

(TLP633)

OFFICE MACHINE.

HOUSEHOLD USE EQUIPMENT.

SOLID STATE RELAY.

SWITCHING POWER SUPPLY.

The TOSHIBA TLP633 and TLP634 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.

TLP634 is no-base internal connection for high-EMI environments.

- 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. 7123, 7437
- SEMKO Approved : SS4330784,  
Certificate No. 8937148 (TLP633)  
9019123 (TLP634)
- Isolation Voltage : 4000V<sub>rms</sub> (Min.)
- Option (D4) type  
VDE Approved : DIN VDE0884 / 08. 87,  
Certificate No. 68367

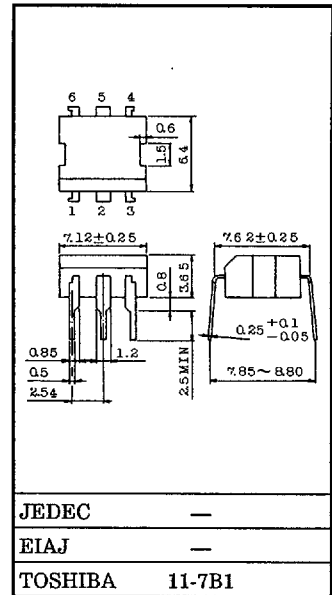
Maximum Operating Insulation Voltage : 630Vpk

Highest Permissible Over Voltage : 6000vpk

(Note) When a VDE0884 approved type is needed,  
Please designate the "option (D4)"

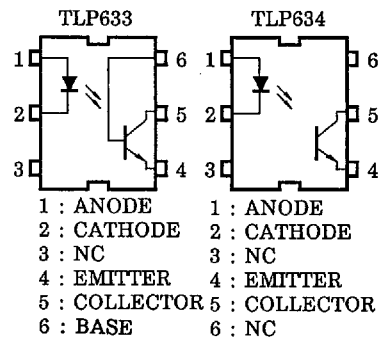
- |                        | 7.62mm pich<br>standard type | 10.16mm pich<br>(LF2) type |
|------------------------|------------------------------|----------------------------|
| • Creepage Distance    | : 7.0mm (Min)                | 8.0mm (Min)                |
| Clearance              | : 7.0mm (Min)                | 8.0mm (Min)                |
| Internal Creepage Path | : 4.0mm (Min)                | 4.0mm (Min)                |
| Insulation Thickness   | : 0.5mm (Min)                | 0.5mm (Min)                |

Unit in mm



Weight : 0.37g

## PIN CONFIGURATIONS (TOP VIEW)



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## Current Transfer Ratio

TYPE	CLASSIFICATION ※1	CURRENT TRANSFER RATIO (%) ( $I_C / I_F$ )		MARKING OF CLASSIFICATION
		$I_F = 5\text{mA}, V_{CE} = 5\text{V}, T_a = 25^\circ\text{C}$		
		MIN.	MAX.	
TLP633	(None)	50	600	BLANK, Y, Y <sup>■</sup> , G, G <sup>■</sup> , B, B <sup>■</sup> , GB
	Rank GR	50	150	Y, Y <sup>■</sup>
TLP634	Rank GR	100	300	G, G <sup>■</sup>
	Rank GB	200	600	B, B <sup>■</sup>
	Rank GB	100	600	G, G <sup>■</sup> , B, B <sup>■</sup> , GB

\*1 : Ex. Rank GB : TLP633 (GB)

