

# TLP719

- Digital logic ground isolation
- Line receivers
- Microprocessor system interfaces
- Switching power supply feedback control
- Transistor invertors

The TOSHIBA TLP719 consists of a GaAlAs high-output light-emitting diode and a high-speed detector.

This unit is a 6-lead SDIP. The TLP719 is 50% smaller than the 8-pin DIP and meets the reinforced insulation class requirements of international safety standards. Therefore the mounting area can be reduced in equipment requiring safety standard certification.

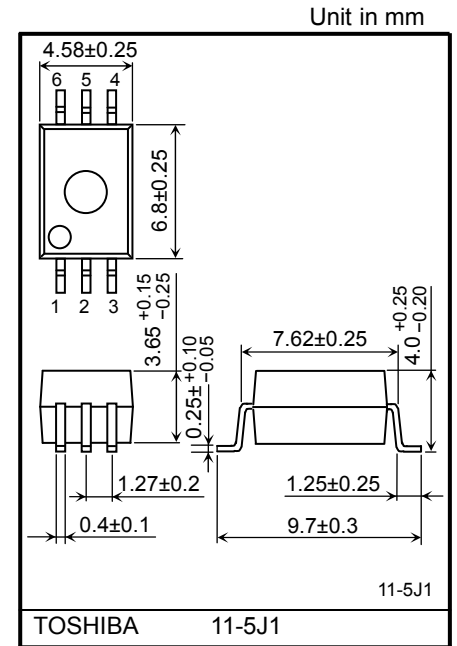
The TLP719 has a Faraday shield integrated on the photodetector chip to provide an effective common mode noise transient immunity. Therefore this product is suitable for application in noisy environmental conditions.

- Open collector
- Package type : SDIP6
- Isolation voltage : 5000 Vrms (min)
- Common mode transient immunity :  $\pm 10$  kV/us(min) @  $V_{CM} = 400$  V
- Switching speed :  $t_{pHL} / t_{pLH} = 0.8$   $\mu$ s (max)  
@  $I_F = 16$  mA ,  $V_{CC} = 5$  V,  
 $R_L = 1.9$  k $\Omega$  ,  $T_a = 25$   $^{\circ}$ C
- TTL compatible
- Construction mechanical rating

	7.62-mm pitch standard type	10.16-mm pitch TLPXXXXF 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)

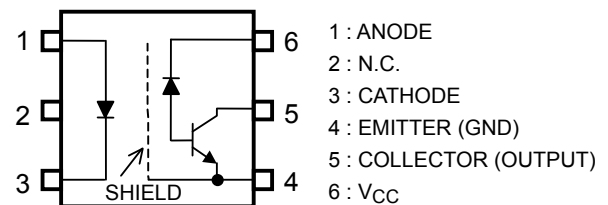
- UL recognized : UL1577, File No. E67349
  - Option (D4) TÜV approved : EN60747-5-2  
Certificate No. R50033433
- Maximum operating insulation voltage : 890 Vpk  
Highest permissible over voltage : 8000 Vpk

**( Note )** When a EN60747-5-2 approved type is needed, please designate the "Option(D4)"

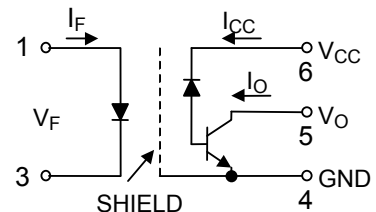


Weight : 0.26 g (typ.)

### PIN CONFIGURATION (Top View)



### SCHEMATIC



A 0.1- $\mu$ F bypass capacitor must be connected between pins 4 and 6.  
(See Note 7.)

