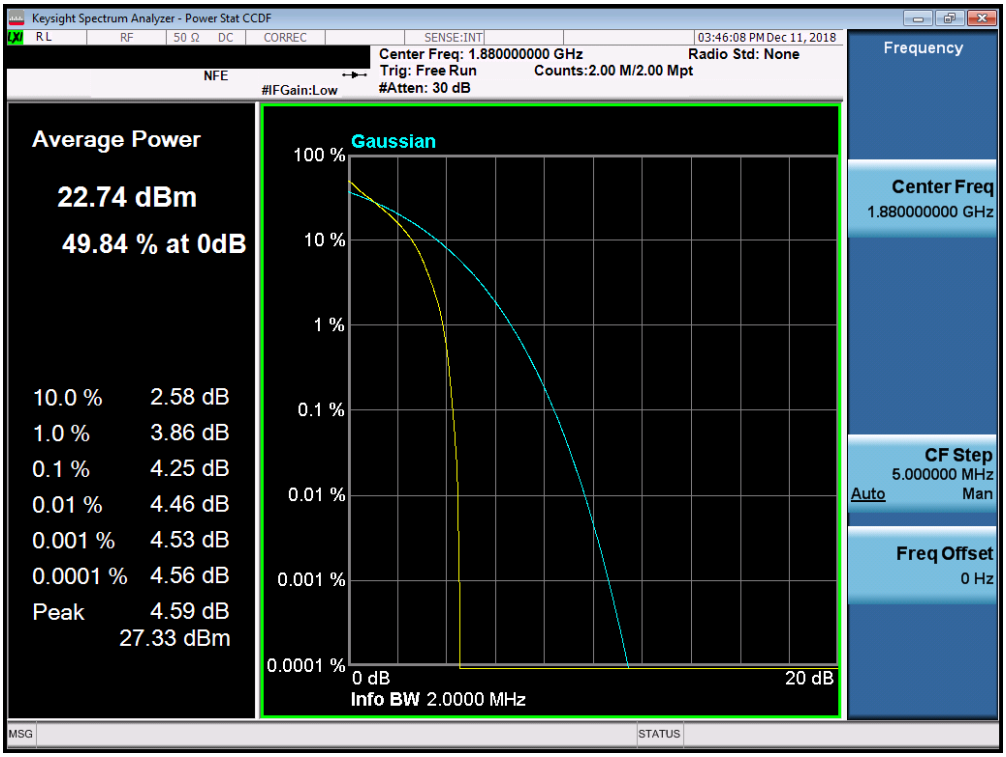
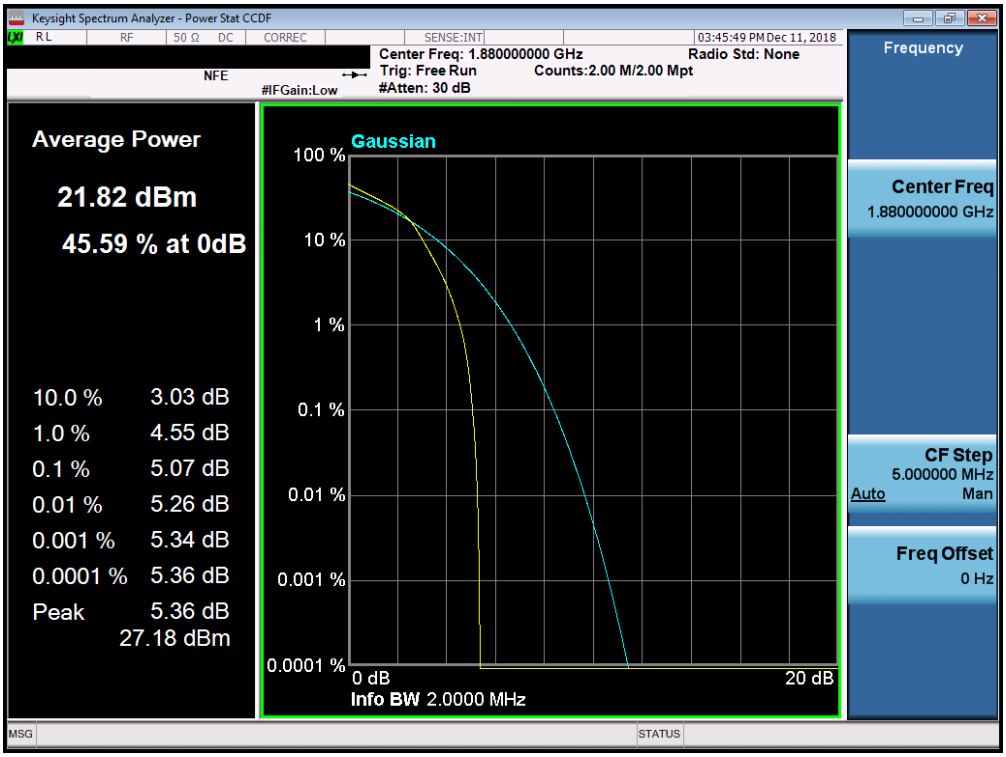
Band 2



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



Plot 7-219. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

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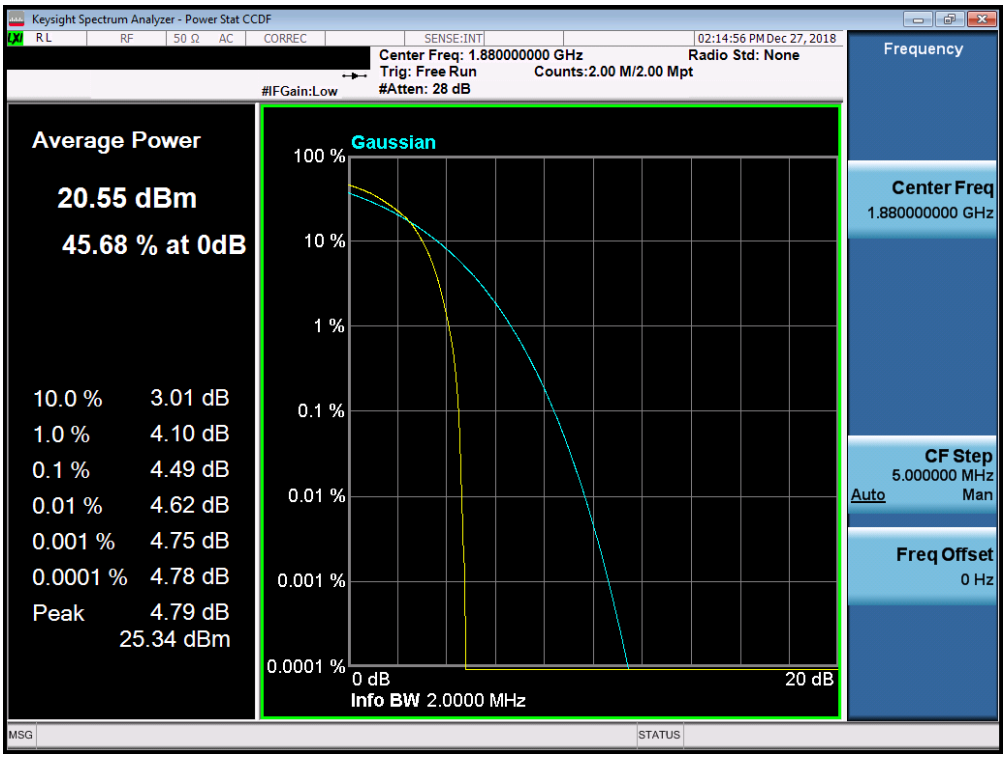
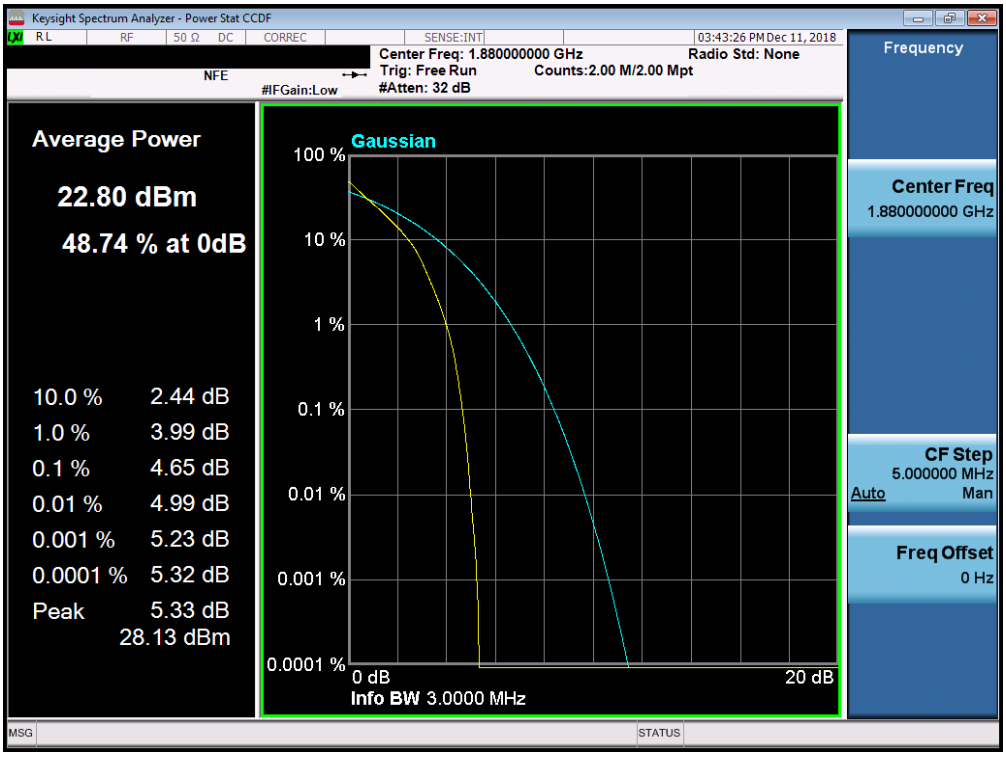


Plot 7-220. PAR Plot (Band 2 - 1.4MHz 64-QAM - Full RB Configuration)



Plot 7-221. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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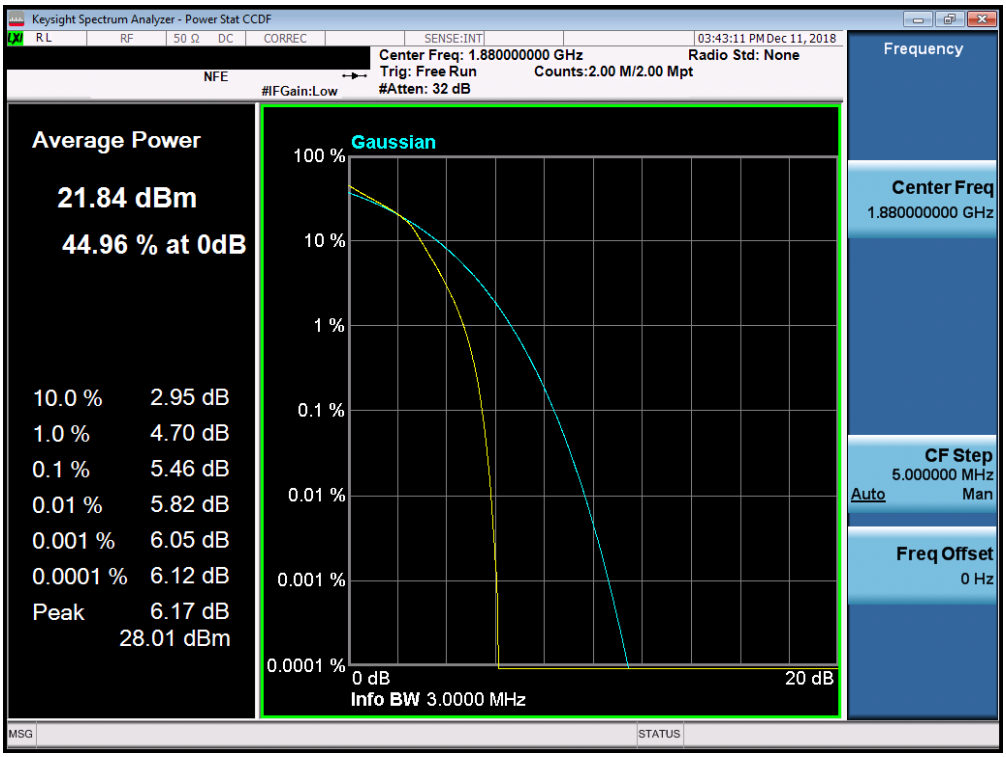
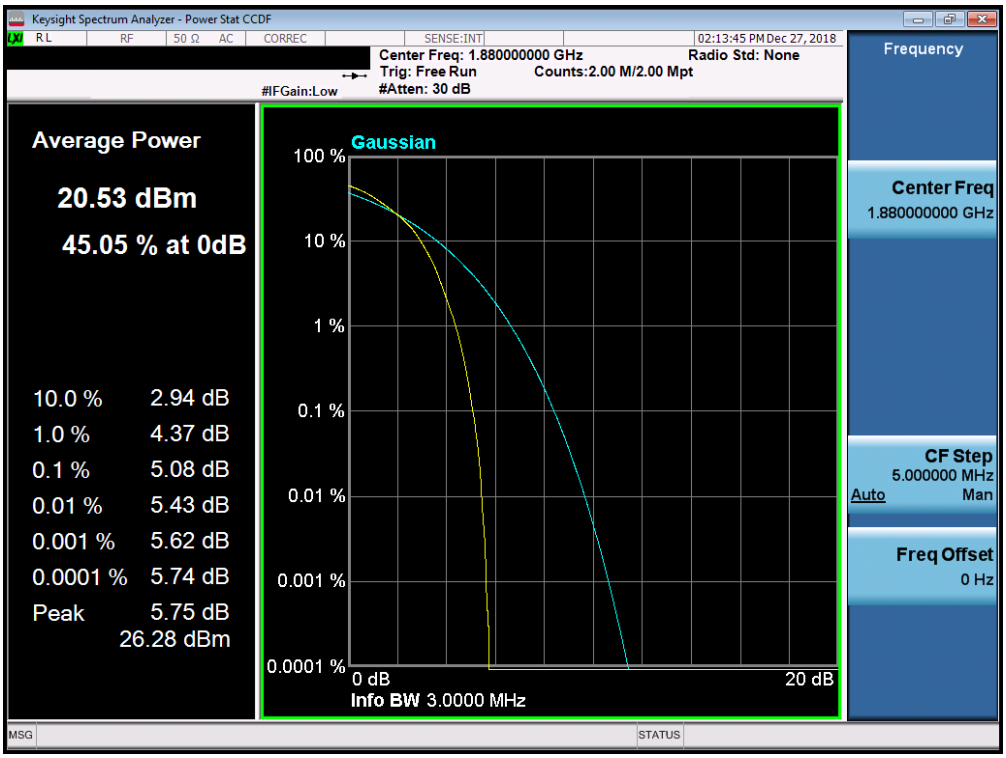


