

# PRODUCT SPECIFICATION

DATE: 03/26/2012

<b>cosmo</b> ELECTRONICS CORPORATION	Photocoupler : <b>KPC6N138H</b>	NO.62P51003	REV.
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## General Purpose Type Photocoupler

### ●Features

1. Pb free and RoHS compliant.
2. High current transfer ratio  
(CTR:MIN.300% at  $I_F = 1.6\text{mA}$ )
3. High speed response  
( $t_{PHL}$ :TYP.2us at  $R_L = 2.2\text{k}\Omega$ )
4. Instantaneous common mode rejection voltage  
( $CM_H$  : TYP.500V/us)
5. TTL compatible output
6. Compact surface mount type package.
7. Agency Approvals  
UL approved : UL1577 , No.E169586  
CUL approved : C22.2 No.1 & NTC No.5 , No.E169586  
VDE approved : EN60747 , No.40006080  
FIMKO approved : EN 60065 No. FI 25798  
EN 60950 No. FI 25798

### ●Applications

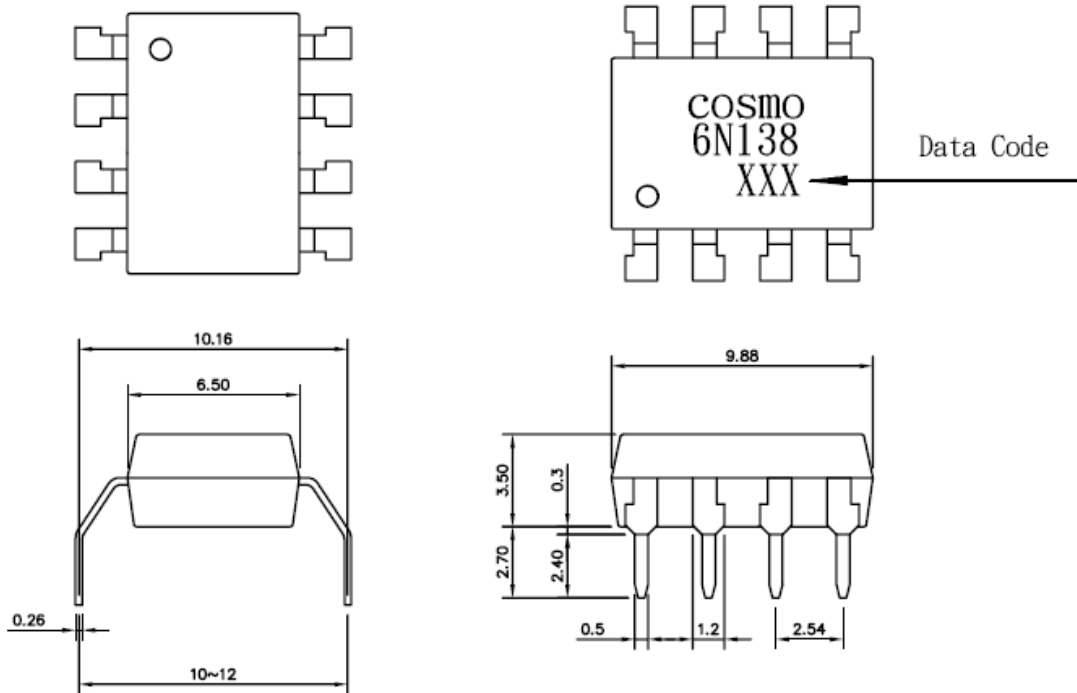
1. Interfaces for computer peripherals
2. Electronic calculators, measuring instruments,  
control equipment
3. Telephone sets.
4. Signal transmission between circuits of  
different potentials and impedances.

