7.5 Peak-Average Ratio

§24.232(d) RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)

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 v03 – 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.

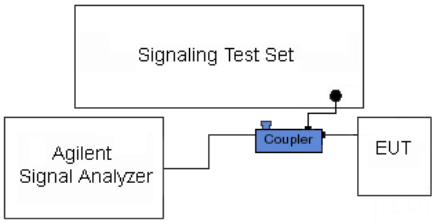

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

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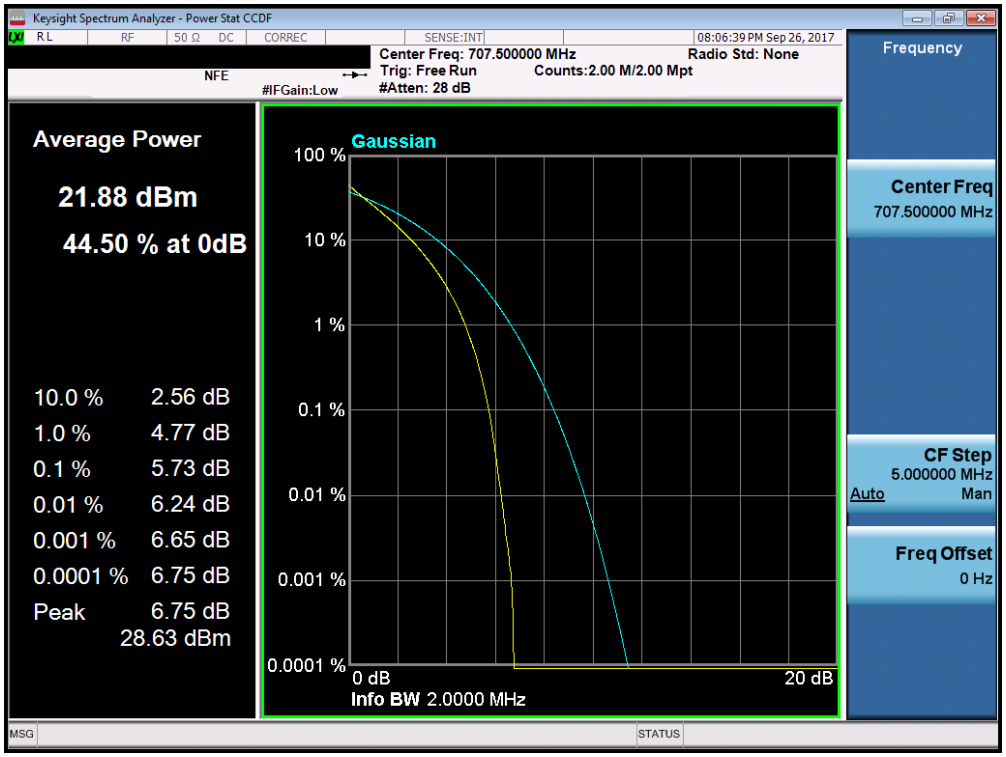
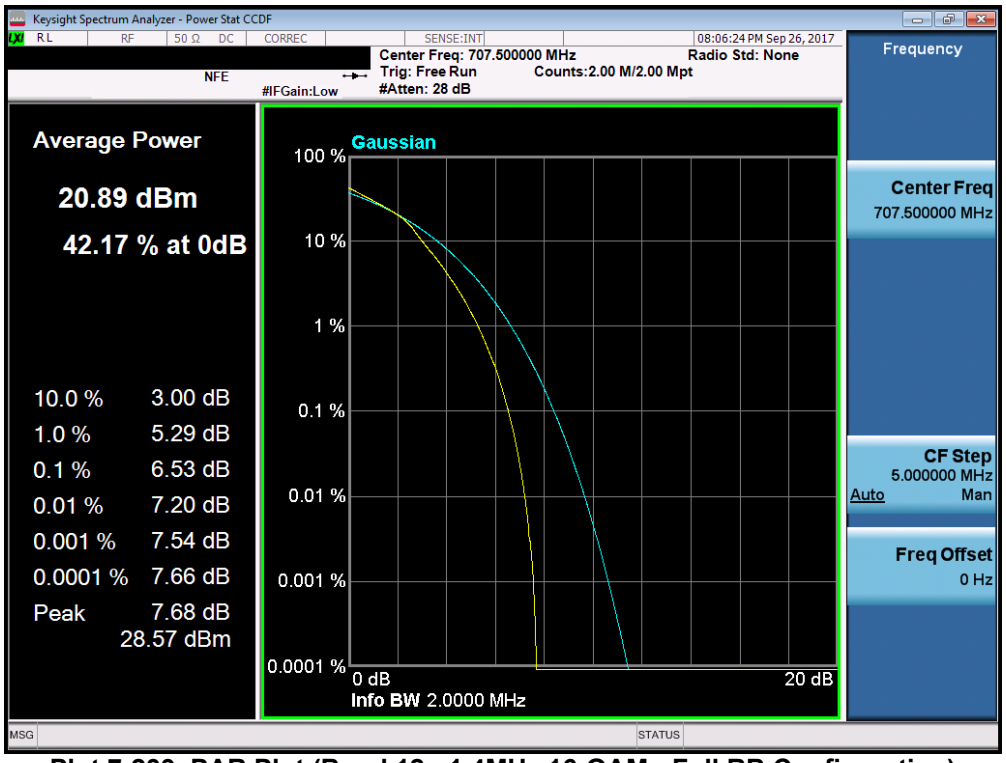


Plot 7-232. PAR Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-233. PAR Plot (Band 12 - 1.4MHz 16-QAM - Full RB Configuration)

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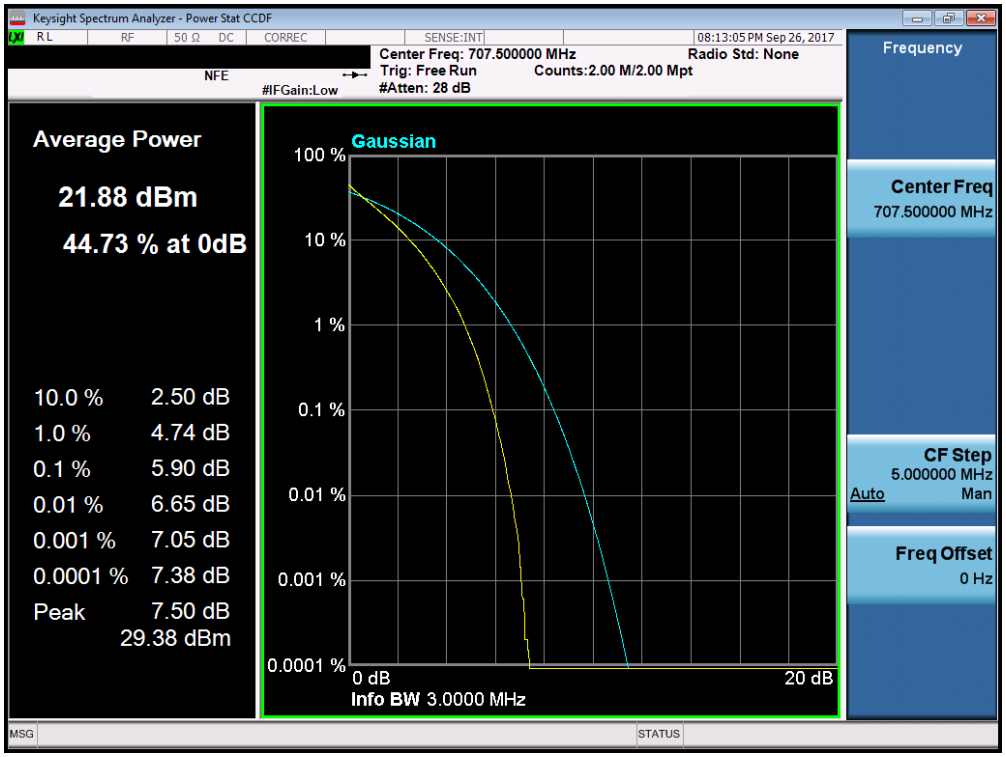
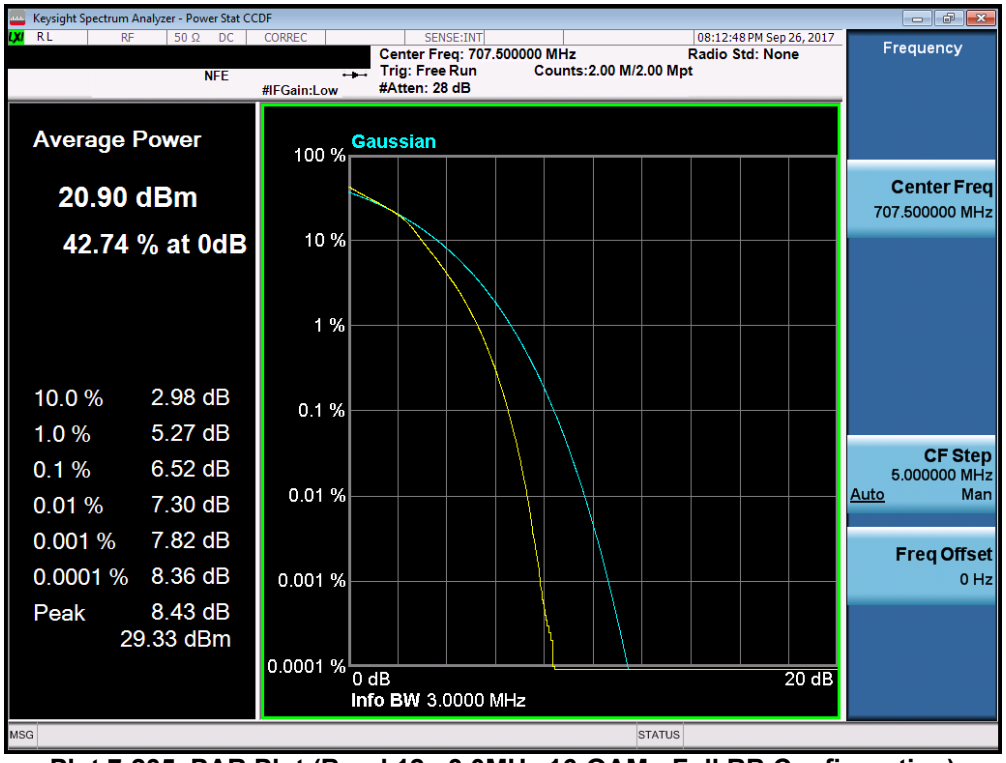
Band 12



Plot 7-234. PAR Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-235. PAR Plot (Band 12 - 3.0MHz 16-QAM - Full RB Configuration)

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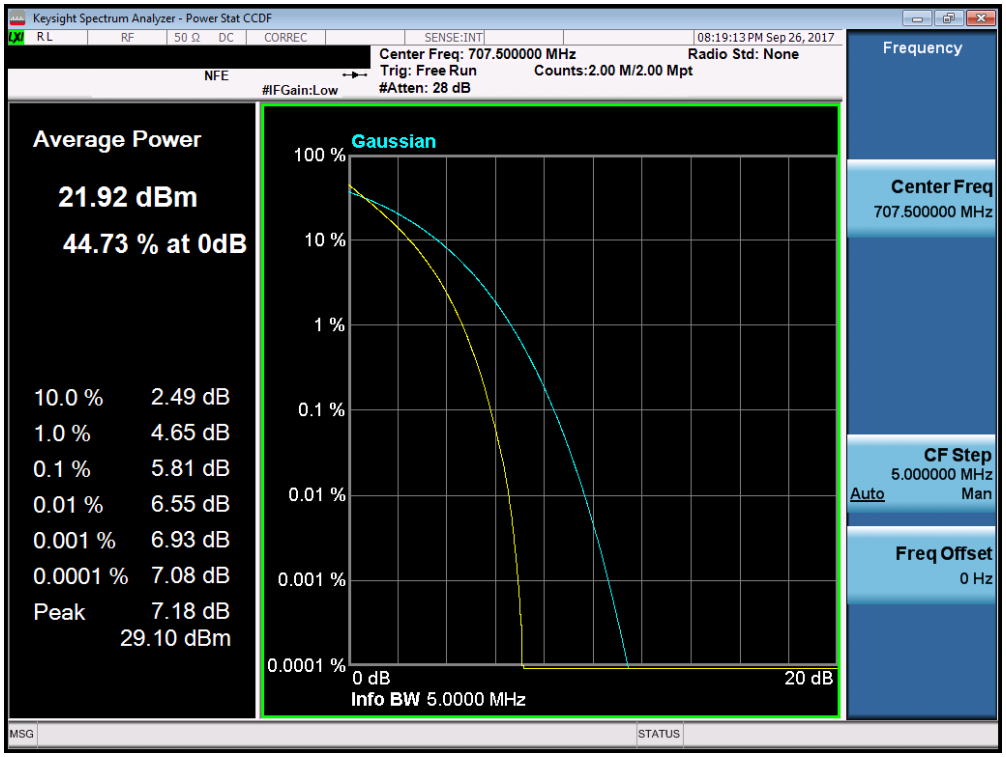
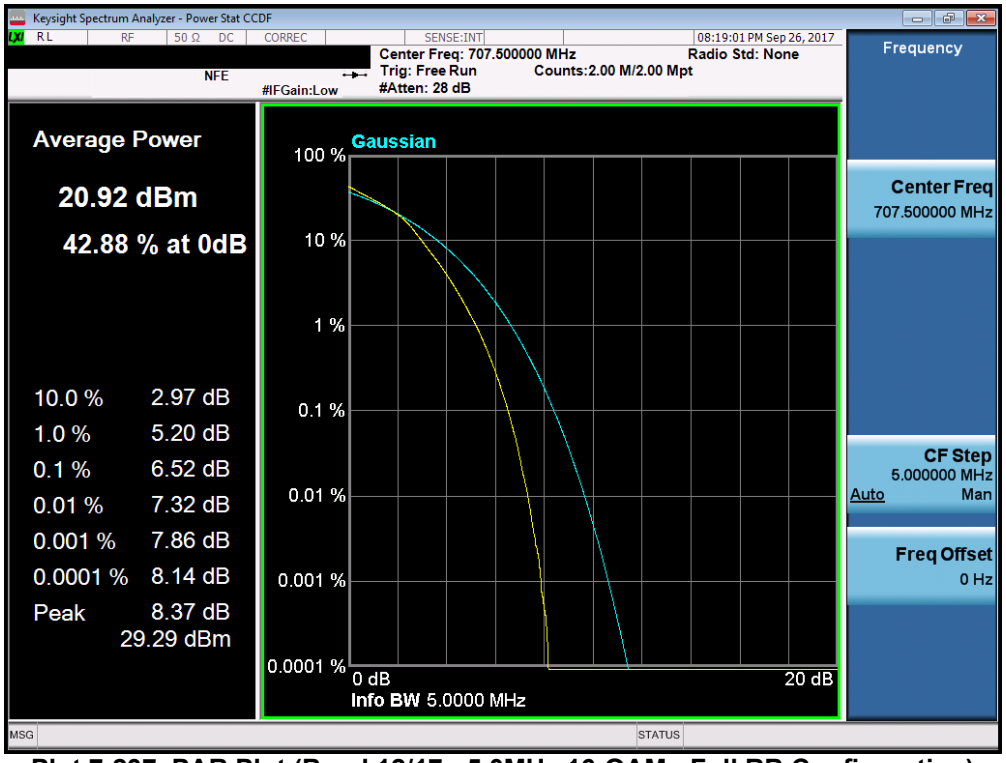


Plot 7-236. PAR Plot (Band 12/17 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-237. PAR Plot (Band 12/17 - 5.0MHz 16-QAM - Full RB Configuration)

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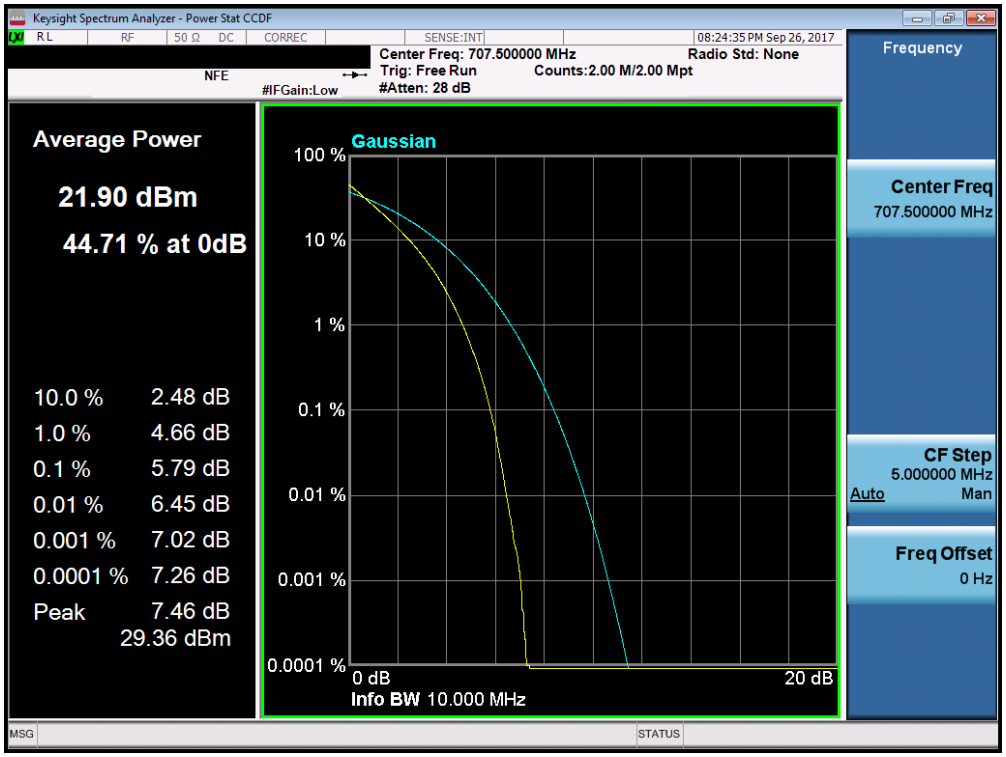
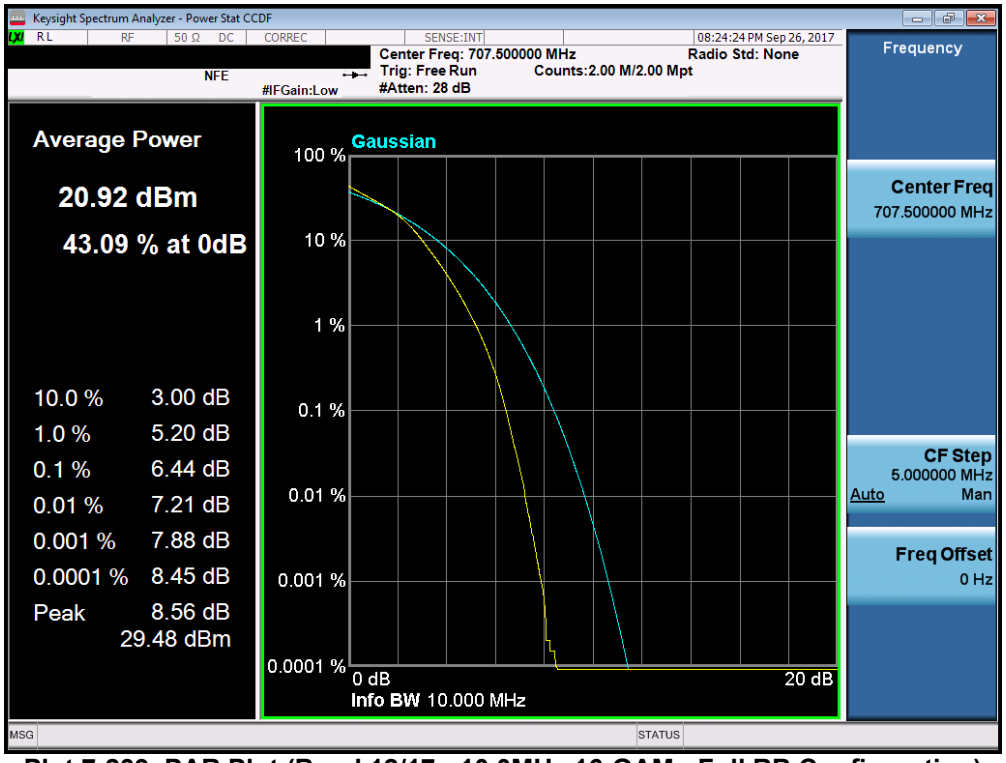
Band 12/17



Plot 7-238. PAR Plot (Band 12/17 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-239. PAR Plot (Band 12/17 - 10.0MHz 16-QAM - Full RB Configuration)

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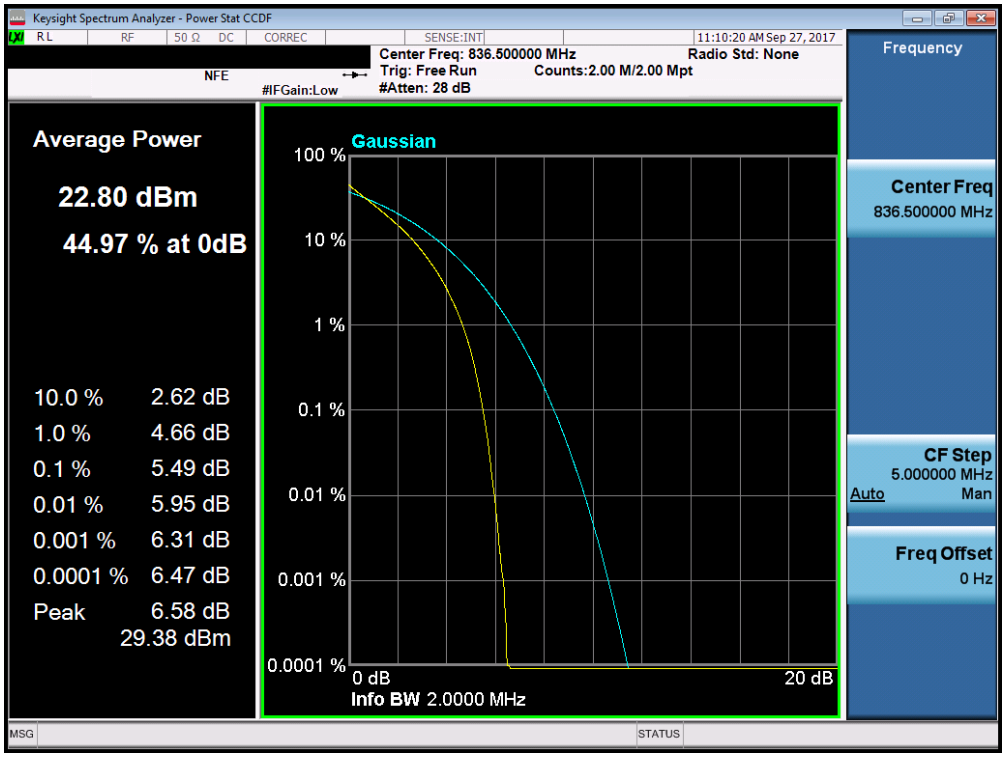
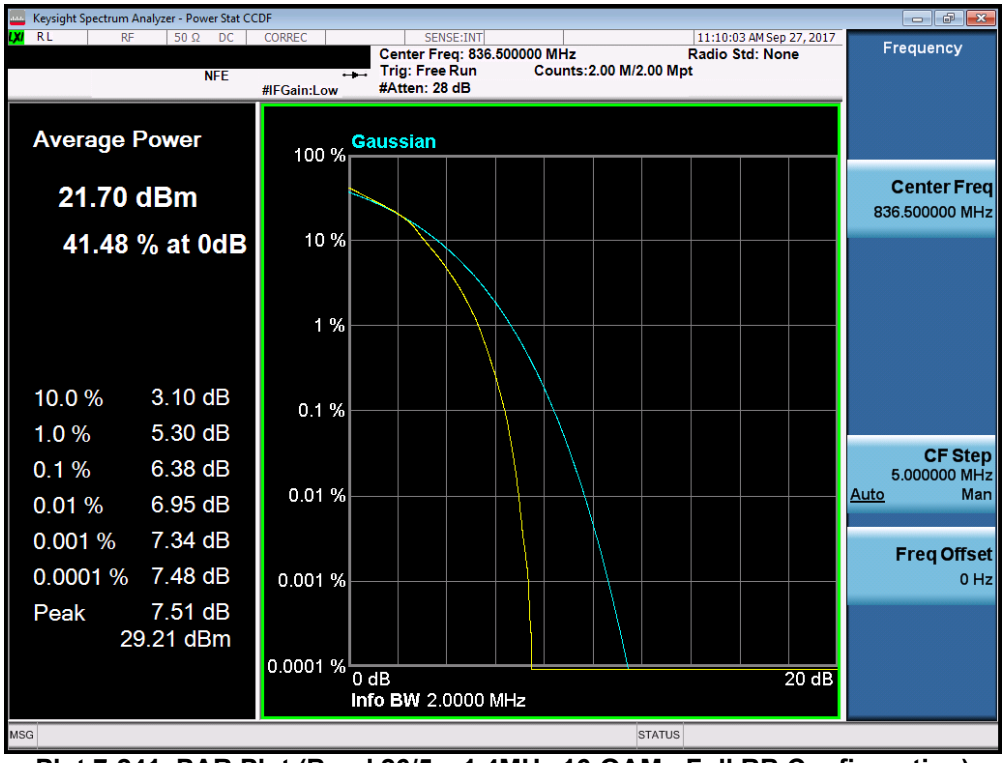
Band 26/5



Plot 7-240. PAR Plot (Band 26/5 – 1.4MHz QPSK - Full RB Configuration)



Plot 7-241. PAR Plot (Band 26/5 – 1.4MHz 16-QAM - Full RB Configuration)

