SEMICONDUCTOR

TOSHIBA

TECHNICAL DATA

TOSHIBA PHOTOCOUPLER

TLP631, TLP632

GaAs IRED & PHOTO-TRANSISTOR

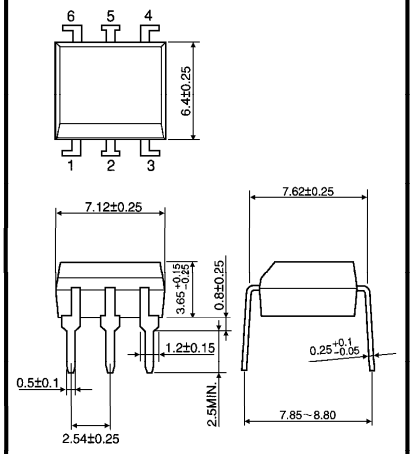
(TLP631)

PROGRAMMABLE CONTROLLERS

AC / DC-INPUT MODULE

SOLID STATE RELAY

Unit in mm

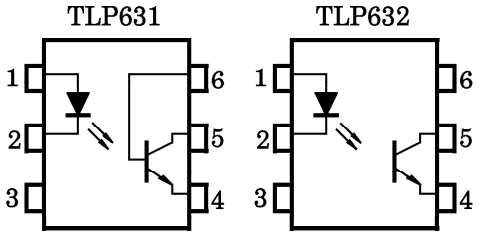


JEDEC	—
EIAJ	—
TOSHIBA	11-7A8

The TOSHIBA TLP631 and TLP632 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.
TLP632632 is no-base internal connection for high-EMI environments.

- Collector-Emitter Voltage : 55V (MIN.)
- Current Transfer Ratio : 50% (MIN.)
  Rank GB : 100% (MIN.)
- Isolation Voltage : 5000V_{rms} (MIN.)
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATIONS (TOP VIEW)



TLP631	TLP632
1 : ANODE	1 : ANODE
2 : CATHODE	2 : CATHODE
3 : N.C.	3 : N.C.
4 : EMITTER	4 : EMITTER
5 : COLLECTOR	5 : COLLECTOR
6 : BASE	6 : N.C.

(TLP631)

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Forward Current	I_F	60	mA
	Forward Current Derating (Ta ≧ 39°C)	ΔI_F / °C	−0.7	mA / °C
	Peak Forward Current (100 μs pulse, 100pps)	I_{FP}	1	A
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_j	125	°C
DETECTOR	Collector-Emitter Voltage	V_{CEO}	55	V
	Collector-Base Voltage (TLP631)	V_{CBO}	80	V
	Emitter-Collector Voltage	V_{ECO}	7	V
	Emitter-Base Voltage (TLP631)	V_{EBO}	7	V
	Collector Current	I_C	50	mA
	Power Dissipation	P_C	150	mW
	Power Dissipation Derating (Ta ≧ 25°C)	ΔP_C / °C	−1.5	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 (10s)		T_{sol}	260	°C
Total Package Power Dissipation		P_T	250	mW
Total Package Power Dissipation Derating (Ta ≧ 25°C)		ΔP_T / °C	−2.5	mW / °C
Isolation Voltage (AC, 1 min., R.H. ≦ 60%)		BV_S	5000	V_{rms}

(TLP631)

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	I_F = 10mA	1.0	1.15	1.3	V
	Reverse Current	I_R	V_R = 5V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 0.5mA	55	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_E = 0.1mA	7	—	—	V
	Collector-Base Breakdown Voltage (TLP631)	$V_{(BR)CBO}$	I_C = 0.1mA	80	—	—	V
	Emitter-Base Breakdown Voltage (TLP631)	$V_{(BR)EBO}$	I_E = 0.1mA	7	—	—	V
	Collector Dark Current	I_{CEO}	V_{CE} = 24V	—	10	100	nA
			V_{CE} = 24V, Ta = 85°C	—	2	50	μA
	Capacitance Collector to Emitter	C_{CE}	V = 0, f = 1MHz	—	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 = 5mA, V_{CE} = 5V	50	—	600	%
		Rank GB	100	—	600	
Saturated CTR	$I_C / I_{F(sat)}$	I_F = 1mA, V_{CE} = 0.4V	—	60	—	%
		Rank GB	30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 2.4mA, I_F = 8mA	—	—	0.4	V