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

TLP633 (GB) : TLP633

## MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	$I_F$	60	mA
	Forward Current Derating ( $T_a \geq 39^\circ\text{C}$ )	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / $^\circ\text{C}$
	Peak Forward Current (100 $\mu\text{s}$ pulse, 100pps)	$I_{FP}$	1	A
	Reverse Voltage	$V_R$	5	V
	Junction Temperature	$T_j$	125	$^\circ\text{C}$
DETECTOR	Collector-Emitter Voltage	$V_{CEO}$	55	V
	Collector-Base Voltage (TLP633)	$V_{CBO}$	80	V
	Emitter-Collector Voltage	$V_{ECO}$	7	V
	Emitter-Base Voltage (TLP633)	$V_{EBO}$	7	V
	Collector Current	$I_C$	50	mA
	Power Dissipation	$P_C$	150	mW
	Power Dissipation Derating ( $T_a \geq 25^\circ\text{C}$ )	$\Delta P_C / ^\circ\text{C}$	-1.5	mW / $^\circ\text{C}$
	Junction Temperature	$T_j$	125	$^\circ\text{C}$
	Storage Temperature Range	$T_{stg}$	-55~150	$^\circ\text{C}$
Operating Temperature Range	$T_{opr}$	-55~100	$^\circ\text{C}$	
Lead Soldering Temperature (10 s)	$T_{sol}$	260	$^\circ\text{C}$	
Total Package Power Dissipation	$P_T$	250	mW	
Total Package Power Dissipation Derating ( $T_a \geq 25^\circ\text{C}$ )	$\Delta P_T / ^\circ\text{C}$	-2.5	mW / $^\circ\text{C}$	
Isolation Voltage (AC, 1min., RH $\leq$ 60%) (Note 1)	$BV_S$	4000	Vrms	

Note 1 : Device considered a two-terminal device : Pins 1, 2 and 3 shorted together and pins 4, 5 and 6 shorted together.

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INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10mA	1.0	1.15	1.3	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5V	—	—	10	μA
	Capacitance	C <sub>T</sub>	V = 0, f = 1MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = 0.5mA	55	—	—	V
	Emitter-Collector Breakdown Voltage	V <sub>(BR)ECO</sub>	I <sub>E</sub> = 0.1mA	7	—	—	V
	Collector-Base Breakdown Voltage (TLP633)	V <sub>(BR)CBO</sub>	I <sub>C</sub> = 0.1mA	80	—	—	V
	Emitter-Base Breakdown Voltage (TLP633)	V <sub>(BR)EBO</sub>	I <sub>E</sub> = 0.1mA	7	—	—	V
	Collector Dark Current	I <sub>CEO</sub>	V <sub>CE</sub> = 24V	—	10	100	nA
			V <sub>CE</sub> = 24V, Ta = 85°C	—	2	50	μA
	Collector Dark Current (TLP633)	I <sub>CER</sub>	V <sub>CE</sub> = 24V, Ta = 85°C R <sub>BE</sub> = 1MΩ	—	0.5	10	μA
	Collector Dark Current (TLP633)	I <sub>CBO</sub>	V <sub>CB</sub> = 10V	—	0.1	—	nA
	DC Foward Current Gain (TLP633)	h <sub>FE</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 0.5mA	—	400	—	—
	Capacitance Collector to Emitter	C <sub>CE</sub>	V = 0, f = 1MHz	—	10	—	pF

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I <sub>C</sub> / I <sub>F</sub>	I <sub>F</sub> = 5mA, V <sub>CE</sub> = 5V Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	I <sub>C</sub> / I <sub>F(sat)</sub>	I <sub>F</sub> = 1mA, V <sub>CE</sub> = 0.4V Rank GB	—	60	—	%
			30	—	—	
Base Photo-Current	I <sub>PB</sub>	I <sub>F</sub> = 5mA, V <sub>CB</sub> = 5V	—	10	—	μA
Collector-Emitter Saturation Voltage	V <sub>CE (sat)</sub>	I <sub>C</sub> = 2.4mA, I <sub>F</sub> = 8mA I <sub>C</sub> = 0.2mA, I <sub>F</sub> = 1mA Rank GB	—	—	0.4	V
			—	0.2	—	
			—	—	0.4	

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ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	C <sub>S</sub>	V <sub>S</sub> =0, f=1MHz	—	0.8	—	pF
Isolation Resistance	R <sub>S</sub>	V <sub>S</sub> =500V	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation Voltage	BV <sub>S</sub>	AC, 1minute	4000	—	—	V <sub>rms</sub>
		AC, 1second, in oil	—	10000	—	
		DC, 1minute, in oil	—	10000	—	V <sub>dc</sub>