Plot 7-222. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



Plot 7-223. PAR Plot (Band 2 - 3.0MHz 64-QAM - Full RB Configuration)

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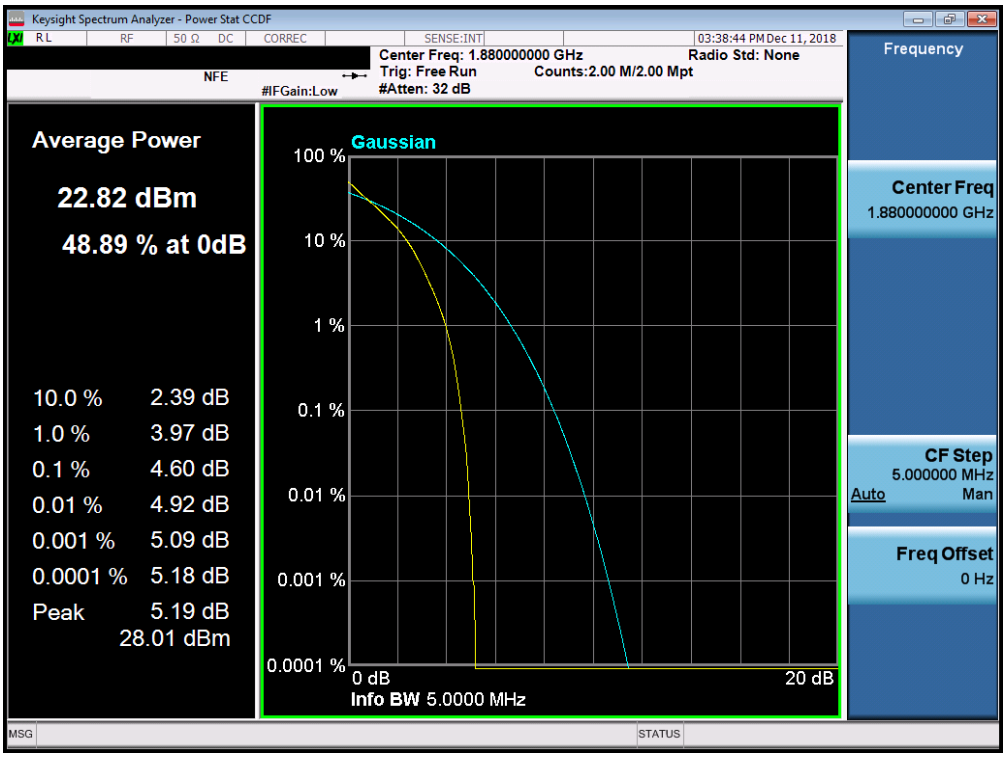
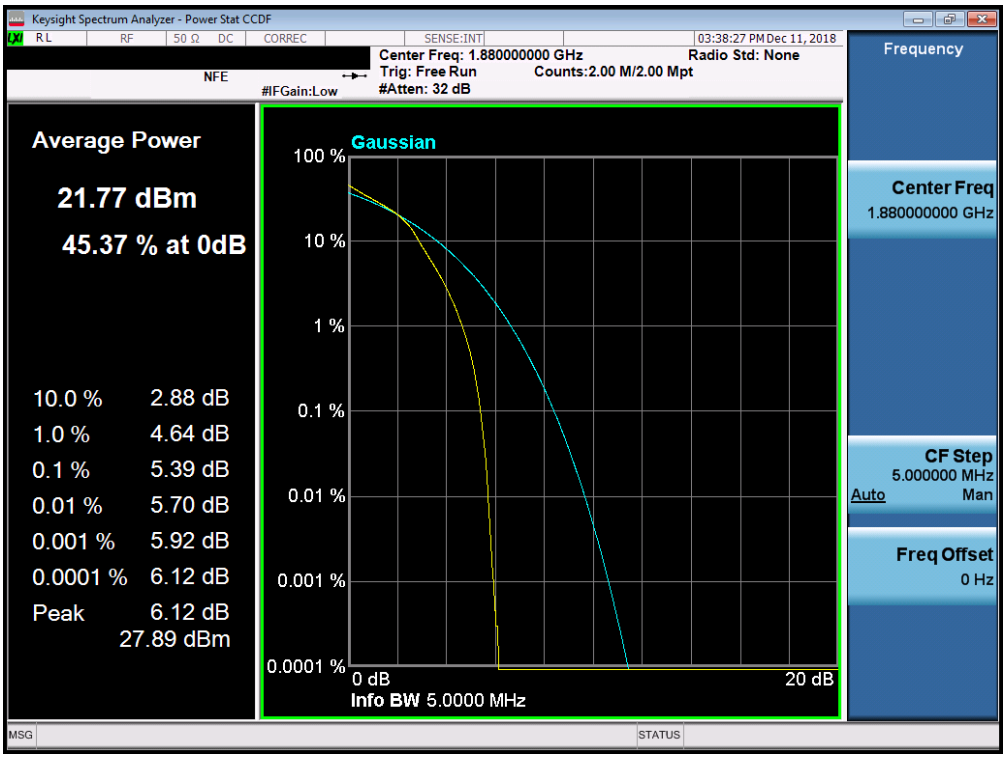


Plot 7-224. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-225. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

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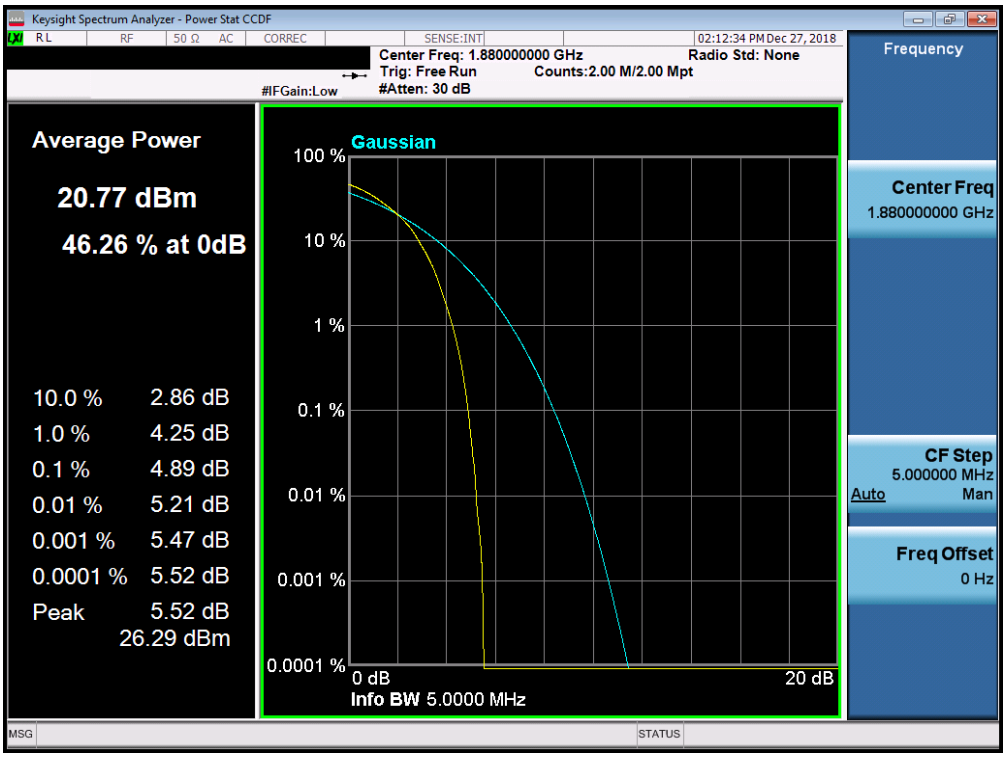
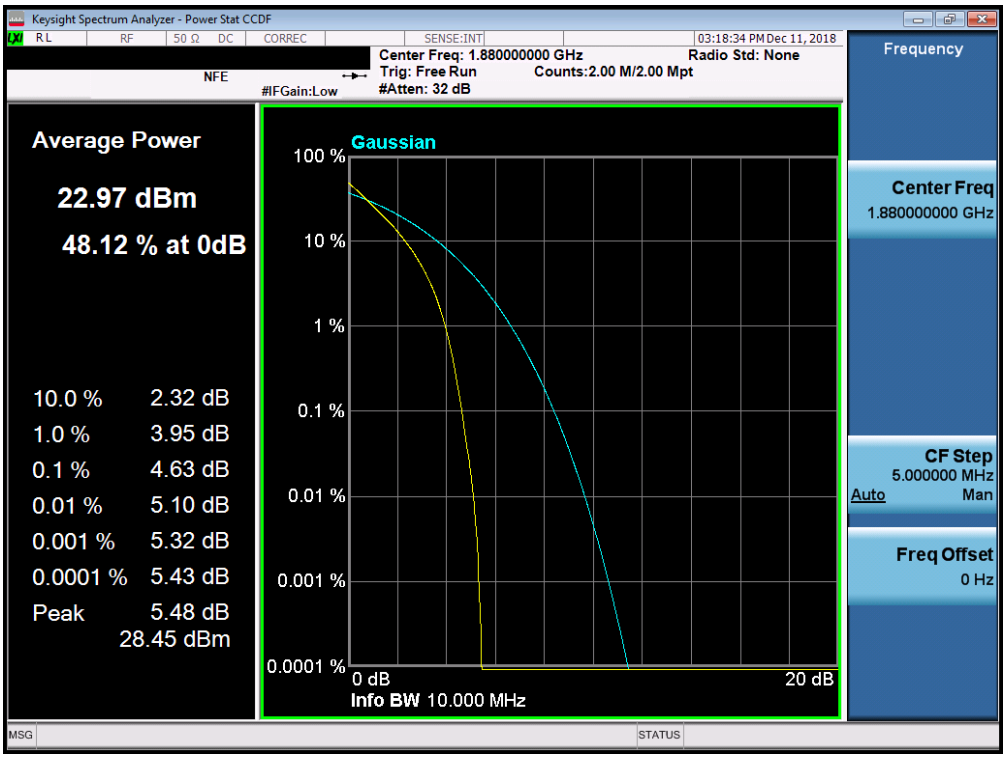


Plot 7-226. PAR Plot (Band 2 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-227. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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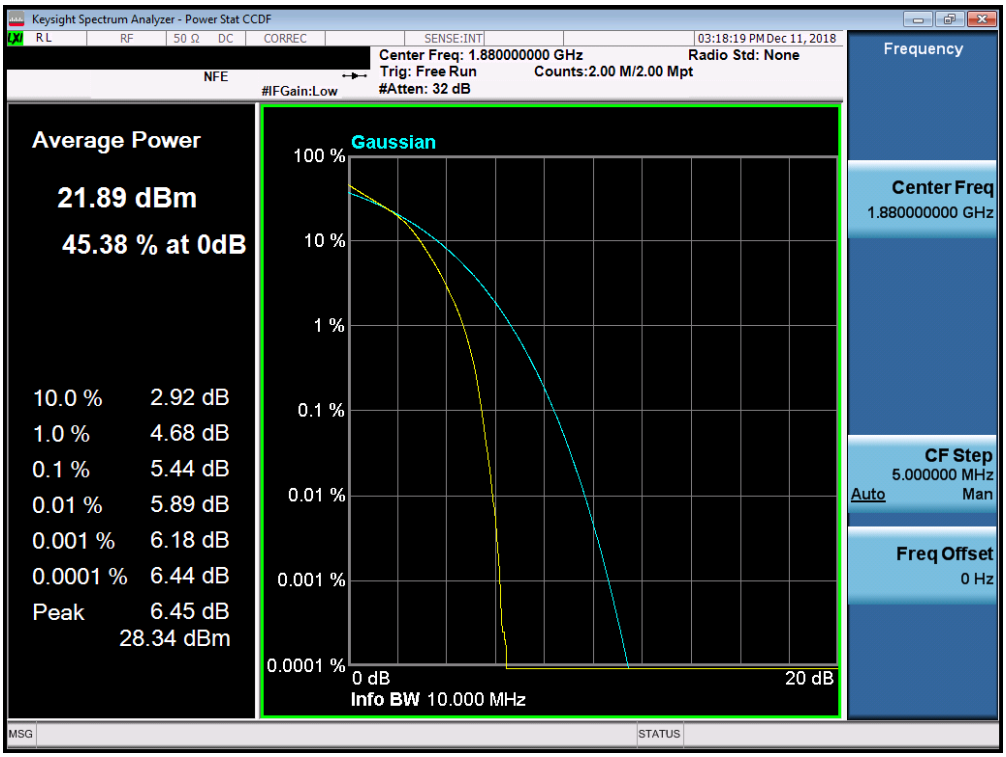
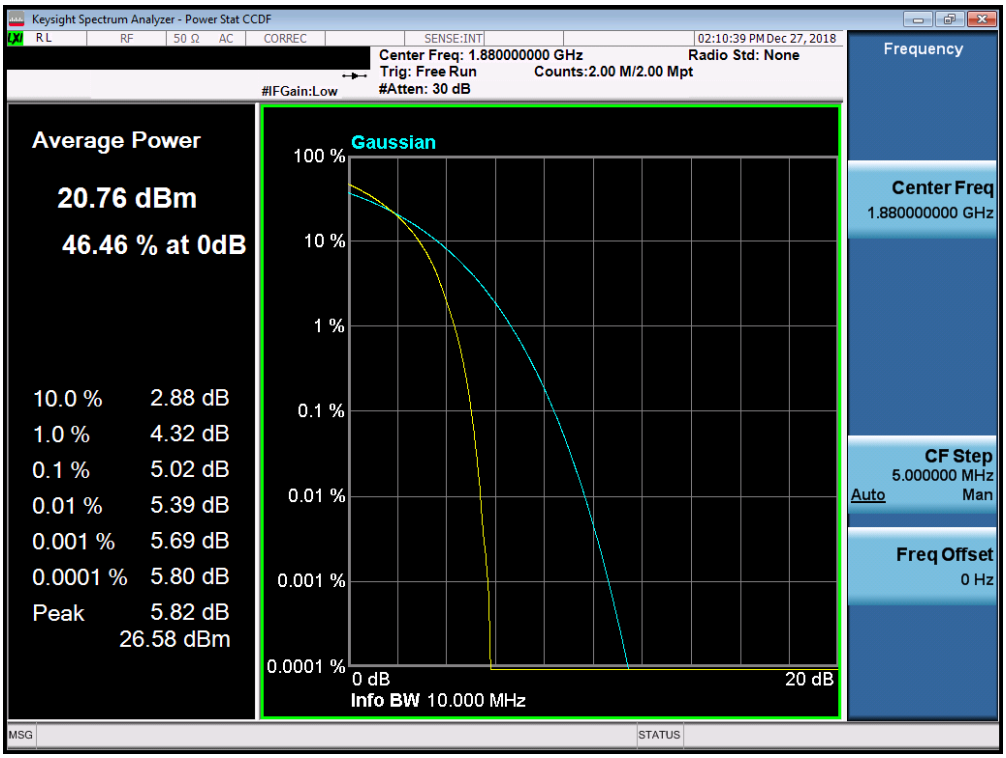


