

PRODUCT SPECIFICATION

DATE:05/23/2006

cosmo ELECTRONICS CORPORATION	Photocoupler : KPC6N137	NO.60P51012	REV
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Super High Speed Response Photocoupler

Features

1. Super high speed response (t_{PLH}, t_{PHL} :typ.45ns at $R_L=350$ ohm).
2. Instantaneous common mode rejection voltage(CMH :typ. 500V/us).
3. High isolation voltage between input and output (Viso:2500Vrms).
4. Low input current drive (I_{FHL} : Max. 5mA).
5. LSTTL and TTL compatible output.

Applications

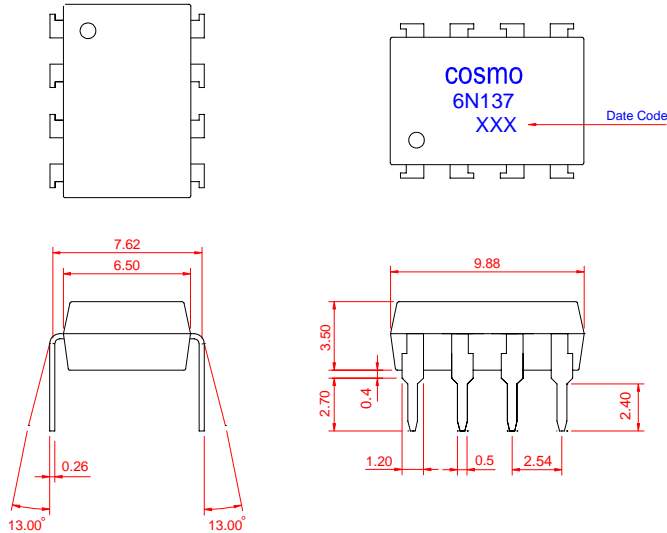
1. High speed interfaces for computer peripherals, microcomputer systems.
2. High speed line receivers.
3. Noise reduction.
4. Interfaces for data transmission equipment.

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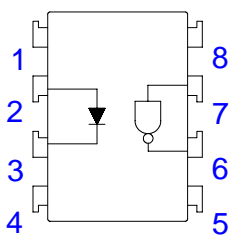
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1. OUTSIDE DIMENSION : UNIT (mm)



TOLERANCE : ± 0.2 mm

2. SCHEMATIC : Top View



- 1.NC
- 2.Anode
- 3.Cathode
- 4.NC
- 5.GND
- 6.Vo
- 7.VE
- 8.Vcc

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Absolute Maximum Ratings

(Ta=25)

Parameter	Symbol	Rating	Unit	
Input	Forward current (*1)	IF	25	mA
	Peak forward current (*2)	IFM	40	mA
	Reverse voltage	VR	5	V
	Power dissipation	PD	45	mW
Output	Supply voltage	VCC	7	V
	Enable voltage	VE	5.5	V
	High level output voltage	VOIL	7	V
	Low level output current	IOL	50	mA
	Output collector power dissipation	PC	85	mW
Isolation voltage 1 minute (*3)	Viso	2500	Vrms	
Operating temperature	Topr	-0 to +70		
Storage temperature	Tstg	-55 to +125		
Soldering temperature 10 second	Tsol	260		

