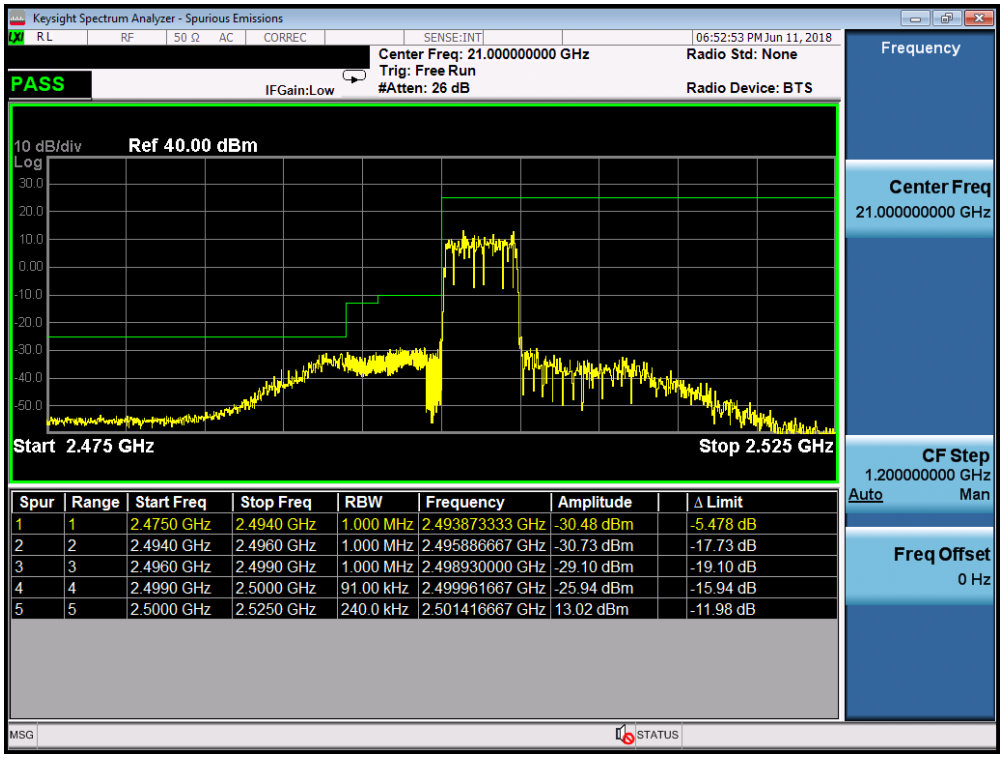
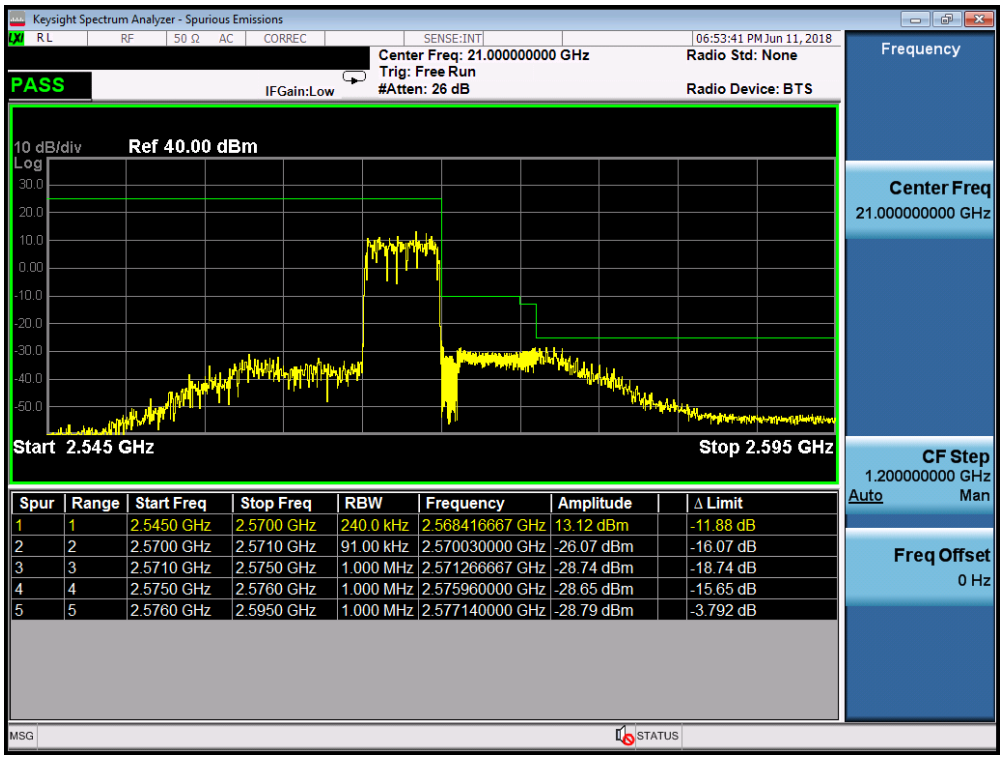
Band 7



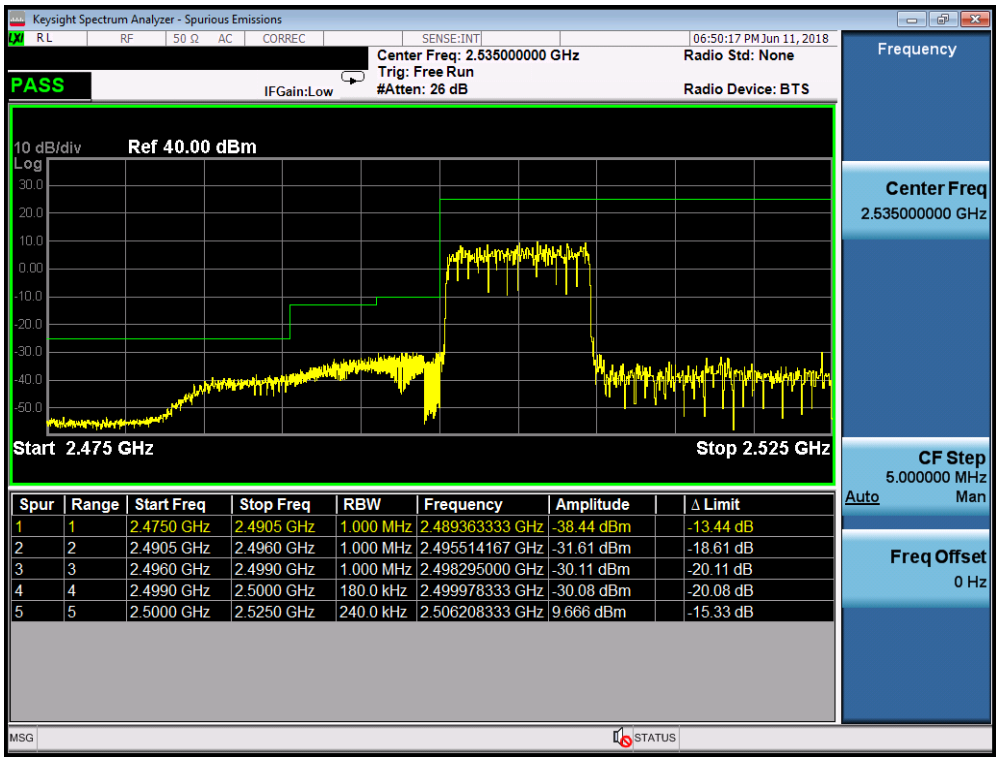
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4940 GHz	1.000 MHz	2.493873333 GHz	-30.48 dBm	-5.478 dB
2	2	2.4940 GHz	2.4960 GHz	1.000 MHz	2.495886667 GHz	-30.73 dBm	-17.73 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498930000 GHz	-29.10 dBm	-19.10 dB
4	4	2.4990 GHz	2.5000 GHz	91.00 kHz	2.499961667 GHz	-25.94 dBm	-15.94 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.501416667 GHz	13.02 dBm	-11.98 dB

Plot 7-217. Lower Band Edge Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.568416667 GHz	13.12 dBm	-11.88 dB
2	2	2.5700 GHz	2.5710 GHz	91.00 kHz	2.570030000 GHz	-26.07 dBm	-16.07 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571266667 GHz	-28.74 dBm	-18.74 dB
4	4	2.5750 GHz	2.5760 GHz	1.000 MHz	2.575960000 GHz	-28.65 dBm	-15.65 dB
5	5	2.5760 GHz	2.5950 GHz	1.000 MHz	2.577140000 GHz	-28.79 dBm	-3.792 dB

Plot 7-218. Upper Band Edge Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)

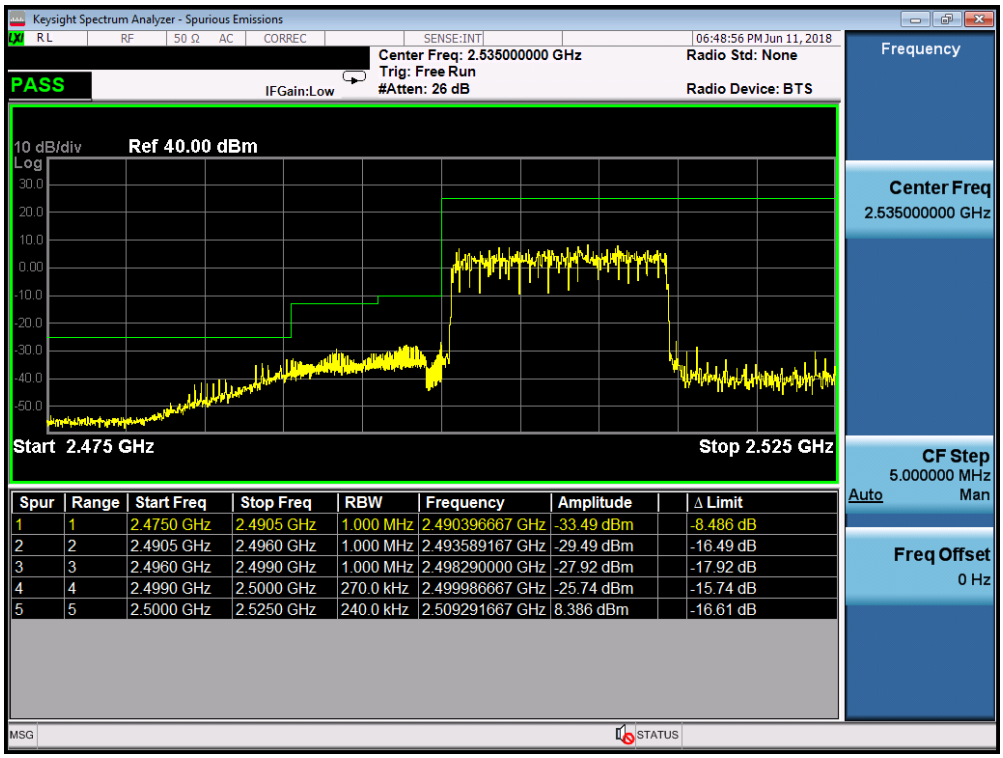


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489363333 GHz	-38.44 dBm	-13.44 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.495514167 GHz	-31.61 dBm	-18.61 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498295000 GHz	-30.11 dBm	-20.11 dB
4	4	2.4990 GHz	2.5000 GHz	180.0 kHz	2.499978333 GHz	-30.08 dBm	-20.08 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.506208333 GHz	9.666 dBm	-15.33 dB

Plot 7-219. Lower Band Edge Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)

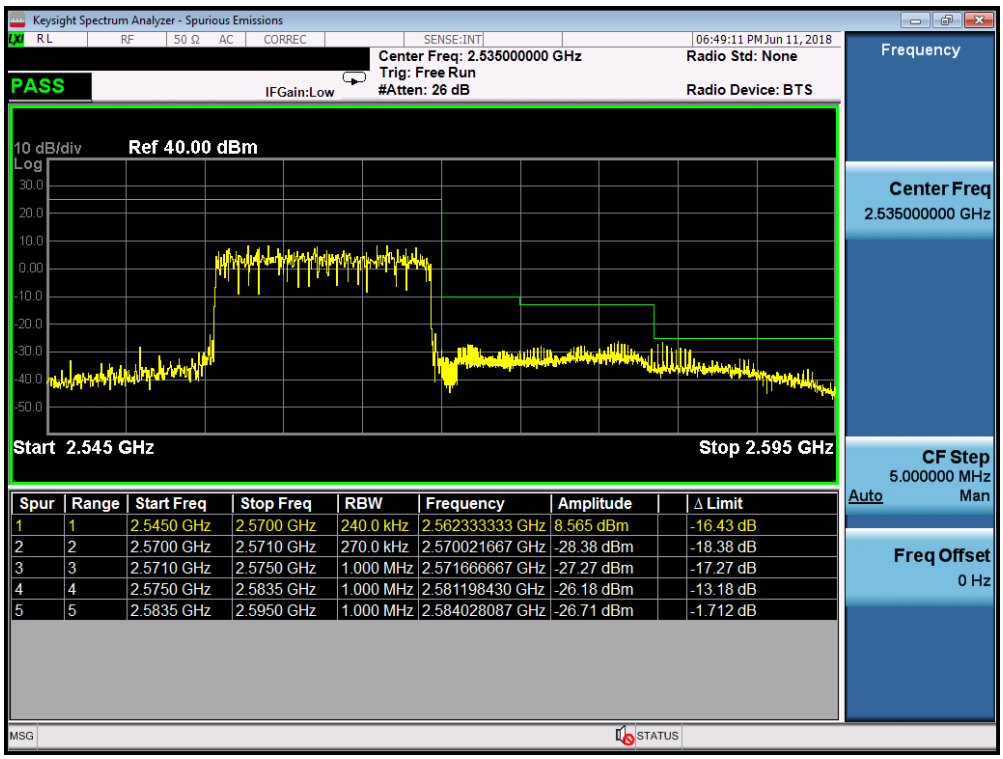
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.566083333 GHz	10.32 dBm	-14.68 dB
2	2	2.5700 GHz	2.5710 GHz	180.0 kHz	2.570030000 GHz	-29.11 dBm	-19.11 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571633333 GHz	-29.30 dBm	-19.30 dB
4	4	2.5750 GHz	2.5790 GHz	1.000 MHz	2.577797523 GHz	-28.77 dBm	-15.77 dB
5	5	2.5790 GHz	2.5950 GHz	1.000 MHz	2.584390647 GHz	-30.99 dBm	-5.992 dB

Plot 7-220. Upper Band Edge Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)



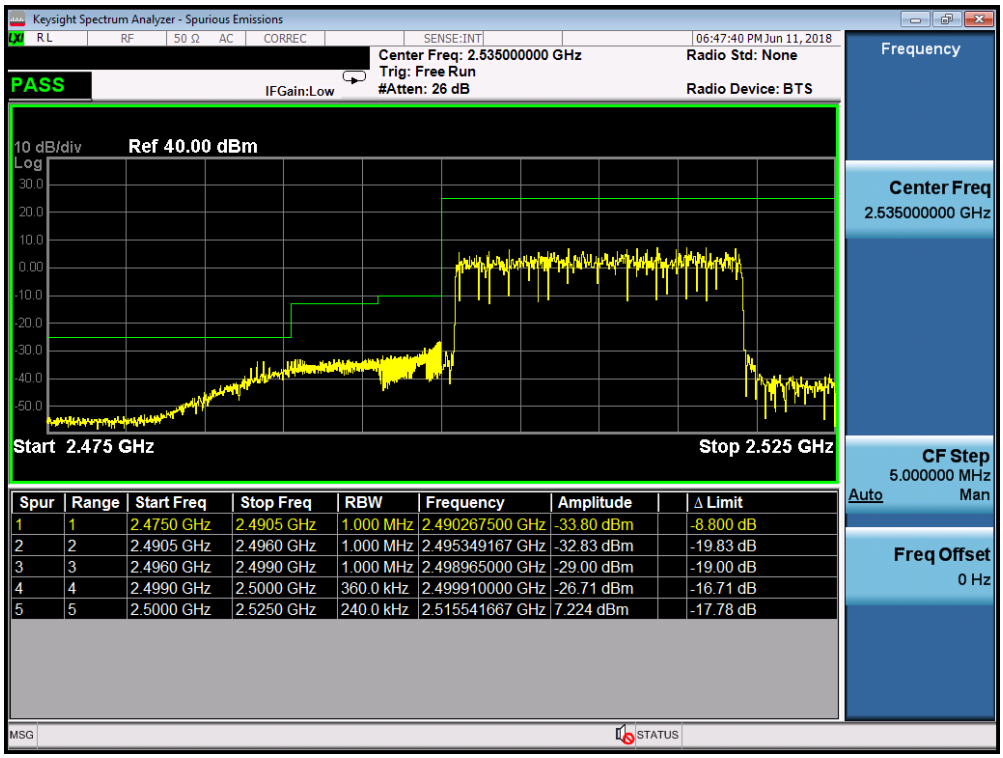
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490396667 GHz	-33.49 dBm	-8.486 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.493589167 GHz	-29.49 dBm	-16.49 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498290000 GHz	-27.92 dBm	-17.92 dB
4	4	2.4990 GHz	2.5000 GHz	270.0 kHz	2.499986667 GHz	-25.74 dBm	-15.74 dB
5	5	2.5000 GHz	2.5250 GHz	240.0 kHz	2.509291667 GHz	8.386 dBm	-16.61 dB

Plot 7-221. Lower Band Edge Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)

