

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

# TLP630

PROGRAMMABLE CONTROLLERS

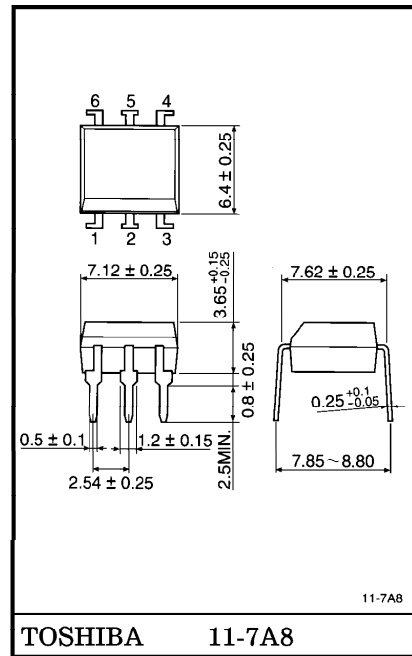
AC/DC-INPUT MODULE

TELECOMMUNICATION

The TOSHIBA TLP630 consists of a photo-transistor optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel in a six lead plastic DIP package.

- Collector-Emitter Voltage : 55V Min.
- Current Transfer Ratio : 50% Min.  
Rank GB : 100% Min.
- Isolation Voltage : 5000Vrms Min.
- UL Recognized : UL1577 File No. E67349

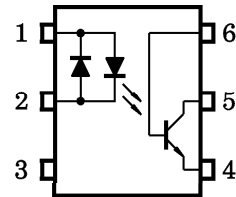
Unit in mm



TOSHIBA 11-7A8

Weight : 0.4g

**PIN CONFIGURATIONS (TOP VIEW)**



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

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● 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.

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## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	$I_F$ (RMS)	60	mA
	Forward Current Derating (Ta $\geq$ 39°C)	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / °C
DETECTOR	Peak Forward Current (100 $\mu$ s pulse, 100pps)	$I_{FPT}$	$\pm 1$	A
	Collector-Emitter Voltage	$V_{CEO}$	55	V
	Collector-Base Voltage	$V_{CBO}$	80	V
	Emitter-Collector Voltage	$V_{ECO}$	7	V
	Emitter-Base Voltage	$V_{EBO}$	7	V
	Collector Current	$I_C$	50	mA
	Power Dissipation	$P_C$	150	mW
	Power Dissipation Derating (Ta $\geq$ 25°C)	$\Delta P_C / ^\circ\text{C}$	-1.5	mW / °C
Operating Temperature Range		$T_{opr}$	-55~100	°C
Storage Temperature Range		$T_{stg}$	-55~125	°C
Lead Soldering Temperature Temperature		$T_{sol}$	260 (10s)	°C
Junction Temperature		$T_j$	125	°C
Total Package Power Dissipation		$P_T$	250	mW
Total Package Power Dissipation Derating		$\Delta P_T / ^\circ\text{C}$	-2.5	mW / °C
Isolation Voltage (AC, 1 min., R.H. $\leq$ 60%)		$BV_S$	5000	Vrms

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	—	5	24	V
Forward Current	I <sub>F</sub> (RMS)	—	16	25	mA
Collector Current	I <sub>C</sub>	—	1	10	mA
Operating Temperature	T <sub>opr</sub>	-25	—	85	°C

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

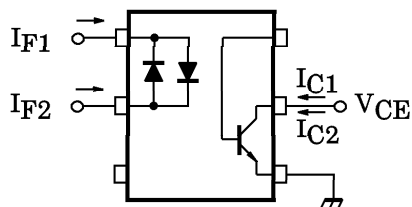
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10mA	1.0	1.15	1.3	V
	Forward Current	I <sub>F</sub>	V <sub>F</sub> = 0.7V	—	2.5	10	μA
	Capacitance	C <sub>T</sub>	V = 0, f = 1MHz	—	60	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	V <sub>(BR) CEO</sub>	I <sub>C</sub> = 0.5mA	55	—	—	V
	Emitter-Collector Breakdown Voltage	V <sub>(BR) ECO</sub>	I <sub>E</sub> = 0.1mA	7	—	—	V
	Collector-Base Breakdown Voltage	V <sub>(BR) CBO</sub>	I <sub>C</sub> = 0.1mA	80	—	—	V
	Emitter-Base Breakdown Voltage	V <sub>(BR) EBO</sub>	I <sub>E</sub> = 0.1mA	7	—	—	V
	Collector Dark Current	I <sub>D</sub> (I <sub>CEO</sub> )	V <sub>CE</sub> = 24V	—	10	100	nA
			V <sub>CE</sub> = 24V, Ta = 85°C	—	2	50	μA
	Collector Dark Current	I <sub>CBO</sub>	V <sub>CB</sub> = 10V	—	0.1	—	nA
Capacitance (Collector to Emitter)	C <sub>CCE</sub>	V = 0, f = 1MHz	—	10	—	pF	

