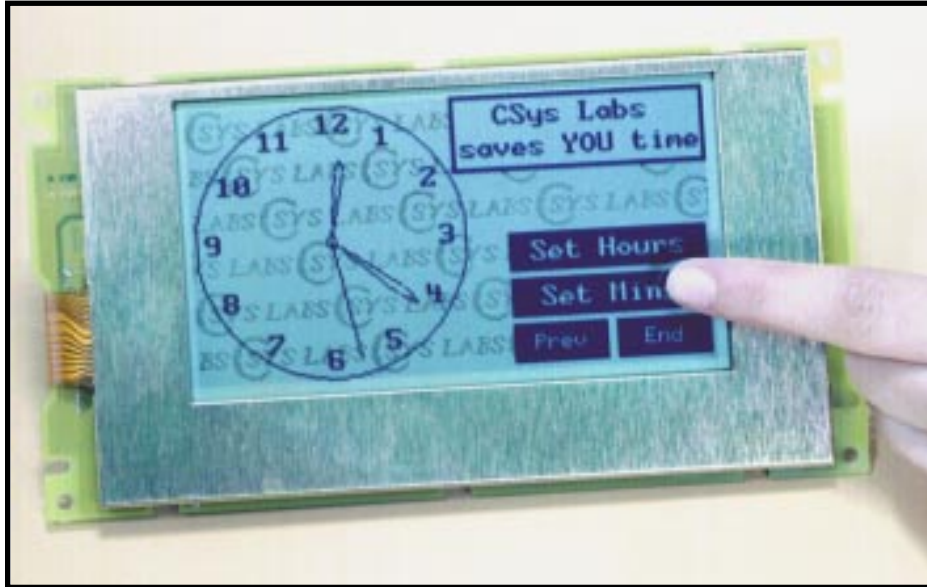


TVM24128 LCD Module



Via software you can draw graphics, adjust the display contrast, control the EL back-light, enable the sound transducer for button feedback or turn it on and off as an alarm. You can also modify the cursor style, select several switch areas as a single button or create phantom buttons in any of the 6 X 10 matrix switch areas of the touch panel. Automatic placement of buttons including labels can also be easily accomplished. An 8 bit parallel and a RS232 interface accommodate a wide variety of systems. The auxiliary I/O port can be used to manage additional user input or output devices. Gray scale capability enhances the aesthetics of instrument or machine displays.

A New Concept in LCD Technology

The TVM24128 combines the best of several "state of the art" technologies into a compact 5 Volt module. Containing either a transmissive or transmissive graphics LCD, touch panel, sound transducer, long life EL back-light with step up voltage transformer and a 16 bit high performance controller, the TVM24128BTC is truly a complete user interface. This comprehensive solution to the I/O problem frees up host CPU board space, simplifies front panel design and assembly, shortens product development time and reduces equipment size and cost while enhancing product appearance and operation.

The TVM24128 makes touch panel and graphics LCD technology available for low to medium quantity products where previously such individual components had been too expensive to be of practical use. Large volume users will like the advantages of a completed, tested module which, in addition to simplifying final product construction, is easily replaced or repaired if necessary.

Easy to Program

Because of its advanced instruction set, which contains a variety of commands for both graphics and text operations, the TVM24128 module makes application programming easier than ever before.

Command and data buffers free your host CPU to continue processing while the TVM24128 executes as a true peripheral returning status information including busy and error flags. Status signals exist to indicate key closures have occurred during host CPU operations and to ascertain the condition of the input and output buffers.

The TVM24128 has two built in text fonts (the bit patterns used to construct text) and can simultaneously accommodate three downloaded soft fonts. If additional fonts are required, they can be easily loaded "on the fly" just prior to use.

Communication with a host processor is done via 8 bit instructions and data through either a parallel or RS232 serial interface.

Built Tough

Liquid Crystal displays are primarily constructed of glass, so we built the TVM24128 with protection of the display in mind. Silicone and Poron gaskets plus a protective metal bezel create a shock absorbing environment for the LCD. The touch panel is fabricated from tough polyester with a hard coated touch surface that is easily cleaned using isopropyl alcohol and is highly resistant to most solvents, acids, bases and even your strongest coffee. Using an optically clear adhesive, a protective glass plate is bonded to the touch panel shielding the LCD from direct contact.

