

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

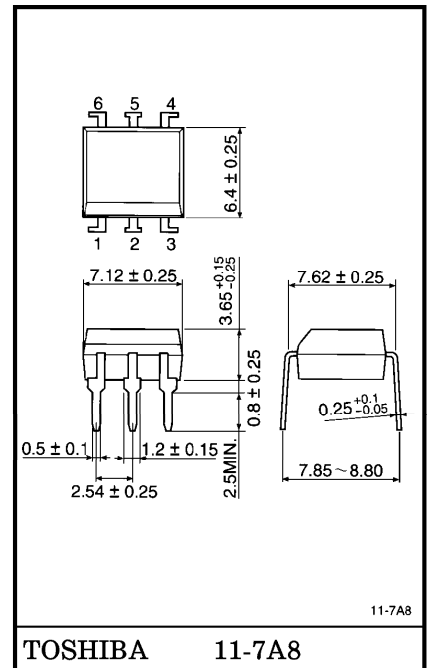
# 4N38(Short), 4N38A(Short)

- 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.

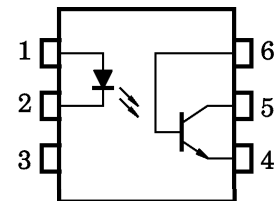
- Switching Speeds :  $3\mu s$  (Typ.)
- DC Current Transfer Ratio : 100% (Typ.)
- Isolation Resistance :  $10^{11}\Omega$  (Min.)
- Isolation Voltage : 2500Vrms (Min.)
- UL Recognized : UL1577, File No. E67349

Unit in mm



Weight : 0.4g

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 <sub>F</sub>	80	mA
	Forward Current Derating	ΔI <sub>F</sub> /°C	1.07 (*)	mA/°C
	Peak Forward Current (Note 1)	I <sub>PF</sub>	3	A
	Power Dissipation	P <sub>D</sub>	150	mW
	Power Dissipation Derating	ΔP <sub>D</sub> /°C	2.0 (*)	mW/°C
	Reverse Voltage	V <sub>R</sub>	3	V
DETECTOR	Collector-Emitter Voltage	BV <sub>CEO</sub>	80	V
	Collector-Base Voltage	BV <sub>CBO</sub>	80	V
	Emitter-Collector Voltage	BV <sub>ECO</sub>	7	V
	Collector Current (Continuous)	I <sub>C</sub>	100	mA
	Power Dissipation	P <sub>C</sub>	150	mW
	Power Dissipation Derating	ΔP <sub>C</sub> /°C	2.0 (*)	mW/°C
COUPLED	Storage Temperature	T <sub>stg</sub>	-55~150	°C
	Operating Temperature	T <sub>opr</sub>	-55~100	°C
	Lead Soldering Temperature (at 10s)	T <sub>sol</sub>	260	°C
	Total Package Dissipation	P <sub>T</sub>	250	mW
	Total Package Power Dissipation Derating	ΔP <sub>T</sub> /°C	3.3 (*)	mW/°C

