

*Pin for pin compatible with  
Agilent HSDL-3201 with  
reduced power consumption.*

## 115.2 kbps infrared transceiver module

### INTRODUCTION:

The MS3201 from Novalog is an IrDA 1.0 and 1.2 compliant 115.2 kbps infrared transceiver module ideal for power sensitive personal data transfer applications. Setting a new industry benchmark the MS3201 will operate with the widest available supply voltage range, 1.5V to 5.5V. The MS3201 is also compliant with Sharp ASK/DASK and Consumer IR (TV Remote) specifications.

The MS3201 integrates an analog receiver, on-chip LED driver, IR photodiode, IR LED transmitter, and voltage filtering capacitor, Figure 1. Only one external current limiting resistor is required. This external resistor should be selected to optimize transmit distance and system power consumption. An external metal shield is utilized on the MS3201 for high EMI environments.

The MS3201 is optically compatible with Novalog's Mini-SIR family but utilizing an alternative pin out for existing or new applications. The new 8 pin footprint adds a separate pin for analog ground.

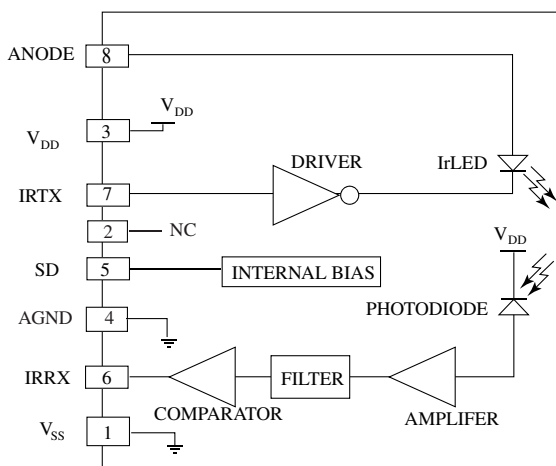
### APPLICATIONS:

- Personal Digital Assistants (PDAs)
- Cellular Phones
- Pagers
- Financial Messaging (IrFM)
- Vending Machines
- Portable printers
- Digital Cameras
- Electronic Books
- Notebook computers
- MP3 players
- Storage peripherals
- Electronic identification
- Personal data transfer devices

### FEATURES:

- IrDA 1.4 compliant.
- Compatible with IrFM specification.
- 0 to 30 cm transmit range.
- Data transfer rates from 9600 bps to 115.2 kbps.
- Evaluation board available to facilitate prototyping.
- Widest operating voltage range available in compliant transceiver, 1.5V to 3.6V.
- Ultra low operating power consumption:
 

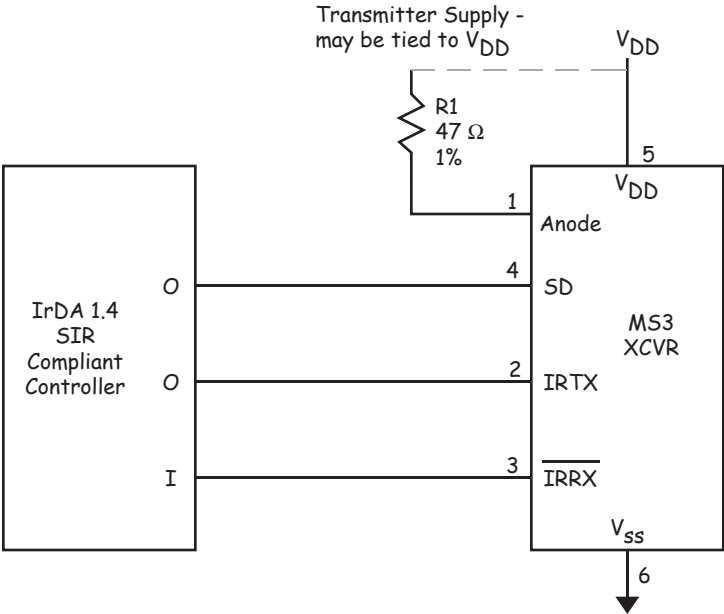
Shutdown Current (max)	0.8 $\mu$ A
Receiver Current (max)	120 $\mu$ A
- Full industrial temperature range, -25°C to +85°C.
- Only one external resistor required.
- Ultra-low system receiver latency.
- IRRX output disabled during transmit.
- Separate pin to drive anode of IR LED transmitter.
- Supplied on Tape & Reel for automated assembly.
- Meets all European Eye Safety levels.



