

6.8 Effective Radiated Power (ERP)

As described in more detail in Exhibit 7.1.b. the radiated power received at a spectrum analyzer was measured from the radio specimen with integral antenna at 2 degree increments as the specimen was rotated. These recorded power readings are uncalibrated ERP measurements. To convert these readings to ERP values a reference reading was obtained from a calibrated (to an ideal dipole) antenna to which was applied the same power level as the measured output power of the radio specimen. The reading at the spectrum analyzer from this calibrated reference antenna served to calibrate the spectrum analyzer readings for ERP measurements. By comparing the readings between the reference antenna and the radio specimen, and with a measurement of the output power of the radio specimen, this measurement also serves to determine the radio specimen antenna gain. The following calculation shows how ERP was determined from these measurements at 252, 260 and 272 degrees rotation.

- a. Analyzer reading for radio specimen, as tested at 4.5 dBm output power: -40.0 dBm
- b. Analyzer reading for a substitution ideal dipole antenna, at 4.5 dBm applied power: -39.0 dBm
- c. Antenna gain (logarithmic) compared to an ideal dipole: $(-40.0) - (-39.0) = -1.0$ dBd
- d. Measured ERP: $(4.5) + (-1.0) = 3.5$ dBm
- e. Measured ERP: 2.24 milliwatts

However, the measured ERP value above was not determined at the production controlled maximum output power of the radio product so it is necessary to scale this number. The antenna gain permits the ERP to be calculated for any output power value in a manner similar to steps c and d above. The following calculations were used to determine the Maximum ERP rating of the radio product (555.8 milliwatts), as stated in Exhibit 12.1.C, based upon the maximum output power rating (700 milliwatts) stated in Exhibit 12.1.A.

- f. Maximum output power rated: 700 milliwatts
- g. Antenna gain (linear value of item c above): 0.794
- h. Maximum calculated ERP: $0.794 \times 700 = 555.8$ milliwatts

The method above was used for all information provided in the data table which follows that, for brevity, only lists values of items a, e and h as a function of rotational angle. The following graph of item h. is provided to serve as a simplified summary of that tabulated data and permits observation of the maximum calculated ERP at the 252, 260 and 272 degree rotational positions.

