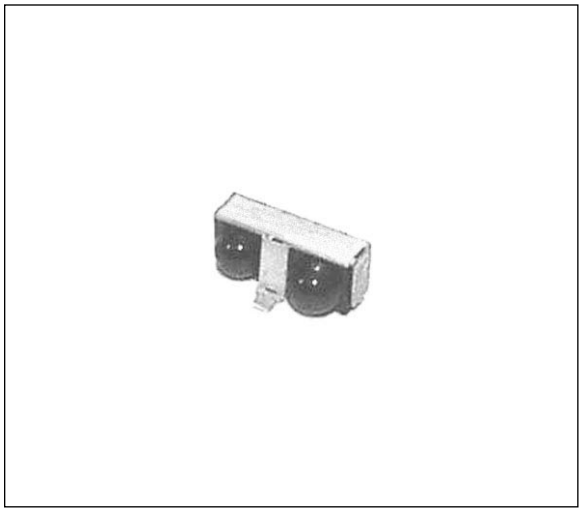
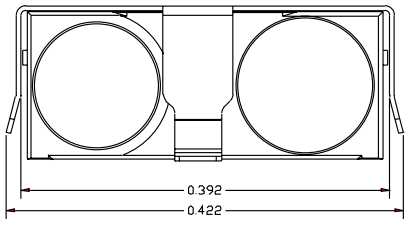
# SIDE VIEW IRMS6453

## 4 Mb/s Infrared Data Transceiver

**Preliminary**



Dimensions in inches




### 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 9600 bit/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, Infineon 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 | No Connect* |
| 8 | GND | Ground |

* Pin 7 internally grounded

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**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**

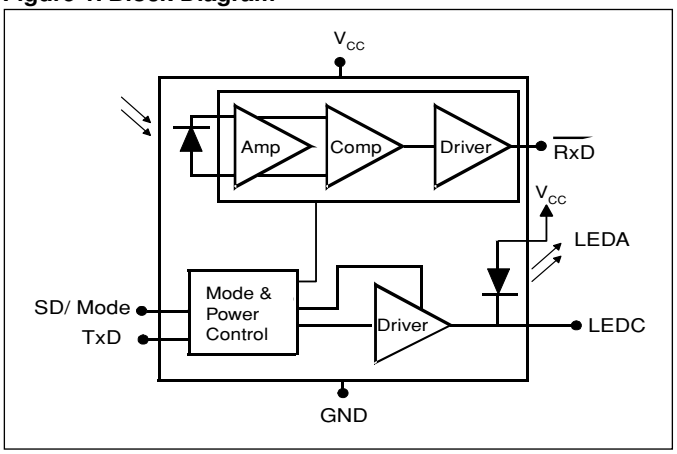



**Figure 2. Minimum Infineon Low-Power Integrated Infrared Transceiver Circuit Diagram**

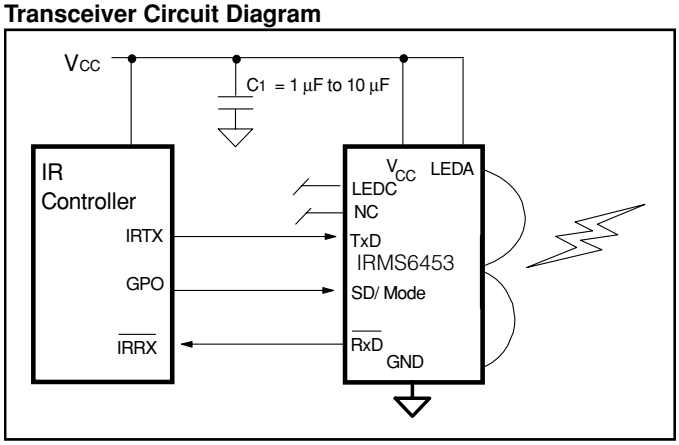



**Table 2. Recommended Operating Conditions**

| 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. |

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| Symbol | Parameter | Min | Typical | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| 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**

