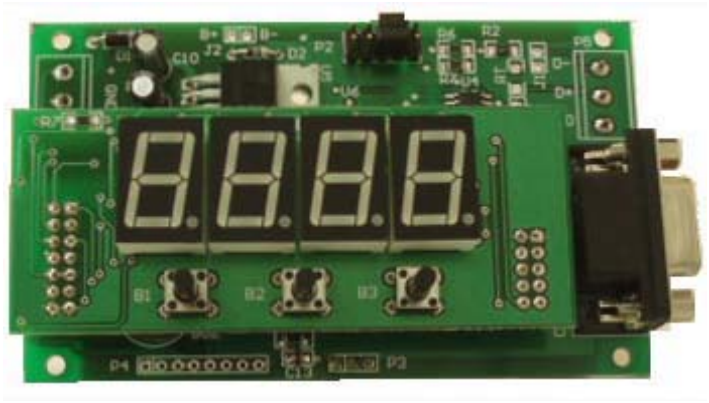
USER'S MANUAL **Rev1.2**

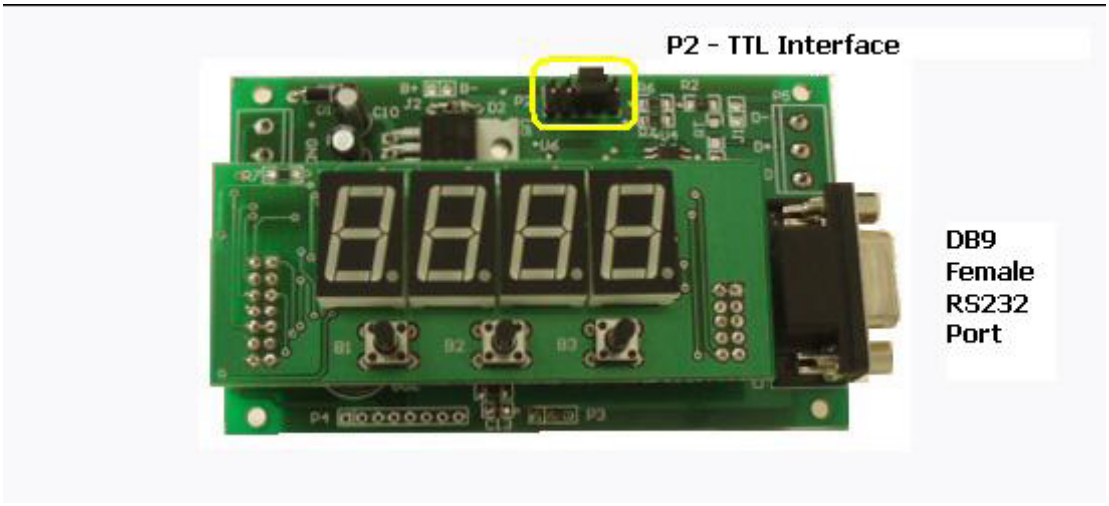


6 Operational Modes in 1 module:

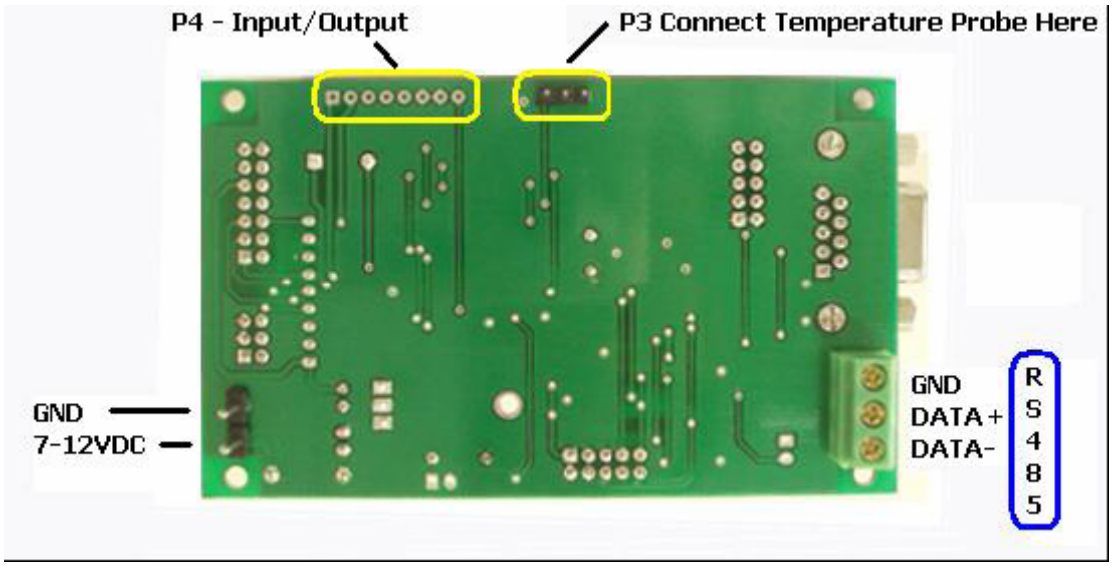
- **Display 4 ASCII characters or an unsigned integer number.**
- **24 Hours Format Real Time Clock.**
- **Count down Timer.**
- **Temperature Sensor.**
- **Pulse Width Modulation (PWM) Controller.**
- **Event Counter.**

Features:

- **Display 4 ASCII characters or 16bits integer.**
- **RS232, RS485 or TTL interface.**
- **Programmable baud rate. (1200bps,2400bps,4800bps,9600bps & 19200bps)**
- **Real Time Clock with Time Stamp Function.**
- **3 Multi Function Push Buttons.**
- **One Darlington Output.**
- **One PWM Output.**
- **On Board Piezo Buzzer.**
- **One Digital Input Port for event counting**
- **NTC Thermistor input port**
- **Up to 255 modules can be separately addressed with programmable device address feature.**
- **Free Demo & setup software.**
- **New feature: Display up to 20 characters with auto scroll function**
- **3 scroll speed setting.**



TOP VIEW



Bottom View

1.1 Setup SC4D for testing

Step 1 – Download SC4Dapp freeware from www.siliconcraft.net/download.
