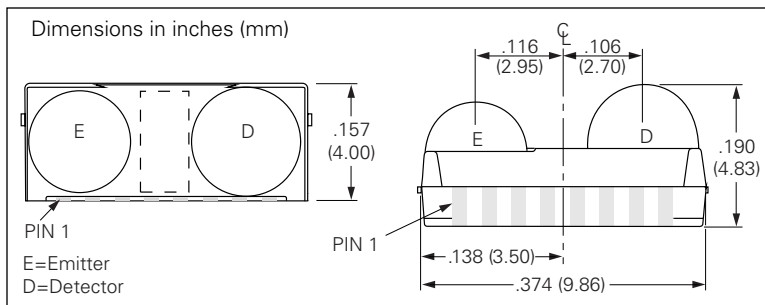
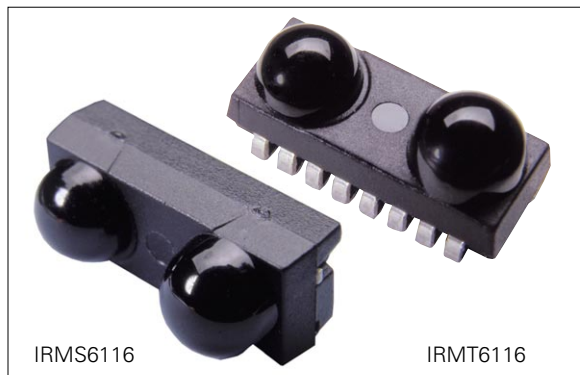




SIDE VIEW IRMS6116

TOP VIEW IRMT6116

115 Kb/s Infrared Data Transceiver



FEATURES

- **Compliant with IrDA Specification**
- **Data Rates 9.6 Kb/s to 115 Kb/s, usable up to 576 Kb/s**
- **Wide Range of Supply Voltage 2.4 to 5.5 V**
- **Standby Current 90 μ A Typical**
- **Excellent Power Supply Noise Rejection**
- **Tri-State Receiver Output and TxD Disable**
- **AC Coupled Transmit Input: Provides Integrated Protection for Eye Safety**
- **High DC Ambient Rejection**
- **Independent LED Supply, Anode Pin Can Take**
 - up to 9.0 V DC when not Transmitting and
 - up to 4.0 V above V_{CC} when Transmitting
- **Receiver Latency Less than 100 μ s**
- **Slimline Package:**
 - H 4.0 mm x D 4.8 mm x L 9.8 mm

Absolute Maximum Ratings, $T_A=25^\circ\text{C}$ (except where noted)

