

TENTATIVE

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP320, TLP320-2, TLP320-4

TELECOMMUNICATION

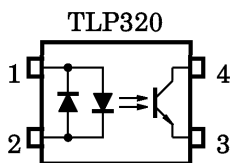
OFFICE MACHINE

TELEPHONE USE EQUIPMENT

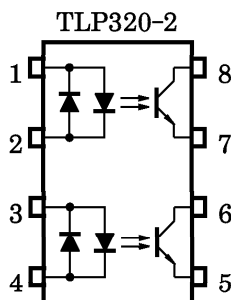
The TOSHIBA TLP320, -2 and -4 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP320-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP320-4 provides four isolated channels in a sixteen plastic DIP package. This is suitable 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_{rms} (Min.)
- UL Recognized : File No. E67349

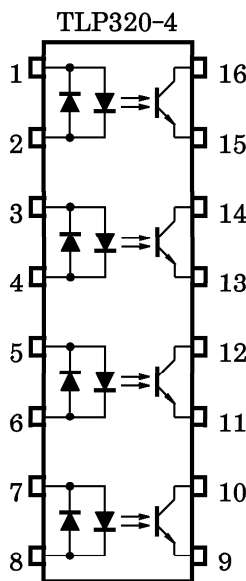
PIN CONFIGURATIONS (TOP VIEW)



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

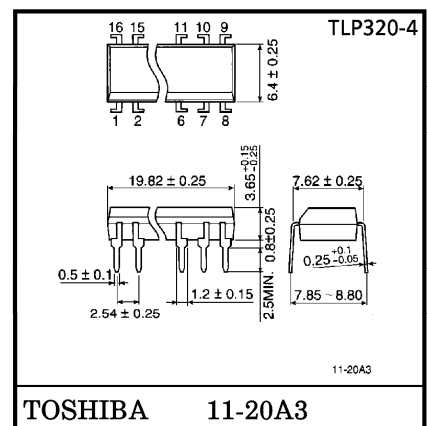
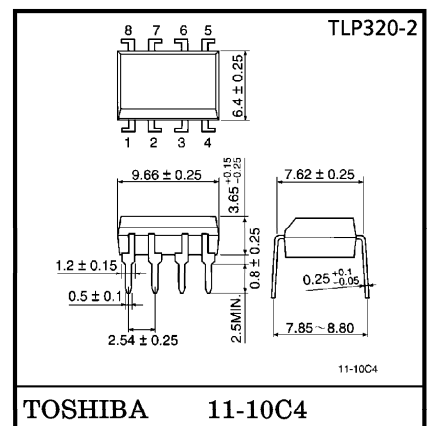
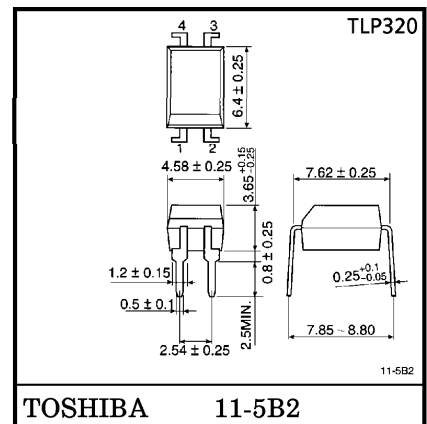


1, 3 : ANODE
2, 4 : CATHODE
5, 7 : EMITTER
6, 8 : COLLECTOR



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

Unit in mm



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}	$\pm 1 (100\mu\text{s pulse, 100pps})$		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)

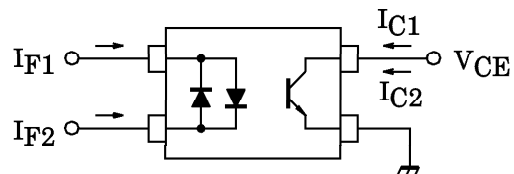
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	$I_F = \pm 20\text{mA}, V_{CE} = 1\text{V}$	25	—	—	%
	I_C / I_F (High)	$I_F = \pm 100\text{mA}, V_{CE} = 1\text{V}$	20	—	80	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 2.4\text{mA}, I_F = \pm 20\text{mA}$	—	—	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	—	Vdc

(Note)