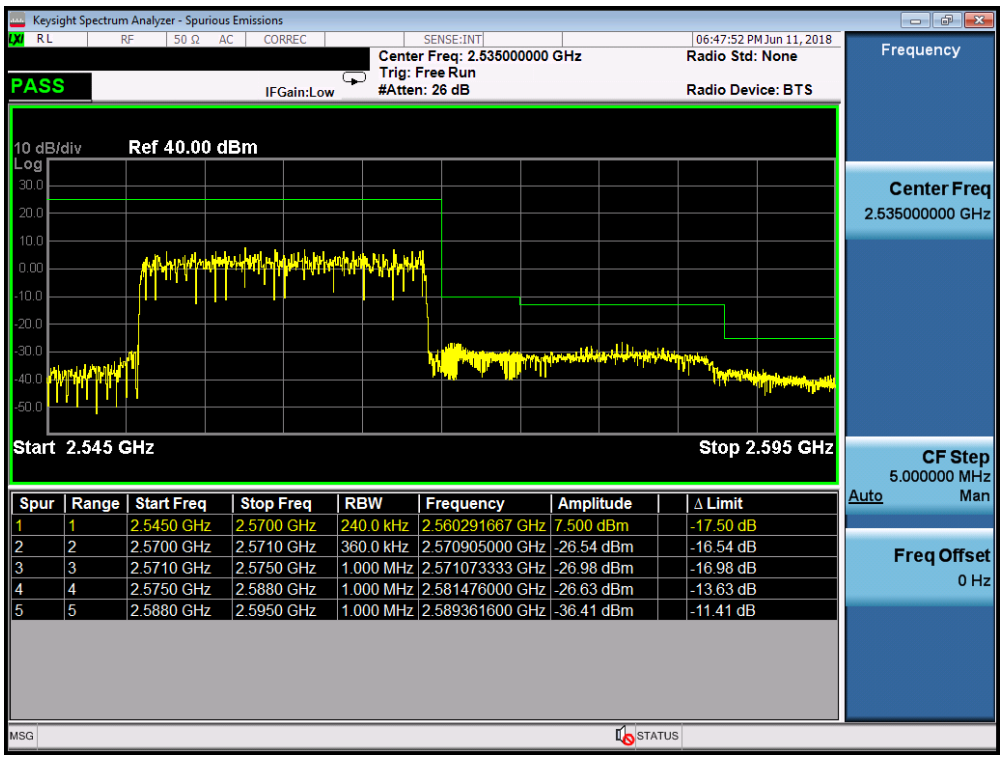


Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5450 GHz	2.5700 GHz	240.0 kHz	2.562333333 GHz	8.565 dBm	-16.43 dB
2	2	2.5700 GHz	2.5710 GHz	270.0 kHz	2.570021667 GHz	-28.38 dBm	-18.38 dB
3	3	2.5710 GHz	2.5750 GHz	1.000 MHz	2.571666667 GHz	-27.27 dBm	-17.27 dB
4	4	2.5750 GHz	2.5835 GHz	1.000 MHz	2.581198430 GHz	-26.18 dBm	-13.18 dB
5	5	2.5835 GHz	2.5950 GHz	1.000 MHz	2.584028087 GHz	-26.71 dBm	-1.712 dB

Plot 7-222. Upper Band Edge Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-223. Lower Band Edge Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-224. Upper Band Edge Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)

7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

Test Setup

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

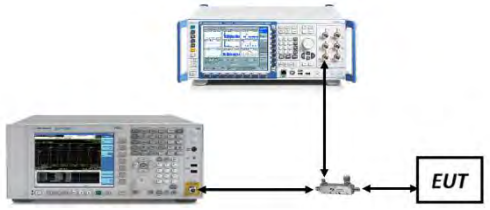
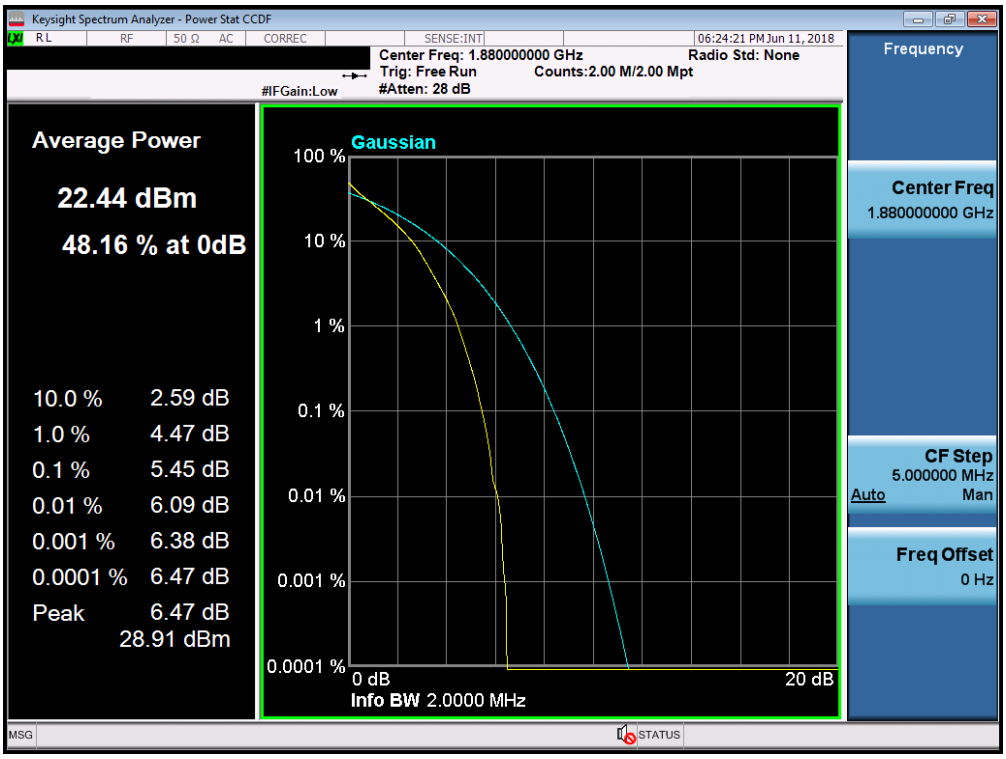


Figure 7-4. Test Instrument & Measurement Setup

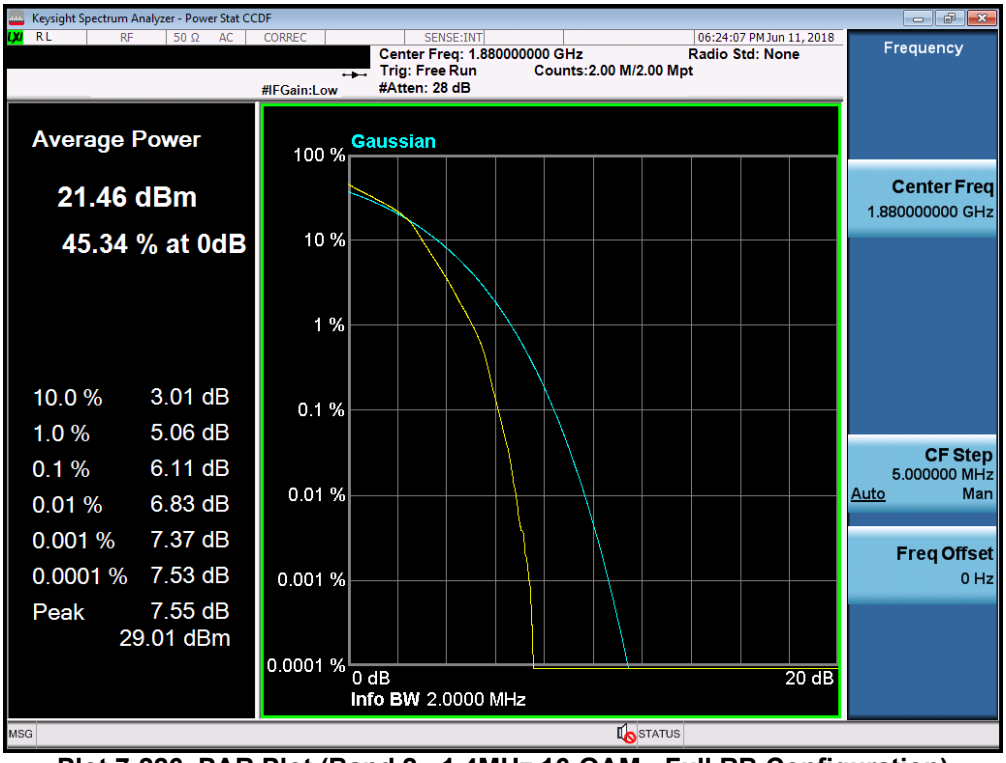
Test Notes

None.

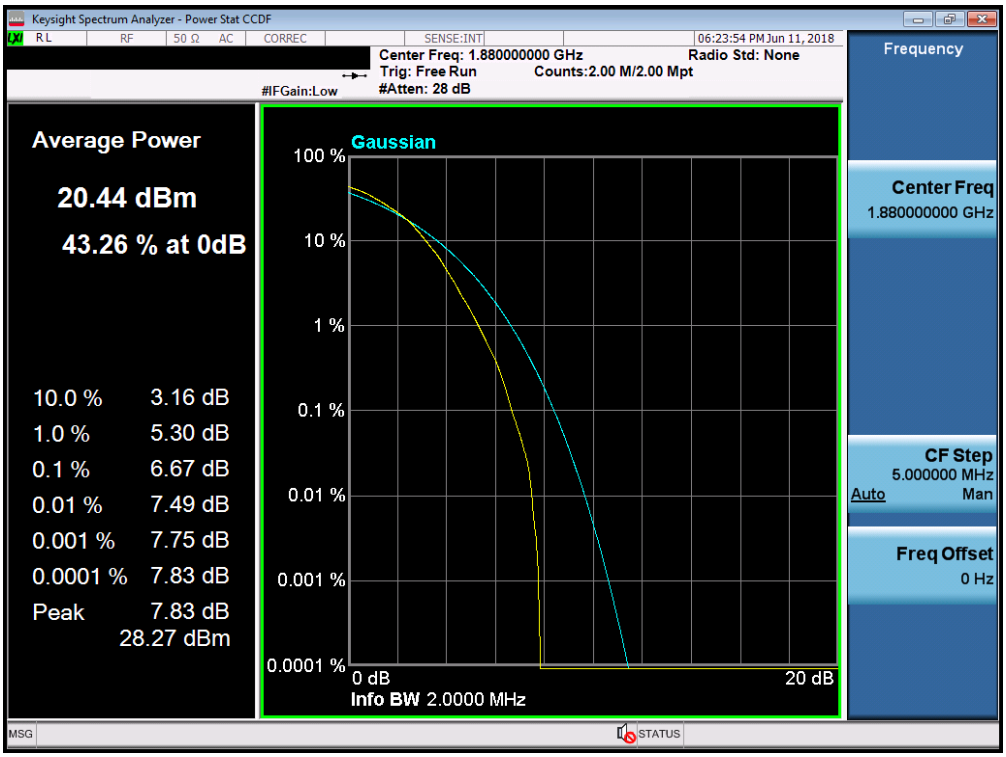
Band 2



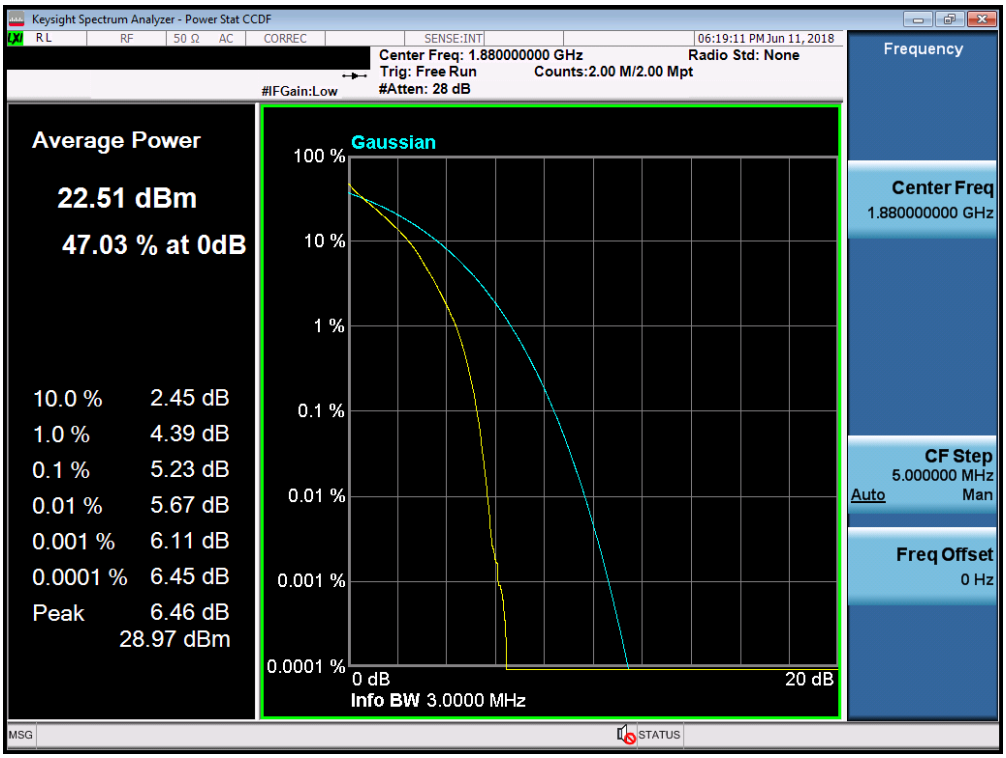
Plot 7-225. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



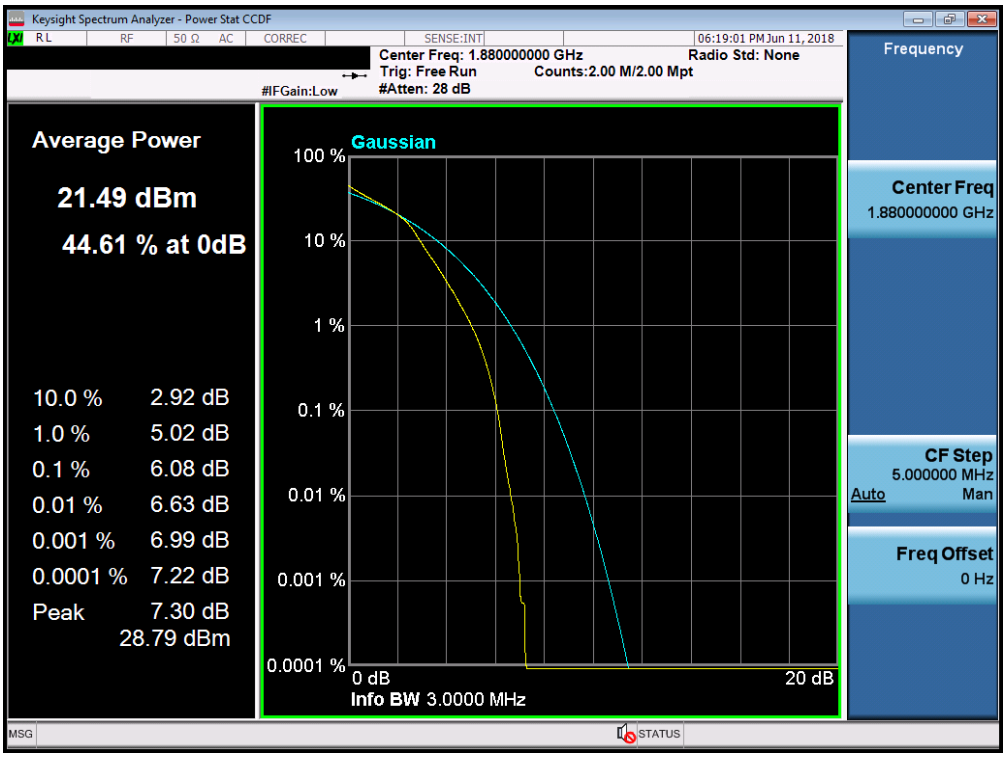
Plot 7-226. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)



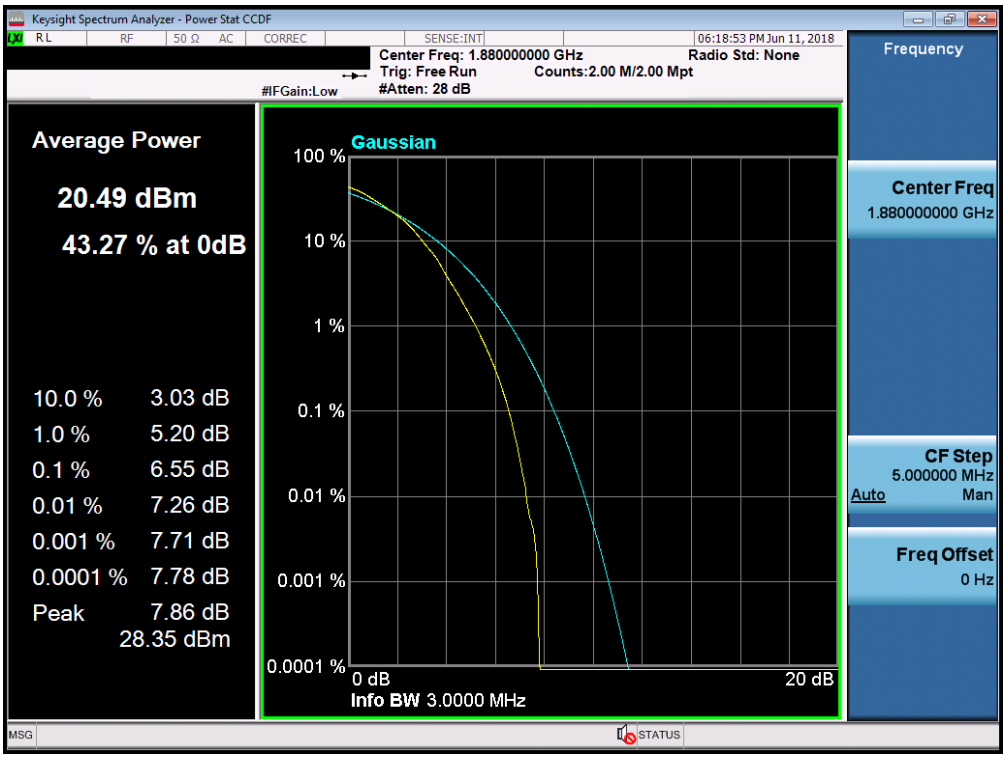
Plot 7-227. PAR Plot (Band 2 - 1.4MHz 64-QAM - Full RB Configuration)



