

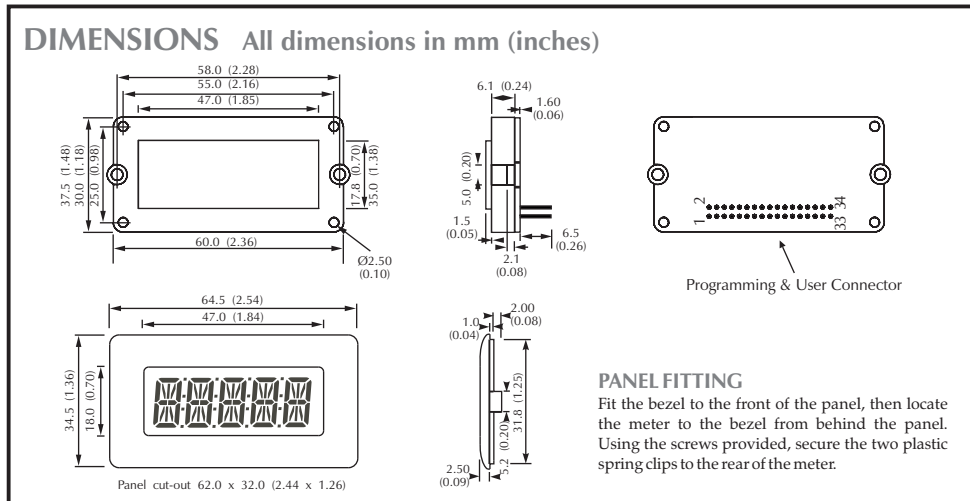
ADDITIONAL DATA: ACCESSORIES & COMPONENTS

Programmers	Manufacturer	Part Number	Web Site
	Arizona Microchip	PICSTART PLUS	http://www.microchip.com
	RF Solutions	EPIC PLUS	http://www.rfolutions.co.uk
	Van Ooijen Tech.	A-Wisp628 A-Cable-MDM	http://www.voti.nl/shop/products.htm
Handheld Enclosures	Manufacturer	Part Number	Website
Veronex Size 3 (Grey)	Vero Electronics	75-227910G 75-227911D	http://www.vero-uk.com http://www.vero-uk.com
Veronex Size 3 (Black+IR)	Vero Electronics	75-237431B 75-237432F	http://www.vero-uk.com http://www.vero-uk.com
Component Datasheets	Manufacturer	Part Number	Website
Microcontroller	Arizona Microchip	PIC 16F877	http://www.microchip.com
LCD Controller	OKI	MSM6544	http://www.okisemi.com

The manufacturers' web sites, listed above, offer comprehensive data which is free of charge and can be downloaded in Adobe Acrobat PDF format for viewing and printing. Contact the relevant manufacturer to place orders for accessories.

⚠ SAFETY WARNING ⚠

To comply with the Low Voltage Directive (LVD 93/68/EEC), input voltages to the module's connectors must not exceed 500VRMS. If voltages to be measured exceed 500VRMS, then fit scaling resistors externally to the module. If the mains power supply is connected to the module, then all the module's connectors must be considered to be floating at mains potential. Consequently due caution must be exercised when connecting to the module's connector functions under these conditions. The user must ensure that the incorporation of the DPM into the user's equipment conforms to the relevant sections of BS EN 61010 (Safety Requirements for Electrical Equipment for Measuring, Control and Laboratory Use).



PANEL FITTING

Fit the bezel to the front of the panel, then locate the meter to the bezel from behind the panel. Using the screws provided, secure the two plastic spring clips to the rear of the meter.

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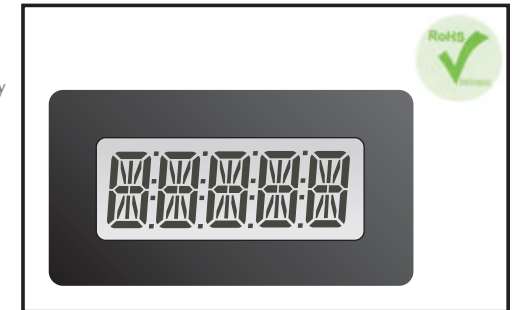
PIC-based Display Module featuring FLASH Memory for Easy (re-)Programming

MDM-1 is a programmable LCD display module, intended for applications that require a fast time to market at low cost. The module is sold unprogrammed, allowing the user to program the desired functionality into the product. MDM-1 can be made to control a complete application, including its display front-end, a keypad interface, switching outputs and any LED's. The module's core components comprise an LCD and a PIC microcontroller. The display consists of a 5-digit, 14-segment starburst LCD with green LED backlighting. Each LCD segment is software-addressable, allowing the user to display numbers, text and non-standard characters. The PIC processor used (a 4 MHz 16F877) features a reduced instruction set (RISC) architecture, making it easy for the user - novice or advanced - to develop professional software quickly. The PIC processor contains 8k 14-bit words of Flash program memory, allowing the module to be programmed in-circuit, and then re-programmed if necessary. This ensures that the latest firmware revision can be downloaded into the module, or changed on-the-fly. An internal 256 byte EEPROM features a pre-programmed character generator, making the display of text particularly easy. Connection is via a 34-way IDC connector, allowing for easy in-circuit programming, using low-cost, off-the-shelf PIC programmers. The same connector provides the application interface. The module has been designed to fit into a range of standard handheld enclosures. Alternatively, the user can mount the MDM-1 into a front panel, using the bezel and mounting hardware provided.

