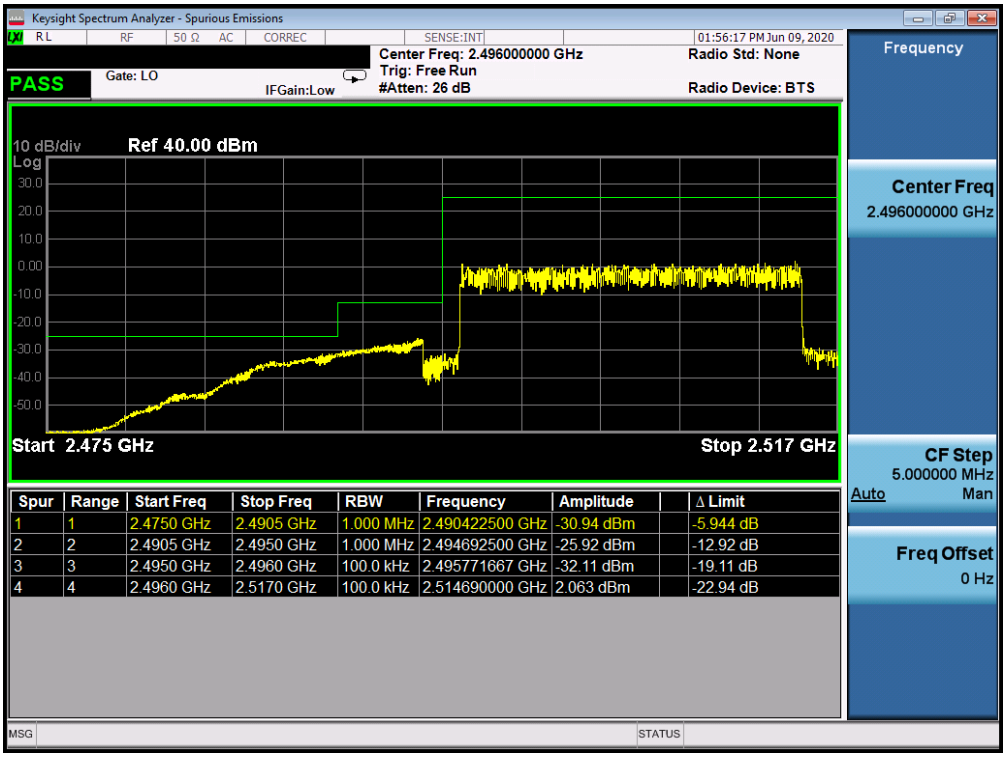
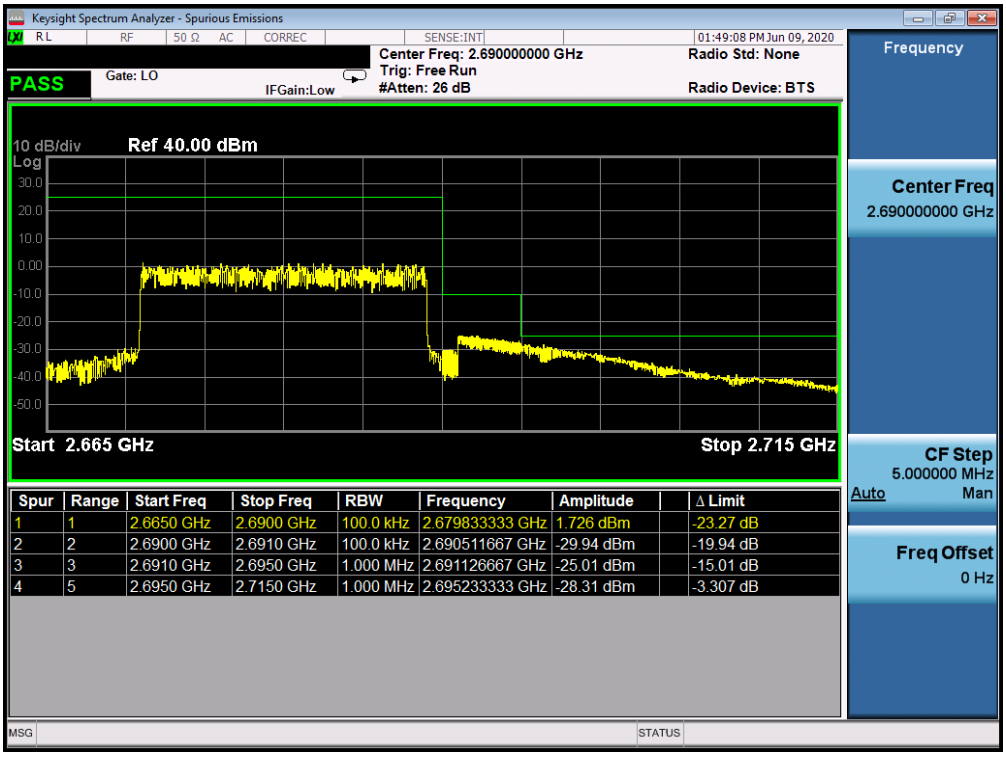


Plot 7-220. Lower ACP Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-221. Upper ACP Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)

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7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW ≥ 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.

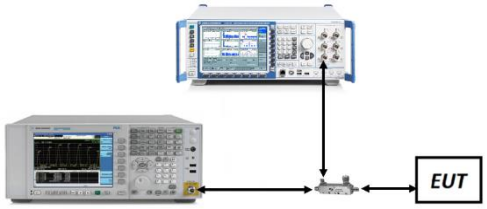

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

1. This device only supports 27RBs or less for 16-QAM uplink.
2. All RB sizes have been investigated and Full RB configuration was found and reported as worst case.

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LTE	BW (MHz)	Modulation	Average Power [dBm]	PAR at 0.1% [dB]	Limit [dB]	Margin [dB]
Band 4	1.4	QPSK	23.48	5.92	13	-7.08
Band 4	1.4	16QAM	22.82	6.58	13	-6.42
Band 4	3	QPSK	23.33	5.99	13	-7.01
Band 4	3	16QAM	22.68	6.68	13	-6.32
Band 4	5	QPSK	23.30	5.97	13	-7.03
Band 4	5	16QAM	22.62	6.56	13	-6.44
Band 4	10	QPSK	23.35	5.79	13	-7.21
Band 4	10	16QAM	22.61	6.50	13	-6.50
Band 4	15	QPSK	23.41	5.98	13	-7.02
Band 4	15	16QAM	22.50	6.48	13	-6.52
Band 4	20	QPSK	23.70	5.50	13	-7.50
Band 4	20	16QAM	22.50	6.44	13	-6.56
Band 66	1.4	QPSK	23.49	5.81	13	-7.19
Band 66	1.4	16QAM	23.08	6.40	13	-6.60
Band 66	3	QPSK	23.44	5.92	13	-7.08
Band 66	3	16QAM	23.01	6.51	13	-6.49
Band 66	5	QPSK	23.38	5.91	13	-7.09
Band 66	5	16QAM	22.88	6.46	13	-6.54
Band 66	10	QPSK	23.28	5.81	13	-7.19
Band 66	10	16QAM	22.97	6.35	13	-6.65
Band 66	15	QPSK	23.31	5.92	13	-7.08
Band 66	15	16QAM	22.84	6.36	13	-6.64
Band 66	20	QPSK	23.59	5.56	13	-7.44
Band 66	20	16QAM	23.17	6.40	13	-6.60
Band 2	1.4	QPSK	23.33	5.58	13	-7.42
Band 2	1.4	16QAM	22.44	6.27	13	-6.73
Band 2	3	QPSK	23.31	5.77	13	-7.23
Band 2	3	16QAM	22.39	6.43	13	-6.57
Band 2	5	QPSK	23.32	5.77	13	-7.23
Band 2	5	16QAM	22.34	6.37	13	-6.63
Band 2	10	QPSK	23.37	5.62	13	-7.38
Band 2	10	16QAM	22.41	6.20	13	-6.80
Band 2	15	QPSK	23.48	5.81	13	-7.19
Band 2	15	16QAM	22.42	6.15	13	-6.85
Band 2	20	QPSK	23.59	5.53	13	-7.47
Band 2	20	16QAM	22.45	6.12	13	-6.88
Band 25	1.4	QPSK	23.29	5.66	13	-7.34
Band 25	1.4	16QAM	22.37	6.35	13	-6.65
Band 25	3	QPSK	23.31	5.83	13	-7.17
Band 25	3	16QAM	22.34	6.46	13	-6.54
Band 25	5	QPSK	23.30	5.82	13	-7.18
Band 25	5	16QAM	22.31	6.42	13	-6.58
Band 25	10	QPSK	23.36	5.69	13	-7.31
Band 25	10	16QAM	22.33	6.21	13	-6.79
Band 25	15	QPSK	23.41	5.90	13	-7.10
Band 25	15	16QAM	22.29	6.17	13	-6.83
Band 25	20	QPSK	23.57	5.60	13	-7.40
Band 25	20	16QAM	22.35	6.17	13	-6.83

Table 7-6. PAR Results (Mid Bands)

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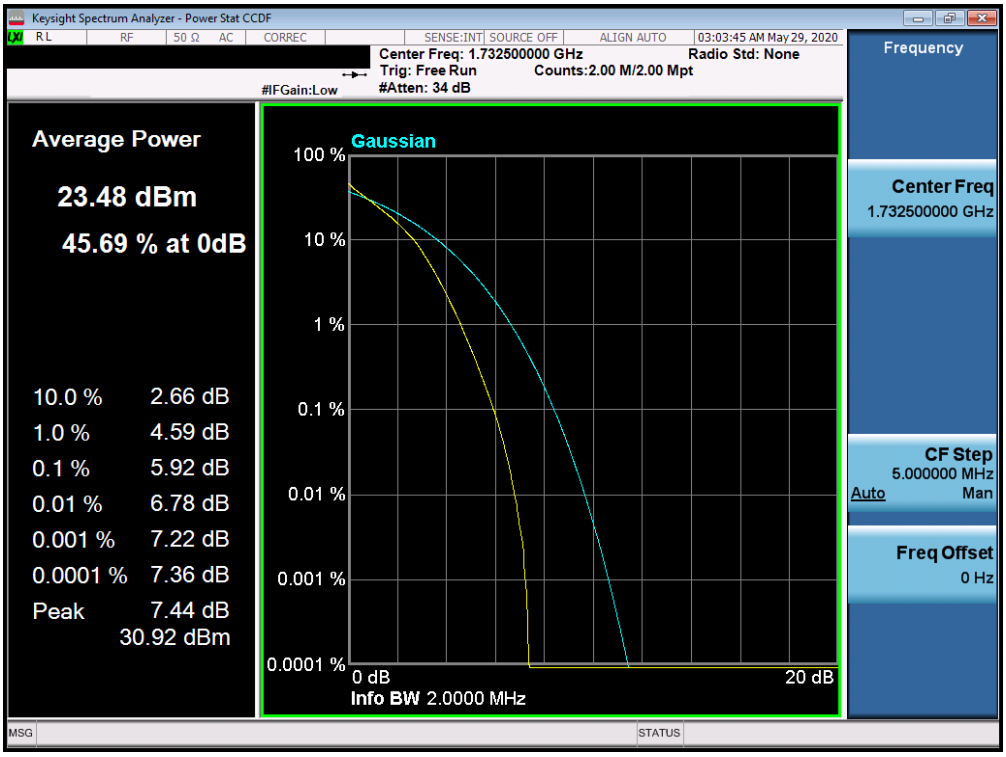
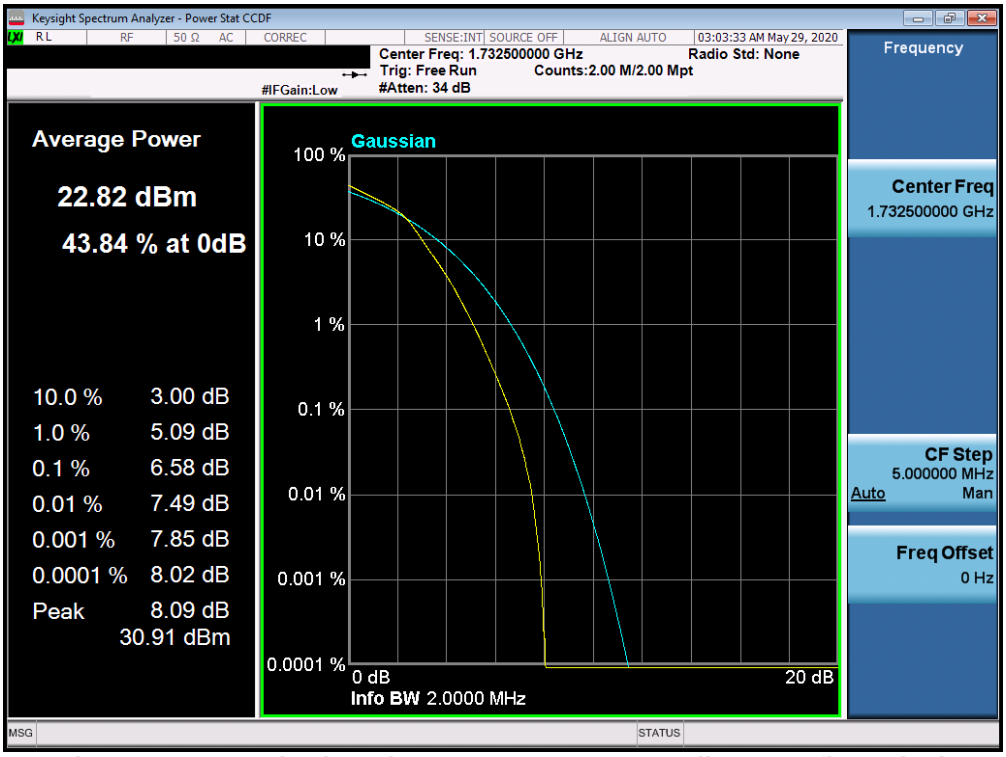
Band 4



Plot 7-222. PAR Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-223. PAR Plot (Band 4 - 1.4MHz 16-QAM - Full RB Configuration)

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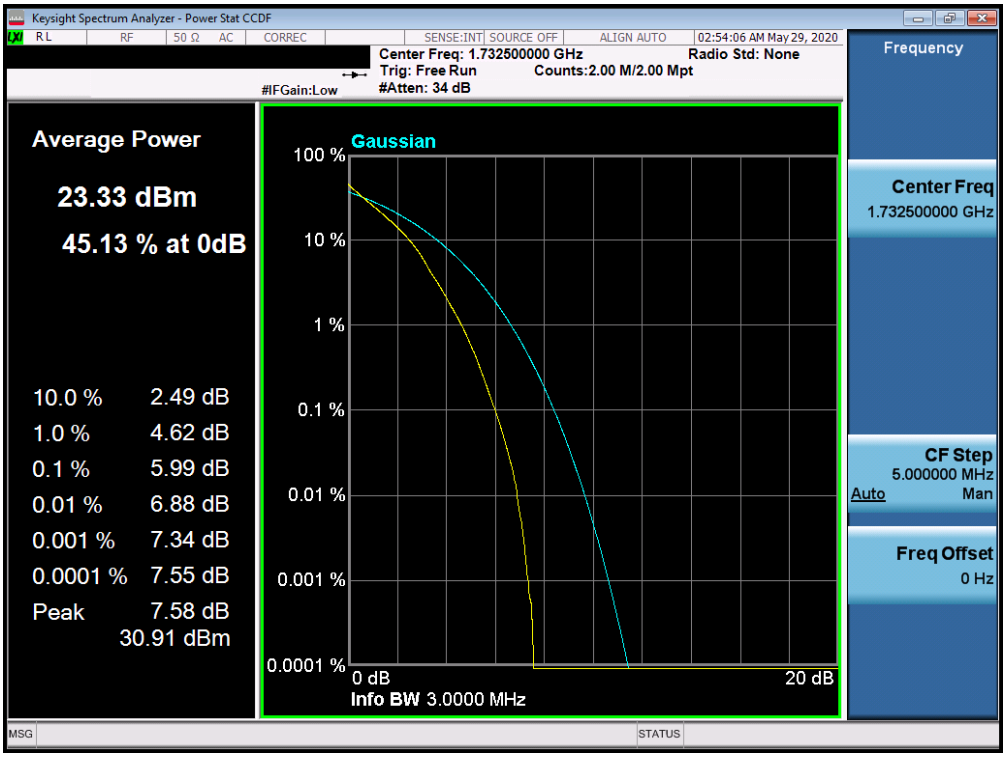
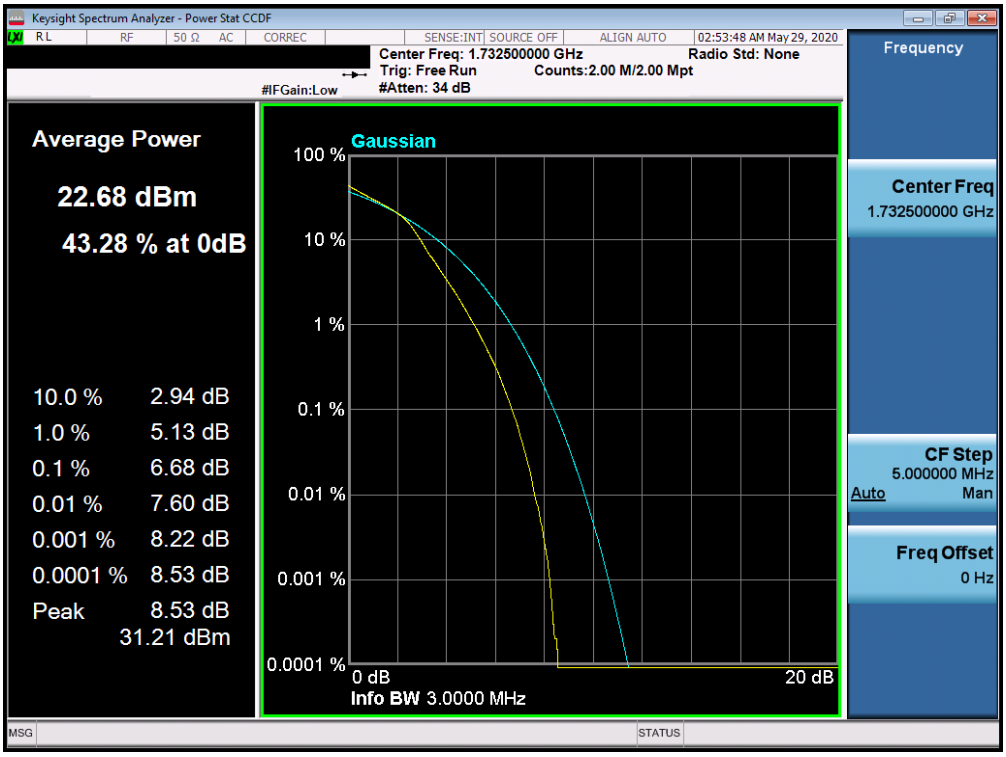


Plot 7-224. PAR Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-225. PAR Plot (Band 4 - 3.0MHz 16-QAM - Full RB Configuration)

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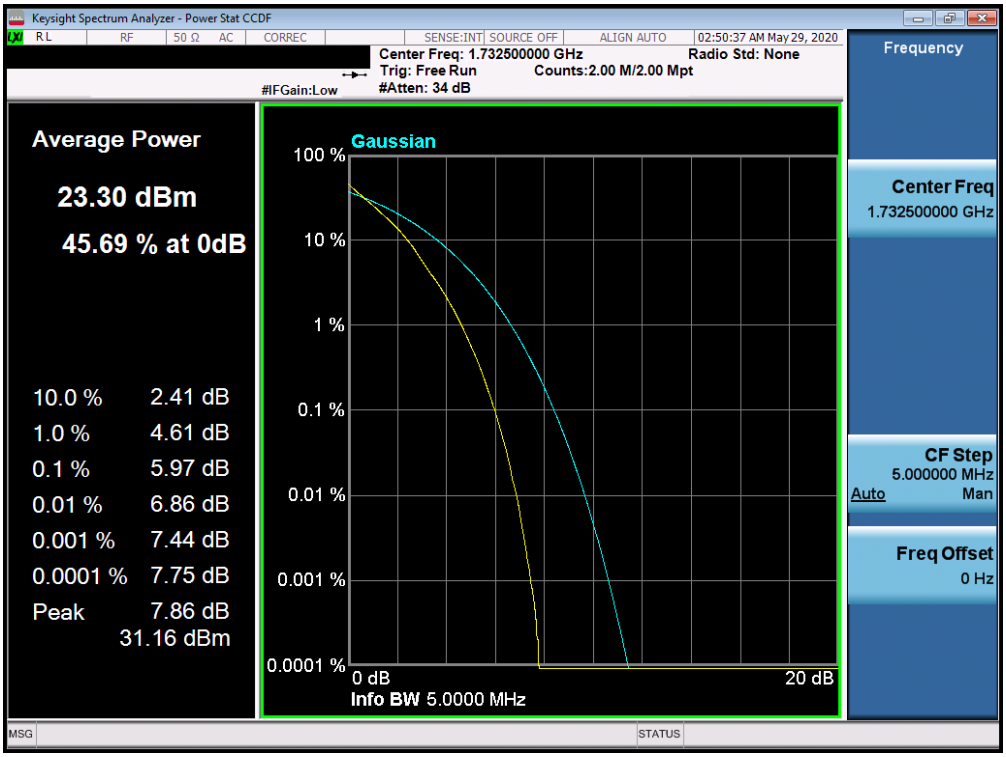
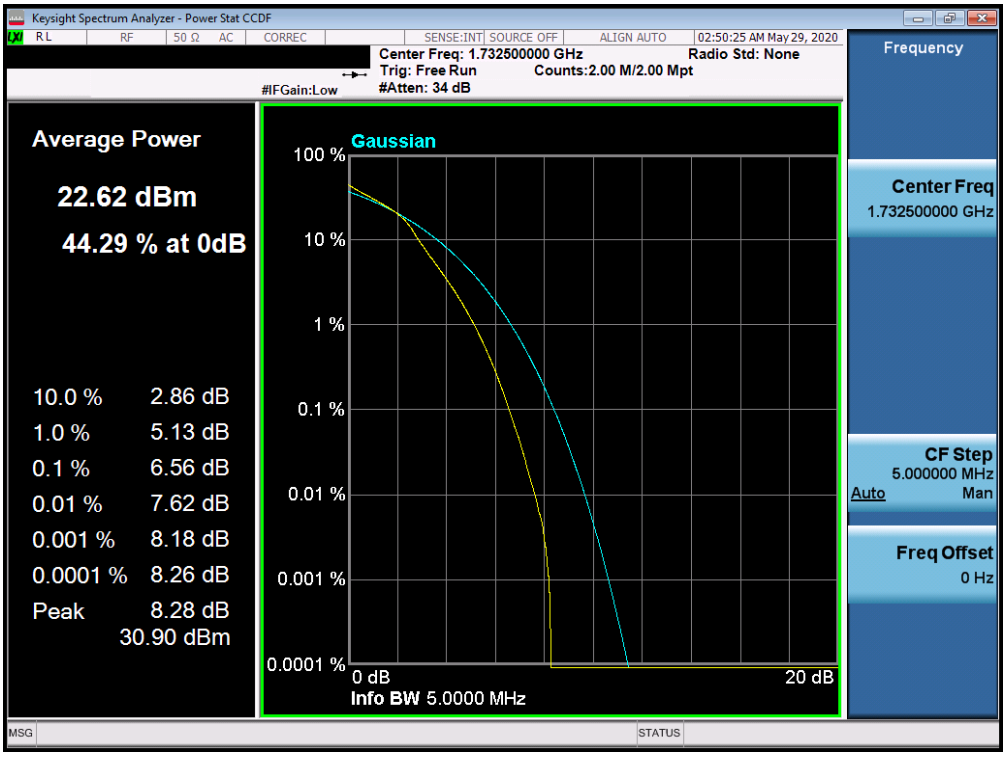


Plot 7-226. PAR Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-227. PAR Plot (Band 4 - 5.0MHz 16-QAM - Full RB Configuration)

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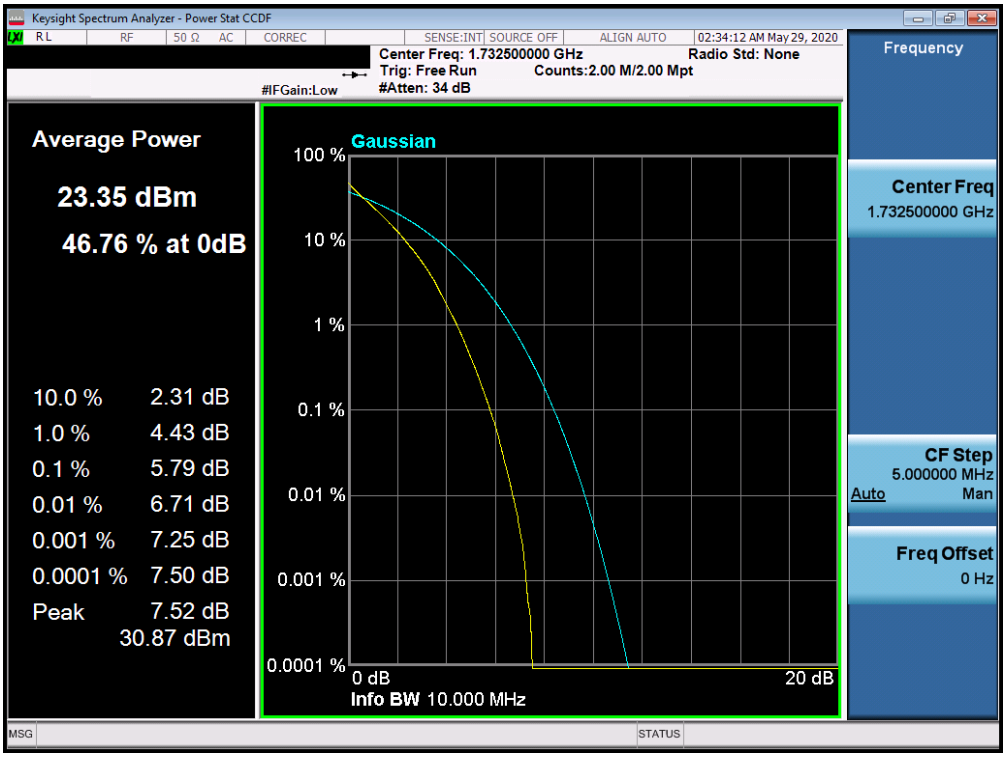
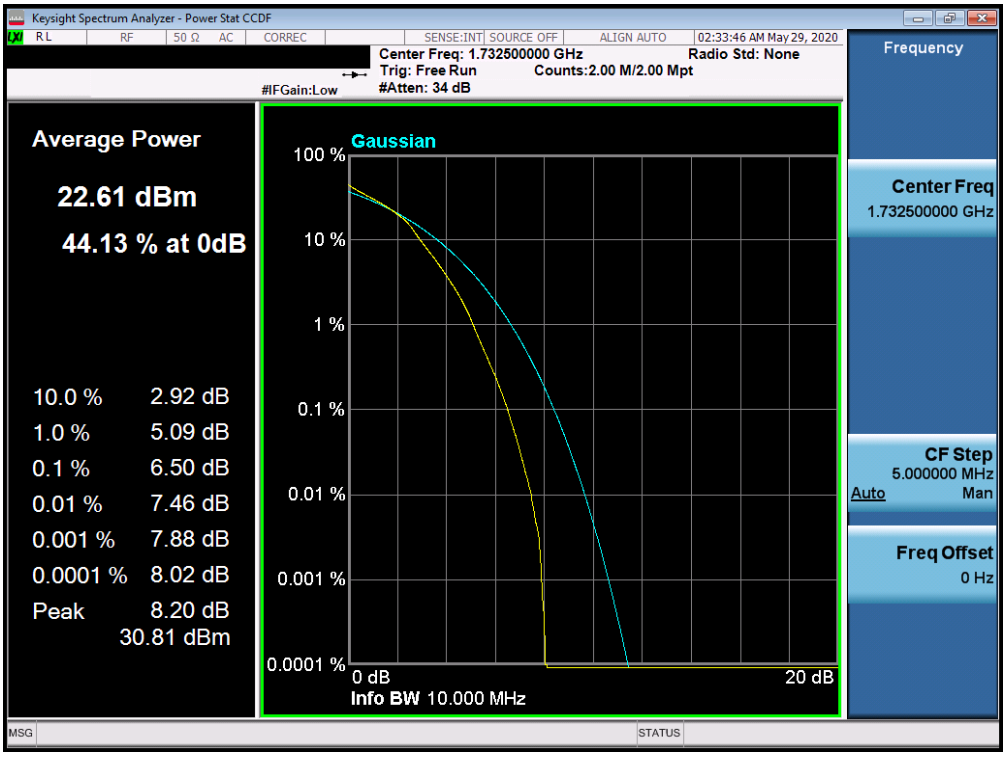


