

# TLP181

OFFICE MACHINE

PROGRAMMABLE CONTROLLERS

AC/DC-INPUT MODULE

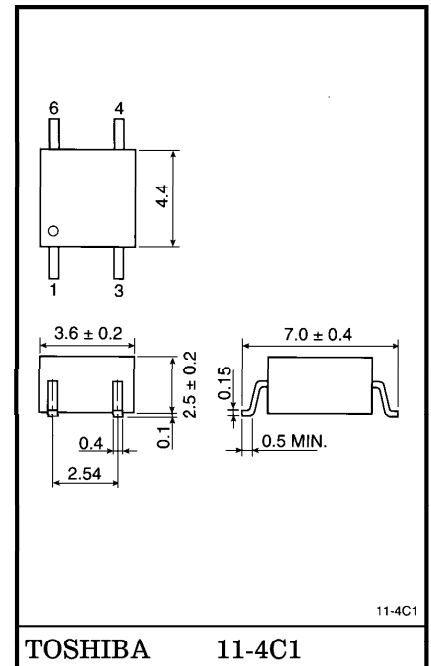
TELECOMMUNICATION

The TOSHIBA MINI FLAT COUPLER TLP181 is a small outline coupler, suitable for surface mount assembly.

TLP181 consist of a photo transistor optically coupled to a gallium arsenide infrared emitting diode.

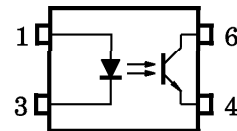
- Collector-Emitter Voltage : 80V (Min.)
- Current Transfer Ratio : 50% (Min.)  
Rank GB : 100% (Min.)
- Isolation Voltage : 3750V<sub>rms</sub> (Min.)
- UL Recognized : UL1577,  
File No. E67349
- Option (V4) type  
VDE Approved : VDE0884 satisfied  
Maximum Operating Insulation Voltage : 565V<sub>PK</sub>  
Highest Permissible Over Voltage : 6000V<sub>PK</sub>

Unit in mm



Weight : 0.09g

PIN CONFIGURATION (TOP VIEW)



- 1 : ANODE
- 3 : CATHODE
- 4 : EMITTER
- 6 : COLLECTOR

## CURRENT TRANSFER RATIO

TYPE	CLASSI- FICATION *1	CURRENT TRANSFER RATIO (%) ( $I_C / I_F$ )		MARKING OF CLASSIFICATION
		$I_F = 5\text{mA}$ , $V_{CE} = 5\text{V}$ , $T_a = 25^\circ\text{C}$		
		MIN.	MAX.	
TLP181	(None)	50	600	BLANK, Y, Y <sup>■</sup> , G, G <sup>■</sup> , B, B <sup>■</sup> , GB
	Rank Y	50	150	Y, Y <sup>■</sup>
	Rank GR	100	300	G, G <sup>■</sup>
	Rank BL	200	600	B, B <sup>■</sup>
	Rank GB	100	600	G, G <sup>■</sup> , B, B <sup>■</sup> , GB

\*1 : EX, Rank GB : TLP181 (GB)

(Note) Application, type name for certification test, please use standard product type name, i.e.