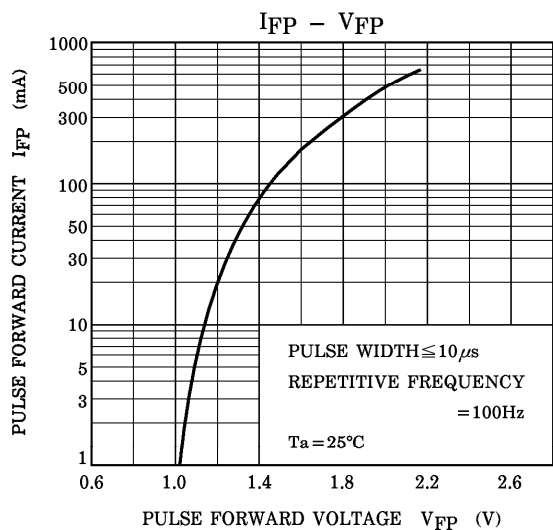
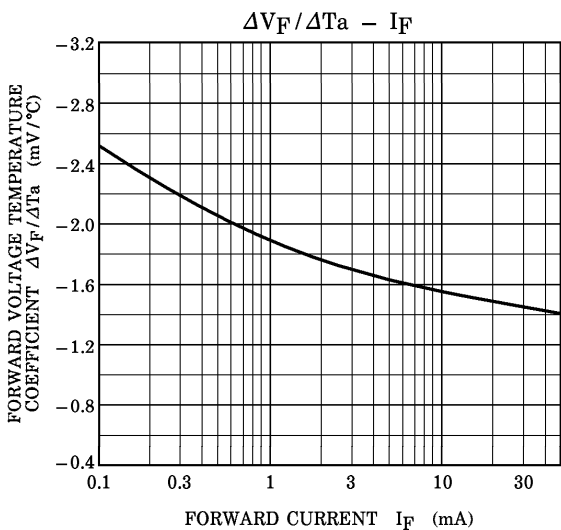
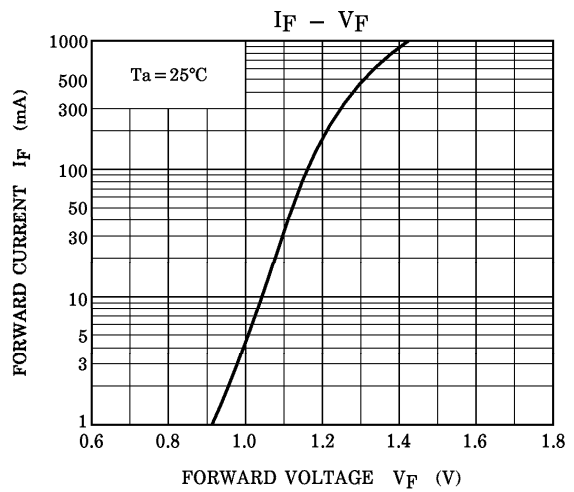
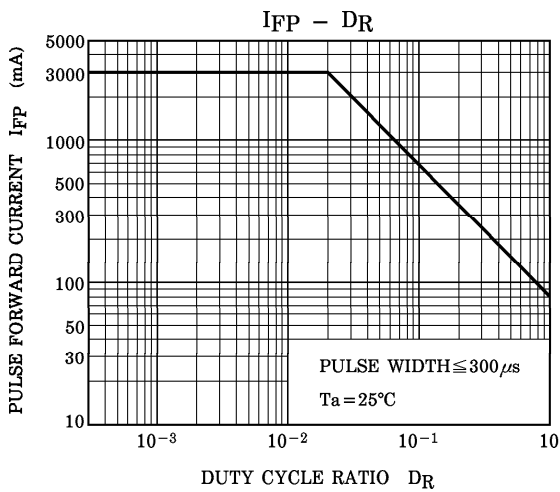
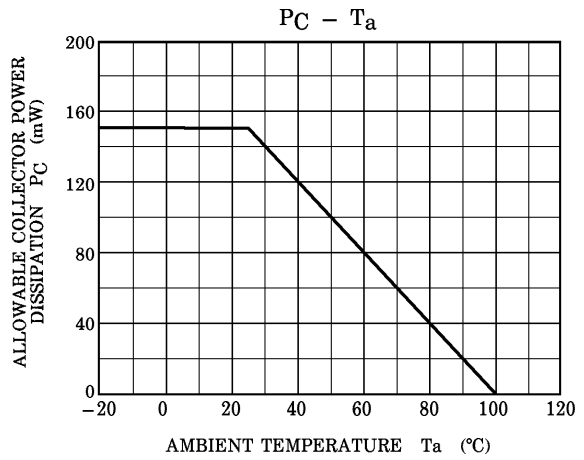
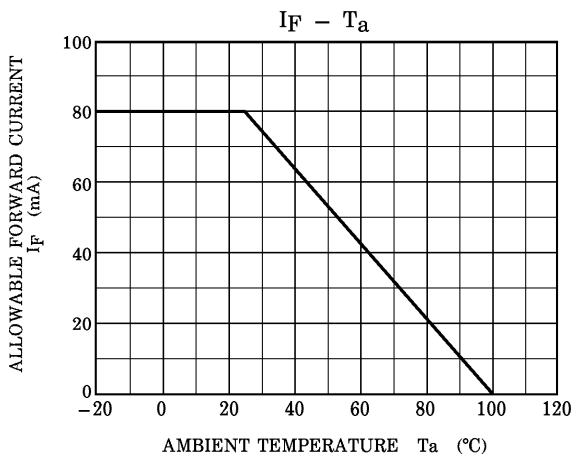
(Note 1) Pulse width 300μs, 2% duty cycle.

