

TLP759(IGM)

Transistor Inverters
Air Conditioners
Line Receiver
Intelligent Power Modules (IPMs) Interfaces

The TOSHIBA TLP759(IGM) consists of a high-output infrared emitting diode optically coupled to a high-speed photodiode with a transistor amplifier and is housed in an 8-pin DIP.

The TLP759(IGM) has no internal base connection. The Faraday shield in the photodetector chip provides an effective common-mode noise transient immunity.

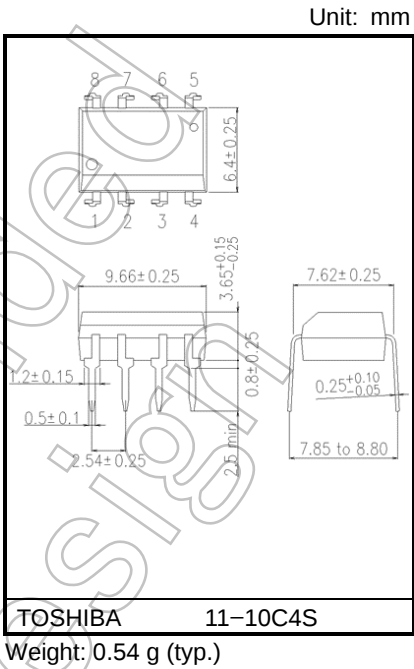
The TLP759(IGM) guarantees minimum and maximum propagation delay, relative time difference between the rise and fall time, and common-mode transient immunity. Therefore, the TLP759(IGM) is suitable for an isolation interface between an intelligent power module (IPM) and a control IC in motor control applications.

- Isolation voltage: 5000V_{rms} (min)
- Common-mode transient immunity: ±10 kV / μs (min)
@V_{CM} = 1500 V_{p-p}
- Switching Time: t_{pHL}, t_{pLH} = 0.1 μs (min), = 0.8 μs (max)
@I_F = 10 mA, V_{CC} = 15 V, R_L = 20 kΩ, T_a = 25°C
- Switching time dispersion: 0.7 μs (max)
(|t_{pLH} - t_{pHL}|)
- TTL compatible
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A
File No.E67349
- VDE-approved: EN 60747-5-5 (Note 1)

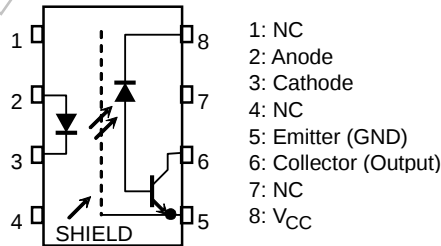
Note 1 : When a VDE-approved type is needed,
please designate the **Option (D4)**.

Construction mechanical rating

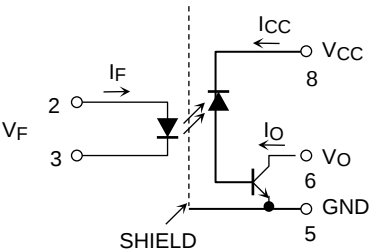
	7.62-mm pitch standard type	10.16-mm pitch TLP759F(IGM) type
Creepage Distance	7.0 mm (min)	8.0 mm (min)
Clearance	7.0 mm (min)	8.0 mm (min)
Insulation Thickness	0.4 mm (min)	0.4 mm (min)



Pin Configuration (top view)



Schematic



Start of commercial production
1995-01

Absolute 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
	Output voltage	V _O	−0.5 to 20	V
	supply voltage	V _{CC}	−0.5 to 30	V
	Output power dissipation (Note 5)	P _O	100	mW
Operating temperature range		T _{opr}	−55 to 100	°C
Storage temperature range		T _{stg}	−55 to 125	°C
Lead solder temperature(10 s)		T _{sol}	260	°C
Isolation voltage(AC, 60 s, R.H. ≤ 60 %)		BV _S	5000	V _{rms}

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

(Note 1): Derate 0.8 mA / °C above 70 °C.

(Note 2): 50 % duty cycle, 1 ms pulse width.

Derate 1.6 mA / °C above 70 °C.

