

# TLP120, -4

GaAs IRED & PHOTO-TRANSISTOR

(TLP120)

PROGRAMMABLE CONTROLLERS

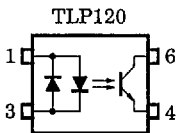
AC/DC-INPUT MODULE

TELECOMMUNICATION

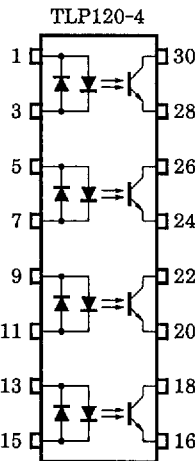
The TOSHIBA MINI FLAT COUPLER TLP120 and TLP120-4 is a small outline coupler, suitable for surface mount assembly. TLP120 and TLP120-4 consists of a photo transistor, optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel, and can operate directly by AC input current. The TLP120-4 provides four isolated channels in a plastic DIP package.

- Collector-Emitter Voltage : 80V (Min.)
- Current Transfer Ratio : 50% (Min.)  
Rank GB : 100% (Min.)
- Isolation Voltage : 3750Vrms (Min.)
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATIONS (TOP VIEW)

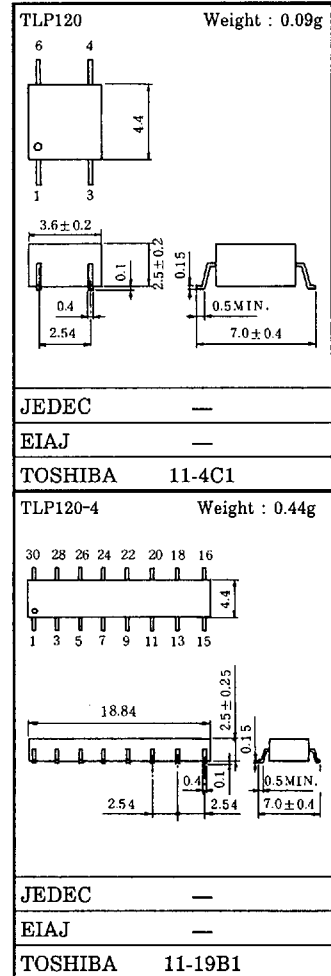


- 1 : ANODE  
CATHODE  
3 : CATHODE  
ANODE  
4 : EMITTER  
6 : COLLECTOR



- 1, 5, 9, 13 : ANODE  
CATHODE  
3, 7, 11, 15 : CATHODE  
ANODE  
16, 20, 24, 28 : EMITTER  
18, 22, 26, 30 : COLLECTOR

Unit in mm



(TLP120)

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			TLP120	TLP120-4	
LED	Forward Current	$I_F(\text{RMS})$	50		mA
	Forward Current Derating	$\Delta I_F / ^\circ\text{C}$	-0.7 (Ta $\geq$ 53°C)	-0.5 (Ta $\geq$ 25°C)	mA / °C
	Pulse Forward Current	$I_{FP}$	1 (100/ $\mu$ s pulse, 100pps)		A
	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
	Collector Power Dissipation (1 Circuit)	$P_C$	150	100	mW
	Collector Power Dissipation Derating (Ta $\geq$ 25°C, 1 Circuit)	$\Delta P_C / ^\circ\text{C}$	-1.5	-1.0	mW / °C
	Junction Temperature	$T_j$	125		°C
	Storage Temperature Range	$T_{stg}$	-55~125		°C
Operating Temperature Range	$T_{opr}$	-55~100		°C	
Lead Soldering Temperature	$T_{sold}$	260 (10 sec.)		°C	
Total Package Power Dissipation	$P_T$	200	170	mW	
Total Package Power Dissipation Derating (Ta $\geq$ 25°C, 1 Circuit)	$\Delta P_T / ^\circ\text{C}$	-2.0	-1.7	mW / °C	
Isolation Voltage	$BV_S$	3750 (AC, 1 min., RH $\leq$ 60%) (Note 1)		Vrms	

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

(TLP120)

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	$V_F$	$I_F = \pm 10\text{mA}$	1.0	1.15	1.3	V
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	60	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector Dark Current	$I_{CEO}$	$V_{CE} = 48\text{V}$	—	10	100	nA
			$V_{CE} = 48\text{V}, T_a = 85^\circ\text{C}$	—	2	50	$\mu\text{A}$
Capacitance (Collector to Emitter)	$C_{CE}$	$V = 0, f = 1\text{MHz}$	—	10	—	pF	

