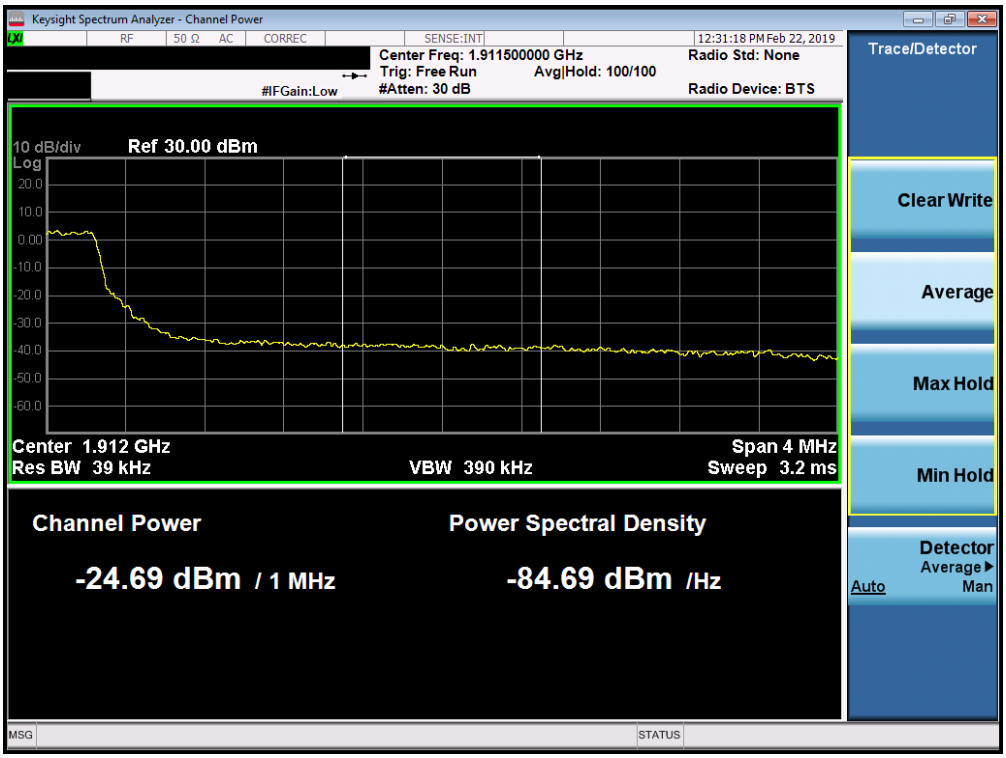
Plot 7-147. Upper Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-148. Upper Extended Band Edge Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)

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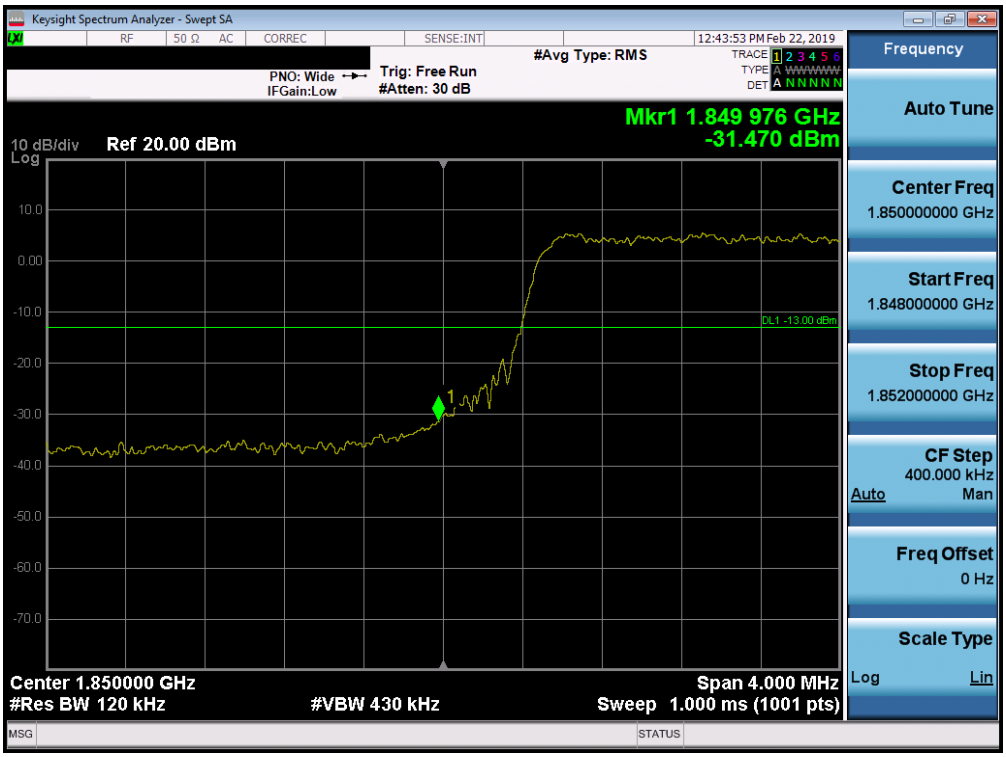
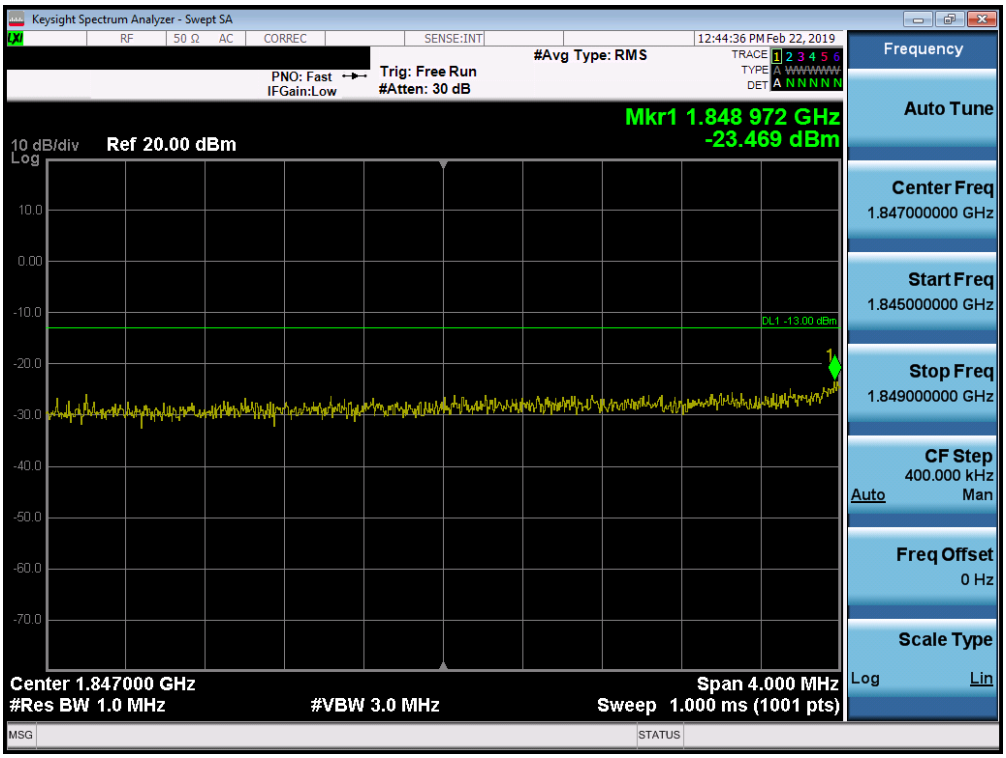


Plot 7-149. Lower Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-150. Lower Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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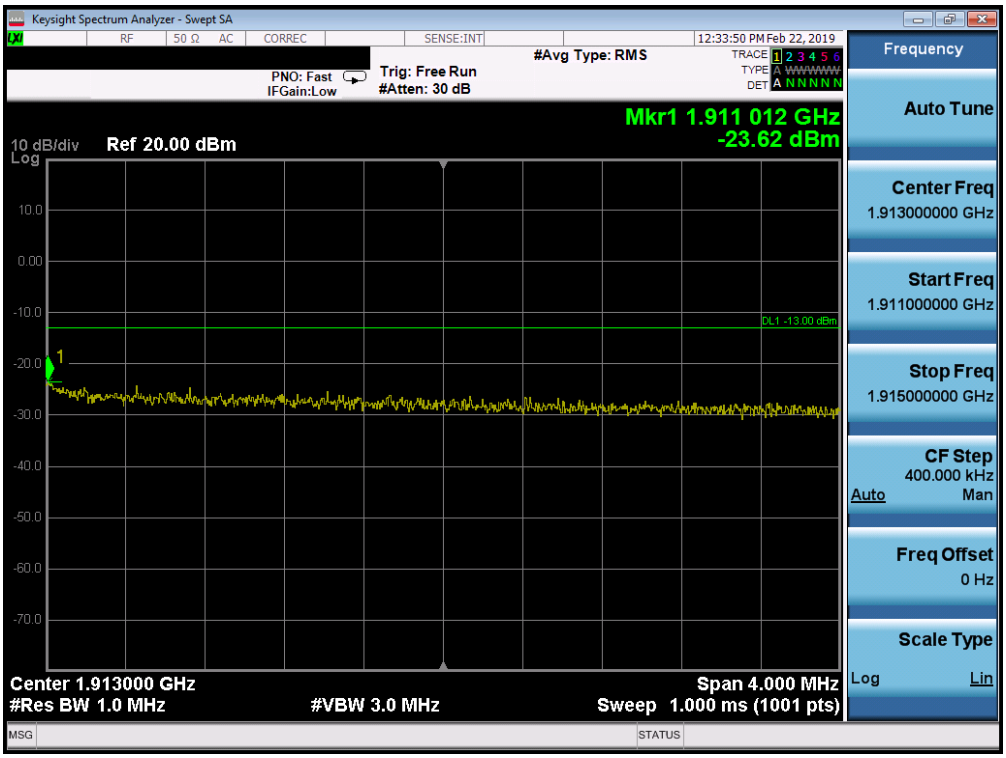
Plot 7-151. Upper Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-152. Upper Extended Band Edge Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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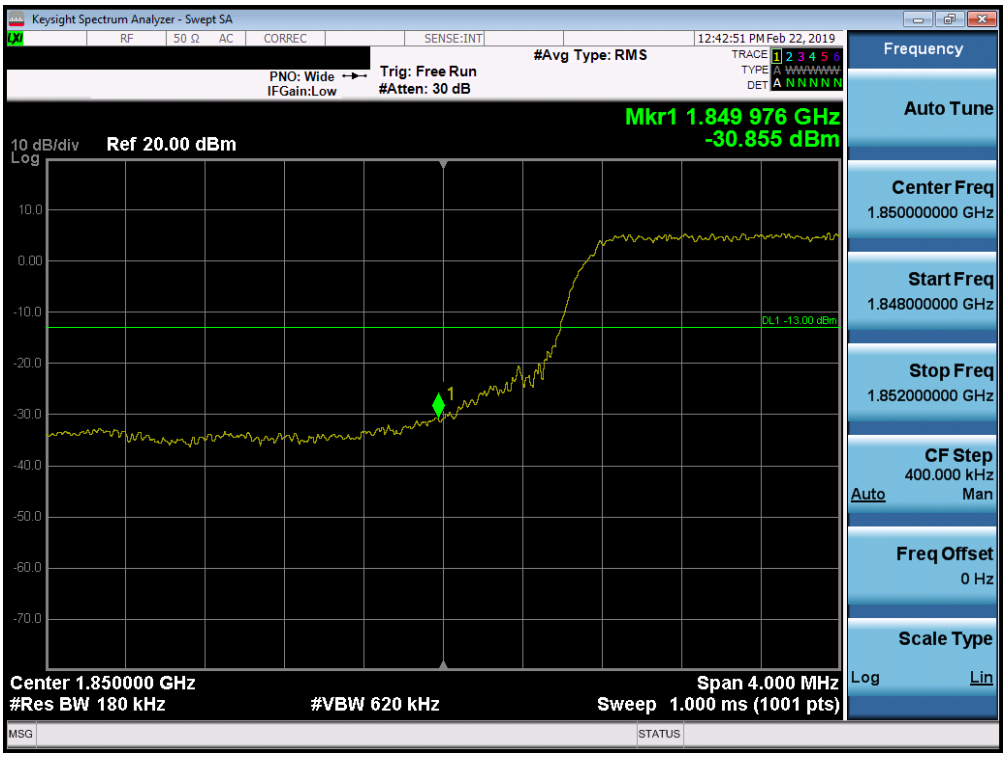
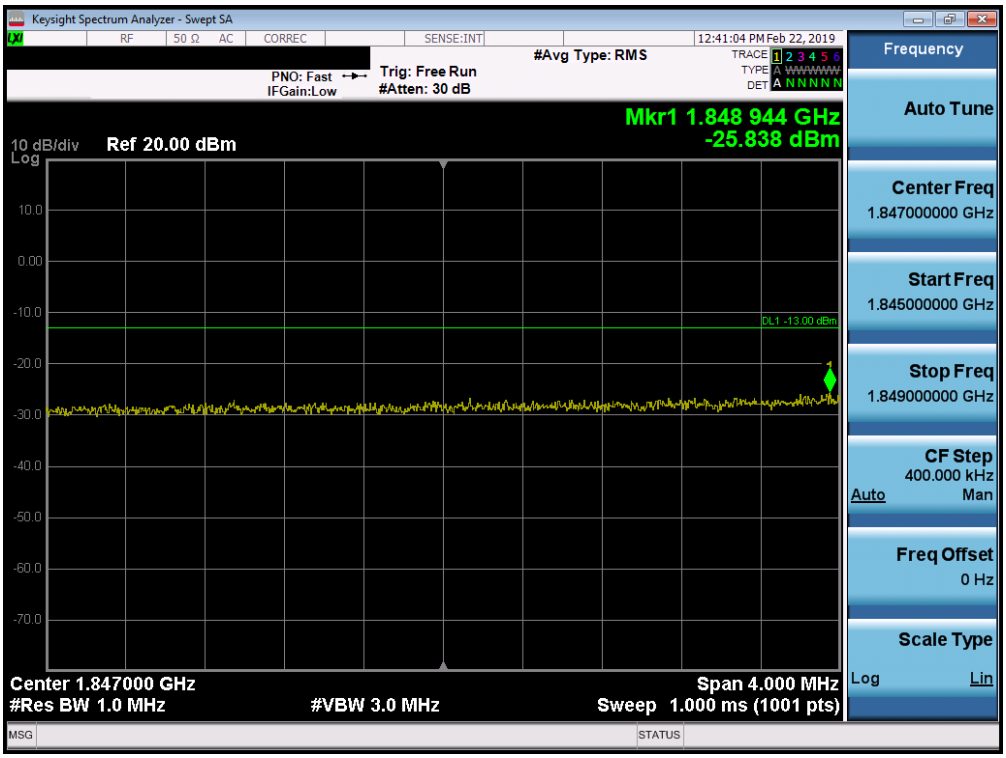


Plot 7-153. Lower Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-154. Lower Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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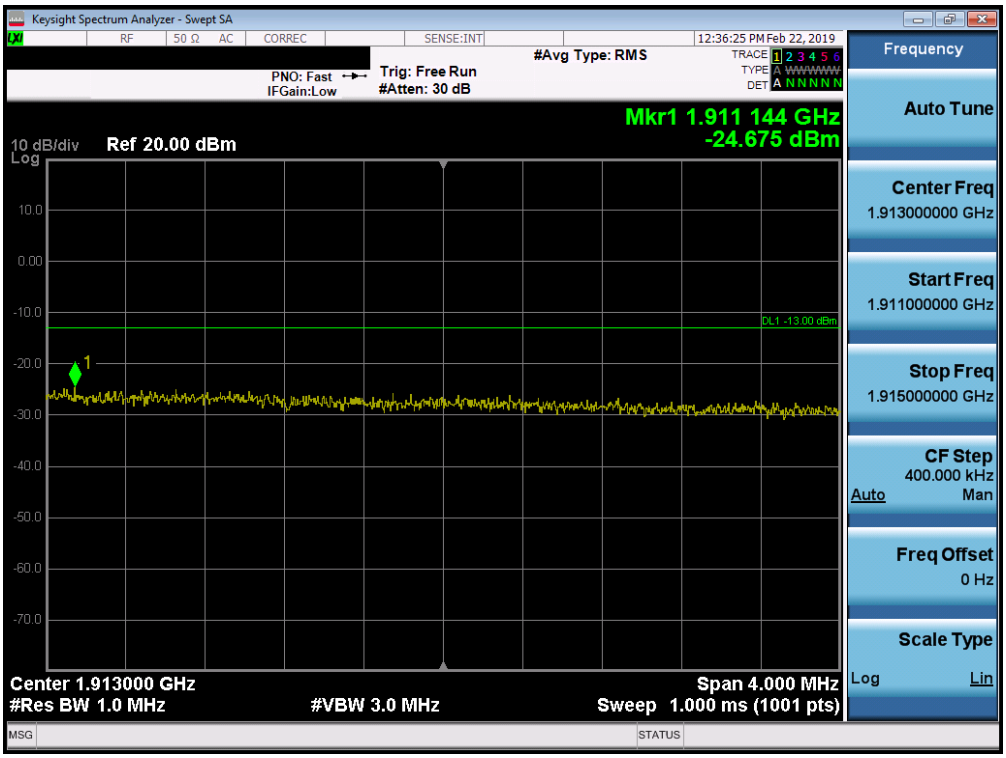
Plot 7-155. Upper Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-156. Upper Extended Band Edge Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)

