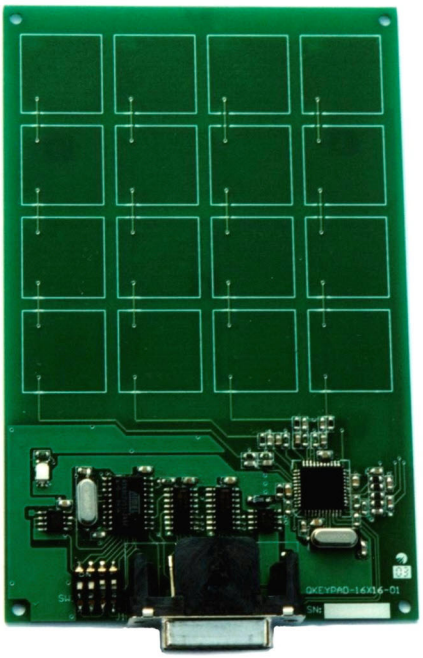
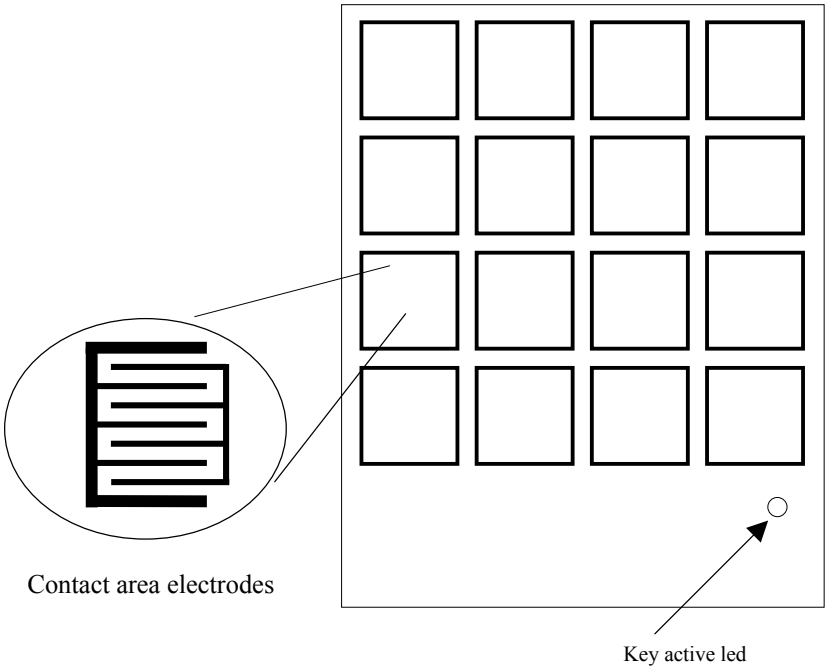
QKEYPAD
16 Key Proximity Keypad

The QKEYPAD is a 16 key proximity keypad intended to detect human touch through any dielectric panel up to a thickness of 10 mm. This product is designed specifically for OEM users needing to provide data entry into a sealed or protected environment.



16 touch keys through any dielectric up to 10 mm thick.
4 x 4 Analog crosspoint switch output to mimic traditional electromechanical keypads.
TTL Uart port.
User selectable sensitivity ranges via DIP switches.
Key active LED indicator.
Autocalibrating with noise and adjacent key suppression.
100% surface mount components to ensure easy mounting against any flat panel.
Access to power and signals lines via industry standard DB15 connector.

Description –
When placed behind a panel made from any dielectric material such as glass, wood, or plastic the contacting surface becomes a touch sensitive keypad with 16 discrete keys. During operation minute amounts of charge is coupled by a set of 16 electrodes through the overlying panel. Any contact with the panel over the area of the electrodes causes charge to leak away from the electrodes and a corresponding drop in voltage is detected as a key activation.



ABSOLUTE MAXIMUM RATINGS (1)

V+ to GND	-0.3V to 15V
Digital Inputs to GND	–0.3V to 5V
Operating Temperature Range	0° C to 85°C
Storage Temperature Range	0° C to 85°C

NOTE: (1) Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. Exposure to absolute maximum conditions for extended periods may affect unit reliability.

Connector Pin Description

Interface is via industry standard 15 way D-connector, female. This connector carries both the unit input power and output signal lines. Table 1. describes the pin connections to the unit.

Pin	Label	Direction	Description
1	X0	In/Out	Keypad row scan line 0 **(1) (4)**
2	X1	In/Out	Keypad row scan line 1 **(1) (4)**
3	X2	In/Out	Keypad row scan line 2 **(1) (4)**
4	X3	In/Out	Keypad row scan line 3 **(1) (4)**
5	Y0	In/Out	Keypad Column scan line 0 **(1) (4)**
6	Y1	In/Out	Keypad Column scan line 1 **(1) (4)**
7	Y2	In/Out	Keypad Column scan line 2 **(1) (4)**
8	Y3	In/Out	Keypad Column scan line 3 **(1) (4)**
9	V+	In	Positive DC supply line.
10	GND	-	Ground
11	GND	-	Ground
12	GND	-	Ground
13	GND	-	Ground
14	GND	-	Ground
15	TX	Out	Uart Output line **(2) (3)**

Table 1. Unit interface: DB15 pin description.

