

| Revision History | | |
|------------------|--|---------------|
| Issue | Comment | Signed |
| 1 | First release | NJA 9/2/2009 |
| 2 | Expand average power and J2B justification, add extrapolation to 1.8metres | BHJ 31/5/2013 |
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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 measured 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.
 - (a) This gives us a safety factor of 2 as the normally accepted average heating power of voice is about 10-20% of the peak power. (This is measured using a thermal Wattmeter at the transceiver output, and is broadly in agreement with the typical crest factor (peak-to-average ratio) of normal speech, being 12dB, with about 3dB signal processing compression. Average speech power in this case is of the order of 1/8 peak power, or about 15W).
 - (b) Regarding J2B (FSK) emissions, this type of emission is used for selective calling systems, and consists of a single nominal 11 second burst of RF transmission at 75W CW, initiated by the caller. Once the call is confirmed, the caller can commence normal speech communication. The averaged power over 6 minutes due only to the J2B emission is therefore about 2.5W.
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 were 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.

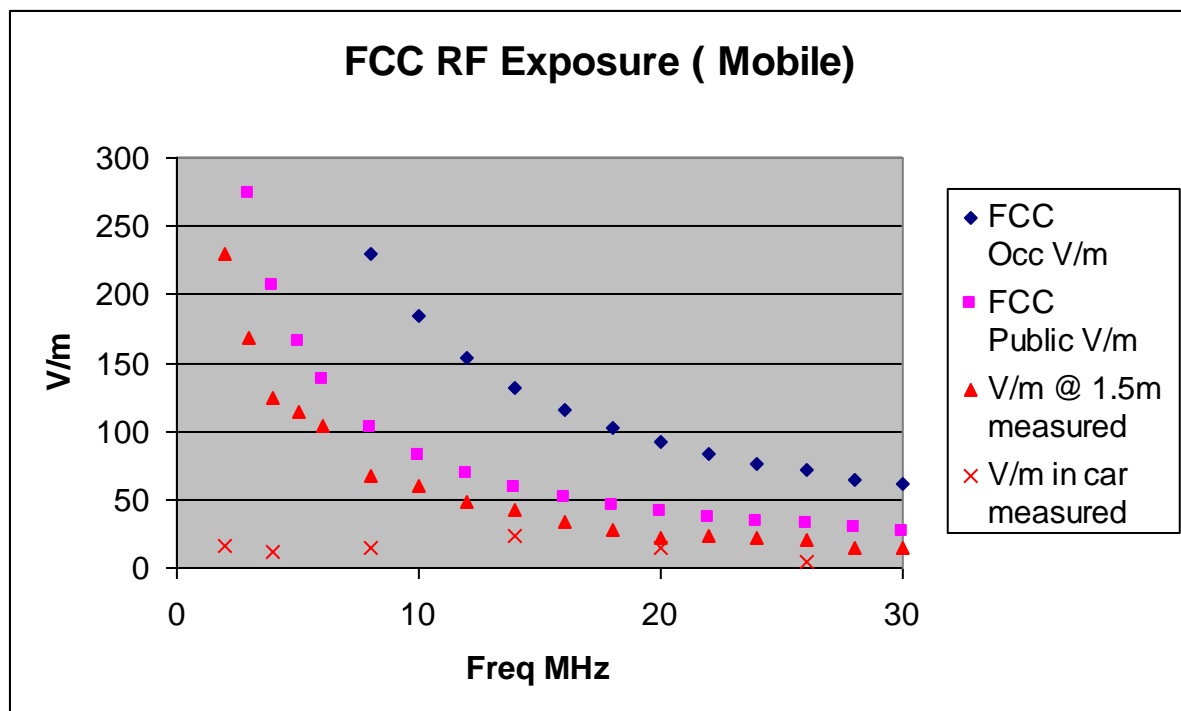
Measurements for Fixed (Base) antenna installation:

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 |

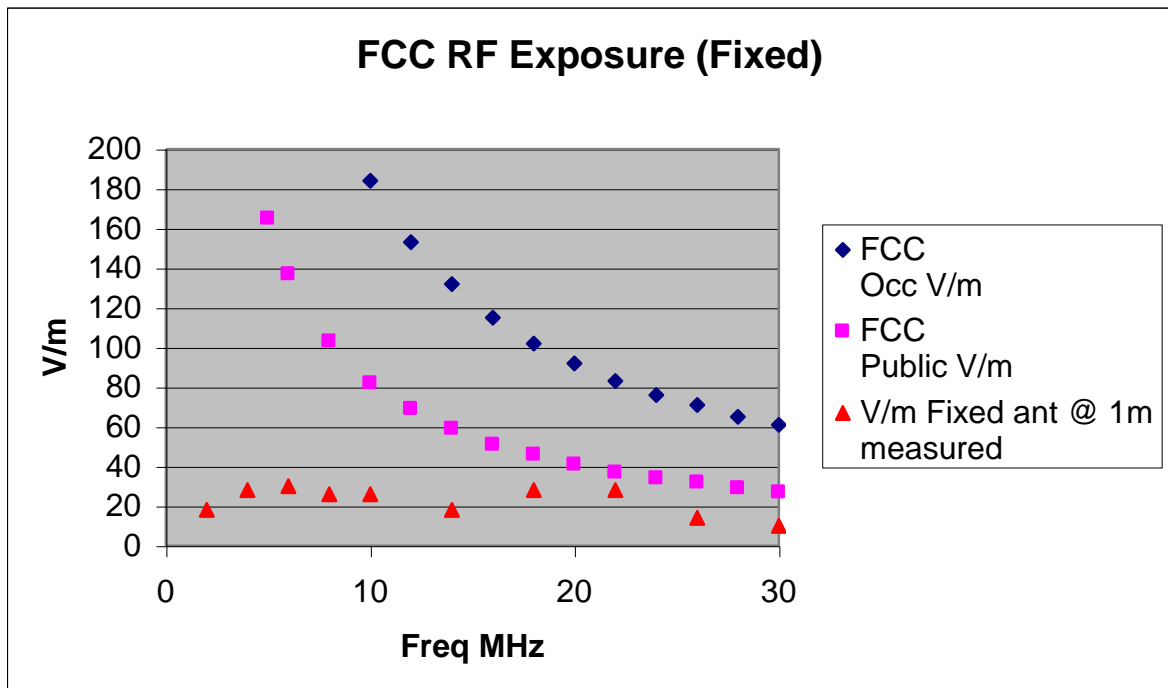


Photo of Semi-Delta fixed antenna (Feed end)

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 FCC 2.1091 (General Population / Uncontrolled Exposure) are also met at the distances we recommend.
5. The following table shows measured field strengths extrapolated to 1.8 metres to demonstrate compliance with RSS-102 (Controlled Use).

| Freq (MHz) | RSS-102 controlled use V/m Limit | V/m @ 1.5m Measured | V/m @ 1.8m Calculated | V/m in car Measured |
|------------|----------------------------------|---------------------|-----------------------|---------------------|
| 2 | 300 | 230 | 192 | 16 |
| 3 | 200 | 168 | 140 | |
| 4 | 150 | 124 | 103 | 12 |
| 5 | 120 | 114 | 95 | |
| 6 | 100 | 104 | 87 | |
| 8 | 75 | 68 | 57 | 14 |
| 10 | 60 | 60 | 50 | |
| 12 | 60 | 48 | 40 | |
| 14 | 60 | 42 | 35 | 24 |
| 16 | 60 | 34 | 28 | |
| 18 | 60 | 28 | 23 | |
| 20 | 60 | 22 | 18 | 14 |
| 22 | 60 | 24 | 20 | |
| 24 | 60 | 22 | 18 | |
| 26 | 60 | 20 | 17 | 4 |
| 28 | 60 | 14 | 12 | |
| 30 | 60 | 14 | 12 | |

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