Plot 7-228. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)



Plot 7-229. PAR Plot (Band 2 - 10.0MHz 64-QAM - Full RB Configuration)

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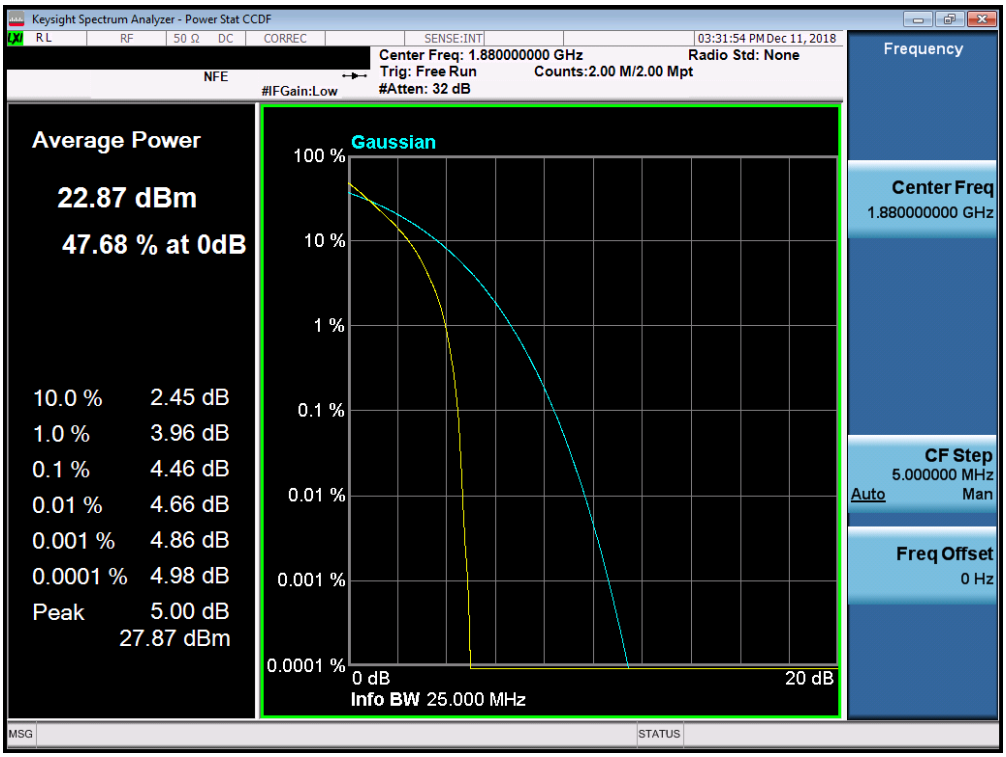
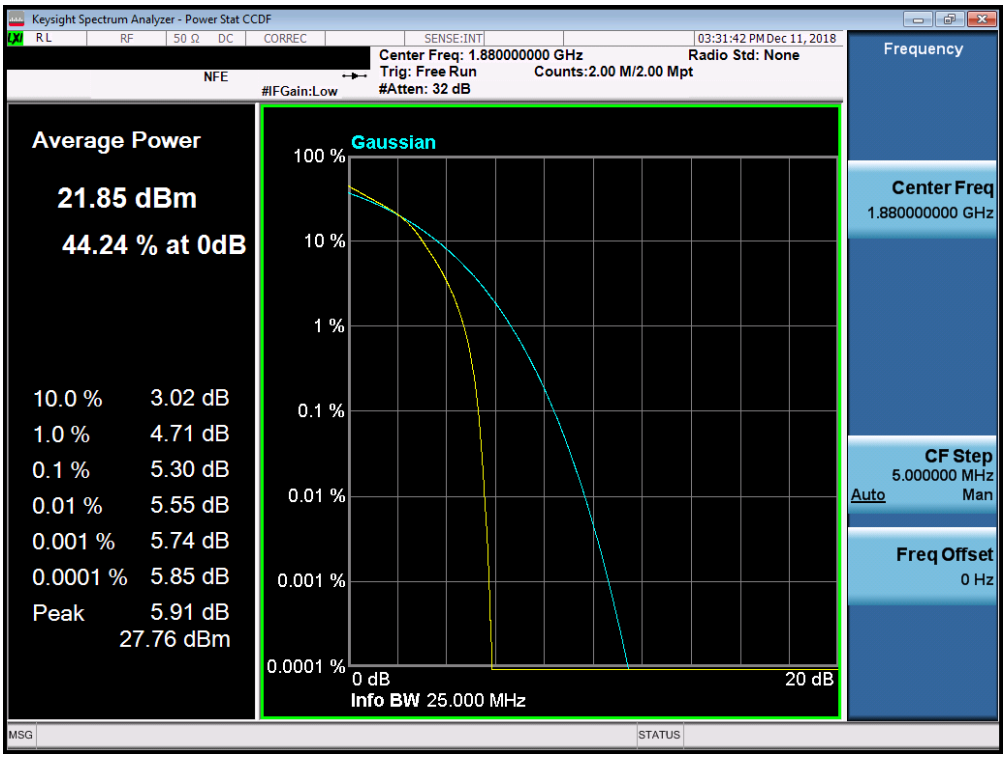


Plot 7-230. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-231. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

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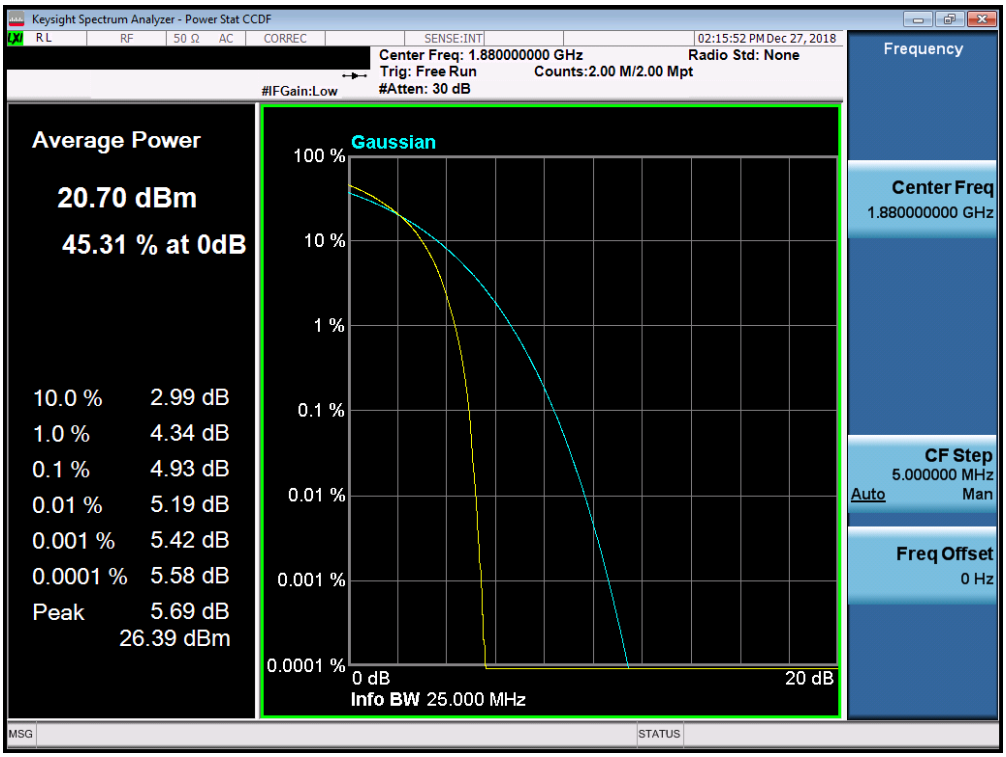
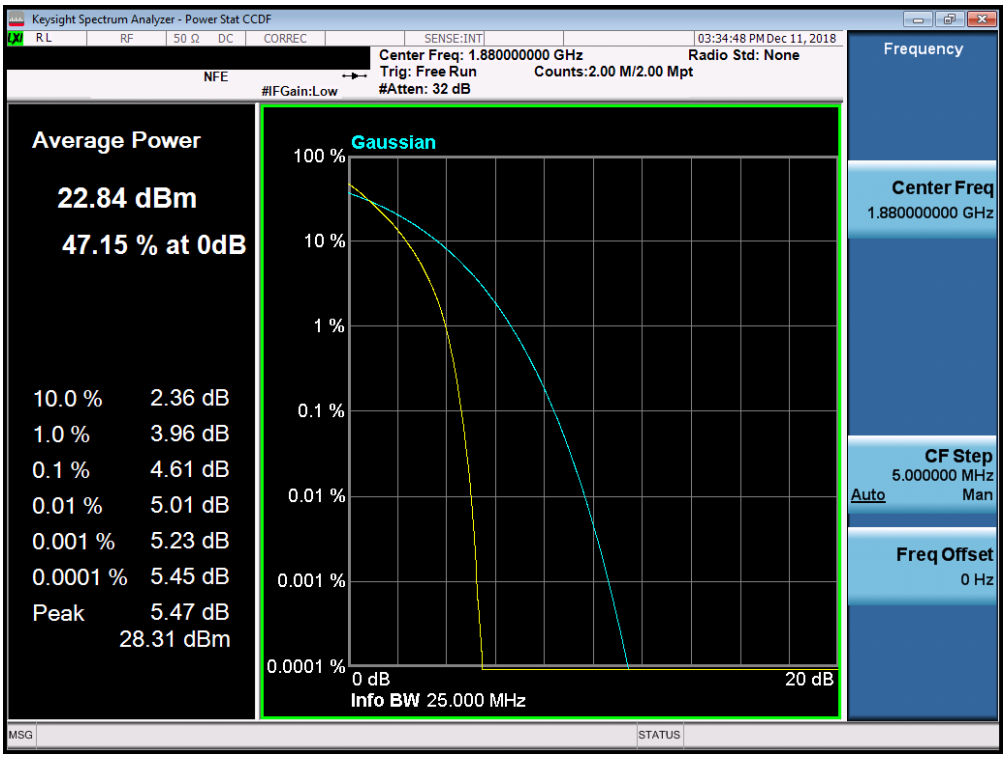


