Purpose:
To study the response characteristics of MOSFET dosimeters in the energy range of the Xoft Axxent Electronic Brachytherapy system. These devices can be used to measure skin dose in breast HDR treatments. While MOSFETs have flat energy response at energies above 1 MeV, at the lower energies relevant to this device spectral dependence is anticipated. Therefore it is important to characterize the response for the source both bare and filtered by varying amounts of absorber to simulate different source-to-skin distances.

Method and Materials:
The Thomson-Nielsen MobileMOSFET dosimetry system was characterized with respect to a calibrated air ionization chamber for a Xoft Axxent x-ray source operating at 50 kVp. A sequence of aluminum absorbers were introduced to study how changes in the spectrum due to filtering affect the cross calibration of the MOSFETs. The Thomson-Nielsen system supports continuous readout at 10 second intervals while under irradiation, allowing detailed comparison of the time series of dose readings, and an evaluation of the real-time capabilities of the system.

Results:
Thomson-Nielsen MOSFETs had excellent linearity, with deviations throughout irradiation up to 14 Gy on the order of 3% or less. Changes in calibration as a function of absorber thickness were observed, and can be characterized by degree of change per fraction of attenuation.

Conclusion:
Thomson-Nielsen MOSFET dosimeters provide skin dose measurement capability with an accuracy on the order of 3%, providing corrections are applied to account for the distance from source to skin. Without these corrections the errors will be as much as 60% compared to an unfiltered source, but in practical use, where significant filtering will always be present, uncorrected errors are likely to be no more than 10%.

Conflict of Interest (only if applicable):
Xoft Inc. is currently in educational and commercialization discussions with several MOSFET system suppliers.