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I <sub>C</sub> / I <sub>F</sub>	I <sub>F</sub> = ±5mA, V <sub>CE</sub> = 5V Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	I <sub>C</sub> / I <sub>F</sub> (sat)	I <sub>F</sub> = ±1mA, V <sub>CE</sub> = 0.4V Rank GB	—	60	—	%
			30	—	—	
Base Photo-current	I <sub>PB</sub>	I <sub>F</sub> = ±5mA, V <sub>CB</sub> = 5V	—	10	—	μA
Collector-Emitter Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = 2.4mA, I <sub>F</sub> = ±8mA	—	—	0.4	V
Off-State Collector Current	I <sub>C</sub> (off)	V <sub>F</sub> = ±0.7V, V <sub>CE</sub> = 24V	—	1	10	μA
CTR Symmetry	I <sub>C</sub> (ratio)	I <sub>C</sub> (I <sub>F</sub> = -5mA) / I <sub>C</sub> (I <sub>F</sub> = +5mA) (Note 1)	0.33	1	3	—

(Note 1)

$$I_C \text{ (ratio)} = \frac{I_{C2} (I_F = I_{F2}, V_{CE} = 5V)}{I_{C1} (I_F = I_{F1}, V_{CE} = 5V)}$$



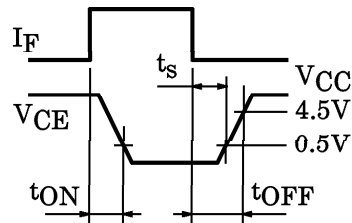
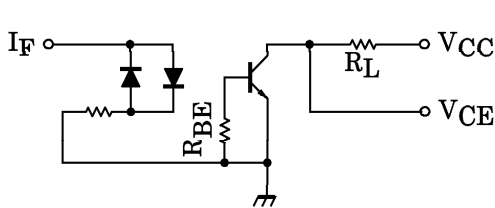
ISOLATION CHARACTERISTICS (Ta = 25°C)

