TLP120, -4

GaAs IRED & PHOTO-TRANSISTOR

(TLP120)

PROGRAMMABLE CONTROLLERS

AC / DC-INPUT MODULE

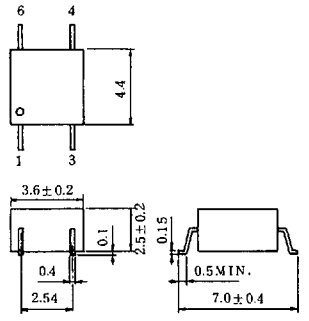
TELECOMMUNICATION

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

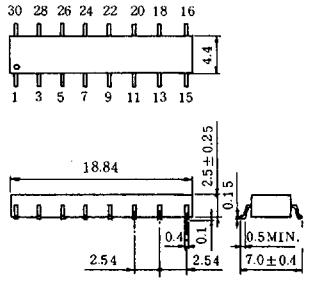
Unit in mm

TLP120 Weight : 0.09g



JEDEC	—
EIAJ	—
TOSHIBA	11-4C1

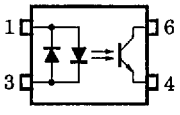
TLP120-4 Weight : 0.44g



JEDEC	—
EIAJ	—
TOSHIBA	11-19B1

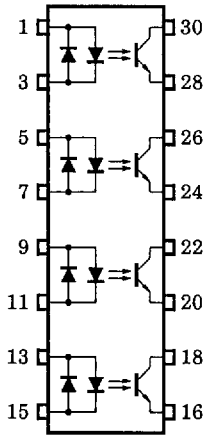
PIN CONFIGURATIONS (TOP VIEW)

TLP120



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

TLP120-4



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

(TLP120)

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING		UNIT
			TLP120	TLP120-4	
LED	Forward Current	$I_{F(RMS)}$	50		mA
	Forward Current Derating	ΔI_F / °C	−0.7 (Ta ≧ 53°C)	−0.5 (Ta ≧ 25°C)	mA / °C
	Pulse Forward Current	I_{FP}	1 (100 μs 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 ≧ 25°C, 1 Circuit)	ΔP_C / °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 ≧ 25°C, 1 Circuit)		ΔP_T / °C	−2.0	−1.7	mW / °C
Isolation Voltage		BV_S	3750 (AC, 1 min., RH ≦ 60%) (Note 1)		Vrms

Note 1 : Device considered a two terminal device : LED side pins shorted together and DETECTOR side pins 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	$I_F = \pm 10mA$	1.0	1.15	1.3	V
	Capacitance	C_T	V = 0, f = 1MHz	—	60	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 0.5mA$	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 0.1mA$	7	—	—	V
	Collector Dark Current	I_{CEO}	$V_{CE} = 48V$	—	10	100	nA
			$V_{CE} = 48V$, Ta = 85°C	—	2	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	$I_F = \pm 5mA$, $V_{CE} = 5V$	50	—	600	%
		Rank GB	100	—	600	
Saturated CTR	$I_C / I_{F(sat)}$	$I_F = \pm 1mA$, $V_{CE} = 0.4V$	—	60	—	%
		Rank GB	30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 2.4mA$, $I_F = \pm 8mA$	—	—	0.4	V
		$I_C = 0.2mA$, $I_F = \pm 1mA$	—	0.2	—	
		Rank GB	—	—	0.4	
Off-State Collector Current	$I_{C(off)}$	$V_F = \pm 0.7V$, $V_{CE} = 48V$	—	1	10	μA
CTR Symmetry	$I_{C(ratio)}$	I_C ($I_F = -5mA$) / I_C ($I_F = 5mA$)	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 = 1MHz	—	0.8	—	pF
Isolation Resistance	R_S	$V_S = 500V$	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	3750	—	—	V_{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V_{dc}

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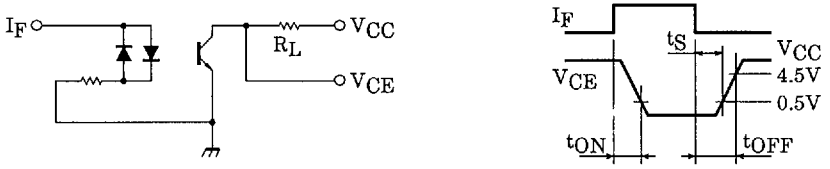
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	V_{CC}=10V, I_C=2mA R_L=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	—	2	—	μs
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	IC	—	1	10	mA
Operating Temperature	T_{opr}	−25	—	85	°C

