SEMICONDUCTOR

TOSHIBA

TECHNICAL DATA

TOSHIBA PHOTOCOUPLER

TLP620, TLP620-2, TLP620-4

GaAs IRED & PHOTO-TRANSISTOR

(TLP620)

PROGRAMMABLE CONTROLLERS

AC / DC-INPUT MODULE

TELECOMMUNICATION

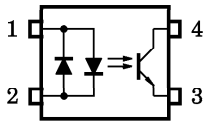
The TOSHIBA TLP620, -2 and -4 consists of a photo-transistor optically coupled to two gallium arsenide infrared emitting diode connected in inverse parallel.
The TLP620-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP620-4 provides four isolated channels in a sixteen plastic DIP package.

- Collector-Emitter Voltage : 55V (Min.)
- Current Transfer Ratio : 50% (Min.)

  Rank GB : 100% (Min.)

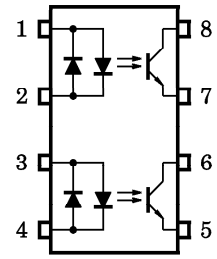
PIN CONFIGURATIONS (TOP VIEW)

TLP620



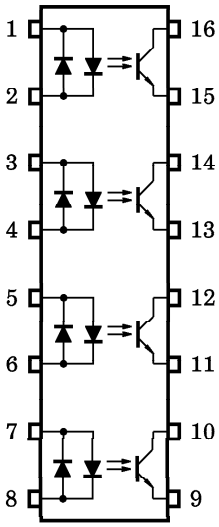
1 : ANODE
CATHODE
2 : CATHODE
ANODE
3 : EMITTER
4 : COLLECTOR

TLP620-2



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

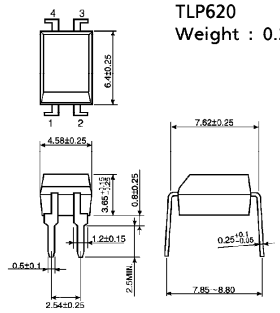
TLP620-4



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

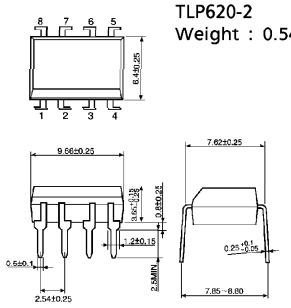
Unit in mm

TLP620
Weight : 0.26g



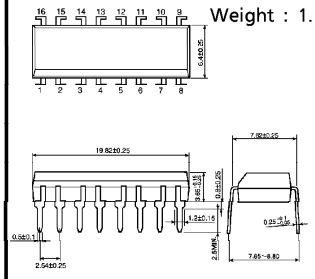
JEDEC	—
EIAJ	—
TOSHIBA	11-5B2

TLP620-2
Weight : 0.54g



JEDEC	—
EIAJ	—
TOSHIBA	11-10C4

TLP560-4
Weight : 1.1g



JEDEC	—
EIAJ	—
TOSHIBA	11-20A3

(TLP620)

- UL Recognized : UL1577, File No. E67349
- Isolation Voltage : 5000V_{rms} (Min.)
- Option (D4) type
  VDE Approved : DIN VDE0884 / 08.87, Certificate No. 68384
  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)".

- Creepage Distance : 6.4mm (Min.)
  Clearance : 6.4mm (Min.)
  Insulation Thickness : 0.4mm (Min.)

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING		UNIT
			TLP620	TLP620-2 TLP620-4	
LED	Forward Current	$I_{F\,(RMS)}$	60	50	mA
	Forward Current Derating	ΔI_F / °C	−0.7 (Ta ≧ 39°C)	−0.5 (Ta ≧ 25°C)	mA / °C
	Pulse Forward Current	I_{FP}	1 (100 μs pulse, 100pps)		A
	Power Dissipation (1 Circuit)	P_D	100	70	mW
	Power Dissipation Derating	ΔP_D / °C	−1.0	−0.7	mW / °C
	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
	Collector Power Dissipation (1 Circuit)	P_C	150	100	mW
	Collector Power Dissipation Derating (1 Circuit) (Ta ≧ 25°C)	ΔP_C / °C	−1.5	−1.0	mW / °C
	Junction Temperature	T_j	125		°C
Storage Temperature Range		T_{stg}	−55~150		°C
Operating Temperature Range		T_{opr}	−55~100		°C
Lead Soldering Temperature		T_{sold}	260 (10s)		°C
Total Package Power Dissipation		P_T	250	150	mW
Total Package Power Dissipation Derating (Ta ≧ 25°C, 1 Circuit)		ΔP_T / °C	−2.5	−1.5	mW / °C
Isolation Voltage		BV_S	5000 (AC, 1 min., RH ≦ 60%)		V_{rms}