(TLP631)

ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	C_S	V_S=0, f=1MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S=500V, R.H.≦60%	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	5000	—	—	V_{rms}

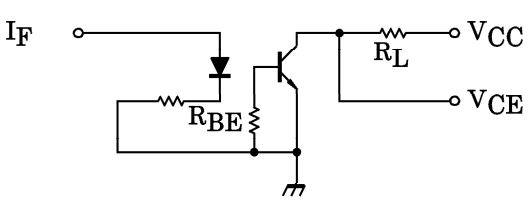
SWITCHING CHARACTERISTICS (Ta = 25°C)

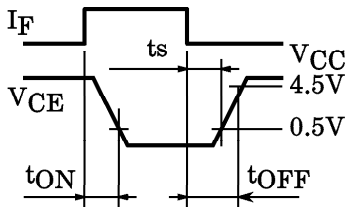
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	V_{CC}=10V, I_C=2mA R_L=100Ω	—	2	—	μs
Fall Time	t_f		—	3	—	
Turn-on Time	t_{on}		—	3	—	
Turn-off Time	t_{off}		—	3	—	
Turn-on Time	t_{ON}	R_L=1.9kΩ (Fig.1) R_{BE}=OPEN V_{CC}=5V, I_F=16mA	—	2	—	μs
Storage Time	t_s		—	15	—	
Turn-off Time	t_{OFF}		—	25	—	
Turn-on Time	t_{ON}	R_L=1.9kΩ (Fig.1) R_{BE}=220kΩ (TLP631) V_{CC}=5V, I_F=16mA	—	2	—	μs
Storage Time	t_s		—	12	—	
Turn-off Time	t_{OFF}		—	20	—	

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	—	5	24	V
Forward Current	I_F	—	16	25	mA
Collector Current	I_C	—	1	10	mA
Operating Temperature	T_{opr}	−25	—	85	°C

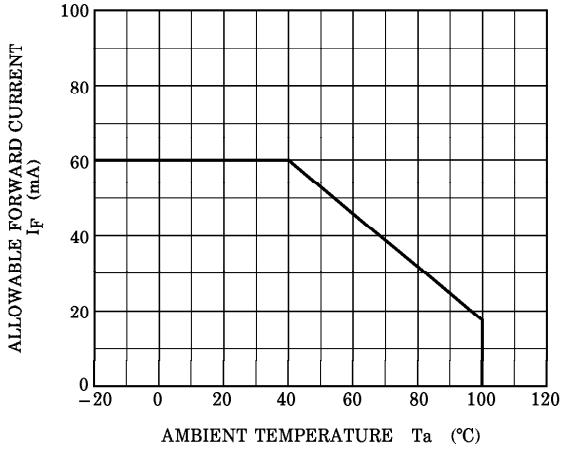
Fig.1 SWITCHING TIME TEST CIRCUIT



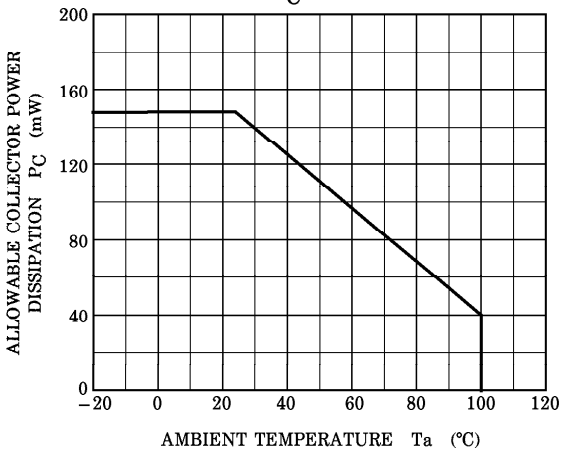


(TLP631)

