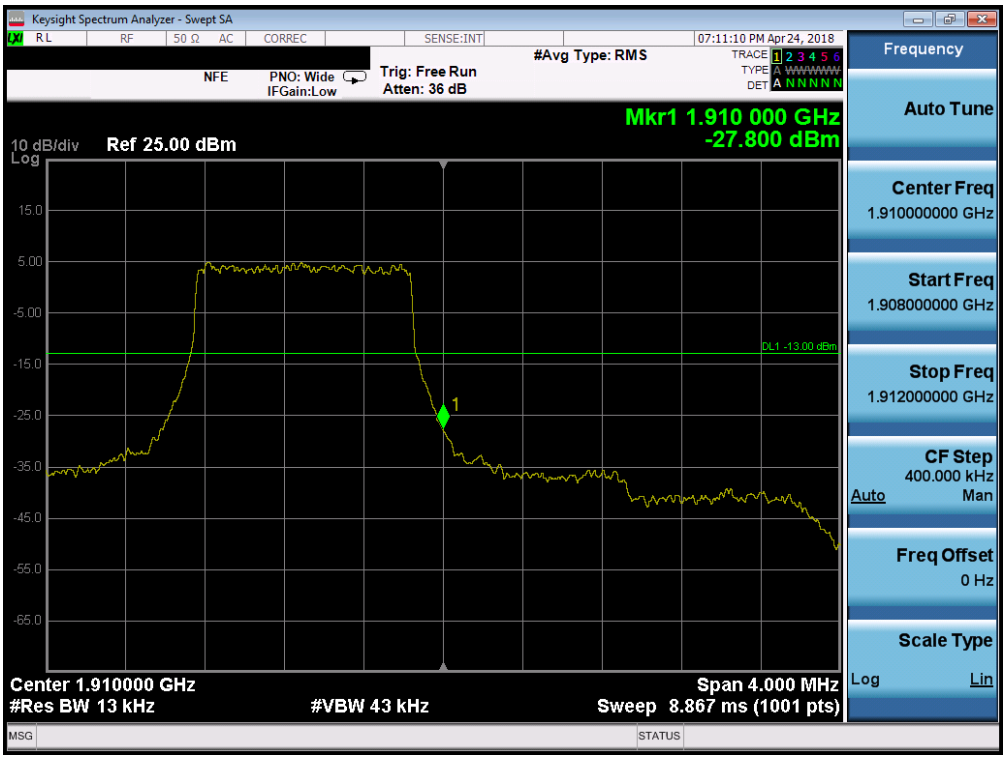
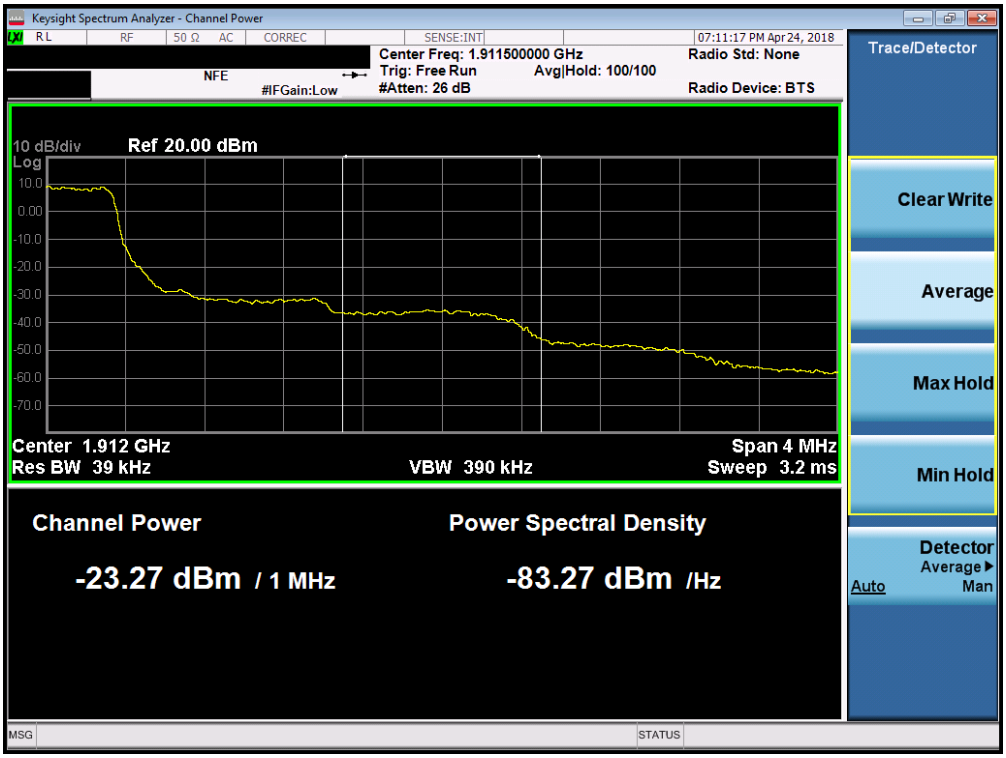


Plot 7-218. Upper Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-219. Upper Extended Band Edge Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)

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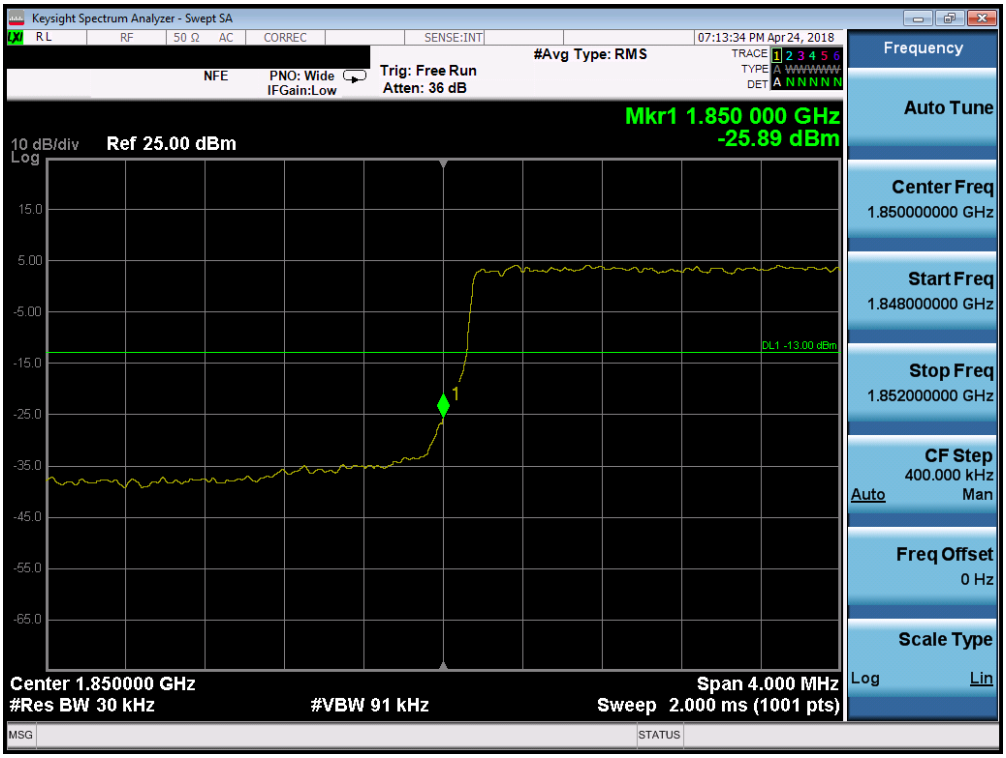
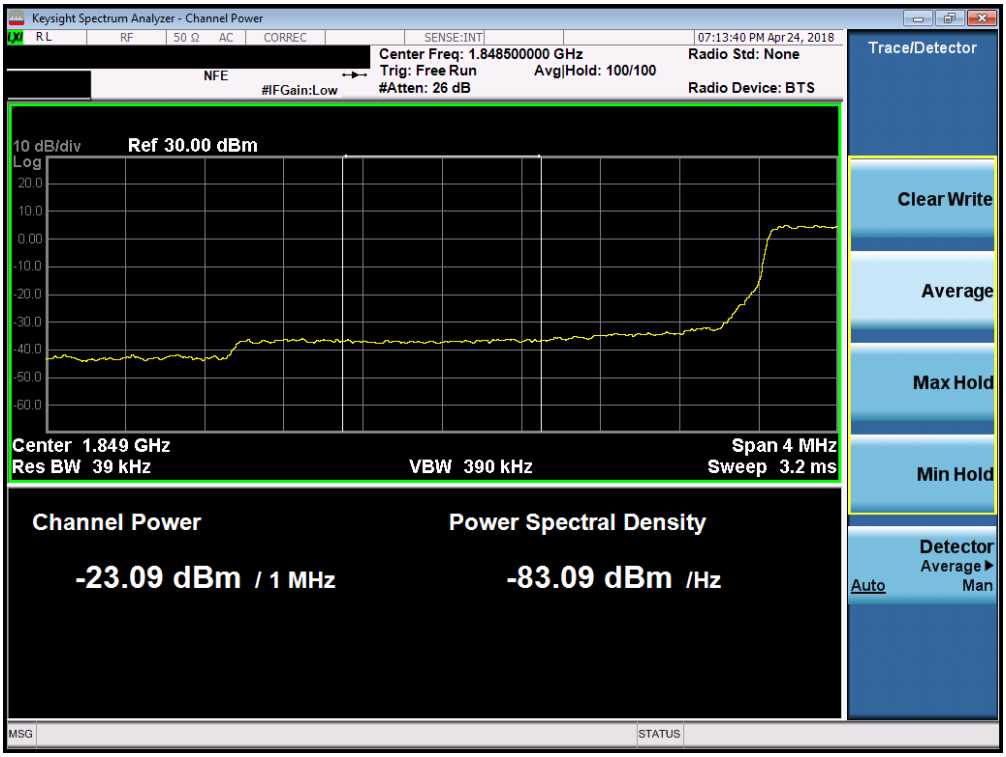


Plot 7-220. Lower Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-221. Lower Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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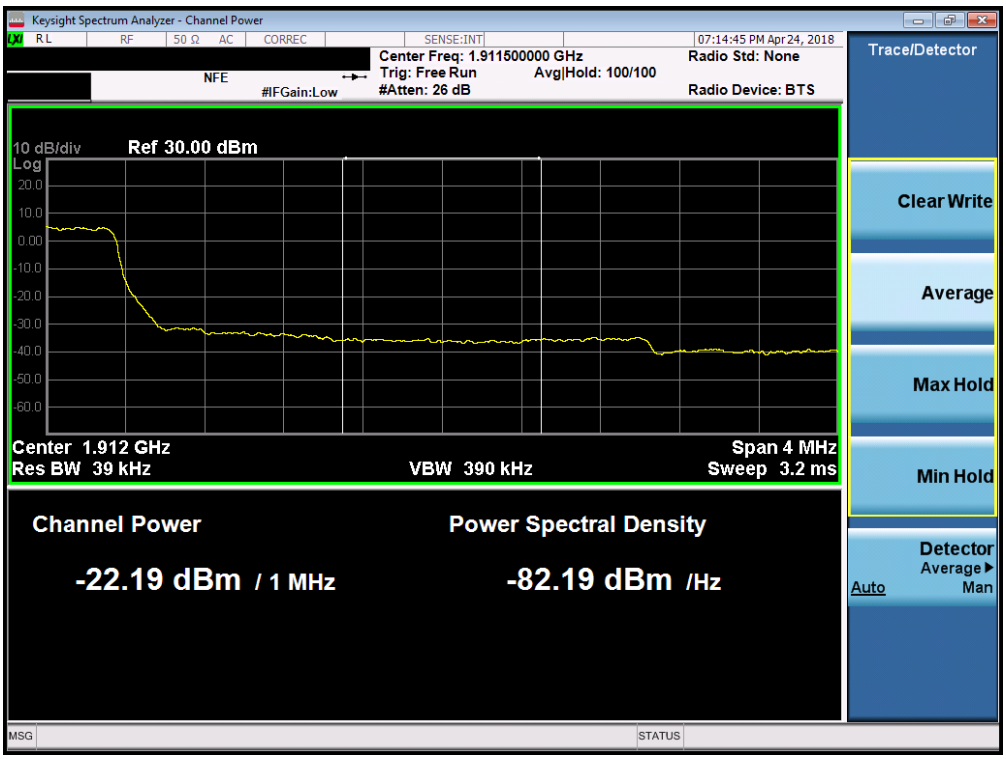
Plot 7-222. Upper Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-223. Upper Extended Band Edge Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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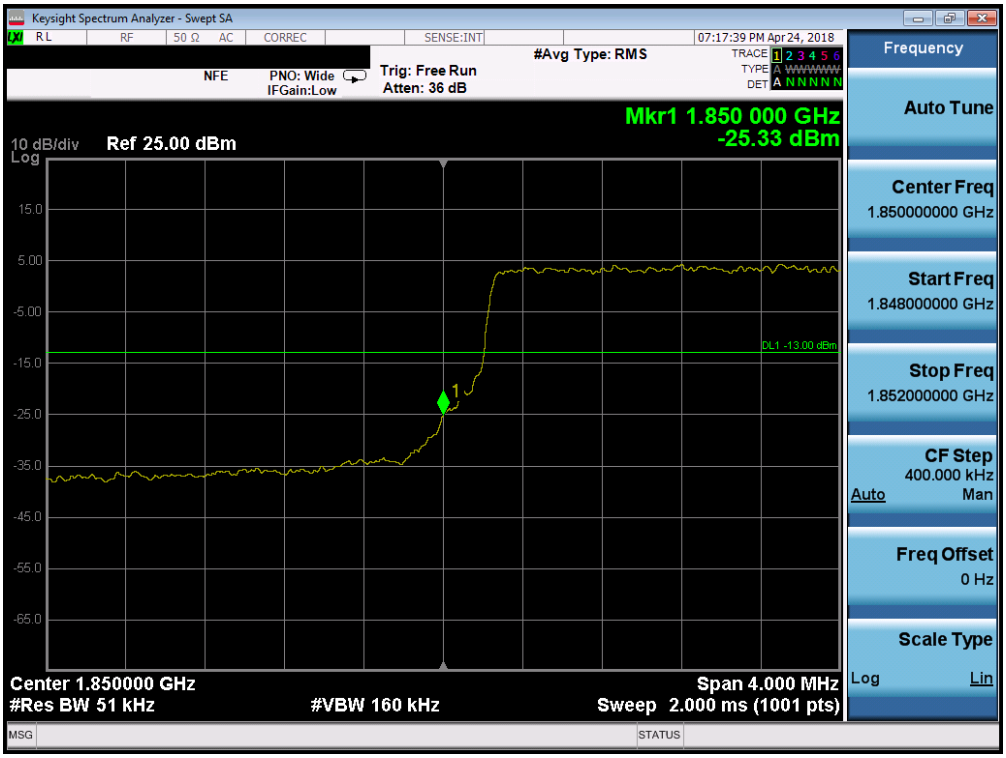
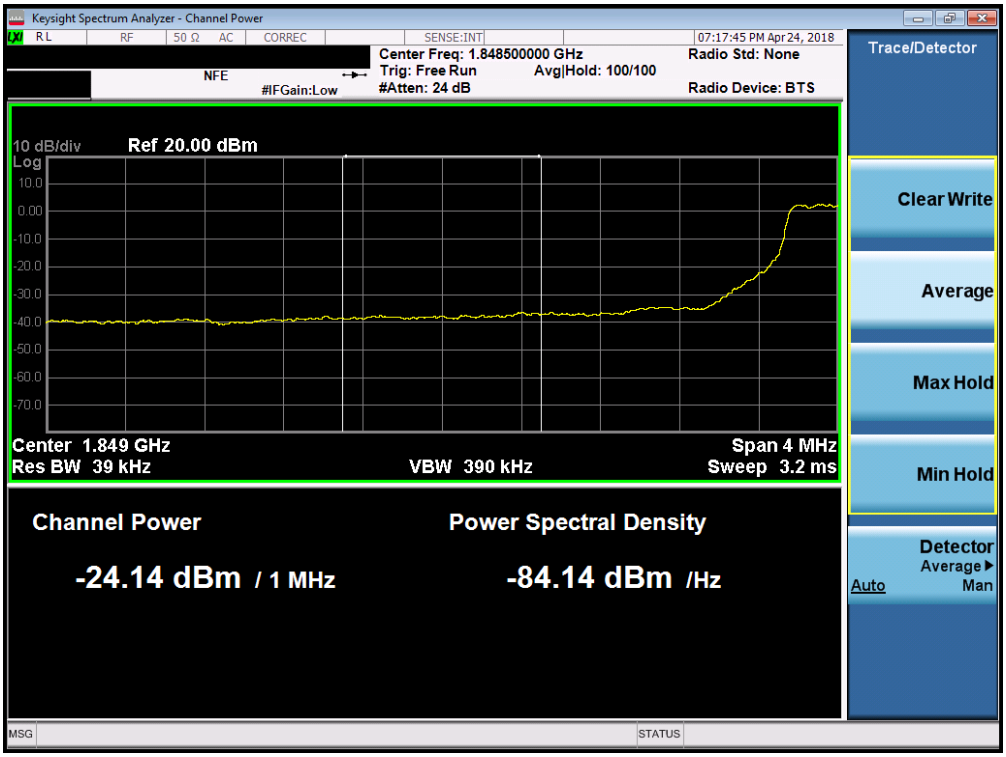


Plot 7-224. Lower Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-225. Lower Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

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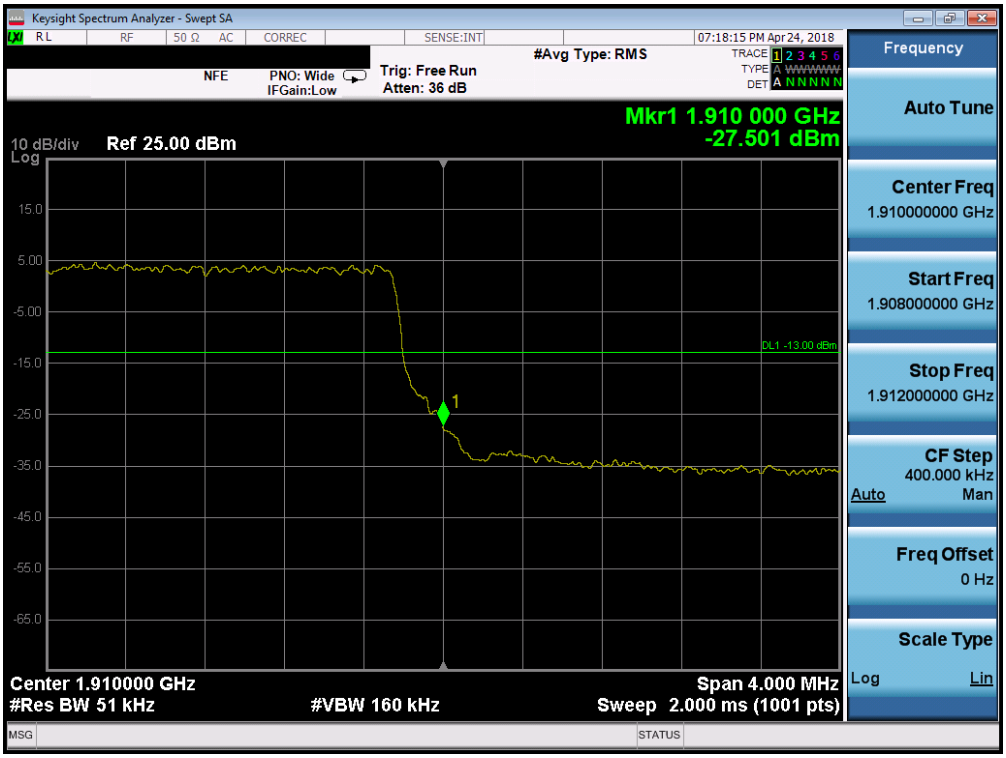
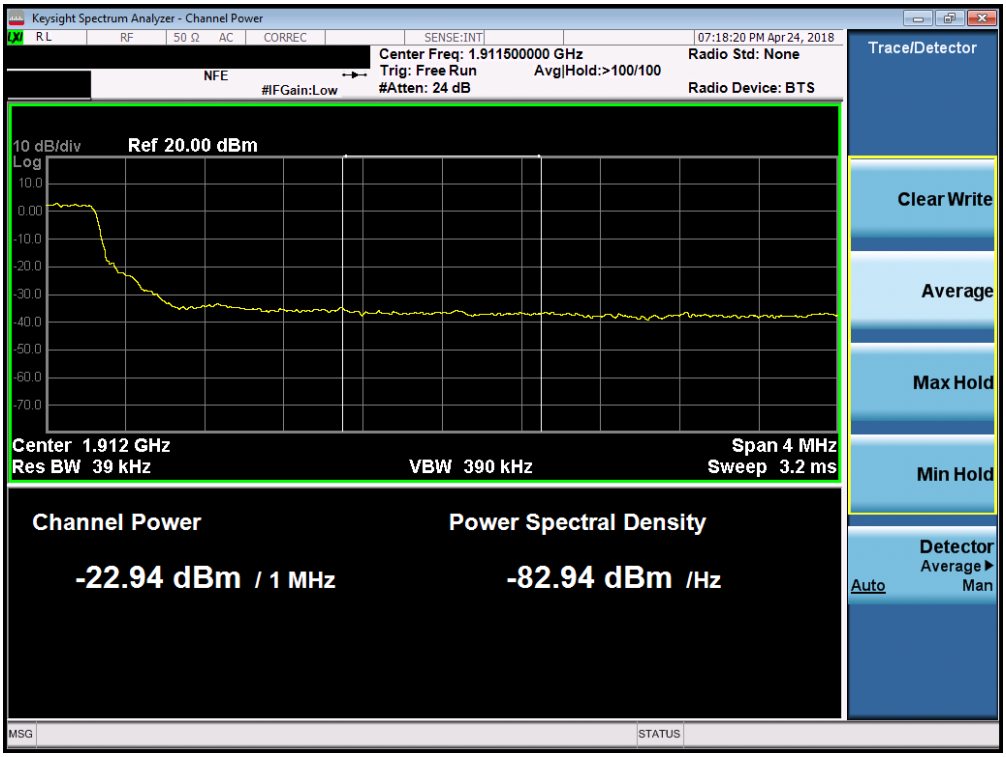


Plot 7-226. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-227. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

