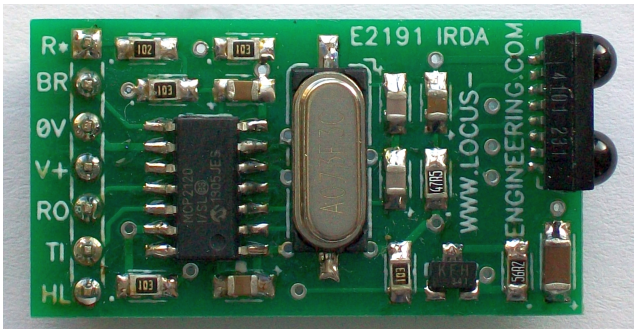
Locus Engineering Inc.
E2191

Serial to IrDA Transceiver

FEATURES



- **9.6K & 115.2K baud data rate selection**
- **+3.0V to +5.5V operation**
- **low/high optical power selection**
- **MCP2120 IrDA to serial interface**
- **TFDU4101 IrDA optical transceiver**
- **simplex transmit & receive**
- **over 1m range**
- **7 pin x 0.1” connector**

DESCRIPTION

The E2191 Serial to IrDA Transceiver is an easy to use module converting between a CMOS/TTL serial signal and an IrDA optical signal. The module formats the serial data to the IrDA standard for both transmit and receive. Simply send serial CMOS/TTL data to the Transmit Input or read serial CMOS/TTL data from the Receive Output. The baud rate is loaded on power up or by resetting the module, and is selectable between 9.6K or 115.2K baud. Operation is from 3.0V to 5.5V. The optical power level is selectable between low and high to allow operation at different distances.

Table 1. Absolute Maximum Ratings

Parameter	Rating
V_{in} to GND	-0.3 to +6V
Logic input voltage to GND	-0.3 to V_{in}+ 0.6V

Table 2. Electrical Characteristics

Test Conditions: Supply Voltage 4.5V<V_{in}<5.5V, $T_{ambient}$ = 25° C, unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{in}	Supply voltage	3.0		5.5	V
I_{dd}	Supply current @9.6Kb	3.3		6.5	mA
I_{dd}	Supply current @115.2Kb	13		52	mA
T	Delay prior to transmit or receive following power up or reset	30			msec
$V_{rise\ rate}$	Vdd rise rate for reset	0.05			V/msec
T_{reset}	Reset pulse width	2			µsec
	Optical wavelength	880		900	nm
	Baud rates	9,600		115,200	Baud
V_{IH}	Digital high input voltage			2.0	V
V_{IL}	Digital low input voltage	0.8			V
$V_{IH\ reset}$	Reset high input voltage			0.8 V_{in}	V
$V_{IL\ reset}$	Reset low input voltage	0.2 V_{in}			
V_{OH}	Digital high output voltage	V_{in}-0.7			V
V_{OL}	Digital low output voltage			0.6	V
$T_{operate}$	Operating temperature	-30		+85	°C

General Precautions

Charged devices and circuit boards can discharge without warning. Proper ESD precautions should be followed to avoid failure.

This device is not authorized for use in any product where the failure or malfunction of the product can reasonably be expected to cause failure in a life support system or to significantly affect its operation.

Locus Engineering Inc. reserves the right to make changes at any time without notice to improve product features or reliability.