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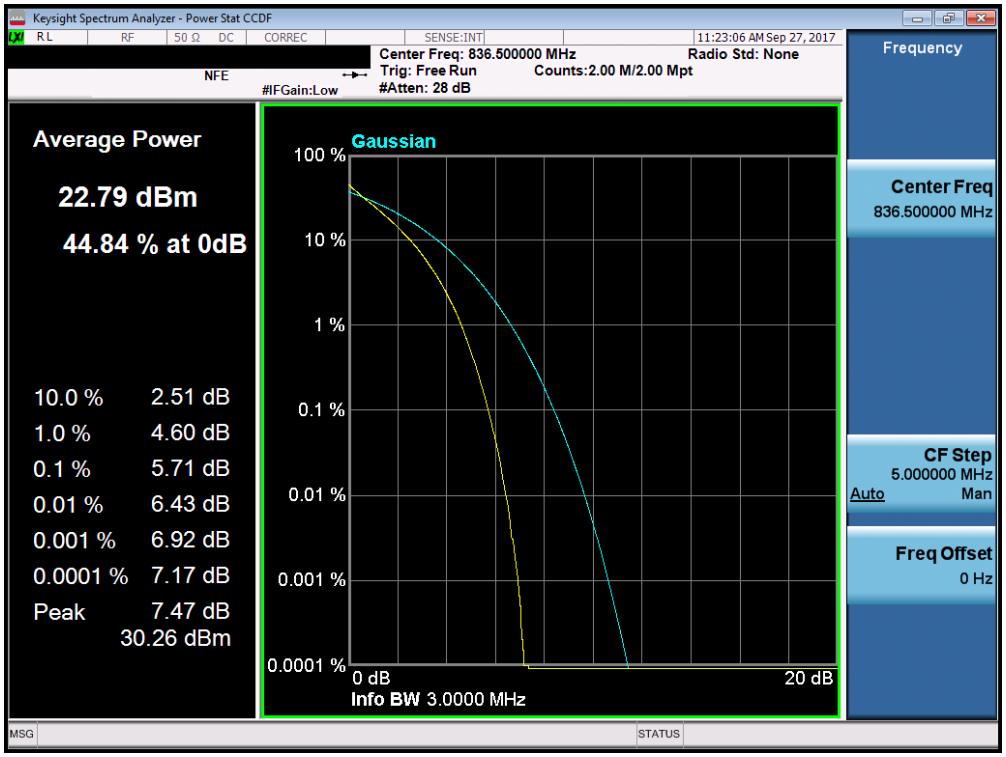
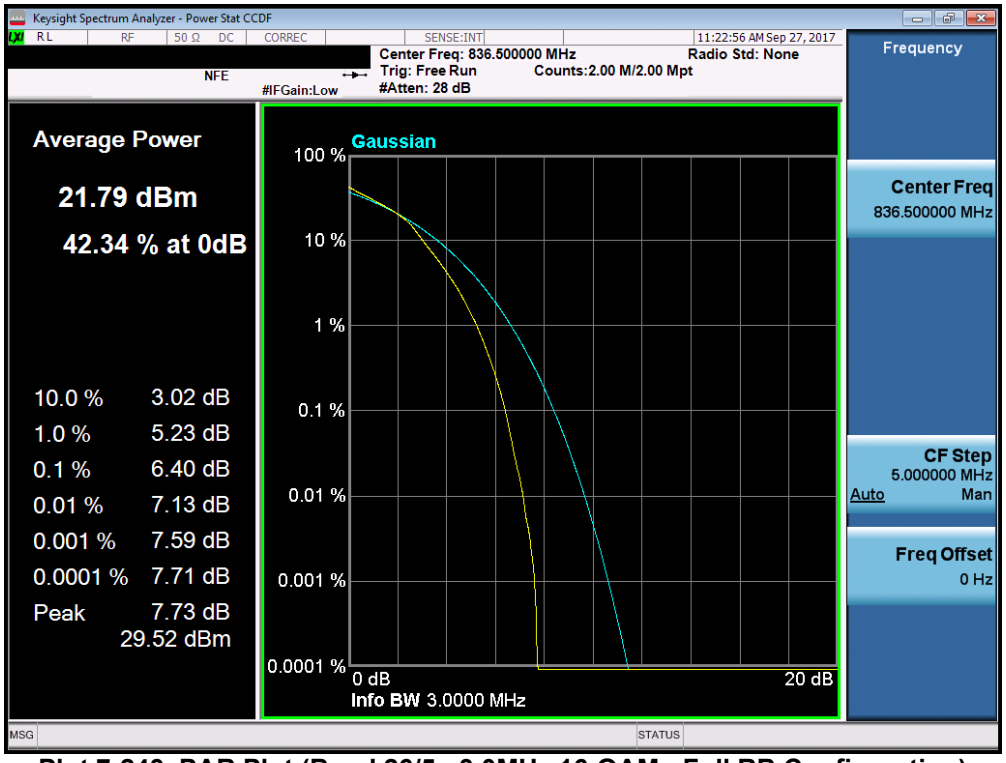
Band 26/5



Plot 7-242. PAR Plot (Band 26/5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-243. PAR Plot (Band 26/5 - 3.0MHz 16-QAM - Full RB Configuration)

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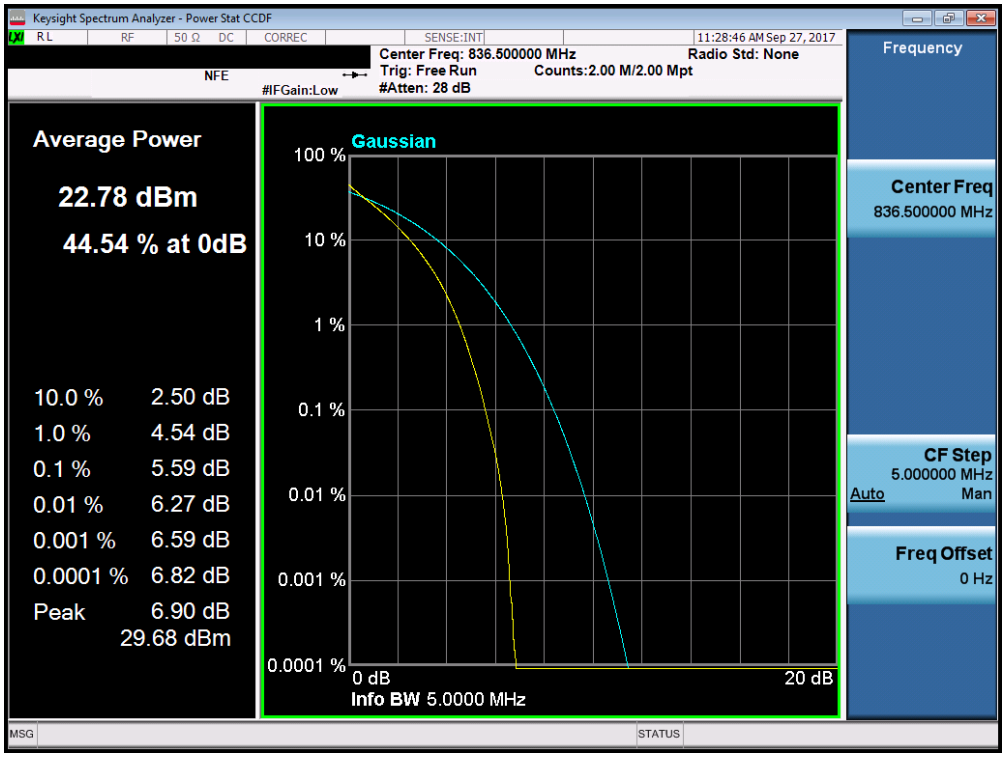
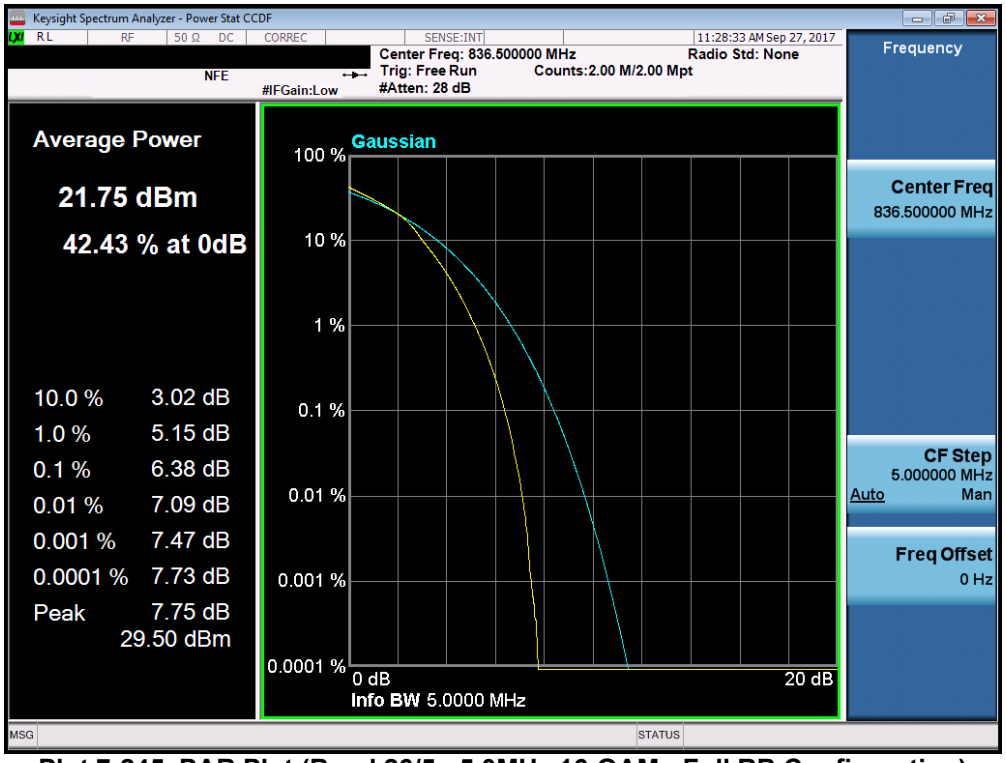
Band 26/5



Plot 7-244. PAR Plot (Band 26/5 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-245. PAR Plot (Band 26/5 - 5.0MHz 16-QAM - Full RB Configuration)

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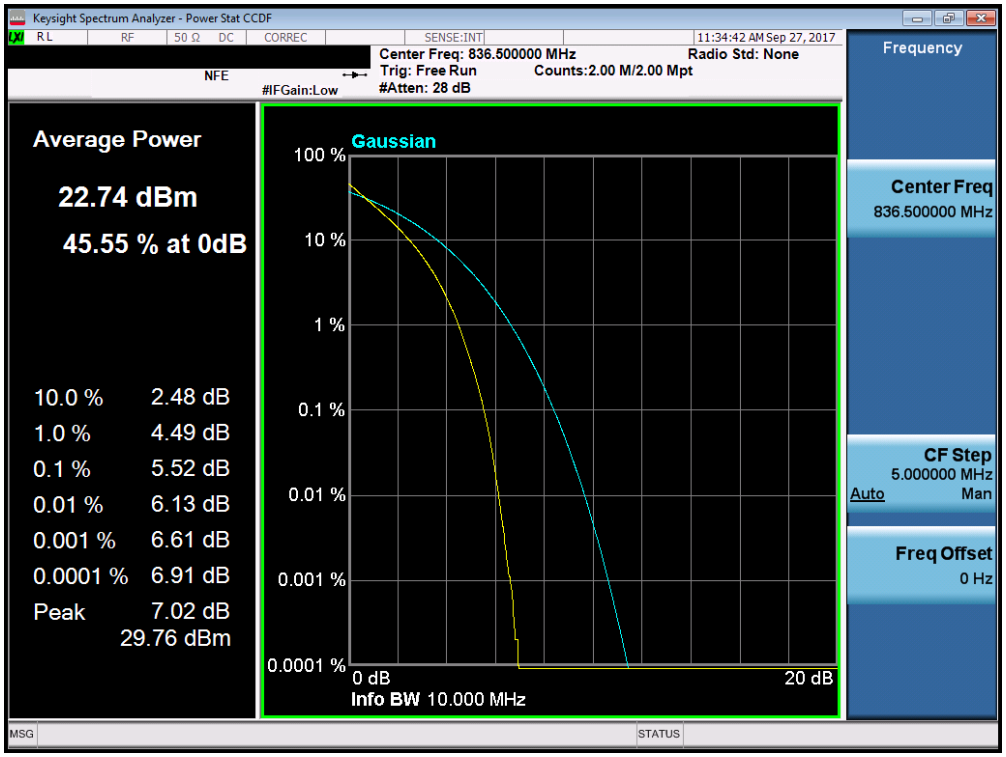
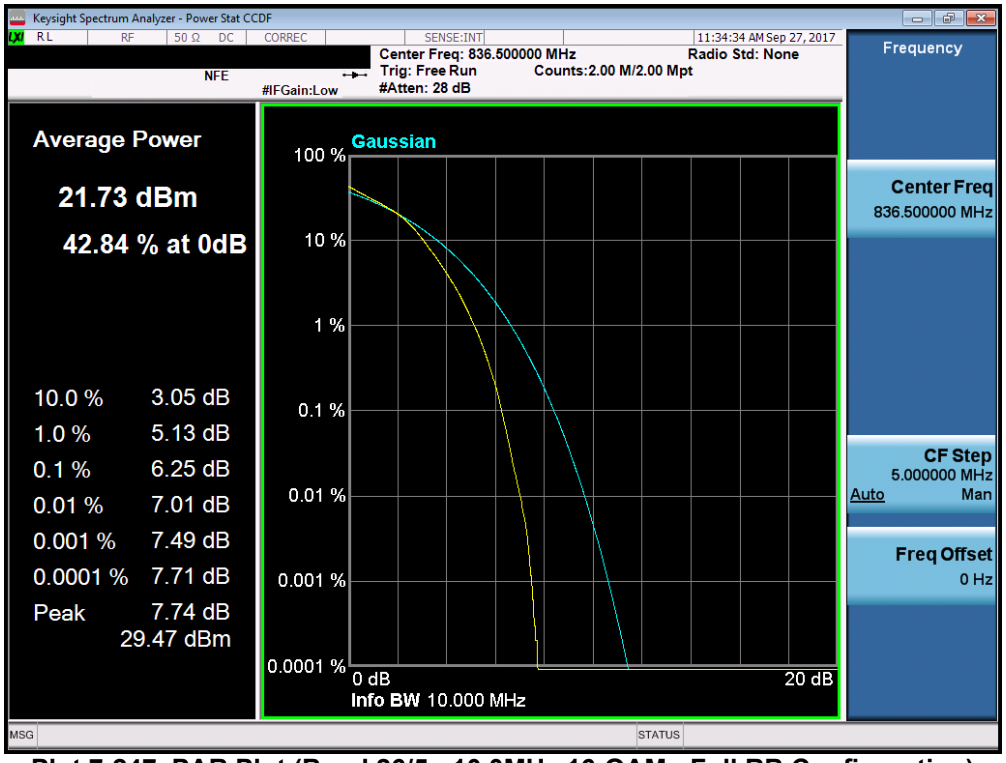
Band 26/5



Plot 7-246. PAR Plot (Band 26/5 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-247. PAR Plot (Band 26/5 - 10.0MHz 16-QAM - Full RB Configuration)

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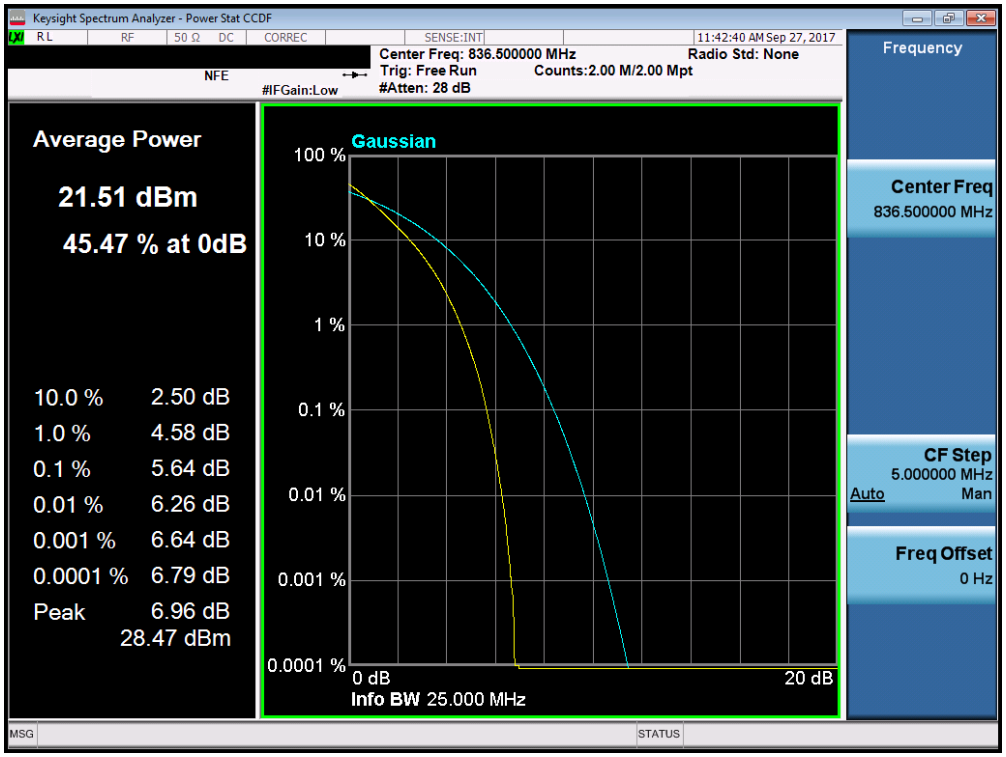
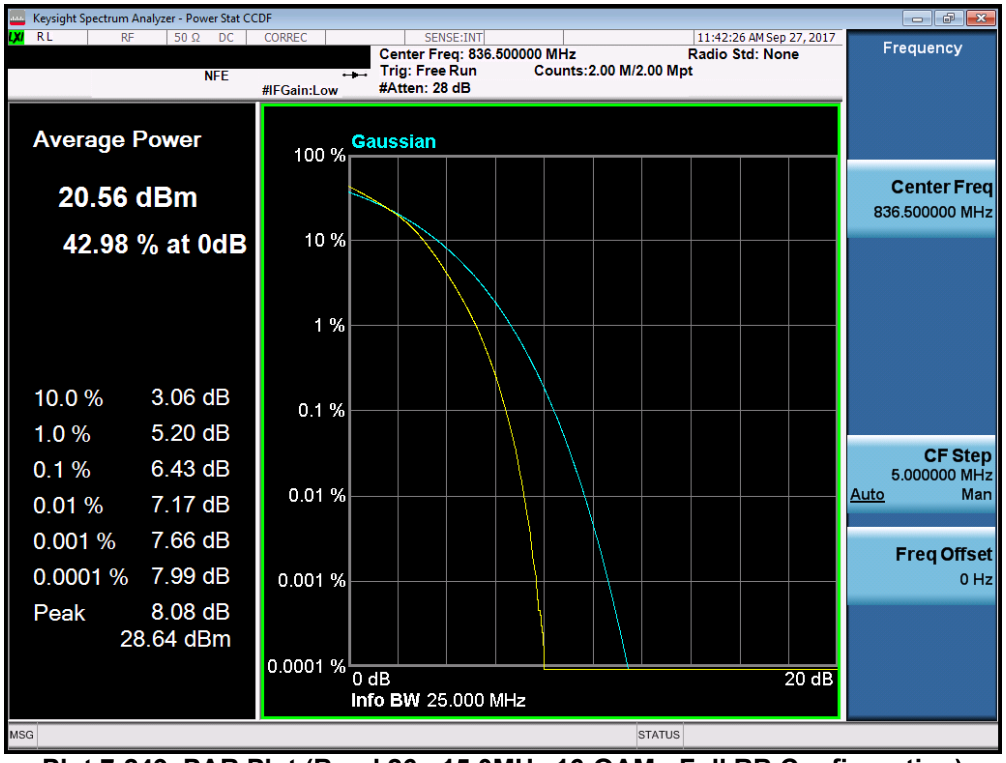
Band 26



Plot 7-248. PAR Plot (Band 26 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-249. PAR Plot (Band 26 - 15.0MHz 16-QAM - Full RB Configuration)

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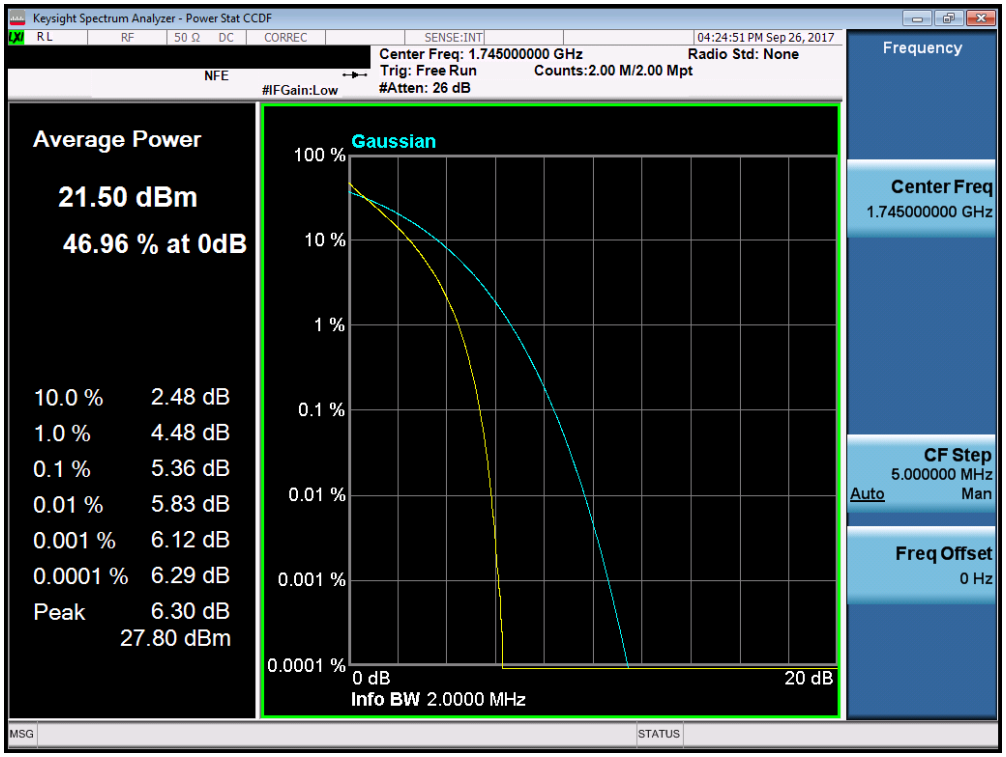
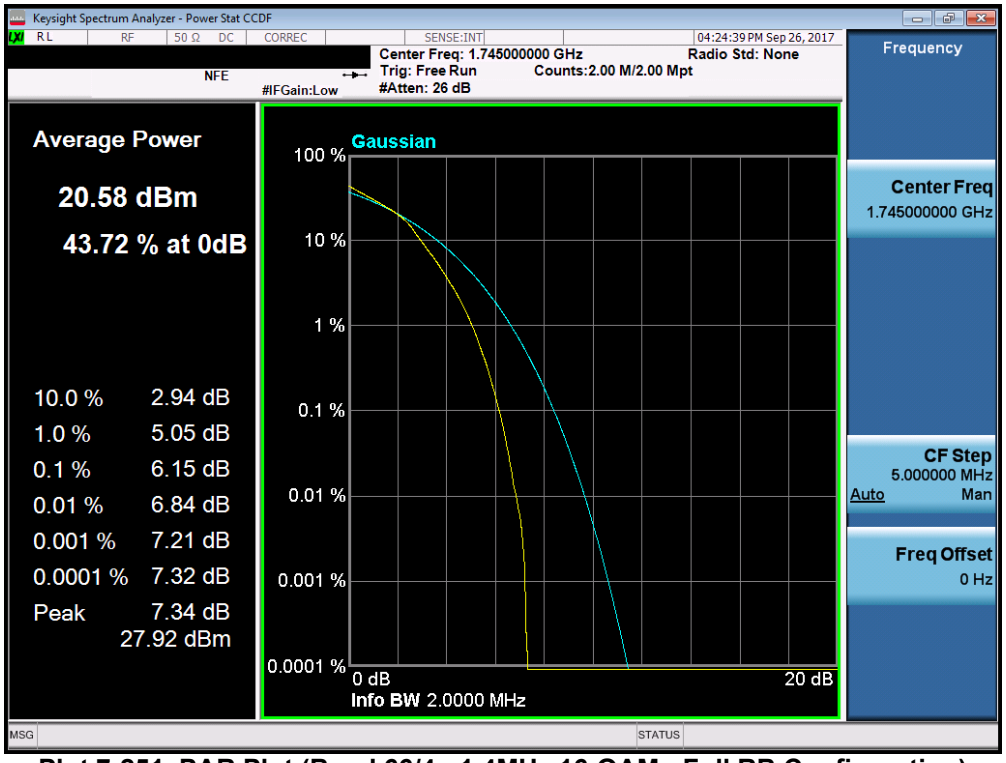
Band 66/4



Plot 7-250. PAR Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-251. PAR Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)