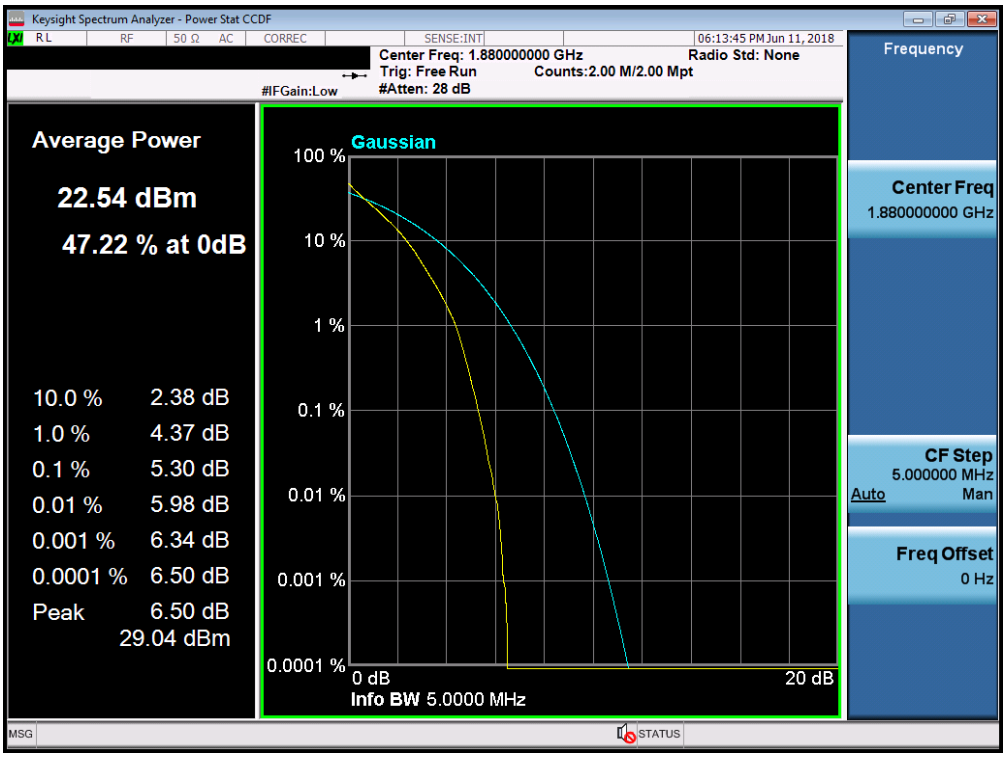
Plot 7-228. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)



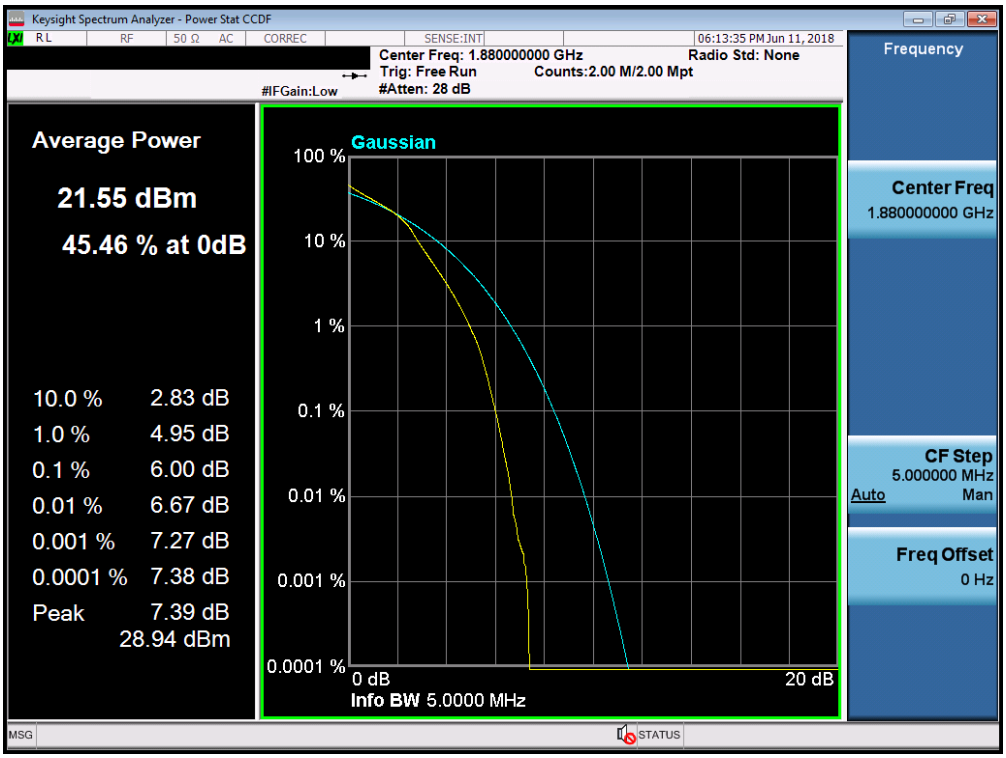
Plot 7-229. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



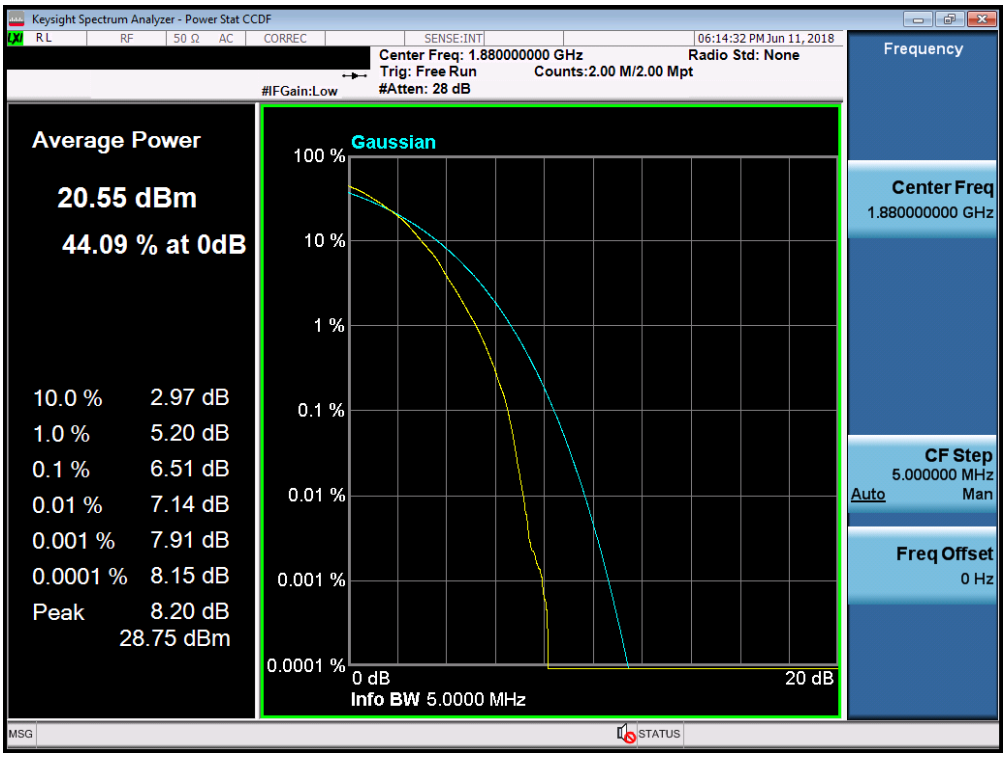
Plot 7-230. PAR Plot (Band 2 - 3.0MHz 64-QAM - Full RB Configuration)



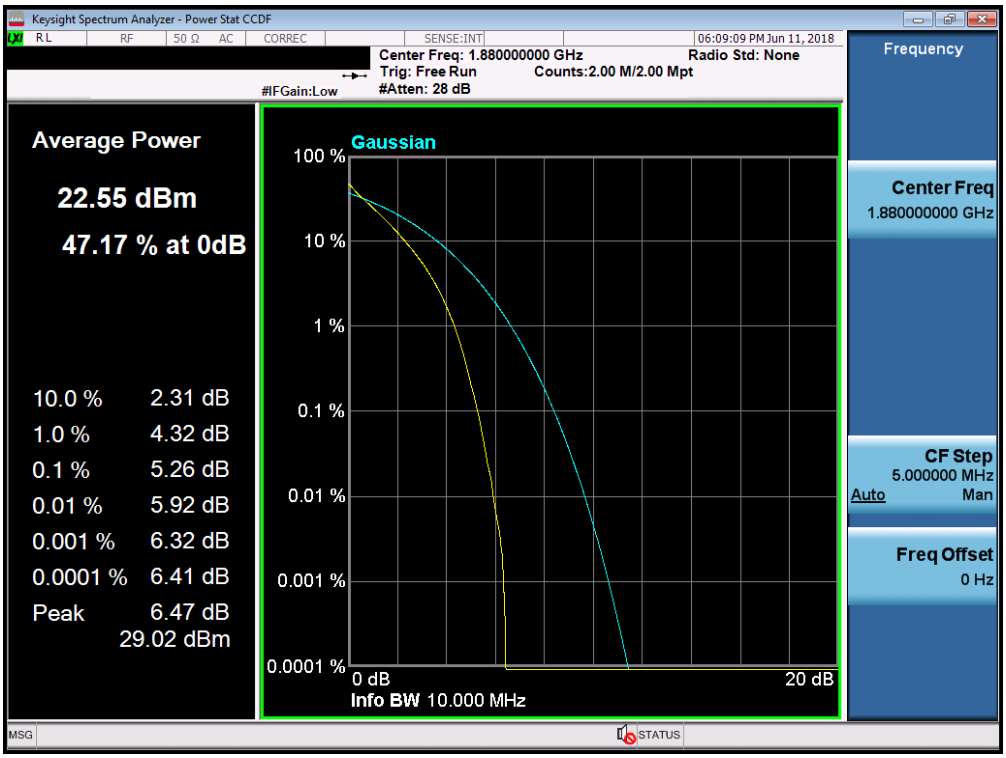
Plot 7-231. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



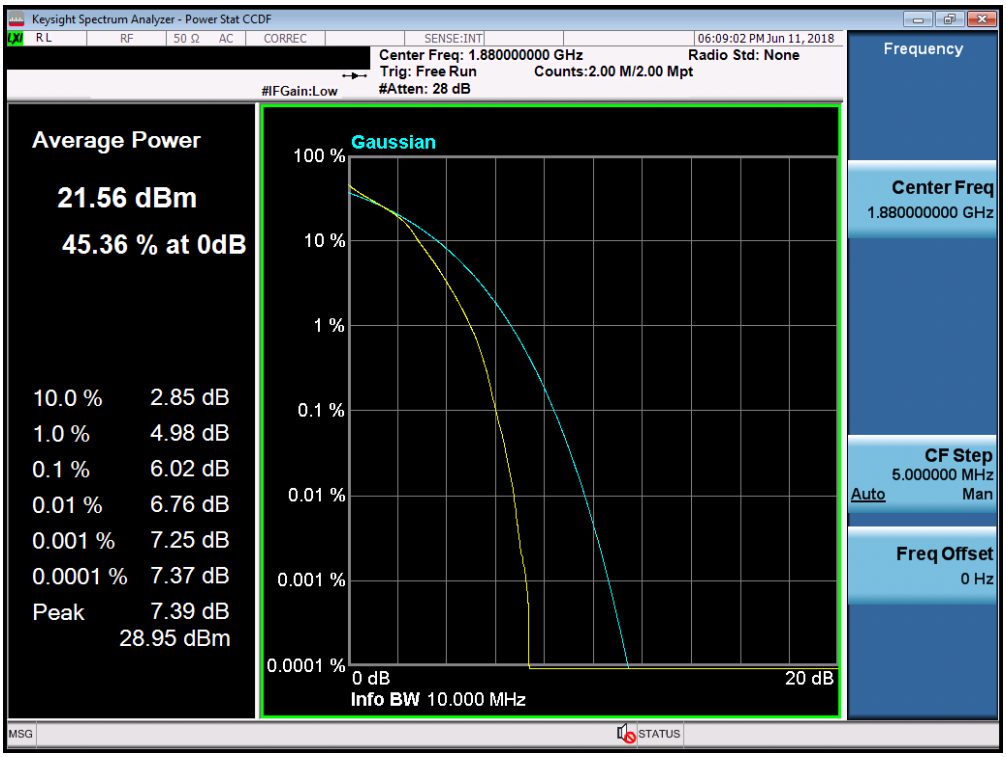
Plot 7-232. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)



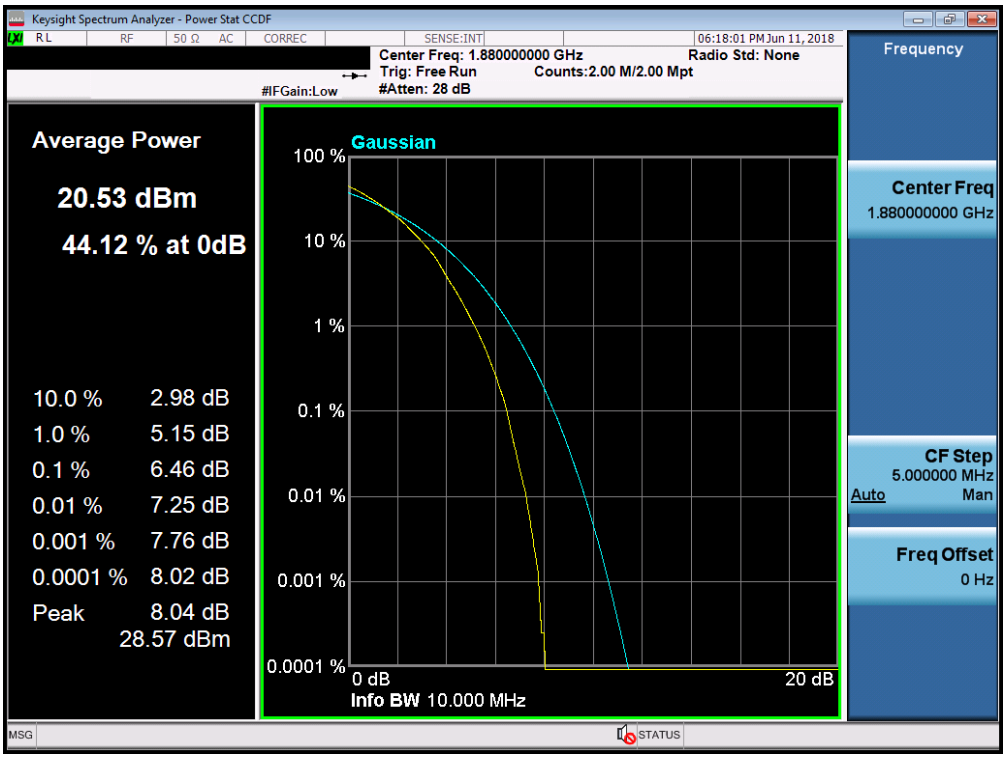
Plot 7-233. PAR Plot (Band 2 - 5.0MHz 64-QAM - Full RB Configuration)



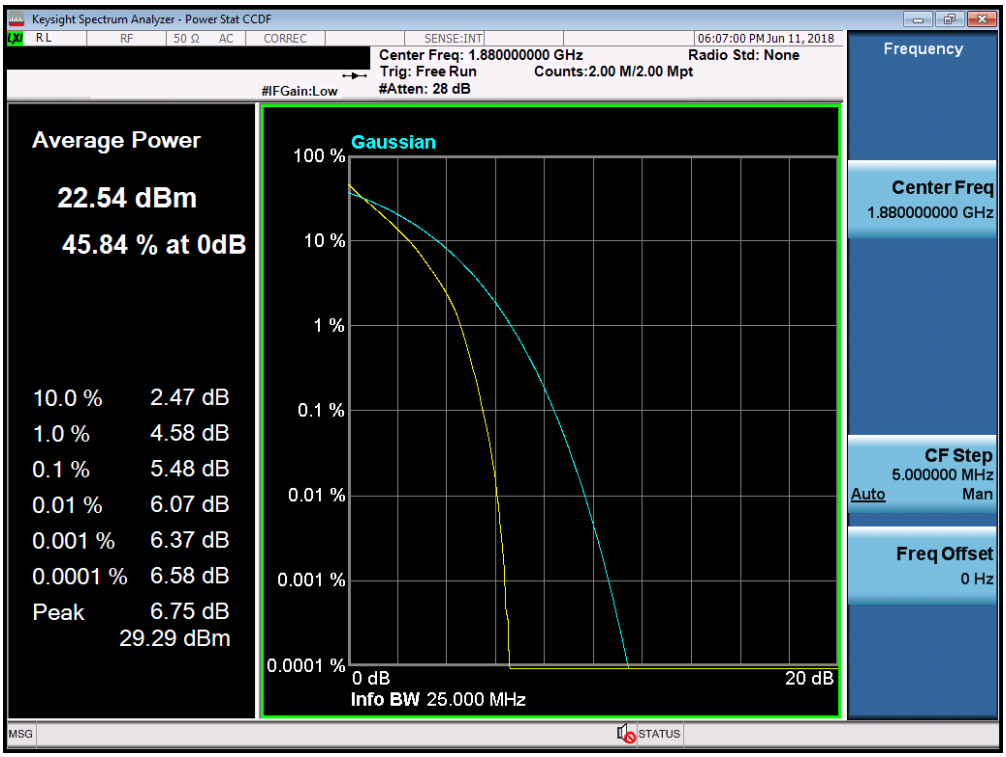
Plot 7-234. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



