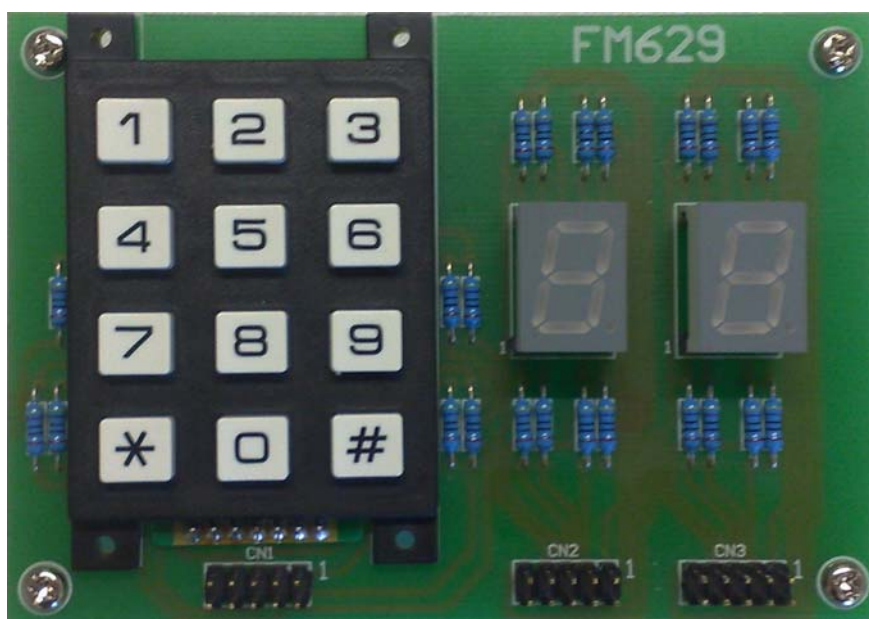


## FM629 Digital I/O Board



This Digital I/O Board contains one keypad for input and two 7-segment LED displays for output. Each component (keypad, displays) is separately mounted on the board and can be used individually.

The three 10-pin connectors at the bottom of the board correspond to the components immediately above, and are compatible in layout with the port connectors on the STK500 development kit board. A 10-pin ribbon-cable can be used to connect this board with the STK500 kit

### Component descriptions

#### ***Keypad:***

The keypad used on this board is a 12-key numeric keypad including star (\*) and hash (#) buttons. Buttons are arranged in a 3 x 4-way matrix. This keypad can be found as catalogue item SP-0770 on the Jaycar website.

#### ***7-segment LED displays:***

The 7-segment LED displays used on this board are small red displays with common cathode. These displays can be found as catalogue item ZD-1855 on the Jaycar website.

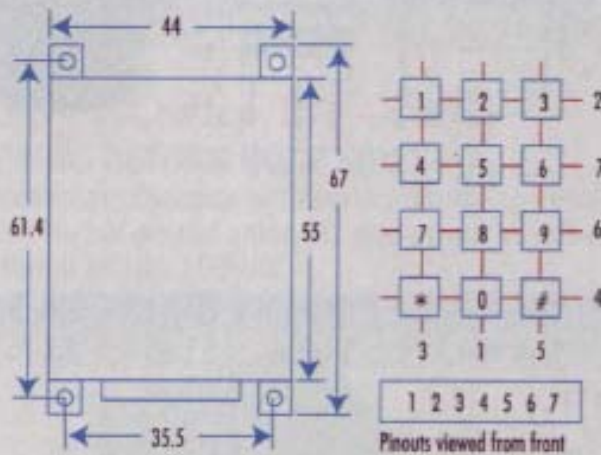
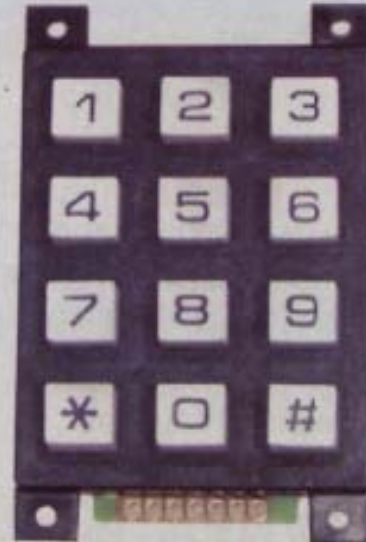
## Supplier Catalogue Entries

### 12 Key Numeric Keypad

This telephone style keypad has many uses. It has 0-9, \*, # - 3 x 4 way matrix.