Electro-optical Characteristics

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input forward voltage (*4)	VF	IF=10mA, Ta=25	-	1.6	1.75	V
Input reverse voltage	BVR	IR=10uA, Ta=25	5	-	-	V
Input capacitance	CIN	VF=0, f=1MHZ	-	60	-	pF
Logic (1) output current	IOH	VCC=5.5V, VO=5.5V, IF=250uA, VE=2.0V	-	2	250	uA
Logic (0) output voltage	VOL	VCC=5.5V, VEH=2V, IF=5mA, IOL(Sinking)=13mA	-	0.4	0.6	V
Logic (1) enable current	IEH	VCC=5.5V, VE=2.0V	-	-0.8	-	mA
Logic (0) enable current	IEL	VCC=5.5V, VE=0.5V	-2.0	-1.2	-	mA
Logic (1) supply current	ICCH	VCC=5.5V, VE=0.5V, IF=0mA	-	7	15	mA
Logic (0) supply current	ICCL	VCC=5.5V, VE=0.5V, IF=10mA	-	13	18	mA
Leak current (*5)	Ii-O	45%RH, Ta=25, t=5s, Vi-O=3000VDC	-	-	1.0	mA
Isolation resistance (input-output) (*5)	RI-O	Vi-O=500V, Ta=25	-	10 ¹²	-	
Capacitance (input-output) (*5)	CI-O	f=1MHZ, Ta=25	-	0.6	-	pF
Propagation delay time Output (0)→(1) (*7)	tPLH	IF=7.5mA, VCC=5V, RL=35, CL=15pF, Ta=25	-	45	75	ns
Propagation delay time Output (1)→(0) (*7)	tPHL		-	45	75	ns
Output rise-fall time (10 to 90%)	tr,tf	IF=7.5mA, VCC=5V, RL=35, CL=15pF	-	30	-	ns
Enable propagation delay time Output (1)→(0) (*8)	teLH	IF=7.5mA, RL=350, CL=15pF, VEH=3.0V, VEL=0.5V	-	40	-	ns
Enable propagation delay time Output (0)→(1) (*8)	teHL		-	15	-	ns
Instantaneous common mode rejection voltage "output(0)" (*9)	CMH	IF=0mA, VCM=10V, VO(Min)=2.0V, RL=350	-	500	-	V/us
Instantaneous common mode rejection voltage "output(1)" (*9)	CML	IF=5mA, VCM=10V, VO(Max)=0.8V, RL=350	-	-500	-	V/us

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Note) Typical values are all at $V_{CC} = 5V$, $T_a = 25^\circ C$

- *1 $T_a = 0$ to $70^\circ C$.
- *2 Pulse width $\leq 1ms$
- *3 40 to 80%RH AC for 1 minute, $f = 60HZ$.
- *4 At $I_{in} = 10mA$, V_F decreases at the rate of $1.6mV/^\circ C$ if the temperature goes up.*6 $T_a = 0$ to $70^\circ C$.
- *5 Measured as 2-pin element. Connect pins 2 and 3, connect pins 5, 6, 7 and 8.
- *6 DC current transfer ratio is defined as the ratio of output collector current to forward bias input current.
- *7 Refer to the Fig. 1.
- *8 Refer to the Fig. 2.
- *9 CMH represents a common mode voltage ignorable rise time ratio that can hold logic (1) state in output.
CML represents a common mode voltage ignorable fall time ratio that can hold logic (0) state in output.

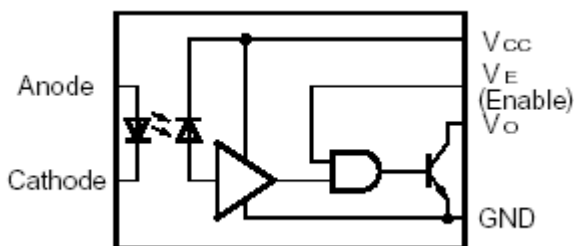
Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Low level input current	I_{FL}	0	250	μA
High level input current	I_{FH}	7.0	15	mA
High level enable voltage	V_{EH}	2.0	V_{CC}	V
Low level enable voltage	V_{EL}	0	0.8	V
Supply voltage	V_{CC}	4.5	5.5	V
Fanout (TTL load)	N	-	8	-
Operating temperature	T_{opr}	0	70	

Truth Table

Input	Enable	Ouput
H	H	L
L	H	H
H	L	H
L	L	H

Circuit Block Diagram



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Fig.1 Test Circuit for Propagation Delay time

