7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §27.53(c) §27.53(g) §27.53(h) §27.53(m)

Test Overview

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.

The minimum permissible attenuation level for Band 41 is as noted in the Test Notes on the following page.

The minimum permissible attenuation level of any spurious emission is 43 + $log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v02r02 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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

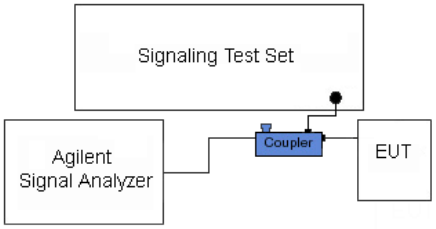


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

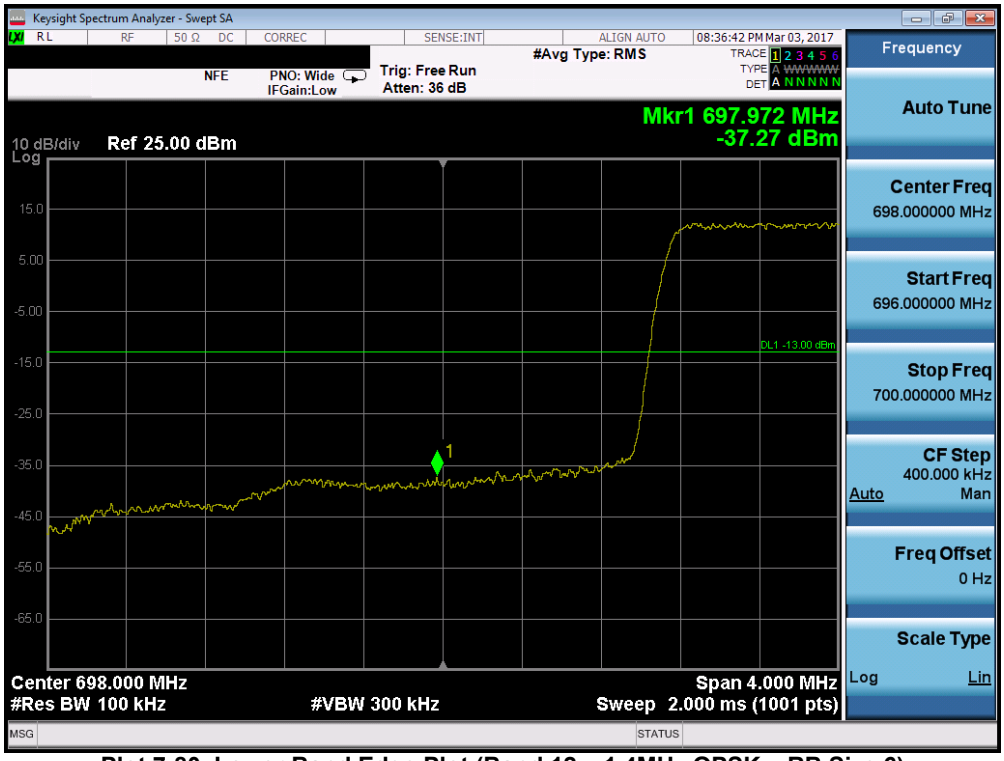
Per 22.917(b) 27.53(h) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

Per 27.53(g) for operations in the 698-746 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

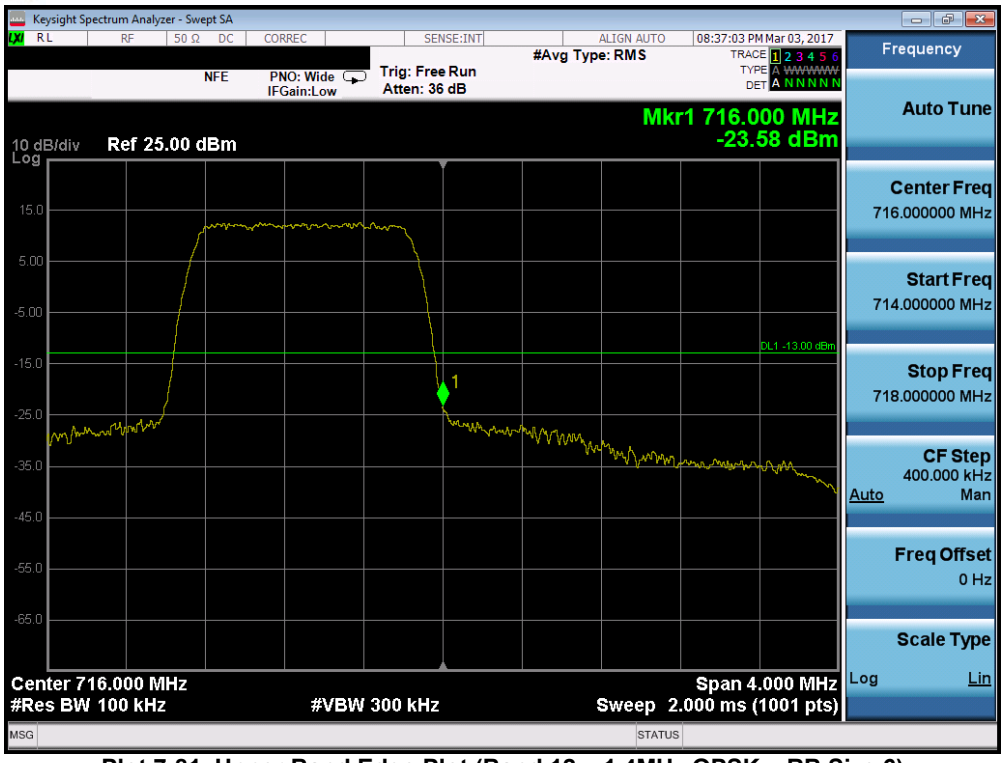
Per 27.53(c.5) for operations in the 776-788 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz may be employed to demonstrate compliance with the out-of-band emissions limit.

For all plots showing emissions in the 763 – 775MHz and 793 – 805MHz band, the FCC limit per 27.53(c.4) is 65 + $10\log_{10}(P)$ = -35dBm in a 6.25kHz bandwidth.

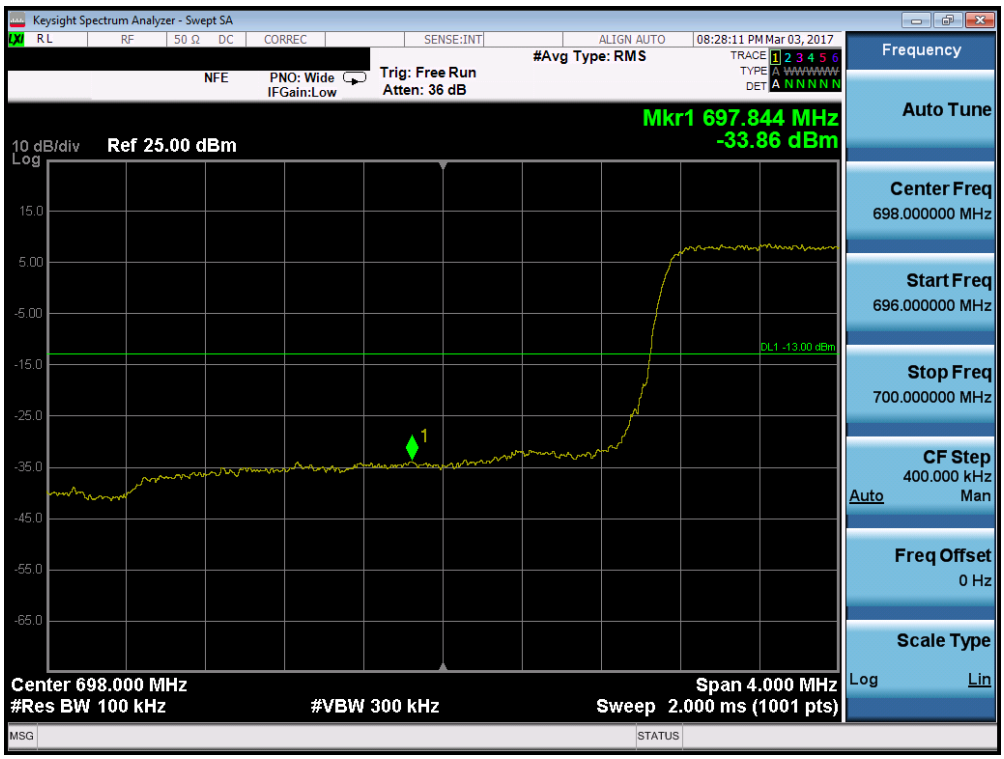
Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.



Plot 7-80. Lower Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

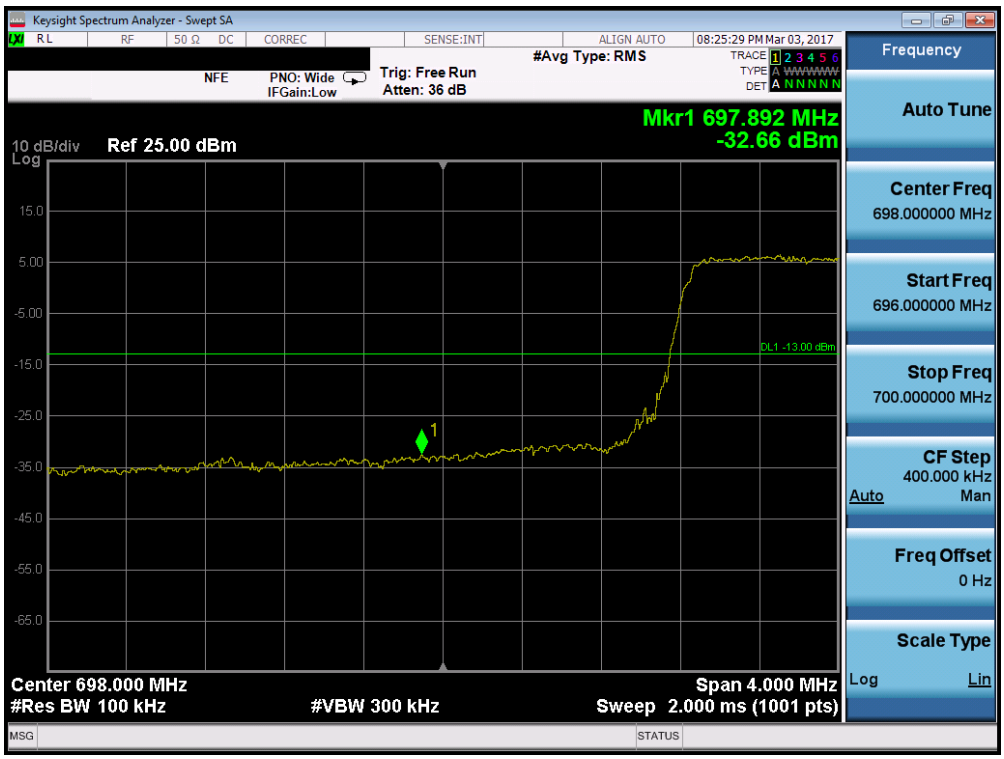


Plot 7-81. Upper Band Edge Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

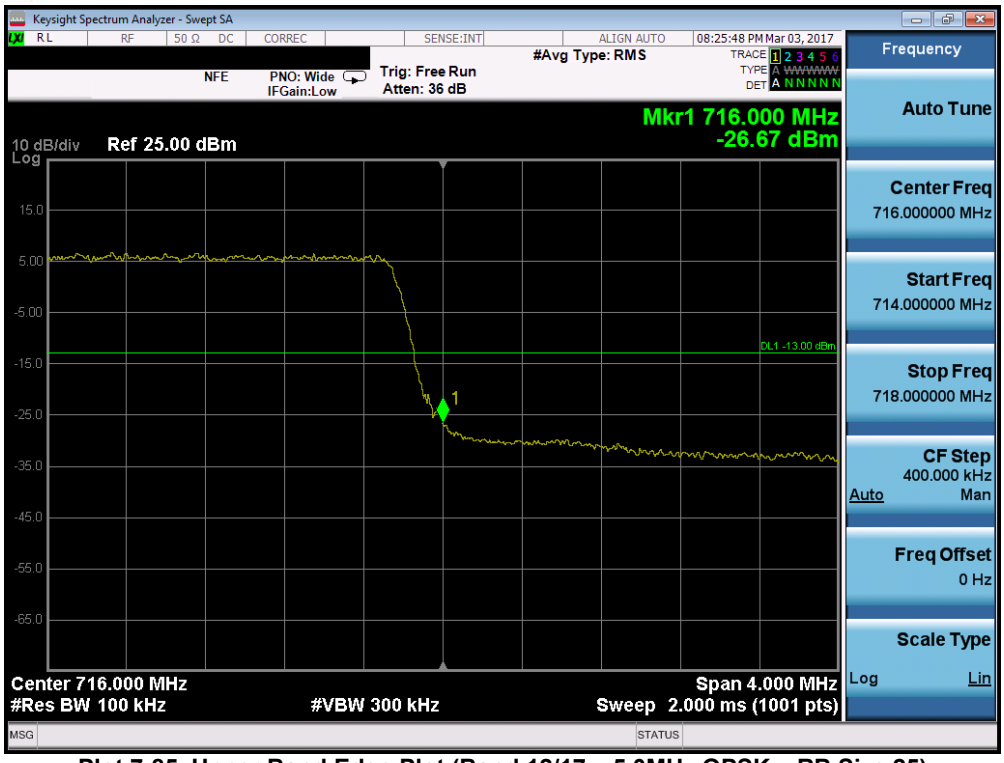


Plot 7-82. Lower Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

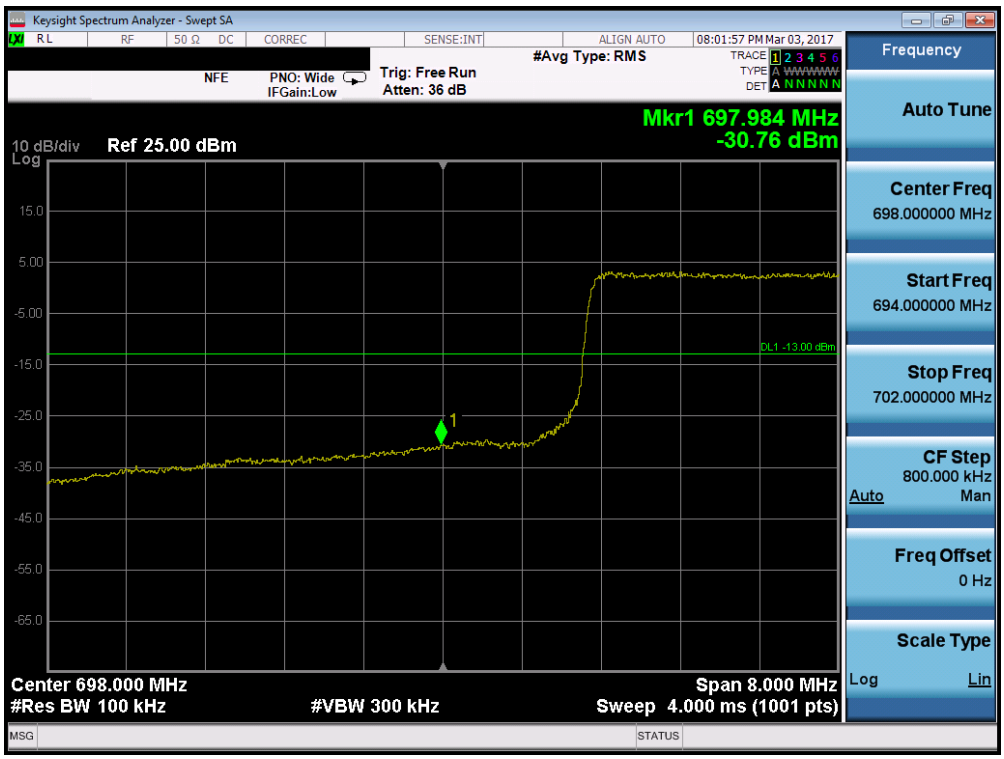
Plot 7-83. Upper Band Edge Plot (Band 12 – 3.0MHz QPSK – RB Size 15)



Plot 7-84. Lower Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)



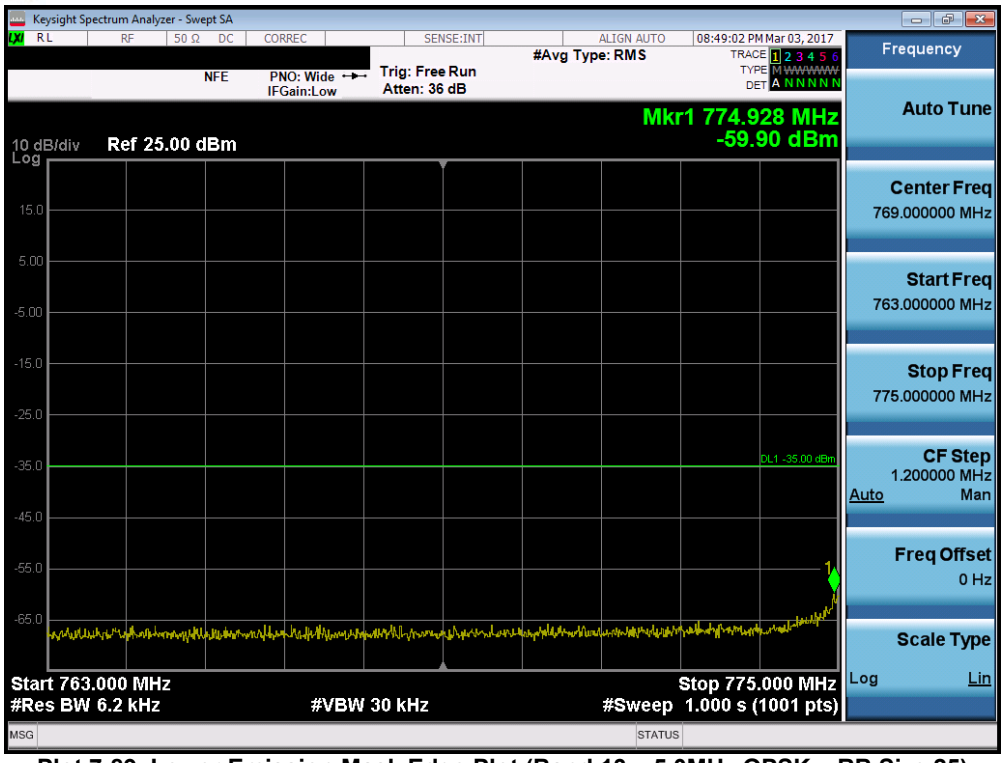
Plot 7-85. Upper Band Edge Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)



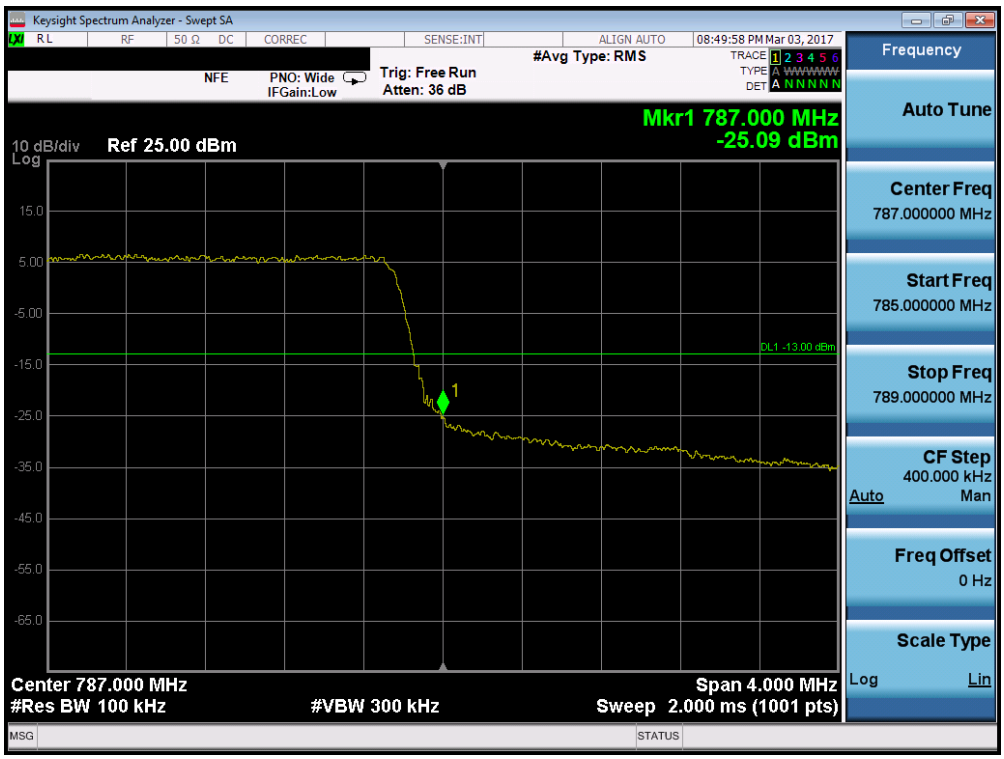
Plot 7-86. Lower Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