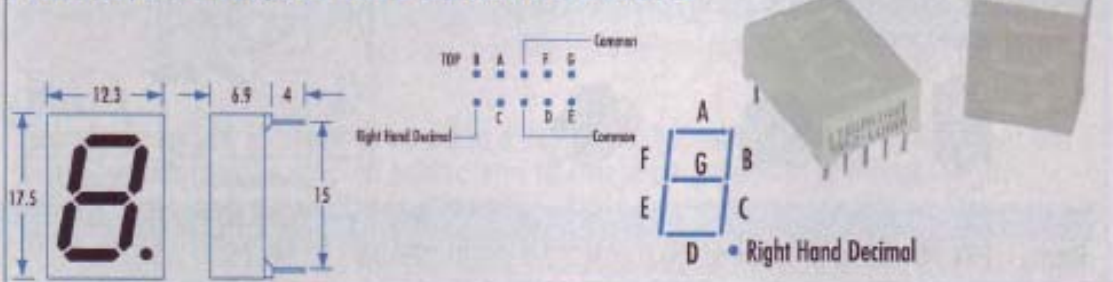
**Specifications:**

Contact rating: 20mA, 24VDC  
 Contact resistance: 200Ω max  
 Life: 1,000,000 cycles per key  
 Contact: Conductive rubber  
 Size (Key Face): 44(W) x 54(H) x 5(D)mm  
 Colour: White keys on black background



### Small Displays - Red

FND500 / LTS543R / S505RWB COMMON CATHODE  
 FND507/LTS542R/S50 RWB COMMON ANODE



## Connector Layouts

All connectors along the bottom of the I/O Board are 10-pin connectors with pin 1 starting at top-right. All three connectors follow this layout:

pin9	pin7	pin5	pin3	pin1
pin10	pin8	pin6	pin4	pin2

Note that when connecting to the STK500 boards, pins 9 and 10 are driven by the STK500 board as ground (GND, pin 9) and 5V (VTG, pin 10).

### **Keypad Connector:**

The keypad connector uses only pins 1-7. Pins 8, 9 & 10 are not connected at all, to any component on this I/O board. The pins are connected to the keypad pins as described in the diagram below, through current limiting resistors.

<i>Pin:</i>	7	6	5	4	3	2	1
<i>Purpose:</i>	<b>Col1</b>	<b>Col2</b>	<b>Col3</b>	<b>Row1</b>	<b>Row2</b>	<b>Row3</b>	<b>Row4</b>

### **LED display Connectors:**

The LED displays use pins 1-9. Pin 10 is not connected to any component on this I/O Board. Pin 9 is connected to one of the common cathode pins on the display and serves as ground for the LEDs. Pins 1-8 are connected to the displays' eight LED segments as described in the diagram below, through current limiting resistors.

<i>Pin:</i>	8	7	6	5	4	3	2	1
<i>Purpose:</i>	<b>DP</b>	<b>g</b>	<b>f</b>	<b>e</b>	<b>d</b>	<b>c</b>	<b>b</b>	<b>a</b>

## Example AVR programs

### **Keypad:**

```
; checking Column 1 through PORTA
ldi temp, 0b10111111 ; set a mask with only column1 to 0
out PORTA, temp ; output to PortA
nop ; one nop delay inherent in AVR circuitry
nop ; second nop delay to ensure correct values
in temp, PINA ; now we can check 'temp' for which row = 0
```

### **LED display:**

```
; outputting number 'zero' to PORTB
ldi temp, 0b00111111 ; use the mask that displays '0'
out PORTB, temp ; output to PORTB
```