

## SERIES 84LS

## Sealed, Low Profile



## FEATURES

- Waterproof Silicone Rubber
- Easily Customized Legends
- Audible, Tactile Contacts
- Low Contact Resistance
- Optional RFI/EMI Shielding
- 3,000,000 Operations per Button

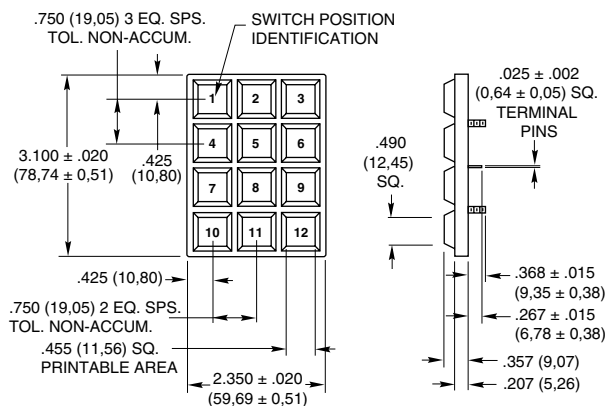


## DESCRIPTION

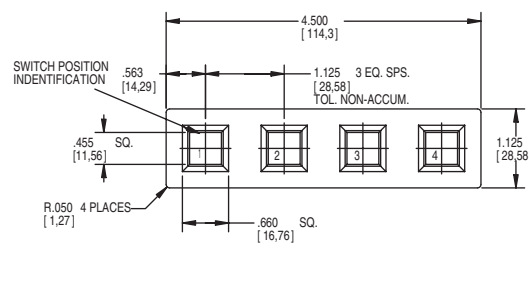
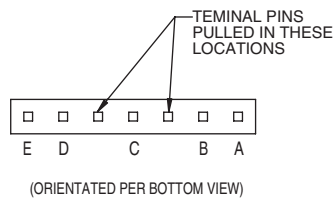
The Series 84LS is the low profile version of Grayhill's popular Series 84S sealed keypads. These keypads are legendary by epoxy ink printing the rubber key tops. Custom legends and colors are available at a nominal cost. The Series 84LS is offered with a choice of matrix or single pole/common bus circuitries and EMI shielding.

**DIMENSIONS** In inches (and millimeters)

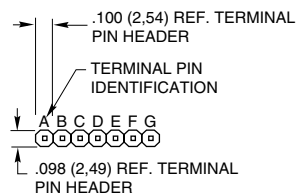
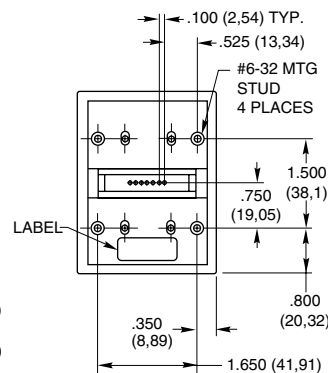
### 3x4 Keyboard



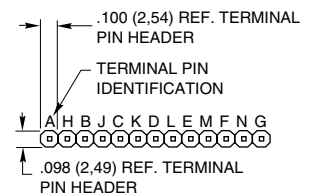
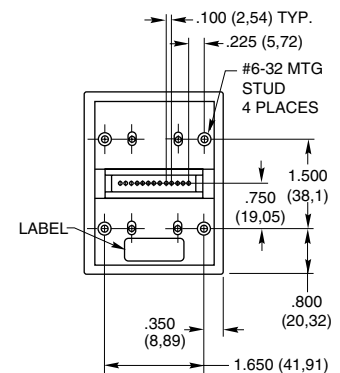
### 1x4 Keyboard