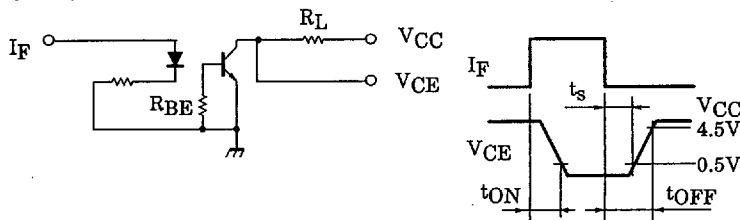
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t <sub>r</sub>	V <sub>CC</sub> =10V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω	—	2	—	μs
Fall Time	t <sub>f</sub>		—	3	—	
Turn-on Time	t <sub>ON</sub>		—	3	10	
Turn-off Time	t <sub>OFF</sub>		—	3	10	
Turn-on Time	t <sub>ON</sub>	R <sub>L</sub> =1.9kΩ (Fig.1) R <sub>BE</sub> =OPEN V <sub>CC</sub> =5V, I <sub>F</sub> =16mA	—	3	—	μs
Storage Time	t <sub>s</sub>		—	40	—	
Turn-off Time	t <sub>OFF</sub>		—	90	—	
Turn-on Time	t <sub>ON</sub>	R <sub>L</sub> =1.9kΩ (Fig.1) R <sub>BE</sub> =220kΩ (TLP633) V <sub>CC</sub> =5V, I <sub>F</sub> =16mA	—	3	—	μs
Storage Time	t <sub>s</sub>		—	30	—	
Turn-off Time	t <sub>OFF</sub>		—	60	—	

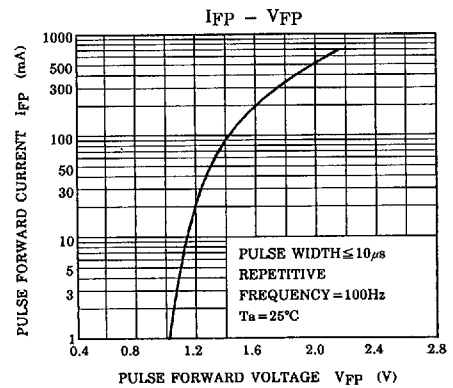
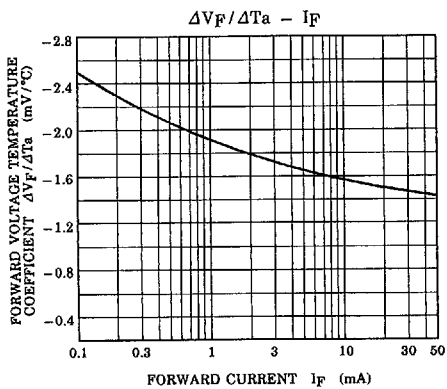
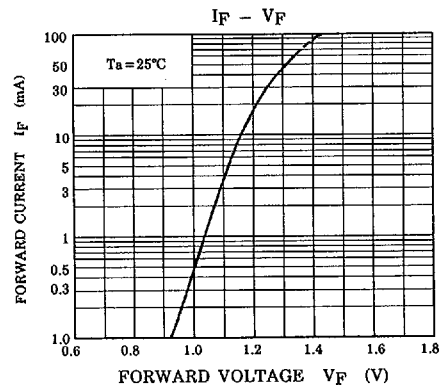
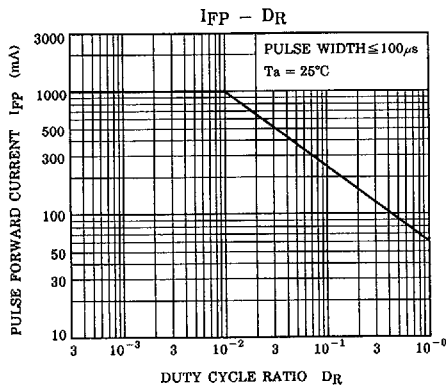
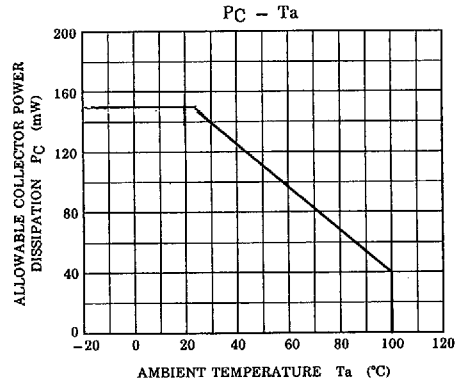
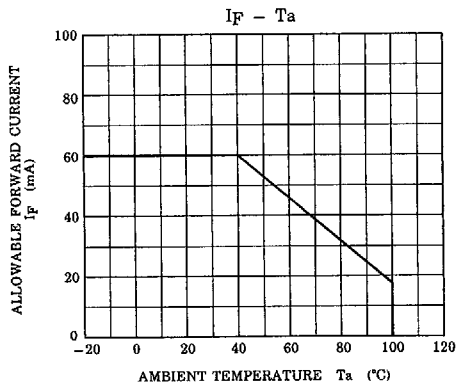
RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	—	5	24	V
Forward Current	I <sub>F</sub>	—	16	25	mA
Collector Current	I <sub>C</sub>	—	1	10	mA
Operating Temperature	T <sub>opr</sub>	-25	—	85	°C

