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# TLP160G

Triac Drive  
 Programmable Controllers  
 AC-Output Module  
 Solid State Relay

The TOSHIBA mini flat coupler TLP160G is a small outline coupler, suitable for surface mount assembly. The TLP160G consists of a photo triac, optically coupled to a gallium arsenide infrared emitting diode.

- Peak off-state voltage: 400 V (min)
- Trigger LED current: 10 mA (max)
- On-state current: 70 mA (max)
- Isolation voltage: 2500 Vrms (min)
- UL recognized: UL1577, file No. E67349

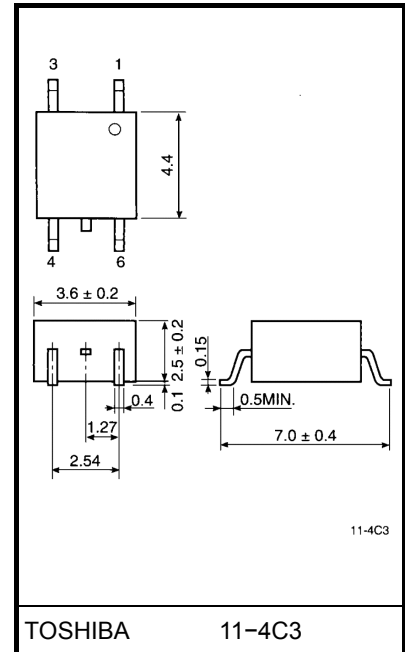
### Trigger LED Current

Classification*	Trigger LED Current (mA)		Marking of Classification
	$V_T=3V, T_a=25^\circ C$		
	Min	Max	
(IFT5)	—	5	T5
(IFT7)	—	7	T5, T7
Standard	—	10	T5, T7, blank

\*Ex. (IFT5); TLP160G (IFT5)

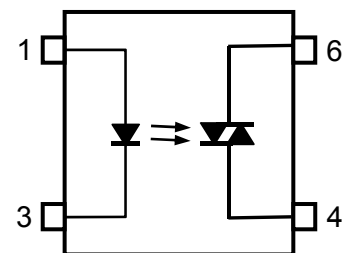
(Note) Application type name for certification test, please use standard product type name, i.e.  
 TLP160G(IFT5): TLP160G

Unit in mm



Weight: 0.09 g (typ.)

### Pin Configurations



- 1. Anode
- 3. Cathode
- 4. Terminal 1
- 6. Terminal 2

Start of commercial production  
 1988/04

## Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
LED	Forward current	$I_F$	50	mA
	Forward current derating (Ta ≥ 53°C)	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / °C
	Peak forward current (100µs pulse, 100 pps)	$I_{FP}$	1	A
	Reverse voltage	$V_R$	5	V
	Junction temperature	$T_j$	125	°C
Detector	Off-state output terminal voltage	$V_{DRM}$	400	V
	On-state RMS current	Ta=25°C	70	mA
		Ta=70°C	40	
	On-state current derating (Ta ≥ 25°C)	$\Delta I_T / ^\circ\text{C}$	-0.67	mA / °C
	Peak on-state current (100µs pulse, 120 pps)	$I_{TP}$	2	A
	Peak non-repetitive surge current (PW=10ms)	$I_{TSM}$	1.2	A
Junction temperature	$T_j$	115	°C	
Storage temperature range		$T_{stg}$	-55 to 125	°C
Operating temperature range		$T_{opr}$	-40 to 100	°C
Lead soldering temperature (10s)		$T_{sol}$	260	°C
Isolation voltage (AC, 1 minute, R.H. ≤ 60%) (Note)		$BV_S$	2500	Vrms

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) Device considered a two terminal device: Pins 1 and 3 shorted together and pins 4 and 6 shorted together.

## Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{AC}$	—	—	120	Vac
Forward current	$I_F$	15	20	25	mA
Peak on-state current	$I_{TP}$	—	—	1	A
Operating temperature	$T_{opr}$	-25	—	85	°C

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.

