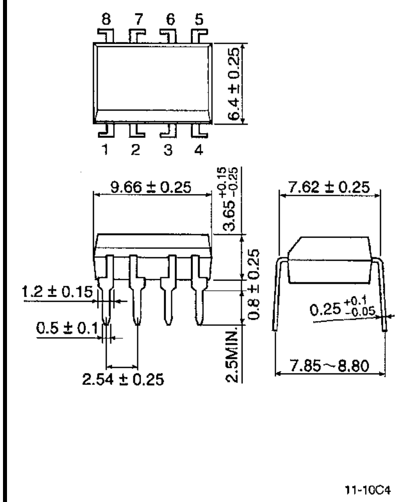
TOSHIBA PHOTOCOUPLER GaAlAs IRED & PHOTO IC

TLP559(IGM)

TRANSISTOR INVERTER
INVERTER FOR AIR CONDITIONER
LINE RECEIVER
IPM INTERFACES

Unit: mm



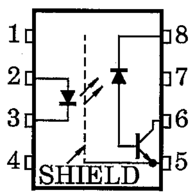
JEDEC	—
EIAJ	—
TOSHIBA	11−10C4

Weight: 0.54 g

The TOSHIBA TLP559(IGM) consists of a GaAlAs high-output light emitting diode and a high speed detector of one chip photo diode-transistor.
This unit is 8-lead DIP package.
TLP559(IGM) has no internal base connection,and a Faraday shield integrated on the photodetector chip provides an effective common mode noise transient immunity.
TLP559(IGM) guarantees minimum and maximum of propagation delay time,switching time dispersion,and high common mode transient immunity.There for TLP559(IGM) is suitable for isolation interface between IPM(Intelligent Power Module) and control IC circuits in motor control application.

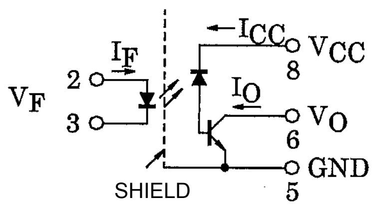
- Isolation Voltage : 2500 Vrms (Min)
- Common Mode Transient Immunity :±10kV/μs (Min) @V_{CM} = 1500 V
- Switching Time : t_{pHL} , t_{pLH} = 0.1μs (Min) = 0.8μs (Max) @I_F = 10 mA , V_{CC} = 15 V , R_L = 20 kΩ , Ta = 25°C
- Switching Time Dispersion (|tpLH−tpHL|) : 0.7μs (Max)
- TTL Compatible
- UL 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:V_{CC}

SCHEMATIC



MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	(Note 1)	I_F	25	mA
LED	Pulse Forward Current	(Note 2)	I_{FP}	50	mA
LED	Peak Transient Forward Current	(Note 3)	I_{FPT}	1	A
LED	Reverse Voltage		V_R	5	V
LED	Diode Power Dissipation	(Note 4)	P_D	45	mW
DETECTOR	Output Current		I_O	8	mA
DETECTOR	Peak Output Current		I_{OP}	16	mA
DETECTOR	Output Voltage		V_O	−0.5~20	V
DETECTOR	Supply Voltage		V_{CC}	−0.5~30	V
DETECTOR	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)		(Note 6)	T_{sol}	260	°C
Isolation Voltage(AC,1min.,R.H.≤60%,Ta=25°C)		(Note 7)	BV_S	2500	Vrms

(Note 1) Derate 0.5mA above 70°C.
(Note 2) 50% duty cycle,1ms pulse width.
Derate –1.0mA/°C above 70°C.
(Note 3) Pulse width PW≤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) Device considerd a two terminal device : pins1,2,3 and 4 shorted together and pins5,6,7 and 8 shorted together.

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	I_F = 16 mA	—	1.65	1.85	V
LED	Forward Voltage Temperature Coefficient	$\Delta V_F / \Delta Ta$	I_F = 16 mA	—	−2	—	mV /°C
LED	Reverse Current	I_R	V_R = 5 V	—	—	10	μA
LED	Capacitance between Terminal	C_T	V = 0, f = 1 MHz	—	45	—	pF
DETECTOR	High Level Output Current	$I_{OH\ (1)}$	I_F = 0 mA, V_{CC} = V_O = 5.5 V	—	3	500	nA
DETECTOR	High Level Output Current	$I_{OH\ (2)}$	I_F = 0 mA, V_{CC} = 30 V V_O = 20 V	—	—	5	μA
DETECTOR	High Level Output Current	I_{OH}	I_F = 0 mA, V_{CC} = 30 V V_O = 20 V, Ta = 70°C	—	—	50	μA
DETECTOR	High Level Supply Voltage	I_{CCH}	I_F = 0 mA, V_{CC} = 30 V	—	0.01	1	μA
DETECTOR	Supply Voltage	V_{CC}	I_{CC} = 0.01 mA	30	—	—	V
DETECTOR	Output Voltage	V_O	I_O = 0.5 mA	20	—	—	V

