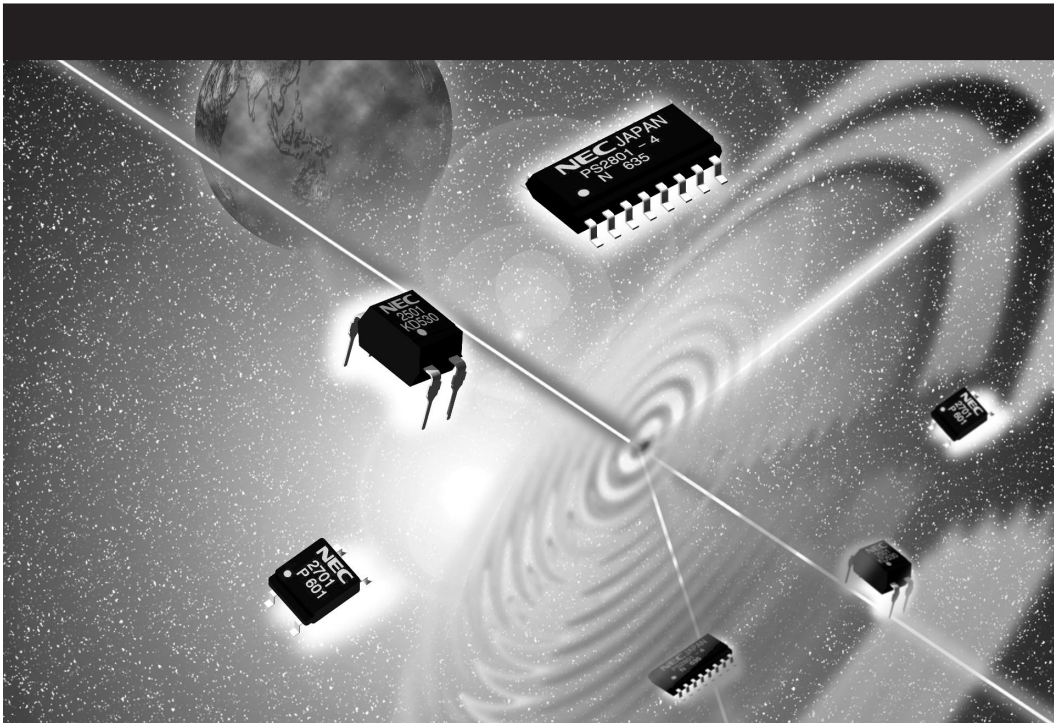


NEPOC™ SERIES PHOTOCOUPLER SELECTION GUIDE



[MEMO]

CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.

NEPOC is a trademark of NEC Corporation.

- **The information in this document is current as of August, 2000. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
 - No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
 - NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.
 - Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
 - While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
 - NEC semiconductor products are classified into the following three quality grades:
"Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product before using it in a particular application.
"Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
"Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
"Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.
- The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.
- (Note)
- (1) "NEC" as used in this statement means NEC Corporation and also includes its majority-owned subsidiaries.
 - (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8E 00.4

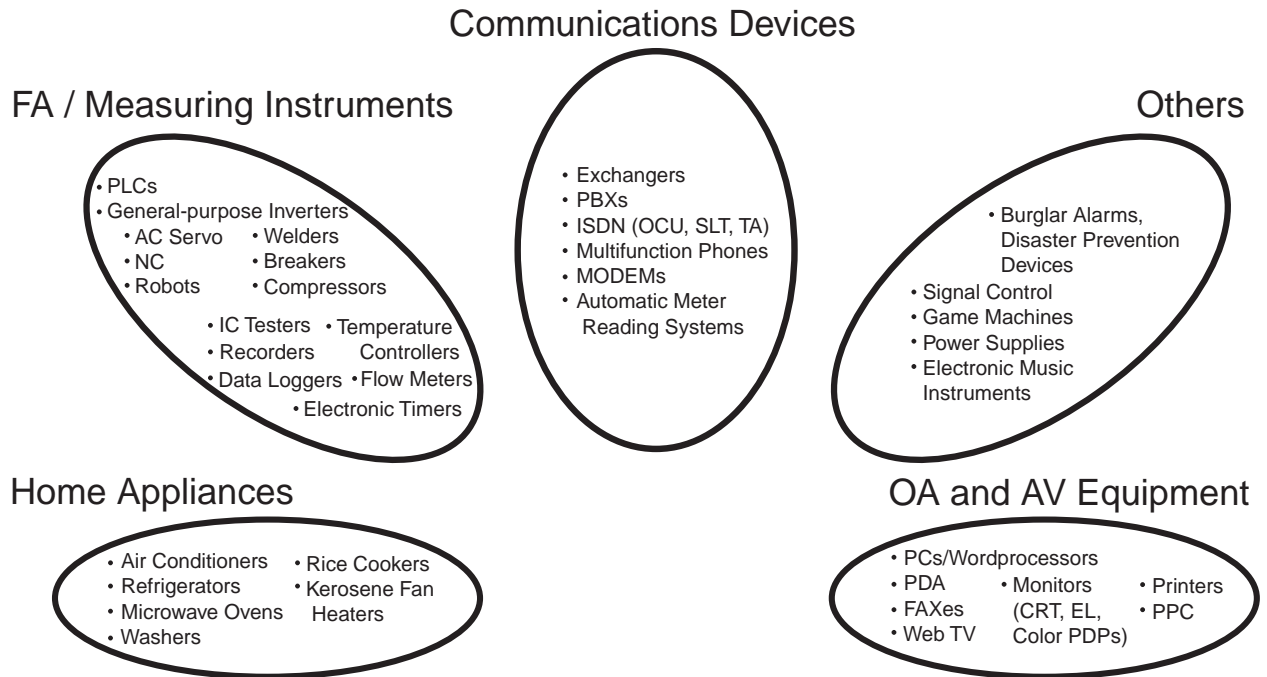
[MEMO]

CONTENTS

1.	PHOTOCOUPLER APPLICATION FIELDS.....	7
2.	APPLICATION EXAMPLES	7
2.1	PROGRAMMABLE LOGIC CONTROLLER APPLICATION OF PHOTOCOUPLER.....	7
2.2	SWITCHING POWER SUPPLIES APPLICATION OF PHOTOCOUPLER.....	8
2.3	APPLICATION FOR COLOR PDP DRIVING CIRCUIT.....	8
2.4	PS9613 FOR IPM DRIVE APPLICATION.....	9
2.5	GENERAL-PURPOSE INVERTER/AC SERVO CIRCUIT.....	9
2.6	MODEM, FAX, WEB TV.....	10
3.	NUMBERING SYSTEM.....	11
4.	MAIN PRODUCT CLASSIFICATION CHART.....	12
5.	CONSTRUCTION AND CONFIGURATION.....	13
5.1	CONSTRUCTION.....	13
5.2	CONFIGURATION.....	14
6.	CLASSIFICATION CHART (BY FUNCTION)	15
6.1	Tr. OUTPUT TYPE · STANDARD TYPE (SINGLE Tr.).....	15
6.2	Tr. OUTPUT TYPE · STANDARD TYPE (DARLINGTON Tr.).....	16
6.3	Tr. OUTPUT TYPE · AC INPUT TYPE (SINGLE Tr.).....	17
6.4	Tr. OUTPUT TYPE · AC INPUT TYPE (DARLINGTON Tr.).....	18
6.5	Tr. OUTPUT TYPE · LOW INPUT CURRENT TYPE (SINGLE Tr.).....	19
6.6	Tr. OUTPUT TYPE · HIGH COLLECTOR TO EMITTER VOLTAGE TYPE.....	20
6.7	Tr. OUTPUT TYPE · LARGE INPUT CURRENT TYPE (DC INPUT/SINGLE Tr.).....	22
6.8	Tr. OUTPUT TYPE · LARGE INPUT CURRENT TYPE (AC INPUT/SINGLE Tr.).....	22
6.9	Tr. OUTPUT TYPE · SAFETY STANDARD TYPE (SINGLE Tr./DARLINGTON Tr.).....	23
6.10	IC OUTPUT TYPE · HIGH-SPEED TYPE (ANALOG OUTPUT).....	25
6.11	IC OUTPUT TYPE · HIGH-SPEED TYPE (DIGITAL OUTPUT).....	26
6.12	IC OUTPUT TYPE · MOTOR CONTROL (INVERTER).....	27
6.13	DIODE OUTPUT TYPE · HIGH LINEARITY	27
7.	PACKAGE DIMENSIONS.....	28
7.1	STANDARD (DIP).....	28
7.2	STANDARD (SOP).....	31
7.3	STANDARD (SMALL SOP).....	32
7.4	LEAD BENDING TYPE FOR LONG CREEPAGE ¹ (DIP).....	33
8.	CTR RANK.....	36
8.1	Tr. OUTPUT TYPE · STANDARD TYPE (SINGLE Tr.).....	36
8.2	Tr. OUTPUT TYPE · STANDARD TYPE (DARLINGTON Tr.).....	38
8.3	Tr. OUTPUT TYPE · AC INPUT TYPE (SINGLE Tr.).....	39
8.4	Tr. OUTPUT TYPE · AC INPUT TYPE (DARLINGTON Tr.).....	40
8.5	Tr. OUTPUT TYPE · LOW INPUT CURRENT TYPE (SINGLE Tr.).....	41

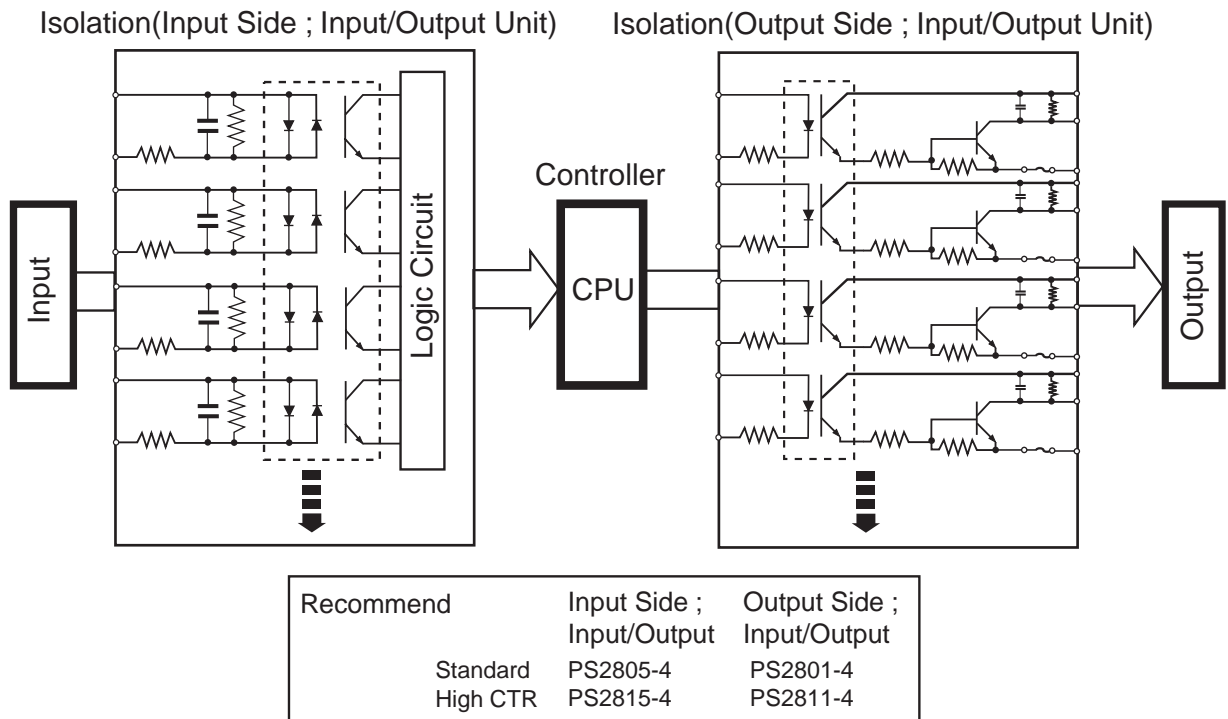
8.6	Tr. OUTPUT TYPE · HIGH COLLECTOR TO EMITTER VOLTAGE TYPE	42
8.7	Tr. OUTPUT TYPE · LARGE INPUT CURRENT TYPE (DC INPUT/SINGLE Tr.)	43
8.8	Tr. OUTPUT TYPE · LARGE INPUT CURRENT TYPE (AC INPUT/SINGLE Tr.)	43
8.9	Tr. OUTPUT TYPE · SAFETY STANDARD TYPE (SINGLE Tr./DARLINGTON Tr.)	44
8.10	IC OUTPUT TYPE · HIGH-SPEED TYPE (ANALOG OUTPUT).....	46
8.11	IC OUTPUT TYPE · HIGH-SPEED TYPE (DIGITAL OUTPUT).....	47
8.12	IC OUTPUT TYPE · MOTOR CONTROL (INVERTER)	48
	8.12.1 IPM DRIVER TYPE.....	48
	8.12.2 HIGH-POWER TYPE.....	48
8.13	DIODE OUTPUT TYPE · HIGH LINEARITY.....	49
9.	SAFETY STANDARDS.....	50
	9.1 SAFETY STANDARD APPROVAL LIST (AS OF AUGUST 2000).....	50
	9.2 LIST OF CONSTRUCTIONAL PARAMETERS.....	54
	9.3 CONSTRUCTION	56
	9.4 LIST OF PRODUCT NAME DURING APPLICATION FOR SAFETY STANDARD	56
10.	OUTLINE DRAWING.....	57
	10.1 MAGAZINE CASE	57
	10.1.1 DIP.....	57
	10.1.2 LEAD BENDING TYPE FOR SURFACE MOUNT.....	57
	10.1.3 SOP	58
	10.1.4 BOX.....	59
	10.2 TAPING SPECIFICATIONS	60
	10.2.1 4-PIN DIP (LEAD BENDING TYPE FOR SURFACE MOUNT).....	60
	10.2.2 6, 8-PIN DIP (LEAD BENDING TYPE FOR SURFACE MOUNT).....	62
	10.2.3 4-PIN SOP (LEAD PIN PITCH: 2.54 mm).....	63
	10.2.4 SMALL SOP (LEAD PIN PITCH: 1.27 mm).....	64
	10.2.5 OUTLINE DRAWING.....	66
11.	MARKING EXAMPLE	67
12.	MOUNTING ON PRINTED WIRING BOARD.....	70
	12.1 BOARD LAYOUT	70
13.	CAUTIONS.....	71
	13.1 SOLDERING PRECAUTIONS.....	71
	13.2 CAUTIONS REGARDING NOISE	71
14.	FAILURE RATE	72
	14.1 CONCEPT OF FAILURE RATE	72
	14.2 CALCULATING THE FAILURE RATE.....	73
15.	WEB SITE INFORMATION.....	75

1. PHOTOCOUPLER APPLICATION FIELDS

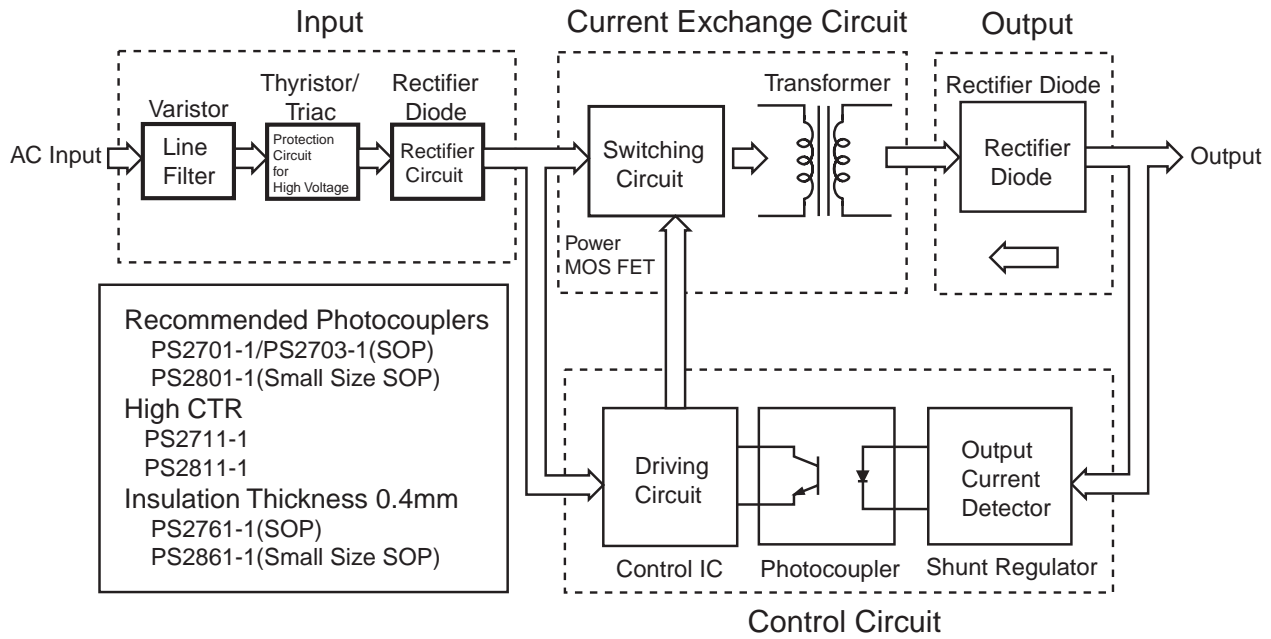


2. APPLICATION EXAMPLES

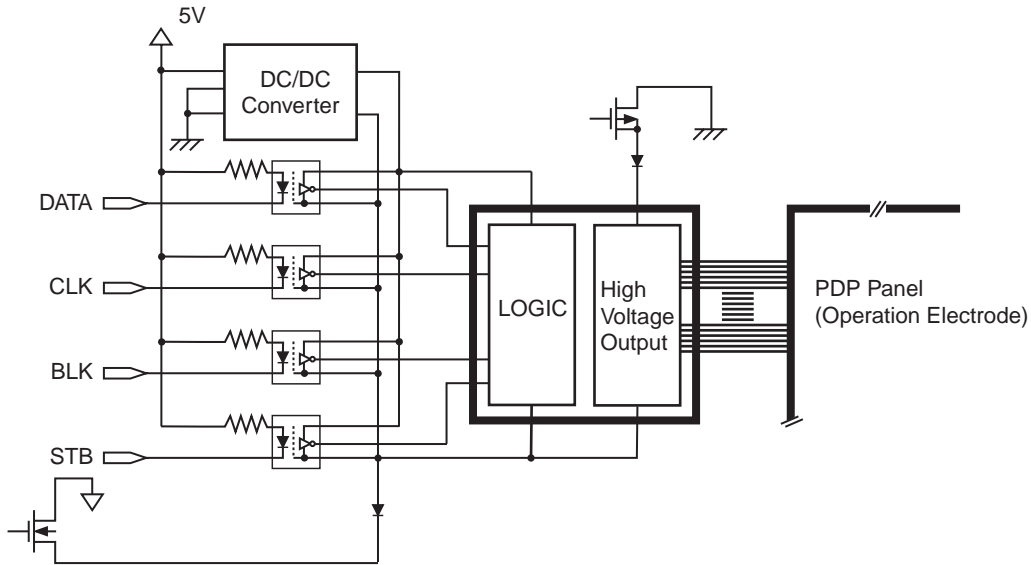
2.1 PROGRAMMABLE LOGIC CONTROLLER APPLICATION OF PHOTOCOUPLER



2.2 SWITCHING POWER SUPPLIES APPLICATION OF PHOTOCOUPLER



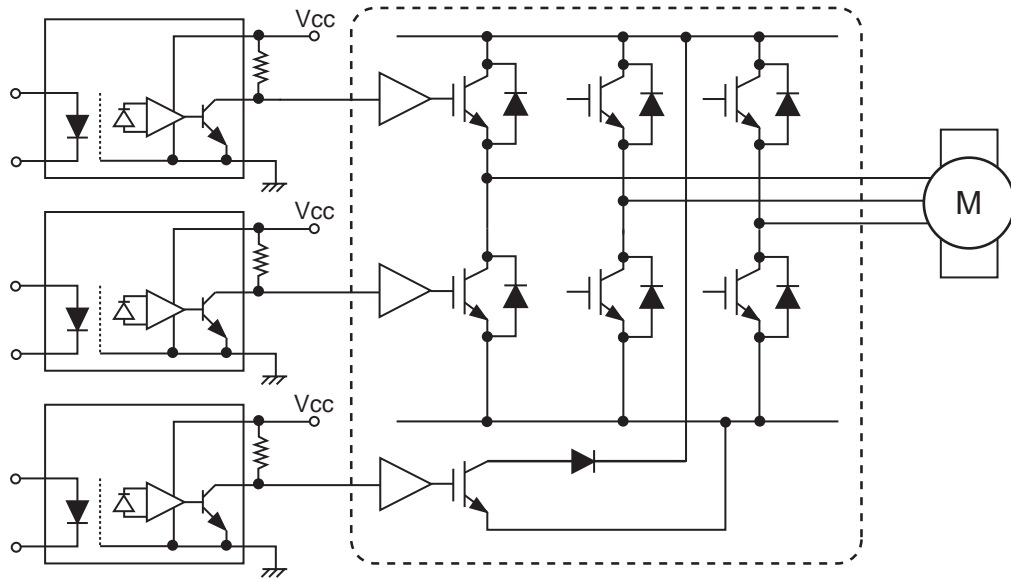
2.3 APPLICATION FOR COLOR PDP DRIVING CIRCUIT