Both mounting holes and slots are provided should you desire to "piggy back" another board onto the TVM24128.

Connectors on the TVM24128 are standard .050 inch ribbon cable type shrouded headers. The bezel has a separate ground connection available and protection circuitry to control static electricity has been designed into the touch panel interface.

Beneficial Cost Factors

The TVM24128, being a high quality mechanical and electrical system, presents an impressive features vs. cost ratio. Since the TVM24128 is so easy to program, time to market as well as both hardware and software development costs are reduced. Being a single component, the costs for TVM24128 procurement and storage are minimal.

Designer's Kit

The designer's kit includes a TVM24128BTC (full feature) module, PC interface card, cables, manuals, software library and example programs (including source code) for your PC. With the designer's kit you'll be creating graphics, down-loading soft fonts, and placing buttons in a very short time. Additional software to support the development of fonts and screen graphics is also available at nominal cost.

TVM 24128BTC Specifications

Mechanical: Unless noted all dimensions are in inches

Width x Height x Depth (including connectors)	7.56 x 4.03 x 1.25 192 x 102 x 32mm
Bezel opening	4.94 x 2.74, 124 x 68mm
Active viewing area	4.72 x 2.51, 120 x 64mm
Mounting hole size	.130 diameter (6-32)
Weight (with EL back-light)	14 oz
Storage Temperature	-20 to +60 °C
Operating Temperature	0 to +50 °C
Temperature Compensated	
Display	240 x 128 graphics LCD
Dot Size	.47 x .47mm
Dot Pitch	.50 x .50mm
Touch Panel	6 x 10 scanned matrix
EL Back-light	Long life aviation green
Auxiliary Port outputs	4 (NPN open collectors)
Auxiliary Port inputs	8 (CMOS / 22K pullups)
Connector A (CPU Buss)	20 pin 3M type 3592
Connector B (Aux I/O)	14 pin 3M type 3598
Connector C (RS232)	10 pin 3M type 3591

Electrical:

Power supply voltage	4.5 to 5.5	Volts
Power supply current (with EL & $V_{EL} = 5\text{ V}$)	450	mA
Power supply current (without EL)	175	mA
Maximum EL input voltage	5.5	Volts
Aux port output current ($V_{CE} = 1.0\text{ V}$)	75	mA

Notes:

Dimensions and electrical specifications are typical values. For complete specifications consult the TVM24128 designer's manual or contact C Sys Labs.

Back-light lifetime is generally calculated to the half brightness point of life. The TVM24128 includes a back-light which has a half life greater than 10,000 hours based on the manufacturer's specifications.

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Instruction Set Summary

Font Selection

- Select Font
- Down Load Font
- Set Font Attributes
- Set Font Gray Palet
- Set Font Plane

Cursor Positioning

- SetXY
- ReadXY
- Cursor Up
- Cursor Down
- Cursor Left
- Cursor Right
- SetX
- SetY
- Set Cursor Attributes

Text Configuration

- Set Text Window
- Set Pitch
- Set Height

Text Input

- Input String

Graphics Input

- Draw Box
- Draw Block
- Draw Horizontal
- Draw Vertical
- Draw Vector
- Set Pixel
- Set Gray Palet
- Set Graphics Plane

Display Control

- Blank Display
- Clear Display
- Dump Display RAM
- Load Display RAM
- Move Block Vertically
- Move Block Horizontally
- Reverse Video Mode

Button Input

- Place Button
- Load Button Buffer
- Get Button Size
- Place Phantom Button
- Delete Button
- Delete All Buttons
- Read KeyCode
- Set Button Attribute
- Set Gray Palet
- Set Button Plane

System Instructions

- Soft Reset
- Set Contrast
- Set EL
- NOP
- Set Beeper
- Read Key Matrix
- RS232 Interface Commands
- Read Aux Port
- Write Aux Port