6.4. Radiated Spurious Emissions Data -- *Pursuant 47 CFR 2.1053, 2.1057, and 90.669(a).*

FCC Limits

Radiated spurious emissions shall be attenuated below the maximum level of emission of the carrier frequency in accordance with the following formula:

Spurious attenuation (dB) = 43 + 10 $\log_{10}$ (P), P = Maximum Power output power setting in Watts.

NOTE 1: The following data reflects worst-case measurements taken on the unit, side orientation in this case.
NOTE 2: Quad-16QAM was used to obtain the reported results.
NOTE 3: Spurious emissions that were more than 20dB below FCC limit were not reported.
NOTE 4: Only the worst case polarization is reported.

Table 6-1: Transmitter Radiated Spurious Emissions
Maximum Output Power Setting, 896.01875MHz

Description	Frequency (MHz)	Measured Power Equivalent Power Into an Ideal Dipole	Worst case Polarization	FCC limit	Margin to FCC Limit
IF	148.65	> -33 dBm		-13 dBm	> 20 dB
2 x IF	297.3	> -33 dBm		-13 dBm	> 20 dB
LO	1044.6688	> -33 dBm		-13 dBm	> 20 dB
2 x FUND	1792.0375	-15.7 dBm	Horizontal	-13 dBm	2.7 dB
3 x FUND	2688.05625	> -33 dBm		-13 dBm	> 20 dB
4 x FUND	3584.075	> -33 dBm		-13 dBm	> 20 dB
5 x FUND	4480.09375	> -33 dBm		-13 dBm	> 20 dB
6 x FUND	5376.1125	> -33 dBm		-13 dBm	> 20 dB
7 x FUND	6272.13125	> -33 dBm		-13 dBm	> 20 dB
8 x FUND	7168.15	> -33 dBm		-13 dBm	> 20 dB
9 x FUND	8064.16875	> -33 dBm		-13 dBm	> 20 dB
10 x FUND	8960.1875	-24.5 dBm	Horizontal	-13 dBm	11.5 dB

Note: The worst case of the horizontal and vertical polarizations is reported.

Figure 6-23: Transmitter Radiated Spurious Emissions
Maximum Output Power Setting, 896.01875MHz

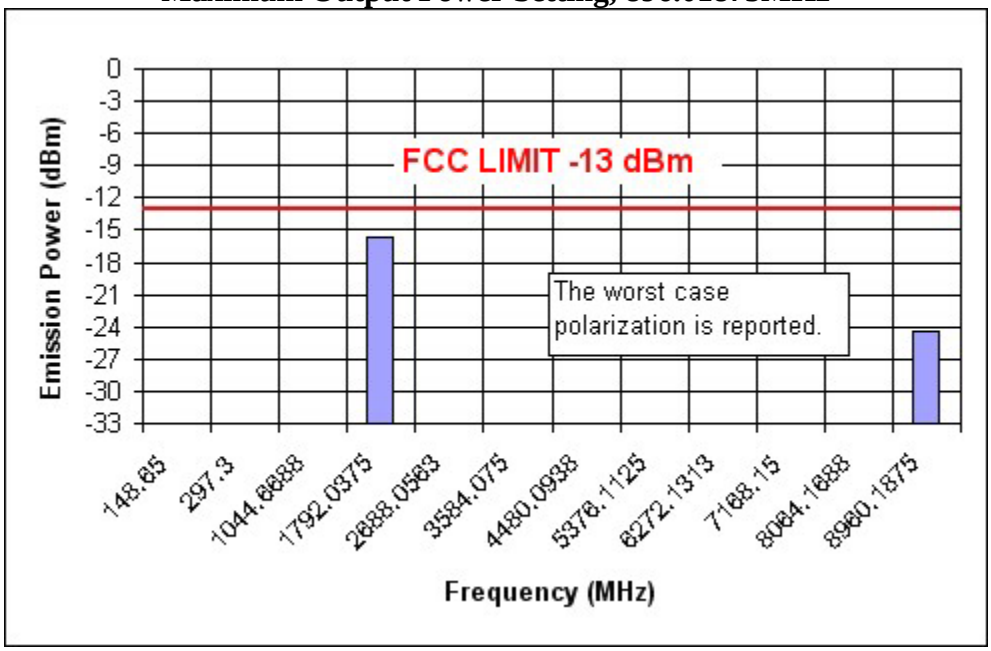


Table 6-2: Transmitter Radiated Spurious Emissions
Maximum Output Power Setting, 898.51875MHz

Description	Frequency (MHz)	Measured Power Equivalent Power Into an Ideal Dipole	Worst case Polarization	FCC limit	Margin to FCC Limit
IF	148.65	> -33 dBm		-13 dBm	> 20 dB
2 x IF	297.3	> -33 dBm		-13 dBm	> 20 dB
LO	1047.1688	> -33 dBm		-13 dBm	> 20 dB
2 x FUND	1797.0375	-16.9 dBm	Horizontal	-13 dBm	3.9 dB
3 x FUND	2695.55625	> -33 dBm		-13 dBm	> 20 dB
4 x FUND	3594.075	> -33 dBm		-13 dBm	> 20 dB
5 x FUND	4492.59375	> -33 dBm		-13 dBm	> 20 dB
6 x FUND	5391.1125	> -33 dBm		-13 dBm	> 20 dB
7 x FUND	6289.63125	> -33 dBm		-13 dBm	> 20 dB
8 x FUND	7188.15	> -33 dBm		-13 dBm	> 20 dB
9 x FUND	8086.66875	> -33 dBm		-13 dBm	> 20 dB
10 x FUND	8985.1875	-25.5 dBm	Horizontal	-13 dBm	12.5 dB

Note: The worst case of the horizontal and vertical polarizations is reported.

