TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

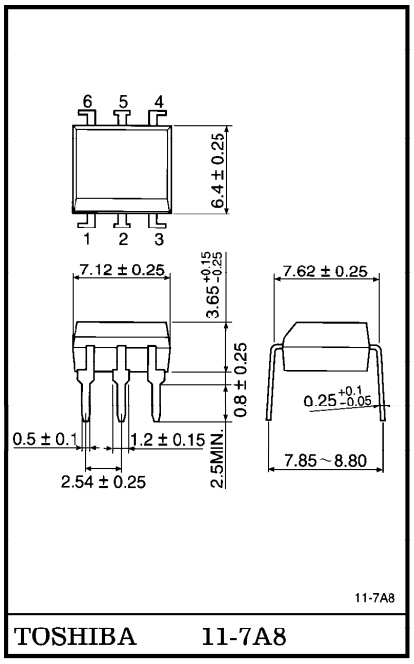
4N35(Short), 4N36(Short), 4N37(Short)

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 4N35 (Short) through 4N37 (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% (Min.)
- Isolation Resistance : $10^{11}\Omega$ (Min.)
- Isolation Voltage : 2500Vrms (Min.)
- UL Recognized : UL1577, File No. E67349

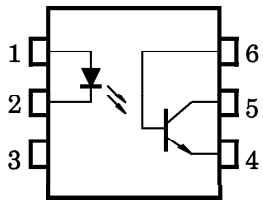
Unit in mm



TOSHIBA 11-7A8

Weight : 0.4g

PIN CONFIGURATIONS (Top view)



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

961001EBC2

- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current (Continuous)		I_F	60	mA
	Forward Current Derating		ΔI_F / °C	0.8 (*)	mA / °C
	Peak Forward Current (Note 1)		I_{PF}	3	A
	Power Dissipation		P_D	100	mW
	Power Dissipation Derating		ΔP_D / °C	1.33 (*)	mW / °C
	Reverse Voltage		V_R	6	V
DETECTOR	Collector-Emitter Voltage		BV_{CEO}	30	V
	Collector-Base Voltage		BV_{CBO}	70	V
	Emitter-Collector Voltage		BV_{ECO}	7	V
	Collector Current (Continuous)		I_C	100	mA
	Power Dissipation		P_C	300	mW
	Power Dissipation Derating		ΔP_C / °C	4.0 (*)	mW / °C
COUPLED	Storage Temperature		T_{stg}	−55~150	°C
	Operating Temperature		T_{opr}	−55~100	°C
	Lead Soldering Temperature (at 10s)		T_{sol}	260	°C
	Total Package Power Dissipation		P_T	300	mW
	Total Package Power Dissipation Derating		ΔP_T / °C	3.3 (*)	mW / °C
	Input to Output Isolation Voltage (AC, 1 Minute)		BV_S	2500	Vrms
		4N35	BV_S (**)	2500 / 3550	Vrms / Vpk
		4N36		1750 / 2500	
		4N37		1050 / 1500	

(Note 1) Pulse width 1μs, 300pps

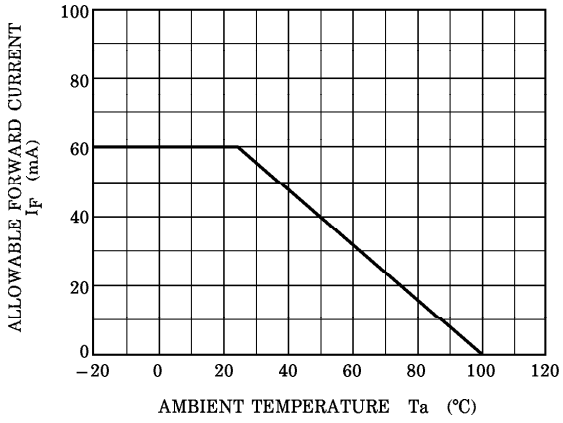
(*) Above 25°C ambient.

(**) JEDEC registered maximum BV_S, however, TOSHIBA specifies a maxium BV_S of $2500V_{rms}$, 1 minute.