Plot 7-87. Upper Band Edge Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

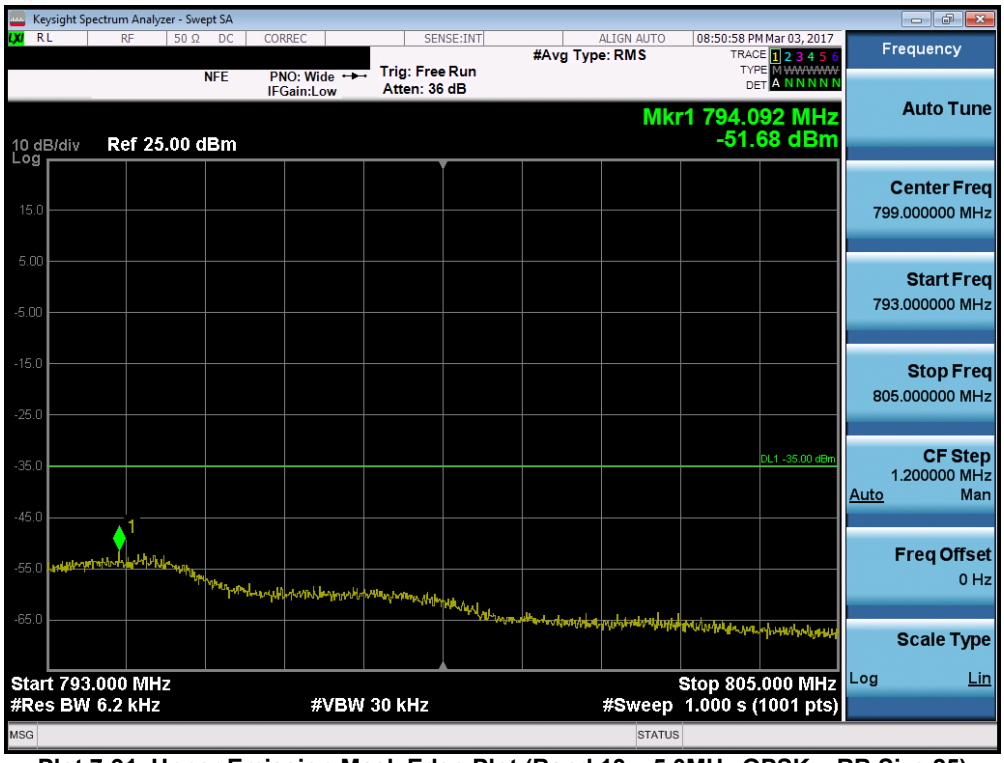
Plot 7-88. Lower Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



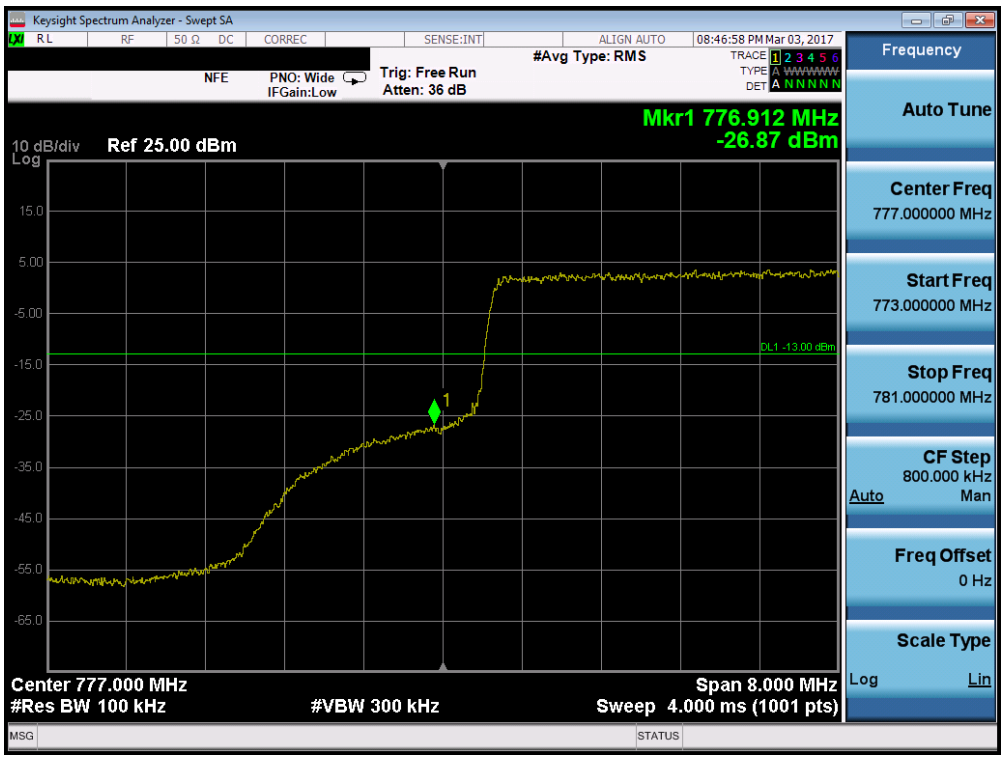
Plot 7-89. Lower Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



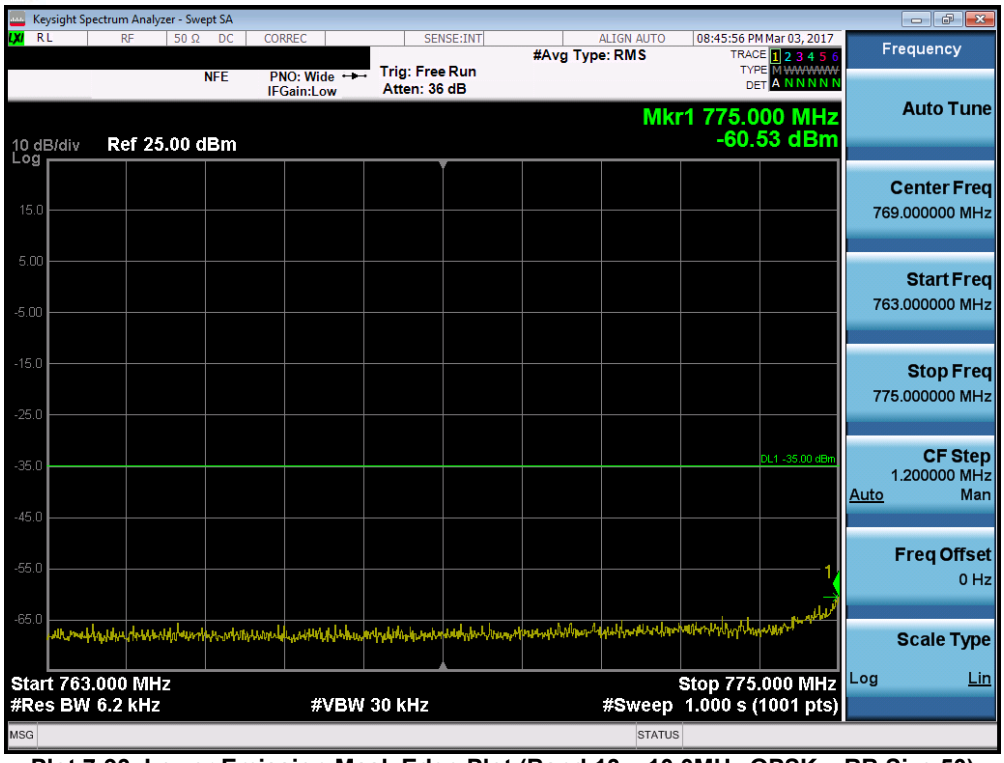
Plot 7-90. Upper Band Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



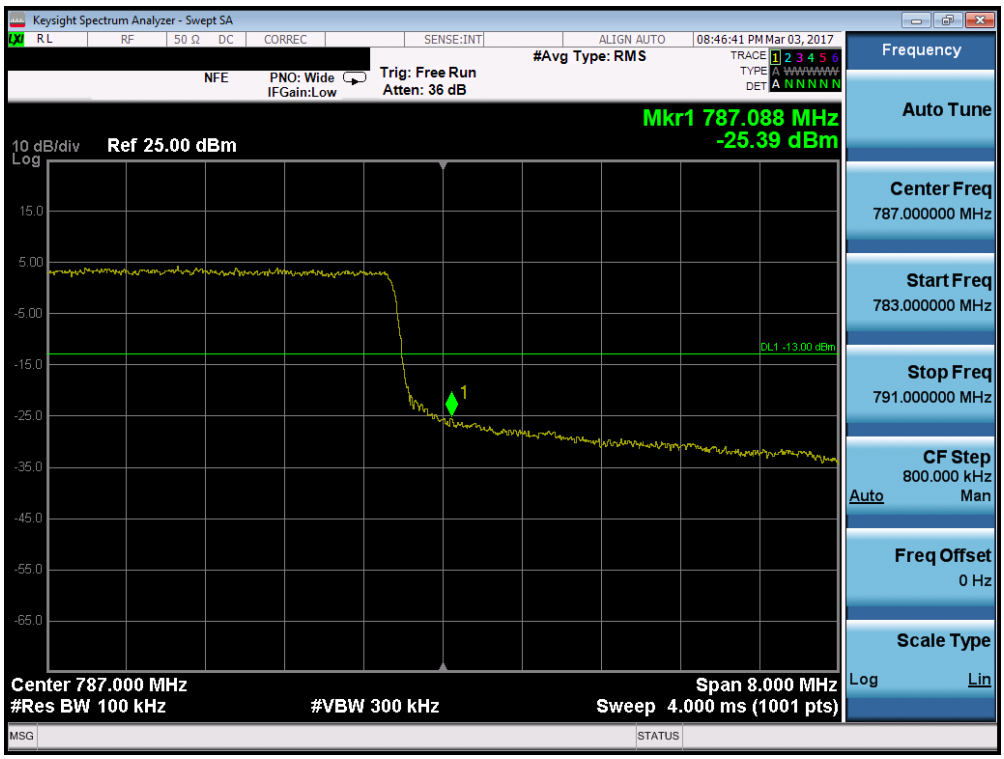
Plot 7-91. Upper Emission Mask Edge Plot (Band 13 – 5.0MHz QPSK – RB Size 25)



Plot 7-92. Lower Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

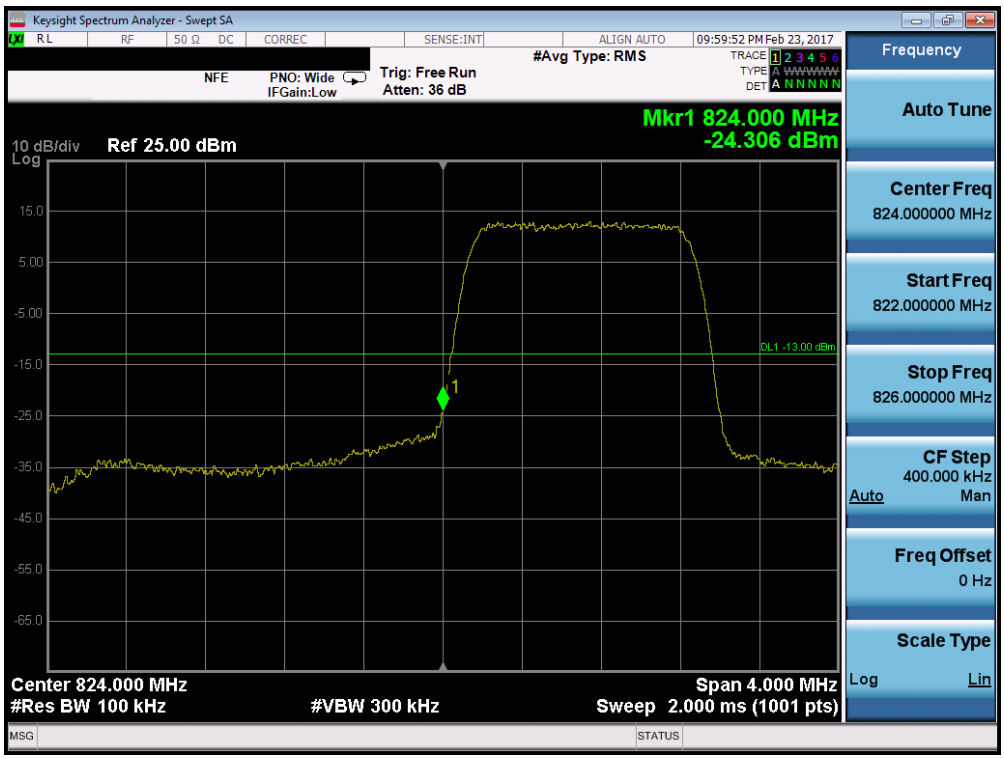


Plot 7-93. Lower Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)



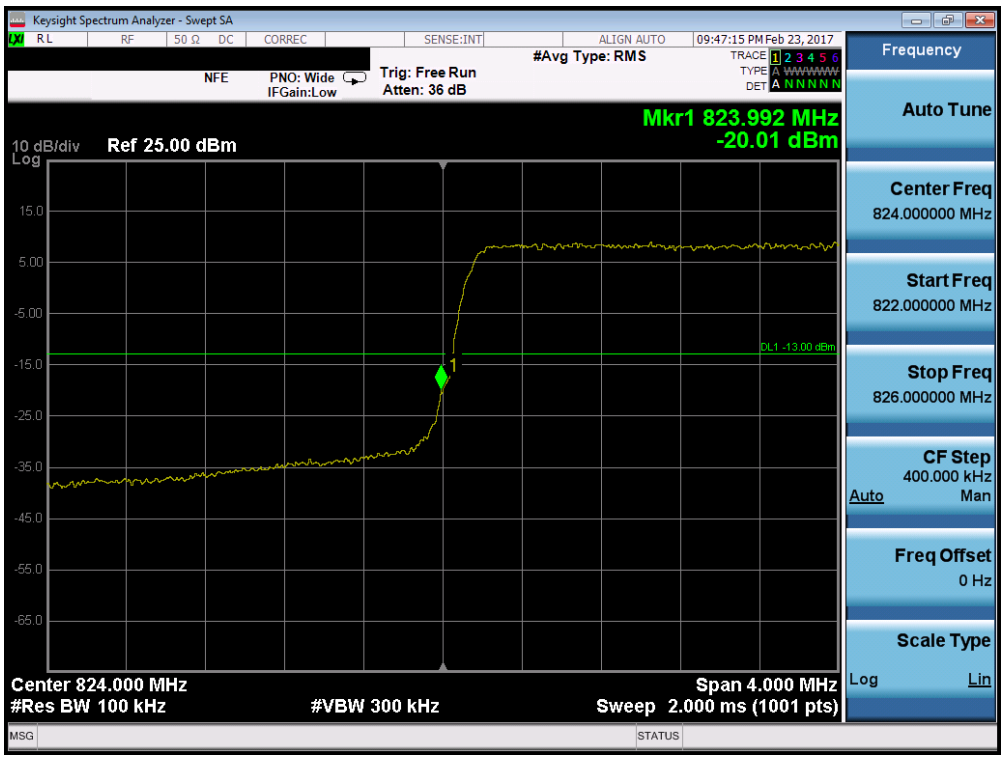
Plot 7-94. Upper Band Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

Plot 7-95. Upper Emission Mask Edge Plot (Band 13 – 10.0MHz QPSK – RB Size 50)



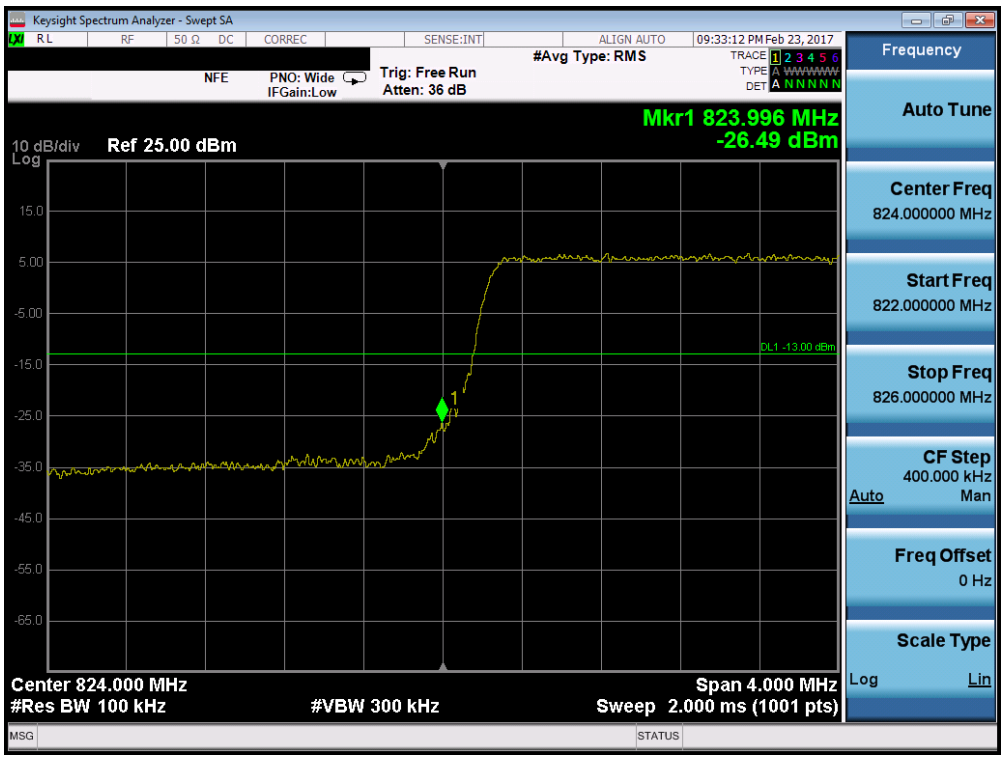
Plot 7-96. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

Plot 7-97. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



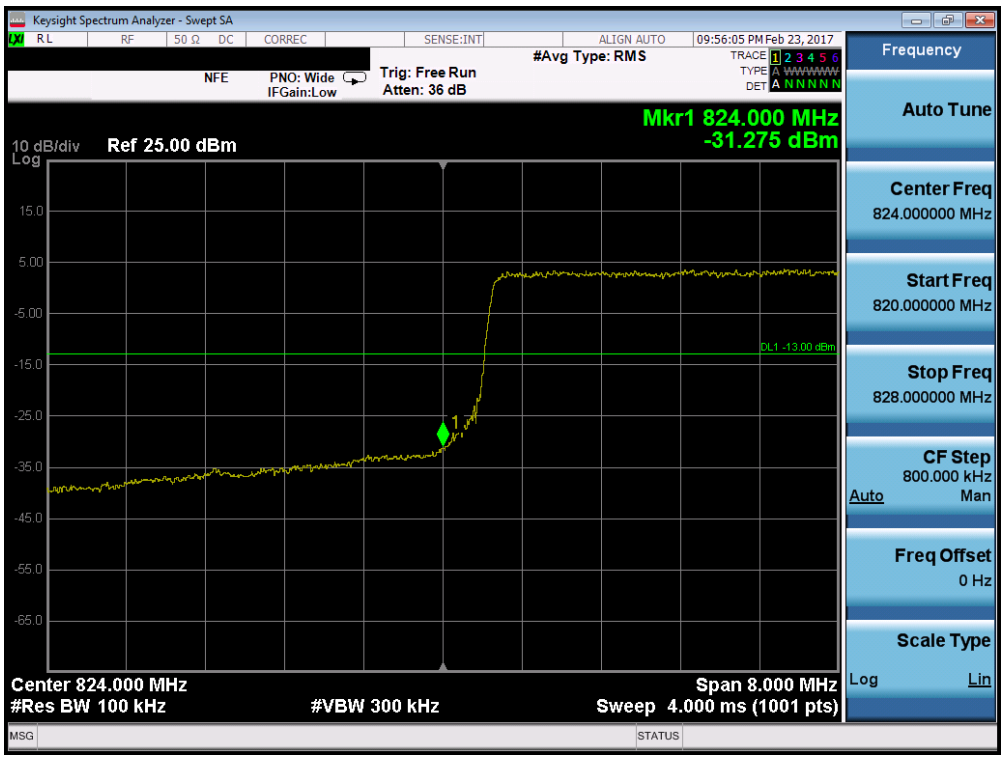
Plot 7-98. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

Plot 7-99. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)