Supply Voltage Range, all states, V_{CC} -0.5 to +7.0 V

LED Anode Voltage, V_{LEDA} -0.5 to +9.0 V

$V_{CC}=0$ to 5.5 V, not transmitting -0.5 to +9.0 V

LED Anode Voltage, V_{LEDA} -0.5 to $V_{CC} + 4.0$ V

$V_{CC}=2.4$ to 5.5 V, transmitting -0.5 to $V_{CC} + 4.0$ V

Input Current I_{CC} , 20 mA

$V_{CC}=5.0$ V, $TxD=V_{CC}$, transmit 50 mA

Output Rx D Current 50 mA

Storage Temperature, T_S -25 to +85 $^\circ\text{C}$

Operating Temperature, T_O -25 to 85 $^\circ\text{C}$

Lead Solder Temperature, Maximum 230 $^\circ\text{C}$ <10 s

IC Junction Temperature, T_J 125 $^\circ\text{C}$

Average IR LED Current, I_{LED} 100 mA

Repetitive Pulsed IR LED Current, 600 mA

<10 μ s, t_{on} <20%, LED Anode=3.3 V, $I_{LED(RP)}$ 600 mA

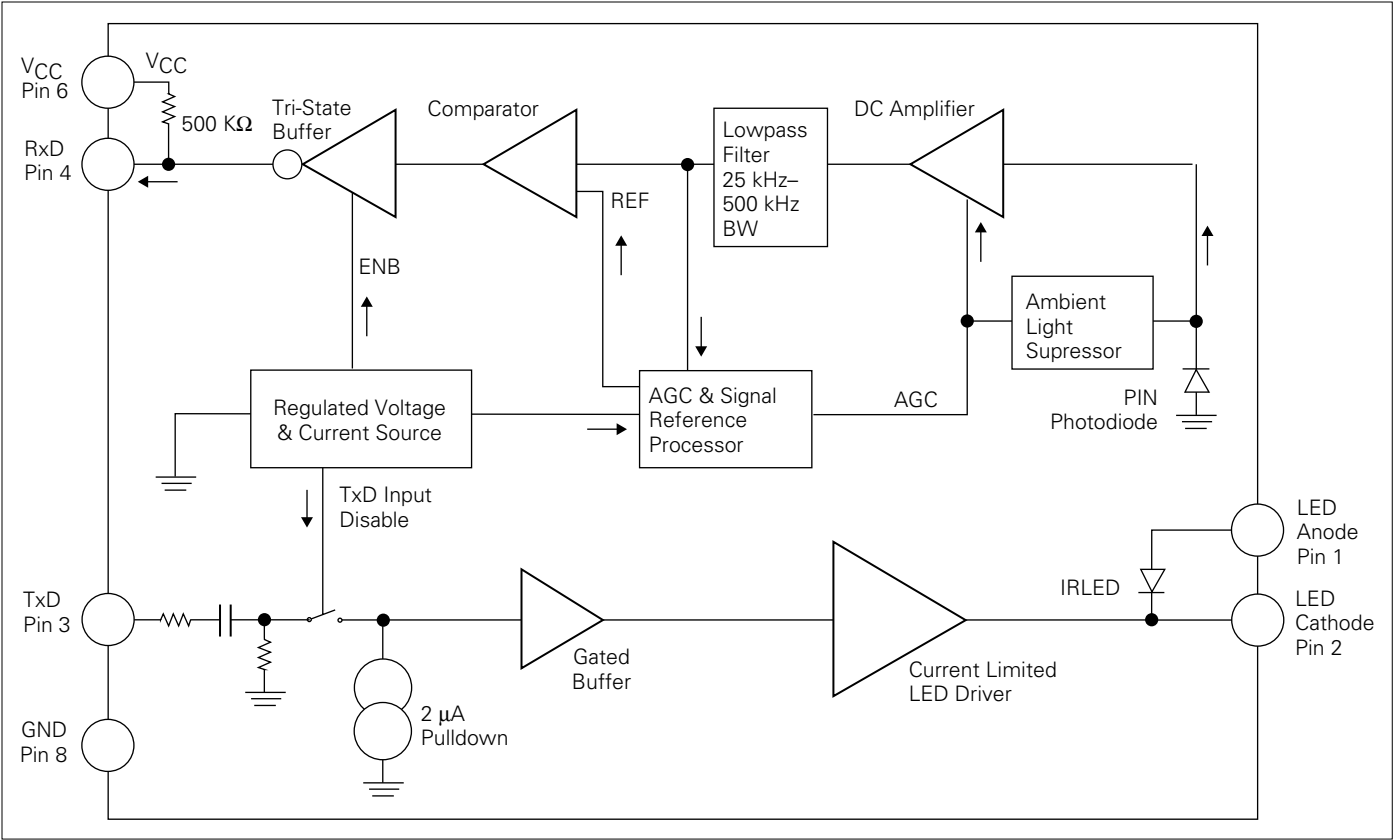
Input Voltage: Tx D -0.5 to $V_{CC} + 0.5$ V

RxD Voltage -0.5 to $V_{CC} + 0.5$ V

Table 1. Pin Functions

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

Figure 1. Block Diagram



Theory of operation

The IRMS/T6116 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 4 mW/cm² (typical) at 2.4 V of DC ambient signal, and up to 1.5 mW/cm² (peak-to-peak) at 120 Hz AC ambient.

The AGC in the IC is to keep the system output constant by varying the gain to accommodate a wide range of input signals. It also provides noise immunity in the high noise ambient environment.

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 1/2 V_{CC} will turn on IR LED transmitter. 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 IRMS/T6116 Truth Table

Inputs		Outputs	
TxD	Detector	RxD	LED
High	—	Undefined	On
Low	0.4 mW/Sr	High	Off
	40 mW/Sr	Low	

Electrical Characteristics

Table 3. Basic Operating Parameters, $T_A=25^\circ\text{C}$ (except where noted)

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
Supported Data Rate	—	9.6 K	—	115 K	Kb/s	1.63 μs or 3/16 clock period
Power Supply Voltage	V_{CC}	2.4	—	5.5	V	-25 to 85°C , V_{CC} to V_{SS}
Maximum LED Anode Voltage	V_{LEDA}	—	—	$V_{CC} + 4$	V	$V_{CC}=2.4$ V to 5.5 V
I_{CC} Standby Current	I_{CC}	65	90	133	μA	no signal, $V_{CC}=2.4$ V to 5.0 V
I_{CC} Receiving Current	I_{CC}	—	117	—	μA	10 μW , 57.6 Kb/s, 15 pF load
I_{CC} Transmitting Current	I_{CC}	—	12	18	mA	$V_{CC}=5.0$ V, No LED resistor, 3.0 V