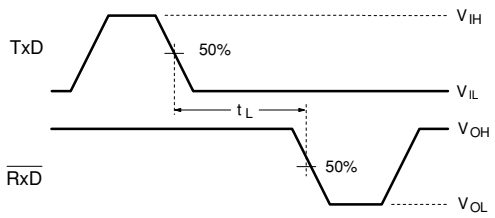
| Symbol | Parameter | Min | Typical | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| $E_{min}$ | Minimum Detection Irradiance 9.6-115.2 kbit/s, SIR | | 3.7 | 4 | $\mu W/cm^2$ | 9.6 kbit/s to 115.2 kbit/s |
| $E_{min}$ | Minimum Detection Irradiance 1.152Mbit/s, MIR | | 4 | | $\mu W/cm^2$ | 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, α = ±15°, $T_A$=25°C, TX@2MHz and 25% |
| aÅ | Output Radiant Half Intensity Angle | ±15 | | | ° | |
| $\lambda_p$ | Peak Wavelength | 850 | 870 | 900 | nm | |
| | Optical Overshoot | | | 25 | % | |

**Table 8. AC Electrical Characteristics**

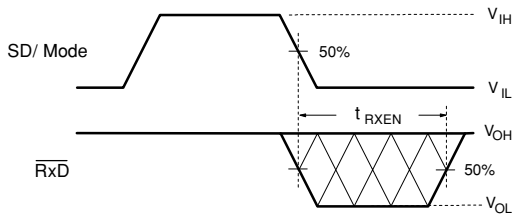
| Symbol | Parameter | Min | Typical | Max | Unit | Conditions |
|---|---|---|---|---|---|---|
| $t_r$ | $\overline{RxD}$ Rise Time | | | 60 | ns | $R_L$=2.2 K, $C_L$=50 pF |
| $t_f$ | $\overline{RxD}$ Fall Time | | | 50 | ns | $R_L$=2.2 K, $C_L$=50 pF |
| $t_{SU}$,$t_H$ | TxDSetup and Hold to SD/ Mode 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**

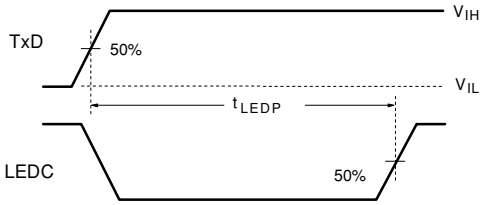
**Latency Timing**



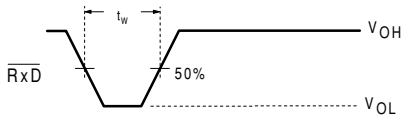

**$\overline{RxD}$ Valid after Shutdown**



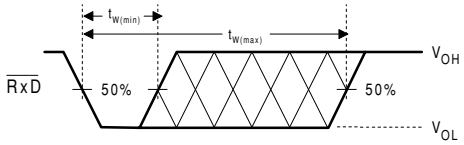

**LED Protection Timing**




**$\overline{RxD}$ 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**

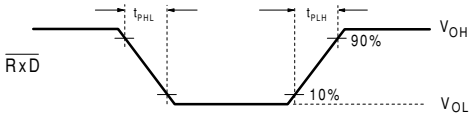
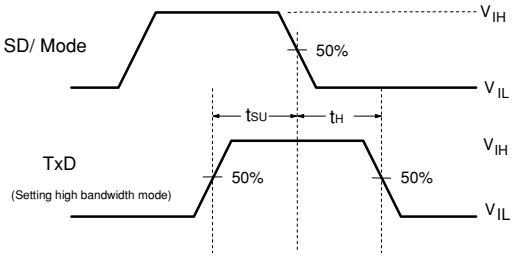
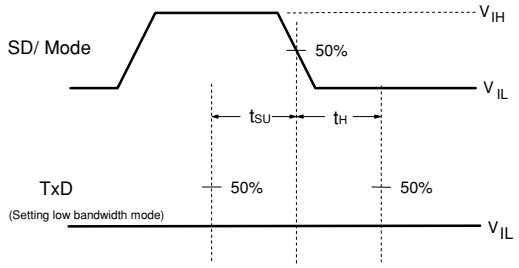



