TENTATIVE TOSHIBA Photocoupler GaAs Ired & Photo−Transistor

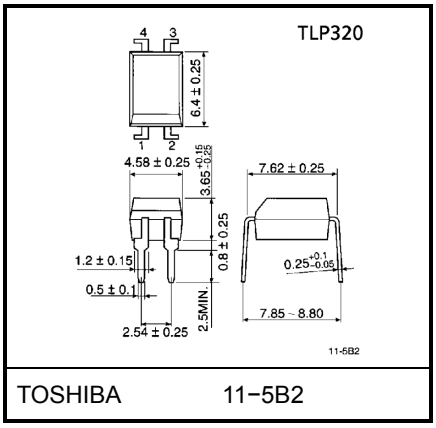
TLP320, TLP320-2, TLP320-4

Telecommunication

Office Machine

Telephone Use Equipment

Unit in mm

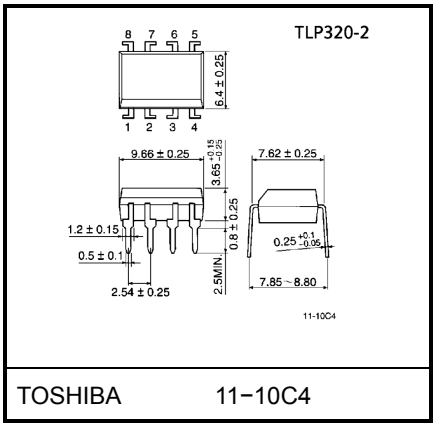


TOSHIBA 11−5B2

Weight: 0.26g

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.

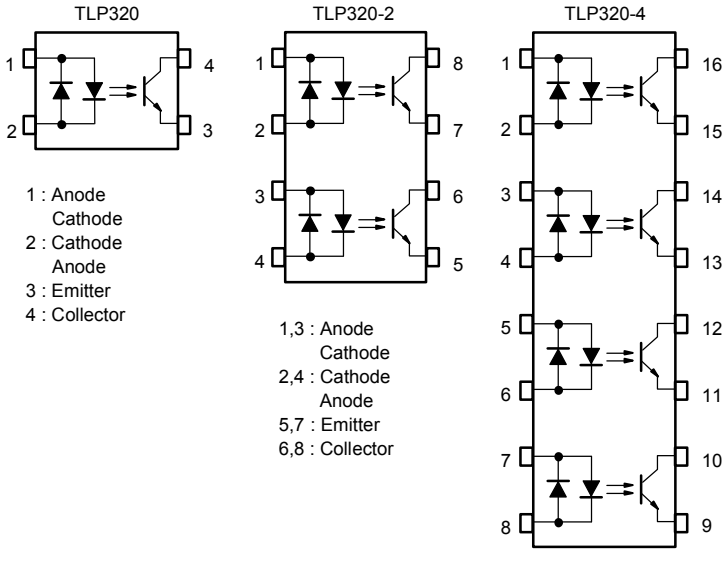
- I_F maximum rating: ±150mA
- Collector−emitter voltage: 55V (min.)
- Current transfer ratio: 25% (min.) (I_F = 20mA)
- Isolation voltage: 5000V_{rms} (min.)
- UL recognized: file No. E67349



TOSHIBA 11−10C4

Weight: 0.54g

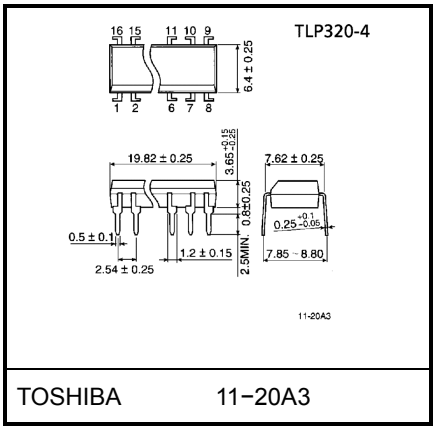
Pin Configurations (top view)