Step 2 – Connect RS232 Serial Cable (not included) to any available serial port on PC.
Step 3 – Connect the temperature probe to P3
Step 4 - Power up the device, you should see the baud rate being display for 2 seconds.
By default, the display will show b 9.6 indicating baud rate of 9600bps
Step 5 – Start sc4d program on PC and set the correct COM port.

If this is done correctly, the display goes blank and wait for command.

1.2 Changing device baud rate

Programmable baud rate of 1200bps,2400bps,4800bps,9600bps and 19200bps.
Data format is always 8 data bits, no parity and 1 stop bit.

To change the baud rate, select from menu " set module baud rate" and click on it.
The new baud rate will be display on the module.

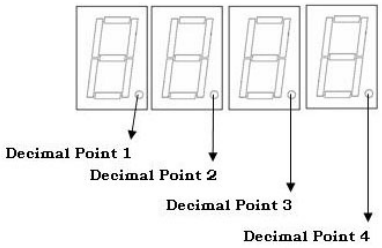
Make sure the PC baud rate also change to the same device baud rate.

1.3 Display Mode

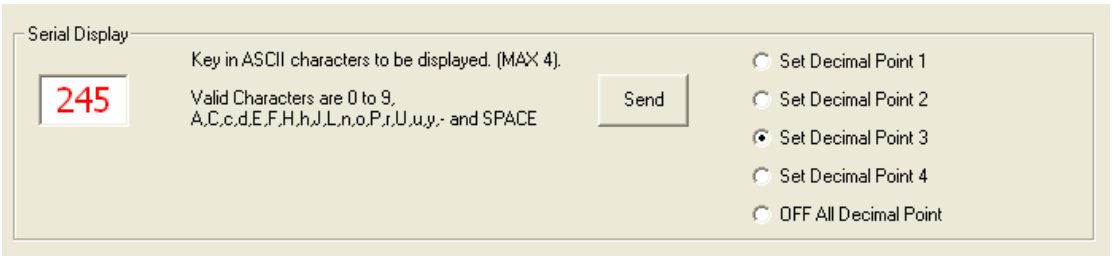
In this mode, the module displays 4 ASCII characters or an unsigned integer number it received from the serial port.
Supported characters are numbers **0,1,2,3,4,5,6,7,8,9** and alphabets **A,b,C,c,d,E,F,H,h,I,J,L,n,o,P,r,S,U,u,y** as well as “SPACE” and “ - “ characters.