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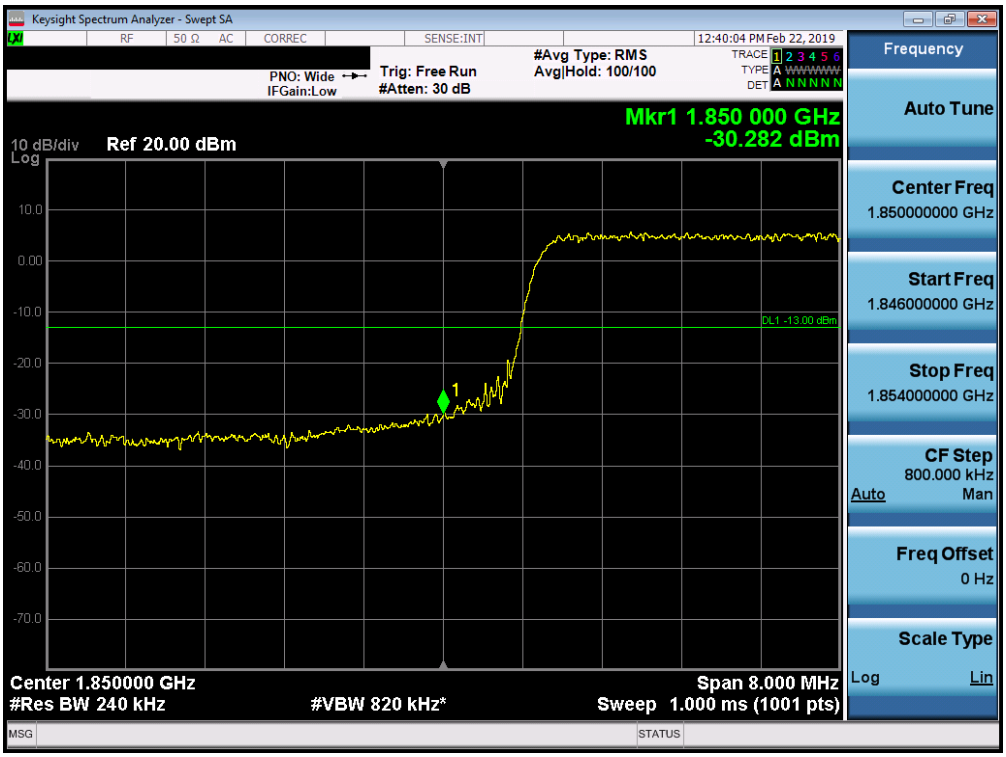
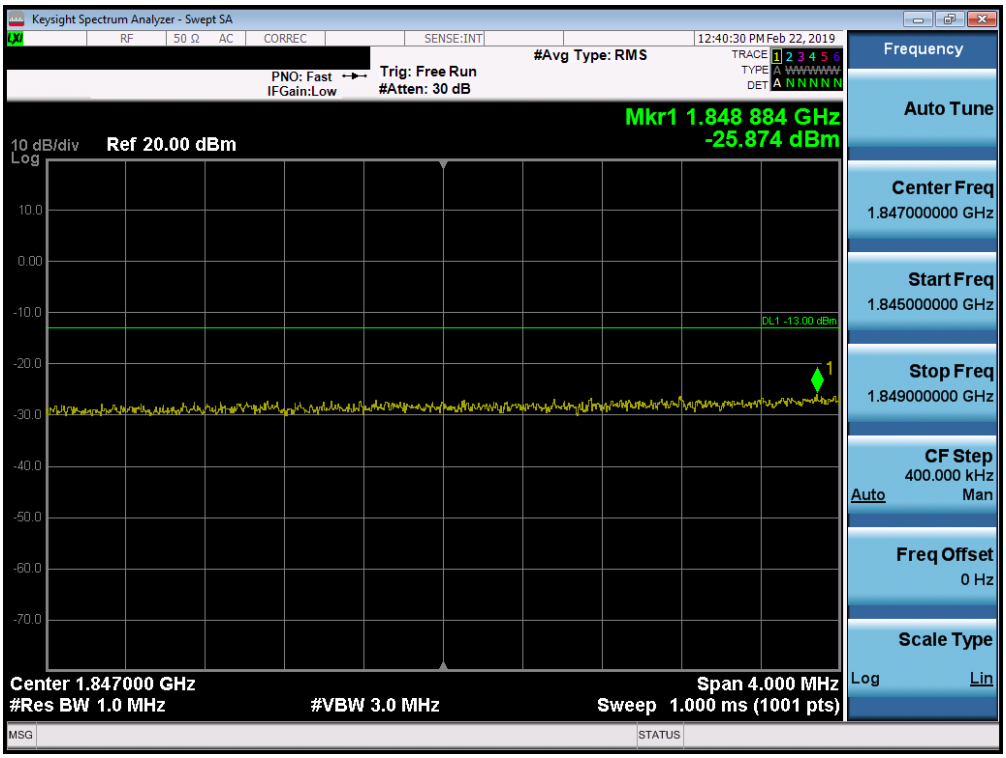


Plot 7-157. Lower Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-158. Lower Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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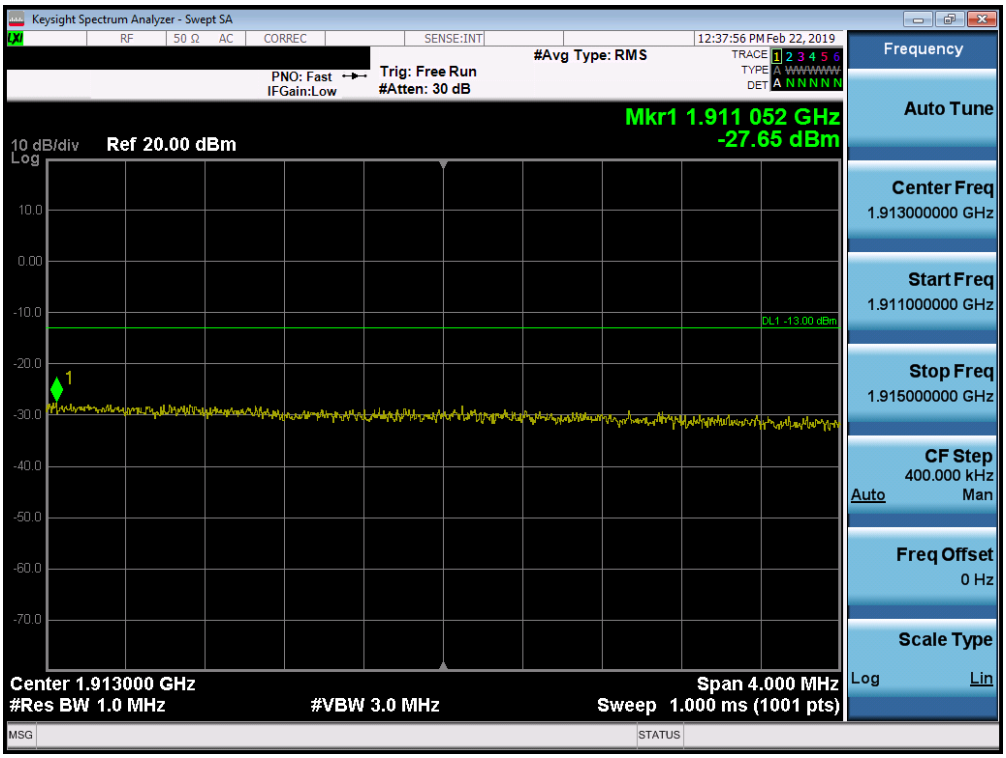
Plot 7-159. Upper Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-160. Upper Extended Band Edge Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

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

Test Setup

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

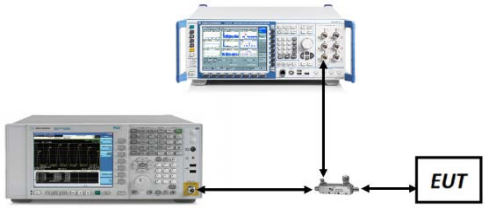

Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None.

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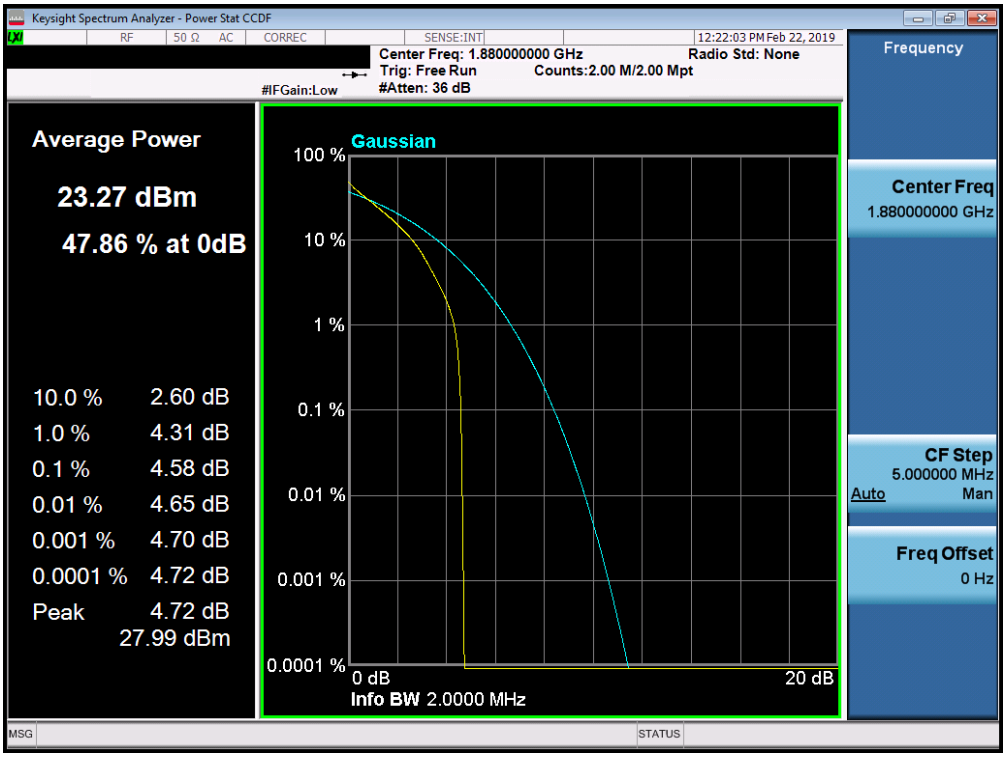
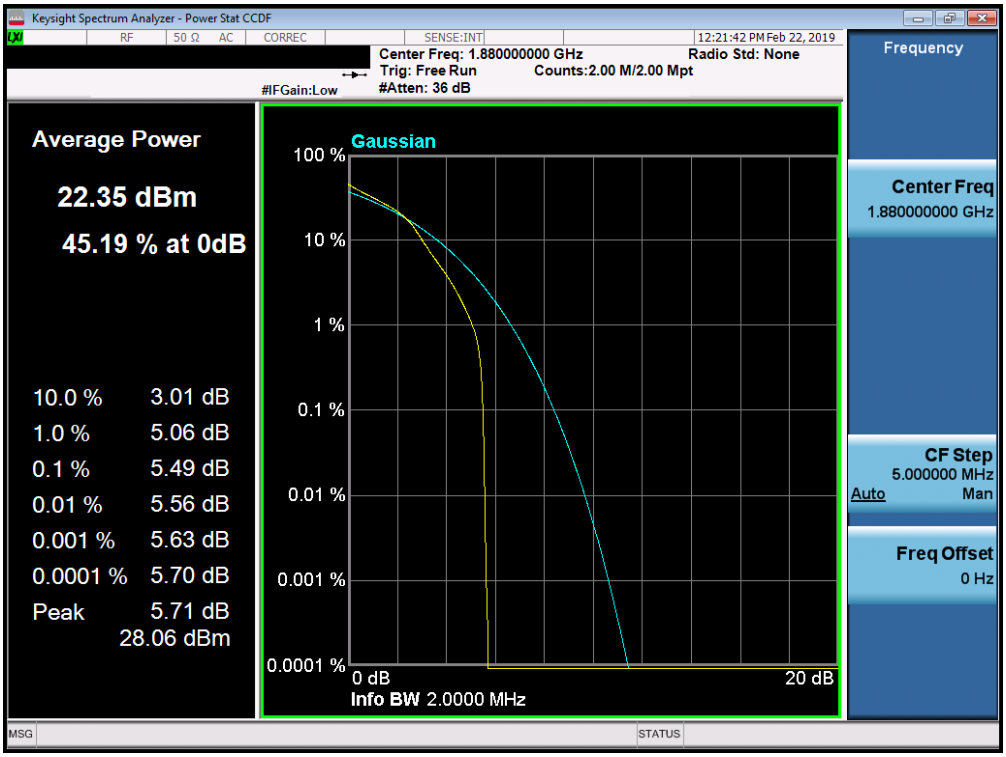
Band 2



Plot 7-161. PAR Plot (Band 2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-162. PAR Plot (Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

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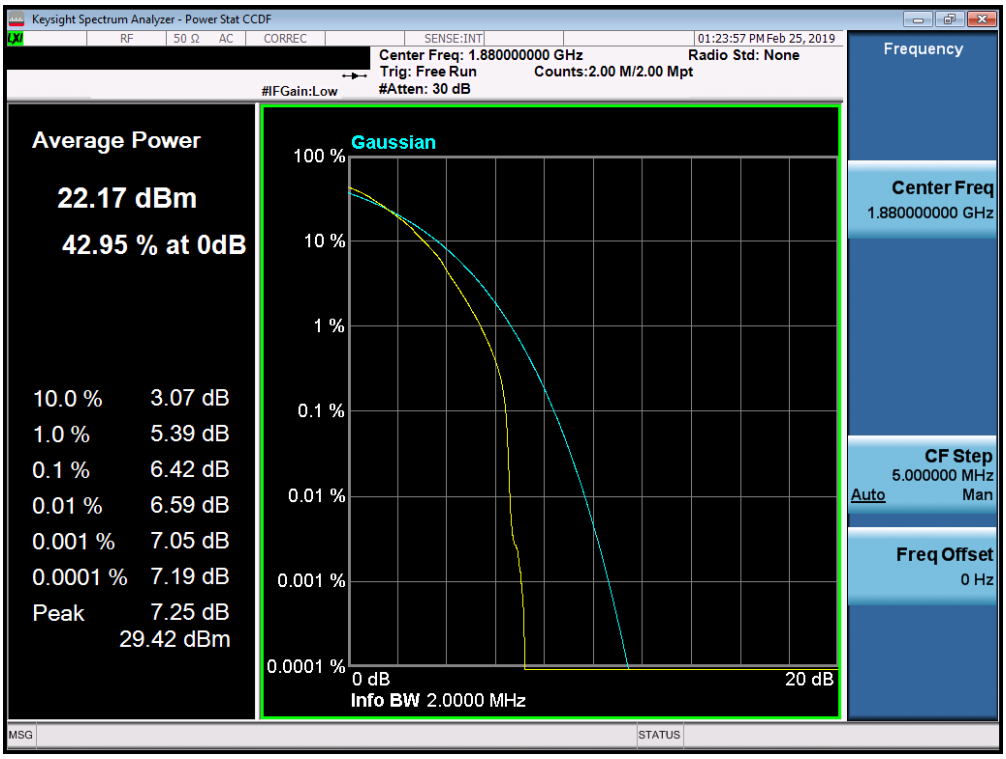
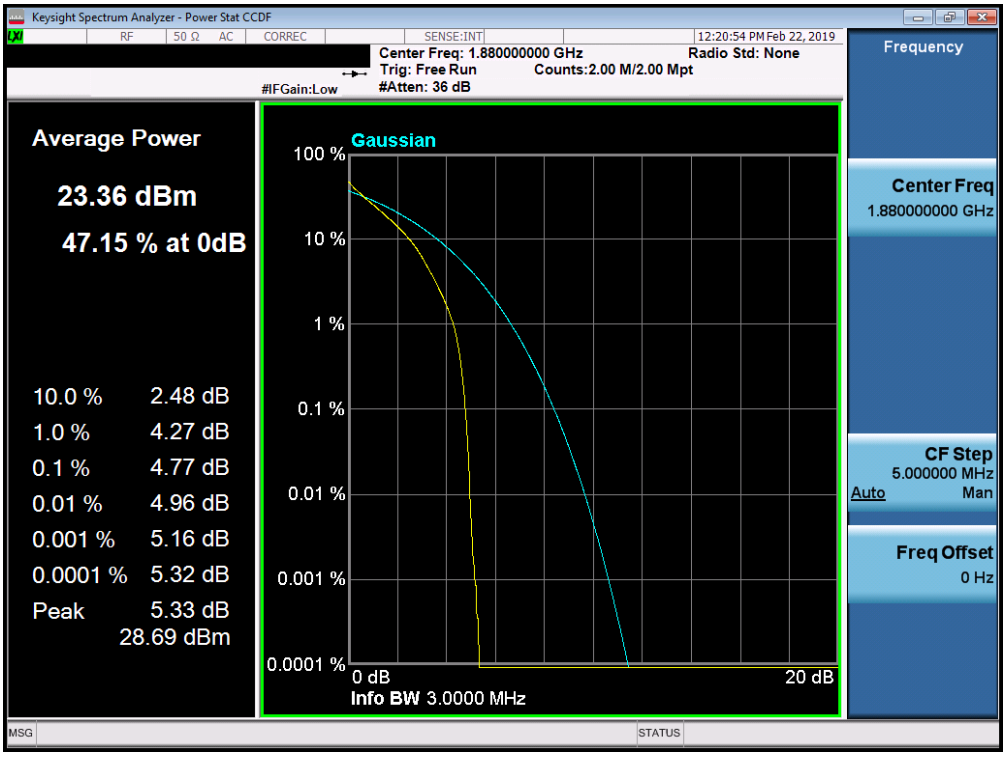


Plot 7-163. PAR Plot (Band 2 - 1.4MHz 64-QAM - Full RB Configuration)



Plot 7-164. PAR Plot (Band 2 - 3.0MHz QPSK - Full RB Configuration)