NOTE: (1) Keypad scan lines are enabled when switch 4 of the user selector Switch (SW1) is “OFF”. This selects the analog crosspoint matrix as the active Interface. The Uart Output is not active in this mode. When the analog crosspoint matrix is disabled these lines must be left unconnected.
NOTE: (2) The Uart output is enabled when switch 4 of the user selector Switch (SW1) is “ON”. This selects the Uart as the active interface. The analog crosspoint matrix output is not active in this mode. When the uart is disabled this line must be left unconnected.
NOTE: (3) The uart output voltage level is standard TTL. Care must be taken to ensure that voltages outside the range of –0.3V to 5V are not applied to this line. If a RS232 interface is required then the use of an appropriate level translation circuit should be used.
NOTE: (4) Switch 4 on the user selector switch SW1 is used to enable either the uart output or the analog crosspoint switch. Switch changes only take affect when the unit is turned on. Changes to the user selector switch must only be made while the unit power is off.

Interface Selection

The interface is selectable between a 4x4 analog crosspoint matrix, and a uart output. Selection is made by way of switch 4 on the DIP switch array SW1. (See Table x User Selector switch)
Figure 1. Illustrates the equivalent circuit output when the analog crosspoint matrix is selected.
The row to column key definitions are as shown in Figure 2. The row to column connections for inactive keys are effectively open circuit. When a key is selected the row to column connection remains in active until the key is released.

When selected the uart output will transmit codes as shown in Figure 1 whenever the corresponding key is activated. Codes are sent once at the point of contact detection. No key release codes are sent.

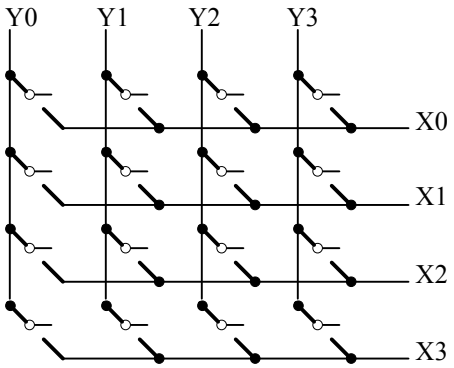


Figure 1. Equivalent circuit of 4x4 analog crosspoint output.

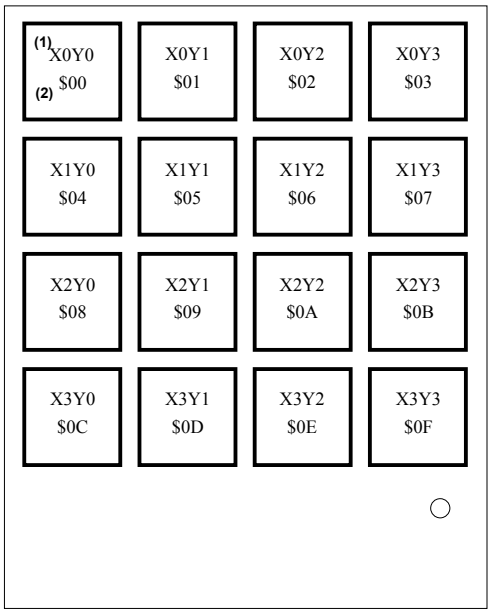


Figure 2. Key descriptions

NOTE: (1) Upper designations indicate row-column connections while the analog crosspoint output is enabled.
NOTE: (2) Lower designations indicate hex codes output while uart output is enabled.
The Qkeypad unit is shown with component less side facing.

Principle of Operation:

The Qkeypad unit has on its surface 16 proximity key sensing areas. The sensing areas consist of simple tracks of conducting material that when pulsed with an electric charge creates an electrostatic field surrounding each proximity key area. When a non-conductive panel is placed over the Qkeypad the electrostatic field permeates through the panel above the sensing area. When contact is made by the human finger some of the charge flowing through the overlying panel is “leaked” away as shown in Figure 3.

