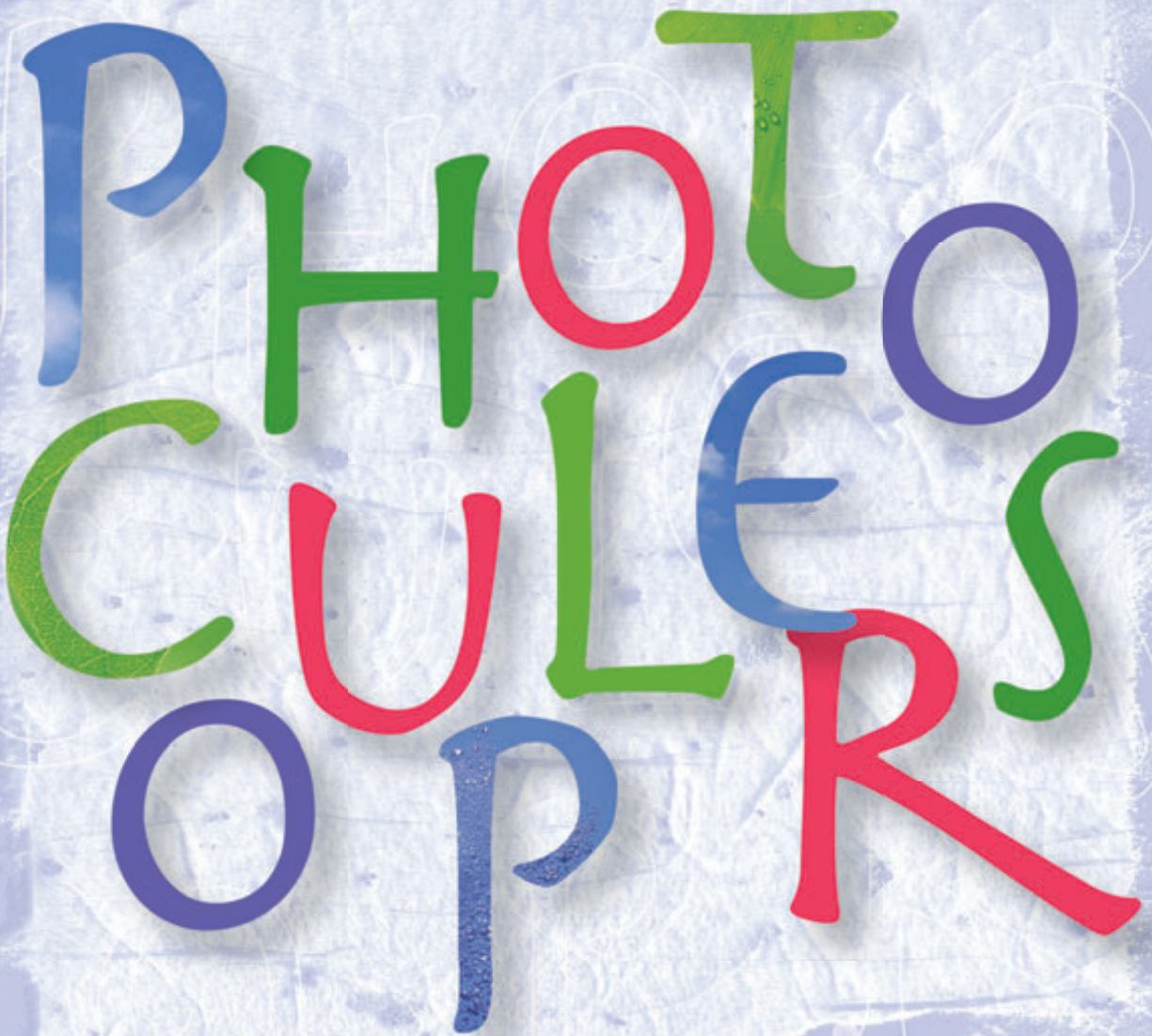


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Semiconductor Catalog 2012-10

# Photocouplers and Photorelays



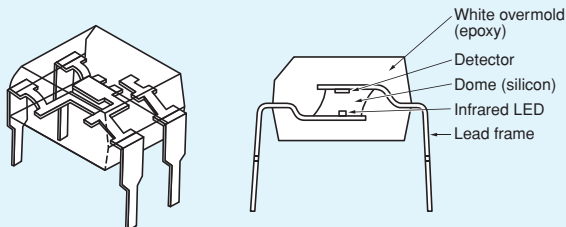
PHOTOCOUPLERS

SEMICONDUCTOR & STORAGE PRODUCTS

<http://www.semicon.toshiba.co.jp/eng>

## Preface

As a type of isolator favored by manufacturers, photocouplers now serve as noise protectors in many electronic devices. Toshiba's photocouplers consist of either a GaAs or GaAlAs infrared LED(s) and a silicon photodetector(s) housed in a mold package. GaAlAs LEDs are adopted in high-speed photo-IC types due to their high-speed and high-light output.



Perspective view of the TLP523

Cross section of the TLP523

## Extensive Line of Products

To meet customers' various needs, we offer an extensive product portfolio shown below as well as general-purpose photocouplers.

1. Photo-IC couplers: High speed and advanced functions (highly integrated detectors)
2. Zero-crossing phototriac couplers: Phototriac-output devices with zero-crossing detection
3. Photovoltaic couplers: MOSFET gate drive (high voltage output achieved using a photodiode array)
4. Photorelays (MOSFET-output devices):  
AC-DC switches (MOSFET output)  
Mechanical relay replacement

## Safety Standard Approvals

UL approval has been obtained under file number E67349 for most of our photocouplers. EN60747-5-2- or EN60747-5-5-approved photocouplers are also offered with a wide selection of output (transistor, thyristor, triac, IC output and photorelay). The designs of these devices meet other standards including IEC380/VDE0806, IEC60950/EN60950 and IEC60065/EN60065.

## Small-Package Products

Toshiba offers a wide variety of photocouplers in a small package to meet the space-saving requirement of increasingly smaller and thinner end products. Packaging options include mini-flat packages (SO6) and half-pitch (1.27 mm) mini-flat SOP packages.

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## 2 New Products

### General-Purpose Thin Transistor-Output Photocouplers with Reinforced Insulation: TLP184 and TLP185

Housed in the SO6 package, the TLP184 and TLP185 feature a thin form factor. They provide guaranteed performance and specifications at ambient temperatures ( $T_a$ ) up to 110°C.

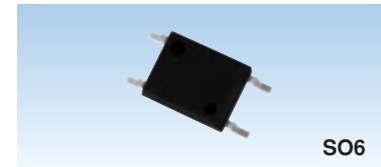
The TLP184 and TLP185 can be used as direct replacements for the TLP180 and TLP181 in the MFSOP6 package, respectively. Part replacement is easy because the recommended PCB land pattern dimensions of the SO6 package are the same as those of the MFSOP6 package. Moreover, SO6 features a PCB mounted height of 2.3 mm (max) compared to 2.8 mm for MFSOP6 and thus helps reduce the thickness of end applications.

SO6 provides guaranteed clearance and creepage distances of 5 mm compared to 4 mm for MFSOP6. Consequently, the TLP184 and TLP185 offer a maximum isolation voltage of 707 Vpk, meeting the EN60747-5-2 requirement. This means these photocouplers can replace part of the functionality that has traditionally been provided by photocouplers in a DIP package (such as the TLP781 and TLP785). The TLP184 and TLP185 comply with international safety standards for reinforced insulation by the use of a Faraday shield with a guaranteed thickness of 0.4 mm.

Certified for UL, cUL, VDE, BSI, etc., they are suitable for applications that target the worldwide market. The intended applications include various electronic devices such as AC adapters and switching power supplies, factory automation (FA) systems.

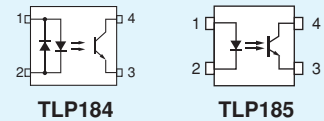
#### ■ Features

- Operating temperature range: -55 to 110°C
- Collector-emitter voltage: 80 V (min)
- Isolation voltage: 3750 Vrms (min)
- Current transfer ratio (CTR): 50 to 400% (at  $I_F = 5$  mA,  $V_{CE} = 5$  V,  $T_a = 25^\circ\text{C}$ )



SO6

#### Pin Configuration



TLP184

TLP185

### General-Purpose 1-Channel Thin Transistor-Output Photocouplers with Reinforced Insulation with 1.27-mm Lead Pitch: TLP290 and TLP291

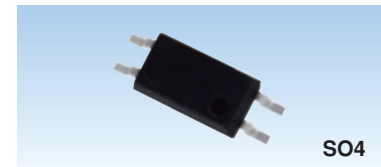
The TLP290 and TLP291 are single-channel transistor-output photocouplers in the SO4 package. These photocouplers feature a high isolation voltage of 3750 Vrms and guaranteed performance and specifications at ambient temperatures ( $T_a$ ) up to 110°C.

The TLP290 is a successor to the TLP280 and TLP284, and the TLP291 is a successor to the TLP281 and TLP285. The TLP290 and TLP291 can be used as replacements for their predecessors because the recommended PCB land pattern dimensions of SO4 are the same as those of the SOP4 package that houses the predecessors. SO4 provides guaranteed clearance and creepage distances of 5 mm compared to 4 mm for SOP4. Consequently, the TLP290 and TLP291 offer a maximum isolation voltage of 707 Vpk, meeting the EN60747-5-2 requirement. Since the TLP290 and TLP291 provide the same isolation voltage as the TLP284 and TLP285, the new devices are suitable for replacement applications.

The TLP290 and TLP291 comply with international safety standards for reinforced insulation by the use of a Faraday shield with a guaranteed thickness of 0.4 mm. Certified for safety standards such as UL, cUL and VDE, the TLP290 and TLP291 are ideal for various electronic devices, including AC adapters, switching power supplies, programmable logic controllers, inverters, etc.

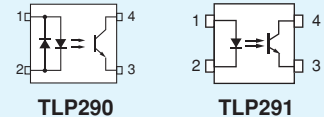
#### ■ Features

- Operating temperature range: -55 to 110°C
- Collector-emitter voltage: 80 V (min)
- Isolation voltage: 3750 Vrms (min)
- Current transfer ratio (CTR): 50 to 400% (at  $I_F = 5$  mA,  $V_{CE} = 5$  V,  $T_a = 25^\circ\text{C}$ )



SO4

#### Pin Configuration



TLP290

TLP291

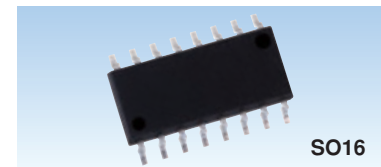
### General-Purpose 4-Channel Thin Transistor-Output Photocouplers: TLP290-4 and TLP291-4

The TLP290-4 and TLP291-4 are four-channel transistor-output photocouplers in the SO16 package that provide guaranteed performance and specifications at ambient temperatures ( $T_a$ ) up to 110°C.

The TLP290-4 and TLP291-4 are successors to the TLP280-4 and TLP281-4 in the SOP16 package, respectively. The new devices can be used as replacements for their predecessors because the recommended PCB land pattern dimensions of SO16 are the same as those of the SOP16 package. Certified for safety standards such as UL, cUL and VDE, the TLP290-4 and TLP291-4 are ideal for various FA applications such as programmable controllers, inverters and servo amplifiers.

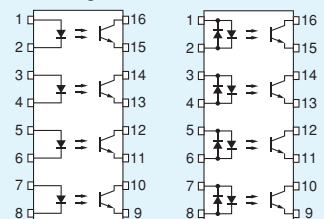
#### ■ Features

- Operating temperature range: -55 to 110°C
- Collector-emitter voltage: 80 V (min)
- Isolation voltage: 2500 Vrms (min)
- Current transfer ratio (CTR): 50 to 400% (at  $I_F = 5$  mA,  $V_{CE} = 5$  V,  $T_a = 25^\circ\text{C}$ )



SO16

#### Pin Configuration



TLP291-4

TLP290-4

# 2 New Products

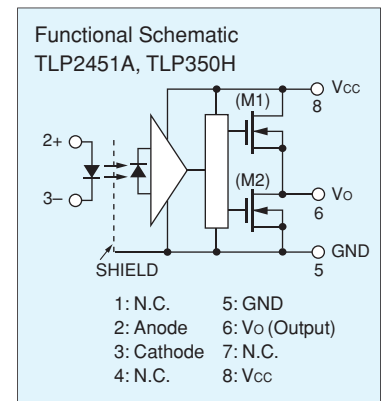
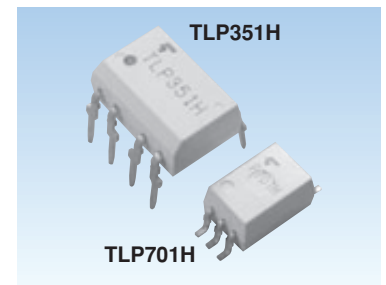
## IGBT/MOSFET Gate-Drive IC-Output Photocouplers with an Extended Operating Temperature Range

Printed circuit boards are becoming smaller and denser as a result of product miniaturization. This is driving the need for electronic components with an extended operating temperature range. To meet this need, Toshiba has been expanding its portfolio of IC-output photocouplers that are guaranteed up to 125°C instead of the conventional 100°C limit. Although the SDIP6 package occupies approximately half the board area of the DIP package (that houses the TLP350), it complies with international safety standards for reinforced insulation.

### ■ Features

- Wide packaging options: SO6, SO8, SDIP6, DIP8
- Key specifications are guaranteed over -40°C to 125°C (-40°C to 110°C for the TLP151A)
- Low current consumption

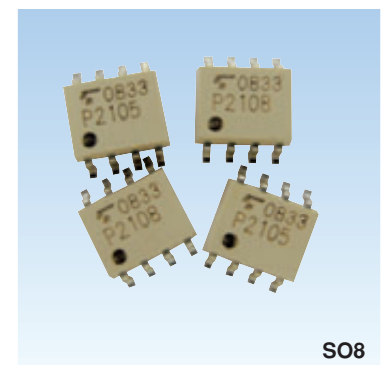
Peak Output Current	Part Number	Package	Supply Voltage (Vcc)	Supply Current (Icc)(max)	Input Threshold Current(max)	Propagation Delay (max)	UVLO
±0.6 A	TLP351H	DIP8	10 V to 30 V	2 mA	5 mA	700 ns	—
	TLP701H	SDIP6					—
	TLP2451A	SO8				500 ns	—
	TLP151A	SO6					—
±2.5 A	TLP700H	SDIP6	15 V to 30 V	3 mA	5 mA	500 ns	Yes
	TLP350H	DIP8					Yes
	TLP352	DIP8				200 ns	Yes
±6.0 A	TLP358H	DIP8		2 mA		500 ns	Yes



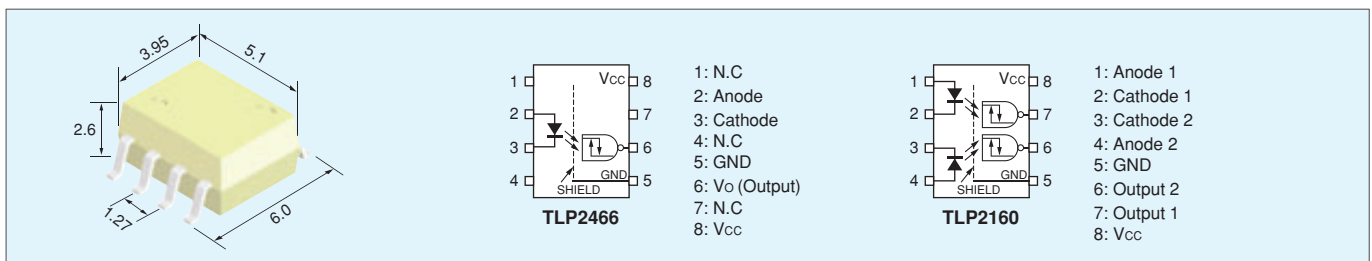
## Small Surface-Mount IC-Output Photocouplers in the SO8 Package

Toshiba is expanding its portfolio of IC-output photocouplers in the small and thin SO8 package. To meet customer needs, Toshiba has released photocouplers featuring various data rates, dual-channel configurations and power device drivers.

Data rate (typ.)	Part Number	# of Circuits	Output	Supply Voltage
0.1 Mbit/s	TLP2403	1-ch	Darlington	Up to 18 V
1 Mbit/s	TLP2404	1-ch	Open-collector	4.5 V to 30 V
	TLP2409	1-ch		Up to 30 V
5 Mbit/s	TLP2405	1-ch	Totem-pole	4.5 V to 20 V
	TLP2408	1-ch		
	TLP2105	2-ch		
15 Mbit/s to 20 Mbit/s	TLP2108	2-ch	Totem-pole	4.5 V to 20 V
	TLP2466	1-ch		
	TLP2160	2-ch		
	TLP2418	1-ch	Open-collector	5 V
	TLP2118E	2-ch		
	TLP2468	1-ch	Open-collector	3.3 V/5 V
	TLP2168	2-ch		
	TLP2116	2-ch	Totem-pole	5 V
TLP2166A	2-ch	3.3 V		
Driver	TLP2451A	1-ch	±0.6-A peak current	10 V to 30 V



### ■ Package Outline Dimensions and Pin Assignments



## IC-Output Photocouplers in the SO6 Package for Reinforced Insulation: Photocouplers for Logic Output and Signal Transmission and Photocouplers for IGBT/MOSFET Gate Drive

Despite the same footprint size as the MFSOP6 package, the new SO6 package provides reinforced insulation, offering clearance and creepage distances of  $\geq 5$  mm; an internal isolation thickness of  $\geq 0.4$  mm; and an isolation voltage of 3750 Vrms.

Additionally, the SO6 features the maximum PCB mounted height of 2.3 mm, approximately 20% lower than the MFSOP6. This makes the photocouplers in SO6 ideal for low-profile applications.

### ■ Features

- Clearance/creepage:  $\geq 5$  mm
- Thin package:  $\leq 2.3$  mm
- Internal Faraday shield:  $\geq 0.4$  mm
- Isolation voltage: 3750 Vrms (min)

### ■ Photocouplers for Logic Output and Signal Transmission

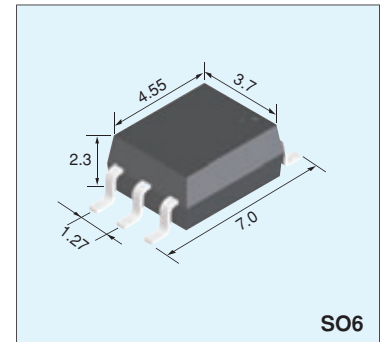
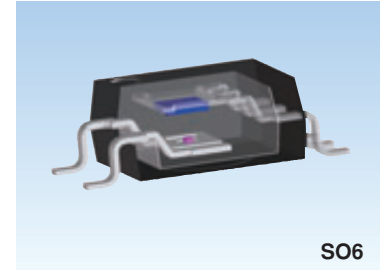
Part Number	Data rate (typ.)	Output	Supply voltage	Input Threshold Current (max)
TLP104	1 Mbit/s	Open-collector, optimized for IPM drive	4.5 V to 30 V	5 mA
TLP109	1 Mbit/s	Open-collector	4.5 V to 30 V	–
TLP2309	1 Mbit/s	Open-collector	3.3 V/5 V	–
TLP2355	5 Mbit/s	Totem-pole buffer logic	3.0 V to 20 V	1.6 mA
TLP2358	5 Mbit/s	Totem-pole inverting logic	3.0 V to 20 V	1.6 mA
TLP2362	10 Mbit/s	Open-collector	3.3 V/5 V	5 mA
TLP116A	20 Mbit/s	Totem-pole inverting logic	5 V	5 mA
TLP2366			3.3 V/5 V	5 mA
TLP118	20 Mbit/s	Open-collector	5 V	5 mA
TLP2368			3.3 V/5 V	5 mA
TLP2367*	40 Mbit/s	Totem-pole inverting logic	3.3 V/5 V	5 mA

\*Under development. Specifications subject to change without notice.  
For the latest information, please contact your nearest Toshiba sales representative.

### ■ Photocouplers for IGBT/MOSFET Gate Drive

Part Number	Peak Output Current (max)	Operating Temperature (Ta)	Supply Voltage (Vcc)	Supply Current (Icc)(max)	Input Threshold Current(max)	Propagation Delay (max)	UVLO
TLP151A	$\pm 0.6$ A	–40 to 110°C	10 to 30 V	2 mA	5 mA	700 ns	–
TLP155		–40 to 100°C		3 mA	7.5 mA	200 ns	–
TLP155E							–
TLP152*	$\pm 2.5$ A						Yes

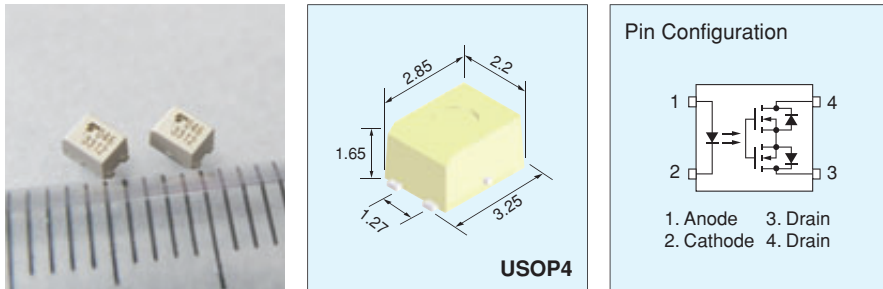
\*Under development. Specifications subject to change without notice.  
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## 2 New Products

### Ultra-Small and Ultra-Low-Capacitance Photorelays: TLP33xx Series Photorelays in the Ultra-Small USOP4 Package with Low Off-State Output Capacitance

There is a strong market need for smaller photorelays. To meet this need, Toshiba has developed photorelays in the ultra-small USOP4 package, which are suitable for high-density board assembly. These photorelays help to reduce system size and cost. They are ideal for use in small measuring instruments such as semiconductor testers that require numerous relays.



Automatic test equipment (ATE) used at the front- and back-end semiconductor manufacturing processes needs to switch electric signals at high speeds in order to measure many pins and devices in a short time. High-end ATE models are equipped with thousands of relays. Because of the performance required for ATE applications, photorelays have been adopted in many ATE models and are rapidly replacing mechanical relays. Photorelays are used along signal paths. A photorelay remains in the off state when it is not conducting electric current. If the off-state output capacitance ( $C_{OFF}$ ) is large, test signals might be subjected to significant distortion, affecting measurement accuracy. To avoid this problem, ATE requires photorelays with low  $C_{OFF}$ . ATE has been driving the need for photorelays with even lower  $C_{OFF}$  and smaller form factors.

In 2011, Toshiba began production of the TLP3340 that features ultra-low  $C_{OFF}$  and has continually expanded its photorelay portfolio to address the challenges of various applications.

The TLP3342 features  $C_{OFF}$  even smaller than that of the TLP3340 and thus provides a cleaner signal waveform. The TLP3351 features a maximum off-state voltage of 60 V despite its ultra-small  $C_{OFF}$ . It helps expand the working voltage range of ATE. Housed in an ultra-small USOP4 package, the TLP3342 and TLP3351 allow high-density board assembly.

The TLP3312 and TLP3375 provide a good balance between off-state voltage and on-state current. They are ideal not only for ATE applications but also for various equipment requiring high-density board assembly such as for battery control applications.

Part Number	OFF-State Voltage (max)	ON-State Current (max)	ON-State Resistance (max)	Output Capacitance (typ.)	Trigger LED Current (max)
TLP3303	20 V	0.9 A	0.22 $\Omega$	40 pF	3 mA
TLP3306*	75 V	0.4 A	2 $\Omega$	40 pF	3 mA
TLP3312	60 V	0.4 A	1.5 $\Omega$	20 pF	3 mA
TLP3314*	40 V	0.25 A	3 $\Omega$	5 pF	4 mA
TLP3315*	40 V	0.3 A	1.5 $\Omega$	10 pF	4 mA
TLP3316*	40 V	0.12 A	15 $\Omega$	1 pF	4 mA
TLP3317*	80 V	0.12 A	12 $\Omega$	5 pF	5 mA
TLP3318*	80 V	0.14 A	25 $\Omega$	3.5 pF	3 mA
TLP3319*	80 V	0.2 A	8 $\Omega$	6.5 pF	3 mA
TLP3320*	100 V	0.08 A	14 $\Omega$	6 pF	5 mA
TLP3330*	20 V	0.16 A	8 $\Omega$	1 pF	4 mA
TLP3331*	20 V	0.45 A	1.2 $\Omega$	5 pF	4 mA
TLP3340	40 V	0.12 A	14 $\Omega$	0.45 pF	3 mA
TLP3341	40 V	0.41 A	10 $\Omega$	0.7 pF	3 mA
TLP3342	40 V	0.1 A	20 $\Omega$	0.3 pF	3 mA
TLP3350	20 V	0.2 A	5 $\Omega$	0.8 pF	3 mA
TLP3351	60 V	0.12 A	15 $\Omega$	0.7 pF	3 mA
TLP3375	50 V	0.3 A	1.5 $\Omega$	12 pF	3 mA

\*Under development. Specifications subject to change without notice.  
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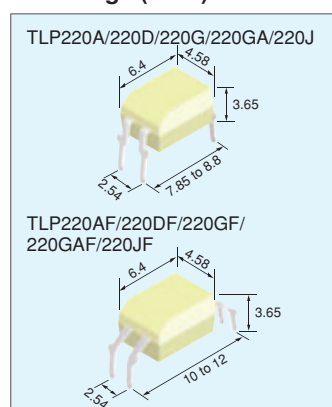


## Photorelays in DIP4 with Reinforced Insulation: TLP220 Series Available with five OFF-State Output Terminal Voltages ( $V_{OFF}$ )

The TLP220 Series in the DIP4 package provides an input-to-output isolation voltage of 5000 Vrms (AC, 1 min.) for reinforced insulation by the use of a double-mold structure. The new photorelay series is available with five OFF-state output terminal voltages (60, 200, 350, 400 and 600 V). Thus, it can be used for various applications such as electricity meters (e.g., smart meters), factory automation (FA) systems and security equipment. Additionally, the TLP220 Series features a trigger LED current of 2 mA (max) compared to 3 mA for its predecessor. Because switching between input and output occurs with less current, the TLP220 Series helps save energy.

The TLP220AF/DF/GF/GAF/JF with clearance and creepage distances of 8 mm (min) are also offered. Toshiba is planning to obtain safety standard certification (UL/cUL/VDE/BSI) for these photorelays.

### ■ Package (DIP4)



Characteristic	Symbol	Unit	TLP220A TLP220AF	TLP220D TLP220DF	TLP220G TLP220GF	TLP220GA TLP220GAF	TLP220J TLP220JF
OFF-state output terminal voltage(min)	$V_{OFF}$	V	60	200	350	400	600
ON-state current (max)	$I_{ON}$	mA	500	250	100	120	90
ON-state resistance (max)	$R_{ON}$	$\Omega$	2	8	50	35	60
Trigger LED current (max)	$I_{FT}$	mA	2				
OFF-state current (max)	$I_{OFF}$	$\mu$ A	1				
Turn-on time (max)	$t_{ON}$	ms	1				
Turn-off time (max)	$t_{OFF}$	ms	1				
Isolation voltage (min)	BVs	Vrms	5000				

### ■ Features

- Reinforced insulation
- Low trigger LED current

### ■ Application

- Replacement for mechanical relays
- Security systems
- Instrumentation and control systems
- FA control systems
- Amusement equipment
- Smart meters
- Electricity, gas and water meters
- Medical equipment

## High-Current Photorelays: TLP354x and TLP355x Series Available in the DIP4 and DIP6 Packages

Photorelays are superior to mechanical relays in terms of power consumption, size and reliability. On the other hand, photorelays might only be available with limited  $V_{OFF}$  and  $I_{ON}$  ranges.

Photorelays use MOSFETs, which have a trade-off between  $V_{OFF}$  and  $I_{ON}$ . Increasing  $V_{OFF}$  decreases  $I_{ON}$ . Therefore, although photorelays are widely used now, mechanical relays are still used for applications that handle relatively large current.

To address the needs for more wide-ranging applications, Toshiba has released the TLP354x Series in the DIP4 package and the TLP355x Series in the DIP6 package. Fabricated with the U-MOS IV process, the TLP355x Series is available with  $V_{OFF}/I_{ON}$  of 20 V/3 A, 40 V/2.5 A, 60 V/2 A and 100 V/1 A, and the TLP354x Series with  $V_{OFF}/I_{ON}$  of 20 V/4 A, 40 V/3.5 A, 60 V/3 A and 100 V/2 A.

The TLP354x Series in the DIP6 package allows B and C connections to provide control over a DC current of 8 A, 7 A, 6 A or 4 A.

### ■ Features

- High current
- Available with a  $V_{OFF}$  of 20, 40, 60 and 100 V

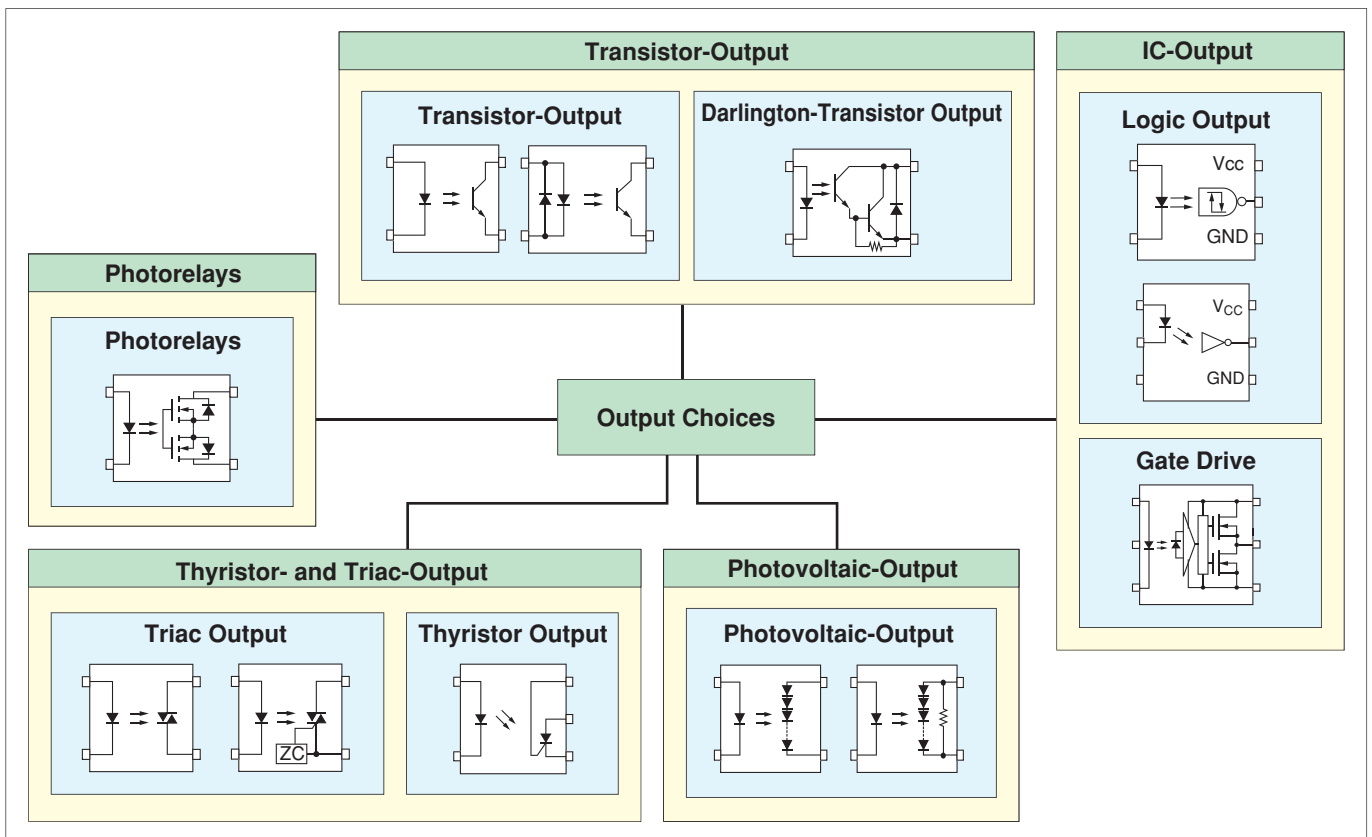
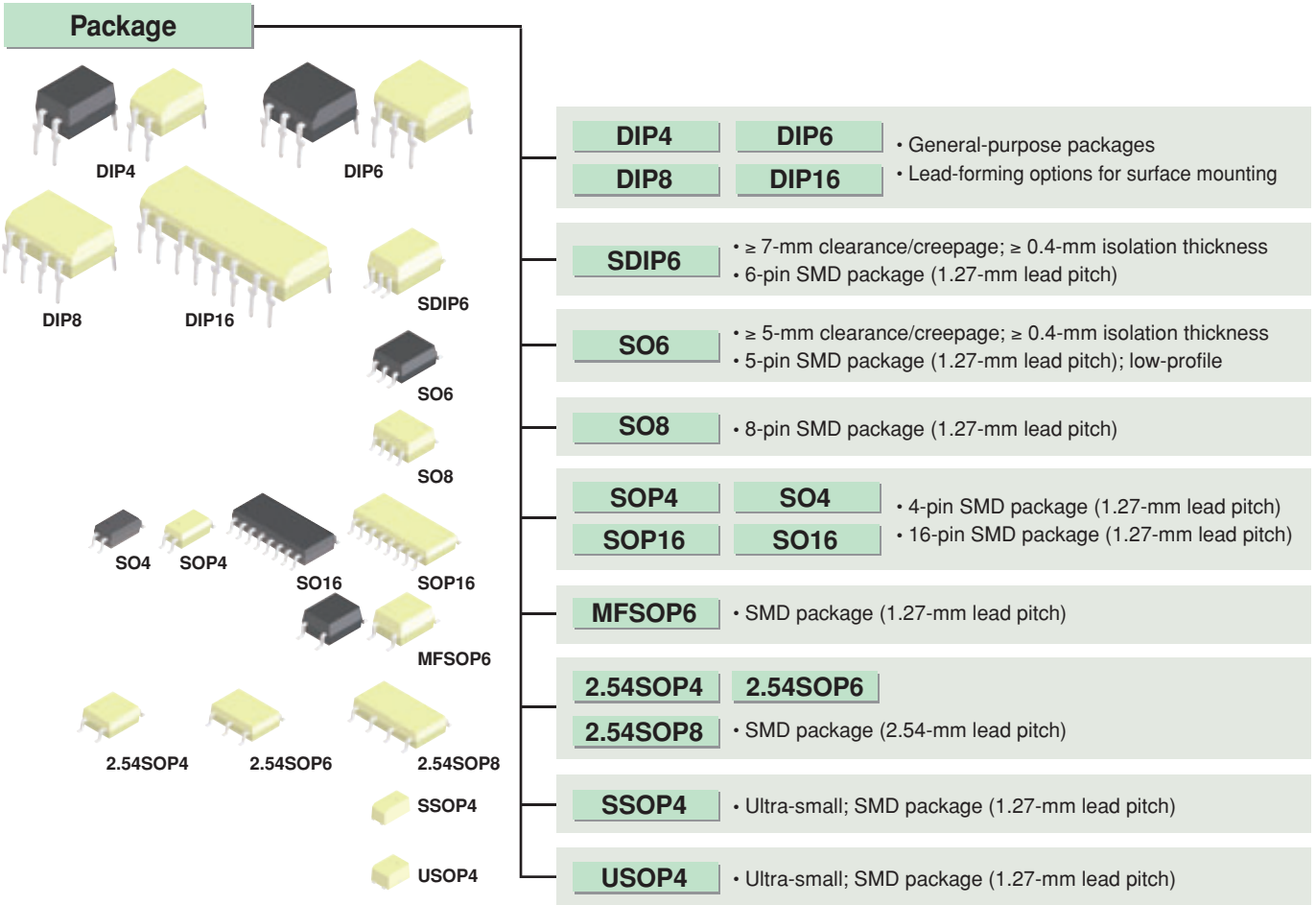
### ■ Application

- Consumer electronics
- Replacement for mechanical relays
- Security systems
- Power supplies
- FA systems

Series	Package	Part Number	$V_{OFF}$ (min) (V)	$I_{ON}$ (max) (A)	$R_{ON}$ (typ.) ( $m\Omega$ )	$R_{ON}$ (max) ( $m\Omega$ )	$t_{ON}$ (max) (ms) ( $I_F = 5$ mA)	$t_{OFF}$ (max) (ms) ( $I_F = 5$ mA)
TLP354x Series		TLP3543	20	4	20	50	5	1
		TLP3544	40	3.5	30	60	5	1
		TLP3545	60	3	40	70	5	1
		TLP3546	100	2	100	200	5	1
TLP355x Series		TLP3553	20	3	40	80	5	1
		TLP3554	40	2.5	50	150	5	1
		TLP3555	60	2	80	200	5	1
		TLP3556	100	1	250	700	5	1










# 3 Photocoupler Product Tree

## Photocoupler Product Tree



# 4 Selection Guide

## 1 Transistor-Output and Darlington-Transistor-Output Photocouplers

Features		Package								
										
		SO4	SOP16	SO16	SO6	MFSOP6	DIP6	DIP4	DIP8	DIP16
Isolation Voltage		Single	Quad	Quad	Single	Single	Single	Single	Dual	Quad
General-purpose	2500 Vrms		TLP281-4	TLP291-4			TLP531 TLP532		TLP504A	
	3750 Vrms	TLP291	TLP285-4		TLP185	TLP131				
	4000 Vrms						TLP731 TLP732 TLP733 TLP734			
	5000 Vrms						TLP631 TLP632	TLP781 TLP785		
Low I <sub>F</sub>	3750 Vrms					TLP124 TLP137				
	5000 Vrms						TLP331 TLP332	TLP624	TLP624-2	TLP624-4
High V <sub>CEO</sub>	5000 Vrms							TLP628	TLP628-2	TLP628-4
High I <sub>F</sub>	5000 Vrms							TLP629	TLP629-2	TLP629-4
AC input	2500 Vrms		TLP280-4	TLP290-4						
	3750 Vrms	TLP290	TLP284-4		TLP184	TLP130				
	5000 Vrms						TLP630	TLP620	TLP620-2	TLP620-4
Low I <sub>F</sub>	3750 Vrms					TLP126				
	5000 Vrms							TLP626	TLP626-2	TLP626-4
High I <sub>F</sub>	5000 Vrms						TLP330	TLP320	TLP320-2	TLP320-4
Darlington	2500 Vrms						TLP570 TLP571 TLP572	TLP523	TLP523-2	TLP523-4
High V <sub>CEO</sub>	2500 Vrms					TLP127				
	5000 Vrms						TLP371 TLP372 TLP373	TLP627	TLP627-2	TLP627-4

# 4 Selection Guide

## Reinforced Insulation in a Small, Surface-Mount SOP Package ( $\geq 5\text{-mm}$ Clearance/Creepage and $\geq 0.4\text{-mm}$ Internal Isolation Thickness)