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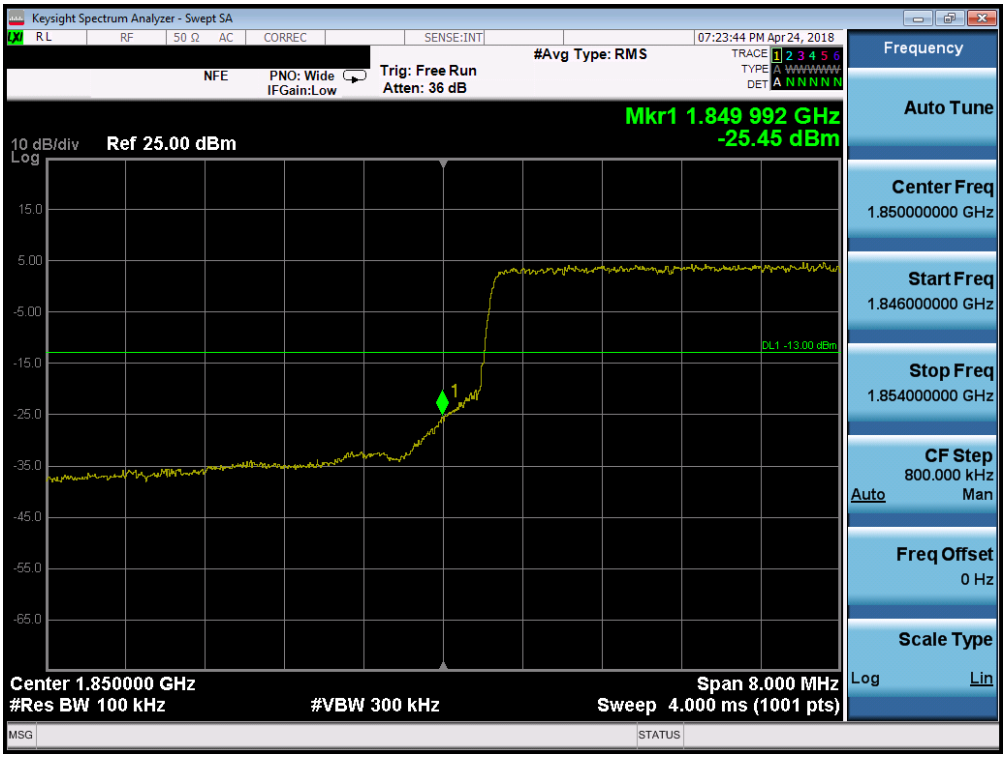
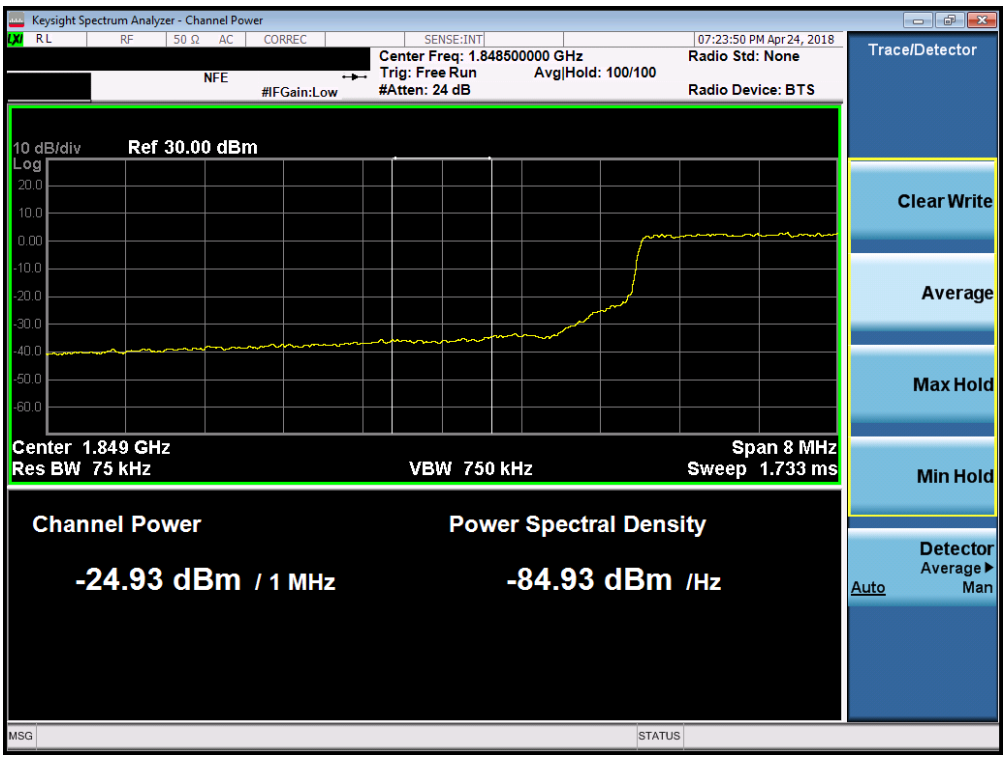


Plot 7-228. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-229. Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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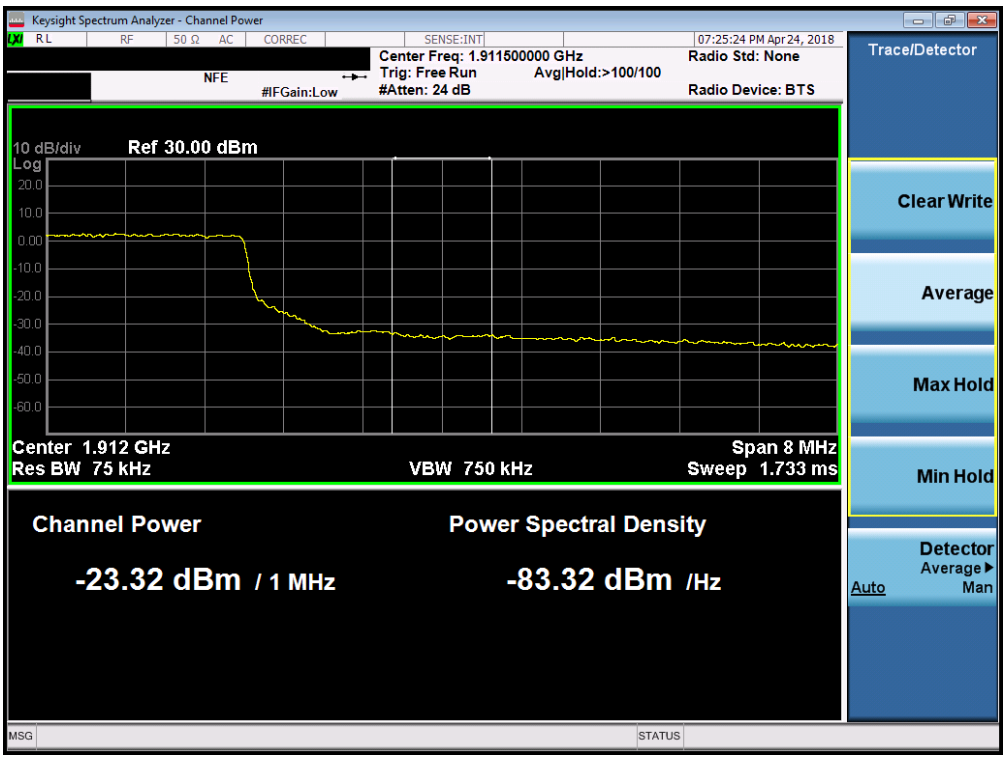
Plot 7-230. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-231. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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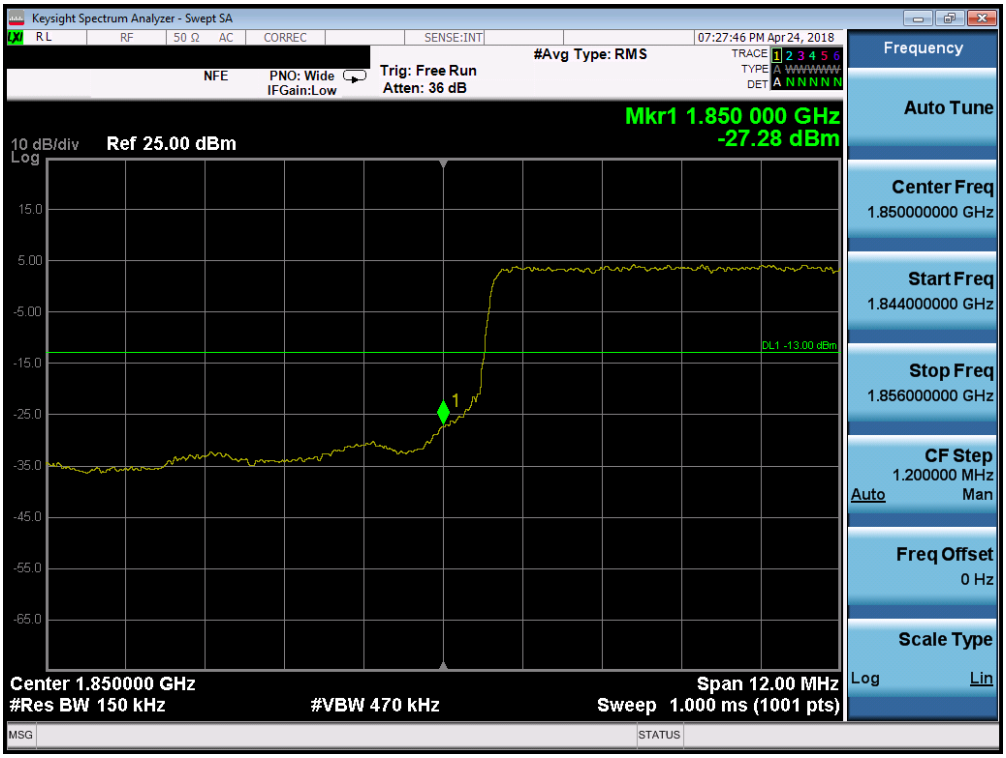
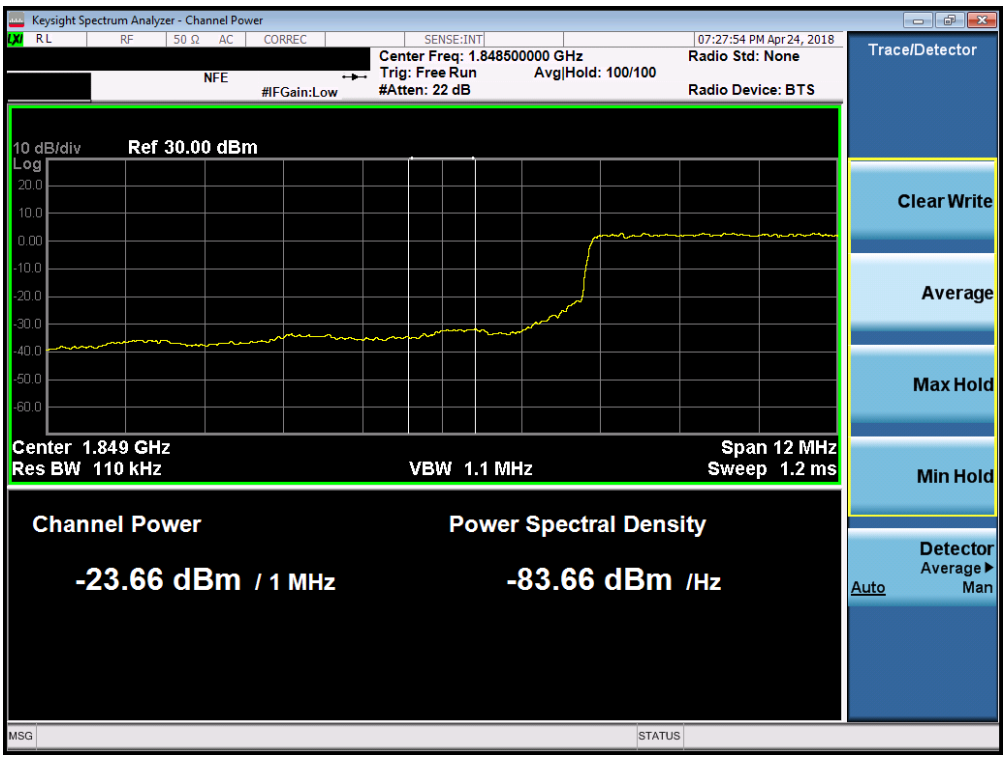


Plot 7-232. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-233. Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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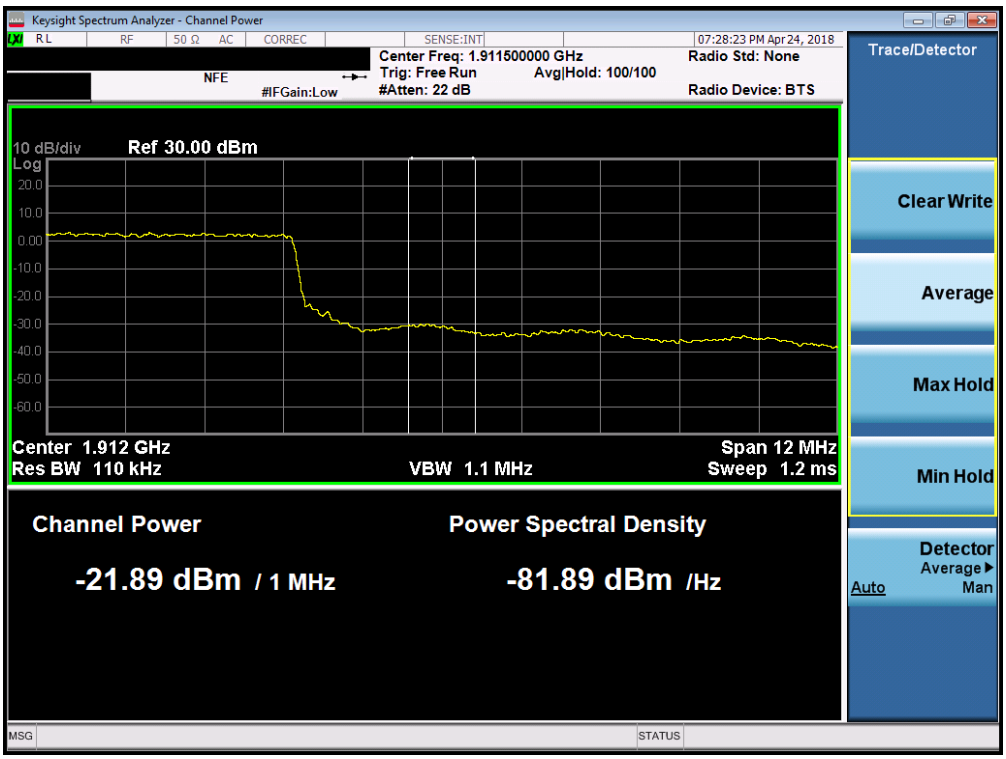
Plot 7-234. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-235. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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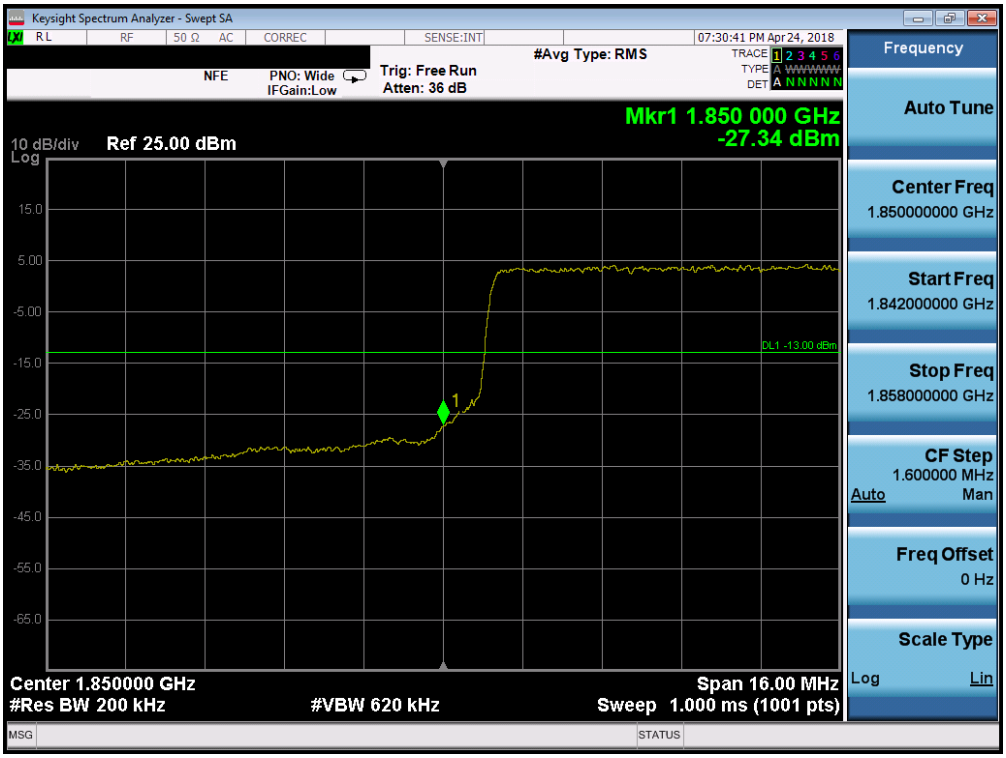
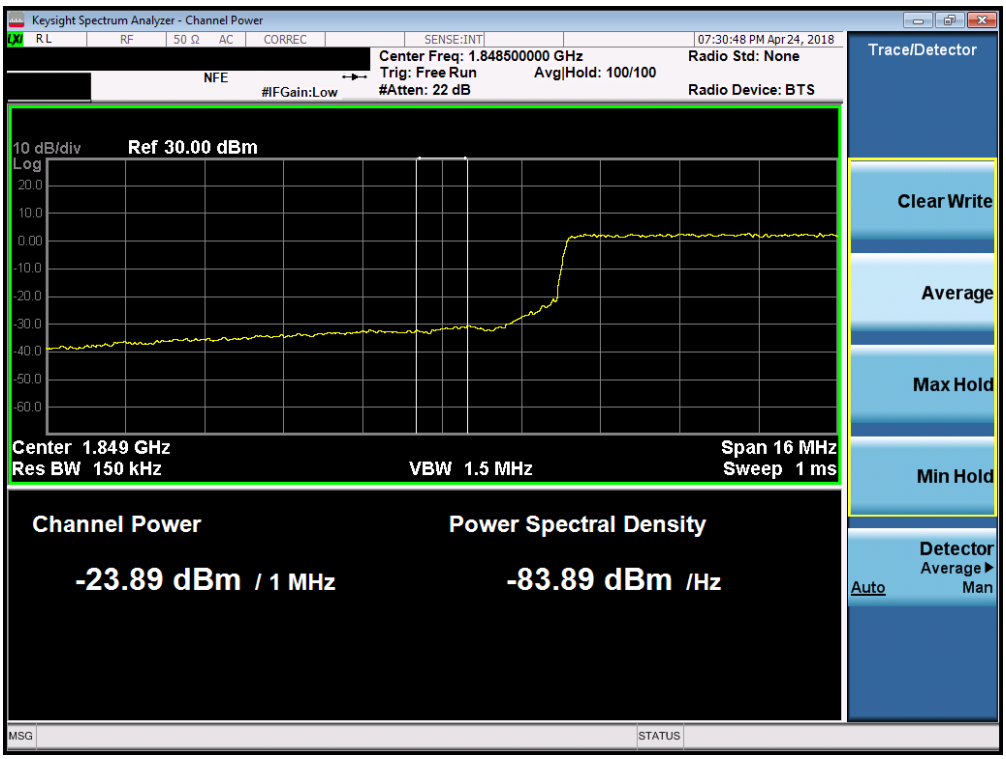


Plot 7-236. Lower Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-237. Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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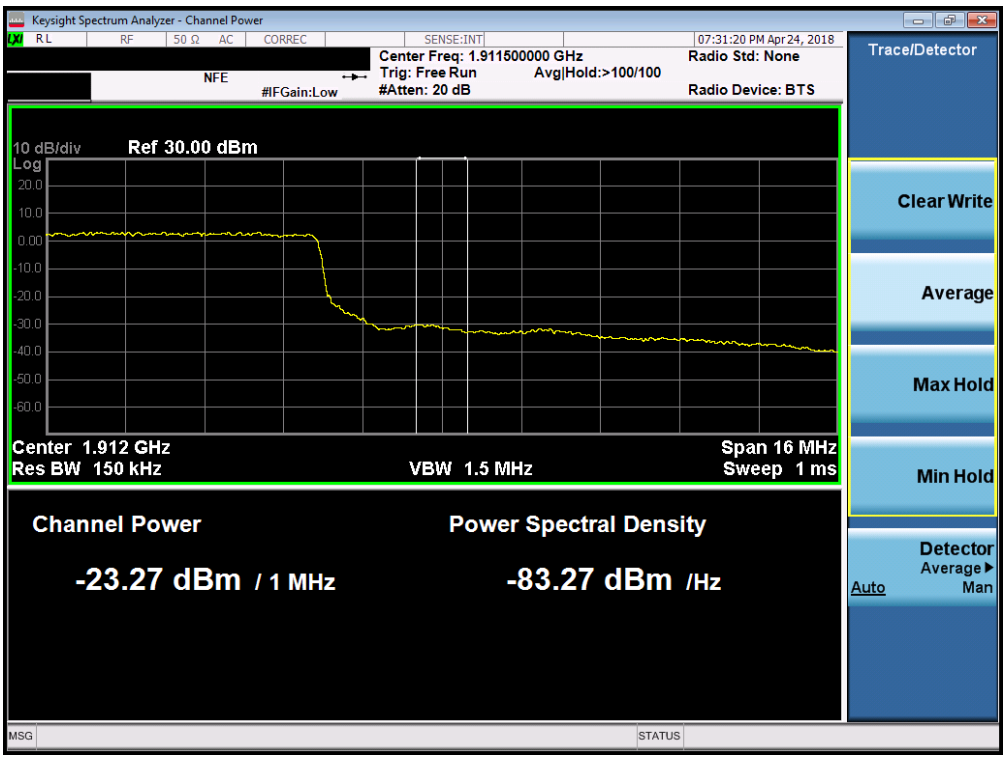
Plot 7-238. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-239. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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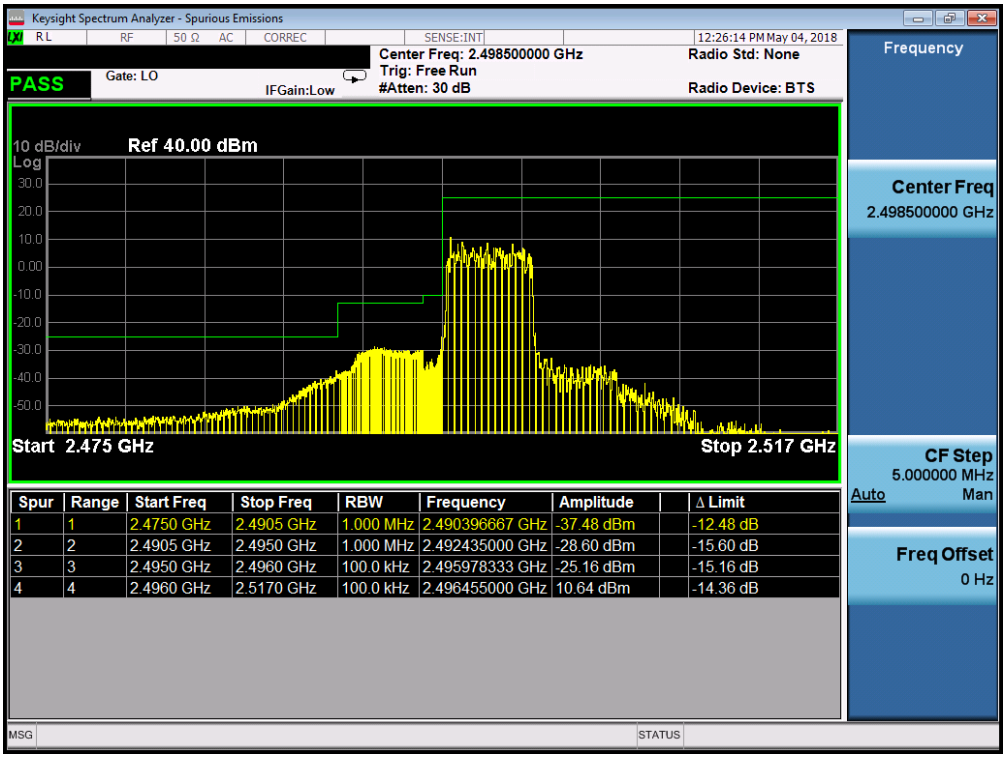
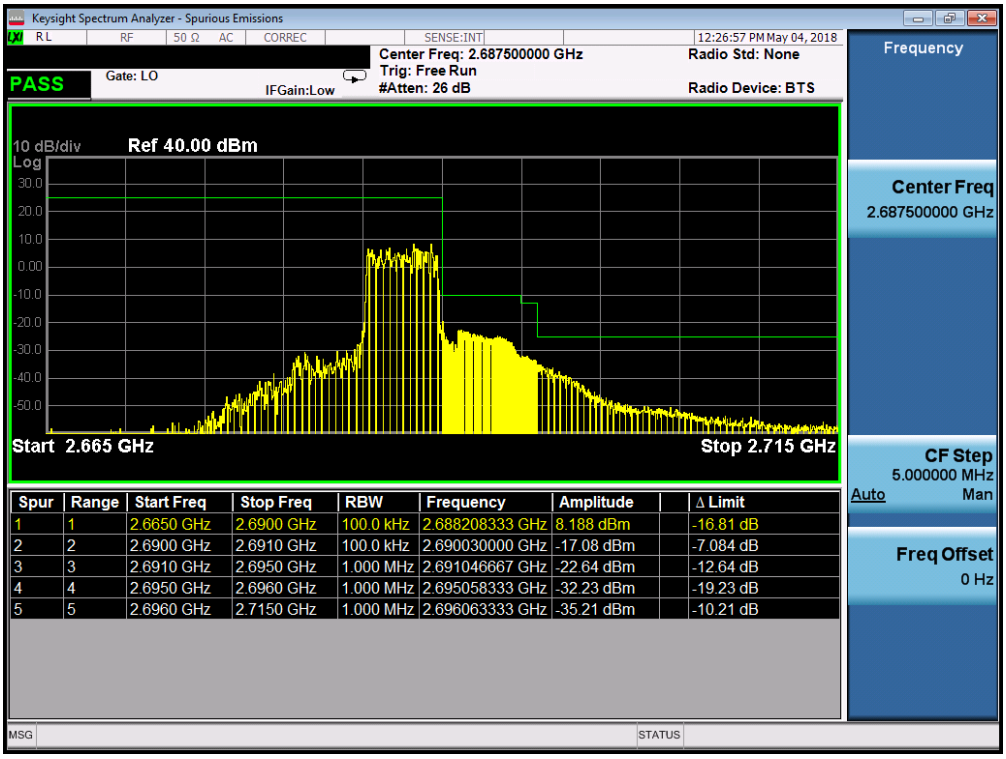
Band 41