Recommended Devices (Under Development)

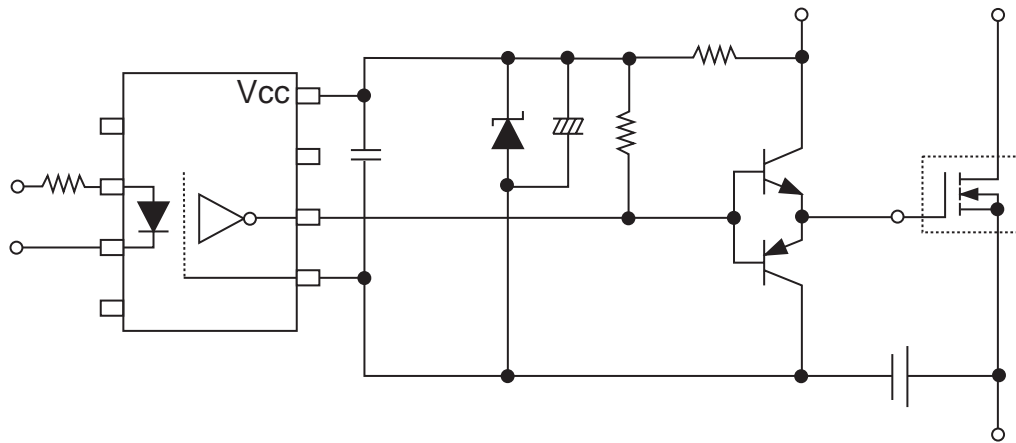
Function	Recommend	Features
Horizontal Signal Controller	PS9714 (5-pin SOP)	High Speed 10Mbps
	PS9715 (5-pin SOP)	High CMR 10kV/ μ s

2.4 PS9613 FOR IPM DRIVE APPLICATION



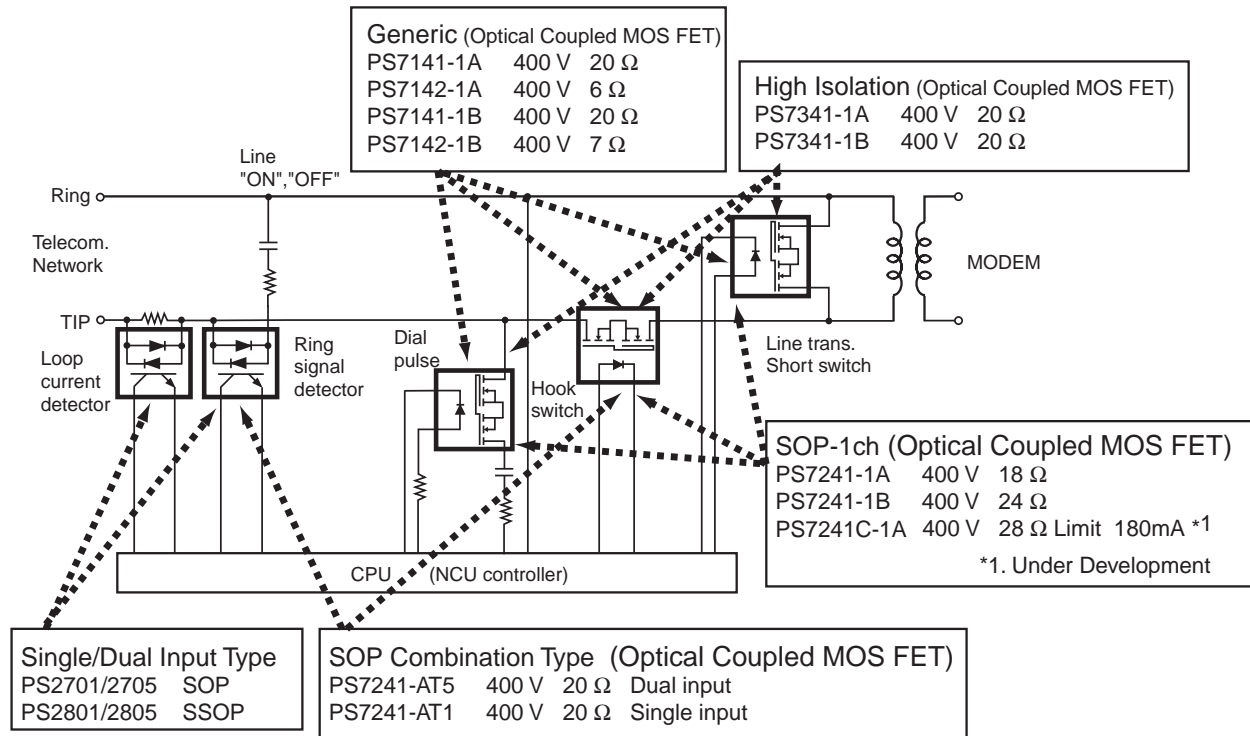
2.5 GENERAL-PURPOSE INVERTER/AC SERVO CIRCUIT

High-speed Switching Power MOS Gate Driving Circuit

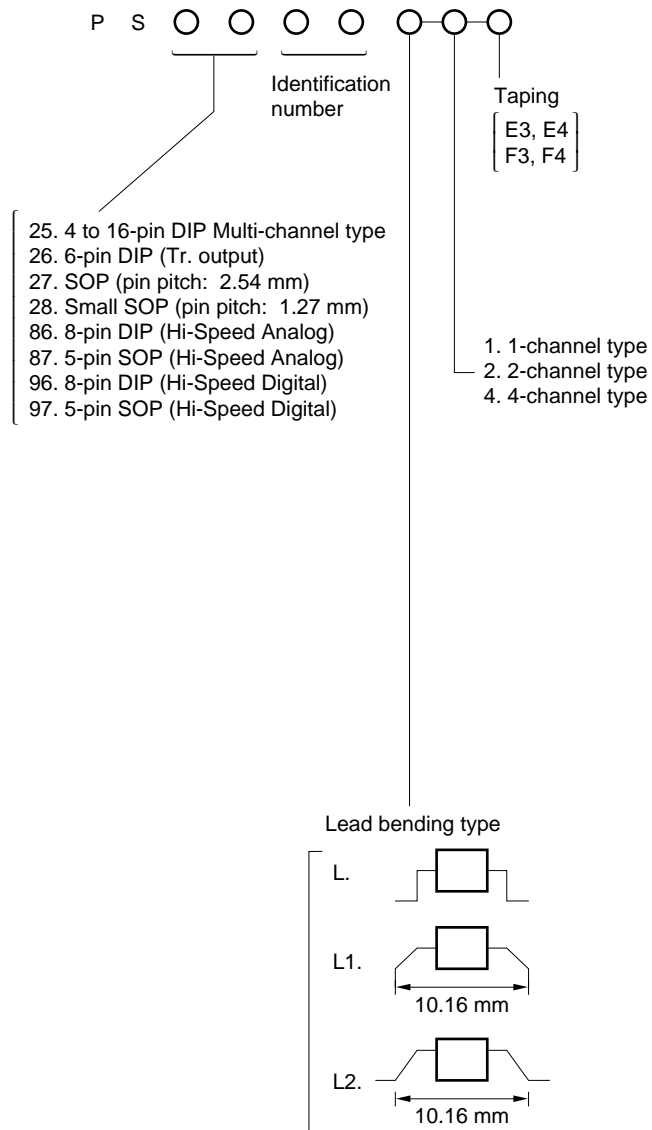


Application Circuit	Recommend
IPM	PS9613/PS9713
MOS Gate Driver	PS9614 *1/PS9714 *1
	PS9715 *1
	*1. Under Development

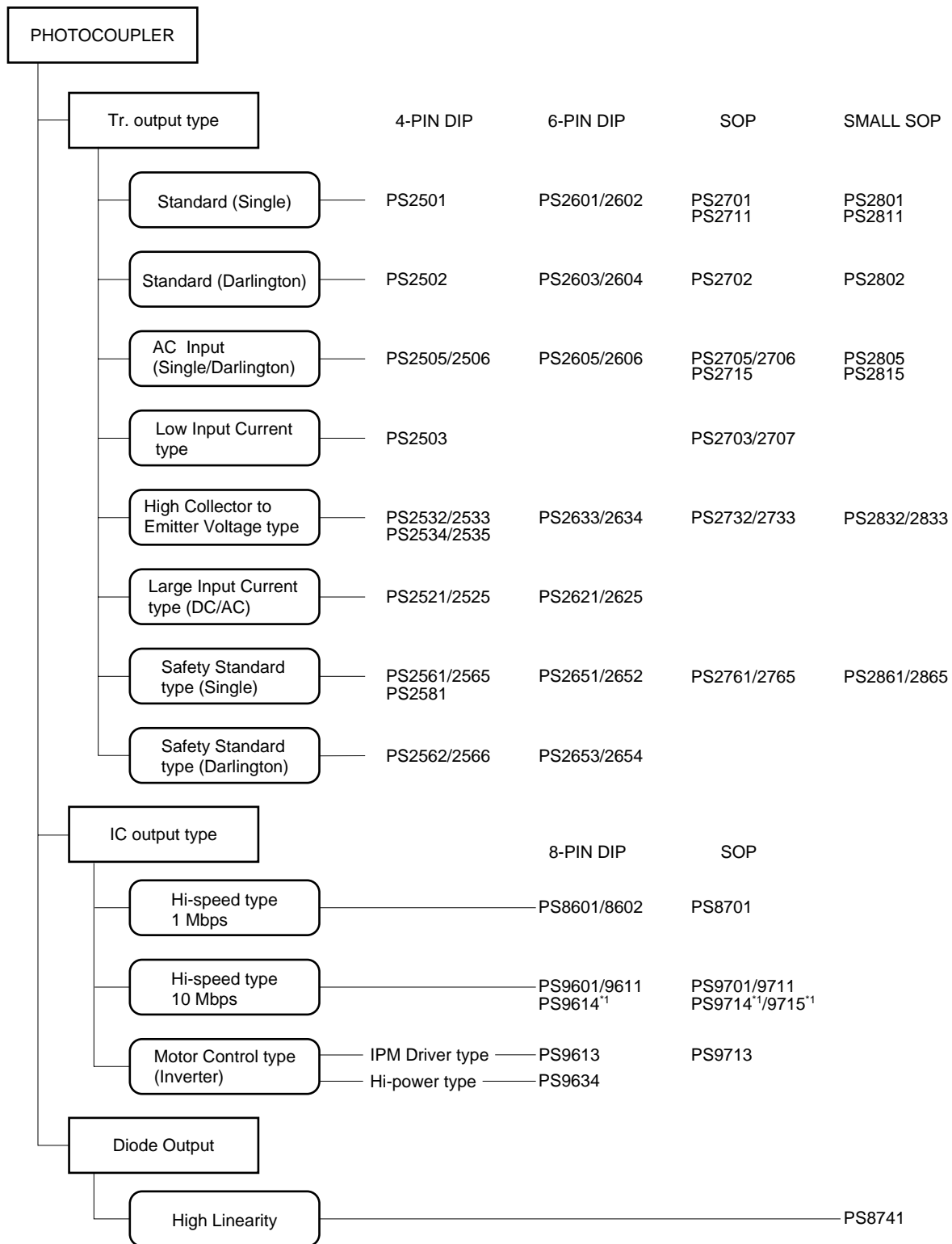
2.6 MODEM, FAX, WEB TV



3. NUMBERING SYSTEM



4. MAIN PRODUCT CLASSIFICATION CHART



*1 Under development

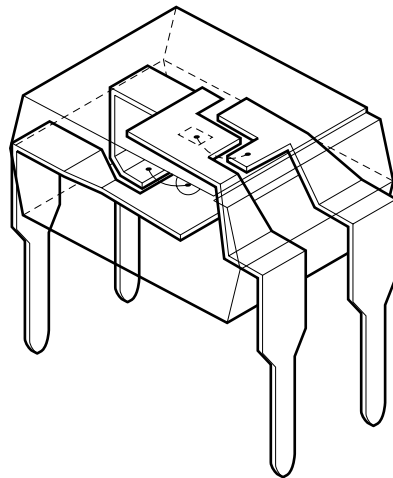
5. CONSTRUCTION AND CONFIGURATION

5.1 CONSTRUCTION

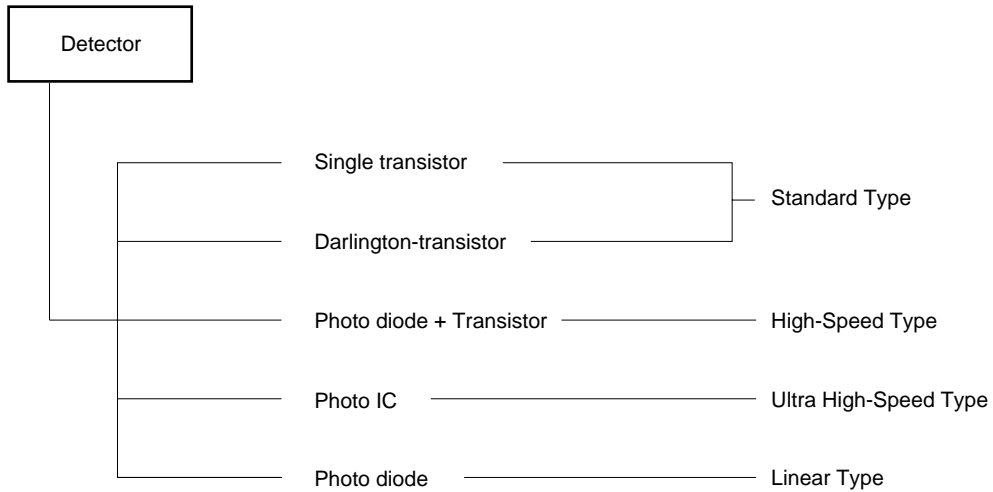
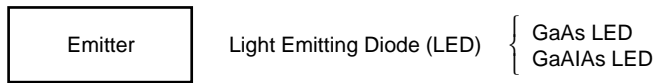
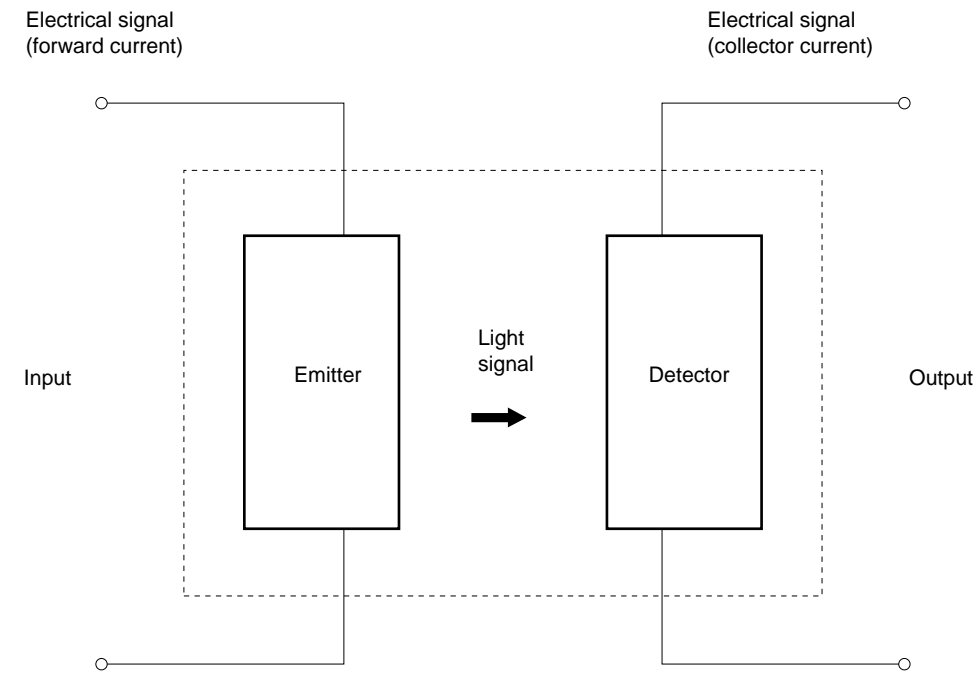
Figure 5-1 shows the internal perspective view of PS25xx photocoupler. A light-emitting diode (LED) is placed opposite a photo-sensitive element (phototransistor or photo Darlington transistor, etc.) with a light-transmittable epoxy resin medium between them. Light signals emitted by the LED are transferred to the photosensitive element via the internal resin medium. To completely cut the effect of external light, black resin is used for the external resin.

Using the above construction, close contact between the inner and outer resins is obtained through the long adjacent area of the inner and outer resins and their identical expansion coefficient. As a result, photocouplers with excellent isolation, withstand voltage, and heat resistance characteristics are realized.