Part Number	Pin Configuration	Features	CTR (%) <sup>(3)</sup>				V <sub>CEO</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank	Min	Max	@I <sub>F</sub> , V <sub>CE</sub>			UL/cUL	TÜV	VDE	BSI	IEC
TLP184		SO6 (reinforced insulation) AC Input	–	50	400	±5 mA, 5 V	80 V	3750 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>	○	△
			Y	50	150								
			GR	100	300								
			BLL	200	400								
			GB	100	400								
TLP185		SO6 (reinforced insulation)	–	50	400	5 mA, 5 V	80 V	3750 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>	○	△
			GB	100	400								
			Y	50	150								
			GR	100	300								
			BLL	200	400								
			YH	75	150								
			GRL	100	200								
GRH	150	300											
TLP284-4		SOP16 4-channel version Lead pitch = 1.27 mm AC Input SEMKO-approved	–	50	600	±5 mA, 5 V	80 V	3750 Vrms	○/○		○ <sup>(1)</sup>	◎	
			GB	100	600								
TLP290		SO4 (reinforced insulation) AC Input Lead pitch = 1.27 mm	–	50	400	±5 mA, 5 V	80 V	3750 Vrms	○/○		○ <sup>(1)</sup>	△	△
			Y	50	150								
			GR	100	300								
			BLL	200	400								
			GB	100	400								
TLP285-4		SOP16 4-channel version Lead pitch = 1.27 mm SEMKO-approved	–	50	600	5 mA, 5 V	80 V	3750 Vrms	○/○		○ <sup>(1)</sup>	◎	
			GB	100	600								
TLP291		SO4 (reinforced insulation) Lead pitch = 1.27 mm	–	50	400	5 mA, 5 V	80 V	3750 Vrms	○/○		○ <sup>(1)</sup>	△	△
			GB	100	400								
			Y	50	150								
			GR	100	300								
			BLL	200	400								
			YH	75	150								
			GRL	100	200								
GRH	150	300											

## General-Purpose, Transistor-Output Photocouplers

Part Number	Pin Configuration	Features	CTR (%) <sup>(3)</sup>				V <sub>CEO</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank	Min	Max	@I <sub>F</sub> , V <sub>CE</sub>			UL/cUL	TÜV	VDE	BSI	IEC
TLP124		MFSOP6 Low input drive current	–	100	1200	1 mA, 0.5 V	80 V	3750 Vrms	○/○				
			BV	200	1200								
TLP131		MFSOP6 Internal base connection	–	50	600	5 mA, 5 V	80 V	3750 Vrms	○/○				
			Y	50	150								
			GR	100	300								
			BL	200	600								
TLP137		MFSOP6 Low input drive current Internal base connection	–	100	1200	1 mA, 0.5 V	80 V	3750 Vrms	○/○				
			BV	200	1200								

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

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## General-Purpose, Transistor-Output Photocouplers (Continued)

Part Number	Pin Configuration	Features	CTR (%) <sup>(3)</sup>				V <sub>CEO</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank	Min	Max	@I <sub>F</sub> , V <sub>CE</sub>			UL/cUL	TÜV	VDE	BSI	IEC
TLP281-4		<b>SOP16</b> 4-channel version Lead pitch = 1.27 mm SEMKO-approved	–	50	600	5 mA, 5 V	80 V	2500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>	◎	△
			GB	100	600								
TLP291-4		<b>SO16</b> 4-channel version Lead pitch = 1.27 mm	–	50	400	5 mA, 5 V	80 V	2500 Vrms	○/○		○ <sup>(1)</sup>	△	△
			GB	100	400								
TLP331		<b>DIP6</b> Low input drive current Internal base connection	–	100	1200	1 mA, 0.5 V	55 V	5000 Vrms	○/○				
			BV	200	1200								
TLP332		<b>DIP6</b> Low input drive current	–	100	1200	1 mA, 0.5 V	55 V	5000 Vrms	○/○				
			BV	200	1200								
TLP504A		<b>DIP8</b>	–	50	600	5 mA, 5 V	55 V	2500 Vrms	○/				
			GB	100	600								
TLP531		<b>DIP6</b> Internal base connection	–	50	600	5 mA, 5 V	55 V	2500 Vrms	○/○				
			Y	50	150								
			GR	100	300								
			BL	200	600								
			GB	100	600								
TLP532		<b>DIP6</b> High EMI immunity	–	50	600	5 mA, 5 V	55 V	2500 Vrms	○/○				
			Y	50	150								
			GR	100	300								
			BL	200	600								
			GB	100	600								
TLP624		<b>DIP4</b> Low input drive current	–	100	1200	1 mA, 5 V	55 V	5000 Vrms	○/○	△	○	◎	△
			BV	200	1200								
TLP624-2		<b>DIP8</b> Dual-channel version of the TLP624	–	100	1200	1 mA, 5 V	55 V	5000 Vrms	○/○	△	○	◎	△
			BV	200	1200								
TLP624-4		<b>DIP16</b> 4-channel version of the TLP624	–	100	1200	1 mA, 5 V	55 V	5000 Vrms	○/○	△	○	◎	△
			BV	200	1200								

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# 4 Selection Guide

## General-Purpose, Transistor-Output Photocouplers (Continued)

Part Number	Pin Configuration	Features	CTR (%) <sup>(3)</sup>				V <sub>CEO</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank	Min	Max	@I <sub>F</sub> , V <sub>CE</sub>			UL/cUL	TÜV	VDE	BSI	IEC
TLP628		DIP4 High V <sub>CEO</sub>	–	50	600	5 mA, 5 V	350 V	5000 Vrms	○/○	△	○	△	△
			GB	100	600								
TLP628-2		DIP8 Dual-channel version of the TLP628	–	50	600	5 mA, 5 V	350 V	5000 Vrms	○/○	△	○	△	△
			GB	100	600								
TLP628-4		DIP16 4-channel version of the TLP628	–	50	600	5 mA, 5 V	350 V	5000 Vrms	○/○	△	○	△	△
			GB	100	600								
TLP629		DIP4 High input current I <sub>F</sub> = 150 mA	–	20	80	100 mA, 1 V	55 V	5000 Vrms	○/	△	○	△	△
			GB	100	600								
TLP629-2		DIP8 Dual-channel version of the TLP629	–	20	80	100 mA, 1 V	55 V	5000 Vrms	○/	△	○	△	△
			GB	100	600								
TLP629-4		DIP16 4-channel version of the TLP629	–	20	80	100 mA, 1 V	55 V	5000 Vrms	○/	△	○	△	△
			GB	100	600								
TLP631		DIP6 Internal base connection	–	50	600	5 mA, 5 V	55 V	5000 Vrms	○/○				
			GB	100	600								
			GR	100	300								
TLP632		DIP6 High EMI immunity	–	50	600	5 mA, 5 V	55 V	5000 Vrms	○/○				
			GB	100	600								
			GR	100	300								
TLP731		DIP6 SEMKO-approved Internal base connection	–	50	600	5 mA, 5 V	55 V	4000 Vrms	○/○	△	○	◎	△
			GB	100	600								
			GR	100	300								
TLP732		DIP6 SEMKO-approved	–	50	600	5 mA, 5 V	55 V	4000 Vrms	○/○	△	○	◎	△
			GB	100	600								
			GR	100	300								
TLP733 TLP733F		DIP6 SEMKO-approved Internal base connection	–	50	600	5 mA, 5 V	55 V	4000 Vrms	○/○	△	○	◎	△
			GB	100	600								
			GR	100	300								
TLP734 TLP734F		DIP6 SEMKO-approved	–	50	600	5 mA, 5 V	55 V	4000 Vrms	○/○	△	○	◎	△
			GB	100	600								
			GR	100	300								

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TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

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## General-Purpose, Transistor-Output Photocouplers (Continued)

Part Number	Pin Configuration	Features	CTR (%) <sup>(3)</sup>				V <sub>CEO</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank	Min	Max	@I <sub>F</sub> , V <sub>CE</sub>			UL/cUL	TÜV	VDE	BSI	IEC
TLP781 TLP781F		<b>DIP4</b> High isolation voltage UL-approved (double protection) SEMKO-approved	–	50	600	5 mA, 5 V	80 V	5000 Vrms	○/○	△	○	◎	△
			Y	50	150								
			GR	100	300								
			BL	200	600								
			GB	100	600								
			YH	75	150								
			GRL	100	200								
			GRH	150	300								
BLL	200	400											
TLP785 TLP785F		<b>DIP4</b> High isolation voltage UL-approved (double protection)	–	50	600	5 mA, 5 V	80 V	5000 Vrms	○/○	△	○	◎	△
			Y	50	150								
			GR	100	300								
			BL	200	600								
			GB	100	600								
			YH	75	150								
			GRL	100	200								
			GRH	150	300								
BLL	200	400											

## AC-Input, Transistor-Output Photocouplers

Part Number	Pin Configuration	Features	CTR (%) <sup>(3)</sup>				V <sub>CEO</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank	Min	Max	@I <sub>F</sub> , V <sub>CE</sub>			UL/cUL	TÜV	VDE	BSI	IEC
TLP126		<b>MFSOP6</b> AC input Low input drive current	–	100	1200	± 1 mA, 0.5 V	80 V	3750 Vrms	○/○				
TLP130		<b>MFSOP6</b> AC input Internal base connection	–	50	600	±5 mA, 5 V	80 V	3750 Vrms	○/○				
			GB	100	600								
TLP290-4		<b>SO16</b> 4-channel version Lead pitch = 1.27 mm AC input	–	50	400	±5 mA, 5 V	80 V	2500 Vrms	○/○		○ <sup>(1)</sup>	△	△
			GB	100	400								
TLP280-4		<b>SOP16</b> 4-channel version Lead pitch = 1.27 mm AC input SEMKO-approved	–	50	600	±5 mA, 5 V	80 V	2500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>	◎	△
			GB	100	600								
TLP320		<b>DIP4</b> High input current AC input I <sub>F</sub> = 150 mA	–	20	80	±100 mA, 1 V	55 V	5000 Vrms	○/○	△	△	◎	△
TLP320-2		<b>DIP8</b> Dual-channel version of the TLP320	–	20	80	±100 mA, 1 V	55 V	5000 Vrms	○/○	△	△	◎	△
TLP320-4		<b>DIP16</b> 4-channel version of the TLP320	–	20	80	±100 mA, 1 V	55 V	5000 Vrms	○/○	△	△	◎	△
TLP330		<b>DIP6</b> High input current AC input I <sub>F</sub> = 150 mA Internal base connection	–	20	80	±100 mA, 1 V	55 V	5000 Vrms	○/○				

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# 4 Selection Guide

## AC-Input, Transistor-Output Photocouplers (Continued)

Part Number	Pin Configuration	Features	CTR (%) <sup>(3)</sup>				V <sub>CEO</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank	Min	Max	@I <sub>F</sub> , V <sub>CE</sub>			UL/cUL	TÜV	VDE	BSI	IEC
TLP620 TLP620F		DIP4 AC input SEMKO-approved	–	50	600	±5 mA, 5 V	55 V	5000 Vrms	○/○	△	○	◎	△
			Y	50	150								
			GR	100	300								
			BL	200	600								
			GB	100	600								
TLP620-2		DIP8 Dual-channel version of the TLP620 SEMKO-approved	–	50	600	±5 mA, 5 V	55 V	5000 Vrms	○/○	△	○	◎	△
			GB	100	600								
TLP620-4		DIP16 4-channel version of the TLP620	–	50	600	±5 mA, 5 V	55 V	5000 Vrms	○/○	△	○	◎	△
			GB	100	600								
TLP626		DIP4 Low input drive current AC input	–	100	1200	±1 mA, 0.5 V	55 V	5000 Vrms	○/○	△	○	◎	△
			BV	200									
TLP626-2		DIP8 Dual-channel version of the TLP626	–	100	1200	±1 mA, 0.5 V	55 V	5000 Vrms	○/○	△	○	◎	△
			BV	200									
TLP626-4		DIP16 4-channel version of the TLP626	–	100	1200	±1 mA, 0.5 V	55 V	5000 Vrms	○/○	△	○	◎	△
			BV	200									
TLP630		DIP6 AC input High isolation voltage Internal base connection	–	50	600	±5 mA, 5 V	55 V	5000 Vrms	○/				
			GB	100									

## Darlington-Transistor-Output Photocouplers

Part Number	Pin Configuration	Features	CTR (%) <sup>(3)</sup>			V <sub>CE(sat)</sub>		V <sub>CEO</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Min	@I <sub>F</sub> , V <sub>CE</sub>	Max	@I <sub>C</sub> , I <sub>F</sub>	UL/cUL			TÜV	VDE	BSI	IEC	
TLP127		MFSOP6 High V <sub>CEO</sub>	1000	1 mA, 1 V	1.2 V	100 mA, 10 mA	300 V	2500 Vrms	○/○	○ <sup>(1)</sup>	○ <sup>(1)</sup>	◎	△	
TLP371		DIP6 High V <sub>CEO</sub> SEMKO-approved Internal base connection	1000	1 mA, 1 V	1.2 V	100 mA, 10 mA	300 V	5000 Vrms	○/○					
TLP372		DIP6 High V <sub>CEO</sub> SEMKO-approved	1000	1 mA, 1 V	1.2 V	100 mA, 10 mA	300 V	5000 Vrms	○/○					
TLP373		DIP6 High V <sub>CEO</sub> Long emitter-collector distance SEMKO-approved	1000	1 mA, 1 V	1.2 V	100 mA, 10 mA	300 V	5000 Vrms	○/○					

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## Darlington-Transistor-Output Photocouplers (Continued)

Part Number	Pin Configuration	Features	CTR (%) <sup>(3)</sup>		V <sub>CE (sat)</sub>		V <sub>CEO</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Min	@I <sub>F</sub> , V <sub>CE</sub>	Max	@I <sub>C</sub> , I <sub>F</sub>			UL/cUL	TÜV	VDE	BSI	IEC
TLP523		DIP4	500	1 mA, 1 V	1 V	50 mA, 10 mA	55 V	2500 Vrms	○/○				
TLP523-2		DIP8 Dual-channel version of the TLP523	500	1 mA, 1 V	1 V	50 mA, 10 mA	55 V	2500 Vrms	○/○				
TLP523-4		DIP16 4-channel version of the TLP523	500	1 mA, 1 V	1 V	50 mA, 10 mA	55 V	2500 Vrms	○/○				
TLP570		DIP6 High EMI immunity	1000	1 mA, 1 V	1.2 V	100 mA, 10 mA	35 V	2500 Vrms	○/○				
TLP571		DIP6 Internal base connection	1000	1 mA, 1 V	1.2 V	100 mA, 10 mA	35 V	2500 Vrms	○/				
TLP572		DIP6 Built-in R <sub>BE</sub>	1000	1 mA, 1.2 V	1.2 V	100 mA, 10 mA	55 V	2500 Vrms	○/				
TLP627		DIP4 High V <sub>CEO</sub> SEMKO-approved	1000	1 mA, 1 V	1.2 V	100 mA, 10 mA	300 V	5000 Vrms	○/○	△	○	◎	△
TLP627-2		DIP8 Dual-channel version of the TLP627 SEMKO-approved	1000	1 mA, 1 V	1.2 V	100 mA, 10 mA	300 V	5000 Vrms	○/○	△	○	◎	△
TLP627-4		DIP16 4-channel version of the TLP627	1000	1 mA, 1 V	1.2 V	100 mA, 10 mA	300 V	5000 Vrms	○/○	△	○	◎	△

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# 4 Selection Guide

## 2 Photocouplers for Logic Signal Transmission

Features		Package									
Data Rate (Typ.)	Output	MFSOP6	SO6	SO8		SDIP6	DIP6	DIP8		JEDEC	
				1ch	2ch			1ch	2ch		
0.1 to 0.3 Mbit/s	Open-collector (Darlington)			TLP2403				TLP553		6N138 6N139	
1 Mbit/s	Open-collector	TLP112** TLP112A** TLP114A**	TLP109 TLP2309	TLP2409			TLP719	TLP512	TLP550 TLP551 TLP559 TLP651 TLP750 TLP751 TLP759	TLP2530 TLP2531	6N135 6N136
		TLP114A(IGM)**	TLP109(IGM) TLP104	TLP2404			TLP714		TLP559(IGM) TLP759(IGM) TLP754		
5 Mbit/s	Totem-pole	TLP105 TLP108	TLP2355 TLP2358	TLP2405 TLP2408	TLP2105 TLP2108	TLP715 TLP718		TLP2955 TLP2958			
		AC input	TLP2095 TLP2098								
	3-state							TLP555 TLP558 TLP2200			
10 Mbit/s	Open-collector	TLP113** TLP115** TLP115A**	TLP2362				TLP513	TLP552 TLP554 TLP2601 TLPN137	TLP2630 TLP2631 TLP2662	6N137	
15 to 20 Mbit/s	Totem-pole	5 V	TLP116**	TLP116A		TLP2116	TLP716				
		3.3 V	TLP2066			TLP2166A					
	3.3/5 V		TLP2366	TLP2466	TLP2160	TLP2766					
	Open-collector	5 V		TLP118	TLP2418	TLP2118E	TLP708				
3.3/5 V			TLP2368	TLP2468	TLP2168	TLP2768		TLP2962			
50 Mbit/s	Totem-pole	5 V	TLP117								

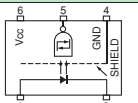
\*\* : Product Obsolescence \* : Under development as of July 2012. For the latest information, please contact your nearest Toshiba sales representative.

### Replacement Devices

New Device	Discontinued Devices
TLP109, TLP2309	TLP112, TLP112A, TLP114A
TLP109(IGM)	TLP114A(IGM)
TLP2362	TLP113, TLP115, TLP115A, TLP116

The new and discontinued devices are not exactly identical in terms of electrical characteristics. When you consider replacing any device with a new one, please go over a relevant datasheet and/or verify the fitness of the device in the end-use application environment.

### Photocouplers for Logic Signal Transmission at 50 Mbit/s (Typ.)

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Output Form	I <sub>FHL</sub> , I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
TLP117		MFSOP6 High speed: 50 Mbit/s V <sub>CC</sub> = 5 V	30 ns	Totem pole output (Inverter logic)	5 mA	3750 V <sub>rms</sub>	○/○	○ <sup>(1)</sup>	○ <sup>(1)</sup>		

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## Photocouplers for Logic Signal Transmission at 15 to 20 Mbit/s (Typ.)

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Output Form	I <sub>FHL</sub> /I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
TLP116A		<b>SO6</b> High speed: 20 Mbit/s V <sub>CC</sub> = 5 V	60 ns	Totem pole output (Inverter logic)	5 mA	3750 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP2116		<b>SO8</b> High speed: 15 Mbit/s V <sub>CC</sub> = 5 V Dual-channel version	75 ns	Totem pole output (Inverter logic)	5 mA	2500 Vrms	○/○	○ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP716 TLP716F		<b>SDIP6</b> High speed: 15 Mbit/s V <sub>CC</sub> = 5 V High isolation voltage	75 ns	Totem pole output (Inverter logic)	6.5 mA	5000 Vrms	○/○	○	○		
TLP2066		<b>MFSOP6</b> High speed: 20 Mbit/s V <sub>CC</sub> = 3.3 V	60 ns	Totem pole output (Inverter logic)	5 mA	3750 Vrms	○/	○ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP2166A		<b>SO8</b> High speed: 15 Mbit/s V <sub>CC</sub> = 3.3 V Dual-channel version	75 ns	Totem pole output (Inverter logic)	3 mA	2500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP2160		<b>SO8</b> V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max)	40 ns	Totem pole output (Inverter logic)	3.5 mA	2500 Vrms	○/○		○ <sup>(1)</sup>		
TLP2366		<b>SO6</b> V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max)	40 ns	Totem pole output (Inverter logic)	3.5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2466		<b>SO8</b> V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max)	40 ns	Totem pole output (Inverter logic)	3.5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2766		<b>SDIP6</b> V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max)	40 ns	Totem pole output (Inverter logic)	3.5 mA	5000 Vrms	○/○		○		
TLP118		<b>SO6</b> High speed: 20 Mbit/s V <sub>CC</sub> = 5 V T <sub>opr</sub> = 125°C (max)	60 ns	Open-collector (Inverter logic)	5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2418		<b>SO8</b> High speed: 15 Mbit/s V <sub>CC</sub> = 5 V T <sub>opr</sub> = 125°C (max)	75 ns	Open-collector (Inverter logic)	5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2118E		<b>SO8</b> High speed: 15 Mbit/s V <sub>CC</sub> = 5 V Dual-channel version	75 ns	Open-collector (Inverter logic)	5 mA	2500 Vrms	○/○		○ <sup>(1)</sup>		
TLP708 TLP708F		<b>SDIP6</b> High speed: 15 Mbit/s V <sub>CC</sub> = 5 V T <sub>opr</sub> = 125°C (max)	75 ns	Open-collector (Inverter logic)	5 mA	5000 Vrms	○/○		○		
TLP2368		<b>SO6</b> High speed: 20 Mbit/s V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max)	60 ns	Open-collector (Inverter logic)	5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

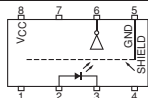
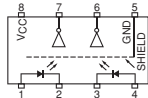
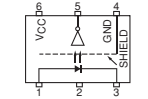
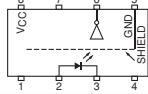
Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
 EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved  
 TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012  
 EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

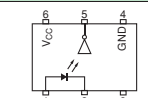
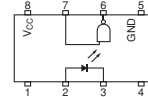
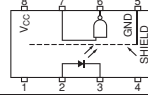
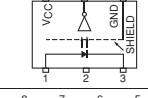
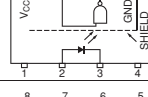
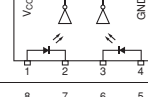
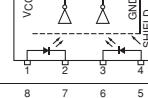
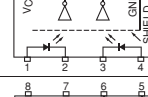
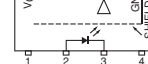
For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## Photocouplers for Logic Signal Transmission at 15 to 20 Mbit/s (Typ.) (Continued)

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Output Form	I <sub>FHL</sub> /I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
TLP2468		<b>SO8</b> High speed: 20 Mbit/s V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max)	60 ns	Open-collector (Inverter logic)	5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2168		<b>SO8</b> High speed: 20 Mbit/s V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max) Dual-channel version	60 ns	Open-collector (Inverter logic)	5 mA	2500 Vrms	○/○		○ <sup>(1)</sup>		
TLP2768		<b>SDIP6</b> High speed: 20 Mbit/s V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max)	60 ns	Open-collector (Inverter logic)	5 mA	5000 Vrms	○/○		○		
TLP2962 TLP2962F		<b>DIP8</b> V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max)	75 ns	Open-collector	5 mA	5000 Vrms	△/△		△		

## Photocouplers for Logic Signal Transmission at 10 Mbit/s (Typ.)

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Output Form	I <sub>FHL</sub> /I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
TLP513		<b>DIP6</b> 6-pin package version of the TLP552 V <sub>CC</sub> = 5 V	120 ns (T <sub>opr</sub> = 25°C)	Open-collector	5 mA	2500 Vrms	○/				
TLP552		<b>DIP8</b> Logic output V <sub>CC</sub> = 5 V	120 ns (T <sub>opr</sub> = 25°C)	Open-collector	5 mA	2500 Vrms	○/				
TLP554		<b>DIP8</b> High CMR version of the TLP552 V <sub>CC</sub> = 5 V	120 ns (T <sub>opr</sub> = 25°C)	Open-collector	5 mA	2500 Vrms	○/○		○		
TLP2362		<b>SO6</b> V <sub>CC</sub> = 3 to 20 V T <sub>opr</sub> = 125°C (max)	250 ns	Open-collector	5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2601		<b>DIP8</b> High CMR V <sub>CC</sub> = 5 V	75 ns (T <sub>opr</sub> = 25°C)	Open-collector	5 mA	2500 Vrms	○/○				
TLP2630		<b>DIP8</b> Dual-channel version of the 6N137 and the TLP552 V <sub>CC</sub> = 5 V	75 ns (T <sub>opr</sub> = 25°C)	Open-collector	5 mA	2500 Vrms	○/○				
TLP2631		<b>DIP8</b> High CMR Dual-channel version of the TLP554 V <sub>CC</sub> = 5 V	75 ns (T <sub>opr</sub> = 25°C)	Open-collector	5 mA	2500 Vrms	○/○				
TLP2662 TLP2662F		<b>DIP8</b> V <sub>CC</sub> = 3.3 V/5 V T <sub>opr</sub> = 125°C (max)	75 ns	Open-collector	5 mA	5000 Vrms	△/△		△		
TLPN137		<b>DIP8</b> High speed	75 ns	Open-collector	5 mA	5000 Vrms	△/△		△	△	△

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN60747-5-5- approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

## Photocouplers for Logic Signal Transmission at 5 Mbit/s (Typ.)

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Output Form	I <sub>FHL</sub> , I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
TLP105		<b>MFSOP6</b> V <sub>CC</sub> = 4.5 to 20 V IPM drive	250 ns	Totem pole output (Buffer logic)	1.6 mA	3750 Vrms	○/○	○ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP108		<b>MFSOP6</b> V <sub>CC</sub> = 4.5 to 20 V IPM drive	250 ns	Totem pole output (Inverter logic)	1.6 mA	3750 Vrms	○/○	○ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP555		<b>DIP8</b> Low input current V <sub>CC</sub> = 4.5 to 20 V	400 ns (T <sub>opr</sub> = 25°C)	3-state (Buffer logic)	1.6 mA	2500 Vrms	○/○				
TLP558		<b>DIP8</b> Inverting logic version of the TLP555 V <sub>CC</sub> = 4.5 to 20 V	400 ns (T <sub>opr</sub> = 25°C)	3-state (Inverter logic)	1.6 mA	2500 Vrms	○/○				
TLP715 TLP715F		<b>SDIP6</b> IPM drive High CMR V <sub>CC</sub> = 4.5 to 20 V	250 ns	Totem pole output (Buffer logic)	3 mA	5000 Vrms	○/○	○	○		
TLP718 TLP718F		<b>SDIP6</b> IPM drive High CMR V <sub>CC</sub> = 4.5 to 20 V	250 ns	Totem pole output (Inverter logic)	3 mA	5000 Vrms	○/○	○	○		
TLP2095		<b>MFSOP6</b> Dual polarity input version of the TLP105 V <sub>CC</sub> = 3 to 20 V	250 ns	Totem pole output (Buffer logic)	3 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2098		<b>MFSOP6</b> Dual polarity input version of the TLP108 V <sub>CC</sub> = 3 to 20 V	250 ns	Totem pole output (Inverter logic)	3 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2105		<b>SO8</b> Dual-channel version for the TLP105 V <sub>CC</sub> = 4.5 to 20 V	250 ns	Totem pole output (Buffer logic)	1.6 mA	2500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP2108		<b>SO8</b> Dual-channel version for the TLP108 V <sub>CC</sub> = 4.5 to 20 V	250 ns	Totem pole output (Inverter logic)	1.6 mA	2500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP2200		<b>DIP8</b> Low input current V <sub>CC</sub> = 4.5 to 20 V	400 ns	3-state (Buffer logic)	1.6 mA	2500 Vrms	○/○				
TLP2355		<b>SO6</b> V <sub>CC</sub> = 3 to 20 V T <sub>opr</sub> = 125°C (max)	250 ns	Totem pole output (Buffer logic)	1.6 mA	3750 Vrms	△/△		△ <sup>(1)</sup>		
TLP2358		<b>SO6</b> V <sub>CC</sub> = 3 to 20 V T <sub>opr</sub> = 125°C (max)	250 ns	Totem pole output (Inverter logic)	1.6 mA	3750 Vrms	△/△		△ <sup>(1)</sup>		

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN60747-5-5- approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## Photocouplers for Logic Signal Transmission at 5 Mbit/s (Typ.) (Continued)

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Output Form	I <sub>FHL</sub> , I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
TLP2405		<b>SO8</b> High speed: 5 Mbit/s V <sub>CC</sub> = 4.5 to 20 V	250 ns	Totem pole output (Buffer logic)	1.6 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2408		<b>SO8</b> High speed: 5 Mbit/s V <sub>CC</sub> = 4.5 to 20 V	250 ns	Totem pole output (Inverter logic)	1.6 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2955 TLP2955F		<b>DIP8</b> V <sub>CC</sub> = 3 to 20 V T <sub>opr</sub> = 125°C(max) Low input current	250 ns	Totem pole output (Buffer logic)	1.6 mA	5000 Vrms	△/△		△		
TLP2958 TLP2958F		<b>DIP8</b> V <sub>CC</sub> = 3 to 20 V T <sub>opr</sub> = 125°C(max) Low input current	250 ns	Totem pole output (Inverter logic)	1.6 mA	5000 Vrms	△/△		△		

## Photocouplers for Logic Signal Transmission at 1 Mbit/s (Typ.)

Part Number	Pin Configuration	Features	Data Rate (NRZ) (Typ.)	CTR	@I <sub>F</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
TLP109		<b>SO6</b>	1 Mbit/s	20% (min)	16 mA	3750 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP512		<b>DIP6</b> 6-pin package version of the TLP550	1 Mbit/s	20% (min)	16 mA	2500 Vrms	○/○				
TLP550		<b>DIP8</b> High CMR	1 Mbit/s	10% (min) (19% min for rank 0)	16 mA	2500 Vrms	○/○				
TLP551		<b>DIP8</b> Internal base connection	1 Mbit/s	10% (min) (19% min for rank 0)	16 mA	2500 Vrms	○/○				
TLP553		<b>DIP8</b> Low input drive current	300 kbit/s	400% (min)	0.5 mA	2500 Vrms	○/○				
TLP559		<b>DIP8</b> High CMR version of the TLP550	1 Mbit/s	20% (min)	16 mA	2500 Vrms	○/○				
TLP651		<b>DIP8</b> Internal base connection	1 Mbit/s	10% (min) (19% min for rank 0)	16 mA	5000 Vrms	○/○				

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

## Photocouplers for Logic Signal Transmission at 1 Mbit/s (Typ.) (Continued)

Part Number	Pin Configuration	Features	Data Rate (NRZ) (Typ.)	CTR	@IF	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
<b>TLP719</b> <b>TLP719F</b>		<b>SDIP6</b> High CMR	1 Mbit/s	20% (min)	16 mA	5000 Vrms	○/○	○	○		
<b>TLP750</b> <b>TLP750F</b>		<b>DIP8</b> High CMR SEMKO-approved	1 Mbit/s	10% (min) (19% min for rank 0)	16 mA	5000 Vrms	○/○	△	○	◎	△
<b>TLP751</b> <b>TLP751F</b>		<b>DIP8</b> Internal base connection SEMKO-approved	1 Mbit/s	10% (min)	16 mA	5000 Vrms	○/○	△	○	◎	△
<b>TLP759</b> <b>TLP759F</b>		<b>DIP8</b> IEC60950-compliant version of the TLP559 SEMKO-approved	1 Mbit/s	20% (min)	16 mA	5000 Vrms	○/○	○	○	◎	△
<b>TLP2309</b>		<b>SO6</b> V <sub>cc</sub> = 3.3 V/5 V T <sub>opr</sub> = 110°C (max)	1 Mbit/s	15% (min)	10 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
<b>TLP2403</b>		<b>SO8</b> Low input drive current	300 kbit/s	400% (min)	0.5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
<b>TLP2409</b>		<b>SO8</b> V <sub>cc</sub> = Up to 30 V T <sub>opr</sub> = 125°C (max)	1 Mbit/s	20% (min)	16 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
<b>TLP2530</b>		<b>DIP8</b> Dual-channel version of the 6N135 and the TLP550	1 Mbit/s	7% (min)	16 mA	2500 Vrms	○/○				
<b>TLP2531</b>		<b>DIP8</b> Dual-channel version of the 6N136 and the TLP550	1 Mbit/s	19% (min)	16 mA	2500 Vrms	○/○				

## IPM-Drive Photocouplers

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Output Form	I <sub>FHL</sub> /I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
<b>TLP104</b>		<b>SO6</b> V <sub>cc</sub> = Up to 30 V T <sub>opr</sub> = 125°C (max)	tp <sub>HL</sub> = 400 ns tp <sub>LH</sub> = 550 ns	Open-collector	5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
<b>TLP2404</b>		<b>SO8</b> V <sub>cc</sub> = Up to 30 V T <sub>opr</sub> = 125°C (max)	tp <sub>HL</sub> = 400 ns tp <sub>LH</sub> = 550 ns	Open-collector	5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		

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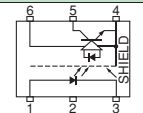
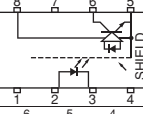
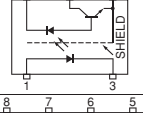
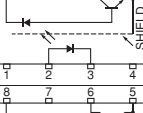
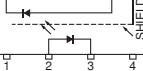
TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

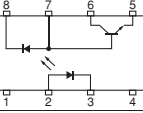
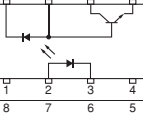
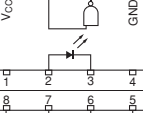
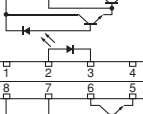
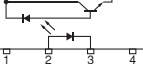
For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## IPM-Drive Photocouplers (Continued)

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Output Form/CTR	I <sub>FHL</sub> , I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>					
							UL/cUL	TÜV	VDE	BSI	IEC	
<b>TLP714</b> <b>TLP714F</b>		<b>SDIP6</b> V <sub>cc</sub> = Up to 30 V T <sub>opr</sub> = 125°C (max)	tp <sub>HL</sub> = 400 ns tp <sub>LH</sub> = 550 ns	Open-collector	5 mA	5000 V <sub>rms</sub>	○/○		○			
<b>TLP754</b> <b>TLP754F</b>		<b>DIP8</b> V <sub>cc</sub> = Up to 30 V T <sub>opr</sub> = 125°C (max)	tp <sub>HL</sub> = 400 ns tp <sub>LH</sub> = 550 ns	Open-collector	5 mA	5000 V <sub>rms</sub>	△/△		△			
<b>TLP109(IGM)</b>		<b>SO6</b> V <sub>cc</sub> = Up to 30 V	800 ns (T <sub>opr</sub> = 25°C)	Open-collector CTR = 25% (min) @I <sub>F</sub> = 10 mA, 25°C	–	3750 V <sub>rms</sub>	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>			
<b>TLP559(IGM)</b>		<b>DIP8</b> V <sub>cc</sub> = Up to 30 V	800 ns (T <sub>opr</sub> = 25°C)	Open-collector CTR = 25% (min) @I <sub>F</sub> = 10 mA, 25°C	–	2500 V <sub>rms</sub>	○/○					
<b>TLP759(IGM)</b> <b>TLP759F(IGM)</b>		<b>DIP8</b> V <sub>cc</sub> = Up to 30 V	800 ns (T <sub>opr</sub> = 25°C)	Open-collector CTR = 25% (min) @I <sub>F</sub> = 10 mA, 25°C	–	5000 V <sub>rms</sub>	○/○	○	○	◎	△	

## JEDEC-Compliant Photocouplers

Part Number	Pin Configuration	Features	Data Rate (NRZ) (Typ.)	CTR	I <sub>FHL</sub> , I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>					
							UL/cUL	TÜV	VDE	BSI	IEC	
<b>6N135</b>		JEDEC-compliant	1 Mbit/s	7% (min)	16 mA	2500 V <sub>rms</sub>	○/					
<b>6N136</b>		JEDEC-compliant	1 Mbit/s	19% (min)	16 mA	2500 V <sub>rms</sub>	○/					
<b>6N137</b>		JEDEC-compliant	10 Mbit/s	700% (typ.)	5 mA	2500 V <sub>rms</sub>	○/					
<b>6N138</b>		JEDEC-compliant High CTR	300 kbit/s	300% (min)	1.6 mA	2500 V <sub>rms</sub>	○/					
<b>6N139</b>		JEDEC-compliant High CTR	300 kbit/s	400% (min)	0.5 mA	2500 V <sub>rms</sub>	○/					

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved


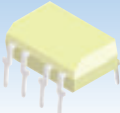


TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.



### 3 Photocouplers for IGBT/MOSFET Gate Drive

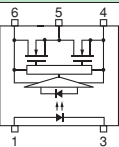
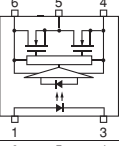
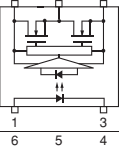
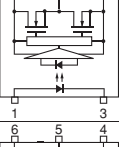
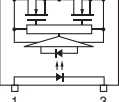
Package Output Peak Current				
	SDIP6	DIP8	SO6	SO8
± 0.25 A		TLP557		
± 0.45 A (max)	TLP705**			
± 0.6 A (max)	TLP701, TLP701A TLP701H, TLP705A	TLP351, TLP351A TLP351H	TLP151, TLP151A TLP155, TLP155E	TLP2451 TLP2451A
± 2.0 A (max)	TLP700			
± 2.5 A (max)	TLP700A TLP700H	TLP350, TLP350H TLP352	TLP152*	
± 6.0 A (max)		TLP358 TLP358H		

\*Under development as of July 2012. For the latest information, please contact your nearest Toshiba sales representative.

TLPxxxH: Guaranteed up to a Ta of 125°C

\*\* The TLP705A is recommended for new designs.

### Photocouplers for IGBT/MOSFET Gate Drive

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Peak Output Current	IFLH (Max)	BVs	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
TLP151		<b>SO6</b> V <sub>cc</sub> = 10 to 30 V I <sub>cc</sub> = 2 mA (max) T <sub>opr</sub> = 110°C (max)	0.7 μs	±0.6 A (max)	5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP151A		<b>SO6</b> V <sub>cc</sub> = 10 to 30 V I <sub>cc</sub> = 2 mA (max) T <sub>opr</sub> = 110°C (max)	0.5 μs	±0.6 A (max)	5 mA	3750 Vrms	○/○		△ <sup>(1)</sup>		
TLP152*		<b>SO6</b> V <sub>cc</sub> = 10 to 30 V I <sub>cc</sub> = 3 mA (max) T <sub>opr</sub> = 100°C (max)	0.2 μs	±2.5 A (max)	7.5 mA	3750 Vrms	△/△		△ <sup>(1)</sup>		
TLP155		<b>SO6</b> V <sub>cc</sub> = 10 to 30 V I <sub>cc</sub> = 3 mA (max) T <sub>opr</sub> = 100°C (max)	0.2 μs	±0.6 A (max)	7.5 mA	3750 Vrms	△/△		△ <sup>(1)</sup>		
TLP155E		<b>SO6</b> V <sub>cc</sub> = 10 to 30 V I <sub>cc</sub> = 3 mA (max) T <sub>opr</sub> = 100°C (max)	0.2 μs	±0.6 A (max)	7.5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## Photocouplers for IGBT/MOSFET Gate Drive

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Peak output Current	I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
<b>TLP350</b> <b>TLP350F</b>		<b>DIP8</b> V <sub>CC</sub> = 15 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 100°C (max)	0.5 μs	±2.5 A (max)	5 mA	3750 V <sub>rms</sub>	○/○	○	○		
<b>TLP350H</b> <b>TLP350HF</b>		<b>DIP8</b> V <sub>CC</sub> = 15 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 125°C (max)	0.5 μs	±2.5 A (max)	5 mA	3750 V <sub>rms</sub>	○/○		○		
<b>TLP351</b> <b>TLP351F</b>		<b>DIP8</b> V <sub>CC</sub> = 10 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 100°C (max)	0.7 μs	±0.6 A (max)	5 mA	3750 V <sub>rms</sub>	○/○	○	○		
<b>TLP351A</b> <b>TLP351AF</b>		<b>DIP8</b> V <sub>CC</sub> = 10 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 100°C (max)	0.5 μs	±0.6 A (max)	5 mA	3750 V <sub>rms</sub>	○/○			△	
<b>TLP351H</b> <b>TLP351HF</b>		<b>DIP8</b> V <sub>CC</sub> = 10 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 125°C (max)	0.7 μs	±0.6 A (max)	5 mA	3750 V <sub>rms</sub>	○/○		○		
<b>TLP352</b> <b>TLP352F</b>		<b>DIP8</b> V <sub>CC</sub> = 15 to 30 V I <sub>CC</sub> = 3 mA (max) T <sub>opr</sub> = 125°C (max)	0.2 μs	±2.5 A (max)	5 mA	3750 V <sub>rms</sub>	○/○			△	
<b>TLP358</b> <b>TLP358F</b>		<b>DIP8</b> V <sub>CC</sub> = 15 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 100°C (max)	0.5 μs	±6.0 A (max)	5 mA	3750 V <sub>rms</sub>	○/○	○	○		

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

## Photocouplers for IGBT/MOSFET Gate Drive (Continued)

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Peak output Current	I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
<b>TLP358H</b> <b>TLP358HF</b>		<b>DIP8</b> V <sub>CC</sub> = 15 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 125°C (max)	0.5 μs	±6.0 A (max)	5 mA	3750 Vrms	○/○	○	○		
<b>TLP557</b>		<b>DIP8</b> Direct drive of a power transistor	5 μs	Constant current output : 0.25 A	5 mA	2500 Vrms	○/○				
<b>TLP700</b> <b>TLP700F</b>		<b>SDIP6</b> V <sub>CC</sub> = 15 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 100°C (max)	0.5 μs	±2.0 A (max)	5 mA	5000 Vrms	○/○	○	○		
<b>TLP700A</b> <b>TLP700AF</b>		<b>SDIP6</b> V <sub>CC</sub> = 15 to 30 V I <sub>CC</sub> = 3 mA (max) T <sub>opr</sub> = 110°C (max)	0.2 μs	±2.5 A (max)	5 mA	5000 Vrms	△/△		△		
<b>TLP700H</b> <b>TLP700HF</b>		<b>SDIP6</b> V <sub>CC</sub> = 15 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 125°C (max)	0.5 μs	±2.5 A (max)	5 mA	5000 Vrms	○/○		○		
<b>TLP701</b> <b>TLP701F</b>		<b>SDIP6</b> V <sub>CC</sub> = 10 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 100°C (max)	0.7 μs	±0.6 A (max)	5 mA	5000 Vrms	○/○	○	○		
<b>TLP701A</b> <b>TLP701AF</b>		<b>SDIP6</b> V <sub>CC</sub> = 10 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 100°C (max)	0.5 μs	±0.6 A (max)	5 mA	5000 Vrms	○/○		○		
<b>TLP701H</b> <b>TLP701HF</b>		<b>SDIP6</b> V <sub>CC</sub> = 10 to 30 V I <sub>CC</sub> = 2 mA (max) T <sub>opr</sub> = 125°C (max)	0.7 μs	±0.6 A (max)	5 mA	5000 Vrms	○/○		○		
<b>TLP705**</b> <b>TLP705F**</b>		<b>SDIP6</b> V <sub>CC</sub> = 10 to 20 V I <sub>CC</sub> = 3 mA (max) T <sub>opr</sub> = 100°C (max) High speed (250 kHz)	0.2 μs	±0.45 A (max)	8 mA	5000 Vrms	○/○	○	○		

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

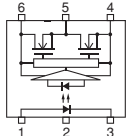
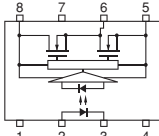
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

\*\* The TLP705A or TLP705AF is recommended for new designs.

