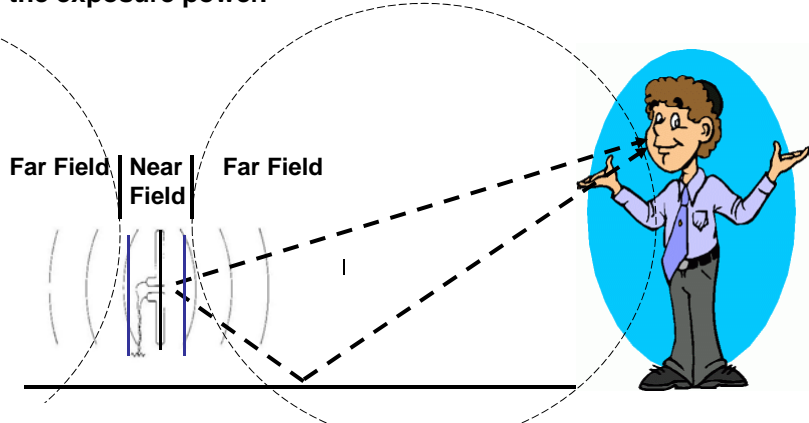


**The Sage report
California Council on Science and Technology report
My calculations**

All agree that there are no unsafe radiation problems from Firefly water meters when using the FCC's recommended formulas, including adding 100% reflection from the ground.

However, the Sage report presents several scenarios where they contend that the Firefly radiation can reach unsafe levels.

Federal Communications System (FCC), OSHA and DoD models for calculating exposure to electromagnetic radiation assumes one perfectly reflecting surface, which can double the exposure power.



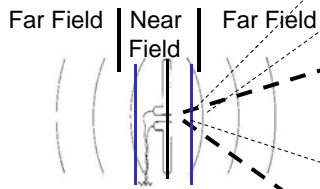
FCC RF & Microwave Power Safety Calculations
http://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf

MICROWAVE AUTOMATIC DOOR OPENERS USE CONTINUOUS MOTION DETECTION DOPPLER RADARS



Federal Communications System (FCC), OSHA and DoD models for calculating exposure assumes one 60% reflecting surface, which can add 2.56 times the power from the direct beam. Sage suggests multiple reflections can add up to an unsafe level. This would not occur in a typical water meter environment.

Experimental verification of summing multiple reflections would be required.*



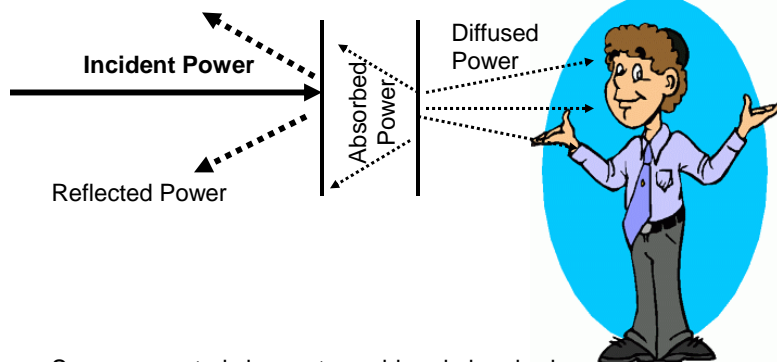
Sage Proposed Reflection Factors: *

- 60% = $(1 + 0.6)^2 = 2.56$ times
- 100% = $(1 + 1)^2 = 4$ times
- 1000% = $(1 + 10)^2 = 121$ times
- 2000% = $(1 + 20)^2 = 441$ times

* If this was a cell-phone antenna the man's head would intercept all the microwave energy in a given region and not just fixed reflections!

FCC Building Materials Attenuation Guidelines Page 23

Transmitted power through building materials is reduced by 10% to 1% of the incident power and is also diffused.



Sage paper study has not considered absorbed, reflected and diffused power from building materials.

Wireless Devices and Pacemakers

The Institute of Electrical and Electronics Engineers (IEEE) Committee on Man and Radiation (COMAR).

<http://ewh.ieee.org/soc/embs/comar/phone.htm>

“The consensus of the scientific community, as reflected in these exposure guidelines*, is that exposure to RF energy below recommended limits in these guidelines is safe.

Measurements have shown that RF exposure to individuals from use of cellular telephones and other low power wireless transceivers is normally within recommended limits.