**Figure 4. Bandwidth Programming**

**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.

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**Figure 5. Infrared Reflow Soldering Profile**

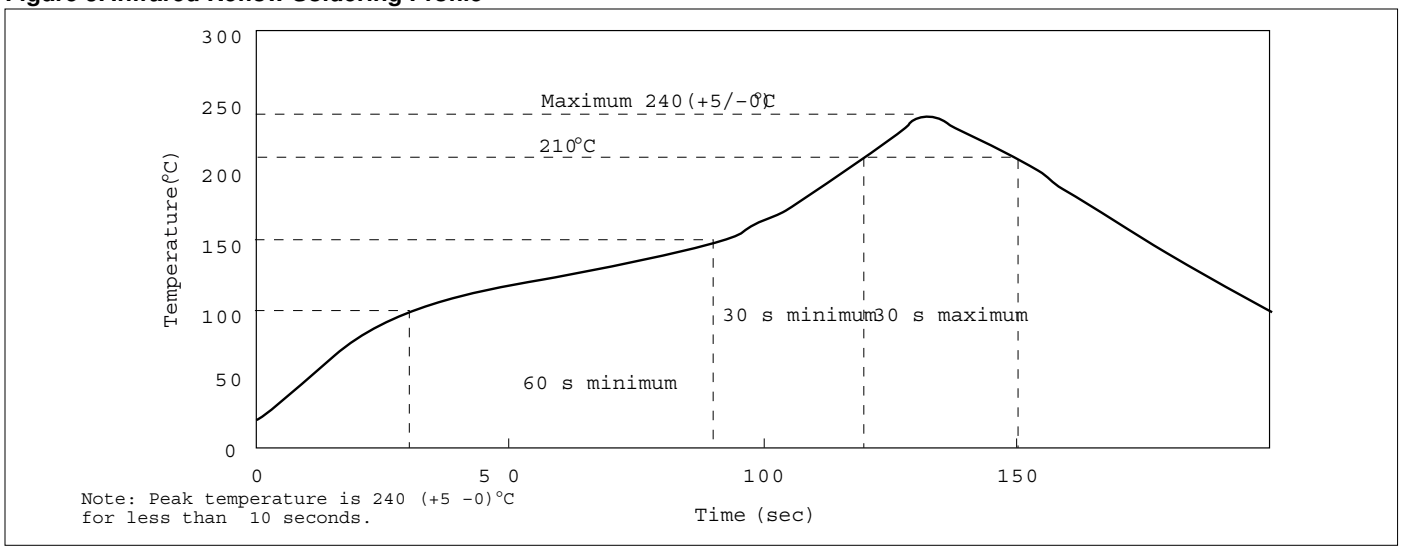



**Figure 6. Super I/O (PC87338VLJ) to IRMS6453**

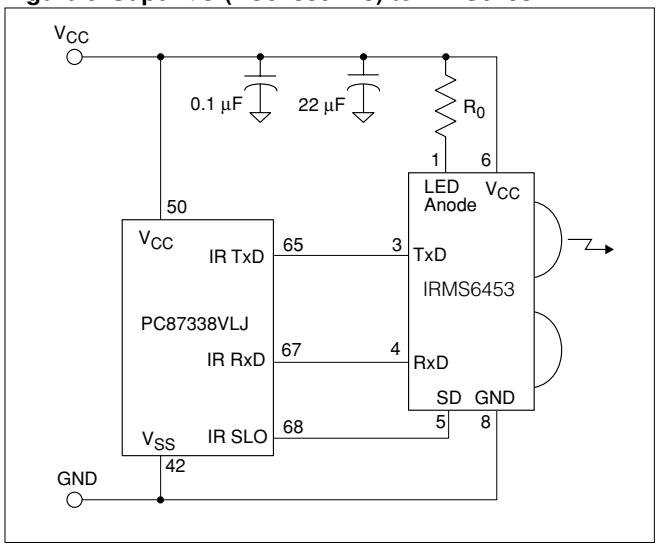



**Figure 7. Ultra I/O controller with fast IR (FDC37C93xFR) to IRMS6453**

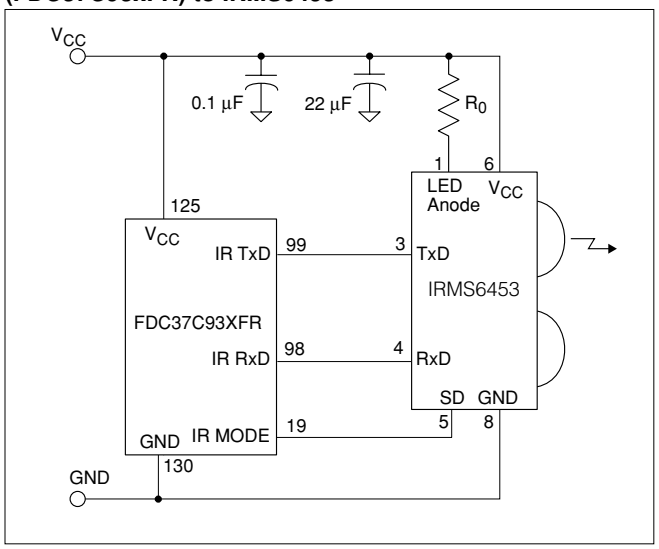



**Figure 8. Super I/O (PC87338VLJ) to IRMS6453 with independent $V_{LED}$ power supply**

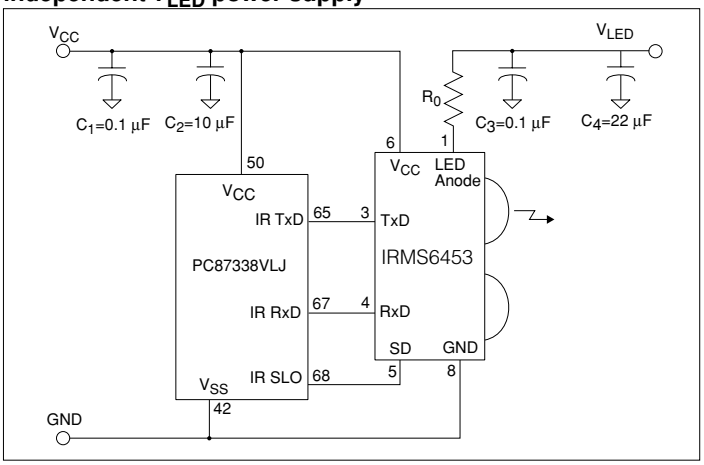



**Table 9. Recommended $R_O$ values for different $V_{LED}$**

| 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) | | |

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**Table 11. Ordering Information**

| Part Number | Description | PCB Mounting Orientation |
|---|---|---|
| IRMS6453 | Integrated Transceiver —Side View | Packaged in Component Carrier Reel (1000/reel) for Side View Mounting on PCB |
| Tape Leader and Trailer is 400 mm minimum. | | |

