TLP721 GaAs IRED & PHOTO-TRANSISTOR

(TLP721)

OFFICE MACHINE.
HOUSEHOLD USE EQUIPMENT.
SOLID STATE RELAY.
SWITCHING POWER SUPPLY.

The TOSHIBA TLP721 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a four lead plastic DIP package.

- Collector-Emitter Voltage : 55V (Min.)
- Current Transfer Ratio : 50% (Min.)
  Rank GB : 100% (Min.)
- UL Recognized : UL1577, File No. E67349
- BSI Approved : BS415 : 1990, BS7002 : 1989 (EN60950)
  Certificate No. 7364, 7365
- SEMKO Approved : SS4330784
  Certificate No. 9325163
  Isolation Voltage : 4000Vrms (Min.)
- Option (D4) type
  VDE Approved : DIN VDE0884 / 06.92,
  Certificate No. 74285

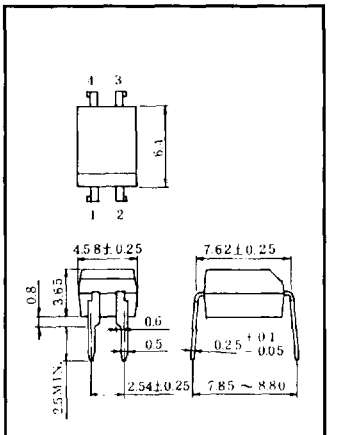
  Maximum Operating Insulation Voltage : 630V_{PK}

  Highest Permissible Over Voltage : 6000V_{PK}

(Note) When a VDE0884 approved type is needed, please designate the "Option (D4)"

	7.62mm pich TLP721 type	10.16mm pich TLP721F type
• Creepage Distance	: 7.0mm (Min.)	8.0mm (Min.)
Clearance	: 7.0mm (Min.)	8.0mm (Min.)
Internal Creepage Path	: 4.0mm (Min.)	4.0mm (Min.)
Insulation Thickness	: 0.5mm (Min.)	0.5mm (Min.)

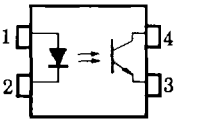
Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	11-5E1

Weight : 0.28g

PIN CONFIGURATIONS (TOP VIEW)



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

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Current Transfer Ratio

TYPE	CLASSIFICATION *1	CURRENT TRANSFER RATIO (%) (I_C / I_F) I_F=5mA, V_{CE}=5V, Ta=25°C MIN.	MAX.	MARKING OF CLASSIFICATION
TLP721	(None)	50	600	BLANK, Y, Y■, G, G■, B, B■, GB
		50	150	Y, Y■
	Rank GR	100	300	G, G■
		200	600	B, B■
	Rank GB	100	600	G, G■, B, B■, GB

*1 : Ex. Rank GB : TLP721 (GB)

Note : Application type name for certification test, please use standard product type name, i. e.
TLP721 (GB) : TLP721

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	STMBOL	RATING	UNIT
LED	Forward Current	IF	60	mA
	Forward Current Derating (Ta≧39°C)	ΔI_F / °C	−0.7	mA / °C
	Peak Forward Current (100μs pulse, 100pps)	I_{FP}	1	A
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_j	125	°C
DETECTOR	Collector-Emitter Voltage	V_{CEO}	55	V
	Emitter-Collector Voltage	V_{ECO}	7	V
	Collector Current	I_C	50	mA
	Power Dissipation	P_C	150	mW
	Power Dissipation Derating (Ta≧25°C)	ΔP_C / °C	−1.5	mW / °C
	Junction Temperature	T_j	125	°C
Storage Temperature Range		T_{stg}	−55~125	°C
Operating Temperature Range		T_{opr}	−40~100	°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 (AC, 1 min., R.H.≦60%)	(NOTE)	BV_S	4000	Vrms

NOTE. Device considered a two terminal device : pins 1 and 2 shorted together, and pins 3 and 4 shorted together.