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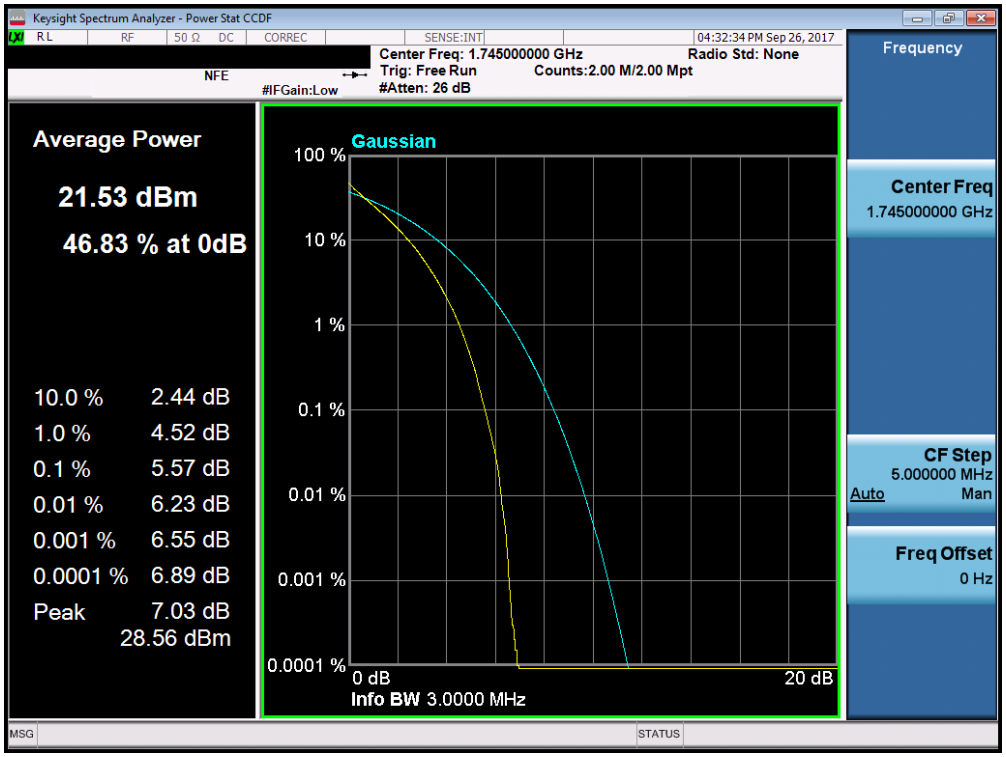
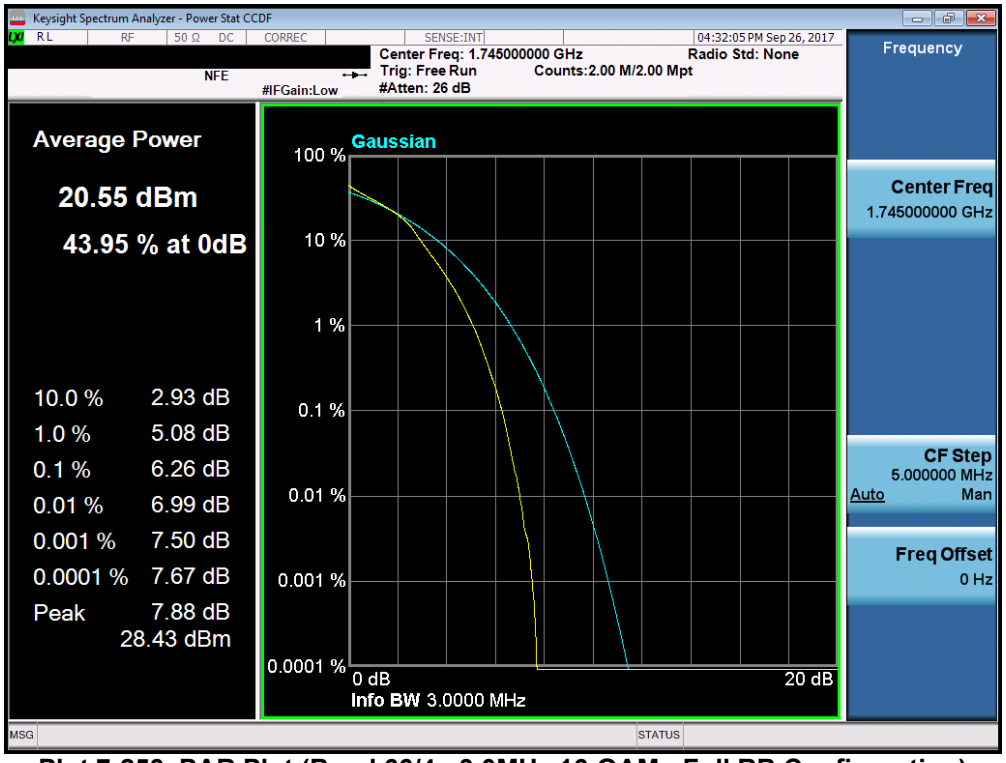
Band 66/4



Plot 7-252. PAR Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-253. PAR Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)

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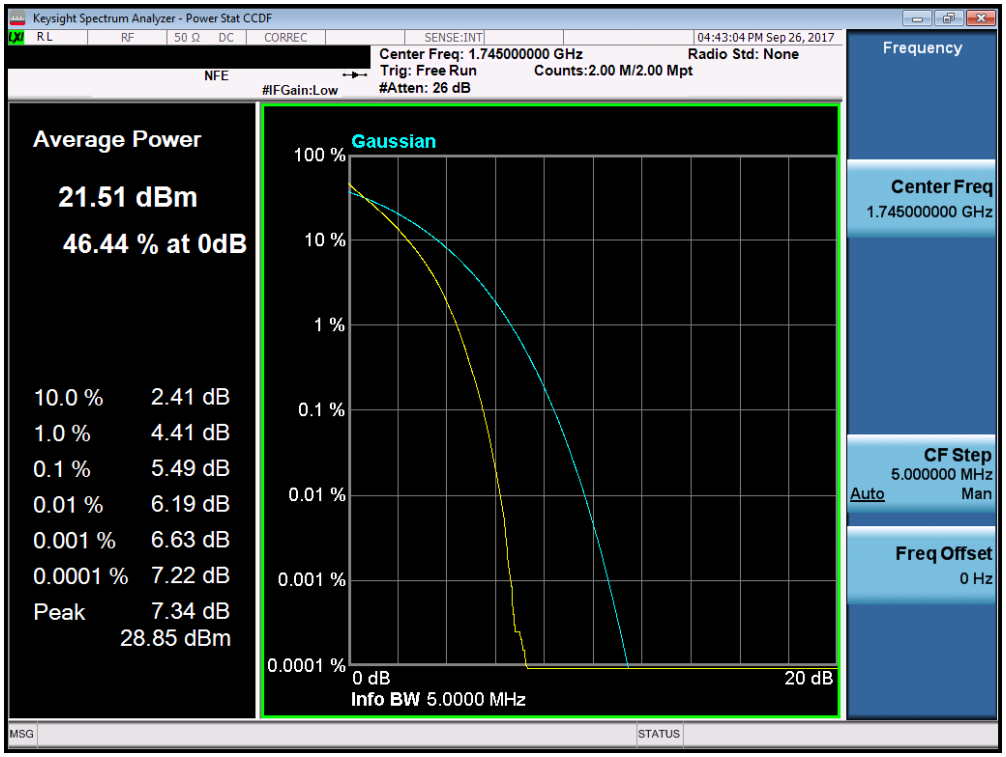
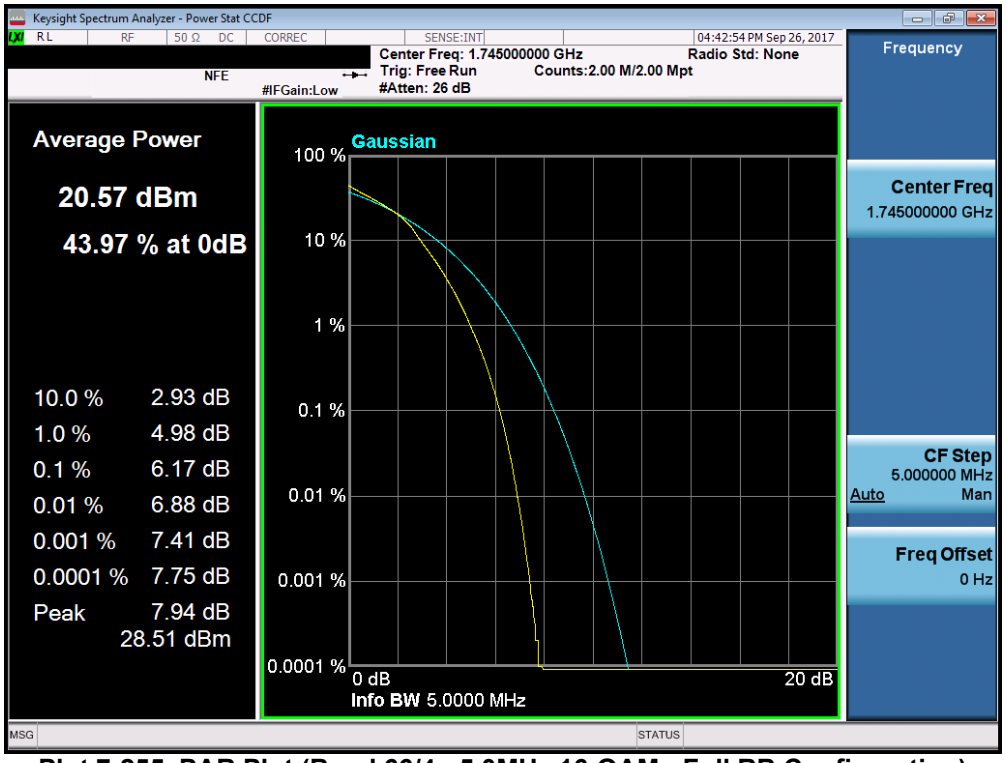
Band 66/4



Plot 7-254. PAR Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-255. PAR Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)

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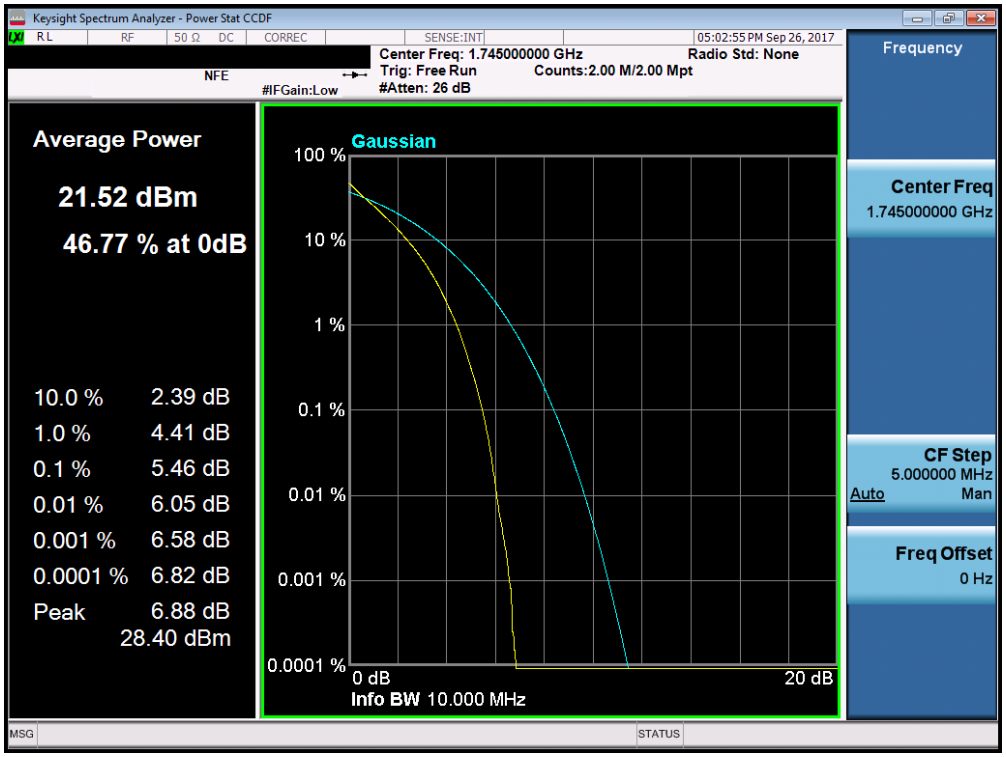
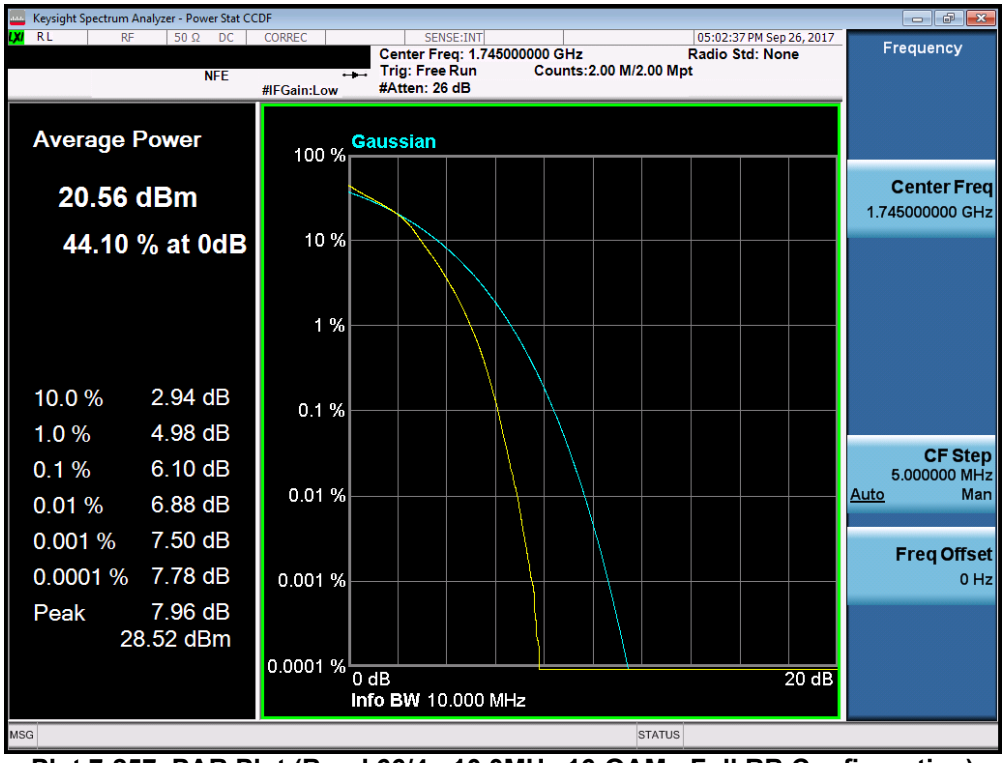
Band 66/4



Plot 7-256. PAR Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-257. PAR Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)

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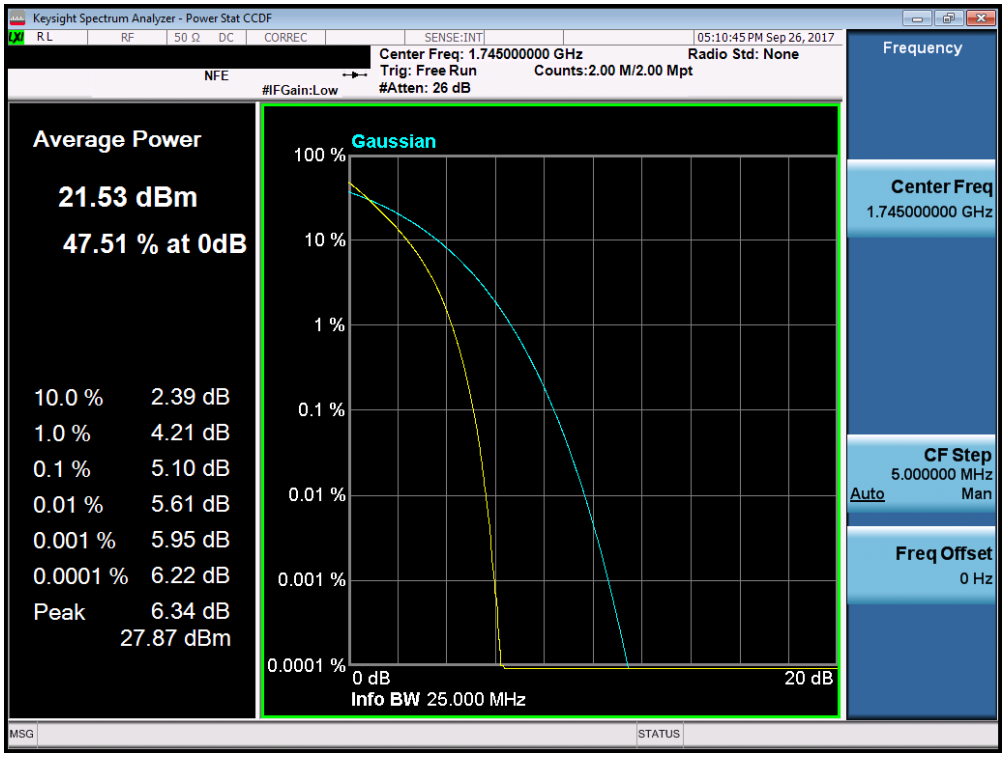
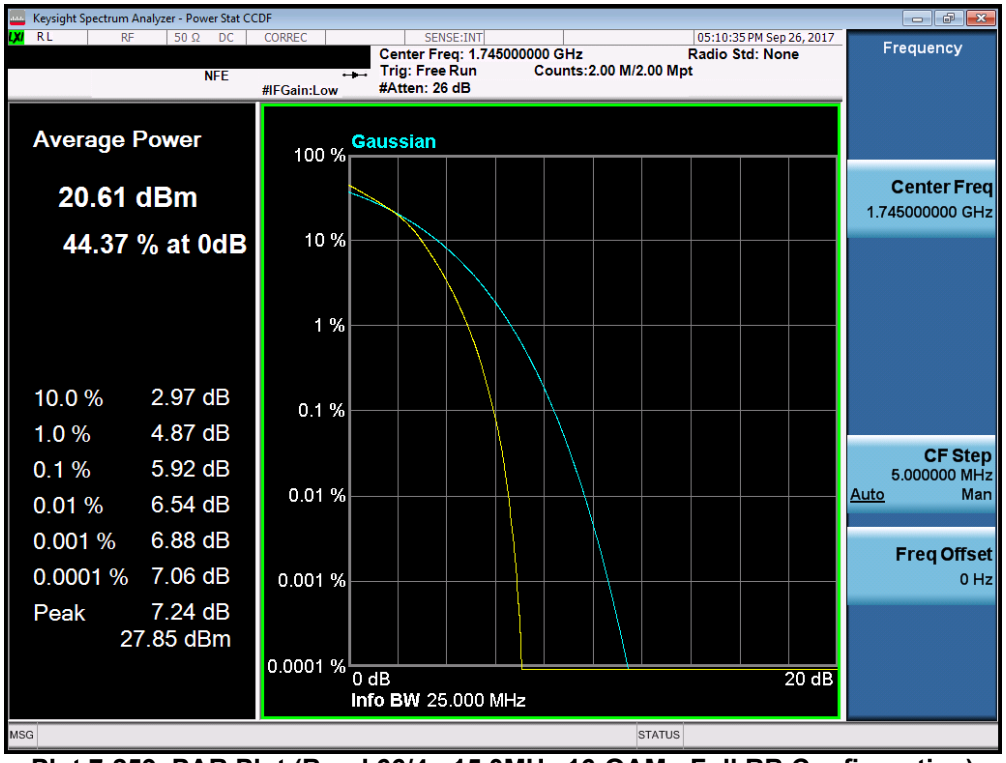
Band 66/4



Plot 7-258. PAR Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-259. PAR Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)

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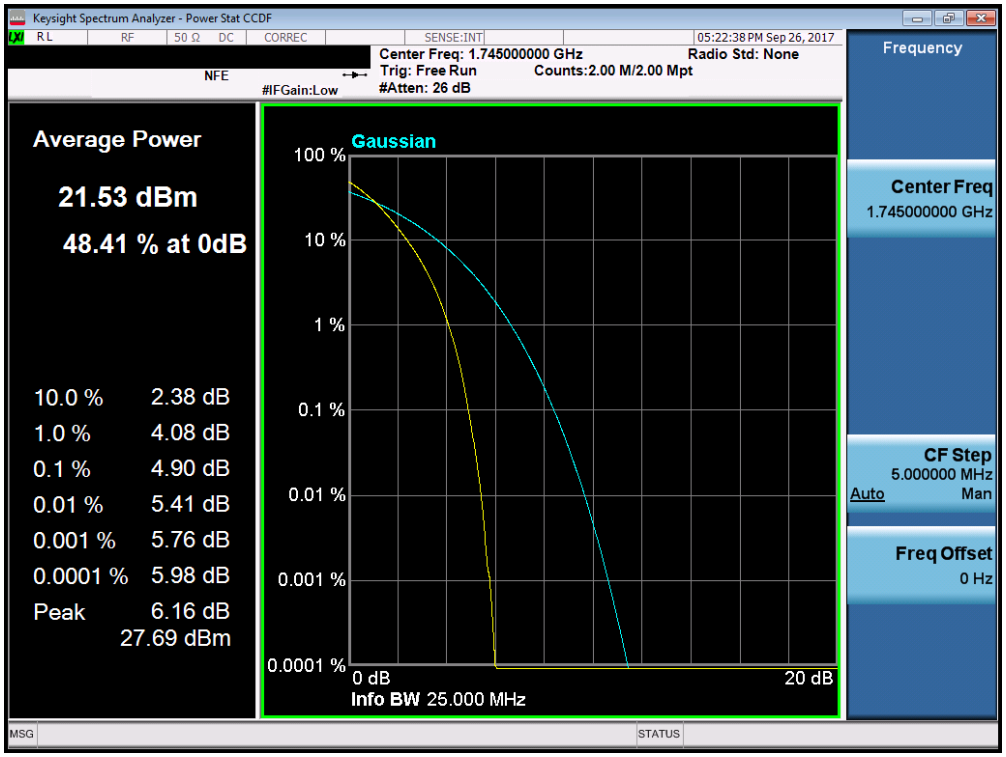
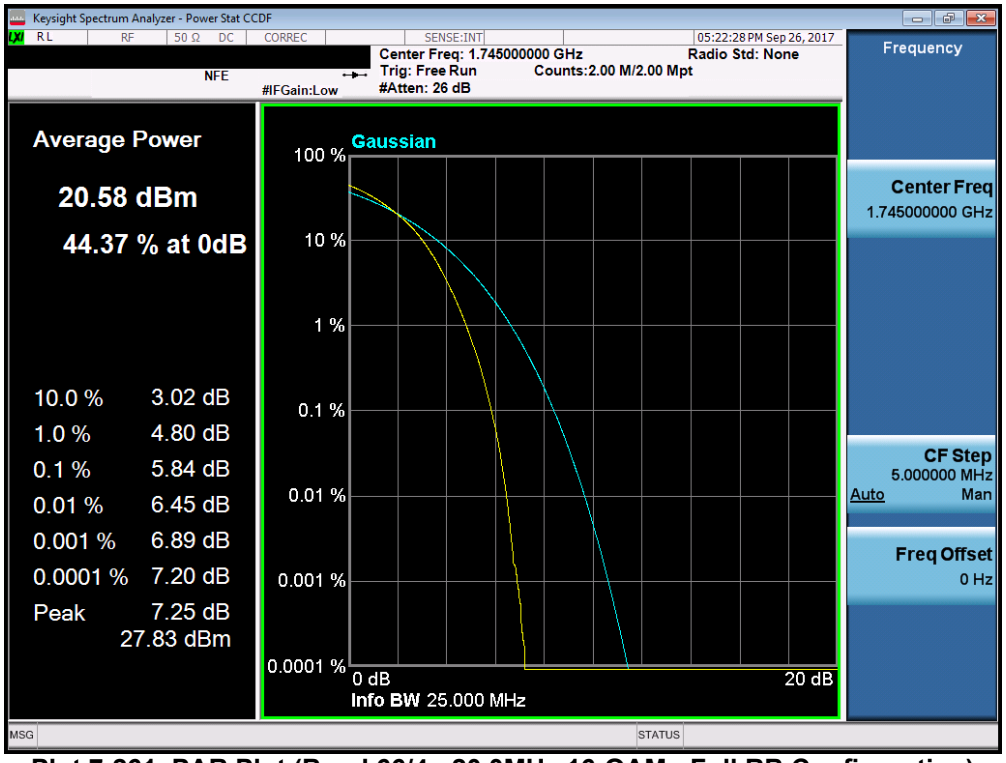
Band 66/4



Plot 7-260. PAR Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-261. PAR Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)

