# DSP004 Datasheet

***PRODUCT HIGHLIGHTS***

- No-Code UI Menu for settings & custom character creation
- Standard ASCII characters with 34 custom characters available
- All settings and custom characters stored on non-volatile EEPROM
- Simple +5V TTL/UART interface
- Non-Scrolling / Scrolling modes with adjustable scroll speed
- On-board ambient light sensor for automatic brightness control, adjustable
- External PWM or fixed-level capable for user-controlled brightness
- Configurable baud rate, EOL terminator
- Easy development setup using Virtual Com Port and Serial Terminal emulator
- High-Visibility LED Dot Matrix Display
- RoHS Compliant
- Bezel with Lens available for purchase

## Product Overview

The DSP-004 is an 8-character 5x7 LED Dot Matrix intelligent display, with 0.7 in. high characters. All user configuration settings, as well as custom character creation, can be accomplished with the patent-pending integrated UI which provides an intuitive no-code solution, allowing ultra-fast integration with the user system. A Serial Terminal emulator and a USB virtual com port is all that is needed to access the integrated UI menu.
For large-volume applications the UI may be bypassed and all settings as well as custom characters may be written directly onto on-board EEPROM, a task designed to be easily be accomplished with a minimal level of expertise.
Robust design includes protection from reverse/overvoltage conditions with ESD protection.
See the Quick Start Guide for detailed information on how to setup the display and access the UI menu.

## Technical Specifications

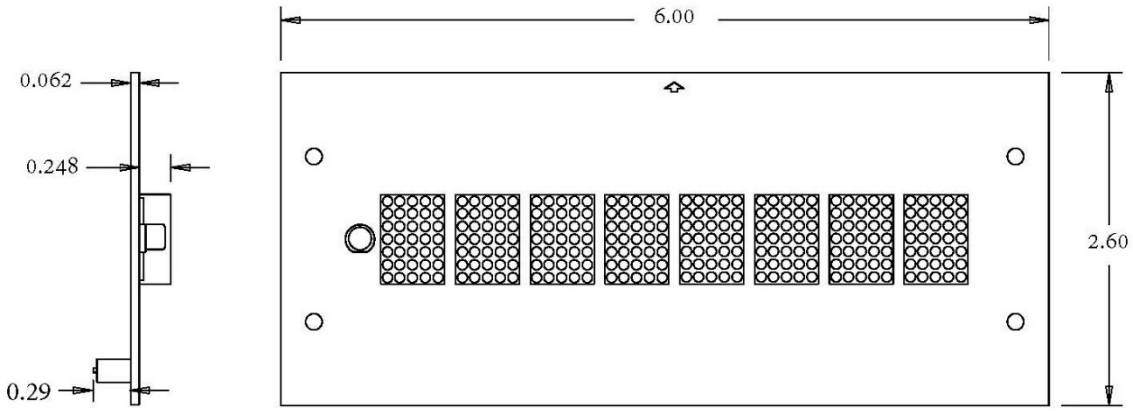
| **Power Supply Voltage** | | |
|---|---|---|
| V Nominal | V min | V max |
| +5.0V DC | +4.75V DC | +5.30V DC |

| **Power Supply Current** | | |
|---|---|---|
| Typical | Minimum | Maximum |
| 20 mA | - | 900 mA |
| **Operating Temperature** | | |
| Min | Nominal | Maximum |
| 0° C | -- | +40° C |

| **Display Data Input Signals** |
|---|
| Protocol: +5V TTL/UART, 8 data bits, 1 stop bit, no parity, no flow control |
| Character encoding: ASCII |
| Baud rate: Selectable, 38400 and 31250 |
| EOL Terminator: RXIN: Selectable <CR>, <LF>, <CR><LF>, <LF><CR><br>TXOUT: Fixed, <CR><LF> |

