DIRRS+
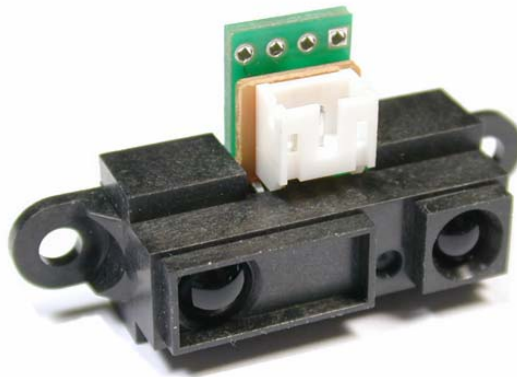
☐ 4-Pak   ☐ Single
(SKU #35100)   (SKU #35090)

Infrared Distance Measurement

5V Output Signal
3 Output Modes
Reliable Optics
Easy to use

Ideal for robotics projects

Thank-you for purchasing the DIRRS+ module. The DIRRS+ is a low-cost, short range Digital Infra-Red Ranging System. Usable detection range is 10 cm to 80 cm (approx. 4" to 31.5"). Three different configurations allow you to quickly and easily design this sensor into any application. The DIRRS+ can be configured as a direct replacement to the original DIRRS.

The DIRRS+ consists of the Sharp GP2D12 distance measuring sensor and an adapter board to provide the analog to digital conversion. The GP2D12 is a compact, self-contained IR ranging system incorporating an IR transmitter, receiver, optics, filter, and amplification circuitry. The unit is resistant to interference from ambient light and is tolerant to variations in surface reflectivity of the detected object.

CAUTION: Do not mount the DIRRS+ Module directly on any conductive surface it may damage the normal operation of this unit.

Connecting to the DIRRS+

Wires can be soldered directly to the DIRRS+ module or a 0.100" 4 Pin header can be used.

| Pin	Symbol	Connect to
1	GND	Ground
2	Vin	Output pin of Microcontroller
3	Vcc	+5V DC
4	Vout	Input pin of Microcontroller

Table 1 - Pinout

The Vin pin of the DIRRS+ is 5V tolerant no voltage divider is required.

Configuring the DIRRS+

The GP2D12 has the ability to sense an object between 10 and 80 cm and produce a voltage proportional to the distance measured. The voltage ranges from 2.6V for objects at 10cm, to 0V for objects at 80cm. An Analog to Digital converter reads the voltage and provides a value ranging from 255 for objects at 10cm, to 0 for objects at 80cm. This value is then transmitted depending on the configuration you have selected.

CAUTION: TTL Only, Do Not Use ± 12 V RS-232

There are three configurations available in the DIRRS+; two are asynchronous serial transmission and one synchronous.
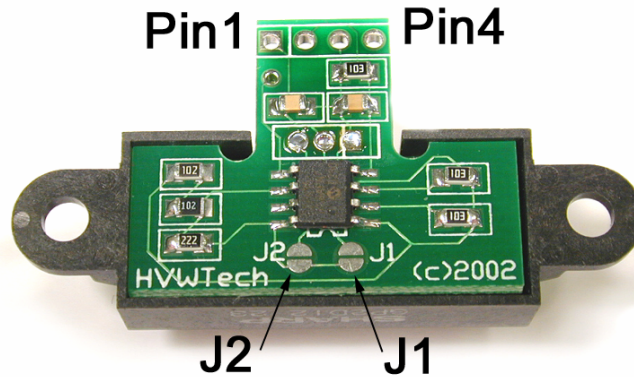
Configuration 1: Default

> Mode: Serial HEX
> A single 8 bit value is transmitted on Pin 4.
> 4800 bps RS-232 TTL 8N1 (8 bits, no parity, 1 stop bit)

Configuration 2: J2 Open, J1 Shorted (Add solder until bridged)

> Mode: Original DIRRS
> A single 8 bit value is transmitted synchronous mode on Pin 4 with clock on Pin 2

Configuration 3: J1 Open, J2 Shorted (Add solder until bridged)

> Mode: Serial CM
> A string of ASCII characters transmitted serially on Pin 4.
> RS-232 TTL 8N1 (8 bits, no parity, 1 stop bit)

