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**Single Board Precision DVM  
with direct Character Display Module driver**

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The ALD MB203 is a precision +/- 5 1/2-digit Digital Voltmeter (DVM) printed circuit board that contains the ALD500R/ALD523D A/D Converter – Display Module Controller chipset. It features direct 2 x 16 Character Display Module interface, calibrated analog input (w/scalable input ranges), and digital circuitry to communicate with PC or other microprocessors. It is designed to be used as a stand-alone, embedded system component in a variety of applications including digital panel meters, customized instrumentation displays, temperature monitoring, high resolution DVM's, weigh scales and others. Direct Full-scale analog input range is +/- 2.00000 V DC with a linearity of 0.005%. ALD's 18-bit plus sign integrating dual-slope analog processor (ALD500) functions as the input device and the ALD523D microprocessor IC implements the digital conversion, control mode and I/O functions for interfacing with a variety of LCD/VFD multi-line Character Display Modules. In addition, the MB203 also drives and manages a 2 x 16 LCD or VFD Character Display Module.

MB203 supports three optional Mode versions, each populated with different components and configuration, are:

Mode A version- calibrated reference mode.

Mode A is used primarily for measurements against a calibrated reference voltage typically required in precision voltmeter applications.

Mode B version – ratio-metric mode.

Mode B is intended for measurements against a ratio-metric reference voltage such as those required in weigh scale applications.

Mode C version- display only mode.

Mode C is used for display applications and can be programmed to be compatible with most industry standard serial binary input data formats — up to 31 serial bits plus sign bit.

Standard Mode A version is available as MB203A. Mode B and Mode C versions are simple application specific adaptations of the MB203A.

The MB203 board has provision for PC interface, including DOS setup, operating and calibration software, Basic programming interface modules, and input resistor divider network for input scaling. DC Inputs are single ended or optionally fully differential, and features automatic zero and automatic input polarity detection. There are also optional socket/footprints for input pre-amplifier and 2-input differential input analog switch. A DB25 connector is provided on-board to conveniently interconnect the MB203 to a personal computer (PC) via the parallel printer port for initial setup and calibration. Standard PC software is included to configure the ALD523D digital controller chip and establish input scaling and user-defined alphanumeric "Title and Unit fields" for the display module, which are then uploaded and stored in the EEPROM on the MB203. Once initial set up and calibration is completed, the MB203 board only requires a single +5V DC power supply to operate.

## Key Features

- User switch-selectable Display Ranges with pre-programmed Unit fields.
- Measurement Range: +/- 2.00000 VDC direct input.  
(Other ranges are user configurable and scalable, using both hardware and software scaling)
- All solid-state construction.
- User selectable +/- 3 1/2 to +/- 6 1/2 digits.
- Differential analog inputs with auto-polarity and auto-zero.
- Includes DOS software for optional user setup and calibration.
- User configurable software and hardware parameters.
- Calibration for positive and negative inputs stored in on-board EEPROM.
- Input Filtering (Sample Averaging) selection for noise reduction and accurate displays.

## Key Specifications

### MB203A

- Direct Full Scale Analog Input Range: +/- 2.00000V
- Input Impedance: 1 G Ohm min, 100 G Ohm typical.
- Optional on-board input resistor divider/preamplifier network for wide input voltage ranges
- Resolution: +/- 1 digit, (+/- 10 uV) @  $V_{in} = 1.00000$  V (16x input averaging)
- Overvoltage Protection: Not available
- Up to 3 Sets of Full Scale Display Ranges: +/- 9999999 ( up to 7 full digits)
- Conversion Sample Rate: 3-samples/sec (from 0.5 sample/min. to 10 samples/sec).
- Power Supply: +4.5 to +5.5V max @ 9mA max.
- Accuracy +/- 0.02% (After 2 hour warm-up )
- Linearity of +/- 0.005% full-scale (23°C, +/- 1°C).
- Logic Compatibility: CMOS inputs and outputs.

### MB203A20V

- Direct Full Scale Analog Input Range: +/- 20.000V
- Input Impedance: 10 MEG Ohm nominal
- Optional on-board input resistor divider/preamplifier network for wide input voltage ranges.
- Resolution: +/- 1 digit, (+/- 100 uV) @  $V_{in} = 10.0000$  V (16x input averaging)
- Overvoltage Protection: 200V DC
- Up to 3 Sets of Full Scale Display Ranges: +/- 9999999 ( up to 7 full digits)
- Conversion Sample Rate: 3-samples/sec (from 0.5 sample/min. to 10 samples/sec).
- Power Supply: +4.5 to +5.5V max @ 9mA max.
- Accuracy +/- 0.02% (After 2 hour warm-up )
- Linearity of +/- 0.005% full-scale (23°C, +/- 1°C).
- Logic Compatibility: CMOS inputs and outputs.

## Applications

Applications for the MB203 Board include embedded digital panel meters, customized instrumentation displays, temperature monitoring, high resolution DVM's, weigh scales, signal conditioners, laboratory data-logging, process monitors, portable/field troubleshooting and calibration.

## Configuration & Outline Drawing

All MB203 boards include a DB25 pin connector that plugs directly into the parallel printer port of a desktop or laptop PC computer for initial setup & calibration. After initial setup, the board may be unplugged from the PC and operated in the stand-alone mode. Depending on a specific application, each board can be readily modified and populated with different components for other modes of operation.

## ALD500/ALD523D Chipset

For complete technical information and operating specifications for the ALD chipset as well as other ALD products, you can download complete datasheets on-line.

## Environmental

- Operating Temperature Range: 0 to 50 degrees C.
- Storage Temperature: -40 to +85 degrees C.
- Humidity: To 90% (no condensation).
- Protection: No shielding — open board construction.

## Mechanical

- Outline Dimensions: 3.00 in. x 2.95 in. x 0.5 in.
- Mounting Holes: 0.125 in. diameter @ 0.125 in from 4 corners
- Weight: 1ounce (28 grams) Nominal

## Ordering Information

- ALDMB203A (MODE A, DVM Mode)
- ALDMB203Tyyyy  
where Tyyyy is a Custom Part Number designator
- ALDMB203A – xxV (Option)  
where xx specifies the input voltage range,  
e.g. xx=20 for +/- 20V input voltage range