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INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	I_F = 10mA	1.0	1.15	1.3	V
	Reverse Current	I_R	V_R = 5V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 0.5mA	55	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_E = 0.1mA	7	—	—	V
	Collector Dark Current	I_{CEO}	V_{CE} = 24V (Ambient Light / Below 1000 lx)	—	0.01 (2)	0.1 (10)	μA
			V_{CE} = 24V, Ta = 85°C (Ambient Light / Below 1000 lx)	—	2 (4)	50 (50)	μA
	Capacitance (Collector to Emitter)	C_{CE}	V = 0, f = 1MHz	—	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 = 5mA, V_{CE} = 5V	50	—	600	%
		Rank GB	100	—	600	
Saturated CTR	$I_C / I_{F(sat)}$	I_F = 1mA, V_{CE} = 0.4V	—	60	—	%
		Rank GB	30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 2.4mA, I_F = 8mA	—	—	0.4	V
		I_C = 0.2mA, I_F = 1mA	—	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 = 1MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S = 500V, R.H. ≦ 60%	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	4000	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

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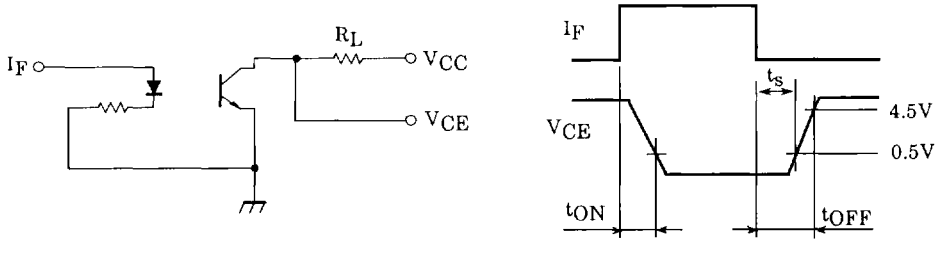
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	V_{CC} = 10V, I_C = 2mA R_L = 100Ω	—	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 = 1.9kΩ (Fig.1) V_{CC} = 5V, I_F = 16mA	—	3	—	μs
Storage Time	t_s		—	40	—	
Turn-off Time	t_{OFF}		—	90	—	

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	—	5	24	V
Forward Current	I_F	—	16	20	mA
Collector Current	I_C	—	1	10	mA
Operating Temperature	T_{opr}	−25	—	85	°C

Fig. 1 Switching Time Test Circuit



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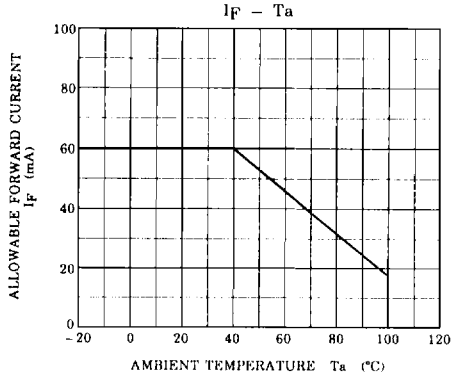
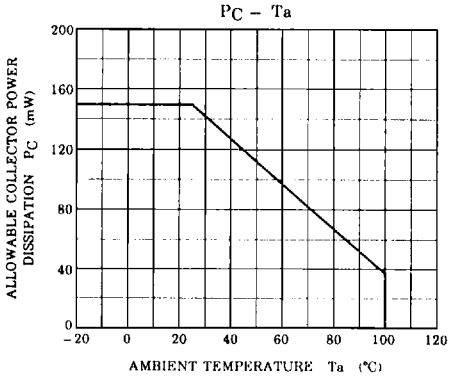
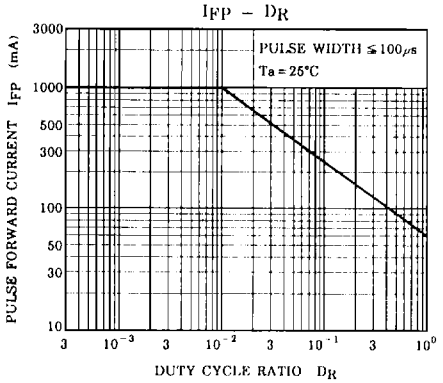
I_F – Ta