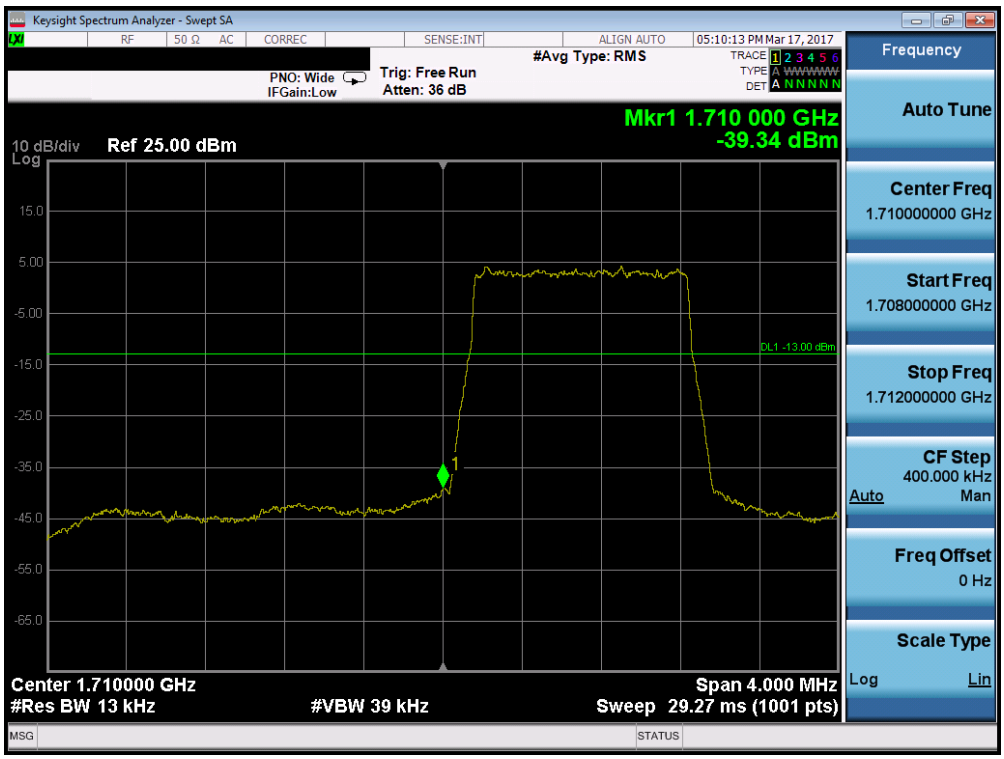
Plot 7-100. Lower Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

Plot 7-101. Upper Band Edge Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

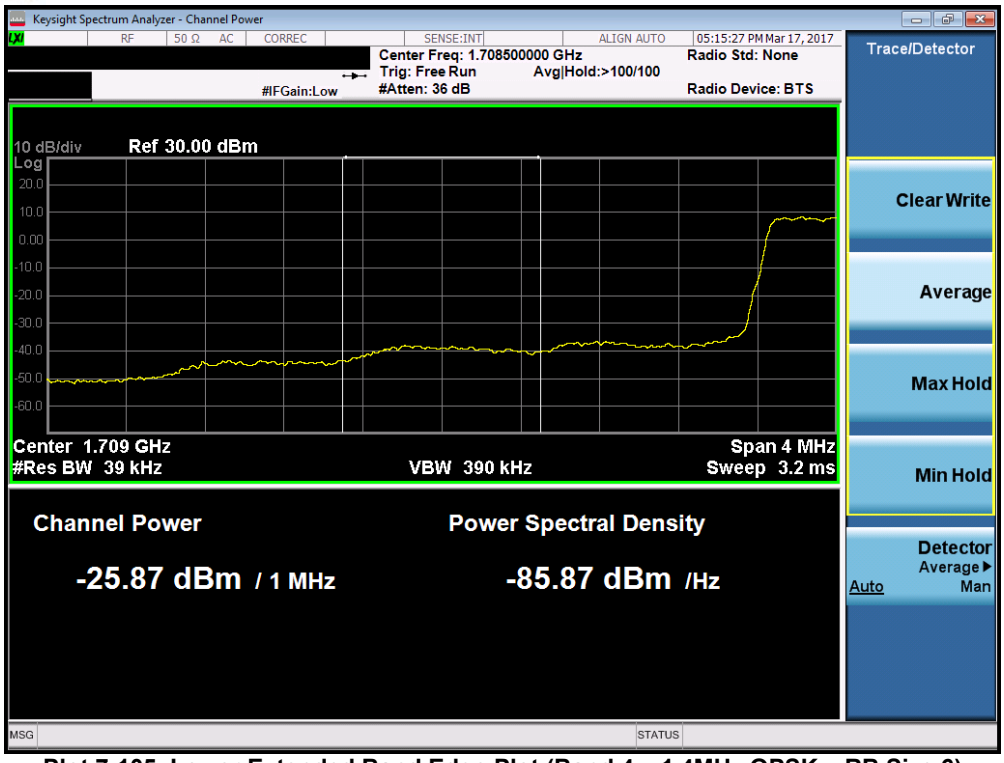


Plot 7-102. Lower Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

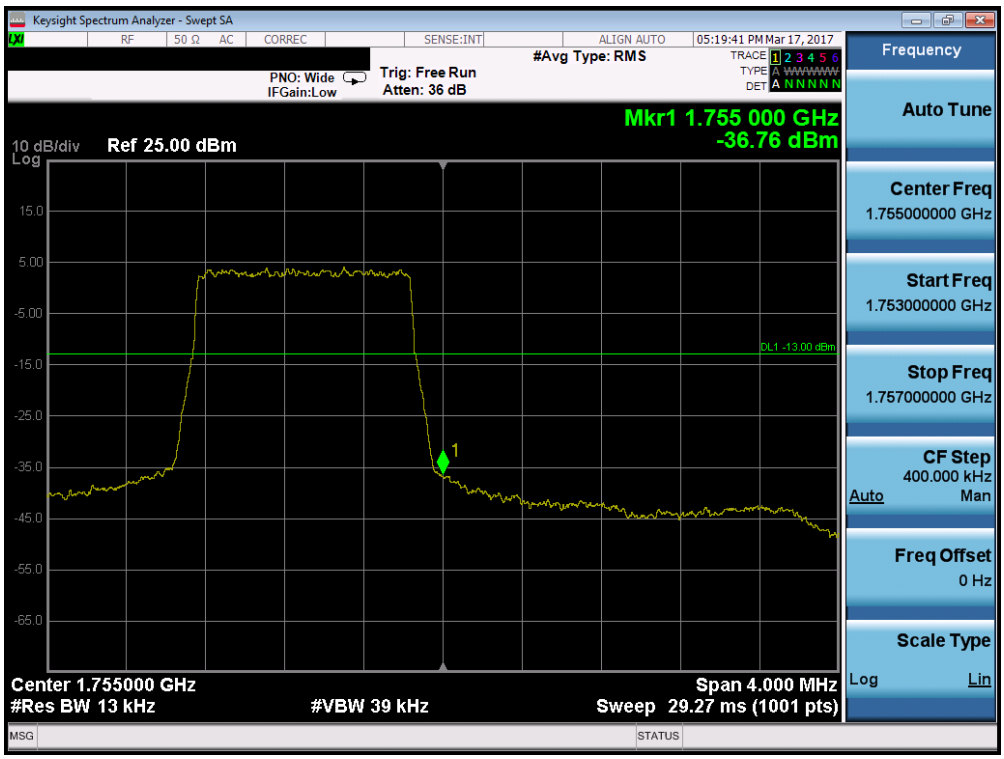
Plot 7-103. Upper Band Edge Plot (Band 5 – 10.0MHz QPSK – RB Size 50)



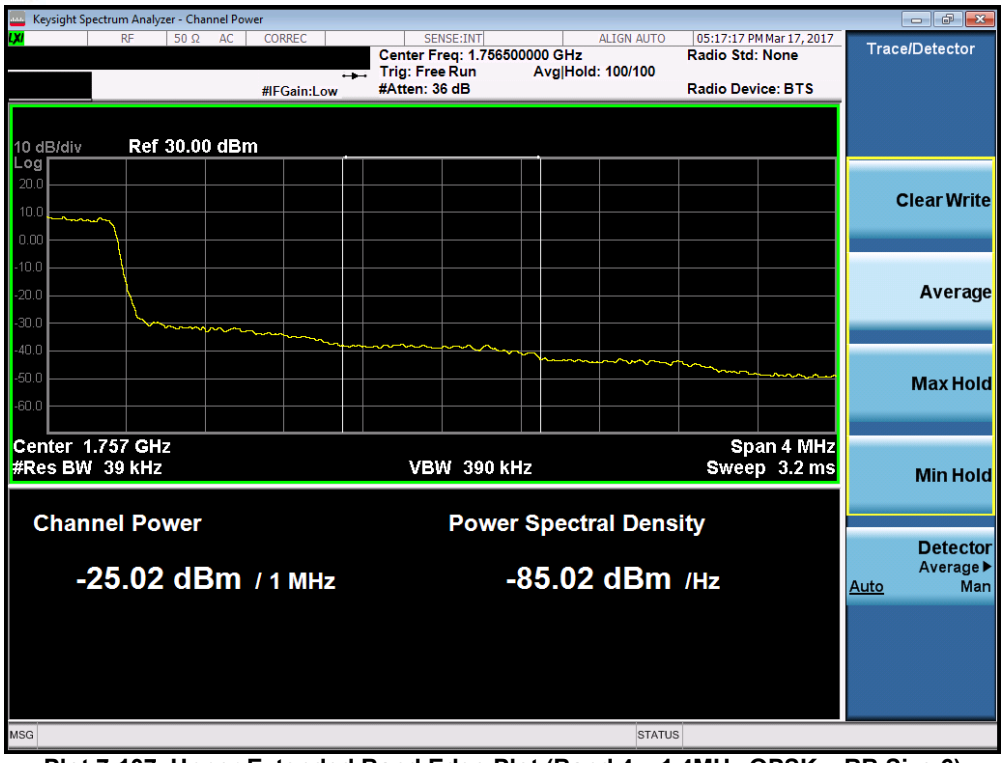
Plot 7-104. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



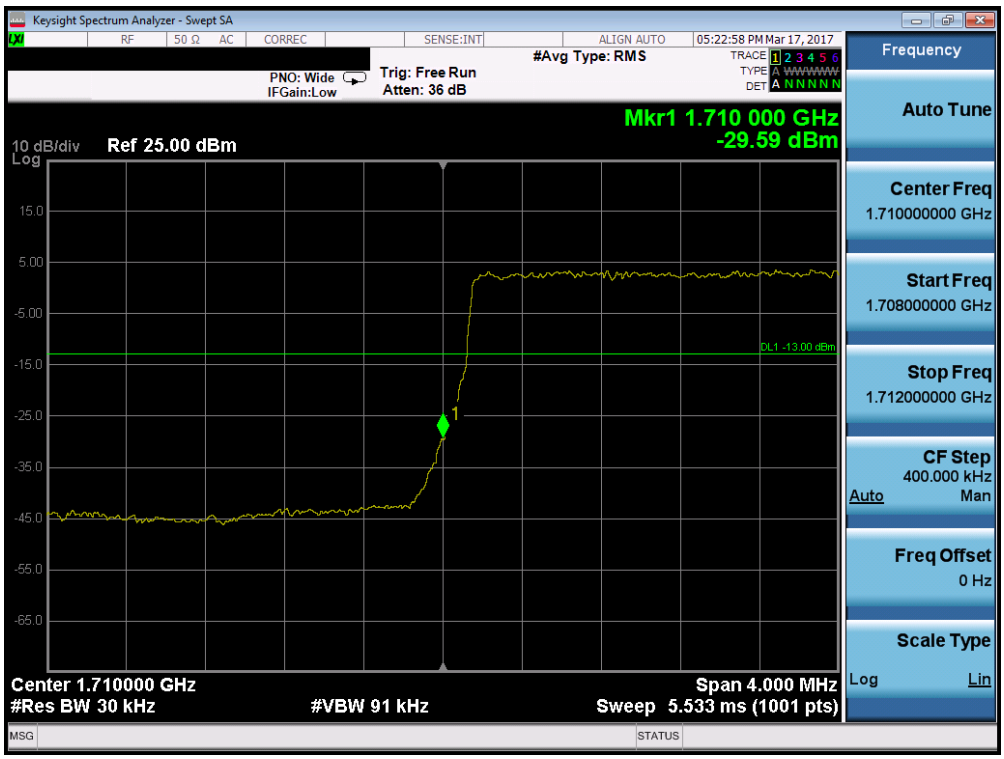
Plot 7-105. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



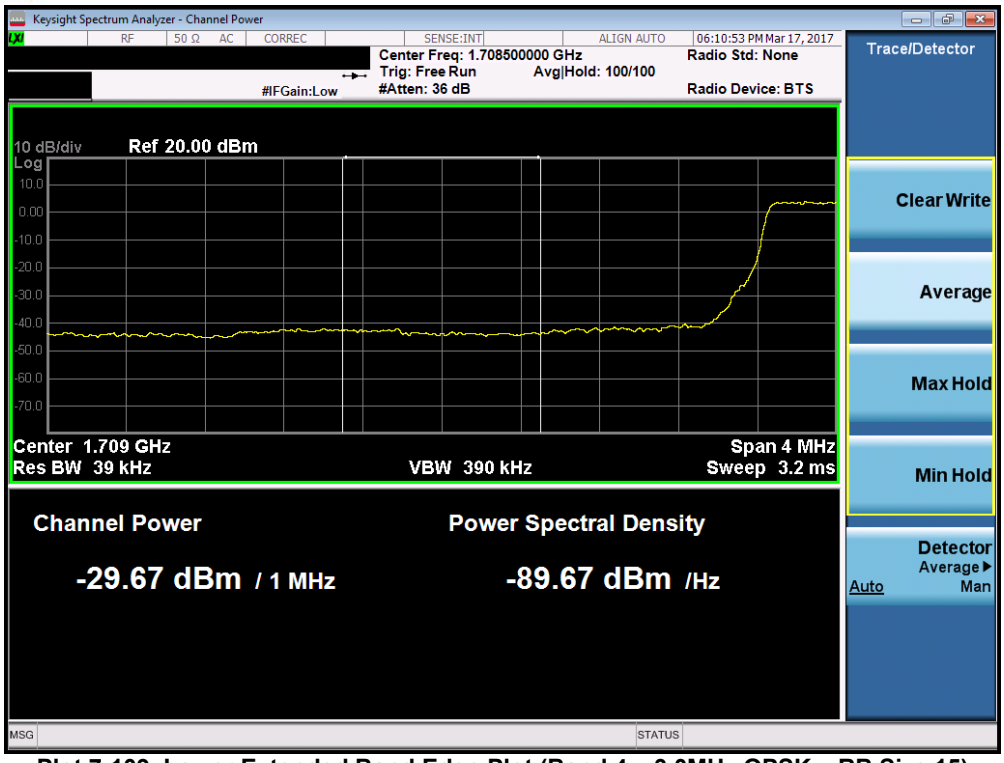
Plot 7-106. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



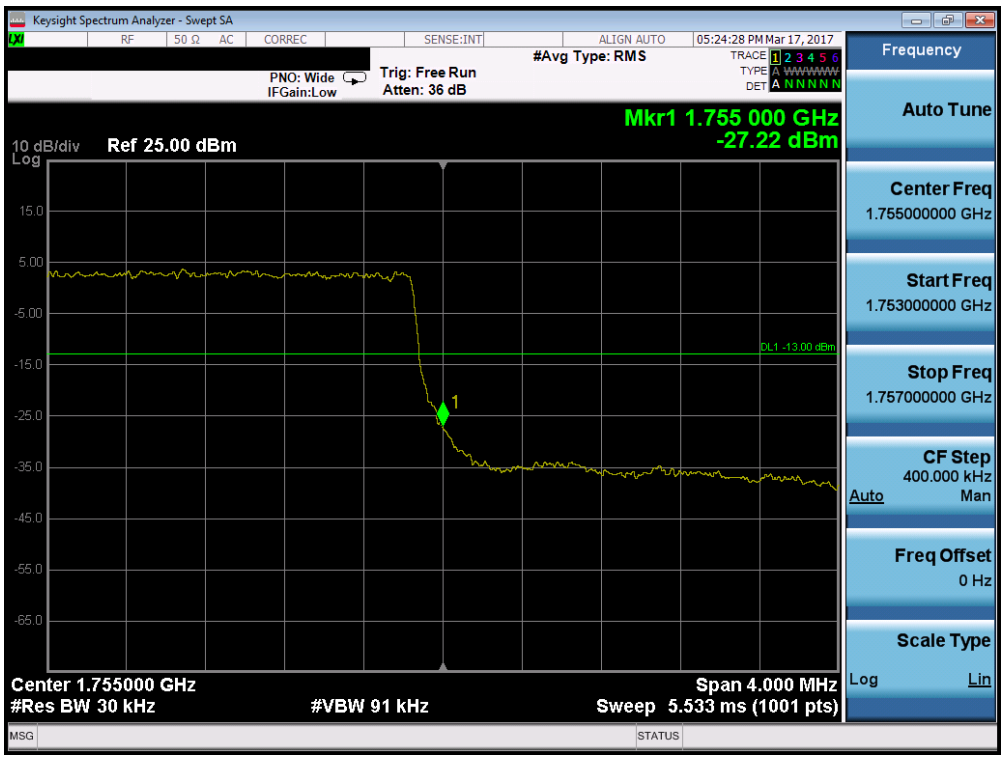
Plot 7-107. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)



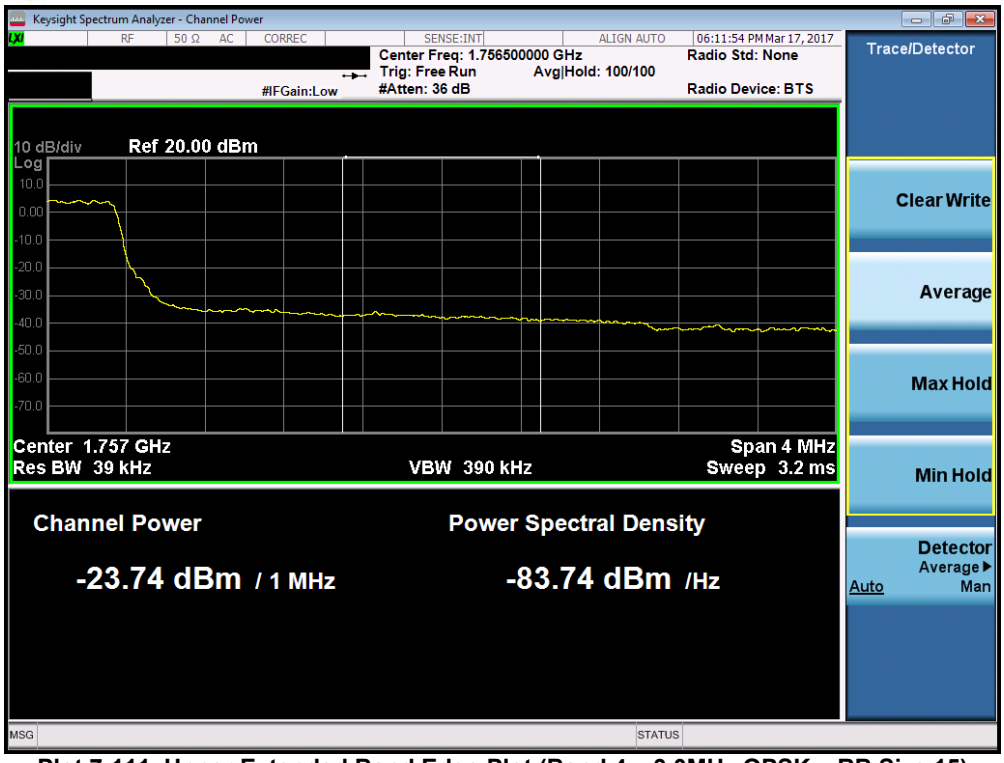
Plot 7-108. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



