

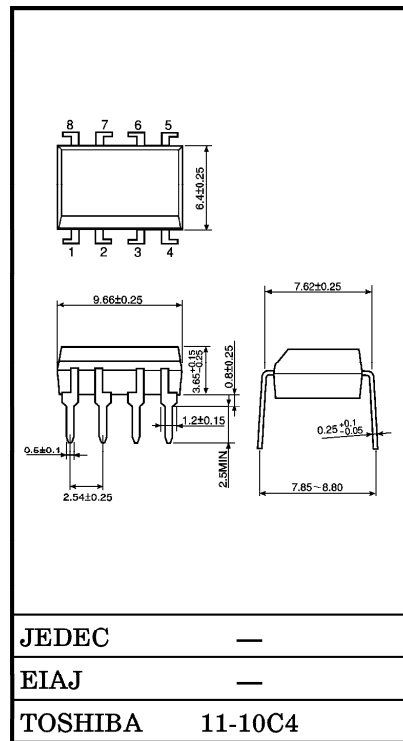
(6N135)  
 DIGITAL LOGIC ISOLATION.  
 LINE RECEIVER.  
 POWER SUPPLY CONTROL  
 SWITCHING POWER SUPPLY  
 TRANSISTOR INVERTER.

The TOSHIBA 6N135 and 6N136 consists of a high emitting diode and a one chip photo diode-transistor.

Each unit is 8-lead DIP package.

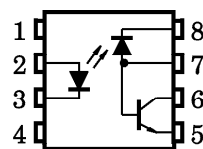
- Isolation Voltage : 2500Vrms (Min.)
- High Speed :  $t_{pHL}, t_{pLH} = 0.5\mu s$  (Typ.) ( $R_L = 1.9k\Omega$ )
- TTL Compatible
- If base pin is open, output signal will be noisy by environmental condition. For this base, TLP550 is suitable
- UL Recognized : UL1577, File No. E67349

Unit in mm

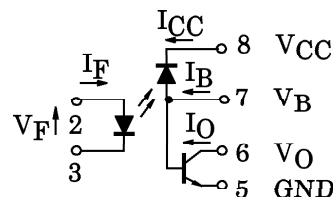


Weight : 0.54g

PIN CONFIGURATIONS



1. N.C.
2. ANODE
3. CATHODE
4. N.C.
5. EMITTER
6. COLLECTOR
7. BASE, ANODE
8. CATHODE



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(6N135)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current (Note 1)	I <sub>F</sub>	25	mA
	Pulse Forward Current (Note 2)	I <sub>FP</sub>	50	mA
	Total Pulse Forward Current (Note 3)	I <sub>FPT</sub>	1	A
	Reverse Voltage	V <sub>R</sub>	5	V
	Diode Power Dissipation (Note 4)	P <sub>D</sub>	45	mW
DETECTOR	Output Current	I <sub>O</sub>	8	mA
	Peak Output Current	I <sub>OP</sub>	16	mA
	Emitter-Base Reverse Voltage (Pin 5-7)	V <sub>EB</sub>	5	V
	Supply Voltage	V <sub>CC</sub>	-0.5~15	V
	Output Voltage	V <sub>O</sub>	-0.5~15	V
	Base Current (Pin 7)	I <sub>B</sub>	5	mA
	Output Power Dissipation (Note 5)	P <sub>O</sub>	100	mW
Operating Temperature Range		T <sub>opr</sub>	-55~100	°C
Storage Temperature Range		T <sub>stg</sub>	-55~125	°C
Lead Solder Temperature (10s) (Note 6)		T <sub>sol</sub>	260	°C
Isolation Voltage (Note 7)		BV <sub>S</sub>	2500	V <sub>rms</sub>

Note 1 : Derate 0.8mA above 70°C.

Note 2 : 50% duty cycle, 1ms pulse width.  
 Derate 1.6mA/°C above 70°C.

Note 3 : Pulse width 1μs, 300pps.

Note 4 : Derate 0.9mW/°C above 70°C.

Note 5 : Derate 2mW/°C above 70°C.

Note 6 : Soldering portion of lead : up to 2mm from the body of the device.

Note 7 : R.H. ≤ 60%, AC / 1min.

(6N135)

**ELECTRICAL CHARACTERISTICS**  
**OVER RECOMMENDED TEMPERATURE ( $T_a = 0^\circ\text{C} \sim 70^\circ\text{C}$  Unless otherwise noted)**

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	※※TYP.	MAX.	UNIT
Current Transfer Ratio	6N135	CTR	$I_F = 16\text{mA}$ , $V_O = 0.4\text{V}$ $V_{CC} = 4.5\text{V}$ , $T_a = 25^\circ\text{C}$ (Note 8)	7	18	—	%
	6N136			19	24	—	%
	6N135	CTR	$I_F = 16\text{mA}$ , $V_O = 0.5\text{V}$ $V_{CC} = 4.5\text{V}$ (Note 1)	5	13	—	%
	6N136			15	21	—	%
Logic Low Output Voltage	6N135	$V_{OL}$	$I_F = 16\text{mA}$ , $I_O = 1.1\text{mA}$ $V_{CC} = 4.5\text{V}$	—	0.1	0.4	V
	6N136			$I_F = 16\text{mA}$ , $I_O = 2.4\text{mA}$ $V_{CC} = 4.5\text{V}$	—	0.1	0.4
Logic High Output Current		$I_{OH}$	$I_F = 0\text{mA}$ , $V_O = V_{CC} = 5.5\text{V}$ $T_a = 25^\circ\text{C}$	—	3	500	nA
			$I_F = 0\text{mA}$ , $V_O = V_{CC} = 15\text{V}$ $T_a = 25^\circ\text{C}$	—	0.1	1	$\mu\text{A}$
		$I_{OH}$	$I_F = 0\text{mA}$ , $V_O = V_{CC} = 15\text{V}$	—	—	50	$\mu\text{A}$
Logic Low Supply Current		$I_{CCL}$	$I_F = 16\text{mA}$ , $V_O = \text{Open}$ $V_{CC} = 15\text{V}$	—	40	—	$\mu\text{A}$
Logic High Supply Current		$I_{CCH}$	$I_F = 0\text{mA}$ , $V_O = \text{Open}$ $V_{CC} = 15\text{V}$ , $T_a = 25^\circ\text{C}$	—	0.01	1	$\mu\text{A}$
		$I_{CCH}$	$I_F = 0\text{mA}$ , $V_O = \text{Open}$ $V_{CC} = 15\text{V}$	—	—	2	$\mu\text{A}$
Input Forward Voltage		$V_F$	$I_F = 16\text{mA}$ , $T_a = 25^\circ\text{C}$	—	1.65	1.7	V
Temperature Coefficient of Forward Voltage		$\Delta V_F / \Delta T_a$	$I_F = 16\text{mA}$	—	-1.9	—	mV / $^\circ\text{C}$
Input Reverse Breakdown Voltage		$BV_R$	$I_R = 10\mu\text{A}$ , $T_a = 25^\circ\text{C}$	5	—	—	V
Input Capacitance		$C_{IN}$	$f = 1\text{MHz}$ , $V_F = 0$	—	60	—	pF
Resistance (Input-Output)		$R_{I-O}$	$V_{I-O} = 500\text{V}$ (Note 9) R.H. $\leq 60\%$	—	$10^{12}$	—	$\Omega$
Capacitance (Input-Output)		$C_{I-O}$	$f = 1\text{MHz}$ (Note 9)	—	0.6	—	pF
Transistor DC Current Gain		$h_{FE}$	$V_O = 5\text{V}$ , $I_O = 3\text{mA}$	—	80	—	—

※※ All typicals at  $T_a = 25^\circ\text{C}$

(6N135)

**SWITCHING SPECIFICATIONS**

(Unless otherwise specified. Ta = 25°C, VCC = 5V, IF = 16mA)

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Propagation Delay Time to Logic Low at Output	6N135	t <sub>pHL</sub>	1	R <sub>L</sub> = 4.1kΩ	—	0.2	1.5	μs
	6N136			R <sub>L</sub> = 1.9kΩ	—	0.2	0.8	μs
Propagation Delay Time to Logic High at Output	6N135	t <sub>pLH</sub>	1	R <sub>L</sub> = 4.1kΩ	—	1.0	1.5	μs
	6N136			R <sub>L</sub> = 1.9kΩ	—	0.5	0.8	μs
Common Mode Transient Immunity at Logic High Level Output (Note 10)	6N135	CM <sub>H</sub>	2	I <sub>F</sub> = 0mA V <sub>CM</sub> = 10V <sub>p-p</sub> R <sub>L</sub> = 4.1kΩ	—	1000	—	V / μs
	6N136			I <sub>F</sub> = 0mA V <sub>CM</sub> = 10V <sub>p-p</sub> R <sub>L</sub> = 1.9kΩ	—	1000	—	V / μs
Common Mode Transient Immunity at Logic Low Level Output (Note 10)	6N135	CM <sub>L</sub>	2	V <sub>CM</sub> = 10V <sub>p-p</sub> R <sub>L</sub> = 4.1kΩ I <sub>F</sub> = 16mA	—	-1000	—	V / μs
	6N136			V <sub>CM</sub> = 10V <sub>p-p</sub> R <sub>L</sub> = 1.9kΩ I <sub>F</sub> = 16mA	—	-1000	—	V / μs
Bandwidth (Note 11)	BW	—	R <sub>L</sub> = 100Ω	—	2	—	MHz	

Note 8 : DC CURRENT TRANSFER RATIO is defined as the ratio of output collector current, I<sub>O</sub>, to the forward LED input current, I<sub>F</sub>, times 100%.