Figure 6-24: Transmitter Radiated Spurious Emissions
Maximum Output Power Setting, 898.51875MHz

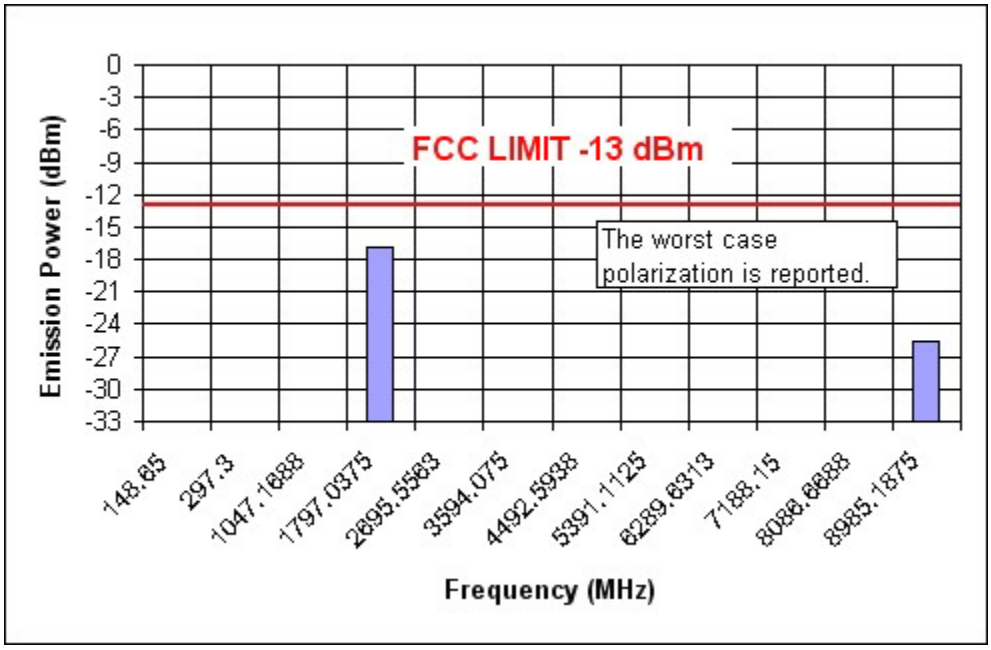


Table 6-3: Transmitter Radiated Spurious Emissions
Maximum Output Power Setting, 900.99375MHz

Description	Frequency (MHz)	Measured Power Equivalent Power Into an Ideal Dipole	Worst case Polarization	FCC limit	Margin to FCC Limit
IF	148.65	> -33 dBm		-13 dBm	> 20 dB
2 x IF	297.3	> -33 dBm		-13 dBm	> 20 dB
LO	1049.6438	> -33 dBm		-13 dBm	> 20 dB
2 x FUND	1801.9875	-15.8 dBm	Vertical	-13 dBm	2.8 dB
3 x FUND	2702.98125	> -33 dBm		-13 dBm	> 20 dB
4 x FUND	3603.975	> -33 dBm		-13 dBm	> 20 dB
5 x FUND	4504.96875	> -33 dBm		-13 dBm	> 20 dB
6 x FUND	5405.9625	> -33 dBm		-13 dBm	> 20 dB
7 x FUND	6306.95625	> -33 dBm		-13 dBm	> 20 dB
8 x FUND	7207.95	> -33 dBm		-13 dBm	> 20 dB
9 x FUND	8108.94375	> -33 dBm		-13 dBm	> 20 dB
10 x FUND	9009.9375	-24.5 dBm	Horizontal	-13 dBm	11.5 dB

Note: The worst case of the horizontal and vertical polarizations is reported.

Figure 6-25: Transmitter Radiated Spurious Emissions
Maximum Output Power Setting, 900.99375MHz

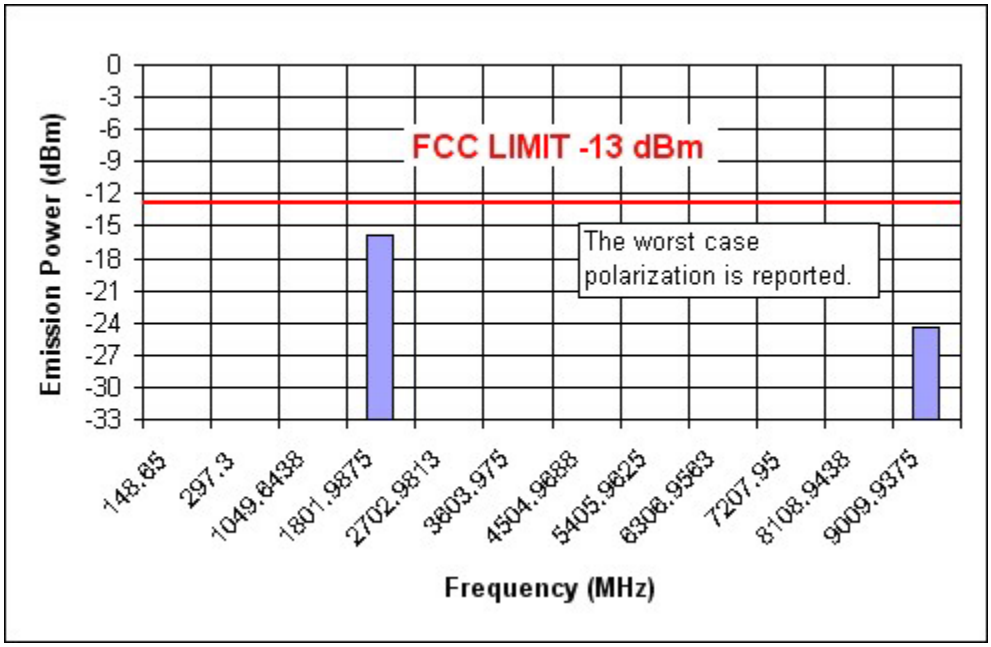


Table 6-4: Transmitter Radiated Spurious Emissions
Minimum Output Power Setting, 896.01875MHz

