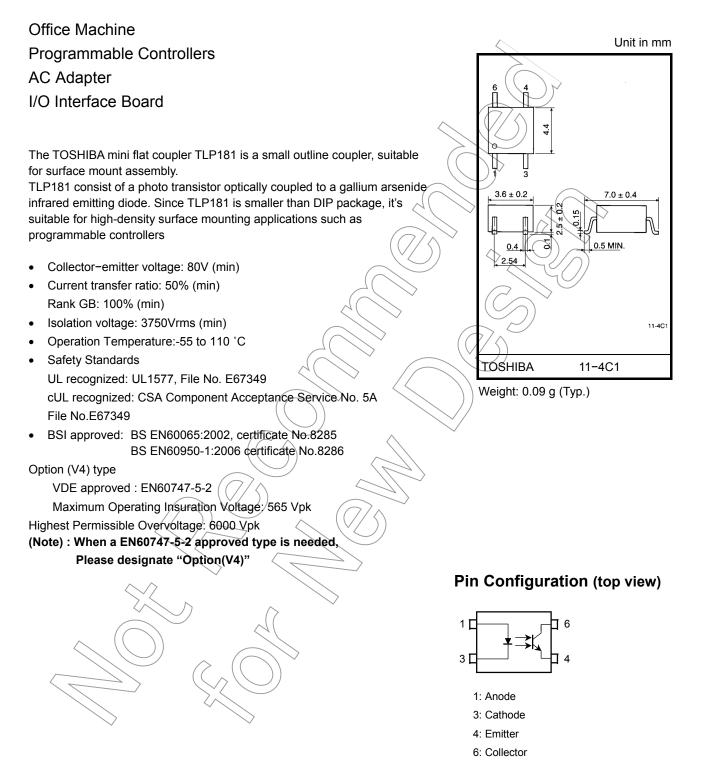
## <u>TOSHIBA</u>

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

# **TLP181**



#### **Current Transfer Ratio**

Туре	Classification *1	Current Transfer Ratio (%) (I <sub>C</sub> / I <sub>F</sub> ) I <sub>F</sub> = 5mA, V <sub>CE</sub> = 5V, Ta = 25°C		- Marking Of Classification
		Min	Max	
	Blank	50	600	Blank ,Y,Y <sup>■</sup> ,YE,G,G <sup>■</sup> ,GR,B, B <sup>■</sup> ,BL,GB
	Rank Y	50	150	YE
	Rank GR	100	300	GR
	Rank BL	200	600	BL ((//))
TLP181	Rank GB	100	600	GB
	Rank YH	75	150	Y• (()>
	Rank GRL	100	200	G
	Rank GRH	150	300	$G^{\bullet} \overset{\sim}{\leftarrow} ( ) \overset{\sim}{\rightarrow} ( ) \overset{\sim}{\leftarrow} ( ) \overset{\leftarrow}{\leftarrow} ( ) \overset{\leftarrow}{\leftarrow}$
	Rank BLL	200	400	B

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

(Note) Application, type name for certification test, please use standard product type name, i, e. TLP181 (GB): TLP181

Absolute Maximum Ratings (Ta = 25°C)

	Characteristic	Symbol	Rating	Unit	
	Forward current	١ <sub>F</sub>	50	mA	
	Forward current detating	ΔI <sub>F</sub> / °C	−1.4 (Ta ≥89°C)	mA / °C	
LED	Pulse forward current (100µs pulse, 100pps)	I <sub>FP</sub>	1	A	
	Reverse voltage	V <sub>R</sub>	5	$(\mathbf{v})$	
	Junction temperature	Тj	125	ů.	$\mathcal{O}$
	Collector-emitter voltage	V <sub>CEO</sub>	80	// v	
	Emitter-collector voltage	V <sub>ECO</sub>	7	×	
r	Collector current	Ι <sub>C</sub>	50 ((	mA	
Detector	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	Тj	125	) °C ((	
Stor	rage temperature range	T <sub>stg</sub>	-55 to 125	Ç	G//
Ope	erating temperature range	T <sub>opr</sub>	-55 to 110	C°C	$\geq$
Lea	d soldering temperature	T <sub>sol</sub>	260 (10s)	C)	
Total package power dissipation		PT	200	mW	
	al package power dissipation ating (Ta $\ge 25^{\circ}$ C)	ΔP <sub>T</sub> / °C	-2.0	mW/°C	
Isolation voltage (AC, 1min., R.H. ≤ 60%) (Note 1)		BVS	3750	V <sub>rms</sub>	

