

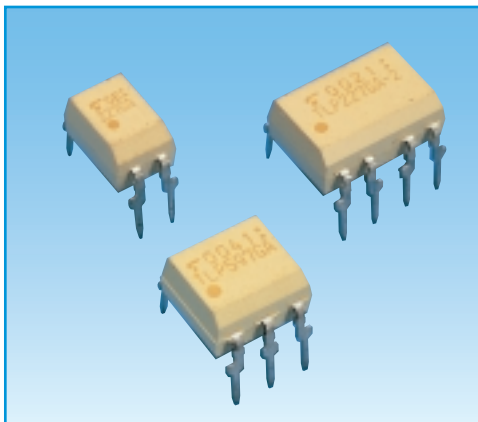
TOSHIBA

Photocouplers

PRODUCT GUIDE

New Products

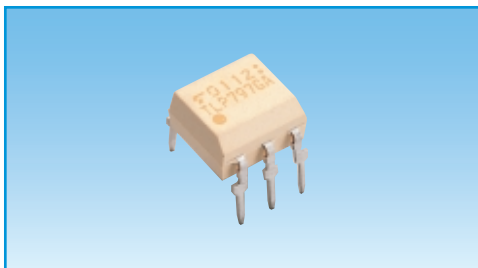
■ Photorelay



The TLP227GA Series of general-purpose photorelays features devices whose OFF-state voltage (400 V) is superior to that of TLP227G Series devices (350 V). This superior OFF-state voltage allows larger safety margins to be incorporated into the design of products, enabling these photorelays to be employed in a variety of application fields, for example telecommunications, where they can be used in modems. TLP227GA Series photorelays can also be used in place of general-purpose mechanical relays. Aside from their superior OFF-state voltage, the other major characteristics of the devices in this new series match those of the TLP227G/TLP597GA/TLP227GA-2 Series, thanks to innovative photodiode array and MOSFET technology.

- OFF-state voltage: $V_{OFF} = 400V$ (min)
- ON-state current: $I_{ON} = 120mA$ (max)
- ON-state resistance: 17Ω (typ.), 35Ω (max)
- Trigger LED current: $I_{FT} = 3mA$ (max)
- Isolation creepage and clearance distance: 7mm(min)
- Safety standards: scheduled for approval by UL, BSI, VDE and SEMKO
- There are two types of device:
 - 1-Form-A and 2-Form-A contacts.
 - 1 Form A: DIP4: TLP227GA
 - 1 Form A: DIP6: TLP597GA
 - 2 Form A: DIP8: TLP227GA-2

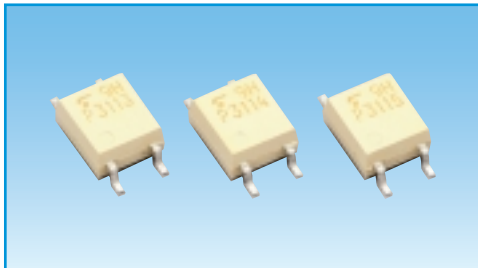
■ Reinforced insulation type Photorelay



The TLP797GA Series is comprised of high-isolation-voltage (5-kVrms) devices whose development has been based on the designs of previous general-purpose photorelay series. The new devices all feature an isolation thickness of at least 0.4 mm. In addition, the series conforms to the EN60950 standard, making the devices suitable for use in applications which require a high isolation voltage. As well as boasting a superior OFF-state voltage, the devices in this series exhibit the same major characteristics as the devices of the 350-V TLP227G/597G/227G-2 Series, due to the use of innovative photodiode array and MOSFET technology.

- 1-form-A
- OFF-state voltage: $V_{OFF} = 400V$ (min)
- ON-state current: $I_{ON} = 120mA$ (max)
- ON-state resistance: $R_{ON} = 17\Omega$ (typ.), 35Ω (max)
- Trigger LED current: $I_{FT} = 3mA$ (max)
- Safety standards: schedule for approval by UL, BSI, VDE and SEMKO
- Conformance with EN60950 standard (reinforced insulation type photorelay)
- Isolation creepage and clearance distance:
 - TLP797GA: 7 mm (min) guaranteed
 - TLP797GAF: 8 mm (min) guaranteed
- Isolation voltage: 0.4 mm (min) guaranteed

■ Photorelay for testers



The new TLP3113, TLP3114 TLP3115 and TLP3116 photorelays exhibit lower output pin capacitance (C_{OFF}) and ON-resistance (R_{ON}) than conventional devices. In addition, they feature a CR value of $10 pF \cdot \Omega$ (typ.) which is approximately equivalent to that of a reed relay. These photorelays have been developed in response to requirements for high-speed operation multiple functions, high reliability, smaller component size and environmental safety (such as calls for an end to the use of mercury). Such characteristics are required for testers and measuring instruments which are used for testing mobile terminals and semiconductor products (which by their nature are evolving at a rapid pace).

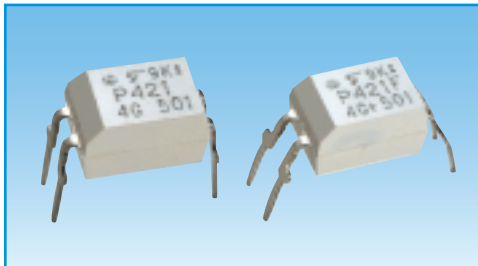
- Compact shape: maximum mounting area $7.40 \times 3.92 mm^2$
- Flat profile: maximum height 2.1 mm
- CR: $10 pF \cdot \Omega$ (typ.)

Select one of the following four photorelays according to the intended application. (Typ.)

Product Number	C_{OFF} (pF)	R_{ON} (Ω)	CR ($pF \cdot \Omega$)
TLP3113	0.5 ~ 0.9	20	10
TLP3114	5	2	
TLP3115	10	1	
TLP3116	1	10	

TLP3113: low- C_{OFF} device TLP3114: CR balance device
TLP3115: low- R_{ON} device TLP3116: low- C_{OFF} device

■ Reflective photocouplers



The TLP421 and TLP421F each consist of a photo-transistor optically coupled to a gallium arsenide infrared-emitting diode inside a 4-pin DIP package. These photocouplers are characterized by a high isolation voltage.

- These products are Toshiba's first reflective photocouplers in DIP packages.
- The products are constructed from palladium plating, which does not contain any lead.
- The products are conformed to the following World safety standards (UL, TUV (VDE0884), BSI and SEMKO).
- Collector-emitter voltage: 80 V
- Current transfer ratio: 50% (min)
- For GB rank products: 100% (min)
- Isolation voltage: 5000 V rms (min)

1. Alphanumeric Listing

Product No.	Page	Product No.	Page
4N25 (SHORT) Single Transistor	8	TLP197G MOSFET, SOP	19
+ * 4N25A (SHORT) Single Transistor	8	TLP200D MOSFET, SOP	19
+ * 4N26 (SHORT) Single Transistor	8	TLP206A MOSFET, SOP	19
+ * 4N27 (SHORT) Single Transistor	8	TLP206G MOSFET, SOP	19
+ * 4N28 (SHORT) Single Transistor	8	TLP225A MOSFET	19
+ 4N29 (SHORT) Darlington Transistor	13	TLP227A MOSFET	19
+ * 4N29A (SHORT) Darlington Transistor	13	TLP227A-2 MOSFET	19
+ * 4N30 (SHORT) Darlington Transistor	13	TLP224G MOSFET	19
+ * 4N31 (SHORT) Darlington Transistor	13	TLP224G-2 MOSFET	19
4N32 (SHORT) Darlington Transistor	13	TLP227G MOSFET	19
+ * 4N32A (SHORT) Darlington Transistor	13	TLP227G(N) MOSFET	19
+ * 4N33 (SHORT) Darlington Transistor	13	TLP227G-2 MOSFET	19
4N35 (SHORT) Single Transistor	8	TLP227G-2(N) MOSFET	19
+ * 4N36 (SHORT) Single Transistor	8	TLP227GA MOSFET	19
+ * 4N37 (SHORT) Single Transistor	8	TLP227GA-2 MOSFET	19
+ 4N38 (SHORT) Single Transistor	8	TLP250 Photo IC	17
+ * 4N38A (SHORT) Single Transistor	8	TLP251 Photo IC	17
+ 6N135 Photo IC	16	TLP270D MOSFET and Transistor	20
6N136 Photo IC	16	TLP270G MOSFET and Transistor	20
6N137 Photo IC	16	TLP280 Half Pitch Mini Flat Transistor	9
6N138 Photo IC	17	TLP280-4 Half Pitch Mini Flat Transistor	9
6N139 Photo IC	17	TLP281 Half Pitch Mini Flat Transistor	9
CNY17-2 Single Transistor	12	TLP281-4 Half Pitch Mini Flat Transistor	9
CNY17-3 Single Transistor	12	TLP296G MOSFET	19
CNY17-4 Single Transistor	12	TLP320 Single Transistor, 4 pin	9
TLP112 Photo IC, Mini Flat	17	TLP320-2 Single Transistor, 2 pin	9
TLP112A Photo IC, Mini Flat	17	TLP320-4 Single Transistor, 4 pin	9
TLP113 Photo IC, Mini Flat	17	* TLP321 Single Transistor, 4 pin	9
TLP114A Photo IC, Mini Flat	17	+ * TLP321-2 Single Transistor, 2 pin	9
TLP114A(IGM) Photo IC, Mini Flat	17	+ * TLP321-4 Single Transistor, 4 pin	9
TLP115 Photo IC, Mini Flat	17	* TLP330 Single Transistor	9
TLP115A Photo IC, Mini Flat	17	TLP331 Single Transistor	9
TLP151 Photo IC	17	TLP332 Single Transistor	9
TLP124 Single Transistor, Mini Flat	8	TLP371 Darlington Transistor	13
TLP126 Single Transistor, Mini Flat	8	TLP372 Darlington Transistor	13
TLP127 Darlington Transistor, Mini Flat	13	TLP421 Single Transistor, 4 pin	10
TLP130 Single Transistor, Mini Flat	8	TLP421F Single Transistor, 4 pin	10
TLP131 Single Transistor, Mini Flat	8	TLP504A Single Transistor, Dual	10
TLP137 Single Transistor, Mini Flat	8	* TLP521-1 Single Transistor, 4 pin	10
TLP141G Thyristor, Mini Flat	14	* TLP521-2 Single Transistor, 2 ch	10
TLP160G Triac, Mini Flat	14	* TLP521-4 Single Transistor, 4 ch	10
TLP160J Triac, Mini Flat	14	* TLP523 Darlington Transistor, 4 pin	13
TLP165J Triac, Mini Flat	14	* TLP523-2 Darlington Transistor, 2 ch	13
TLP161G Triac, Mini Flat	14	* TLP523-4 Darlington Transistor, 4 ch	13
TLP161J Triac, Mini Flat	14	* TLP525G Triac, 4 pin	14
TLP166J Triac, Mini Flat	14	* TLP525G-2 Triac, 2 ch	14
TLP168J Triac, Mini Flat	14	* TLP525G-4 Triac, 4 ch	14
TLP176A MOSFET, SOP	19	+ * TLP541G Thyristor	14
TLP176D MOSFET, SOP	19	TLP550 Photo IC	17
TLP176G MOSFET, SOP	19	TLP557 Photo IC	17
TLP180 Single Transistor, Mini Flat	8	TLP558 Photo IC	17
TLP181 Single Transistor, Mini Flat	8	+ TLP559 Photo IC	17
TLP190B Photovoltaic, Mini Flat	18	TLP559(IGM) Photo IC	17
TLP191B Photovoltaic, Mini Flat	18	+ * TLP560G Triac	15
TLP197A MOSFET, SOP	19	+ * TLP560J Triac	15

Product No.		Page	Product No.		Page
+ *	TLP561G Triac	15	TLP747J Thyristor		14
+ *	TLP561J Triac	15	TLP747JF Thyristor		14
	TLP590B Photovoltaic	18	TLP750 Photo IC		17
	TLP591B Photovoltaic	18	TLP751 Photo IC		18
	TLP598A MOSFET	20	TLP759 Photo IC		18
	TLP599A MOSFET	20	TLP759F Photo IC		18
	TLP598B MOSFET	20	TLP759(IGM) Photo IC		18
	TLP599B MOSFET	20	TLP759F(IGM) Photo IC		18
	TLP598G MOSFET	20	TLP762J Triac		15
	TLP599G MOSFET	20	TLP762JF Triac		15
	TLP597G MOSFET	20	TLP763J Triac		15
	TLP597A MOSFET	20	TLP763JF Triac		15
	TLP597GA MOSFET	20	TLP797GA MOSFET		20
	TLP798G MOSFET	20	TLP797GAF MOSFET		20
	TLP620 Single Transistor, 4 pin	10	TLP798G MOSFET		20
	TLP620-2 Single Transistor, 2 ch	10	TLP2200 Photo IC		18
	TLP620-4 Single Transistor, 4 ch	10	TLP2530 Photo IC		18
	TLP621 Single Transistor, 4 pin	10	TLP2531 Photo IC		18
	TLP621F Single Transistor, 4 pin	10	TLP2601 Photo IC		18
	TLP621-2 Single Transistor, 2 ch	10	TLP2630 Photo IC		18
	TLP621-4 Single Transistor, 4 ch	10	TLP2631 Photo IC		18
	TLP624 Single Transistor, 4 pin	11	TLP3022 Triac		15
	TLP624-2 Single Transistor, 2 ch	11	TLP3023 Triac		15
	TLP624-4 Single Transistor, 4 ch	11	TLP3042 Triac		15
	TLP626 Single Transistor, 4 pin	11	TLP3043 Triac		15
	TLP626-2 Single Transistor, 2 ch	11	* TLP3051 Triac		15
	TLP626-4 Single Transistor, 4 ch	11	TLP3052 Triac		15
	TLP627 Darlington Transistor, 4 pin	13	TLP3062 Triac		15
	TLP627A Darlington Transistor, 4 pin	13	TLP3063 Triac		15
	TLP627-2 Darlington Transistor, 2 ch	13	TLP3064 Triac		15
	TLP627-4 Darlington Transistor, 4 ch	13	TLP3110 MOSFET, MFSOP		20
	TLP628 Single Transistor, 4 pin	11	TLP3111 MOSFET, MFSOP		20
	TLP628-2 Single Transistor, 2 ch	11	TLP3113 MOSFET, MFSOP		20
	TLP628-4 Single Transistor, 4 ch	11	TLP3114 MOSFET, MFSOP		20
	TLP629 Single Transistor, 4 pin	11	TLP3115 MOSFET, MFSOP		20
	TLP629-2 Single Transistor, 2 ch	11	TLP3116 MOSFET, MFSOP		20
	TLP629-4 Single Transistor, 4 ch	11	TLP3130 MOSFET, MFSOP		20
	TLP630 Single Transistor	11	TLP3131 MOSFET, MFSOP		20
+	TLP631 Single Transistor	12	+	TLP3502 Triac	15
+	TLP632 Single Transistor	12	+	TLP3502A Triac	16
+	TLP651 Photo IC	17	+	TLP3503 Triac	15
	TLP722 Single Transistor	12		TLP3506 Triac	15
+	TLP731 Single Transistor	12		TLP3507 Triac	15
+	TLP732 Single Transistor	12	+	TLP3520 Triac	15
	TLP733 Single Transistor	12	+	TLP3520A Triac	16
	TLP733F Single Transistor	12	+	TLP3521 Triac	15
	TLP734 Single Transistor	12		TLP3526 Triac	16
	TLP734F Single Transistor	12		TLP3527 Triac	16
	TLP741G Thyristor	14	+	TLP3530 Triac	16
	TLP741J Thyristor	14		TLP3540 MOSFET	20
	TLP747G Thyristor	14			

+ Not Promotion Item in Europe
* Not Promotion Item in USA

2. Selection Guide

2-1 Phototransistor Output Devices

Producto No.	Pin Configuration	Features	CTR (%)				V _{CEO} (V)	BV _s (Vrms)	Safety Standards ⁽¹⁾									
			Rank	Min	Max	@I _F (mA)			UL	TÜV	VDE	BSI	SEMKO					
4N25 (SHORT)		JEDEC type 4N25 (short) can be used in place of types 25A to 28.	—	20	—	10	30	2500	○									
+☆4N25A(SHORT)																		
+☆4N26 (SHORT)																		
+☆4N27 (SHORT)						10	30	2500										
+☆4N28 (SHORT)																		
4N35 (SHORT)		JEDEC type 4N35 (short) can be used in place of types 36 to 37.	—	100	—													
+☆4N36 (SHORT)						10	30	2500										
+☆4N37 (SHORT)																		
+ 4N38 (SHORT)	JEDEC type 4N38 (short) can be used in place of 4N38A (short)	—	10	—														
+☆4N38A(SHORT)																		
TLP124		Mini-flat Low input current	— BV	100 200	1200	1	80	3750	○									
TLP126		Mini-flat AC input Low input current	—	100	1200	± 1												
TLP130		Mini-flat AC input Internal base connection	— GB	50 100	600	± 5												
TLP131		Mini-flat Internal base connection	— GB	50 100	600	5												
TLP137		Mini-flat Low input current Internal base connection	— BV	100 200	1200	1												
TLP180		Mini-flat AC input	— GB	50 100	600	± 5												
TLP181 ⁽²⁾		Mini-flat Standard	— GB GR	50 100 100	600 300	5												

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

Note (2): TLP181 is manufactured in Thailand by Toshiba Semiconductor Thailand as well as in Japan.

Note (6): VDE0884-approved with option (V4)

+ : Not promotion item in Europe

☆ : Not promotion item in USA

Product No.	Pin Configuration	Features	CTR (%)				V _{CEO} (V)	BVs (V _{rms})	Safety Standards ⁽¹⁾				
			Rank	Min	Max	@I _F (mA)			UL	TÜV	VDE	BSI	SEMKO
TLP280		Half-pitch mini-flat Lead pitch = 1.27 mm AC input	—	50	600	± 5	80	2500	○	○ ⁽⁶⁾	△ ⁽⁶⁾	○	
TLP280-4		Half-pitch mini-flat 4-ch type Lead pitch = 1.27 mm AC input	GB	100		± 5							
			—	50		GB							
TLP281		Half-pitch mini-flat Lead pitch = 1.27 mm	—	50		5							
TLP281-4		Mini-flat 4-ch type Lead pitch = 1.27 mm	GB	100	5								
			—	50	GB	100							
TLP320		4-pin small package AC input 150-mA I _F rating	—	20	80	± 100	55	○					
TLP320-2		Two TLP320 channels	—	20									
TLP320-4		Four TLP320 channels	—	20									
☆TLP321		4-pin small package High V _{CEO}	—	50	600	5	80	5000					
+☆TLP321-2		Two TLP321 channels	GB	100									
			—	50									
+☆TLP321-4		Four TLP321 channels	—	50	GB	100							
☆TLP330		150-mA I _F rating AC input Internal base connection	—	20	80	±100	55						
TLP331		Low input current Internal base connection	—	100	1200	1							
			BV	200									
TLP332		Low input current No internal base connection	—	100	BV	200							

Note (1): In the safety standard column:
 Symbol ○: Approved
 Symbol △: Design which meets safety standards
 Note (6): VDE0884-approved with option (V4)

+ : Not promotion item in Europe
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2-1 Phototransistor Output Devices (continued)

Product No.	Pin Configuration	Features	CTR (%)			@I _F (mA)	V _{CEO} (V)	BV _s (V _{rms})	Safety Standards ⁽¹⁾																			
			Rank	Min	Max				UL	TÜV	VDE	BSI	SEMKO															
TLP421 TLP421F		4-pin small package VDE0884-approved with option (D4) SEMKO approved	—	50	600	5	80	5000	○	△ ⁽⁴⁾	△ ⁽⁴⁾	○ ⁽⁵⁾	○ ⁽⁷⁾															
TLP504A		Standard	GB	100																								
			GR	100																								
☆ TLP521-1 ⁽²⁾		4-pin small package Standard	A	50	600	5	55	2500																				
			GB	100																								
			BL	200																								
			YG	50	300																							
			GR	100																								
			GRL	100	200																							
			GRH	150	300																							
Y	50	150																										
☆ TLP521-2 ⁽²⁾		Two TLP521-1 channels	A	50	600																							
			GB	100																								
			GR	100	300																							
			BL	200	600																							
☆ TLP521-4		Four TLP521-1 channels	A	50	600																							
			GB	100																								
TLP620 ⁽²⁾		AC input 4-pin small package VDE0884-approved with option (D4) SEMKO-approved	—	50	600	± 5	55	5000																				
TLP620F ⁽²⁾			GB	100																								
TLP620-2 ⁽²⁾			GR	100	300																							
TLP620-2 ⁽²⁾		Two TLP620 channels SEMKO approved	—	50	600																							
			GB	100																								
TLP620-4		Four TLP620 channels	—	50	600																							
			GB	100																								
TLP621 ⁽²⁾		4-pin small package VDE0884-approved with option (D4) SEMKO-approved	—	50	600	5	55	5000																				
TLP621F ⁽²⁾			GB	100																								
			BL	200																								
			YG	50	300																							
			GR	100																								
			GRL	100	200																							
			GRH	150	300																							
TLP621-2			Y	50	150																							
TLP621-2		Two TLP621 channels SEMKO-approved	—	50	600																							
			GB	100																								
			TLP621-4											GR	100	300												
TLP621-4		Four TLP621 channels VDE0884-approved with option (D4)	—	50	600																							
			GB	100																								

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

Note (2): TLP521-1 and TLP620 are manufactured in Thailand by Toshiba Semiconductor Thailand as well as in Japan.

Note (4): VDE0884-approved with option (D4)

Note (5): BS EN60065, BS EN60950

Note (7): SS EN60065, SS EN60950

+ : Not promotion item in Europe

☆ : Not promotion item in USA

Product No.	Pin Configuration	Features	CTR (%)			@I _F (mA)	V _{CEO} (V)	BV _s (V _{rms})	Safety Standards ⁽¹⁾				
			Rank	Min	Max				UL	TÜV	VDE	BSI	SEMKO
TLP624		4-pin small package Low input current	—	100	1200	1	55	5000	○	△ ⁽³⁾	△ ⁽³⁾	○ ⁽⁵⁾	
			BV	200									
TLP624-2		Two TLP624 channels	—	100									
			BV	200									
TLP624-4		Four TLP624 channels	—	100									
			BV	200									
TLP626		4-pin small package AC input Low input current	—	100	1200	± 1	55	5000					
			BV	200									
TLP626-2		Two TLP626 channels	—	100									
			BV	200									
TLP626-4		Four TLP626 channels	—	100									
			BV	200									
TLP628		4-pin small package High V _{CEO} (350 V)	—	50	600	5	350	5000					
			GB	100									
TLP628-2		Two TLP628 channels	—	50									
			GB	100									
TLP628-4		Four TLP628 channels	—	50									
			GB	100									
TLP629		4-pin small package 150-mA I _F rating DC input	—	20	80	100	55	5000					
TLP629-2		Two TLP629 channels											
TLP629-4		Four TLP629 channels											
TLP630		Standard AC input Internal base connection	—	50	600	± 5	55	5000					
			GB	100									

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

Note (3): VDE0884-approved

Note (5): BS EN60065, BS EN60950

2-1 Phototransistor Output Devices (continued)

Product No.	Pin Configuration	Features	CTR (%)			@I _F (mA)	V _{CEO} (V)	BV _s (V _{rms})	Safety Standards ⁽¹⁾												
			Rank	Min	Max				UL	TÜV	VDE	BSI	SEMKO								
+ TLP631		Standard High isolation Internal base connection	A	50	600	5	55	5000	○	△ ⁽⁴⁾	○ ⁽⁴⁾	○ ⁽⁵⁾	○ ⁽⁷⁾								
+ TLP632		Standard No internal base connection	GB	100																	
			BL	200																	
			YG	50	300																
			GR	100																	
			Y	50										150							
TLP731		VDE0884-approved with option (D4)	—	50	600									5	55	4000	○	△ ⁽⁴⁾	○ ⁽⁴⁾	○ ⁽⁵⁾	○ ⁽⁷⁾
TLP732		VDE0884-approved with option (D4) No internal base connection	GB	100																	
			TLP733 TLP733F		VDE0884-approved with option (D4) SEMKO-approved																
GB	100																				
GR	100	300																			
TLP734 TLP734F		VDE0884-approved with option (D4) SEMKO-approved No internal base connection	—	50	600																
			GB	100																	
			GR	100		300															
CNY17-2 CNY17-3 CNY17-4		Direct replacement for CNY17 series	—	63	125	10	70	2500	△												
			—	100	200																
			—	160	320																

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

+ : Not promotion item in Europe

☆ : Not promotion item in USA

Note (2): TLP721 and TLP721F are manufactured in Thailand by Toshiba Semiconductor Thailand as well as in Japan.

Note (4): VDE0884-approved with option (D4)

Note (5): BS EN60065, BS EN60950

Note (7): SS EN60065, SS EN60950

2-2 Photodiode Output Devices

Product No.	Pin Configuration	Features	CTR (%)		I _{LEAK} (nA)		V _{KAO} (V)	BV _s (V _{rms})	Safety Standards ⁽¹⁾				
			Min	@I _F (mA)	Max	@V _{KA} (V)			UL	TÜV	VDE	BSI	SEMCO
TLP722		4pin-small package High-speed SEMCO-approved	0.1	10	50	10	30	5000	○	○ ⁽⁴⁾	△ ⁽⁴⁾		○ ⁽⁷⁾

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

Note (4): VDE0884-approved with option (D4)

Note (7): SS EN60065, SS EN60950

2-3 Photodarlington Transistor Output Devices

Product No.	Pin Configuration	Features	CTR (%)		V _{CE(sat)} (V)		V _{CEO} (V)	BV _s (V _{rms})	Safety Standards ⁽¹⁾					
			Min	@I _F (mA)	Max	@I _C (mA)			UL	TÜV	VDE	BSI	SEMKO	
+4N29 (SHORT)		JEDEC type 4N29 (Short) can be used in place of types 29A to 31.	100	10	1.0	2	30	2500	○					
+☆4N29A (SHORT)			50		1.2									
+☆4N30 (SHORT)					1.0									
+☆4N31 (SHORT)		JEDEC type 4N32 (Short) can be used in place of types 32A and 33.	500	1.0										
4N32 (SHORT)			500		1.0									
+☆4N32A (SHORT)														
+☆4N33 (SHORT)														
TLP127		Mini-flat High V _{CEO}	1000	1	1.2	100	300	2500		○ ⁽⁶⁾	△ ⁽⁶⁾	○ ⁽⁵⁾		
TLP371		High V _{CEO} (300 V)	1000	1	1.2	100	300	5000						
TLP372		High V _{CEO} (300 V) No internal base connection												
☆ TLP523		4-pin small package General-purpose	500	1	1.0	50	55	2500	○					
☆ TLP523-2		Two TLP523 channels												
☆ TLP523-4		Four TLP523 channels												
TLP627 ⁽²⁾		High V _{CEO} (300 V) 4-pin small package SEMKO-approved	1000	1	1.2	100	300	5000					○ ⁽⁷⁾	
TLP627-2		Two TLP627 channels SEMKO-approved												
TLP627-4		Four TLP627 channels												
TLP627A		High V _{CEO} (350 V) 4-pin small package	1500	1	1.2	100	350	5000		△	△	△	△	

Note (1): In the safety standard column:

Symbol ○ : Approved

Symbol △ : Design which meets safety standards

Note (2): TLP627 is manufactured in Thailand by Toshiba Semiconductor Thailand, as well as in Japan.