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_O / I_F	I_F = 10 mA, V_{CC} = 4.5 V V_O = 0.4 V	25	35	75	%
		I_F = 10 mA, V_{CC} = 4.5 V V_O = 0.4 V, Ta = −25~100°C	15	—	—	
Low Level Output Voltage	V_{OL}	I_F = 16 mA, V_{CC} = 4.5 V I_O = 2.4 mA	—	—	0.4	V

ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance Input to Output	CS	V = 0, f = 1 MHz	—	0.8	—	pF
Isolation Resistance	R_S	R.H.≤60%, V_S = 500 V	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC , 1minute	2500	—	—	Vrms
		AC , 1second, in oil	—	5000	—	
		DC , 1minute,in oil	—	5000	—	Vdc

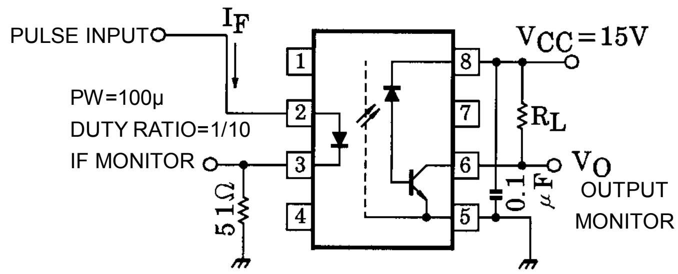
SWITCHING CHARACTERISTICS (Ta = 25°C、V_{CC} = 15 V)

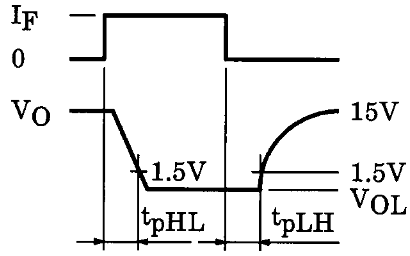
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time (H→L) Propagation Delay Time (L→H)	t_{pHL} t_{pLH}	1	I_F = 10 mA, R_L = 20 kΩ	0.1	0.45	0.8	μs
			I_F = 10 mA, R_L = 20 kΩ Ta = 0~85°C	0.1	0.45	0.9	
			I_F = 10 mA, R_L = 20 kΩ Ta = −25~100°C	0.1	0.45	1.0	
Switching Time Dispersion between ON and OFF	$\lvert t_{pLH}-t_{pHL}\rvert$		I_F = 10 mA, R_L = 20 kΩ	—	0.15	0.7	μs
			I_F = 10 mA, R_L = 20 kΩ Ta = 0~85°C	—	0.25	0.8	
			I_F = 20 mA, R_L = 20 kΩ Ta = −25~100°C	—	0.25	0.9	
Common Mode Transient Immunity at Logic High Output (Note 8)	CM_H	2	I_F = 0 mA, V_{CM} = 1500 V_{p-p}, R_L = 20 kΩ	10000	15000	—	V /μs
Common Mode Transient Immunity at Logic Low Output (Note 8)	CM_L		I_F =10 mA, V_{CM} = 1500 V_{p-p}, R_L = 20 kΩ	−10000	−15000	—	V /μs

(Note 8) CM_L is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state(Vo<1V).
CM_H is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic high state(Vo>4V).

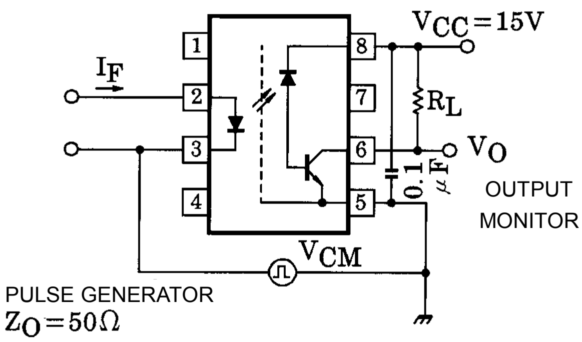
(Note 9) Maximum electrostatic discharge voltage for any pins : 100V(C=200pF,R=0)

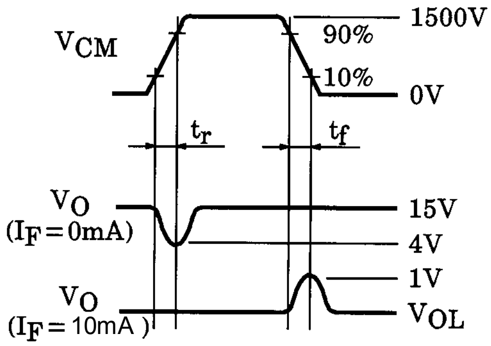
TEST CIRCUIT 1 : Switching time test circuit





TEST CIRCUIT 2 : Common mode noise immunity test circuit





$$CM_H = \frac{1200(V)}{t_r(\mu s)}, \quad CM_L = \frac{1200(V)}{t_f(\mu s)}$$

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