TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP421

OFFICE EQUIPMENT

HOUSEHOLD APPLIANCES

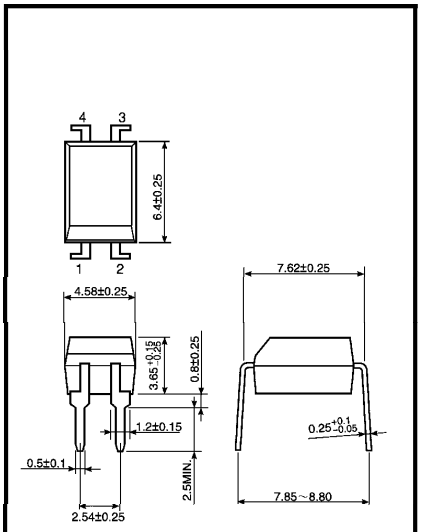
SOLID STATE RELAYS

SWITCHING POWER SUPPLIES

VARIOUS CONTROLLERS

SIGNAL TRANSMISSION BETWEEN DIFFERENT VOLTAGE CIRCUITS

Unit in mm



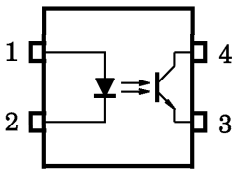
TOSHIBA 11-5B2

Weight : 0.26 g

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

PIN CONFIGURATIONS
(TOP VIEW)



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

980910EBC1

- 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)"

  Making the VDE Application : DIN VDE0884

- Construction Mechanical Rating

	7.62 mm pich Typical type	10.16 mm pich 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	CLASSIFICATION (*1)	CURRENT TRANSFER RATIO (%) (I_C / I_F) I_F = 5 mA, V_{CE} = 5 V, Ta = 25°C		MARKING OF CLASSIFICATION
		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 mA	1.0	1.2	1.3	V
	Reverse Current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1 MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 0.5 mA	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_E = 0.1 mA	7	—	—	V
	Collector Dark Current	I_D (I_{CEO})	V_{CE} = 24 V (Ambient Light Below 1000 ℓx)	—	0.01 (0.1)	0.1 (10)	μA
			V_{CE} = 24 V, Ta = 85°C (Ambient Light Below 1000 ℓx)	—	0.6 (1)	50 (50)	μA
	Capacitance (Collector to Emitter)	C_{CE}	V = 0, f = 1 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 mA, V_{CE} = 5 V	50	—	600	%
		Rank GB	100	—	600	
Saturated CTR	$I_C / I_{F(sat)}$	I_F = 1 mA, V_{CE} = 0.4 V	—	60	—	%
		Rank GB	30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 2.4 mA, I_F = 8 mA	—	—	0.4	V
		I_C = 0.2 mA, I_F = 1 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 MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S = 500 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 V, I_C = 2 mA R_L = 100 Ω	—	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 kΩ (Fig.1) V_{CC} = 5 V, I_F = 16 mA	—	2	—	μs
Storage Time	t_s		—	25	—	
Turn-off Time	t_{OFF}		—	50	—	