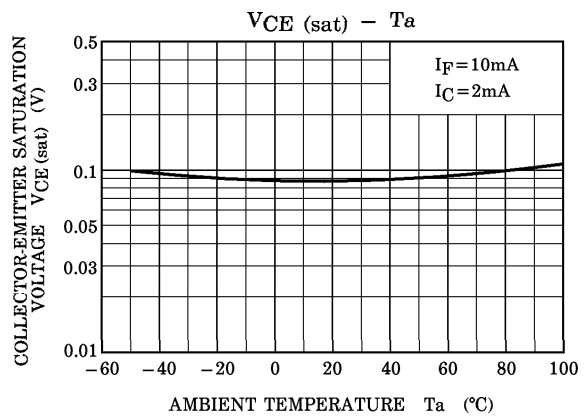
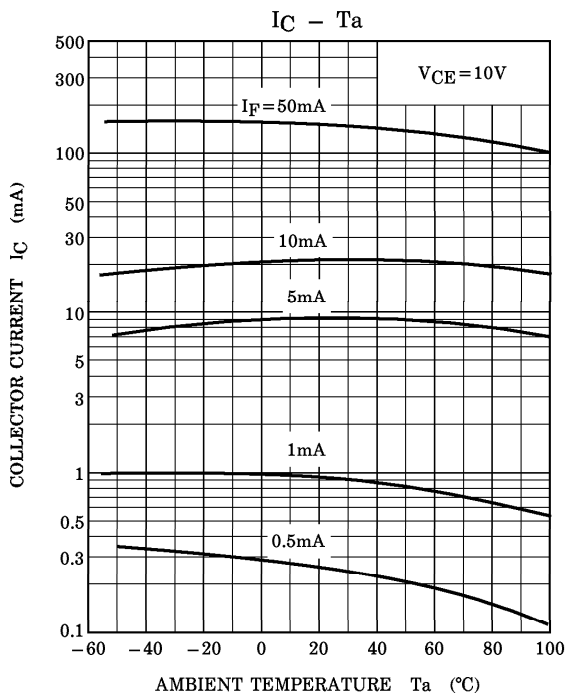
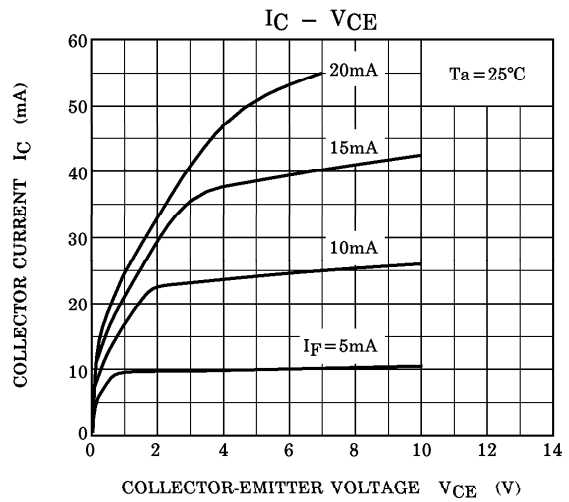
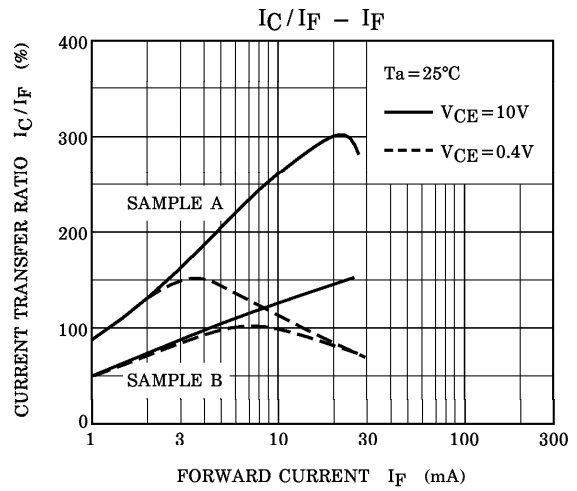
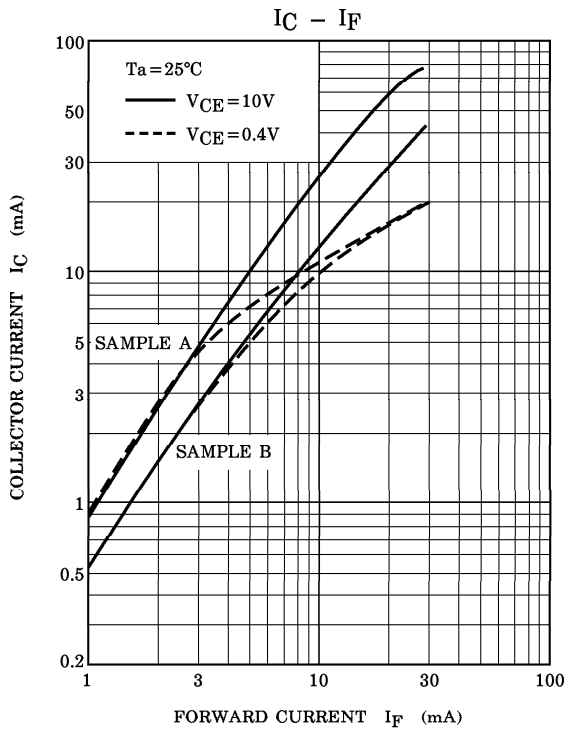
(\*) Above 25°C ambient.