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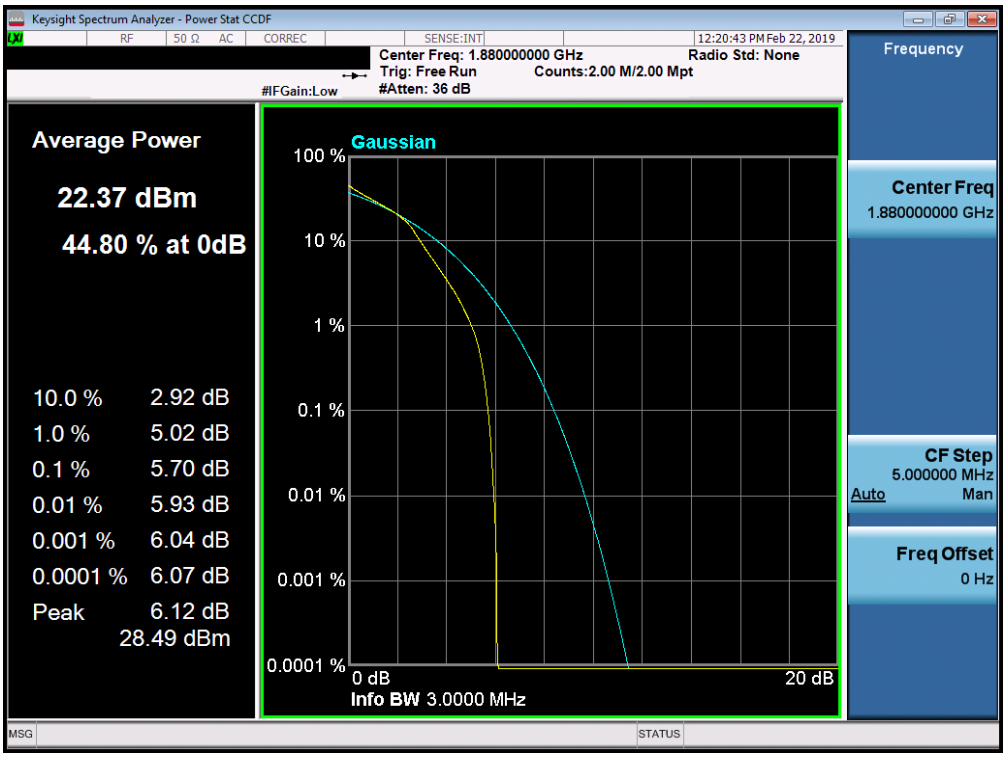
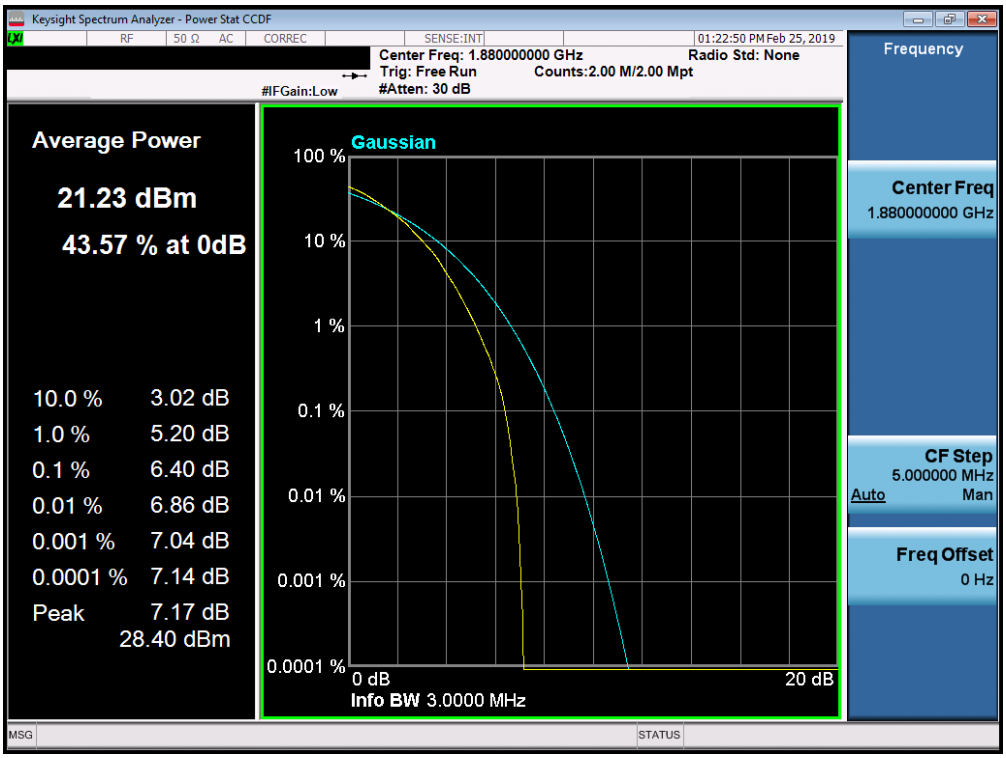


Plot 7-165. PAR Plot (Band 2 - 3.0MHz 16-QAM - Full RB Configuration)



Plot 7-166. PAR Plot (Band 2 - 3.0MHz 64-QAM - Full RB Configuration)

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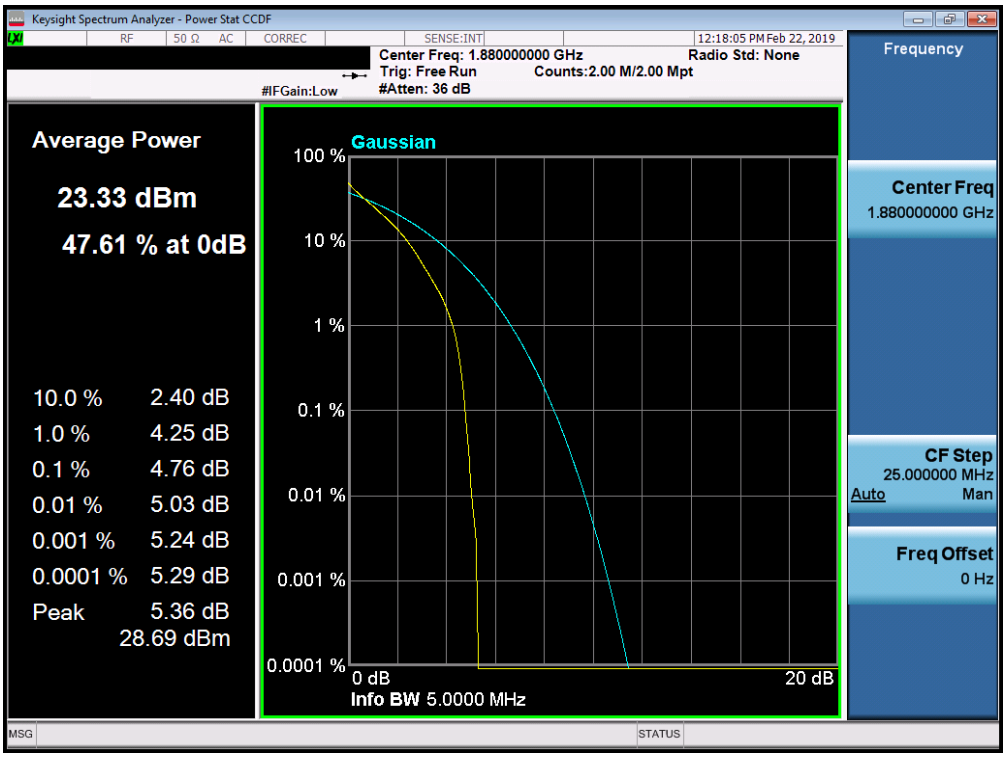
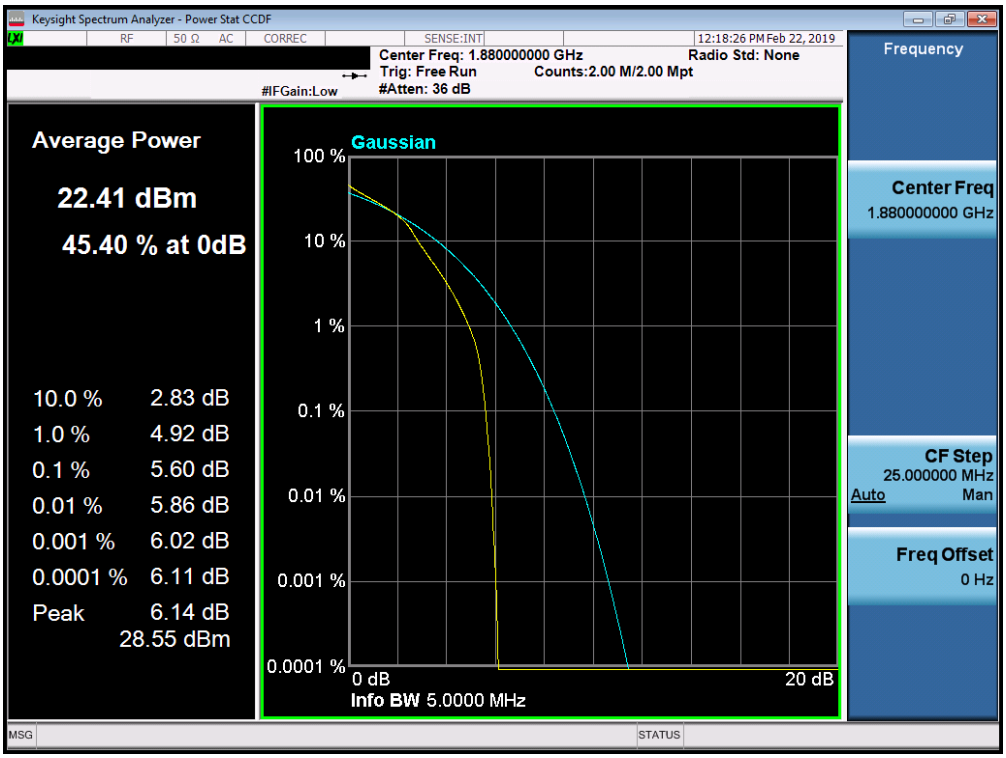


Plot 7-167. PAR Plot (Band 2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-168. PAR Plot (Band 2 - 5.0MHz 16-QAM - Full RB Configuration)

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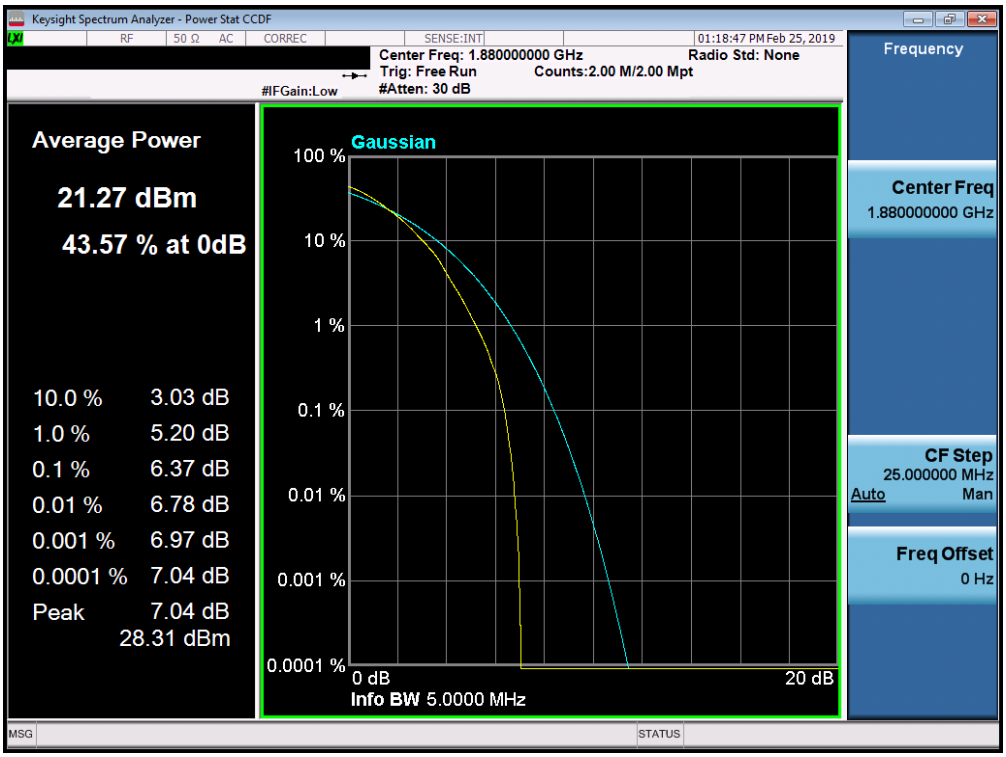
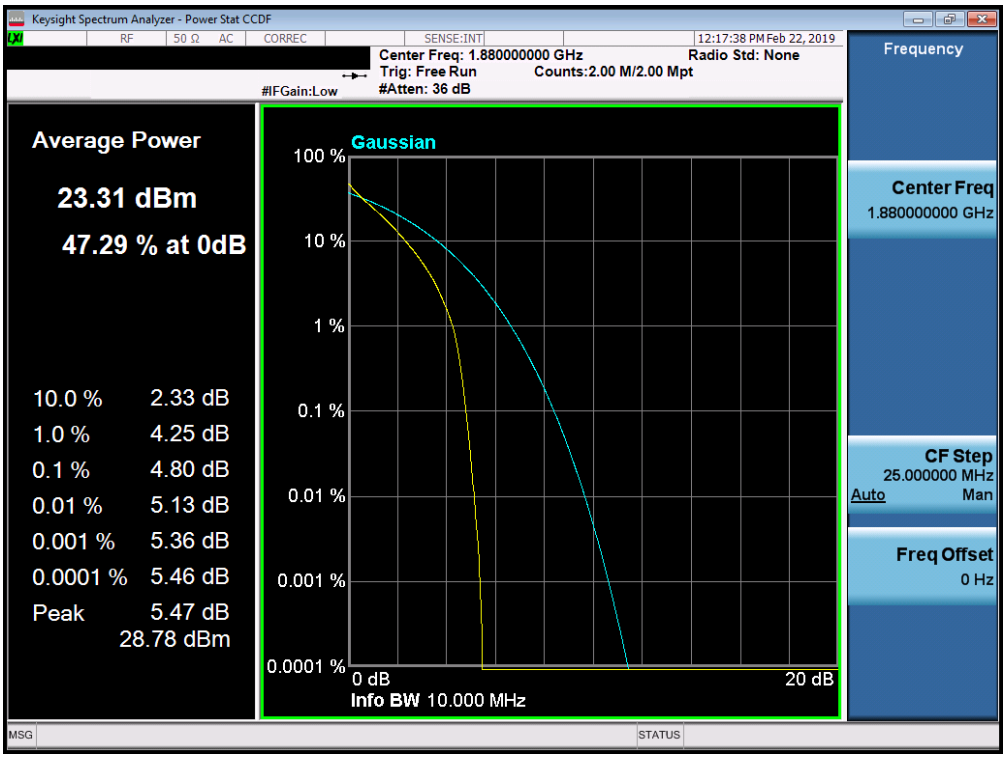


Plot 7-169. PAR Plot (Band 2 - 5.0MHz 64-QAM - Full RB Configuration)



Plot 7-170. PAR Plot (Band 2 - 10.0MHz QPSK - Full RB Configuration)

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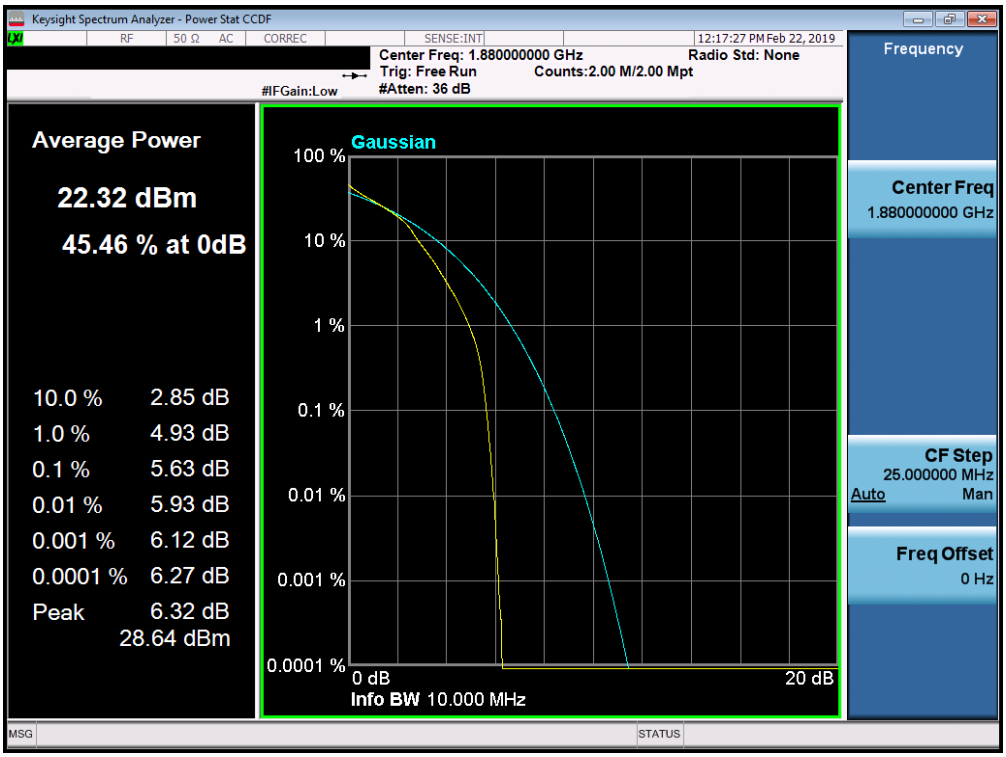
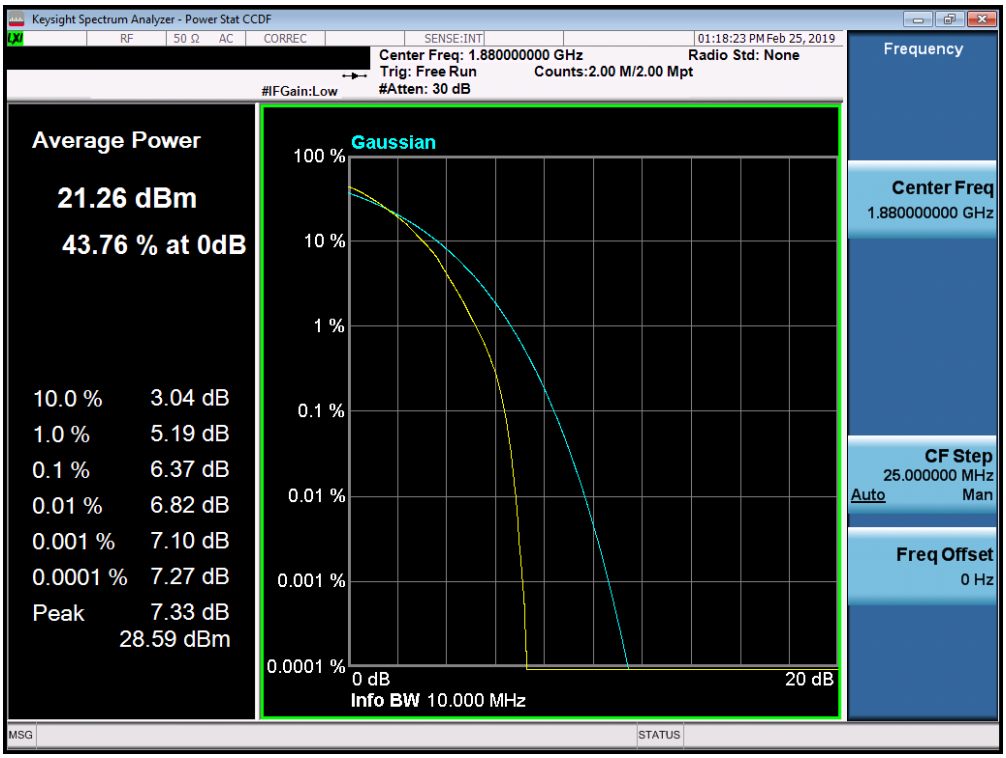


Plot 7-171. PAR Plot (Band 2 - 10.0MHz 16-QAM - Full RB Configuration)



Plot 7-172. PAR Plot (Band 2 - 10.0MHz 64-QAM - Full RB Configuration)

