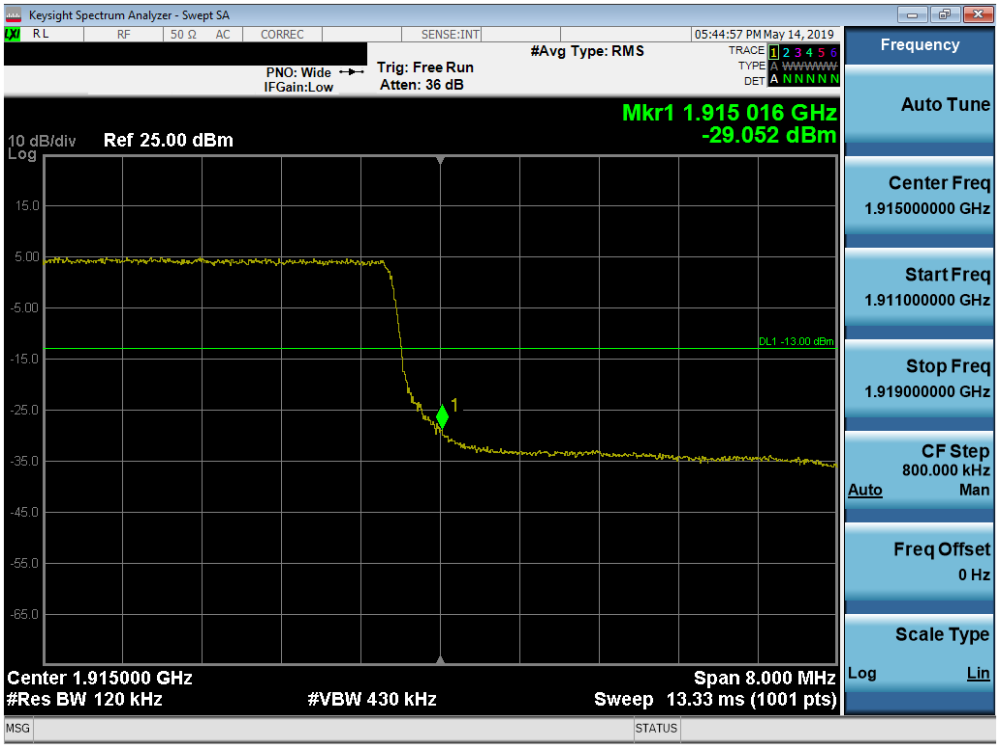
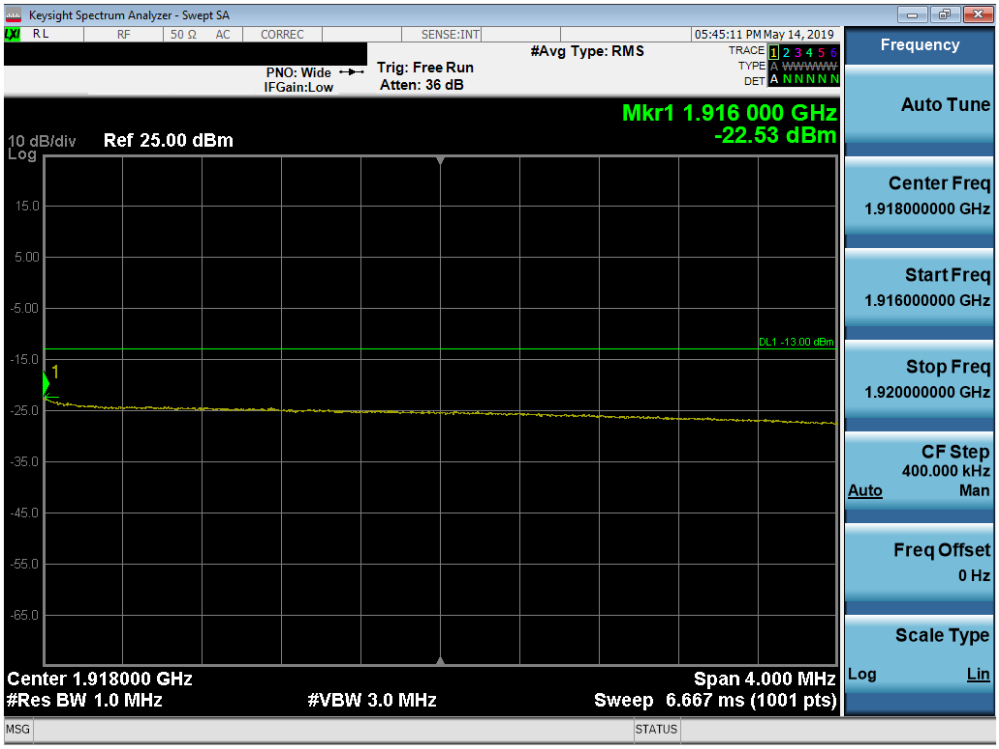
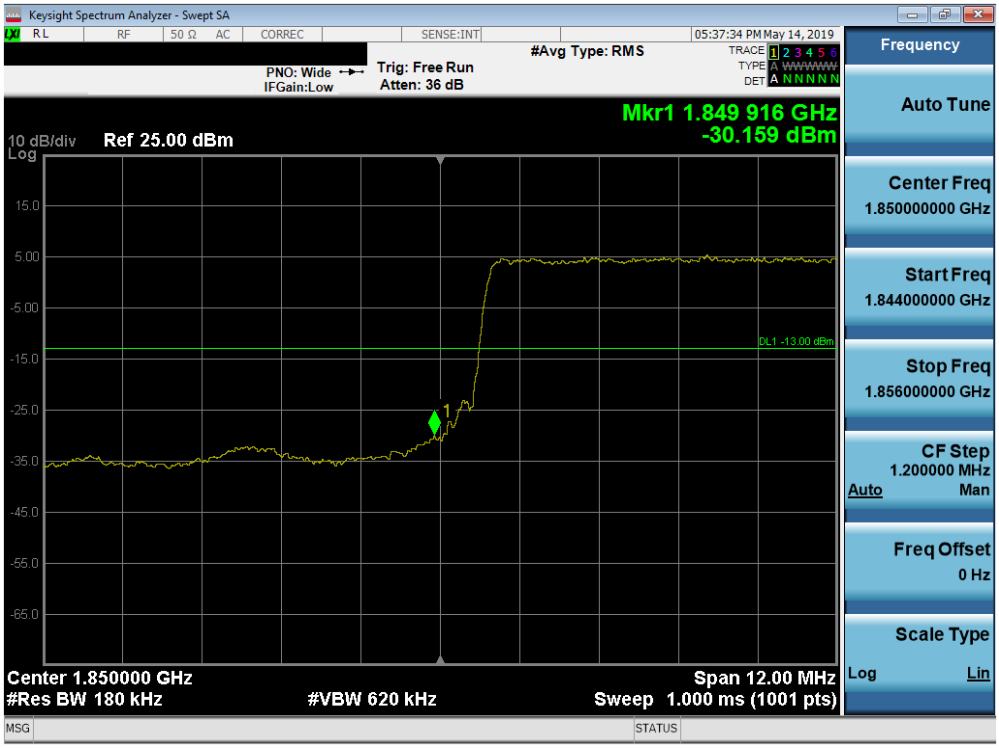


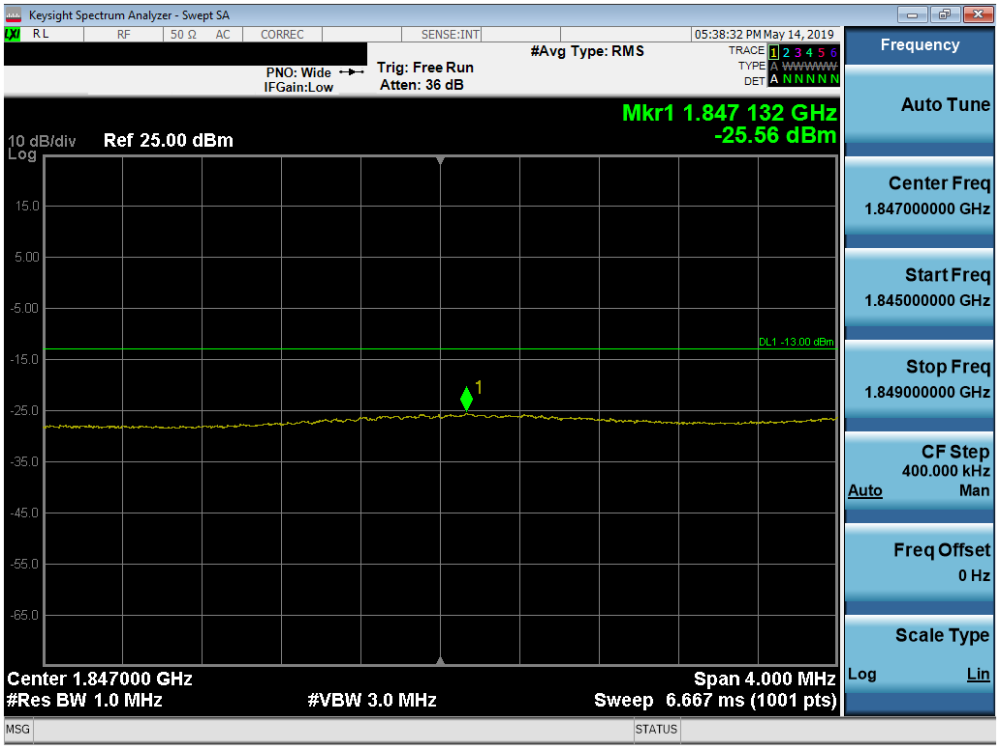
Plot 7-253. Upper Band Edge Plot (Band 25 - 10.0MHz QPSK - Full RB Configuration)



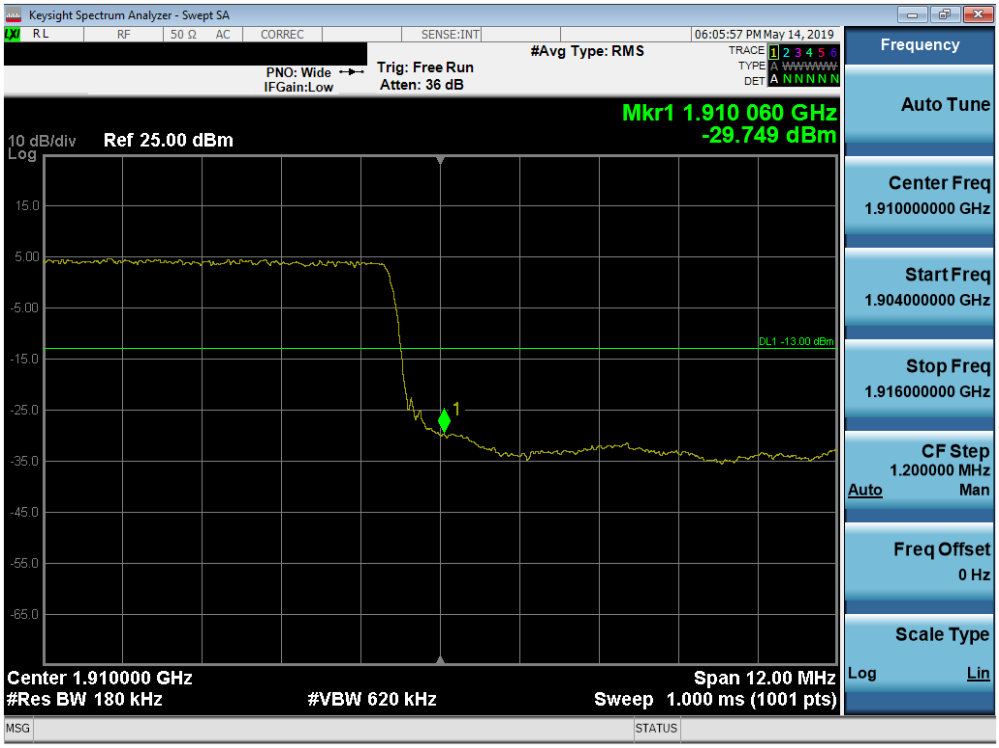
Plot 7-254. Upper Extended Band Edge Plot (Band 25 - 10.0MHz QPSK - Full RB Configuration)



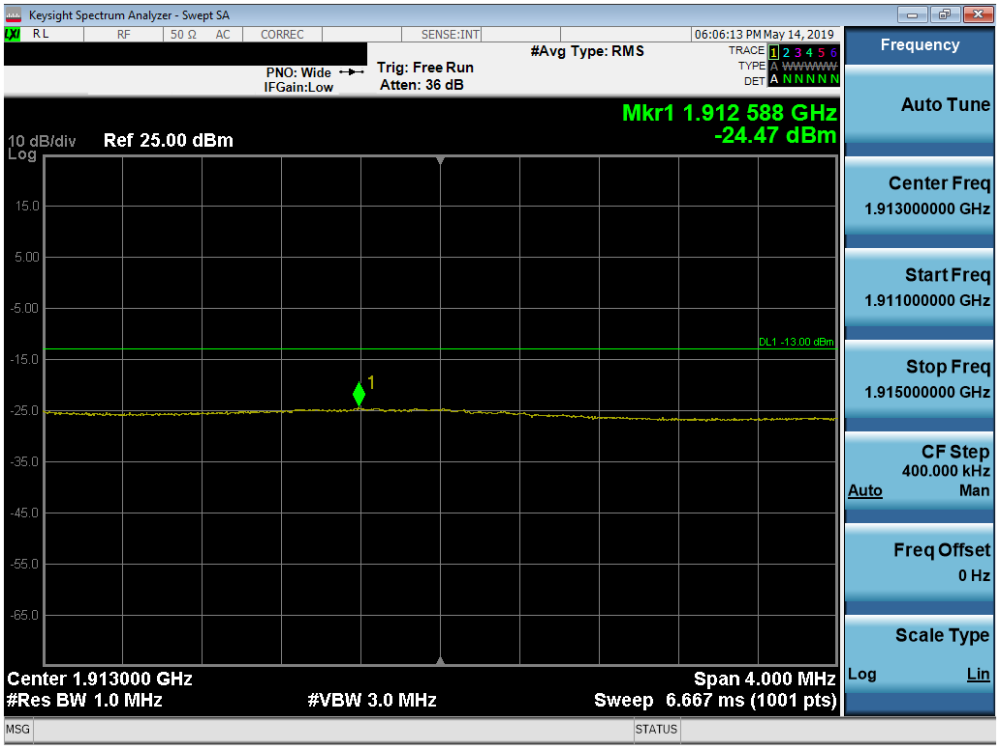
Plot 7-255. Lower Band Edge Plot (Band 25/2 - 15.0MHz QPSK - Full RB Configuration)



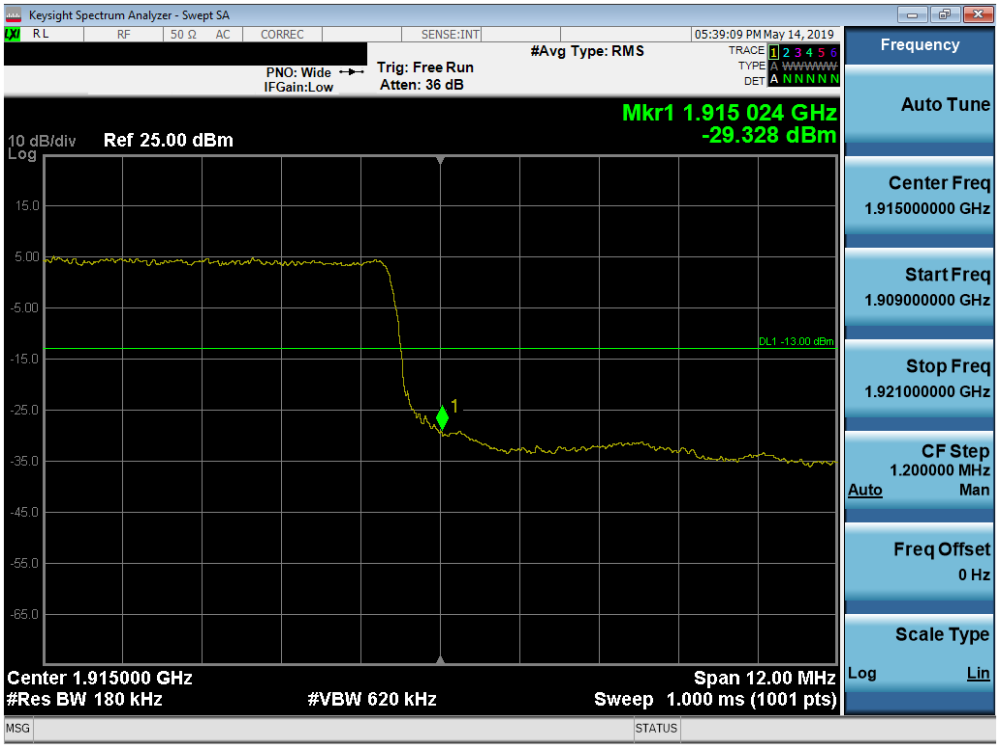
Plot 7-256. Lower Extended Band Edge Plot (Band 25/2 - 15.0MHz QPSK - Full RB Configuration)



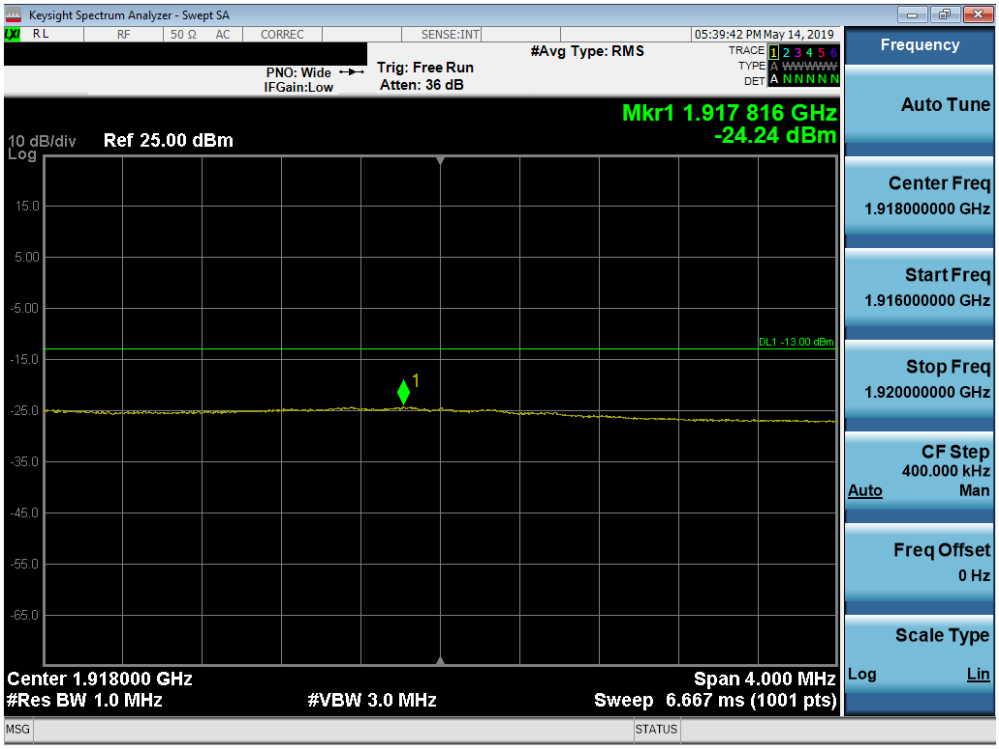
Plot 7-257. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



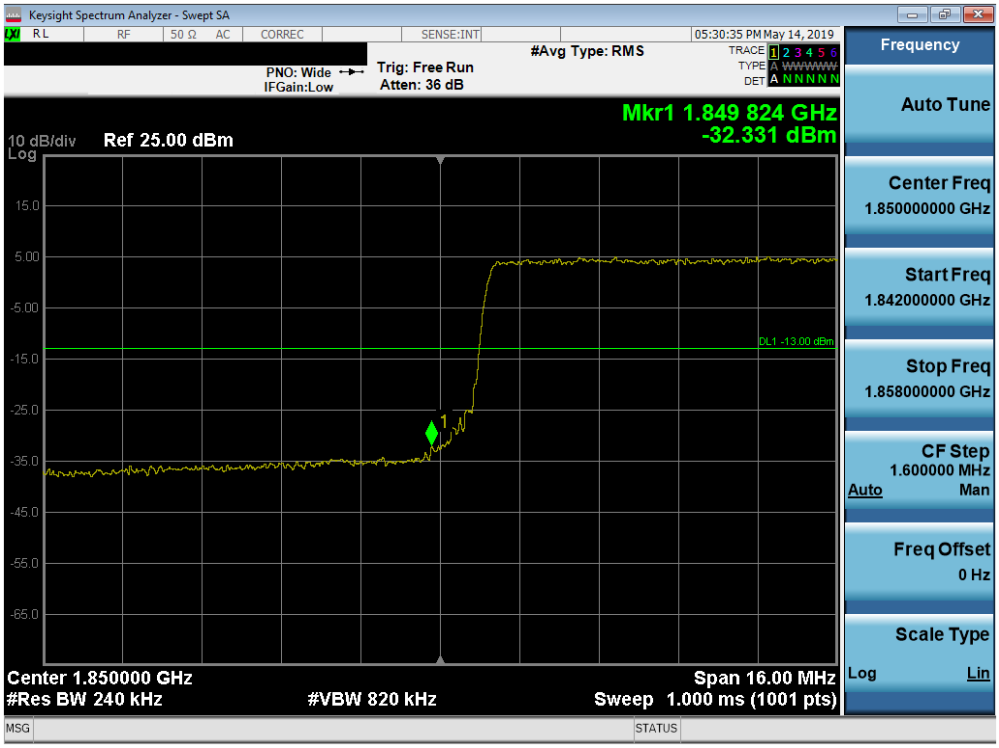
Plot 7-258. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



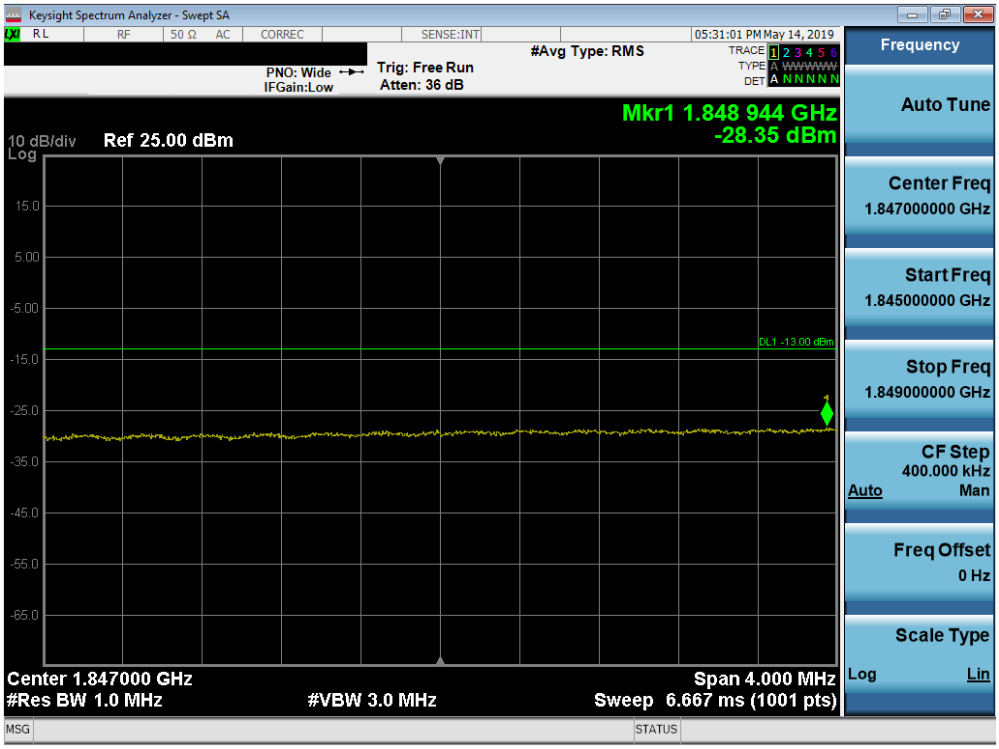
Plot 7-259. Upper Band Edge Plot (Band 25 - 15.0MHz QPSK - Full RB Configuration)



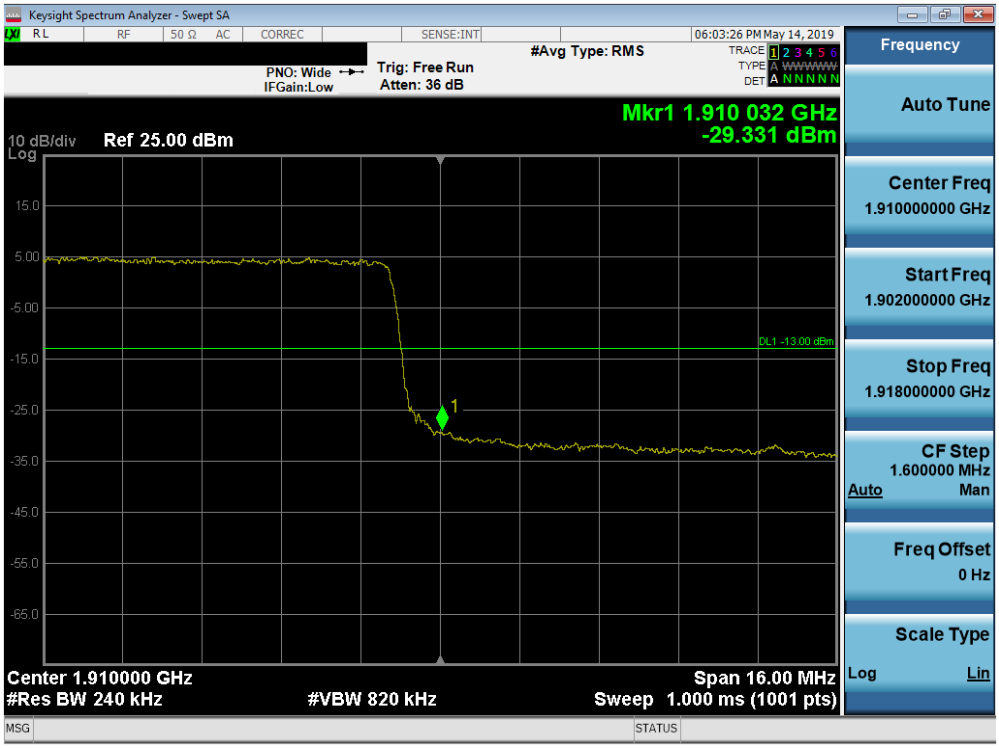
Plot 7-260. Upper Extended Band Edge Plot (Band 25 - 15.0MHz QPSK - Full RB Configuration)