Note (4): VDE0884-approved with option (D4)

Note (5): BS EN60065, BS EN60950

Note (6): VDE0884-approved with option (V4)

Note (7): SS EN60065, SS EN60950

+ : Not promotion item in Europe

☆ : Not promotion item in USA

2-4 Photothyristor Output Devices

Product No.	Pin Configuration	Features	I _{FT}	V _{TM}		V _{DRM} (V)	BVs (Vrms)	Safety Standards ⁽¹⁾				
			Max (mA)	Max (V)	@I _{TM} (mA)			UL	TÜV	VDE	BSI	SEMKO
TLP141G		Mini-flat General-purpose	10	1.3	100	400	2500	○				
+☆TLP541G		Standard	7	1.3	100	400	2500					
TLP741G		VDE0884-approved with option (D4)	10	1.3	100	400	4000					
TLP741J						600						
TLP747G TLP747GF		VDE0884-approved with option (D4) SEMKO-approved	15	1.3	100	400	4000					
TLP747J TLP747JF						600						

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

Note (4): VDE0884-approved with option (D4)

Note (5): BS EN60065, BS EN60950

Note (7): SS EN60065, SS EN60950

+ : Not promotion item in Europe

☆ : Not promotion item in USA

2-5 Phototriac Output Devices

Product No.	Pin Configuration	Features	IFT		V _{TM}		V _{DRM} (V)	BVS (Vrms)	Safety Standards ⁽¹⁾				
			Rank	Max (mA)	Max (V)	@I _{TM} (mA)			UL	TÜV	VDE	BSI	SEMKO
TLP160G		Mini-flat Non-zero voltage turn-on	—	10	2.8	70	400	2500	○	△ ⁽⁶⁾	○ ⁽⁶⁾		
TLP160J/165J		Mini-flat High V _{DRM} ●VDE0884-approved with option (V4)	IFT7	7			600						
			IFT5	5									
TLP161G		Mini-flat Zero-voltage turn-on	—	10			400						
TLP161J/166J		Mini-flat High V _{DRM} ●VDE0884-approved with option (V4)	IFT7	7			600						
			IFT5	5									
TLP168J		Mini-flat Zero-voltage turn-on Extra-low I _{FT}	—	3									
TLP260J		Mini-flat High V _{DRM} ●VDE0884-registered with option (V4)	—	10				3000		△ ⁽⁶⁾	○ ⁽⁶⁾		
☆TLP525G		4-pin small package											
☆TLP525G-2		Two TLP525G channels	—	10	3.0	100	400	2500					
☆TLP525G-4		Four TLP525G channels											

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

Note (4): VDE0884-approved with option (D4)

Note (5): BS EN60065, BS EN60950

Note (6): VDE0884-approved with option (V4): TLP165J/TLP166J

Note (7): SS EN60065, SS EN60950

+ : Not promotion item in Europe

☆ : Not promotion item in USA

Product No.	Pin Configuration	Features	I _{FT}		V _{TM}		V _{DRM} (V)	BVs (Vrms)	Safety Standards ⁽¹⁾				
			Rank	Max (mA)	Max (V)	@I _{TM} (mA)			UL	TÜV	VDE	BSI	SEMKO
+☆ TLP560G		Non-zero-voltage Standard Low I _{FT}	—	10	3.0	100	400	2500	○	△ ⁽⁴⁾	○ ⁽⁴⁾	○ ⁽⁵⁾	○ ⁽⁷⁾
+☆ TLP560J			IFT7	7									
+☆ TLP561G		Standard Low I _{FT} Zero-voltage turn-on	—	10	3.0	100	400						
+☆ TLP561J			IFT7	7									
TLP762J		Non-zero-voltage VDE0884-approved with option (D4) SEMKO-approved	—	10	3.0	100	600	4000					
TLP762JF			—	10									
TLP763J		VDE0884-approved with option (D4) SEMKO-approved Zero-voltage turn-on	—	10	3.0	100	600	4000					
TLP763JF			—	10									
TLP3022(S)		Short package Direct replacement for XXX3020/3021/3022	—	10	3.0	100	400	5000					
TLP3023(S)		Short package Direct replacement for XXX3023	—	5									
TLP3042(S)		Short package Direct replacement for XXX3040/3041/3042	—	10	3.0	100	400	5000					
TLP3043(S)		Short package Direct replacement for XXX3043	—	5									
☆TLP3051		High V _{DRM} Non-zero voltage turn-on	—	15	3.0	100	600	5000					
TLP3052		Low I _{FT}	—	10									
TLP3062(S)		Short package Direct replacement for XXX3060/3061/3062	—	10	3.0	100	600	5000					
TLP3063(S)		Short package Direct replacement for XXX3063	—	5									
TLP3064		Extra Low I _{FT}	—	3									

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

Note (4): VDE0884-approved with option (D4)

Note (5): BS EN60065, BS EN60950

Note (7): SS EN60065, SS EN60950

+ : Not promotion item in Europe

☆ : Not promotion item in USA

2-6 AC Power (Triac Output) Devices

Product No.	Pin Configuration	Features	IFT		ITM	VDRM (V)	BVs (Vrms)	Safety Standards ⁽¹⁾				
			Rank	Max (mA)	@Ta = 40°C (Arms)			UL	TÜV	VDE	BSI	SEMKO
+ TLP3502												

Note (1): In the safety standard column:

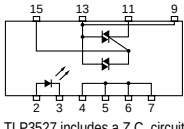
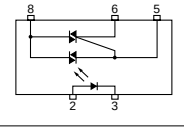
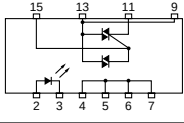
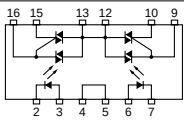
Symbol ○: Approved

Z.C.: Zero-cross

+ : Not promotion item in Europe

☆ : Not promotion item in USA

2-6 AC Power (Photocoupled Relay) Devices (continued)

Product No.	Pin Configuration	Features	I _{FT}		I _{TM}	V _{DRM} (V)	BV _s (V _{rms})	Safety Standards ⁽¹⁾													
			Rank	Max (mA)	@Ta = 40°C (Arms)			UL	TÜV	VDE	BSI	SEMKO									
TLP3526	 TLP3527 includes a Z.C. circuit.	Direct control up to 1.0-Arms load Zero-voltage turn-on (TLP3527)	—	10	1.0	600	2500	○													
TLP3527																					
+ TLP3502A		Direct control up to 0.6-Arms load	IFT7	7	0.6	400															
			IFT5	5																	
+ TLP3520A		Direct control up to 1.2-Arms load	IFT7	7	1.2	400															
			IFT5	5																	
+ TLP3530		Two-channels type { 1.0 Arms [for 1 ch] 1.4 Arms [for 2 ch]	—	10	1.0 [for 1 channel]	400															
			IFT7	7	1.4 [for 2 channel]																

Note (1): In the safety standard column:

Symbol ○: Approved

Z.C.: Zero-cross

+ : Not promotion item in Europe

☆ : Not promotion item in USA

2-7 Photo-IC Output Devices

Product No.	Pin Configuration	Features	Data Rate (NRZ) Typ.	CTR	@If (mA)	BVs (Vrms)	Safety Standards ⁽¹⁾				
					UL		TÜV	VDE	BSI	SEMKO	
+6N135											

Note (1): In the safety standard column:

Symbol ○: Approved

+ : Not promotion item in Europe

☆ : Not promotion item in USA

Product No.	Pin Configuration	Features	Data Rate (NRZ) Typ.	CTR	@I _F (mA)	BV _s (V _{rms})	Safety Standards ⁽¹⁾							
							UL	TÜV	VDE	BSI	SEMKO			
6N138		High CTR	300 Kbit/s	300% min	1.6	2500								
6N139				400% min	0.5									
TLP112		Mini-flat High speed	1 Mbit/s	10% min	16									
TLP112A		Mini-flat High CTR		20% min										
TLP113		Mini-flat High speed	10 Mbit/s	Open-collector	10									
TLP114A		Mini-flat High CMR	1 Mbit/s	20% min	16							○	△ ⁽⁵⁾	△ ⁽⁵⁾
TLP114A (IGM)				25% min	10									
TLP115		Mini-flat High CMR	10 Mbit/s	Open-collector	10									
TLP115A		Mini-flat Low input current High CMR			5									
TLP250		Medium power IGBT/MOSFET Direct drive VDE0884-approved with option (D4)	0.2 μs	± 0.5 A peak (min)	5	2500	○	△ ⁽⁴⁾	○ ⁽⁴⁾					
TLP251		Low power IGBT/MOSFET Direct drive VDE0884-approved with option (D4)	0.3 μs	± 0.1 A peak (min)	5									
TLP550		Standard	1 Mbit/s	10% min (19% min for rank O)	16									
TLP557		Giant transistor direct drive	1 μs	0.25-A constant current output	5									
TLP558		3-state output Low input Inverter logic	5 Mbit/s	3-state output	1.6									
+ TLP559		Internal shield High CMR	1 Mbit/s	20% min	16									
TLP559(IGM)				25% min	10									
TLP651		High isolation Base connection	1 Mbit/s	10% min (19% min for rank O)	16					5000				
TLP750		IEC 950 satisfied VDE0884-approved with option (D4)	1 Mbit/s	10% min (19% min for rank O)	16									

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

Note (4): VDE0884-approved with option (D4)

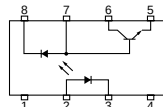
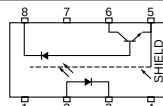
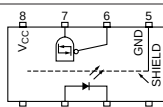
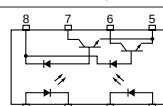
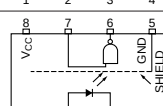
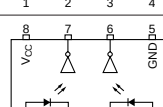
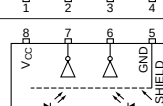
Note (5): BS EN60065, BS EN60950

Note (7): SS EN60065, SS EN60950

+ : Not promotion item in Europe

☆ : Not promotion item in USA

2-7 Photo-IC Output Devices (continued)

Product No.	Pin Configuration	Features	Data Rate (NRZ) Typ.	CTR	@I _F (mA)	BVs (V _{rms})	Safety Standards ⁽¹⁾				
							UL	TÜV	VDE	BSI	SEMKO
TLP751		Base connection IEC 65 satisfied VDE0884-approved with option (D4)	1 Mbit/s	4% min	16	5000	○	△ ⁽⁴⁾	○ ⁽⁴⁾	○ ⁽⁵⁾	○ ⁽⁷⁾
TLP759/759F		Internal shield IEC 950 satisfied VDE0884-approved with option (D4)	1 Mbit/s	20% min	16						
TLP759(IGM)/759F(IGM)				25% min	10					△ ⁽⁵⁾	
TLP2200		3-state output Low input Buffer logic	5 Mbit/s	3-state output	1.6	2500					
TLP2530		Dual-channel version of 6N135	1 Mbit/s	7% min	16						
TLP2531		Dual-channel version of 6N136	1 Mbit/s	19% min	16						
TLP2601		High CMR High speed	10 Mbit/s	Open-collector	5						
TLP2630		Dual-channel version of 6N137	10 Mbit/s	Open-collector	5						
TLP2631		High CMR Dual-channel version of TLP2601	10 Mbit/s	Open-collector	5						

Note (1): In the safety standard column:

Symbol ○: Approved

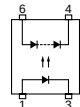
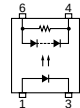
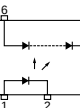
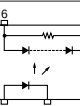
Symbol △: Design which meets safety standards

Note (4): VDE0884-approved with option (D4)

Note (5): BS EN60065, BS EN60950

Note (7): SS EN60065, SS EN60950

2-8 Photovoltaic Output Devices

Product No.	Pin Configuration	Features	Short-circuit Current (μA)			Open Voltage V _{CC} (V)		BV _s (V _{rms})	Safety Standards ⁽¹⁾										
			Rank	Min	@I _F (mA)	Min	@I _F (mA)		UL	TÜV	VDE	BSI	SEMKO						
TLP190B		Mini-flat High output current	—	12	10	7	10	2500	○										
TLP191B		Mini-flat High output current Internal shunt resistor	—	24	20	7	20												
TLP590B		High output current	—	12	10	7	10												
			C20	20															
TLP591B		High output current Internal shunt resistor	—	24	20	7	20												
			C40	40															

Note (1): In the safety standard column:

Symbol ○: Approved

2-9 MOSFET Output (Photorelay) Devices

Product No.	Pin Configuration	Features	I _{FT}		R _{ON}			V _{OFF} (V)	BV _s (V _{rms})	Safety Standards ⁽¹⁾								
			Rank	Max (mA)	Max (Ω)	@I _F (mA)	@I _{ON} (A)			UL	TÜV	VDE	BSI	SEMKO				
TLP176A		2.54SOP4 Low trigger current High output current	—	3	2	5	0.4 [AC]	60	1500	○	△ ⁽⁶⁾	○ ⁽⁶⁾						
TLP176D		2.54SOP4 Low trigger current For PBXes	—	3	8	5	0.15 [AC]	200										
TLP176G		2.54SOP4 Low trigger current General-purpose For modems	—	3	35	5	0.12 [AC]	350							○ ⁽⁵⁾			
TLP197A		2.54SOP6 Low trigger current For modems	—	3	2	5	0.4 [AC]	60										
TLP197G			—	3	35	5	0.12 [AC]	350										
TLP200D		2.54SOP8 Two TLP176D channels	—	3	8	5	0.15 [AC]	200										
TLP206A		2.54SOP8 Two TLP176A channels	—	3	2	5	0.3 [AC]	60										
TLP206G		2.54SOP8 Two TLP176G channels	—	3	35	5	0.12 [AC]	350					△ ⁽⁶⁾	○ ⁽⁶⁾	○ ⁽⁵⁾			
TLP225A		DIP4 For DC use only	—	5	1.1	10	0.5 [DC]	60	2500									
TLP224G		DIP4 Low trigger current Current limiting func- tion	—	3	35	5	0.12 [AC]	350										
TLP224G-2		DIP8 Two TLP224G channels	—	3	35	5	0.12 [AC]	350							△ ⁽⁵⁾	○ ⁽⁷⁾		
TLP227A		DIP4 Low trigger current	—	3	2	5	0.5 [AC]	60										
TLP227A-2		Two TLP227A channels	—	3	2	5	0.5 [AC]	60										
TLP227G		DIP4 Low trigger current General-purpose For modems	—	3	35	5	0.12 [AC]	350										
TLP227G(N)																		
TLP227G-2		DIP8 Two TLP227G channels	—	3	35	5	0.12 [AC]	350					△ ⁽⁴⁾	○ ⁽⁴⁾	○ ⁽⁵⁾	○ ⁽⁷⁾		
TLP227G-2(N)																		
TLP227GA		DIP4 Low trigger current	—	3	35	5	0.12 [AC]	400					△					
TLP227GA-2		DIP8 Two TLP227GA channels	—	3	35	5	0.12 [AC]	400										
TLP296G		DIP8 Two channels High V _{OFF}	—	5	30	10	0.1 [AC]	400					○					

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

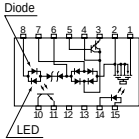
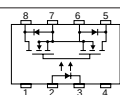
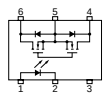
Note (4): VDE0884-approved with option (D4)

Note (5): BS EN60065, BS EN60950

Note (6): VDE0884-approved with option (V4)

Note (7): SS EN60065, SS EN60950

2-9 MOSFET Output (Photorelay) Devices (continued)

Product No.	Pin Configuration	Features	I _{FT}		R _{ON}			V _{OFF} (V)	BV _s (V _{rms})	Safety Standards ⁽¹⁾											
			Rank	Max (mA)	Max (Ω)	@I _F (mA)	@I _{ON} (A)			UL	TÜV	VDE	BSI	SEMKO							
TLP270D		SOP16 (14-pin) For DDA in modems	—	3	8	5	0.15 [AC]	200	1500	○			○ ⁽⁶⁾								
TLP270G		SOP16 (14-pin) For DDA in modems	—	3	35	5	0.12 [AC]	350													
TLP3110		MFSOP6 (4-pin) Low CR C _{OFF} ≤ 150 pF For testers	—	4	1.2	10	0.35 [AC]	60													
TLP3111		MFSOP6 (4-pin) Low CR C _{OFF} ≤ 15 pF For testers	—	4	20	10	0.1 [AC]	80													
☆☆TLP3113		2.54SOP4 (4-pin) Lower CR C _{OFF} ≤ 1.4 pF For testers	—	4	35	5	0.08 [AC]	40		△											
☆☆TLP3114		2.54SOP4 (4-pin) Lower CR C _{OFF} ≤ 7 pF For testers	—	4	3	5	0.25 [AC]	40													
☆☆TLP3115		2.54SOP4 (4-pin) Lower CR C _{OFF} ≤ 14 pF For testers	—	4	1.5	5	0.3 [AC]	40													
☆☆TLP3116		2.54SOP4 (4-pin) Lower CR C _{OFF} ≤ 2 pF For testers	—	4	15	5	0.12 [AC]	40													
TLP3130		2.54SOP4 (4-pin) Lower CR C _{OFF} ≤ 2.5 pF For testers	—	4	8	5	0.16 [AC]	20													
TLP3131		2.54SOP4 (4-pin) Lower CR C _{OFF} ≤ 12 pF For testers	—	4	1.5	5	0.3 [AC]	20													
TLP3540		I _{OFF} ≤ 4 nA DIP8 High output current For testers	—	5	0.12	10	2 [AC]	60	2500	○											
TLP598A		DIP6 Low trigger current available High output current	—	5	2	10	0.3 [AC]	60													
TLP599A			IFT2	2																	
TLP597A			—	3											2	5	0.5 [AC]				
TLP598B		DIP6 Low trigger current available	—	5	4	10	0.2 [AC]	100													
TLP599B			IFT2	2																	
TLP598G			—	5											12	10	0.15 [AC]				
TLP599G		DIP6 Low trigger current High V _{OFF}	IFT2	2	30	0.12 [AC]	400														
TLP597G			—	5	0.12 [AC]																
TLP597GA		DIP6 Low trigger current General-purpose	—	3	35	5	0.12 [AC]	350								△ ⁽⁴⁾	○ ⁽⁴⁾	○ ⁽⁵⁾	○ ⁽⁷⁾		
TLP597GA			—	3	35	5	0.12 [AC]	400							△						
TLP594G		DIP6 Low trigger current Current limiting function	—	3	35	5	0.12 [AC]	350													
TLP797GA		DIP6 High isolation voltage	—	3	35	5	0.12 [AC]	400		△	△	△	△	△							
TLP797GAF																					
TLP798G	DIP6 High isolation voltage IEC950 standard SEMKO-approved Low trigger current available	—	5	12	10	0.15 [AC]	400	5000	○	○ ⁽⁴⁾	△ ⁽⁴⁾	○ ⁽⁵⁾	○ ⁽⁷⁾								
		IFT2	2																		

Note (1): In the safety standard column:

Symbol ○: Approved

Symbol △: Design which meets safety standards

Note (3): VDE0884-approved

Note (4): VDE0884-approved with option (D4)

Note (5): BS EN60065, BS EN60950

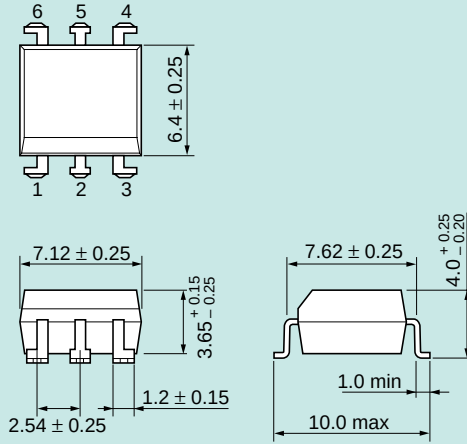
Note (7): SS EN60065, SS EN60950

☆☆: Under development

3-1 Packages Dimensions (continued)

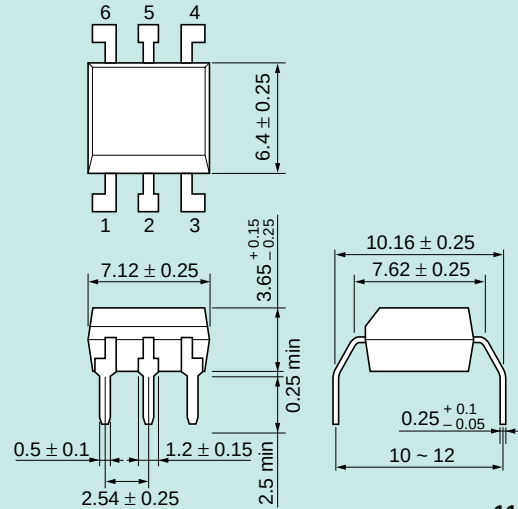
Unit: mm

DIP6 (LF1)



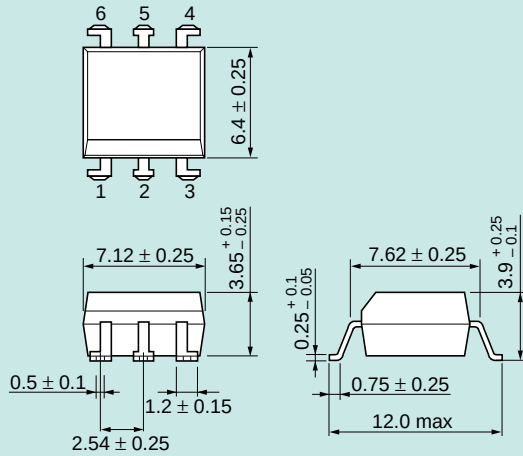
11-7AB01

DIP6 (LF2)



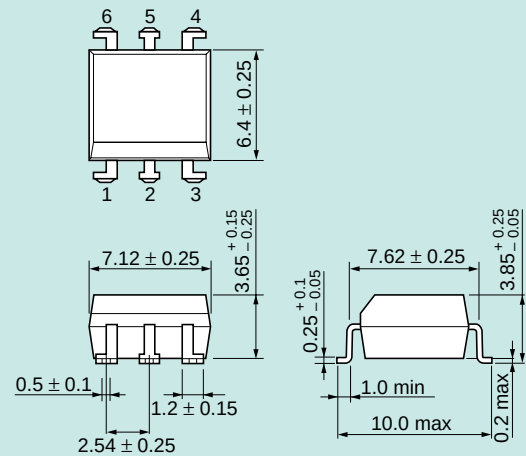
11-7AB02

DIP6 (LF4)



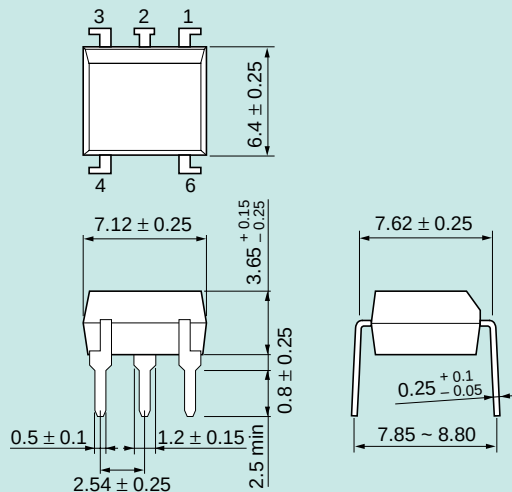
11-7AB04

DIP6 (LF5)



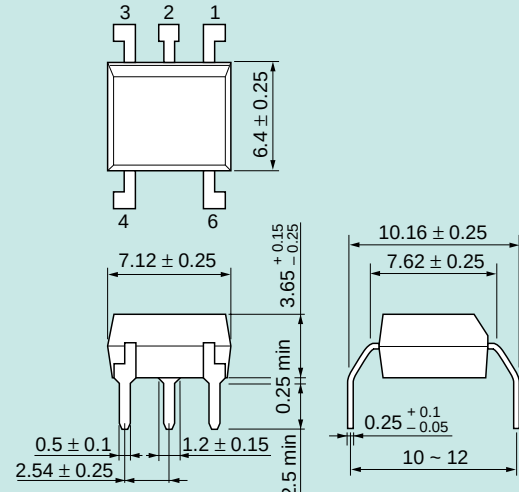
11-7AB05

DIP6 (5pin)

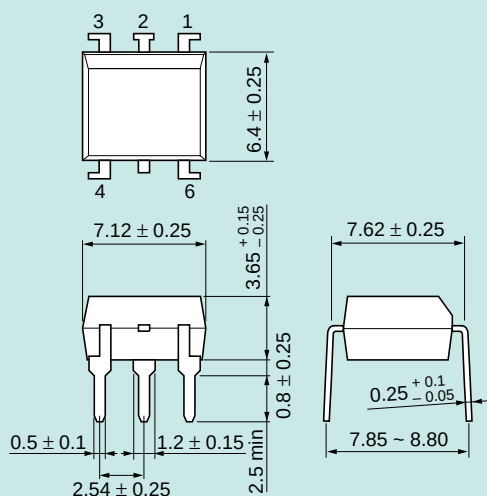


11-7A10

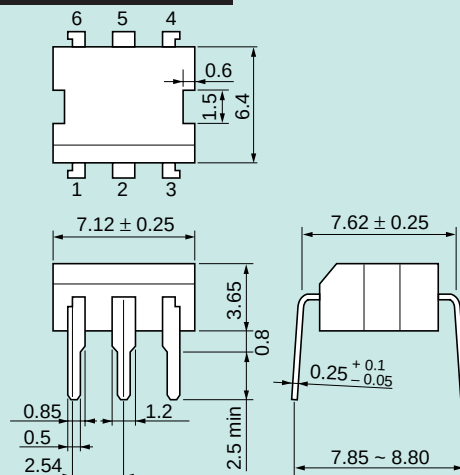
DIP6 (LF2) (5pin)