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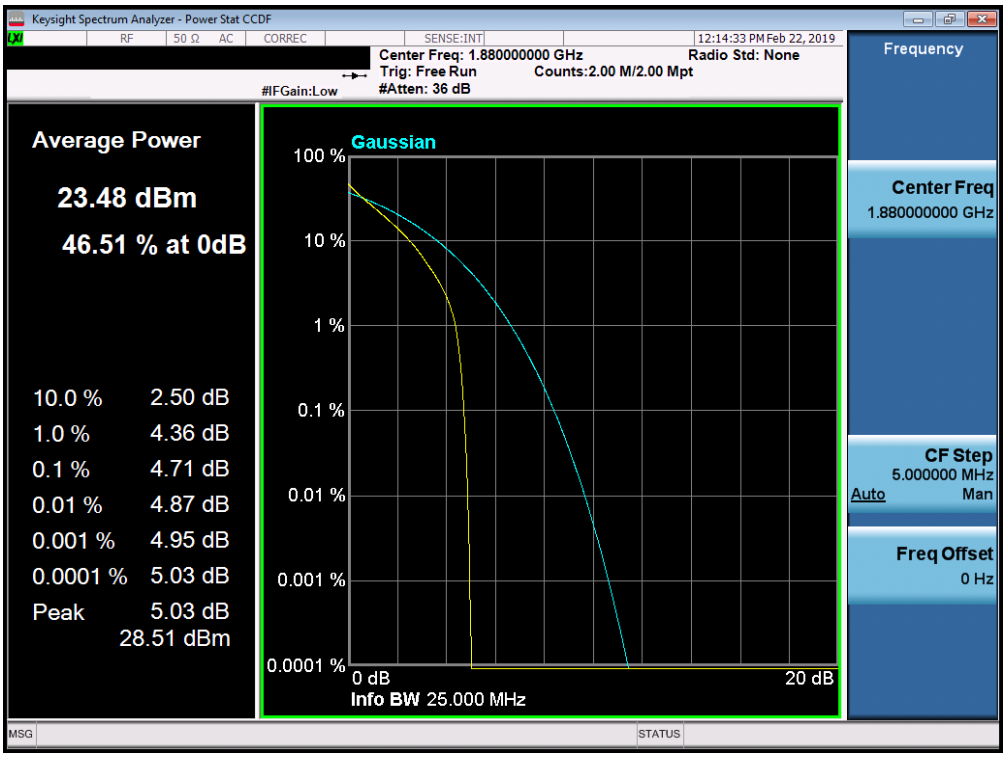
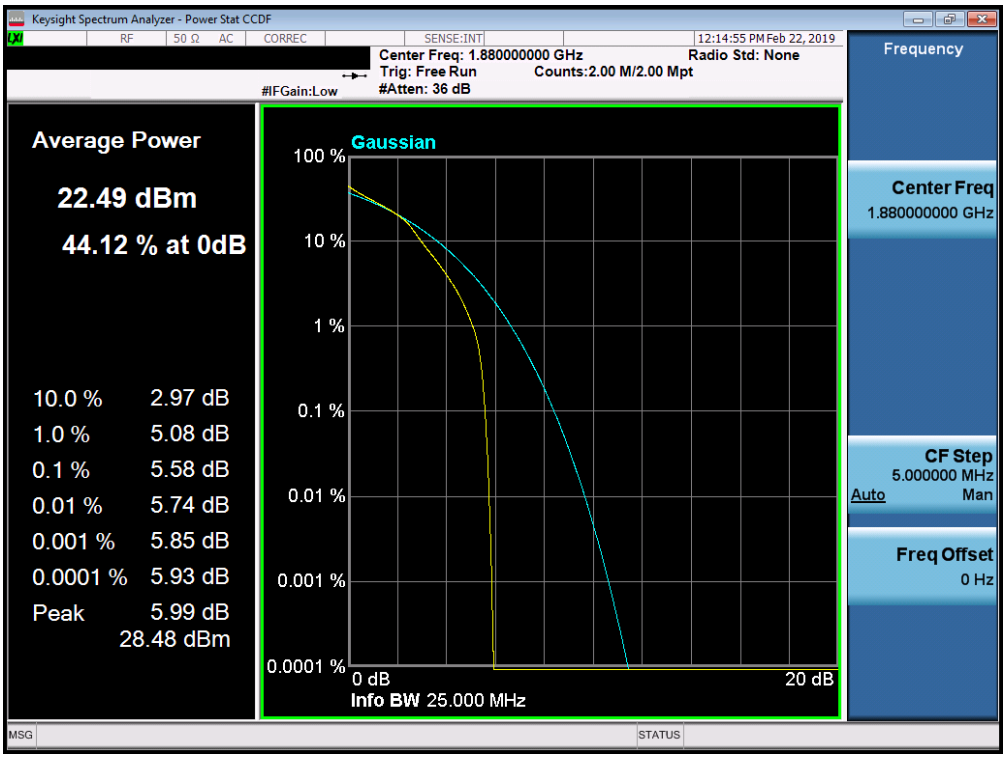


Plot 7-173. PAR Plot (Band 2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-174. PAR Plot (Band 2 - 15.0MHz 16-QAM - Full RB Configuration)

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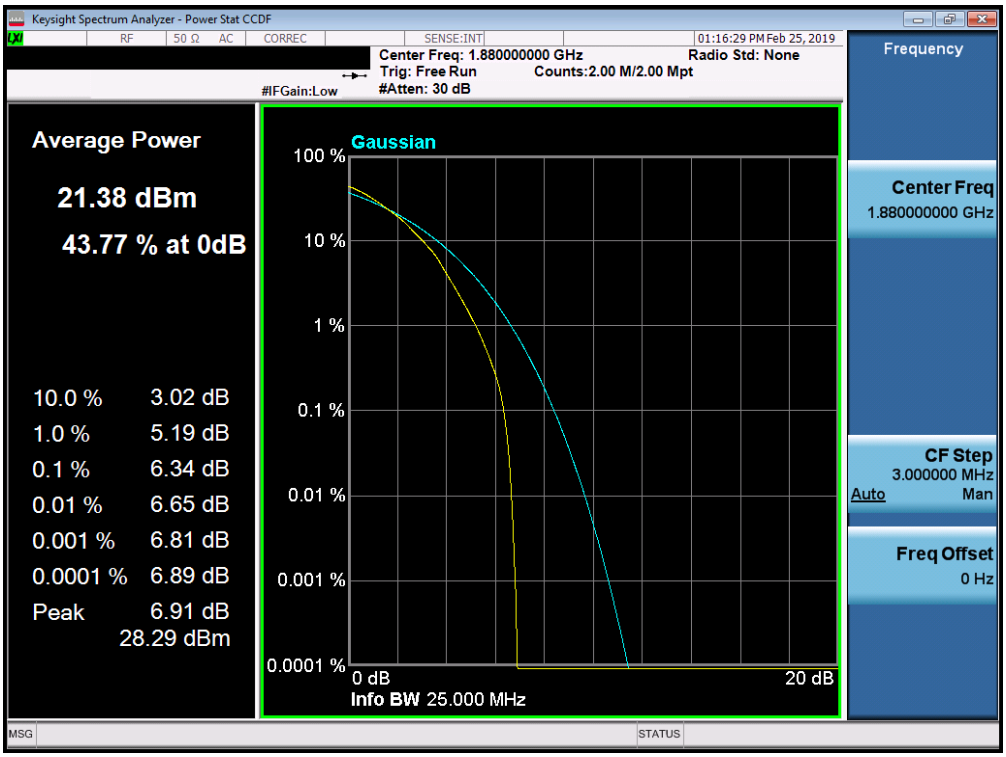
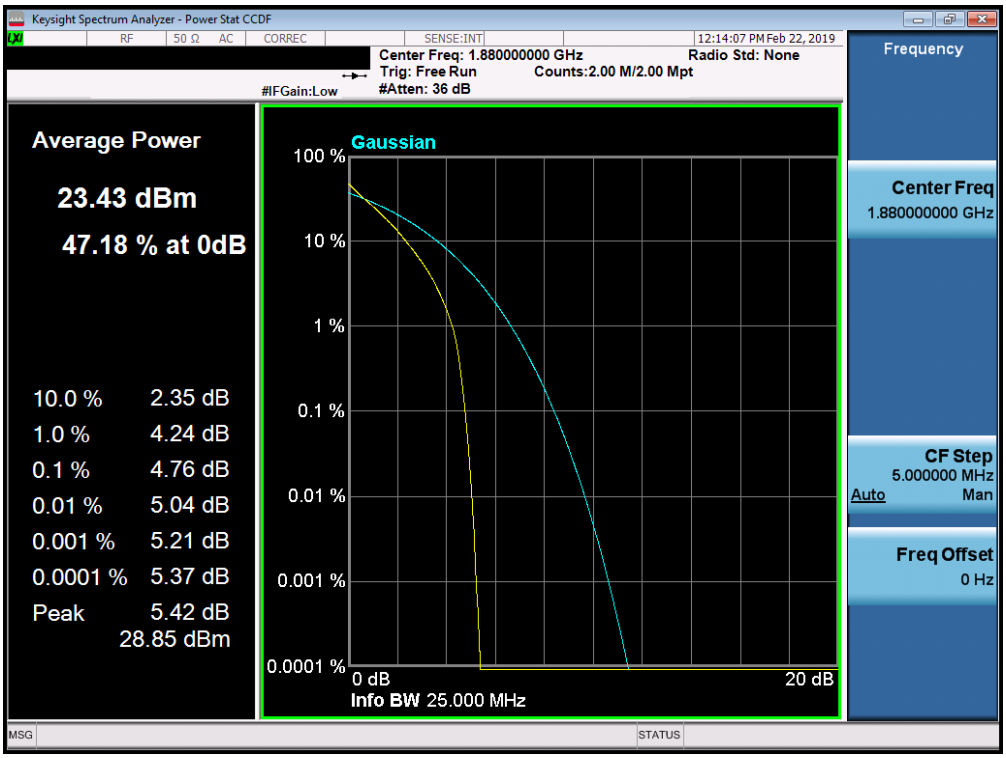


Plot 7-175. PAR Plot (Band 2 - 15.0MHz 64-QAM - Full RB Configuration)



Plot 7-176. PAR Plot (Band 2 - 20.0MHz QPSK - Full RB Configuration)

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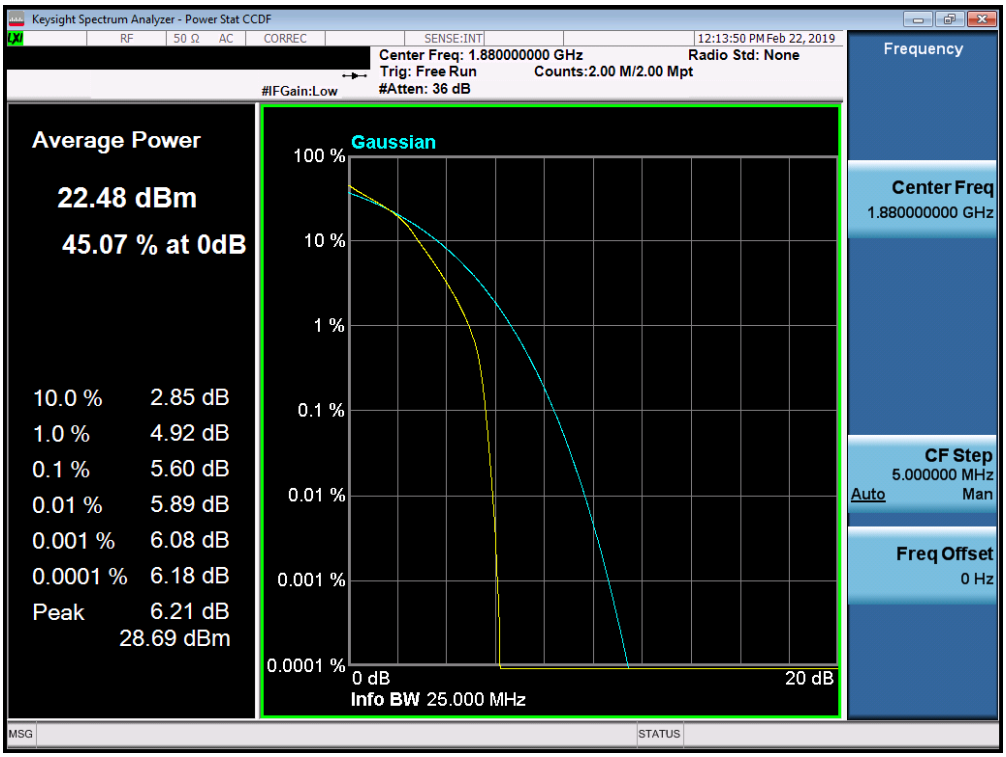
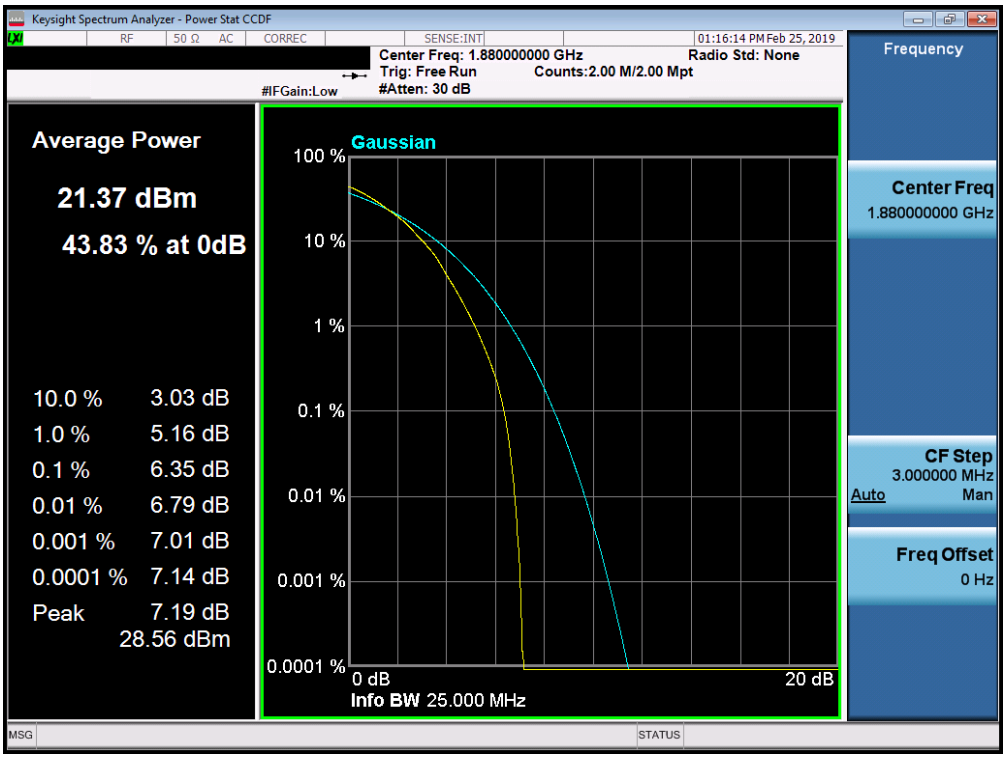


Plot 7-177. PAR Plot (Band 2 - 20.0MHz 16-QAM - Full RB Configuration)



Plot 7-178. PAR Plot (Band 2 - 20.0MHz 64-QAM - Full RB Configuration)

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7.6 Uplink Carrier Aggregation

§27.53(m)

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

For Band 38/41, the minimum permissible attenuation level of any spurious emission is 55 + $\log_{10}(P_{[Watts]})$.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

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

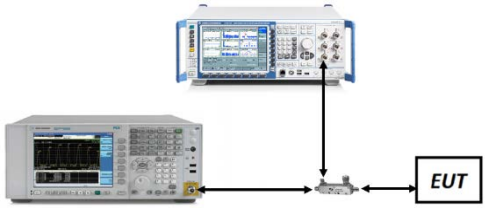

Figure 7-5. Test Instrument & Measurement Setup

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Test Notes

1. Uplink carrier aggregation is only supported in this EUT while operating in Power Class 3.

2. Conducted power and spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device. The worst case (highest) powers were found while operating with QPSK modulation, as shown in Table 7-503 and 7-504 below, with both carriers set to transmit using 1RB.

3. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

Power State	PCC							SCC							Power
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset	ULCA Tx.Power (dBm)
Max	LTE B5	10	20450	829	QPSK	1	49	LTE B5	10	20549	838.9	QPSK	1	0	25.20
Max	LTE B5	10	20475	831.5	QPSK	1	49	LTE B5	10	20574	841.4	QPSK	1	0	25.15
Max	LTE B5	10	20600	844	QPSK	1	0	LTE B5	10	20501	834.1	QPSK	1	49	25.17

Table 7-3. Conducted Powers (B5 – PCC: RB Size 1 Offset Max SCC: RB Size 1 Offset 0)

Power State	PCC							SCC							Power
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset	ULCA Tx.Power (dBm)
Max	LTE B5	10	20450	829	QPSK	50	0	LTE B5	10	20549	838.9	QPSK	50	0	23.52
Max	LTE B5	10	20450	829	16-QAM	50	0	LTE B5	10	20549	838.9	16-QAM	50	0	22.68
Max	LTE B5	10	20450	829	64-QAM	50	0	LTE B5	10	20549	838.9	64-QAM	50	0	21.51

Table 7-4. Conducted Powers (B5 with Various Combinations)

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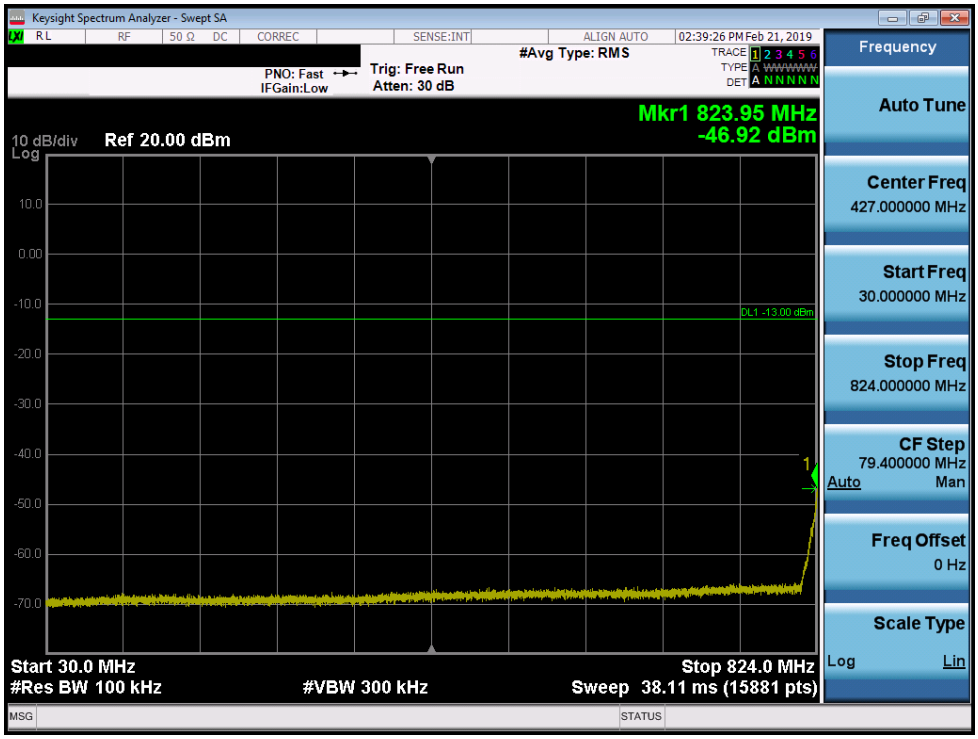

Table 7-179. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Mid Channel)