Operation: Serial HEX

In this mode the DIRRS+ uses TTL (5 Volt Logic) to serially transmit a preamble byte ("10101010") followed by a single byte. The mode is set to 4800 bps 8N1 Example code is given for the BASIC Stamp II. For other microcontrollers please see our website for other examples or refer to your datasheet. An object at 10 cm will result in Hex - FF (Binary 11111111 or DEC 255) being transmitted. An object at 80 cm will result in Hex - 00 (Binary 00000000 or DEC 0) being sent. When no object is present some fluctuations may occur in the measurement of 0V resulting in values being sent.

```
'*********************************************
'This software is used with the DIRRS Plus when it is configured
'for SERIAL HEX mode. The DIRRS Plus transmits by TTL level
'RS-232 (8Bits, No Parity, 1StopBit) at 4800 bps.
'Measurements are transmitted every 5 milliseconds approximately.
'*********************************************
DIST        VAR        WORD
datain      CON        0            'Pin 0 of microcontroller

START
        Serin datain,188,[wait(%10101010),DIST]
        Debug dec dist, cr
        Pause 2
Goto START
```

Operation: Original DIRRS (Synchronous Serial)

The DIRRS+ module makes repeated measurements before it returns the distance to an object. The time it takes to make these measurements varies slightly from unit to unit and can be as long as 10 ms. The following 3 steps illustrate a measurement cycle:

1. The V_{in} line is normally held HIGH (+3V). To begin a measurement sequence, pull this line LOW (0V).
2. Wait for V_{out} to go HIGH (or Pause 10ms).
3. You can now begin clocking-in the distance data (8 bits).

To transfer the data, you must generate a series of 8 pulses (maximum pulse width 200 µs) on the V_{in} line and read the V_{out} line in between each pulse. The pulses must not be more than 200 µs long. The entire process is done painlessly with the BASIC Stamp 2's SHIFTIN command, as demonstrated in the following example:

```
'*********************************************
'This software is used with the DIRRS+ when it is configured
'for Original DIRRS mode. The input from the DIRRS+ is
'triggered by a high low transition with the resulting
'distance measurement shifted into the DIST variable.
'*********************************************

DIST    VAR    BYTE      'Variable used to store DIRRS result
T       VAR    BYTE
OUTPUT 0                 'Pin 0 connects to Pin 2 of DIRRS+
INPUT 1                  'Pin 1 connects to Pin 4 of DIRRS+

START:
        High 0                   'Vin high-low transition
        Pause 3                  'Wait for high to be recognized
        Low 0
        For T= 1 to 30           'Begin 30 ms wait
        Pause 1
        If IN1=1 Then JUMP       'Vout is HIGH, data available -jump
```

```
        Next                    'Measurement not complete, loop
Goto START
Shiftin 1,0,2,[DIST\8]   'Shift 8 bits into DIST via pin P1,
                         'clocking with P0, MSB first
Debug "Distance= ", dec DIST,cr
                         'Display distance in debug window
Goto START               'Start over
```

Operation: Serial CM

In this mode the DIRRS+ uses TTL (5 Volt Logic) to serially transmit
between 3 bytes. The mode is set to 4800 bps 8N1. Example code is
given for the BASIC Stamp II. For other microcontrollers please see our
website for other examples or refer to your datasheet. An object at 10
cm will result in a preamble byte "10101010" and ASCII characters 1, 0,
0 being transmitted. The DIRRS+ does a calculation and provides a
measurement in centimeters. This calculation is based on an average
of many different sensors and may vary slightly with your specific sen-
sor. An object at 80 cm will result in ASCII characters 8, 0, 0 being sent
but at this distance small variations in voltage measured will result in
large variations in calculated distances. When no object is present or an
object is out of range the sensor will transmit a value of '0'.

```
'*********************************************
'This software is used with the DIRRS+ when it is configured
'for SERIAL CM mode. The DIRRS+ transmits by TTL level
'RS-232 (8Bits, No Parity, 1StopBit) at 4800 bps.
'Measurements are transmitted every 5 milliseconds approximately.
'*********************************************
DIST        VAR        WORD
datain      CON        0          'Pin 0 of microcontroller

START
            Serin datain,188,[wait(%10101010),dec DIST]
            Debug dec dist,"x", cr
Pause 1
Goto START
```

More examples can be found on our website at :
www.HVWTech.com/dirrsplus.htm

How Does it Work ?