Figure 5-1. Internal Perspective View of PS25xx-1



5.2 CONFIGURATION



6. CLASSIFICATION CHART (BY FUNCTION)

6.1 Tr. OUTPUT TYPE - STANDARD TYPE (SINGLE Tr.)

(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2501-1 PS2501L-1		High isolation voltage High V _{CEO} UL approved	5	80	80	50	80 to 600	3, 5 (R _L = 100 Ω)
PS2501-2 PS2501L-2								
PS2501-4 PS2501L-4								
PS2601 PS2601L		High isolation voltage High V _{CEO} (80 V) UL approved						
PS2602 PS2602L								

(2) SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2701-1		UL, VDE (Option), BSI approved	3.75	50	40	80	50 to 300	3, 5 (R _L = 100 Ω)
PS2711-1		High CTR UL approved				40		

(3) Small SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2801-1		Pin pitch: 1.27 mm UL, VDE (Option), BSI approved	2.5	50	80	50	80 to 600	3, 5 (R _L = 100 Ω)
PS2801-4						40		
PS2811-1		Pin pitch: 1.27 mm High CTR UL approved				40	100 to 400 (I _F = 1 mA)	4, 5 (R _L = 100 Ω)
PS2811-4								

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.2 Tr. OUTPUT TYPE - STANDARD TYPE (DARLINGTON Tr.)

(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ¹ (%)	t _r , t _f (μs) TYP.
PS2502-1 PS2502L-1		High isolation voltage High CTR UL approved	5	80	40	200	200 or above (I _F = 1 mA)	100, 100 (R _L = 100 Ω)
PS2502-2 PS2502L-2						160		
PS2502-4 PS2502L-4						200		
PS2603 PS2603L		High isolation voltage High CTR UL approved						
PS2604 PS2604L								

(2) SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ¹ (%)	t _r , t _f (μs) TYP.
PS2702-1		High CTR UL, VDE (Option), BSI approved	3.75	50	40	200	200 or above (I _F = 1 mA)	200, 200 (R _L = 100 Ω)

(3) Small SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ¹ (%)	t _r , t _f (μs) TYP.
PS2802-1		Pin pitch: 1.27 mm UL, VDE (Option), BSI approved	2.5	50	40	90	200 or above (I _F = 1 mA)	200, 200 (R _L = 100 Ω)
PS2802-4						100		

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.3 Tr. OUTPUT TYPE - AC INPUT TYPE (SINGLE Tr.)

(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2505-1 PS2505L-1		High isolation voltage AC input	5	±80	80	50	80 to 600	3, 5 (R _L = 100 Ω)
PS2505-2 PS2505L-2		High V _{CEO} UL approved						
PS2505-4 PS2505L-4								
PS2605 PS2605L		High isolation voltage AC input						
PS2606 PS2606L		High V _{CEO} (80 V)						
		UL approved						

(2) SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2705-1		AC input UL, VDE (Option), BSI approved	3.75	±50	40	80	50 to 300	3, 5 (R _L = 100 Ω)
PS2715-1		High CTR UL approved					40	100 to 400 (I _F = ±1 mA)

(3) Small SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2805-1		Pin pitch: 1.27 mm AC input	2.5	±50	80	50	80 to 600	3, 5 (R _L = 100 Ω)
PS2805-4		UL, VDE (Option), BSI approved						
PS2815-1		Pin pitch: 1.27 mm AC input						
PS2815-4		High CTR UL approved						
					40	40	100 to 400 (I _F = ±1 mA)	4, 5 (R _L = 100 Ω)

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified

- Remarks**
- Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 - Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.4 Tr. OUTPUT TYPE - AC INPUT TYPE (DARLINGTON Tr.)

(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ¹ (%)	t _r , t _f (μs) TYP.
PS2506-1 PS2506L-1		High isolation voltage AC input	5	±80	40	200	200 or above (I _F = ±1 mA)	100, 100 (R _L = 100 Ω)
PS2506-2 PS2506L-2		High CTR UL approved				160		
PS2506-4 PS2506L-4								
PS2607 PS2607L		High isolation voltage AC input				200		
PS2608 PS2608L		High CTR UL approved						

(2) SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ¹ (%)	t _r , t _f (μs) TYP.
PS2706-1		High CTR AC input UL, VDE (Option), BSI approved	3.75	±50	40	200	200 or above (I _F = ±1 mA)	200, 200 (R _L = 100 Ω)

(3) Small SOP



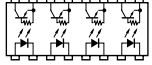
PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ¹ (%)	t _r , t _f (μs) TYP.
PS2806-1		Pin pitch: 1.27 mm AC input	2.5	±50	40	90	200 or above (I _F = ±1 mA)	200, 200 (R _L = 100 Ω)
PS2806-4		UL, VDE (Option), BSI approved				100		

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified



- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.5 Tr. OUTPUT TYPE - LOW INPUT CURRENT TYPE (SINGLE Tr.)

(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2503-1 PS2503L-1		High isolation voltage Hi-Speed UL, CSA approved	5	80	40	30	100 to 400 (I _F = 1 mA)	20, 30 (R _L = 10 kΩ)
PS2503-2 PS2503L-2								
PS2503-4 PS2503L-4								

(2) SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2703-1		High V _{CEO} (120 V) UL, VDE (Option), BSI approved	3.75	50	120	30	50 to 400	10, 10 (R _L = 1 kΩ)
PS2707-1		AC input High V _{CEO} (120 V) UL, VDE (Option), BSI approved		±50				

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.6 Tr. OUTPUT TYPE - HIGH COLLECTOR TO EMITTER VOLTAGE TYPE



(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS				
			BV (kVr.m.s.)	I _F (mA)	V _{CE0} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.			
PS2532-1 PS2532L-1		High isolation voltage High V _{CE0} (300 V) Darlington Tr.	5	80	300	150	1500 to 6500 (I _F = 1 mA)	100, 100 (R _L = 100 Ω)			
PS2532-2 PS2532L-2		UL, VDE (Option), CSA, BSI (Insulation supplementary), SEMKO, FIMKO, NEMKO, DEMKO approved									
PS2532-4 PS2532L-4											
PS2533-1 PS2533L-1		High isolation voltage High V _{CE0} (350 V) Darlington Tr.			350						
PS2533-2 PS2533L-2		UL, VDE (Option), CSA, BSI (Insulation supplementary), SEMKO, FIMKO, NEMKO, DEMKO approved									
PS2533-4 PS2533L-4											
PS2534-1 PS2534L-1		High isolation voltage High V _{CE0} (300 V)			50				300	100	400 to 5500 (I _F = 1 mA)
PS2534-2 PS2534L-2		High CTR Darlington Tr. UL, BSI (Insulation supplementary) approved									
PS2534-4 PS2534L-4											
PS2535-1 PS2535L-1		High isolation voltage High V _{CE0} (350 V)	350								
PS2535-2 PS2535L-2		High CTR Darlington Tr. UL, BSI (Insulation supplementary) approved									
PS2535-4 PS2535L-4											
PS2633 PS2633L		High isolation voltage High V _{CE0} (300 V)	80	300	150	1000 to 15000 (I _F = 1 mA)					
PS2634 PS2634L		High CTR Darlington Tr. UL approved									


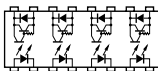

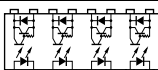
*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

(2) SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _C (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2732-1		High isolation voltage High V _{CEO} (300 V) Darlington Tr. UL, VDE (Option), BSI approved	2.5	50	300	150	1500 or above (I _F = 1 mA)	100, 100 (R _L = 100 Ω)
PS2733-1		High isolation voltage High V _{CEO} (350 V) Darlington Tr. UL, VDE (Option), BSI approved			350			

(3) Small SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _C (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2832-1		High isolation voltage High V _{CEO} (300 V) Darlington Tr.	2.5	50	300	60	400 to 4500 (I _F = 1 mA)	20, 5 (R _L = 100 Ω)
PS2832-4		UL, VDE (Option), BSI approved						
PS2833-1		High isolation voltage High V _{CEO} (350 V) Darlington Tr.	2.5	50	300	60	400 to 4500 (I _F = 1 mA)	20, 5 (R _L = 100 Ω)
PS2833-4		UL approved						

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.7 Tr. OUTPUT TYPE · LARGE INPUT CURRENT TYPE (DC INPUT/SINGLE Tr.)

(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2521-1 PS2521L-1		High isolation voltage Large input current UL, CSA approved	5	150	80	50	20 to 80 (I _F = 100 mA)	3, 5 (R _L = 100 Ω)
PS2521-2 PS2521L-2								
PS2521-4 PS2521L-4								
PS2621 PS2621L		High isolation voltage Large input current UL approved					20 to 50 (I _F = 100 mA)	
PS2622 PS2622L								

6.8 Tr. OUTPUT TYPE · LARGE INPUT CURRENT TYPE (AC INPUT/SINGLE Tr.)

(1) DIP










PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.
PS2525-1 PS2525L-1		High isolation voltage Large input current AC input UL, CSA approved	5	±150	80	50	20 to 80 (I _F = ±100 mA)	3, 5 (R _L = 100 Ω)
PS2525-2 PS2525L-2								
PS2525-4 PS2525L-4								
PS2625 PS2625L		High isolation voltage Large input current AC input UL approved					20 to 50 (I _F = ±100 mA)	
PS2626 PS2626L								

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.9 Tr. OUTPUT TYPE - SAFETY STANDARD TYPE (SINGLE Tr./DARLINGTON Tr.)

(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS		
			BV (kVr.m.s.)	I _F (mA)	V _{CE0} (V)	I _c (mA)	CTR ^{*1} (%)	t _r , t _f (μs) TYP.	
PS2561-1 PS2561L-1		High isolation voltage UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved	5	80	80	50	80 to 400	3, 5 (R _L = 100 Ω)	
PS2561-2 PS2561L-2		High isolation voltage UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved							
PS2562-1 PS2562L-1									High isolation voltage UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved
PS2562-2 PS2562L-2		40							
PS2565-1 PS2565L-1		High isolation voltage AC input UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved			±80	80	50	80 to 400	3, 5 (R _L = 100 Ω)
PS2565-2 PS2565L-2		High isolation voltage AC input UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved							
PS2566-1 PS2566L-1					High isolation voltage AC input UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved	40	200	160	200 or above (I _F = ±1 mA)
PS2566-2 PS2566L-2									
PS2581L1 PS2581L2		High isolation voltage Outer creepage distance: 8 mm UL, VDE (Standard), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved	80	80	50	80 to 400	3, 5 (R _L = 100 Ω)		

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _C (mA)	CTR ¹ (%)	t _r , t _f (μs) TYP.
PS2651 PS2651L2		High isolation voltage UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved	5	80	80	50	50 to 400	3, 5 (R _L = 100 Ω)
PS2652 PS2652L2								
PS2653 PS2653L2		High isolation voltage High CTR UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved			40	200	200 or above (I _F = 1 mA)	100, 100 (R _L = 100 Ω)
PS2654 PS2654L2								

(2) SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _C (mA)	CTR ¹ (%)	t _r , t _f (μs) TYP.
PS2761-1		Insulation thickness: 0.4 mm UL, BSI (Insulation supplementary) approved	3.75	50	40	40	50 to 400	4, 5 (R _L = 100 Ω)
PS2765-1		AC input Insulation thickness: 0.4 mm UL, BSI (Insulation supplementary) approved		±50				

(3) Small SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CEO} (V)	I _C (mA)	CTR ¹ (%)	t _r , t _f (μs) TYP.
PS2861-1		Insulation thickness: 0.4 mm UL, BSI (Insulation supplementary) approved	2.5	50	40	40	50 to 400	4, 5 (R _L = 100 Ω)
PS2865-1		AC input Insulation thickness: 0.4 mm UL, BSI (Insulation supplementary) approved		±50				

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.10 IC OUTPUT TYPE - HIGH-SPEED TYPE (ANALOG OUTPUT)

(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CC} (V)	I _O (mA)	CTR ^{*1} (%)	t _{PLH} , t _{PHL} (μs) MAX.
PS8601 PS8601L		8-pin base connection UL, VDE (Option), BSI approved	5	25	35	8	15 or above (I _F = 16 mA, V _{CC} = 4.5 V, V _O = 0.4 V)	0.8 (R _L = 1.9 kΩ)
PS8602 PS8602L		8 pins High CMR (2 kV/μs) UL, VDE (Option), BSI approved						

(2) SOP




PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CC} (V)	I _O (mA)	CTR ^{*1} (%)	t _{PLH} (μs) MAX.
PS8701		5-pin High CMR (10 kV/μs) UL, VDE (Option) approved	2.5	25	35	8	15 to 35 (I _F = 16 mA, V _{CC} = 4.5 V, V _O = 0.4 V)	1.2 (R _L = 2.2 kΩ)

*1. I_F = 5 mA, V_{CE} = 5 V, unless otherwise specified





- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.11 IC OUTPUT TYPE - HIGH-SPEED TYPE (DIGITAL OUTPUT)

(1) DIP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CC} (V)	I _o (mA)	I _{FHL} (mA) MAX.	t _{PLH} , t _{PHL} (ns) MAX.
PS9601 PS9601L		Open collector output type UL, BSI approved	5	30	7	50	5.0	75 (R _L = 350 Ω)
PS9611 PS9611L		Totem pole output type High CMR (1 kV/μs) UL approved	3.75			25		65
PS9614 ^{*1} PS9614L ^{*1}		Open collector output type High CMR (10 kV/μs)				40		75 (R _L = 350 Ω)

(2) SOP


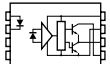
PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CC} (V)	I _o (mA)	I _{FHL} (mA) MAX.	t _{PLH} , t _{PHL} (ns) MAX.
PS9701		Open collector output type UL, VDE (Option), BSI approved	2.5	30	7	50	5.0	75 (R _L = 350 Ω)
PS9711		Totem pole output type High CMR (1 kV/μs) UL, BSI approved				13		65
PS9714 ^{*1}		Open collector output type High CMR (10 kV/μs)				40	3.5	75 (R _L = 350 Ω)
PS9715 ^{*1}		Totem pole output type High CMR (10 kV/μs)				13	5.0	65

*1. Under development


- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

6.12 IC OUTPUT TYPE - MOTOR CONTROL (INVERTER)

(1) DIP

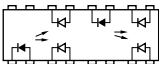
PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CC} (V)	I _O , I _{O1} /I _{O2} (mA)	CM _H , CM _L (kV/μs) MIN.	t _{PLH} , t _{PHL} (μs) MAX.
PS9613 PS9613L		8-pin IPM driver High CMR (15 kV/μs) UL, VDE (Option) approved	5	25	35	15	15	0.75/0.5 (R _L = 20 kΩ)
PS9634 PS9634L		Inverter circuit UL, VDE (Option) approved		30	18	500/800	1.0	5.0

(2) SOP

PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _{CC} (V)	I _O (mA)	CM _H , CM _L (kV/μs) MIN.	t _{PLH} , t _{PHL} (μs) MAX.
PS9713		5-pin IPM driver High CMR (15 kV/μs) UL, VDE (Option) approved	2.5	25	35	15	15	0.75/0.5 (R _L = 20 kΩ)

6.13 DIODE OUTPUT TYPE - HIGH LINEARITY

(1) DIP

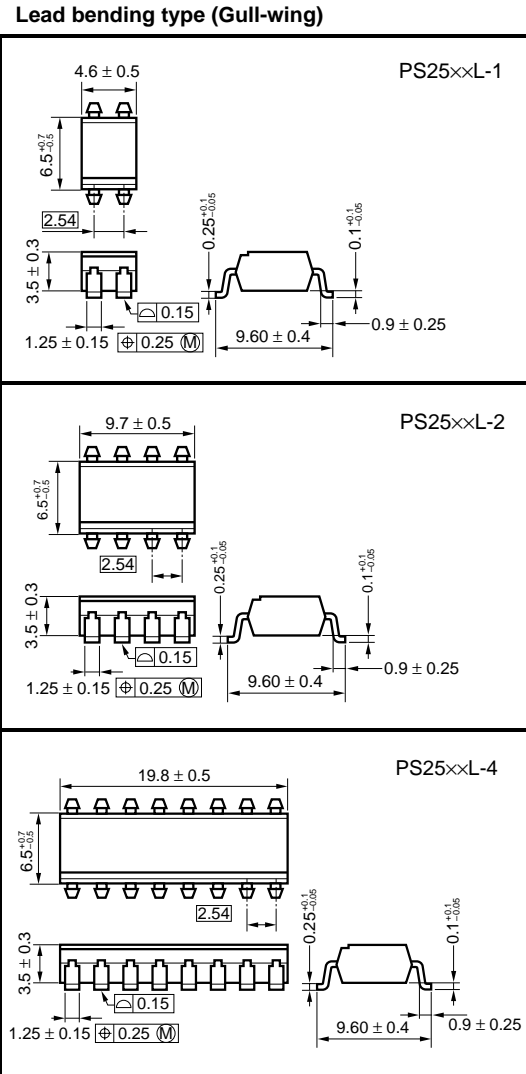
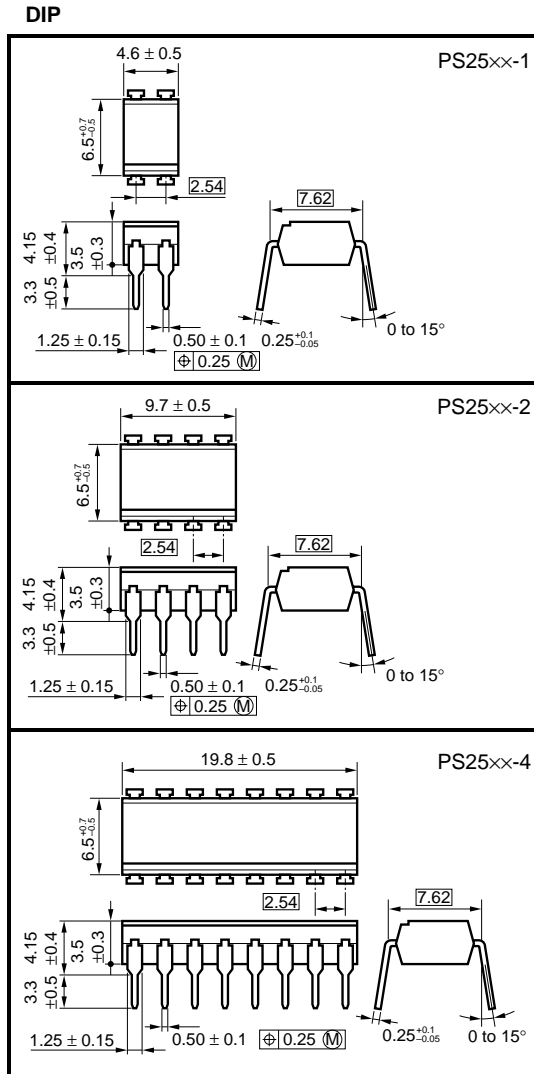
PART NUMBER	PIN CONNECTIONS	FEATURES	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS	
			BV (kVr.m.s.)	I _F (mA)	V _R (Diode) (V)	V _R (Photo Diode) (V)	K ₁ , K ₂ (%)	K ₃
PS8741		16-pin base connection High Linearity BSI (Insulation supplementary) approved	1.5	50	3	20	0.3 to 1.0 to 1.8	0.75 to 1.0 to 1.25

