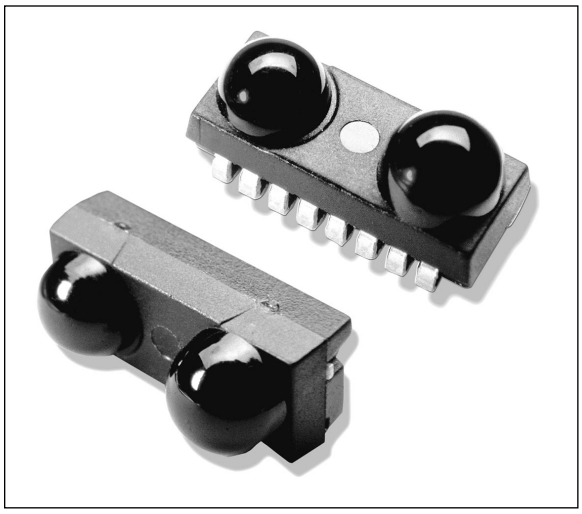
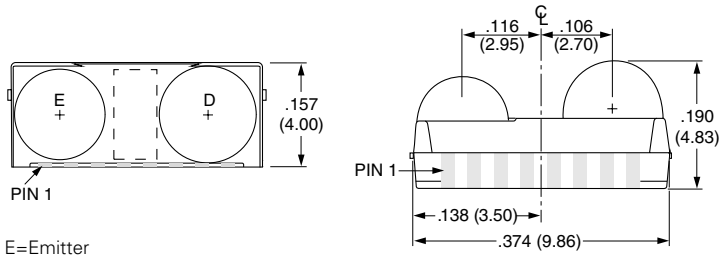
SIDE VIEW **IRMS6452/**TOP VIEW **IRMT6452**

4 Mb/s Infrared Data Transceiver

Preliminary



Dimensions in inches (mm)



IRMS6452 **IRMT6452**

Features

- **IrDA, HP-SIR, Local Talk and Sharp ASK**
- **Ultracompact package:**
- **H 4.0 mm x D 4.8 mm x L 9.8 mm**
- **Data rates from 9.6 Kbit/s to 4 Mbit/s**
- **Supply voltage 2.7 V to 5.25 V**
- **Power Shutdown mode (<100 nA)**
- **Low power consumption**
  - **– 1.7 mA (typ) @ 2.7 V**
  - **– 3.2 mA (typ) @ 5.0 V**
- **Zero external resistors required**

Description

Responding to the volumetric constraints of today's ultra-compact and power conscious portable products, Vishay has developed the next generation in infrared wireless communication transceivers. The transceiver has been designed to support up to 4 Mbit/s IrDA™, HP-SIR™, Local Talk™ and Sharp ASK™ modes. The device combines an LED, photodiode, LED driver and a fully differential receiver into a single integrated package.

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

Supply Voltage Range, all states, V_{CC} ..... –0.5 to +5.5 V
Storage Temperature, T_{STG} ..... –25 to +85°C
Ambient Temperature, operating, T_A ..... –25 to +75°C
Lead Solder Temperature, ... 240°C<10 s
IC Junction Temperature, T_J ..... 125°C
Average IR LED Current, DC, I_{LED} ..... 100 mA
Repetitive Pulsed IR LED Current,
<90 µs, ton <25%, I_{LED}(RP) ..... 710 mA
Transmit Data Input Voltage, V_{TxD} ..... –0.5 to V_{CC} + 0.5 V
Receive Data Output Voltage, V_{RxD} ..... –0.5 to V_{CC} + 0.5 V

Pin Number	Symbol	Description
1	LEDA	LED Anode
2	LEDC	LED Cathode
3	TxD	Transmit Data
4	RxD	Receive Data
5	SD/ Mode	Shutdown/ Mode Select
6	V_{CC}	Positive Supply (Power)
7	NC	GND
8	GND	Ground