Plot 7-228. PAR Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-229. PAR Plot (Band 4 - 10.0MHz 16-QAM - Full RB Configuration)

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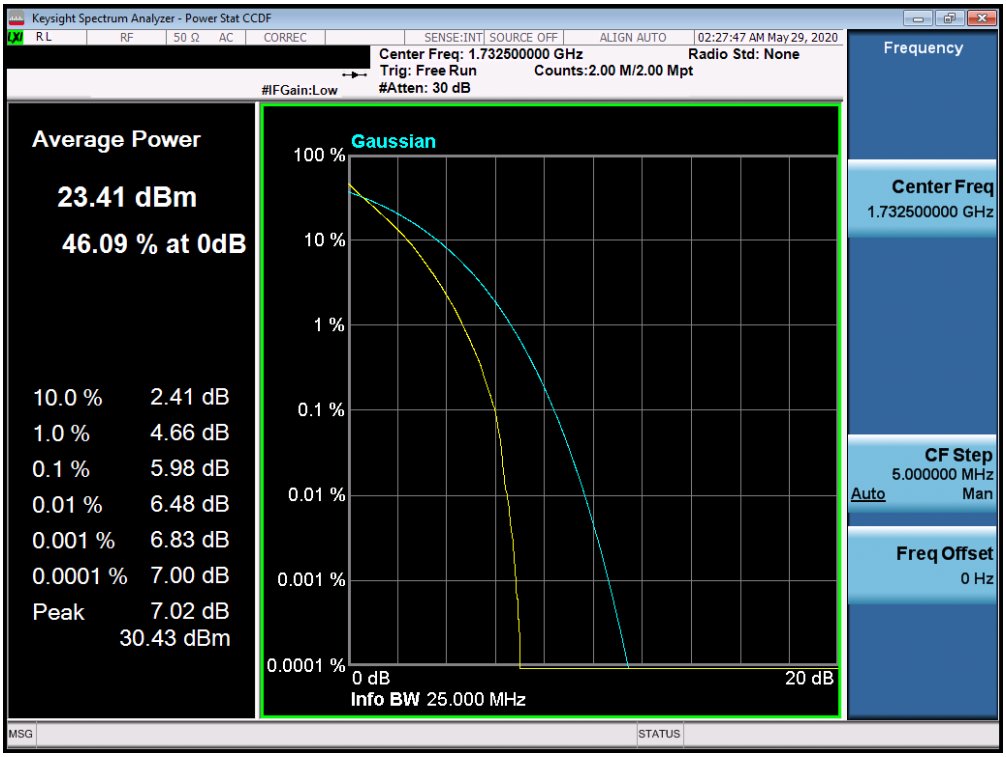
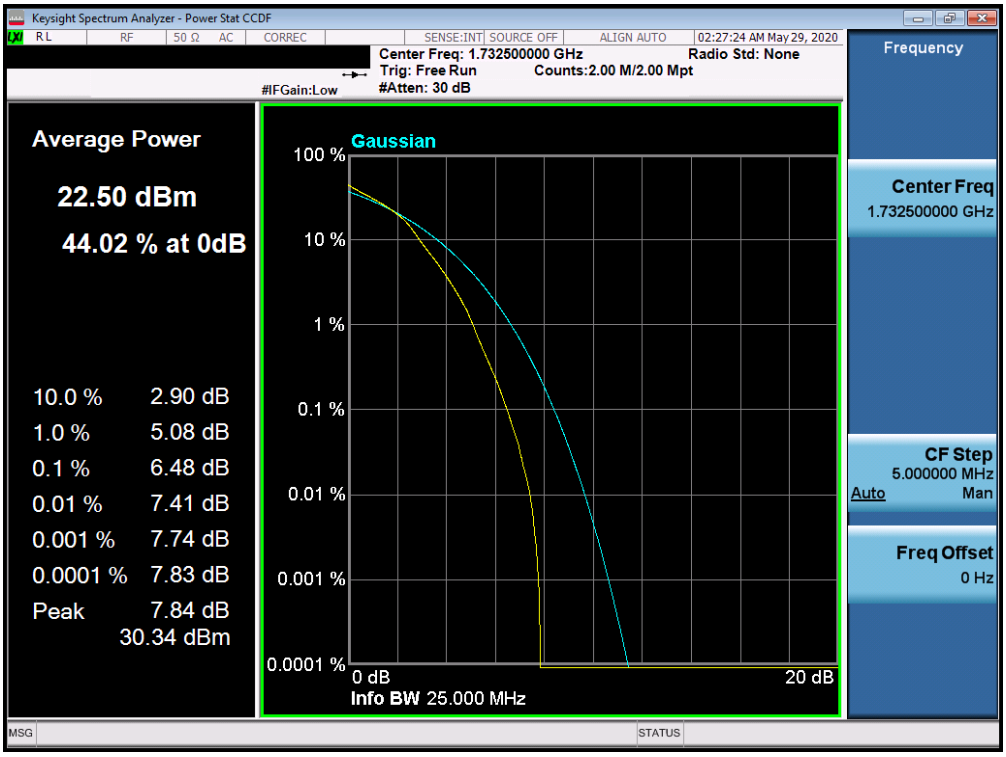


Plot 7-230. PAR Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-231. PAR Plot (Band 4 - 15.0MHz 16-QAM - Full RB Configuration)

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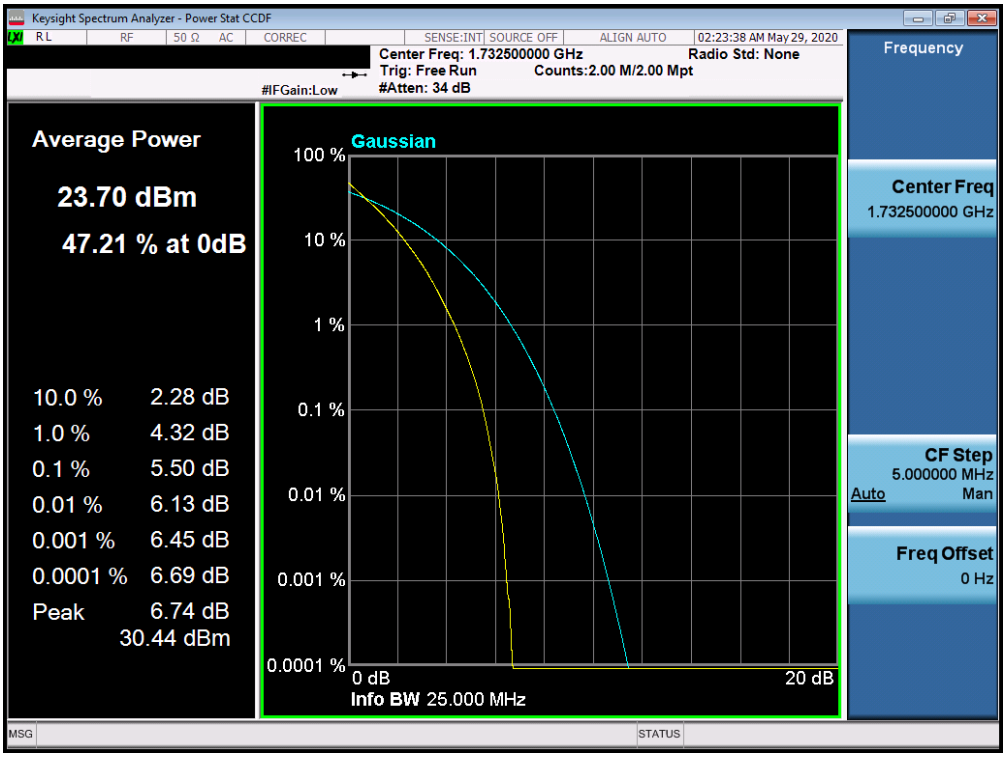
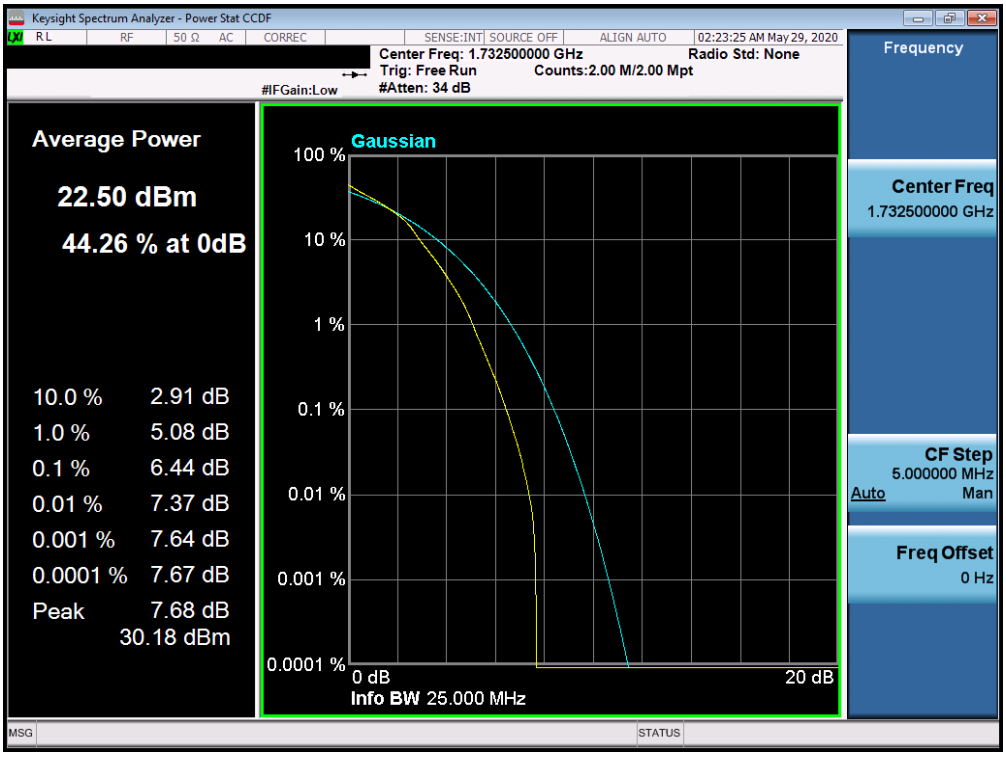


Plot 7-232. PAR Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-233. PAR Plot (Band 4 - 20.0MHz 16-QAM - Full RB Configuration)

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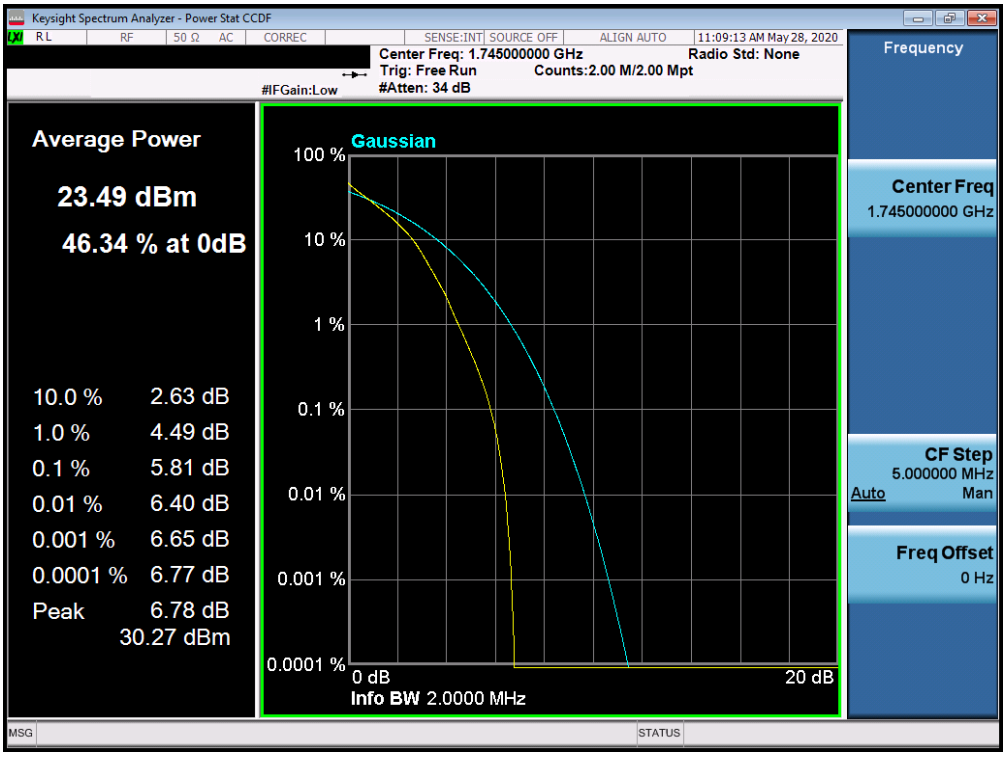
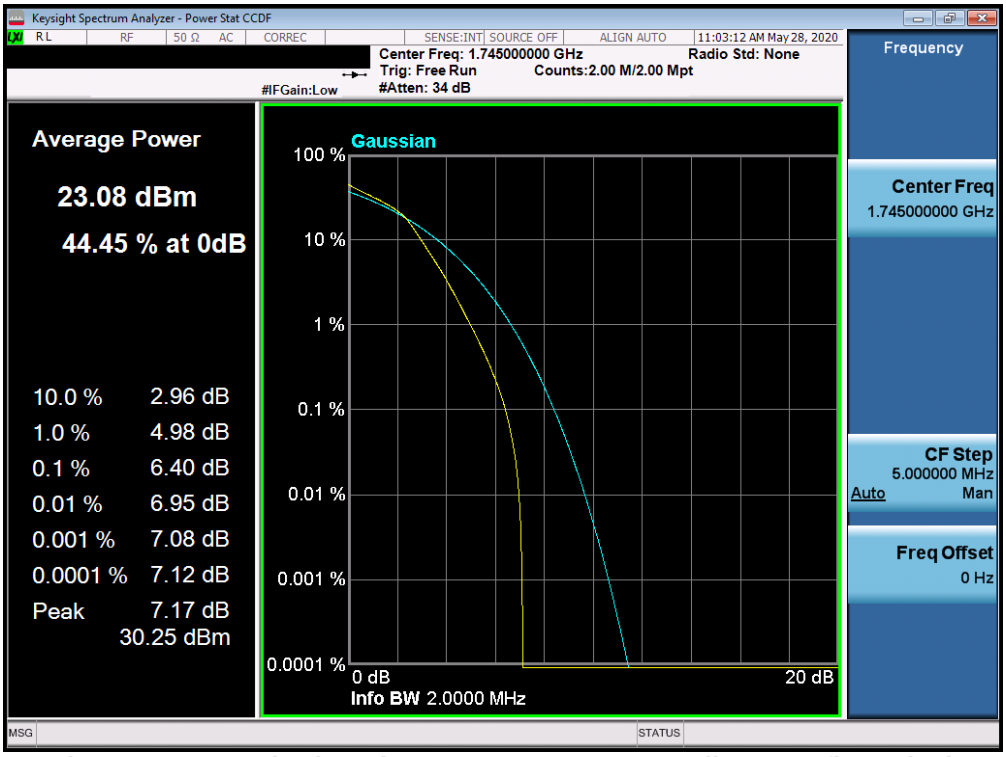
Band 66



Plot 7-234. PAR Plot (Band 66 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-235. PAR Plot (Band 66 - 1.4MHz 16-QAM - Full RB Configuration)

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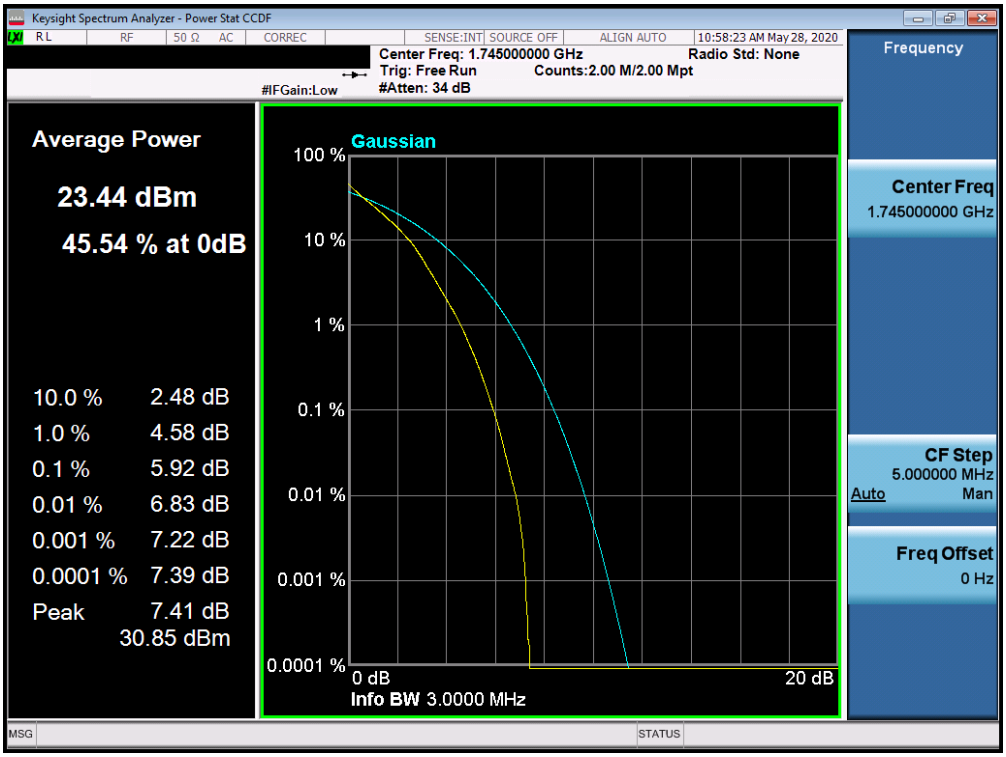
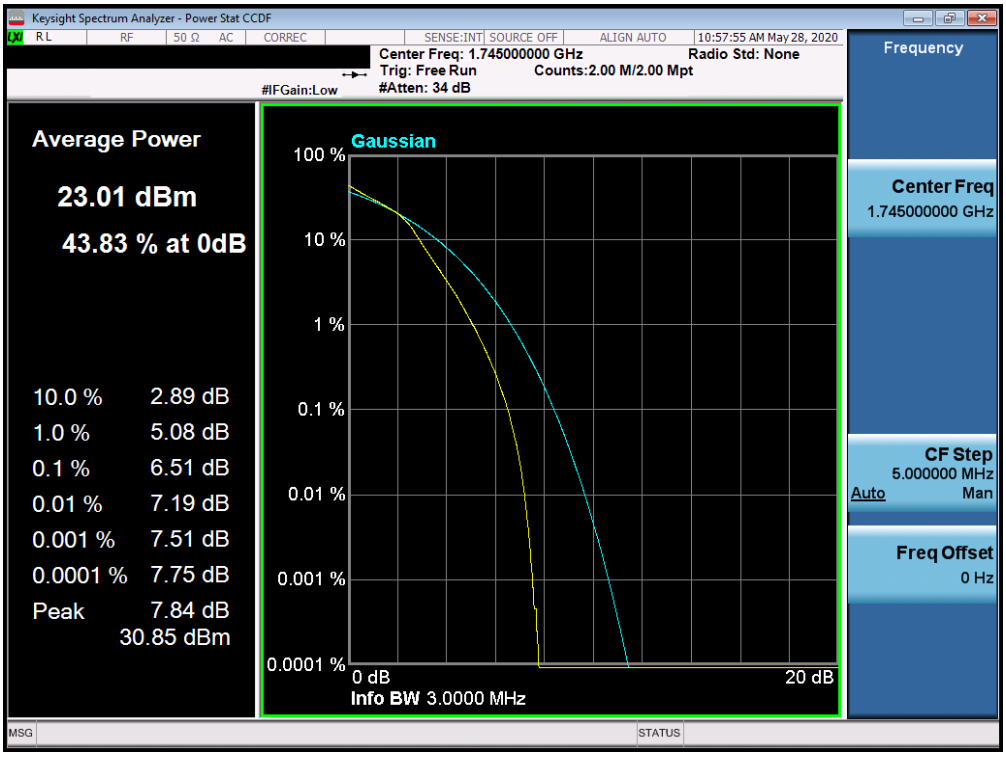


Plot 7-236. PAR Plot (Band 66 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-237. PAR Plot (Band 66 - 3.0MHz 16-QAM - Full RB Configuration)

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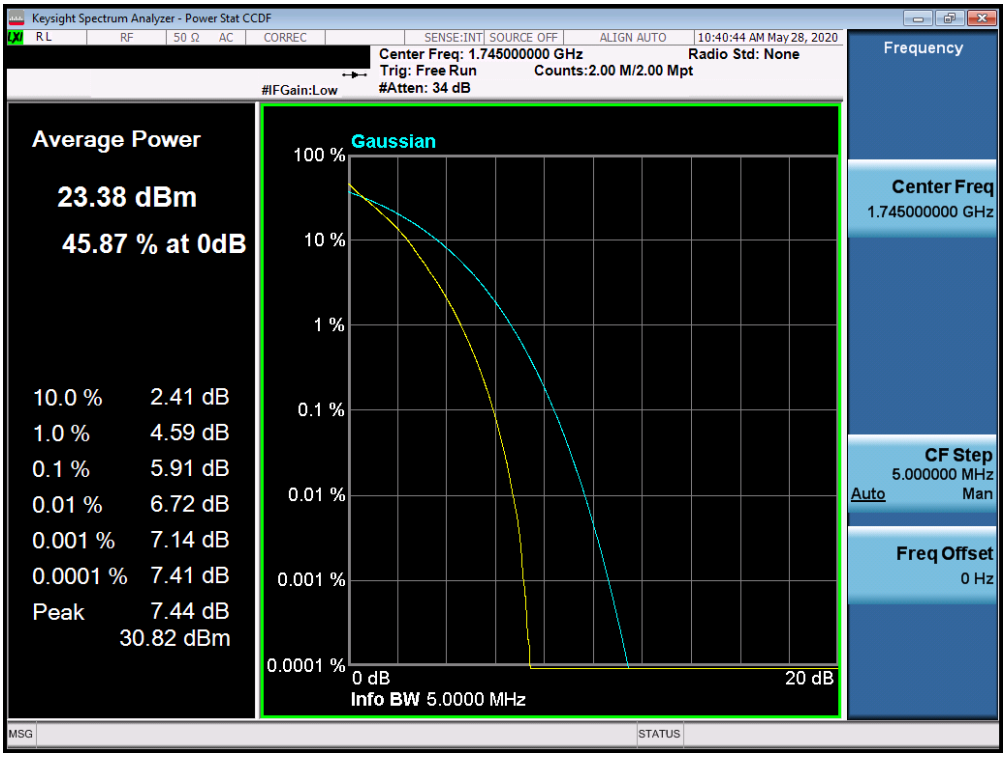
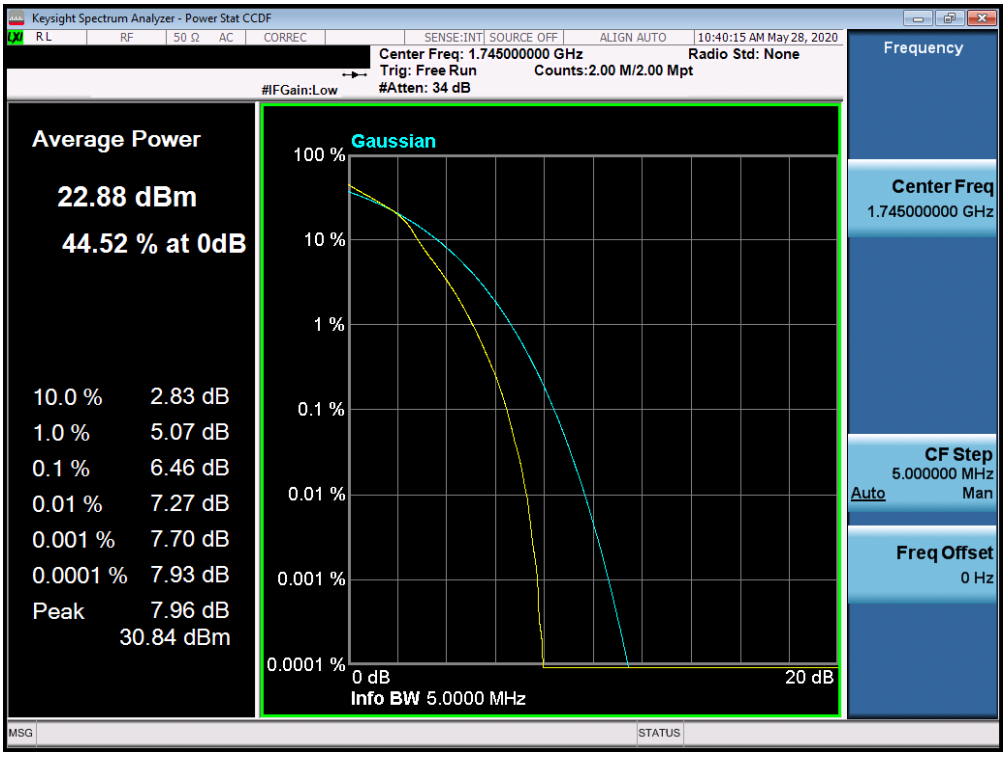