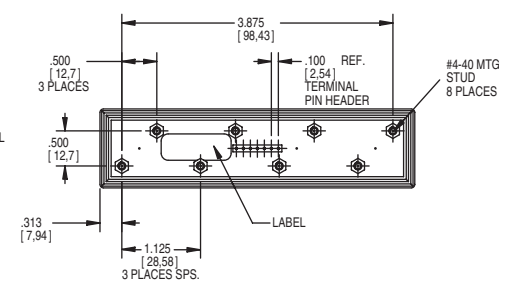
### Matrix Output



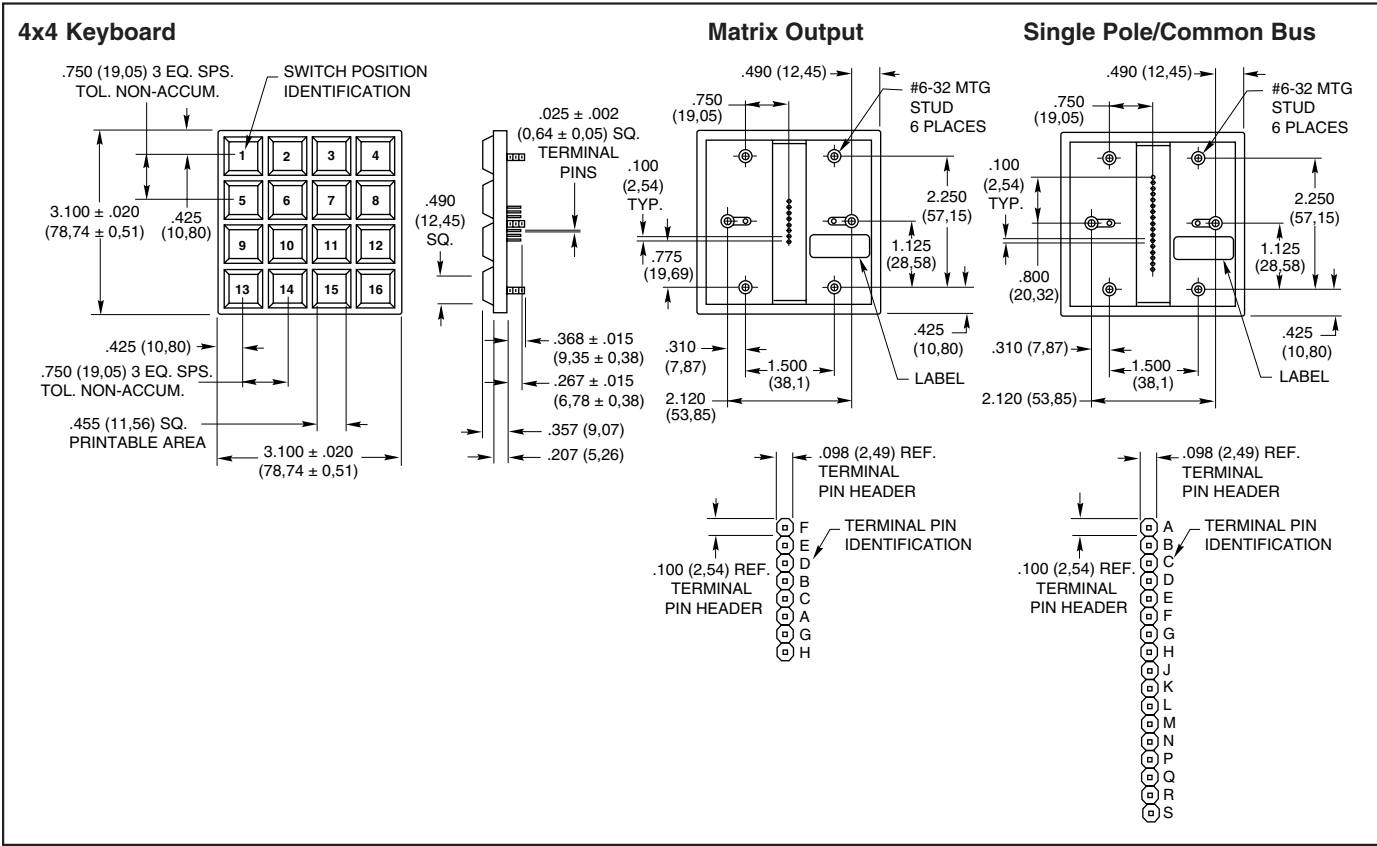
### Single Pole/Common Bus



### Single Pole/Common Bus



DIMENSIONS In inches (and millimeters)



Keyboards and Keypads

CODE AND TRUTH TABLES

The chart indicates the relationship of the terminal pins to each key switch. The dot indicates a closed switch. Terminals are identified on the keyboard.