Description	Frequency (MHz)	Measured Power Equivalent Power Into an Ideal Dipole	FCC limit	Margin to FCC Limit
IF	148.65	> -33 dBm	-13 dBm	> 20 dB
2 x IF	297.3	> -33 dBm	-13 dBm	> 20 dB
LO	1044.6688	> -33 dBm	-13 dBm	> 20 dB
2 x FUND	1792.0375	> -33 dBm	-13 dBm	> 20 dB
3 x FUND	2688.05625	> -33 dBm	-13 dBm	> 20 dB
4 x FUND	3584.075	> -33 dBm	-13 dBm	> 20 dB
5 x FUND	4480.09375	> -33 dBm	-13 dBm	> 20 dB
6 x FUND	5376.1125	> -33 dBm	-13 dBm	> 20 dB
7 x FUND	6272.13125	> -33 dBm	-13 dBm	> 20 dB
8 x FUND	7168.15	> -33 dBm	-13 dBm	> 20 dB
9 x FUND	8064.16875	> -33 dBm	-13 dBm	> 20 dB
10 x FUND	8960.1875	> -33 dBm	-13 dBm	> 20 dB

Table 6-5: Transmitter Radiated Spurious Emissions
Minimum Output Power Setting, 898.51875MHz

Description	Frequency (MHz)	Measured Power Equivalent Power Into an Ideal Dipole	FCC limit	Margin to FCC Limit
IF	148.65	> -33 dBm	-13 dBm	> 20 dB
2 x IF	297.3	> -33 dBm	-13 dBm	> 20 dB
LO	1047.1688	> -33 dBm	-13 dBm	> 20 dB
2 x FUND	1797.0375	> -33 dBm	-13 dBm	> 20 dB
3 x FUND	2695.55625	> -33 dBm	-13 dBm	> 20 dB
4 x FUND	3594.075	> -33 dBm	-13 dBm	> 20 dB
5 x FUND	4492.59375	> -33 dBm	-13 dBm	> 20 dB
6 x FUND	5391.1125	> -33 dBm	-13 dBm	> 20 dB
7 x FUND	6289.63125	> -33 dBm	-13 dBm	> 20 dB
8 x FUND	7188.15	> -33 dBm	-13 dBm	> 20 dB
9 x FUND	8086.66875	> -33 dBm	-13 dBm	> 20 dB
10 x FUND	8985.1875	> -33 dBm	-13 dBm	> 20 dB

Table 6-6: Transmitter Radiated Spurious Emissions
Minimum Output Power Setting, 900.99375MHz

Description	Frequency (MHz)	Measured Power Equivalent Power Into an Ideal Dipole	FCC limit	Margin to FCC Limit
IF	148.65	> -33 dBm	-13 dBm	> 20 dB
2 x IF	297.3	> -33 dBm	-13 dBm	> 20 dB
LO	1049.6438	> -33 dBm	-13 dBm	> 20 dB
2 x FUND	1801.9875	> -33 dBm	-13 dBm	> 20 dB
3 x FUND	2702.98125	> -33 dBm	-13 dBm	> 20 dB
4 x FUND	3603.975	> -33 dBm	-13 dBm	> 20 dB
5 x FUND	4504.96875	> -33 dBm	-13 dBm	> 20 dB
6 x FUND	5405.9625	> -33 dBm	-13 dBm	> 20 dB
7 x FUND	6306.95625	> -33 dBm	-13 dBm	> 20 dB
8 x FUND	7207.95	> -33 dBm	-13 dBm	> 20 dB
9 x FUND	8108.94375	> -33 dBm	-13 dBm	> 20 dB
10 x FUND	9009.9375	> -33 dBm	-13 dBm	> 20 dB

6.5. Conducted Spurious Emissions Data -- *Pursuant 47 CFR 2.1051, 2.1057 and 90.669 (a).*

Conducted Path: 50 Ohm Connector
FCC Emission Limit: less than -13 dBm

Table 6-7: Transmitter Conducted Spurious Emissions Data.
Fundamental Frequency 896.01875MHz, Maximum Output Power Setting

Description	Frequency (MHz)	Measured Power	Margin to FCC limit
IF	148.65	<-33 dBm	> 20 dB
2 x IF	297.3	<-33 dBm	> 20 dB
6 x IF	891.9	-21 dBm	8 dB
6 xIF & FUND IMD	900.1375	-18 dBm	5 dB
LO	1044.6688	<-33 dBm	> 20 dB
2 x FUND	1792.0375	-24.5	12 dB
3 x FUND	2688.05625	<-33 dBm	> 20 dB
4 x FUND	3584.075	<-33 dBm	> 20 dB
5 x FUND	4480.09375	<-33 dBm	> 20 dB
6 x FUND	5376.1125	<-33 dBm	> 20 dB
7 x FUND	6272.13125	<-33 dBm	> 20 dB
8 x FUND	7168.15	<-33 dBm	> 20 dB
9 x FUND	8064.16875	<-33 dBm	> 20 dB
10 x FUND	8960.1875	<-33 dBm	> 20 dB

Table 6-8: Transmitter Conducted Spurious Emissions Data.
Fundamental Frequency 898.51875MHz, Maximum Output Power Setting

Description	Frequency (MHz)	Measured Power	Margin to FCC limit
IF	148.65	<-33 dBm	> 20 dB
2 x IF	297.3	<-33 dBm	> 20 dB
6 x IF	891.9	-25 dBm	12 dB
6 xIF & FUND IMD	905.1375	-24 dBm	11 dB
LO	1047.1688	<-33 dBm	> 20 dB
2 x FUND	1797.0375	-24 dBm	11 dB
3 x FUND	2695.55625	<-33 dBm	> 20 dB
4 x FUND	3594.075	<-33 dBm	> 20 dB
5 x FUND	4492.59375	<-33 dBm	> 20 dB
6 x FUND	5391.1125	<-33 dBm	> 20 dB
7 x FUND	6289.63125	<-33 dBm	> 20 dB
8 x FUND	7188.15	<-33 dBm	> 20 dB
9 x FUND	8086.66875	<-33 dBm	> 20 dB
10 x FUND	8985.1875	<-33 dBm	> 20 dB