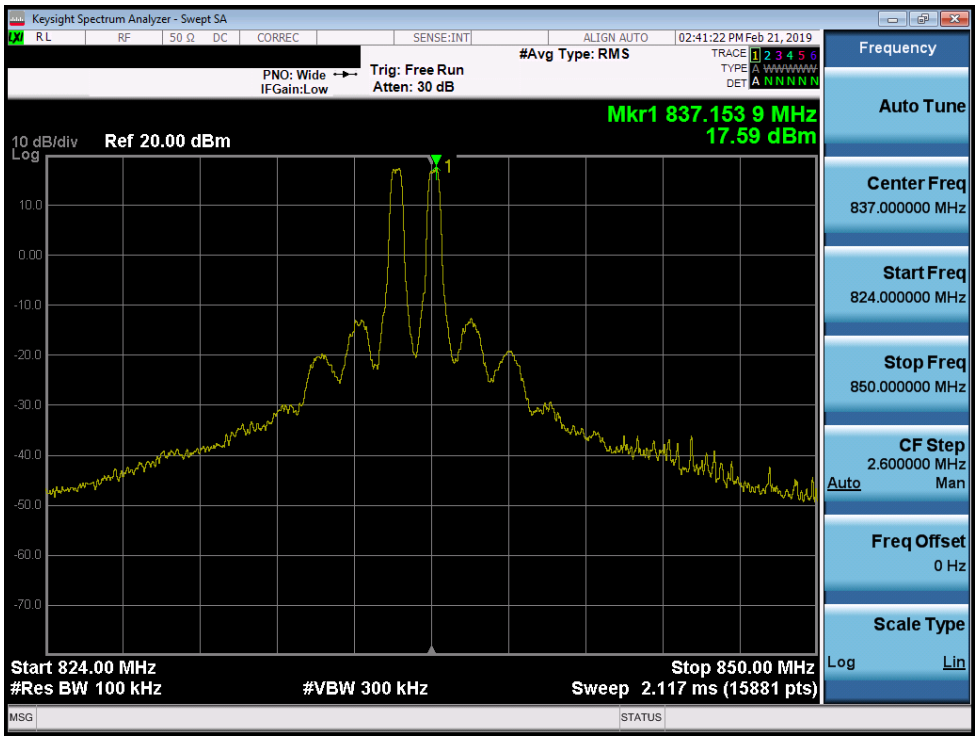

Table 7-180. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Mid Channel)

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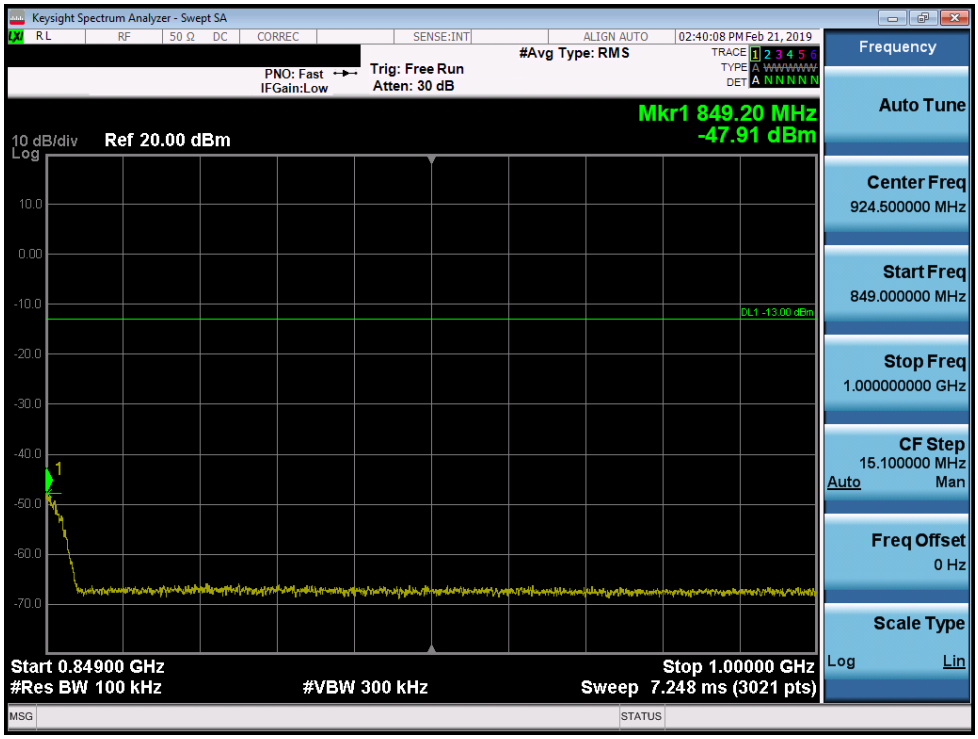

Table 7-181. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Mid Channel)

Table 7-182. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 1/49 SCC 1/0 – Mid Channel)

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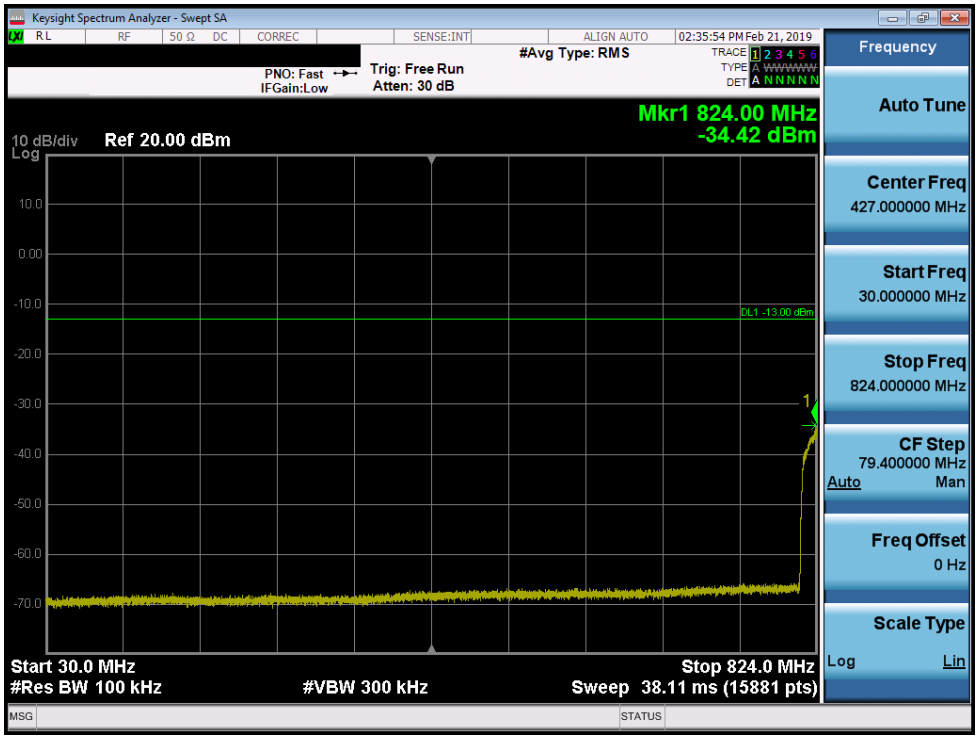

Table 7-183. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 50/0 SCC 50/0 – Mid Channel)

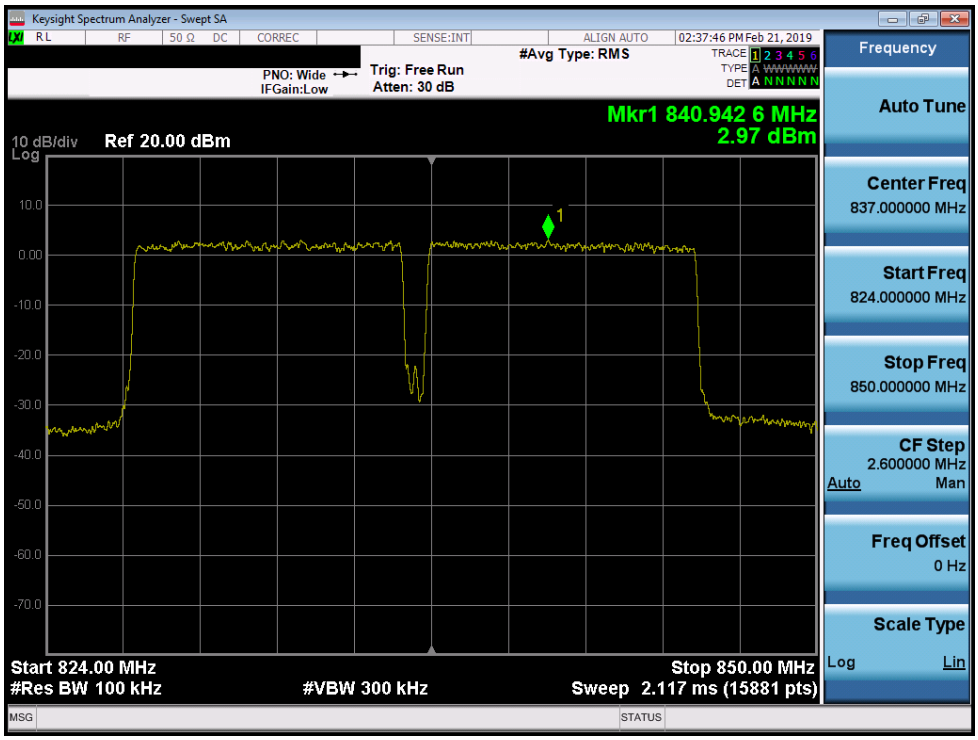

Table 7-184. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 50/0 SCC 50/0 – Mid Channel)

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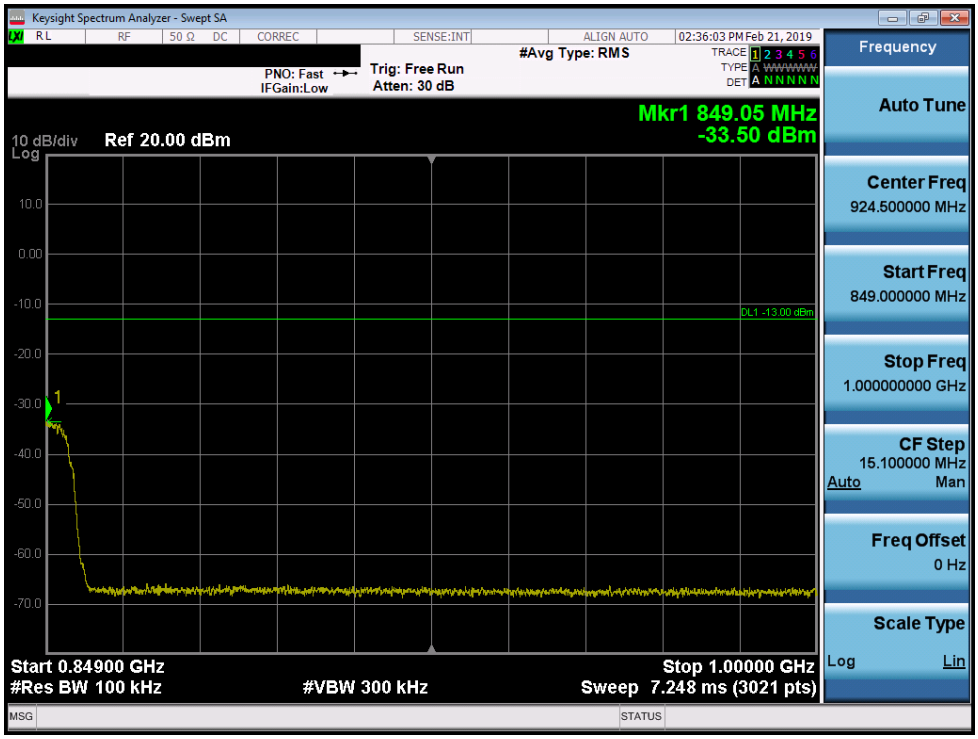

Table 7-185. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 50/0 SCC 50/0 – Mid Channel)

Table 7-186. Conducted Spurious Plot (Band 5 – 10.0MHz QPSK – PCC 50/0 SCC 50/0 – Mid Channel)

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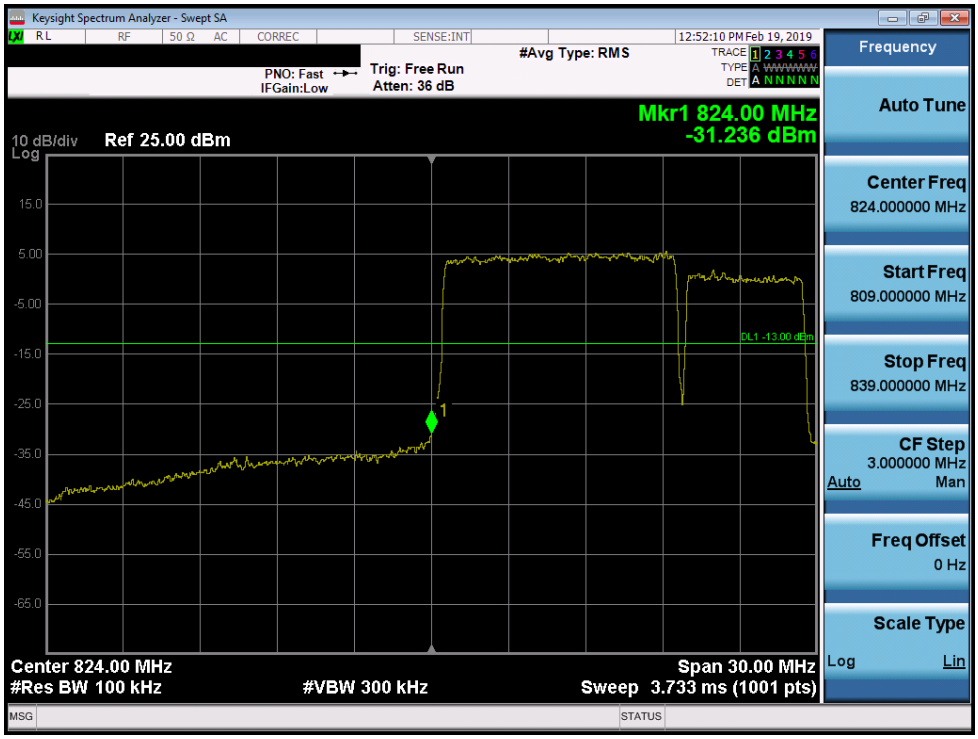

Table 7-187. Lower Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:5 MHz – Full RB)

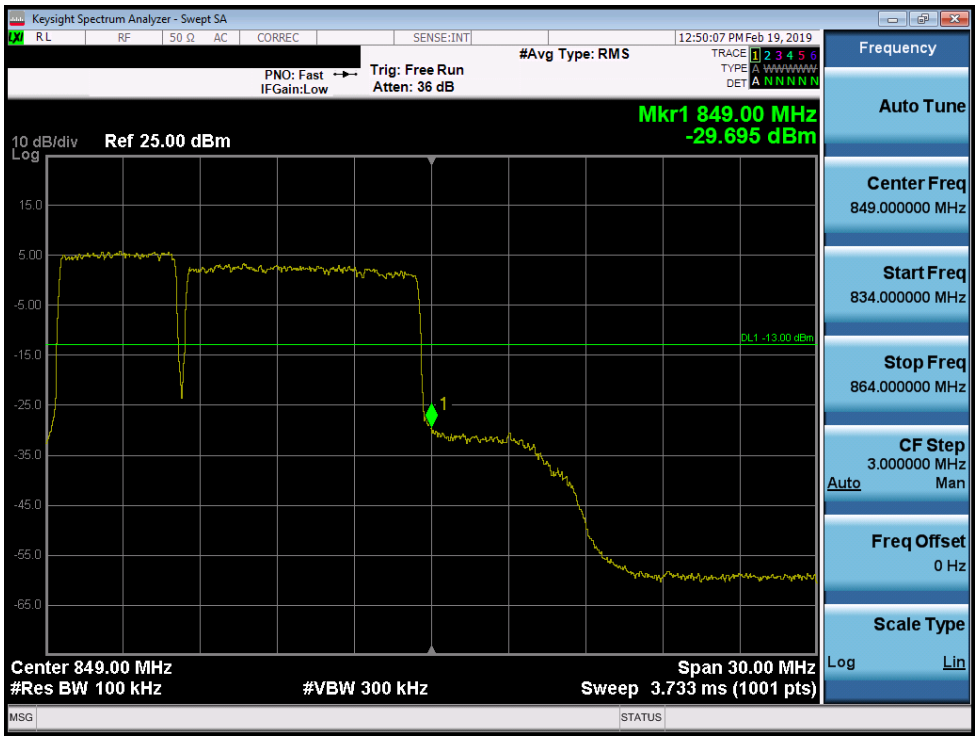

Table 7-188. Upper Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:5 MHz – Full RB)

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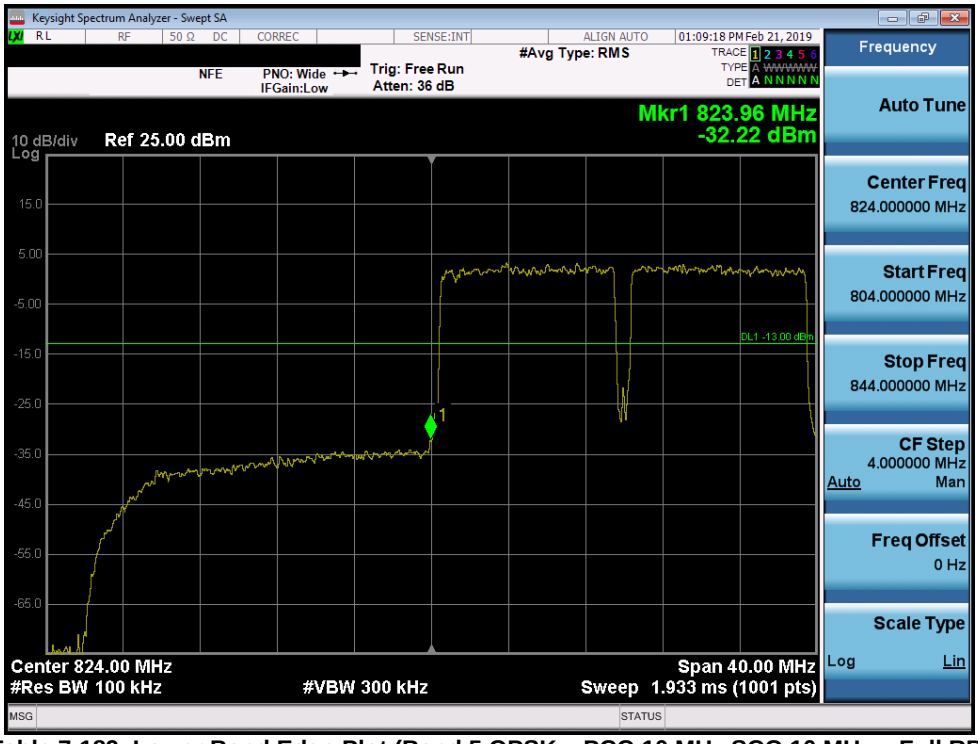

Table 7-189. Lower Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:10 MHz – Full RB)

Table 7-190. Upper Band Edge Plot (Band 5 QPSK – PCC:10 MHz SCC:10 MHz – Full RB)

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7.7 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.