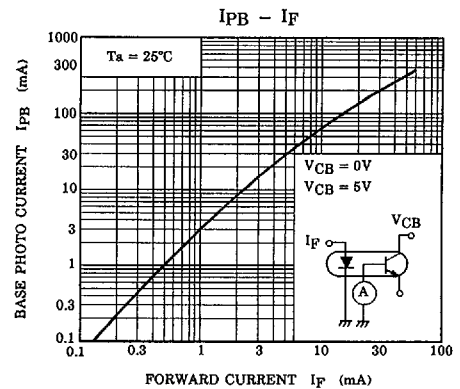
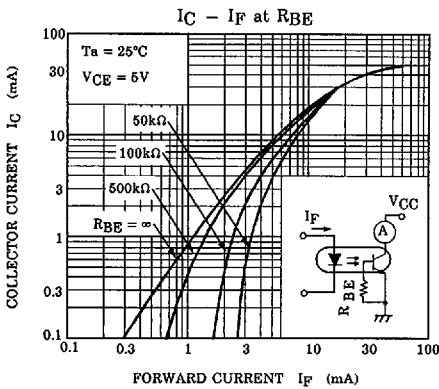
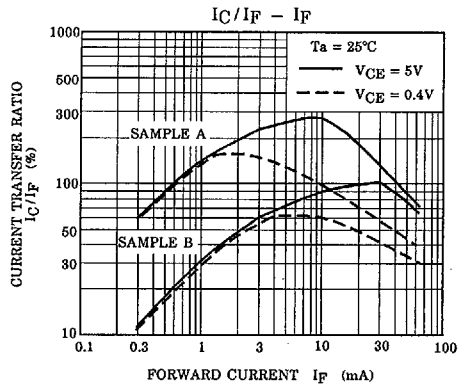
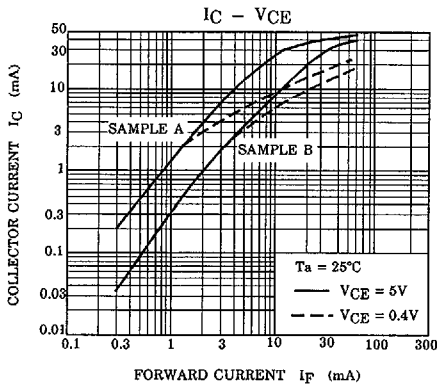
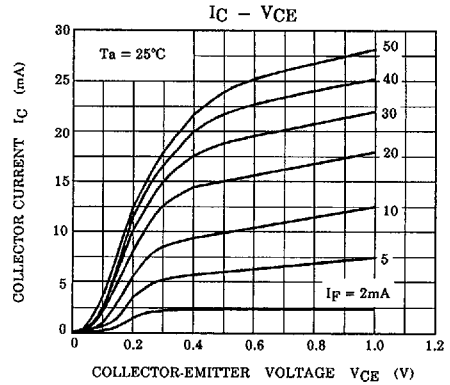
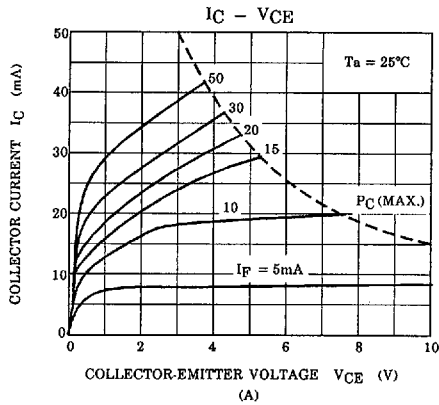
Fig. 1 SWITCHING TIME TEST CIRCUIT



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