Table 6-9: Transmitter Conducted Spurious Emissions Data.
Fundamental Frequency 900.99375MHz, Maximum Output Power Setting

Description	Frequency (MHz)	Measured Power	Margin to FCC limit
IF	148.65	<-33 dBm	> 20 dB
2 x IF	297.3	<-33 dBm	> 20 dB
6 x IF	891.9	<-33 dBm	> 20 dB
6 xIF & FUND IMD	910.0875	<-33 dBm	> 20 dB
LO	1049.6438	<-33 dBm	> 20 dB
2 x FUND	1801.9875	-24 dBm	> 20 dB
3 x FUND	2702.98125	<-33 dBm	> 20 dB
4 x FUND	3603.975	<-33 dBm	> 20 dB
5 x FUND	4504.96875	<-33 dBm	> 20 dB
6 x FUND	5405.9625	<-33 dBm	> 20 dB
7 x FUND	6306.95625	<-33 dBm	> 20 dB
8 x FUND	7207.95	<-33 dBm	> 20 dB
9 x FUND	8108.94375	<-33 dBm	> 20 dB
10 x FUND	9009.9375	<-33 dBm	> 20 dB

Table 6-10: Transmitter Conducted Spurious Emissions Data.
Fundamental Frequency 896.01875MHz, Minimum Output Power Setting

Description	Frequency (MHz)	Measured Power	Margin to FCC limit
IF	148.65	<-33 dBm	> 20 dB
2 x IF	297.3	<-33 dBm	> 20 dB
6 x IF	891.9	<-33 dBm	> 20 dB
6 xIF & FUND IMD	900.1375	<-33 dBm	> 20 dB
LO	1044.6688	<-33 dBm	> 20 dB
2 x FUND	1792.0375	<-33 dBm	> 20 dB
3 x FUND	2688.05625	<-33 dBm	> 20 dB
4 x FUND	3584.075	<-33 dBm	> 20 dB
5 x FUND	4480.09375	<-33 dBm	> 20 dB
6 x FUND	5376.1125	<-33 dBm	> 20 dB
7 x FUND	6272.13125	<-33 dBm	> 20 dB
8 x FUND	7168.15	<-33 dBm	> 20 dB
9 x FUND	8064.16875	<-33 dBm	> 20 dB
10 x FUND	8960.1875	<-33 dBm	> 20 dB

Table 6-11: Transmitter Conducted Spurious Emissions Data.
Fundamental Frequency 898.51875MHz, Minimum Output Power Setting

Description	Frequency (MHz)	Measured Power	Margin to FCC limit
IF	148.65	<-33 dBm	> 20 dB
2 x IF	297.3	<-33 dBm	> 20 dB
6 x IF	891.9	<-33 dBm	> 20 dB
6 xIF & FUND IMD	905.1375	<-33 dBm	> 20 dB
LO	1047.1688	<-33 dBm	> 20 dB
2 x FUND	1797.0375	<-33 dBm	> 20 dB
3 x FUND	2695.55625	<-33 dBm	> 20 dB
4 x FUND	3594.075	<-33 dBm	> 20 dB
5 x FUND	4492.59375	<-33 dBm	> 20 dB
6 x FUND	5391.1125	<-33 dBm	> 20 dB
7 x FUND	6289.63125	<-33 dBm	> 20 dB
8 x FUND	7188.15	<-33 dBm	> 20 dB
9 x FUND	8086.66875	<-33 dBm	> 20 dB
10 x FUND	8985.1875	<-33 dBm	> 20 dB

Table 6-12: Transmitter Conducted Spurious Emissions Data.
Fundamental Frequency 900.99375MHz, Minimum Output Power Setting

Description	Frequency (MHz)	Measured Power	Margin to FCC limit
IF	148.65	<-33 dBm	> 20 dB
2 x IF	297.3	<-33 dBm	> 20 dB
6 x IF	891.9	<-33 dBm	> 20 dB
6 x IF & FUND IMD	910.0875	<-33 dBm	> 20 dB
LO	1049.6438	<-33 dBm	> 20 dB
2 x FUND	1801.9875	<-33 dBm	> 20 dB
3 x FUND	2702.98125	<-33 dBm	> 20 dB
4 x FUND	3603.975	<-33 dBm	> 20 dB
5 x FUND	4504.96875	<-33 dBm	> 20 dB
6 x FUND	5405.9625	<-33 dBm	> 20 dB
7 x FUND	6306.95625	<-33 dBm	> 20 dB
8 x FUND	7207.95	<-33 dBm	> 20 dB
9 x FUND	8108.94375	<-33 dBm	> 20 dB
10 x FUND	9009.9375	<-33 dBm	> 20 dB

6.6. **Frequency Stability Data** -- Pursuant 47 CFR 2.1055

Measurements were made per method described in paragraph 7.5. Because of the transmitter's dependence on the stability of the base station oscillator, it is not possible to provide stability data for this transmitter as is commonly supplied for certification per *47 CFR 2.1055* for a radio with a locally stabilized oscillator.

The following information is provided to clarify how the transmitter attains the necessary accuracy of 1.5 PPM or better. The transmitter's suppressed carrier emission is produced by mixing of a modulated intermediate frequency with a higher, digitally synthesized injection frequency with a resolution of 12.5 kHz. Both of these frequencies are derived from a temperature compensated crystal oscillator (Y300 in Figure 4-1).

The AFC routine and frequency locking mechanism are implemented using both hardware and software. The hardware and software combined provide an automatic frequency control function, which locks the receiver to within 0.4 PPM of the control channel oscillator. Since the base station stability is FCC regulated to be 0.1 PPM or better, the absolute accuracy of the transmitter is inherently better than 0.5 PPM.