# 4 Selection Guide

## Photocouplers for IGBT/MOSFET Gate Drive (Continued)

Part Number	Pin Configuration	Features	Propagation Delay Time (Max)	Peak Output Current	I <sub>FLH</sub> (Max)	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
							UL/cUL	TÜV	VDE	BSI	IEC
TLP705A TLP705AF		<b>SDIP6</b> V <sub>cc</sub> = 10 to 30 V I <sub>cc</sub> = 3 mA (max) T <sub>opr</sub> = 100°C (max) High speed (250 kHz)	0.2 μs	±0.6 A (max)	7.5 mA	5000 Vrms	○/○		○		
TLP2451		<b>SO8</b> V <sub>cc</sub> = 10 to 30 V I <sub>cc</sub> = 2 mA (max) T <sub>opr</sub> = 125°C (max)	0.7 μs	±0.6 A (max)	5 mA	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP2451A			0.5 μs								

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.










Note 2: Legend in the Safety Standards column:

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012  
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.







## 4 Photorelays (1-Form-A and 2-Form-A)

Package			Features								
											
Off-State Voltage (max) (V)	On-State Resistance (max) ( $\Omega$ )	On-State Current (max) (A)	USOP4	SSOP4	SO6	2.54SOP4	2.54SOP6	2.54SOP8	DIP4	DIP6	DIP8
20	8	0.16	TLP3330	TLP3230		TLP3130					
	5	0.2	TLP3350	TLP3250							
	1.2	0.3				TLP3131					
	1.2	0.45	TLP3331	TLP3231							
	0.22	0.9	TLP3303	TLP3203							
	0.075	3							TLP3553		
	0.05	2.5					TLP3100				
0.05	4								TLP3543		
40	20	0.1	TLP3342								
	15	0.12	TLP3316	TLP3216		TLP3116					
	14	0.12	TLP3340	TLP3240							
	10	0.14	TLP3341	TLP3241							
	3	0.25	TLP3314	TLP3214		TLP3114					
	1.5	0.3	TLP3315	TLP3215		TLP3115					
	0.13	1				TLP3123					
	0.11	2.5							TLP3554		
	0.06	2.5					TLP3102				
0.06	3.5								TLP3544		
50	1.5	0.3	TLP3375	TLP3275							
	50	0.07									
	50	0.1			TLP173A <sup>†</sup>						
60	15	0.12	TLP3351								
	2	0.4				TLP170A TLP171A TLP172A TLP176A	TLP192A TLP197A	TLP202A* TLP206A*			
	2	0.5							TLP220A TLP222A TLP227A	TLP598AA TLP592A TLP597A	TLP222A-2* TLP227A-2*
	1.5	0.4		TLP3212							
	1.2	0.35				TLP3110					
	1.1	0.5							TLP225A		
	1.5	0.4	TLP3312								
	0.7	1				TLP3122					
	0.2	1.5							TLP221A TLP3555		
	0.17	2									
	0.1	2.5								TLP3542	
	0.07	2.3						TLP3103			
	0.07	3								TLP3545	
75	2	0.4	TLP3306								
	25	0.04	TLP3318			TLP3118					
80	20	0.1				TLP3111					
	12	0.12	TLP3317	TLP3217							
	8	0.2	TLP3319			TLP3119					
	1.2	0.35				TLP3121					
	0.15	1.25					TLP3120				
100	14	0.08	TLP3320	TLP3220							
	0.67	1							TLP3556		
	0.2	1.4					TLP3105				
200	0.2	2								TLP3546	
	50	0.05				TLP179D TLP170D TLP171D TLP176D	TLP199D	TLP209D*			
	8	0.2					TLP197D	TLP200D*			
	8	0.25							TLP220D		

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

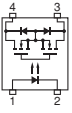
\* Dual-channel †: MFSOP6

# 4 Selection Guide

Package											
Off-State Voltage (max) (V)	On-State Resistance (max) (Ω)	On-State Current (max) (A)	USOP4	SSOP4	SO6	2.54SOP4	2.54SOP6	2.54SOP8	DIP4	DIP6	DIP8
350	50	0.1				TLP170G			TLP220G		
	50	0.12							TLP228G		TLP228G-2*
	35	0.11				TLP172G	TLP192G	TLP202G*			
400	35	0.12				TLP174G TLP176G	TLP197G	TLP206G*	TLP222G TLP224G TLP227G	TLP592G TLP597G	TLP222G-2* TLP224G-2* TLP227G-2*
	12	0.15				TLP171GA TLP176GA	TLP197GA	TLP206GA*	TLP227GA TLP220GA	TLP597GA TLP797GA	TLP227GA-2*
	35	0.12				TLP174GA			TLP224GA	TLP598GA TLP798GA	TLP224GA-2*
600	4	0.2						TLP3125			
	35	0.1								TLP797J	
	60	0.09				TLP171J TLP170J			TLP220J		

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.      \* Dual-channel †: MFSOP6

## MOSFET-Output Photorelays, 1-Form-A in a USOP4 Package

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards <sup>(2)</sup>				
				@IF					UL/cUL	TÜV	VDE	BSI	IEC
TLP3303		USOP4 Ultra-low On-resistance	3 mA	0.22 Ω	5 mA	0.9 A	20 V	500 Vrms	○/				
TLP3306*		USOP4 75-V V <sub>OFF</sub>	3 mA	2 Ω	5 mA	0.4 A	75 V	500 Vrms	△/				
TLP3312		USOP4 C <sub>OFF</sub> : 20 pF (typ.)	3 mA	1.5 Ω	5 mA	0.4 A	60 V	500 Vrms	○/				
TLP3314*		USOP4 Ultra-low CR	4 mA	3 Ω	5 mA	0.25 A	40 V	500 Vrms	△/				
TLP3315*		USOP4 Ultra-low CR	4 mA	1.5 Ω	5 mA	0.3 A	40 V	500 Vrms	△/				
TLP3316*		USOP4 Ultra-low CR	4 mA	15 Ω	5 mA	0.12 A	40 V	500 Vrms	△/				
TLP3317*		USOP4 Low CR	5 mA	12 Ω	5 mA	0.12 A	80 V	500 Vrms	△/				
TLP3318*		USOP4 Low CR	3 mA	25 Ω	5 mA	0.04 A	80 V	500 Vrms	△/				
TLP3319*		USOP4 Low CR	3 mA	8 Ω	5 mA	0.2 A	80 V	500 Vrms	△/				
TLP3320*		USOP4 100-V V <sub>OFF</sub>	5 mA	14 Ω	10 mA	0.08 A	100 V	500 Vrms	△/				
TLP3330*		USOP4 Ultra-low CR	4 mA	8 Ω	5 mA	0.16 A	20 V	500 Vrms	△/				
TLP3331*		USOP4 Ultra-low CR	4 mA	1.2 Ω	5 mA	0.45 A	20 V	500 Vrms	△/				
TLP3340		USOP4 Ultra-low CR	3 mA	14 Ω	5 mA	0.12 A	40 V	500 Vrms	○/				

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

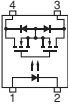
BSI and IEC: ○: Approved (supplementary or basic insulation)    ◎: Approved (reinforced insulation)    △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved    △: Design which meets safety standard/approval pending as of July 2012

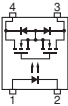
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

### MOSFET-Output Photorelays, 1-Form-A in a USOP4 Package (Continued)

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards <sup>(2)</sup>				
				@IF					UL/cUL	TÜV	VDE	BSI	IEC
TLP3341		<b>USOP4</b> Ultra-low CR	3 mA	10 Ω	5 mA	0.14 A	40 V	500 Vrms	○/				
TLP3342		<b>USOP4</b> Ultra-low COFF	3 mA	20 Ω	5 mA	0.1 A	40 V	500 Vrms	○/				
TLP3350		<b>USOP4</b> Ultra-low CR	3 mA	5 Ω	5 mA	0.2 A	20 V	500 Vrms	○/				
TLP3351		<b>USOP4</b> Ultra-low COFF	3 mA	15 Ω	5 mA	0.12 A	60 V	500 Vrms	○/				
TLP3375		<b>USOP4</b> COFF: 12 pF (typ.)	3 mA	1.5 Ω	5 mA	0.3 A	50 V	500 Vrms	△/				

### MOSFET-Output Photorelays, 1-Form-A in a SSOP4 Package

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards <sup>(2)</sup>				
				@IF					UL/cUL	TÜV	VDE	BSI	IEC
TLP3203		<b>SSOP4</b> COFF: 40 pF (typ.)	3 mA	0.22 Ω	5 mA	0.9 A	20 V	1500 Vrms	○/				
TLP3212		<b>SSOP4</b> COFF: 20 pF (typ.)	5 mA	1.5 Ω	5 mA	0.4 A	60 V	1500 Vrms	○/				
TLP3214		<b>SSOP4</b> COFF: 5 pF (typ.)	4 mA	3 Ω	5 mA	0.25 A	40 V	1500 Vrms	○/				
TLP3215		<b>SSOP4</b> COFF: 10 pF (typ.)	4 mA	1.5 Ω	5 mA	0.3 A	40 V	1500 Vrms	○/				
TLP3216		<b>SSOP4</b> COFF: 1 pF (typ.)	4 mA	15 Ω	5 mA	0.12 A	40 V	1500 Vrms	○/				
TLP3217		<b>SSOP4</b> COFF: 5 pF (typ.)	5 mA	12 Ω	5 mA	0.12 A	80 V	1500 Vrms	○/				
TLP3220		<b>SSOP4</b> COFF: 6 pF (typ.)	5 mA	14 Ω	10 mA	0.08 A	100 V	1500 Vrms	○/				
TLP3230		<b>SSOP4</b> COFF: 1 pF (typ.)	4 mA	8 Ω	5 mA	0.16 A	20 V	1500 Vrms	○/				
TLP3231		<b>SSOP4</b> COFF: 5 pF (typ.)	4 mA	1.2 Ω	5 mA	0.45 A	20 V	1500 Vrms	○/				
TLP3240		<b>SSOP4</b> COFF: 0.45 pF (typ.)	3 mA	14 Ω	5 mA	0.12 A	40 V	1500 Vrms	○/				
TLP3241		<b>SSOP4</b> COFF: 0.7 pF (typ.)	3 mA	10 Ω	5 mA	0.14 A	40 V	1500 Vrms	○/				
TLP3250		<b>SSOP4</b> COFF: 0.8 pF (typ.)	3 mA	5 Ω	5 mA	0.2 A	20 V	1500 Vrms	○/				
TLP3275		<b>SSOP4</b> COFF: 12 pF (typ.)	3 mA	1.5 Ω	5 mA	0.3 A	50 V	1500 Vrms	△/				

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## MOSFET Output, 1-Form-A, 2.54SOP4, MFSOP6 and SO6 Packages

Part Number	Pin Configuration	Features	I <sub>FT</sub> (Max)	R <sub>ON</sub> (Max)		I <sub>ON</sub> (Max)	V <sub>OFF</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
					@I <sub>F</sub>				UL/cUL	TÜV	VDE	BSI	IEC
TLP170A		<b>2.54SOP4</b> Low trigger LED current	1 mA	2 Ω	2 mA	0.4 A	60 V	1500 Vrms	○/○				
TLP170D		<b>2.54SOP4</b> Low trigger LED current	1 mA	8 Ω	2 mA	0.2 A	200 V	1500 Vrms	○/○				
TLP170G		<b>2.54SOP4</b> Low trigger LED current	1 mA	50 Ω	2 mA	0.1 A	350 V	1500 Vrms	○/○				
TLP170J		<b>2.54SOP4</b> Low trigger LED current	1 mA	60 Ω	2 mA	0.09 A	600 V	1500 Vrms	○/○				
TLP171A*		<b>2.54SOP4</b> Ultra-low trigger LED current	0.1 mA	2 Ω	0.2 mA	0.4 A	60 V	1500 Vrms	△/△				
TLP171D*		<b>2.54SOP4</b> Ultra-low trigger LED current	0.1 mA	8 Ω	0.2 mA	0.2 A	200 V	1500 Vrms	△/△				
TLP171GA*		<b>2.54SOP4</b> Ultra-low trigger LED current	0.1 mA	35 Ω	0.2 mA	0.12 A	400 V	1500 Vrms	△/△				
TLP171J*		<b>2.54SOP4</b> Ultra-low trigger LED current	0.1 mA	60 Ω	0.2 mA	0.09 A	600 V	1500 Vrms	△/△				
TLP172A		<b>2.54SOP4</b> C <sub>OFF</sub> : 130 pF (typ.)	3 mA	2 Ω	5 mA	0.4 A	60 V	1500 Vrms	○/○				
TLP172G		<b>2.54SOP4</b> C <sub>OFF</sub> : 30 pF (typ.)	3 mA	50 Ω	5 mA	0.11 A	350 V	1500 Vrms	○/○				
TLP173A		<b>MFSOP6</b> Low trigger LED current	2 mA	50 Ω	3 mA	0.07 A	60 V	3750 Vrms	○/○		○ <sup>(1)</sup>		
TLP174G		<b>2.54SOP4</b> SEMKO-approved Current-limiting function Limit current: 150 to 300 mA	3 mA	35 Ω	5 mA	0.12 A	350 V	1500 Vrms	○/○				
TLP174GA		<b>2.54SOP4</b> Current-limiting function Limit current: 150 to 300 mA	3 mA	35 Ω	5 mA	0.12 A	400 V	1500 Vrms	○/				
TLP175A*		<b>SO6</b> General-purpose Low trigger LED current	1 mA	50 Ω	2 mA	0.1 A	60 V	3750 Vrms	△/△				
TLP176A		<b>2.54SOP4</b> C <sub>OFF</sub> : 130 pF (typ.)	3 mA	2 Ω	5 mA	0.4 A	60 V	1500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP176D		<b>2.54SOP4</b> C <sub>OFF</sub> : 100 pF (typ.)	3 mA	8 Ω	5 mA	0.2 A	200 V	1500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP176G		<b>2.54SOP4</b> SEMKO-approved C <sub>OFF</sub> : 40 pF (typ.)	3 mA	35 Ω	5 mA	0.12 A	350 V	1500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>	○	△
TLP176GA		<b>2.54SOP4</b> C <sub>OFF</sub> : 70 pF (typ.)	3 mA	35 Ω	5 mA	0.12 A	400 V	1500 Vrms	○/			○	△
TLP179D		<b>2.54SOP4</b> C <sub>OFF</sub> : 15 pF (typ.)	3 mA	50 Ω	5 mA	0.05 A	200 V	1500 Vrms	○/○				
TLP3111		<b>2.54SOP4</b> C <sub>OFF</sub> : 11 pF (typ.)	4 mA	20 Ω	5 mA	0.1 A	80 V	1500 Vrms	○/				

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved


TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

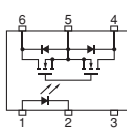
For the latest information, please contact your nearest Toshiba sales representative.



### MOSFET Output, 1-Form-A, 2.54SOP4, MFSOP6 and SO6 Packages (Continued)

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards <sup>(2)</sup>				
					@IF				UL/cUL	TÜV	VDE	BSI	IEC
TLP3114		<b>2.54SOP4</b> COFF: 5 pF (typ.)	4 mA	3 Ω	5 mA	0.25 A	40 V	1500 Vrms	○/○				
TLP3115		<b>2.54SOP4</b> COFF: 10 pF (typ.)	4 mA	1.5 Ω	5 mA	0.3 A	40 V	1500 Vrms	○/○				
TLP3116		<b>2.54SOP4</b> COFF: 1 pF (typ.)	4 mA	15 Ω	5 mA	0.12 A	40 V	1500 Vrms	○/○				
TLP3118		<b>2.54SOP4</b> COFF: 2.5 pF (typ.)	3 mA	25 Ω	5 mA	0.04 A	80 V	1500 Vrms	○/○				
TLP3119		<b>2.54SOP4</b> COFF: 6.5 pF (typ.)	3 mA	8 Ω	5 mA	0.2 A	80 V	1500 Vrms	○/○				
TLP3121		<b>2.54SOP4</b> COFF: 30 pF (typ.)	4 mA	1.2 Ω	5 mA	0.35 A	80 V	1500 Vrms	○/○				
TLP3122		<b>2.54SOP4</b> COFF: 90 pF (typ.)	3 mA	0.7 Ω	5 mA	1.0 A	60 V	1500 Vrms	○/○				
TLP3123		<b>2.54SOP4</b> COFF: 300 pF (typ.)	3 mA	0.13 Ω	5 mA	1 A	40 V	1500 Vrms	○/○				
TLP3130		<b>2.54SOP4</b> COFF: 1 pF (typ.)	4 mA	8 Ω	5 mA	0.16 A	20 V	1500 Vrms	○/○				
TLP3131		<b>2.54SOP4</b> COFF: 5 pF (typ.)	4 mA	1.2 Ω	5 mA	0.3 A	20 V	1500 Vrms	○/○				

### MOSFET-Output Photorelays, 1-Form-A in a 2.54SOP6 or 2.54SOP8 Package

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards <sup>(2)</sup>				
					@IF				UL/cUL	TÜV	VDE	BSI	IEC
TLP192A		<b>2.54SOP6</b> COFF: 130 pF (typ.)	3 mA	2 Ω	5 mA	0.4 A	60 V	1500 Vrms	○/○				
TLP192G		<b>2.54SOP6</b> COFF: 30 pF (typ.)	3 mA	50 Ω	5 mA	0.11 A	350 V	1500 Vrms	○/○				
TLP197A		<b>2.54SOP6</b> COFF: 130 pF (typ.)	3 mA	2 Ω	5 mA	0.4 A	60 V	1500 Vrms	○/○				
TLP197D		<b>2.54SOP6</b> COFF: 100 pF (typ.)	3 mA	8 Ω	5 mA	0.2 A	200 V	1500 Vrms	○/○				
TLP197G		<b>2.54SOP6</b> SEMKO-approved	3 mA	35 Ω	5 mA	0.12 A	350 V	1500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>	○	△
TLP197GA		<b>2.54SOP6</b> COFF: 70 pF (typ.)	3 mA	35 Ω	5 mA	0.12 A	400 V	1500 Vrms	○/○			○	△
TLP199D		<b>2.54SOP6</b> COFF: 15 pF (typ.)	3 mA	50 Ω	5 mA	0.05 A	200 V	1500 Vrms	○/○				
TLP3100		<b>2.54SOP6</b> ION = 2.5 A (max)	3 mA	0.05 Ω	5 mA	2.5 A	20 V	1500 Vrms	○/○				

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

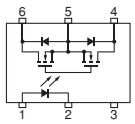
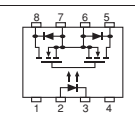
TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

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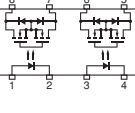
For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

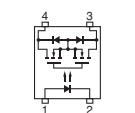
## MOSFET-Output Photorelays, 1-Form-A in a 2.54SOP6 or 2.54SOP8 Package (Continued)

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards (2)				
					@IF				UL/cUL	TÜV	VDE	BSI	IEC
TLP3102		<b>2.54SOP6</b> ION (DC) = 5 A (max); C-connection	3 mA	0.06 Ω	5 mA	2.5 A	40 V	1500 Vrms	○/○				
TLP3103		<b>2.54SOP6</b> ION (DC) = 4.6 A (max); C-connection	3 mA	0.07 Ω	5 mA	2.3 A	60 V	1500 Vrms	○/○				
TLP3105		<b>2.54SOP6</b> ION (DC) = 2.8 A (max); C-connection	3 mA	0.2 Ω	5 mA	1.4 A	100 V	1500 Vrms	○/○				
TLP3120		<b>2.54SOP6</b> ION = 1.25 A (max)	5 mA	0.15 Ω	5 mA	1.25 A	80 V	1500 Vrms	○/○				
TLP3125		<b>2.54SOP8</b> COFF: 410 pF (typ.)	3 mA	4 Ω	5 mA	0.2 A	400 V	1500 Vrms	○/○				

## MOSFET-Output Photorelays, 2-Form-A in a 2.54SOP8 Package

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards (2)				
					@IF				UL/cUL	TÜV	VDE	BSI	IEC
TLP200D		<b>2.54SOP8</b> Dual-channel version of the TLP176D	3 mA	8 Ω	5 mA	0.2 A	200 V	1500 Vrms	○/				
TLP202A		<b>2.54SOP8</b> Dual-channel version of the TLP172A	3 mA	2 Ω	5 mA	0.4 A	60 V	1500 Vrms	○/				
TLP202G		<b>2.54SOP8</b> Dual-channel version of the TLP172G	3 mA	50 Ω	5 mA	0.11 A	350 V	1500 Vrms	○/				
TLP206A		<b>2.54SOP8</b> Dual-channel version of the TLP176A	3 mA	2 Ω	5 mA	0.4 A	60 V	1500 Vrms	○/				
TLP206G		<b>2.54SOP8</b> Dual-channel version of the TLP176G	3 mA	35 Ω	5 mA	0.12 A	350 V	1500 Vrms	○/	△ <sup>(1)</sup>	○ <sup>(1)</sup>	○	△
TLP206GA		<b>2.54SOP8</b> Dual-channel version of the TLP176GA	3 mA	35 Ω	5 mA	0.12 A	400 V	1500 Vrms	○/			○	△
TLP209D		<b>2.54SOP8</b> Dual-channel version of the TLP179D	3 mA	50 Ω	5 mA	0.05 A	200 V	1500 Vrms	○/				

## MOSFET-Output Photorelays, 1-Form-A in a DIP4 Package

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards (2)				
					@IF				UL/cUL	TÜV	VDE	BSI	IEC
TLP220A TLP220AF		<b>DIP4</b> General-purpose Reinforced insulation	2 mA	2 Ω	5 mA	0.5 A	60 V	5000 Vrms	○/○		△	△	
TLP220D TLP220DF		<b>DIP4</b> General-purpose Reinforced insulation	2 mA	8 Ω	5 mA	0.25 A	200 V	5000 Vrms	○/○		△	△	
TLP220G TLP220GF		<b>DIP4</b> General-purpose Reinforced insulation	2 mA	50 Ω	5 mA	0.1 A	350 V	5000 Vrms	○/○		△	△	
TLP220GA TLP220GAF		<b>DIP4</b> General-purpose Reinforced insulation	2 mA	35 Ω	5 mA	0.12 A	400 V	5000 Vrms	○/○		△	△	
TLP220J TLP220JF		<b>DIP4</b> General-purpose Reinforced insulation	2 mA	60 Ω	5 mA	0.09 A	600 V	5000 Vrms	○/○		△	△	
TLP221A* TLP221AF*		<b>DIP4</b> General-purpose Reinforced insulation	2 mA	0.2 Ω	5 mA	2 A	40 V	5000 Vrms	△/△		△	△	

\*Under development. Specifications subject to change without notice. For the latest information, please contact your nearest Toshiba sales representative.

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

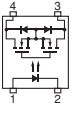
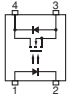
BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

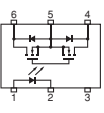
EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

## MOSFET-Output Photorelays, 1-Form-A in a DIP4 Package (Continued)

Part Number	Pin Configuration	Features	I <sub>FT</sub> (Max)	R <sub>ON</sub> (Max)		I <sub>ON</sub> (Max)	V <sub>OFF</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
					@I <sub>F</sub>				UL/cUL	TÜV	VDE	BSI	IEC
TLP222A		<b>DIP4</b> C <sub>OFF</sub> : 130 pF (typ.)	3 mA	2 Ω	5 mA	0.5 A	60 V	2500 V <sub>rms</sub>	○/○				
TLP222G		<b>DIP4</b> C <sub>OFF</sub> : 30 pF (typ.)	3 mA	50 Ω	5 mA	0.12 A	350 V	2500 V <sub>rms</sub>	○/○			○	△
TLP224G		<b>DIP4</b> SEMKO-approved Current-limiting function Limit current: 150 to 300 mA	3 mA	35 Ω	5 mA	0.12 A	350 V	2500 V <sub>rms</sub>	○/○			◎	△
TLP224GA		<b>DIP4</b> For modems Current-limiting function Limit current: 150 to 300 mA	3 mA	35 Ω	5 mA	0.12 A	400 V	2500 V <sub>rms</sub>	○/○				
TLP227A		<b>DIP4</b> SEMKO-approved C <sub>OFF</sub> : 130 pF (typ.)	3 mA	2 Ω	5 mA	0.5 A	60 V	2500 V <sub>rms</sub>	○/○				
TLP227G		<b>DIP4</b> SEMKO-approved C <sub>OFF</sub> : 40 pF (typ.)	3 mA	35 Ω	5 mA	0.12 A	350 V	2500 V <sub>rms</sub>	○/○	△	○	○	△
TLP227GA		<b>DIP4</b> SEMKO-approved	3 mA	35 Ω	5 mA	0.12 A	400 V	2500 V <sub>rms</sub>	○/○				
TLP228G		<b>DIP4</b> General-purpose, SEMKO-approved, High EMI immunity	3 mA	50 Ω	5 mA	0.12 A	350 V	2500 V <sub>rms</sub>	○/○			○	△
TLP3553		<b>DIP4</b> High output current: 3 A (max)	3 mA	0.075 Ω	5 mA	3 A	20 V	2500 V <sub>rms</sub>	○/○				
TLP3554		<b>DIP4</b> High output current: 2.5 A (max)	3 mA	0.11 Ω	5 mA	2.5 A	40 V	2500 V <sub>rms</sub>	○/○				
TLP3555		<b>DIP4</b> High output current: 2 A (max)	3 mA	0.17 Ω	5 mA	2 A	60 V	2500 V <sub>rms</sub>	○/○				
TLP3556		<b>DIP4</b> High output current: 1 A (max)	3 mA	0.67 Ω	5 mA	1 A	100 V	2500 V <sub>rms</sub>	○/○				
TLP225A			<b>DIP4</b> For DC use only	5 mA	1.1 Ω	10 mA	0.5 A	60 V	2500 V <sub>rms</sub>	○/○			

## MOSFET-Output Photorelays, 1-Form-A in a DIP6 Package

Part Number	Pin Configuration	Features	I <sub>FT</sub> (Max)	R <sub>ON</sub> (Max)		I <sub>ON</sub> (Max)	V <sub>OFF</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
					@I <sub>F</sub>				UL/cUL	TÜV	VDE	BSI	IEC
TLP592A		<b>DIP6</b> C <sub>OFF</sub> : 130 pF (typ.)	3 mA	2 Ω	5 mA	0.5 A	60 V	2500 V <sub>rms</sub>	○/○				
TLP592G		<b>DIP6</b> C <sub>OFF</sub> : 30 pF (typ.)	3 mA	50 Ω	5 mA	0.12 A	350 V	2500 V <sub>rms</sub>	○/○				
TLP597A		<b>DIP6</b> SEMKO-approved C <sub>OFF</sub> : 130 pF (typ.)	3 mA	2 Ω	5 mA	0.5 A	60 V	2500 V <sub>rms</sub>	○/○				
TLP597G		<b>DIP6</b> SEMKO-approved C <sub>OFF</sub> : 40 pF (typ.)	3 mA	35 Ω	5 mA	0.12 A	350 V	2500 V <sub>rms</sub>	○/○	△	○	◎	△
TLP597GA		<b>DIP6</b> SEMKO-approved C <sub>OFF</sub> : 70 pF (typ.)	3 mA	35 Ω	5 mA	0.12 A	400 V	2500 V <sub>rms</sub>	○/○				
TLP598AA		<b>DIP6</b> C <sub>OFF</sub> : 130 pF (typ.)	3 mA	2 Ω	5 mA	0.5 A	60 V	2500 V <sub>rms</sub>	○/○				
TLP598GA		<b>DIP6</b>	3 mA	12 Ω	5 mA	0.15 A	400 V	2500 V <sub>rms</sub>	○/○				

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## MOSFET-Output Photorelays, 1-Form-A in a DIP6 Package (Continued)

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
					@IF				UL/cUL	TÜV	VDE	BSI	IEC
TLP797GA TLP797GAF		<b>DIP6</b> COFF: 40 pF (typ.)	3 mA	35 Ω	5 mA	0.12 A	400 V	5000 Vrms	○/○	△	○	△	△
TLP797J TLP797JF		<b>DIP6</b> COFF: 120 pF (typ.)	5 mA	35 Ω	10 mA	0.1 A	600 V	5000 Vrms	○/○	△	○	△	△
TLP798GA		<b>DIP6</b>	5 mA	12 Ω	5 mA	0.15 A	400 V	5000 Vrms	○/○	△	△	△	△
TLP3542		<b>DIP6</b> High output current: 2.5 A (max) COFF: 400 pF (typ.)	3 mA	0.1 Ω	10 mA	2.5 A	60 V	2500 Vrms	○/○				
TLP3543		<b>DIP6</b> High output current: 4 A (max)	3 mA	0.05 Ω	5 mA	4 A	20 V	2500 Vrms	○/○				
TLP3544		<b>DIP6</b> High output current: 3.5 A (max)	3 mA	0.06 Ω	5 mA	3.5 A	40 V	2500 Vrms	○/○				
TLP3545		<b>DIP6</b> High output current: 3 A (max)	3 mA	0.07 Ω	5 mA	3 A	60 V	2500 Vrms	○/○				
TLP3546		<b>DIP6</b> High output current: 2 A (max)	3 mA	0.2 Ω	5 mA	2 A	100 V	2500 Vrms	○/○				

## MOSFET-Output Photorelays, 2-Form-A in a DIP8 Package

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
					@IF				UL/cUL	TÜV	VDE	BSI	IEC
TLP222A-2		<b>DIP8</b> Dual-channel version of the TLP222A	3 mA	2 Ω	5 mA	0.5 A	60 V	2500 Vrms	○/○				
TLP222G-2		<b>DIP8</b> Dual-channel version of the TLP222G SEMKO-approved	3 mA	50 Ω	5 mA	0.12 A	350 V	2500 Vrms	○/○			○	△
TLP224G-2		<b>DIP8</b> Dual-channel version of the TLP224G SEMKO-approved	3 mA	35 Ω	5 mA	0.12 A	350 V	2500 Vrms	○/○			○	△
TLP224GA-2		<b>DIP8</b> Current-limiting function Limit current: 150 to 300 mA	3 mA	35 Ω	5 mA	0.12 A	400 V	2500 Vrms	○/				
TLP227A-2		<b>DIP8</b> Dual-channel version of the TLP227A SEMKO-approved	3 mA	2 Ω	5 mA	0.5 A	60 V	2500 Vrms	○/○				△
TLP227G-2		<b>DIP8</b> Dual-channel version of the TLP227G SEMKO-approved	3 mA	35 Ω	5 mA	0.12 A	350 V	2500 Vrms	○/○	△	○	○	△
TLP227GA-2		<b>DIP8</b> Dual-channel version of the TLP227GA SEMKO-approved	3 mA	35 Ω	5 mA	0.12 A	400 V	2500 Vrms	○/				△
TLP228G-2		<b>DIP8</b> Dual-channel version of the TLP228G SEMKO-approved, High noise immunity	3 mA	50 Ω	5 mA	0.12 A	350 V	2500 Vrms	○/○			○	△

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012



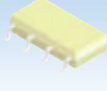


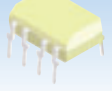
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4





For the latest information, please contact your nearest Toshiba sales representative.

## 5 Photorelays (1-Form-B, 2-Form-B and 1-Form-A/1-Form-B)

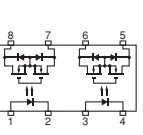
Features	Package								
	Off-State Voltage (max) (V)	On-State Resistance (max) ( $\Omega$ )	On-State Current (max) (A)	2.54SOP4	2.54SOP6	2.54SOP8	DIP4	DIP6	DIP8
1-Form-B, 2-Form-B	350	25	0.12	TLP4176G	TLP4197G	TLP4206G*			
		25	0.15				TLP4227G	TLP4597G	TLP4227G-2*
1-Form-A/ 1-Form-B	350	25	0.12			TLP4026G*			TLP4006G*

\*: Dual-channel

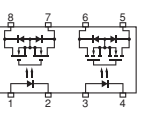
### MOSFET-Output Photorelays, 1-Form-B

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards <sup>(2)</sup>					
					@IF				UL/cUL	TÜV	VDE	BSI	IEC	
TLP4176G		2.54SOP4 1-Form-B	3 mA	25 $\Omega$	0 mA	0.12 A	350 V	1500 Vrms	○ /					
TLP4197G		2.54SOP6 1-Form-B	3 mA	25 $\Omega$	0 mA	0.12 A	350 V	1500 Vrms	○ /					
TLP4227G		DIP4 1-Form-B SEMKO-approved	3 mA	25 $\Omega$	0 mA	0.15 A	350 V	2500 Vrms	○ /					
TLP4597G		DIP6 1-Form-B SEMKO-approved	3 mA	25 $\Omega$	0 mA	0.15 A	350 V	2500 Vrms	○ /					

### MOSFET-Output Photorelays, 2-Form-B

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards <sup>(2)</sup>					
					@IF				UL/cUL	TÜV	VDE	BSI	IEC	
TLP4206G		2.54SOP8 Dual-channel version of the TLP4176G 2-Form-B	3 mA	25 $\Omega$	0 mA	0.12 A	350 V	1500 Vrms	○ /					
TLP4227G-2		DIP8 Dual-channel version of the TLP4227G 2-Form-B SEMKO-approved	3 mA	25 $\Omega$	0 mA	0.15 A	350 V	2500 Vrms	○ /					

### MOSFET-Output Photorelays, 1-Form-A/1-Form-B

Part Number	Pin Configuration	Features	IFT (Max)	RON (Max)		ION (Max)	VOFF	BVs	Safety Standards <sup>(2)</sup>					
					@IF				UL/cUL	TÜV	VDE	BSI	IEC	
TLP4026G		2.54SOP8 1a1b (N.C. + N.O.)	3 mA	25 $\Omega$	(Form-A) 5 mA (Form-B) 0 mA	0.12 A	350 V	1500 Vrms	○ /					
TLP4006G		DIP8 1a1b (N.C. + N.O.)	3 mA	25 $\Omega$	(Form-A) 5 mA (Form-B) 0 mA	0.12 A	350 V	2500 Vrms	$\Delta$ /					

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation)  $\Delta$ : Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved  $\Delta$ : Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## 6 Triac-Output Photocouplers

Package		MFSOP6		DIP6		DIP4/8/16	
		NZC	ZC	NZC	ZC	NZC	ZC
V <sub>DRM</sub>	Isolation voltage						
	2500 Vrms	<b>TLP160G</b>	<b>TLP161G</b>	<b>TLP560G</b>	<b>TLP561G</b>	<b>TLP525G/-2/-4</b>	
400 V	5000 Vrms			<b>TLP3022(S)</b> <b>TLP3023(S)</b>	<b>TLP3042(S)</b> <b>TLP3043(S)</b>		
	2500 Vrms	<b>TLP160J</b> <b>TLP165J</b>	<b>TLP161J</b> <b>TLP163J</b> <b>TLP166J</b> <b>TLP168J</b>	<b>TLP560J</b>	<b>TLP561J</b>		
600 V	3000 Vrms	<b>TLP260J</b>	<b>TLP261J</b>				
	3750 Vrms						
	4000 Vrms			<b>TLP762J</b>	<b>TLP763J</b>		
	5000 Vrms			<b>TLP3052(S)</b>	<b>TLP3762(S)</b> <b>TLP3062(S)</b> <b>TLP3063(S)</b> <b>TLP3064(S)</b>	<b>TLP360J</b>	<b>TLP361J</b> <b>TLP363J</b>
800 V	5000 Vrms			<b>TLP3082(S)</b> <b>TLP3782(S)</b> <b>TLP3783(S)</b>			

NZC: Non-zero cross  
ZC: Zero cross

### Triac-Output Photocouplers for Solid State Relays (SSRs)

Part Number	Pin Configuration	Features	I <sub>FT</sub> (Max)		V <sub>TM</sub> (Max)		V <sub>DRM</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank		@I <sub>TM</sub>				UL/c-UL	TÜV	VDE	BSI	IEC
<b>TLP160G</b>		<b>MFSOP6</b> Non-zero cross	-	10 mA	2.8 V	70 mA	400 V	2500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
			IFT7	7 mA									
			IFT5	5 mA									
<b>TLP161G</b>		<b>MFSOP6</b> Zero cross	-	10 mA	2.8 V	70 mA	400 V	2500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
			IFT7	7 mA									
			IFT5	5 mA									
<b>TLP160J</b> <b>TLP165J</b>		<b>MFSOP6</b> Non-zero cross	-	10 mA	2.8 V	70 mA	600 V	2500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
			IFT7	7 mA									
<b>TLP161J</b> <b>TLP166J</b>		<b>MFSOP6</b> Zero cross	-	10 mA	2.8 V	70 mA	600 V	2500 Vrms	○/○	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
			IFT7	7 mA									
<b>TLP168J</b>		<b>MFSOP6</b> Zero cross Low trigger current	-	3 mA	2.8 V	70 mA	600 V	2500 Vrms	○/○		○ <sup>(1)</sup>		
<b>TLP163J</b>		<b>MFSOP6</b> Zero cross High impulse noise immunity V <sub>N</sub> =2000 V (typ.)	-	10 mA	2.8 V	100 mA	600 V	2500 Vrms	○/○	△ <sup>(1)</sup>	△ <sup>(1)</sup>		

Note 1: The EN60747 safety standard for compact packages is different from that for standard DIP packages.

Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

### Triac-Output Photocouplers for Solid State Relays (SSRs) (Continued)

Part Number	Pin Configuration	Features	I <sub>FT</sub> (Max)		V <sub>TM</sub> (Max)		V <sub>DRM</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank		@I <sub>TM</sub>				UL/c-UL	TÜV	VDE	BSI	IEC
TLP260J		<b>MFSOP6</b> Non-zero cross	-	10 mA	2.8 V	70 mA	600 V	3000 V <sub>rms</sub>	○/	△ <sup>(1)</sup>	○ <sup>(1)</sup>		
TLP261J		<b>MFSOP6</b> Zero cross	-	10 mA	2.8 V	70 mA	600 V	3000 V <sub>rms</sub>	○/	△ <sup>(1)</sup>	○ <sup>(1)</sup>		

### Triac-Output Photocouplers for Office Equipment

Part Number	Pin Configuration	Features	I <sub>FT</sub> (Max)		V <sub>TM</sub> (Max)		V <sub>DRM</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank		@I <sub>TM</sub>				UL/c-UL	TÜV	VDE	BSI	IEC
TLP360J TLP360JF		<b>DIP4</b> Non-zero cross	-	10 mA	2.8 V	70 mA	600 V	5000 V <sub>rms</sub>	○/○	○	○		
			IFT7	7 mA									
TLP361J TLP361JF		<b>DIP4</b> Zero cross	-	10 mA	2.8 V	70 mA	600 V	5000 V <sub>rms</sub>	○/○	○	○		
			IFT7	7 mA									
TLP363J TLP363JF		<b>DIP4</b> Zero cross High impulse noise immunity V <sub>N</sub> = 2000 V (typ.)	-	10 mA	2.8 V	70 mA	600 V	5000 V <sub>rms</sub>	○/○	○	○		

### Triac-Output Photocouplers for AC 100 to 120 V Lines

Part Number	Pin Configuration	Features	I <sub>FT</sub> (Max)		V <sub>TM</sub> (Max)		V <sub>DRM</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank		@I <sub>TM</sub>				UL/c-UL	TÜV	VDE	BSI	IEC
TLP525G		<b>DIP4</b>	-	10 mA	3 V	100 mA	400 V	2500 V <sub>rms</sub>	○/○				
TLP525G-2		<b>DIP8</b> Dual-channel version of the TLP525G	-	10 mA	3 V	100 mA	400 V	2500 V <sub>rms</sub>	○/○				
TLP525G-4		<b>DIP16</b> 4-channel version of the TLP525G	-	10 mA	3 V	100 mA	400 V	2500 V <sub>rms</sub>	○/○				
TLP560G		<b>DIP6</b> General-purpose Non-zero cross	-	10 mA	3 V	100 mA	400 V	2500 V <sub>rms</sub>	○/○		○		
			IFT7	7 mA									
			IFT5	5 mA									

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012

EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## Triac-Output Photocouplers for AC 100 to 120 V Lines (Continued)

Part Number	Pin Configuration	Features	IFT (Max)		V <sub>TM</sub> (Max)		V <sub>DRM</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank		@ITM				UL/c-UL	TÜV	VDE	BSI	IEC
TLP561G		<b>DIP6</b> General-purpose Zero cross	-	10 mA	3 V	100 mA	400 V	2500 Vrms	○/○	○			
			IFT7	7 mA									
			IFT5	5 mA									
TLP3022(S) TLP3022F(S)		<b>DIP6</b> Direct replacement for XXX3020/3021/3022 SEMKO-approved Non-zero cross	-	10 mA	3 V	100 mA	400 V	5000 Vrms	○/○	△	○	◎	△
TLP3023(S) TLP3023F(S)		<b>DIP6</b> Direct replacement for XXX3023 SEMKO-approved Non-zero cross	-	5 mA	3 V	100 mA	400 V	5000 Vrms	○/○	△	○	◎	△
TLP3042(S) TLP3042F(S)		<b>DIP6</b> Direct replacement for XXX3040/3041/3042 SEMKO-approved Zero cross	-	10 mA	3 V	100 mA	400 V	5000 Vrms	○/○	△	○	◎	△
TLP3043(S) TLP3043F(S)		<b>DIP6</b> Direct replacement for XXX3043 SEMKO-approved Zero cross	-	5 mA	3 V	100 mA	400 V	5000 Vrms	○/○	△	○	◎	△

## Triac-Output Photocouplers for AC 200 to 240 V Line

Part Number	Pin Configuration	Features	IFT (Max)		V <sub>TM</sub> (Max)		V <sub>DRM</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank		@ITM				UL/c-UL	TÜV	VDE	BSI	IEC
TLP560J		<b>DIP6</b> General-purpose Non-zero cross	-	10 mA	3 V	100 mA	600 V	2500 Vrms	○/○	○			
			IFT7	7 mA									
TLP561J		<b>DIP6</b> General-purpose Zero cross	-	10 mA	3 V	100 mA	600 V	2500 Vrms	○/○	○			
			IFT7	7 mA									
TLP762J TLP762JF		<b>DIP6</b> Internal creepage: 4 mm (min) SEMKO-approved Non-zero cross-on	-	10 mA	3 V	100 mA	600 V	4000 Vrms	○/○	△	○	◎	△
TLP763J TLP763JF		<b>DIP6</b> Internal creepage: 4 mm (min) SEMKO-approved Zero cross	-	10 mA	3 V	100 mA	600 V	4000 Vrms	○/○	△	○	◎	△
TLP3052(S) TLP3052F(S)		<b>DIP6</b> High V <sub>DRM</sub> SEMKO-approved Non-zero cross-on	-	10 mA	3 V	100 mA	600 V	5000 Vrms	○/○	△	○	◎	△
TLP3062(S) TLP3062F(S)		<b>DIP6</b> SEMKO-approved High V <sub>DRM</sub> Zero cross	-	10 mA	3 V	100 mA	600 V	5000 Vrms	○/○	△	○	◎	△

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
 EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved  
 TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012  
 EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4  
 For the latest information, please contact your nearest Toshiba sales representative.



## Triac-Output Photocouplers for AC 200 to 240 V Line (Continued)

Part Number	Pin Configuration	Features	IFT (Max)		V <sub>TM</sub> (Max)		V <sub>DRM</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Rank			@ITM			UL/c-UL	TÜV	VDE	BSI	IEC
TLP3063(S) TLP3063F(S)		DIP6 SEMKO-approved High V <sub>DRM</sub> Zero cross	-	5 mA	3 V	100 mA	600 V	5000 Vrms	○/○	△	○	◎	△
TLP3064(S) TLP3064F(S)		DIP6 SEMKO-approved Low trigger current Zero cross	-	3 mA	3 V	100 mA	600 V	5000 Vrms	○/○	△	○	◎	△
TLP3762(S) TLP3762F(S)		DIP6 Zero cross High impulse noise immunity V <sub>N</sub> = 2000 V (typ.)	-	10 mA	3 V	100 mA	600 V	5000 Vrms	○/○	△	○		
TLP3082(S) TLP3082F(S)		DIP6 Zero cross	-	10 mA	3 V	100 mA	800 V	5000 Vrms	○/○	△	○		
TLP3782(S) TLP3782F(S)		DIP6 High impulse noise immunity V <sub>N</sub> = 1500 V (typ.) Zero cross	-	10 mA	3 V	100 mA	800 V	5000 Vrms	○/○	△	○		
TLP3783(S) TLP3783F(S)			-	5 mA	3 V	100 mA	800 V	5000 Vrms	○/○	△	○		

Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
 EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved  
 TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012  
 EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

## 7 Thyristor-Output Photocouplers

Package		Features		
V <sub>DRM</sub>	Isolation voltage	MFSOP6	DIP6	DIP8
400 V	2500 Vrms	TLP148G		
600 V	2500 Vrms		TLP548J	TLP549J
	4000 Vrms		TLP748J	

### Replacement Devices

New Device	Discontinued Devices		
TLP148G	TLP141G		
TLP548J	TLP541G	TLP545J	
TLP549J	TLP542G	TLP543J	
TLP748J	TLP641G/J	TLP741G/J	TLP747G/J

The new and discontinued devices are not exactly identical in terms of electrical characteristics. For device replacement, hardware evaluation must be performed in the real-world environment.

Part Number	Pin Configuration	Features	IFT		V <sub>TM</sub>		V <sub>DRM</sub>	BV <sub>s</sub>	Safety Standards <sup>(2)</sup>				
			Max		Max	@ITM			UL/cUL	TÜV	VDE	BSI	IEC
TLP148G		MFSOP6	10 mA		1.45 V	100 mA	400 V	2500 Vrms	○/○				
TLP548J		DIP6 Low trigger current	7 mA		1.45 V	100 mA	600 V	2500 Vrms	○/△				
TLP549J		DIP8 Long anode-cathode distance (SCR)	7 mA		1.45 V	100 mA	600 V	2500 Vrms	○/△				
TLP748J TLP748JF		DIP6	10 mA		1.45 V	100 mA	600 V	4000 Vrms	○/○		○	◎	




Note 2: Legend in the Safety Standards column:

BSI and IEC: ○: Approved (supplementary or basic insulation) ◎: Approved (reinforced insulation) △: Design which meets safety standard/approval pending as of July 2012  
 EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved  
 TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012  
 EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4



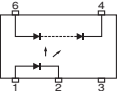
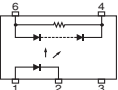


For the latest information, please contact your nearest Toshiba sales representative.

# 4 Selection Guide

## 8 Photovoltaic-Output photocouplers

Package		Features		
				
Short-Circuit Current	Open Voltage	SSOP4	MFSOP6	DIP6
		1500 Vrms	2500 Vrms	
5 $\mu$ A	7 V	<b>TLP3904</b>	<b>TLP3902</b>	
12 $\mu$ A	7 V		<b>TLP190B</b>	<b>TLP590B</b>
20 $\mu$ A	7 V	<b>TLP3914</b>		
24 $\mu$ A	7 V		<b>TLP191B*</b>	<b>TLP591B*</b>
4 $\mu$ A	30 V	<b>TLP3924</b>		

\*Built-in shunt resistor

Part Number	Pin Configuration	Features	Short-Circuit Current			Open-Circuit Voltage		BVs	Safety Standards <sup>(2)</sup>					
			Rank	Min	@I <sub>F</sub>	Min	@I <sub>F</sub>		UL/cUL	TÜV	VDE	BSI	IEC	
<b>TLP190B</b>		<b>MFSOP6</b>	—	12 $\mu$ A	10 mA	7 V	10 mA	2500 Vrms	○/○					
<b>TLP191B</b>		<b>MFSOP6</b> Built-in shunt resistor	—	24 $\mu$ A	20 mA	7 V	20 mA	2500 Vrms	○/○					
<b>TLP590B</b>		<b>DIP6</b>	—	12 $\mu$ A	10 mA	7 V	10 mA	2500 Vrms	○/					
			C20	20 $\mu$ A										
<b>TLP591B</b>		<b>DIP6</b> Built-in shunt resistor	—	24 $\mu$ A	20 mA	7 V	20 mA	2500 Vrms	○/					
<b>TLP3902</b>		<b>MFSOP6</b>	—	5 $\mu$ A	10 mA	7 V	10 mA	2500 Vrms	○/○					
<b>TLP3904</b>		<b>SSOP4</b>	—	5 $\mu$ A	10 mA	7 V	10 mA	1500 Vrms	○/					
<b>TLP3914</b>		<b>SSOP4</b>	—	20 $\mu$ A	10 mA	7 V	10 mA	1500 Vrms	○/					
<b>TLP3924</b>		<b>SSOP4</b> High open-circuit voltage	—	4 $\mu$ A	10 mA	30 V	10 mA	1500 Vrms	○/					

Note 2: Legend in the Safety Standards column:

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EN 60065- and IEC 60065-approved, EN 60950- and IEC 60950-approved

TÜV and VDE: ○: Approved △: Design which meets safety standard/approval pending as of July 2012

EN 60747-5-2- or EN 60747-5-5-approved with option V4 or D4

For the latest information, please contact your nearest Toshiba sales representative.

# 5 Part Naming Conventions

## 1. Transistor-Output, Darlington-Transistor-Output and IC-Output Photocouplers

**TLP** □□□□ □ **F** (□□ - □□□□ - □□□□, □, **F**)

Part number

Wide-spaced leads  
Specify this option, if necessary.

Safety standard option

CTR rank  
See respective datasheets.

RoHS COMPATIBLE\*

Revision code  
The revision code may be added to identify a revision of a device. For details, contact your nearest Toshiba sales representative.

Lead form option for DIP packages  
Select one of the lead form options shown on page 44.  
Carrier tape option  
Select one of the carrier tape options shown on pages 56.

Example 1: **TLP781(D4-GB-TP6,F**      Example 2: **TLP781F(GR,F)**  
 [D4] = EN60747-5-2 option      [F] = Wide-spaced leads  
 [GB] = CTR rank      [GR] = CTR rank  
 [TP6] = LF6 lead form      [F] = RoHS COMPATIBLE\*  
                                          Tape-and-reel packing  
 [F] = RoHS COMPATIBLE\*  
 The right parenthesis is omitted due to the limit to the number of characters.

## 2. Triac-Output and Thyristor-Output Photocouplers

**TLP** □□□□ □ **F** (□□ - □□□□ - □□□□, □, **F**)

Part number

V<sub>DRM</sub>  
G: 400 V  
J: 600 V  
L: 800 V

Wide-spaced leads

Safety standard option

I<sub>FT</sub> rank  
No character: No I<sub>FT</sub> rank specified  
IFTx: For example, IFT5 denotes the 5-mA rank.  
The available I<sub>FT</sub> ranks differ from product to product.  
See datasheets.

RoHS COMPATIBLE\*

Revision code

Lead form option for DIP packages  
Carrier tape option

Example 3: **TLP361J(D4-IFT7-TP1,S,F)**      [IFT7] = [T7] = I<sub>FT</sub> = 7 mA  
**TLP361J(D4T7TP1S,F)**      [TP1] = LF1 lead form  
 (Abbreviated due to the limit to      Tape-and-reel packing  
 the number of characters.)      [S] = [S] = Revision code: S  
 [J] = V<sub>DRM</sub>: 600 V      [F] = RoHS COMPATIBLE\*  
 [D4] = EN60747-5-2 option

## 3. Photorelays

**TLP** □□□□ □ **F** (□□ - □□□□, □, **F**)

Part number

V<sub>OFF</sub>  
A: 60 V  
D: 200 V  
G: 350 V  
GA: 400 V  
J: 600 V  
Some photorelays do not have a V<sub>OFF</sub> code in their names.  
See respective datasheets.

Wide-spaced leads

Safety standard option

RoHS COMPATIBLE\*

Revision code

Lead form option for DIP packages  
Carrier tape option

Example 4: **TLP227A(TP1,F)**      Example 5: **TLP3110(TP,F)**  
 [A] = V<sub>OFF</sub>: 60 V      [TP] = Tape-and-reel packing  
 [TP1] = LF1 lead form      [F] = RoHS COMPATIBLE\*  
                                          Tape-and-reel packing  
 [F] = RoHS COMPATIBLE\*

\*: "F" identifies the indication of product Labels with "[G]/RoHS COMPATIBLE".

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.





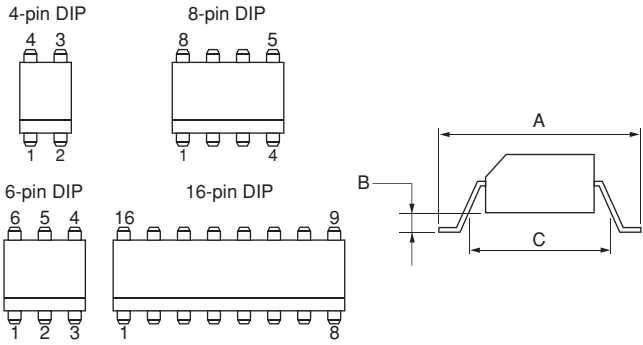
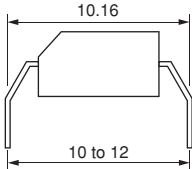
The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Note: The length of part names is limited to 18 characters. Longer names are abbreviated by omitting the "-" character and/or using shorthand symbols. However, be sure to give full part names when you have any inquiries. For details, please contact your nearest Toshiba sales representative.

# 6 Package Information

## 1 Lead Form Options for DIP Packages

The **DIP4**, **DIP6**, **DIP8** and **DIP16** packages offer three surface-mount lead form options and a wide-spaced lead form option. The electrical characteristics are identical, regardless of these options.

Lead Form	Surface-Mount			Wide-Spaced																																		
Appearance																																						
Lead Form Code	(LF1)	(LF4)	(LF5)	(LF2)																																		
Carrier Tape Code	(TP1)	(TP4)	(TP5)	Not available*																																		
Package Outlines	 <p><b>Dimensions</b> <span style="float: right;">Unit: mm</span></p> <table border="1"> <thead> <tr> <th rowspan="2">Version</th> <th colspan="2">(LF1)</th> <th colspan="2">(LF4)</th> <th colspan="2">(LF5)</th> </tr> <tr> <th>Min</th> <th>Max</th> <th>Min</th> <th>Max</th> <th>Min</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>–</td> <td>10.0</td> <td>–</td> <td>12.0</td> <td>–</td> <td>10.0</td> </tr> <tr> <td>B</td> <td colspan="2">(0.35 typ.)</td> <td colspan="2">(0.25 typ.)</td> <td>–</td> <td>0.2</td> </tr> <tr> <td>C</td> <td>6.4</td> <td>–</td> <td>8.0</td> <td>–</td> <td>6.4</td> <td>–</td> </tr> </tbody> </table> <p>All other package dimensions are the same as for each standard package specification.</p>			Version	(LF1)		(LF4)		(LF5)		Min	Max	Min	Max	Min	Max	A	–	10.0	–	12.0	–	10.0	B	(0.35 typ.)		(0.25 typ.)		–	0.2	C	6.4	–	8.0	–	6.4	–	
Version	(LF1)		(LF4)		(LF5)																																	
	Min	Max	Min	Max	Min	Max																																
A	–	10.0	–	12.0	–	10.0																																
B	(0.35 typ.)		(0.25 typ.)		–	0.2																																
C	6.4	–	8.0	–	6.4	–																																

\* Tape-and-reel packing is not available with (LF2).

Example 1: Standard part: TLP620(F)

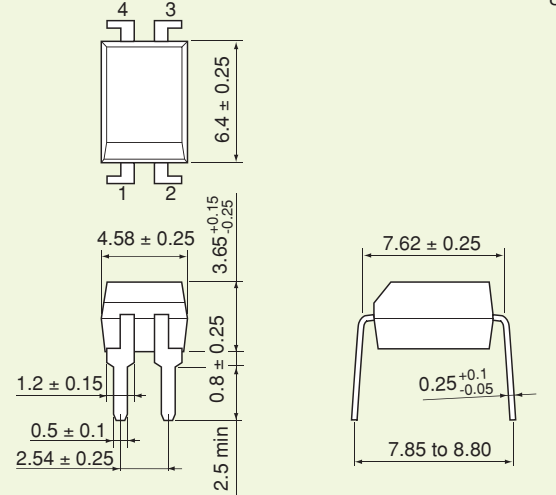
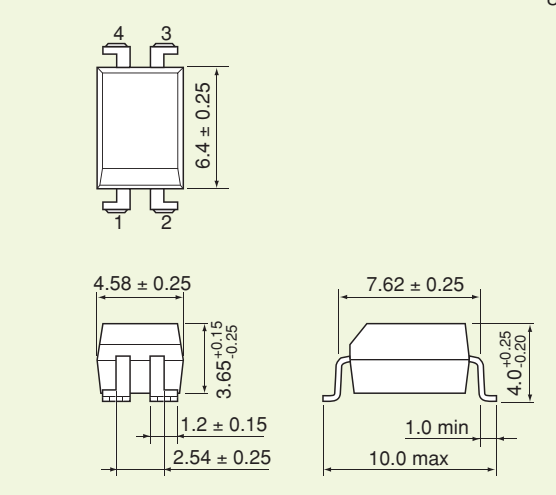
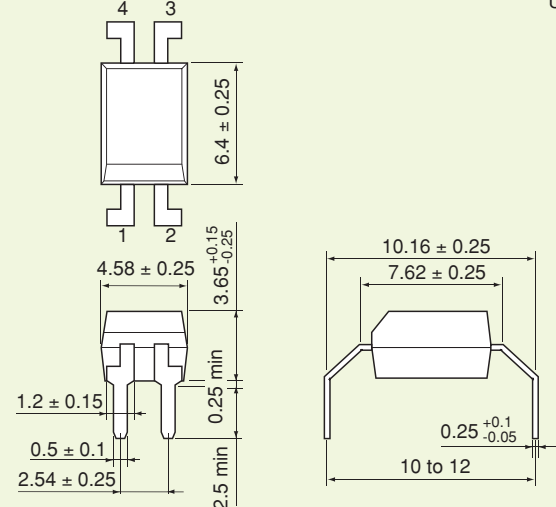
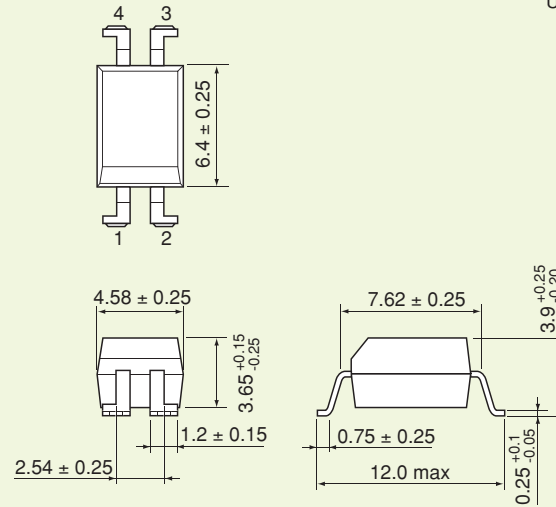
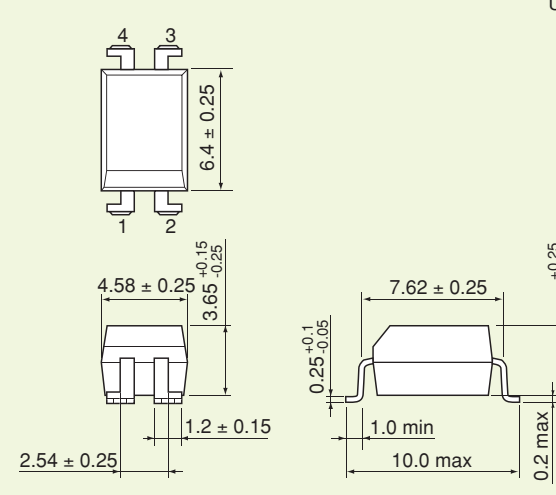
Surface-mount option: TLP620(LF1,F): Packed in stick magazines (see page 54).

Surface-mount and tape-and-reel options: TLP620(TP1,F): Packed in tape-and-reel (see page 56).

- Standard part names should be used when applying for safety standard approval.
- The package dimensions and lead form options of the TLP781, TLP785 differ from those shown above. See the TLP781, TLP785 datasheet.

\*All dimensions are for reference only unless tolerance is given.

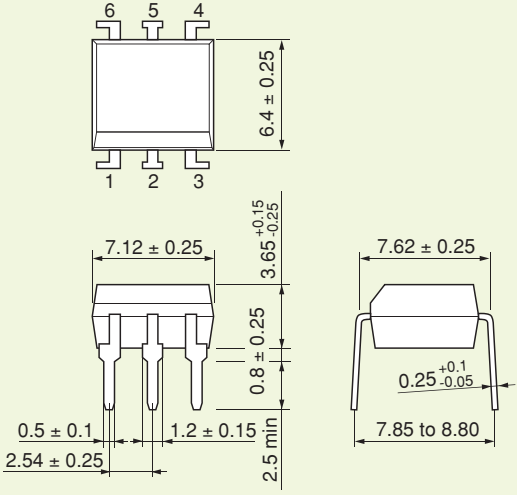
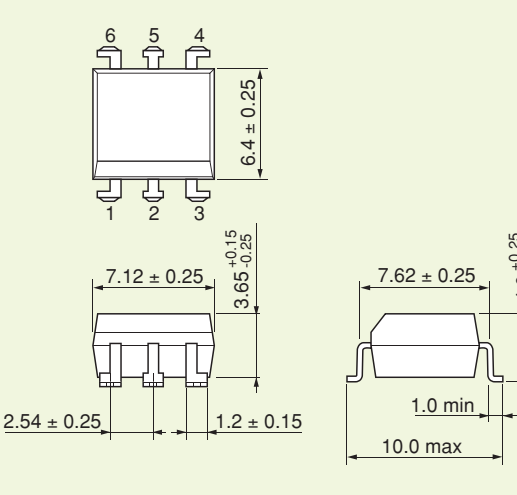
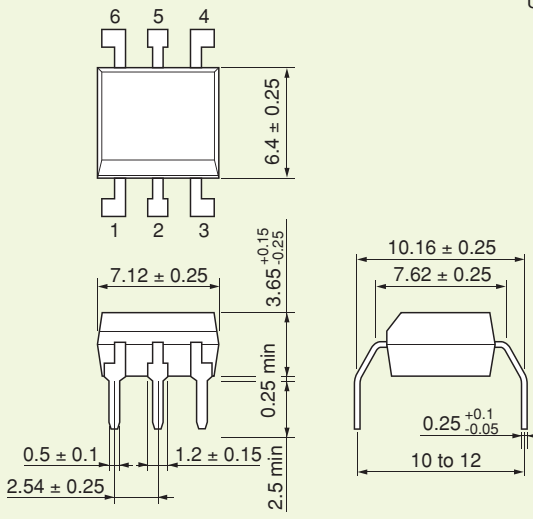
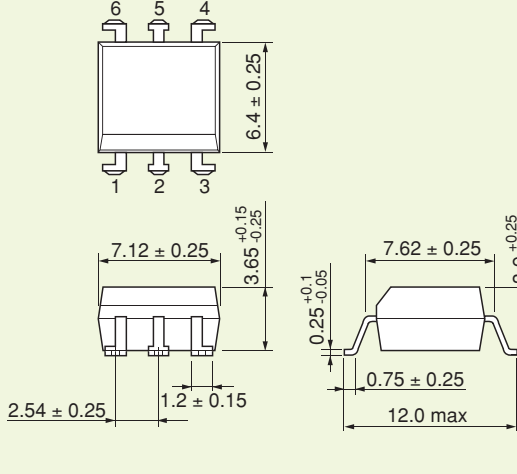
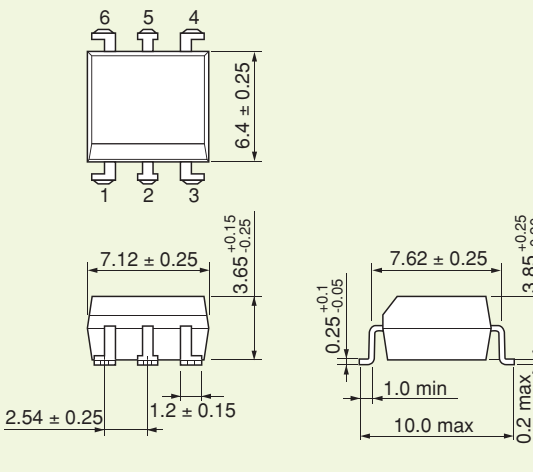
## 2 Package Dimensions (4-Pin DIP)

Standard	DIP4 (LF1) / (TP1)
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DIP4 (LF2)	DIP4 (LF4) / (TP4)
<p style="text-align: right;">Unit: mm</p> 	<p style="text-align: right;">Unit: mm</p> 
DIP4 (LF5) / (TP5)	
<p style="text-align: right;">Unit: mm</p> 	

# 6 Package Information

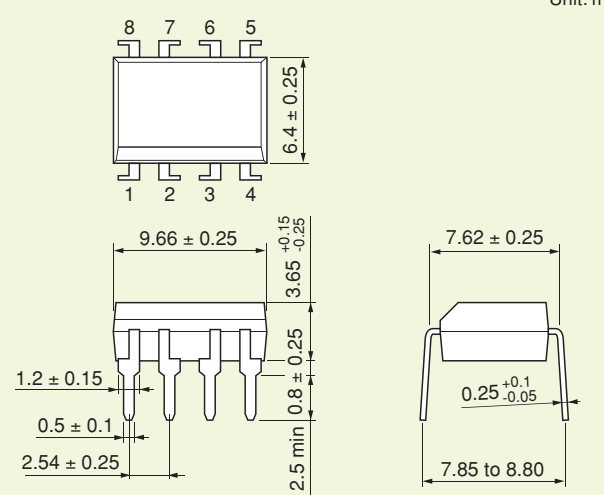
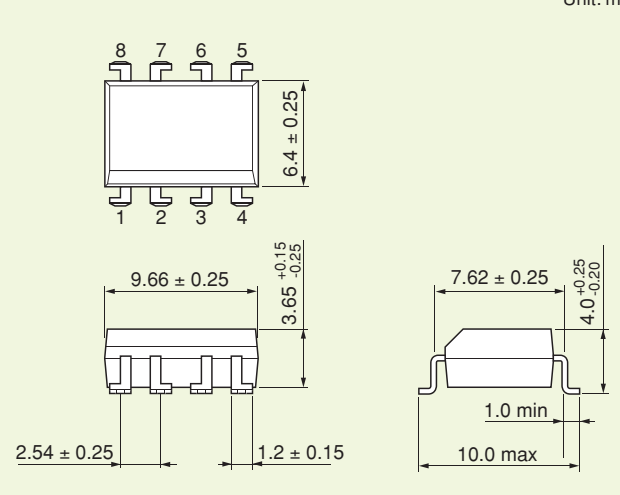
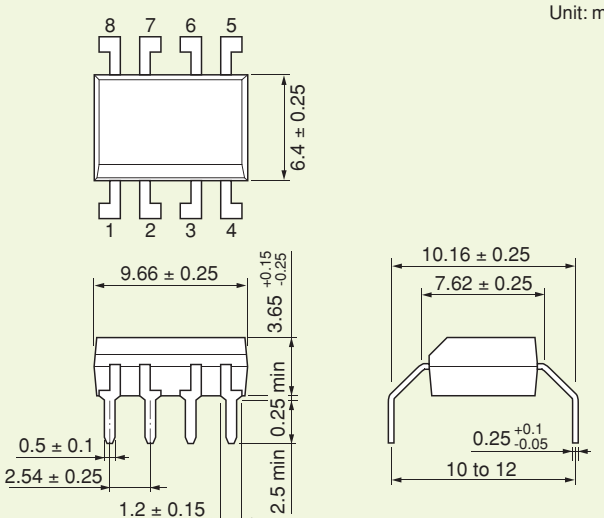
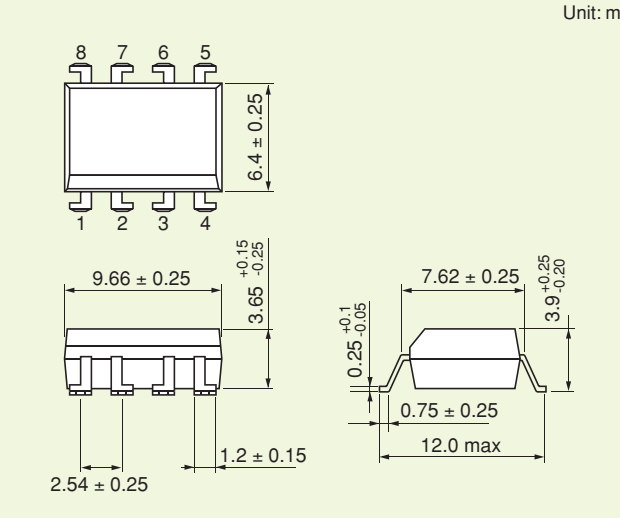
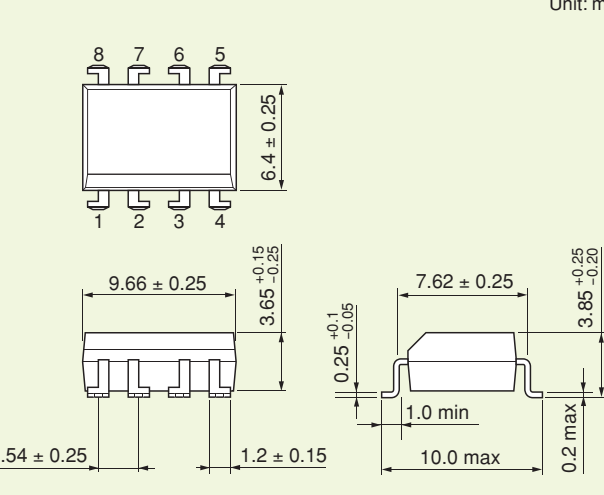
\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (6-Pin DIP)

Standard	DIP6 (LF1) / (TP1)
<p><b>DIP6</b></p> <p>Unit: mm</p> 	<p><b>DIP6 (LF1) / (TP1)</b></p> <p>Unit: mm</p> 
<p><b>DIP6 (LF2)</b></p> <p>Unit: mm</p> 	<p><b>DIP6 (LF4) / (TP4)</b></p> <p>Unit: mm</p> 
<p><b>DIP6 (LF5) / (TP5)</b></p>	
<p>Unit: mm</p> 	

\*All dimensions are for reference only unless tolerance is given.

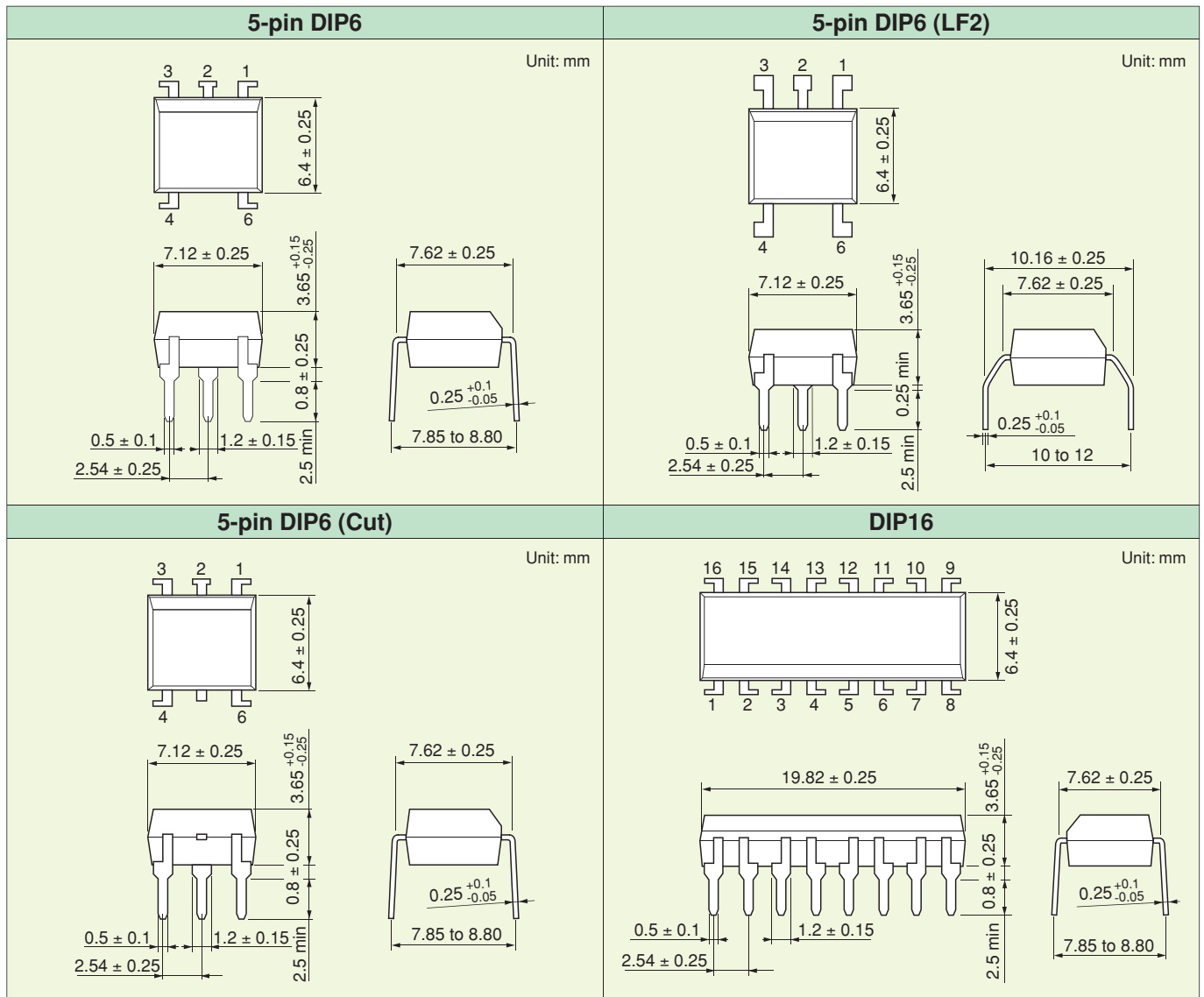
## 2 Package Dimensions (8-Pin DIP)

Standard	DIP8 (LF1) / (TP1)
<p style="text-align: right;">Unit: mm</p> 	<p style="text-align: right;">Unit: mm</p> 
DIP8 (LF2)	DIP8 (LF4) / (TP4)
<p style="text-align: right;">Unit: mm</p> 	<p style="text-align: right;">Unit: mm</p> 
DIP8 (LF5) / (TP5)	
<p style="text-align: right;">Unit: mm</p> 	

# 6 Package Information

\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (Other DIP Packages)





\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (Surface Mount)

<p style="text-align: center;"><b>5-pin SO6</b></p> <p style="text-align: right;">Unit: mm</p> <p>Top view dimensions: 4.55 +0.25 / -0.15, 3.7 +0.25 / -0.15, 1, 3, 4, 5, 6.</p> <p>Side view dimensions: 7.0 ± 0.4, 0.15, 0.1, 2.1 ± 0.1, 0.4, 1.27, 2.54.</p> <p>Cross-sectional view dimensions: 0.5 min.</p>	<p style="text-align: center;"><b>SO8</b></p> <p style="text-align: right;">Unit: mm</p> <p>Top view dimensions: 3.95 ± 0.25, 1, 2, 3, 4, 5, 6, 7, 8.</p> <p>Side view dimensions: 5.1 ± 0.2, 2.5 ± 0.2, 0.1 ± 0.1, 1.27 ± 0.15, 0.38.</p> <p>Cross-sectional view dimensions: 6.0 ± 0.2, 0.305 min.</p>
<p style="text-align: center;"><b>SO4</b></p> <p style="text-align: right;">Unit: mm</p> <p>Top view dimensions: 2.6 +0.25 / -0.15, 4, 3, 4.55 +0.25 / -0.15, 1, 2.</p> <p>Side view dimensions: 7.0 ± 0.4, 0.15, 2.1 ± 0.1, 0.1, 1.27, 0.38 ± 0.1, 0.15 M A.</p> <p>Cross-sectional view dimensions: 0.5 min.</p>	<p style="text-align: center;"><b>SO16</b></p> <p style="text-align: right;">Unit: mm</p> <p>Top view dimensions: 10.3 +0.25 / -0.15, 16, 15, 14, 13, 12, 11, 10, 9, 4.55 +0.25 / -0.15, 1, 2, 3, 4, 5, 6, 7, 8.</p> <p>Side view dimensions: 7.0 ± 0.4, 2.1 ± 0.1, 0.15, 0.1, 1.27, 0.4 ± 0.1, 0.15 M A.</p> <p>Cross-sectional view dimensions: 0.5 min.</p>
<p style="text-align: center;"><b>4-pin SO6</b></p> <p style="text-align: right;">Unit: mm</p> <p>Top view dimensions: 4.55 +0.25 / -0.15, 6, 4, 3.7 +0.25 / -0.15, 1, 3.</p> <p>Side view dimensions: 7.0 ± 0.4, 0.15, 2.1 ± 0.1, 0.4, 1.27, 2.54 ± 0.25, 0.1.</p> <p>Cross-sectional view dimensions: 0.5 min.</p>	<p style="text-align: center;"><b>SDIP6</b></p> <p style="text-align: right;">Unit: mm</p> <p>Top view dimensions: 4.58 ± 0.25, 6, 5, 4, 6.8 ± 0.25, 1, 2, 3.</p> <p>Side view dimensions: 3.65 +0.15 / -0.25, 0.25 +0.10 / -0.05, 1.27 ± 0.2, 0.4 ± 0.1, 7.62 ± 0.25, 4.0 +0.25 / -0.20.</p> <p>Cross-sectional view dimensions: 9.7 ± 0.3, 1.25 ± 0.25.</p>

# 6 Package Information

\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (Surface Mount)(Continued)

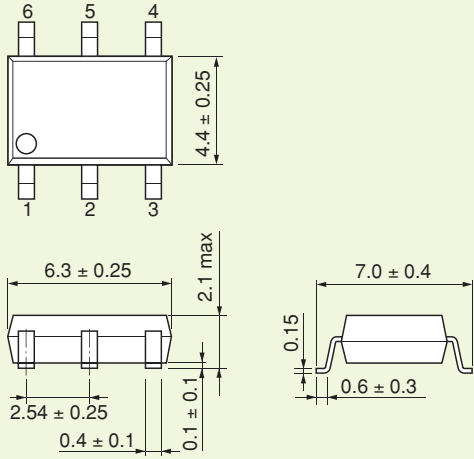
SDIP6 (F type)	4-pin MFSOP6
<p>Unit: mm</p>	<p>Unit: mm</p>
5-pin MFSOP6	4-pin MFSOP6 (No.5Cut)
<p>Unit: mm</p>	<p>Unit: mm</p>
SOP4	2.54SOP4
<p>Unit: mm</p>	<p>Unit: mm</p>

\*All dimensions are for reference only unless tolerance is given.