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

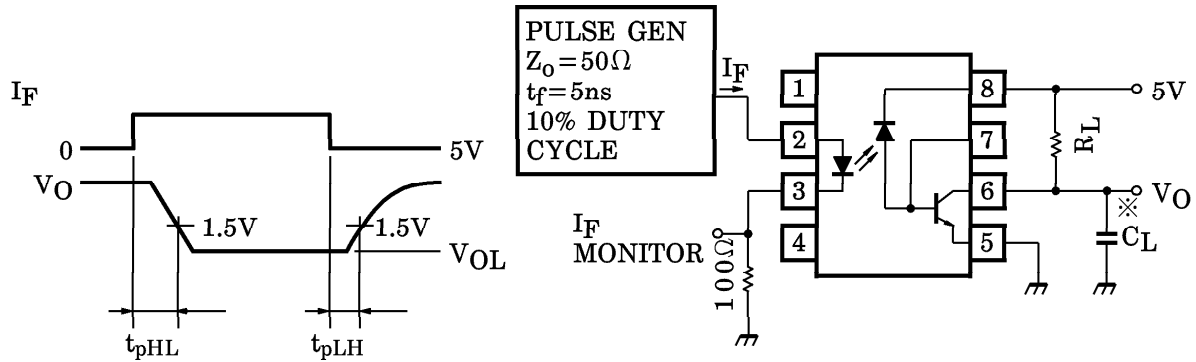
10 : Common mode transient immunity in Logic High level is the maximum tolerable (positive) dV<sub>CM</sub>/dt on the leading edge of the common mode pulse, V<sub>CM</sub>, to assure that the output will remain in a Logic High state (i.e., V<sub>O</sub> > 2.0V).

Common mode transient immunity in Logic Low level is the maximum tolerable (negative) dV<sub>CM</sub>/dt on the trailing edge of the common mode pulse signal, V<sub>CM</sub>, to assure that the output will remain in a Logic Low state (i.e., V<sub>O</sub> < 0.8V).

11 : The frequency at which the AC output voltage is 3dB below the low frequency asymptote.

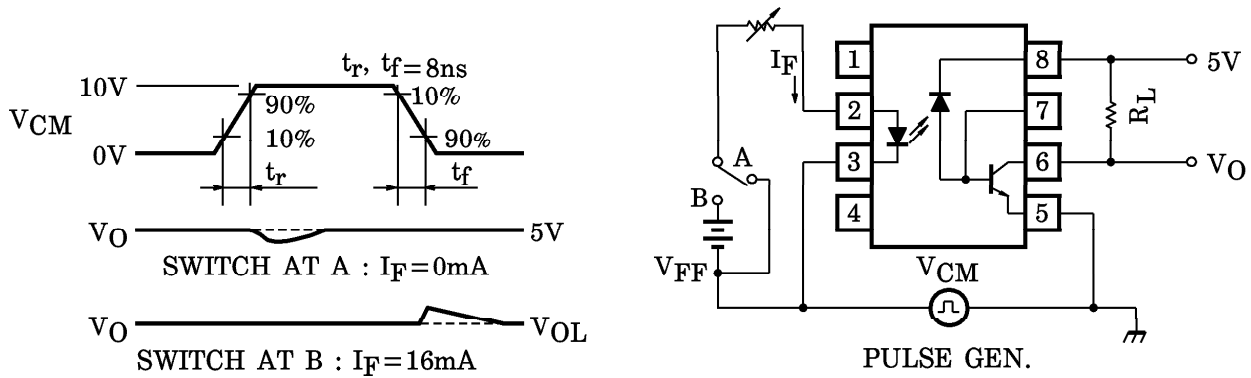
(6N135)

TEST CIRCUIT 1.