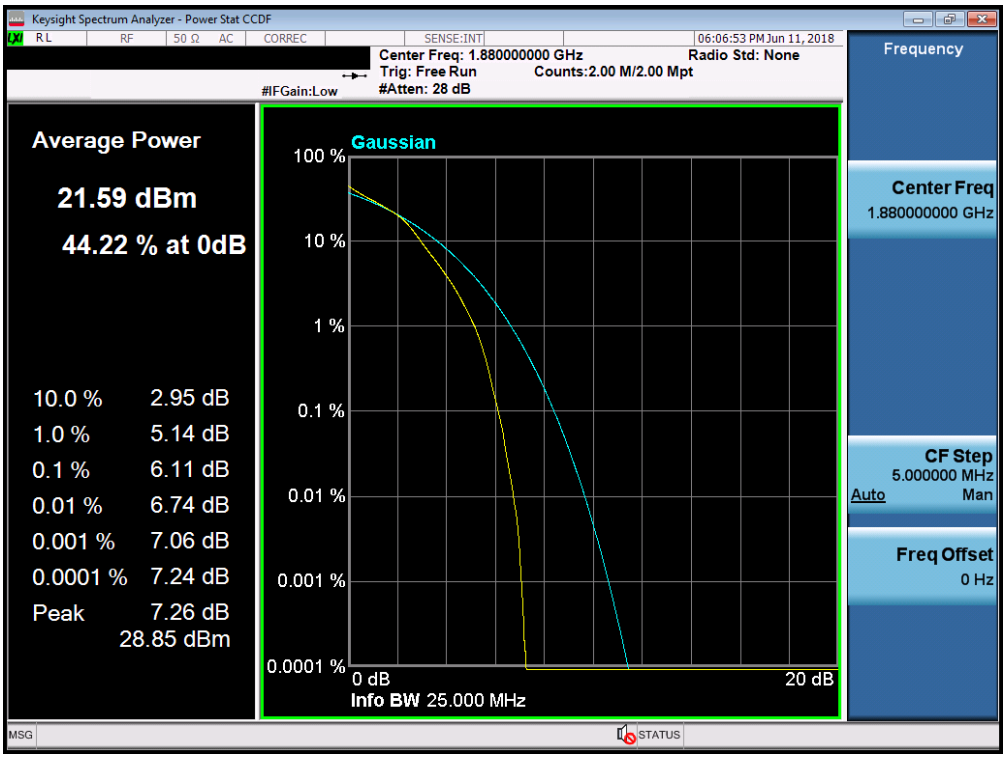
Plot 7-235. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)



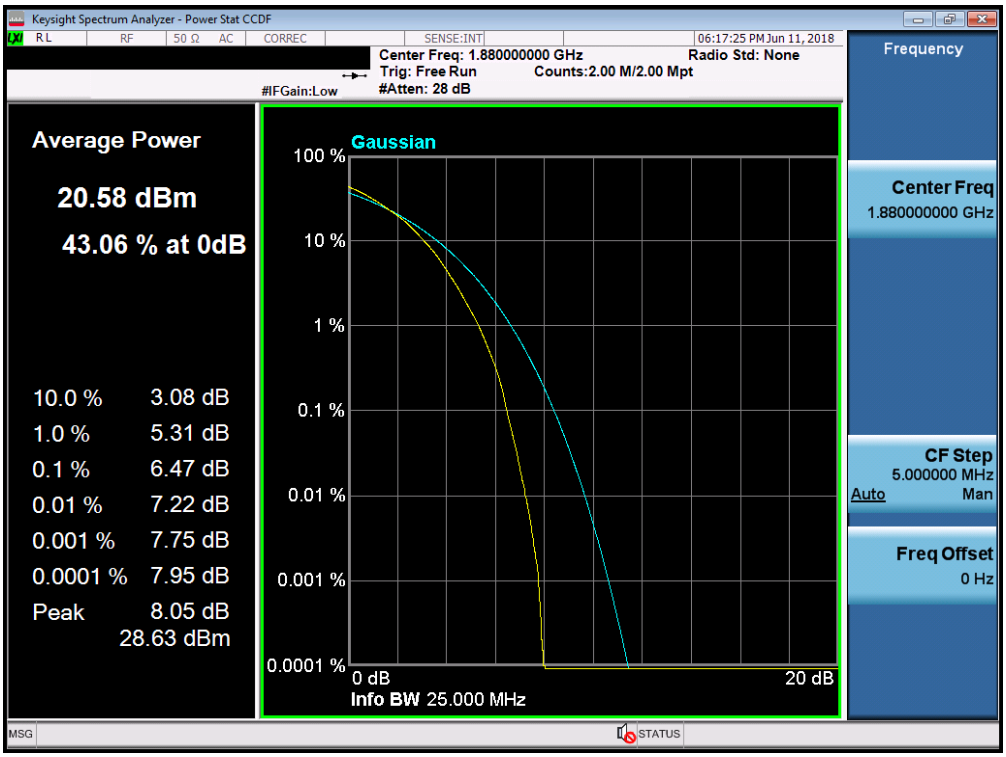
Plot 7-236. PAR Plot (Band 2 - 10.0MHz 64-QAM - Full RB Configuration)



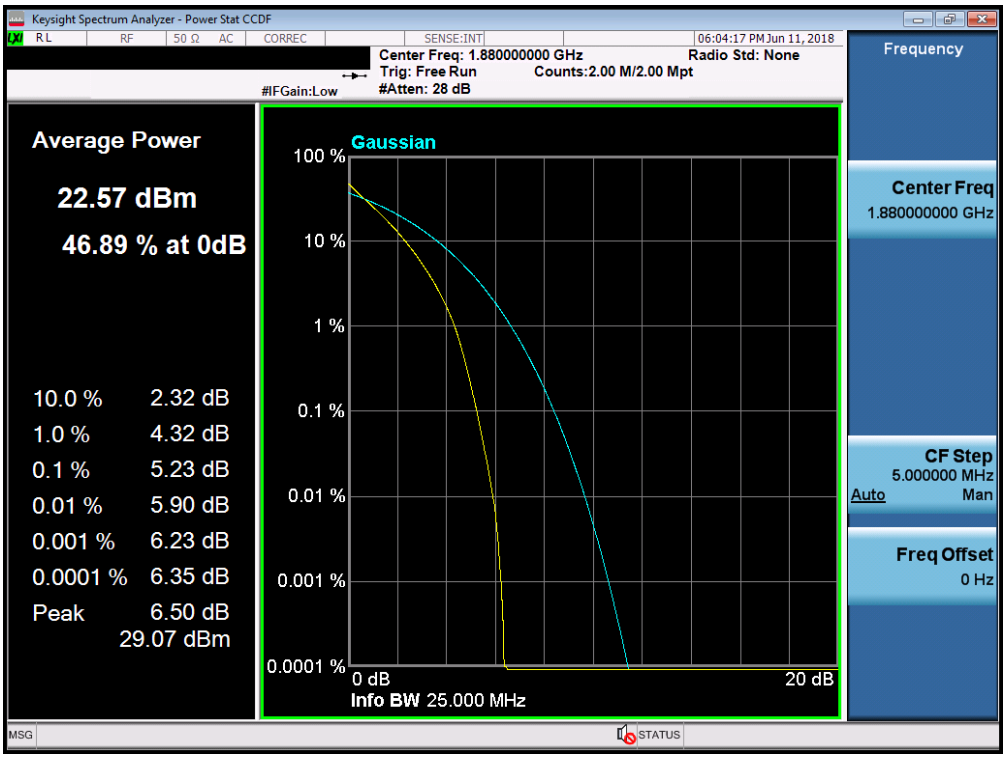
Plot 7-237. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



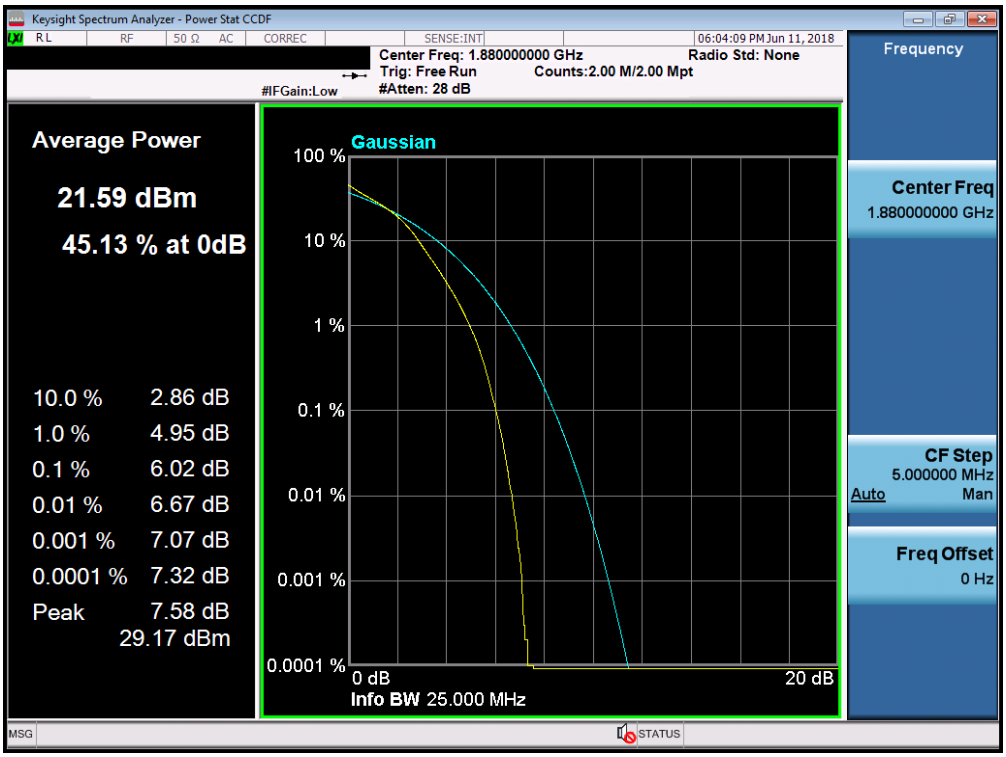
Plot 7-238. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)



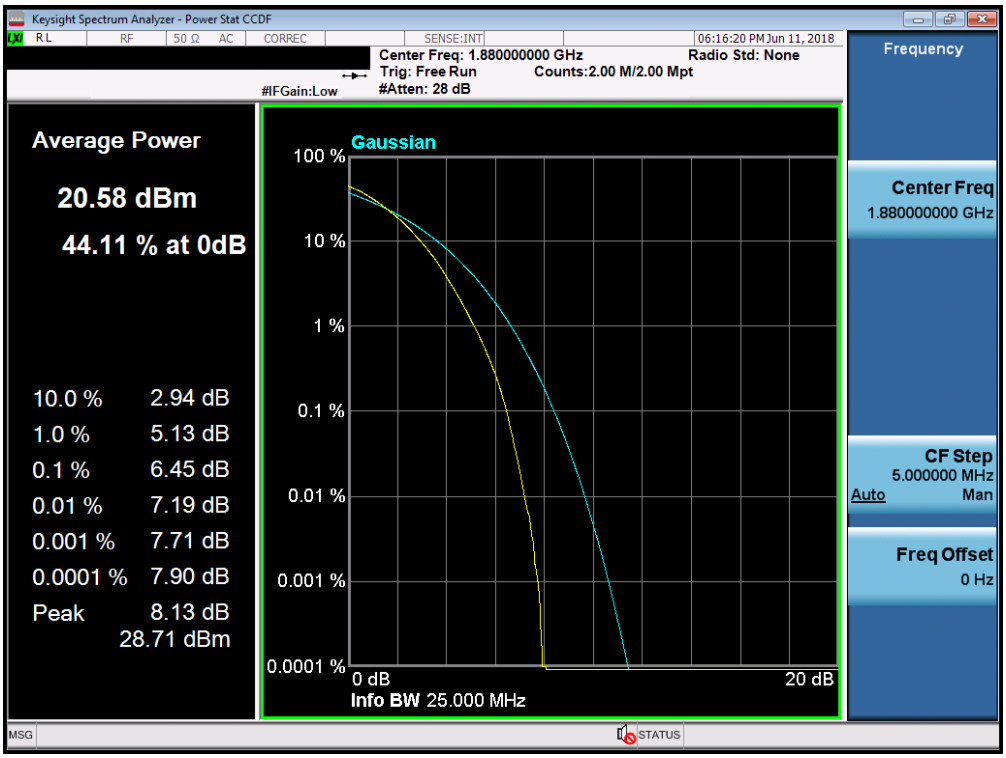
Plot 7-239. PAR Plot (Band 2 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-240. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-241. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-242. PAR Plot (Band 2 - 20.0MHz 64-QAM - Full RB Configuration)

7.6 Radiated Power (ERP/EIRP)

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
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

Test Setup

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

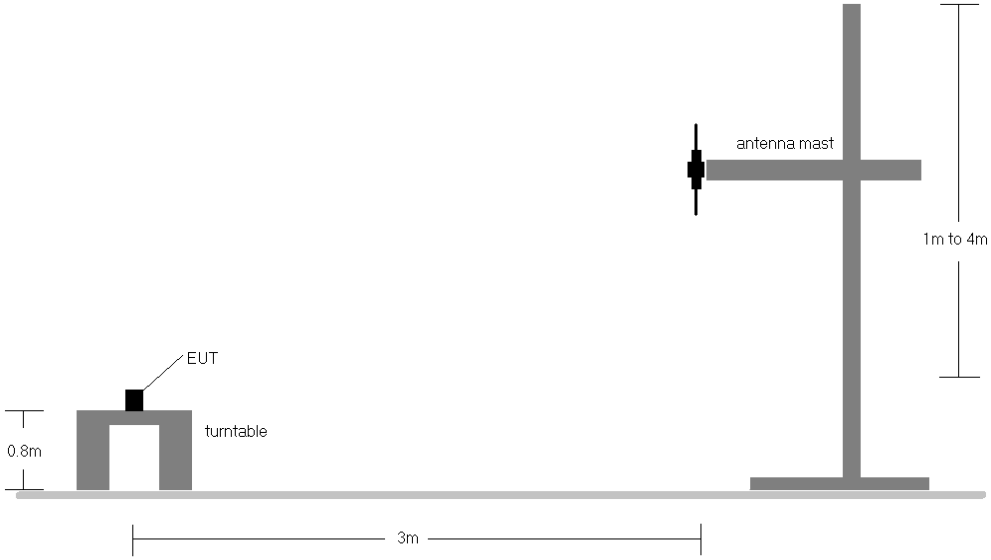


Figure 7-5. Radiated Test Setup <1GHz

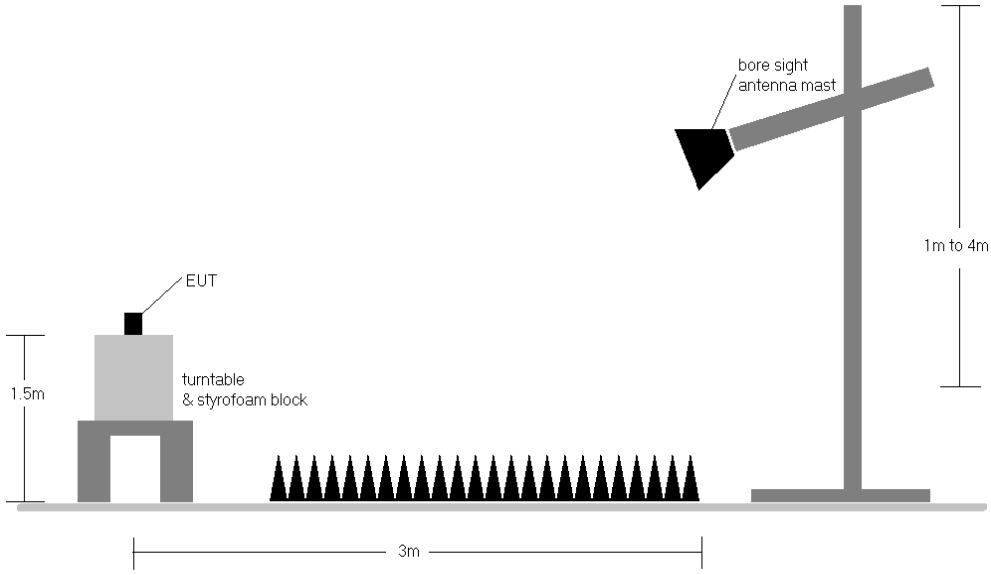


Figure 7-6. Radiated Test Setup >1GHz

Test Notes

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

2) This unit was tested with its standard battery.