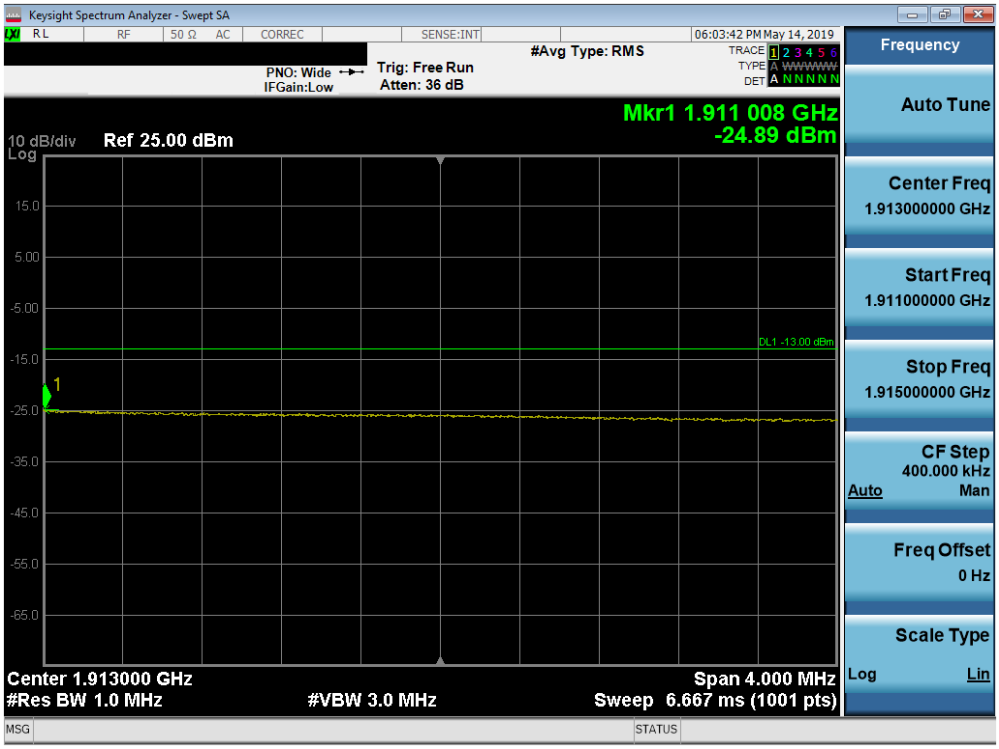
Plot 7-261. Lower Band Edge Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)



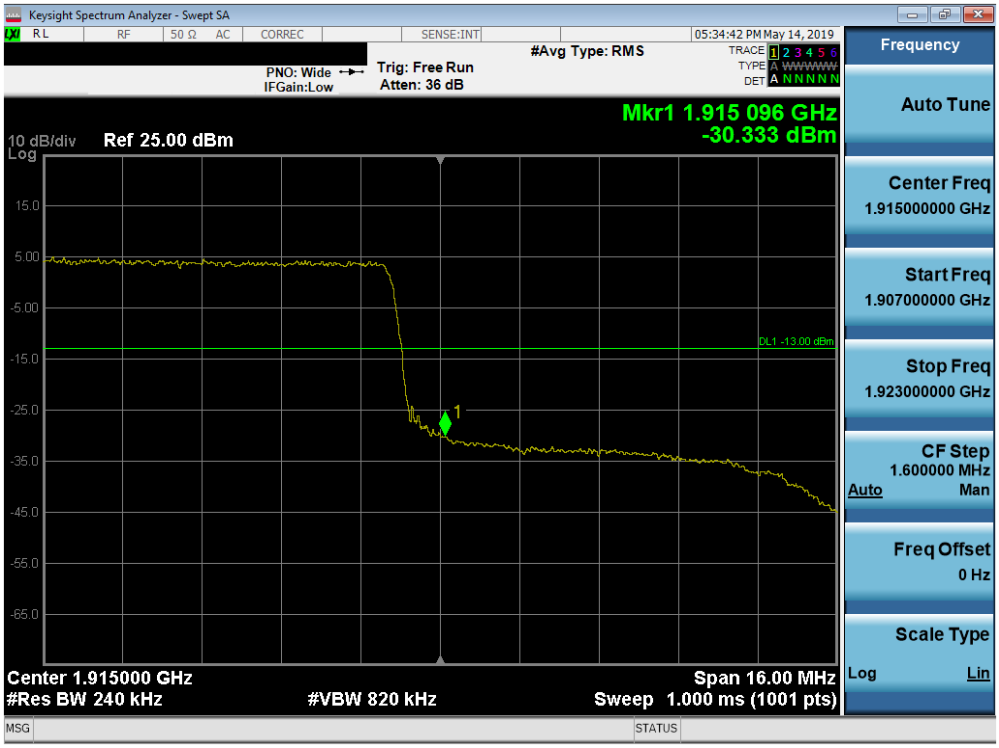
Plot 7-262. Lower Extended Band Edge Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)



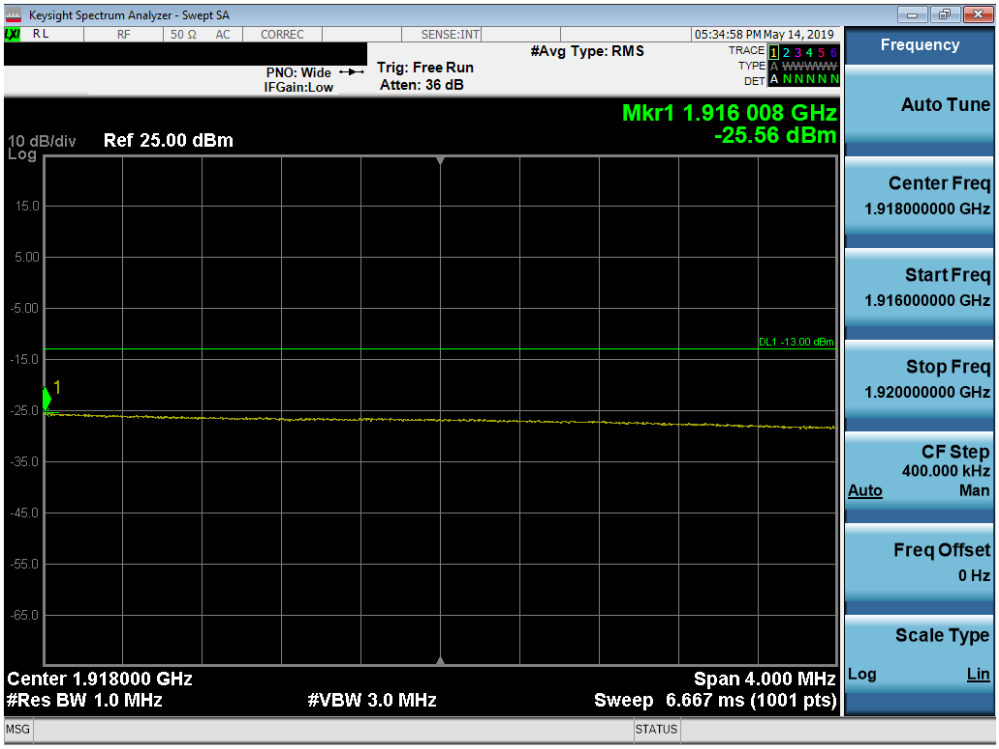
Plot 7-263. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



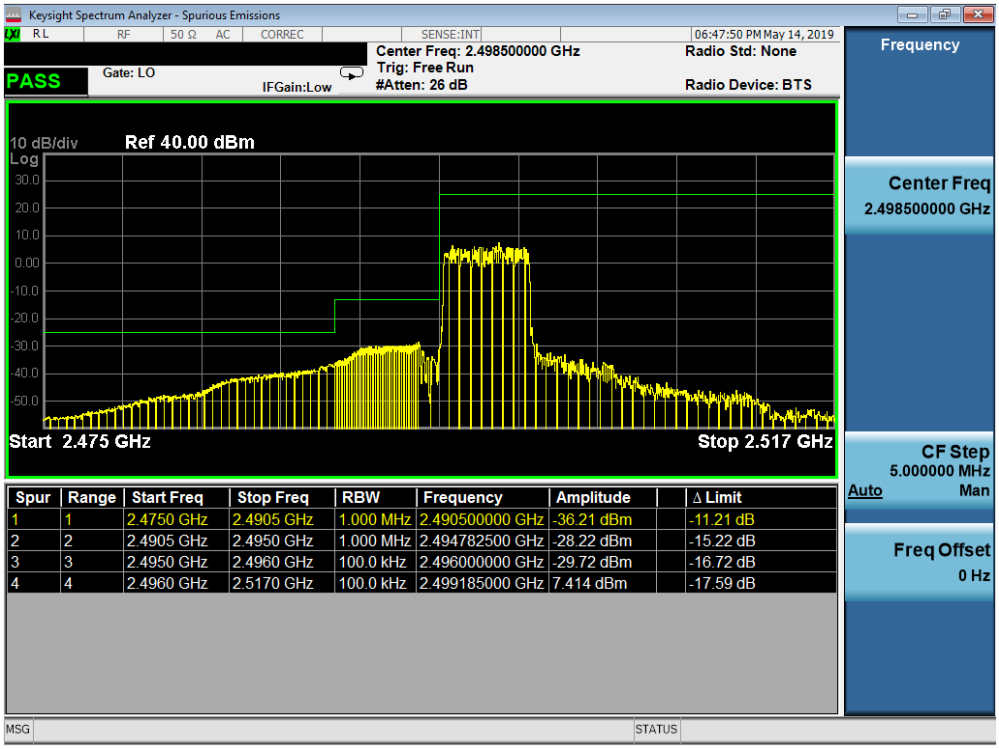
Plot 7-264. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



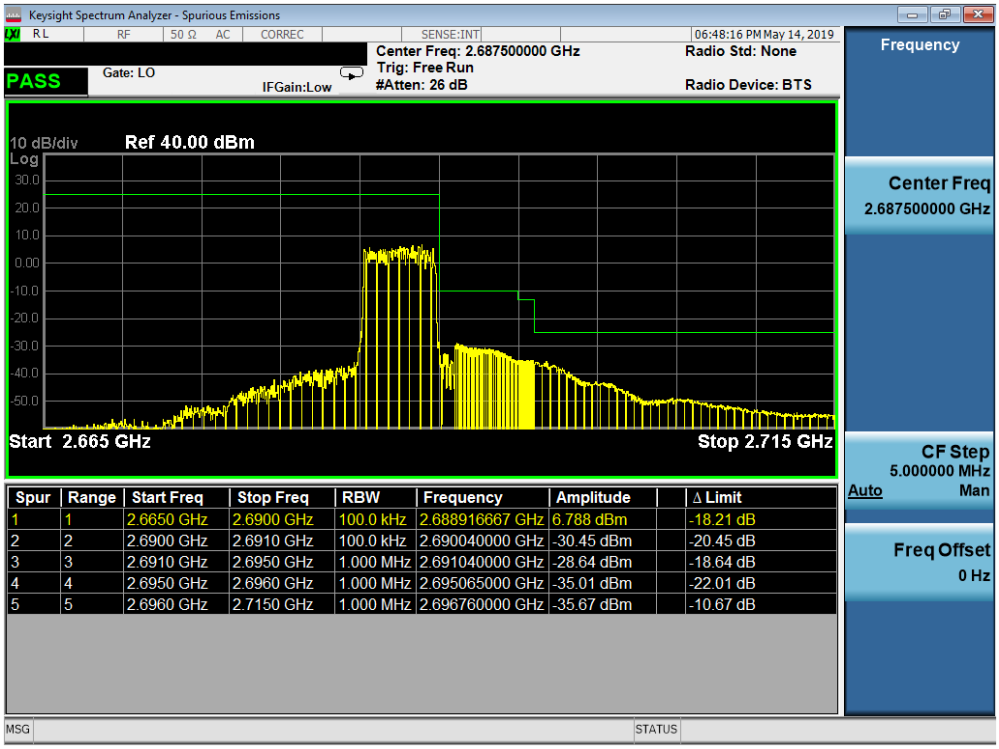
Plot 7-265. Upper Band Edge Plot (Band 25 - 20.0MHz QPSK - Full RB Configuration)



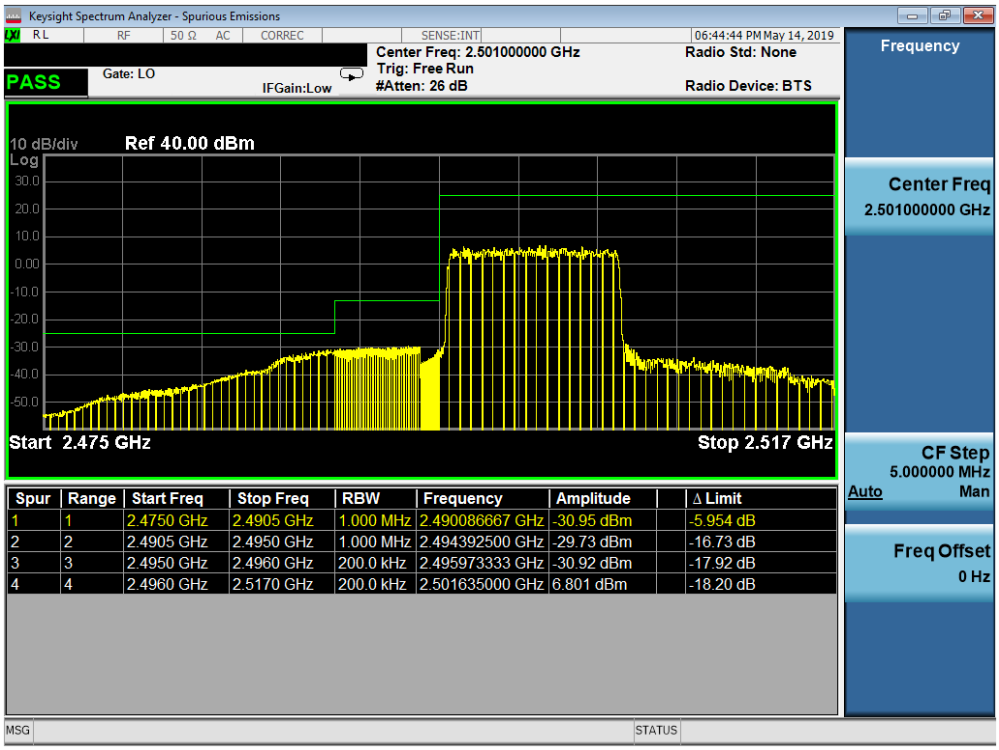
Plot 7-266. Upper Extended Band Edge Plot (Band 25 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-267. Lower ACP Plot at 2496 MHz (Band 41 - 5.0MHz QPSK - Full RB Configuration)

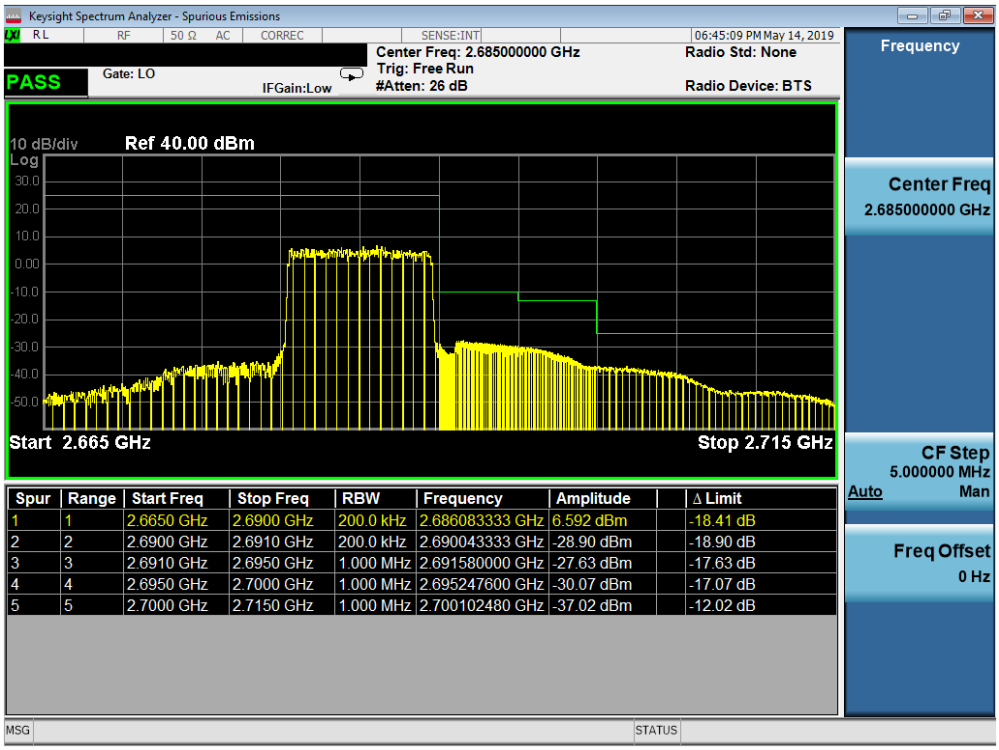


Plot 7-268. Upper ACP Plot (Band 41 - 5.0MHz QPSK - Full RB Configuration)



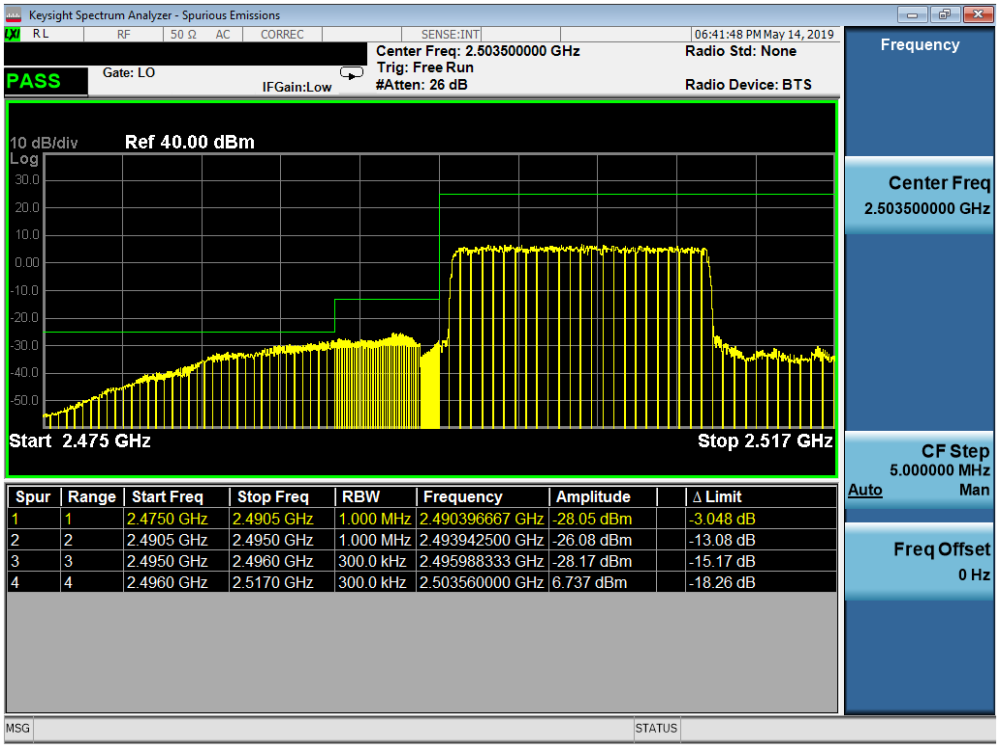
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490086667 GHz	-30.95 dBm	-5.954 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494392500 GHz	-29.73 dBm	-16.73 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495973333 GHz	-30.92 dBm	-17.92 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.501635000 GHz	6.801 dBm	-18.20 dB

Plot 7-269. Lower ACP Plot at 2496 MHz (Band 41 - 10.0MHz QPSK - Full RB Configuration)

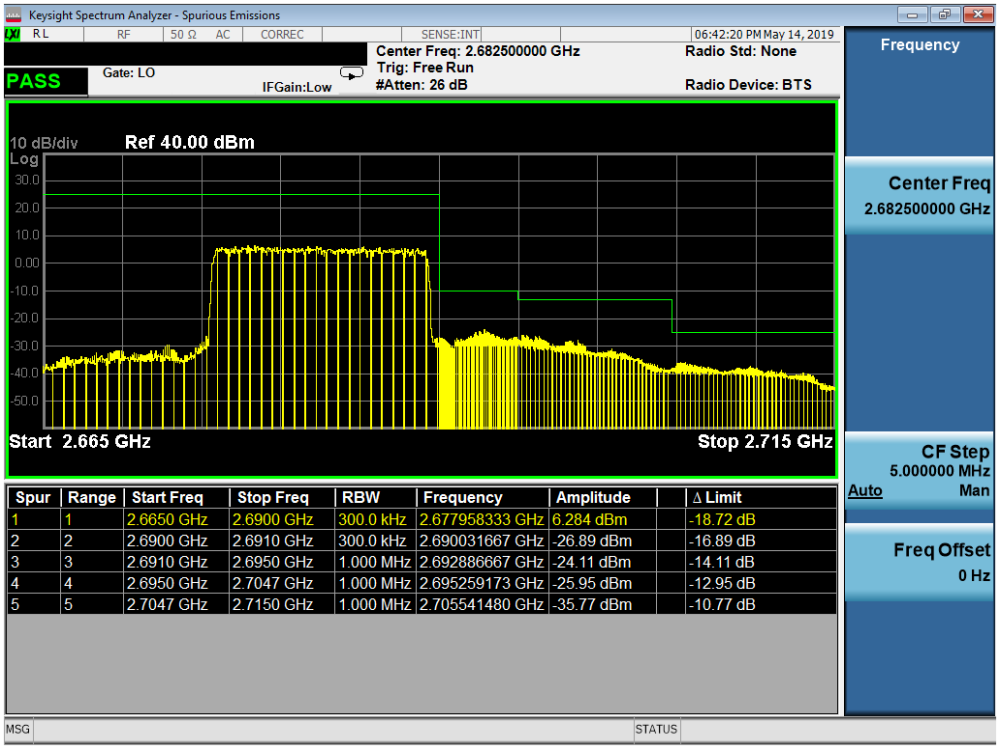


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	200.0 kHz	2.686083333 GHz	6.592 dBm	-18.41 dB
2	2	2.6900 GHz	2.6910 GHz	200.0 kHz	2.690043333 GHz	-28.90 dBm	-18.90 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691580000 GHz	-27.63 dBm	-17.63 dB
4	4	2.6950 GHz	2.7000 GHz	1.000 MHz	2.695247600 GHz	-30.07 dBm	-17.07 dB
5	5	2.7000 GHz	2.7150 GHz	1.000 MHz	2.700102480 GHz	-37.02 dBm	-12.02 dB

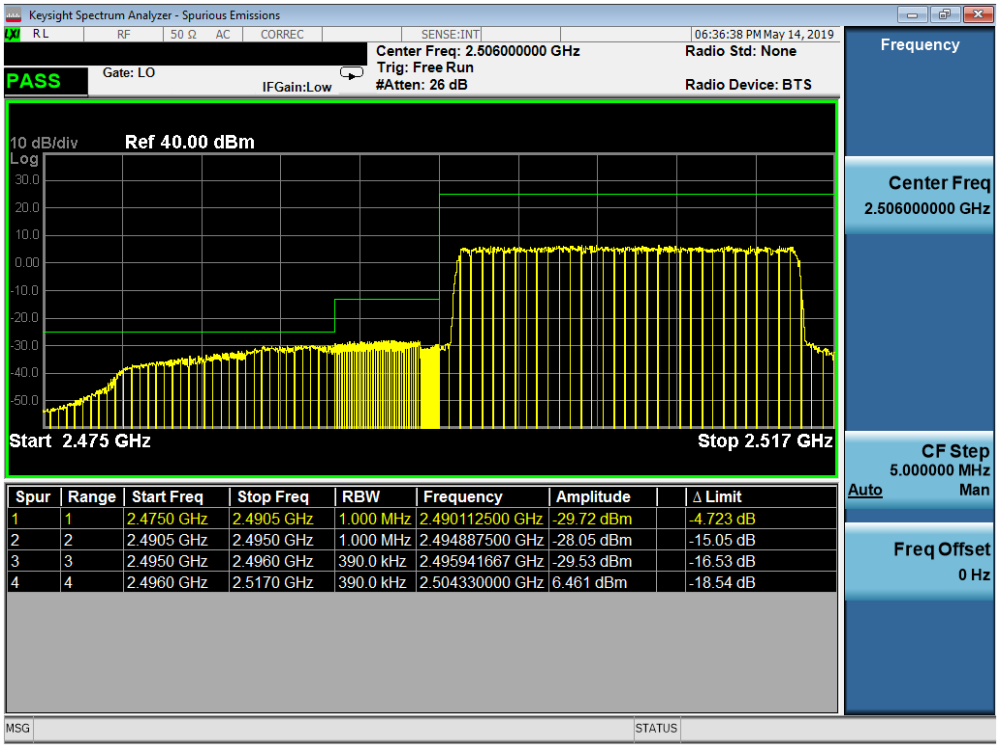
Plot 7-270. Upper ACP Plot (Band 41 - 10.0MHz QPSK - Full RB Configuration)



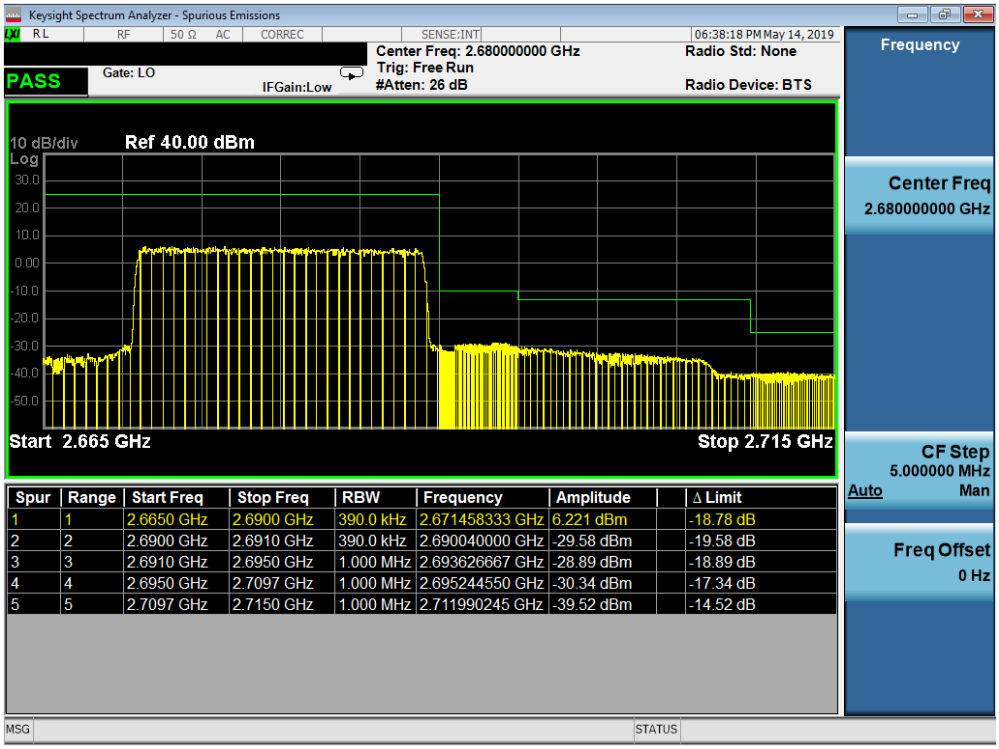
Plot 7-271. Lower ACP Plot at 2496 MHz (Band 41 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-272. Upper ACP Plot (Band 41 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-273. Lower ACP Plot at 2496 MHz (Band 41 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-274. Upper ACP Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)

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 ≥ OBW or specified reference bandwidth
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.

