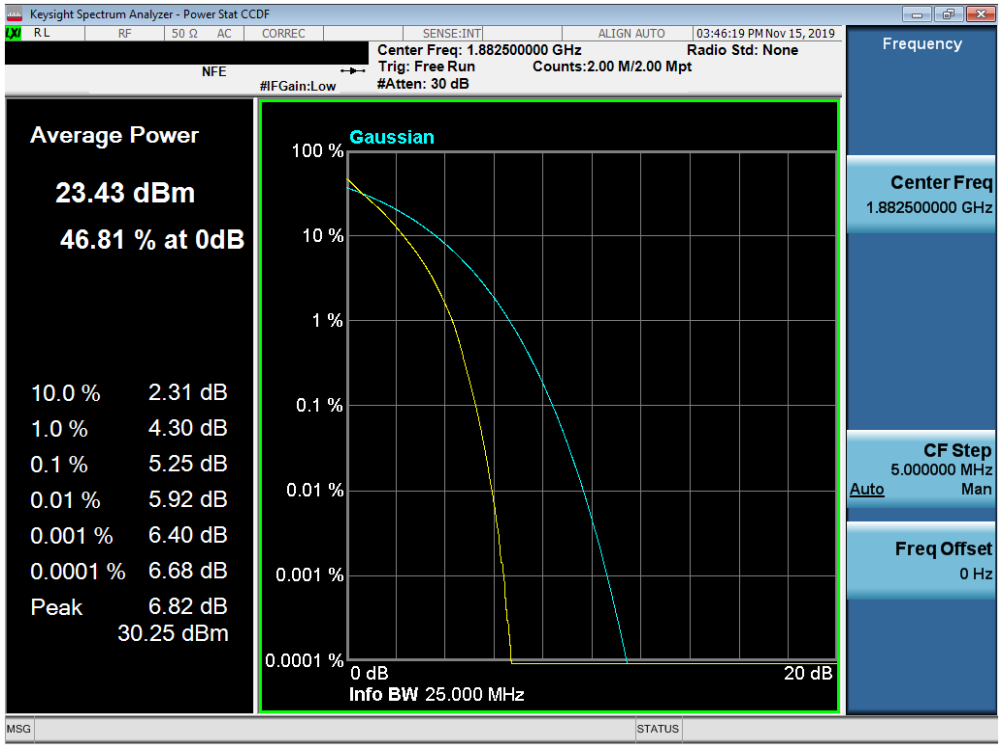
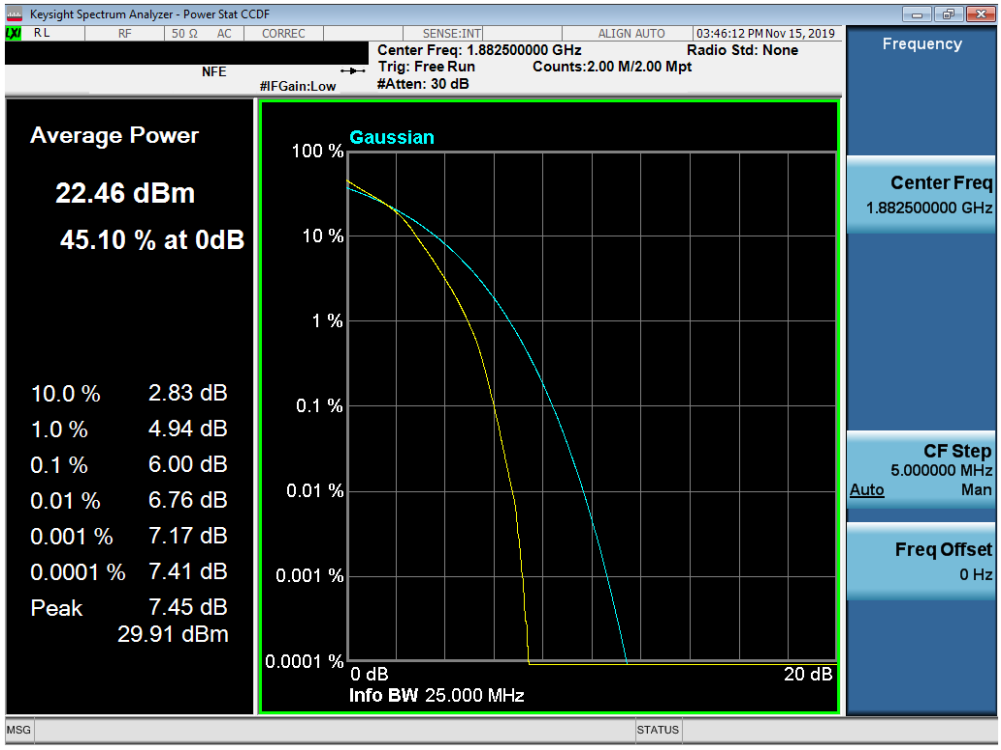


Plot 7-436. PAR Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-437. PAR Plot (Band 25/2 - 20.0MHz 16-QAM - Full RB Configuration)

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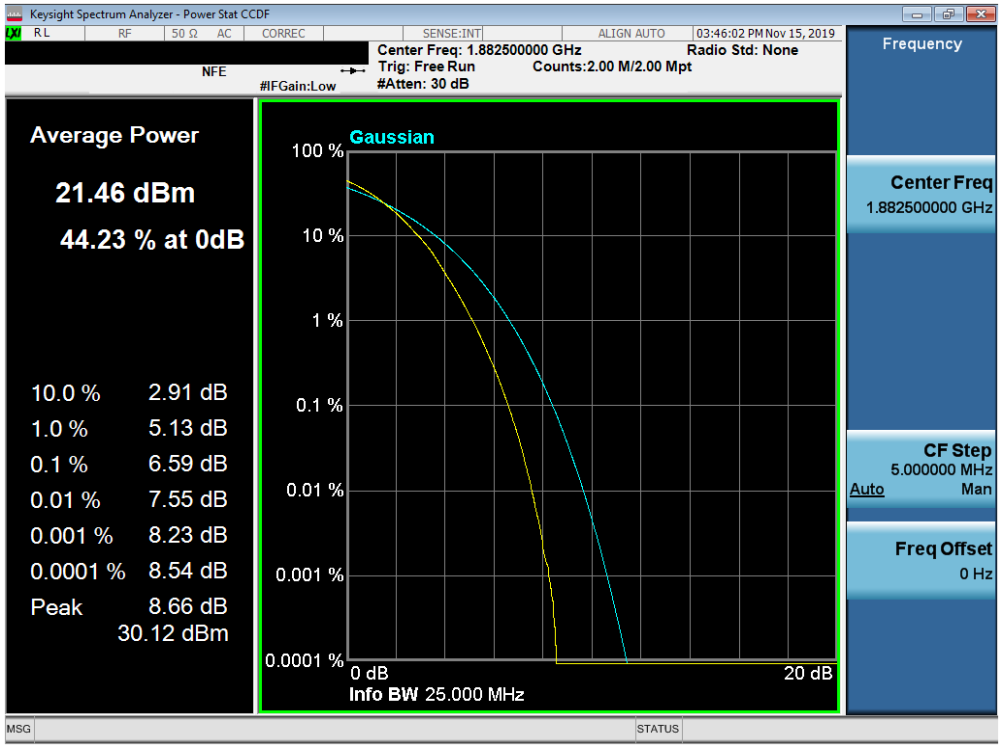
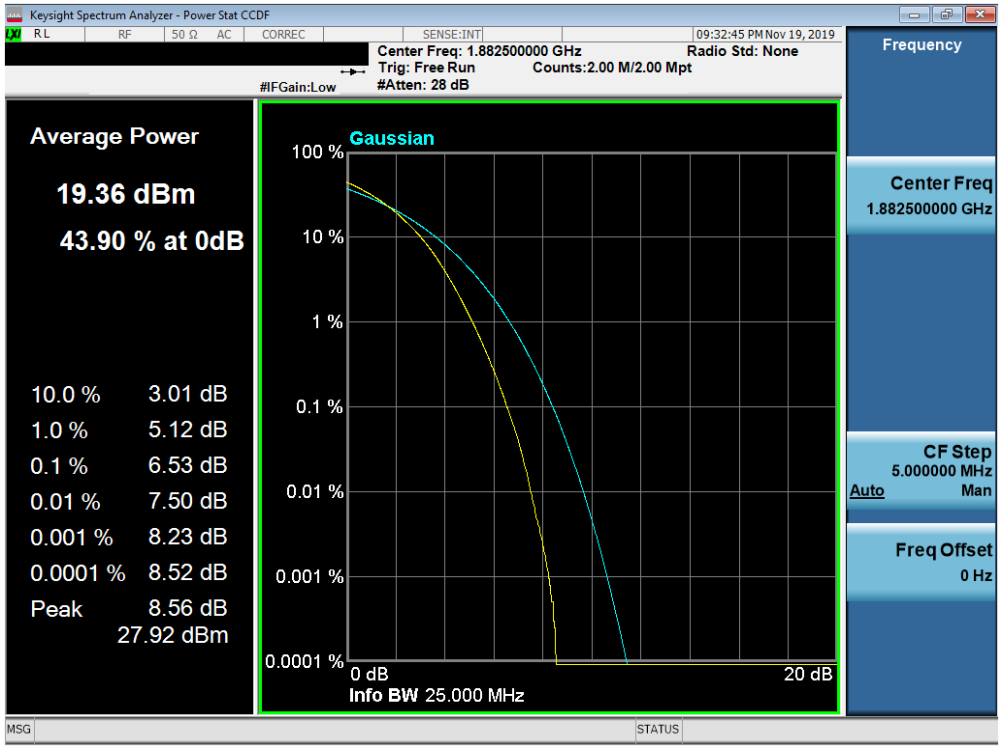


Plot 7-438. PAR Plot (Band 25/2 - 20.0MHz 64-QAM - Full RB Configuration)



Plot 7-439. PAR Plot (Band 25/2 - 20.0MHz 256-QAM - Full RB Configuration)

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7.6 Additional Maximum Power Reduction (A-MPR)
§2.1046

Test Overview

A-MPR is implemented in this device when operating at Power Class 2 in LTE Band 41 per the A-MPR specification in 3GPP TS 36.101. The conducted powers are shown herein to cover the different A-MPR levels specified in the standard. Measurement equipment was set up with triggering/gating on the spectrum analyzer such that powers were measured only during the on-time of the signal.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.2.2

Test Settings

1. Span = 2 x OBW to 3 x OBW
2. RBW = 1% to 5% of the OBW
3. Number of measurement points in sweep ≥ 2 x span / RBW
4. Sweep = auto-couple (less than transmission burst duration)
5. Detector = RMS (power)
6. Trigger was set to enable power measurements only on full power bursts
7. Trace was allowed to stabilize
8. Spectrum analyzer's "Channel Power" function was used to compute the power by integrating the spectrum across the OBW of the signal

Test Setup

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

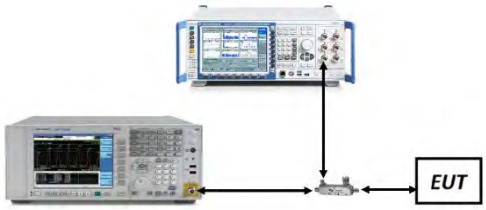

Figure 7-5. Test Instrument & Measurement Setup

Test Notes

None.

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Test Case	NS	MCC	MNC	Channel BW [MHz]	Channel Number	Channel Frequency [MHz]	Modulation	RB Size	RB Offset	MPR [dB]	A-MPR [dB]	Measured Power [dBm]	Lowest Typical Power [dBm]	Delta [dB]
1				5	39675	2498.5	QPSK	1	0	0	≤ 3	23.83	22.7	**1.13**
							16-QAM	1	0	≤ 1		23.14	21.7	**1.44**
							64-QAM	1	0	≤ 2		22.54	20.7	**1.84**
							256-QAM	1	0	≤ 4		20.01	18.7	**1.31**
2				5	39675	2498.5	QPSK	1	9	0	0	26.70	25.7	**1.00**
							16-QAM	1	9	≤ 1		26.07	24.7	**1.37**
							64-QAM	1	9	≤ 2		24.48	23.7	**0.78**
							256-QAM	1	9	≤ 4		22.14	21.7	**0.44**
3				10	39700	2501	QPSK	1	0	0	≤ 5	21.71	20.7	**1.01**
							16-QAM	1	0	≤ 1		21.27	19.7	**1.57**
							64-QAM	1	0	≤ 2		20.09	18.7	**1.39**
							256-QAM	1	0	≤ 4		18.26	16.7	**1.56**
4				10	39700	2501	QPSK	20	0	0	≤ 2	23.92	22.7	**1.22**
							16-QAM	20	0	≤ 1		22.98	21.7	**1.28**
							64-QAM	20	0	≤ 2		21.60	20.7	**0.90**
							256-QAM	20	0	≤ 4		19.84	18.7	**1.14**
5				10	39700	2501	QPSK	50	0	0	≤ 3	22.82	21.7	**1.12**
							16-QAM	50	0	≤ 1		21.90	20.7	**1.20**
							64-QAM	50	0	≤ 2		20.37	19.7	**0.67**
							256-QAM	50	0	≤ 4		18.79	17.7	**1.09**
6				10	39700	2501	QPSK	25	20	0	≤ 1	25.88	23.7	**2.18**
							16-QAM	25	20	≤ 1		24.95	22.7	**2.25**
							64-QAM	25	20	≤ 2		22.84	21.7	**1.14**
							256-QAM	25	20	≤ 4		20.46	19.7	**0.76**
7				10	39700	2501	QPSK	1	36	0	0	26.85	25.7	**1.15**
							16-QAM	1	36	≤ 1		26.12	24.7	**1.42**
							64-QAM	1	36	≤ 2		24.87	23.7	**1.17**
							256-QAM	1	36	≤ 4		22.13	21.7	**0.43**
8				15	39725	2503.5	QPSK	1	0	0	≤ 5	21.96	20.7	**1.26**
							16-QAM	1	0	≤ 1		20.54	19.7	**0.84**
							64-QAM	1	0	≤ 2		19.31	18.7	**0.61**
							256-QAM	1	0	≤ 4		18.64	16.7	**1.94**
9	01	310	120	15	39725	2503.5	QPSK	20	0	0	≤ 2	24.08	22.7	**1.38**
							16-QAM	20	0	≤ 1		23.11	21.7	**1.41**
							64-QAM	20	0	≤ 2		22.09	20.7	**1.39**
							256-QAM	20	0	≤ 4		20.17	18.7	**1.47**
10				15	39725	2503.5	QPSK	75	0	0	≤ 4	21.99	20.7	**1.29**
							16-QAM	75	0	≤ 1		21.04	19.7	**1.34**
							64-QAM	75	0	≤ 2		19.76	18.7	**1.06**
							256-QAM	75	0	≤ 4		18.04	16.7	**1.34**
11				15	39725	2503.5	QPSK	50	15	0	≤ 3	23.05	21.7	**1.35**
							16-QAM	50	15	≤ 1		22.10	20.7	**1.40**
							64-QAM	50	15	≤ 2		21.43	19.7	**1.73**
							256-QAM	50	15	≤ 4		19.56	17.7	**1.86**
12				15	39725	2503.5	QPSK	1	60	0	0	26.96	25.7	**1.26**
							16-QAM	1	60	≤ 1		26.14	24.7	**1.44**
							64-QAM	1	60	≤ 2		25.36	23.7	**1.66**
							256-QAM	1	60	≤ 4		23.42	21.7	**1.72**
13				20	39750	2506	QPSK	1	0	0	≤ 5	22.25	20.7	**1.55**
							16-QAM	1	0	≤ 1		21.44	19.7	**1.74**
							64-QAM	1	0	≤ 2		20.64	18.7	**1.94**
							256-QAM	1	0	≤ 4		18.64	16.7	**1.94**
14				20	39750	2506	QPSK	20	0	0	≤ 2	24.19	22.7	**1.49**
							16-QAM	20	0	≤ 1		23.23	21.7	**1.53**
							64-QAM	20	0	≤ 2		22.04	20.7	**1.34**
							256-QAM	20	0	≤ 4		20.56	18.7	**1.86**
15				20	39750	2506	QPSK	100	0	0	≤ 4	22.01	20.7	**1.31**
							16-QAM	100	0	≤ 1		21.04	19.7	**1.34**
							64-QAM	100	0	≤ 2		19.98	18.7	**1.28**
							256-QAM	100	0	≤ 4		17.69	16.7	**0.99**
16				20	39750	2506	QPSK	75	24	0	≤ 3	22.98	21.7	**1.28**
							16-QAM	75	24	≤ 1		22.01	20.7	**1.31**
							64-QAM	75	24	≤ 2		20.76	19.7	**1.06**
							256-QAM	75	24	≤ 4		18.97	17.7	**1.27**
17				20	39750	2506	QPSK	1	77	0	0	27.02	25.7	**1.32**
							16-QAM	1	77	≤ 1		26.35	24.7	**1.65**
							64-QAM	1	77	≤ 2		25.43	23.7	**1.73**
							256-QAM	1	77	≤ 4		22.67	21.7	**0.97**
18	01	311	870	5	39675	2498.5	QPSK	1	0	0	≤ 3	23.90	22.7	**1.20**
							16-QAM			≤ 1		23.2	21.7	**1.50**
							64-QAM			≤ 2		22.07	20.7	**1.37**
							256-QAM			≤ 4		20.21	18.7	**1.51**
19	01	001	01	5	39675	2498.5	QPSK	1	0	0	0	26.61	25.7	**0.91**
							16-QAM			≤ 1		25.98	24.7	**1.28**
							64-QAM			≤ 2		24.34	23.7	**0.64**
							256-QAM			≤ 4		22.31	21.7	**0.61**

Table 7-3. A-MPR Conducted Power Measurements

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7.7 Uplink Carrier Aggregation

§27.53(m)

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

For Band 38/41, the minimum permissible attenuation level of any spurious emission is 55 + 10 $\log_{10}(P_{[Watts]})$.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

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

Figure 7-6. Test Instrument & Measurement Setup

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Test Notes

1. Uplink carrier aggregation is supported in this EUT while operating in Power Class 2 and 3.

2. Conducted power and spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device. The worst case (highest) powers were found while operating with QPSK modulation, as shown in Table 7-4 to 7-11 below, with both carriers set to transmit using 1RB.

3. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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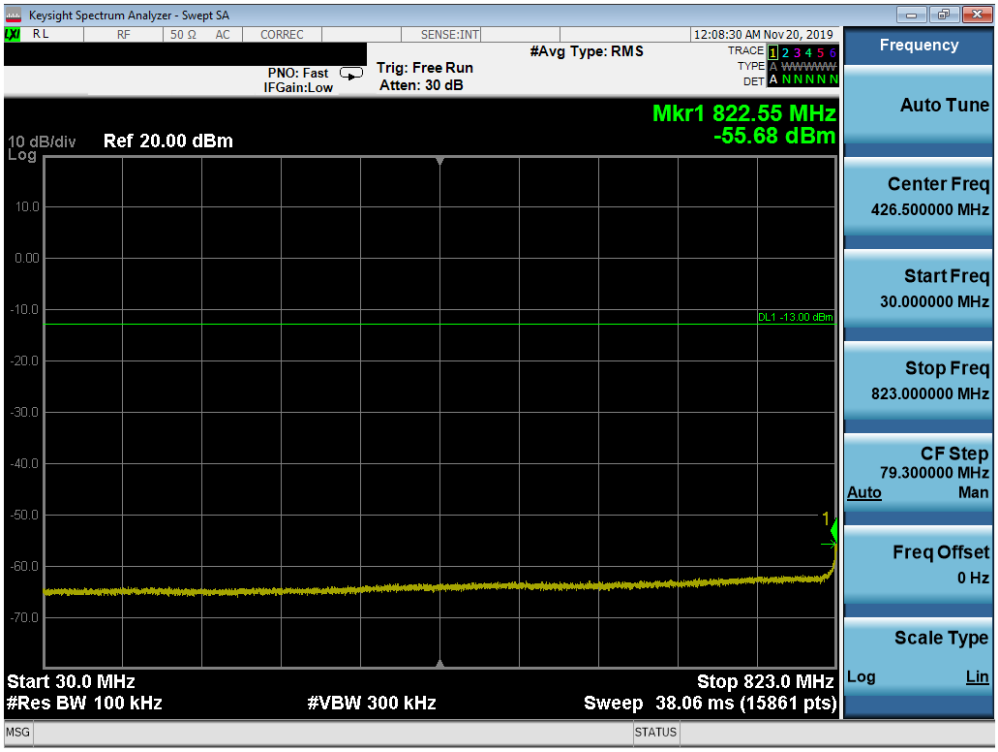
Uplink CA Configuration 5B

PCC						SCC						
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
20450	829.0	10	QPSK	1	49	20549	838.9	10	QPSK	1	0	25.45
20525	836.5	10	QPSK	1	49	20597	843.7	5	QPSK	1	0	24.80
20600	844.0	10	QPSK	1	0	20501	834.1	10	QPSK	1	49	25.35

Table 7-4. Conducted Powers (B5 – PCC/SCC: RB Size 1)

PCC						SCC						
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
20450	829.0	10	QPSK	50	0	20549	838.9	10	QPSK	50	0	25.45
20450	829.0	10	16-QAM	50	0	20549	838.9	10	16-QAM	50	0	24.91
20450	829.0	10	64-QAM	50	0	20549	838.9	10	64-QAM	50	0	23.67
20450	829.0	10	256-QAM	50	0	20549	838.9	10	256-QAM	50	0	20.87

Table 7-5. Conducted Powers (B5 with Various Combinations for 10MHz Channel Bandwidth)



Plot 7-440. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)

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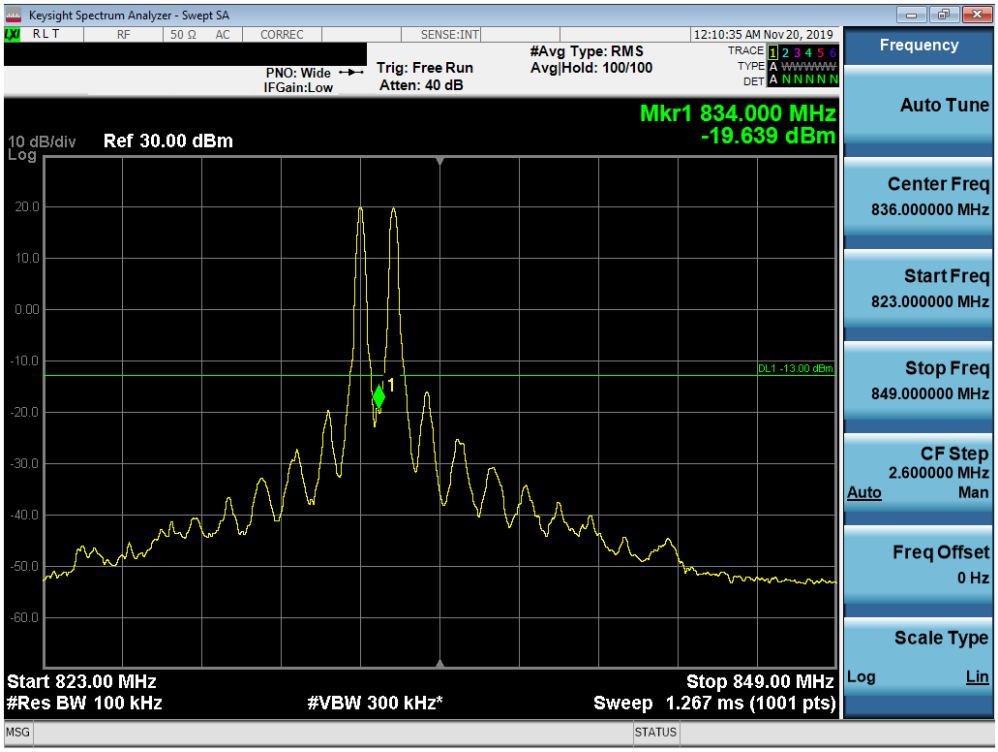
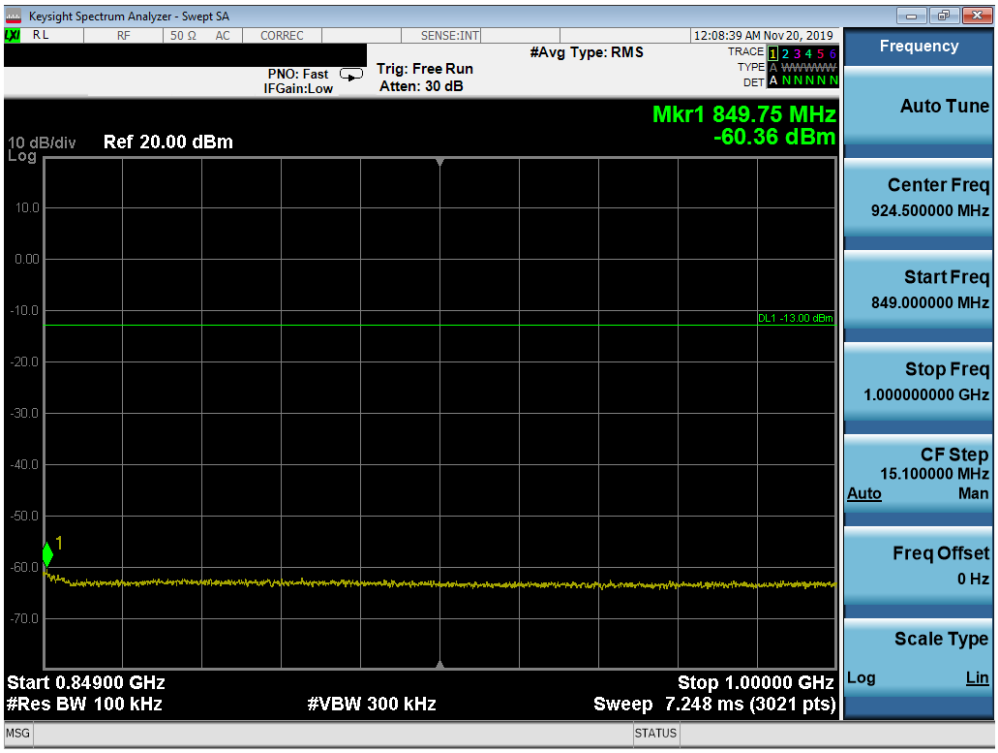


Plot 7-441. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)



Plot 7-442. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)

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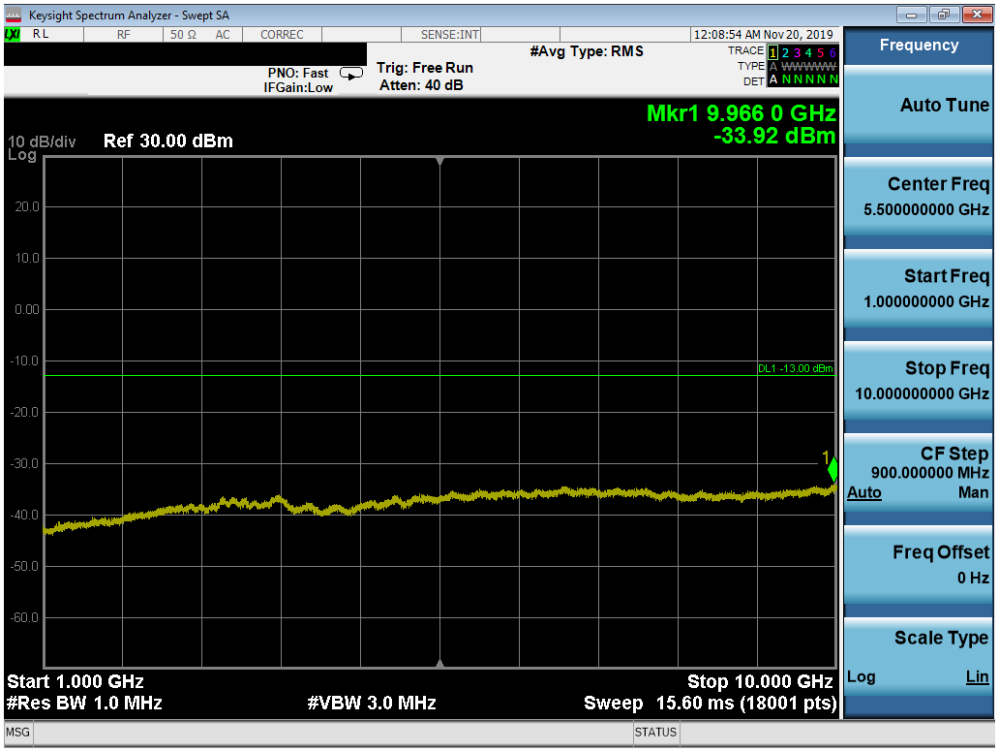
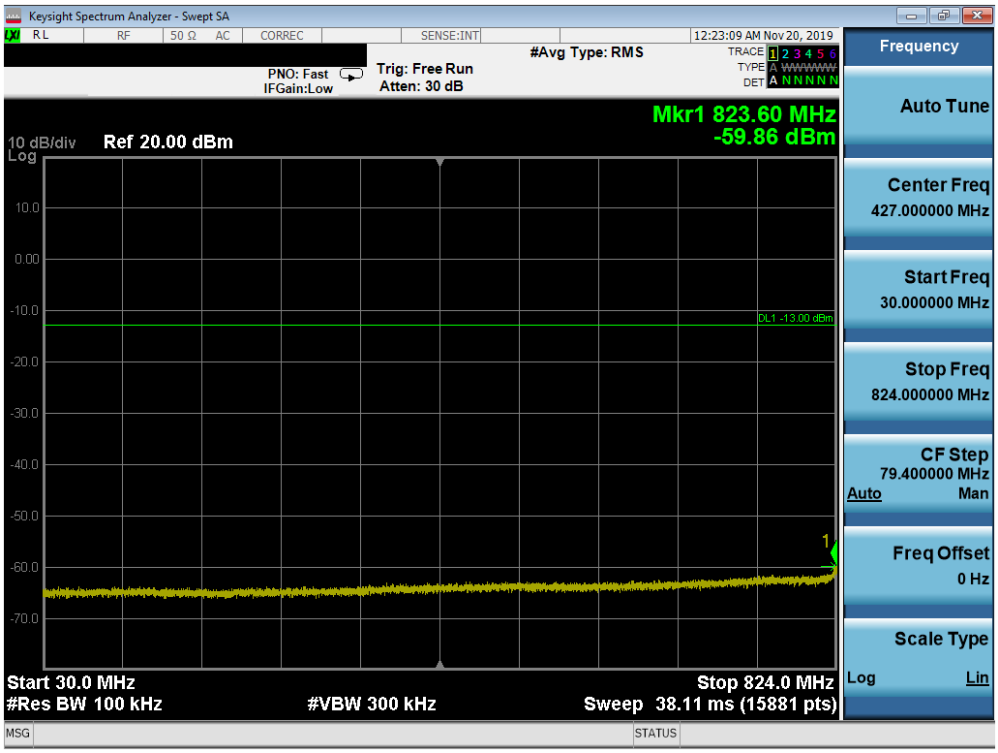


Plot 7-443. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Low Channel)



Plot 7-444. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)

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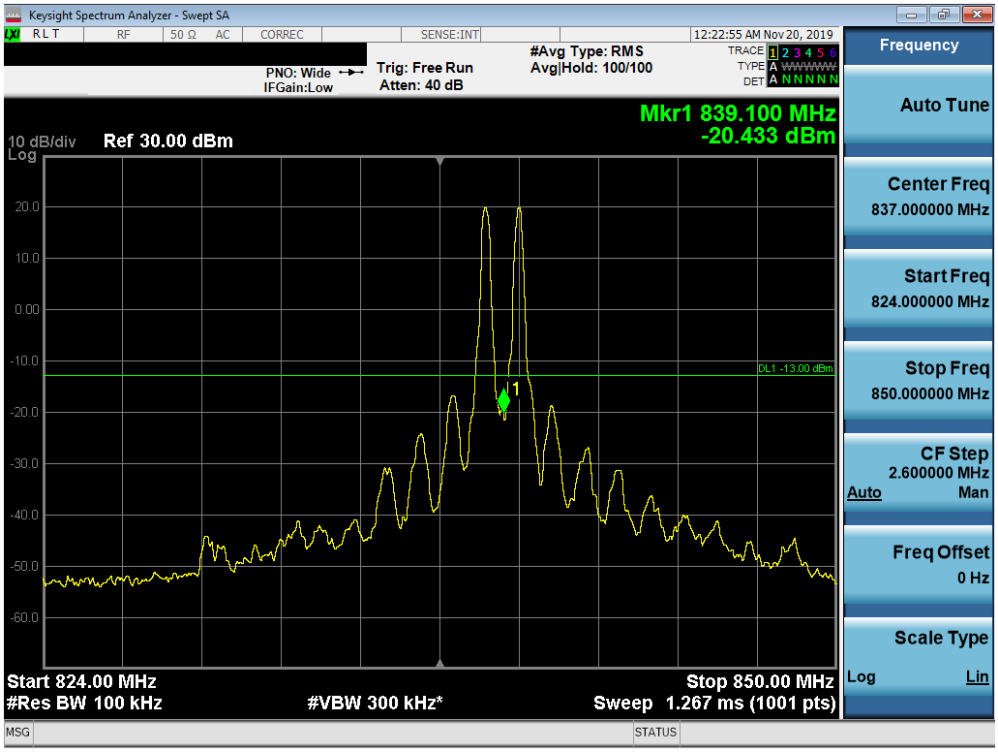
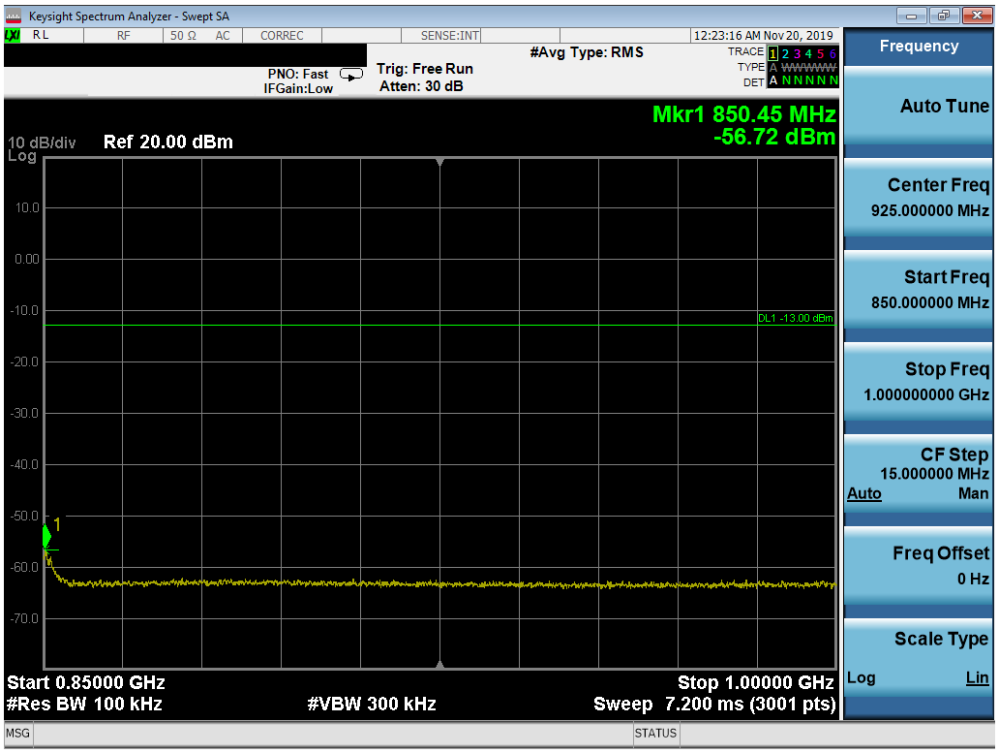


Plot 7-445. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)



Plot 7-446. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)

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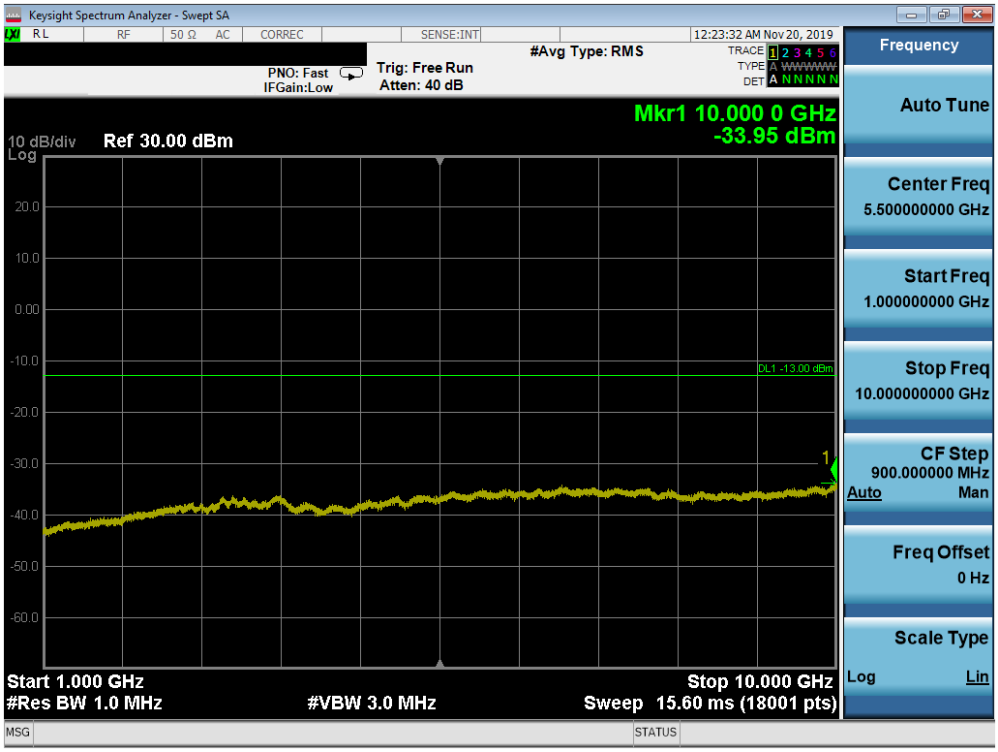
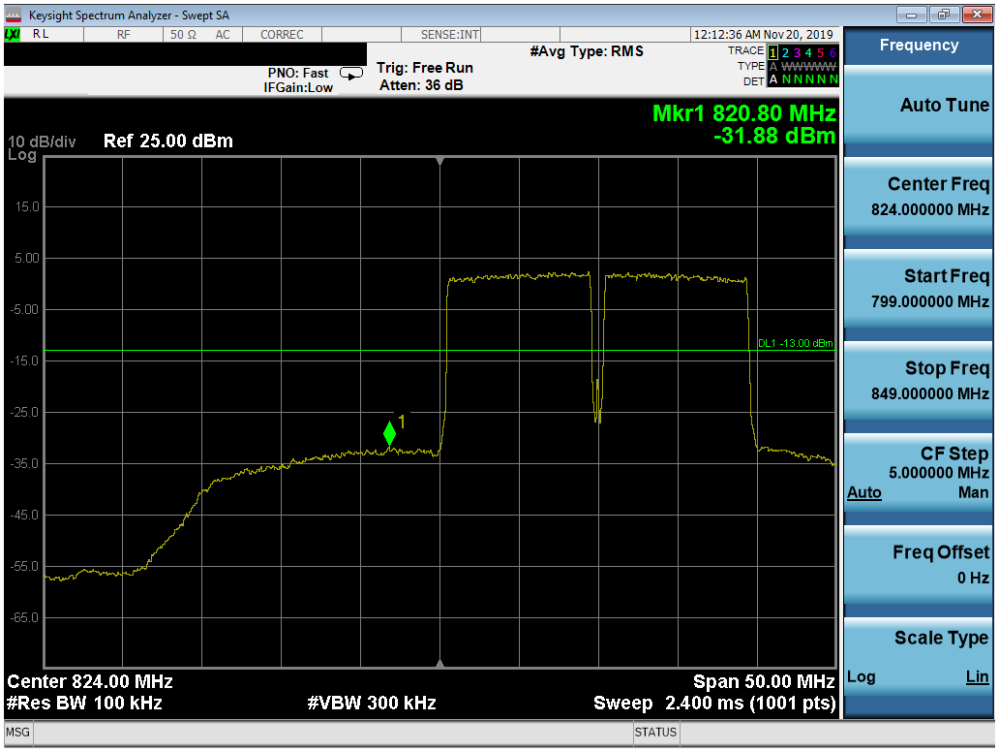


Plot 7-447. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/0 SCC 1/49 – High Channel)



Plot 7-448. Lower Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:10 MHz – Full RB)

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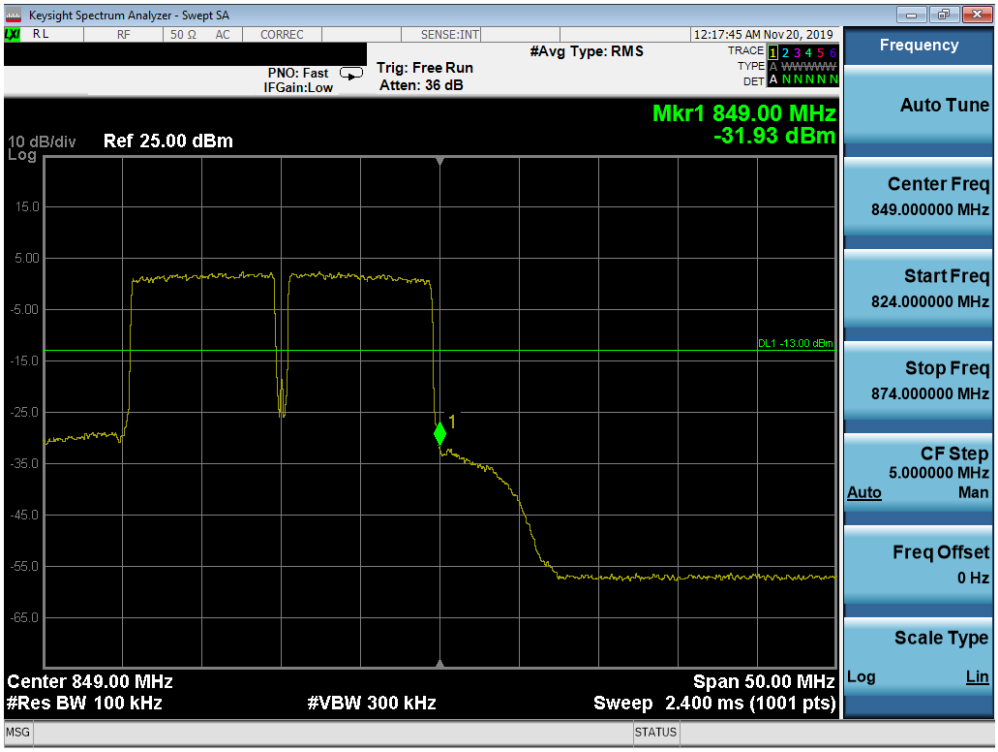