**Figure 9. Reel Dimensions in Inches (mm)**

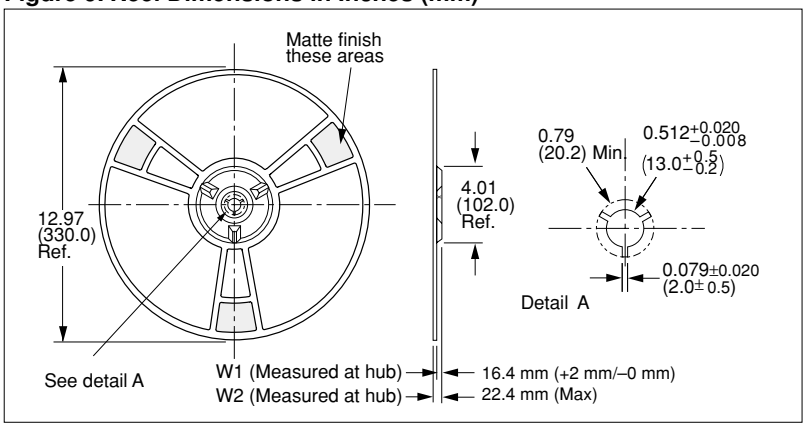



**Figure 10. Tape Dimensions in Inches (mm)**

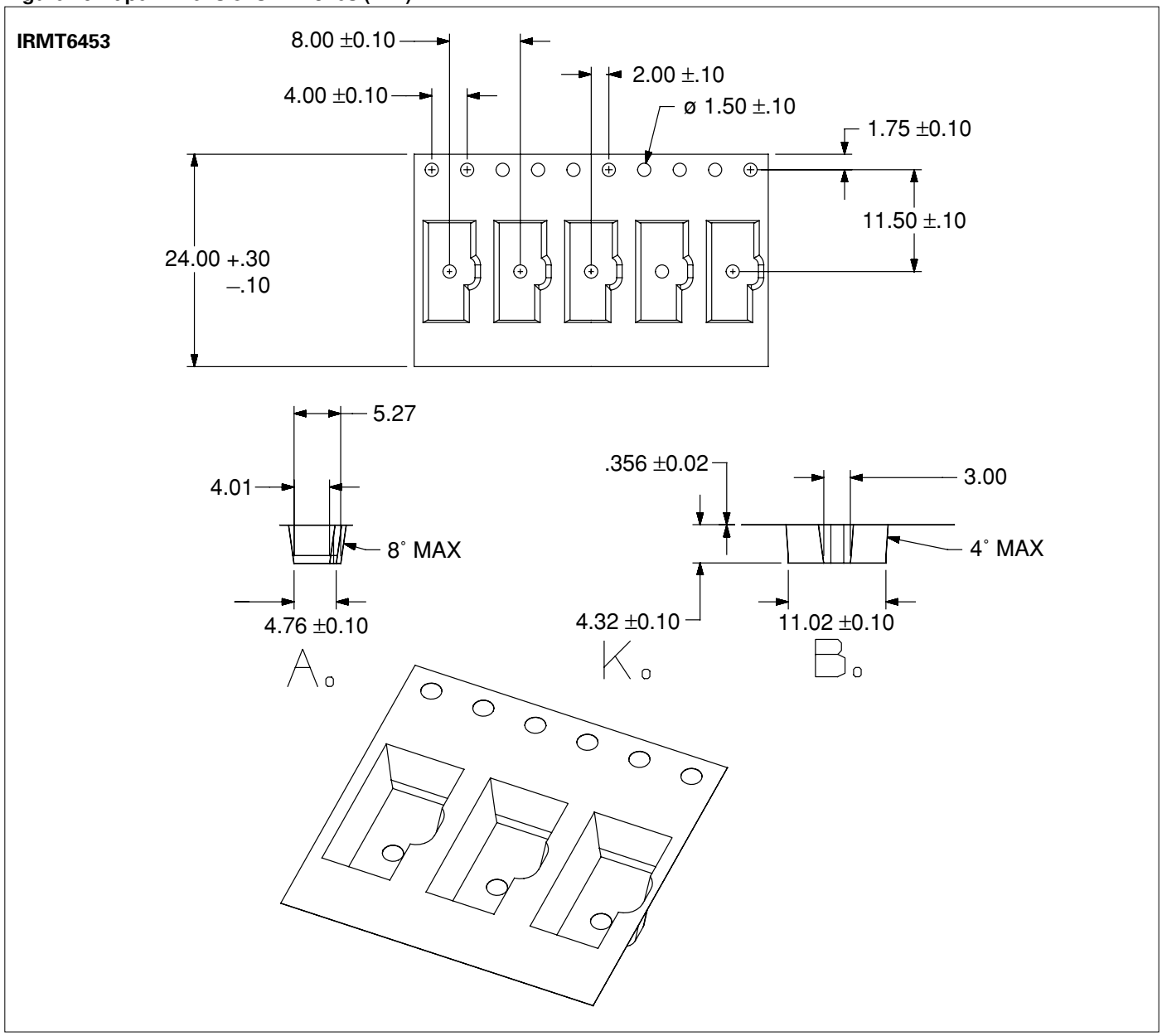