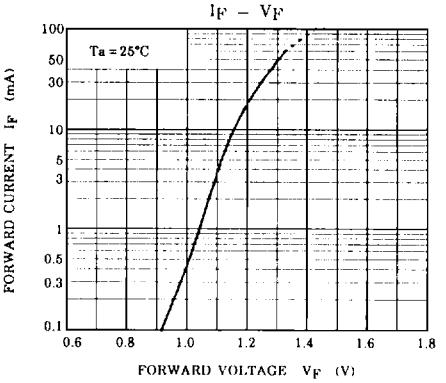
P_C – Ta



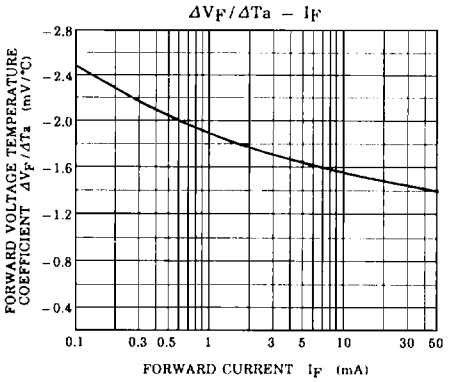
I_{FP} – D_R



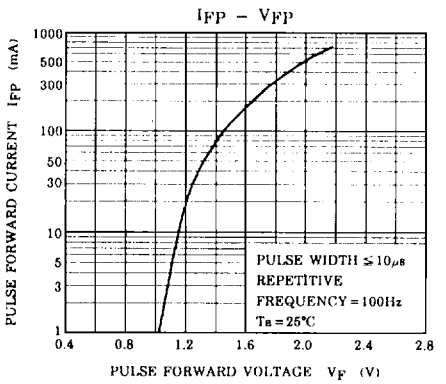
I_F – V_F



$\Delta V_F / \Delta Ta$ – I_F



I_{FP} – V_{FP}



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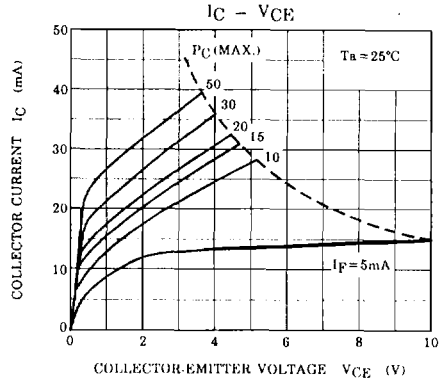
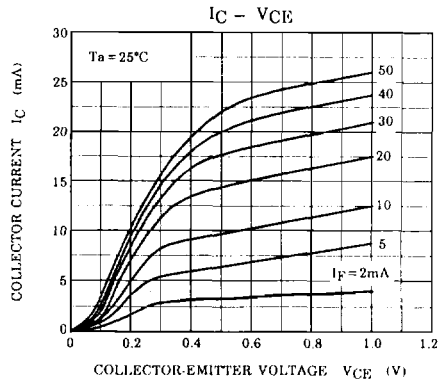
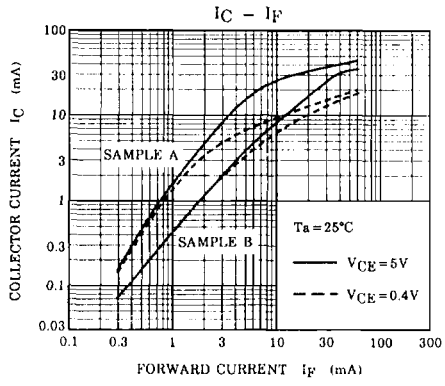
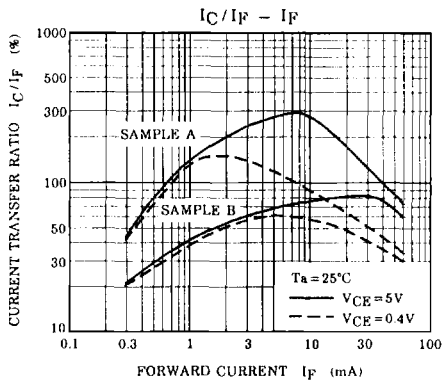

