6N136

General Purpose Type *OPIC Photocoupler

■ Features

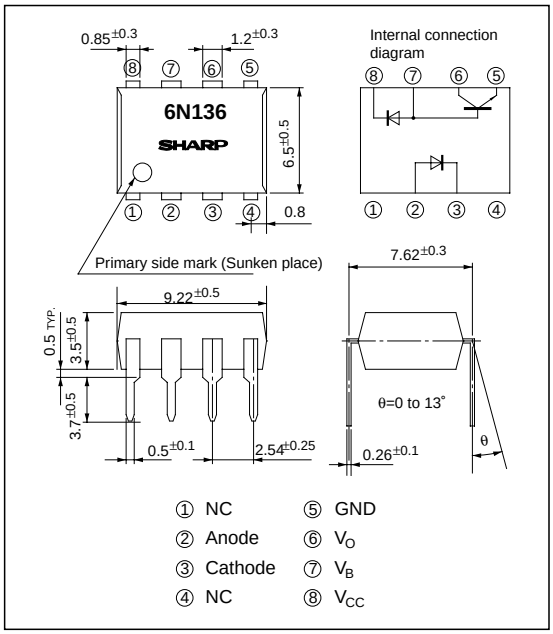
1. High speed response
   (t_{PHL}, t_{PLH} : MAX.0.8μs at R_L=1.9kΩ)
2. High common mode rejection voltage
   (CM_H : TYP. 1kV/μs)
3. Standard dual-in-line package
4. Recognized by UL, file No. E64380

■ Applications

1. Computers, measuring instruments, control equipment
2. High speed line receivers, high speed logic
3. Telephone sets
4. Signal transmission between circuits of different potentials and impedances

■ Outline Dimensions

(Unit : mm)



* "OPIC" (Optical IC) is a trademark of the SHARP Corporation. An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a single chip.

■ Absolute Maximum Ratings

(Ta=25˚C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	25	mA
	*1Peak forward current	I_F	50	mA
	*2Peak transient forward current	I_{FM}	1	A
	Reverse voltage	V_R	5	V
	Power dissipation	P	45	mW
Output	Supply voltage	V_{CC}	−0.5 to +15	V
	Output voltage	V_O	−0.5 to +15	V
	Emitter-base reverse withstand voltage (Pin 5 to 7)	V_{EBO}	5	V
	Average output current	I_O	8	mA
	Peak output current	I_{OP}	16	mA
	Base current (Pin 7)	I_B	5	mA
	Power dissipation	P_O	100	mW
*3Isolation voltage		$V_{iso(rms)}$	2.5	kV
Operating temperature		T_{opr}	−55 to +100	˚C
Storage temperature		T_{stg}	−55 to +125	˚C
*4Soldering temperature		T_{sol}	260	˚C

*1 50% duty cycle, Pulse width=1ms
Decreases at the rate of 1.6mA/˚C if the external temperature is 70˚C or more.
*2 Pulse width≤1μs, 300pulse/s
*3 40 to 60% RH, AC for 1 minute
*4 For 10 seconds