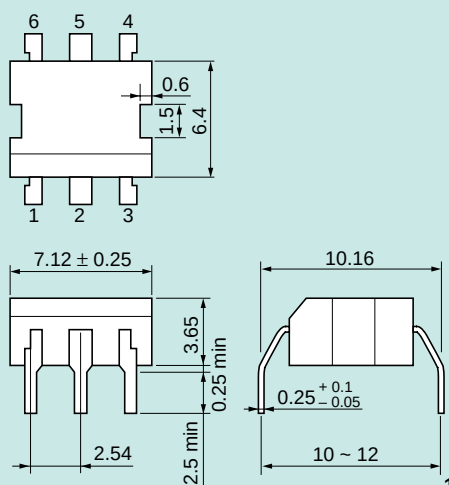
11-7A1002

DIP6 (5pin Cut)

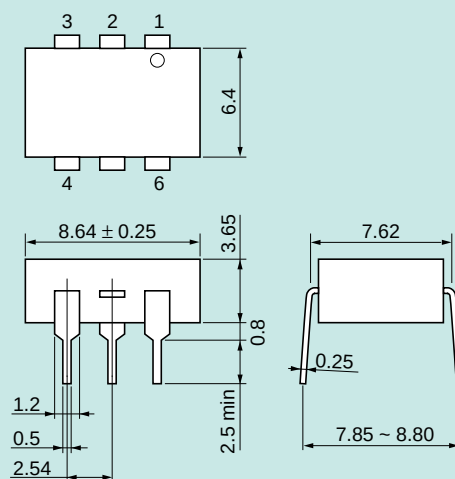
11-7A-B

**TLP731, TLP732
TLP741G, TLP741J**

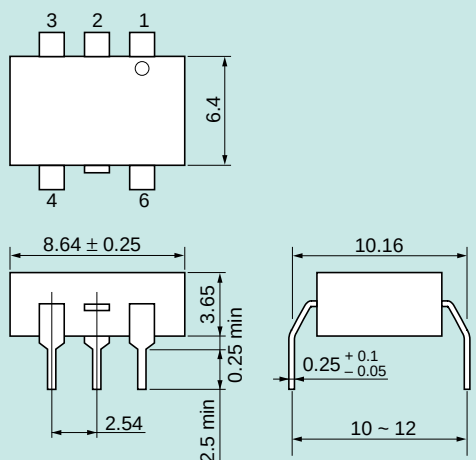
11-7B1

**TLP731 (LF2), TLP732 (LF2)
TLP741G (LF2), TLP741J (LF2)**

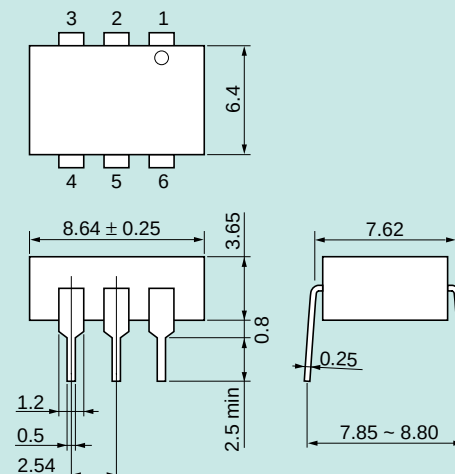
11-7B102

DIP6 (Long 5pin)

11-9A2

DIP6 (LF2) (Long 5pin)

11-9A202

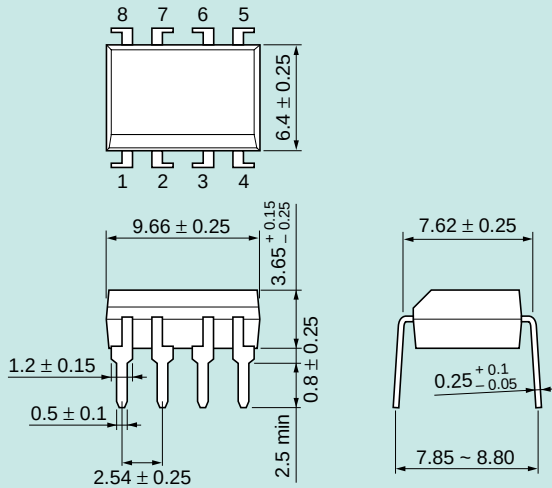
DIP6 (Long 6pin)

11-9A1

3-1 Packages Dimensions (continued)

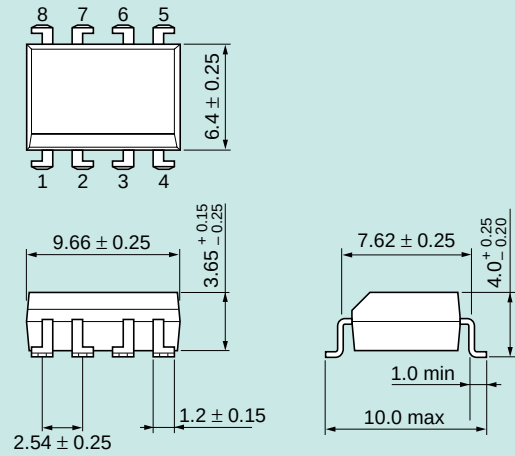
Unit: mm

DIP8



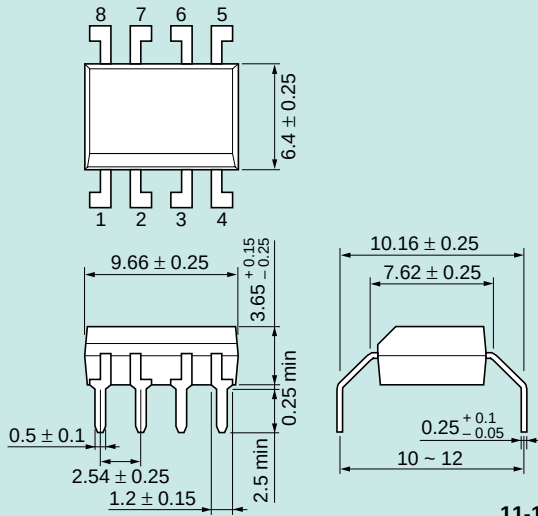
11-10C4

DIP8 (LF1)



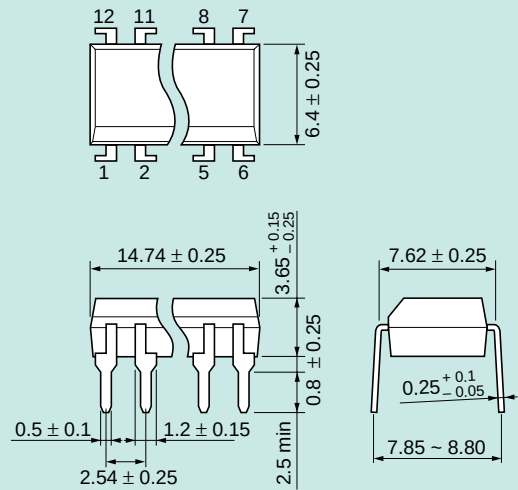
11-10C401

DIP8 (LF2)



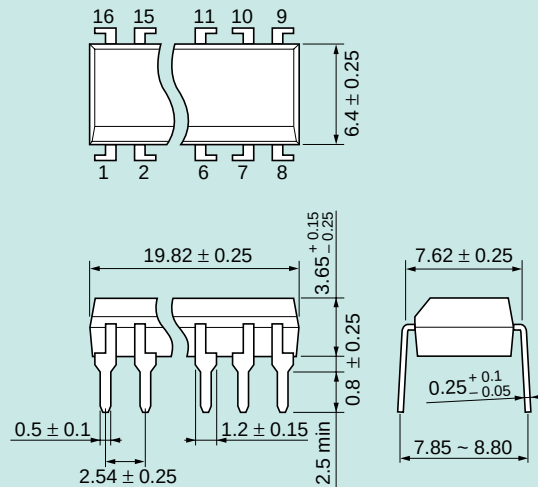
11-10C402

DIP12



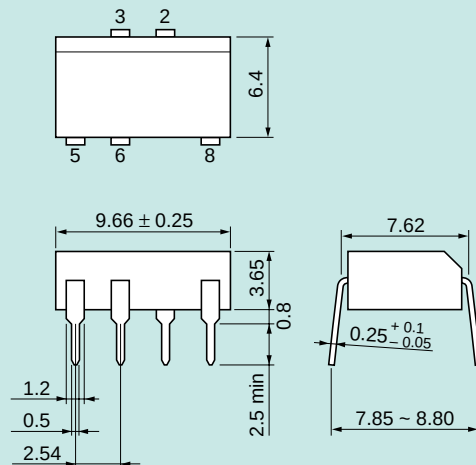
11-15A2

DIP16

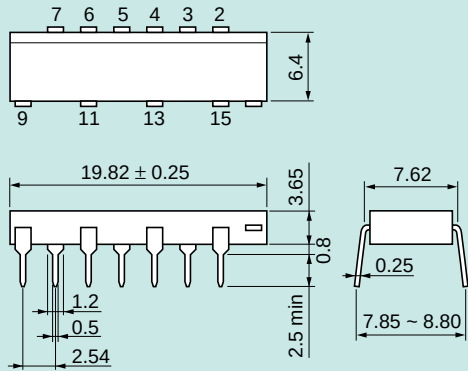


11-20A3

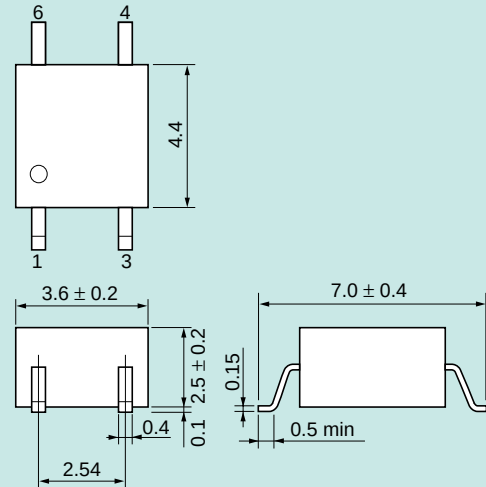
TLP3502, TLP3502A TLP3503, TLP3506A, TLP3507



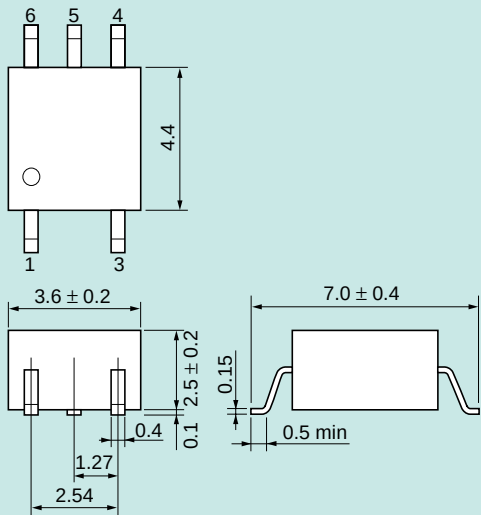
11-10C3

**TLP3520, TLP3520A
TLP3521, TLP3526, TLP3527**


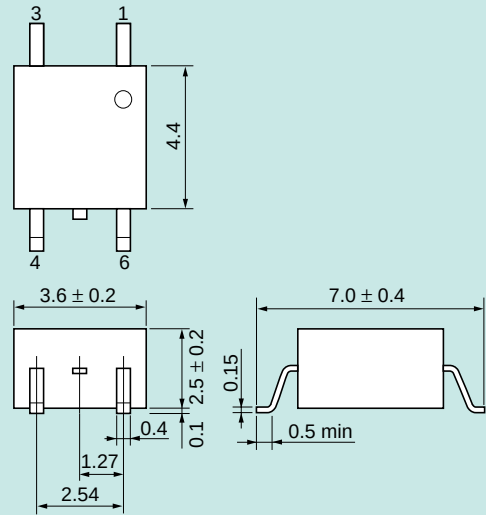
11-20A2

MFSOP6 (4pin)


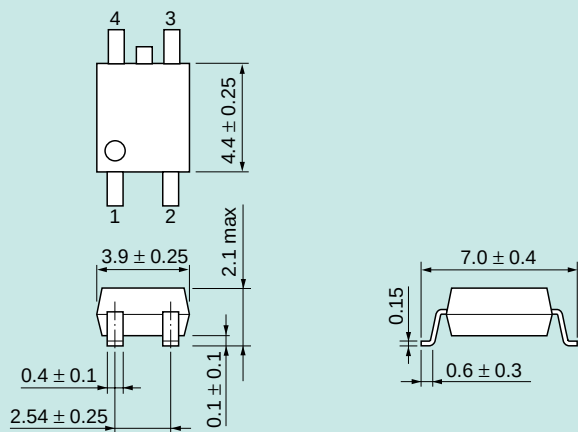
11-4C1

MFSOP6 (5pin)


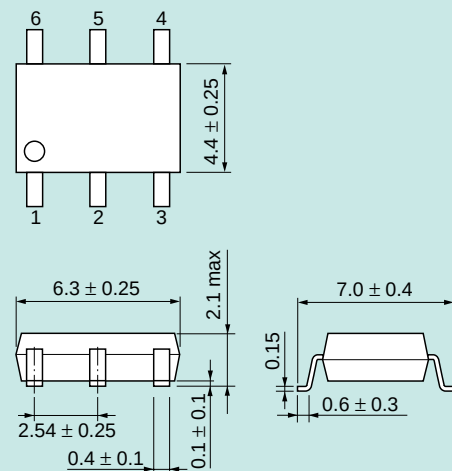
11-4C2

MFSOP6 (4pin: No.5 Cut)


11-4C3

2.54SOP4


11-5H1

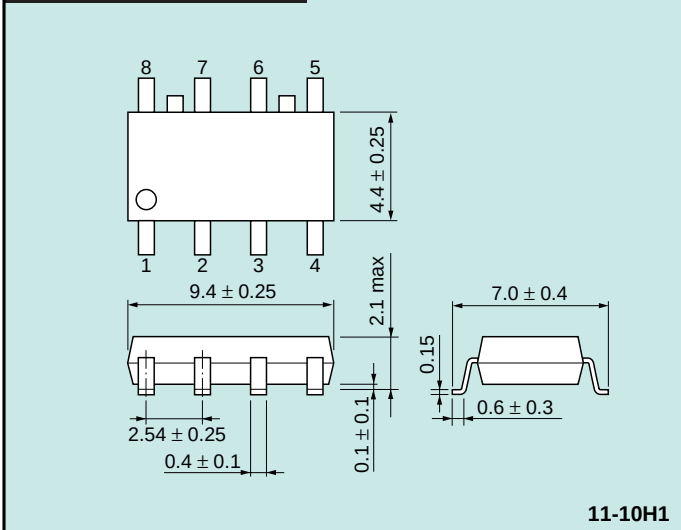
2.54SOP6


11-7C1

3-1 Packages Dimensions (continued)

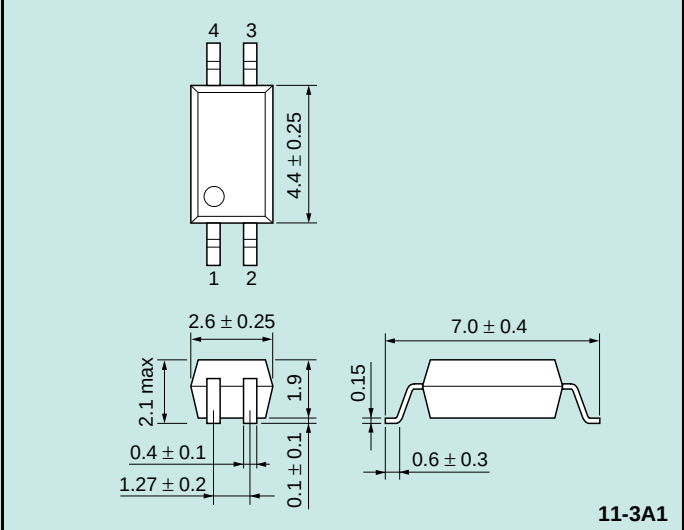
Unit: mm

2.54SOP8



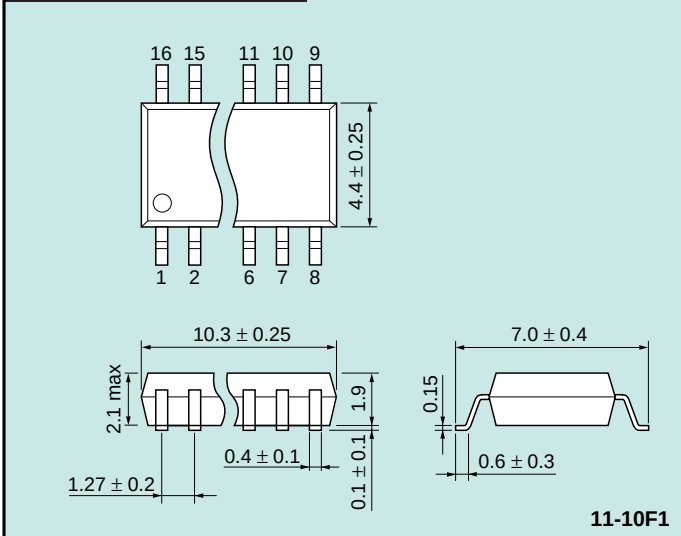
11-10H1

SOP4



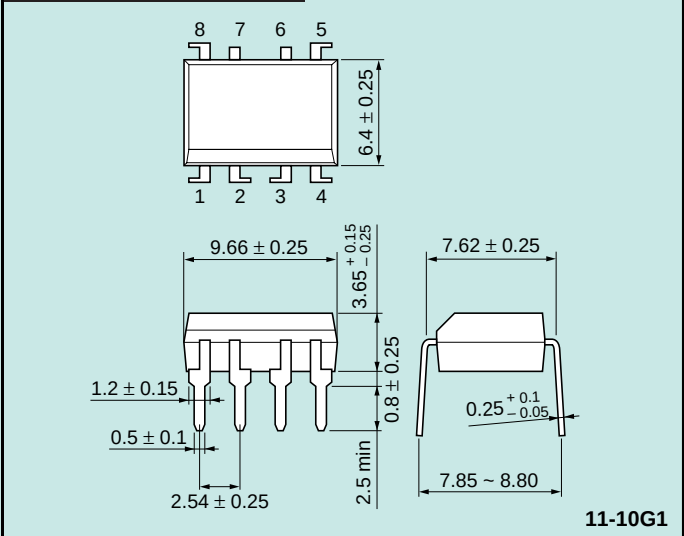
11-3A1

SOP16



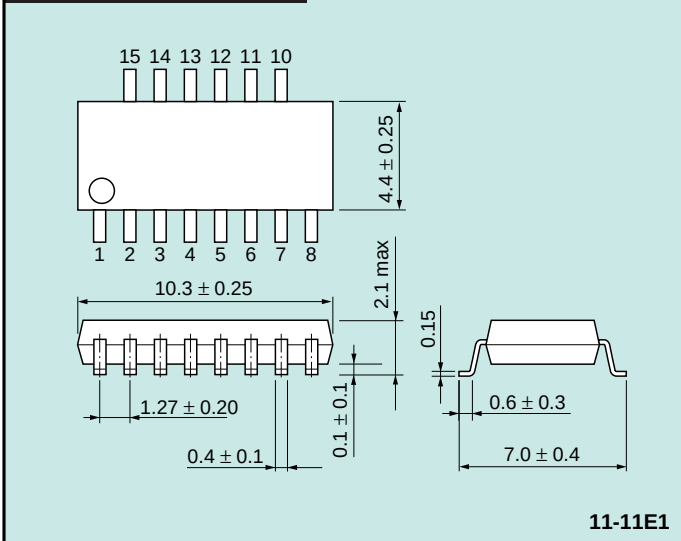
11-10F1

TLP3540



11-10G1

SOP16 (14pin)



11-11E1

4. Supplementary Information

4-1 Current Transfer Ratio (CTR), LED Trigger Current (I_{FT}) Ranking and Marking

Standard rank classifications are applied for the CTR of transistor-type photocouplers and for the I_{FT} of MOSFET, SCR, Triac-type photocouplers. Indicative product markings corresponding to rank names are as shown below. Also, note that the applied rank classifications depend on product types.

1) CTR Rank Name and Rank Marking

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

Product No.	A or None	YG	GB	Y	GR	BL	GRL	GRH	Rank Marking Group
TLP180	○		○						1
TLP181	○		○	○	○	○	△	△	1
TLP280	○		○						1
TLP280-4	○		○						2
TLP281	○		○	○	○	○			1
TLP281-4	○		○						2
TLP321	○		○		△				1
TLP321-2/-3/-4	○		○						2
TLP421/421F	○		○	○	○	○			1
TLP521-1	○	○	○	○	○	○	○	○	1
TLP521-2	○		○		○	○			2

Product No.	A or None	YG	GB	Y	GR	BL	GRL	GRH	Rank Marking Group
TLP521-4	○		○		△				2
TLP531/532	○	○	○	△	○	○	△	△	1
TLP620	○		○		○				2
TLP620-2	○		○		△				2
TLP620-4	○		○						2
TLP621	○	○	○	○	○	○	○	○	1
TLP621-2	○		○		○	△			2
TLP621-4	○		○		△				2
TLP630	○		○						2
TLP631/632	○		○		○	△			1
TLP731/732	○		○		○		△	△	1
TLP733F/734F	○		○		○		△	△	1

i) Marking for Group 1

Rank Name	CTR	CTR Rank Marking
A or None	50 % to 600 %	Blank, Y, Y■, G, G■, B, B■, GB
YG	50 % to 300 %	Y, Y■, G, G■
GB	100 % to 600 %	GB, G, G■, B, B■
Y	50 % to 150 %	Y, Y■
GR	100 % to 300 %	G, G■
BL	200 % to 600 %	B, B■
GRL	100 % to 200 %	G
GRH	150 % to 300 %	G■

ii) Marking for Group 2

Rank Name	CTR	CTR Rank Marking
A or None	50 % to 600 %	Blank, YG, GB, GR, BL
GB	100 % to 600 %	GB, GR, BL
GR	100 % to 300 %	GR
BL	200 % to 600 %	BL

2) I_{FT} Rank Name and Rank Marking

Rank Name	IFT	IFT Rank Marking
None	IFT Max	Blank, T7, T5
IFT7	7 mA Max	T7, T5
IFT5	5 mA Max	T5

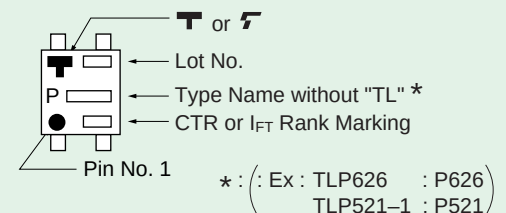
3) Safety Standard Certification

Use Toshiba standard product number for safety standard certificate application.

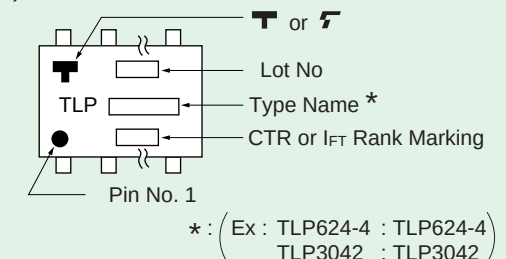
Example : TLP621 (GR) → TLP621

Marking Example

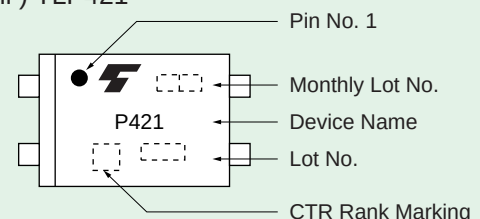
i) 4pin Type & Mini Flat 1ch Type



ii) Others



iii) TLP421

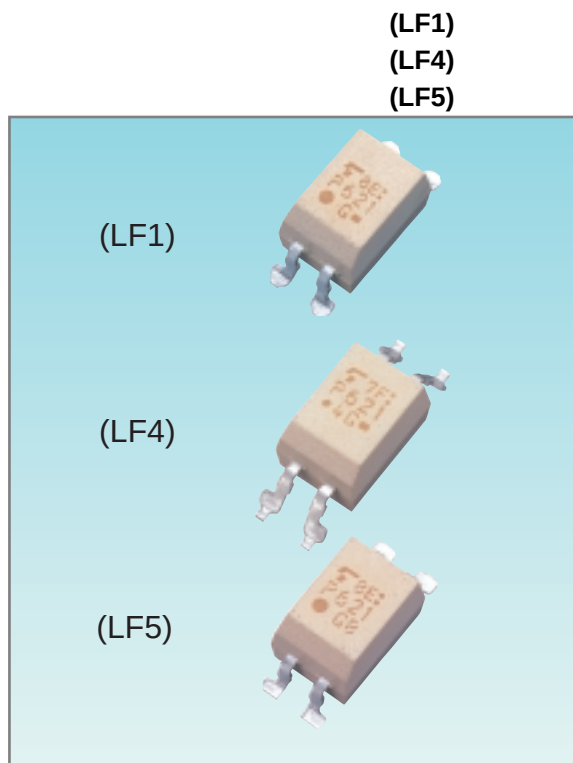


Label example

TYPE	TLP421		
ADD.C	(D4-GR)	Q'TY	PCS.
NOTE			

4-2 Optional Lead Formed Products

1) Surface-Mount Lead Form Options

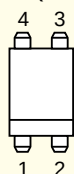


- The photocoupler product line with lead forming is available for surface mounting.
- Features
 - Surface mountable
 - Available for all 4, 6, 8 & 16pin DIP
 - All electrical parameters remain unchanged from standard package
- Ordering Information
To order any standard photocoupler with a surface mount lead form, add : (LF1), (LF4) or (LF5) to the standard part number, depending on the lead form desired.
Example :
Standard product number : TLP731 (GR)
Surface-mount type product number :
TLP731 (GR-LF1), TLP731 (GR-LF4) or
TLP731 (GR-LF5)

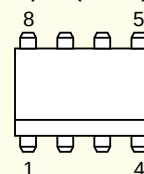
- Safety Standards Certification
Use TOSHIBA standard part number for safety standards certificate application.
Example :
TLP731 (GR-LF1) → TLP731

Package Dimensions

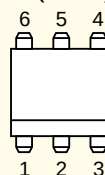
4pin (DIP4)



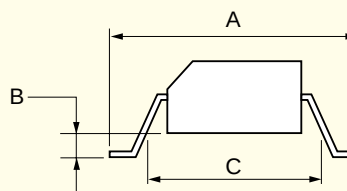
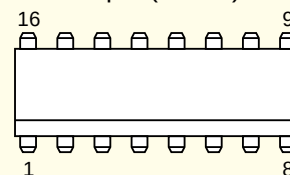
8pin (DIP8)



6pin (DIP6)



16pin (DIP16)



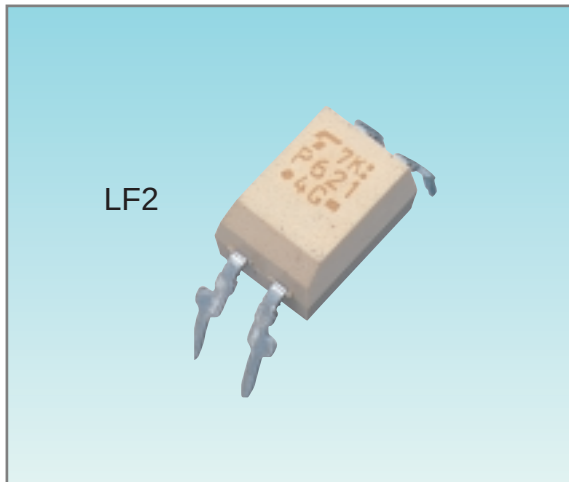
Unit: mm

Version	(LF1)		(LF4)		(LF5)	
	Min	Max	Min	Max	Min	Max
Dimension						
A	—	10.0	—	12.0	—	10.0
B	(0.35 typ.)		(0.25 typ.)		—	0.2
C	6.4	—	8.0	—	6.4	—

All other package dimensions are the same as for each standard package specifications.