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

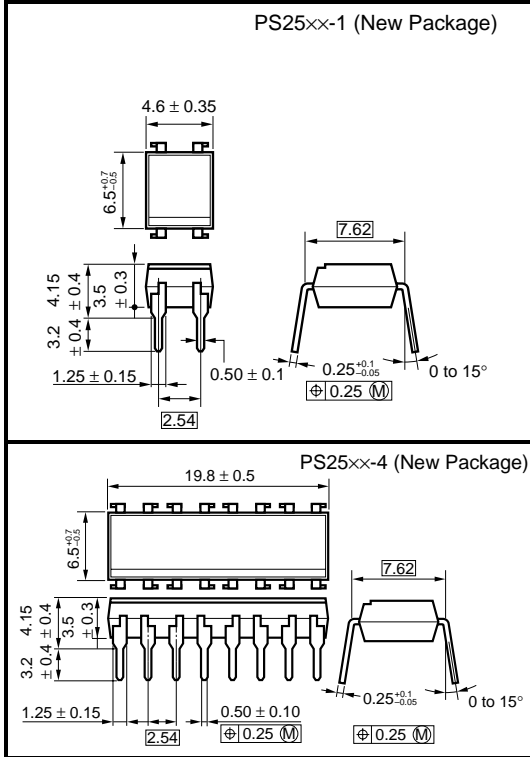
7. PACKAGE DIMENSIONS

7.1 STANDARD (DIP)

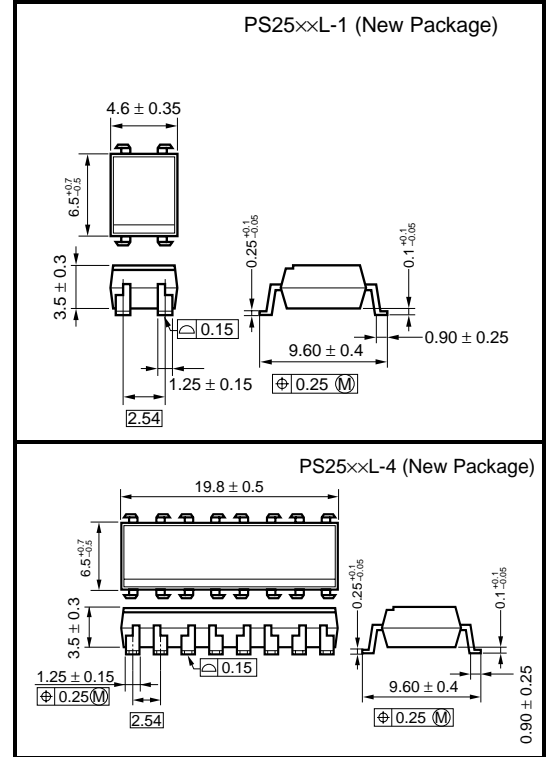
(1) 4-pin based multi-channel DIP type (Unit: mm)



DIP (New package)

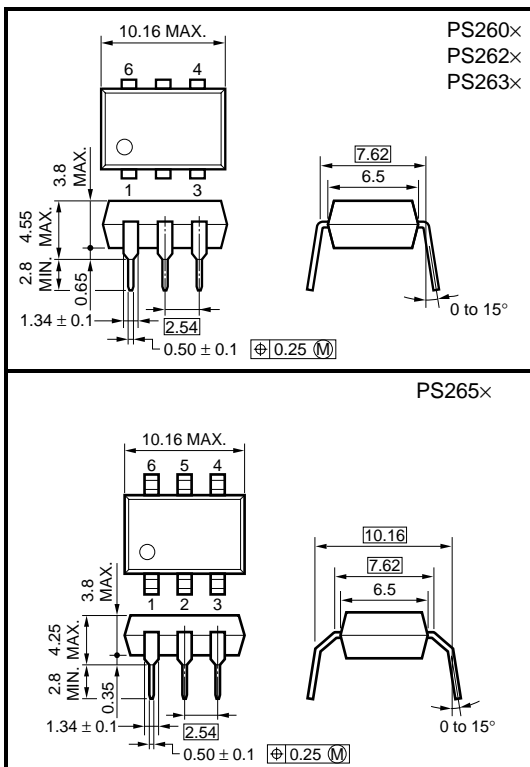


Lead bending type (New package)

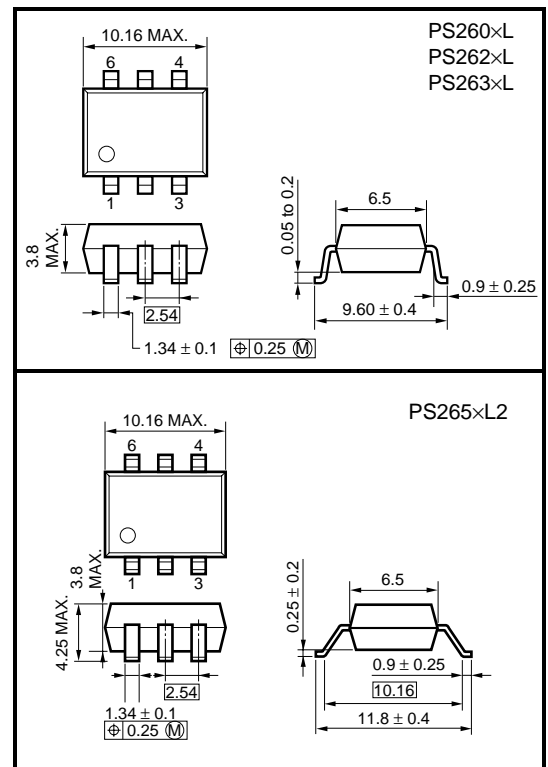


(2) 6-pin DIP type (Unit: mm)

DIP

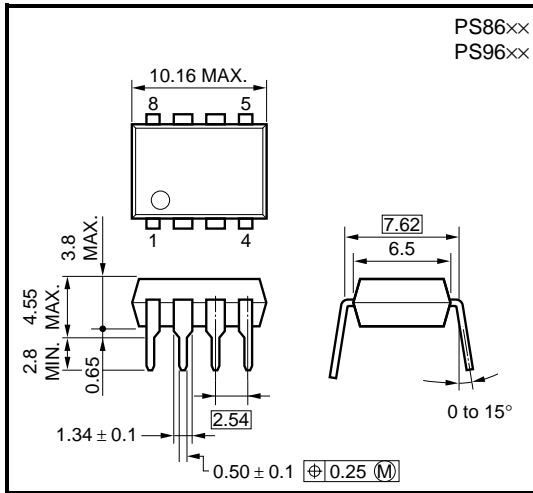


Lead bending type

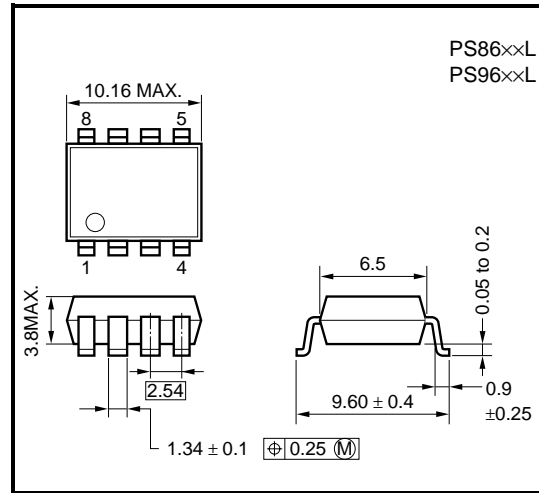


(3) 8-pin DIP type (Unit: mm)

DIP

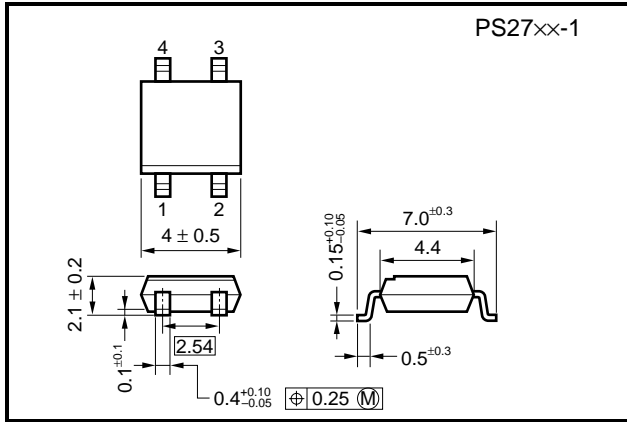


Lead bending type



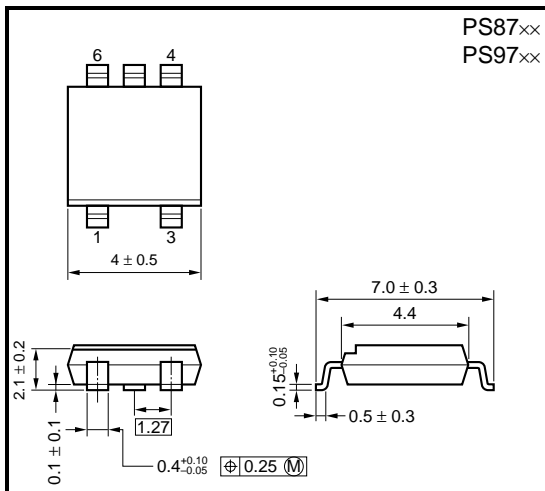
7.2 STANDARD (SOP)

(1) 4-pin SOP type (Unit: mm)



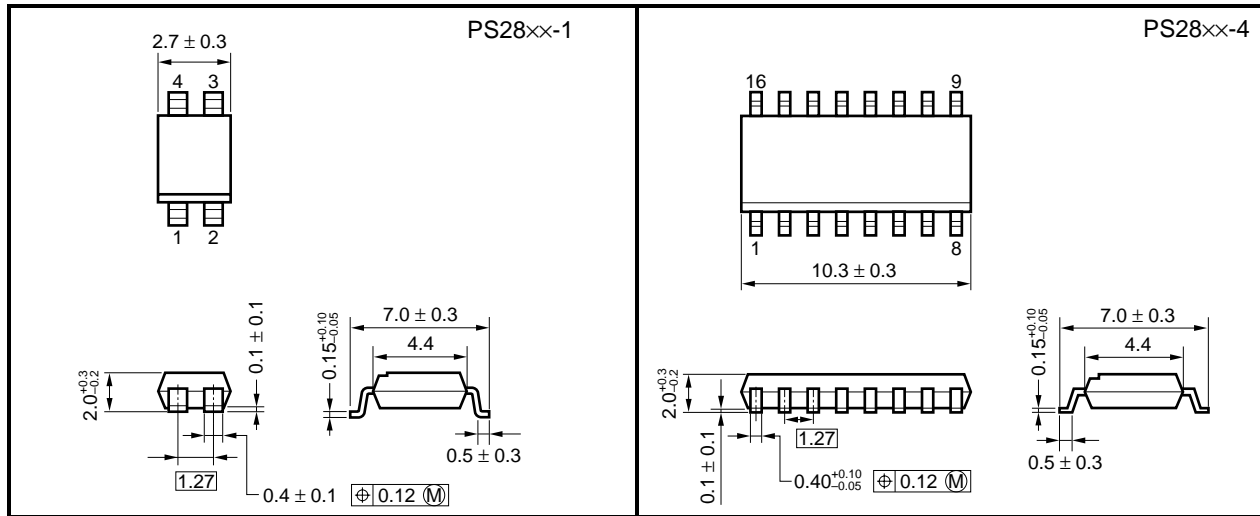
(2) 5-pin SOP type (Unit: mm)

Hi-Speed Analog type



7.3 STANDARD (SMALL SOP)

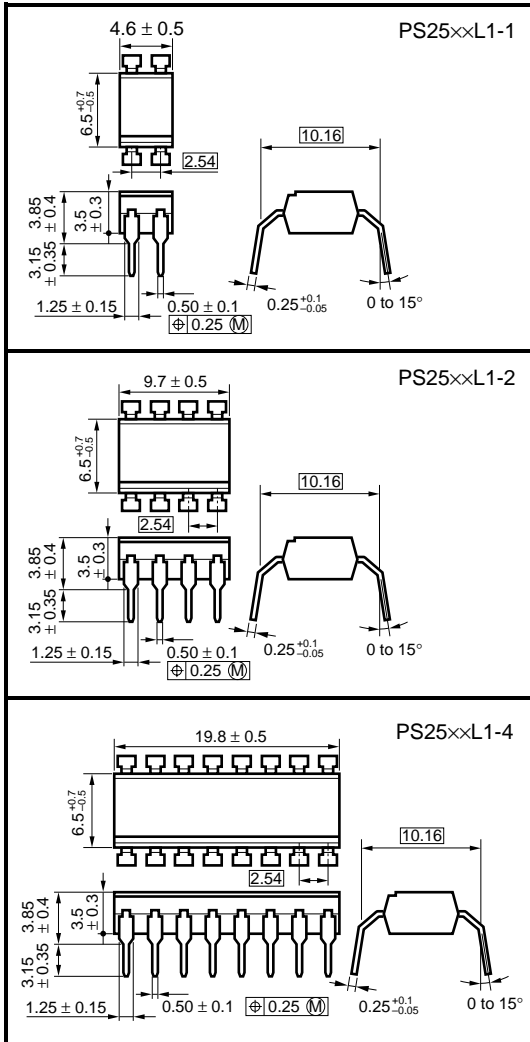
(1) 4-pin based multi-channel small SOP type (Unit: mm)



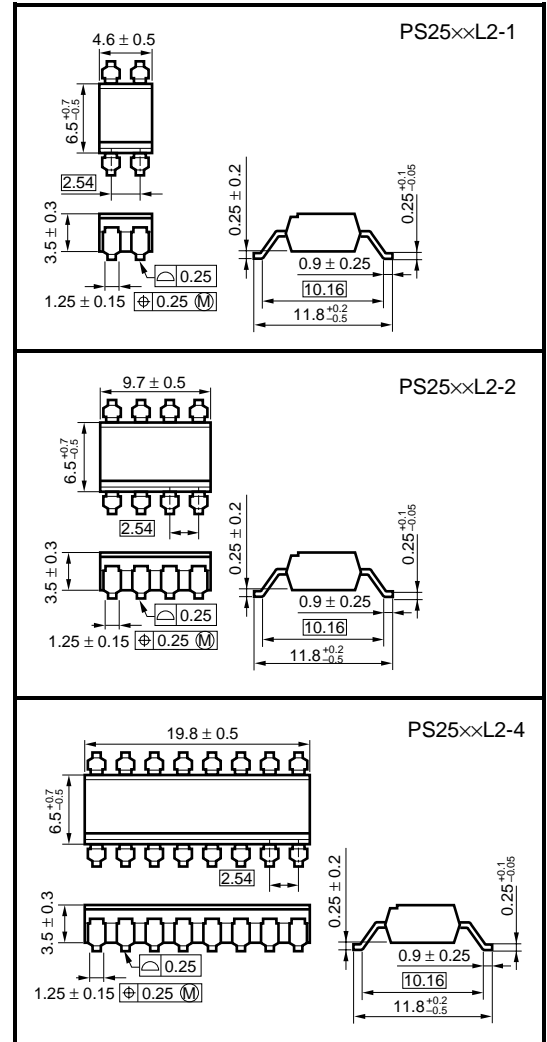
7.4 LEAD BENDING TYPE FOR LONG CREEPAGE^{*1} (DIP)

(1) 4-pin based multi-channel type (Unit: mm)

Long creepage distance

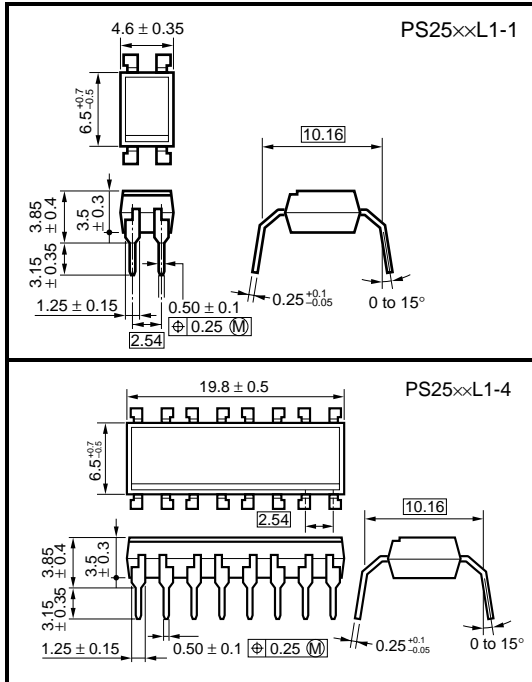


Long creepage distance (Gull-wing, New package)

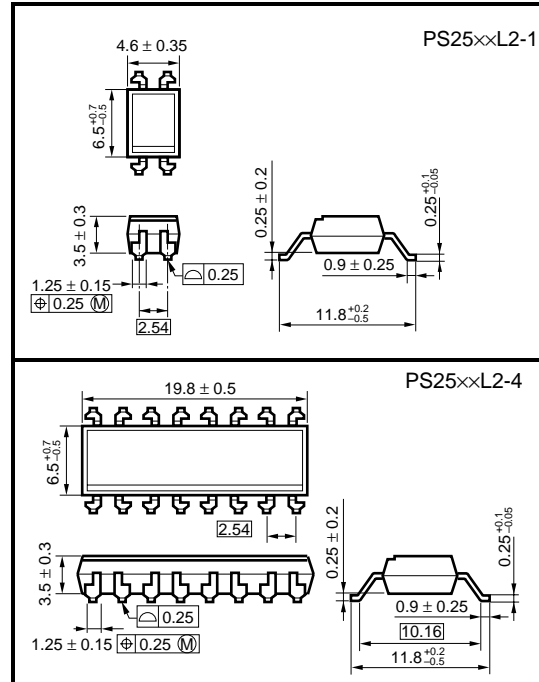


- *1. Lead bending type for long creepage is available in the following products:
4-pin based multi-channel photocoupler, 6, 8-pin DIP.