Fig.1 SWITCHING TIME TEST CIRCUIT



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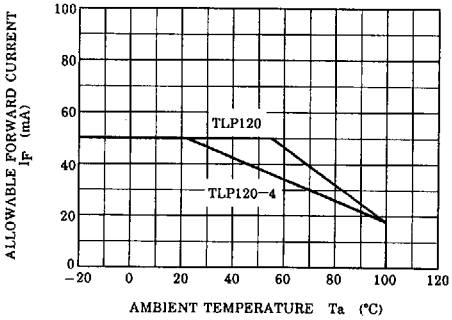
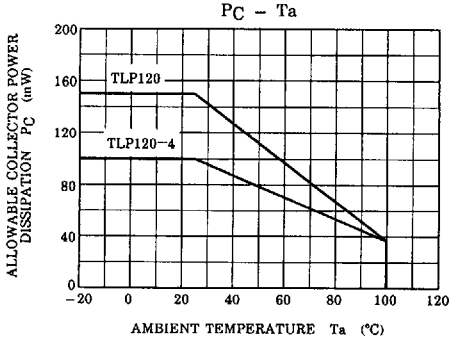
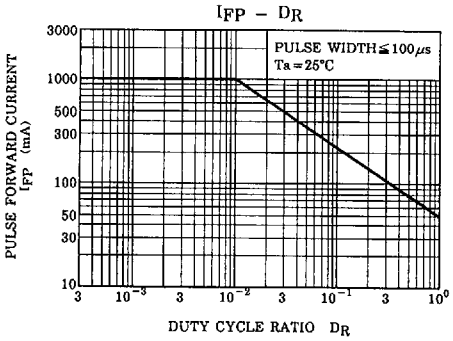
I_F – Ta



