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CSM/Win SYSTEM and SOFTWARE DESCRIPTION

Materials Development Corporation (MDC) has been manufacturing C-V Testing Systems since 1970. In 1977, MDC designed, built, and marketed the first computerized C-V plotter. Since then MDC has worked at improving both the hardware and software for C-V measurements and has taken full advantage of new C-V measurement instruments and more powerful computers. MDC has a continuing program to improve its measurement software and add new features.

The software provided may include these functions:

- Production MOS Tests
- Engineering MOS Tests
- Junction Tests
- System Setup
- Variable Frequency MOS C-V Tests
- Multiple Frequency C-V Tests
- Quasi-Static/Dit Test
- GOI Tests
- IV Tests
- TVS Tests
- Parametric Tests
- Dielectric Tests
- Comprehensive Help File

These functions are described briefly below. All CSM/Win System programs include:

- Menu-driven operation,
- Test Recipes that may be saved and edited,
- Storage and Recall of complete data sets in all programs,
- Storage of Data Summaries in Production Program,
- Comprehensive, single-screen reports of test results,
- Overlay plotting of multiple data sets,
- Output of ASCII data tables,
- Limits checking of test results,
- Series Resistance Correction, and
- Temperature compensation of all measurements

PRODUCTION MOS TESTS include MOS C-V measurements with or without bias- temperature stress to look at basic MOS device parameters like V_{fb} , C_{fb} , doping, V_t , Q_{total} , and N_m . All tests include correction for series resistance effects.

ENGINEERING MOS TESTS include basic MOS C-V measurements as well as RETRACE and PULSED C-V data gathering modes and Conductance-Voltage plotting. Advanced features like theoretical MOS C-V curve generation and Dit computation using the Terman Method are included. Capacitance-time measurements to measure substrate lifetime are included along with Zerbst analysis. Doping profiling of sub-oxide regions is provided. Thin oxide analysis uses the Ricco method. Additional analyses including quantum effects and polysilicon depletion are provided.

JUNCTION TESTS include special adaptive C-V data gathering and analyses for doping and resistivity profiles as well as junction series resistance and built-in potential. On screen utilities for averaging of doping and resistivity profiles are provided.

SYSTEM SETUP includes programs to setup and zero the capacitance meter as well as utilities to choose system parameters such as default temperature, and material parameters. Also included are utilities for checking system operation.



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VARIABLE FREQUENCY MOS C-V TESTS include measurement of MOS device capacitance and conductance as a function of frequency and associated analyses to present plots of Interface Trap Density versus bandgap position using the Conductance-Frequency technique.

MULTIPLE FREQUENCY C-V TESTS include additional software to measure and plot a family of C-V and G-V curves as a function of measurement frequency.

QUASI-STATIC/Dit TEST includes automatic data gathering of both quasi-static and high frequency C-V plots and associated analyses to plot interface trap density versus surface potential or bandgap position using both the Kuhn and Castagne methods. Analyses including quantum effects and polysilicon depletion are provided.

GOI TESTS include additional software to measure gate oxide integrity using forced, ramped, or pulsed voltage and current sources. Data presentation using histograms, TDDB plots, and Weibull plots are included. Tests included are hardware dependent.

IV TESTS include additional software to measure and plot current voltage characteristics of junction and MIS structures and oxide breakdown tests.

TVS TESTS include additional software to measure and analyze high temperature quasi-static C-V plots for mobile ionic charge. Uses an on-screen automated integration program to determine Nm with better resolution than conventional CVBT method.

PARAMETRIC TESTS include additional software to control multiple SMU measurements of multi-terminal devices and to plot of a wide variety of output and transfer characteristic plots to extract device parameters.

THIN OXIDE PROGRAMS include special programs for measurement and analysis of thin oxides. The Frequency-Shifting data gathering allows accurate measurement of thin oxide C-V plots in the presence of leakage. The CVC Analysis functions analyze and model C-V plots affected by quantum effects and polysilicon depletion effects.

The COMPREHENSIVE HELP FILE is an online help program that provides information about all program functions as well as measurement suggestions, technical information, and a comprehensive reference list.

FACILITIES
The CSM/Win System C-V Testing System requires the following facilities: Power: 220V, 50Hz, 20 Amps. Vacuum: As required for wafer hold-down only. Cooling water: For the BTS temperature cycle only if chiller is not ordered. 1 liter per minute flow at a pressure not exceeding 15 psi. Detailed specifications and site drawings will be supplied.

INSTALLATION
CSM/Win Systems are shipped partially assembled and require minor setup and connection to customer facilities.

If you have any further questions, please contact us. We thank you for the opportunity to present our software to you. As MDC enters its fourth decade of C-V plotter development we have a continuing commitment to supply the latest and best instrumentation available.