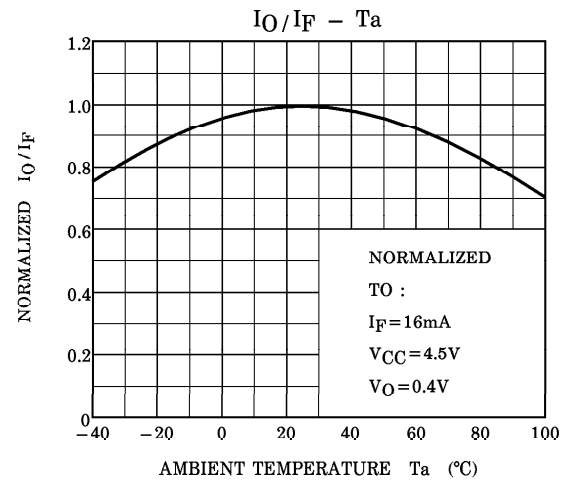
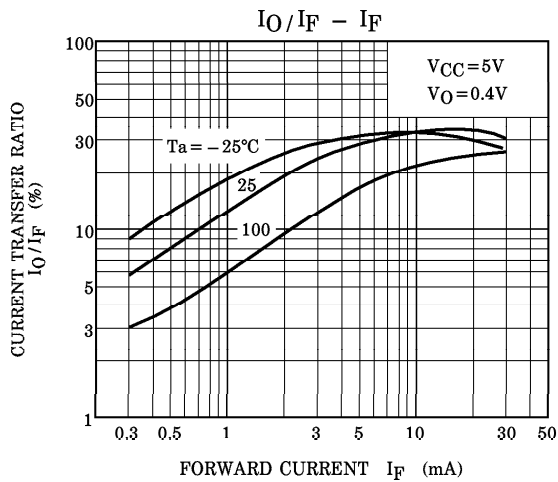
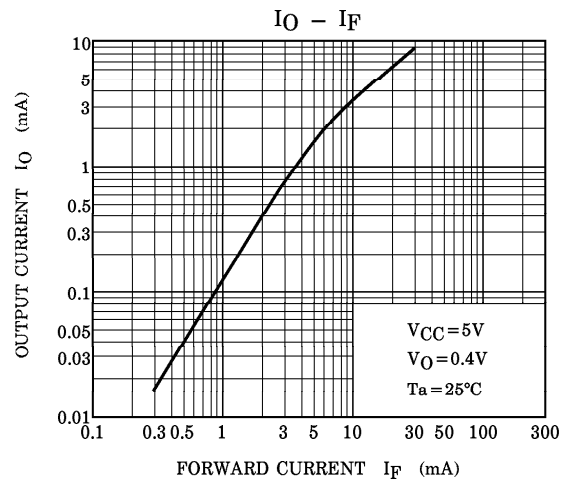
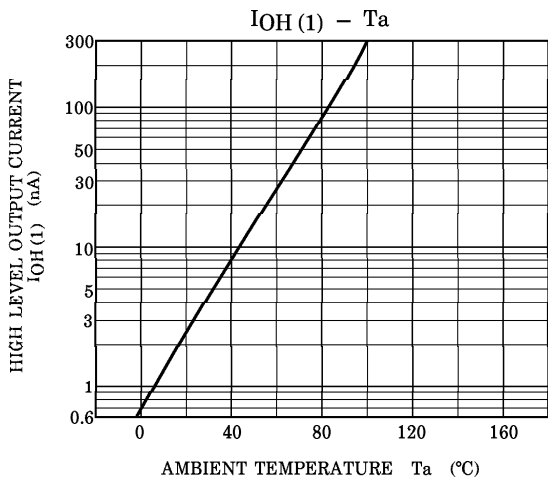
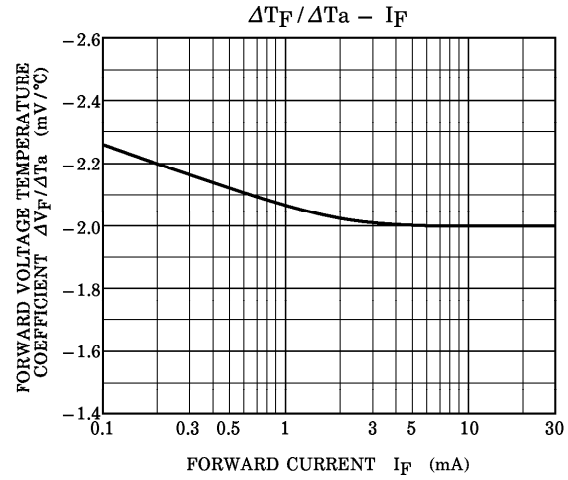
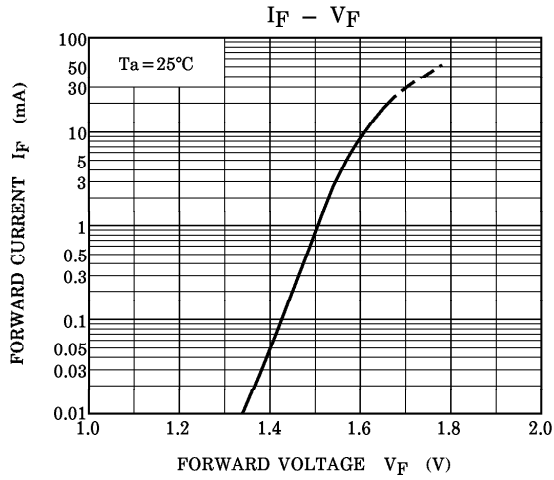


※  $C_L$  is approximately 15pF which includes probe and stray wiring capacitance.

TEST CIRCUIT 2.



(6N135)



(6N135)

