High Speed Type Photocoupler

6N135 / 6N136 Series

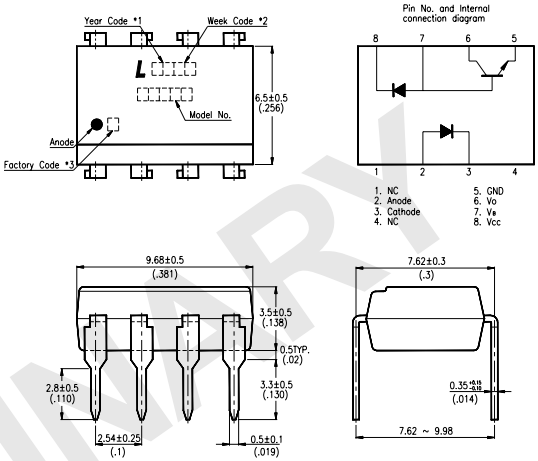
Features

- High speed response t_{PHL}, t_{PLH}
  (6N135 MAX. 1.5 μ s at RL=4.1k Ω)
  (6N136 MAX. 0.8 μ s at RL=1.9k Ω)
- High common mode rejection voltage
  (CM_H : TYP. 1kV / μ s)
- Options Available :
  - Leads with 0.4" (10.16mm) Spacing (M Type)
  - Lead Bends for Surface Mounting (S Type)
  - Tape and Reel of Type I for SMD (Add "-TA" Suffix)
  - Tape and Reel of Type II for SMD (Add "-TA1" Suffix)
  - VDE 0884 Approvals (Add "-V" Suffix)

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

Package Dimensions



NOTES :

1. Year date code.
2. 2-digit work week.
3. Factory code shall be marked (Z : Taiwan, Y : Thailand).
4. Model No.: 6N135 ; 6N136
5. All dimensions are in millimeters (inches).
6. Tolerance is $\pm$ 0.25mm (.010") unless otherwise noted.
7. Specifications are subject to change without notice.

■ Ordering Information

Part Number	Package	Application part number
6N135 6N135M 6N135S 6N135S-TA 6N135S-TA1	8-pin DIP 8-pin (leads with 0.4" spacing) 8-pin (lead bends for surface mount) 8-pin (tape and reel packaging of type I) 8-pin (tape and reel packaging of type II)	6N135
6N136 6N136M 6N136S 6N136S-TA 6N136S-TA1	8-pin DIP 8-pin (leads with 0.4" spacing) 8-pin (lead bends for surface mount) 8-pin (tape and reel packaging of type I) 8-pin (tape and reel packaging of type II)	6N136
6N135-V 6N135M-V 6N135S-V 6N135STA-V 6N135STA1-V	8-pin DIP 8-pin (leads with 0.4" spacing) 8-pin (lead bends for surface mount) 8-pin (tape and reel packaging of type I) 8-pin (tape and reel packaging of type II)	6N135
6N136-V 6N136M-V 6N136S-V 6N136STA-V 6N136STA1-V	8-pin DIP 8-pin (leads with 0.4" spacing) 8-pin (lead bends for surface mount) 8-pin (tape and reel packaging of type I) 8-pin (tape and reel packaging of type II)	6N136

Ratings and Characteristics
Absolute Maximum Ratings

(Ta=25℃)

Parameter		Symbol	Rating	Unit
Input	Forward Current	I_F	25	mA
	Reverse Voltage	V_R	5	V
	Power Dissipation	P	45	mW
Output	Supply Voltage	V_{CC}	-0.5~+15	V
	Output Voltage	V_O	-0.5~+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
*1.Isolation Voltage		V_{iso}	2,500	Vrms
Operating Temperature		T_{opr}	-55~+100	℃
Storage Temperature		T_{stg}	-55~+125	℃
*2.Soldering Temperature		T_{sol}	260	℃

*1. AC for 1 minute, R.H. = 40 ~ 60%
Isolation voltage shall be measured using the following method.
(1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.
(2) The isolation voltage tester with zero-cross circuit shall be used.
(3) The waveform of applied voltage shall be a sine wave.

*2. For 10 seconds

Electrical / Optical Characteristics

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

Parameter		Symbol	Min.	Typ.	Max.	unit	Conditions
Input Forward Voltage		V_F	–	1.8	1.95	V	Ta=25℃, I_F=16mA
Input Forward Voltage Temperature Coefficient		$\triangle V_F / \triangle T_a$	–	-1.9	–	mV/℃	I_F=16mA
Input Reverse Current		BV_R	5.0	–	–	V	Ta=25℃, I_R=10 μA
Input Capacitance		C_{IN}	–	60	–	pF	V_F=0, f=1MHz
*1 Current Transfer Ratio	6N135	CTR(1)	7.0	30	–	%	Ta=25℃, I_F=16mA V_O=0.4V, V_{CC}=4.5V
	6N136	CTR(1)	19	40	–	%	
	6N135	CTR(2)	5.0	33	–	%	I_F=16mA, V_O=0.5V V_{CC}=4.5V
	6N136	CTR(2)	15	43	–	%	
Logic (0) Output Voltage		V_{OL}	–	0.1	0.4	V	I_F=16mA V_{CC}=4.5V I_O=1.1mA
Logic (1) Output Current		I_{OH}(1)	–	3.0	500	nA	Ta=25℃, I_F=0 V_{CC}=V_O=5.5V
		I_{OH}(2)	–	0.01	1.0	μA	Ta=25℃, I_F=0 V_{CC}=V_O=15V
		I_{OH}(3)	–	–	50	μA	I_F=0, V_{CC}=V_O=15V
Logic (0) Output Voltage		I_{CCL}	–	–	200	μA	I_F=16mA, V_{CC}=15V V_O=open
Logic (1) Output Current		I_{CCH}(1)	–	0.02	1.0	μA	Ta=25℃, V_{CC}=15V V_O=open, I_F=0
		I_{CCH}(2)	–	–	2.0	μA	V_{CC}=15V V_O=open, I_F=0
*2 Isolation Resistance (Input-Output)		R_{I-O}	–	10^{12}	–	Ω	V_{I-O}=500VDC
Capacitance (Input-Output)		C_{I-O}	–	0.6	–	pF	f=1MHz
Transistor Current Amplification Factor		h_{FE}	–	150	–		V_O=5V, I_O=3mA

*1. Current transfer ratio is the ratio of input current and output current expressed in %.

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

Electrical / Optical Characteristics

(Ta = 25℃ V_{CC} = 5V, I_F = 16mA)

Parameter		Symbol	Min.	Typ.	Max.	unit	Conditions
*3 Propagation Delay time Output	6N135	t_{PHL}	–	0.2	1.5	μs	R_L=4.1kΩ
		t_{PLH}	–	1.1	1.5		
	6N136	t_{PHL}	–	0.2	0.8	μs	R_L=1.9KΩ
		t_{PLH}	–	0.5	0.8		
*4 Instantaneous common mode rejection voltage "output(1)"		CM_H	–	1000	–	V/μs	I_F=0, V_{CM}=10V_{P-P} R_L=*6
*5 Instantaneous common mode rejection voltage "output(0)"		CM_L	–	-1000	–	V/μs	V_{CM}=10V_{P-P} I_F=16mA , R_L=*6
*7 Bandwidth		BW	–	2.0	–	MHz	R_L=100Ω

*3 R_L = 4.1kΩ is equivalent to one LSTTL and 6.1kΩ pull-up resistor.

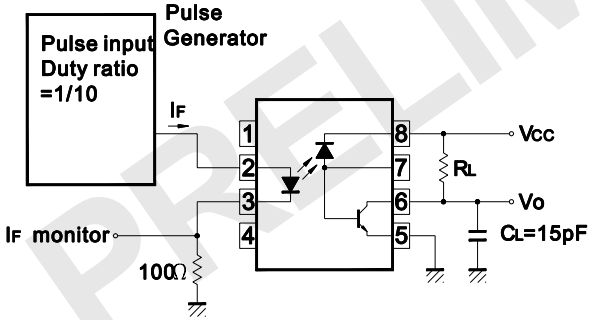
*4 Instantaneous common mode rejection voltage "output (1)" represents a common mode voltage variation that can hold the output above (1) level (Vo>2.0V).

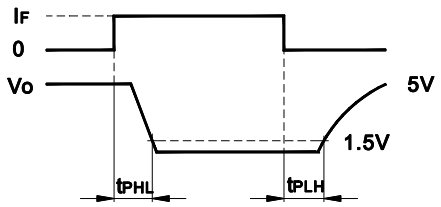
*5 Instantaneous common mode rejection voltage "output (0)" represents a common mode voltage variation that can hold the output above (0) level (Vo<0.8V).

*6 **6N135** : R_L=4.1kΩ **6N136** : R_L=1.9kΩ

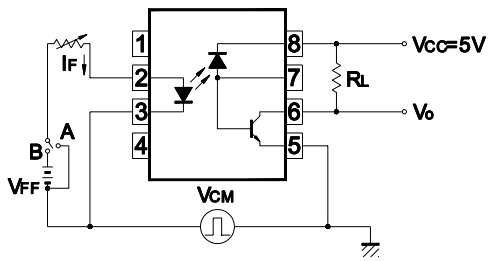
*7 Bandwidth represents a point where AC input goes down by 3dB.

