PRODUCT SPECIFICATION

General Purpose Type Photocoupler

●Features

1. Pb free and RoHS compliant.

2. High current transfer ratio

   (CTR:MIN.300% at I_F =1.6mA)

3. High speed response

   (t_{PHL}:TYP.2us at R_L =2.2kΩ)

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.

PRODUCT SPECIFICATION

DATE: 03/26/2012

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Photocoupler :

KPC6N138

NO.60P51003

SHEET 2 OF 7

REV. 2

1. OUTSIDE DIMENSION

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6N138
XXX ←——— Date code

7.62
6.50
0.26
13.00°
13.00°

9.68
3.50
3.00
0.4
2.70
1.20
0.5
2.54
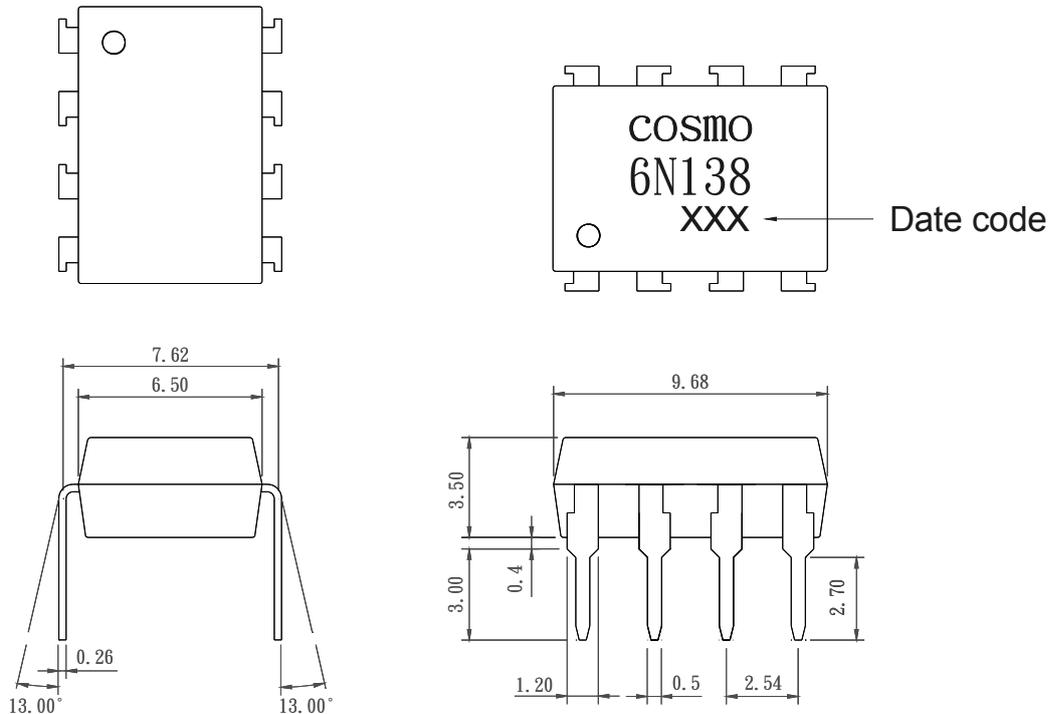
TOLERANCE : ±0.2mm

2. SCHEMATIC : TOP VIEW

8 7 6 5

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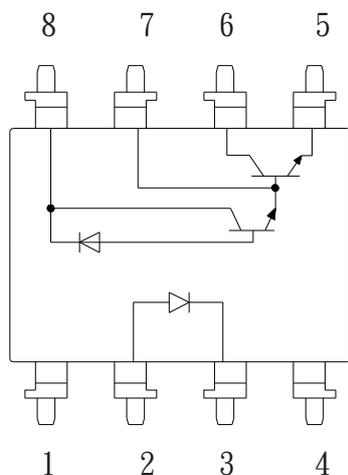
1. NC
2. Anode
3. Cathode
4. NC
5. GND
6. Vo
7. V_B
8. Vcc