## Absolute 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
	Peak transient 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
	Junction temperature	T <sub>j</sub>	125	°C
Detector	Output current	I <sub>O</sub>	8	mA
	Peak output current	I <sub>OP</sub>	16	mA
	Output voltage	V <sub>O</sub>	-0.5~20	V
	Supply voltage	V <sub>CC</sub>	-0.5~30	V
	Output power dissipation (Note 5)	P <sub>O</sub>	100	mW
	Junction Temperature	T <sub>j</sub>	125	°C
Operating temperature range		T <sub>opr</sub>	-55~100	°C
Storage temperature range		T <sub>stg</sub>	-55~125	°C
Lead soldering temperature (10 s)		T <sub>sol</sub>	260	°C
Isolation voltage (AC, 1 minute, R.H. ≤ 60 %) (Note 6)		BV <sub>S</sub>	5000	V <sub>rms</sub>

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 0.45 mA / °C above 70 °C.

Note 2: 50% duty cycle, 1 ms pulse width.  
Derate 0.9 mA / °C above 70 °C.

Note 3: Pulse width ≤ 1 μs, 300 pps.

Note 4: Derate 0.8 mW / °C above 70 °C.

Note 5: Derate 1.8 mW / °C above 70 °C.

Note 6: Device considered a two-terminal device: pins 1, 2 and 3 paired with pins 4, 5 and 6 respectively.

Note 7: A ceramic capacitor (0.1 μF) should be connected from pin 6 to pin 4 to stabilize the operation of the high-gain linear amplifier. Failure to provide the bypassing may impair the switching property.  
The total lead length between capacitor and coupler should not exceed 1 cm.

## 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	$\mu\text{A}$
	Capacitance between terminals	$C_T$	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$	—	45	—	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	$\mu\text{A}$
		$I_{OH}$	$I_F = 0 \text{ mA}, V_{CC} = 30 \text{ V}$ $V_O = 20 \text{ V}, T_a = 70 \text{ }^\circ\text{C}$	—	—	50	
	HIGH-level supply current	$I_{CCH}$	$I_F = 0 \text{ mA}, V_{CC} = 30 \text{ V}$	—	0.01	1	$\mu\text{A}$
	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	$I_O / I_F$	$I_F = 16 \text{ mA}, V_{CC} = 4.5 \text{ V}$ $V_O = 0.4 \text{ V}$	20	—	—	%
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 6)	—	0.8	—	pF
Isolation resistance	$R_S$	R.H. $\leq 60\%$ , $V_S = 500 \text{ V}$ (Note 6)	$1 \times 10^{12}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	5000	—	—	$V_{rms}$
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

## Switching Characteristics (Ta = 25 °C, VCC = 5 V)

Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time (H→L)	$t_{pHL}$	Fig1	$I_F = 0 \rightarrow 16 \text{ mA}$ $R_L = 1.9 \text{ k}\Omega$	—	—	0.8	$\mu\text{s}$
Propagation delay time (L→H)	$t_{pLH}$		$I_F = 16 \rightarrow 0 \text{ mA}$ $R_L = 1.9 \text{ k}\Omega$	—	—	0.8	$\mu\text{s}$
Common mode transient immunity at logic HIGH output (Note 8)	$CM_H$	Fig2	$I_F = 0 \text{ mA}$ $V_{CM} = 400 \text{ Vp-p}$ $R_L = 1.9 \text{ k}\Omega$	10000	—	—	$\text{V} / \mu\text{s}$
Common mode transient immunity at logic LOW output (Note 8)	$CM_L$		$I_F = 16 \text{ mA}$ $V_{CM} = 400 \text{ Vp-p}$ $R_L = 1.9 \text{ k}\Omega$	-10000	—	—	$\text{V} / \mu\text{s}$

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 ( $V_O < 0.8 \text{ V}$ ).

$CM_H$  is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic HIGH state ( $V_O > 2 \text{ V}$ ).