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	166	357	1 / 0	18.90	1.10	17.85	0.061	34.77	-16.92	20.00	0.100	36.99	-16.99
707.50	1.4	QPSK	H	175	7	1 / 5	19.14	1.13	18.12	0.065	34.77	-16.65	20.27	0.106	36.99	-16.72
715.30	1.4	QPSK	H	143	2	1 / 5	19.91	1.16	**18.92**	0.078	34.77	-15.85	**21.07**	0.128	36.99	-15.92
715.30	1.4	16-QAM	H	143	2	1 / 5	19.11	1.16	**18.12**	0.065	34.77	-16.65	**20.27**	0.106	36.99	-16.72
715.30	1.4	64-QAM	H	143	2	1 / 5	18.52	1.16	**17.53**	0.057	34.77	-17.24	**19.68**	0.093	36.99	-17.31
700.50	3	QPSK	H	3	126	8 / 4	18.81	1.10	17.76	0.060	34.77	-17.01	19.91	0.098	36.99	-17.08
707.50	3	QPSK	H	167	356	1 / 14	19.20	1.13	18.18	0.066	34.77	-16.59	20.33	0.108	36.99	-16.66
714.50	3	QPSK	H	155	9	1 / 14	19.99	1.16	**19.00**	0.079	34.77	-15.77	**21.15**	0.130	36.99	-15.84
714.50	3	16-QAM	H	155	9	1 / 14	19.36	1.16	**18.37**	0.069	34.77	-16.40	**20.52**	0.113	36.99	-16.47
714.50	3	64-QAM	H	155	9	1 / 14	18.67	1.16	**17.68**	0.059	34.77	-17.09	**19.83**	0.096	36.99	-17.16
701.50	5	QPSK	H	5	87	12 / 6	18.87	1.11	17.83	0.061	34.77	-16.95	19.98	0.099	36.99	-17.01
707.50	5	QPSK	H	180	2	1 / 24	19.53	1.13	18.51	0.071	34.77	-16.26	20.66	0.116	36.99	-16.33
713.50	5	QPSK	H	167	355	1 / 24	20.08	1.15	**19.08**	0.081	34.77	-15.69	**21.23**	0.133	36.99	-15.76
713.50	5	16-QAM	H	167	355	1 / 24	19.41	1.15	**18.41**	0.069	34.77	-16.36	**20.56**	0.114	36.99	-16.43
713.50	5	64-QAM	H	167	355	1 / 24	18.76	1.15	**17.76**	0.060	34.77	-17.01	**19.91**	0.098	36.99	-17.08
704.00	10	QPSK	H	167	6	1 / 49	19.51	1.12	18.48	0.070	34.77	-16.29	20.63	0.116	36.99	-16.36
707.50	10	QPSK	H	4	81	1 / 0	18.62	1.13	17.60	0.058	34.77	-17.17	19.75	0.094	36.99	-17.24
711.00	10	QPSK	H	167	2	1 / 49	20.30	1.14	**19.29**	**0.085**	34.77	-15.48	**21.44**	**0.139**	36.99	-15.55
711.00	10	16-QAM	H	167	2	1 / 49	19.21	1.14	**18.20**	0.066	34.77	-16.57	**20.35**	0.109	36.99	-16.64
711.00	10	64-QAM	H	167	2	1 / 49	18.25	1.14	**17.24**	0.053	34.77	-17.53	**19.39**	0.087	36.99	-17.60
711.00	10	QPSK	V	287	159	1 / 49	19.37	1.13	18.35	0.068	34.77	-16.42	20.50	0.112	36.99	-16.49

Table 7-3. 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]
824.70	1.4	QPSK	H	150	351	1 / 5	22.59	1.50	**21.94**	0.156	38.45	-16.51
836.50	1.4	QPSK	H	150	355	1 / 0	21.10	1.50	20.45	0.111	38.45	-18.00
848.30	1.4	QPSK	H	150	351	1 / 0	20.55	1.50	19.90	0.098	38.45	-18.55
824.70	1.4	16-QAM	H	150	351	1 / 5	21.78	1.50	**21.13**	0.130	38.45	-17.32
824.70	1.4	64-QAM	H	150	351	1 / 0	20.59	1.50	**19.94**	0.099	38.45	-18.51
825.50	3	QPSK	H	150	358	1 / 14	22.76	1.50	**22.11**	0.163	38.45	-16.34
836.50	3	QPSK	H	150	348	1 / 14	20.63	1.50	19.98	0.100	38.45	-18.47
847.50	3	QPSK	H	150	349	1 / 0	21.55	1.50	20.90	0.123	38.45	-17.55
825.50	3	16-QAM	H	150	358	1 / 14	21.77	1.50	**21.12**	0.129	38.45	-17.33
825.50	3	64-QAM	H	150	358	1 / 14	21.15	1.50	**20.50**	0.112	38.45	-17.95
826.50	5	QPSK	H	150	359	1 / 24	23.02	1.50	**22.37**	**0.173**	38.45	-16.08
836.50	5	QPSK	H	150	3	1 / 24	21.32	1.50	20.67	0.117	38.45	-17.78
846.50	5	QPSK	H	150	355	1 / 0	22.24	1.50	21.59	0.144	38.45	-16.86
826.50	5	16-QAM	H	150	359	1 / 24	22.18	1.50	**21.53**	0.142	38.45	-16.92
826.50	5	64-QAM	H	150	359	1 / 24	21.39	1.50	**20.74**	0.119	38.45	-17.71
829.00	10	QPSK	H	150	351	1 / 0	22.44	1.50	**21.79**	0.151	38.45	-16.66
836.50	10	QPSK	H	150	1	1 / 0	21.96	1.50	21.31	0.135	38.45	-17.14
844.00	10	QPSK	H	150	1	1 / 0	21.31	1.50	20.66	0.116	38.45	-17.79
829.00	10	16-QAM	H	150	351	1 / 0	21.57	1.50	**20.92**	0.124	38.45	-17.53
829.00	10	64-QAM	H	150	351	1 / 0	20.70	1.50	**20.05**	0.101	38.45	-18.40
826.50	5	QPSK	V	150	17	1 / 24	21.73	1.50	21.08	0.128	38.45	-17.37

Table 7-4. ERP Data (Band 5)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	111	25	1 / 0	15.16	8.16	**23.32**	0.215	30.00	-6.68
1745.00	1.4	QPSK	H	111	25	1 / 5	13.41	8.18	21.59	0.144	30.00	-8.41
1779.30	1.4	QPSK	H	111	25	1 / 0	14.00	8.21	22.21	0.166	30.00	-7.79
1710.70	1.4	16-QAM	H	111	25	1 / 0	14.23	8.16	**22.39**	0.173	30.00	-7.61
1710.70	1.4	64-QAM	H	111	25	1 / 0	13.14	8.16	**21.30**	0.135	30.00	-8.70
1711.50	3	QPSK	H	140	215	1 / 0	15.19	8.16	23.35	0.216	30.00	-6.65
1745.00	3	QPSK	H	140	215	1 / 14	15.46	8.18	**23.64**	0.231	30.00	-6.36
1778.50	3	QPSK	H	140	215	1 / 0	15.18	8.21	23.39	0.218	30.00	-6.61
1745.00	3	16-QAM	H	140	215	1 / 14	14.77	8.18	**22.95**	0.197	30.00	-7.05
1745.00	3	64-QAM	H	140	215	1 / 14	13.61	8.18	**21.79**	0.151	30.00	-8.21
1712.50	5	QPSK	H	316	208	1 / 0	15.62	8.16	23.78	0.239	30.00	-6.22
1745.00	5	QPSK	H	316	208	1 / 0	16.06	8.18	**24.24**	**0.265**	30.00	-5.76
1777.50	5	QPSK	H	316	208	1 / 0	14.76	8.20	22.96	0.198	30.00	-7.04
1745.00	5	16-QAM	H	316	208	1 / 0	15.24	8.18	**23.42**	0.220	30.00	-6.58
1745.00	5	64-QAM	H	316	208	1 / 0	14.11	8.18	**22.29**	0.169	30.00	-7.71
1715.00	10	QPSK	H	316	220	1 / 0	14.78	8.16	22.94	0.197	30.00	-7.06
1745.00	10	QPSK	H	316	220	1 / 49	15.53	8.18	**23.71**	0.235	30.00	-6.29
1775.00	10	QPSK	H	316	220	1 / 49	14.80	8.20	23.00	0.200	30.00	-7.00
1745.00	10	16-QAM	H	316	220	1 / 0	15.59	8.18	**23.77**	0.238	30.00	-6.23
1745.00	10	64-QAM	H	316	220	1 / 0	14.62	8.18	**22.80**	0.191	30.00	-7.20
1717.50	15	QPSK	H	144	219	1 / 0	14.64	8.16	22.80	0.191	30.00	-7.20
1745.00	15	QPSK	H	144	219	1 / 74	14.51	8.18	22.69	0.186	30.00	-7.31
1772.50	15	QPSK	H	144	219	1 / 0	15.76	8.20	**23.96**	0.249	30.00	-6.04
1772.50	15	16-QAM	H	144	219	1 / 0	14.75	8.20	**22.95**	0.197	30.00	-7.05
1772.50	15	64-QAM	H	144	219	1 / 0	13.64	8.20	**21.84**	0.153	30.00	-8.16
1720.00	20	QPSK	H	316	222	1 / 0	14.41	8.17	22.58	0.181	30.00	-7.42
1745.00	20	QPSK	H	316	222	1 / 0	15.22	8.18	23.40	0.219	30.00	-6.60
1770.00	20	QPSK	H	316	222	1 / 99	15.72	8.19	**23.91**	0.246	30.00	-6.09
1770.00	20	16-QAM	H	316	222	1 / 99	14.62	8.19	**22.81**	0.191	30.00	-7.19
1770.00	20	64-QAM	H	316	222	1 / 99	13.55	8.19	**21.74**	0.149	30.00	-8.26
1745.00	5	QPSK	V	306	247	1 / 0	12.27	8.18	20.45	0.111	30.00	-9.55

Table 7-5. EIRP Data (Band 66/4)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.70	1.4	QPSK	H	355	23	3 / 2	17.43	4.82	22.25	0.168	33.01	-10.76
1880.00	1.4	QPSK	H	5	18	3 / 2	17.73	4.74	22.47	0.177	33.01	-10.54
1909.30	1.4	QPSK	H	358	19	3 / 2	19.26	4.68	**23.94**	0.248	33.01	-9.07
1909.30	1.4	16-QAM	H	358	19	3 / 2	18.44	4.68	**23.12**	0.205	33.01	-9.89
1909.30	1.4	64-QAM	H	358	19	3 / 2	17.32	4.68	**22.00**	0.159	33.01	-11.01
1851.50	3	QPSK	H	356	22	8 / 4	17.49	4.82	22.31	0.170	33.01	-10.70
1880.00	3	QPSK	H	357	15	1 / 14	17.86	4.74	22.60	0.182	33.01	-10.41
1908.50	3	QPSK	H	356	22	8 / 4	19.34	4.68	**24.02**	**0.252**	33.01	-8.99
1908.50	3	16-QAM	H	356	22	8 / 4	18.68	4.68	**23.36**	0.217	33.01	-9.65
1908.50	3	64-QAM	H	356	22	8 / 4	17.72	4.68	**22.40**	0.174	33.01	-10.61
1852.50	5	QPSK	H	359	20	1 / 24	17.70	4.81	22.51	0.178	33.01	-10.50
1880.00	5	QPSK	H	355	21	1 / 24	18.38	4.74	23.12	0.205	33.01	-9.89
1907.50	5	QPSK	H	6	15	1 / 0	18.83	4.68	**23.51**	0.225	33.01	-9.50
1907.50	5	16-QAM	H	6	15	1 / 0	18.10	4.68	**22.78**	0.190	33.01	-10.23
1907.50	5	64-QAM	H	6	15	1 / 0	17.00	4.68	**21.68**	0.147	33.01	-11.33
1855.00	10	QPSK	H	355	23	1 / 49	17.75	4.81	22.56	0.180	33.01	-10.45
1880.00	10	QPSK	H	8	20	1 / 49	18.43	4.74	23.17	0.208	33.01	-9.84
1905.00	10	QPSK	H	10	19	1 / 0	18.97	4.68	**23.65**	0.232	33.01	-9.36
1905.00	10	16-QAM	H	10	19	1 / 0	18.09	4.68	**22.77**	0.189	33.01	-10.24
1905.00	10	64-QAM	H	10	19	1 / 0	16.99	4.68	**21.67**	0.147	33.01	-11.34
1857.50	15	QPSK	H	12	20	1 / 74	17.45	4.80	22.25	0.168	33.01	-10.76
1880.00	15	QPSK	H	4	19	1 / 74	18.40	4.74	23.14	0.206	33.01	-9.87
1902.50	15	QPSK	H	356	20	1 / 74	18.95	4.69	**23.64**	0.231	33.01	-9.37
1902.50	15	16-QAM	H	356	20	1 / 74	18.18	4.69	**22.87**	0.193	33.01	-10.14
1902.50	15	64-QAM	H	356	20	1 / 74	17.09	4.69	**21.78**	0.151	33.01	-11.23
1860.00	20	QPSK	H	350	16	1 / 99	17.49	4.79	22.28	0.169	33.01	-10.73
1880.00	20	QPSK	H	350	20	1 / 99	18.37	4.74	23.11	0.205	33.01	-9.90
1900.00	20	QPSK	H	9	20	1 / 99	19.03	4.69	**23.72**	0.235	33.01	-9.29
1900.00	20	16-QAM	H	9	20	1 / 99	18.17	4.69	**22.86**	0.193	33.01	-10.15
1900.00	20	64-QAM	H	9	20	1 / 99	17.09	4.69	**21.78**	0.151	33.01	-11.23
1908.50	3	QPSK	V	240	89	8 / 4	13.60	8.36	21.96	0.157	33.01	-11.05

Table 7-6. EIRP Data (Band 2)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2307.50	5	QPSK	H	258	302	1 / 0	16.71	5.74	22.45	0.176	23.98	-1.53
2312.50	5	QPSK	H	258	302	1 / 0	16.62	5.74	22.36	0.172	23.98	-1.62
2307.50	5	16-QAM	H	258	302	1 / 0	16.05	5.74	21.79	0.151	23.98	-2.19
2312.50	5	16-QAM	H	258	302	1 / 0	16.14	5.74	**21.88**	0.154	23.98	-2.10
2307.50	5	64-QAM	H	258	302	1 / 0	15.00	5.74	20.74	0.119	23.98	-3.24
2312.50	5	64-QAM	H	258	302	1 / 0	15.10	5.74	20.84	0.121	23.98	-3.14
2310.00	10	QPSK	H	255	302	1 / 0	16.62	5.74	**22.36**	0.172	23.98	-1.62
2310.00	10	16-QAM	H	255	302	1 / 0	16.00	5.74	21.74	0.149	23.98	-2.24
2310.00	10	64-QAM	H	255	302	1 / 0	14.87	5.74	20.61	0.115	23.98	-3.37
2310.00	5	QPSK	V	106	48	1 / 0	10.49	8.23	**18.72**	**0.074**	23.98	-5.26

Table 7-7. EIRP Data (Band 30)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
2502.50	5	QPSK	V	279	73	1 / 24	10.19	7.69	17.88	0.061	33.01	-15.13
2535.00	5	QPSK	V	279	73	1 / 24	11.17	7.69	18.86	0.077	33.01	-14.15
2567.50	5	QPSK	V	279	73	1 / 0	11.96	7.69	**19.65**	0.092	33.01	-13.36
2567.50	5	16-QAM	V	279	73	1 / 0	11.18	7.69	**18.87**	0.077	33.01	-14.14
2567.50	5	64-QAM	V	279	73	1 / 0	10.14	7.69	**17.83**	0.061	33.01	-15.18
2505.00	10	QPSK	V	102	113	1 / 0	11.64	7.69	19.33	0.086	33.01	-13.68
2535.00	10	QPSK	V	102	113	1 / 49	11.07	7.69	18.76	0.075	33.01	-14.25
2565.00	10	QPSK	V	102	113	1 / 49	12.52	7.69	**20.21**	0.105	33.01	-12.80
2565.00	10	16-QAM	V	102	113	1 / 49	11.57	7.69	**19.26**	0.084	33.01	-13.75
2565.00	10	64-QAM	V	102	113	1 / 49	10.49	7.69	**18.18**	0.066	33.01	-14.83
2507.50	15	QPSK	V	214	97	1 / 0	11.35	7.69	19.04	0.080	33.01	-13.97
2535.00	15	QPSK	V	214	97	1 / 0	11.46	7.69	19.15	0.082	33.01	-13.86
2562.50	15	QPSK	V	214	97	1 / 0	14.83	7.69	**22.52**	**0.179**	33.01	-10.49
2562.50	15	16-QAM	V	214	97	1 / 0	14.01	7.69	**21.70**	0.148	33.01	-11.31
2562.50	15	64-QAM	V	214	97	1 / 0	12.86	7.69	**20.55**	0.114	33.01	-12.46
2510.00	20	QPSK	V	111	100	1 / 0	11.80	7.69	19.49	0.089	33.01	-13.52
2535.00	20	QPSK	V	111	100	1 / 99	12.79	7.69	**20.48**	0.112	33.01	-12.53
2560.00	20	QPSK	V	111	100	1 / 0	11.18	7.69	18.87	0.077	33.01	-14.14
2535.00	20	16-QAM	V	111	100	1 / 99	12.06	7.69	**19.75**	0.094	33.01	-13.26
2560.00	20	64-QAM	V	111	100	1 / 0	11.96	7.69	**19.65**	0.092	33.01	-13.36
2562.50	15	QPSK	H	149	141	1 / 0	13.35	7.69	21.04	0.127	33.01	-11.97