Long creepage distance (New package)

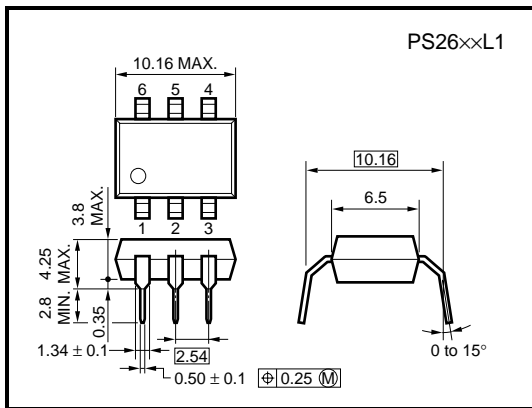


Long creepage distance (Gull-wing, New package)

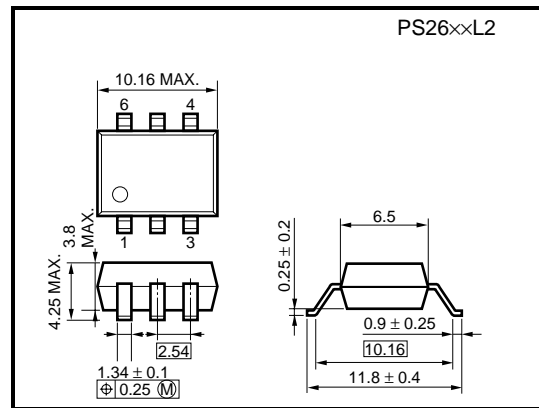


(2) 6-pin DIP type (Unit: mm)

Long creepage distance

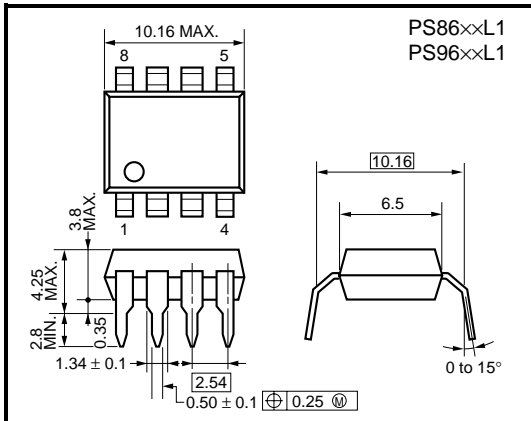


Long creepage distance (Gull-wing)

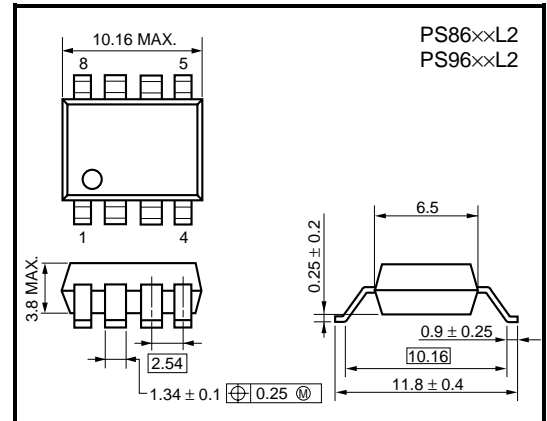


(3) 8-pin DIP type (Unit: mm)

Long creepage distance



Long creepage distance (Gull-wing)



8. CTR RANK

8.1 Tr. OUTPUT TYPE · STANDARD TYPE (SINGLE Tr.)

(1) DIP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2501-1 PS2501L-1	K	300 to 600	5	5	Multi type UL approved
	L	200 to 400			
	M	80 to 240			
	D	100 to 300			
	H	80 to 160			
	W	130 to 260			
	Q	100 to 200			
	N	80 to 600			
PS2501-2 PS2501L-2 PS2501-4 PS2501L-4	N	80 to 600	5	5	
PS2601 PS2601L PS2602 PS2602L	K	300 to 600	5	5	6-pin type UL approved
	L	200 to 400			
	M	80 to 240			

(2) SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2701-1	P	150 to 300	5	5	Pin pitch: 2.54 mm UL, VDE (Option), BSI approved
	L	100 to 300			
	M	50 to 150			
	N	50 to 300			
PS2711-1	K	200 to 400	1	5	Pin pitch: 2.54 mm High CTR UL approved
	L	150 to 300			
	M	100 to 200			
	N	100 to 400			

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

(3) Small SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2801-1	K	300 to 600	5	5	Pin pitch: 1.27 mm UL, VDE (Option), BSI approved
	L	100 to 300			
	P	150 to 300			
	N	80 to 600			
PS2801-4	N	80 to 600			
PS2811-1	K	200 to 400	1	5	Pin pitch: 1.27 mm High CTR UL approved
	L	150 to 300			
	M	100 to 200			
	N	100 to 400			
PS2811-4	N	100 to 400			

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.2 Tr. OUTPUT TYPE - STANDARD TYPE (DARLINGTON Tr.)

(1) DIP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2502-1 PS2502L-1	K	2000 or above	1	2	Multi type UL approved
	L	700 to 3400			
	M	200 to 1000			
PS2502-2 PS2502L-2 PS2502-4 PS2502L-4	N	200 or above			
PS2603 PS2603L PS2604 PS2604L	K	2000 or above	1	2	6-pin type UL approved
	L	700 to 3400			
	M	200 to 1000			

(2) SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2702-1	K	2000 or above	1	2	Pin pitch: 2.54 mm UL, VDE (Option), BSI approved
	L	700 to 3400			
	M	200 to 1000			
	N	200 or above			

(3) Small SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2802-1	K	2000 or above	1	2	Pin pitch: 1.27 mm UL, VDE (Option), BSI approved
	L	700 to 3400			
	M	200 to 1000			
	N	200 or above			
PS2802-4	N	200 or above			

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.3 Tr. OUTPUT TYPE - AC INPUT TYPE (SINGLE Tr.)

(1) DIP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2505-1 PS2505L-1 PS2505-2 PS2505L-2 PS2505-4 PS2505L-4	N	80 to 600	±5	5	Multi type UL approved
PS2605 PS2605L PS2606 PS2606L	N	80 to 600	±5	5	6-pin type UL approved

(2) SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2705-1	P	150 to 300	±5	5	Pin pitch: 2.54 mm UL, VDE (Option), BSI approved
	L	100 to 300			
	M	50 to 150			
	N	50 to 300			
PS2715-1	N	100 to 400	±1	5	Pin pitch: 2.54 mm High CTR UL approved

(3) Small SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2805-1 PS2805-4	N	80 to 600	±5	5	Pin pitch: 1.27 mm UL, VDE (Option), BSI approved
PS2815-1 PS2815-4	N	100 to 400	±1	5	Pin pitch: 1.27 mm High CTR UL approved

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.4 Tr. OUTPUT TYPE - AC INPUT TYPE (DARLINGTON Tr.)

(1) DIP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2506-1 PS2506L-1 PS2506-2 PS2506L-2 PS2506-4 PS2506L-4	N	200 or above (2000 (TYP.))	±1	2	Multi type UL approved
PS2607 PS2607L PS2608 PS2608L	N	200 or above (2000 (TYP.))	±1	2	6-pin type UL approved

(2) SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2706-1	N	200 or above (2000 (TYP.))	±1	2	Pin pitch: 2.54 mm UL, VDE (Option), BSI approved

(3) Small SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2806-1	N	200 or above (2000 (TYP.))	±1	2	Pin pitch: 1.27 mm UL, VDE (Option), BSI approved
PS2806-4					

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.5 Tr. OUTPUT TYPE - LOW INPUT CURRENT TYPE (SINGLE Tr.)

(1) DIP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2503-1 PS2503L-1	K	200 to 400	1	5	Multi type UL, CSA approved
	L	150 to 300			
	M	100 to 200			
PS2503-2 PS2503L-2 PS2503-4 PS2503L-4	N	100 to 400 (200 (TYP.))			

(2) SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2703-1	K	200 to 400	5	5	Pin pitch: 2.54 mm UL, VDE (Option), BSI approved
		80 or above	1		
	L	100 to 300	5		
		25 or above	1		
	M	50 to 150	5		
		10 or above	1		
	S	100 or above			
	N	50 to 400	5		
10 or above		1			
PS2707-1	N	50 to 400	±5	5	
		10 or above	±1		

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.6 Tr. OUTPUT TYPE - HIGH COLLECTOR TO EMITTER VOLTAGE TYPE

(1) DIP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2532-1 PS2532L-1 PS2532-2 PS2532L-2 PS2532-4 PS2532L-4	N	1500 to 6500	1	2	Multi type High collector to emitter voltage type (300 V) UL, VDE (Option), CSA, BSI (Insulation supplementary), SEMKO, FIMKO, NEMKO, DEMKO approved
PS2533-1 PS2533L-1 PS2533-2 PS2533L-2 PS2533-4 PS2533L-4	N	1500 to 6500	1	2	Multi type High collector to emitter voltage type (350 V) UL, VDE (Option), CSA, BSI (Insulation supplementary), SEMKO, FIMKO, NEMKO, DEMKO approved
PS2534-1 PS2534L-1 PS2534-2 PS2534L-2 PS2534-4 PS2534L-4	N	400 to 5500	1	2	Multi type High collector to emitter voltage type (300 V) UL, BSI (Insulation supplementary) approved
PS2535-1 PS2535L-1 PS2535-2 PS2535L-2 PS2535-4 PS2535L-4					Multi type High collector to emitter voltage type (350 V) UL, BSI (Insulation supplementary) approved
PS2633 PS2633L PS2634 PS2634L	N	1000 to 15000	1	2	6-pin type UL approved

(2) SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2732-1	N	1500 or above (4000 (TYP.))	1	2	Pin pitch: 2.54 mm UL, VDE (Option), BSI approved
PS2733-1					

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

(3) Small SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2832-1 PS2832-4	N	400 to 4500	1	2	Pin pitch: 1.27 mm UL, VDE (Option), BSI approved
PS2833-1 PS2833-4					Pin pitch: 1.27 mm UL approved

8.7 Tr. OUTPUT TYPE · LARGE INPUT CURRENT TYPE (DC INPUT/SINGLE Tr.)**(1) DIP**

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2521-1 PS2521L-1 PS2521-2 PS2521L-2 PS2521-4 PS2521L-4	N	20 to 80	±100	3	Multi type UL, CSA approved
PS2621 PS2621L PS2622 PS2622L	N	20 to 50	100	3	6-pin type UL approved

8.8 Tr. OUTPUT TYPE · LARGE INPUT CURRENT TYPE (AC INPUT/SINGLE Tr.)**(1) DIP**

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2525-1 PS2525L-1 PS2525-2 PS2525L-2 PS2525-4 PS2525L-4	N	20 to 80	±100	3	Multi type UL, CSA approved
PS2625 PS2625L PS2626 PS2626L	N	20 to 50	±100	3	6-pin type UL approved

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.9 Tr. OUTPUT TYPE - SAFETY STANDARD TYPE (SINGLE Tr./DARLINGTON Tr.)

(1) DIP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2561-1 PS2561L-1	L	200 to 400	5	5	Multi type UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved
	M	80 to 240			
	D	100 to 300			
	H	80 to 160			
	W	130 to 260			
PS2561-2 PS2561L-2	N	80 to 400			
PS2562-1 PS2562L-1	K	2000 or above	1	2	Multi type UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved
	L	700 to 3400			
	M	200 to 1000			
PS2562-2 PS2562L-2	N	200 or above			
PS2565-1 PS2565L-1 PS2565-2 PS2565L-2	N	80 to 400	±5	5	Multi type UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved
PS2566-1 PS2566L-1 PS2566-2 PS2566L-2	N	200 or above (2000 (TYP.))	±1	2	Multi type UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved
PS2581L1 PS2581L2	L	200 to 400	5	5	UL, VDE (Standard), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved
	M	80 to 240			
	D	100 to 300			
	H	80 to 160			
	W	130 to 260			
PS2651 PS2651L2 PS2652 PS2652L2	K	160 to 400	5	5	6-pin type UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved
	L	80 to 240			
	M	50 to 120			
PS2653 PS2653L2 PS2654 PS2654L2	K	2300 or above	1	2	6-pin type UL, VDE (Option), CSA, BSI, SEMKO, FIMKO, NEMKO, DEMKO approved
	L	700 to 3400			
	M	200 to 1000			

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

(2) SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2761-1	K	200 to 400	5	5	Insulation thickness: 0.4 mm UL, BSI (Insulation supplementary) approved
	M	50 to 150			
	L	100 to 300			
	N	50 to 400			
PS2765-1	N	50 to 400			AC input Insulation thickness: 0.4 mm UL, BSI (Insulation supplementary) approved

(3) Small SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS		REMARKS
			I _F (mA)	V _{CE} (V)	
PS2861-1	K	200 to 400	5	5	Insulation thickness: 0.4 mm UL, BSI (Insulation supplementary) approved
	M	50 to 150			
	L	100 to 300			
	N	50 to 400			
PS2865-1	N	50 to 400			AC input Insulation thickness: 0.4 mm UL, BSI (Insulation supplementary) approved

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.10 IC OUTPUT TYPE - HIGH-SPEED TYPE (ANALOG OUTPUT)

(1) DIP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS			REMARKS
			I _F (mA)	V _{CC} (V)	V _O (V)	
PS8601 PS8601L	N	15 or above	16	4.5	0.4	8-pin base connection UL, VDE (Option), BSI approved
PS8602 PS8602L						8 pins High CMR UL, VDE (Option), BSI approved

(2) SOP

PART NUMBER	RANK	CTR (%)	TEST CONDITIONS			REMARKS
			I _F (mA)	V _{CC} (V)	V _O (V)	
PS8701	N	15 to 35 (20 (TYP.))	16	4.5	0.4	5 pins High CMR UL, VDE (Option) approved

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.11 IC OUTPUT TYPE - HIGH-SPEED TYPE (DIGITAL OUTPUT)

(1) DIP

PART NUMBER	RANK	I _{FHL} (mA)	TEST CONDITIONS			REMARKS
			V _{CC} (V)	R _L (Ω)	V _O (V)	
PS9601 PS9601L	N	5 (MAX.) (2.5 (TYP.))	5	350	0.8	Open collector output type UL, BSI approved
PS9611 PS9611L	N	5 (MAX.) (2.7 (TYP.))	5	–	–	Totem pole output type UL approved
PS9614 ^{*1} PS9614L ^{*1}	N	5 (MAX.) (3.0 (TYP.))	5	350	0.8	Open collector output type

(2) SOP

PART NUMBER	RANK	I _{FHL} (mA)	TEST CONDITIONS			REMARKS
			V _{CC} (V)	R _L (Ω)	V _O (V)	
PS9701	N	5 (MAX.) (2.5 (TYP.))	5	350	0.8	Open collector output type UL, VDE (Option), BSI approved
PS9711	N	5 (MAX.) (2.0 (TYP.))	5	–	–	Totem pole output type UL approved
PS9714 ^{*1}	N	3.5 (MAX.) (2.0 (TYP.))	5	350	0.8	Open collector output type
PS9715 ^{*1}	N	5 (MAX.) (3.0 (TYP.))	5	–	–	Totem pole output type

*1. Under development

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.12 IC OUTPUT TYPE - MOTOR CONTROL (INVERTER)

8.12.1 IPM DRIVER TYPE

(1) DIP

PART NUMBER	RANK	I _{FLH} (mA)	TEST CONDITIONS			REMARKS
			V _{CC} (V)	V _O (V)	I _O (mA)	
PS9613 PS9613L	N	5 (MAX.) (1.5 (TYP.))	15	0.8	0.75	8-pin DIP UL, VDE (Option) approved

(2) SOP

PART NUMBER	RANK	I _{FLH} (mA)	TEST CONDITIONS			REMARKS
			V _{CC} (V)	V _O (V)	I _O (mA)	
PS9713	N	5 (MAX.) (1.5 (TYP.))	15	0.8	0.75	5-pin SOP UL, VDE (Option) approved

8.12.2 HIGH-POWER TYPE

(1) DIP

PART NUMBER	RANK	I _{FLH} (mA)	TEST CONDITIONS			REMARKS
			V _{CC} (V)	R _{L1} (Ω)	R _{L2} (Ω)	
PS9634 PS9634L	N	3 (MAX.) (1.5 (TYP.))	6	5	10	8-pin DIP UL, VDE (Option) approved

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).

8.13 DIODE OUTPUT TYPE - HIGH LINEARITY




(1) Small SOP

PART NUMBER	RANK	K ₁ (%)	K ₂ (%)	K ₃	TEST CONDITIONS		REMARKS
					I _F (mA)	V _{CC} (V)	
PS8741	N	0.3 to 1.0	0.3 to 1.0	0.75 to 1.0 to 1.25	2	5	16-pin Small SOP BSI (Insulation supplementary) approved
	K	1.0 to 1.8	1.0 to 1.8	0.85 to 1.0 to 1.15			

- Remarks**
1. Refer to 9.1 SAFETY STANDARD APPROVAL LIST for safety standard approval list.
 2. Refer to 7.4 LEAD BENDING TYPE FOR LONG CREEPAGE for available product list for long creepage (L1, L2 type).




9. SAFETY STANDARDS

9.1 SAFETY STANDARD APPROVAL LIST (AS OF AUGUST 2000)

Part Number	UL 				CSA 			BSI 		
	UL1577 E72422 (S) Single/Double Protection				CAN/CSA-C22.2 No.950			BS/EN60065(BS415)+IEC65 BS/EN60950(BS7002)+IEC950		
	Single	Double	Made in Japan	Made in Taiwan		Made in Japan	Made in Taiwan		Made in Japan	Made in Taiwan
PS2501-1, -2, -4 /PS2501L-1, -2, -4	●	●	●	●						
PS2502-1, -2, -4 /PS2502L-1, -2, -4	●	●	●	●						
PS2503-1, -2, -4 /PS2503L-1, -2, -4	●		●	●	●	●	●			
PS2505-1, -2, -4 /PS2505L-1, -2, -4	●	●	●	●						
PS2506-1, -2, -4 /PS2506L-1, -2, -4	●	●	●	●						
PS2521-1, -2, -4 /PS2521L-1, -2, -4	●		●	●	●	●	●			
PS2525-1, -2, -4 /PS2525L-1, -2, -4	●		●	●	●	●	●			
PS2532-1, -2, -4 /PS2532L-1, -2, -4	●		●	●	●	●	●	●SR		
PS2533-1, -2, -4 /PS2533L-1, -2, -4	●		●	●	●	●	●	●SR		
PS2534-1, -2, -4 /PS2534L-1, -2, -4	●		●	●				●SR		
PS2535-1, -2, -4 /PS2535L-1, -2, -4	●		●	●				●SR		
PS2561-1, -2 /PS2561L-1, -2	●	●	●	●	●	●	●	●R	●	●
PS2562-1, -2 /PS2562L-1, -2	●	●	●	●	●	●	●	●R	●	●
PS2565-1, -2 /PS2565L-1, -2	●	●	●	●	●	●	●	●R	●	●
PS2566-1, -2 /PS2566L-1, -2	●	●	●	●	●	●	●	●R	●	●
PS2581L1/PS2581L2	●	●	●	●	●	●	●	●R	●	
PS2601/PS2601L	●	●	●							
PS2602/PS2602L	●	●	●							
PS2603/PS2603L	●	●	●							
PS2604/PS2604L	●	●	●							
PS2605/PS2605L	●	●	●							
PS2606/PS2606L	●	●	●							
PS2607/PS2607L	●	●	●							
PS2608/PS2608L	●	●	●							
PS2621/PS2621L	●	●	●							
PS2622/PS2622L	●	●	●							
PS2625/PS2625L	●	●	●							
PS2626/PS2626L	●	●	●							
PS2633/PS2633L	●		●							
PS2634/PS2634L	●		●							
PS2651/PS2651L2	●	●	●		●	●	●	●R	●	
PS2652/PS2652L2	●	●	●		●	●	●	●R	●	

Remark ●: Approved △: Awaiting Approval







R: Insulation Reinforced S: Insulation Supplementary B: Insulation Basic

Part Number	UL 				CSA 			BSI 		
	UL1577 E72422 (S) Single/Double Protection				CAN/CSA-C22.2 No.950			BS/EN60065(BS415)+IEC65 BS/EN60950(BS7002)+IEC950		
	Single	Double	Made in Japan	Made in Taiwan		Made in Japan	Made in Taiwan		Made in Japan	Made in Taiwan
PS2653/PS2653L2	●	●	●		●	●	●	●R	●	
PS2654/PS2654L2	●	●	●		●	●	●	●R	●	
PS2701-1	●		●					●B		
PS2702-1	●		●					●B		
PS2703-1	●		●					●B		
PS2705-1	●		●					●B		
PS2706-1	●		●					●B		
PS2707-1	●		●					●B		
PS2711-1	●		●							
PS2715-1	●		●							
PS2732-1	●		●					●B		
PS2733-1	●		●					●B		
PS2761-1	●		●		△			●S	●	
PS2765-1	●		●		△			●S	●	
PS2801-1, -4	●		●					●B		
PS2802-1, -4	●		●					●B		
PS2805-1, -4	●		●					●B		
PS2806-1, -4	●		●					●B		
PS2811-1, -4	●		●							
PS2815-1, -4	●		●							
PS2832-1, -4	●		●					●B	●	
PS2833-1, -4	●		●							
PS2861-1	●		●		△			●S	●	
PS2865-1	●		●		△			●S	●	
PS8601/PS8601L	●		●					●R	●	
PS8602/PS8602L	●		●					●R	●	
PS8701	●		●							
PS8741	△				△			●S	●	
PS9601/PS9601L	●		●					●B	●	
PS9611/PS9611L	●		●							
PS9613/PS9613L	●		●							
PS9614/PS9614L ^{*1}	△									
PS9634/PS9634L	●		●							
PS9701	●		●					●B	●	
PS9711	●		●					●B	●	
PS9713	●		●							
PS9714 ^{*1}	△									
PS9715 ^{*1}	△									

