

# CND0216A

## 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 (1.6 mm × 7.2 mm × 2.6 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
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	$V_{CC}$		2.8		4.5	V
Input/output supply voltage	$V_{IO}$		1.5	1.8	3.0	V

### ■ Electrical-Optical Characteristics $V_{CC} = 3.2 \text{ V}$ , $V_{IO} = 1.8 \text{ V}$ , $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
High level supply current *1	$I_{CCH}$	$E_I = 0$ , $V_I = 0.5 \text{ V}$ , $V_{SD} \leq 0.5 \text{ V}$		110	150	$\mu\text{A}$
Low level supply current *1	$I_{CCL}$	$E_I = 3 \text{ mW/cm}^2$ , $V_I = 0.5 \text{ V}$ , $V_{SD} \leq 0.5 \text{ V}$		170	380	$\mu\text{A}$
Shut down supply current *1	$I_{CCSD}$	$V_I = 0.5 \text{ V}$ , $V_{IO} \geq V_{SD} \geq V_{IO} - 0.3 \text{ (SD = High)}$		10	200	nA
Maximum reception distance *4	$L_{\text{max}}$	$V_{SD} \leq 0.5 \text{ V}$ , External components	23	40		cm
RC maximum reception distance	$L_{\text{maxR}}$	$\text{RC S} = 0.05 \mu\text{W/cm}^2$	5			m
Data Rates	—		9.6		115.2	kbps
SD high level input voltage	$V_{IHSD}$		$V_{IO} - 0.5$		$V_{IO}$	V
SD low level input voltage	$V_{ILSD}$		0		0.5	V

**■ Electrical-Optical Characteristics (Continued)**  $V_{CC} = 3.2\text{ V}$ ,  $V_{IO} = 1.8\text{ V}$ ,  $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$ 

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Transmitter</b>						
Peak emission wavelength <sup>*1</sup>	$\lambda_p$	$V_{SD} \leq 0.5\text{ V}$ , Duty 3/16 (IrDA mode)	878	883	888	nm
		$V_{SD} \leq 0.5\text{ V}$ , Duty 25% (RC mode)	878	894	910	nm
Pulse forward current <sup>*1</sup>	$I_{FP}$	$V_{SD} \leq 0.5\text{ V}$ , I-TXD Duty 3/16, R-TXD $\leq 0.5\text{ V}$ , (IrDA mode)	40	60	90	mA
		$V_{CC} = 4.2\text{ V}$ , $V_{SD} \leq 0.5\text{ V}$ , R-TXD Duty 25%, I-TXD $\leq 0.5\text{ V}$ , (RC mode)	240	270	300	mA
		$V_{CC} = 3.2\text{ V}$ , $V_{SD} \leq 0.5\text{ V}$ , R-TXD Duty 25%, I-TXD $\leq 0.5\text{ V}$ , (RC mode)	190	220	250	mA
Center radiant intensity <sup>*1, 2, 9</sup>	$\theta_T = 0$	$V_{CC} = 3.2\text{ V}$ , $V_{SD} \leq 0.5\text{ V}$ , I-TXD Duty 3/16, R-TXD $\leq 0.5\text{ V}$ , (IrDA mode)	9	20		mW/sr
		$V_{CC} = 4.2\text{ V}$ , $V_{SD} \leq 0.5\text{ V}$ , R-TXD Duty 25%, I-TXD $\leq 0.5\text{ V}$ , (RC mode)	40	73	110	mW/sr
		$V_{CC} = 3.2\text{ V}$ , $V_{SD} \leq 0.5\text{ V}$ , R-TXD Duty 25%, I-TXD $\leq 0.5\text{ V}$ , (RC mode)	36	68	102	mW/sr
	$\theta_T = \pm 15$	$V_{CC} = 3.2\text{ V}$ , $V_{SD} \leq 0.5\text{ V}$ , I-TXD Duty 3/16, R-TXD $\leq 0.5\text{ V}$ , (IrDA mode)	6	10		mW/sr
		$V_{CC} = 4.2\text{ V}$ , $V_{SD} \leq 0.5\text{ V}$ , R-TXD Duty 25%, I-TXD $\leq 0.5\text{ V}$ , (RC mode)	28	40	63	mW/sr
		$V_{CC} = 3.2\text{ V}$ , $V_{SD} \leq 0.5\text{ V}$ , R-TXD Duty 25%, I-TXD $\leq 0.5\text{ V}$ , (RC mode)	28	38	60	mW/sr
High level input voltage <sup>*1</sup>	$V_{IH}$	I-TXD	$V_{IO} - 0.5$		$V_{IO}$	V
		R-TXD	$V_{IO} - 0.5$		$V_{IO}$	V
Low level input voltage <sup>*1</sup>	$V_{IL}$		0		0.5	V
TX half-angle	$\theta_T$		$\pm 15$			°
Rise time <sup>*1, 3</sup>	$t_r$	$t_w = 1.6\text{ }\mu\text{s}$ , $R_L = 50\text{ }\Omega$		0.3	0.6	$\mu\text{s}$
Fall time <sup>*1, 3</sup>	$t_f$	$t_w = 1.6\text{ }\mu\text{s}$ , $R_L = 50\text{ }\Omega$		0.3	0.6	$\mu\text{s}$
TX wake up time <sup>*7</sup>	$t_{Twu}$			0.3	1	$\mu\text{s}$
Intensity delay time <sup>*1, 3</sup>	$I_{DT}$				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