Figure 1. Switching Time Test Circuit

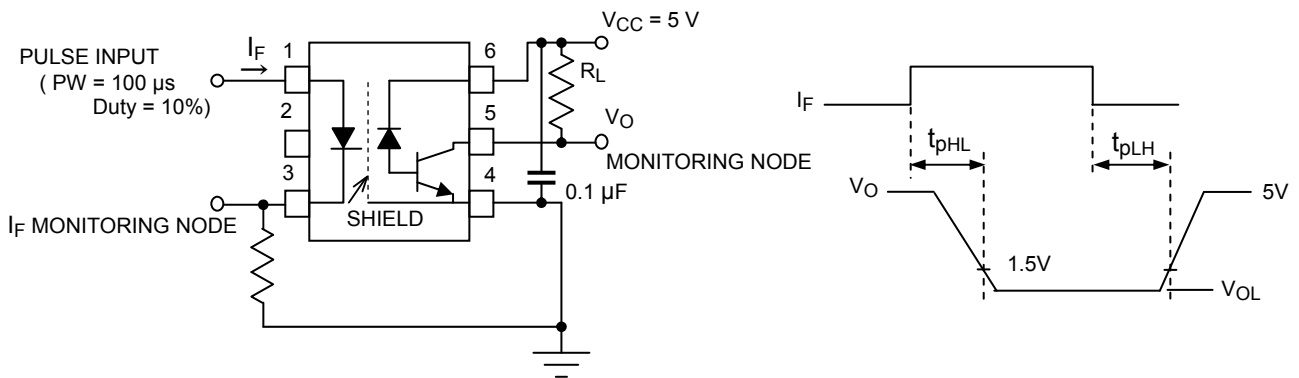
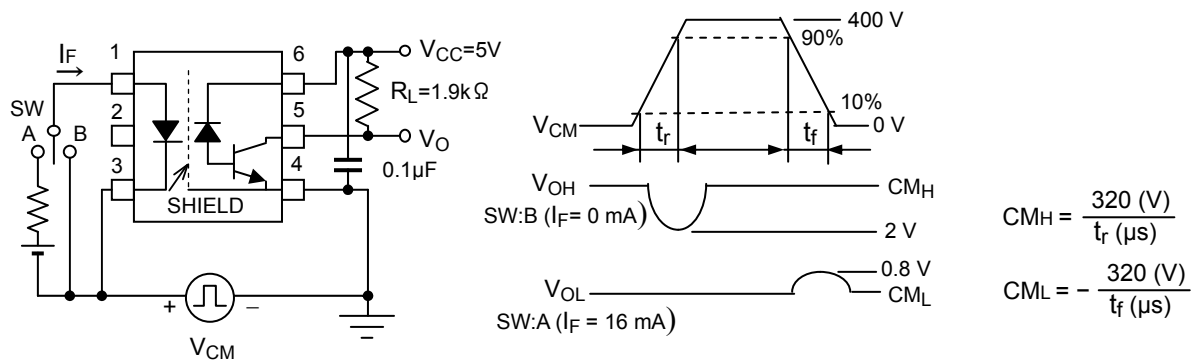
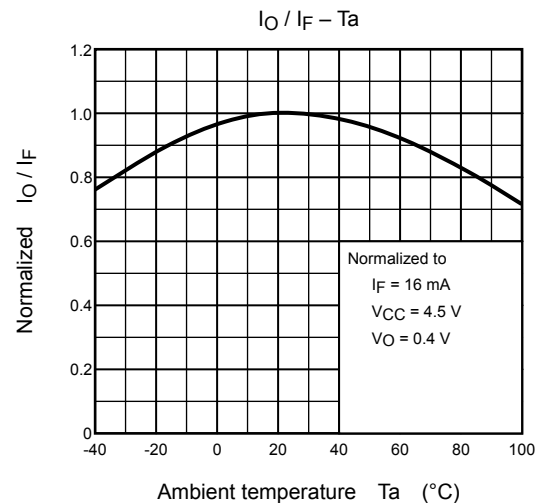
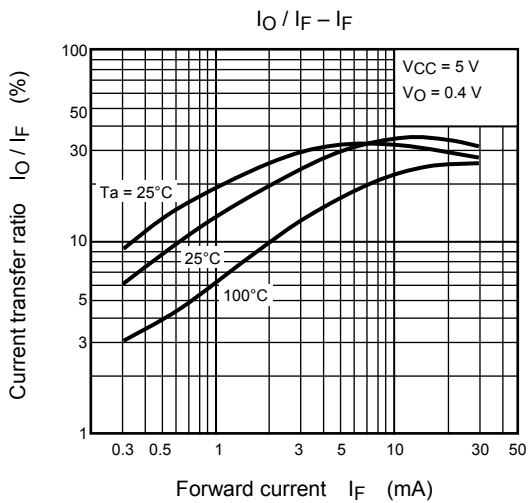