1 : Anode
Cathode
2 : Cathode
Anode
3 : Emitter
4 : Collector

1,3 : Anode
Cathode
2,4 : Cathode
Anode
5,7 : Emitter
6,8 : Collector

1,3,5,7 : Anode
Cathode
2,4,6,8 : Cathode
Anode
9,11,13,15 : Emitter
10,12,14,16 : Collector



TOSHIBA 11−20A3

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	ΔI_F /°C	−1.5 (Ta ≥ 25°C)		mA / °C
	Pulse forward current	I_{FP}	±1 (100μs pulse, 100pps)		A
	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	80		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}	−55~125		°C
Operating temperature range		T_{opr}	−55~100		°C
Lead soldering temperature		T_{sol}	260 (10s)		°C
Total package power dissipation		P_T	250	200	mW
Total package power dissipation derating (Ta≥25°C)		ΔP_T / °C	−2.5	2.0	mW / °C
Isolation voltage	(Note 1)	BV_S	5000 (AC, 1min., R.H. ≤ 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	°C

Individual Electrical Characteristics (Ta = 25°C)

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

Coupled Electrical Characteristics (Ta = 25°C)

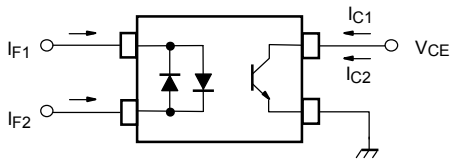
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	I_C / I_F	I_F = ±20 mA, V_{CE} = 1 V	25	—	—	%
	I_C / I_F (high)	I_F = ±100 mA, V_{CE} = 1 V	20	—	80	
Collector−emitter saturation voltage	$V_{CE\ (sat)}$	I_C = 2.4 mA, I_F = ±20 mA	—	—	0.4	V
		I_C = 2.4 mA, I_F = ±100 mA	—	—	0.4	
Off−state collector current	$I_{C(off)}$	V_F = ± 0.7V, V_{CE} = 24 V	—	1	10	μA
CTR symmetry (Note)	$I_{C\ (ratio)}$	I_C (I_F = −20mA) / I_C (I_F = +20mA) (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 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≤ 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)

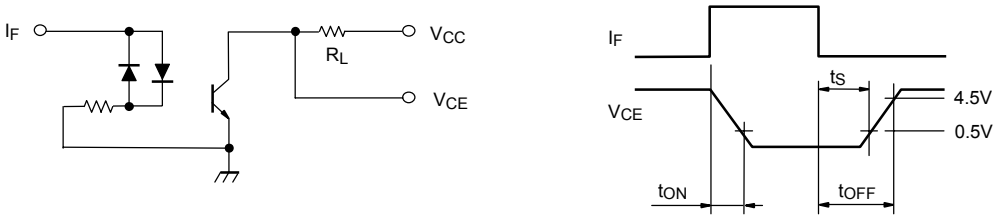
$$I_{C(ratio)} = \frac{I_{C2}(I_F = I_{F2}, V_{CE} = 1V)}{I_{C1}(I_F = I_{F1}, V_{CE} = 1V)}$$



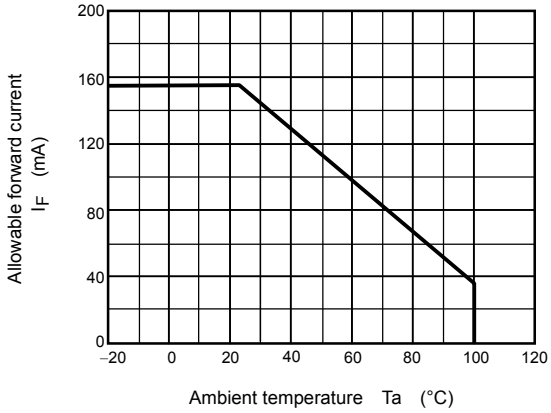
Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t_r	V_{CC} = 10 V, I_C = 2 mA 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 = 1.9 kΩ (Fig.1) V_{CC} = 5 V, I_F = ±16 mA	—	2	—	μs
Storage time	t_s		—	15	—	
Turn−off time	t_{OFF}		—	25	—	

