

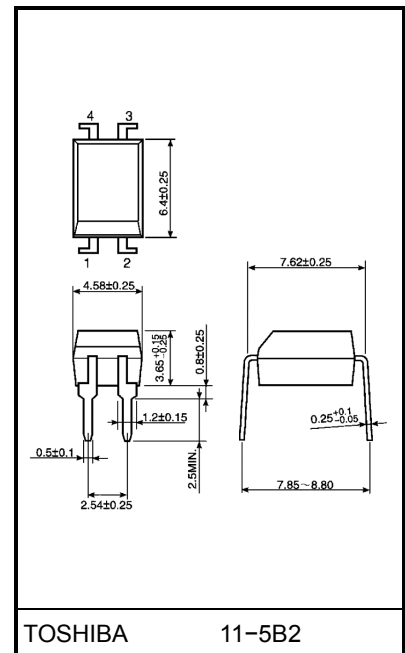
# TLP421

Unit in mm

Office Equipment  
Household Appliances  
Solid State Relays  
Switching Power Supplies  
Various Controllers  
Signal Transmission Between Different Voltage Circuits

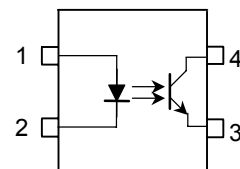
The TOSHIBA TLP421 consists of a silicone photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a four lead plastic DIP (DIP4) with having high isolation voltage (AC: 5kVRMS (min)).

- Collector-emitter voltage: 80V (min.)
- Current transfer ratio: 50% (min.)  
Rank GB: 100% (min.)
- Isolation voltage: 5000V<sub>rms</sub> (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



Weight: 0.26 g

## Pin Configurations (top view)



- 1 : Anode
- 2 : Cathode
- 3 : Emitter
- 4 : Collector

- Option(D4)type  
TÜV approved: DIN VDE0884  
Approved no.R9950202  
Maximum operating insulation voltage: 890V<sub>PK</sub>  
Maximum permissible overvoltage: 8000V<sub>PK</sub>

**(Note): When a VDE0884 approved type is needed,  
please designate the “Option(D4)”**

Making the VDE application: DIN VDE0884

- Construction mechanical rating

	7.62mm Pitch Typical Type	10.16mm Pitch TLPxxxF Type
Creepage distance	7.0mm(min)	8.0mm(min)
Clearance	7.0mm(min)	8.0mm(min)
Insulation thickness	0.4mm(min)	0.4mm(min)

## Current Transfer Ratio

Type	Classi- fication (*1)	Current Transfer Ratio (%) (I <sub>C</sub> / I <sub>F</sub> )		Marking Of Classification
		I <sub>F</sub> = 5mA, V <sub>CE</sub> = 5V, T <sub>a</sub> = 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)	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / °C
	Pulse forward current (Note 2)	$I_{FP}$	1	A
	Power dissipation	$P_D$	100	mW
	Power dissipation derating	$\Delta P_D / ^\circ\text{C}$	-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)	$\Delta P_C / ^\circ\text{C}$	-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 (10s)		$T_{sol}$	260	°C
Total package power dissipation		$P_T$	250	mW
Total package power dissipation derating (Ta ≥ 25°C)		$\Delta P_T / ^\circ\text{C}$	-2.5	mW / °C
Isolation voltage (Note 3)		$BV_S$	5000	$V_{rms}$

(Note 2): 100μs pulse, 100Hz 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	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR) \text{ CEO}}$	$I_C = 0.5 \text{ mA}$	80	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR) \text{ ECO}}$	$I_E = 0.1 \text{ mA}$	7	—	—	V
	Collector dark current	$I_D(I_{\text{CEO}})$	$V_{\text{CE}} = 24 \text{ V}$ (ambient light below 1000 lx)	—	0.01 (0.1)	0.1 (10)	$\mu\text{A}$
			$V_{\text{CE}} = 24 \text{ V}$ (ambient light Ta = 85°C below 1000 lx)	—	0.6 (1)	50 (50)	$\mu\text{A}$
	Capacitance (collector to emitter)	$C_{\text{CE}}$	$V = 0, f = 1 \text{ MHz}$	—	10	—	pF