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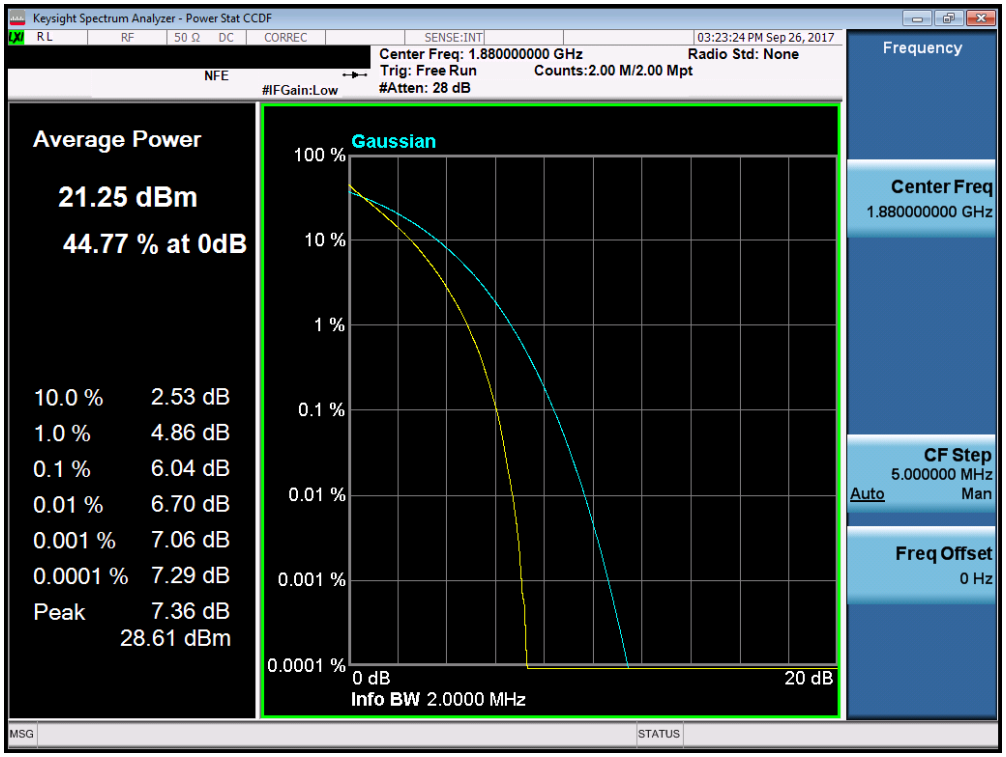
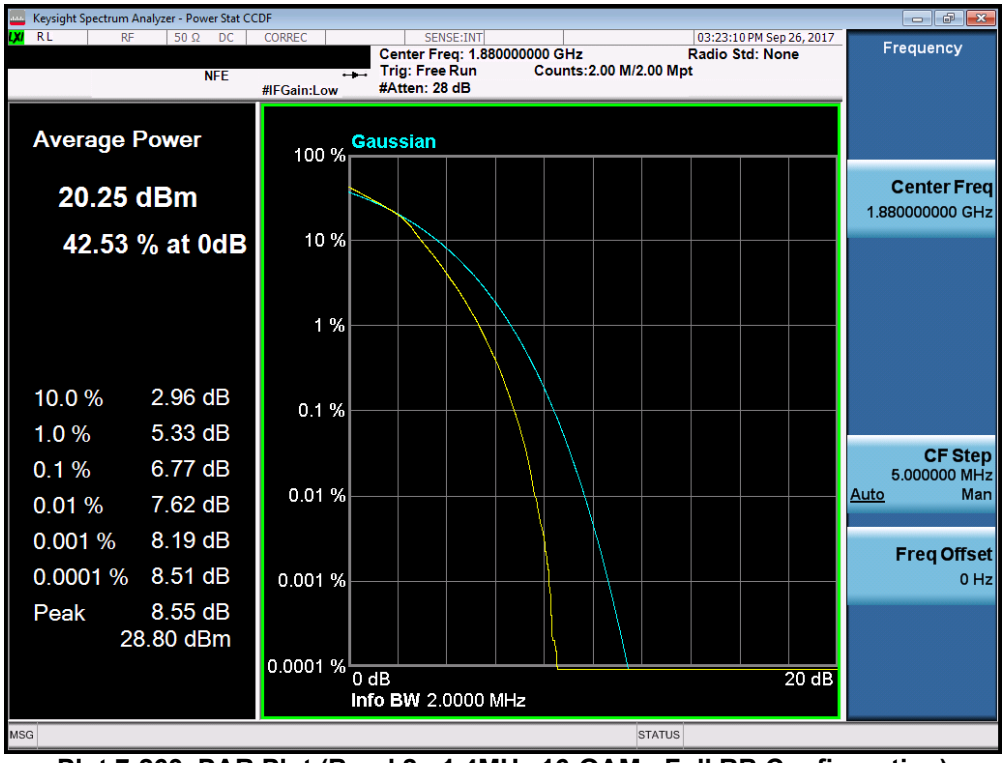
Band 2



Plot 7-262. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-263. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

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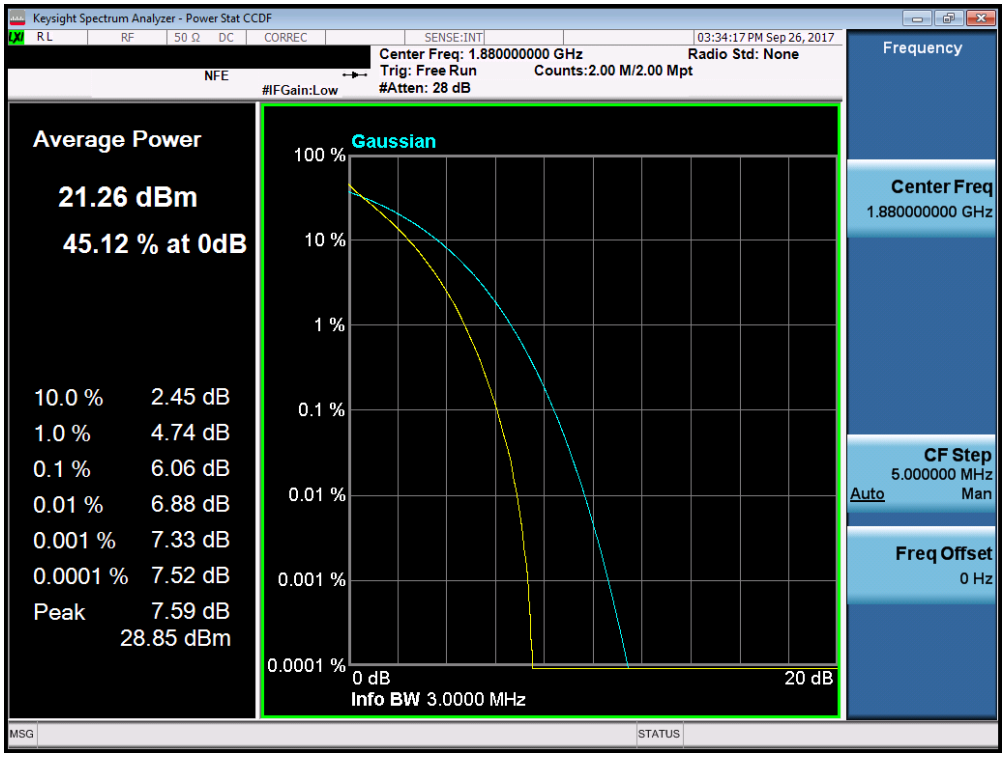
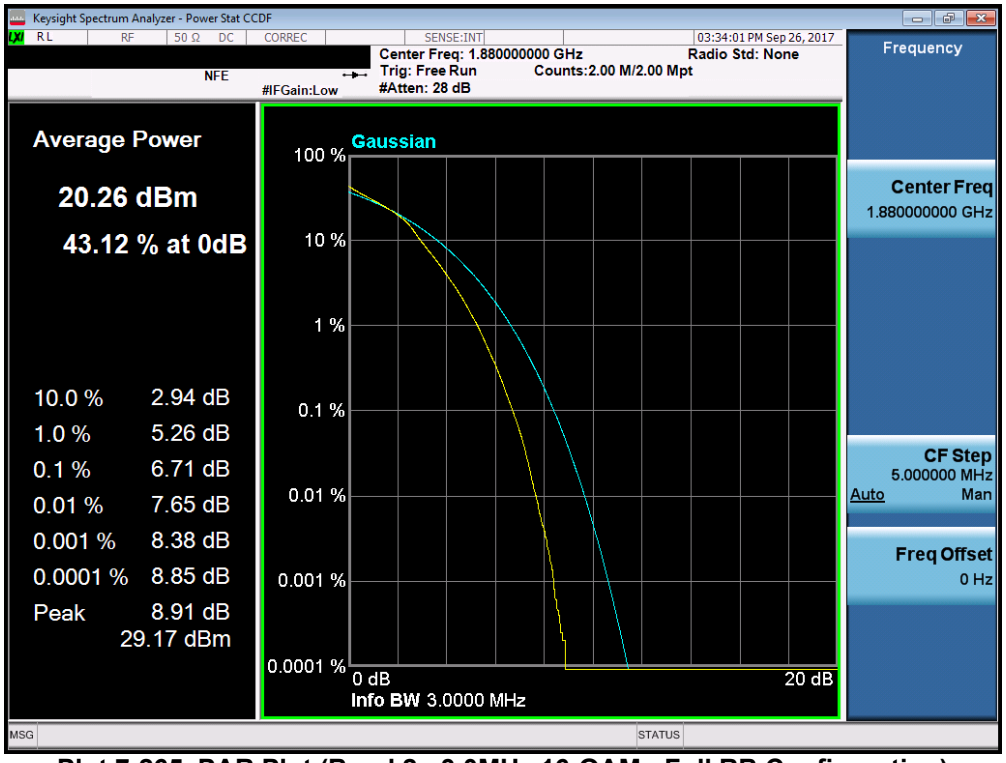
Band 2



Plot 7-264. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-265. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

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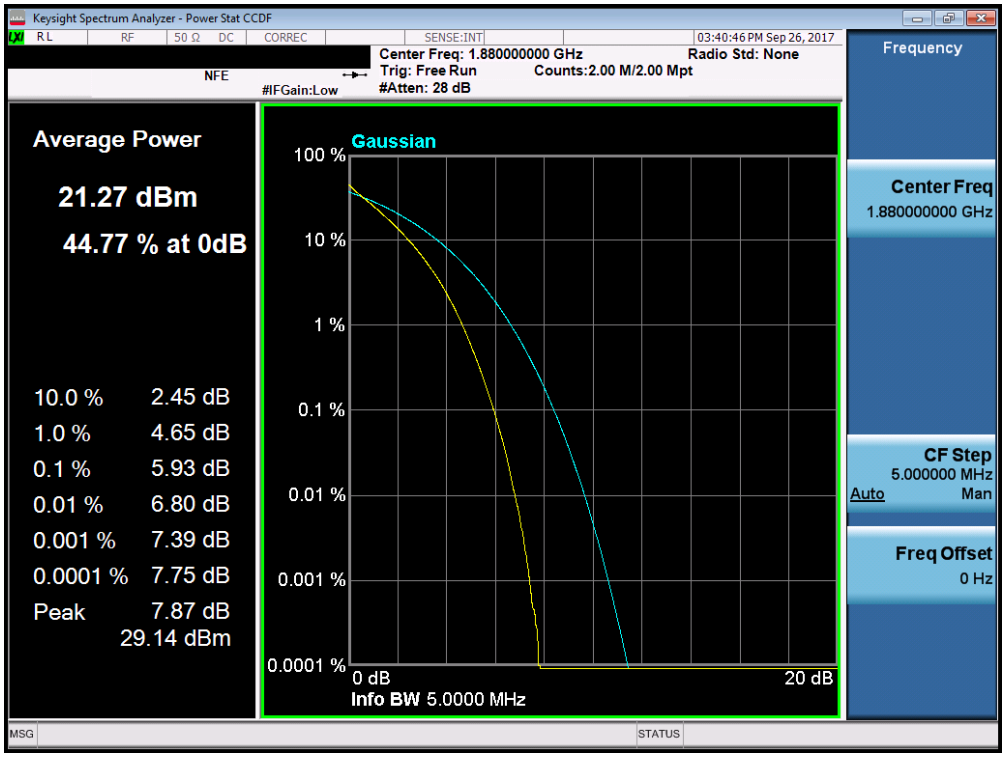
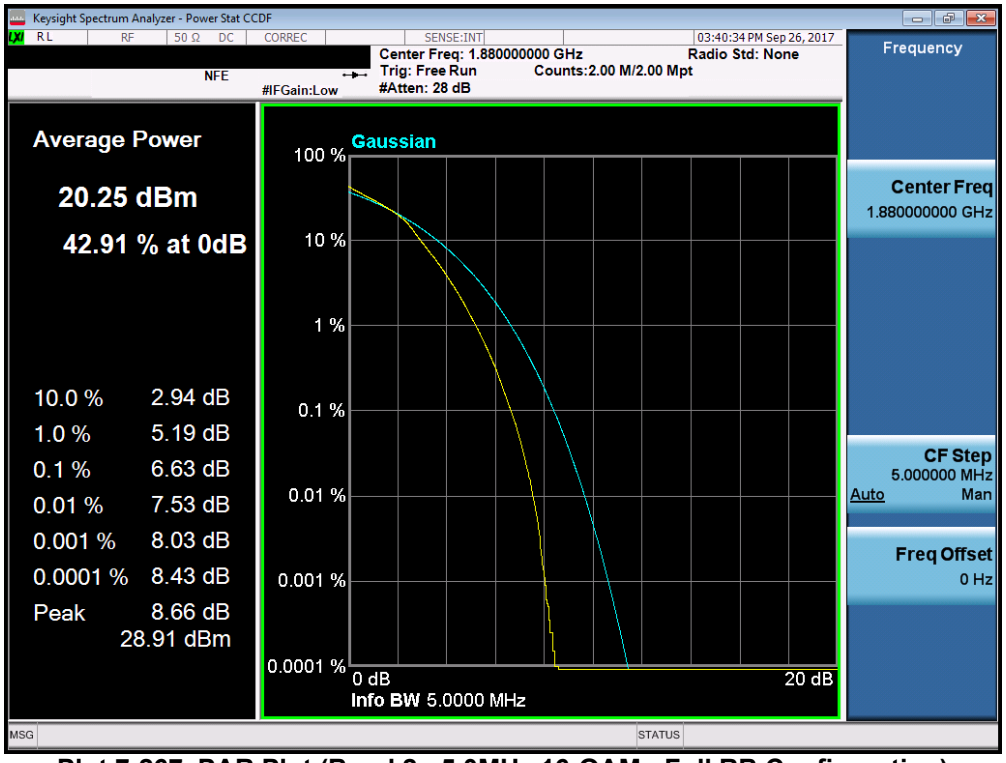
Band 2



Plot 7-266. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-267. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

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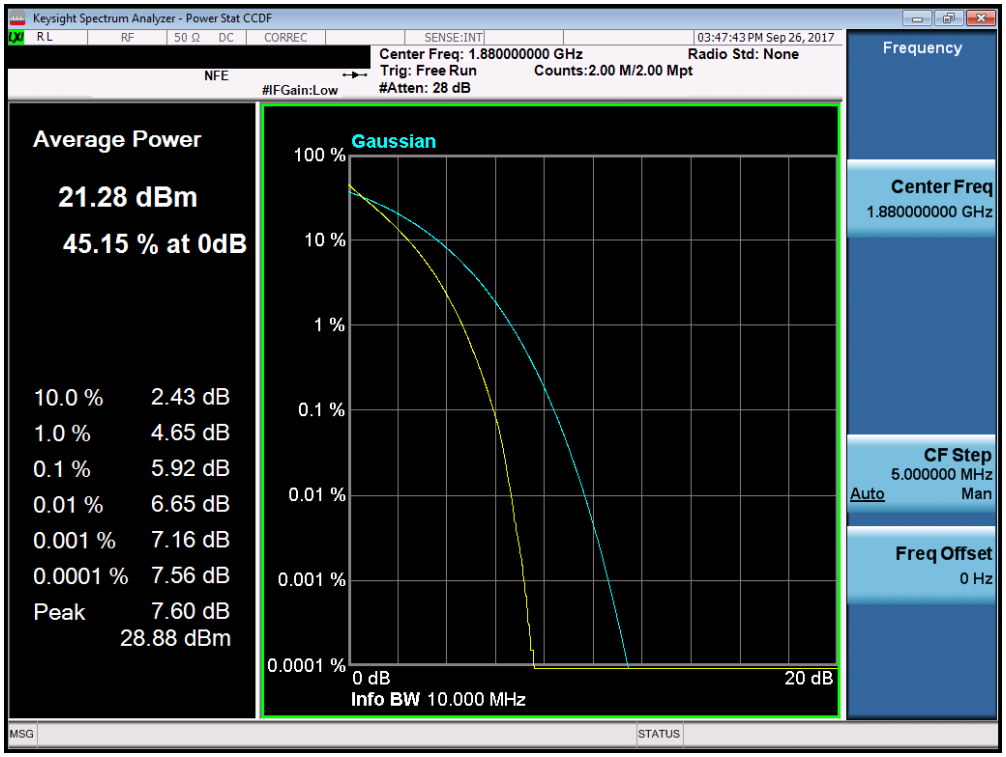
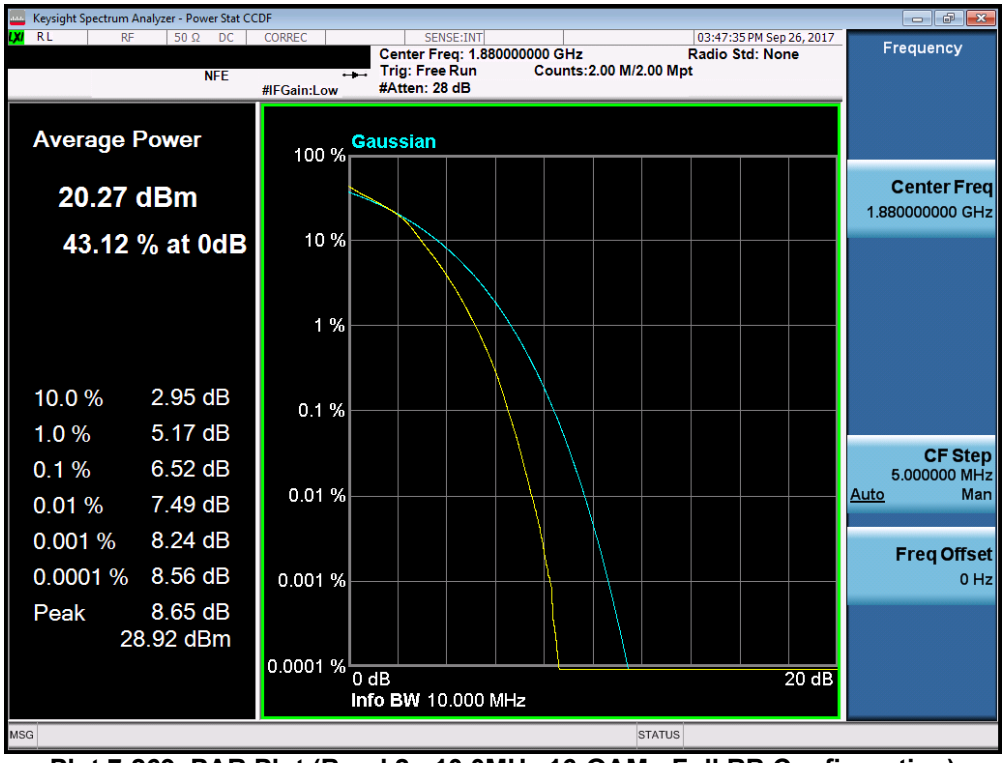
Band 2



Plot 7-268. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-269. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

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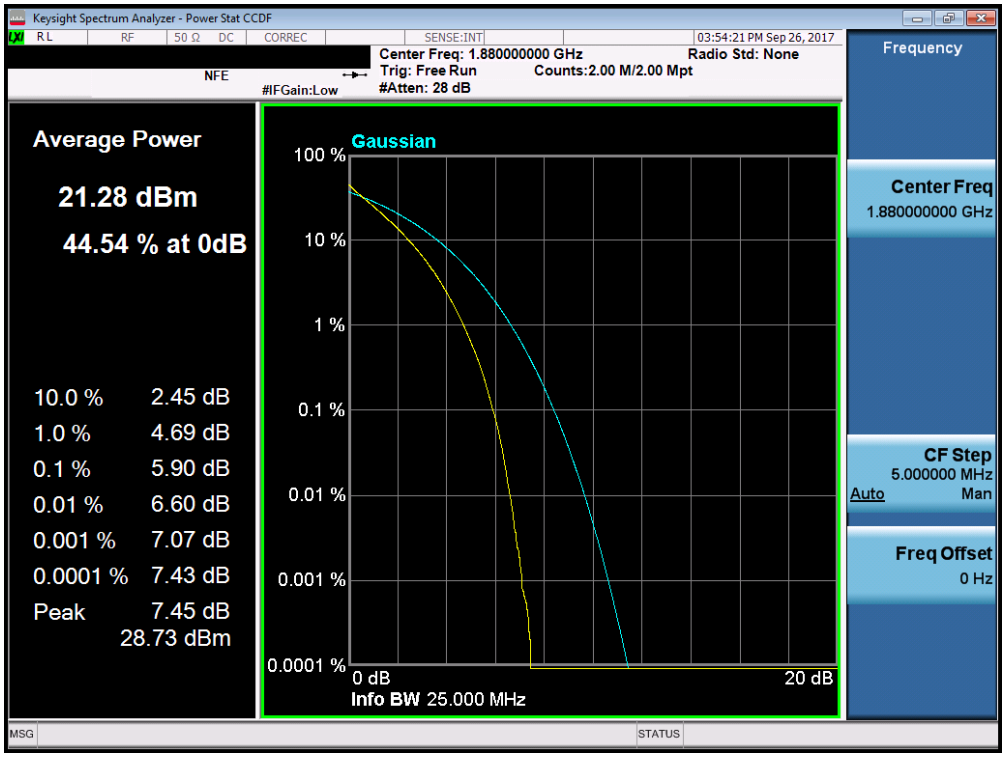
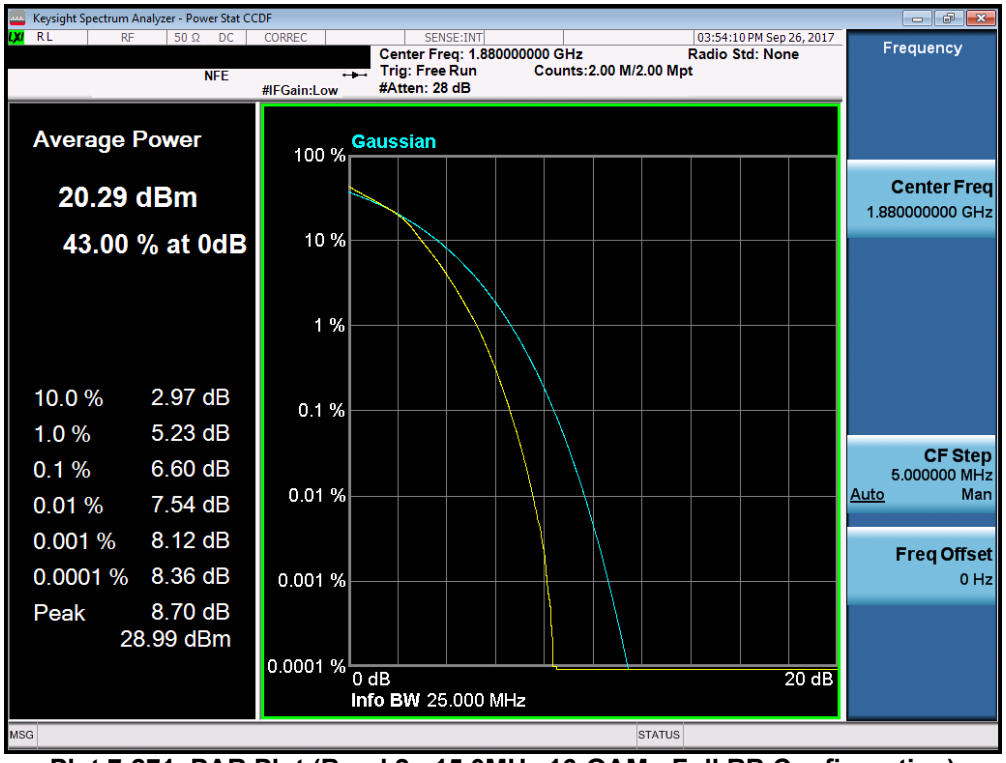
Band 2



Plot 7-270. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-271. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

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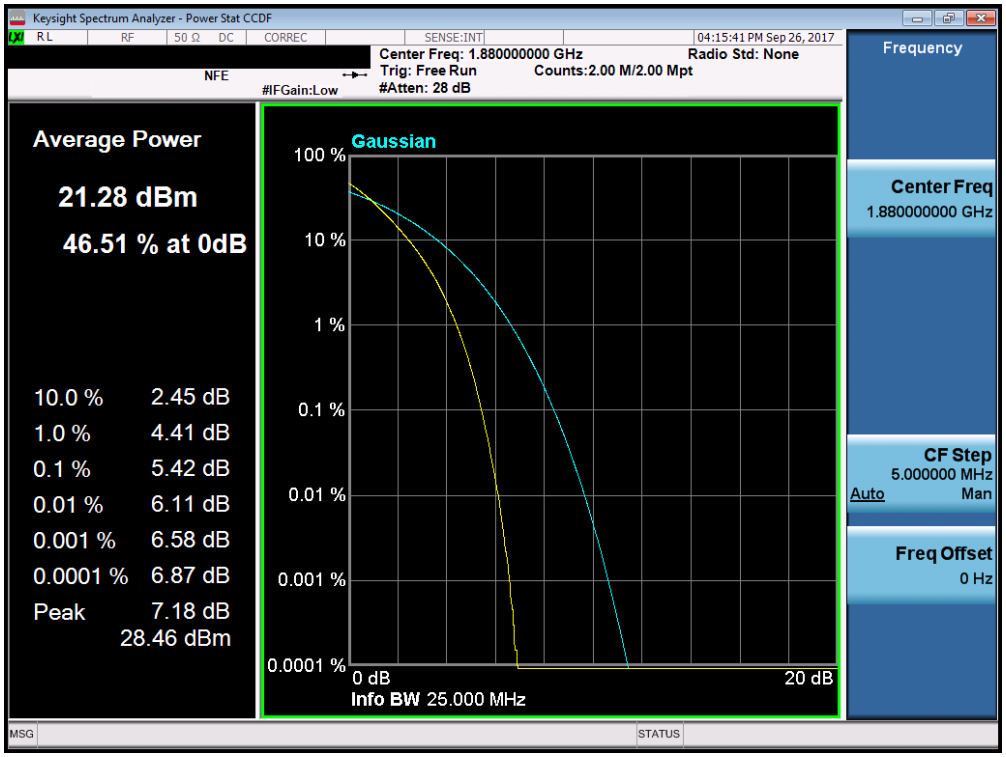
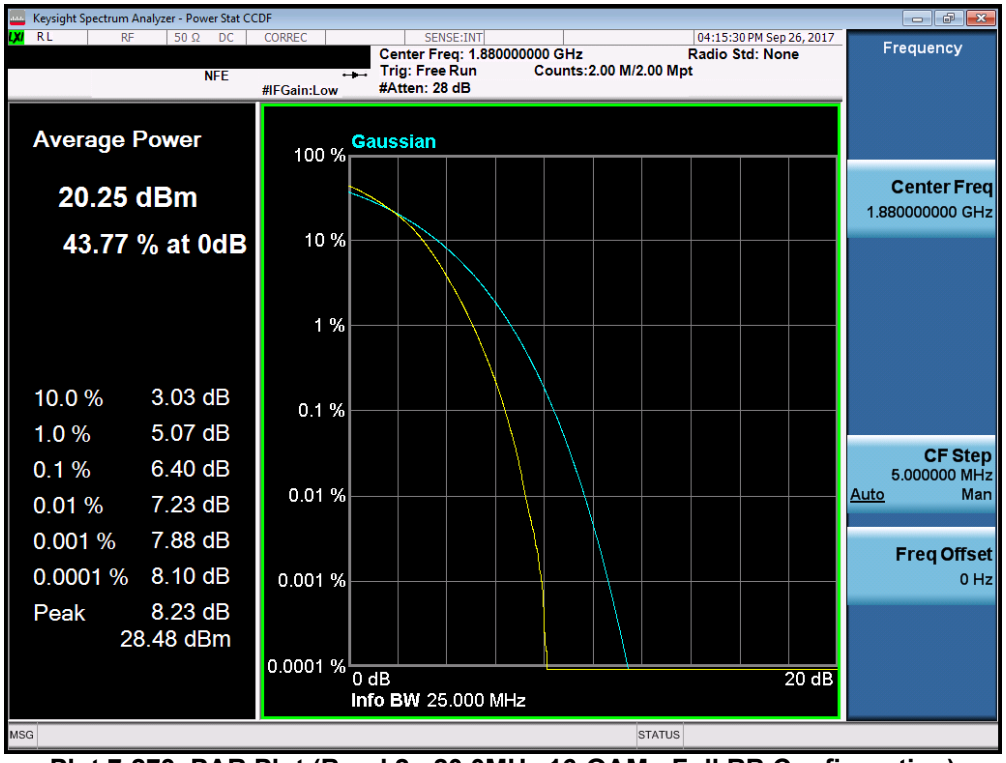
Band 2