Table 1. Input/Output Functional Description

Symbol	I/O Type	Polarity	Function
RxD	Output	Active Low	This output indicates received serial data. 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. This output may switch indeterminately when the module is transmitting. This output pin is in tri-state mode when the module is in shutdown mode and during digital serial programming operations. RxD is high at initializaton.
TxD	Input	Active High	This CMOS input is used to transmit serial data when SD/ Mode is low. An on-chip protection circuit disables the LED driver if the TxDpin is asserted for longer than 60 µs. When used in conjunction with the SD/ Mode pin. TxD is low at initializaton.
SD/ Mode	Input	Active High	Assertion of this pin high for a period of time exceeding 400 µs places the module into shutdown mode. On the falling edge of this signal, the state of the TxDpin is sampled and used to set receiver low bandwidth (TxD= Low) or high bandwidth (TxD= High) mode. See Figures 7 and 8 for timings. SD is low at initializaton
V_{CC}	Positive Supply	-	Connect to positive power supply (2.7 V to 5.25 V). Placement of a 1.0 µF to 10.0 µF decoupling ceramic capacitor as close as possible to the V_{CC} pin is recommended.
GND	Ground (Power)	-	Connect to power supply ground. A solid ground plane is recommended.
NC	No Connect	-	This pin could be connected to ground.
L_{EDA}	Input	-	This pin can be connected directly to V_{CC}. No series resistor is required.
L_{EDC}	Output	-	LED cathode. Leave this pin unconnected. This pin may be monitored to determine the state of the LED.

Figure 1. Block Diagram

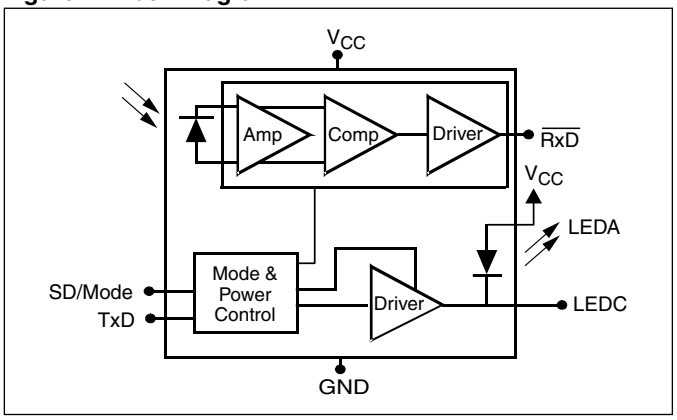


Figure 2. Minimum Vishay Low-Power Integrated Infrared Transceiver Circuit Diagram

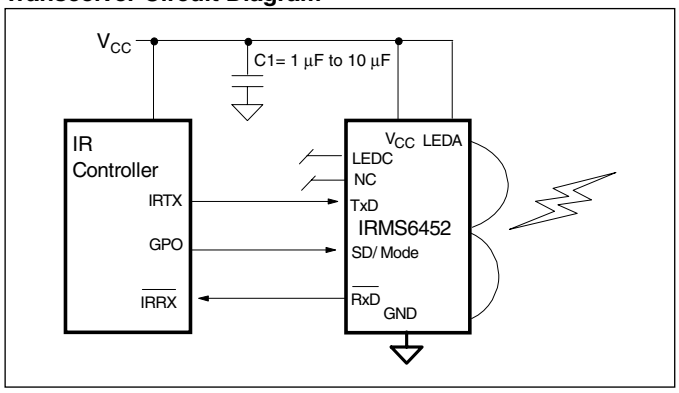


Table 2. Recommended Operating Conditions

Symbol	Parameter	Min	Typical	Max	Unit	Conditions
V_{CC}	Supply Voltage	2.7		5.25	V	
T_A	Ambient Operating Temperature	-25		75	˚C	

Table 3. DC Electrical Characteristics

Symbol	Parameter	Min	Typical	Max	Unit	Conditions
I_{CC}	Supply Current; Listening	2.0	3.2	4.5	mA	Typical value obtained at Vcc=5 V
I_{CC}	Supply Current; Receiving		3.8	15	mA	Interface and optical input power dependent
I_{SD}	Supply Current; Shutdown		50	100	nA	$V_{SD}=V_{CC}$

Table 4. Receiver DC Electrical Characteristics

Symbol	Parameter	Min	Typical	Max	Unit	Conditions
V_{OL}	$\overline{RxD}$ Output Low Voltage			0.5	V	
I_{OL}	Static Sink Current on $\overline{RxD}$			2.4	mA	2.2KΩ load.
V_{OH}	$\overline{RxD}$ Output High Voltage	Vcc-0.5			V	
I_{OH}	Static Source Current on $\overline{RxD}$			2.4	mA	2.2KΩ load.
RL	$\overline{RxD}$ Rosistive Load	2.2			kΩ	
C_L	$\overline{RxD}$ Capacitive Load			50	pF	