4 Button Keypads

| BUTTON LOCATION | CODES             |   |   |   |
|-----------------|-------------------|---|---|---|
|                 | PINS              |   |   |   |
| 1               | •                 |   |   | • |
| 2               |                   | • |   |   |
| 3               |                   |   | • |   |
| 4               |                   |   |   | • |
|                 | A                 | B | C | D |
|                 | TERMINAL LOCATION |   |   |   |

12 Button Keypads

| BUTTON LOCATION | CODES             |   |   |   |   |   |                        |   |   |   |   |   |
|-----------------|-------------------|---|---|---|---|---|------------------------|---|---|---|---|---|
|                 | Matrix            |   |   |   |   |   | Single Pole/Common Bus |   |   |   |   |   |
| 1               | •                 |   |   |   |   |   | •                      |   |   |   |   | • |
| 2               |                   | • |   |   |   |   |                        |   |   |   |   | • |
| 3               |                   |   | • |   |   |   |                        |   |   |   |   | • |
| 4               |                   |   |   | • |   |   |                        |   |   |   |   | • |
| 5               |                   |   |   |   | • |   |                        |   |   |   |   | • |
| 6               |                   |   |   |   |   | • |                        |   |   |   |   | • |
| 7               |                   |   |   |   |   |   | •                      |   |   |   |   | • |
| 8               |                   |   |   |   |   |   |                        | • |   |   |   | • |
| 9               |                   |   |   |   |   |   |                        |   | • |   |   | • |
| 10              |                   |   |   |   |   |   |                        |   |   | • |   | • |
| 11              |                   |   |   |   |   |   |                        |   |   |   | • | • |
| 12              |                   |   |   |   |   |   |                        |   |   |   |   | • |
|                 | C                 | B | A | G | F | E | D                      | E | C | B | F | D |
|                 | TERMINAL LOCATION |   |   |   |   |   |                        |   |   |   |   |   |

16 Button Keypads

| BUTTON LOCATION | CODES             |   |   |   |   |   |   |   |                        |   |   |   |   |   |   |   |
|-----------------|-------------------|---|---|---|---|---|---|---|------------------------|---|---|---|---|---|---|---|
|                 | Matrix            |   |   |   |   |   |   |   | Single Pole/Common Bus |   |   |   |   |   |   |   |
| 1               | •                 |   |   |   |   |   |   |   | •                      |   |   |   |   |   |   | • |
| 2               |                   | • |   |   |   |   |   |   |                        |   |   |   |   |   |   | • |
| 3               |                   |   | • |   |   |   |   |   |                        |   |   |   |   |   |   | • |
| 4               |                   |   |   | • |   |   |   |   |                        |   |   |   |   |   |   | • |
| 5               |                   |   |   |   | • |   |   |   |                        |   |   |   |   |   |   | • |
| 6               |                   |   |   |   |   | • |   |   |                        |   |   |   |   |   |   | • |
| 7               |                   |   |   |   |   |   | • |   |                        |   |   |   |   |   |   | • |
| 8               |                   |   |   |   |   |   |   | • |                        |   |   |   |   |   |   | • |
| 9               |                   |   |   |   |   |   |   |   | •                      |   |   |   |   |   |   | • |
| 10              |                   |   |   |   |   |   |   |   |                        | • |   |   |   |   |   | • |
| 11              |                   |   |   |   |   |   |   |   |                        |   | • |   |   |   |   | • |
| 12              |                   |   |   |   |   |   |   |   |                        |   |   | • |   |   |   | • |
| 13              |                   |   |   |   |   |   |   |   |                        |   |   |   | • |   |   | • |
| 14              |                   |   |   |   |   |   |   |   |                        |   |   |   |   | • |   | • |
| 15              |                   |   |   |   |   |   |   |   |                        |   |   |   |   |   | • | • |
| 16              |                   |   |   |   |   |   |   |   |                        |   |   |   |   |   |   | • |
|                 | A                 | B | C | D | E | F | G | H | D                      | B | A | C | H | F | E | G |
|                 | TERMINAL LOCATION |   |   |   |   |   |   |   |                        |   |   |   |   |   |   |   |

SPECIFICATIONS

Rating Criteria

Rating at 24 Vdc: ≤ 10 milliamps resistive  
Contact Bounce: 4 milliseconds maximum at make; 10 milliseconds, at break  
Contact Resistance: MOS, TTL, and DTL compatible. (10 ohms maximum)  
Operating Temperature: -55°C to 85°C

Life Expectancy: 3 million operations/button  
Insulation Resistance: 1,000 megohms

Operating Features

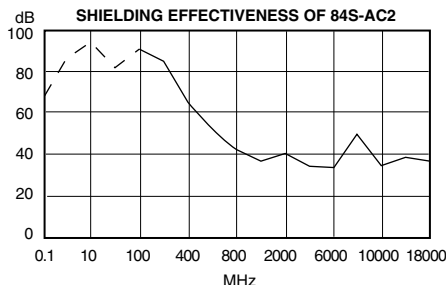
Pre-Travel: .030 inches minimum  
Operating Force: 20 ± 4 ounces  
Humidity: 0 to 98% (no condensation)  
Minimum Push Out Force Per Pin: 5 pounds