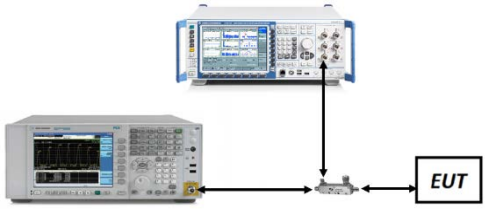
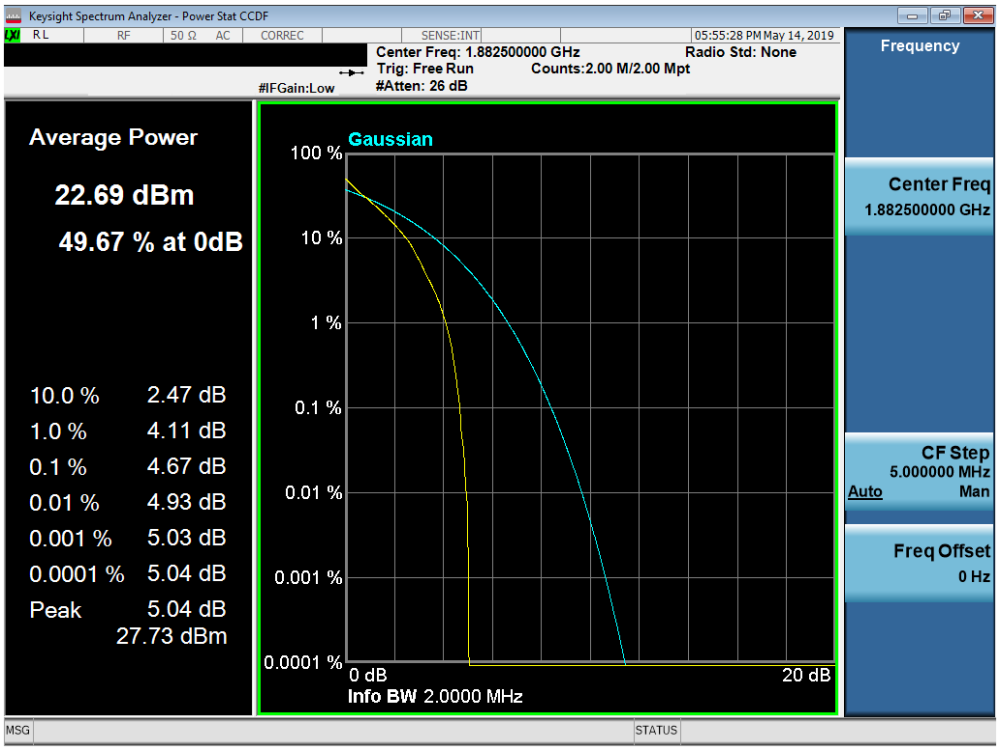


Figure 7-4. Test Instrument & Measurement Setup

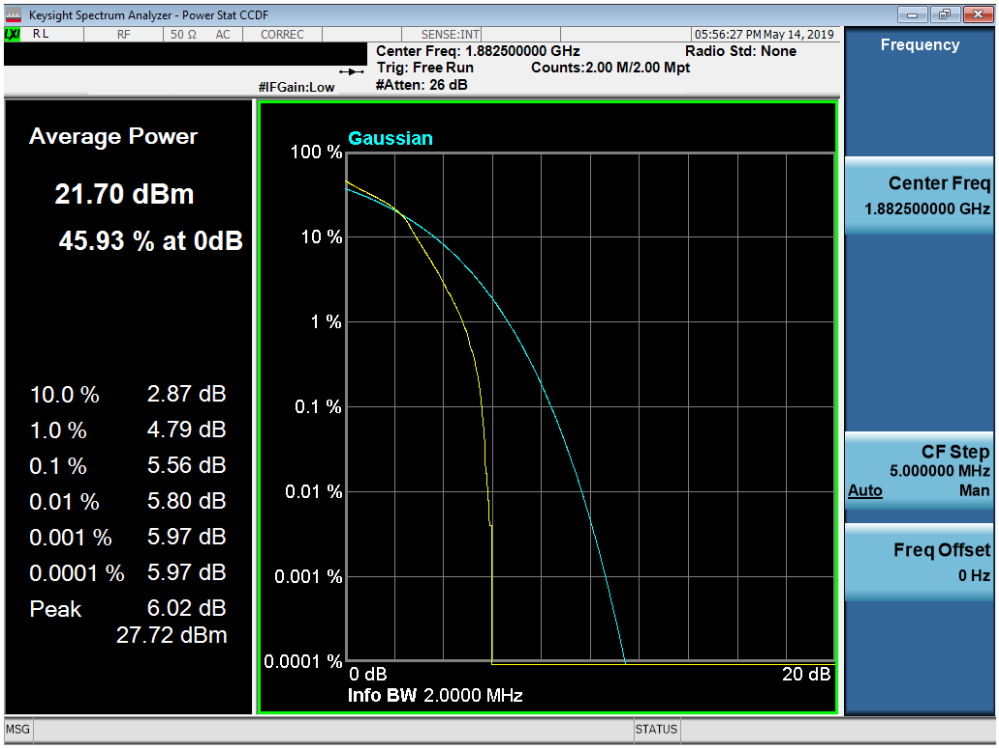
Test Notes

None.

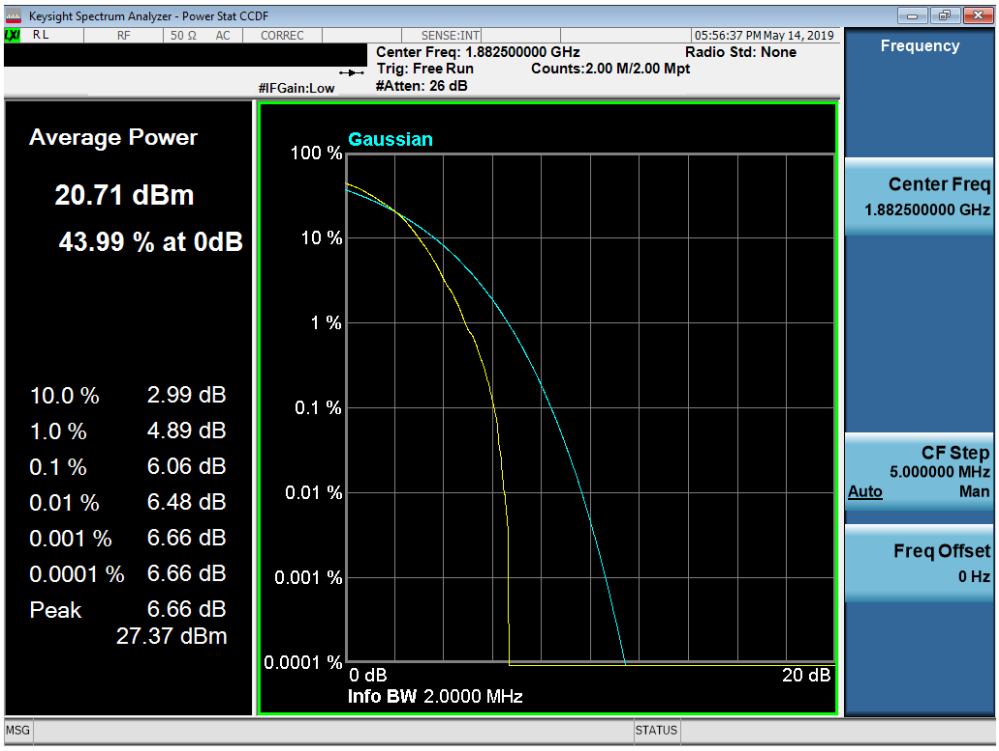
Band 25/2



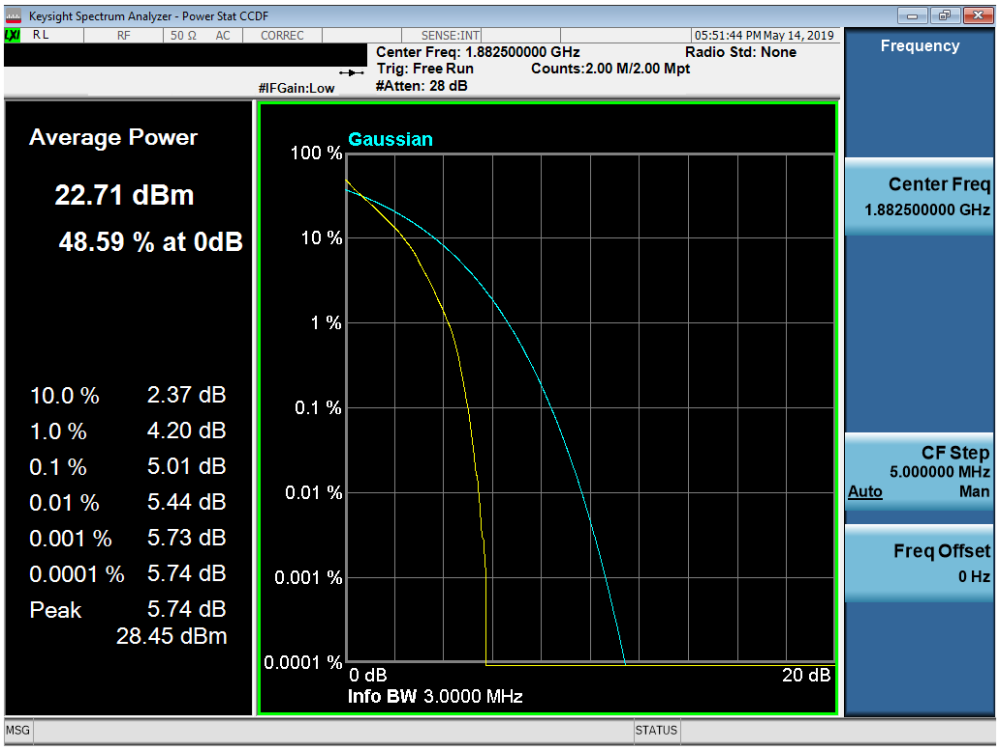
Plot 7-275. PAR Plot (Band 25/2 - 1.4MHz QPSK - Full RB Configuration)



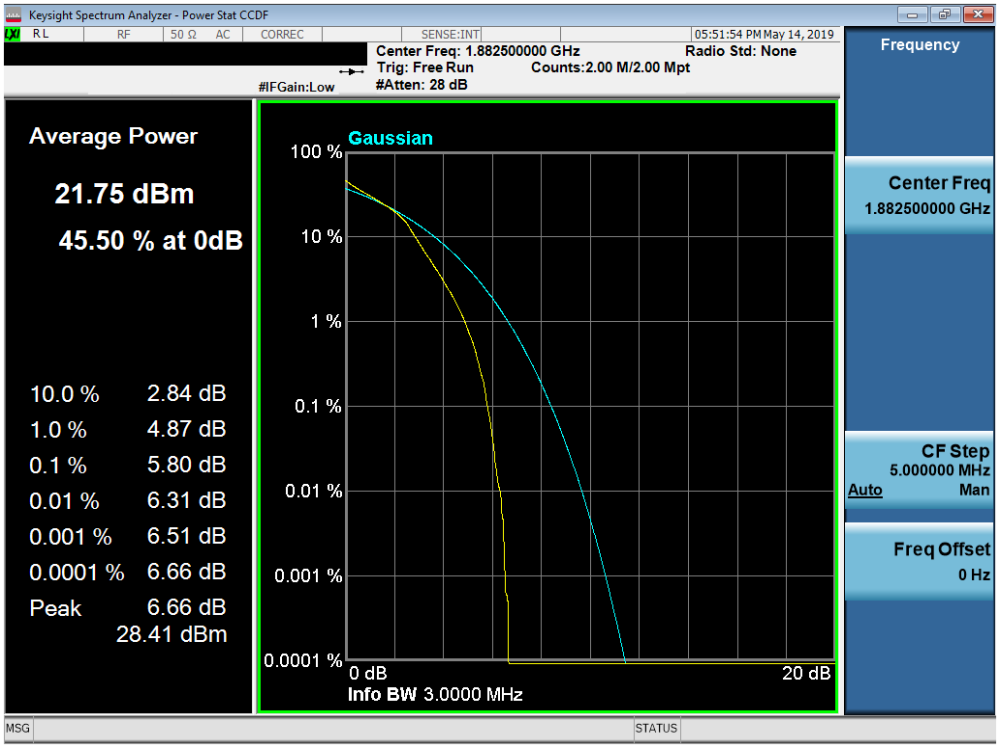
Plot 7-276. PAR Plot (Band 25/2 - 1.4MHz 16-QAM - Full RB Configuration)



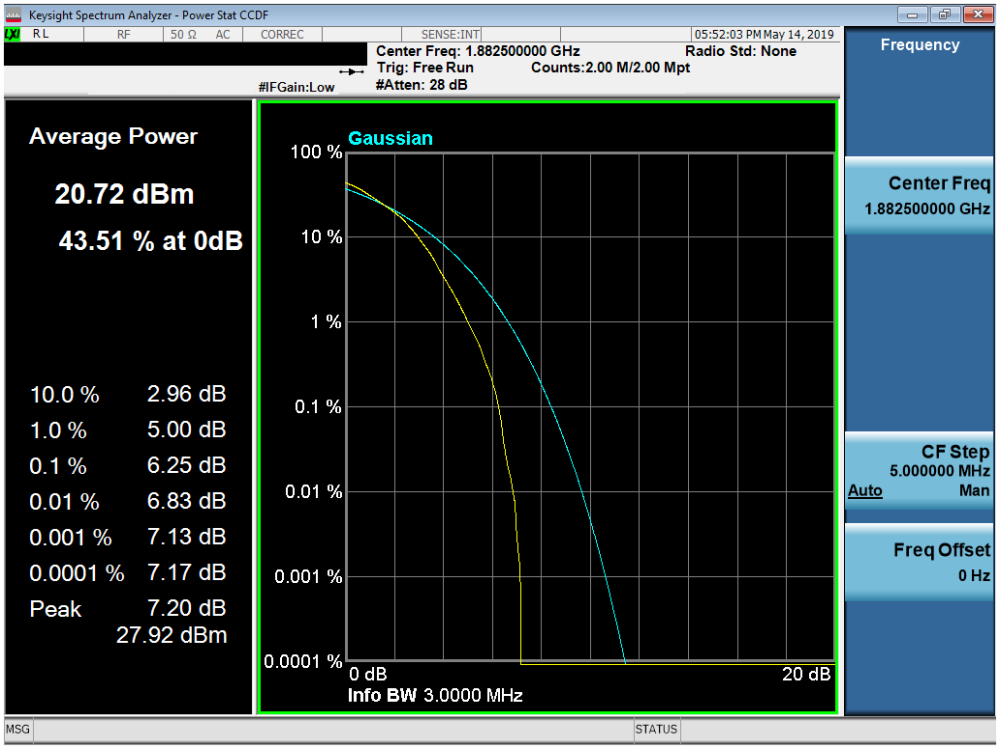
Plot 7-277. PAR Plot (Band 25/2 - 1.4MHz 64-QAM - Full RB Configuration)



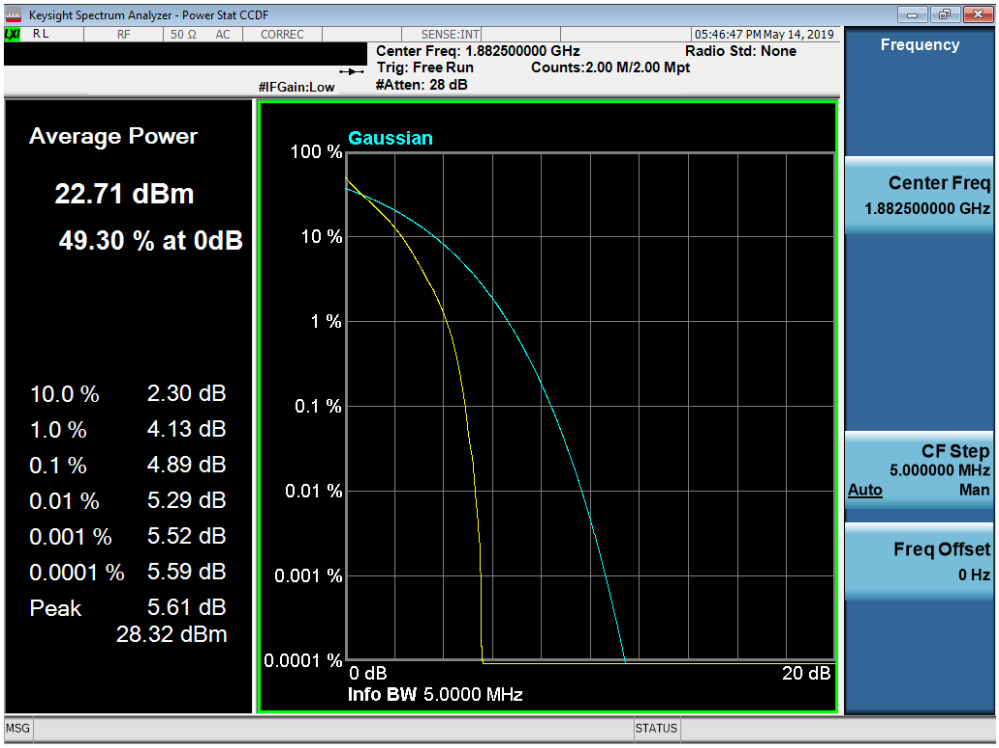
Plot 7-278. PAR Plot (Band 25/2 - 3.0MHz QPSK - Full RB Configuration)



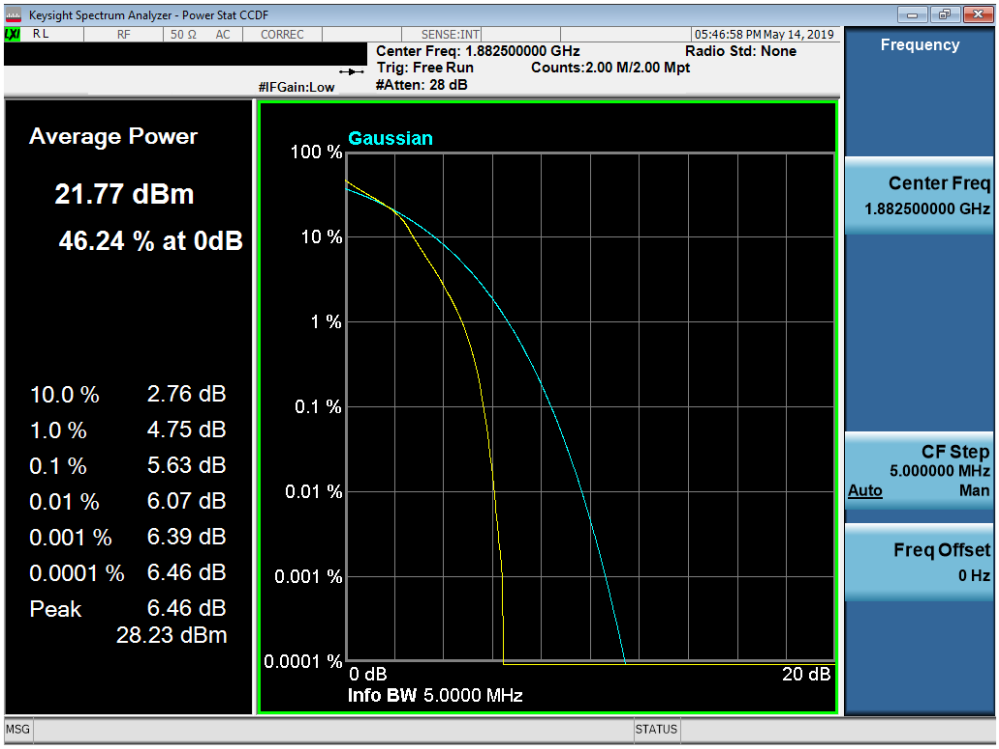
Plot 7-279. PAR Plot (Band 25/2 - 3.0MHz 16-QAM - Full RB Configuration)



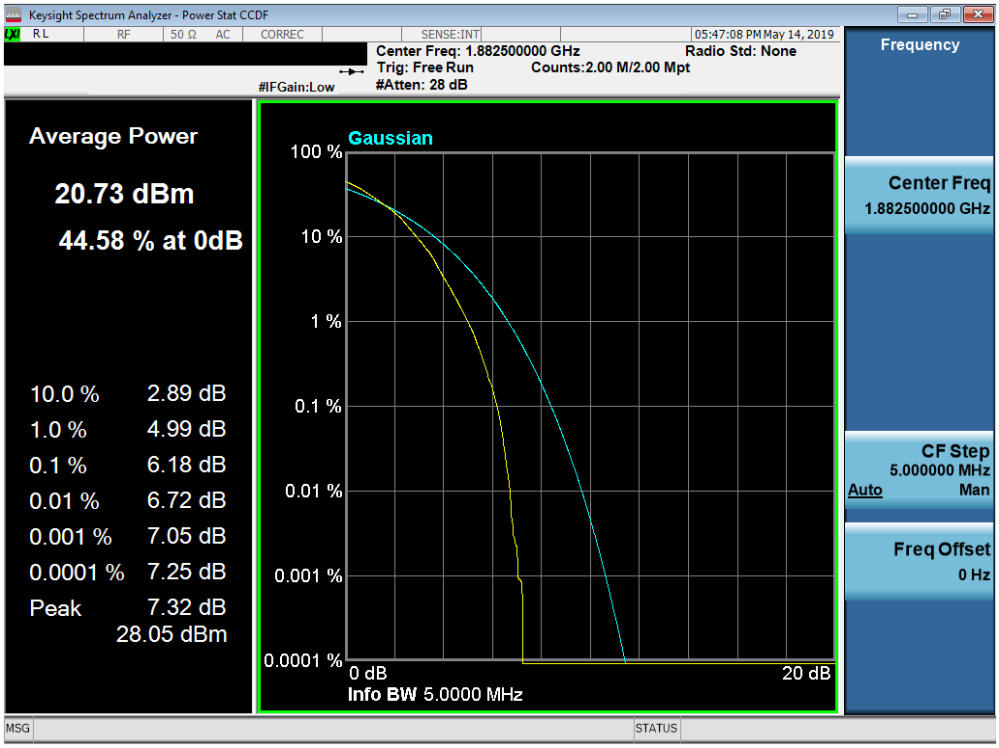
Plot 7-280. PAR Plot (Band 25/2 - 3.0MHz 64-QAM - Full RB Configuration)



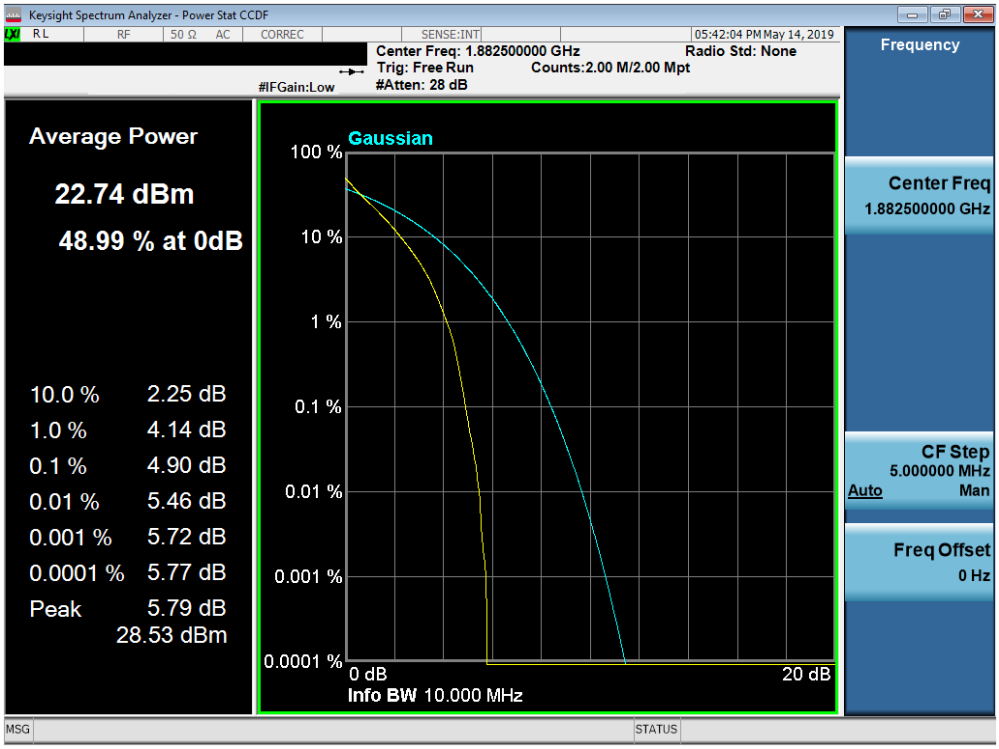
Plot 7-281. PAR Plot (Band 25/2 - 5.0MHz QPSK - Full RB Configuration)



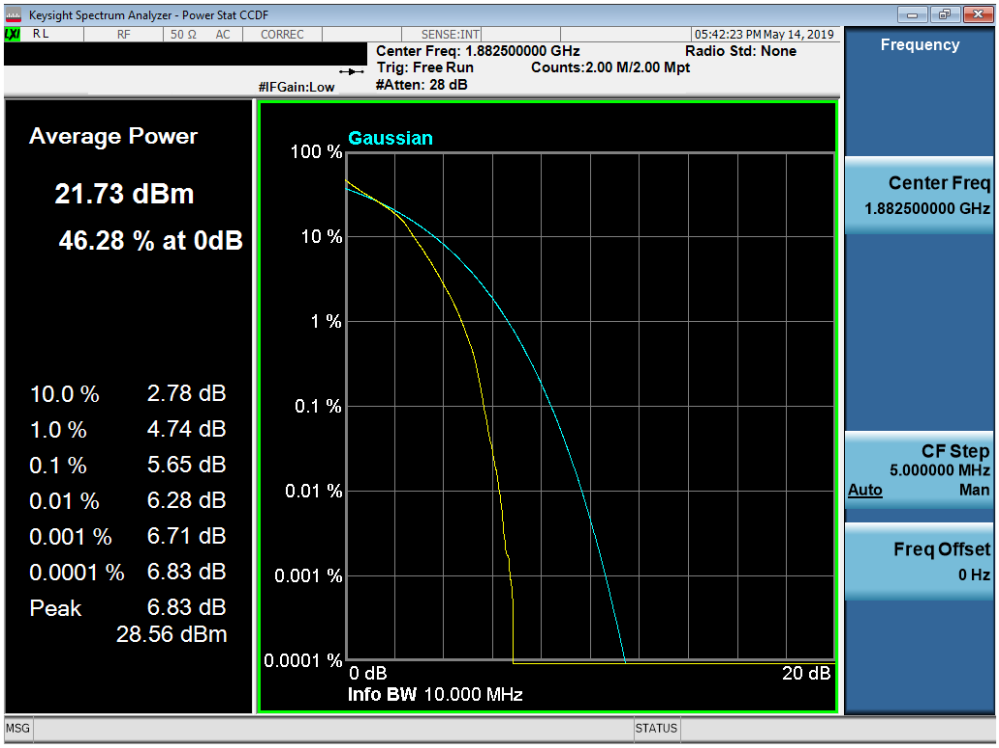
Plot 7-282. PAR Plot (Band 25/2 - 5.0MHz 16-QAM - Full RB Configuration)



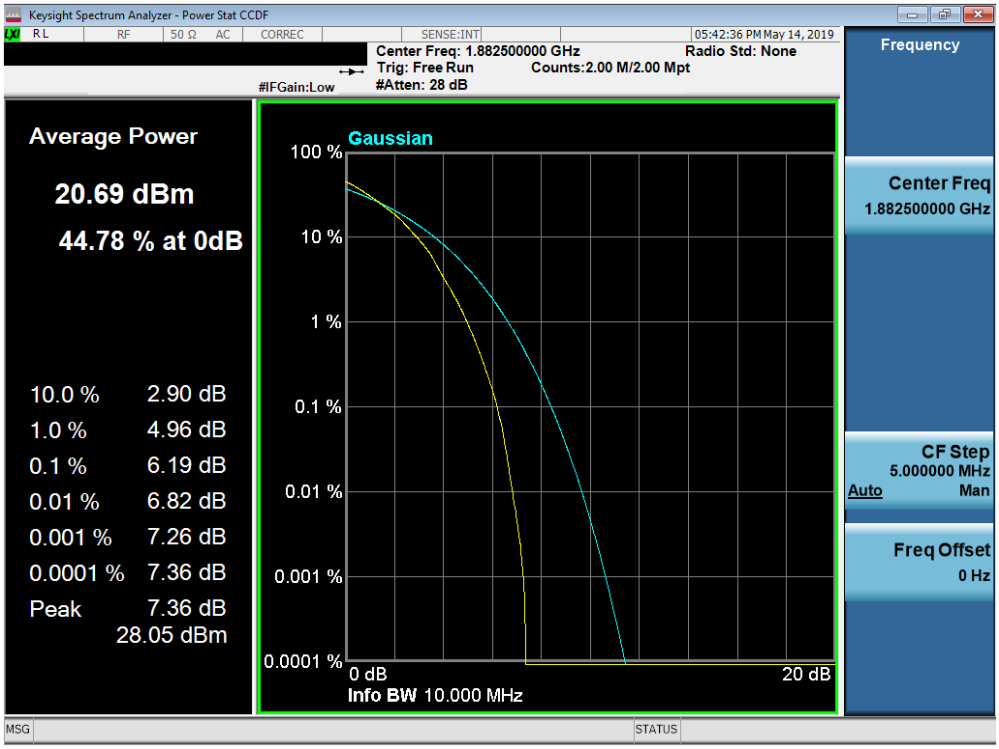
Plot 7-283. PAR Plot (Band 25/2 - 5.0MHz 64-QAM - Full RB Configuration)



