

Safe working distance measurements, with 9350 mobile and fixed antenna installations

Equipment available :

Electric field sensor (Isotropic)
 NATA traceable calibrated
 Holaday HI-4422 Probe
 HI-4416 Readout



Safe-working standards (occupational)

FCC 2.1091 :

1MHz – 3MHz : E = 614 V/m,
 3MHz – 30MHz : E = (1842/f) V/m,

ICNIRP 1998 :

1MHz – 10MHz : E = (600/f) V/m,
 10MHz – 30MHz : E = 60V/m,

Measurements for Mobile 9350 whip antenna installation:

1. The radiated V/m was measure at a distance of 1.5m from the antenna at a power level of 40 Watts CW to simulate continuous speech from the SSB Transceiver. This gives us a safety factor of 2 as the normally accepted RMS heating power of voice is about 10-20% of the peak power.
2. The field strength was measured in a 180 degree arc around the antenna and no significant change in reading was noted (<10%). This was tested at several frequencies with the same results.
3. The measurements in the car where made at the point of highest reading assuming a person was in that position. This was directly in line with the antenna and the middle of the rear window.

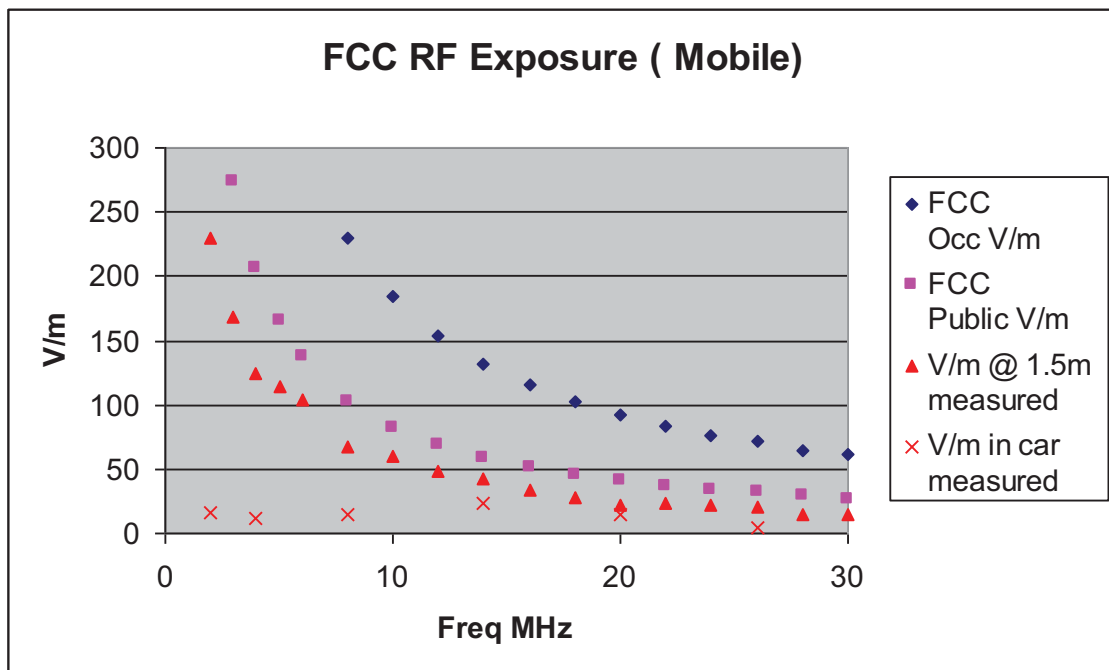
Measurements for Fixed (Base) antenna installation:

1. This was carried out on a “Semi Delta “ fixed broadband antenna mounted above a metal roof.
2. This was measured at the feed end of the antenna at a distance of 1m with a power of 40 Watts CW.