Plot 7-272. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-273. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

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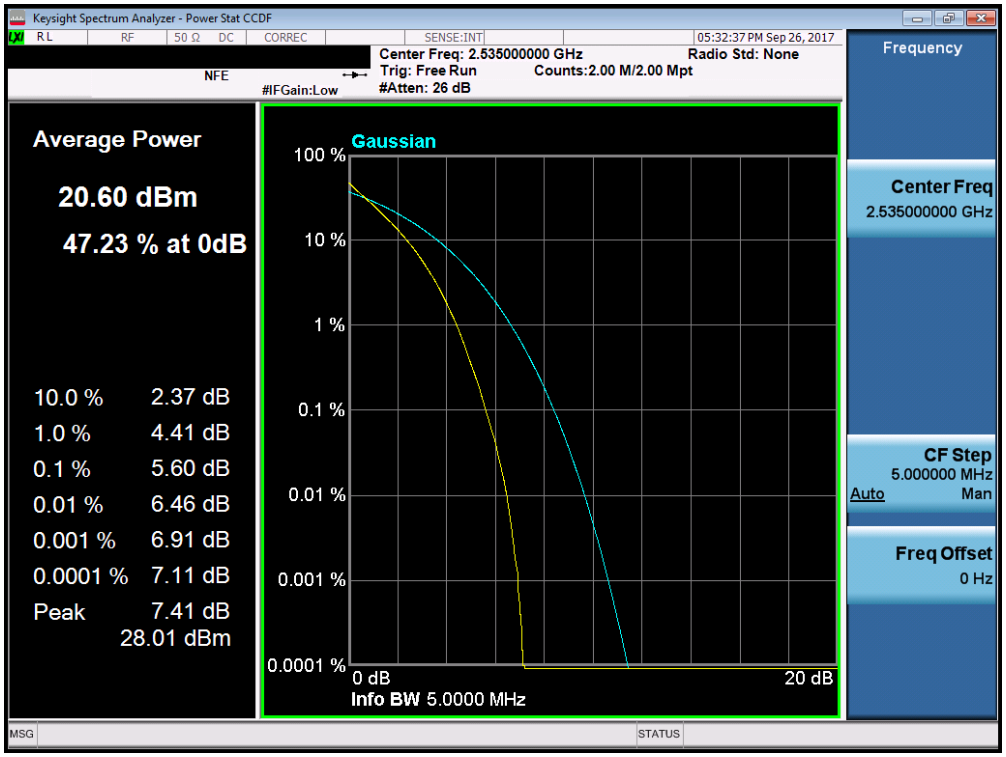
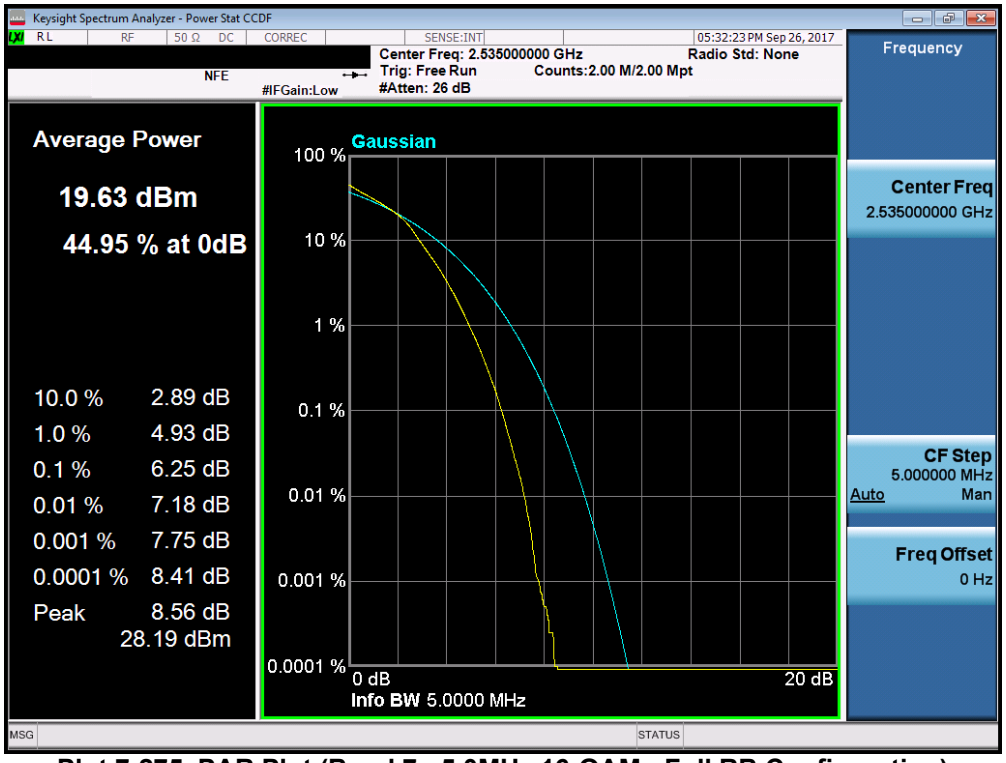
Band 7



Plot 7-274. PAR Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-275. PAR Plot (Band 7 - 5.0MHz 16-QAM - Full RB Configuration)

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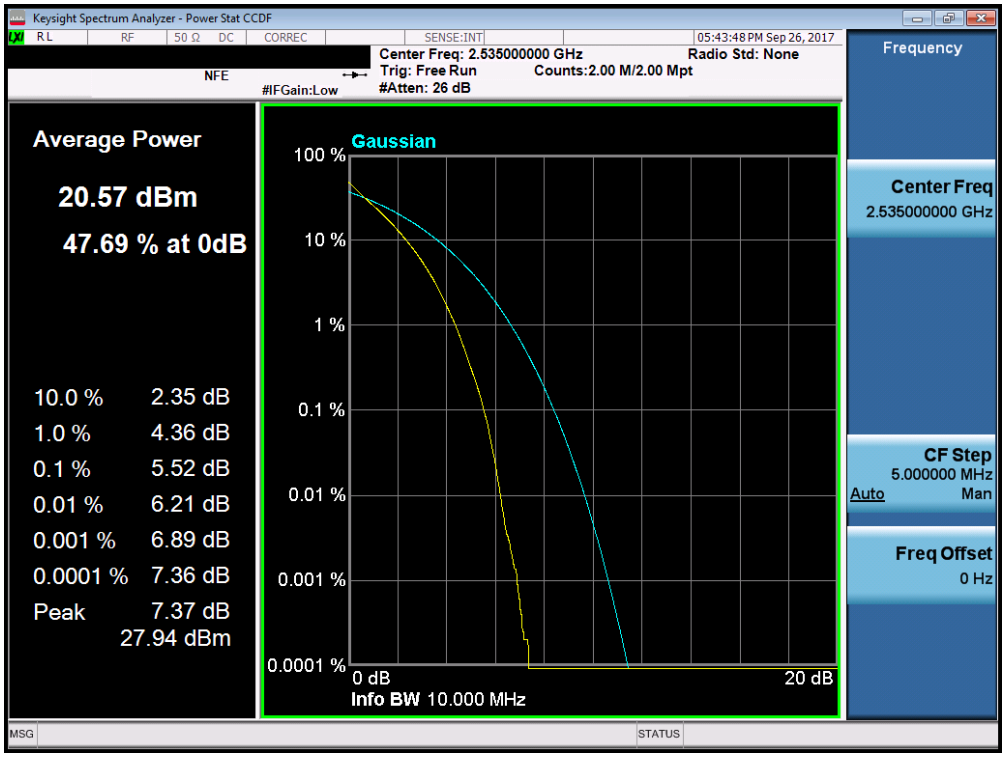
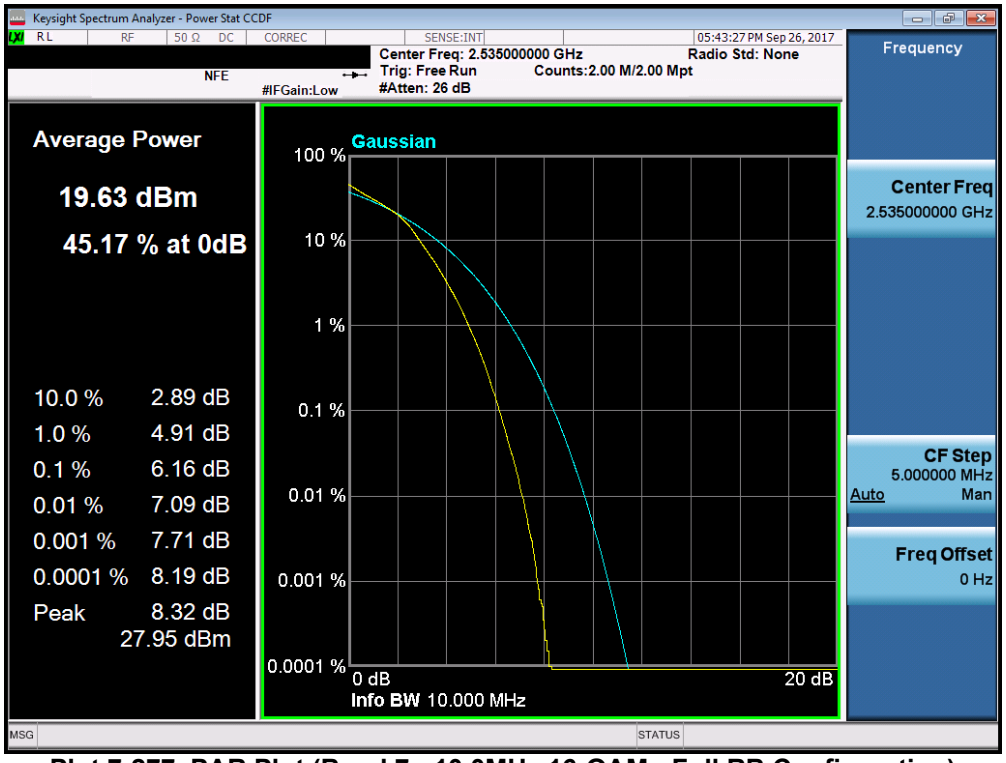
Band 7



Plot 7-276. PAR Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-277. PAR Plot (Band 7 - 10.0MHz 16-QAM - Full RB Configuration)

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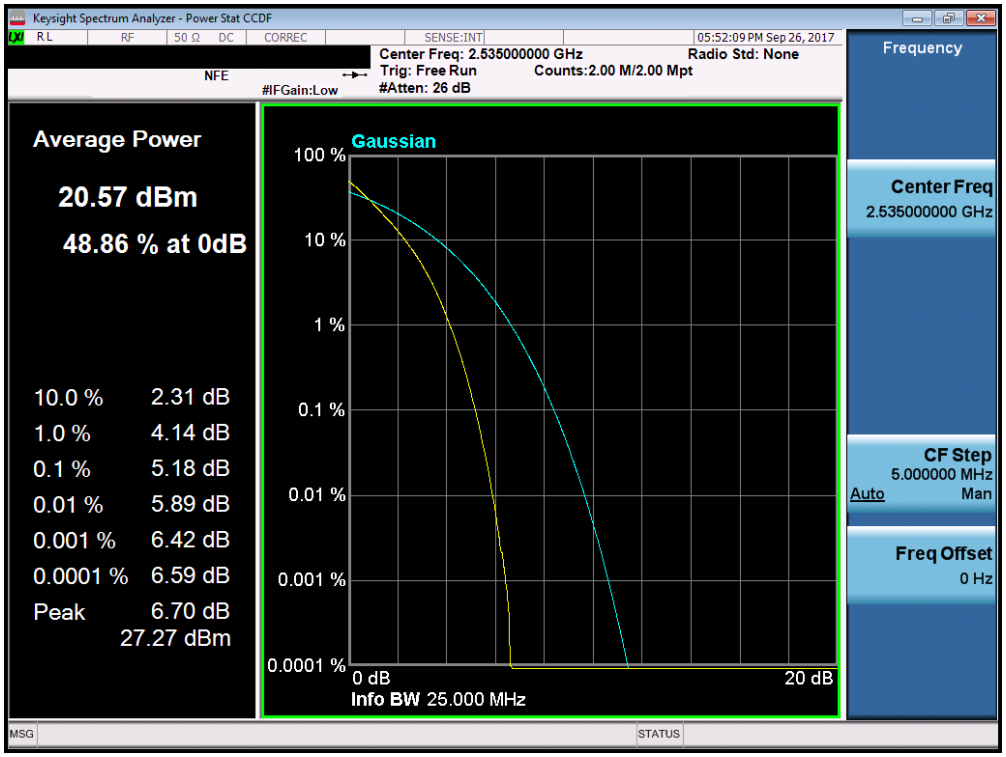
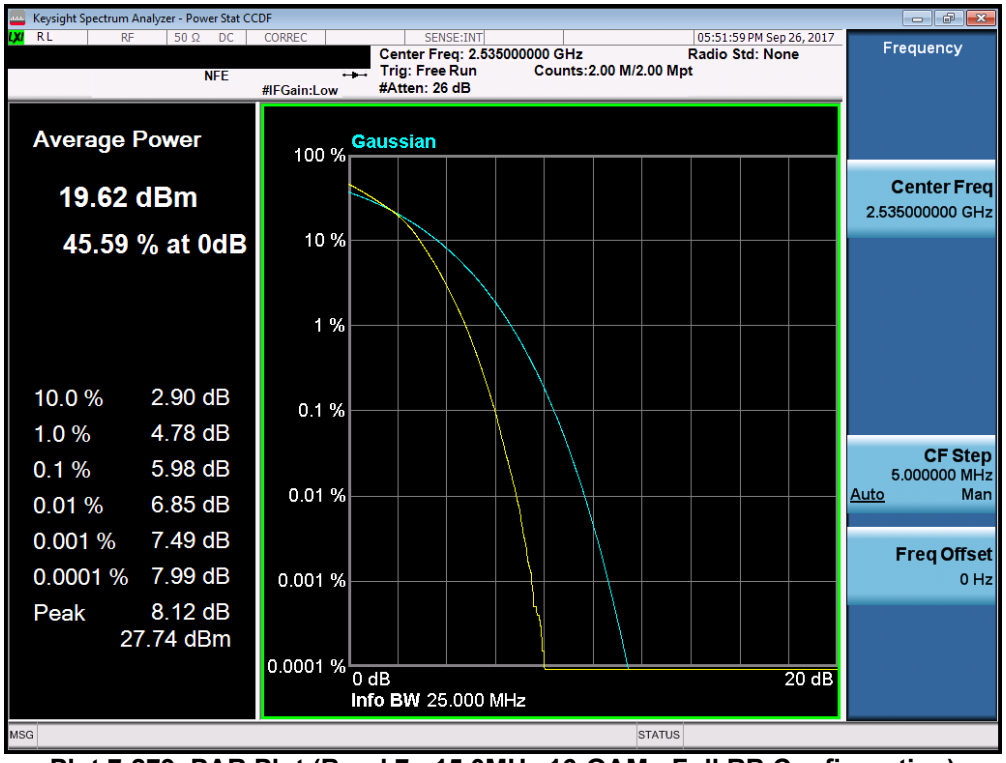
Band 7



Plot 7-278. PAR Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-279. PAR Plot (Band 7 - 15.0MHz 16-QAM - Full RB Configuration)

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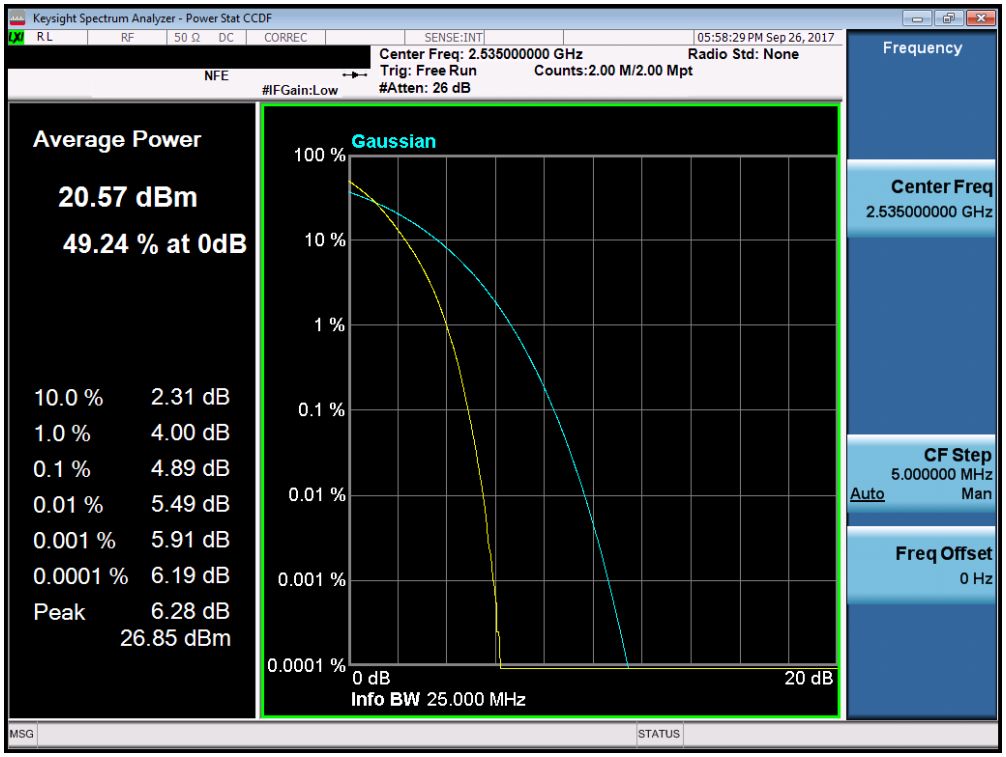
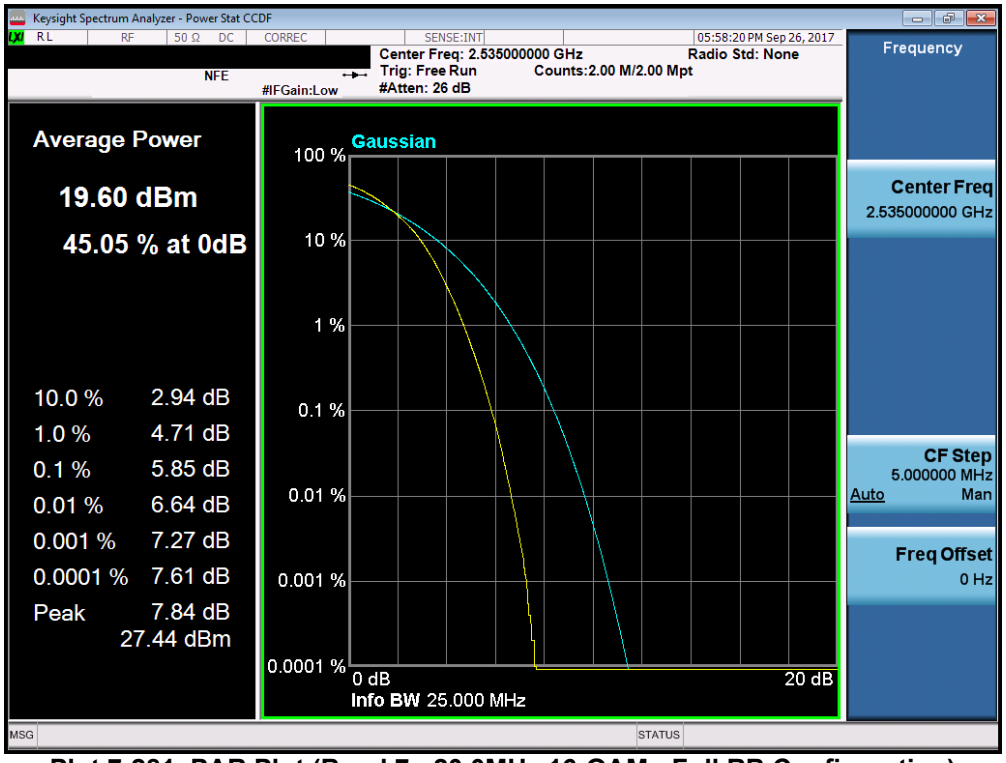
Band 7



Plot 7-280. PAR Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-281. PAR Plot (Band 7 - 20.0MHz 16-QAM - Full RB Configuration)

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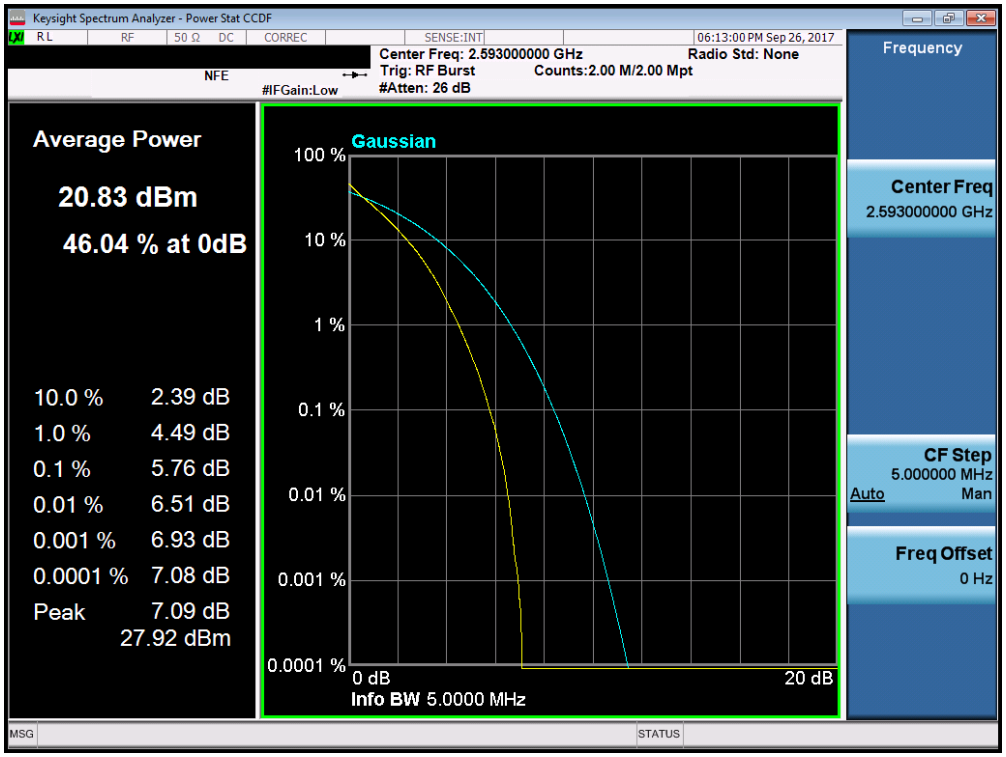
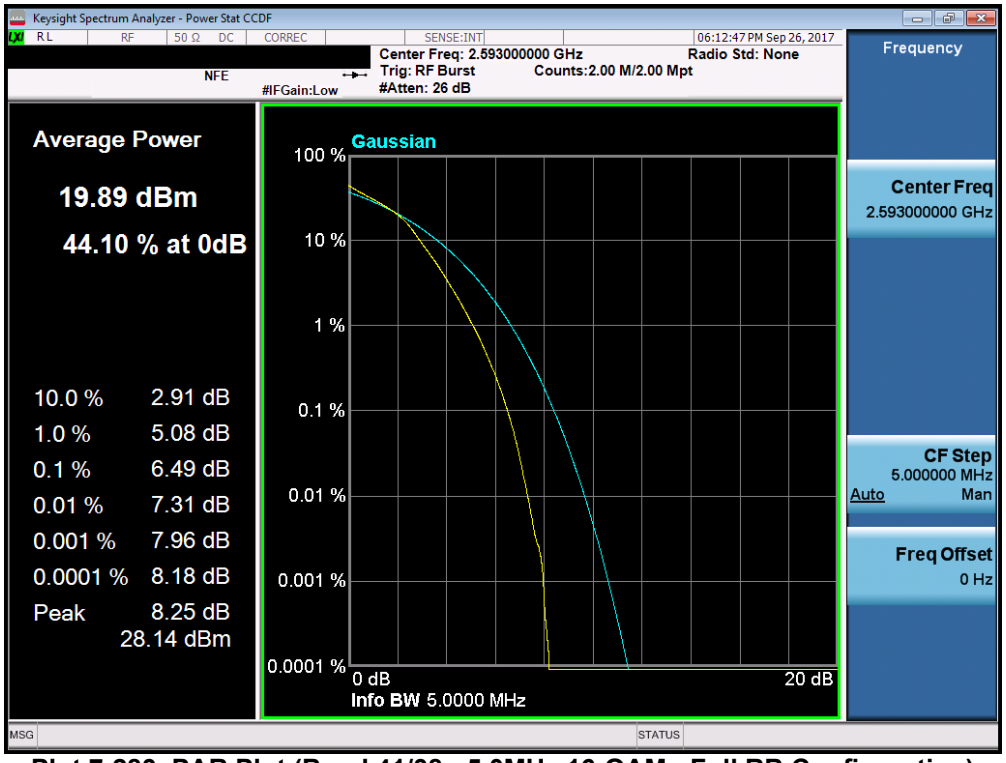
Band 41/38



