

# 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	$\mu\text{A}$
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	$\mu\text{A}$
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
<b>Transmitter</b>						
Peak emission wavelength *1	$\lambda_p$	$V_{SD} \leq 0.5 \text{ V}$ (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 $3.3 \text{ V}$ , $V_{SD} \leq 0.5 \text{ V}$	$V_{CC} - 0.3$		$V_{CC}$	V
		R-TXD $V_{CC} = 2.4 \text{ V}$ to $3.3 \text{ V}$ , $V_{SD} \leq 0.5 \text{ V}$	1.5	1.8	$V_{CC}$	V
Low level input voltage *1	$V_{IL}$	$V_{CC} = 2.4 \text{ V}$ to $3.3 \text{ V}$ , $V_{SD} \leq 0.5 \text{ V}$	0		0.7	V
TX half-angle	$\theta_T$		$\pm 15$			°
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	$\mu\text{s}$
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	$\mu\text{s}$
TX wake up time *7	$t_{Twu}$			0.3	1	$\mu\text{s}$
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	$\mu\text{s}$
Overshoot	$O_S$				25	%
Edge jitter	$E_J$		-40		40	ns

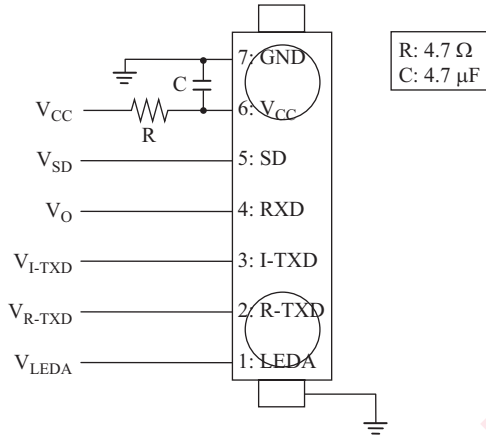
**■ Electrical-Optical Characteristics (Continued)**  $V_{CC} = 2.8 \text{ V}$ ,  $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$ 

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Receiver</b>						
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			$\text{mW}/\text{cm}^2$
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	$\theta_R$		$\pm 15$			°
RXD output pulse width	$T_{WR}$	$C_L = 15 \text{ pF}$ , 9.6 kbps to 115.2 kbps	1.3	2.3	4.2	$\mu\text{s}$
RX wake up time *8	$t_{Rwu}$	$E_I = 8.1 \mu\text{W}/\text{cm}^2$		250	400	$\mu\text{s}$
Receiver latency time	$t_L$	$E_I = 8.1 \mu\text{W}/\text{cm}^2$		100	200	$\mu\text{s}$
Rise time	$t_r$	$C_L = 15 \text{ pF}$		100	300	ns
Fall time	$t_f$	$C_L = 15 \text{ pF}$		100	300	ns

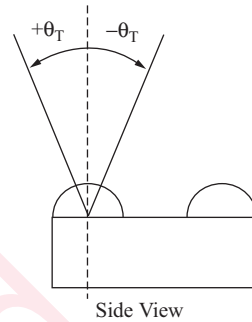
■ Electrical-Optical Characteristics (Continued)

Note) Measuring circuit

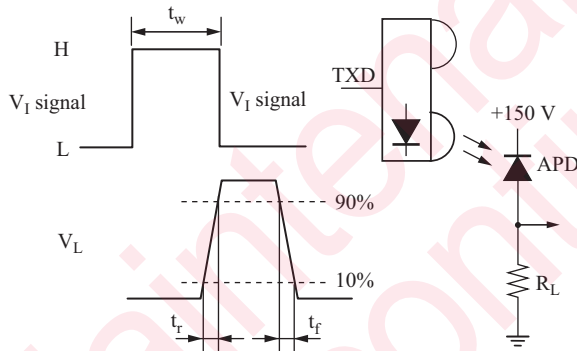
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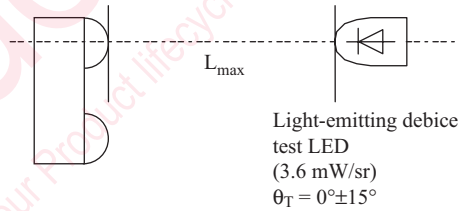
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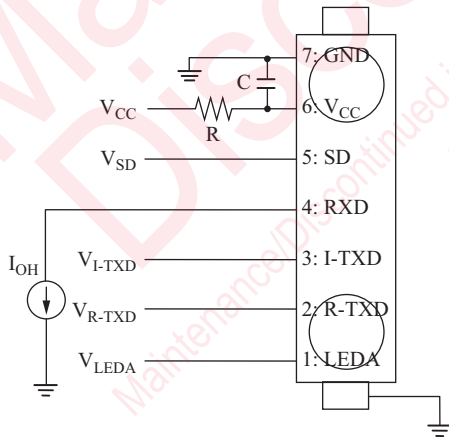
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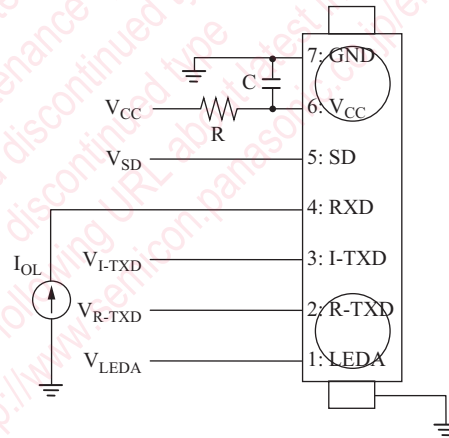
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\*5:

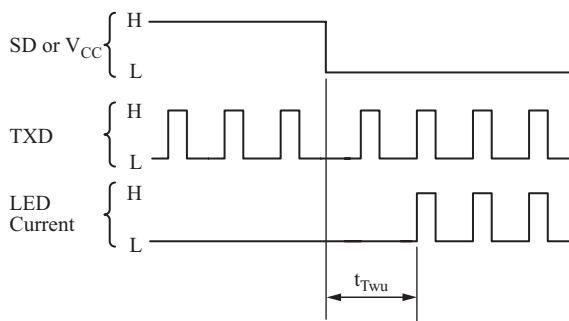


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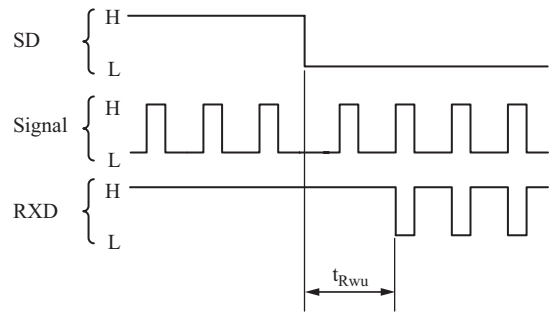
\*7:

TX wake up time



\*8:

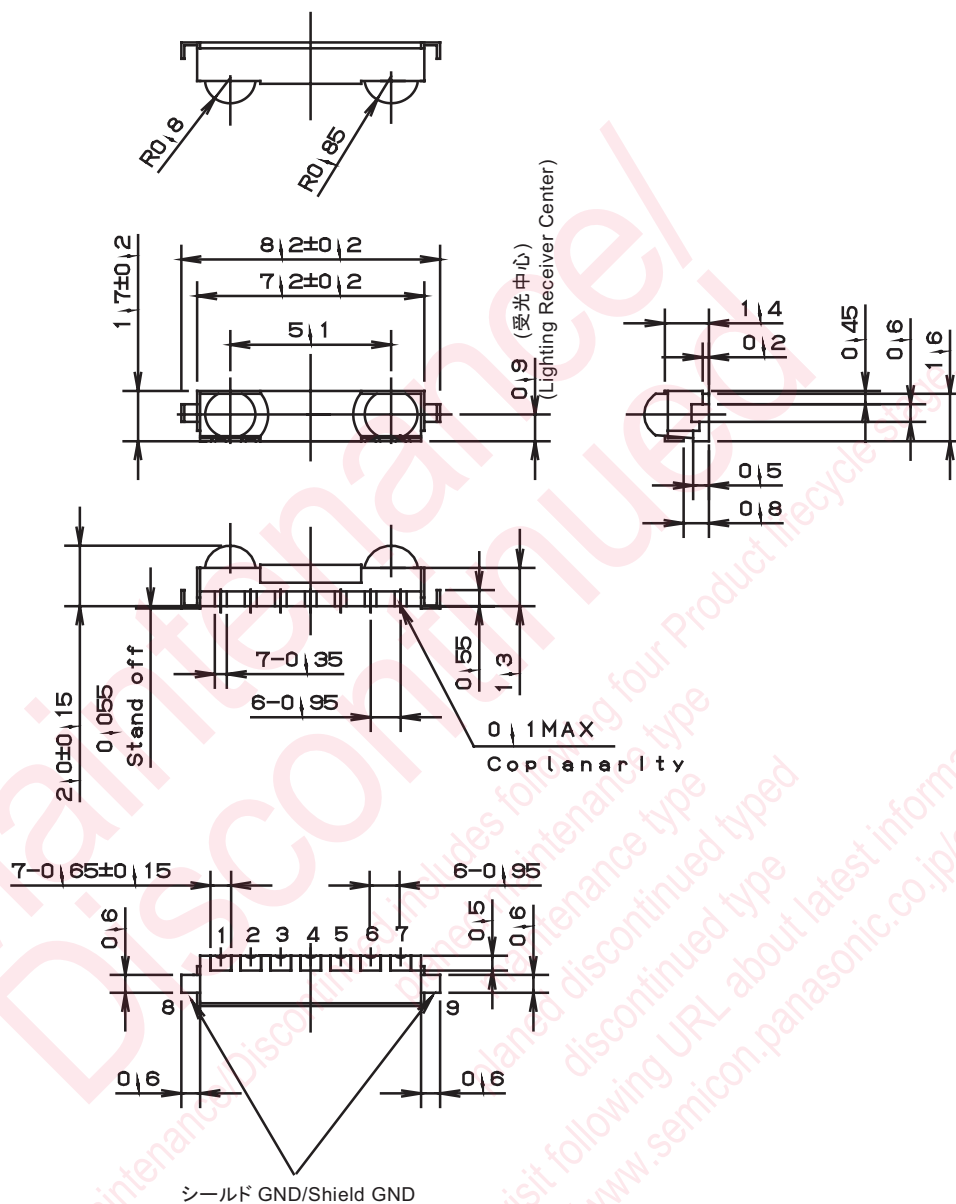
RX wake up time



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

■ Package (Unit: mm)

KMTLTM7K0001



• Pin name

- |          |                    |
|----------|--------------------|
| 1. LEDA  | 6. V <sub>CC</sub> |
| 2. R-TXD | 7. GND             |
| 3. I-TXD | 8. Shield GND      |
| 4. RXD   | 9. Shield GND      |
| 5. SD    |                    |

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