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions")" Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

(Note 1) Device considered a two-terminal device: Pin1, 3 shorted together and pins 4, 6 shorted together

### **Recommended Operating Conditions**

Characteristic	Symbol	Min	Тур.	Max	Unit
Supply voltage	Vcc	_	5	48	V
Forward current	↓ I <sub>F</sub>	_	16	20	mA
Collector current	Ι <sub>C</sub>		1	10	mA

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

#### Individual Electrical Characteristics (Ta = 25°C)

	Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
	Forward voltage	VF	I <sub>F</sub> = 10 mA	1.0	1.15	1.3	V
LED	Reverse current	I <sub>R</sub>	V <sub>R</sub> = 5 V			10	μA
	Capacitance	CT	V = 0, f = 1 MHz	Ŋ	30		pF
	Collector–emitter breakdown voltage	V <sub>(BR)</sub> CEO	I <sub>C</sub> = 0.5 mA	80	2	Ι	V
ŗ	Emitter–collector breakdown voltage	V <sub>(BR) ECO</sub>	I <sub>E</sub> = 0.1 mA		2_	_	V
Detector	Collector dark current		V <sub>CE</sub> = 48 V, ( Ambient light below 1000 lx)	))	0.01 (2)	0.1 (10)	μA
		ICEO	$\frac{V_{CE} = 48 \text{ V, (Ambient light)}}{V_{CE} = 48 \text{ V, (Ambient light)}} = \frac{0.01 \text{ m}}{(2) \text{ (1)}}$	50 (50)	μA		
	Capacitance (collector to emitter)	C <sub>CE</sub>	V = 0, f = 1 MHz	_	10	$\langle  $	pF

# Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур	Max	Unit
Current transfer ratio	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	50)	—	600	%	
	I <sub>C</sub> / I <sub>F</sub>	Rank GB	(100	_	600	70
Saturated CTR	In /In / IF = 1 mA, VCE = 0.4 V	) —	60	_	%	
Saturated CTR	IC / IF (sat)	Rank GB	30	—		70
		$I_{\rm C}$ = 2.4 mA, $I_{\rm F}$ = 8 mA	_	—	0.4	
Collector–emitter saturation voltage	V <sub>CE (sat)</sub>	I <sub>C</sub> = 0.2 mA, I <sub>F</sub> = 1 mA	_	0.2	_	V
	$\overline{\mathcal{C}}$	Rank GB	_	_	0.4	
Off-state collector current	IC (off)	V <sub>F</sub> = 0.7V, V <sub>CE</sub> = 48 V	_	1	10	μA