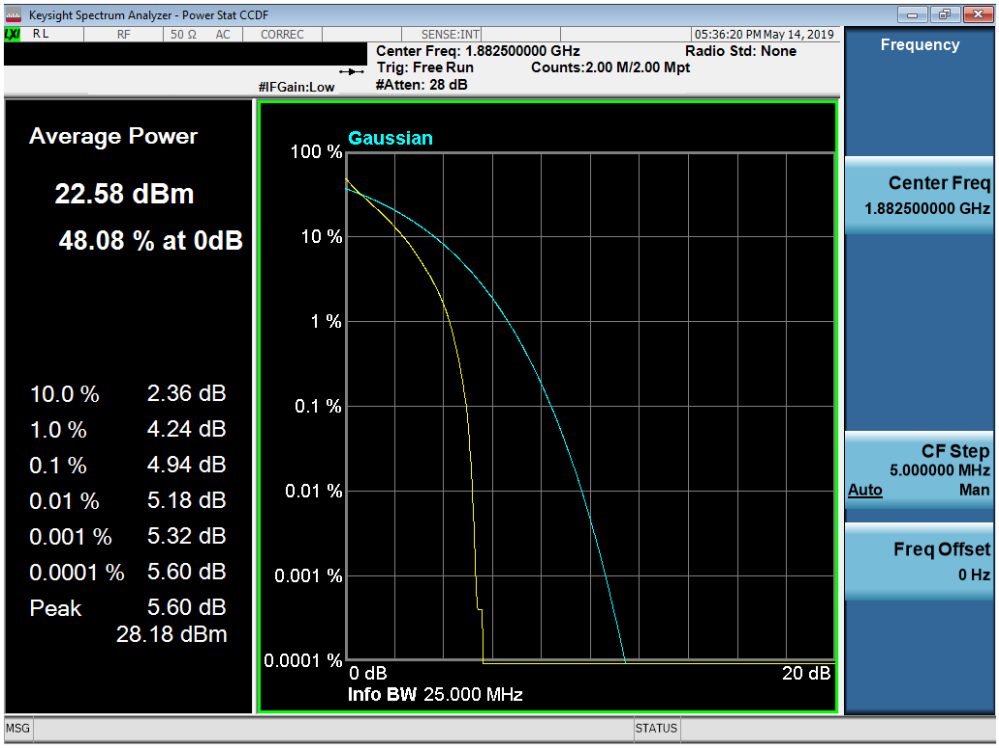
Plot 7-284. PAR Plot (Band 25/2 - 10.0MHz QPSK - Full RB Configuration)



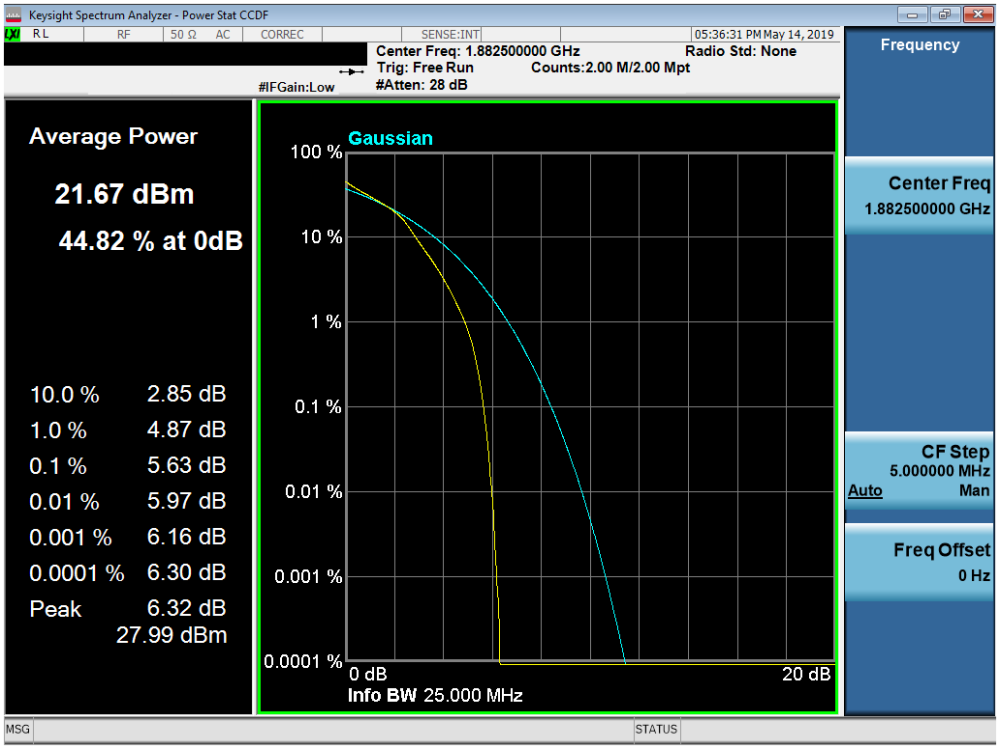
Plot 7-285. PAR Plot (Band 25/2 - 10.0MHz 16-QAM - Full RB Configuration)



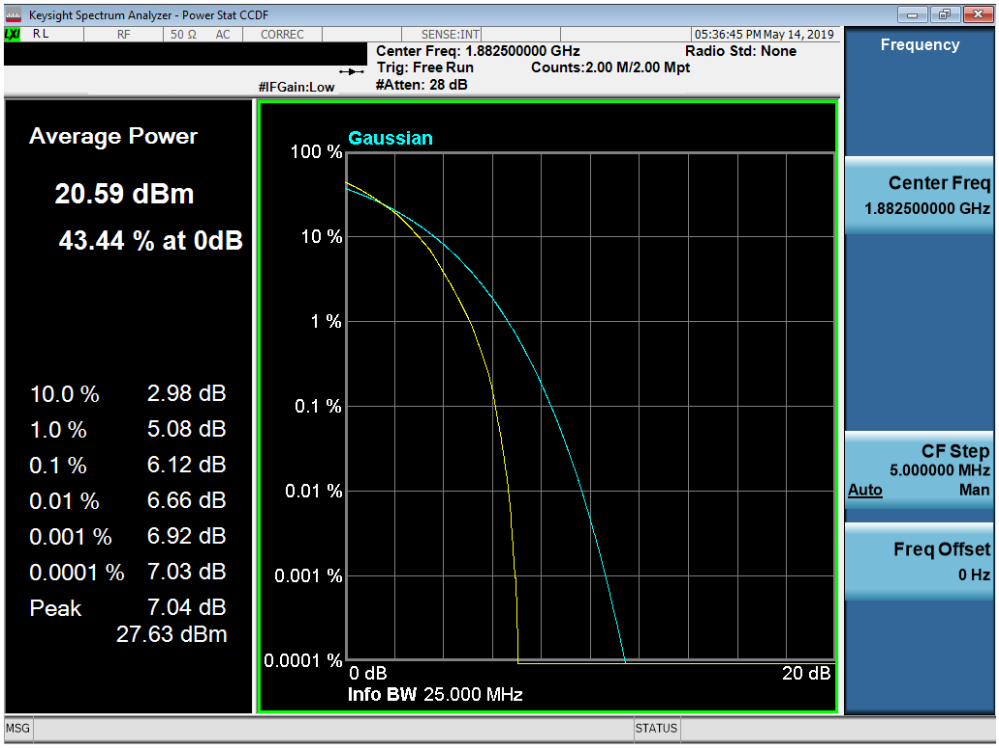
Plot 7-286. PAR Plot (Band 25/2 - 10.0MHz 64-QAM - Full RB Configuration)



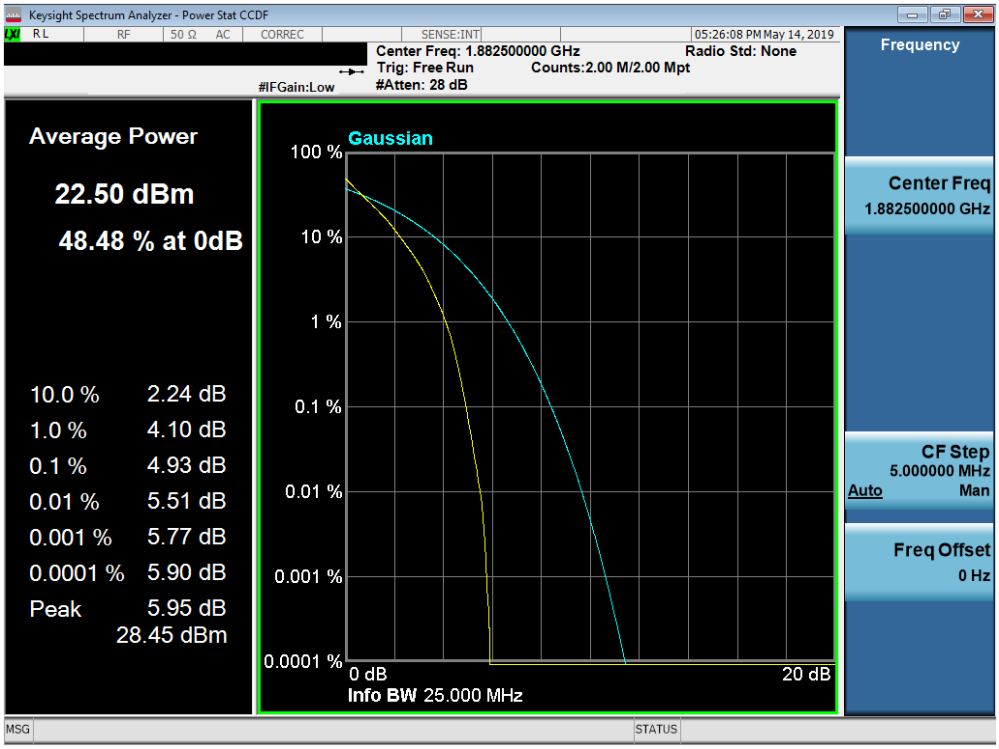
Plot 7-287. PAR Plot (Band 25/2 - 15.0MHz QPSK - Full RB Configuration)



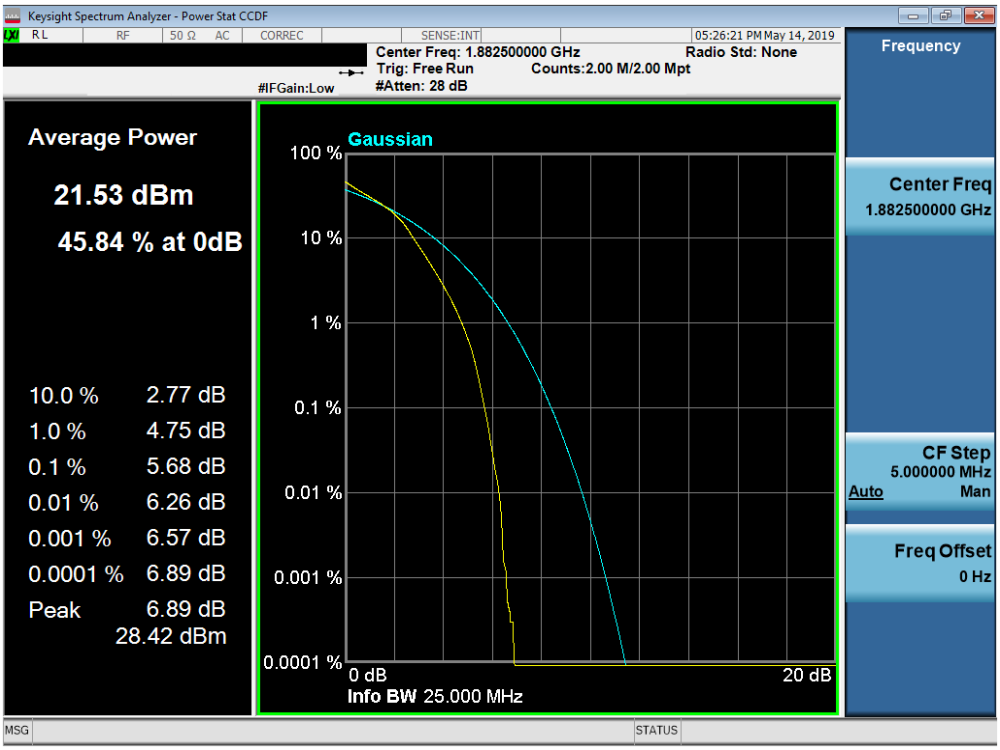
Plot 7-288. PAR Plot (Band 25/2 - 15.0MHz 16-QAM - Full RB Configuration)



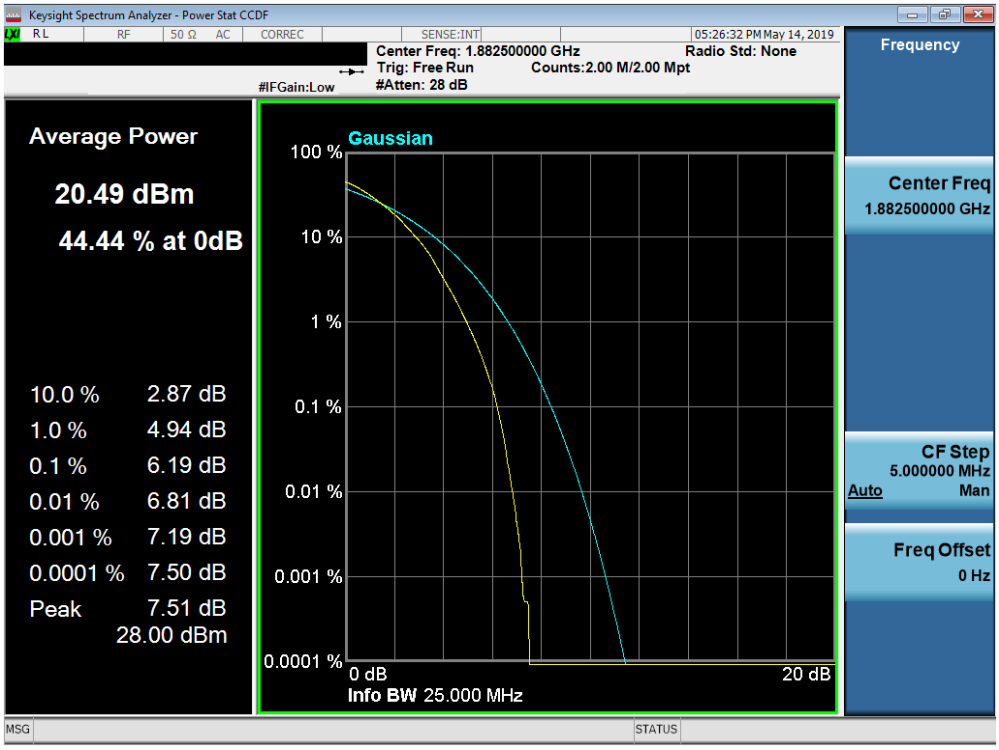
Plot 7-289. PAR Plot (Band 25/2 - 15.0MHz 64-QAM - Full RB Configuration)



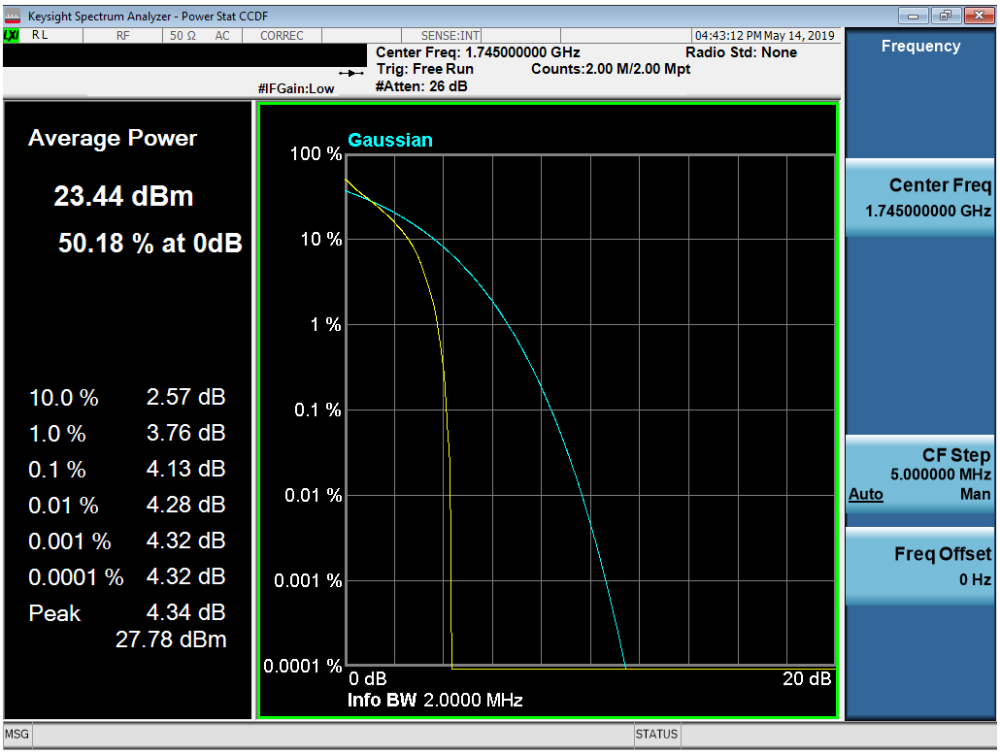
Plot 7-290. PAR Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)



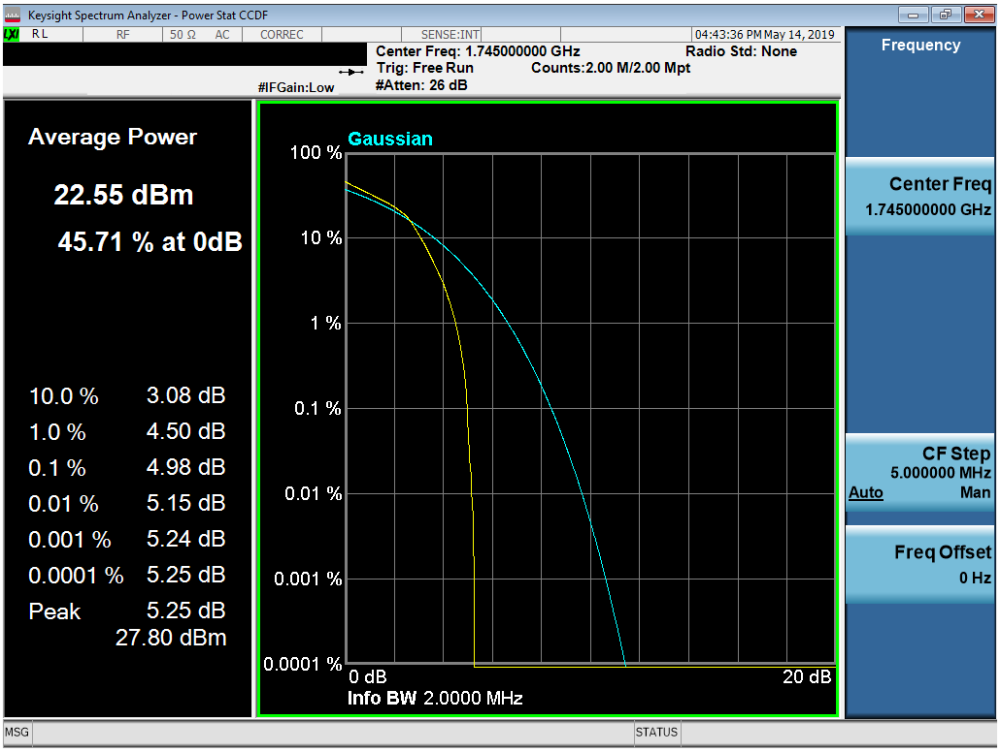
Plot 7-291. PAR Plot (Band 25/2 - 20.0MHz 16-QAM - Full RB Configuration)



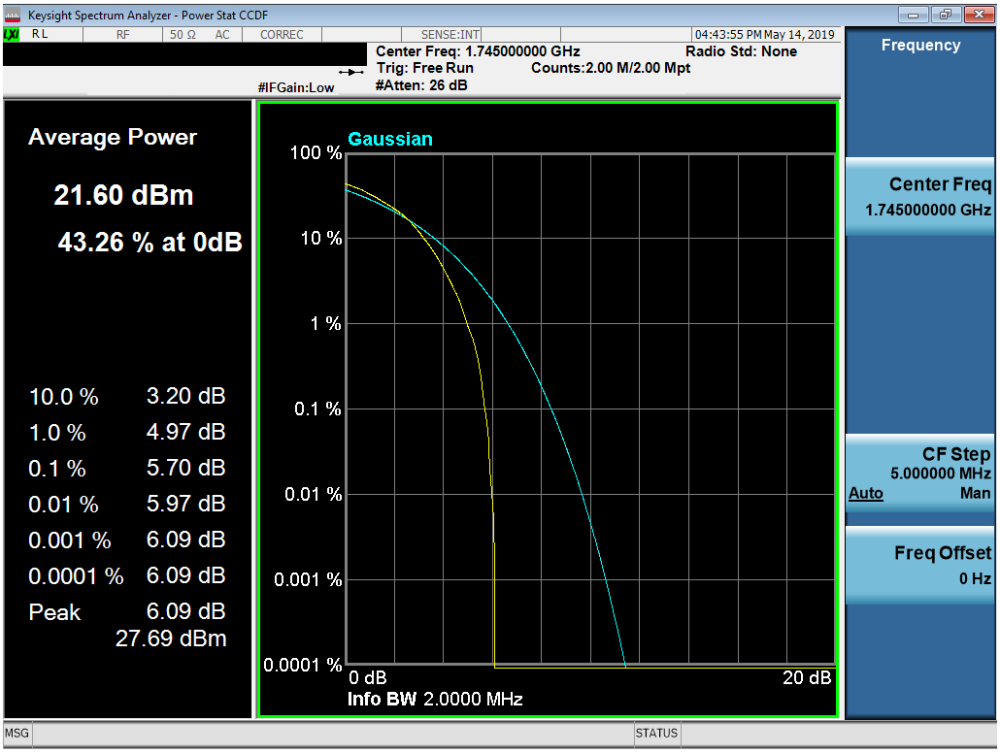
Plot 7-292. PAR Plot (Band 25/2 - 20.0MHz 64-QAM - Full RB Configuration)



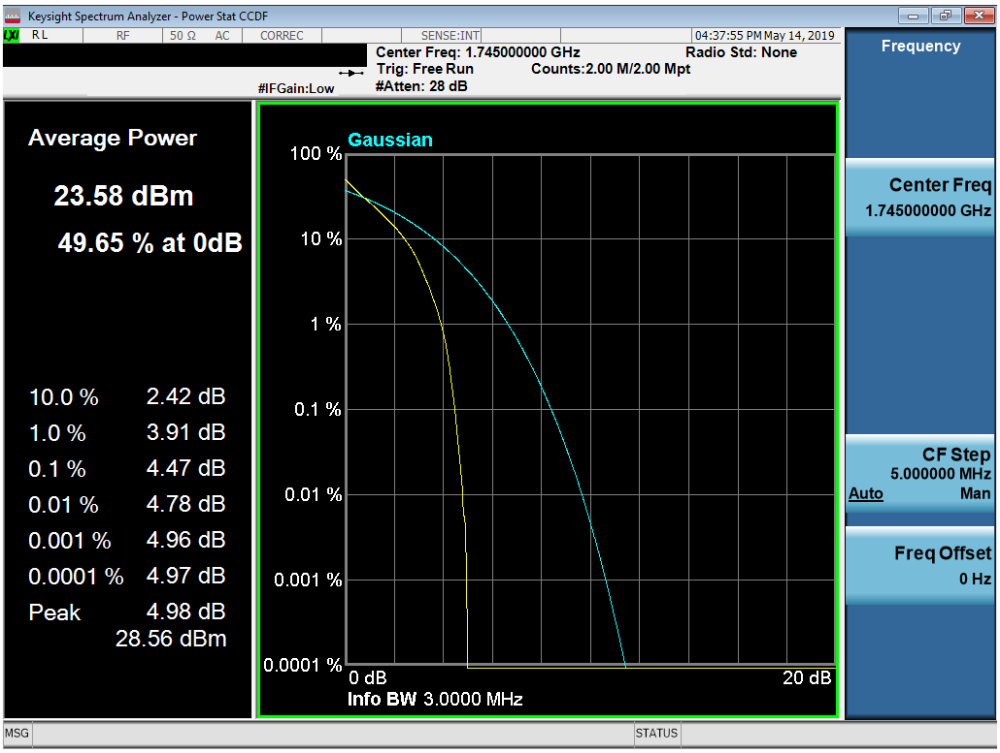
Plot 7-293. PAR Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



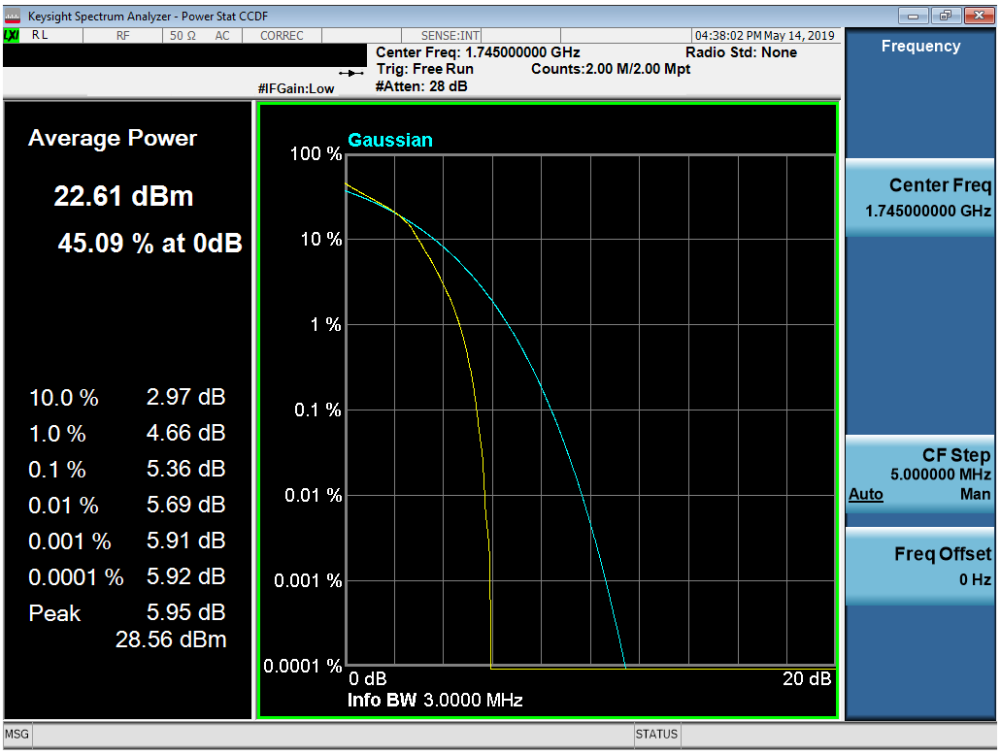
Plot 7-294. PAR Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)