Plot 7-232. PAR Plot (Band 2 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-233. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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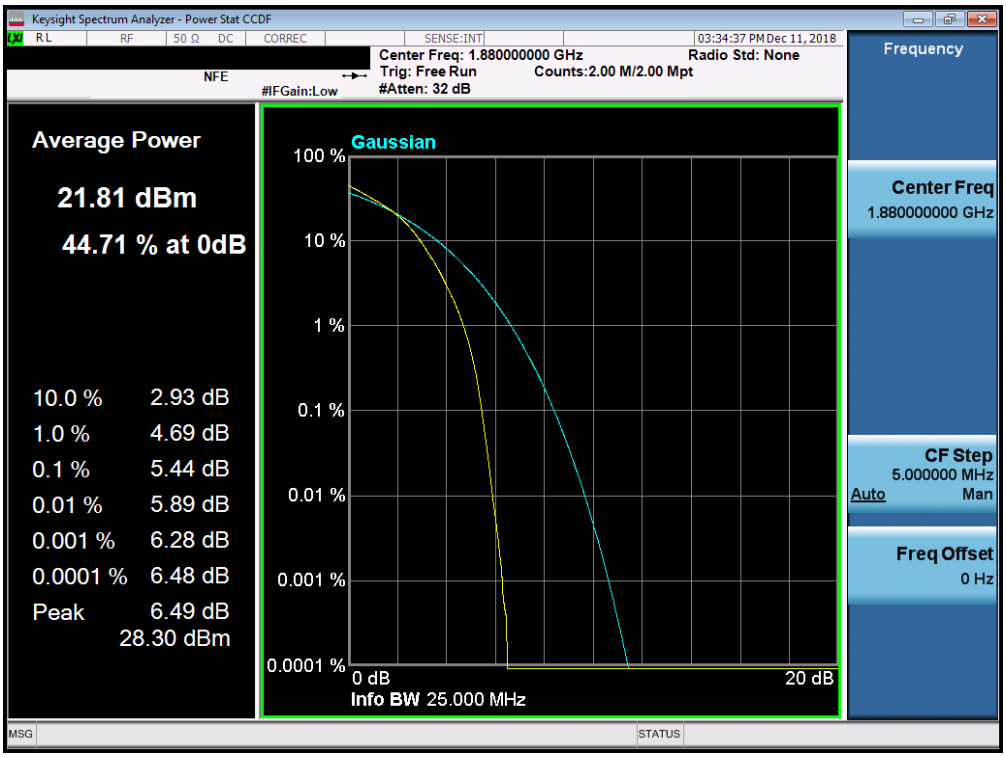
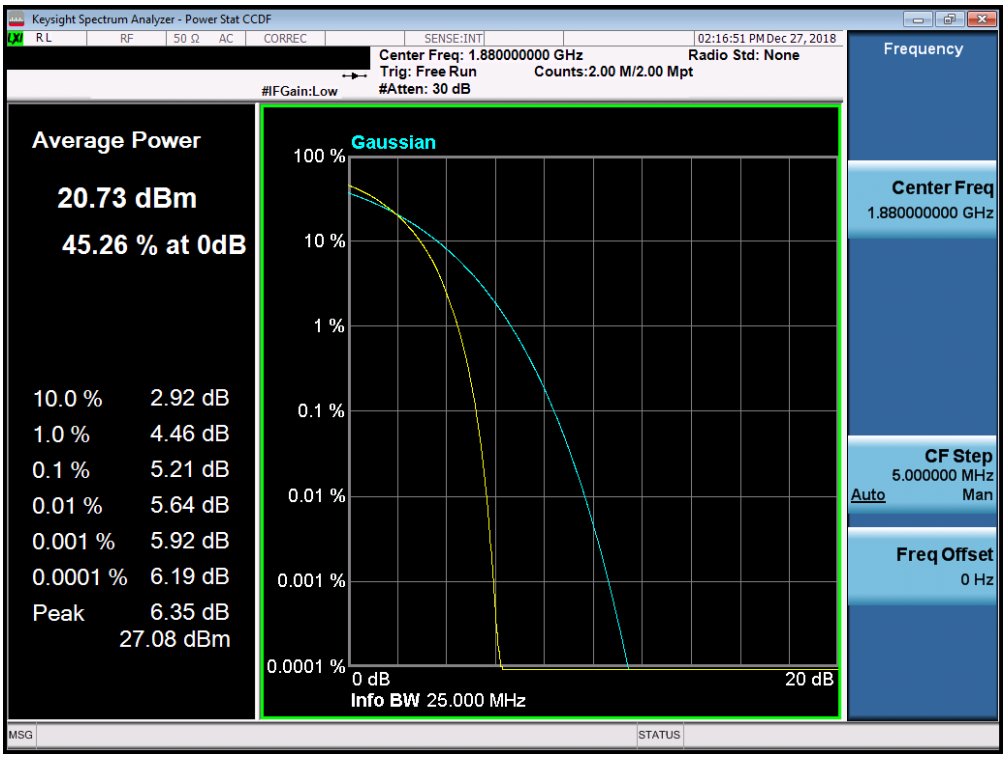


Plot 7-234. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-235. PAR Plot (Band 2 - 20.0MHz 64-QAM - Full RB Configuration)

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7.6 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
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".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
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.

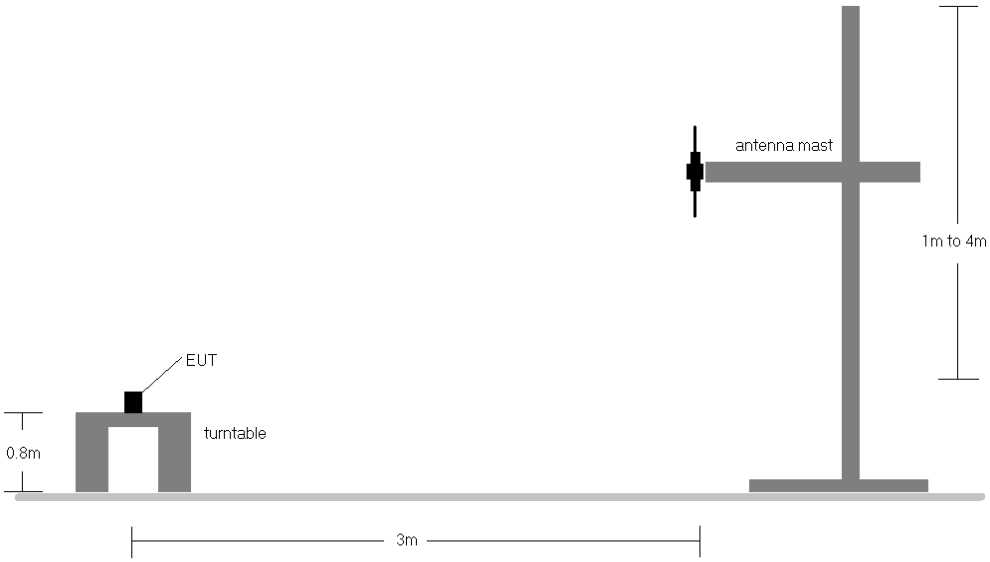

Figure 7-5. Radiated Test Setup <1GHz

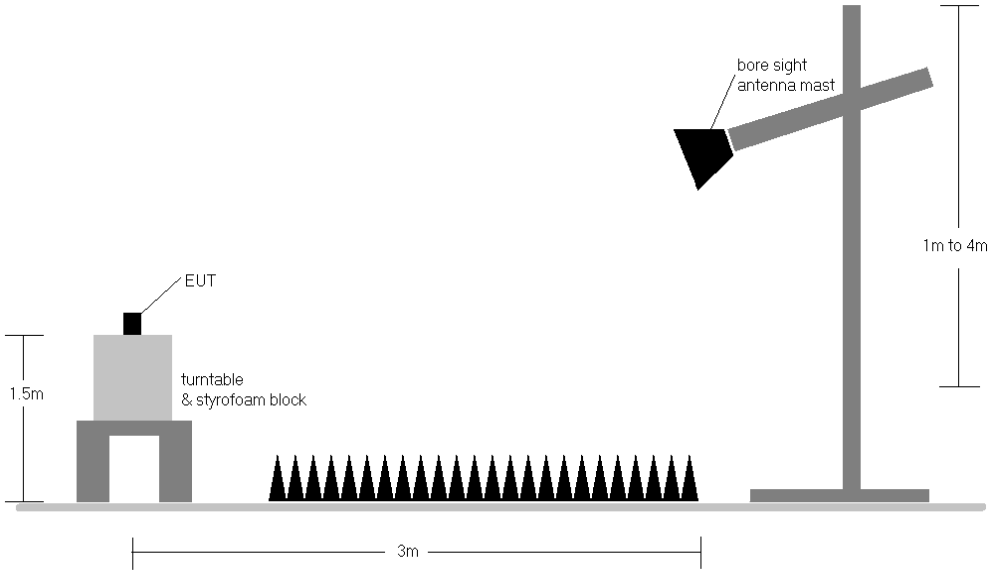

Figure 7-6. Radiated Test Setup >1GHz

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]
665.50	5	QPSK	V	102	336	1 / 0	15.05	3.84	16.74	0.047	34.77	-18.04
680.50	5	QPSK	V	100	334	1 / 0	15.93	3.91	**17.69**	0.059	34.77	-17.08
695.50	5	QPSK	V	100	327	1 / 0	15.12	3.98	16.95	0.050	34.77	-17.82
680.50	5	16-QAM	V	100	334	1 / 0	14.88	3.91	**16.64**	0.046	34.77	-18.13
680.50	5	64-QAM	V	100	334	1 / 0	13.84	3.91	**15.60**	0.036	34.77	-19.17
668.00	10	QPSK	V	100	280	1 / 0	15.15	3.85	16.85	0.048	34.77	-17.92
680.50	10	QPSK	V	100	276	1 / 0	16.10	3.91	**17.86**	**0.061**	34.77	-16.91
693.00	10	QPSK	V	102	277	1 / 0	15.43	3.97	17.25	0.053	34.77	-17.52
680.50	10	16-QAM	V	100	276	1 / 0	15.01	3.91	**16.77**	0.048	34.77	-18.00
680.50	10	64-QAM	V	100	276	1 / 0	13.94	3.91	**15.70**	0.037	34.77	-19.07
670.50	15	QPSK	V	105	283	1 / 0	14.79	3.86	16.50	0.045	34.77	-18.27
680.50	15	QPSK	V	100	274	1 / 0	16.08	3.91	**17.84**	0.061	34.77	-16.93
680.50	15	16-QAM	V	100	274	1 / 0	14.89	3.91	**16.65**	0.046	34.77	-18.12
680.50	15	64-QAM	V	100	274	1 / 0	13.84	3.91	**15.60**	0.036	34.77	-19.17
673.00	20	QPSK	V	100	331	1 / 0	15.17	3.87	16.89	0.049	34.77	-17.88
680.50	20	QPSK	V	100	270	1 / 0	15.90	3.91	**17.66**	0.058	34.77	-17.11
688.00	20	QPSK	V	100	328	1 / 0	15.75	3.94	17.54	0.057	34.77	-17.23
688.00	20	16-QAM	V	100	328	1 / 0	14.86	3.94	**16.65**	0.046	34.77	-18.12
680.50	20	64-QAM	V	100	270	1 / 0	13.82	3.91	**15.58**	0.036	34.77	-19.19
680.50	10	QPSK	H	177	179	1 / 0	15.78	3.91	17.54	0.057	34.77	-17.23

Table 7-3. ERP Data (Band 71)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	V	157	201	1 / 0	14.25	4.00	16.10	0.041	34.77	-18.67	18.25	0.067	36.99	-18.74
707.50	1.4	QPSK	V	142	197	1 / 0	14.74	4.22	16.81	0.048	34.77	-17.97	18.96	0.079	36.99	-18.03
715.30	1.4	QPSK	V	142	210	1 / 0	15.21	4.44	**17.50**	0.056	34.77	-17.27	**19.65**	0.092	36.99	-17.34
715.30	1.4	16-QAM	V	142	210	1 / 0	14.11	4.44	**16.40**	0.044	34.77	-18.37	**18.55**	0.072	36.99	-18.44
715.30	1.4	64-QAM	V	142	210	1 / 0	12.54	4.44	**14.83**	0.030	34.77	-19.94	**16.98**	0.050	36.99	-20.01
700.50	3	QPSK	V	168	190	1 / 0	15.21	4.01	17.07	0.051	34.77	-17.70	19.22	0.084	36.99	-17.77
707.50	3	QPSK	V	100	264	1 / 0	15.56	4.22	17.63	0.058	34.77	-17.15	19.78	0.095	36.99	-17.21
714.50	3	QPSK	V	155	187	1 / 0	15.74	4.41	**18.00**	0.063	34.77	-16.77	**20.15**	0.104	36.99	-16.84
714.50	3	16-QAM	V	155	187	1 / 0	14.81	4.41	**17.07**	0.051	34.77	-17.70	**19.22**	0.084	36.99	-17.77
707.50	3	64-QAM	V	100	264	1 / 0	12.94	4.22	**15.01**	0.032	34.77	-19.77	**17.16**	0.052	36.99	-19.83
701.50	5	QPSK	V	166	357	1 / 0	16.03	4.04	17.92	0.062	34.77	-16.85	20.07	0.102	36.99	-16.92
707.50	5	QPSK	V	184	219	1 / 0	16.45	4.22	18.52	0.071	34.77	-16.26	20.67	0.117	36.99	-16.32
713.50	5	QPSK	V	102	270	1 / 0	16.93	4.39	**19.17**	0.083	34.77	-15.60	**21.32**	0.135	36.99	-15.67
713.50	5	16-QAM	V	102	270	1 / 0	16.11	4.39	**18.35**	0.068	34.77	-16.42	**20.50**	0.112	36.99	-16.49
707.50	5	64-QAM	V	184	219	1 / 0	14.44	4.22	**16.51**	0.045	34.77	-18.27	**18.66**	0.073	36.99	-18.33
704.00	10	QPSK	V	162	349	1 / 0	16.39	4.12	18.36	0.068	34.77	-16.42	20.51	0.112	36.99	-16.48
707.50	10	QPSK	V	149	302	1 / 0	17.15	4.22	19.22	0.083	34.77	-15.56	21.37	0.137	36.99	-15.62
711.00	10	QPSK	V	174	338	1 / 0	17.11	4.32	**19.28**	**0.085**	34.77	-15.50	**21.43**	**0.139**	36.99	-15.56
711.00	10	16-QAM	V	174	338	1 / 0	16.11	4.32	**18.28**	0.067	34.77	-16.50	**20.43**	0.110	36.99	-16.56
711.00	10	64-QAM	V	174	338	1 / 0	14.82	4.32	**16.99**	0.050	34.77	-17.79	**19.14**	0.082	36.99	-17.85
715.30	1.4	QPSK	H	171	7	1 / 0	16.94	4.44	19.23	0.084	34.77	-15.54	21.38	0.137	36.99	-15.61