Transmitter frequency stability is guaranteed over all specified environmental operating conditions (battery voltage, temperature, humidity, etc.) because of the nature of the base station frequency locking mechanism. The frequency stability of the transmitter is maintained until the battery voltage drops below 4.6 volts. Any voltage below 4.6 volts is outside the specified operating range of the transmitter and linearity is degraded. For this reason, the radio shuts down (while in transmit mode) when the voltage drops below 4.6 volts.

Note:

Frequency stability is independent of modulation scheme (Quad –QPSK, Quad-16QAM, Quad-64QAM). The data shown in following tables was taken with the radio set to transmit a Quad -16QAM signal at 896.06875 MHz while locked to a R2660C service monitor.

Table 6-13: Transmitter Frequency Stability Data - Frequency vs. Temperature

Temperature Centigrade	Frequency Error [Hz]	Frequency Error [ppm]
-20	10	0.011
-15	11	0.012
-10	30	0.033
-5	29	0.032
0	10	0.011
5	15	0.017
10	12	0.013
15	-1	-0.001
20	6	0.007
25	5	0.006
30	5	0.006
35	-3	-0.003
40	2	0.002
45	-5	-0.006
50	-7	-0.008
55	-3	-0.003
60	-11	-0.012

Table 6-14: Transmitter Frequency Stability Vs. Supply Voltage

Supply Voltage (Volt)	Frequency Error [Hz]	Frequency Error [ppm]
4.7	5	0.006
4.8	10	0.011
4.9	5	0.006
5	3	0.003
5.1	5	0.006
5.2	-3	-0.003
5.3	4	0.004
5.4	8	0.009
5.5	-2	-0.002
5.6	15	0.017
5.7	3	0.003
5.8	5	0.006
5.9	7	0.008
6	8	0.009
6.1	4	0.004
6.2	-4	-0.004
6.3	-7	-0.008
6.4	-25	-0.028
6.5	-19	-0.021
6.6	-15	-0.017
6.7	-21	-0.023

Figure 6-26: Frequency Stability Vs. Temperature at Nominal Supply Voltage

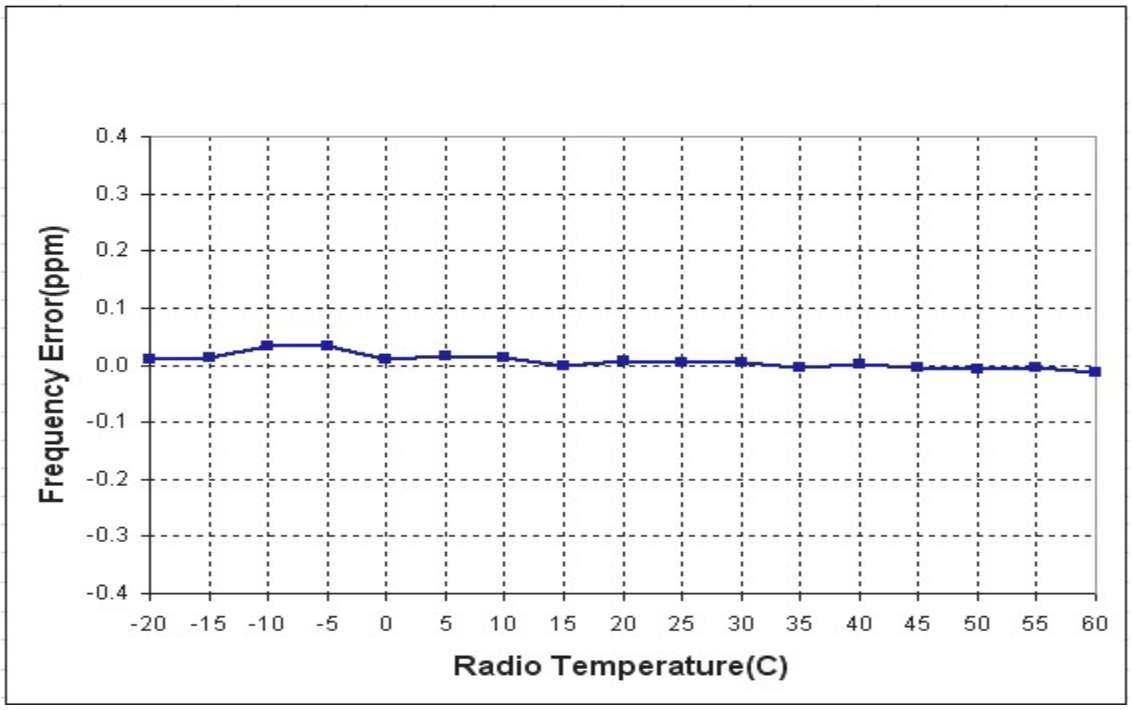
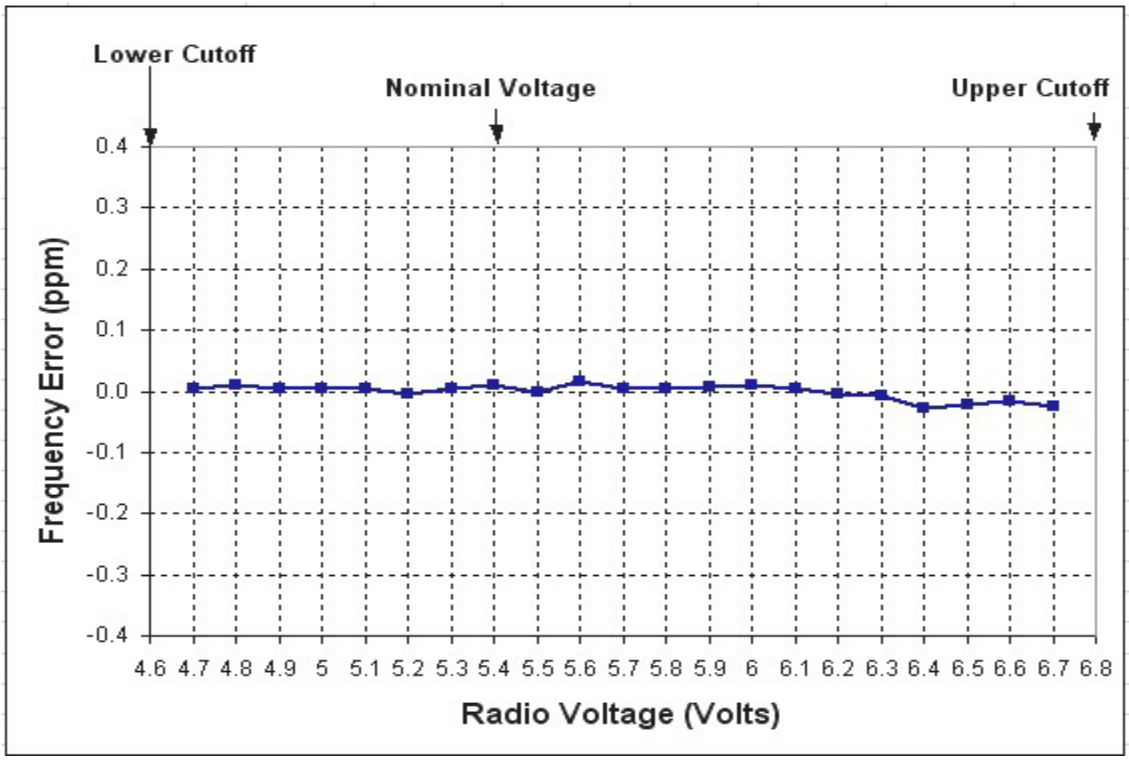