Table 5. Transmitter DC Electrical Characteristics

Symbol	Parameter	Min	Typical	Max	Unit	Conditions
V_{IL}	TxD Input Voltage Low			0.8	V	
V_{IH}	TxD Input Voltage High	2.4			V	
C_i	Input Capacitance			5	pF	

Table 6. SD/Mode DC Electrical Characteristics

Symbol	Parameter	Min	Typical	Max	Unit	Conditions
V_{IL}	SD/ Mode Input Voltage Low			0.8	V	
V_{IH}	SD/ Mode Input Voltage High	2.4			V	
C_i	Input Capacitance			5	pF	

Table 7. Optical Characteristics

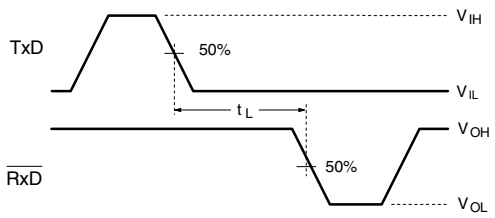
Symbol	Parameter	Min	Typical	Max	Unit	Conditions
E_{min}	Minimum Detection Irradiance 9.6-115.2 kbit/s, SIR		3.7	4	$\mu W/cm^2$	9.6 kbit/s to 115.2 kbit/s
E_{min}	Minimum Detection Irradiance 1.152Mbit/s, MIR		4		$\mu W/cm^2$	1.152 Mbit/s
E_{min}	Minimum Detection Irradiance 4 Mbit/s, FIR		7.9	9	$\mu W/cm^2$	4 Mbit/s
t_r, t_f	LED Optical Rise/Fall Time			40	ns	
t_{xpw}	SIR Optical Pulse Width	1.41		22.13	µs	TxD Input Pulse Width = 3/16 duty cycle
t_{xpw}	MIR Optical Pulse Width	147		261	ns	TxD Input Pulse Width = 217ns
t_{xpw}	FIR Optical Pulse Width	115		140	ns	TxD Input Pulse Width = 125ns
I_e	Output Radiant Intensity	110	200	400	mW/sr	TxD=High, SD/Mode=Low, V_{CC}=3.3 V, $\alpha = \pm 15°$, T_A=25°C, TX@2MHz and 25%
aÅ	Output Radiant Half Intensity Angle	±15			°	
λ_p	Peak Wavelength	850	870	900	nm	
	Optical Overshoot			25	%	

Table 8. AC Electrical Characteristics

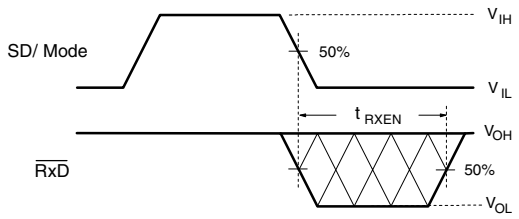
Symbol	Parameter	Min	Typical	Max	Unit	Conditions
t_r	$\overline{RxD}$ Rise Time			60	ns	R_L=2.2 K, C_L=50 pF
t_f	$\overline{RxD}$ Fall Time			50	ns	R_L=2.2 K, C_L=50 pF
t_{SU}, t_H	TxDSetup and Hold to SD/ Mode Falling Edge	10			ns	
t_w	$\overline{RxD}$ Pulse Width (SIR)	1.0		2.1	µs	
t_w	$\overline{RxD}$ Pulse Width (1.152Mbit/s)	100		600	ns	
t_w	$\overline{RxD}$ Pulse Width (4Mbit/s, single pulse)	80		165	ns	
t_w	$\overline{RxD}$ Pulse Width (4Mbit/s, double pulse)	210		290	ns	
t_L	Receiver Latency			100	µs	
t_{RxDEN}	$\overline{RxD}$ Valid After Shutdown			200	µs	
t_{LEDP}	LED Protection Time-out			100	µs	
I_{LED}	Peak Transmit Current	10		710	mA	25% duty cycle
I_{LED}	Average Transmit Current	5		150	mA	25% duty cycle

