

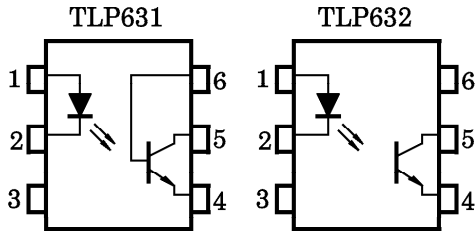
(TLP631)
 PROGRAMMABLE CONTROLLERS
 AC/DC-INPUT MODULE
 SOLID STATE RELAY

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.

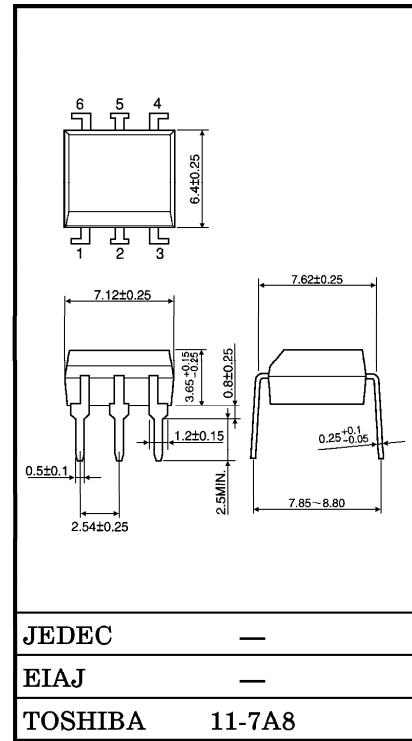
- Collector-Emitter Voltage : 55V (MIN.)
- Current Transfer Ratio : 50% (MIN.)
 Rank GB : 100% (MIN.)
- Isolation Voltage : 5000V_{rms} (MIN.)
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATIONS (TOP VIEW)



- | | |
|---------------|---------------|
| 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. |

Unit in mm



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(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 (100μs 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 _{CB0}	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}

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INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
	Reverse Current	I_R	$V_R = 5\text{V}$	—	—	10	μA
	Capacitance	C_T	$V = 0, f = 1\text{MHz}$	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	55	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector-Base Breakdown Voltage (TLP631)	$V_{(BR)CBO}$	$I_C = 0.1\text{mA}$	80	—	—	V
	Emitter-Base Breakdown Voltage (TLP631)	$V_{(BR)EBO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector Dark Current	I_{CEO}	$V_{CE} = 24\text{V}$	—	10	100	nA
			$V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$	—	2	50	μA
	Capacitance Collector to Emitter	C_{CE}	$V = 0, f = 1\text{MHz}$	—	10	—	pF

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE} (\text{sat})$	$I_C = 2.4\text{mA}, I_F = 8\text{mA}$	—	—	0.4	V

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ISOLATION CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

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

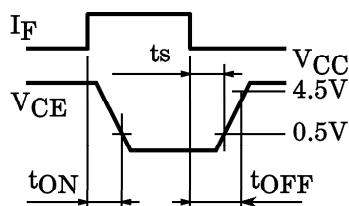
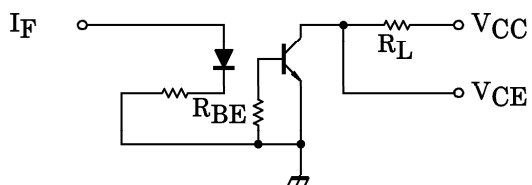
SWITCHING CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