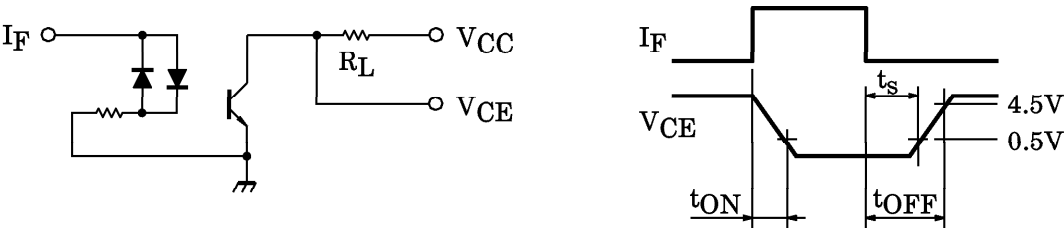
$$I_C \text{ (ratio)} = \frac{I_{C2} (I_F = I_{F2}, V_{CE} = 1\text{V})}{I_{C1} (I_F = I_{F1}, V_{CE} = 1\text{V})}$$

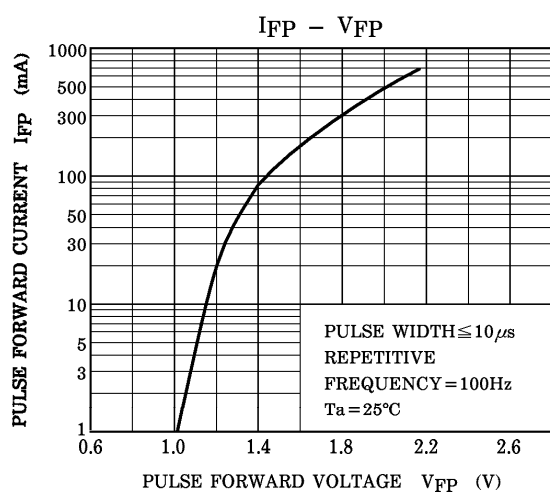
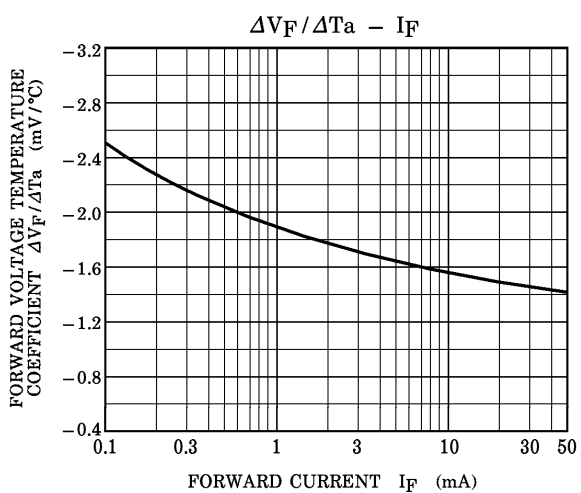
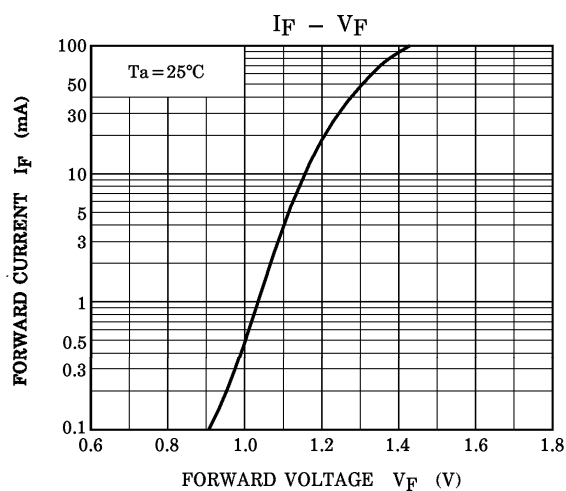
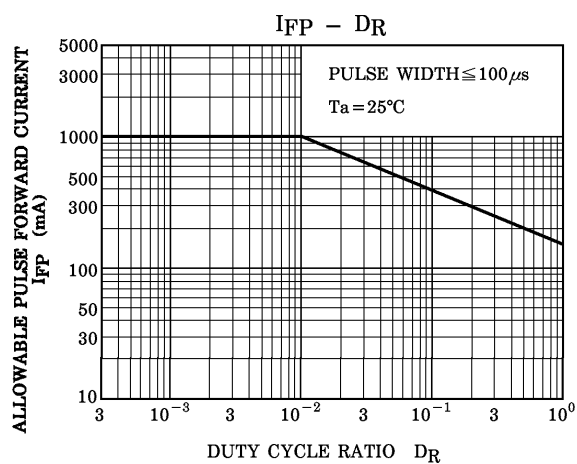
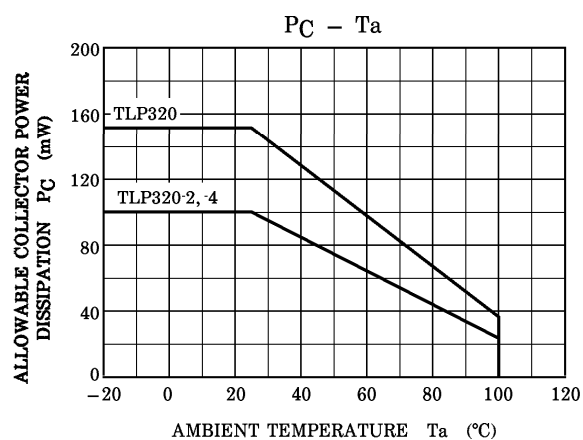
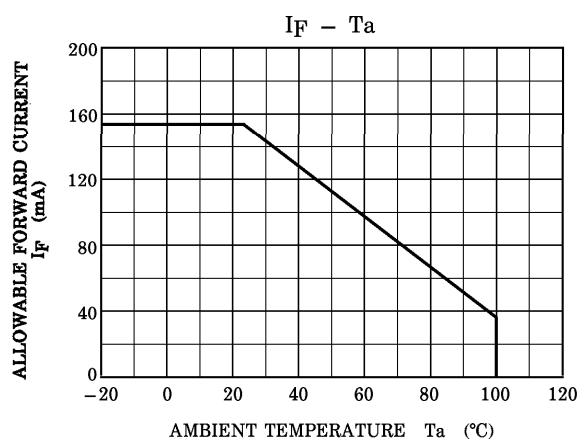