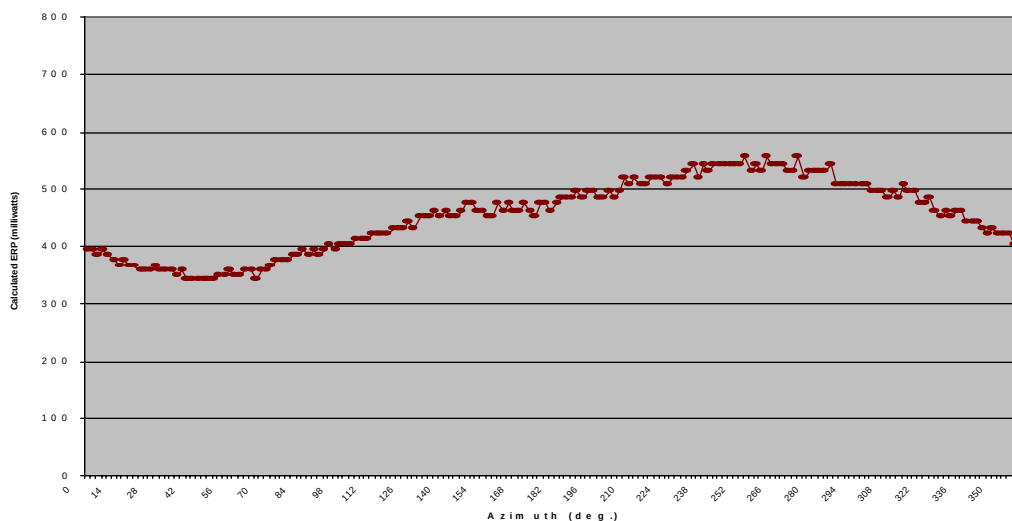


Figure 6-49: Maximum ERP vs. Azimuth

Angle	SA Reading	Measured ERP	Maximum Calculated ERP	Notes
(deg)	(dBm)	(mW)	(mW)	
0.0	-41.4	1.78	402.8	Front
2.0	-41.5	1.74	393.6	
4.0	-41.5	1.74	393.6	
6.0	-41.6	1.70	384.7	
8.0	-41.5	1.74	393.6	
10.0	-41.6	1.70	384.7	
12.0	-41.7	1.66	375.9	
14.0	-41.8	1.62	367.4	
16.0	-41.7	1.66	375.9	
18.0	-41.8	1.62	367.4	
20.0	-41.8	1.62	367.4	
22.0	-41.9	1.58	359.0	
24.0	-41.9	1.58	359.0	
26.0	-41.9	1.58	359.0	
28.0	-41.8	1.62	367.4	
30.0	-41.9	1.58	359.0	
32.0	-41.9	1.58	359.0	
34.0	-41.9	1.58	359.0	
36.0	-42.0	1.55	350.8	
38.0	-41.9	1.58	359.0	
40.0	-42.1	1.51	342.8	
42.0	-42.1	1.51	342.8	
44.0	-42.1	1.51	342.8	
46.0	-42.1	1.51	342.8	
48.0	-42.1	1.51	342.8	
50.0	-42.1	1.51	342.8	
52.0	-42.0	1.55	350.8	
54.0	-42.0	1.55	350.8	
56.0	-41.9	1.58	359.0	
58.0	-42.0	1.55	350.8	
60.0	-42.0	1.55	350.8	
62.0	-41.9	1.58	359.0	
64.0	-41.9	1.58	359.0	
66.0	-42.1	1.51	342.8	
68.0	-41.9	1.58	359.0	
70.0	-41.9	1.58	359.0	
72.0	-41.8	1.62	367.4	
74.0	-41.7	1.66	375.9	
76.0	-41.7	1.66	375.9	
78.0	-41.7	1.66	375.9	
80.0	-41.6	1.70	384.7	

82.0	-41.6	1.70	384.7
84.0	-41.5	1.74	393.6
86.0	-41.6	1.70	384.7
88.0	-41.5	1.74	393.6
90.0	-41.6	1.70	384.7
92.0	-41.5	1.74	393.6
94.0	-41.4	1.78	402.8
96.0	-41.5	1.74	393.6
98.0	-41.4	1.78	402.8
100.0	-41.4	1.78	402.8
102.0	-41.4	1.78	402.8
104.0	-41.3	1.82	412.2
106.0	-41.3	1.82	412.2
108.0	-41.3	1.82	412.2
110.0	-41.2	1.86	421.8
112.0	-41.2	1.86	421.8
114.0	-41.2	1.86	421.8
116.0	-41.2	1.86	421.8
118.0	-41.1	1.91	431.6
120.0	-41.1	1.91	431.6
122.0	-41.1	1.91	431.6
124.0	-41.0	1.95	441.7
126.0	-41.1	1.91	431.6
128.0	-40.9	2.00	452.0
130.0	-40.9	2.00	452.0
132.0	-40.9	2.00	452.0
134.0	-40.8	2.04	462.5
136.0	-40.9	2.00	452.0
138.0	-40.8	2.04	462.5
140.0	-40.9	2.00	452.0
142.0	-40.9	2.00	452.0
144.0	-40.8	2.04	462.5
146.0	-40.7	2.09	473.3
148.0	-40.7	2.09	473.3
150.0	-40.8	2.04	462.5
152.0	-40.8	2.04	462.5
154.0	-40.9	2.00	452.0
156.0	-40.9	2.00	452.0
158.0	-40.7	2.09	473.3
160.0	-40.8	2.04	462.5
162.0	-40.7	2.09	473.3
164.0	-40.8	2.04	462.5
166.0	-40.8	2.04	462.5
168.0	-40.7	2.09	473.3