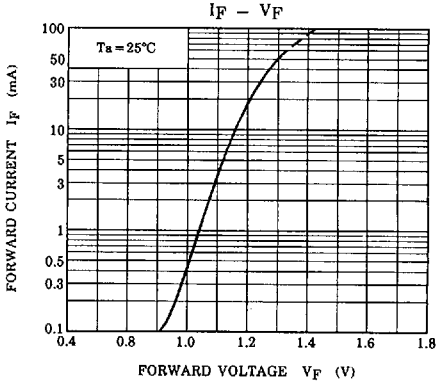
P_C – Ta



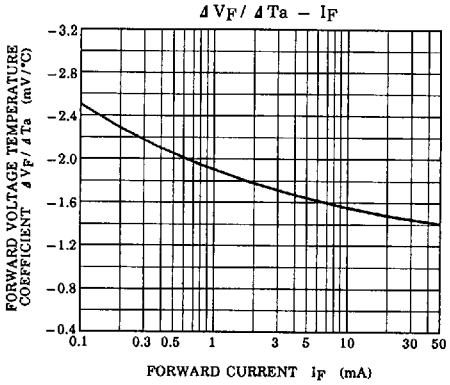
I_{FP} – D_R



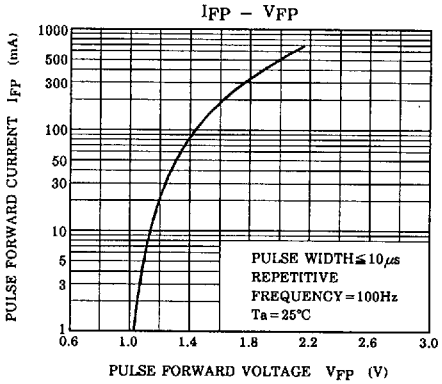
I_F – V_F



$\Delta V_F / \Delta Ta$ – I_F



I_{FP} – V_{FP}



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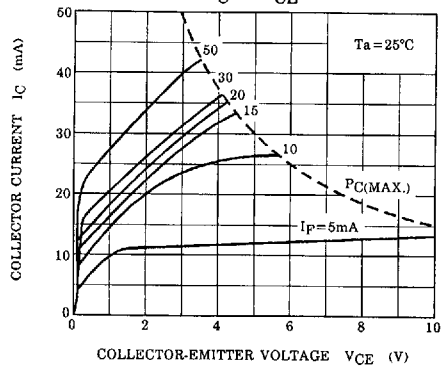
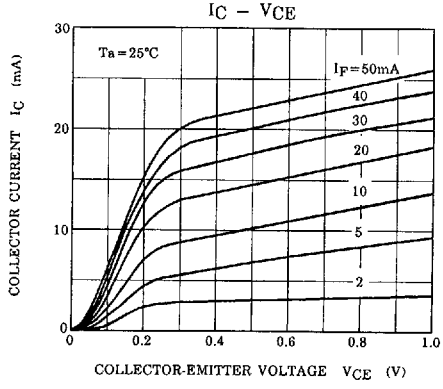
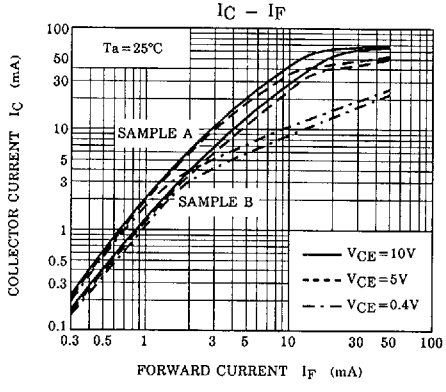
$I_C - V_{CE}$



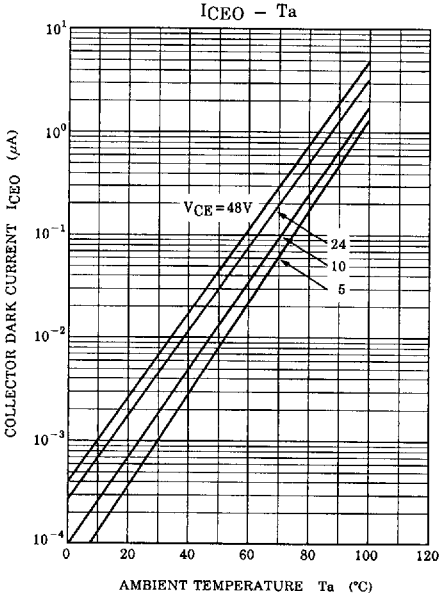
$I_C - V_{CE}$



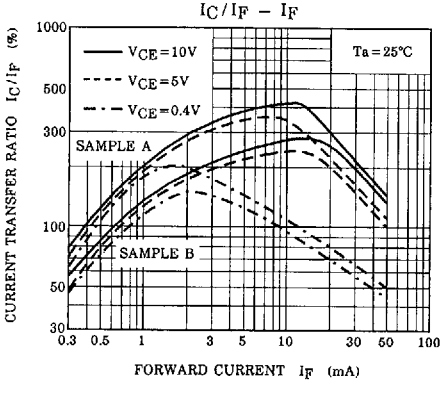
$I_C - I_F$



$I_{CEO} - Ta$



$I_C / I_F - I_F$



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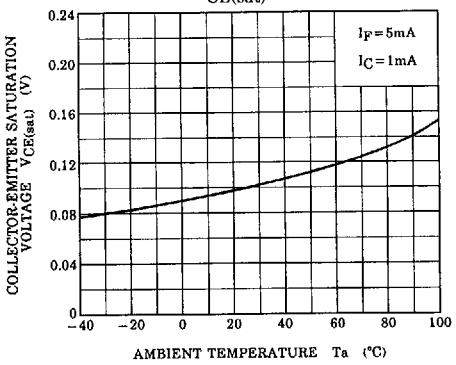
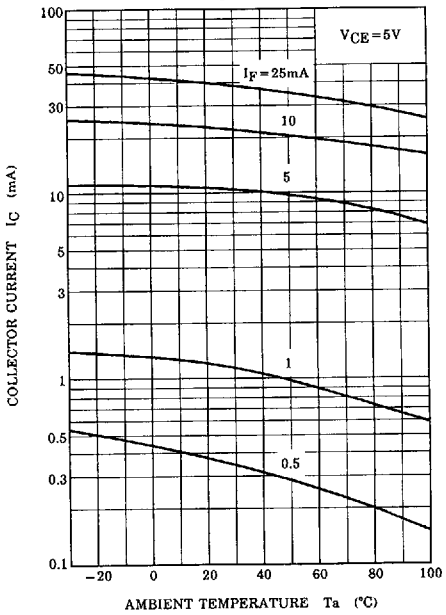
$V_{CE(sat)}$ – Ta



I_C – Ta



SWITCHING TIME – R_L