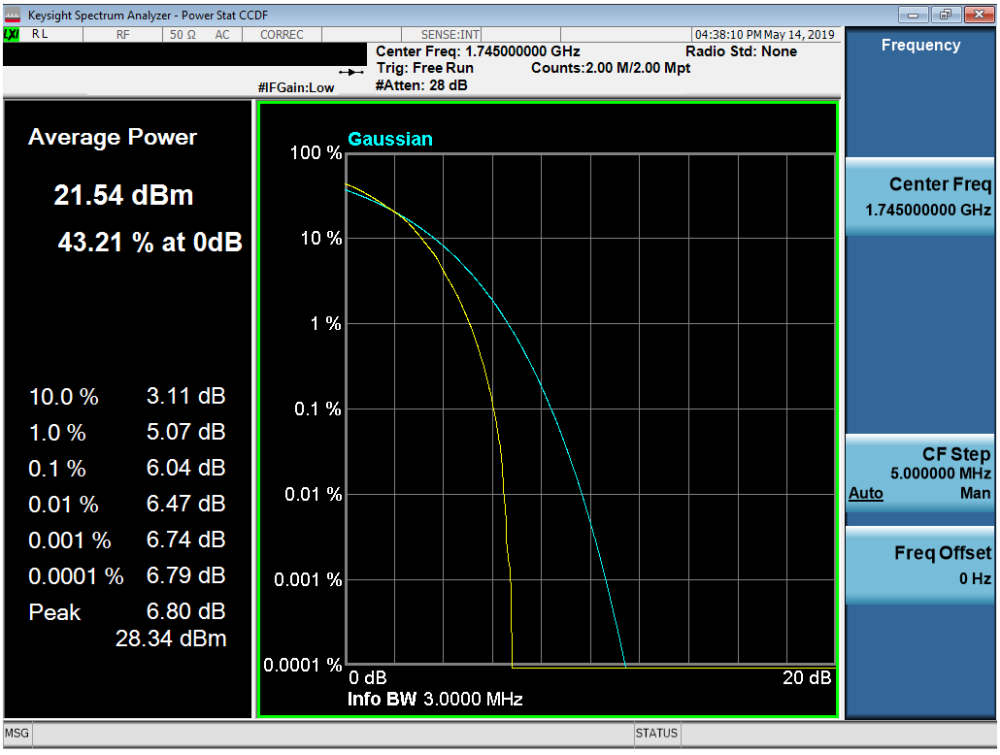
Plot 7-295. PAR Plot (Band 66/4 - 1.4MHz 64-QAM - Full RB Configuration)



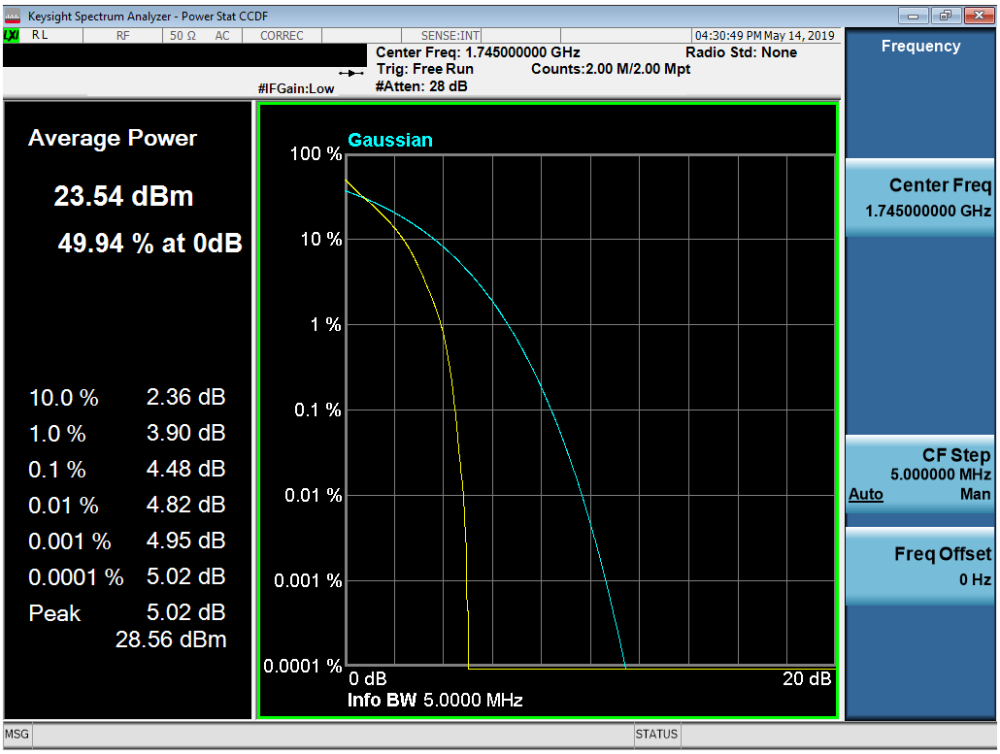
Plot 7-296. PAR Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



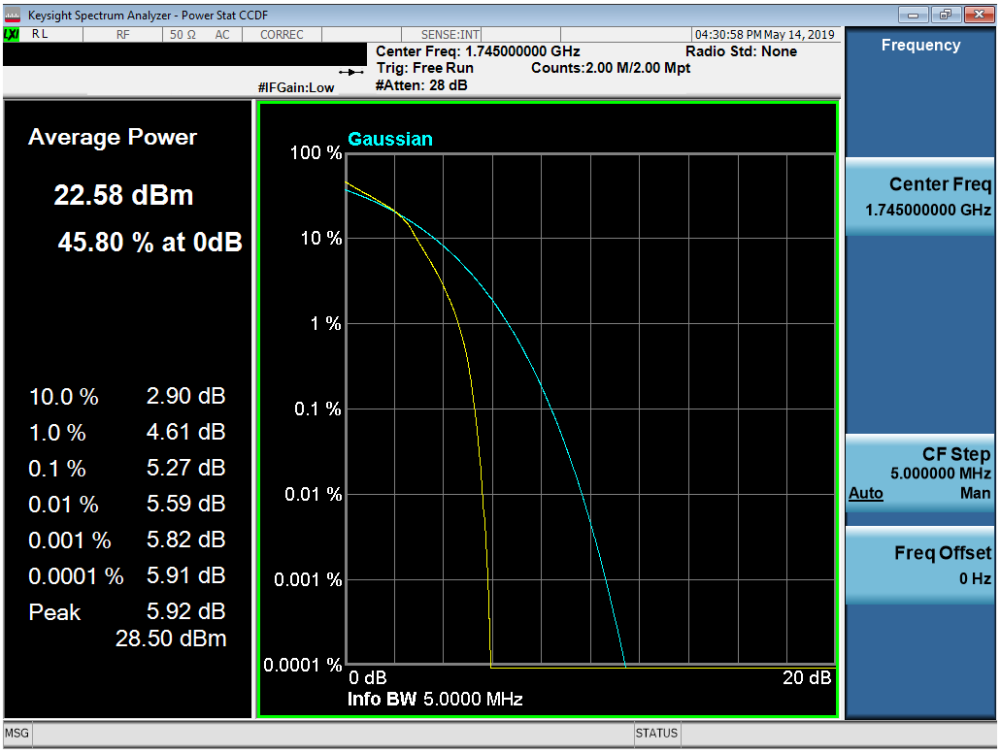
Plot 7-297. PAR Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)



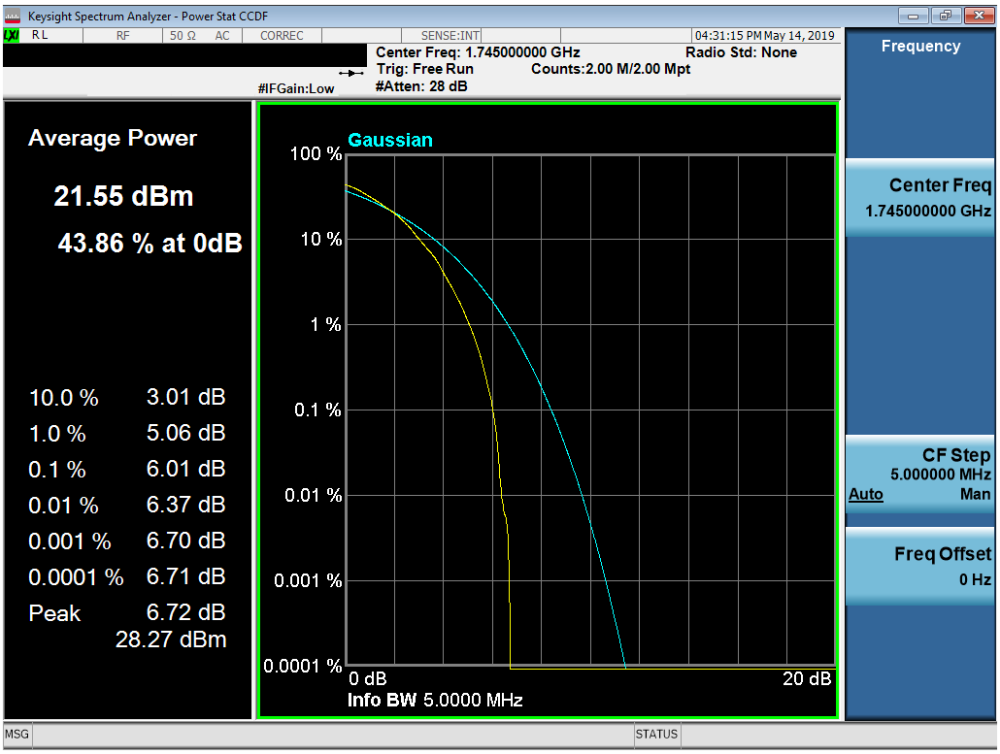
Plot 7-298. PAR Plot (Band 66/4 - 3.0MHz 64-QAM - Full RB Configuration)



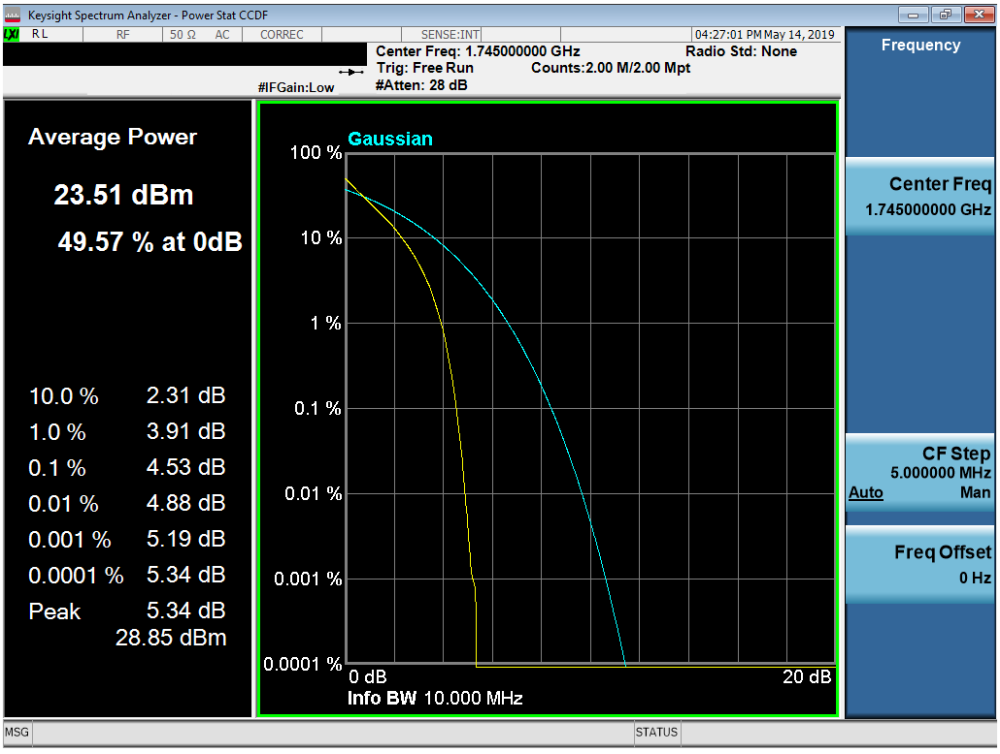
Plot 7-299. PAR Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



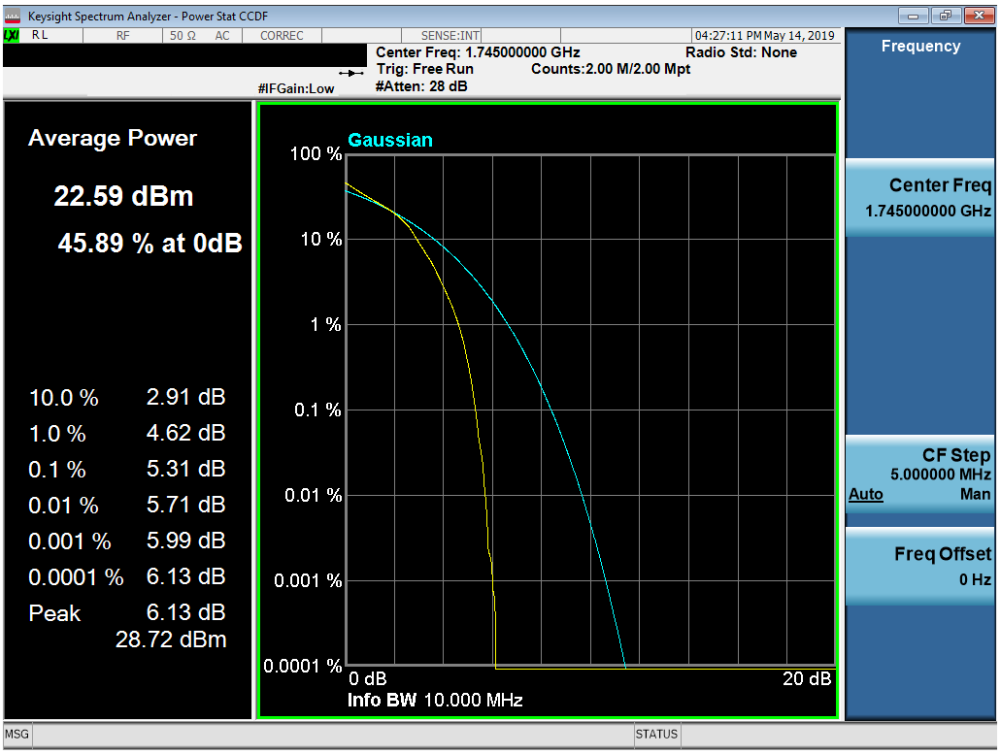
Plot 7-300. PAR Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)



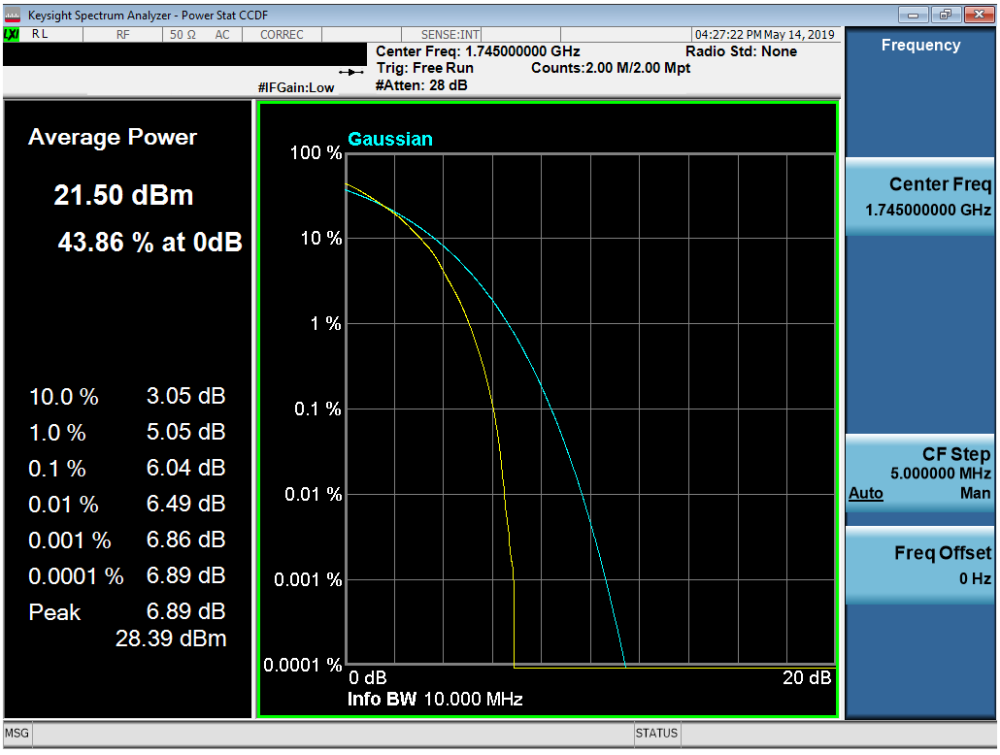
Plot 7-301. PAR Plot (Band 66/4 - 5.0MHz 64-QAM - Full RB Configuration)



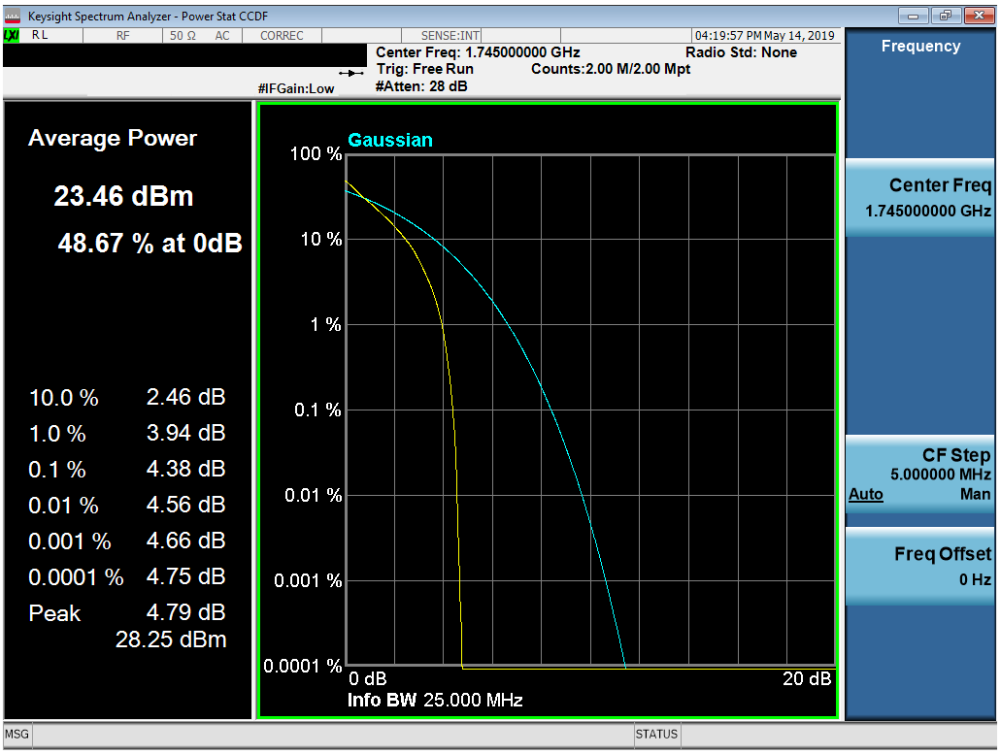
Plot 7-302. PAR Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



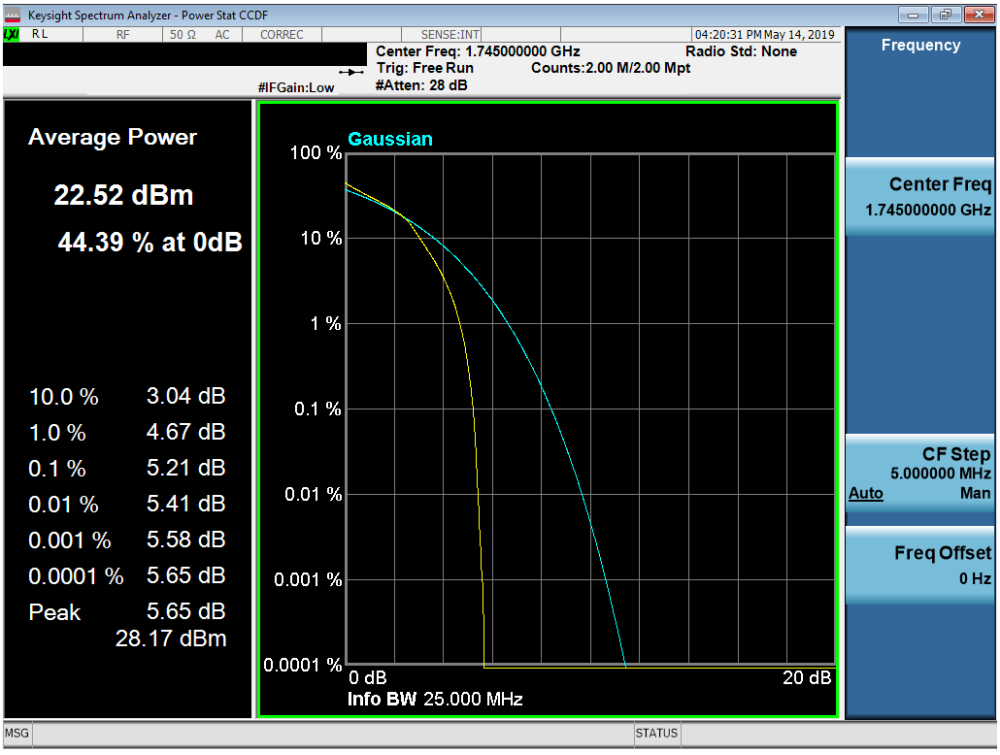
Plot 7-303. PAR Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)



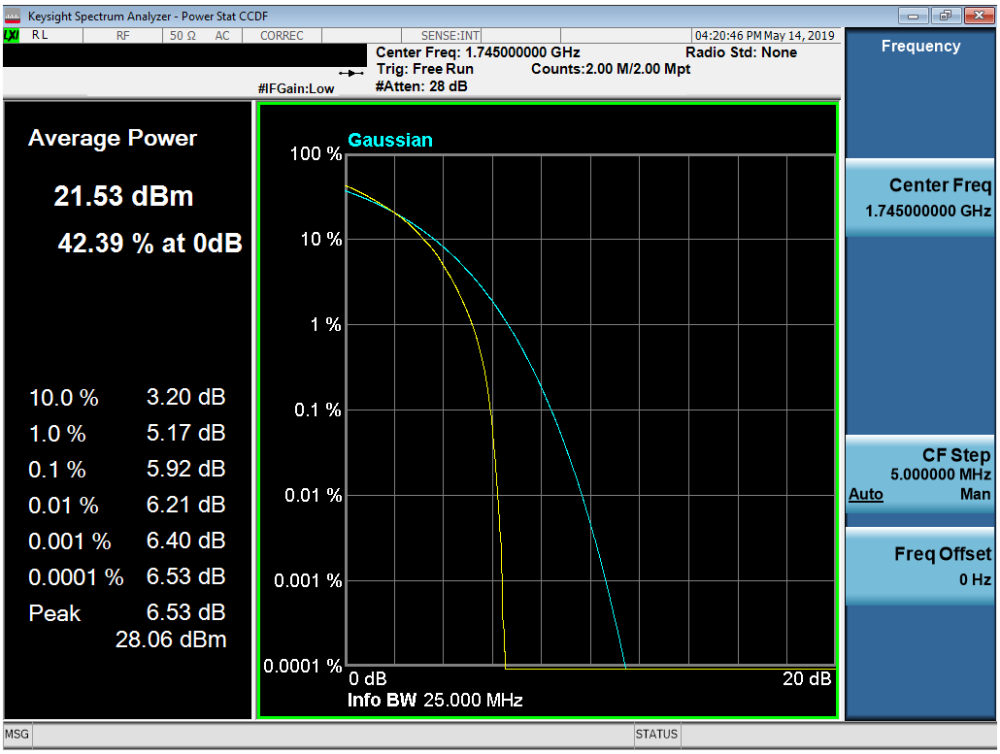
Plot 7-304. PAR Plot (Band 66/4 - 10.0MHz 64-QAM - Full RB Configuration)



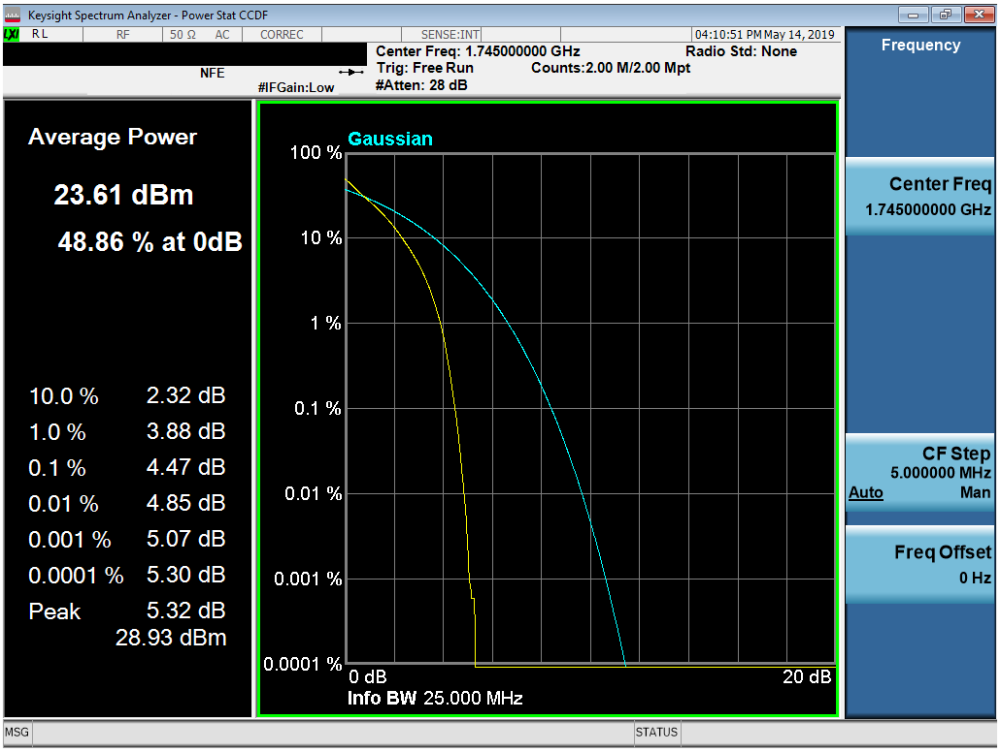
Plot 7-305. PAR Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