Plot 7-238. PAR Plot (Band 66 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-239. PAR Plot (Band 66 - 5.0MHz 16-QAM - Full RB Configuration)

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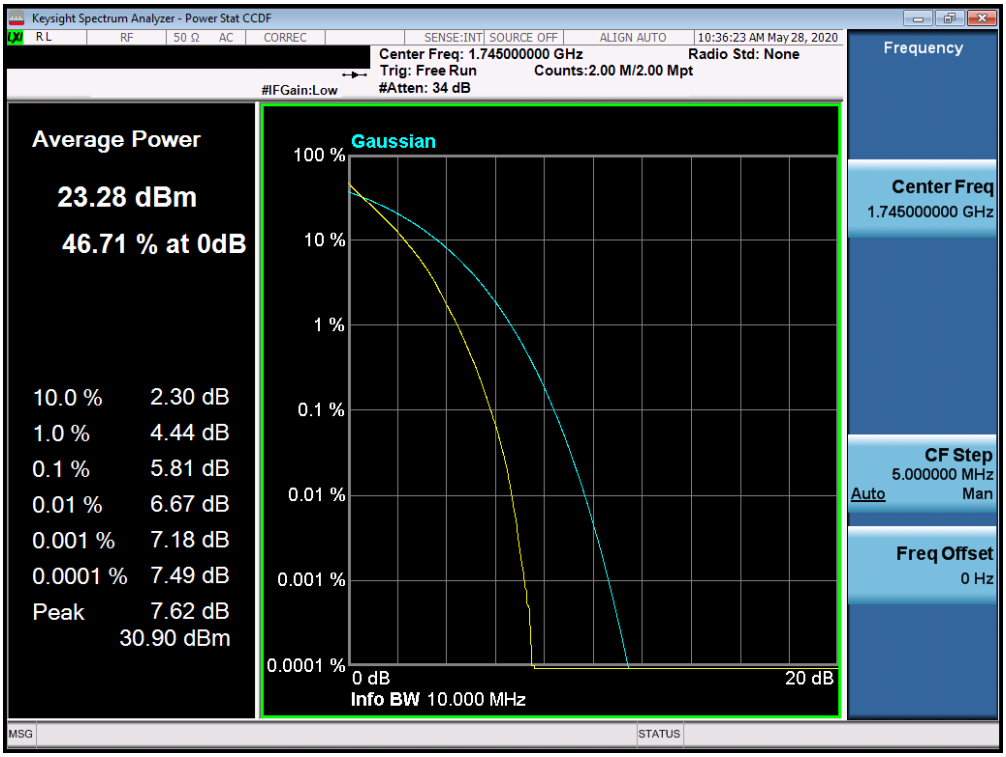
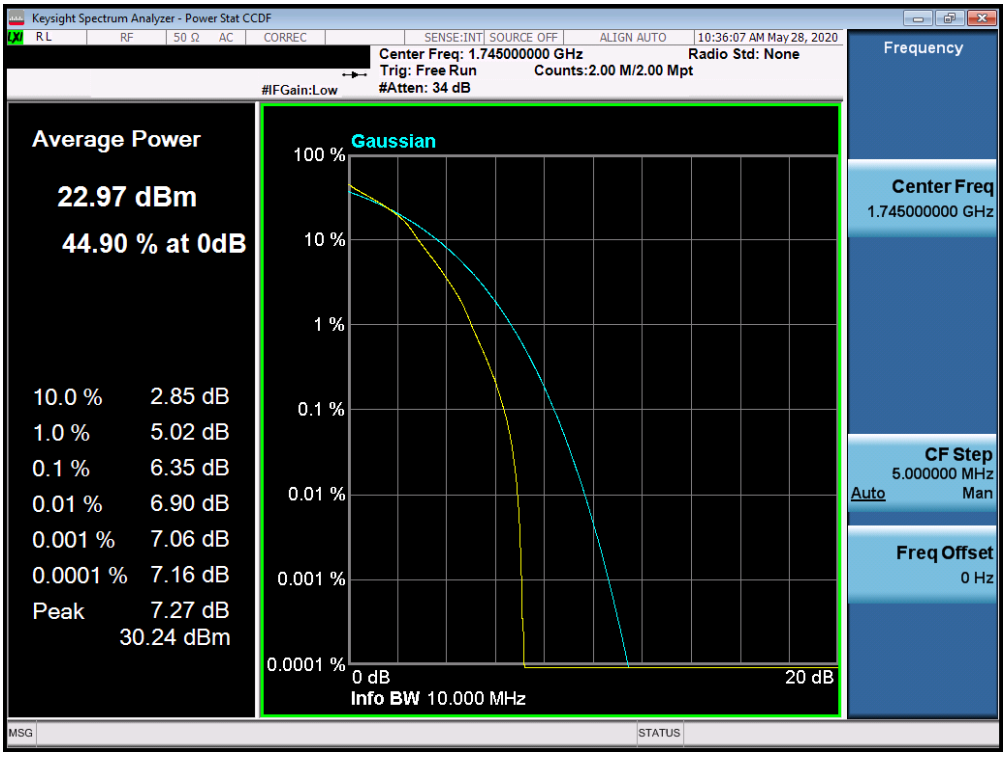


Plot 7-240. PAR Plot (Band 66 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-241. PAR Plot (Band 66 - 10.0MHz 16-QAM - Full RB Configuration)

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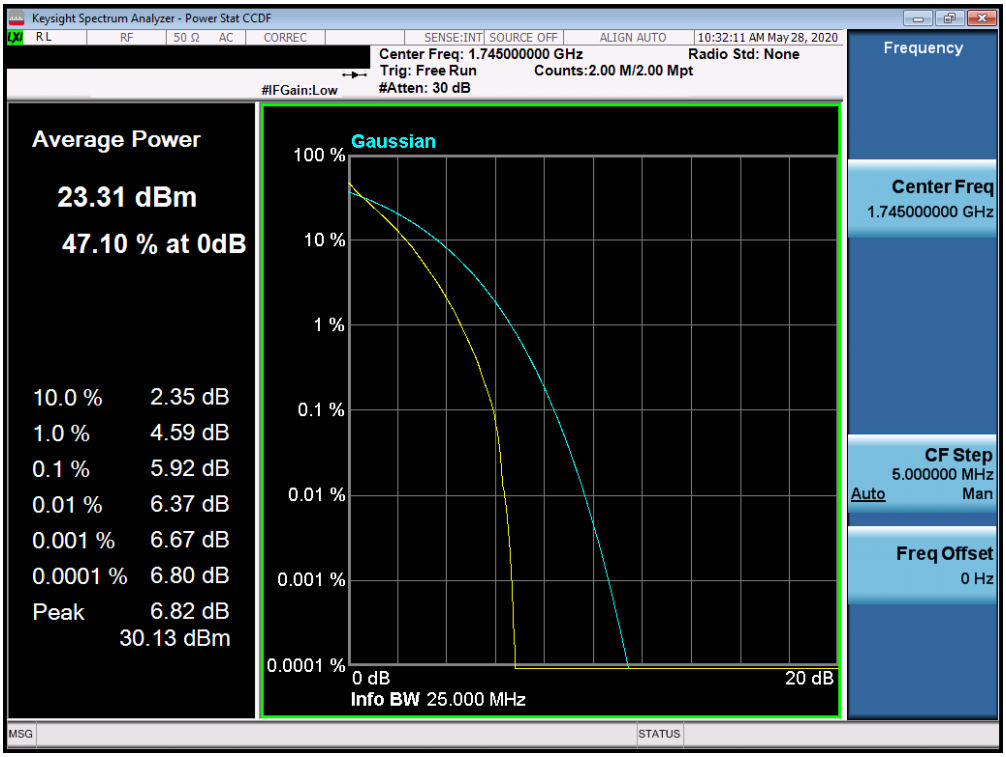
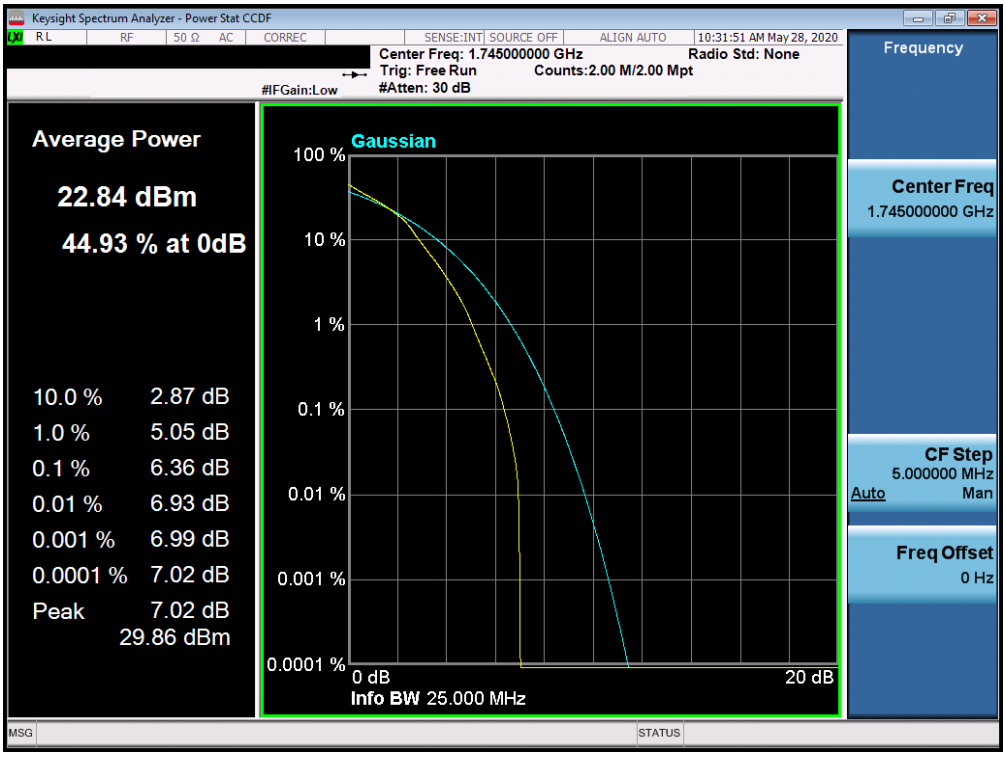


Plot 7-242. PAR Plot (Band 66 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-243. PAR Plot (Band 66 - 15.0MHz 16-QAM - Full RB Configuration)

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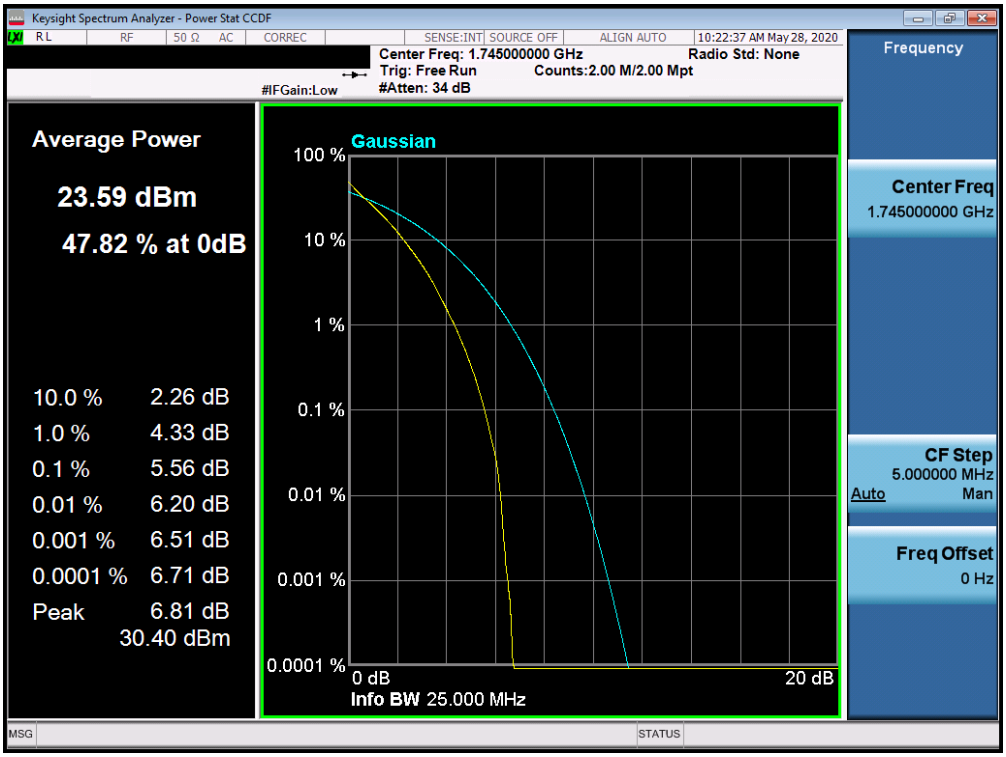
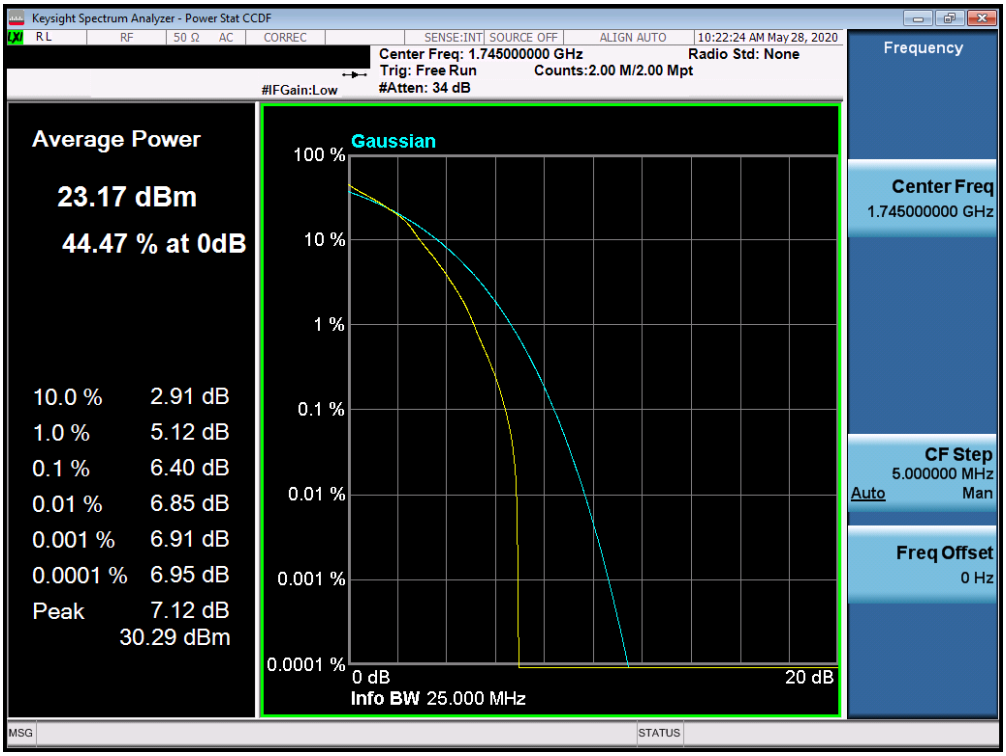


Plot 7-244. PAR Plot (Band 66 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-245. PAR Plot (Band 66 - 20.0MHz 16-QAM - Full RB Configuration)

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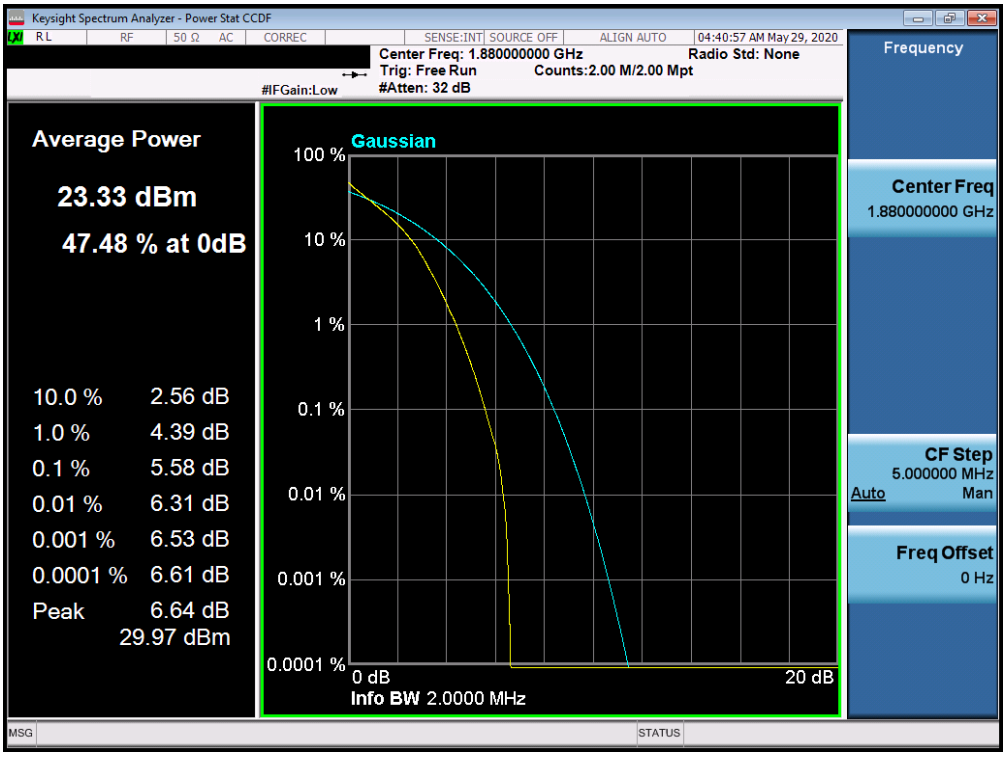
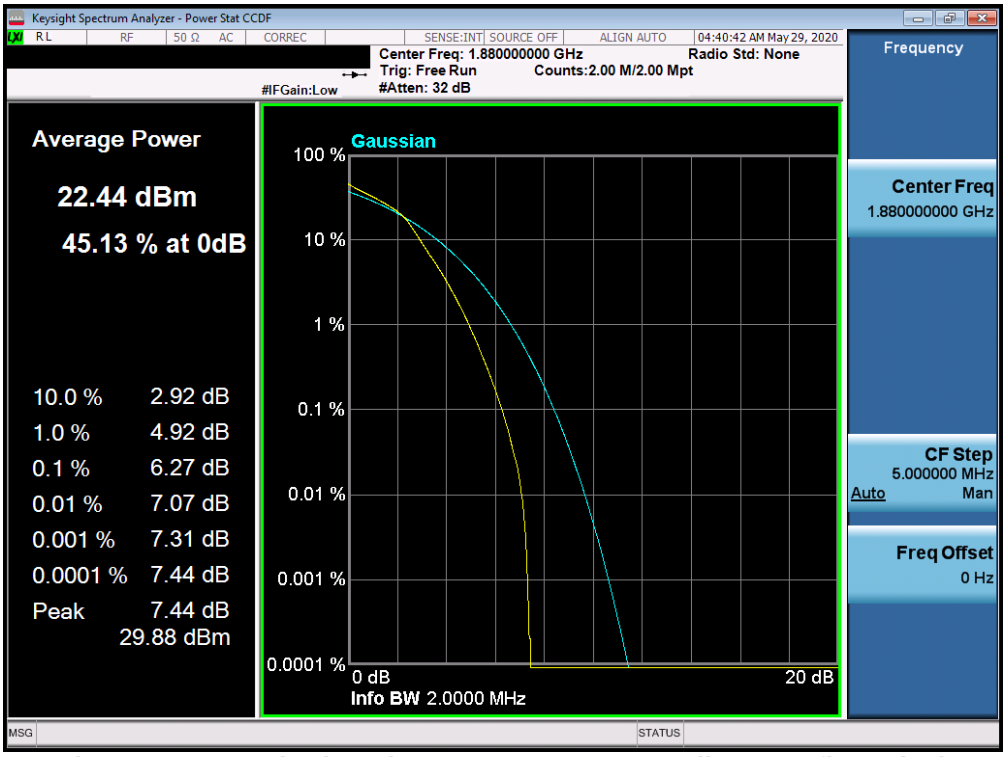
Band 2



Plot 7-246. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-247. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

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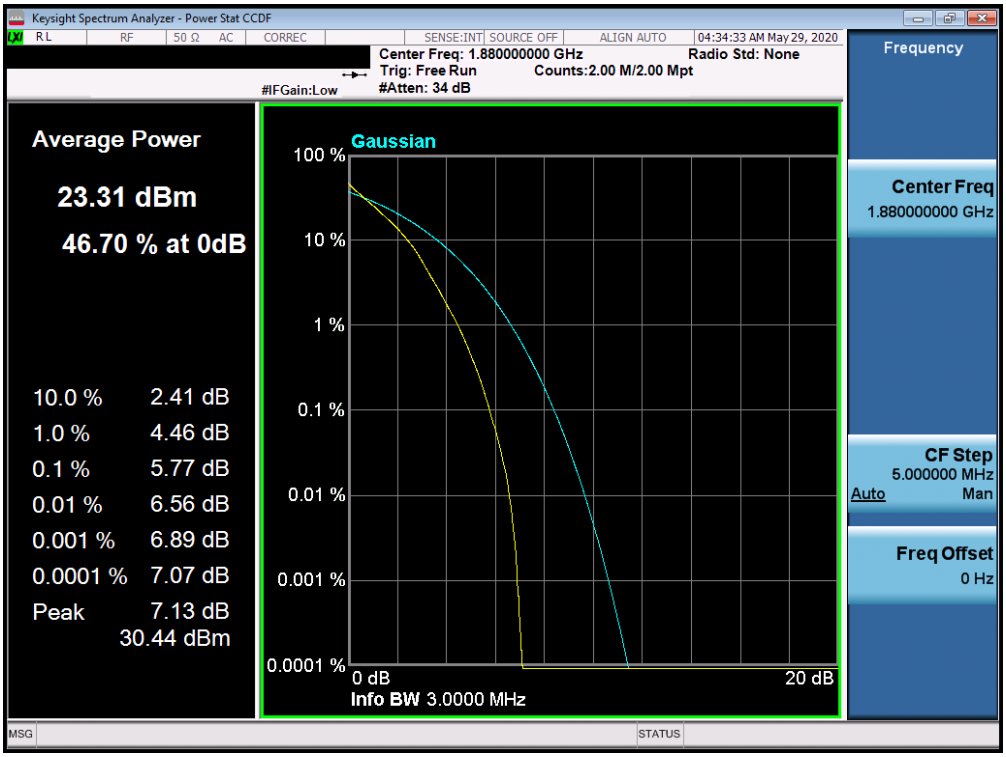
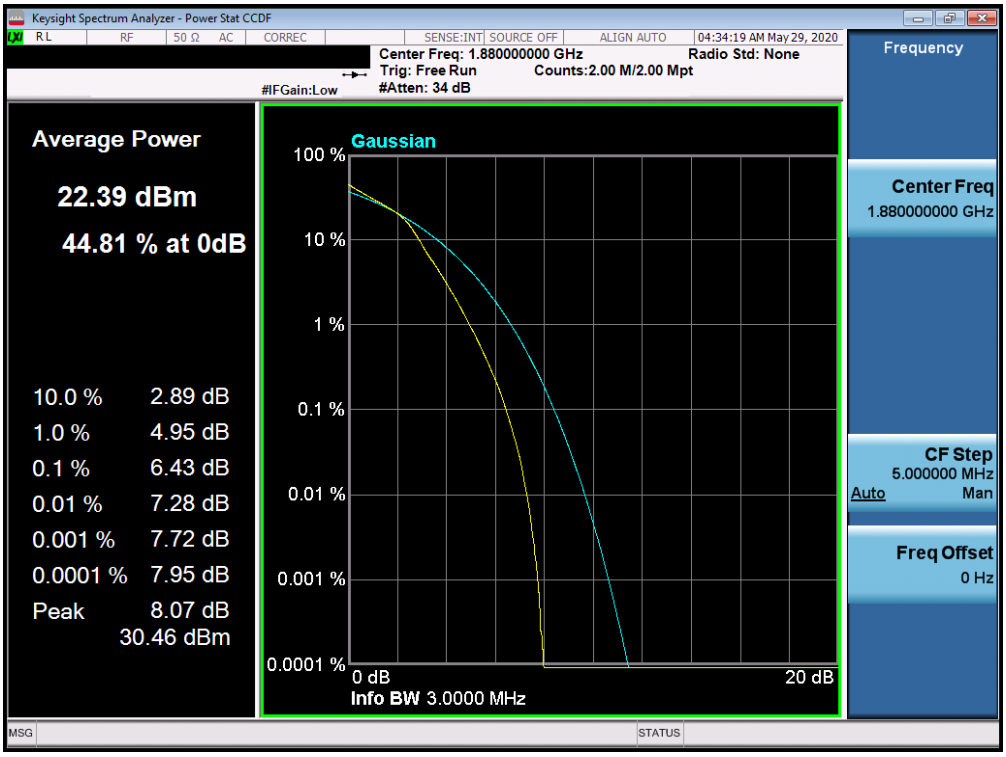


Plot 7-248. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-249. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)