Figure 3. Timing Diagrams

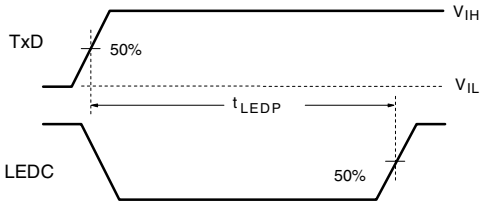
Latency Timing



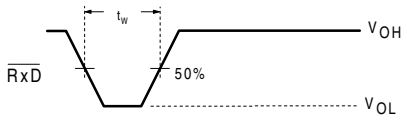
$\overline{RxD}$ Valid after Shutdown



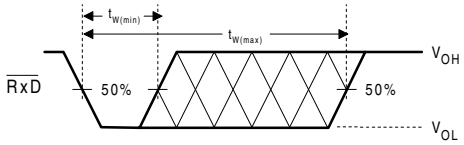
LED Protection Timing



$\overline{RxD}$ Timing 1.2 and 4 Mbit/s Mode



$\overline{RxD}$ Timing, SIR mode. The output may be indeterminate in the shaded area. Spurious transitions may occur.



$\overline{RxD}$ Rise and Fall Timing Measurements

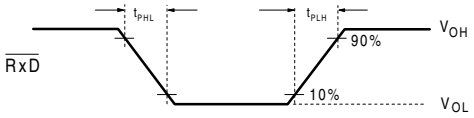
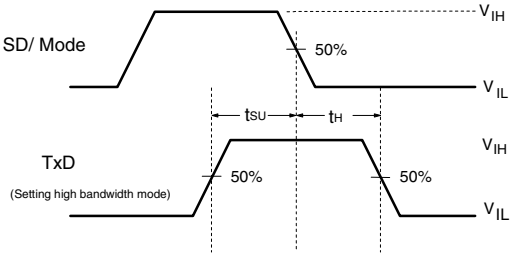
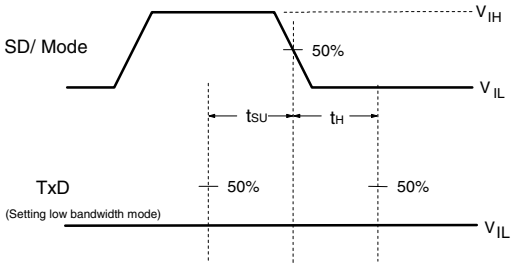


Figure 4. Bandwidth Programming

Setting the Receiver to High BW Mode (FIR)



Setting the Receiver to Low BW Mode (SIR & MIR)



The transceiver powers on with the receiver in low bandwidth mode. To enable high bandwidth mode, apply timings as shown in the figure 7, to the SD/ Mode and the TxD inputs. Note that the internal LED driver is disabled when SD/ Mode is active and is not enabled until the next rising edge of TxD. This ensures that the LED will not be active during bandwidth adjustment. It is recommended that the SD/ Mode pin be connected to GND if bandwidth adjustment and shutdown mode are not used.

Setting the Receiver to High Bandwidth Mode (see Figure 4)

1. Set the SD/ Mode input to 'logic high'.
2. Set the TxD input to 'logic high'. Wait $t_{SU} \geq 10$ ns.
3. Set the SD/ Mode to 'logic low'. (This high-to-low transition latches the state of TxD, which determines the receiver bandwidth.)
4. After waiting $t_h \geq 10$ ns, set the TxDinput to 'logic low'. The receiver is in high bandwidth mode within 200 µs of the SD/ Mode rising edge or 10 ns after the SD/ Mode falling edge, whichever occurs later.

Setting the Receiver to Low Bandwidth Mode (see Figure 4)

1. Set the SD/ Mode input to 'logic high'.
2. Ensure that the TxD input is at 'logic low'. Wait $t_{SU} \geq 10$ ns.
3. Set the SD/ Mode to 'logic low'. (This high-to-low transition latches the state of TxD, which determines the receiver bandwidth.)
4. Ensure that the TxD input remains low for $t_h \geq 10$ ns. The receiver is in low bandwidth mode within 200 µs of the SD/ Mode rising edge or 10 ns after the SD/ Mode falling edge, whichever occurs later.