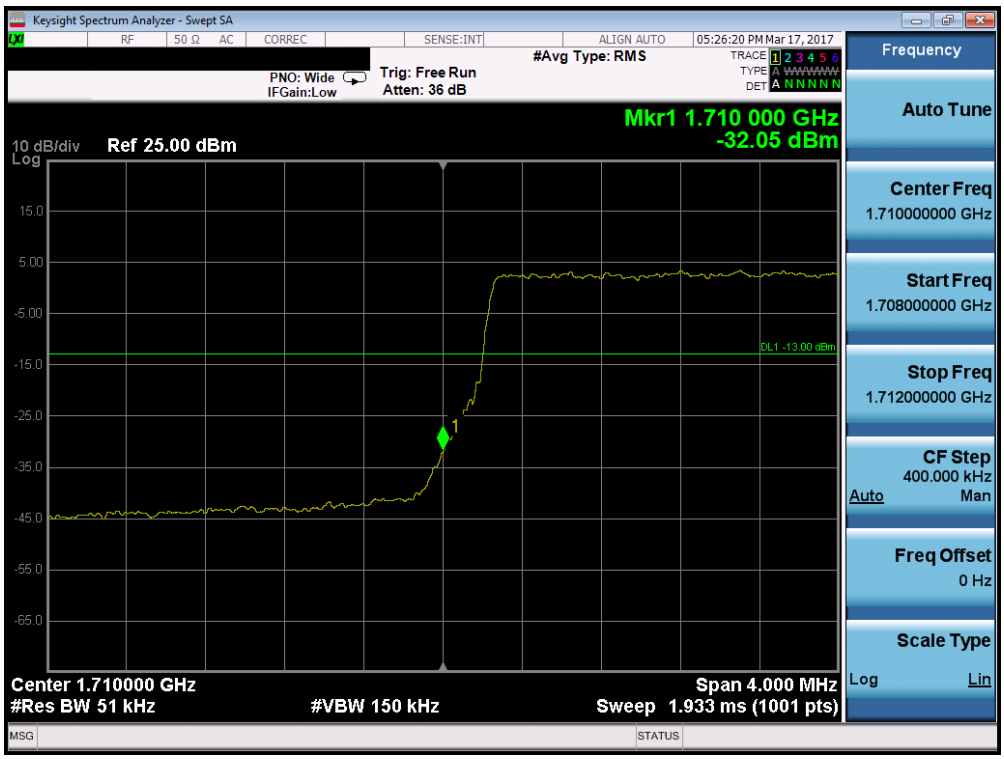
Plot 7-109. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



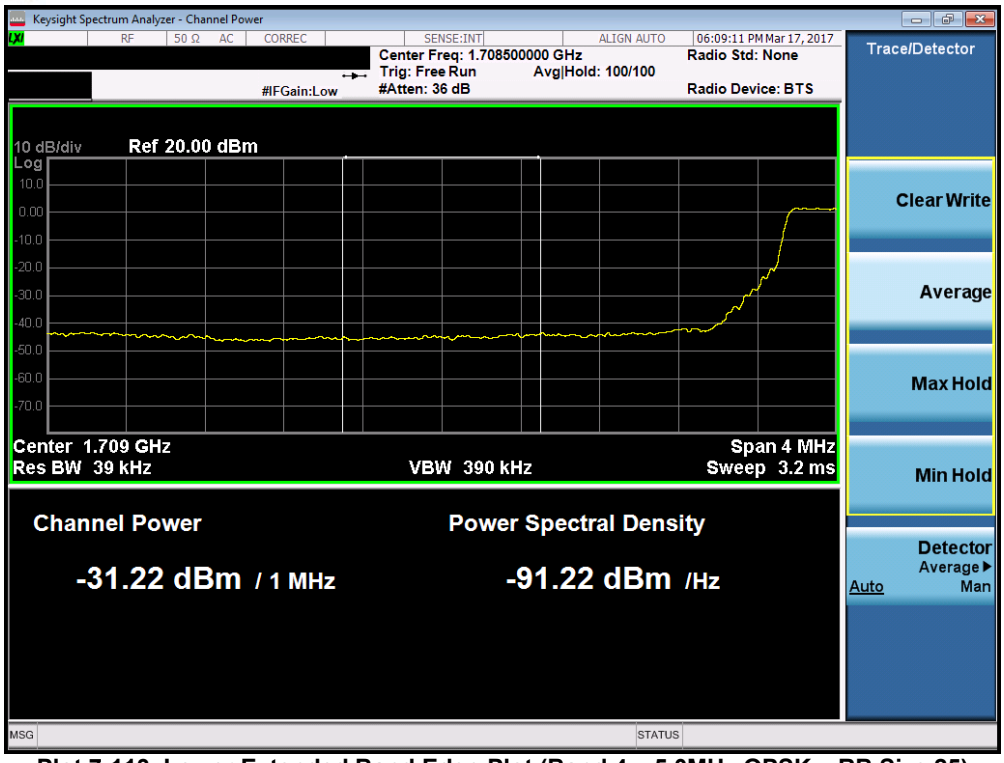
Plot 7-110. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



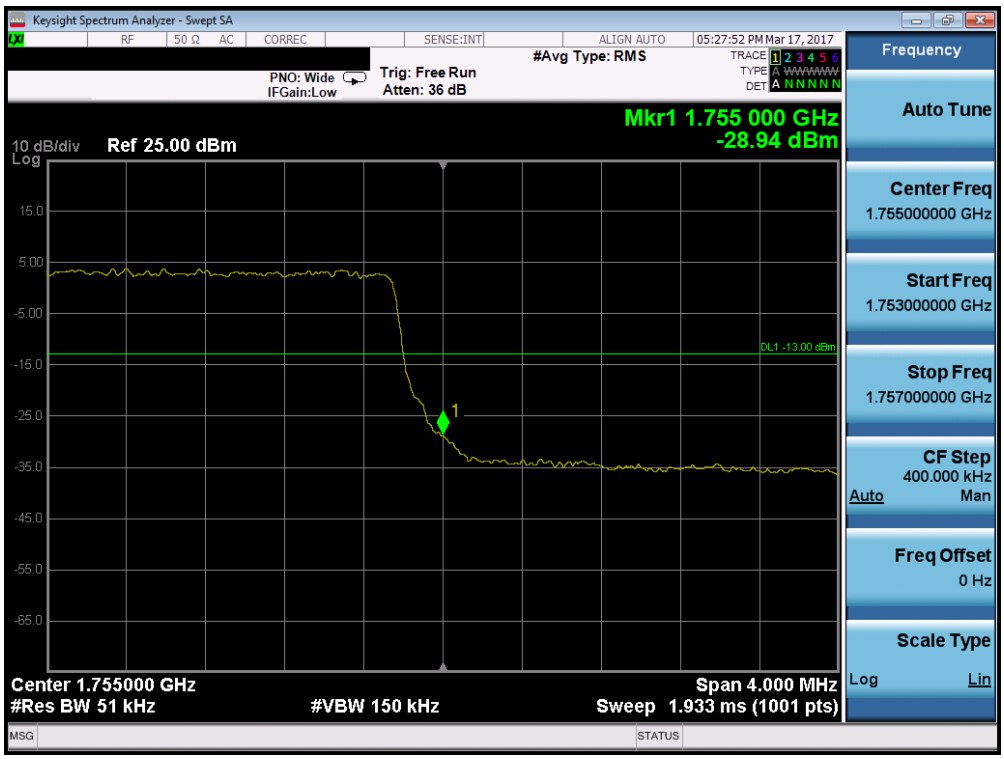
Plot 7-111. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)



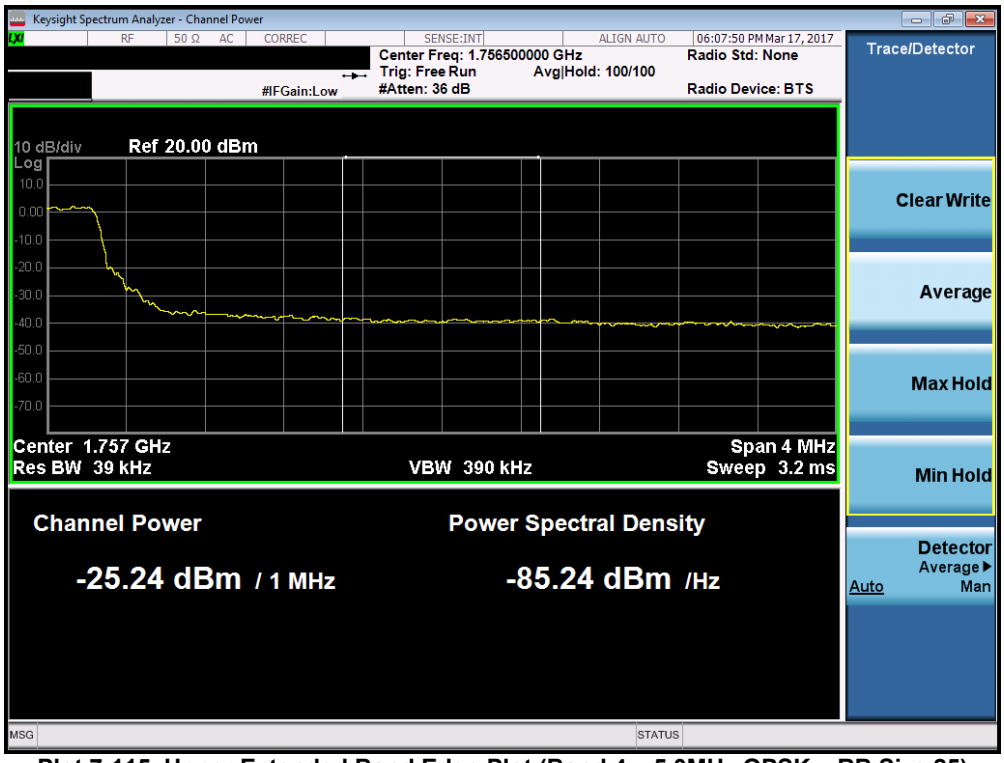
Plot 7-112. Lower Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



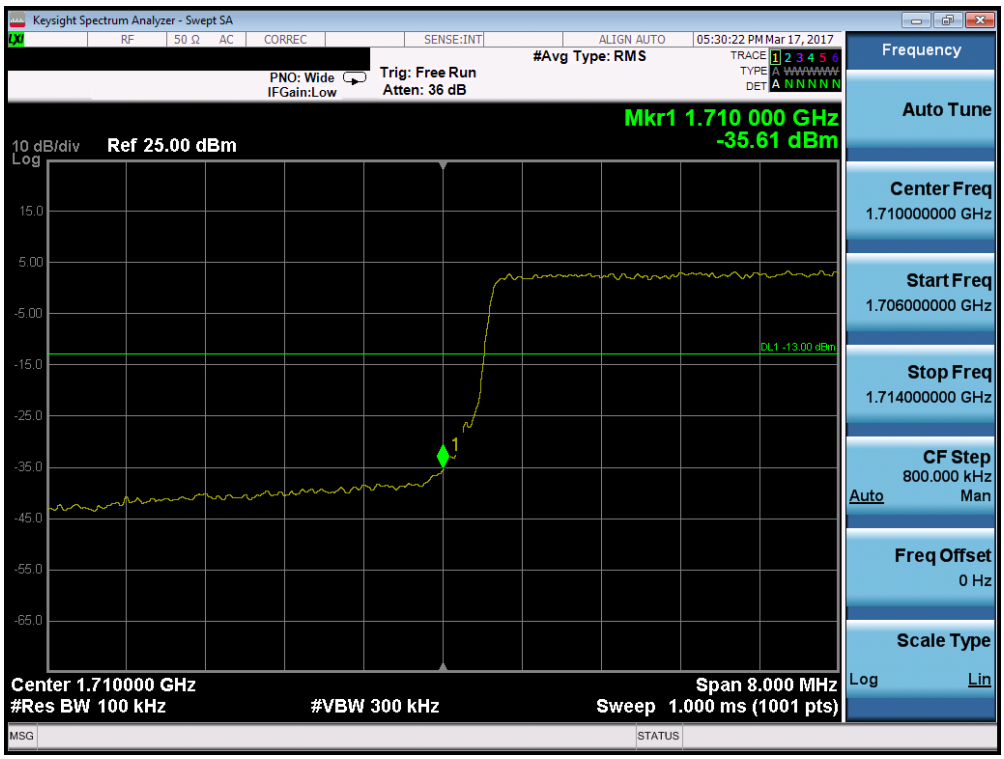
Plot 7-113. Lower Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



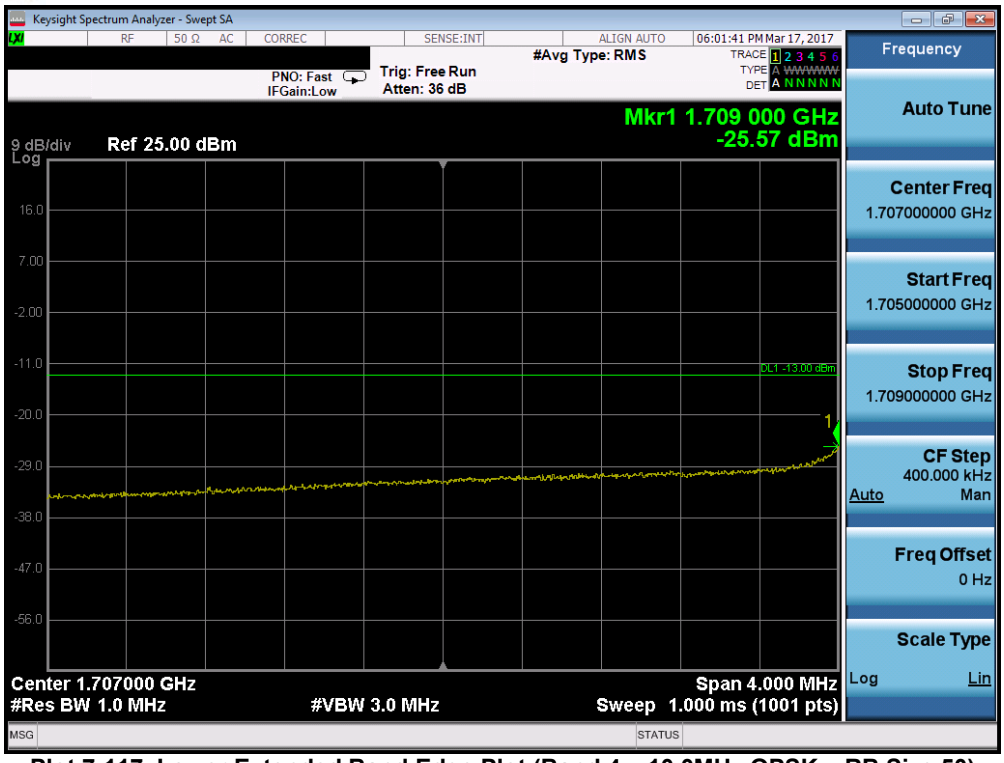
Plot 7-114. Upper Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



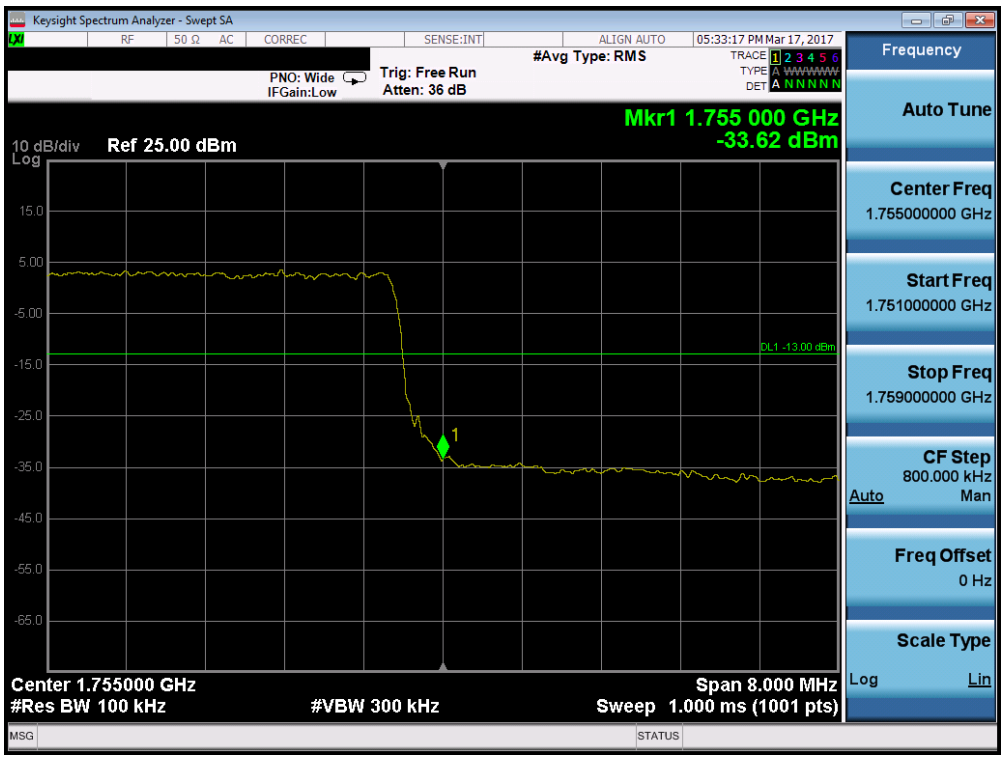
Plot 7-115. Upper Extended Band Edge Plot (Band 4 – 5.0MHz QPSK – RB Size 25)



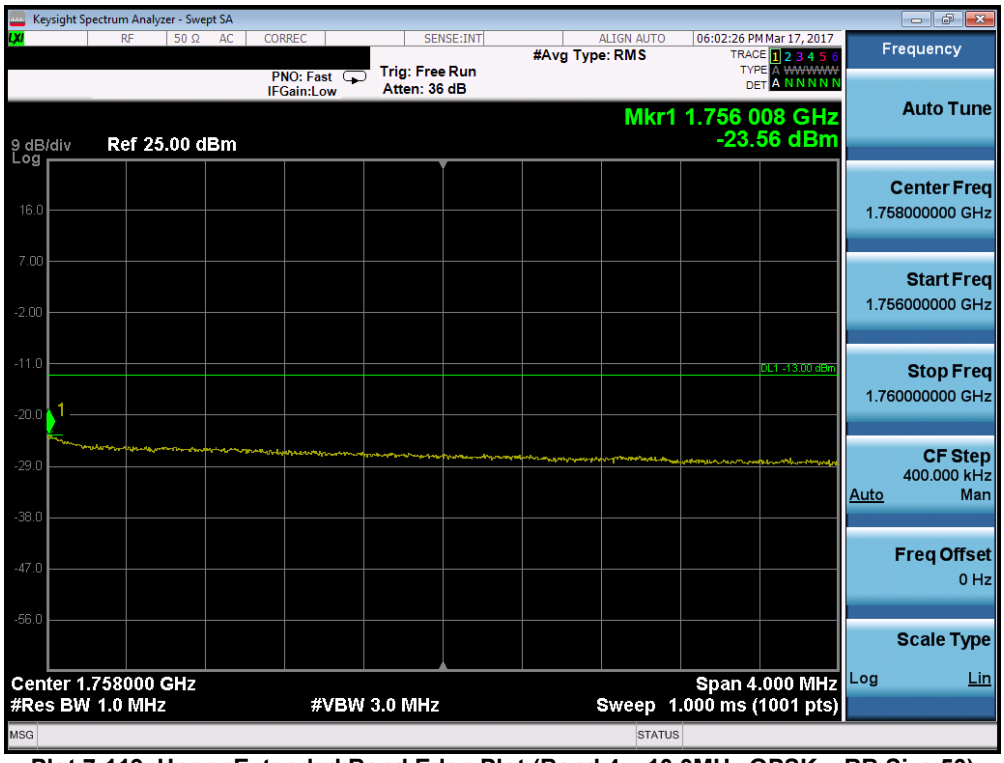
Plot 7-116. Lower Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



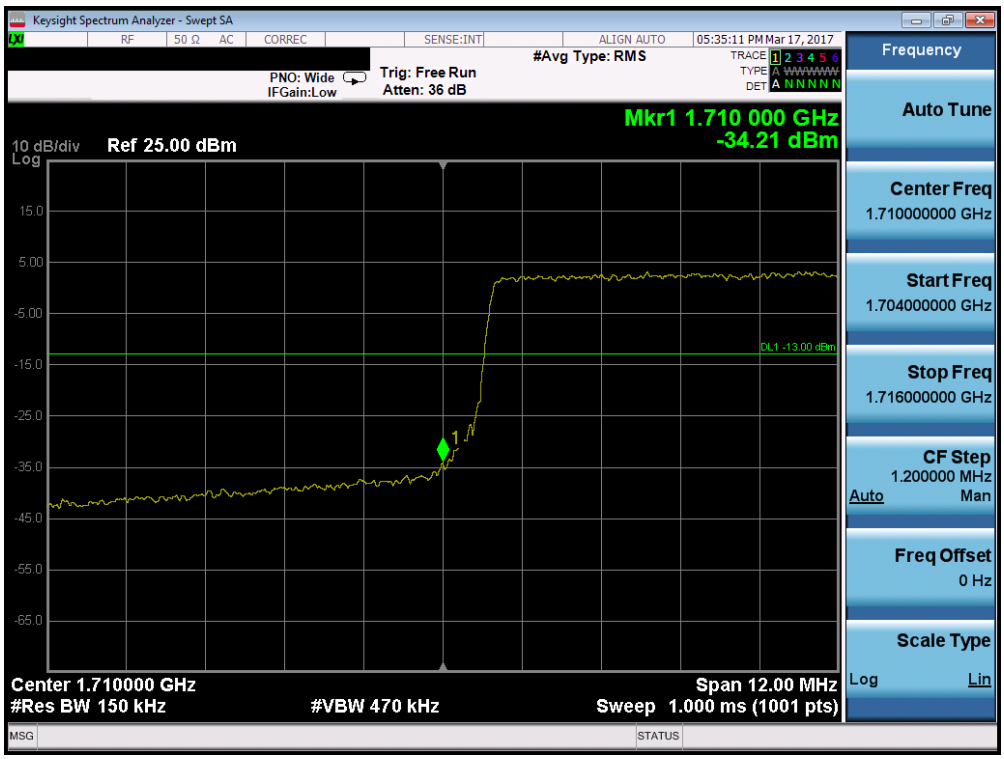
Plot 7-117. Lower Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