**Coupled Electrical Characteristics (Ta = 25°C)**

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	$I_C / I_F$	$I_F = 5 \text{ mA}, V_{\text{CE}} = 5 \text{ V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F(\text{sat})$	$I_F = 1 \text{ mA}, V_{\text{CE}} = 0.4 \text{ V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-emitter saturation voltage	$V_{\text{CE}}(\text{sat})$	$I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}$	—	—	0.4	V
		$I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$ Rank GB	—	0.2	—	
			—	—	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	$R_S$	$V_S = 500 \text{ V}$	$1 \times 10^{12}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	5000	—	—	$V_{\text{rms}}$
		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	—	$\mu\text{s}$
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	—	$\mu\text{s}$
Storage time	$t_s$		—	25	—	
Turn-off time	$t_{OFF}$		—	50	—	

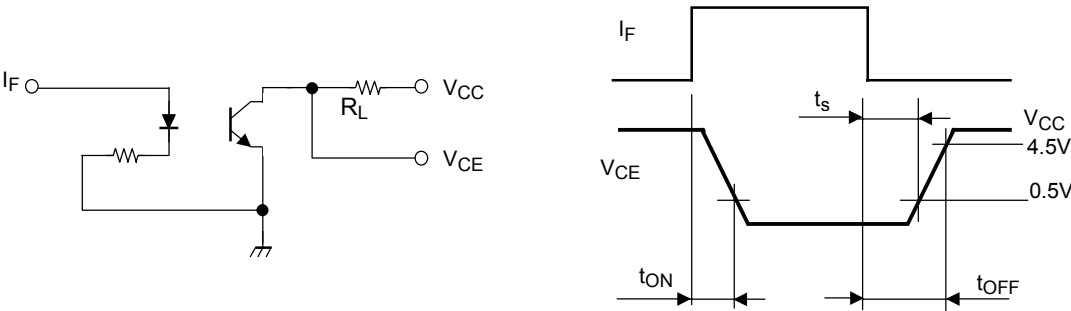
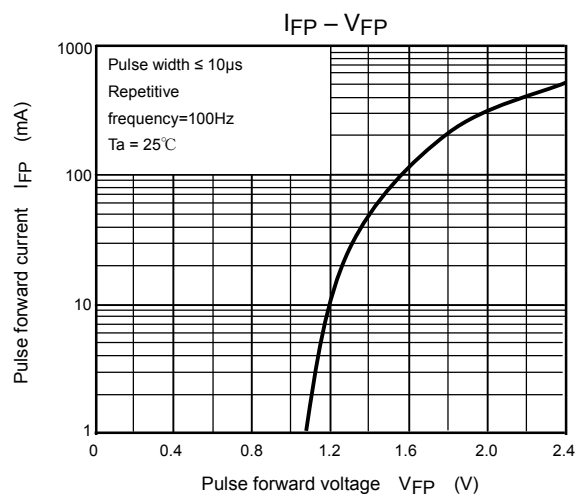
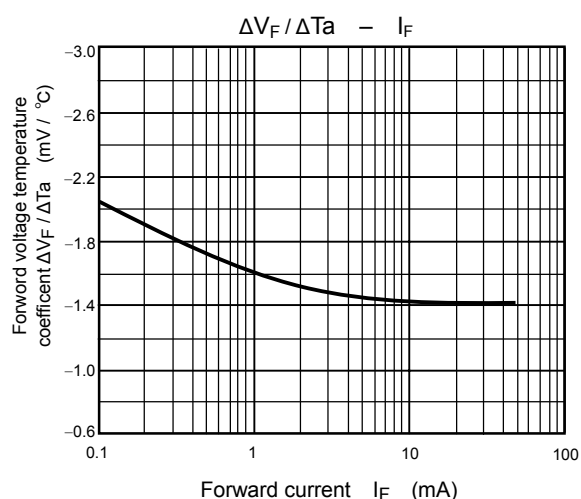
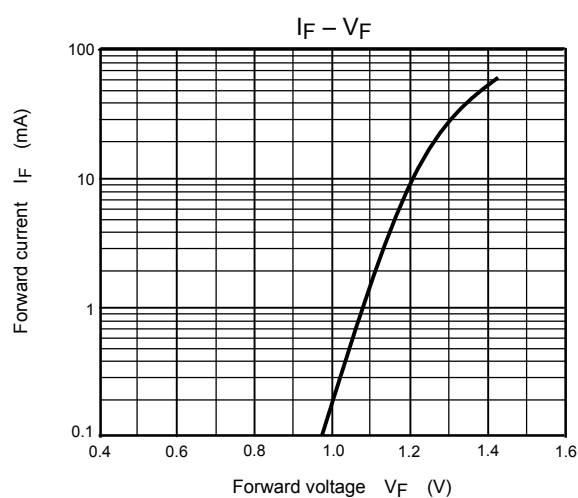
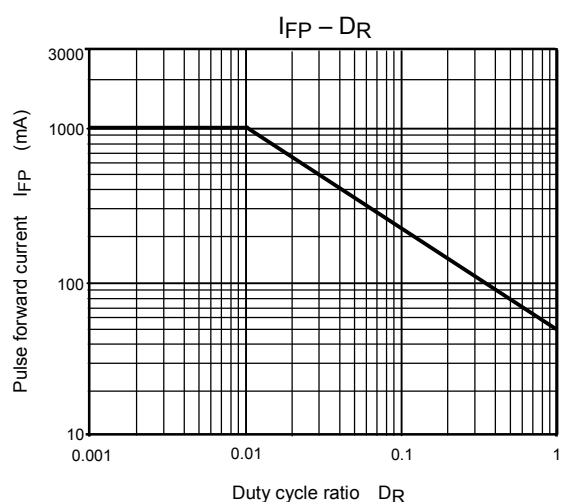
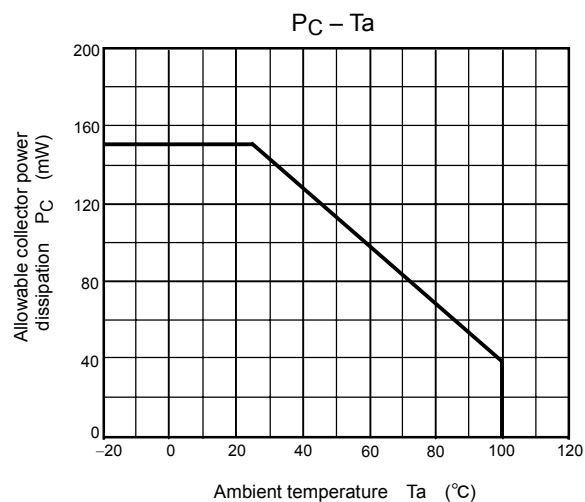
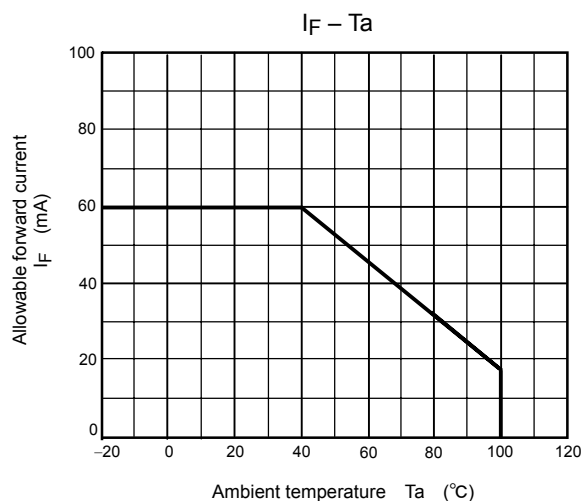