Table 4. I/O Parameters

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
TxD High Loading	—	1.0	2.0	3.0	μA	$\text{TxD}=V_{CC}$, $V_{CC}=2.4$ V to 5.5 V
TxD Low Loading	—	—	—	0.01	μA	$\text{TxD}=0$, $V_{CC}=2.4$ V to 5.5 V
RxD Output High	V_{IH}	4.3	4.6	—	V	$V_{CC}=5.0$ V, $I_{OH}=8$ mA
RxD Output High	V_{IH}	1.9	2.1	—	V	$V_{CC}=2.4$ V, $I_{OH}=3$ mA
RxD Output Low	V_{IL}	—	0.22	0.4	V	$V_{CC}=5.0$ V, $I_{OL}=8$ mA
RxD Output Low	V_{IL}	—	0.17	0.3	V	$V_{CC}=2.4$ V, $I_{OL}=3.0$ mA
RxD Short Circuit	—	—	48	—	mA	$V_{CC}=5.0$ V, $\text{RxD}=0$, $\text{RxD}=V_{CC}$
RxD Short Circuit	—	—	10	—	mA	$V_{CC}=2.4$ V, $\text{RxD}=0$, $\text{RxD}=V_{CC}$
RxD to V_{CC} Tri-State Impedance	—	350	500	650	$\text{k}\Omega$	$V_{CC}=2.4$ V to 5.0 V, between RxD to V_{CC}
RxD Rise Time	t_r	12	18	27	ns	$V_{CC}=5.0$ V, Load=15 pF
RxD Fall Time	t_f	20	30	40	ns	$V_{CC}=5.0$ V, Load=50 pF
RxD Rise Time	t_r	17	25	40	ns	$V_{CC}=2.4$ V, Load=15 pF
RxD Fall Time	t_f	30	45	70	ns	$V_{CC}=2.4$ V, Load=50 pF

Table 5. Receiver Parameters, $T_A=25^\circ\text{C}$ (except where noted)

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
Maximum Data Rate	—	9.6	115.2	576	Kb/s	10 $\mu\text{W}/\text{cm}^2$ to 500 mW/cm^2
Receive 1/2 Angle	—	15	—	—	degree	IrDA Physical Layer specification
Minimum Signal Detect Irradiance	E_{IHmin}	—	2.0	4.0	$\mu\text{W}/\text{cm}^2$	Bit error rate= 10^{-8} , 1.63 μs pulse
Maximum Signal Detect Irradiance	E_{Emax}	500	1000	—	mW/cm^2	Bit error rate= 10^{-8} , 1.63 μs pulse
Maximum Signal Irradiance No detect	—	—	—	0.3	$\mu\text{W}/\text{cm}^2$	<0.1 pulse per second detect, 1.63 μs
Maximum DC Ambient Irradiance, 5.0 V (Note 6)	—	—	7.5	—	mW/cm^2	$V_{CC}=5.0$ V
Maximum DC Ambient Irradiance, 2.4 V (Note 6)	—	—	4.0	—	mW/cm^2	$V_{CC}=2.4$ V
AGC Attack Time (Note 1)	—	—	1.0	2.0	μs	4 $\mu\text{W}/\text{cm}^2$ to 500 mW/cm^2
AGC Settling (Note 2)	—	—	5.0	10	pulse	4 $\mu\text{W}/\text{cm}^2$ to 500 mW/cm^2 at 115 Kb/s
Near-Far Receiver Latency (Note 3)	—	—	2.5	4.0	ms	0 to 5 mW/cm^2 ambient input
AGC Decay Rate (Note 4)	—	—	44	—	dB/ms	Following AGC settling at 500 mW/cm^2
Transmit Receiver Latency (Note 3)	t_L	—	50	100	μs	0 to 3 mW/cm^2 DC ambient input
RxD Suppression Duration (Note 7)	—	—	50	100	μs	Following end of TxD pulse
Powerup Receiver Latency	—	—	50	100	μs	0 to 3 mW/cm^2 DC ambient input
Output Pulse Width at RxD	—	1.41	1.63	3.0	μs	1.63 μs , 4 $\mu\text{W}/\text{cm}^2$ to 500 mW/cm^2 input

Table 5. Receiver Parameters (continued)

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
Maximum Output Pulse Width at RxD, (Note 6)	—	—	57	100	μs	200 μs , 500 mW/cm ² , $V_{\text{CC}} = 5.0\text{ V}$
Small Ripple Power Supply Rejection (Note 5)	—	50	100	—	mV/ms	100 mV _{P-P} triangle wave on V_{CC}
Large Ripple Power Supply Rejection (Note 5)	—	100	200	—	mV/ms	1.0 V _{P-P} triangle wave on V_{CC}