Table 7-8. EIRP Data (Band 7)

7.7 Radiated Spurious Emissions Measurements

Test Overview

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

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

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

Test Setup

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

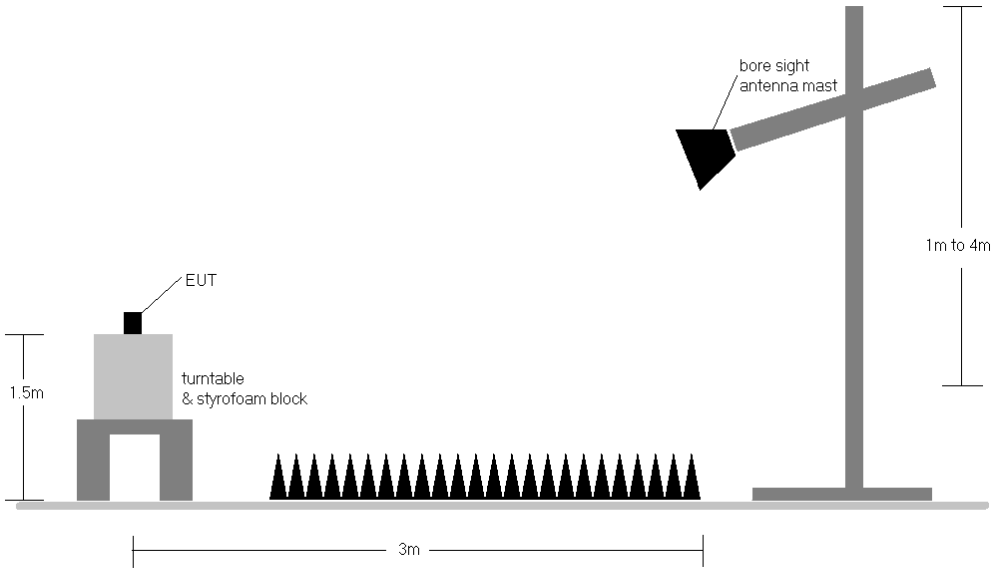


Figure 7-7. Test Instrument & Measurement Setup

Test Notes

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

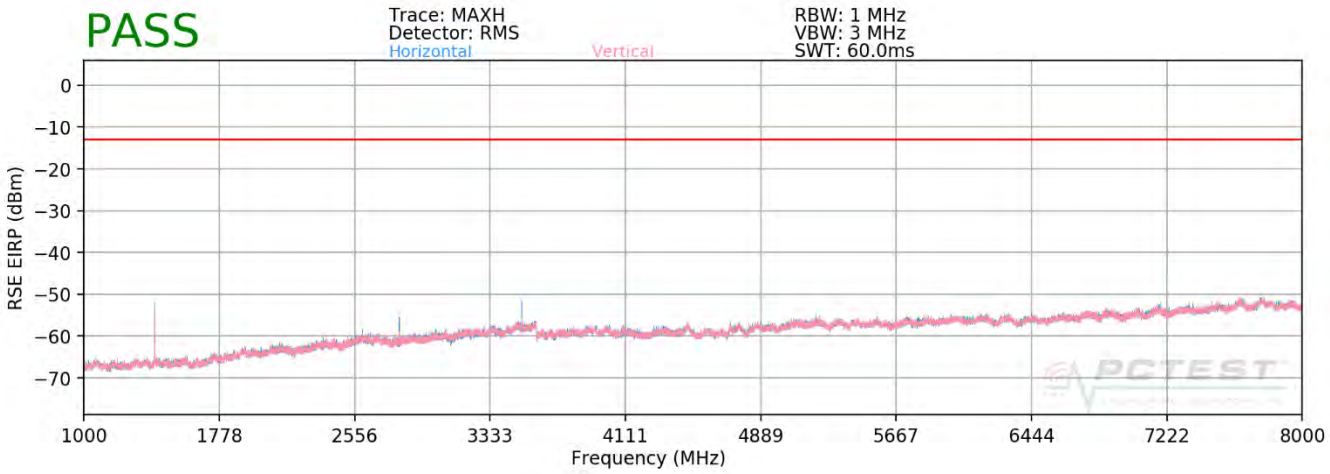
2) This unit was tested with its standard battery.

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

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

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

Band 12



Plot 7-243. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY:	704.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1408.00	H	124	10	-59.87	7.54	-52.33	-39.3
2112.00	H	202	320	-64.04	8.85	-55.20	-42.2
2816.00	H	119	52	-68.30	10.12	-58.18	-45.2
3520.00	H	129	307	-64.93	9.91	-55.02	-42.0
4224.00	H	-	-	-69.03	10.50	-58.53	-45.5

Table 7-9. Radiated Spurious Data (Band 12 – Low Channel)

OPERATING FREQUENCY:	707.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	174	32	-60.48	7.63	-52.85	-39.9
2122.50	H	188	325	-73.11	8.86	-64.25	-51.3
2830.00	H	121	43	-65.79	10.10	-55.70	-42.7
3537.50	H	153	308	-65.40	9.90	-55.50	-42.5
4245.00	H	-	-	-70.18	10.58	-59.60	-46.6
4952.50	H	-	-	-68.28	10.92	-57.36	-44.4
5660.00	H	138	4	-68.82	11.22	-57.60	-44.6

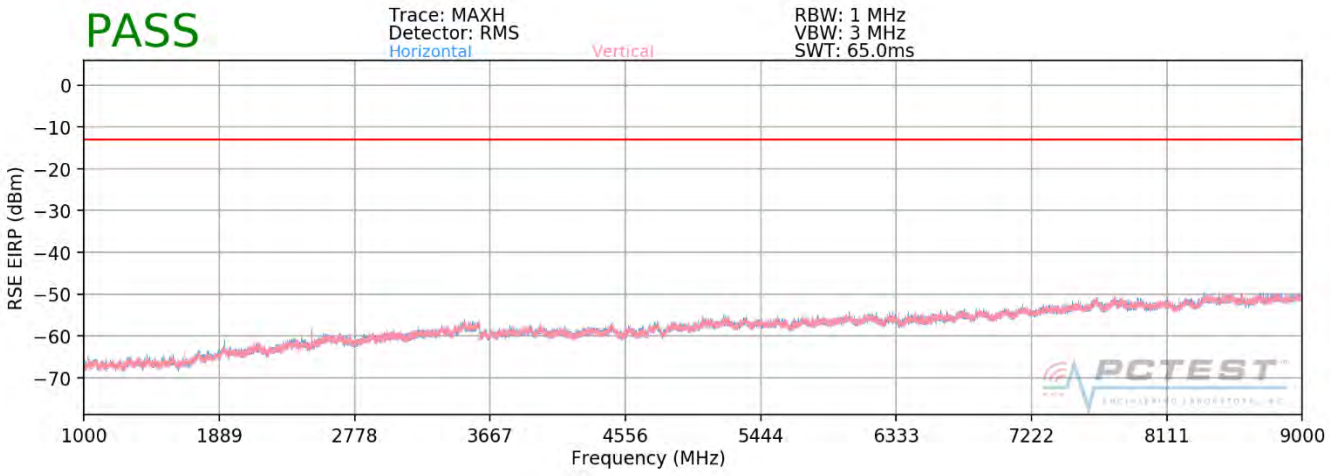
Table 7-10. Radiated Spurious Data (Band 12 – Mid Channel)

OPERATING FREQUENCY:	711.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1422.00	H	187	17	-57.18	7.72	-49.45	-36.5
2133.00	H	192	329	-64.99	8.87	-56.12	-43.1
2844.00	H	131	52	-68.44	10.07	-58.37	-45.4
3555.00	H	178	314	-68.08	9.89	-58.19	-45.2
4266.00	H	-	-	-69.21	10.65	-58.56	-45.6

Table 7-11. Radiated Spurious Data (Band 12 – High Channel)

Band 5



Plot 7-244. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY:	826.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1653.00	H	106	56	-62.89	8.99	-53.90	-40.9
2479.50	H	224	11	-69.73	9.12	-60.60	-47.6
3306.00	H	135	56	-69.98	9.37	-60.62	-47.6
4132.50	H	1116	321	-70.05	9.89	-60.16	-47.2
4959.00	H	102	276	-73.97	11.24	-62.73	-49.7
5785.50	H	117	45	-73.50	11.36	-62.13	-49.1
6612.00	H	-	-	-71.37	11.21	-60.15	-47.2
7438.50	H	-	-	-70.28	10.86	-59.42	-46.4
8265.00	H	102	225	-60.30	11.75	-48.55	-35.6

Table 7-12. Radiated Spurious Data (Band 5 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	102	45	-59.43	8.85	-50.58	-37.6
2509.50	H	149	44	-78.00	9.17	-68.83	-55.8
3346.00	H	102	56	-76.46	9.36	-67.10	-54.1
4182.50	H	111	49	-74.20	10.19	-64.01	-51.0
5019.00	H	-	-	-75.76	11.10	-64.66	-51.7
5855.50	H	-	-	-74.99	11.32	-63.66	-50.7
6692.00	H	-	-	-69.84	10.94	-58.91	-45.9
7528.50	H	-	-	-70.56	11.05	-59.51	-46.5
8365.00	H	117	240	-67.39	11.76	-55.63	-42.6

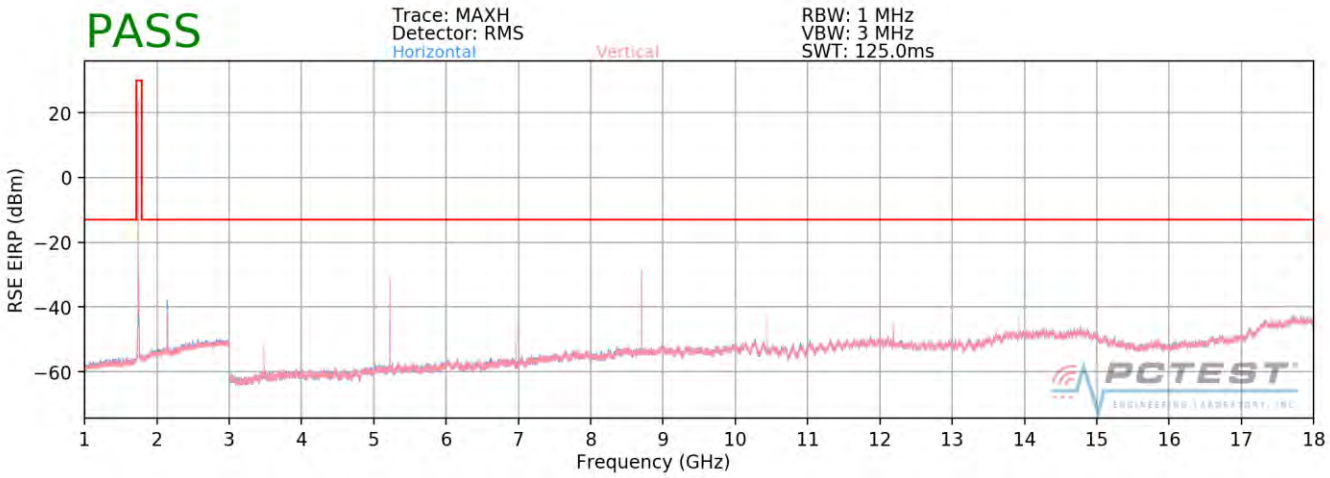
Table 7-13. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY:	846.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1693.00	H	140	48	-61.81	8.70	-53.10	-40.1
2539.50	H	111	55	-71.08	9.26	-61.82	-48.8
3386.00	H	394	316	-74.21	9.44	-64.77	-51.8
4232.50	H	241	117	-74.79	10.43	-64.36	-51.4
5079.00	H	-	-	-75.02	10.90	-64.12	-51.1
5925.50	H	111	0	-72.89	11.24	-61.65	-48.7
6772.00	H	-	-	-70.78	10.82	-59.96	-47.0
7618.50	H	-	-	-70.24	11.24	-59.00	-46.0
8465.00	H	106	46	-63.59	11.70	-51.89	-38.9

Table 7-14. Radiated Spurious Data (Band 5 – High Channel)

Band 66/4



Plot 7-245. Radiated Spurious Plot above 1GHz (Band 66/4)

OPERATING FREQUENCY:	1712.50	MHz
CHANNEL:	131997	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3425.00	H	144	312	-56.35	9.83	-46.52	-33.5
5137.50	H	120	6	-43.72	10.69	-33.03	-20.0
6850.00	H	115	287	-51.07	11.64	-39.43	-26.4
8562.50	H	136	327	-36.70	11.14	-25.56	-12.6
10275.00	H	196	70	-53.55	12.21	-41.33	-28.3
11987.50	H	249	358	-54.78	12.55	-42.24	-29.2
13700.00	H	186	322	-50.64	12.04	-38.61	-25.6
15412.50	H	127	53	-63.65	15.74	-47.91	-34.9
17125.00	H	128	32	-54.94	13.45	-41.49	-28.5

Table 7-15. Radiated Spurious Data (Band 66/4 – Low Channel)

OPERATING FREQUENCY:	1745.00	MHz
CHANNEL:	132322	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	H	153	311	-55.18	9.91	-45.27	-32.3
5235.00	H	130	63	-42.01	10.73	-31.28	-18.3
6980.00	H	117	302	-53.38	11.82	-41.56	-28.6
8725.00	H	130	330	-37.11	11.00	-26.11	-13.1
10470.00	H	172	11	-53.42	12.58	-40.84	-27.8
12215.00	H	161	306	-57.42	13.11	-44.31	-31.3
13960.00	H	138	319	-50.87	11.85	-39.02	-26.0
15705.00	H	135	54	-63.70	16.63	-47.08	-34.1
17450.00	H	164	54	-50.20	12.24	-37.96	-25.0

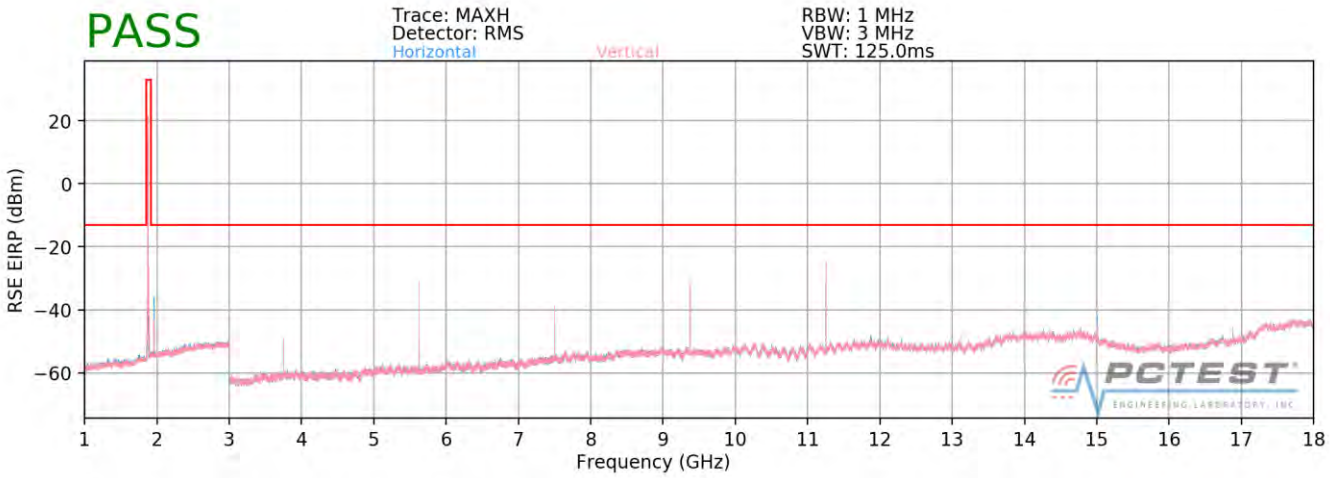
Table 7-16. Radiated Spurious Data (Band 66/4 – Mid Channel)

OPERATING FREQUENCY:	1777.50	MHz
CHANNEL:	132647	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3555.00	H	115	314	-53.21	9.89	-43.32	-30.3
5332.50	H	113	65	-40.74	10.70	-30.05	-17.0
7110.00	H	115	302	-55.05	11.73	-43.32	-30.3
8887.50	H	131	331	-39.94	11.03	-28.91	-15.9
10665.00	H	128	9	-52.38	12.56	-39.83	-26.8
12442.50	H	289	309	-57.46	13.47	-43.99	-31.0
14220.00	H	125	21	-50.29	11.37	-38.91	-25.9
15997.50	H	135	10	-65.23	16.72	-48.51	-35.5
17775.00	H	154	67	-47.33	10.28	-37.05	-24.1

Table 7-17. Radiated Spurious Data (Band 66/4 – High Channel)

Band 2



Plot 7-246. Radiated Spurious Plot above 1GHz (Band 2)

OPERATING FREQUENCY:	1851.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3703.00	H	124	58	-57.26	9.57	-47.69	-34.7
5554.50	H	112	57	-48.54	10.95	-37.59	-24.6
7406.00	H	114	225	-63.27	10.96	-52.31	-39.3
9257.50	H	112	255	-48.04	11.63	-36.42	-23.4
11109.00	H	113	58	-50.50	12.74	-37.76	-24.8
12960.50	H	113	29	-64.02	13.29	-50.73	-37.7
14812.00	H	112	104	-57.85	12.47	-45.38	-32.4
16663.50	H	-	-	-65.79	15.43	-50.36	-37.4

