

TOSHIBA Photocoupler GaAs IRed & Photo-Transistor

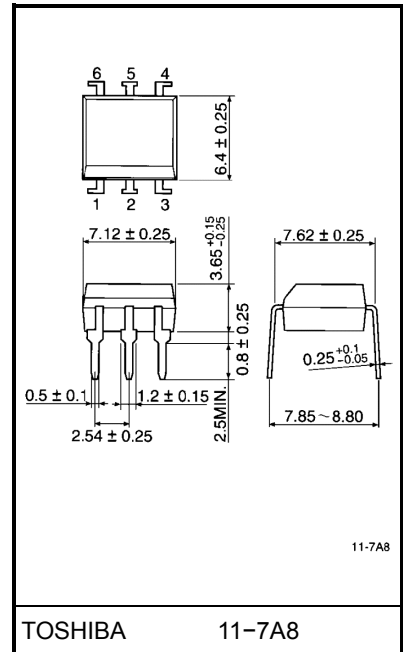
4N38(short),4N38A(short)

- AC Line / Digital Logic Isolator.
- Digital Logic / Digital Logic Isolator.
- Telephone Line Receiver.
- Twisted Pair Line Receiver.
- High Frequency Power Supply Feedback Control.
- Relay Contact Monitor.

The TOSHIBA 4N38 (short) through 4N38A (short) consists of a gallium arsenide infrared emitting diode coupled with a silicon phototransistor in a dual in-line package.

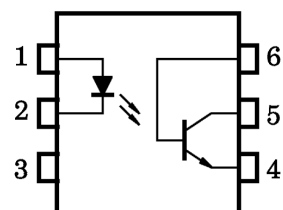
- Switching speeds: 3μs (typ.)
- DC current transfer ratio: 100% (typ.)
- Isolation resistance: 10¹¹Ω (min.)
- Isolation voltage: 2500Vrms (min.)
- UL recognized: UL1577, file no. E67349

Unit in mm



Weight: 0.4 g

Pin Configurations(top view)



- 1 : ANODE
- 2 : CATHODE
- 3 : N.C.
- 4 : EMITTER
- 5 : COLLECTOR
- 6 : BASE

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current (continuous)	I_F	80	mA
	Forward current derating	$\Delta I_F / ^\circ\text{C}$	1.07 (*)	mA / °C
	Peak forward current (Note 1)	I_{PF}	3	A
	Power dissipation	P_D	150	mW
	Power dissipation derating	$\Delta P_D / ^\circ\text{C}$	2.0 (*)	mW / °C
	Reverse voltage	V_R	3	V
Detector	Collector-emitter voltage	BV_{CEO}	80	V
	Collector-base voltage	BV_{CBO}	80	V
	Emitter-collector voltage	BV_{ECO}	7	V
	Collector current (continuous)	I_C	100	mA
	Power dissipation	P_C	150	mW
	Power dissipation derating	$\Delta P_C / ^\circ\text{C}$	2.0 (*)	mW / °C
Coupled	Storage temperature	T_{stg}	-55~150	°C
	Operating temperature	T_{opr}	-55~100	°C
	Lead soldering temperature (at 10 s)	T_{sol}	260	°C
	Total package power dissipation	P_T	250	mW
	Total package power dissipation derating	$\Delta P_T / ^\circ\text{C}$	3.3 (*)	mW / °C

