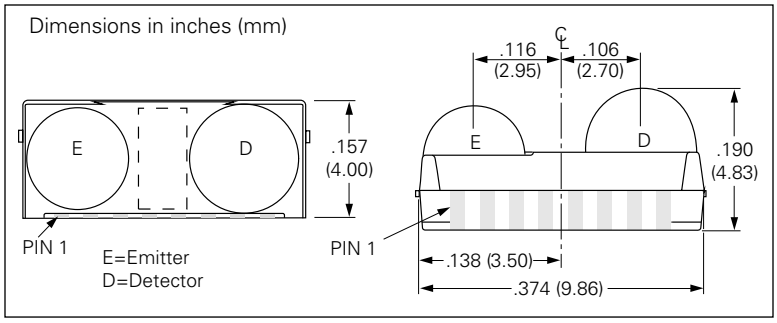
SIDE VIEW IRMS6100
TOP VIEW IRMT6100

1.15 Mb/s IrDT Data Transceiver

Preliminary

IRMS6100 IRMT6100



FEATURES

- **Fully Compliant with IrDA Specification**
- **IrDA Data Rates 9.6 Kb/s to 1.152 Mb/s**
- **High Immunity to Fluorescent Light Noise**
- **Battery & Power Management Features:**
  - **Receive – 470 μA Typical**
  - **Shutdown – 10 nA Typical**
  - **Programmable 500 mA/50 mA LED Transmitter for Standard 1.0 m or Low Power (30 cm) Operation**
  - **Independent LED Anode Supply – up to 9.0 V DC**
  - **Wide Voltage Range 2.7 V to 5.5 V Full Specification**
  - **High V_{CC} Noise Rejection >100 mV_{P-P}**
- **Shutdown Tri-States Receiver Output and Disables TxD allowing Bus Interfacing**
- **Integrated Protection for Eye Safety— AC Coupled Transmit Input**
- **High DC Ambient Rejection—Operates Outdoors**
- **Receiver Latency Less <100 μs**
- **Slimline Package: H 4.0 mm x D 4.8 mm x L 9.8 mm**

DESCRIPTION

IRMS6100/IRMT6100 is an IrDA compliant 1.152 Mb/s infrared data transceiver. Its external Shut Down (SD) feature cuts current consumption to typically less than 0.01 μA. The Shut Down (SD) mode disables the transmit input and tri-states the receiver output with a 500 kΩ pull up. The transmit input is AC coupled, limiting transmit pulse duration to 70 μs, preventing transmitter damage and continuous LED output which also provides protection for eye safety.

Selectable LED transmit power (Pin 7) makes it easy for designers to use standard power mode (Pin 7=H) for 1 meter link or low power mode (Pin 7=L) for 20 cm link.

Absolute Maximum Ratings, T_A=25°C (except where noted)

Supply Voltage Range, all states, V_{CC} ..... –0.5 to +7.0 V
LED Anode Voltage,
V_{CC}=0 to 5.5 V not transmitting, V_{LEDA} ..... –0.5 to +9.0 V
LED Anode Voltage,
V_{CC}=2.7 to 5.5 V, transmitting, V_{LEDA} ..... –0.5 to V_{CC} +4.0 V
Input Current,
I_{CC} during transmit, V_{CC}=5.0 V, TxD=V_{CC} (peak) ..... 20 mA
Output RxD Current ..... 50 mA
Storage Temperature,
storage or reduced performance, T_S ..... –40 to +100°C
Ambient Temperature, operating, T_A ..... –25 to 85°C
Lead Solder Temperature, 230°C ..... <10 s
IC Junction Temperature, T_J ..... 125°C
Average IR LED Current, LED Anode=3.3 V, I_{LED} ..... 100 mA
Repetitive Pulsed IR LED Current,
<10 μs, t_{on} <20%, LED Anode=3.3 V, $I_{LED(RP)}$ ..... 600 mA
Input Voltage: TxD, SD ..... –0.5 to V_{CC}+0.5 V
RxD Voltage ..... –0.5 to V_{CC} +0.5 V

Table 1. Pin Functions

Pin no.	Function	Pin no.	Function
1	IR LEDA	5	SD
2	IR LEDC	6	V_{CC}
3	TxD	7	LED Power Select
4	RxD	8	GND