PRODUCT SPECIFICATION

●Absolute Maximum Ratings

(Ta=25℃)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I_F	20	mA
	*1Peak forward current	I_F	40	mA
	*2Peak forward current	I_{FM}	1	A
	Reverse voltage	V_R	5	V
	Power dissipation	P_D	35	mW
Output	Supply voltage	V_{CC}	-0.5 to 7	V
	Output voltage	V_O	-0.5 to 7	V
	Emitter-base reverse with-stand voltage (Pin 5 to 7)	V_{EBO}	0.5	V
	*3Average output current	I_O	60	mA
	Power dissipation	P_O	100	mW
	*4Isolation voltage 1 minute	V_{iso}	5000	Vrms
	Operating temperature	T_{opr}	-40 to +100	℃
	Storage temperature	T_{stg}	-55 to +125	℃
	*5Soldering temperature	T_{sol}	260	℃

*1 50% duty cycle, pulse width : 1mS
*2 Pulse width<=1uS,300 pulse/sec
*3 Decreases at the rate of 0.7mA/℃ if the external temperature is 25℃ or more
*4 40% to 60% RH,AC for 1 minute
*5 For 10 seconds

●Electro-optical Characteristics

(Ta=0 to +70℃ unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
*6 Current transfer ratio	CTR	I_F=1.6mA Vo=0.4V,Vcc=4.5V	300	1600	-	%
Logic (0) output volage	V_{OL}	I_F=1.6mA Io=4.8mA,Vcc=4.5V	–	0.1	0.4	V
Logic (1) output current	I_{OH}	I_F=0,Vo=Vcc=7V	-	0.1	250	uA
Logic (0) supply current	I_{CCL}	I_F=1.6mA,Vo=open,Vcc=5V	–	0.5	-	mA
Logic (1) supply current	I_{CCH}	I_F=0,VO=open,Vcc=5V	-	10	-	nA
Input forward voltage	V_F	Ta=25℃,I_F=1.6mA	-	1.5	1.7	V
Input forward voltage temperature coefficient	$\triangle V_F/\triangle Ta$	I_F=1.6mA	-	-1.9	-	mV/℃
Input reverse voltage	BV_R	Ta=25℃,I_R=10uA	5.0	-	-	V
Input capacitance	C_{IN}	V_F=0,f=1MHz	-	60	-	pF
*7 Leak current(input-output)	I_{I-O}	Ta=25℃,45% RH V_{I-O}=3kVDC,t=5s	-	-	1.0	uA
*7 Isolation resistance(input-output)	R_{I-O}	V_{I-O}=500VDC	–	10^{12}	-	Ω
*7 Capacitance(input-output)	C_{I-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)

PRODUCT SPECIFICATION

COSMO ELECTRONICS CORPORATION	**Photocoupler :** **KPC6N138**	**NO.60P51003** **SHEET 4 OF 7**	**REV. 2**

●Switching Characteristics

(Ta=25℃ ,Vcc=5V)

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

*9 Instantaneous common mode rejection voltage "output(1)" represents
  a common mode voltage variation that can hold the output above (1) level (Vo > 2.0V)
*10 Instantaneous common mode rejection voltage "output(0)" represents.
  a common mode voltage variation that can hold the output above (0) level (Vo < 0.8V)

*8 Tset Circuit Propagation Delay Time
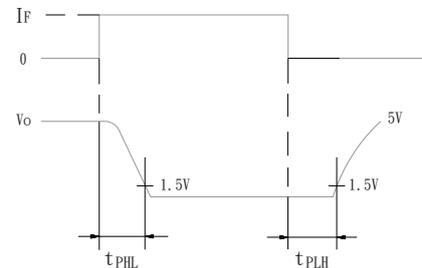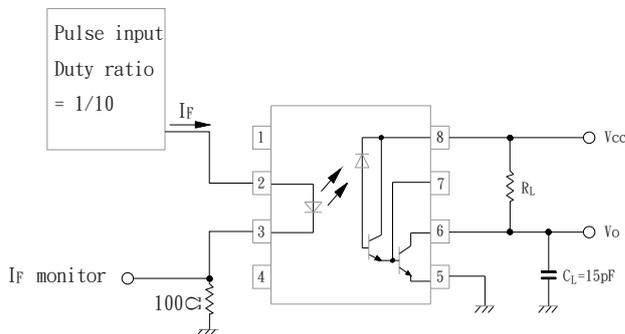
*10 Tset Circuit for Instantaneous Common Mode Rejection Voltage
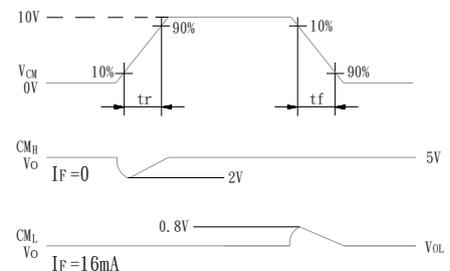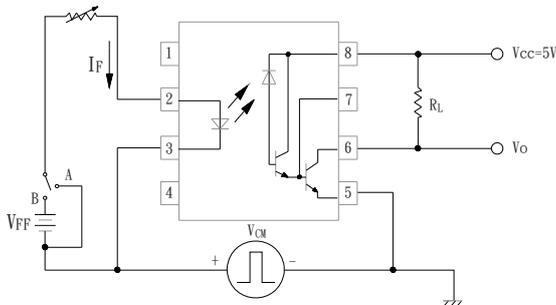
PRODUCT SPECIFICATION