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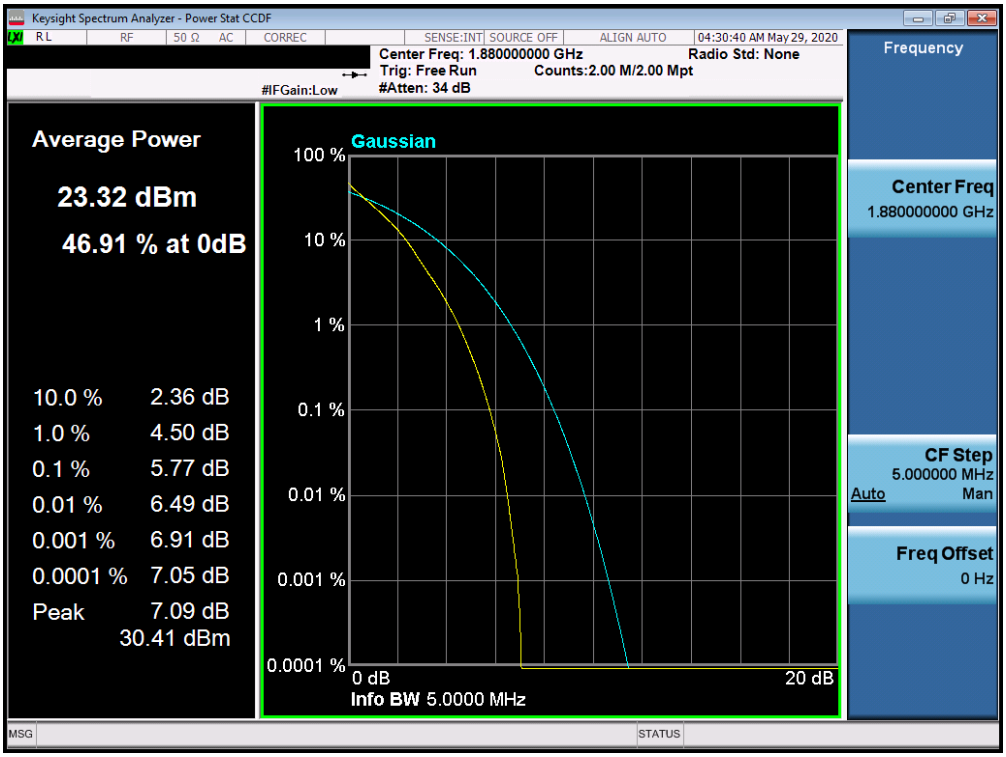
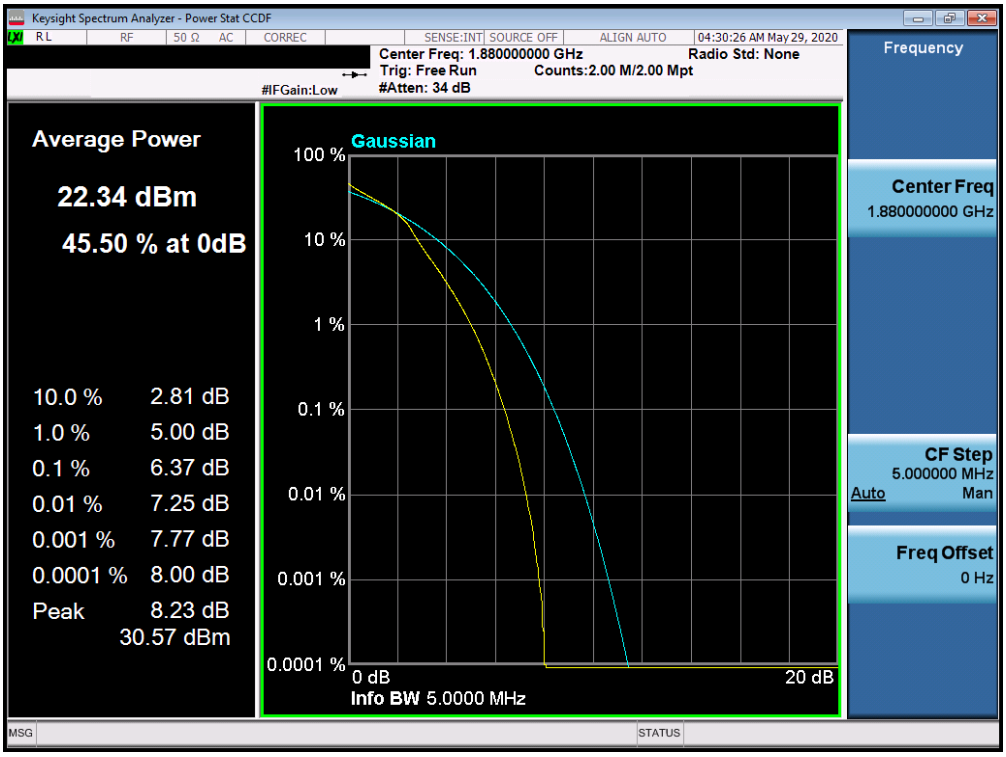


Plot 7-250. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-251. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

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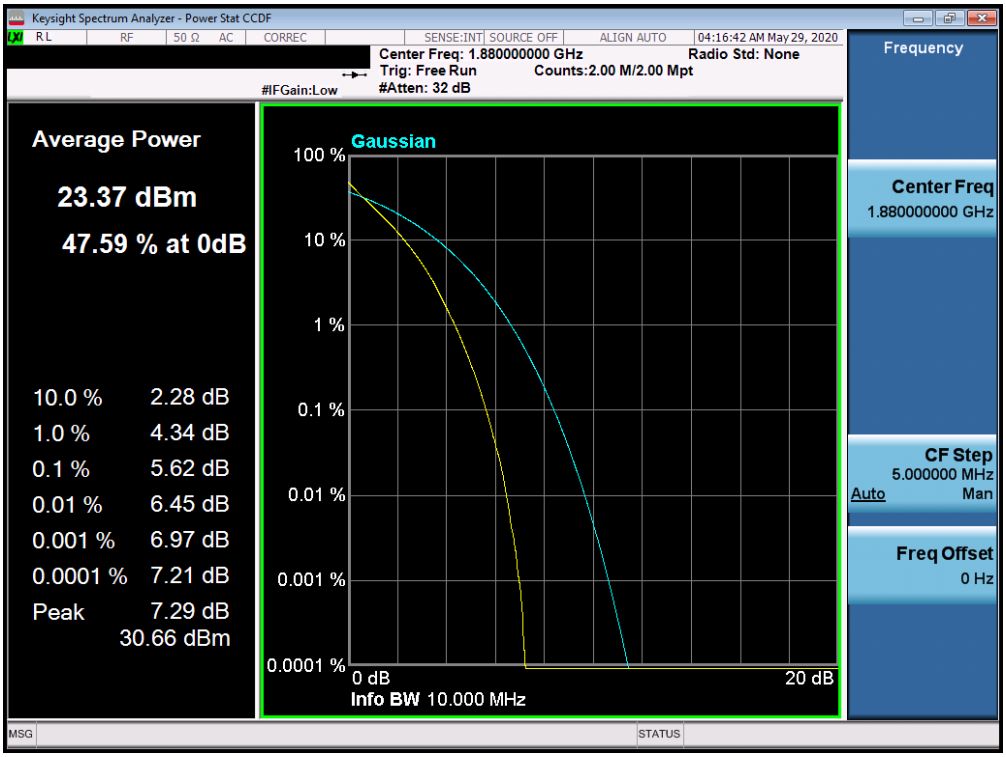
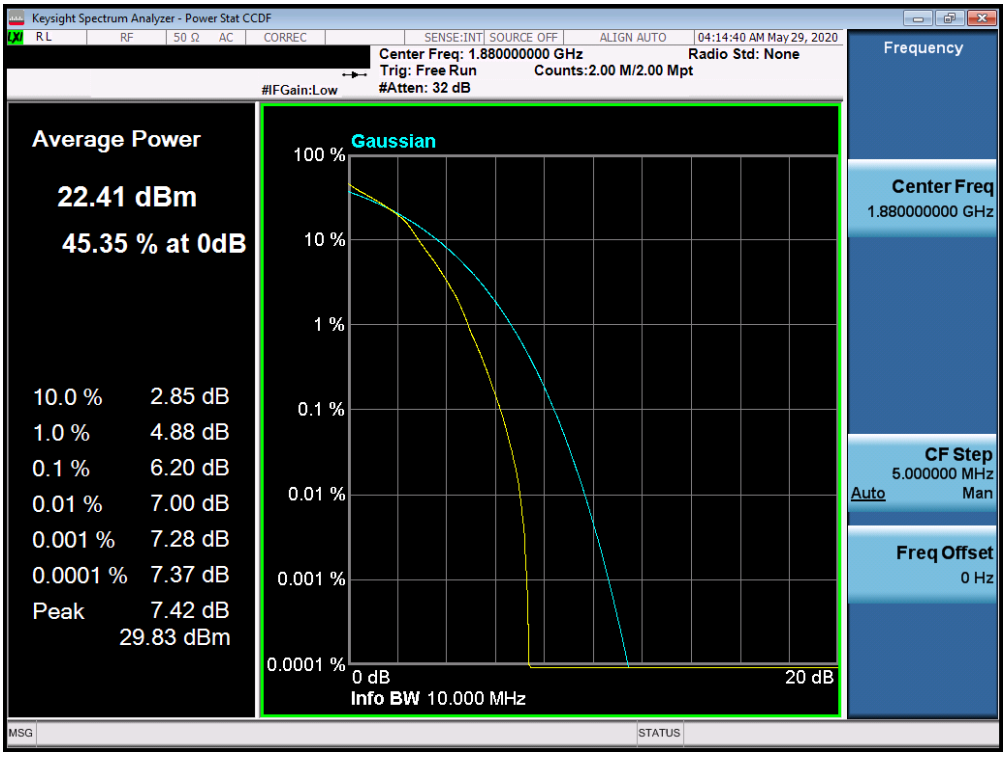


Plot 7-252. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-253. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)

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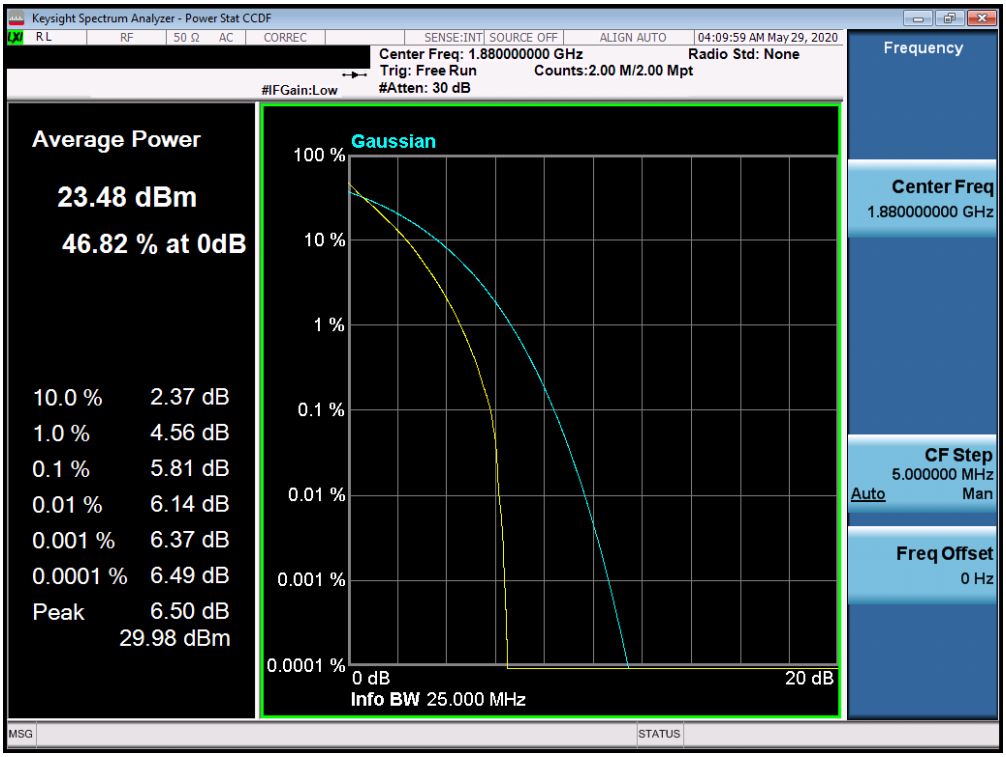
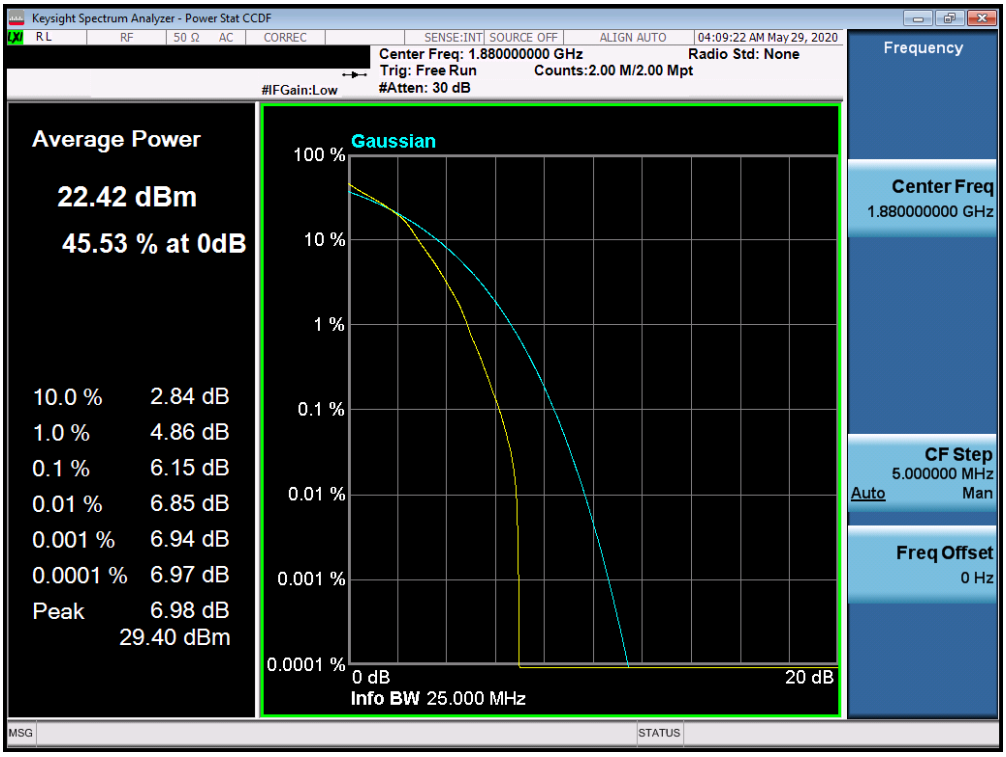


Plot 7-254. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-255. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

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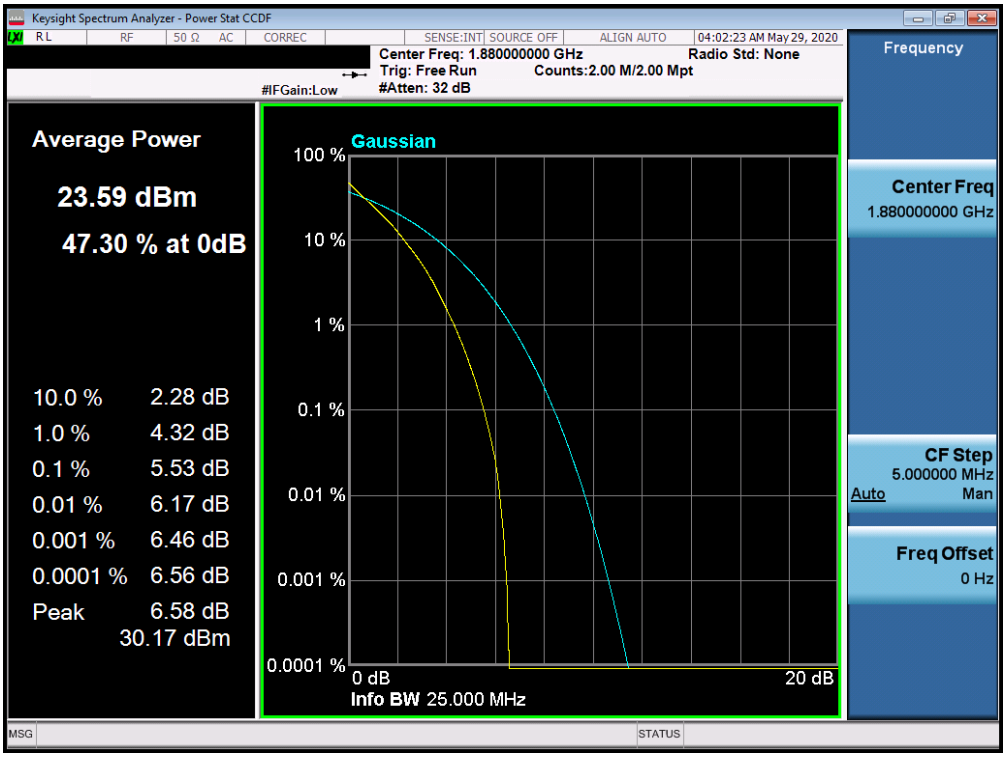
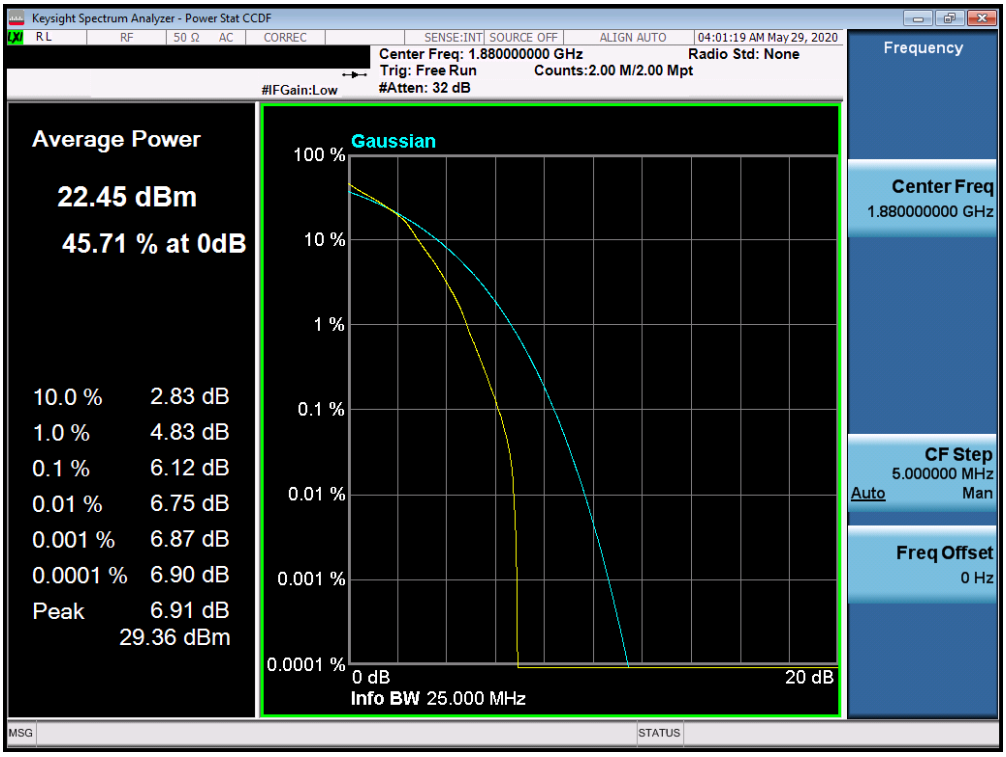


Plot 7-256. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-257. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)

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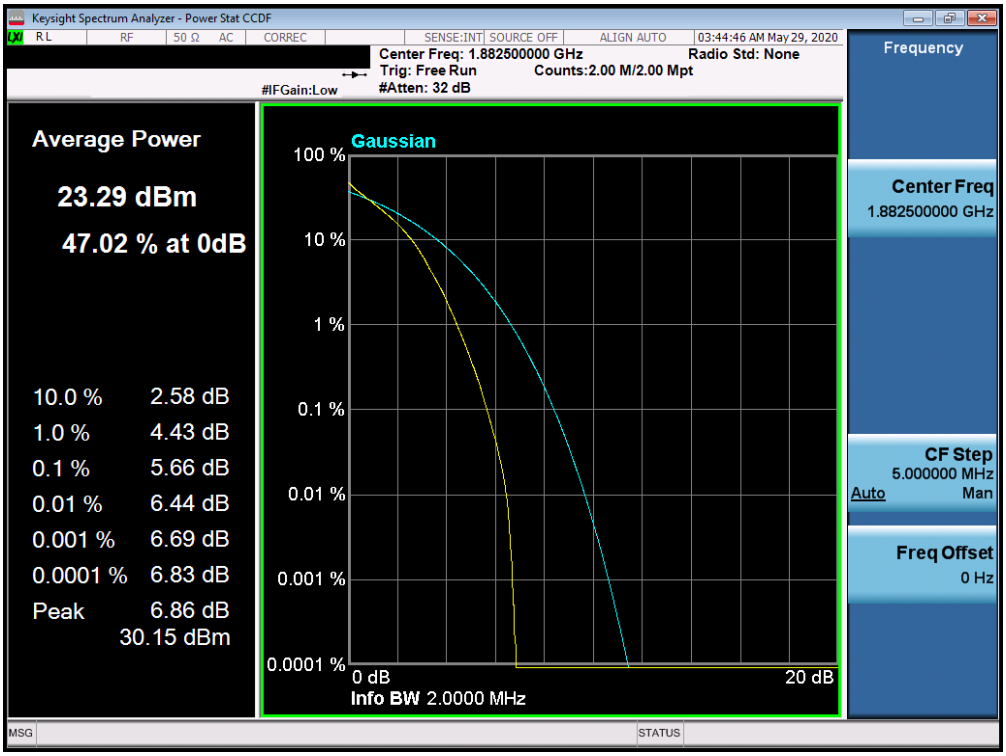
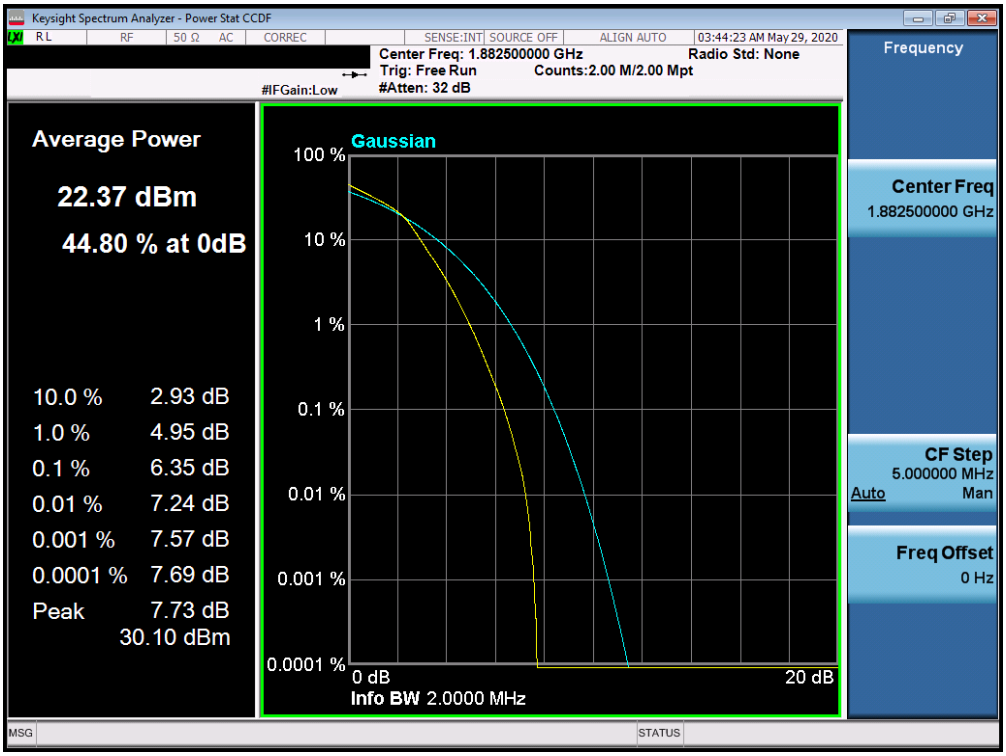
Band 25



Plot 7-258. PAR Plot (Band 25 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-259. PAR Plot (Band 25 - 1.4MHz 16-QAM - Full RB Configuration)

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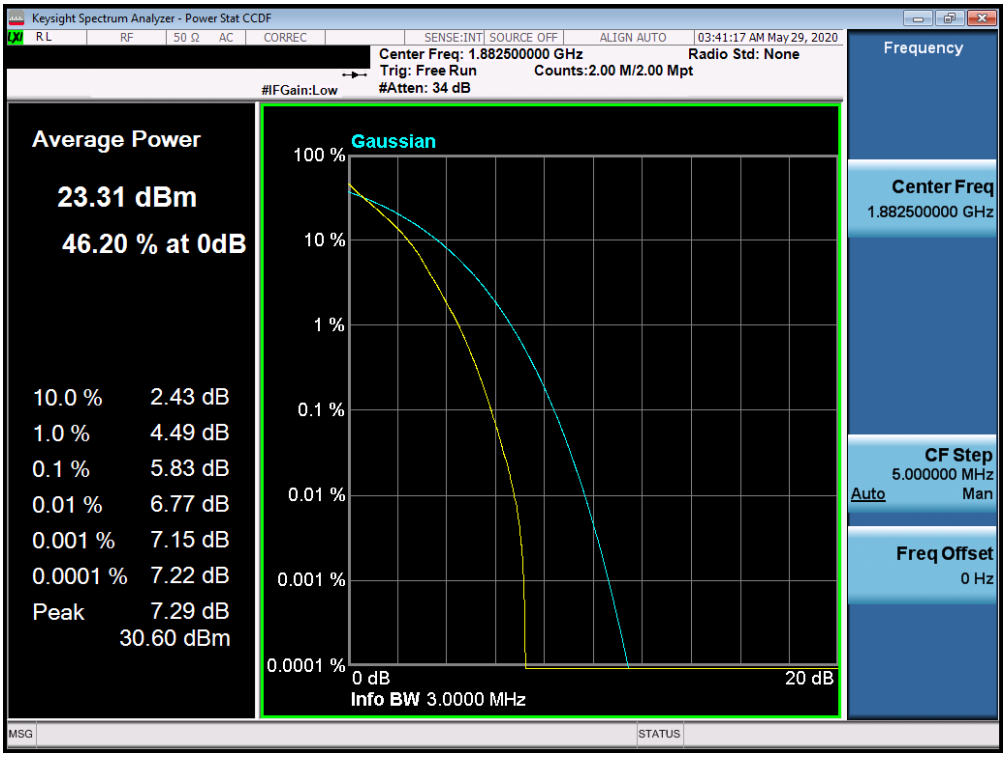
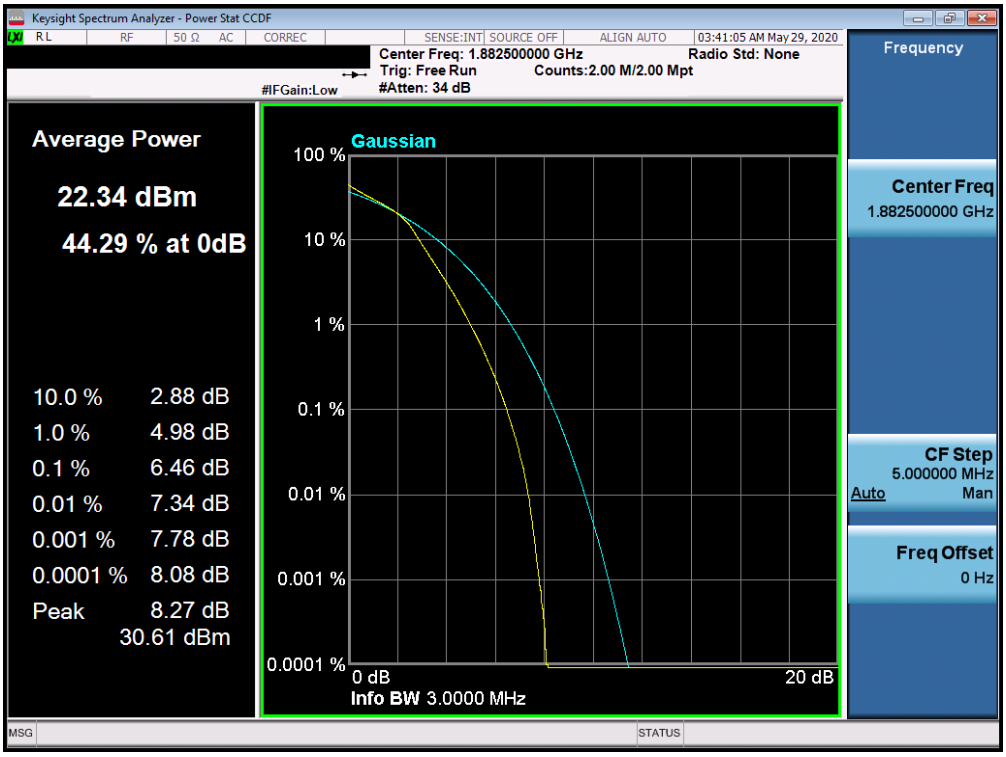