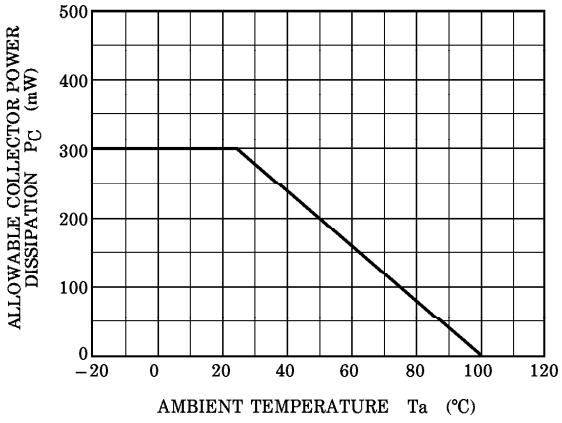
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

	CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage		V_F	I_F = 10mA	0.8	1.15	1.5	V
				I_F = 10mA, Ta = −55°C	0.9	—	1.7	
				I_F = 10mA, Ta = 100°C	0.7	—	1.4	
	Reverse Current		I_R	V_R = 6V	—	—	10	μA
	Capacitance		C_D	V = 0, f = 1MHz	—	30	100	pF
DETECTOR	DC Forward Current Gain		h_{FE}	V_{CE} = 5V, I_C = 500μA	—	200	—	—
	Collector-Emitter Breakdown Voltage		$V_{(BR)CEO}$	I_C = 10mA	30	—	—	V
	Collector-Base Breakdown Voltage		$V_{(BR)CBO}$	I_C = 100μA	70	—	—	V
	Emitter-Collector Breakdown Voltage		$V_{(BR)ECO}$	I_E = 100μA	7	—	—	V
	Collector Dark Current		I_{CEO}	V_{CE} = 10V	—	1	50	nA
	Collector Dark Current		I_{CEO}	V_{CE} = 30V, Ta = 100°C	—	—	500	μA
	Collector-Emitter Capacitance		C_{CE}	V = 0, f = 1MHz	—	10	—	pF
COUPLED	Current Transfer Ratio		I_C / I_F	I_F = 10mA, V_{CE} = 10V	100	—	—	%
				I_F = 10mA, V_{CE} = 10V Ta = −55°C	40	—	—	
				I_F = 10mA, V_{CE} = 10V Ta = 100°C	40	—	—	
	Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	I_F = 10mA, I_C = 0.5mA	—	0.1	0.3	V
	Capacitance Input to Output		C_S	V_S = 0, f = 1MHz	—	0.8	2.5	pF
	Isolation Resistance		R_S	V_S = 500V, R. H. ≦ 60%	10^{11}	—	—	Ω
	Input to Output Isolation Current (Pulse Width = 8ms)	4N35	I_{IO}	V_{io} = 3550Vpk	—	—	100	μA
		4N36		V_{io} = 2500Vpk	—	—	100	
		4N37		V_{io} = 1500Vpk	—	—	100	
	Turn-On Time		t_{ON}	V_{CC} = 10V, I_C = 2mA R_L = 100Ω	—	3	10	μs
	Turn-Off Time		t_{OFF}		—	3	10	