Table 6. Transmitter Output

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
Maximum Data Rate	—	9.6	115.2	576	Kb/s	TxD pulse width=434 ns
TxD Radiant Intensity	—	40	150	500	mW/Sr	$I_{\text{LED}}=350\text{ mA}$, (6.8 Ω LED resistor, 5.0 V _{LED} supply)
TxD Radiant Intensity	—	—	70	500	mW/Sr	LEDA=2.4 V, no current limiting LED resistor
TxD $1/2$ Angle	—	15	20	30	degree	IrDA <i>Physical Layer</i> specification
TxD Peak Wavelength	λ_{peak}	850	870	900	nm	$I_{\text{F}}=20\text{ mA}$
I_{LED} Pulse Width	—	1.55	1.60	1.65	μs	TxD=1.63 μs , $V_{\text{CC}}=5.0\text{ V}$
Optical Rise and Fall Time	t_r, t_f	10	—	600	ns	V _{LED} =2.7 V
Pulse Width Limit	—	35	70	140	μs	TxD pulse>200 μs , 5.0 V pulse, $V_{\text{CC}}=5.0\text{ V}$
I_{LED} Limit	—	350	400	600	mA	TxD= V_{CC} , LED anode=3.3 V, $V_{\text{CC}}=5.0\text{ V}$
I_{LED} Limit Temperature Coefficient	—	—	+0.47	—	%/°C	TxD= V_{CC} , LED anode=3.3 V, $V_{\text{CC}}=5.0\text{ V}$
LED Temperature Coefficient	—	—	-0.5	—	%/°C	$I_{\text{LED}}=300\text{ mA}$
LED Cathode Saturation Drop	—	—	0.3	0.4	V	300 mA, $V_{\text{CC}}=2.4\text{ V}$
TxD V_{CC} dV/dt Rejection	—	—	5.0	—	V/ μs	dV/dt for less than 10% change in TxD output

Note 1:

“AGC Attack Time” is the time required for internal AGC (Automatic Gain Control) attenuation to rise to within 10% of final value.

Note 2:

“AGC Settling” is the number of pulses within 100 μs required for the output pulse width to settle to 90% of its final value.

Note 3:

“Near-Far Receiver Latency” is the time required for the AGC and ambient correction circuits to return to maximum sensitivity (Far) following reception of a maximum (Near) signal or a change in ambient. “Transmit Receiver Latency” is commonly called “Receiver Latency” or “Transmitter Turn-around Time.”

Note 4:

“AGC Decay Rate” is the rate at which the receiver gain increases following the cessation of signal input.

Note 5:

The receiver V_{CC} power supply rejection is significantly better for small ripple of less than 100 mV_{P-P} than for larger values. For ripple of more than 100 mV_{P-P}, internal circuits can maintain operating headroom provided that the slew rate is significantly slower. Typically, these specifications allow operation without an external filter from either switching supplies with less than 50 mV_{P-P} ripple or unregulated supplies with less than 1 V_{P-P} of 120 Hz ripple.

Note 6:

If the low going RxD pulse width exceeds 100 μs , then the maximum DC ambient irradiance has been exceeded.

Note 7:

RxD is suppressed (forced high) while (TxD) transmit pulse is active and for the indicated period following the end of the TxD pulse.