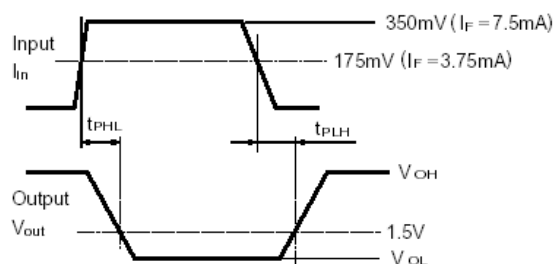
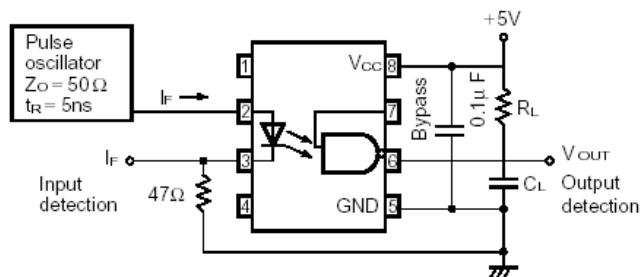


Fig.2 Test Circuit for Enable Propagation Delay Time

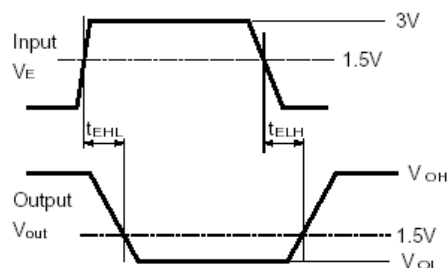
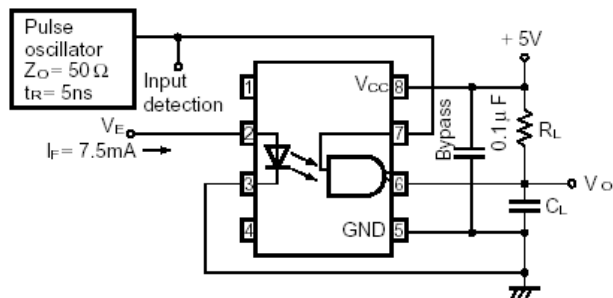
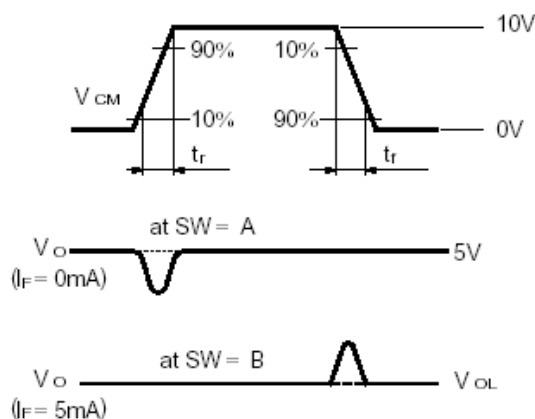
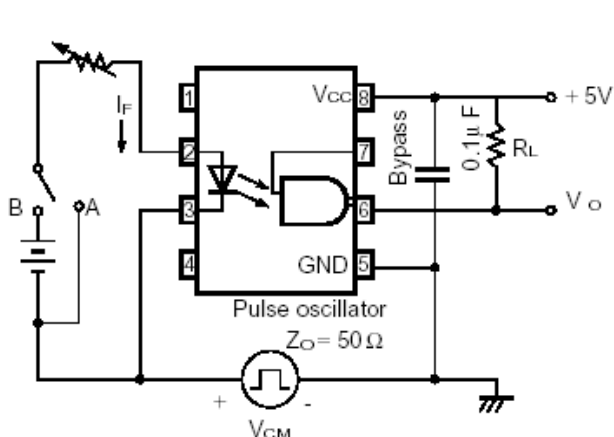