Sending an unsupported character will result in blank display.
For example; sending 12AG, display will show 12A .

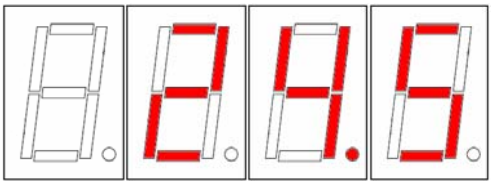
Each digit decimal point can be turned on or off individually.



Example:



Click Send Display will show



An unique code will be transmitted via the serial port each time the push button is pressed.

button = 0x10 B1 Pressed
button = 0x20 B2 Pressed
button = 0x08 B3 Pressed
button = 0x30 B1 + B2 Pressed
button = 0x18 B1 + B3 Pressed
button = 0x28 B2 + B3 Pressed
button = 0x38 B1 + B2 + B3 Pressed

MSB LSB

UID	**0x03**	**button**	**0xFF**

*MSB transmitted first.
*UID – Unit ID (address)

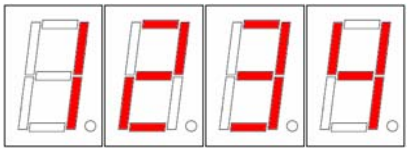
Command List:

Display 4 digits ASCII characters:

0xFE	0x03	ASCII-4	ASCII-3	ASCII-2	ASCII-1	0xFF

Example:

Sending 0xFE 0x03 0x31 0x32 0x33 0x34 0xFF

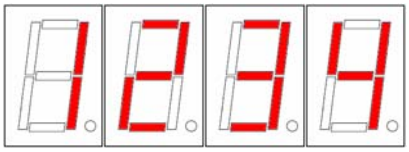
Display shows: 

Display an unsigned integer number (maximum 9999)

0xFE	0x23	MSB	LSB	0xFF

Example:

Sending oxFE 0x23 0x04 0xD2 0xFF

Display shows: 

Hex Value of 1234 is 0x04D2

Turn On Decimal Point

0xFE	0x13	DP	0xFF

*DP – decimal point to turn on.
DP = 0x01 Decimal Point 1
DP = 0x02 Decimal Point 2
DP = 0x03 Decimal Point 3
DP = 0x04 Decimal Point 4

Toggle Flashing Mode

This will cause the display to turn on and off in 0.6s interval

0xFE	0xFC	0xFF

1.3a Auto Scroll Mode

This is a new additional feature added in Rev. 1.2

If you transmit more than 4 ACSII characters to SC4D, auto scroll mode is automatically enabled with text scrolling from right to left.
You can send up to 20 ASCII characters. However, only those supported will be displayed.

Command code 0xFE,0x03," Text " , 0xFF

Where "Text" is the characters you want to display.