Figure 2. Timing Diagrams

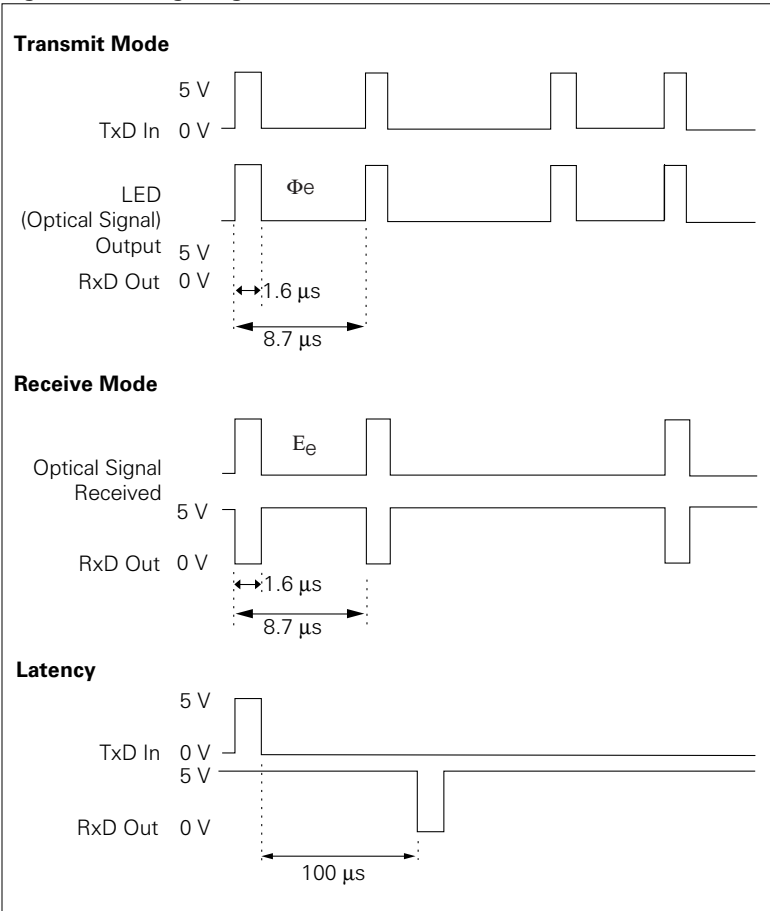


Figure 3. Input Schematics

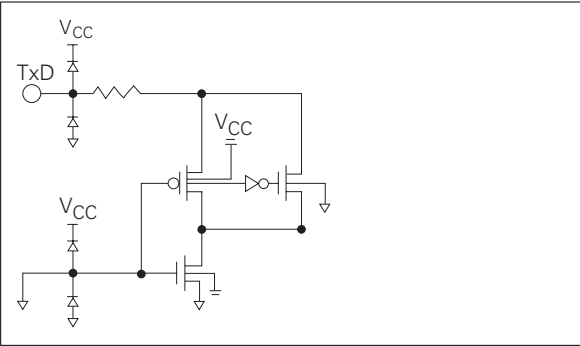


Figure 4. Output Schematics

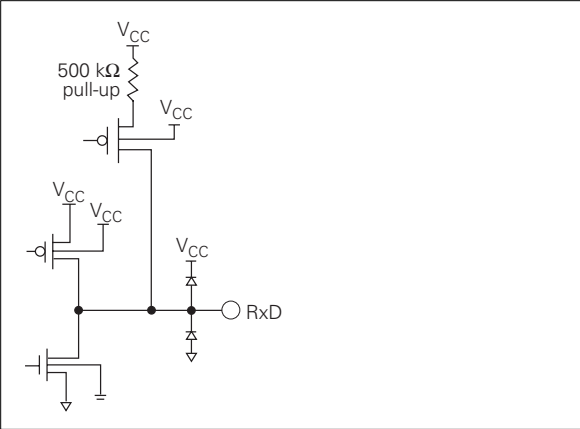
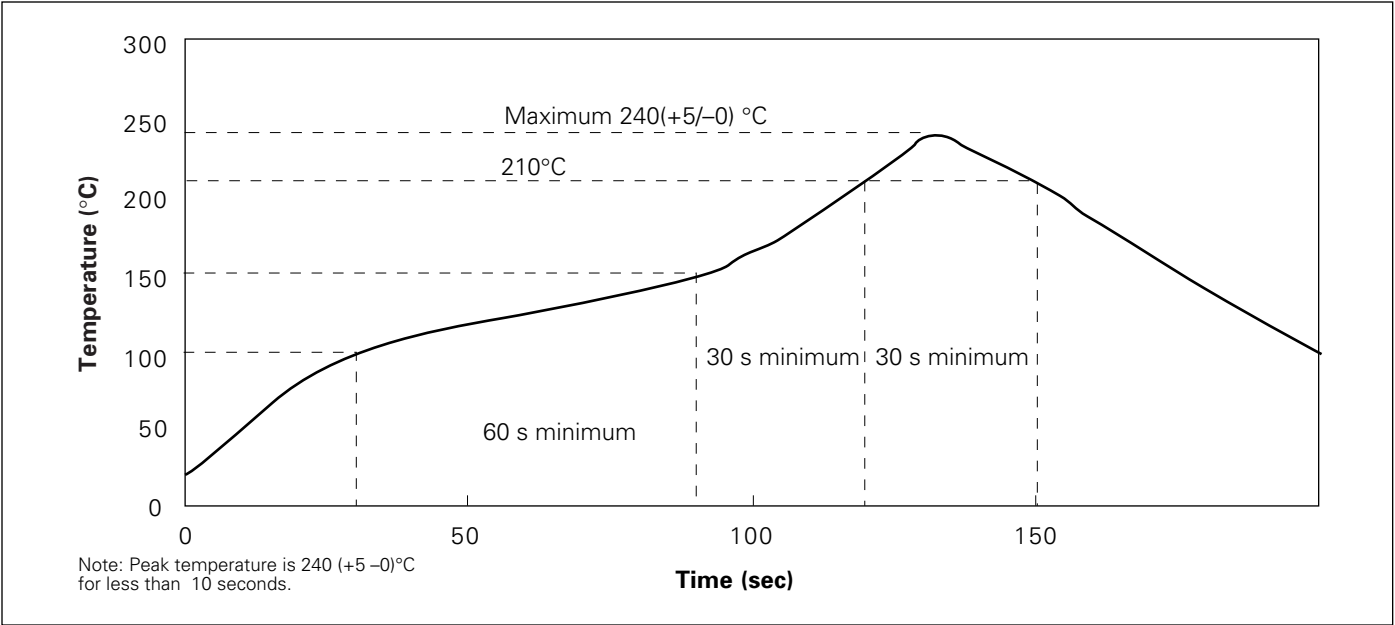


