

TENTATIVE TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP320, TLP320-2, TLP320-4

Telecommunication

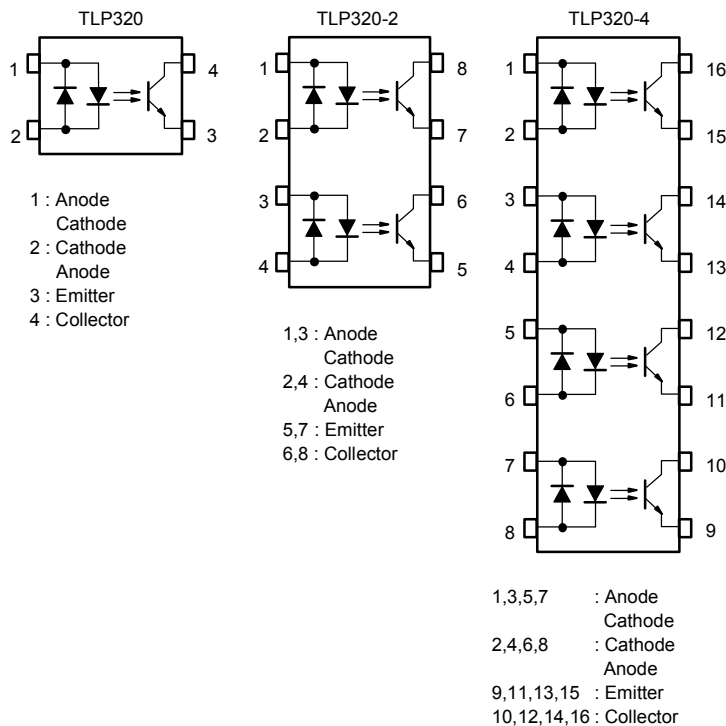
Office Machine

Telephone Use Equipment

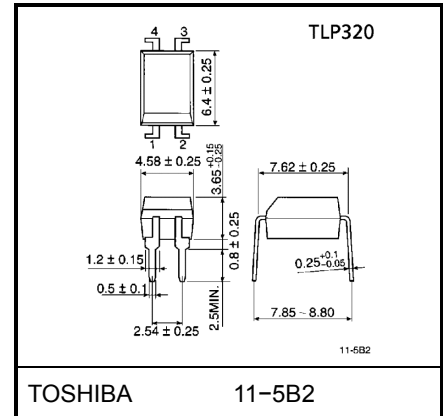
The TOSHIBA TLP320, -2 and -4 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP320-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP320-4 provides four isolated channels in a sixteen plastic DIP package. This is suitable for application of AC input current up to 150mA.

- I_F maximum rating: $\pm 150\text{mA}$
- Collector-emitter voltage: 55V (min.)
- Current transfer ratio: 25% (min.) ($I_F = 20\text{mA}$)
- Isolation voltage: $5000V_{\text{rms}}$ (min.)
- UL recognized: file No. E67349

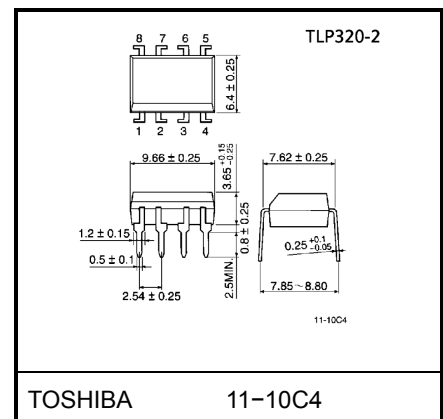
Pin Configurations (top view)