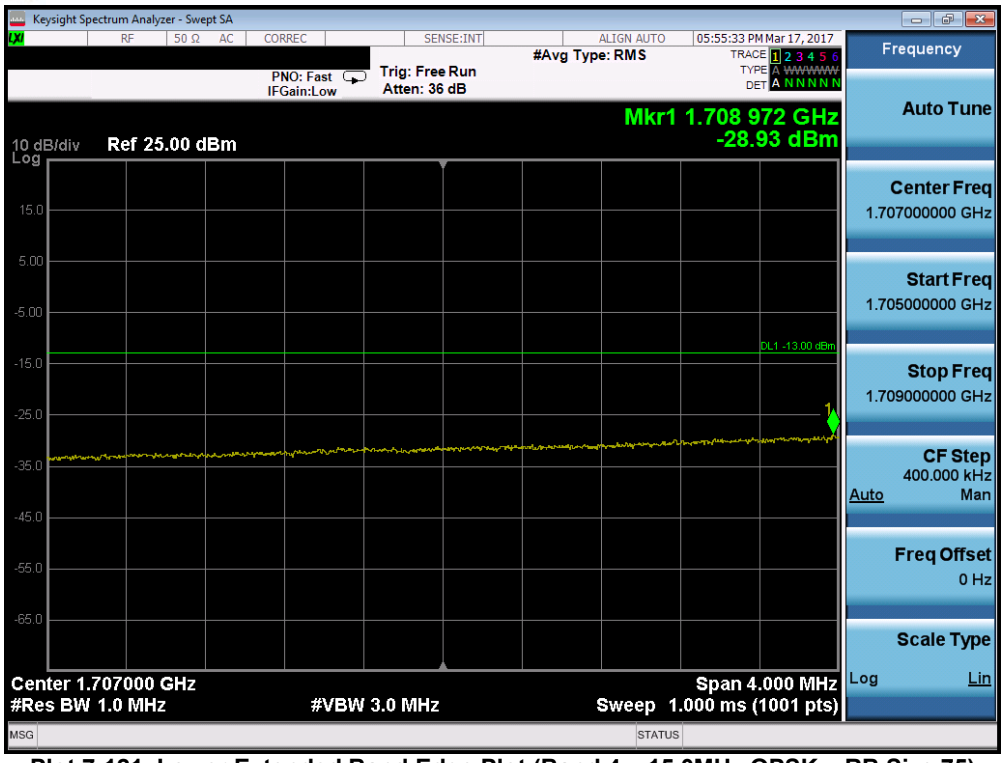
Plot 7-118. Upper Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



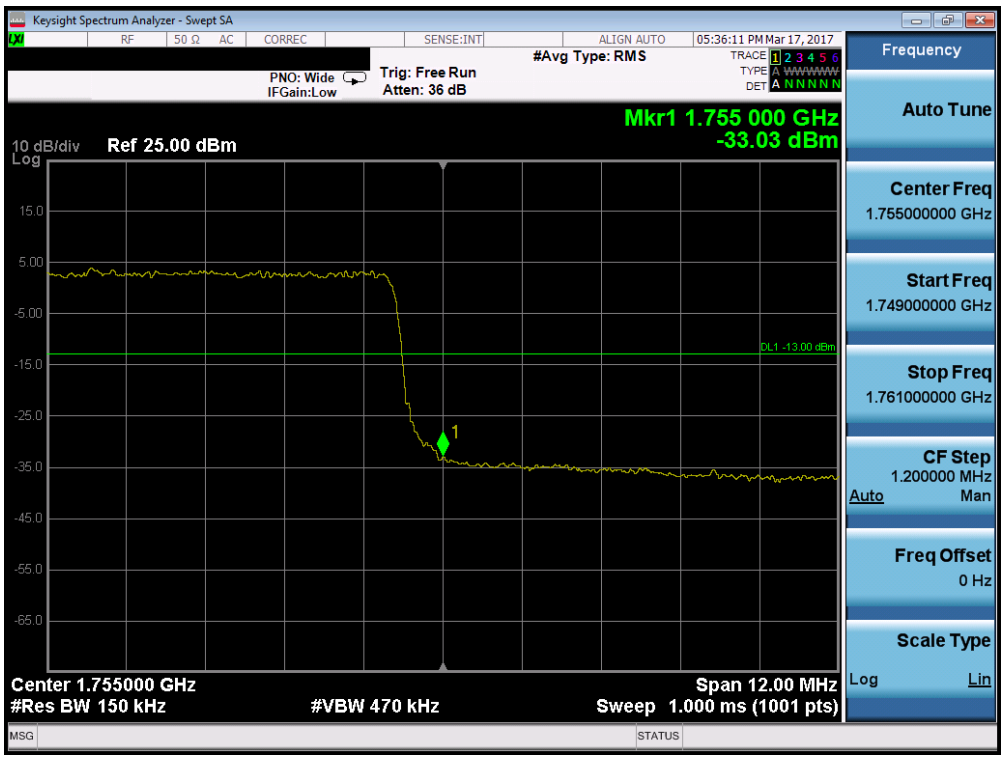
Plot 7-119. Upper Extended Band Edge Plot (Band 4 – 10.0MHz QPSK – RB Size 50)



Plot 7-120. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

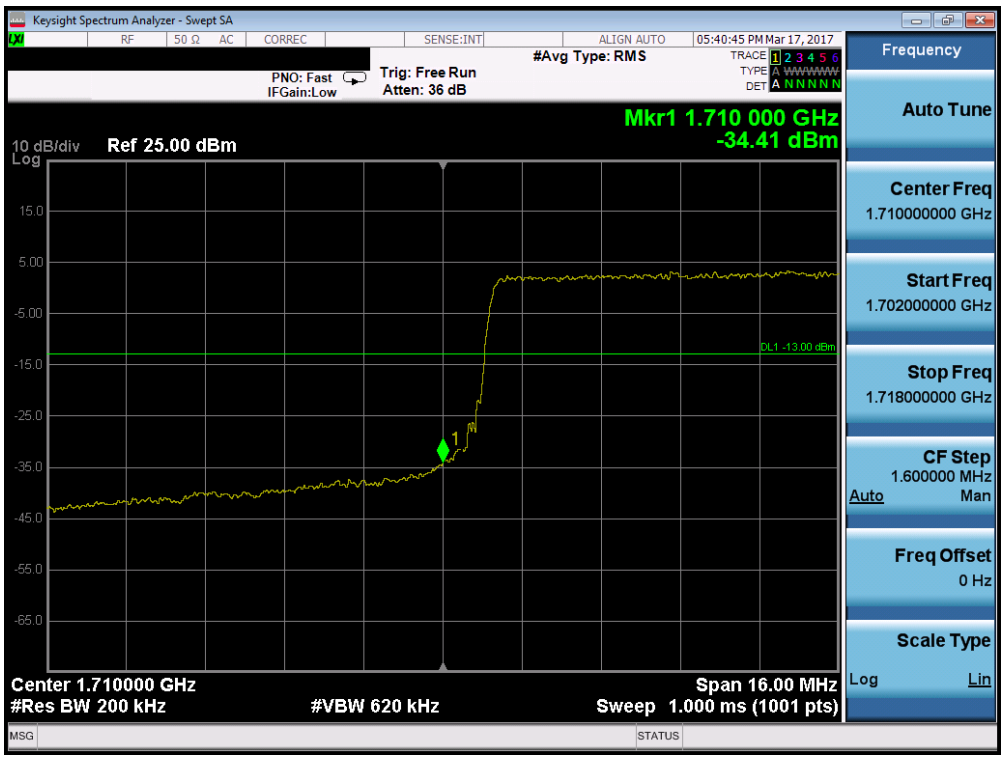


Plot 7-121. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

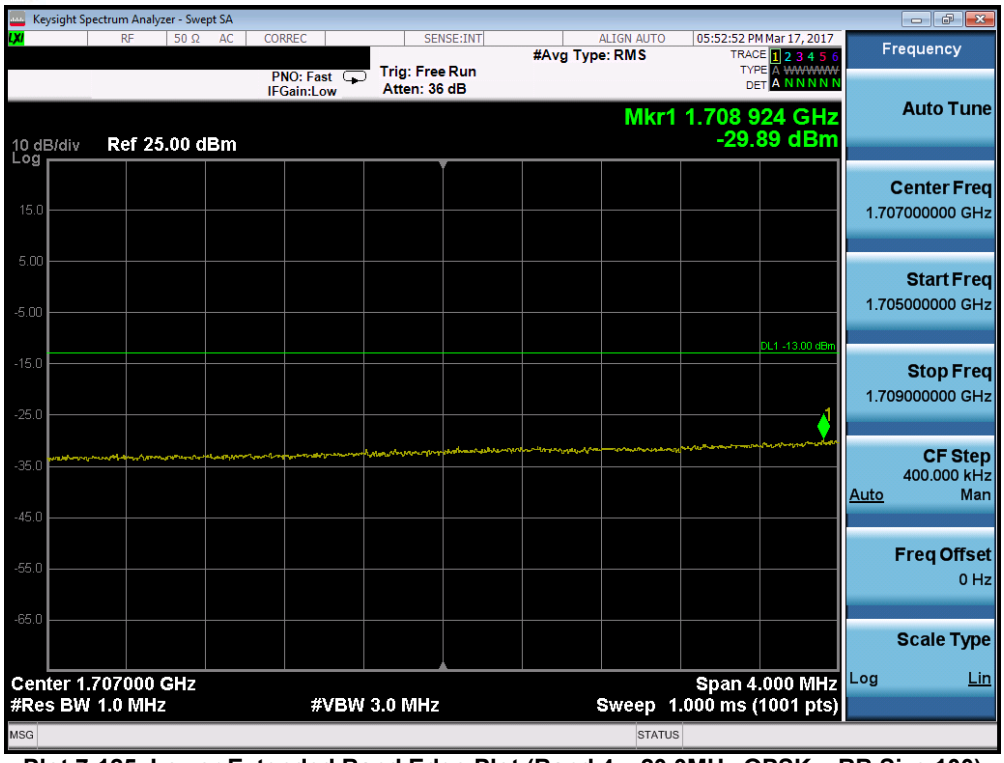


Plot 7-122. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

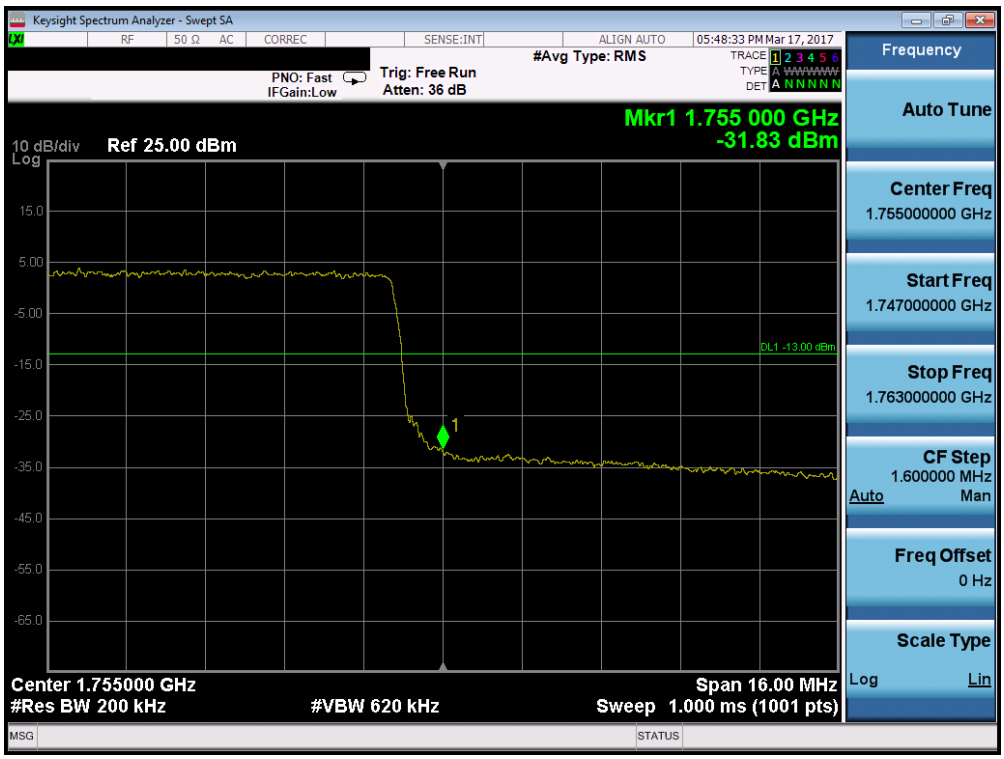
Plot 7-123. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)



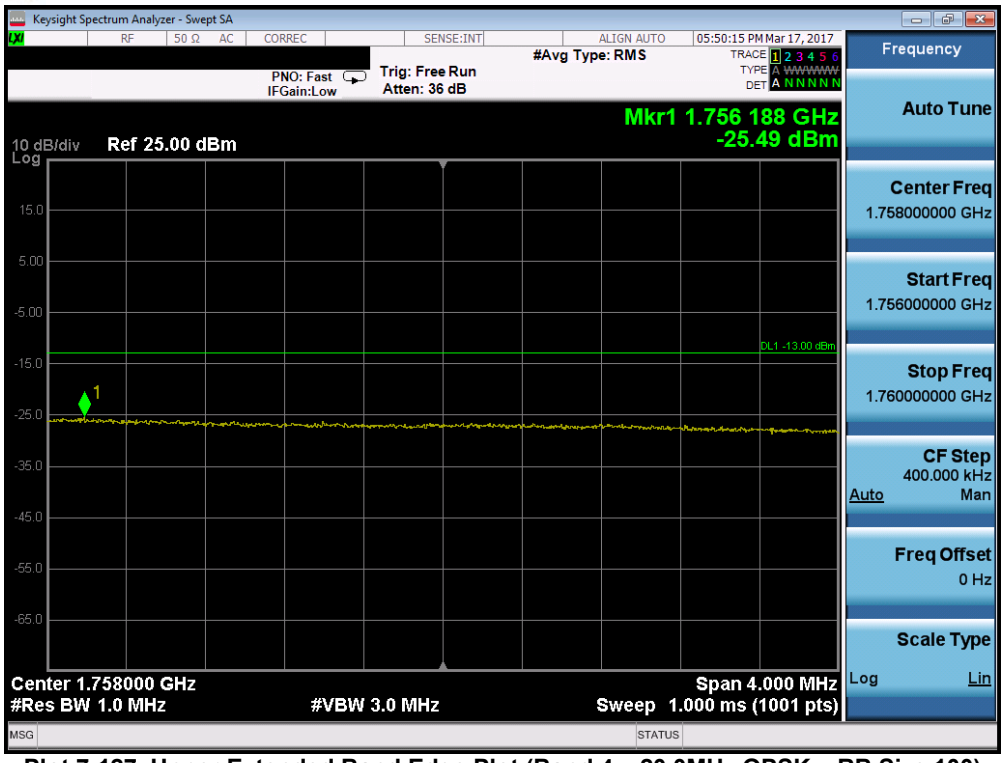
Plot 7-124. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



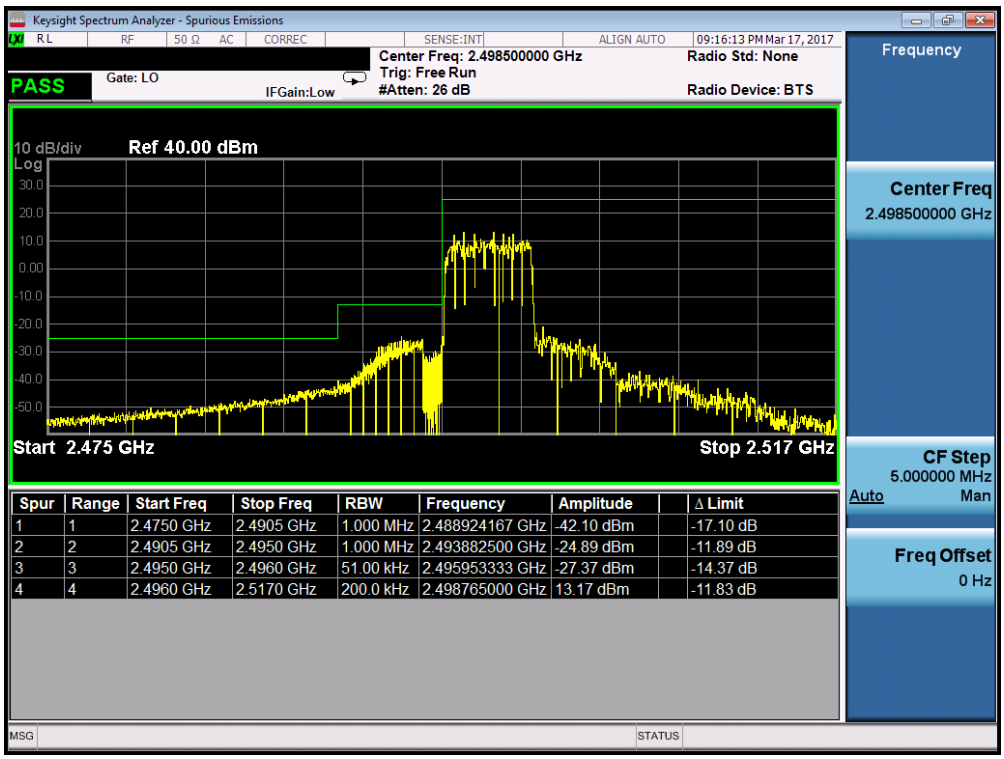
Plot 7-125. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



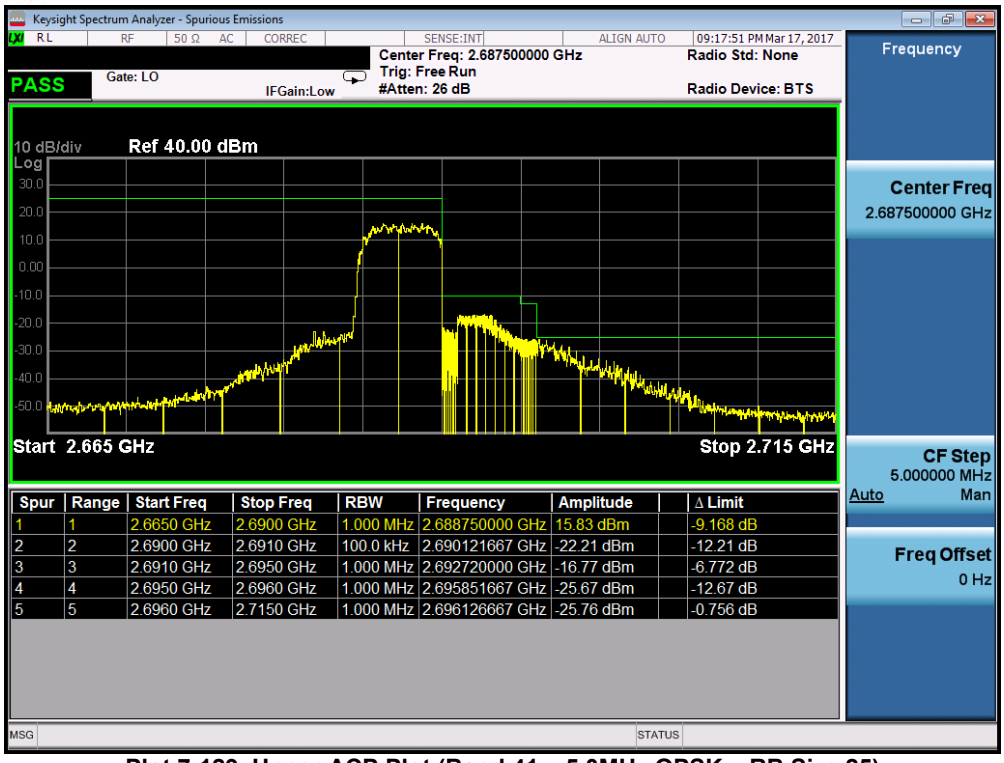
Plot 7-126. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)