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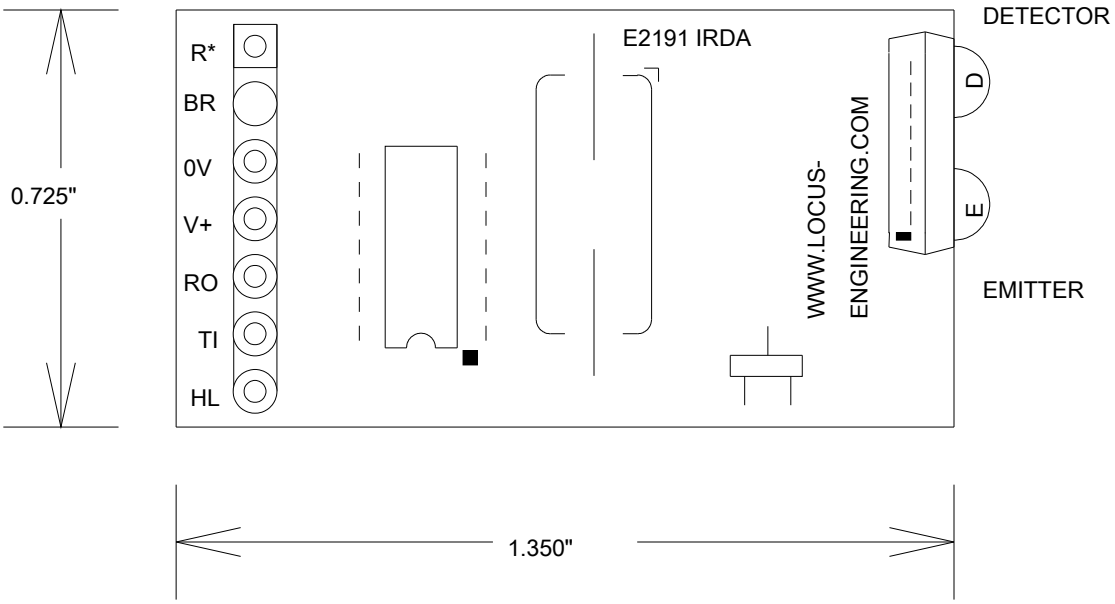

Figure 1. Module Pinout

Table 3. Pin Descriptions

Pin	Description
R*	Reset input, active low 2µsec minimum, loads baud rate on rising edge
BR	Baud rate selection, L=9600 baud, H=115,200 baud
0V	0V or ground
V+	+3.0V to +5.5V power input
RO	Receive output, TTL/CMOS level
TI	Transmit input, TTL/CMOS level
HL	High/Low optical transmit power setting; L=high power, H or disconnected=low power