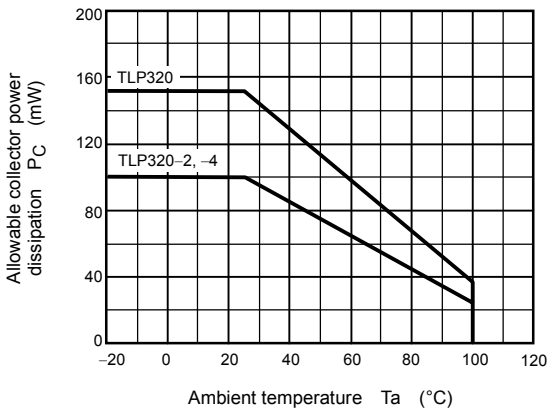
Fig. 1 Switching time test circuit



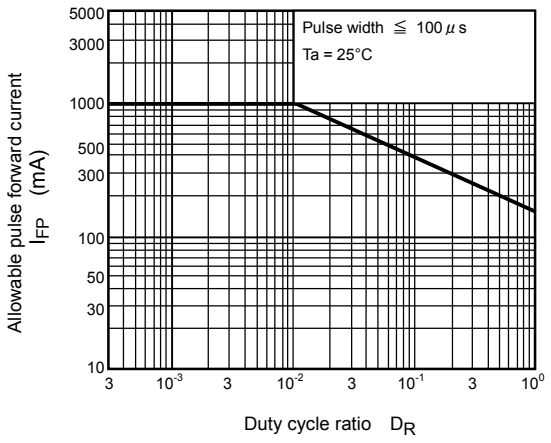
I_F – Ta



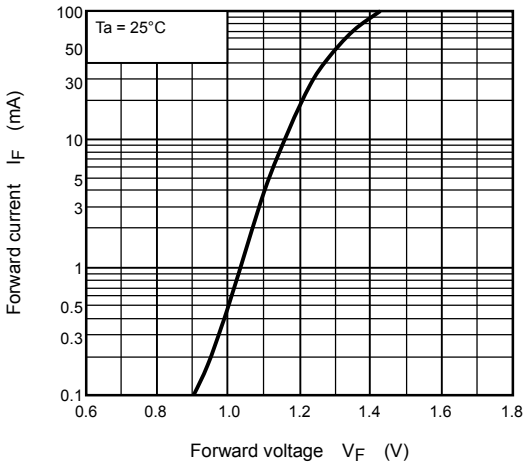
P_C – Ta



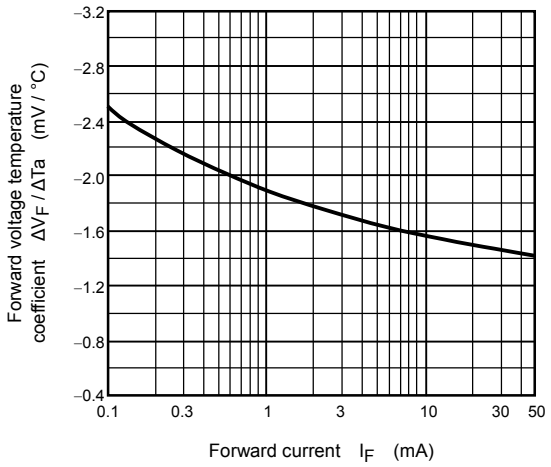
I_{FP} – D_R



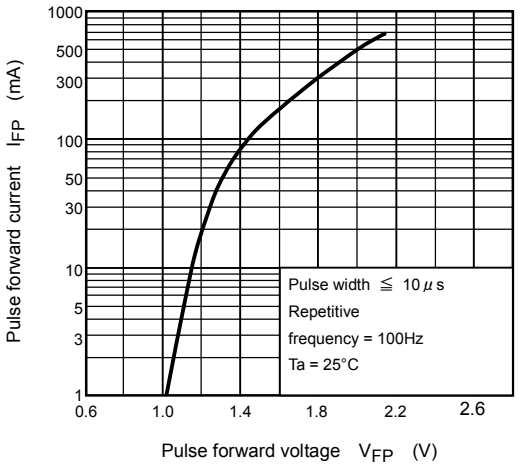
