

CND0209A

Infrared Optocal Module (IrDA)

Infrared data link for cellular phones, peripheral devices

■ Features

- Compliant with IrDA Ver.1.2
- Light emitting function for remote controller
- Corresponding reflow solder (260°C)
- Ultra-small top view package (2.0 mm × 8.2 mm × 1.7 mm)

■ Type

- GaAlAs LED + IC + PIN Photodiode

■ Absolute Maximum Ratings $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

| Parameter | Symbol | Rating | Unit |
|-------------------------------|------------|--------------|------|
| Operating supply voltage | V_{CC} | -0.5 to +3.8 | V |
| Output voltage | V_O | -0.5 to +3.8 | V |
| Input voltage | V_I | -0.5 to +3.8 | V |
| Shutdown input voltage | V_{SD} | -0.5 to +3.8 | V |
| LED operating supply voltage | V_{LEDA} | -0.5 to +7.0 | V |
| Pulse forward current * | I_{FP} | 300 | mA |
| Low level output current | I_{OL} | 10 | mA |
| Operating ambient temperature | T_{opr} | -20 to +70 | °C |
| Storage temperature | T_{stg} | -30 to +85 | °C |

Note) *: $t_w \leq 90 \mu\text{s}$, Duty $\leq 25\%$

■ Operating Condition

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|------------------------------|------------|------------|-----|-----|-----|------|
| Operating supply voltage | V_{CC} | | 2.4 | 2.8 | 3.3 | V |
| LED operating supply voltage | V_{LEDA} | | 2.8 | | 4.5 | V |

■ Electrical-Optical Characteristics $V_{CC} = 2.8 \text{ V}$, $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|-------------------------------|------------|--|-----|-----|-------|---------------|
| High level supply current *1 | I_{CCH} | $E_I = 0$, $V_I = 0.5 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$ | | 90 | 120 | μA |
| Low level supply current *1 | I_{CCL} | $E_I = 3 \text{ mW/cm}^2$, $V_I = 0.5 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$ | | 150 | 360 | μA |
| Shut down supply current *1 | I_{CCSD} | $V_I = 0.5 \text{ V}$, $V_{CC} \geq V_{SD} \geq V_{CC} \times 0.8$ (SD = High) | | 10 | 200 | nA |
| Maximum reception distance *4 | L_{max} | $V_{LEDA} = 3.2 \text{ V to } 4.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, External components | 23 | | | cm |
| Minimum reception distance | L_{min} | $V_{LEDA} = 2.8 \text{ V to } 4.2 \text{ V}$, LED power: 150 mW/sr | | | 0 | cm |
| Data Rates | — | | 9.6 | | 115.2 | kbps |
| RC maximum reception distance | L_{maxR} | $V_{LEDA} = 3.2 \text{ V}$, $V_{CC} \geq V_{SD} \geq V_{CC} - 0.3 \text{ V}$ RC Receiver sensitivity = 0.0125 $\mu\text{W/cm}^2$ | 10 | | | m |