Plot 7-282. PAR Plot (Band 41/38 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-283. PAR Plot (Band 41/38 - 5.0MHz 16-QAM - Full RB Configuration)

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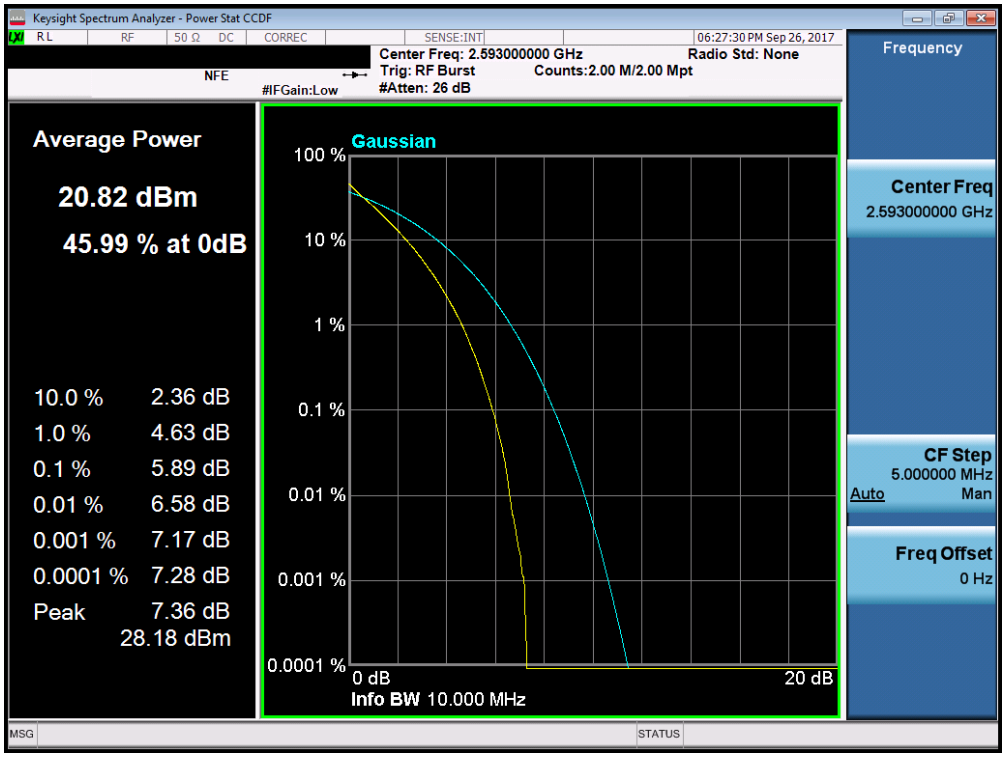
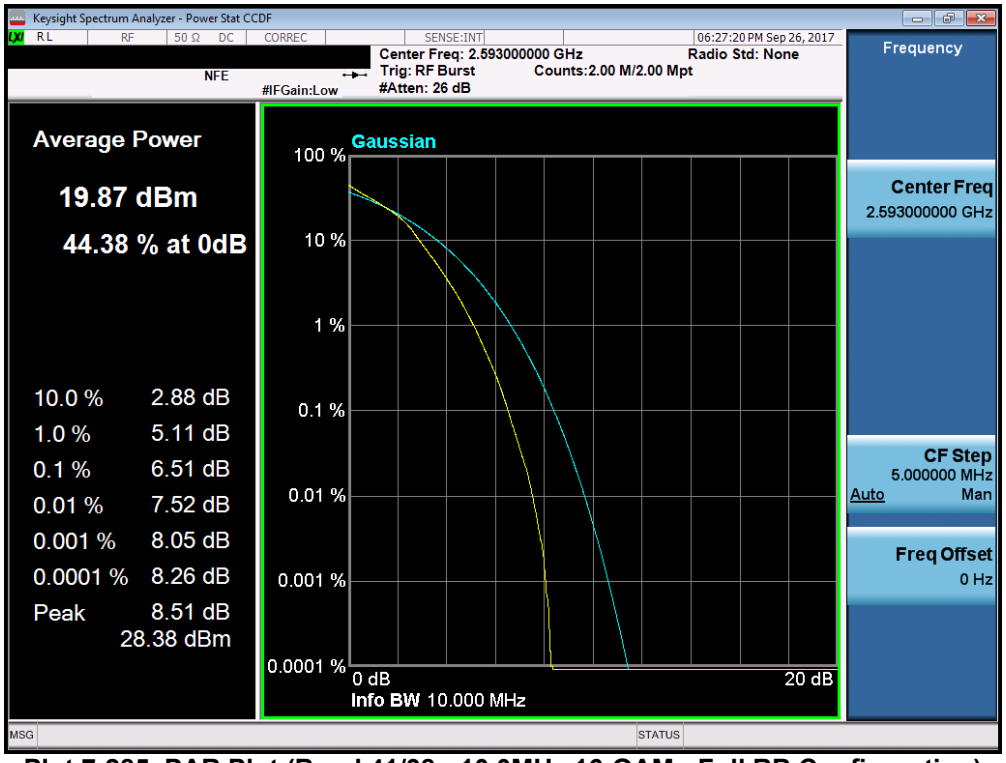
Band 41/38



Plot 7-284. PAR Plot (Band 41/38 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-285. PAR Plot (Band 41/38 - 10.0MHz 16-QAM - Full RB Configuration)

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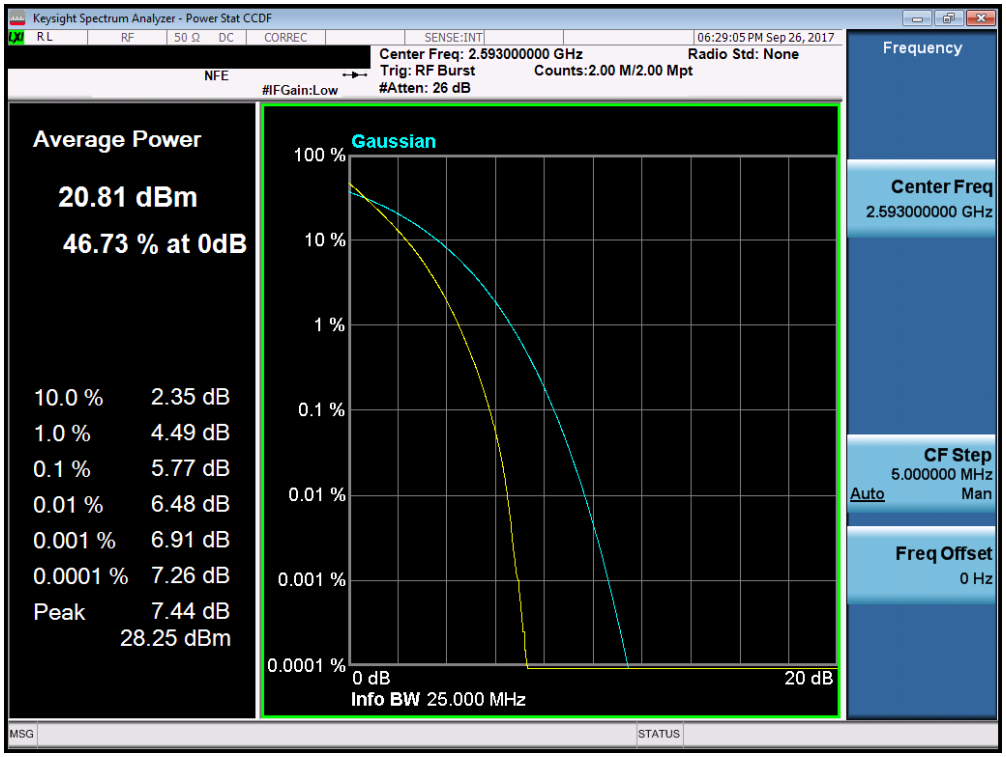
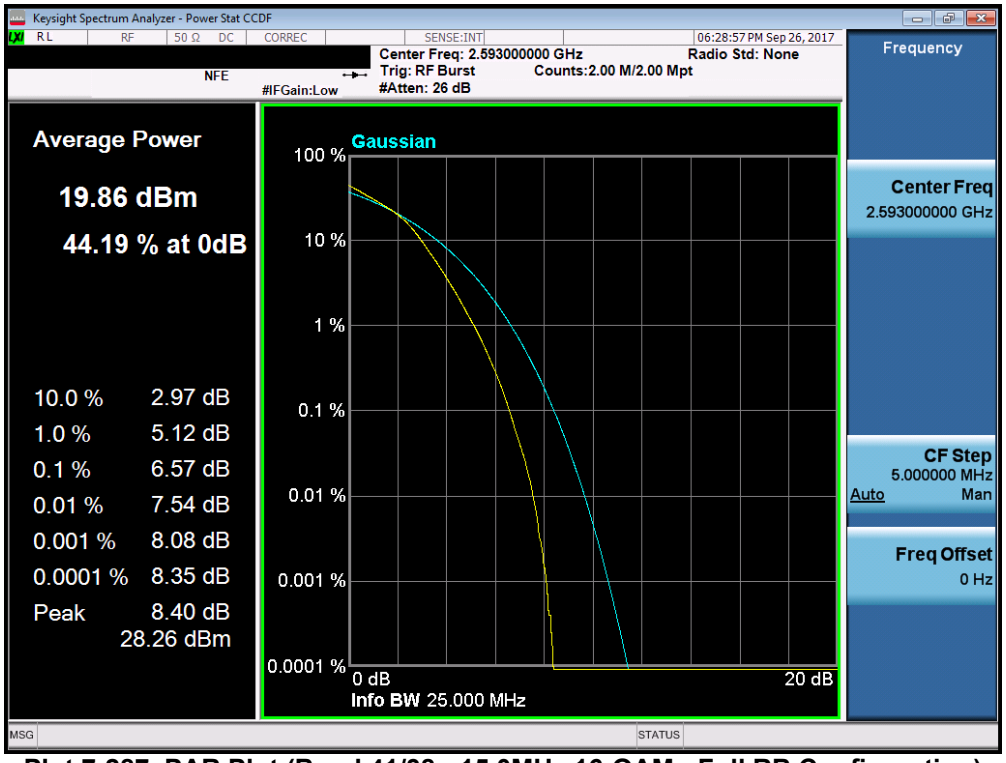
Band 41/38



Plot 7-286. PAR Plot (Band 41/38 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-287. PAR Plot (Band 41/38 - 15.0MHz 16-QAM - Full RB Configuration)

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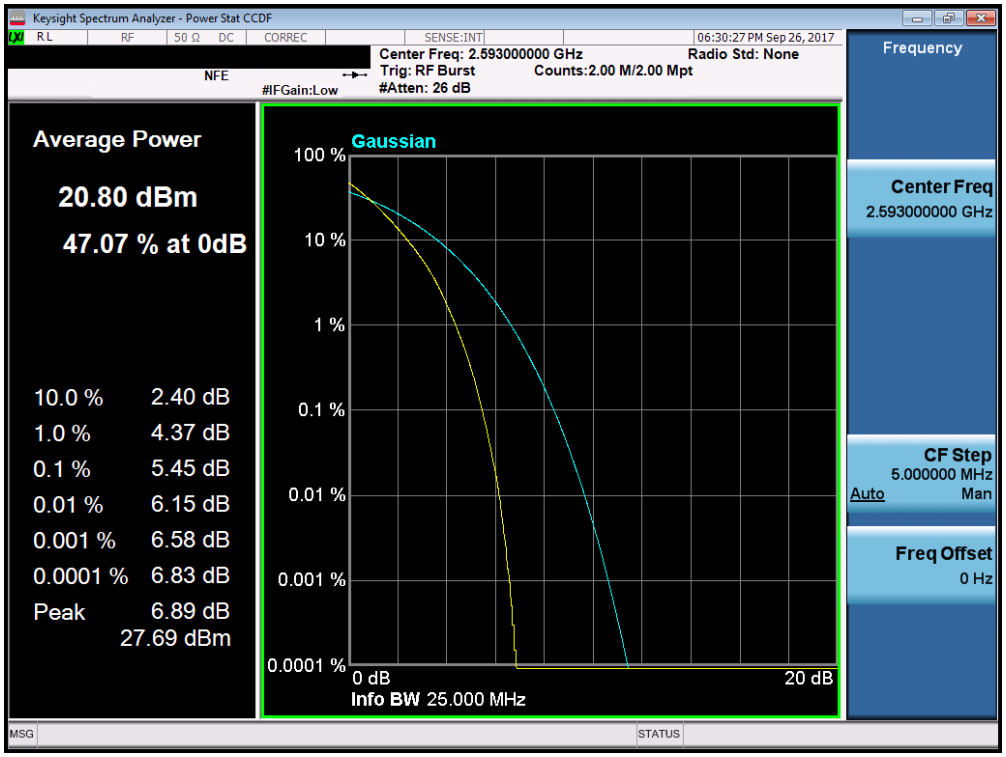
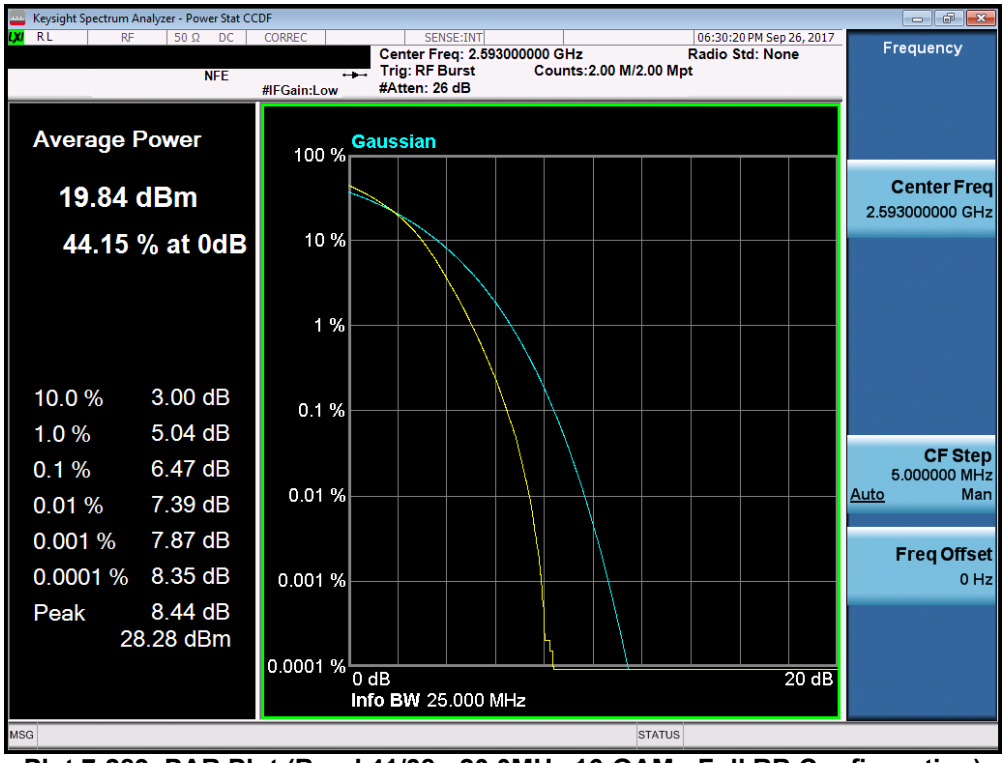
Band 41/38



Plot 7-288. PAR Plot (Band 41/38 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-289. PAR Plot (Band 41/38 - 20.0MHz 16-QAM - Full RB Configuration)

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7.6 Radiated Power (ERP/EIRP)

§22.913(a)(2) §24.232(c.2) §27.50(h)(2) §27.50(b)(10) §27.50(c)(10) §27.50(d)(4) RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5) RSS-199(4.4)

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 v03 – 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.

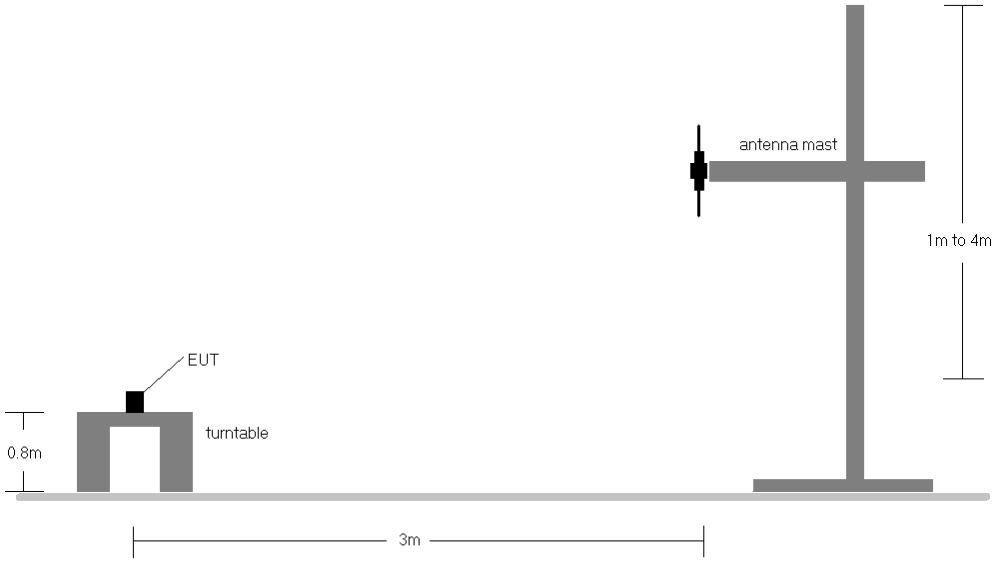

Figure 7-5. Radiated Test Setup <1GHz

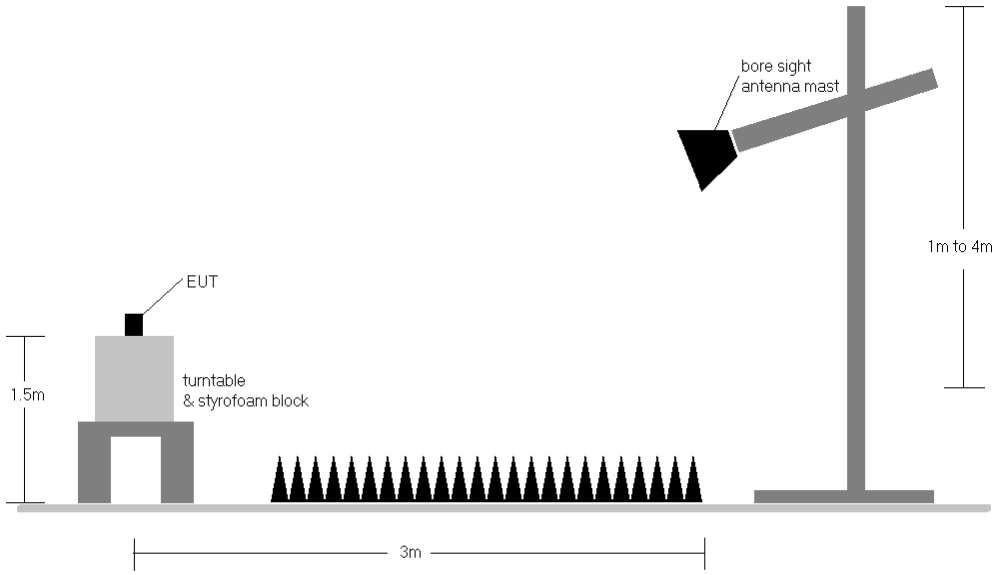

Figure 7-6. Radiated Test Setup >1GHz

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.

2) This unit was tested with its standard battery.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	150	356	1 / 5	8.46	1.10	7.41	0.006	34.77	-27.36	9.56	0.009	36.99	-27.43
707.50	1.4	QPSK	V	150	347	1 / 5	8.88	1.13	7.86	0.006	34.77	-26.91	10.01	0.010	36.99	-26.98
715.30	1.4	QPSK	V	150	358	1 / 3	9.97	1.16	8.98	0.008	34.77	-25.79	11.13	0.013	36.99	-25.86
715.30	1.4	16-QAM	V	150	358	1 / 3	8.71	1.16	7.72	0.006	34.77	-27.05	9.87	0.010	36.99	-27.12
700.50	3	QPSK	V	150	346	1 / 14	8.58	1.10	7.53	0.006	34.77	-27.24	9.68	0.009	36.99	-27.31
707.50	3	QPSK	V	150	2	1 / 0	9.15	1.13	8.13	0.007	34.77	-26.64	10.28	0.011	36.99	-26.71
714.50	3	QPSK	V	150	347	1 / 7	9.92	1.16	8.93	0.008	34.77	-25.84	11.08	0.013	36.99	-25.91
714.50	3	16-QAM	V	150	347	1 / 7	8.33	1.16	7.34	0.005	34.77	-27.43	9.49	0.009	36.99	-27.50

Table 7-3. ERP/EIRP 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]
701.50	5	QPSK	V	150	350	1 / 24	9.09	1.11	8.05	0.006	34.77	-26.73	10.20	0.010	36.99	-26.79
707.50	5	QPSK	V	150	350	1 / 24	10.01	1.13	8.99	0.008	34.77	-25.78	11.14	0.013	36.99	-25.85
713.50	5	QPSK	V	150	351	1 / 24	9.80	1.15	8.80	0.008	34.77	-25.97	10.95	0.012	36.99	-26.04
707.50	5	16-QAM	V	150	350	1 / 24	8.43	1.13	7.41	0.006	34.77	-27.36	9.56	0.009	36.99	-27.43
704.00	10	QPSK	V	150	353	1 / 25	9.02	1.12	7.99	0.006	34.77	-26.78	10.14	0.010	36.99	-26.85
707.50	10	QPSK	V	150	3	1 / 49	9.84	1.13	8.82	0.008	34.77	-25.95	10.97	0.013	36.99	-26.02
711.00	10	QPSK	V	150	350	1 / 49	9.81	1.14	8.80	0.008	34.77	-25.97	10.95	0.012	36.99	-26.04
707.50	10	16-QAM	V	150	3	1 / 49	8.65	1.13	7.63	0.006	34.77	-27.14	9.78	0.010	36.99	-27.21
707.50	5	QPSK	H	150	62	1 / 3	8.60	1.13	7.58	0.006	34.77	-27.19	9.73	0.009	36.99	-27.26

Table 7-4. ERP/EIRP 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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	150	285	1 / 24	12.64	1.32	11.81	0.015	34.77	-22.96	13.96	0.025	36.99	-23.03
782.00	5	QPSK	H	150	286	1 / 24	13.58	1.33	12.76	0.019	34.77	-22.01	14.91	0.031	36.99	-22.08
784.50	5	QPSK	H	150	289	1 / 24	13.53	1.34	12.72	0.019	34.77	-22.05	14.87	0.031	36.99	-22.12
782.00	5	16-QAM	H	150	286	1 / 24	12.39	1.33	11.57	0.014	34.77	-23.20	13.72	0.024	36.99	-23.27
782.00	10	QPSK	H	150	286	1 / 49	13.96	1.33	13.14	0.021	34.77	-21.63	15.29	0.034	36.99	-21.70
782.00	10	16-QAM	H	150	286	1 / 49	12.61	1.33	11.79	0.015	34.77	-22.98	13.94	0.025	36.99	-23.05
782.00	10	QPSK	V	150	140	1 / 49	10.20	1.33	9.38	0.009	34.77	-25.39	11.53	0.014	36.99	-25.46