I_F – V_F



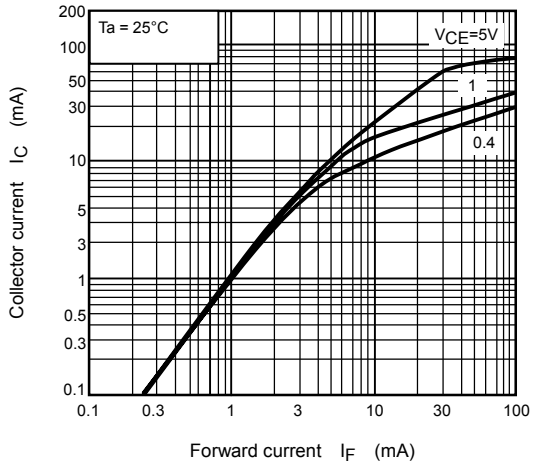
$\Delta V_F / \Delta Ta$ – I_F



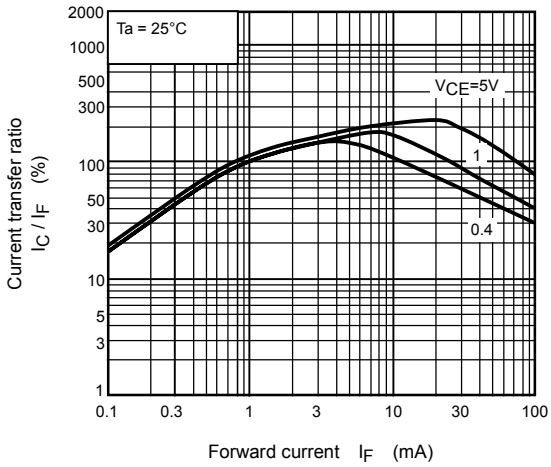
I_{FP} – V_{FP}



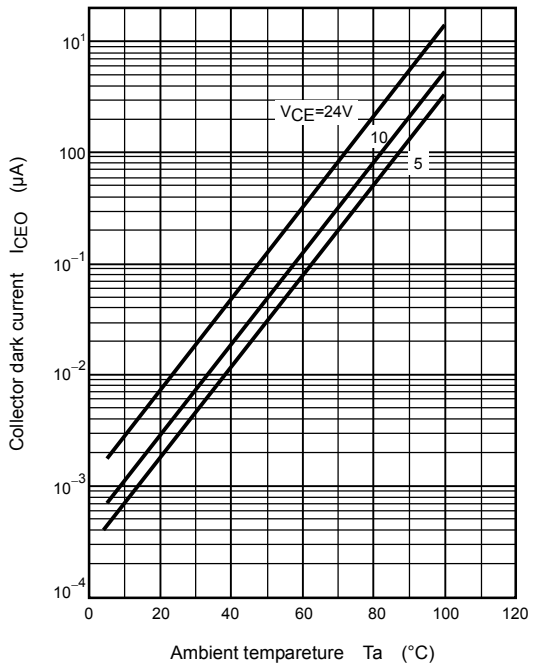
$I_C - I_F$



$I_C / I_F - I_F$



$I_{CEO} - Ta$



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