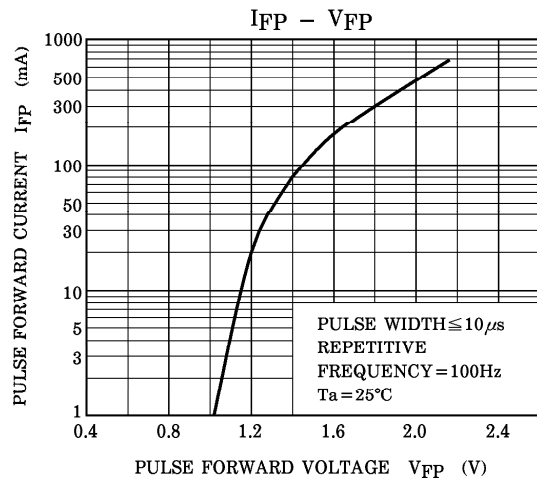
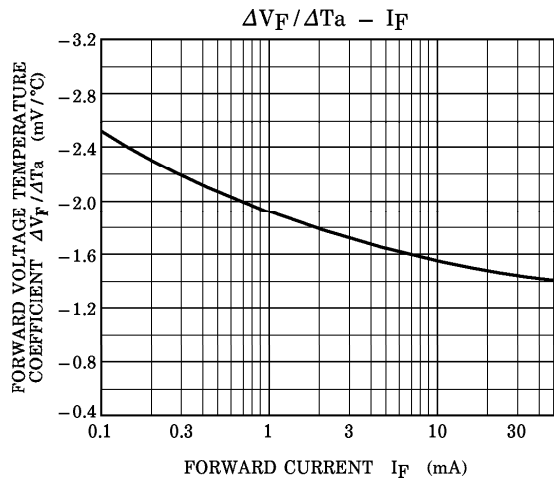
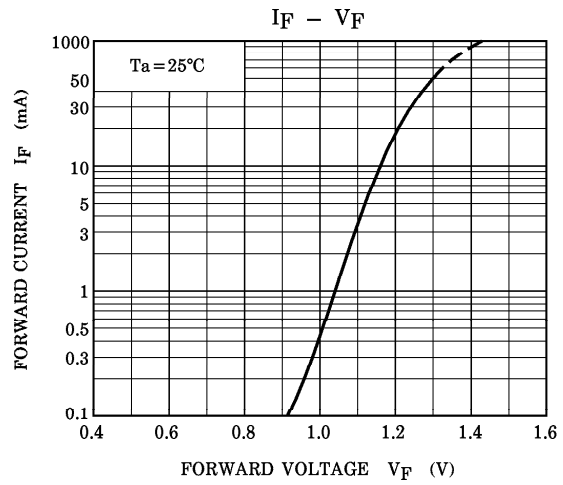
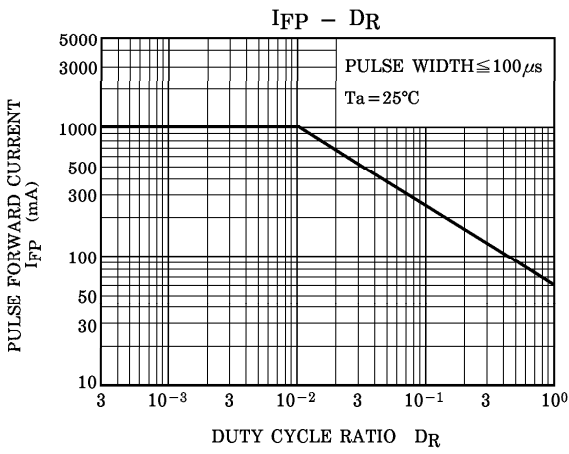
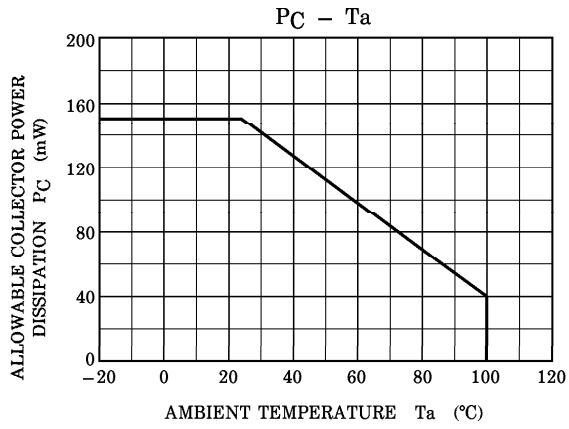
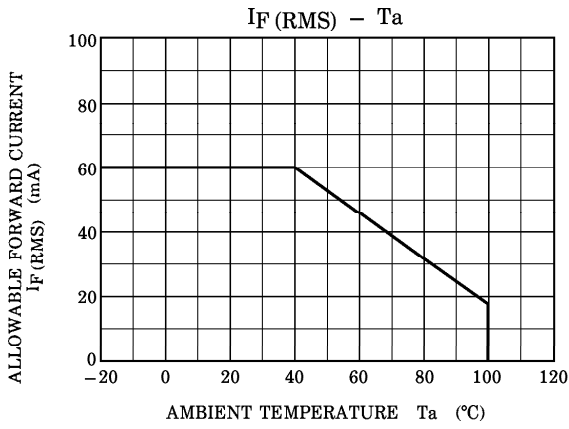
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	C <sub>S</sub>	V <sub>S</sub> =0, f=1MHz	—	0.8	—	pF
Isolation Resistance	R <sub>S</sub>	V <sub>S</sub> =500V, R.H. ≤ 60%	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation Voltage	BV <sub>S</sub>	AC, 1 minute	5000	—	—	V <sub>rms</sub>
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V <sub>dc</sub>