(TLP620)

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
	Forward Current	I_F	$V_F = \pm 0.7V$	—	2.5	20	μA
	Capacitance	C_T	$V = 0$, $f = 1MHz$	—	60	—	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}	$V_{CE} = 24V$	—	10	100	nA
			$V_{CE} = 24V$, $Ta = 85°C$	—	2	50	μA
	Capacitance (Collector to Emitter)	C_{CE}	$V_{CE} = 0$, $f = 1MHz$	—	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	$I_{C(off)}$	$V_F = \pm 0.7V$, $V_{CE} = 24V$	—	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	5000	—	—	V_{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V_{dc}

(TLP620)

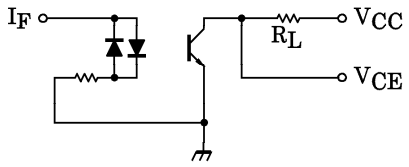
SWITCHING CHARACTERISTICS (Ta = 25°C)

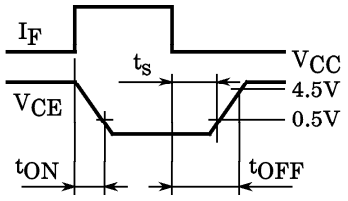
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	V_{CC} = 10V, I_C = 2mA, R_L = 100Ω	—	2	—	μs
Fall Time	t_f		—	3	—	
Turn-on Time	t_{on}		—	3	—	
Turn-off Time	t_{off}		—	3	—	
Turn-on Time	t_{ON}	R_L = 1.9kΩ (Fig.1), V_{CC} = 5V, I_F = ±16mA	—	2	—	μs
Storage Time	t_s		—	15	—	
Turn-off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

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	—	5	24	V
Forward Current	$I_{F\,(RMS)}$	—	16	20	mA
Collector Current	IC	—	1	10	mA
Operating Temperature	T_{opr}	−25	—	85	°C

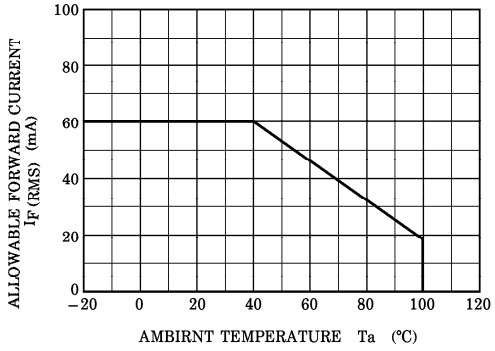
Fig.1 Switching Time Test Circuit



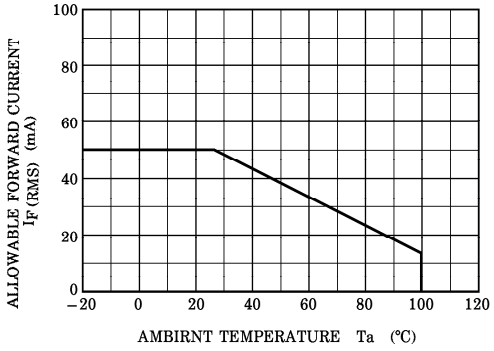


(TLP620)