■ Electrical-Optical Characteristics (Continued) $V_{CC} = 2.8 \text{ V}$, $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|-----------------------------------|---------------------|--|----------------|-----|----------|---------------|
| Transmitter | | | | | | |
| Peak emission wavelength *1 | λ_p | $V_{SD} \leq 0.5 \text{ V}$ (IrDA mode), $V_{LEDA} = 3.2 \text{ V}$, Duty 3/16 | 878 | | 888 | nm |
| | | $V_{SD} \leq 0.5 \text{ V}$ (IrDA mode), $V_{LEDA} = 3.2 \text{ V}$, Duty 3/16, $T_a = -20^\circ\text{C}$ to $+70^\circ\text{C}$ | 850 | | 900 | nm |
| | | $V_{CC} = 3.0 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, (RC mode) $V_{LEDA} = 2.8 \text{ V}$, Duty 25% | 878 | | 910 | nm |
| Pulse forward current *1 | I_{FP} | $V_{LEDA} = 3.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, I-TXD Duty 3/16, R-TXD $\leq 0.5 \text{ V}$ | 40 | 60 | 90 | mA |
| | | $V_{LEDA} = 4.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, R-TXD Duty 25%, I-TXD $\leq 0.5 \text{ V}$ | 220 | 250 | 280 | mA |
| | | $V_{LEDA} = 3.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, R-TXD Duty 25%, I-TXD $\leq 0.5 \text{ V}$ | 170 | 200 | 230 | mA |
| Center radiant intensity *1, 2, 9 | $\theta_T = 0$ | $V_{LEDA} = 3.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, I-TXD Duty 3/16, R-TXD $\leq 0.5 \text{ V}$ (IrDA mode) | 9 | 20 | | mW/sr |
| | | $V_{LEDA} = 4.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, R-TXD Duty 25%, I-TXD $\leq 0.5 \text{ V}$ (RC mode) | 40 | 73 | | mW/sr |
| | | $V_{LEDA} = 3.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, R-TXD Duty 25%, I-TXD $\leq 0.5 \text{ V}$ (RC mode) | 36 | 68 | | mW/sr |
| | $\theta_T = \pm 15$ | $V_{LEDA} = 3.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, I-TXD Duty 3/16, R-TXD $\leq 0.5 \text{ V}$ (IrDA mode) | 6 | 10 | | mW/sr |
| | | $V_{LEDA} = 4.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, R-TXD Duty 25%, I-TXD $\leq 0.5 \text{ V}$ (RC mode) | 28 | 40 | | mW/sr |
| | | $V_{LEDA} = 3.2 \text{ V}$, $V_{SD} \leq 0.5 \text{ V}$, R-TXD Duty 25%, I-TXD $\leq 0.5 \text{ V}$ (RC mode) | 28 | 38 | | mW/sr |
| High level input voltage *1 | V_{IH} | I-TXD $V_{CC} = 2.4 \text{ V}$ to 3.3 V , $V_{SD} \leq 0.5 \text{ V}$ | $V_{CC} - 0.3$ | | V_{CC} | V |
| | | R-TXD $V_{CC} = 2.4 \text{ V}$ to 3.3 V , $V_{SD} \leq 0.5 \text{ V}$ | 1.5 | 1.8 | V_{CC} | V |
| Low level input voltage *1 | V_{IL} | $V_{CC} = 2.4 \text{ V}$ to 3.3 V , $V_{SD} \leq 0.5 \text{ V}$ | 0 | | 0.7 | V |
| TX half-angle | θ_T | | ± 15 | | | ° |
| Rise time *1, 3 | t_r | $V_{LEDA} = 3.2 \text{ V}$, $t_w = 1.6 \mu\text{s}$, $R_L = 50 \Omega$ | | 0.3 | 0.6 | μs |
| Fall time *1, 3 | t_f | $V_{LEDA} = 3.2 \text{ V}$, $t_w = 1.6 \mu\text{s}$, $R_L = 50 \Omega$ | | 0.3 | 0.6 | μs |
| TX wake up time *7 | t_{Twu} | | | 0.3 | 1 | μs |
| Intensity delay time *1, 3 | I_{DT} | $V_{LEDA} = 3.2 \text{ V}$ | | | 400 | ns |
| Maximum pulse width | $T_{wLEDmax}$ | I-TXD, R-TXD = Low \rightarrow High | 20 | 50 | 100 | μs |
| Overshoot | O_S | | | | 25 | % |
| Edge jitter | E_J | | -40 | | 40 | ns |

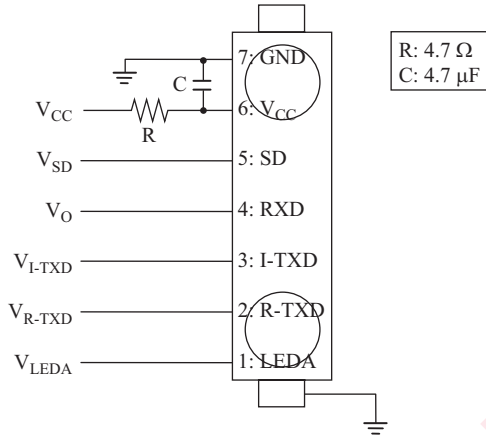
■ Electrical-Optical Characteristics (Continued) $V_{CC} = 2.8 \text{ V}$, $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|------------------------------|-------------|---|----------------|-----|----------|---------------------------|
| Receiver | | | | | | |
| Minimum input irradiance | $E_{I\min}$ | $V_{SD} \leq 0.5 \text{ V}$ | | 2.3 | 6.8 | $\mu\text{W}/\text{cm}^2$ |
| Maximum input irradiance | $E_{I\max}$ | $V_{SD} \leq 0.5 \text{ V}$ | 500 | | | mW/cm^2 |
| High level output voltage *5 | V_{OH} | Non signal condition $I_{OH} = -200 \mu\text{A}$, $V_{SD} \leq 0.5 \text{ V}$ | $V_{CC} - 0.3$ | | V_{CC} | V |
| Low level output voltage *6 | V_{OL} | $I_{OL} = 500 \mu\text{A}$, $V_{SD} \leq 0.5 \text{ V}$ | | | 0.5 | V |
| RX half angle | θ_R | | ± 15 | | | ° |
| RXD output pulse width | T_{WR} | $C_L = 15 \text{ pF}$, 9.6 kbps to 115.2 kbps | 1.3 | 2.3 | 4.2 | μs |
| RX wake up time *8 | t_{Rwu} | $E_I = 8.1 \mu\text{W}/\text{cm}^2$ | | 250 | 400 | μs |
| Receiver latency time | t_L | $E_I = 8.1 \mu\text{W}/\text{cm}^2$ | | 100 | 200 | μs |
| Rise time | t_r | $C_L = 15 \text{ pF}$ | | 100 | 300 | ns |
| Fall time | t_f | $C_L = 15 \text{ pF}$ | | 100 | 300 | ns |