Plot 7-449. Upper Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:10 MHz – Full RB)

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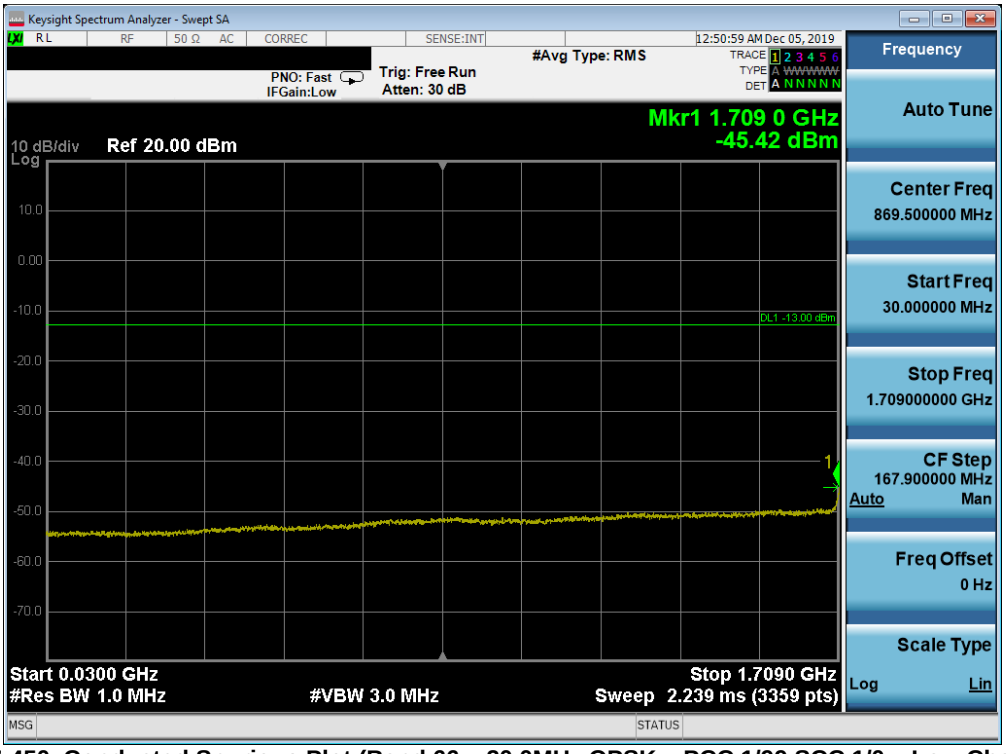
Uplink CA Configuration 66B/C

PCC						SCC						
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
132072	1720.0	20	QPSK	1	99	132270	1739.8	20	QPSK	1	0	24.63
132322	1745.0	20	QPSK	1	99	132520	1764.8	20	QPSK	1	0	24.66
132572	1770.0	20	QPSK	1	0	132374	1750.2	20	QPSK	1	99	24.63

Table 7-6. Conducted Powers (B66 – 20MHz + 20MHz Channel Bandwidth – PCC/SCC: RB Size 1)

PCC						SCC						
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
132072	1720.0	20	QPSK	100	0	132270	1739.8	20	QPSK	100	0	22.65
132072	1720.0	20	16-QAM	100	0	132270	1739.8	20	16-QAM	100	0	21.63
132072	1720.0	20	64-QAM	100	0	132270	1739.8	20	64-QAM	100	0	21.62
132072	1720.0	20	256-QAM	100	0	132270	1739.8	20	256-QAM	100	0	19.68

Table 7-7. Conducted Powers (B66 with Various Combinations for 20MHz + 20MHz Channel Bandwidth)



Plot 7-450. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)

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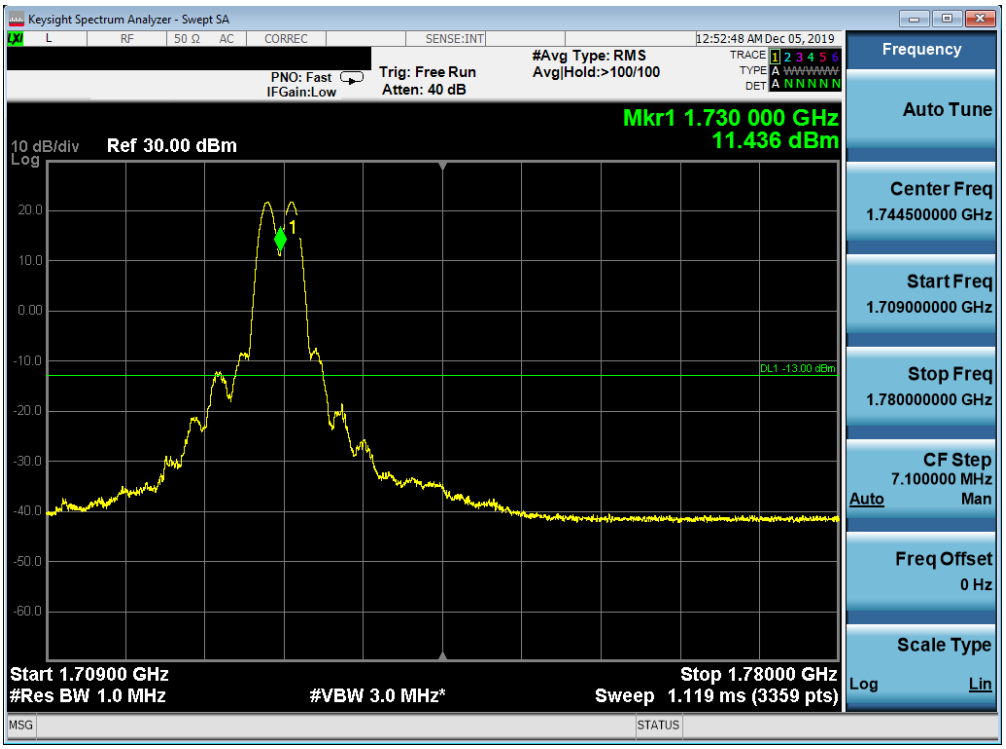
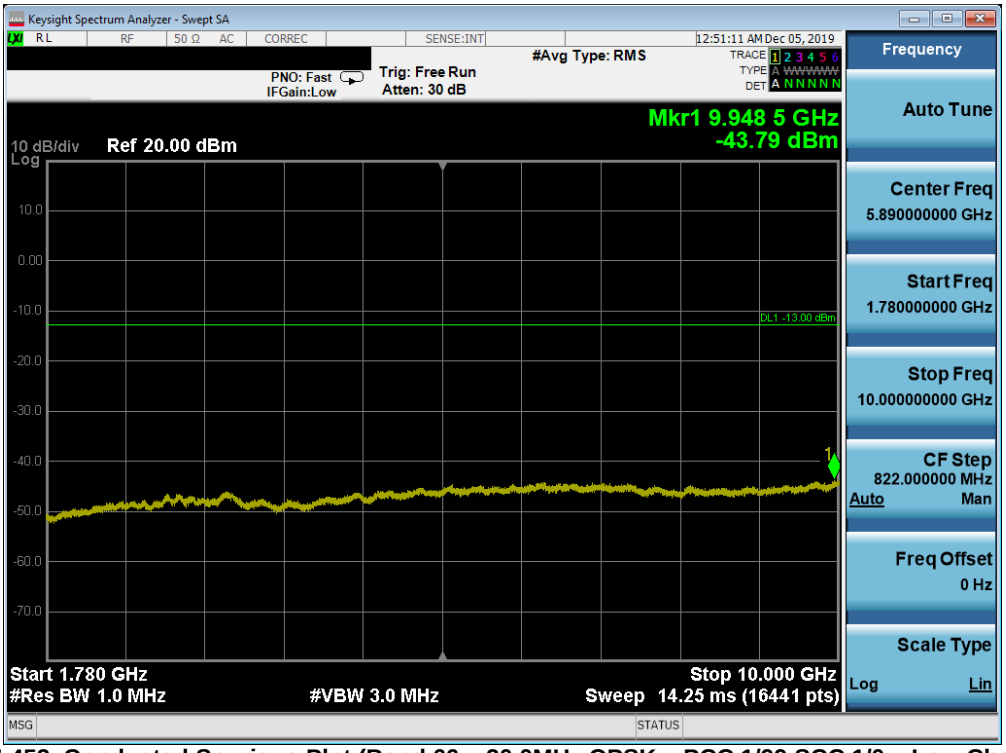


Plot 7-451. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



Plot 7-452. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)

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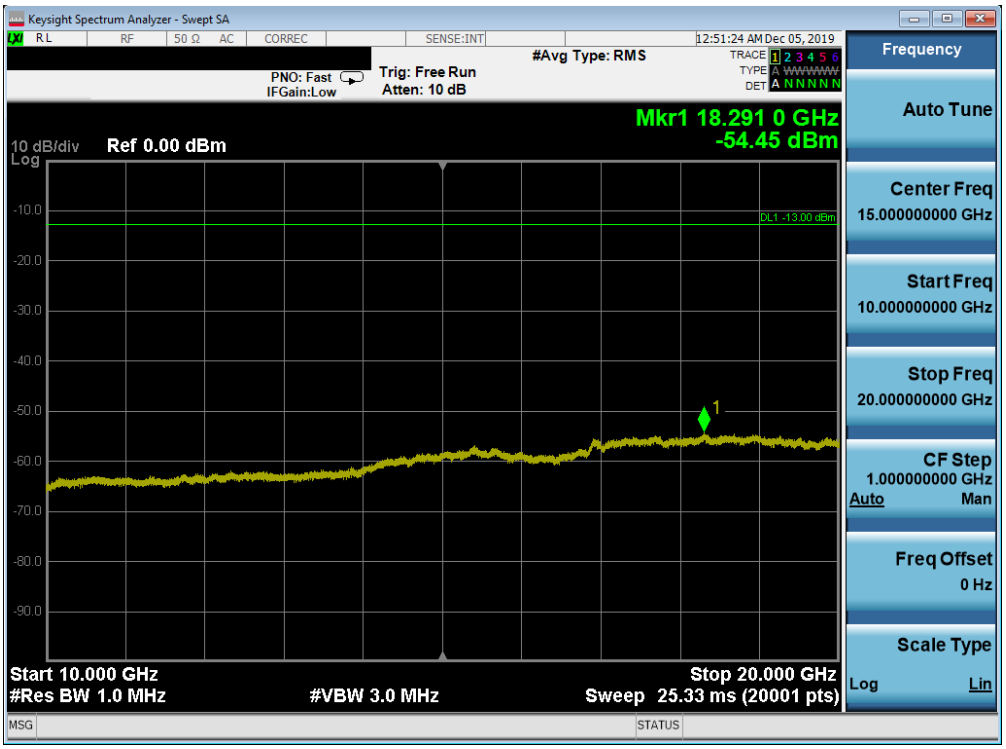
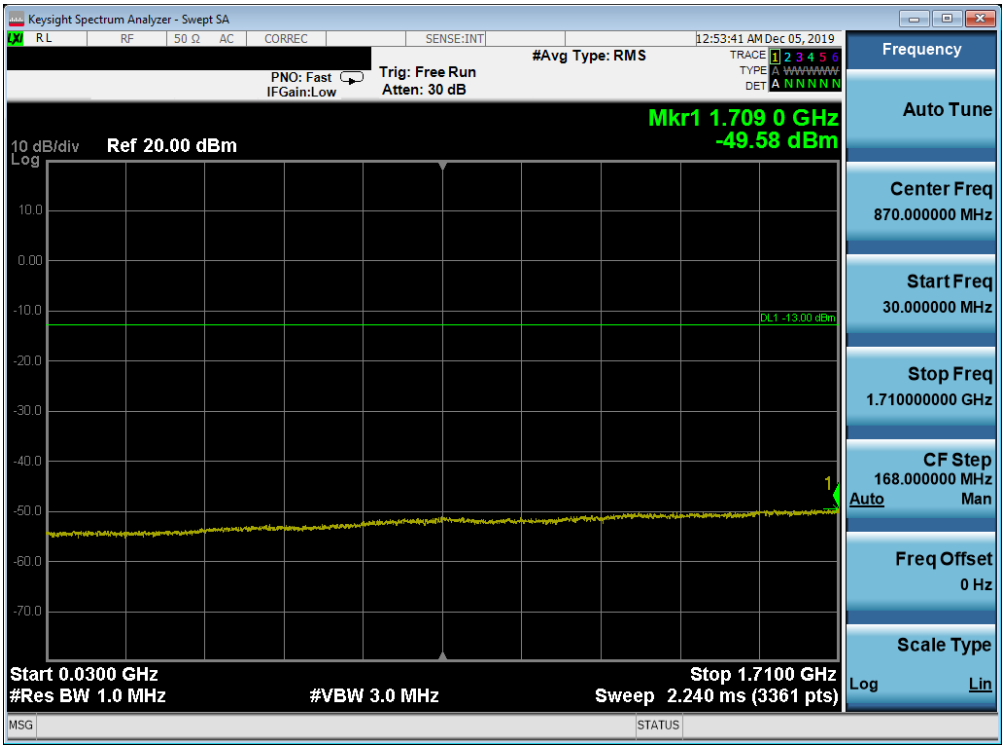


Plot 7-453. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



Plot 7-454. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

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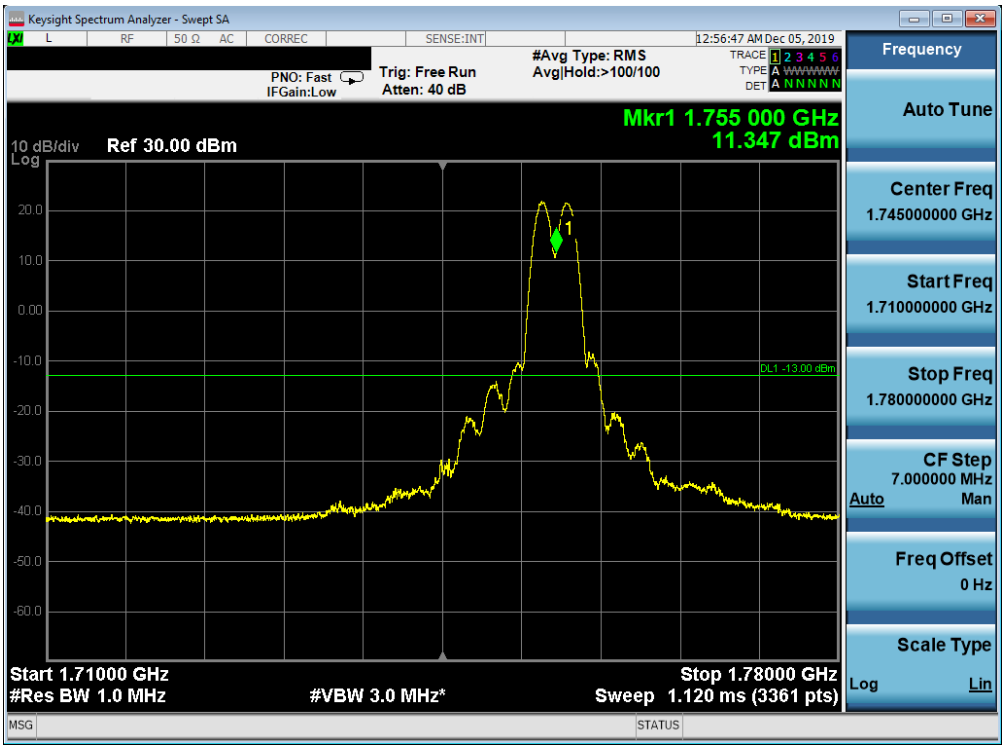
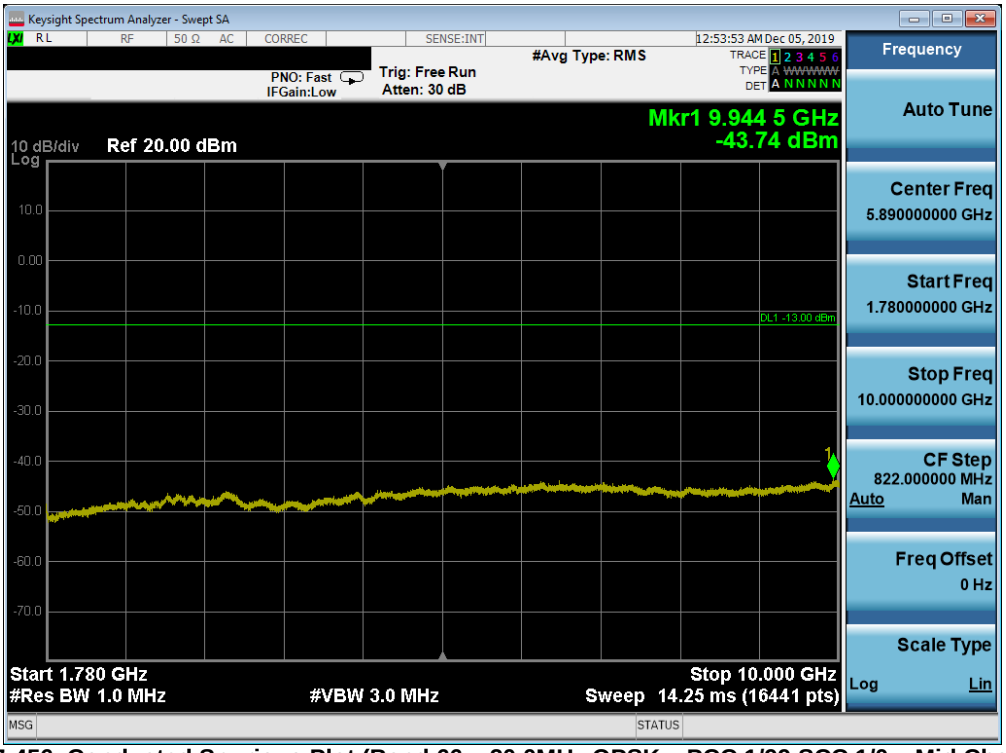


Plot 7-455. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-456. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

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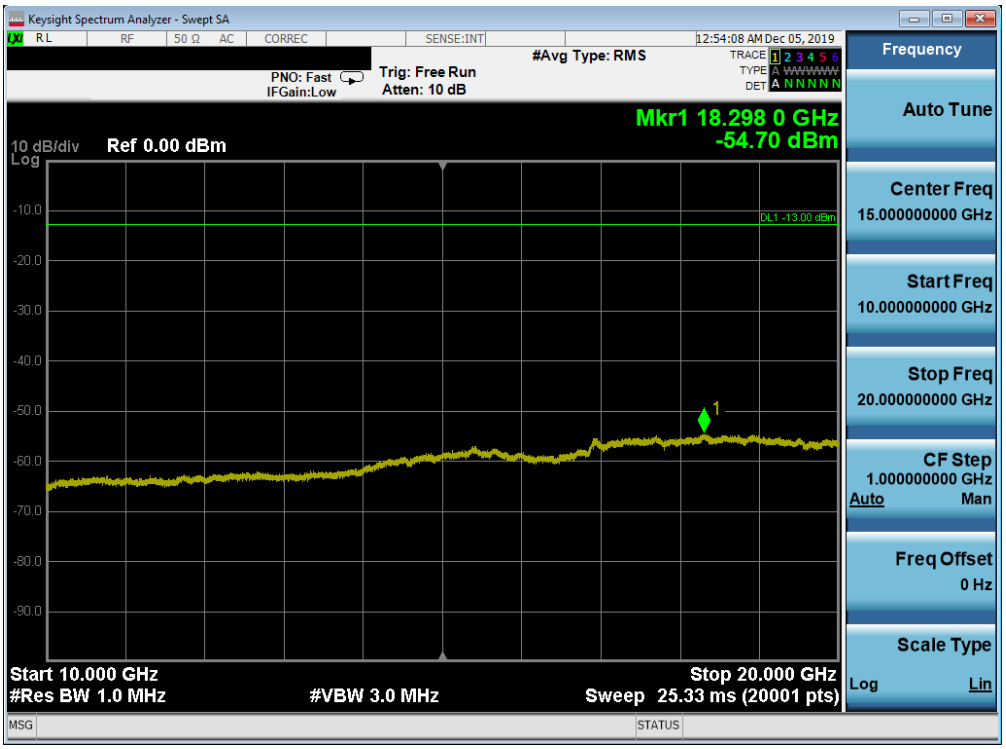
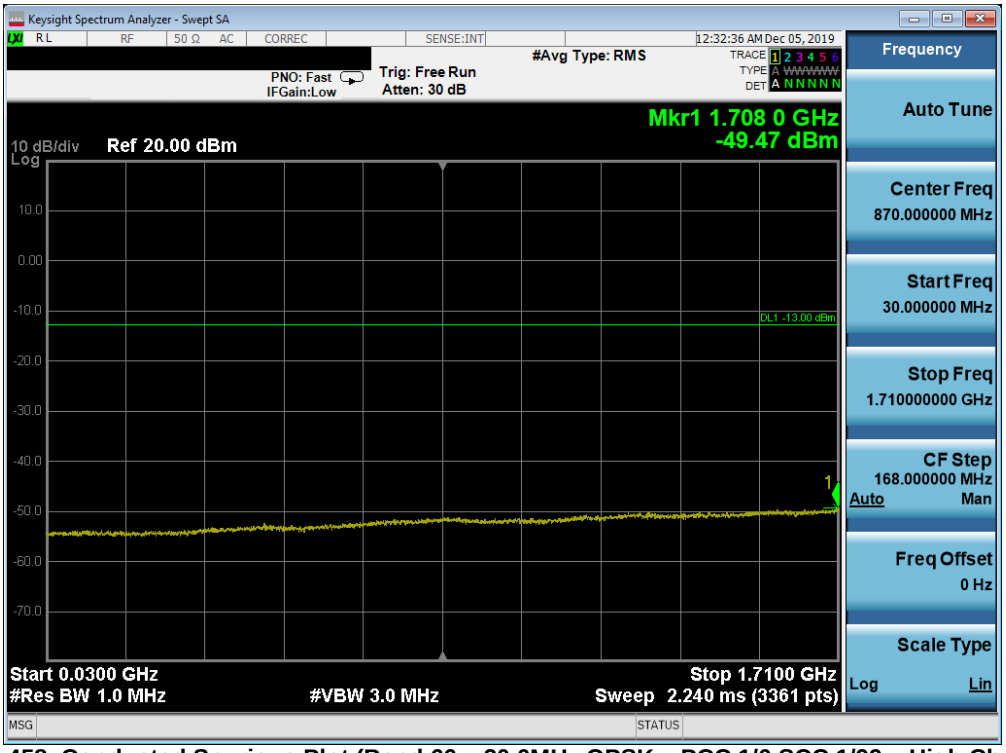


Plot 7-457. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-458. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

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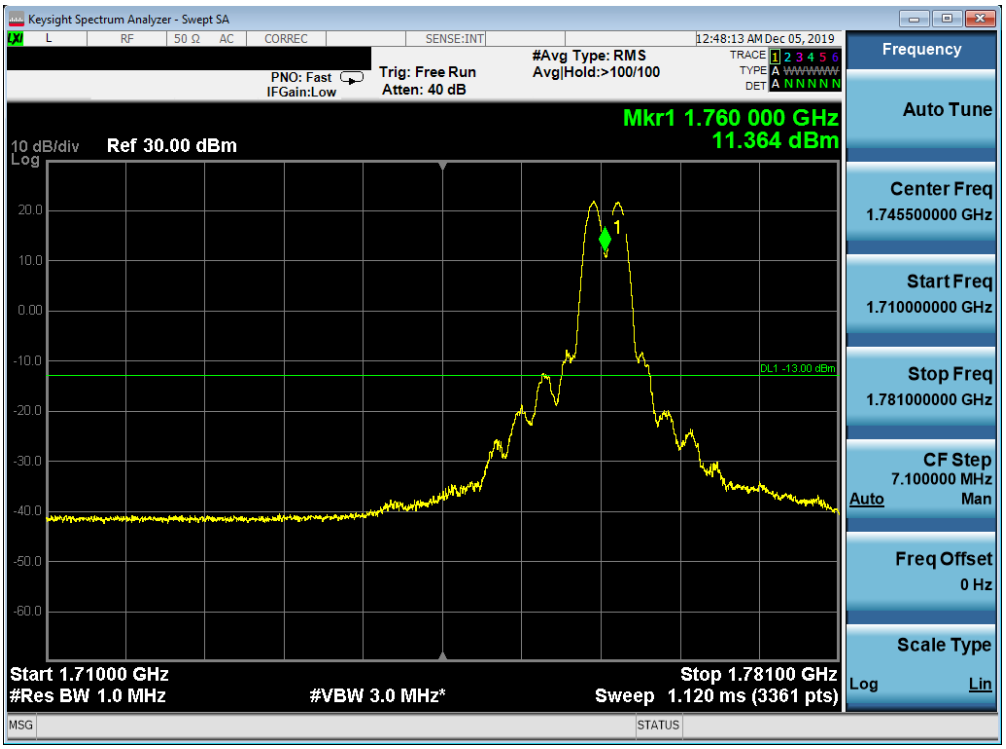
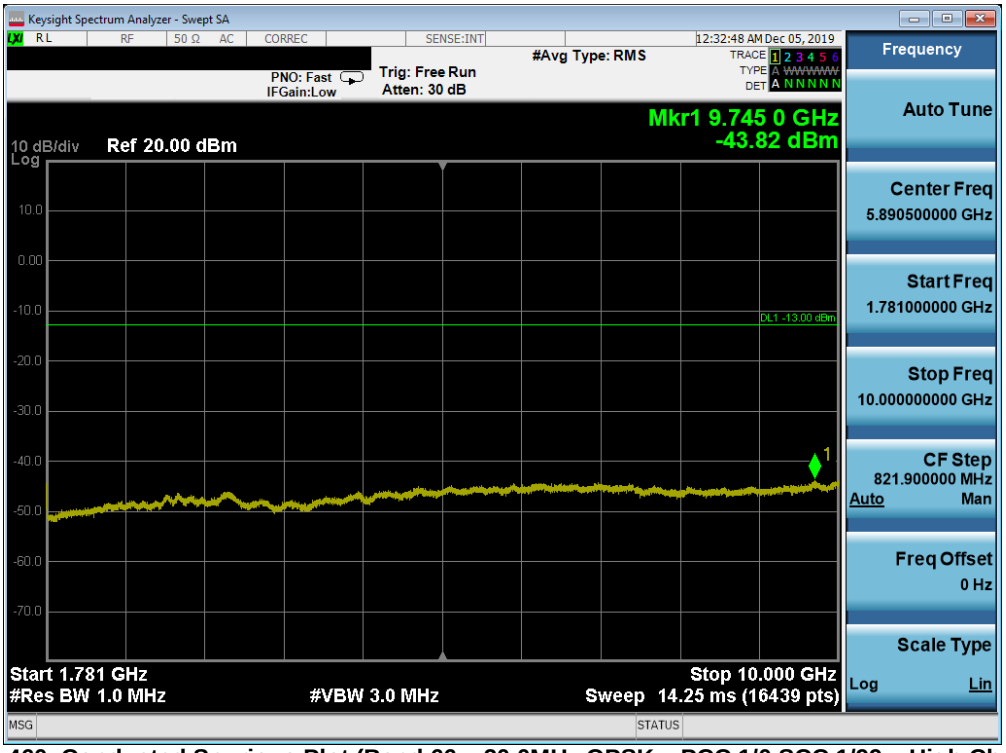


Plot 7-459. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Plot 7-460. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

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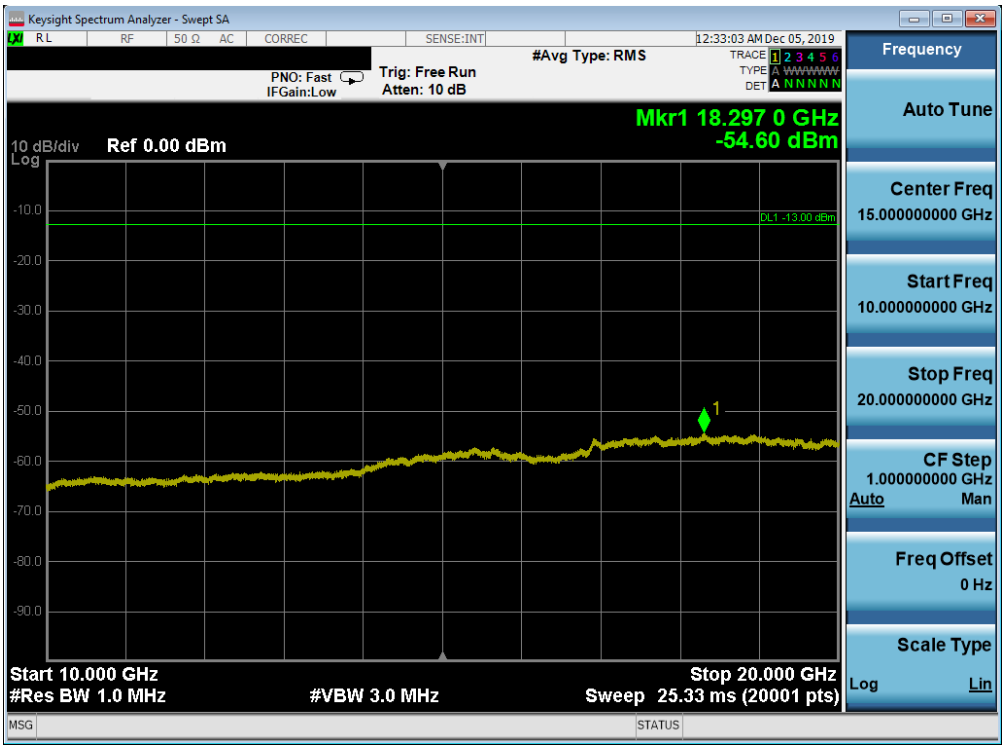

Plot 7-461. Conducted Spurious Plot (Band 66 – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

Plot 7-462. Lower Band Edge Plot (Band 66 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

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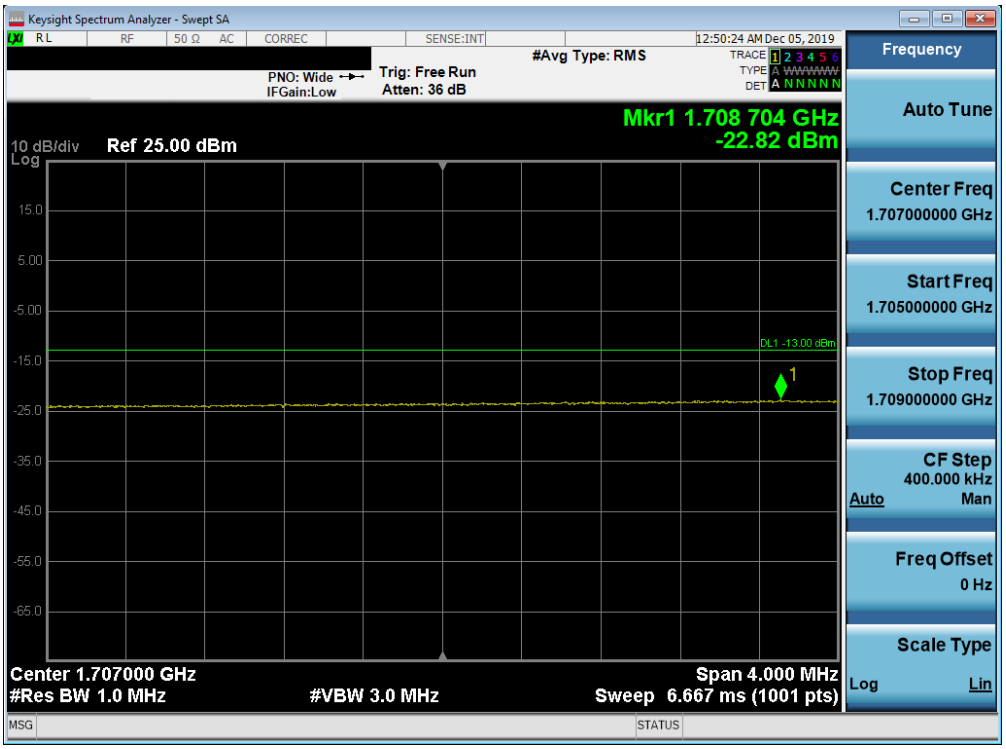

Plot 7-463. Extended Lower Band Edge Plot (Band 66 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

Plot 7-464. Upper Band Edge Plot (Band 66 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

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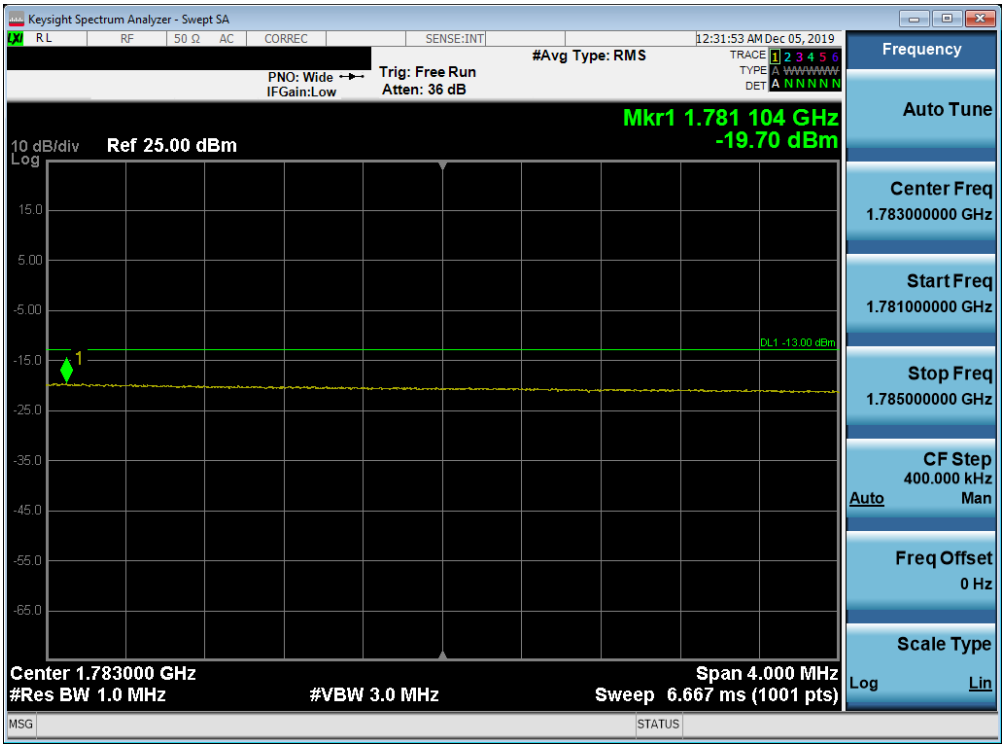

Plot 7-465. Extended Upper Band Edge Plot (Band 66 QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

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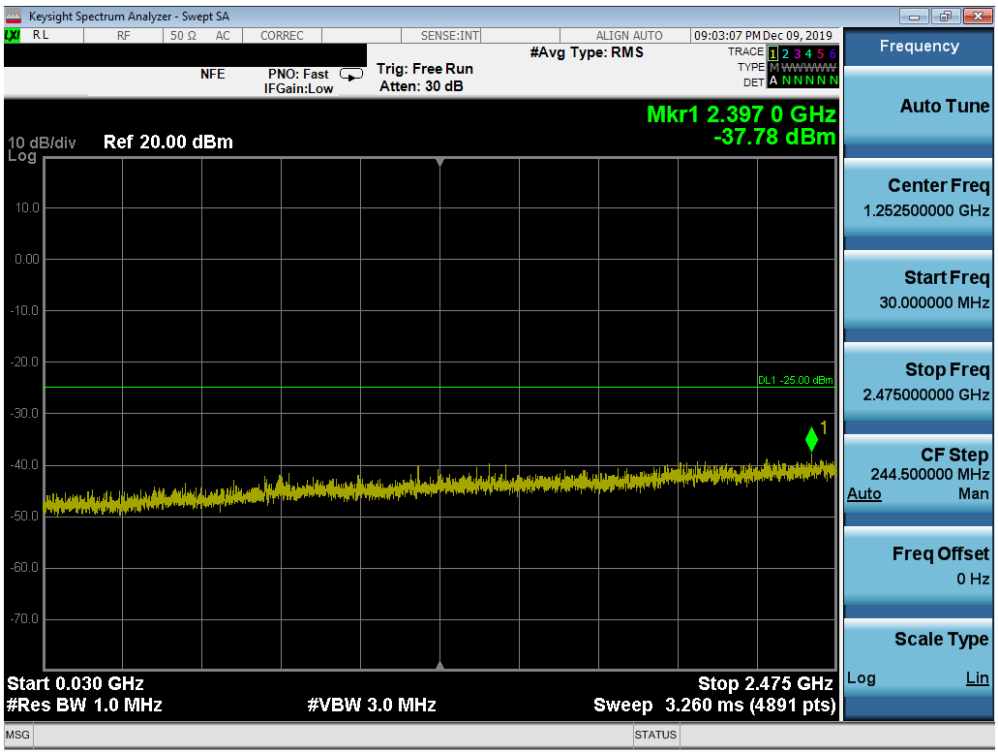
Uplink CA Configuration B41 (PC2)

PCC						SCC						
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
39750	2506.0	20	QPSK	1	99	39948	2525.8	20	QPSK	1	0	27.40
40620	2593.0	20	QPSK	1	99	40818	2612.8	20	QPSK	1	0	26.47
41490	2680.0	20	QPSK	1	0	41292	2660.2	20	QPSK	1	99	27.99

Table 7-8. Conducted Powers (B41 (PC2) - 20MHz + 20MHz Channel Bandwidth - PCC/SCC: 1RB)

PCC						SCC						
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
41490	2680.0	20	QPSK	100	0	41292	2660.2	20	QPSK	100	0	26.70
41490	2680.0	20	16-QAM	100	0	41292	2660.2	20	16-QAM	100	0	25.26
41490	2680.0	20	64-QAM	100	0	41292	2660.2	20	64-QAM	100	0	24.24
41490	2680.0	20	256-QAM	100	0	41292	2660.2	20	256-QAM	100	0	22.04

Table 7-9. Conducted Powers (B41 (PC2) with Various Combinations for 20MHz + 20MHz Channel Bandwidth)



Plot 7-466. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)

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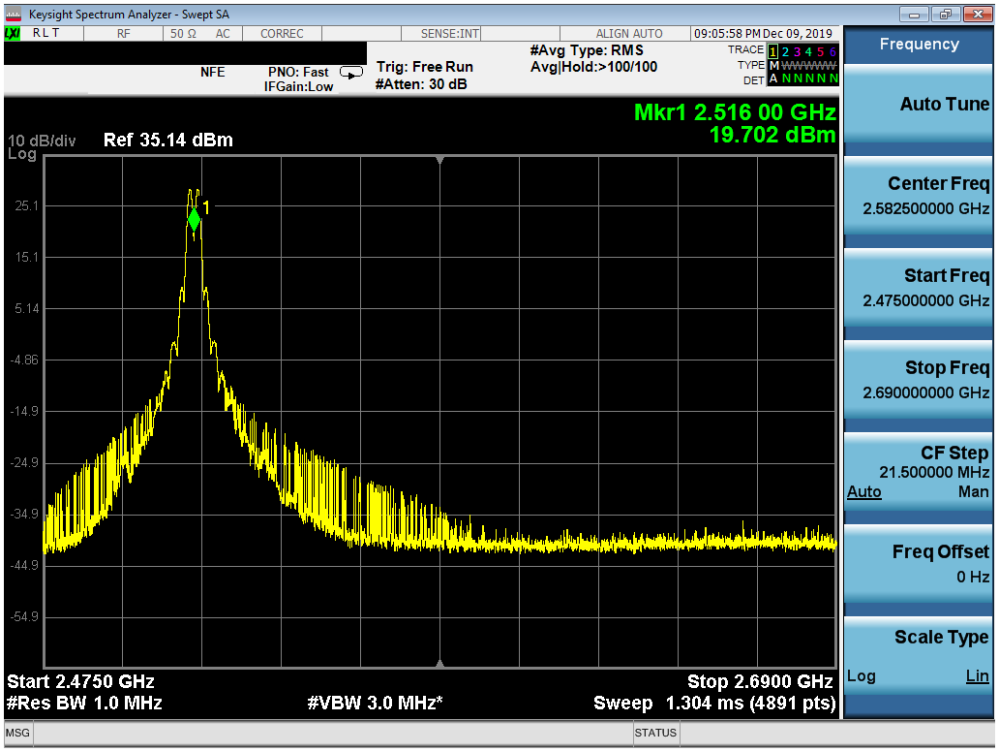
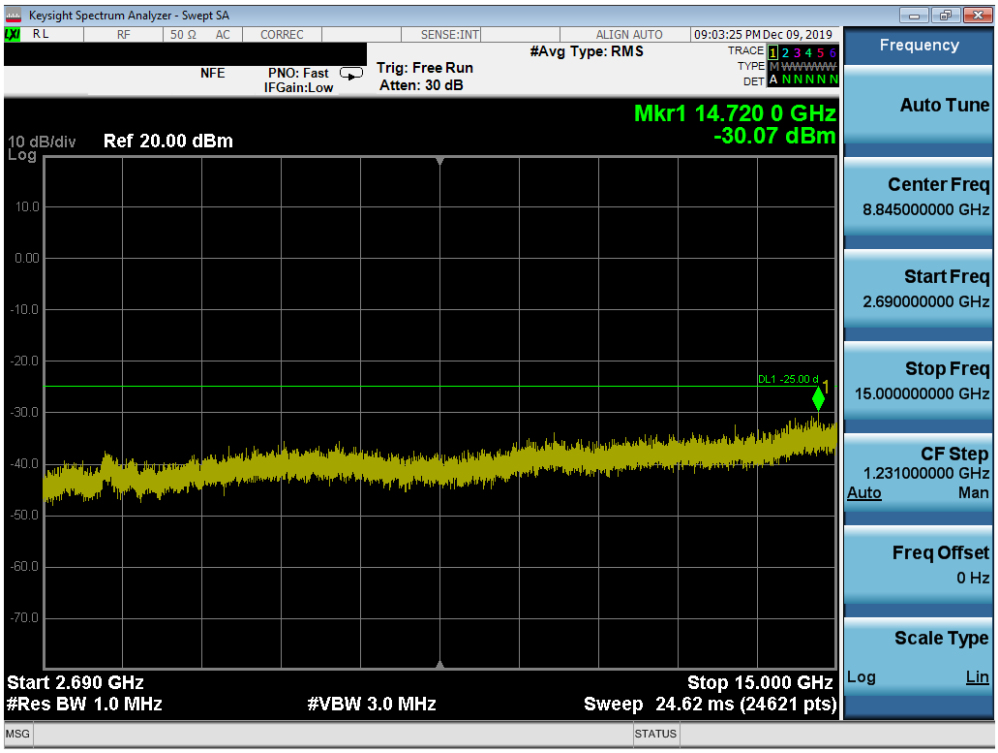