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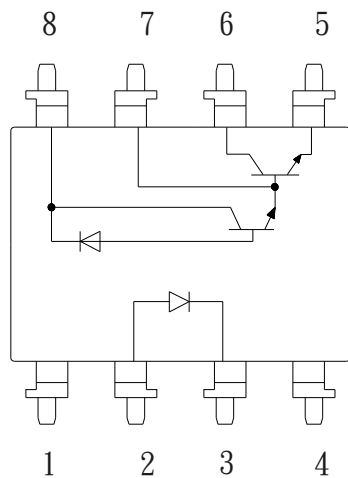
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## 1. OUTSIDE DIMENSION : UNIT (mm)



TOLERANCE :  $\pm 0.2\text{mm}$

## 2. SCHEMATIC : TOP VIEW



- 1. NC
- 2. Anode
- 3. Cathode
- 4. NC
- 5. GND
- 6. Vo
- 7. V<sub>B</sub>
- 8. V<sub>cc</sub>

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## ● Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Rating	Unit
Input	Forward current	IF	20
	*1Peak forward current	IF	40
	*2Peak forward current	IFM	1
	Reverse voltage	VR	5
	Power dissipation	PD	35
Output	Supply voltage	Vcc	-0.5 to 7
	Output voltage	Vo	-0.5 to 7
	Emitter-base reverse with-stand voltage (Pin 5 to 7)	VEBO	0.5
	*3Average output current	Io	60
	Power dissipation	PO	100
	*4Isolation voltage 1 minute	Viso	5000
Operating temperature	Topr	-40 to +100	°C
Storage temperature	Tstg	-55 to +125	°C
*5Soldering temperature	Tsol	260	°C

\*1 50% duty cycle, pulse width : 1mS

\*2 Pulse width<=1uS,300 pulse/sec

\*3 Decreases at the rate of 0.7mA/°C if the external temperature is 25°C or more

\*4 40% to 60% RH,AC for 1 minute

\*5 For 10 seconds

## ● Electro-optical Characteristics

(Ta=0 to +70°C unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
*6 Current transfer ratio	CTR	IF=1.6mA Vo=0.4V,Vcc=4.5V	300	1600	-	%
Logic (0) output volage	VOL	IF=1.6mA Io=4.8mA,Vcc=4.5V	-	0.1	0.4	V
Logic (1) output current	IOH	IF=0,Vo=Vcc=7V	-	0.1	250	uA
Logic (0) supply current	ICCL	IF=1.6mA,Vo=open,Vcc=5V	-	0.5	-	mA
Logic (1) supply current	ICCH	IF=0,Vo=open,Vcc=5V	-	10	-	nA
Input forward voltage	VF	Ta=25°C,IF=1.6mA	-	1.5	1.7	V
Input forward voltage temperature coefficient	$\Delta VF/\Delta Ta$	IF=1.6mA	-	-1.9	-	mV/°C
Input reverse voltage	BVR	Ta=25°C,IR=10uA	5.0	-	-	V
Input capacitance	CIN	VF=0,f=1MHz	-	60	-	pF
*7 Leak current(input-output)	Ii-o	Ta=25°C,45% RH Vi-o=3kVDC,t=5s	-	-	1.0	uA
*7 Isolation resistance(input-output)	Ri-o	Vi-o=500VDC	-	10 <sup>12</sup>	-	Ω
*7 Capacitance(input-output)	CI-O	f=1MHz	-	0.6	-	pF

\*6 Current transfer ratio is the ratio is the ratio of input current and output current expressed in %

\*7 Measured as 2-pin element (Short 1,2,3,4 and 5,6,7,8)

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## ● Switching Characteristics

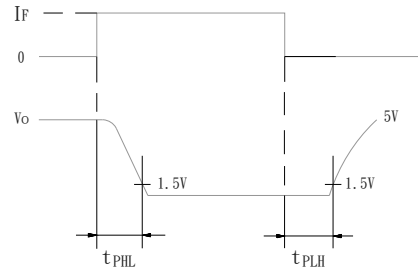
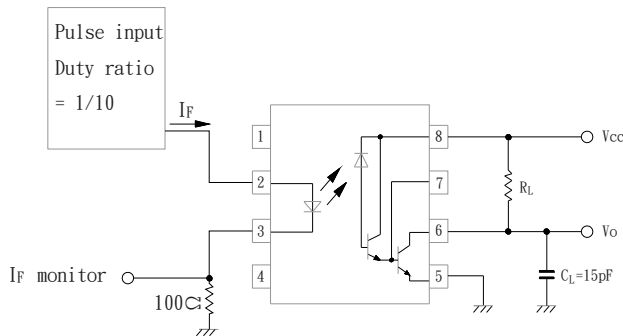
( $T_a=25^\circ\text{C}$ ,  $V_{CC}=5\text{V}$ )