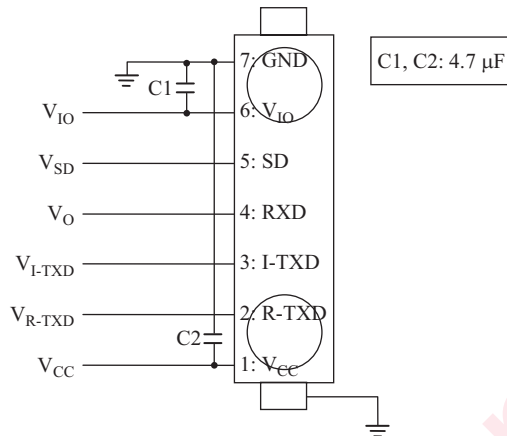
■ Electrical-Optical Characteristics (Continued)  $V_{CC} = 3.2 \text{ V}$ ,  $V_{IO} = 1.8 \text{ V}$ ,  $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Receiver						
Minimum input irradiance	$E_{I\min}$	$V_{SD} \leq 0.5 \text{ V}$		2.2	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 $I_{OH} = -200 \mu\text{A}$ , $V_{SD} \leq 0.5 \text{ V}$	$V_{IO} - 0.3$		$V_{IO}$	V
Low level output voltage *6	$V_{OL}$	$I_{OL} = 200 \mu\text{A}$ , $V_{SD} \leq 0.5 \text{ V}$			0.3	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	$\mu\text{s}$
Rise time	$t_r$	$C_L = 15 \text{ pF}$		100	300	ns
Fall time	$t_f$	$C_L = 15 \text{ pF}$		100	300	ns

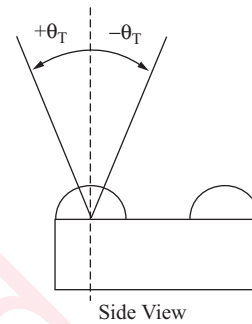
## ■ Electrical-Optical Characteristics (Continued)

Note) Measuring circuit

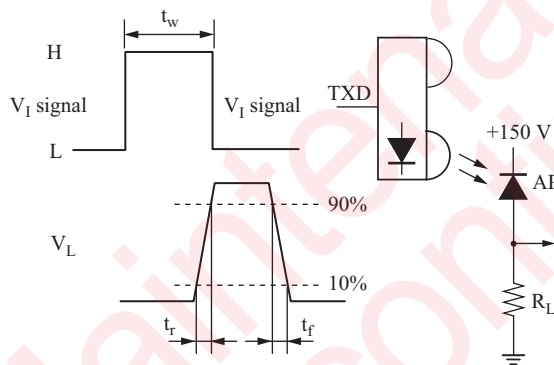
\*1:



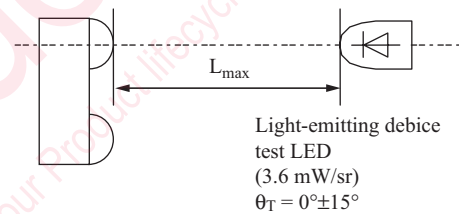
\*2:



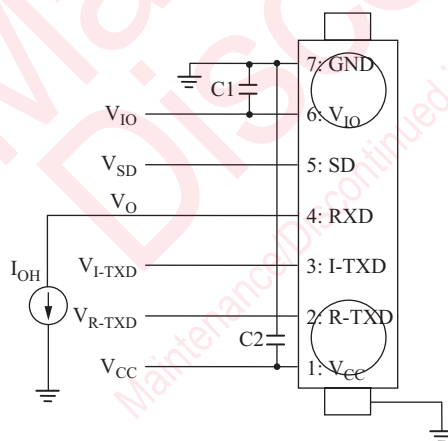
\*3:



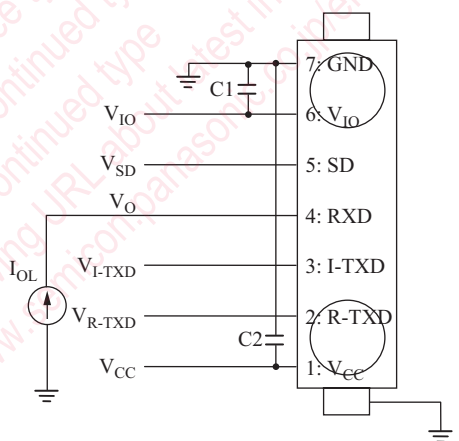
\*4:



\*5:

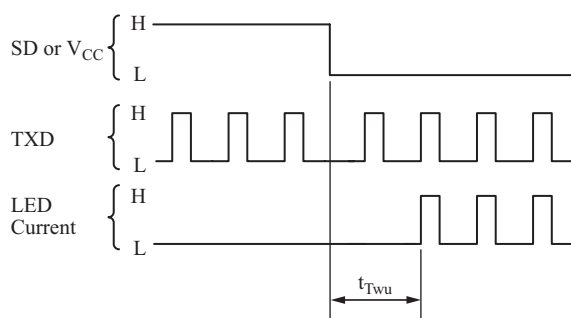


\*6:



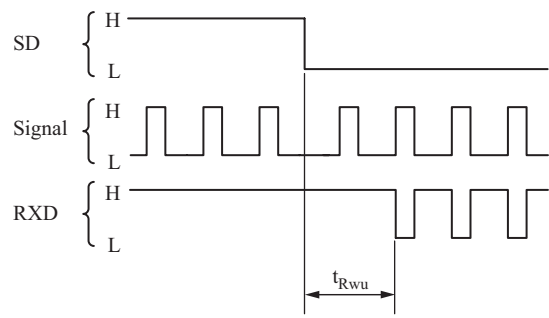
\*7:

TX wake up time



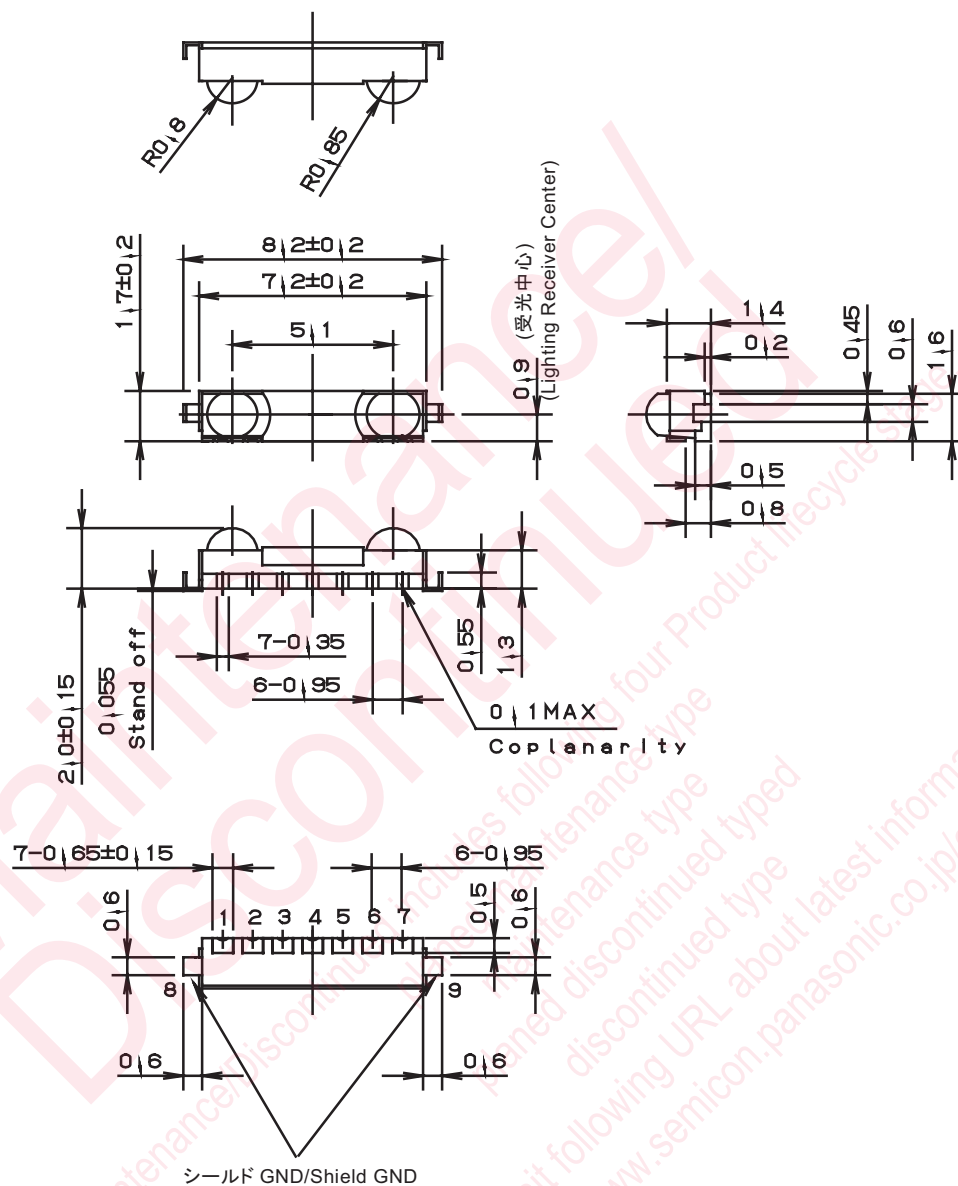
\*8:

RX wake up time



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

KMTLTM7K0001



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

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