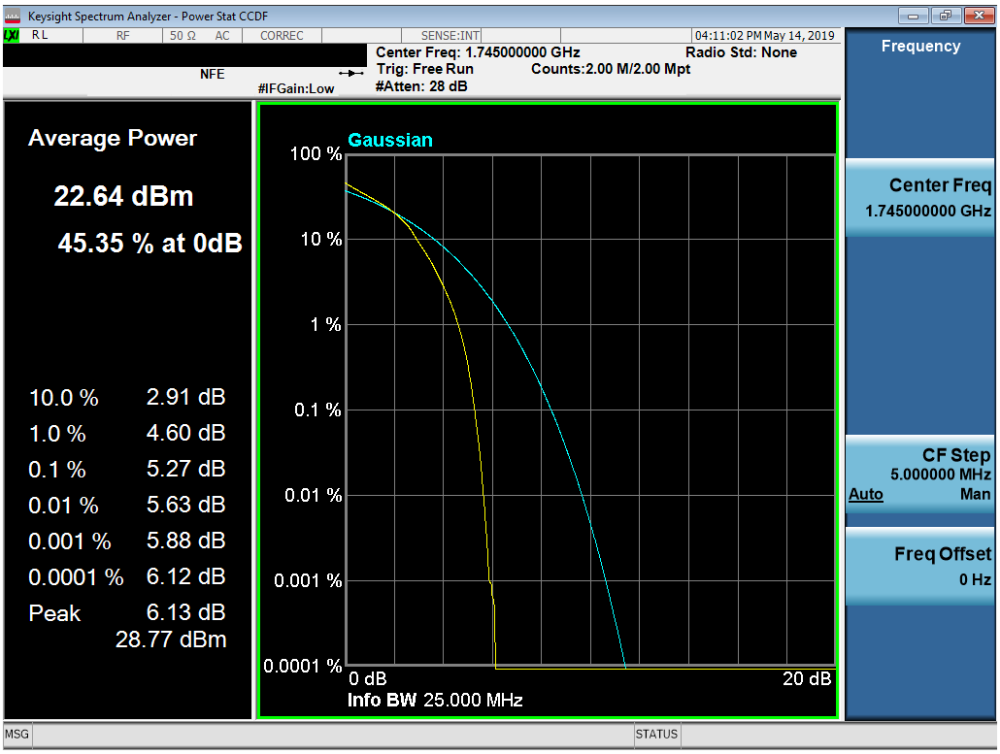
Plot 7-306. PAR Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)



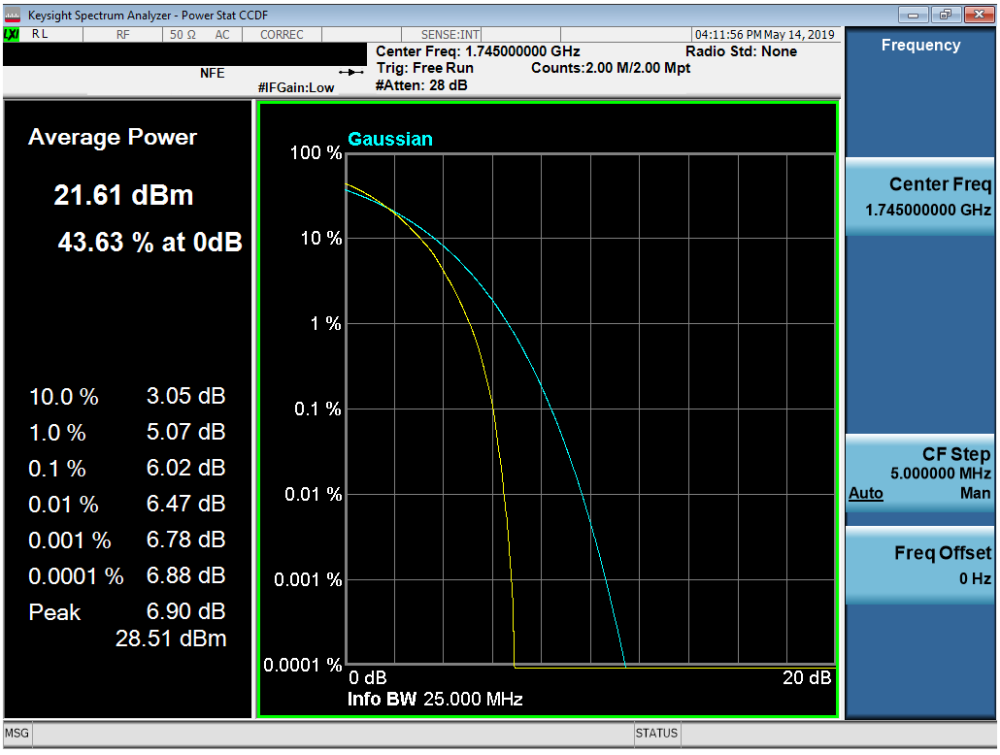
Plot 7-307. PAR Plot (Band 66/4 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-308. PAR Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-309. PAR Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-310. PAR Plot (Band 66/4 - 20.0MHz 64-QAM - Full RB Configuration)

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

Test Setup

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

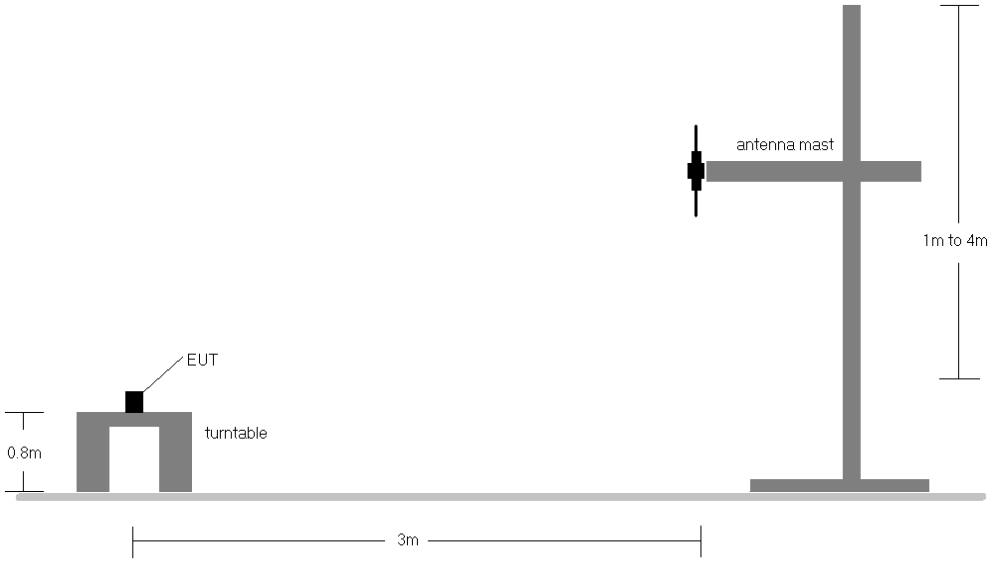


Figure 7-5. Radiated Test Setup <1GHz

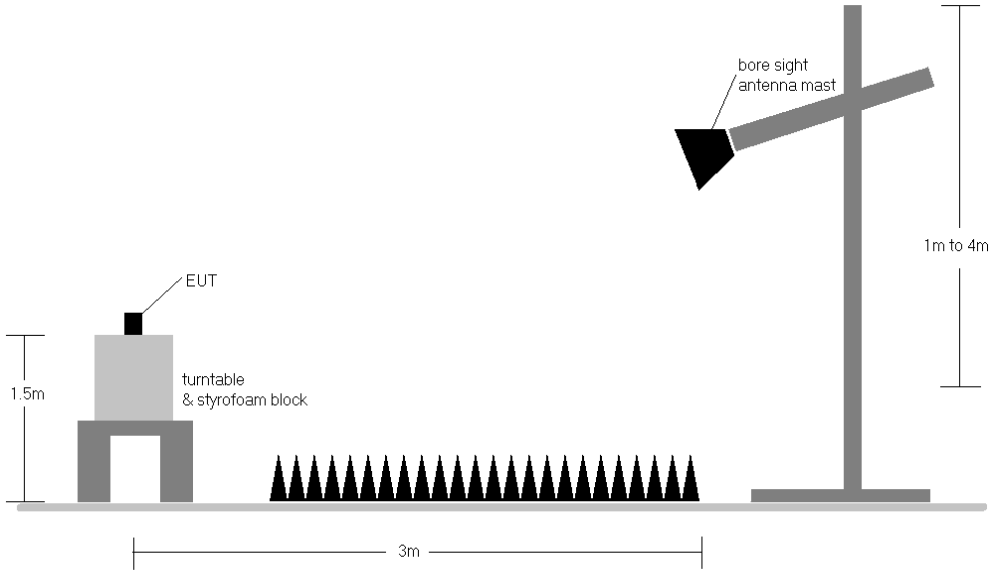


Figure 7-6. Radiated Test Setup >1GHz

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.

2) This unit was tested with its standard battery.

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	H	392	264	1 / 0	16.97	2.90	17.72	0.059	34.77	-17.05
680.50	5	QPSK	H	392	264	1 / 0	17.99	3.20	**19.04**	**0.080**	34.77	-15.73
695.50	5	QPSK	H	392	264	1 / 0	16.86	3.30	18.01	0.063	34.77	-16.76
680.50	5	16-QAM	H	392	264	1 / 0	16.50	3.20	**17.55**	0.057	34.77	-17.22
680.50	5	64-QAM	H	392	264	1 / 0	15.61	3.20	**16.66**	0.046	34.77	-18.11
668.00	10	QPSK	H	392	264	1 / 0	16.86	2.90	17.61	0.058	34.77	-17.16
680.50	10	QPSK	H	392	264	1 / 0	17.71	3.20	**18.76**	0.075	34.77	-16.01
693.00	10	QPSK	H	392	264	1 / 0	16.94	3.30	18.09	0.064	34.77	-16.68
680.50	10	16-QAM	H	392	264	1 / 0	16.51	3.20	**17.56**	0.057	34.77	-17.21
680.50	10	64-QAM	H	392	264	1 / 0	15.14	3.20	**16.19**	0.042	34.77	-18.58
670.50	15	QPSK	H	392	264	1 / 0	16.85	3.00	17.70	0.059	34.77	-17.07
680.50	15	QPSK	H	392	264	1 / 0	17.86	3.20	**18.91**	0.078	34.77	-15.86
690.50	15	QPSK	H	392	264	1 / 0	17.03	3.30	18.18	0.066	34.77	-16.59
680.50	15	16-QAM	H	392	264	1 / 0	16.44	3.20	**17.49**	0.056	34.77	-17.28
680.50	15	64-QAM	H	392	264	1 / 0	15.48	3.20	**16.53**	0.045	34.77	-18.24
673.00	20	QPSK	H	392	264	1 / 0	16.76	3.10	17.71	0.059	34.77	-17.06
680.50	20	QPSK	H	392	264	1 / 0	17.91	3.20	**18.96**	0.079	34.77	-15.81
688.00	20	QPSK	H	392	264	1 / 0	16.94	3.30	18.09	0.064	34.77	-16.68
680.50	20	16-QAM	H	392	264	1 / 0	16.51	3.20	**17.56**	0.057	34.77	-17.21
680.50	20	64-QAM	H	392	264	1 / 0	15.14	3.20	**16.19**	0.042	34.77	-18.58
680.50	5	QPSK	V	392	356	1 / 0	15.91	3.20	16.96	0.050	34.77	-17.81

Table 7-3. ERP Data (Band 71)

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	H	133	176	1 / 5	15.27	3.40	16.52	0.045	34.77	-18.25
707.50	1.4	QPSK	H	133	176	1 / 0	15.35	3.65	**16.85**	0.048	34.77	-17.92
715.30	1.4	QPSK	H	133	176	1 / 0	15.13	3.70	16.68	0.047	34.77	-18.09
715.30	1.4	16-QAM	H	133	176	1 / 5	14.42	3.70	**15.97**	0.040	34.77	-18.80
707.50	1.4	64-QAM	H	133	176	1 / 5	13.84	3.65	**15.34**	0.034	34.77	-19.43
700.50	3	QPSK	H	133	176	1 / 14	15.24	3.40	16.49	0.045	34.77	-18.28
707.50	3	QPSK	H	133	176	1 / 0	15.34	3.65	**16.84**	0.048	34.77	-17.93
714.50	3	QPSK	H	133	176	1 / 0	15.03	3.70	16.58	0.045	34.77	-18.19
714.50	3	16-QAM	H	133	176	1 / 14	14.44	3.70	**15.99**	0.040	34.77	-18.78
707.50	3	64-QAM	H	133	176	1 / 14	13.70	3.65	**15.20**	0.033	34.77	-19.57

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]
701.50	5	QPSK	H	133	176	1 / 24	15.28	3.40	16.53	0.045	34.77	-18.24
707.50	5	QPSK	H	133	176	1 / 0	15.43	3.65	16.93	0.049	34.77	-17.84
713.50	5	QPSK	H	133	176	1 / 0	15.39	3.70	**16.94**	0.049	34.77	-17.83
713.50	5	16-QAM	H	133	176	1 / 24	14.68	3.70	**16.23**	0.042	34.77	-18.54
707.50	5	64-QAM	H	133	176	1 / 24	13.59	3.65	**15.09**	0.032	34.77	-19.68
704.00	10	QPSK	H	133	176	1 / 49	15.49	3.50	16.84	0.048	34.77	-17.93
707.50	10	QPSK	H	133	176	1 / 0	15.56	3.65	**17.06**	**0.051**	34.77	-17.71
711.00	10	QPSK	H	133	176	1 / 0	15.31	3.70	16.86	0.049	34.77	-17.91
711.00	10	16-QAM	H	133	176	1 / 49	14.38	3.70	**15.93**	0.039	34.77	-18.84
707.50	10	64-QAM	H	133	176	1 / 49	13.46	3.65	**14.96**	0.031	34.77	-19.81
707.50	10	QPSK	V	177	188	1 / 49	15.47	3.65	16.97	0.050	34.77	-17.80

Table 7-5. ERP Data (Band 12/17)

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	259	233	1 / 0	14.01	5.70	17.56	0.057	34.77	-17.21
782.00	5	QPSK	V	259	233	1 / 0	15.28	5.80	**18.93**	0.078	34.77	-15.84
784.50	5	QPSK	V	259	233	1 / 0	13.96	5.80	17.61	0.058	34.77	-17.16
782.00	5	16-QAM	V	259	233	1 / 0	14.15	5.80	**17.80**	0.060	34.77	-16.97
782.00	5	64-QAM	V	259	233	1 / 0	15.23	5.80	**18.88**	0.077	34.77	-15.89
782.00	10	QPSK	V	259	233	1 / 49	15.48	5.80	**19.13**	**0.082**	34.77	-15.64
782.00	10	16-QAM	V	259	233	1 / 49	15.13	5.80	**18.78**	0.076	34.77	-15.99
782.00	10	64-QAM	V	259	233	1 / 49	12.93	5.80	**16.58**	0.045	34.77	-18.19
782.00	10	QPSK	H	173	264	1 / 49	12.92	5.80	16.57	0.045	34.77	-18.20

Table 7-6. ERP Data (Band 13)

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]
824.70	1.4	QPSK	V	146	293	1 / 0	13.84	6.30	**17.99**	0.063	38.45	-20.46
836.50	1.4	QPSK	V	146	293	1 / 0	13.67	6.40	17.92	0.062	38.45	-20.53
848.30	1.4	QPSK	V	146	293	1 / 0	13.49	6.50	17.84	0.061	38.45	-20.61
836.50	1.4	16-QAM	V	146	293	1 / 0	13.62	6.40	**17.87**	0.061	38.45	-20.58
824.70	1.4	64-QAM	V	146	293	1 / 0	12.12	6.30	**16.27**	0.042	38.45	-22.18
825.50	3	QPSK	V	146	293	1 / 0	13.96	6.30	**18.11**	0.065	38.45	-20.34
836.50	3	QPSK	V	146	293	1 / 0	13.75	6.40	18.00	0.063	38.45	-20.45
847.50	3	QPSK	V	146	293	1 / 0	13.56	6.50	17.91	0.062	38.45	-20.54
836.50	3	16-QAM	V	146	293	1 / 0	13.72	6.40	**17.97**	0.063	38.45	-20.48
825.50	3	64-QAM	V	146	293	1 / 0	12.15	6.30	**16.30**	0.043	38.45	-22.15
826.50	5	QPSK	V	146	293	1 / 0	14.09	6.30	**18.24**	0.067	38.45	-20.21
836.50	5	QPSK	V	146	293	1 / 0	13.86	6.40	18.11	0.065	38.45	-20.34
846.50	5	QPSK	V	146	293	1 / 0	13.68	6.50	18.03	0.064	38.45	-20.42
826.50	5	16-QAM	V	146	293	1 / 0	14.35	6.30	**18.50**	**0.071**	38.45	-19.95
826.50	5	64-QAM	V	146	293	1 / 0	12.43	6.30	**16.58**	0.045	38.45	-21.87
829.00	10	QPSK	V	146	293	1 / 0	14.03	6.30	**18.18**	0.066	38.45	-20.27
836.50	10	QPSK	V	146	293	1 / 0	13.84	6.40	18.09	0.064	38.45	-20.36
844.00	10	QPSK	V	146	293	1 / 0	13.71	6.40	17.96	0.063	38.45	-20.49
836.50	10	16-QAM	V	146	293	1 / 0	13.86	6.40	**18.11**	0.065	38.45	-20.34
829.00	10	64-QAM	V	146	293	1 / 0	12.25	6.30	**16.40**	0.044	38.45	-22.05
826.50	5	16-QAM	H	137	271	1 / 0	12.26	6.70	16.81	0.048	38.45	-21.64

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

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]
831.50	15	QPSK	V	146	293	1 / 0	14.25	6.35	**18.45**	0.070	38.45	-20.00
836.50	15	QPSK	V	146	293	1 / 0	14.15	6.40	18.40	0.069	38.45	-20.05
841.50	15	QPSK	V	146	293	1 / 0	14.08	6.40	18.33	0.068	38.45	-20.12
831.50	15	16-QAM	V	146	293	1 / 0	14.08	6.35	**18.28**	0.067	38.45	-20.17
831.50	15	64-QAM	V	146	293	1 / 0	12.57	6.35	**16.77**	0.048	38.45	-21.68

Table 7-8. ERP Data (Band 26)

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	142	10	1 / 5	12.42	9.44	**21.86**	0.154	30.00	-8.14
1745.00	1.4	QPSK	V	215	130	1 / 5	11.11	9.23	20.34	0.108	30.00	-9.66
1779.30	1.4	QPSK	V	144	10	1 / 5	10.27	9.26	19.53	0.090	30.00	-10.47
1710.70	1.4	16-QAM	V	142	10	1 / 5	11.23	9.44	**20.67**	0.117	30.00	-9.33
1710.70	1.4	64-QAM	V	142	10	1 / 5	7.92	9.44	**17.36**	0.054	30.00	-12.64
1711.50	3	QPSK	V	142	10	1 / 14	12.51	9.44	**21.95**	0.156	30.00	-8.05
1745.00	3	QPSK	V	215	130	1 / 14	11.22	9.23	20.45	0.111	30.00	-9.55
1778.50	3	QPSK	V	144	10	1 / 14	10.19	9.26	19.44	0.088	30.00	-10.56
1711.50	3	16-QAM	V	142	10	1 / 14	11.38	9.44	**20.82**	0.121	30.00	-9.18
1711.50	3	64-QAM	V	142	10	1 / 14	7.87	9.44	**17.31**	0.054	30.00	-12.69
1712.50	5	QPSK	V	142	10	1 / 24	12.46	9.43	**21.90**	0.155	30.00	-8.10
1745.00	5	QPSK	V	215	130	1 / 24	11.46	9.23	20.69	0.117	30.00	-9.31
1777.50	5	QPSK	V	144	10	1 / 24	10.27	9.26	19.53	0.090	30.00	-10.47
1712.50	5	16-QAM	V	142	10	1 / 24	12.03	9.43	**21.47**	0.140	30.00	-8.53
1712.50	5	64-QAM	V	142	10	1 / 24	8.44	9.43	**17.88**	0.061	30.00	-12.12
1715.00	10	QPSK	V	142	10	1 / 49	12.45	9.42	**21.87**	0.154	30.00	-8.13
1745.00	10	QPSK	V	215	130	1 / 49	11.31	9.23	20.54	0.113	30.00	-9.46
1775.00	10	QPSK	V	144	10	1 / 49	10.20	9.25	19.45	0.088	30.00	-10.55
1715.00	10	16-QAM	V	142	10	1 / 49	11.38	9.42	**20.80**	0.120	30.00	-9.20
1715.00	10	64-QAM	V	142	10	1 / 49	7.98	9.42	**17.40**	0.055	30.00	-12.60
1717.50	15	QPSK	V	142	10	1 / 74	12.65	9.40	**22.05**	0.160	30.00	-7.95
1745.00	15	QPSK	V	215	130	1 / 74	11.55	9.23	20.78	0.120	30.00	-9.22
1772.50	15	QPSK	V	144	10	1 / 74	10.36	9.25	19.61	0.091	30.00	-10.39
1717.50	15	16-QAM	V	142	10	1 / 74	11.78	9.40	**21.18**	0.131	30.00	-8.82
1717.50	15	64-QAM	V	142	10	1 / 74	8.37	9.40	**17.77**	0.060	30.00	-12.23
1720.00	20	QPSK	V	142	10	1 / 99	12.70	9.38	**22.08**	**0.162**	30.00	-7.92
1745.00	20	QPSK	V	215	130	1 / 99	11.41	9.23	20.64	0.116	30.00	-9.36
1770.00	20	QPSK	V	144	10	1 / 99	10.42	9.24	19.66	0.092	30.00	-10.34
1720.00	20	16-QAM	V	142	10	1 / 99	11.78	9.38	**21.16**	0.131	30.00	-8.84
1720.00	20	64-QAM	V	142	10	1 / 99	8.42	9.38	**17.80**	0.060	30.00	-12.20
1720.00	20	QPSK	H	100	75	1 / 99	11.01	9.38	20.39	0.110	30.00	-9.61

Table 7-9. EIRP Data (Band 66/4)

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	V	130	274	1 / 0	10.18	9.48	19.66	0.092	33.01	-13.35
1882.50	1.4	QPSK	V	100	276	1 / 0	10.71	9.94	**20.65**	0.116	33.01	-12.37
1914.30	1.4	QPSK	V	130	271	1 / 0	9.91	10.29	20.20	0.105	33.01	-12.81
1882.50	1.4	16-QAM	V	100	276	1 / 0	9.27	9.94	**19.21**	0.083	33.01	-13.81
1882.50	1.4	64-QAM	V	100	276	1 / 0	8.51	9.94	**18.45**	0.070	33.01	-14.57
1851.50	3	QPSK	V	130	274	1 / 0	10.03	9.50	19.52	0.090	33.01	-13.49
1882.50	3	QPSK	V	100	276	1 / 0	10.62	9.94	**20.56**	0.114	33.01	-12.46
1913.50	3	QPSK	V	130	271	1 / 0	10.00	10.29	20.28	0.107	33.01	-12.73
1882.50	3	16-QAM	V	100	276	1 / 0	9.30	9.94	**19.24**	0.084	33.01	-13.78
1913.50	3	64-QAM	V	130	271	1 / 0	8.14	10.29	**18.42**	0.070	33.01	-14.59
1852.50	5	QPSK	V	130	274	1 / 0	10.29	9.51	19.80	0.095	33.01	-13.21
1882.50	5	QPSK	V	100	276	1 / 0	11.00	9.94	**20.94**	**0.124**	33.01	-12.08
1912.50	5	QPSK	V	130	271	1 / 0	10.09	10.28	20.37	0.109	33.01	-12.64
1882.50	5	16-QAM	V	100	276	1 / 0	9.37	9.94	**19.31**	0.085	33.01	-13.71
1882.50	5	64-QAM	V	100	276	1 / 0	8.55	9.94	**18.49**	0.071	33.01	-14.53
1855.00	10	QPSK	V	130	274	1 / 0	10.17	9.55	19.71	0.094	33.01	-13.30
1882.50	10	QPSK	V	100	276	1 / 0	10.82	9.94	**20.76**	0.119	33.01	-12.26
1910.00	10	QPSK	V	130	271	1 / 0	10.05	10.26	20.30	0.107	33.01	-12.71
1882.50	10	16-QAM	V	100	276	1 / 0	9.33	9.94	**19.27**	0.084	33.01	-13.75
1882.50	10	64-QAM	V	100	276	1 / 0	8.53	9.94	**18.47**	0.070	33.01	-14.55
1857.50	15	QPSK	V	130	274	1 / 0	10.12	9.58	19.70	0.093	33.01	-13.31
1882.50	15	QPSK	V	100	276	1 / 0	10.70	9.94	**20.64**	0.116	33.01	-12.38
1907.50	15	QPSK	V	130	271	1 / 0	10.04	10.24	20.28	0.107	33.01	-12.73
1882.50	15	16-QAM	V	100	276	1 / 0	8.79	9.94	**18.73**	0.075	33.01	-14.29
1907.50	15	64-QAM	V	130	271	1 / 0	7.71	10.24	**17.95**	0.062	33.01	-15.06
1860.00	20	QPSK	V	130	274	1 / 50	10.13	9.62	19.75	0.094	33.01	-13.26
1882.50	20	QPSK	V	100	276	1 / 0	10.67	9.94	**20.61**	0.115	33.01	-12.41
1905.00	20	QPSK	V	130	271	1 / 50	10.19	10.22	20.41	0.110	33.01	-12.60
1882.50	20	16-QAM	V	100	276	1 / 0	9.14	9.94	**19.08**	0.081	33.01	-13.94
1882.50	20	64-QAM	V	100	276	1 / 0	8.47	9.94	**18.41**	0.069	33.01	-14.61
1882.50	5	QPSK	H	130	358	1 / 0	10.12	9.94	20.06	0.101	33.01	-12.96

Table 7-10. EIRP Data (Band 25/2)

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	105	339	1 / 24	12.14	9.43	21.58	0.144	33.01	-11.43
2593.00	5	QPSK	H	100	336	1 / 0	13.83	9.55	**23.38**	**0.218**	33.01	-9.63
2687.50	5	QPSK	H	105	332	1 / 0	12.26	9.82	22.08	0.161	33.01	-10.93
2593.00	5	16-QAM	H	100	336	1 / 0	13.19	9.55	**22.74**	0.188	33.01	-10.27
2593.00	5	64-QAM	H	100	336	1 / 0	11.77	9.55	**21.32**	0.136	33.01	-11.69
2501.00	10	QPSK	H	105	339	1 / 49	12.23	9.43	21.66	0.146	33.01	-11.35
2593.00	10	QPSK	H	100	336	1 / 0	13.78	9.55	**23.33**	0.215	33.01	-9.68
2685.00	10	QPSK	H	105	332	1 / 0	12.14	9.82	21.96	0.157	33.01	-11.05
2593.00	10	16-QAM	H	100	336	1 / 0	12.98	9.55	**22.53**	0.179	33.01	-10.48
2593.00	10	64-QAM	H	100	336	1 / 0	11.58	9.55	**21.13**	0.130	33.01	-11.88
2503.50	15	QPSK	H	105	339	1 / 74	12.32	9.43	21.75	0.150	33.01	-11.26
2593.00	15	QPSK	H	100	336	1 / 0	13.37	9.55	**22.92**	0.196	33.01	-10.09
2682.50	15	QPSK	H	105	332	1 / 0	12.06	9.83	21.89	0.155	33.01	-11.12
2593.00	15	16-QAM	H	100	336	1 / 0	12.58	9.55	**22.13**	0.163	33.01	-10.88
2593.00	15	64-QAM	H	100	336	1 / 0	11.34	9.55	**20.89**	0.123	33.01	-12.12
2506.00	20	QPSK	H	105	339	1 / 99	11.97	9.42	21.39	0.138	33.01	-11.62
2593.00	20	QPSK	H	100	336	1 / 50	13.47	9.55	**23.02**	0.201	33.01	-9.99
2680.00	20	QPSK	H	105	332	1 / 50	12.12	9.83	21.95	0.157	33.01	-11.06
2593.00	20	16-QAM	H	100	336	1 / 50	12.83	9.55	**22.38**	0.173	33.01	-10.63
2593.00	20	64-QAM	H	100	336	1 / 50	11.37	9.55	**20.92**	0.124	33.01	-12.09
2593.00	5	QPSK	V	109	319	1 / 0	12.60	9.55	22.15	0.164	33.01	-10.86

Table 7-11. EIRP Data (Band 41 PC3)

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

Test Setup

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

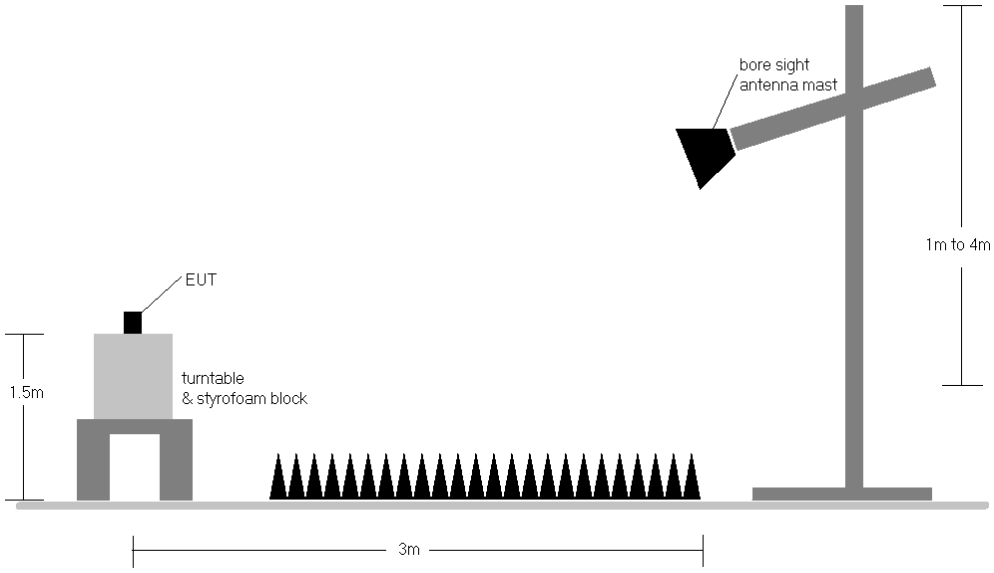


Figure 7-7. Test Instrument & Measurement Setup

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.