Plot 7-127. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

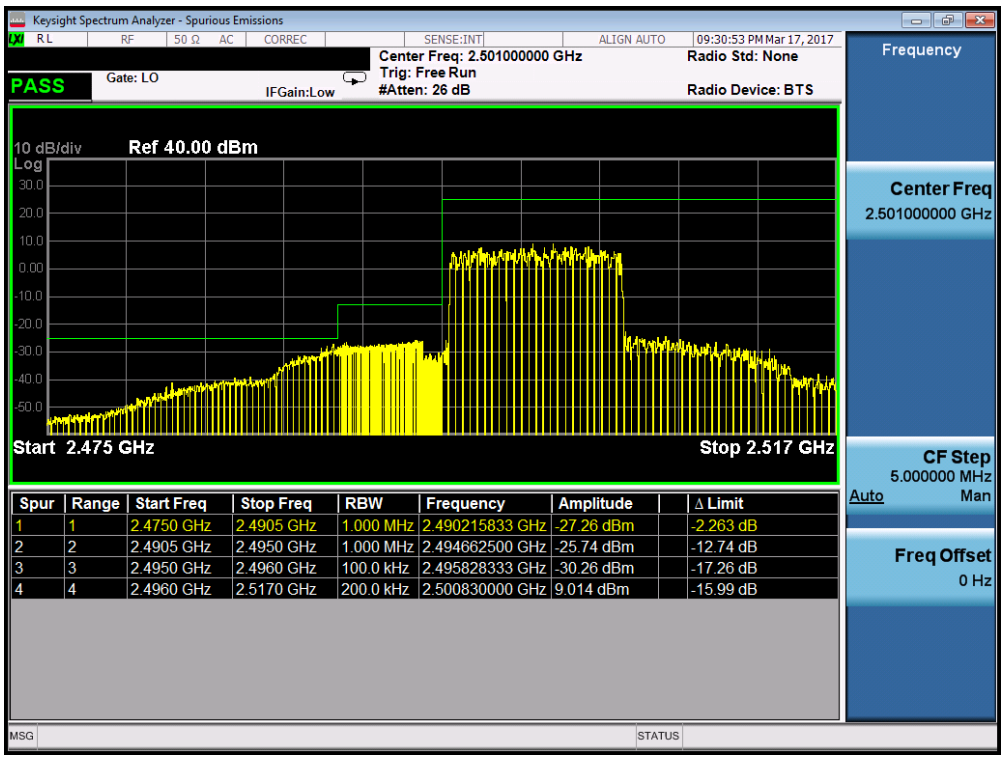


Plot 7-128. Lower ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)



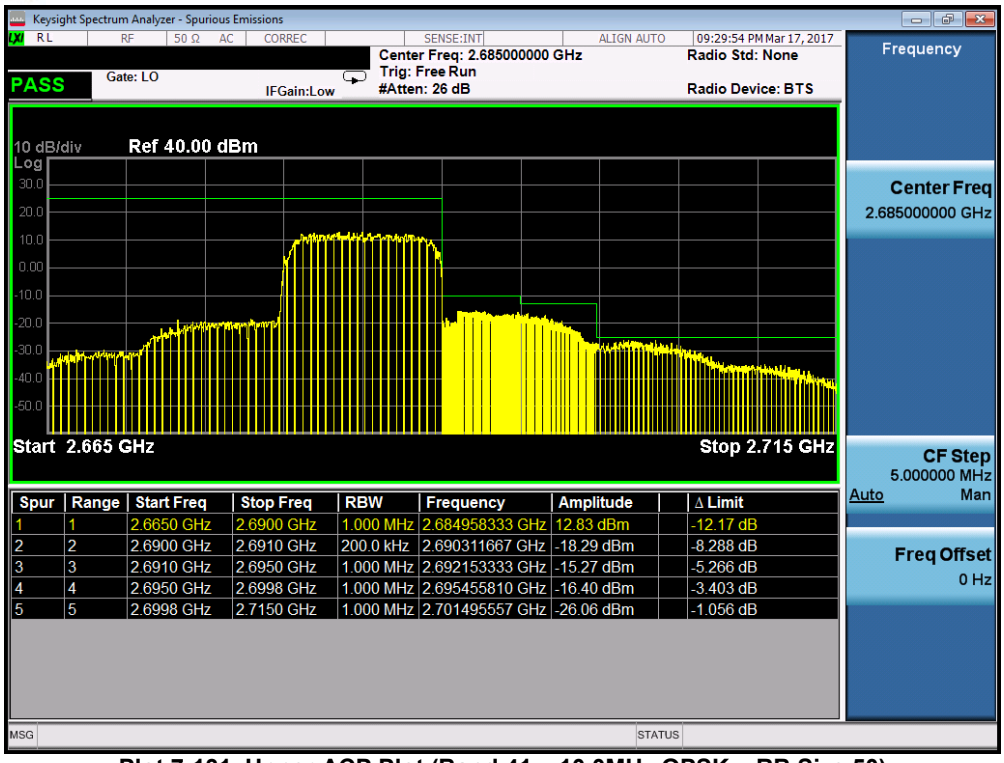
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.688750000 GHz	15.83 dBm	-9.168 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690121667 GHz	-22.21 dBm	-12.21 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692720000 GHz	-16.77 dBm	-6.772 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695851667 GHz	-25.67 dBm	-12.67 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696126667 GHz	-25.76 dBm	-0.756 dB

Plot 7-129. Upper ACP Plot (Band 41 – 5.0MHz QPSK – RB Size 25)



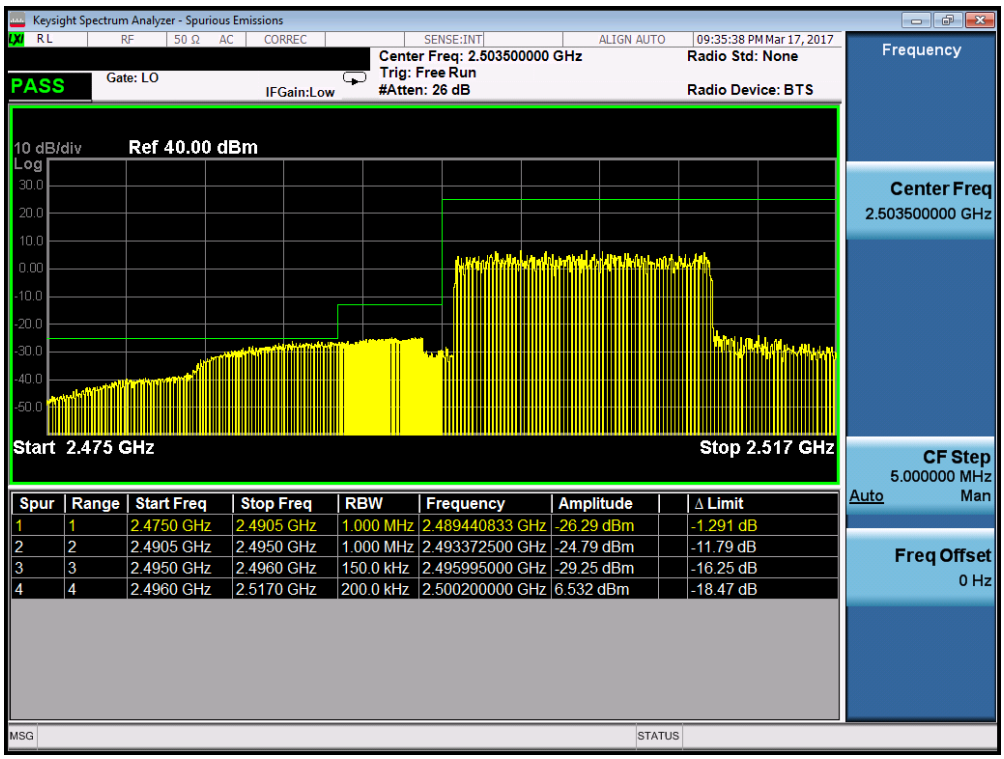
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490215833 GHz	-27.26 dBm	-2.263 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494662500 GHz	-25.74 dBm	-12.74 dB
3	3	2.4950 GHz	2.4960 GHz	100.0 kHz	2.495828333 GHz	-30.26 dBm	-17.26 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.500830000 GHz	9.014 dBm	-15.99 dB

Plot 7-130. Lower ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



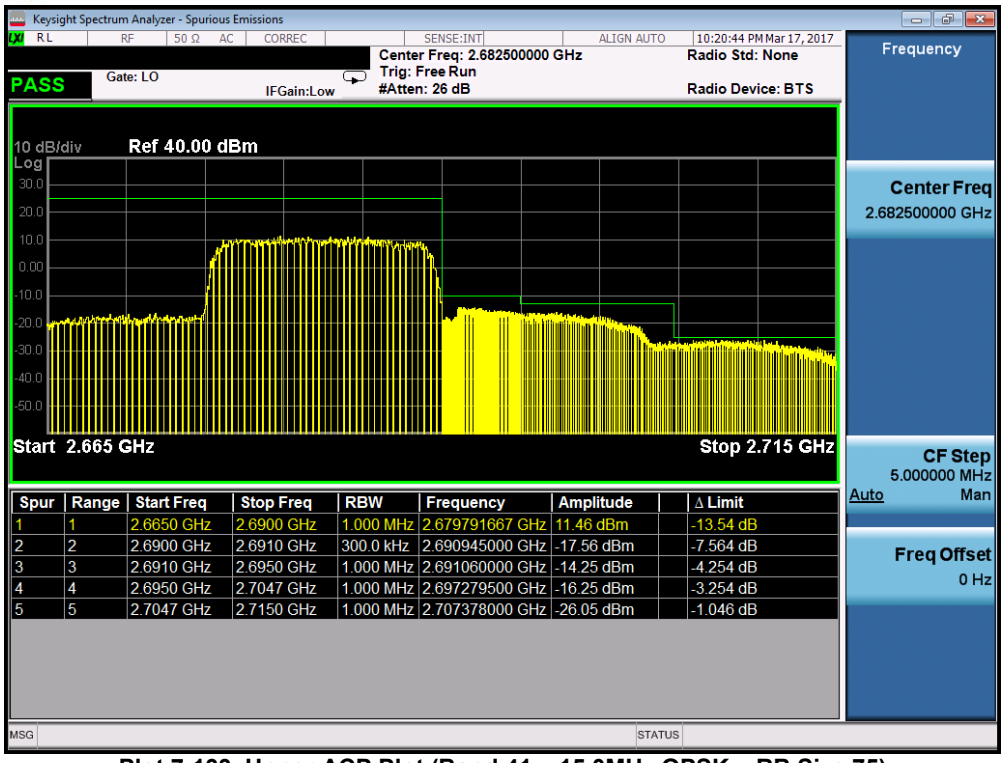
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.684958333 GHz	12.83 dBm	-12.17 dB
2	2	2.6900 GHz	2.6910 GHz	200.0 kHz	2.690311667 GHz	-18.29 dBm	-8.288 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692153333 GHz	-15.27 dBm	-5.266 dB
4	4	2.6950 GHz	2.6998 GHz	1.000 MHz	2.695455810 GHz	-16.40 dBm	-3.403 dB
5	5	2.6998 GHz	2.7150 GHz	1.000 MHz	2.701495557 GHz	-26.06 dBm	-1.056 dB

Plot 7-131. Upper ACP Plot (Band 41 – 10.0MHz QPSK – RB Size 50)



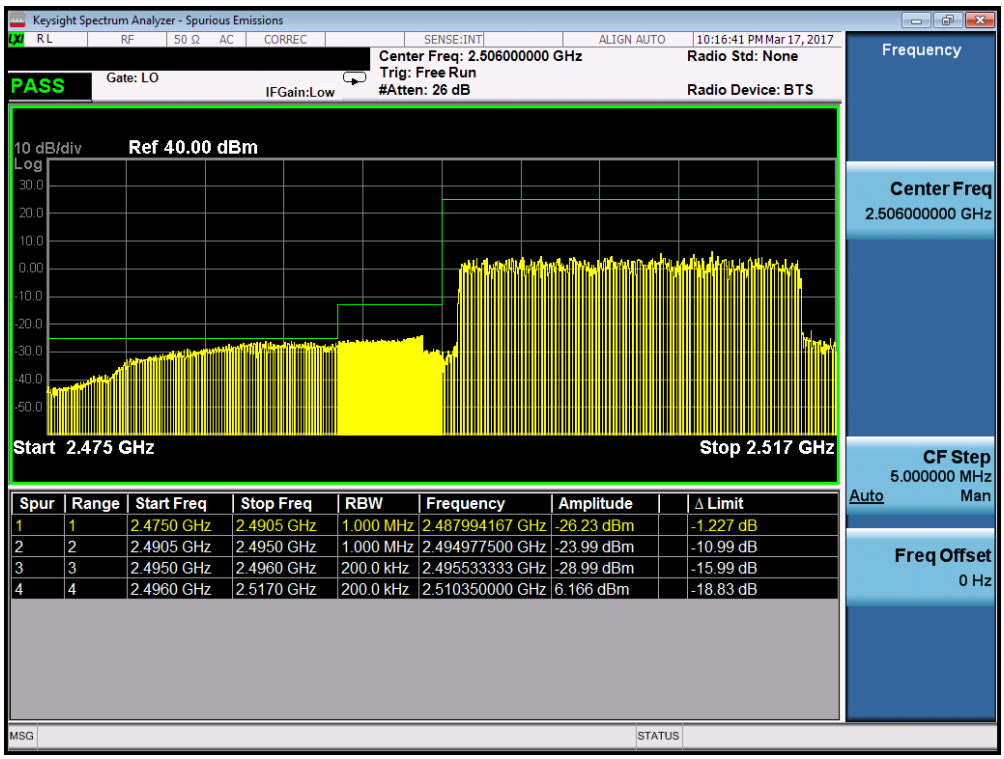
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489440833 GHz	-26.29 dBm	-1.291 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.493372500 GHz	-24.79 dBm	-11.79 dB
3	3	2.4950 GHz	2.4960 GHz	150.0 kHz	2.495995000 GHz	-29.25 dBm	-16.25 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.500200000 GHz	6.532 dBm	-18.47 dB

Plot 7-132. Lower ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



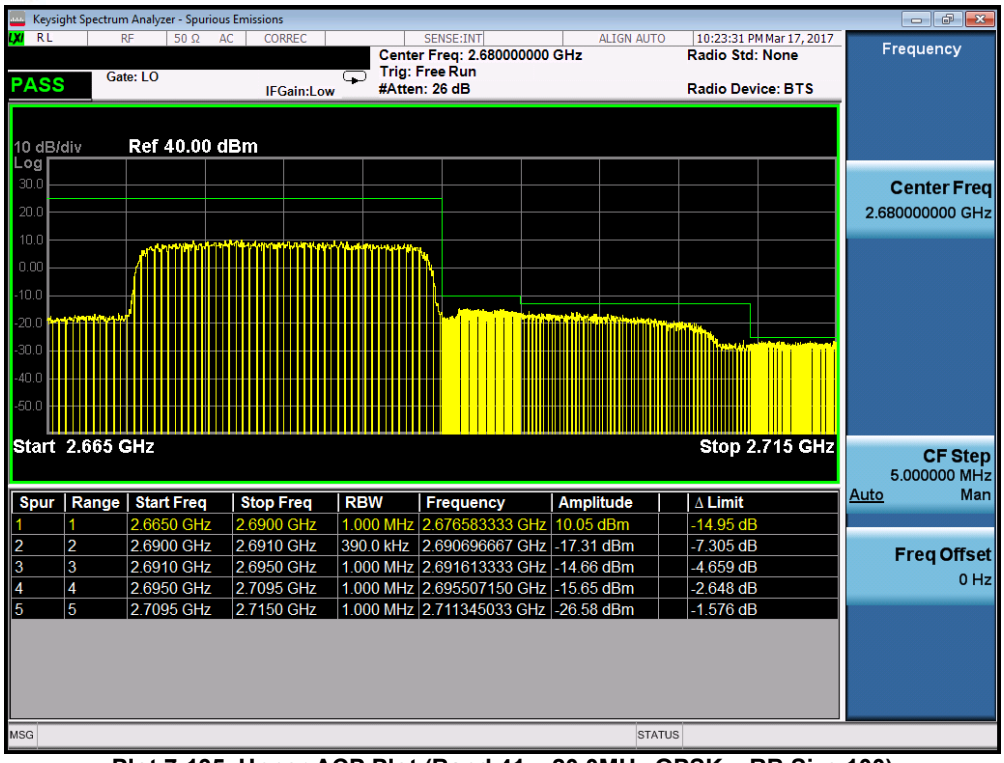
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.679791667 GHz	11.46 dBm	-13.54 dB
2	2	2.6900 GHz	2.6910 GHz	300.0 kHz	2.690945000 GHz	-17.56 dBm	-7.564 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691060000 GHz	-14.25 dBm	-4.254 dB
4	4	2.6950 GHz	2.7047 GHz	1.000 MHz	2.697279500 GHz	-16.25 dBm	-3.254 dB
5	5	2.7047 GHz	2.7150 GHz	1.000 MHz	2.707378000 GHz	-26.05 dBm	-1.046 dB

Plot 7-133. Upper ACP Plot (Band 41 – 15.0MHz QPSK – RB Size 75)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.487994167 GHz	-26.23 dBm	-1.227 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494977500 GHz	-23.99 dBm	-10.99 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495533333 GHz	-28.99 dBm	-15.99 dB
4	4	2.4960 GHz	2.5170 GHz	200.0 kHz	2.510350000 GHz	6.166 dBm	-18.83 dB

Plot 7-134. Lower ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	1.000 MHz	2.676583333 GHz	10.05 dBm	-14.95 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690696667 GHz	-17.31 dBm	-7.305 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691613333 GHz	-14.66 dBm	-4.659 dB
4	4	2.6950 GHz	2.7095 GHz	1.000 MHz	2.695507150 GHz	-15.65 dBm	-2.648 dB
5	5	2.7095 GHz	2.7150 GHz	1.000 MHz	2.711345033 GHz	-26.58 dBm	-1.576 dB

Plot 7-135. Upper ACP Plot (Band 41 – 20.0MHz QPSK – RB Size 100)

7.5 Radiated Power (ERP/EIRP)

§22.913(a.2) §24.232(c.2) §27.50(h.2) §27.50(b.10) §27.50(c.10) §27.50(d.4)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) 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 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 v02r02 – Section 5.2.1