Plot 7-467. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



Plot 7-468. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)

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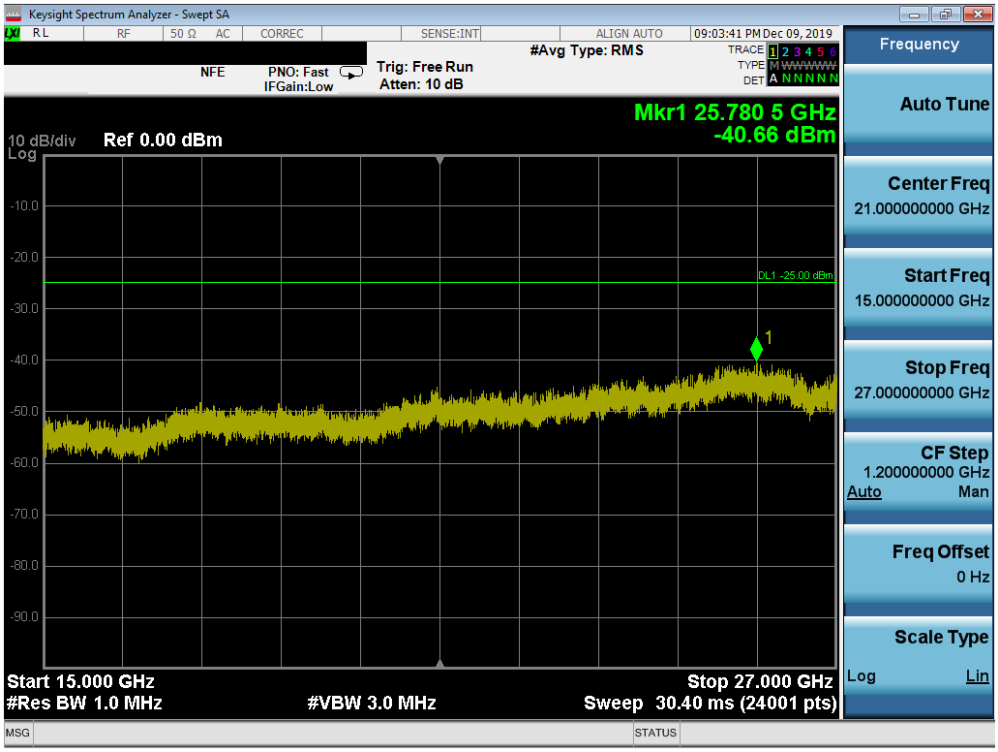
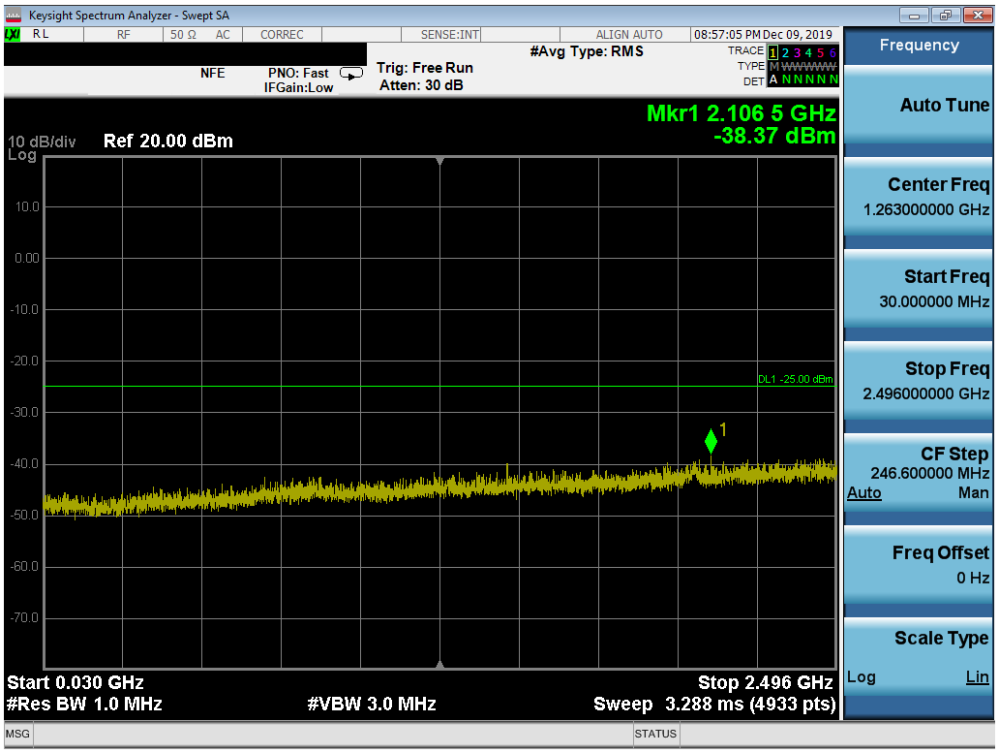


Plot 7-469. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



Plot 7-470. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

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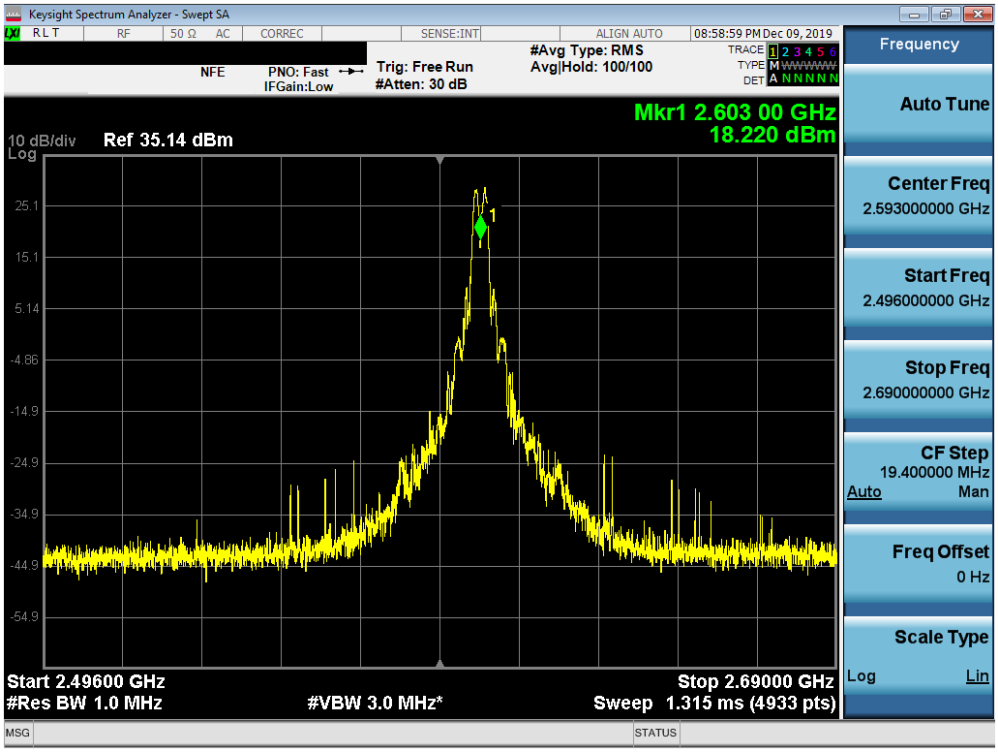
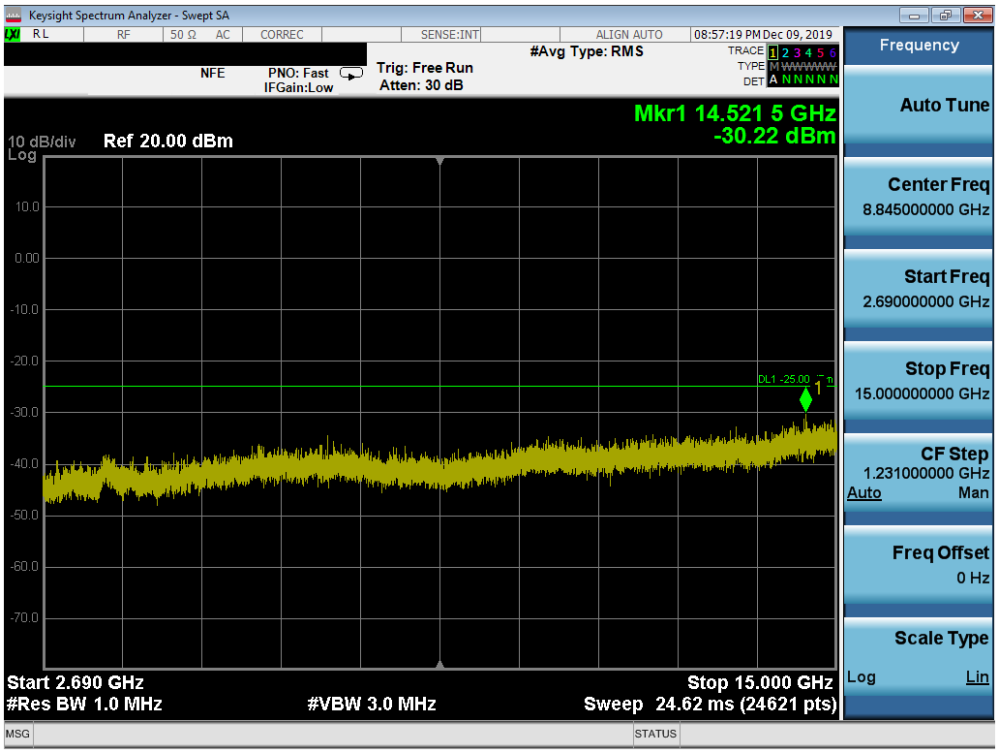


Plot 7-471. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-472. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

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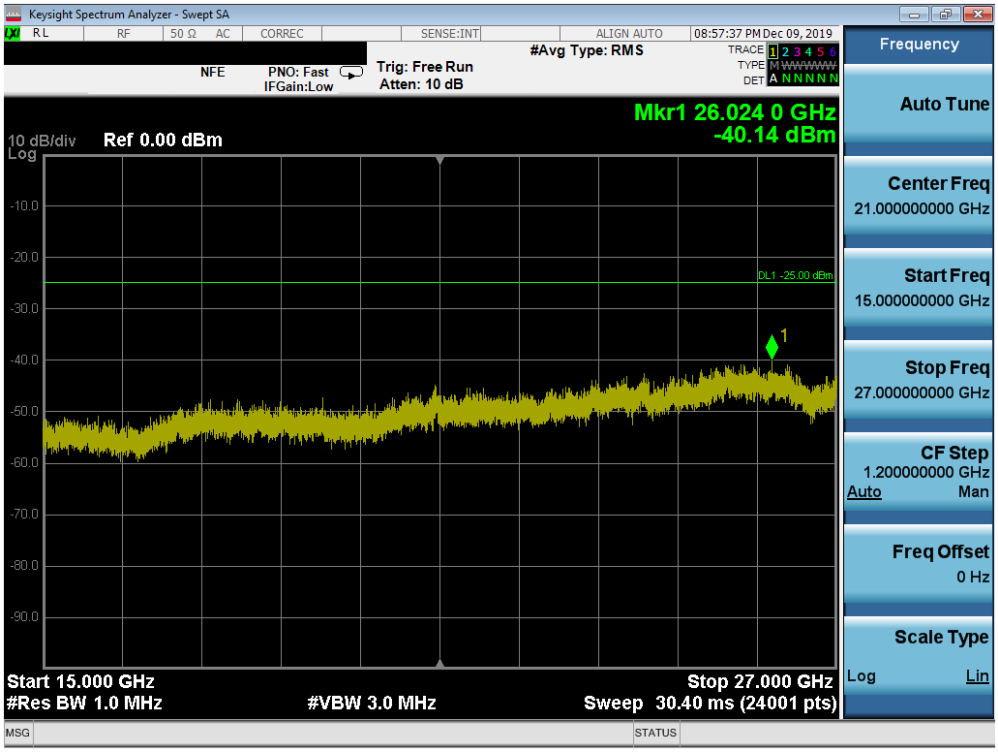
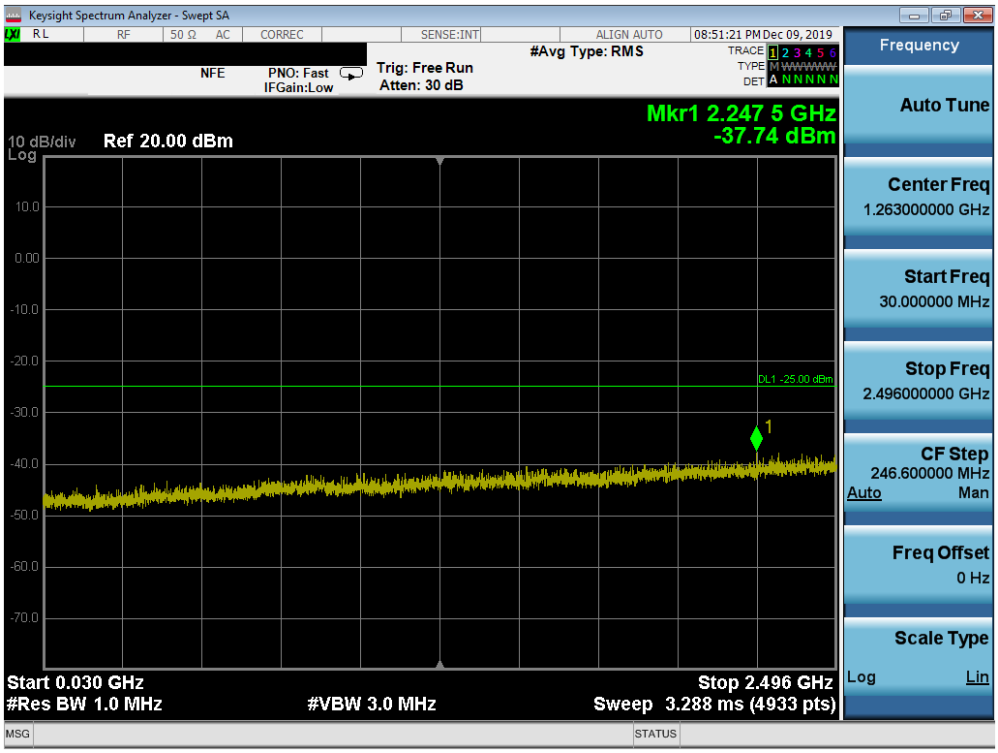


Plot 7-473. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-474. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

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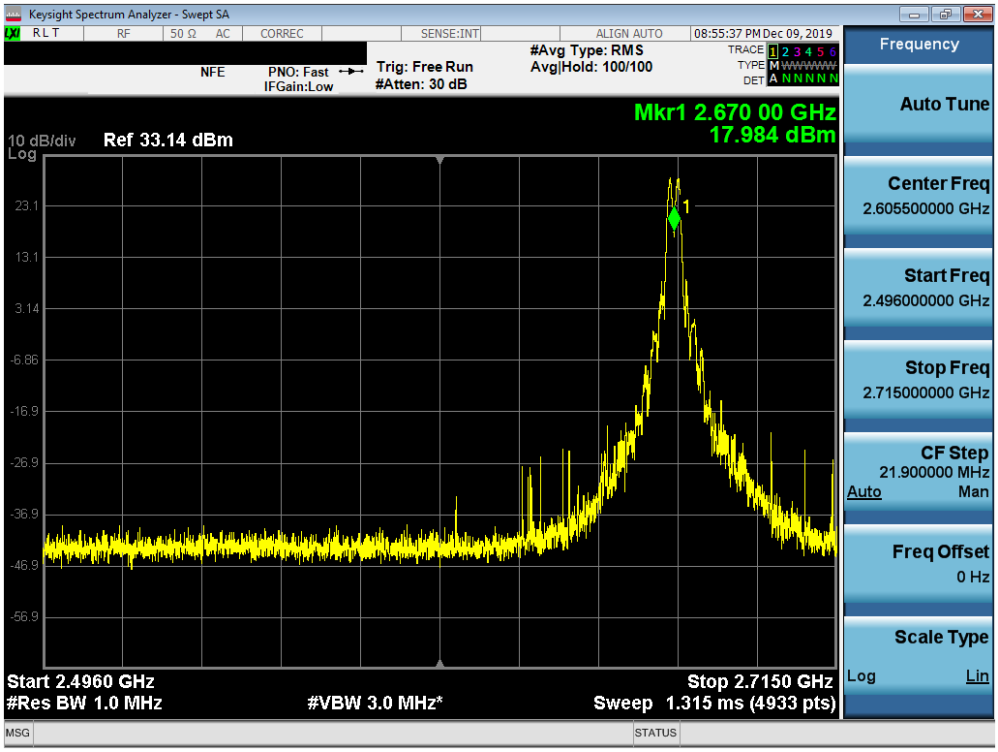
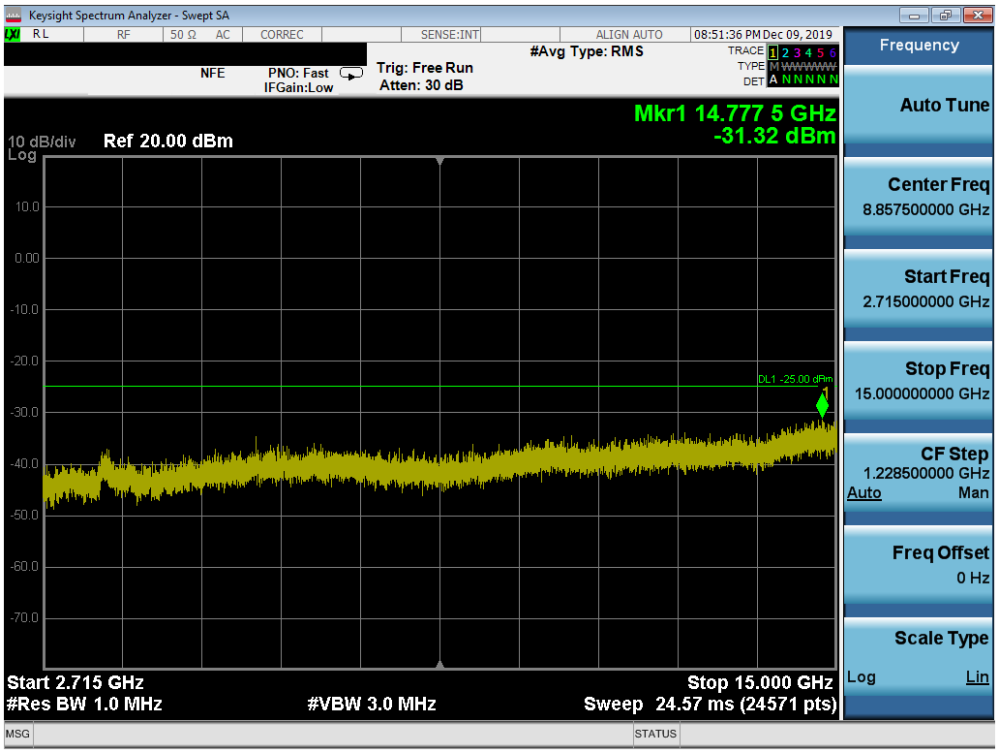


Plot 7-475. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Plot 7-476. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

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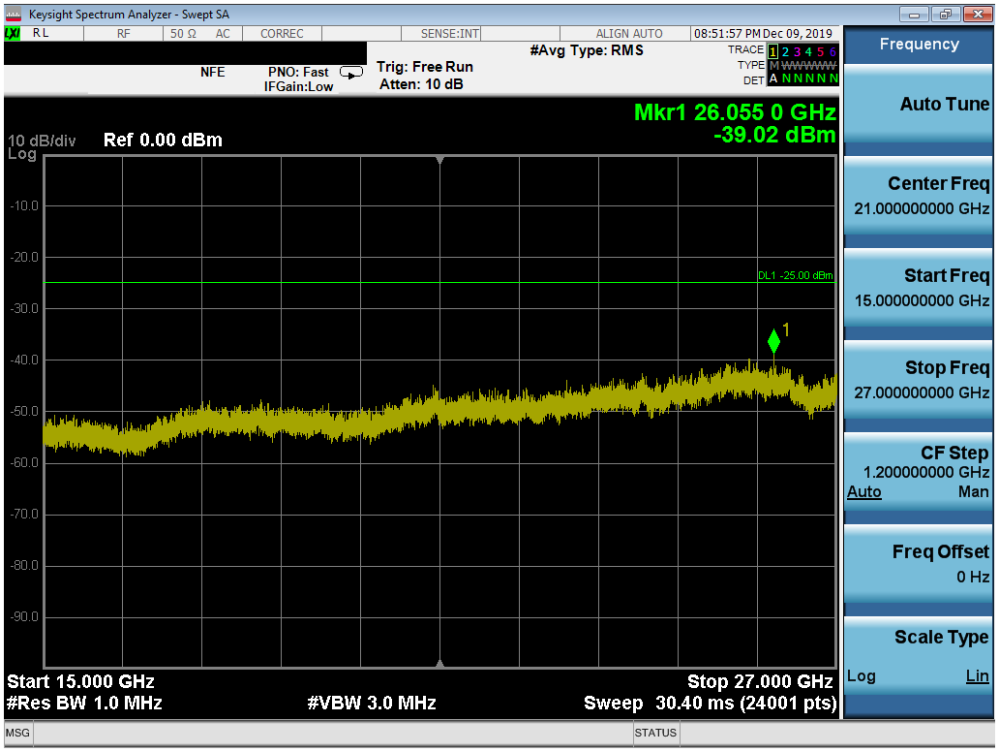
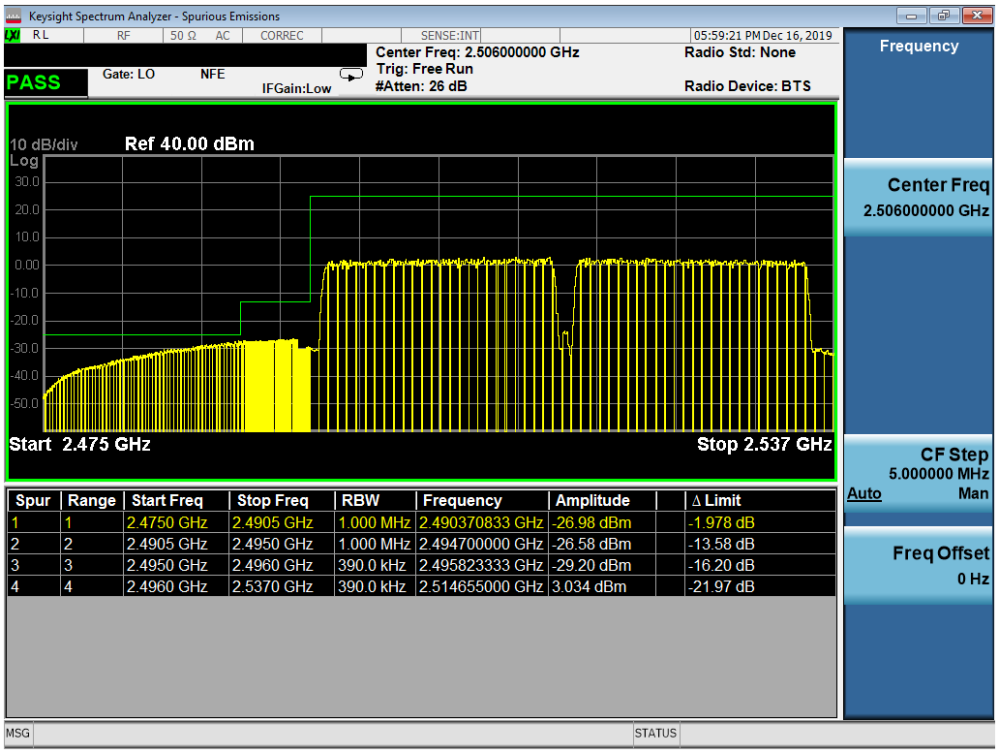


Plot 7-477. Conducted Spurious Plot (Band 41 (PC2) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490370833 GHz	-26.98 dBm		-1.978 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494700000 GHz	-26.58 dBm		-13.58 dB
3	3	2.4950 GHz	2.4960 GHz	390.0 kHz	2.495823333 GHz	-29.20 dBm		-16.20 dB
4	4	2.4960 GHz	2.5370 GHz	390.0 kHz	2.514655000 GHz	3.034 dBm		-21.97 dB

Table 7-478. Lower ACP Plot (Band 41 (PC2) QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

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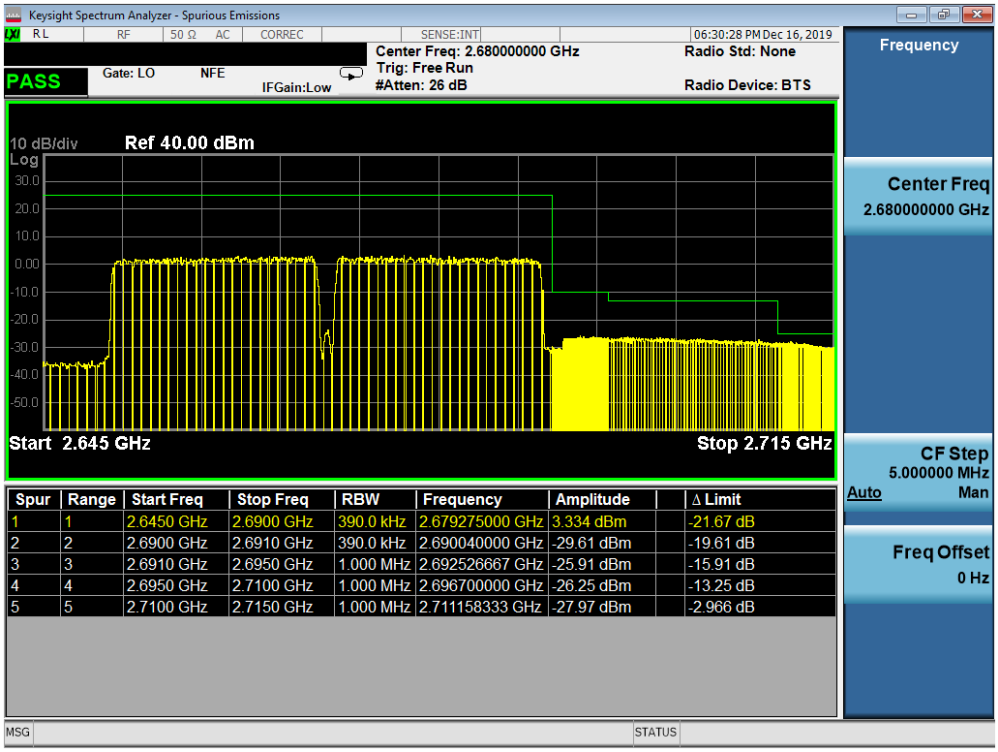

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.6450 GHz	2.6900 GHz	390.0 kHz	2.679275000 GHz	3.334 dBm		-21.67 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690040000 GHz	-29.61 dBm		-19.61 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692526667 GHz	-25.91 dBm		-15.91 dB
4	4	2.6950 GHz	2.7100 GHz	1.000 MHz	2.696700000 GHz	-26.25 dBm		-13.25 dB
5	5	2.7100 GHz	2.7150 GHz	1.000 MHz	2.711158333 GHz	-27.97 dBm		-2.966 dB

Table 7-479. Upper ACP Plot (Band 41 (PC2) QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

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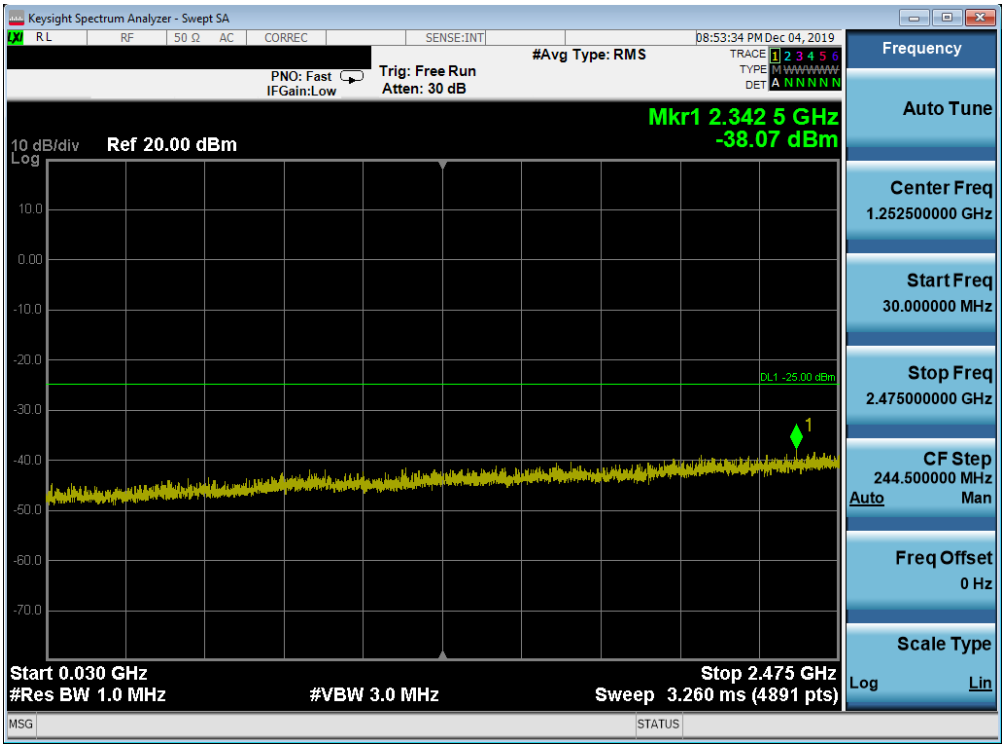
Uplink CA Configuration B41 (PC3)

PCC						SCC						
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
39750	2506.0	20	QPSK	1	99	39948	2525.8	20	QPSK	1	0	24.31
40620	2593.0	20	QPSK	1	99	40818	2612.8	20	QPSK	1	0	24.76
41490	2680.0	20	QPSK	1	0	41292	2660.2	20	QPSK	1	99	25.17

Table 7-10. Conducted Powers (B41 (PC3) – 20MHz + 20MHz Channel Bandwidth - PCC/SCC: 1RB)

PCC						SCC						
Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	Channel	Frequency [MHz]	BW [MHz]	Mod.	RB Size	RB Offset	ULCA Tx.Power (dBm)
41490	2680.0	20	QPSK	100	0	41292	2660.2	20	QPSK	100	0	23.94
41490	2680.0	20	16-QAM	100	0	41292	2660.2	20	16-QAM	100	0	22.94
41490	2680.0	20	64-QAM	100	0	41292	2660.2	20	64-QAM	100	0	22.78
41490	2680.0	20	256-QAM	100	0	41292	2660.2	20	256-QAM	100	0	20.76

Table 7-11. Conducted Powers (B41 (PC3) with Various Combinations for 20MHz + 20MHz Channel Bandwidth)



Plot 7-480. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)

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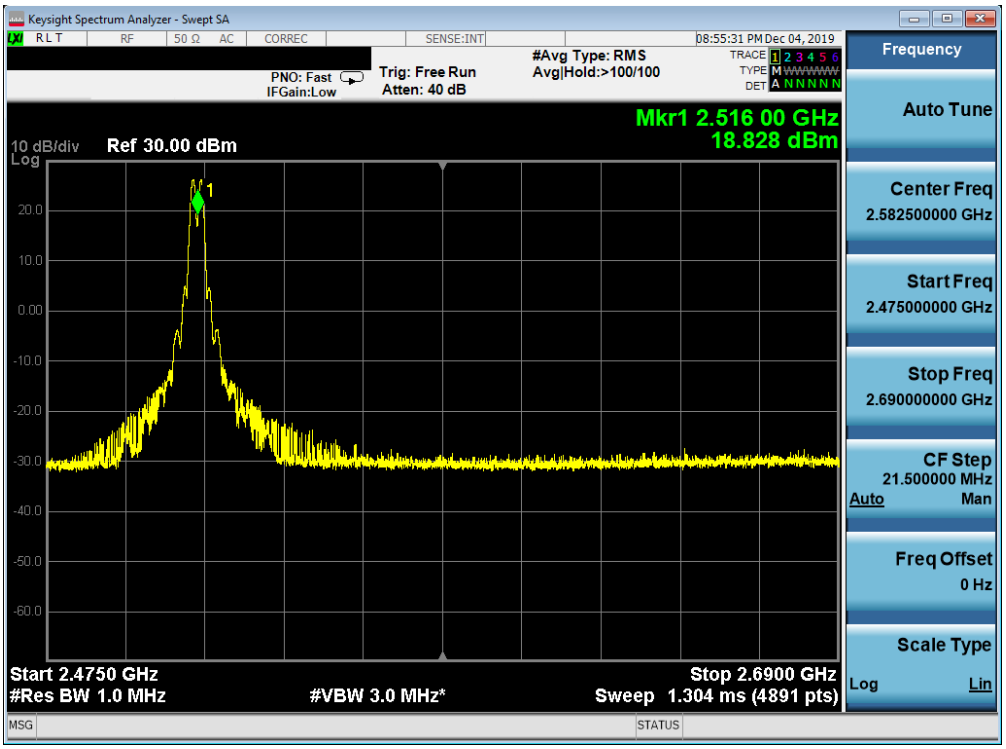
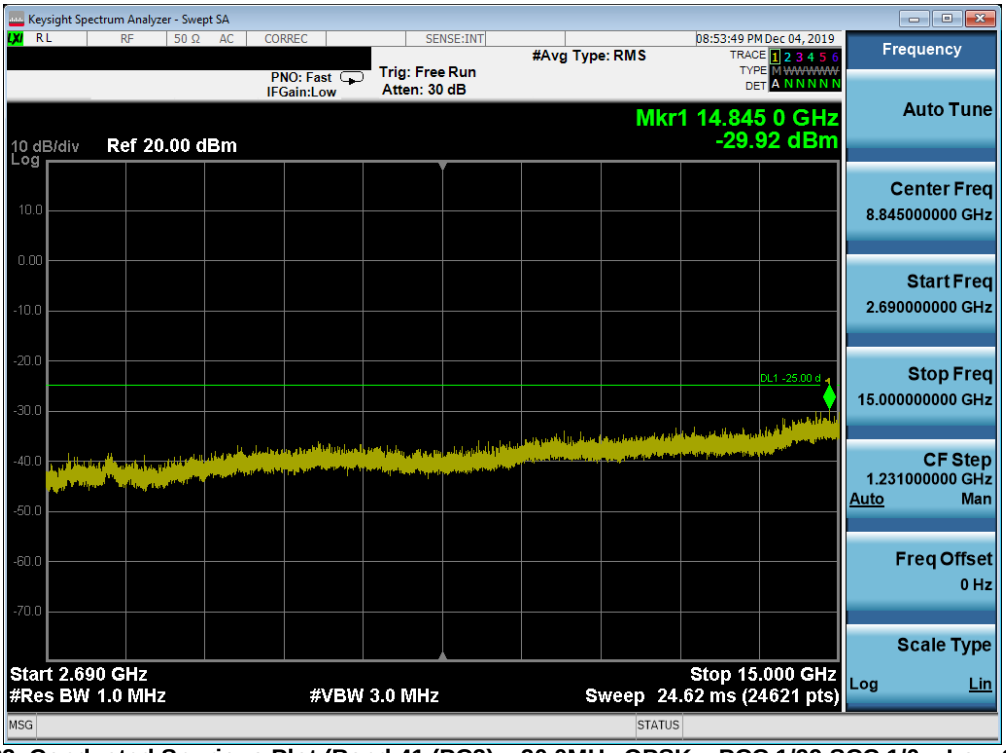


Plot 7-481. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



Plot 7-482. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)

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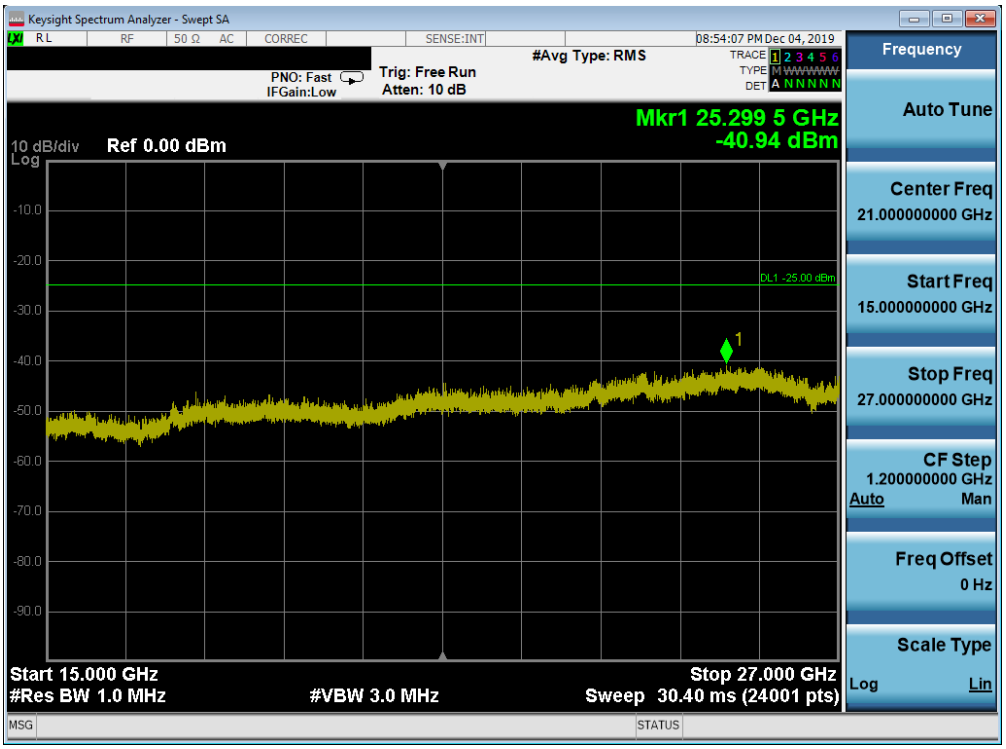
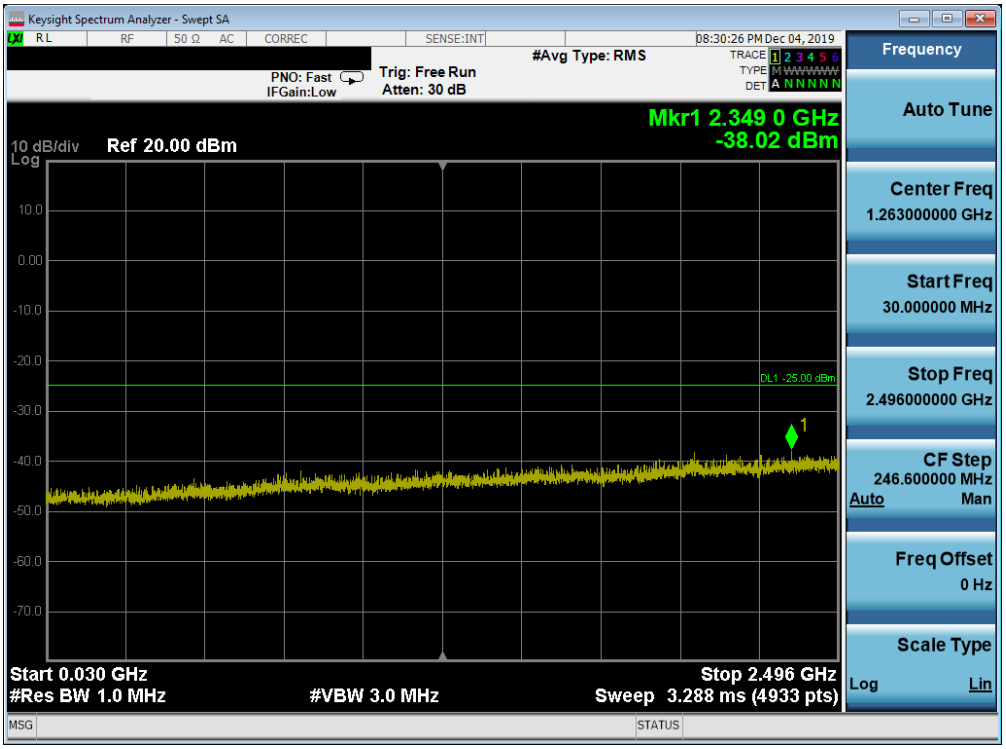


Plot 7-483. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Low Channel)