Plot 7-260. PAR Plot (Band 25 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-261. PAR Plot (Band 25 - 3.0MHz 16-QAM - Full RB Configuration)

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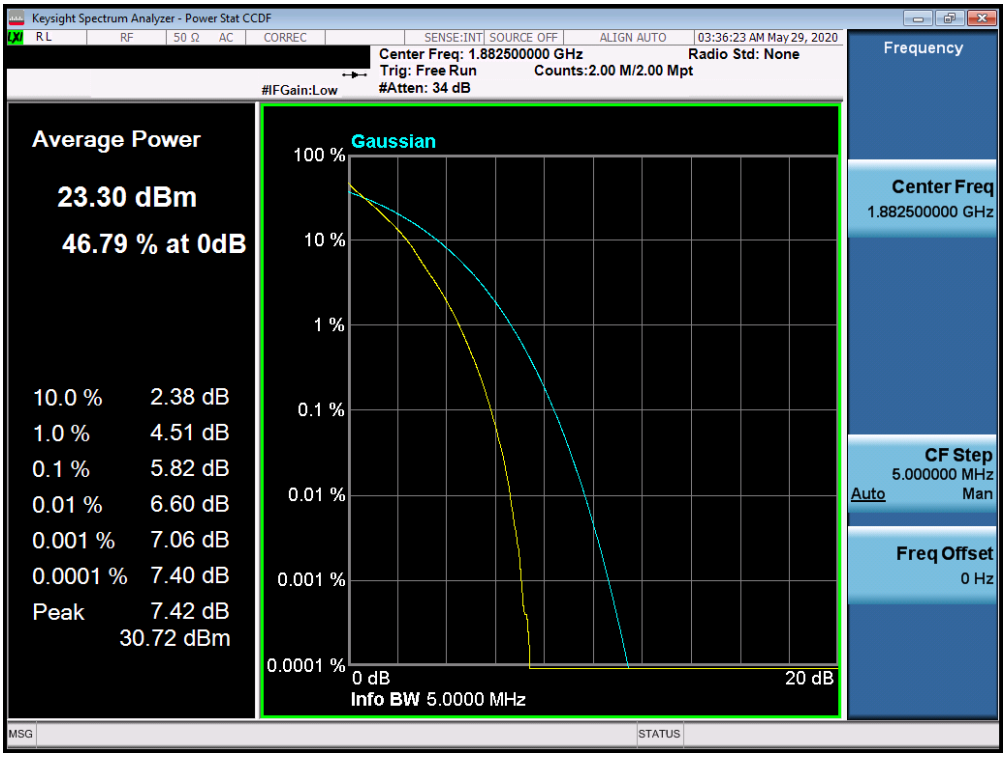
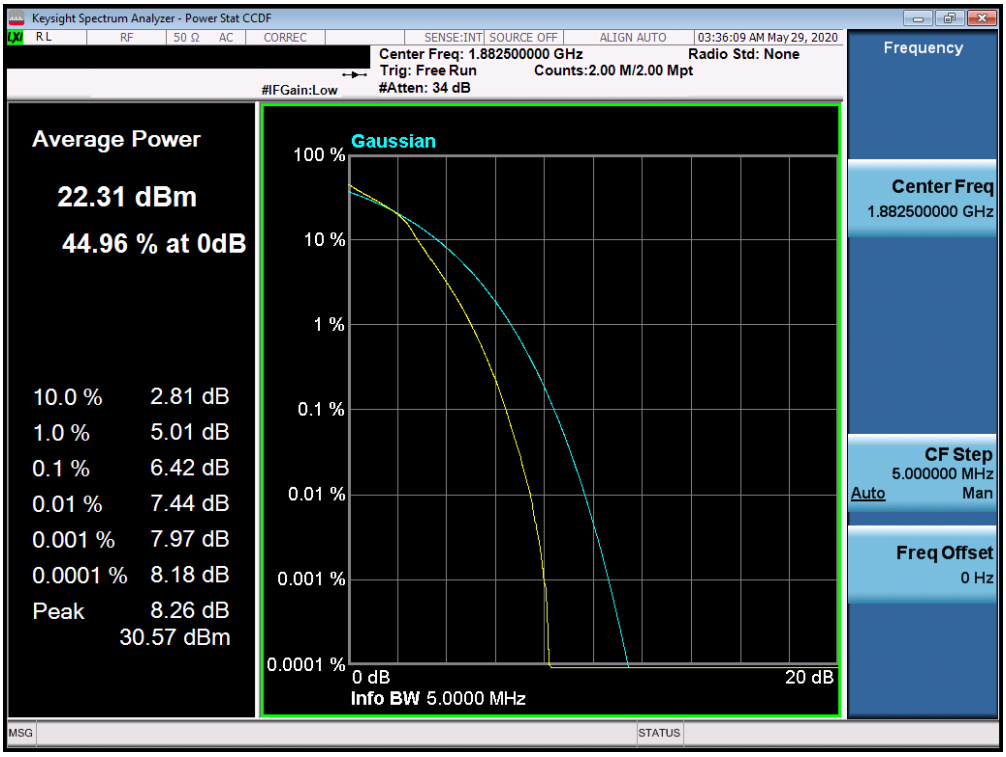


Plot 7-262. PAR Plot (Band 25 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-263. PAR Plot (Band 25 - 5.0MHz 16-QAM - Full RB Configuration)

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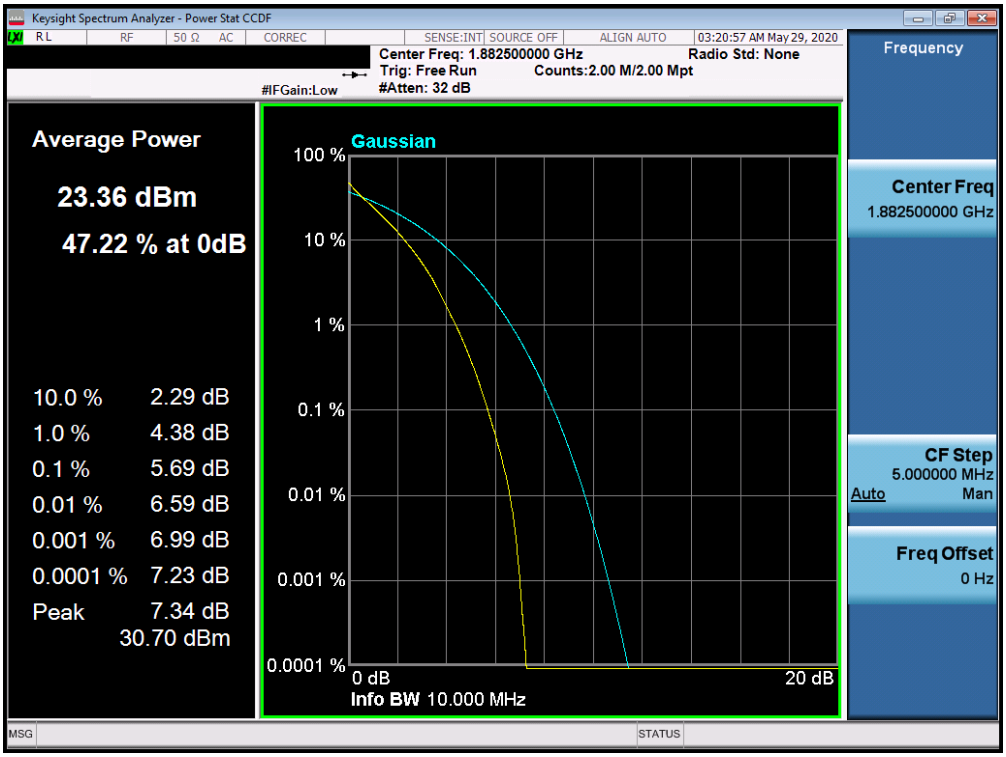
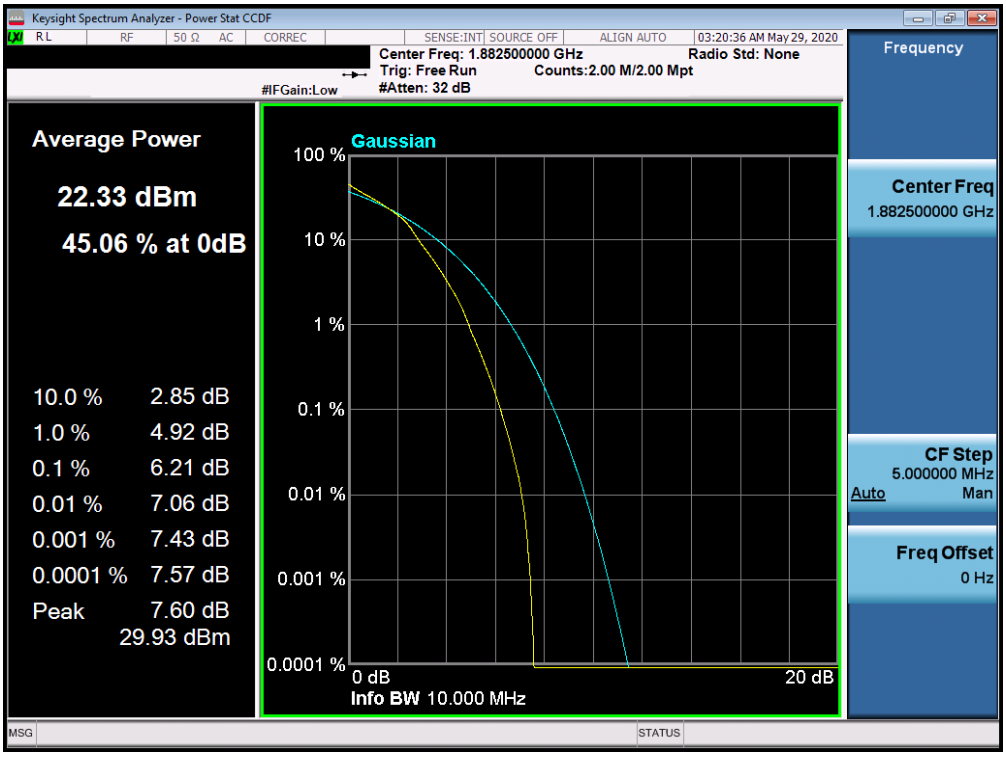


Plot 7-264. PAR Plot (Band 25 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-265. PAR Plot (Band 25 - 10.0MHz 16-QAM - Full RB Configuration)

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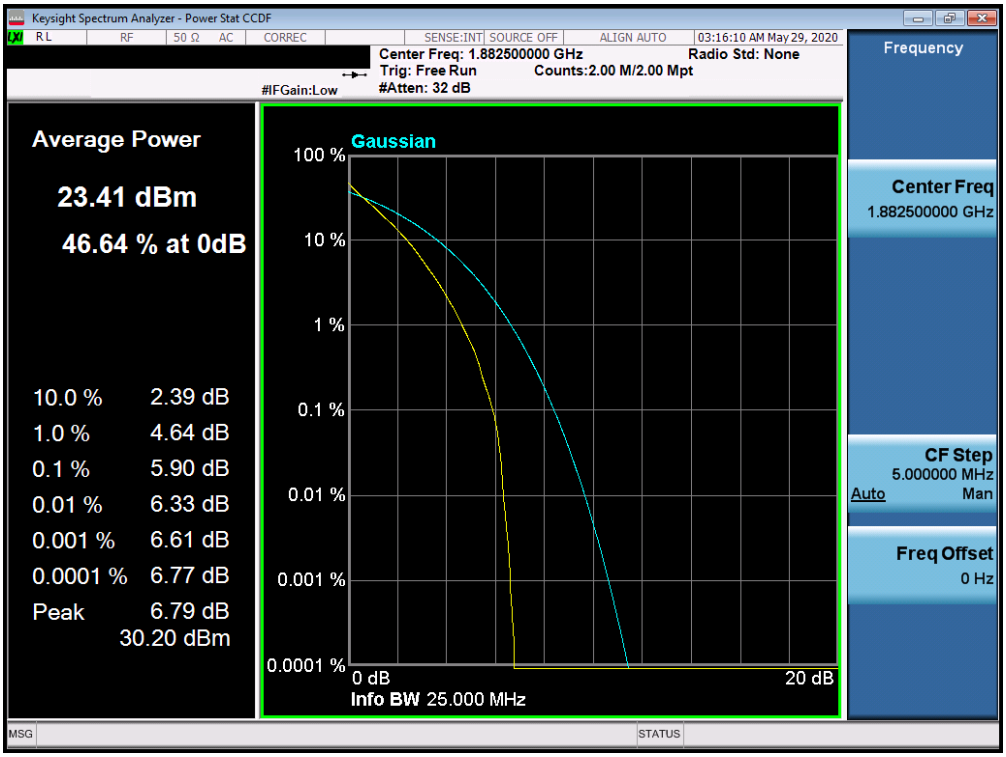
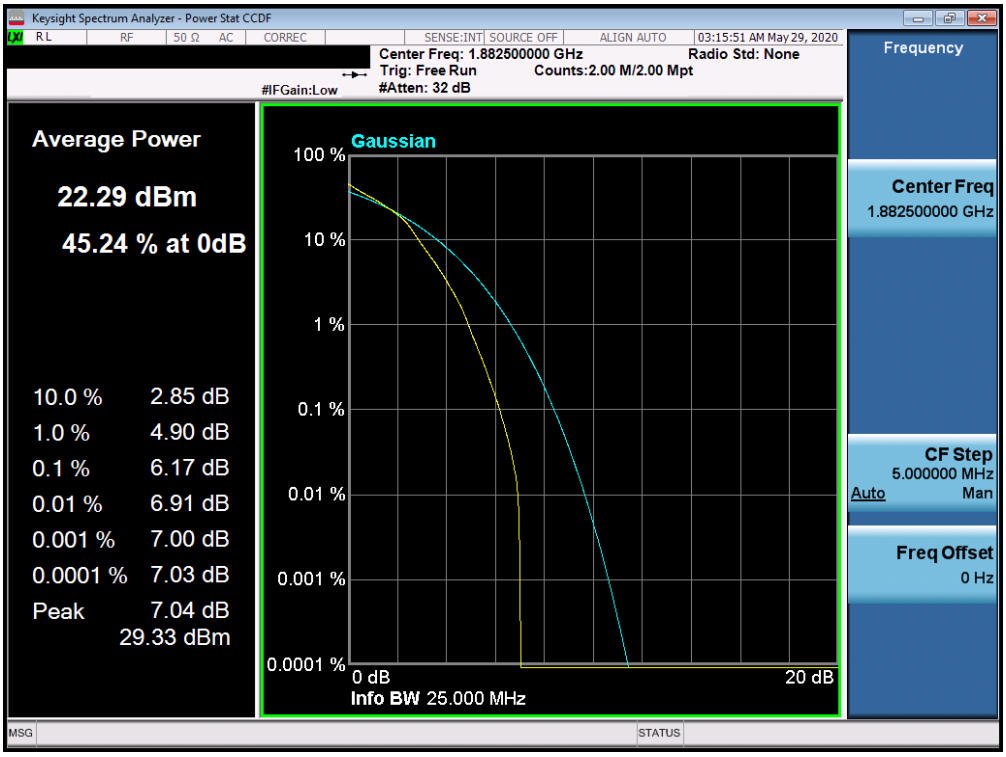


Plot 7-266. PAR Plot (Band 25 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-267. PAR Plot (Band 25 - 15.0MHz 16-QAM - Full RB Configuration)

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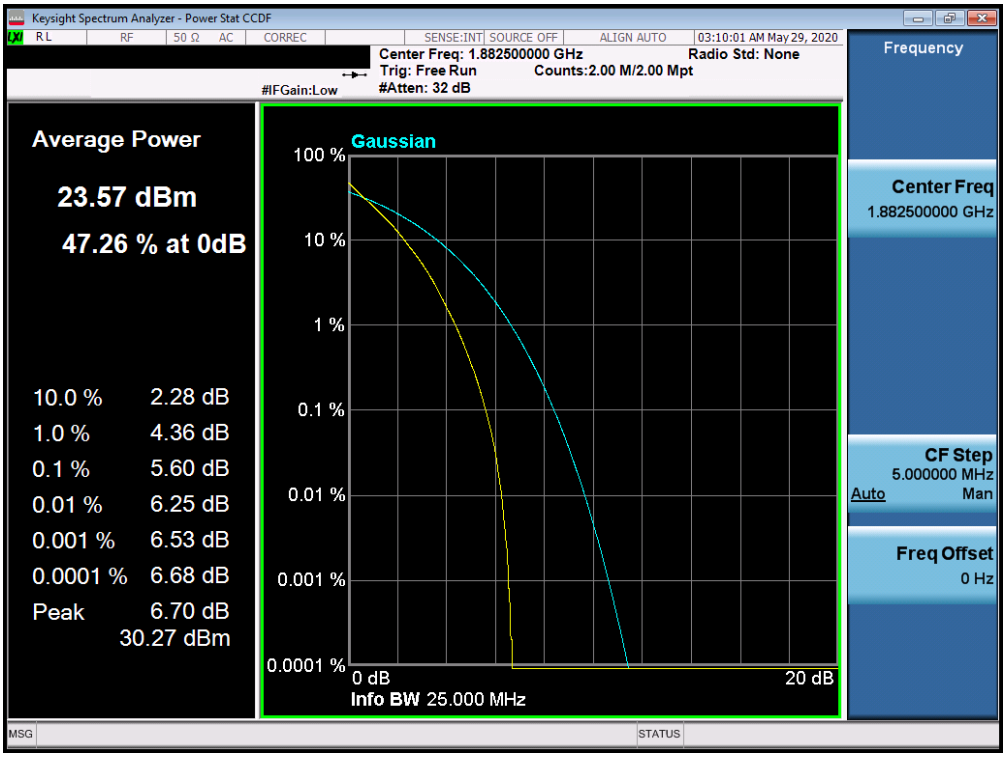
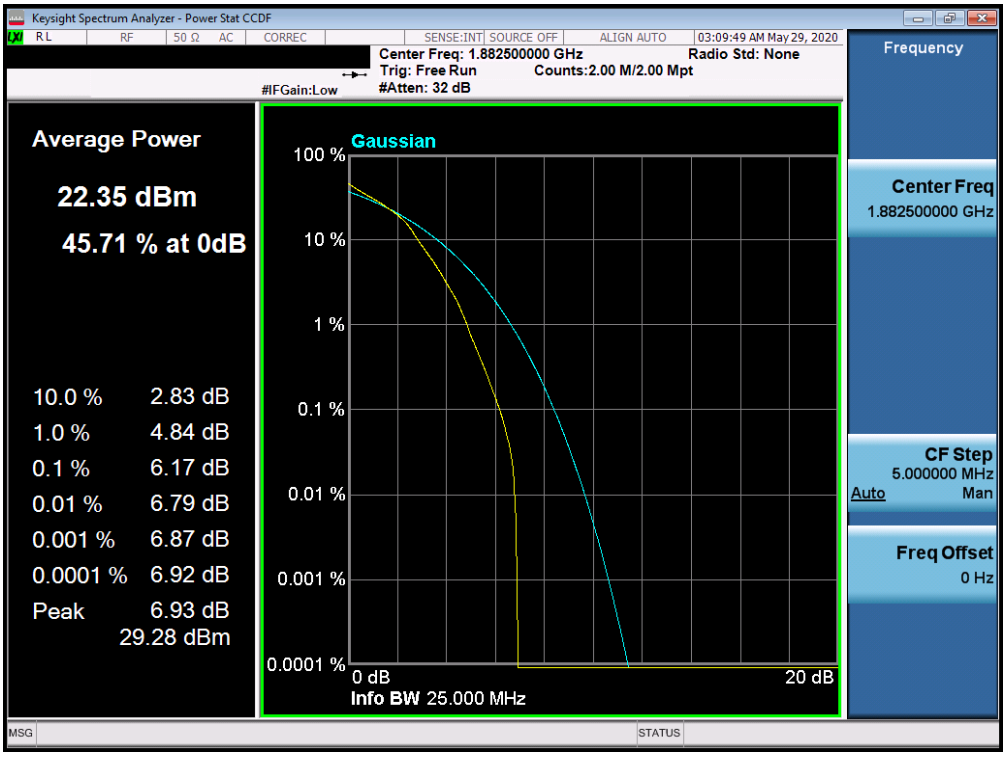


Plot 7-268. PAR Plot (Band 25 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-269. PAR Plot (Band 25 - 20.0MHz 16-QAM - Full RB Configuration)

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7.6 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are calculated by adding highest antenna gain to maximum measured conducted output power. 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 C63.26-2015 – Section 5.2.5.5

Test Settings

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured is:

ERP/EIRP = PMeas – LC + GT

Where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm)

PMeas = measured transmitter output power or PSD, in dBW or dBm

LC = signal attenuation in the connecting cable between the transmitter and antenna in dB

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

Test Setup

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

Figure 7-5. ERP/EIRP Measurement Setup

Test Notes

1) The EUT was tested in all possible test configurations. The worst case emissions are reported with the EUT 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 Level (dBm) readings in the table were taken with a correction table loaded into the base station simulator. The correction table was used to account for the signal attenuation in the connecting cable between the transmitter and antenna.
4) The Ant. Gains (GT) are listed in dBi.
5) This device only supports 27RBs or less for 16-QAM uplink.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	RB Size/Offset	Conducted Power [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [mW]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	1 / 0	24.92	-29.40	-6.63	0.217	38.45	-45.08	-4.48	0.356	40.61	-45.09
836.50	1.4	QPSK	1 / 5	25.00	-29.40	**-6.55**	**0.221**	38.45	-45.00	**-4.40**	**0.363**	40.61	-45.01
848.30	1.4	QPSK	1 / 5	24.99	-29.40	-6.56	0.221	38.45	-45.01	-4.41	0.362	40.61	-45.02
836.50	1.4	16-QAM	1 / 2	24.27	-29.40	**-7.28**	0.187	38.45	-45.73	**-5.13**	0.307	40.61	-45.74
825.50	3	QPSK	1 / 0	24.87	-29.40	-6.68	0.215	38.45	-45.13	-4.53	0.352	40.61	-45.14
836.50	3	QPSK	1 / 7	25.00	-29.40	**-6.55**	**0.221**	38.45	-45.00	**-4.40**	**0.363**	40.61	-45.01
847.50	3	QPSK	1 / 14	24.75	-29.40	-6.80	0.209	38.45	-45.25	-4.65	0.343	40.61	-45.26
836.50	3	16-QAM	1 / 0	24.46	-29.40	**-7.09**	0.195	38.45	-45.54	**-4.94**	0.321	40.61	-45.55
826.50	5	QPSK	1 / 12	24.87	-29.40	-6.68	0.215	38.45	-45.13	-4.53	0.352	40.61	-45.14
836.50	5	QPSK	1 / 12	25.00	-29.40	**-6.55**	**0.221**	38.45	-45.00	**-4.40**	**0.363**	40.61	-45.01
846.50	5	QPSK	1 / 24	24.81	-29.40	-6.74	0.212	38.45	-45.19	-4.59	0.348	40.61	-45.20
836.50	5	16-QAM	1 / 0	24.11	-29.40	**-7.44**	0.180	38.45	-45.89	**-5.29**	0.296	40.61	-45.90
829.00	10	QPSK	1 / 0	24.88	-29.40	-6.67	0.215	38.45	-45.12	-4.52	0.353	40.61	-45.13
836.50	10	QPSK	1 / 25	25.00	-29.40	**-6.55**	**0.221**	38.45	-45.00	**-4.40**	**0.363**	40.61	-45.01
844.00	10	QPSK	1 / 0	24.96	-29.40	-6.59	0.219	38.45	-45.04	-4.44	0.360	40.61	-45.05
836.50	10	16-QAM	1 / 13	24.37	-29.40	**-7.18**	0.191	38.45	-45.63	**-5.03**	0.314	40.61	-45.64

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

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	RB Size/Offset	Conducted Power [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [mW]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	1 / 0	24.90	-29.40	-6.65	0.216	38.45	-45.10	-4.50	0.355	40.61	-45.11
836.50	1.4	QPSK	1 / 5	25.00	-29.40	**-6.55**	**0.221**	38.45	-45.00	**-4.40**	**0.363**	40.61	-45.01
848.30	1.4	QPSK	1 / 5	24.95	-29.40	-6.60	0.219	38.45	-45.05	-4.45	0.359	40.61	-45.06
836.50	1.4	16-QAM	1 / 2	24.43	-29.40	**-7.12**	0.194	38.45	-45.57	**-4.97**	0.318	40.61	-45.58
825.50	3	QPSK	1 / 0	24.84	-29.40	-6.71	0.213	38.45	-45.16	-4.56	0.350	40.61	-45.17
836.50	3	QPSK	1 / 7	25.00	-29.40	**-6.55**	**0.221**	38.45	-45.00	**-4.40**	**0.363**	40.61	-45.01
847.50	3	QPSK	1 / 14	24.76	-29.40	-6.79	0.209	38.45	-45.24	-4.64	0.344	40.61	-45.25
836.50	3	16-QAM	1 / 7	24.44	-29.40	**-7.11**	0.195	38.45	-45.56	**-4.96**	0.319	40.61	-45.57
826.50	5	QPSK	1 / 0	24.99	-29.40	-6.56	0.221	38.45	-45.01	-4.41	0.362	40.61	-45.02
836.50	5	QPSK	1 / 12	25.00	-29.40	**-6.55**	**0.221**	38.45	-45.00	**-4.40**	**0.363**	40.61	-45.01
846.50	5	QPSK	1 / 24	24.77	-29.40	-6.78	0.210	38.45	-45.23	-4.63	0.344	40.61	-45.24
826.50	5	16-QAM	1 / 0	24.50	-29.40	**-7.05**	0.197	38.45	-45.50	**-4.90**	0.324	40.61	-45.51
829.00	10	QPSK	1 / 0	24.89	-29.40	-6.66	0.216	38.45	-45.11	-4.51	0.354	40.61	-45.12
836.50	10	QPSK	1 / 25	25.00	-29.40	**-6.55**	**0.221**	38.45	-45.00	**-4.40**	**0.363**	40.61	-45.01
844.00	10	QPSK	1 / 0	24.98	-29.40	-6.57	0.220	38.45	-45.02	-4.42	0.361	40.61	-45.03
836.50	10	16-QAM	1 / 25	24.49	-29.40	**-7.06**	0.197	38.45	-45.51	**-4.91**	0.323	40.61	-45.52