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490396667 GHz	-37.48 dBm	-12.48 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.492435000 GHz	-28.60 dBm	-15.60 dB
3	3	2.4950 GHz	2.4960 GHz	100.0 kHz	2.495978333 GHz	-25.16 dBm	-15.16 dB
4	4	2.4960 GHz	2.5170 GHz	100.0 kHz	2.496455000 GHz	10.64 dBm	-14.36 dB

Plot 7-240. Lower ACP Plot at 2496 MHz (Band 41 - 5.0MHz QPSK - RB Size 25)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	100.0 kHz	2.688208333 GHz	8.188 dBm	-16.81 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690030000 GHz	-17.08 dBm	-7.084 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691046667 GHz	-22.64 dBm	-12.64 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695058333 GHz	-32.23 dBm	-19.23 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696063333 GHz	-35.21 dBm	-10.21 dB

Plot 7-241. Upper ACP Plot (Band 41 - 5.0MHz QPSK - RB Size 25)

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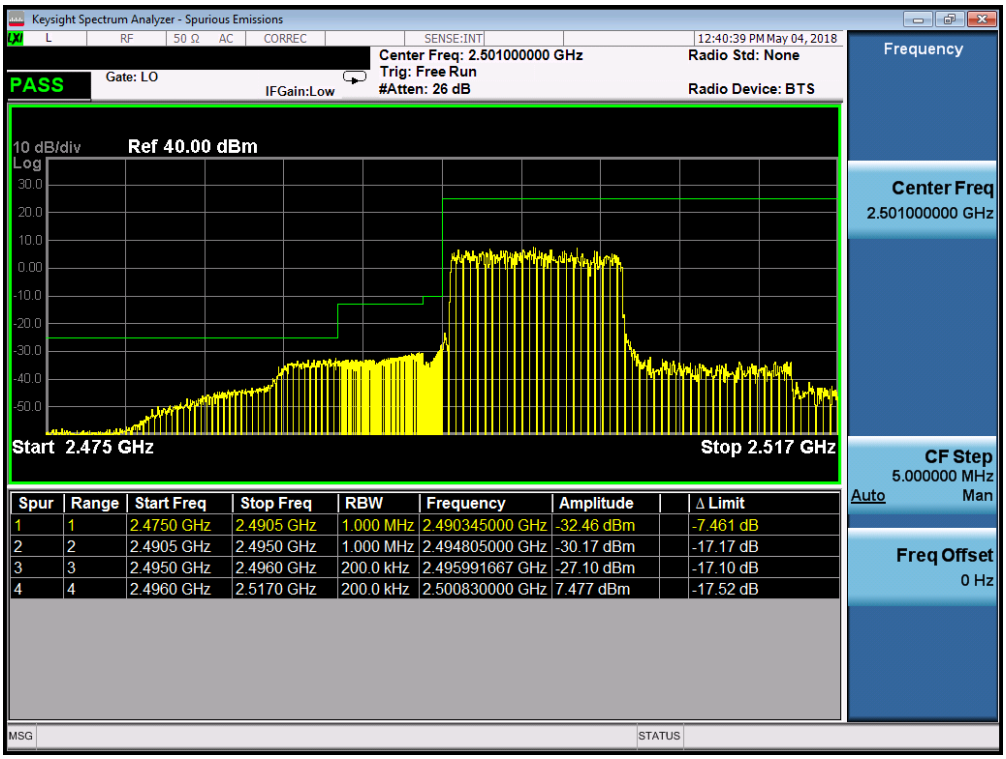
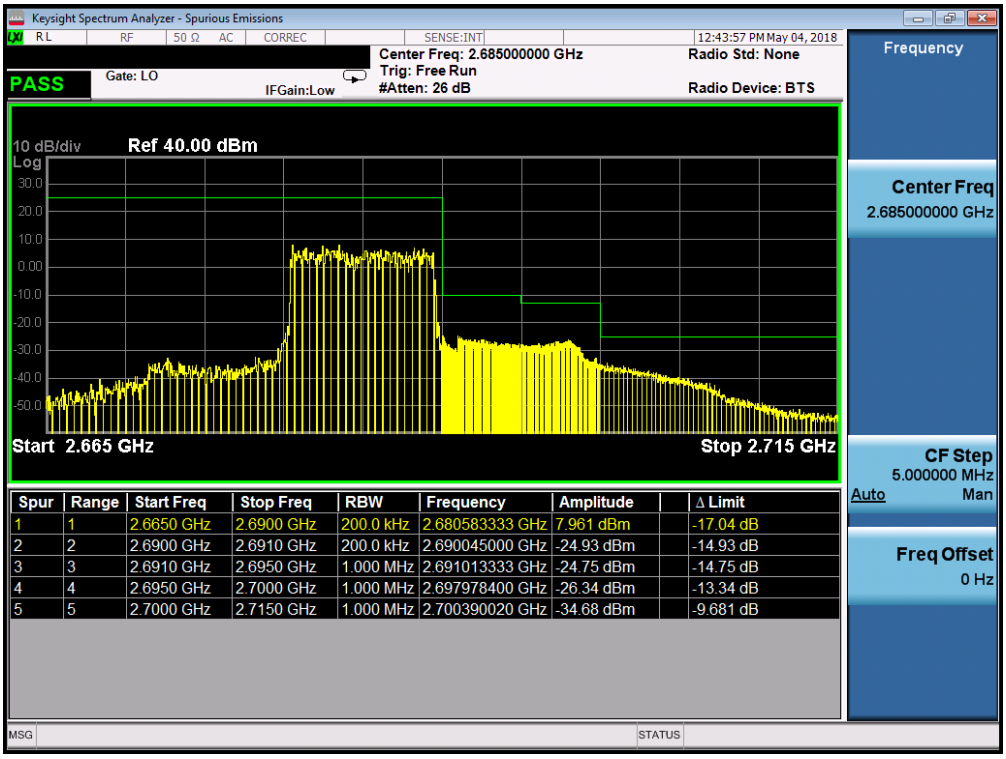


Plot 7-242. Lower ACP Plot at 2496 MHz (Band 41 - 10.0MHz QPSK - RB Size 25)



Plot 7-243. Upper ACP Plot (Band 41 - 10.0MHz QPSK - RB Size 25)

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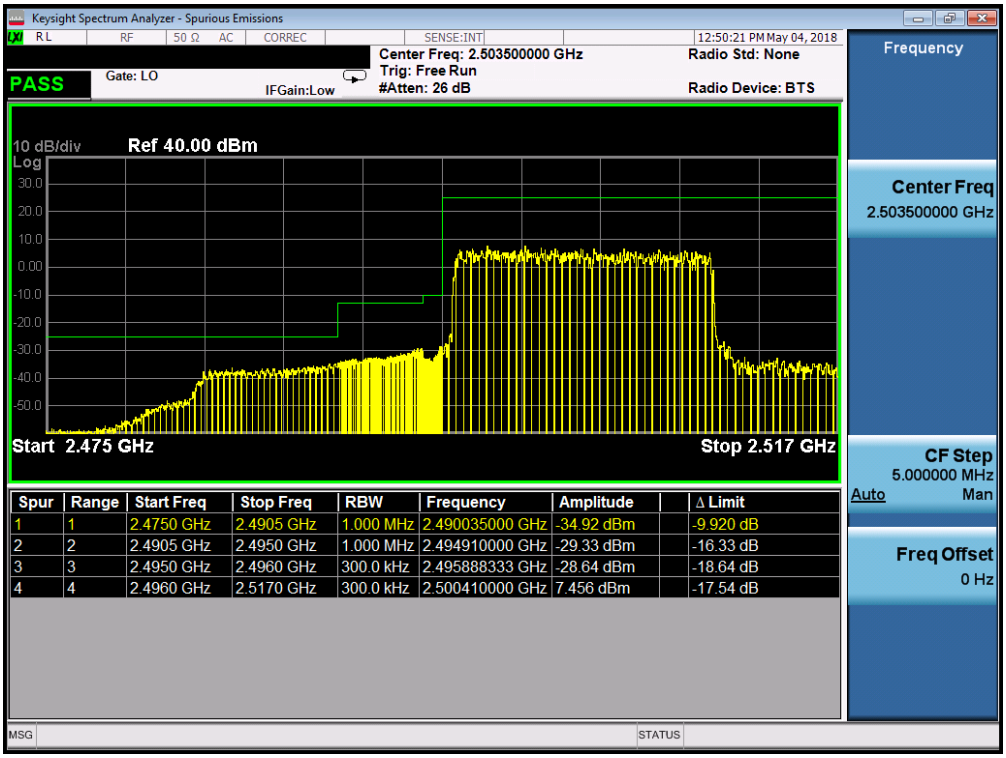
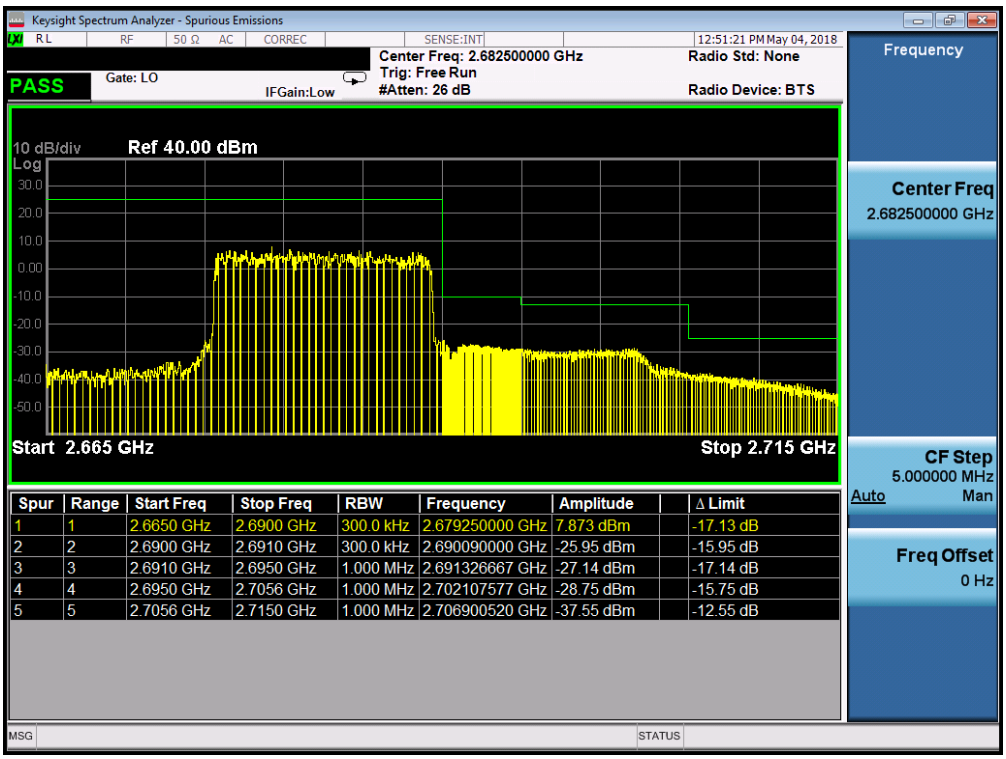


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490035000 GHz	-34.92 dBm	-9.920 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494910000 GHz	-29.33 dBm	-16.33 dB
3	3	2.4950 GHz	2.4960 GHz	300.0 kHz	2.495888333 GHz	-28.64 dBm	-18.64 dB
4	4	2.4960 GHz	2.5170 GHz	300.0 kHz	2.500410000 GHz	7.456 dBm	-17.54 dB

Plot 7-244. Lower ACP Plot at 2496 MHz (Band 41 - 15.0MHz QPSK - RB Size 25)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	300.0 kHz	2.679250000 GHz	7.873 dBm	-17.13 dB
2	2	2.6900 GHz	2.6910 GHz	300.0 kHz	2.690090000 GHz	-25.95 dBm	-15.95 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691326667 GHz	-27.14 dBm	-17.14 dB
4	4	2.6950 GHz	2.7056 GHz	1.000 MHz	2.702107577 GHz	-28.75 dBm	-15.75 dB
5	5	2.7056 GHz	2.7150 GHz	1.000 MHz	2.706900520 GHz	-37.55 dBm	-12.55 dB

Plot 7-245. Upper ACP Plot (Band 41 - 15.0MHz QPSK - RB Size 25)

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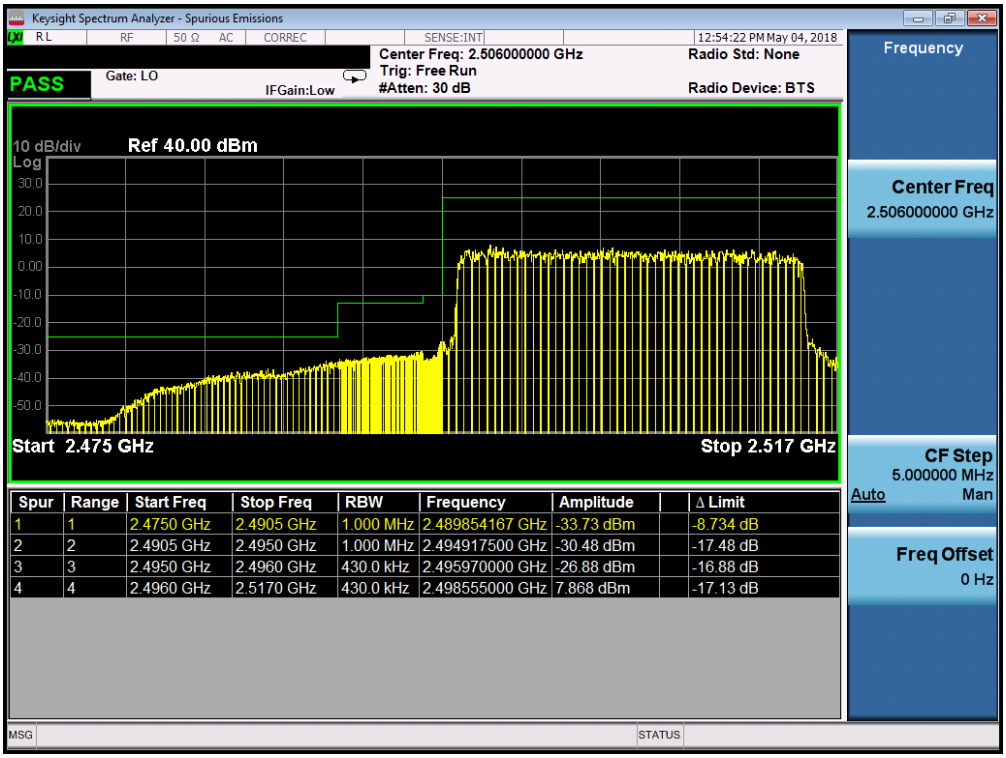
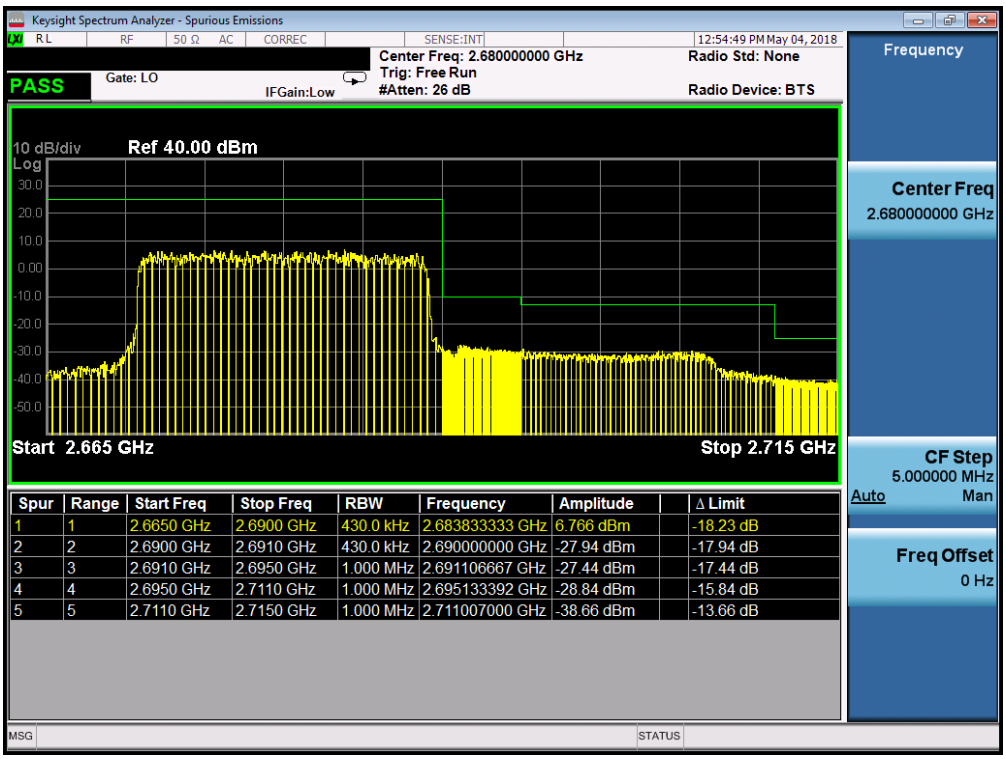


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489854167 GHz	-33.73 dBm	-8.734 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494917500 GHz	-30.48 dBm	-17.48 dB
3	3	2.4950 GHz	2.4960 GHz	430.0 kHz	2.495970000 GHz	-26.88 dBm	-16.88 dB
4	4	2.4960 GHz	2.5170 GHz	430.0 kHz	2.498555000 GHz	7.868 dBm	-17.13 dB

Plot 7-246. Lower ACP Plot at 2496 MHz (Band 41 - 20.0MHz QPSK - RB Size 25)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	430.0 kHz	2.683833333 GHz	6.766 dBm	-18.23 dB
2	2	2.6900 GHz	2.6910 GHz	430.0 kHz	2.690000000 GHz	-27.94 dBm	-17.94 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691106667 GHz	-27.44 dBm	-17.44 dB
4	4	2.6950 GHz	2.7110 GHz	1.000 MHz	2.695133392 GHz	-28.84 dBm	-15.84 dB
5	5	2.7110 GHz	2.7150 GHz	1.000 MHz	2.711007000 GHz	-38.66 dBm	-13.66 dB

Plot 7-247. Upper ACP Plot (Band 41 - 20.0MHz QPSK - RB Size 25)

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7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