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	$I_C / I_F$	$I_F = \pm 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_{F(\text{sat})}$	$I_F = \pm 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE(\text{sat})}$	$I_C = 2.4\text{mA}, I_F = \pm 8\text{mA}$	—	—	0.4	V
		$I_C = 0.2\text{mA}, I_F = \pm 1\text{mA}$ Rank GB	—	0.2	—	
			—	—	0.4	
Off-State Collector Current	$I_{C(\text{off})}$	$V_F = \pm 0.7\text{V}, V_{CE} = 48\text{V}$	—	1	10	$\mu\text{A}$
CTR Symmetry	$I_{C(\text{ratio})}$	$I_C (I_F = -5\text{mA}) / I_C (I_F = 5\text{mA})$	0.33	1	3	—

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	$R_S$	$V_S = 500\text{V}$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation Voltage	$BV_S$	AC, 1 minute	3750	—	—	$V_{\text{rms}}$
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	$V_{\text{dc}}$

(TLP120)

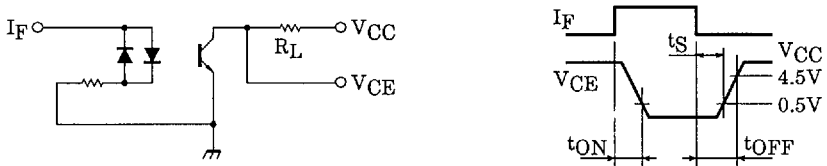
SWITCHING CHARACTERISTICS (Ta = 25°C)

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) $V_{CC}=5V, I_F=\pm 16mA$	—	2	—	$\mu s$
Storage Time	$t_s$		—	25	—	
Turn-off Time	$t_{OFF}$		—	40	—	

RECOMMENDED OPERATING CONDITIONS

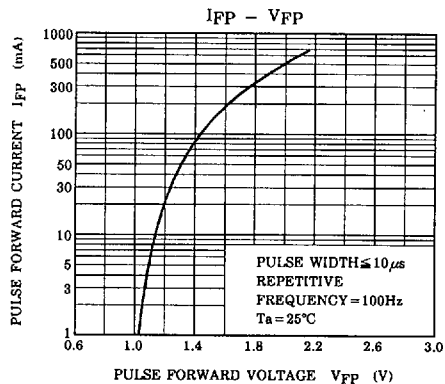
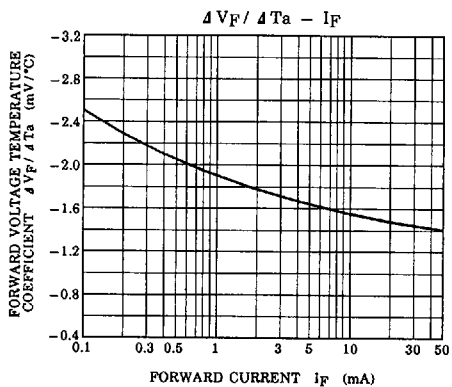
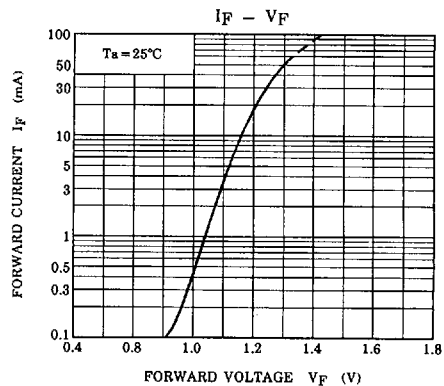
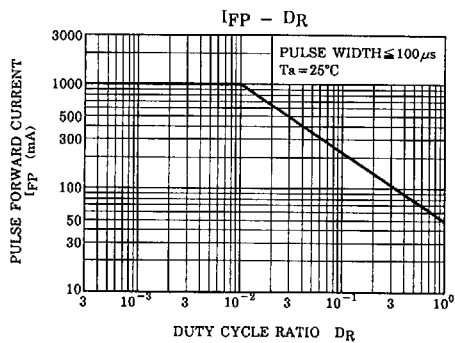
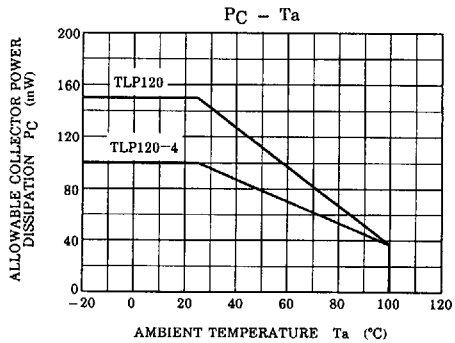
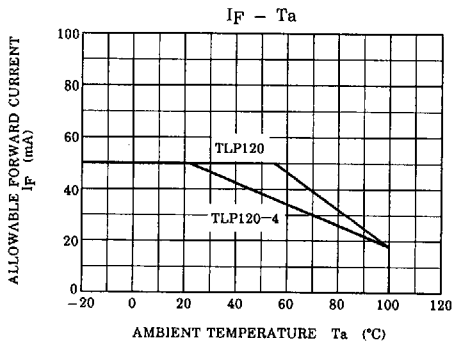
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	$V_{CC}$	—	5	48	V
Forward Current	$I_F(RMS)$	—	16	20	mA
Collector Current	$I_C$	—	1	10	mA
Operating Temperature	$T_{opr}$	-25	—	85	°C