Table 7-8. ERP/EIRP Data (Band 26)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	RB Size/Offset	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	1 / 0	23.72	-11.00	12.72	18.707	30.00	-17.28
1732.50	1.4	QPSK	1 / 5	23.77	-11.00	**12.77**	18.923	30.00	-17.23
1754.30	1.4	QPSK	1 / 0	23.41	-11.00	12.41	17.418	30.00	-17.59
1710.70	1.4	16-QAM	1 / 0	23.27	-11.00	**12.27**	16.866	30.00	-17.73
1711.50	3	QPSK	1 / 7	23.74	-11.00	**12.74**	18.793	30.00	-17.26
1732.50	3	QPSK	1 / 7	23.73	-11.00	12.73	18.750	30.00	-17.27
1753.50	3	QPSK	1 / 7	23.34	-11.00	12.34	17.140	30.00	-17.66
1732.50	3	16-QAM	1 / 0	23.22	-11.00	**12.22**	16.672	30.00	-17.78
1712.50	5	QPSK	1 / 0	23.79	-11.00	12.79	19.011	30.00	-17.21
1732.50	5	QPSK	1 / 24	23.90	-11.00	**12.90**	**19.498**	30.00	-17.10
1752.50	5	QPSK	1 / 24	23.30	-11.00	12.30	16.982	30.00	-17.70
1732.50	5	16-QAM	1 / 12	23.36	-11.00	**12.36**	17.219	30.00	-17.64
1715.00	10	QPSK	1 / 0	23.66	-11.00	12.66	18.450	30.00	-17.34
1732.50	10	QPSK	1 / 49	23.71	-11.00	**12.71**	18.664	30.00	-17.29
1750.00	10	QPSK	1 / 0	23.56	-11.00	12.56	18.030	30.00	-17.44
1732.50	10	16-QAM	1 / 27	23.20	-11.00	**12.20**	16.596	30.00	-17.80
1717.50	15	QPSK	1 / 0	23.81	-11.00	**12.81**	19.099	30.00	-17.19
1732.50	15	QPSK	1 / 36	23.61	-11.00	12.61	18.239	30.00	-17.39
1747.50	15	QPSK	1 / 0	23.58	-11.00	12.58	18.113	30.00	-17.42
1732.50	15	16-QAM	1 / 13	23.31	-11.00	**12.31**	17.022	30.00	-17.69
1720.00	20	QPSK	1 / 0	23.83	-11.00	**12.83**	19.187	30.00	-17.17
1732.50	20	QPSK	1 / 50	23.57	-11.00	12.57	18.072	30.00	-17.43
1745.00	20	QPSK	1 / 0	23.82	-11.00	12.82	19.143	30.00	-17.18
1745.00	20	16-QAM	1 / 0	23.27	-11.00	**12.27**	16.866	30.00	-17.73

Table 7-9. EIRP Data (Band 4)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	RB Size/Offset	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	1 / 0	23.98	-11.00	12.98	19.861	30.00	-17.02
1745.00	1.4	QPSK	1 / 0	24.00	-11.00	**13.00**	**19.953**	30.00	-17.00
1779.30	1.4	QPSK	1 / 5	24.00	-11.00	**13.00**	**19.953**	30.00	-17.00
1745.00	1.4	16-QAM	1 / 5	23.48	-11.00	**12.48**	17.701	30.00	-17.52
1711.50	3	QPSK	1 / 7	24.00	-11.00	**13.00**	**19.953**	30.00	-17.00
1745.00	3	QPSK	1 / 7	23.88	-11.00	12.88	19.409	30.00	-17.12
1778.50	3	QPSK	1 / 7	23.84	-11.00	12.84	19.231	30.00	-17.16
1745.00	3	16-QAM	1 / 14	23.47	-11.00	**12.47**	17.660	30.00	-17.53
1712.50	5	QPSK	1 / 0	24.00	-11.00	**13.00**	**19.953**	30.00	-17.00
1745.00	5	QPSK	1 / 12	23.98	-11.00	12.98	19.861	30.00	-17.02
1777.50	5	QPSK	1 / 0	23.86	-11.00	12.86	19.320	30.00	-17.14
1712.50	5	16-QAM	1 / 0	23.48	-11.00	**12.48**	17.701	30.00	-17.52
1715.00	10	QPSK	1 / 0	23.93	-11.00	12.93	19.634	30.00	-17.07
1745.00	10	QPSK	1 / 0	23.91	-11.00	12.91	19.543	30.00	-17.09
1775.00	10	QPSK	1 / 0	24.00	-11.00	**13.00**	**19.953**	30.00	-17.00
1745.00	10	16-QAM	1 / 25	23.48	-11.00	**12.48**	17.701	30.00	-17.52
1717.50	15	QPSK	1 / 36	24.00	-11.00	**13.00**	**19.953**	30.00	-17.00
1745.00	15	QPSK	1 / 0	23.96	-11.00	12.96	19.770	30.00	-17.04
1772.50	15	QPSK	1 / 0	23.97	-11.00	12.97	19.815	30.00	-17.03
1745.00	15	16-QAM	1 / 36	23.47	-11.00	**12.47**	17.660	30.00	-17.53
1720.00	20	QPSK	1 / 0	24.00	-11.00	**13.00**	**19.953**	30.00	-17.00
1745.00	20	QPSK	1 / 0	23.88	-11.00	12.88	19.409	30.00	-17.12
1770.00	20	QPSK	1 / 99	23.93	-11.00	12.93	19.634	30.00	-17.07
1770.00	20	16-QAM	1 / 99	23.50	-11.00	**12.50**	17.783	30.00	-17.50

Table 7-10. EIRP Data (Band 66)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	RB Size/Offset	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	1 / 0	23.91	-10.70	13.21	20.941	33.01	-19.80
1880.00	1.4	QPSK	1 / 0	23.98	-10.70	**13.28**	21.281	33.01	-19.73
1909.30	1.4	QPSK	1 / 5	23.96	-10.70	13.26	21.184	33.01	-19.75
1880.00	1.4	16-QAM	1 / 2	23.47	-10.70	**12.77**	18.923	33.01	-20.24
1851.50	3	QPSK	1 / 7	23.88	-10.70	13.18	20.797	33.01	-19.83
1880.00	3	QPSK	1 / 7	23.96	-10.70	**13.26**	21.184	33.01	-19.75
1908.50	3	QPSK	1 / 14	23.75	-10.70	13.05	20.184	33.01	-19.96
1880.00	3	16-QAM	1 / 0	23.42	-10.70	**12.72**	18.707	33.01	-20.29
1852.50	5	QPSK	1 / 0	23.95	-10.70	13.25	21.135	33.01	-19.76
1880.00	5	QPSK	1 / 0	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1907.50	5	QPSK	1 / 0	23.86	-10.70	13.16	20.701	33.01	-19.85
1880.00	5	16-QAM	1 / 0	23.43	-10.70	**12.73**	18.750	33.01	-20.28
1855.00	10	QPSK	1 / 0	23.94	-10.70	13.24	21.086	33.01	-19.77
1880.00	10	QPSK	1 / 49	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1905.00	10	QPSK	1 / 0	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1905.00	10	16-QAM	1 / 0	23.44	-10.70	**12.74**	18.793	33.01	-20.27
1857.50	15	QPSK	1 / 0	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1880.00	15	QPSK	1 / 36	23.95	-10.70	13.25	21.135	33.01	-19.76
1902.50	15	QPSK	1 / 0	23.92	-10.70	13.22	20.989	33.01	-19.79
1880.00	15	16-QAM	1 / 27	23.47	-10.70	**12.77**	18.923	33.01	-20.24
1860.00	20	QPSK	1 / 99	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1880.00	20	QPSK	1 / 99	23.95	-10.70	13.25	21.135	33.01	-19.76
1900.00	20	QPSK	1 / 99	23.95	-10.70	13.25	21.135	33.01	-19.76
1880.00	20	16-QAM	1 / 27	23.47	-10.70	**12.77**	18.923	33.01	-20.24

Table 7-11. EIRP Data (Band 2)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	RB Size/Offset	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	1 / 0	23.91	-10.70	13.21	20.941	33.01	-19.80
1882.50	1.4	QPSK	1 / 0	23.98	-10.70	13.28	21.281	33.01	-19.73
1914.30	1.4	QPSK	1 / 0	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1882.50	1.4	16-QAM	1 / 0	23.49	-10.70	**12.79**	19.011	33.01	-20.22
1851.50	3	QPSK	1 / 7	23.91	-10.70	13.21	20.941	33.01	-19.80
1882.50	3	QPSK	1 / 7	23.99	-10.70	**13.29**	21.330	33.01	-19.72
1913.50	3	QPSK	1 / 7	23.96	-10.70	13.26	21.184	33.01	-19.75
1913.50	3	16-QAM	1 / 0	23.50	-10.70	**12.80**	19.055	33.01	-20.21
1852.50	5	QPSK	1 / 0	23.94	-10.70	13.24	21.086	33.01	-19.77
1882.50	5	QPSK	1 / 24	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1912.50	5	QPSK	1 / 12	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1852.50	5	16-QAM	1 / 24	23.42	-10.70	**12.72**	18.707	33.01	-20.29
1855.00	10	QPSK	1 / 0	23.94	-10.70	13.24	21.086	33.01	-19.77
1882.50	10	QPSK	1 / 0	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1910.00	10	QPSK	1 / 49	23.88	-10.70	13.18	20.797	33.01	-19.83
1882.50	10	16-QAM	1 / 49	23.49	-10.70	**12.79**	19.011	33.01	-20.22
1857.50	15	QPSK	1 / 74	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1882.50	15	QPSK	1 / 0	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1907.50	15	QPSK	1 / 74	23.89	-10.70	13.19	20.845	33.01	-19.82
1882.50	15	16-QAM	1 / 0	23.49	-10.70	**12.79**	19.011	33.01	-20.22
1860.00	20	QPSK	1 / 99	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1882.50	20	QPSK	1 / 99	24.00	-10.70	**13.30**	**21.380**	33.01	-19.71
1905.00	20	QPSK	1 / 50	23.99	-10.70	13.29	21.330	33.01	-19.72
1882.50	20	16-QAM	1 / 27	23.48	-10.70	**12.78**	18.967	33.01	-20.23

Table 7-12. EIRP Data (Band 25)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	RB Size/Offset	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	1 / 0	23.50	-7.80	**15.70**	**37.154**	33.01	-17.31
2535.00	5	QPSK	1 / 0	23.41	-7.80	15.61	36.392	33.01	-17.40
2567.50	5	QPSK	1 / 24	23.24	-7.80	15.44	34.995	33.01	-17.57
2502.50	5	16-QAM	1 / 0	22.90	-7.80	**15.10**	32.359	33.01	-17.91
2505.00	10	QPSK	1 / 0	23.50	-7.80	**15.70**	**37.154**	33.01	-17.31
2535.00	10	QPSK	1 / 0	23.32	-7.80	15.52	35.645	33.01	-17.49
2565.00	10	QPSK	1 / 49	23.23	-7.80	15.43	34.914	33.01	-17.58
2505.00	10	16-QAM	1 / 0	22.95	-7.80	**15.15**	32.734	33.01	-17.86
2507.50	15	QPSK	1 / 0	23.50	-7.80	**15.70**	**37.154**	33.01	-17.31
2535.00	15	QPSK	1 / 0	23.27	-7.80	15.47	35.237	33.01	-17.54
2562.50	15	QPSK	1 / 74	23.20	-7.80	15.40	34.674	33.01	-17.61
2507.50	15	16-QAM	1 / 27	22.70	-7.80	**14.90**	30.903	33.01	-18.11
2510.00	20	QPSK	1 / 0	23.50	-7.80	**15.70**	**37.154**	33.01	-17.31
2535.00	20	QPSK	1 / 0	23.18	-7.80	15.38	34.514	33.01	-17.63
2560.00	20	QPSK	1 / 99	23.44	-7.80	15.64	36.644	33.01	-17.37
2510.00	20	16-QAM	1 / 0	22.73	-7.80	**14.93**	31.117	33.01	-18.08

Table 7-13. EIRP Data (Band 7)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	RB Size/Offset	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [mW]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	1 / 24	23.49	-7.80	**15.69**	**37.068**	33.01	-17.32
2593.00	5	QPSK	1 / 24	23.21	-7.80	15.41	34.754	33.01	-17.60
2687.50	5	QPSK	1 / 0	23.25	-7.80	15.45	35.075	33.01	-17.56
2687.50	5	16-QAM	1 / 24	22.50	-7.80	**14.70**	29.512	33.01	-18.31
2501.00	10	QPSK	1 / 25	23.47	-7.80	**15.67**	36.898	33.01	-17.34
2593.00	10	QPSK	1 / 49	23.23	-7.80	15.43	34.914	33.01	-17.58
2685.00	10	QPSK	1 / 0	23.41	-7.80	15.61	36.392	33.01	-17.40
2501.00	10	16-QAM	1 / 25	22.50	-7.80	**14.70**	29.512	33.01	-18.31
2503.50	15	QPSK	1 / 36	23.38	-7.80	15.58	36.141	33.01	-17.43
2593.00	15	QPSK	1 / 74	23.18	-7.80	15.38	34.514	33.01	-17.63
2682.50	15	QPSK	1 / 0	23.44	-7.80	**15.64**	36.644	33.01	-17.37
2682.50	15	16-QAM	1 / 0	22.40	-7.80	**14.60**	28.840	33.01	-18.41
2506.00	20	QPSK	1 / 50	23.39	-7.80	**15.59**	36.224	33.01	-17.42
2593.00	20	QPSK	1 / 99	23.30	-7.80	15.50	35.481	33.01	-17.51
2680.00	20	QPSK	1 / 50	23.28	-7.80	15.48	35.318	33.01	-17.53
2680.00	20	16-QAM	1 / 0	22.41	-7.80	**14.61**	28.907	33.01	-18.40

Table 7-14. EIRP Data (Band 41)

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7.7 Radiated Spurious Emissions

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI C63.26-2015/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 C63.26-2015

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.

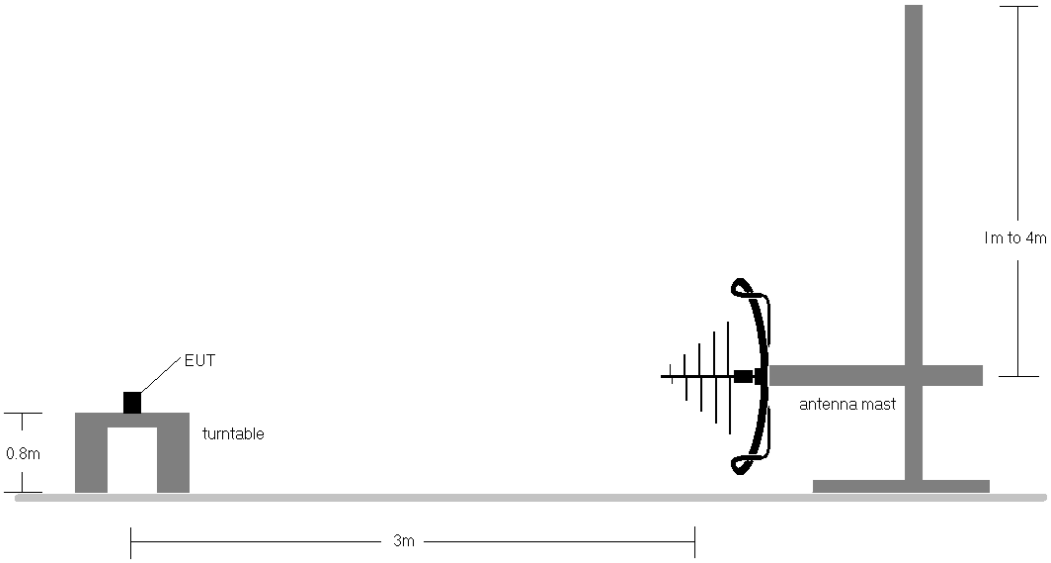

Figure 7-6. Radiated Measurement Setup < 1GHz

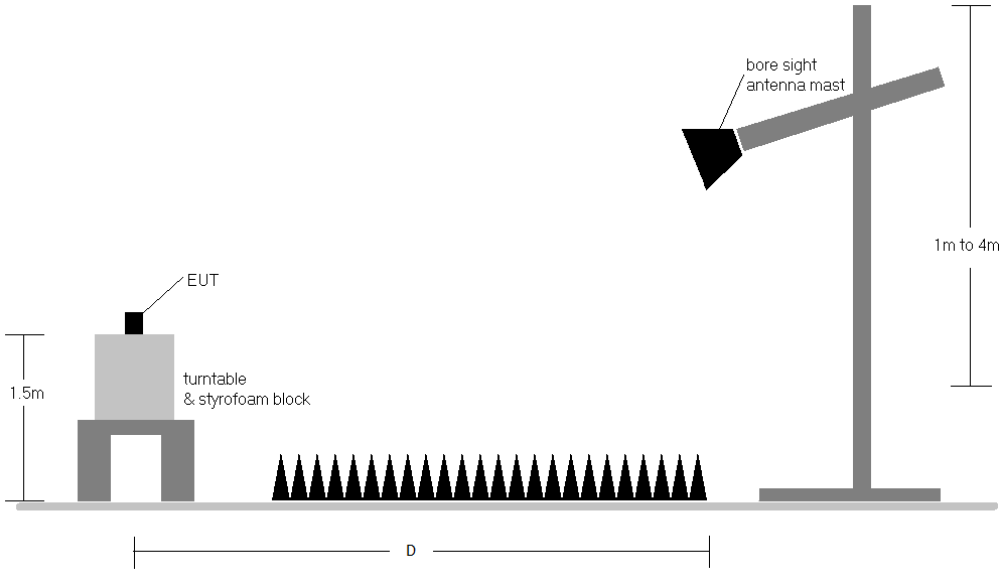

Figure 7-7. Radiated Measurement Setup > 1GHz

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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 modulations, offsets and channel bandwidth configurations in this section. QPSK/10MHz/1RB was found and reported as worst case configuration for low bands and QPSK/20MHz/1RB was found and reported as worst case configuration for mid/high bands.

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) “D” is 3 meter distance for 1GHz – 18GHz measurements and 1 meter distance for above 18GHz with the application of a distance correction factor.

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

6) No significant emissions were found for below 1GHz and Above 18GHz measurement.

7) The intermodulation emissions were tested against the less stringent limit across all rule parts applicable to simultaneous transmitters.

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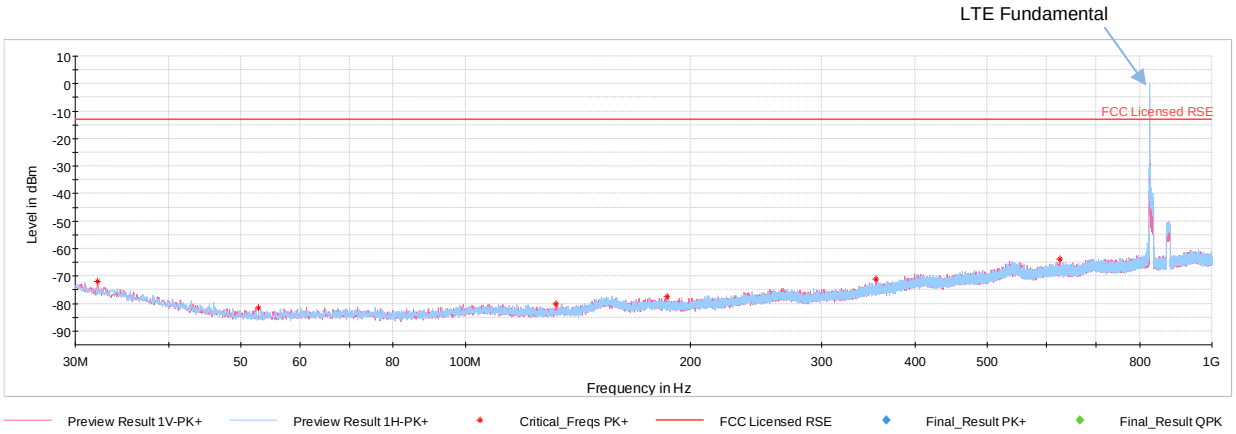
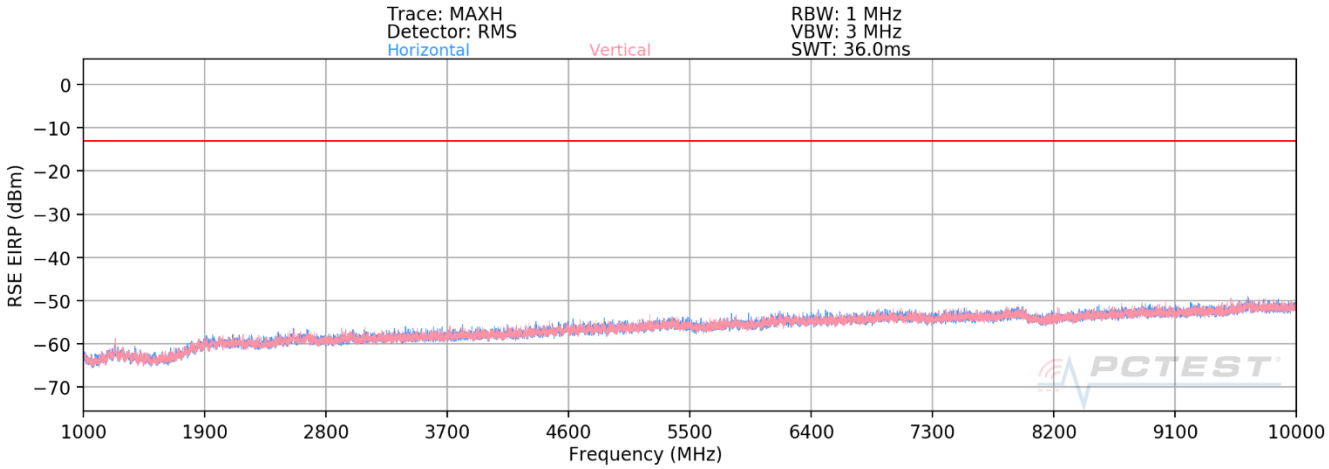
Band 26/5



Plot 7-270. Radiated Spurious Emissions below 1GHz (Band 26/5)



Plot 7-271. Radiated Spurious Emissions above 1GHz (Band 26/5)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1658.00	V	193	188	-72.01	4.75	-67.26	-54.3
2487.00	V	292	266	-68.08	4.37	-63.71	-50.7
3316.00	V	-	-	-69.68	6.66	-63.02	-50.0
4145.00	V	-	-	-69.83	8.01	-61.82	-48.8
4974.00	V	-	-	-69.33	8.72	-60.61	-47.6

Table 7-15. Radiated Spurious Data (Band 26/5 – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	V	-	-	-70.50	4.71	-65.79	-52.8
2509.50	V	-	-	-68.13	4.38	-63.75	-50.8
3346.00	V	-	-	-69.33	6.70	-62.63	-49.6
4182.50	V	-	-	-69.80	8.07	-61.73	-48.7

Table 7-16. Radiated Spurious Data (Band 26/5 – Mid Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1688.00	V	346	108	-71.93	4.68	-67.25	-54.3
2532.00	V	267	327	-68.27	4.46	-63.82	-50.8
3376.00	V	-	-	-70.31	6.78	-63.52	-50.5
4220.00	V	-	-	-70.54	8.13	-62.41	-49.4
5064.00	V	-	-	-69.80	8.87	-60.93	-47.9

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

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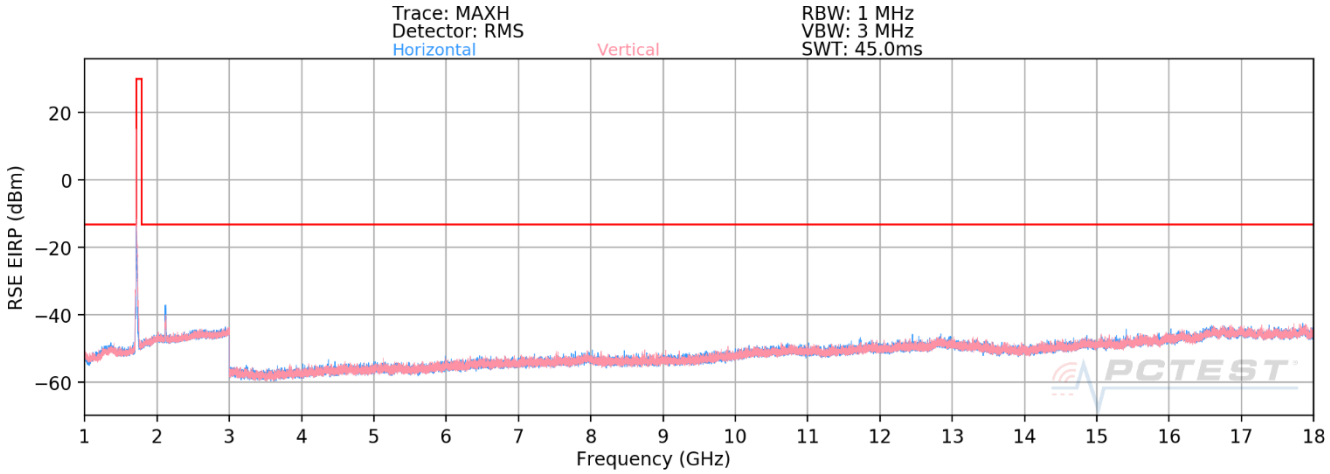
Band 66/4



Plot 7-272. Radiated Spurious Emissions 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]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3440.00	V	-	-	-70.55	6.93	-63.62	-50.6
5160.00	V	101	189	-65.05	9.13	-55.92	-42.9
6880.00	V	-	-	-70.73	9.86	-60.87	-47.9
8600.00	V	-	-	-70.29	10.01	-60.28	-47.3
10320.00	V	-	-	-67.48	9.76	-57.73	-44.7