Plot 7-484. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

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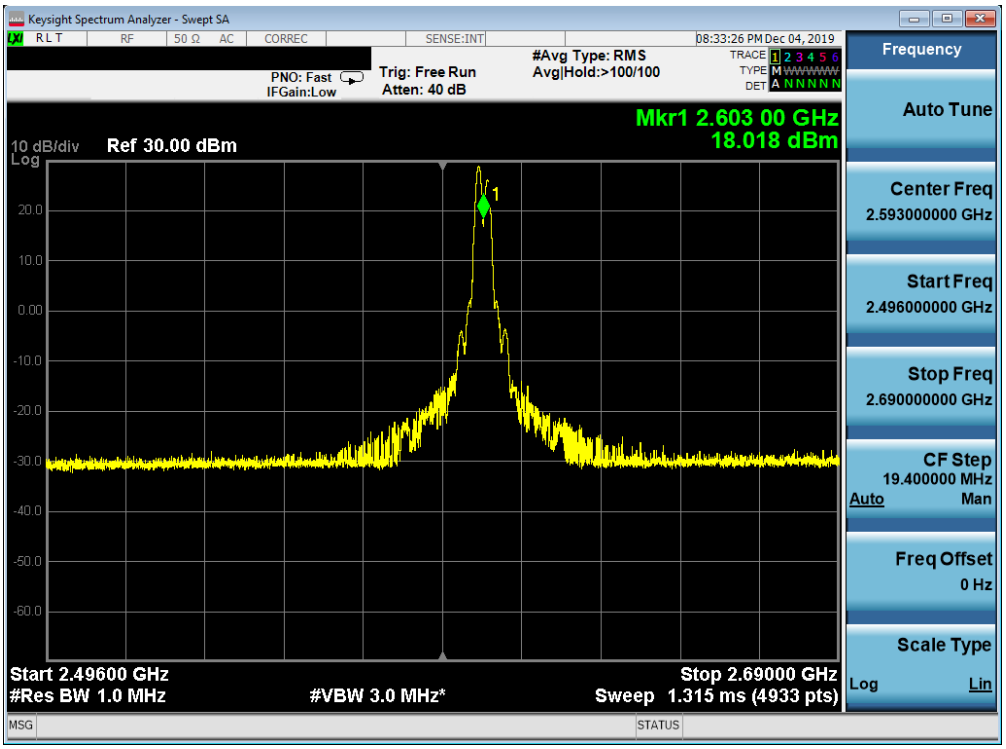
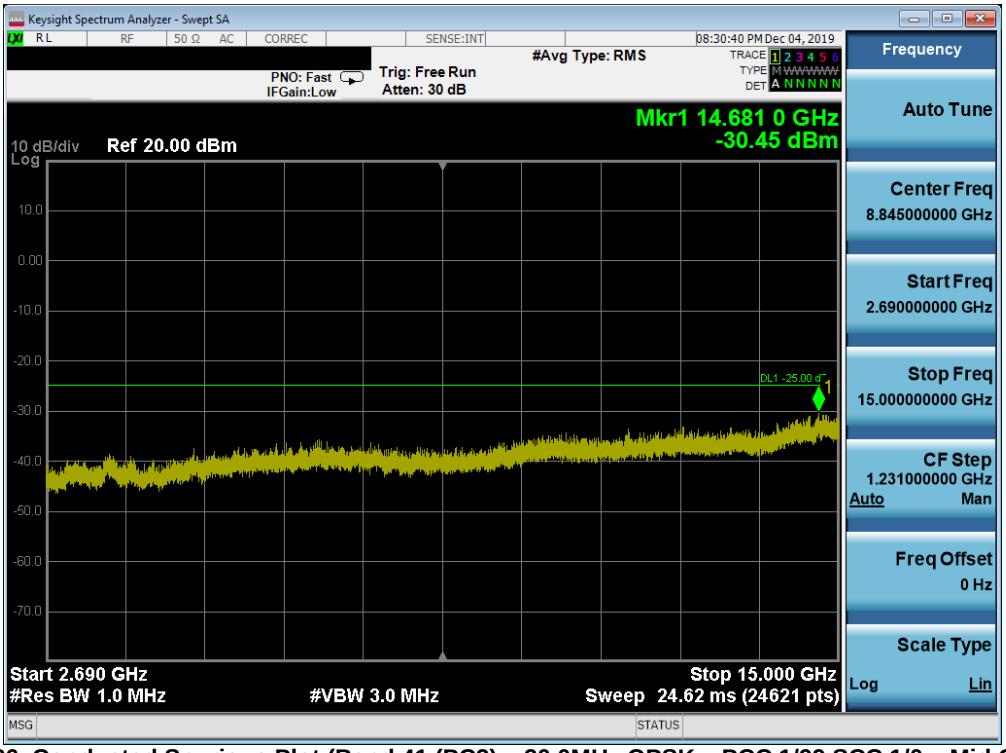


Plot 7-485. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-486. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)

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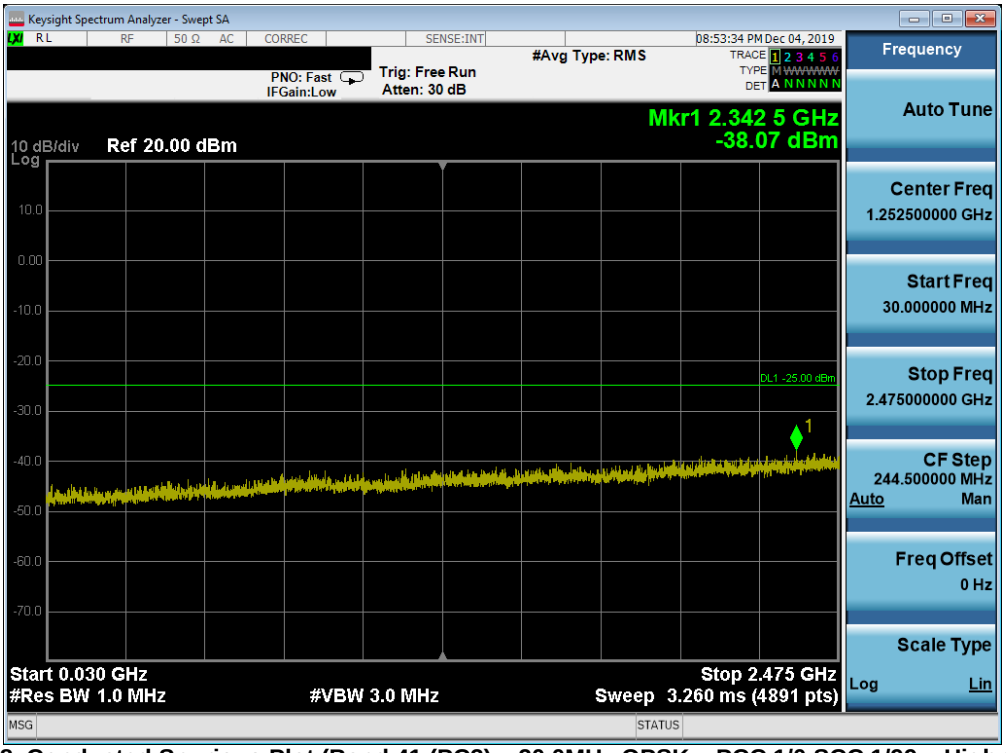
Plot 7-487. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/99 SCC 1/0 – Mid Channel)



Plot 7-488. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

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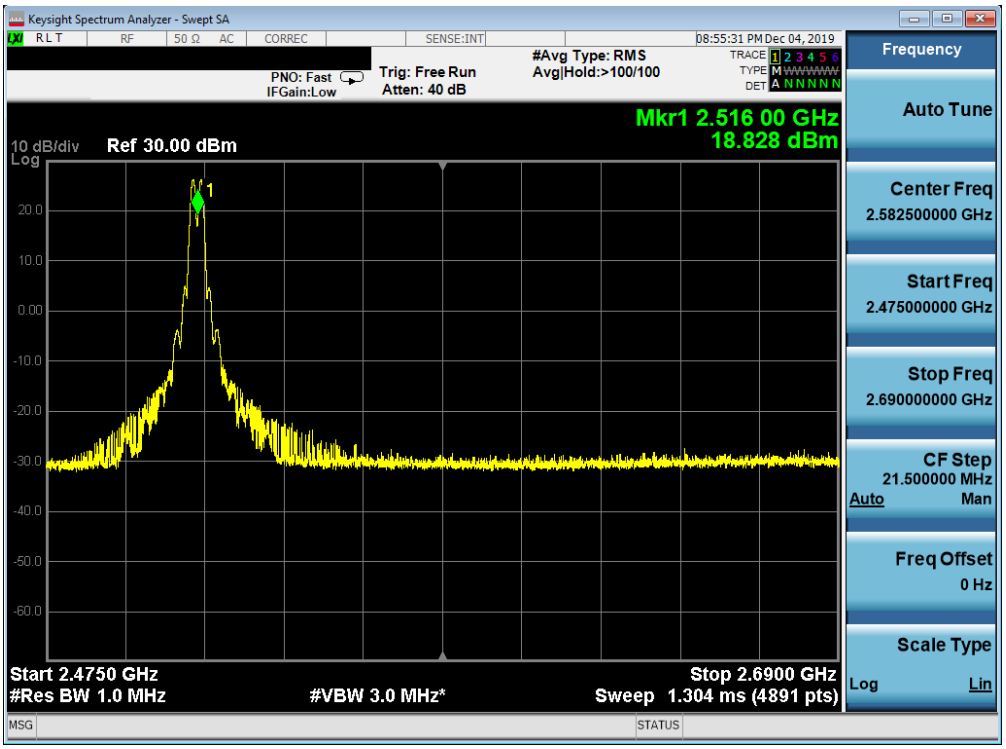
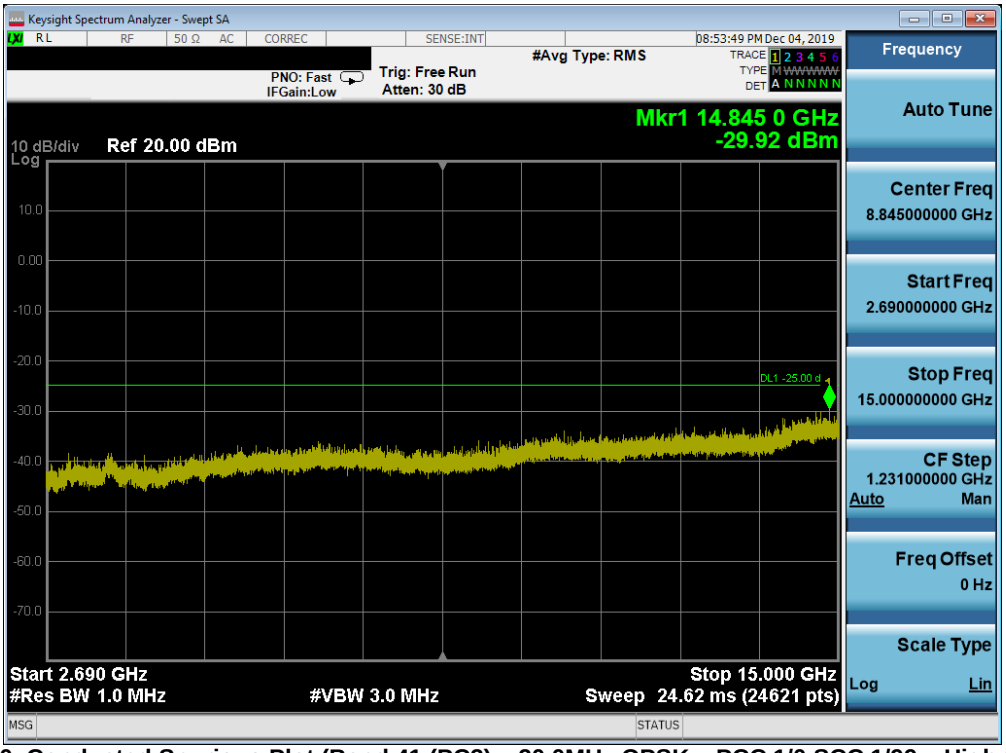


Plot 7-489. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Plot 7-490. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)

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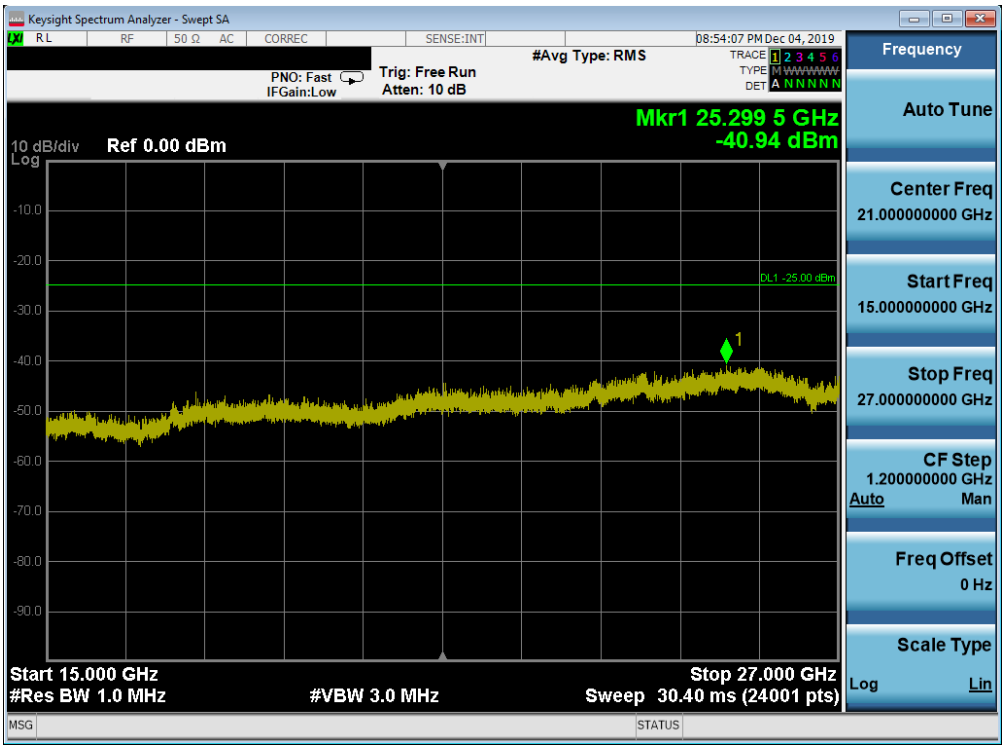
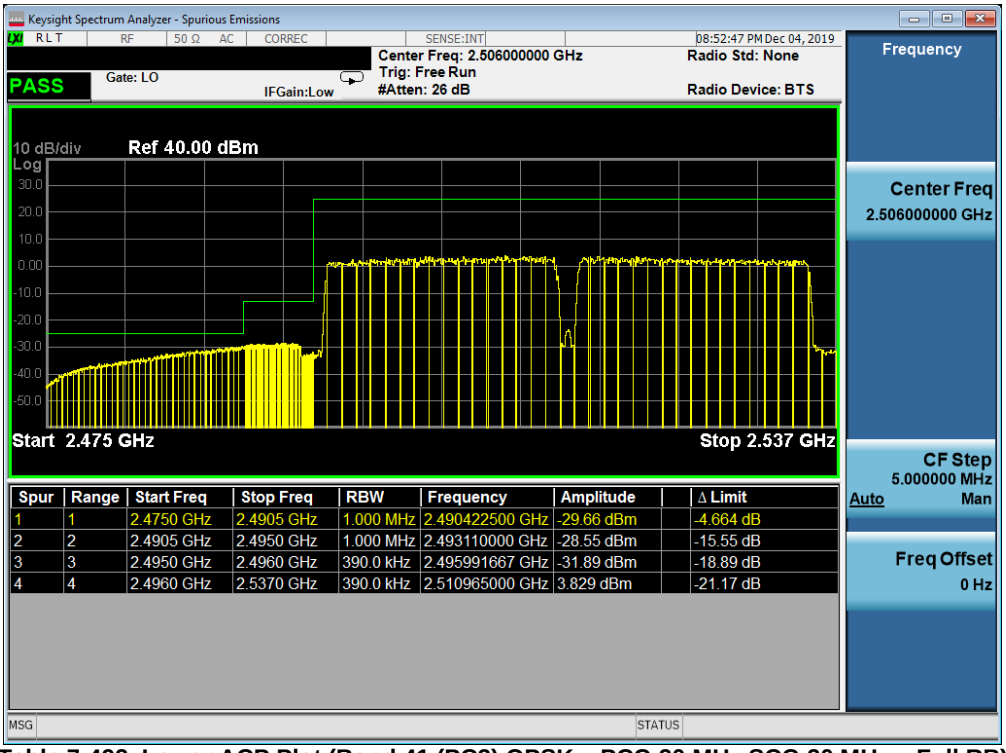


Plot 7-491. Conducted Spurious Plot (Band 41 (PC3) – 20.0MHz QPSK – PCC 1/0 SCC 1/99 – High Channel)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490422500 GHz	-29.66 dBm	-4.664 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.493110000 GHz	-28.55 dBm	-15.55 dB
3	3	2.4950 GHz	2.4960 GHz	390.0 kHz	2.495991667 GHz	-31.89 dBm	-18.89 dB
4	4	2.4960 GHz	2.5370 GHz	390.0 kHz	2.510965000 GHz	3.829 dBm	-21.17 dB

Table 7-492. Lower ACP Plot (Band 41 (PC3) QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

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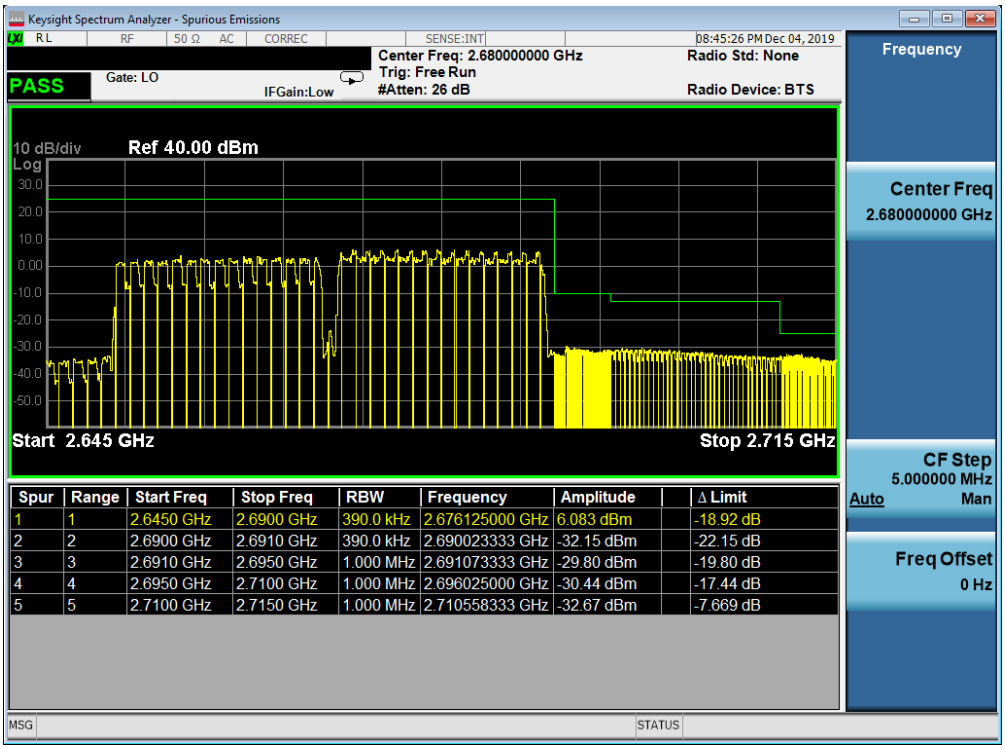

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude		Δ Limit
1	1	2.6450 GHz	2.6900 GHz	390.0 kHz	2.676125000 GHz	6.083 dBm		-18.92 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690023333 GHz	-32.15 dBm		-22.15 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691073333 GHz	-29.80 dBm		-19.80 dB
4	4	2.6950 GHz	2.7100 GHz	1.000 MHz	2.696025000 GHz	-30.44 dBm		-17.44 dB
5	5	2.7100 GHz	2.7150 GHz	1.000 MHz	2.710558333 GHz	-32.67 dBm		-7.669 dB

Table 7-493. Upper ACP Plot (Band 41 (PC3) QPSK – PCC:20 MHz SCC:20 MHz – Full RB)

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7.8 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. 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 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

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Test Setup

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

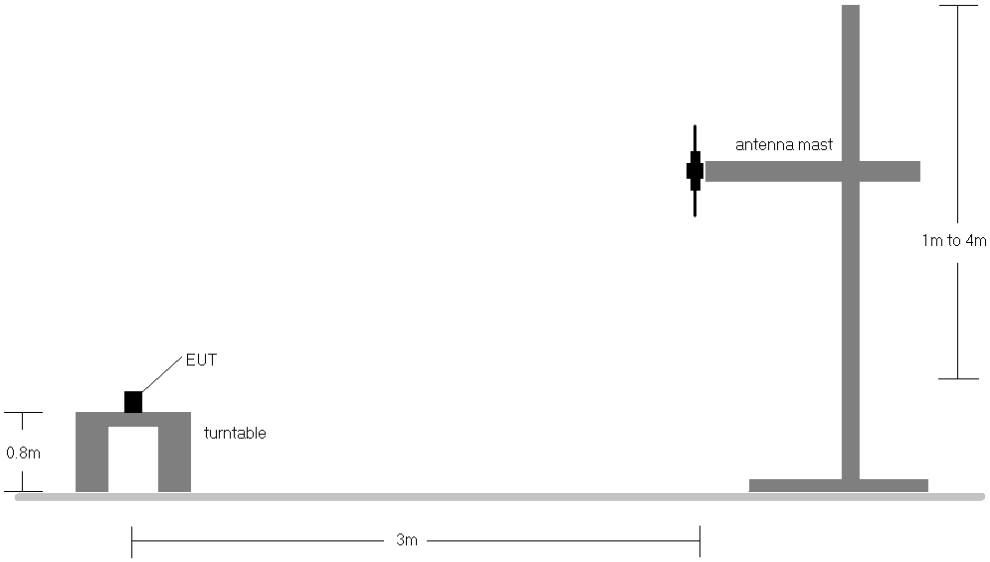

Figure 7-7. Radiated Test Setup <1GHz

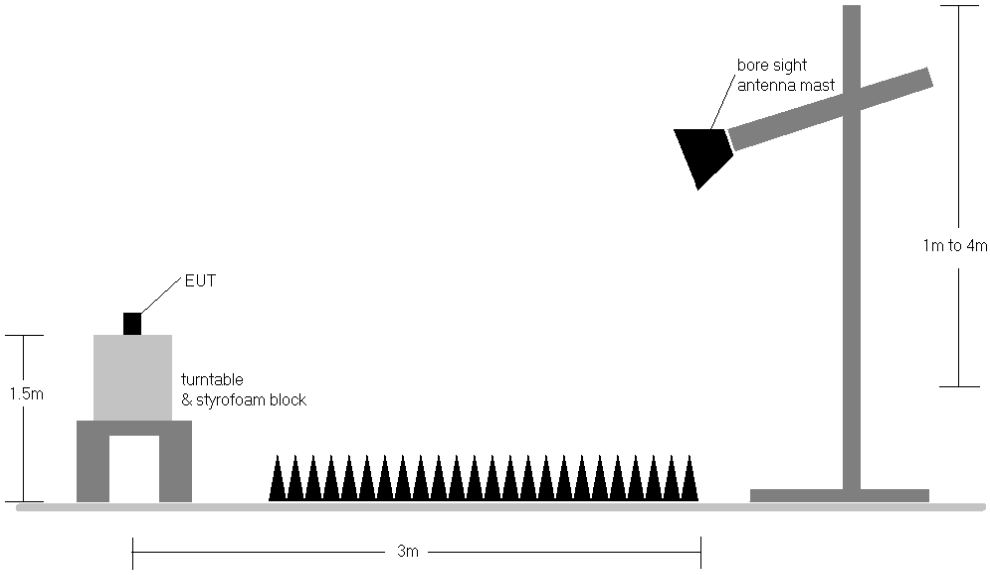

Figure 7-8. Radiated Test Setup >1GHz

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
665.50	5	QPSK	V	192	277	1 / 0	15.44	3.75	17.04	0.051	34.77	-17.73
680.50	5	QPSK	V	181	278	1 / 24	15.25	4.20	**17.30**	0.054	34.77	-17.47
695.50	5	QPSK	V	192	265	1 / 24	14.61	4.50	16.96	0.050	34.77	-17.81
680.50	5	16-QAM	V	181	278	1 / 24	14.19	4.20	**16.24**	0.042	34.77	-18.53
695.50	5	64-QAM	V	192	265	1 / 24	13.43	4.50	**15.78**	0.038	34.77	-18.99
695.50	5	256-QAM	V	192	265	1 / 24	10.54	4.50	**12.89**	0.019	34.77	-21.88
668.00	10	QPSK	V	181	278	1 / 0	15.28	3.80	16.93	0.049	34.77	-17.84
680.50	10	QPSK	V	184	278	1 / 0	15.33	4.20	**17.38**	0.055	34.77	-17.39
693.00	10	QPSK	V	198	278	1 / 0	14.67	4.40	16.92	0.049	34.77	-17.85
680.50	10	16-QAM	V	184	278	1 / 0	14.30	4.20	**16.35**	0.043	34.77	-18.42
693.00	10	64-QAM	V	198	278	1 / 49	13.60	4.40	**15.85**	0.038	34.77	-18.92
693.00	10	256-QAM	V	198	278	25 / 12	10.45	4.40	**12.70**	**0.019**	34.77	-22.07
670.50	15	QPSK	V	186	274	1 / 74	15.45	3.90	17.20	0.052	34.77	-17.57
680.50	15	QPSK	V	181	270	1 / 0	15.39	4.20	**17.44**	**0.055**	34.77	-17.33
690.50	15	QPSK	V	189	272	1 / 0	15.04	4.40	17.29	0.054	34.77	-17.48
680.50	15	16-QAM	V	181	270	1 / 0	14.31	4.20	**16.36**	0.043	34.77	-18.41
690.50	15	64-QAM	V	189	272	1 / 0	13.57	4.40	**15.82**	0.038	34.77	-18.95
690.50	15	256-QAM	V	189	272	36 / 18	10.91	4.40	**13.16**	**0.021**	34.77	-21.61
673.00	20	QPSK	V	188	281	1 / 99	15.30	4.00	17.15	0.052	34.77	-17.62
680.50	20	QPSK	V	183	274	1 / 0	15.26	4.20	**17.31**	0.054	34.77	-17.46
688.00	20	QPSK	V	191	272	1 / 0	14.79	4.40	17.04	0.051	34.77	-17.73
680.50	20	16-QAM	V	183	274	1 / 0	14.31	4.20	**16.36**	0.043	34.77	-18.41
688.00	20	64-QAM	V	191	272	1 / 99	13.20	4.40	**15.45**	0.035	34.77	-19.32
688.00	20	256-QAM	V	191	272	50 / 25	10.88	4.40	**13.13**	**0.021**	34.77	-21.64
680.50	15	QPSK	H	322	283	1 / 0	14.52	3.20	15.57	0.036	34.77	-19.20
680.50	15 (WCP)	QPSK	V	178	310	1 / 0	9.97	4.20	12.02	0.016	34.77	-22.75

Table 7-12. ERP Data (Band 71)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	183	292	3 / 2	17.01	4.50	19.36	0.086	34.77	-15.41
707.50	1.4	QPSK	V	179	246	3 / 2	17.17	4.60	19.62	0.092	34.77	-15.15
715.30	1.4	QPSK	V	176	249	3 / 2	17.33	4.63	**19.81**	0.096	34.77	-14.96
715.30	1.4	16-QAM	V	176	249	1 / 0	16.07	4.63	**18.55**	0.072	34.77	-16.22
707.50	1.4	64-QAM	V	179	246	1 / 0	15.30	4.60	**17.75**	0.060	34.77	-17.02
707.50	1.4	256-QAM	V	179	246	3 / 2	13.39	4.60	**15.84**	**0.038**	34.77	-18.93
700.50	3	QPSK	V	185	289	1 / 0	17.03	4.55	19.43	0.088	34.77	-15.34
707.50	3	QPSK	V	189	237	1 / 14	17.12	4.60	19.57	0.091	34.77	-15.20
714.50	3	QPSK	V	170	251	1 / 0	17.35	4.60	**19.80**	0.095	34.77	-14.97
714.50	3	16-QAM	V	170	251	1 / 0	16.31	4.60	**18.76**	0.075	34.77	-16.01
714.50	3	64-QAM	V	170	251	1 / 14	15.38	4.60	**17.83**	0.061	34.77	-16.94
707.50	3	256-QAM	V	189	237	1 / 14	13.40	4.60	**15.85**	**0.038**	34.77	-18.92
701.50	5	QPSK	V	186	286	1 / 24	17.07	4.60	19.52	0.090	34.77	-15.25
707.50	5	QPSK	V	189	246	1 / 24	17.13	4.60	19.58	0.091	34.77	-15.19
713.50	5	QPSK	V	174	246	1 / 24	17.38	4.60	**19.83**	**0.096**	34.77	-14.94
713.50	5	16-QAM	V	174	246	1 / 0	16.32	4.60	**18.77**	0.075	34.77	-16.00
707.50	5	64-QAM	V	189	246	1 / 0	15.37	4.60	**17.82**	0.061	34.77	-16.95
713.50	5	256-QAM	V	174	246	1 / 24	13.45	4.60	**15.90**	**0.039**	34.77	-18.87
704.00	10	QPSK	V	185	290	1 / 49	17.01	4.50	19.36	0.086	34.77	-15.41
707.50	10	QPSK	V	183	243	1 / 0	17.14	4.60	19.59	0.091	34.77	-15.18
711.00	10	QPSK	V	174	250	1 / 0	17.38	4.60	**19.83**	**0.096**	34.77	-14.94
711.00	10	16-QAM	V	174	250	1 / 0	16.34	4.60	**18.79**	0.076	34.77	-15.98
711.00	10	64-QAM	V	174	250	1 / 0	15.35	4.60	**17.80**	0.060	34.77	-16.97
711.00	10	256-QAM	V	174	250	25 / 12	13.57	4.60	**16.02**	**0.040**	34.77	-18.75
713.50	5	QPSK	H	283	175	1 / 24	14.48	3.40	15.73	0.037	34.77	-19.04
713.50	5 (WCP)	QPSK	V	160	309	1 / 24	10.04	3.40	11.29	0.013	34.77	-23.48

Table 7-13. ERP Data (Band 12)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	148	289	1 / 0	15.51	5.70	19.06	0.081	34.77	-15.71
782.00	5	QPSK	V	138	287	1 / 0	15.57	5.80	**19.22**	0.084	34.77	-15.55
784.50	5	QPSK	V	146	286	1 / 24	15.37	5.80	19.02	0.080	34.77	-15.75
782.00	5	16-QAM	V	138	287	1 / 0	14.46	5.80	**18.11**	0.065	34.77	-16.66
782.00	5	64-QAM	V	138	287	1 / 24	13.81	5.80	**17.46**	0.056	34.77	-17.31
782.00	5	256-QAM	V	138	287	12 / 6	11.99	5.80	**15.64**	**0.037**	34.77	-19.13
782.00	10	QPSK	V	145	286	1 / 0	15.58	5.80	**19.23**	**0.084**	34.77	-15.54
782.00	10	16-QAM	V	145	286	1 / 0	14.74	5.80	**18.39**	0.069	34.77	-16.38
782.00	10	64-QAM	V	145	286	1 / 0	13.86	5.80	**17.51**	0.056	34.77	-17.26
782.00	10	256-QAM	V	145	286	1 / 0	11.90	5.80	**15.55**	**0.036**	34.77	-19.22
782.00	10	QPSK	H	103	276	1 / 0	15.26	5.80	18.91	0.078	34.77	-15.86
782.00	10 (WCP)	QPSK	V	153	283	1 / 0	10.34	5.80	13.99	0.025	34.77	-20.78

Table 7-14. ERP Data (Band 13)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]
824.70	1.4	QPSK	V	147	273	3 / 2	15.57	6.30	**19.72**	0.094	38.45
836.50	1.4	QPSK	V	140	283	3 / 2	15.21	6.40	19.46	0.088	38.45
848.30	1.4	QPSK	V	146	279	1 / 5	15.10	6.50	19.45	0.088	38.45
848.30	1.4	16-QAM	V	146	279	1 / 0	14.13	6.50	**18.48**	0.070	38.45
836.50	1.4	64-QAM	V	140	283	1 / 5	12.88	6.40	**17.13**	0.052	38.45
848.30	1.4	256-QAM	V	146	279	3 / 2	9.91	6.50	**14.26**	**0.027**	38.45
825.50	3	QPSK	V	137	281	1 / 14	15.52	6.30	**19.67**	0.093	38.45
836.50	3	QPSK	V	142	279	1 / 0	15.32	6.40	19.57	0.091	38.45
847.50	3	QPSK	V	144	277	1 / 0	15.24	6.50	19.59	0.091	38.45
847.50	3	16-QAM	V	144	277	1 / 14	14.20	6.50	**18.55**	0.072	38.45
836.50	3	64-QAM	V	142	279	1 / 0	12.92	6.40	**17.17**	0.052	38.45
847.50	3	256-QAM	V	144	277	8 / 4	9.93	6.50	**14.28**	**0.027**	38.45
826.50	5	QPSK	V	145	279	1 / 24	15.53	6.30	**19.68**	0.093	38.45
836.50	5	QPSK	V	147	278	1 / 24	15.30	6.40	19.55	0.090	38.45
846.50	5	QPSK	V	146	273	1 / 0	15.21	6.50	19.56	0.090	38.45
846.50	5	16-QAM	V	146	273	1 / 24	14.17	6.50	**18.52**	0.071	38.45
846.50	5	64-QAM	V	146	273	1 / 24	12.78	6.50	**17.13**	0.052	38.45
846.50	5	256-QAM	V	146	273	12 / 6	9.90	6.50	**14.25**	**0.027**	38.45
829.00	10	QPSK	V	143	281	1 / 0	15.64	6.30	**19.79**	**0.095**	38.45
836.50	10	QPSK	V	152	278	1 / 0	15.30	6.40	19.55	0.090	38.45
844.00	10	QPSK	V	144	275	1 / 0	15.19	6.40	19.44	0.088	38.45
829.00	10	16-QAM	V	143	281	1 / 0	14.51	6.30	**18.66**	0.073	38.45
836.50	10	64-QAM	V	152	278	1 / 49	12.84	6.40	**17.09**	0.051	38.45
829.00	10	256-QAM	V	143	281	1 / 49	9.98	6.30	**14.13**	**0.026**	38.45
829.00	10	QPSK	H	224	297	1 / 0	12.53	6.70	17.08	0.051	38.45
829.00	10 (WCP)	QPSK	V	139	298	1 / 0	10.32	6.35	14.52	0.028	38.45

Table 7-15. ERP Data (Band 26/5)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]
831.50	15	QPSK	V	136	235	1 / 74	15.39	6.35	**19.59**	0.091	38.45
836.50	15	QPSK	V	139	231	1 / 74	15.32	6.40	19.57	0.091	38.45
841.50	15	QPSK	V	149	230	1 / 0	15.22	6.40	19.47	0.089	38.45
841.50	15	16-QAM	V	149	230	1 / 0	14.20	6.40	**18.45**	0.070	38.45
836.50	15	64-QAM	V	139	231	1 / 74	13.11	6.40	**17.36**	0.054	38.45
841.50	15	256-QAM	V	149	230	1 / 74	9.96	6.40	**14.21**	**0.026**	38.45

Table 7-16. ERP Data (Band 26)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	V	136	6	3 / 2	12.50	9.35	21.85	0.153	30.00	-8.15
1745.00	1.4	QPSK	V	100	325	3 / 2	13.14	9.11	22.25	0.168	30.00	-7.75
1779.30	1.4	QPSK	V	135	224	3 / 2	13.56	9.17	**22.73**	0.188	30.00	-7.27
1779.30	1.4	16-QAM	V	135	224	1 / 0	12.77	9.17	**21.94**	0.156	30.00	-8.06
1745.00	1.4	64-QAM	V	100	325	1 / 5	12.64	9.11	**21.75**	0.150	30.00	-8.25
1745.00	1.4	256-QAM	V	100	325	3 / 2	9.74	9.11	**18.85**	**0.077**	30.00	-11.15
1711.50	3	QPSK	V	138	4	1 / 14	12.63	9.34	21.97	0.157	30.00	-8.03
1745.00	3	QPSK	V	108	334	1 / 0	13.20	9.11	22.31	0.170	30.00	-7.69
1778.50	3	QPSK	V	125	210	1 / 0	13.67	9.17	**22.84**	0.192	30.00	-7.16
1711.50	3	16-QAM	V	138	4	1 / 14	11.79	9.34	21.13	0.130	30.00	-8.87
1745.00	3	16-QAM	V	108	334	1 / 0	12.61	9.11	21.72	0.149	30.00	-8.28
1778.50	3	16-QAM	V	125	210	1 / 0	12.93	9.17	**22.10**	0.162	30.00	-7.90
1745.00	3	64-QAM	V	108	334	1 / 14	12.69	9.11	**21.80**	0.151	30.00	-8.20
1745.00	3	256-QAM	V	108	334	15 / 0	9.53	9.11	**18.64**	**0.073**	30.00	-11.36
1712.50	5	QPSK	V	149	1	1 / 0	12.51	9.34	21.85	0.153	30.00	-8.15
1745.00	5	QPSK	V	102	329	1 / 0	13.12	9.11	22.23	0.167	30.00	-7.77
1777.50	5	QPSK	V	135	213	1 / 0	13.57	9.16	**22.73**	0.188	30.00	-7.27
1777.50	5	16-QAM	V	135	213	1 / 0	12.79	9.16	**21.95**	0.157	30.00	-8.05
1745.00	5	64-QAM	V	102	329	1 / 0	12.60	9.11	**21.71**	0.148	30.00	-8.29
1745.00	5	256-QAM	V	102	329	1 / 0	9.57	9.11	**18.68**	**0.074**	30.00	-11.32
1715.00	10	QPSK	V	138	359	1 / 0	12.46	9.32	21.78	0.151	30.00	-8.22
1745.00	10	QPSK	V	100	324	1 / 49	12.97	9.11	22.08	0.161	30.00	-7.92
1775.00	10	QPSK	V	125	215	1 / 0	13.49	9.16	**22.65**	0.184	30.00	-7.35
1775.00	10	16-QAM	V	125	215	1 / 0	12.64	9.16	**21.80**	0.151	30.00	-8.20
1745.00	10	64-QAM	V	100	324	1 / 0	12.38	9.11	**21.49**	0.141	30.00	-8.51
1745.00	10	256-QAM	V	100	324	1 / 49	9.43	9.11	**18.54**	**0.071**	30.00	-11.46
1717.50	15	QPSK	V	148	359	1 / 0	12.89	9.30	22.19	0.166	30.00	-7.81
1745.00	15	QPSK	V	100	336	1 / 0	13.19	9.11	22.30	0.170	30.00	-7.70
1772.50	15	QPSK	V	125	219	1 / 0	13.84	9.15	**22.99**	0.199	30.00	-7.01
1772.50	15	16-QAM	V	125	219	1 / 0	13.08	9.15	**22.23**	0.167	30.00	-7.77
1745.00	15	64-QAM	V	100	336	1 / 74	12.73	9.11	**21.84**	0.153	30.00	-8.16
1745.00	15	256-QAM	V	100	336	36 / 18	9.72	9.11	**18.83**	**0.076**	30.00	-11.17
1720.00	20	QPSK	V	142	4	1 / 0	12.60	9.28	21.88	0.154	30.00	-8.12
1745.00	20	QPSK	V	103	329	1 / 99	13.13	9.11	22.24	0.167	30.00	-7.76
1770.00	20	QPSK	V	132	217	1 / 99	13.86	9.14	**23.00**	**0.200**	30.00	-7.00
1770.00	20	16-QAM	V	132	217	1 / 99	13.15	9.14	**22.29**	0.169	30.00	-7.71
1745.00	20	64-QAM	V	103	329	1 / 99	12.56	9.11	**21.67**	0.147	30.00	-8.33
1745.00	20	256-QAM	V	103	329	1 / 99	9.47	9.11	**18.58**	**0.072**	30.00	-11.42
1770.00	20	QPSK	H	100	-5	1 / 99	13.57	9.14	22.71	0.187	30.00	-7.29
1770.00	20 (WCP)	QPSK	V	103	40	1 / 99	9.78	9.14	18.92	0.078	30.00	-11.08

Table 7-17. EIRP Data (Band 66/4)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	114	184	3 / 2	14.08	9.48	23.56	0.227	33.01	-9.45
1882.50	1.4	QPSK	H	158	352	3 / 2	14.13	9.94	24.07	0.255	33.01	-8.95
1914.30	1.4	QPSK	H	117	357	1 / 0	14.19	10.29	**24.48**	0.281	33.01	-8.53
1914.30	1.4	16-QAM	H	117	357	1 / 0	13.43	10.29	**23.72**	0.236	33.01	-9.29
1882.50	1.4	64-QAM	H	158	352	1 / 0	13.01	9.94	**22.95**	0.197	33.01	-10.07
1882.50	1.4	256-QAM	H	158	352	3 / 2	9.97	9.94	**19.91**	**0.098**	33.01	-13.11
1851.50	3	QPSK	H	108	190	1 / 14	14.11	9.50	23.61	0.229	33.01	-9.40
1882.50	3	QPSK	H	162	359	1 / 14	14.32	9.94	24.26	0.266	33.01	-8.76
1913.50	3	QPSK	H	116	345	1 / 0	14.37	10.29	**24.66**	0.292	33.01	-8.36
1913.50	3	16-QAM	H	116	345	1 / 14	13.73	10.29	**24.02**	0.252	33.01	-9.00
1882.50	3	64-QAM	H	162	359	1 / 0	13.07	9.94	**23.01**	0.200	33.01	-10.01
1882.50	3	256-QAM	H	162	359	1 / 14	10.03	9.94	**19.97**	**0.099**	33.01	-13.05
1852.50	5	QPSK	H	109	187	1 / 24	14.27	9.51	23.78	0.239	33.01	-9.23
1882.50	5	QPSK	H	164	357	1 / 24	14.31	9.94	24.25	0.266	33.01	-8.77
1912.50	5	QPSK	H	110	347	1 / 0	14.47	10.28	**24.75**	0.298	33.01	-8.26
1912.50	5	16-QAM	H	110	347	1 / 0	13.72	10.28	**24.00**	0.251	33.01	-9.01
1882.50	5	64-QAM	H	164	357	1 / 0	13.06	9.94	**23.00**	0.199	33.01	-10.02
1882.50	5	256-QAM	H	164	357	1 / 24	10.11	9.94	**20.05**	**0.101**	33.01	-12.97
1855.00	10	QPSK	H	122	188	1 / 0	13.97	9.55	23.52	0.225	33.01	-9.49
1882.50	10	QPSK	H	151	350	1 / 0	14.08	9.94	24.02	0.252	33.01	-9.00
1910.00	10	QPSK	H	106	354	1 / 0	14.68	10.26	**24.94**	0.312	33.01	-8.07
1910.00	10	16-QAM	H	106	354	1 / 49	14.00	10.26	**24.26**	0.267	33.01	-8.75
1882.50	10	64-QAM	H	151	350	1 / 0	12.76	9.94	**22.70**	0.186	33.01	-10.32
1882.50	10	256-QAM	H	151	350	25 / 12	9.90	9.94	**19.84**	**0.096**	33.01	-13.18
1857.50	15	QPSK	H	113	185	1 / 74	14.22	9.58	23.80	0.240	33.01	-9.21
1882.50	15	QPSK	H	154	349	1 / 74	14.61	9.94	24.55	0.285	33.01	-8.47
1907.50	15	QPSK	H	117	348	1 / 0	14.70	10.24	**24.94**	0.312	33.01	-8.07
1907.50	15	16-QAM	H	117	348	1 / 0	13.86	10.24	**24.10**	0.257	33.01	-8.91
1882.50	15	64-QAM	H	154	349	1 / 74	13.36	9.94	**23.30**	0.214	33.01	-9.72
1882.50	15	256-QAM	H	154	349	1 / 74	10.27	9.94	**20.21**	**0.105**	33.01	-12.81
1860.00	20	QPSK	H	115	185	1 / 0	14.50	9.62	24.12	0.258	33.01	-8.89
1882.50	20	QPSK	H	157	353	1 / 0	14.61	9.94	24.55	0.285	33.01	-8.47
1905.00	20	QPSK	H	113	350	1 / 99	14.73	10.22	**24.95**	**0.313**	33.01	-8.06
1905.00	20	16-QAM	H	113	350	1 / 99	14.23	10.22	**24.45**	0.279	33.01	-8.56
1882.50	20	64-QAM	H	157	353	1 / 0	12.97	9.94	**22.91**	0.195	33.01	-10.11
1882.50	20	256-QAM	H	157	353	100 / 0	10.18	9.94	**20.12**	**0.103**	33.01	-12.90
1905.00	20	QPSK	V	146	339	1 / 99	14.01	9.94	23.95	0.248	33.01	-9.07
1905.00	20 (WCP)	QPSK	H	147	38	1 / 99	11.13	9.94	21.07	0.128	33.01	-11.95