MS3201 Block Diagram

*Figure 1*

**Typical Application:**



**Pin Description:**

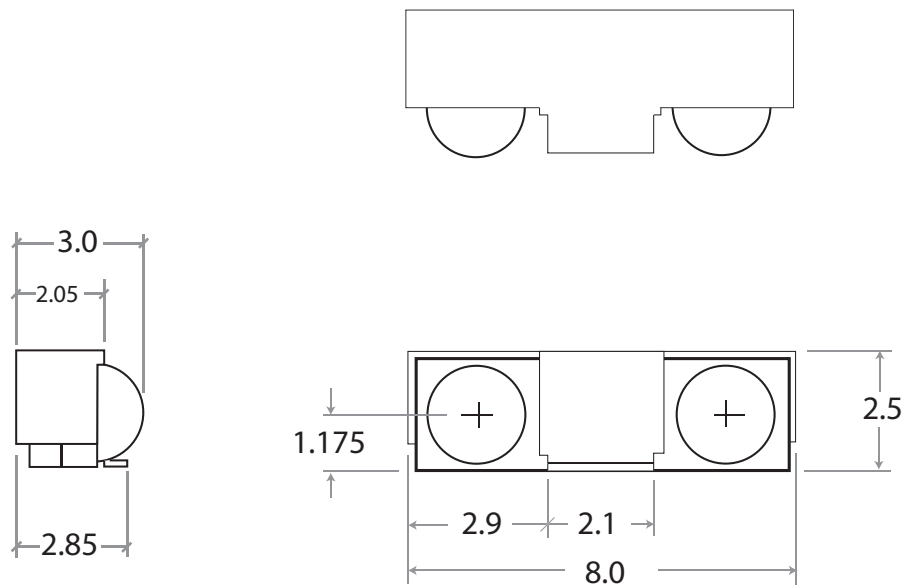
<i>Pin</i>	<i>Mnemonic</i>	<i>Function</i>	<i>I/O</i>	<i>Active</i>
1	V <sub>SS</sub>	Ground	I	-
2	NC	No Connection	-	-
3	V <sub>DD</sub>	Supply Voltage	O	-
4	V <sub>SSA</sub>	Analog Ground	I	-
5	SD	Shutdown	I	High
6	IRRX'	IR Receiver Output	O	Low
7	IRTX	IR Transmitter Input	I	High
8	Anode	Transmitter LED Anode	I	-

**Absolute Maximum Ratings:**

Voltage, Any Input .....	-0.3V to +6.0V
Operating Temperature Range .....	-25°C to +85°C
Storage Temperature Range .....	-30°C to +90°C

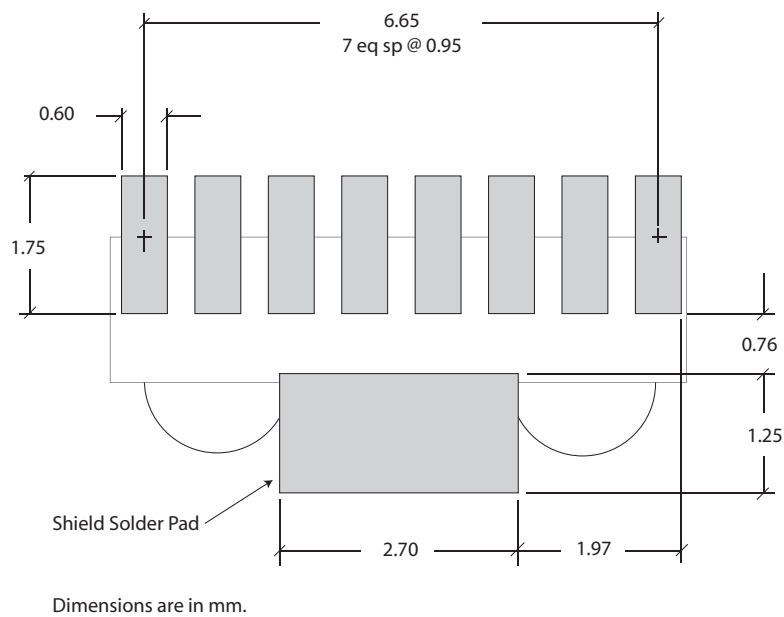
*Stress beyond 'Absolute Maximum Ratings' may cause damage to the device. These are stress ratings only, no operation beyond operating specifications is implied. Exposure to any absolute maximum condition for extended periods may permanently affect device reliability.*