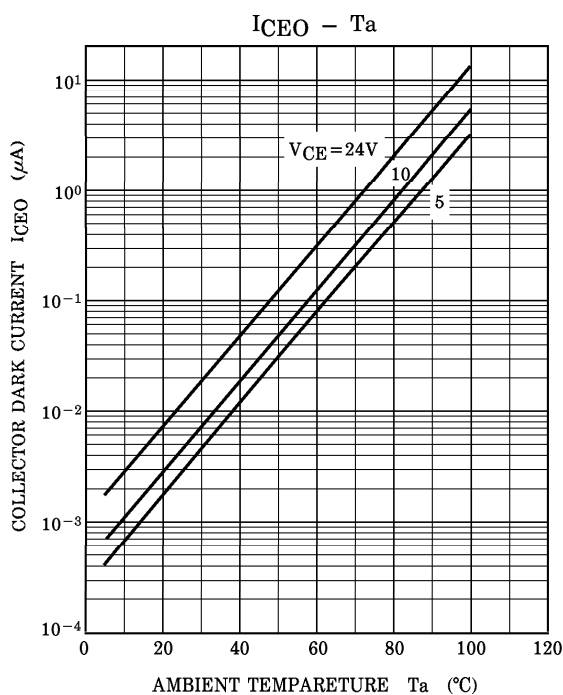
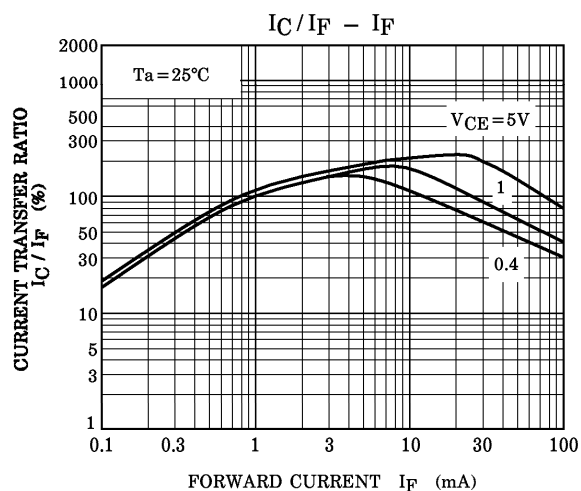
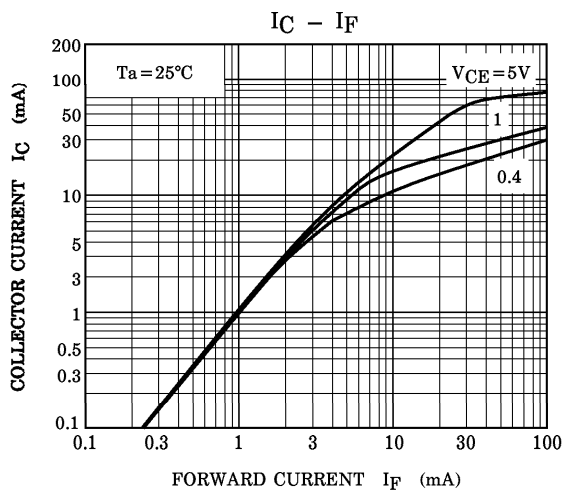
SWITCHING CHARACTERISTICS (Ta = 25°C)

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

Fig.1 SWITCHING TIME TEST CIRCUIT







RESTRICTIONS ON PRODUCT USE

000707EBC

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