Table 7-18. EIRP Data (Band 25/2)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2307.50	5	QPSK	V	127	327	1 / 0	12.76	10.23	**22.99**	0.199	23.98	-0.99
2312.50	5	QPSK	V	119	331	1 / 0	12.67	10.21	22.88	0.194	23.98	-1.10
2312.50	5	16-QAM	V	119	331	1 / 0	11.82	10.21	**22.03**	0.160	23.98	-1.95
2312.50	5	64-QAM	V	119	331	1 / 24	11.29	10.21	**21.50**	0.141	23.98	-2.48
2312.50	5	256-QAM	V	119	331	12 / 6	8.66	10.21	**18.87**	**0.077**	23.98	-5.11
2310.00	10	QPSK	V	126	325	1 / 49	12.90	10.22	**23.12**	**0.205**	23.98	-0.86
2310.00	10	16-QAM	V	126	325	1 / 49	12.14	10.22	22.36	0.172	23.98	-1.62
2310.00	10	64-QAM	V	126	325	1 / 49	11.11	10.22	21.33	0.136	23.98	-2.65
2310.00	10	256-QAM	V	126	325	25 / 12	8.63	10.22	**18.85**	**0.077**	23.98	-5.13
2310.00	10	QPSK	H	161	339	1 / 49	11.97	10.31	22.28	0.169	23.98	-1.70
2310.00	10 (WCP)	QPSK	V	143	201	1 / 49	9.27	10.22	19.49	0.089	23.98	-4.49

Table 7-19. EIRP Data (Band 30)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	H	100	334	1 / 24	11.09	9.43	20.52	0.113	33.01	-12.49
2535.00	5	QPSK	H	118	338	1 / 24	11.05	9.39	20.44	0.111	33.01	-12.57
2567.50	5	QPSK	H	116	335	1 / 24	12.21	9.45	**21.66**	0.147	33.01	-11.35
2567.50	5	16-QAM	H	116	335	1 / 24	11.34	9.45	**20.79**	0.120	33.01	-12.22
2567.50	5	64-QAM	H	116	335	1 / 0	10.70	9.45	**20.15**	0.104	33.01	-12.86
2567.50	5	256-QAM	H	116	335	1 / 24	10.20	9.45	**19.65**	**0.092**	33.01	-13.36
2505.00	10	QPSK	H	104	341	1 / 49	11.09	9.43	20.52	0.113	33.01	-12.49
2535.00	10	QPSK	H	126	333	1 / 49	11.10	9.39	20.49	0.112	33.01	-12.52
2565.00	10	QPSK	H	111	335	1 / 49	12.05	9.44	**21.49**	0.141	33.01	-11.52
2565.00	10	16-QAM	H	111	335	1 / 49	11.01	9.44	**20.45**	0.111	33.01	-12.56
2565.00	10	64-QAM	H	111	335	1 / 0	10.63	9.44	**20.07**	0.102	33.01	-12.94
2565.00	10	256-QAM	H	111	335	1 / 49	10.13	9.44	**19.57**	**0.091**	33.01	-13.44
2507.50	15	QPSK	H	100	338	1 / 74	11.33	9.42	20.75	0.119	33.01	-12.26
2535.00	15	QPSK	H	129	327	1 / 74	11.21	9.39	20.60	0.115	33.01	-12.41
2562.50	15	QPSK	H	111	336	1 / 74	12.38	9.43	**21.81**	**0.152**	33.01	-11.20
2562.50	15	16-QAM	H	111	336	1 / 0	11.70	9.43	**21.13**	0.130	33.01	-11.88
2562.50	15	64-QAM	H	111	336	1 / 0	11.54	9.43	**20.97**	0.125	33.01	-12.04
2562.50	15	256-QAM	H	111	336	1 / 74	11.04	9.43	**20.47**	**0.111**	33.01	-12.54
2510.00	20	QPSK	H	100	334	1 / 99	11.50	9.42	20.92	0.124	33.01	-12.09
2535.00	20	QPSK	H	124	331	1 / 99	11.51	9.39	20.90	0.123	33.01	-12.11
2560.00	20	QPSK	H	117	328	1 / 99	12.26	9.42	**21.68**	0.147	33.01	-11.33
2560.00	20	16-QAM	H	117	328	1 / 99	11.40	9.42	**20.82**	0.121	33.01	-12.19
2560.00	20	64-QAM	H	117	328	1 / 99	10.82	9.42	**20.24**	0.106	33.01	-12.77
2560.00	20	256-QAM	H	117	328	1 / 99	10.32	9.42	**19.74**	**0.094**	33.01	-13.27
2562.50	15	QPSK	V	109	281	1 / 74	11.48	9.42	20.90	0.123	33.01	-12.11
2562.50	15 (WCP)	QPSK	H	100	324	1 / 74	8.46	9.42	17.88	0.061	33.01	-15.13

Table 7-20. EIRP Data (Band 7)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	123	232	1 / 0	16.15	9.43	25.58	0.362	33.01	-7.43
2593.00	5	QPSK	H	124	234	1 / 0	16.39	9.55	25.94	0.393	33.01	-7.07
2687.50	5	QPSK	H	139	228	1 / 0	16.91	9.82	**26.73**	0.471	33.01	-6.28
2687.50	5	16-QAM	H	139	228	1 / 24	16.61	9.82	**26.43**	0.439	33.01	-6.58
2687.50	5	64-QAM	H	139	228	1 / 0	13.74	9.82	**23.56**	0.227	33.01	-9.45
2687.50	5	256-QAM	H	139	228	12 / 6	12.57	9.82	**22.39**	**0.173**	33.01	-10.62
2501.00	10	QPSK	H	135	231	1 / 0	16.26	9.43	25.69	0.371	33.01	-7.32
2593.00	10	QPSK	H	119	242	1 / 0	16.18	9.55	25.73	0.374	33.01	-7.28
2685.00	10	QPSK	H	131	227	1 / 0	16.83	9.82	**26.65**	0.463	33.01	-6.36
2685.00	10	16-QAM	H	131	227	1 / 0	16.50	9.82	**26.32**	0.429	33.01	-6.69
2685.00	10	64-QAM	H	131	227	1 / 49	13.20	9.82	**23.02**	0.201	33.01	-9.99
2685.00	10	256-QAM	H	131	227	25 / 12	12.45	9.82	**22.27**	**0.169**	33.01	-10.74
2503.50	15	QPSK	H	123	227	1 / 0	16.38	9.43	25.81	0.381	33.01	-7.20
2593.00	15	QPSK	H	122	242	1 / 0	16.44	9.55	25.99	0.398	33.01	-7.02
2682.50	15	QPSK	H	136	228	1 / 74	17.13	9.83	**26.96**	0.497	33.01	-6.05
2682.50	15	16-QAM	H	136	228	1 / 74	16.26	9.83	**26.09**	0.406	33.01	-6.92
2682.50	15	64-QAM	H	136	228	1 / 0	13.63	9.83	**23.46**	0.222	33.01	-9.55
2682.50	15	256-QAM	H	136	228	36 / 18	12.66	9.83	**22.49**	**0.177**	33.01	-10.52
2506.00	20	QPSK	H	128	226	1 / 0	16.12	9.42	25.54	0.358	33.01	-7.47
2593.00	20	QPSK	H	123	239	1 / 0	15.78	9.55	25.33	0.341	33.01	-7.68
2680.00	20	QPSK	H	136	227	1 / 0	17.13	9.83	**26.96**	**0.497**	33.01	-6.05
2680.00	20	16-QAM	H	136	227	1 / 0	16.53	9.83	**26.36**	0.433	33.01	-6.65
2680.00	20	64-QAM	H	136	227	1 / 0	13.93	9.83	**23.76**	0.238	33.01	-9.25
2680.00	20	256-QAM	H	136	227	1 / 0	13.05	9.83	**22.88**	**0.194**	33.01	-10.13
2680.00	20	QPSK	V	109	271	1 / 0	14.32	9.83	24.15	0.260	33.01	-8.86
2680.00	20 (WCP)	QPSK	H	114	268	1 / 0	13.99	9.83	23.82	0.241	33.01	-9.19

Table 7-21. EIRP Data (Band 41 – PC2)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	123	224	1 / 0	13.45	9.43	22.88	0.194	33.01	-10.13
2593.00	5	QPSK	H	126	235	1 / 0	13.59	9.55	23.14	0.206	33.01	-9.87
2687.50	5	QPSK	H	139	230	1 / 0	14.08	9.82	**23.90**	0.245	33.01	-9.11
2687.50	5	16-QAM	H	134	234	1 / 24	13.53	9.82	**23.35**	0.216	33.01	-9.66
2687.50	5	64-QAM	H	139	222	1 / 24	11.42	9.82	**21.24**	0.133	33.01	-11.77
2687.50	5	256-QAM	H	143	226	1 / 0	10.88	9.82	**20.70**	**0.117**	33.01	-12.31
2501.00	10	QPSK	H	129	223	1 / 0	13.56	9.43	22.99	0.199	33.01	-10.02
2593.00	10	QPSK	H	139	224	1 / 0	13.38	9.55	22.93	0.197	33.01	-10.08
2685.00	10	QPSK	H	141	222	1 / 0	14.00	9.82	**23.82**	0.241	33.01	-9.19
2685.00	10	16-QAM	H	140	226	1 / 0	13.42	9.82	**23.24**	0.211	33.01	-9.77
2685.00	10	64-QAM	H	132	231	1 / 0	10.88	9.82	**20.70**	0.118	33.01	-12.31
2685.00	10	256-QAM	H	137	232	1 / 49	10.34	9.82	**20.16**	**0.104**	33.01	-12.85
2503.50	15	QPSK	H	124	232	1 / 0	13.68	9.43	23.11	0.205	33.01	-9.90
2593.00	15	QPSK	H	123	240	1 / 0	13.64	9.55	23.19	0.209	33.01	-9.82
2682.50	15	QPSK	H	131	228	1 / 74	14.13	9.83	**23.96**	0.249	33.01	-9.05
2682.50	15	16-QAM	H	133	226	1 / 74	13.23	9.83	**23.06**	0.202	33.01	-9.95
2682.50	15	64-QAM	H	142	227	1 / 74	11.36	9.83	**21.19**	0.132	33.01	-11.82
2682.50	15	256-QAM	H	133	228	1 / 0	10.82	9.83	**20.65**	**0.116**	33.01	-12.36
2506.00	20	QPSK	H	127	232	1 / 0	13.42	9.42	22.84	0.193	33.01	-10.17
2593.00	20	QPSK	H	123	238	1 / 0	12.98	9.55	22.53	0.179	33.01	-10.48
2680.00	20	QPSK	H	140	220	1 / 99	14.30	9.83	**24.13**	**0.259**	33.01	-8.88
2680.00	20	16-QAM	H	140	220	1 / 99	13.45	9.83	**23.28**	0.213	33.01	-9.73
2680.00	20	64-QAM	H	140	220	1 / 0	11.07	9.83	**20.90**	0.123	33.01	-12.11
2680.00	20	256-QAM	H	140	220	50 / 25	9.84	9.83	**19.67**	**0.093**	33.01	-13.34
20.00	QPSK	H	V	109	271	1 / 99	12.32	9.83	22.15	0.164	33.01	-10.86
20.00	QPSK (WCP)	H	H	114	268	1 / 99	12.09	9.83	21.92	0.156	33.01	-11.09

Table 7-22. EIRP Data (Band 41 – PC3)

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7.9 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

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Test Setup

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

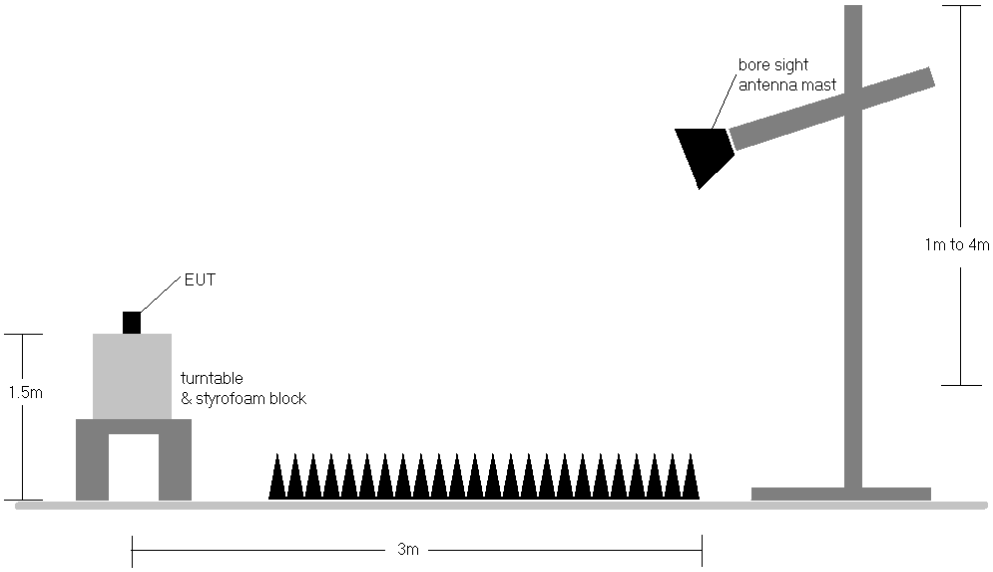

Figure 7-9. Test Instrument & Measurement Setup

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

5) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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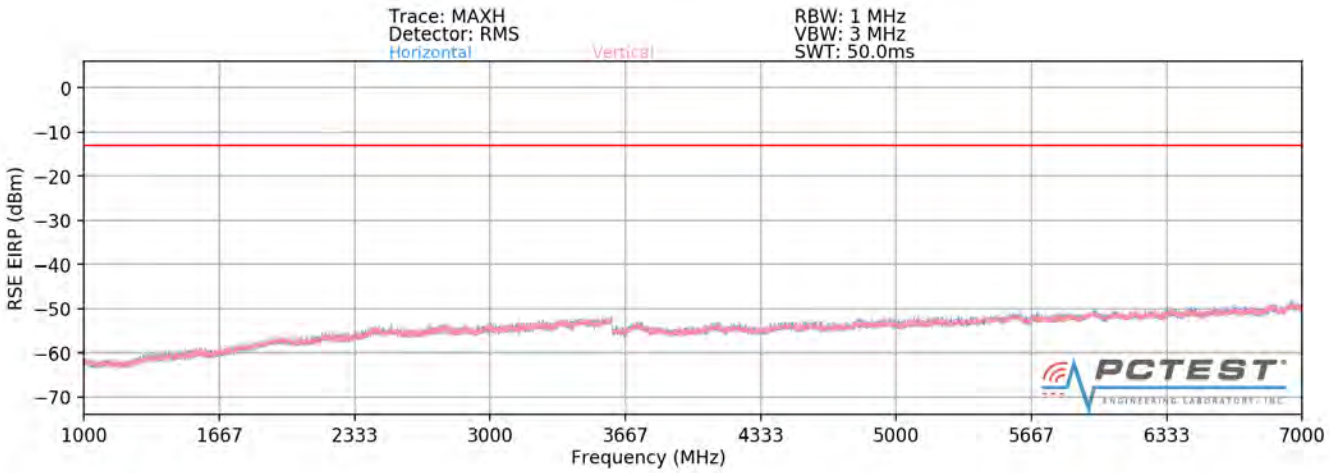
Band 71



Plot 7-494. Radiated Spurious Plot above 1GHz (Band 71)

OPERATING FREQUENCY:	673.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1346.00	H	117	179	-55.53	2.91	-52.62	-39.6
2019.00	H	127	172	-51.07	2.82	-48.25	-35.2
2692.00	H	-	-	-57.65	4.53	-53.12	-40.1
3365.00	H	-	-	-58.98	6.10	-52.88	-39.9

Table 7-23. Radiated Spurious Data (Band 71 – Low Channel)

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OPERATING FREQUENCY:	680.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1361.00	H	154	20	-54.23	2.88	-51.36	-38.4
2041.50	H	156	16	-61.06	2.73	-58.34	-45.3
2722.00	H	-	-	-57.77	4.63	-53.14	-40.1
3402.50	H	-	-	-67.11	6.26	-60.85	-47.9

Table 7-24. Radiated Spurious Data (Band 71 – Mid Channel)

OPERATING FREQUENCY:	688.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1376.00	H	101	191	-66.73	2.64	-64.09	-51.1
2064.00	H	101	192	-60.63	2.82	-57.81	-44.8
2752.00	H	-	-	-65.15	4.60	-60.55	-47.5
3440.00	H	-	-	-68.01	6.28	-61.73	-48.7

Table 7-25. Radiated Spurious Data (Band 71 – High Channel)

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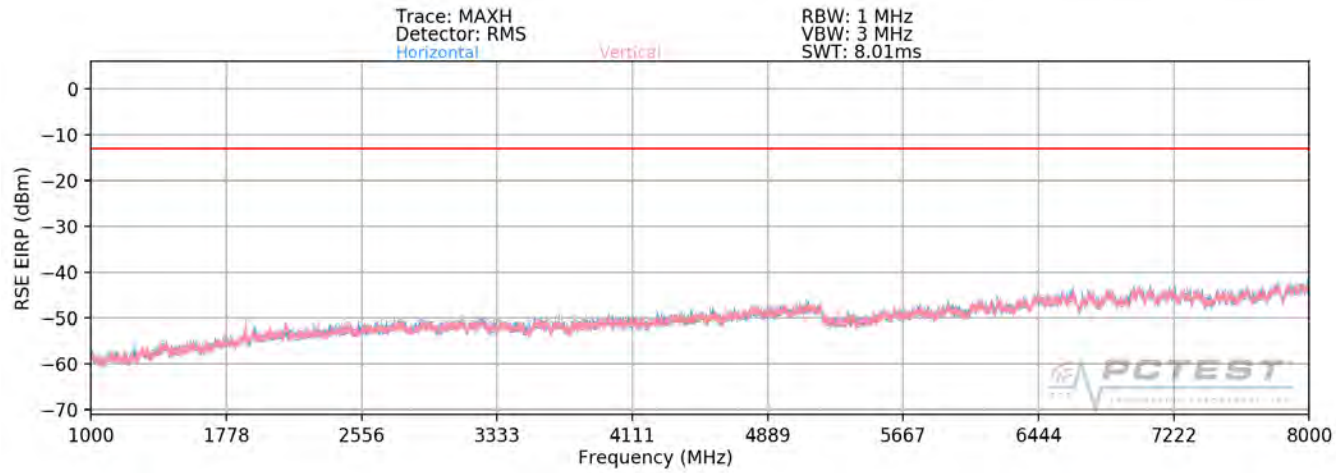
Band 12



Plot 7-495. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY:	701.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1403.00	H	166	169	-66.58	2.30	-64.27	-51.3
2104.50	H	124	350	-54.11	3.12	-50.98	-38.0
2806.00	H	-	-	-67.37	4.82	-62.55	-49.5
3507.50	H	-	-	-69.38	6.48	-62.90	-49.9

Table 7-26. Radiated Spurious Data (Band 12 – Low Channel)

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OPERATING FREQUENCY:	707.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	211	170	-62.26	2.39	-59.87	-46.9
2122.50	H	104	360	-57.06	3.14	-53.92	-40.9
2830.00	H	-	-	-68.05	4.87	-63.18	-50.2
3537.50	H	-	-	-68.48	6.45	-62.03	-49.0

Table 7-27. Radiated Spurious Data (Band 12 – Mid Channel)

OPERATING FREQUENCY:	713.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1427.00	H	156	34	-67.08	2.53	-64.56	-51.6
2140.50	H	149	360	-57.52	3.11	-54.41	-41.4
2854.00	H	-	-	-67.73	4.91	-62.82	-49.8
3567.50	H	-	-	-67.57	6.46	-61.12	-48.1

Table 7-28. Radiated Spurious Data (Band 12 – High Channel)

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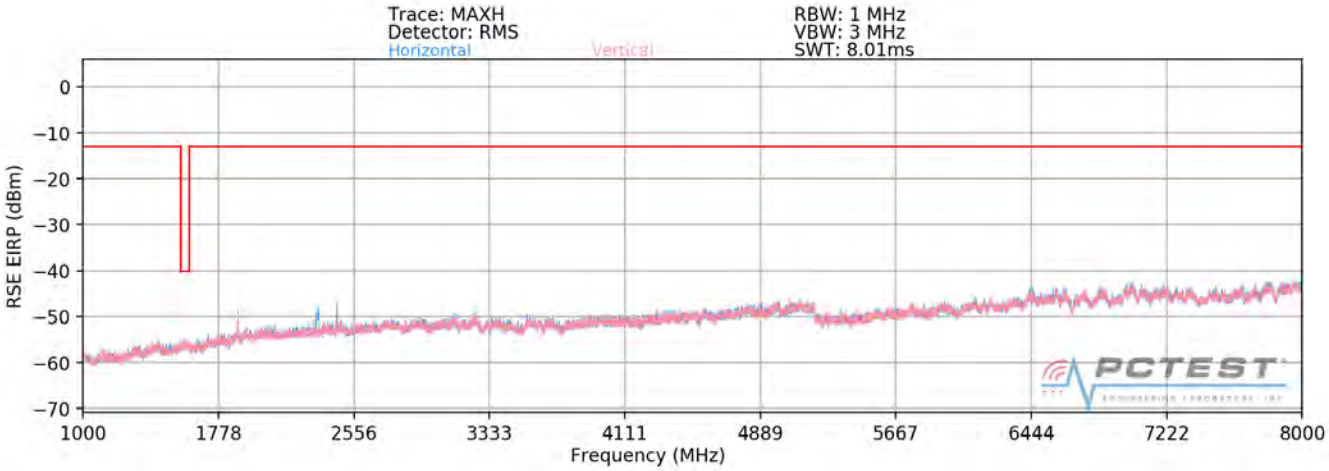
Band 13



Plot 7-496. Radiated Spurious Plot above 1GHz (Band 13)

OPERATING FREQUENCY:	782.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2346.00	H	115	213	-56.28	3.64	-52.64	-39.6
3128.00	H	107	226	-49.73	5.73	-43.99	-31.0
3910.00	H	-	-	-58.85	7.25	-51.59	-38.6
4692.00	H	-	-	-64.45	8.47	-55.98	-43.0

Table 7-29. Radiated Spurious Data (Band 13 – Mid Channel)

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MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.00	MHz
DISTANCE:	3	meters
NARROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	229	234	-59.30	2.93	-56.36	-16.4

Table 7-30. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

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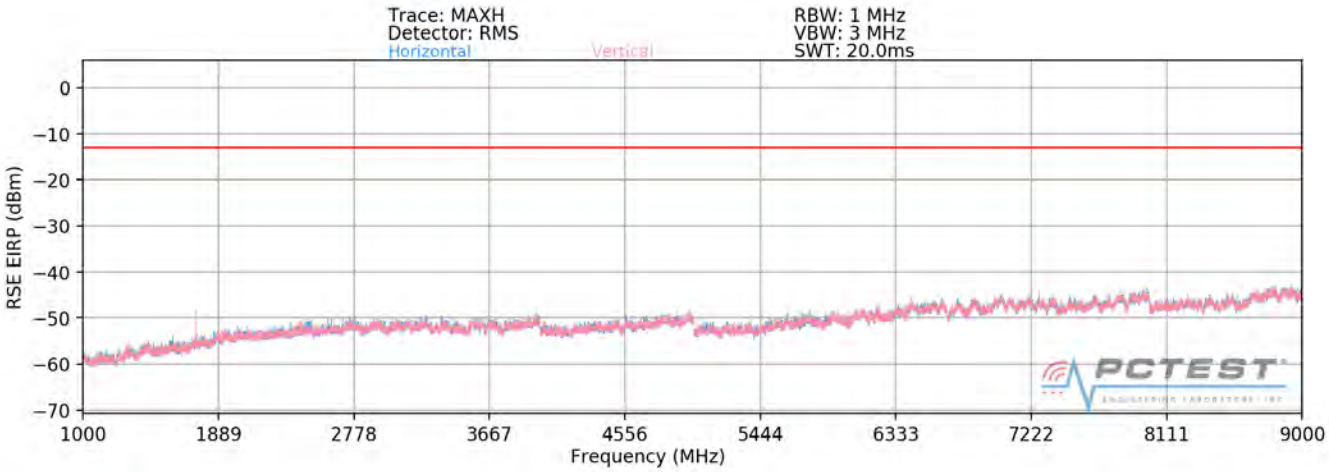
Band 26/5



Plot 7-497. Radiated Spurious Plot above 1GHz (Band 26/5)

OPERATING FREQUENCY:	829.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1658.00	H	125	300	-60.95	3.12	-57.83	-44.8
2487.00	H	152	30	-58.56	3.87	-54.70	-41.7
3316.00	H	-	-	-57.79	6.02	-51.77	-38.8
4145.00	H	-	-	-64.77	7.79	-56.98	-44.0

Table 7-31. Radiated Spurious Data (Band 26/5 – Low Channel)

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OPERATING FREQUENCY:	836.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	192	127	-60.53	3.10	-57.43	-44.4
2509.50	H	192	132	-53.56	4.02	-49.55	-36.5
3346.00	H	-	-	-58.06	6.03	-52.03	-39.0
4182.50	H	-	-	-64.53	7.79	-56.74	-43.7

Table 7-32. Radiated Spurious Data (Band 26/5 – Mid Channel)

OPERATING FREQUENCY:	844.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1688.00	H	100	247	-61.71	3.15	-58.56	-45.6
2532.00	H	137	128	-54.12	4.07	-50.05	-37.0
3376.00	H	-	-	-60.82	6.10	-54.72	-41.7
4220.00	H	-	-	-66.16	7.82	-58.34	-45.3

Table 7-33. Radiated Spurious Data (Band 26/5 – High Channel)

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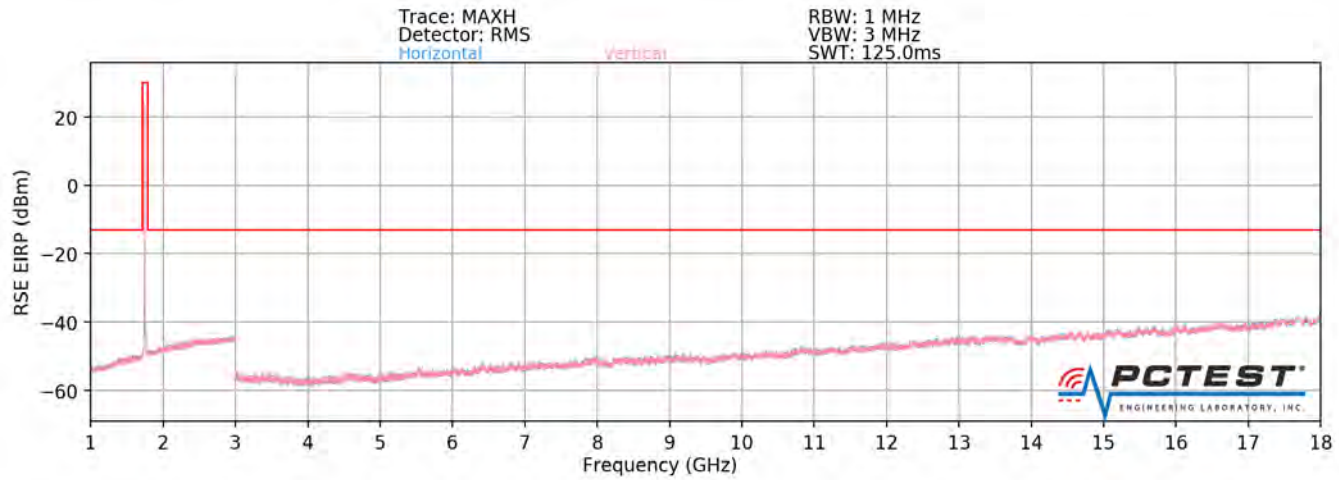
Band 66/4



Plot 7-498. Radiated Spurious Plot above 1GHz (Band 66/4)

OPERATING FREQUENCY:	1720.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3440.00	H	-	-	-70.44	6.28	-64.16	-51.2
5160.00	H	-	-	-72.48	8.98	-63.50	-50.5
6880.00	H	-	-	-70.37	9.42	-60.95	-47.9

Table 7-34. Radiated Spurious Data (Band 66/4 – Low Channel)

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OPERATING FREQUENCY:	1745.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	H	-	-	-70.59	6.47	-64.12	-51.1
5235.00	H	-	-	-71.59	8.97	-62.62	-49.6
6980.00	H	-	-	-70.29	9.23	-61.07	-48.1

Table 7-35. Radiated Spurious Data (Band 66/4 – Mid Channel)

OPERATING FREQUENCY:	1770.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3540.00	H	-	-	-70.53	6.45	-64.09	-51.1
5310.00	H	-	-	-71.47	9.09	-62.38	-49.4
7080.00	H	-	-	-70.92	9.17	-61.75	-48.7

Table 7-36. Radiated Spurious Data (Band 66/4 – High Channel)

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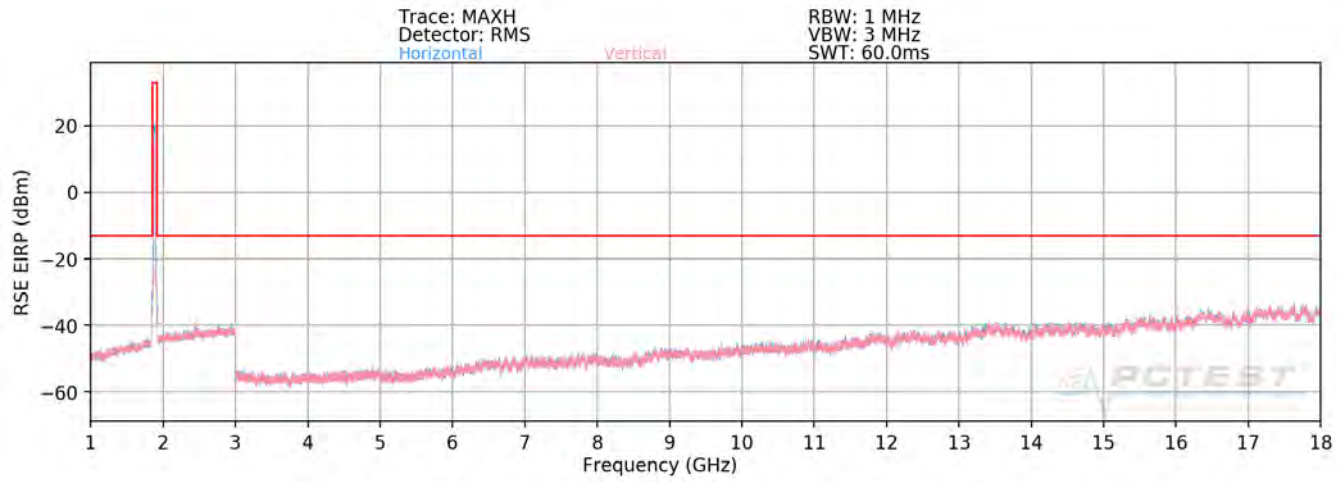
Band 25/2



Plot 7-499. Radiated Spurious Plot above 1GHz (Band 25/2)

OPERATING FREQUENCY:	1860.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3720.00	V	-	-	-70.86	6.90	-63.96	-51.0
5580.00	V	-	-	-71.01	9.06	-61.95	-48.9
7440.00	V	-	-	-68.58	9.26	-59.32	-46.3

Table 7-37. Radiated Spurious Data (Band 25/2 – Low Channel)

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OPERATING FREQUENCY:	1882.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3765.00	V	-	-	-71.92	6.94	-64.98	-52.0
5647.50	V	-	-	-71.37	9.17	-62.20	-49.2
7530.00	V	-	-	-68.81	9.31	-59.51	-46.5

Table 7-38. Radiated Spurious Data (Band 25/2 – Mid Channel)

OPERATING FREQUENCY:	1905.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3810.00	V	-	-	-71.38	7.07	-64.31	-51.3
5715.00	V	-	-	-71.24	9.04	-62.20	-49.2
7620.00	V	-	-	-68.98	9.27	-59.71	-46.7

Table 7-39. Radiated Spurious Data (Band 25/2 – High Channel)

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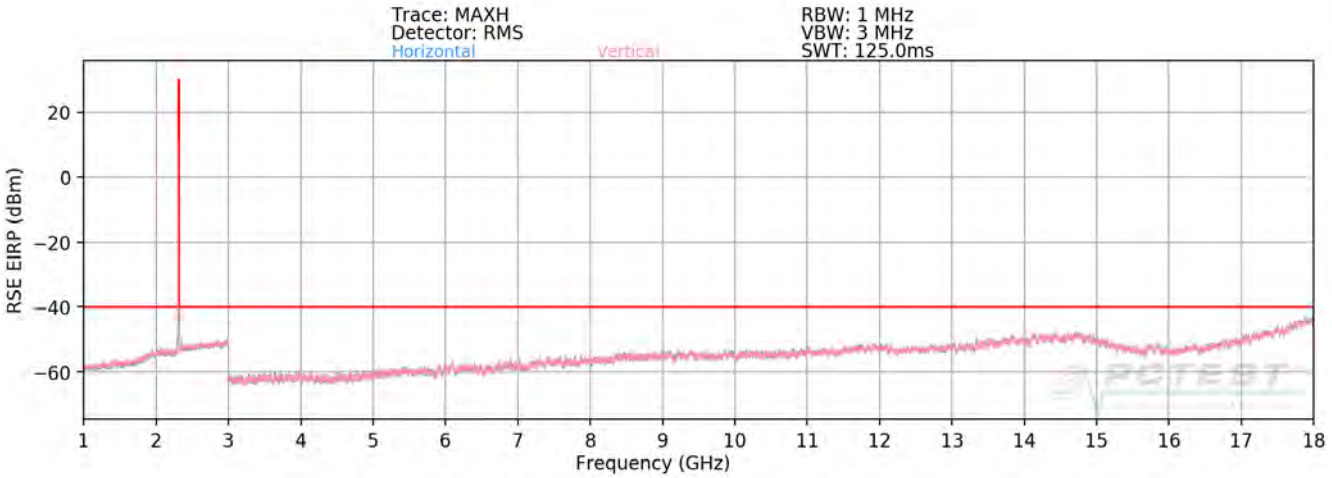
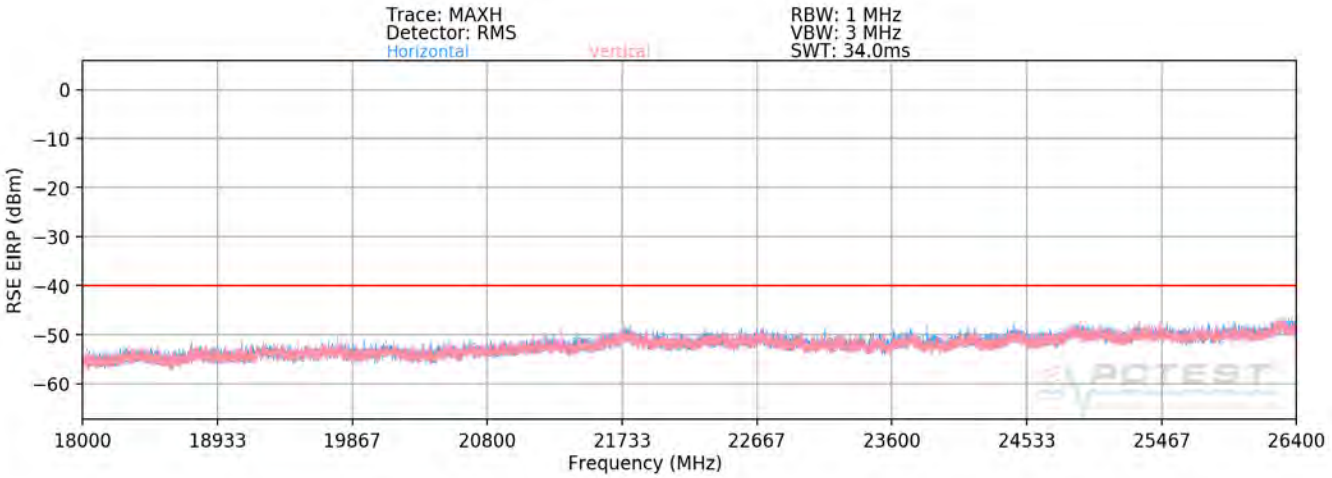
Band 30



Plot 7-500. Radiated Spurious Plot 1GHz - 18GHz (Band 30)



Plot 7-501. Radiated Spurious Plot 18GHz – 26.5GHz (Band 30)

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OPERATING FREQUENCY:	2310.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-40	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
4620.00	V	123	220	-73.88	8.42	-65.46	-25.5
6930.00	V	-	-	-71.39	9.38	-62.00	-22.0
9240.00	V	-	-	-68.83	9.46	-59.37	-19.4
11550.00	V	400	88	-65.47	9.48	-55.99	-16.0
13860.00	V	-	-	-63.80	8.74	-55.05	-15.1
16170.00	V	-	-	-66.67	8.40	-58.26	-18.3

Table 7-40. Radiated Spurious Data (Band 30 – Mid Channel)

OPERATING FREQUENCY:	2310.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-40	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
4620.00	V	-	-	-65.08	8.42	-56.66	-16.7
6930.00	V	-	-	-62.68	9.38	-53.29	-13.3
9240.00	V	-	-	-61.60	9.46	-52.14	-12.1

Table 7-41. Radiated Spurious Data with WCP (Band 30 – MID Channel)

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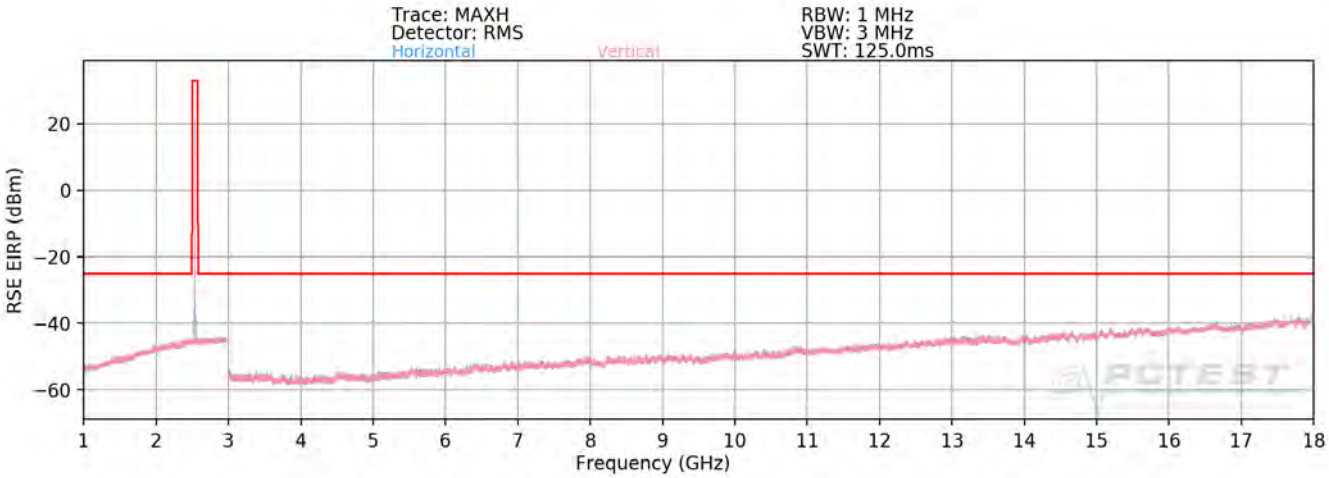
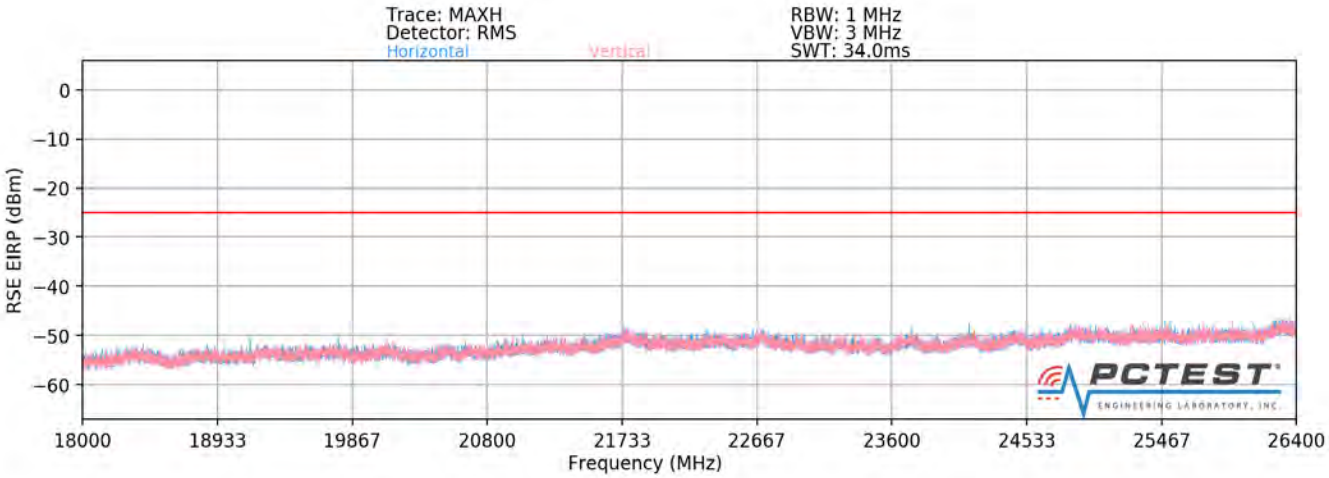
Band 7



