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(TLP504A)

**PROGRAMMABLE CONTROLLERS**

**AC / DC-INPUT MODULE**

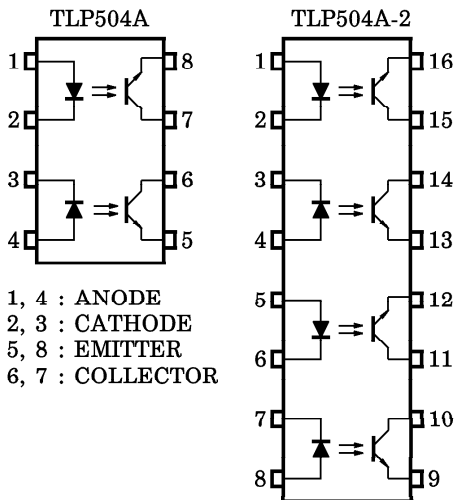
**SOLID STATE RELAY**

The TOSHIBA TLP504A and TLP504A-2 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode.

The TLP504A offers two isolated channels in a eight lead plastic DIP package, while the TLP504A-2 provides four isolated channels in a sixteen plastic DIP package.

- Collector-Emitter Voltage : 55V (Min.)
- Current Transfer Ratio : 50% (Min.)  
     Rank GB : 100% (Min.)
- Isolation Voltage : 2500Vrms (Min.)
- UL Recognized : UL1577,  
     File No. E67349

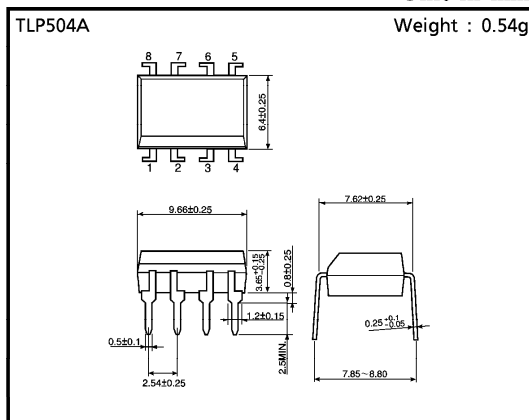
**PIN CONFIGURATIONS (TOP VIEW)**



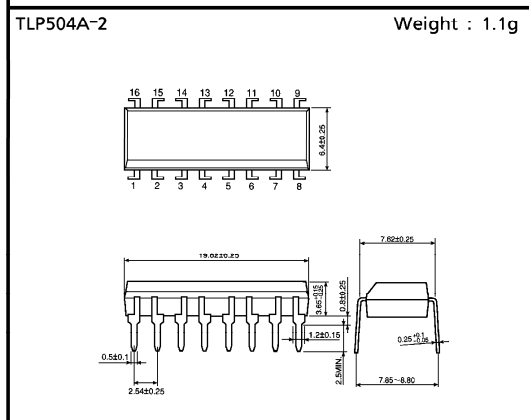
1, 4 : ANODE  
 2, 3 : CATHODE  
 5, 8 : EMITTER  
 6, 7 : COLLECTOR