3 scroll speeds are available : Fast,Medium,Slow

By Default, speed is set at Medium @ 1 second scroll rate

You can change the scroll speed at any time by command

0xFE,0xF6	Slow
0xFE,0xF5	Medium
0xFE,0xF4	Fast

1.4 Real Time Clock mode

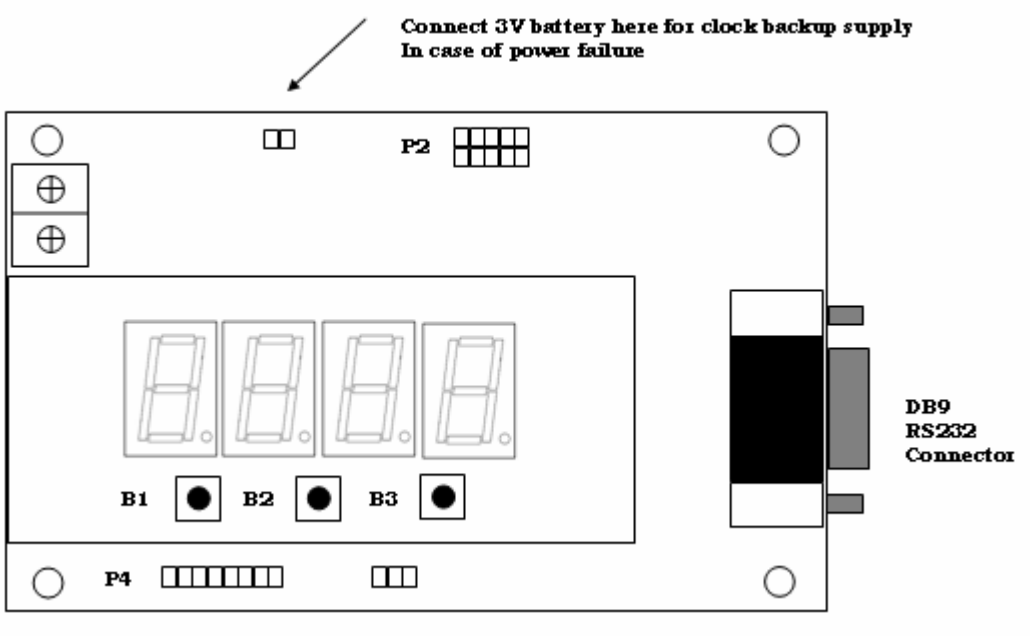
24 hours display format.
The time is set at 00.00 at power up or reset.
Current time can be set using the SC4D Application Software ,the push buttons or serial command.

Setup Real Time Clock Using SC4D Application Software

Clicking on the " Set Current Time " button to set up the real time clock using the PC system time.

Setup Real Time Clock Using the Push Buttons

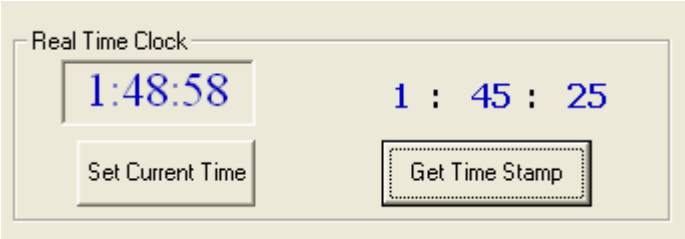
To set the time via push buttons, pressed B1 once. Press B2 to increment minute or press B3 to decrement. Press B1 again to set hour. Pressing B1 for the third time will exit time setting mode.



Time Stamp Function

The module will transmit its time information when requested via serial command. Information includes Hour , minute and second.

To demonstrate this function , click on “GET TIME STAMP”



Command List:

Set Real Time Clock

0xFE	0x10	Sec	Min	Hour	0xFF

Display Real Time Clock

0xFE	0x00	0xFF

Get Time Stamp.

0xFE	0x13	0xF7	0xFF

Reply:

0xFE	0x01	second	minute	hour	0xFF

Display Current Time

0xFE	0x00	0xFF

1.5 Count Down Timer Mode

Maximum interval is 99 minutes and 59 seconds (99:59)
The operation can be controlled using the SC4D application software or the push buttons.
When count down timer reaches 00:00, buzzer will sound and darlington output turns on.
The display flashes.

Using Count Down Timer with SC4D application software

Key in minutes (0-99) and seconds value (0-59). Click on “Set Interval”.
“Start/Stop” and “Reset” button will be enabled.

Click Start/Stop to start or stop the timer.

Click Reset will cause timer to reset to set interval and stop the timer.
Buzzer and output will be turned off if the timer already reaches 00:00.

Using Count Down Timer with push buttons

To set the count down interval via push buttons, pressed B1 once. Press B2 to increment seconds or press B3 to decrement. Press B1 again to set minutes. Pressing B1 for the third time will exit interval setting mode.

Press B2 to start or stop counting. Press B3 to reset count down timer.

When the timer counts down to 00:00, the display will flash and the Darlington output port turn on. This port can be used to control external device like relay etc.

Pressing B3 will reset the timer, turn off the Darlington output and stop display from flashing.

