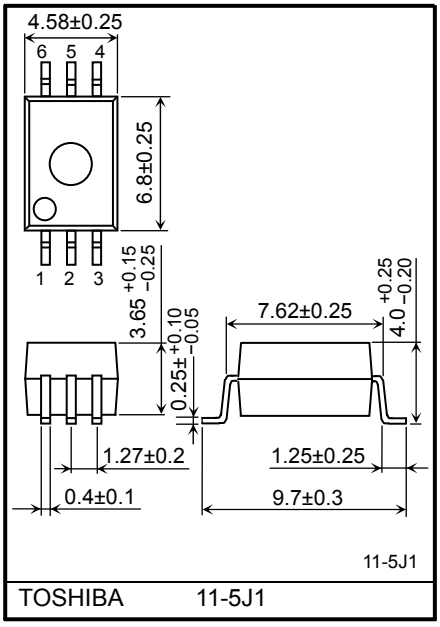
TOSHIBA PHOTOCOUPLER GaAℓAs IRED + PHOTO-IC

TLP719

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

Unit in mm



Weight : 0.26 g (typ.)

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.

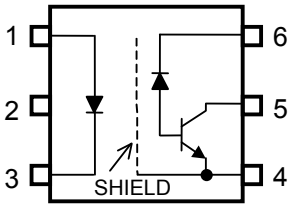
- Open collector
- Package type : SDIP6
- Isolation voltage : 5000 Vrms (min)
- Common mode transient immunity : ±10 kV/us(min) @V_{CM} = 400 V
- Switching speed : t_{pHL}/ t_{pLH} = 0.8 μs (max)
  @ I_F = 16 mA , V_{CC} = 5 V,
  R_L = 1.9 kΩ , Ta = 25 °C
- TTL compatible
- Construction mechanical rating

	7.62-mm pitch standard type	10.16-mm pitch TLPXXXF 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

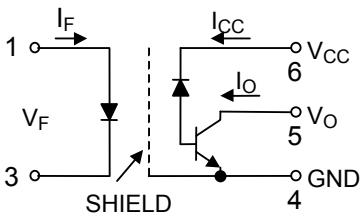
(Note) When a EN60747-5-2 approved type is needed, please designate the "Option(D4)"

PIN CONFIGURATION (Top View)



1 : ANODE
2 : N.C.
3 : CATHODE
4 : EMITTER (GND)
5 : COLLECTOR (OUTPUT)
6 : V_{CC}

SCHEMATIC



A 0.1-μF 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_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
	Junction temperature		T_j	125	°C
Detector	Output current		I_O	8	mA
	Peak output current		I_{OP}	16	mA
	Output voltage		V_O	−0.5~20	V
	Supply voltage		V_{CC}	−0.5~30	V
	Output power dissipation	(Note 5)	P_O	100	mW
	Junction Temperature		T_j	125	°C
Operating temperature range			T_{opr}	−55~100	°C
Storage temperature range			T_{stg}	−55~125	°C
Lead soldering temperature (10 s)			T_{sol}	260	°C
Isolation voltage (AC, 1 minute, R.H.≤ 60 %)		(Note 6)	BV_S	5000	Vrms

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 mA		1.65	1.85	V
	Forward voltage Temperature coefficient	$\Delta V_F / \Delta Ta$	I_F = 16 mA	—	−2	—	mV / °C
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance between terminals	C_T	V_F = 0 V , 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
		$I_{OH\ (2)}$	I_F = 0 mA ,V_{CC} = 30 V V_O = 20 V	—	—	5	μA
		I_{OH}	I_F = 0 mA ,V_{CC} = 30 V V_O = 20 V,Ta = 70 °C	—	—	50	
	HIGH-level supply current	I_{CCH}	I_F = 0 mA ,V_{CC} = 30 V	—	0.01	1	μA
	Supply voltage	V_{CC}	I_{CC} = 0.01 mA	30	—	—	V
	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 = 16 mA ,V_{CC} = 4.5 V V_O = 0.4 V	20	—	—	%
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	C_S	V = 0 V , f = 1 MHz (Note 6)	—	0.8	—	pF
Isolation resistance	R_S	R.H. ≤ 60% ,V_S = 500 V (Note 6)	1×10^{12}	10^{14}	—	Ω
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, V_{CC} = 5 V)

Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time (H→ L)	t_{pHL}	Fig1	I_F = 0→ 16 mA R_L = 1.9kΩ	—	—	0.8	μs
Propagation delay time (L→ H)	t_{pLH}		I_F = 16→ 0 mA R_L = 1.9kΩ	—	—	0.8	μs
Common mode transient immunity at logic HIGH output (Note 8)	CM_H	Fig2	I_F = 0 mA V_{CM} = 400 Vp−p R_L = 1.9kΩ	10000	—	—	V / μs
Common mode transient immunity at logic LOW output (Note 8)	CM_L		I_F = 16 mA V_{CM} = 400 Vp−p R_L = 1.9 kΩ	−10000	—	—	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 (V_O < 0.8 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 V).

Figure 1. Switching Time Test Circuit

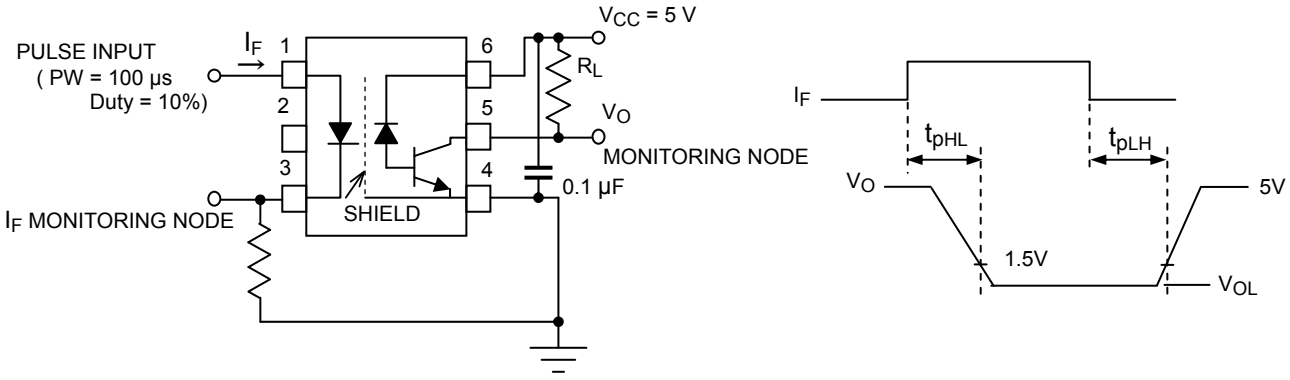
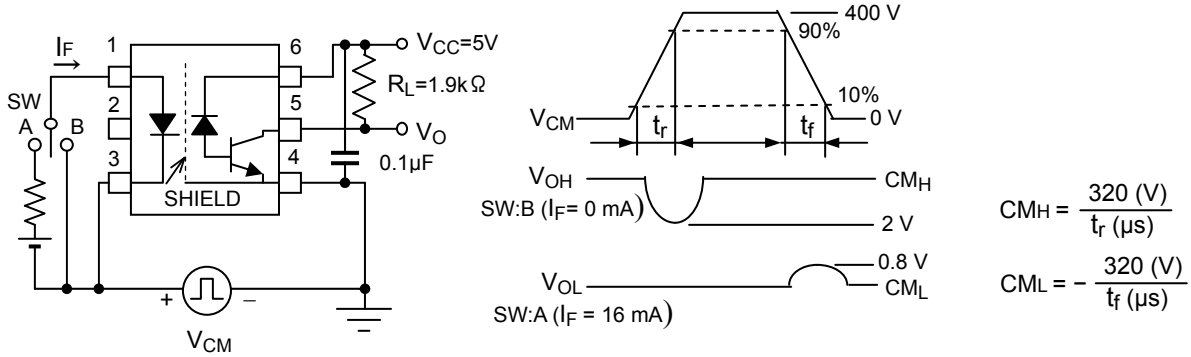
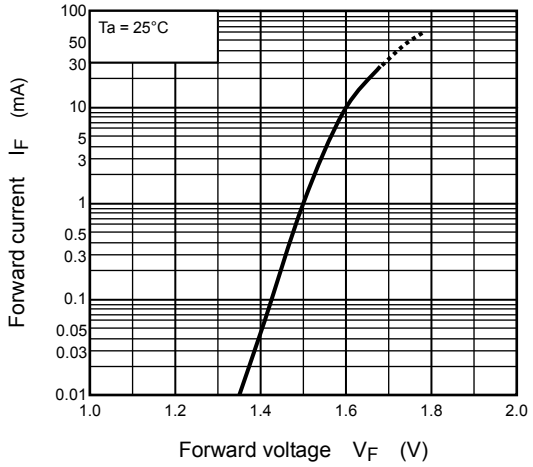