2) Wide Clearance Lead Form Option

(LF2)



- The photocoupler line is available with lead forming for insertion mounting with wider clearance.
- Features
 - High board clearance
 - Available for all 4, 6, 8 & 16pin DIP
 - All electrical parameters remain unchanged from standard package
- Ordering Information

To order any standard photocoupler with an wide clearance lead form, add : (LF2) to the standard part number.

Example :

Standard product number : TLP731 (GR)
 wide clearance product number : TLP731 (GR-LF2)

- Safety Standards Certification

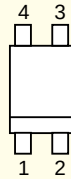
Use TOSHIBA standard part number for safety standards certificate application.

Example :

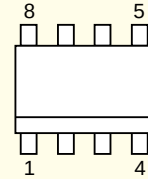
TLP731 (GR-LF2) → TLP731

Package Dimensions

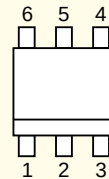
4pin (DIP4)



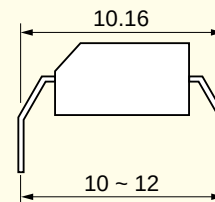
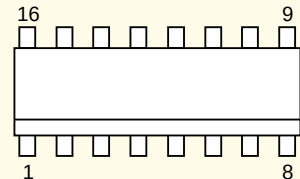
8pin (DIP8)



6pin (DIP6)



16pin (DIP16)



Unit: mm

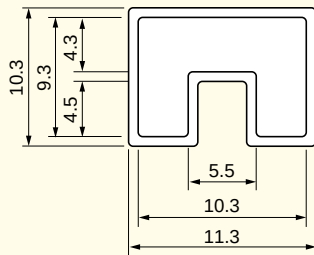
All other package dimensions are the same as for each standard package specifications.

4-3 Photocoupler Magazine Packing Specifications

DIP Standard Lead Forming

Dimensions of Magazine

Unit: mm

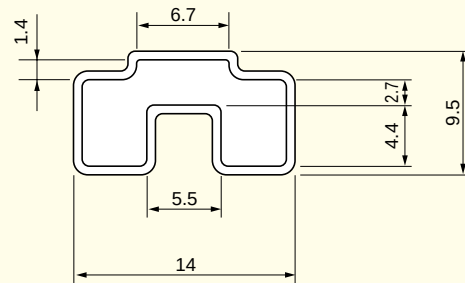


Length = 525
Thickness = 0.5

DIP LF1, LF2, LF4 and LF5

Dimensions of Magazine

Unit: mm



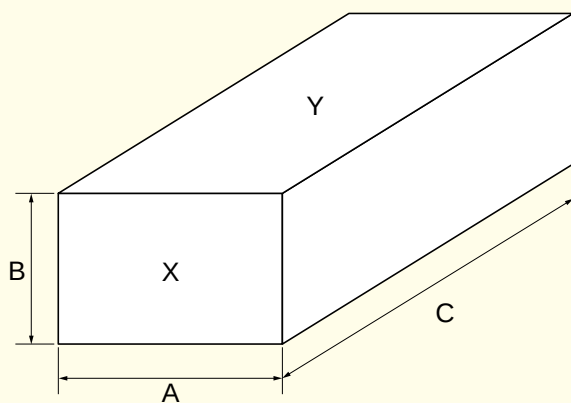
Length = 525
Thickness = 0.5

Quantities of Devices per Magazine

Number of Pins	4	6	8	12	16
Quantity (pcs)	100	50	50	25	25

Packing Dimensions

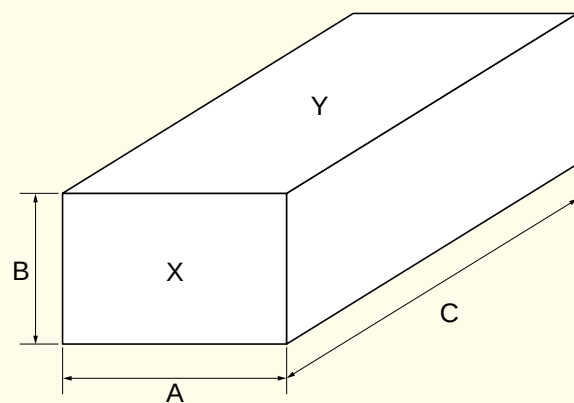
Unit: mm



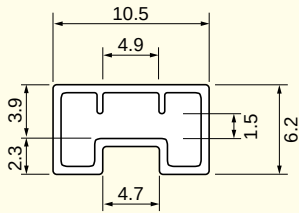
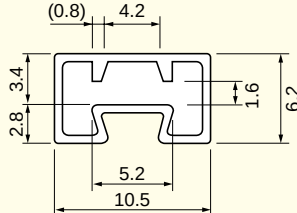
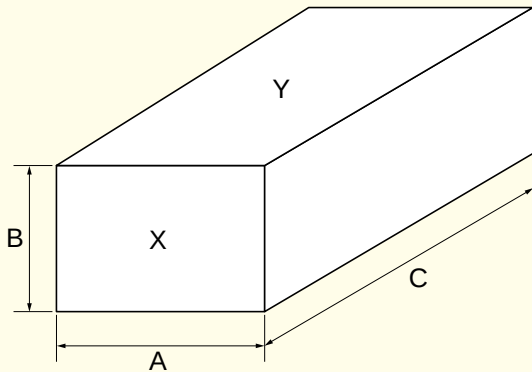
Quantity of Magazines	Dimensions (A x B x C)	Label Position
4	50 x 12 x 531	Y
20	67 x 51 x 559	Y
60	123 x 76 x 568	X

Packing Dimensions

Unit: mm



Quantity of Magazines	Dimensions (A x B x C)	Label Position
4	60 x 13 x 531	Y
40	135 x 58 x 568	X

MFSOP (Mini-Flat Coupler)	SOP (SOP4, SOP16, 2.54 SOP)																			
Dimensions Unit: mm  Length = 555 Thickness = 0.5	Dimensions Unit: mm  Length = 555 Thickness = 0.5																			
Quatities of Devices per Magazine<table><tr><td>Package Type</td><td>MFSOP6</td></tr><tr><td>Quantity (pcs)</td><td>150</td></tr></table>	Package Type	MFSOP6	Quantity (pcs)	150	<table><tr><td rowspan="2">Package Type</td><td rowspan="2">SOP4</td><td rowspan="2">SOP16</td><td colspan="3">2.54 SOP</td></tr><tr><td>4pin</td><td>6pin</td><td>8pin</td></tr><tr><td>Quantity (pcs)</td><td>150</td><td>50</td><td>100</td><td>75</td><td>50</td></tr></table>	Package Type	SOP4	SOP16	2.54 SOP			4pin	6pin	8pin	Quantity (pcs)	150	50	100	75	50
Package Type	MFSOP6																			
Quantity (pcs)	150																			
Package Type	SOP4	SOP16	2.54 SOP																	
			4pin	6pin	8pin															
Quantity (pcs)	150	50	100	75	50															
Packing Dimensions Unit: mm  <table><tr><td>Quantity of Magazines per Box</td><td>Dimensions (A x B x C)</td><td>Label Position</td></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>X</td></tr><tr><td>40</td><td>67 x 55 x 586</td><td>X</td></tr></table>		Quantity of Magazines per Box	Dimensions (A x B x C)	Label Position	4	29 x 13 x 563	Y	24	77 x 31 x 586	X	40	67 x 55 x 586	X							
Quantity of Magazines per Box	Dimensions (A x B x C)	Label Position																		
4	29 x 13 x 563	Y																		
24	77 x 31 x 586	X																		
40	67 x 55 x 586	X																		

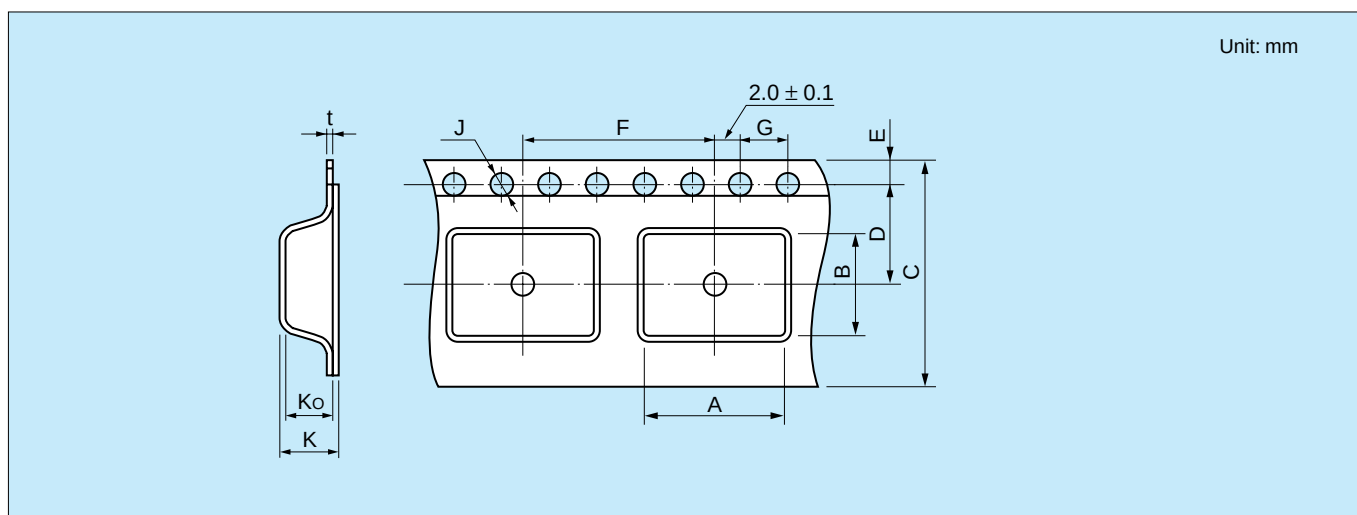
Photocoupler Package Type	Typical Devices
MFC (MFSOP6)	TLP180, TLP114A, TLP160J, TLP3110
SOP-1ch (SOP4)	TLP280, TLP281
SOP-4ch (SOP16)	TLP280-4, TLP281-4, TLP270D, TLP270G
SOP (2.54SOP4)	TLP197G, TLP176G, TLP206G
SOP (2.54SOP6)	TLP197G
SOP (2.54SOP8)	TLP206G, TLP206A

4-4 Photocoupler Tape and Reel Specifications

1) Type (Surface-mount photocouplers are available on tape and reel as described below).

Photocoupler Package Types	Tape Option Symbol	Typical Devices
MFSOP6	(TPL) or (TPR)	TLP114A, TLP160J, TLP181, TLP190B
SOP4	(TP)	TLP280, TLP281
SOP16	(TP)	TLP280-4, TLP281-4, TLP270G, TLP270D
2.54SOP	(TP)	TLP176G, TLP197G, TLP206G
DIP(LF1, LF5)	(TP1) or (TP5)	TLP550, TLP560G, TLP621
DIP(LF4)	(TP4)	TLP251, TLP560G, TLP621

2) Tape Dimensions



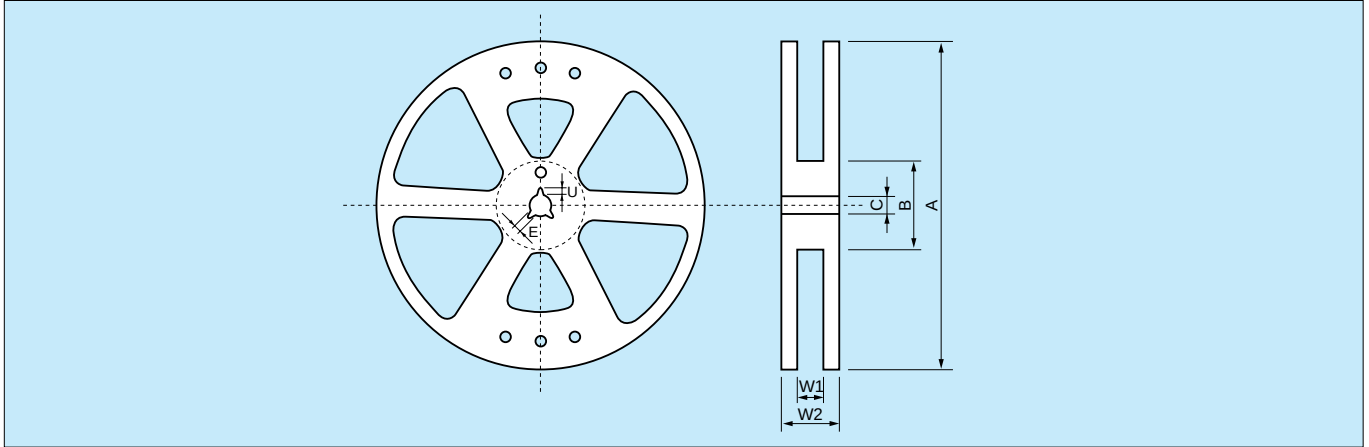
Unit: mm

Photocoupler Package Type		MFSOP6	SOP4	SOP16	2.54SOP4	2.54SOP6	2.54SOP8	DIP(LF1, LF5)	DIP(LF4)		
Tape Option :		(TPL), (TPR)	(TP)	(TP)	4pin	6pin	8pin	(TP1), (TP5)	(TP4)		
Dimension symbol (See Figure)	A	Dimension	4.2 ± 0.1	3.1 ± 0.1	7.5 ± 0.1	4.3 ± 0.1	7.5 ± 0.1		10.4 ± 0.1	12.3 ± 0.1	
	B		7.6 ± 0.1	7.5 ± 0.1	10.5 ± 0.1	7.5 ± 0.1	6.7 ± 0.1	10.5 ± 0.1	* 1	* 1	
	C		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				
	E		1.75 ± 0.1								
	F		8.0 ± 0.1		12.0 ± 0.1	8.0 ± 0.1	12.0 ± 0.1			16.0 ± 0.1	
	G		4.0 ± 0.1								
	J		1.5 ^{+0.1} ₋₀								
	K		3.15 ± 0.2	2.5 ± 0.2	2.4 ± 0.2	2.6 ± 0.2	2.5 ± 0.2	2.4 ± 0.2	4.55 ± 0.2		
	K0		2.8 ± 0.1	2.3 ± 0.1	2.2 ± 0.1	2.4 ± 0.1	2.3 ± 0.1	2.2 ± 0.1	4.1 ± 0.1		
	t		0.3 ± 0.05						0.4 ± 0.05		

*1: Typical devices

DIP 4pin	TLP620, TLP621, TLP721	5.1 ± 0.1
DIP 6pin (short package)	TLP631, TLP734, TLP747G, TLP3022 (S)	7.6 ± 0.1
DIP 6pin (long package)	TLP598G, TLP3052	10.1 ± 0.1
DIP 8pin	TLP250, TLP555, TLP2601	(TP4) is not available.

3) Reel Dimensions



Unit in mm

Photocoupler Package Type		MFSOP		SOP4	SOP16	2.54SOP4	2.54SOP6	2.54SOP8	DIP(LF1, LF5)	DIP(LF4)
Tape Options :		(TPL), (TPR)		(TP)	(TP)	(TP)			(TP1), (TP5)	(TP4)
Symbol	A	Dimensions	$\phi 380 \pm 2$	$\phi 330 \pm 2$					$\phi 380 \pm 2$	
	B		$\phi 80 \pm 1$							
	C		$\phi 13 \pm 0.5$							
	E		2.0 ± 0.5							
	U		4.0 ± 0.5							
	W1		13.5 ± 0.5		17.5 ± 0.5	13.5 ± 0.5	17.5 ± 0.5			
	W2		17.5 ± 1.0		21.5 ± 1.0	17.5 ± 1.0	21.5 ± 1.0			

4) Other Packing Information

a) Device orientation on tape, by combinations of photocoupler package type and tape options.

Tape orientation →

Photocoupler Package Type	Tape Option
MFSOP6	TPR

Photocoupler Package Type	Tape Option
MFSOP6	TPL
SOP4, 2.54SOP4	TP

Photocoupler Package Type	Tape Option
SOP16	TP
2.54SOP6/8	TP
DIP (LF1, LF5)	TP1, TP5
DIP (LF4)	TP4

4-4 Photocoupler Tape and Reel Specifications (continued)

b) Details of Tape

● Quantities per Reel

Photocoupler Package Type	MFSOP6	SOP4	SOP16	2.54SOP4/6/8	DIP (LF1, LF5)	DIP (LF4)
Quantities (pcs)	3000	2500	2500	2500	1500	1000

● Empty Cavities :

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

※ 2 : 6pcs max/reel for DIP types

c) Packing boxes

2 types : One-reel box or five-reel box.

d) Label

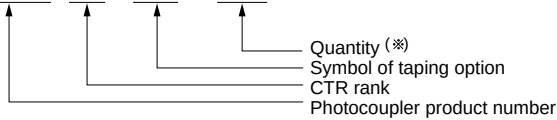
The reel label includes the following information.

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

e) Purchase order

Specify the product number, tape and quantity as follows.

ex. **TLP181 (GB - TPR) 3000pcs**



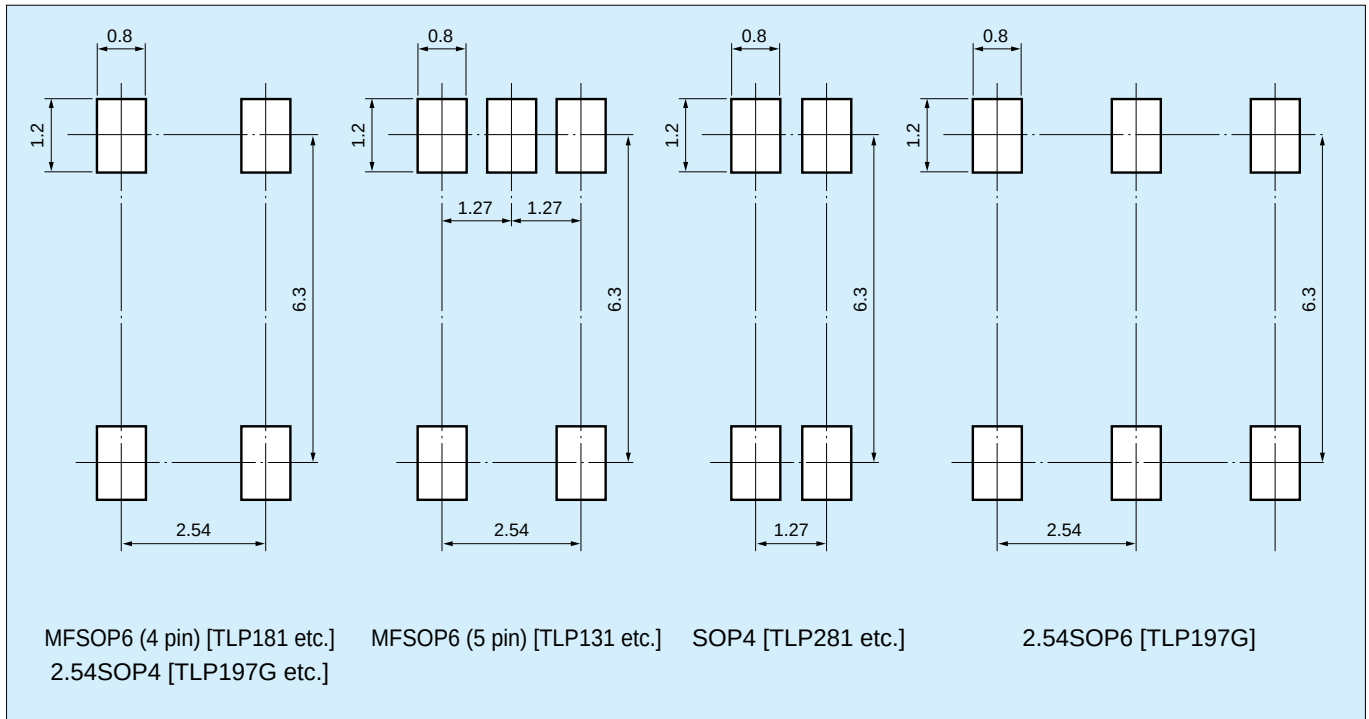
※ Per reel must be a multiple of quantity

4-5 Recommended Footprint Dimensions

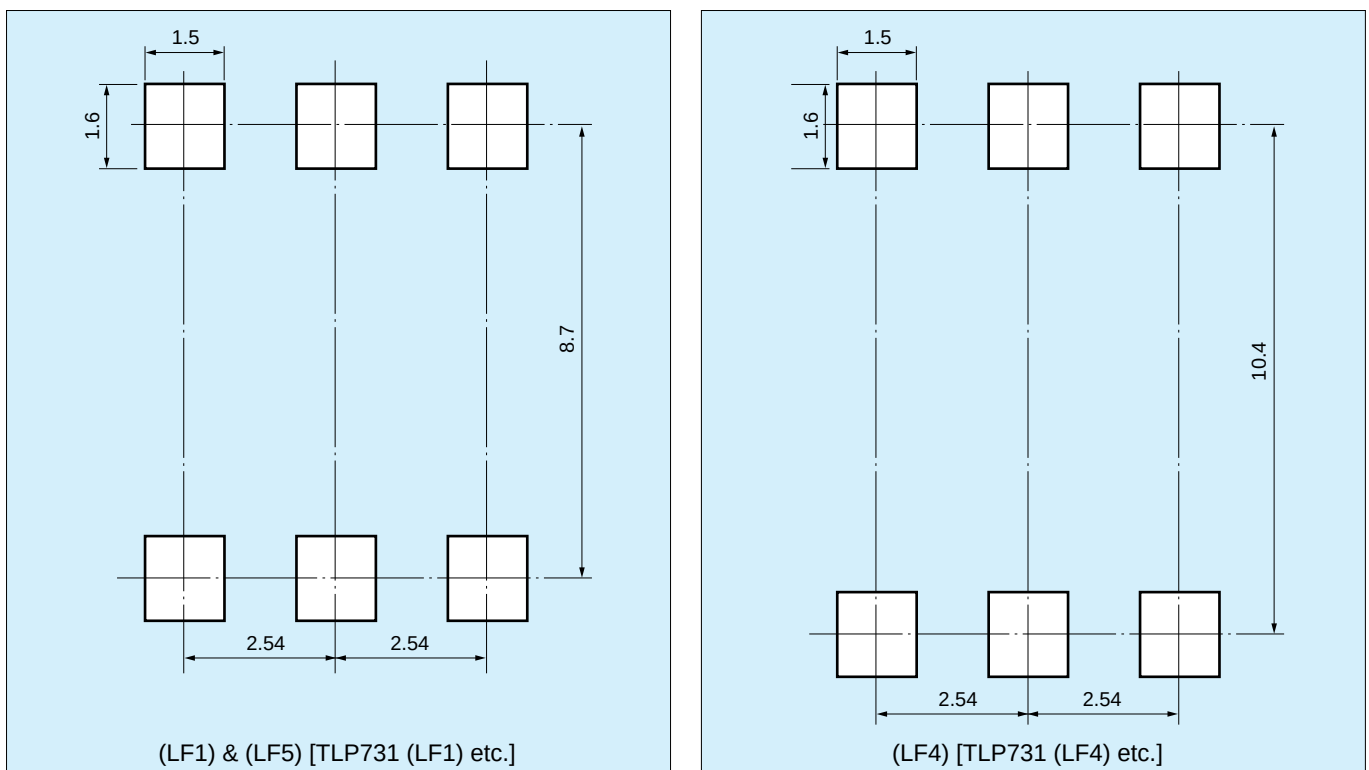
Below are the recommended footprint (mount pad) dimensions for surface-mount packages.

(Units in mm)

1) Mini-Flat Coupler (MFSOP, 2.54SOP, SOP)



2) SMD Lead Forming of 6-pin DIP Coupler



4-6 Precautions for Assembly Using Mini Flat Coupler

1) Soldering

Avoid rise in the device temperature as much as possible by observing the following conditions.

a) Soldering lead directly (by solder header)

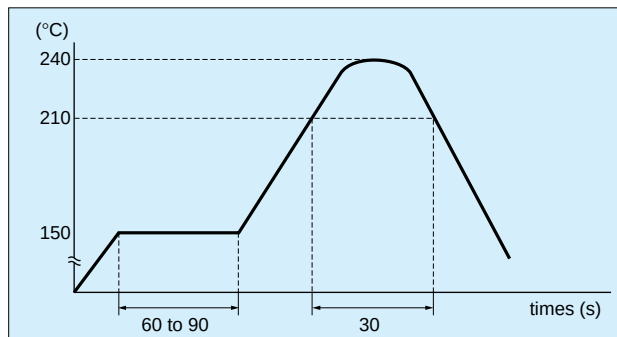
260°C max, 10 second max, for once.

b) Reflow soldering

(1) Complete the reflow process for once within 30 second at a package surface temperature above 210°C.