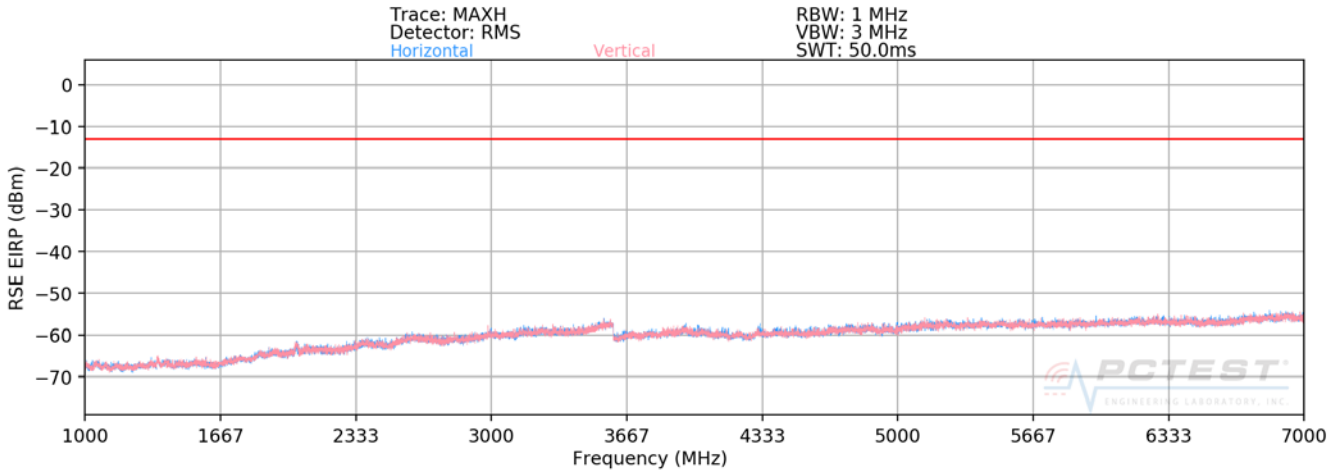
2) This unit was tested with its standard battery.

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.

Band 71



Plot 7-311. 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	149	34	-73.84	8.76	-65.08	-52.1
2019.00	H	101	18	-65.53	10.22	-55.32	-42.3
2692.00	H	-	-	-72.91	9.81	-63.10	-50.1
3365.00	H	-	-	-69.41	7.30	-62.11	-49.1

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

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	109	10	-71.41	8.61	-62.81	-49.8
2041.50	H	166	27	-62.11	10.04	-52.08	-39.1
2722.00	H	-	-	-73.24	9.58	-63.66	-50.7
3402.50	H	-	-	-69.49	7.33	-62.16	-49.2

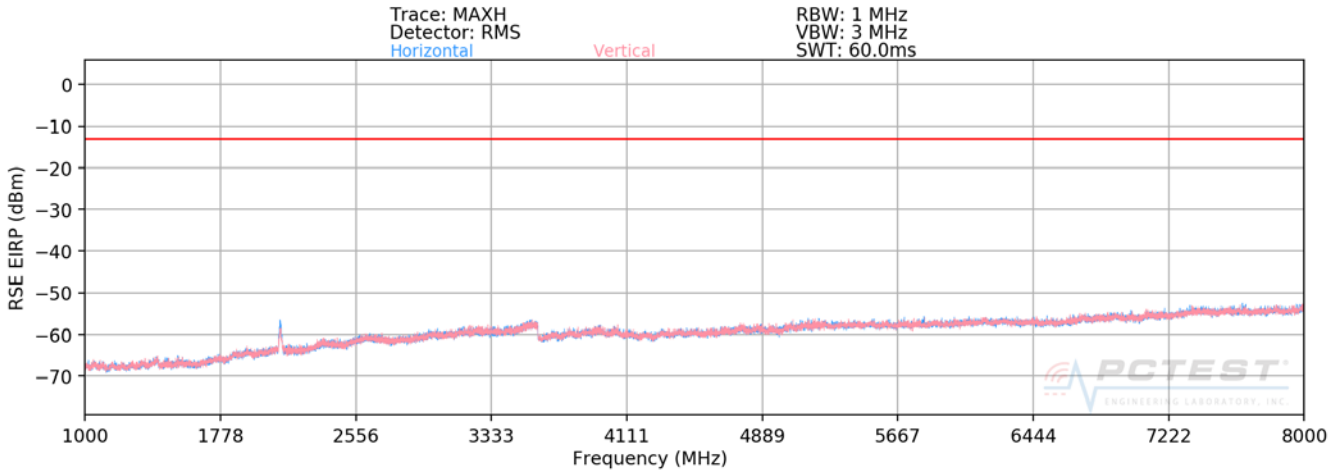
Table 7-13. Radiated Spurious Data (Band 71 – Mid Channel)

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	179	-59.55	8.41	-51.14	-38.1
2064.00	H	101	12	-61.51	9.87	-51.64	-38.6
2752.00	H	-	-	-72.48	9.30	-63.18	-50.2
3440.00	H	-	-	-69.78	7.51	-62.27	-49.3

Table 7-14. Radiated Spurious Data (Band 71 – High Channel)

Band 12/17



Plot 7-312. Radiated Spurious Plot above 1GHz (Band 12/17)

OPERATING FREQUENCY:	704.00	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]
1408.00	V	127	109	-67.74	8.16	-59.57	-46.6
2112.00	V	128	118	-59.94	9.61	-50.33	-37.3
2816.00	V	-	-	-71.66	9.09	-62.56	-49.6
3520.00	V	-	-	-69.89	7.37	-62.52	-49.5

Table 7-15. Radiated Spurious Data (Band 12/17 – Low Channel)

OPERATING FREQUENCY:	707.50	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]
1415.00	V	150	130	-71.16	8.22	-62.95	-49.9
2122.50	V	117	55	-59.13	9.59	-49.54	-36.5
2830.00	V	-	-	-72.00	9.10	-62.90	-49.9
3537.50	V	-	-	-69.61	7.26	-62.35	-49.3

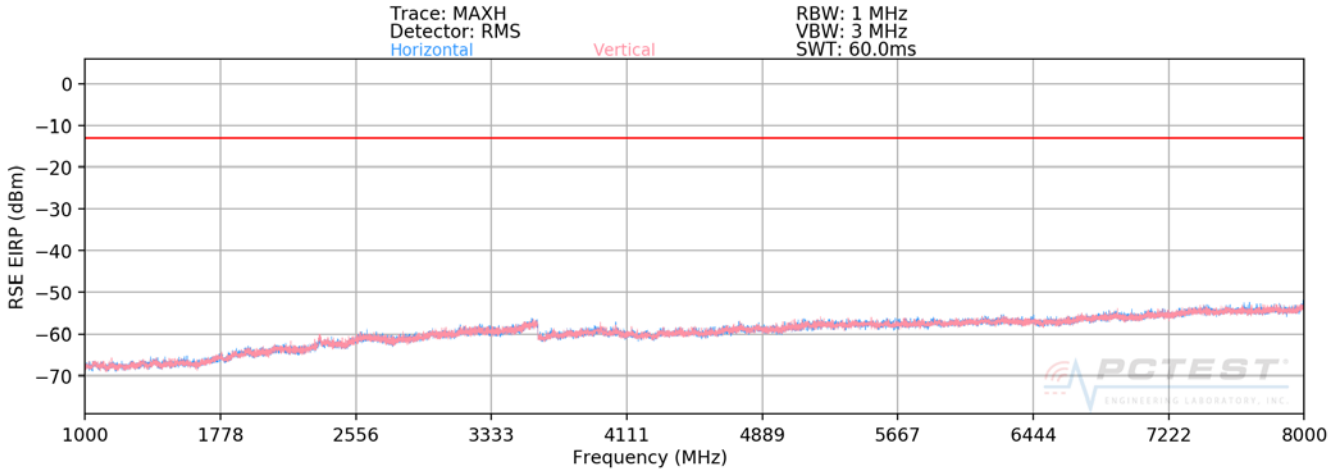
Table 7-16. Radiated Spurious Data (Band 12/17 – Mid Channel)

OPERATING FREQUENCY:	711.00	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]
1422.00	V	131	104	-67.32	8.27	-59.05	-46.1
2133.00	V	145	100	-56.78	9.57	-47.21	-34.2
2844.00	V	-	-	-72.12	9.11	-63.01	-50.0
3555.00	V	-	-	-69.55	7.16	-62.39	-49.4

Table 7-17. Radiated Spurious Data (Band 12/17 – High Channel)

Band 13



Plot 7-313. 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	141	9	-63.20	10.31	-52.89	-39.9
3128.00	H	-	-	-68.25	8.60	-59.65	-46.7
3910.00	H	-	-	-65.69	5.98	-59.71	-46.7

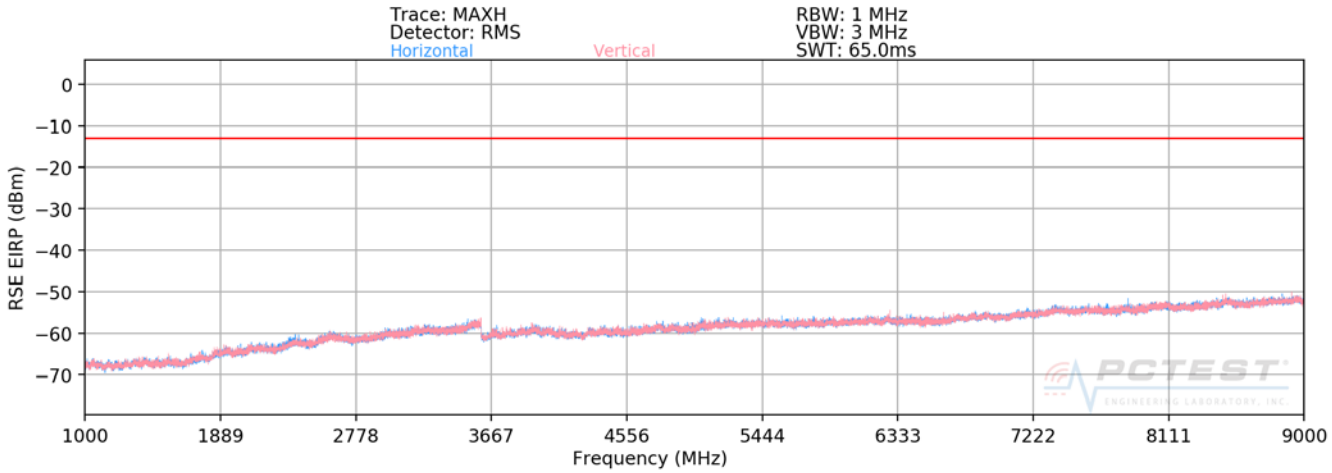
Table 7-18. Radiated Spurious Data (Band 13 – Mid Channel)

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	H	-	-	-74.84	9.44	-65.41	-25.4

Table 7-19. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

Band 26/5



Plot 7-314. Radiated Spurious Plot above 1GHz (Band 26/5)

OPERATING FREQUENCY:	826.50	MHz
MODULATION SIGNAL:	16-QAM	
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]
1653.00	H	209	222	-71.95	9.56	-62.39	-49.4
2479.50	H	146	225	-65.17	9.46	-55.71	-42.7
3306.00	H	-	-	-69.97	7.49	-62.48	-49.5
4132.50	H	-	-	-69.66	8.01	-61.65	-48.7

Table 7-20. Radiated Spurious Data (Band 26/5 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz
MODULATION SIGNAL:	16-QAM	
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]
1673.00	H	102	229	-72.43	9.54	-62.89	-49.9
2509.50	H	155	218	-65.65	9.42	-56.23	-43.2
3346.00	H	-	-	-69.33	7.32	-62.02	-49.0
4182.50	H	-	-	-69.96	8.16	-61.80	-48.8

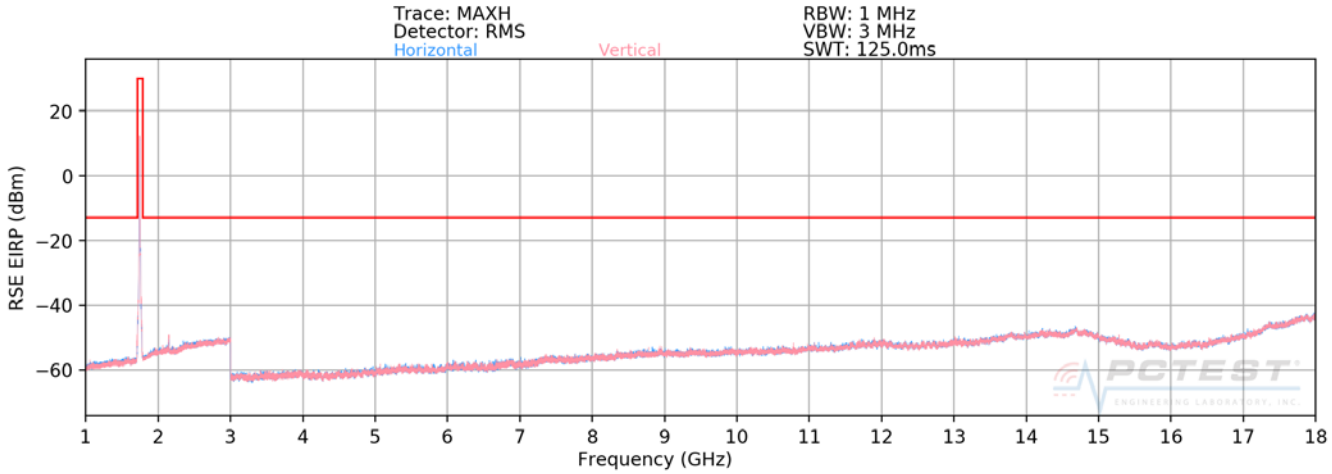
Table 7-21. Radiated Spurious Data (Band 26/5 – Mid Channel)

OPERATING FREQUENCY:	846.50	MHz
MODULATION SIGNAL:	16-QAM	
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]
1693.00	H	106	227	-71.66	9.52	-62.14	-49.1
2539.50	H	127	227	-64.51	9.39	-55.12	-42.1
3386.00	H	-	-	-69.15	7.31	-61.84	-48.8
4232.50	H	-	-	-70.51	8.42	-62.09	-49.1

Table 7-22. Radiated Spurious Data (Band 26/5 – High Channel)

Band 66/4



Plot 7-315. 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	V	117	4	-65.26	7.51	-57.76	-44.8
5160.00	V	103	32	-69.82	11.10	-58.72	-45.7
6880.00	V	106	20	-66.02	11.72	-54.30	-41.3
8600.00	V	-	-	-66.05	8.83	-57.22	-44.2
10320.00	V	-	-	-66.67	11.16	-55.51	-42.5

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

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	V	105	23	-65.25	7.50	-57.75	-44.7
5235.00	V	108	4	-70.70	11.26	-59.45	-46.4
6980.00	V	102	20	-65.70	11.85	-53.85	-40.8
8725.00	V	108	348	-65.13	8.41	-56.72	-43.7
10470.00	V	115	51	-67.10	12.59	-54.51	-41.5
12215.00	V	-	-	-66.26	13.56	-52.70	-39.7
13960.00	V	-	-	-65.10	13.76	-51.34	-38.3

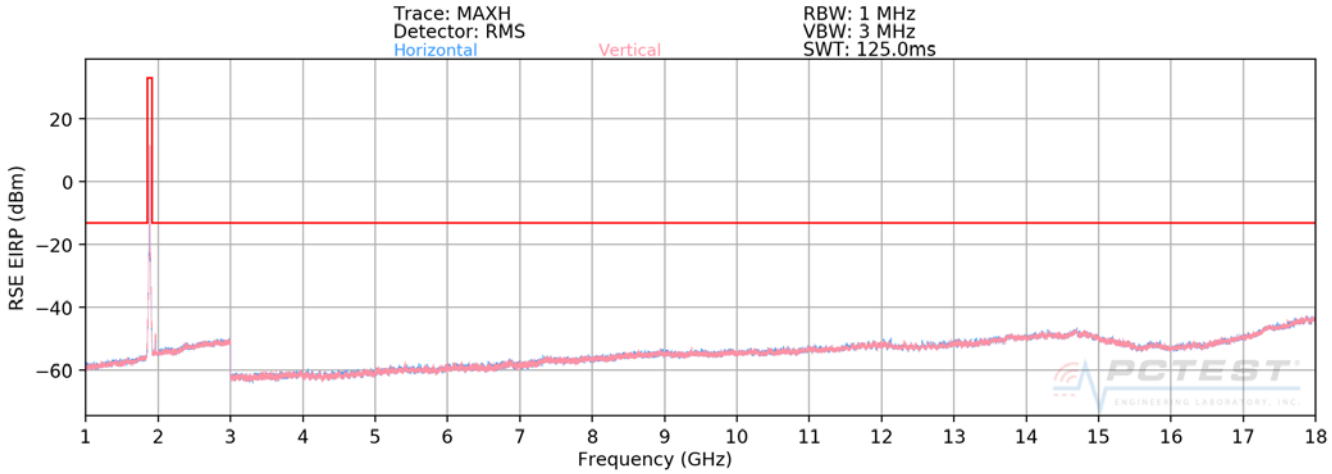
Table 7-24. Radiated Spurious Data (Band 66/4 – Mid Channel)

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	V	100	28	-63.88	7.24	-56.64	-43.6
5310.00	V	103	20	-70.29	11.51	-58.78	-45.8
7080.00	V	299	30	-64.64	11.94	-52.70	-39.7
8850.00	V	-	-	-63.51	7.62	-55.89	-42.9
10620.00	V	105	46	-65.11	11.99	-53.12	-40.1
12390.00	V	-	-	-65.87	13.66	-52.21	-39.2
14160.00	V	-	-	-64.12	13.07	-51.05	-38.1

Table 7-25. Radiated Spurious Data (Band 66/4 – High Channel)

Band 25/2



Plot 7-316. Radiated Spurious Plot above 1GHz (Band 25/2)

OPERATING FREQUENCY:	1852.50	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]
3705.00	H	179	61	-66.49	6.12	-60.38	-47.4
5557.50	H	117	300	-71.09	12.03	-59.06	-46.1
7410.00	H	370	63	-66.06	12.45	-53.61	-40.6
9262.50	H	-	-	-64.64	8.79	-55.85	-42.9
11115.00	H	193	3	-58.21	9.13	-49.08	-36.1
12967.50	H	-	-	-58.74	7.66	-51.08	-38.1
14820.00	H	-	-	-60.18	10.88	-49.30	-36.3

Table 7-26. Radiated Spurious Data (Band 25/2 – Low Channel)

OPERATING FREQUENCY:	1882.50	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]
3765.00	H	307	55	-66.02	5.89	-60.13	-47.1
5647.50	H	193	21	-71.93	12.29	-59.63	-46.6
7530.00	H	121	65	-67.10	12.56	-54.54	-41.5
9412.50	H	-	-	-64.99	9.07	-55.92	-42.9
11295.00	H	192	3	-58.03	8.06	-49.97	-37.0
13177.50	H	-	-	-60.03	9.45	-50.58	-37.6
15060.00	H	-	-	-61.63	11.99	-49.64	-36.6

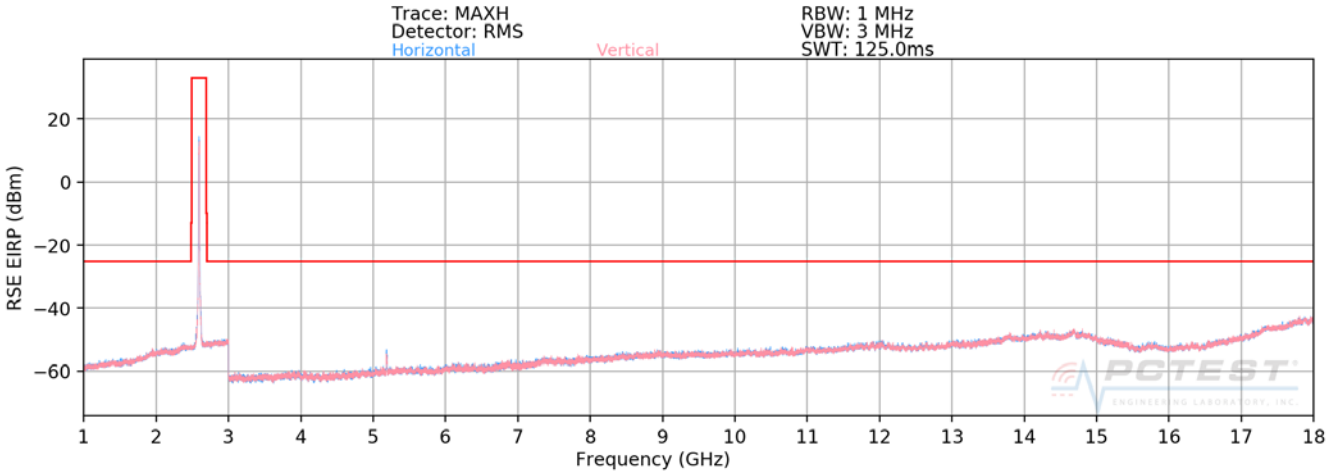
Table 7-27. Radiated Spurious Data (Band 25/2 – Mid Channel)

OPERATING FREQUENCY:	1912.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

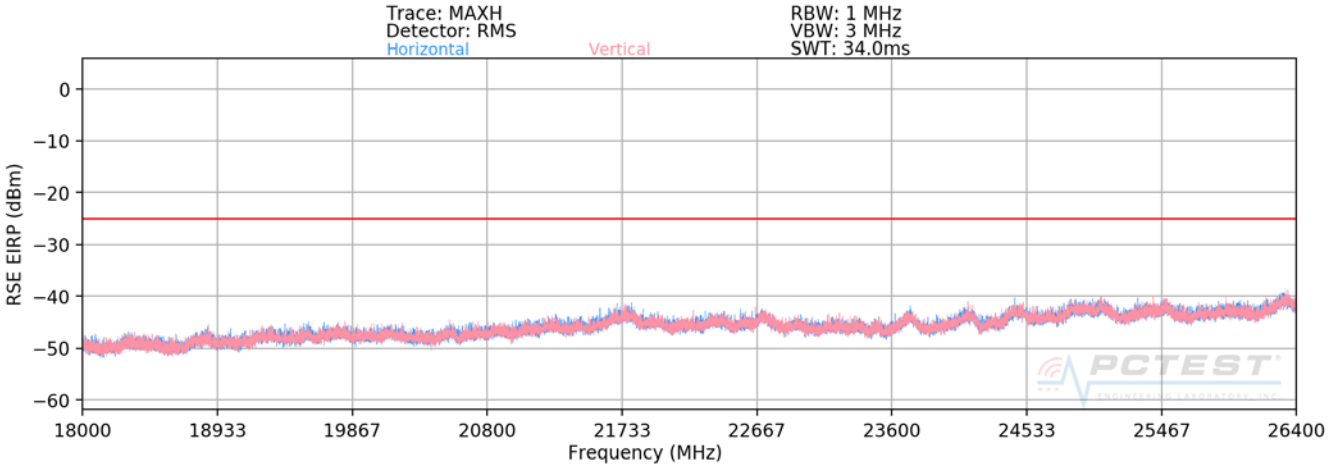
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3825.00	H	132	322	-59.13	5.81	-53.32	-40.3
5737.50	H	147	17	-71.50	12.45	-59.04	-46.0
7650.00	H	277	326	-64.86	12.38	-52.48	-39.5
9562.50	H	-	-	-65.41	9.38	-56.03	-43.0
11475.00	H	130	7	-55.90	8.32	-47.58	-34.6
13387.50	H	130	300	-58.69	8.37	-50.32	-37.3
15300.00	H	-	-	-58.29	9.05	-49.24	-36.2
17212.50	H	-	-	-57.92	10.75	-47.17	-34.2

Table 7-28. Radiated Spurious Data (Band 25/2 – High Channel)

Band 41 PC3



Plot 7-317. Radiated Spurious Plot 1GHz - 18GHz (Band 41)



Plot 7-318. Radiated Spurious Plot 18GHz – 26.5GHz (Band 41)

OPERATING FREQUENCY:	2506.00	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]
5012.00	H	162	357	-54.72	10.77	-43.95	-19.0
7518.00	H	-	-	-67.10	12.55	-54.55	-29.5
10024.00	H	302	308	-59.43	12.42	-47.01	-22.0
12530.00	H	-	-	-63.60	13.29	-50.31	-25.3
15036.00	H	-	-	-60.12	12.59	-47.53	-22.5
17542.00	H	-	-	-55.89	12.59	-43.30	-18.3

Table 7-29. Radiated Spurious Data (Band 41 – 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	198	358	-51.61	11.14	-40.48	-15.5
7779.00	H	-	-	-66.77	12.33	-54.44	-29.4
10372.00	H	395	354	-63.23	12.42	-50.81	-25.8
12965.00	H	136	299	-57.00	13.45	-43.55	-18.5
15558.00	H	-	-	-58.80	12.60	-46.20	-21.2
18151.00	H	-	-	-58.79	11.56	-47.23	-22.2

Table 7-30. Radiated Spurious Data (Band 41 – Mid Channel)

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	166	4	-50.21	11.49	-38.72	-13.7
8040.00	H	354	38	-63.53	12.03	-51.51	-26.5
10720.00	H	128	356	-62.86	12.42	-50.44	-25.4
13400.00	H	129	357	-56.81	13.26	-43.55	-18.5
16080.00	H	-	-	-56.47	12.66	-43.81	-18.8
18760.00	H	-	-	-56.09	11.56	-44.53	-19.5

Table 7-31. Radiated Spurious Data (Band 41 – High Channel)

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

Band 71 Frequency Stability Measurements

OPERATING FREQUENCY: 680,500,000 Hz

REFERENCE VOLTAGE: 4.33 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.33	- 30	680,499,834	-166	-0.0000244
100 %		- 20	680,499,951	-49	-0.0000072
100 %		- 10	680,499,602	-398	-0.0000585
100 %		0	680,500,215	215	0.0000316
100 %		+ 10	680,499,961	-39	-0.0000057
100 %		+ 20	680,500,098	98	0.0000144
100 %		+ 30	680,499,969	-31	-0.0000046
100 %		+ 40	680,500,045	45	0.0000066
100 %		+ 50	680,500,196	196	0.0000288
BATT. ENDPOINT	3.50	+ 20	680,499,790	-210	-0.0000309

Table 7-32. 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.