Some cell phones and other wireless transceivers can affect the operation of heart pacemakers, implantable defibrillators, or other body-mounted medical devices, if the phone is placed directly next to the devices (within a few centimeters). Individuals with such devices should follow their physicians' recommendations.

* OET Bulletin 65, August 1997.

Wireless Devices and Pacemakers


US Food and Drug Administration (FDA)

But based on current research, cell phones would not seem to pose a significant health problem for the vast majority of pacemaker wearers. Still, people with pacemakers may want to take some simple precautions to be sure that their cell phones don't cause a problem.


Hold the phone to the ear opposite the side of the body where the pacemaker is implanted to add some extra distance between the pacemaker and the phone.

Avoid placing a turned-on phone next to the pacemaker implant (e.g. don't carry the phone in a shirt or jacket pocket directly over the pacemaker)


<http://www.fda.gov/RadiationEmittingProducts/RadiationEmittingProductsandProcedures/HomeBusinessandEntertainment/CellPhones/ucm116311.htm>




HF32D
(800MHz-2.5GHz)



HF35C
(800MHz-2.5GHz)



HF38B
(800MHz-2.5GHz)
(3.3GHz mit erhöhter Toleranz)



Deutsch	HF-Analyser Hochfrequenz-Analyser für Frequenzen von 800 MHz bis 2,5 (3,3) GHz Seite 1
	Bedienungsanleitung
English	RF-Analyser High-Frequency Analyser for Frequencies from 800 MHz to 2.5 (3.3) GHz Page 8
	Manual
Français	Analyseur-RF Analyseur de hautes fréquences de 800 MHz à 2,5 (3,3) GHz Page 15
	Mode d'emploi
Español	HF-Analyser Medidor de altas frecuencias de 800MHz a 2,5 GHz (3,3 GHz) Página 24
	Manual de instrucciones

**The GIGAHERTZ SOLUTION
RF Analyzer meters Instruction Manual**

The HF35C RF-Analyzer has been used in a number of videos on **Youtube** to attempt to measure the power density for a number of RF power sources, including utility meters, cell-phones, microwave ovens etc.

When these very sensitive meters are used by people not trained in radio frequency technology, gross errors are presented as facts.

GigaHertz Solutions RF Analyzers

In many of the **Youtube** videos the HF35C meter's antenna is held up to close to the meter. The HF35C's manual states: "Minimum distance 2 meters to reliably measure the customary power density (W/m^2) in close vicinity of the source of radiation. For instruments described here, the distance should be in excess of 2 meters"

Many of the videos on Youtube violate the greater than 2 meter distance.

The HF35C's maximum range scale for power density is 1999 microwatts **per square meter**. This is not in **power per square centimeter**, the units that are used in the RF safety specifications.

This causes many conversion errors by untrained users.

The maximum power density the HF35C can measure with out going off scale, as it does in many **Youtube** videos, when converted, is 199 microwatts per square centimeter. Thus the meter goes off scale at 1/5 to 1/10 of the safe power density on the maximum power range setting! If more sensitive range settings are used on the HF35C can go off scale far below the maximum safe power density.

The Youtube videos do not tell us what range scale the meter's are set to.

A worry some part of the **GIGAHERTZ SOLUTIONS HF35C** operations manual is the complexity required for measuring pulsed sources. It takes the integration of many pulses to hopefully get an accurate power density reading.

The **HF35C** manual states that **it cannot directly measure short radar pulses** that typically operate at 400 pulses per second. "This necessitates a special approach". To integrate pulses you must store data from many pulses. Many hours or even days of monitoring would be required to get an accurate reading on the **Firefly's** three, 1/8 second pulses every hour. In fact the meters most probably cannot make an accurate measurement.

The pulsed sources section of the manual then states :
"In most cases the measurement will be at the lower tolerance band or in the extreme case even up to a factor of 10 too low".
The Youtube videos only show instant readings of pulsed sources.

In reality we engineers must spend hours with very special equipment to get any where near accurate power density readings from pulsed microwave sources and accurate values are very important.

Conclusions

- The exposure to **FIREFLY** water meter microwave radiation is miniscule compared to cell-phone microwave radiation.
- Paper studies can only estimate possible problems. Experimental verification can resolve issues.
- Much experimental data as has been accumulated over 30 years for higher power cell-phones in the same range of frequencies as **FIREFLY** meters with **no adverse results**.
- Many applications using **safe, low power, microwaves** are in use today. For example; walking through the radar beam from automatic door openers at the supermarket exposes us to a greater level of microwave radiation than being very close to a **FIREFLY** water meter.