(2) Atmospheric temperature close to mold body surface : 240°C max, 10 second max

(3) Recommended temperature profile



c) Precautions for heating

(1) Soldering time has to be kept as short as possible.

(2) When using a halogen lamp or infrared heater, please do not irradiate the mold body surface directly.

d) Dip soldering (Flow soldering)

Reflow soldering is recommended, because thermal stress is much less than in other soldering methods.

Contact Toshiba when you plan to use dip soldering.

2) Cleaning

2-1) The following types of solvents are recommended for cleaning the flux.

Toshiba Technocare (FRW-1, FRW-17, FRW-100)

Kao Cleanthru 750H

Asahi Clean AK-225AES

Pine-alpha ST-100S

2-2) Cleaning Conditions

Cleaning conditions and precautions may differ depending on the product specifications.

When cleaning the flux, reactive ions such as Cl and Na must be removed.

a) General precautions on dip cleaning

Dipping time may differ depending on the solvent used.

However, as a general reference, it is recommended to limit the dip 3 minutes.

b) General precautions on ultrasonic cleaning

When ultrasonic cleaning is conducted for excessively long times, contact between product resin and metal leads may lessen. Also, excessive ultrasonic stress may cause cracks in the pellet.

It is recommended to apply a minimum of stress.

Recommended conditions for standard ultrasonic cleaning

Frequency : 27 to 29kHz

Time : 30 seconds or less

Output : 0.25 W/ cm² or less

Temperature : 50°C (may differ depending on the solvent used)

Cleaning must be conducted in a condition in which the printed circuit board or device should be floating on the solvent used in order to avoid direct contact with the ultrasonic vibrator.

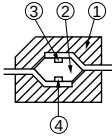
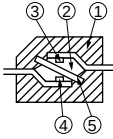
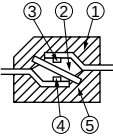
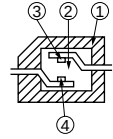
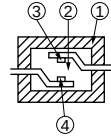
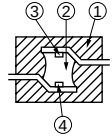
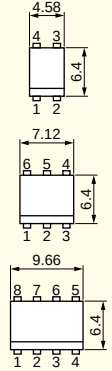
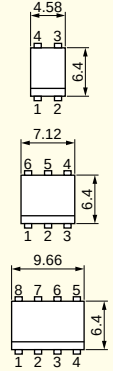
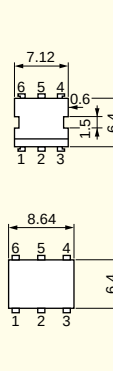
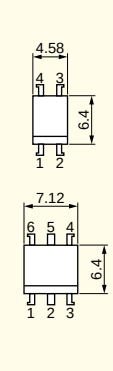
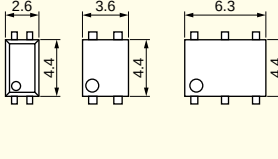
2-3) Handling Precautions

During cleaning, or when cleaning liquid is being applied to a device, do not touch the device-marking surface with hand or brush. Device markings may be erased.

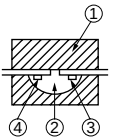
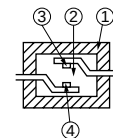
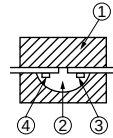
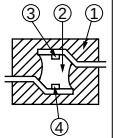
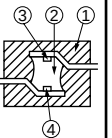
It is necessary to confirm the safety of the solvent used for cleaning, as well as cleaning conditions, so as not to harm the device package.

4-7 Safety Standard Approved Photocouplers and VDE0884-Approved Photocouplers

(as of September 2000)

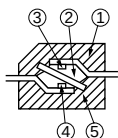
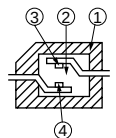
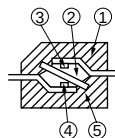
Safety Standard		TLP521-1 TLP531/532 TLP541G/545J TLP550/551 TLP560G/561G	TLP620/-2/-4 TLP621/-2/-4 TLP750/751 TLP631/632 TLP641G/641J TLP651 TLP30xx(S) Series	TLP731/732 TLP741G TLP741J TLP3022 TLP3052 TLP3042 TLP3062	TLP733/734 TLP747G TLP747J TLP762J TLP763J	TLP121 TLP131 TLP112A TLP115A TLP180 TLP181 TLP280 TLP281	TLP127 TLP160G TLP141G TLP190B TLP197G TLP176G TLP206G
		TLP227G TLP227G-2 TLP250 TLP251 TLP597G	TLP620/-2/-4 TLP621/-2/-4 TLP627/-2/-4 TLP750/751/759 TLP30xx(S) Series	TLP731/732 TLP741G TLP741J TLP3022 TLP3052 TLP3042 TLP3062 TLP668JF TLP798G	TLP733/734 TLP747G TLP747J TLP762J	TLP165J TLP166J TLP181 TLP280 TLP281	TLP127 TLP176G TLP197G TLP206G
		TLP227G TLP227G-2 TLP597G	TLP620/-2/-4 TLP621/-2/-4 TLP624/-2/-4 TLP626/-2/-4 TLP627/-2/-4 TLP750/751	TLP731/732 TLP741G TLP741J TLP798G	TLP733/734 TLP747G TLP747J TLP762J TLP763J	TLP180 TLP181 TLP280 TLP281	TLP127 TLP176G TLP197G TLP206G
		TLP227G TLP227G-2 TLP597G	TLP620/-2 TLP621/-2 TLP627/-2 TLP750/751/759 TLP30xx(S) Series	TLP798G	TLP733/734 TLP747G TLP747J TLP762J TLP763J	TLP180 TLP181 TLP280 TLP281	TLP176G TLP197G TLP206G
Construction (Cross-section)	① Body ② Window ③ Detector ④ LED ⑤ Film						
Package Dimensions (Unit: mm)						TLP181/TLP281 	

4-7 Safety Standard Approved Photocouplers and VDE0884-Approved Photocouplers

Device Type	4pin and Multichannel	TLP181**/ TLP180	—	—	TLP280/TLP281	—	—
	Transistor Output	—	TLP131	—	—	—	—
	Thyristor Output	—	—	—	—	TLP141G	—
	Triac Output	—	—	TLP165J/ TLP166J	—	TLP160J/ TLP161J	—
	IC Output	—	TLP114A	—	—	—	—
	Photorelay	—	—	—	—	—	TLP176G TLP206G
Construction Mechanical Ratings (min)	Package	MFSOP		SOP		MFSOP	2.54SOP
	Isolation Creepage Path (mm)	4.0		4.0		4.0	
	Isolation Clearance (mm)	4.0		4.0		4.0	
	Isolation Thickness (mm)	0.4	—		0.4	—	—
	Internal Creepage Path (mm)	—		—		—	
	Isolation Voltage (kVrms)	3.75		2.5	2.5		1.5
	Internal Construction (Cross Section)	① Body ② Window ③ Detector ④ LED ⑤ Film					
Safety Standard		UL1577 (File No. E67349)	Parts Specifica- tions	●	●	●	●
			Double Protection	—	—	—	—
		DIN VDE 0884/08.87	Parts Specifica- tions	●** (Note 1)	○	● (Note 1)	○
		DIN IEC65/ VDE 0860/08.81	Home Appliances	○	○	○	○
		DIN IEC380/ VDE 0806/08.81	Office Equipment	○	○	○	○
		DIN IEC435/ VDE 0805/08.79	Data pro- cessing Equipment	○	○	○	○
		DIN57 804 VDE 0804/01.83	Data pro- cessing Equipment	○	◎	○	○
		DIN57 700T1/ VDE 0700T1/2.81	Home Appliances	○	○	○	○
		DIN IEC601T1/ VDE 0750T1/05.82	Medical Equipment	○	○	○	○
		BS EN60065: 1994	Home Appliances	●	○	●	○
		BS EN60950: 1992	Office Equipment	●	○	●	○
		BS6301: 1989	Telecom- munications Networks	●	○	●	○
		SEMKO SS-EN60950	Office Equipment	—	—	—	—

** : Only applied for TLP181

Note 1 : VDE0884 standards for MFSOP and SOP photocouplers are different from those of standard DIP photocouplers because MFSOP and SOP are compact and small packages.

Device Type		4pin and Multichannel	TLP624/626	TLP621*/620/627	—	—	—	—	TLP421
		Transistor Output	—	—	TLP733/734	—	TLP731/732	—	—
		Thyristor Output	—	—	TLP747G/ TLP747J	—	TLP741G/ TLP747J	—	—
		Triac Output	—	—	—	TLP762J/ TLP763J	—	TLP3022F/3052F TLP3042F/3062F	—
		IC Output	—	TLP750/ TLP751	—	—	—	—	—
		Photorelay	—	—	—	—	—	—	—
Construction Mechanical Ratings (min)		Package	DIP		DIP		DIP		DIP
		Isolation Creepage Path (mm)	6.4		7.0 8.0 (Note 2)		7.0 8.0 (Note 2)		7.0 8.0 (Note 2)
		Isolation Clearance (mm)	6.4						
		Isolation Thickness (mm)	0.4		0.5	0.4	0.5		0.4
		Internal Creepage Path (mm)	—		4.0		—		—
		Isolation Voltage (kVrms)	5.0		4.0		4.0	5.0	5.0
		Internal Construction (Cross Section)	① Body ② Window ③ Detector ④ LED ⑤ Film						
Safety Standard		UL1577 (File No. E67349)	Parts Specifications	●	●	●	●	●	
			Double Protection	—	● *	●	—	—	
		DIN VDE 0884/08.87	Parts Specifications	◎	● (Note 3)	● (Note 3)	● (Note 3)	● (TUV) (Note 3)	
		DIN IEC65/ VDE 0860/08.81	Home Appliances	◎		◎	◎	◎	
		DIN IEC380/ VDE 0806/08.81	Office Equipment	○		○	◎	○	
		DIN IEC435/ VDE 0805/08.79	Data processing Equipment	○		○	◎	○	
		DIN57 804 VDE 0804/01.83	Data processing Equipment	◎		◎	◎	◎	
		DIN57 700T1/ VDE 0700T1/2.81	Home Appliances	○		○	○	○	
		DIN IEC601T1/ VDE 0750T1/05.82	Medical Equipment	○		○	◎	○	
		BS EN60065: 1994	Home Appliances	●		●	●	●	
		BS EN60950: 1992	Office Equipment	●		●	●	●	
		BS6301: 1989	Telecommunications Networks	●		●	●	●	
		SEMCO SS-EN60950	Office Equipment	● (Note 4)		●	—	●	

*: Only applied for TLP621

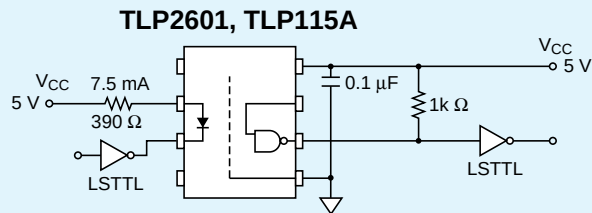
Note 2: 8.0 for (LF2) or F type. Note 3: VDE0884-approved with option (D4).

Note 4: TLP621 / 620 / 627 / 750 / 751 are approved. TOSHIBA recommend TLP621 rather than TLP721 for your new designing.

5. Application Data

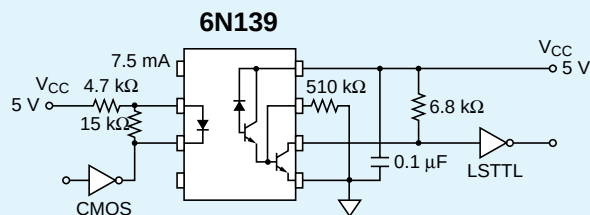
5-1 Digital Data Interface Applications for High-Speed Photo-IC Photocouplers

High Speed



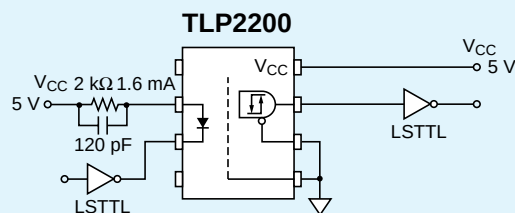
By using the high-speed TLP2601 device, (the equivalent MFC⁽¹⁾ version is the TLP115A) high-speed data transmission is possible up to approximately 5 MHz.
f (typ.): 5 MHz

Low Input Current Drive



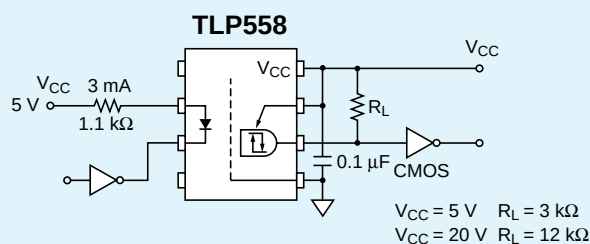
Use of the high-CTR (current transfer ratio) 6N139 enables operation by low input current, and direct driving with a CMOS.
f (typ.): 50 kHz

Pull-up Resistor Replacement



When the 3-state-output TLP2200 is used, the next-step logic gate can be actuated without using a pull-up resistor.
f (typ.): 1 MHz

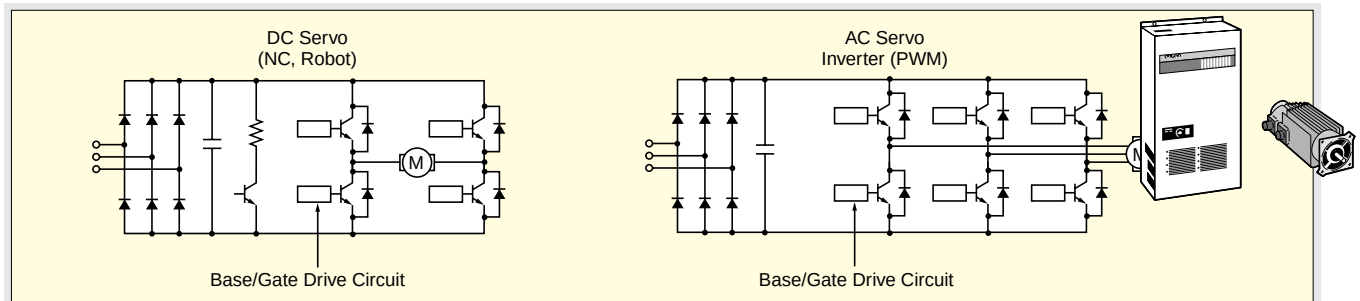
High V_{CC} Tolerance



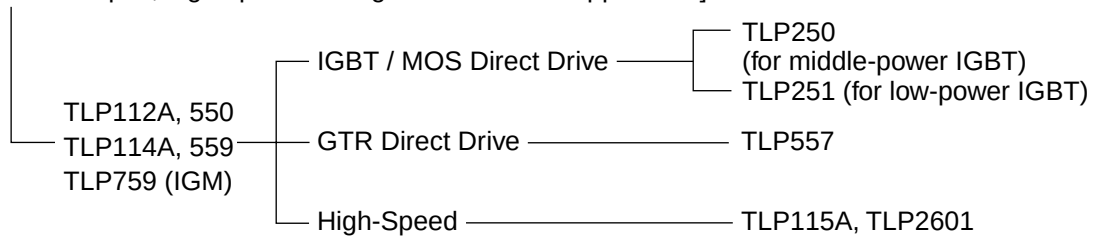
By using the TLP558 which accepts a wide range of V_{CC}, the CMOS logic gates and other components can be operated with high V_{CC}.
f (typ.): 1 MHz

Not 1: MFC = Mini-Flat Coupler

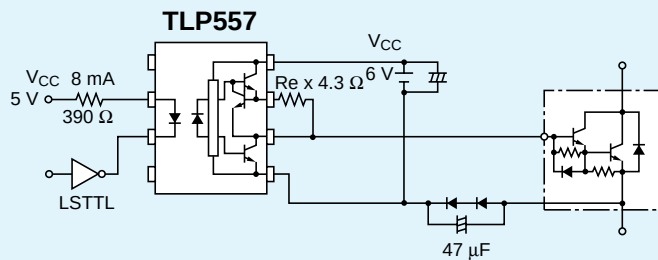
5-2 Inverter and AC / DC Servo Applications for High-Speed Photo-IC Photocouplers



[Photo-IC coupler, high-speed base/gate drive circuit application]



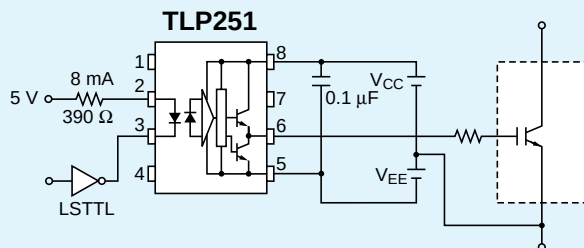
15-A Class GTR (Giant Transistor) Module Base Drive



An external resistor R_{ex} is connected between pins 6 and 7.

This resistor causes the drive base current to become constant and stabilizes the GTR drive.

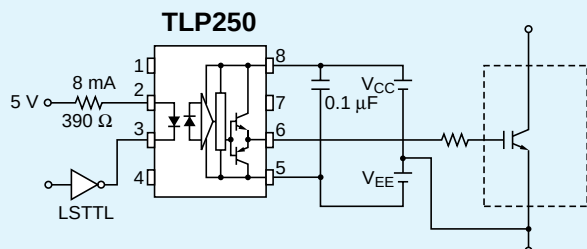
15-A Class IGBT Module Gate Drive



The TLP251 high-speed photo-IC photocoupler can drive a low power IGBT (Insulated Gate Bipolar Transistor) directly.

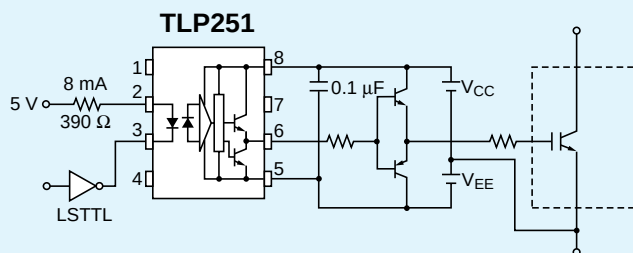
5-2 Inverter and AC/DC Servo Applications for High-Speed Photo-IC Photocouplers (continued)

50-A Class IGBT Module Gate Drive



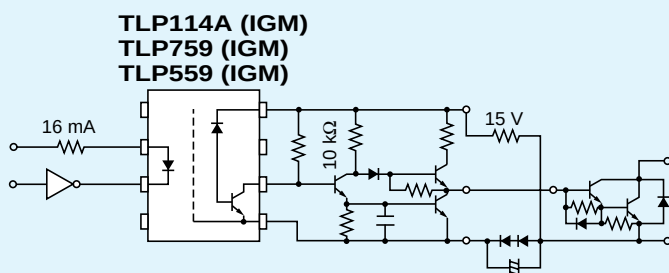
The TLP250 high-speed photo-IC photocoupler can drive a medium power IGBT (Insulated Gate Bipolar Transistor) directly.

IC = 400-A Class IGBT Module Gate Drive



The TLP251 high-speed photo-IC photocoupler and two booster transistors can drive a high power IGBT.

High-Speed Switching Transistor Module Base Drive



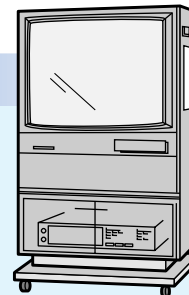
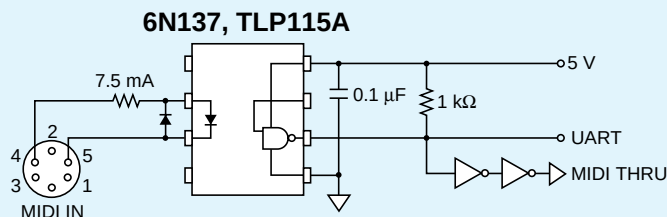
This is a base drive circuit for a GTR employing the high-CMR TLP559 high-speed photo-IC photocoupler and a discrete circuit.

(IGM) Selection

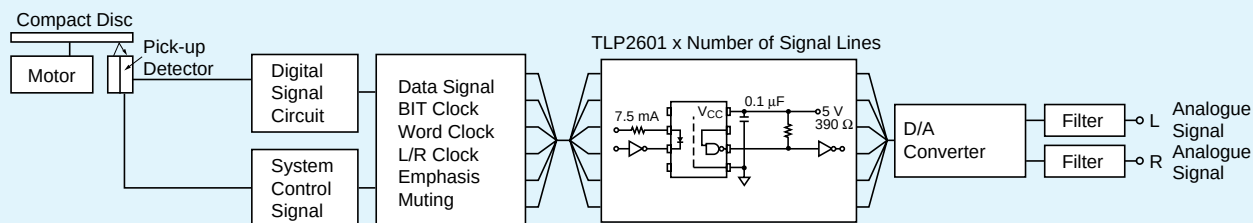
Product No.	Package Type	BVs (Vrms)	V_O/V_{CC}	CTR	$ t_{PLH} - t_{PHL} $	CM_H	CM_L
TLP114A (IGM)	MFSOP6	3750	20 V max / 30 V max	25 % min 75 % max @ $I_F = 10$ mA $V_{CC} = 4.5$ V $V_O = 0.4$ V	0.7 μ s max @ $I_F = 10$ mA $R_L = 20$ k Ω	10000 V / μ s min @ $I_F = 0$ mA $R_L = 20$ k Ω $V_{CM} = 1500$ V _{p-p}	- 10000 V / μ s min @ $I_F = 10$ mA $R_L = 20$ k Ω $V_{CM} = 1500$ V _{p-p}
TLP559 (IGM)	DIP8	2500					
TLP759 (IGM)	DIP8	5000					

5-3 Consumer Products Applications for High-Speed Photo-IC Photocouplers

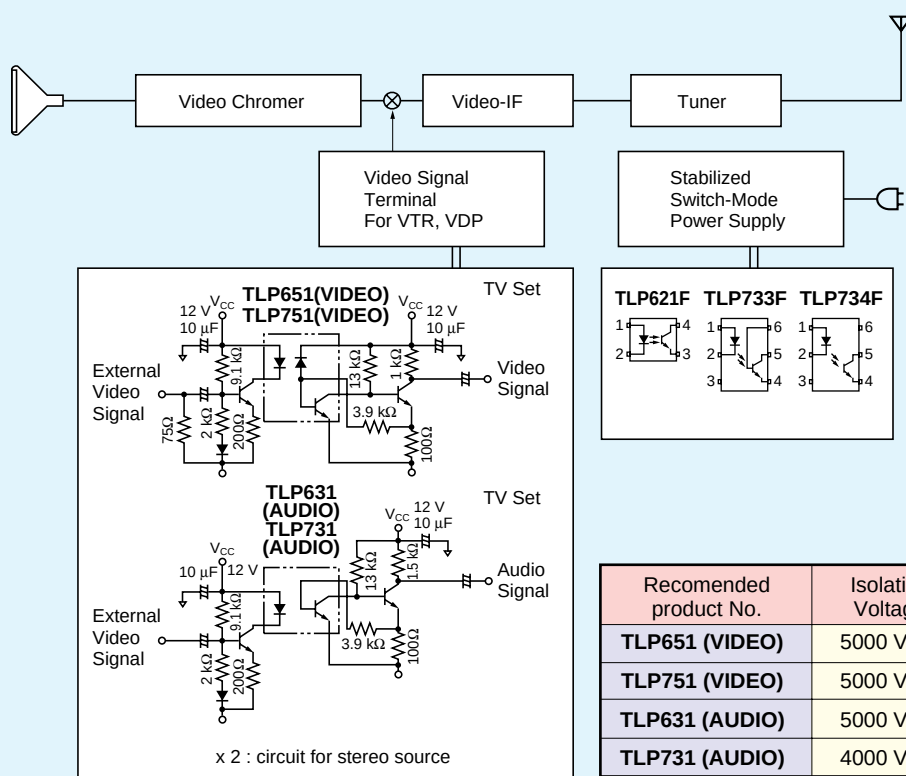
Application for "MIDI" Interface for Electronic Musical Instrument



Application for Compact Disc Player

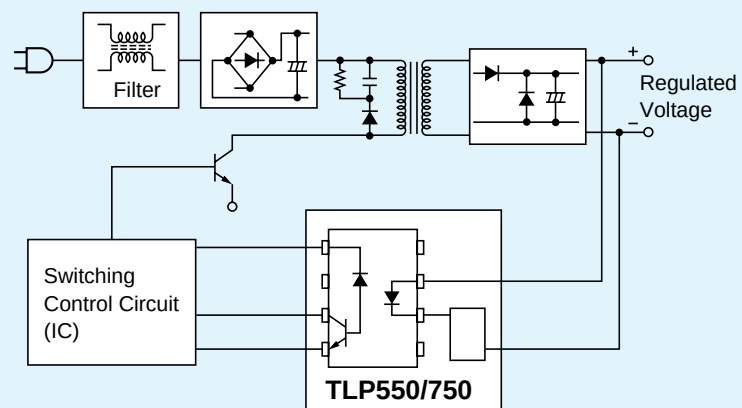


Application for TV Terminal Isolation From Home Computer & VCR



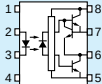
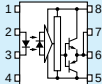
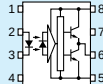
5-4 High-Speed Photo-IC Photocoupler Applications