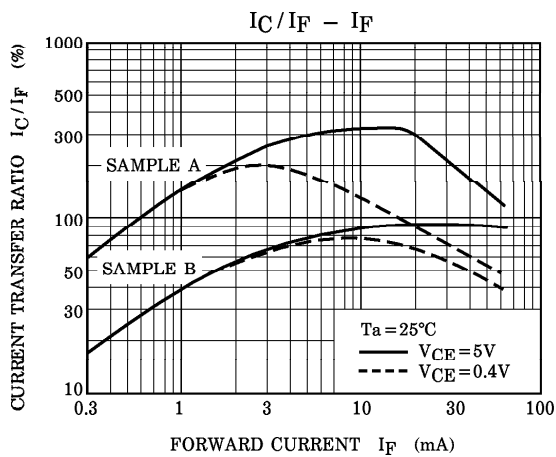
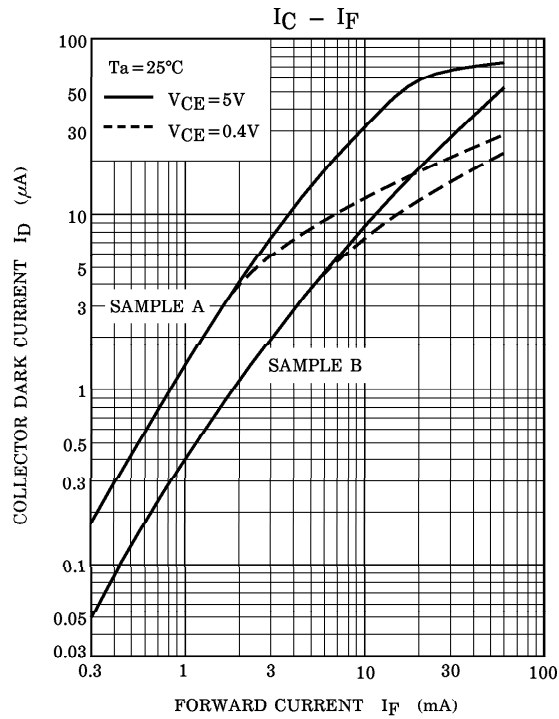
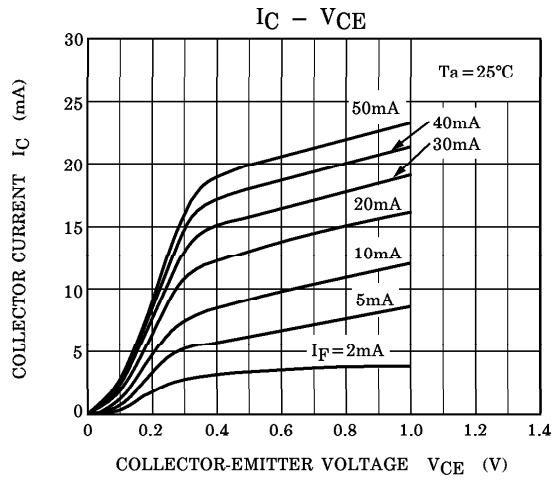
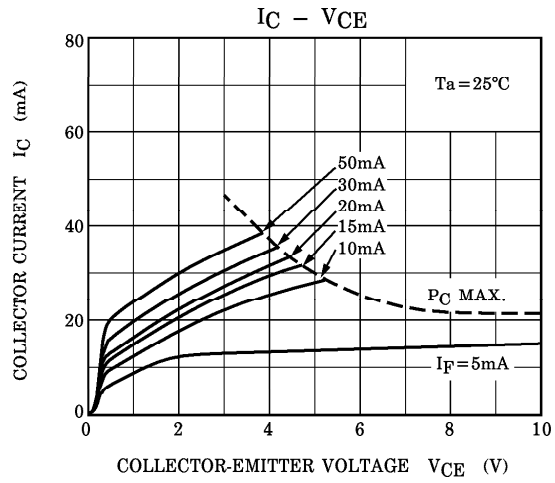
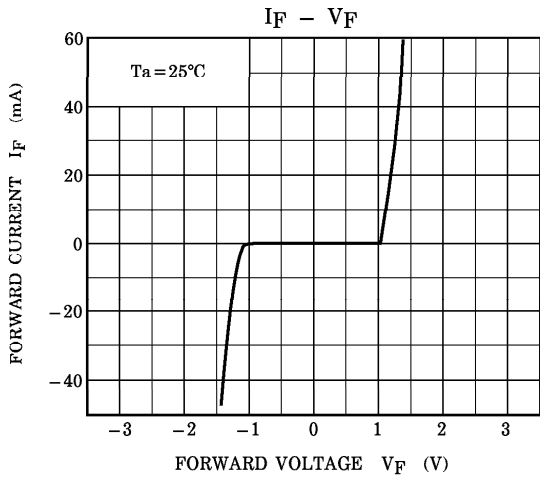
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t <sub>r</sub>	V <sub>CC</sub> =10V, I <sub>C</sub> =2mA R <sub>L</sub> =100Ω	—	2	—	μs
Fall Time	t <sub>f</sub>		—	3	—	
Turn-on Time	t <sub>ON</sub>		—	3	—	
Turn-off Time	t <sub>OFF</sub>		—	3	—	
Turn-on Time	t <sub>ON</sub>	R <sub>L</sub> =1.9kΩ (Note 2)	—	2	—	μs
Storage Time	t <sub>s</sub>	R <sub>BE</sub> =OPEN	—	15	—	
Turn-off Time	t <sub>OFF</sub>	V <sub>CC</sub> =5V, I <sub>F</sub> = ±16mA	—	25	—	
Turn-on Time	t <sub>ON</sub>	R <sub>L</sub> =1.9kΩ (Note 2)	—	2	—	μs
Storage Time	t <sub>s</sub>	R <sub>BE</sub> =220kΩ, V <sub>CC</sub> =5V	—	12	—	
Turn-off Time	t <sub>OFF</sub>	I <sub>F</sub> = ±16mA	—	20	—	