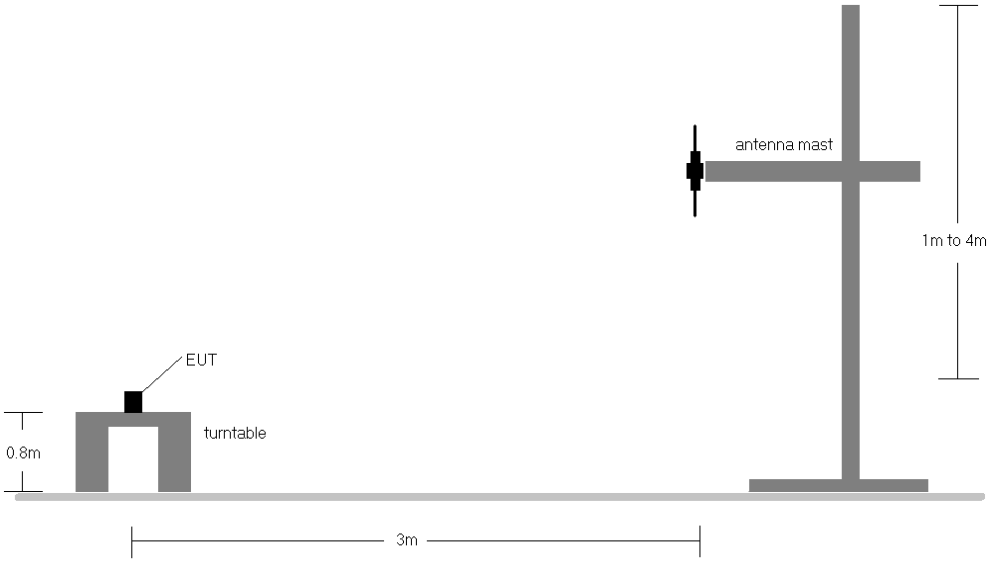

Figure 7-6. Radiated Test Setup <1GHz

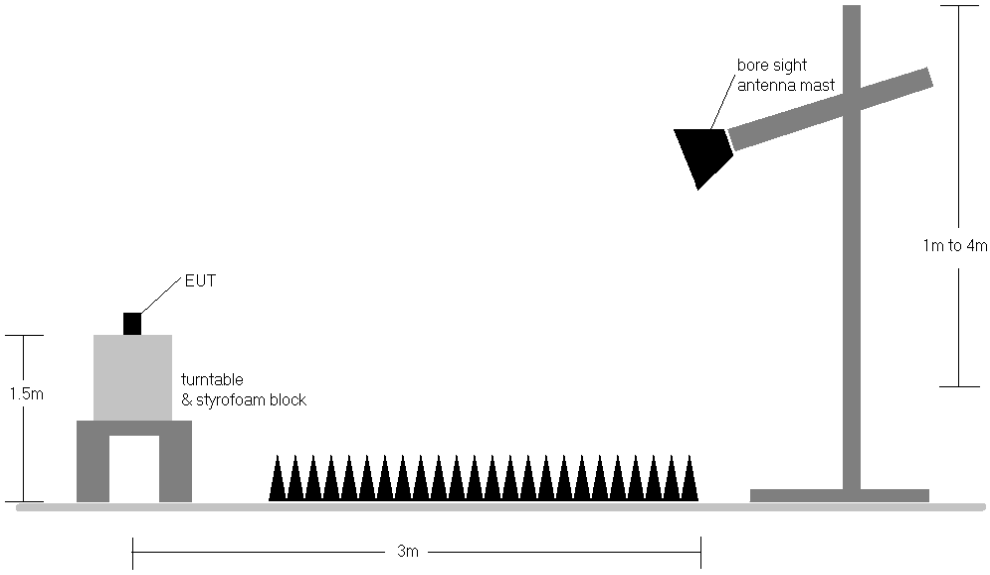

Figure 7-7. Radiated Test Setup >1GHz

Test Notes

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

2) This unit was tested with its standard battery.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	145	281	1 / 24	14.56	6.18	18.59	0.072	34.77	-16.19	20.74	0.118	36.99	-16.25
782.00	5	QPSK	H	145	290	1 / 24	14.39	6.24	18.48	0.070	34.77	-16.29	20.63	0.116	36.99	-16.36
784.50	5	QPSK	H	146	283	1 / 0	14.48	6.30	**18.63**	0.073	34.77	-16.14	**20.78**	0.120	36.99	-16.21
784.50	5	16-QAM	H	146	283	1 / 0	13.18	6.30	**17.33**	0.054	34.77	-17.44	**19.48**	0.089	36.99	-17.51
784.50	5	64-QAM	H	146	283	1 / 0	12.13	6.30	**16.28**	0.043	34.77	-18.49	**18.43**	0.070	36.99	-18.56
782.00	10	QPSK	H	153	291	1 / 0	14.62	6.24	**18.71**	**0.074**	34.77	-16.06	**20.86**	**0.122**	36.99	-16.13
782.00	10	16-QAM	H	153	291	1 / 0	13.06	6.24	**17.15**	0.052	34.77	-17.62	**19.30**	0.085	36.99	-17.69
782.00	10	64-QAM	H	153	291	1 / 0	11.79	6.24	**15.88**	0.039	34.77	-18.89	**18.03**	0.064	36.99	-18.96
782.00	10	QPSK	V	106	217	1 / 0	11.47	6.24	15.55	0.036	34.77	-19.22	17.70	0.059	36.99	-19.28
782.00	10 (WCP)	QPSK	H	142	304	1 / 0	10.52	6.24	14.61	0.029	34.77	-20.16	16.76	0.047	36.99	-20.23

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	H	100	288	1 / 5	12.07	6.30	**16.22**	0.042	38.45	-22.23	**18.37**	0.069	40.61	-22.23
836.50	1.4	QPSK	H	149	354	1 / 5	11.34	6.35	15.54	0.036	38.45	-22.91	17.69	0.059	40.61	-22.92
848.30	1.4	QPSK	H	106	276	1 / 0	10.40	6.40	14.65	0.029	38.45	-23.80	16.80	0.048	40.61	-23.81
824.70	1.4	16-QAM	H	100	288	1 / 5	10.48	6.30	**14.63**	0.029	38.45	-23.82	**16.78**	0.048	40.61	-23.82
824.70	1.4	64-QAM	H	100	288	1 / 5	9.46	6.30	**13.61**	0.023	38.45	-24.84	**15.76**	0.038	40.61	-24.84
825.50	3	QPSK	H	102	297	1 / 14	12.24	6.31	**16.40**	**0.044**	38.45	-22.05	**18.55**	**0.072**	40.61	-22.06
836.50	3	QPSK	H	154	335	1 / 0	11.12	6.35	15.32	0.034	38.45	-23.13	17.47	0.056	40.61	-23.14
847.50	3	QPSK	H	105	237	1 / 0	11.15	6.40	15.40	0.035	38.45	-23.06	17.55	0.057	40.61	-23.06
825.50	3	16-QAM	H	102	297	1 / 14	10.57	6.31	**14.73**	0.030	38.45	-23.72	**16.88**	0.049	40.61	-23.73
825.50	3	64-QAM	H	102	297	1 / 14	9.66	6.31	13.82	0.024	38.45	-24.63	15.97	0.040	40.61	-24.64
826.50	5	QPSK	H	105	278	1 / 24	12.09	6.31	**16.25**	0.042	38.45	-22.20	**18.40**	0.069	40.61	-22.21
836.50	5	QPSK	H	145	357	1 / 0	11.36	6.35	15.56	0.036	38.45	-22.89	17.71	0.059	40.61	-22.90
846.50	5	QPSK	H	108	257	1 / 0	11.85	6.39	16.09	0.041	38.45	-22.36	18.24	0.067	40.61	-22.37
826.50	5	16-QAM	H	105	278	1 / 24	10.36	6.31	**14.52**	0.028	38.45	-23.93	**16.67**	0.046	40.61	-23.94
826.50	5	64-QAM	H	105	278	1 / 24	9.56	6.31	**13.72**	0.024	38.45	-24.73	**15.87**	0.039	40.61	-24.74
829.00	10	QPSK	H	102	276	1 / 49	12.13	6.32	**16.30**	0.043	38.45	-22.15	**18.45**	0.070	40.61	-22.16
836.50	10	QPSK	H	186	347	1 / 0	11.48	6.35	15.68	0.037	38.45	-22.77	17.83	0.061	40.61	-22.78
844.00	10	QPSK	H	142	317	1 / 0	10.57	6.38	14.80	0.030	38.45	-23.65	16.95	0.050	40.61	-23.66
829.00	10	16-QAM	H	102	276	1 / 49	10.43	6.32	**14.60**	0.029	38.45	-23.85	**16.75**	0.047	40.61	-23.86
829.00	10	64-QAM	H	102	276	1 / 49	9.50	6.32	**13.67**	0.023	38.45	-24.78	**15.82**	0.038	40.61	-24.79
825.50	3	QPSK	V	168	128	1 / 14	7.94	6.35	12.14	0.016	38.45	-26.31	14.29	0.027	40.61	-26.32
825.50	3 (WCP)	QPSK	H	102	37	1 / 14	10.28	6.31	14.44	0.028	38.45	-24.01	16.59	0.046	40.61	-24.02

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	120	213	3 / 2	10.49	9.58	20.07	0.102	30.00	-9.93
1745.00	1.4	QPSK	H	116	359	3 / 2	12.50	9.58	**22.08**	0.161	30.00	-7.92
1779.30	1.4	QPSK	H	106	199	1 / 5	11.78	9.65	21.43	0.139	30.00	-8.57
1745.00	1.4	16-QAM	H	116	359	1 / 0	11.27	9.58	**20.85**	0.122	30.00	-9.15
1745.00	1.4	64-QAM	H	116	359	1 / 0	10.40	9.58	**19.98**	0.099	30.00	-10.02
1711.50	3	QPSK	H	126	358	1 / 0	11.78	9.58	21.36	0.137	30.00	-8.64
1745.00	3	QPSK	H	135	359	1 / 0	12.04	9.58	21.62	0.145	30.00	-8.38
1778.50	3	QPSK	H	112	355	1 / 0	11.98	9.64	**21.62**	0.145	30.00	-8.38
1778.50	3	16-QAM	H	112	355	1 / 0	11.37	9.64	**21.01**	0.126	30.00	-8.99
1778.50	3	64-QAM	H	112	355	1 / 0	10.00	9.64	19.64	0.092	30.00	-10.36
1712.50	5	QPSK	H	127	358	1 / 0	11.53	9.58	21.11	0.129	30.00	-8.89
1745.00	5	QPSK	H	134	346	1 / 24	12.40	9.58	**21.98**	0.158	30.00	-8.02
1777.50	5	QPSK	H	131	357	1 / 24	12.24	9.64	21.88	0.154	30.00	-8.12
1745.00	5	16-QAM	H	134	346	1 / 24	11.50	9.58	21.08	0.128	30.00	-8.92
1745.00	5	64-QAM	H	134	346	1 / 24	10.43	9.58	20.01	0.100	30.00	-9.99
1715.00	10	QPSK	H	130	356	1 / 0	12.23	9.58	21.81	0.152	30.00	-8.19
1745.00	10	QPSK	H	115	356	1 / 49	12.56	9.58	**22.14**	0.164	30.00	-7.86
1775.00	10	QPSK	H	121	359	1 / 49	11.82	9.64	21.46	0.140	30.00	-8.54
1745.00	10	16-QAM	H	115	356	1 / 49	11.67	9.58	**21.25**	0.133	30.00	-8.75
1745.00	10	64-QAM	H	115	356	1 / 49	10.72	9.58	**20.30**	0.107	30.00	-9.70
1717.50	15	QPSK	H	139	358	1 / 74	12.11	9.58	21.69	0.148	30.00	-8.31
1745.00	15	QPSK	H	120	359	1 / 74	12.54	9.58	**22.12**	0.163	30.00	-7.88
1772.50	15	QPSK	H	135	357	1 / 74	12.47	9.63	22.10	0.162	30.00	-7.90
1745.00	15	16-QAM	H	120	359	1 / 74	11.64	9.58	**21.22**	0.132	30.00	-8.78
1745.00	15	64-QAM	H	120	359	1 / 74	10.69	9.58	20.27	0.106	30.00	-9.73
1720.00	20	QPSK	H	133	356	1 / 99	12.40	9.58	21.98	0.158	30.00	-8.02
1745.00	20	QPSK	H	129	0	1 / 99	12.62	9.58	22.20	0.166	30.00	-7.80
1770.00	20	QPSK	H	127	351	1 / 0	13.31	9.62	**22.93**	**0.196**	30.00	-7.07
1770.00	20	16-QAM	H	127	351	1 / 0	12.09	9.62	**21.71**	0.148	30.00	-8.29
1770.00	20	64-QAM	H	127	351	1 / 0	11.26	9.62	**20.88**	0.123	30.00	-9.12
1770.00	20	QPSK	V	111	315	1 / 0	12.61	9.62	22.23	0.167	30.00	-7.77
1770.00	20 (WCP)	QPSK	H	102	333	1 / 0	11.19	9.62	20.81	0.121	30.00	-9.19

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	159	348	1 / 5	13.97	9.54	23.51	0.224	33.01	-9.50
1880.00	1.4	QPSK	H	157	350	3 / 2	15.01	9.28	**24.29**	0.269	33.01	-8.72
1909.30	1.4	QPSK	H	108	343	1 / 0	14.06	8.95	23.01	0.200	33.01	-10.00
1880.00	1.4	16-QAM	H	157	350	1 / 0	14.24	9.28	**23.52**	0.225	33.01	-9.49
1880.00	1.4	64-QAM	H	157	350	1 / 0	13.25	9.28	**22.53**	0.179	33.01	-10.48
1851.50	3	QPSK	H	165	344	1 / 14	14.09	9.53	23.62	0.230	33.01	-9.39
1880.00	3	QPSK	H	157	350	1 / 0	15.29	9.28	**24.57**	0.287	33.01	-8.44
1908.50	3	QPSK	H	111	341	1 / 0	13.94	8.97	22.91	0.195	33.01	-10.10
1880.00	3	16-QAM	H	157	350	1 / 0	14.08	9.28	**23.36**	0.217	33.01	-9.65
1880.00	3	64-QAM	H	157	350	1 / 0	13.32	9.28	**22.60**	0.182	33.01	-10.41
1852.50	5	QPSK	H	165	344	1 / 24	14.27	9.52	23.79	0.240	33.01	-9.22
1880.00	5	QPSK	H	157	350	1 / 0	15.13	9.28	**24.41**	0.276	33.01	-8.60
1907.50	5	QPSK	H	111	342	1 / 0	14.18	8.98	23.16	0.207	33.01	-9.85
1880.00	5	16-QAM	H	157	350	1 / 0	14.34	9.28	**23.62**	0.230	33.01	-9.39
1880.00	5	64-QAM	H	157	350	1 / 0	13.35	9.28	**22.63**	0.183	33.01	-10.38
1855.00	10	QPSK	H	108	356	1 / 0	13.71	9.50	23.21	0.210	33.01	-9.80
1880.00	10	QPSK	H	155	350	1 / 0	14.79	9.28	**24.07**	0.255	33.01	-8.94
1905.00	10	QPSK	H	148	350	1 / 49	13.81	9.03	22.84	0.192	33.01	-10.18
1880.00	10	16-QAM	H	155	350	1 / 0	13.95	9.28	**23.23**	0.211	33.01	-9.78
1880.00	10	64-QAM	H	155	350	1 / 0	12.93	9.28	**22.21**	0.166	33.01	-10.80
1857.50	15	QPSK	H	159	347	1 / 74	15.26	9.48	**24.74**	**0.298**	33.01	-8.27
1880.00	15	QPSK	H	157	346	1 / 0	15.31	9.28	24.59	0.288	33.01	-8.42
1902.50	15	QPSK	H	148	345	1 / 74	14.08	9.07	23.15	0.206	33.01	-9.86
1857.50	15	16-QAM	H	159	347	1 / 74	14.32	9.48	**23.80**	0.240	33.01	-9.21
1857.50	15	64-QAM	H	159	347	1 / 74	13.43	9.48	**22.91**	0.195	33.01	-10.10
1860.00	20	QPSK	H	157	345	1 / 99	15.25	9.46	**24.71**	0.296	33.01	-8.30
1880.00	20	QPSK	H	157	351	1 / 0	15.29	9.28	24.57	0.287	33.01	-8.44
1900.00	20	QPSK	H	144	339	1 / 99	12.61	9.11	21.72	0.149	33.01	-11.29
1860.00	20	16-QAM	H	157	345	1 / 99	14.49	9.46	**23.95**	0.248	33.01	-9.06
1860.00	20	64-QAM	H	157	345	1 / 99	13.55	9.46	**23.01**	0.200	33.01	-10.00
1857.50	15	QPSK	V	146	240	1 / 74	13.89	9.48	23.37	0.217	33.01	-9.64
1857.50	15 (WCP)	QPSK	H	160	361	1 / 74	13.49	9.48	22.97	0.198	33.01	-10.04

Table 7-8. EIRP Data (Band 2)

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7.8 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.