MDM-1 features a high accuracy 10-bit A/D converter, making measurement of analogue signals on multiple channels possible. Calibration is achieved via the on-board potentiometer or in software.

A development system - MDM-DEV-1 - is also available, comprising an MDM-1, a development board, cables, Windows software and firmware routines. Additional firmware routines are available on <http://www.lascarelectronics.com>, as they become available.

- 5 Digit Starburst LCD with LED Backlighting
- 16F877 Flash PIC Microcontroller
- 8k x 14 Bit Word User-Programmable Flash Memory
- 10-Bit A/D Converter, up to 8 Channels
- 8 Bit and 16 Bit Counter/Timers
- 2 Pulse Width Modulation Channels
- Bi-directional Parallel I/O Port with Flow Control
- Built-in I²C Bus (RS232 Option)
- Built-in Character Generator in 256 Byte EEPROM



Built-In Software Routines

- 5V Voltmeter
- °C/°F Thermometer
- Up/Down Counter
- 25-Character/8-Message Display

Typical Applications

- Panel Meters
- Data Displays
- Controllers
- Data Loggers
- Counters
- Slave Displays
- Thermometers

Ordering

PIC Based Display

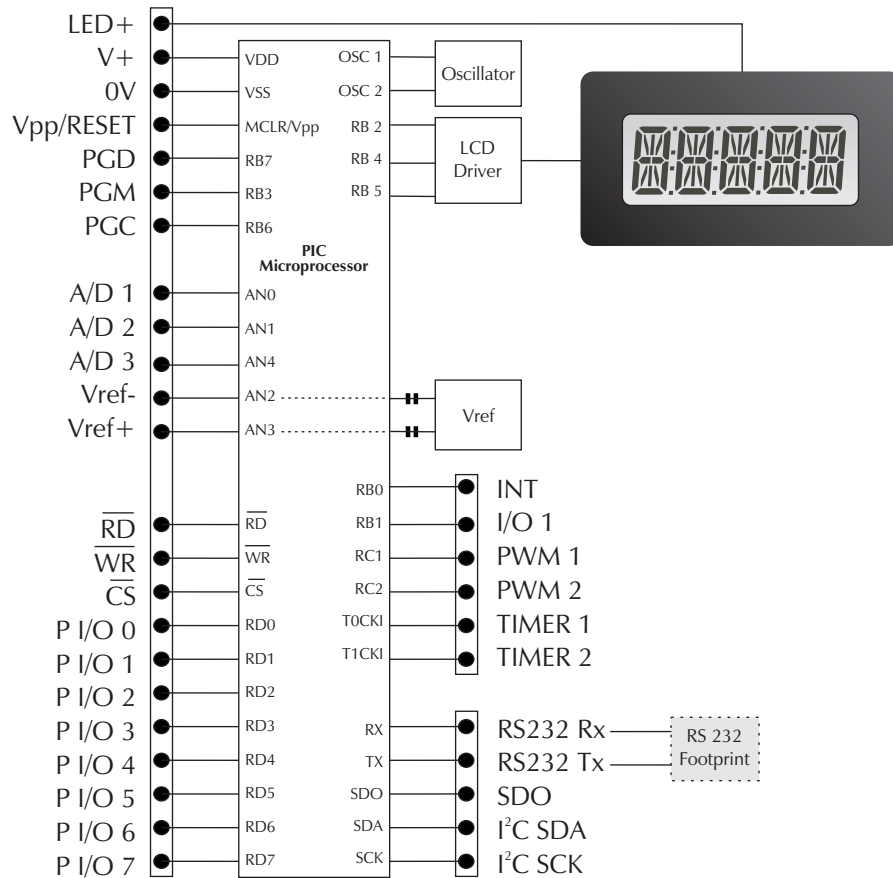
- Display module with A/D converter
- Bezel and fixing hardware

Development Kit

- MDM-1 display module
- Bezel and Fixing Hardware
- MDM-DEV-1 development board
- Windows software on 3 1/2" disk
- Firmware routines and subroutines
- Programming Cable
- Communications cable

Consult the Lascar website for the latest **FREE** software components and application ideas. Alternatively, ask Lascar to write your software or program your modules with your code.