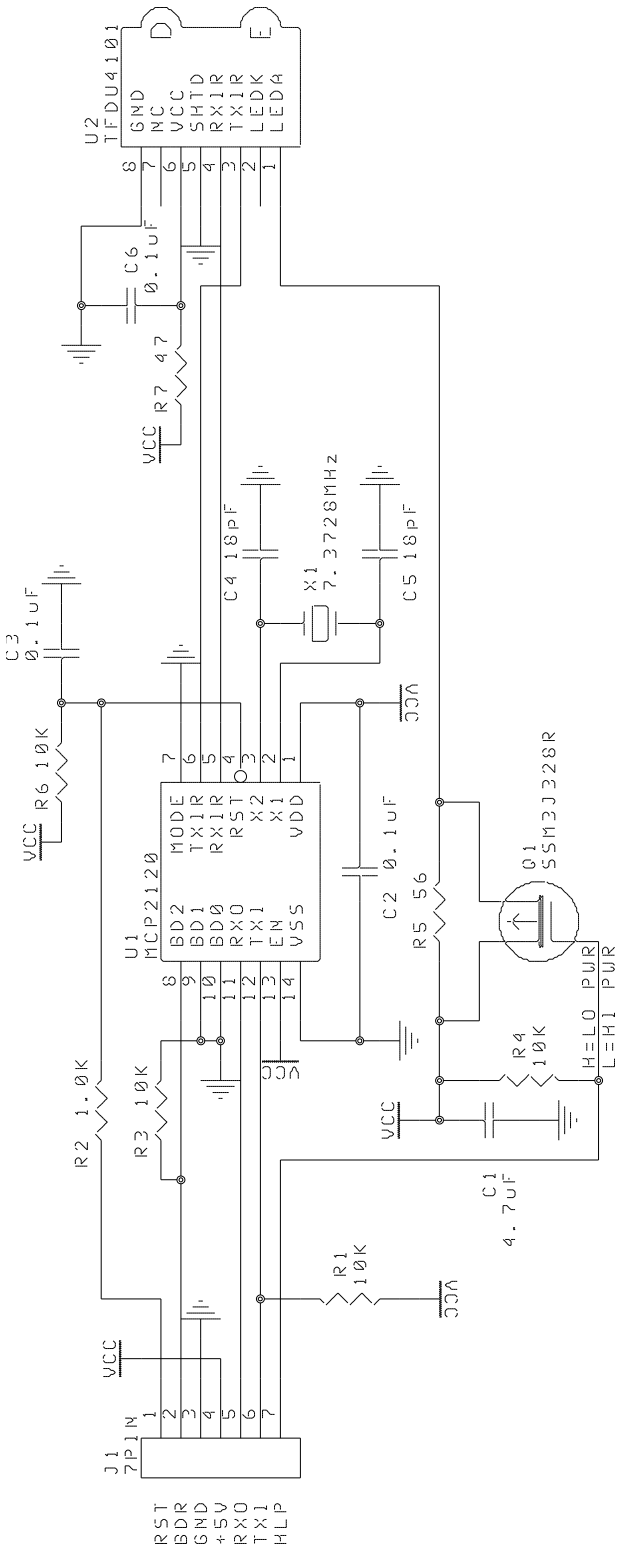

Figure 2. Schematic

Installation

The module can be tested on a breadboard with a 0.100" grid. Apply 3.0V to 5.5V to the V+ and 0V pins with a power supply current rating of at least 100 mA. The module uses on average between 3.3mA to 13mA in low power mode and between 7 and 54 mA in high power mode.

Reset

The module requires a 2µsec minimum active low pulse to reset the device at the R* pin. On the rising edge of the reset pulse, an internal reset timer starts and the module becomes usable 30msec later. Therefore no data can be received or transmitted until the internal reset timer has completed.

Baud Rate

The baud rate is loaded on power up or it can be loaded by setting the BR baud rate control pin and pulsing the R* reset input pin low for > 2 µsec. The baud rate cannot be changed without also pulsing the R* reset pin. A microcontroller can easily change the baud rate and pulse the R* reset pin. The module becomes usable 30msec following the rising edge of the reset pulse. Note that the baud rate must be set at both ends of the data link.

Low & High Power Modes

The optical power level can be changed with the High/Low Power HL pin. An open or logic high signal selects the low power mode while a low signal selects the high power mode. The HL pin controls a P-channel FET which bypasses a 56Ω current limiting resistor to the optical transceiver.

Application Tips

As in all wireless data links, it is advisable to send data in packets along with error detection so that bad packets can be identified and a request made for it to be re-transmitted. Longer data streams have an increasingly higher risk of corruption so there will be a tradeoff between packet size and repeat rates.

Errors can be detected by generating a special checksum from a data packet, and then sending both. At the receiving end, the incoming data is used to generate the same checksum and compared with the received checksum. Any errors can be used to request a re-transmission of the packet. One such checksum is the Cyclic Redundancy Code which can detect several error types while being easy to implement. See the References section for useful links and further information.

A dead time of at least two byte periods is recommended between packets to allow the receiver to re-sync to the transmitter for the next packet in the event of a previous bad packet. Without the inter packet dead time and a bad packet, the receiver will be out of phase with the following transmitted bits and all the succeeding packets will be in error.

Other light sources such as fluorescent or IR sources such as the sun may interfere with the receiver's ability to recover the transmitted signal. The modules should therefore not be pointed to direct external sources of light.

The transmitter-receiver pair is simplex, i.e. the module may transmit or receive but not both at the same time. There needs to be at least one bit period at the baud rate between reception and transmission.

Range Test Results

A pair of E2191 Serial to IrDa Transceivers were tested in a transmit-receive setup at different baud rates and power levels. A data packet with a 256 byte pseudorandom data payload and 16 bit error detecting CRC was transmitted by one unit and received by the other. The calculated receive CRC was compared with the transmitted CRC and a pass/fail result was used to determine the workable range over ten attempts without CRC failure. A supply voltage of 5V was used for the test and the background lighting was subdued incandescent. User results may vary however and these results are only presented as guidelines.

Table 4. Range Test Results

Baud Rate	Low Power Range	High Power Range
9,600	~2.5m/8’	~3.3m/11’
115,200	~1.2m/4’	~3.3m/11’

References

The following references may be useful:

Microchip MCP2120 Infrared Encoder Decoder Datasheet

Microchip MCP2120 AN 756 Using the MCP2120 for Infrared Communication

Vishay TFDU4101 Infrared Transceiver Module for IrDA Applications Datasheet

Microchip AN 730 CRC Generating and Checking

Sensirion CRC Checksum Calculation