TLP181 (GB) : TLP181

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I <sub>F</sub>	50	mA
	Forward Current Derating	ΔI <sub>F</sub> / °C	-0.7 (Ta ≥ 53°C)	mA / °C
	Pulse Forward Current (100 μs pulse, 100pps)	I <sub>FP</sub>	1	A
	Reverse Voltage	V <sub>R</sub>	5	V
	Junction Temperature	T <sub>j</sub>	125	°C
DETECTOR	Collector-Emitter Voltage	V <sub>CEO</sub>	80	V
	Emitter-Collector Voltage	V <sub>ECO</sub>	7	V
	Collector Current	I <sub>C</sub>	50	mA
	Collector Power Dissipation (1 Circuit)	P <sub>C</sub>	150	mW
	Collector Power Dissipation Derating (1 Circuit Ta ≥ 25°C)	ΔP <sub>C</sub> / °C	-1.5	mW / °C
	Junction Temperature	T <sub>j</sub>	125	°C
Storage Temperature Range		T <sub>stg</sub>	-55~125	°C
Operating Temperature Range		T <sub>opr</sub>	-55~100	°C
Lead Soldering Temperature		T <sub>sol</sub>	260 (10s)	°C
Total Package Power Dissipation		P <sub>T</sub>	200	mW
Total Package Power Dissipation Derating (Ta ≥ 25°C)		ΔP <sub>T</sub> / °C	-2.0	mW / °C
Isolation Voltage (AC, 1min., R.H. ≤ 60%) (Note 1)		BV <sub>S</sub>	3750	V <sub>rms</sub>

(Note 1) Device considered a two-terminal device : Pin 1, 3 shorted together and pins 4, 6 shorted together

## RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	—	5	48	V
Forward Current	I <sub>F</sub>	—	16	20	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	$V_F$	$I_F=10\text{mA}$	1.0	1.15	1.3	V
	Reverse Current	$I_R$	$V_R=5\text{V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V=0, f=1\text{MHz}$	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=0.5\text{mA}$	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E=0.1\text{mA}$	7	—	—	V
	Collector Dark Current	$I_{CEO}$	$V_{CE}=48\text{V}$ , (Ambient Light Below 1000 lx )	—	0.01 (2)	0.1 (10)	$\mu\text{A}$
			$V_{CE}=48\text{V}$ , Ta = 85°C, (Ambient Light Below 1000 lx )	—	2 (4)	50 (50)	$\mu\text{A}$
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	$V_{CE} (\text{sat})$	$I_C=2.4\text{mA}$ , $I_F=8\text{mA}$ $I_C=0.2\text{mA}$ , $I_F=1\text{mA}$ Rank GB	—	—	0.4	V
			—	0.2	—	
			—	—	0.4	
Off-State Collector Current	$I_C (\text{off})$	$V_F=0.7\text{V}$ , $V_{CE}=48\text{V}$	—	1	10	$\mu\text{A}$

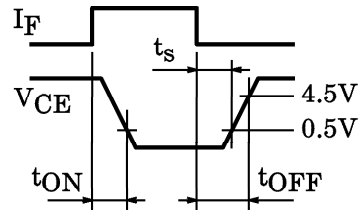
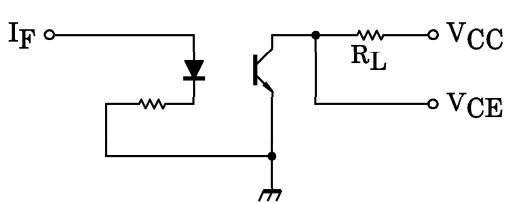
ISOLATION CHARACTERISTICS (Ta = 25°C)