1, 4, 5, 8 : ANODE  
 2, 3, 6, 7 : CATHODE  
 9, 12, 13, 16 : EMITTER  
 10, 11, 14, 15 : COLLECTOR

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	11-10C4



JEDEC	—
EIAJ	—
TOSHIBA	11-20A3

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(TLP504A)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING		UNIT	
		TLP504A	TLP504A-2		
LED	Forward Current	I <sub>F</sub>	60	50	mA
	Forward Current Derating	ΔI <sub>F</sub> / °C	-0.7 (Ta ≥ 39°C)	-0.5 (Ta ≥ 25°C)	mA / °C
	Pulse Forward Current	I <sub>FP</sub>	1 (100μs pulse, 100pps)		A
	Reverse Voltage	V <sub>R</sub>	5		V
	Junction Temperature	T <sub>j</sub>	125		°C
DETECTOR	Collector-Emitter Voltage	V <sub>CEO</sub>	55		V
	Emitter-Collector Voltage	V <sub>ECO</sub>	7		V
	Collector Current	I <sub>C</sub>	50		mA
	Collector Power Dissipation (1 Circuit)	P <sub>C</sub>	150	100	mW
	Collector Power Dissipation Derating (1 Circuit Ta ≥ 25°C)	ΔP <sub>C</sub> / °C	-1.5	-1.0	mW / °C
	Junction Temperature	T <sub>j</sub>	125		°C
Storage Temperature Range	T <sub>stg</sub>	-55~150		°C	
Operating Temperature Range	T <sub>opr</sub>	-55~100		°C	
Lead Soldering Temperature	T <sub>sol</sub>	260 (10s)		°C	
Total Package Power Dissipation	R <sub>T</sub>	250	150	mW	
Total Package Power Dissipation Derating (Ta ≥ 25°C)	ΔP <sub>T</sub> / °C	-2.5	-1.5	mW / °C	
Isolation Voltage	BV <sub>S</sub>	2500 (AC, 1min., R.H. ≤ 60%) (Note 1)		V <sub>rms</sub>	

Note 1 : Device considered a two terminal device : LED side pins shorted together and DETECTOR side pins shorted together.

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(TLP504A)

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 (BR) CEO	I <sub>C</sub> = 0.5mA	55	—	—	V
	Emitter-Collector Breakdown Voltage	V (BR) ECO	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
Capacitance Collector to Emitter	C <sub>CCE</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</sub> (sat)	I <sub>F</sub> = 1mA, V <sub>CE</sub> = 0.4V Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = 2.4mA, I <sub>F</sub> = 8mA	—	—	0.4	V
		I <sub>C</sub> = 0.2mA, I <sub>F</sub> = 1mA Rank GB	—	0.2	—	
			—	—	0.4	

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, 1 minute	2500	—	—	V <sub>rms</sub>
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	V <sub>dc</sub>

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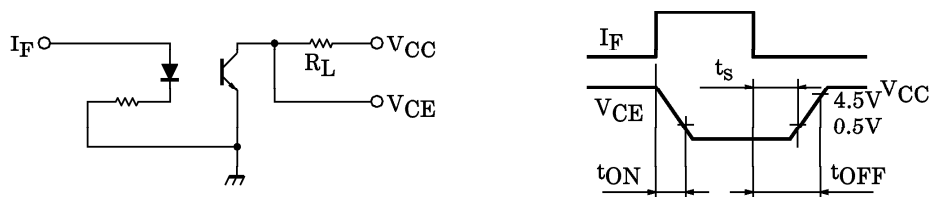
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(TLP504A)

SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	$t_r$	$V_{CC} = 10V, I_C = 2mA$ $R_L = 100\Omega$	—	2	—	$\mu S$
Fall Time	$t_f$		—	3	—	
Turn-on Time	$t_{on}$		—	3	—	
Turn-off Time	$t_{off}$		—	3	—	
Turn-on Time	$t_{ON}$	$R_L = 1.9k\Omega$ (Fig.1) $V_{CC} = 5V, I_F = 16mA$	—	2	—	$\mu S$
Storage Time	$t_s$		—	15	—	
Turn-off Time	$t_{OFF}$		—	25	—	