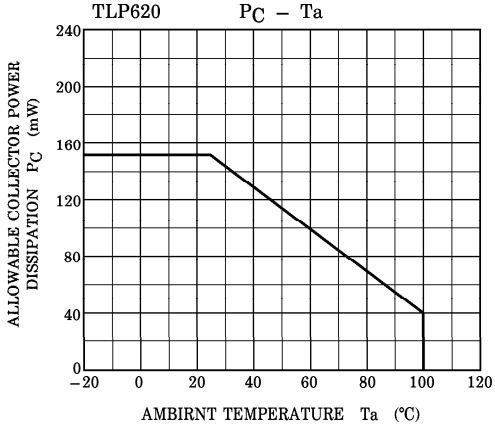
TLP620 I_F – Ta



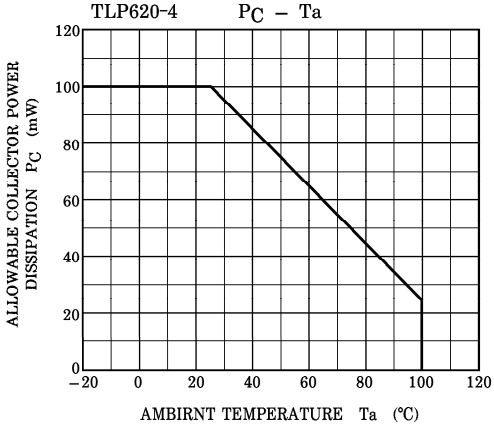
TLP620-2
TLP620-4 I_F – Ta



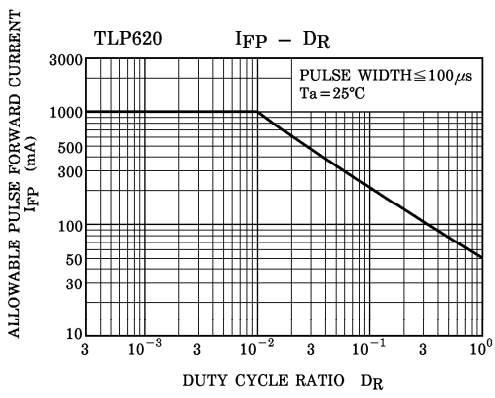
TLP620 P_C – Ta



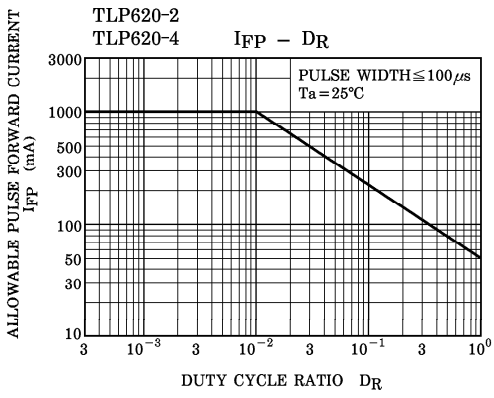
TLP620-2
TLP620-4 P_C – Ta



TLP620 I_{FP} – D_R

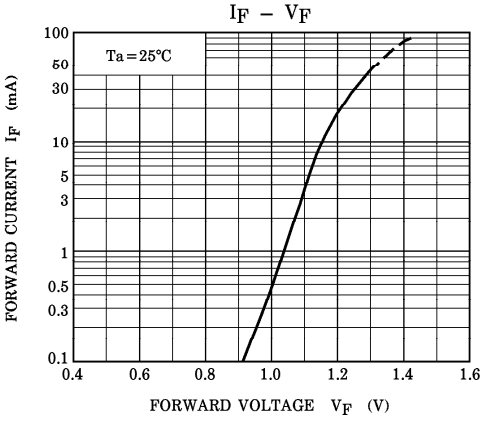


TLP620-2
TLP620-4 I_{FP} – D_R

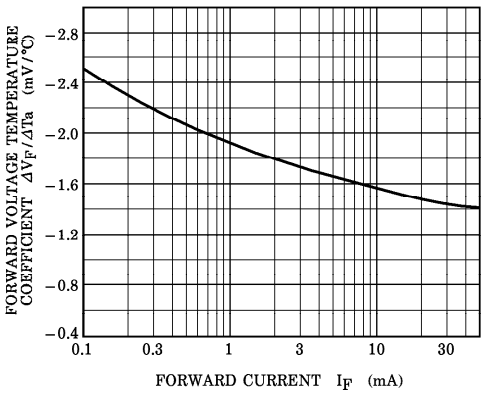


(TLP620)