(Note 3): Pulse width PW ≤ 1 μs, 300 pps.

(Note 4): Derate 0.9 mW / °C above 70 °C.

(Note 5): Derate 2 mW / °C above 70 °C.

(Note 6): Soldering portion of lead: Up to 2 mm from the body of the device

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

Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	$I_F = 16 \text{ mA}$		1.65	1.85	V
	Forward voltage temperature coefficient	$\Delta V_F / \Delta T_a$	$I_F = 16 \text{ mA}$	—	-2	—	mV / °C
	Reverse current	I_R	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance between terminal	C_T	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$	—	100	—	pF
Detector	High level output current	$I_{OH(1)}$	$I_F = 0 \text{ mA}, V_{CC} = V_O = 5.5 \text{ V}$	—	3	500	nA
		$I_{OH(2)}$	$I_F = 0 \text{ mA}, V_{CC} = 30 \text{ V}, V_O = 20 \text{ V}$	—	—	5	μA
		I_{OH}	$I_F = 0 \text{ mA}, V_{CC} = 30 \text{ V}, V_O = 20 \text{ V}, T_a = 70^\circ\text{C}$	—	—	50	
	High level supply current	I_{CCH}	$I_F = 0 \text{ mA}, V_{CC} = 30 \text{ V}$	—	0.01	1	μA
	Supply voltage	V_{CC}	$I_{CC} = 0.01 \text{ mA}$	30	—	—	V
	Output voltage	V_O	$I_O = 0.5 \text{ mA}$	20	—	—	V

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I_O / I_F	$I_F = 10 \text{ mA}, V_{CC} = 4.5 \text{ V}, V_O = 0.4 \text{ V}$	25	35	75	%
		$I_F = 10 \text{ mA}, V_{CC} = 4.5 \text{ V}, V_O = 0.4 \text{ V}, T_a = -25 \text{ to } 100^\circ\text{C}$	15	—	—	
Low level output voltage	V_{OL}	$I_F = 16 \text{ mA}, V_{CC} = 4.5 \text{ V}, I_O = 2.4 \text{ mA}$	—	—	0.4	V

Isolation Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	$V = 0 \text{ V}, f = 1 \text{ MHz}$ (Note 7)	—	0.8	—	pF
Isolation resistance	R_S	$R.H. \leq 60\%, V_S = 500 \text{ V}$ (Note 7)	1×10^{12}	10^{14}	—	Ω
Isolation voltage	BVS	AC, 60 s	5000	—	—	V_{rms}

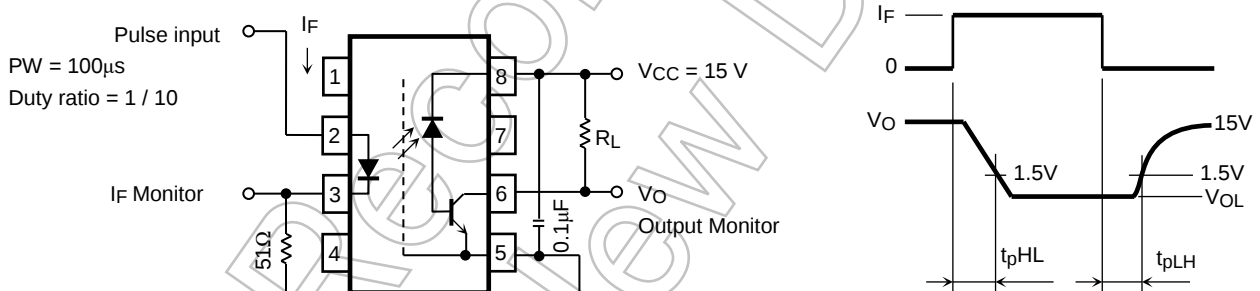
Switching Characteristics (Ta = 25°C, Vcc = 15V)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Propagation delay time (H→L)	t_{pHL}	1	$I_F = 10 \text{ mA}$, $R_L = 20 \text{ k}\Omega$	0.1	0.45	0.8	μs
Propagation delay time (L→H)	t_{pLH}		$I_F = 10 \text{ mA}$, $R_L = 20 \text{ k}\Omega$ $T_a = 0 \text{ to } 85^\circ\text{C}$	0.1	0.45	0.9	
Propagation delay time (L→H)	t_{pLH}		$I_F = 10 \text{ mA}$, $R_L = 20 \text{ k}\Omega$ $T_a = -25 \text{ to } 100^\circ\text{C}$	0.1	0.45	1.0	
Switching time dispersion between on and off	$ t_{pLH} - t_{pHL} $	1	$I_F = 10 \text{ mA}$, $R_L = 20 \text{ k}\Omega$	—	0.15	0.7	μs
			$I_F = 10 \text{ mA}$, $R_L = 20 \text{ k}\Omega$ $T_a = 0 \text{ to } 85^\circ\text{C}$	—	0.25	0.8	
			$I_F = 10 \text{ mA}$, $R_L = 20 \text{ k}\Omega$ $T_a = -25 \text{ to } 100^\circ\text{C}$	—	0.25	0.9	
Common mode transient immunity at logic high output (Note 8)	CM_H	2	$I_F = 0 \text{ mA}$ $V_{CM} = 1500 \text{ V}_{p-p}$ $R_L = 20 \text{ k}\Omega$	10000	15000	—	$\text{V} / \mu\text{s}$
Common mode transient immunity at logic low output (Note 8)	CM_L		$I_F = 10 \text{ mA}$ $V_{CM} = 1500 \text{ V}_{p-p}$ $R_L = 20 \text{ k}\Omega$	-10000	-15000	—	$\text{V} / \mu\text{s}$