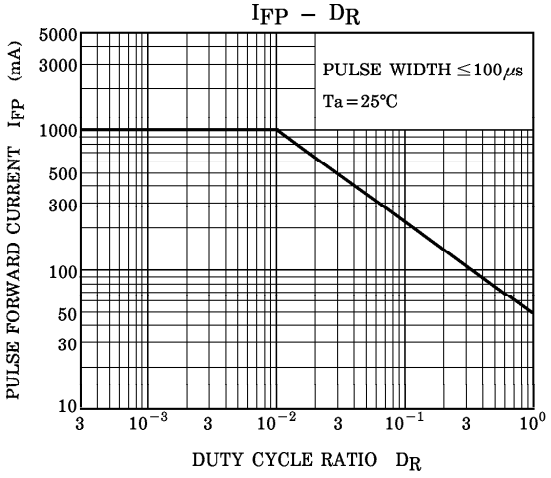
I_F – Ta



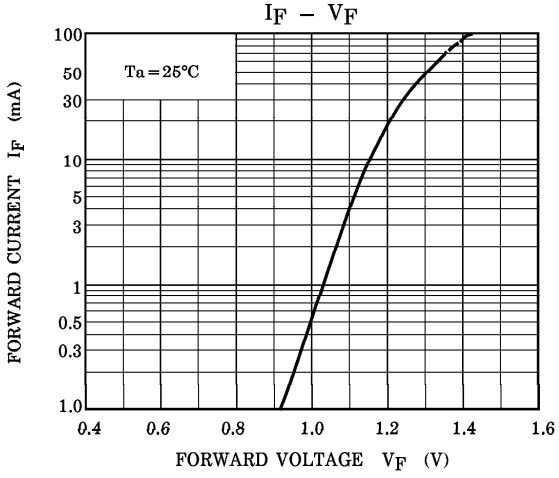
P_C – Ta



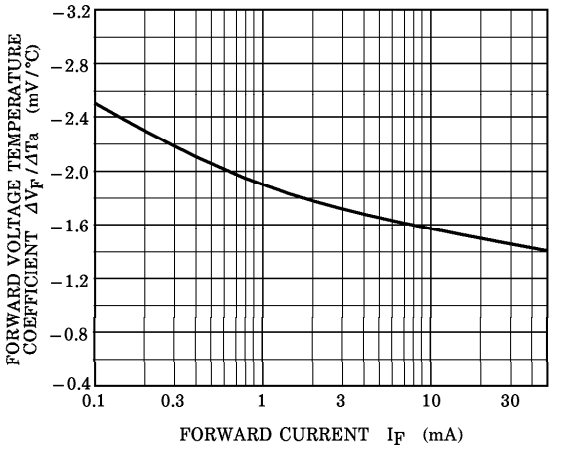
I_{FP} – D_R



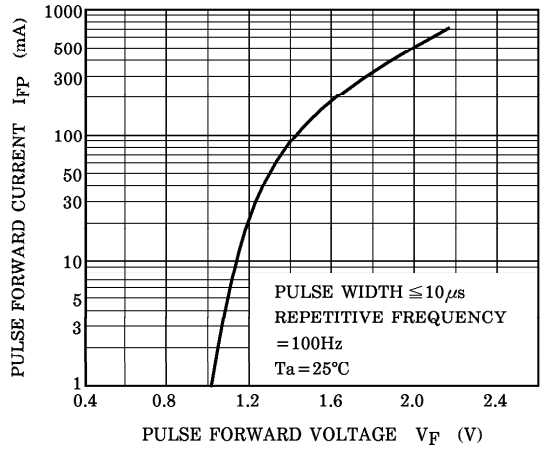
I_F – V_F



$\Delta V_F / \Delta Ta$ – I_F

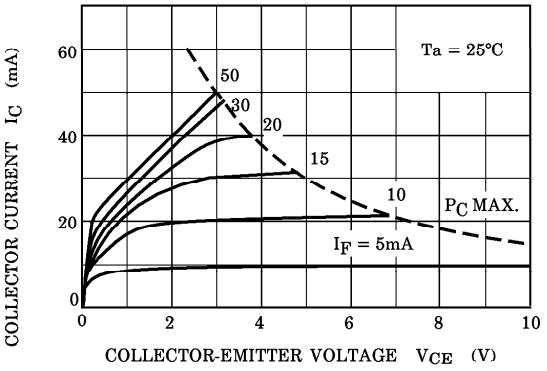


I_{FP} – V_{FP}

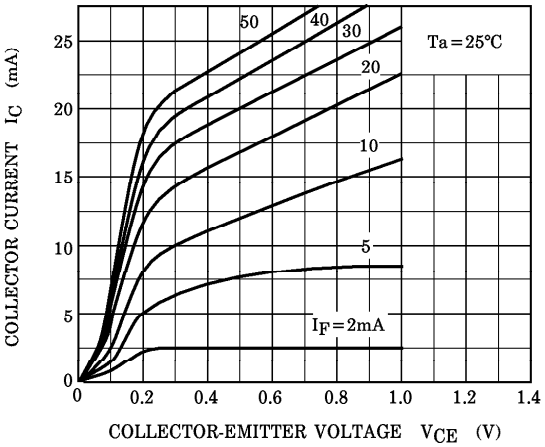


(TLP631)