Figure 5. Infrared Reflow Soldering Profile



Interface Diagrams

Figure 6. Super I/O (PC87108AVJE) to IRMS/T6116

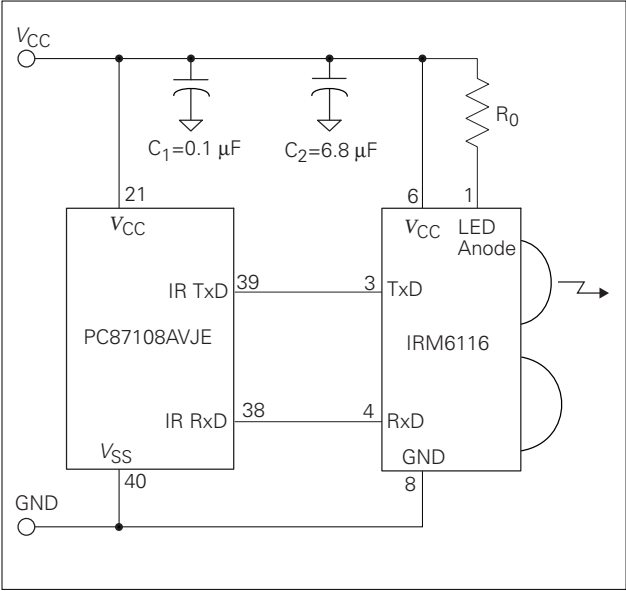


Figure 7. With independent V_{LED} supply

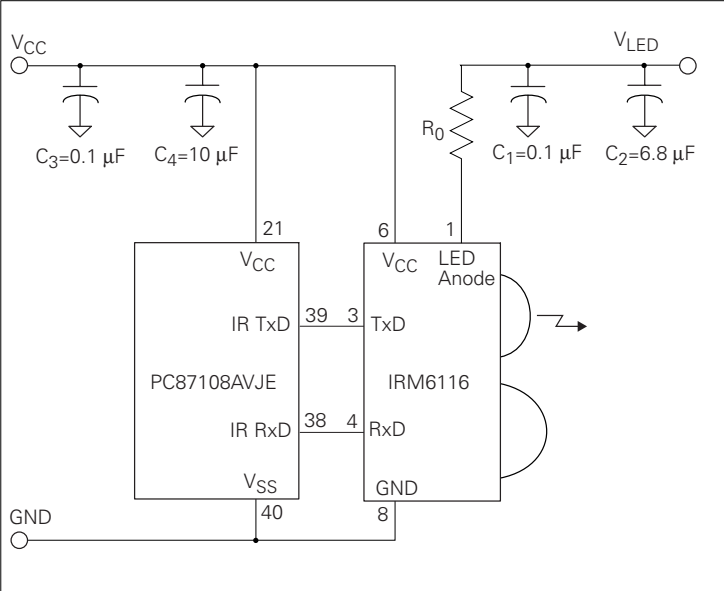


Table 7. Recommended External Component

Parameter	Values							Unit
V _{LED} power supply	2.4	2.7	3.0	3.5	4.0	4.5	5.0	V
Resistor	0	0	0	1.5	3.9	5.1	6.8	Ω

Ordering Information

Part Number	Description	PCB Mounting Orientation
IRMS6116	Integrated Transceiver —Side View	Packaged in Component Carrier Reel (1000/reel) for Side View Mounting on PCB
IRMT6116	Integrated Transceiver —Top View	Packaged in Component Carrier Reel (1000/reel) for Top View Mounting on PCB

Tape Leader and Trailer is 400 mm minimum.