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
*8 Propagation delay time Output (1)-->(0)	$t_{PHL}$	$R_L=2.2\text{k}\Omega, I_F=1.6\text{mA}$	-	2	10	$\mu\text{S}$
*8 Propagation delay time Output (0)-->(1)	$t_{PLH}$	$R_L=2.2\text{k}\Omega, I_F=1.6\text{mA}$	-	7	35	$\mu\text{S}$
*9 Instantaneous common mode rejection voltage "Output (1)"	CMH	$I_F=0, V_{CM}=10\text{Vp-p}, R_L=2.2\text{k}\Omega$	-	500	-	$\text{V}/\mu\text{S}$
*9 Instantaneous common mode rejection voltage "Output (0)"	CML	$I_F=1.6\text{mA}, V_{CM}=10\text{Vp-p}, R_L=2.2\text{k}\Omega$	-	-500	-	$\text{V}/\mu\text{S}$

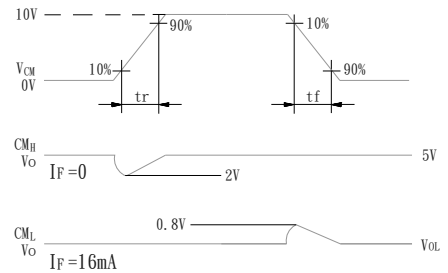
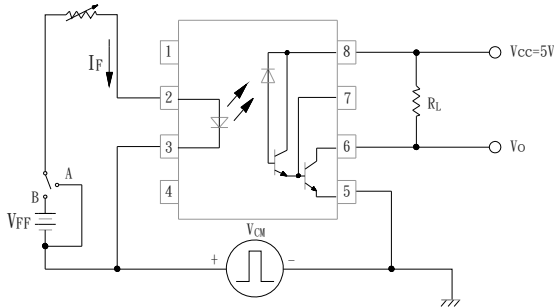
\*9 Instantaneous common mode rejection voltage "output(1)" represents a common mode voltage variation that can hold the output above (1) level ( $V_o > 2.0\text{V}$ )

\*10 Instantaneous common mode rejection voltage "output(0)" represents a common mode voltage variation that can hold the output above (0) level ( $V_o < 0.8\text{V}$ )

\*8 Tset Circuit Propagation Delay Time



\*10 Tset Circuit for Instantaneous Common Mode Rejection Voltage



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Fig.1 LED Forward Current vs. Forward Voltage