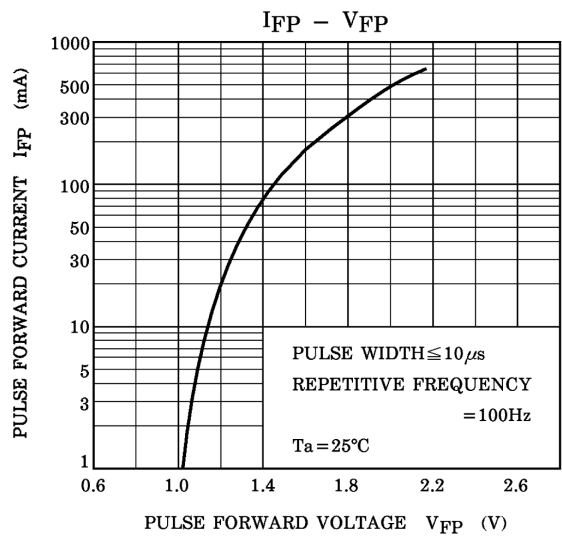
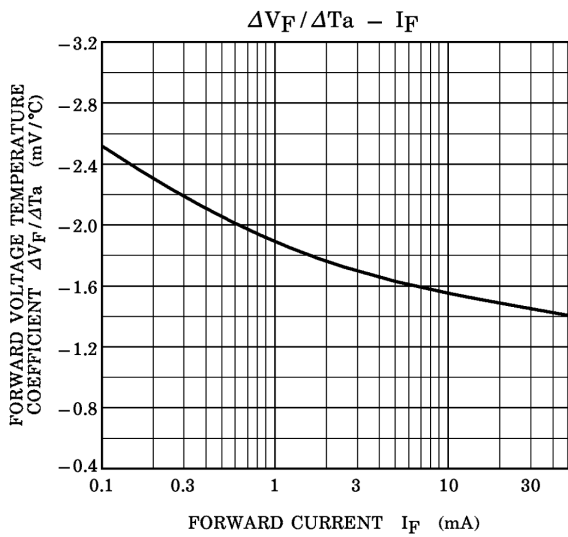
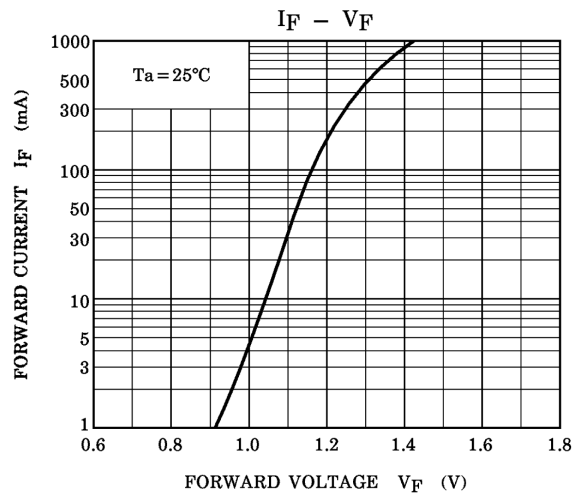
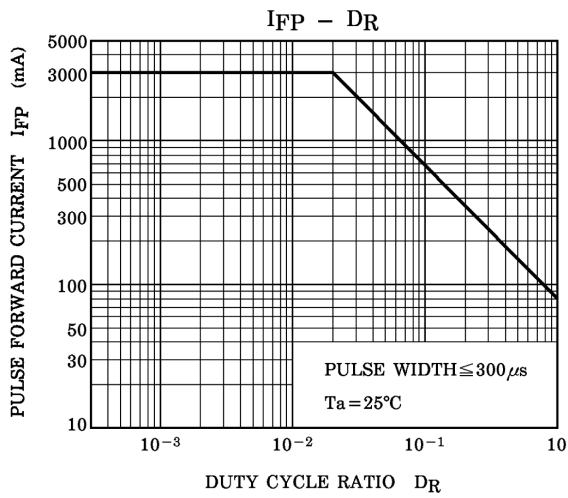
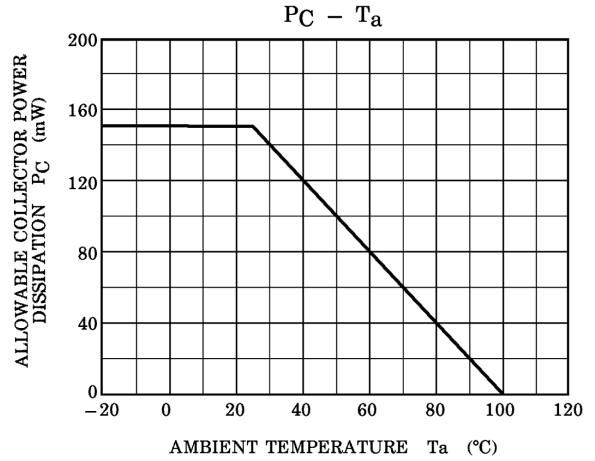
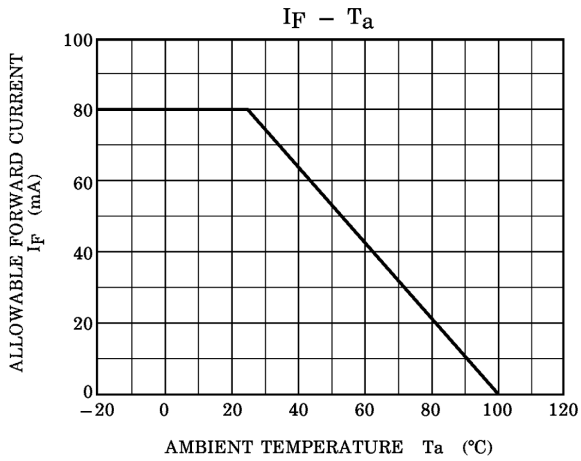
(Note 1) Pulse width 300μs, 2% duty cycle.