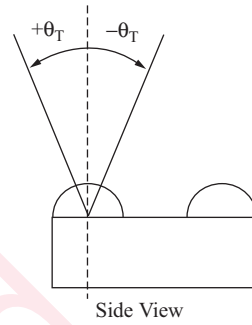
■ Electrical-Optical Characteristics (Continued)

Note) Measuring circuit

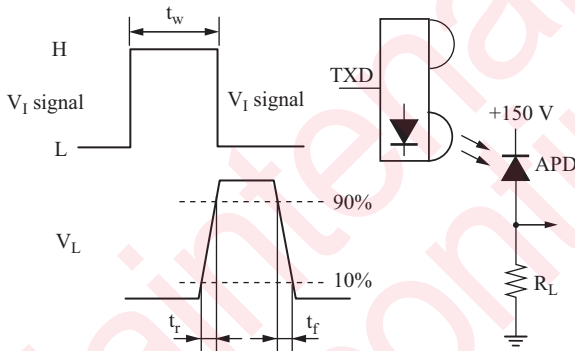
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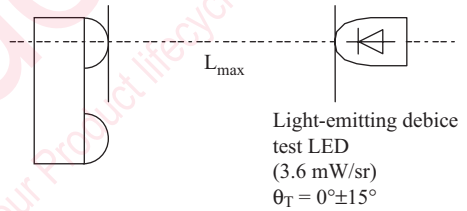
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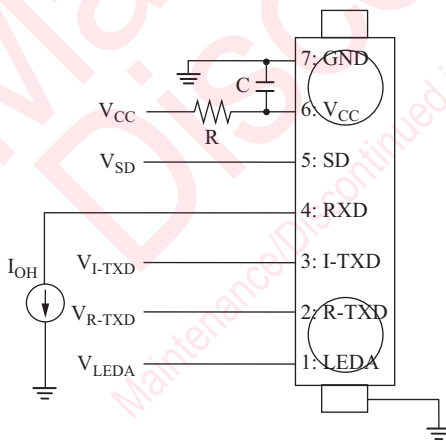
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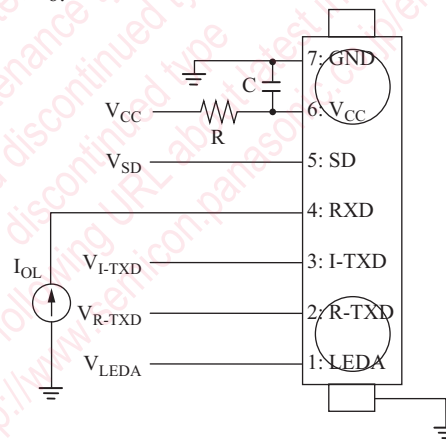
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*5:

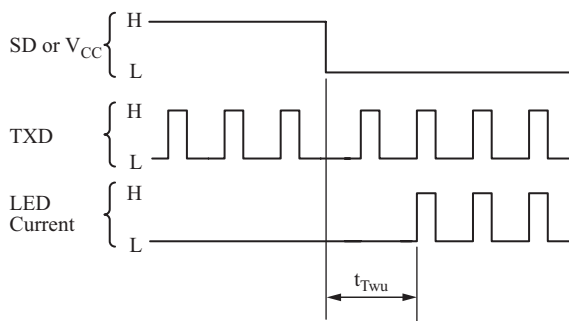


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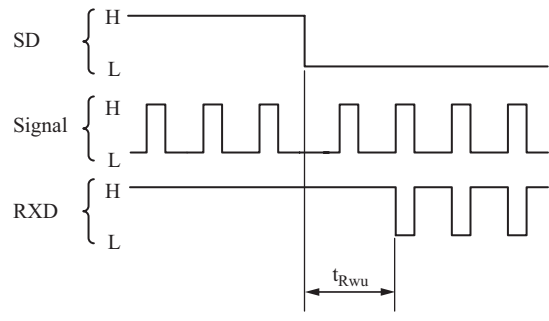
*7:

TX wake up time



*8:

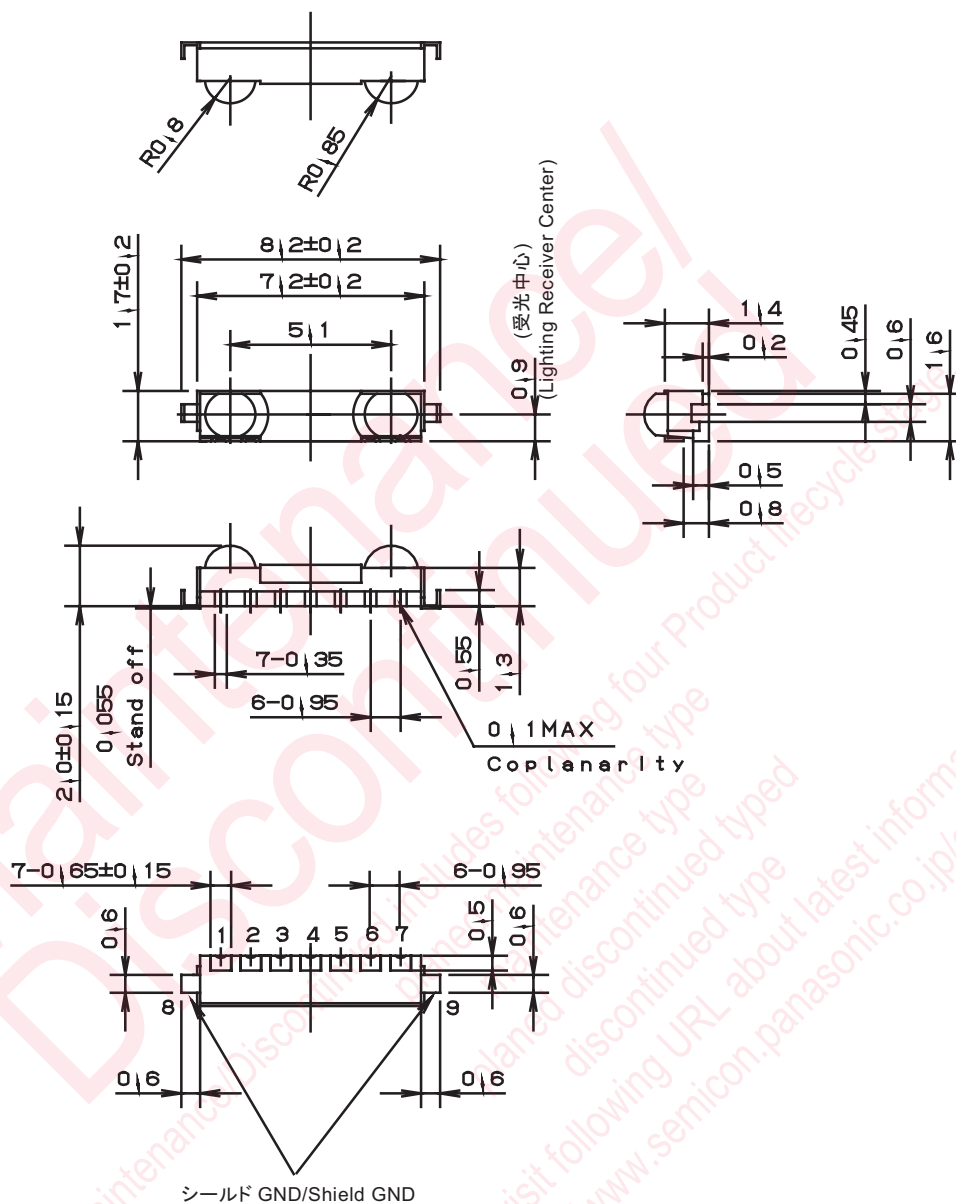
RX wake up time



*9: Eye-Safety IEC60825-1 Class1 Eye safe

■ Package (Unit: mm)

KMTLTM7K0001



• Pin name

- | | |
|----------|---------------|
| 1. LEDA | 6. V_{CC} |
| 2. R-TXD | 7. GND |
| 3. I-TXD | 8. Shield GND |
| 4. RXD | 9. Shield GND |
| 5. SD | |

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