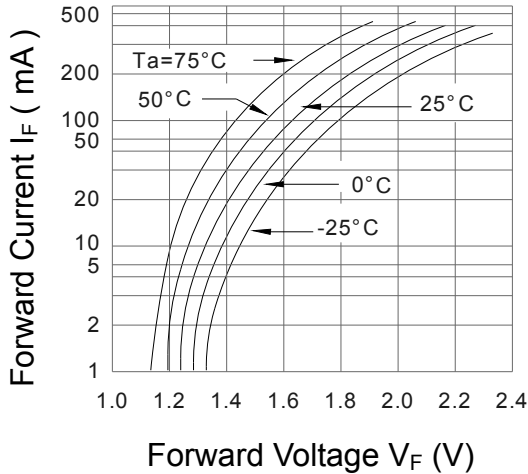


Fig.2 LED Forward Current vs. Ambient Temperature

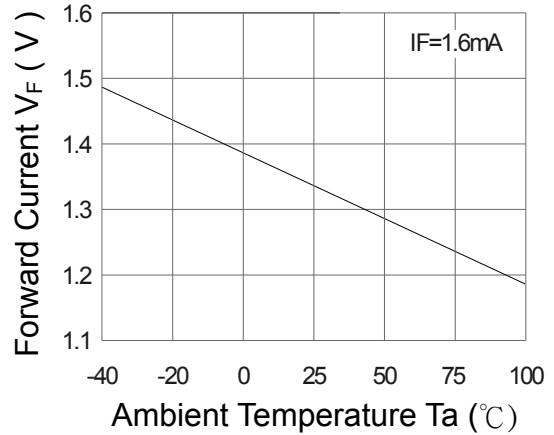


Fig.3 Response and Fall Time vs. Load Resistance

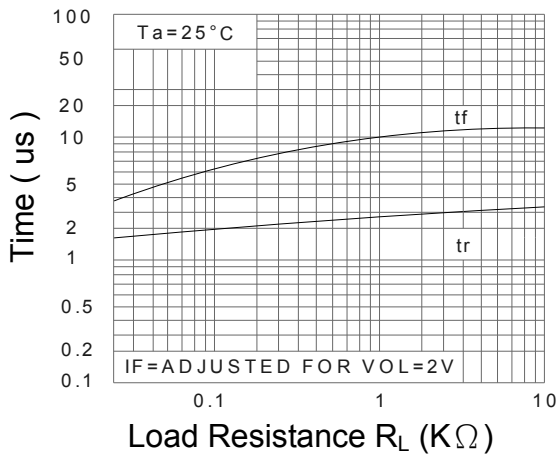


Fig.4 Current Transfer Ratio vs. Forward Current

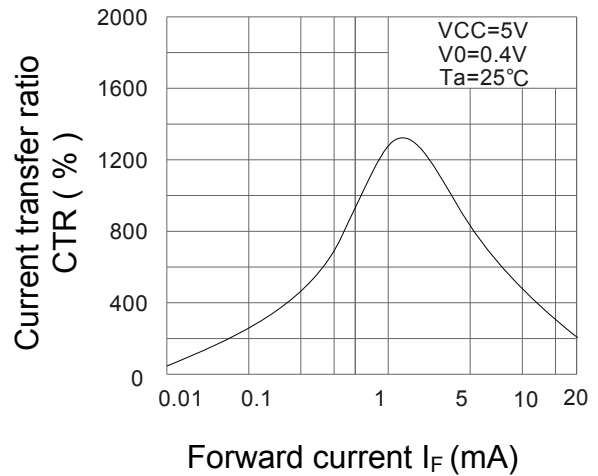


Fig.5 Current Transfer Ratio vs. Base-Emitter Resistance

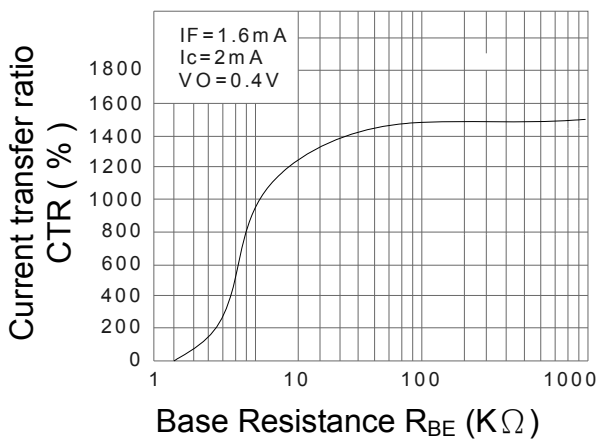
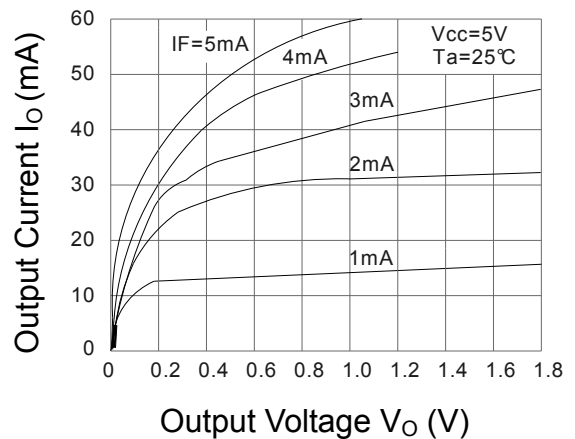