■ Electro-optical Characteristics

(Ta=0 to 70˚C unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
*5 Current transfer ratio	$CTR_{(1)}$	Ta=25˚C, I_F=16mA V_O=0.4V, V_{CC}=4.5V	19	40	–	%
	$CTR_{(2)}$	I_F=16mA, V_O=0.5V V_{CC}=4.5V	15	43	–	%
Logic (0) output voltage	V_{OL}	I_F=16mA, V_{CC}=4.5V, I_O=2.4mA	–	0.1	0.4	V
Logic (1) output current	$I_{OH(1)}$	Ta=25˚C, I_F=0 V_{CC}=V_O=5.5V	–	3.0	500	nA
	$I_{OH(2)}$	Ta=25˚C, I_F=0 V_{CC}=V_O=15V	–	0.01	1.0	μA
	$I_{OH(3)}$	I_F=0, V_{CC}=V_O=15V	–	–	50	μA
Logic (0) supply current	I_{CCL}	I_F=16mA, V_{CC}=15V V_O=open	–	200	–	μA
Logic (1) supply current	$I_{CCH(1)}$	Ta=25˚C, V_{CC}=15V V_F=open, I_O=0	–	0.02	1.0	μA
	$I_{CCH(2)}$	V_{CC}=15V V_O=open, I_F=0	–	–	2.0	μA
Input forward voltage	V_F	Ta=25˚C, I_F=16mA	–	1.7	1.95	V
Input forward voltage temperature coefficient	$\Delta V_F / \Delta T_a$	I_F=16mA	–	–1.9	–	mV / ˚C
Input reverse voltage	BV_R	Ta=25˚C, I_R=10mA	5.0	–	–	V
Input capacitance	C_{IN}	V_F=0, f=1MHz	–	60	–	pF
*6 Leak current (input-output)	I_{I-O}	Ta=25˚C, 45%RH, t=5s V_{I-O}=3kVDC	–	–	1.0	μA
*6 Isolation resistance (input-output)	R_{I-O}	V_{I-O}=500VDC	–	10^{12}	–	Ω
*6 Capacitance (input-output)	C_{I-O}	f=1MHz	–	0.6	–	pF
Transistor current amplification factor	h_{FE}	V_O=5V, I_O=3mA	–	70	–	

*5 Current transfer ratio is the ratio of input current and output current expressed in %.
*6 Measured as 2-pin element (Short 1, 2, 3, 4 and 5, 6, 7, 8)

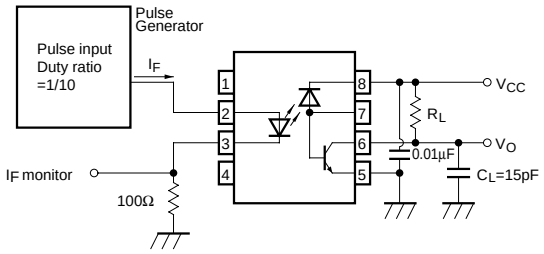
■ Switching Characteristics

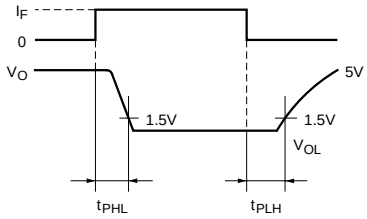
(Ta=25˚C, V_{CC} =5V, I_F =16mA)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
*8 *9 Propagation delay time Output (1) → (0)	t_{PHL}	R_L=1.9kΩ	–	0.3	0.8	μs
*8 *9 Propagation delay time Output (0) → (1)	t_{PLH}	R_L=1.9kΩ	–	0.3	0.8	μs
*10 *11 Instantaneous common mode rejection voltage " output (1) "	CM_H	I_F=0, V_{CM}=10V_{P-P}, R_L=1.9kΩ	–	1.0	–	kV/μs
*10 *11 Instantaneous common mode rejection voltage " output (0) "	CM_L	V_{CM}=10V_{P-P}, I_F=16mA, R_L=1.9kΩ	–	–1.0	–	kV/μs
*12 Bandwidth	BW	R_L=100Ω	–	2.0	–	MHz

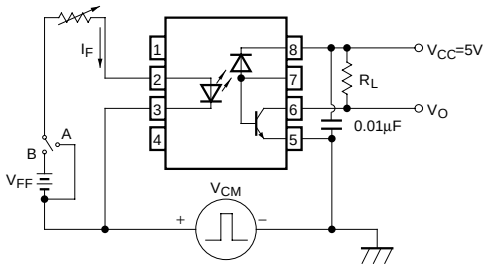
*8 R_L=1.9kΩ is equivalent to one LSTTL and 5.6kΩ pull-up resistor.
*10 Instantaneous common mode rejection voltage " output (1) " represents a common mode voltage variation that can hold the output above (1) level (V_O>2.0V)
Instantaneous common mode rejection voltage " output (0) " represents a common mode voltage variation that can hold the output above (0) level (V_O<0.8V)
*12 Bandwidth represents a point where AC input gose down by 3dB.