Table 7-4. ERP Data (Band 12)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	184	306	1 / 0	14.22	6.18	18.25	0.067	34.77	-16.53	20.40	0.110	36.99	-16.59
782.00	5	QPSK	V	169	309	1 / 0	14.14	6.24	18.23	0.067	34.77	-16.54	20.38	0.109	36.99	-16.61
784.50	5	QPSK	V	169	302	1 / 0	14.24	6.30	**18.39**	0.069	34.77	-16.38	**20.54**	0.113	36.99	-16.45
784.50	5	16-QAM	V	169	302	1 / 0	13.34	6.30	**17.49**	0.056	34.77	-17.28	**19.64**	0.092	36.99	-17.35
784.50	5	64-QAM	V	169	302	1 / 0	11.84	6.30	**15.99**	0.040	34.77	-18.78	**18.14**	0.065	36.99	-18.85
782.00	10	QPSK	V	154	310	1 / 0	14.44	6.24	**18.53**	**0.071**	34.77	-16.24	**20.68**	**0.117**	36.99	-16.31
782.00	10	16-QAM	V	154	310	1 / 0	13.34	6.24	**17.43**	0.055	34.77	-17.34	**19.58**	0.091	36.99	-17.41
782.00	10	64-QAM	V	154	310	1 / 0	11.74	6.24	**15.83**	0.038	34.77	-18.94	**17.98**	0.063	36.99	-19.01
782.00	10	QPSK	H	150	112	1 / 0	11.60	6.24	15.69	0.037	34.77	-19.08	17.84	0.061	36.99	-19.15

Table 7-5. ERP Data (Band 13)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	V	239	271	1 / 5	11.37	6.75	15.97	0.040	38.45	-22.48	18.12	0.065	40.61	-22.49
836.50	1.4	QPSK	V	236	264	1 / 5	12.12	6.78	16.75	0.047	38.45	-21.71	18.90	0.078	40.61	-21.71
848.30	1.4	QPSK	V	253	260	1 / 5	12.96	6.80	**17.61**	0.058	38.45	-20.84	**19.76**	0.095	40.61	-20.85
848.30	1.4	16-QAM	V	253	260	1 / 5	11.79	6.80	**16.44**	0.044	38.45	-22.01	**18.59**	0.072	40.61	-22.02
848.30	1.4	64-QAM	V	253	260	1 / 5	11.07	6.80	**15.72**	0.037	38.45	-22.73	**17.87**	0.061	40.61	-22.74
825.50	3	QPSK	V	239	269	1 / 14	12.17	6.75	16.77	0.048	38.45	-21.68	18.92	0.078	40.61	-21.68
836.50	3	QPSK	V	246	260	1 / 14	13.25	6.78	**17.88**	0.061	38.45	-20.58	**20.03**	0.101	40.61	-20.58
847.50	3	QPSK	V	224	270	1 / 14	12.92	6.80	17.57	0.057	38.45	-20.88	19.72	0.094	40.61	-20.89
836.50	3	16-QAM	V	246	260	1 / 14	11.92	6.78	**16.55**	0.045	38.45	-21.91	**18.70**	0.074	40.61	-21.91
836.50	3	64-QAM	V	246	260	1 / 14	11.07	6.78	**15.70**	0.037	38.45	-22.76	**17.85**	0.061	40.61	-22.76
826.50	5	QPSK	V	239	267	1 / 24	13.37	6.76	17.98	0.063	38.45	-20.48	20.13	0.103	40.61	-20.48
836.50	5	QPSK	V	246	266	1 / 24	13.97	6.78	18.60	0.072	38.45	-19.86	20.75	0.119	40.61	-19.86
846.50	5	QPSK	V	248	258	1 / 24	14.07	6.80	**18.72**	0.074	38.45	-19.74	**20.87**	0.122	40.61	-19.74
846.50	5	16-QAM	V	248	258	1 / 24	12.97	6.80	**17.62**	0.058	38.45	-20.84	**19.77**	0.095	40.61	-20.84
846.50	5	64-QAM	V	248	258	1 / 24	12.07	6.80	**16.72**	0.047	38.45	-21.74	**18.87**	0.077	40.61	-21.74
829.00	10	QPSK	V	139	264	1 / 49	13.98	6.76	18.59	0.072	38.45	-19.86	20.74	0.119	40.61	-19.87
836.50	10	QPSK	V	138	264	1 / 49	14.05	6.78	18.68	0.074	38.45	-19.78	20.83	0.121	40.61	-19.78
844.00	10	QPSK	V	251	259	1 / 49	14.80	6.79	**19.44**	**0.088**	38.45	-19.01	**21.59**	**0.144**	40.61	-19.02
844.00	10	16-QAM	V	251	259	1 / 49	13.63	6.79	**18.27**	0.067	38.45	-20.18	**20.42**	0.110	40.61	-20.19
844.00	10	64-QAM	V	251	259	1 / 49	12.75	6.79	**17.39**	0.055	38.45	-21.06	**19.54**	0.090	40.61	-21.07
844.00	10	QPSK	H	117	305	1 / 49	12.27	6.78	16.90	0.049	38.45	-21.56	19.05	0.080	40.61	-21.56

Table 7-6. ERP Data (Band 5)

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	100	18	1 / 5	12.19	8.16	**20.35**	0.108	30.00	-9.65
1745.00	1.4	QPSK	H	400	15	1 / 5	11.39	8.19	19.58	0.091	30.00	-10.42
1779.30	1.4	QPSK	H	115	32	1 / 5	11.59	8.25	19.84	0.096	30.00	-10.16
1710.70	1.4	16-QAM	H	100	18	1 / 5	11.49	8.16	**19.65**	0.092	30.00	-10.35
1710.70	1.4	64-QAM	H	100	18	1 / 5	10.47	8.16	**18.63**	0.073	30.00	-11.37
1711.50	3	QPSK	H	100	22	1 / 14	12.44	8.16	**20.60**	0.115	30.00	-9.40
1745.00	3	QPSK	H	100	30	1 / 14	12.25	8.19	20.44	0.111	30.00	-9.56
1778.50	3	QPSK	H	119	28	1 / 14	12.07	8.25	20.32	0.108	30.00	-9.68
1711.50	3	16-QAM	H	100	22	1 / 14	11.68	8.16	**19.84**	0.096	30.00	-10.16
1711.50	3	64-QAM	H	100	22	1 / 14	10.59	8.16	**18.75**	0.075	30.00	-11.25
1712.50	5	QPSK	H	100	20	1 / 24	13.67	8.16	**21.83**	0.152	30.00	-8.17
1745.00	5	QPSK	H	400	12	1 / 24	12.55	8.19	20.74	0.119	30.00	-9.26
1777.50	5	QPSK	H	115	34	1 / 24	13.16	8.25	21.41	0.138	30.00	-8.59
1712.50	5	16-QAM	H	100	20	1 / 24	12.79	8.16	**20.95**	0.124	30.00	-9.05
1712.50	5	64-QAM	H	100	20	1 / 24	11.89	8.16	**20.05**	0.101	30.00	-9.95
1715.00	10	QPSK	H	136	39	1 / 49	14.17	8.16	22.33	0.171	30.00	-7.67
1745.00	10	QPSK	H	136	24	1 / 49	13.59	8.19	21.78	0.151	30.00	-8.22
1775.00	10	QPSK	H	126	26	1 / 49	14.19	8.24	**22.43**	**0.175**	30.00	-7.57
1775.00	10	16-QAM	H	126	26	1 / 49	12.89	8.24	**21.13**	0.130	30.00	-8.87
1775.00	10	64-QAM	H	126	26	1 / 49	11.77	8.24	**20.01**	0.100	30.00	-9.99
1717.50	15	QPSK	H	117	35	1 / 74	13.93	8.16	**22.09**	0.162	30.00	-7.91
1745.00	15	QPSK	H	130	26	1 / 74	13.45	8.19	21.64	0.146	30.00	-8.36
1772.50	15	QPSK	H	118	40	1 / 74	13.14	8.24	21.38	0.137	30.00	-8.62
1717.50	15	16-QAM	H	117	35	1 / 74	12.64	8.16	**20.80**	0.120	30.00	-9.20
1717.50	15	64-QAM	H	117	35	1 / 74	11.59	8.16	**19.75**	0.094	30.00	-10.25
1720.00	20	QPSK	H	136	32	1 / 99	13.53	8.17	**21.70**	0.148	30.00	-8.30
1745.00	20	QPSK	H	130	25	1 / 99	13.32	8.19	21.51	0.142	30.00	-8.49
1770.00	20	QPSK	H	126	23	1 / 99	12.98	8.23	21.21	0.132	30.00	-8.79
1720.00	20	16-QAM	H	136	32	1 / 99	12.49	8.17	**20.66**	0.116	30.00	-9.34
1720.00	20	64-QAM	H	136	32	1 / 99	11.39	8.17	**19.56**	0.090	30.00	-10.44
1775.00	10	QPSK	V	138	46	1 / 49	14.02	8.19	22.21	0.167	30.00	-7.79

Table 7-7. 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	148	21	1 / 0	11.33	8.37	19.70	0.093	33.01	-13.31
1880.00	1.4	QPSK	H	145	9	1 / 0	11.15	8.41	19.56	0.090	33.01	-13.45
1909.30	1.4	QPSK	H	138	7	1 / 0	11.60	8.46	**20.06**	0.101	33.01	-12.95
1850.70	1.4	16-QAM	H	148	21	1 / 0	10.80	8.37	**19.17**	0.083	33.01	-13.84
1850.70	1.4	64-QAM	H	148	21	1 / 0	9.65	8.37	**18.02**	0.063	33.01	-14.99
1851.50	3	QPSK	H	154	25	1 / 0	12.55	8.37	20.92	0.124	33.01	-12.09
1880.00	3	QPSK	H	148	11	1 / 0	12.15	8.41	20.56	0.114	33.01	-12.45
1908.50	3	QPSK	H	139	12	1 / 0	12.55	8.46	**21.01**	0.126	33.01	-12.00
1880.00	3	16-QAM	H	148	11	1 / 0	12.03	8.41	**20.44**	0.111	33.01	-12.57
1880.00	3	64-QAM	H	148	11	1 / 0	11.15	8.41	**19.56**	0.090	33.01	-13.45
1852.50	5	QPSK	H	150	28	1 / 0	13.05	8.37	21.42	0.139	33.01	-11.59
1880.00	5	QPSK	H	149	14	1 / 0	12.75	8.41	21.16	0.131	33.01	-11.85
1907.50	5	QPSK	H	145	14	1 / 0	13.12	8.46	**21.58**	0.144	33.01	-11.43
1852.50	5	16-QAM	H	150	28	1 / 0	12.25	8.37	**20.62**	0.115	33.01	-12.39
1852.50	5	64-QAM	H	150	28	1 / 0	11.15	8.37	**19.52**	0.090	33.01	-13.49
1855.00	10	QPSK	H	153	27	1 / 0	12.85	8.37	21.22	0.133	33.01	-11.79
1880.00	10	QPSK	H	152	12	1 / 0	13.84	8.41	**22.25**	**0.168**	33.01	-10.76
1905.00	10	QPSK	H	149	2	1 / 0	13.35	8.45	21.80	0.152	33.01	-11.21
1905.00	10	16-QAM	H	149	2	1 / 0	12.05	8.45	**20.50**	0.112	33.01	-12.51
1905.00	10	64-QAM	H	149	2	1 / 0	11.13	8.45	**19.58**	0.091	33.01	-13.43
1857.50	15	QPSK	H	151	23	1 / 0	13.08	8.38	21.46	0.140	33.01	-11.55
1880.00	15	QPSK	H	139	14	1 / 0	12.42	8.41	20.83	0.121	33.01	-12.18
1902.50	15	QPSK	H	144	12	1 / 0	13.19	8.45	**21.64**	0.146	33.01	-11.37
1857.50	15	16-QAM	H	151	23	1 / 0	12.25	8.38	**20.63**	0.116	33.01	-12.38
1857.50	15	64-QAM	H	151	23	1 / 0	11.15	8.38	**19.53**	0.090	33.01	-13.48
1860.00	20	QPSK	H	150	18	1 / 0	12.65	8.38	21.03	0.127	33.01	-11.98
1880.00	20	QPSK	H	147	6	1 / 0	12.46	8.41	20.87	0.122	33.01	-12.14
1900.00	20	QPSK	H	140	12	1 / 0	12.59	8.45	**21.04**	0.127	33.01	-11.97
1860.00	20	16-QAM	H	150	18	1 / 0	11.75	8.38	**20.13**	0.103	33.01	-12.88
1860.00	20	64-QAM	H	150	18	1 / 0	10.65	8.38	**19.03**	0.080	33.01	-13.98
1880.00	10	QPSK	V	127	59	1 / 0	13.28	8.41	21.69	0.148	33.01	-11.32

Table 7-8. EIRP Data (Band 2)

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7.7 Radiated Spurious Emissions Measurements

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

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

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Test Setup

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

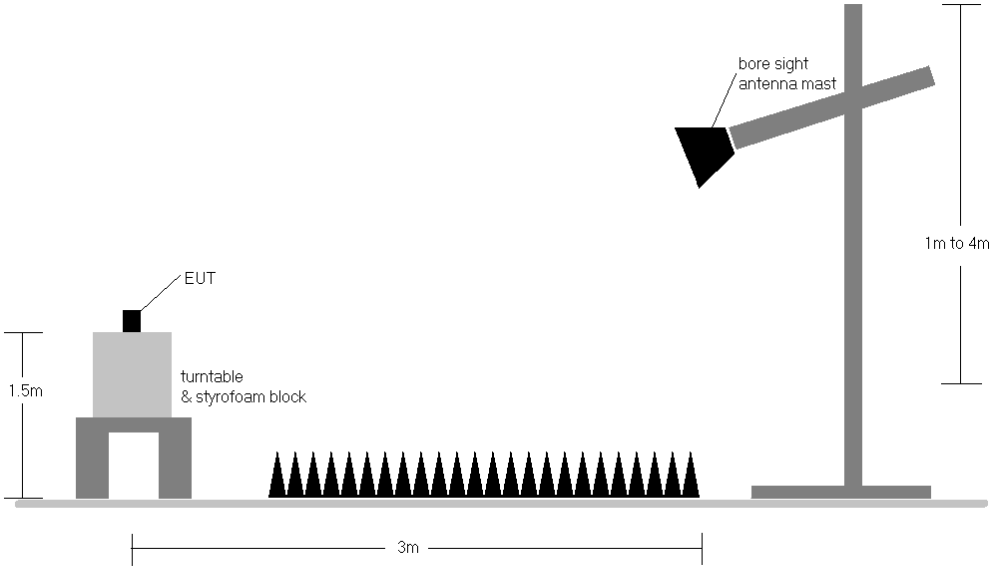

Figure 7-7. Test Instrument & Measurement Setup

Test Notes

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

2) This unit was tested with its standard battery.