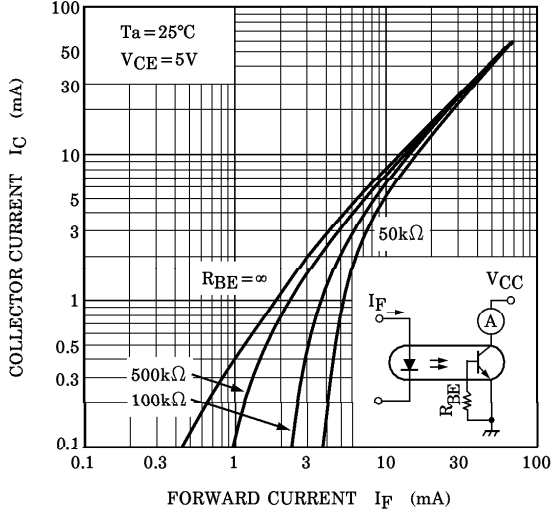
(Note 2) SWITCHING TIME TEST CIRCUIT



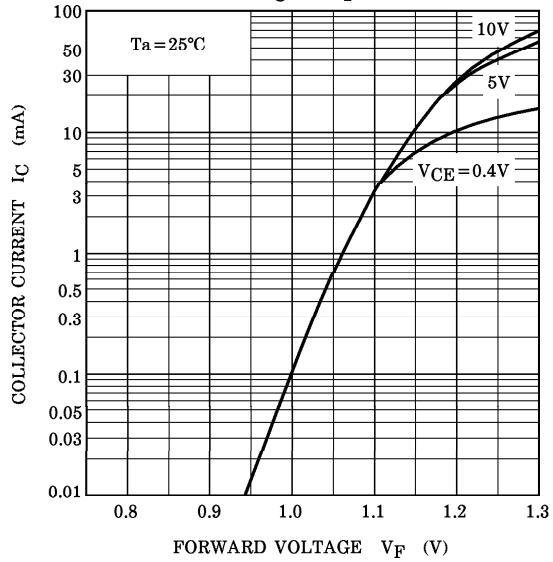




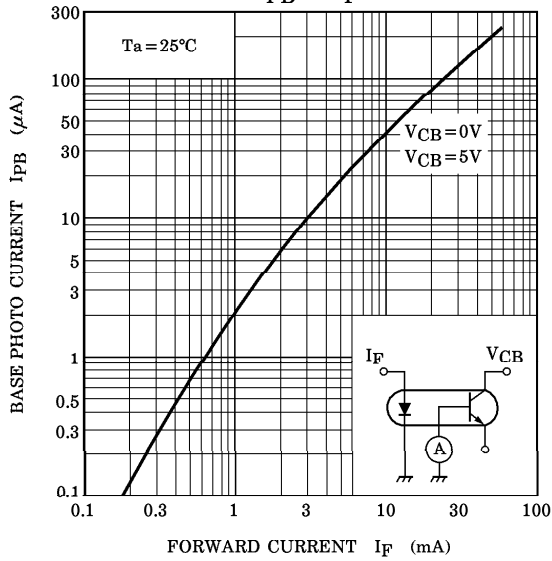
$I_C - I_F$  at  $R_{BE}$



$I_C - V_F$



$I_{PB} - I_F$



$I_D - T_a$