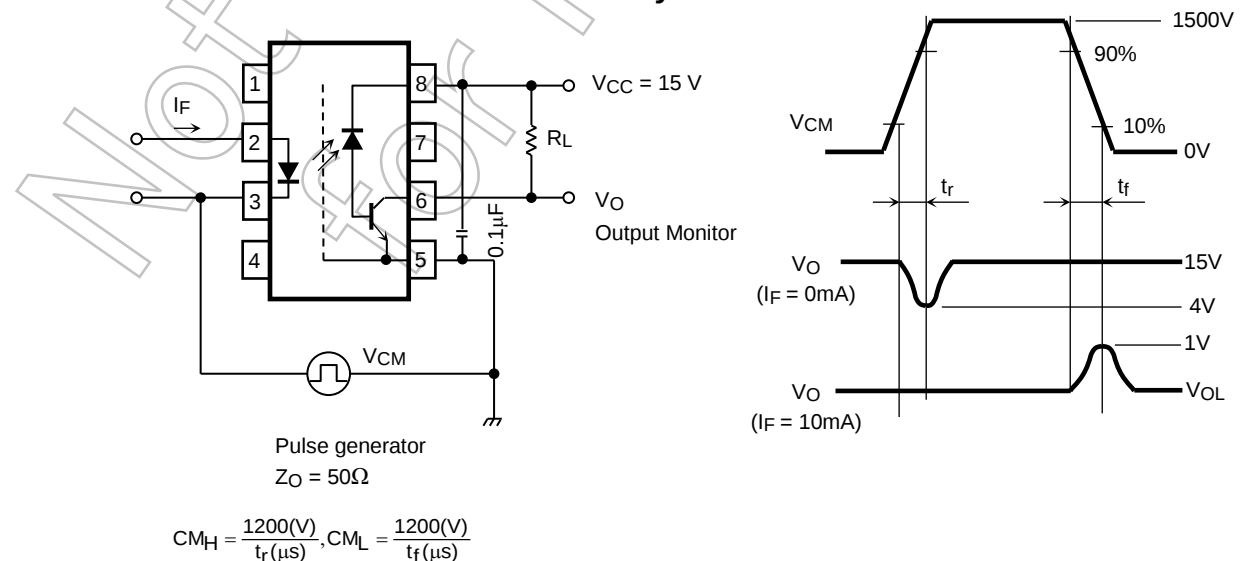
(Note 8): CM_L is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state ($V_O < 1 \text{ V}$).

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 ($V_O > 4 \text{ V}$).

Test Circuit 1: Switching Time Test Circuit



Test Circuit 2: Common Mode Noise Immunity Test Circuit



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