Figure 9. Reel Dimensions in Inches (mm)

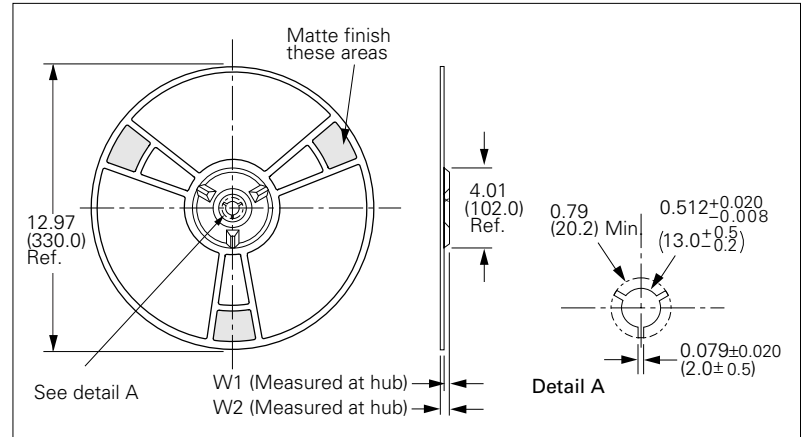


Figure 8. Tape Dimensions in Inches (mm)