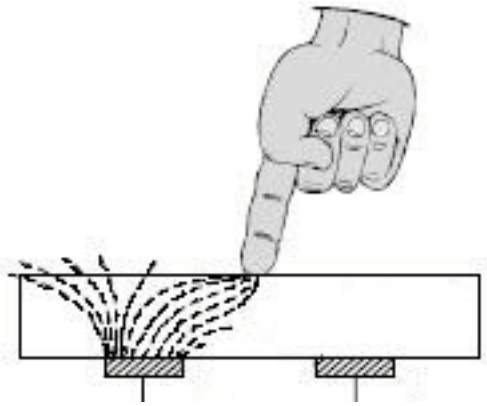
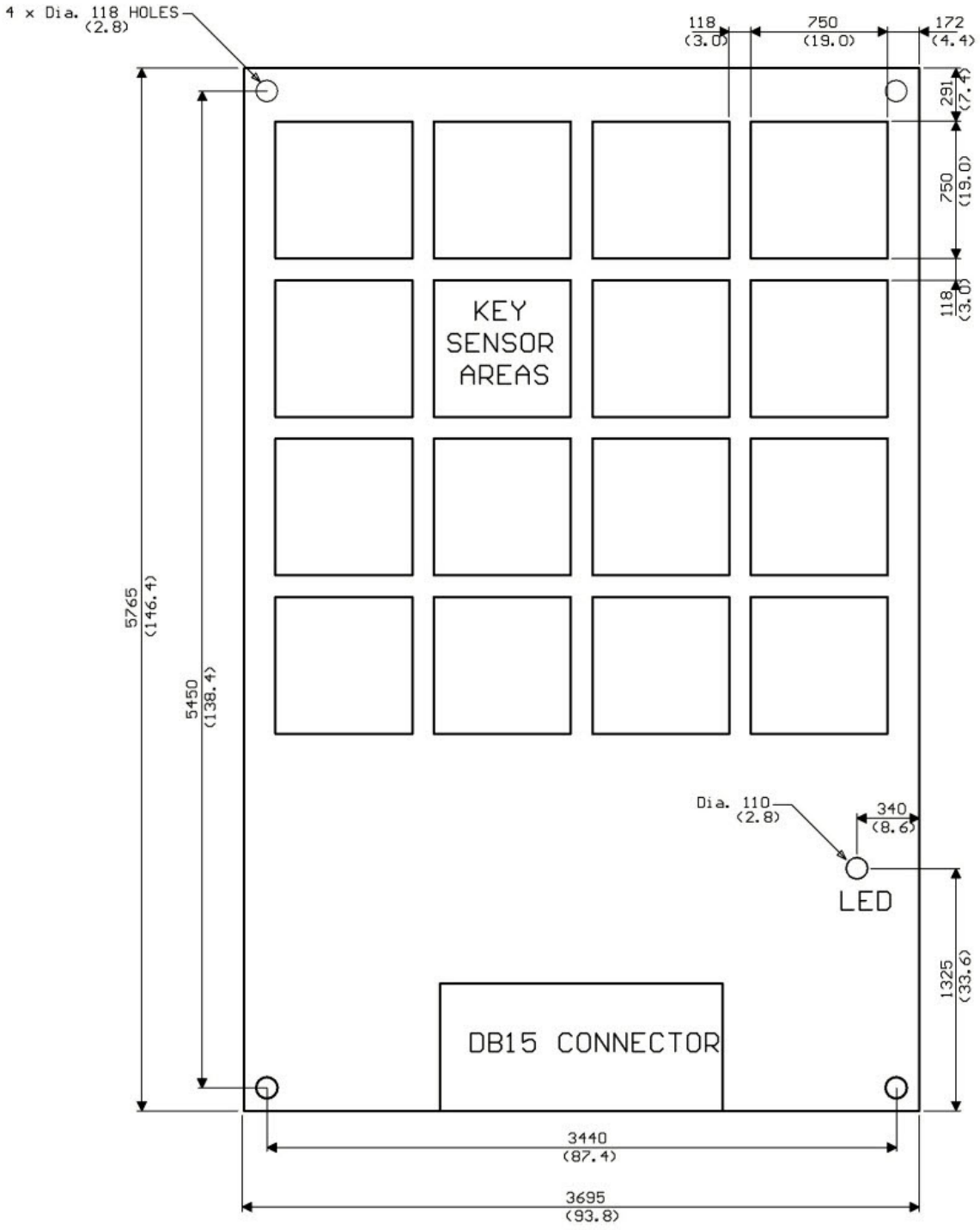


Figure 3

This leaking away of charge is detected by the associated circuitry as a change in voltage levels. When the change in voltage beyond a certain reference level reaches a defined trigger point the Qkeypad detects this as a key press.

In practice any object near the sensing electrodes will cause some leaking of charge to occur. Also water droplets and other surface contaminates will cause coupling of the electrostatic field between the individual proximity keys. To avoid a false trigger an individual reference voltage is generated for each proximity key area. Additionally the reference voltage is adjusted periodically to allow for any fluctuating influences such as water moisture that would change with time at a rate much slower than would be the case for a genuine key press.

Dimensions:



All Dimensions in mils and (mm)
Copper side view.

Disclaimers.

Life support — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury.