TOSHIBA PHOTOCOUPLER INFRARED LED + PHOTO IC

# TLP550

DEGITAL LOGIC ISOLATION

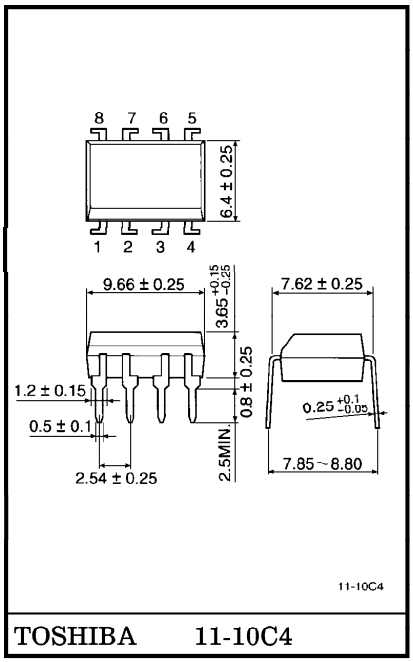
LINE RECEIVER FEEDBACK CONTROL

POWER SUPPLY CONTROL

SWITCHING POWER SUPPLY

TRANSISTOR INVERTOR

Unit in mm



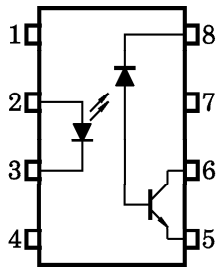

TOSHIBA 11-10C4

Weight : 0.54g

TLP550 constructs a high emitting diode and a one chip photo diode-transistor.
TLP550 has no base connection, and is suitable for application at noisy environmental condition.
This unit is 8-lead DIP package.

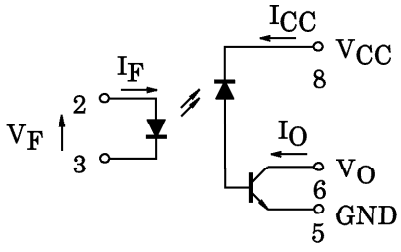
- Isolation Voltage : 2500Vrms (MIN.)
- Switching Speed : $t_{pHL}$, $t_{pLH}$ = 0.5$\mu$s (TYP.) ($R_L$ = 1.9k$\Omega$)
- TTL Compatible
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATION (TOP VIEW)




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

SCHEMATIC




961001EAA2

MAXIMUM RATINGS (Ta = 25°C)

| | CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| LED | Forward Current (Note 1) | $I_F$ | 25 | mA |
| | Pulse Forward Current (Note 2) | $I_{FP}$ | 50 | mA |
| | Peak Transient Forward Current (Note 3) | $I_{FPT}$ | 1 | A |
| | Reverse Voltage | $V_R$ | 5 | V |
| | Diode Power Dissipation (Note 4) | $P_D$ | 45 | mW |
| DETECTOR | Output Current | $I_O$ | 8 | mA |
| | Peak Output Current | $I_{OP}$ | 16 | mA |
| | Supply Voltage | $V_{CC}$ | −0.5~15 | V |
| | Output Voltage | $V_O$ | −0.5~15 | V |
| | Output Power Dissipation (Note 5) | $P_O$ | 100 | mW |
| Operating Temperature Range | | $T_{opr}$ | −55~100 | °C |
| Storage Temperature Range | | $T_{stg}$ | −55~125 | °C |
| Lead Solder Temperature (10s) | | $T_{sol}$ | 260 | °C |
| Isolation Voltage (AC, 1min., R.H = 40~60%) (Note 6) | | $BV_S$ | 2500 | Vrms |

(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 1$\mu$s, 300pps.
(Note 4) Derate 0.9mW / °C above 70°C.
(Note 5) Derate 2mW / °C above 70°C.

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

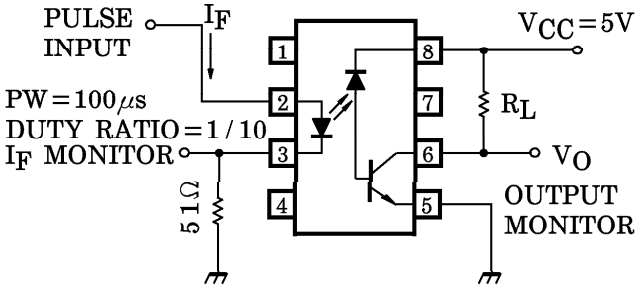
| | CHARACTERISTIC | SYMBOL | TEST CONDITION | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|---|
| LED | Forward Voltage | $V_F$ | $I_F$ = 16mA | | 1.45 | 1.65 | 1.85 | V |
| | Forward Voltage Temperature Coefficient | $\Delta V_F / \Delta Ta$ | $I_F$ = 16mA | | — | −2 | — | mV / °C |
| | Reverse Current | $I_R$ | $V_R$ = 5V | | — | — | 10 | μA |
| | Capacitance Between Terminal | $C_T$ | $V_F$ = 0, f = 1MHz | | — | 60 | — | pF |
| DETECTOR | High Level Output Current | $I_{OH}$ (1) | $I_F$ = 0mA, $V_{CC}$ = $V_O$ = 5.5V | | — | 3 | 500 | nA |
| | | $I_{OH}$ (2) | $I_F$ = 0mA, $V_{CC}$ = $V_O$ = 15V | | — | — | 5 | μA |
| | | $I_{OH}$ | $I_F$ = 0mA, $V_{CC}$ = $V_O$ = 15V Ta = 70°C | | — | — | 50 | μA |
| | High Level Supply Voltage | $I_{CCH}$ | $I_F$ = 0mA, $V_{CC}$ = 15V | | — | 0.01 | 1 | μA |
| COUPLED | Current Transfer Ratio | $I_O / I_F$ | $I_F$ = 16 mA, $V_{CC}$ = 4.5V, $V_O$ = 0.4V | Ta = 25°C | 10 | 30 | — | % |
| | | | | Rank : 0 | 19 | 30 | — | |
| | | | | Ta = 0~70°C | 5 | — | — | |
| | | | | Rank : 0 | 15 | — | — | |
| | Low Level Output Voltage | $V_{OL}$ | $I_F$ = 16mA, $V_{CC}$ = 4.5V, $I_O$ = 1.1mA (Rank 0 : $I_O$ = 2.4mA) | | — | — | 0.4 | V |
| | Isolation Resistance | $R_S$ | R.H. = 40~60%, V = 1kV DC (Note 6) | | — | $10^{12}$ | — | Ω |
| | Capacitance Between Input to Output | $C_S$ | V = 0, f = 1MHz | | — | 0.8 | — | pF |

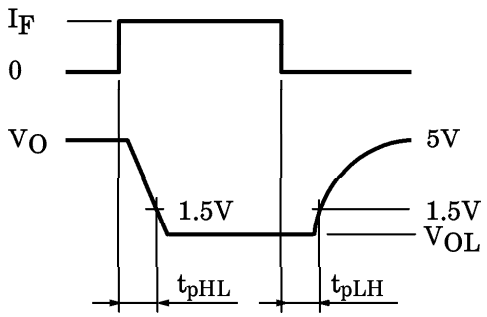
SWITCHING CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Propagation Delay Time (H→L) | $t_{pHL}$ | $I_F$ = 0→16mA, $V_{CC}$ = 5V, $R_L$ = 4.1kΩ | | — | 0.3 | 0.8 | μs |
| | | (Note 7) | Rank 0 : $R_L$ = 1.9kΩ | — | 0.5 | 0.8 | |
| Propagation Delay Time (L→H) | $t_{pLH}$ | $I_F$ = 16→0mA, $V_{CC}$ = 5V, $R_L$ = 4.1kΩ | | — | 1.0 | 2.0 | μs |
| | | (Note 7) | Rank 0 : $R_L$ = 1.9kΩ | — | 0.6 | 1.2 | |
| Common Mode Transient Immunity at High Output Level | $C_{MH}$ | $I_F$ = 0mA, $V_{CM}$ = 200Vp-p $R_L$ = 4.1kΩ (Rank 0 : $R_L$ = 1.9kΩ) (Note 8) | | — | 1500 | — | V / μs |
| Common Mode Transient Immunity at Low Output Level | $C_{ML}$ | $I_F$ = 16mA, $V_{CM}$ = 200Vp-p $R_L$ = 4.1kΩ (Rank 0 : $R_L$ = 1.9kΩ) (Note 8) | | — | −1500 | — | V / μs |

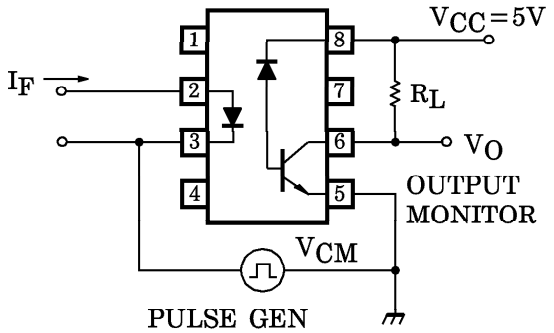
(Note 6) Device considered a two-terminal device : Pins 1, 2, 3 and 4 shorted together and Pin 5, 6, 7 and 8 shorted together.

(Note 7) Switching time test circuit.



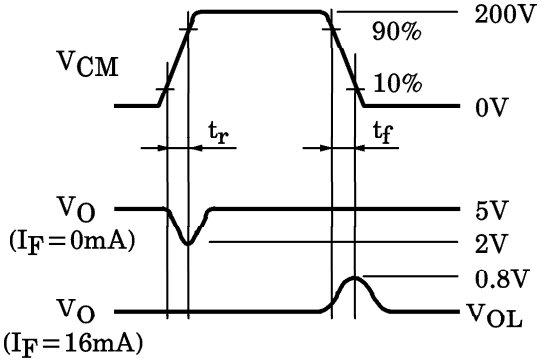




(Note 8) Common mode transient immunity test circuit.



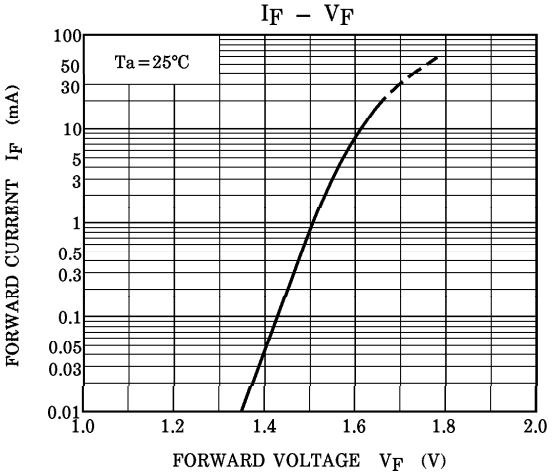

$Z_O = 50\Omega$

$$CM_H = \frac{160\,(V)}{t_r\,(\mu s)},\ CM_L = \frac{160\,(V)}{t_f\,(\mu s)}$$

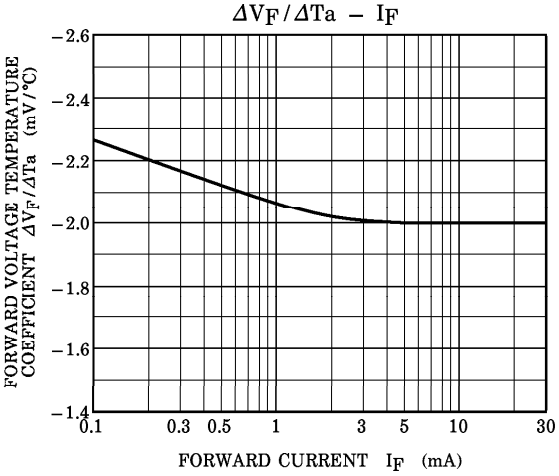



(Note 9) Maximum electrostatic discharge voltage for any pins : 100V (C = 200pF, R = 0)

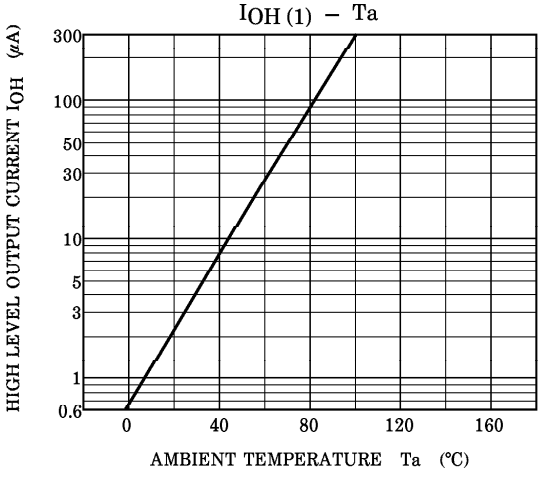
$I_F - V_F$



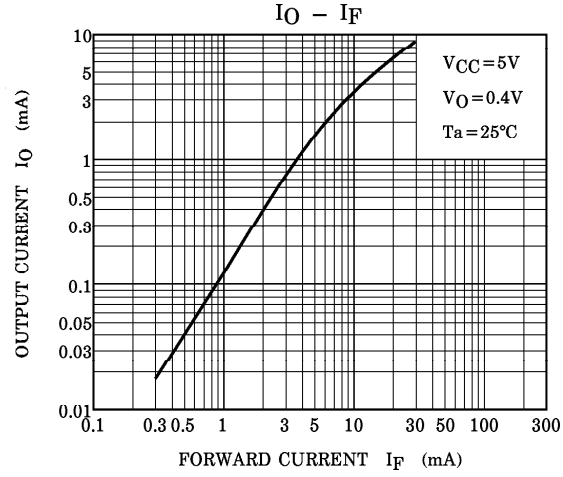

$\Delta V_F / \Delta Ta - I_F$



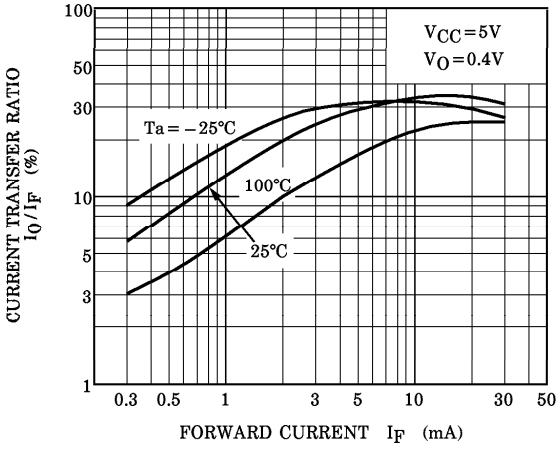

$I_{OH\,(1)} - Ta$



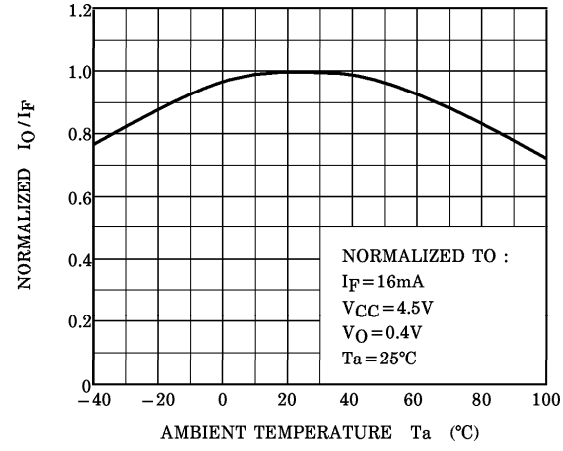

$I_O - I_F$



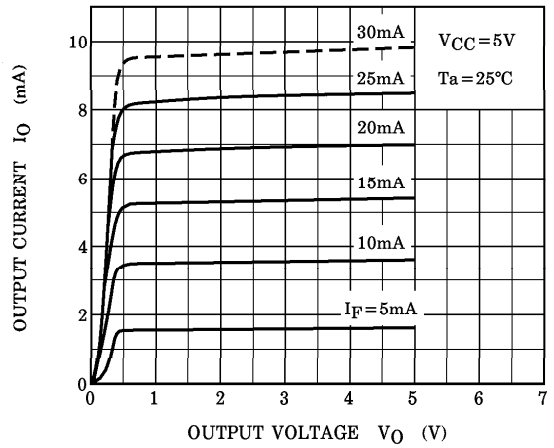

$I_O / I_F - I_F$



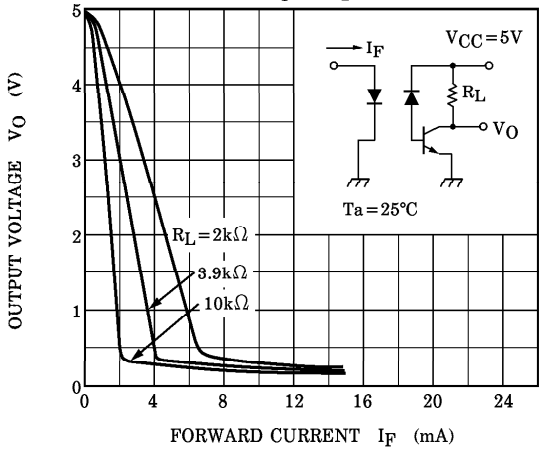

$I_O / I_F - Ta$



$I_O - V_O$




$V_O - I_F$




$t_{pHL}$, $t_{pLH}$ – $R_L$