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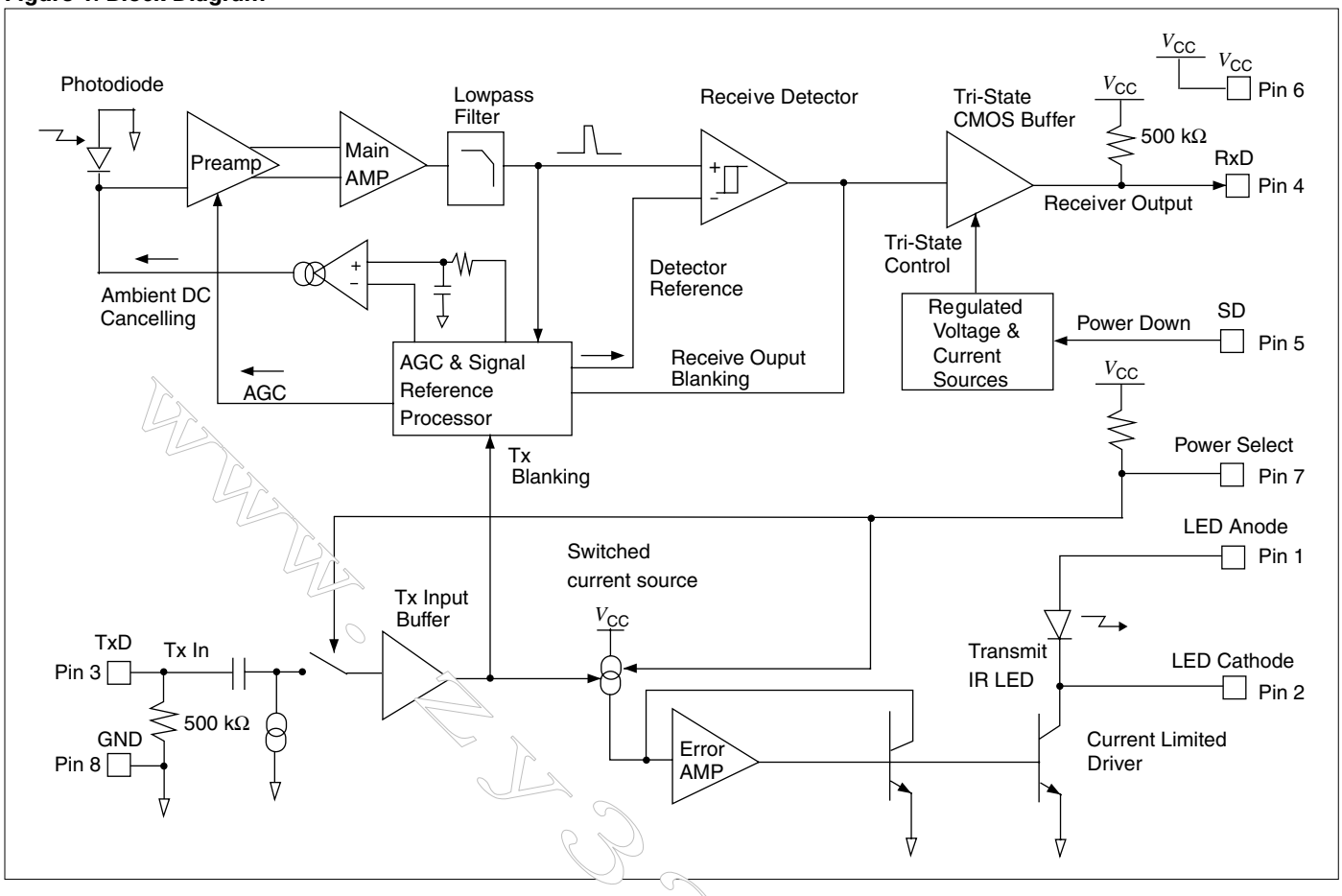
Figure 1. Block Diagram



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Theory of Operation

The IRMS6100/IRMT6100 Slimline—Infrared Data Transceiver consists of a detector photodiode, an IR LED transmitter, an IC containing ambient light suppressor and Automatic Gain control circuitry (AGC).

The ambient light suppressor can cancel up to 10 mW/cm^2 at 5.0 V. This will typically allow operation in all but direct sunlight.

The receiver automatic gain control (AGC) circuit normalizes pulse width despite 120 dB signal range. The AGC also improves noise immunity while receiving a transmission by reducing gain so that noise less than 1/2 the peak signal height will not be detected.

Asserting shutdown powers down the transceiver, and for bus multiplexing, tri-states the receiver output and disables TxD input.

In receive mode, the receiver output (RxD) which normally stays high, will go low for duration of the receive pulses. It is a push-pull CMOS driver capable of driving a standard CMOS or TTL load. No external pull-up or pull-down resistor is required.

In transmit mode, by asserting the TxD pin above 1.4 V will turn on IR LED transmitter. This pin has a 500 kΩ pulldown. At the LED Anode (pin 1) connect this pin to V_{CC} or unregulated power supply (not to exceed V_{CC} +4.0 V), through a resistor to set the proper LED current to reduce the thermal dissipation and to lower LED current.

Table 2. Slimline Truth Table

Inputs			Outputs	
SD	TxD	detector	RxD	LED
High	X=don't care state	X=don't care state	500 kΩ pull-up	Off
Low	High		Undefined	On
	Low	<0.4 µW/cm^2 (115 Kb/s) <1 µW/cm^2 (1 Mb/s)	High	Off
		>4 µW/cm^2 (115 Kb/s) >10 µW/cm^2 (1 Mb/s)	Low	

The transmitter current limit is programmed to the high or low value by the state of Power Selection pin. If Power Select is low, low drive current limit is set. If the Power Select is high, high drive current limit is set.