Fig.3 Test Circuit for Instantaneous Common Mode Rejection Voltage



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- Telecommunication equipment (trunk lines).
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Fig.1 Low Level Output Voltage vs. Ambient Temperature

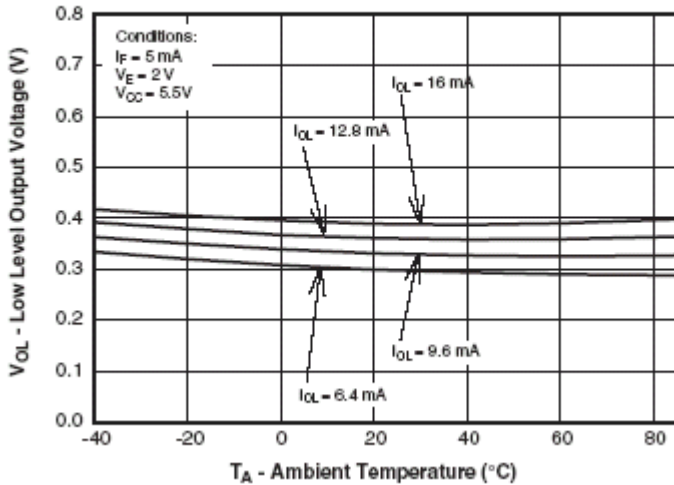


Fig.2 Input Diode Forward Voltage vs. Forward Current

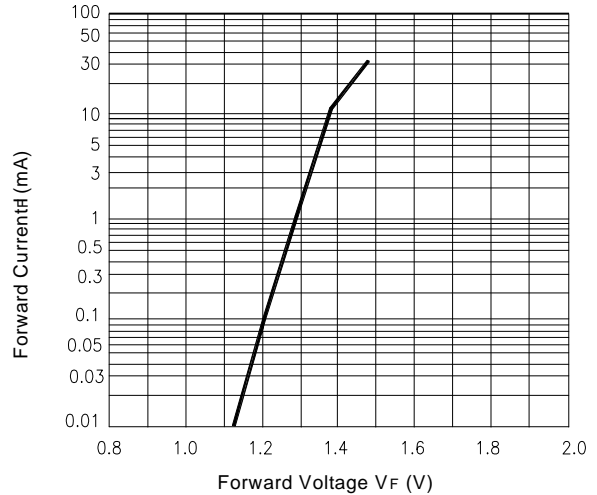


Fig.3 Switching Time vs. Forward Current