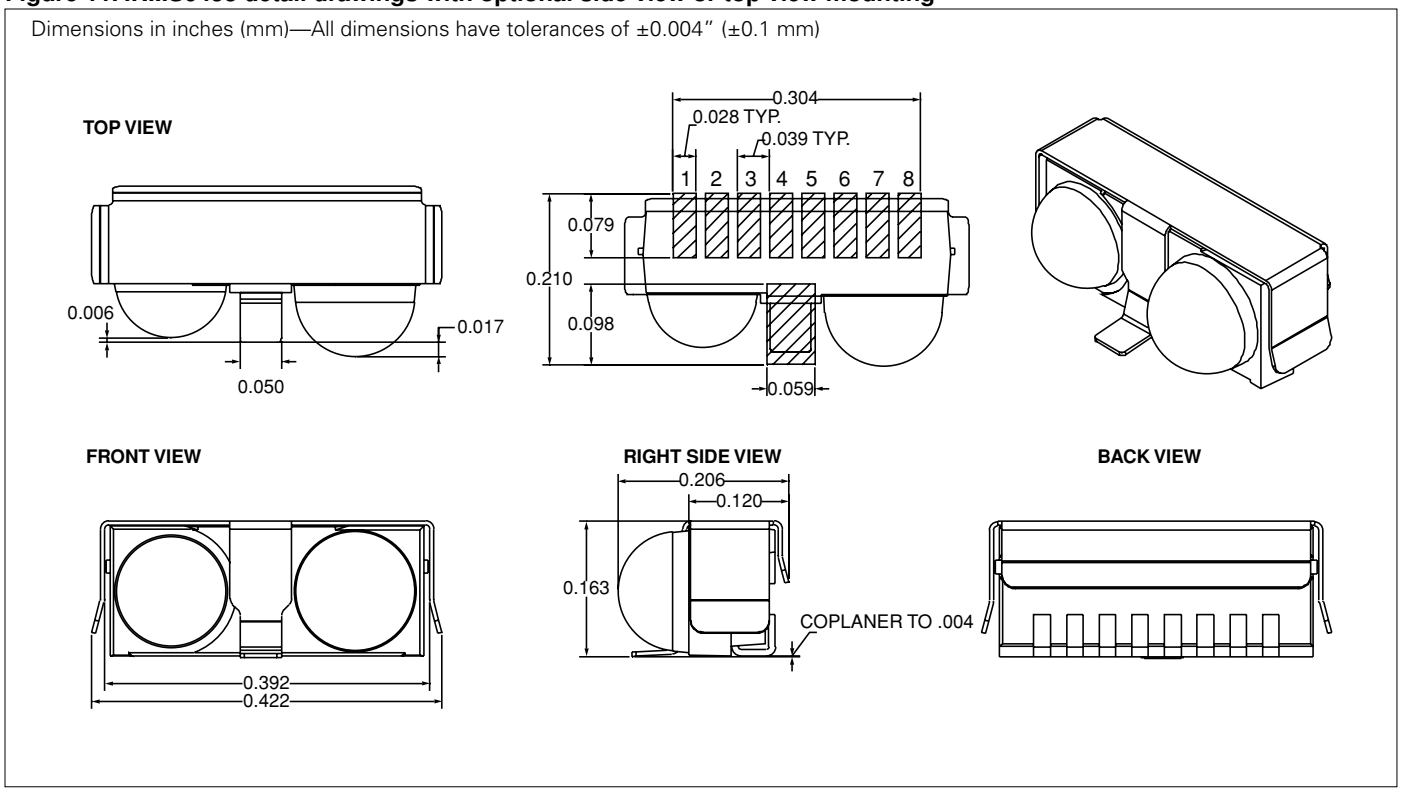


**Figure 11. IRMS6453 detail drawings with optional side view or top view mounting**





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