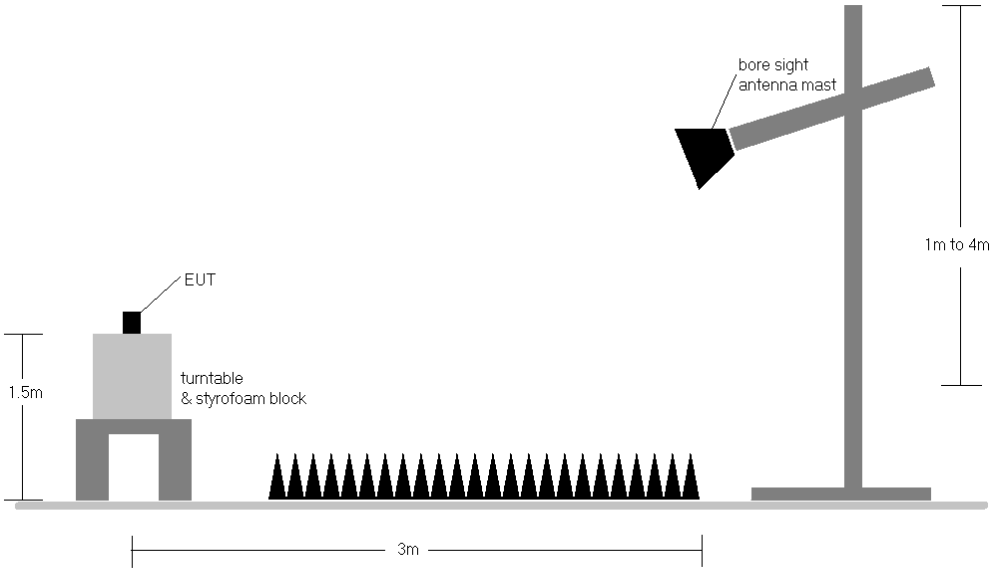

Figure 7-8. Test Instrument & Measurement Setup

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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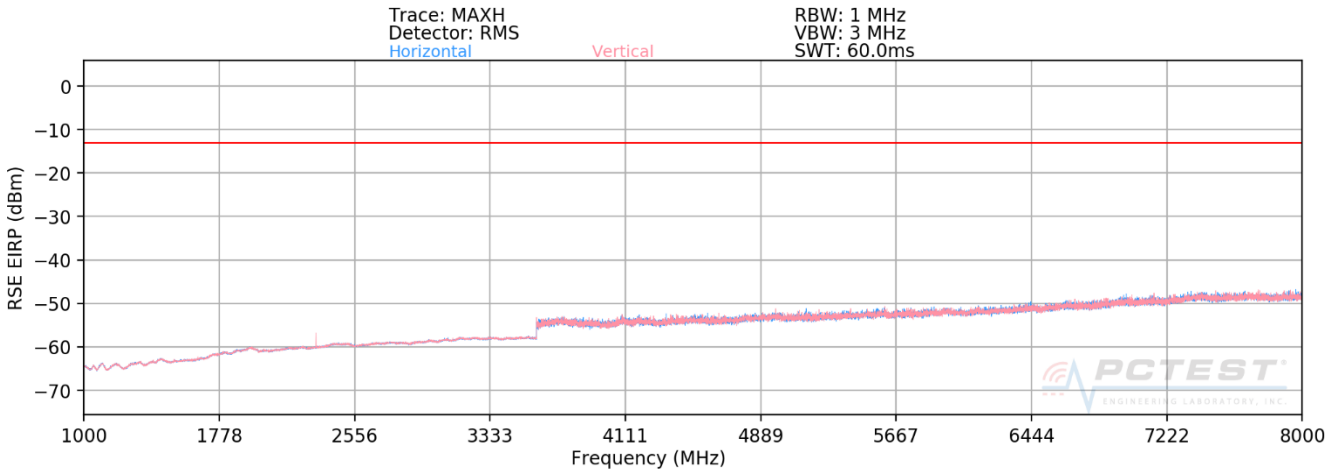
Band 13



Plot 7-191. 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	160	328	-68.08	6.00	-62.09	-49.1
3128.00	V	-	-	-68.80	7.20	-61.60	-48.6
3910.00	V	-	-	-69.69	8.74	-60.95	-47.9

Table 7-9. 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	-	-	-71.72	6.03	-65.70	-25.7

Table 7-10. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

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	222	117	-45.88	6.00	-39.88	-26.9
3128.00	V	-	-	-71.43	7.20	-64.23	-51.2

Table 7-11. Radiated Spurious Data with WCP (Band 13 – Mid Channel)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	V	126	136	-67.55	6.03	-61.53	-21.5

Table 7-12. Radiated Spurious Data with WCP (Band 13 – 1559-1610MHz Band)

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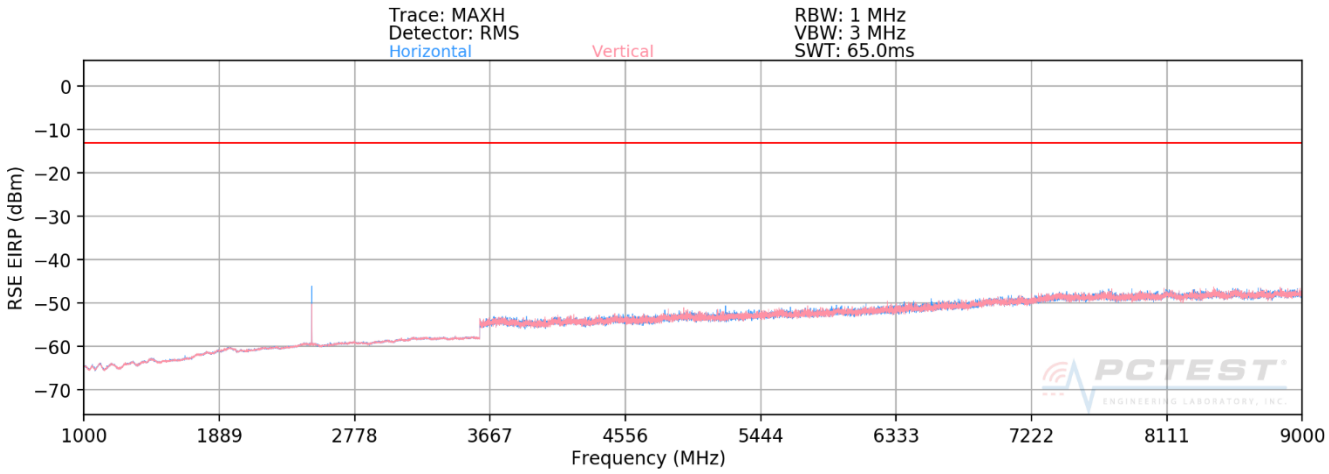
Band 5



Plot 7-192. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY:	825.50	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]
1651.00	V	-	-	-71.51	6.03	-65.49	-52.5
2476.50	V	122	203	-65.68	5.78	-59.91	-46.9
3302.00	V	-	-	-68.82	7.66	-61.16	-48.2
4127.50	V	-	-	-69.67	9.13	-60.54	-47.5

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

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OPERATING FREQUENCY:	836.50	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]
1673.00	V	-	-	-71.43	5.97	-65.46	-52.5
2509.50	V	362	230	-67.64	5.80	-61.84	-48.8
3346.00	V	-	-	-68.94	7.87	-61.06	-48.1
4182.50	V	-	-	-69.73	9.35	-60.38	-47.4

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

OPERATING FREQUENCY:	847.50	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]
1695.00	V	-	-	-71.18	5.91	-65.27	-52.3
2542.50	V	231	148	-69.13	5.91	-63.22	-50.2
3390.00	V	-	-	-69.43	8.06	-61.37	-48.4
4237.50	V	-	-	-70.14	9.45	-60.70	-47.7

Table 7-15. Radiated Spurious Data (Band 5 – High Channel)

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OPERATING FREQUENCY:	825.50	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]
1651.00	V	264	108	-66.36	6.03	-60.34	-47.3
2476.50	V	-	-	-70.04	5.78	-64.26	-51.3

Table 7-16. Radiated Spurious Data with WCP (Band 5 – Low Channel)

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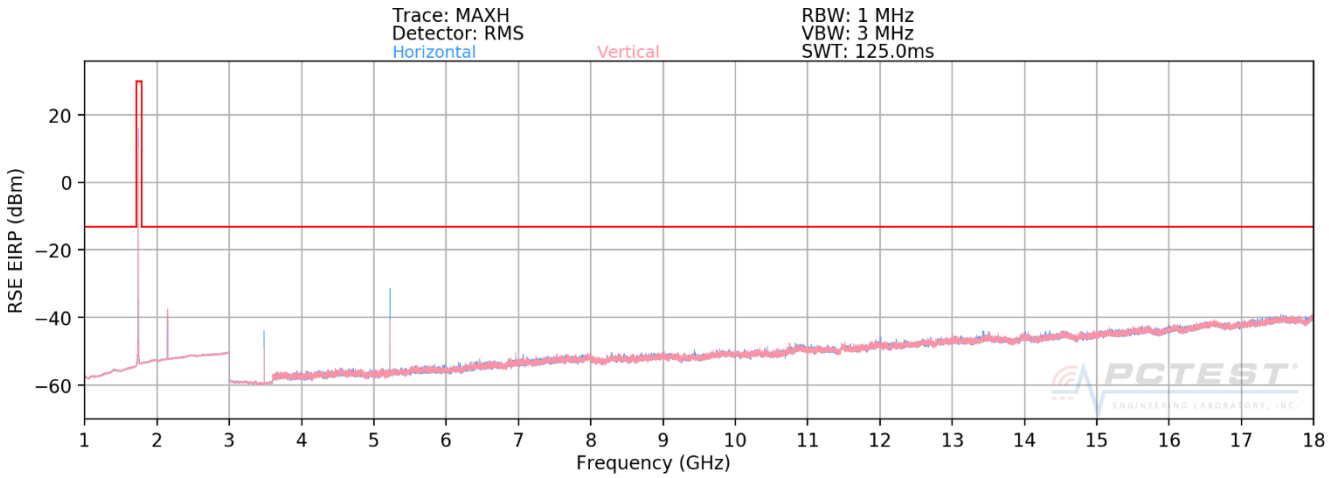
Band 66/4



Plot 7-193. Radiated Spurious Plot above 1GHz (Band 66/4)

OPERATING FREQUENCY:	1720.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3440.00	V	114	264	-64.35	8.20	-56.15	-43.1
5160.00	V	396	139	-72.22	10.26	-61.96	-49.0
6880.00	V	-	-	-71.64	11.44	-60.20	-47.2
8600.00	V	-	-	-70.55	13.06	-57.49	-44.5

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3490.00	V	115	252	-67.13	8.32	-58.82	-45.8
5235.00	V	-	-	-72.95	10.39	-62.56	-49.6
6980.00	V	-	-	-72.51	11.49	-61.02	-48.0

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

OPERATING FREQUENCY:	1770.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3540.00	V	127	47	-71.39	8.37	-63.02	-50.0
5310.00	V	-	-	-72.67	10.32	-62.35	-49.3
7080.00	V	-	-	-72.49	11.65	-60.85	-47.8

Table 7-19. Radiated Spurious Data (Band 66/4 – High Channel)

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OPERATING FREQUENCY:	1770.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3540.00	V	104	7	-71.21	8.37	-62.84	-49.8
5310.00	V	260	314	-76.41	10.32	-66.09	-53.1
7080.00	V	-	-	-76.17	11.65	-64.53	-51.5

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

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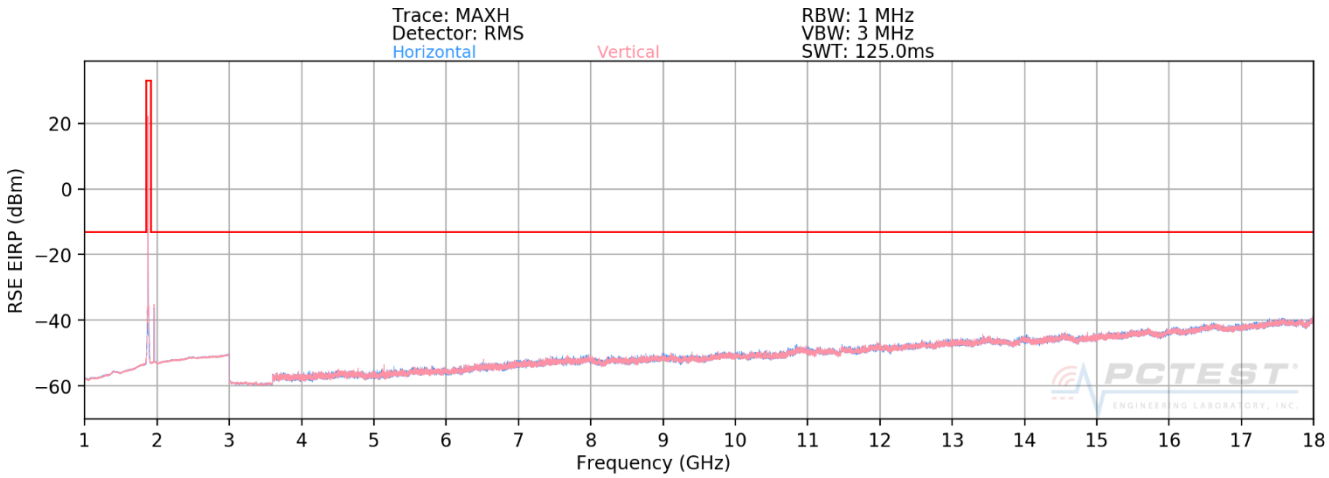
Band 2



Plot 7-194. Radiated Spurious Plot above 1GHz (Band 2)

OPERATING FREQUENCY:	1857.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	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]
3715.00	H	394	169	-71.94	8.55	-63.38	-50.4
5572.50	H	-	-	-72.71	10.56	-62.15	-49.2
7430.00	H	-	-	-71.37	12.03	-59.34	-46.3

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

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OPERATING FREQUENCY:	1880.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	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	400	195	-71.73	8.43	-63.29	-50.3
5640.00	H	-	-	-72.51	10.63	-61.87	-48.9
7520.00	H	-	-	-71.70	12.09	-59.61	-46.6

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

OPERATING FREQUENCY:	1902.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	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]
3805.00	H	400	15	-72.39	8.38	-64.00	-51.0
5707.50	H	-	-	-73.76	10.72	-63.04	-50.0
7610.00	H	-	-	-72.57	12.19	-60.38	-47.4

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

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OPERATING FREQUENCY:	1857.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	15.0	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]
3715.00	V	104	202	-72.85	8.55	-64.29	-51.3
5572.50	V	-	-	-76.48	10.56	-65.92	-52.9

Table 7-24. Radiated Spurious Data with WCP (Band 2 - Low Channel)

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7.9 Uplink Carrier Aggregation Radiated Measurements

§2.1053,

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 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 peak 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 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – 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. No. of sweep points ≥ 2 x span / RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. 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.

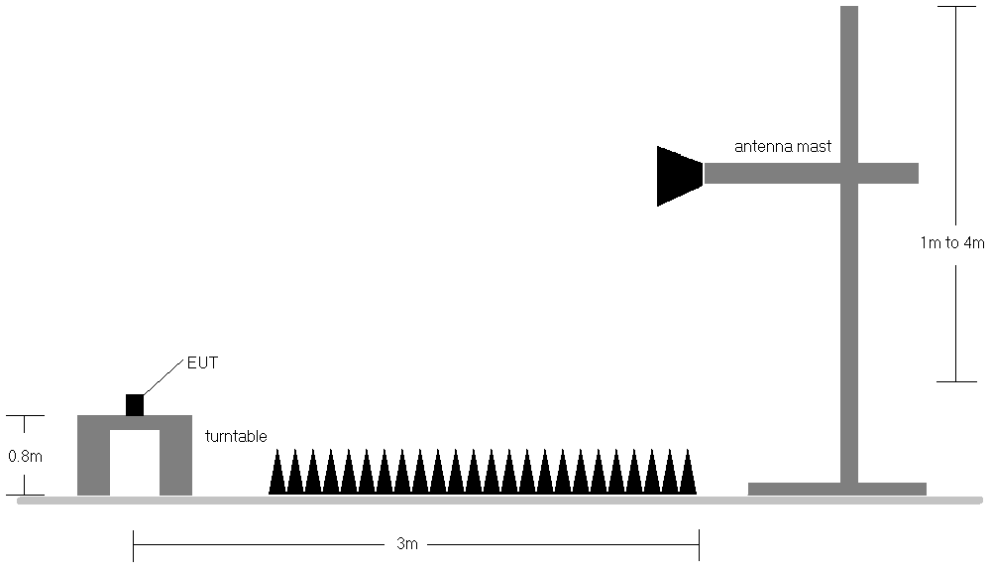

Figure 7-9. Test Instrument & Measurement Setup

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) Radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.

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

5) 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.

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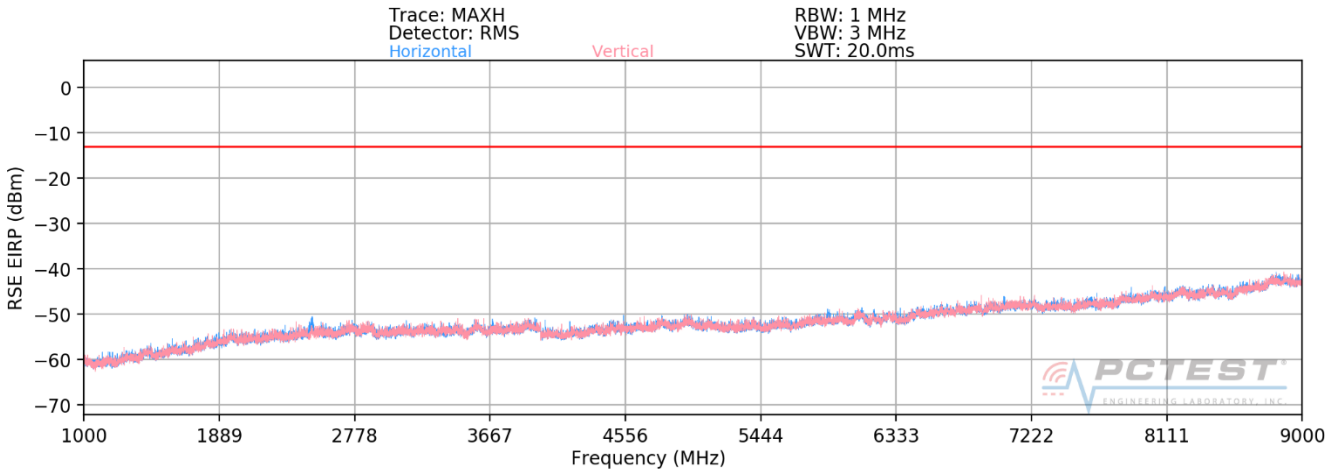
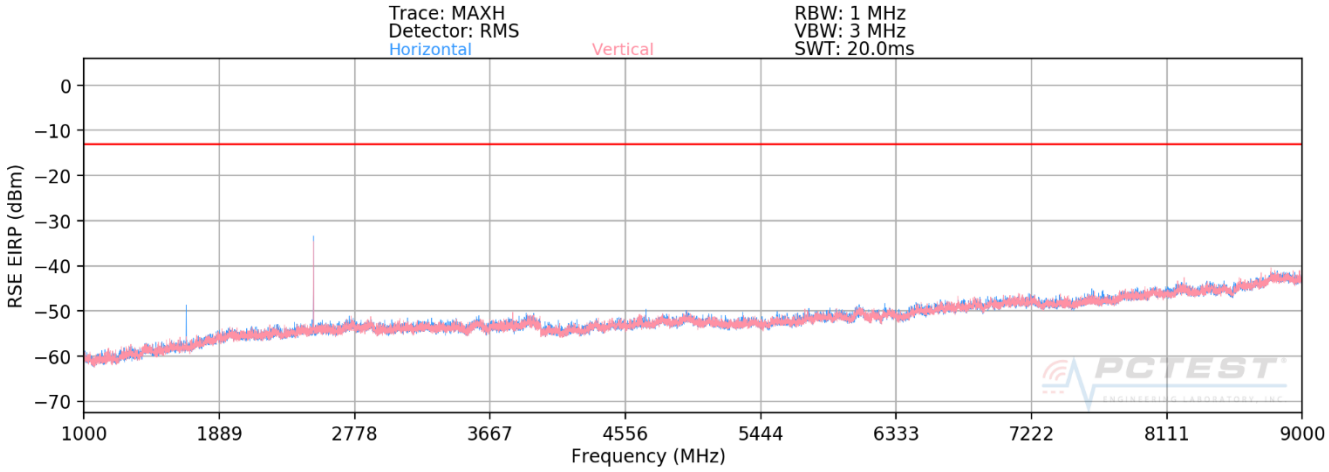