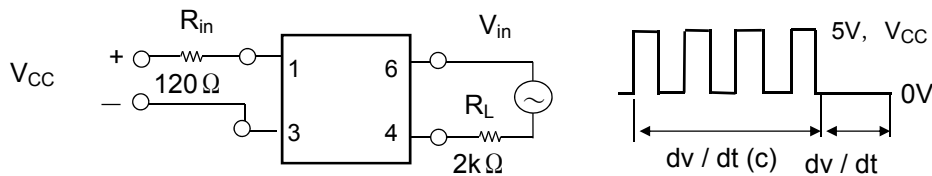
**Individual Electrical Characteristics (Ta = 25°C)**

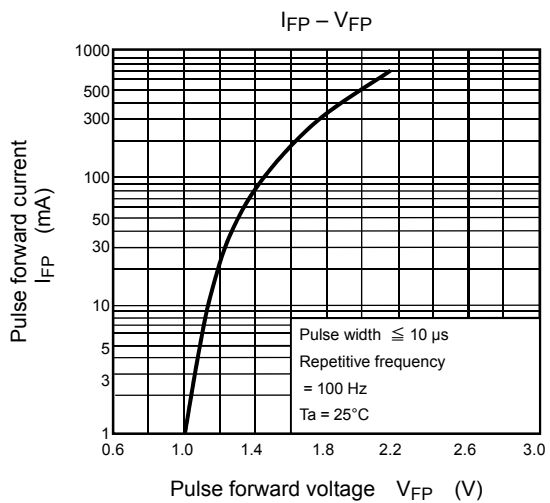
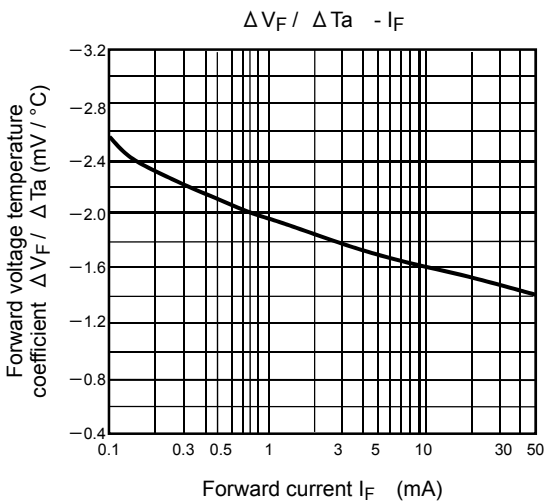
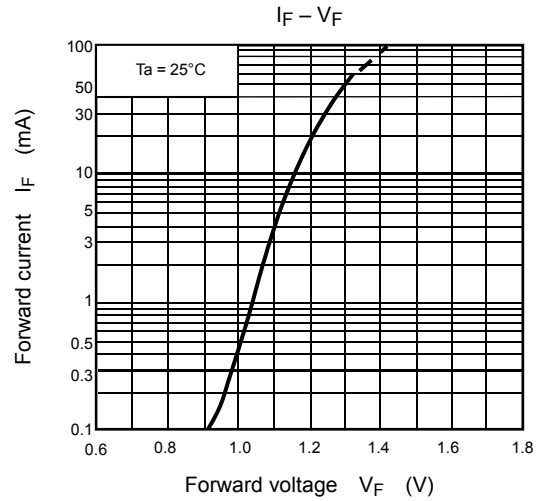
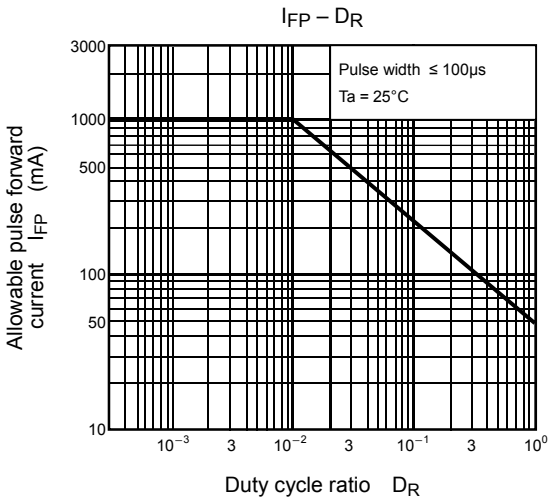
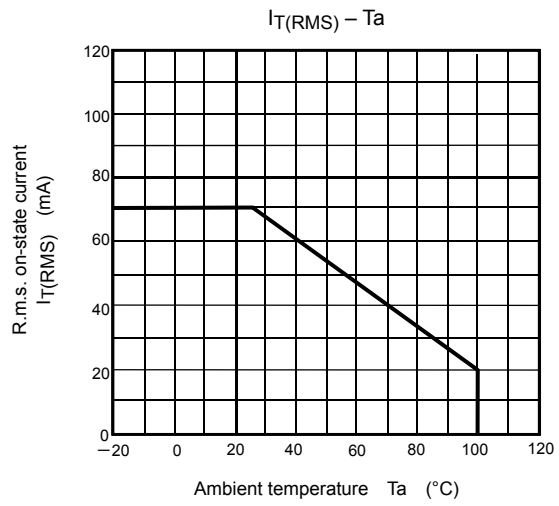
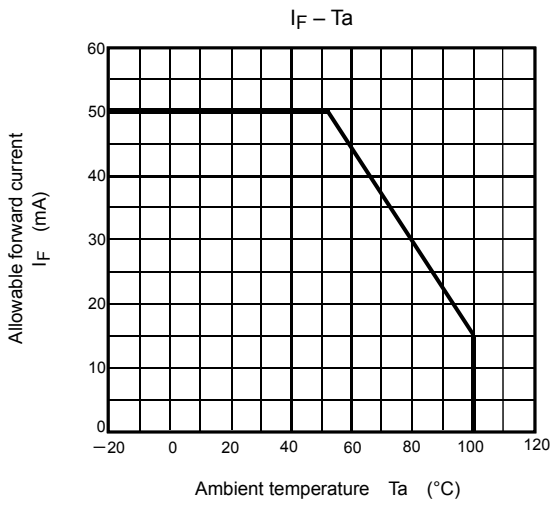
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	$V_F$	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
	Reverse current	$I_R$	$V_R = 5\text{V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	30	—	pF
Detector	Peak off-state current	$I_{DRM}$	$V_{DRM} = 400\text{V}$	—	10	1000	nA
	Peak on-state voltage	$V_{TM}$	$I_{TM} = 70\text{mA}$	—	1.7	2.8	V
	Holding current	$I_H$	—	—	0.6	—	mA
	Critical rate of rise of off-state voltage	$dv/dt$	$V_{in} = 120\text{Vrms}, Ta = 85^\circ\text{C}$ (Fig.1)	200	500	—	V / $\mu\text{s}$
	Critical rate of rise of commutating voltage	$dv/dt(c)$	$I_T = 15\text{mA}, V_{in} = 30\text{Vrms}$ (Fig.1)	—	0.2	—	V / $\mu\text{s}$