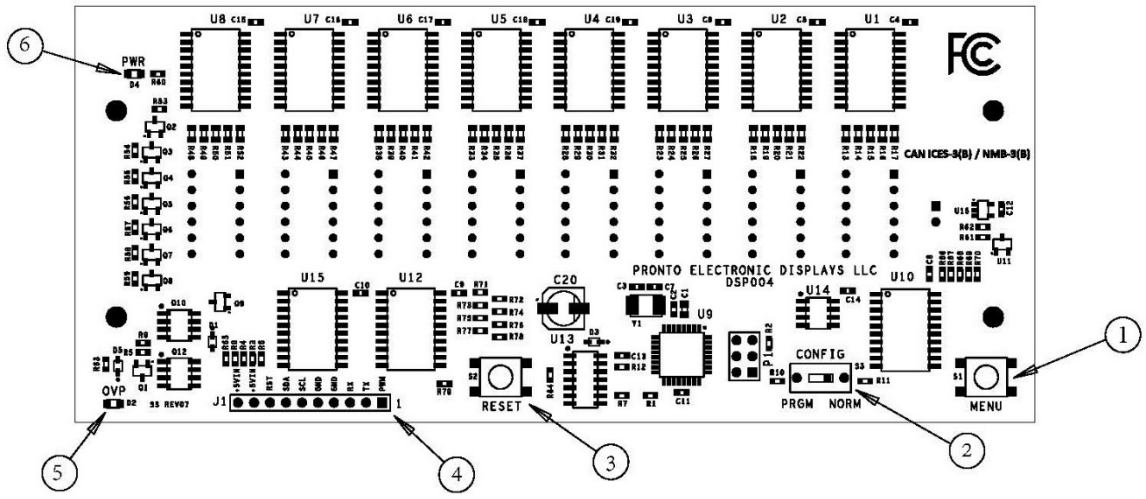
| **On-Board EEPROM** | |
|---|---|
| Communications Protocol: | I2C,100kHz, +5V |
| Manufacturer, P/N: | Microchip Technology, 24AA024-I/SN |
| **Scroll Mode Character Buffer** | |
| Baud Rate: | Character Buffer Size: |
| 38400 | 20 Characters |
| 31250 | 16 Characters |

## Dimensions & Features




FRONT VIEW

BACK VIEW




1- Menu button
2- CONFIG switch
3- RESET button
4- J1 I/O Connector, 100 mil SIP, thru holes
5- OVP Indicator LED, Red
6- Power ON Indicator LED, Green

Unit Weight: 2.1 oz.

## Device Features

1- "CONFIG" switch

NORM position: Unit runs in default configuration. MENU switch is enabled.
PRGM postion: Unit runs in accordance with user-defined configuration settings.

2- "MENU" Button

Pushing this button will result in the UI to be displayed on a Serial Emulator. It is enabled for use ony when the CONFIG switch is in the NORM position.

3- "RESET" Button

Pushing this button will reset the unit, clearing the display serial buffer. The display will show the default reset display of "01234567".

4- J1 I/O Connector

10 pin SIP connector accomodates square post header connections on .100 lead pitch.

5- "OVP" LED

Red LED illuminates if overvoltage condition has been applied to the +5V input, resulting in the overvoltage protection circuit cutting off power to the unit. Green "PWR" led will be off in this condition.

6- "PWR" LED

Green LED illuminates when circuit supplying board power is on.

## J1 I/O Connector Pin Functions

Pin 1- PWM Input

Used when external real-time brightness modulation is desired. Prior to applying the signal, unit must be set to "External PWM Mode", using either the UI or by directly programming this setting onto the on-board EEPROM. Recommended PWM signal should have a frequency of 8 kHz +/- 10% at +5V TTL levels. Pin is pulled up to +5V by an on-board 10k resistor. Pin should be kept at logic High or unconnected when not used.

Pin 2- TXOUT

+5V TTL/UART signal provides data used for communication using the UI Menu. Format is 8 data bits, 1 stop bit, no parity, no flow control. Baud rate is fixed at 38400. All transmitted characters use <CR><LF> for EOL Terminator. Pin is internally pulled up to +5V by an on-board 10k resistor.

Pin 3- RXIN

+5V TTL/UART signal used for writing character data to be displayed by the unit, and also provides user input data when communicating with the unit by means of the UI Menu. Format is 8 data bits, 1 stop bit, no parity, no flow control.
Pin is internally pulled up to +5V by an on-board 10k resistor.

Pins 4,5- GND

These pins are used for Power and Signal ground. They are connected together on the PCB.

Pin 6- SCL

This pin is used to connect +5V I2C 100kHz SCL signal from the user when it is desired to directly program the on-board EEPROM. Pin is internally pulled up to +5V by an on-board 4.7k resistor.

Pin 7- SDA

This pin is used to connect +5V I2C 100kHz SDA signal from the user when it is desired to directly program the on-board EEPROM. Pin is internally pulled up to +5V by an on-board 4.7k resistor.

Pin 8- Remote Reset

This pin is used to allow remotely resetting the unit. Unit may be reset using either a pushbutton with one side connected pin 8 and the other side to GND, or by connecting pin 8 to an MCU pin and setting it low. If using an MCU, minimum pulldown time for reset should be 2.5us. The MCU pin should be programmed to stay normally high or be in high-Z mode, until being brought low for the reset.

Pins 9,10- +5V VCC

These pins are used for connecting the power supply +5V output. They are connected together on the PCB. Ensure the power supply being used has an output capable of supplying 1.0A.

## Additional Documents:

User Manual, Document # 1031-DSP004-M
Quick Start Guide, Document # 1032-DSP004-QSG
Bezel/Lens & Mounting Kit Instructions, Document# 1033-DSP004-BZ