Table 7-5. ERP/EIRP 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	H	150	337	3 / 2	15.96	1.50	15.31	0.034	36.99	-21.68	17.46	0.056	38.45	-20.99
836.50	1.4	QPSK	H	150	339	3 / 2	16.17	1.50	15.52	0.036	36.99	-21.47	17.67	0.058	38.45	-20.78
848.30	1.4	QPSK	H	150	352	1 / 0	20.37	1.50	19.72	0.094	36.99	-17.27	21.87	0.154	38.45	-16.58
848.30	1.4	16-QAM	H	150	352	1 / 0	19.49	1.50	18.84	0.077	36.99	-18.15	20.99	0.126	38.45	-17.46
825.50	3	QPSK	H	150	332	1 / 14	16.01	1.50	15.36	0.034	36.99	-21.63	17.51	0.056	38.45	-20.94
836.50	3	QPSK	H	150	340	1 / 14	16.25	1.50	15.60	0.036	36.99	-21.39	17.75	0.060	38.45	-20.70
847.50	3	QPSK	H	150	337	1 / 0	20.64	1.50	19.99	0.100	36.99	-17.00	22.14	0.164	38.45	-16.31
847.50	3	16-QAM	H	150	337	1 / 0	19.10	1.50	18.45	0.070	36.99	-18.54	20.60	0.115	38.45	-17.85
826.50	5	QPSK	H	150	327	1 / 0	16.00	1.50	15.35	0.034	36.99	-21.64	17.50	0.056	38.45	-20.95
836.50	5	QPSK	H	150	329	1 / 24	16.17	1.50	15.52	0.036	36.99	-21.47	17.67	0.058	38.45	-20.78
846.50	5	QPSK	H	150	331	1 / 24	20.85	1.50	20.20	0.105	36.99	-16.79	22.35	0.172	38.45	-16.10
846.50	5	16-QAM	H	150	331	1 / 24	19.21	1.50	18.56	0.072	36.99	-18.43	20.71	0.118	38.45	-17.74
829.00	10	QPSK	H	150	322	1 / 25	15.98	1.50	15.33	0.034	36.99	-21.66	17.48	0.056	38.45	-20.97
836.50	10	QPSK	H	150	337	1 / 25	16.21	1.50	15.56	0.036	36.99	-21.43	17.71	0.059	38.45	-20.74
844.00	10	QPSK	H	150	336	1 / 25	20.83	1.50	20.18	0.104	36.99	-16.81	22.33	0.171	38.45	-16.12
844.00	10	16-QAM	H	150	336	1 / 25	19.68	1.50	19.03	0.080	36.99	-17.96	21.18	0.131	38.45	-17.27
846.50	5	QPSK	V	150	254	1 / 24	19.22	1.50	18.57	0.072	36.99	-18.42	20.72	0.118	38.45	-17.73

Table 7-6. ERP/EIRP 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]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
831.50	15	QPSK	H	150	343	1 / 36	18.81	1.50	18.16	0.065	38.45	-20.29	20.31	0.107	36.99	-16.68
836.50	15	QPSK	H	150	338	1 / 36	18.87	1.50	18.22	0.066	38.45	-20.23	20.37	0.109	36.99	-16.62
841.50	15	QPSK	H	150	330	1 / 36	19.06	1.50	18.41	0.069	38.45	-20.04	20.56	0.114	36.99	-16.43
841.50	15	16-QAM	H	150	330	1 / 36	17.75	1.50	17.10	0.051	38.45	-21.35	19.25	0.084	36.99	-17.74
841.50	15	QPSK	V	150	238	1 / 36	17.48	1.50	16.83	0.048	38.45	-21.62	18.98	0.079	36.99	-18.01

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

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	150	351	1 / 5	16.12	5.56	21.68	0.147	30.00	-8.32
1745.00	1.4	QPSK	H	150	356	1 / 0	16.47	5.32	21.79	0.151	30.00	-8.21
1779.30	1.4	QPSK	H	150	358	1 / 5	17.25	5.09	22.34	0.171	30.00	-7.66
1779.30	1.4	16-QAM	H	150	358	1 / 0	16.16	5.09	21.25	0.133	30.00	-8.75
1711.50	3	QPSK	H	150	350	1 / 0	16.13	5.55	21.68	0.147	30.00	-8.32
1745.00	3	QPSK	H	150	352	1 / 14	16.46	5.32	21.78	0.151	30.00	-8.22
1778.50	3	QPSK	H	150	358	1 / 14	17.15	5.10	22.25	0.168	30.00	-7.75
1778.50	3	16-QAM	H	150	358	1 / 14	16.00	5.10	21.10	0.129	30.00	-8.90
1712.50	5	QPSK	H	150	354	1 / 0	16.18	5.55	21.73	0.149	30.00	-8.27
1745.00	5	QPSK	H	150	347	1 / 24	16.37	5.32	21.69	0.148	30.00	-8.31
1777.50	5	QPSK	H	150	351	1 / 24	17.05	5.10	22.15	0.164	30.00	-7.85
1777.50	5	16-QAM	H	150	351	1 / 24	16.17	5.10	21.27	0.134	30.00	-8.73
1715.00	10	QPSK	H	150	352	1 / 0	11.98	5.53	17.51	0.056	30.00	-12.49
1745.00	10	QPSK	H	150	354	1 / 0	9.29	5.32	14.61	0.029	30.00	-15.39
1775.00	10	QPSK	H	150	357	1 / 49	17.24	5.12	22.36	0.172	30.00	-7.64
1775.00	10	16-QAM	H	150	357	1 / 49	16.11	5.12	21.23	0.133	30.00	-8.77
1717.50	15	QPSK	H	150	351	1 / 74	11.97	5.51	17.48	0.056	30.00	-12.52
1745.00	15	QPSK	H	150	336	1 / 0	12.49	5.32	17.81	0.060	30.00	-12.19
1772.50	15	QPSK	H	150	354	1 / 74	12.55	5.14	17.69	0.059	30.00	-12.31
1745.00	15	16-QAM	H	150	336	1 / 0	11.44	5.32	16.76	0.047	30.00	-13.24
1720.00	20	QPSK	H	150	351	1 / 0	9.48	5.49	14.97	0.031	30.00	-15.03
1745.00	20	QPSK	H	150	356	100 / 0	7.83	5.32	13.15	0.021	30.00	-16.85
1770.00	20	QPSK	H	150	357	100 / 0	5.90	5.15	11.05	0.013	30.00	-18.95
1720.00	20	16-QAM	H	150	351	1 / 0	8.71	5.49	14.20	0.026	30.00	-15.80
1775.00	10	QPSK	V	150	224	1 / 0	15.83	5.12	20.95	0.124	30.00	-9.05

Table 7-8. EIRP Data (Band 66/4)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	150	350	1 / 0	19.10	4.82	23.92	0.246	33.01	-9.09
1880.00	1.4	QPSK	H	150	348	1 / 0	17.98	4.74	22.72	0.187	33.01	-10.29
1909.30	1.4	QPSK	H	150	348	1 / 0	19.12	4.68	23.80	0.240	33.01	-9.21
1909.30	1.4	16-QAM	H	150	348	1 / 5	17.87	4.68	22.55	0.180	33.01	-10.46
1851.50	3	QPSK	H	150	354	1 / 14	18.06	4.82	22.88	0.194	33.01	-10.13
1880.00	3	QPSK	H	150	353	1 / 0	18.94	4.74	23.68	0.233	33.01	-9.33
1908.50	3	QPSK	H	150	348	1 / 14	19.08	4.68	23.76	0.238	33.01	-9.25
1880.00	3	16-QAM	H	150	353	1 / 14	17.92	4.74	22.66	0.185	33.01	-10.35
1852.50	5	QPSK	H	150	354	1 / 0	18.77	4.81	23.58	0.228	33.01	-9.43
1880.00	5	QPSK	H	150	344	1 / 0	18.38	4.74	23.12	0.205	33.01	-9.89
1907.50	5	QPSK	H	150	350	1 / 24	19.54	4.68	24.22	0.264	33.01	-8.79
1907.50	5	16-QAM	H	150	350	1 / 24	18.33	4.68	23.01	0.200	33.01	-10.00
1855.00	10	QPSK	H	150	352	1 / 0	18.87	4.81	23.68	0.233	33.01	-9.33
1880.00	10	QPSK	H	150	355	1 / 49	17.67	4.74	22.41	0.174	33.01	-10.60
1905.00	10	QPSK	H	150	347	1 / 0	19.03	4.68	23.71	0.235	33.01	-9.30
1905.00	10	16-QAM	H	150	347	1 / 49	18.06	4.68	22.74	0.188	33.01	-10.27
1857.50	15	QPSK	H	150	343	1 / 74	18.32	4.80	23.12	0.205	33.01	-9.89
1880.00	15	QPSK	H	150	345	1 / 74	17.90	4.74	22.64	0.184	33.01	-10.37
1902.50	15	QPSK	H	150	344	1 / 0	19.51	4.69	24.20	0.263	33.01	-8.81
1902.50	15	16-QAM	H	150	344	1 / 0	17.92	4.69	22.61	0.182	33.01	-10.40
1860.00	20	QPSK	H	150	342	100 / 0	17.85	4.79	22.64	0.184	33.01	-10.37
1880.00	20	QPSK	H	150	344	100 / 0	17.37	4.74	22.11	0.163	33.01	-10.90
1900.00	20	QPSK	H	150	343	100 / 0	18.10	4.69	22.79	0.190	33.01	-10.22
1900.00	20	16-QAM	H	150	343	100 / 0	17.12	4.69	21.81	0.152	33.01	-11.20
1907.50	5	QPSK	V	150	71	1 / 0	17.09	4.74	21.83	0.152	33.01	-11.18

Table 7-9. 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]
2502.50	5	QPSK	V	150	271	1 / 24	15.90	5.61	21.51	0.141	33.01	-11.50
2535.00	5	QPSK	V	150	273	1 / 0	15.29	5.85	21.14	0.130	33.01	-11.87
2567.50	5	QPSK	V	150	277	1 / 24	15.50	6.09	21.59	0.144	33.01	-11.42
2502.50	5	16-QAM	V	150	271	1 / 24	15.27	5.61	20.88	0.122	33.01	-12.13
2505.00	10	QPSK	V	150	265	1 / 49	15.93	5.63	21.56	0.143	33.01	-11.45
2535.00	10	QPSK	V	150	243	1 / 0	15.51	5.85	21.36	0.137	33.01	-11.65
2565.00	10	QPSK	V	150	279	1 / 0	15.52	6.07	21.59	0.144	33.01	-11.42
2505.00	10	16-QAM	V	150	265	1 / 49	15.24	5.63	20.87	0.122	33.01	-12.14
2507.50	15	QPSK	V	150	264	1 / 74	16.54	5.64	22.18	0.165	33.01	-10.83
2535.00	15	QPSK	V	150	270	1 / 0	15.57	5.85	21.42	0.139	33.01	-11.59
2562.50	15	QPSK	V	150	271	1 / 0	15.94	6.05	21.99	0.158	33.01	-11.02
2507.50	15	16-QAM	V	150	264	1 / 74	15.92	5.64	21.56	0.143	33.01	-11.45
2510.00	20	QPSK	V	150	274	100 / 0	15.77	5.66	21.43	0.139	33.01	-11.58
2535.00	20	QPSK	V	150	270	100 / 0	14.33	5.85	20.18	0.104	33.01	-12.83
2560.00	20	QPSK	V	150	269	100 / 0	14.87	6.03	20.90	0.123	33.01	-12.11
2510.00	20	16-QAM	V	150	274	100 / 0	14.78	5.66	20.44	0.111	33.01	-12.57
2507.50	15	QPSK	H	150	77	1 / 0	14.89	5.85	20.74	0.119	33.01	-12.27

Table 7-10. EIRP Data (Band 7)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	150	1	1 / 0	19.22	5.73	24.95	0.313	33.01	-8.06
2593.00	5	QPSK	H	150	1	1 / 0	19.83	6.07	25.90	0.389	33.01	-7.11
2687.50	5	QPSK	H	150	2	1 / 0	17.79	6.48	24.27	0.268	33.01	-8.74
2593.00	5	16-QAM	H	150	1	1 / 0	18.83	6.07	24.90	0.309	33.01	-8.11
2501.00	10	QPSK	H	150	1	1 / 49	21.08	5.73	26.81	0.480	33.01	-6.20
2593.00	10	QPSK	H	150	3	1 / 0	20.88	6.07	26.95	0.496	33.01	-6.06
2685.00	10	QPSK	H	150	358	1 / 0	18.31	6.47	24.78	0.301	33.01	-8.23
2593.00	10	16-QAM	H	150	3	1 / 0	18.78	6.07	24.85	0.306	33.01	-8.16
2503.50	15	QPSK	H	150	0	1 / 74	19.89	5.74	25.63	0.366	33.01	-7.38
2593.00	15	QPSK	H	150	2	1 / 0	20.67	6.07	26.74	0.472	33.01	-6.27
2682.50	15	QPSK	H	150	1	1 / 0	17.06	6.46	23.52	0.225	33.01	-9.49
2593.00	15	16-QAM	H	150	2	1 / 0	20.08	6.07	26.15	0.412	33.01	-6.86
2506.00	20	QPSK	H	150	1	1 / 99	19.59	5.75	25.34	0.342	33.01	-7.67
2593.00	20	QPSK	H	150	359	1 / 0	19.63	6.07	25.70	0.372	33.01	-7.31
2680.00	20	QPSK	H	150	4	1 / 0	17.62	6.45	24.07	0.255	33.01	-8.94
2593.00	20	16-QAM	H	150	359	1 / 0	19.19	6.07	25.26	0.336	33.01	-7.75
2593.00	10	QPSK	V	150	120	1 / 0	16.36	6.07	22.43	0.175	33.01	-10.58

Table 7-11. EIRP Data (Band 41/38)

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7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) §27.53(m) RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6) RSS-199(4.5)

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 v03 – 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.

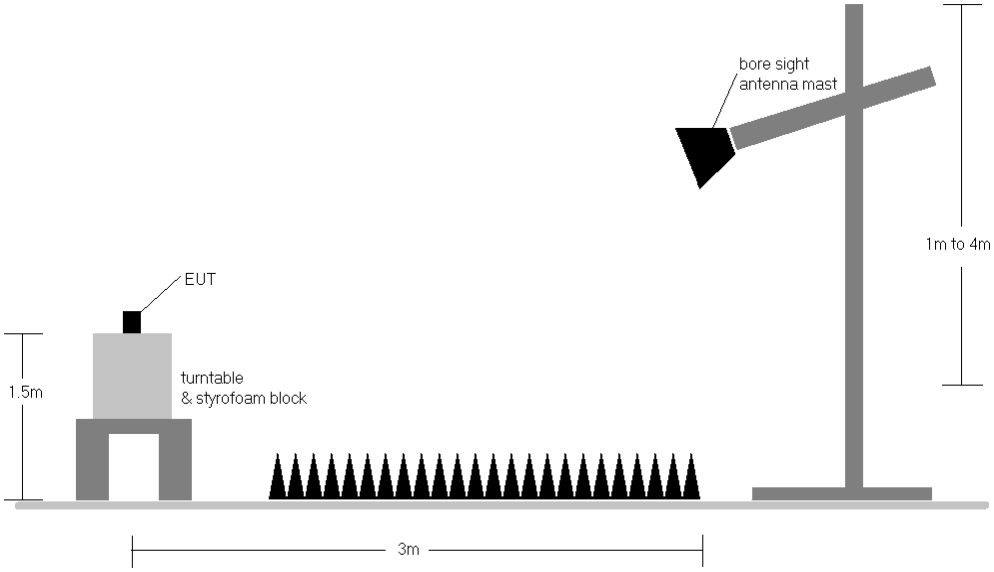

Figure 7-7. Test Instrument & Measurement Setup

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 12/17

OPERATING FREQUENCY:	701.50	MHz
CHANNEL:	23035	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1403.00	H	172	188	-64.37	7.75	-56.62	-43.6
2104.50	H	127	340	-66.39	8.82	-57.57	-44.6
2806.00	H	-	-	-73.20	10.07	-63.14	-50.1

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

OPERATING FREQUENCY:	707.50	MHz
CHANNEL:	23095	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	167	341	-65.29	7.84	-57.45	-44.4
2122.50	H	133	345	-62.16	8.90	-53.26	-40.3
2830.00	H	-	-	-72.59	10.05	-62.55	-49.5

Table 7-13. Radiated Spurious Data (Band 12/17 – Mid Channel)

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OPERATING FREQUENCY:	713.50	MHz
CHANNEL:	23155	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1427.00	H	163	191	-56.79	7.94	-48.86	-35.9
2140.50	H	126	353	-63.76	8.97	-54.79	-41.8
2854.00	H	-	-	-72.40	10.03	-62.37	-49.4

Table 7-14. Radiated Spurious Data (Band 12/17 – High Channel)

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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	H	121	8	-68.94	9.48	-59.46	-46.5
3128.00	H	214	200	-68.85	9.35	-59.50	-46.5
3910.00	H	-	-	-67.87	9.49	-58.38	-45.4

Table 7-15. 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	148	214	-55.13	8.72	-46.41	-6.4

Table 7-16. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

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Band 26/5

OPERATING FREQUENCY:	826.50	MHz
CHANNEL:	20425	
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]
1653.00	H	133	355	-50.88	8.85	-42.04	-29.0
2479.50	H	301	271	-72.56	9.69	-62.87	-49.9
3306.00	H	260	29	-68.15	9.53	-58.62	-45.6
4132.50	H	-	-	-68.13	10.25	-57.89	-44.9

Table 7-17. Radiated Spurious Data (Band 26/5 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz
CHANNEL:	20525	
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]
1673.00	H	135	32	-51.78	8.85	-42.93	-29.9
2509.50	H	110	253	-71.48	9.78	-61.71	-48.7
3346.00	H	118	35	-66.33	9.66	-56.66	-43.7
4182.50	H	186	48	-63.76	10.38	-53.39	-40.4
5019.00	H	-	-	-67.71	10.90	-56.81	-43.8

Table 7-18. Radiated Spurious Data (Band 26/5 – Mid Channel)

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OPERATING FREQUENCY:	846.50	MHz
CHANNEL:	20625	
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]
1693.00	H	130	2	-48.61	8.85	-39.76	-26.8
2539.50	H	136	358	-69.38	9.75	-59.63	-46.6
3386.00	H	211	22	-68.01	9.80	-58.21	-45.2
4232.50	H	172	133	-65.30	10.52	-54.78	-41.8
5079.00	H	-	-	-66.65	10.80	-55.85	-42.9

Table 7-19. Radiated Spurious Data (Band 26/5– High Channel)

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Band 66/4

OPERATING FREQUENCY:	1715.00	MHz
CHANNEL:	132022	
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]
3430.00	V	200	37	-64.92	9.51	-55.41	-42.4
5145.00	V	210	359	-57.59	10.71	-46.88	-33.9
6860.00	V	177	5	-41.26	10.82	-30.44	-17.4
8575.00	V	140	314	-61.75	11.66	-50.09	-37.1
10290.00	V	155	343	-60.25	12.48	-47.77	-34.8
12005.00	V	126	342	-58.93	12.25	-46.68	-33.7
13720.00	V	-	-	-59.25	12.53	-46.72	-33.7

Table 7-20. Radiated Spurious Data (Band 66/4 – Low Channel)

OPERATING FREQUENCY:	1745.00	MHz
CHANNEL:	132322	
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]
3490.00	V	155	32	-63.90	9.62	-54.28	-41.3
5235.00	V	197	370	-59.20	10.90	-48.30	-35.3
6980.00	V	169	5	-42.50	10.90	-31.60	-18.6
8725.00	V	109	324	-62.90	11.84	-51.06	-38.1
10470.00	V	146	354	-59.00	12.59	-46.41	-33.4
12215.00	V	129	350	-58.63	12.45	-46.18	-33.2
13960.00	V	-	-	-58.52	12.00	-46.52	-33.5

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

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OPERATING FREQUENCY:	1775.00	MHz
CHANNEL:	132622	
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]
3550.00	V	132	23	-60.28	9.75	-50.53	-37.5
5325.00	V	190	8	-57.88	11.01	-46.87	-33.9
7100.00	V	179	7	-37.68	10.97	-26.71	-13.7
8875.00	V	147	9	-61.08	11.97	-49.11	-36.1
10650.00	V	145	338	-59.56	12.71	-46.85	-33.8
12425.00	V	150	0	-59.62	12.61	-47.01	-34.0
14200.00	V	-	-	-57.78	11.69	-46.09	-33.1

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

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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	H	178	302	-56.59	9.52	-47.07	-34.1
5557.50	H	147	25	-56.00	11.03	-44.97	-32.0
7410.00	H	159	33	-48.48	10.95	-37.53	-24.5
9262.50	H	155	64	-58.88	11.53	-47.35	-34.4
11115.00	H	143	39	-56.80	12.80	-44.00	-31.0
12967.50	H	-	-	-56.19	13.36	-42.83	-29.8

Table 7-23. Radiated Spurious Data (Band 2 – Low Channel)

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	H	172	303	-56.04	9.39	-46.65	-33.7
5640.00	H	161	321	-59.53	11.22	-48.31	-35.3
7520.00	H	169	356	-51.81	11.10	-40.71	-27.7
9400.00	H	167	72	-57.60	11.54	-46.06	-33.1
11280.00	H	137	43	-55.74	12.76	-42.97	-30.0
13160.00	H	-	-	-57.44	13.05	-44.38	-31.4

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

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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	H	198	302	-59.68	9.32	-50.36	-37.4
5722.50	H	156	320	-55.48	11.35	-44.13	-31.1
7630.00	H	180	350	-52.31	11.32	-40.98	-28.0
9537.50	H	144	54	-58.77	11.75	-47.02	-34.0
11445.00	H	156	21	-56.33	12.70	-43.64	-30.6
13352.50	H	-	-	-57.90	12.67	-45.23	-32.2

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

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Band 7

OPERATING FREQUENCY:	2507.50	MHz
CHANNEL:	20825	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	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]
5015.00	H	141	359	-65.22	11.12	-54.10	-29.1
7522.50	H	152	34	-51.22	11.04	-40.18	-15.2
10030.00	H	128	72	-49.47	12.17	-37.30	-12.3
12537.50	H	104	297	-51.83	12.79	-39.04	-14.0
15045.00	H	155	1	-53.96	11.75	-42.21	-17.2
17552.50	H	118	355	-53.01	11.19	-41.82	-16.8

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

OPERATING FREQUENCY:	2535.00	MHz
CHANNEL:	21100	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5070.00	H	132	337	-63.33	10.91	-52.42	-27.4
7605.00	H	118	44	-47.53	11.22	-36.31	-11.3
10140.00	H	132	80	-46.84	12.28	-34.56	-9.6
12675.00	H	104	290	-52.14	12.91	-39.23	-14.2
15210.00	H	150	14	-55.93	12.48	-43.45	-18.4
17745.00	H	136	330	-48.42	9.55	-38.87	-13.9

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

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OPERATING FREQUENCY:	2562.50	MHz
CHANNEL:	21375	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	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]
5125.00	H	146	314	-60.75	10.83	-49.92	-24.9
7687.50	H	128	25	-46.31	11.35	-34.96	-10.0
10250.00	H	123	69	-48.14	12.43	-35.71	-10.7
12812.50	H	104	292	-54.52	12.88	-41.64	-16.6
15375.00	H	169	26	-60.45	13.82	-46.63	-21.6
17937.50	H	-	-	-46.68	7.92	-38.76	-13.8

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

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Band 41/38

OPERATING FREQUENCY:	2501.00	MHz
CHANNEL:	39700	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5002.00	V	151	21	-60.22	10.89	-49.34	-24.3
7503.00	V	158	331	-50.55	11.07	-39.48	-14.5
10004.00	V	147	342	-40.81	12.05	-28.76	-3.8
12505.00	V	127	355	-51.77	13.47	-38.30	-13.3
15006.00	V	148	354	-52.39	13.35	-39.04	-14.0
17507.00	V	-	-	-49.17	11.67	-37.50	-12.5

Table 7-29. Radiated Spurious Data (Band 41/38 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz
CHANNEL:	40620	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	V	167	8	-53.55	10.62	-42.94	-17.9
7779.00	V	191	1	-45.70	11.40	-34.30	-9.3
10372.00	V	146	321	-42.31	12.54	-29.77	-4.8
12965.00	V	164	353	-50.43	13.33	-37.10	-12.1
15558.00	V	142	18	-59.88	16.12	-43.76	-18.8

Table 7-30. Radiated Spurious Data (Band 41/38 – Mid Channel)

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OPERATING FREQUENCY:	2685.00	MHz
CHANNEL:	41540	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5370.00	V	174	339	-54.85	10.72	-44.12	-19.1
8055.00	V	165	335	-45.61	11.14	-34.47	-9.5
10740.00	V	150	326	-47.41	12.71	-34.70	-9.7
13425.00	V	163	356	-50.50	12.50	-38.00	-13.0
16110.00	V	-	-	-60.64	16.52	-44.12	-19.1

Table 7-31. Radiated Spurious Data (Band 41/38 – High Channel)

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7.8 Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235 §27.54 RSS-130(4.3) RSS-132(5.3) RSS-133(6.3) RSS-139(6.3) RSS-195(5.4) RSS-199(4.3)

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, RSS-132 and RSS-133, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 27, RSS-130, RSS-139 and RSS-199, 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 12/17 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,500,023	23	0.0000033
100 %		- 30	707,499,946	-54	-0.0000076
100 %		- 20	707,499,904	-96	-0.0000136
100 %		- 10	707,500,176	176	0.0000249
100 %		0	707,500,139	139	0.0000196
100 %		+ 10	707,500,147	147	0.0000208
100 %		+ 20	707,500,054	54	0.0000076
100 %		+ 30	707,500,066	66	0.0000093
100 %		+ 40	707,500,322	322	0.0000455
100 %		+ 50	707,500,072	72	0.0000102
BATT. ENDPOINT	3.45	+ 20	707,500,052	52	0.0000073

Table 7-32. 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.