cosmo ELECTRONICS CORPORATION	Photocoupler : **KPC6N138**	NO.60P51003 SHEET 5 OF 7	REV. 2

Fig.1 **LED Forward Current vs. Forward Voltage**
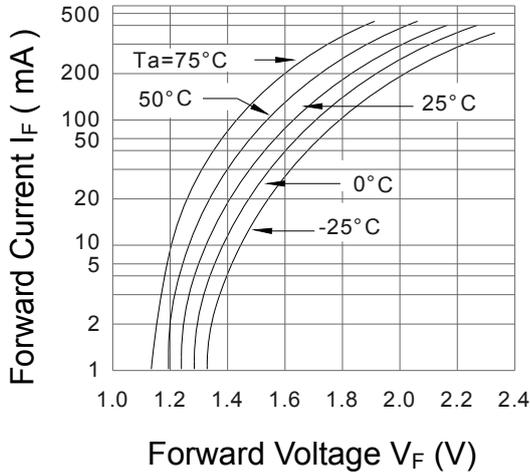

Fig.2 **LED Forward Current vs. Ambient Temperature**
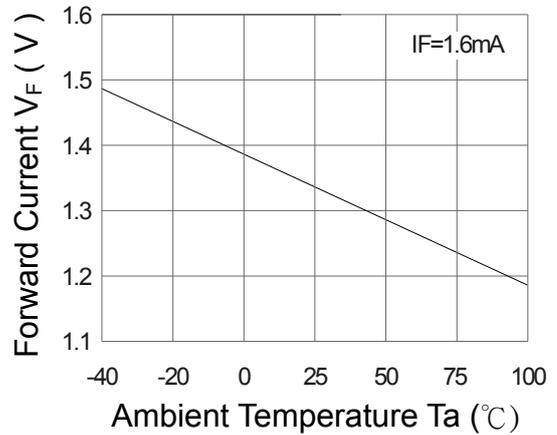

**Fig.3** **Response and Fall Time vs. Load Resistance**
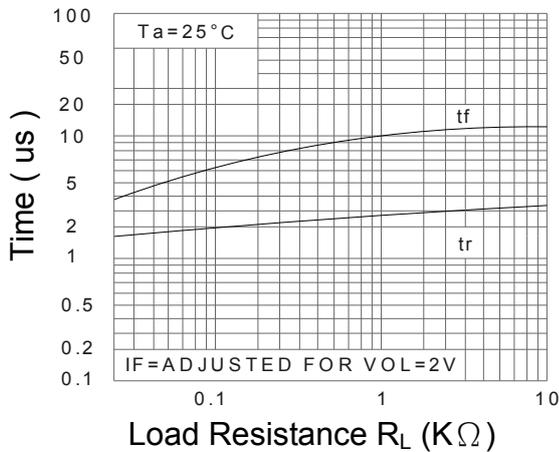

Fig.4 **Current Transfer Ratio vs. Forward Current**
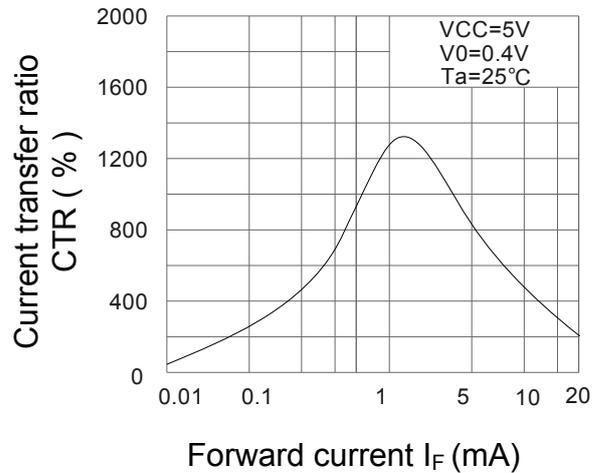