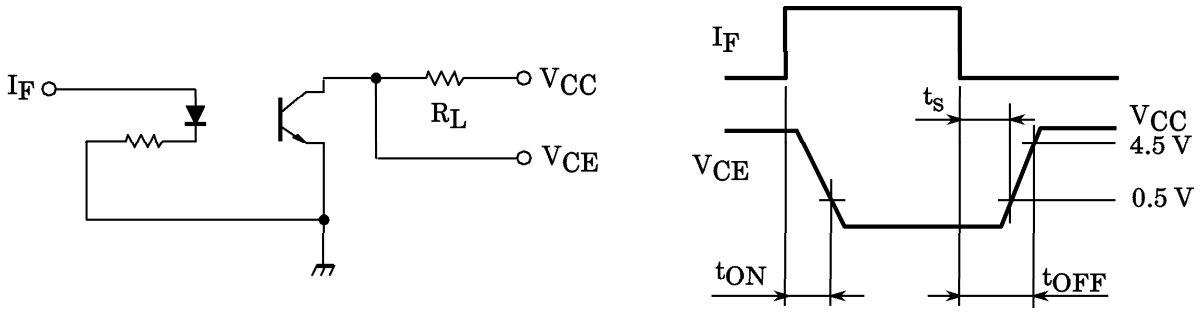
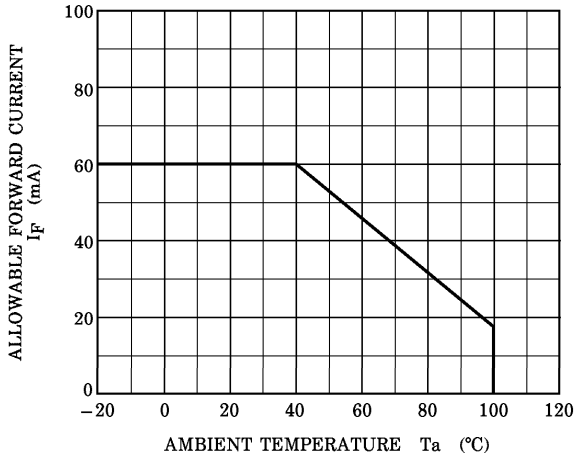
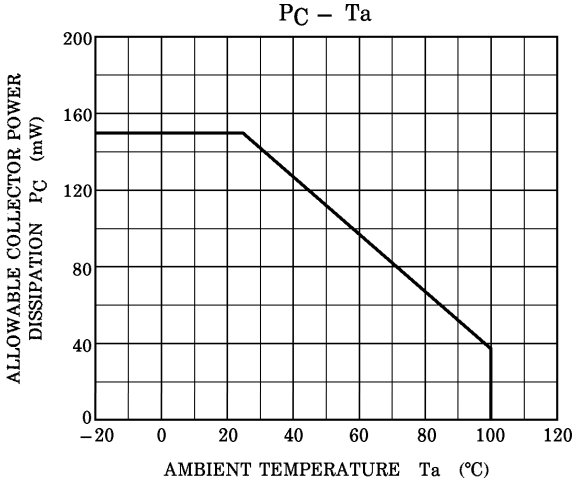