Application for High-Frequency Switch Mode Power Supply



Applications Table for High-Speed Photo-IC Photocouplers

	TLP2601 	6N137 	TLP558 	TLP2200 	6N138 6N139 	6N135 TLP651 6N136 TLP751 	TLP550 TLP750 	TLP559 TLP759 				
Dual Type	TLP2631 	TLP2630 					TLP2530 TLP2531 					
Mini-Flat Type	TLP115 TLP115A 	TLP113 					TLP112 TLP112A 	TLP114A 				
Output	Open Collector		3 State Totem Pole		Open Collector		Open Collector					
Speed	10 Mbps		5 Mbps		0.3 Mbps		1 Mbps					
Input Current I _F	5 mA		1.6 mA		0.5 mA		16 mA					
Supply Voltage V _{CC}	5 V		4.5 to 20 V		< 18 V		< 15 V (30 V for TLP759, 114A)					
Supply Current I _{CC}	12 mA (24 mA for Dual Type)		5 mA		0.1 mA		0.1 mA (0.2 mA for Dual Type)					
CMR*	◎		○		—		○ ◎					
Application	● NC machines ● Industrial robots ● High-speed digital signal interfaces ● Computer terminal devices ● Various industrial control equipment		● Electronic musical instruments ● Compact Disk players ● High-speed digital signal interfaces ● Computer terminal devices		● Computer data bus drivers ● High-speed digital signal interfaces ● High-speed gate drives for power MOS elements ● Various industrial control equipment		● CMOS direct drive ● Current loop receiver / driver ● Telephone ring detector ● Computer terminal devices		● TV units ● Transmission of analog signals such as video signals ● Digital signal interfaces		● General-purpose inverters ● Inverter-equipped air-conditioning equipment ● NC machines ● Switching power supply units	

	TLP557	TLP250	TLP251
			
Dual Type			
Mini-Flat Type			
Output	– 0.25 / 0.5 A	± 0.5 A	± 0.1 A
Speed	1 μs	0.2 μs	0.3 μs
Input Current I _F	5 mA	5 mA	5 mA
Supply Voltage V _{CC}	< 16 V	10 to 35 V	10 to 35 V
Supply Current I _{CC}	10 mA	10 mA	10 mA
CMR*	◎	◎	◎
Application	● General-purpose inverters ● Inverter-equipped air-conditioning equipment ● GTR base drives ● General-purpose inverters ● Inverter-equipped air-conditioning equipment ● IGBT / MOSFET drivers		

* Common Mode Noise Rejection ◎ Excellent
○ Very good

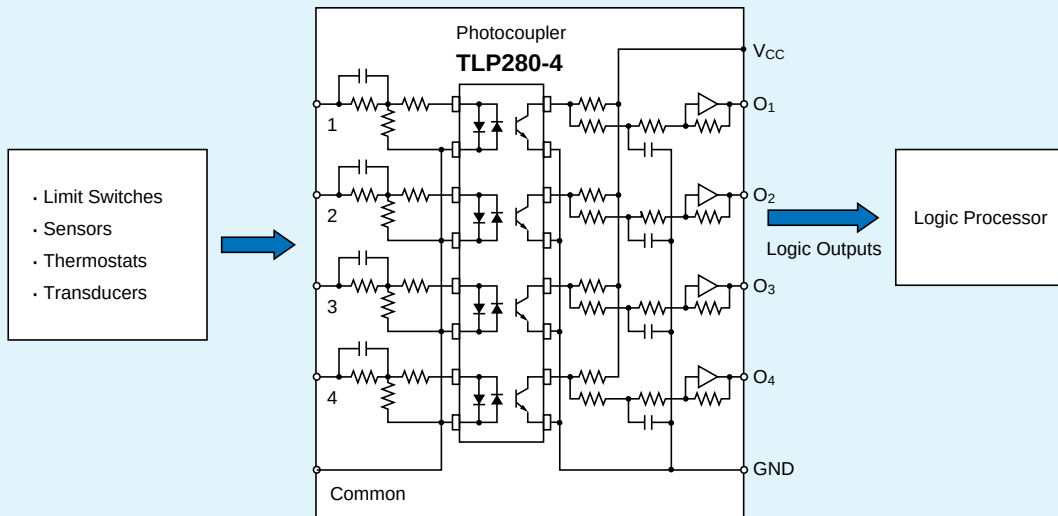
5-5 Programmable Controller Applications for Low Input Photocouplers and High V_{CE0} Photocouplers

AC Input Module

TLP626-4* / 280-4

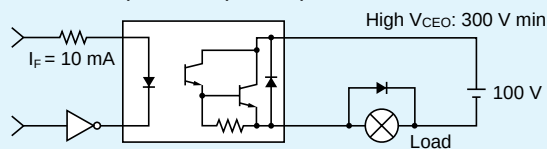
* Low Input

CTR > 100 % at $I_F = 0.5 \text{ mA}$, $V_{CE} = 1.5 \text{ V}$

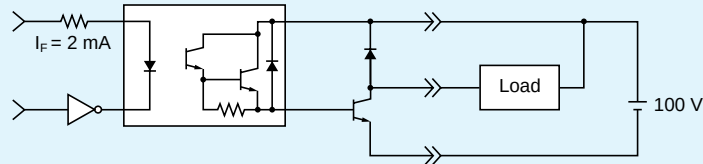


DC Output Module

TLP127, TLP627, 627-2, 627-4

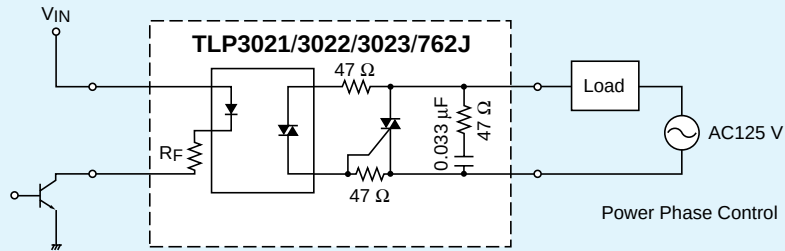


TLP127, TLP627, 627-2, 627-4

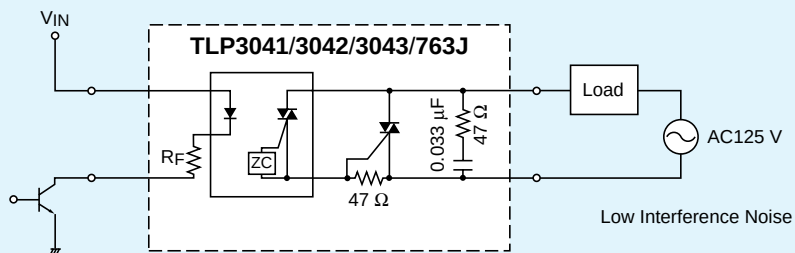


5-6 Solid State Relay

Non-Zero Crossing Type



Zero Crossing Type



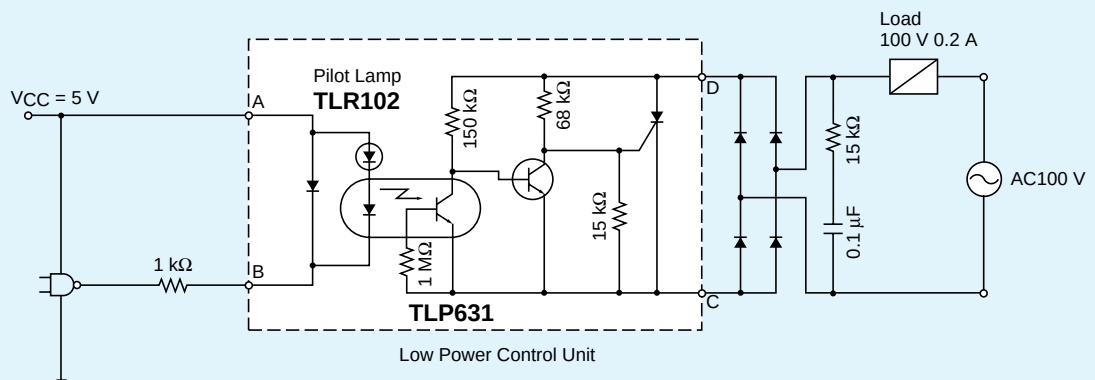
* A snubber circuit must be added.

Recommended R_F Value

Product No.	Recommended R_F [Power rating (W)]		
	@ $V_{IN} = 5\text{ V}$	@ $V_{IN} = 12\text{ V}$	@ $V_{IN} = 32\text{ V}$
TLP3021 TLP3041	120 Ω [1 / 2]	390 Ω [1 / 2]	1.2 k Ω [2]
TLP3022 TLP3042	180 Ω [1 / 4]	560 Ω [1 / 2]	1.8 k Ω [1]
TLP3023 TLP3043	360 Ω [1 / 8]	1.2 k Ω [1 / 4]	3.6 k Ω [1/2]

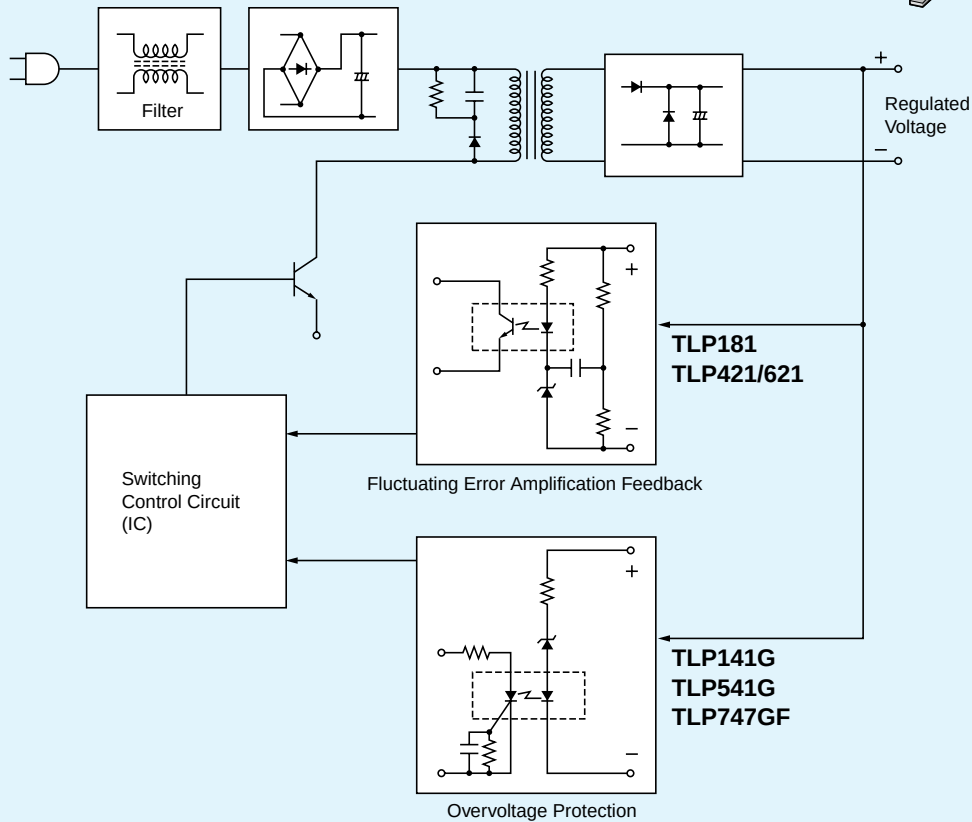
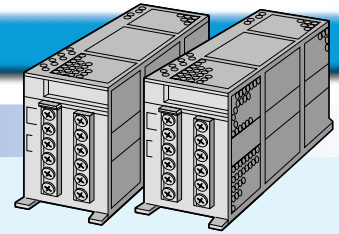
Power Control Circuit

Low Power control (By C^2 MOS)



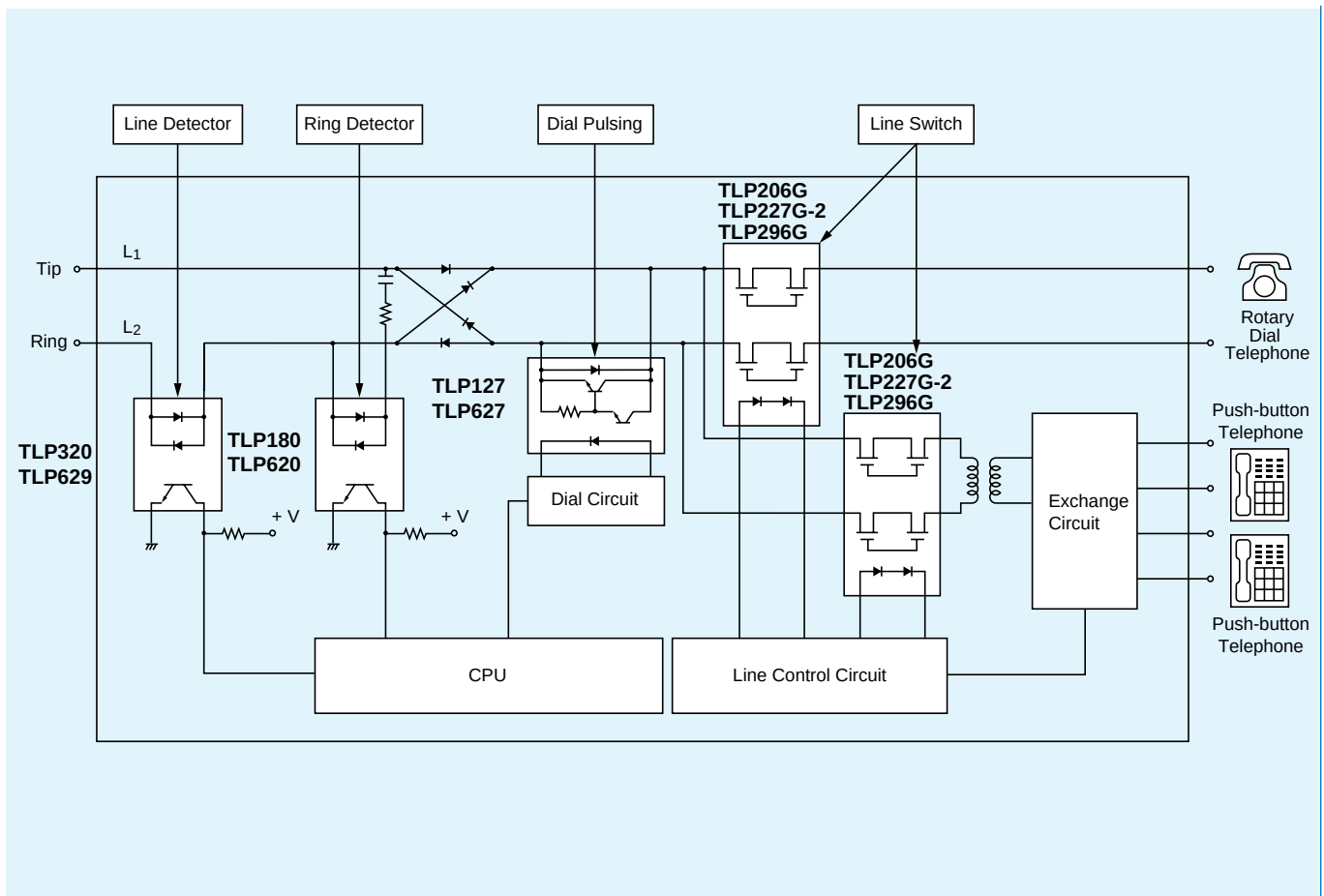
5-7 Switch Mode Power Supply Applications

For CTR Classified Transistor, SCR and Triac Photocouplers



Recommended Product No.	Isolation Voltage	Safety Standards Recognition				CTR (I_c / I_F) (%)		
		UL1577	BSI7002	VDE0884	Nordic SEMKO	Rank	Min	Max
TLP421 (DIP4) TLP621 (DIP4)	5000 Vrms	○	○	○		No Rank	50	600
						(GB) Rank	100	600
						(Y) Rank	50	150
						(GR) Rank	100	300
						(BL) Rank	200	600
						(GRL) Rank	100	200
TLP731 (with Base) / TLP732 (No Base)	4000 Vrms	○	○	○	○	(GRH) Rank	150	300
TLP733F (with Base) / TLP734F (No Base)		○	○	○		(GB) Rank	100	600
TLP750 (High Speed)	5000 Vrms	○	○	○		(GR) Rank	100	300
						No Rank	10	—
						(O) Rank	19	

5-8 Telephone Applications

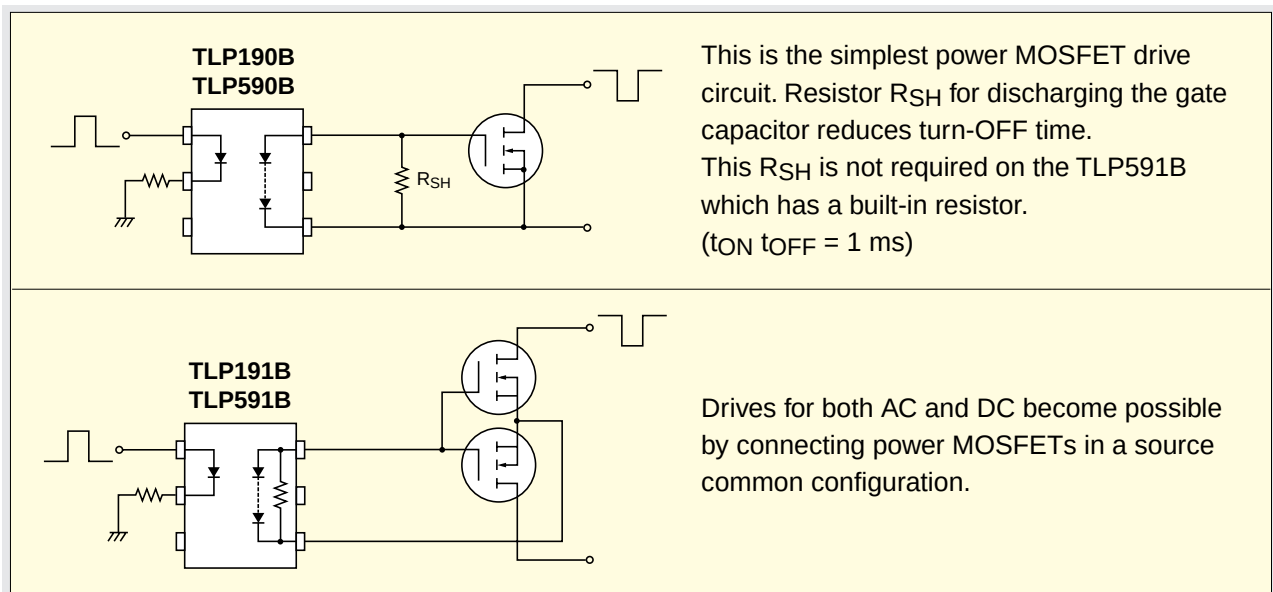


Photocouplers for Telecommunications

Application	Package Type	Product Number		Features
		DC Input	AC Input	
Ring Detector	DIP4	TLP421	TLP620	General single transistor output in compact packages. Good cost performance.
	DIP8 (Dual)	TLP521-2	TLP620-2	
	SOP/MFSOP	TLP281, TLP181	TLP280	
Dial Pulsing	DIP4	TLP627		High $V_{CE0} = 300\text{ V}$ Darlington transistor output in compact packages.
	MFSOP	TLP127		
	DIP4	TLP628		High $V_{CE0} = 350\text{ V}$ single transistor output.
Line Detector	DIP4	TLP629	TLP320	High LED current rating 150 mA. Directly connectable in telephone line.
Line Switch	DIP4	TLP227G		V _{off} = 350 V* MOSFET output photorelay. Suitable to replace mechanical relays for crosspoint, hookswitch and dial pulse applications.
	DIP8 (Dual)	TLP227G-2, TLP296G		
	DIP6	TLP597G		
	2.54SOP8 (Dual)	TLP206G		

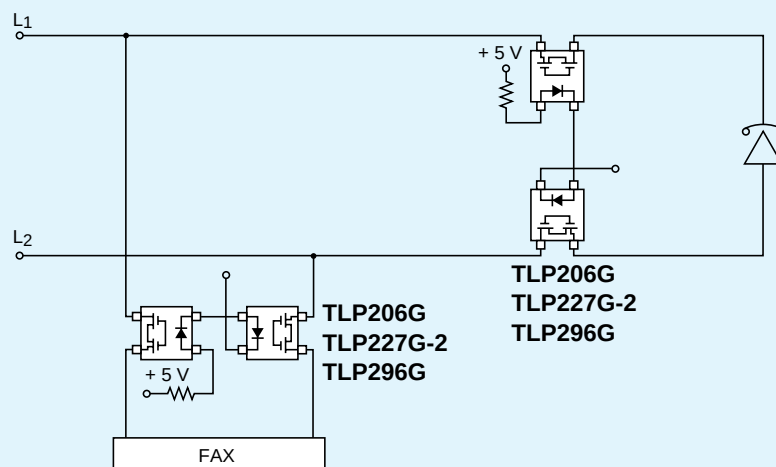
* V_{off} = 400 V for TLP296G

5-9 Photovoltaic Coupler Applications



Technical information pertaining to the two circuits above is used solely to explain representative operation and applications of products. Therefore such technical data are not intended to provide guarantees for assertion of industrial proprietary rights or other rights, nor to grant permission for licensee rights of Toshiba or any third parties.

5-10 Photorelay (MOSFET Coupler) Applications

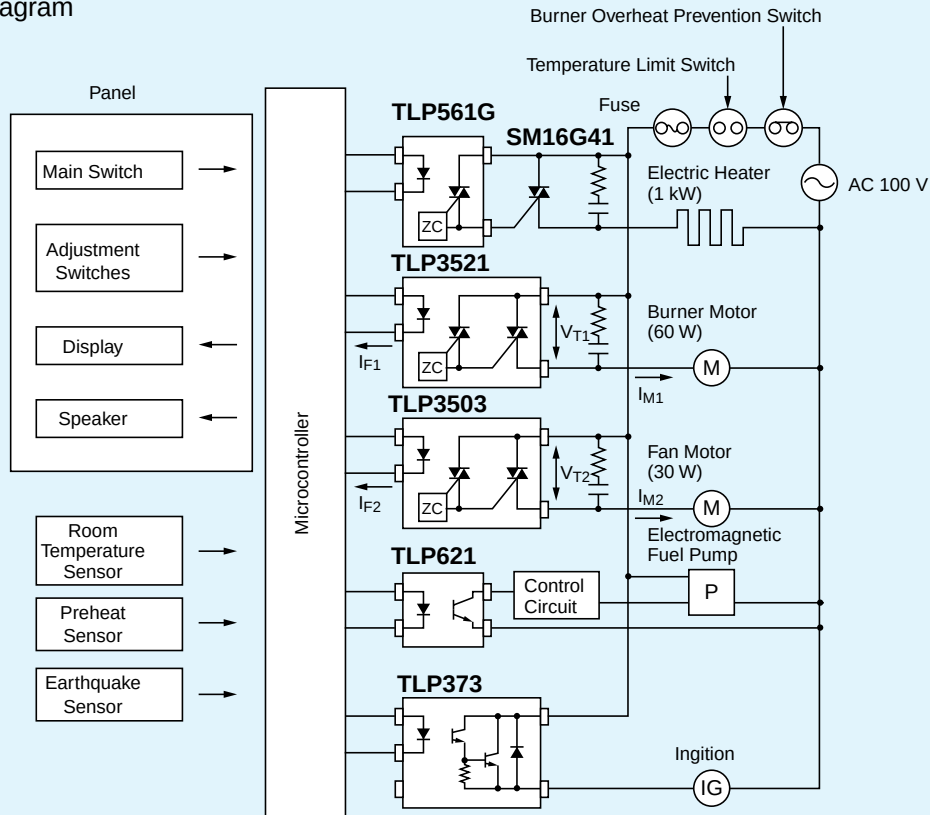


TLP227G-2, 296G Applications for PBX Cross-Point Relays

5-11 Home Appliance Applications

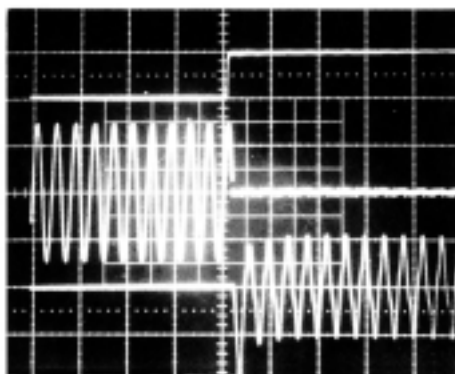
Oil Fan Heater

a) Block Diagram



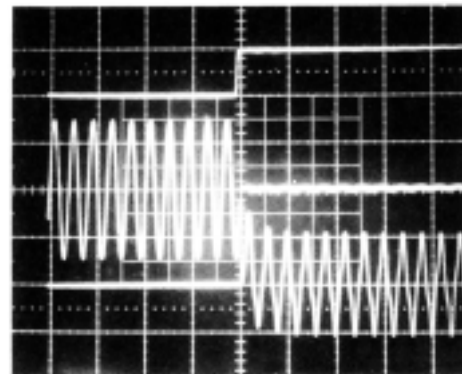
b) Waveform Examples

1. Example of Operating Waveform for Burner Motor



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

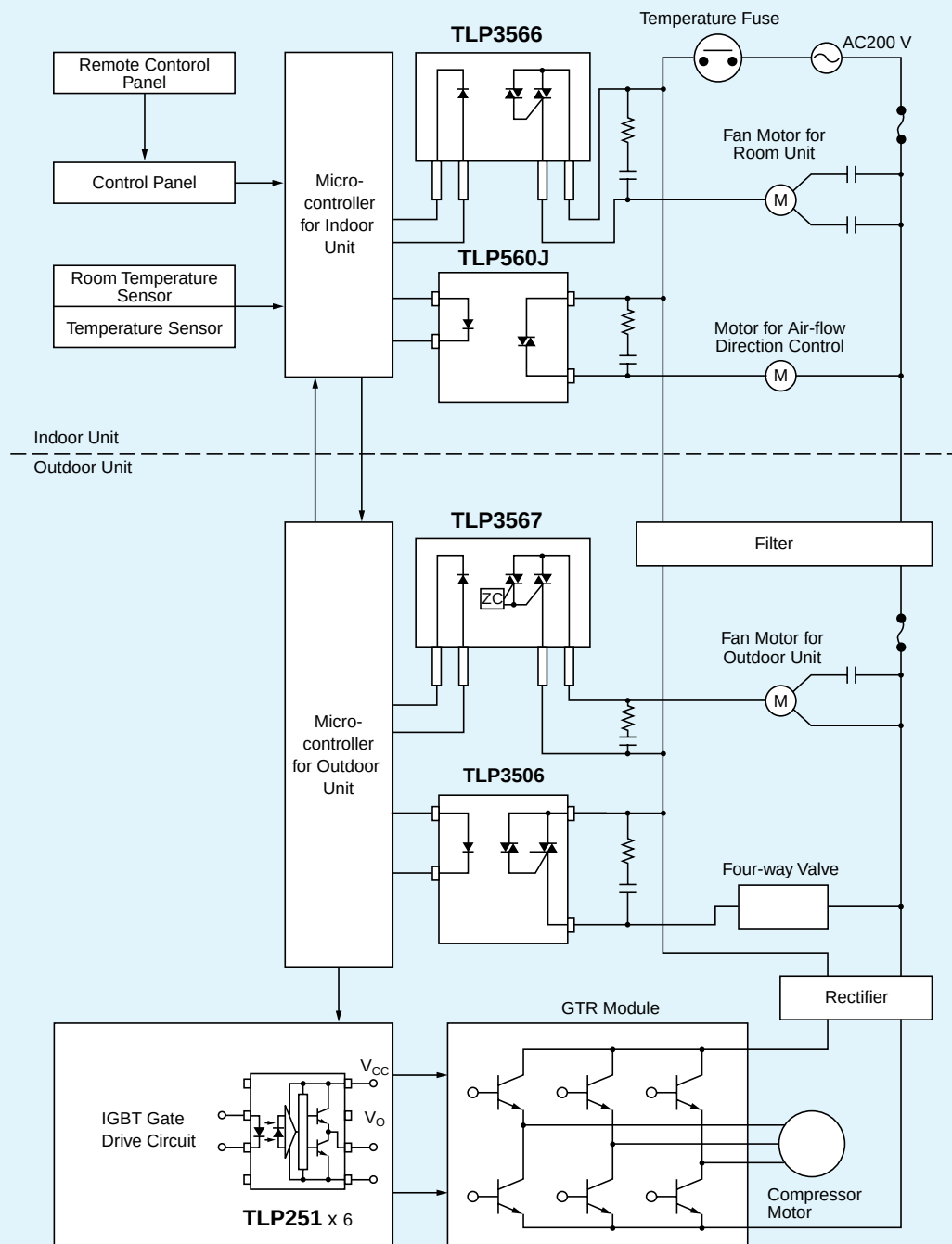
2. Example of Operating Waveform for Motor



