Legend Design Technology

Service Success Story: Customer B

TFT Model Refining

For Leakage Currents at Various Technologies

Service Project:

While developing the advanced amorphous-silicon TFT devices for high-performance display panels, customer was finding it difficult to correctly model the TFT device by measured data, especially for leakage currents. This project goal was to refine existing models for a complete set of model parameters that fit all available physical measurements at various technologies. Legend's MSIM-TFT Model Refiner was used for this service project.

Measured Data Provided:

The input data required for model refining are (1) channel length of device, (2) channel width of device, (3) ambient temperature, (4) device currents, and (5) the existing model to refine.

Each set of measurement data are I_{DS} vs V_{GS} at various V_{DS}, and I_{DS} vs V_{DS} at various V_{GS}. Based upon the given 3 technologies, there are 3 sets of the measured data provided, with the format shown below

I_{DS} vs V_{GS}		Technology A	Technology B	Technology C
V_{DS}	V_{GS}	I_{DS}	I_{DS}	I_{DS}
		:		
8	-10	2.6240e-11	1.2610e-11	2.2746e-10
		:		
8	2.8	1.8431e-06	1.6640e-06	1.7821e-06
		:		
16	-8.0	2.7709e-10	8.3240e-11	5.2749e-10
		:		
16	3.6	6.0349e-06	5.2562e-06	5.4244e-06
		:		

I_{DS} vs V_{DS}		Technology A	Technology B	Technology C
V_{GS}	V_{DS}	I_{DS}	I_{DS}	I_{DS}
		:		
10	2	4.8521e-05	4.5107e-05	4.7486e-05
		:		
10	8	1.4084e-04	1.3063e-04	1.3582e-04
		:		
15	5	2.4610e-04	2.3829e-04	2.4651e-04
		:		
15	12	4.7363e-04	4.6425e-04	4.7626e-04
		:		

Model Extracted:

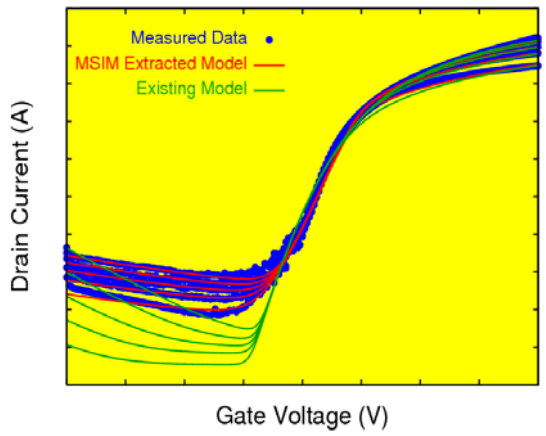

Fig. 1: Refined model, existing model and measured data comparison of I_{DS} vs V_{GS} at various V_{DS} for TFT Device of Technology C

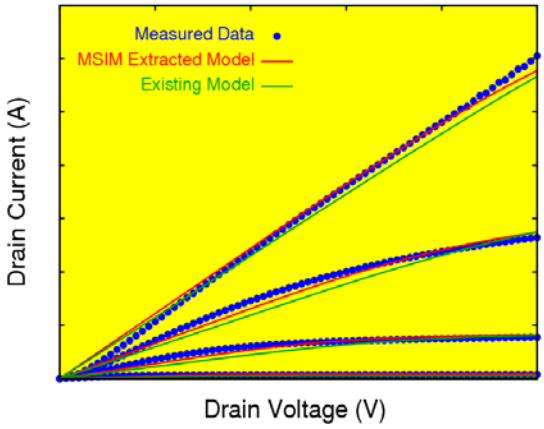

Fig. 2: Refined model, existing model and measured data comparison of I_{DS} vs V_{DS} at various V_{GS} for TFT Device of Technology C

Summary:

As shown in Fig. 1 and Fig. 2, the accuracy of TFT models refined during this service has been proven much better than the existing models by comparing with the measurement data. Especially, at low leakage currents, the refined models are very well fitted with the physical measurements. In summary, the high-accuracy models produced through this model refining service project shall enable the precise simulation and analysis of TFT panel designs for high-quality display products.