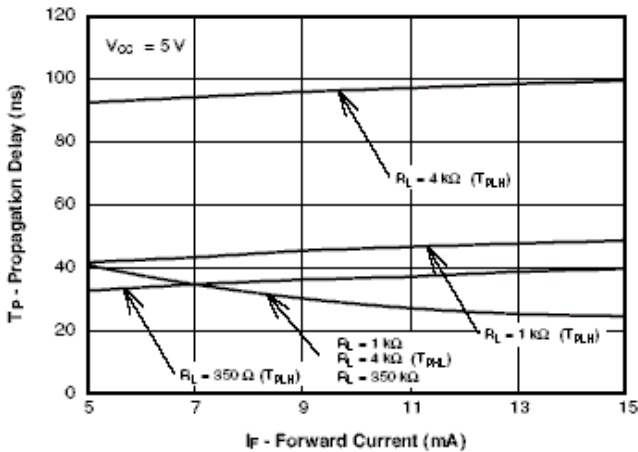


Fig.4 Low Level Output Current vs. Ambient Temperature

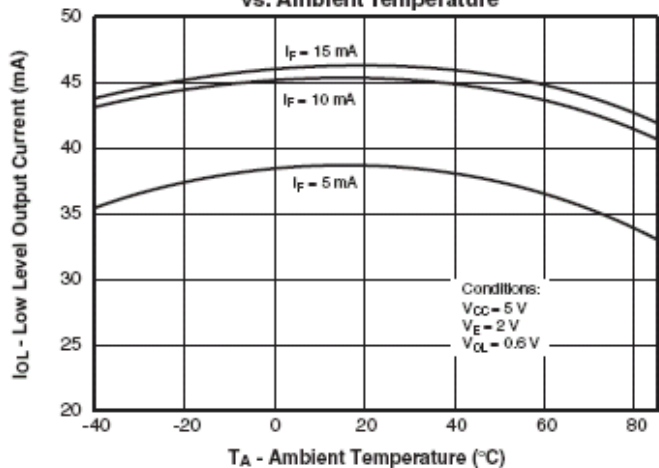


Fig.5 Input Threshold Current vs. Ambient Temperature

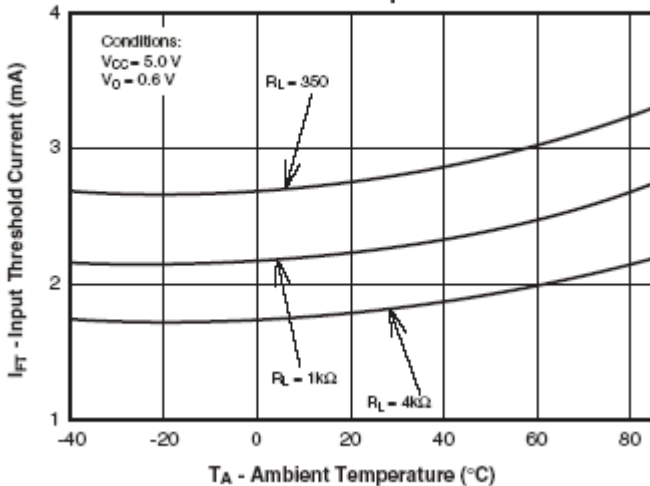
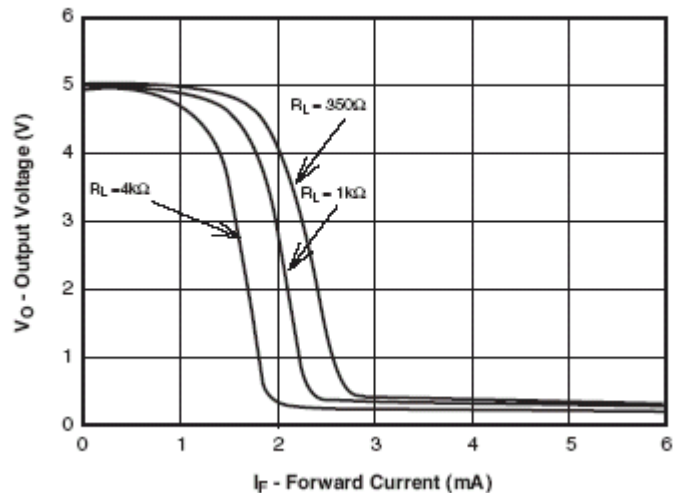


Fig.6 Output Voltage vs. Input Forward Current



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Fig. 7 Pulse Width Distortion vs. Temperature

