

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP421

OFFICE EQUIPMENT

HOUSEHOLD APPLIANCES

SOLID STATE RELAYS

SWITCHING POWER SUPPLIES

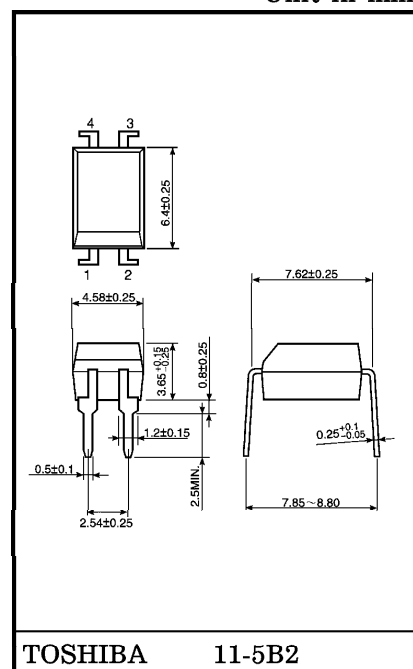
VARIOUS CONTROLLERS

SIGNAL TRANSMISSION BETWEEN DIFFERENT VOLTAGE CIRCUITS

The TOSHIBA TLP421 consists of a silicone photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a four lead plastic DIP (DIP4) with having high isolation voltage (AC : 5k V_{RMS} (min)).

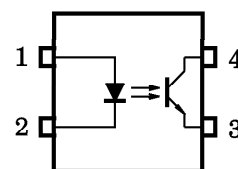
- Collector-Emitter Voltage : 80 V (min)
- Current Transfer Ratio : 50% (min)
Rank GB : 100% (min)
- Isolation Voltage : 5000 V_{rms} (min)
- UL Recognized : UL1577
- BSI Approved : BS EN60065 : 1994
Approved No. 8411
BS EN60950 : 1992
Approved No. 8412
- SEMKO Approved : EN60065, EN60950, EN60335
Approved No. 9910249 / 01

Unit in mm



Weight : 0.26 g

PIN CONFIGURATIONS (TOP VIEW)



- 1 : ANODE
- 2 : CATHODE
- 3 : EMITTER
- 4 : COLLECTOR

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- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
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- Option (D4) type
TÜV Approved : DIN VDE0884
Approved No. R9950202
Maximum Operating Insulation Voltage : 890 V_{PK}
Maximum Permissible Overvoltage : 8000 V_{PK}

(Note) : When a VDE0884 approved type is needed, please designate the “Option (D4)”
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Making the VDE Application : DIN VDE0884

- Construction Mechanical Rating

	7.62 mm pitch Typical 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)

CURRENT TRANSFER RATIO

TYPE	CLASSI- FICATION (*1)	CURRENT TRANSFER RATIO (%)		MARKING OF CLASSIFICATION
		(I _C / I _F)		
		I _F = 5 mA, V _{CE} = 5 V, Ta = 25°C		
		MIN	MAX	
TLP421	(None)	50	600	Blank, Y, Y+, G, G+, B, B+, GB
	Rank Y	50	150	Y, Y+
	Rank GR	100	300	G, G+
	Rank BL	200	600	B, B+
	Rank GB	100	600	G, G+, B, B+, GB

(*1) : Ex. Rank GB : TLP421 (GB)

(Note): Application type name for certification test, please use standard product type name, i. e.

TLP421 (GB) : TLP421

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		STMBOL	RATING	UNIT
LED	Forward Current	I _F	60	mA
	Forward Current Derating (Ta ≥ 39°C)	ΔI _F / °C	−0.7	mA / °C
	Pulse Forward Current (Note 2)	I _{FP}	1	A
	Power Dissipation	P _D	100	mW
	Power Dissipation Derating	ΔP _D / °C	−1.0	mW / °C
	Reverse Voltage	V _R	5	V
	Junction Temperature	T _j	125	°C
DETECTOR	Collector-Emitter Voltage	V _{CEO}	80	V
	Emitter-Collector Voltage	V _{ECO}	7	V
	Collector Current	I _C	50	mA
	Power Dissipation (Single Circuit)	P _C	150	mW
	Power Dissipation Derating (Ta ≥ 25°C) (Single Circuit)	ΔP _C / °C	−1.5	mW / °C
	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
Total Package Power Dissipation		P _T	250	mW
Total Package Power Dissipation Derating (Ta ≥ 25°C)		ΔP _T / °C	−2.5	mW / °C
Isolation Voltage (Note 3)		BV _S	5000	V _{rms}