Table 7-18. Radiated Spurious Data (Band 66/4 – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	V	-	-	-72.38	7.02	-65.36	-52.4
5235.00	V	101	187	-66.95	9.24	-57.71	-44.7
6980.00	V	-	-	-70.78	9.83	-60.95	-47.9
8725.00	V	-	-	-70.87	10.03	-60.85	-47.8
10470.00	V	-	-	-67.85	9.74	-58.11	-45.1

Table 7-19. 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]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3540.00	V	-	-	-70.77	6.98	-63.79	-50.8
5310.00	V	105	171	-66.59	9.24	-57.34	-44.3
7080.00	V	-	-	-70.40	9.86	-60.53	-47.5
8850.00	V	-	-	-69.77	10.05	-59.72	-46.7
10620.00	V	-	-	-67.15	9.70	-57.45	-44.5

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

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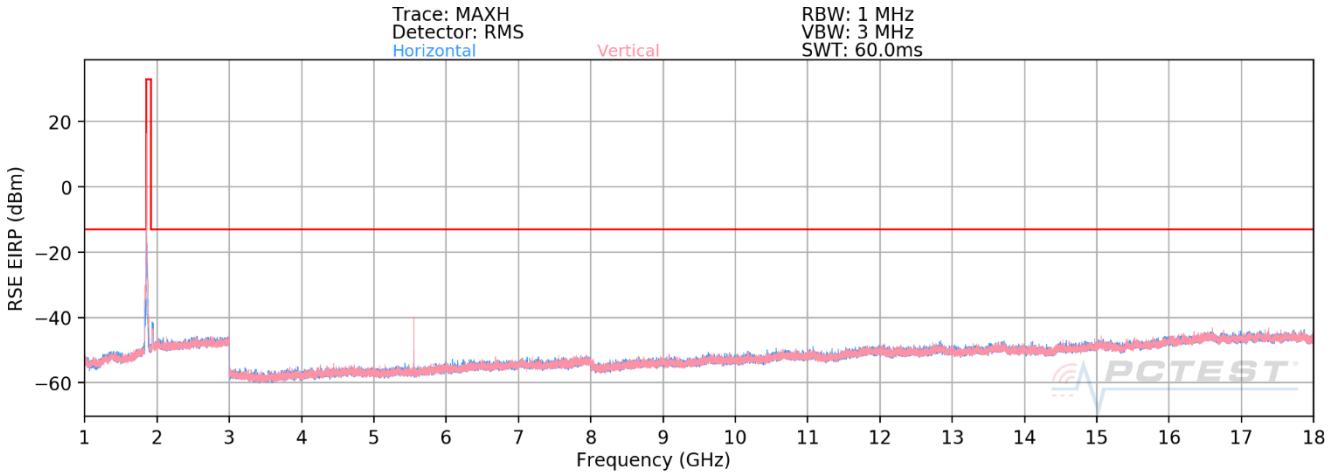
Band 25/2



Plot 7-273. Radiated Spurious Emissions above 1GHz (Band 25/2)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3720.00	V	-	-	-70.60	7.36	-63.23	-50.2
5580.00	V	105	277	-59.59	9.38	-50.20	-37.2
7440.00	V	-	-	-69.32	9.45	-59.87	-46.9
9300.00	V	-	-	-69.99	9.62	-60.37	-47.4

Table 7-21. Radiated Spurious Data (Band 25/2 – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3765.00	V	-	-	-68.38	7.55	-60.83	-47.8
5670.00	V	101	263	-61.87	9.48	-52.39	-39.4
7575.00	H	-	-	-67.91	9.54	-58.36	-45.4
9480.00	H	-	-	-64.29	9.73	-54.56	-41.6

Table 7-22. Radiated Spurious Data (Band 25/2 – Mid Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3810.00	V	-	-	-70.01	7.55	-62.46	-49.5
5715.00	V	107	298	-64.75	9.48	-55.27	-42.3
7620.00	V	-	-	-68.61	9.54	-59.07	-46.1
9525.00	V	-	-	-63.82	9.73	-54.10	-41.1

Table 7-23. Radiated Spurious Data (Band 25/2 – High Channel)

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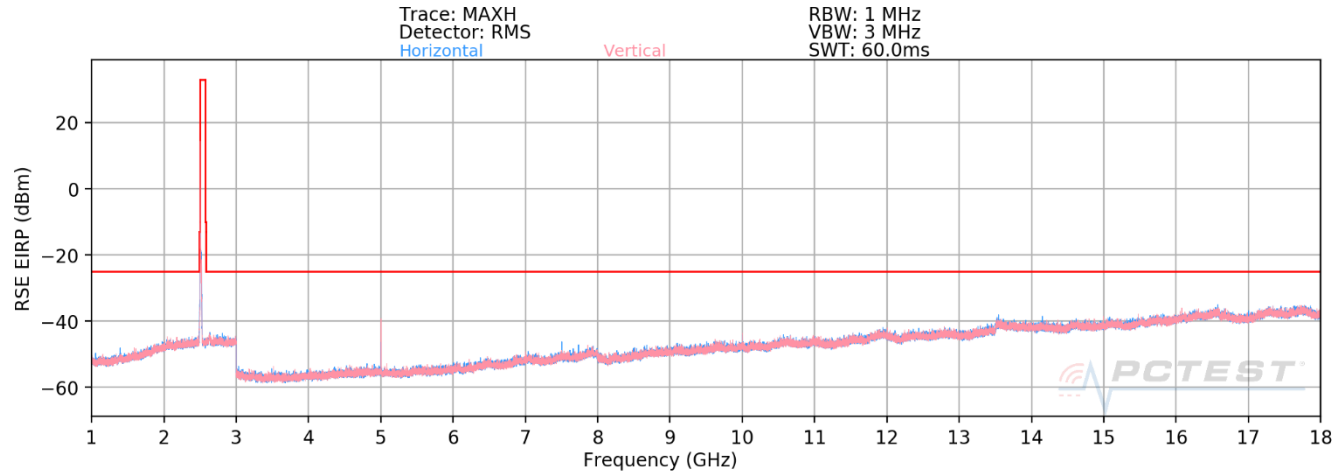
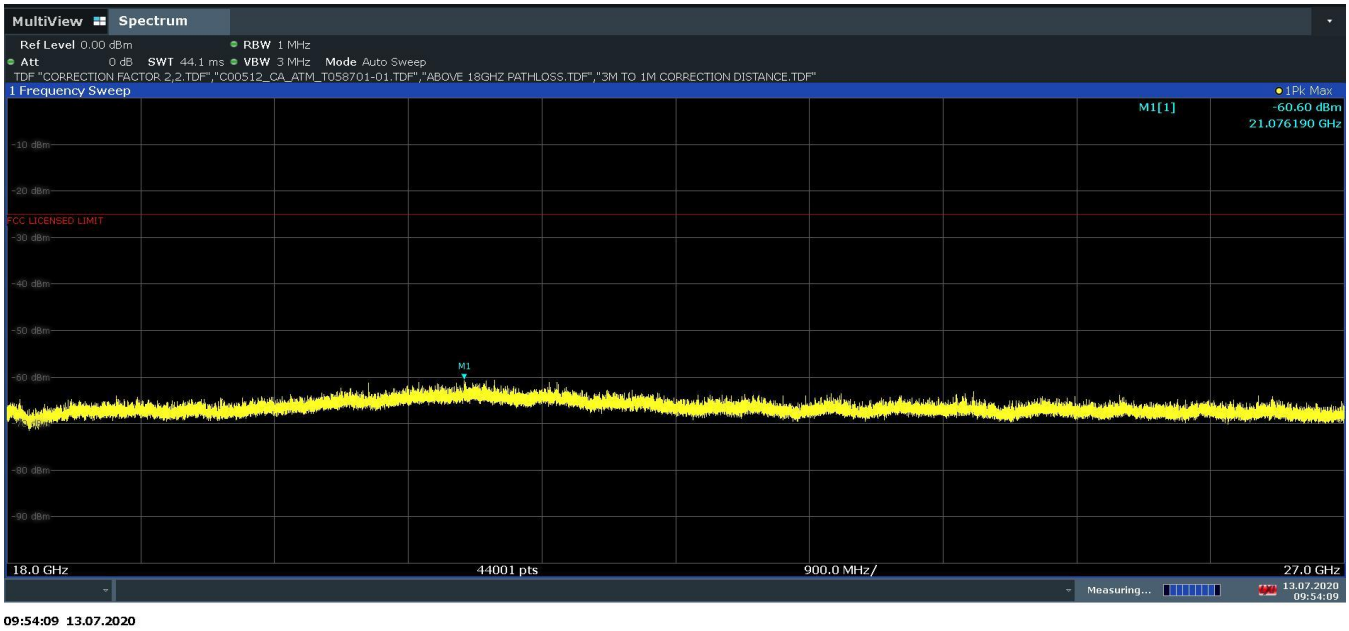
Band 7



Plot 7-274. Radiated Spurious Emissions 1GHz - 18GHz (Band 7)



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Plot 7-275. Radiated Spurious Emissions 18GHz – 27GHz (Band 7, Pol. H)

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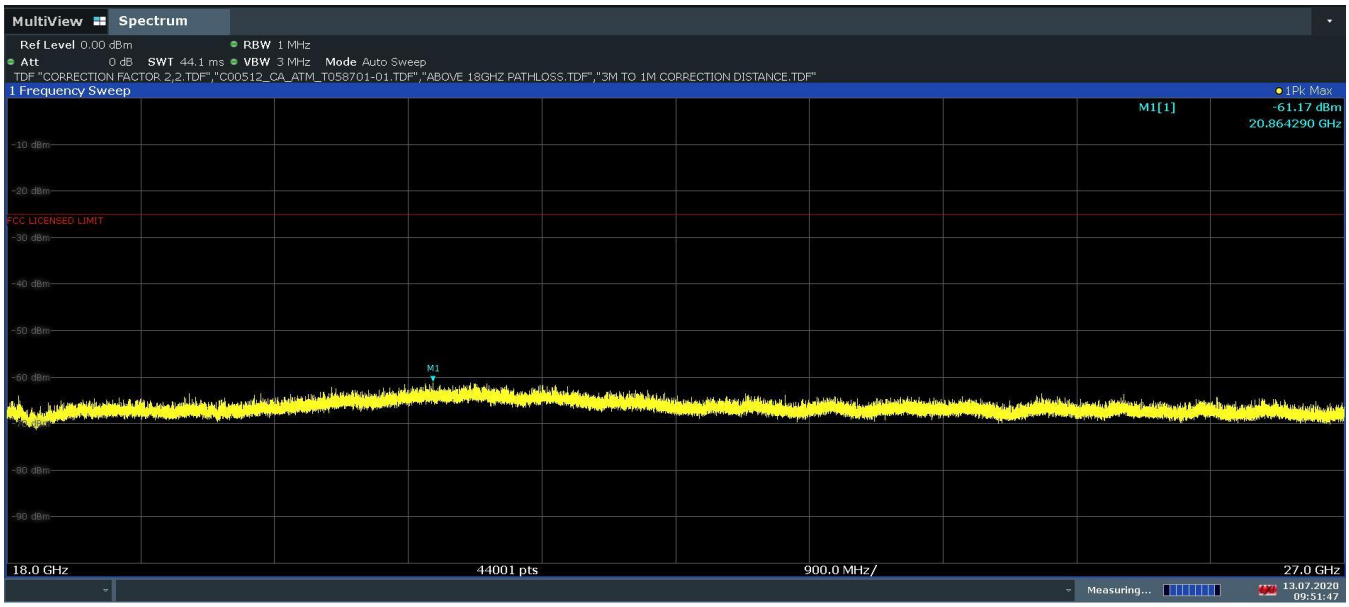

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Plot 7-276. Radiated Spurious Emissions 18GHz – 27GHz (Band 7, Pol. V)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5020.00	V	131	7	-59.08	8.76	-50.32	-25.3
7530.00	H	370	292	-66.07	9.47	-56.59	-31.6
10040.00	H	-	-	-63.58	9.67	-53.91	-28.9
12550.00	H	-	-	-60.54	9.56	-50.98	-26.0

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5070.00	H	-	-	-69.55	8.88	-60.67	-35.7
7580.00	V	-	-	-66.97	9.50	-57.47	-32.5
10090.00	H	-	-	-63.62	9.72	-53.90	-28.9

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5120.00	H	-	-	-69.69	9.00	-60.69	-35.7
7680.00	H	-	-	-66.69	9.58	-57.11	-32.1
10240.00	H	-	-	-63.52	9.73	-53.79	-28.8

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

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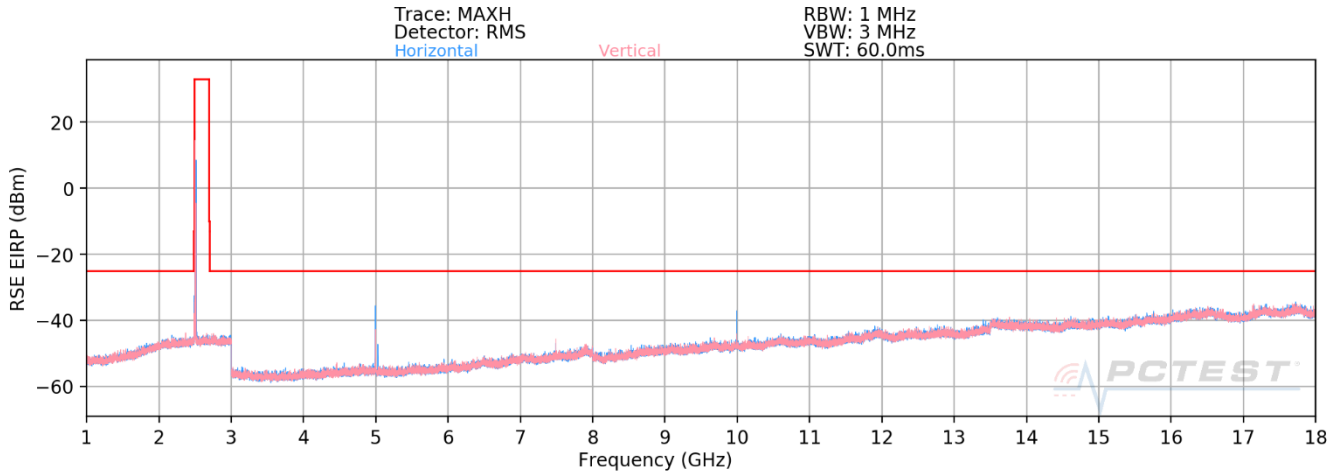
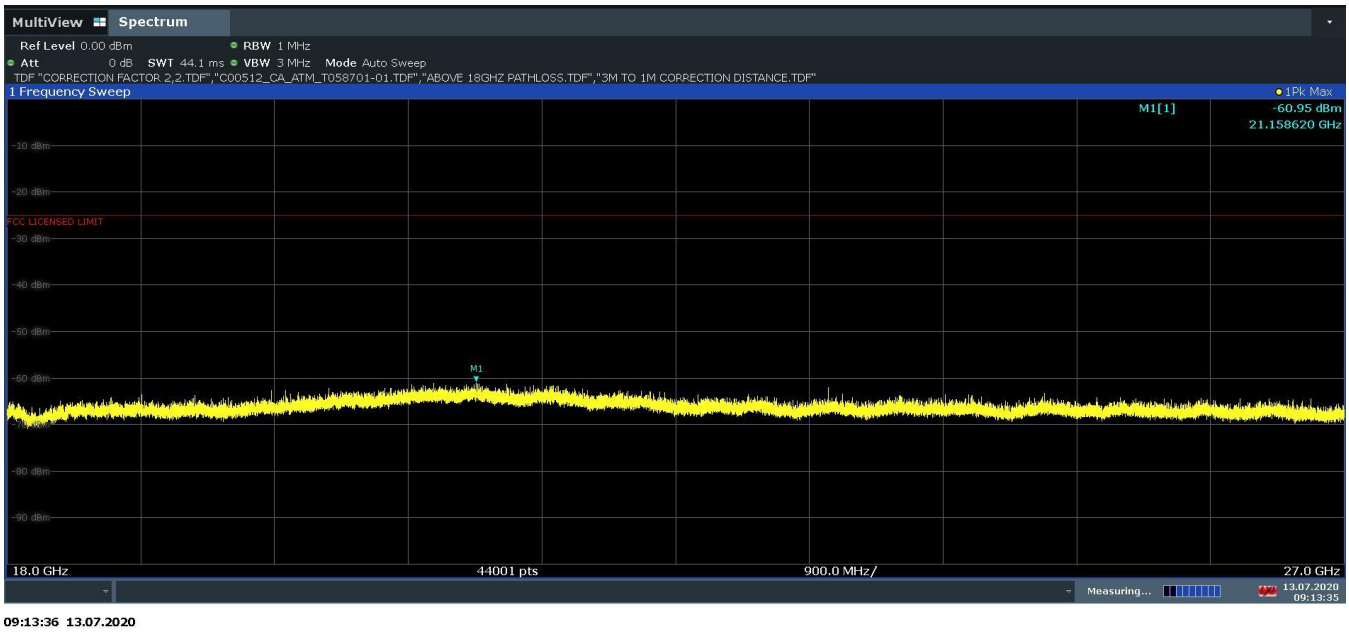
Band 41



Plot 7-277. Radiated Spurious Emissions 1GHz - 18GHz (Band 41)



Plot 7-278. Radiated Spurious Emissions 18GHz – 27GHz (Band 41, Pol. H)

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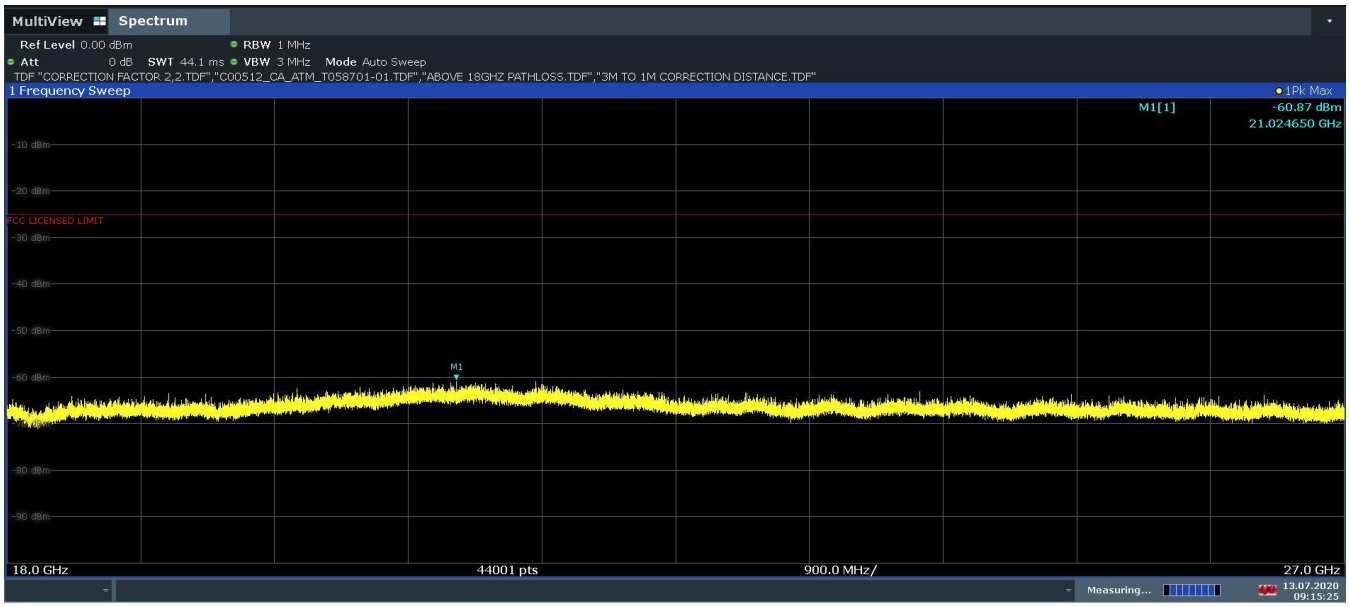

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Plot 7-279. Radiated Spurious Emissions 18GHz – 27GHz (Band 41, Pol. V)

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]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5012.00	H	131	136	-46.28	8.74	-37.54	-12.5
7518.00	V	290	355	-55.91	9.49	-46.43	-21.4
10024.00	H	240	26	-49.52	9.67	-39.85	-14.9

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

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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]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	H	114	357	-49.79	9.21	-40.59	-15.6
7779.00	H	-	-	-57.53	9.62	-47.91	-22.9
10372.00	H	-	-	-55.18	9.75	-45.43	-20.4

Table 7-28. 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]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5360.00	H	-	-	-61.04	9.22	-51.82	-26.8
8040.00	H	-	-	-58.25	9.70	-48.56	-23.6
10720.00	H	-	-	-53.56	9.72	-43.84	-18.8

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

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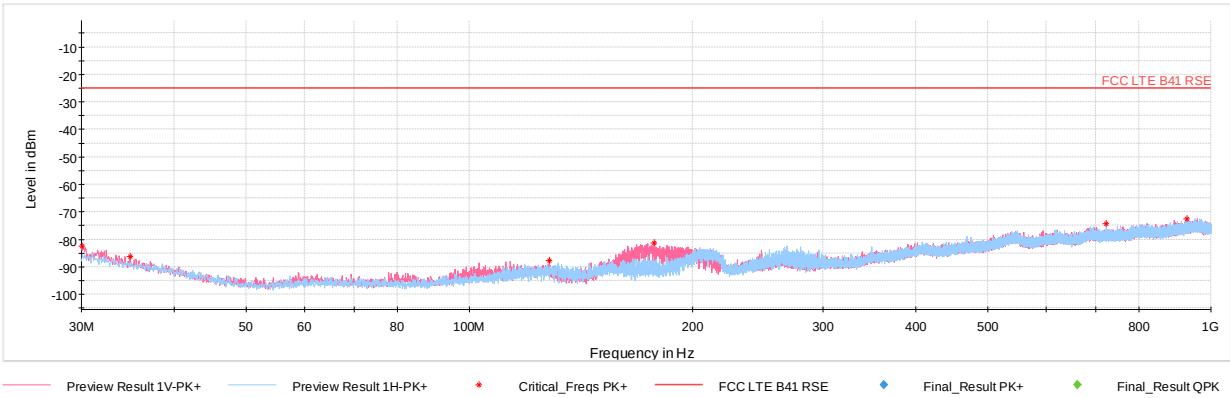
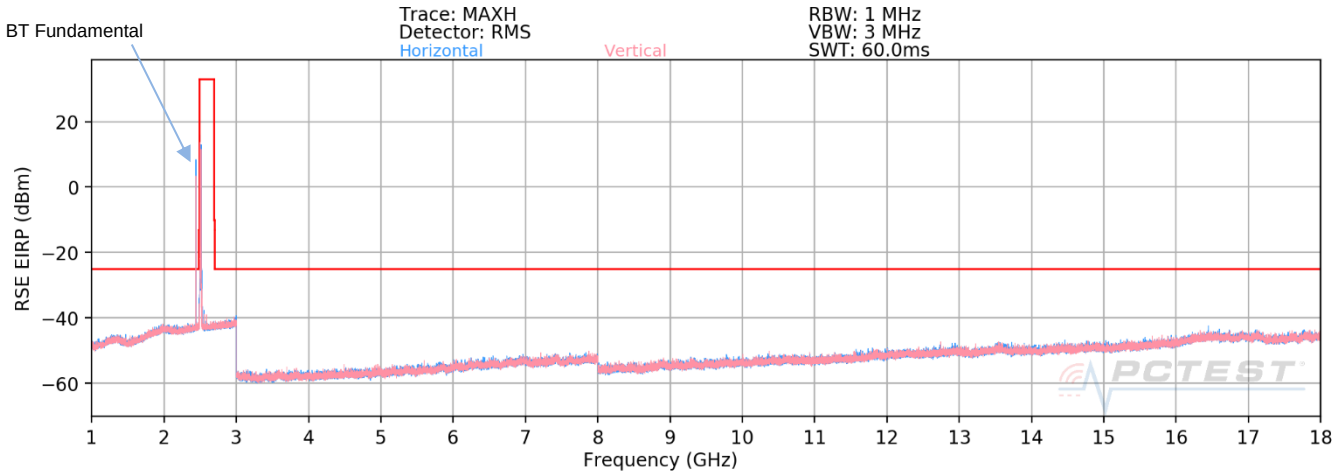
7.7.1 Simultaneous Tx Radiated Spurious Emissions Measurements

Description	Bluetooth	LTE (Band 41)
Antenna	FCM	FCM
Channel	39	39750
Operating Frequency (MHz)	2441	2506
Mode/Modulation	GFSK ePA	QPSK/1RB/20MHz

Table 7-30. Worst Case Simultaneous Transmission Configuration



Plot 7-280. Radiated Spurious Emissions – Simultaneous Transmission 30MHz – 1GHz



Plot 7-281. Radiated Spurious Emissions – Simultaneous Transmission 1GHz – 18GHz

Note: Only the LTE B41 limit was shown in the plot above. The other fundamental is BT.