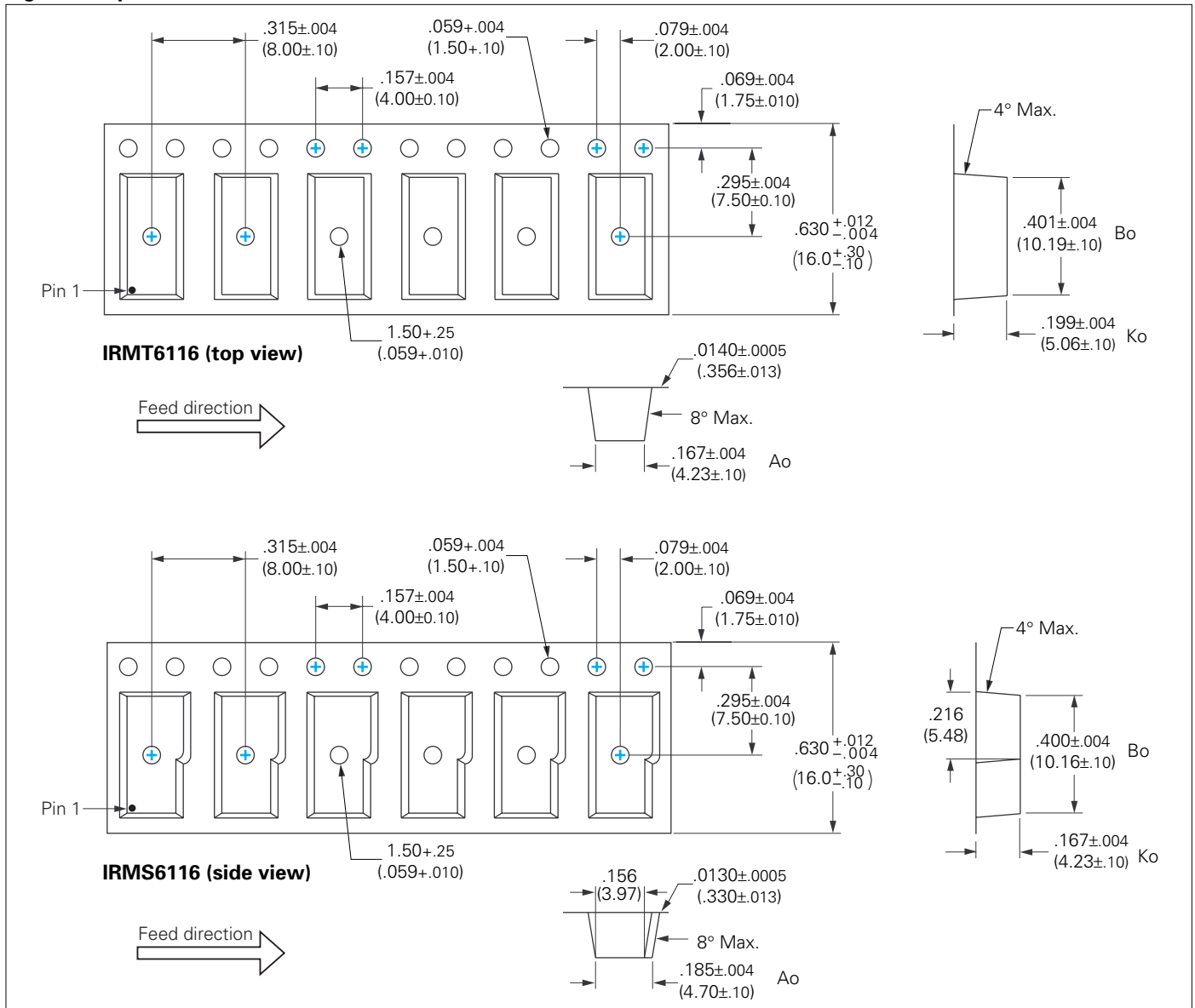
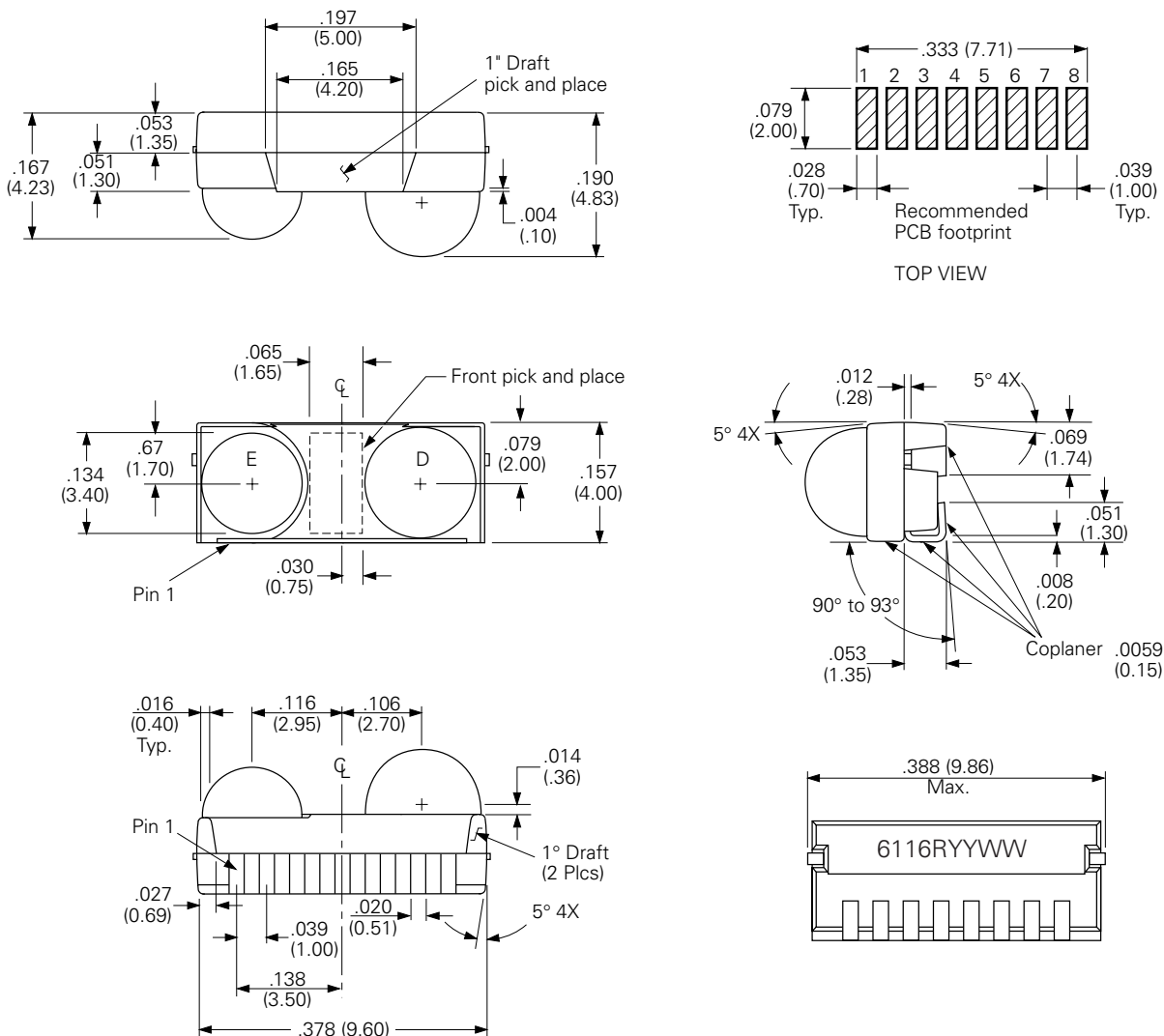


Figure 10. IRMS/T6116 Detail Drawings With Optional Side View or Top View Mounting

Dimensions in inches (mm)—All dimensions have tolerances of ± 0.004 " (± 0.1 mm)



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