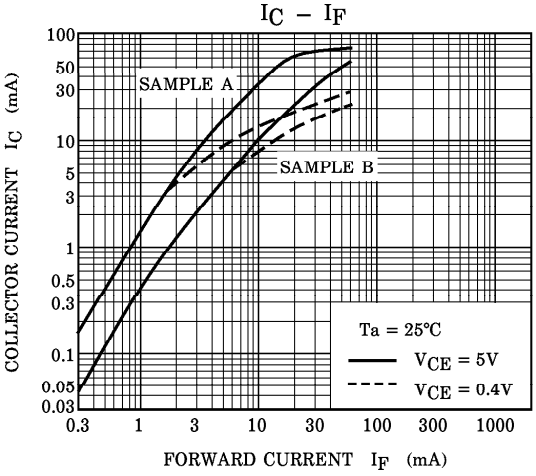
$I_C - V_{CE}$



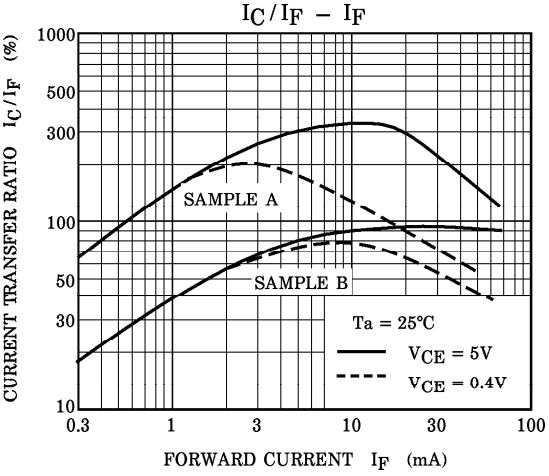
$I_C - V_{CE}$



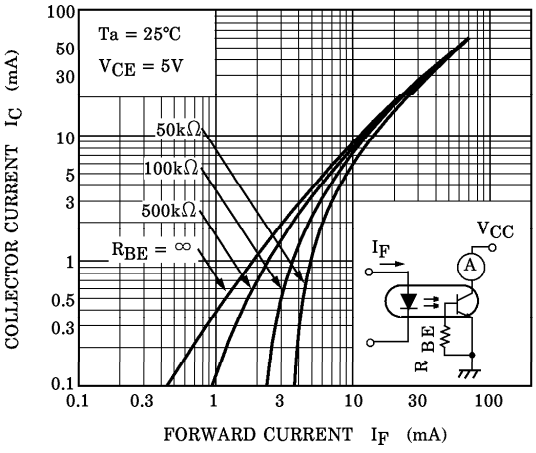
$I_C - I_F$



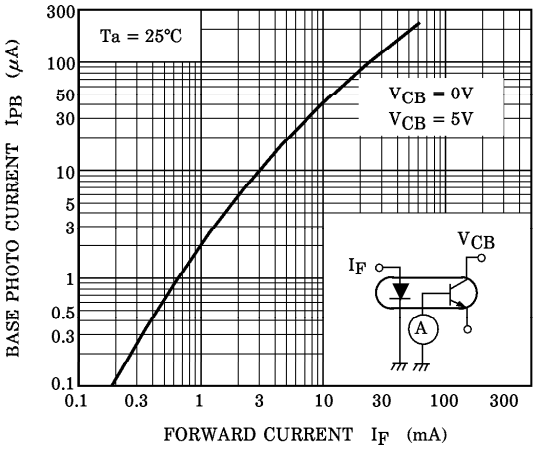
$I_C / I_F - I_F$



TLP631 $I_C - I_F$ at R_{BE}

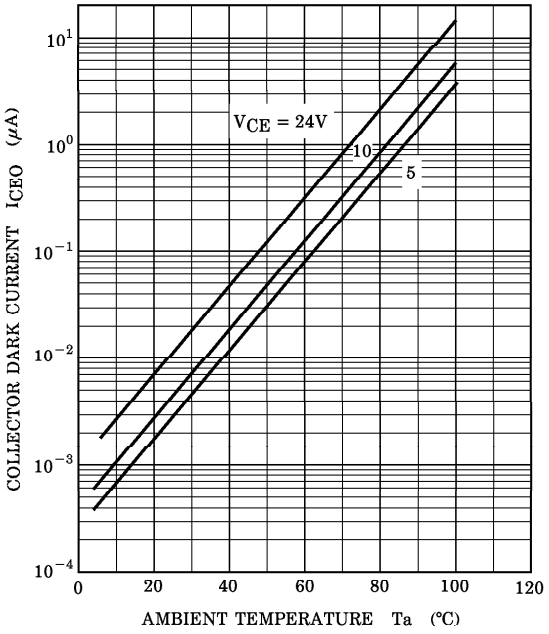