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

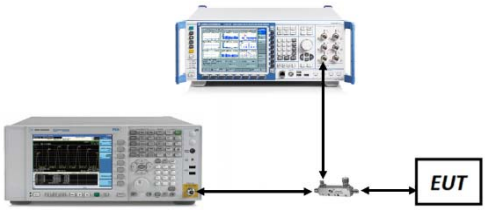

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

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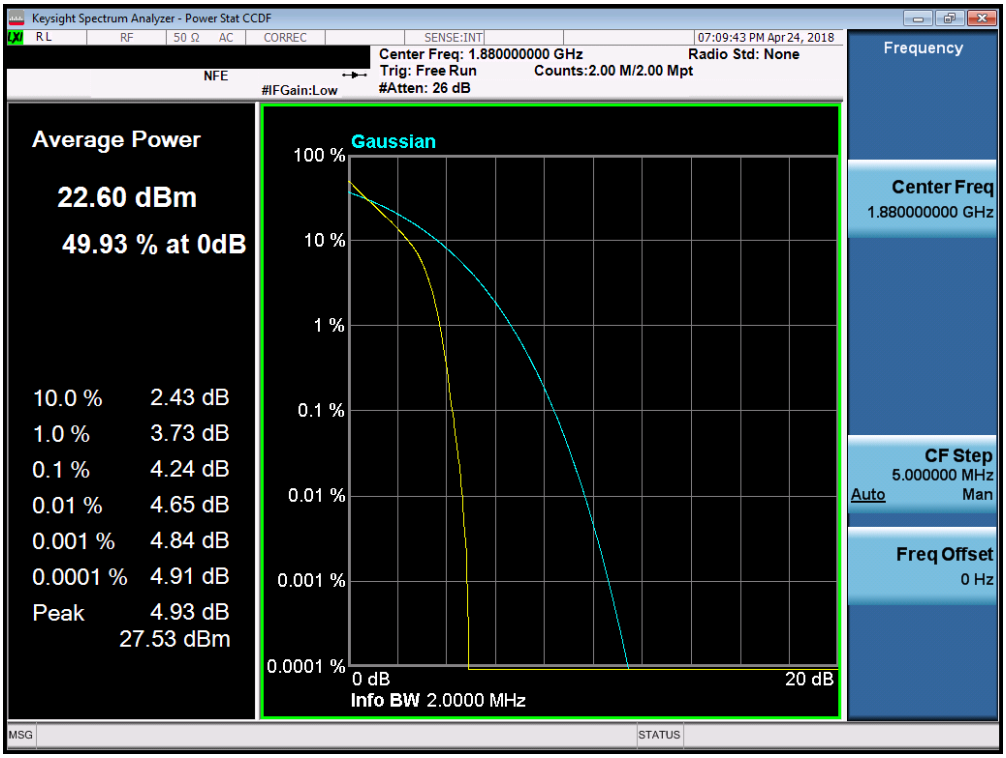
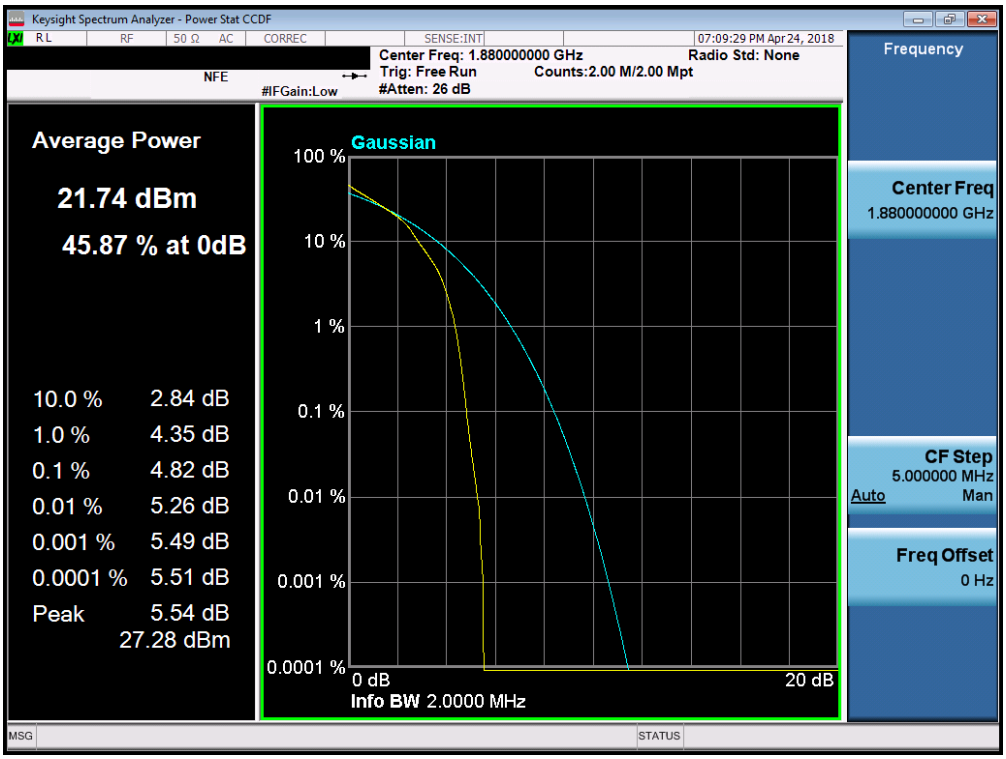
Band 2



Plot 7-248. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-249. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

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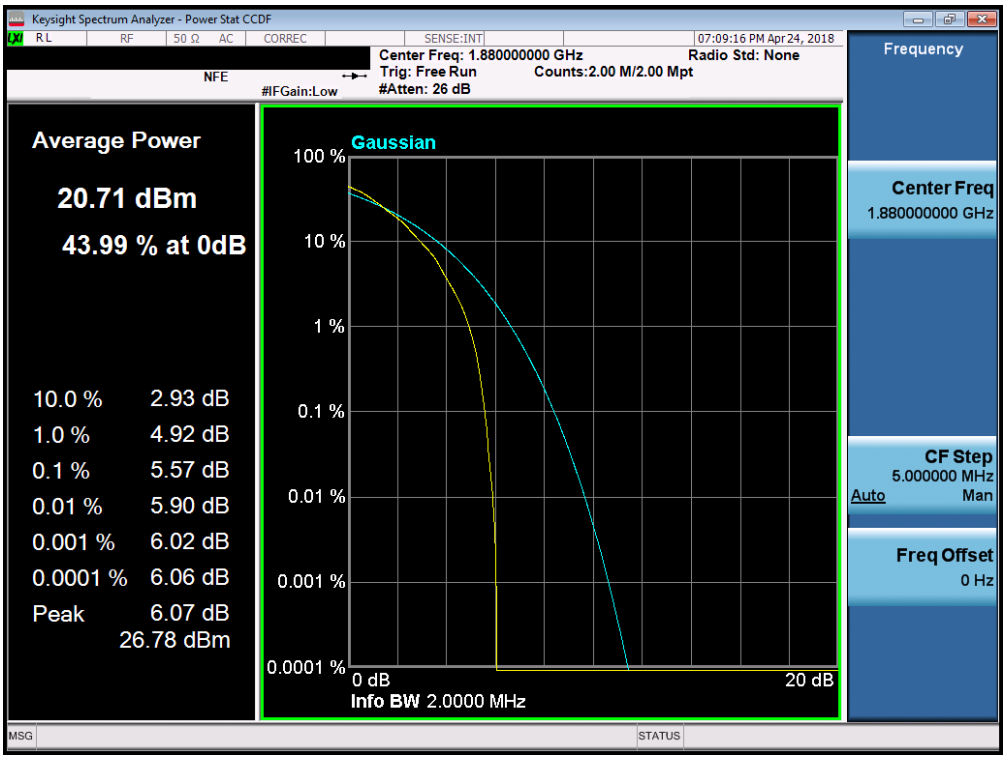
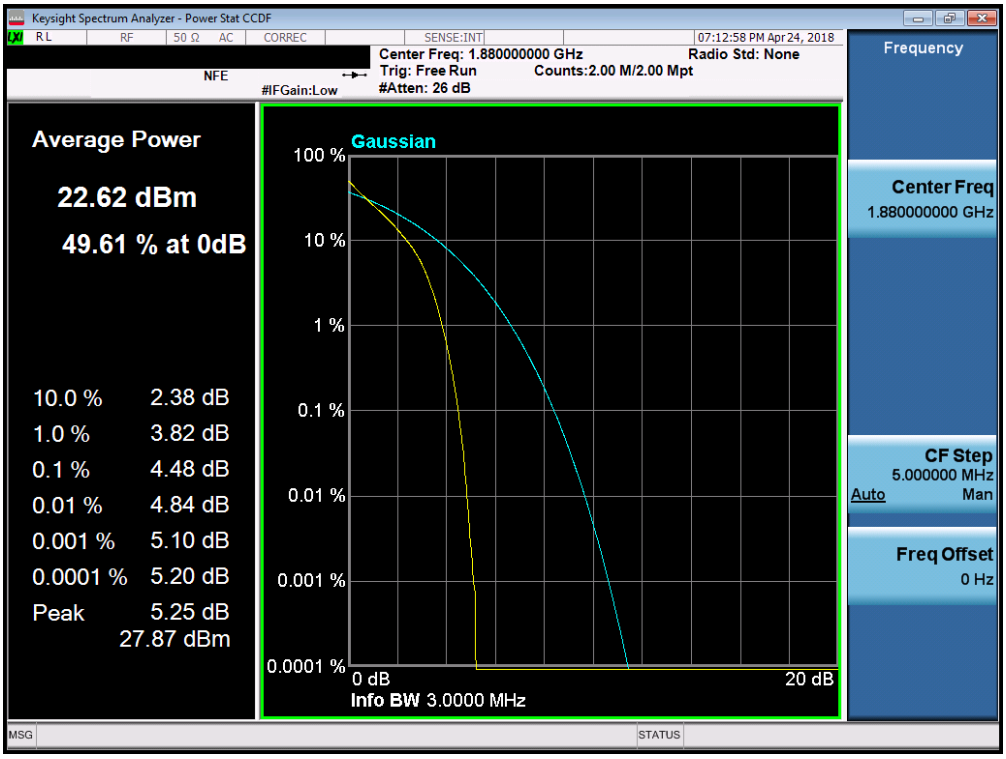


Plot 7-250. PAR Plot (Band 2 - 1.4MHz 64-QAM - Full RB Configuration)



Plot 7-251. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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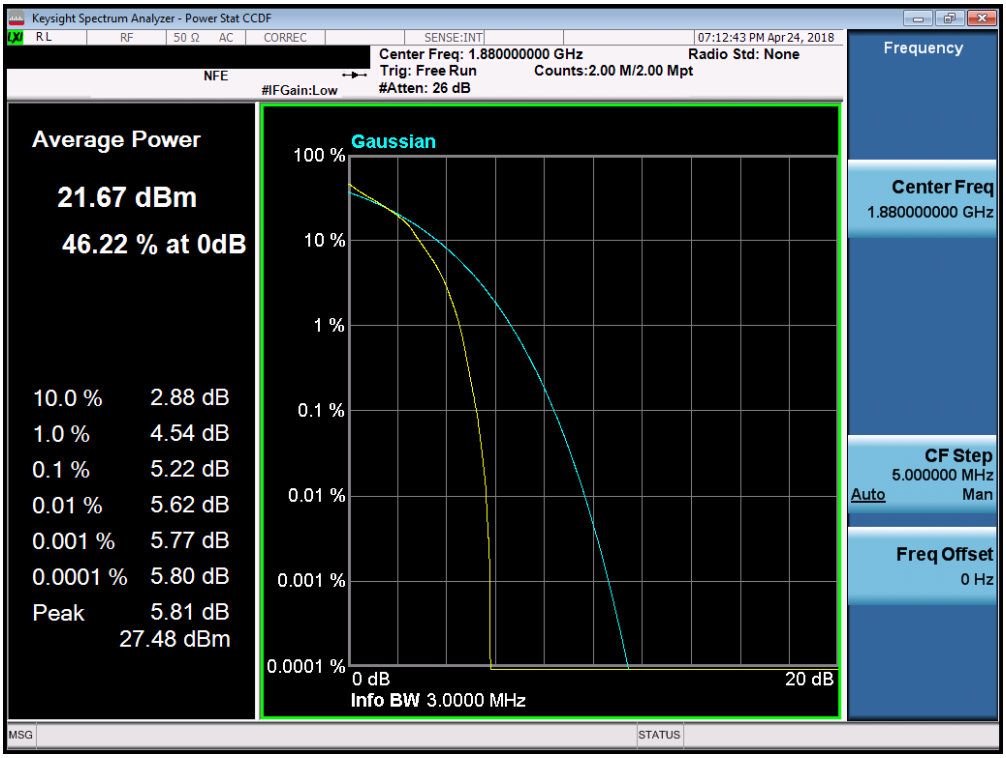
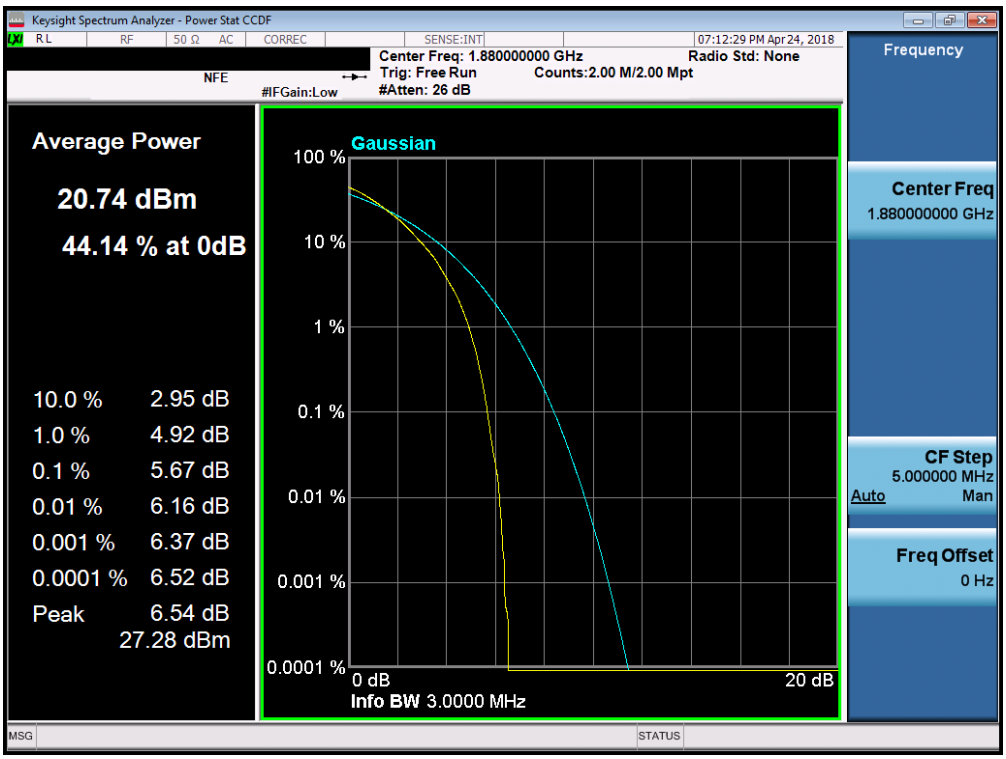


Plot 7-252. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



Plot 7-253. PAR Plot (Band 2 - 3.0MHz 64-QAM - Full RB Configuration)

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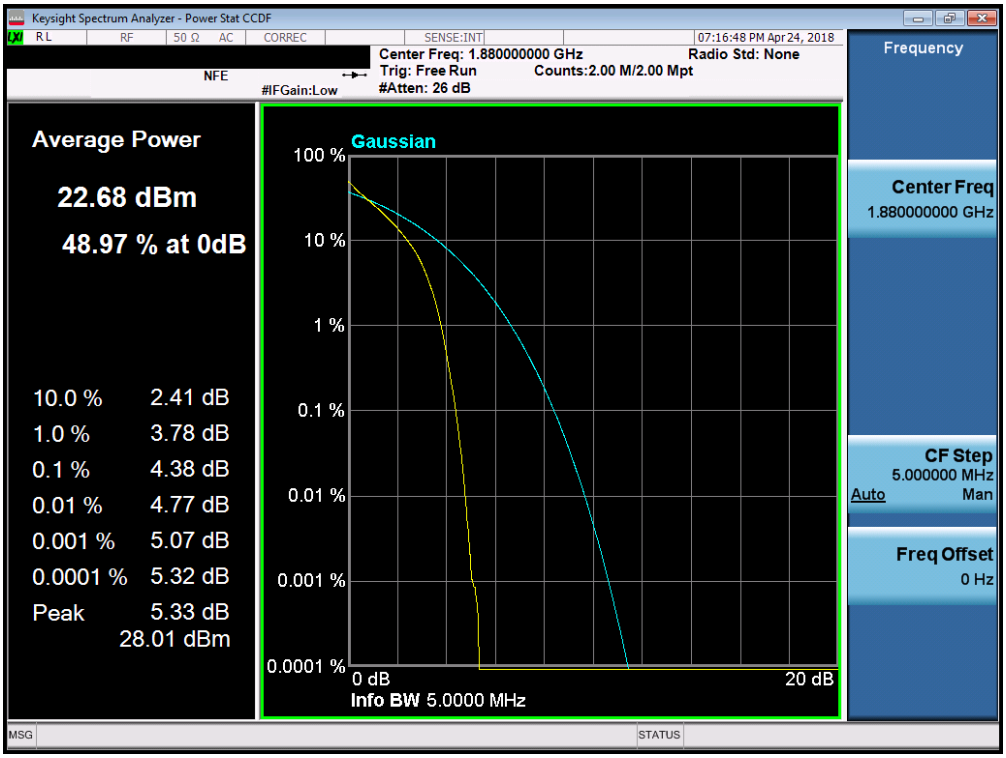
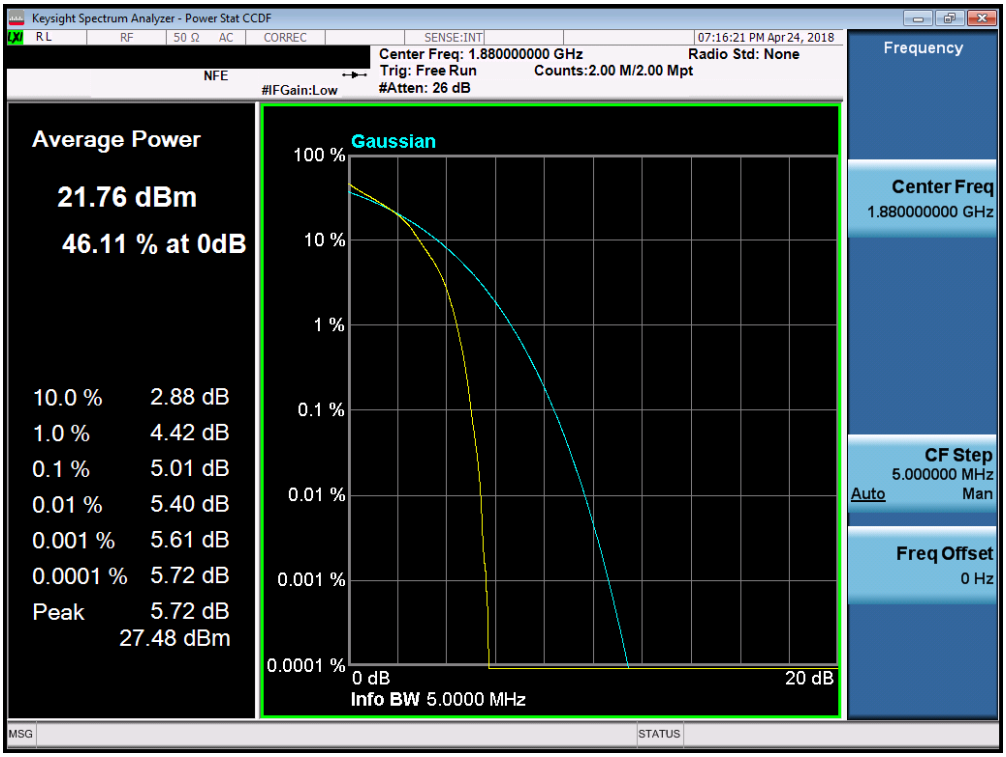


Plot 7-254. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-255. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

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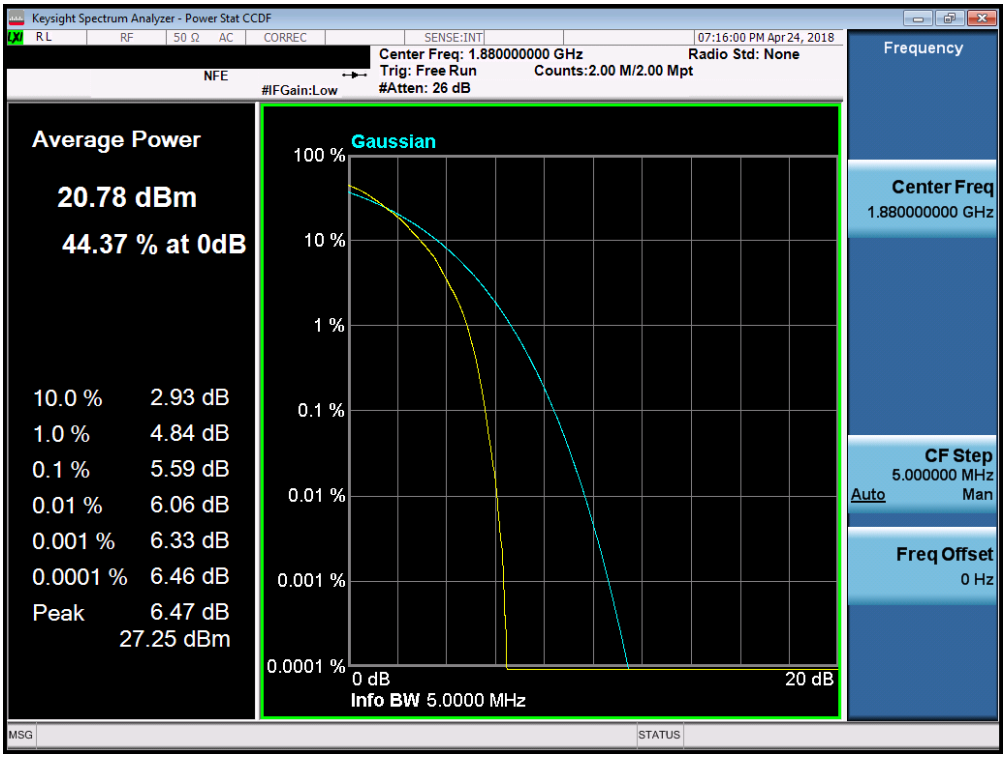
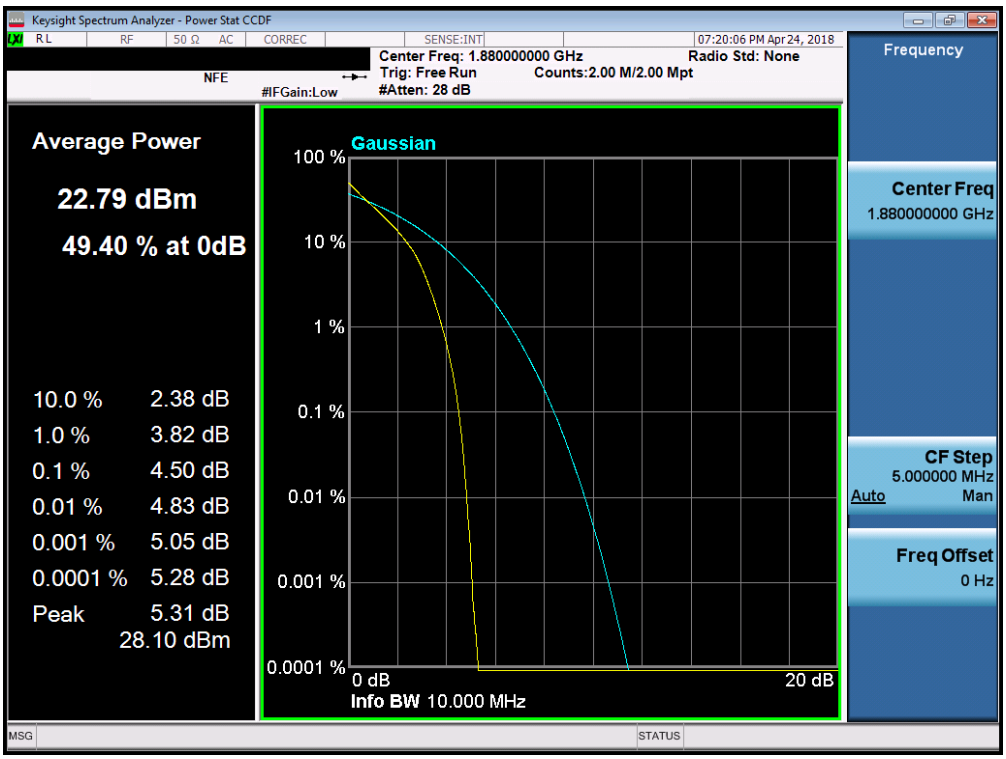