Fig.1 Switching Time Test Circuit

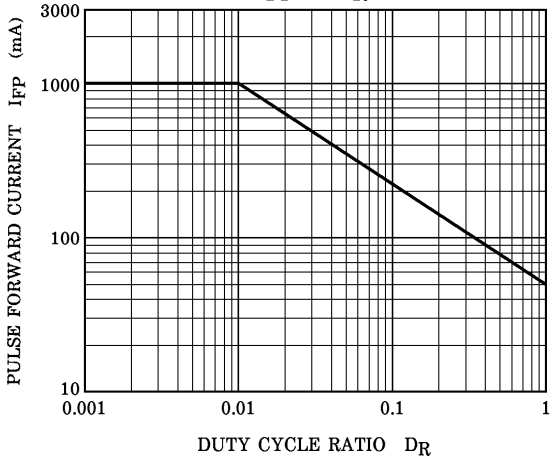
I_F – Ta



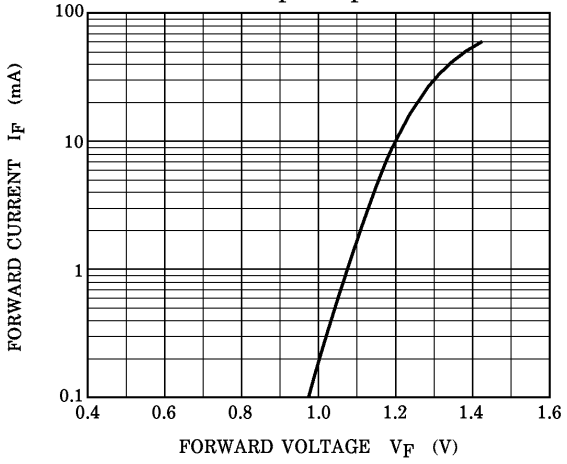
P_C – Ta



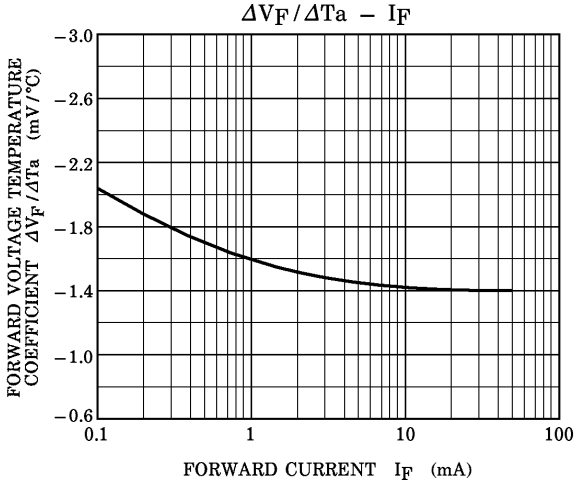
I_{FP} – D_R



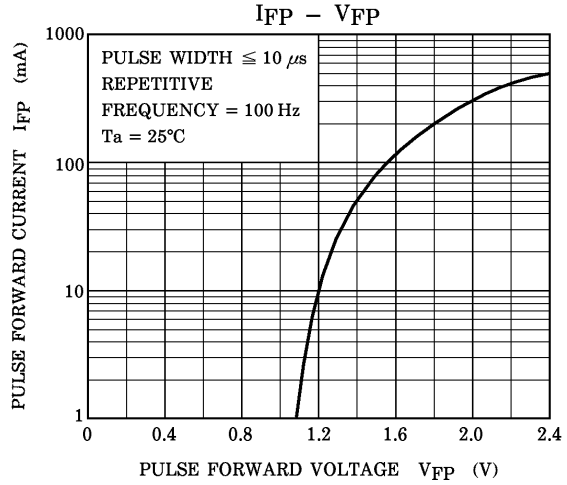
I_F – V_F



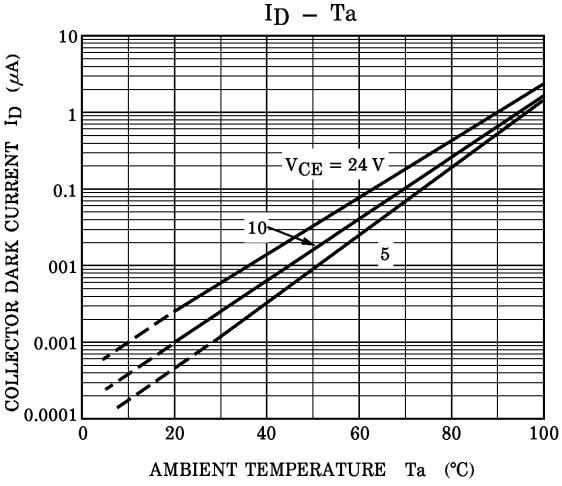
$\Delta V_F / \Delta Ta$ – I_F



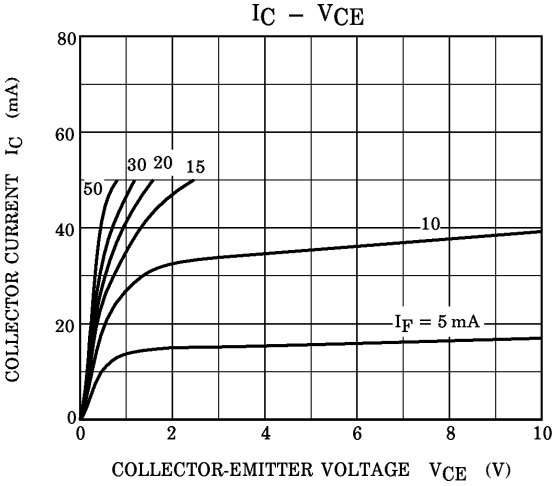