**Package Dimensions:**

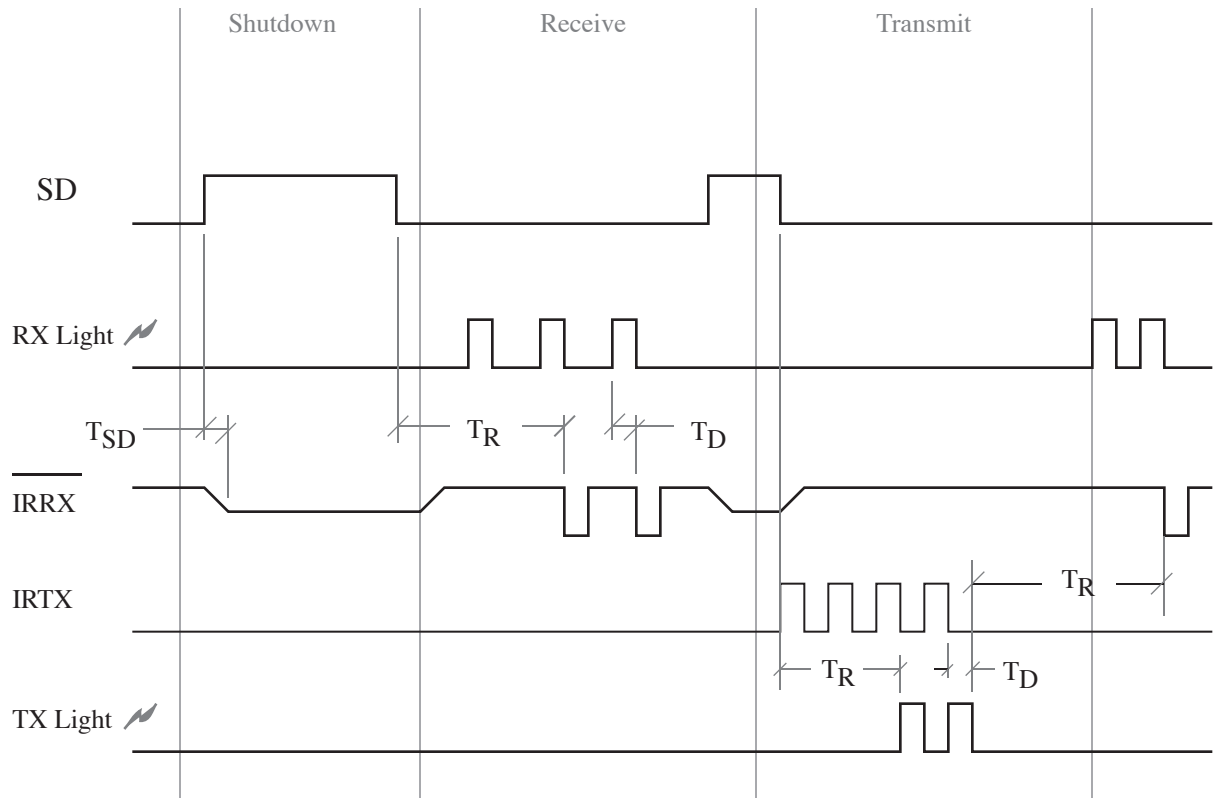


Notes:  
Units: mm  
Tolerance:  $\pm 0.2\text{mm}$   
Coplanarity: 0.1 mm Max.