Fig.6 Output Current vs. Output Voltage



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Fig.7 Output Current vs. Input Diode Forward Current

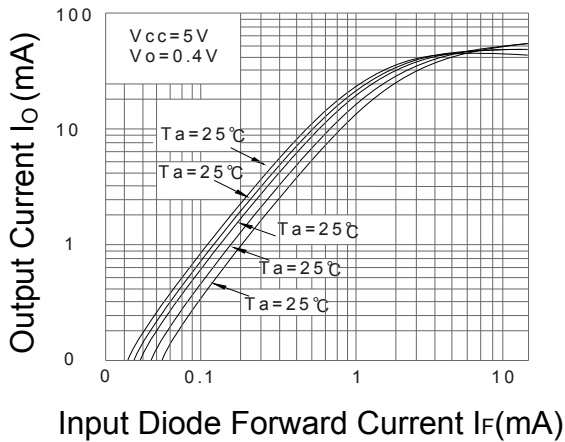


Fig.8 Logic Low Supply Current vs. Input Diode Forward Current

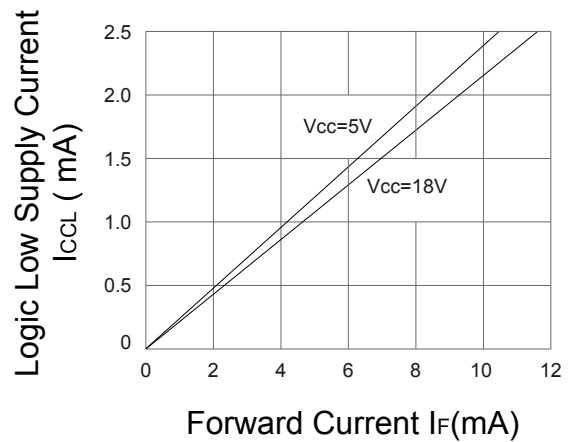


Fig.9 Propagation Delay vs. Input Diode Forward Current

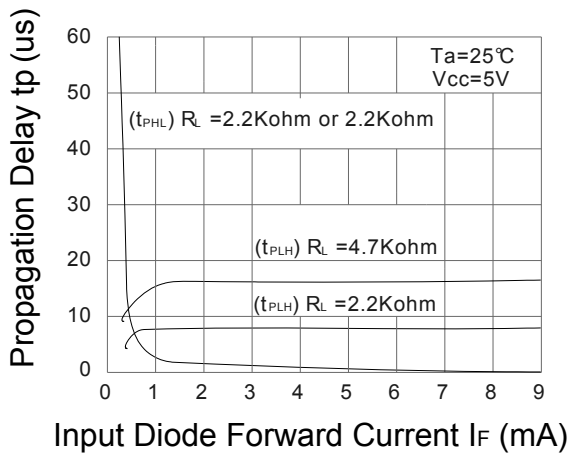
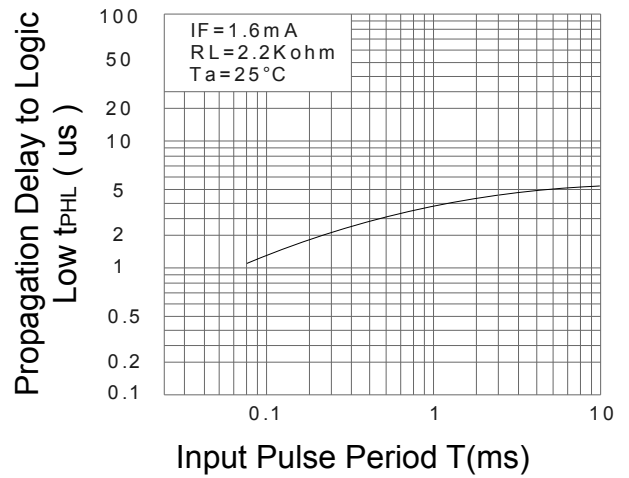


Fig.10 Propagation Delay to Logic Low vs. Pulse Period



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