Plot 7-25. Radiated Spurious Plot (ULCA B5 PCC: RB 50 Offset 0, SCC: RB 50 Offset 0)



Plot 7-26. Radiated Spruious Plot (ULCA B5 PCC: RB 1 Offset 0, SCC: RB 1 Offset 49)

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OPERATING FREQUENCY (PCC):	829.00	MHz
OPERATING FREQUENCY (SCC):	838.90	
CHANNEL (PCC):	20450	
CHANNEL (SCC):	20549	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10 + 10	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	H	324	175	-59.15	8.35	-50.80	-37.8
2487.00	H	118	187	-54.88	8.45	-46.43	-33.4
3316.00	H	187	92	-59.57	9.84	-49.73	-36.7
4145.00	H	-	-	-71.50	9.29	-62.21	-49.2

Plot 7-27. Radiated Spurious Data – Low (ULCA B5 PCC: RB 1 Offset 49, SCC: RB 1 Offset 0)

OPERATING FREQUENCY (PCC):	831.50	MHz
OPERATING FREQUENCY (SCC):	841.50	
CHANNEL (PCC):	20600	
CHANNEL (SCC):	20575	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10 + 10	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]
1663.00	H	340	157	-58.89	8.45	-50.44	-37.4
2494.50	H	128	178	-54.82	8.75	-46.07	-33.1
3326.00	H	163	67	-58.00	9.73	-48.27	-35.3
4157.50	H	-	-	-71.04	9.19	-61.85	-48.9

Plot 7-28. Radiated Spurious Data – Mid (ULCA B5 PCC: RB 1 Offset 49, SCC: RB 1 Offset 0)

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OPERATING FREQUENCY (PCC):	844.00	MHz
OPERATING FREQUENCY (SCC):	834.10	
CHANNEL (PCC):	20600	
CHANNEL (SCC):	20501	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10 + 10	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	H	350	189	-60.04	8.40	-51.64	-38.6
2532.00	H	101	219	-56.83	9.19	-47.64	-34.6
3376.00	H	190	71	-60.00	9.52	-50.48	-37.5
4220.00	H	-	-	-70.00	9.07	-60.94	-47.9

Plot 7-29. Radiated Spurious Data – High (ULCA B5 PCC: RB 1 Offset 0, SCC: RB 1 Offset 49)

OPERATING FREQUENCY (PCC):	829.00	MHz
OPERATING FREQUENCY (SCC):	838.90	
CHANNEL (PCC):	20450	
CHANNEL (SCC):	20549	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10 + 10	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	H	128	23	-61.15	8.35	-52.80	-39.8
2487.00	H	109	204	-56.47	8.45	-48.02	-35.0
3316.00	H	-	-	-73.57	9.84	-63.73	-50.7

Plot 7-30. Radiated Spurious Data WCP (ULCA B5 PCC: RB 1 Offset 49, SCC: RB 1 Offset 0)

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7.10 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 13 Frequency Stability Measurements

OPERATING FREQUENCY: 782,000,000 Hz

CHANNEL: 23230

REFERENCE VOLTAGE: 4.20 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{0}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.20	- 30	781,999,930	-70	-0.0000090
100 %		- 20	782,000,117	117	0.0000150
100 %		- 10	782,000,193	193	0.0000247
100 %		0	782,000,305	305	0.0000390
100 %		+ 10	781,999,838	-162	-0.0000207
100 %		+ 20	782,000,195	195	0.0000249
100 %		+ 30	782,000,108	108	0.0000138
100 %		+ 40	782,000,105	105	0.0000134
100 %		+ 50	781,999,695	-305	-0.0000390
BATT. ENDPOINT	3.59	+ 20	781,999,765	-235	-0.0000301

Table 7-31. 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

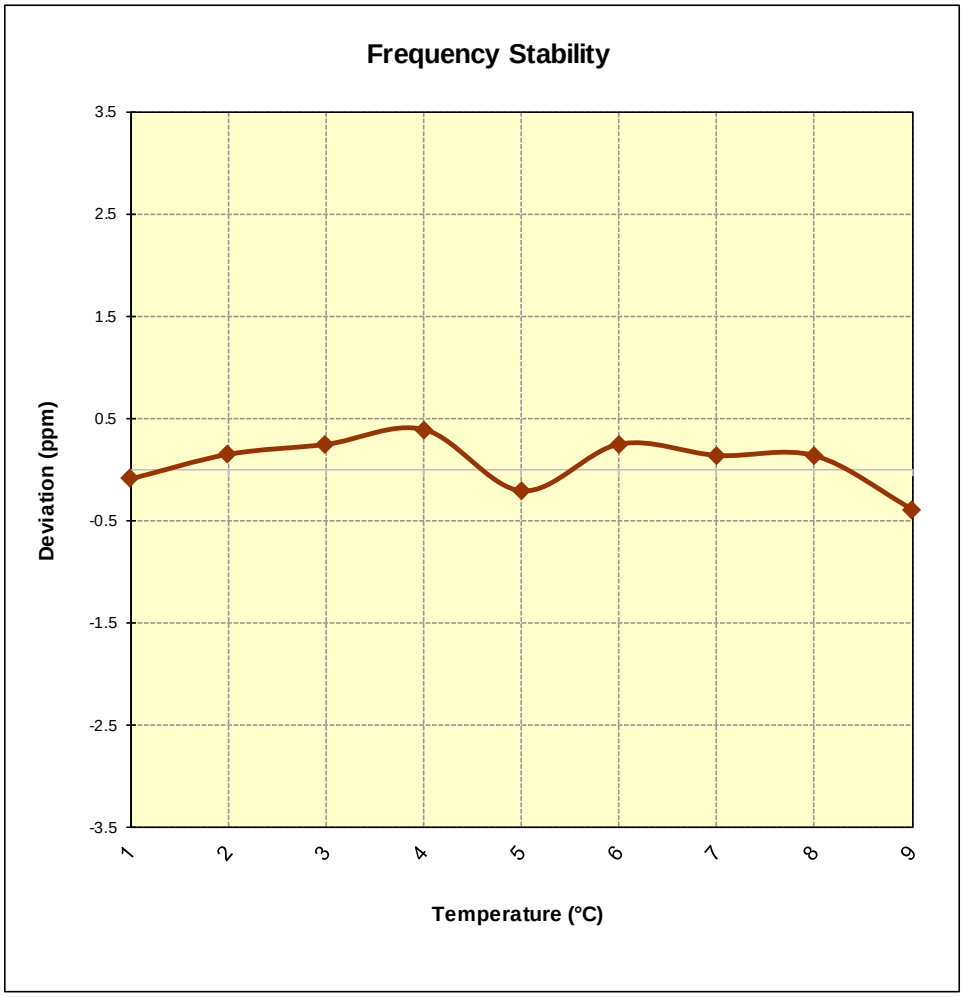

Figure 7-10. Frequency Stability Graph (Band 13)

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Band 5 Frequency Stability Measurements

OPERATING FREQUENCY:	836,500,000	Hz
CHANNEL:	20525	
REFERENCE VOLTAGE:	4.20	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (^{0}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.20	- 30	836,500,087	87	0.0000104
100 %		- 20	836,500,264	264	0.0000316
100 %		- 10	836,500,220	220	0.0000263
100 %		0	836,500,045	45	0.0000054
100 %		+ 10	836,499,918	-82	-0.0000098
100 %		+ 20	836,500,039	39	0.0000047
100 %		+ 30	836,499,867	-133	-0.0000159
100 %		+ 40	836,500,200	200	0.0000239
100 %		+ 50	836,500,233	233	0.0000279
BATT. ENDPOINT	3.59	+ 20	836,499,846	-154	-0.0000184

Table 7-32. Frequency Stability Data (Band 5)

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Band 5 Frequency Stability Measurements

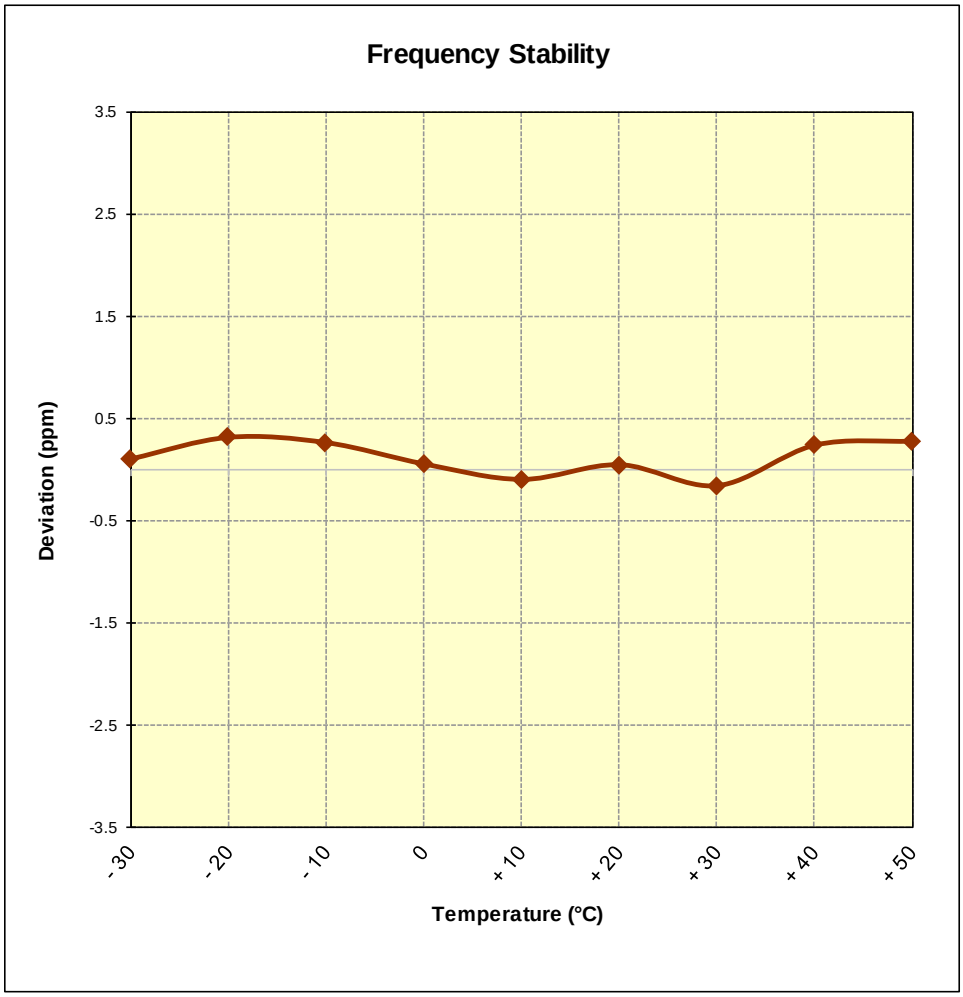

Figure 7-11. Frequency Stability Graph (Band 5)

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Band 66/4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,745,000,000 Hz

CHANNEL: 132322

REFERENCE VOLTAGE: 4.20 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.20	- 30	1,744,999,985	-15	-0.0000009
100 %		- 20	1,745,000,138	138	0.0000079
100 %		- 10	1,745,000,210	210	0.0000120
100 %		0	1,744,999,877	-123	-0.0000070
100 %		+ 10	1,745,000,049	49	0.0000028
100 %		+ 20	1,744,999,878	-122	-0.0000070
100 %		+ 30	1,745,000,057	57	0.0000033
100 %		+ 40	1,745,000,036	36	0.0000021
100 %		+ 50	1,745,000,237	237	0.0000136
BATT. ENDPOINT	3.59	+ 20	1,745,000,127	127	0.0000073

Table 7-33. 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

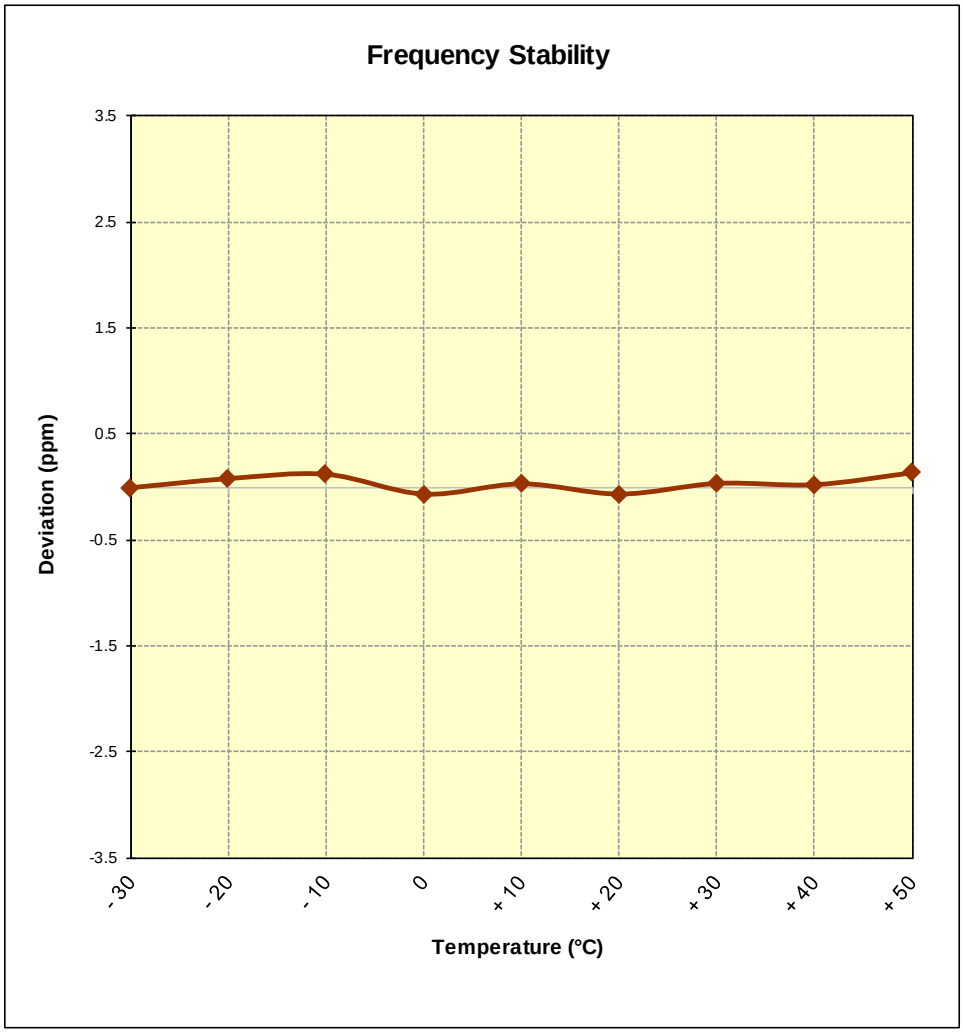

Figure 7-12. Frequency Stability Graph (Band 66/4)

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Band 2 Frequency Stability Measurements

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	18900	
REFERENCE VOLTAGE:	4.20	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (^{o}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.20	- 30	1,879,999,998	-2	-0.0000001
100 %		- 20	1,879,999,929	-71	-0.0000038
100 %		- 10	1,880,000,025	25	0.0000013
100 %		0	1,879,999,755	-245	-0.0000130
100 %		+ 10	1,879,999,737	-263	-0.0000140
100 %		+ 20	1,879,999,936	-64	-0.0000034
100 %		+ 30	1,879,999,985	-15	-0.0000008
100 %		+ 40	1,880,000,188	188	0.0000100
100 %		+ 50	1,880,000,074	74	0.0000039
BATT. ENDPOINT	3.59	+ 20	1,879,999,943	-57	-0.0000030

Table 7-34. 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.

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Band 2 Frequency Stability Measurements

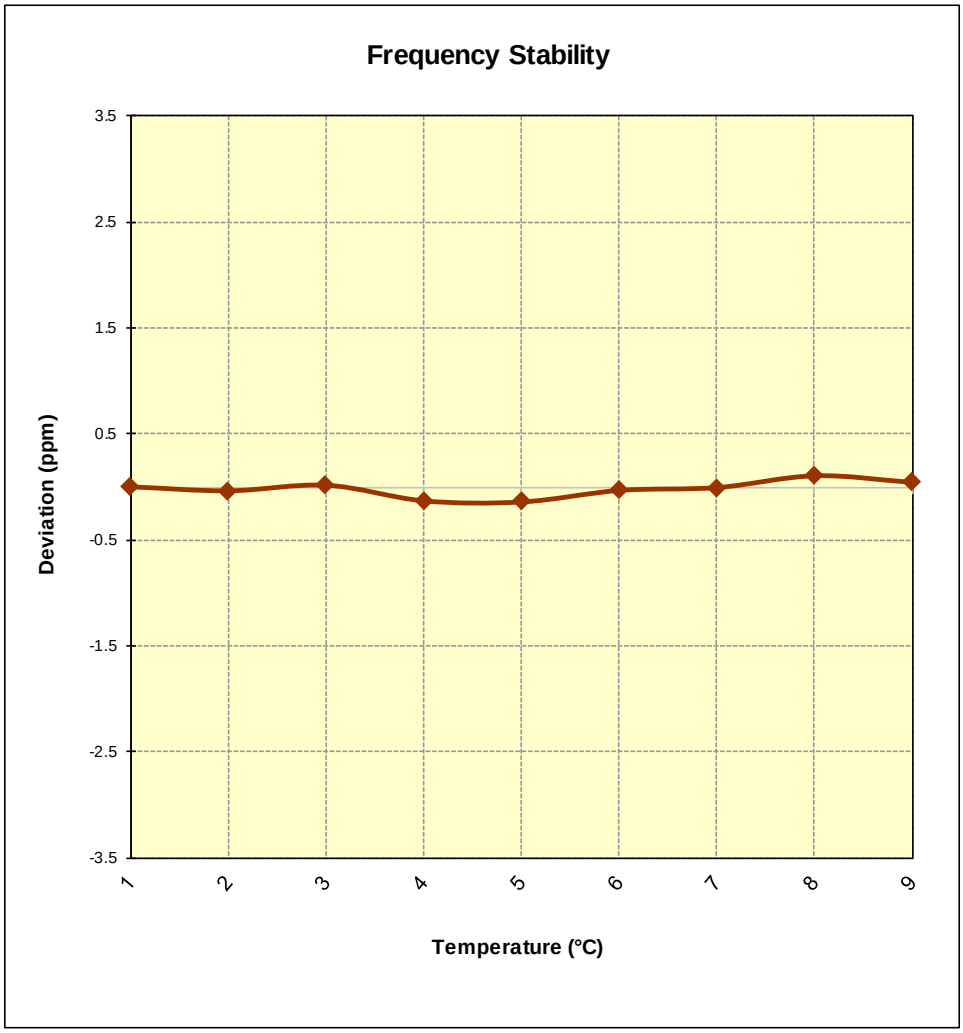

Figure 7-13. Frequency Stability Graph (Band 2)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFV450VM** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.

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