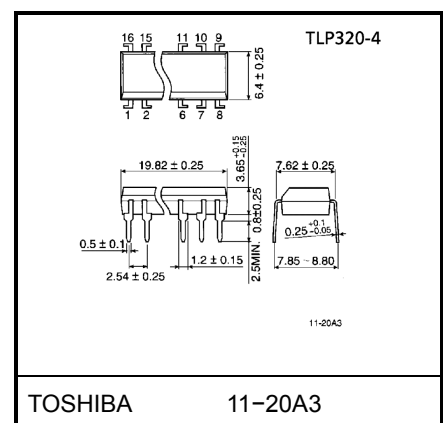
Unit in mm



Weight: 0.26g



Weight: 0.54g



Weight: 1.1g

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating		Unit
			TLP320	TLP320-2 TLP320-4	
LED	Forward current	I_F	± 150		mA
	Forward current derating	$\Delta I_F / ^\circ\text{C}$	$-1.5 (T_a \geq 25^\circ\text{C})$		mA / $^\circ\text{C}$
	Pulse forward current	I_{FP}	± 1 (100 μs pulse, 100pps)		A
	Junction temperature	T_j	125		$^\circ\text{C}$
Detector	Collector-emitter voltage	V_{CEO}	55		V
	Emitter-collector voltage	V_{ECO}	7		V
	Collector current	I_C	80		mA
	Collector power dissipation (1 circuit)	P_C	150	100	mW
	Collector power dissipation derating (1 circuit, $T_a \geq 25^\circ\text{C}$)	$\Delta P_C / ^\circ\text{C}$	-1.5	-1.0	mW / $^\circ\text{C}$
	Junction temperature	T_j	125		$^\circ\text{C}$
Storage temperature range		T_{stg}	$-55 \sim 125$		$^\circ\text{C}$
Operating temperature range		T_{opr}	$-55 \sim 100$		$^\circ\text{C}$
Lead soldering temperature		T_{sol}	260 (10s)		$^\circ\text{C}$
Total package power dissipation		P_T	250	200	mW
Total package power dissipation derating ($T_a \geq 25^\circ\text{C}$)		$\Delta P_T / ^\circ\text{C}$	-2.5	2.0	mW / $^\circ\text{C}$
Isolation voltage (Note 1)		BV_S	5000 (AC, 1min., R.H. $\leq 60\%$)		V_{rms}

(Note 1) Device consider a two terminal: LED side pins shorted together and detector side pins shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	—	5	24	V
Forward current	I_F	—	20	120	mA
Collector current	I_C	—	1	10	mA
Operating temperature	T_{opr}	-25	—	85	$^\circ\text{C}$

Individual Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	$I_F = \pm 100 \text{ mA}$	—	1.4	1.7	V
	Forward current	I_F	$V_F = \pm 0.7 \text{ V}$	—	2.5	20	μA
	Capacitance	C_T	$V = 0, f = 1 \text{ MHz}$	—	60	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.5 \text{ mA}$	55	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 0.1 \text{ mA}$	7	—	—	V
	Collector dark current	I_{CEO}	$V_{CE} = 24 \text{ V}$	—	10	100	nA
			$V_{CE} = 24 \text{ V}, T_a = 85^\circ\text{C}$	—	2	50	μA
	Capacitance collector to emitter	C_{CE}	$V = 0, f = 1 \text{ MHz}$	—	10	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

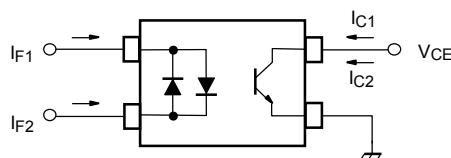
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	I_C / I_F	$I_F = \pm 20 \text{ mA}, V_{CE} = 1 \text{ V}$	25	—	—	%
	I_C / I_F (high)	$I_F = \pm 100 \text{ mA}, V_{CE} = 1 \text{ V}$	20	—	80	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 2.4 \text{ mA}, I_F = \pm 20 \text{ mA}$	—	—	0.4	V
		$I_C = 2.4 \text{ mA}, I_F = \pm 100 \text{ mA}$	—	—	0.4	
Off-state collector current	$I_{C(off)}$	$V_F = \pm 0.7 \text{ V}, V_{CE} = 24 \text{ V}$	—	1	10	μA
CTR symmetry (Note)	I_C (ratio)	$I_C (I_F = -20 \text{ mA}) / I_C (I_F = +20 \text{ mA})$ (Note)	0.5	1	2	—

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	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	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}

(Note)

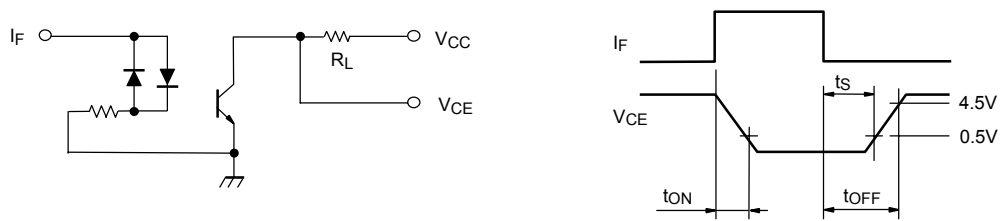
$$I_C(\text{ratio}) = \frac{I_{C2}(I_F = I_{F2}, V_{CE} = 1 \text{ V})}{I_{C1}(I_F = I_{F1}, V_{CE} = 1 \text{ V})}$$