Command List:

Set Count Down Interval

0xFE	**0x01**	**second**	**minute**	**0xFF**

Start or Stop Timer

0xFE	**0x11**	**0xFF**

Reset Timer

0xFE	**0x21**	**0xFF**

1.6 Thermometer mode

This module works with the supplied 10K NTC Probe. Upon activation, the module sample the temperature sensor every 1s, and update the display. Measurement is shown in unit Celsius.

Measured temperature can be read out via serial command.

0xFE	0x04	0xFF

Reply:

UID	0x04	sign	temperature	0xFF

Sign = 4 if temperature is positive.
Sign = 6 if temperature is negative.
Temperature reading in CELSIUS

1.7 PWM mode

8 selectable PWM frequencies. 160 Hz, 320 Hz, 640 Hz, 1280 Hz, 2560 Hz, 5120 Hz, 10240 Hz and 20480 Hz.

PWM must be is disabled state before the selected frequency can be changed.

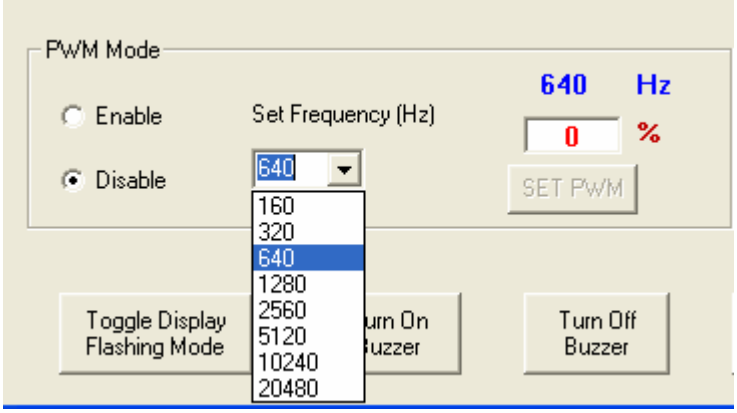
The duty cycle starts at 0% and can be set between 0 to 100%

PWM output can be used to control external device like LED, motor etc.

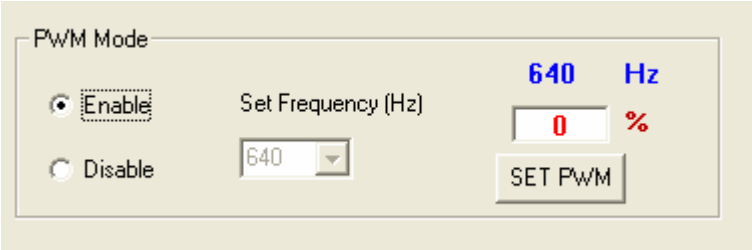
Note: Real Time Clock is stop when this mode is operation. User need to set the time again when exiting this mode.

Using SC4D Application Software to set PWM

Step 1: Select the frequency



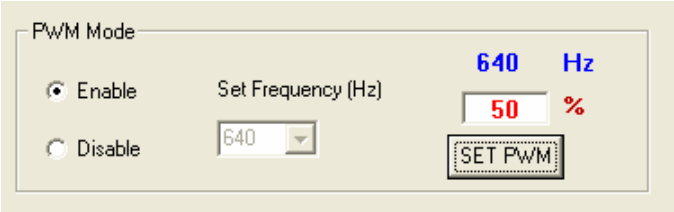
Step 2: Enable PWM



Display shows 00 indicating current duty cycle is 0%.

Step 3: Set duty cycle

Key in duty cycle (0 – 100%) and click on “SET PWM”



Command List:

Set PWM Frequency

0xFE	0x12	freq	0xFF

freq Frequency

0	160Hz
1	320Hz
2	640Hz
3	1280Hz
4	2560Hz
5	5120Hz
6	10240Hz
7	20480Hz

Set PWM Duty Cycle

0xFE	0x02	Duty cycle	0xFF

Disable PWM

0xFE	0x22	0xFF

Note: This command is valid only when the frequency has been set.
This command need to be issued before the frequency can be changed.

1.8 Event Counter Mode

Count up to 9999 input events. <10kHz Pulsed or Contact.
Code transmission on each event.