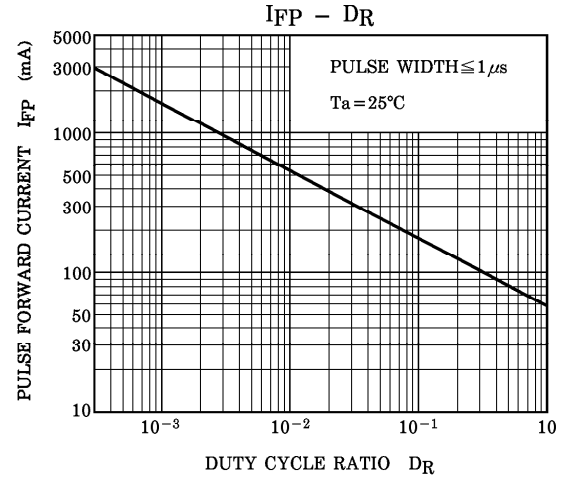
$I_F - T_a$



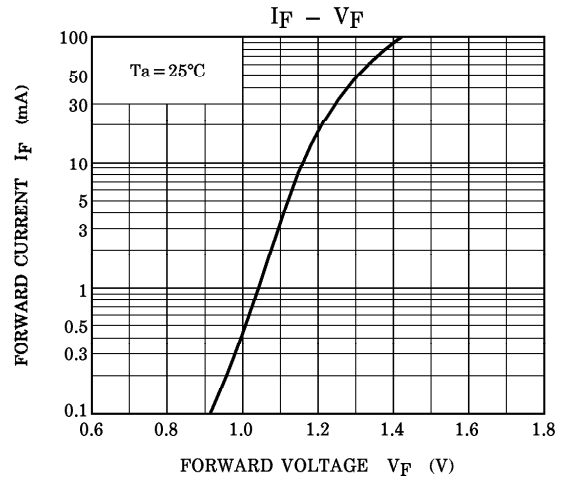
$P_C - T_a$



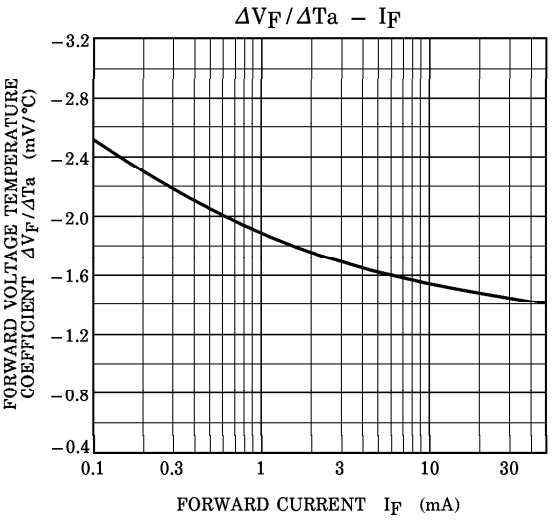
$I_{FP} - D_R$



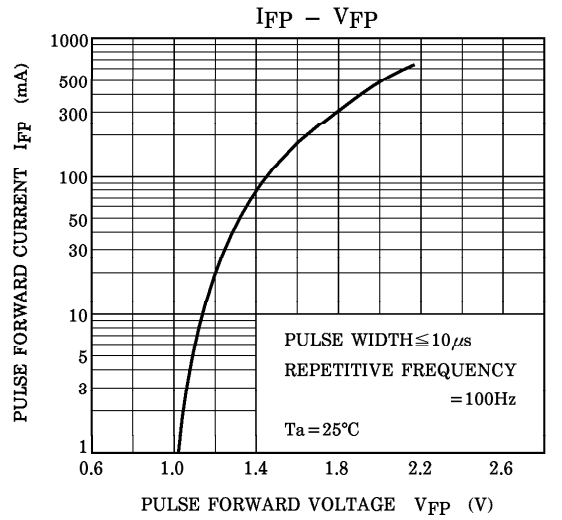
$I_F - V_F$



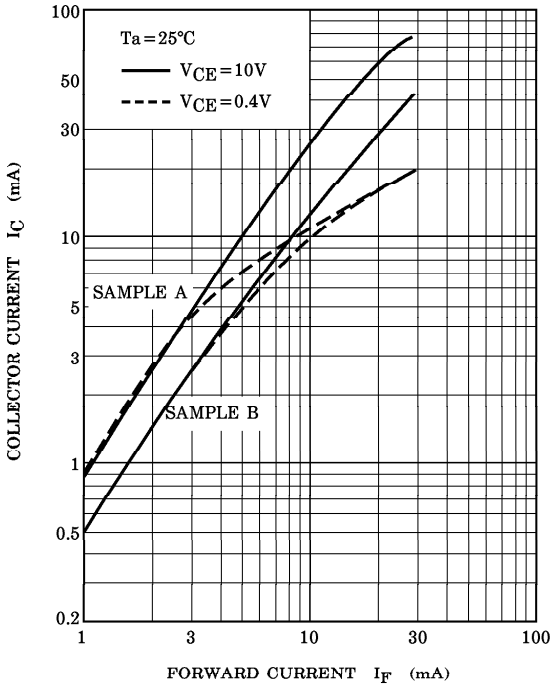