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

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

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

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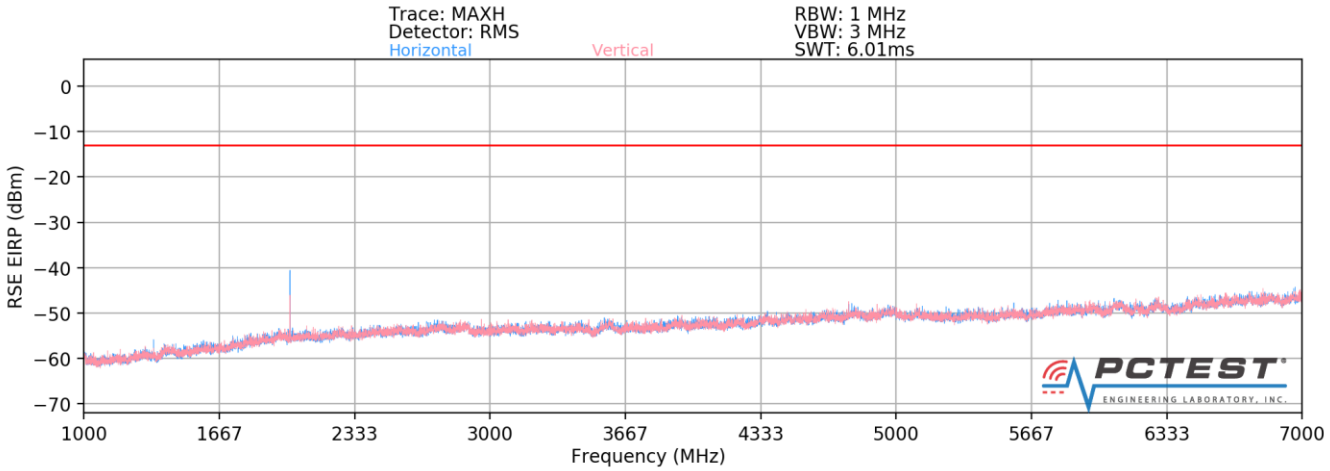
Band 71



Plot 7-236. Radiated Spurious Plot above 1GHz (Band 71)

OPERATING FREQUENCY:	668.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10MHz	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1336.00	V	314	254	-64.22	3.11	-61.10	-48.1
2004.00	V	123	195	-57.55	3.55	-54.00	-41.0
2672.00	V	-	-	-71.05	4.71	-66.34	-53.3

Table 7-9. Radiated Spurious Data (Band 71 – Low Channel)

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OPERATING FREQUENCY:	680.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10MHz	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1361.00	V	400	202	-62.91	3.04	-59.86	-46.9
2041.50	V	130	154	-55.92	3.49	-52.43	-39.4
2722.00	V	-	-	-70.95	4.83	-66.12	-53.1

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

OPERATING FREQUENCY:	693.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10MHz	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1386.00	V	400	168	-63.83	2.77	-61.06	-48.1
2079.00	V	112	196	-58.82	3.52	-55.30	-42.3
2772.00	V	-	-	-71.23	4.90	-66.33	-53.3

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

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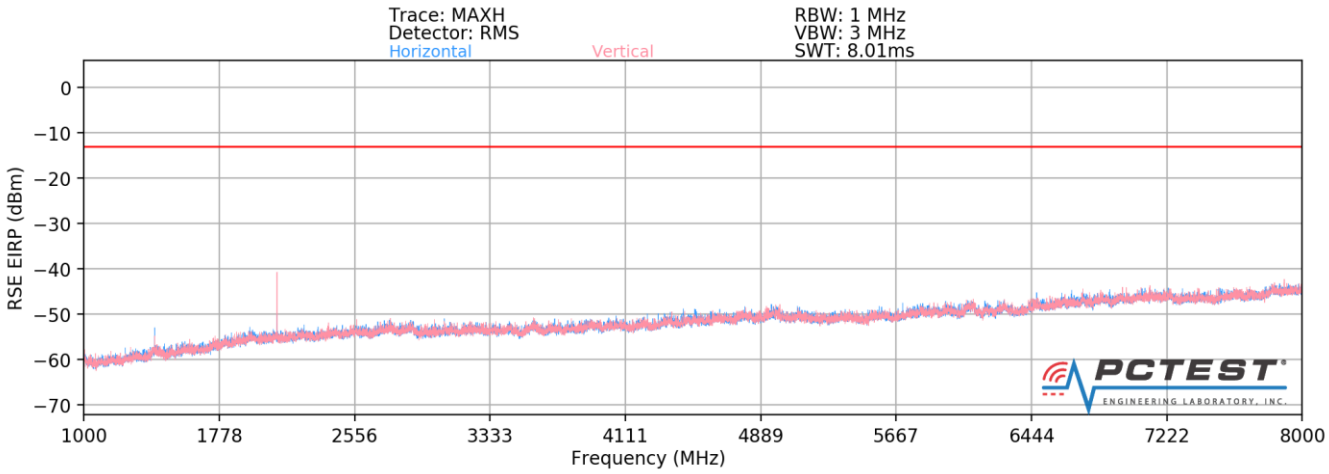
Band 12



Plot 7-237. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY:	699.70	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1399.40	V	354	253	-64.52	2.63	-61.89	-48.9
2099.10	V	128	169	-59.80	3.56	-56.24	-43.2
2798.80	V	-	-	-71.08	4.92	-66.16	-53.2

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

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OPERATING FREQUENCY:	707.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	V	306	322	-67.41	2.80	-64.62	-51.6
2122.50	V	127	174	-63.98	3.57	-60.40	-47.4
2830.00	V	-	-	-71.03	5.02	-66.01	-53.0

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

OPERATING FREQUENCY:	715.30	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	1.4	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1430.60	V	294	250	-64.12	2.98	-61.14	-48.1
2145.90	V	116	160	-56.65	3.59	-53.06	-40.1
2861.20	V	-	-	-70.86	5.12	-65.74	-52.7

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

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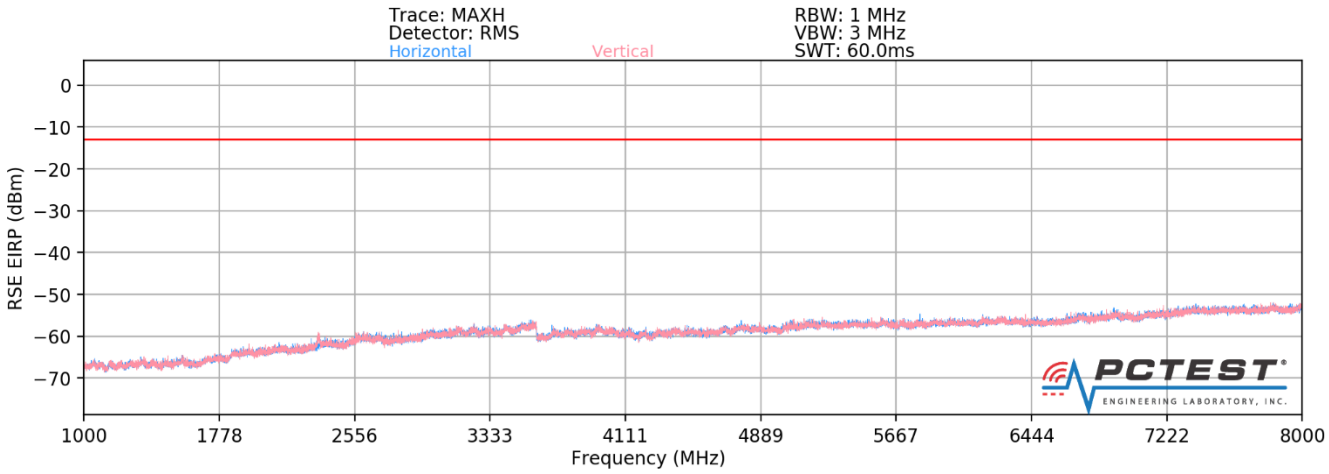
Band 13



Plot 7-238. Radiated Spurious Plot above 1GHz (Band 13)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2346.00	V	117	203	-60.15	4.00	-56.15	-43.1
3128.00	V	-	-	-69.67	5.38	-64.29	-51.3

Table 7-15. Radiated Spurious Data (Band 13 – Mid Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	V	303	182	-58.91	3.53	-55.38	-15.4

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

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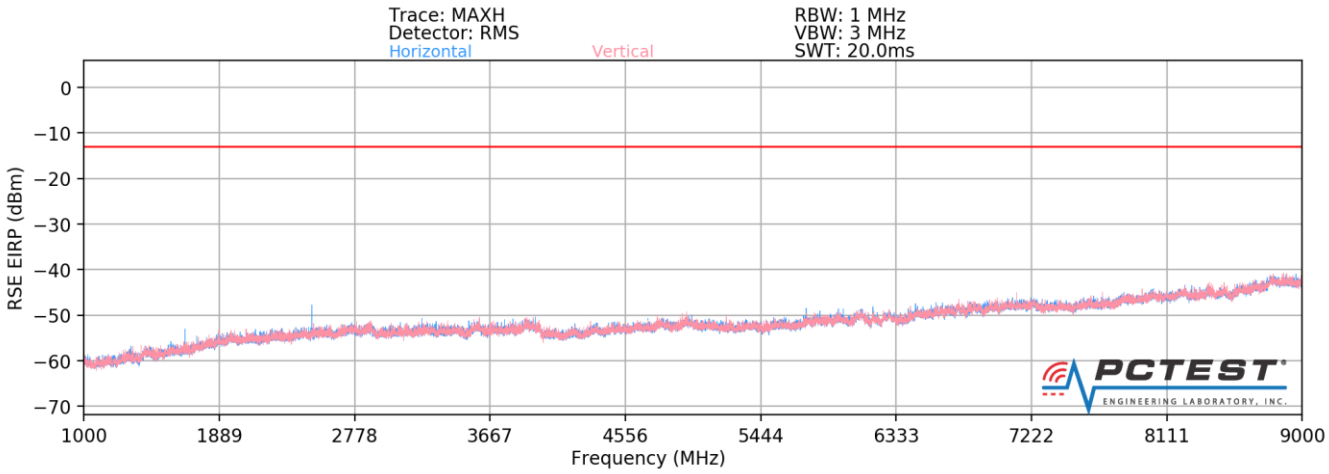
Band 5



Plot 7-239. Radiated Spurious Plot above 1GHz (Band 5)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1658.00	V	378	273	-68.70	3.61	-65.09	-52.1
2487.00	V	173	168	-60.41	4.25	-56.17	-43.2
3316.00	V	-	-	-70.97	5.83	-65.14	-52.1

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	V	360	299	-66.49	3.62	-62.87	-49.9
2509.50	V	169	180	-62.32	4.33	-57.99	-45.0
3346.00	V	-	-	-70.59	5.92	-64.67	-51.7

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1688.00	V	400	227	-65.08	3.63	-61.45	-48.5
2532.00	V	158	159	-58.78	4.47	-54.31	-41.3
3376.00	V	-	-	-71.05	6.05	-65.00	-52.0

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

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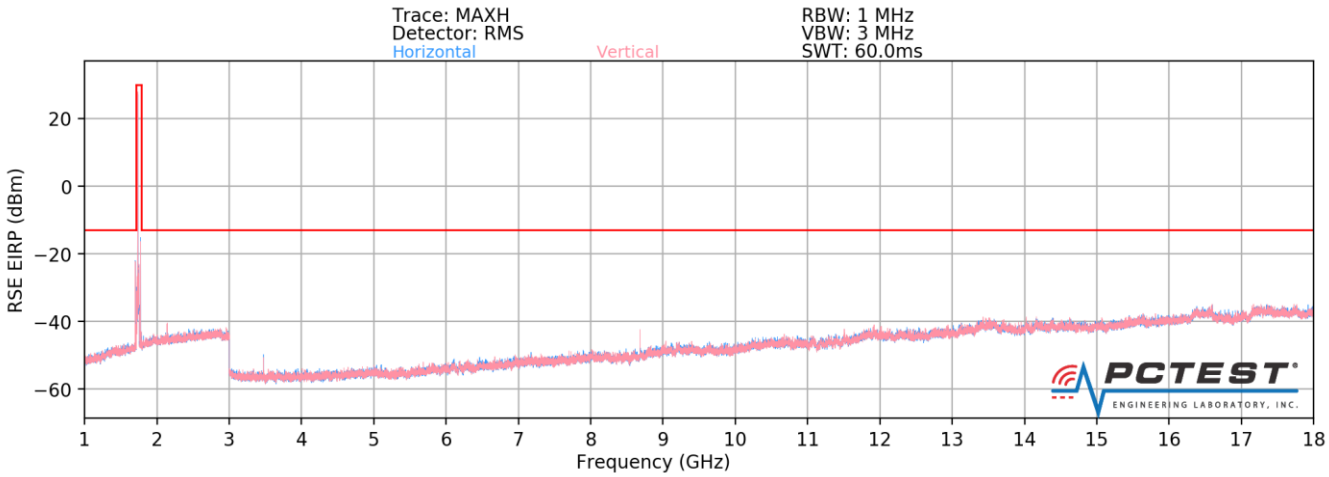
Band 66/4