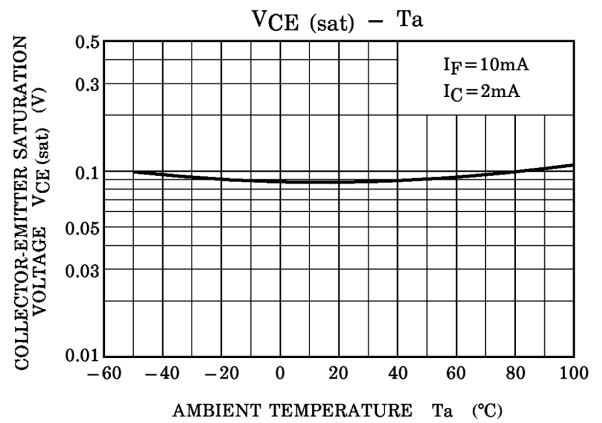
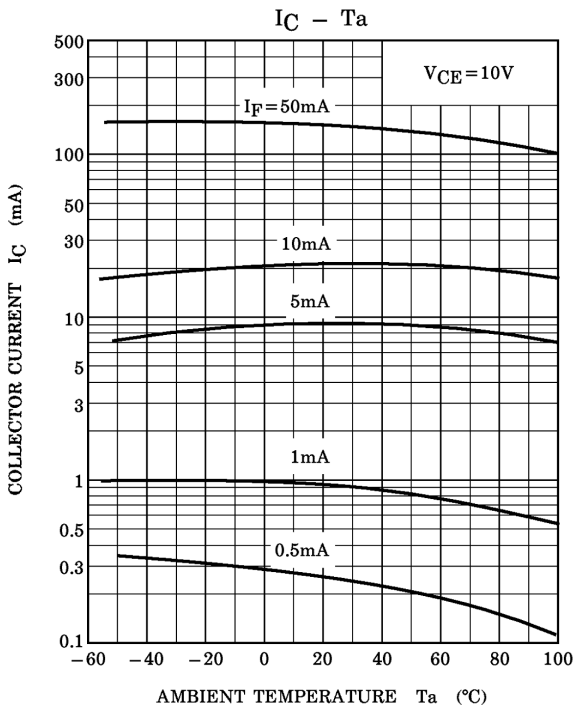
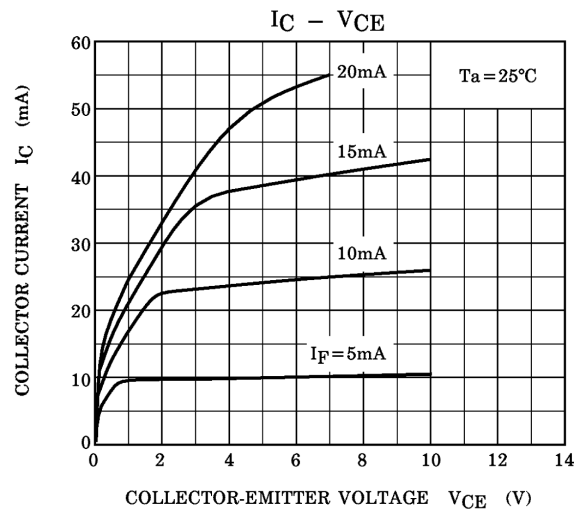
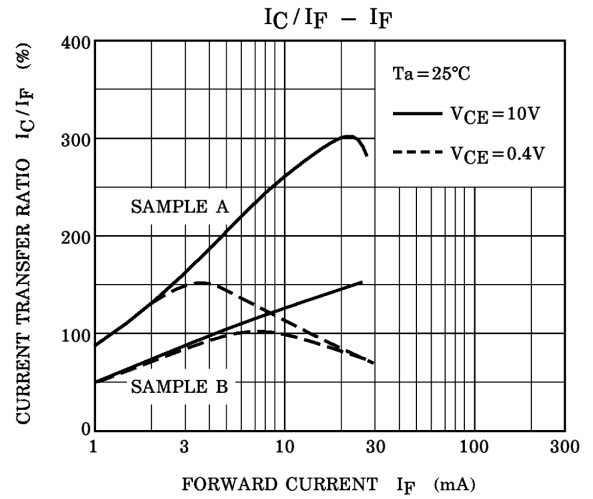
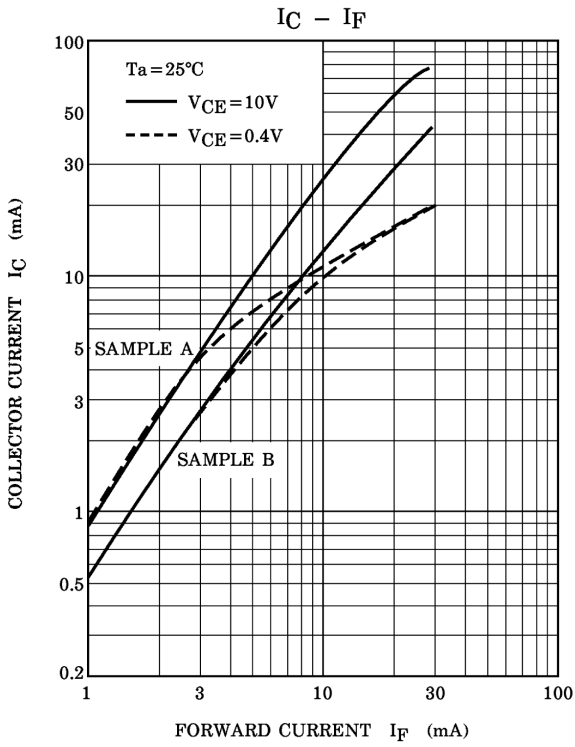
(*) Above 25°C ambient.