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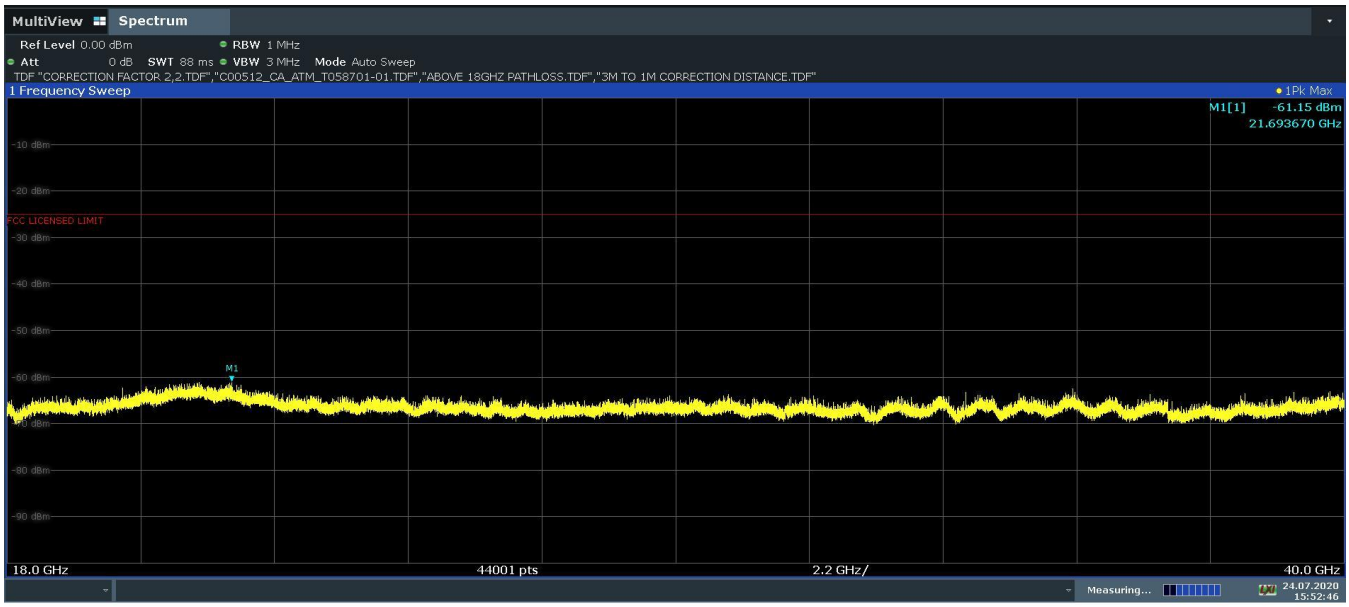

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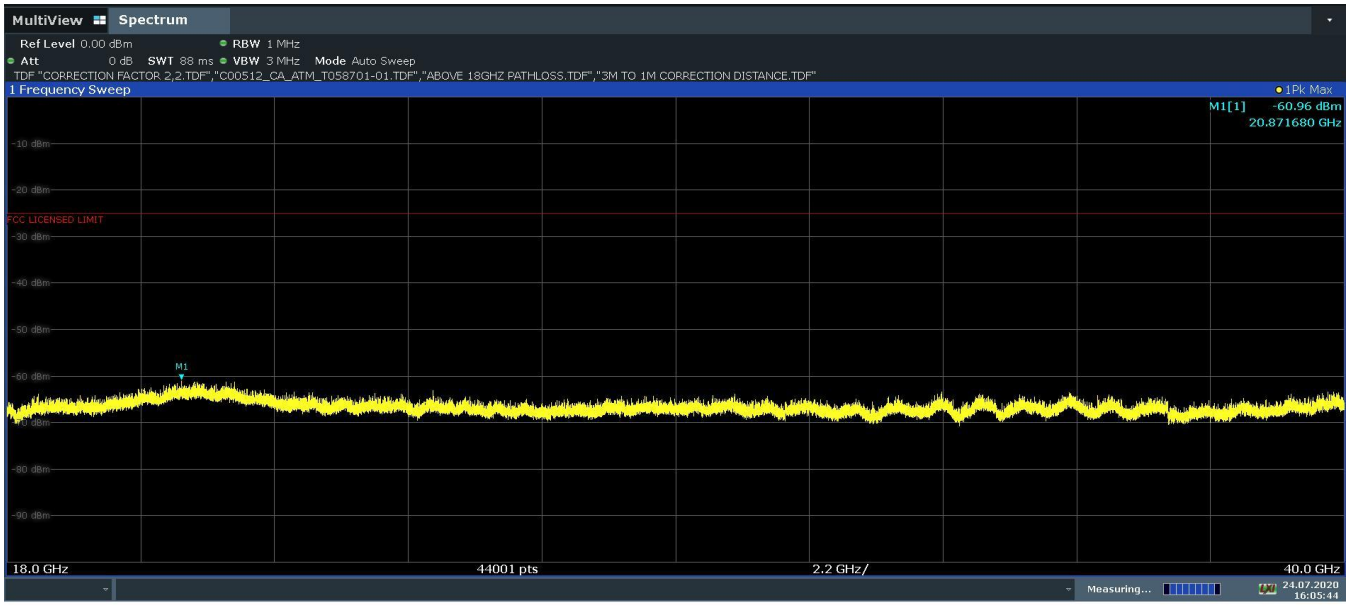
Plot 7-282. Radiated Spurious Emissions – Simultaneous Transmission 18GHz – 40GHz (Pol. H)



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Plot 7-283. Radiated Spurious Emissions – Simultaneous Transmission 18GHz – 40GHz (Pol. V)

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Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4882.00	Avg	H	-	-	-81.60	10.39	35.79	53.98	-18.19
4882.00	Peak	H	-	-	-70.57	10.39	46.82	73.98	-27.16
7323.00	Avg	H	101	88	-77.46	13.48	43.02	53.98	-10.96
7323.00	Peak	H	101	88	-69.13	13.48	51.35	73.98	-22.63
12205.00	Avg	H	-	-	-85.20	19.54	41.34	53.98	-12.64
12205.00	Peak	H	-	-	-73.95	19.54	52.59	73.98	-21.39

Table 7-31. BT Harmonics Emissions Measurement in Simultaneous Transmission Mode

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	EIRP Level at Sub Ant Port [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5012.00	Avg	H	105	357	-47.80	8.74	-39.05	-25.0	-14.1
7518.00	Avg	H	-	-	-57.43	9.49	-47.95	-25.0	-22.9
10024.00	Avg	H	-	-	-57.51	9.67	-47.84	-25.0	-22.8
12530.00	Avg	H	-	-	-54.75	9.56	-45.19	-25.0	-20.2
2376.00	Avg	H	117	345	-44.74	4.24	-40.50	-25.0	-15.5

Table 7-32. LTE Harmonics and Intermodulations Emissions Measurement in Simultaneous Transmission Mode

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7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015/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 C63.26 2015
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 wideband radio communication tester with the EUT placed inside an environmental chamber.

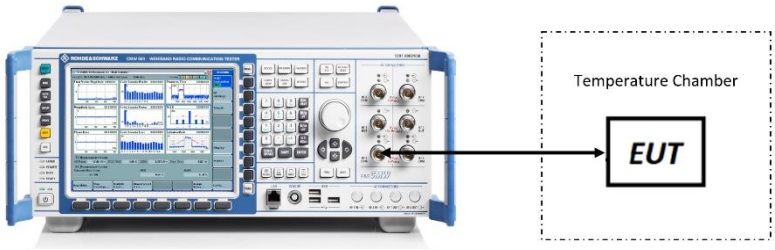

Figure 7-8. Test Instrument & Measurement Setup

Test Notes

None

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Band 26/5 Frequency Stability Measurements

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	26865	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	836,500,001	1.2	0.00000014
100 %		- 20	836,500,000	0.3	0.00000003
100 %		- 10	836,500,000	0.4	0.00000004
100 %		0	836,500,000	-0.4	-0.00000005
100 %		+ 10	836,499,999	-0.9	-0.00000011
100 %		+ 20	836,500,001	0.6	0.00000007
100 %		+ 30	836,499,999	-0.6	-0.00000007
100 %		+ 40	836,500,001	0.5	0.00000006
100 %		+ 50	836,499,999	-1.0	-0.00000012
BATT. ENDPOINT	3.40	+ 20	836,500,001	1.2	0.00000014

Table 7-33. Frequency Stability Data (Band 26/5 – 10MHz QPSK – Full RB Configuration)

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Band 26/5 Frequency Stability Measurements

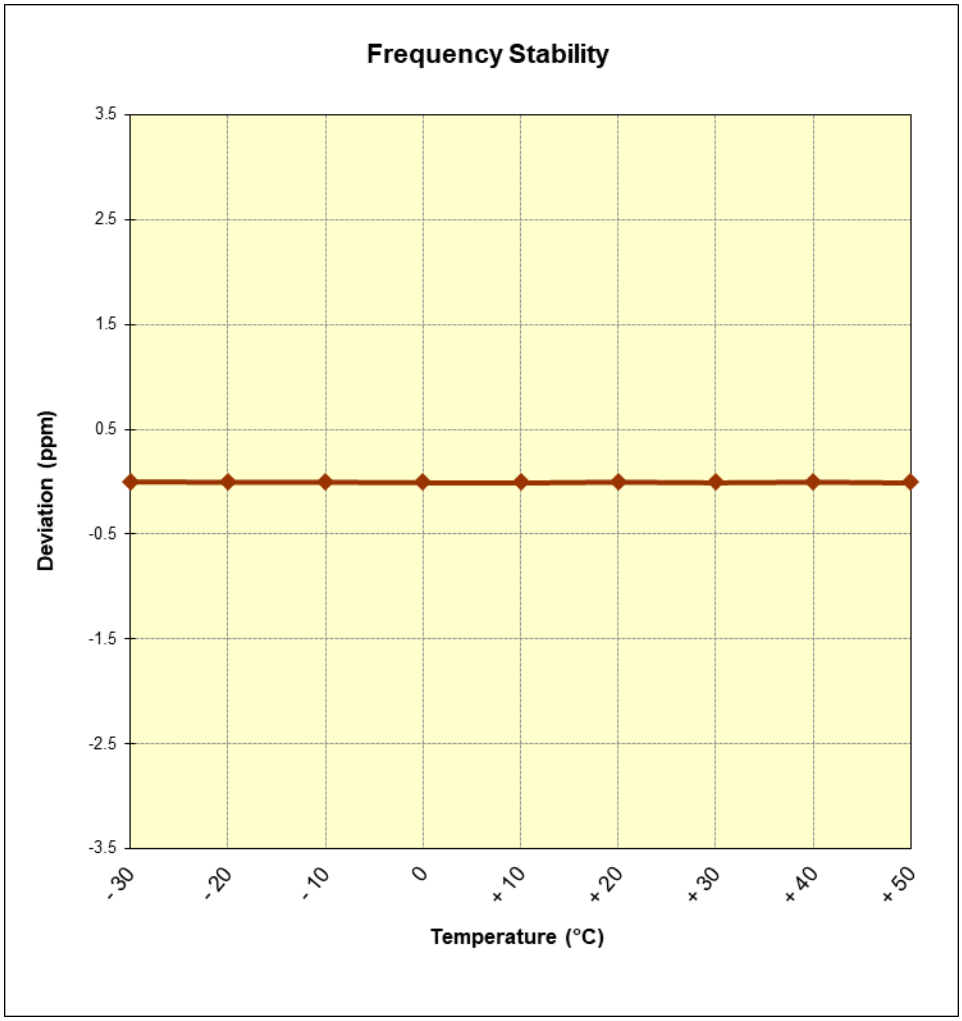

Figure 7-9. Frequency Stability Graph (Band 26/5 – 10MHz QPSK – Full RB Configuration)

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Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY:	1,745,000,000	Hz
CHANNEL:	132322	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	1,745,000,000	-0.2	-0.00000001
100 %		- 20	1,744,999,999	-0.7	-0.00000004
100 %		- 10	1,745,000,000	-0.3	-0.00000001
100 %		0	1,744,999,998	-2.2	-0.00000013
100 %		+ 10	1,744,999,998	-2.4	-0.00000014
100 %		+ 20	1,745,000,000	-0.5	-0.00000003
100 %		+ 30	1,744,999,997	-2.9	-0.00000017
100 %		+ 40	1,744,999,999	-0.7	-0.00000004
100 %		+ 50	1,744,999,999	-1.1	-0.00000006
BATT. ENDPOINT	3.40	+ 20	1,744,999,998	-2.2	-0.00000012

Table 7-34. Frequency Stability Data (Band 66/4 – 20MHz QPSK – Full RB Configuration)

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Band 66/4 Frequency Stability Measurements

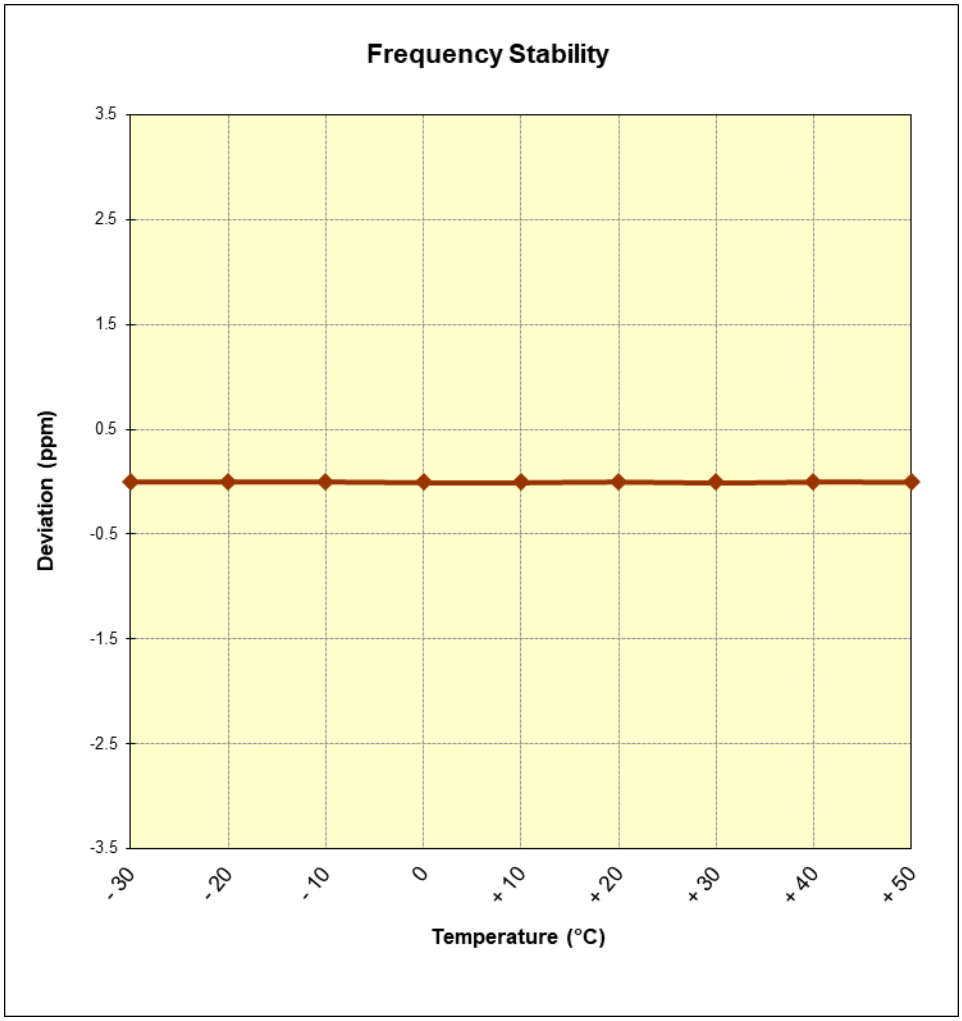

Figure 7-10. Frequency Stability Graph (Band 66/4 – 20MHz QPSK – Full RB Configuration)

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Band 25/2 Frequency Stability Measurements

OPERATING FREQUENCY:	1,882,500,000	Hz
CHANNEL:	26365	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	1,882,499,999	-1.3	-0.00000007
100 %		- 20	1,882,499,998	-2.2	-0.00000011
100 %		- 10	1,882,500,001	0.8	0.00000004
100 %		0	1,882,500,000	0.4	0.00000002
100 %		+ 10	1,882,500,001	0.7	0.00000004
100 %		+ 20	1,882,499,996	-4.4	-0.00000023
100 %		+ 30	1,882,499,996	-3.8	-0.00000020
100 %		+ 40	1,882,499,997	-3.5	-0.00000019
100 %		+ 50	1,882,499,997	-3.4	-0.00000018
BATT. ENDPOINT	3.40	+ 20	1,882,499,997	-3.1	-0.00000017

Table 7-35. Frequency Stability Data (Band 25/2 – 20MHz QPSK – Full RB Configuration)

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Band 25/2 Frequency Stability Measurements

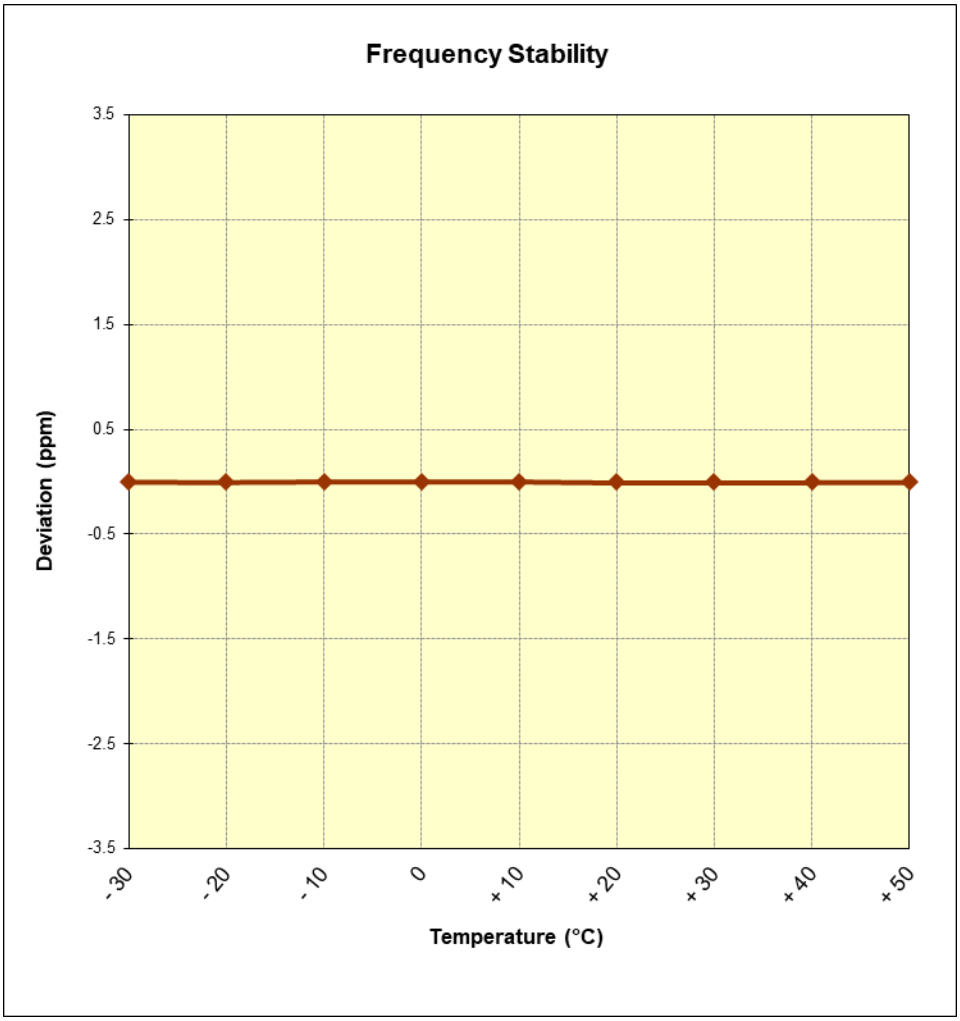

Figure 7-11. Frequency Stability Graph (Band 25/2 – 20MHz QPSK – Full RB Configuration)

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Band 7 Frequency Stability Measurements

OPERATING FREQUENCY:	2,535,000,000	Hz
CHANNEL:	21100	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	2,535,000,002	2.1	0.00000008
100 %		- 20	2,535,000,003	2.9	0.00000011
100 %		- 10	2,535,000,002	2.1	0.00000008
100 %		0	2,535,000,003	2.7	0.00000010
100 %		+ 10	2,535,000,003	3.4	0.00000013
100 %		+ 20	2,535,000,005	5.2	0.00000020
100 %		+ 30	2,535,000,003	2.9	0.00000011
100 %		+ 40	2,535,000,003	3.3	0.00000013
100 %		+ 50	2,535,000,003	3.0	0.00000012
BATT. ENDPOINT	3.40	+ 20	2,535,000,003	2.8	0.00000011

Table 7-36. Frequency Stability Data (Band 7 – 20MHz QPSK – Full RB Configuration)

Note:

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

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Band 7 Frequency Stability Measurements

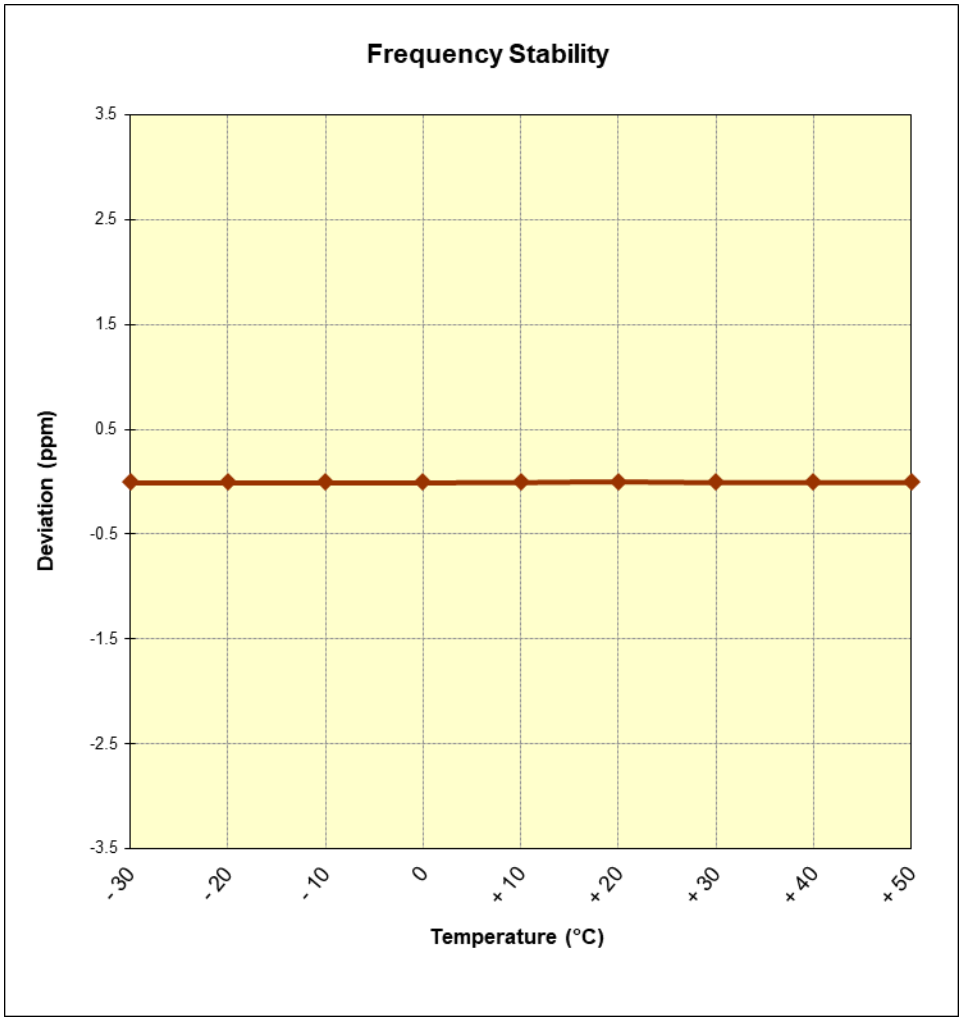

Figure 7-12. Frequency Stability Graph (Band 7 – 20MHz QPSK – Full RB Configuration)

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Band 41 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	2,592,999,997	-2.6	-0.0000001
100 %		- 20	2,592,999,995	-5.3	-0.0000002
100 %		- 10	2,593,000,012	12.4	0.0000005
100 %		0	2,593,000,015	15.3	0.0000006
100 %		+ 10	2,593,000,037	36.6	0.0000014
100 %		+ 20	2,593,000,060	59.5	0.0000023
100 %		+ 30	2,593,000,070	69.5	0.0000027
100 %		+ 40	2,593,000,072	71.6	0.0000028
100 %		+ 50	2,593,000,060	59.9	0.0000023
BATT. ENDPOINT	3.40	+ 20	2,593,000,038	38.4	0.0000015

Table 7-37. Frequency Stability Data (Band 41 – 20MHz QPSK – Full RB Configuration)

Note:

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

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Band 41 Frequency Stability Measurements

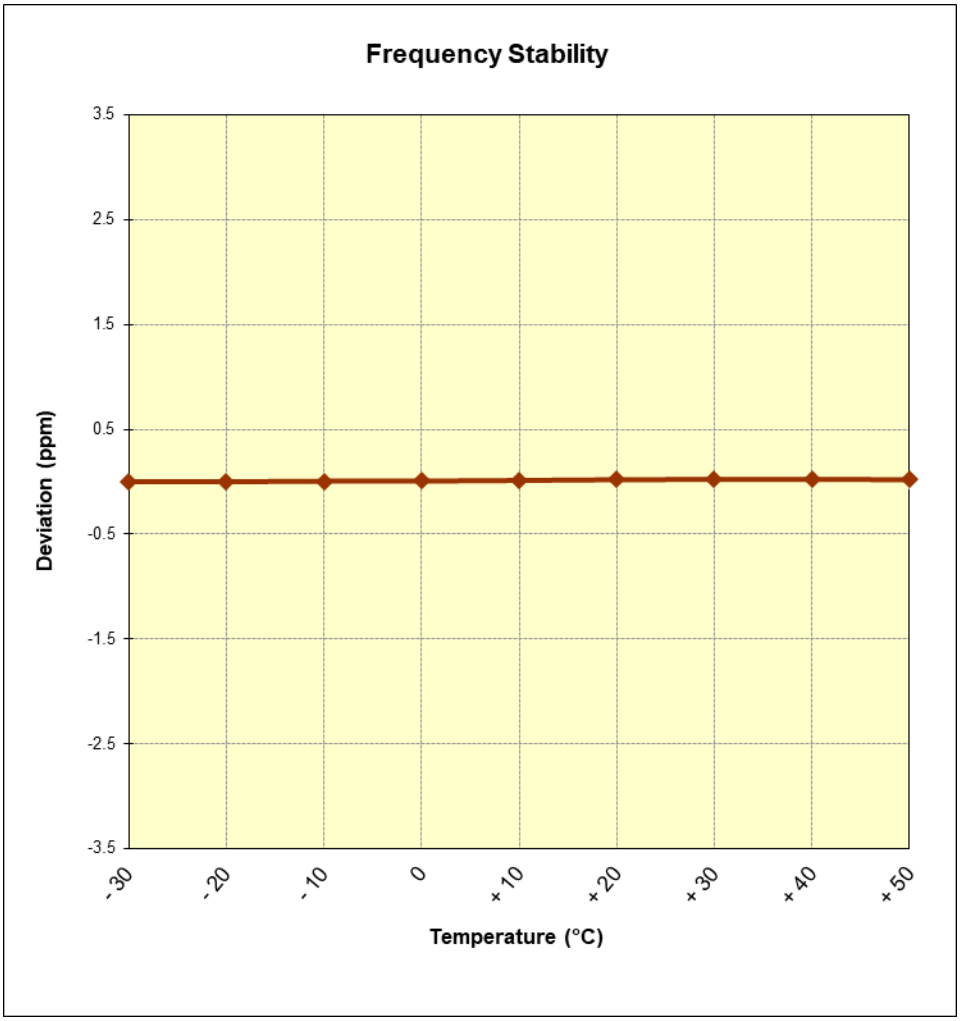

Figure 7-13. Frequency Stability Graph (Band 41 – 20MHz QPSK – Full RB Configuration)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Apple Watch FCC ID: BCG-A2355** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

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