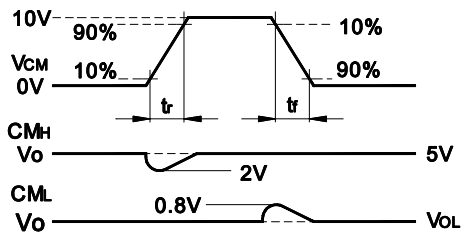
Test Circuit for Propagation Delay Time





Test Circuit for Instantaneous Common Mode Rejection Voltage





PHOTOCOUPLER

Typical Electrical/Optical Characteristic Curves (25℃Ambient Temperature Unless Otherwise Noted)

Fig.1 Forward Current vs. Ambient Temperature

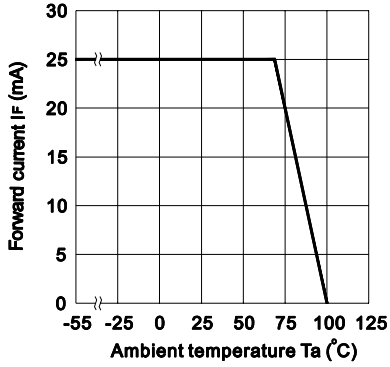


Fig.2 Collector Power Dissipation vs. Ambient Temperature

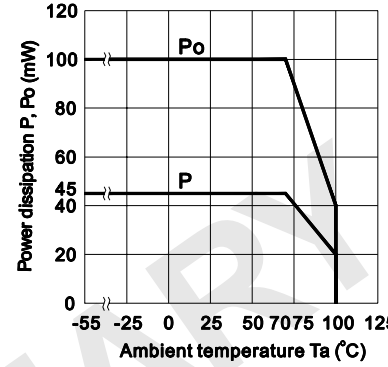


Fig.3 Forward Current vs. Forward Voltage

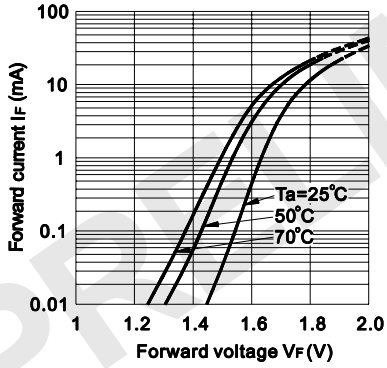


Fig.4 Relative Current Transfer Ration vs. Forward Current

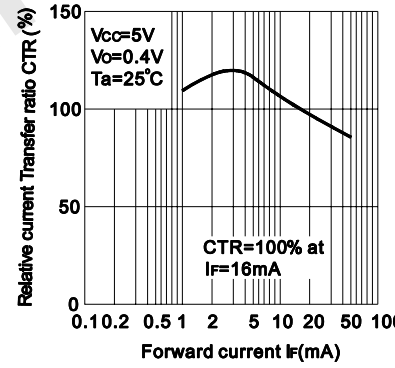


Fig.5 Output Current vs. Output Voltage

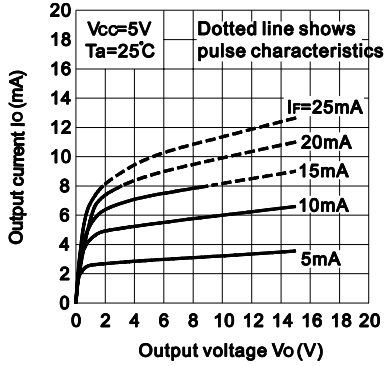


Fig.6 Relative Current Transfer Ratio vs. Ambient Temperature

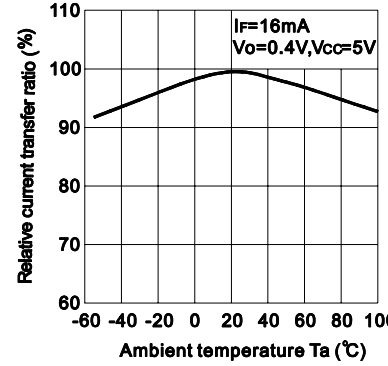


Fig.7 Propagation Delay Time vs. Ambient Temperature

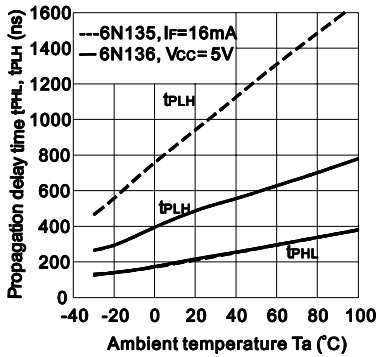


Fig.8 High Level Output Current vs. Ambient Temperature

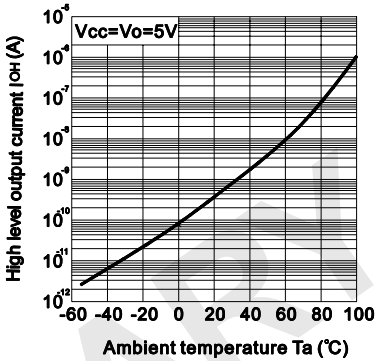
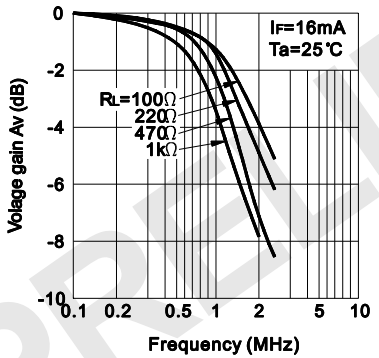


Fig.9 Frequency Response



Test Circuit for Frequency Characteristic