## 2 Package Dimensions (Surface Mount)(Continued)

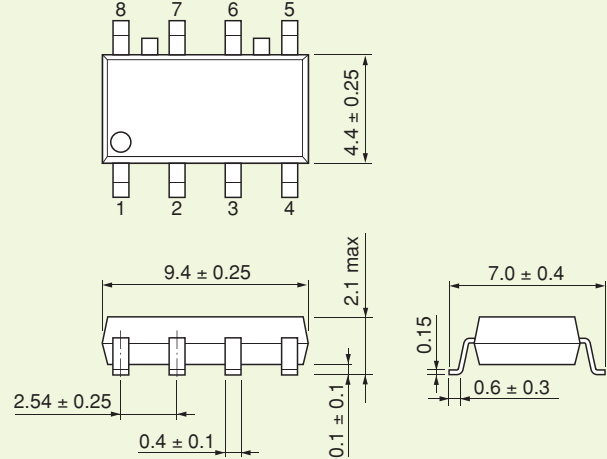
**2.54SOP6**

Unit: mm



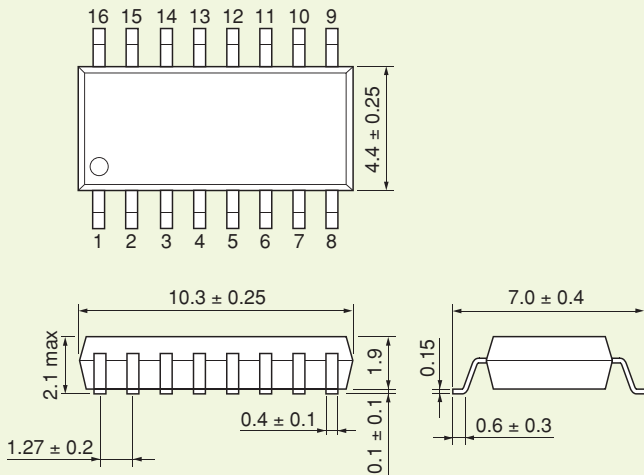
**2.54SOP8**

Unit: mm



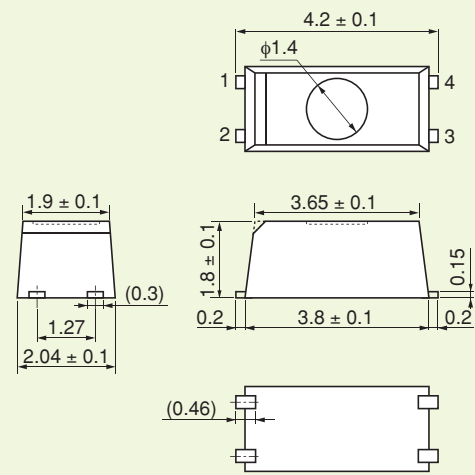
**SOP16**

Unit: mm



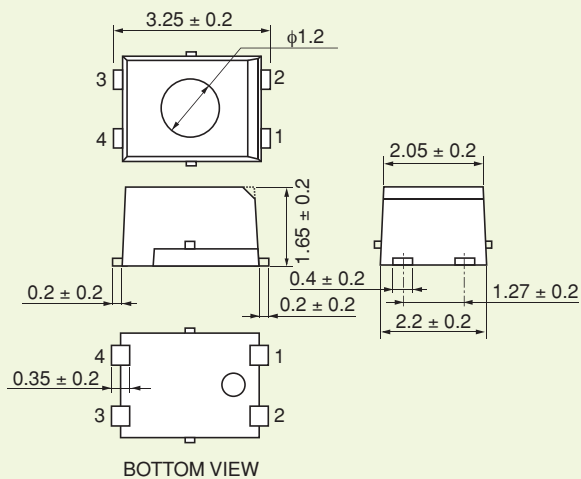
**SSOP4**

Unit: mm



**USOP4**

Unit: mm



# 6 Package Information

## 3 Rank Marking

Transistor-output photocouplers are ranked according to their CTR ranges, whereas thyristor-output and triac-output photocouplers are ranked according to their maximum I<sub>FT</sub> value. The following gives the rank classifications and rank marks printed on packages. Note that the rank classifications differ from product to product. For details, please refer to the relevant technical datasheets.

### 1. CTR Rank Name and Rank Marking

Available CTR Rank Selection (○: Available, △: Contact Toshiba)

Part Number	Rank Name								
	None	GB	Y	GR	BL	YH	GRL	GRH	BLL
TLP184	○	○	○	○					○
TLP185	○	○	○	○		○	○	○	○
TLP280-4	○	○							
TLP281-4	○	○							
TLP290	○	○	○	○					○
TLP291	○	○	○	○		○	○	○	○
TLP290-4	○	○							
TLP291-4	○	○							
TLP531/532	○	○	△	○	△				
TLP620	○	○	△	○	△				
TLP620-2	○	○							
TLP620-4	○	○							
TLP630	○	○	△	○	△				
TLP631/632	○	○	△	○	△				
TLP731/732	○	○	△	○	△				
TLP733/734	○	○	△	○	△				

Part Number	Rank Name	CTR	CTR Rank
TLP185 TLP291	None	50 to 400%	Blank, YE, GR, GB, Y+, G, G+, B
	Y	50 to 150%	YE
	GR	100 to 300%	GR
	GB	100 to 400%	GB
	YH	75 to 150%	Y+
	GRL	100 to 200%	G
	GRH	150 to 300%	G+
	BLL	200 to 400%	B

Part Number	Rank Name	CTR	CTR Rank
TLP531 TLP631 TLP632 TLP731 TLP732 TLP733F TLP734F	None	50 to 600%	Blank, Y, Y <sup>■</sup> , YE, G, G <sup>■</sup> , GR, B, B <sup>■</sup> , BL, GB
	Y	50 to 150%	YE
	GR	100 to 300%	GR
	GB	100 to 600%	GB
	BL	200 to 600%	BL
	GRL	100 to 200%	G
	GRH	150 to 300%	G <sup>■</sup>

Part Number	Rank Name	CTR	CTR Rank
TLP184 TLP290	None	50 to 400%	Blank, YE, GR, GB, B
	Y	50 to 150%	YE
	GR	100 to 300%	GR
	BLL	200 to 400%	B
	GB	100 to 400%	GB

Part Number	Rank Name	CTR	CTR Rank
TLP620 TLP630	None	50 to 600%	Blank, YE, GR, BL, GB
	Y	50 to 150%	YE
	GR	100 to 300%	GR
	GB	100 to 600%	GB
	BL	200 to 600%	BL
	GRL	100 to 200%	G
	GRH	150 to 300%	G <sup>■</sup>

Part Number	Rank Name	CTR	CTR Rank
TLP290-4 TLP291-4	None	50 to 400%	Blank
	GB	100 to 400%	GB

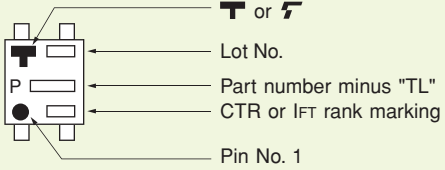
Part Number	Rank Name	CTR	CTR Rank
TLP280-4 TLP281-4 TLP620-2 TLP620-4	None	50 to 600%	Blank, GB
	GB	100 to 600%	GB


## 2. LED Trigger Current (IFT) Ranking and Marking

Rank Name	IFT	IFT Rank Marking
None	IFT max	Blank, T7, T5
IFT7	7 mA max	T7, T5
IFT5	5 mA max	T5
IFT2	2 mA max	T2 (only for photorelays)

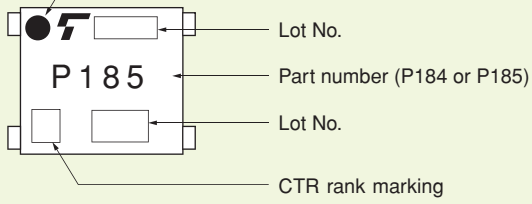
## 3. Marking Examples

(a) 4-pin mini-flat 1-channel type

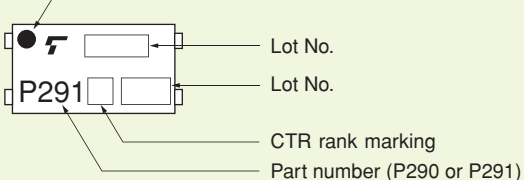


(Example: TLP626 : P626  
TLP785 : P785  TLP626)

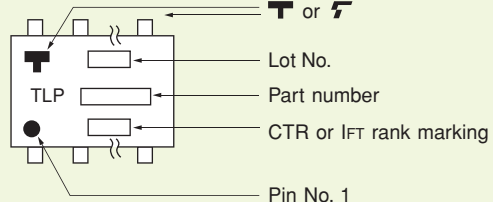
(b) TLP184, TLP185




(c) TLP290, TLP291



(d) Others



(Example: TLP620-2 : TLP620-2  
TLP666GF : TLP666GF  TLP620-2)

Note: When ordering a standard photocoupler, add a CTR or IFT rank in parentheses to the standard part number.

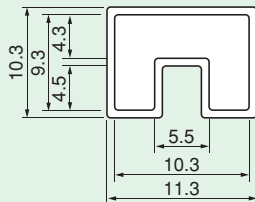
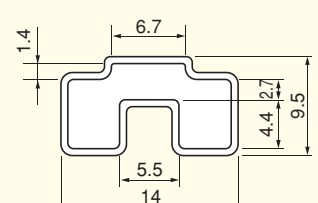
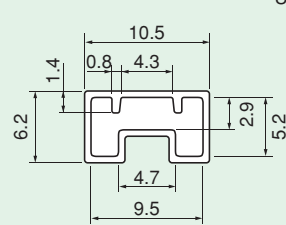
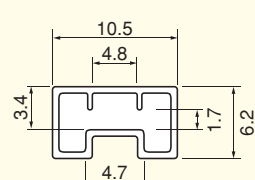
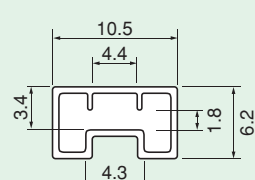
Examples: **TLP185(GB)** **TLP785(GR)**

Use the standard part number when applying for safety standard approval.

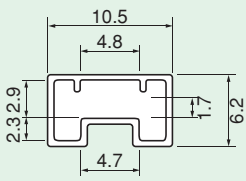
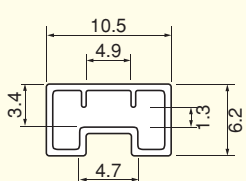
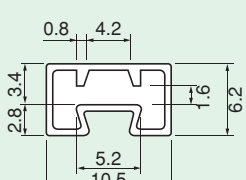
Example  $\frac{\text{Part number}}{\text{TLP291(GB)}} \rightarrow \frac{\text{Use this part number}}{\text{TLP291}}$

# 7 Packing Information

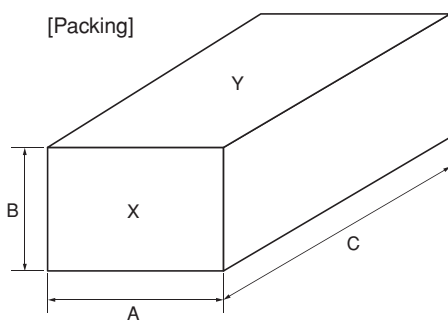
## 1 Photocoupler Magazine Packing Specifications

	Magazine Dimensions*	Device Quantities per Magazine	Packing Dimensions*																								
Standard DIP	<p>Unit: mm</p>  <p>Length = 525 Thickness = 0.5</p>	<table border="1"> <tr> <td>Package Pin Count</td> <td>4</td> <td>6</td> <td>8</td> <td>12</td> <td>16</td> </tr> <tr> <td>Quantity (pcs)</td> <td>100</td> <td>50</td> <td>50</td> <td>25</td> <td>25</td> </tr> </table>	Package Pin Count	4	6	8	12	16	Quantity (pcs)	100	50	50	25	25	<table border="1"> <thead> <tr> <th>Number of Magazines</th> <th>Dimensions (A x B x C)</th> <th>Label Position</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>50 x 12 x 531</td> <td>Y</td> </tr> <tr> <td>20</td> <td>67 x 51 x 559</td> <td>Y</td> </tr> <tr> <td>60</td> <td>123 x 76 x 568</td> <td>X</td> </tr> </tbody> </table>	Number of Magazines	Dimensions (A x B x C)	Label Position	4	50 x 12 x 531	Y	20	67 x 51 x 559	Y	60	123 x 76 x 568	X
			Package Pin Count	4	6	8	12	16																			
Quantity (pcs)	100	50	50	25	25																						
Number of Magazines	Dimensions (A x B x C)	Label Position																									
4	50 x 12 x 531	Y																									
20	67 x 51 x 559	Y																									
60	123 x 76 x 568	X																									
DIPs with LF1, LF2, LF4 and LF5 Lead Forming	<p>Unit: mm</p>  <p>Length = 525 Thickness = 0.5</p>	<table border="1"> <tr> <td>Package Pin Count</td> <td>4</td> <td>6</td> <td>8</td> <td>12</td> <td>16</td> </tr> <tr> <td>Quantity (pcs)</td> <td>100</td> <td>50</td> <td>50</td> <td>25</td> <td>25</td> </tr> </table>	Package Pin Count	4	6	8	12	16	Quantity (pcs)	100	50	50	25	25	<table border="1"> <thead> <tr> <th>Number of Magazines</th> <th>Dimensions (A x B x C)</th> <th>Label Position</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>60 x 13 x 531</td> <td>Y</td> </tr> <tr> <td>40</td> <td>135 x 58 x 568</td> <td>X</td> </tr> </tbody> </table>	Number of Magazines	Dimensions (A x B x C)	Label Position	4	60 x 13 x 531	Y	40	135 x 58 x 568	X			
Package Pin Count	4	6	8	12	16																						
Quantity (pcs)	100	50	50	25	25																						
Number of Magazines	Dimensions (A x B x C)	Label Position																									
4	60 x 13 x 531	Y																									
40	135 x 58 x 568	X																									
SO4	<p>Unit: mm</p>  <p>Length = 555 Thickness = 0.5</p>	<table border="1"> <tr> <td>Package Pin Count</td> <td>4 (SO4)</td> </tr> <tr> <td>Quantity (pcs)</td> <td>175</td> </tr> </table>	Package Pin Count	4 (SO4)	Quantity (pcs)	175	<table border="1"> <thead> <tr> <th>Number of Magazines</th> <th>Dimensions (A x B x C)</th> <th>Label Position</th> </tr> </thead> <tbody> <tr> <td>40</td> <td>71 x 32 x 584</td> <td>X</td> </tr> </tbody> </table>	Number of Magazines	Dimensions (A x B x C)	Label Position	40	71 x 32 x 584	X														
Package Pin Count	4 (SO4)																										
Quantity (pcs)	175																										
Number of Magazines	Dimensions (A x B x C)	Label Position																									
40	71 x 32 x 584	X																									
SO6	<p>Unit: mm</p>  <p>Length = 555 Thickness = 0.5</p>	<table border="1"> <tr> <td>Package Pin Count</td> <td>4 or 5 (SO6)</td> </tr> <tr> <td>Quantity (pcs)</td> <td>125</td> </tr> </table>	Package Pin Count	4 or 5 (SO6)	Quantity (pcs)	125	<table border="1"> <thead> <tr> <th>Number of Magazines</th> <th>Dimensions (A x B x C)</th> <th>Label Position</th> </tr> </thead> <tbody> <tr> <td>40</td> <td>70 x 55 x 585</td> <td>X</td> </tr> </tbody> </table>	Number of Magazines	Dimensions (A x B x C)	Label Position	40	70 x 55 x 585	X														
Package Pin Count	4 or 5 (SO6)																										
Quantity (pcs)	125																										
Number of Magazines	Dimensions (A x B x C)	Label Position																									
40	70 x 55 x 585	X																									
SO8	<p>Unit: mm</p>  <p>Length = 555 Thickness = 0.5</p>	<table border="1"> <tr> <td>Package Pin Count</td> <td>8 (SO8)</td> </tr> <tr> <td>Quantity (pcs)</td> <td>100</td> </tr> </table>	Package Pin Count	8 (SO8)	Quantity (pcs)	100	<table border="1"> <thead> <tr> <th>Number of Magazines</th> <th>Dimensions (A x B x C)</th> <th>Label Position</th> </tr> </thead> <tbody> <tr> <td>24</td> <td>75 x 29 x 579</td> <td>X</td> </tr> </tbody> </table>	Number of Magazines	Dimensions (A x B x C)	Label Position	24	75 x 29 x 579	X														
Package Pin Count	8 (SO8)																										
Quantity (pcs)	100																										
Number of Magazines	Dimensions (A x B x C)	Label Position																									
24	75 x 29 x 579	X																									

\*All dimensions are typical values.

	Magazine Dimensions*	Device Quantities per Magazine	Packing Dimensions*																		
SO16	Unit: mm  Length = 555 Thickness = 0.5	<table border="1"> <tr> <td>Package Pin Count</td> <td>16 (SO16)</td> </tr> <tr> <td>Quantity (pcs)</td> <td>50</td> </tr> </table>	Package Pin Count	16 (SO16)	Quantity (pcs)	50	<table border="1"> <tr> <th>Number of Magazines</th> <th>Dimensions (A x B x C)</th> <th>Label Position</th> </tr> <tr> <td>40</td> <td>61 x 56 x 586</td> <td>X</td> </tr> </table>	Number of Magazines	Dimensions (A x B x C)	Label Position	40	61 x 56 x 586	X								
		Package Pin Count	16 (SO16)																		
Quantity (pcs)	50																				
Number of Magazines	Dimensions (A x B x C)	Label Position																			
40	61 x 56 x 586	X																			
MFSOP6	Unit: mm  Length = 555 Thickness = 0.5	<table border="1"> <tr> <td>Package Pin Count</td> <td>4 or 5 (MFSOP6)</td> </tr> <tr> <td>Quantity (pcs)</td> <td>150</td> </tr> </table>	Package Pin Count	4 or 5 (MFSOP6)	Quantity (pcs)	150	<table border="1"> <tr> <th>Number of Magazines</th> <th>Dimensions (A x B x C)</th> <th>Label Position</th> </tr> <tr> <td>4</td> <td>29 x 13 x 563</td> <td>Y</td> </tr> <tr> <td>24</td> <td>77 x 31 x 586</td> <td>Y</td> </tr> <tr> <td>40</td> <td>67 x 55 x 586</td> <td>X</td> </tr> </table>	Number of Magazines	Dimensions (A x B x C)	Label Position	4	29 x 13 x 563	Y	24	77 x 31 x 586	Y	40	67 x 55 x 586	X		
Package Pin Count	4 or 5 (MFSOP6)																				
Quantity (pcs)	150																				
Number of Magazines	Dimensions (A x B x C)	Label Position																			
4	29 x 13 x 563	Y																			
24	77 x 31 x 586	Y																			
40	67 x 55 x 586	X																			
SOP Photocoupler	Unit: mm  Length = 555 Thickness = 0.5	<table border="1"> <tr> <td>Package Pin Count</td> <td>4 (SOP4)</td> <td>16 (SOP16)</td> </tr> <tr> <td>Quantity (pcs)</td> <td>150</td> <td>50</td> </tr> </table>	Package Pin Count	4 (SOP4)	16 (SOP16)	Quantity (pcs)	150	50	<table border="1"> <tr> <th>Number of Magazines</th> <th>Dimensions (A x B x C)</th> <th>Label Position</th> </tr> <tr> <td>4</td> <td>29 x 13 x 563</td> <td>Y</td> </tr> <tr> <td>24</td> <td>77 x 31 x 586</td> <td>Y</td> </tr> <tr> <td>40</td> <td>67 x 55 x 586</td> <td>X</td> </tr> </table>	Number of Magazines	Dimensions (A x B x C)	Label Position	4	29 x 13 x 563	Y	24	77 x 31 x 586	Y	40	67 x 55 x 586	X
		Package Pin Count	4 (SOP4)	16 (SOP16)																	
Quantity (pcs)	150	50																			
Number of Magazines	Dimensions (A x B x C)	Label Position																			
4	29 x 13 x 563	Y																			
24	77 x 31 x 586	Y																			
40	67 x 55 x 586	X																			
		<table border="1"> <tr> <td>Package Pin Count</td> <td>4 (2.54SOP4)</td> <td>6 (2.54SOP6)</td> <td>8 (2.54SOP8)</td> </tr> <tr> <td>Quantity (pcs)</td> <td>100</td> <td>75</td> <td>50</td> </tr> </table>	Package Pin Count	4 (2.54SOP4)	6 (2.54SOP6)	8 (2.54SOP8)	Quantity (pcs)	100	75	50											
Package Pin Count	4 (2.54SOP4)	6 (2.54SOP6)	8 (2.54SOP8)																		
Quantity (pcs)	100	75	50																		

\*All dimensions are typical values.



Package Type		Typical Devices
MFC	MFSOP6	TLP160J, TLP190B
SOP	SO4	TLP290, TLP291
	SO6	TLP184, TLP185
	SO16	TLP290-4, TLP291-4
	SOP16	TLP280-4, TLP281-4, TLP270D, TLP270G
	2.54SOP4	TLP176G, TLP176A
	2.54SOP6	TLP197G
	2.54SOP8	TLP206G, TLP206A

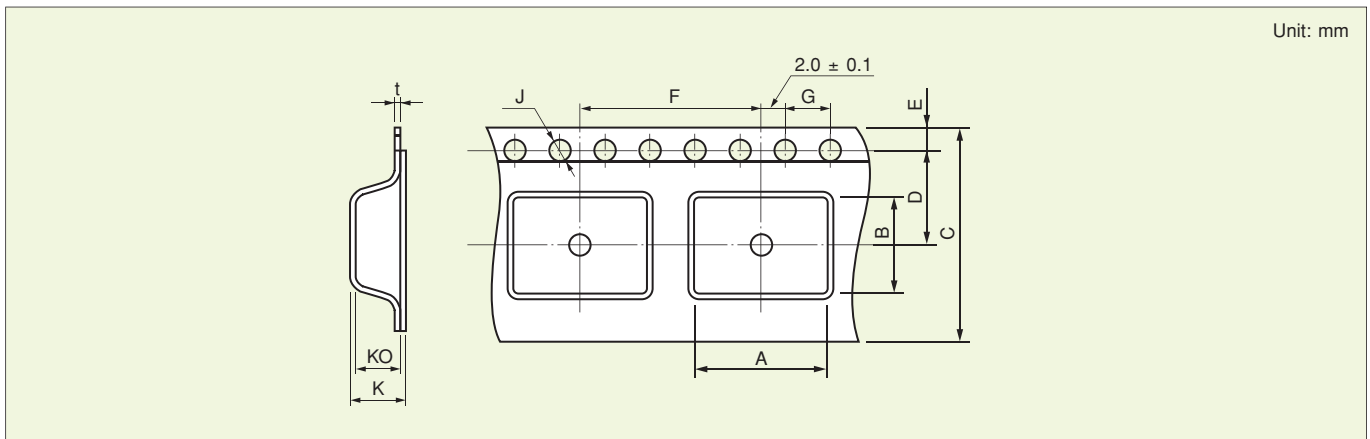
# 7 Packing Information

## 2 Tape-and-Reel Specifications

### 1. Embossed Tape Specifications for Surface-Mount Lead Form Options

Photocoupler Package Types	Tape Option Symbol	Typical Devices
MFSOP6	(TPL) or (TPR)	<b>TLP165J, TLP190B</b>
SO6	(TPL) or (TPR)	<b>TLP185, TLP186</b>
SO4	(TP)	<b>TLP290, TLP291</b>
SOP16	(TP)	<b>TLP280-4, TLP281-4</b>
SO16	(TP)	<b>TLP290-4, TLP291-4</b>
2.54SOP4	(TP)	<b>TLP176G, TLP176A, TLP176D</b>
2.54SOP6	(TP)	<b>TLP197G</b>
2.54SOP8	(TP)	<b>TLP200D, TLP206A, TLP206G</b>
SSOP4	(TP15)	<b>TLP3212, TLP3214 to TLP3217, TLP3230 to TLP3250</b>
SDIP6	(TP)	<b>TLP701, TLP705, TLP719</b>
DIP(LF1, LF5)	(TP1) or (TP5)	<b>TLP550, TLP560G</b>
DIP(LF4)	(TP4)	<b>TLP560G</b>
SO8	(TP)	<b>TLP2168, TLP2468</b>

### 2. Tape Dimensions



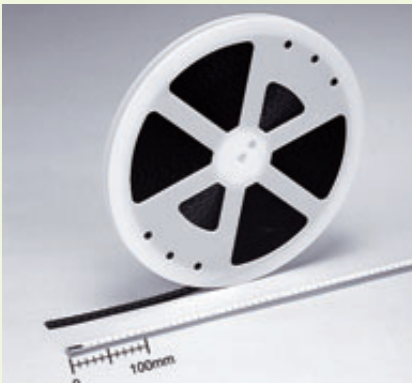
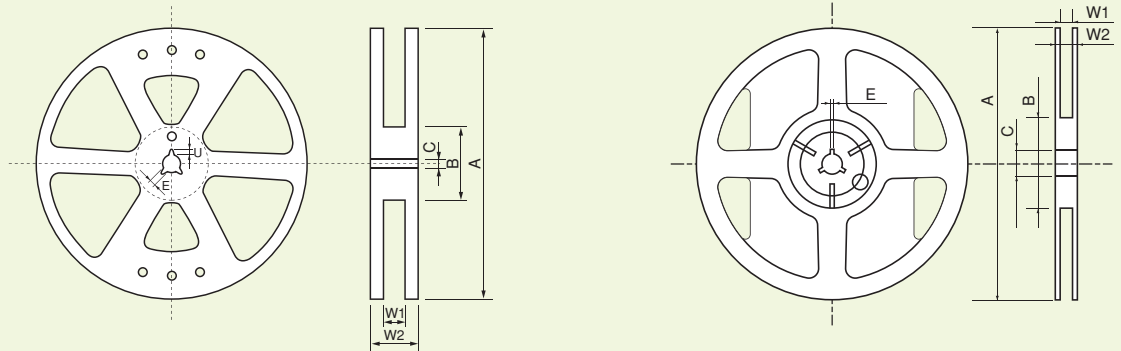
Photocoupler Package Type		MFSOP6	SO6	SO8	SOP4	SO4	SOP16	SO16	2.54SOP4	2.54SOP6	2.54SOP8	SSOP4	SDIP6	SDIP6 F type	DIP(LF1, LF5)	DIP(LF4)	
Tape Option		(TPL), (TPR)	(TPL), (TPR)	(TP)	(TP)	(TP)	(TP)	(TP)	(TP)	(TP)	(TP)	(TP15)	(TP)	(TP)	(TP1), (TP5)	(TP4)	
Symbol (See figure above)	A	4.2 ± 0.1	4.0 ± 0.1	6.5 ± 0.1	3.1 ± 0.1	7.5 ± 0.1	7.5 ± 0.1	4.3 ± 0.1	7.5 ± 0.1	2.35 ± 0.2	10.4 ± 0.1	12.3 ± 0.1	10.4 ± 0.1	12.3 ± 0.1			
	B	7.6 ± 0.1		5.6 ± 0.1	7.5 ± 0.1	10.5 ± 0.1	7.5 ± 0.1	6.7 ± 0.1	10.5 ± 0.1	4.5 ± 0.1	5.1 ± 0.1	*	*				
	C	12.0 ± 0.3					16.0 ± 0.3	12.0 ± 0.3	16.0 ± 0.3	12.0 ± 0.3	16.0 ± 0.3						
	D	5.5 ± 0.1					7.5 ± 0.1	5.5 ± 0.1	7.5 ± 0.1	5.5 ± 0.1	7.5 ± 0.1						
	E	1.75 ± 0.1															
	F	8.0 ± 0.1					12.0 ± 0.1	8.0 ± 0.1	12.0 ± 0.1	4.0 ± 0.1	12.0 ± 0.1	16.0 ± 0.1	12.0 ± 0.1	16.0 ± 0.1			
	G	4.0 ± 0.1															
	J	1.5 <sup>+0.1</sup> <sub>-0</sub>															
	K	3.15 ± 0.2	2.9 ± 0.2	3.4 ± 0.2	2.5 ± 0.2	3.15 ± 0.2	2.4 ± 0.2	2.6 ± 0.2	2.6 ± 0.2	2.5 ± 0.2	2.4 ± 0.2	2.4 ± 0.2	4.55 ± 0.2				
	KO	2.8 ± 0.1	2.6 ± 0.1	3.1 ± 0.1	2.3 ± 0.1	2.2 ± 0.1	2.4 ± 0.1	2.3 ± 0.1	2.2 ± 0.1	2.1 ± 0.1	4.1 ± 0.1						
t	0.3 ± 0.05												0.4 ± 0.05				

\*1: Typical devices

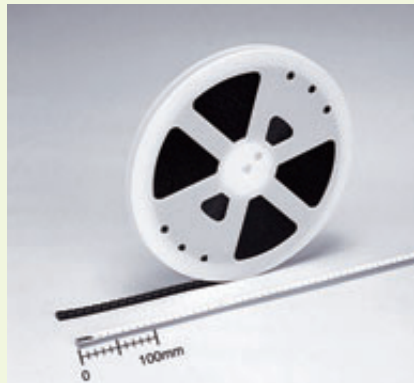
DIP4	<b>TLP620, TLP721</b>	5.1 ± 0.1
DIP6 (short package)	<b>TLP631, TLP734, TLP747G</b>	7.6 ± 0.1
DIP8	<b>TLP555, TLP2601</b>	10.1 ± 0.1 (TP4) is not available



### 3. Reel Dimensions



ø380 mm



ø330 mm



ø180 mm

Unit: mm

Photocoupler Package Type		MFSOP, SO6	SOP4	SO4	SOP16	SO16	2.54SOP4	2.54SOP6	2.54SOP8	SSOP4	SDIP6	SDIP6 F type	DIP(LF1, LF5)	DIP(LF4)
Tape Option		(TPL), (TPR)	(TP)	(TP)	(TP)	(TP)	(TP)	(TP)	(TP)	(TP15)	(TP)	(TP)	(TP1), (TP5)	(TP4)
Symbol (See figure above)	A	ø380 ± 2	ø330 ± 2							180 <sup>+0</sup> <sub>-4</sub>	ø380 ± 2			
	B	ø80 ± 1								ø60	ø80 ± 1			
	C	ø13 ± 0.5								ø13	ø13 ± 0.5			
	E	2.0 ± 0.5								2 ± 0.5	2.0 ± 0.5			
	U	4.0 ± 0.5								4.0 ± 0.5	4.0 ± 0.5			
	W1	13.5 ± 0.5			17.5 ± 0.5		13.5 ± 0.5	17.5 ± 0.5		13 ± 0.3	17.5 ± 0.5			
	W2	17.5 ± 1.0			21.5 ± 1.0		17.5 ± 1.0	21.5 ± 1.0		15.4 ± 1.0	21.5 ± 1.0			

# 7 Packing Information

## 4. Other Packing Information

### a) Device orientation on tape

Photocouplers are oriented in cavity, as shown below.

Photocoupler Package Type	Tape Option
<b>MFSOP6, SO6</b>	TPR

A)

Photocoupler Package Type	Tape Option
<b>MFSOP6, SO6</b>	TPL
<b>SO4, SOP4, 2.54SOP4</b>	TP
<b>SSOP4</b>	TP15

B)

Photocoupler Package Type	Tape Option
<b>SO16, SOP16, SO8</b>	TP
<b>2.54SOP6/8</b>	TP
<b>SDIP6</b>	TP
<b>DIP(LF1, LF5)</b>	TP1, TP5
<b>DIP(LF4)</b>	TP4

C)

### b) Tape Specifications

#### ■ Quantities Per Reel

Photocoupler Package Type	MFSOP6, SO6	SO4, SOP4, SO8	SOP16	SO16	2.54SOP4/6/8	SSOP4	SDIP6	SDIP6 F type	DIP(LF1, LF5)	DIP(LF4)
Quantity (pcs)	3000	2500	2500	2000	2500	1500	1500	1000	1500	1000

#### ■ Empty Cavities

Item	Specification	Note
Consecutive empty cavities	Zero	Any 40-mm portion of tape except leader and trailer.
Non-consecutive empty cavities	0.2% max/reel *2	Except leader and trailer.

\*2: 6 pcs max/reel for DIP and SDIP packages

### c) Packing boxes

One or five reels per box

### d) Label

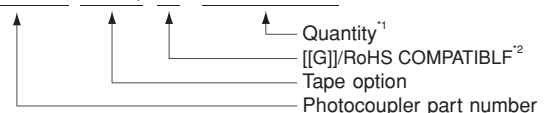
The reel label includes the following information:

1. Part number
2. Tape type
3. Quantity
4. Lot number

### e) Purchase order

Specify the part number, tape and quantity as follows.

Example TLP127 (TPL, F) 3000 units



\*1: Must be a multiple of the quantity per-reel.

\*2: "F" identifies the indication of product Labels with "[[G]]/RoHS COMPATIBLE".

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.

The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

# 8 Board Assembly

## 1 Example Land Patterns

Unit: mm

SO6 (4-pin) MFSOP6 (4-pin) 2.54SOP4	SO6 (5-pin) MFSOP6 (5-pin)	SOP4 SO4	SSOP4

Unit: mm

SO8	SOP16 SO16	SDIP6

Unit: mm

SDIP6 (F type)	DIP package* (LF1), (LF5)	DIP package* (LF4)
	<p>Example: DIP 6pin</p>	<p>Example: DIP 6pin</p>

\*: For the example land patterns for the TLP781 and TLP785, see their respective datasheets.

# 8 Board Assembly

## 2 Board Assembly Considerations

### 1. Soldering

The profile below shows only the typical temperature profile and conditions, which might not apply to all Toshiba photocouplers. Temperature profiles and conditions may differ from product to product. Refer to the relevant technical datasheets and databooks when mounting a device.

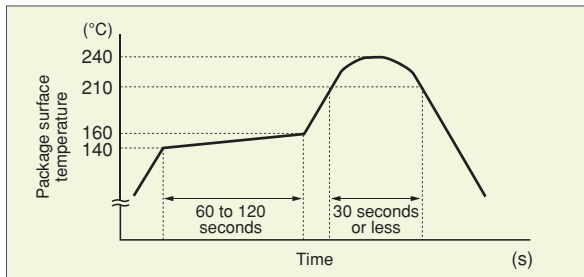
When using a soldering iron or medium infrared ray/hot air reflow, avoid a rise in device temperature as much as possible by observing the following conditions.

#### 1.1) Using a soldering iron

- Solder once within 10 seconds for a lead temperature of up to 260°C.
- Solder once within 3 seconds for a lead temperature of up to 350°C.

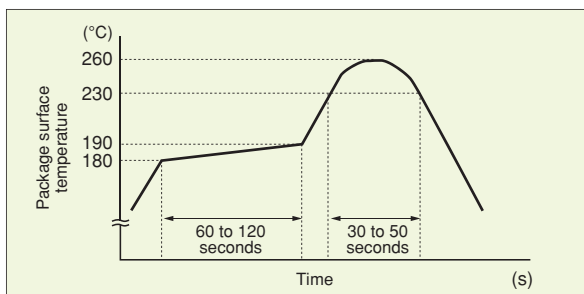
#### 1.2) Using medium infrared ray/hot air reflow

- Complete the infrared ray/hot air reflow process at once within 30 seconds at a package surface temperature between 210°C and 240°C.
- Example of temperature profile of lead (Pb) solder



Example of temperature profile of lead (Pb) solder

- Example of temperature profile of lead (Pb)-free solder



Example of temperature profile of lead (Pb)-free solder

- Precautions for heating

Keeping packages at high temperature for a long period of time can degrade the quality and reliability of devices. Soldering time has to be kept as short as possible to avoid a rise in package temperature.

When using a halogen lamp or infrared heater, avoid direct irradiation of packages, since this may cause a rise in package temperature.

#### 1.3) Dip soldering (flow soldering)

The thermal shock of dip soldering increases thermal stress on devices. To avoid stress, the use of a soldering iron or medium infrared ray/hot air reflow is recommended. If you want to use dip soldering, contact your nearest Toshiba sales representative.

### 2. Flux Cleaning

- When cleaning circuit boards to remove flux, make sure that no residual reactive ions such as sodium(Na<sup>+</sup>) or chloride(Cl<sup>-</sup>) ions remain. Note that organic solvents react with water to generate hydrogen chloride and other corrosive gases, which can degrade device performance.
- Washing devices with water will not cause any problems. However, make sure that no reactive ions such as sodium(Na<sup>+</sup>) or chloride(Cl<sup>-</sup>) ions are left as residue. Also, be sure to dry devices sufficiently after washing.
- Do not rub device markings with a brush or with your hand during cleaning or while the devices are still wet from the cleaning agent. Doing so can rub off the markings.
- Dip cleaning, shower cleaning and steam cleaning processes all involve the chemical action of a solvent. Use only recommended solvents for these cleaning methods. When immersing devices in a solvent or steam bath, make sure that the temperature of the liquid is 50°C or below and that the circuit board is removed from the bath within one minute.
- If a device package allows ultrasonic cleaning, keep the duration of ultrasonic cleaning as short as possible, since long hours of ultrasonic cleaning degrade the adhesion between the mold resin and the frame material.