Figure 5. Infrared Reflow Soldering Profile

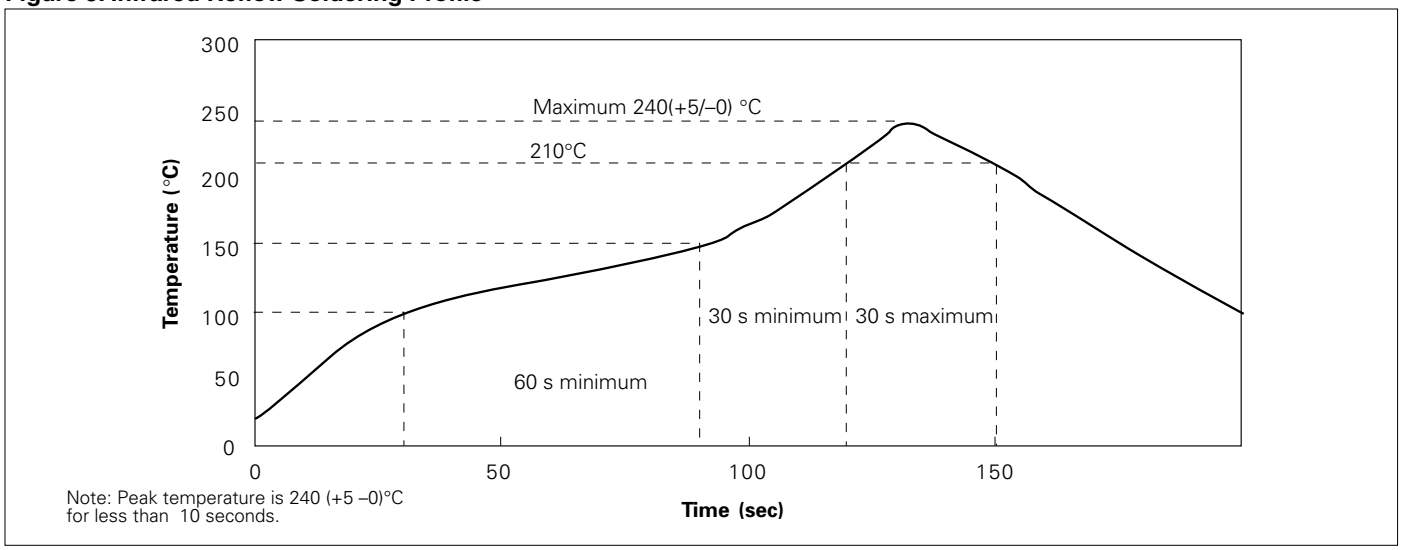


Figure 6. Super I/O (PC87338VLJ) to IRMS6452/IRMT6452

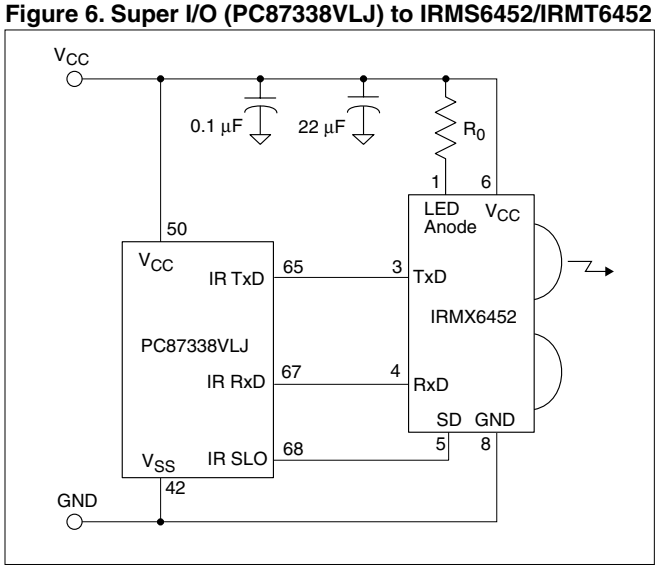


Figure 7. Ultra I/O controller with fast IR (FDC37C93xFR) to IRMS6452/IRMT6452

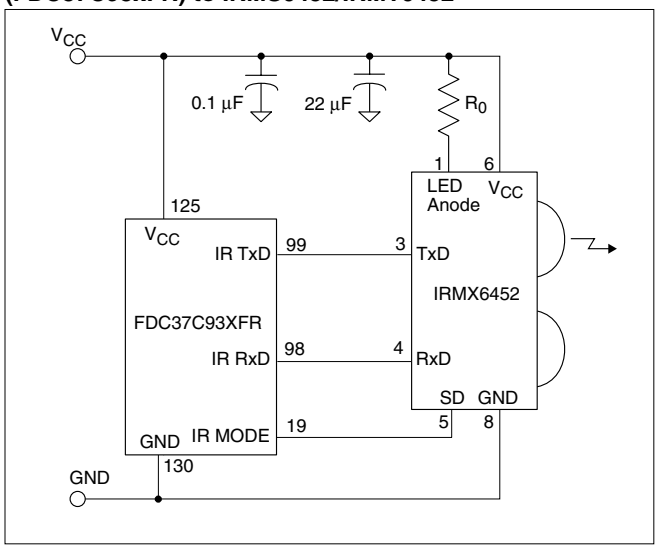


Figure 8. Super I/O (PC87338VLJ) to IRMS6452/IRMT6452 with independent V_{LED} power supply

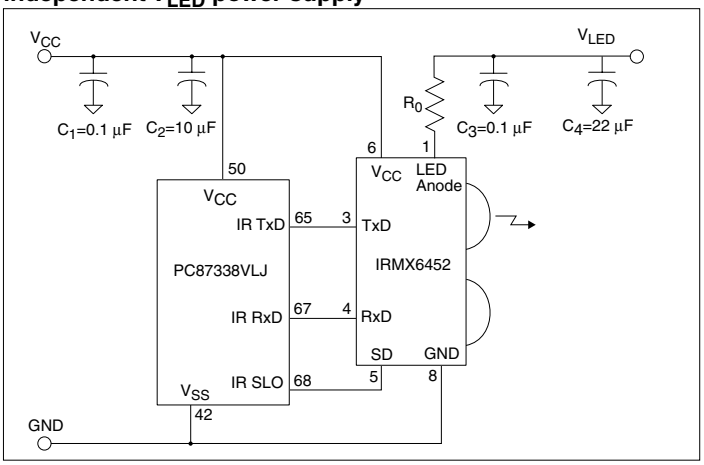


Table 9. Recommended R_O values for different V_{LED}

Parameter	Values				Unit
V_{LED} power supply	2.7	3	3.3	>3.5	V
Resistor	0	1.8	4.7	6.8	Ω

Table 10. Slimline IRMS64XX Truth Table

Inputs				Outputs	