ELECTRICAL CHARACTERISTICS

Table 3. Basic Operating Parameters, T_A=25°C (except where noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supported IrDA Data Rate	—	9.6	—	1152	Kb/s	3/16 clock period or 1/4 clock >115 Kb/s
V_{CC} Voltage	V_{CC}	2.7	—	5.5	V	0 to 70°C V_{CC} to V_{SS}
Maximum LED Anode Voltage	V_{LEDA}	—	—	V_{CC}+4	V	V_{CC}=1.5 V to 5.5 V
I_{CC} Shut Down Current **(Note 1)**	I_{CC1}	—	0.01	1.0	µA	SD=V_{CC} V_{CC}=2.7 V to 5.5 V
I_{CC} Standby Current	I_{CC2}	375	470	585	µA	SD=0 V_{CC}=2.7 V to 5.0 V no signal
I_{CC} Receiving Current	I_{CC3}	—	650	—	µA	4.0 µW/cm^2 576 Kb/s 15 pF load
I_{CC} Transmitting Current, Saturated Driver (Average)	I_{CC4}	—	3.0	4.5	mA	V_{CC}=5.0, LED I=400 mA

Table 4. I/O Parameters

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
TxD, SD input capacitance	—	—	5.0	—	pF	V_{CC}=2.7 V to 5.5 V
TxD Resistance	—	350	500	650	kΩ	TxD=V_{CC} V_{CC}=2.7 V to 5.5 V
TxD, SD Input Threshold **(Note 1)**	—	0.8	1.4	2.0	V	V_{CC}=2.7 V to 5.0 V
SD to RxD Tri-State	—	—	35	100	ns	V_{CC}=2.7 V to 5.0 V
SD to RxD Enable	—	—	90	200	ns	V_{CC}=2.7 V to 5.0 V
RxD Output High	V_{IH}	4.3	4.6	—	V	V_{CC}=5.0 V I_{oh}=8.0 mA
RxD Output High	V_{IH}	1.5	1.7	—	V	V_{CC}=2.7 V I_{oh}=2.0 mA
RxD Output Low	V_{IL}	—	0.22	0.4	V	V_{CC}=5.0 V I_{ol}=8.0 mA
RxD Output Low	V_{IL}	—	0.17	0.3	V	V_{CC}=2.7 V I_{ol}=2.0 mA
RxD Short Circuit	—	—	[illegible]	—	mA	V_{CC}=5.0 V RxD=0 RxD=V_{CC}
RxD Short Circuit	—	—	8.0	—	mA	V_{CC}=2.7 V RxD=0 RxD=V_{CC}
RxD to V_{CC} Tri-State Impedance	—	350	500	650	kΩ	SD=V_{CC} V_{CC}=2.0 V to 5.0 V between RxD to V_{CC}
RxD Rise/Fall Time	—	12	18	27	ns	V_{CC}=5.0 V Load=15 pF
RxD Rise/Fall Time	—	20	30	40	ns	V_{CC}=5.0 V Load=50 pF
RxD Rise/Fall Time	—	24	36	55	ns	V_{CC}=2.7 V Load=15 pF
RxD Rise/Fall Time	—	42	63	94	ns	V_{CC}=2.7 V Load=50 pF

Table 5. Receiver Parameters, T_A=25°C (except where noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Maximum Data Rate	—	—	1.15	—	Mb/s	200 ns 4.0 µW/cm^2 to 500 mW/cm^2
Receive 1/2 Angle	—	15	—	—	degrees	IrDA *Physical Layer* specification
Minimum Signal Detect Irradiance	E_{IHmin}	—	5.0	10	µW/cm^2	Bit error Rate=10^{-8} 217 ns pulse
Maximum Signal Detect Irradiance	E_{Emax}	500	1000	—	mW/cm^2	Bit error Rate=10^{-8} 217 ns pulse
Maximum Signal Irradiance No detect	—	—	—	0.3	W/cm^2	< 0.1 pulse per second detect, 20 kHz to 200 kHz square wave <100 ns rise/fall
Maximum DC Ambient Irradiance 5.0 V	—	—	30	—	mW/cm^2	V_{CC}=5.0 V
Maximum DC Ambient Irradiance 2.7 V	—	—	10	—	mW/cm^2	V_{CC}=2.7 V
AGC Attack Time **(Note 2)**	—	—	300	1000	µs	4.0 µW/cm^2 to 500 mW/cm^2
AGC Settling **(Note 3)**	—	—	2.0	5.0	pulse	4.0 µW/cm^2 to 500 mW/cm^2 217ns pulse

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