Plot 7-256. PAR Plot (Band 2 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-257. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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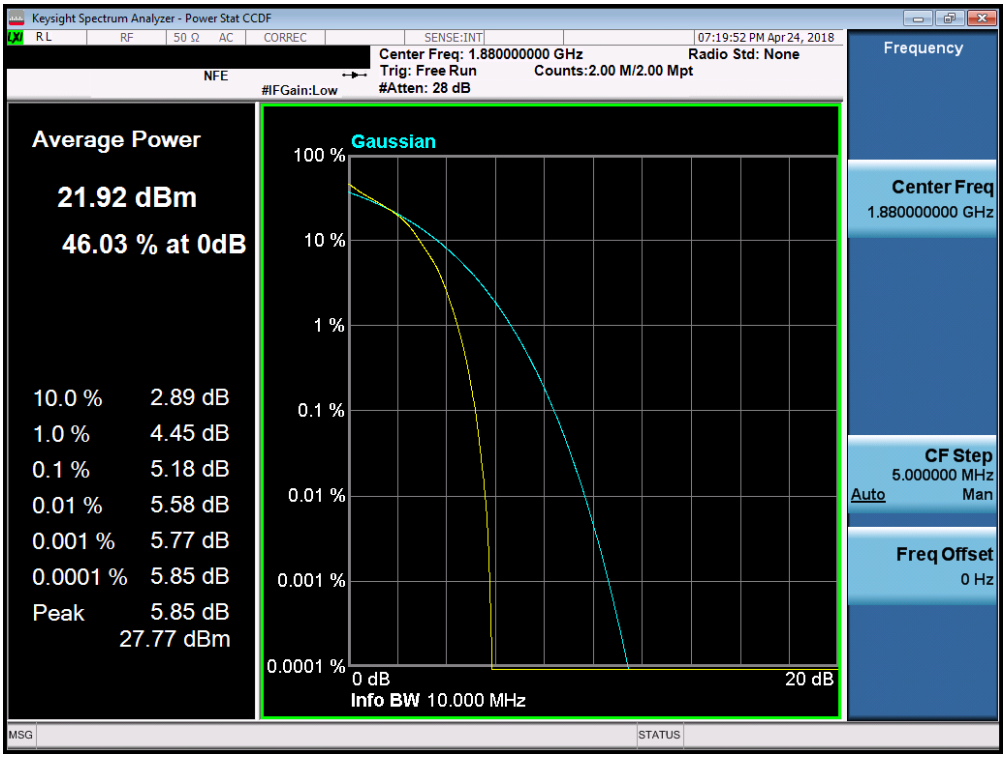
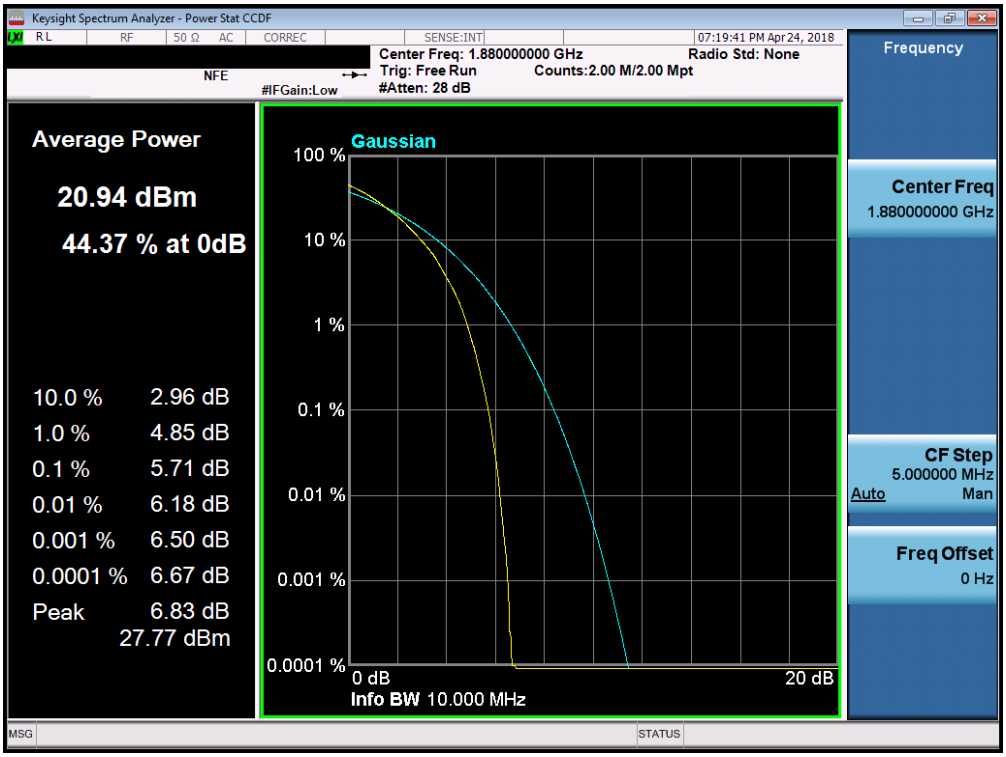


Plot 7-258. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)



Plot 7-259. PAR Plot (Band 2 - 10.0MHz 64-QAM - Full RB Configuration)

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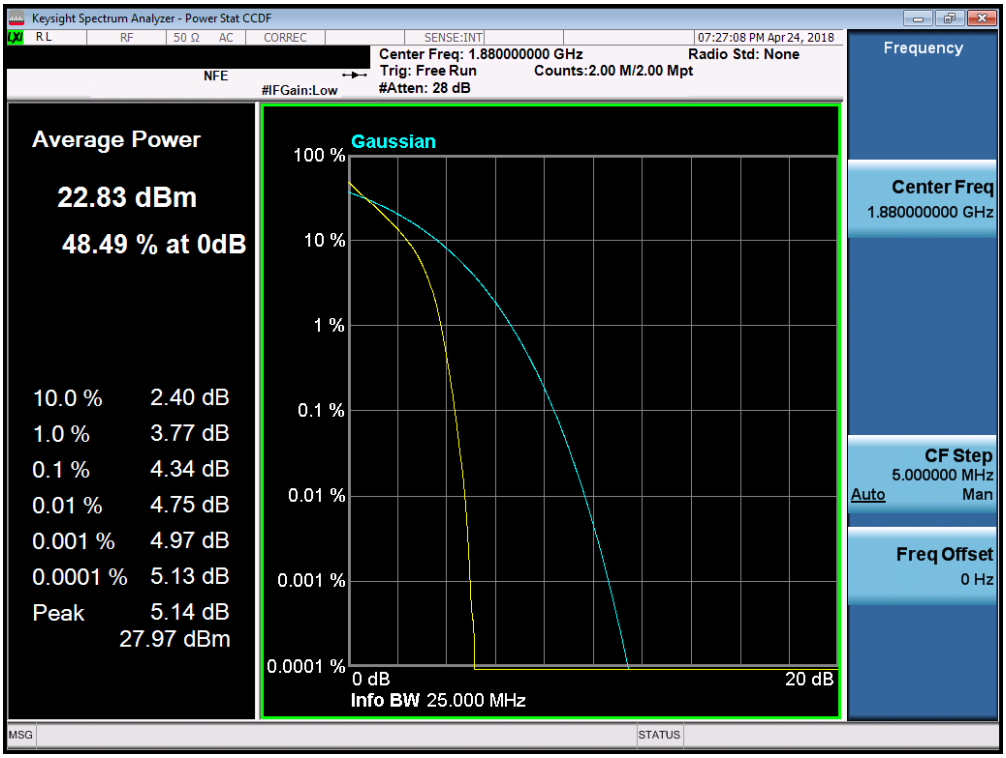
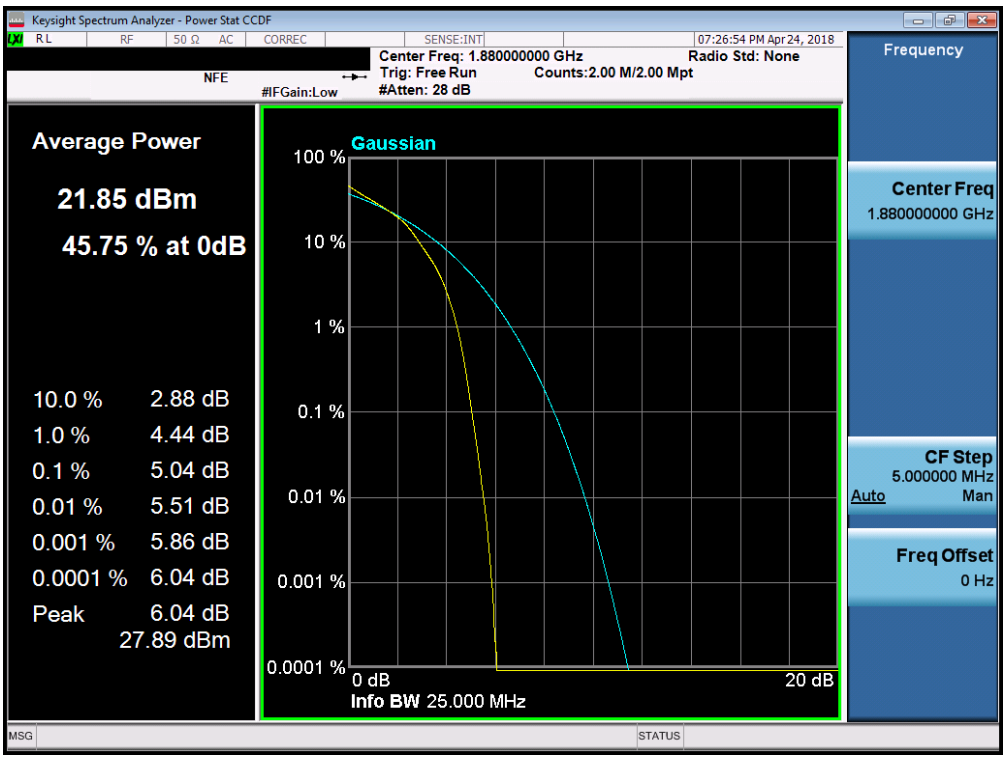


Plot 7-260. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-261. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

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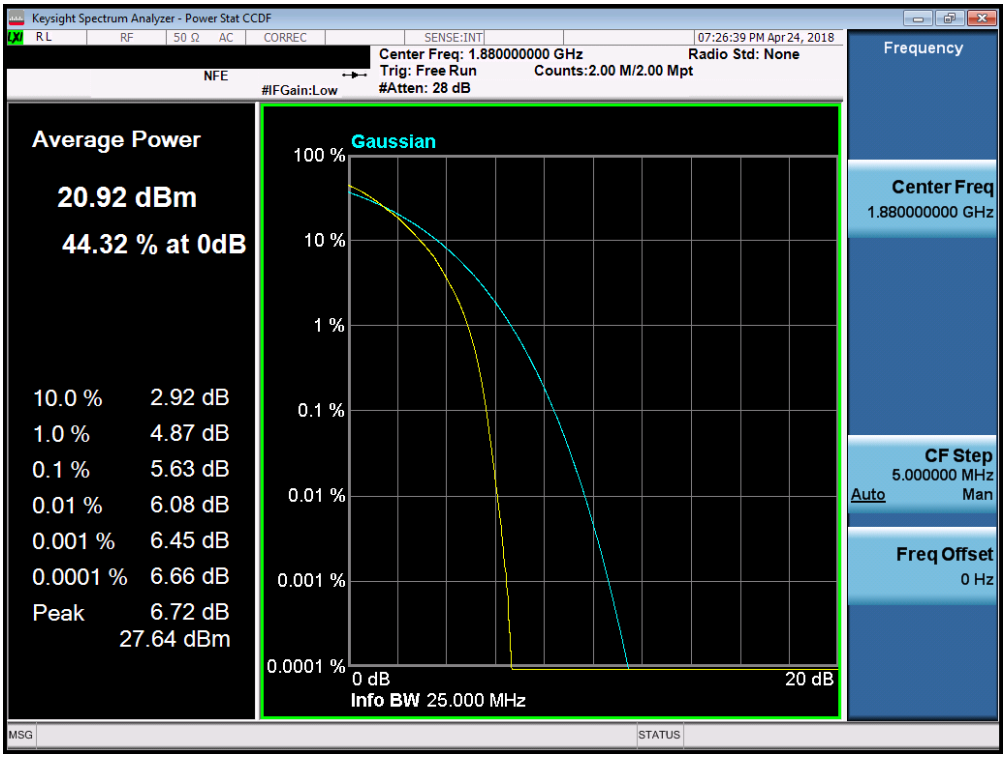
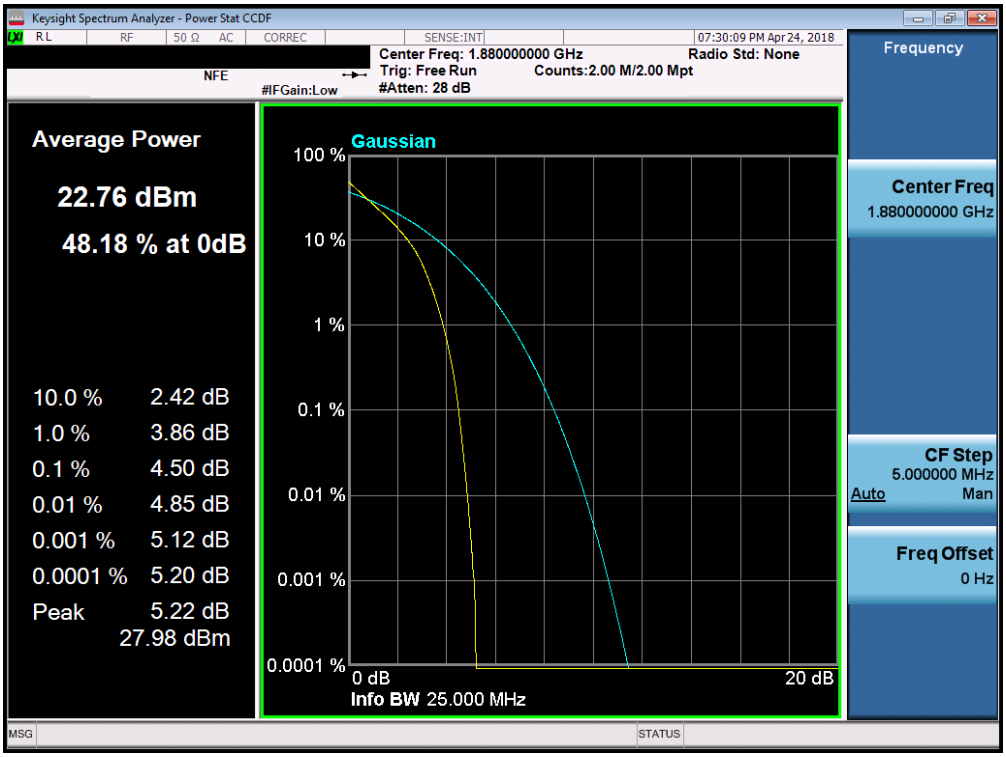


Plot 7-262. PAR Plot (Band 2 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-263. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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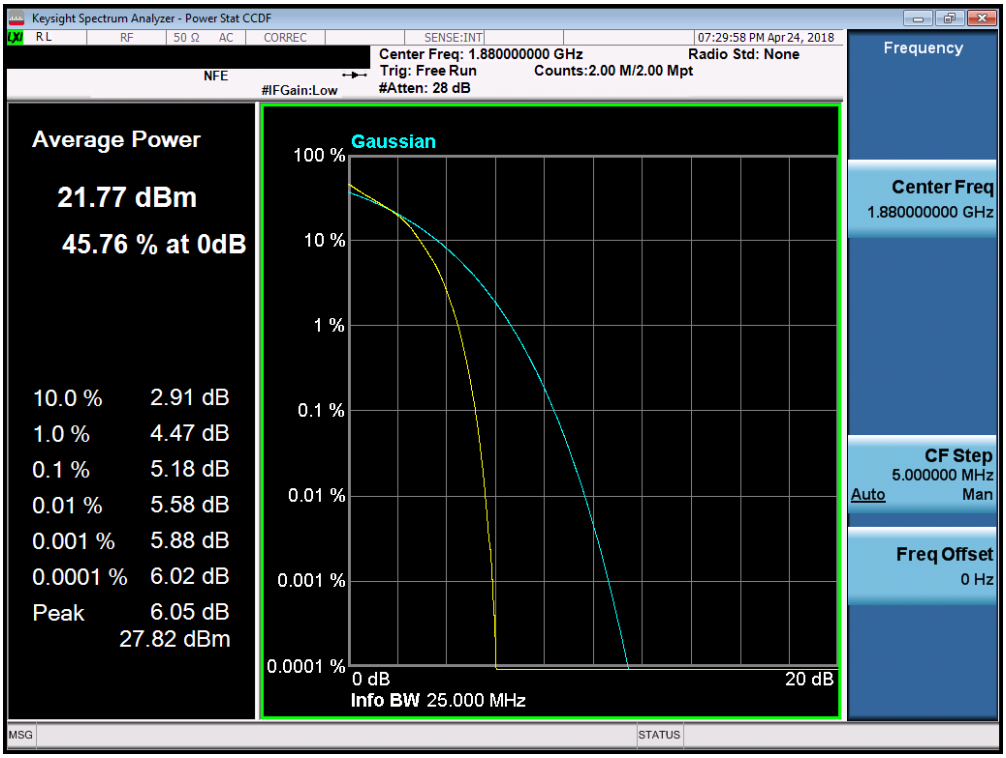
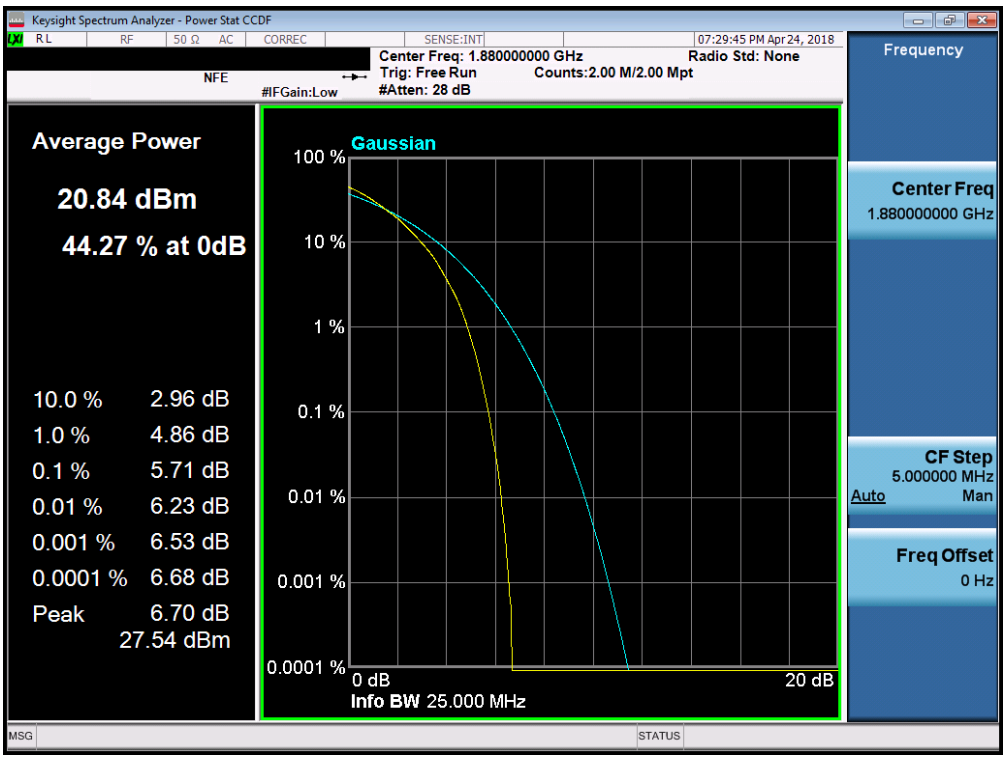


Plot 7-264. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-265. PAR Plot (Band 2 - 20.0MHz 64-QAM - Full RB Configuration)

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7.6 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.