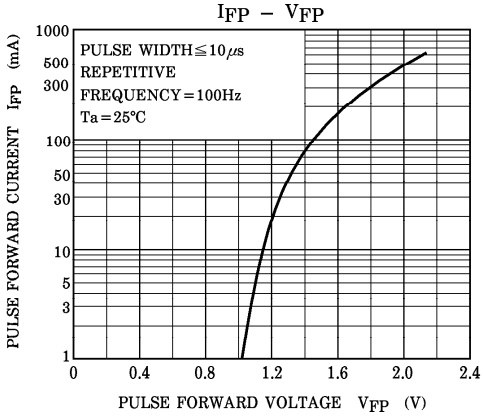
$I_F - V_F$



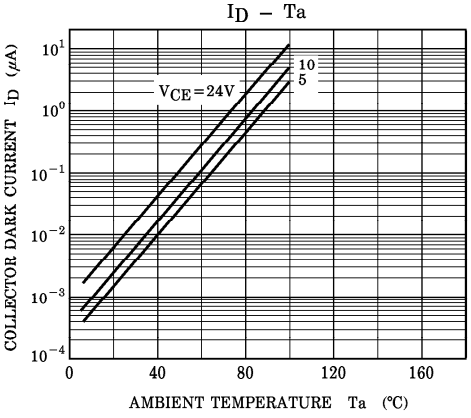
$\Delta V_F / \Delta Ta - I_F$



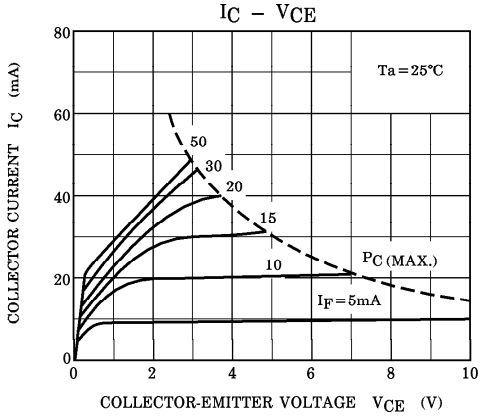
$I_{FP} - V_{FP}$



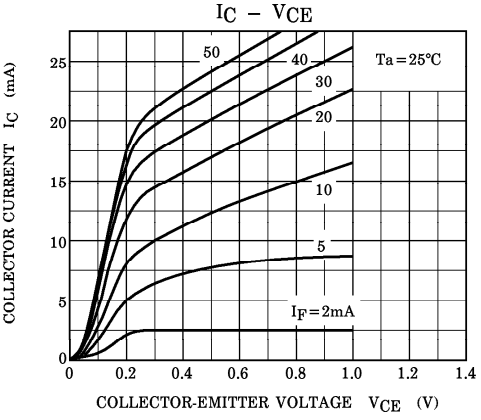
$I_D - Ta$



$I_C - V_{CE}$

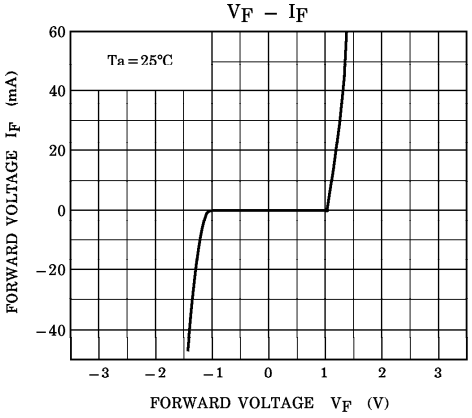


$I_C - V_{CE}$

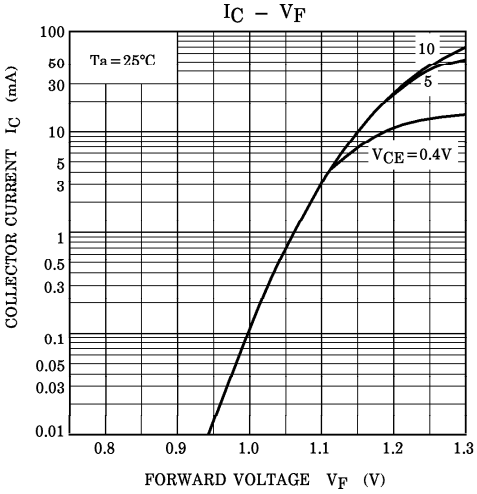


(TLP620)