ANSI/TIA-603-D-2010 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Setup

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

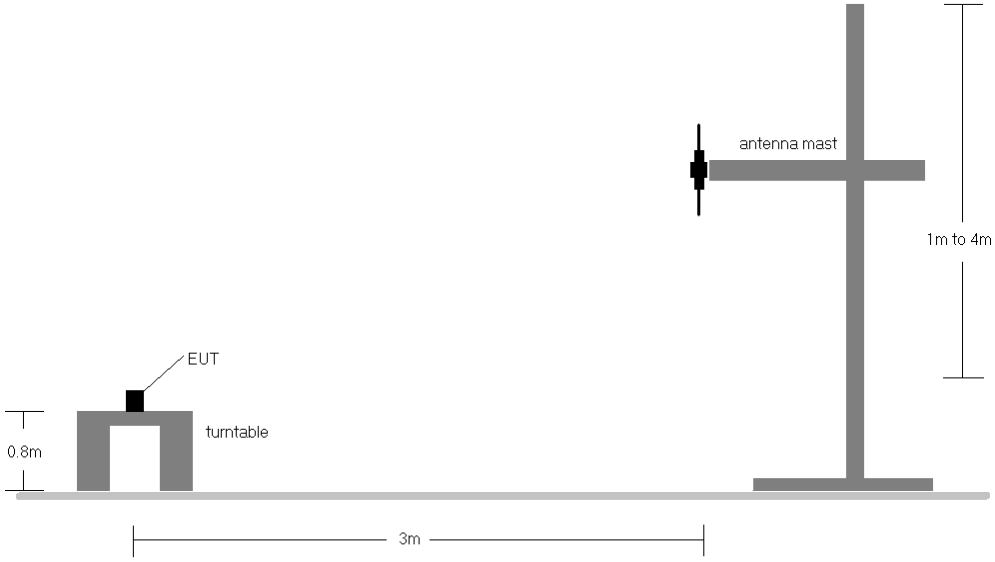


Figure 7-4. Radiated Test Setup <1GHz

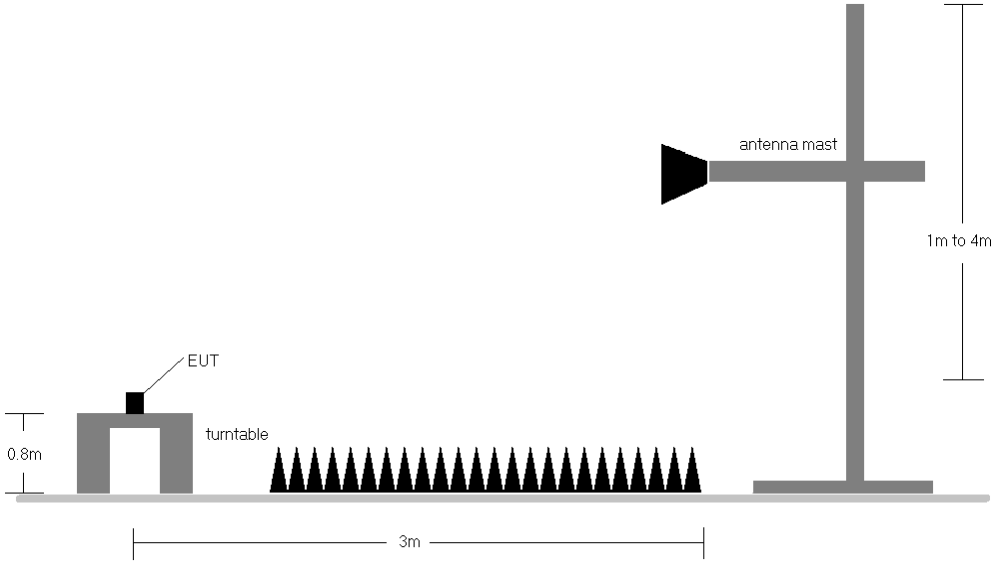


Figure 7-5. Radiated Test Setup >1GHz

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 [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
699.70	1.4	QPSK	H	150	87	1 / 0	17.19	-1.05	16.14	34.77	-18.63
707.50	1.4	QPSK	H	150	90	1 / 0	17.46	-1.02	16.44	34.77	-18.33
715.30	1.4	QPSK	H	150	90	1 / 5	17.07	-0.99	16.08	34.77	-18.69
707.50	1.4	16-QAM	H	150	90	1 / 0	16.70	-1.02	15.68	34.77	-19.09
700.50	3	QPSK	H	150	88	1 / 0	17.32	-1.05	16.28	34.77	-18.49
707.50	3	QPSK	H	150	90	1 / 0	17.61	-1.02	16.59	34.77	-18.19
714.50	3	QPSK	H	150	93	1 / 14	17.12	-0.99	16.13	34.77	-18.64
707.50	3	16-QAM	H	150	90	1 / 0	16.86	-1.02	15.84	34.77	-18.93

Table 7-2. 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 [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
701.50	5	QPSK	H	150	86	1 / 0	17.43	-1.04	16.39	34.77	-18.39
707.50	5	QPSK	H	150	90	1 / 0	17.91	-1.02	16.89	34.77	-17.88
713.50	5	QPSK	H	150	91	1 / 24	17.39	-1.00	16.39	34.77	-18.38
707.50	5	16-QAM	H	150	90	1 / 0	17.16	-1.02	16.15	34.77	-18.63
704.00	10	QPSK	H	150	91	1 / 49	17.24	-1.03	16.21	34.77	-18.56
707.50	10	QPSK	H	150	91	1 / 49	17.59	-1.02	16.57	34.77	-18.20
711.00	10	QPSK	H	150	90	1 / 0	17.77	-1.01	16.77	34.77	-18.01
711.00	10	16-QAM	H	150	90	1 / 0	14.54	-1.01	13.53	34.77	-21.24
707.50	5	QPSK	V	150	274	1 / 0	13.53	-1.02	12.51	34.77	-22.26
707.50	5 (WCP)	QPSK	H	150	94	1 / 0	17.75	-1.02	16.73	34.77	-18.04

Table 7-3. ERP Data (Band 12/17)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	H	150	81	1 / 0	18.95	-0.83	18.12	34.77	-16.65
782.00	5	QPSK	H	150	84	1 / 24	18.58	-0.82	17.76	34.77	-17.01
784.50	5	QPSK	H	150	86	1 / 0	18.96	-0.81	18.15	34.77	-16.62
784.50	5	16-QAM	H	150	86	1 / 0	18.23	-0.81	17.42	34.77	-17.35
782.00	10	QPSK	H	150	84	1 / 0	19.08	-0.82	18.26	34.77	-16.51
782.00	10	16-QAM	H	150	84	1 / 0	18.43	-0.82	17.61	34.77	-17.16
782.00	10	QPSK	V	76	14	1 / 0	17.84	-0.82	17.02	34.77	-17.75
782.00	10 (WCP)	QPSK	H	150	84	1 / 0	18.73	-0.82	17.91	34.77	-16.86

Table 7-4. ERP Data (Band 13)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBd]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]
824.70	1.4	QPSK	V	150	331	1 / 5	18.15	-0.65	17.50	38.45	-20.95
836.50	1.4	QPSK	V	150	342	1 / 0	18.31	-0.65	17.66	38.45	-20.79
848.30	1.4	QPSK	V	150	347	1 / 0	18.51	-0.65	17.86	38.45	-20.59
848.30	1.4	16-QAM	V	150	347	1 / 0	17.95	-0.65	17.30	38.45	-21.15
825.50	3	QPSK	V	150	335	1 / 14	18.25	-0.65	17.60	38.45	-20.85
836.50	3	QPSK	V	150	340	1 / 14	18.39	-0.65	17.74	38.45	-20.71
847.50	3	QPSK	V	150	341	1 / 0	18.70	-0.65	18.05	38.45	-20.40
847.50	3	16-QAM	V	150	341	1 / 0	17.89	-0.65	17.24	38.45	-21.21
826.50	5	QPSK	V	150	336	1 / 24	18.54	-0.65	17.89	38.45	-20.56
836.50	5	QPSK	V	150	337	1 / 0	18.63	-0.65	17.98	38.45	-20.47
846.50	5	QPSK	V	150	343	1 / 0	18.98	-0.65	18.33	38.45	-20.12
846.50	5	16-QAM	V	150	343	1 / 0	18.18	-0.65	17.53	38.45	-20.92
829.00	10	QPSK	V	150	340	1 / 49	19.34	-0.65	18.69	38.45	-19.76
836.50	10	QPSK	V	150	340	1 / 0	18.53	-0.65	17.88	38.45	-20.57
844.00	10	QPSK	V	150	341	1 / 0	19.54	-0.65	18.89	38.45	-19.56
829.00	10	16-QAM	V	150	340	1 / 49	18.62	-0.65	17.97	38.45	-20.48
844.00	10	QPSK	H	150	88	1 / 0	19.23	-0.65	18.58	38.45	-19.87
844.00	10 (WCP)	QPSK	V	150	341	1 / 0	16.48	-0.65	15.83	38.45	-22.62

Table 7-5. 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 Limit [dBm]	Margin [dB]
1710.70	1.4	QPSK	H	150	80	1 / 0	16.33	5.56	21.89	30.00	-8.11
1732.50	1.4	QPSK	H	150	79	1 / 0	15.46	5.41	20.87	30.00	-9.13
1754.30	1.4	QPSK	H	150	86	1 / 5	15.52	5.26	20.78	30.00	-9.22
1710.70	1.4	16-QAM	H	150	80	1 / 0	15.33	5.56	20.89	30.00	-9.11
1711.50	3	QPSK	H	150	82	1 / 0	17.03	5.55	22.58	30.00	-7.42
1732.50	3	QPSK	H	150	83	1 / 14	16.17	5.41	21.58	30.00	-8.42
1753.50	3	QPSK	H	150	89	1 / 14	16.44	5.26	21.70	30.00	-8.30
1711.50	3	16-QAM	H	150	82	1 / 0	15.99	5.55	21.54	30.00	-8.46
1712.50	5	QPSK	H	150	78	1 / 0	17.82	5.55	23.37	30.00	-6.63
1732.50	5	QPSK	H	150	78	1 / 0	17.03	5.41	22.44	30.00	-7.56
1752.50	5	QPSK	H	150	87	1 / 0	17.12	5.27	22.39	30.00	-7.61
1712.50	5	16-QAM	H	150	78	1 / 0	16.82	5.55	22.37	30.00	-7.63
1715.00	10	QPSK	H	150	79	1 / 0	17.72	5.53	23.25	30.00	-6.75
1732.50	10	QPSK	H	150	77	1 / 0	17.08	5.41	22.49	30.00	-7.51
1750.00	10	QPSK	H	150	80	1 / 0	17.10	5.29	22.39	30.00	-7.61
1715.00	10	16-QAM	H	150	79	1 / 0	16.61	5.53	22.14	30.00	-7.86
1717.50	15	QPSK	H	150	78	1 / 0	17.43	5.51	22.94	30.00	-7.06
1732.50	15	QPSK	H	150	78	1 / 0	16.95	5.41	22.36	30.00	-7.64
1747.50	15	QPSK	H	150	86	1 / 0	16.91	5.31	22.22	30.00	-7.78
1717.50	15	16-QAM	H	150	78	1 / 0	16.14	5.51	21.65	30.00	-8.35
1720.00	20	QPSK	H	150	80	1 / 0	16.67	5.49	22.16	30.00	-7.84
1732.50	20	QPSK	H	150	83	1 / 0	16.22	5.41	21.63	30.00	-8.37
1745.00	20	QPSK	H	150	87	1 / 0	16.39	5.32	21.71	30.00	-8.29
1720.00	20	16-QAM	H	150	80	1 / 0	15.69	5.49	21.18	30.00	-8.82
1712.50	5	QPSK	V	150	348	1 / 0	15.27	5.55	20.82	30.00	-9.18
1712.50	5 (WCP)	QPSK	H	150	79	1 / 0	16.86	5.55	22.41	30.00	-7.59

Table 7-6. EIRP Data (Band 4)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Positioner Azimuth	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
2498.50	5	QPSK	H	360	227	1 / 0	15.10	5.73	20.83	33.01	-12.18
2593.00	5	QPSK	H	360	58	1 / 0	15.97	6.07	22.04	33.01	-10.97
2687.50	5	QPSK	H	360	56	1 / 0	15.61	6.48	22.09	33.01	-10.92
2687.50	5	16-QAM	H	360	56	1 / 0	14.22	6.48	20.70	33.01	-12.31
2501.00	10	QPSK	H	353	53	1 / 0	14.78	5.73	20.51	33.01	-12.50
2593.00	10	QPSK	H	360	57	1 / 0	16.86	6.07	22.93	33.01	-10.08
2685.00	10	QPSK	H	352	59	1 / 0	16.01	6.47	22.48	33.01	-10.53
2593.00	10	16-QAM	H	360	57	1 / 0	15.38	6.07	21.45	33.01	-11.56
2503.50	15	QPSK	H	360	57	1 / 0	14.96	5.74	20.70	33.01	-12.31
2593.00	15	QPSK	H	360	58	1 / 0	16.24	6.07	22.31	33.01	-10.70
2682.50	15	QPSK	H	360	60	1 / 0	15.60	6.46	22.06	33.01	-10.95
2593.00	15	16-QAM	H	360	58	1 / 0	15.73	6.07	21.80	33.01	-11.21
2506.00	20	QPSK	H	359	53	1 / 0	12.16	5.75	17.91	33.01	-15.10
2593.00	20	QPSK	H	360	54	1 / 0	13.72	6.07	19.79	33.01	-13.22
2680.00	20	QPSK	H	361	57	1 / 0	12.59	6.45	19.04	33.01	-13.97
2593.00	20	16-QAM	H	360	54	1 / 0	12.79	6.07	18.86	33.01	-14.15
2593.00	10	QPSK	V	282	348	1 / 0	15.81	6.27	22.08	33.01	-10.93
2593.00	10 (WCP)	QPSK	H	360	330	1 / 0	16.02	6.07	22.09	33.01	-10.92

Table 7-7. EIRP Data (Band 41)

7.6 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) §27.53(m)

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. 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.

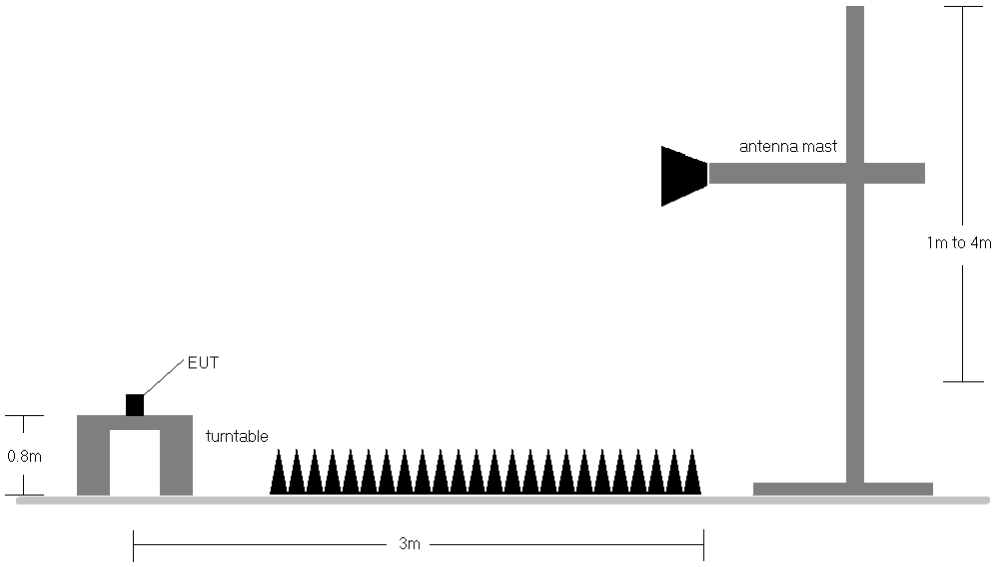


Figure 7-6. Test Instrument & Measurement Setup

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.

OPERATING FREQUENCY:	701.50	MHz		
CHANNEL:	23035			
MEASURED OUTPUT POWER:	16.39	dBm	=	0.044 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	29.39	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1403.00	H	196	287	-74.57	5.60	-68.97	85.4
2104.50	H	-	-	-72.24	6.67	-65.57	82.0

Table 7-8. Radiated Spurious Data (Band 12/17 – Low Channel)

OPERATING FREQUENCY:	707.50	MHz		
CHANNEL:	23095			
MEASURED OUTPUT POWER:	16.89	dBm	=	0.049 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	29.89	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	H	-	-	-75.04	5.69	-69.35	86.2
2122.50	H	-	-	-72.59	6.75	-65.85	82.7

Table 7-9. Radiated Spurious Data (Band 12/17 – Mid Channel)

OPERATING FREQUENCY:	713.50	MHz		
CHANNEL:	23155			
MEASURED OUTPUT POWER:	16.39	dBm	=	0.044 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	29.39	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1427.00	H	110	265	-72.37	5.79	-66.58	83.0
2140.50	H	-	-	-72.95	6.82	-66.13	82.5

Table 7-10. Radiated Spurious Data (Band 12/17 – High Channel)

OPERATING FREQUENCY:	707.50	MHz		
CHANNEL:	23095			
MEASURED OUTPUT POWER:	16.73	dBm	=	0.047 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	29.73	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1415.00	H	-	-	-77.23	5.69	-71.54	88.3
2122.50	H	-	-	-75.29	6.75	-68.55	85.3

Table 7-11. Radiated Spurious Data with WCP (Band 12/17 – Mid Channel)

OPERATING FREQUENCY:	782.00	MHz		
CHANNEL:	23230			
MEASURED OUTPUT POWER:	18.26	dBm	=	0.067 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.26	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2346.00	H	103	329	-71.30	7.00	-64.30	82.6
3128.00	H	-	-	-68.86	7.21	-61.65	79.9

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	-	-	-75.21	6.41	-68.80	-28.8

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

OPERATING FREQUENCY:	782.00	MHz		
CHANNEL:	23230			
MEASURED OUTPUT POWER:	17.91	dBm	=	0.062 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	30.91	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
2346.00	H	-	-	-72.08	7.00	-65.08	83.0
3128.00	H	-	-	-68.87	7.21	-61.66	79.6

Table 7-14. 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 [dBd]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	H	-	-	-75.32	6.41	-68.91	-28.9

Table 7-15. Radiated Spurious Data with WCP(Band 13 – 1559-1610MHz Band)

OPERATING FREQUENCY:	829.00	MHz		
CHANNEL:	26840			
MEASURED OUTPUT POWER:	18.69	dBm	=	0.074 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.69	dBc	

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]	[dBc]
1658.00	H	-	-	-75.62	6.26	-69.35	88.0
2487.00	H	-	-	-73.31	6.84	-66.47	85.2

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

OPERATING FREQUENCY:	836.50	MHz		
CHANNEL:	26915			
MEASURED OUTPUT POWER:	17.88	dBm	=	0.061 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	30.88	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1673.00	H	-	-	-76.26	6.21	-70.05	87.9
2509.50	H	-	-	-73.34	6.86	-66.48	84.4

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

OPERATING FREQUENCY:	844.00	MHz		
CHANNEL:	26990			
MEASURED OUTPUT POWER:	18.89	dBm	=	0.077 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	31.89	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1688.00	H	169	332	-75.72	6.15	-69.57	88.5
2532.00	H	-	-	-73.05	6.93	-66.13	85.0

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

OPERATING FREQUENCY:	844.00	MHz		
CHANNEL:	26990			
MEASURED OUTPUT POWER:	15.83	dBm	=	0.038 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	10.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	28.83	dBc	

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	[dBc]
1688.00	H	-	-	-75.85	6.15	-69.70	85.5
2532.00	H	-	-	-73.10	6.93	-66.18	82.0

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

OPERATING FREQUENCY:	1712.50	MHz		
CHANNEL:	19975			
MEASURED OUTPUT POWER:	23.37	dBm	=	0.217 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	36.37	dBc	

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]	[dBc]
3425.00	H	-	-	-68.78	9.65	-59.13	82.5
5137.50	H	-	-	-66.91	10.91	-56.00	79.4

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

OPERATING FREQUENCY:	1732.50	MHz		
CHANNEL:	20175			
MEASURED OUTPUT POWER:	22.44	dBm	=	0.175 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.44	dBc	

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]	[dBc]
3465.00	H	-	-	-69.24	9.77	-59.46	81.9
5197.50	H	-	-	-67.04	10.81	-56.23	78.7

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

OPERATING FREQUENCY:	1752.50	MHz		
CHANNEL:	20375			
MEASURED OUTPUT POWER:	22.39	dBm	=	0.173 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.39	dBc	

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]	[dBc]
3505.00	H	-	-	-68.94	9.89	-59.06	81.4
5257.50	H	-	-	-66.93	10.92	-56.00	78.4

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

OPERATING FREQUENCY:	1712.50	MHz		
CHANNEL:	19975			
MEASURED OUTPUT POWER:	22.41	dBm	=	0.174 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5.0	MHz		
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	35.41	dBc	

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]	[dBc]
3425.00	H	-	-	-69.00	9.65	-59.35	81.8
5137.50	H	-	-	-67.67	10.91	-56.76	79.2

Table 7-23. Radiated Spurious Data with WCP (Band 4 – Low Channel)

OPERATING FREQUENCY:	2501.00	MHz			
CHANNEL:	39700				
MEASURED OUTPUT POWER:	20.51	dBm	=	0.113	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W)	45.51	dBc		

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]	[dBc]
5002.00	H	111	7	-59.60	10.93	-48.67	69.2
7503.00	H	-	-	-57.82	11.06	-46.76	67.3
10004.00	H	-	-	-56.72	12.06	-44.66	65.2

Table 7-24. Radiated Spurious Data (Band 41 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz			
CHANNEL:	40620				
MEASURED OUTPUT POWER:	22.93	dBm	=	0.196	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W)	47.93	dBc		

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]	[dBc]
5186.00	H	114	217	-58.61	10.75	-47.86	70.8
7779.00	H	112	353	-54.50	11.40	-43.10	66.0
10372.00	H	-	-	-58.34	12.59	-45.75	68.7

Table 7-25. Radiated Spurious Data (Band 41 – Mid Channel)

OPERATING FREQUENCY:	2685.00	MHz			
CHANNEL:	41540				
MEASURED OUTPUT POWER:	22.48	dBm	=	0.177	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W)	47.48	dBc		

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]	[dBc]
5370.00	H	165	4	-59.99	10.75	-49.24	71.7
8055.00	H	120	181	-54.73	11.15	-43.59	66.1
10740.00	H	-	-	-57.77	12.80	-44.97	67.5

Table 7-26. Radiated Spurious Data (Band 41 – High Channel)