Fig.5 **Current Transfer Ratio vs. Base-Emitter Resistance**

Fig.6 **Output Current vs. Output Voltage**

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Photocoupler :

KPC6N138

Fig.7 **Output Current vs. Input Diode Forward Current**

Vcc=5V
Vo=0.4V
Ta=25℃
Ta=25℃
Ta=25℃
Ta=25℃
Ta=25℃

Output Current I_O (mA)

Input Diode Forward Current I_F (mA)
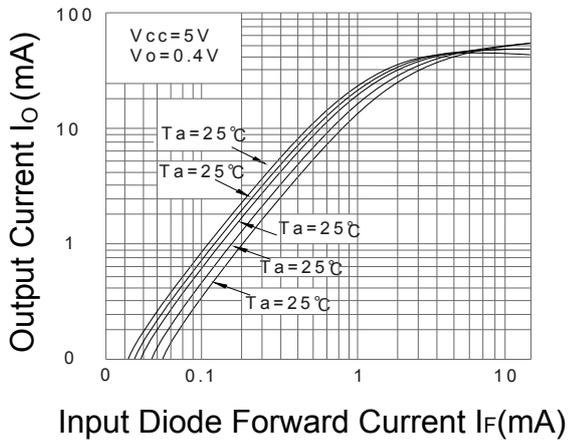
Fig.8 **Logic Low Supply Current vs. Input Diode Forward Current**

Vcc=5V
Vcc=18V

Logic Low Supply Current I_{CCL} (mA)

Forward Current I_F (mA)
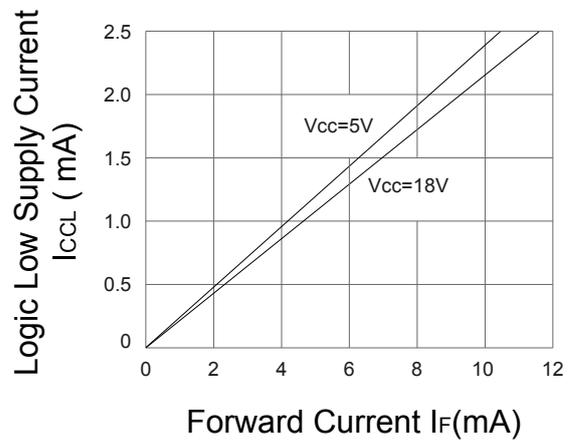
Fig.9 **Propagation Delay vs. Input Diode Forward Current**

Ta=25℃
Vcc=5V

(t_{PHL}) R_L =2.2Kohm or 2.2Kohm

(t_{PLH}) R_L =4.7Kohm

(t_{PLH}) R_L =2.2Kohm

Propagation Delay tp (us)

Input Diode Forward Current I_F (mA)
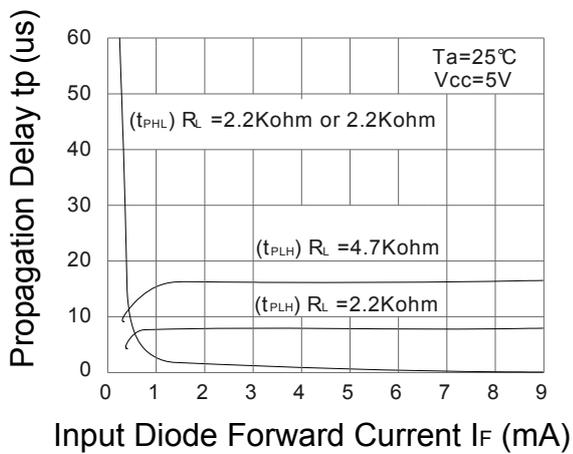
Fig.10 **Propagation Delay to Logic Low vs. Pulse Period**

IF=1.6mA
RL=2.2Kohm
Ta=25℃

Propagation Delay to Logic Low t_{PHL} (us)

Input Pulse Period T(ms)

PRODUCT SPECIFICATION

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