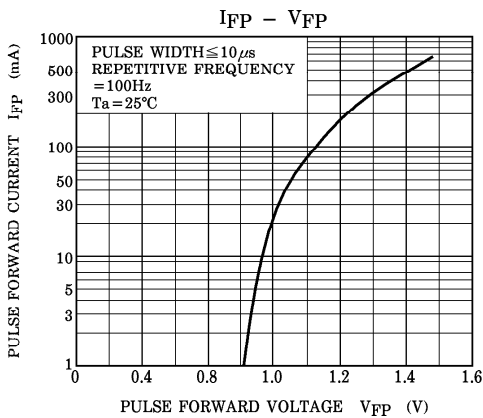
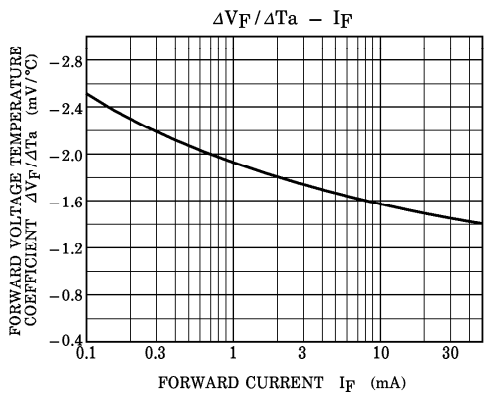
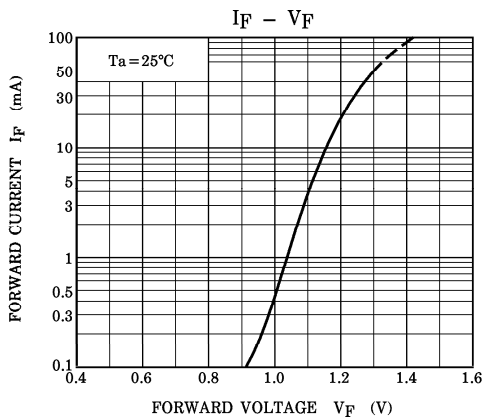
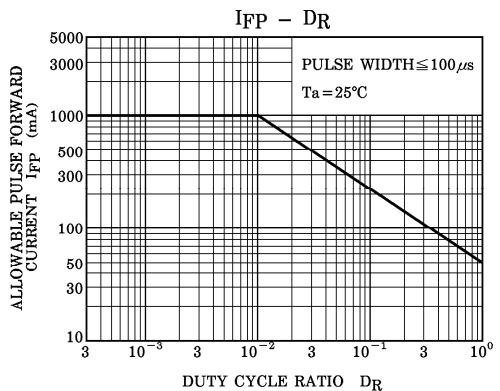
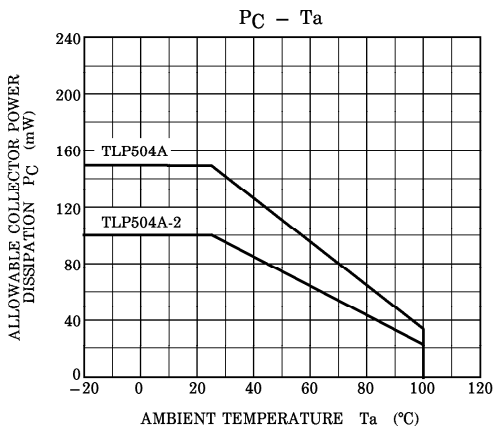
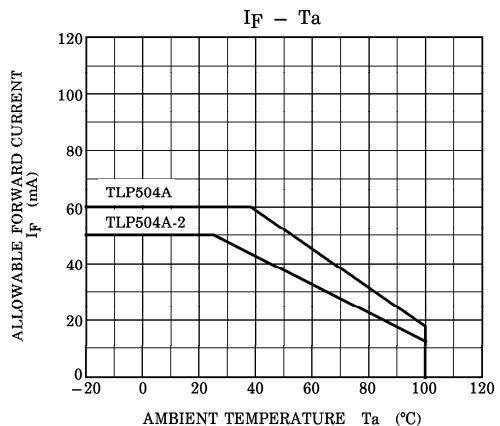
Fig.1 Switching Time Test Circuit