Fig.1 SWITCHING TIME TEST CIRCUIT

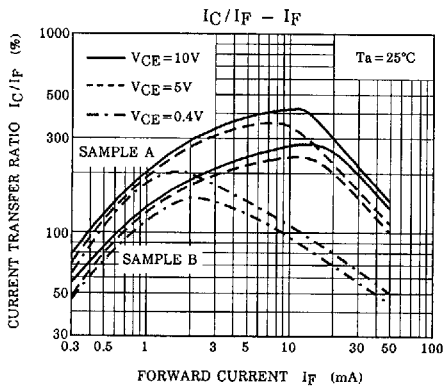
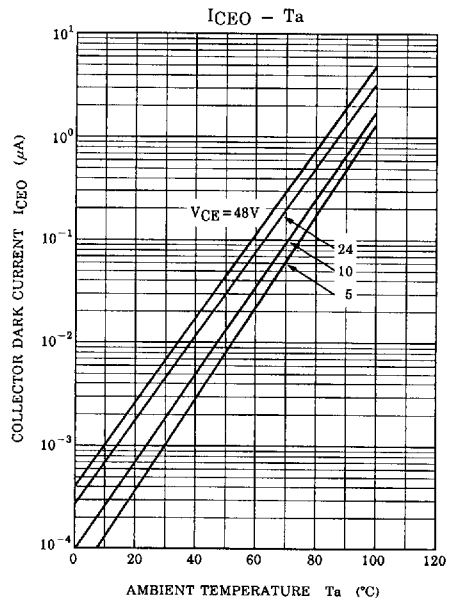
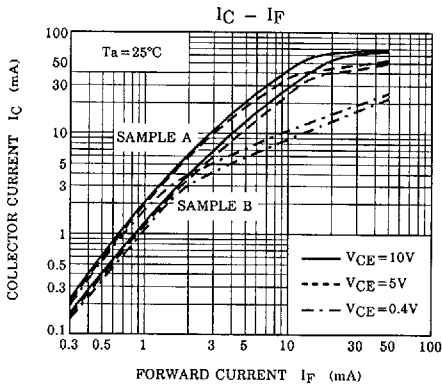
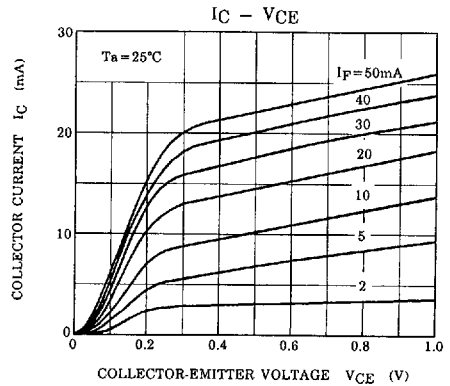
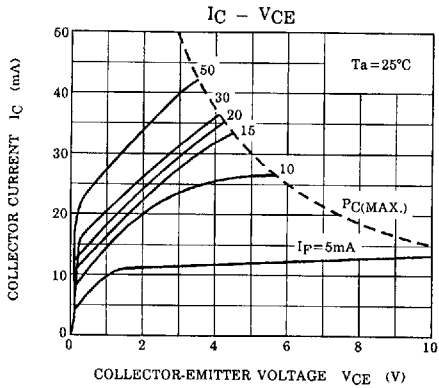


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