#### The following ultrasonic cleaning conditions are recommended.

Frequency: 27 kHz to 29 kHz

Ultrasonic output power: 300 W or less (0.25 W/cm<sup>2</sup> or less)

Cleaning time: 30 seconds or less

Suspend the circuit board in the solvent bath during ultrasonic cleaning in such a way that the ultrasonic vibrator does not come into direct contact with the circuit board or the device.

Conventional cleaning solvents that contain freon are not recommended due to its adverse effects on the earth's ozone layer. Alternative freon-free products are available on the market. Some of these alternative cleaning agents are listed in the table below.

Contact Toshiba or a Toshiba distributor regarding cleaning conditions and other relevant information for each product type.

#### Examples of Alternative Cleaning Agents

Technocare	FRW-1, FRW-17, FRV-100	GE Toshiba Silicon
Asahi Clean	AK-225AES	Asahi Glass Co., Ltd
Clean Through	750H	Kao Co., Ltd.
Pine Alpha	ST-100S, ST-100SX	Arakawa Chemical Co., Ltd.

# 9 Device Degradation

## 1 Projected Operating Life Based on LED Light Output Degradation

Toshiba photocouplers use one of four types of LEDs and a projection of the operating life has been made for each LED. The table on page 62 shows the types of LED used in photocouplers and the figures on pages 63 to 66 show projections of long-term light output performance and operating life. Note that these operating life data are estimates extrapolated from long-term light output degradation over a single wafer lot and are shown as reference only.

	Projected Operating Life ( $T_a = 40^\circ\text{C}$ , $I_F = 20\text{ mA}$ , failure criteria: degradation rate $\Delta P_o < -50\%$ )		Photocouplers
	F50% operating life	F0.1% operating life	
① GaAs LED	1,300,000 h	260,000 h	Mainly for phototransistor output devices and phototriac output devices
② GaAlAs(SH) LED	540,000 h	100,000 h	Mainly for photo-IC couplers
③ GaAlAs(DH) LED	1,000,000 h	200,000 h	Mainly for photorelays (MOSFET output), photovoltaic couplers and photo-IC couplers
④ GaAlAs(MQW) LED	Ask your local Toshiba sales representative.		Mainly for photo-IC couplers

F50% (cumulative failure rate 50%) operating life: Time period until the projected long-term light output degradation curve of the average light output change ( $\bar{X}$ ) shown on pages 63 to 65 reaches the failure criteria.

F0.1% (cumulative failure rate 0.1%) operating life: Time period until the projected long-term light output degradation curve of  $\bar{X} - 3\sigma$  shown on pages 63 to 65 reaches the failure criteria.

The relationship between LED light output degradation and optical coupling characteristics is shown below.

- (1) The relationship between LED light output degradation and current transfer ratio (CTR)/short circuit current ( $I_{sc}$ ) is 1:1.

$$\frac{\text{CTR}(t)}{\text{CTR}(o)} = \frac{P_o(t)}{P_o(o)}$$

- (2) The relationship between a reciprocal value of LED light output degradation and  $I_{FT}/I_{FLH}/I_{FHL}/I_{FH}$  change is 1:1.

$$\frac{I_{FT}(t)}{I_{FT}(o)} = \left( \frac{P_o(t)}{P_o(o)} \right)^{-1}$$

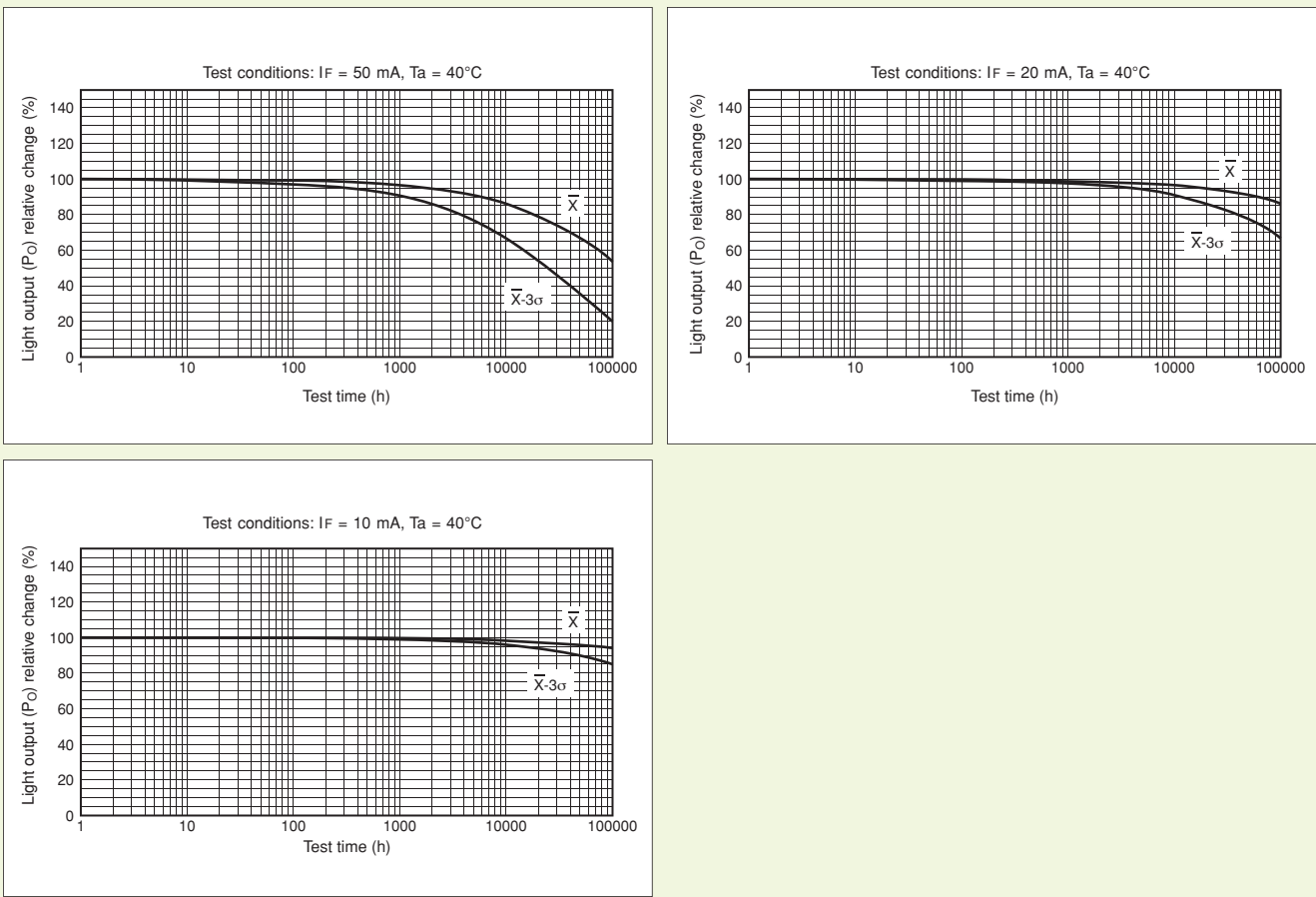
# 9 Device Degradation

## LEDs Used in Photocouplers

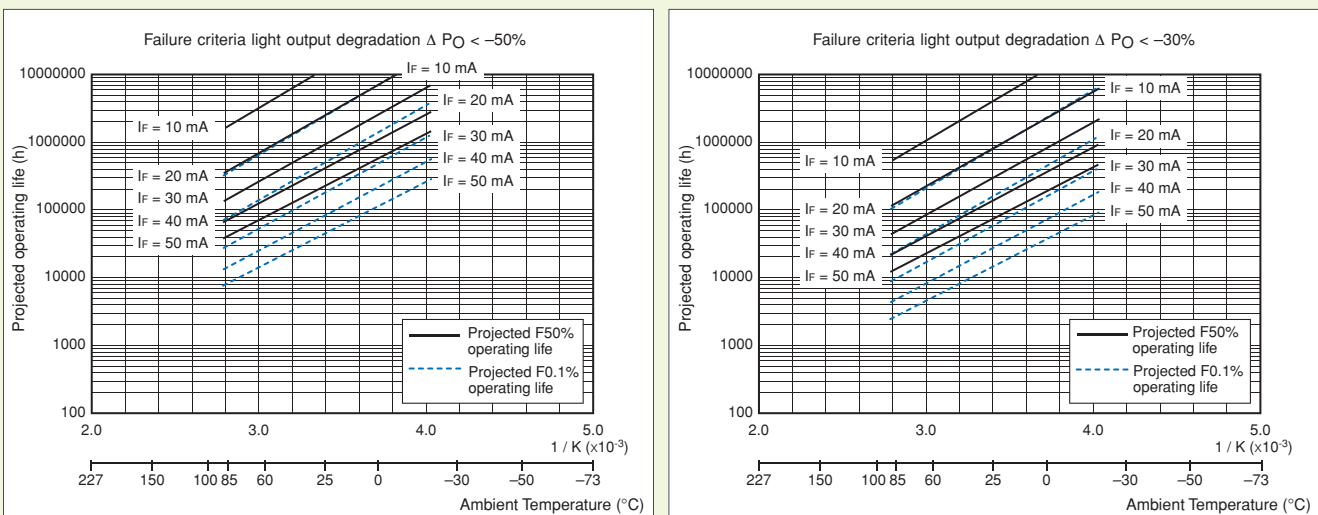
LED: ① GaAs LED ② GaAlAs (SH) LED ③ GaAlAs (DH) LED ④ GaAlAs (MQW) LED

Photocouplers	LED	Photocouplers	LED	Photocouplers	LED	Photocouplers	LED	Photocouplers	LED
6N135	②	TLP200D	①	TLP513	②	TLP641 Series	①	TLP2468	④
6N136	②	TLP202 Series	①	TLP523 Series	①	TLP651	②	TLP2530	②
6N137	②	TLP206 Series	①	TLP525G Series	①	TLP700	④	TLP2531	②
6N138	②	TLP222 Series	①	TLP531	①	TLP700A	④	TLP2601	②
6N139	②	TLP224G Series	①	TLP532	①	TLP700H	④	TLP260J	①
TLP104	④	TLP225A	①	TLP541G	①	TLP701	②	TLP2630	②
TLP105	④	TLP227 Series	①	TLP542G	①	TLP701A	④	TLP2631	②
TLP108	④	TLP250 Series	②	TLP543J	①	TLP701H	④	TLP2768	④
TLP116	③	TLP251 Series	②	TLP545J	①	TLP705	②	TLP3022(S) Series	①
TLP117	④	TLP260J	①	TLP550	②	TLP708	④	TLP3042(S) Series	①
TLP118	④	TLP270 Series	①	TLP551	②	TLP714	④	TLP3063(S) Series	③
TLP124	①	TLP280 Series	①	TLP552	②	TLP715	②	TLP31xx Series	①
TLP126	①	TLP281 Series	①	TLP553	②	TLP716	②	TLP32xx Series	①
TLP127	①	TLP283 Series	①	TLP554	②	TLP718	②	TLP3230	①
TLP130	①	TLP290	①	TLP555	②	TLP719	②	TLP3231	①
TLP131	①	TLP291	①	TLP557	②	TLP731	①	TLP3240	③
TLP137	①	TLP296G	①	TLP558	②	TLP732	①	TLP3241	③
TLP141G	①	TLP320 Series	①	TLP559	②	TLP733 Series	①	TLP3250	③
TLP151	④	TLP330	①	TLP560 Series	①	TLP734 Series	①	TLP3762(S) Series	①
TLP151A	④	TLP331	①	TLP561 Series	①	TLP741 Series	①	TLP3904	①
TLP155	④	TLP332	①	TLP570	①	TLP747 Series	①	TLP3914	③
TLP155E	④	TLP350	②	TLP571	①	TLP750 Series	②	TLP3924	③
TLP160 Series	①	TLP350A	④	TLP572	①	TLP751 Series	②	TLP4xxx Series	①
TLP161 Series	①	TLP350H	④	TLP590B	③	TLP754	④		
TLP163	①	TLP351	②	TLP591B	③	TLP759 Series	②		
TLP165J	①	TLP351A	④	TLP592 Series	①	TLP762J Series	①		
TLP166J	①	TLP351H	④	TLP594 Series	①	TLP763J Series	①		
TLP168J	③	TLP352	④	TLP597 Series	①	TLP797 Series	①		
TLP172 Series	①	TLP358	④	TLP598 Series	③	TLP798GA	③		
TLP174G	①	TLP358H	④	TLP599 Series	①	TLP2066	③		
TLP176 Series	①	TLP360 Series	①	TLP620 Series	①	TLP2118E	④		
TLP180	①	TLP361 Series	①	TLP624 Series	①	TLP2160	④		
TLP181	①	TLP363 Series	①	TLP626 Series	①	TLP2168	④		
TLP184	①	TLP371	①	TLP627 Series	①	TLP2200	②		
TLP185	①	TLP372	①	TLP628 Series	①	TLP2368	④		
TLP190B	③	TLP373	①	TLP629 Series	①	TLP2404	④		
TLP191B	③	TLP421 Series	①	TLP630	①	TLP2409	④		
TLP192 Series	①	TLP504A	①	TLP631	①	TLP2418	④		
TLP197 Series	①	TLP512	②	TLP632	①	TLP2451,TLP2451A	④		

## ① GaAs LED Projected Light Output Degradation Data



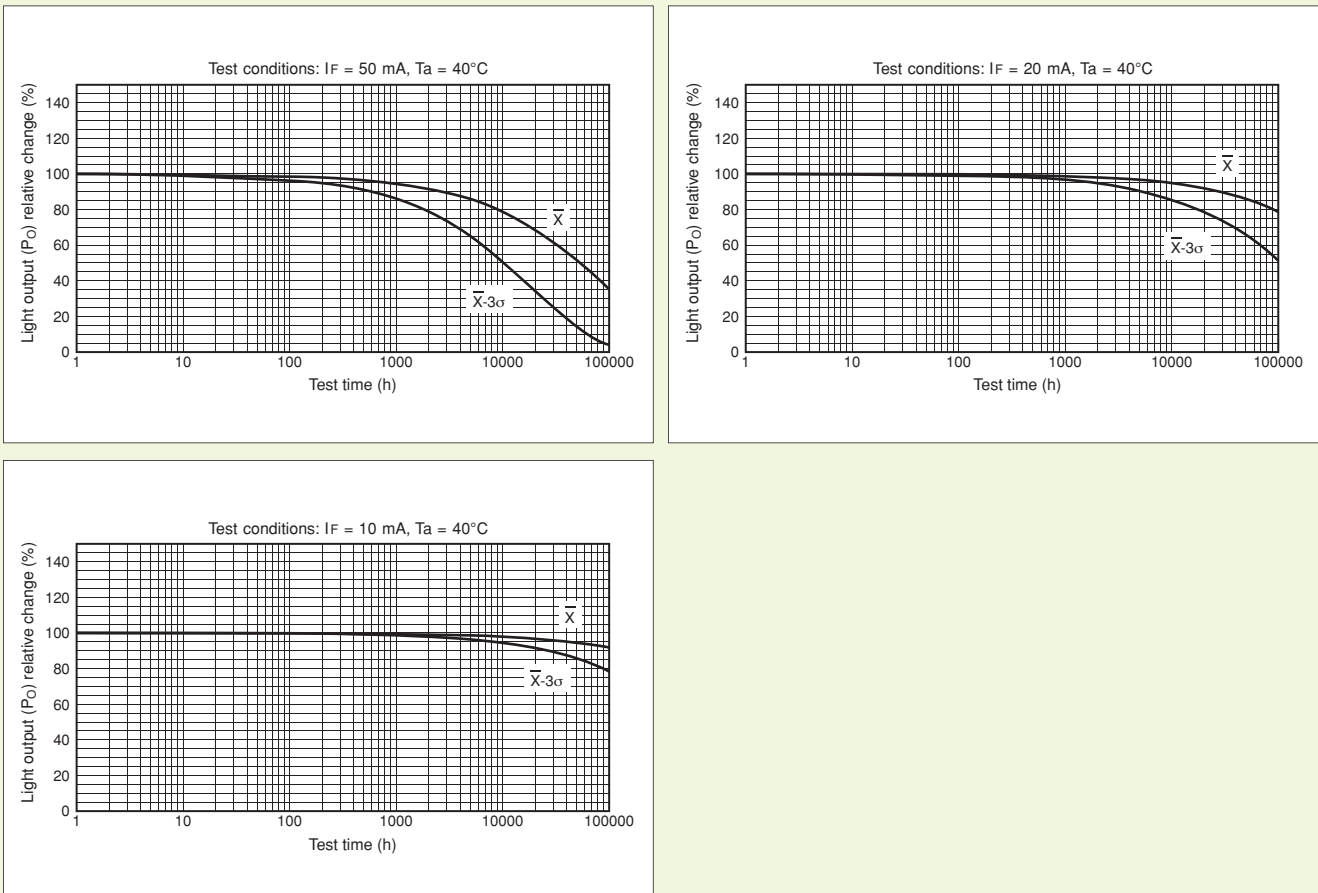
## ① GaAs LED Projected Operating Life Data



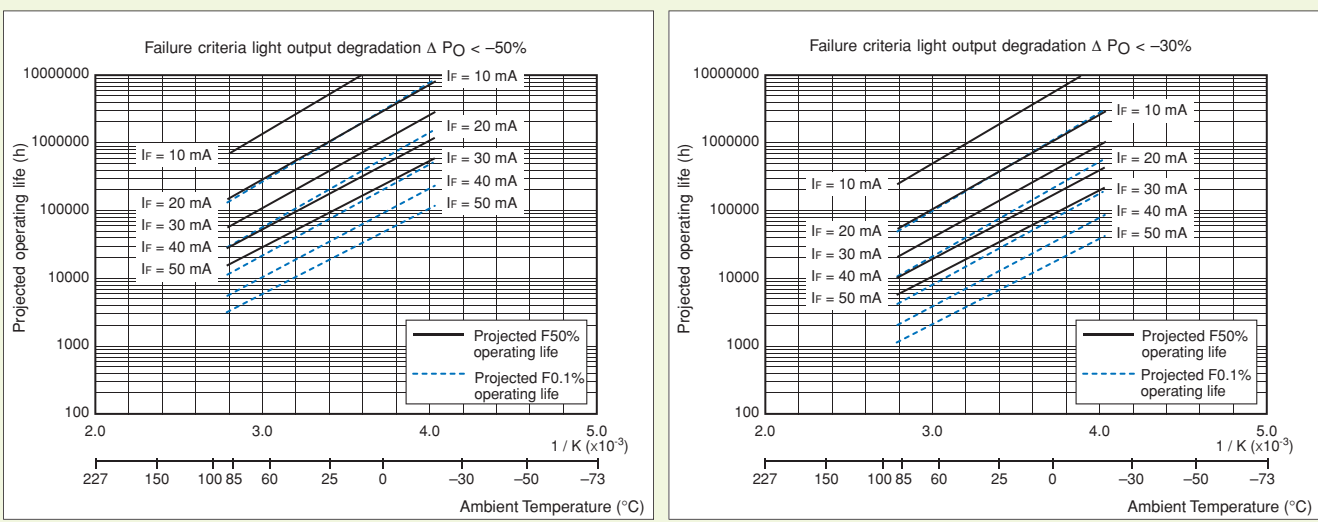
The above operating life data are estimates extrapolated from long-term light output degradation over a single wafer lot and are shown as reference only. Operating conditions exceeding the maximum ratings are not guaranteed.

# 9 Device Degradation

## ② GaAlAs (SH) LED Projected Light Output Degradation Data



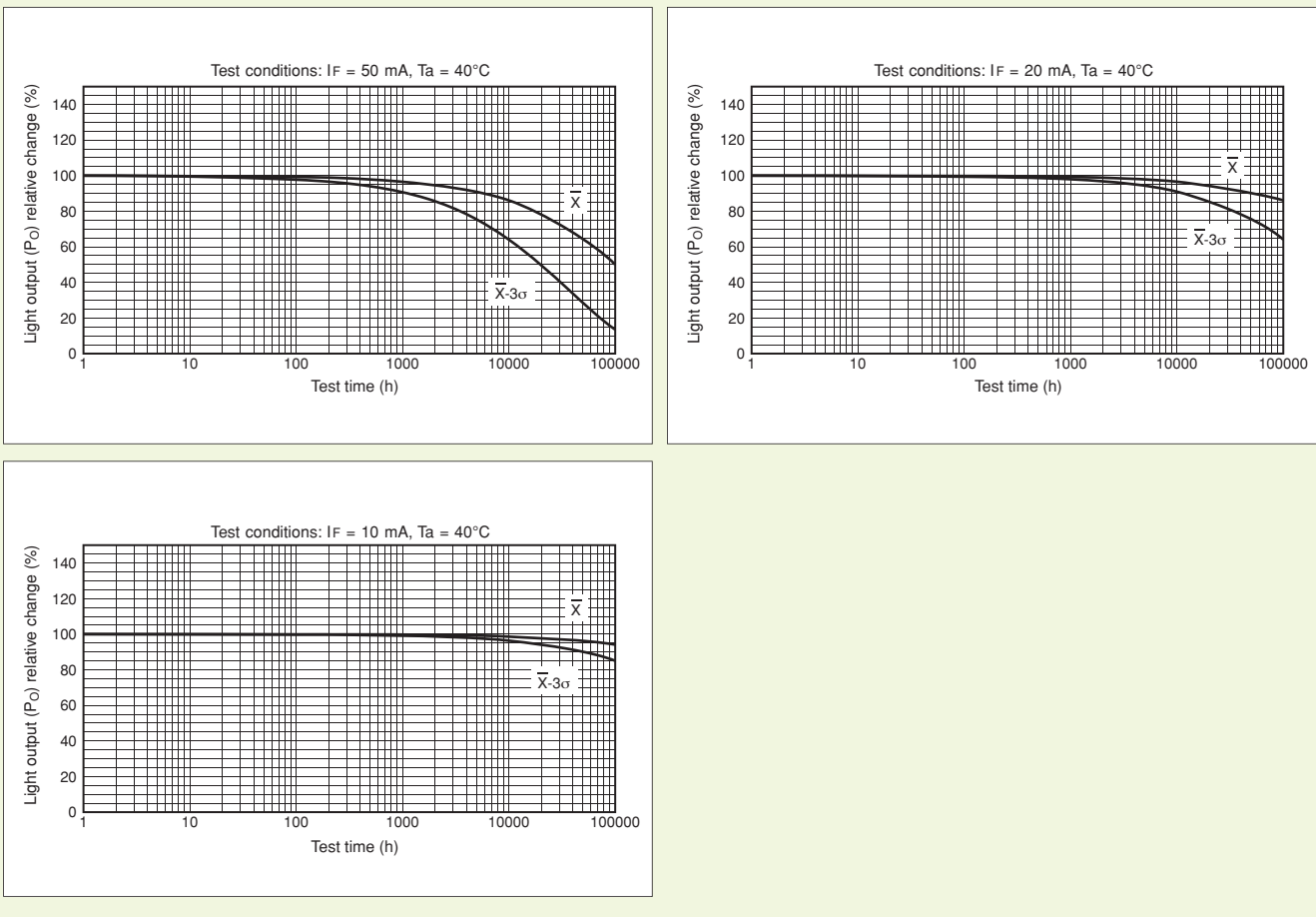
## ② GaAlAs (SH) LED Projected Operating Life Data



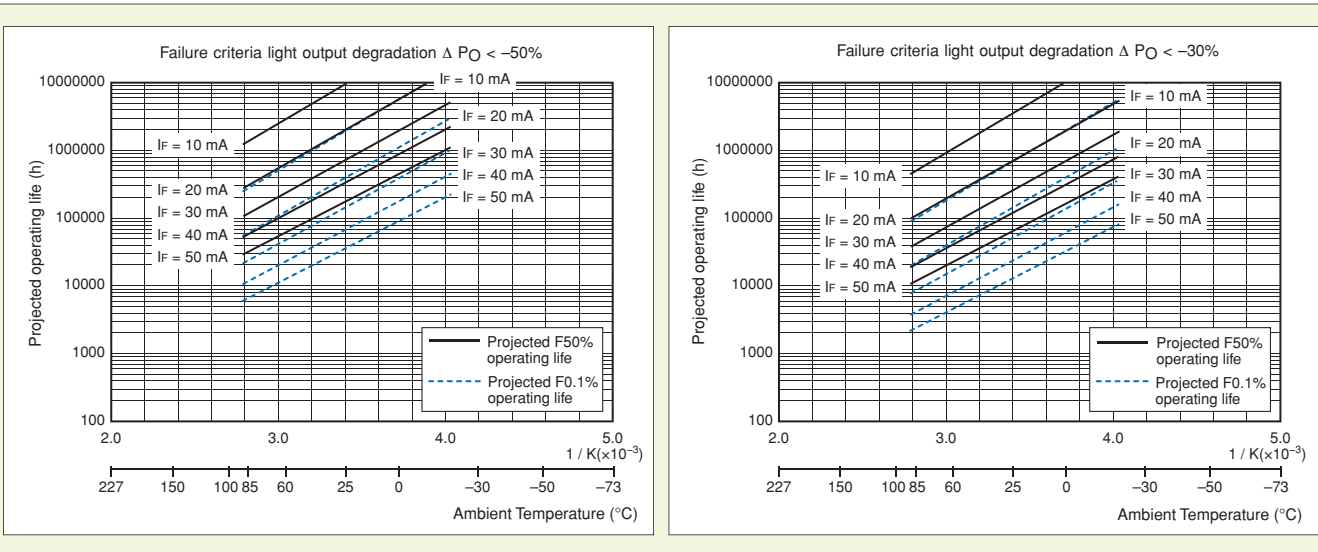
The above operating life data are estimates extrapolated from long-term light output degradation over a single wafer lot and are shown as reference only. Operating conditions exceeding the maximum ratings are not guaranteed.



### ③ GaAlAs (DH) LED Projected Light Output Degradation Data



### ③ GaAlAs (DH) LED Projected Operating Life Data



The above operating life data are estimates extrapolated from long-term light output degradation over a single wafer lot and are shown as reference only. Operating conditions exceeding the maximum ratings are not guaranteed.

# 9 Device Degradation

## ④ GaA<sub>0</sub>As (MQW) LED Projected Light Output Degradation and Operating Life Data

Toshiba is now preparing the light output degradation and operating life data for GaA<sub>0</sub>As LEDs.

These data are available for individual LEDs. Ask your local Toshiba sales representative.

### Note

Lined area for notes.

## Reading the Projected LED Operating Life Graph

For example, let's calculate the operating life of the GaAs LED, based on the data shown on page 63.

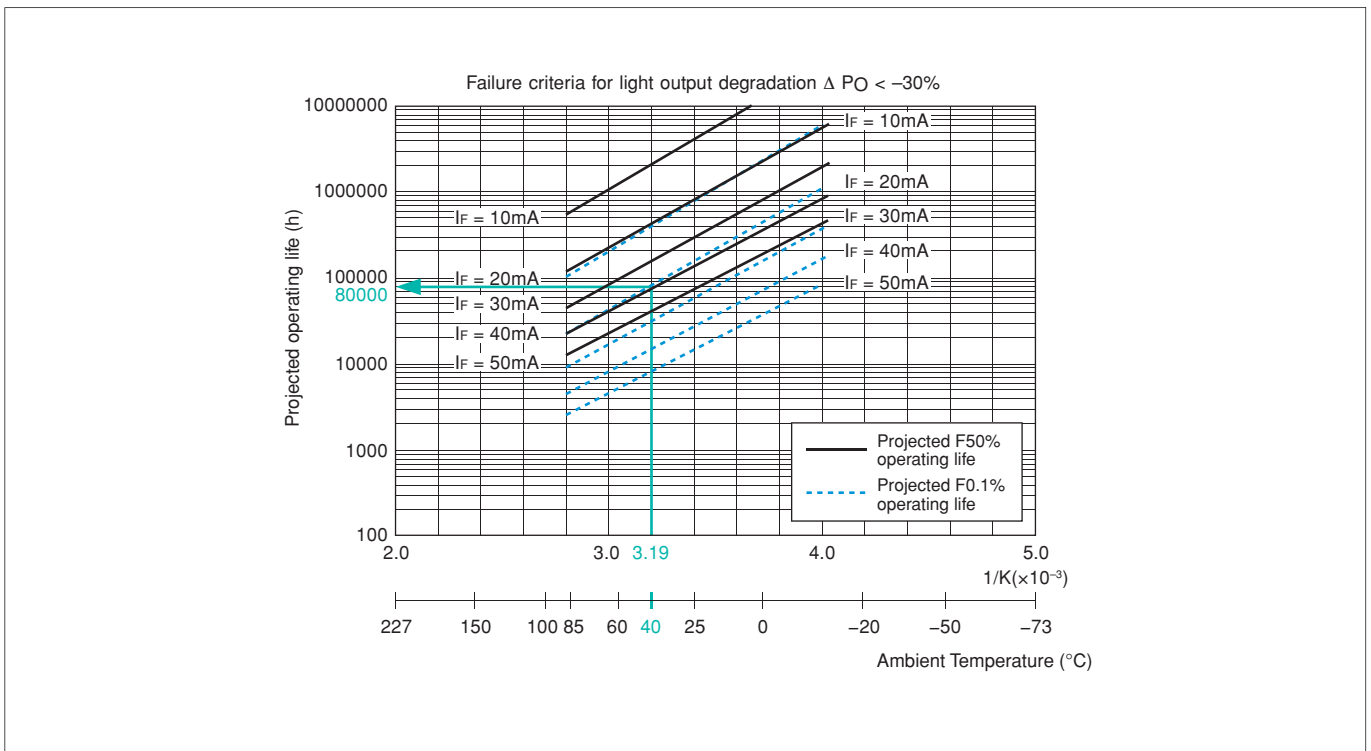
Here is an example of how to read an operating life, assuming that the ambient temperature ( $T_a$ ) is 40°C and that the failure criterion is a 30% decrease in light output.

Suppose that the initial LED current,  $I_F$ , is 20 mA. Since the horizontal axis of the failure criteria graph is the reciprocal of absolute temperature, it is necessary to convert the ambient temperature ( $T_a$ ) to the reciprocal of absolute temperature ( $T$ ):

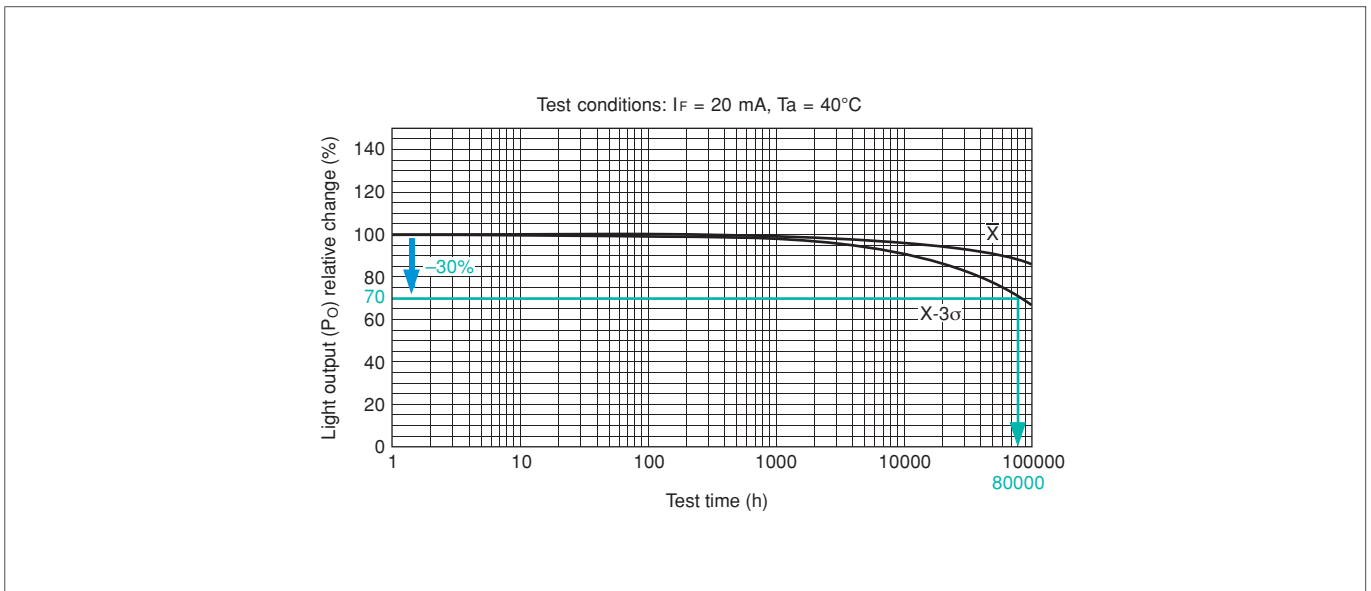
$$T = \frac{I}{T_a + 273.15} = \frac{I}{40 + 273.15} \doteq 3.19 \times 10^{-3}$$

The graph shows the projected lifetimes for F50% and F0.1% cumulative failure probabilities in solid and dashed lines respectively. Normally, it is recommended to use F0.1% lines.

As  $X = 3.19$ , its intersection with the  $I_F = 20$  mA line for F0.1% is approximately 80,000 hours. (This figure is for reference only.)



You can also estimate the projected operating life from the projected light output degradation data.



# 10 Safety Standard Approvals

Toshiba offers a wide selection of photocouplers with a transistor output, IC output, thyristor output and triac output, as well as photorelays certified to UL (USA), cUL (Canada), VDE (Germany), BSI (Britain) and SEMKO (Sweden).

## Safety Standard Approvals for Photocouplers (DIN EN60747-5-2/5)

Mechanical Construction		Reflective Photocouplers in Single-Molded Packages				Transmissive Photocouplers in Single-Molded Packages			
Internal Construction									
Package		SOP4/SOP16		MFSOP6	MFSOP6	SO8 (2 ch)	2.54SOP 4/6/8	DIP	DIP (F type)
Construction Mechanical Ratings (min)	Isolation Creepage Path (mm)	4.0	5.0	4.0	4.0	4.2	4.0	6.4/7.0	8.0
	Isolation Clearance (mm)	4.0	5.0	4.0	4.0	4.2	4.0	6.4/7.0	8.0
	Isolation Thickness (mm)	0.4	0.4	0.4	–	–	–	(0.4)	(0.4)
	Internal Creepage Path (mm)	–	–	–	–	–	–	–	–
VDE/TÜV DIN EN 60747-5-2/5	Max. Working Insulation Voltage (Viorm)	565 Vpk	707 Vpk	565 Vpk	565 Vpk	565 Vpk	565 Vpk	630 Vpk /890 Vpk	1140 Vpk
	Highest Allowable Overvoltage (Viotm)	4000 Vpk	6000 Vpk	6000 Vpk	4000 Vpk	4000 Vpk	2500 Vpk	4000 Vpk	6000 Vpk

Certified Devices	IC Output					TLP2105 TLP2108 TLP2166 TLP2166A TLP2116 TLP2118E TLP2168 TLP2160		TLP350 TLP351	TLP350F TLP351F
	Transistor Output	TLP280-4 TLP281-4	TLP284-4 TLP285-4		TLP127				
	Triac/Thyristor Output			TLP260J TLP261J	TLP160G TLP160J TLP161G TLP161J			TLP560G TLP560J TLP561G TLP561J TLP587G	
	Photorelay						TLP176A TLP176D TLP176G TLP197G TLP202G TLP206G	TLP227G TLP227G-2 TLP597G	

The table above lists photocouplers and photorelays that have already been approved as of July 2012.  
 The information herein is subject to change. For the latest information, please contact your nearest Toshiba sales representative.

Transmissive Photocouplers with an Insulating Film in Single-Molded Packages					Transmissive Photocouplers in Double-Molded Packages						
SO8 (1 ch)	SDIP6	SDIP6 (F type)	DIP	DIP (F type)	MFSOP6	SO4	SO6	SO16	DIP	DIP (F type)	
4.0	7.0	8.0	6.4/7.0	8.0	4.0	5.0	5.0	5.0	6.5/7.0	8.0	
4.0	7.0	8.0	6.4/7.0	8.0	4.0	5.0	5.0	5.0	6.5/7.0	8.0	
–	0.4	0.4	0.4/0.5	0.4/0.5	–	0.4	0.4	–	0.4/0.5	0.4/0.5	
–	–	–	–	–	–	–	–	–	0.4/0.5	4.0	
565 Vpk	890 Vpk	1140 Vpk	890 Vpk	1140 Vpk	565 Vpk	707 Vpk	707 Vpk	565 Vpk	890 Vpk /1130 Vpk	890 Vpk /1130 Vpk	
6000 Vpk	8000 Vpk	8000 Vpk	6000 Vpk /8000 Vpk	6000 Vpk /8000 Vpk	4000 Vpk /6000 Vpk	6000 Vpk	6000 Vpk	4000 Vpk	6000 Vpk /8000 Vpk	6000 Vpk /8000 Vpk	

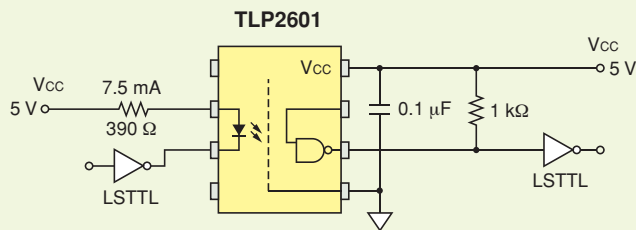
TLP2403 TLP2404 TLP2405 TLP2408 TLP2409 TLP2418 TLP2451 TLP2451A TLP2466 TLP2468	TLP700 TLP700A TLP700H TLP700HF TLP701 TLP701A TLP701H TLP701HF TLP702 TLP702F TLP705 TLP706 TLP706F TLP708 TLP708F TLP714 TLP714F TLP715 TLP715F TLP716 TLP716F TLP718 TLP718F TLP719 TLP719F TLP2766 TLP2768	TLP700F TLP700AF TLP700HF TLP701F TLP701AF TLP701HF TLP702F TLP705F TLP706F TLP708F TLP714F TLP715F TLP716F TLP718F TLP719F TLP2766F TLP2768F	TLP750 TLP751 TLP759 TLP350H TLP351H TLP358 TLP358H	TLP750F TLP751F TLP759F TLP350HF TLP351HF TLP358F TLP358HF	TLP105 TLP108 TLP116 TLP117 TLP2066 TLP2095		TLP109 TLP116A TLP104 TLP118 TLP151A TLP155 TLP155E TLP2309 TLP2355 TLP2358 TLP2362 TLP2366 TLP2367 TLP2368			
			TLP620 TLP620-2 TLP620-4 TLP627 TLP627-2 TLP627-4 TLP731 TLP732	TLP620F TLP620F-2		TLP290 TLP291	TLP184 TLP185	TLP290-4 TLP291-4	TLP733 TLP734 TLP781 TLP785	TLP733F TLP734F TLP781F TLP785F
			TLP360J TLP361J TLP363J TLP3022(S) TLP3023(S) TLP3042(S) TLP3043(S) TLP3052(S) TLP3062(S) TLP3063(S) TLP3064(S) TLP3065(S) TLP3082(S) TLP3083(S) TLP3762(S) TLP3763(S) TLP3782(S) TLP3783(S)	TLP360JF TLP361JF TLP363JF TLP3022F(S) TLP3023F(S) TLP3042F(S) TLP3043F(S) TLP3052F(S) TLP3062F(S) TLP3063F(S) TLP3064F(S) TLP3065F(S) TLP3082F(S) TLP3083F(S) TLP3762F(S) TLP3763F(S) TLP3782F(S) TLP3783F(S)	TLP165J TLP166J		TLP265J TLP266J		TLP762J TLP763J TLP748J	TLP762JF TLP763JF TLP748JF

# 1.1 Photocoupler Application Circuit Examples

\*See datasheets for pin assignments.