*1. Under development

Remark ●: Approved △: Awaiting Approval

R: Insulation Reinforced S: Insulation Supplementary B: Insulation Basic

VDE  		SEMKO 		NEMKO 		FIMKO 		DEMKO 	
VDE0884		EN 60065/IEC60065 EN 60950/IEC60950		EN 60065 + EN 60950		EN 60065 + EN 60950 + Nordic deviations		EN 60065/IEC60065 EN 60950/IEC60950	
Made in Japan	Made in Taiwan	Made in Japan	Made in Taiwan	Made in Japan	Made in Taiwan	Made in Japan	Made in Taiwan	Made in Japan	Made in Taiwan
•	•	•R	•	•	•	•	•	•R	•
•	•	•R	•	•	•	•	•	•R	•
•	•								
•	•								
•	•								
•	•								
•	•								
•	•								
△									
△									
•	•								
•	•								
△		△		△		△		△	
△		△		△		△		△	
•	•								
•	•								
•	•								
•	•								
△									
△									
•	•								
△		△		△		△		△	
△		△		△		△		△	
•	•								
•	•								
•	•								
△									
△									
•	•								
△									
•	•								
•	•								
△									
•	•								
△									
△									

9.2 LIST OF CONSTRUCTIONAL PARAMETERS

(1/2)

PART NUMBER	PARAMETERS*1				
	AIR DISTANCE	CREEPAGE DISTANCE		INSULATION THICKNESS	ISOLATION VOLTAGE
		OUTER CREEPAGE DISTANCE	INNER CREEPAGE DISTANCE		
PS2501-1, -2, -4 /PS2501L-1, -2, -4	7.0 mm	7.0 mm	3.5 mm	0.3 mm	5 kVr.m.s.
PS2502-1, -2, -4 /PS2502L-1, -2, -4					
PS2503-1, -2, -4 /PS2503L-1, -2, -4					
PS2505-1, -2, -4 /PS2505L-1, -2, -4					
PS2506-1, -2, -4 /PS2506L-1, -2, -4					
PS2521-1, -2, -4 /PS2521L-1, -2, -4					
PS2525-1, -2, -4 /PS2525L-1, -2, -4					
PS2532-1, -2, -4 /PS2532L-1, -2, -4					
PS2533-1, -2, -4 /PS2533L-1, -2, -4					
PS2534-1, -2, -4 /PS2534L-1, -2, -4					
PS2535-1, -2, -4 /PS2535L-1, -2, -4					
PS2561-1, -2 /PS2561L-1, -2					
PS2562-1, -2 /PS2562L-1, -2					
PS2565-1, -2 /PS2565L-1, -2					
PS2566-1, -2 /PS2566L-1, -2					
PS2581L1/PS2581L2	8.0 mm	8.0 mm			
PS2601/PS2601L	7.0 mm	7.0 mm		0.3 mm	
PS2602/PS2602L					
PS2603/PS2603L					
PS2604/PS2604L					
PS2605/PS2605L					
PS2606/PS2606L					
PS2607/PS2607L					
PS2608/PS2608L					
PS2621/PS2621L					
PS2622/PS2622L					
PS2625/PS2625L					
PS2626/PS2626L					
PS2633/PS2633L					
PS2634/PS2634L					

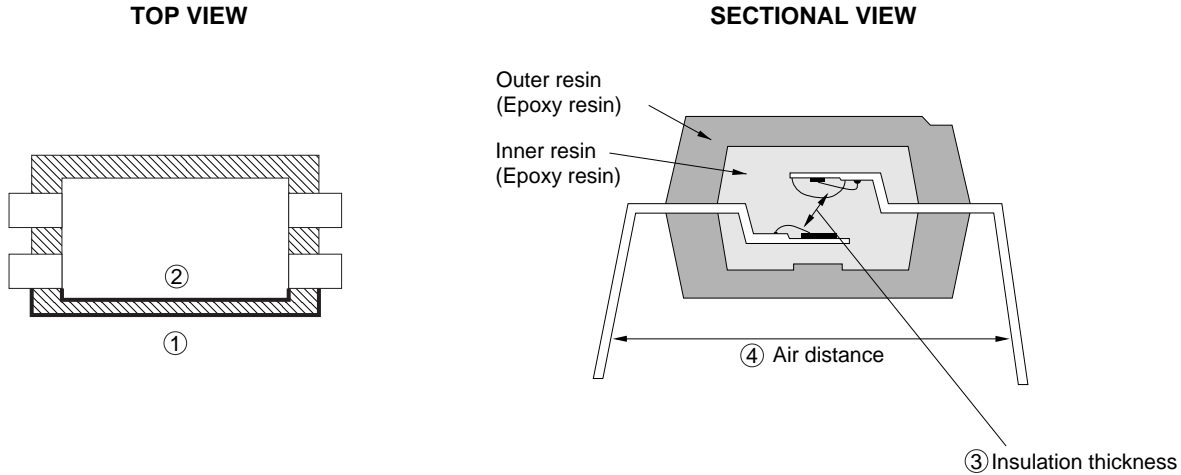
*1. Refer to 9.3 CONSTRUCTION.

PART NUMBER	PARAMETERS ^{*1}								
	AIR DISTANCE	CREEPAGE DISTANCE		INSULATION THICKNESS	ISOLATION VOLTAGE				
		OUTER CREEPAGE DISTANCE	INNER CREEPAGE DISTANCE						
PS2651/PS2651L2	8.0 mm	8.0 mm	4.0 mm	0.5 mm	5 kVr.m.s.				
PS2652/PS2652L2									
PS2653/PS2653L2									
PS2654/PS2654L2									
PS2701-1	5.0 mm	5.0 mm	2.5 mm	0.3 mm	3.75 kVr.m.s.				
PS2702-1									
PS2703-1									
PS2705-1									
PS2706-1									
PS2707-1									
PS2711-1									
PS2715-1									
PS2732-1						2.5 kVr.m.s.			
PS2733-1									
PS2761-1						5.0 mm		0.4 mm	3.75 kVr.m.s.
PS2765-1									
PS2801-1, -4					4.5 mm	4.5 mm	2.5 mm	0.1 mm	2.5 kVr.m.s.
PS2802-1, -4									
PS2805-1, -4									
PS2806-1, -4									
PS2811-1, -4									
PS2815-1, -4									
PS2832-1, -4									
PS2833-1, -4									
PS2861-1	4.5 mm		0.4 mm						
PS2865-1									
PS8601/PS8601L	7.0 mm	7.0 mm	3.5 mm	0.3 mm					
PS8602/PS8602L									
PS8701	5.0 mm	5.0 mm	2.5 mm	0.2 mm	2.5 kVr.m.s.				
PS8741						4.5 mm		0.4 mm	1.5 kVr.m.s.
PS9601/PS9601L	7.0 mm	7.0 mm	3.5 mm	0.3 mm	5 kVr.m.s.				
PS9611/PS9611L				0.2 mm	3.75 kVr.m.s.				
PS9613/PS9613L				0.3 mm	5 kVr.m.s.				
PS9614/PS9614L									
PS9634/PS9634L									
PS9701	5.0 mm	5.0 mm	2.5 mm	0.2 mm	2.5 kVr.m.s.				
PS9711									
PS9713									
PS9714									
PS9715									

*1. Refer to 9.3 CONSTRUCTION.

9.3 CONSTRUCTION

- ① Outer Creepage Distance
Over-surface spacing between input and output
- ② Inner Creepage Distance
Internal thickness spacing
- ③ Insulation Thickness
Through air spacing between input and output
- ④ Air Distance
Through air spacing between input and output



9.4 LIST OF PRODUCT NAME DURING APPLICATION FOR SAFETY STANDARD

When applying for a safety standard, use the basic product name without the type number indicating the lead shape (L, L1, L2).

PRODUCT NAME	PRODUCT NAME DURING APPLICATION
PS2xxx-x PS2xxxL-x PS2xxxL1-x PS2xxxL2-x	PS2xxx-x

ex) **PS2561**

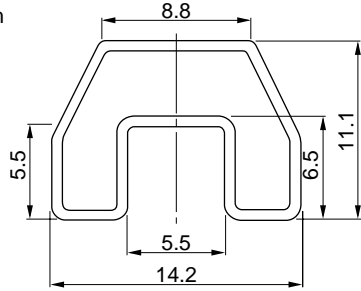
PRODUCT NAME	PRODUCT NAME DURING APPLICATION
PS2561-1 PS2561L-1 PS2561L1-1 PS2561L2-1	PS2561-1
PS2561-2 PS2561L-2 PS2561L1-2 PS2561L2-2	PS2561-2

10. OUTLINE DRAWING

10.1 MAGAZINE CASE

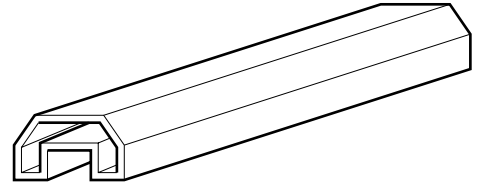
10.1.1 DIP

Unit: mm



Length 500 ± 2 mm
 Thickness $0.5^{+0.2}_{-0.1}$ mm
 Tolerance ± 0.4 mm

Rubber stopper

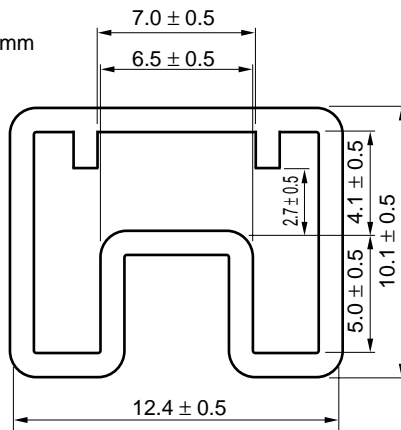


APPLIED TYPE NUMBER	QUANTITY (Pcs)	APPLIED TYPE NUMBER	QUANTITY (Pcs)
PS25xx-1	100	PS26xx	50
PS25xx-2	45	PS86xx	
PS25xx-4	20	PS96xx	

Remark Including Type number PSxxxxL1

10.1.2 LEAD BENDING TYPE FOR SURFACE MOUNT

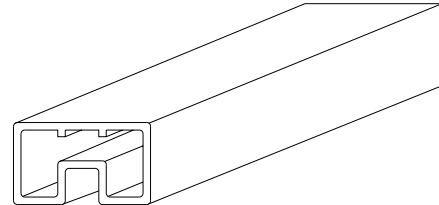
Unit: mm



Rubber stopper



Length : 515
 Material : Plastic (with antistatic finish)

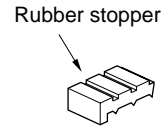
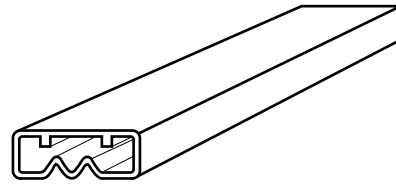
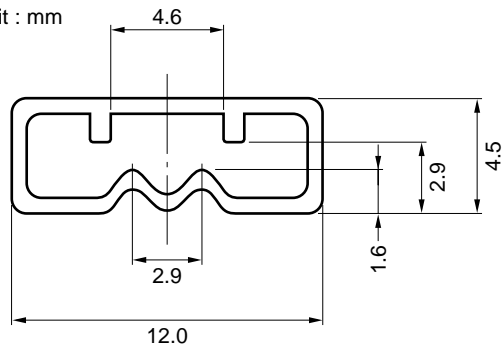


APPLIED TYPE NUMBER	QUANTITY (Pcs)	APPLIED TYPE NUMBER	QUANTITY (Pcs)
PS25xxL-1	100	PS26xxL	50
PS25xxL-2	45	PS86xxL	
PS25xxL-4	20	PS96xxL	

Remark Including Type number PSxxxxL2

10.1.3 SOP

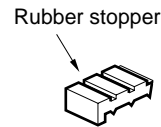
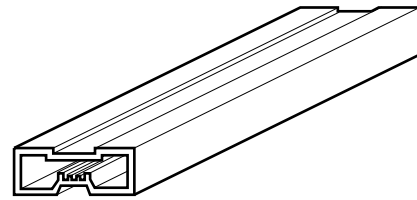
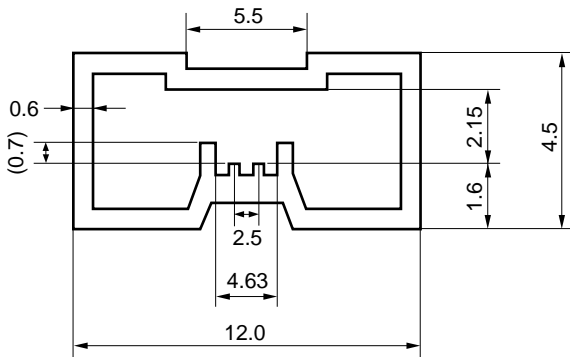
Unit : mm



Length : 515
 Thickness : ±0.4
 Material : Plastic (with antistatic finish)

APPLIED TYPE NUMBER	QUANTITY (Pcs)	APPLIED TYPE NUMBER	QUANTITY (Pcs)
PS27×× -1	100	PS87××	100
PS28×× -4	45	PS97××	
PS874×			

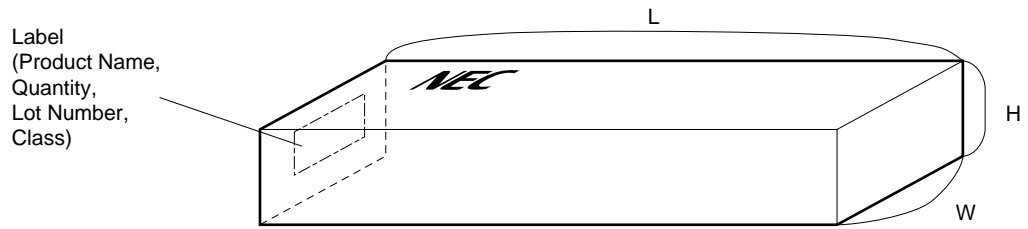
Unit: mm



Length : 515
 Thickness : ±0.4
 Material : Plastic (with antistatic finish)

APPLIED TYPE NUMBER	QUANTITY (Pcs)
PS87××	100
PS97××	

10.1.4 BOX



APPLIED TYPE NUMBER	DIMENSION (Unit: mm) (W × H × L)	QUANTITY (tube)
PS25xx-1 PS25xxL-1	169 × 76 × 536	1 to 50
PS25xx-2 PS25xxL-2		
PS25xx-4 PS25xxL-4		
PS26xx PS26xxL	169 × 141 × 536	51 to 100
PS86xx PS86xxL		
PS96xx PS96xxL		
PS27xx-1	169 × 76 × 536	1 to 100
PS28xx-4		
PS87xx	169 × 141 × 536	101 to 200
PS97xx		

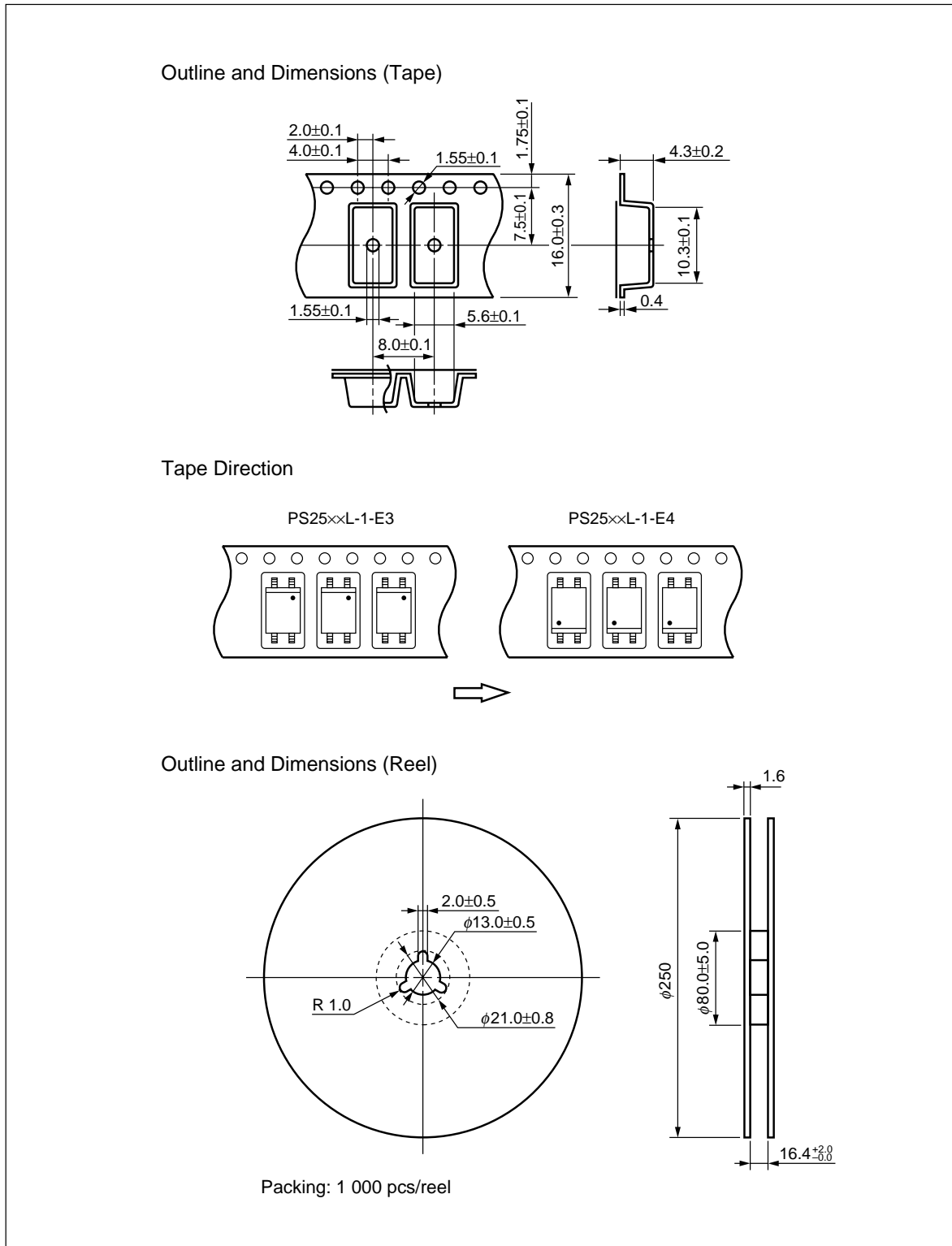
Remark Including Type number PSxxxxL1, PSxxxxL2

10.2 TAPING SPECIFICATIONS

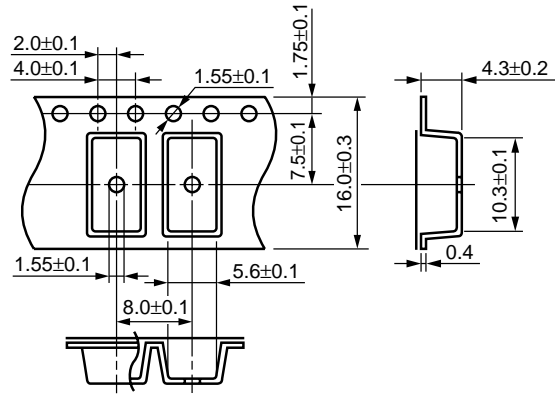
10.2.1 4-PIN DIP (LEAD BENDING TYPE FOR SURFACE MOUNT)

This taping-drawing shows four types: E3, E4, F3 and F4.