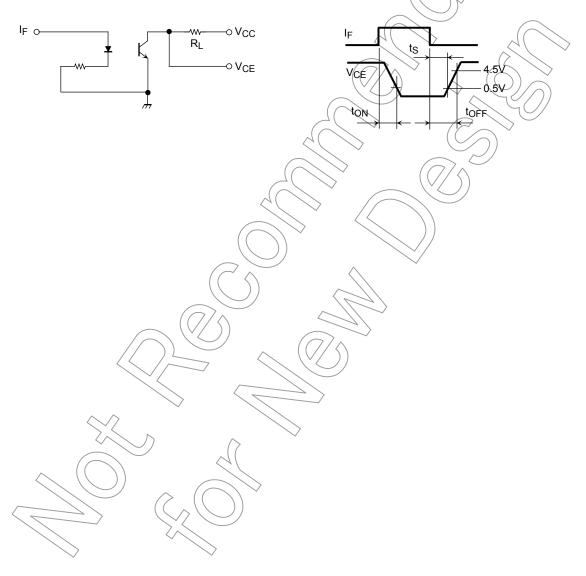
## Isolation Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Capacitance (input to output)	Çŝ	V <sub>S</sub> = 0V, f = 1 MHz	_	0.8	_	pF
Isolation resistance	R <sub>S</sub>	V <sub>S</sub> = 500 V, R.H. ≤ 60%	1×10 <sup>12</sup>	10 <sup>14</sup>	_	Ω
	$\cdot$	AC, 1 minute	3750	—	_	V
Isolation voltage	BVs	AC, 1 second, in oil	_	10000	_	V <sub>rms</sub>
	$\sim$	DC, 1 minute, in oil	_	10000	_	V <sub>dc</sub>
	$\bigcirc$					

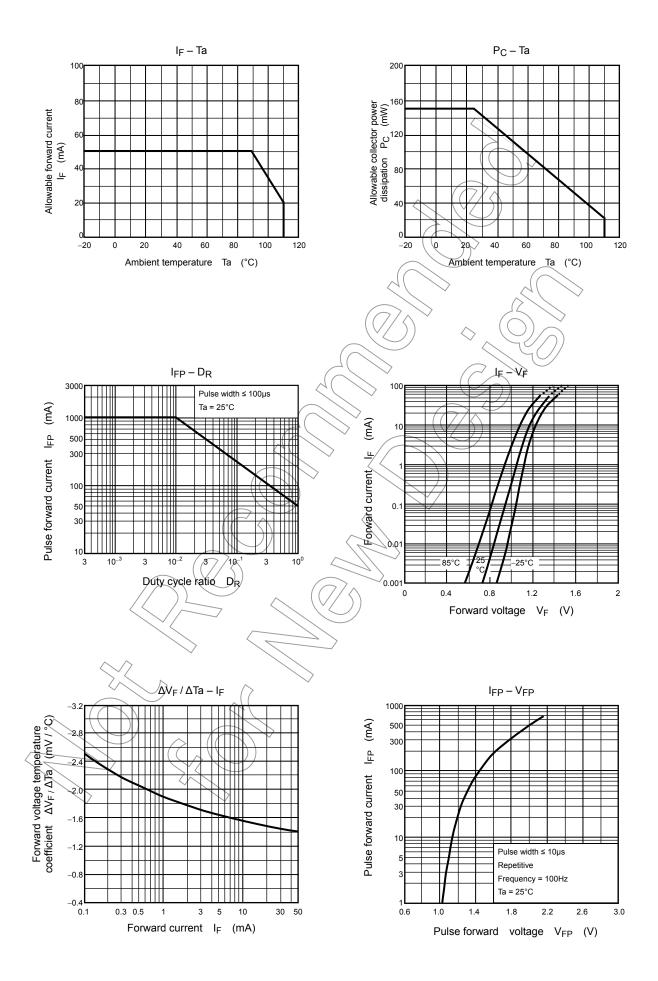
Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Rise time	tr	$V_{CC}$ = 10 V, I <sub>C</sub> = 2 mA R <sub>L</sub> = 100 $\Omega$	_	2	_	
Fall time	t <sub>f</sub>		_	3	_	110
Turn-on time	t <sub>on</sub>		$\overline{\langle}$	3	_	μs
Turn-off time	t <sub>off</sub>		$\langle \rangle$	3	_	
Turn-on time	t <sub>ON</sub>		Æ	) >2	_	
Storage time	ts	$R_L = 1.9 kΩ$ (Fig.1) V <sub>CC</sub> = 5 V, I <sub>F</sub> = 16 mA	$\sum$	25	_	μs
Turn-off time	tOFF		$\bigcirc$	40	_	