UID	0x05	0x05	0xFF

1.9 Miscellaneous Command

Turn On Buzzer

0xFE	0xFA	0xFF

Turn Off Buzzer

0xFE	0xFB	0xFF

Turn On Output

0xFE	0xF9	0xFF

Turn Off Output

0xFE	0xF8	0xFF

2 Standalone Mode

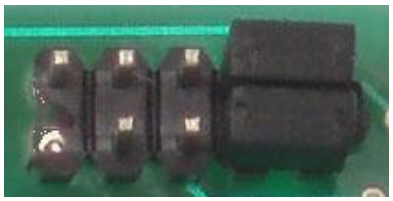
5 modes are available in application where serial port is not connected.

Press B1 & B3 simultaneously to switch to next mode.

F1 – Real Time Clock Mode
F2 – Count down Timer Mode
F3 – Show Temperature Mode
F4 – Show Temperature & Clock Alternately mode
F5 – Event Counter mode.

3 RS485 Setup

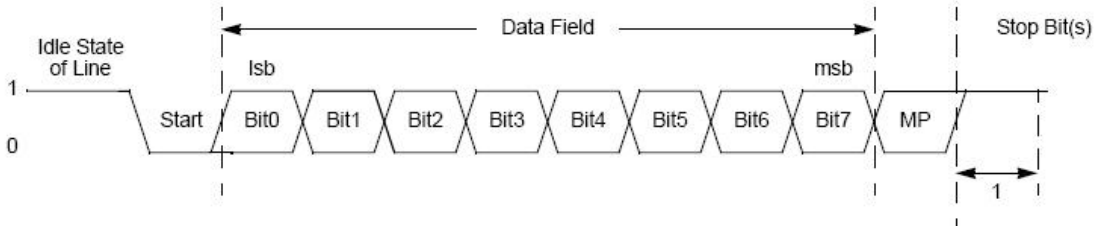
Point to Point – UID always 254
8,N,1 data format



Header P2 setting for RS485

Multipoint – each device with unique UID

9,N,1 data format



Bit 9 (MP) – "0" data byte
Bit 9 (MP) = "1" address byte

To send command to specific device, send UID first with MP set to 1 , follow by the command with MP set to 0.

To change the UID, Power off the module. Press & Hold Button B1 and B3. Power up the module. You should see the module ID displayed (Example : u254)

Change the UID by using B2 to increase and B3 to decrease.

Press B1 when done.

Note: Changing UID other than 254 will cause the module set at 9,N,1 data format.

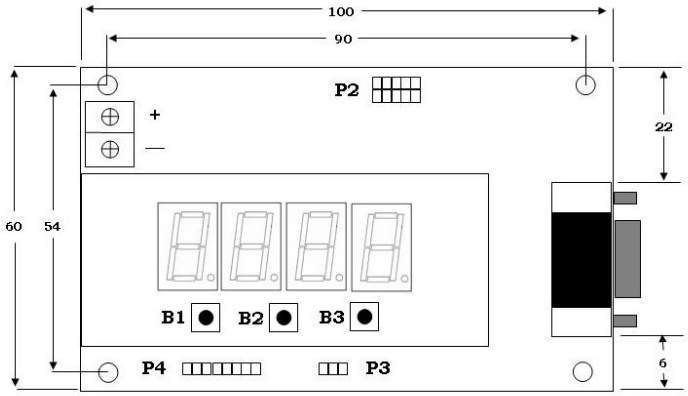
4 Specification

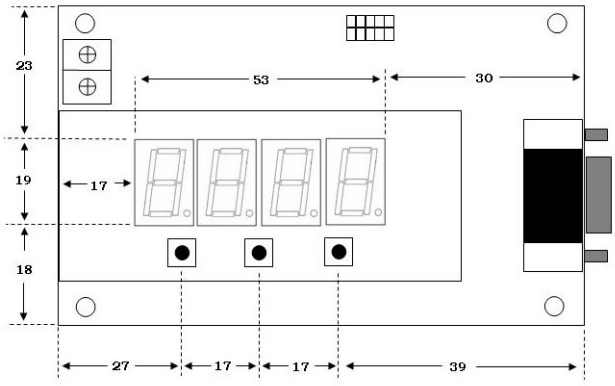
Operating Temperature : 0˚C to 70˚C
Storage Temperature : -20˚C to 80˚C
Operating Relative Humidity : 90% max non-condensing
Supply Voltage: 7-12VDC
Supply Current: 70mA typical
Maximum Sink Current into PWM port: 500mA
Maximum Sink Current into Darlington Port: 500mA
Maximum Current into Event Counter Port: 20mA
Maximum Voltage into Event Counter Port: 3.3VDC
Maximum Voltage into TTL UART Port: 5.5VDC
Maximum RS232 cable length: 5 meters.
Maximum RS485 cable length: 1000 meters