$\Delta V_F / \Delta Ta - I_F$



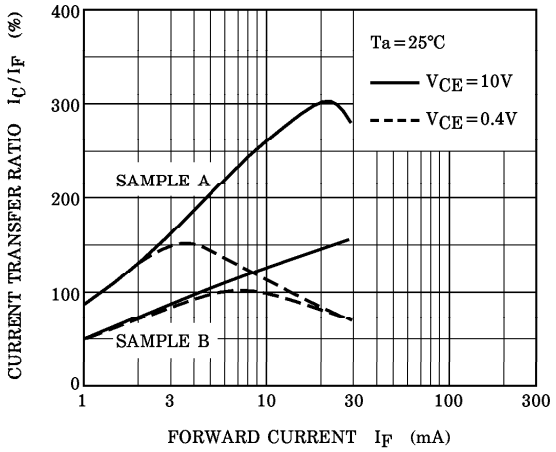
$I_{FP} - V_{FP}$



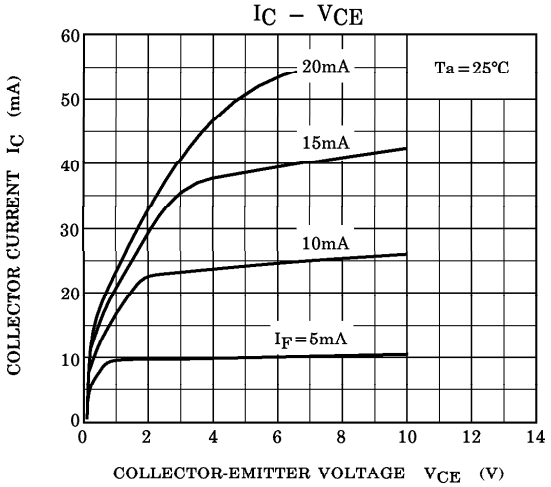
$I_C - I_F$



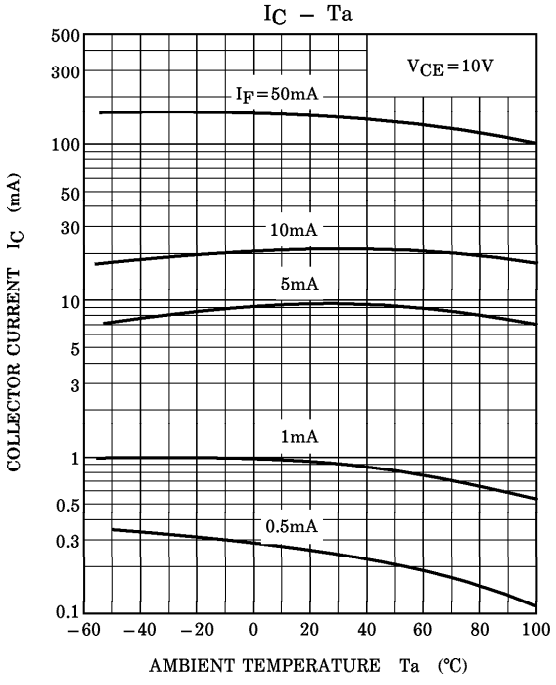
$I_C / I_F - I_F$



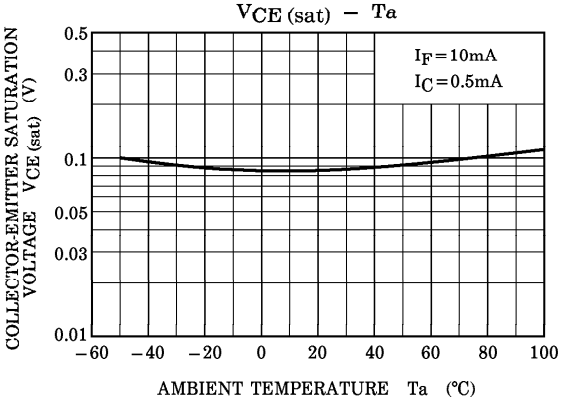
$I_C - V_{CE}$



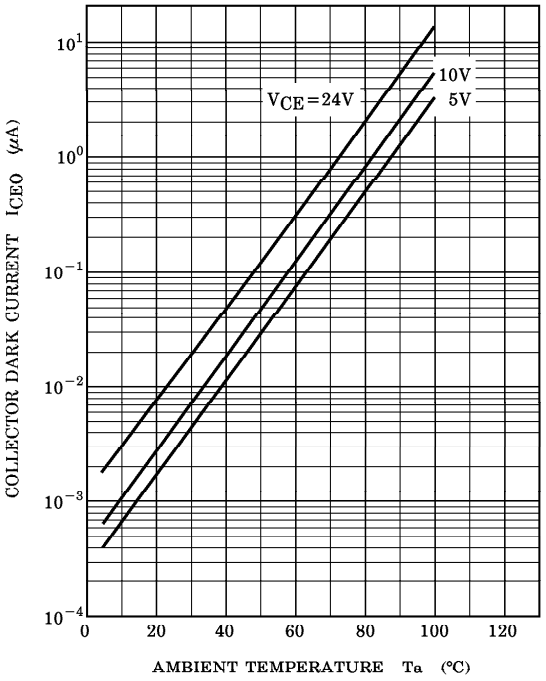