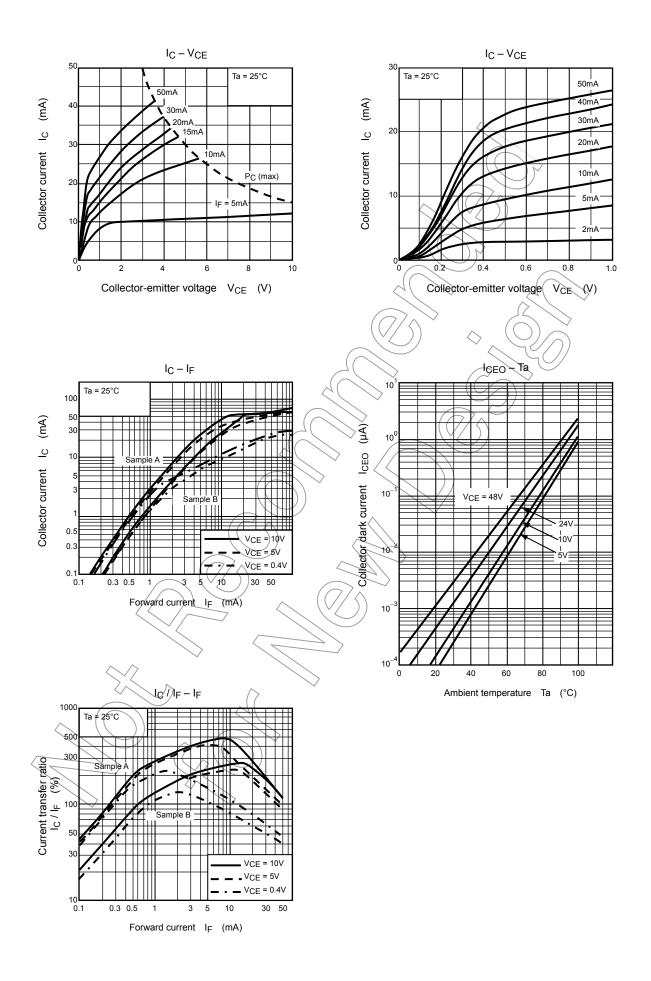
#### Fig. 1 Switching time test circuit



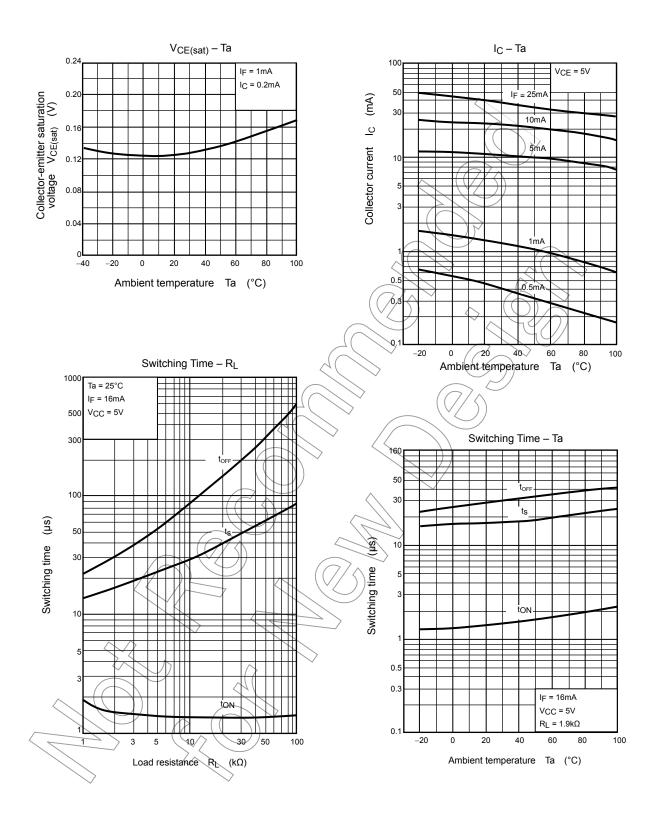
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