(Note 2) : 100 μs pulse, 100 Hz frequency

(Note 3) : AC, 1 min., R.H. ≤ 60%. Apply voltage to LED pin and detector pin together.

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN	TYP.	MAX	UNIT
Supply Voltage	V _{CC}	—	5	24	V
Forward Current	I _F	—	16	25	mA
Collector Current	I _C	—	1	10	mA
Operating Temperature	T _{opr}	−25	—	85	°C

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
LED	Forward Voltage	V_F	$I_F = 10 \text{ mA}$	1.0	1.2	1.3	V
	Reverse Current	I_R	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance	C_T	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 0.5 \text{ mA}$	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 0.1 \text{ mA}$	7	—	—	V
	Collector Dark Current	$I_D (I_{CEO})$	$V_{CE} = 24 \text{ V}$ (Ambient Light Below 1000 lx)	—	0.01 (0.1)	0.1 (10)	μA
			$V_{CE} = 24 \text{ V}$ (Ambient Light Below 1000 lx) $T_a = 85^\circ\text{C}$	—	0.6 (1)	50 (50)	μA
	Capacitance (Collector to Emitter)	C_{CE}	$V = 0, f = 1 \text{ MHz}$	—	10	—	pF

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Current Transfer Ratio	I_C / I_F	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE} (\text{sat})$	$I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}$	—	—	0.4	V
		$I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$	—	0.2	—	
		Rank GB	—	—	0.4	

ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Capacitance (Input to Output)	C_S	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation Resistance	R_S	$V_S = 500 \text{ V}$	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)

CHARACTERISTICS	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Rise Time	t_r	$V_{CC} = 10\text{ V}, I_C = 2\text{ mA}$ $R_L = 100\ \Omega$	—	2	—	μs
Fall Time	t_f		—	3	—	
Turn-on Time	t_{on}		—	3	—	
Turn-off Time	t_{off}		—	3	—	
Turn-on Time	t_{ON}	$R_L = 1.9\text{ k}\Omega$ $V_{CC} = 5\text{ V}, I_F = 16\text{ mA}$ (Fig.1)	—	2	—	μs
Storage Time	t_s		—	25	—	
Turn-off Time	t_{OFF}		—	50	—	

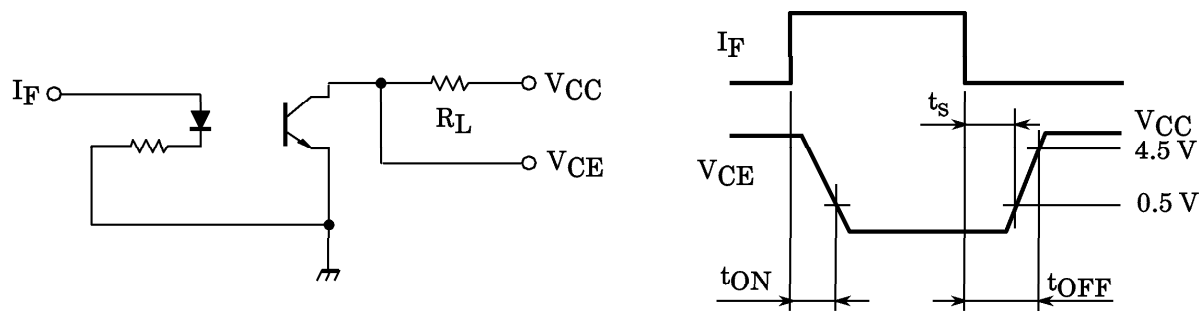


Fig.1 Switching Time Test Circuit