Materials and Finishes

Terminal Pins: Copper alloy CDA 725  
PC Board: FR-4 glass cloth epoxy  
Dome Retainer/Rear Seal Sheet: Polyester  
Mounting Studs: Phosphor bronze  
Optional Hex Nut: Stainless steel, passivated  
Optional EMI Shield: Aluminum foil  
Keypad: Silicone rubber

## Shielding Effectiveness

Results shown are typical for a standard Grayhill Series 84LS Keyboard. A conductive gasket will generally increase the shielding, depending on the size and shape of the gasket and its material. Data derived for E-Field Radiation.



— — Represents shielding effectiveness greater than or equal to line.

| Frequency<br>MHz | Rating<br>in dB |
|------------------|-----------------|
| 0.1              | 66.2            |
| 10               | 94.8            |
| 100              | 89.0            |
| 400              | 70.6            |
| 800              | 42.5            |
| 2,000            | 39.5            |
| 6,000            | 32.6            |
| 10,000           | 45.2            |
| 18,000           | 42.2            |

### Test Method:

Measurements were made with the keyboard mounted to a brass plate, which in turn was mounted to a shielded enclosure containing the receiving equipment. A signal generator

provided the frequency source that was radiated from the transmitting antenna to the enclosed receiving antenna. The spacing between antennas was maintained constant throughout the frequency range. The effectiveness rating is determined by establishing a reference reading without obstruction between the two antennas and determining the difference between that reading and the test setup reading.

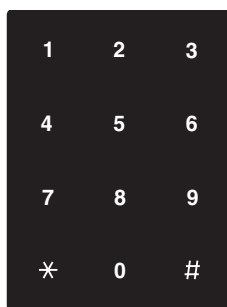
### Note:

When measured in actual equipment, shielding effectiveness is determined by many factors. This method accurately represents the shielding effectiveness of the Grayhill Series 84LS under ideal test conditions.

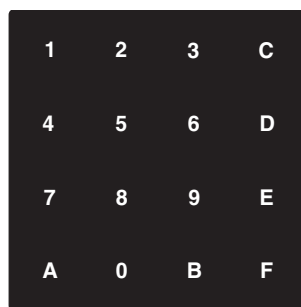
## STANDARD LEGENDS

### Available through Grayhill Distributors

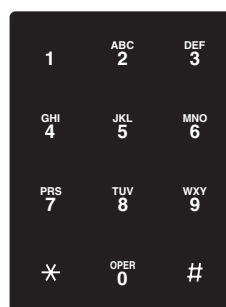
To order one of the configurations below, use the dash number shown here; select the keypad size and code, and order the part number with the appropriate legend dash number.



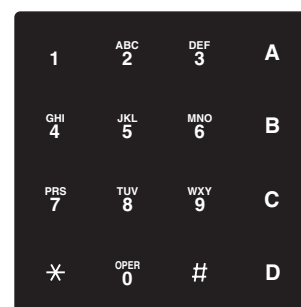
-112



-014



-113



-016

301

302

## CUSTOM LEGENDS

Any reasonable legend can be printed in the key area. Fax a sketch of your requirements to Grayhill. Printing and symbols will be coordinated in keeping with concepts of good design. Or, if required, the details of your

submitted artwork will be matched as closely as possible. Allow 3 to 4 weeks for custom legend delivery. A nominal charge, depending on the total quantity of keypads ordered and the complexity of the legend, will be assessed.

## HEADER CONNECTORS

### Compatible with:

**Samtec, Inc.** Header Series BCS, BSW, CES, ESW, ESQ, SLW, SSW, SSQ, IDSS and IDSD or equivalent.

## ORDERING INFORMATION

84LS-AC2-113-N

Grayhill Series Number

Shielded or Non-Shielded Option

Size Option

Circuitry Option

Mounting Nut Option

Standard Legend Choices

S = Shielded

SN = Non-Shielded

A = 3x4 B = 4x4 C = 1x4

B2 = Matrix in-line pins C2 = Single pole/common bus, in-line pins

N = Provided with hex nuts for mounting

Blank = Nuts not provided

3x4 Size, choose -112 or -113

4x4 Size, choose -014 or -016

1x4 Size, choose -301 or -302

### Available from your local Grayhill Distributor.

For prices and discounts, contact a local Sales Office, an authorized local distributor or Grayhill.