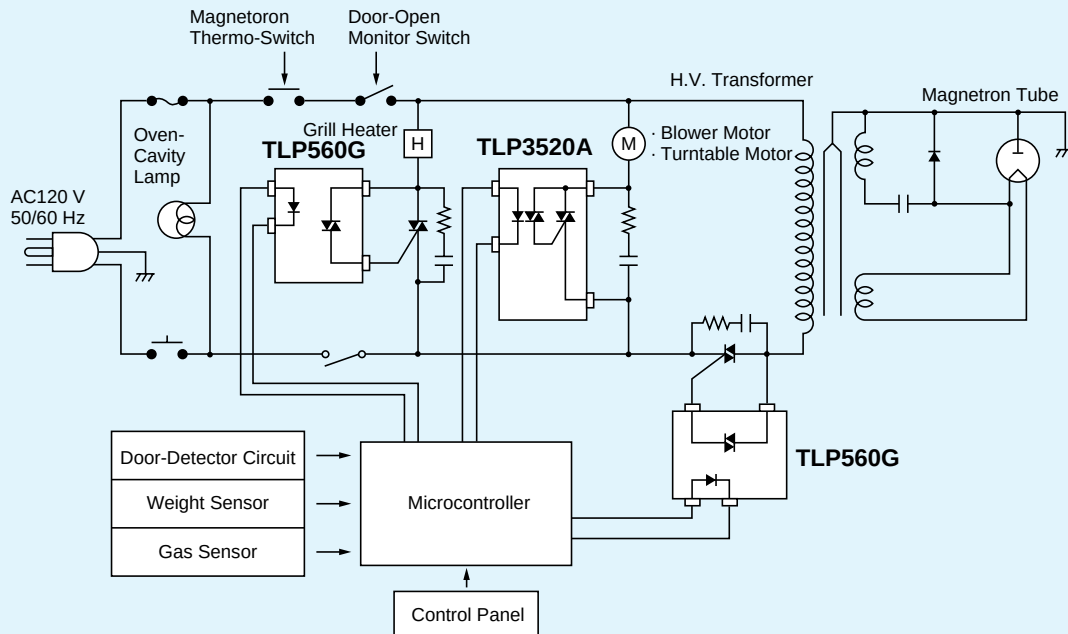
{	Top	: I_{F1}	20 mA / div
	Medium	: V_{T1}	100 V / div
	Bottom	: I_{M1}	0.5 A / div
	Horizontal	: time	50 ms / div

5-11 Home Appliance Applications (continued)

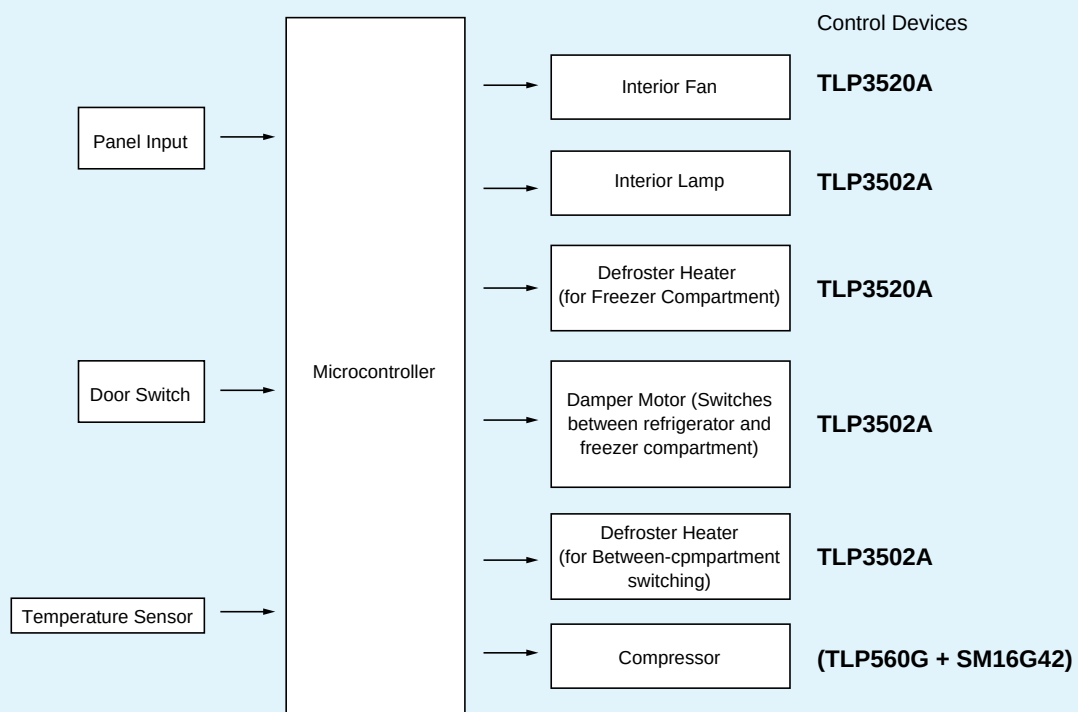
Inverter Air Conditioner



Oven Grill Range

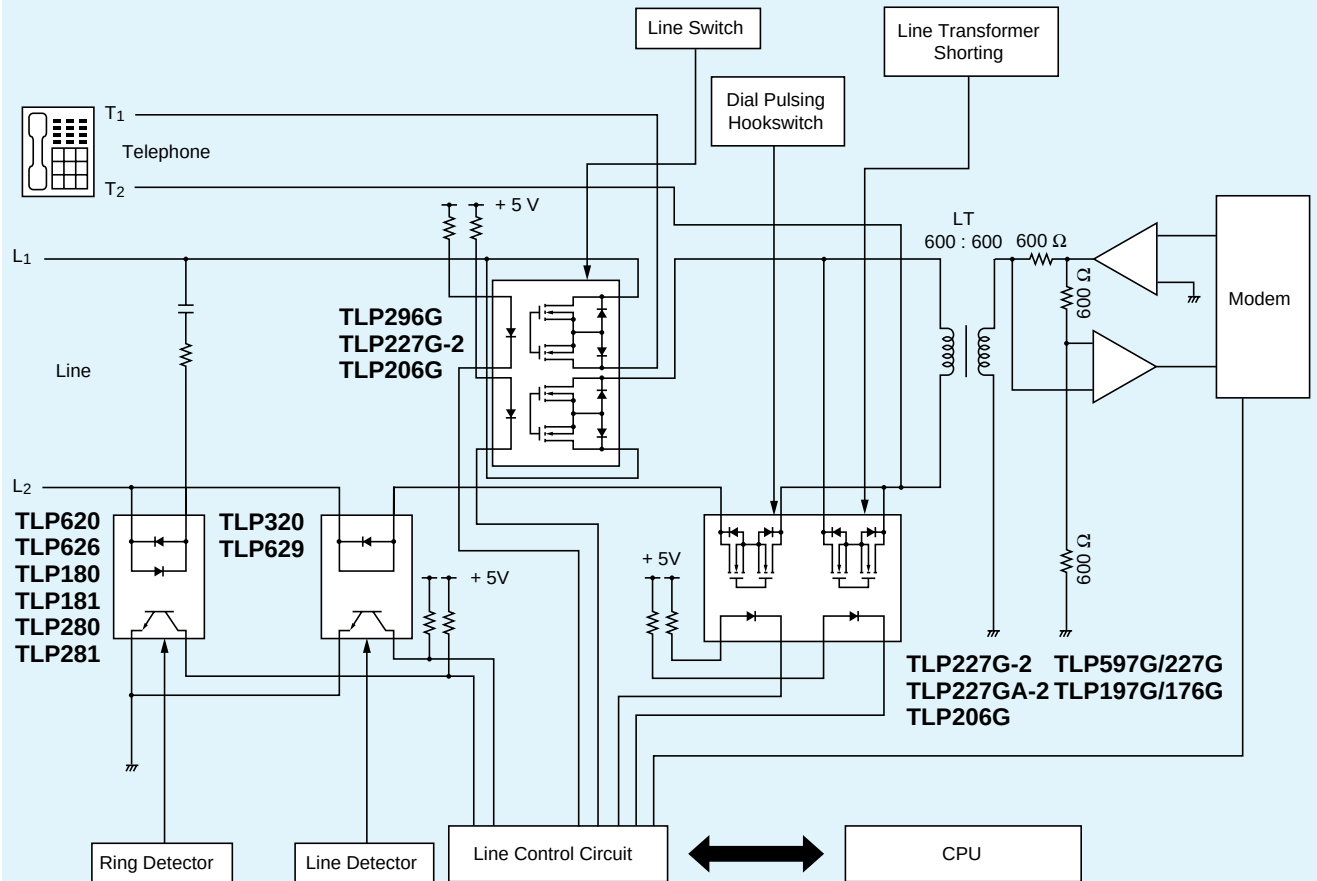


Refrigerator Microprocessor



5-12 FAX and Modem Applications

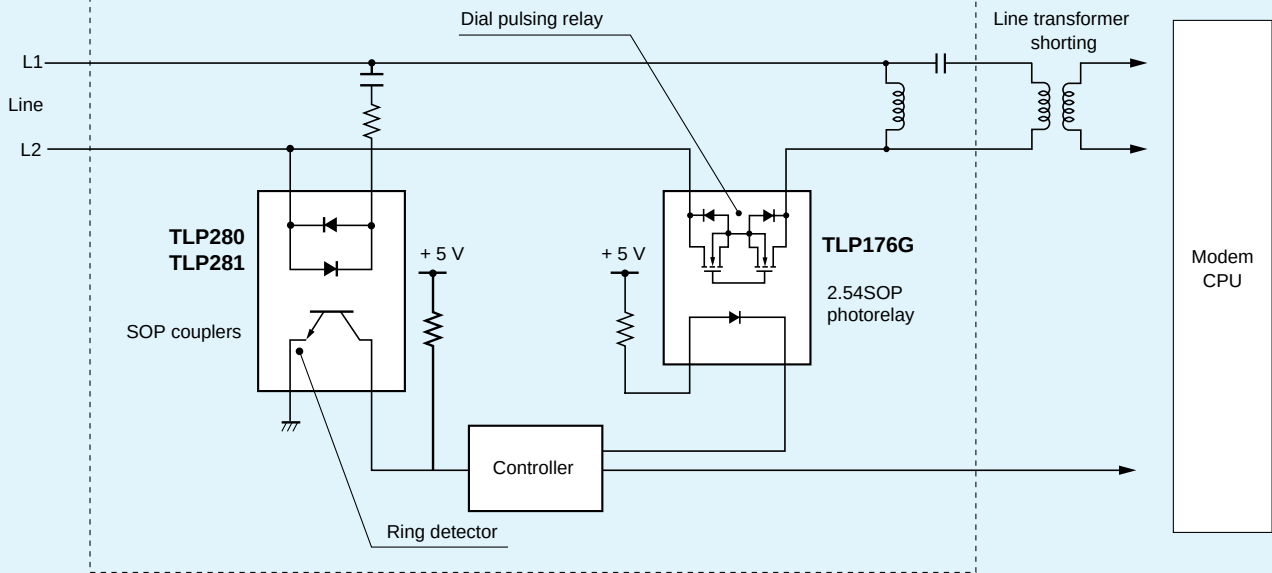
Data Access Arrangement (DAA)



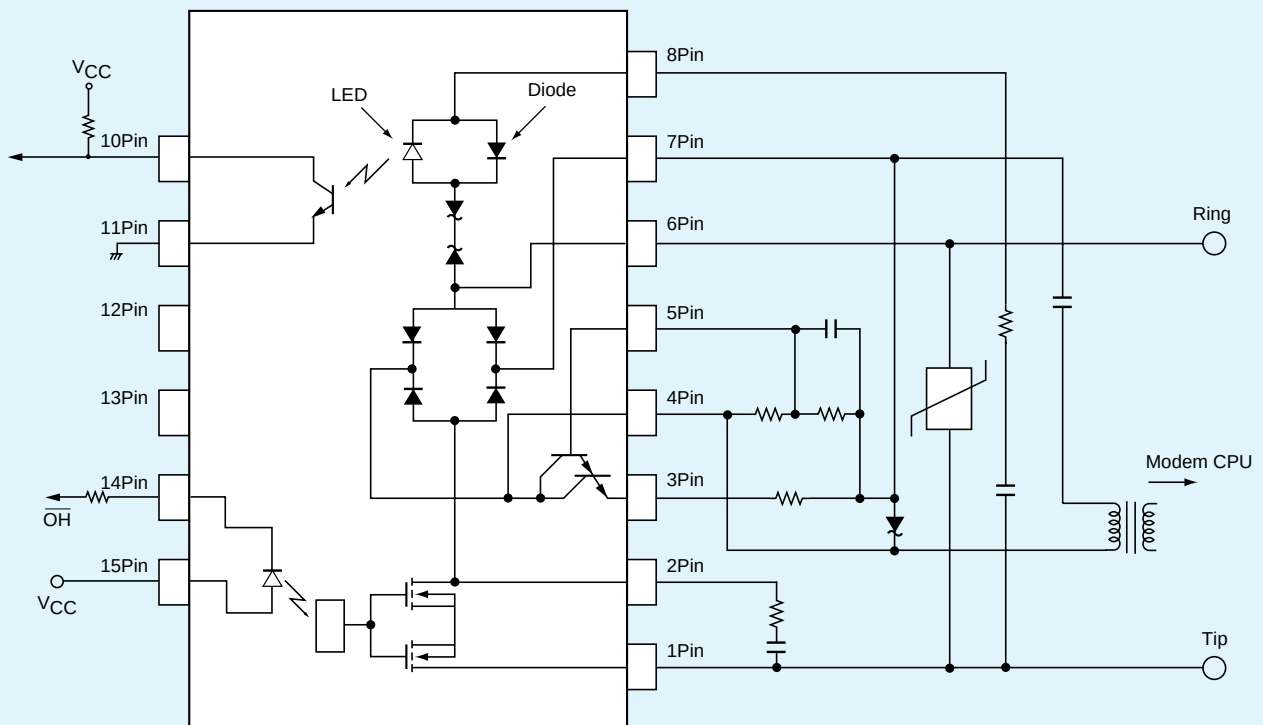
DAA Circuit Application for Fax Modem Card

- No need for output snubber circuit
- No need for reverse-blocking diode in input side

DAA circuit (fax modem card)

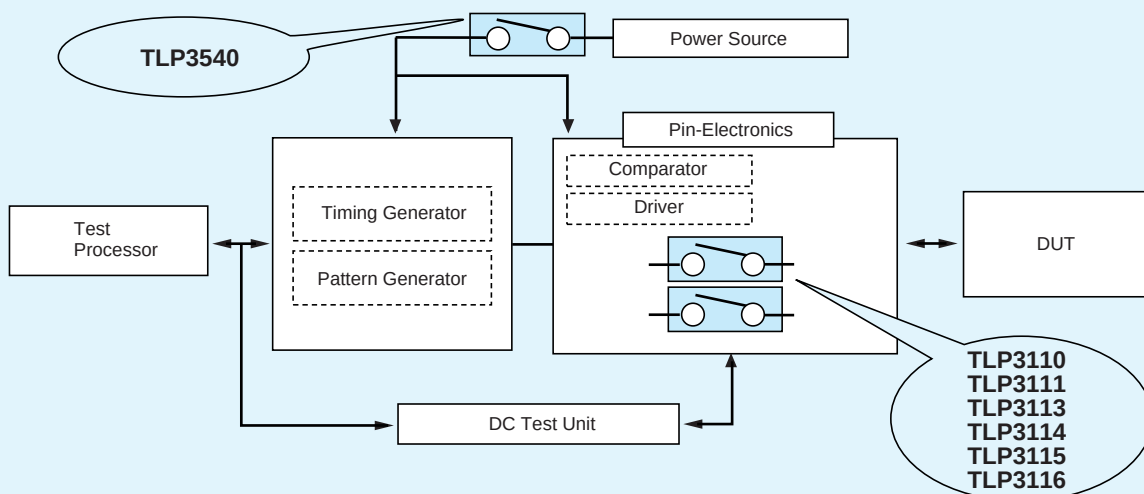
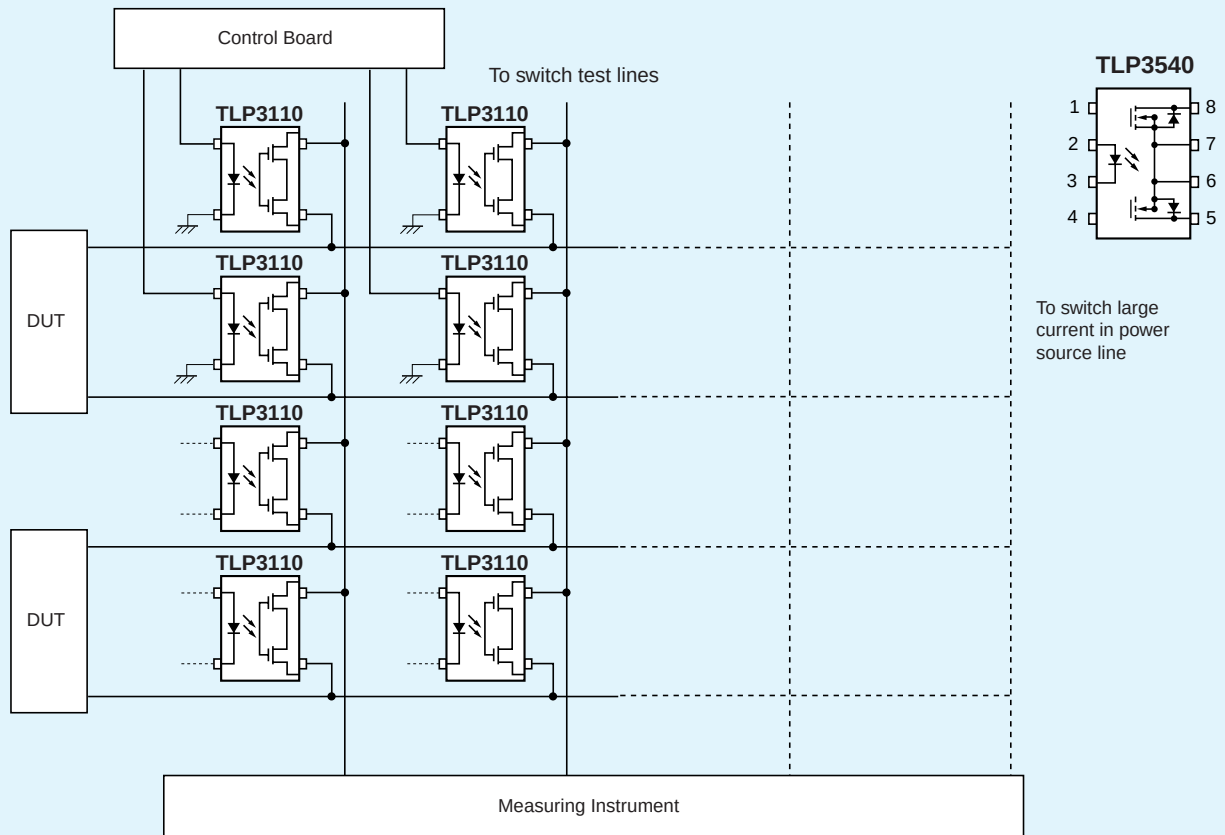


TLP270G / TLP270D Used in a DAA Example



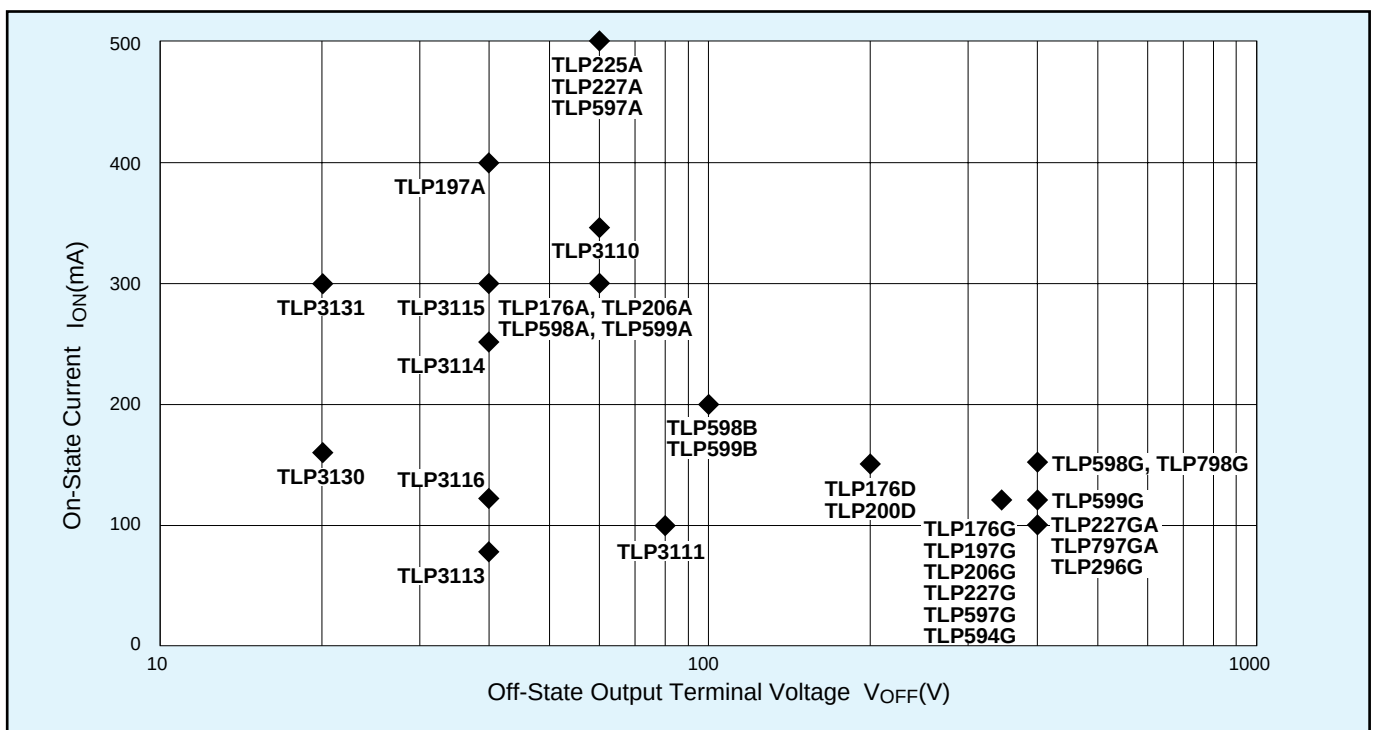
5-13 Tester Applications

Sample Multi-Contact Measurement System Application (Multiplexer) (Using the TLP3110/3111 and TLP176A)



5-14 Applications of Photorelays

Package (number of channels, contact type)						Off voltage V_{OFF} (min)	On current I_{ON} (max)	Trigger current I_{FT} (typ.)	Feature	Application
2.54SOP4 (1-Form-A)	2.54SOP6 (1-Form-A)	2.54SOP8 (2-Form-A)	DIP4 (1-Form-A)	DIP6 (1-Form-A)	DIP8 (2-Form-A)					
TLP176A	TLP197A	TLP206A	TLP225A TLP227A	TLP598A TLP599A TLP597A	TLP227A-2	60 V	03~ 0.5 A	1~2 mA	Low on-resistance High-current output	•Programmable controller •Relay output I/O board •Industrial robot •Measuring instrument
TLP176D		TLP200D				200 V	0.15 A	1~2 mA	FA switching	•Digital line card •Industrial robot •Relay output I/O board
TLP176G	TLP197G	TLP206G	TLP227G	TLP594G TLP597G	TLP227G-2	350 V	0.12 A	1~2 mA	High breakdown voltage Communication line switching Supports UL1950	•Public phone line card •Modem •STB •Various actuator drivers
				TLP598B TLP599B		100 V	0.2 A	1~2 mA	FA switching	•Relay output I/O board •Industrial robot •Programmable controller
			TLP227GA	TLP598G TLP599G TLP597G TLP798G TLP797GA	TLP227GA-2 TLP296G	400 V	0.12 A/ 0.15 A	1~2 mA	High breakdown voltage Communication line switching Supports UL1950	•Public phone line card •Modem •STB •Various actuator drivers
TLP3110 TLP3114 TLP3115 TLP3131						20~ 60 V	0.25~ 0.35 A	2~3 mA	Low on-resistance for IC tester/measuring instrument Low CR products/ high current	•Memory tester •Logic tester •Measuring instrument
TLP3111 TLP3113 TLP3116 TLP3130						20~ 80 V	0.08~ 0.1 A	2~3 mA	Low on-capacitance for IC testers/measuring instruments $C_{OFF} \leq 15$ pF Low CR product	•Memory tester •Logic tester •Measuring instrument



6. Cross Reference

The following Cross-Reference is meant to serve as a guide to other existing devices competing with Toshiba's photocoupler product line.

