Legend Design Technology

Application Note

CV Model Extraction

For Amorphous-Silicon TFT Devices

Purposes:

While developing the advanced amorphous-silicon TFT devices for high-performance display panel, customers frequently have difficulties to correctly model the capacitances (C_{GS} and C_{GD}) of TFT device based on measured data. This Application Note is to illustrate how to extract a complete set of model parameters that fit all available physical measurements of C_{GS} and C_{GD} data. MSIM-TFT Model Extractor was used here.

Measured Data Provided:

The input data required for model extraction are (1) channel length of device, (2) channel width of device, (3) ambient temperature, (4) measured capacitance data, and (4) the existing CV model to refine.

The set of measurement data are C_{GD} vs V_{DS} and C_{GS} vs V_{DS} at various V_{GS}. The CV formats of those measured data are shown below

V_{GS}	V_{DS}	C_{GD}	C_{GS}	Length	Width
		:			
2	0.3	25.7772e-15	29.4898e-15	0.8e-06	100e-06
		:			
2	2.5	9.0839e-15	35.2154e-15	0.8e-06	100e-06
		:			
6	1.0	27.7645e-15	33.1098e-15	0.8e-06	100e-06
		:			
6	4.6	13.8634e-15	38.5559e-15	0.8e-06	100e-06
		:			

Model Extracted:

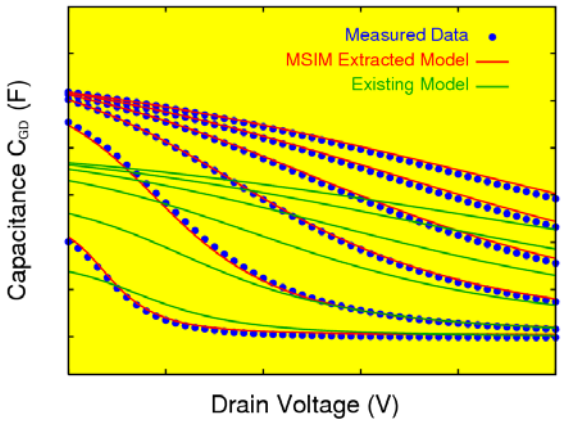

Fig. 1: MSIM extracted model, existing model and measured data comparison of C_{GD} vs V_{DS} at various V_{GS} for TFT device

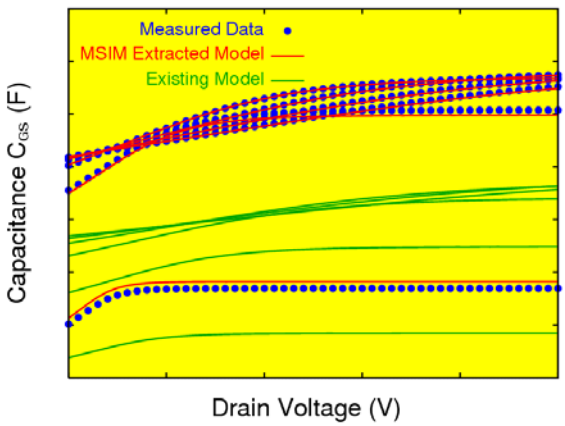

Fig. 2: MSIM extracted model, existing model and measured data comparison of C_{GS} vs V_{DS} at various V_{GS} for TFT device

Summary:

As shown in Fig. 1 and Fig. 2, the accuracy of C_{GS} and C_{GD} models extracted has been proven much better than the existing models by comparing with the measurement data at various V_{GS}. Those high-accuracy C_{GS} and C_{GD} models produced by MSIM-TFT Model Extractor shall enable the precise simulation and analysis of TFT panel designs for high-quality display products.