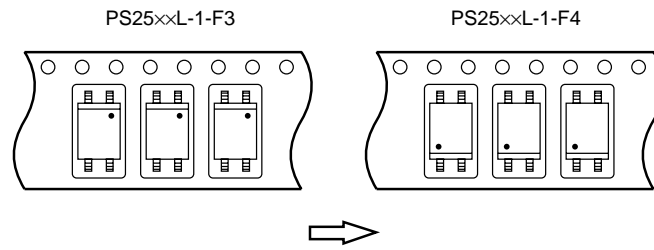
Standing type "F3" is recommended (Unit: mm).



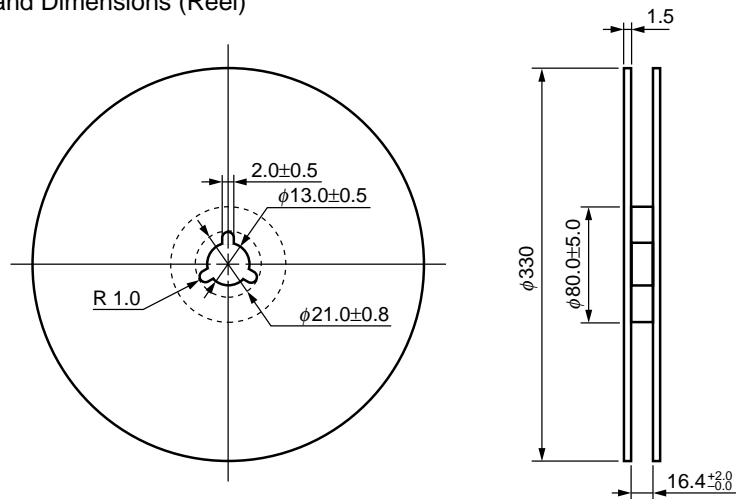
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)

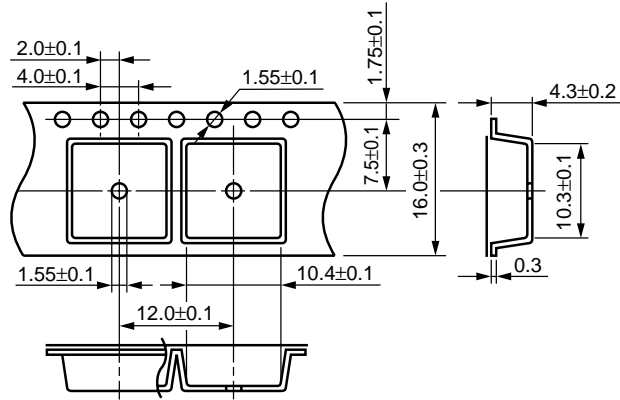


Packing: 2 000 pcs/reel

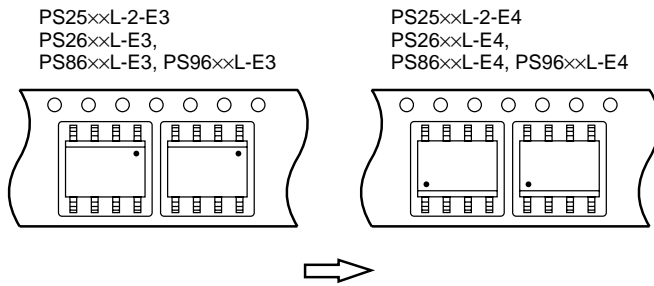
10.2.2 6, 8-PIN DIP (LEAD BENDING TYPE FOR SURFACE MOUNT)

This taping-drawing shows two types: E3 and E4.
 Standing type "E3" is recommended (Unit: mm).

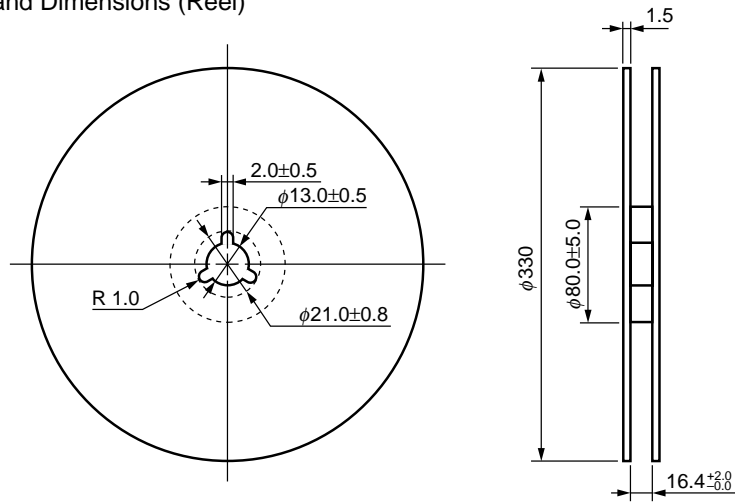
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



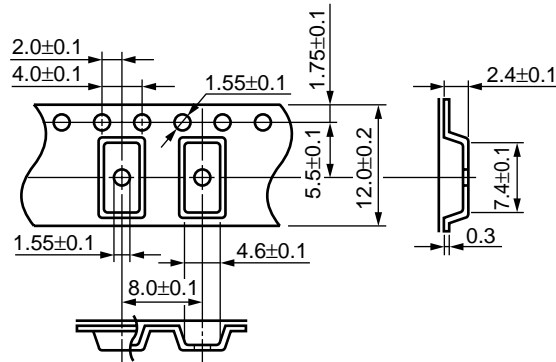
Packing: 1 000 pcs/reel

10.2.3 4-PIN SOP (LEAD PIN PITCH: 2.54 mm)

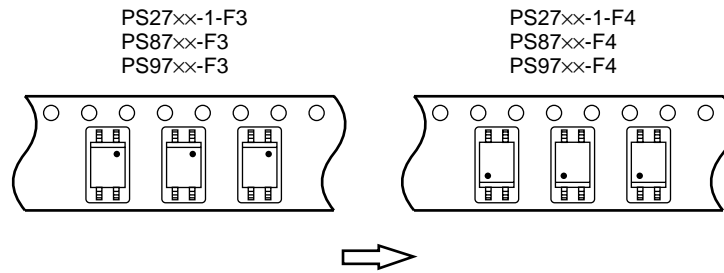
This taping-drawing shows two types: F3 and F4.

Standing type "F3" is recommended (Unit: mm).

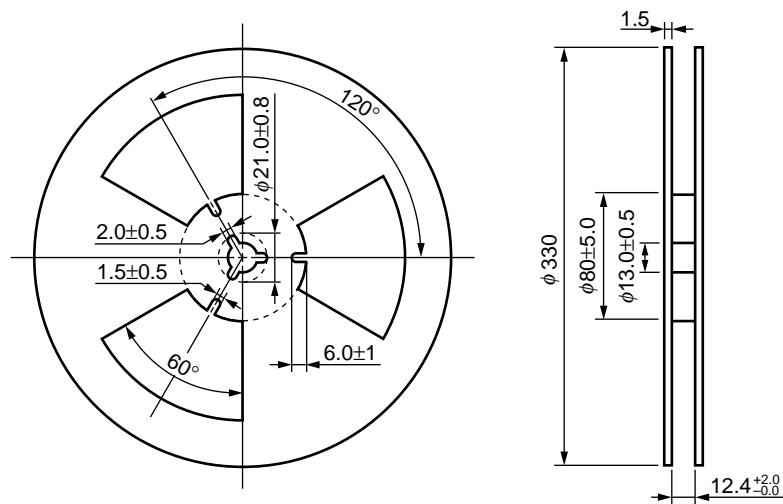
Outline and Dimensions (Tape)



Tape Direction



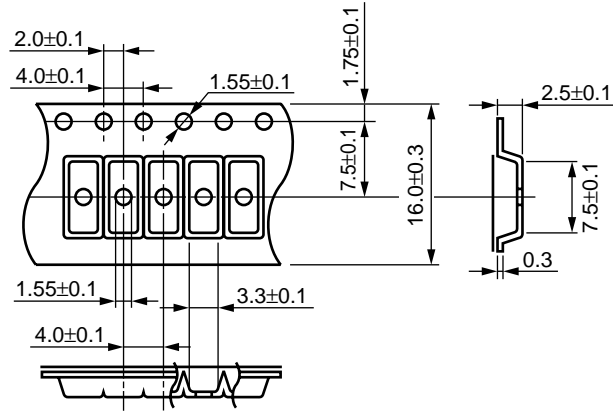
Outline and Dimensions (Reel)



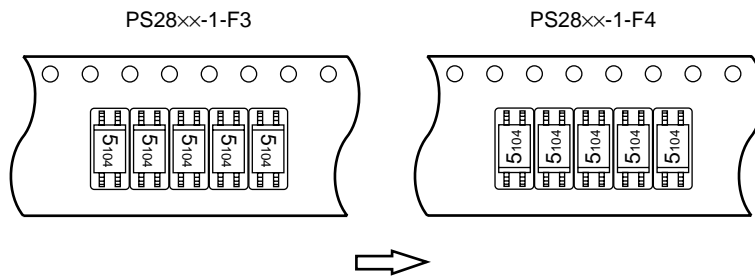
Packing: 3 500 pcs/reel

10.2.4 SMALL SOP (LEAD PIN PITCH: 1.27 mm)

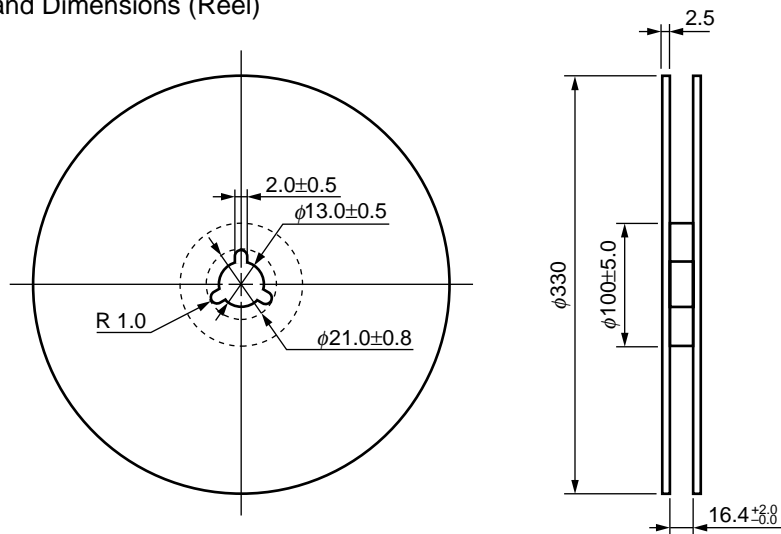
Outline and Dimensions (Tape)



Tape Direction

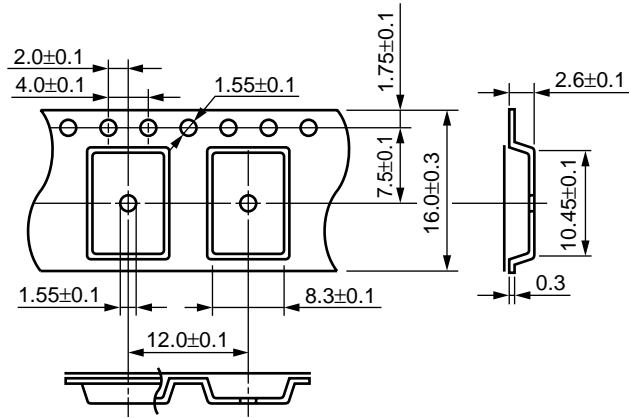


Outline and Dimensions (Reel)

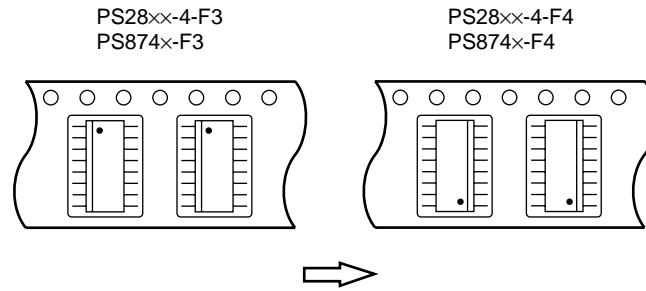


Packing: 3 500 pcs/reel

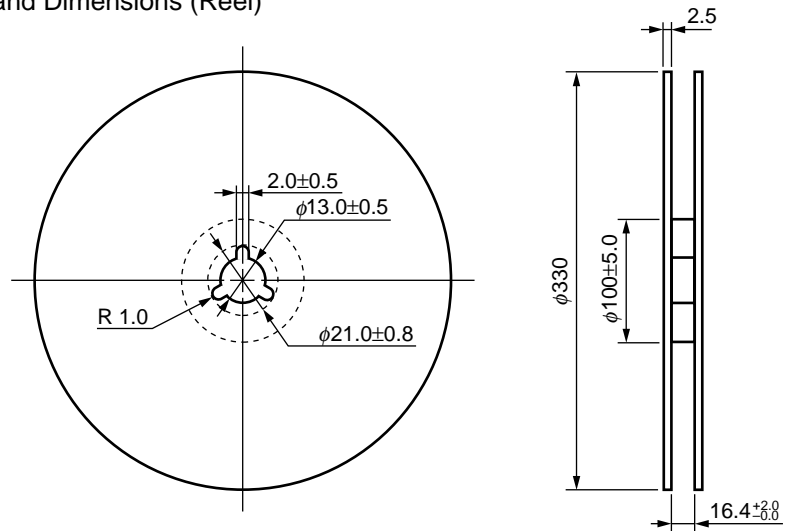
Outline and Dimensions (Tape)



Tape Direction



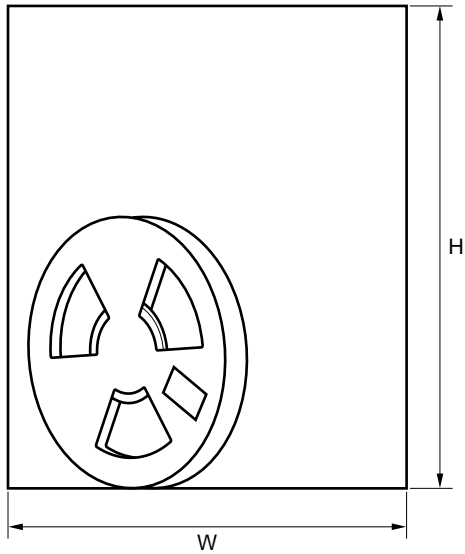
Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

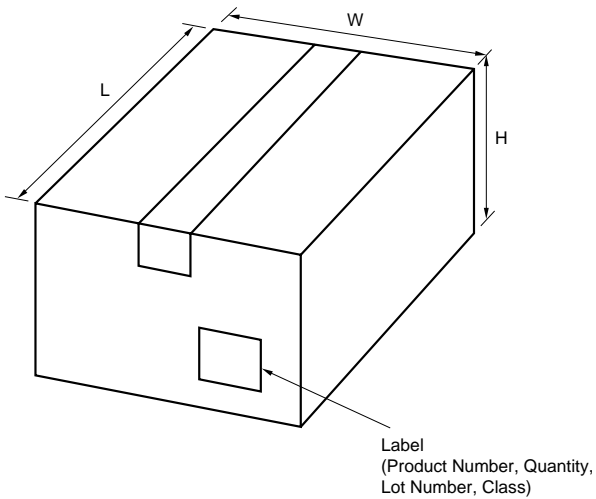
10.2.5 OUTLINE DRAWING

CONTAINER (Vinylbag)



TAPING PRODUCT NUMBER	ITEM	DIMENSIONS (Unit: mm) (H × W)	QUANTITY (reel)
PS25xxL-1-E3, E4		390 × 300	1
PS25xxL-1-F3, F4		490 × 420	
PS25xxL-2-E3, E4			
PS26xxL-E3, E4			
PS86xxL-E3, E4			
PS96xxL-E3, E4			
PS27xx-1-E3, E4		300 × 220	
PS87xx-E3, E4		490 × 420	
PS97xx-E3, E4			
PS27xx-1-F3, F4			
PS87xx-F3, F4			
PS97xx-F3, F4			
PS28xx-1-F3, F4			
PS28xx-4-F3, F4			

BOX



TAPING PRODUCT NUMBER	ITEM	DIMENSIONS (Unit: mm) (W × L × H)	QUANTITY (reel)
PS25xxL-1-E3, E4		280 × 355 × 380	10
PS25xxL-2-F3, F4			
PS25xxL-2-E3, E4			
PS26xxL-E3, E4			
PS86xxL-E3, E4			
PS96xxL-E3, E4			
PS27xx-1-E3, E4		210 × 240 × 140	5
PS87xx-E3, E4		340 × 450 × 230	10
PS97xx-E3, E4			
PS27xx-1-F3, F4			
PS87xx-F3, F4			
PS97xx-F3, F4			
PS28xx-1-F3, F4		280 × 355 × 380	10
PS28xx-4-F3, F4			
PS874x-F3, F4			

11. MARKING EXAMPLE

(1) PS25 $\times\times$ -1, PS2581 Series

No. 1 pin Mark

Trade Mark
Type Number*1
Assembly Lot

*1. Applicable type numbers are listed below.

2501	2533
2502	2534
2503	2535
2505	2561
2506	2562
2521	2565
2525	2566
2532	2581

M D 5 03

CTR Rank Code
In-house Code
Year Assembled (Last 1 Digit)
Week Assembled

Package	Made in Japan	Made in Taiwan
Standard PKG	①	③
New PKG	②	

(2) PS25 $\times\times$ -2, 4 Series

No. 1 pin Mark

Trade Mark and Country Assembled
Type Number*1
Assembly Lot

*1. Applicable type numbers are listed below.