Results

Mobile 9350 whip antenna installation

Freq (MHz)	FCC Occ V/m Limit	FCC Public V/m Limit	V/m @ 1.5m Measured	V/m in car Measured
2	614	412	230	16
3	614	274	168	
4	460	206	124	12
5	368	165	114	
6	307	137	104	
8	230	103	68	14
10	184	82	60	
12	153	69	48	
14	132	59	42	24
16	115	51	34	
18	102	46	28	
20	92	41	22	14
22	83	37	24	
24	76	34	22	
26	71	32	20	4
28	65	29	14	
30	61	27	14	





Outside Vehicle @ 1.5m



Inside Vehicle at highest reading point

Results

Fixed antenna installation

Freq (MHz)	FCC Occ V/m Limit	FCC Public V/m Limit	V/m Fixed ant @ 1m Measured
2	614	412	18
3	614	274	
4	460	206	28
5	368	165	
6	307	137	30
8	230	103	26
10	184	82	26
12	153	69	
14	132	59	18
16	115	51	
18	102	46	28
20	92	41	
22	83	37	28
24	76	34	
26	71	32	14
28	65	29	
30	61	27	10

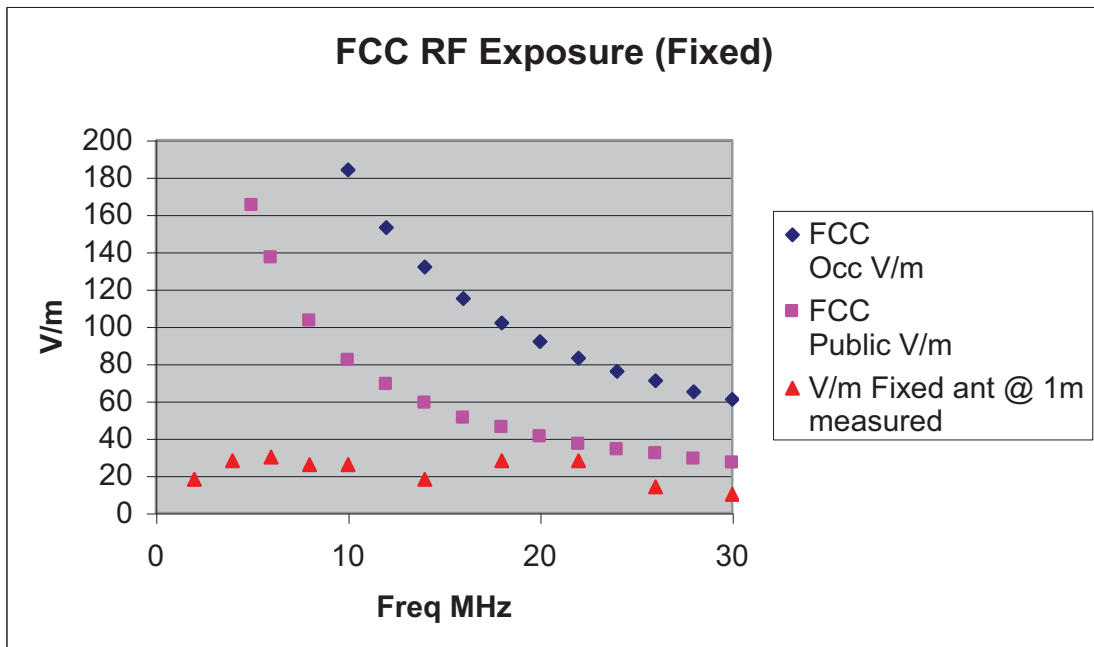


Photo of Semi-Delta fixed antenna (Feed end)

Conclusions

1. The requirements of FCC 2.1091 (occupational) are easily met at a distance of 1.5 metres from a typical Mobile antenna installation for all frequencies and possible average power levels from a 125wPEP Power Amplifier.
2. The requirements of FCC 2.1091 (occupational) are easily met at a distance of 2 metres from a typical Fixed antenna installation for all frequencies and possible average power levels from a 125w PEP Power Amplifier..
3. Average exposure levels are significantly less with typical usage of transceiver systems using 125w PEP .
4. From the measurements the requirements for General Population / Uncontrolled Exposure are also met at the distances we recommend.

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Codan 2310 HF Radio System, exposure summary

Assessed against CFR47 Part2 para. 2.1091

Report "Safe working distance measurements 9350 and delta.pdf" is based on:

1. A typical vehicular installation including a 9350 antenna tuner and whip antenna. This is electrically identical to the 3040 antenna tuner with whip antenna, so is equivalent for the purposes of exposure measurement.
2. A typical fixed antenna installation which is a Codan semi-delta antenna.
3. Earlier model transceivers capable of producing 125W PEP.

The 2310 HF Radio System is capable of transmitting 150W PEP, so will produce approx. 10% higher V/m than the transceiver used in the report.

Review of this report shows that the Exposure level conclusions are still valid for the 150W PEP 2310 HF Radio System.

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