Maximum Current draw from 5VDC Pin: 500mA

Temperature Probe operating range -10˚C to 100˚C
Temperature Probe accuracy +/- 1%

Mechanical Dimension



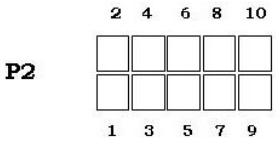


All dimension in mm.
Mounting holes diameter is 3mm

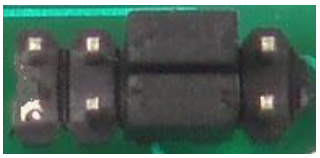
P4 Header Pinout Description

Pin 1 - PWM Output
Pin 2 - Darlington Output
Pin 3 - Vsupply
Pin 4 - Vsupply
Pin 5 - +5VDC
Pin 6 - GND
Pin 7 - GND
Pin 8 - Event Counter Input

P2 Header Pinout Description

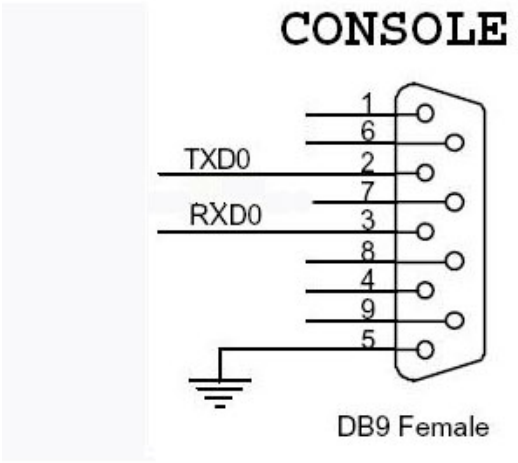


Pin 1 - +5VDS
Pin 2 - +5VDC
Pin 3 - GND
Pin 4 - GND
Pin 5 - MAX3232 Rin
Pin 6 - MAX3232 Tout
Pin 7 - TTL logic UART Receive
Pin 8 - TTL logic UART Transmit
Pin 9 - RESERVED
Pin 10 - RESERVED