Band 71 Frequency Stability Measurements

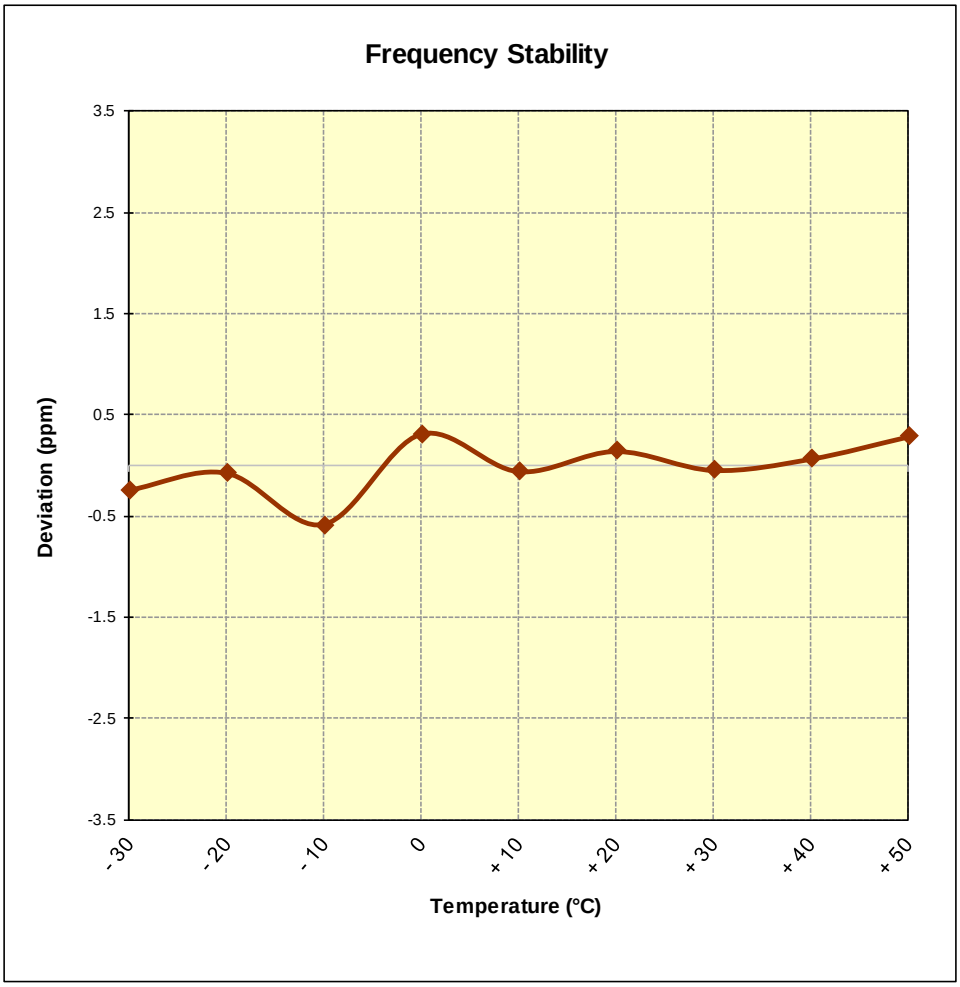


Figure 7-8. Frequency Stability Graph (Band 71)

Band 12/17 Frequency Stability Measurements

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	4.33	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.33	- 30	707,500,126	126	0.0000178
100 %		- 20	707,500,164	164	0.0000232
100 %		- 10	707,499,893	-107	-0.0000151
100 %		0	707,500,020	20	0.0000028
100 %		+ 10	707,500,269	269	0.0000380
100 %		+ 20	707,500,119	119	0.0000168
100 %		+ 30	707,500,122	122	0.0000172
100 %		+ 40	707,500,238	238	0.0000336
100 %		+ 50	707,500,136	136	0.0000192
BATT. ENDPOINT	3.50	+ 20	707,500,040	40	0.0000057

Table 7-33. Frequency Stability Data (Band 12/17)

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.

Band 12/17 Frequency Stability Measurements

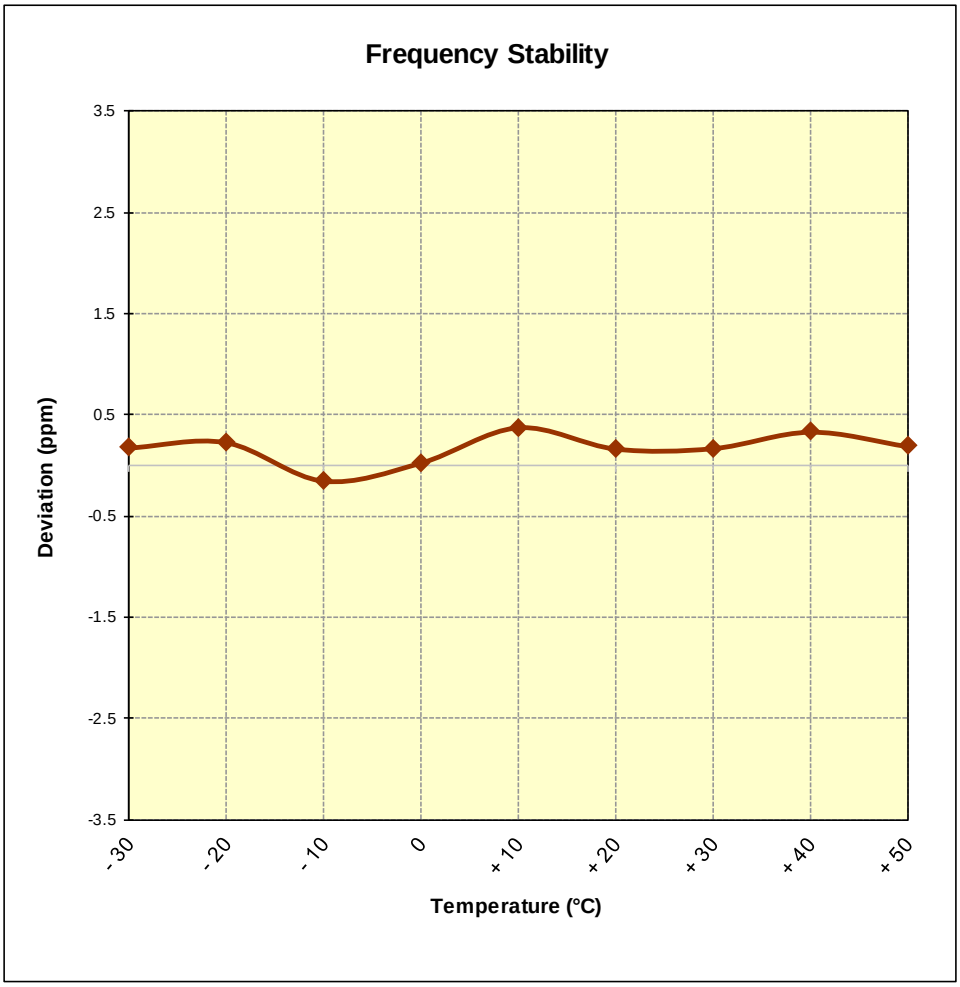


Figure 7-9. Frequency Stability Graph (Band 12/17)

Band 13 Frequency Stability Measurements

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	4.33	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.33	- 30	781,999,888	-112	-0.0000143
100 %		- 20	782,000,088	88	0.0000113
100 %		- 10	782,000,254	254	0.0000325
100 %		0	781,999,989	-11	-0.0000014
100 %		+ 10	782,000,042	42	0.0000054
100 %		+ 20	781,999,711	-289	-0.0000370
100 %		+ 30	782,000,177	177	0.0000226
100 %		+ 40	782,000,304	304	0.0000389
100 %		+ 50	781,999,994	-6	-0.0000008
BATT. ENDPOINT	3.50	+ 20	782,000,340	340	0.0000435

Table 7-34. 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.

Band 13 Frequency Stability Measurements

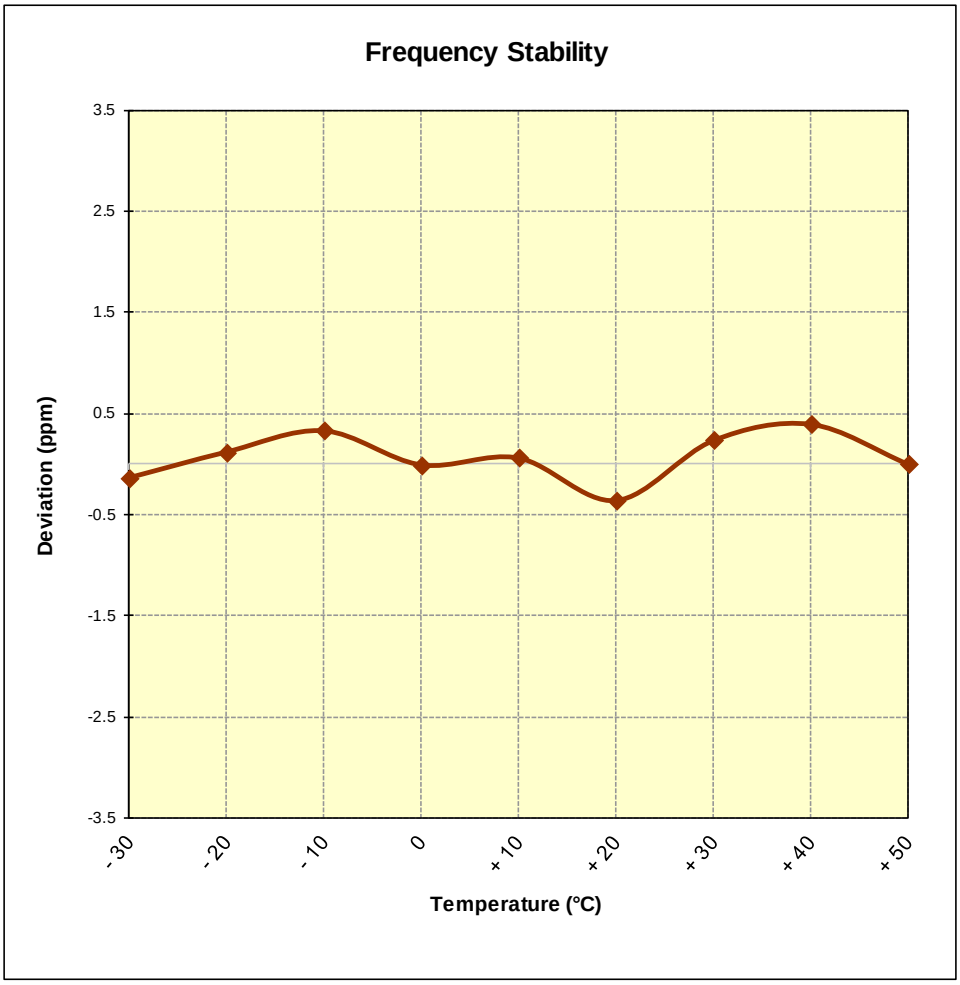


Figure 7-10. Frequency Stability Graph (Band 13)

Band 26/5 Frequency Stability Measurements

OPERATING FREQUENCY:	831,500,000	Hz
CHANNEL:	26865	
REFERENCE VOLTAGE:	4.33	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.33	- 30	831,499,922	-78	-0.0000094
100 %		- 20	831,499,924	-76	-0.0000091
100 %		- 10	831,500,038	38	0.0000046
100 %		0	831,500,284	284	0.0000342
100 %		+ 10	831,500,015	15	0.0000018
100 %		+ 20	831,499,925	-75	-0.0000090
100 %		+ 30	831,500,325	325	0.0000391
100 %		+ 40	831,500,028	28	0.0000034
100 %		+ 50	831,499,833	-167	-0.0000201
BATT. ENDPOINT	3.50	+ 20	831,500,074	74	0.0000089

Table 7-35. Frequency Stability Data (Band 26/5)

Band 26/5 Frequency Stability Measurements

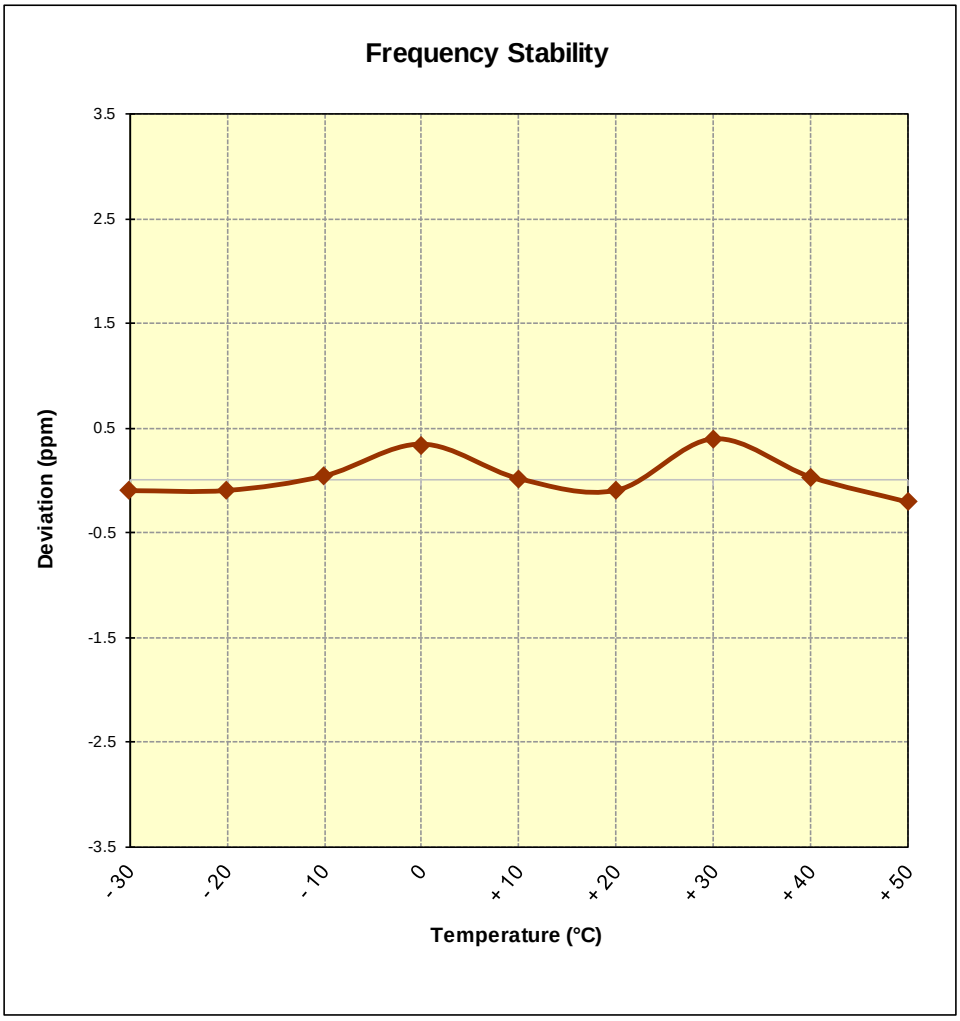


Figure 7-11. Frequency Stability Graph (Band 26/)

Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY:	1,745,000,000	Hz
CHANNEL:	132322	
REFERENCE VOLTAGE:	4.33	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.33	- 30	1,744,999,797	-203	-0.0000116
100 %		- 20	1,745,000,161	161	0.0000092
100 %		- 10	1,745,000,297	297	0.0000170
100 %		0	1,745,000,070	70	0.0000040
100 %		+ 10	1,745,000,067	67	0.0000038
100 %		+ 20	1,744,999,964	-36	-0.0000021
100 %		+ 30	1,745,000,136	136	0.0000078
100 %		+ 40	1,745,000,011	11	0.0000006
100 %		+ 50	1,744,999,559	-441	-0.0000253
BATT. ENDPOINT	3.50	+ 20	1,745,000,003	3	0.0000002

Table 7-36. 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.

Band 66/4 Frequency Stability Measurements

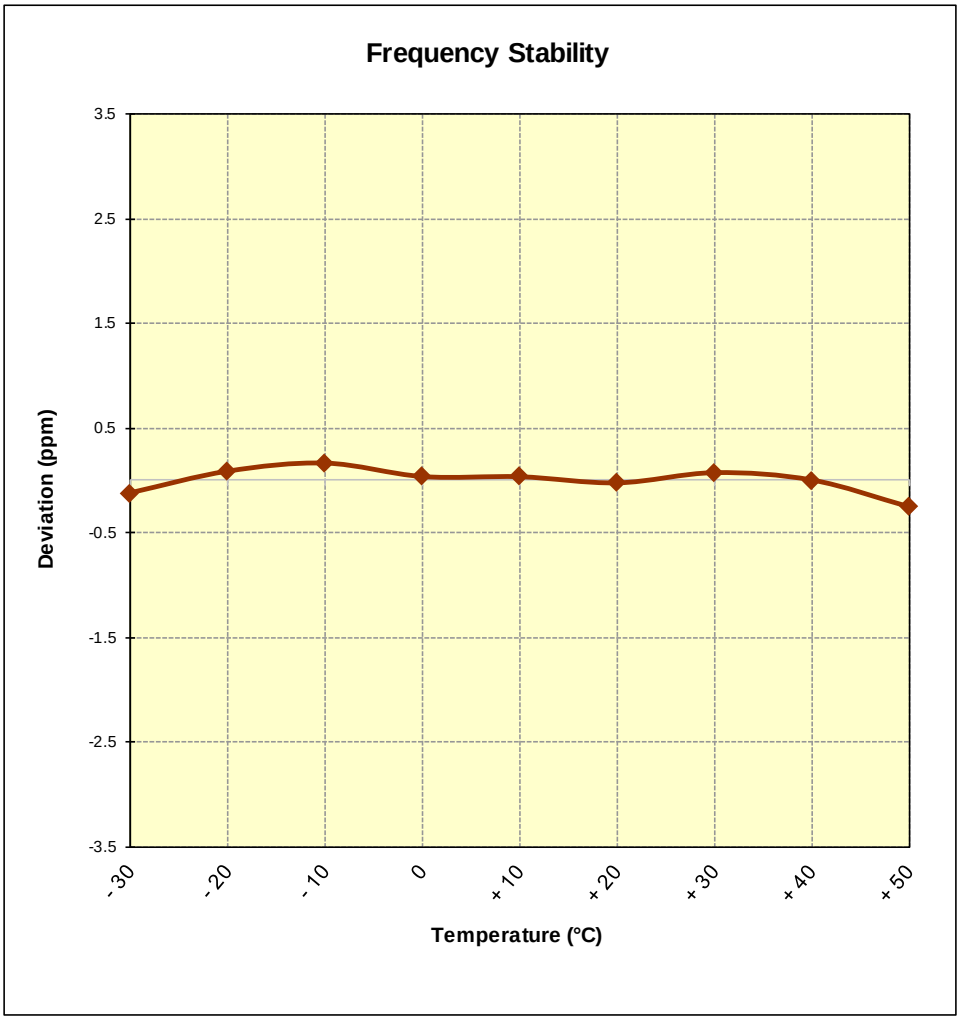


Figure 7-12. Frequency Stability Graph (Band 66/4)

Band 25/2 Frequency Stability Measurements

OPERATING FREQUENCY:	1,882,500,000	Hz
CHANNEL:	26365	
REFERENCE VOLTAGE:	4.33	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.33	- 30	1,882,500,137	137	0.0000073
100 %		- 20	1,882,500,040	40	0.0000021
100 %		- 10	1,882,500,300	300	0.0000159
100 %		0	1,882,500,070	70	0.0000037
100 %		+ 10	1,882,499,991	-9	-0.0000005
100 %		+ 20	1,882,499,821	-179	-0.0000095
100 %		+ 30	1,882,499,972	-28	-0.0000015
100 %		+ 40	1,882,500,061	61	0.0000032
100 %		+ 50	1,882,500,149	149	0.0000079
BATT. ENDPOINT	3.50	+ 20	1,882,499,931	-69	-0.0000037

Table 7-37. Frequency Stability Data (Band 25/2)

Band 25/2 Frequency Stability Measurements

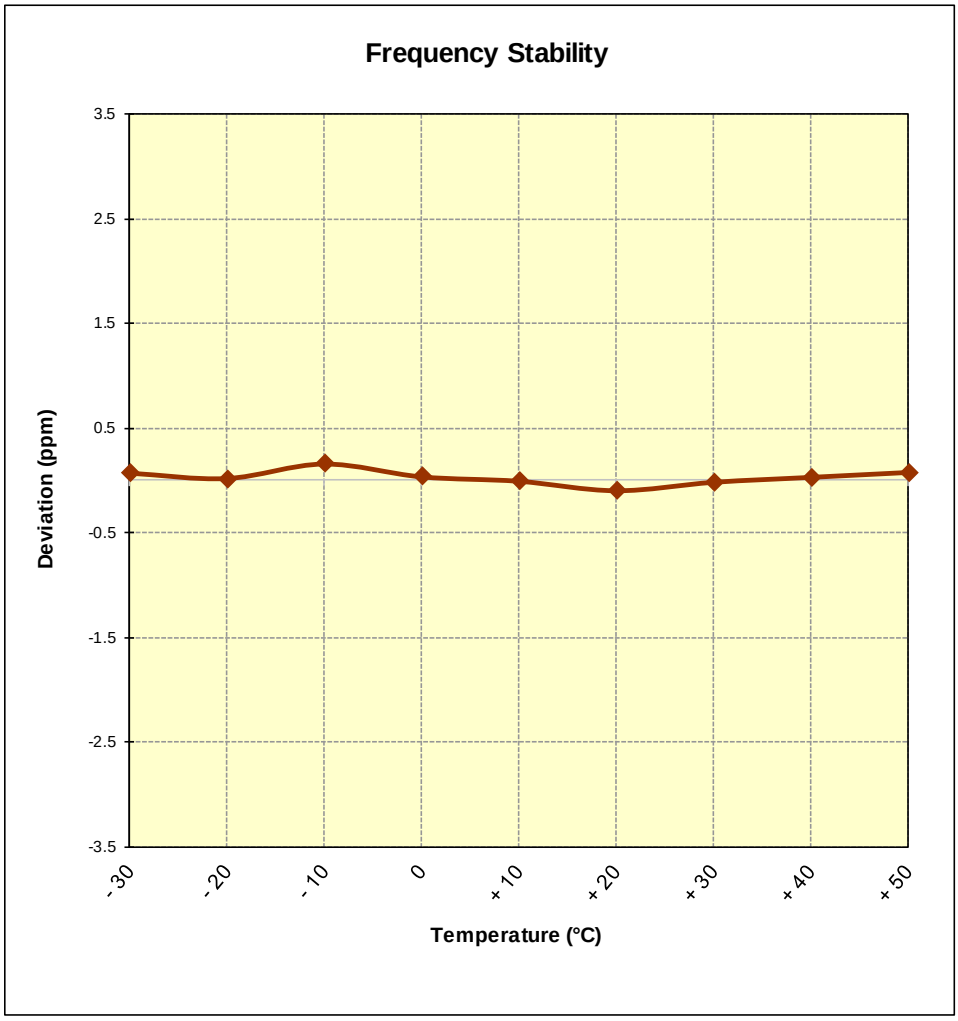


Figure 7-13. Frequency Stability Graph (Band 25/2)

Band 41 Frequency Stability Measurements

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	4.33	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.33	- 30	2,593,000,001	1	0.0000000
100 %		- 20	2,592,999,728	-272	-0.0000105
100 %		- 10	2,593,000,202	202	0.0000078
100 %		0	2,593,000,181	181	0.0000070
100 %		+ 10	2,593,000,170	170	0.0000066
100 %		+ 20	2,593,000,154	154	0.0000059
100 %		+ 30	2,592,999,926	-74	-0.0000029
100 %		+ 40	2,592,999,957	-43	-0.0000017
100 %		+ 50	2,592,999,769	-231	-0.0000089
BATT. ENDPOINT	3.50	+ 20	2,592,999,973	-27	-0.0000010

Table 7-38. 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.

Band 41 Frequency Stability Measurements

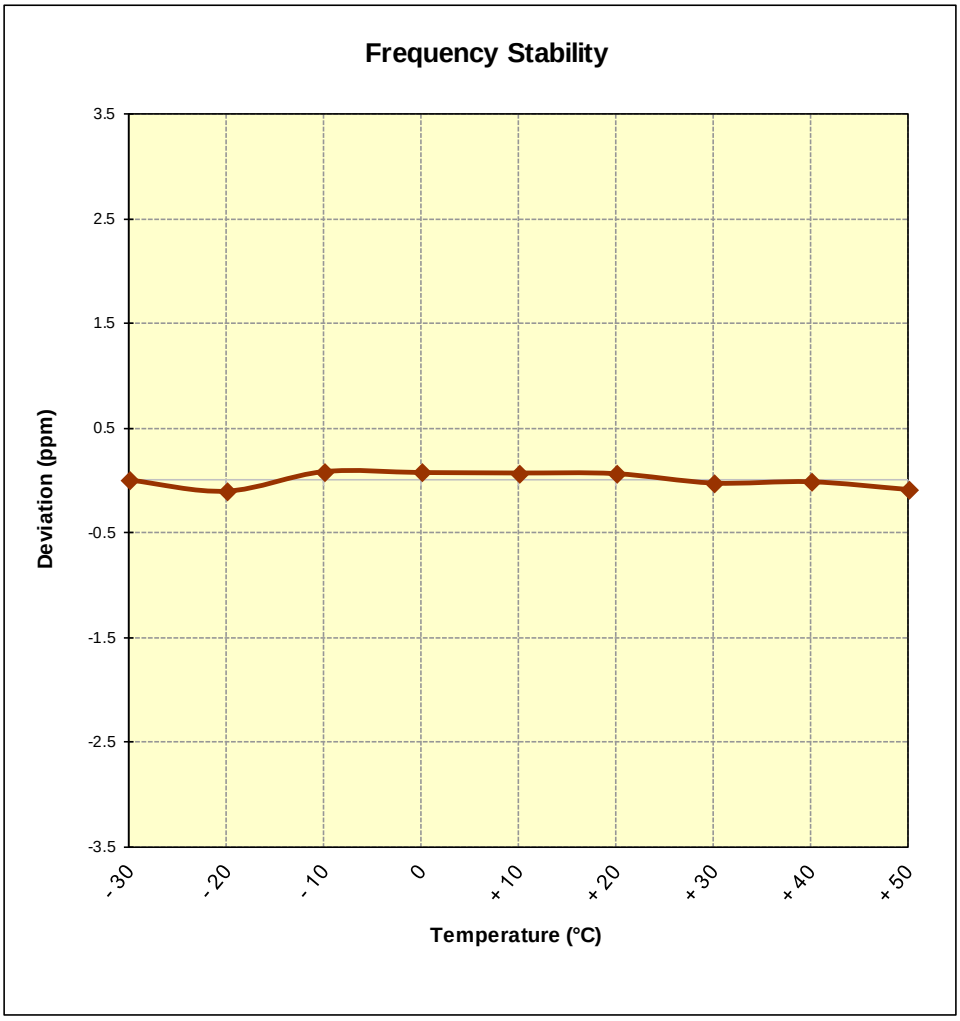


Figure 7-14. Frequency Stability Graph (Band 41)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFQ720QM** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.