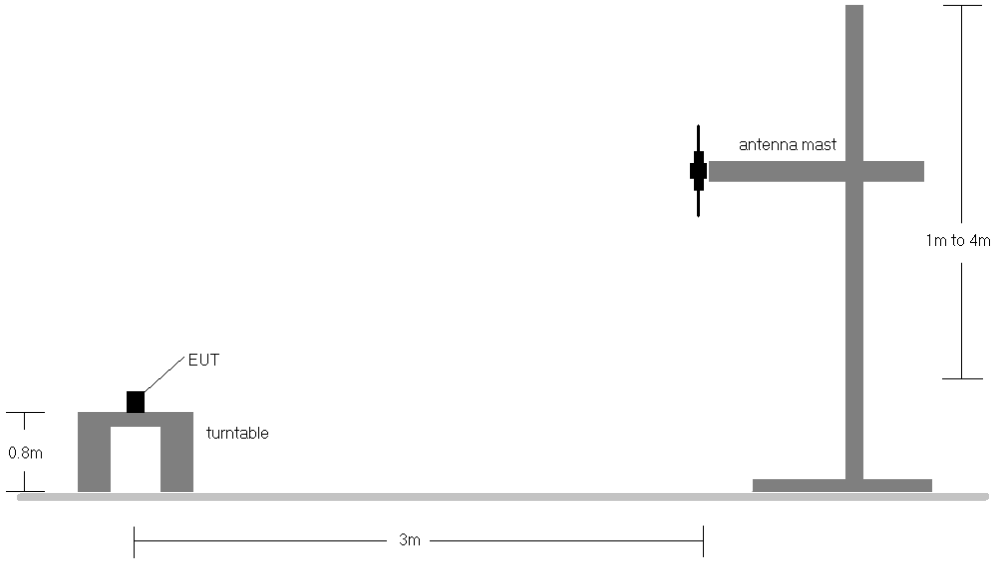

Figure 7-5. Radiated Test Setup <1GHz

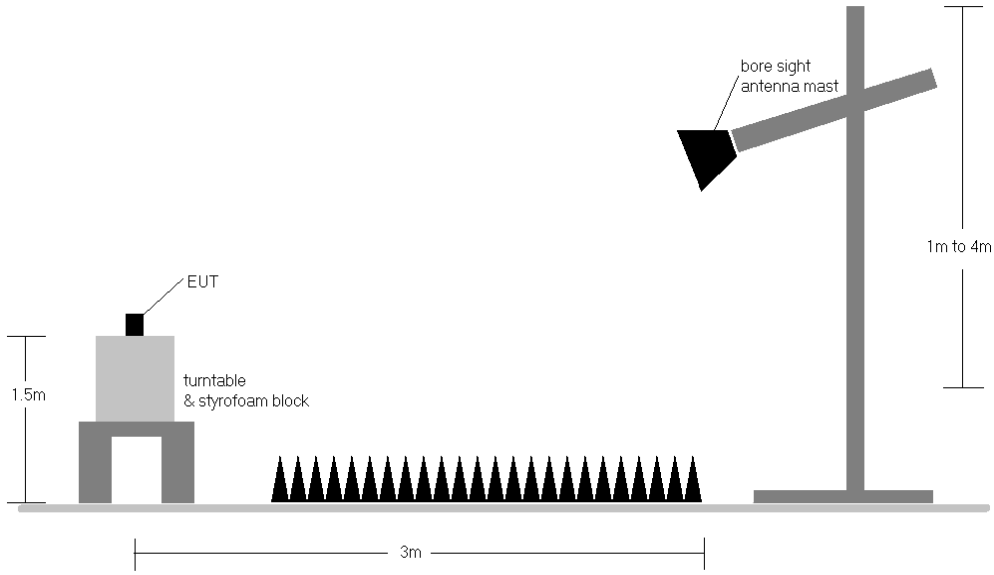

Figure 7-6. Radiated Test Setup >1GHz

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.

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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	150	15	1 / 24	17.00	1.10	15.95	0.039	34.77	-18.82
680.50	5	QPSK	V	150	17	1 / 24	19.08	1.10	18.03	0.064	34.77	-16.74
695.50	5	QPSK	V	150	35	1 / 0	20.62	1.10	**19.57**	0.091	34.77	-15.20
695.50	5	16-QAM	V	150	35	1 / 24	19.44	1.10	**18.39**	0.069	34.77	-16.38
695.50	5	64-QAM	V	150	35	1 / 24	19.46	1.10	**18.41**	0.069	34.77	-16.36
668.00	10	QPSK	V	150	5	1 / 49	15.84	1.10	14.79	0.030	34.77	-19.98
680.50	10	QPSK	V	150	5	1 / 49	19.30	1.10	18.25	0.067	34.77	-16.52
693.00	10	QPSK	V	150	30	1 / 49	20.51	1.10	**19.46**	0.088	34.77	-15.31
693.00	10	16-QAM	V	150	30	1 / 49	18.76	1.10	**17.71**	0.059	34.77	-17.06
693.00	10	64-QAM	V	150	30	1 / 49	20.07	1.10	**19.02**	0.080	34.77	-15.75
670.50	15	QPSK	V	150	25	1 / 74	17.72	1.10	16.67	0.046	34.77	-18.10
680.50	15	QPSK	V	150	96	1 / 74	19.85	1.10	18.80	0.076	34.77	-15.97
690.50	15	QPSK	V	150	13	1 / 74	20.91	1.10	**19.86**	0.097	34.77	-14.91
690.50	15	16-QAM	V	150	13	1 / 74	19.89	1.10	**18.84**	0.077	34.77	-15.93
690.50	15	64-QAM	V	150	13	1 / 74	19.86	1.10	**18.81**	0.076	34.77	-15.96
673.00	20	QPSK	V	150	23	1 / 99	19.83	1.10	18.78	0.076	34.77	-15.99
683.00	20	QPSK	V	150	9	1 / 99	20.84	1.10	19.79	0.095	34.77	-14.98
688.00	20	QPSK	V	150	23	1 / 99	21.90	1.10	**20.85**	**0.122**	34.77	-13.92
688.00	20	16-QAM	V	150	23	1 / 99	21.23	1.10	**20.18**	0.104	34.77	-14.59
688.00	20	64-QAM	V	150	23	1 / 99	20.51	1.10	**19.46**	0.088	34.77	-15.31
688.00	20	QPSK	H	150	235	1 / 99	18.06	1.10	17.01	0.050	34.77	-17.76

Table 7-3. 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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	150	105	1 / 5	20.43	1.10	19.38	0.087	34.77	-15.39	21.53	0.142	36.99	-15.46
707.50	1.4	QPSK	V	150	95	1 / 5	20.50	1.13	19.48	0.089	34.77	-15.29	21.63	0.146	36.99	-15.36
715.30	1.4	QPSK	V	150	98	1 / 0	21.32	1.16	**20.33**	**0.108**	34.77	-14.44	**22.48**	**0.177**	36.99	-14.51
715.30	1.4	16-QAM	V	150	98	1 / 5	19.76	1.16	**18.77**	0.075	34.77	-16.00	**20.92**	0.124	36.99	-16.07
699.70	1.4	64-QAM	V	150	105	1 / 5	20.03	1.10	**18.98**	0.079	34.77	-15.79	**21.13**	0.130	36.99	-15.86
700.50	3	QPSK	V	150	109	1 / 14	20.27	1.10	19.22	0.084	34.77	-15.55	21.37	0.137	36.99	-15.62
707.50	3	QPSK	V	150	103	1 / 14	20.15	1.13	19.13	0.082	34.77	-15.64	21.28	0.134	36.99	-15.71
714.50	3	QPSK	V	150	102	1 / 14	21.05	1.16	**20.06**	0.101	34.77	-14.71	**22.21**	0.166	36.99	-14.78
714.50	3	16-QAM	V	150	102	1 / 14	19.84	1.16	**18.85**	0.077	34.77	-15.92	**21.00**	0.126	36.99	-15.99
700.50	3	64-QAM	V	150	109	1 / 14	20.16	1.10	**19.11**	0.082	34.77	-15.66	**21.26**	0.134	36.99	-15.73
701.50	5	QPSK	V	150	99	1 / 24	20.37	1.11	19.33	0.086	34.77	-15.45	21.48	0.140	36.99	-15.51
707.50	5	QPSK	V	150	103	1 / 24	20.81	1.13	19.79	0.095	34.77	-14.98	21.94	0.156	36.99	-15.05
713.50	5	QPSK	V	150	92	1 / 24	20.96	1.15	**19.96**	0.099	34.77	-14.81	**22.11**	0.163	36.99	-14.88
713.50	5	16-QAM	V	150	92	1 / 24	19.78	1.15	**18.78**	0.076	34.77	-15.99	**20.93**	0.124	36.99	-16.06
707.50	5	64-QAM	V	150	103	1 / 24	20.46	1.13	**19.44**	0.088	34.77	-15.33	**21.59**	0.144	36.99	-15.40
704.00	10	QPSK	V	150	103	1 / 49	21.16	1.12	20.13	0.103	34.77	-14.64	22.28	0.169	36.99	-14.71
707.50	10	QPSK	V	150	96	1 / 49	20.79	1.13	19.77	0.095	34.77	-15.00	21.92	0.156	36.99	-15.07
711.00	10	QPSK	V	150	103	1 / 49	21.31	1.14	**20.30**	0.107	34.77	-14.47	**22.45**	0.176	36.99	-14.54
707.50	10	16-QAM	V	150	96	1 / 49	20.19	1.13	**19.17**	0.083	34.77	-15.60	**21.32**	0.136	36.99	-15.67
704.00	10	64-QAM	V	150	103	1 / 49	19.80	1.12	**18.77**	0.075	34.77	-16.00	**20.92**	0.123	36.99	-16.07
715.30	1	QPSK	H	150	283	1 / 0	19.02	1.16	18.03	0.064	34.77	-16.74	20.18	0.104	36.99	-16.81

Table 7-4. ERP Data (Band 12)

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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	150	19	1 / 0	18.18	1.32	**17.35**	0.054	34.77	-17.42	**19.50**	0.089	36.99	-17.49
782.00	5	QPSK	V	150	18	1 / 24	17.73	1.33	16.91	0.049	34.77	-17.86	19.06	0.081	36.99	-17.93
784.50	5	QPSK	V	150	23	1 / 0	17.52	1.34	16.71	0.047	34.77	-18.06	18.86	0.077	36.99	-18.13
779.50	5	16-QAM	V	150	19	1 / 0	16.52	1.32	**15.69**	0.037	34.77	-19.08	**17.84**	0.061	36.99	-19.15
782.00	5	64-QAM	V	150	18	1 / 24	16.79	1.33	**15.97**	0.040	34.77	-18.80	**18.12**	0.065	36.99	-18.87
782.00	10	QPSK	V	150	9	1 / 0	18.24	1.33	**17.42**	**0.055**	34.77	-17.35	**19.57**	**0.091**	36.99	-17.42
782.00	10	16-QAM	V	150	9	1 / 0	16.82	1.33	**16.00**	0.040	34.77	-18.77	**18.15**	0.065	36.99	-18.84
782.00	10	64-QAM	V	150	9	1 / 0	17.05	1.33	**16.23**	0.042	34.77	-18.54	**18.38**	0.069	36.99	-18.61
782.00	10	QPSK	H	150	15	1 / 0	16.48	1.33	15.66	0.037	34.77	-19.11	17.81	0.060	36.99	-19.18

Table 7-5. 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]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	V	150	3	1 / 0	20.35	1.50	**19.70**	0.093	38.45	-18.75	**21.85**	0.153	40.61	-18.76
836.50	1.4	QPSK	V	150	0	1 / 0	20.24	1.50	19.59	0.091	38.45	-18.86	21.74	0.149	40.61	-18.87
848.30	1.4	QPSK	V	150	358	1 / 5	19.47	1.50	18.82	0.076	38.45	-19.63	20.97	0.125	40.61	-19.64
824.70	1.4	16-QAM	V	150	3	1 / 0	19.12	1.50	**18.47**	0.070	38.45	-19.98	**20.62**	0.115	40.61	-19.99
824.70	1.4	64-QAM	V	150	3	1 / 0	19.15	1.50	**18.50**	0.071	38.45	-19.95	**20.65**	0.116	40.61	-19.96
825.50	3	QPSK	V	150	5	1 / 0	20.31	1.50	19.66	0.092	38.45	-18.79	21.81	0.152	40.61	-18.80
836.50	3	QPSK	V	150	2	1 / 0	20.36	1.50	**19.71**	0.094	38.45	-18.74	**21.86**	0.153	40.61	-18.75
847.50	3	QPSK	V	150	358	1 / 0	19.73	1.50	19.08	0.081	38.45	-19.37	21.23	0.133	40.61	-19.38
836.50	3	16-QAM	V	150	2	1 / 0	18.94	1.50	**18.29**	0.067	38.45	-20.16	**20.44**	0.111	40.61	-20.17
836.50	3	64-QAM	V	150	2	1 / 0	18.85	1.50	**18.20**	0.066	38.45	-20.25	**20.35**	0.108	40.61	-20.26
826.50	5	QPSK	V	150	3	1 / 0	20.30	1.50	**19.65**	0.092	38.45	-18.80	**21.80**	0.151	40.61	-18.81
836.50	5	QPSK	V	150	3	1 / 0	20.09	1.50	19.44	0.088	38.45	-19.01	21.59	0.144	40.61	-19.02
846.50	5	QPSK	V	150	358	1 / 0	19.78	1.50	19.13	0.082	38.45	-19.32	21.28	0.134	40.61	-19.33
836.50	5	16-QAM	V	150	3	1 / 0	19.35	1.50	**18.70**	0.074	38.45	-19.75	**20.85**	0.122	40.61	-19.76
836.50	5	64-QAM	V	150	3	1 / 0	19.24	1.50	**18.59**	0.072	38.45	-19.86	**20.74**	0.119	40.61	-19.87
829.00	10	QPSK	V	150	3	1 / 0	20.29	1.50	19.64	0.092	38.45	-18.81	21.79	0.151	40.61	-18.82
836.50	10	QPSK	V	150	4	1 / 0	20.72	1.50	**20.07**	**0.102**	38.45	-18.38	**22.22**	**0.167**	40.61	-18.39
844.00	10	QPSK	V	150	358	1 / 0	20.50	1.50	19.85	0.097	38.45	-18.60	22.00	0.158	40.61	-18.61
836.50	10	16-QAM	V	150	4	1 / 0	18.82	1.50	**18.17**	0.066	38.45	-20.28	**20.32**	0.108	40.61	-20.29
836.50	10	64-QAM	V	150	4	1 / 0	19.08	1.50	**18.43**	0.070	38.45	-20.02	**20.58**	0.114	40.61	-20.03
836.50	10	QPSK	H	150	25	1 / 0	16.93	1.50	16.28	0.042	38.45	-22.17	18.43	0.070	40.61	-22.18

Table 7-6. ERP Data (Band 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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	V	150	290	1 / 0	15.65	5.56	21.21	0.132	30.00	-8.79
1745.00	1.4	QPSK	V	150	290	1 / 0	16.45	5.32	21.77	0.150	30.00	-8.23
1779.30	1.4	QPSK	V	150	290	1 / 0	17.29	5.09	**22.38**	0.173	30.00	-7.62
1779.30	1.4	16-QAM	V	150	290	1 / 0	16.66	5.09	**21.75**	0.150	30.00	-8.25
1779.30	1.4	64-QAM	V	150	290	1 / 0	16.14	5.09	**21.23**	0.133	30.00	-8.77
1711.50	3	QPSK	V	150	287	1 / 0	15.52	5.55	21.07	0.128	30.00	-8.93
1745.00	3	QPSK	V	150	291	1 / 0	16.67	5.32	21.99	0.158	30.00	-8.01
1778.50	3	QPSK	V	150	290	1 / 0	17.31	5.10	**22.41**	**0.174**	30.00	-7.59
1745.00	3	16-QAM	V	150	291	1 / 0	16.43	5.32	**21.75**	0.150	30.00	-8.25
1778.50	3	64-QAM	V	150	290	1 / 0	16.44	5.10	**21.54**	0.142	30.00	-8.46
1712.50	5	QPSK	V	150	288	1 / 0	14.50	5.55	20.05	0.101	30.00	-9.95
1745.00	5	QPSK	V	150	292	1 / 0	16.57	5.32	21.89	0.155	30.00	-8.11
1777.50	5	QPSK	V	150	291	1 / 0	17.26	5.10	**22.36**	0.172	30.00	-7.64
1777.50	5	16-QAM	V	150	291	1 / 0	16.68	5.10	**21.78**	0.151	30.00	-8.22
1777.50	5	64-QAM	V	150	291	1 / 0	15.46	5.10	**20.56**	0.114	30.00	-9.44
1715.00	10	QPSK	V	150	291	1 / 0	15.42	5.53	20.95	0.124	30.00	-9.05
1745.00	10	QPSK	V	150	287	1 / 0	16.90	5.32	**22.22**	0.167	30.00	-7.78
1775.00	10	QPSK	V	150	291	1 / 0	16.80	5.12	21.92	0.156	30.00	-8.08
1745.00	10	16-QAM	V	150	287	1 / 0	16.09	5.32	**21.41**	0.138	30.00	-8.59
1745.00	10	64-QAM	V	150	287	1 / 0	15.33	5.32	**20.65**	0.116	30.00	-9.35
1717.50	15	QPSK	V	150	290	1 / 0	14.81	5.51	20.32	0.108	30.00	-9.68
1745.00	15	QPSK	V	150	287	1 / 0	16.51	5.32	**21.83**	0.152	30.00	-8.17
1772.50	15	QPSK	V	150	293	1 / 0	16.69	5.14	21.83	0.152	30.00	-8.17
1745.00	15	16-QAM	V	150	287	1 / 0	16.24	5.32	**21.56**	0.143	30.00	-8.44
1745.00	15	64-QAM	V	150	287	1 / 0	15.51	5.32	**20.83**	0.121	30.00	-9.17
1720.00	20	QPSK	V	150	289	1 / 0	14.48	5.49	19.97	0.099	30.00	-10.03
1745.00	20	QPSK	V	150	286	1 / 0	16.13	5.32	21.45	0.140	30.00	-8.55
1770.00	20	QPSK	V	150	292	1 / 0	17.02	5.15	**22.17**	0.165	30.00	-7.83
1770.00	20	16-QAM	V	150	292	1 / 0	16.63	5.15	**21.78**	0.151	30.00	-8.22
1770.00	20	64-QAM	V	150	292	1 / 0	16.04	5.15	**21.19**	0.132	30.00	-8.81
1778.50	3	QPSK	H	150	12	1 / 0	16.50	5.10	21.60	0.144	30.00	-8.40

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

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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	150	359	1 / 0	17.75	4.82	22.57	0.181	33.01	-10.44
1880.00	1.4	QPSK	H	150	359	1 / 0	18.10	4.74	**22.84**	0.192	33.01	-10.17
1909.30	1.4	QPSK	H	150	362	1 / 0	16.93	4.68	21.61	0.145	33.01	-11.40
1850.70	1.4	16-QAM	H	150	359	1 / 0	17.60	4.82	**22.42**	0.174	33.01	-10.59
1880.00	1.4	64-QAM	H	150	359	1 / 0	17.02	4.74	**21.76**	0.150	33.01	-11.25
1851.50	3	QPSK	H	150	339	1 / 0	19.61	4.82	24.43	0.277	33.01	-8.58
1880.00	3	QPSK	H	150	332	1 / 0	19.82	4.74	**24.56**	0.286	33.01	-8.45
1908.50	3	QPSK	H	150	328	1 / 0	18.92	4.68	23.60	0.229	33.01	-9.41
1880.00	3	16-QAM	H	150	332	1 / 0	19.64	4.74	**24.38**	0.274	33.01	-8.63
1880.00	3	64-QAM	H	150	332	1 / 0	18.72	4.74	**23.46**	0.222	33.01	-9.55
1852.50	5	QPSK	H	150	336	1 / 0	19.74	4.81	24.55	0.285	33.01	-8.46
1880.00	5	QPSK	H	150	333	1 / 0	20.35	4.74	**25.09**	**0.323**	33.01	-7.92
1907.50	5	QPSK	H	150	332	1 / 0	20.13	4.68	24.81	0.303	33.01	-8.20
1880.00	5	16-QAM	H	150	333	1 / 0	20.08	4.74	**24.82**	0.303	33.01	-8.19
1880.00	5	64-QAM	H	150	333	1 / 0	19.42	4.74	**24.16**	0.261	33.01	-8.85
1855.00	10	QPSK	H	150	348	1 / 0	19.84	4.81	**24.65**	0.291	33.01	-8.36
1880.00	10	QPSK	H	150	352	1 / 0	19.21	4.74	23.95	0.248	33.01	-9.06
1905.00	10	QPSK	H	150	344	1 / 0	19.59	4.68	24.27	0.268	33.01	-8.74
1855.00	10	16-QAM	H	150	348	1 / 0	19.72	4.81	**24.53**	0.284	33.01	-8.48
1855.00	10	64-QAM	H	150	348	1 / 0	18.77	4.81	**23.58**	0.228	33.01	-9.43
1857.50	15	QPSK	H	150	359	1 / 0	18.32	4.80	23.12	0.205	33.01	-9.89
1880.00	15	QPSK	H	150	337	1 / 0	20.23	4.74	**24.97**	0.314	33.01	-8.04
1902.50	15	QPSK	H	150	355	1 / 0	17.96	4.69	22.65	0.184	33.01	-10.36
1880.00	15	16-QAM	H	150	337	1 / 0	20.17	4.74	**24.91**	0.310	33.01	-8.10
1880.00	15	64-QAM	H	150	337	1 / 0	19.11	4.74	**23.85**	0.243	33.01	-9.16
1860.00	20	QPSK	H	150	344	1 / 0	20.08	4.79	24.87	0.307	33.01	-8.14
1880.00	20	QPSK	H	150	348	1 / 0	19.34	4.74	24.08	0.256	33.01	-8.93
1900.00	20	QPSK	H	150	337	1 / 0	20.30	4.69	**24.99**	0.315	33.01	-8.02
1900.00	20	16-QAM	H	150	337	1 / 0	20.04	4.69	**24.73**	0.297	33.01	-8.28
1900.00	20	64-QAM	H	150	337	1 / 0	19.02	4.69	**23.71**	0.235	33.01	-9.30
1880.00	5	QPSK	V	150	280	1 / 0	15.92	4.74	20.66	0.116	33.01	-12.35

Table 7-8. EIRP Data (Band 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]
2498.50	5	QPSK	H	150	3	25 / 0	18.21	5.73	23.94	0.248	33.01	-9.07
2593.00	5	QPSK	H	150	8	1 / 0	19.28	6.07	**25.35**	**0.343**	33.01	-7.66
2687.50	5	QPSK	H	150	23	1 / 0	16.99	6.48	23.47	0.223	33.01	-9.54
2593.00	5	16-QAM	H	150	8	1 / 0	17.25	6.07	**23.32**	0.215	33.01	-9.69
2593.00	5	64-QAM	H	150	8	1 / 0	16.36	6.07	**22.43**	0.175	33.01	-10.58
2501.00	10	QPSK	H	150	3	50 / 0	18.21	5.73	23.94	0.248	33.01	-9.07
2593.00	10	QPSK	H	150	7	1 / 0	19.23	6.07	**25.30**	0.339	33.01	-7.71
2685.00	10	QPSK	H	150	15	1 / 0	17.01	6.47	23.48	0.223	33.01	-9.53
2593.00	10	16-QAM	H	150	7	1 / 0	17.19	6.07	**23.26**	0.212	33.01	-9.75
2593.00	10	64-QAM	H	150	7	1 / 0	16.43	6.07	**22.50**	0.178	33.01	-10.51
2503.50	15	QPSK	H	150	3	1 / 74	19.01	5.74	24.75	0.299	33.01	-8.26
2593.00	15	QPSK	H	150	8	1 / 0	19.17	6.07	**25.24**	0.334	33.01	-7.77
2682.50	15	QPSK	H	150	23	1 / 0	16.31	6.46	22.77	0.189	33.01	-10.24
2593.00	15	16-QAM	H	150	8	1 / 0	18.42	6.07	**24.49**	0.281	33.01	-8.52
2593.00	15	64-QAM	H	150	8	1 / 0	17.27	6.07	**23.34**	0.216	33.01	-9.67
2506.00	20	QPSK	H	150	0	1 / 99	19.14	5.75	**24.89**	0.308	33.01	-8.12
2593.00	20	QPSK	H	150	5	1 / 99	18.40	6.07	24.47	0.280	33.01	-8.54
2680.00	20	QPSK	H	150	21	1 / 0	17.29	6.45	23.74	0.237	33.01	-9.27
2506.00	20	16-QAM	H	150	0	1 / 99	18.38	5.75	**24.13**	0.259	33.01	-8.88
2506.00	20	64-QAM	H	150	0	1 / 99	17.49	5.75	**23.24**	0.211	33.01	-9.77
2593.00	5	QPSK	V	150	32	1 / 0	13.36	6.07	19.43	0.088	33.01	-13.58

Table 7-9. EIRP Data (Band 41)

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7.7 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.