Plot 7-502. Radiated Spurious Plot 1GHz - 18GHz (Band 7)



Plot 7-503. Radiated Spurious Plot 18GHz – 26.5GHz (Band 7)

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OPERATING FREQUENCY:	2510.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5020.00	H	111	4	-71.27	8.78	-62.48	-37.5
7530.00	H	123	331	-68.31	9.31	-59.01	-34.0
10040.00	H	125	359	-63.12	9.78	-53.34	-28.3
12550.00	H	143	342	-64.59	8.80	-55.79	-30.8
15060.00	H	-	-	-62.74	8.89	-53.85	-28.9
17570.00	H	-	-	-58.34	7.78	-50.56	-25.6

Table 7-42. Radiated Spurious Data (Band 7 – Low Channel)

OPERATING FREQUENCY:	2535.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5070.00	H	116	3	-69.82	8.89	-60.93	-35.9
7605.00	H	113	306	-68.03	9.25	-58.78	-33.8
10140.00	H	124	292	-64.70	9.75	-54.95	-29.9
12675.00	H	123	345	-64.78	8.89	-55.90	-30.9
15210.00	H	-	-	-63.43	8.73	-54.70	-29.7
17745.00	H	-	-	-55.69	7.71	-47.98	-23.0

Table 7-43. Radiated Spurious Data (Band 7 – Mid Channel)

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OPERATING FREQUENCY:	2560.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5120.00	H	119	358	-70.21	8.91	-61.30	-36.3
7680.00	H	111	303	-67.08	9.28	-57.81	-32.8
10240.00	H	144	317	-64.12	9.66	-54.46	-29.5
12800.00	H	117	344	-63.42	8.87	-54.54	-29.5
15360.00	H	-	-	-64.57	8.44	-56.13	-31.1
17920.00	H	-	-	-55.38	7.70	-47.68	-22.7

Table 7-44. Radiated Spurious Data (Band 7 – High Channel)

OPERATING FREQUENCY:	2535.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5070.00	H	-	-	-64.13	8.89	-55.24	-30.2
7605.00	H	180	49	-61.07	9.25	-51.82	-26.8
10140.00	H	-	-	-59.55	9.75	-49.80	-24.8
12675.00	H	-	-	-59.38	8.89	-50.50	-25.5
15210.00	H	-	-	-57.49	8.73	-48.76	-23.8

Table 7-45. Radiated Spurious Data with WCP (Band 7 – Low Channel)

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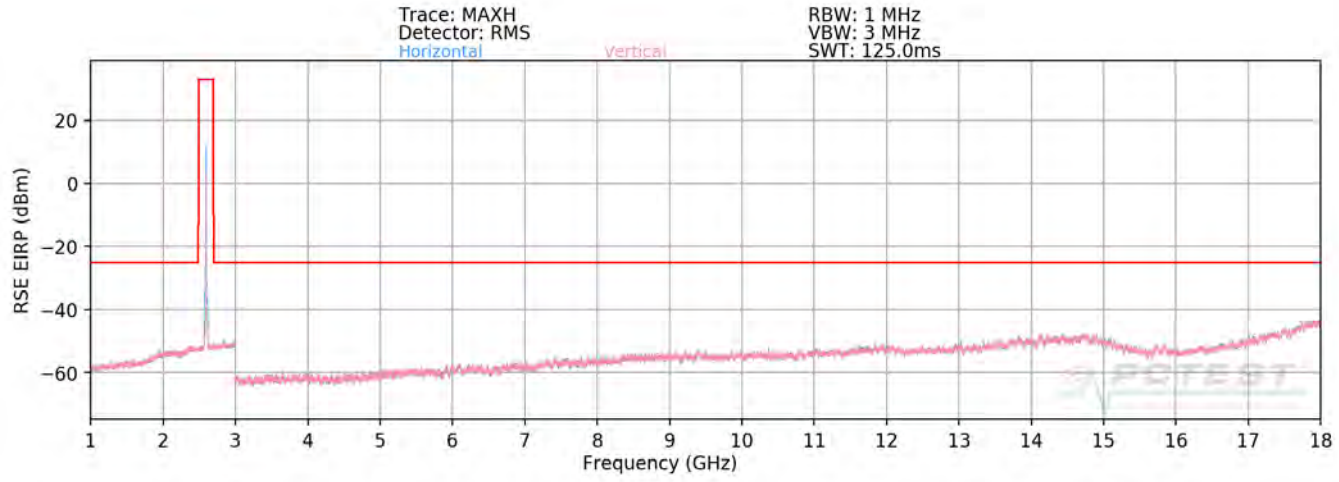
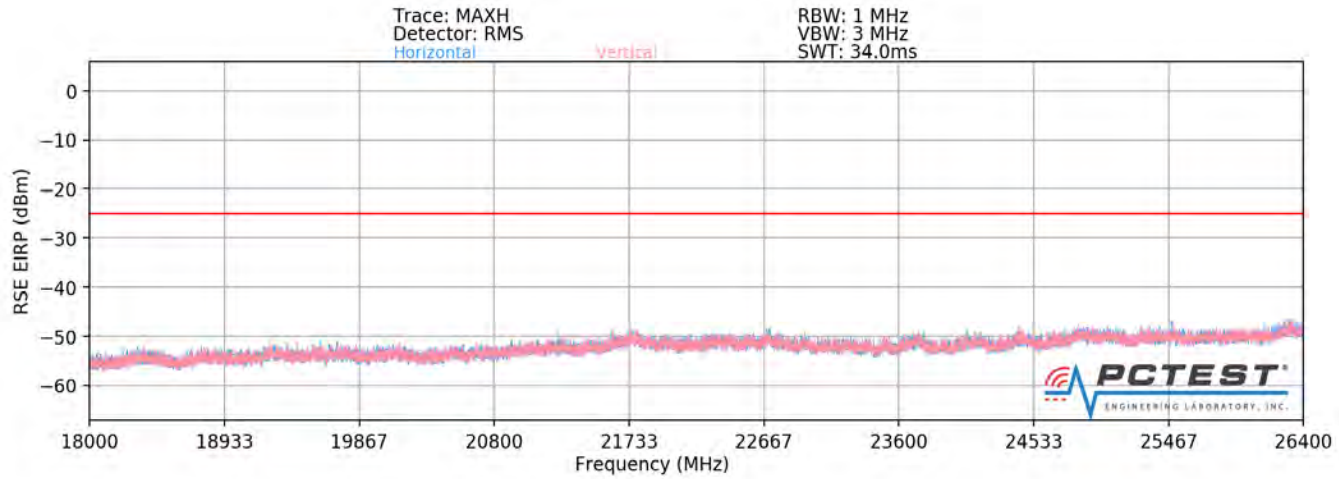
Band 41 PC2



Plot 7-504. Radiated Spurious Plot 1GHz - 18GHz (Band 41 PC2)



Plot 7-505. Radiated Spurious Plot 18GHz – 26.5GHz (Band 41 PC2)

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OPERATING FREQUENCY:	2560.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5120.00	H	297	14	-56.86	8.91	-47.95	-22.9
7680.00	H	218	359	-41.28	9.28	-32.01	-7.0
10240.00	H	111	36	-48.74	9.66	-39.08	-14.1
12800.00	H	394	352	-54.78	8.87	-45.90	-20.9
15360.00	H	239	295	-61.56	8.44	-53.12	-28.1

Table 7-46. Radiated Spurious Data (Band 41 PC2 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	H	180	156	-66.47	9.03	-57.45	-32.4
7779.00	H	234	356	-43.76	9.29	-34.47	-9.5
10372.00	H	111	21	-48.50	9.50	-39.00	-14.0
12965.00	H	112	353	-57.60	8.75	-48.84	-23.8
15558.00	H	-	-	-63.41	8.47	-54.94	-29.9

Table 7-47. Radiated Spurious Data (Band 41 PC2 – Mid Channel)

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OPERATING FREQUENCY:	2680.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5360.00	H	175	91	-64.52	8.99	-55.52	-30.5
8040.00	H	218	42	-49.92	9.35	-40.57	-15.6
10720.00	H	160	325	-52.93	9.39	-43.54	-18.5
13400.00	H	112	357	-58.05	8.67	-49.38	-24.4
16080.00	H	-	-	-63.45	8.46	-54.99	-30.0

Table 7-48. Radiated Spurious Data (Band 41 PC2 – High Channel)

OPERATING FREQUENCY:	2560.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5120.00	H	-	-	-64.02	8.78	-55.23	-30.2
7680.00	H	-	-	-61.54	9.31	-52.24	-27.2
10240.00	H	-	-	-60.55	9.78	-50.77	-25.8

Table 7-49. Radiated Spurious Data with WCP (Band 41 PC2 – Low Channel)

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7.10 Uplink Carrier Aggregation Radiated Measurements

§2.1053, §27.53(m)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak 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 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. No. of sweep points ≥ 2 x span / RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. The trace was allowed to stabilize

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Test Setup

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

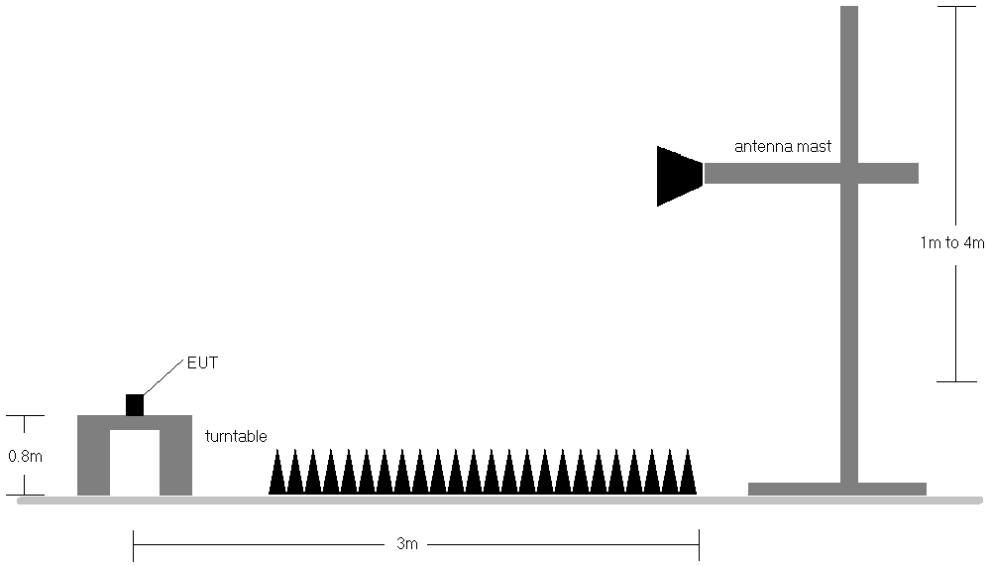

Figure 7-10. Test Instrument & Measurement Setup

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) Radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.

4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

6) No significant emissions were found as a result of two uplink carriers operating contiguously.

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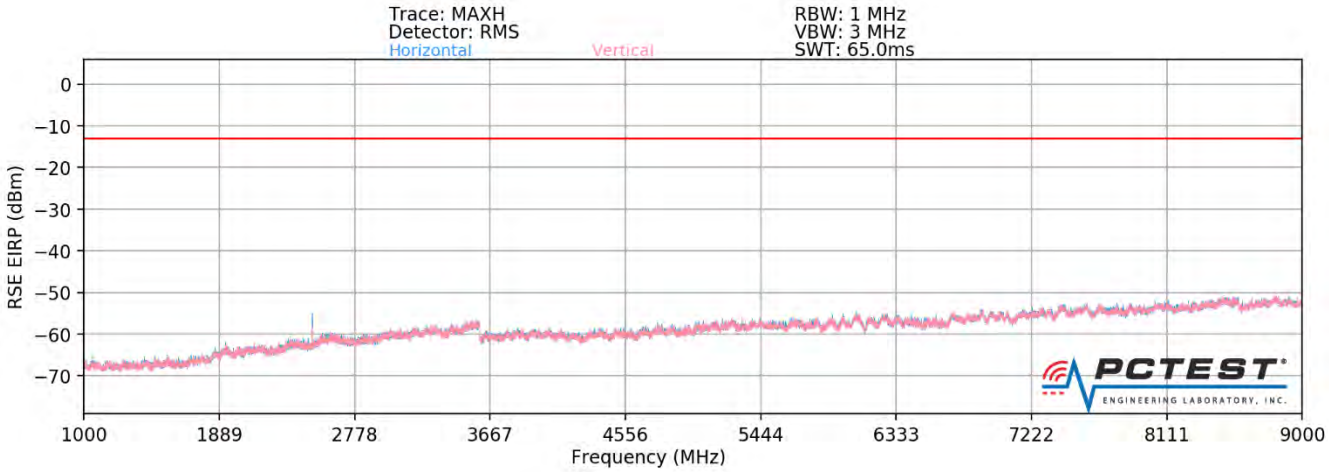
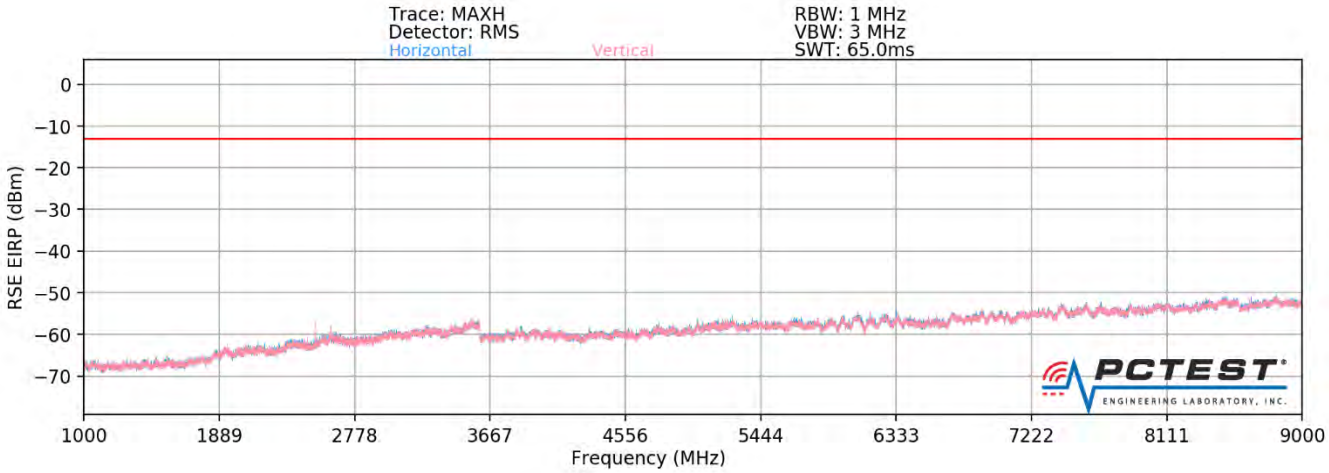
ULCA Band 5



Plot 7-506. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 5 Low Channel – PCC/SCC: 1RB)



Plot 7-507. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 5 High Channel – PCC/SCC: 1RB)

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OPERATING FREQUENCY (PCC):	829.00	MHz
OPERATING FREQUENCY (SCC):	838.90	MHz
CHANNEL (PCC):	20450	
CHANNEL (SCC):	20549	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1658.00	H	139	115	-74.75	3.61	-71.14	-58.1
2487.00	H	112	44	-60.18	4.25	-55.93	-42.9
3316.00	H	-	-	-72.38	5.83	-66.55	-53.6
4145.00	H	-	-	-73.77	7.66	-66.11	-53.1
4974.00	H	-	-	-73.53	8.56	-64.97	-52.0

Plot 7-50. Radiated Spurious Data (ULCA B5 PCC: RB 1 Offset 49, SCC: RB 1 Offset 0 – Low Channel)

OPERATING FREQUENCY (PCC):	844.00	MHz
OPERATING FREQUENCY (SCC):	834.10	MHz
CHANNEL (PCC):	20600	
CHANNEL (SCC):	20501	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1688.00	H	153	106	-74.17	3.63	-70.54	-57.5
2532.00	H	139	42	-58.85	4.47	-54.38	-41.4
3376.00	H	-	-	-73.34	6.05	-67.29	-54.3
4220.00	H	137	113	-72.65	7.75	-64.90	-51.9
5064.00	H	-	-	-72.98	8.59	-64.39	-51.4
5908.00	H	-	-	-71.63	8.89	-62.74	-49.7

Plot 7-51. Radiated Spurious Data (ULCA B5 PCC: RB 1 Offset 0, SCC: RB 1 Offset 49 – High Channel)

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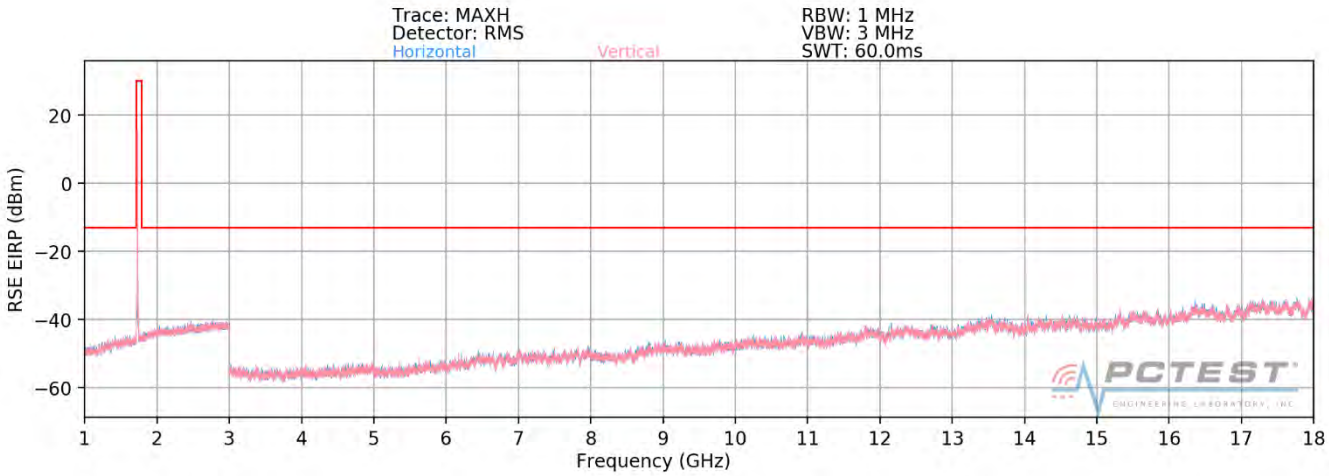
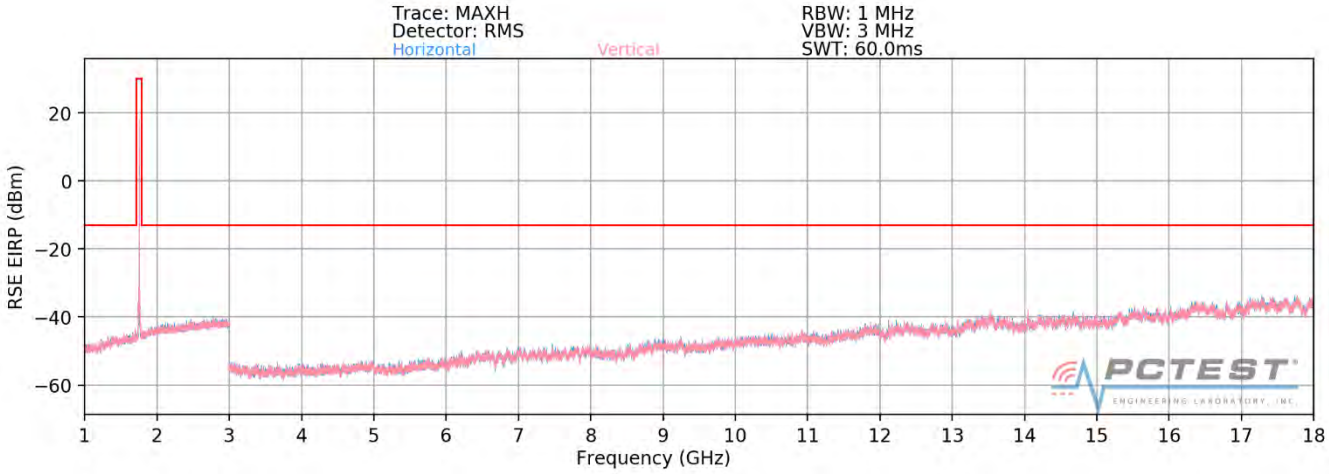
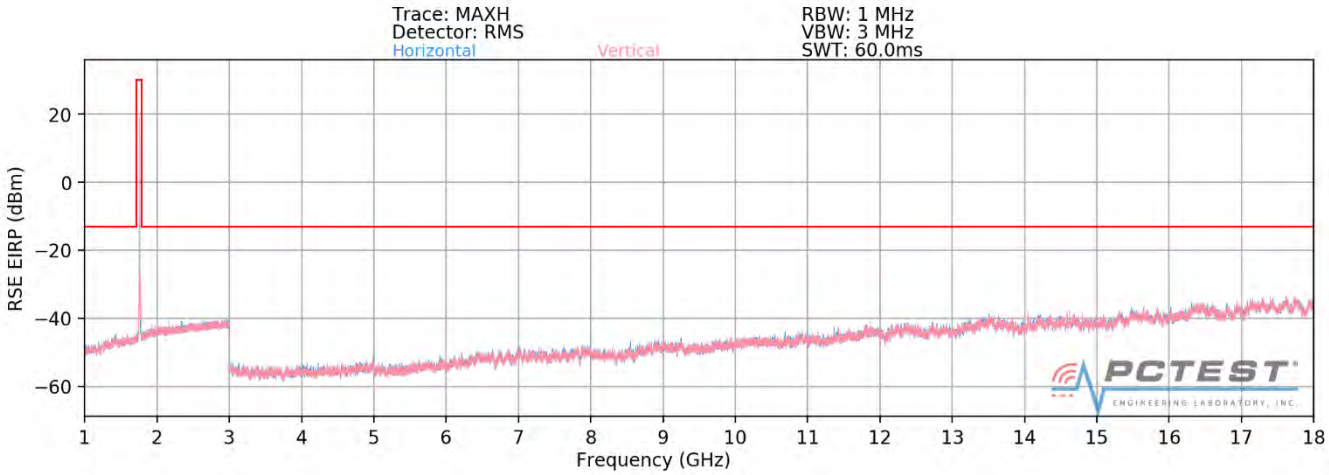
ULCA Band 66



Plot 7-508. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 66 Low Channel – PCC/SCC: 1RB)



Plot 7-509. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 66 Mid Channel – PCC/SCC: 1RB)



Plot 7-510. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 66 High Channel – PCC/SCC: 1RB)

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OPERATING FREQUENCY (PCC):	1720.00	MHz
OPERATING FREQUENCY (SCC):	1739.80	MHz
CHANNEL (PCC):	132072	
CHANNEL (SCC):	132270	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3440.00	V	-	-	-70.96	6.22	-64.74	-51.7
5160.00	V	-	-	-73.37	8.68	-64.70	-51.7
6880.00	V	-	-	-70.51	8.76	-61.76	-48.8

Plot 7-52. Radiated Spurious Data (ULCA B66 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Low Channel)

OPERATING FREQUENCY (PCC):	1745.00	MHz
OPERATING FREQUENCY (SCC):	1764.80	MHz
CHANNEL (PCC):	132322	
CHANNEL (SCC):	132520	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	V	-	-	-70.83	6.32	-64.50	-51.5
5235.00	V	-	-	-72.31	8.71	-63.60	-50.6
6980.00	V	-	-	-70.56	8.74	-61.83	-48.8

Plot 7-53. Radiated Spurious Data (ULCA B66 PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)

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OPERATING FREQUENCY (PCC):	1770.00	MHz
OPERATING FREQUENCY (SCC):	1750.20	MHz
CHANNEL (PCC):	132572	
CHANNEL (SCC):	132374	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3540.00	V	-	-	-71.38	6.31	-65.08	-52.1
5310.00	V	-	-	-72.35	8.74	-63.62	-50.6
7080.00	V	-	-	-70.64	8.66	-61.98	-49.0

Plot 7-54. Radiated Spurious Data (ULCA B66 PCC: RB 1 Offset 0, SCC: RB 1 Offset 99 – High Channel)

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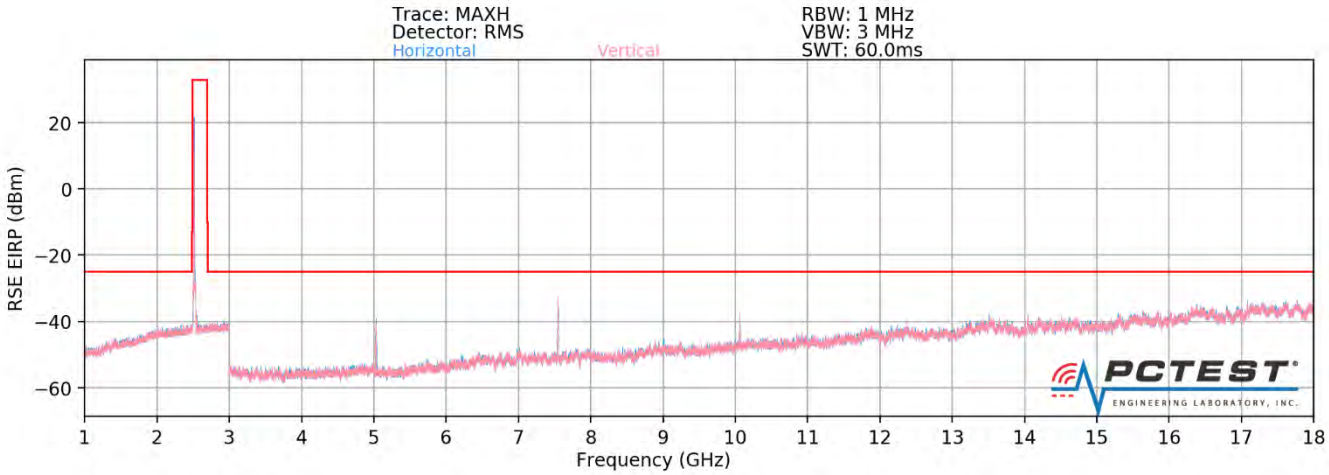
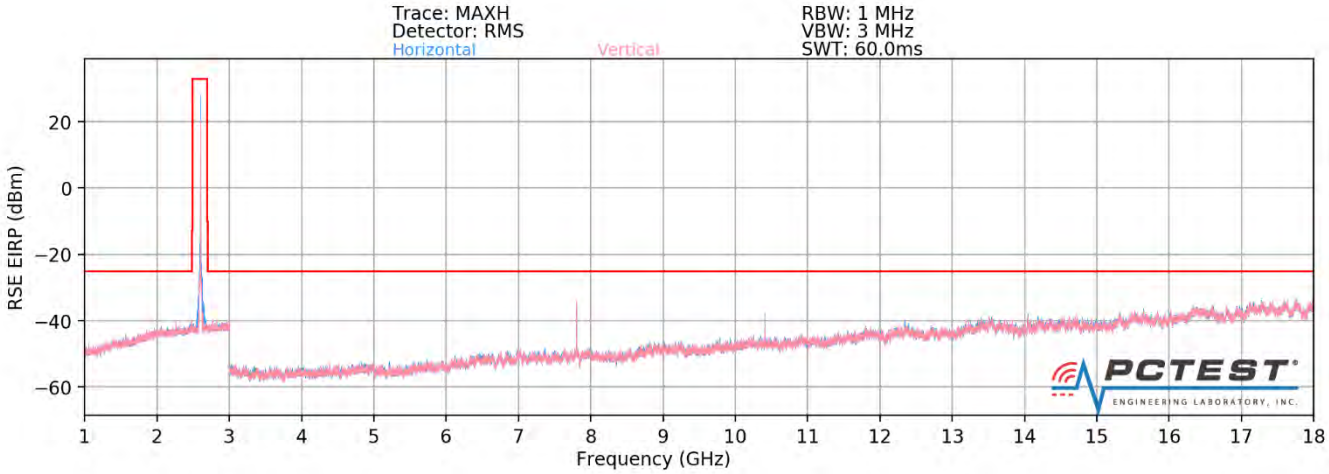
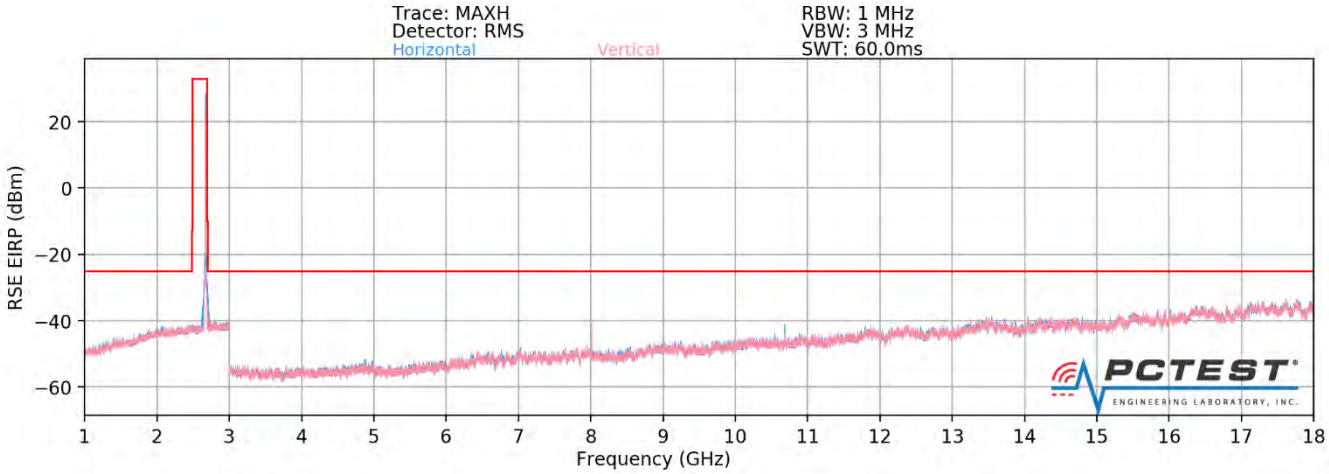
ULCA Band 41 (PC2)



Plot 7-511. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 (PC2) Low Channel – PCC/SCC: 1RB)



Plot 7-512. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 (PC2) Mid Channel – PCC/SCC: 1RB)



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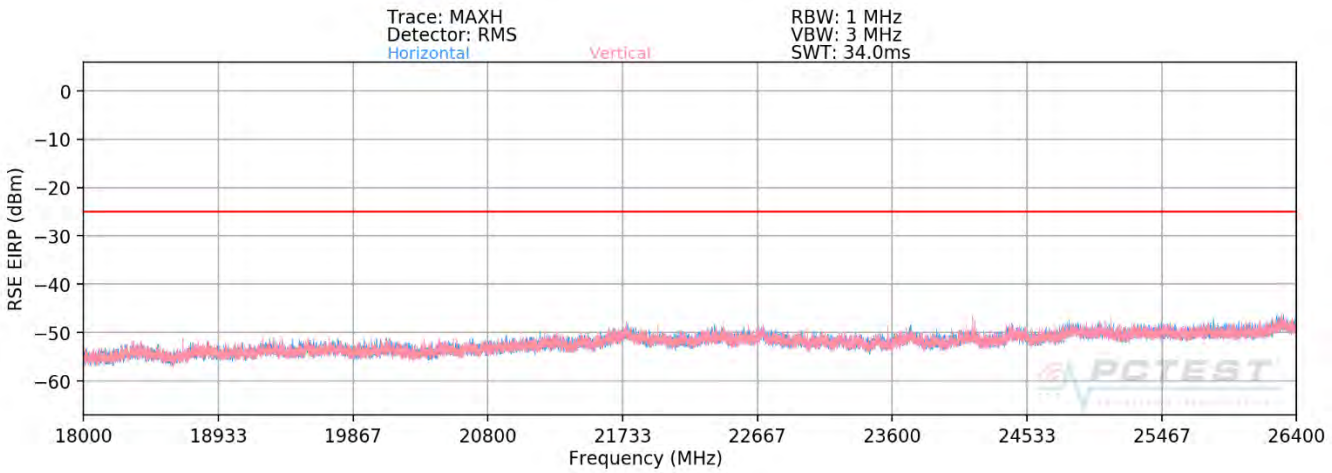
Plot 7-513. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 (PC2) High Channel – PCC/SCC: 1RB)



Plot 7-514. Radiated Spurious Plot 18GHz – 26.5GHz (ULCA Band 41 (PC2) Mid Channel – PCC/SCC: 1RB)

OPERATING FREQUENCY (PCC):	2506.00	MHz
OPERATING FREQUENCY (SCC):	2525.80	MHz
CHANNEL (PCC):	39750	
CHANNEL (SCC):	39948	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5012.00	V	116	318	-53.57	8.56	-45.01	-20.0
7518.00	V	100	355	-41.89	8.49	-33.40	-8.4
10024.00	V	103	45	-50.41	9.85	-40.56	-15.6
12530.00	V	106	15	-49.66	9.07	-40.59	-15.6
15036.00	V	-	-	-49.05	8.77	-40.28	-15.3
17542.00	V	-	-	-38.26	7.64	-30.63	-5.6

Plot 7-55. Radiated Spurious Data (ULCA B41 (PC2) PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Low Channel)

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OPERATING FREQUENCY (PCC):	2593.00	MHz
OPERATING FREQUENCY (SCC):	2612.80	MHz
CHANNEL (PCC):	40620	
CHANNEL (SCC):	40818	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	V	115	264	-56.53	8.70	-47.83	-22.8
7779.00	V	103	26	-42.57	8.69	-33.88	-8.9
10372.00	V	107	317	-49.21	9.62	-39.58	-14.6
12965.00	V	-	-	-50.76	8.99	-41.77	-16.8
15558.00	V	-	-	-47.99	8.32	-39.67	-14.7

Plot 7-56. Radiated Spurious Data (ULCA B41 (PC2) PCC: RB 1 Offset 99, SCC: RB 1 Offset 0 – Mid Channel)

OPERATING FREQUENCY (PCC):	2680.00	MHz
OPERATING FREQUENCY (SCC):	2660.20	MHz
CHANNEL (PCC):	41490	
CHANNEL (SCC):	41292	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5360.00	V	100	271	-56.05	8.70	-47.35	-22.4
8040.00	V	107	18	-43.17	8.95	-34.22	-9.2
10720.00	V	101	309	-51.09	9.32	-41.77	-16.8
13400.00	V	-	-	-49.83	8.77	-41.06	-16.1
16080.00	V	-	-	-46.94	8.01	-38.93	-13.9

Plot 7-57. Radiated Spurious Data (ULCA B41 (PC2) PCC: RB 1 Offset 0, SCC: RB 1 Offset 99 – High Channel)

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7.11 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments 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.

For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

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 fifteen minutes 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.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

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Band 71 Frequency Stability Measurements

OPERATING FREQUENCY: 680,500,000 Hz

REFERENCE VOLTAGE: 4.30 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	- 30	680,499,847	-153	-0.0000225
100 %		- 20	680,499,879	-121	-0.0000178
100 %		- 10	680,500,135	135	0.0000198
100 %		0	680,500,070	70	0.0000103
100 %		+ 10	680,500,041	41	0.0000060
100 %		+ 20	680,499,684	-316	-0.0000464
100 %		+ 30	680,500,030	30	0.0000044
100 %		+ 40	680,499,772	-228	-0.0000335
100 %		+ 50	680,500,358	358	0.0000526
BATT. ENDPOINT	2.76	+ 20	680,499,945	-55	-0.0000081

Table 7-58. Frequency Stability Data (Band 71)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 71 Frequency Stability Measurements

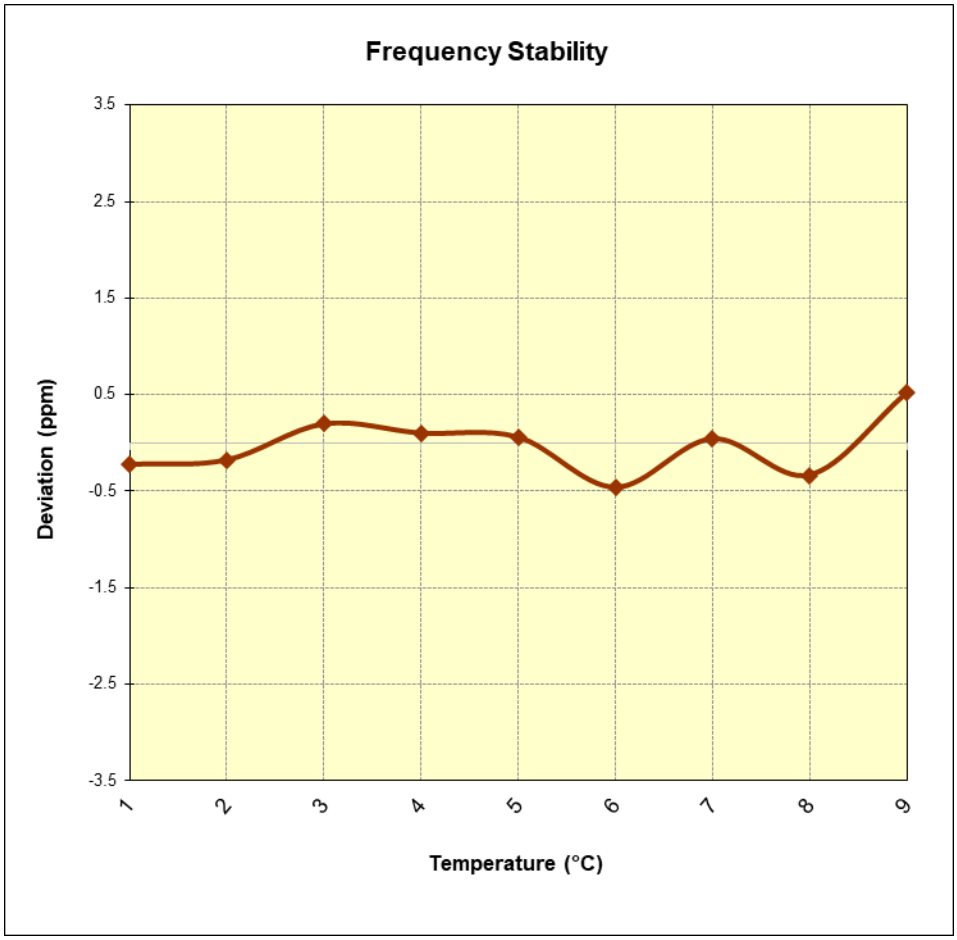

Figure 7-11. Frequency Stability Graph (Band 71)

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Band 12 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz

REFERENCE VOLTAGE: 4.30 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	- 30	707,499,814	-186	-0.0000263
100 %		- 20	707,499,777	-223	-0.0000315
100 %		- 10	707,500,047	47	0.0000066
100 %		0	707,500,116	116	0.0000164
100 %		+ 10	707,500,000	0	0.0000000
100 %		+ 20	707,499,611	-389	-0.0000550
100 %		+ 30	707,499,950	-50	-0.0000071
100 %		+ 40	707,500,194	194	0.0000274
100 %		+ 50	707,500,018	18	0.0000025
BATT. ENDPOINT	2.76	+ 20	707,499,796	-204	-0.0000288

Table 7-59. Frequency Stability Data (Band 12)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 12 Frequency Stability Measurements

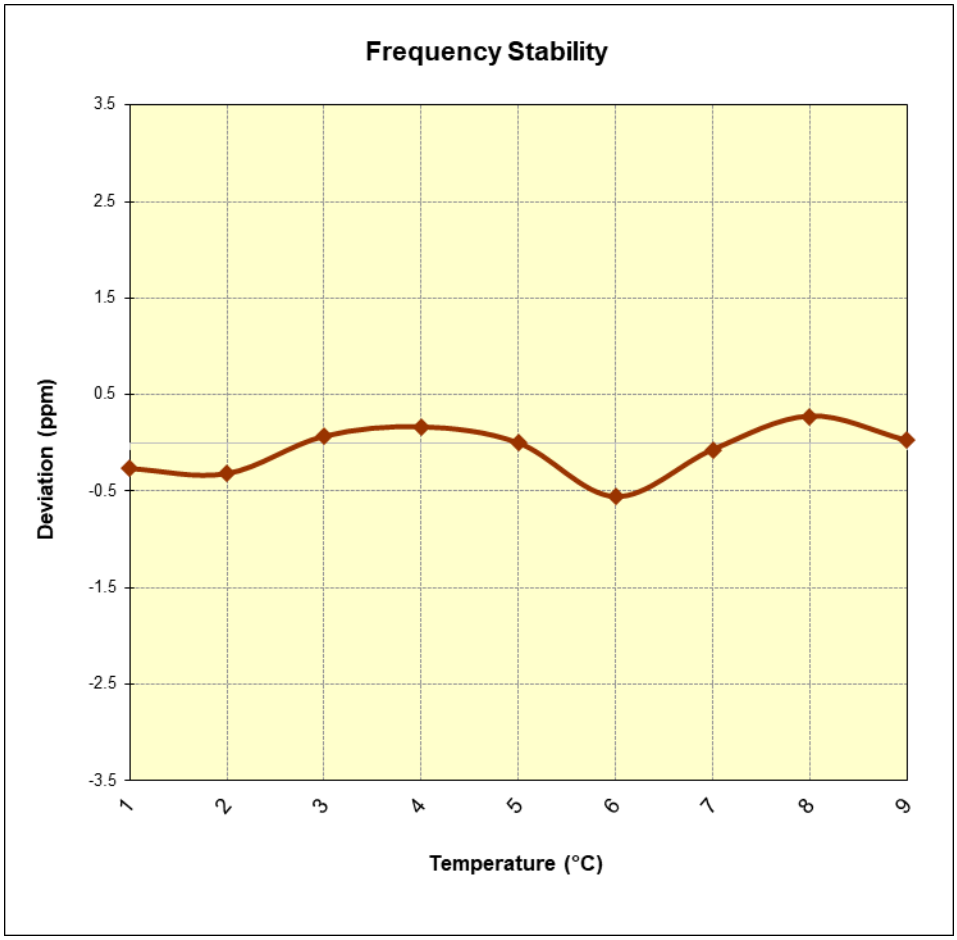

Figure 7-12. Frequency Stability Graph (Band 12)