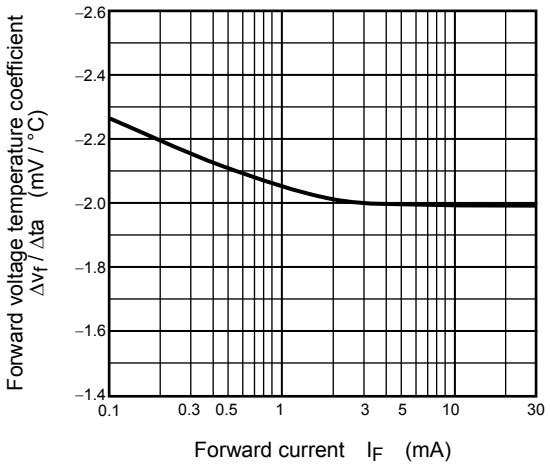
Figure 2. Common Mode Noise Immunity Test Circuit.



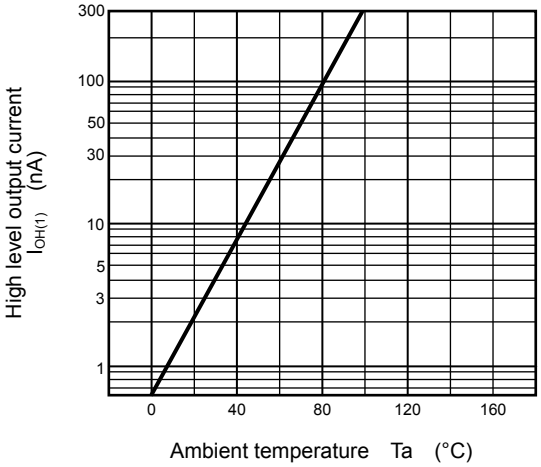
$I_F - V_F$



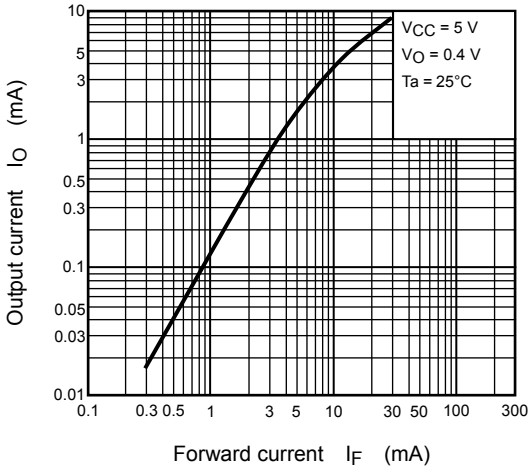
$\Delta V_F / \Delta Ta - I_F$



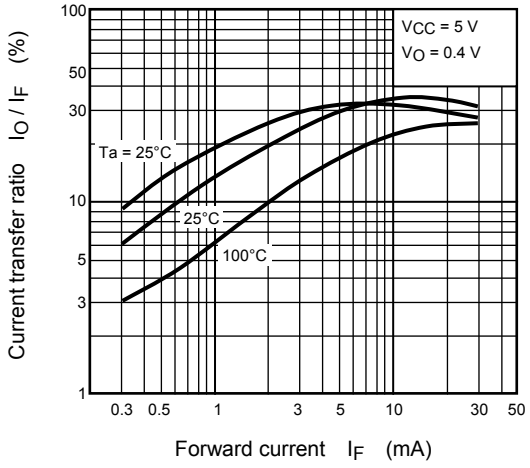
$I_{OH(1)} - Ta$



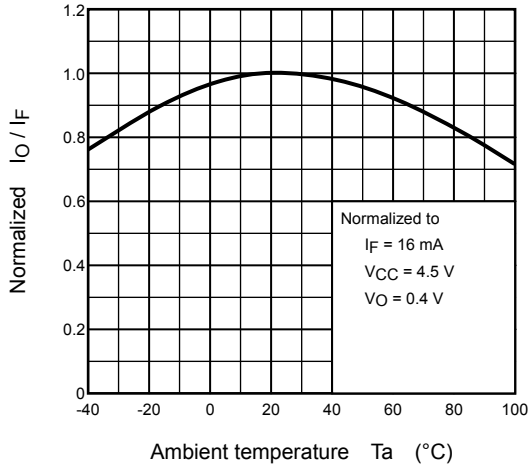
$I_O - I_F$



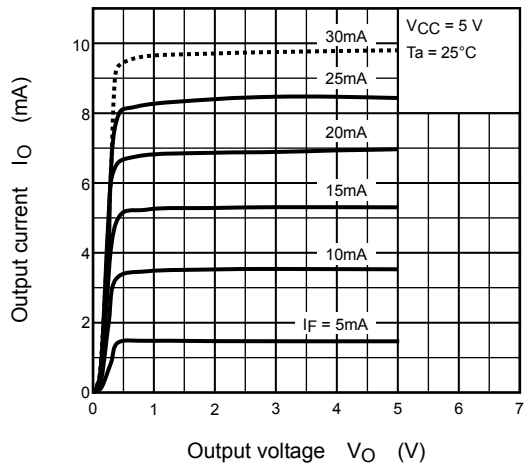