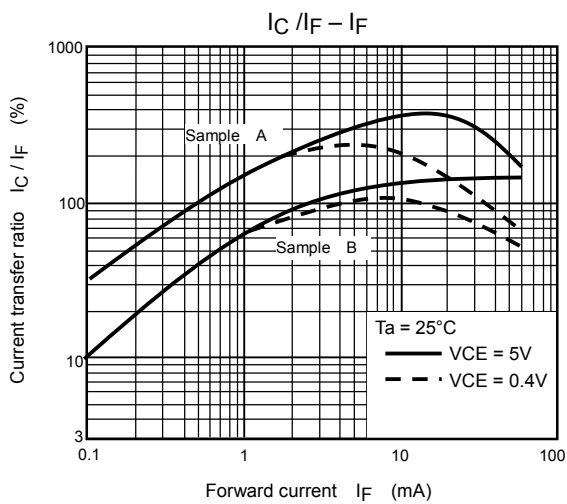
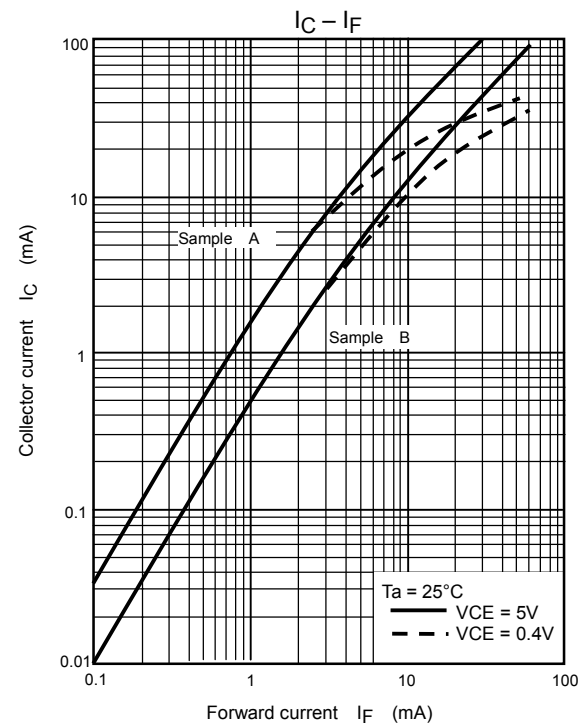
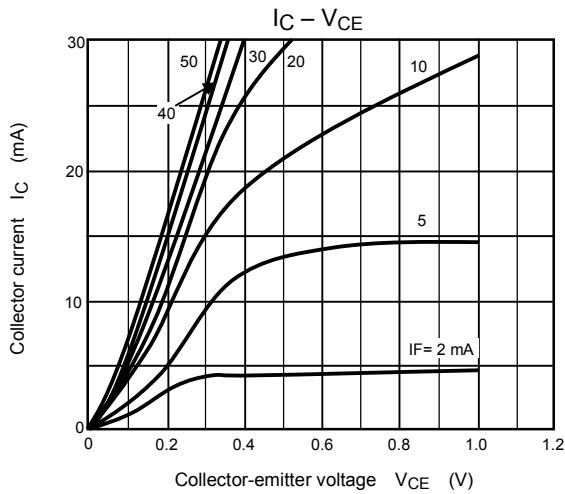
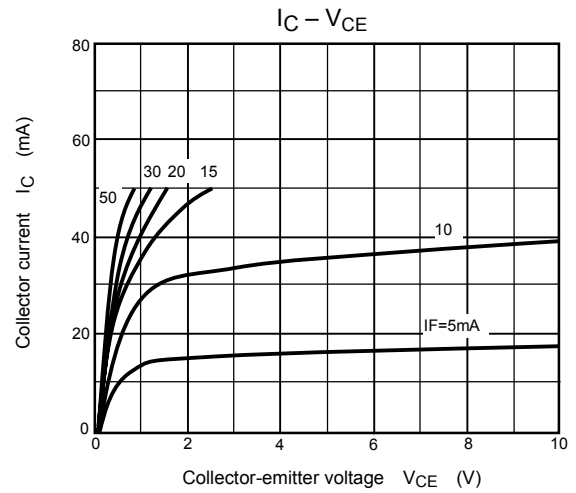
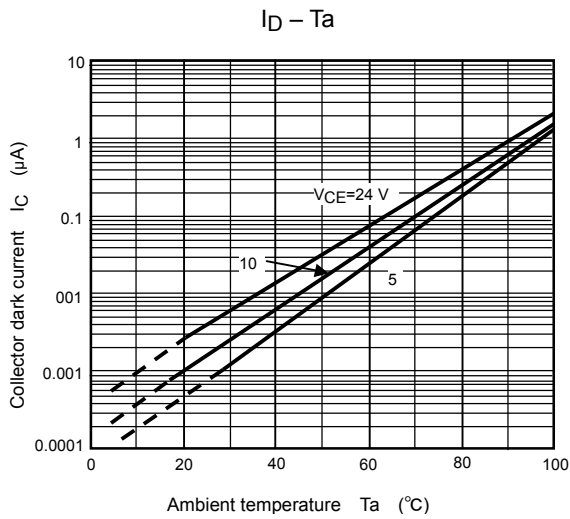
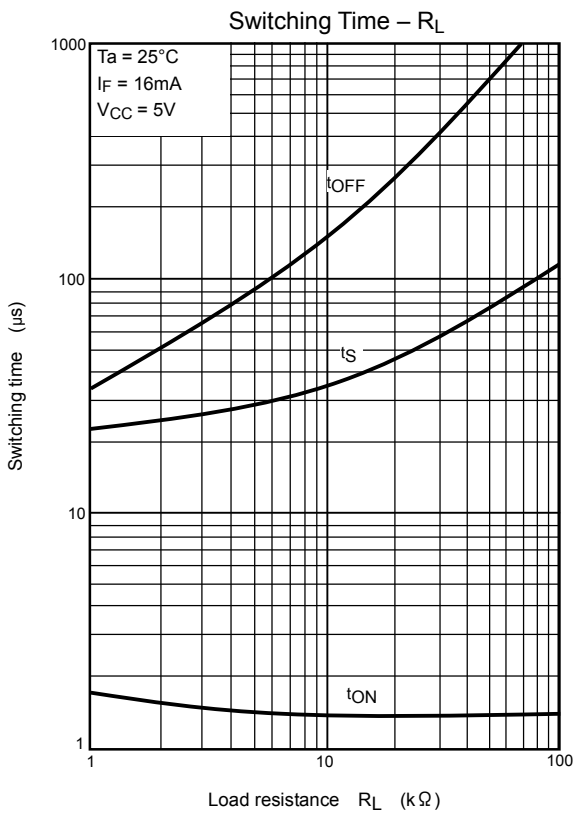
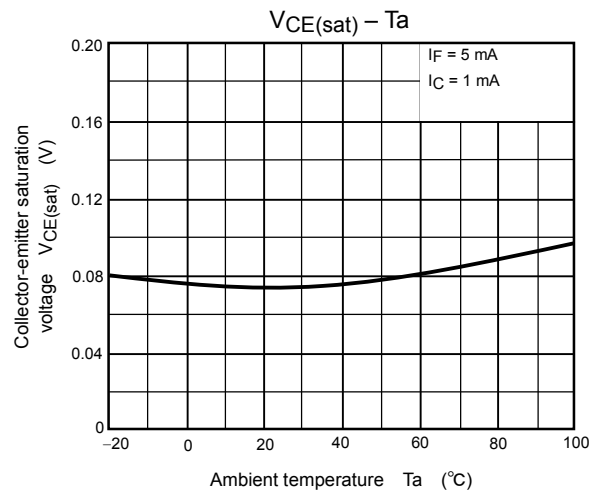
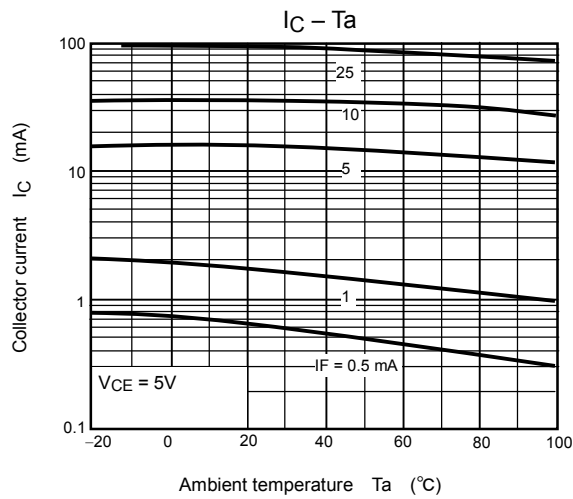


Fig.1 Switching time test circuit









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