## 1 Digital Interface Applications

### High Speed

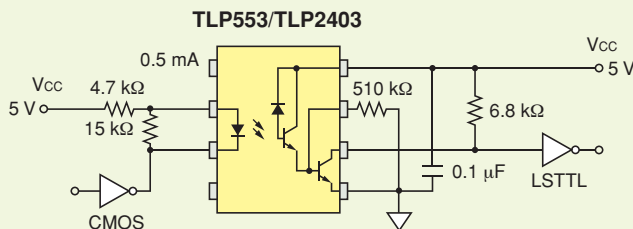


The **TLP2601** allows high-speed data transmission at up to approximately 5 MHz.

Data rate of left-side circuit

$f$  (typ.): 5 Mbit/s (duty cycle  $\approx$  1/2)

### Low Input Current Drive

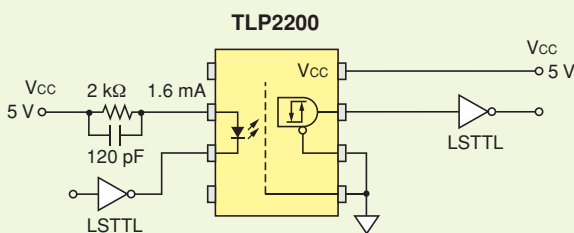


The high-CTR (current transfer ratio) **TLP553** and **TLP2403** allow operation with low input current (0.5 mA) and direct driving with a CMOS signal.

Data rate of left-side circuit

$f$  (typ.): 50 kbit/s (duty cycle  $\approx$  1/2)

### No Pull-up Resistor Required

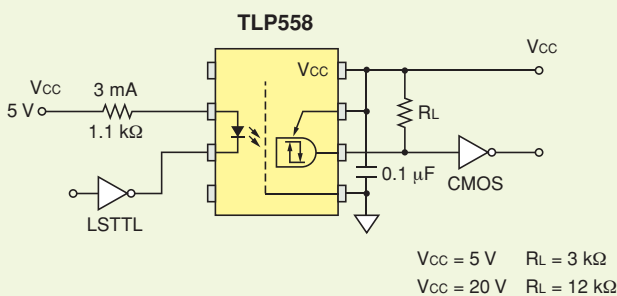


When the **TLP2200** with a 3-state output is used, the next-stage logic gate can be actuated without using a pull-up resistor.

Data rate of left-side circuit

$f$  (typ.): 1 Mbit/s (duty cycle  $\approx$  1/2)

### High Vcc Tolerance



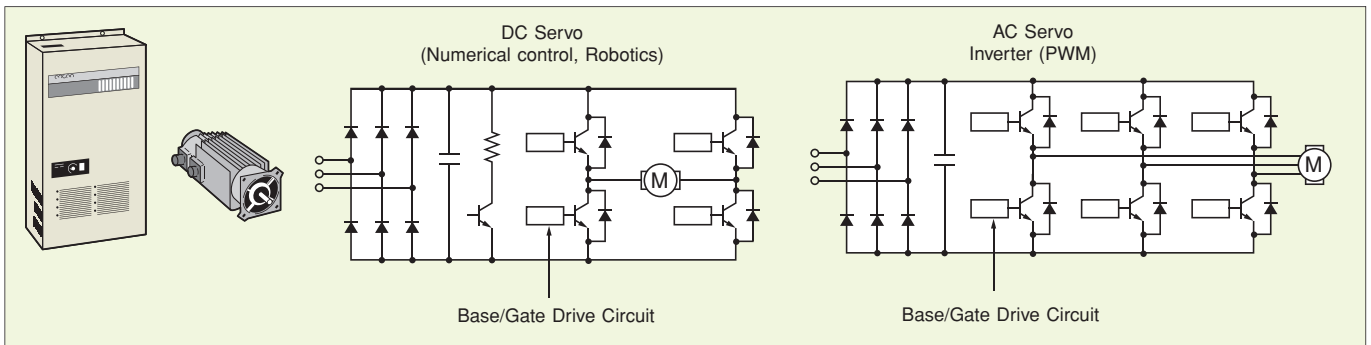
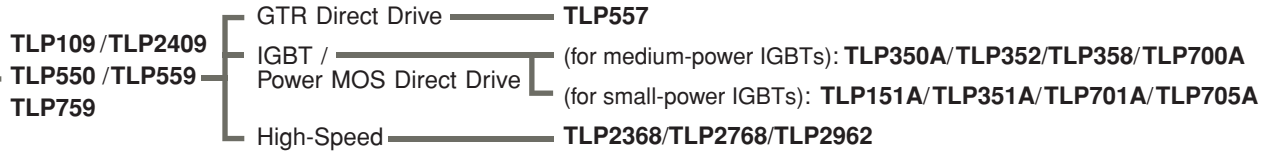
By using the **TLP558** which tolerates  $V_{cc}$  up to 20 V, CMOS logic gates and other components can be driven without design restrictions on  $V_{cc}$ .

Data rate of left-side circuit

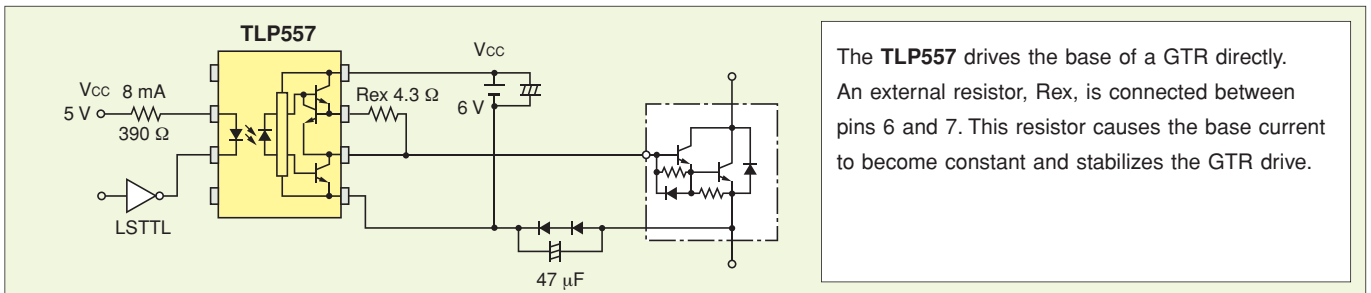
$f$  (typ.): 1 Mbit/s (duty cycle  $\approx$  1/2)

## 2 Inverter and AC-DC Servo Applications

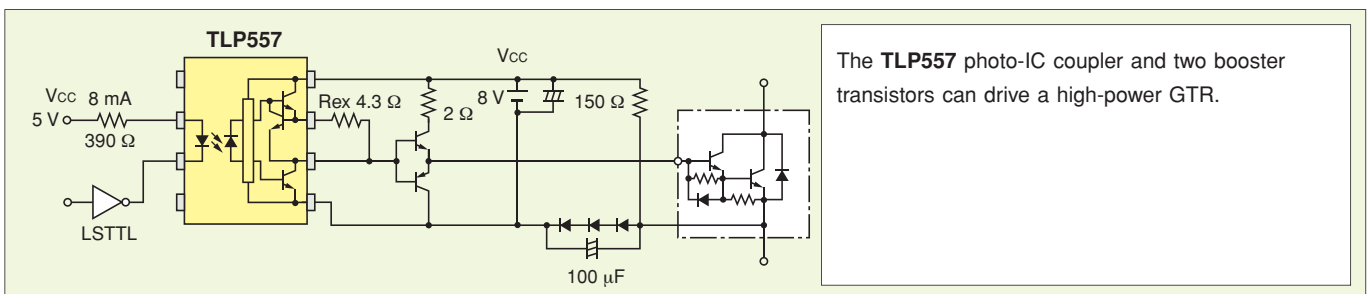
[Photo-IC couplers: high-speed base/gate drive applications]



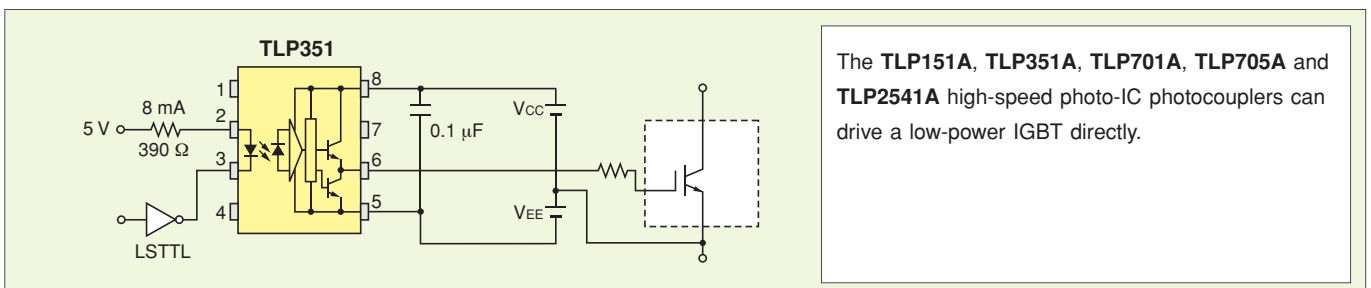
### Driving the Base of a 15-A-Class GTR (Giant Transistor) Module



### Driving the Base of a 100-A-Class GTR Module



### Driving the Gate of a 15-A-Class IGBT (Insulated Gate Bipolar Transistor) Module

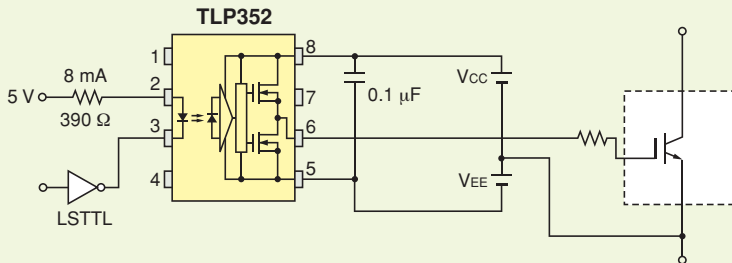


# 11 Photocoupler Application Circuit Examples

\*See datasheets for pin assignments.

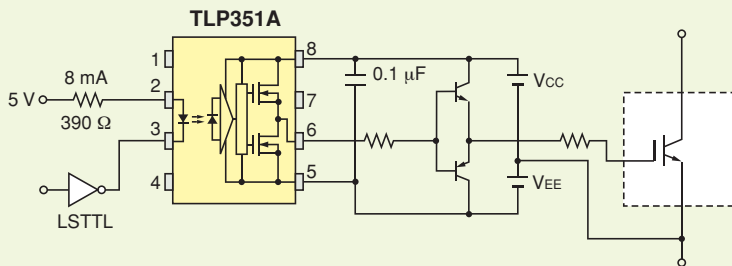
## 2 Inverter and AC-DC Servo Applications

### Driving the Gate of a 50-A-Class IGBT Module



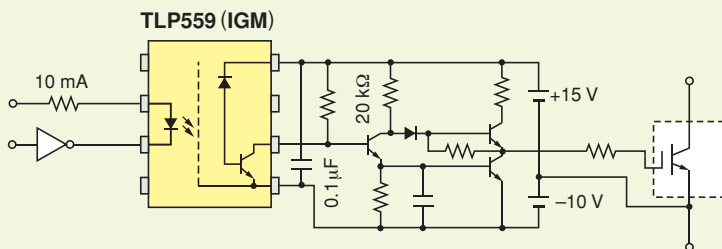
The **TLP350A**, **TLP352**, **TLP358** and **TLP700A** can drive a medium-power IGBT directly.

### Driving the Gate of a 400-A-Class IGBT Module



The **TLP151A**, **TLP351A**, **TLP701A**, **TLP705A** or **TLP2541A** high-speed photo-IC photocoupler and two booster transistors can drive a high power IGBT.

### Driving the Gate of an IGBT Module Using an IGM Photocoupler



IGM photocouplers are suitable for driving an intelligent power module (IPM). These photocouplers guarantee symmetrical low-to-high and high-to-low propagation delays ( $t_{PLH} - t_{PHL}$ ) and provides a high common mode transient immunity.

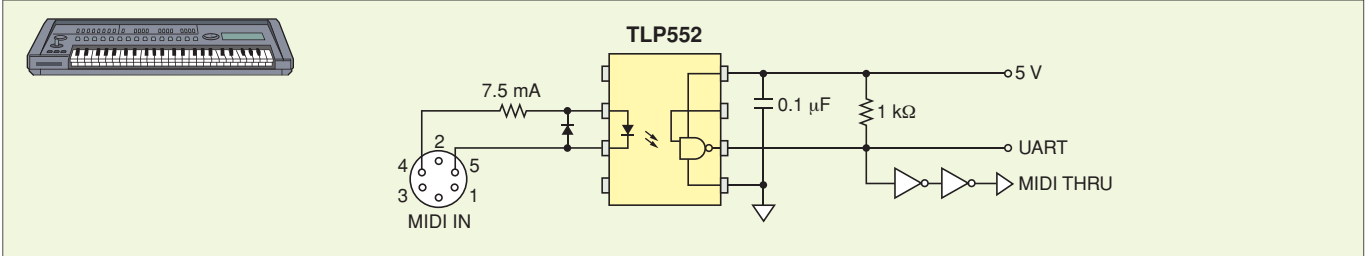
### IGM Selection

Part Number	Package	BVs (Vrms)	Vo/Vcc	CTR	$ t_{PLH} - t_{PHL} $	CMH	CML
<b>TLP109 (IGM)</b>	SO6	3750	20 V / 30 V max	25% min 75% max @IF = 10 mA VCC = 4.5 V VO = 0.4 V	0.7 μs max @IF = 10 mA RL = 20 kΩ	10000 V / μs min @IF = 0 mA RL = 20 kΩ VCM = 1500 Vp-p	- 10000 V / μs min @IF = 10 mA RL = 20 kΩ VCM = 1500 Vp-p
<b>TLP559 (IGM)</b>	DIP8	2500					
<b>TLP759 (IGM)</b>	DIP8	5000					

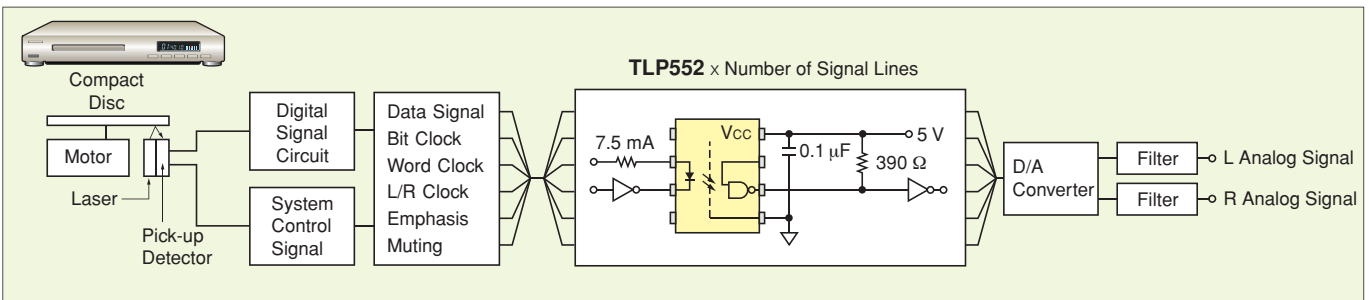


### 3 TV and Audio Applications

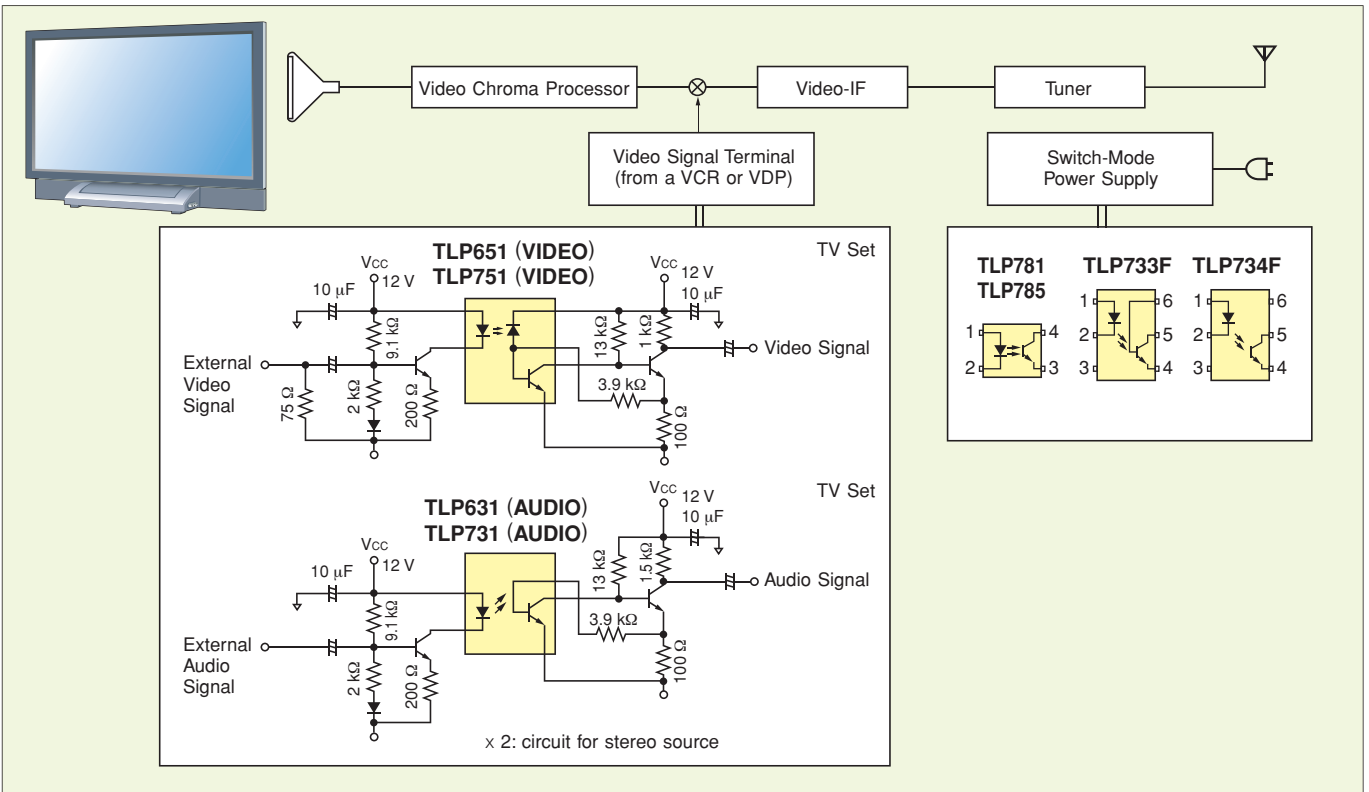
#### MIDI Interfaces for Electronic Musical Instruments



#### Compact Disc Players



#### TV/AV Terminal Isolations



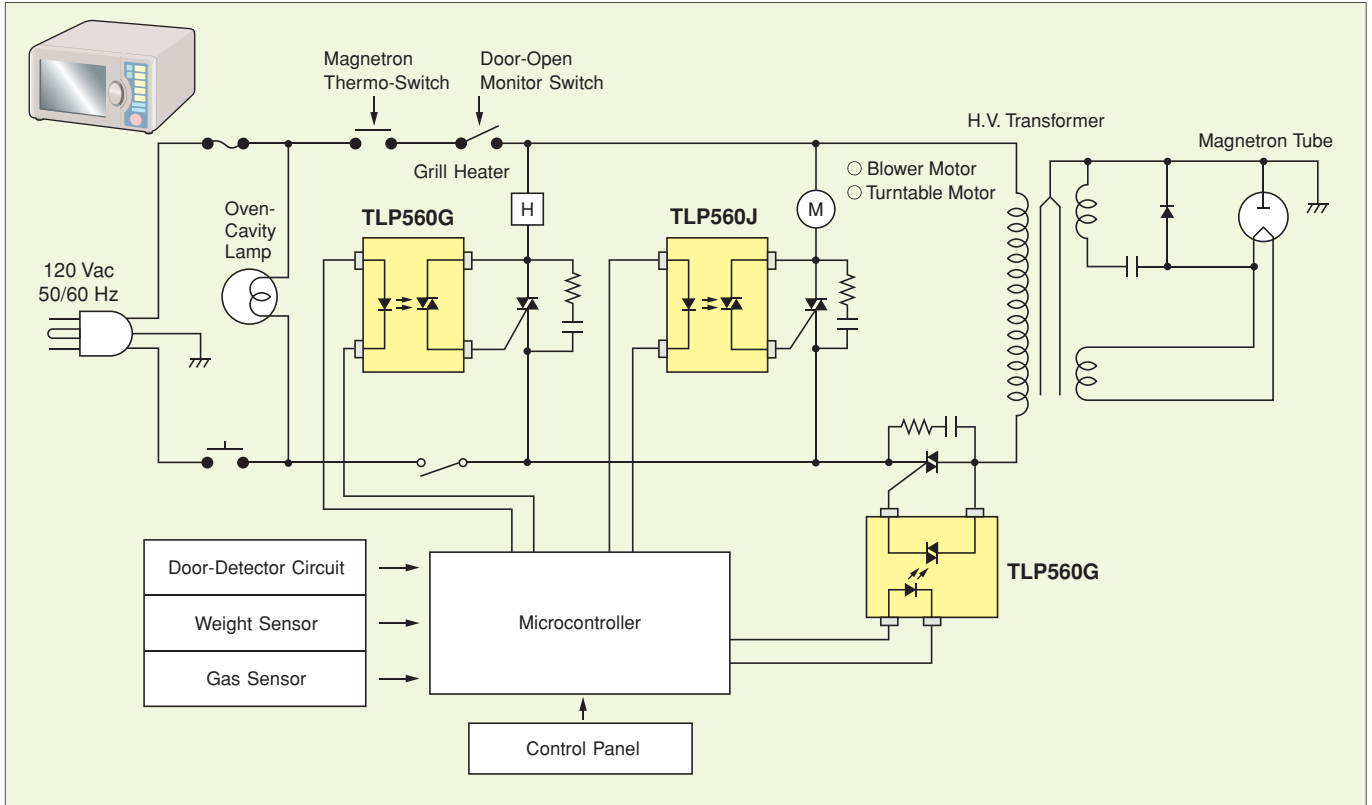
Part Number	Isolation Voltage	Bandwidth	Voltage Gain
TLP651 (VIDEO)	5000 Vrms	> 4.5 MHz	0.5 to 2
TLP751 (VIDEO)	5000 Vrms		0.4 to 1.8
TLP631 (AUDIO)	5000 Vrms	> 100 kHz	0.7 to 2
TLP731 (AUDIO)	4000 Vrms		

# 11 Photocoupler Application Circuit Examples

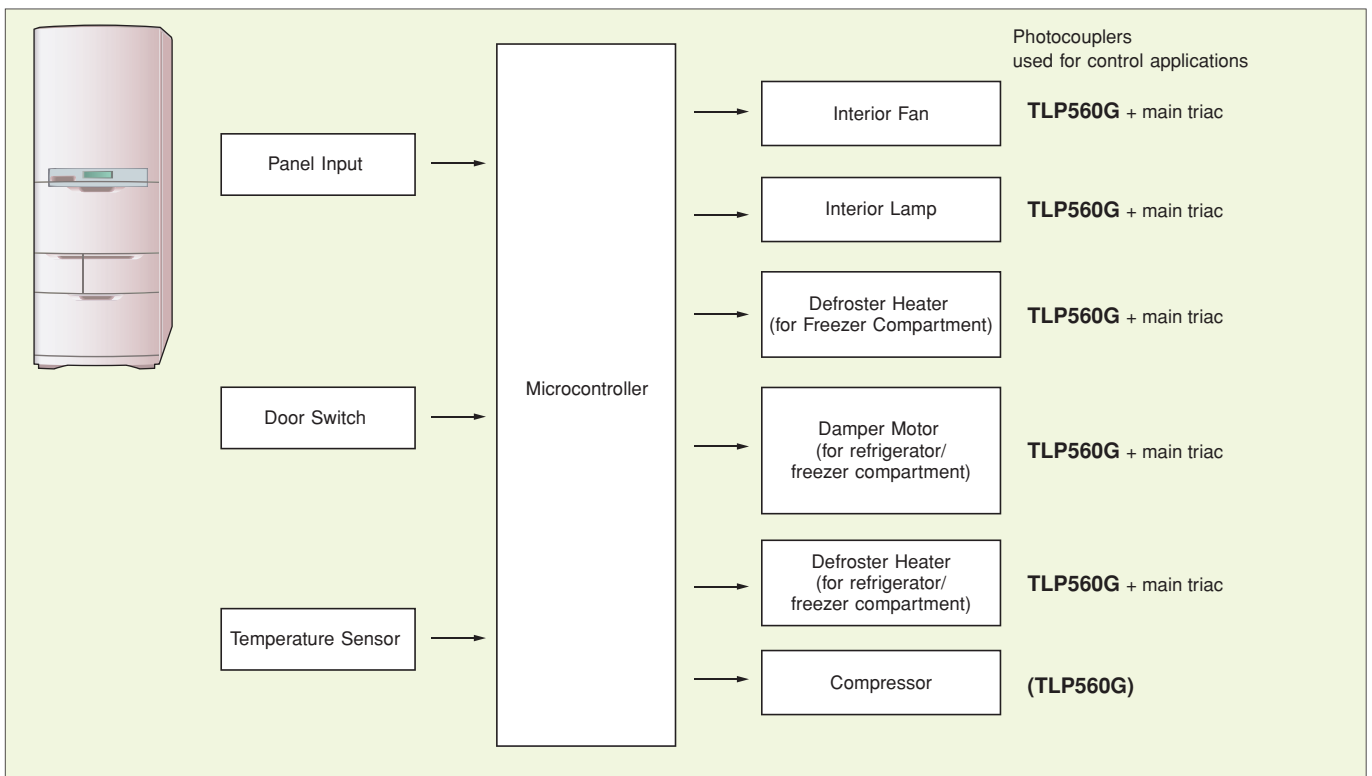
\*See datasheets for pin assignments.

## 4 Home Appliance Applications

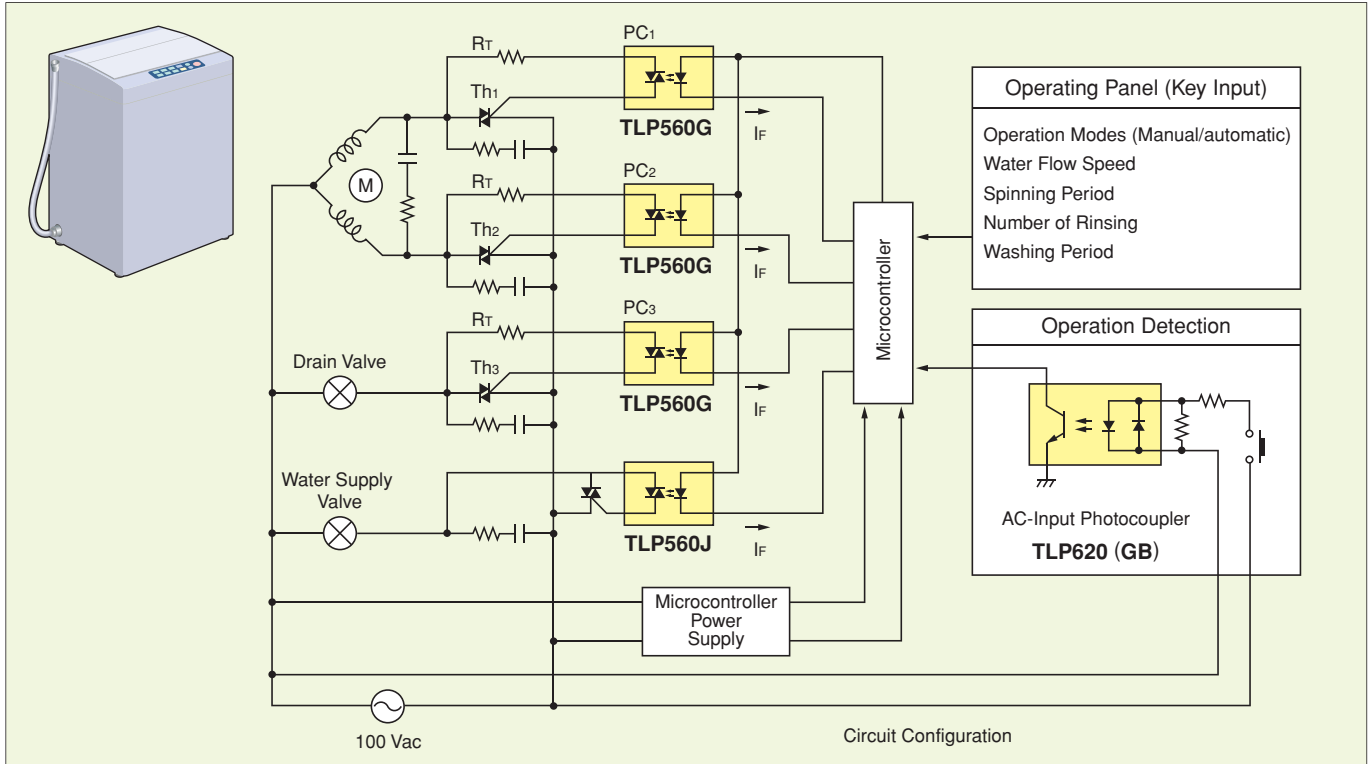
### Electric Oven/Grills



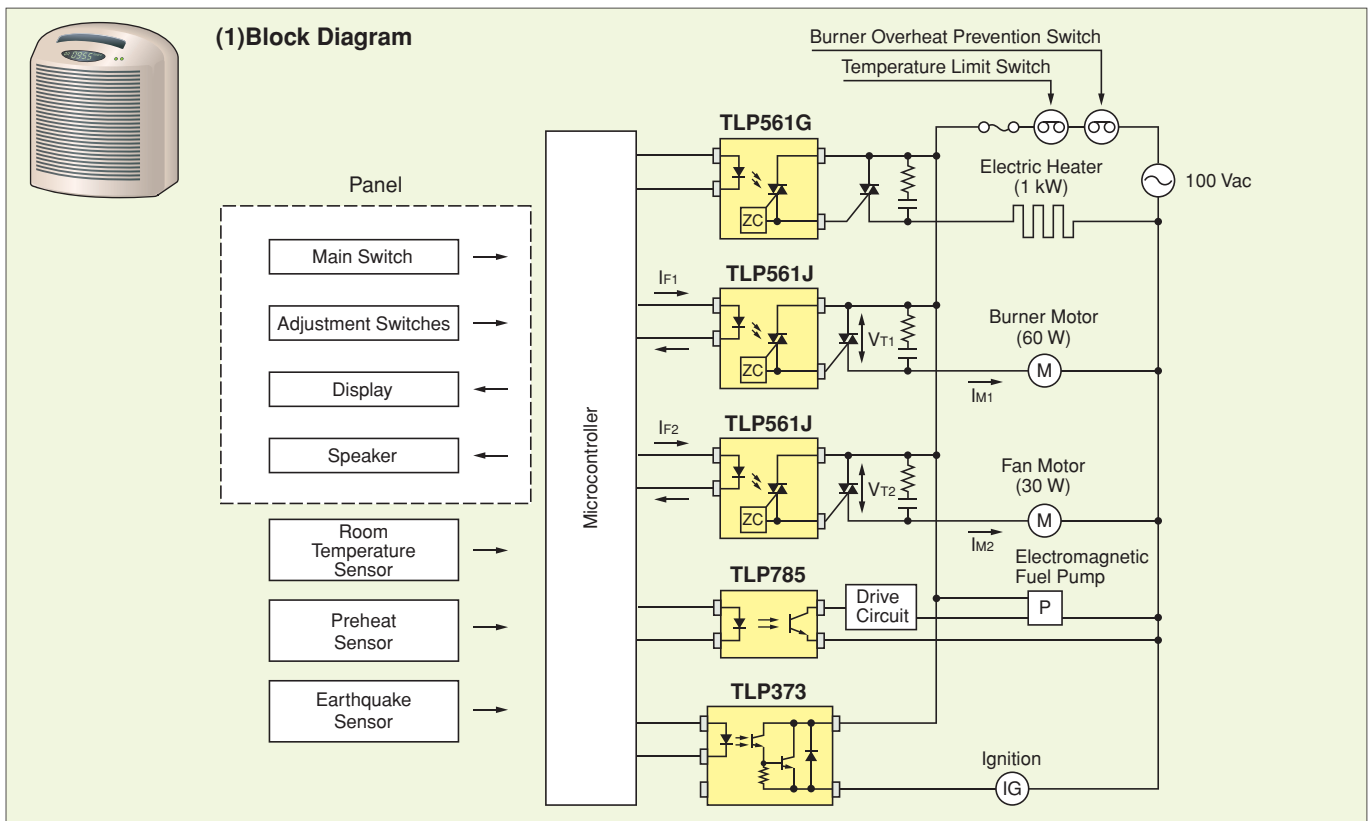
### Refrigerator Block Diagram



## Automatic Washing Machines



## Fan Heaters



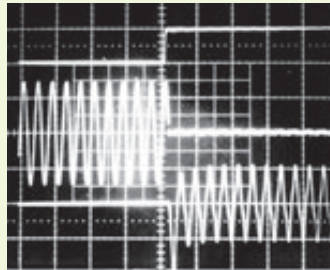
# 11 Photocoupler Application Circuit Examples

\*See datasheets for pin assignments.

## 4 Home Appliance Applications (Continued)

### (2) Waveform Examples

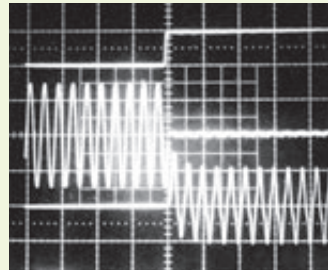
1. Example of Operating Waveform for Burner Motor



Trigger Point

waveforms {  
 Top:  $I_{F1}$  20 mA/div  
 Medium:  $V_{T1}$  100 V/div  
 Bottom:  $I_{M1}$  1 A/div  
 Horizontal: time 50 ms/div

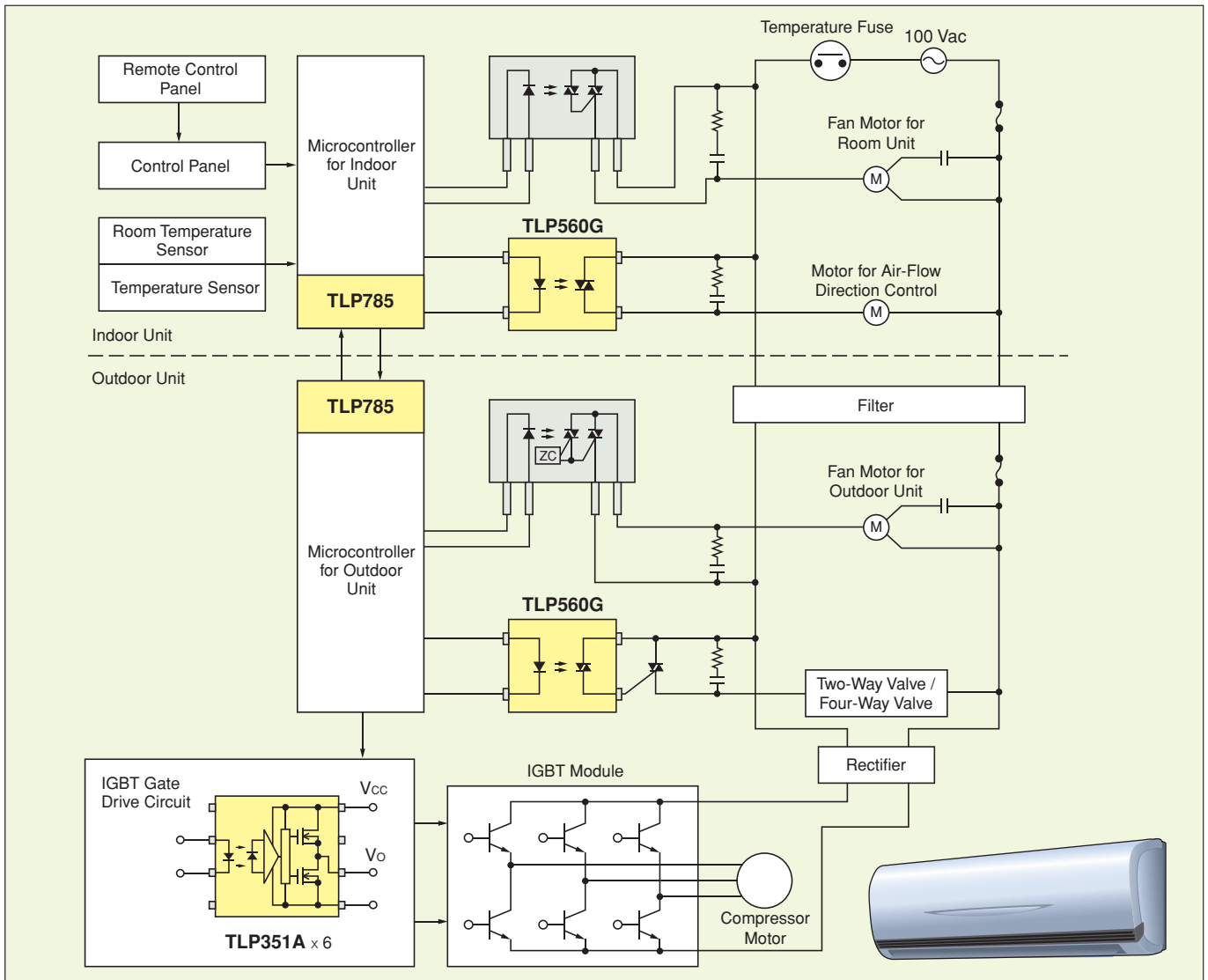
2. Example of Operating Waveform for Fan Motor



Trigger Point

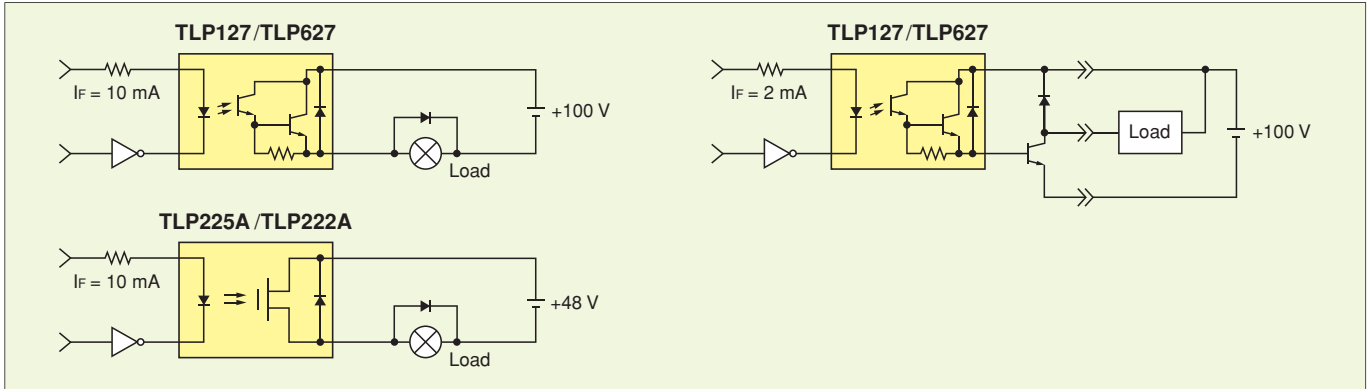
waveforms {  
 Top:  $I_{F2}$  20 mA/div  
 Medium:  $V_{T2}$  100 V/div  
 Bottom:  $I_{M2}$  0.5 A/div  
 Horizontal: time 50 ms/div