Figure 1 shows how the GP2D12 uses an array of photodiodes (called
a Position Sensitive Detector, or PSD) and some simple optics to detect
distance. An infra-red diode emits a modulated beam; the beam hits an
object and a portion of the light is reflected back through the receiver
optics and strikes the PSD. Object A is closer and therefore the re-
flected light from it enters the receiver's lens at a greater angle than
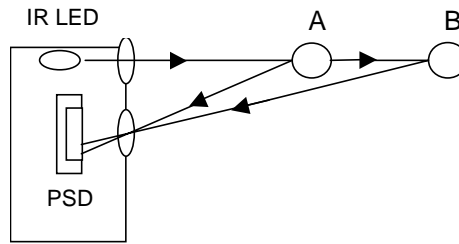does light from object B.

Figure 1.

Here, Object A is at the limit of the PSD's range (about 10 cm away). Notice how that if it were any closer, the light would not hit the PSD at all. Similarly, if B were moved farther away, its' light would eventually go past the 'top' of the PSD and would not be seen either (at about 80 cm). This explains why GP2D12 has these limits

Think of the PSD as a resistor with a large number of taps (wires coming out at various points along the resistor). When light hits the PSD, it hits one of the 'taps' and causes current to flow out each end of the resistor, forming a voltage divider similar to that of figure 1. As an object moves closer or farther from the sensor, incoming light hits a different 'tap' causing the current coming out each end of the resistor to change. These currents are compared and a voltage proportional to the position of the 'tap' (and hence the distance of the object) is generated.

CAUTION: The GP2D12 is a precision device. **Do Not** attempt to open the unit. Doing so will ruin the delicate alignment of the optics

Technical Specifications

Operating Voltage	5 Vdc
Current	35mA
Output Signal	TTL High Level
Dimension	25 x 35 x 18 mm
Detection Width	5cm max
Detection Distance	10cm– 80cm

Outline Dimensions (Unit : mm)
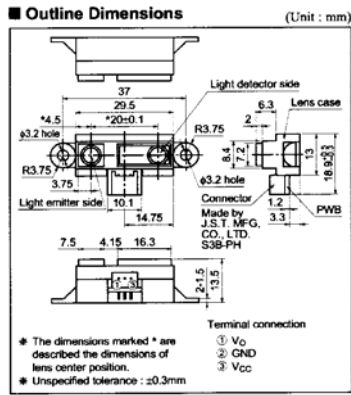
Analog Output Voltage vs.Detection Distance
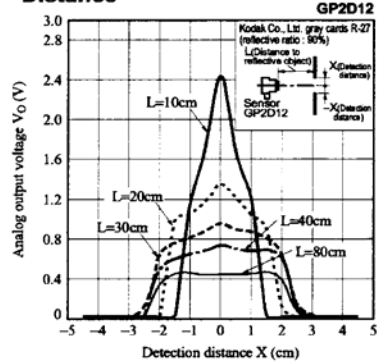
Technical Support

Symptom	Probable Cause(s) / Solution(s)
Unrecognized Characters	-Jumper settings wrong / check the communications protocol your micro is expecting
Unrecognized Characters	-Baud rate wrong / check the speed and configuration of your micro

Technical support is available if you are having problems. If you need help, please provide as much detailed information as possible.

E-mail: support@HVWTech.com
Phone: (403) 730-8603 (Monday - Friday 9am – 5pm Mountain time)

IR Distance Measurement Made Easy

Simple 5V Connection
Easily Connects to any Microcontroller
3 Configuration for output
Great for Robotic Projects

Other Products from HVW Technologies

Stamp Stack II: The Ultimate BASIC Stamp II prototyping tool. A
complete BASIC Stamp II on a board that mounts onto a solderless
breadboard. Includes a serial connector, reset switch and a "bullet-proof"
power supply. Easy to build, simple to use.

Also: Microcontrollers • IR Sensors • Compilers • PIC Programmers
and Proto Boards • FPGA Development Kits • Robotics Kits/Parts....

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