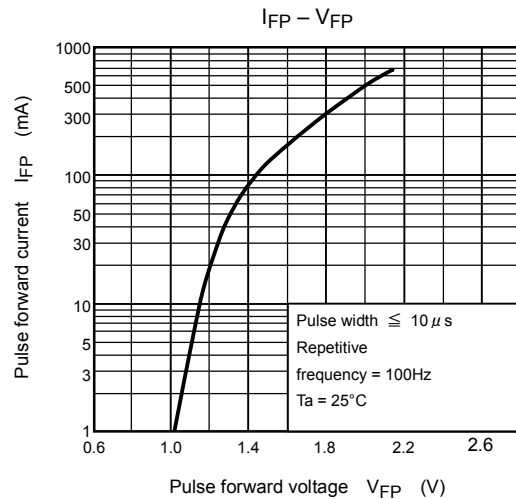
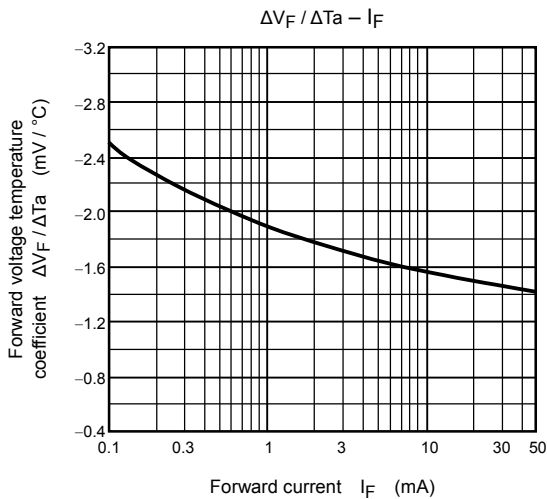
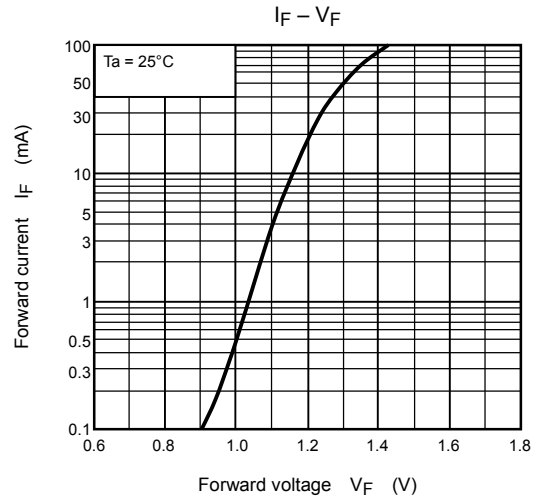
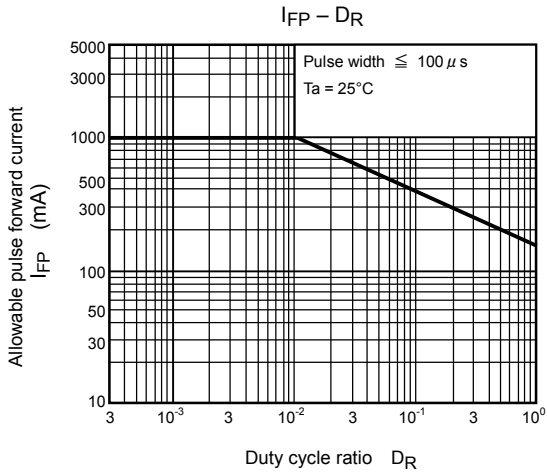
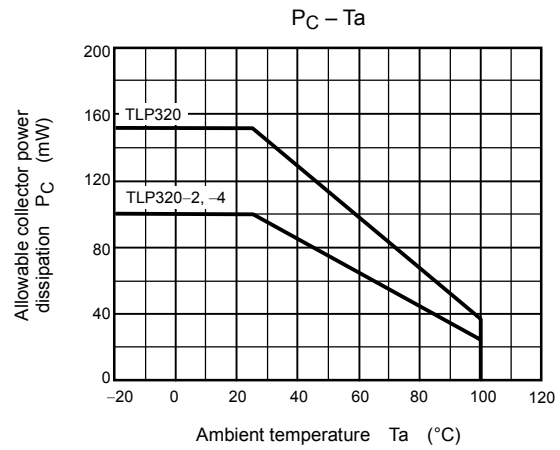
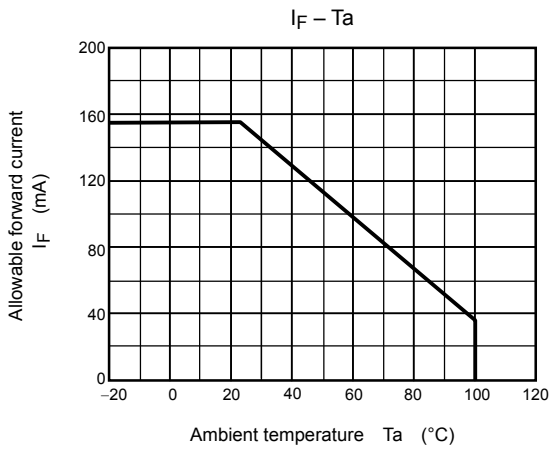