$I_C - V_{CE}$
P_C (MAX.)
Ta = 25°C
50
30
20
15
10
I_F = 5mA
COLLECTOR CURRENT I_C (mA)
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)


$I_C - V_{CE}$
Ta = 25°C
50
40
30
20
10
5
I_F = 2mA
COLLECTOR CURRENT I_C (mA)
COLLECTOR-EMITTER VOLTAGE V_{CE} (V)


$I_C - I_F$
SAMPLE A
SAMPLE B
Ta = 25°C
V_{CE} = 5V
V_{CE} = 0.4V
COLLECTOR CURRENT I_C (mA)
FORWARD CURRENT I_F (mA)


$I_C / I_F - I_F$
SAMPLE A
SAMPLE B
Ta = 25°C
V_{CE} = 5V
V_{CE} = 0.4V
CURRENT TRANSFER RATIO I_C / I_F (%)
FORWARD CURRENT I_F (mA)

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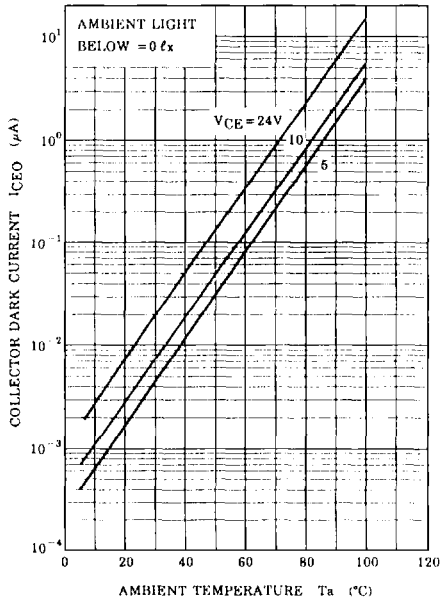
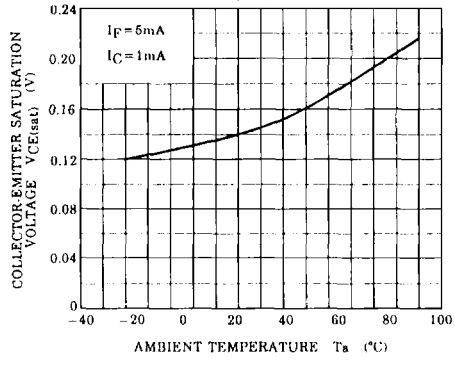
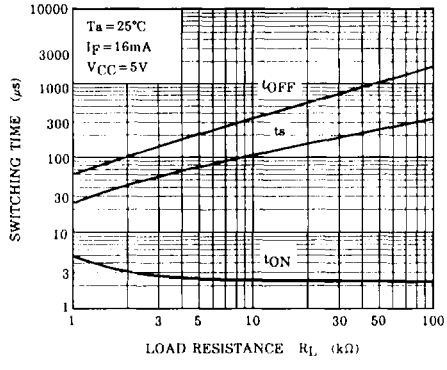
I_D – Ta



$V_{CE(sat)}$ – Ta



SWITCHING TIME – R_L



I_C – Ta