Table 7-18. Radiated Spurious Data (Band 2 – Low Channel)

OPERATING FREQUENCY:	1880.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	115	59	-57.09	9.37	-47.73	-34.7
5640.00	H	121	57	-49.21	11.17	-38.04	-25.0
7520.00	H	114	48	-58.91	11.11	-47.80	-34.8
9400.00	H	118	248	-48.17	11.57	-36.60	-23.6
11280.00	H	114	57	-44.80	12.72	-32.09	-19.1
13160.00	H	117	32	-65.33	13.15	-52.18	-39.2
15040.00	H	114	100	-61.27	13.52	-47.76	-34.8
16920.00	H	117	360	-64.09	14.36	-49.72	-36.7

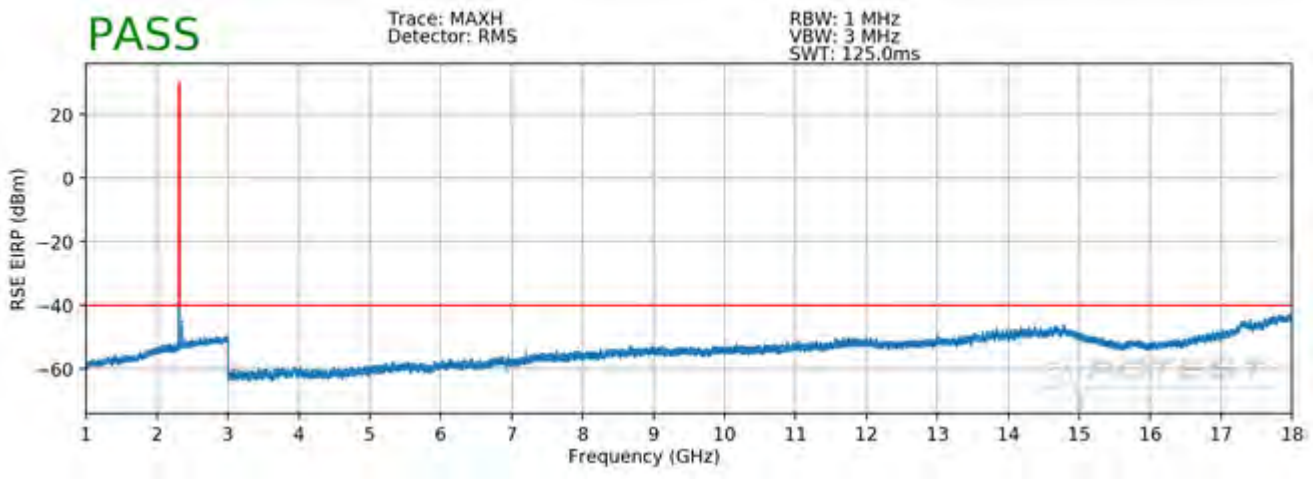
Table 7-19. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY:	1913.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	3.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

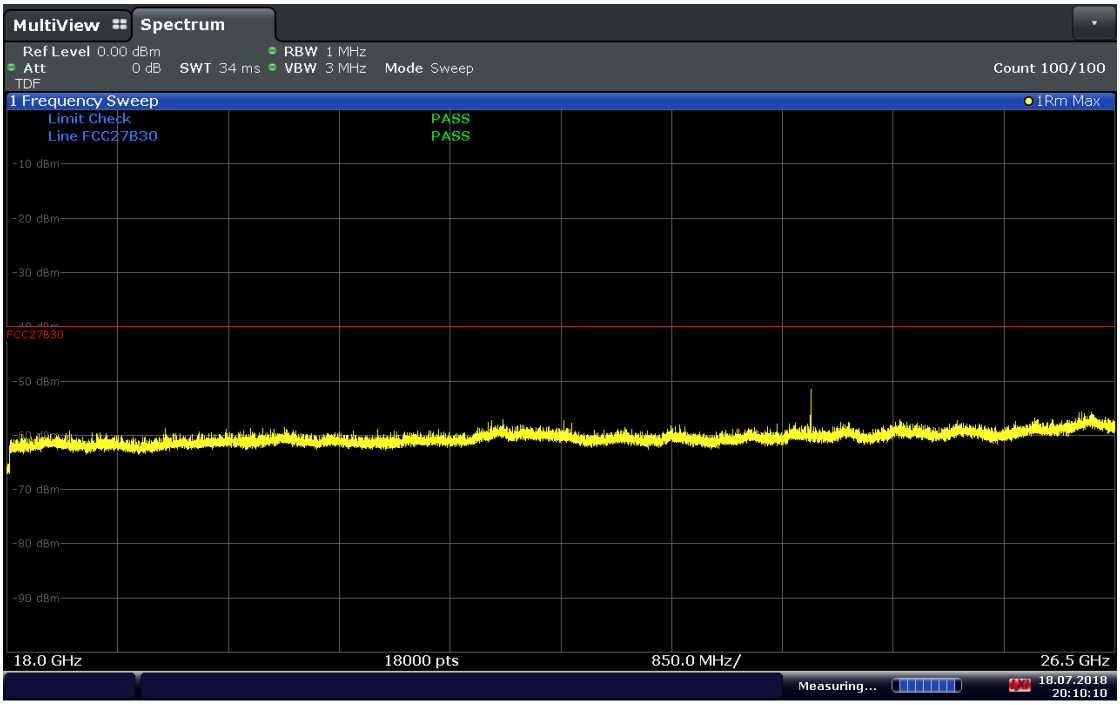
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3827.00	H	116	41	-55.82	9.30	-46.52	-33.5
5740.50	H	119	47	-48.93	11.38	-37.56	-24.6
7654.00	H	112	51	-55.28	11.32	-43.96	-31.0
9567.50	H	118	298	-43.87	11.77	-32.10	-19.1
11481.00	H	112	296	-41.59	12.82	-28.76	-15.8
13394.50	H	134	342	-61.01	12.79	-48.23	-35.2
15308.00	H	122	34	-62.54	14.87	-47.68	-34.7
17221.50	H	-	-	-62.15	13.34	-48.80	-35.8

Table 7-20. Radiated Spurious Data (Band 2 – High Channel)

Band 30



Plot 7-247. Radiated Spurious Plot 1GHz - 18GHz (Band 30)



20:10:10 18.07.2018

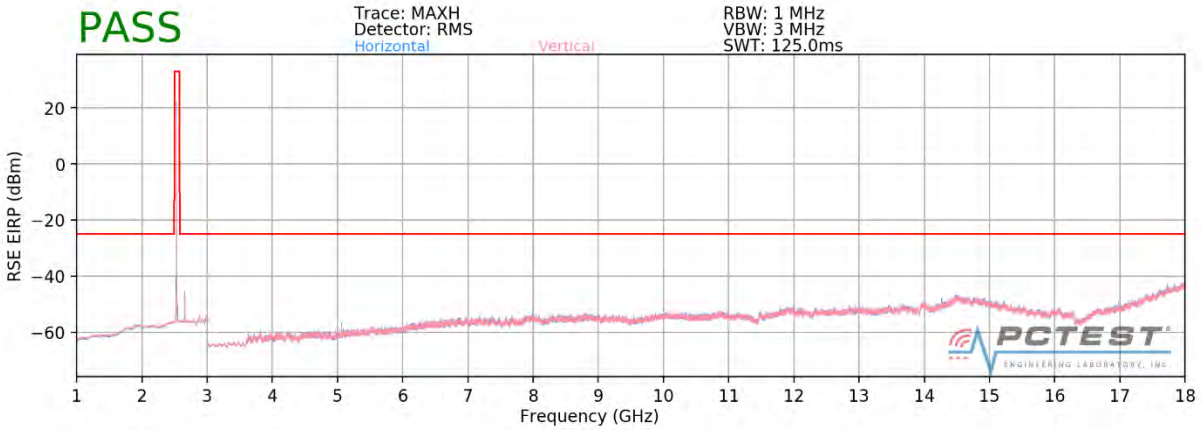
Plot 7-248. Radiated Spurious Plot 18GHz – 26.5GHz (Band 30)

OPERATING FREQUENCY:	2310.00	MHz
CHANNEL:	27710	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-40	dBm

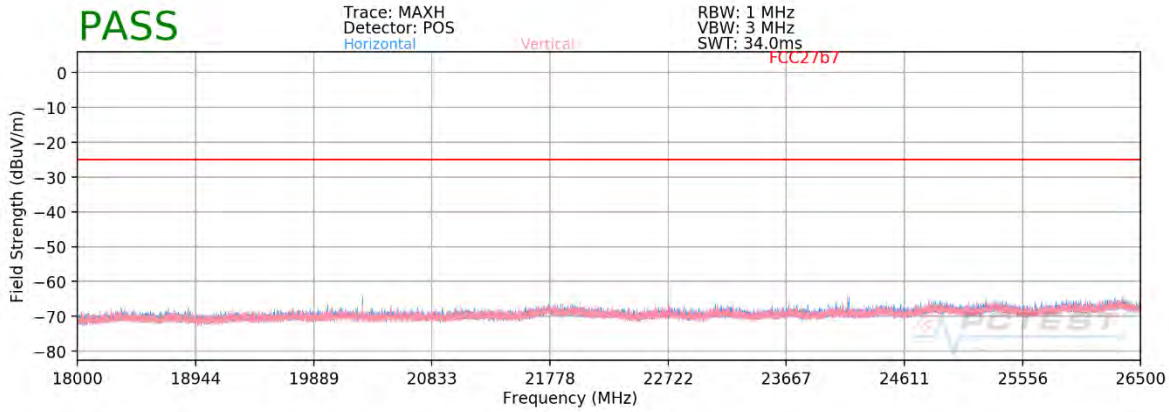
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
4620.00	V	-	-	-56.79	8.10	-48.69	-8.7
6930.00	V	-	-	-53.91	8.67	-45.24	-5.2
9240.00	V	-	-	-52.88	9.89	-42.99	-3.0

Table 7-21. Radiated Spurious Data (Band 30 – Mid Channel)

Band 7



Plot 7-249. Radiated Spurious Plot 1GHz - 18GHz (Band 7)



Plot 7-250. Radiated Spurious Plot 18GHz – 26.5GHz (Band 7)

OPERATING FREQUENCY:	2507.50	MHz
CHANNEL:	20825	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5015.00	H	150	20	-60.81	8.35	-52.47	-27.5
7522.50	H	-	-	-62.46	8.45	-54.01	-29.0
10030.00	H	150	335	-60.55	9.84	-50.71	-25.7
12537.50	H	-	-	-59.69	9.29	-50.40	-25.4

Table 7-22. Radiated Spurious Data (Band 7 – Low Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5070.00	H	150	10	-59.87	8.39	-51.48	-26.5
7605.00	H	150	249	-62.58	8.51	-54.07	-29.1
10140.00	H	150	263	-55.71	9.70	-46.01	-21.0
12675.00	H	-	-	-59.08	9.24	-49.84	-24.8

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

OPERATING FREQUENCY:	2562.50	MHz
CHANNEL:	21375	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5125.00	H	150	20	-63.10	8.42	-54.67	-29.7
7687.50	H	-	-	-62.86	8.63	-54.23	-29.2
10250.00	H	-	-	-62.21	9.71	-52.50	-27.5

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

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

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

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

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

For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

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

Test Setup

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

Test Notes

None

Band 12 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	707,499,959	-41	-0.0000058
100 %		- 30	707,499,970	-30	-0.0000042
100 %		- 20	707,500,102	102	0.0000144
100 %		- 10	707,500,007	7	0.0000010
100 %		0	707,499,897	-103	-0.0000146
100 %		+ 10	707,500,143	143	0.0000202
100 %		+ 20	707,499,935	-65	-0.0000092
100 %		+ 30	707,499,953	-47	-0.0000066
100 %		+ 40	707,500,079	79	0.0000112
100 %		+ 50	707,500,024	24	0.0000034
BATT. ENDPOINT	3.65	+ 20	707,500,026	26	0.0000037

Table 7-25. 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.

Band 12 Frequency Stability Measurements

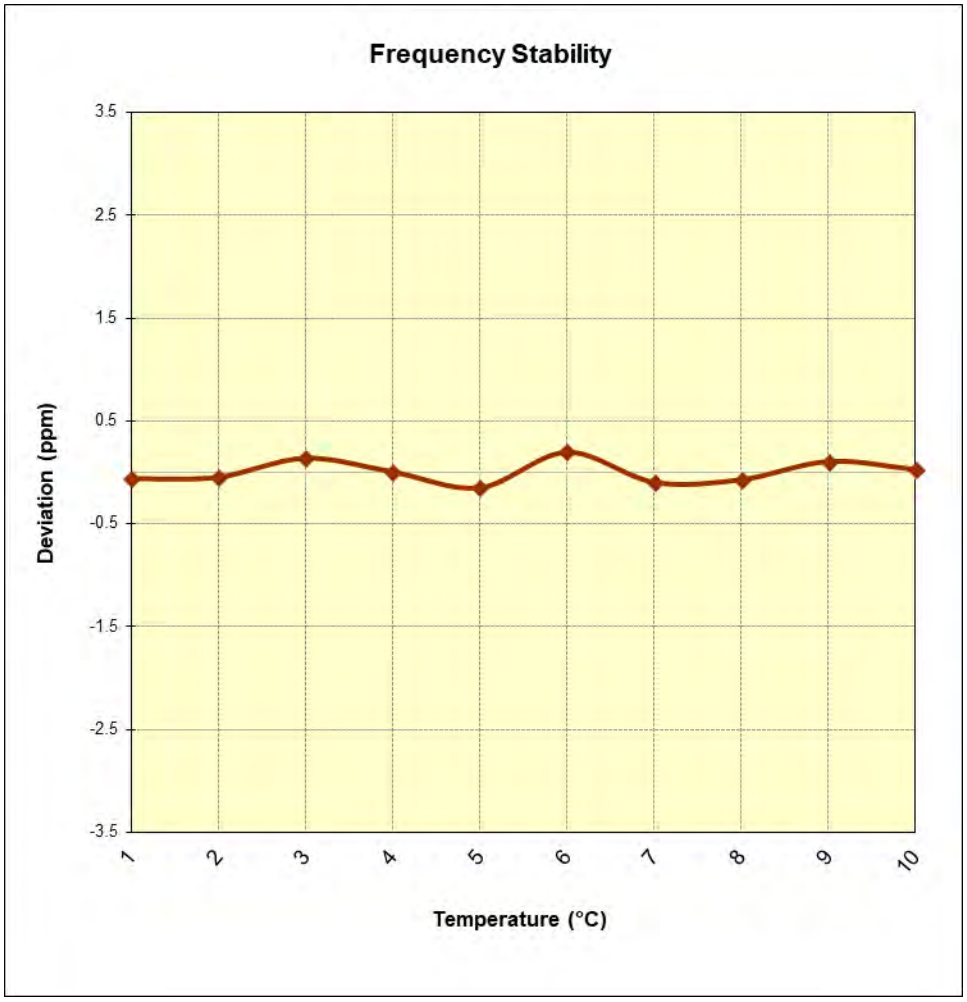


Figure 7-8. Frequency Stability Graph (Band 12)

Band 5 Frequency Stability Measurements

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
REFERENCE VOLTAGE:	3.85	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	836,500,134	134	0.0000160
100 %		- 30	836,499,982	-18	-0.0000022
100 %		- 20	836,499,881	-119	-0.0000142
100 %		- 10	836,500,120	120	0.0000143
100 %		0	836,499,869	-131	-0.0000157
100 %		+ 10	836,500,081	81	0.0000097
100 %		+ 20	836,499,679	-321	-0.0000384
100 %		+ 30	836,499,771	-229	-0.0000274
100 %		+ 40	836,500,270	270	0.0000323
100 %		+ 50	836,499,724	-276	-0.0000330
BATT. ENDPOINT	3.56	+ 20	836,499,980	-20	-0.0000024

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

Band 5 Frequency Stability Measurements

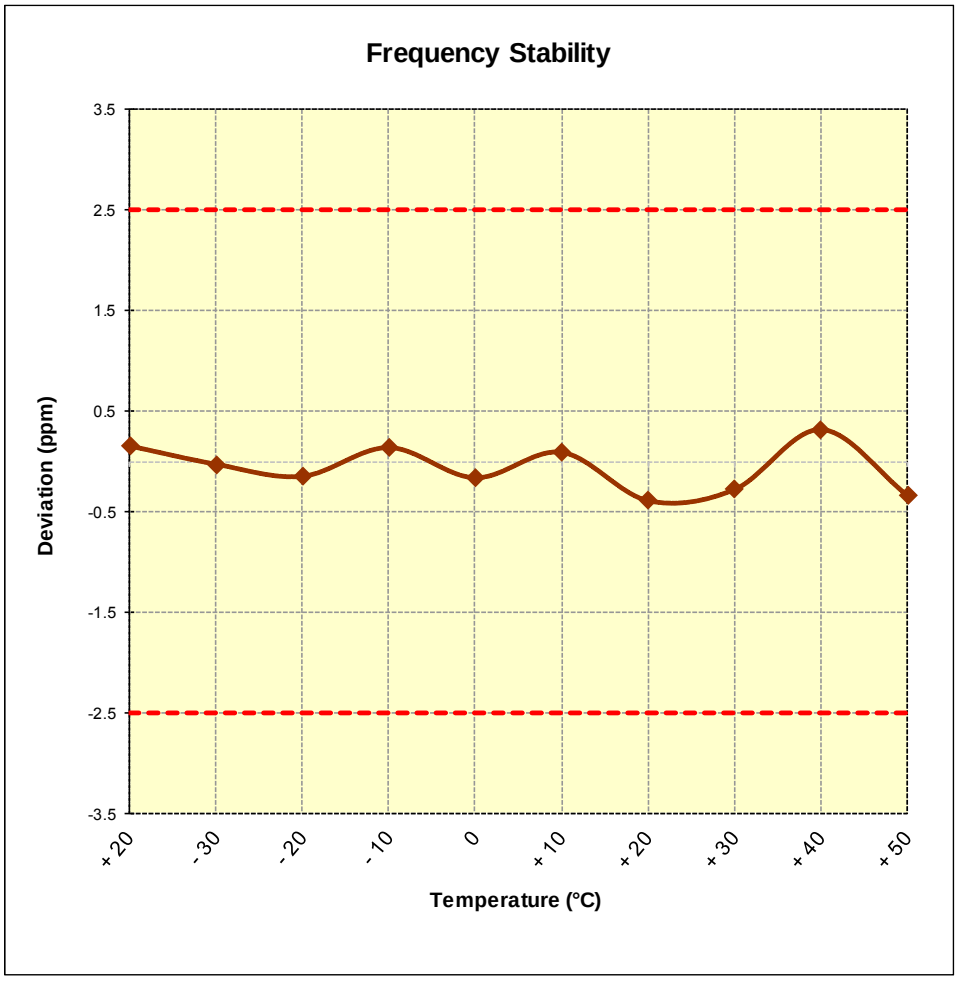


Figure 7-9. Frequency Stability Graph (Band 5)

Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY:	1,745,000,000	Hz
CHANNEL:	132322	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,744,999,976	-24	-0.0000014
100 %		- 30	1,745,000,288	288	0.0000165
100 %		- 20	1,744,999,961	-39	-0.0000022
100 %		- 10	1,745,000,140	140	0.0000080
100 %		0	1,745,000,039	39	0.0000022
100 %		+ 10	1,744,999,868	-132	-0.0000076
100 %		+ 20	1,745,000,061	61	0.0000035
100 %		+ 30	1,744,999,999	-1	-0.0000001
100 %		+ 40	1,745,000,137	137	0.0000079
100 %		+ 50	1,744,999,990	-10	-0.0000006
BATT. ENDPOINT	3.56	+ 20	1,744,999,795	-205	-0.0000117

Table 7-27. Frequency Stability Data (Band 66/4)

Note:

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

Band 66/4 Frequency Stability Measurements

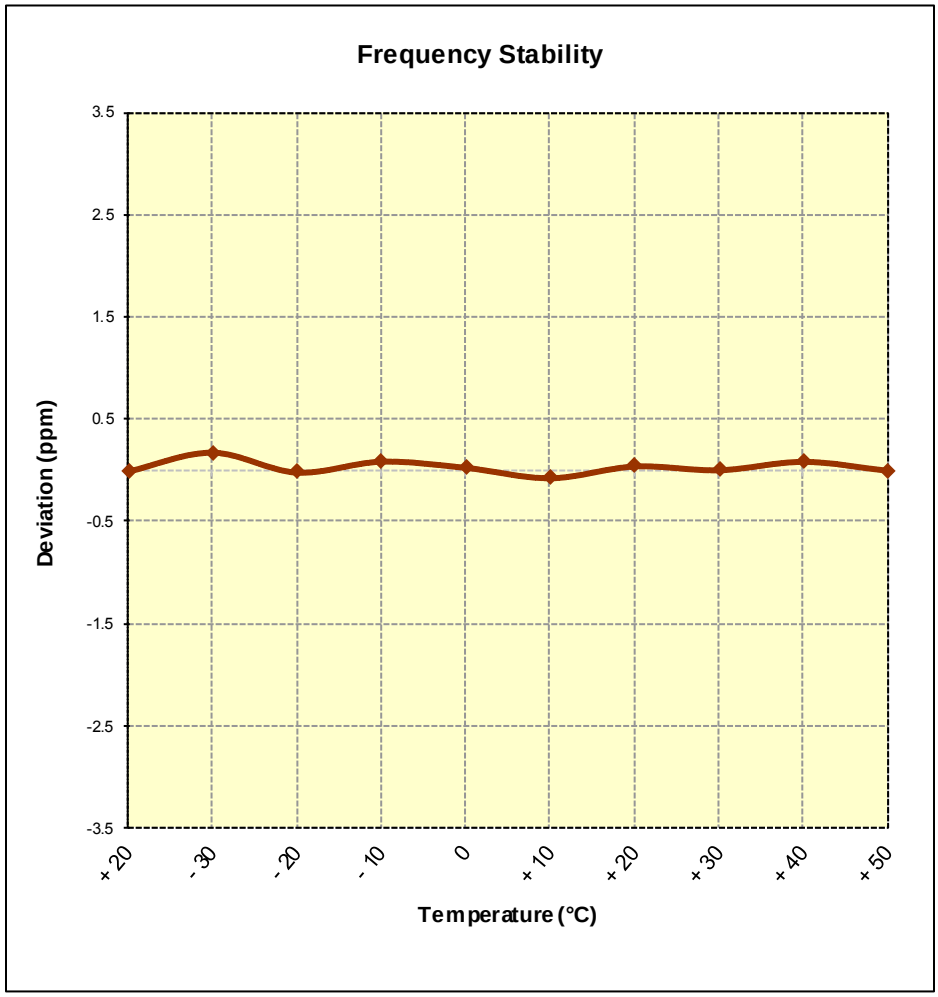


Figure 7-10. Frequency Stability Graph (Band 66/4)

Band 2 Frequency Stability Measurements

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	1,880,000,066	66	0.0000035
100 %		- 30	1,880,000,014	14	0.0000007
100 %		- 20	1,880,000,062	62	0.0000033
100 %		- 10	1,879,999,920	-80	-0.0000043
100 %		0	1,879,999,741	-259	-0.0000138
100 %		+ 10	1,879,999,746	-254	-0.0000135
100 %		+ 20	1,879,999,694	-306	-0.0000163
100 %		+ 30	1,879,999,840	-160	-0.0000085
100 %		+ 40	1,879,999,726	-274	-0.0000146
100 %		+ 50	1,879,999,997	-3	-0.0000002
BATT. ENDPOINT	3.56	+ 20	1,880,000,009	9	0.0000005

Table 7-28. Frequency Stability Data (Band 2)

Note:

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

Band 2 Frequency Stability Measurements

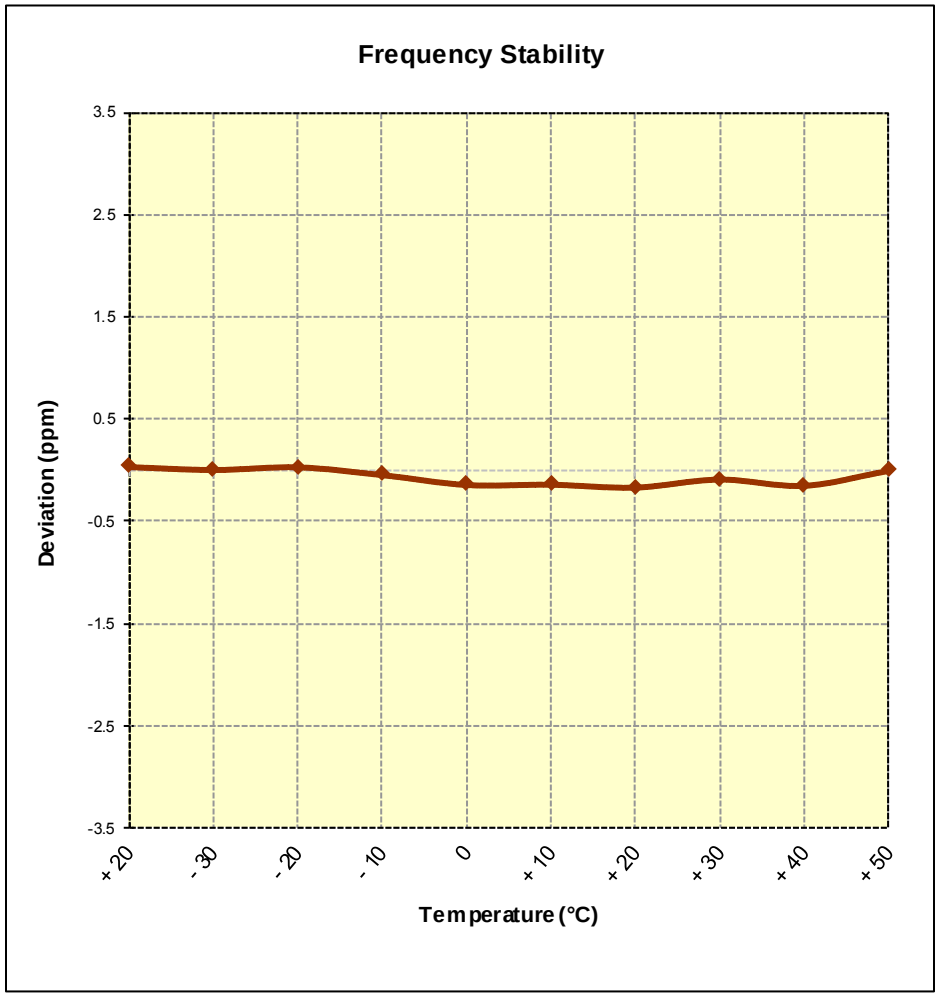


Figure 7-11. Frequency Stability Graph (Band 2)

Band 30 Frequency Stability Measurements

OPERATING FREQUENCY:	2,310,000,000	Hz
CHANNEL:	27710	
REFERENCE VOLTAGE:	3.85	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,310,000,075	75	0.0000032
100 %		- 30	2,310,000,108	108	0.0000047
100 %		- 20	2,309,999,978	-22	-0.0000010
100 %		- 10	2,310,000,112	112	0.0000048
100 %		0	2,310,000,038	38	0.0000016
100 %		+ 10	2,310,000,107	107	0.0000046
100 %		+ 20	2,309,999,983	-17	-0.0000007
100 %		+ 30	2,310,000,041	41	0.0000018
100 %		+ 40	2,310,000,074	74	0.0000032
100 %		+ 50	2,309,999,877	-123	-0.0000053
BATT. ENDPOINT	3.65	+ 20	2,310,000,018	18	0.0000008

Table 7-29. Frequency Stability Data (Band 30)

Note:

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

Band 30 Frequency Stability Measurements

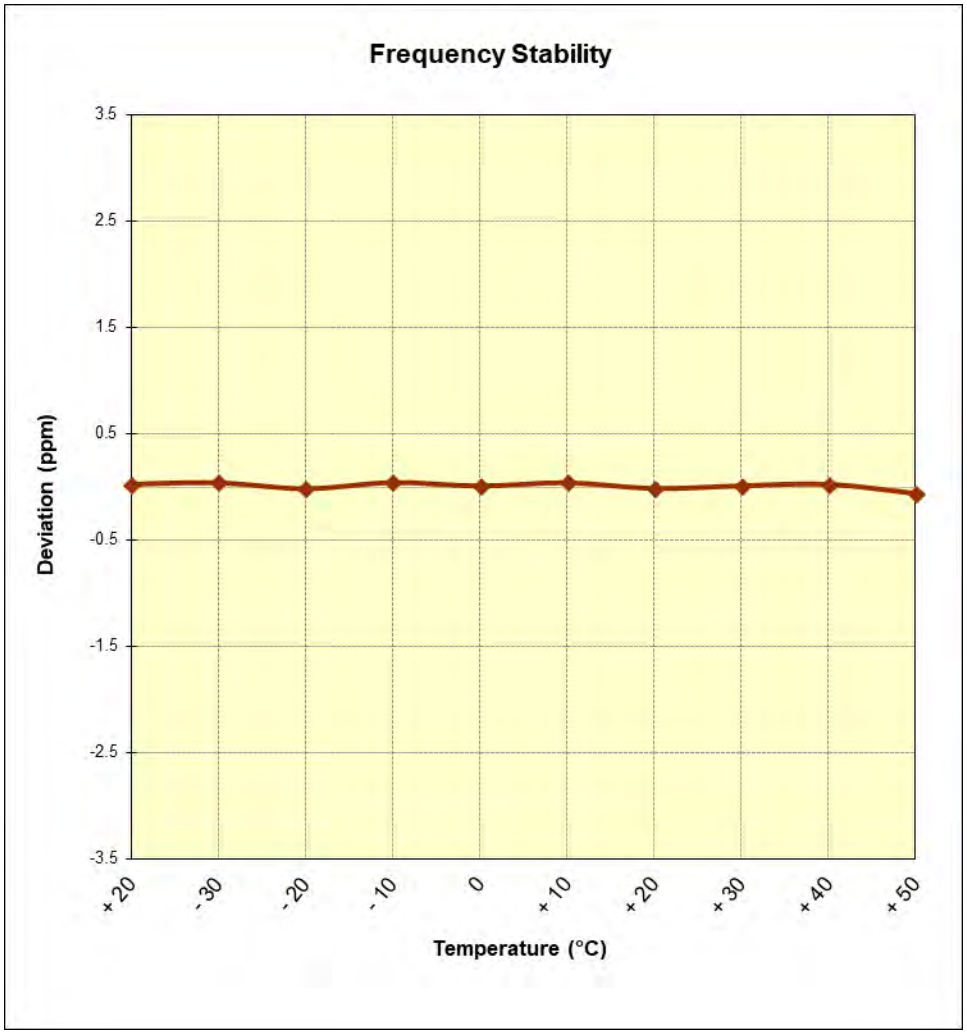


Figure 7-12. Frequency Stability Graph (Band 30)

Band 7 Frequency Stability Measurements

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	2,534,999,799	-201	-0.0000079
100 %		- 30	2,534,999,910	-90	-0.0000036
100 %		- 20	2,535,000,093	93	0.0000037
100 %		- 10	2,535,000,011	11	0.0000004
100 %		0	2,535,000,173	173	0.0000068
100 %		+ 10	2,535,000,056	56	0.0000022
100 %		+ 20	2,534,999,901	-99	-0.0000039
100 %		+ 30	2,534,999,853	-147	-0.0000058
100 %		+ 40	2,534,999,989	-11	-0.0000004
100 %		+ 50	2,534,999,990	-10	-0.0000004
BATT. ENDPOINT	3.56	+ 20	2,534,999,613	-387	-0.0000153

Table 7-30. Frequency Stability Data (Band 7)

Note:

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

Band 7 Frequency Stability Measurements

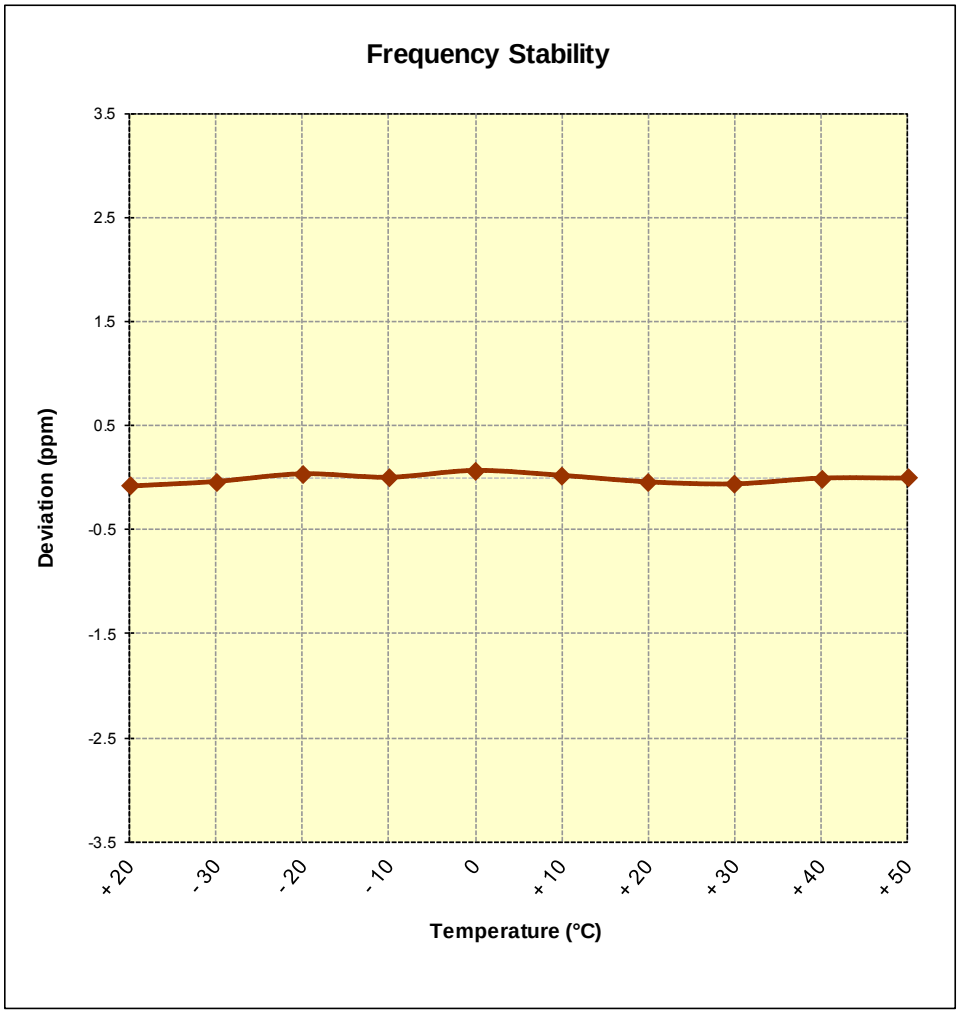


Figure 7-13. Frequency Stability Graph (Band 7)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Tablet FCC ID: A3LSMT837A** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.