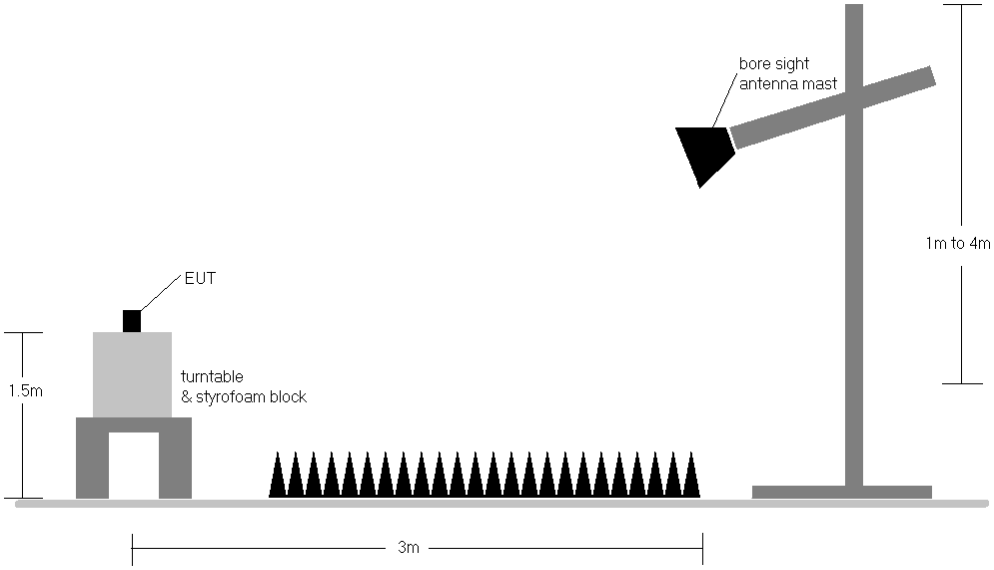

Figure 7-7. Test Instrument & Measurement Setup

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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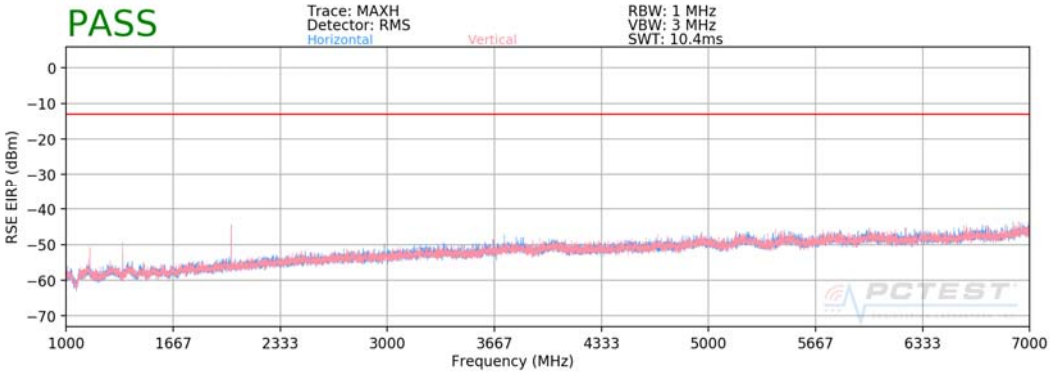
Band 71



Plot 7-266. Radiated Spurious Plot above 1GHz (Band 71)

OPERATING FREQUENCY:	668.00	MHz
CHANNEL:	133172	
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]
1336.00	V	150	10	-62.07	9.17	-52.89	-39.9
2004.00	V	150	12	-61.28	9.45	-51.83	-38.8
2672.00	V	-	-	-69.73	8.80	-60.93	-47.9

Table 7-10. Radiated Spurious Data (Band 71 – Low Channel)

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OPERATING FREQUENCY:	680.50	MHz
CHANNEL:	133297	
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]
1361.00	V	150	346	-60.44	9.03	-51.41	-38.4
2041.50	V	150	30	-58.42	9.31	-49.11	-36.1
2722.00	V	-	-	-69.51	8.82	-60.69	-47.7

Table 7-11. Radiated Spurious Data (Band 71 – Mid Channel)

OPERATING FREQUENCY:	693.00	MHz
CHANNEL:	133422	
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]
1386.00	V	150	355	-60.67	8.71	-51.96	-39.0
2079.00	V	150	41	-58.05	9.14	-48.91	-35.9
2772.00	V	-	-	-69.91	8.70	-61.21	-48.2

Table 7-12. Radiated Spurious Data (Band 71 – High Channel)

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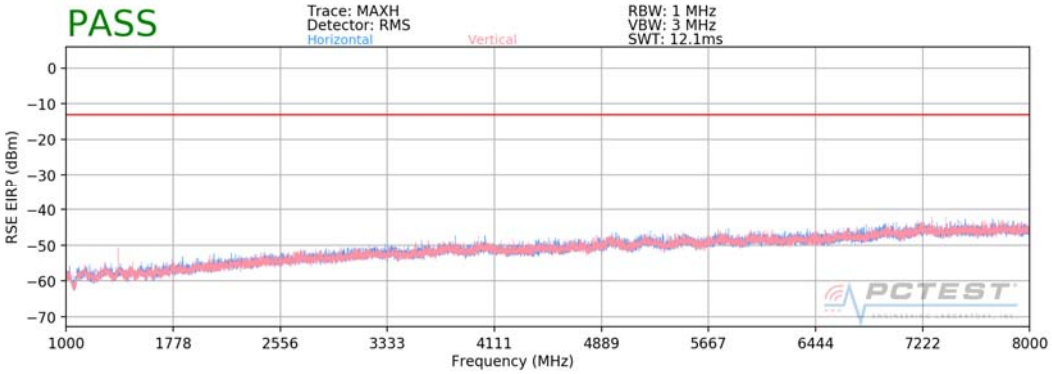
Band 12



Plot 7-267. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY:	699.70	MHz
CHANNEL:	23017	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	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]
1399.40	V	150	354	-70.68	8.54	-62.14	-49.1
2099.10	V	150	38	-63.42	9.04	-54.38	-41.4
2798.80	V	-	-	-69.48	8.61	-60.87	-47.9

Table 7-13. Radiated Spurious Data (Band 12 – Low Channel)

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OPERATING FREQUENCY:	707.50	MHz
CHANNEL:	23095	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	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	V	150	354	-69.32	8.48	-60.84	-47.8
2122.50	V	150	63	-67.85	8.94	-58.92	-45.9
2830.00	V	-	-	-68.08	8.32	-59.76	-46.8

Table 7-14. Radiated Spurious Data (Band 12 – Mid Channel)

OPERATING FREQUENCY:	715.30	MHz
CHANNEL:	23173	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	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]
1430.60	V	150	171	-68.45	8.43	-60.02	-47.0
2145.90	V	150	364	-67.71	8.83	-58.87	-45.9
2861.20	V	-	-	-67.86	8.08	-59.78	-46.8

Table 7-15. Radiated Spurious Data (Band 12 – High Channel)

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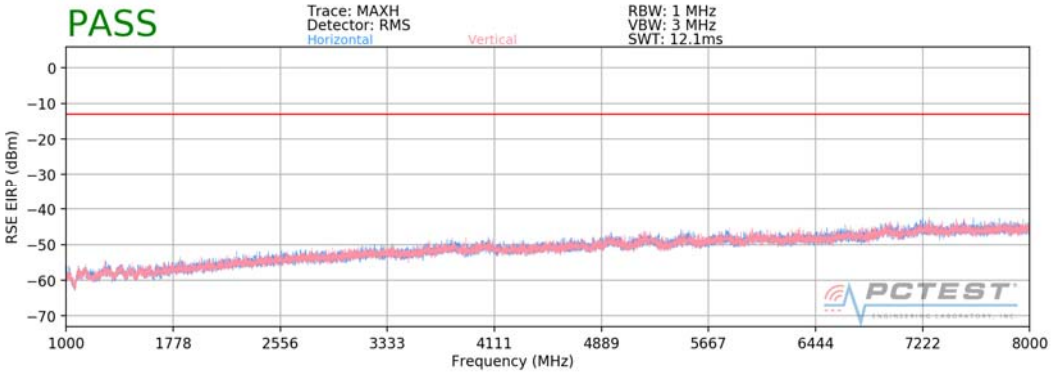
Band 13



Plot 7-268. Radiated Spurious Plot above 1GHz (Band 13)

OPERATING FREQUENCY:	782.00	MHz
CHANNEL:	23230	
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	V	-	-	-71.44	9.04	-62.39	-49.4
3128.00	V	-	-	-69.17	8.56	-60.61	-47.6

Table 7-16. Radiated Spurious Data (Band 13 – Mid Channel)

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	V	-	-	-73.92	8.77	-65.15	-25.1

Table 7-17. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

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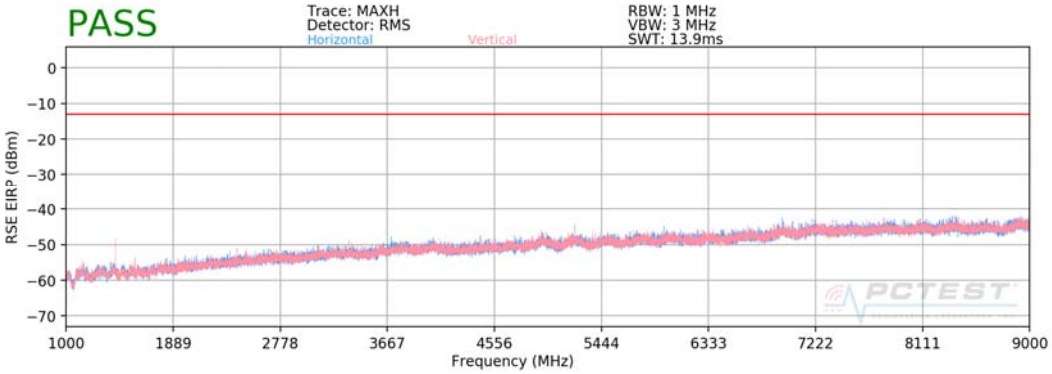
Band 5



Plot 7-269. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY:	829.00	MHz
CHANNEL:	20450	
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	V	-	-	-73.41	9.36	-64.06	-51.1
2487.00	V	150	278	-65.51	8.58	-56.93	-43.9
3316.00	V	-	-	-68.87	8.41	-60.46	-47.5

Table 7-18. Radiated Spurious Data (Band 5 – Low Channel)

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OPERATING FREQUENCY:	836.50	MHz
CHANNEL:	20525	
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	V	-	-	-72.58	9.45	-63.13	-50.1
2509.50	V	150	63	-60.37	8.50	-51.87	-38.9
3346.00	V	-	-	-68.38	8.71	-59.67	-46.7

Table 7-19. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY:	844.00	MHz
CHANNEL:	20600	
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	V	150	71	-74.21	9.54	-64.67	-51.7
2532.00	V	150	73	-60.05	8.45	-51.60	-38.6
3376.00	V	-	-	-68.71	8.92	-59.79	-46.8

Table 7-20. Radiated Spurious Data (Band 5 – High Channel)

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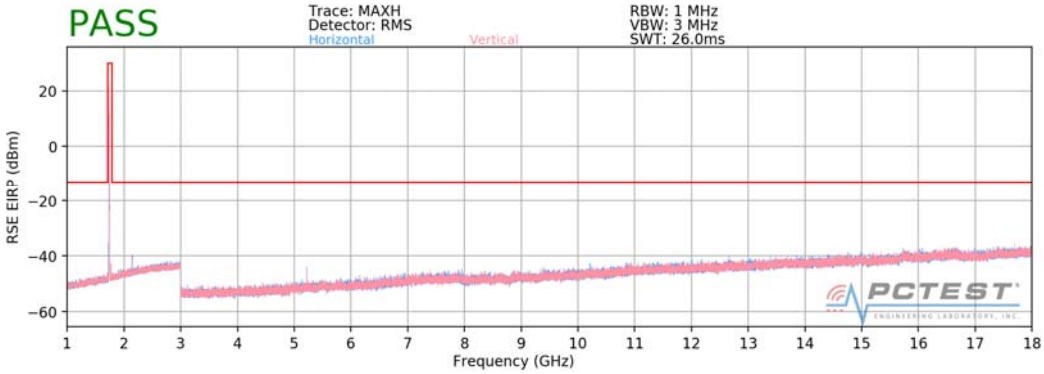
Band 66/4



Plot 7-270. Radiated Spurious Plot above 1GHz (Band 66/4)

OPERATING FREQUENCY:	1711.50	MHz
CHANNEL:	131987	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	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]
3423.00	V	150	30	-66.87	9.21	-57.67	-44.7
5134.50	V	150	287	-69.45	11.99	-57.47	-44.5
6846.00	V	-	-	-65.92	10.48	-55.45	-42.4

Table 7-21. Radiated Spurious Data (Band 66/4 – Low Channel)

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OPERATING FREQUENCY:	1745.00	MHz
CHANNEL:	132322	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	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	150	178	-67.92	9.17	-58.75	-45.7
5235.00	V	150	51	-69.97	12.49	-57.48	-44.5
6980.00	V	-	-	-65.77	10.26	-55.51	-42.5

Table 7-22. Radiated Spurious Data (Band 66/4 – Mid Channel)

OPERATING FREQUENCY:	1778.50	MHz
CHANNEL:	132657	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	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]
3557.00	V	150	13	-66.19	8.75	-57.44	-44.4
5335.50	V	150	41	-70.17	12.57	-57.60	-44.6
7114.00	V	-	-	-64.15	10.17	-53.97	-41.0

Table 7-23. Radiated Spurious Data (Band 66/4 – High Channel)

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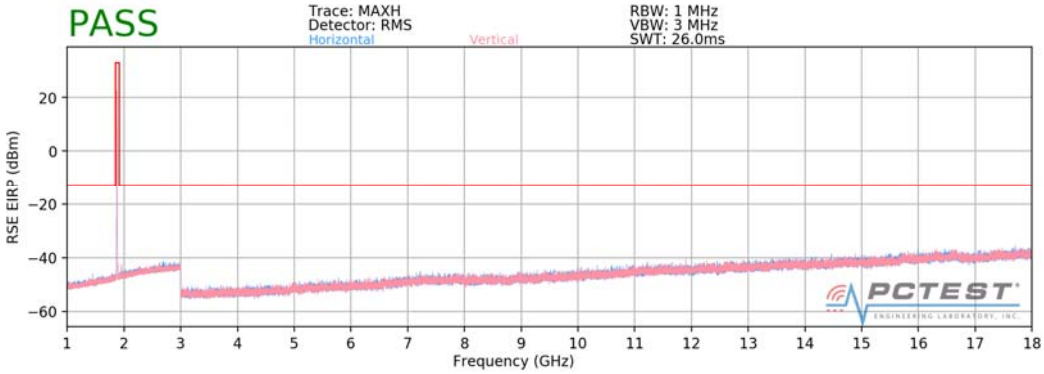
Band 2



Plot 7-271. Radiated Spurious Plot above 1GHz (Band 2)

OPERATING FREQUENCY:	1852.50	MHz
CHANNEL:	18625	
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]
3705.00	V	275	73	-68.70	8.95	-59.75	-46.8
5557.50	V	111	17	-65.96	12.71	-53.25	-40.3
7410.00	V	-	-	-67.84	10.25	-57.59	-44.6

Table 7-24. Radiated Spurious Data (Band 2 – Low Channel)

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OPERATING FREQUENCY:	1880.00	MHz
CHANNEL:	18900	
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]
3760.00	V	294	67	-61.86	9.36	-52.50	-39.5
5640.00	V	107	272	-64.88	12.96	-51.92	-38.9
7520.00	V	-	-	-68.54	10.63	-57.91	-44.9

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

OPERATING FREQUENCY:	1907.50	MHz
CHANNEL:	19175	
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]
3815.00	V	169	64	-66.32	9.50	-56.83	-43.8
5722.50	V	102	286	-68.52	12.97	-55.55	-42.6
7630.00	V	-	-	-68.71	10.67	-58.04	-45.0

Table 7-26. Radiated Spurious Data (Band 2 – High Channel)

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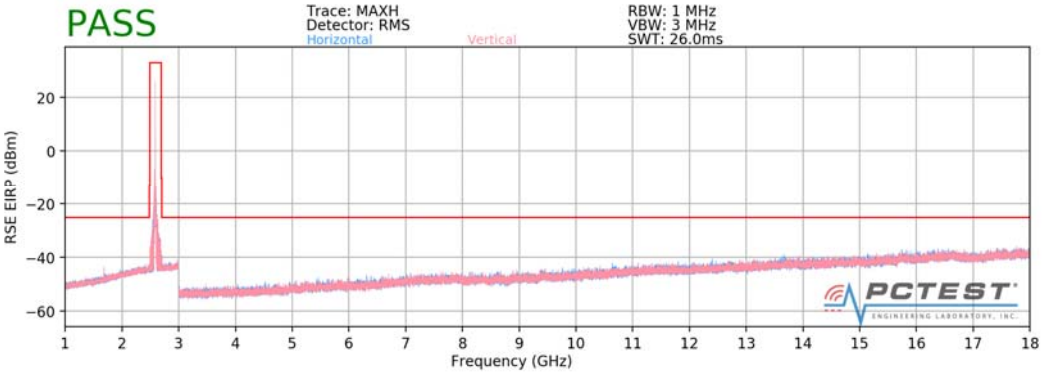
Band 41



Plot 7-272. Radiated Spurious Plot 1GHz - 18GHz (Band 41)

OPERATING FREQUENCY:	2502.50	MHz
CHANNEL:	39715	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
5005.00	V	106	341	-69.29	10.09	-59.20	-34.2
7507.50	V	111	235	-64.35	12.10	-52.25	-27.3
10010.00	V	183	31	-61.99	13.19	-48.81	-23.8
12512.50	V	294	333	-63.05	13.23	-49.82	-24.8
15015.00	V	233	358	-57.80	14.08	-43.71	-18.7
17517.50	V	-	-	-60.41	14.02	-46.39	-21.4

Table 7-27. Radiated Spurious Data (Band 41 – Low Channel)

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OPERATING FREQUENCY:	2593.00	MHz
CHANNEL:	40620	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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	321	28	-69.91	10.27	-59.65	-34.6
7779.00	V	330	182	-63.08	12.28	-50.79	-25.8
10372.00	V	-	-	-65.14	13.12	-52.02	-27.0

Table 7-28. Radiated Spurious Data (Band 41 – Mid Channel)

OPERATING FREQUENCY:	2687.50	MHz
CHANNEL:	41565	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	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]
5375.00	V	-	-	-70.10	10.43	-59.68	-34.7
8062.50	V	132	137	-67.60	12.63	-54.97	-30.0
10750.00	V	400	14	-63.77	13.12	-50.65	-25.6
13437.50	V	289	8	-61.27	14.00	-47.27	-22.3
16125.00	V	-	-	-66.07	13.62	-52.45	-27.4

Table 7-29. Radiated Spurious Data (Band 41 – High Channel)

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7.8 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: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	680,499,900	-100	-0.0000147
100 %		- 30	680,500,138	138	0.0000203
100 %		- 20	680,500,155	155	0.0000228
100 %		- 10	680,500,035	35	0.0000051
100 %		0	680,499,848	-152	-0.0000223
100 %		+ 10	680,499,961	-39	-0.0000057
100 %		+ 20	680,499,984	-16	-0.0000024
100 %		+ 30	680,500,163	163	0.0000240
100 %		+ 40	680,499,935	-65	-0.0000096
100 %		+ 50	680,500,268	268	0.0000394
BATT. ENDPOINT	3.10	+ 20	680,499,888	-112	-0.0000165

Table 7-30. 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

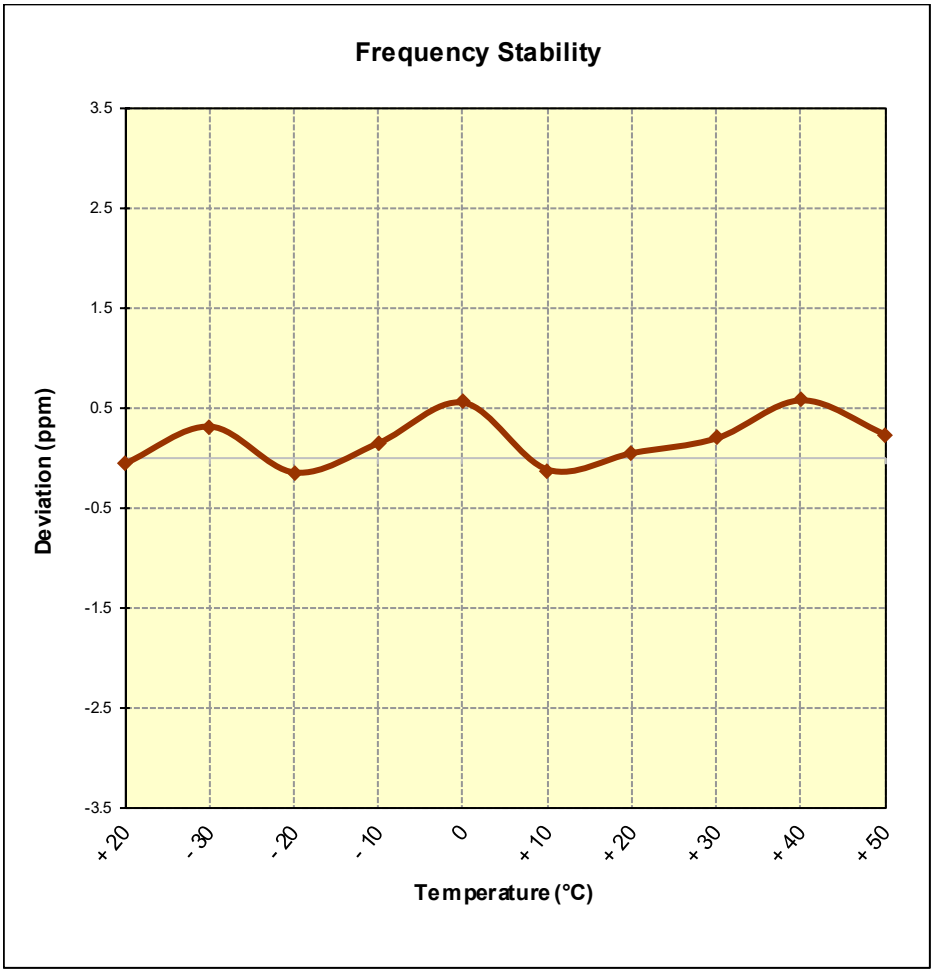

Figure 7-8. Frequency Stability Graph (Band 71)