Figure 6-27: Frequency Stability Vs. Supply Voltage



6.7. Power Line Conducted Spurious Emissions -- *Pursuant 47 CFR 15.107*

The portable RF device can transmit and receive while resting in a battery charger that is connected to the AC power line. The maximum emissions Measurements were made per method described in paragraph 7.5 shown in Figures 6-28 to 6-31.

The maximum permitted emission according to Pursuant *47 CFR 15.107* is 250 microvolts (48 dBuV) over the frequency range 450 kHz to 30 MHz.

Figure 6-28: Charger Phase Line Conducted Emissions – Tx mode

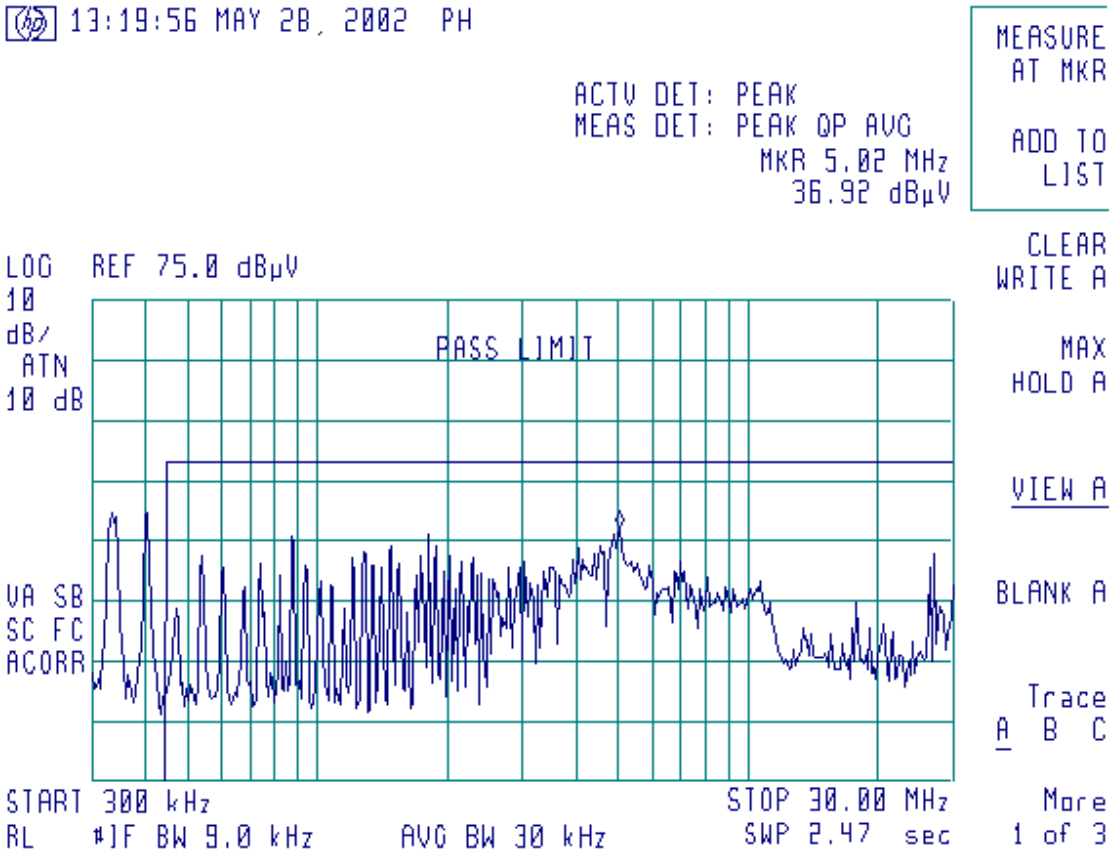


Table 6-15: Charger Phase Line Conducted Emissions – Tx mode

Signal	Freq (MHz)	QP Amp (dBuV)	FCC Limit (dBuV)	Margin from FCC limit (dB)
1	0.621830	35.40	48	-12.60
2	0.881610	35.21	48	-12.79
3	1.788904	34.62	48	-13.38
4	5.004489	34.67	48	-13.33