Plot 7-240. Radiated Spurious Plot above 1GHz (Band 66/4)

OPERATING FREQUENCY:	1715.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3430.00	H	127	27	-56.34	6.20	-50.14	-37.1
5145.00	H	117	152	-69.49	8.66	-60.82	-47.8
6860.00	H	-	-	-67.46	8.77	-58.70	-45.7

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

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OPERATING FREQUENCY:	1745.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	H	118	26	-59.02	6.32	-52.70	-39.7
5235.00	H	114	145	-69.40	8.71	-60.69	-47.7
6980.00	H	-	-	-67.72	8.74	-58.99	-46.0

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

OPERATING FREQUENCY:	1775.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3550.00	H	136	29	-51.75	6.30	-45.45	-32.5
5325.00	H	118	142	-69.55	8.72	-60.83	-47.8
7100.00	H	-	-	-67.39	8.62	-58.77	-45.8

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

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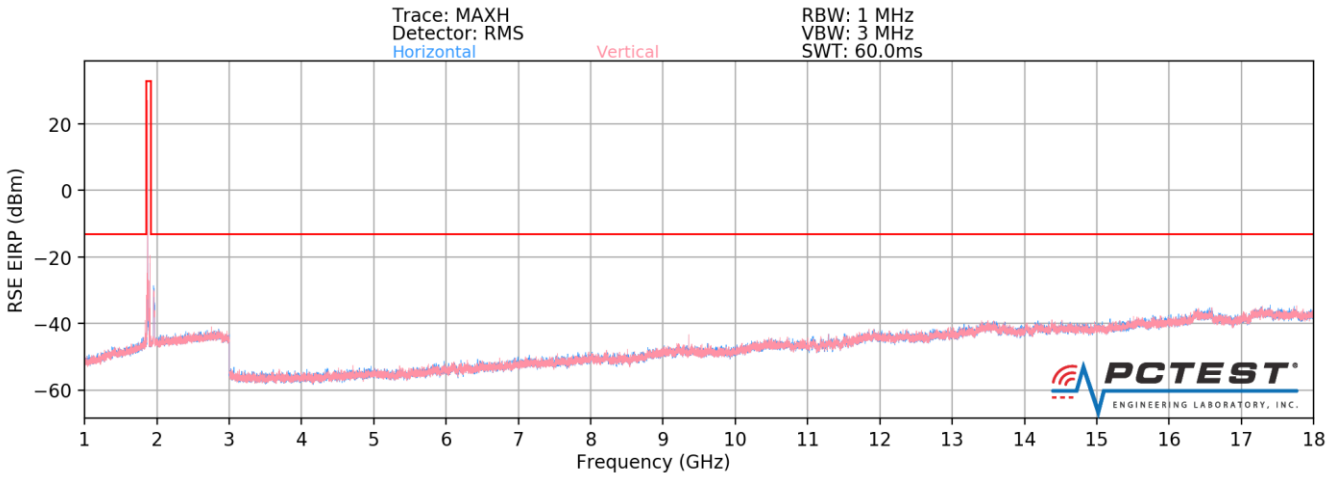
Band 2



Plot 7-241. Radiated Spurious Plot above 1GHz (Band 2)

OPERATING FREQUENCY:	1855.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3710.00	H	-	-	-69.21	6.57	-62.64	-49.6
5565.00	H	-	-	-69.29	8.73	-60.56	-47.6

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

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OPERATING FREQUENCY:	1880.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	-	-	-69.09	6.67	-62.42	-49.4
5640.00	H	-	-	-69.30	8.81	-60.48	-47.5

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

OPERATING FREQUENCY:	1905.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3810.00	H	-	-	-69.77	6.94	-62.84	-49.8
5715.00	H	-	-	-69.66	8.77	-60.90	-47.9

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

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7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

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

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

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

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

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

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

Test Notes

None

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Band 71 Frequency Stability Measurements

OPERATING FREQUENCY: 680,500,000 Hz

CHANNEL: 133297

REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	680,499,929	-71	-0.0000104
100 %		- 20	680,499,809	-191	-0.0000280
100 %		- 10	680,499,883	-117	-0.0000173
100 %		0	680,499,933	-67	-0.0000099
100 %		+ 10	680,499,858	-142	-0.0000208
100 %		+ 20	680,499,984	-16	-0.0000024
100 %		+ 30	680,499,988	-12	-0.0000018
100 %		+ 40	680,499,841	-159	-0.0000234
100 %		+ 50	680,499,857	-143	-0.0000210
BATT. ENDPOINT	3.40	+ 20	680,499,998	-2	-0.0000002

Table 7-26. Frequency Stability Data (Band 71)

Note:

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

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Band 71 Frequency Stability Measurements

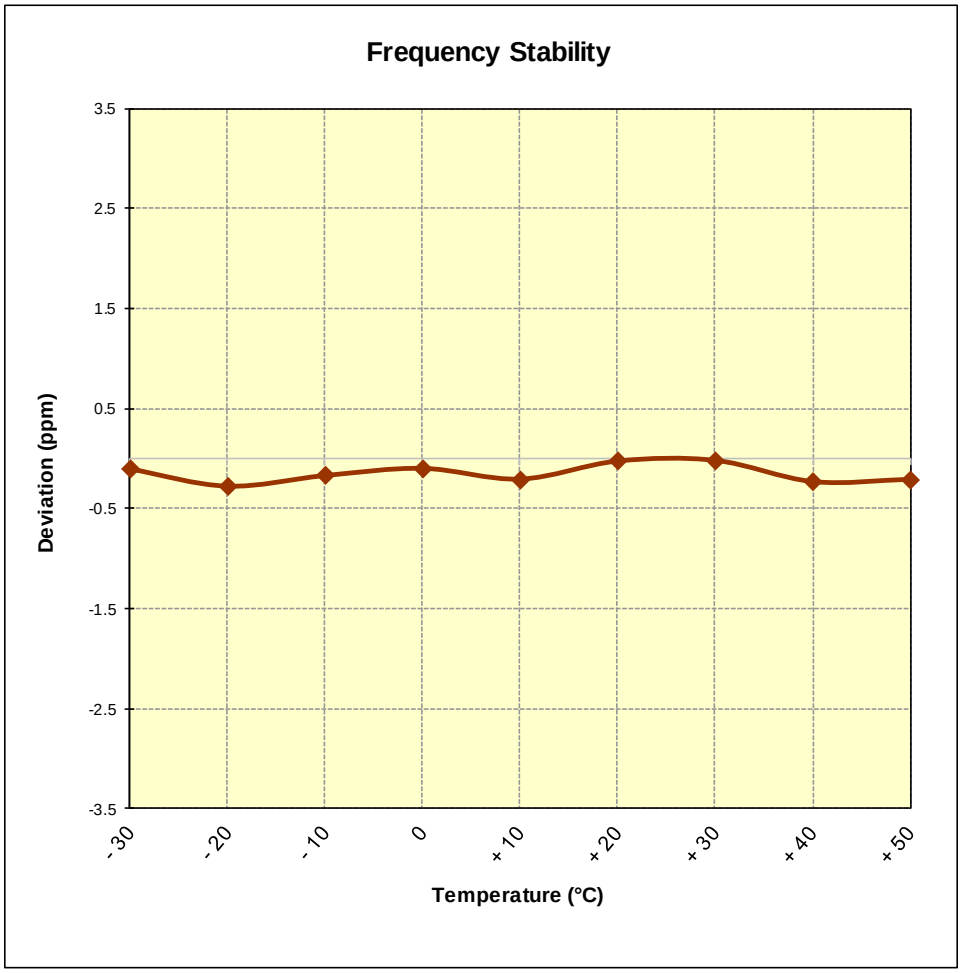

Figure 7-8. Frequency Stability Graph (Band 71)

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Band 12 Frequency Stability Measurements

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	707,499,844	-156	-0.0000221
100 %		- 20	707,499,840	-160	-0.0000227
100 %		- 10	707,499,990	-10	-0.0000014
100 %		0	707,499,874	-126	-0.0000178
100 %		+ 10	707,499,830	-170	-0.0000241
100 %		+ 20	707,499,832	-168	-0.0000237
100 %		+ 30	707,499,856	-144	-0.0000203
100 %		+ 40	707,499,977	-23	-0.0000033
100 %		+ 50	707,499,848	-152	-0.0000216
BATT. ENDPOINT	3.40	+ 20	707,499,849	-151	-0.0000213

Table 7-27. Frequency Stability Data (Band 12)

Note:

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

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Band 12 Frequency Stability Measurements

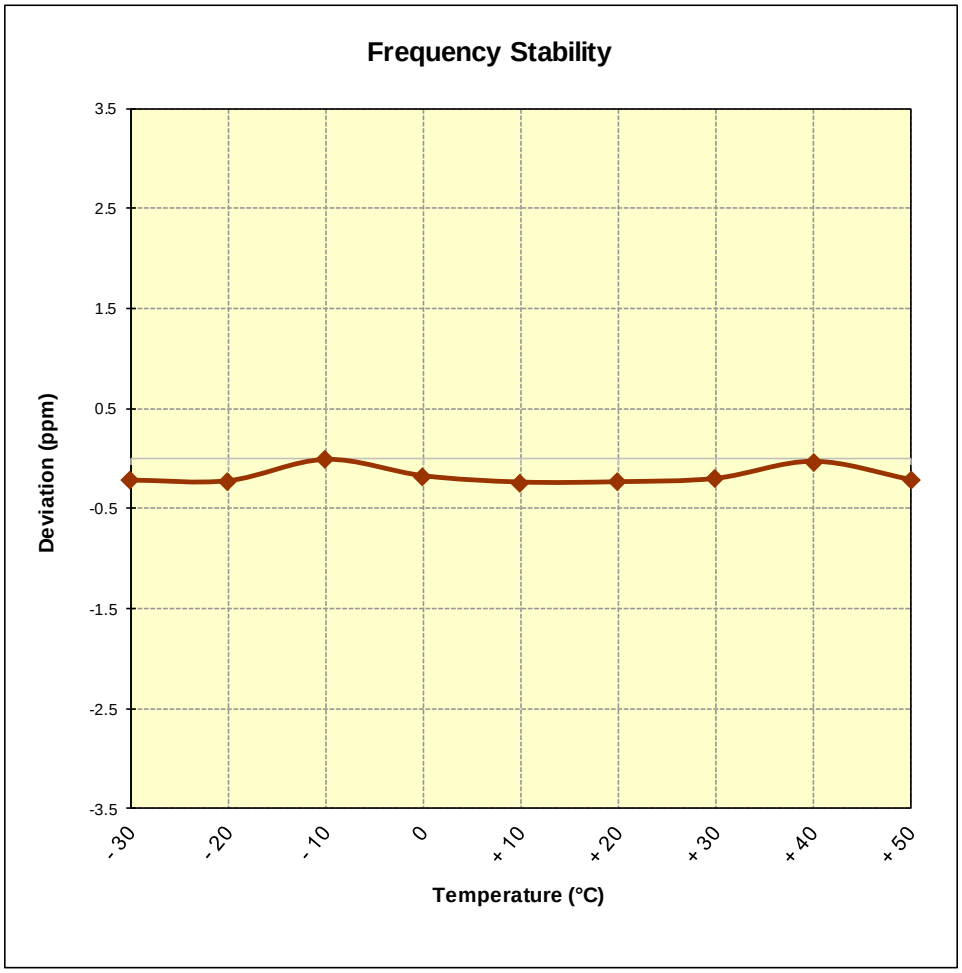

Figure 7-9. Frequency Stability Graph (Band 12)

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Band 13 Frequency Stability Measurements

OPERATING FREQUENCY: 782,000,000 Hz

CHANNEL: 23230

REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	782,000,000	0	0.0000000
100 %		- 20	781,999,938	-62	-0.0000079
100 %		- 10	781,999,844	-156	-0.0000200
100 %		0	781,999,861	-139	-0.0000177
100 %		+ 10	782,000,000	0	-0.0000001
100 %		+ 20	781,999,991	-9	-0.0000012
100 %		+ 30	781,999,851	-149	-0.0000190
100 %		+ 40	781,999,981	-19	-0.0000025
100 %		+ 50	781,999,995	-5	-0.0000006
BATT. ENDPOINT	3.40	+ 20	781,999,862	-138	-0.0000176

Table 7-28. Frequency Stability Data (Band 13)

Note:

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

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Band 13 Frequency Stability Measurements