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Band 12/17 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

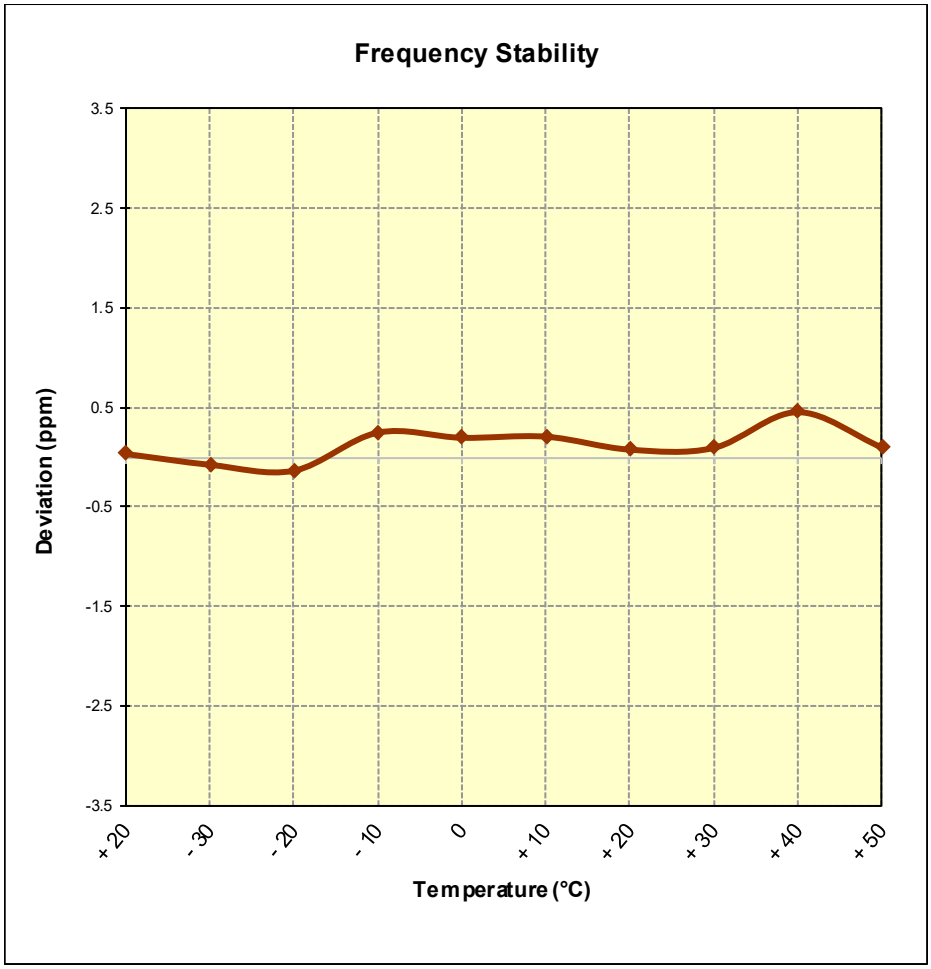

Figure 7-8. Frequency Stability Graph (Band 12/17)

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Band 13 Frequency Stability Measurements

§2.1055 §27.54 RSS-130(4.3)

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	781,999,901	-99	-0.0000127
100 %		- 30	782,000,020	20	0.0000026
100 %		- 20	781,999,673	-327	-0.0000418
100 %		- 10	781,999,926	-74	-0.0000095
100 %		0	782,000,035	35	0.0000045
100 %		+ 10	782,000,214	214	0.0000274
100 %		+ 20	782,000,067	67	0.0000086
100 %		+ 30	781,999,996	-4	-0.0000005
100 %		+ 40	781,999,822	-178	-0.0000228
100 %		+ 50	781,999,940	-60	-0.0000077
BATT. ENDPOINT	3.45	+ 20	781,999,852	-148	-0.0000189

Table 7-33. 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

§2.1055 §27.54 RSS-130(4.3)

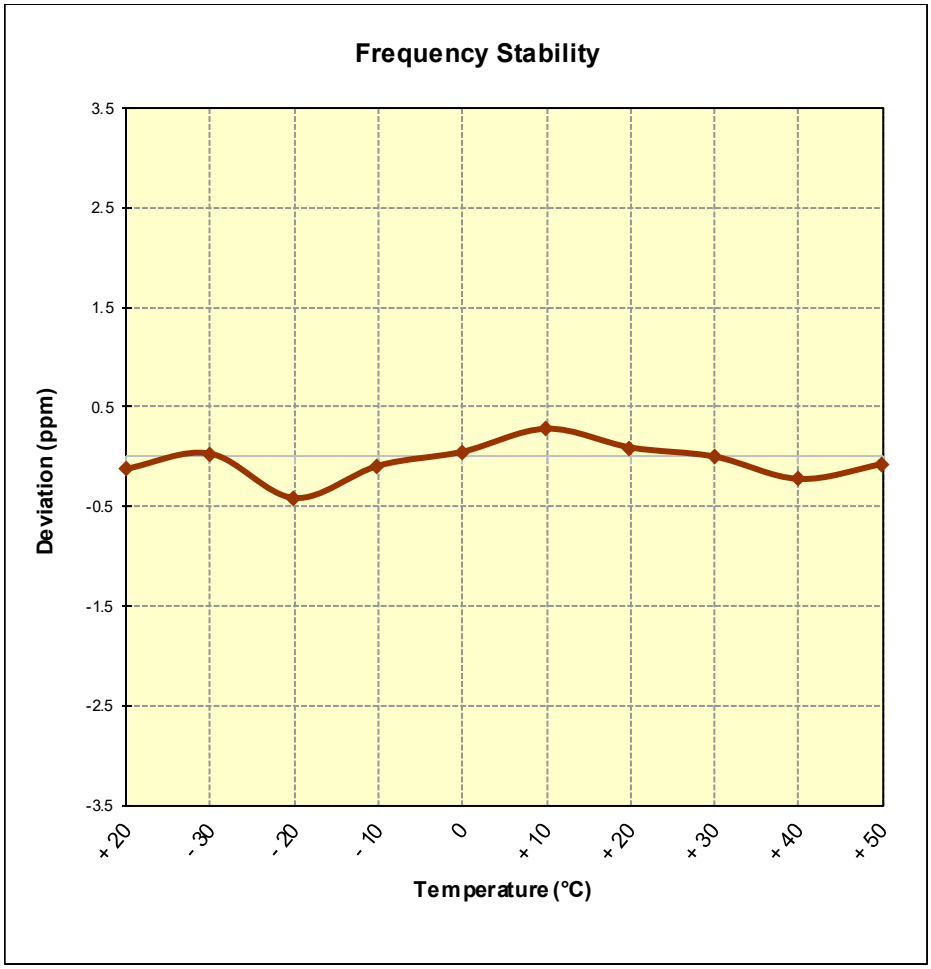

Figure 7-9. Frequency Stability Graph (Band 13)

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Band 26/5 Frequency Stability Measurements

§2.1055 §22.355 RSS-132(5.3)

OPERATING FREQUENCY:	831,500,000	Hz
CHANNEL:	26865	
REFERENCE VOLTAGE:	3.85	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	831,499,763	-237	-0.0000285
100 %		- 30	831,499,973	-27	-0.0000032
100 %		- 20	831,500,143	143	0.0000172
100 %		- 10	831,500,058	58	0.0000070
100 %		0	831,500,267	267	0.0000321
100 %		+ 10	831,499,783	-217	-0.0000261
100 %		+ 20	831,500,002	2	0.0000002
100 %		+ 30	831,499,707	-293	-0.0000352
100 %		+ 40	831,499,928	-72	-0.0000087
100 %		+ 50	831,499,961	-39	-0.0000047
BATT. ENDPOINT	3.45	+ 20	831,500,165	165	0.0000198

Table 7-34. Frequency Stability Data (Band 26/5)

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Band 26/5 Frequency Stability Measurements

§2.1055 §22.355 RSS-132(5.3)

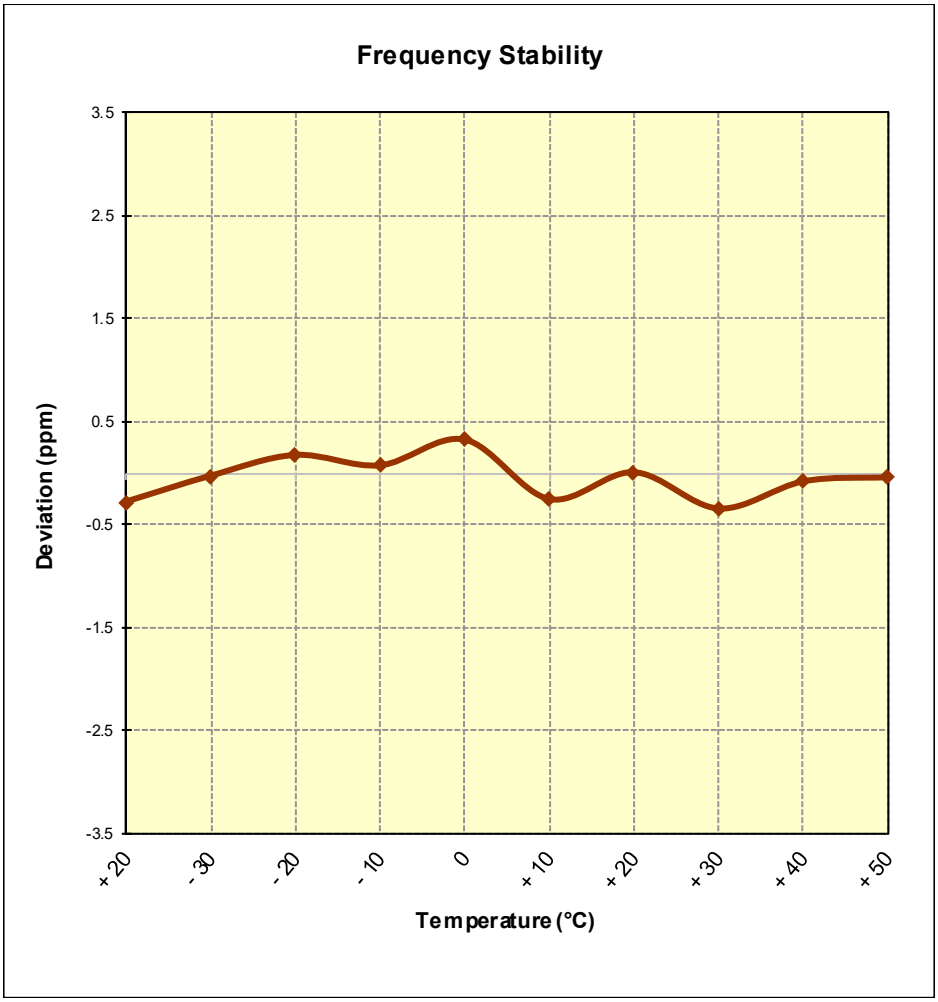

Figure 7-10. Frequency Stability Graph (Band 26/5)

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Band 66/4 Frequency Stability Measurements

§2.1055 §§27.54 RSS-139(6.4)

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,744,999,787	-213	-0.0000122
100 %		- 30	1,744,999,778	-222	-0.0000127
100 %		- 20	1,745,000,005	5	0.0000003
100 %		- 10	1,745,000,144	144	0.0000083
100 %		0	1,745,000,003	3	0.0000002
100 %		+ 10	1,745,000,210	210	0.0000120
100 %		+ 20	1,744,999,942	-58	-0.0000033
100 %		+ 30	1,744,999,976	-24	-0.0000014
100 %		+ 40	1,745,000,162	162	0.0000093
100 %		+ 50	1,744,999,885	-115	-0.0000066
BATT. ENDPOINT	3.45	+ 20	1,745,000,042	42	0.0000024

Table 7-35. 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

§2.1055 §§27.54 RSS-139(6.4)

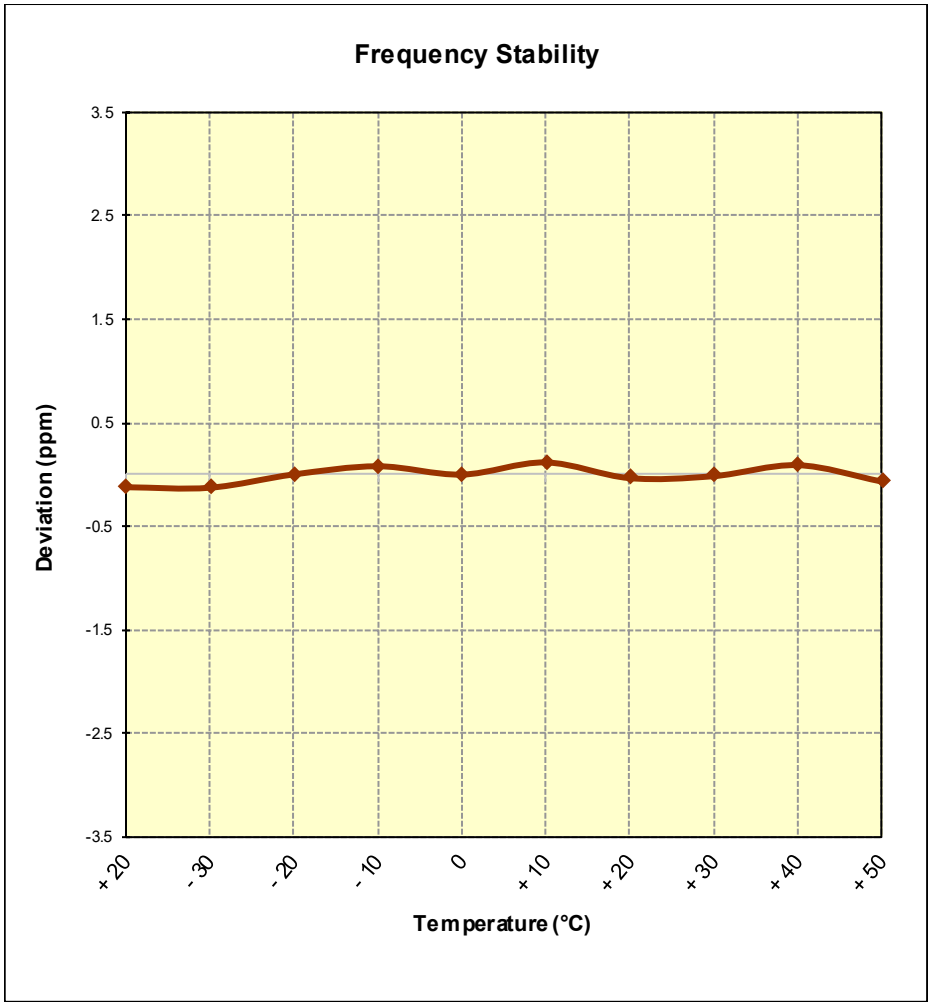

Figure 7-11. Frequency Stability Graph (Band 66/4)

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Band 2 Frequency Stability Measurements

§2.1055 §24.235 RSS-133(6.3)

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	3.85	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,879,999,770	-230	-0.0000122
100 %		- 30	1,880,000,021	21	0.0000011
100 %		- 20	1,880,000,248	248	0.0000132
100 %		- 10	1,880,000,274	274	0.0000146
100 %		0	1,879,999,982	-18	-0.0000010
100 %		+ 10	1,880,000,014	14	0.0000007
100 %		+ 20	1,879,999,999	-1	-0.0000001
100 %		+ 30	1,879,999,664	-336	-0.0000179
100 %		+ 40	1,879,999,657	-343	-0.0000182
100 %		+ 50	1,880,000,001	1	0.0000001
BATT. ENDPOINT	3.45	+ 20	1,880,000,012	12	0.0000006

Table 7-36. Frequency Stability Data (Band 2)

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Band 2 Frequency Stability Measurements

§2.1055 §24.235 RSS-133(6.3)

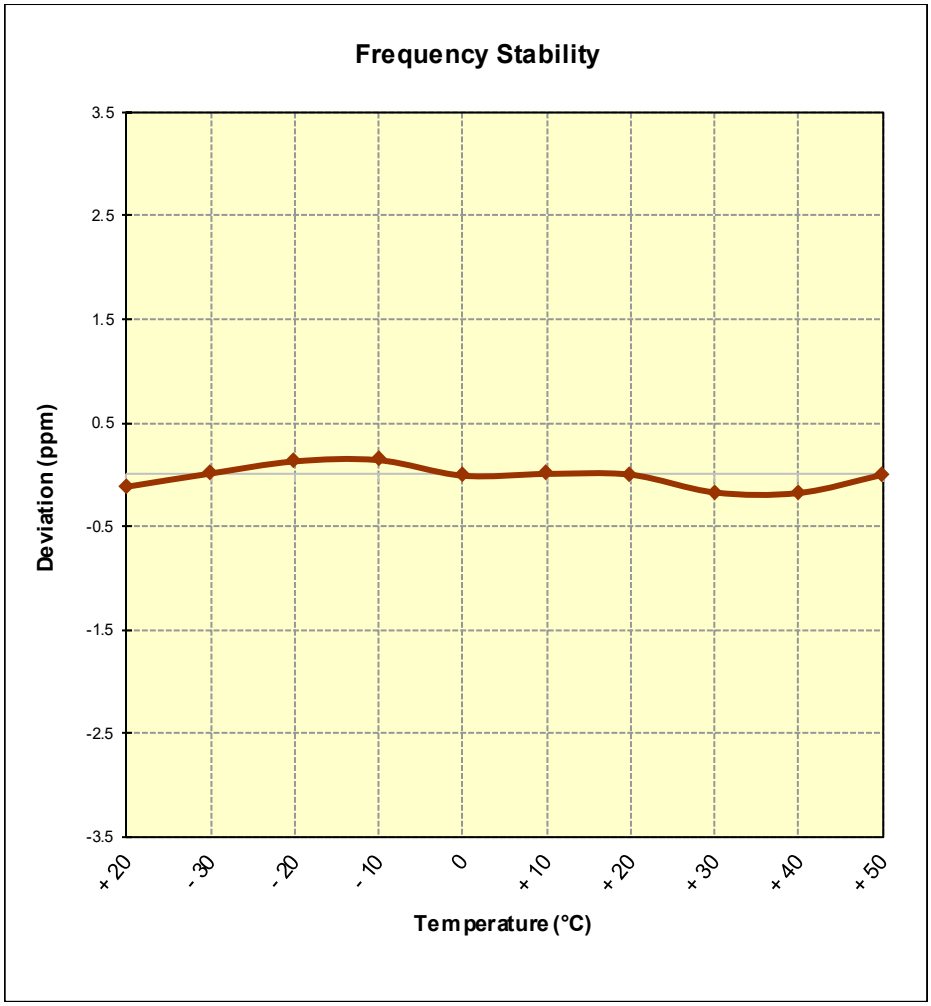

Figure 7-12. Frequency Stability Graph (Band 2)

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Band 7 Frequency Stability Measurements

§2.1055 §27.54 RSS-199(4.3)

OPERATING FREQUENCY:	2,535,000,000	Hz
CHANNEL:	21100	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,535,000,076	76	0.0000030
100 %		- 30	2,534,999,933	-67	-0.0000026
100 %		- 20	2,534,999,798	-202	-0.0000080
100 %		- 10	2,535,000,238	238	0.0000094
100 %		0	2,535,000,394	394	0.0000155
100 %		+ 10	2,534,999,814	-186	-0.0000073
100 %		+ 20	2,534,999,946	-54	-0.0000021
100 %		+ 30	2,535,000,045	45	0.0000018
100 %		+ 40	2,534,999,858	-142	-0.0000056
100 %		+ 50	2,534,999,991	-9	-0.0000004
BATT. ENDPOINT	3.45	+ 20	2,534,999,820	-180	-0.0000071

Table 7-37. Frequency Stability Data (Band 7)

Note:

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

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Band 7 Frequency Stability Measurements

§2.1055 §27.54 RSS-199(4.3)

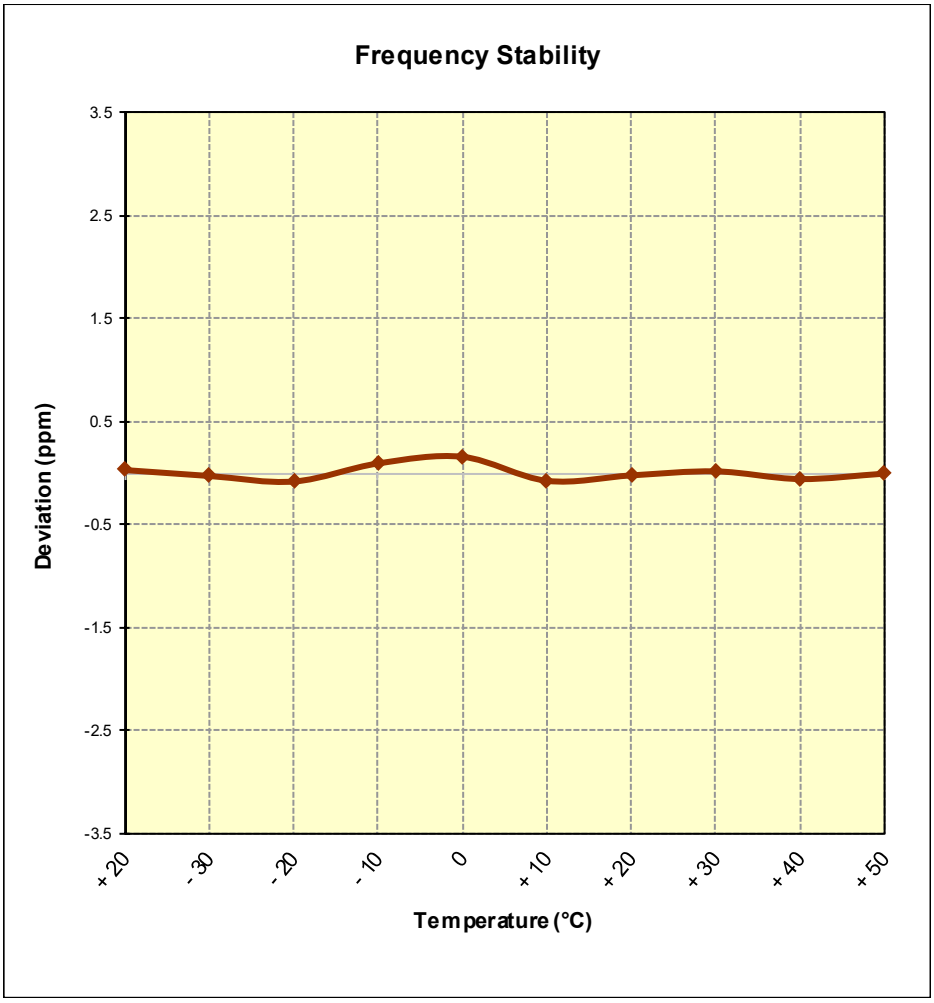

Figure 7-13. Frequency Stability Graph (Band 7)

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Band 41/38 Frequency Stability Measurements

§2.1055 §27.54 RSS-199(4.3)

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,592,999,901	-99	-0.0000038
100 %		- 30	2,592,999,662	-338	-0.0000130
100 %		- 20	2,593,000,079	79	0.0000030
100 %		- 10	2,593,000,132	132	0.0000051
100 %		0	2,593,000,056	56	0.0000022
100 %		+ 10	2,592,999,942	-58	-0.0000022
100 %		+ 20	2,592,999,822	-178	-0.0000069
100 %		+ 30	2,593,000,218	218	0.0000084
100 %		+ 40	2,593,000,227	227	0.0000088
100 %		+ 50	2,592,999,983	-17	-0.0000007
BATT. ENDPOINT	3.45	+ 20	2,592,999,670	-330	-0.0000127

Table 7-38. Frequency Stability Data (Band 41/38)

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 41/38 Frequency Stability Measurements

§2.1055 §27.54 RSS-199(4.3)

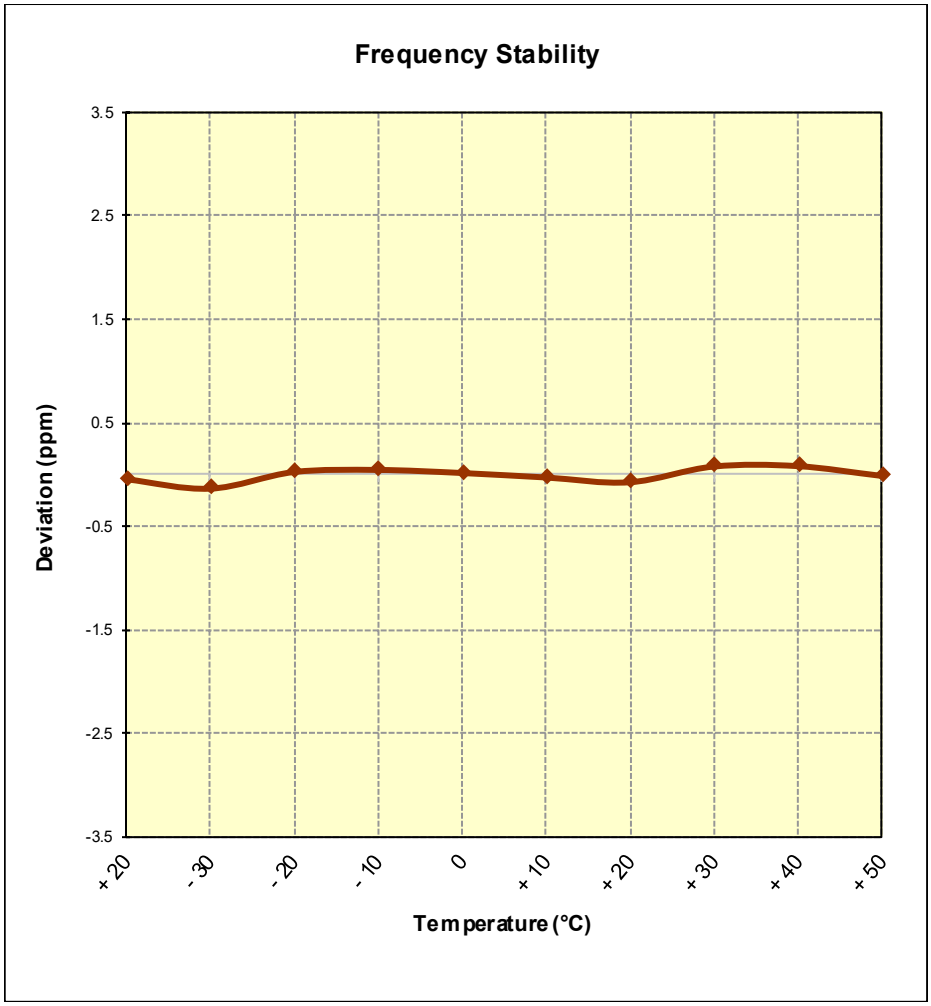

Figure 7-14. Frequency Stability Graph (Band 41/38)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMA530N** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

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