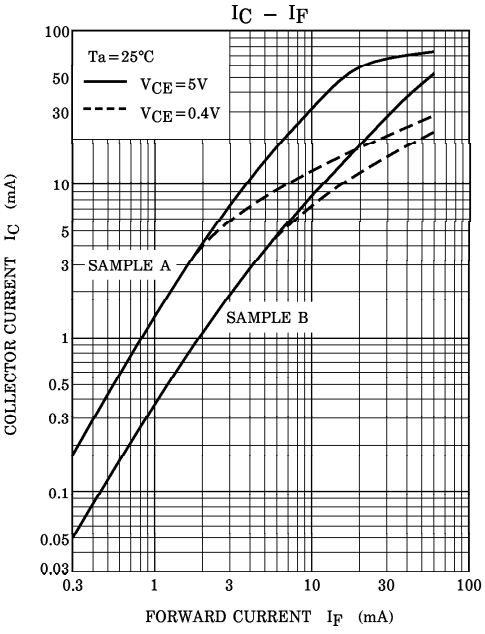
$V_F - I_F$



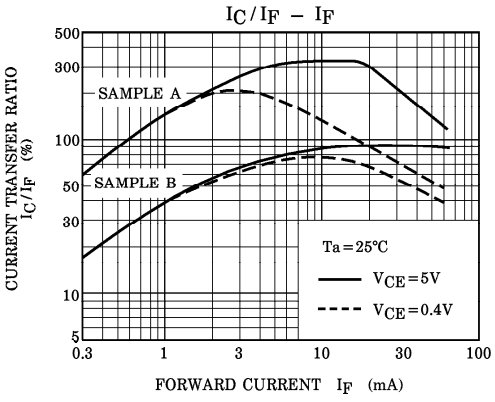
$I_C - V_F$



$I_C - I_F$

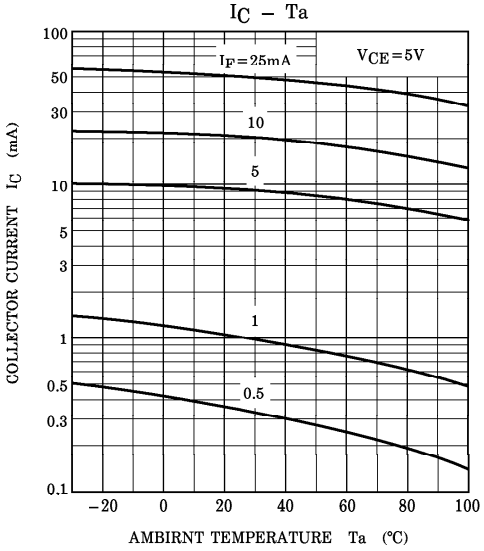


$I_C / I_F - I_F$

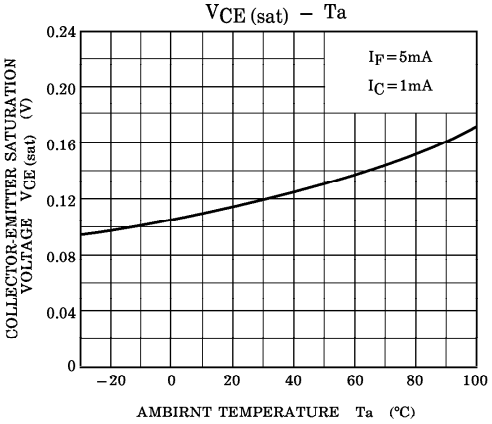


(TLP620)

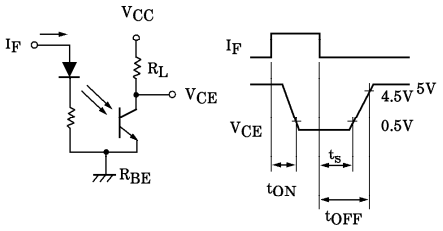
I_C – Ta



$V_{CE\,(sat)}$ – Ta



t_{on}, t_{off}, t_s TEST CONDITION



R_L – SWITCHING TIME