

## CETEM 2008

### Presentation Extended Summary Form

Presenter Information	Contact Information
<b>Presenter Name:</b> <i>Dr. Ali Hussein Muqaibel</i> <b>coauthored with <i>Mr. Umar Johar</i></b>	<b>Contact Name: Dr. Ali Muqaibel</b>
	<b>Telephone No: 03-8601595</b>
<b>Presenter biography:</b> <ul style="list-style-type: none"> <li>➤ Assistant Professor with Electrical Engineering Department, KFUPM</li> <li>➤ Ph.D. from Virginia Tech</li> <li>➤ Research Interest: UWB, Channel Ch/s, Signal propagation, Channel Coding.</li> <li>➤ More than 25 journal and conference publications.</li> <li>➤</li> <li>➤ Mr. Umar Johar is a lecturer with the Electrical Engineering Department at KFUPM</li> </ul>	<b>Fax No: 03-8603535</b>
	<b>Email Address (Required):</b> <b>muqaibel@kfupm.edu.sa</b>
	<b>Sponsoring Department/Company:</b> <b>Electrical Engineering Department</b> <b>King Fahd University of Petroleum and Minerals</b>
<b>Paper/Presentation Title:</b> <b>Investigation of Commercial Microwave Ovens Radiation</b>	<b>Targeted Audience: (i. e., Management, Engineers, Planners, etc.):</b> <b>Engineers, Management</b>

Extended Summary: (Do not exceed 1000 words).

While few people would dispute the convenience of microwave ovens, consumers are sometimes concerned about the safety of microwaves and effect of their radiations. Radiation leakage not only possess a hazard to the human health but also interfere with the ISM (industrial, scientific, and medical) band. WiFi, Bluetooth, in addition to some cordless phones are among the important technologies that could be directly impacted by microwave oven radiation. Industrial plants are among the affected sectors.

While there are mature standards to control the emission and leakage of microwave ovens, the performance of commercial microwave ovens is questionable. A spectrum analyzer based setup was prepared to measure the radiation of microwave ovens in the frequency range of about 2.45 GHz. Data was collected and analyzed. The objective of this research is to illustrate the variation of radiation leakage under different conditions. Tested scenarios include:

- The relation between leakage power and distance form the oven
- The impact of the relative position of the load (food) within the oven on the amount of leaking power
- Receiver polarization effect
- Radiation pattern
- Variability among different Microwave ovens
- In-out Band radiation

This research suggests that users should remain at more than 1 meter distance; as the measured radiation decreases dramatically with distance. Load placement test did not show consistent effect on the radiation, so it can be considered insignificant. Vertically polarized dipole antenna received significantly more radiated power than the horizontally polarized counterpart did. Radiation pattern test depicted that the radiation through the front panel of the microwave oven is the highest and second is the radiation from the back. The lowest radiation was measured at the left and right sides. As a recommendation, the user should avoid the front and the back of the oven. It is also shown that radiated power varies significantly between different manufacturers.

It is recommended that sensitive control rooms which are in the vicinity of microwave ovens should be provided with a digital leakage detector. Leakage detectors are relatively cheap, sensitive and highly accurate. The detectors can, also, send warning messages and alarms.