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Band 13 Frequency Stability Measurements

OPERATING FREQUENCY: 782,000,000 Hz

REFERENCE VOLTAGE: 4.30 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	- 30	781,999,935	-65	-0.0000083
100 %		- 20	781,999,647	-353	-0.0000451
100 %		- 10	781,999,900	-100	-0.0000128
100 %		0	782,000,003	3	0.0000004
100 %		+ 10	782,000,176	176	0.0000225
100 %		+ 20	781,999,988	-12	-0.0000015
100 %		+ 30	781,999,838	-162	-0.0000207
100 %		+ 40	782,000,218	218	0.0000279
100 %		+ 50	781,999,931	-69	-0.0000088
BATT. ENDPOINT	2.76	+ 20	781,999,938	-62	-0.0000079

Table 7-60. Frequency Stability Data (Band 13)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 13 Frequency Stability Measurements

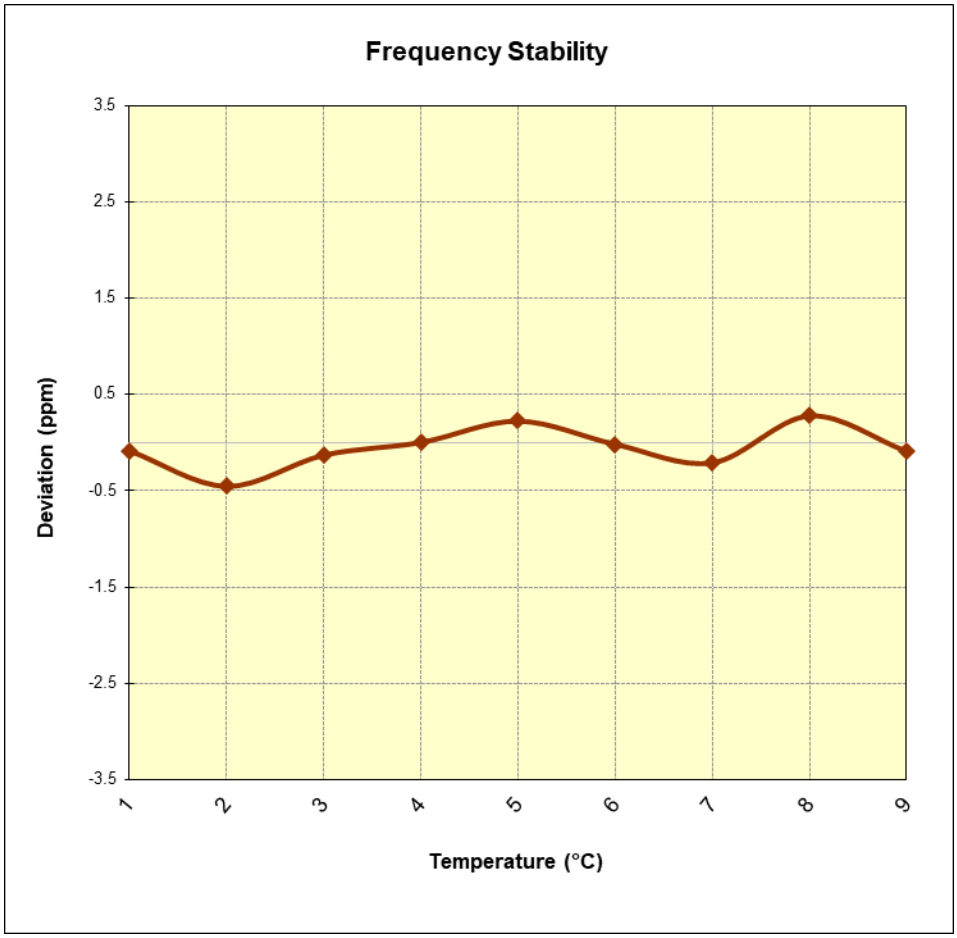

Figure 7-13. Frequency Stability Graph (Band 13)

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Band 26/5 Frequency Stability Measurements

OPERATING FREQUENCY: 831,500,000 Hz

REFERENCE VOLTAGE: 4.30 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	- 30	831,499,872	-128	-0.0000154
100 %		- 20	831,499,910	-90	-0.0000108
100 %		- 10	831,499,661	-339	-0.0000408
100 %		0	831,499,834	-166	-0.0000200
100 %		+ 10	831,500,030	30	0.0000036
100 %		+ 20	831,499,889	-111	-0.0000133
100 %		+ 30	831,499,991	-9	-0.0000011
100 %		+ 40	831,499,767	-233	-0.0000280
100 %		+ 50	831,500,228	228	0.0000274
BATT. ENDPOINT	2.76	+ 20	831,500,029	29	0.0000035

Table 7-61. Frequency Stability Data (Band 26/5)

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Band 26/5 Frequency Stability Measurements

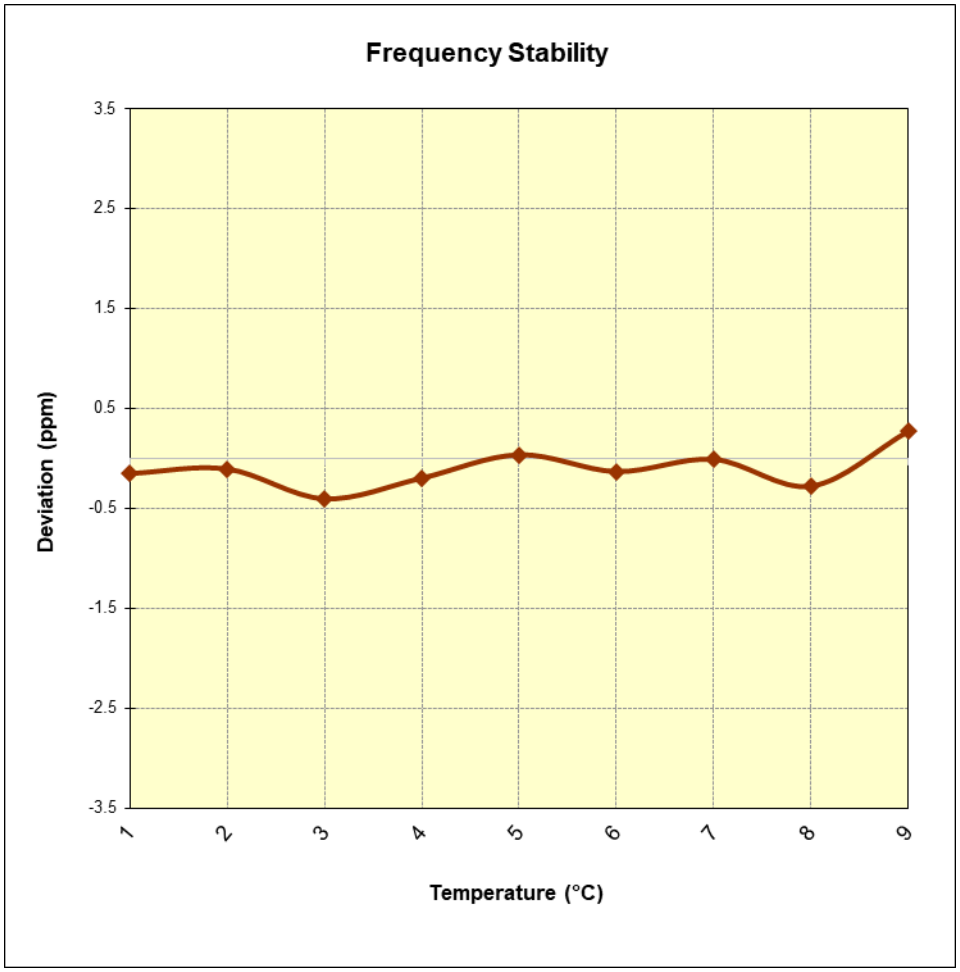

Figure 7-14. Frequency Stability Graph (Band 26/5)

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Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,745,000,000 Hz

REFERENCE VOLTAGE: 4.30 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	- 30	1,744,999,984	-16	-0.0000009
100 %		- 20	1,744,999,996	-4	-0.0000002
100 %		- 10	1,744,999,867	-133	-0.0000076
100 %		0	1,744,999,700	-300	-0.0000172
100 %		+ 10	1,744,999,952	-48	-0.0000028
100 %		+ 20	1,744,999,785	-215	-0.0000123
100 %		+ 30	1,745,000,348	348	0.0000199
100 %		+ 40	1,745,000,143	143	0.0000082
100 %		+ 50	1,744,999,850	-150	-0.0000086
BATT. ENDPOINT	2.76	+ 20	1,744,999,886	-114	-0.0000065

Table 7-62. Frequency Stability Data (Band 66/4)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 66/4 Frequency Stability Measurements

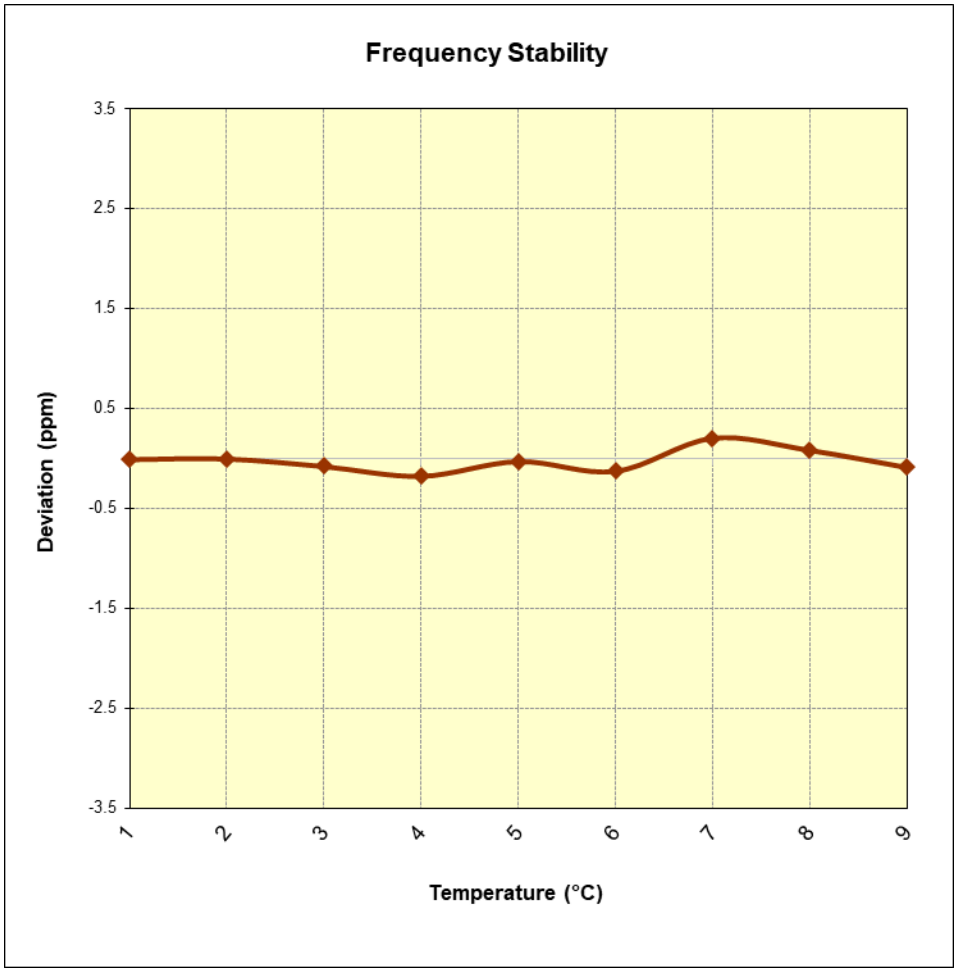

Figure 7-15. Frequency Stability Graph (Band 66/4)

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Band 25/2 Frequency Stability Measurements

OPERATING FREQUENCY: 1,882,500,000 Hz

REFERENCE VOLTAGE: 4.30 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	- 30	1,882,500,247	247	0.0000131
100 %		- 20	1,882,499,588	-412	-0.0000219
100 %		- 10	1,882,499,982	-18	-0.0000010
100 %		0	1,882,499,939	-61	-0.0000032
100 %		+ 10	1,882,500,023	23	0.0000012
100 %		+ 20	1,882,500,046	46	0.0000024
100 %		+ 30	1,882,499,698	-302	-0.0000160
100 %		+ 40	1,882,499,981	-19	-0.0000010
100 %		+ 50	1,882,499,748	-252	-0.0000134
BATT. ENDPOINT	2.76	+ 20	1,882,500,133	133	0.0000071

Table 7-63. Frequency Stability Data (Band 25/2)

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Band 25/2 Frequency Stability Measurements

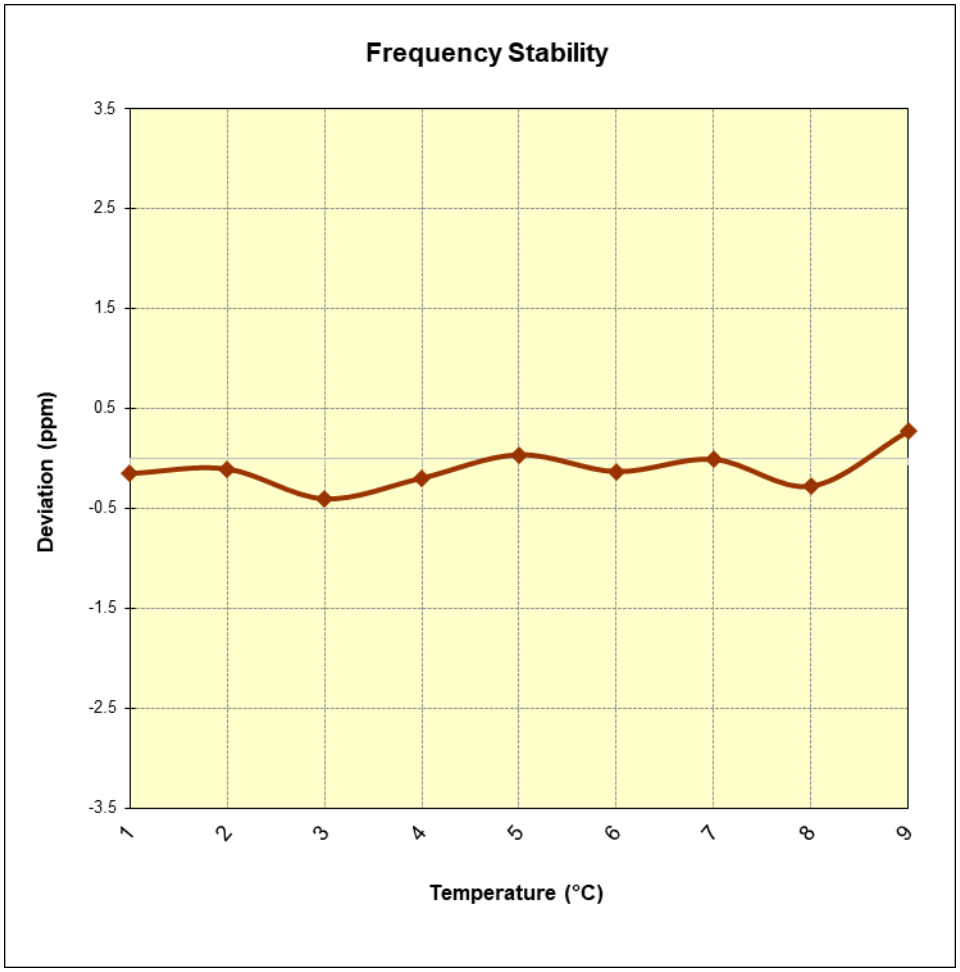

Figure 7-16. Frequency Stability Graph (Band 25/2)

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Band 30 Frequency Stability Measurements

OPERATING FREQUENCY: 2,310,000,000 Hz

REFERENCE VOLTAGE: 4.30 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	- 30	2,310,000,122	122	0.0000053
100 %		- 20	2,310,000,072	72	0.0000031
100 %		- 10	2,310,000,208	208	0.0000090
100 %		0	2,310,000,053	53	0.0000023
100 %		+ 10	2,310,000,146	146	0.0000063
100 %		+ 20	2,310,000,065	65	0.0000028
100 %		+ 30	2,310,000,435	435	0.0000188
100 %		+ 40	2,309,999,566	-434	-0.0000188
100 %		+ 50	2,309,999,928	-72	-0.0000031
BATT. ENDPOINT	2.76	+ 20	2,310,000,067	67	0.0000029

Table 7-64. Frequency Stability Data (Band 30)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 30 Frequency Stability Measurements

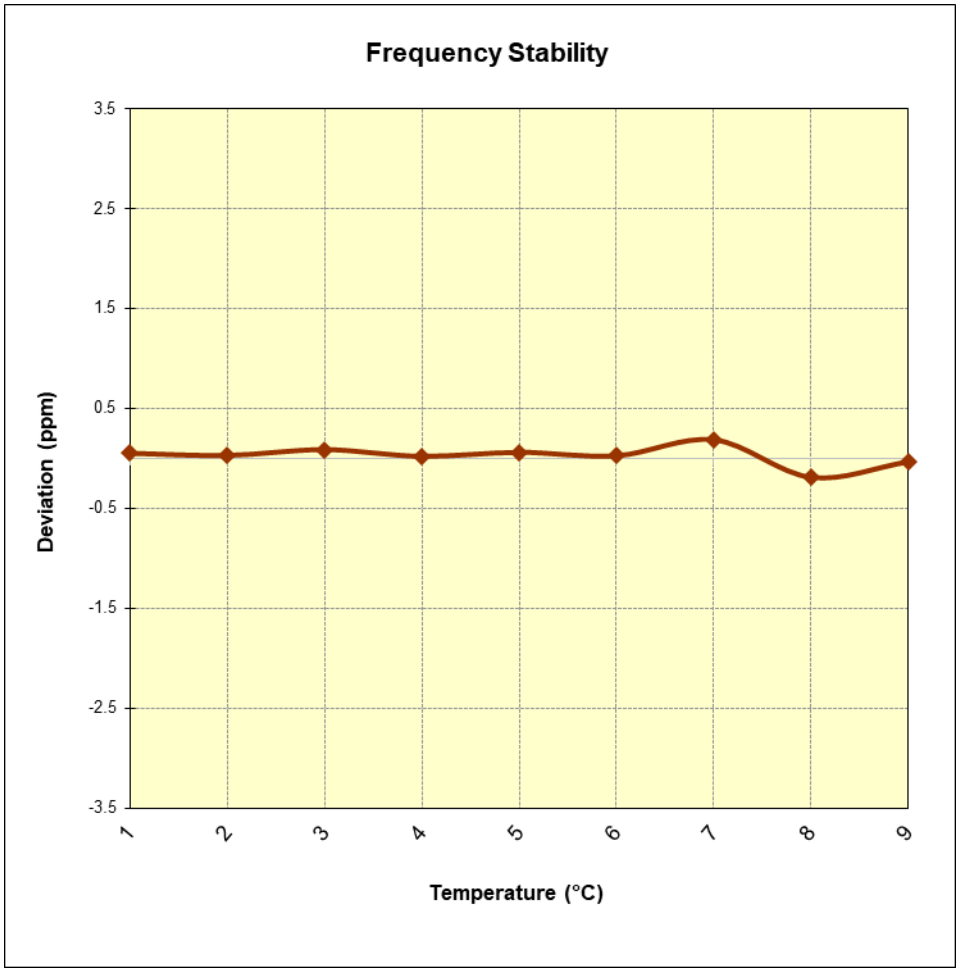

Figure 7-17. Frequency Stability Graph (Band 30)

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Band 7 Frequency Stability Measurements

OPERATING FREQUENCY: 680,500,000 Hz

REFERENCE VOLTAGE: 4.30 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	- 30	680,499,847	-153	-0.0000225
100 %		- 20	680,499,879	-121	-0.0000178
100 %		- 10	680,500,135	135	0.0000198
100 %		0	680,500,070	70	0.0000103
100 %		+ 10	680,500,041	41	0.0000060
100 %		+ 20	680,499,684	-316	-0.0000464
100 %		+ 30	680,500,030	30	0.0000044
100 %		+ 40	680,499,772	-228	-0.0000335
100 %		+ 50	680,500,358	358	0.0000526
BATT. ENDPOINT	2.76	+ 20	680,499,945	-55	-0.0000081

Table 7-65. Frequency Stability Data (Band 7)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 7 Frequency Stability Measurements

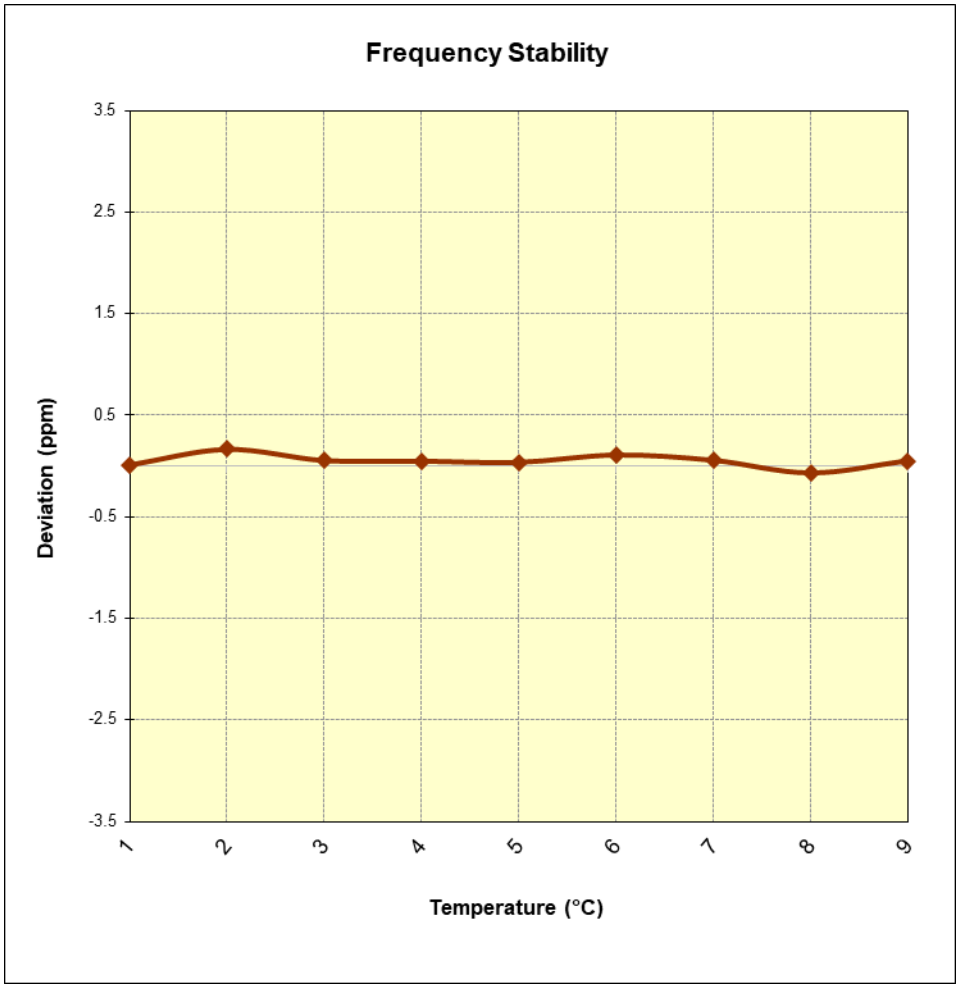

Figure 7-18. Frequency Stability Graph (Band 7)

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Band 41 Frequency Stability Measurements

OPERATING FREQUENCY: 2,593,000,000 Hz

REFERENCE VOLTAGE: 4.30 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.30	- 30	2,592,999,938	-62	-0.0000024
100 %		- 20	2,593,000,109	109	0.0000042
100 %		- 10	2,592,999,784	-216	-0.0000083
100 %		0	2,592,999,797	-203	-0.0000078
100 %		+ 10	2,592,999,996	-4	-0.0000002
100 %		+ 20	2,593,000,056	56	0.0000022
100 %		+ 30	2,592,999,937	-63	-0.0000024
100 %		+ 40	2,593,000,015	15	0.0000006
100 %		+ 50	2,592,999,944	-56	-0.0000022
BATT. ENDPOINT	2.76	+ 20	2,592,999,900	-100	-0.0000039

Table 7-66. Frequency Stability Data (Band 41)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Band 41 Frequency Stability Measurements

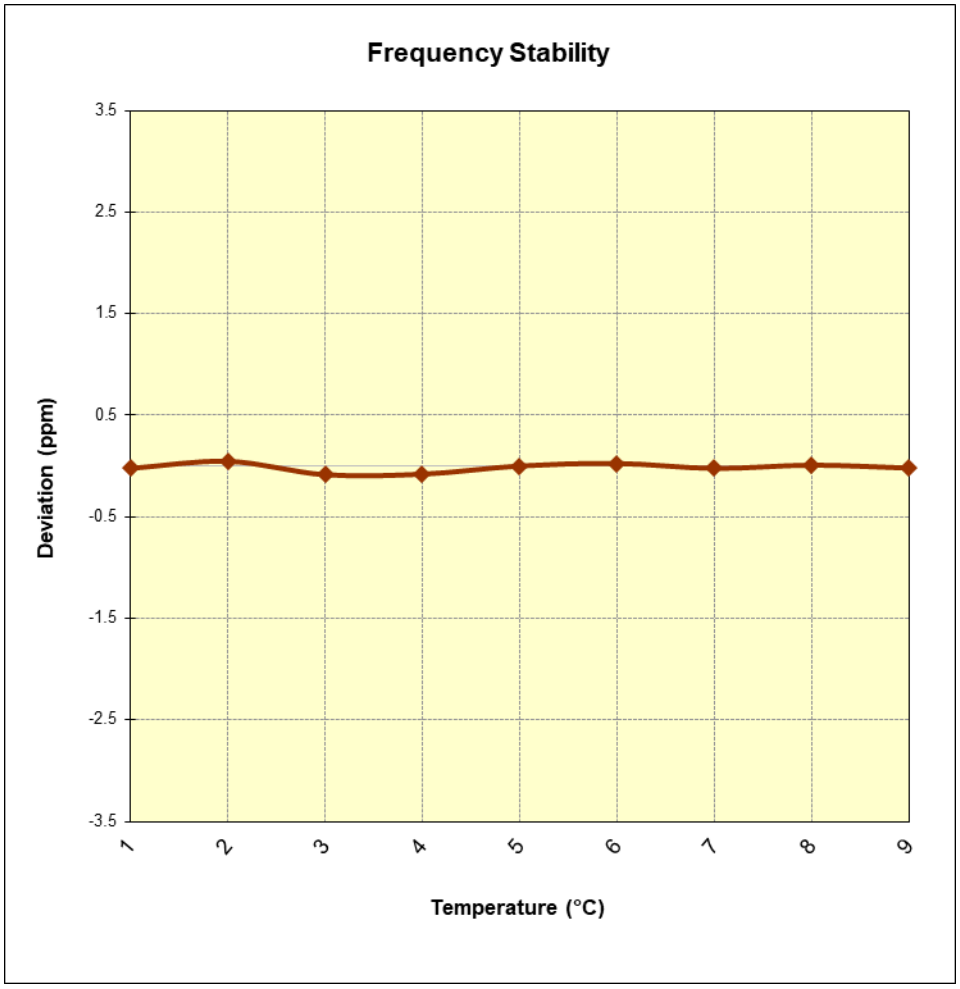

Figure 7-19. Frequency Stability Graph (Band 41)

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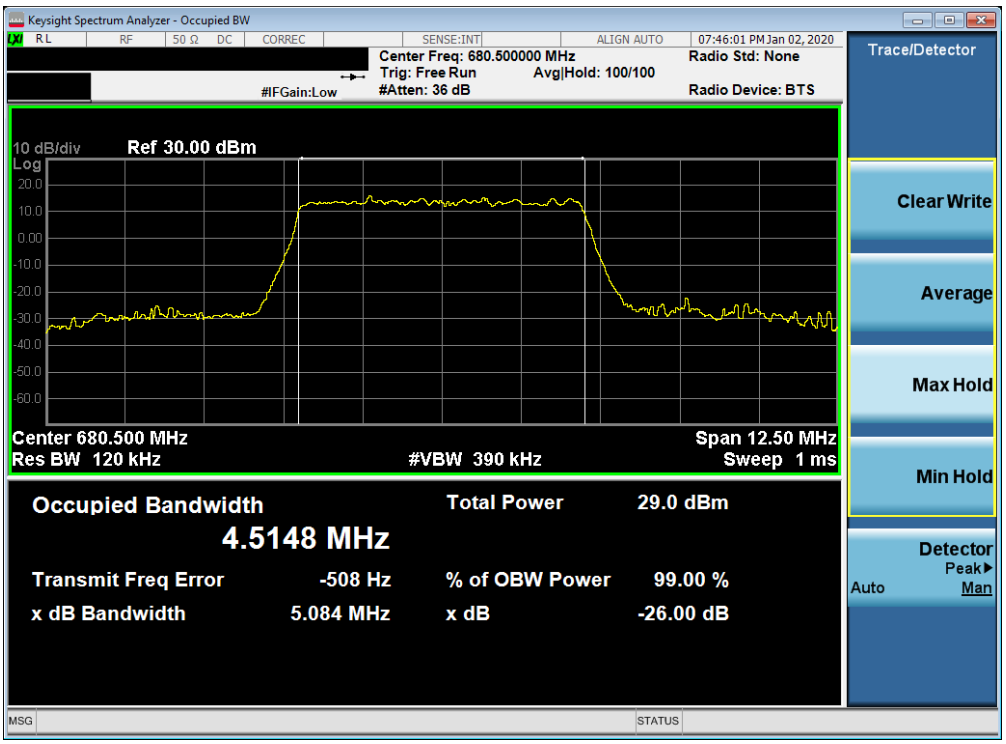
7.12 Sub 6GHz NR / EN-DC Test Results

Occupied Bandwidth

All SCS's and Waveforms (CP-OFDM vs DFT-s OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

NR Band n71



Plot 7-515. Occupied Bandwidth Plot (n71 5MHz QPSK-CP-OFDM - Full RB Configuration)

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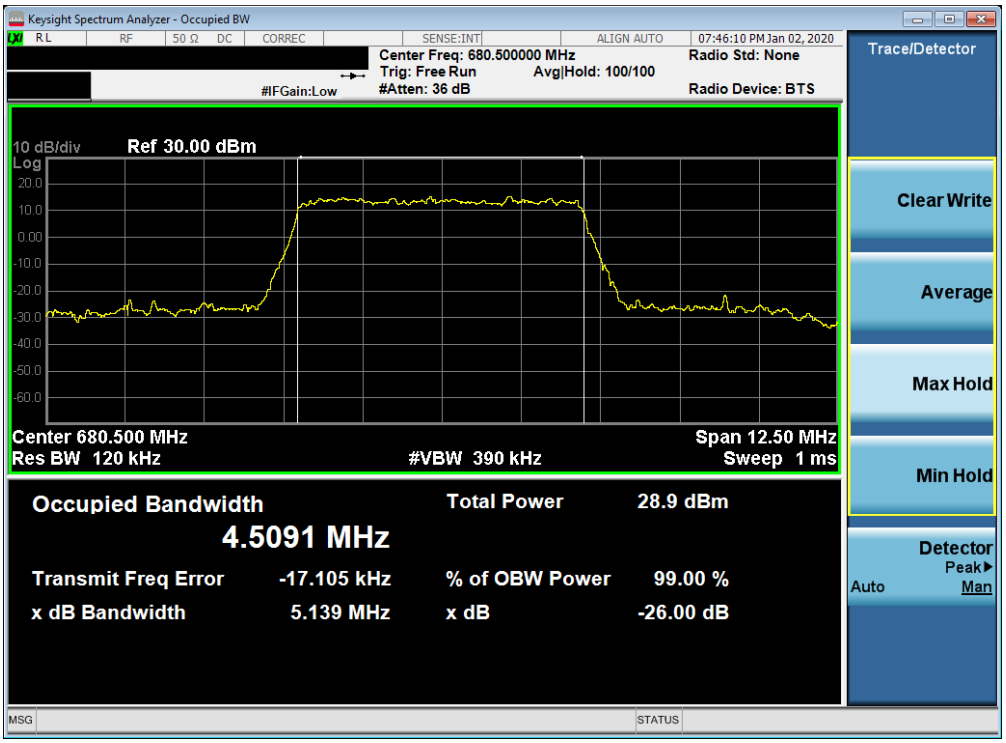
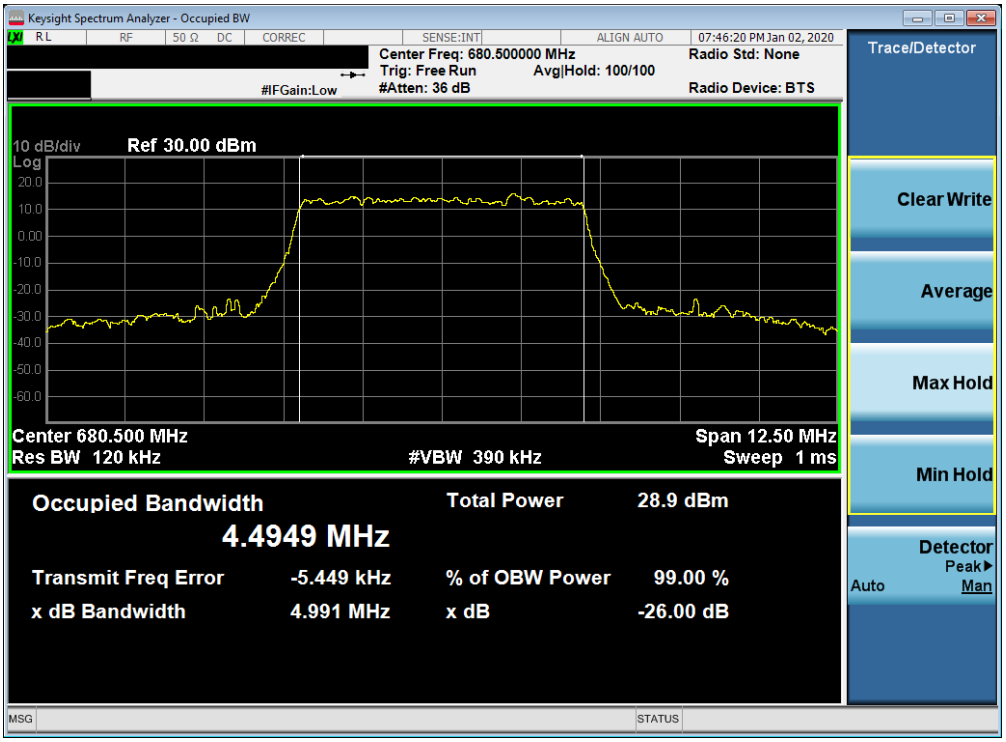


Plot 7-516. Occupied Bandwidth Plot (n71 5MHz 16QAM-CP-OFDM - Full RB Configuration)



Plot 7-517. Occupied Bandwidth Plot (n71 5MHz 64QAM-CP-OFDM- Full RB Configuration)

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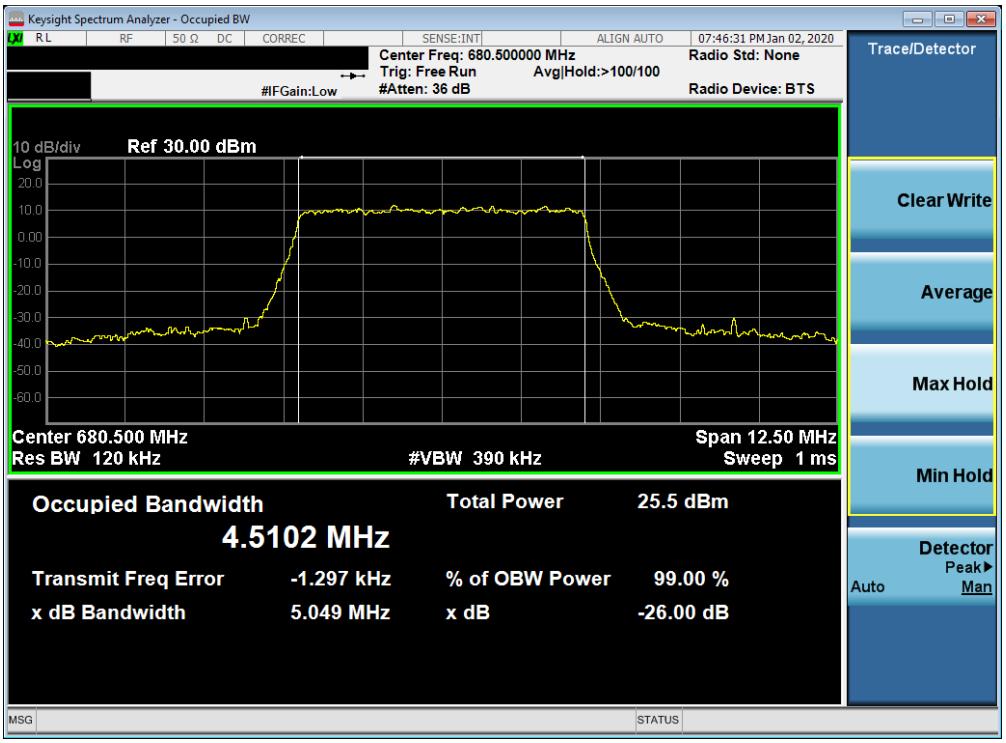
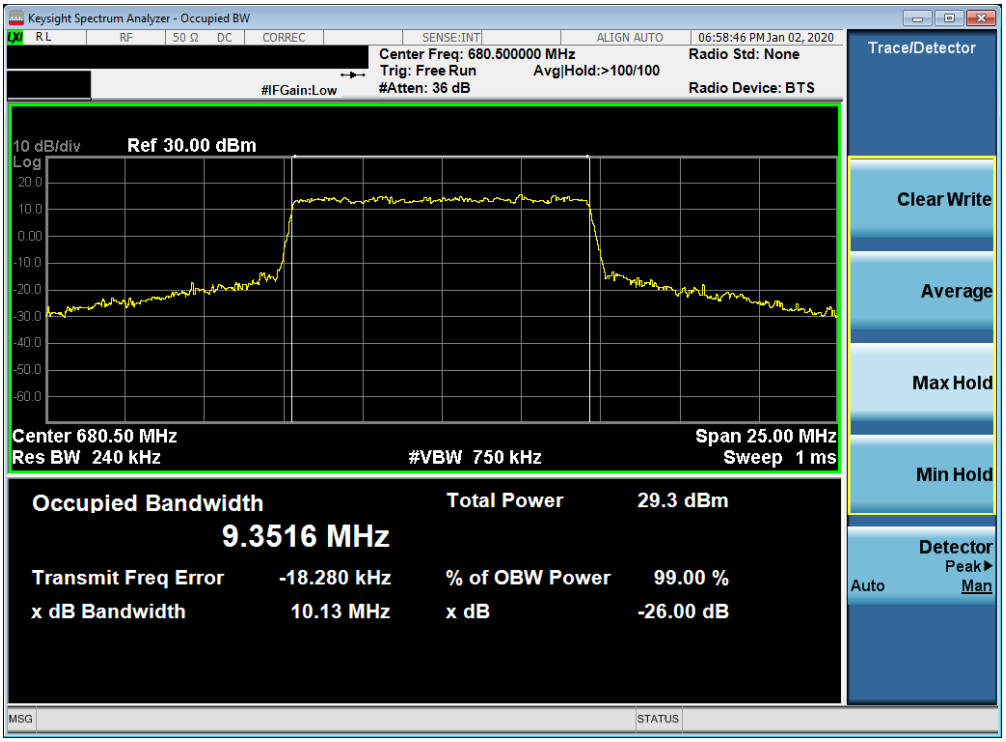


Plot 7-518. Occupied Bandwidth Plot (n71 5MHz 256QAM-CP-OFDM - Full RB Configuration)



Plot 7-519. Occupied Bandwidth Plot (n71 10MHz QPSK-CP-OFDM - Full RB Configuration)