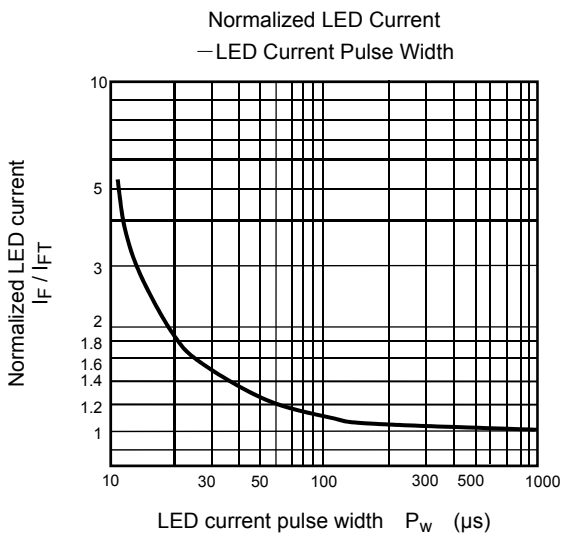
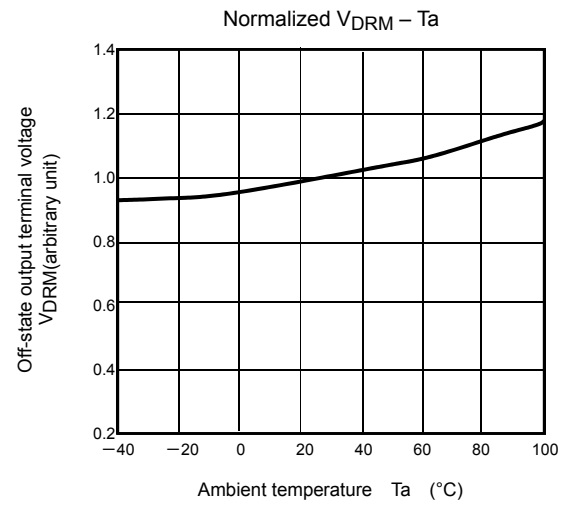
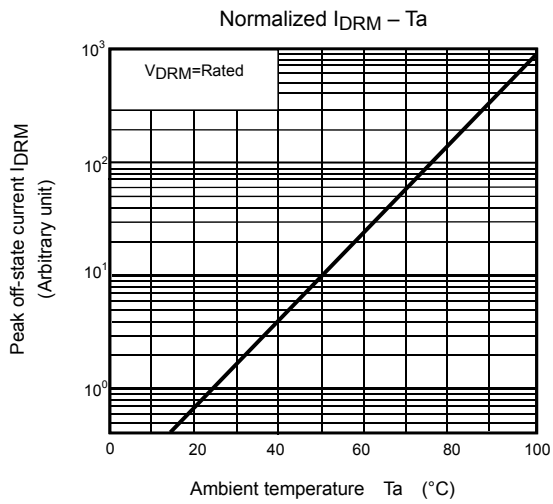
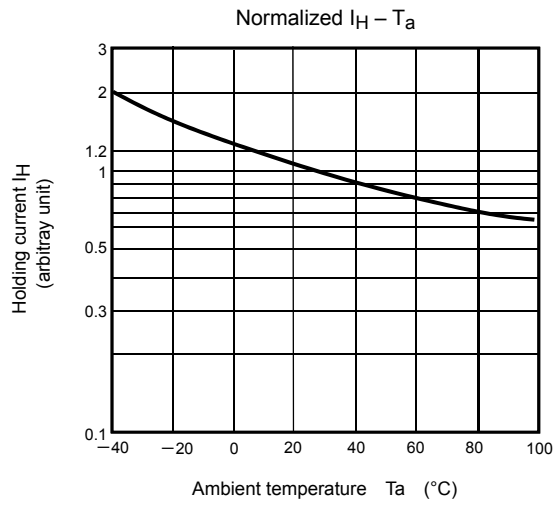
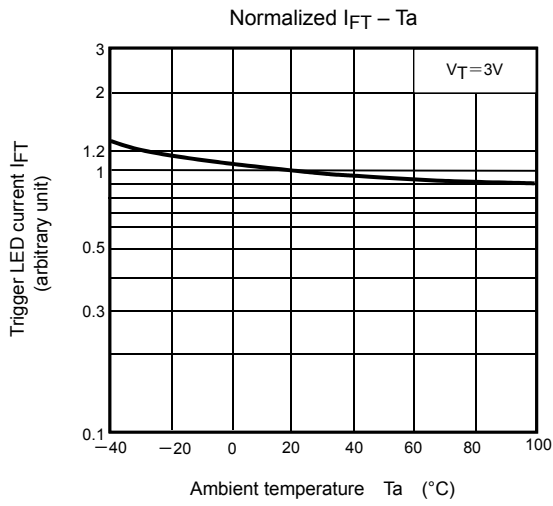
**Coupled Electrical Characteristics (Ta = 25°C)**

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Trigger LED current	$I_{FT}$	$V_T = 3\text{V}$	—	5	10	mA
Capacitance input to output	$C_s$	$V_S = 0, f = 1\text{MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500\text{V}, \text{R.H.} \leq 60\%$	$1 \times 10^{12}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second, in oil	—	5000	—	Vrms
		DC, 1 minute, in oil	—	5000	—	Vdc
Turn-on time	$t_{ON}$	$V_D = 6 \rightarrow 4\text{V}, R_L = 100\Omega$ $I_F = \text{rate } I_{FT} \times 1.5$	—	30	100	$\mu\text{s}$

Fig.1  $dv/dt$  Test Circuit







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