Toshiba's nearest equivalent devices are selected on the basis of general similarity of electrical characteristics and mechanical configurations.

Before using, please compare the detailed specifications of the substitute device to the data sheet of the original.

Code Definitions

- A : Direct Replacement**
- B : Minor Electrical Difference**
- C : Minor Mechanical Difference**
- D : Major Electrical Difference**
- E : Major Mechanical Difference**
- F : Call TOSHIBA***
- G : No Equivalent**

* Devices that can be second sourced if volume and pricing warrant.

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SIEMENS

Type	TOSHIBA Type	Code	Type	TOSHIBA Type	Code	Type	TOSHIBA Type	Code
4N25	4N25(Short)	A	IL256	TLP180	E	CNY65	TLP732(D4-LF2)	E
4N26	4N26(Short)	A	IL400	TLP541G	A	CNY66	—	G
4N27	4N27(Short)	A	IL410	TLP3062	A	CNY71	TLP630	F
4N28	4N28(Short)	A	IL416	—	G	CNY74-2	TLP504A	F
4N32	4N32(Short)	A	IL420	TLP3052	A	CNY74-4	TLP504A-2	F
4N33	4N33(Short)	A	ILCT6	TLP504A	A	CNY75A	TLP731(Y)	F
4N35	4N35(Short)	A	ILD1	TLP504A	A	CNY75B	TLP731(GR)	F
4N36	4N36(Short)	A	ILD2	TLP504A(GB)	D	CNY75C	TLP731(GR)	F
4N37	4N37(Short)	A	ILD5	TLP504A	D	CNY75G	TLP731(LF2)	F
6N135	6N135	A	ILD30	—	G	CQY80N	TLP733(D4-GR)	A
6N136	6N136	A	ILD32	—	G	CQY80NG	TLP733F(D4-GR)	A
6N138	6N138	A	ILD55	—	G	K827P	TLP621-2	B
6N139	6N139	A	ILD610-1	TLP621-2	D	K847P	TLP621-2	B
BRT11H	TLP560G	D	ILD610-2	TLP621-2	D	K3010P	TLP3021	A
BRT11M	TLP560G	D	ILD610-3	TLP621-2	D	K3010PG	TLP3021(LF2)	A
BRT12H	TLP560J	D	ILD610-4	TLP621-2	D	K3020P	TLP3021	A
BRT12M	TLP560J	D	ILQ1	TLP504A-2	A	K3020PG	TLP3021(LF2)	A
BRT21H	TLP561G	D	ILQ2	TLP504A-2(GB)	D	K5013P	—	G
BRT21M	TLP561G	D	ILQ5	TLP504A-2	D	K8031P	—	G
BRT22H	TLP561J	D	ILQ30	—	G			
BRT22M	TLP561J	D	ILQ32	—	G			
CNY17-1	CNY17-2	B	ILQ55	—	G			
CNY17-2	CNY17-2	C	SFH600-0	TLP731	F			
CNY17-3	CNY17-3	C	SFH600-1	TLP731(Y)	F			
CNY17-4	CNY17-4	C	SFH600-2	TLP731(GR)	F			
CNY17F-1	TLP734(D4)	F	SFH600-3	TLP731(GR)	F			
CNY17F-2	TLP734(D4-C172)	A	SFH601-0	TLP731	F			
CNY17F-3	TLP734(D4-C173)	A	SFH601-1	TLP731(Y)	F			
CNY17F-4	TLP734(D4-C174)	A	SFH601-2	TLP731(GR)	F			
CNY17GF-1	TLP734F(D4)	F	SFH601-3	TLP731(GR)	F			
CNY17GF-2	TLP734F(D4-C172)	A	SFH601G-1	TLP731(LF2)	F			
CNY17GF-3	TLP734F(D4-C173)	A	SFH601G-2	TLP731(Y-LF2)	F			
CNY17GF-4	TLP734F(D4-C174)	A	SFH601G-3	TLP731(GR-LF2)	F			
H11AA1	TLP630	A	SFH601G-4	TLP731(GR-LF2)	F			
H11C4	TLP541G	A	SFH609-1	—	G			
H11C5	TLP541G	A	SFH609-2	—	G			
H11C6	TLP541G	A	SFH609-3	—	G			
IL1	TLP631	A	SFH610-1	TLP621	F			
IL2	TLP631(GB)	A	SFH610-2	TLP621(Y)	F			
IL5	TLP631	A	SFH610-3	TLP621(GR)	D			
IL8	TLP732(D4-LF2)	E	SFH610-4	TLP621(GR)	D			
IL9	TLP731(D4-LF2)	E	SFH611-1	TLP621	D			
IL10	TOP732(D4-LF2)	E	SFH611-2	TLP621(Y)	D			
IL11	TLP731(D4-LF2)	E	SFH611-3	TLP621(GR)	D			
IL30	TLP571	A	SFH611-4	TLP621(GR)	D			
IL55	TLP571	D	SFH615-1	TLP621	F			
IL101	6N137	B	SFH615-2	TLP621(Y)	F			
IL201	TLP631	F	SFH615-3	TLP621(GR)	F			
IL202	TLP631(GB)	F	SFH615-4	TLP621(GR)	F			
IL203	TLP631(GB)	F						
IL205	TLP181	E						
IL206	TLP181	E						
IL207	TLP181(GB)	E						
IL211	TLP181	E						
IL212	TLP181	E						
IL213	TLP181(GB)	E						
IL215	TLP124	E						
IL216	TLP124	E						
IL217	TLP124	E						
IL221	TLP124	E						
IL222	TLP124(BV)	E						
IL223	TLP127	E						
IL250	TLP630	A						
IL251	TLP630	A						
IL252	TLP630(GB)	A						

MOTOROLA

4N25	4N25(Short)	A
4N25A	4N25A(Short)	A
4N26	4N26(Short)	A
4N27	4N27(Short)	A
4N28	4N28(Short)	A
4N29	4N29(Short)	A
4N29A	4N29A(Short)	A
4N30	4N30(Short)	A
4N31	4N31(Short)	A
4N32	4N32(Short)	A
4N32A	4N32A(Short)	A
4N33	4N33(Short)	A
4N35	4N35(Short)	A
4N36	4N36(Short)	A
4N37	4N37(Short)	A
4N38	4N38(Short)	A
4N38A	4N38A(Short)	A
4N39	TLP541(Short)	B
CNY17-1	CNY17-2	B
CNY17-2	CNY17-2	A
CNY17-3	CNY17-3	A
CNY17-4	CNY17-4	A
H11A1/A2/A3	TLP631	A
H11A4/A5	TLP631	A
H11AA1/2/3	TLP630	A
H11AA4	TLP630(GB)	A
H11B1	TLP571	A
H11B2	TLP571	A
H11B3	TLP571	A
H11C1/C2/C3	TLP541G	A
H11C4/C5/C6	TLP541G	A
H11D1/D2	TLP371	D
H11D3/D4	TLP371	D
H11G1/G2/G3	TLP371	A
H11L1	—	G
H11L2	—	G
IL1	TLP631	A
IL12	TLP631	A
IL74	TLP631	A
MCT2	TLP631	A
MCT2E	TLP631	A
MOC119	TLP570	A
MOC205	TLP181	E

TELEFUNKEN

4N25	4N25(Short)	A
4N26	4N26(Short)	A
4N27	4N27(Short)	A
4N32	4N32(Short)	A
4N33	4N33(Short)	A
4N35	4N35(Short)	A
4N36	4N36(Short)	A
4N37	4N37(Short)	A
4N38A	4N37A(Short)	A
CNR21	—	G
CNY18	—	G
CNY21	TLP732(D4-LF2)	E
CNY64	TLP732(D4-LF2)	E

Type	TOSHIBA Type	Code	Type	TOSHIBA Type	Code	Type	TOSHIBA Type	Code
MOC206	TLP181	E	4N29A	4N29A(Short)	A	GE3010	TLP3021	A
MOC207	TLP181(GB)	E	4N30	4N30(Short)	A	GE3011	TLP3022	A
MOC211	TLP181	E	4N31	4N31(Short)	A	GE3012	TLP3023	A
MOC212	TLP181	E	4N32	4N32(Short)	A	GE3020	TLP3021	A
MOC213	TLP181(GB)	E	4N32A	4N32A(Short)	A	GE3021	TLP3021	A
MOC215	TLP124	E	4N33	4N33(Short)	A	GE3022	TLP3022	A
MOC216	TLP124	E	4N35	4N35(Short)	A	GE3023	TLP3022	A
MOC217	TLP124	E	4N36	4N36(Short)	A	GEPS2001	TLP731	A
MOC221	TLP124	E	4N37	4N37(Short)	A	GFH600-I	TLP731(Y)	F
MOC222	TLP124(BV)	E	4N38	4N38(Short)	A	GFH600-II	TLP731(GR)	F
MOC223	TLP127	E	4N38A	4N38A(Short)	A	GFH600-III	TLP731(GR)	F
MOC601A, B	TLP731	A	4N39	4N541G	A	GFH601-I	TLP731	F
MOC602A, B	TLP731	A	4N40	4N541G	A	GFH601-II	TLP731(Y)	F
MOC603A, B	TLP731	A	H11A1/A2/A3	TLP631	A	GFH601-III	TLP731(GR)	F
MOC604A, B	TLP731(GB)	A	H11A4/A5/A10	TLP631	A	GFH601-IV	TLP731(GR)	F
MOC633A, B	TLP3022	A	H11A520	TLP631	A	QUALITY TECHNOLOGIES		
MOC634A, B	TLP3022	A	H11A550	TLP631	A			
MOC635A, B	TLP3022	A	H11A5100	TLP631(GB)	A	4N25	4N25(Short)	A
MOC640A, B	TLP3042	A	H11AA1/2/3	TLP630	A	4N26	4N26(Short)	A
MOC641A, B	TLP3042	A	H11AA4	TLP630(GB)	A	4N27	4N27(Short)	A
MOC1005	TLP631	A	H11AG1	TLP331	A	4N28	4N28(Short)	A
MOC1006	TLP631	A	H11AG2	TLP331(BV)	A	4N29	4N29(Short)	A
MOC3002	TLP541G	A	H11AG3	TLP331(BV)	B	4N30	4N30(Short)	A
MOC3003	TLP541G	A	H11AV1	TLP733(D4-GB)	B	4N31	4N31(Short)	A
MOC3007	TLP541G	A	H11AV1A	TLP733F(D4-GB)	B	4N32	4N32(Short)	A
MOC3009	TLP3021	A	H11AV2	TLP733(D4-GB)	A	4N33	4N33(Short)	A
MOC3010	TLP3021	A	H11AV2A	TLP733F(D4-GB)	A	4N35	4N35(Short)	A
MOC3011	TLP3022	A	H11AV3	TLP733(D4)	A	4N36	4N36(Short)	A
MOC3012	TLP3023	A	H11AV3A	TLP733F(D4)	A	4N37	4N37(Short)	A
MOC3020	TLP3021	A	H11B1	TLP571	A	6N135	6N135	A
MOC3021	TLP3021	A	H11B2	TLP571	A	6N136	6N136	A
MOC3022	TLP3022	A	H11B3	TLP571	A	6N137	6N137	A
MOC3023	TLP3023	A	H11B255	TLP571	B	6N138	6N138	A
MOC3030	TLP3041	A	H11BX522	TLP571	A	6N139	6N139	A
MOC3031	TLP3041	A	H11C1/C2/C3	TLP541G	A	4N25	4N25(Short)	A
MOC3032	TLP3042	A	H11C4/C5/C6	TLP541G	A	4N26	4N26(Short)	A
MOC3040	TLP3041	A	H11D1/D2	TLP371	D	4N27	4N27(Short)	A
MOC3041	TLP3041	A	H11D3/D4	TLP371	D	4N28	4N28(Short)	A
MOC3060	TLP3061	A	H11F1/F2/F3	—	G	4N29	4N29(Short)	A
MOC3061	TLP3061	A	H11G1/G2/G3	TLP371	A	4N30	4N30(Short)	A
MOC3062	TLP3062	A	H11G45/G46	TLP371	F	4N31	4N31(Short)	A
MOC3063	TLP3063	A	H11J1/J2	TLP3022	A	4N32	4N32(Short)	A
MOC5007	—	G	H11J3/J4/J5	TLP3022	A	4N33	4N33(Short)	A
MOC5008	—	G	H11L1	—	G	4N35	4N35(Short)	A
MOC5009	—	G	H11L2	—	G	4N36	4N36(Short)	A
MOC8020	TLP372	A	H11L3	—	G	4N37	4N37(Short)	A
MOC8021	TLP372	A	H74A1	TLP631	A	6N135	6N135	A
MOC8030	TLP372	A	H74C1	TLP541G	A	6N136	6N136	A
MOC8050	TLP372	A	H74C2	TLP541G	A	6N137	6N137	A
MOC8100	TLP631(GB)	A	CNY17-I	CNY17-2	B	6N138	6N138	A
MOC8111	TLP632	A	CNY17-II	CNY17-2	A	6N139	6N139	A
MOC8112	TLP632	A	CNY17-III	CNY17-3	A	740L6010	—	G
MOC8113	TLP632(GB)	A	CNY17-IV	CNY17-4	A	740L6011	—	G
MOC8204	TLP371	D	CNY30	TLP541G	A	CNY17-1	CNY17-2	B
MOC8205	TLP371	D	CNY31	—	G	CNY17-2	CNY17-2	A
MOC8206	TLP371	D	CNY32	TLP621	F	CNY17-3	CNY17-3	A
GENERAL ELECTRIC			CNY33	TLP631	B	CNY17-4	CNY17-4	A
			CNY34	TLP541G	A	CNY17-1Z	TLP733(D4)	F
4N25	4N25(Short)	A	CNY35	TLP630	A	CNY17-2Z	TLP733(D4-C172)	A
4N25A	4N25A(Short)	A	CNY47	TLP631	F	CNY17-3Z	TLP733(D4-C173)	A
4N26	4N26(Short)	A	CNY47A	TLP631	A	CNY17-4Z	TLP733(D4-C174)	A
4N27	4N27(Short)	A	CNY48	TLP571	A	CNX35	TLP631	F
4N28	4N28(Short)	A	CNY51	TLP731(GB)	A	CNX36	TLP631(GB)	A
4N29	4N29(Short)	A	CQY80	TLP631	A	H11A1/1Z	TLP731	A
			GE3009	TLP3021	A			

Type	TOSHIBA Type	Code	Type	TOSHIBA Type	Code	Type	TOSHIBA Type	Code
H11AA1/2/3	TLP630	A	MCT276	TLP631	F	6N138	6N138	A
H11AA4	TLP630(GB)	A	MCT277	TLP631(GB)	A	6N139	6N139	A
H11D1	TLP371	D	MCT2200/OZ	TLP731/(D4)	A	CNY17/I	CNY17-2	B
H11D2	TLP371	D	MCT2201/1Z	TLP731/(D4)	B	CNY17/II	CNY17-2	A
H11D3	TLP371	D	MCT2202/2Z	TLP731/(D4)	F	CNY17/III	CNY17-3	A
H11G1/G2/G3	TLP371	A	MCT5200	TLP631/(GB)	F	CNY17/IV	CNY17-4	A
HCPL2502	TLP751	F	MCT5201	TLP631(GB)	F	OPI2100	TLP631(GB)	A
HCPL2503	TLP751	F	MCT5210	TLP331	A	OPI2150	TLP631	A
HCPL2530	TLP2530	A	MCT5211	TLP331(BV)	A	OPI2151	TLP631	A
HCPL2531	TLP2531	A	MID400	—	G	OPI2152	TLP631	A
HCPL2601	TLP2601	A	GIC5102	TLP521-1	A	OPI2153	TLP631	A
HCPL2630	TLP2630	A	GIC5102-2	TLP521-2	A	OPI2154	TLP631(GB)	A
HCPL2631	TLP2631	A	GIC5102-3	TLP521-3	A	OPI2155	TLP631(GB)	A
MCA11G1/G2/G3	TLP371	A	GIC5102-4	TLP521-4	A	OPI2156	TLP631(GB)	A
MCA230	TLP571	A	HEWLETT PACKARD			OPI2250	TLP631	A
MCA231	TLP571	A	6N135	6N135	A	OPI2251	TLP631	A
MCA255	TLP571	B	6N136	6N136	A	OPI2252	TLP631	A
MCA2230/Z	TLP371	B	6N137	6N137	A	OPI2254	TLP631(GB)	A
MCA2231/Z	TLP371	B	6N138	6N138	A	OPI2255	TLP631(GB)	A
MCA2255/Z	TLP371	B	6N139	6N139	A	OPI2500	TLP630	A
MCL2501	TLP559	F	HCPL-0500	TLP112A	E	OPI2501	TLP630	A
MCL2502	TLP559	F	HCPL-0501	TLP112A	E	OPI3009	TLP3021	A
MCL2503	TLP559	F	HCPL-0452	TLP112A	E	OPI3010	TLP3021	A
MCL2530	TLP2530	A	HCPL-0453	TLP114A	E	OPI3011	TLP3022	A
MCL2531	TLP2531	A	HCPL-0600	TLP113	E	OPI3012	TLP3023	A
MCL2601	TLP2601	A	HCPL-0601	TLP115A	E	OPI3020	TLP3021	A
MCL2630	TLP2630	A	HCPL-0611	TLP115A	E	OPI3021	TLP3021	A
MCP3009	TLP3021	A	HCPL-2200	TLP2200	A	OPI3022	TLP3022	A
MCP3010	TLP3021	A	HCPL-2300	—	G	OPI3023	TLP3023	A
MCP3011	TLP3022	A	HCPL-2400	—	G	OPI3024	TLP3023	A
MCP3011A	TLP3022	A	HCPL-2502	TLP551	F	OPI3030	TLP3041	B
MCP3012	TLP3023	A	HCPL-2503	TLP551	F	OPI3031	TLP3041	A
MCP3020/OZ	TLP3021/(D4)	A	HCPL-2530	TLP2530	A	OPI3032	TLP3042	A
MCP3021/1Z	TLP3021/(D4)	A	HCPL-2531	TLP2531	A	OPI3033	TLP3043	A
MCP3022/2Z	TLP3022/(D4)	A	HCPL-2601	TLP2601	A	OPI3040	TLP3041	B
MCP3022A	TLP3022	A	HCPL-2630	TLP2630	A	OPI3041	TLP3041	A
MCP3023	TLP3023	A	HCPL-2631	TLP2631	A	OPI3042	TLP3042	A
MCP3030	TLP3041	A	HCPL-4502	TLP550	F	OPI3043	TLP3043	A
MCP3031	TLP3041	A	HCPL-4503	TLP759(IGM)	B	OPI3150	TLP571	A
MCP3032	TLP3042	A	SL5505	—	G	OPI3151	TLP571	A
MCP3033	TLP3043	A	TRW-OPTRON			OPI3152	TLP571	F
MCP3040/OZ	TLP3041/(D4)	A	4N25	4N25(Short)	A	OPI3153	TLP571	A
MCP3041/1Z	TLP3041/(D4)	A	4N26	4N26(Short)	A	OPI3250	TLP571	A
MCP3042	TLP3042	A	4N27	4N27(Short)	A	OPI3251	TLP571	A
MCP3043	TLP3043	A	4N28	4N28(Short)	A	OPI3252	TLP571	F
MCS2	TLP541G	A	4N29	4N29(Short)	A	OPI3253	TLP571	A
MCS21	TLP541G	A	4N30	4N30(Short)	A	OPI6000	—	G
MCS2400	TLP541G	A	4N31	4N31(Short)	A	OPI6100	—	G
MCS2401	TLP541G	A	4N32	4N32(Short)	A	OPI8012	—	G
MCT2	TLP631	A	4N33	4N33(Short)	A	OPI8013	—	G
MCT2E	TLP631	A	4N35	4N35(Short)	A	OPI8014	—	G
MCT4	—	G	4N36	4N36(Short)	A	OPI8015	—	G
MCT4R	—	G	4N37	4N37(Short)	A	TEXAS INSTRUMENTS		
MCT6	TLP504A	A	4N38	4N38(Short)	A	4N25	4N25(Short)	A
MCT26	TLP631	A	4N38A	4N38A(Short)	A	4N26	4N26(Short)	A
MCT61	TLP504A	A	4N45	—	G	4N27	4N27(Short)	A
MCT62	TLP504A(GB)	A	4N46	—	G	4N28	4N28(Short)	A
MCT66	TLP504A	A	6N135	6N135	A	4N35	4N35(Short)	A
MCT210	TLP631(BL)	F	6N136	6N136	A	4N25	4N25(Short)	A
MCT270	TLP631	A	6N137	6N137	A	4N26	4N26(Short)	A
MCT271	TLP631	F				4N27	4N27(Short)	A
MCT272	TLP631(GR)	F				4N28	4N28(Short)	A
MCT273	TLP631(GR)	F				4N35	4N35(Short)	A
MCT274	TLP631(BL)	F				4N36	4N36(Short)	A
MCT275	TLP631(GR)	F						

Type	TOSHIBA Type	Code
4N37	4N37(Short)	A
MCT2	TLP631	A
MCT2E	TLP631	A
TIL102	—	G
TIL103	—	G
TIL107	—	G
TIL108	—	G
TIL111	TLP631	A
TIL112	TLP631	A
TIL113	TLP631	A
TIL114	TLP631	A
TIL115	TLP631	A
TIL116	TLP631	A
TIL117	TLP631	A
TIL118	TLP632	A
TIL119	TLP570	A
TIL119A	TLP570	A
TIL120	—	G
TIL121	—	G
TIL124	TLP631	A
TIL125	TLP631	A
TIL126	TLP631	A
TIL127	TLP371	B
TIL128	TLP372	B
TIL128A	TLP372	B
TIL153	TLP631	A
TIL154	TLP631	A
TIL155	TLP631	A
TIL156	TLP371	B
TIL157	TLP372	B
TIL157A	TLP372	B

Type	TOSHIBA Type	Code
PC815	TLP523	B
PC816	TLP321	A
PC817	TLP621	A
PC818	TLP621	B
PC818I	TLP621(LF1)	A
PC823	TLP626-2	A
PC824	TLP620-2	A
PC825	TLP523-2	B
PC826	TLP321-2	A
PC827	TLP621-2	A
PC829	TLP504A	B
PC835	TLP523-3	B
PC837	TLP621-3	A
PC843	TLP626-4	A
PC844	TLP620-4	A
PC845	TLP523-4	B
PC846	TLP321-4	A
PC847	TLP621-4	A
PC849	TLP504A-2	B
PC910	6N137	A
S11MD3	TLP560G	A
S11MD3H	TLP560J	A
S12MD1	TLP541G	A
S12MD2	—	G
S12MD22	—	G
S12MD3	TLP3022	A
S13MD1	TLP541G	A
S13MD3	TLP3022	A
S21MD3	TLP560J	A
S21MD4	TLP561J	A
S22MD1	TLP545J	A
S22MD3	TLP3062	A

AROMAT (NAIS)

Type	TOSHIBA Type	Code
AQV210S	TLP197G	A
AQY210S	TLP176G	A
AQW210S	TLP206G	A
AQV210	TLP597G/TLP599G	A
AQY210E	TLP227G	A
AQY210L	TLP224G	A
AQW210	TLP227G-2	A
AQV214	TLP596G	A
AQV214S	TLP197G	B
AQW214	TLP296G	A
AQW214S	TLP206G	B
AQS210PS	TLP270G	C
AQY225NS	TLP3110/3111	B

CP CLARE

Type	TOSHIBA Type	Code
PLA110	TLP598G	A
LCA110	TLP597G	A
LCA110L	TLP594G	B
XCA170	TLP597G	A
LAA110	TLP227G-2	A
ITC117P	TLP270G	C
ITC135P	TLP270G	C
ITC137P	TLP270G	C

SHARP

PC4N25	4N25(Short)	A
PC4N26	4N26(Short)	A
PC4N27	4N27(Short)	A
PC4N28	4N28(Short)	A
PC4N29	4N29(Short)	A
PC4N30	4N30(Short)	A
PC4N32	4N32(Short)	A
PC4N33	4N33(Short)	A
PC4N35	4N35(Short)	A
PC4N36	4N36(Short)	A
PC4N37	4N37(Short)	A
PC110	TLP733F(D4)	A
PC111	TLP734F(D4)	A
PC354	TLP180	A
PC355	TLP127	A
PC356	TLP124	A
PC357	TLP181	A
PC702	TLP631	A
PC703	TLP631	A
PC713	TLP631	A
PC714	TLP632	A
PC715	TLP570	B
PC716	TLP570	B
PC723	TLP531	A
PC725	TLP371	A
PC733	TLP630	A
PC733H	TLP330	A
PC810	TLP621	A
PC812	TLP621	B
PC813	TLP626	A
PC814	TLP620	A

NEC

PS2006B	TLP551	A
PS2007B	TLP552	A
PS5016B	TLP550	A
PS2401-1	TLP621	A
PS2403-1	TLP624	A
PS2501-1	TLP621	A
PS2501-2	TLP621-2	A
PS2501-3	TLP621-3	A
PS2501-4	TLP621-4	A
PS2701-1	TLP181	A
PS2801-4	TLP281-4	A
PS2805-4	TLP280-4	A
PS7112-1A	TLP599B	A
PS7112L-1A	TLP599B(LF1)	A
PS7141-1A	TLP598G/599G	A
PS7141L-1A	TLP598G(LF1)/ TLP599G(LF1)	A
PS7141-2A	TLP296G,227G-2	B
PS7141L-2A	TLP296G(LF1)/ TLP227G-2(LF1)	B
PS7142-1A	TLP598G/597G	B
PS7142L-1A	TLP598G(LF1)	B
PS7200A-1A	TLP3111	B
PS7200B-1A	TLP3110/3113	B
PS7341-1A	TLP798G	B
PS7341L-1A	TLP798G(LF1)	B

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