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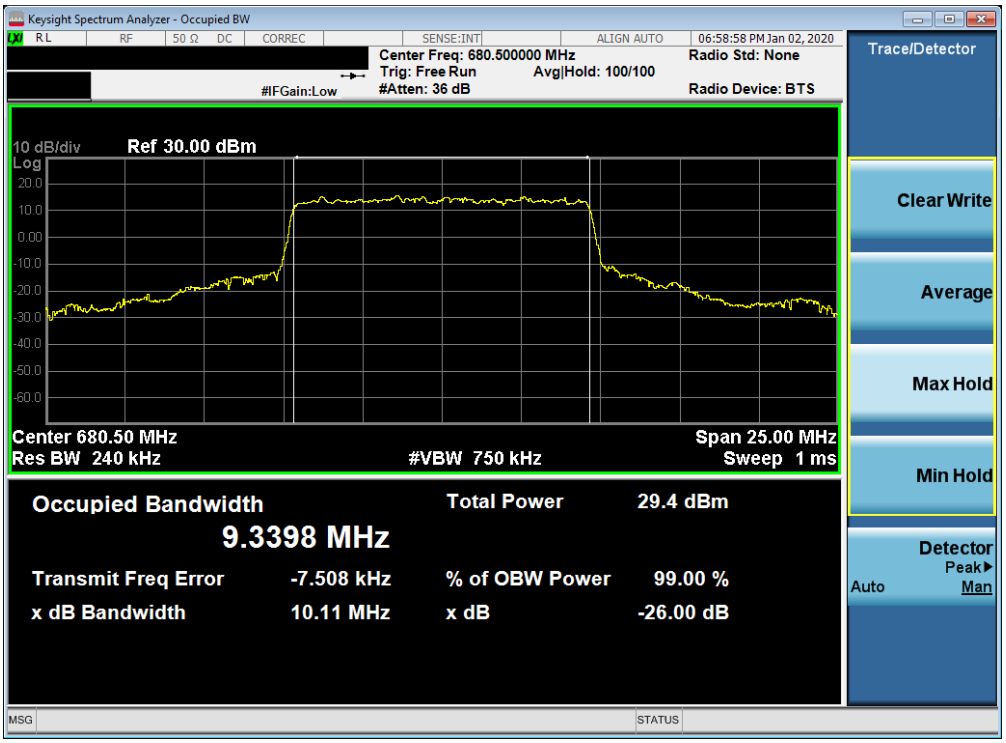
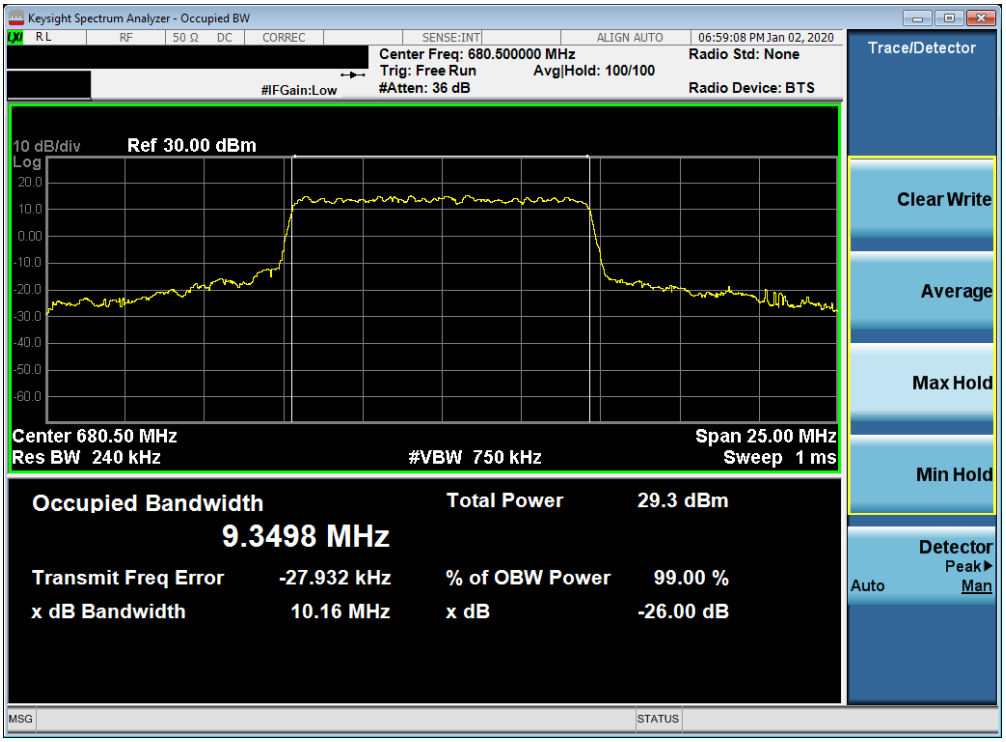


Plot 7-520. Occupied Bandwidth Plot (n71 10MHz 16QAM-CP-OFDM - Full RB Configuration)



Plot 7-521. Occupied Bandwidth Plot (n71 10MHz 64QAM-CP-OFDM- Full RB Configuration)

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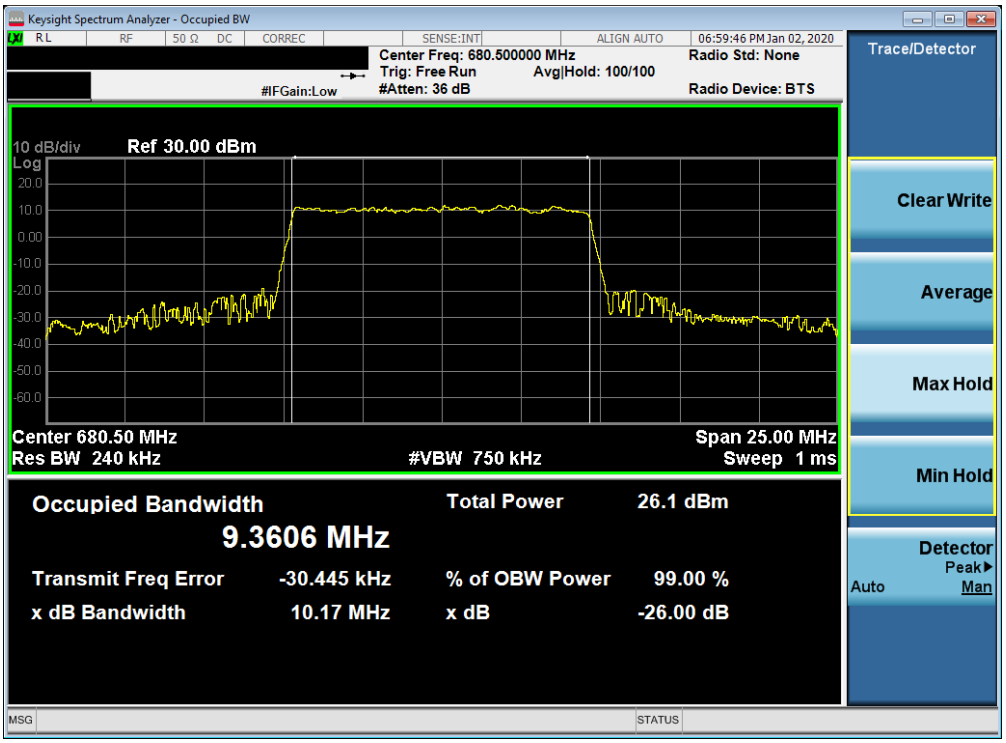
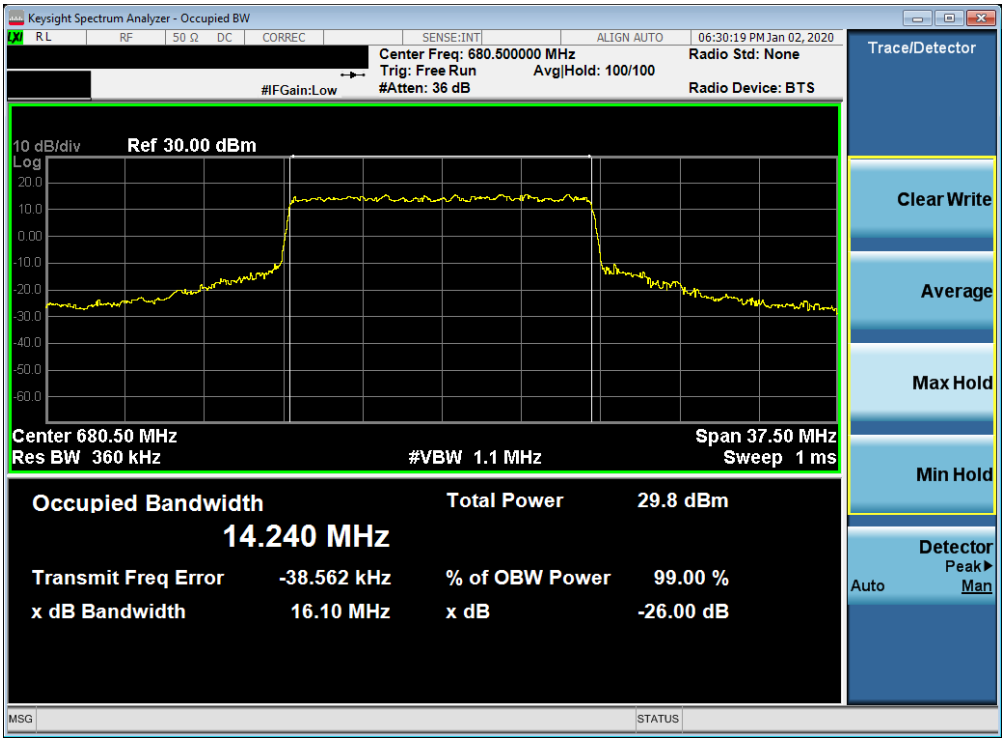


Plot 7-522. Occupied Bandwidth Plot (n71 10MHz 256QAM-CP-OFDM - Full RB Configuration)



Plot 7-523. Occupied Bandwidth Plot (n71 15MHz QPSK-CP-OFDM - Full RB Configuration)

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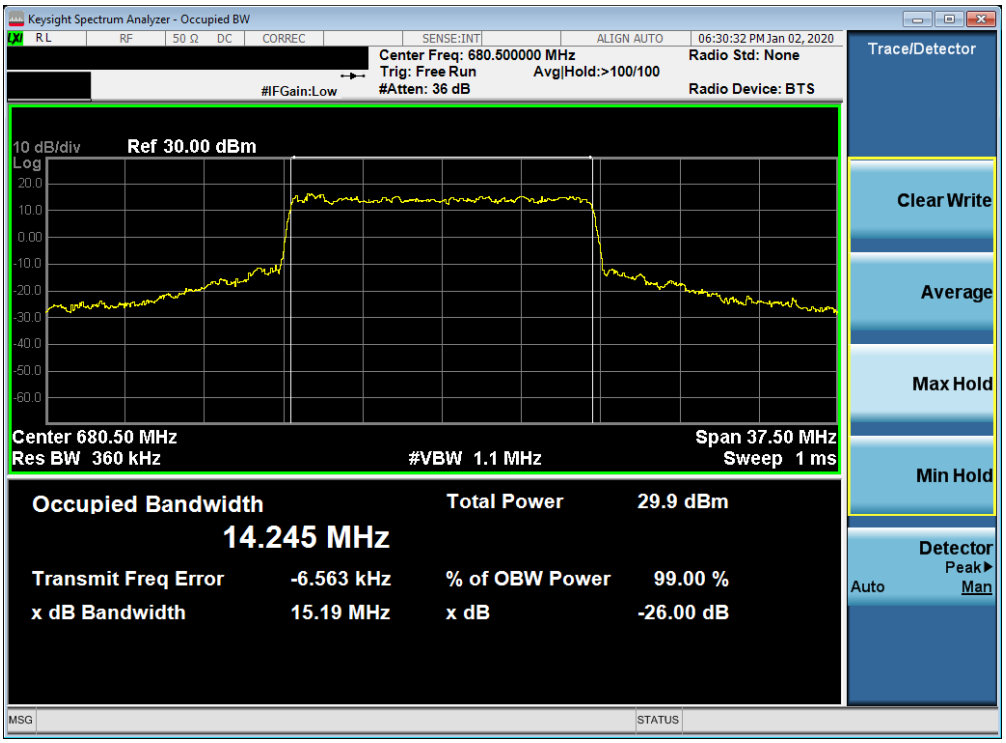
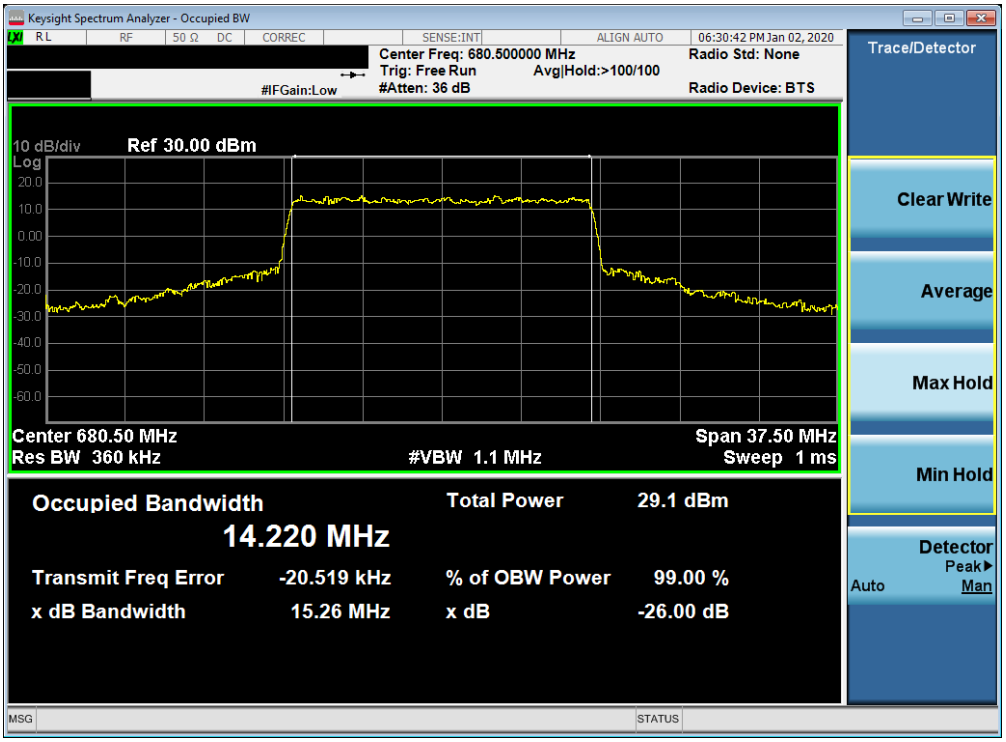


Plot 7-524. Occupied Bandwidth Plot (n71 15MHz 16QAM-CP-OFDM - Full RB Configuration)



Plot 7-525. Occupied Bandwidth Plot (n71 15MHz 64QAM-CP-OFDM- Full RB Configuration)

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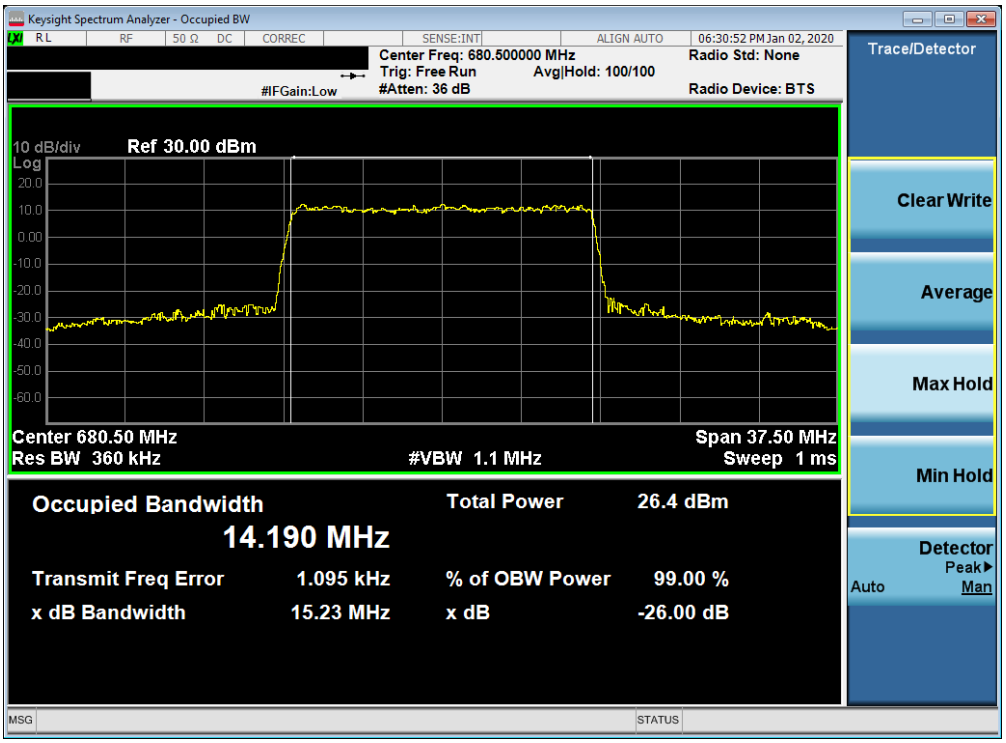
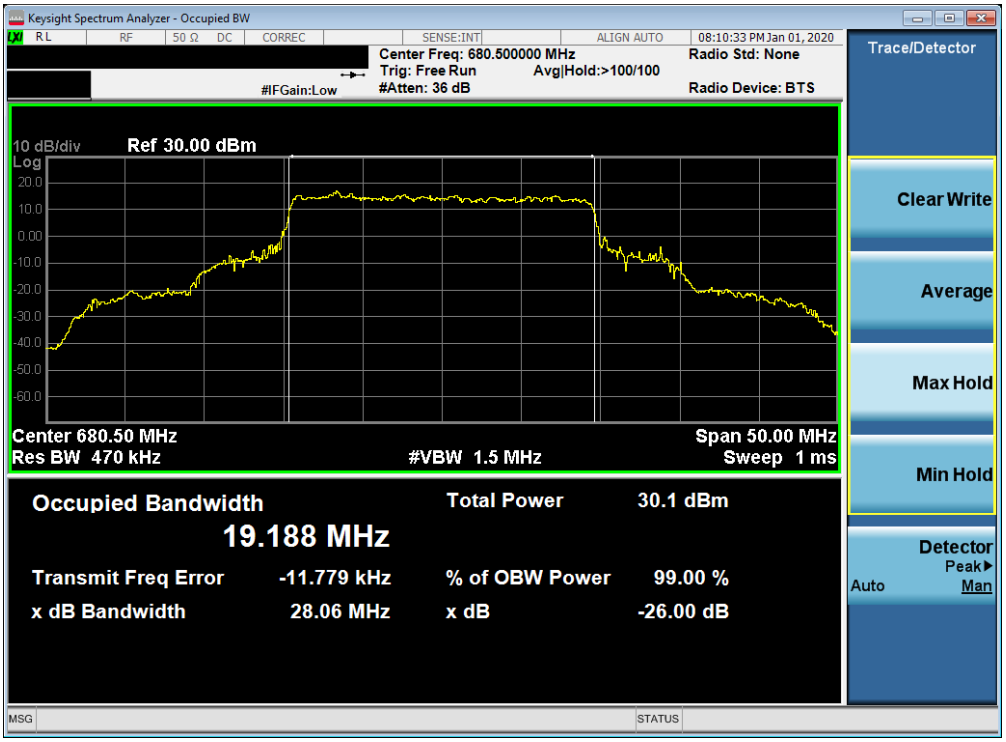


Plot 7-526. Occupied Bandwidth Plot (n71 15MHz 256QAM-CP-OFDM - Full RB Configuration)



Plot 7-527. Occupied Bandwidth Plot (n71 20MHz QPSK-CP-OFDM - Full RB Configuration)

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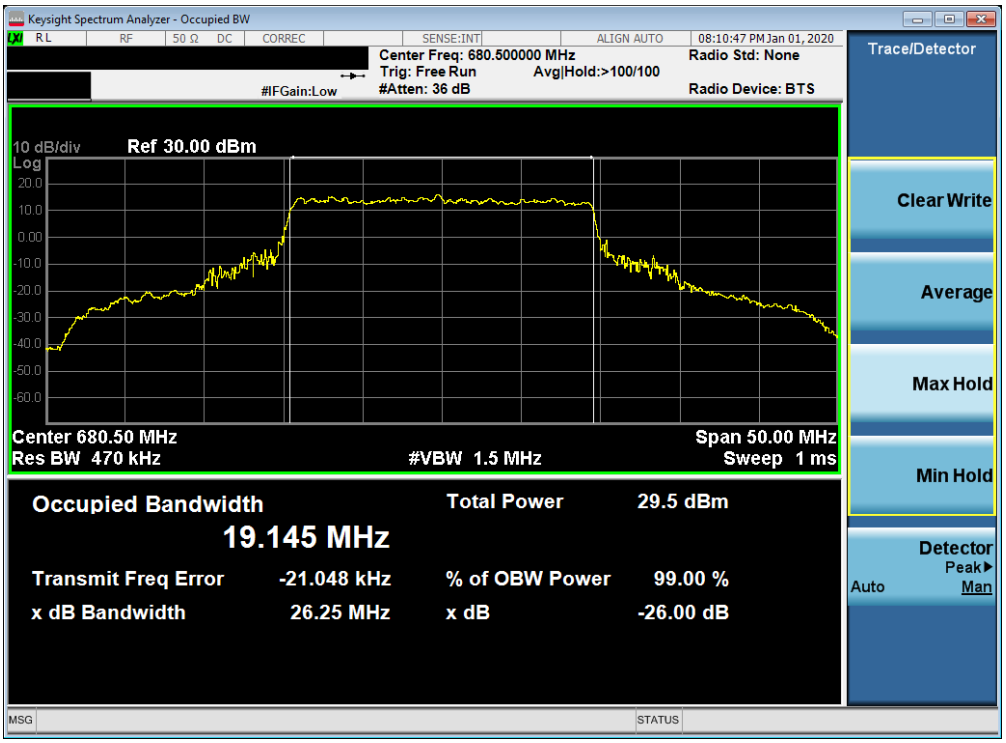
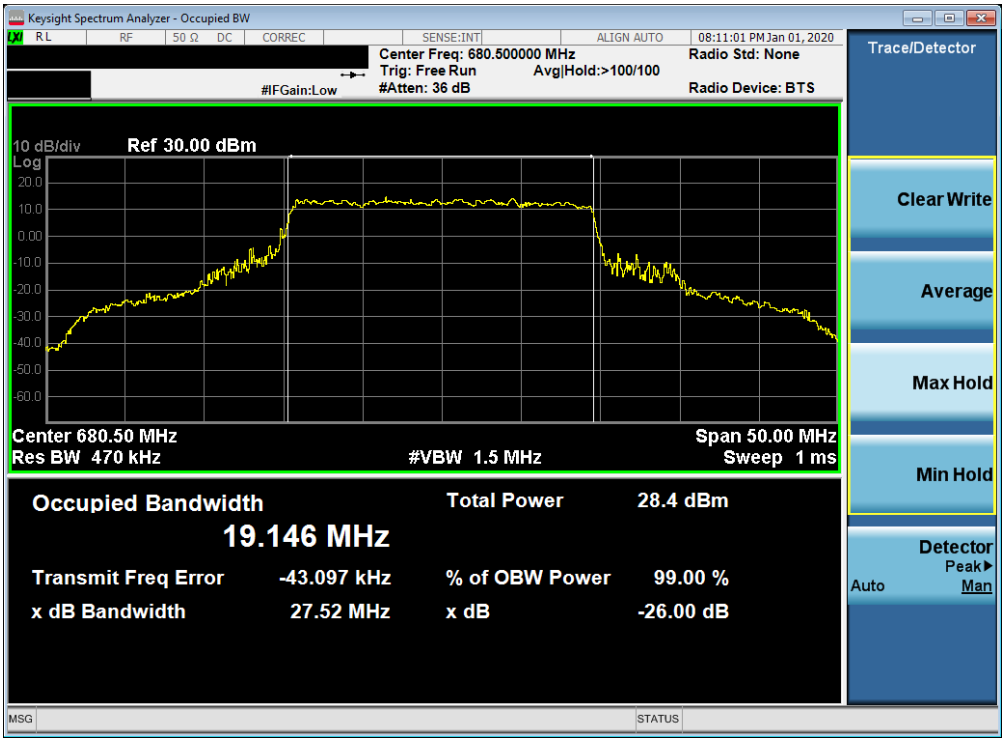


Plot 7-528. Occupied Bandwidth Plot (n71 20MHz 16QAM-CP-OFDM - Full RB Configuration)



Plot 7-529. Occupied Bandwidth Plot (n71 20MHz 64QAM-CP-OFDM- Full RB Configuration)

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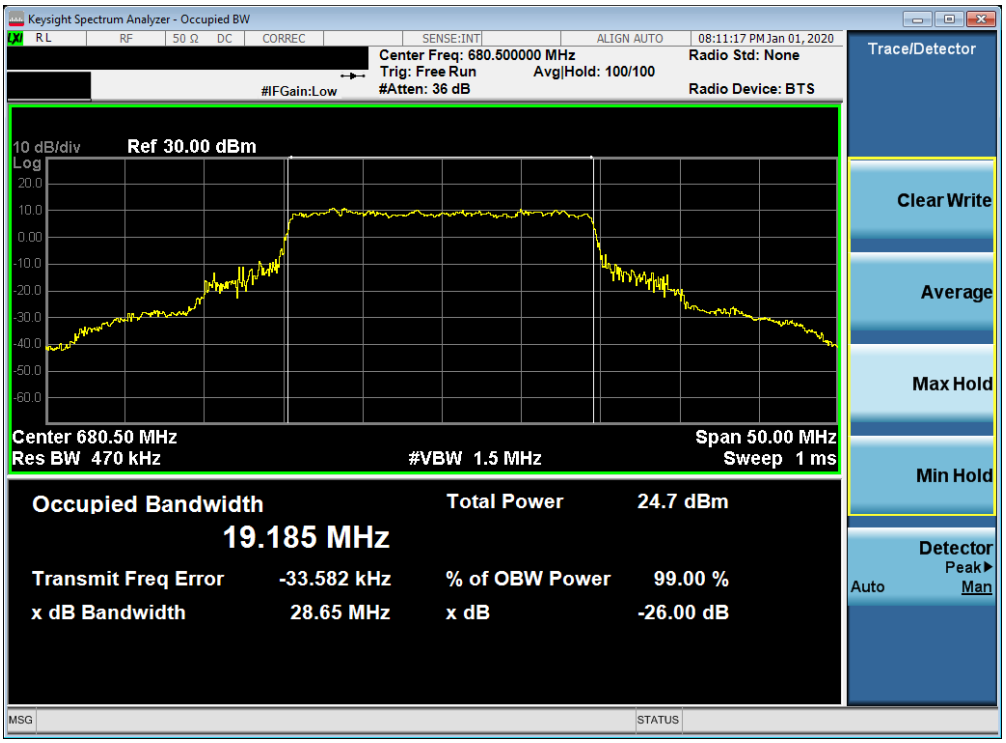

Plot 7-530. Occupied Bandwidth Plot (n71 20MHz 256QAM-CP-OFDM - Full RB Configuration)

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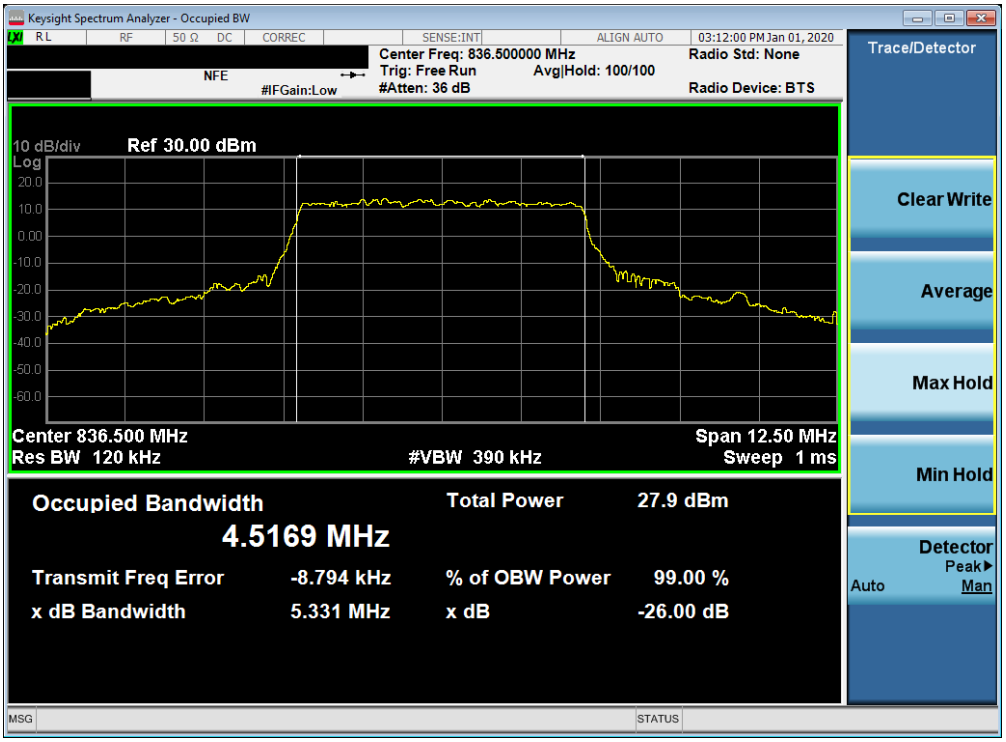
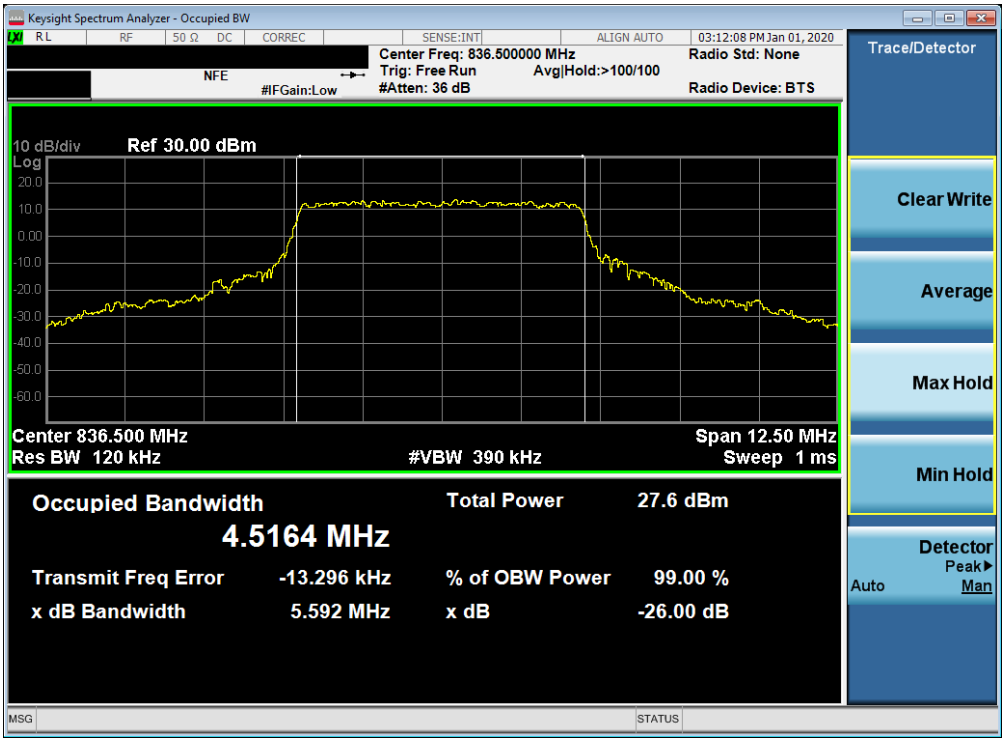


Plot 7-531. Occupied Bandwidth Plot (n5 5MHz QPSK-CP-OFDM - Full RB Configuration)



Plot 7-532. Occupied Bandwidth Plot (n5 5MHz 16QAM-CP-OFDM - Full RB Configuration)

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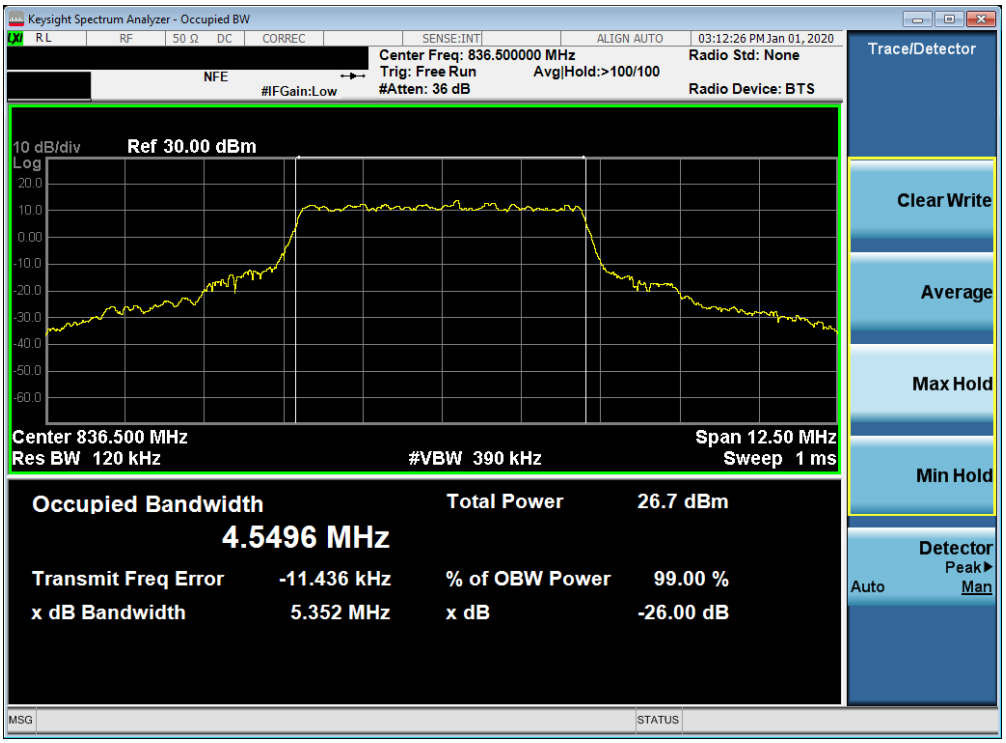
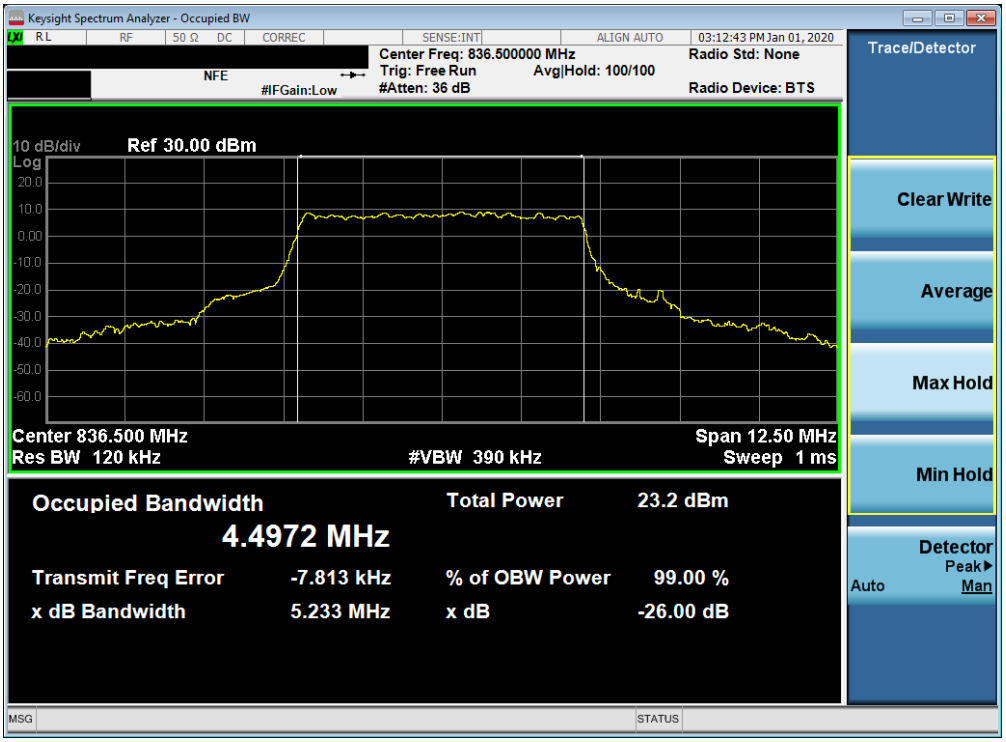


Plot 7-533. Occupied Bandwidth Plot (n5 5MHz 64QAM-CP-OFDM- Full RB Configuration)



Plot 7-534. Occupied Bandwidth Plot (n5 5MHz 256QAM-CP-OFDM - Full RB Configuration)

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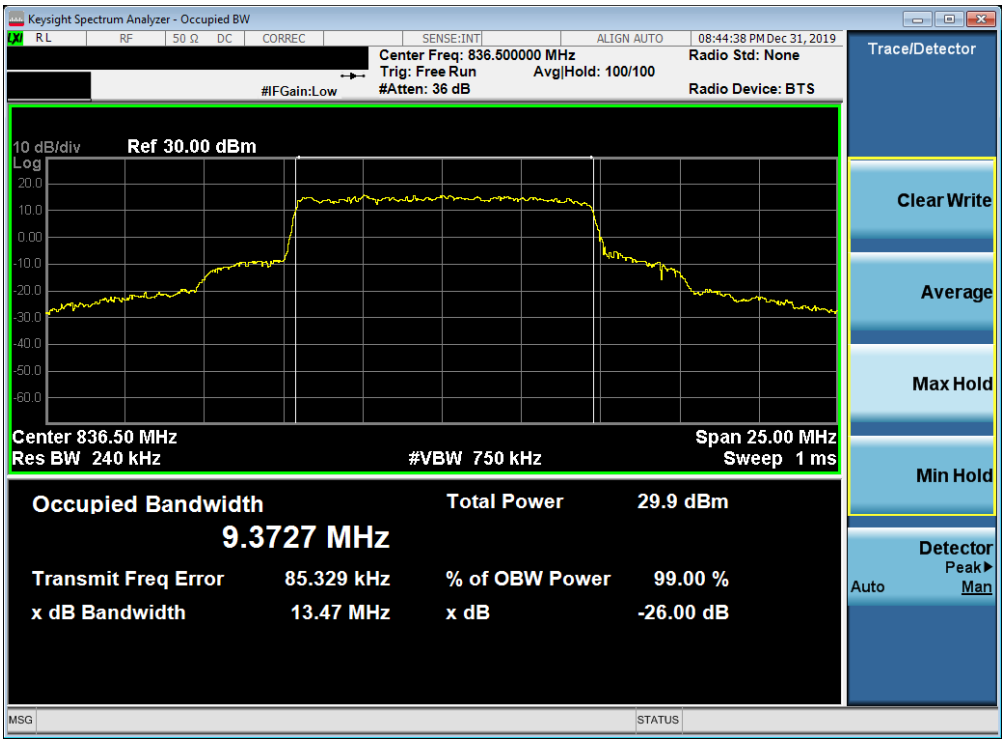
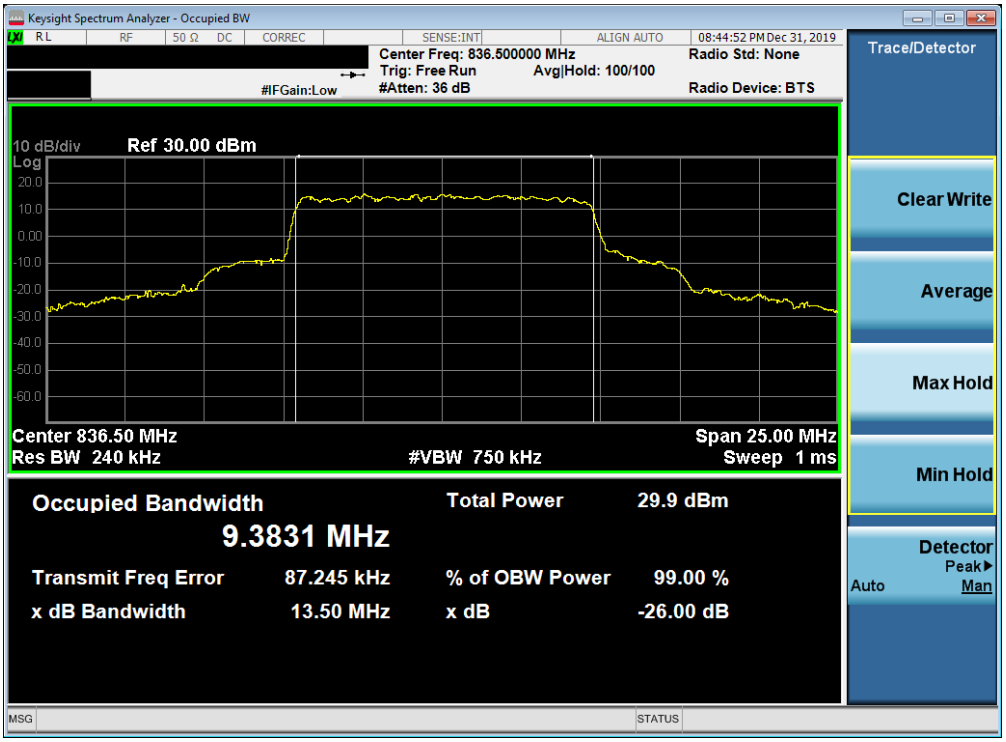


Plot 7-535. Occupied Bandwidth Plot (n5 10MHz QPSK-CP-OFDM - Full RB Configuration)



Plot 7-536. Occupied Bandwidth Plot (n5 10MHz 16QAM-CP-OFDM - Full RB Configuration)

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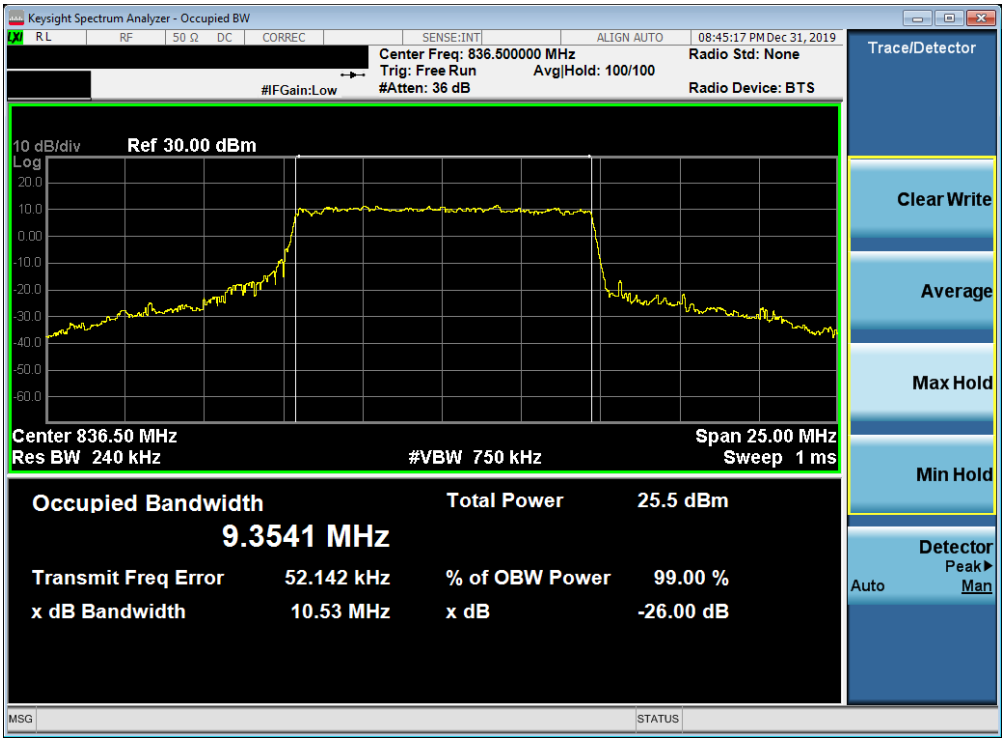
Plot 7-537. Occupied Bandwidth Plot (n5 10MHz 64QAM-CP-OFDM- Full RB Configuration)



Plot 7-538. Occupied Bandwidth Plot (n5 10MHz 256QAM-CP-OFDM - Full RB Configuration)

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