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Abstract : The thesis presents a study and investigation of the different techniques of precision metal-detection and explains the compatibility of each level of the available technologies (discrete components, thin film, IC MOSFET) with these techniques. It also develops a powerful modeling of each technique, these models have been experimentally verified and showed a very good agreement between the measurements and the theory. Original methods have also been elaborated and used to improve the I detector performance (accuracy; resolution linearity, dynamic range of detection,...) and operation (simplicity, reliability, persistivity,). This study necessitates a good knowledge of thin film theory and technology which is covered in Chapter (1), microelectronics and integrated circuits which have been given great attention in Chapter (2). -- The measurements and analysis have been exposed in Chapter (3) with detailed discussions. Finally our conclusions are given in Chapter (4)aa

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