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

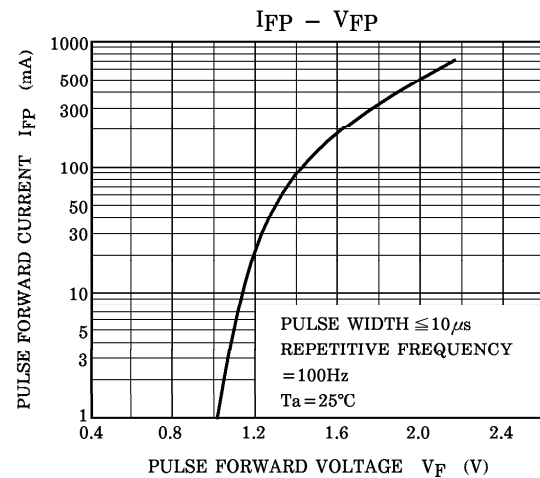
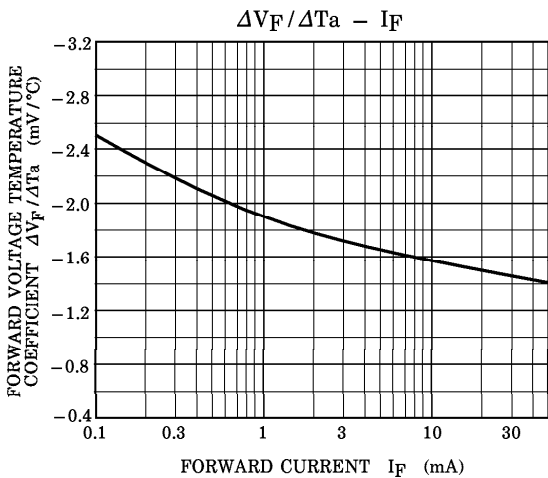
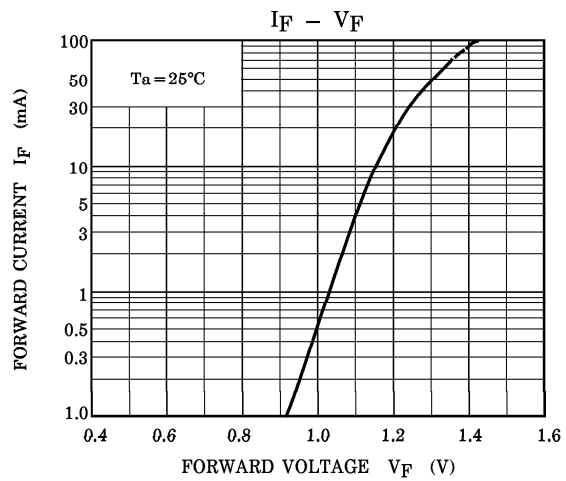
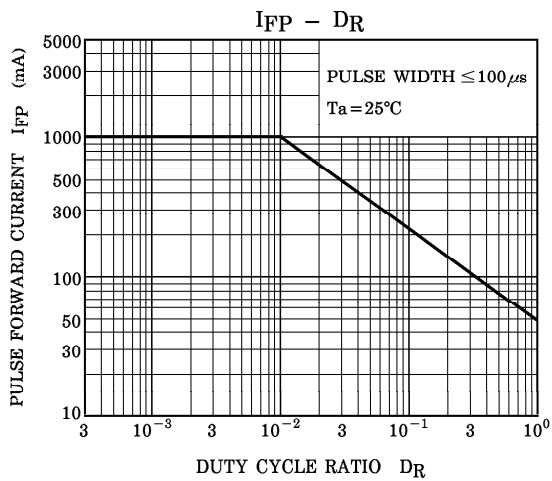
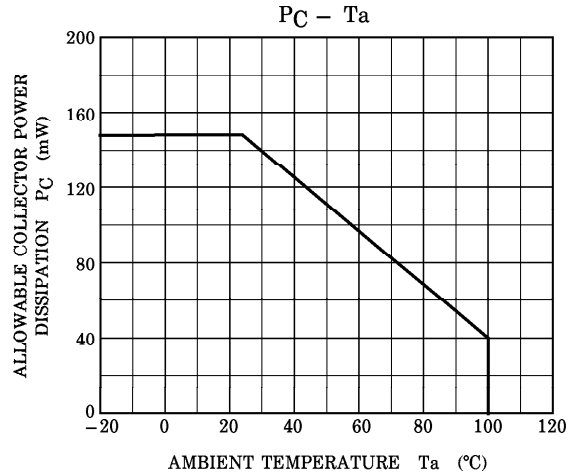
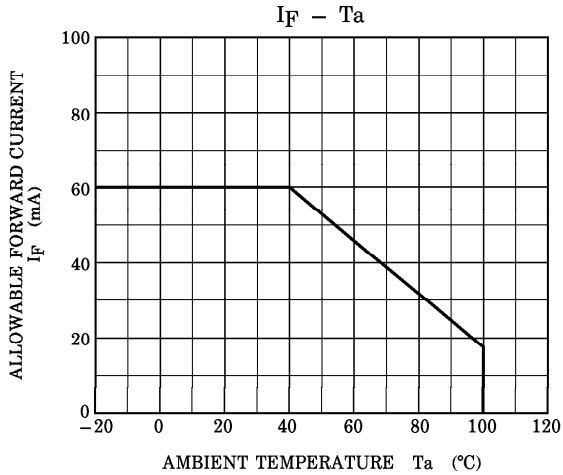
RECOMMENDED OPERATING CONDITIONS