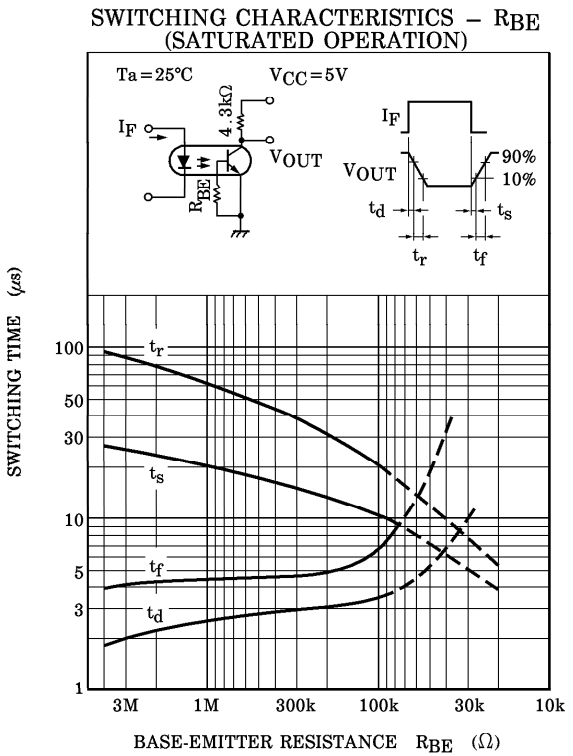
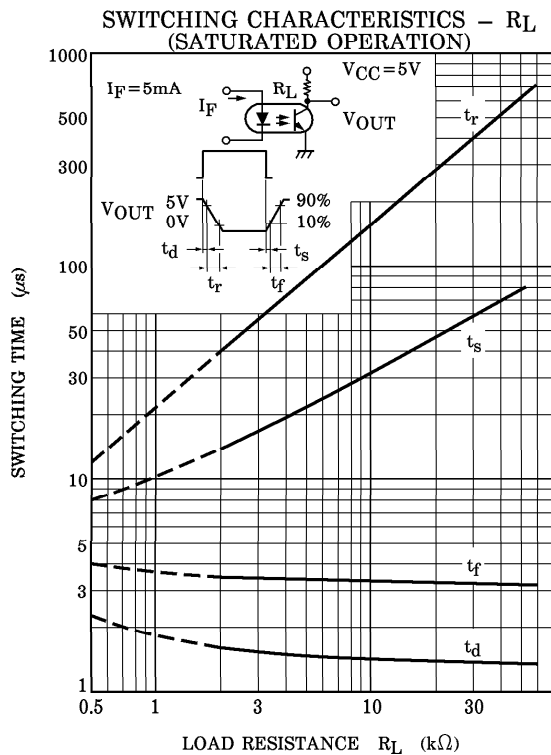
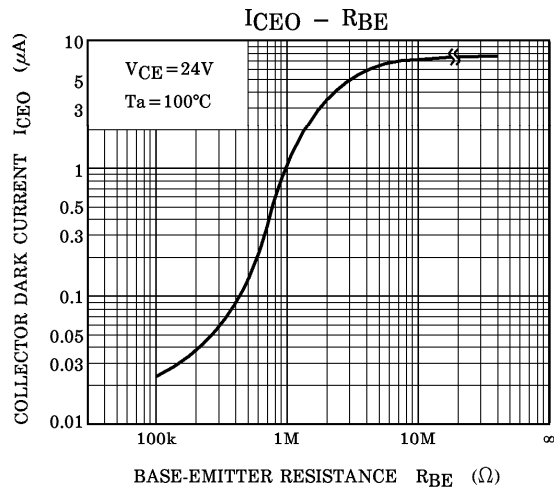
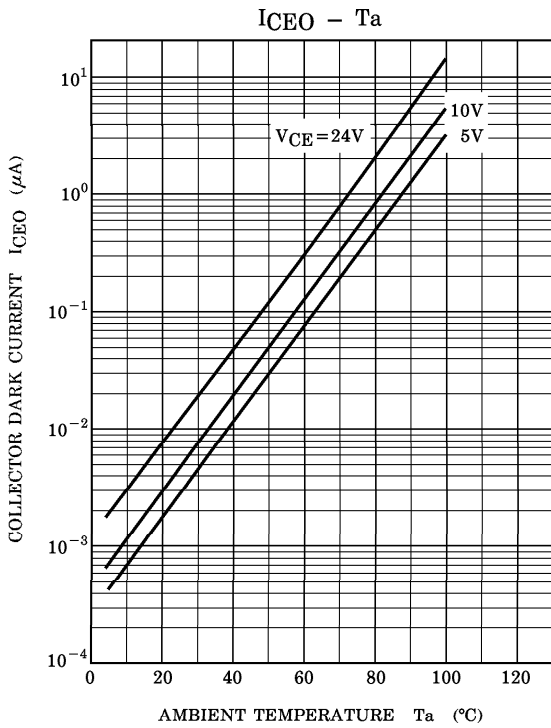
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
LED	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10mA	—	1.15	1.5	V	
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 3V	—	—	100	μA	
	Capacitance	C <sub>D</sub>	V = 0, f = 1MHz	—	30	—	pF	
DETECTOR	DC Forward Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 500μA	—	200	—	—	
	Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = 1mA	80	—	—	V	
	Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> = 100μA	80	—	—	V	
	Emitter-Collector Breakdown Voltage	V <sub>(BR)ECO</sub>	I <sub>E</sub> = 100μA	7	—	—	V	
	Collector Dark Current	I <sub>CEO</sub>	V <sub>CE</sub> = 60V	—	1	50	nA	
	Collector Dark Current	I <sub>CBO</sub>	V <sub>CB</sub> = 60V	—	0.1	20	nA	
	Collector-Emitter Capacitance	C <sub>CE</sub>	V = 0, f = 1MHz	—	10	—	pF	