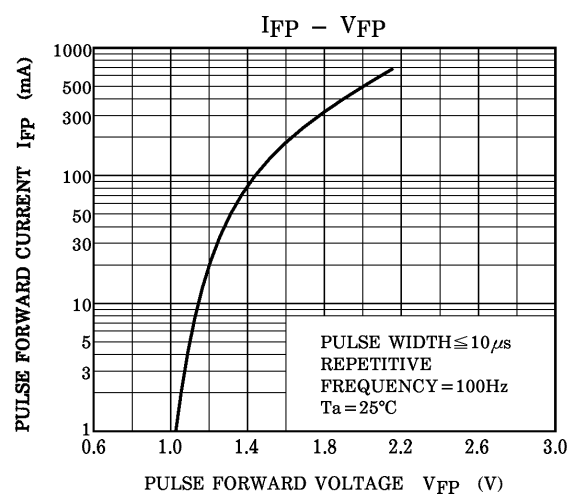
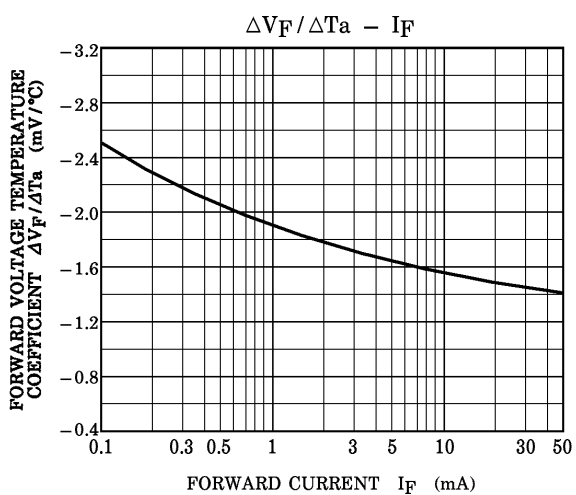
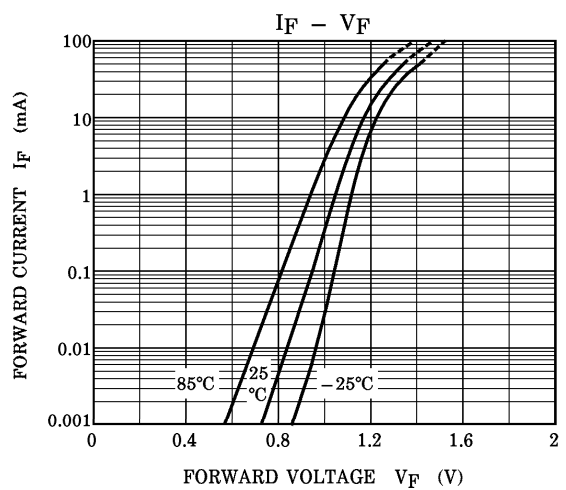
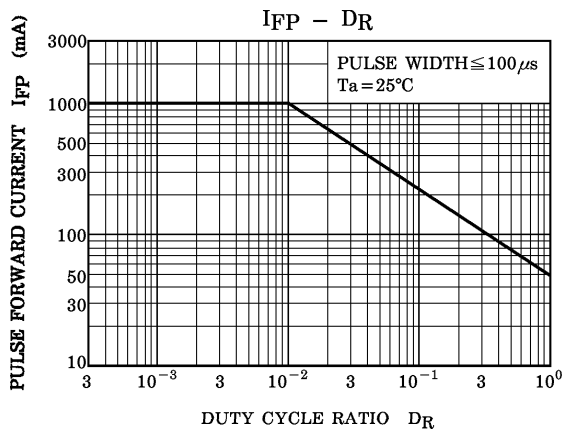
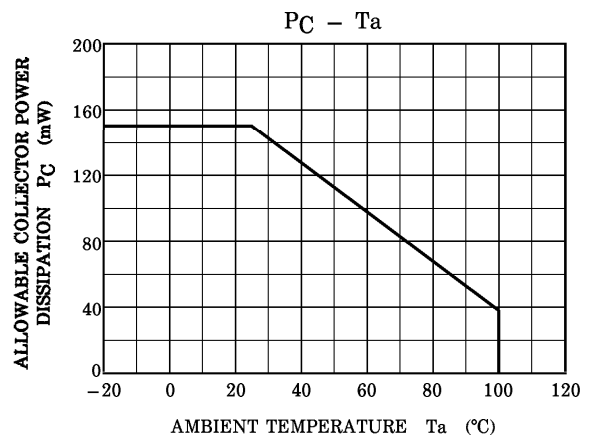
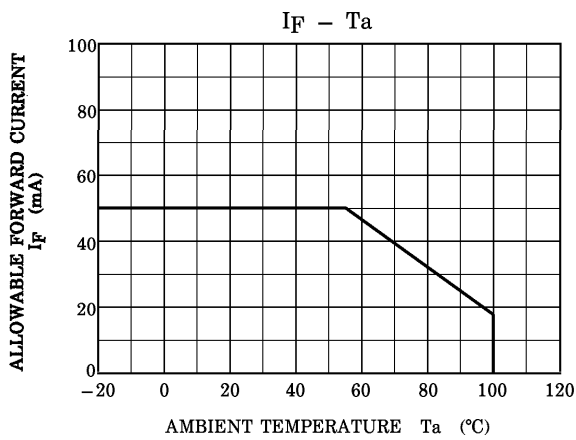
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	$C_S$	$V_S=0\text{V}$ , $f=1\text{MHz}$	—	0.8	—	pF
Isolation Resistance	$R_S$	$V_S=500\text{V}$ , R.H. $\leq 60\%$	$1 \times 10^{12}$	$10^{14}$	—	$\Omega$
Isolation Voltage	$BV_S$	AC, 1 minute	3750	—	—	$V_{\text{rms}}$
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	$V_{\text{dc}}$