**Recommended PCB Pad Layout:**



## AC Timing:



## Device Operation:

The operating mode of the transceiver is controlled by the SD (shutdown) input and the state of the transmitter input. The device is enabled whenever the SD input is a logic low. If the SD input is high IRTX is opened and the IRRX' output is tri-stated and the device is said to be shutdown. If the SD input is low half duplex operation is enabled. Care must be taken to ensure that the transmitter input is low when not transmitting (idle), this enables the receiver. Table 1 summarizes the operating modes. Once the transmit input is toggled (or from the last bit transmitted) the receiver is not active for the recovery time,  $T_R$ . The receive data output

may be valid after the recovery time provided there is received light.

The MS3201s transmitter LED (IrLED) radiant intensity is proportional to the forward current ( $I_F$ ) through IrLED. System power consumption can be optimized for each application by selection of an appropriate external current limiting resistor. Transmit distance may be approximated using the following equation;

$$D \text{ (meters)} = \sqrt{(I_F \text{ (amps)})/0.3}$$

Current limiting resistors should be  $\pm 2\%$  tolerance, non inductive (not wire wound) type.

**Table 1:**

<i>SD input</i>	<i>IRTX input</i>	<i>IrLED</i>	<i>Receiver</i>	<i>IRRX Output</i>
0	0	Off	Enabled	Valid Data
0	Toggling	Toggling	Disabled, for $T_R$ min	Tri-State
1	x	Off	Shutdown	Tri-State

## MS3201 Electrical and Optical Characteristics

### Device Specifications:

Symbol	Parameter	Conditions	Min.	Typical	Max.	Units
$I_{DD}$	Supply Current	No received data, transmitter off @3.0V, T=25°C		90	120	$\mu A$
$I_{SD}$	Shutdown Current	SD=Logic High		0.001	1.0	$\mu A$
$V_{DD}$	Supply Voltage		1.5		3.6	V

### Digital Input/Output:

Symbol	Parameter	Conditions	Min.	Typical	Max.	Units
$V_{IH}$	Input High	IRTX, SD inputs	0.6 $V_{DD}$		$V_{DD}+0.5$	$\mu A$
$V_{IL}$	Input Low	IRTX and SD inputs	-0.5		0.2 $V_{DD}$	$\mu A$
$V_{OH}$	Output High	IRRX = -250 $\mu A$ @ 2.5V	1.5			V
$V_{OL}$	Output Low	IRRX = 1.0 mA			0.4	
$I_{OL}$	Output Leakage	SD = Logic High	-1.0		+1.0	
$I_{IL}$	Input Leakage	SD, IRTX = Logic Low	-1.0		+1.0	
$I_I$	Input Current	IRTX = High, SD = Low	4.0		100.0	

### AC Parameters:

Symbol	Parameter	Conditions	Min.	Typical	Max.	Units
$T_R$	Recovery Delay	from Shutdown to Full Sensitivity			200	$\mu S$
$T_{SD}$	Shutdown Delay				200	$\mu S$
$T_R/T_F$	Rise & Fall Time	IRRX output, $V_{DD} = 1.5$ to 5.5V		100		nS
$T_W$	Pulse Width	IRRX output	1.0		2.5	$\mu S$
$T_J$	Pulse Jitter	IRRX output			400	nS
$T_D$	Pulse Delay	IRRX output			1.8	$\mu S$
$T_{W(max)}$	Max. Pulse Width	IRTX=Logic 1>200 $\mu S$	18		150	$\mu S$
$T_L$	Receiver Latency			17	50	$\mu S$

### Transmitter:

Symbol	Parameter	Conditions	Min.	Typical	Max.	Units
	Radiant Intensity	LED peak $I_F = 300mA$ , IRTX = 1	46		100	mW/sr
	Radiant Intensity	IRTX = 0			0.3	mW/sr
	Half Intensity Angle			20		°
	Optical Rise/Fall Time			40		nS
	Peak Wavelength		850	875	900	nm
	Optical Bandwidth	$I_F=50mA$		40		nm
	Optical Overshoot				3	%

### Receiver:

Symbol	Parameter	Conditions	Min.	Typical	Max.	Units
	Detector Threshold Irradiance			2.5	3.5	$\mu W/cm^2$
	Overload Irradiance		500			$\mu W/cm^2$
	Half Angle (Photodiode)			35		°
	Sunlight Ambient Rejection	no modulation	500			$\mu W/cm^2$

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