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(54) Title: THREE-DIMENSIONAL HOT SPOT LOCALIZATION

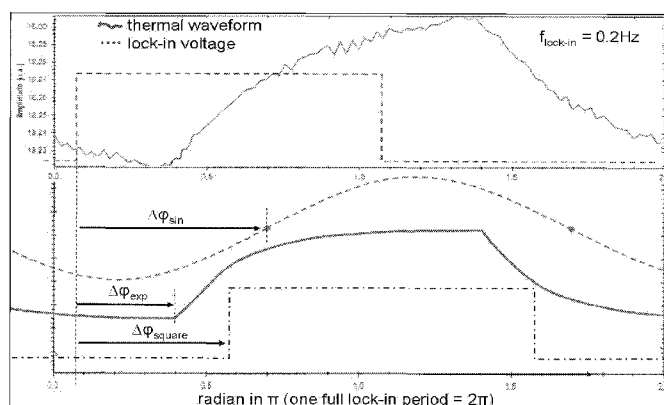


FIGURE 15

(57) Abstract: A non-destructive approach for the 3D localization of buried hot spots in electronic device architectures by use of Lock-in Thermography (LIT). The 3D analysis is based on the principles of thermal wave propagation through different material layers and the resulting phase shift/thermal time delay. With more complex multi level stacked die architectures it is necessary to acquire multiple LIT results at different excitation frequencies for precise hot spot depth localization. Additionally, the use of multiple time-resolved thermal waveforms, measured in a minimized field of view on top of the hot spot location, can be used to speed up the data acquisition. The shape of the resulting waveforms can be analyzed to further increase the detection accuracy and confidence level.