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	$^\circ\text{C}$

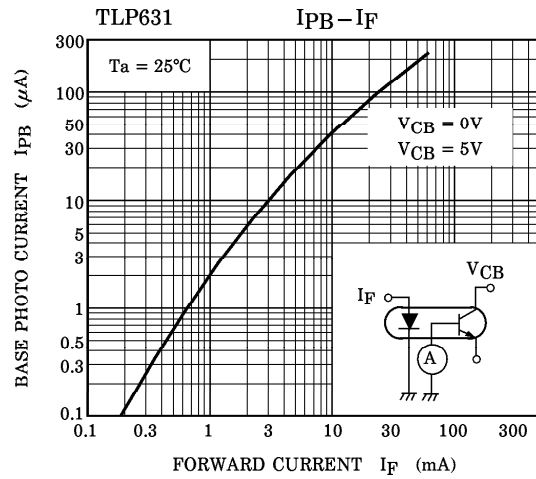
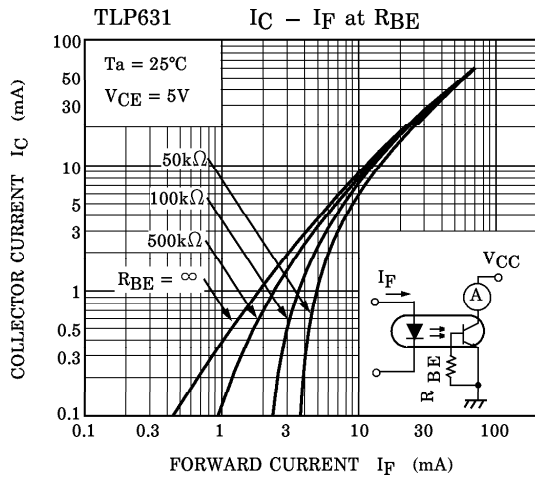
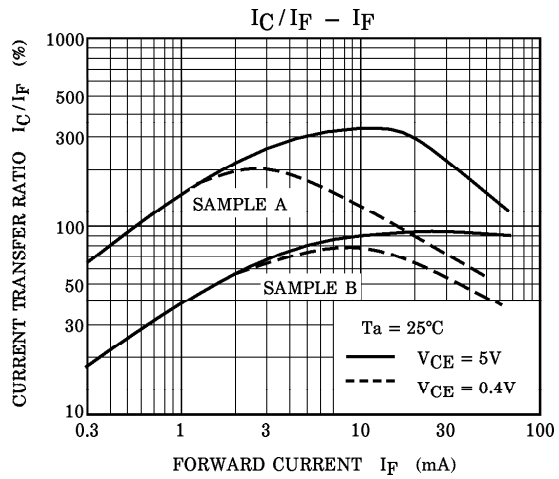
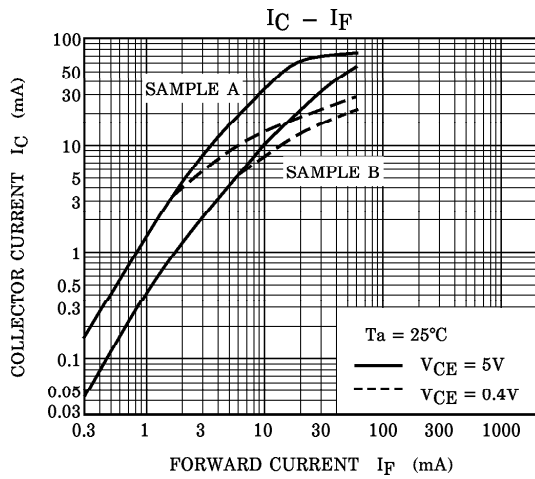
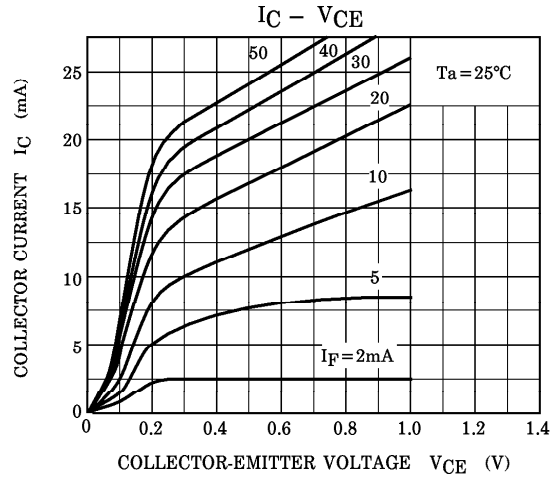
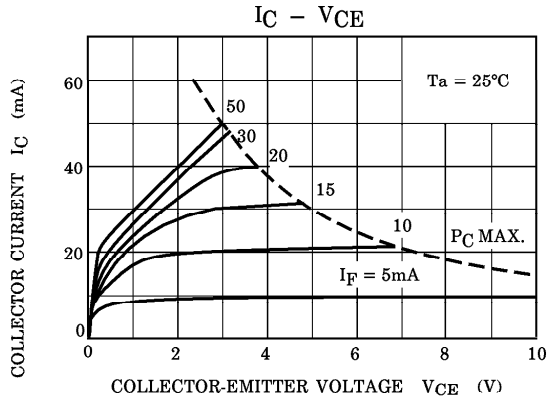
Fig.1 SWITCHING TIME TEST CIRCUIT



(TLP631)



(TLP631)



(TLP631)