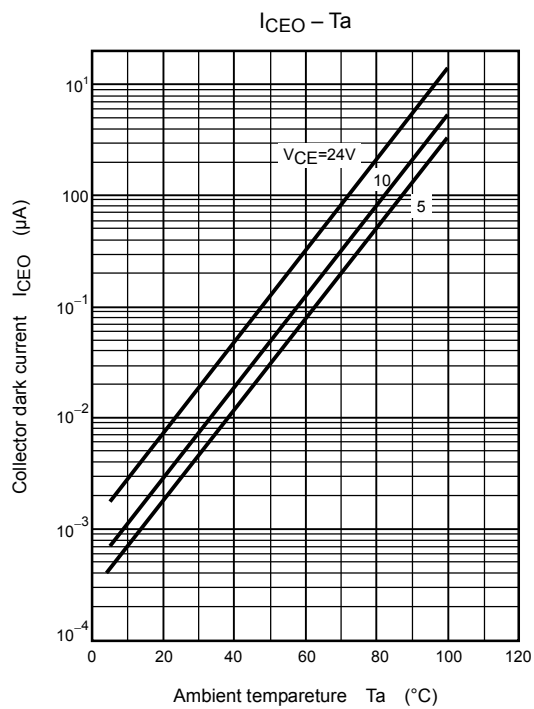
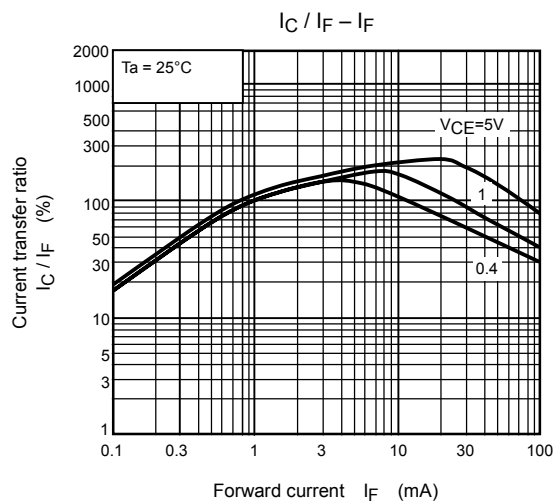
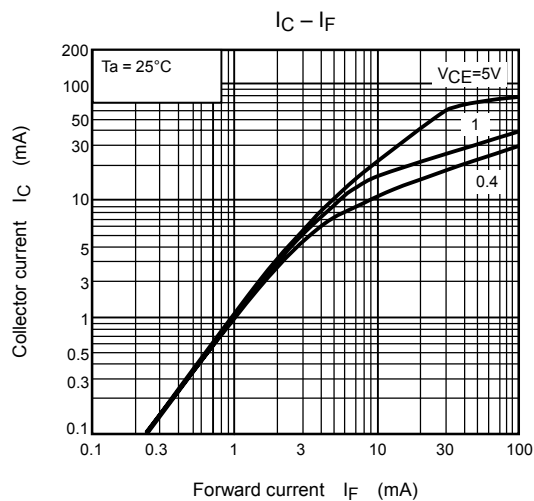
Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t_r	$V_{CC} = 10\text{ V}, I_C = 2\text{ mA}$ $R_L = 100\Omega$	—	2	—	μs
Fall time	t_f		—	3	—	
Turn-on time	t_{on}		—	3	—	
Turn-off time	t_{off}		—	3	—	
Turn-on time	t_{ON}	$R_L = 1.9\text{ k}\Omega$ $V_{CC} = 5\text{ V}, I_F = \pm 16\text{ mA}$ (Fig.1)	—	2	—	μs
Storage time	t_s		—	15	—	
Turn-off time	t_{OFF}		—	25	—	

Fig. 1 Switching time test circuit







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