I_{FP} – V_{FP}



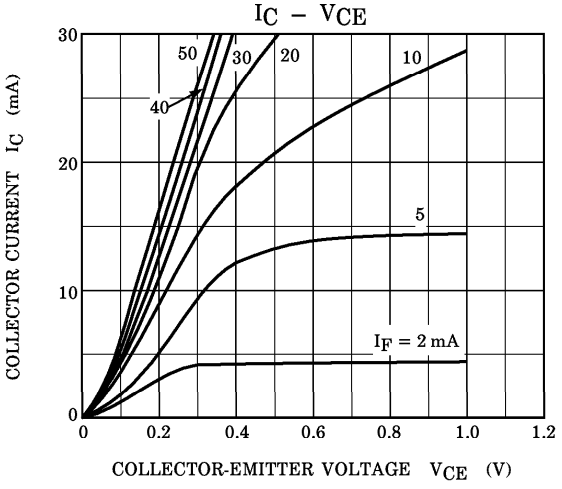
I_D – Ta



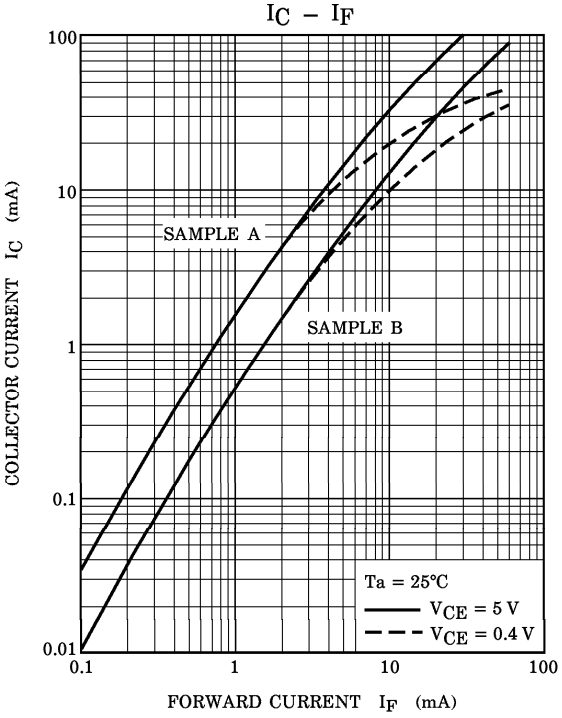
I_C – V_{CE}



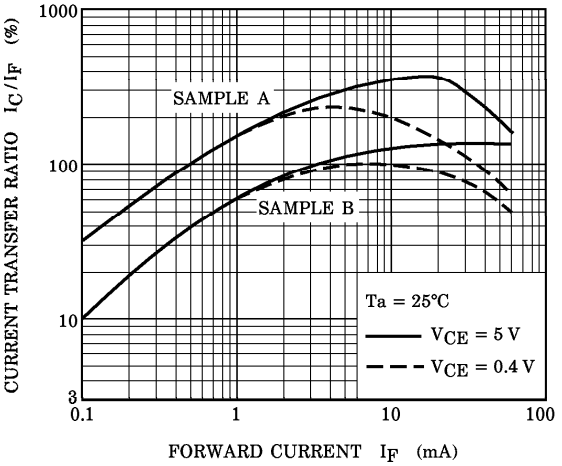
I_C – V_{CE}



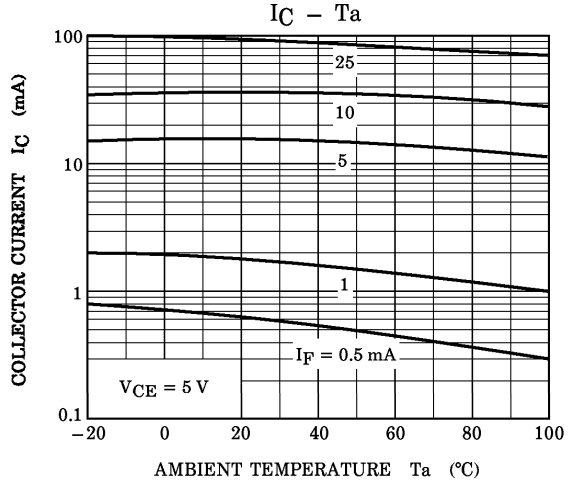
I_C – I_F



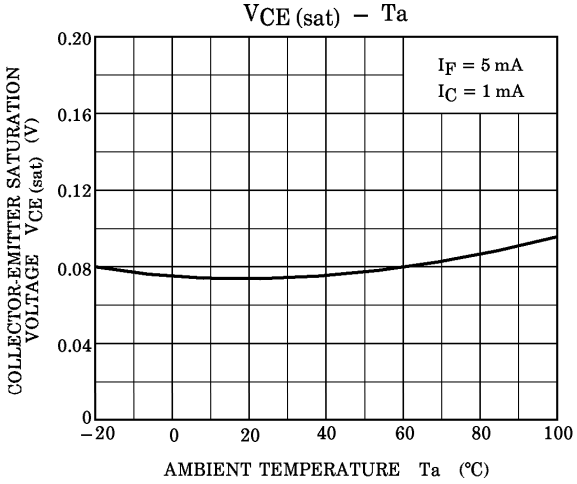
I_C / I_F – I_F



I_C – Ta



$V_{CE\,(sat)}$ – Ta



SWITCHING TIME – R_L