$I_C - Ta$



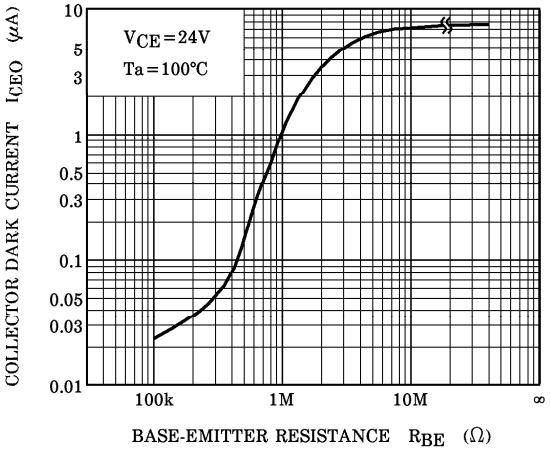
$V_{CE\,(sat)} - Ta$



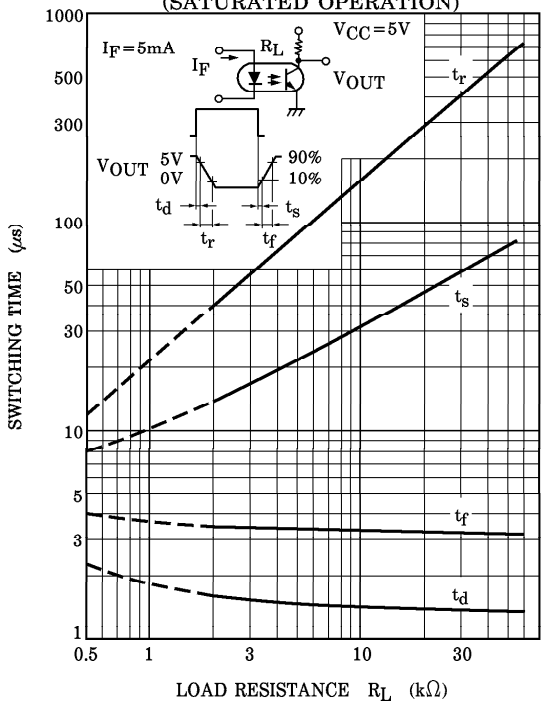
I_{CEO} – Ta



I_{CEO} – R_{BE}



SWITCHING CHARACTERISTICS – R_L
(SATURATED OPERATION)



SWITCHING CHARACTERISTICS – R_{BE}
(SATURATED OPERATION)