Figure 6-29: Charger Neutral Line Conducted Emission – Tx mode

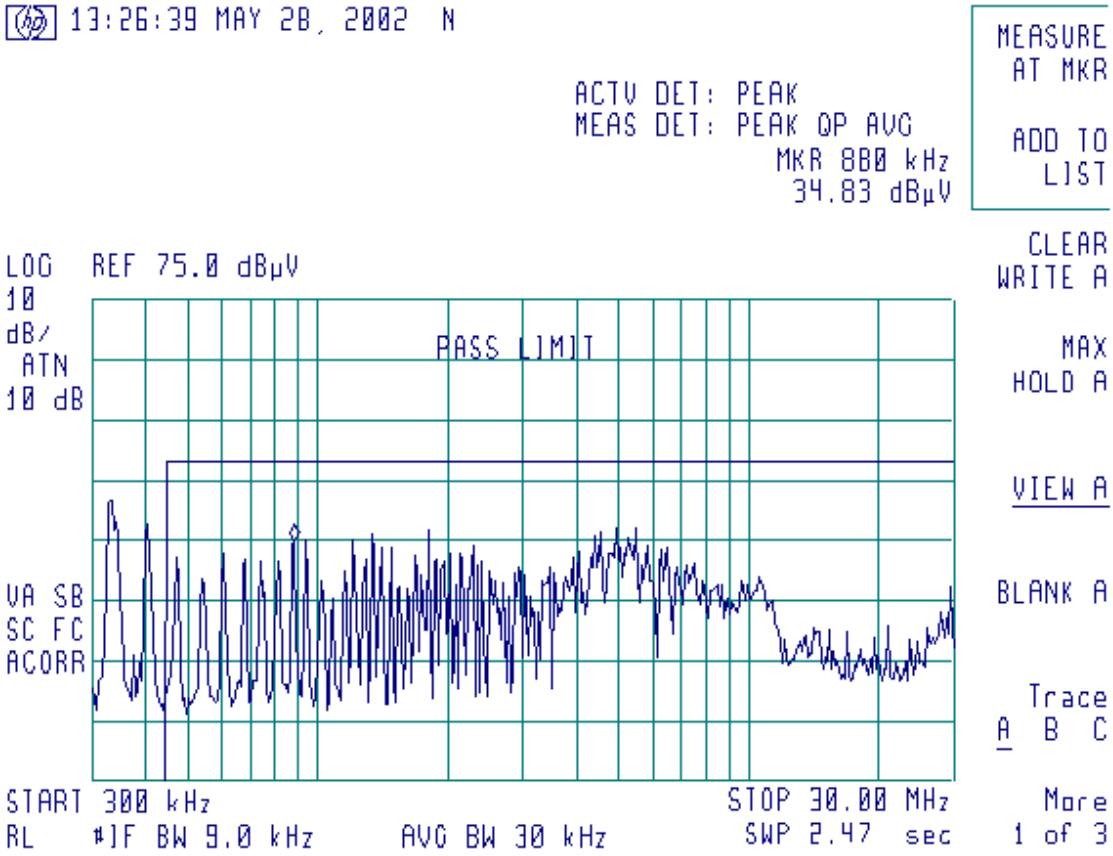


Table 6-16: Charger Neutral Line Conducted Emission – Tx mode

Signal	Freq (MHz)	QP Amp (dBuV)	FCC Limit (dBuV)	Margin from FCC limit (dB)
1	0.885059	35.58	48	-12.42
2	1.904126	36.87	48	-11.13
3	5.300468	35.54	48	-12.46