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Band 12 Frequency Stability Measurements

OPERATING FREQUENCY: 707,500,000 Hz

CHANNEL: 23790

REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	707,499,958	-42	-0.0000059
100 %		- 30	707,500,220	220	0.0000311
100 %		- 20	707,499,890	-110	-0.0000155
100 %		- 10	707,500,104	104	0.0000147
100 %		0	707,500,392	392	0.0000554
100 %		+ 10	707,499,910	-90	-0.0000127
100 %		+ 20	707,500,031	31	0.0000044
100 %		+ 30	707,500,138	138	0.0000195
100 %		+ 40	707,500,409	409	0.0000578
100 %		+ 50	707,500,162	162	0.0000229
BATT. ENDPOINT	3.10	+ 20	707,499,843	-157	-0.0000222

Table 7-31. 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

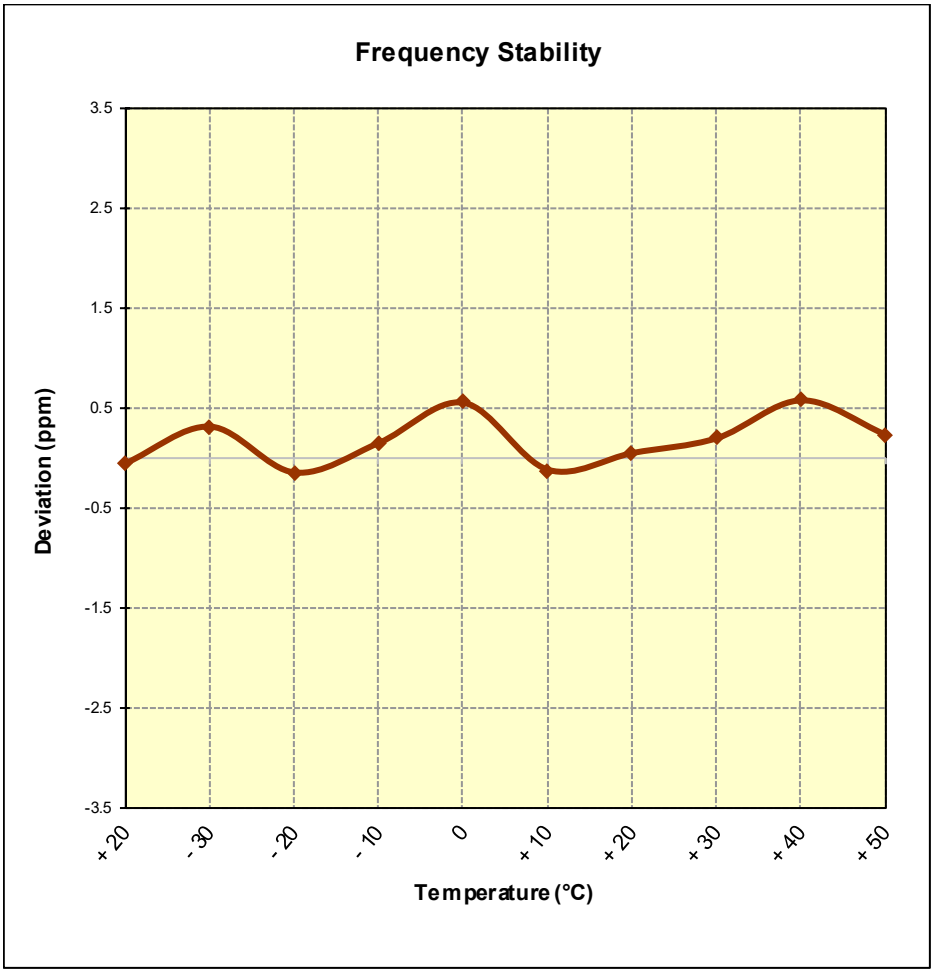

Figure 7-9. Frequency Stability Graph (Band 12)

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Band 13 Frequency Stability Measurements

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	781,999,705	-295	-0.0000377
100 %		- 30	781,999,936	-64	-0.0000082
100 %		- 20	782,000,175	175	0.0000224
100 %		- 10	781,999,953	-47	-0.0000060
100 %		0	782,000,093	93	0.0000119
100 %		+ 10	782,000,082	82	0.0000105
100 %		+ 20	781,999,881	-119	-0.0000152
100 %		+ 30	781,999,765	-235	-0.0000301
100 %		+ 40	781,999,860	-140	-0.0000179
100 %		+ 50	781,999,871	-129	-0.0000165
BATT. ENDPOINT	3.10	+ 20	781,999,773	-227	-0.0000290

Table 7-32. 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

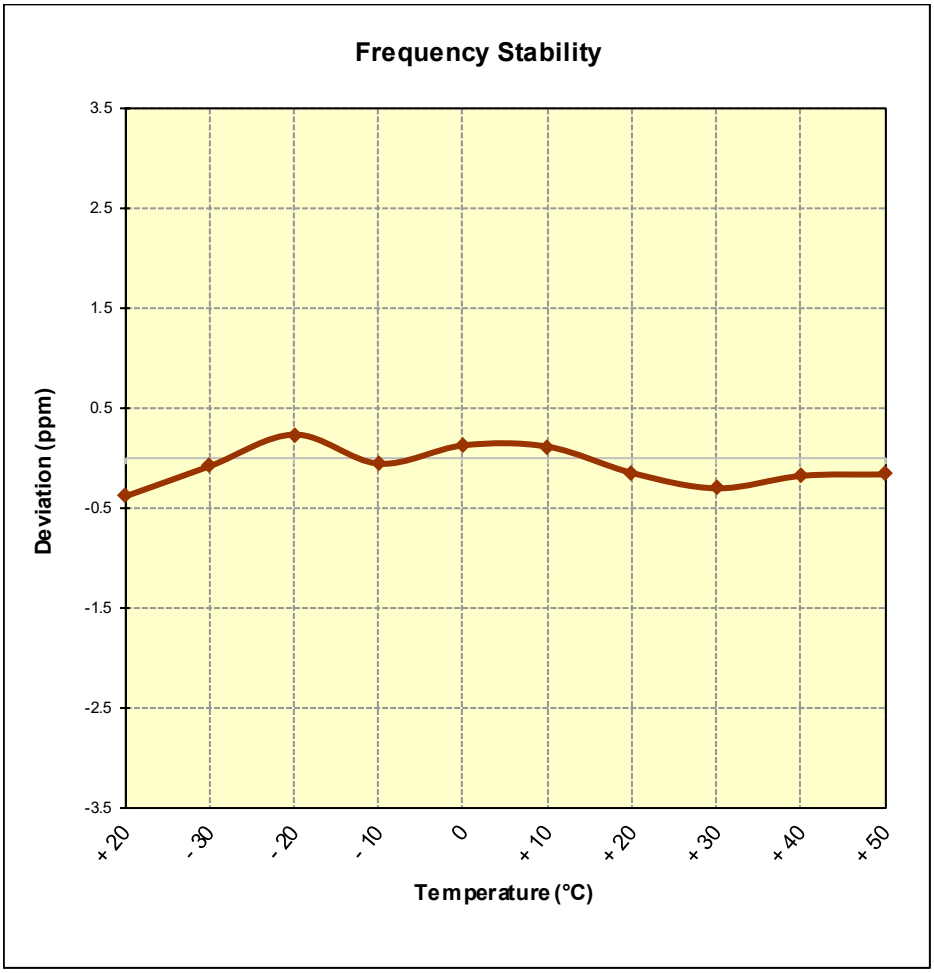

Figure 7-10. Frequency Stability Graph (Band 13)

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Band 5 Frequency Stability Measurements

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,499,849	-151	-0.0000181
100 %		- 30	836,500,000	0	0.0000000
100 %		- 20	836,499,967	-33	-0.0000039
100 %		- 10	836,500,138	138	0.0000165
100 %		0	836,500,079	79	0.0000094
100 %		+ 10	836,499,780	-220	-0.0000263
100 %		+ 20	836,499,802	-198	-0.0000237
100 %		+ 30	836,500,211	211	0.0000252
100 %		+ 40	836,499,584	-416	-0.0000497
100 %		+ 50	836,499,921	-79	-0.0000094
BATT. ENDPOINT	3.10	+ 20	836,499,643	-357	-0.0000427

Table 7-33. Frequency Stability Data (Band 5)

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Band 5 Frequency Stability Measurements

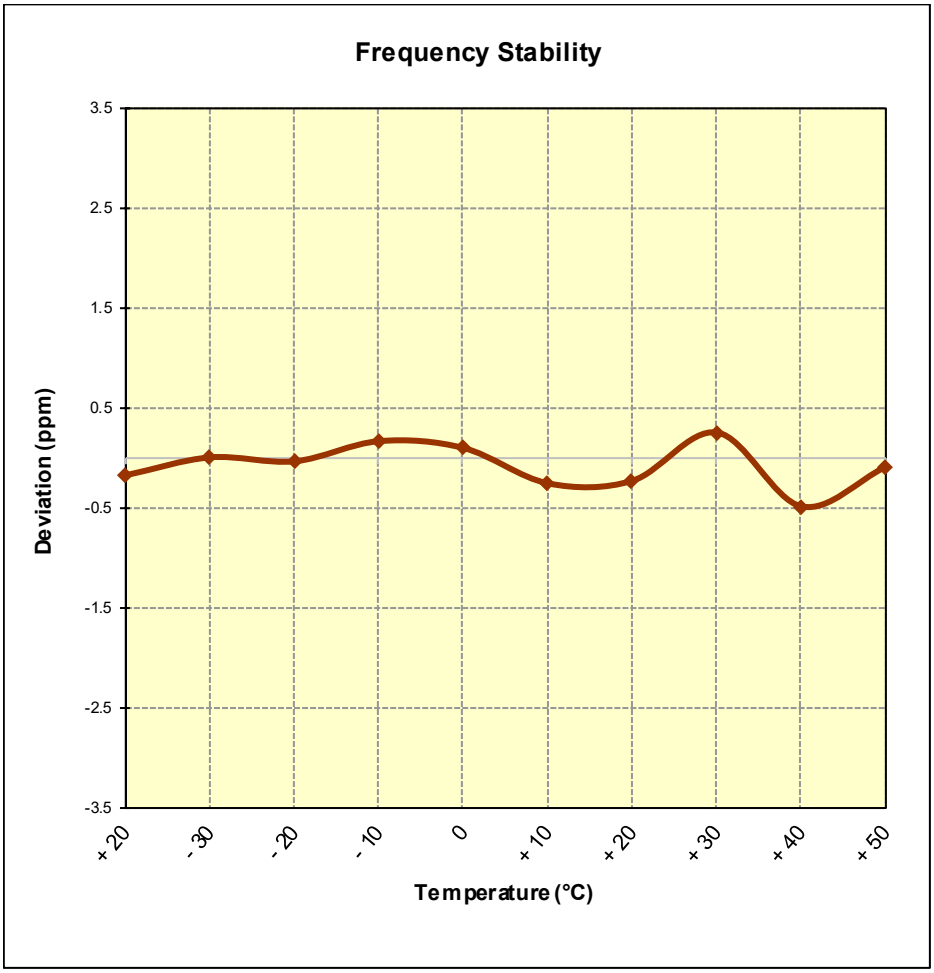

Figure 7-11. Frequency Stability Graph (Band 5)

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Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,744,999,888	-112	-0.0000064
100 %		- 30	1,744,999,849	-151	-0.0000087
100 %		- 20	1,745,000,114	114	0.0000065
100 %		- 10	1,745,000,102	102	0.0000058
100 %		0	1,745,000,032	32	0.0000018
100 %		+ 10	1,744,999,878	-122	-0.0000070
100 %		+ 20	1,745,000,122	122	0.0000070
100 %		+ 30	1,745,000,218	218	0.0000125
100 %		+ 40	1,744,999,948	-52	-0.0000030
100 %		+ 50	1,744,999,619	-381	-0.0000218
BATT. ENDPOINT	3.10	+ 20	1,745,000,129	129	0.0000074

Table 7-34. 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

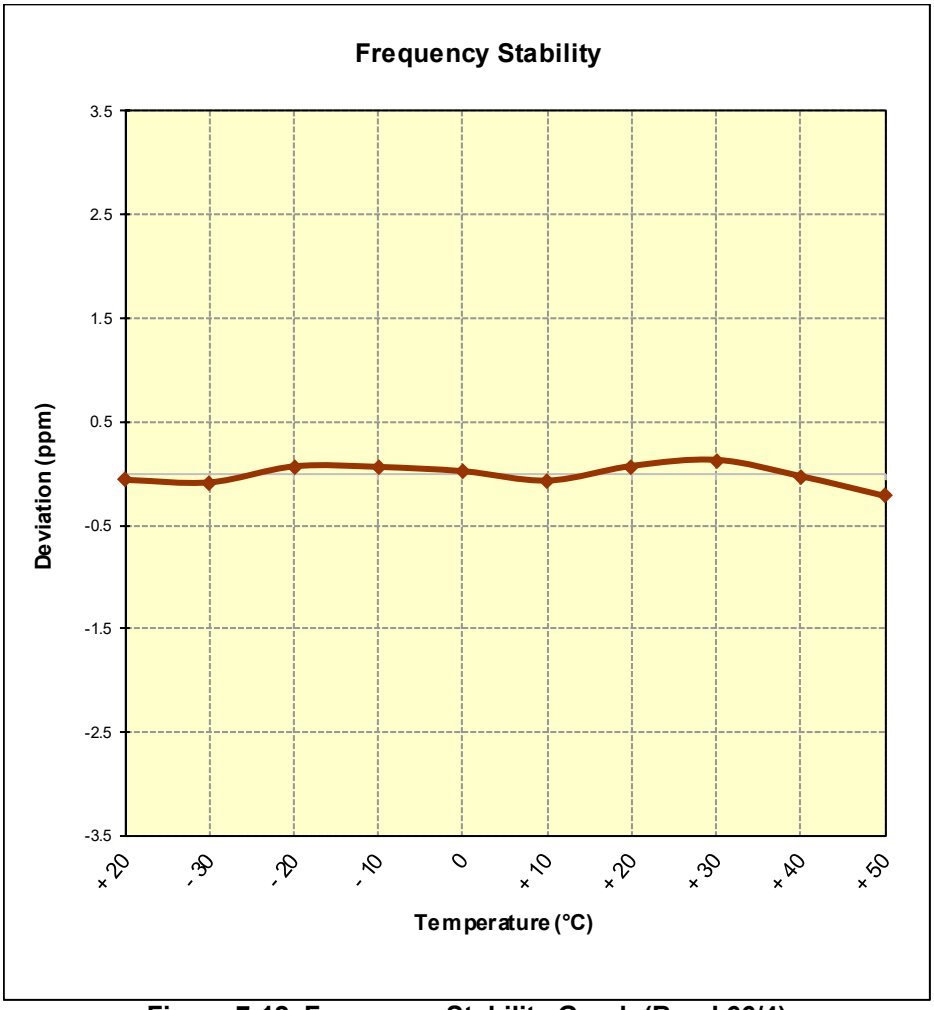

Figure 7-12. Frequency Stability Graph (Band 66/4)

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Band 2 Frequency Stability Measurements

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 18900

REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,879,999,663	-337	-0.0000179
100 %		- 30	1,880,000,142	142	0.0000076
100 %		- 20	1,880,000,142	142	0.0000076
100 %		- 10	1,879,999,949	-51	-0.0000027
100 %		0	1,880,000,217	217	0.0000115
100 %		+ 10	1,879,999,807	-193	-0.0000103
100 %		+ 20	1,880,000,127	127	0.0000068
100 %		+ 30	1,879,999,703	-297	-0.0000158
100 %		+ 40	1,880,000,088	88	0.0000047
100 %		+ 50	1,879,999,932	-68	-0.0000036
BATT. ENDPOINT	3.10	+ 20	1,880,000,252	252	0.0000134

Table 7-35. Frequency Stability Data (Band 2)

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 2 Frequency Stability Measurements

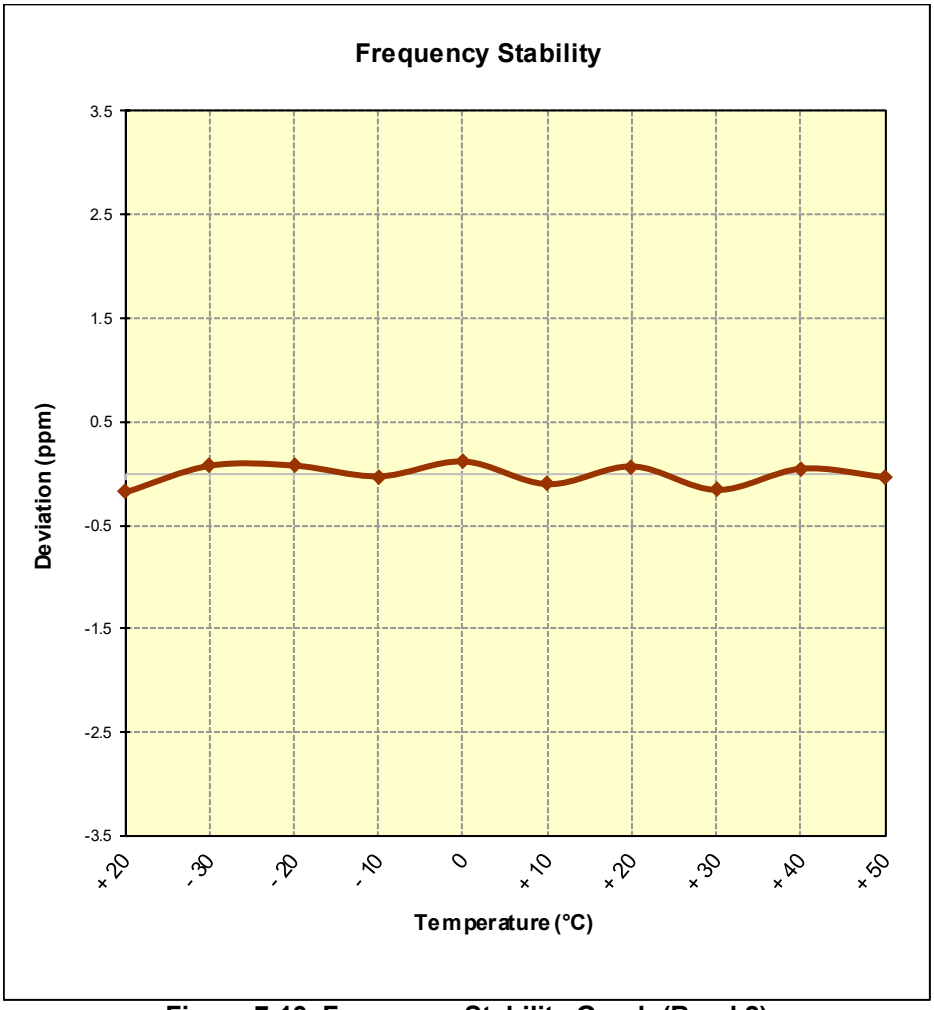

Figure 7-13. Frequency Stability Graph (Band 2)

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Band 41 Frequency Stability Measurements

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	2,593,000,085	85	0.0000033
100 %		- 30	2,592,999,946	-54	-0.0000021
100 %		- 20	2,592,999,998	-2	-0.0000001
100 %		- 10	2,593,000,052	52	0.0000020
100 %		0	2,592,999,850	-150	-0.0000058
100 %		+ 10	2,593,000,291	291	0.0000112
100 %		+ 20	2,593,000,058	58	0.0000022
100 %		+ 30	2,592,999,955	-45	-0.0000017
100 %		+ 40	2,593,000,247	247	0.0000095
100 %		+ 50	2,592,999,862	-138	-0.0000053
BATT. ENDPOINT	3.10	+ 20	2,592,999,884	-116	-0.0000045

Table 7-36. 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

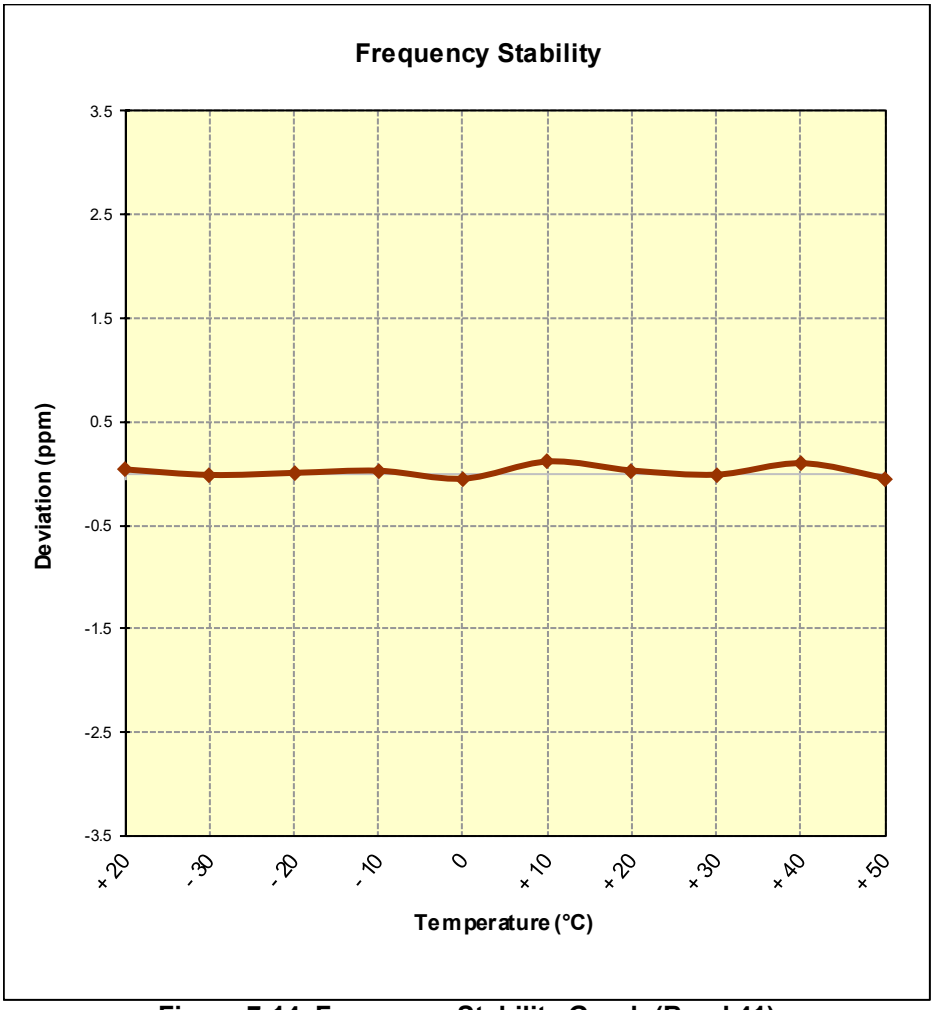

Figure 7-14. Frequency Stability Graph (Band 41)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFQ610TA** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

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