*9 Test Circuit for Propagation Delay Time





*11 Test Circuit for Instantaneous Common Mode Rejection Voltage



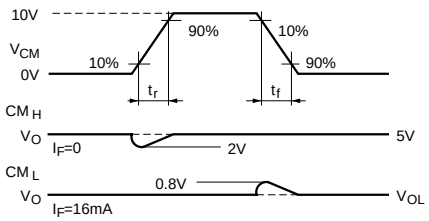


Fig. 1 Forward Current vs. Ambient Temperature

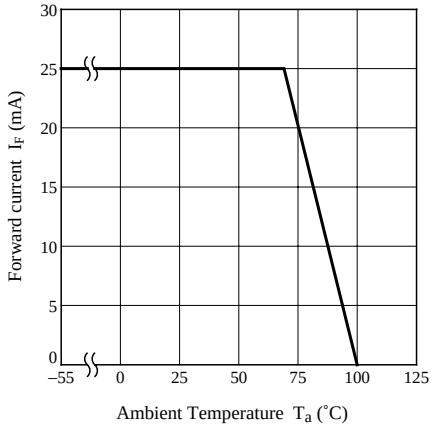


Fig. 2 Power Dissipation vs. Ambient Temperature

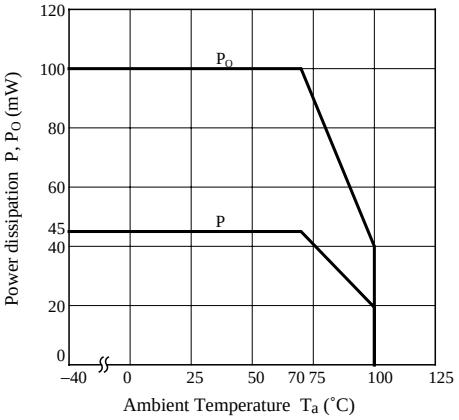


Fig. 3 Forward Current vs. Forward Voltage

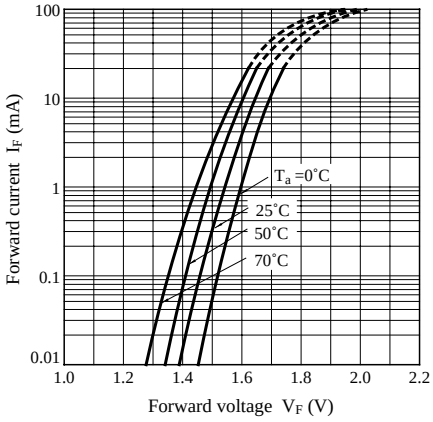


Fig. 4 Relative Current Transfer Ratio vs. Forward Current

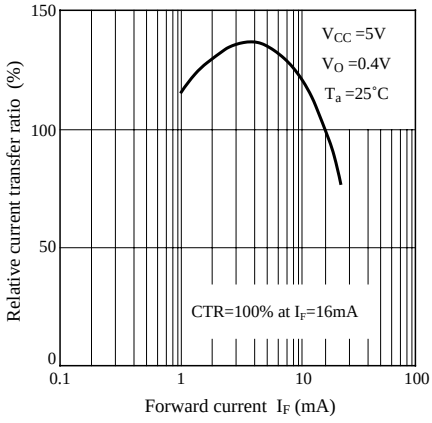


Fig. 5 Output Current vs. Output Voltage

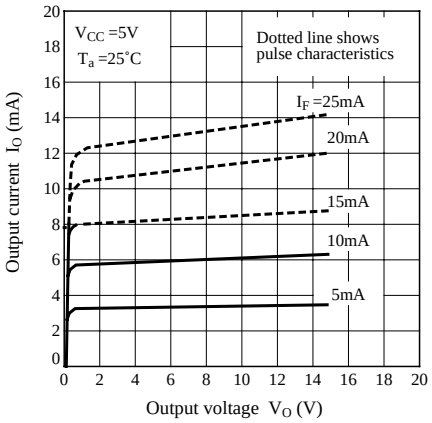


Fig. 6 Relative Current Transfer Ratio vs. Ambient Temperature

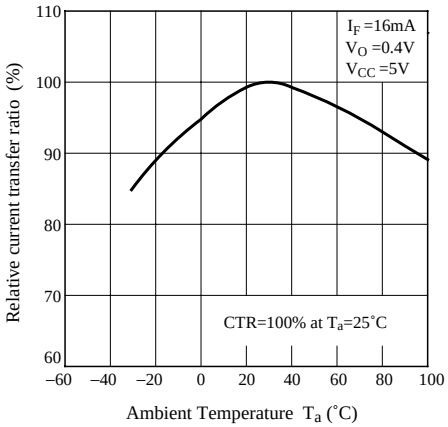


Fig. 7 Propagation Delay Time vs. Ambient Temperature

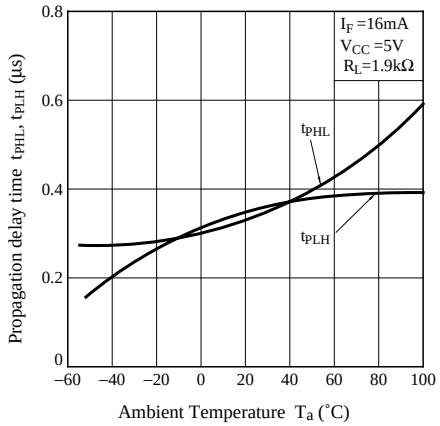


Fig. 8 High Level Output Current vs. Ambient Temperature

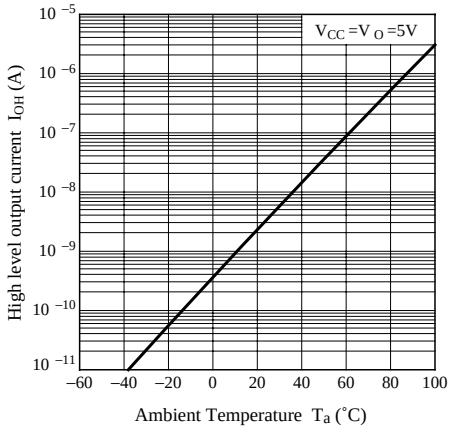
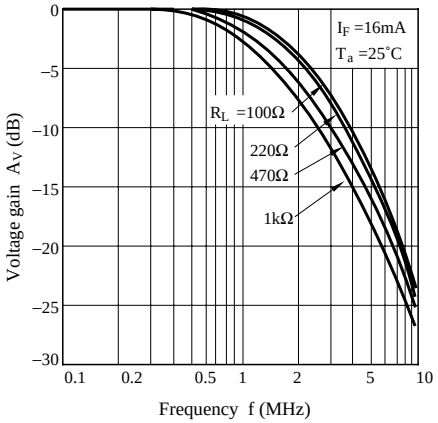
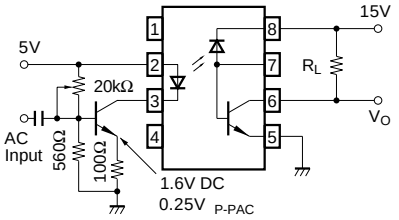


Fig. 9 Frequency Response



Test Circuit for Frequency Characteristic



■ Precaution for use

(1) It is recommended that a by-pass capacitor of more than 0.01µF be added between V_{CC} and GND near the device in order to stabilize power supply line.

(2) Transistor of detector side in bipolar configuration is apt to be affected by static electricity for its minute design. When handling them, general conterplan against static electricity should be taken to avoid breakdown of devices or degradation of characteristics.

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— Telecommunication equipment [terminal]
— Test and measurement equipment
— Industrial control
— Audio visual equipment
— Consumer electronics

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— Traffic signals
— Gas leakage sensor breakers
— Alarm equipment
— Various safety devices, etc.

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— Telecommunication equipment [trunk lines]
— Nuclear power control equipment
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