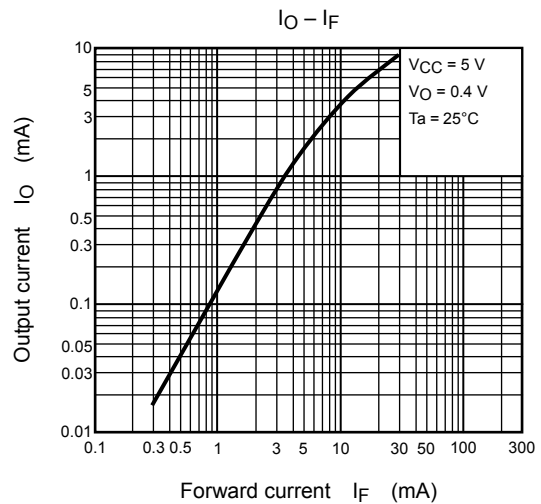
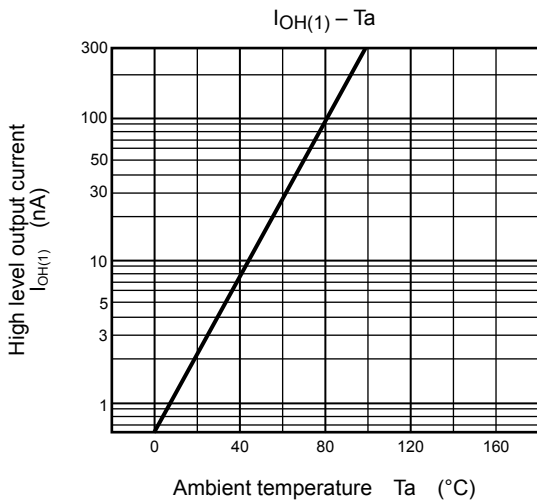
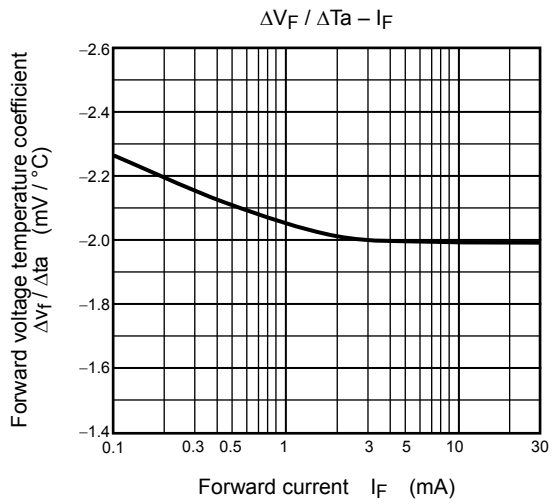
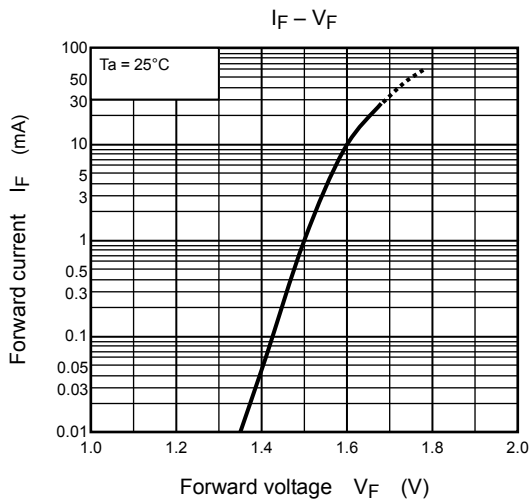
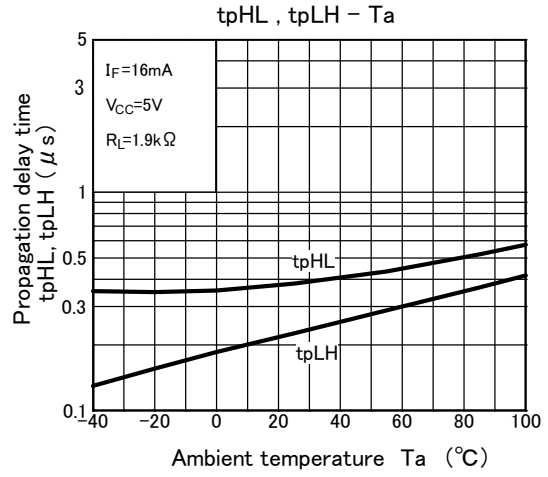
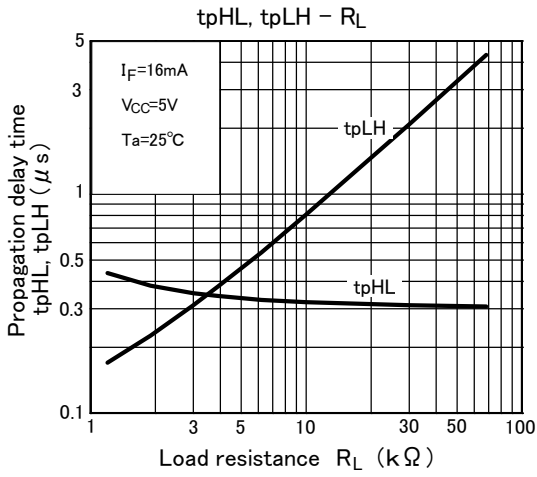