System Block Diagram (Example)



Module IDC Connector

PGD	1	2	Vpp/RESET
PGC	3	4	A/D 1
RS232 RX	5	6	A/D 2
RS232 TX	7	8	Vref-
PGM	9	10	Vref+
TIMER 1	11	12	A/D3
TIMER 2	13	14	I/O 1
LED+	15	16	INT
V+	17	18	SDO
0V	19	20	I ² C SCK
RD	21	22	I ² C SDA
WR	23	24	PWM 2
CS	25	26	PWM 1
P I/O 7	27	28	P I/O 0
P I/O 6	29	30	P I/O 1
P I/O 5	31	32	P I/O 2
P I/O 4	33	34	P I/O 3

Equivalent PIC 16F877 Pin Nomenclature

RB7/PGD	1	2	MCLR/Vpp/THV
RB6/PGC	3	4	RA0/AN0
RC7/RX/DT	5	6	RA1/AN1
RC6/TX/CK	7	8	RA2/AN2/VREF-
RB3/PGM	9	10	RA3/AN3/VREF+
RA4/T0CKI	11	12	RA5/AN4/SS
RC0/T1OSO/T1CKI	13	14	RB1
No Equivalent	15	16	RB0/INT
VDD	17	18	RC5/SDO
VSS	19	20	RC3/SCK/SCL
RE0/RD/AN5	21	22	RC4/SDI/SDA
RE1/WR/AN6	23	24	RC1/T1OSI/CCP2
RE2/CS/AN7	25	26	RC2/CCP1
RD7/PSP7	27	28	RD0/PSP0
RD6/PSP6	29	30	RD1/PSP1
RD5/PSP5	31	32	RD2/PSP2
RD4/PSP4	33	34	RD3/PSP3

DIL Programming Header

Vpp/RESET	1	40	PGD
A/D 1	2	39	PGC
A/D 2	3	38	RS232 RX
Vref-	4	37	RS232 TX
Vref+	5	36	PGM
I/O 1	6	35	TIMER 1
A/D 3	7	34	TIMER 2
INT	8	33	LED+
SDO	9	32	V+
I ² C SCK	10	31	0V
I ² C SDA	11	30	RD
PWM 2	12	29	WR
PWM 1	13	28	CS
P I/O 0	14	27	P I/O 7
P I/O 1	15	26	P I/O 6
P I/O 2	16	25	P I/O 5
P I/O 3	17	24	P I/O 4
Not Used	18	23	Not Used
Not Used	19	22	Not Used
Not Used	20	21	Not Used

Pin Functions (overview)

Power Supply	IDC	DIL	Name
Positive supply input	17	32	V+
Negative supply input	19	31	0V
LED backlighting supply	15	33	LED+

Programming	IDC	DIL	Name
Programming voltage input	2	1	Vpp/RESET
Low voltage programming input	9	36	PGM
Serial programming data	1	40	PGD
Serial programming clock	3	39	PGC
Positive supply voltage	17	32	V+
Negative supply voltage	19	31	0V

Analogue Measurement	IDC	DIL	Name
Measurement input 1	4	2	A/D 1
Measurement input 2	6	3	A/D 2
Measurement input 3	12	7	A/D 3
Negative voltage reference input	8	4	Vref-
Positive voltage reference input	10	5	Vref+

Counter/Timers	IDC	DIL	Name
8-bit Counter/Timer	11	35	TIMER 1
16-bit Counter/Timer	13	34	TIMER 2

Pulse Width Modulators	IDC	DIL	Name
PWM Channel 1	26	13	PWM 1
PWM Channel 2	24	12	PWM 2

Parallel Port	IDC	DIL	Name
I/O line 0	28	14	P I/O 0
I/O line 1	30	15	P I/O 1
I/O line 2	32	16	P I/O 2
I/O line 3	34	17	P I/O 3
I/O line 4	33	24	P I/O 4
I/O line 5	31	25	P I/O 5
I/O line 6	29	26	P I/O 6
I/O line 7	27	27	P I/O 7
Chip Select	25	28	CS
Write	23	29	WR
Read	21	30	RD

Serial Coms Ports	IDC	DIL	Name
SDO	18	9	SDO
I ² C Clock	20	10	I ² C SCK
I ² C Data	22	11	I ² C SDA
RS232 Transmit	7	37	RS232 TX
RS232 Receive	5	38	RS232 RX

Interrupt & I/O	IDC	DIL	Name
External interrupt	16	8	INT
General I/O port	14	6	I/O 1

Technical Specifications

Module

Supply Voltage: 5V d.c. (typ.)
 Supply Current: Application dependent
 Backlight Current: 50mA (typ.) @ 5V d.c.
 Operating Temperature Range: 0 to 50°C

LCD

Segments: 74, duplexed
 Digit Height: 12.7mm (0.5")
 Viewing Angle: 6 o'clock

Microprocessor*

Type: PIC 16F877
 Speed: 4 MHz
 Program Memory: 8k x 14-bit FLASH
 Data Memory: 368 bytes (RAM)
 I/O Lines: Sink up to 25mA d.c.
 Source up to 20mA d.c.
 A/D Converter: 10-bit
 Timers: 8-bit & 16-bit

* Consult the IC manufacturer's datasheet for a full set of up-to-date technical specifications (see back page).