OPERATING FREQUENCY:	2593.00	MHz			
CHANNEL:	40620				
MEASURED OUTPUT POWER:	22.09	dBm	=	0.162	W
MODULATION SIGNAL:	QPSK				
BANDWIDTH:	10.0	MHz			
DISTANCE:	3	meters			
LIMIT:	55 + 10 log10 (W)	47.09	dBc		

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]	[dBc]
5186.00	H	123	187	-58.96	10.75	-48.21	70.3
7779.00	H	127	12	-55.48	11.40	-44.08	66.2
10372.00	H	-	-	-58.40	12.59	-45.81	67.9

Table 7-27. Radiated Spurious Data with WCP (Band 41 – Mid Channel)

7.7 Frequency Stability / Temperature Variation

§2.1055 §22.355 §27.54

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-D-2010. 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 and 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-D-2010

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 12/17 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	3.84	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.84	+ 20 (Ref)	707,499,989	-11	-0.0000016
100 %		- 30	707,500,326	326	0.0000461
100 %		- 20	707,499,876	-124	-0.0000175
100 %		- 10	707,499,700	-300	-0.0000424
100 %		0	707,499,920	-80	-0.0000113
100 %		+ 10	707,500,170	170	0.0000240
100 %		+ 20	707,499,977	-23	-0.0000033
100 %		+ 30	707,500,075	75	0.0000106
100 %		+ 40	707,500,071	71	0.0000100
100 %		+ 50	707,499,671	-329	-0.0000465
BATT. ENDPOINT	3.44	+ 20	707,499,800	-200	-0.0000283

Table 7-28. Frequency Stability Data (Band 12/17)

Band 12/17 Frequency Stability Measurements

§2.1055 §27.54

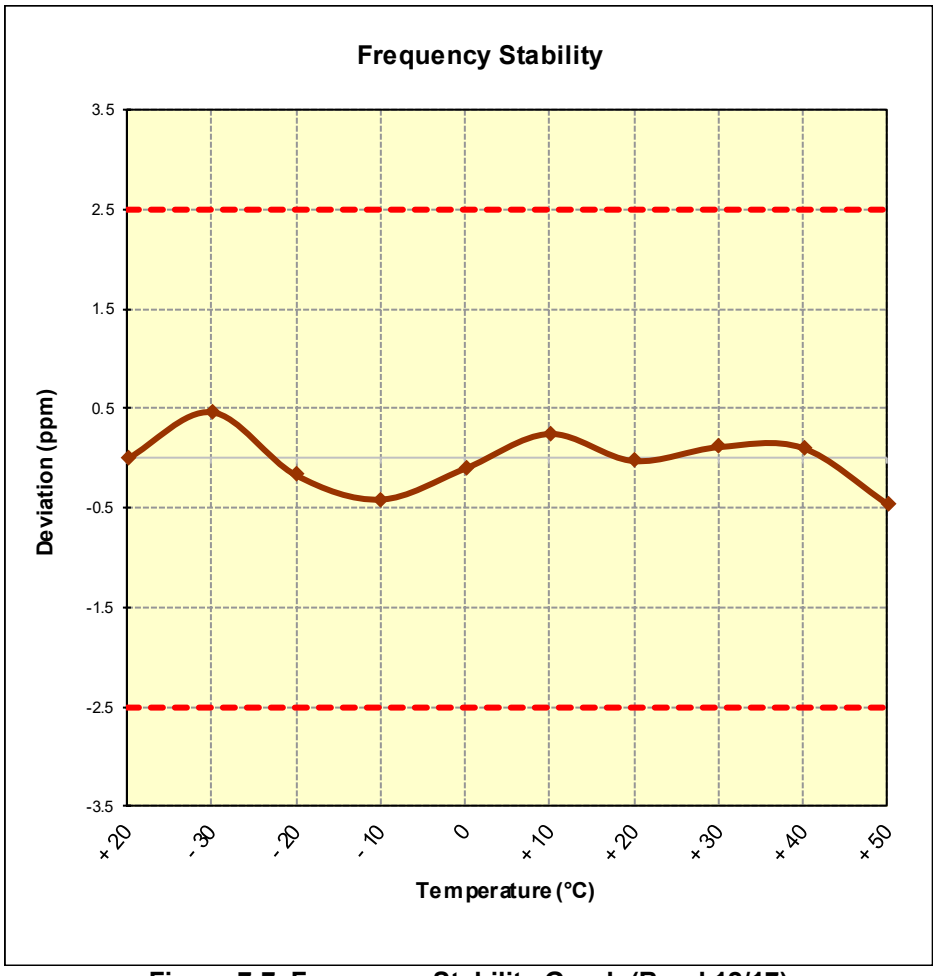


Figure 7-7. Frequency Stability Graph (Band 12/17)

Band 13 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	3.84	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.84	+ 20 (Ref)	782,000,090	90	0.0000115
100 %		- 30	782,000,063	63	0.0000081
100 %		- 20	782,000,058	58	0.0000074
100 %		- 10	782,000,076	76	0.0000097
100 %		0	781,999,765	-235	-0.0000301
100 %		+ 10	781,999,922	-78	-0.0000100
100 %		+ 20	782,000,148	148	0.0000189
100 %		+ 30	782,000,272	272	0.0000348
100 %		+ 40	781,999,976	-24	-0.0000031
100 %		+ 50	781,999,901	-99	-0.0000127
BATT. ENDPOINT	3.44	+ 20	781,999,982	-18	-0.0000023

Table 7-29. Frequency Stability Data (Band 13)

Band 13 Frequency Stability Measurements

§2.1055 §27.54

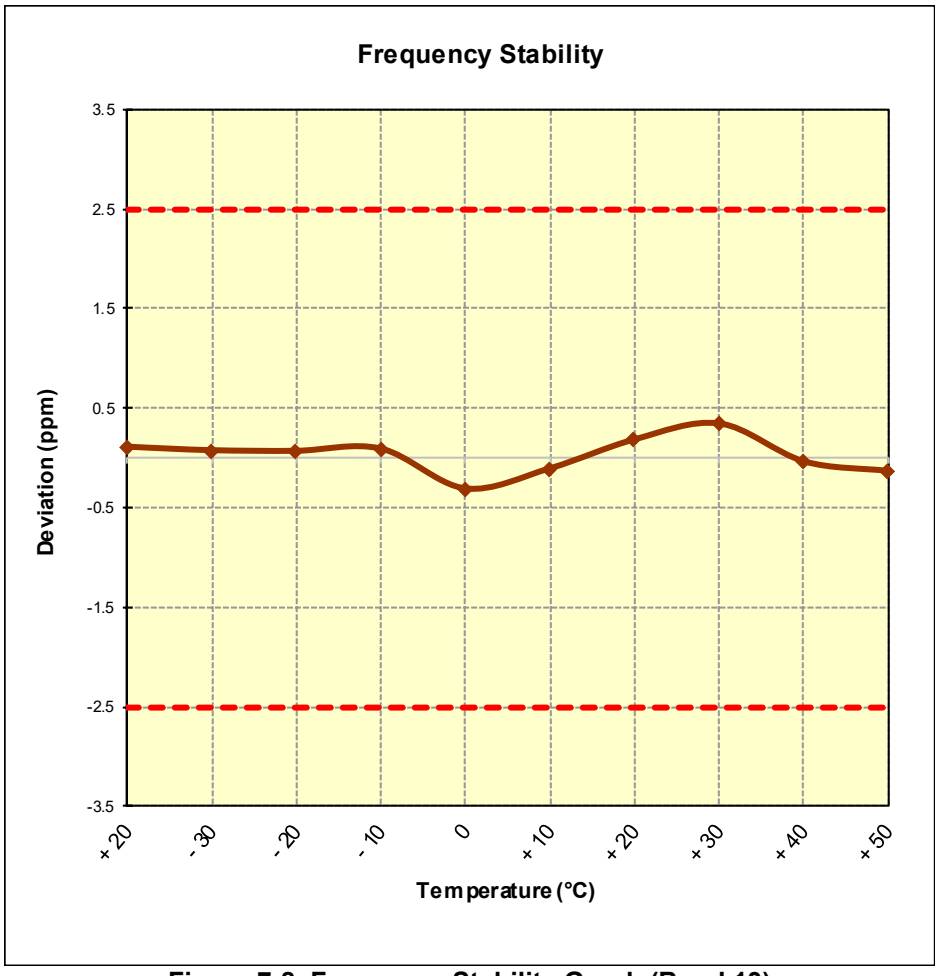


Figure 7-8. Frequency Stability Graph (Band 13)

Band 5 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY:	831,500,000	Hz
CHANNEL:	26865	
REFERENCE VOLTAGE:	3.84	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.84	+ 20 (Ref)	831,500,107	107	0.0000129
100 %		- 30	831,499,823	-177	-0.0000213
100 %		- 20	831,500,042	42	0.0000051
100 %		- 10	831,499,959	-41	-0.0000049
100 %		0	831,499,820	-180	-0.0000216
100 %		+ 10	831,499,860	-140	-0.0000168
100 %		+ 20	831,500,072	72	0.0000087
100 %		+ 30	831,499,837	-163	-0.0000196
100 %		+ 40	831,500,265	265	0.0000319
100 %		+ 50	831,500,061	61	0.0000073
BATT. ENDPOINT	3.44	+ 20	831,499,684	-316	-0.0000380

Table 7-30. Frequency Stability Data (Band 5)

Band 5 Frequency Stability Measurements

§2.1055 §22.355

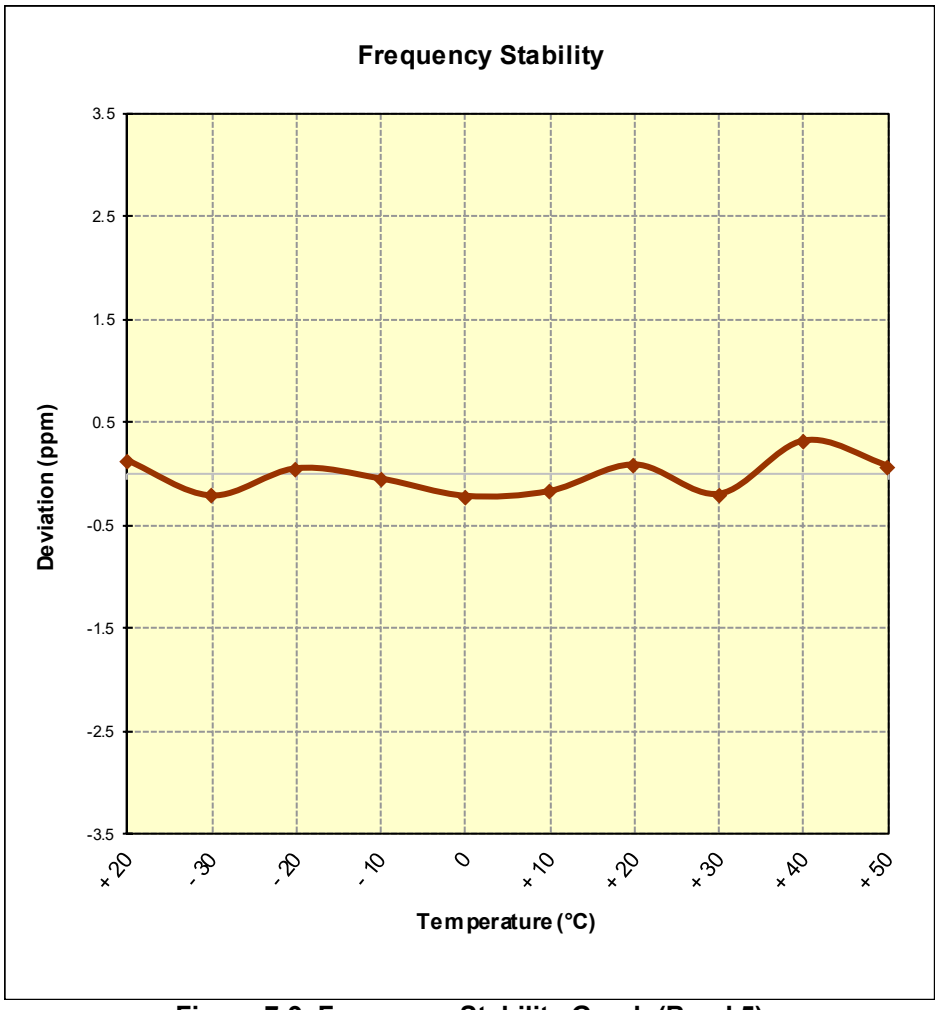


Figure 7-9. Frequency Stability Graph (Band 5)

Band 4 Frequency Stability Measurements

§2.1055 §§27.54

OPERATING FREQUENCY:	1,732,500,000	Hz
CHANNEL:	20175	
REFERENCE VOLTAGE:	3.84	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.84	+ 20 (Ref)	1,732,500,097	97	0.0000056
100 %		- 30	1,732,499,889	-111	-0.0000064
100 %		- 20	1,732,500,055	55	0.0000032
100 %		- 10	1,732,499,862	-138	-0.0000080
100 %		0	1,732,500,306	306	0.0000177
100 %		+ 10	1,732,500,145	145	0.0000084
100 %		+ 20	1,732,499,764	-236	-0.0000136
100 %		+ 30	1,732,500,121	121	0.0000070
100 %		+ 40	1,732,499,913	-87	-0.0000050
100 %		+ 50	1,732,500,280	280	0.0000162
BATT. ENDPOINT	3.44	+ 20	1,732,499,939	-61	-0.0000035

Table 7-31. Frequency Stability Data (Band 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 4 Frequency Stability Measurements

§2.1055 §§27.54

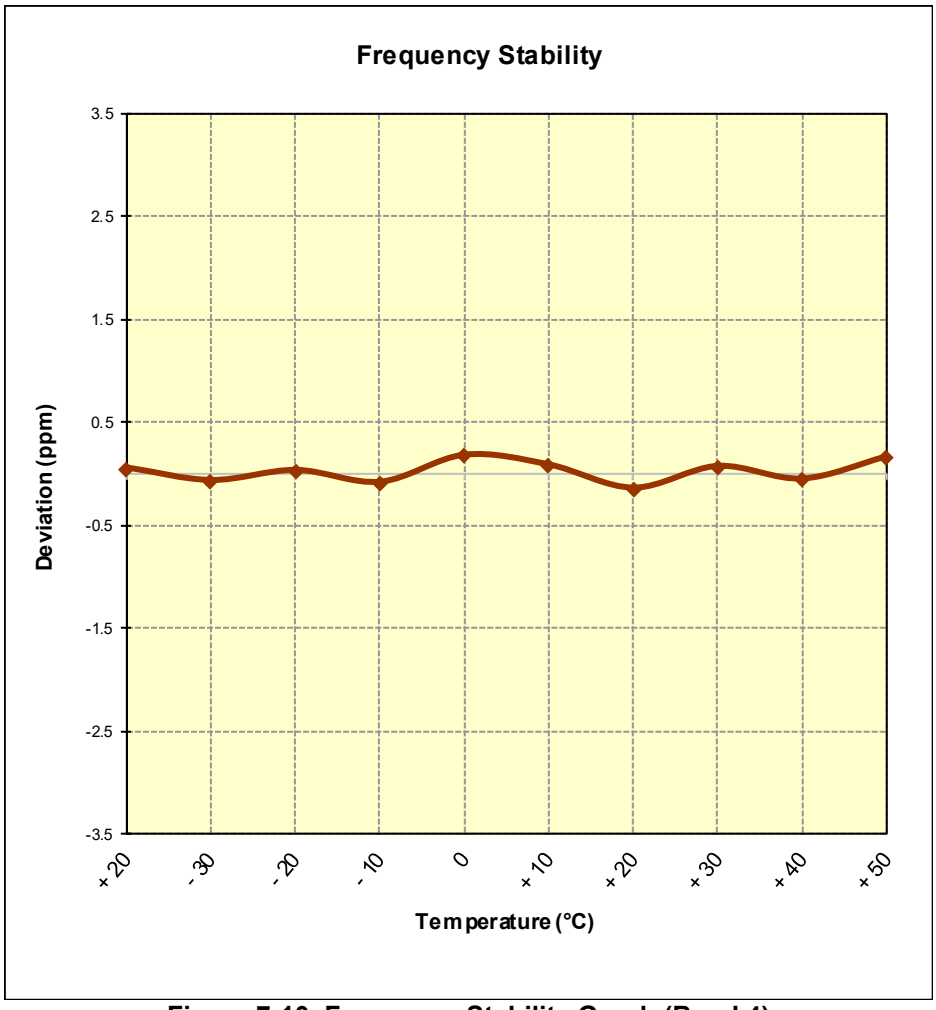


Figure 7-10. Frequency Stability Graph (Band 4)

Band 41 Frequency Stability Measurements

§2.1055 §27.54

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	3.84	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.84	+ 20 (Ref)	2,593,000,280	280	0.0000108
100 %		- 30	2,593,000,324	324	0.0000125
100 %		- 20	2,593,000,278	278	0.0000107
100 %		- 10	2,592,999,856	-144	-0.0000056
100 %		0	2,592,999,968	-32	-0.0000012
100 %		+ 10	2,592,999,983	-17	-0.0000007
100 %		+ 20	2,592,999,959	-41	-0.0000016
100 %		+ 30	2,592,999,768	-232	-0.0000089
100 %		+ 40	2,593,000,145	145	0.0000056
100 %		+ 50	2,592,999,971	-29	-0.0000011
BATT. ENDPOINT	3.44	+ 20	2,593,000,047	47	0.0000018

Table 7-32. Frequency Stability Data (Band 41)

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 41 Frequency Stability Measurements

§2.1055 §27.54

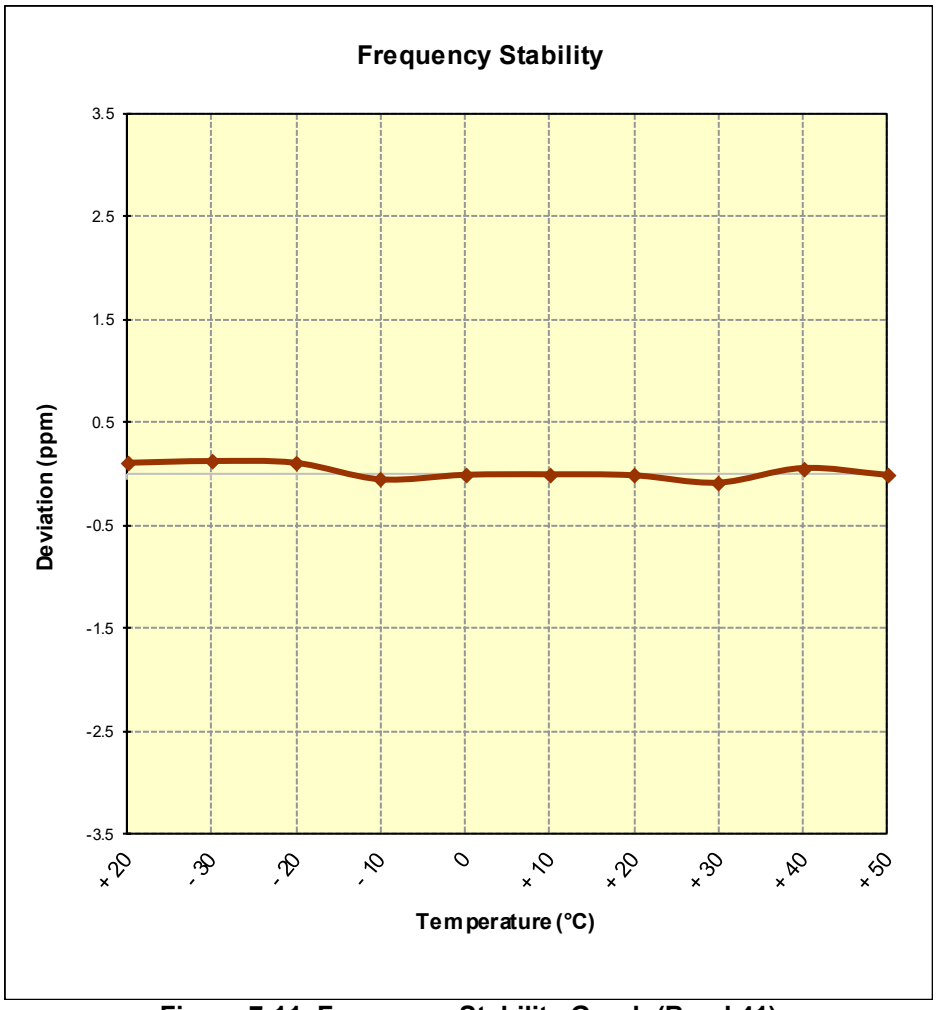


Figure 7-11. Frequency Stability Graph (Band 41)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSC02J** complies with all the requirements of Parts 22 & 27 of the FCC rules for LTE operation only.