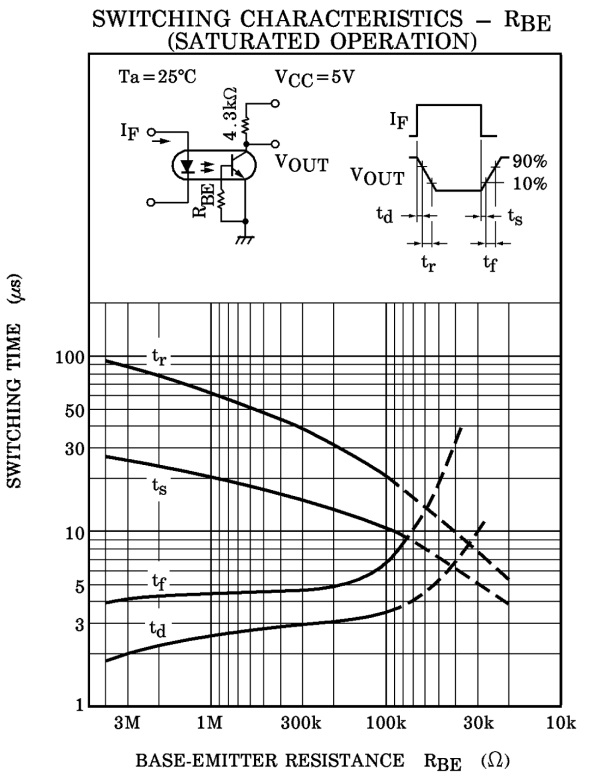
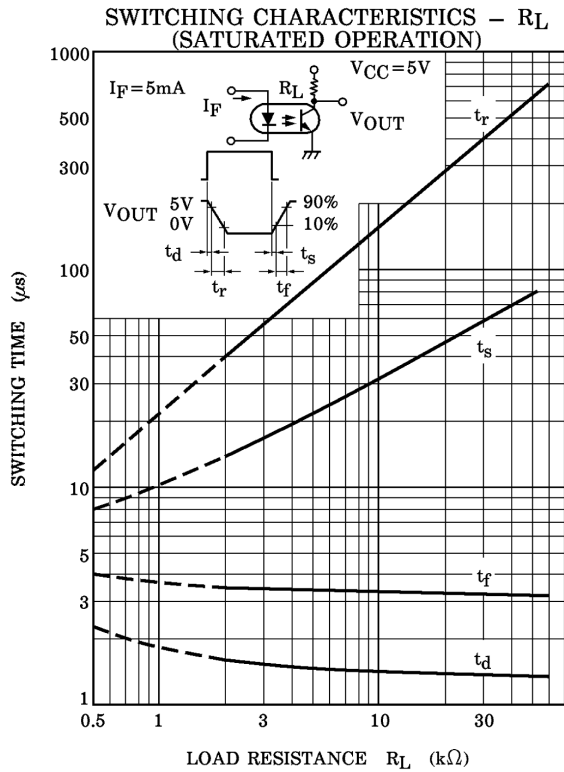
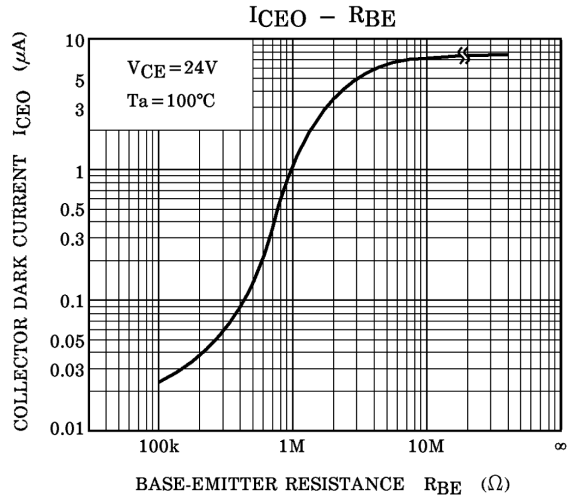
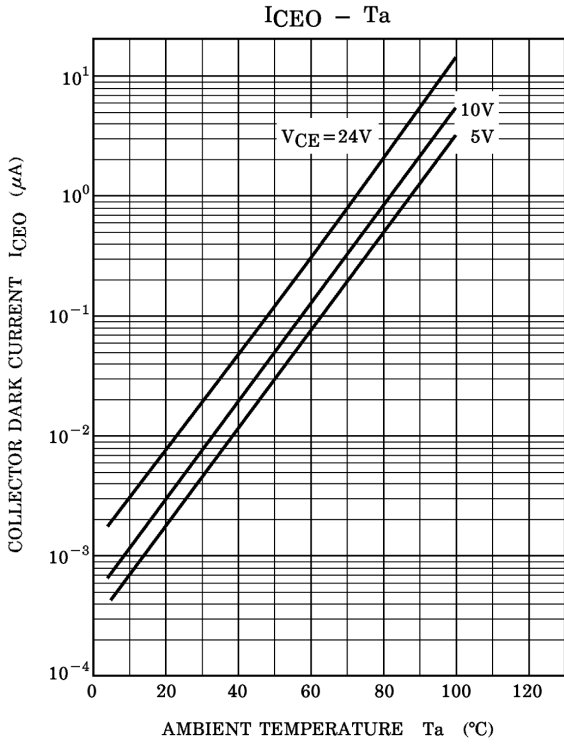
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit	
LED	Forward voltage	V_F	$I_F = 10 \text{ mA}$	—	1.15	1.5	V	
	Reverse current	I_R	$V_R = 3 \text{ V}$	—	—	100	μA	
	Capacitance	C_D	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF	
Detector	DC forward current gain	h_{FE}	$V_{CE} = 5 \text{ V}, I_C = 500 \mu\text{A}$	—	200	—	—	
	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 1 \text{ mA}$	80	—	—	V	
	Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 100 \mu\text{A}$	80	—	—	V	
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 100 \mu\text{A}$	7	—	—	V	
	Collector dark current	I_{CEO}	$V_{CE} = 60 \text{ V}$	—	1	50	nA	
	Collector dark current	I_{CBO}	$V_{CB} = 60 \text{ V}$	—	0.1	20	nA	
	Collector-emitter capacitance	C_{CE}	$V = 0, f = 1 \text{ MHz}$	—	10	—	pF	
	Coupled	Current transfer ratio	I_C / I_F	$I_F = 10 \text{ mA}, V_{CE} = 10 \text{ V}$	10	100	—	%
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_F = 20 \text{ mA}, I_C = 4 \text{ mA}$	—	—	1.0	V	
Capacitance input to output		C_S	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF	
Isolation resistance		R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60 \%$	10^{11}	—	—	Ω	
Isolation voltage			BV_S	AC, 1 minute	2500	—	—	Vrms
		4N38	$BV_S (*)$	AC, peak	1500	—	—	Vpk
		4N38A			2500	—	—	
4N38A		AC, 1 second		1775	—	—	Vrms	
Turn-on time	t_{ON}	$R_L = 100\Omega$	$V_{CE} = 10 \text{ V}, I_C = 2 \text{ mA}$	—	3	—	μs	
Turn-off time	t_{OFF}		—	3	—			

(*) JEDEC registered minimum BV_S , however, TOSHIBA specifies a minimum BV_S of 2500 Vrms, 1 minute.







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