SD	V_{CC}	RxD	Detector	RxD	LED
High	2.4 to 5.5 V	X=don't care state	X=don't care state		Off
Low	2.4 to 5.5 V	High			On
	2.4 to 5.5 V	Low	<0.4 µW/cm^2 (115 Kb/s)	High	Off
	2.4 to 5.5 V		<1.0 µW/cm^2 (1 & 4 Mb/s)		
	2.4 to 5.5 V	Low	<4.0 µW/cm^2 (115 Kb/s)	Low	Off
	2.4 to 5.5 V		<10.0 µW/cm^2 (1 & 4 Mb/s)		

Table 11. Ordering Information

Part Number	Description	PCB Mounting Orientation
IRMS6452	Integrated Transceiver —Side View	Packaged in Component Carrier Reel (1000/reel) for Side View Mounting on PCB
IRMT6452	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)

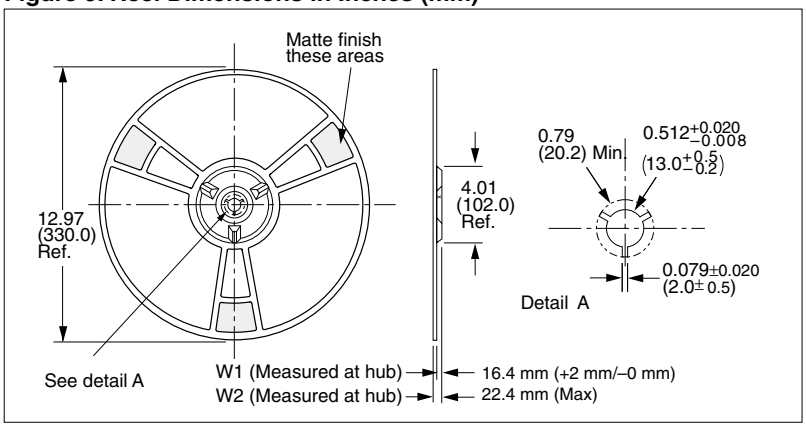


Figure 10. Tape Dimensions in Inches (mm)