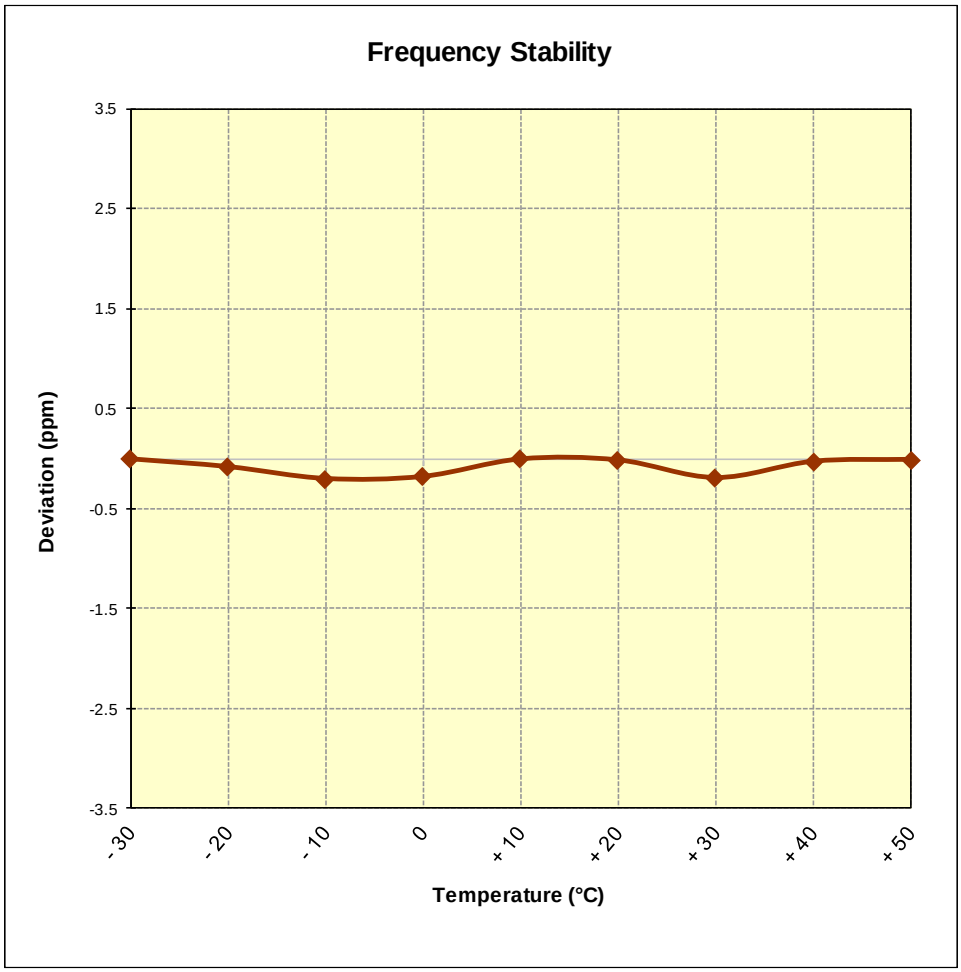

Figure 7-10. Frequency Stability Graph (Band 13)

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Band 5 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	836,499,960	-40	-0.0000048
100 %		- 20	836,499,962	-38	-0.0000045
100 %		- 10	836,499,981	-19	-0.0000022
100 %		0	836,499,928	-72	-0.0000087
100 %		+ 10	836,499,963	-37	-0.0000045
100 %		+ 20	836,499,993	-7	-0.0000009
100 %		+ 30	836,499,825	-175	-0.0000209
100 %		+ 40	836,499,994	-6	-0.0000007
100 %		+ 50	836,499,843	-157	-0.0000188
BATT. ENDPOINT	3.40	+ 20	836,499,832	-168	-0.0000201

Table 7-29. Frequency Stability Data (Band 5)

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Band 5 Frequency Stability Measurements

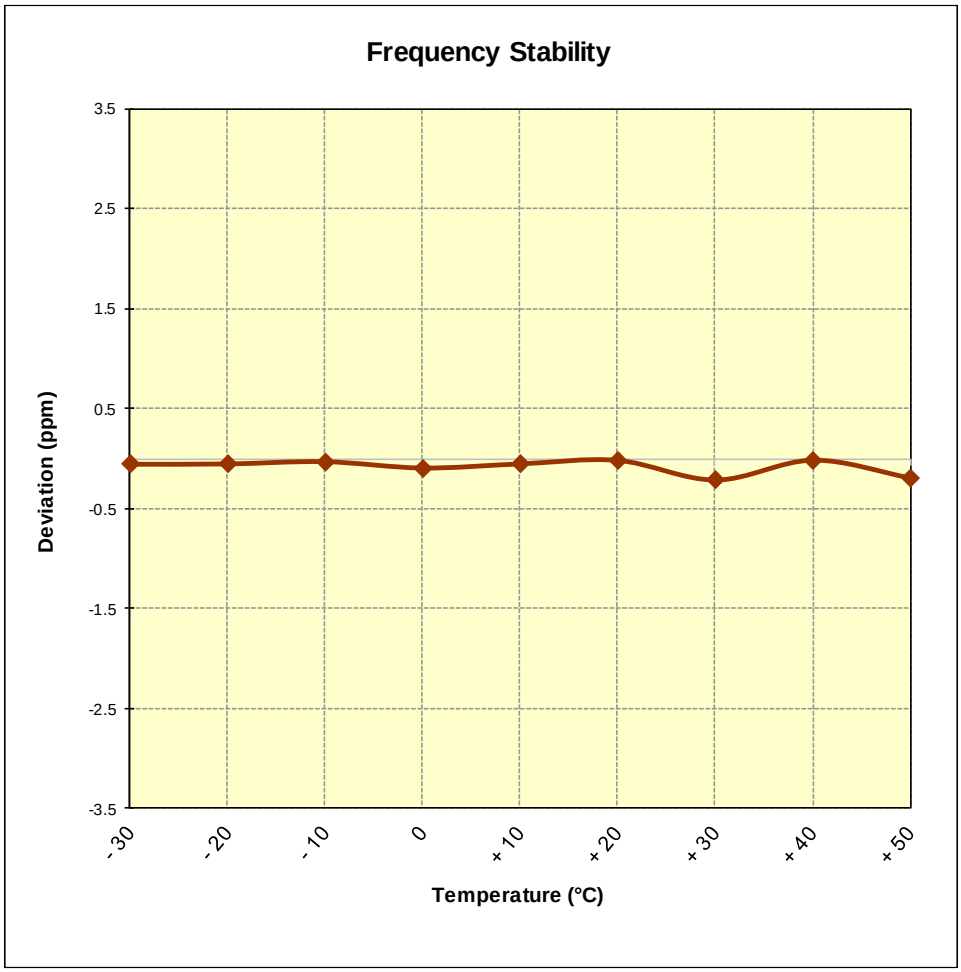

Figure 7-11. Frequency Stability Graph (Band 5)

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Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 3.80 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	1,744,999,965	-35	-0.0000020
100 %		- 20	1,744,999,845	-155	-0.0000089
100 %		- 10	1,744,999,892	-108	-0.0000062
100 %		0	1,744,999,898	-102	-0.0000058
100 %		+ 10	1,744,999,925	-75	-0.0000043
100 %		+ 20	1,744,999,901	-99	-0.0000057
100 %		+ 30	1,744,999,898	-102	-0.0000059
100 %		+ 40	1,744,999,939	-61	-0.0000035
100 %		+ 50	1,744,999,957	-43	-0.0000025
BATT. ENDPOINT	3.40	+ 20	1,744,999,809	-191	-0.0000110

Table 7-30. Frequency Stability Data (Band 66/4)

Note:

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

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Band 66/4 Frequency Stability Measurements

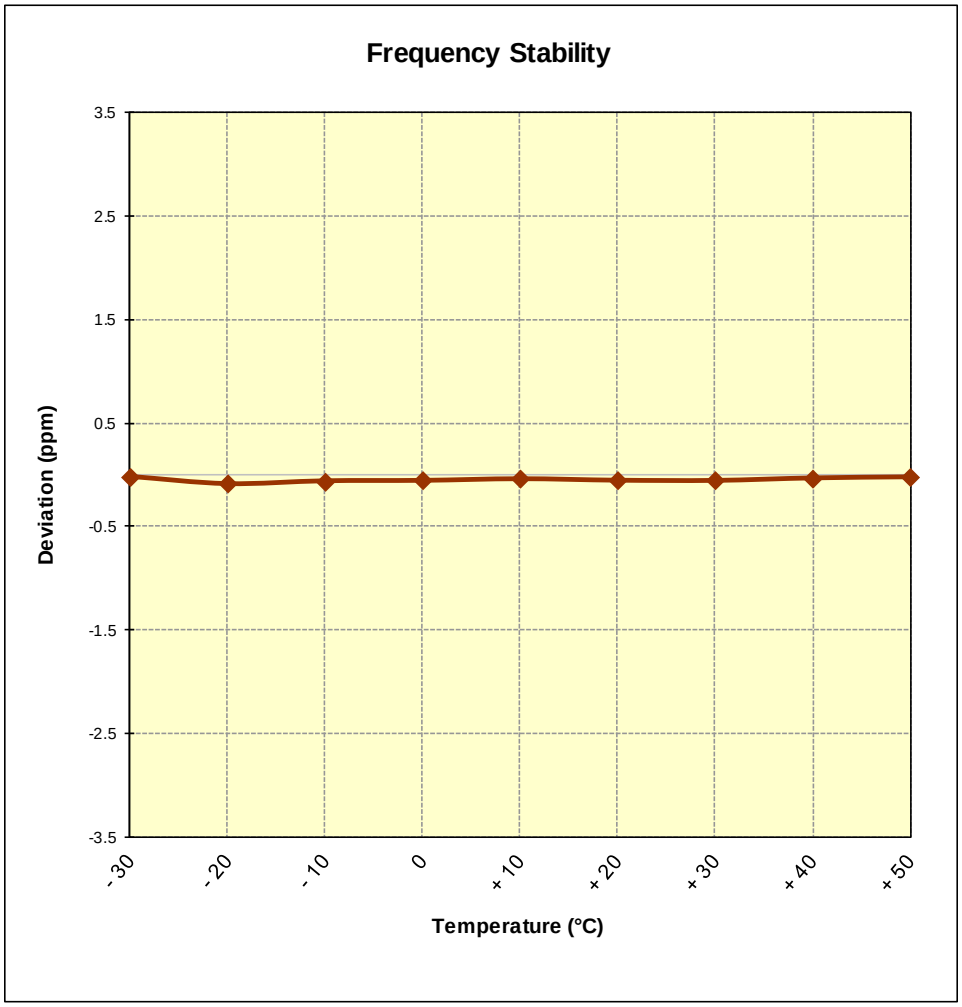

Figure 7-12. Frequency Stability Graph (Band 66/4)

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Band 2 Frequency Stability Measurements

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	- 30	1,879,999,818	-182	-0.0000097
100 %		- 20	1,879,999,872	-128	-0.0000068
100 %		- 10	1,879,999,851	-149	-0.0000079
100 %		0	1,879,999,948	-52	-0.0000028
100 %		+ 10	1,879,999,964	-36	-0.0000019
100 %		+ 20	1,879,999,884	-116	-0.0000062
100 %		+ 30	1,879,999,817	-183	-0.0000098
100 %		+ 40	1,879,999,836	-164	-0.0000087
100 %		+ 50	1,880,000,000	0	0.0000000
BATT. ENDPOINT	3.40	+ 20	1,879,999,887	-113	-0.0000060

Table 7-31. Frequency Stability Data (Band 2)

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Band 2 Frequency Stability Measurements

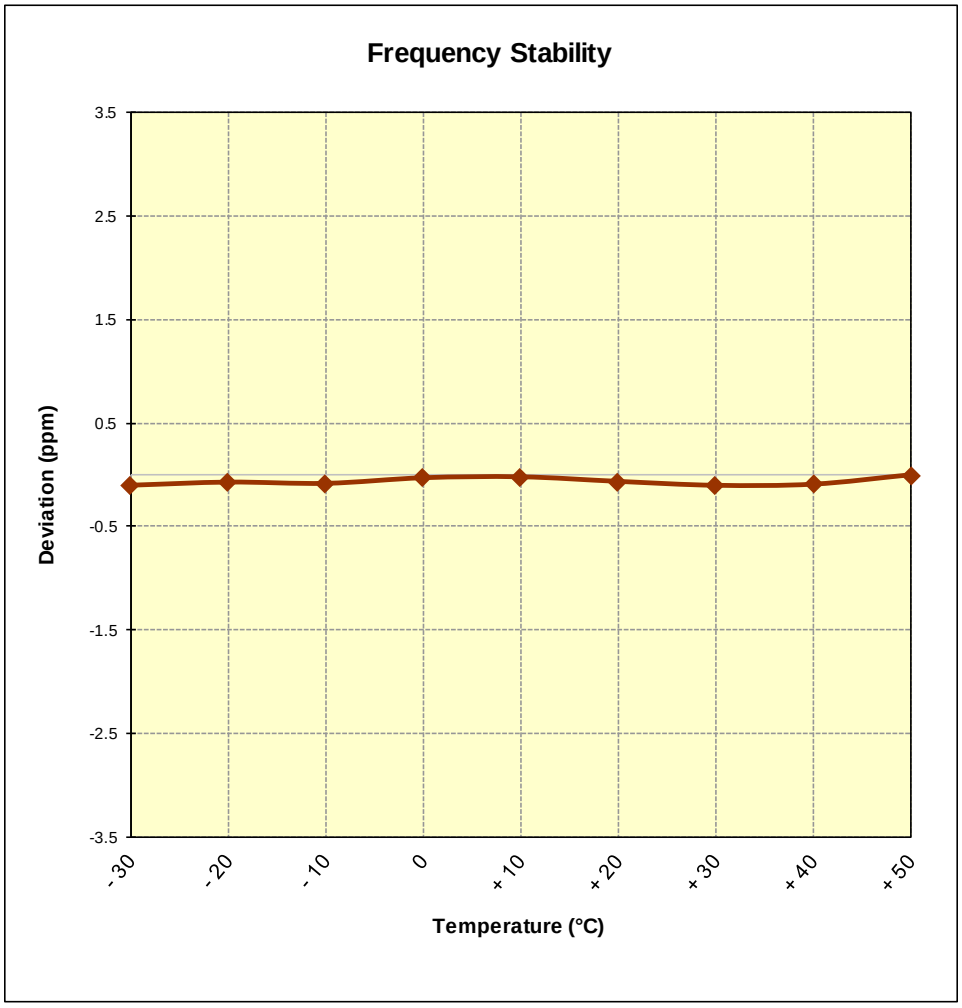

Figure 7-13. Frequency Stability Graph (Band 2)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LGE Portable Handset FCC ID: ZNFL423DL** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

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