Figure 6-30: Charger Phase Line Conducted Emissions – Idle mode

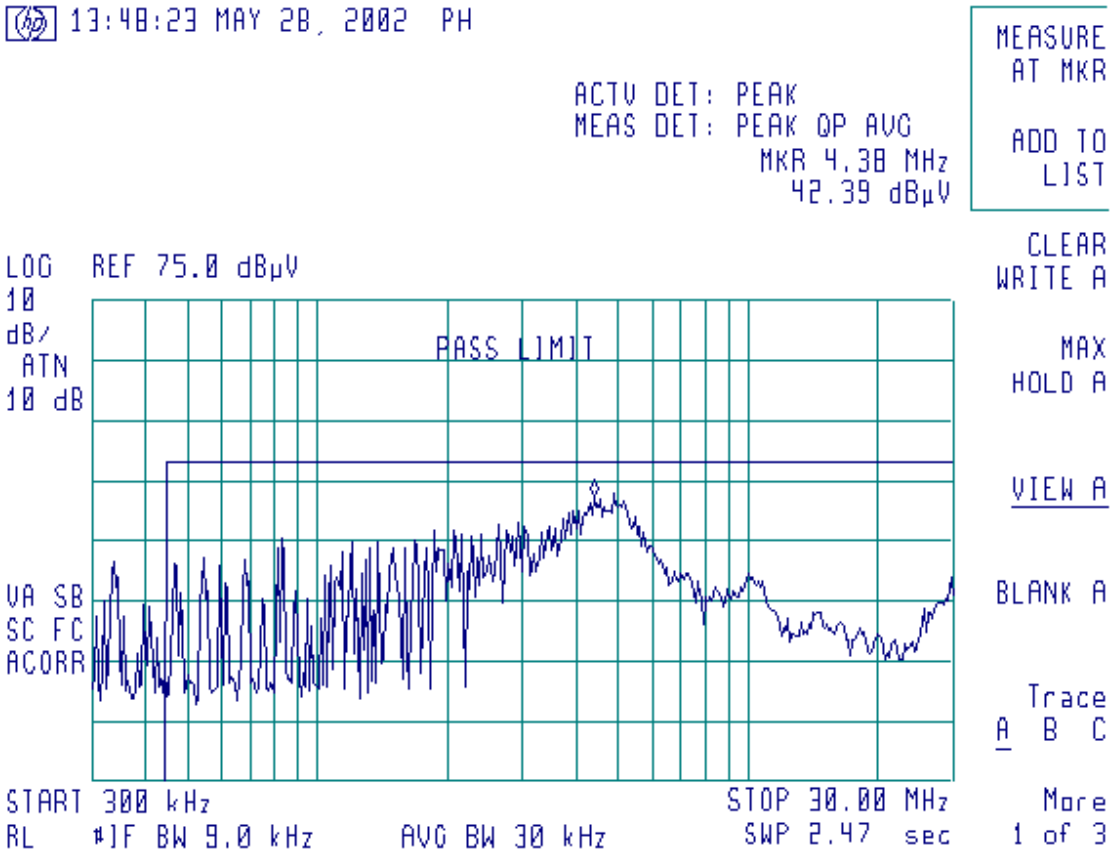


Table 6-17: Charger Phase Line Conducted Emissions – idle mode

Signal	Freq (MHz)	QP Amp (dBuV)	FCC Limit (dBuV)	Margin from FCC limit (dB)
1	0.632212	33.91	48	-14.09
2	0.829505	34.27	48	-13.73
3	2.108719	35.81	48	-12.19
4	4.543886	40.18	48	-7.82

Figure 6-31: Charger Neutral Line Conducted Emission – idle mode

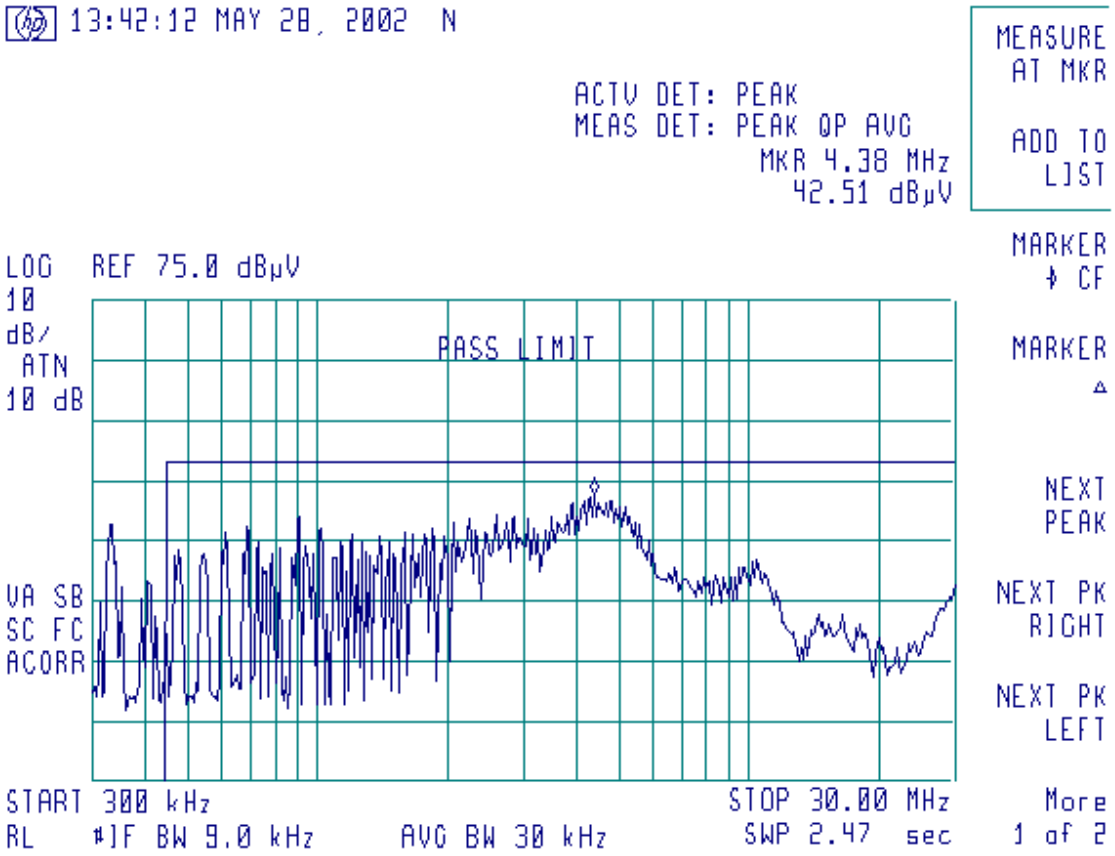


Table 6-18: Charger Neutral Line Conducted Emission – idle mode

Signal	Freq (MHz)	QP Amp (dBuV)	FCC Limit (dBuV)	Margin from FCC limit (dB)
1	0.624330	35.79	48	-12.21
2	0.910265	36.63	48	-11.37
3	2.169308	37.77	48	-10.23
4	4.565893	39.21	48	-8.79

6.8. Effective Radiated Power (ERP)

As described in more detail in Exhibit 7.1.b. the effective radiated power (ERP) characteristic was measured while a radio was vertically mounted on a non-conducting platform/turntable in a RF Anechoic Chamber. The radio configured to transmit at the maximum power and the radiated power was detected by a spectrum analyzer at 10-degree increments as the unit was rotated. These recorded power readings are un-calibrated ERP measurements. To convert these readings to ERP values, a reference reading were obtained from a calibrated dipole antenna. This reference antenna with a calibrated gain was connected to the same radio outside the RF Anechoic Chamber through RF cable with a calibrated loss. Comparing the spectrum analyzer reading of the reference antenna and the radio, and compensating for the cable, antenna, and adaptor losses provide the calibrated pulse averaged ERP.

As can be seen from figure 6-32, in maximum output power setting, the maximum Pulse averaged ERP was 1.46Watts and the minimum ERP was 1.06Watts. The measurement was repeated for two frequencies across the transmitting band: 901MHz and 896MHz.

Figure 6-32:Pulse Averaged Effective radiated Power (ERP) Vs. Azimuth Angle at maximum power setting