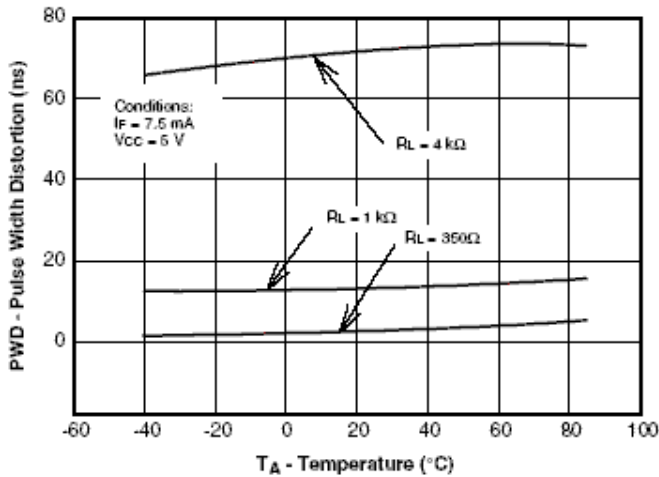


Fig. 8 Rise and Fall Time vs. Temperature

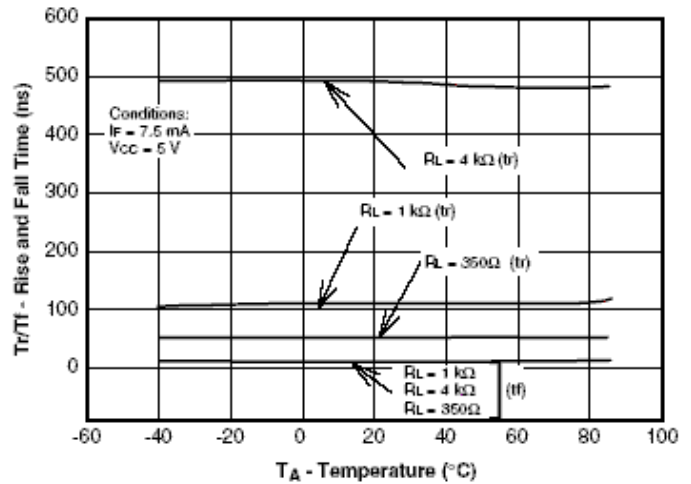


Fig. 9 Enable Propagation Delay vs. Temperature

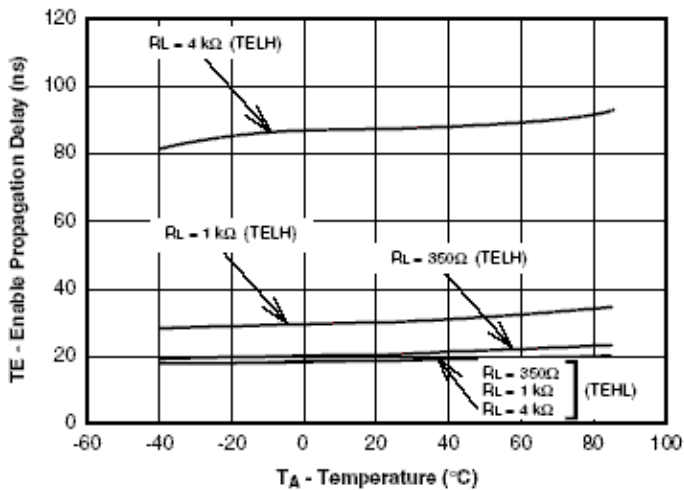


Fig. 10 Switching Time vs. Temperature

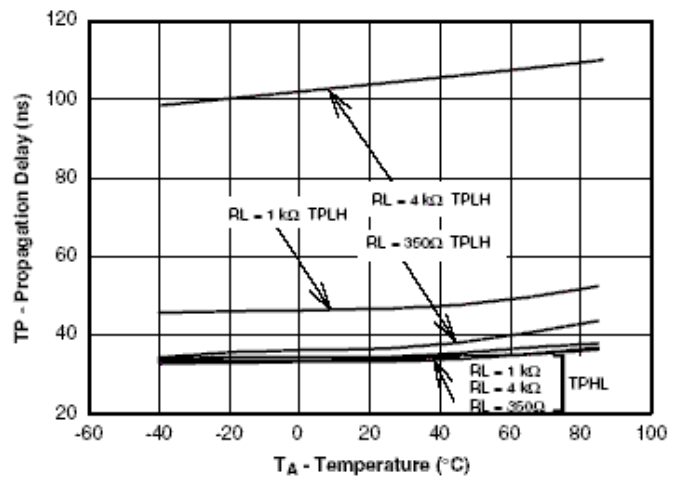


Fig. 11 High Level Output Current vs. Temperature

