6N135/6N136 – High Speed 1MBd Optocouplers

Aug 2008

FEATURES

* High speed – 1MBd
* CTR guarantee - 0 ~ 70℃
* Instantaneous common mode rejection – 1KV/μs
* UL, CSA, IEC/EN/DIN EN60747-5-2 – Pending
* Dual-in-line package - 6N135 / 6N136
* Wide lead spacing package - 6N135M / 6N136M
* Surface mounting package - 6N135S / 6N136S
* Tape and reel packaging - 6N135S-TA / 6N136S-TA, 6N135S-TA1 / 6N136S-TA1

APPLICATIONS

* High Voltage Isolation
* Line receivers
* Feedback Element in Switching Mode Power Supplier
* High Speed Logic Ground Isolation – TTL/TTL, TTL/CMOS, TTL/LSTTL

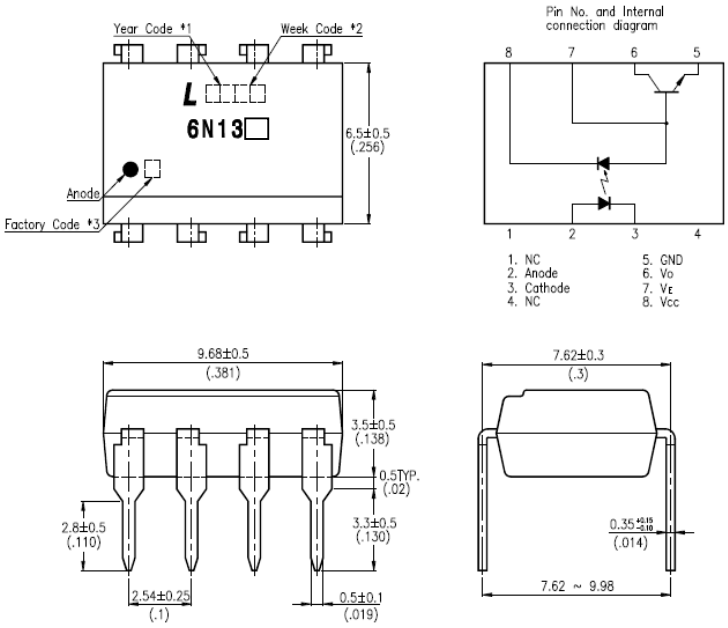
DESCRIPTION

These diode-transistor photocouplers consist of an AlGaAs LED optically coupled to high speed photodetector transistor.

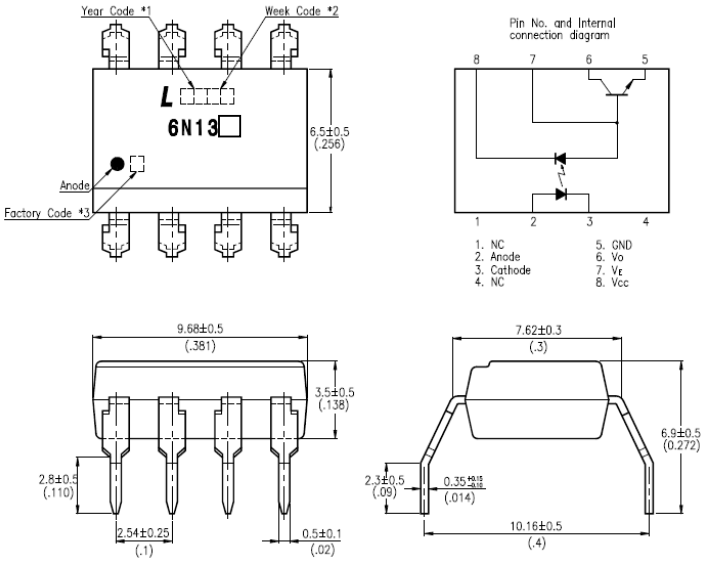
Separate connections for the bias of the photodiode bias and output transistor collector increase the speed up to several times that of a conventional phototransistor photocouplers by reducing the capacitance of base-collector.

OUTLINE DIMENSIONS

6N135 / 6N136



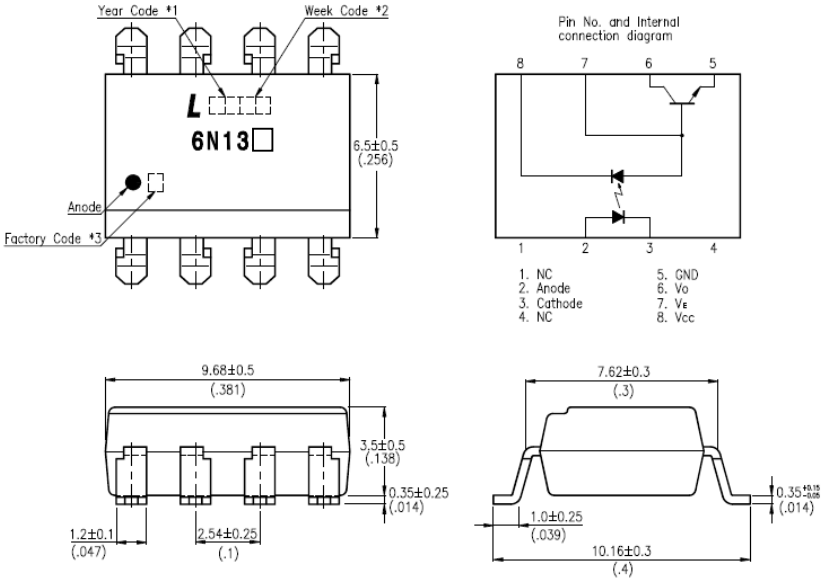
6N135M / 6N136M



*1. Year date code.
*2. 2-digit work week.
*3. Factory identification mark shall be marked (Z : Taiwan, Y : Thailand).

OUTLINE DIMENSIONS

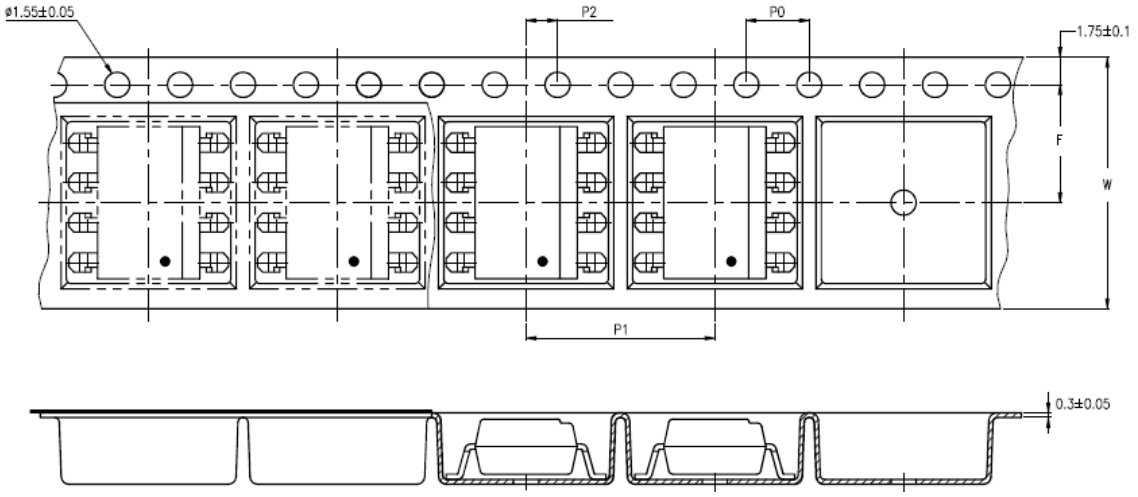
6N135S / 6N136S



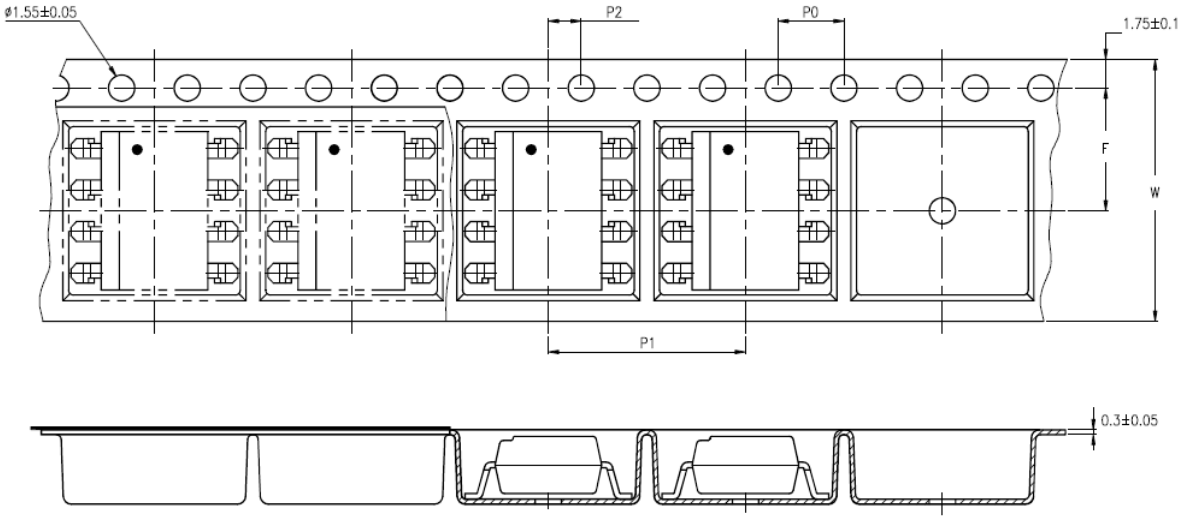
*1. Year date code.
*2. 2-digit work week.
*3. Factory identification mark shall be marked (Z : Taiwan, Y : Thailand).

TAPING DIMENSIONS

6N135S-TA / 6N136S-TA



6N135S-TA1 / 6N136S-TA1



Description	Symbol	Dimensions in mm (inches)
Tape wide	W	16 ± 0.3 (.63)
Pitch of sprocket holes	P_0	4 ± 0.1 (.15)
Distance of compartment	F P_2	7.5 ± 0.1 (.295) 2 ± 0.1 (.079)
Distance of compartment to compartment	P_1	12 ± 0.1 (.472)

ABSOLUTE MAXIMUM RATING

(Ta = 25°C)

PARAMETER		SYMBOL	RATING	UNIT
INPUT	Forward Current	I_F	25	mA
	Reverse Voltage	V_R	5	V
	Power Dissipation	P	35	mW
OUTPUT	Supply Voltage	V_{CC}	-0.5 ~ +30	V
	Output Voltage	V_O	-0.5 ~ +20	V
	Emitter-base Reverse Voltage	V_{EBR}	0.5	V
	Average Output Current	I_O	8	mA
	Power Dissipation	P_O	100	mW
1	Isolation Voltage	V_{iso}	5000	Vrms
	Operating Temperature	T_{opr}	-40 ~ +100	°C
	Storage Temperature	T_{stg}	-55 ~ +125	°C
2	Soldering Temperature	T_{sol}	260	°C

Notes:

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

(T_A = 25°C, unless otherwise specified)

	PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
	Input Forward Voltage		V_F	—	1.45	1.7	V	Ta=25℃, IF=1.6mA
	Input Forward Voltage Temperature Coefficient		$\Delta V_F / \Delta Ta$	—	-1.6	—	mV/℃	IF=16mA
	Input Reverse Voltage		BV_R	5.0	—	—	V	Ta=25℃, IR=10μA
3	Current Transfer Ratio	6N135	CTR	7	—	50	%	I_F=16mA, Vo=0.4V, V_{CC}=4.5V
		6N136		19	—	50		
	Logic Low (0) Output Voltage	6N135	V_{OL}	—	—	0.4	V	I_F=16mA, I_O=1.1mA , V_{CC}=4.5V
					—	0.5		I_F=16mA, I_O=0.8mA , V_{CC}=4.5V
		6N136			—	0.4		I_F=16mA, I_O=3mA , V_{CC}=4.5V
	Logic High (1) Output Current		I_{OH}	—	—	0.5	μA	I_F=0, V_{CC}=Vo=5.5V, T_A = 25°C
					—	1		I_F=0, V_{CC}=Vo=15V T_A = 25°C
						50		I_F=0, V_{CC}=Vo=15V
4	Logic Low (0) Supply Current		I_{CCL}	—	—	200	uA	IF=16mA, V_{CC}=15V Vo=open
4	Logic High (1) Supply Current		I_{CCH}	—	—	1	μA	I_F=0, V_{CC}=15V, Vo= open, T_A = 25°C
				—	—	2		I_F=0, V_{CC}=15V, Vo= open

** All typical at T_A = 25℃

SWITCHING SPECIFICATIONS (AC)

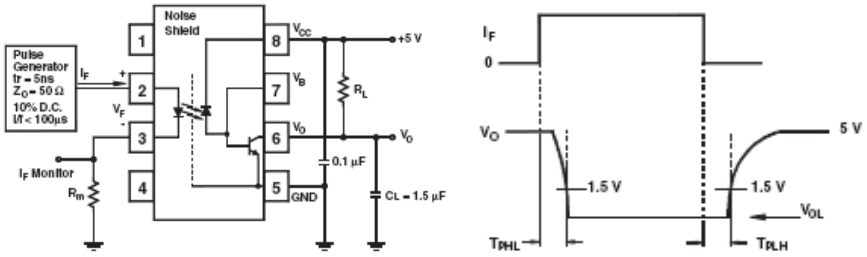
(T_A = 0~70°C, V_{CC} = 5V, unless otherwise specified)

	PARAMETER		SYM.	MIN.	TYP.	MAX. T_A=25℃	MAX.	UNIT	CONDITIONS
4	Propagation Delay time to Logic Low Output (1)→(0)	6N135	t_{PHL}	—	—	1.5		μs	IF = 16mA, R_L = 4.1kΩ (7)
				—	—		2		
		6N136		—	—	0.8			IF = 16mA, R_L = 1.9kΩ (8)
				—	—		1.0		
4	Propagation Delay time to Logic High Output (0)→(1)	6N135	t_{PLH}	—	—	1.5		us	IF = 16mA, R_L = 4.1kΩ (7)
				—	—		2		
		6N136		—	—	0.8			IF = 16mA, R_L = 1.9kΩ (8)
				—	—		1		
5	Instantaneous common mode rejection at high logic output (1)		$\|CM_H\|$	—	1000	—		V / μs	I_F=0, $\|V_{CM}\|$ =10V_{P-P}, RL=4.1kΩ RL=1.9kΩ
5	Instantaneous common mode rejection at low logic output (0)		$\|CM_L\|$	—	1000	—		V / μs	I_F=16mA $\|V_{CM}\|$ =10$_{P-P}$, RL=4.1kΩ RL=1.9kΩ

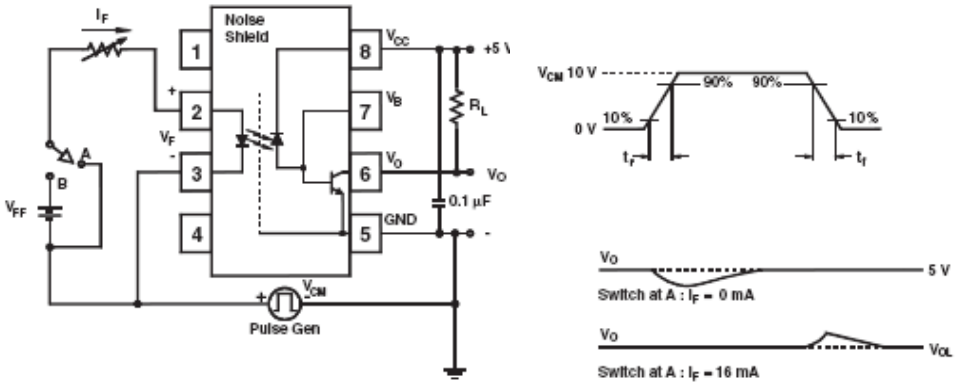
** All typical at T_A = 25℃

SWITCHING TEST CIRCUITS (AC)

Switching Time Test Circuit



Common Mode Immunity Test Circuit



ISOLATION CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
6 Isolation Resistance (Input-output)	R_{I-O}	—	10^{12}	—		Ta=25℃, RH<45%, V_{I-O}=500V DC
6 Capacitance (Input-output)	C_{I-O}	—	0.6	—	pF	f=1MHz

** All typical at T_A = 25℃

Notes,

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

3. Current Transfer Ratio (CTR) is defined as the ration of output collector current, Io, to the forward LED input current, IF, times 100%.

4. Add a 0.1uF bypass capacitor connected between pin5 and pin8 is recommended.

5. Common transient immunity in logic high level is the maximum tolerance (positive) dV_{CM}/dt on the leading edge of the common mode pulse signal, V_{CM}, to assure that the output will remain in a logic high state (i.e., Vo>2.0V). Common mode transient immunity in a logic low level is the maximum tolerance (negative) dV_{CM}/dt on the teailing edge of the common mode pulse signal, VCM, to assure that the output will remain in a logic low state (i.e., Vo<0.8V).

6. Device considered a two terminal device. Pins 1, 2, 3 and 4 shorted together and Pins 5, 6, 7 and 8 shorted together.

7. The 4.1 kΩ load represents 1 LSTTL unit load of 0.36mAand 6.1 kΩ pull up resistor.

8. The 1.9 kΩ load represents 1 TTL unit load of 1.6mAand 5.6 kΩ pull up resistor.

Notes:

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- Do not immerse unit’s body in solder paste.