170.0	-40.8	2.04	462.5	
172.0	-40.9	2.00	452.0	
174.0	-40.7	2.09	473.3	
176.0	-40.7	2.09	473.3	
178.0	-40.8	2.04	462.5	
180.0	-40.7	2.09	473.3	Back
182.0	-40.6	2.14	484.3	
184.0	-40.6	2.14	484.3	
186.0	-40.6	2.14	484.3	
188.0	-40.5	2.19	495.6	
190.0	-40.6	2.14	484.3	
192.0	-40.5	2.19	495.6	
194.0	-40.5	2.00	495.6	
196.0	-40.6	1.95	484.3	
198.0	-40.6	1.95	484.3	
200.0	-40.5	2.00	495.6	
202.0	-40.6	1.95	484.3	
204.0	-40.5	2.00	495.6	
206.0	-40.3	2.09	518.9	
208.0	-40.4	2.04	507.1	
210.0	-40.3	2.09	518.9	
212.0	-40.4	2.04	507.1	
214.0	-40.4	2.04	507.1	
216.0	-40.3	2.09	518.9	
218.0	-40.3	2.09	518.9	
220.0	-40.3	2.09	518.9	
222.0	-40.4	2.04	507.1	
224.0	-40.3	2.09	518.9	
226.0	-40.3	2.09	518.9	
228.0	-40.3	2.09	518.9	
230.0	-40.2	2.14	531.0	
232.0	-40.1	2.19	543.4	
234.0	-40.3	2.09	518.9	
236.0	-40.1	2.19	543.4	
238.0	-40.2	2.14	531.0	
240.0	-40.1	2.19	543.4	
242.0	-40.1	2.19	543.4	
244.0	-40.1	2.19	543.4	
246.0	-40.1	2.19	543.4	
248.0	-40.1	2.19	543.4	
250.0	-40.1	2.19	543.4	
252.0	-40.0	2.24	555.8	Maximum
254.0	-40.2	2.14	531.0	
256.0	-40.1	2.19	543.4	

258.0	-40.2	2.14	531.0	
260.0	-40.0	2.24	555.8	Maximum
262.0	-40.1	2.19	543.4	
264.0	-40.1	2.19	543.4	
266.0	-40.1	2.19	543.4	
268.0	-40.2	2.14	531.0	
270.0	-40.2	2.14	531.0	
272.0	-40.0	2.24	555.8	Maximum
274.0	-40.3	2.09	518.9	
276.0	-40.2	2.14	531.0	
278.0	-40.2	2.14	531.0	
280.0	-40.2	2.14	531.0	
282.0	-40.2	2.14	531.0	
284.0	-40.1	2.19	543.4	
286.0	-40.4	2.04	507.1	
288.0	-40.4	2.04	507.1	
290.0	-40.4	2.04	507.1	
292.0	-40.4	2.04	507.1	
294.0	-40.4	2.04	507.1	
296.0	-40.4	2.04	507.1	
298.0	-40.4	2.04	507.1	
300.0	-40.5	2.00	495.6	
302.0	-40.5	2.00	495.6	
304.0	-40.5	2.00	495.6	
306.0	-40.6	1.95	484.3	
308.0	-40.5	2.00	495.6	
310.0	-40.6	1.95	484.3	
312.0	-40.4	2.04	507.1	
314.0	-40.5	2.00	495.6	
316.0	-40.5	2.00	495.6	
318.0	-40.7	1.91	473.3	
320.0	-40.7	1.91	473.3	
322.0	-40.6	1.95	484.3	
324.0	-40.8	1.86	462.5	
326.0	-40.9	1.82	452.0	
328.0	-40.8	1.86	462.5	
330.0	-40.9	1.82	452.0	
332.0	-40.8	1.86	462.5	
334.0	-40.8	1.86	462.5	
336.0	-41.0	1.78	441.7	
338.0	-41.0	1.78	441.7	
340.0	-41.0	1.78	441.7	
342.0	-41.1	1.74	431.6	
344.0	-41.2	1.70	421.8	

346.0	-41.1	1.74	431.6	
348.0	-41.2	1.70	421.8	
350.0	-41.2	1.70	421.8	
352.0	-41.2	1.70	421.8	
354.0	-41.4	1.62	402.8	
356.0	-41.3	1.66	412.2	

Figure 6-50: ERP Data vs. Azimuth