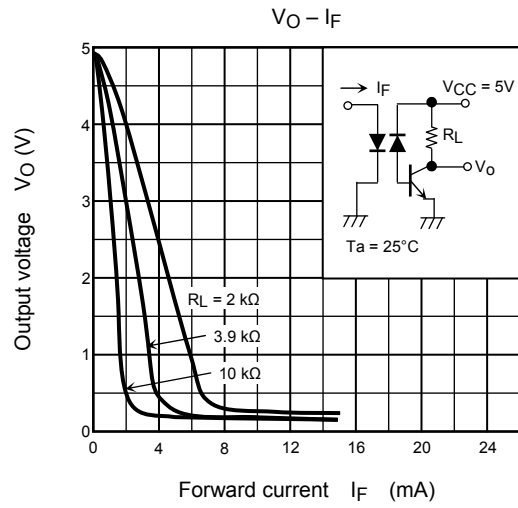
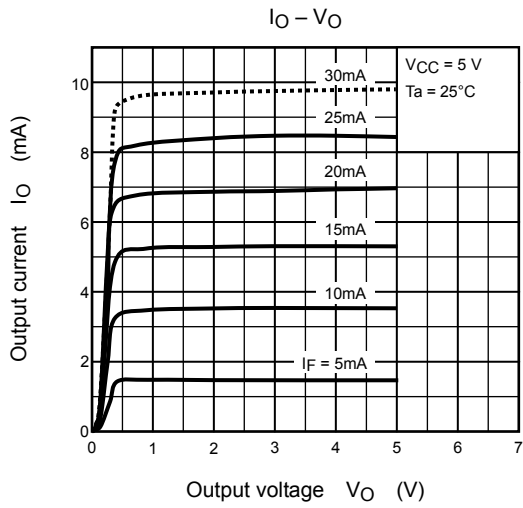


Figure 2. Common Mode Noise Immunity Test Circuit.







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