	Current Transfer Ratio	I <sub>C</sub> / I <sub>F</sub>	I <sub>F</sub> = 10mA, V <sub>CE</sub> = 10V	10	100	—	%	
COUPLED	Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>F</sub> = 20mA, I <sub>C</sub> = 4mA	—	—	1.0	V	
	Capacitance Input to Output	C <sub>S</sub>	V <sub>S</sub> = 0, f = 1MHz	—	0.8	—	pF	
	Isolation Resistance	R <sub>S</sub>	V <sub>S</sub> = 500V, R.H. ≤ 60%	10 <sup>11</sup>	—	—	Ω	
	Isolation Voltage	BV <sub>S</sub> (*)	BV <sub>S</sub>	AC, 1 minute	2500	—	—	V <sub>rms</sub>
			4N38	AC, peak	1500	—	—	V <sub>pk</sub>
					4N38A	2500	—	—
	4N38A	AC, 1 second	1775	—	—	V <sub>rms</sub>		
	Turn-On Time	t <sub>ON</sub>	V <sub>CE</sub> = 10V, I <sub>C</sub> = 2mA	—	3	—	μs	
Turn-Off Time	t <sub>OFF</sub>	R <sub>L</sub> = 100Ω	—	3	—			

(\*) JEDEC registered minimum BV<sub>S</sub>, however, TOSHIBA specifies a minimum BV<sub>S</sub> of 2500V<sub>rms</sub>, 1 minute.







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