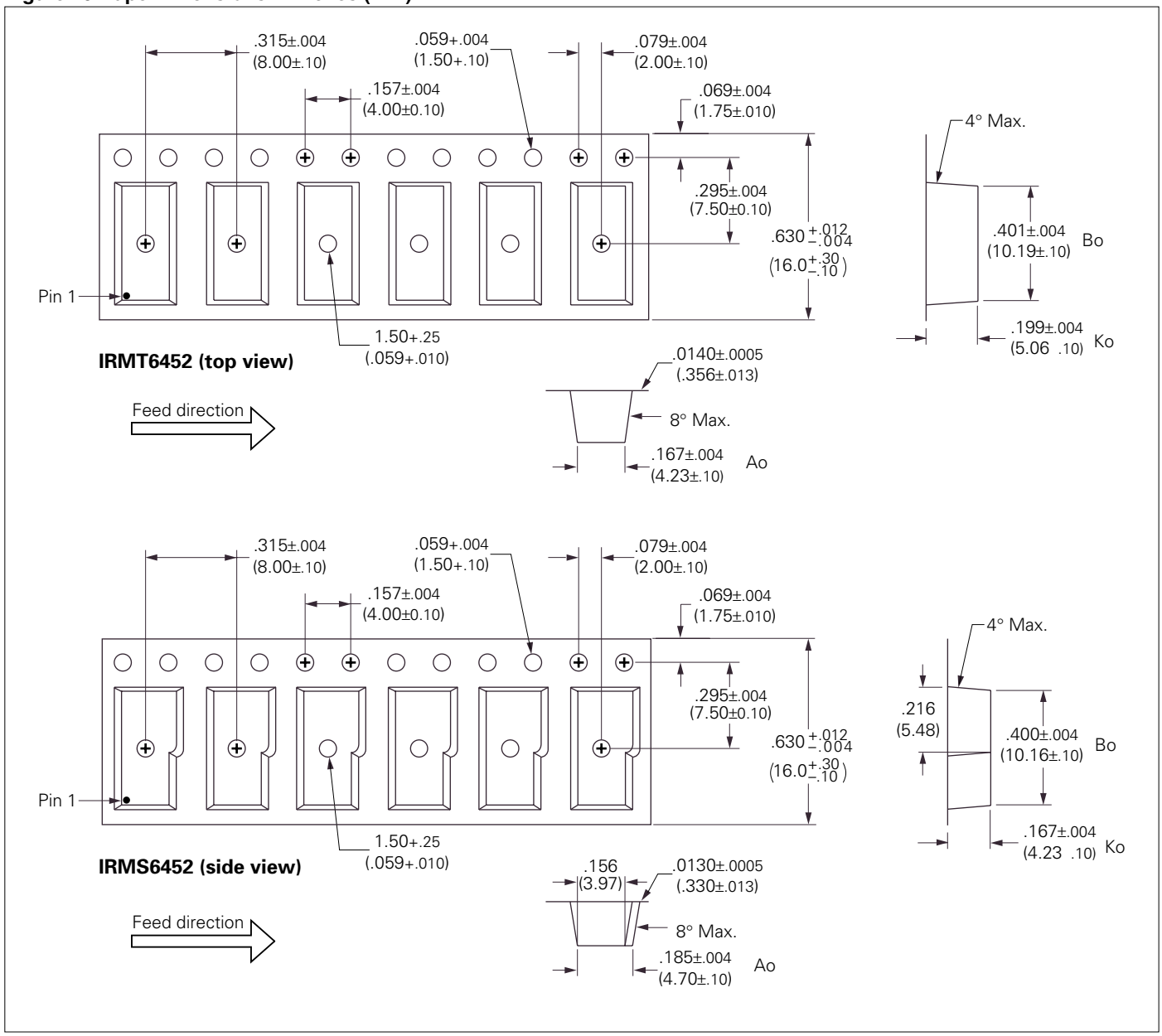
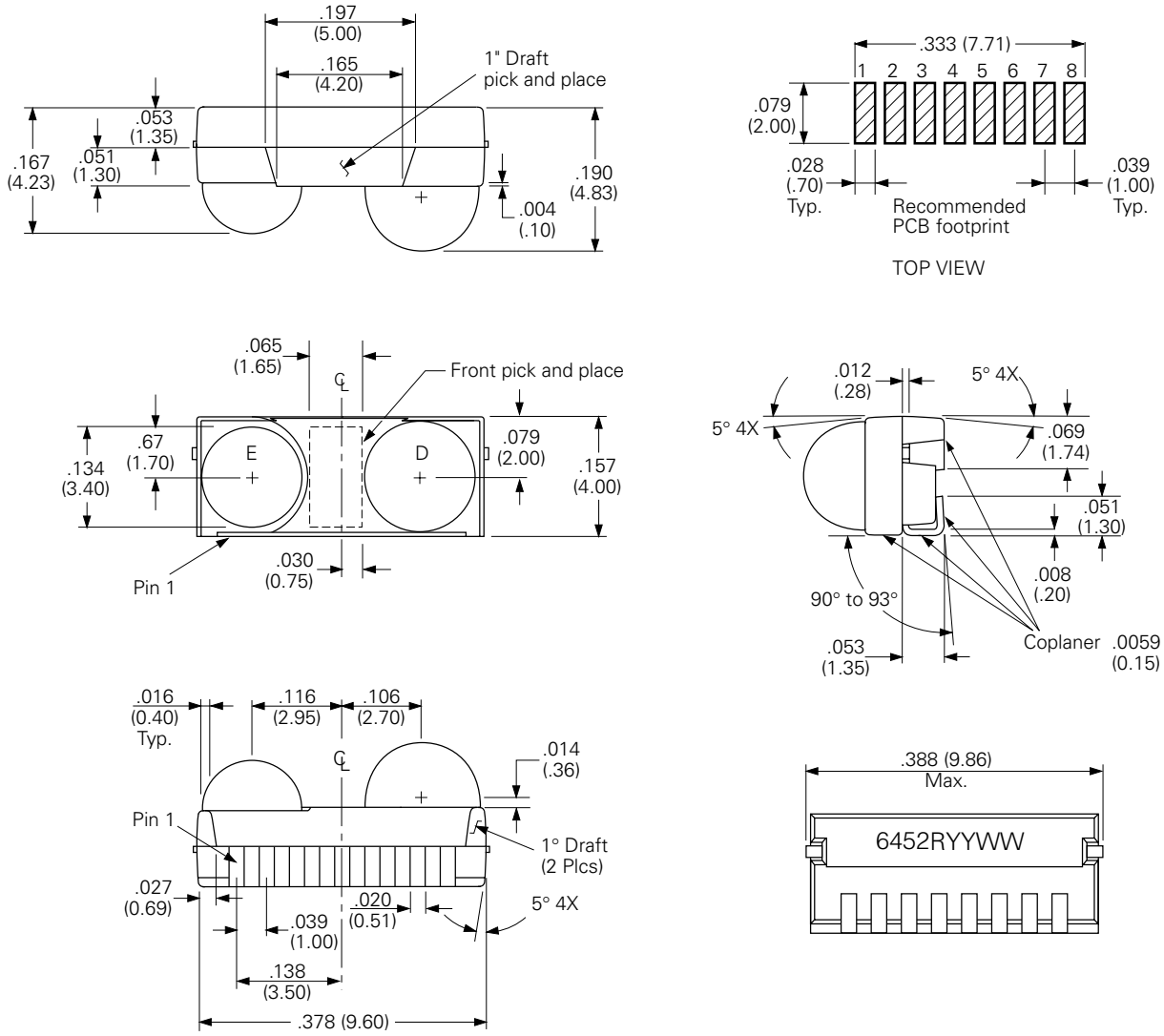


Figure 11. IRMS6452/IRMT6452 detail drawings with optional side view or top view mounting

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



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