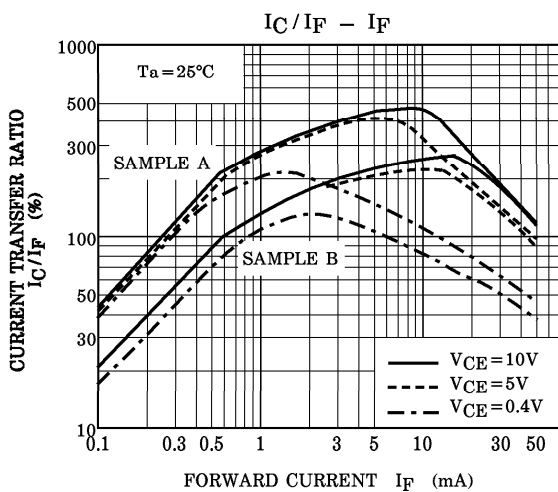
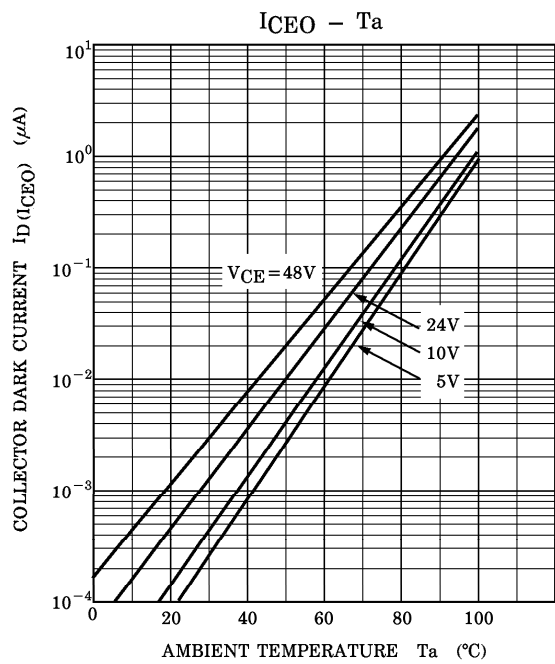
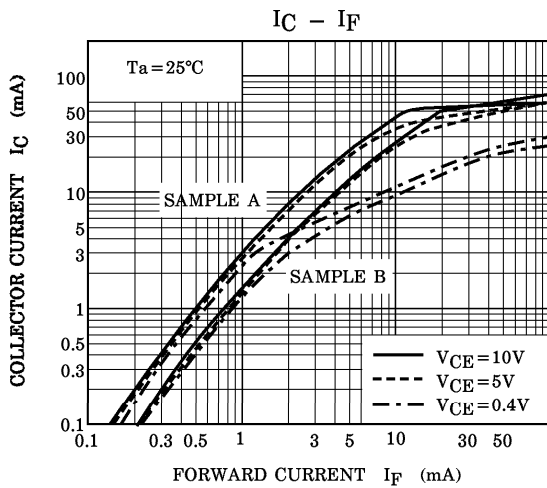
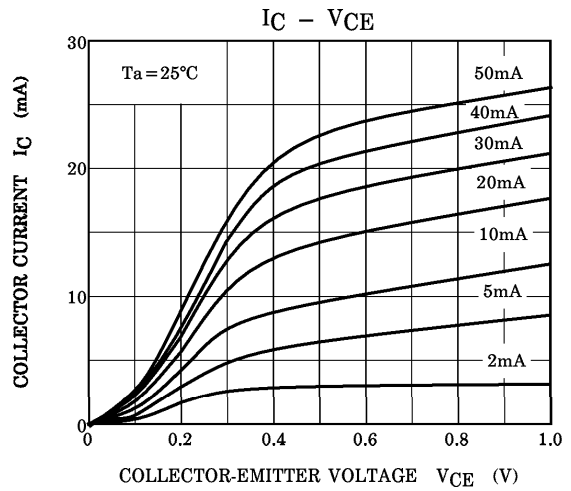
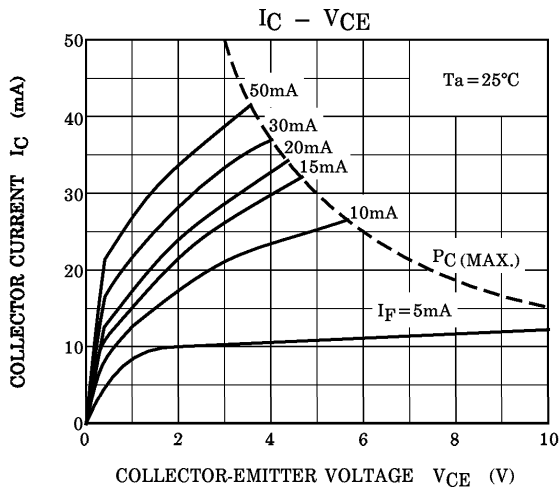
SWICHING CHARACTERISTICS (Ta = 25°C)

