APD-192G088-5

Vishay Dale

Plasma Panel Display Modules

192 by 88 Graphics Display,
Drive Electronics Controller, and Infrared Touch Screen

FEATURES

- 192 x 88 full field dot matrix
- Text or graphics modes
  (11 rows of 32 characters in text mode)
- Infrared touch panel
- 63 x 31 touch point format
- Flexible operating modes
- All functions software accessible
- High brightness
- Wide viewing angle
- Low input voltage
- Parallel and serial interfaces

The APD-192G088-5 is a full field dot matrix display with 192 columns and 88 rows. It includes drive electronics, microprocessor based controller, IR touch panel and bezel. The controller maintains all the refresh memory, character generation, touch input and control logic to enable the module to serve as a direct input/output device for communications terminals, computer readouts, microprocessor instruments or any other system requiring a self-contained input/output terminal.
It also controls the report of touch point coordinates from the touch panel to the host computer.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature: 0°C to + 55°C.

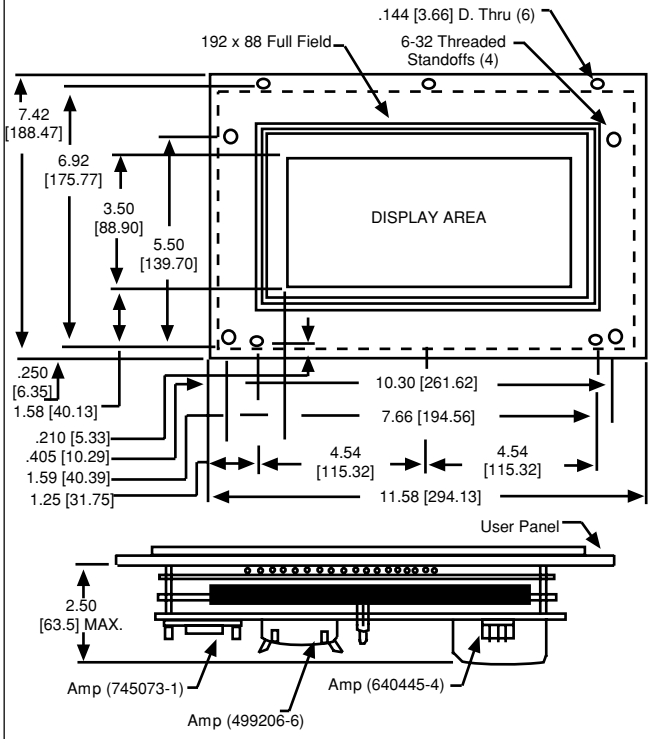
Storage Temperature: - 55°C to + 85°C.

Relative Humidity: 10 - 90% R.H. non-condensing.

Mechanical Shock: 50G 1/2 sine wave, 11 msec duration, 5 shocks in each of 6 directions.

Vibration: 0.018" [0.457] displacement amplitude from 10 to 50 Hz, 2G acceleration from 50 to 2000 Hz logarithmic sweep rate, along each side of the 3 major axes.

DIMENSIONS in inches [millimeters]



OPTICAL SPECIFICATIONS

Viewing Area: 7.66" [194.56] W x 3.50" [88.90] H.

Pixel Size: 0.020" [.508].

Pixel Pitch: 0.040" [1.02].

Luminance: 80 foot lamberts.

Color: Neon orange.

Viewing Angle: 120° cone.

IR Beams: 32 on X axis, 16 on Y axis.

STANDARD ELECTRICAL SPECIFICATIONS

	MIN.	TYP.	MAX.	UNITS
Logic Supply Voltage	+ 4.75	+ 5.0	+ 5.25	V
Logic Supply Current	—	700	—	mA
Panel Supply Voltage	+ 11.4	+12.0	12.6	V
Panel Supply Current*	—	1.0	2.2	A
Logic One Voltage	2.0	—	—	V
Logic Zero Voltage	—	—	0.8	V
Logic Zero Input Current	—	—	- 0.4	mA

*This is the input to a DC/DC converter. There may be peak in-rush currents higher than shown.

GENERAL DESCRIPTION

The APD-192G088-5 consists of a graphics DC plasma display panel, IR touch screen, controller and bezel.

The controller maintains all the refresh memory, character generation, touch panel operation and control logic to enable the module to serve as a direct I/O device for communications terminals, computer readouts, microprocessor instruments or any other system requiring a self-contained terminal. It is programmable to operate in a parallel or RS-232C compatible serial mode with 7 selectable baud rates from 300 to 19,200.

Single byte and two byte commands allow simplified code generation, yet accomplish complex display tasking such as scrolling or inserting lines and characters. The character generator is a 4K x 8 bit EPROM with 256 characters consisting of 128 ASCII characters (including control codes) and 128 block graphics characters. The character set can be factory or user modified.