$I_O / I_F - I_F$



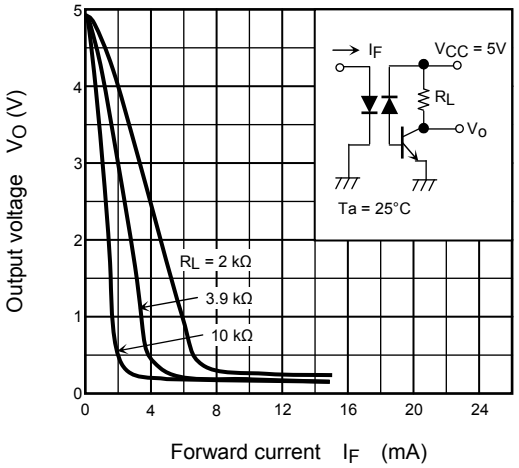
$I_O / I_F - Ta$



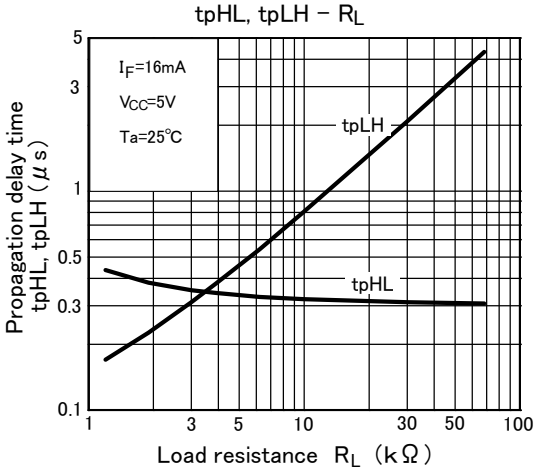
$I_O - V_O$



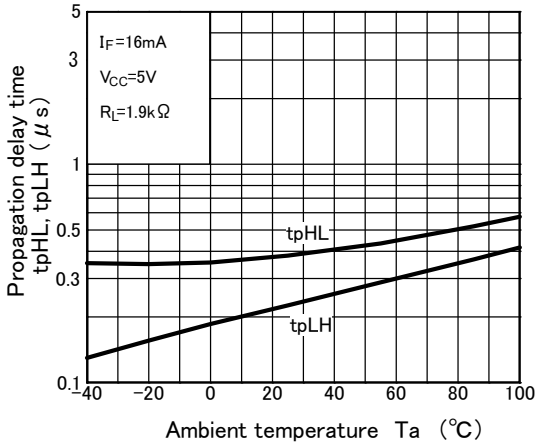
$V_O - I_F$



tpHL, tpLH − R_L



tpHL , tpLH − Ta



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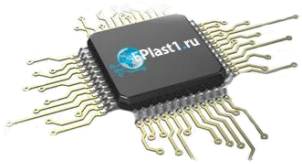

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