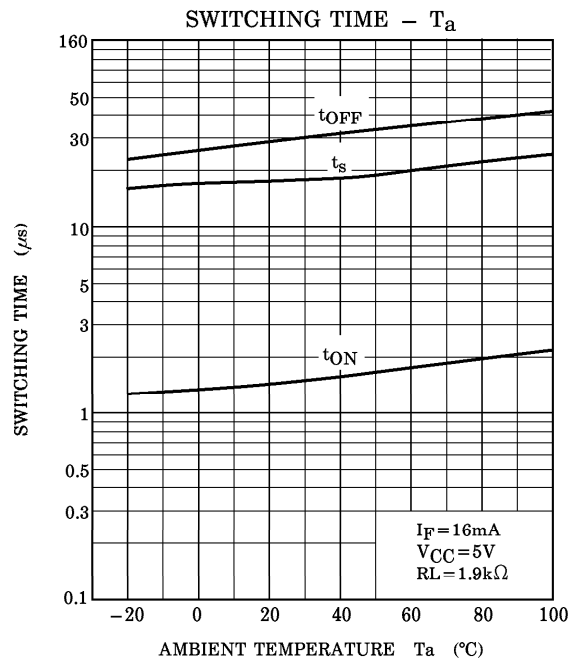
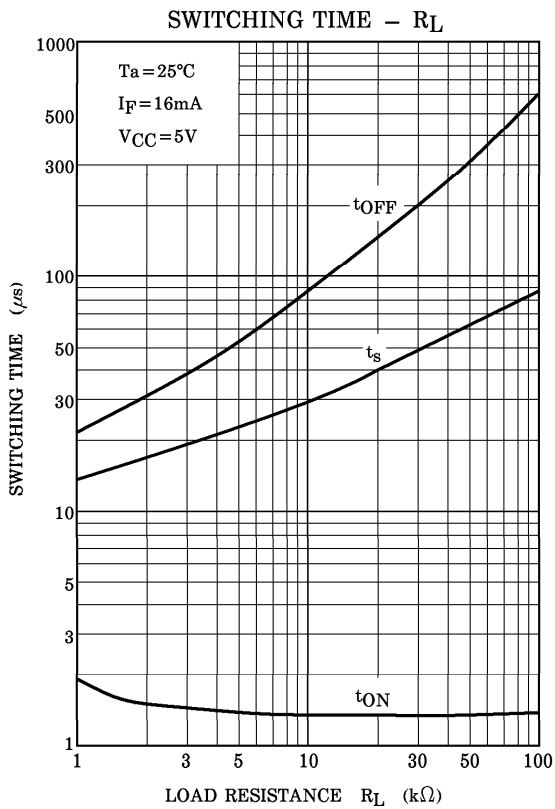
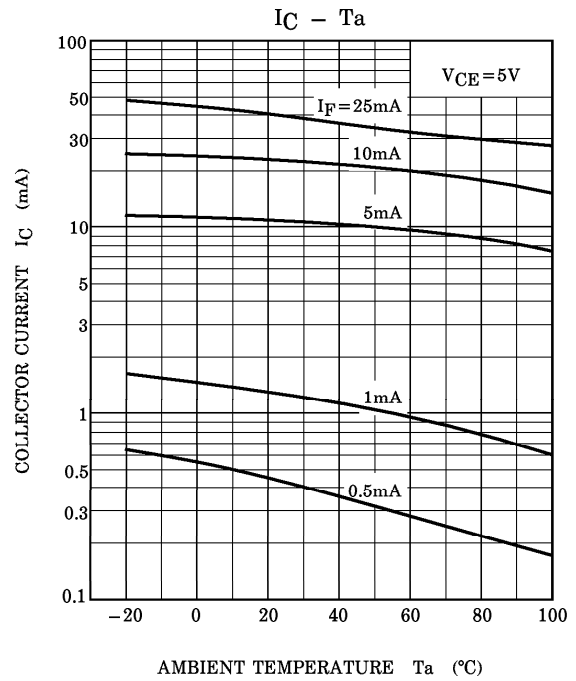
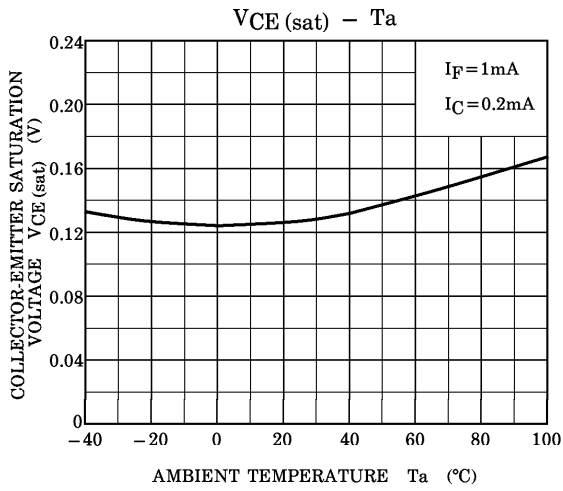
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	$t_r$	$V_{CC} = 10V, I_C = 2mA$ $R_L = 100\Omega$	—	2	—	$\mu S$
Fall Time	$t_f$		—	3	—	
Turn-on Time	$t_{on}$		—	3	—	
Turn-off Time	$t_{off}$		—	3	—	
Turn-on Time	$t_{ON}$	$R_L = 1.9k\Omega$ (Fig.1) $V_{CC} = 5V, I_F = 16mA$	—	2	—	$\mu S$
Storage Time	$t_s$		—	25	—	
turn-off Time	$t_{OFF}$		—	40	—	

Fig.1 SWITCHING TIME TEST CIRCUIT











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