Two means of using graphics are supported - character graphics, in which the user sends the proper ASCII code to select the desired graphics character or the bit plot mode. The character graphics mode allows easy mixing of text and graphic images and the bit plot mode (using set and reset commands) allows any graphic pattern to be drawn a bit at a time.

The infrared touch screen consists of IR LEDs and detectors arranged to provide a grid of infrared light beams across the face of the display. If an object is present, then an intersecting pair of beams will be blocked and the controller will determine the coordinates of that point and report it to the host computer. Using simple input commands, the touch screen can be configured to report coordinates when a stylus is entered into the touch panel, when it is removed or continuously. Other commands are provided to allow control over the flow of touch point coordinates between the touch panel and the host computer.

A DC/DC converter generates the required display voltage from + 12 VDC and all input lines are LSTTL compatible with 4.7 kilohm pull-up resistors to Vcc.

INTERFACING

PARALLEL INTERFACE

The parallel interface offers two forms of handshaking called READY and DATA TAKEN. Each 8 bit word appearing on the data bus is latched with the falling edge of the DATA STROBE pulse.

This same negative transition notifies the on-board processor that data has been entered. The READY signal then goes low and the DATA TAKEN signal goes low momentarily. The READY signal remains low until the command is completed or the data has been entered. The DATA TAKEN pulse indicates when the on-board processor has read the input latch. Data may be entered into the input latch after the rising edge of DATA TAKEN.

SERIAL RS-232C INTERFACE

(See J4 pin descriptions.) The controller is considered to be a DTE type device and will operate with a host that is either a DTE or DCE device. The serial input and output lines meet RS-232C specifications. Serial data is entered asynchronously with selectable baud rates. The byte format is 1 start bit, 8 data bits and 1 stop bit.

TOUCH SCREEN COMMANDS

COMMAND	CODE (HEX)
Enable Exit Point Mode	20
* Disable Exit Point Mode	21
Enable Enter Point Mode	22
* Disable Enter Point Mode	23
Enable Continuous Mode	24
* Disable Continuous Mode	25
Enable Touch Screen	27
Request Failed Beam Report	28
Enable Report Transfer	29
* Disable Report Transfer	2A
Request Report	2B

* Indicates default condition.

NOTE: All touch screen commands are preceded by 18.

ABRIDGED FUNCTION SUMMARY

CONTROL CODES	HEX	ASCII
Cursor Home	0E	CNTRL N
Carriage Return	0D	CNTRL M
Cursor Down (Line Feed)	0A	CNTRL J
Cursor Up	0B	CNTRL K
Cursor Right	09	CNTRL I
Cursor Left	08	CNTRL H
Alter Cursor Character Position Cursor Character Address (0-1F)	11 ##	CNTRL Q
Alter Cursor Row Position Cursor Row Address (0-A)	13 ##	CNTRL S
Cursor On	12	CNTRL R
Cursor Off	14	CNTRL T
Clear Screen	0C	CNTRL L
Character Insert	0F	CNTRL O
Character Delete	10	CNTRL P
Line Insert	16	CNTRL V
Line Delete	17	CNTRL W
ESCAPE CONTROL CODES		
Erase to End of Line	1B,0D	ESC CNTRL M
Erase to End of Screen	1B,18	ESC CNTRL X
Erase Line	1B,13	ESC CNTRL S
Erase Line and Carriage Return	1B,25	ESC CNTRL %
Alter Brightness 0 = Brightest 7 = Dimmest	1B,0C ##	ESC CNTRL L
Scroll	1B,1A	ESC CNTRL Z
*End Scroll	1B,20	ESC SPACE
Blank Display (on/off alternately)	1B,11	ESC CNTRL Q
Enter Bit Plot Mode	1B,16	ESC CNTRL V
*Exit Bit Plot Controller	1B,17	ESC CNTRL W
Reset Controller (to initial state)	1B,19	ESC CNTRL Y

PIN DESCRIPTION

CONNECTOR	PIN	SIGNAL
J1	1	+ 12 VDC
	2	+ 5 VDC
	3	GND
	4	NC
J3	1, 2, 4 ,5 ,7 ,6 ,3 ,9	DB7-DB0
	13	READY
	15	DATA STROBE
	17	DATA TAKEN
	22	SYSTEM SELECT
	10	CURSOR DISABLE
	16	INITIALIZE
	12	RESERVED
	25, 26	+ 5 VDC
	19, 20	GND
J4	3	RECEIVE DATA
	2	TRANSMIT DATA
	4	READY TO SEND
	5	CLEAR TO SEND
	7	GND

(Pins 6, 8 and 20 of J4 are connected together internally.)

NOTE: Unidentified pins are not connected.

WARNING: Wrong connections or reversing J3 may cause permanent damage to the display.

ORDERING INFORMATION

DESCRIPTION	PART NUMBER
Display, Drive Electronics, plus Controller, Touch Scree and Bezel (Includes DC/DC Converter)	APD-192G088-5
Parallel Data Connector Kit	280105-01
Power Connector Kit	280108-04

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