TLP631 $I_{PB} - I_F$

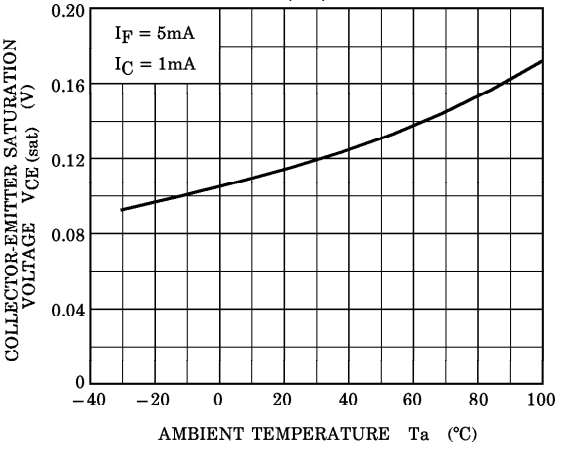


(TLP631)

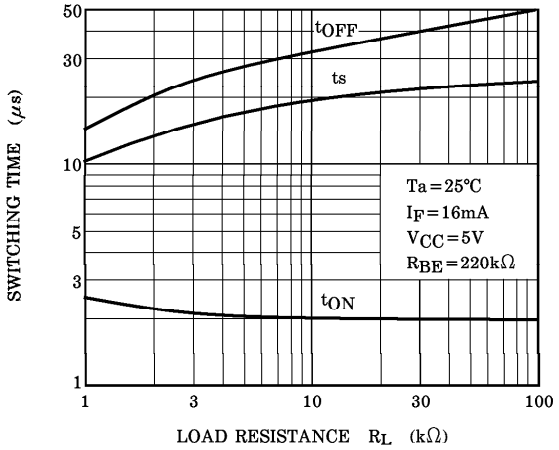
I_{CEO} – Ta



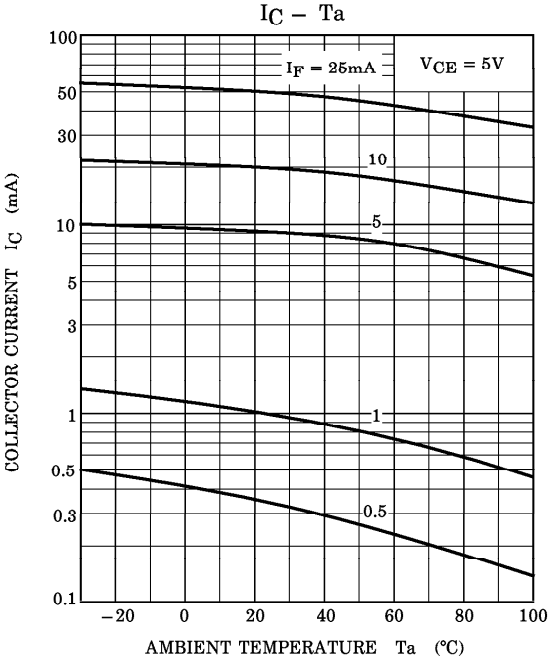
$V_{CE\,(sat)}$ – Ta



TLP631 SWITCHING TIME – R_L



I_C – Ta



TLP631 SWITCHING TIME – R_{BE}