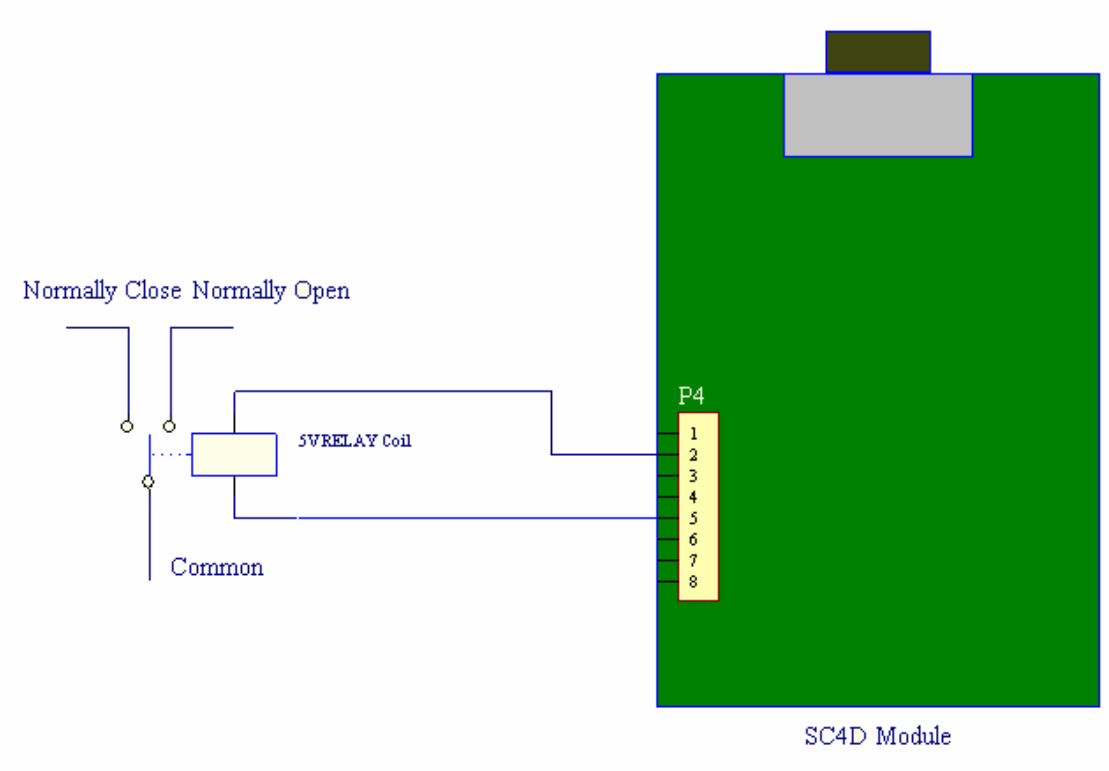


Header P2 (RS232 Setup)

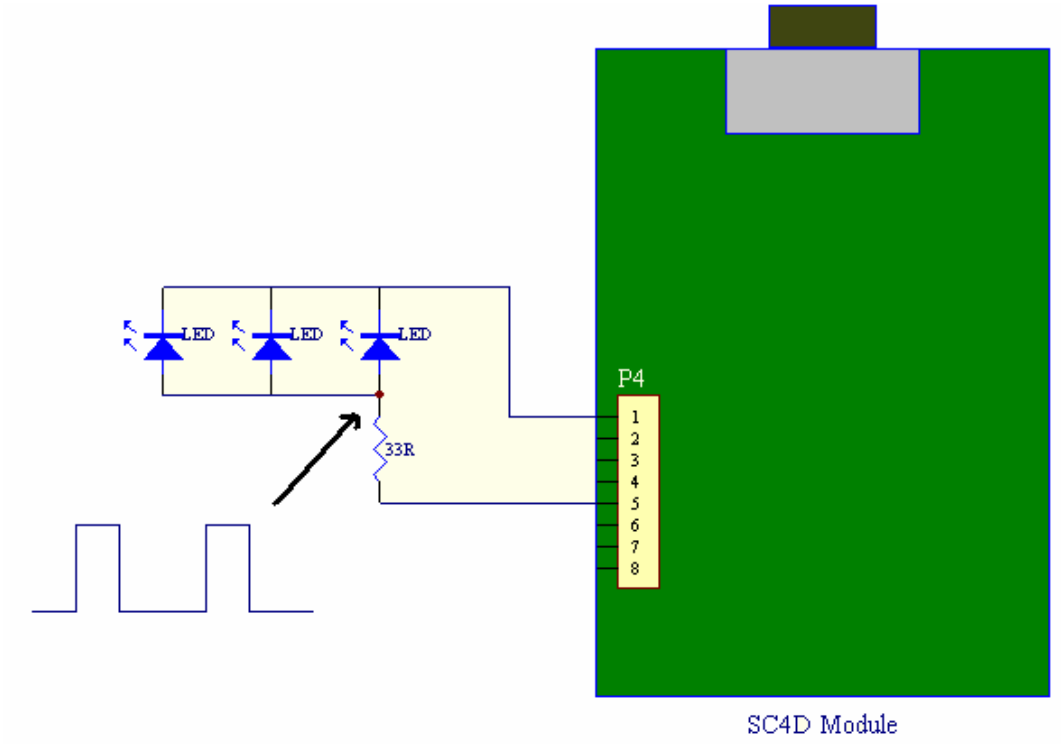
Header P2 (RS485 Setup)



RS232 Port



External Circuit Interface Example: Use Darlington Output Port to Drive Relay



External Circuit Interface Example: Use PWM Output to Drive LED