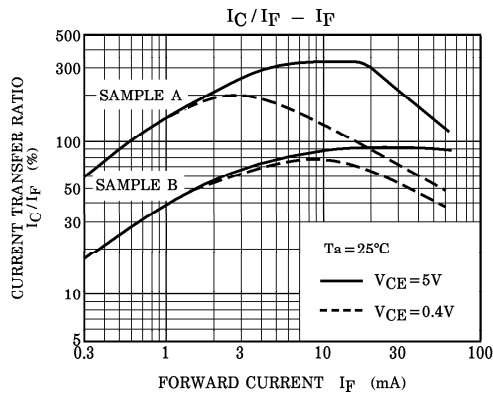
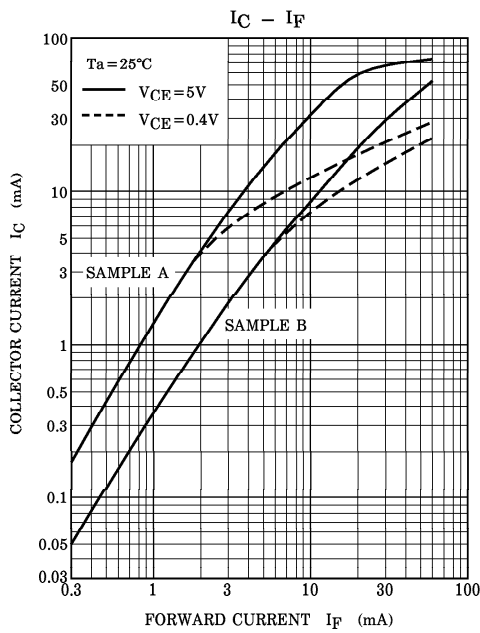
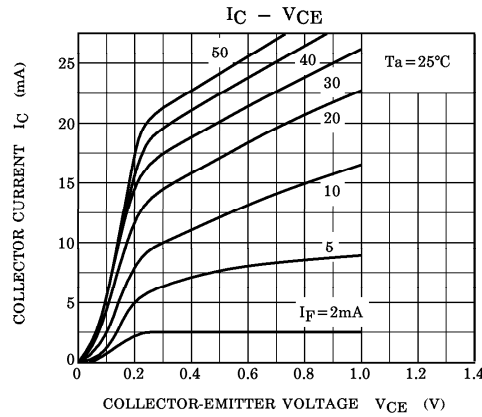
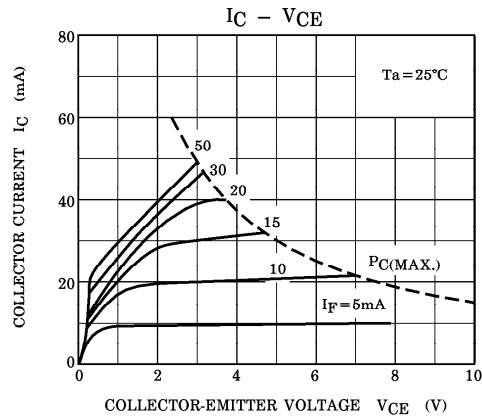
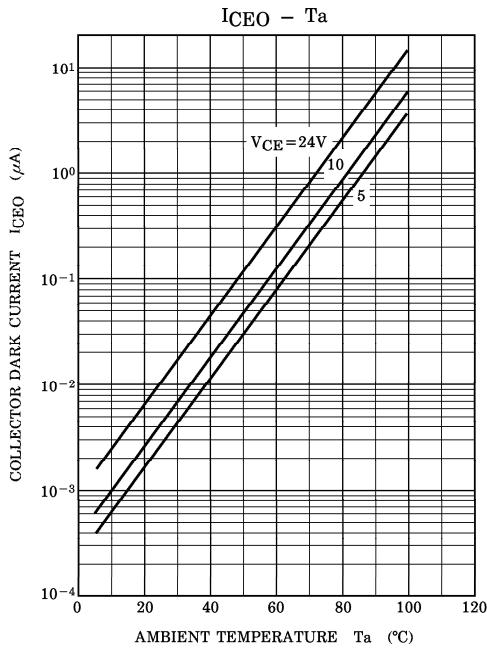
RECOMMENDED OPERATING CONDITIONS

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

(TLP504A)



(TLP504A)



(TLP504A)