## Inverter Air Conditioners

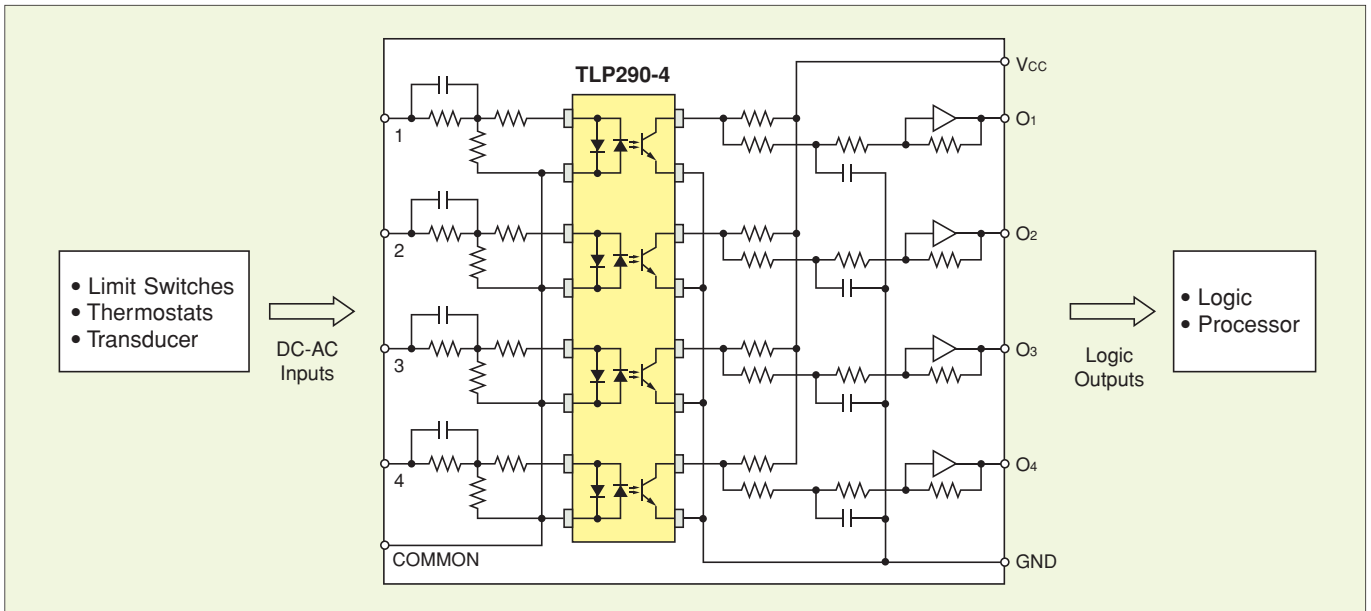


## 5 Programmable Controller Applications

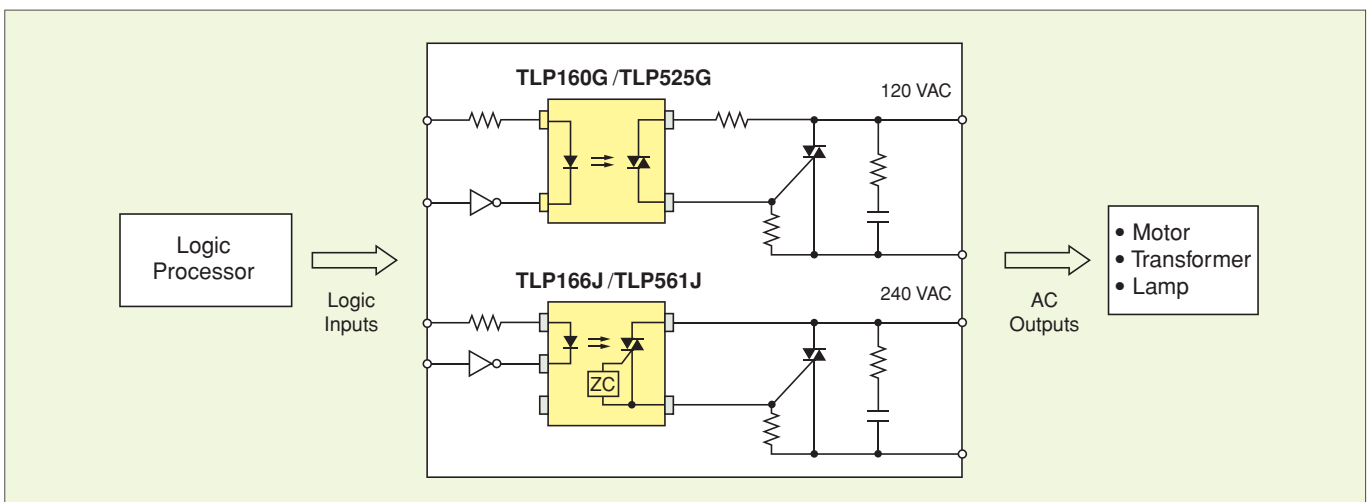
### DC Output for Sequencers



### AC Input for Sequencers



### 120-/240-Vac Output for Sequencers and Solid State Relays (SSRs)

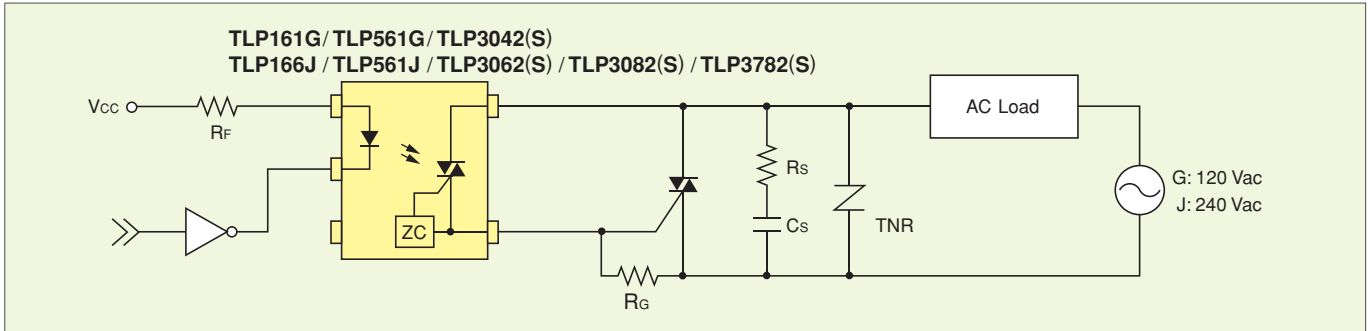


# 11 Photocoupler Application Circuit Examples

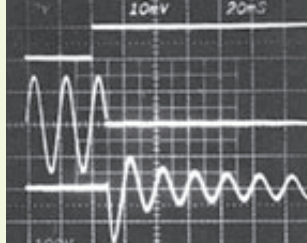
\*See datasheets for pin assignments.

## 6 SSR and Power Control Circuit Applications

### Zero-Crossing Phototriac Output: TLP561G/TLP561J and Mini-Flat TLP161G/TLP166J

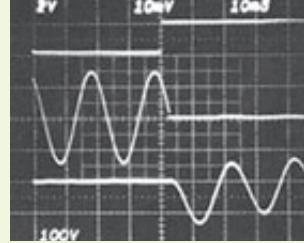


Lamp Load (1-A tungsten lamp)



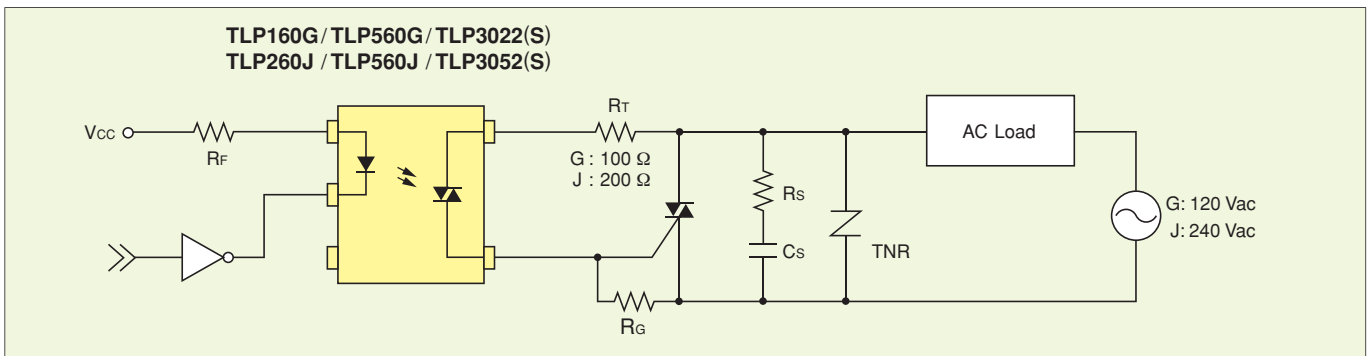
Waveforms { Top:  $I_F$  20 mA/div  
 Medium:  $V_T$  100 V/div  
 Bottom:  $I_T$  5 A/div

L load (2.5-A pure inductive load)

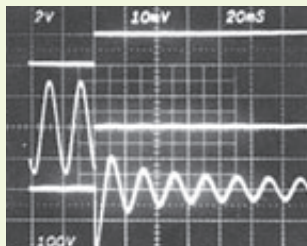


Recommended conditions {  $I_F$  = 20 mA  
 $R_G$  = 47  $\Omega$   
 $R_S$  = 47  $\Omega$ ,  $C_S$  = 0.033  $\mu$ F

### Non-Zero Crossing Phototriac Output: TLP560G/TLP560J and Mini-Flat TLP160G/TLP260J

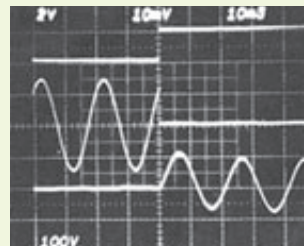


Lamp Load (1-A tungsten lamp)



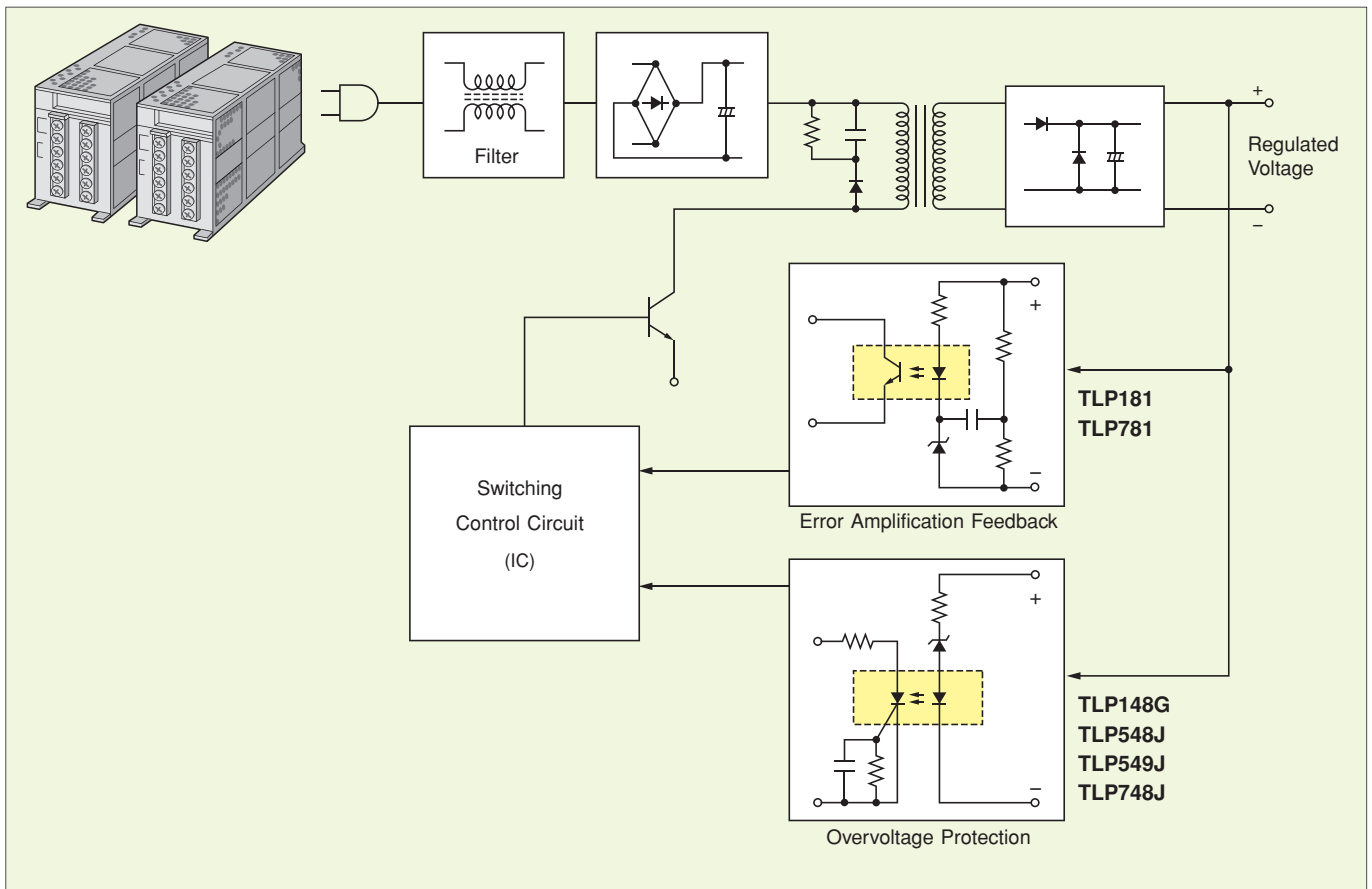
Waveforms { Top:  $I_F$  20 mA/div  
 Medium:  $V_T$  100 V/div  
 Bottom:  $I_T$  5 A/div

L load (2.5-A pure inductive load)



Recommended conditions {  $I_F$  = 20 mA  
 $R_T$  = 100  $\Omega$  / 200  $\Omega$   
 $R_G$  = 47  $\Omega$   
 $R_S$  = 47  $\Omega$ ,  $C_S$  = 0.033  $\mu$ F

## 7 Switching Power Supply Circuit Application



### ■ Transistor Output (○: Approved, as of July 2012)

Part Number	Package Type	Isolation Voltage	Safety Standard Approvals				CTR (Ic / If) Rank (%)		
			UL 1577	BSI 7002(EN60950)	EN60747 (Note 1)	Nordic SEMKO		Min	Max
<b>TLP185</b>	SO6	3750 Vrms	○	○	○(Note 2)	○	No Rank (GB) Rank (Y) Rank (GR) Rank (BL) Rank** (GRL) Rank (GRH) Rank (O) Rank No Rank	50	600 <sup>▲</sup>
<b>TLP781 TLP785</b>	DIP4	5000 Vrms	○*	○	○	○		100	600 <sup>▲</sup>
								50	150
								100	300
								200	600
								100	200
<b>TLP750 (high-speed)</b>	DIP8	5000 Vrms	○	○	○	○	150	300	
							19	–	
							10	–	

### ■ Thyristor Output (○: Approved, as of July 2012)

Part Number	Package Type	Isolation Voltage	Safety Standard Approvals		IFT (mA)	VDRM (V)
			UL 1577	EN60747 (Note 1)		
<b>TLP148G</b>	MFSOP6	2500 Vrms	○		10	400
<b>TLP548J</b>	DIP6		○		7	600
<b>TLP748J</b>			4000 Vrms	○	○	10

Note 1: EN60747-5-2/5 approved with option (V4) or (D4)

Note 2: The EN60747-5-2/5 safety standard for compact packages is different from those for standard DIP packages. Since the mini-flat package is a compact package, please contact your nearest Toshiba sales representative for more details.

\*: Double protection ▲: 400% for TLP185 \*\*: (BLL) class for TLP185; 200% minimum and 400% maximum

# 11 Photocoupler Application Circuit Examples

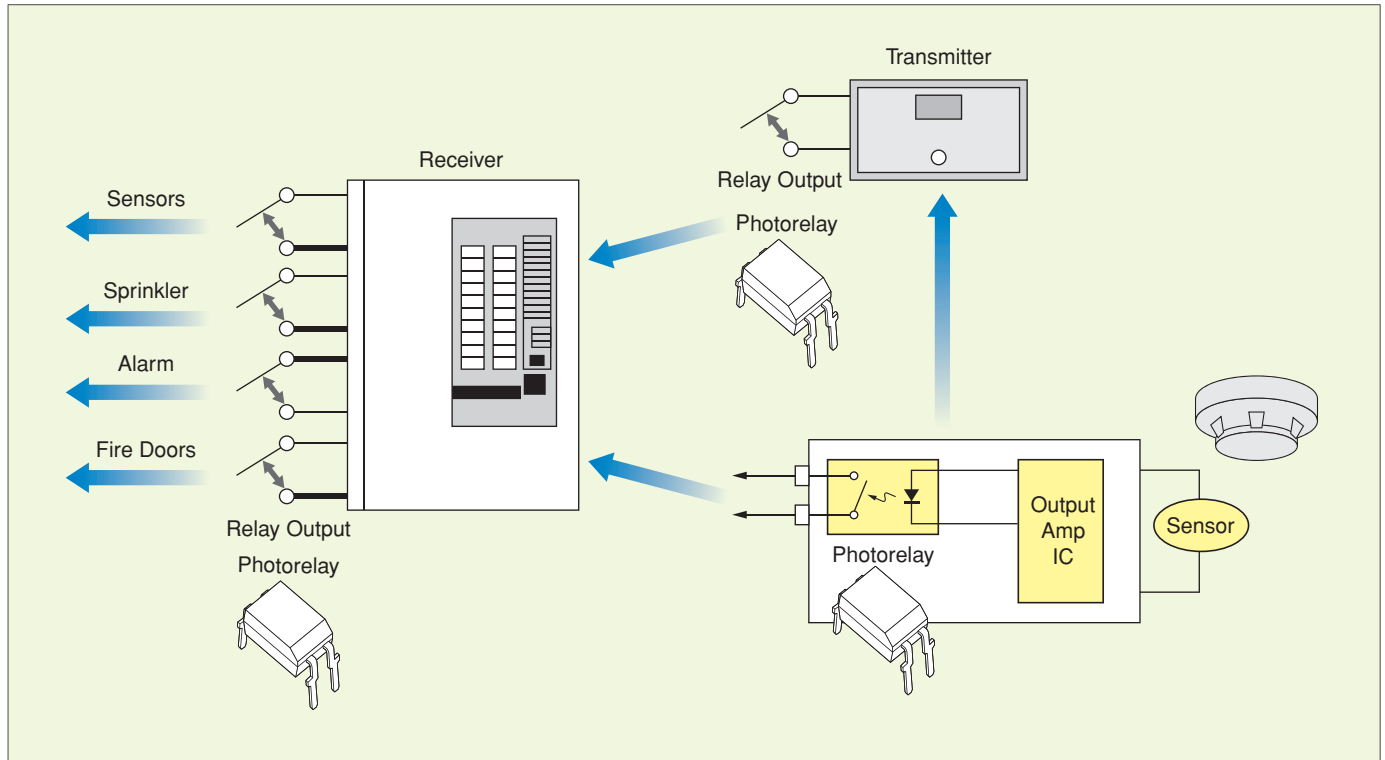
\*See datasheets for pin assignments.

## 8 Security System Applications

Security systems: House fire alarms, smoke sensors, passive infrared ray (PIR) sensors, intruder detectors, surveillance cameras, room entry/exit tracking systems, gas leak alarms, etc.

TLP220A/TLP220D/TLP220G/TLP220GA/TLP220J/TLP220AF/TLP220DF/TLP220GF/TLP220GAF/TLP220JF

### Fire Alarm System Example

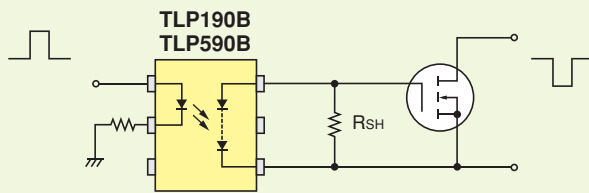


### Examples of Sensors

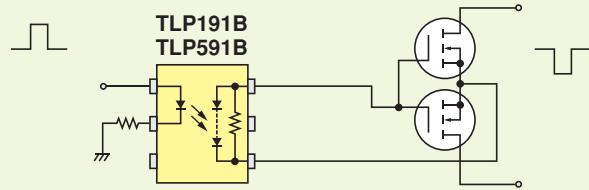




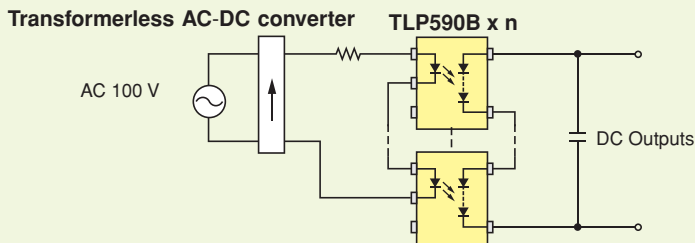
## 9 Photovoltaic Coupler Applications



This is the simplest power MOSFET drive circuit. The resistor  $R_{SH}$  for discharging the gate capacitor reduces turn-off time.  $R_{SH}$  is not required for the TLP591B, which has a built-in resistor. ( $T_{ON}$ ,  $T_{OFF}$   $\approx$  several ms)

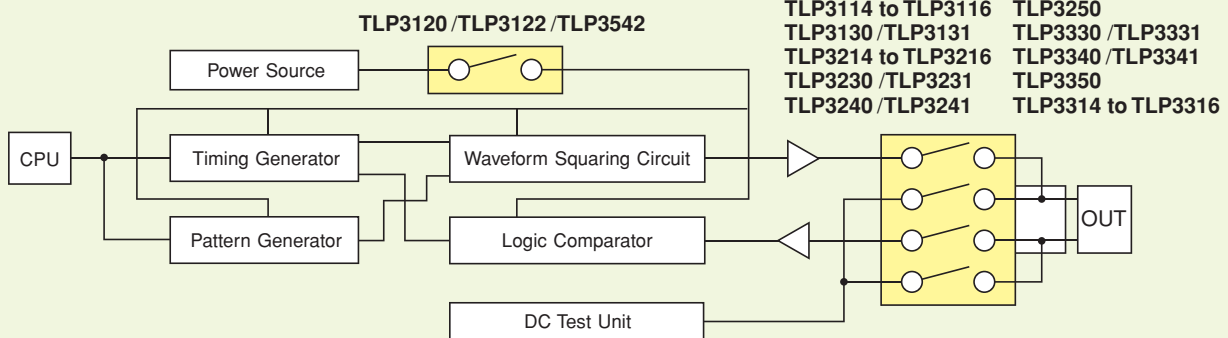


Both AC and DC drivers become possible by connecting power MOSFETs in a common-source configuration.



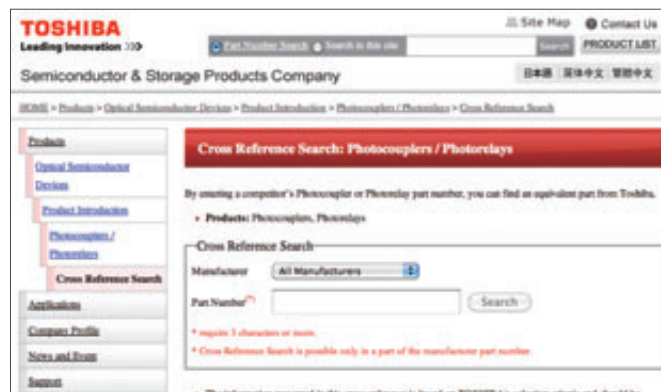
Photovoltaic couplers in a parallel-serial configuration convert AC power to DC without a transformer. This type of configuration requires tens to hundreds of photovoltaic couplers.

## 10 Photorelays for Tester Application



## 11 Competitor Part Number Cross Reference Search

The Toshiba Semiconductor webpage at <http://www.semicon.toshiba.co.jp/eng/product/opto/selection/coupler/xref/index.html> offers a cross reference search tool for photocouplers and photorelays.



# 12 Competitor Cross Reference

## Avago-1

Part Number	Toshiba Part Number
ACNW3120	TLP352F
ACNW3190	TLP358F
ACPL-071L	TLP2466
ACPL-074L	TLP2160
ACPL-214	TLP290
ACPL-217	TLP291
ACPL-247	TLP291-4
ACPL-312U	TLP352
ACPL-3130	TLP352
ACPL-827	TLP785 x 2pcs
ACPL-847	TLP785 x 4pcs
ACPL-H312	TLP700A
ACPL-J313	TLP352
ACPL-K312	TLP700AF
ACPL-M43U	TLP109
ACPL-M46U	TLP104
ACPL-M60L	TLP2368
ACPL-M61L	TLP2366
ACPL-M61U	TLP2362
ACPL-M75L	TLP2366
ACPL-P302	TLP701H
ACPL-P314	TLP701H
ACPL-P454	TLP719
ACPL-P456	TLP714
ACPL-P480	TLP715
ACPL-P481	TLP718
ACPL-P611	TLP2768
ACPL-T350	TLP352
ACPL-W302	TLP701HF
ACPL-W314	TLP701HF
ACPL-W454	TLP719F
ACPL-W456	TLP714F
ACPL-W480	TLP715F
ACPL-W481	TLP718F
ACPL-W60L	TLP2768F
ACPL-W611	TLP2768F
ACPL-W70L	TLP2766F
ASSR-1218	TLP176A
ASSR-1219	TLP592A
ASSR-1228	TLP227A-2
ASSR-1410	TLP172A
ASSR-1420	TLP227A-2
ASSR-1510	TLP3122
ASSR-1511	TLP3542
ASSR-1611	TLP3542
ASSR-301C	TLP172G
ASSR-302C	TLP222G-2
ASSR-3210	TLP176G
ASSR-401C	TLP176GA
ASSR-402C	TLP227GA-2
ASSR-4110	TLP176GA
ASSR-4118	TLP176GA
ASSR-4120	TLP227GA-2
HCNW2201	TLP2955F
HCNW2211	TLP2955F
HCNW3130	TLP352F
HCNW4502	TLP759F
HCNW4503	TLP759F
HCNW4504	TLP759F
HCPL-0201	TLP2405
HCPL-0211	TLP2405
HCPL-0302	TLP2451A
HCPL-0314	TLP2451A
HCPL-0452	TLP2409
HCPL-0453	TLP2409

## Avago-2

Part Number	Toshiba Part Number
HCPL-0454	TLP2409
HCPL-0466	TLP2404
HCPL-0500	TLP2409
HCPL-0501	TLP2409
HCPL-0600	TLP2468
HCPL-0601	TLP2468
HCPL-060L	TLP2468
HCPL-0611	TLP2468
HCPL-061A	TLP2468
HCPL-061N	TLP2468
HCPL-0630	TLP2168
HCPL-0631	TLP2168
HCPL-063A	TLP2168
HCPL-063L	TLP2168
HCPL-063N	TLP2168
HCPL-0661	TLP2168
HCPL-0700	TLP2403
HCPL-0701	TLP2403
HCPL-0708	TLP2466
HCPL-070A	TLP2403
HCPL-070L	TLP2403
HCPL-0738	TLP2160
HCPL-181	TLP185
HCPL-2200	TLP2955
HCPL-2201	TLP2955
HCPL-2202	TLP2955
HCPL-2211	TLP2955
HCPL-2212	TLP2955
HCPL-2219	TLP2955
HCPL-2231	TLP2105
HCPL-2232	TLP2105
HCPL-2300	TLP2962
HCPL-2601	TLP2601
HCPL-2611	TLP2601
HCPL-261A	TLP2962
HCPL-261N	TLP2962
HCPL-2630	TLP2662
HCPL-2631	TLP2662
HCPL-3020	TLP351H
HCPL-3100	TLP351H
HCPL-3101	TLP351H
HCPL-3120	TLP352
HCPL-3140	TLP351H
HCPL-314J	TLP701H x 2pcs
HCPL-3150	TLP351H
HCPL-315J	TLP701H x 2pcs
HCPL-3180	TLP352
HCPL-4502	TLP759
HCPL-4503	TLP759
HCPL-4504	TLP759
HCPL-4506	TLP754
HCPL-4661	TLP2662
HCPL-817	TLP785
HCPL-J312	TLP352
HCPL-J314	TLP351H
HCPL-J454	TLP759
HCPL-J456	TLP754
HCPL-M452	TLP2309
HCPL-M453	TLP2309
HCPL-M454	TLP2309
HCPL-M456	TLP104
HCPL-M600	TLP2362
HCPL-M601	TLP2362
HCPL-M611	TLP2362
HCPL-T250	TLP352

## Renesas-1

Part Number	Toshiba Part Number
PS2501-1	TLP785
PS2501-2	TLP785 x 2pcs
PS2501-4	TLP785 x 4pcs
PS2501A-1	TLP785
PS2501L-1	TLP785
PS2501L-2	TLP785 x 2pcs
PS2502L-1	TLP627
PS2502L-4	TLP627-4
PS2503L-1	TLP624
PS2505L-1	TLP620
PS2505L-2	TLP620-2
PS2505L-4	TLP620-4
PS2513L-1	TLP628
PS2521-1	TLP629
PS2521L-1	TLP629
PS2525L-1	TLP320
PS2532-1	TLP627
PS2532-2	TLP627-2
PS2532-4	TLP627-4
PS2532L-1	TLP627
PS2533L-1	TLP627
PS2535L-1	TLP627
PS2561	TLP785
PS2561AL	TLP785F
PS2561BL	TLP785F
PS2561F-1	TLP785
PS2561FL1-1	TLP785F
PS2561L1-1	TLP785F
PS2562L-1	TLP627
PS2565L-1	TLP620
PS2581AL	TLP785F
PS2581L1	TLP785F
PS2601	TLP631
PS2602	TLP632
PS2633	TLP371
PS2634	TLP372
PS2701-1	TLP185
PS2702-1	TLP127
PS2703-1	TLP185
PS2705A-1	TLP184
PS2711-1	TLP124
PS2715-1	TLP184
PS2732-1	TLP127
PS2733-1	TLP127
PS2761B-1	TLP124
PS2801-1	TLP291
PS2801-4	TLP291-4
PS2801C-1	TLP291
PS2801C-4	TLP291-4
PS2805-1	TLP290
PS2805-4	TLP290-4
PS2805C-1	TLP290
PS2805C-4	TLP290-4
PS2811-1	TLP291
PS2811-4	TLP291-4
PS2815-1	TLP290
PS2815-4	TLP290-4
PS2861B-1	TLP291
PS710B-1A	TLP3542
PS7113-1A	TLP598GA
PS7122A-1A	TLP598GA
PS7141-1B	TLP4597G
PS7141E-1A	TLP597GA
PS7200A-1A	TLP3116
PS7200H-1A	TLP3114

## Renesas-2

Part Number	Toshiba Part Number
PS7200K-1A	TLP3115
PS7200R-1A	TLP3116
PS7205B-1A	TLP3121
PS7206-1A	TLP3122
PS7221A-2A	TLP200D
PS7801-1A	TLP3216
PS7802-1A	TLP3214
PS7802A-1A	TLP3214
PS7802B-1A	TLP3215
PS7804-1A	TLP3212
PS8101	TLP2309
PS8302L	TLP719
PS8302L2	TLP719F
PS8501	TLP751
PS8502	TLP759
PS8601	TLP751
PS8602	TLP759
PS8701	TLP2309
PS8802	TLP2409
PS8821	TLP2409
PS9113	TLP104
PS9114	TLP2362
PS9115	TLP2366
PS9117A	TLP2362
PS9121	TLP2368
PS9122	TLP2368
PS9123	TLP2366
PS9124	TLP2362
PS9151	TLP2366
PS9213	TLP104
PS9214	TLP2362
PS9301	TLP701H
PS9302	TLP700A
PS9303L	TLP715
PS9305L	TLP700A
PS9306L	TLP701H
PS9307L	TLP701H
PS9308L	TLP700A
PS9309L	TLP715
PS9313L	TLP714
PS9317L	TLP2768
PS9317L2	TLP2768F
PS9324	TLP2768
PS9351	TLP2766
PS9505	TLP352
PS9506	TLP351H
PS9513	TLP754
PS9552	TLP350H
PS9553	TLP351H
PS9587	TLP2601
PS9614	TLP2962
PS9617	TLP2601
PS9701	TLP2362
PS9714	TLP2362
PS9801	TLP2451A
PS9817A-1	TLP2418
PS9817A-2	TLP2168
PS9821-1	TLP2466
PS9821-2	TLP2160
PS9822-1	TLP2468
PS9822-2	TLP2168
PS9851-1	TLP2466
PS9851-2	TLP2160

## Panasonic

Part Number	Toshiba Part Number
AQV210	TLP592G
AQV210E	TLP597G
AQV210EH	TLP797GA
AQV210S	TLP192G
AQV212	TLP592A
AQV212S	TLP197A
AQV214	TLP597GA
AQV214E	TLP597G
AQV214EH	TLP797GA
AQV214H	TLP797GA
AQV214S	TLP197GA
AQV215	TLP597A
AQV216	TLP797J
AQV217S	TLP197D
AQV251G	TLP3544
AQV252G	TLP3545
AQV255G	TLP3105
AQV414E	TLP4597G
AQV414S	TLP4197G
AQW210	TLP222G-2
AQW210S	TLP202G
AQW212	TLP222A-2
AQW214	TLP206GA
AQW214S	TLP227GA-2
AQW215	TLP222A-2
AQW217	TLP222G-2
AQW610S	TLP4026G
AQY210EH	TLP227G
AQY210LS	TLP174G
AQY210S	TLP174G
AQY211EHA	TLP221A
AQY212EHA	TLP220A
AQY212G	TLP3555
AQY214EH	TLP227G
AQY214EHA	TLP220GA
AQY214S	TLP176GA
AQY216EH	TLP220J
AQY221N1S	TLP3113 /TLP3116
AQY221N2S	TLP3113 /TLP3116
AQY221N2V	TLP3216
AQY221R2V	TLP3215
AQY410EH	TLP4227G
AQY414EH	TLP4227G
AQY414S	TLP4176G

## Sharp

Part Number	Toshiba Part Number
PC123	TLP785
PC1231	TLP624
PC352	TLP185
PC354NT	TLP184
PC355NT	TLP127
PC357NT	TLP185
PC367	TLP124
PC3H21	TLP525G
PC3H3	TLP290
PC3H4	TLP290
PC3H7	TLP291
PC410	TLP2362
PC411	TLP2366
PC417	TLP2309
PC452	TLP127
PC457	TLP2309
PC4D10S	TLP2168
PC4SD21	TLP669L(S)*
PC813	TLP620
PC814	TLP626
PC815	TLP627
PC817	TLP785
PC8171	TLP624
PC845	TLP523 x 4pcs
PC847	TLP785 x 4pcs
PC851	TLP628
PC852	TLP627
PC910	TLP2962
PC923	TLP351H
PC924	TLP351H
PC925	TLP352
PC942	TLP351H
PR36MF11	TLP3506
PR36MF12	TLP3506
S201D01	TLP3526
S201D02	TLP3527
S21MD3V	TLP3051 (S)
S2S3	TLP260J
S2S4	TLP161J

## Vishay

Part Number	Toshiba Part Number
SFH614A	TLP628
SFH615A	TLP785
SFH617A	TLP785
SFH618A	TLP624
TCET1100	TLP785
SFH690xT	TLP185
TCMT110	TLP291
TCMT4100	TLP291-4
SFH628A	TLP620
K815P	TLP627
SFH612A	TLP627
SFH619A	TLP627
SFH655A	TLP627
SFH692AT	TLP127
TCED1100	TLP627
IL66	TLP371
IL66B	TLP372
IL255	TLP330
SFH6156	TLP785
TCMT1600	TLP290
TCMT4600	TLP290-4
SFH618	TLP785
SFH619	TLP628

## Fairchild-1

Part Number	Toshiba Part Number
6N137M	TLPN137
FOD050L	TLP751
FOD060L	TLP2160
FOD2200	TLP2955
FOD260L	TLP2962
FOD3120	TLP352
FOD3150	TLP351H
FOD3180	TLP352
FOD3181	TLP351H
FOD3184	TLP352
FOD410	TLP668J(S)*
FOD617	TLP785
FOD814	TLP620
FOD815	TLP627
FOD817	TLP785
FOD8320	TLP700AF
FOD8321	TLP700AF
FOD852	TLP627
FODM121	TLP185
FODM124	TLP185
FODM2701	TLP185
FODM2705	TLP184
FODM3021	TLP160G
FODM3022	TLP160G
FODM3051	TLP160J
FODM3052	TLP160J
FODM452	TLP2309
FODM453	TLP2309
FODM611	TLP2368
FODM8061	TLP2368
FODM8071	TLP2366
H11A1	TLP631
H11A617	TLP785
H11A817	TLP785
H11AA1	TLP630
H11AA814	TLP620
H11AG1	TLP331
H11B1	TLP571
H11B815	TLP627
H11C1	TLP541G
H11D1	TLP371
H11G1	TLP371
HCPL0452	TLP2409
HCPL0453	TLP2409
HCPL0500	TLP2409
HCPL0501	TLP2409
HCPL0600	TLP2468
HCPL0601	TLP2468
HCPL0611	TLP2468
HCPL062L	TLP2168
HCPL0637	TLP2168
HCPL0638	TLP2168
HCPL0639	TLP2168
HCPL2601	TLP2601
HCPL2611	TLP2601
HCPL2630	TLP2662
HCPL2631	TLP2662
HMA121	TLP185
HMA124	TLP124
HMA2701	TLP185
HMAA2705	TLP184
HMHA2801	TLP291
HMHA2801	TLP291
HMHA281	TLP291
HMHA280	TLP290

## Fairchild-2

Part Number	Toshiba Part Number
MCT5201	TLP331
MCT5210	TLP331
MCT5211	TLP331
MOC3021-M	TLP3021 (S)
MOC3022-M	TLP3022 (S)
MOC3023-M	TLP3023 (S)
MOC3041-M	TLP3041 (S)
MOC3042-M	TLP3042 (S)
MOC3043-M	TLP3043 (S)
MOC3051-M	TLP3051 (S)
MOC3052-M	TLP3052 (S)
MOC3061-M	TLP3061 (S)
MOC3062-M	TLP3062 (S)
MOC3063-M	TLP3063 (S)

## LITEON

Part Number	Toshiba Part Number
LTV-123	TLP785
LTV-816	TLP785
LTV-817	TLP785
LTV-851	TLP628
LTV-356T	TLP185
LTV-357T	TLP185
LTV-814	TLP620
LTV-814H	TLP320
LTV-354T	TLP184
LTV-815	TLP627
LTV-852	TLP627
LTV-352T	TLP127
LTV-355T	TLP127
MOC3020	TLP3020 (S)
MOC3021	TLP3021 (S)
MOC3022	TLP3022 (S)
MOC3023	TLP3023 (S)
MOC3051	TLP3051 (S)
MOC3052	TLP3052 (S)
MOC3061	TLP3061 (S)
MOC3062	TLP3062 (S)
MOC3063	TLP3063 (S)

## COSMO

Part Number	Toshiba Part Number
K1010	TLP781
K1020	TLP621-2
K2010	TLP631
K3010	TLP620
KP3020	TLP620-2
KP4010	TLP627
KP4020	TLP627-2
K5010	TLP371
K6010	TLP630
KPS2801	TLP291
KPC354NT	TLP184
KPC355NT	TLP127
KPC357NT	TLP185
KPC452	TLP127

## Everlight

Part Number	Toshiba Part Number
EL3H7	TLP291
EL357	TLP185
EL816	TLP785
EL816M	TLP785F
EL817	TLP785
EL817M	TLP785F

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For details of optical and electrical characteristics, package dimensions, pin assignments, etc., see the latest technical documentation. Visit the Toshiba Semiconductor & Storage Products Company website for information about the parts marked with \*.

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