

DSP004 Data Sheet

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 capability for user-controlled brightness
- Configurable baud rate, EOL terminator
- Easy development setup using USB 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. Device configuration settings may be adjusted by using the patented built-in User Interface in conjunction with a serial terminal emulator, or by directly programming on-board EEPROM. The device supports both scrolling and non-scrolling modes, and features an adjustable ambient light sensor which can be enabled for automatic brightness control.

Software flow control using the Smarti™ suite of ASCII control codes permits brightness, scroll mode and scroll speed assignment with individual message granularity. Device supports scrolling messages of up to 40 characters in length.

Robust design includes protection from reverse/overvoltage conditions with ESD protection. Device is assembled for enhanced reliability in accordance with IPC A-610 Class 2, and is designed for use in an enclosed sheltered environment.

See the Quick Start Guide for detailed information on how to setup the display and access the UI menu. The User Manual provides in-depth application information for development, integration, as well as guidance for using the Smarti™ control suite.

Technical Specifications

Power Supply Voltage		
V Nominal	V min	V max
+5.0V DC	+4.75V DC	+5.25V DC
Power Supply Current		
Typical	Minimum	Maximum
60 mA	-	900 mA
Operating Environment		
For indoor use in temperature-controlled environment		
Display Data Input / Output Signals		
Message Data Protocol: +5V UART, 8 data bits, 1 stop bit, no parity, no flow control.		
Rx,Tx, PWM pins Logic Level: +5V TTL/CMOS		
Reset Pin: Pin is active low, and can be taken directly to GND using a switch.		
Character encoding: ASCII		
Baud rate: Selectable, 38400 and 31250		
EOL Terminator for RXIN: Selectable <CR>, <LF>, <CR><LF>, <LF><CR>		
EOL Terminator for TXOUT: Fixed, <CR><LF>		
External PWM Signal Specification: Recommended frequency range is 6-9 kHz.		

On-Board EEPROM

Manufacturer	Part Number	Protocol	Operating Frequency	Operating Voltage
Microchip	24AA024-I/SN	I2C	100 kHz	+5V

Smarti™ Control Codes- Rx IN

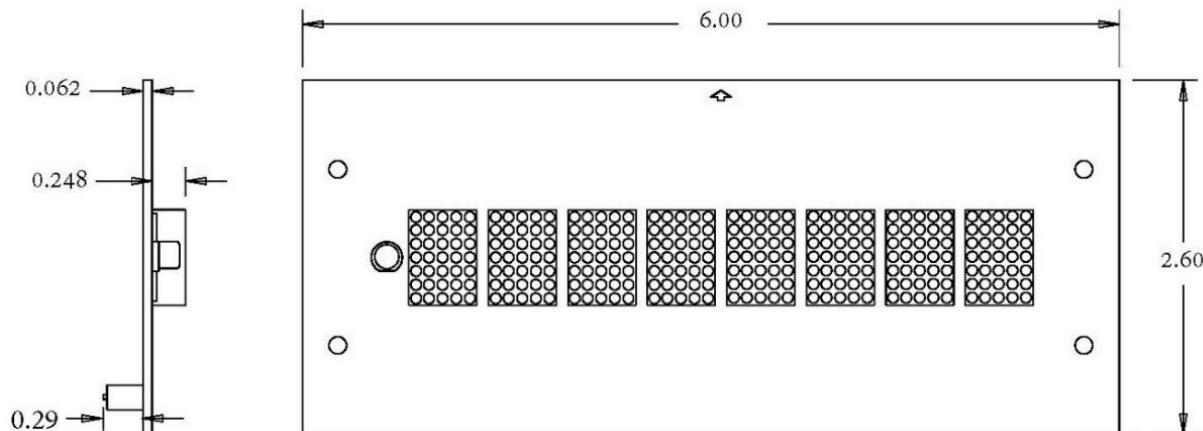
Decimal	ASCII Mnemonic	Opcode Name	Description
18	DC2	SCROLL_SPD	Scroll Speed Control Prefix
24	CAN	RESET	Software Reset
28	FS	SCROLL_ON	Enable Scrolling Mode
29	GS	SCROLL_OFF	Disable Scrolling Mode
30	RS	EXTPWM_ON	Enable External PWM
31	US	EXTPWM_OFF	Disable External PWM

Smarti™ Control Codes- Tx OUT

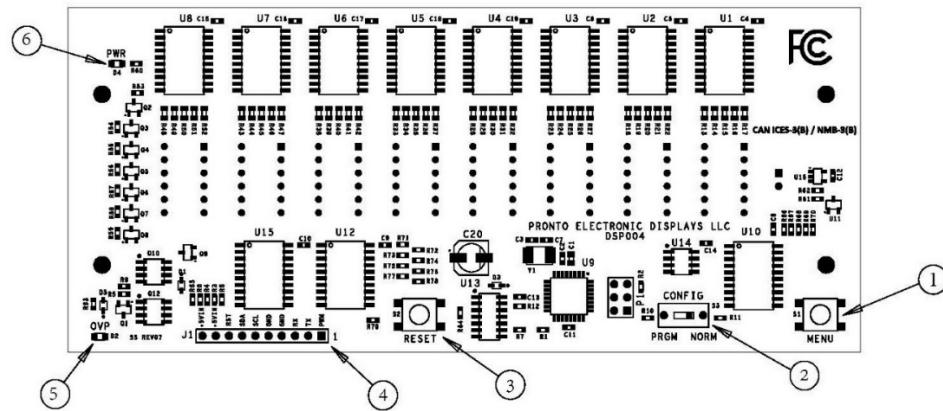
Decimal	ASCII Mnemonic	Opcode Name	Description
17	DC1	DATA_GO	Message data send GO signal
19	DC3	DATA_STOP	Message data send STOP signal
20	DC4	SCROLL_DONE	Message scrolling done

Weight and Dimensions

Device weight: 2.1 oz



FRONT VIEW



1- MENU Button
 2- CONFIG Switch
 3- RESET Button

4- J1 I/O Connector
 5- OVP LED, Red
 6- PWR ON LED, Green

Device Features

- 1- "CONFIG" switch
 NORM position: Unit runs in default configuration. MENU switch is enabled.
 PRGM position: 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 only when the CONFIG switch is in the NORM position.
- 3- "RESET" Button
 Pushing this button will reset the unit, flushing the display serial buffer.
- 4- J1 I/O Connector
 10 pin SIP connector accommodates 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.

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” operation. Recommended PWM signal should have a frequency of 6-9 kHz. Pin is pulled up to +5V by an on-board 10k resistor. Accepts +5V TTL/CMOS logic levels.

Pin 2- TXOUT

+5V UART signal provides data output, control codes as well as providing a communication channel for the built-in UI. Pin is internally pulled up to +5V by an on-board 10k resistor. Output is 5V TTL/CMOS logic level.

Pin 3- RXIN

+5V TTL/UART signal used for writing character data to be displayed by the unit, sending control codes, and providing a communication channel for the UI. Pin is internally pulled up to +5V by an on-board 10k resistor. Accepts +5V TTL/CMOS logic levels.

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 active-low reset. Pin is internally pulled up to +5V by an on-board 10k resistor.

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.

Document Revisions			
Rev. No.	Date	Engr.	Description
01	9/11/2025	M.Hawkins	Document origination, firmware Rev. 5.4.7
02	12/25/2025	M.Hawkins	Updated for firmware Rev. 5.7.4 Updated Vmax and environmental spec

Additional Documents:

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

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