PS2501-2, 4	PS2533-2, 4
PS2502-2, 4	PS2534-2, 4
PS2503-2, 4	PS2535-2, 4
PS2505-2, 4	PS2561-2, 4
PS2506-2, 4	PS2562-2, 4
PS2521-2, 4	PS2565-2, 4
PS2525-2, 4	PS2566-2, 4
PS2532-2, 4	

M D 5 03

CTR Rank Code
In-house Code
Year Assembled (Last 1 Digit)
Week Assembled

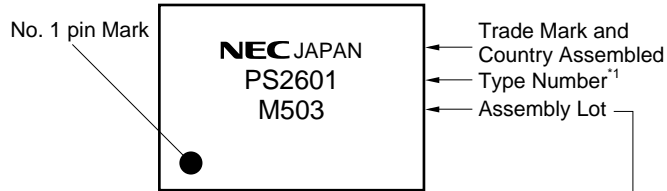
PS2501-4, PS2505-4 only

Package	Made in Japan	Made in Taiwan
Standard PKG	①	③
New PKG	②	

Table

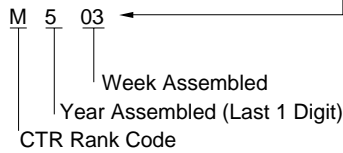
	①	②	③
PS2501-1	D	E	F
PS2502-1	D	E	F
PS2503-1	Blank	/	/
PS2505-1	D	E	F
PS2506-1	D	E	/
PS2521-1	Blank	/	/
PS2525-1	Blank	/	/
PS2532-1	Blank	E	F
PS2533-1	Blank	E	F
PS2534-1	Blank	E	F
PS2535-1	Blank	E	F
PS2561-1	Blank	E	F
PS2562-1	Blank	E	/
PS2565-1	Blank	E	F
PS2566-1	Blank	E	/
PS2581	/	E	/
PS2501-2	D	/	F
PS2502-2	D	/	F
PS2503-2	Blank	/	/
PS2505-2	D	/	F
PS2506-2	D	/	/
PS2521-2	Blank	/	/
PS2525-2	Blank	/	/
PS2532-2	Blank	/	F
PS2533-2	Blank	/	F
PS2534-2	Blank	/	F
PS2535-2	Blank	/	F
PS2561-2	Blank	/	F
PS2562-2	Blank	/	/
PS2565-2	Blank	/	F
PS2566-2	Blank	/	/
PS2501-4	D	E	F
PS2502-4	D	/	F
PS2503-4	Blank	/	/
PS2505-4	D	E	F
PS2506-4	D	/	/
PS2521-4	Blank	/	/
PS2525-4	Blank	/	/
PS2532-4	Blank	/	F
PS2533-4	Blank	/	F
PS2534-4	Blank	/	F
PS2535-4	Blank	/	F
PS2561-4	Blank	/	F
PS2562-4	Blank	/	/
PS2565-4	Blank	/	F
PS2566-4	Blank	/	/

(3) PS26xx, PS86xx, PS96xx Series



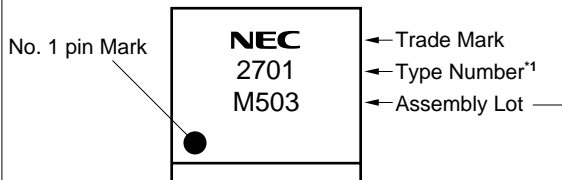
*1. Applicable type numbers are listed below.

PS2601	PS2622	PS8601
PS2602	PS2625	PS8602
PS2603	PS2626	PS9601
PS2604	PS2633	PS9611
PS2605	PS2634	PS9613
PS2606	PS2651	PS9614*2
PS2607	PS2652	PS9634
PS2608	PS2653	
PS2621	PS2654	



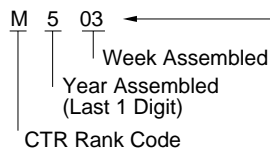
*2. Under development

(4) PS27xx-1, PS87xx, PS97xx Series



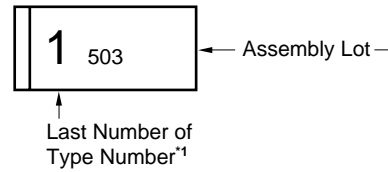
*1. Applicable type numbers are listed below.

2701	2761
2702	2765
2703	8701
2705	8741
2706	9701
2707	9711
2711	9713
2715	9714*2
2732	9715*2
2733	



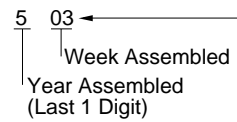
*2. Under development

(5) PS280x-1 Series

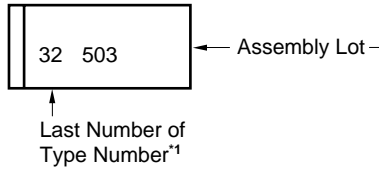


*1. Applicable type numbers are listed below.

PS2801-1
PS2802-1
PS2805-1
PS2806-1

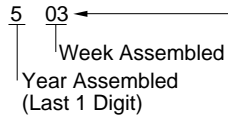


(6) PS28xx-1 Series



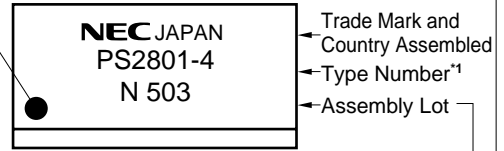
*1. Applicable type numbers are listed below.

- PS2811-1
- PS2815-1
- PS2832-1
- PS2833-1
- PS2861-1
- PS2865-1



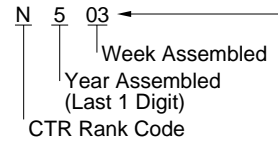
(7) PS28xx-4 Series

No. 1 pin Mark



*1. Applicable type numbers are listed below.

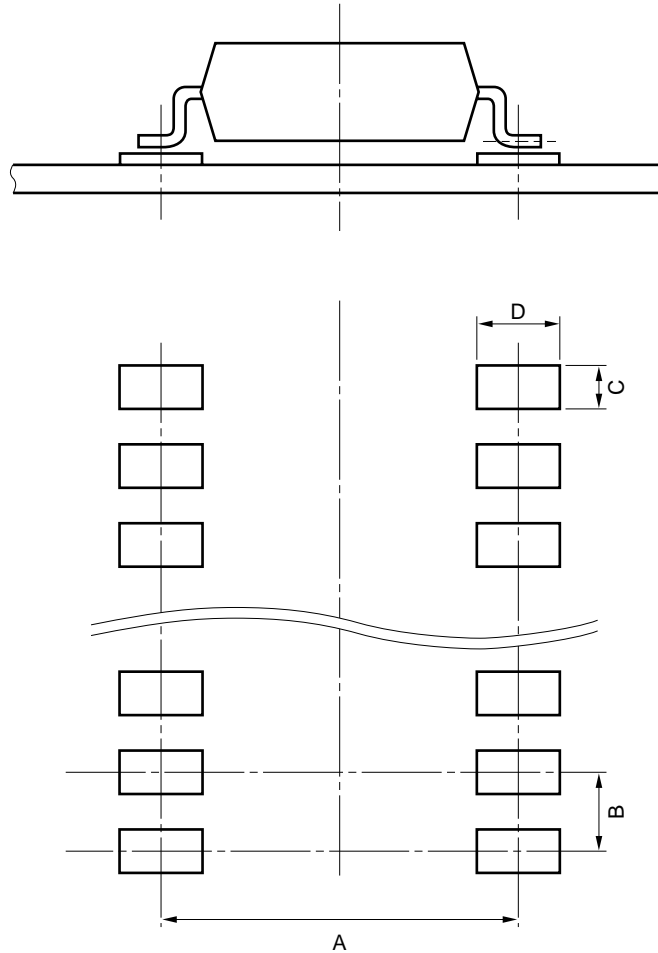
- PS2801-4
- PS2802-4
- PS2805-4
- PS2806-4
- PS2811-4
- PS2815-4
- PS2832-4
- PS2833-4



12. MOUNTING ON PRINTED WIRING BOARD

12.1 BOARD LAYOUT

The mount pad dimensions indicated below are recommended.



Mount pad dimensions

(Unit: mm)

PART NUMBER	A	B	C	D
DIP (Bending type for surface mount) 4, 6, 8, 12, 16-pin type PS2501L-1, etc.	8.2	2.54	1.7	2.2
DIP (Bending type for long creepage) 4, 6, 8-pin type PS2561L2-1, etc.	10.2	2.54	1.7	2.2
SOP 4, 8, 16-pin type PS2701-1, etc.	6.25	2.54	0.8	1.45
Small SOP (pin pitch: 1.27 mm) 4, 16-pin type PS2801-1, etc.	6.25	1.27	0.8	1.45

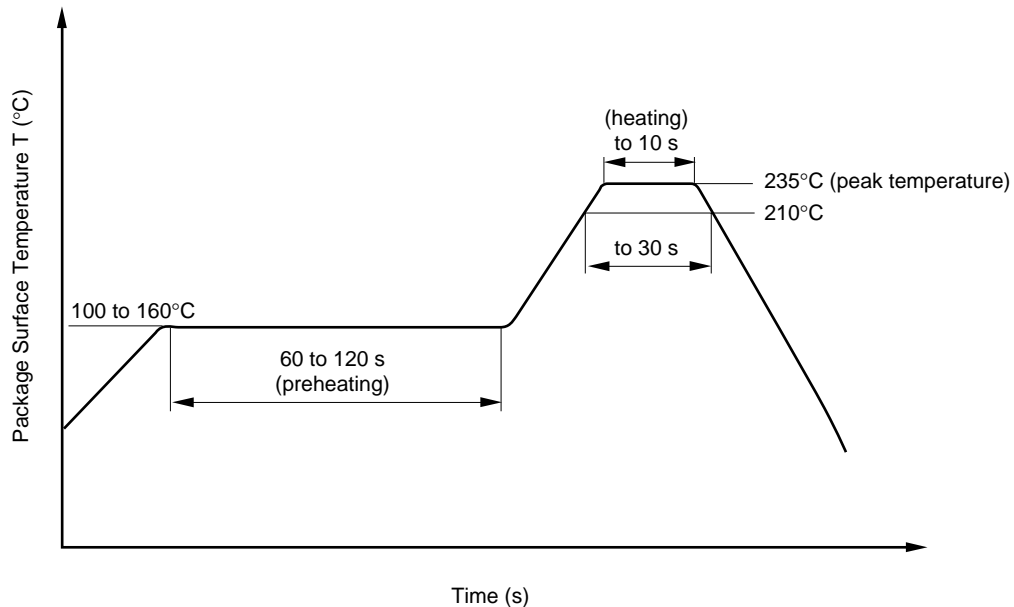
13. CAUTIONS

13.1 SOLDERING PRECAUTIONS

(1) Infrared reflow soldering

- Peak reflow temperature 235°C or below (package surface temperature)
- Time of temperature higher than 210°C 30 seconds or less
- Number of reflows Three
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

Recommended Temperature Profile of Infrared Reflow



(2) Dip soldering

- Temperature 260°C or below (molten solder temperature)
- Time 10 seconds or less
- Number of times One (Allowed to be dipped in solder including plastic mold portion except the PS8741.)
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

(3) Caution

- Fluxes
Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

13.2 CAUTIONS REGARDING NOISE

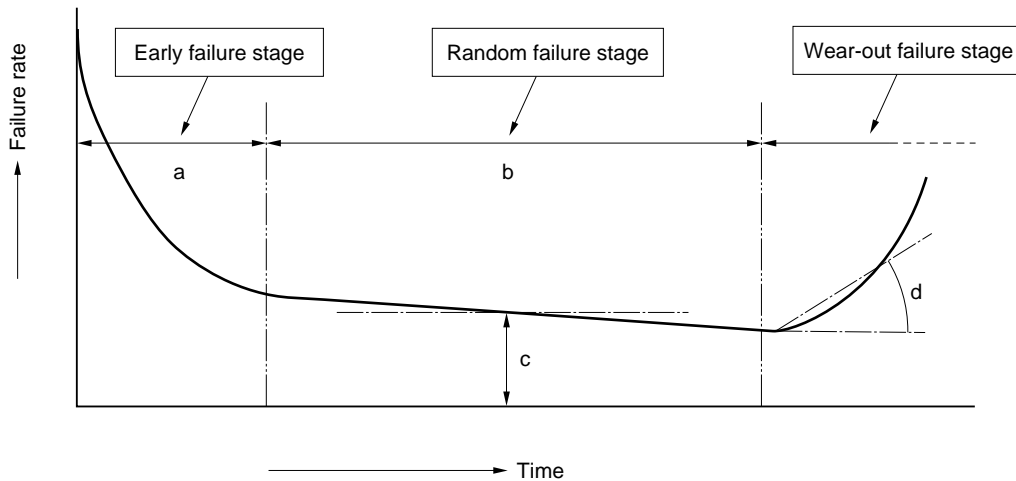
Be aware that except in the case of the PS8xxx, PS9xxx, when voltage is applied suddenly between the photocoupler's input and output or between corrector-emitters at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

14. FAILURE RATE

14.1 CONCEPT OF FAILURE RATE

The failure rate is a widely used indicator of reliability in semiconductors. It describes the rate of failure in a given time period. The failure rate changes over time, as is shown in Figure 14-1. The symbols (a to d) in Figure 14-1 are also noted in parentheses below.

Figure 14-1. Time-related Changes in Failure Rate



- **Early failure stage:** During this stage, failures occur at a high rate following the initial operation of semiconductor devices. Latent causes of failure that were not detected during previous screening tend to become apparent soon after the device is initially put into operation. Since these failures are mainly due to manufacturing defects or material defects, they occur very soon and thus the failure rate declines rapidly over time. Advances in manufacturing process control technologies have helped to reduce the failure rate during the early failure stage. In addition, screening has enabled failures that occur during the early failure stage (a) to be experienced as part of the manufacturing process, which has also helped to lower the failure rate once the manufactured devices begin operating.
- **Random failure stage:** During this stage, various failures that were not screened out occur with random frequency. The failure rate during this period remains fairly constant since failures that occur during this period are sporadic (random) and are due to complex factors, such as design quality and the use environment. Methods to suppress the failure rate (c) and to increase the life of semiconductors before they reach their wear-out failure stage, include building an extra reliability margin into the semiconductor's design and establishing a safety margin in the semiconductor's use conditions.
- **Wear-out failure stage:** During this stage, failures occur with increasingly frequency over time and are caused by age-related wear and fatigue. Such failures are often seen in products that have outlived their useful life. In devices whose components can be replaced to extend useful life (called repairable system), analyzing the start of their wear-out failure stage as the sum of (a) and (b) and the manner in which wear-out failures occur (d) can make it possible to implement preventive maintenance whereby certain components are replaced before they fail.

The basic failure rate shown below is estimated from the results of life-testing the failure rate (λ) of the random failure area and from performance records in the marketplace.

14.2 CALCULATING THE FAILURE RATE

The semiconductor failure rate (λ) is determined from the reliability of a device inherent in its design and the conditions under which it is used by the customer. For the former parameter, the basic failure rate is $E_a = 0.7$, λ_b (fit) = 10. For the latter parameter, the conditions include the temperature at which the device is used, and for transistors and FETs, the applied voltage. (All other conditions are those that comply with the recommended condition specifications in NEC's data sheets and data books).

1) Calculation procedure

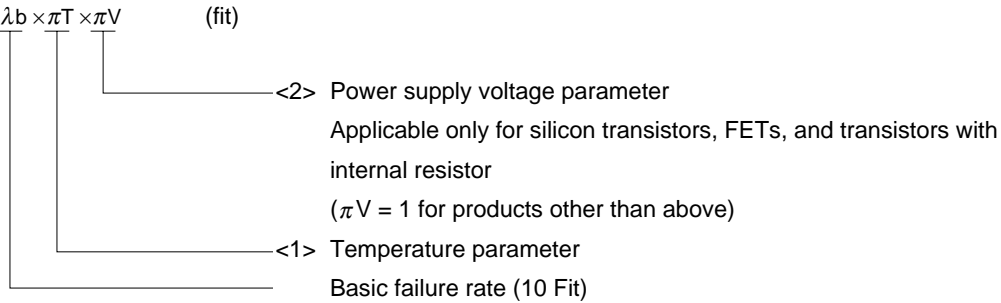
- <1> Determine the basic failure rate (λ_b) of the relevant product.
- <2> Calculate the parameters (π_T , π_V) from the customer's product usage conditions.
- <3> Insert the value calculated in <2> above into the failure rate estimation formula to determine the failure rate (λ). (Refer to the following page for <2> and <3>.)

2) Calculation formula

The device's failure rate (λ) is determined based on the device-specific basic failure rate (λ_b) and the use conditions. After considering the hypothetical use environment, the failure rate can be calculated via the following steps.

- Failure rate estimation formula (λ) (failure rate during random failure period)

$$\lambda = \lambda_b \times \pi T \times \pi V \quad (\text{fit})$$



- <1> Temperature parameter (πT)

$$\pi T = \exp \left(11600 \times E_a \times \left(\frac{1}{273 + 55} - \frac{1}{273 + T_a(j)} \right) \right)$$

E_a : Activation energy (0.7)

T_a : Ambient temperature during use (for IC)

T_j : Junction temperature during use (for discrete device)

Expressed as $T_a(j)$ in above formula

πT Reference Chart (when $E_a = 0.7$ eV)

$T_a(j)$	40	45	50	55	60	65	70	75	80	85	90	95	100	110
πT	0.31	0.46	0.68	1	1.45	2.08	2.95	4.14	5.77	7.96	10.88	14.74	19.85	34.99

- <2> Power supply voltage parameter (πV) – Applicable only for silicon transistors, FETs, and transistors with internal resistor

$$S = \frac{\text{Used power supply voltage (VCE or VDS)}}{\text{Absolute maximum rated voltage (VCEO or VDSS)}}$$

When $S > 0.2$, $\pi V = \exp(2.86 \times S - 2.29)$

When $S \leq 0.2$, $\pi V = 0.18$

(Calculation standard)

- Reliability level: 60 %
- Basic temperature = 55 °C
- Used under recommended conditions

15. WEB SITE INFORMATION

The Opto-Electronics homepage has many documents available for viewing or download. Please see our web site at <http://www.ic.nec.co.jp/opto/>.

[MEMO]

For further information, please contact:

NEC Corporation

NEC Building
7-1, Shiba 5-chome, Minato-ku
Tokyo 108-8001, Japan
Tel: 03-3454-1111
<http://www.ic.nec.co.jp/>

[North & South America]

California Eastern Laboratories

4590 Patrick Henry Drive
Santa Clara, CA95054-1817, USA
Tel: 408-988-3500
Fax: 408-988-0279
<http://www.cel.com/>

Western Region

6033 W. Century Blvd., Suite 840
Los Angeles, CA90045, USA
Tel: 310-645-0985
Fax: 310-645-3149

Central Region

801 Warrenville Road, Suite 65
Lisle, IL 60532, USA
Tel: 630-241-3040
Fax: 630-241-3057

Eastern Region

Two Central Street, Suite 204
Middleton, MA 01949, USA
Tel: 978-762-7400
Fax: 978-762-7444

NEC do Brasil S.A.

Electron Devices Division
Rodovia Presidente Dutra, Km 214
07210-902-Guarulhos-SP Brasil
Tel: 55-11-6462-6810
Fax: 55-11-6462-6829

[Europe]

NEC Electronics (Germany) GmbH

Kanzlerstr. 2,
40472 Düsseldorf
Germany
Tel: 0211-650302
Fax: 0211-6503490
<http://www.nec.de/>

Munich Office

Arabellastr. 17
81925 München, Germany
Tel: 089-921003-0
Fax: 089-92100315

Stuttgart Office

Industriestr. 3
D-70565 Stuttgart, Germany
Tel: 0711-99010-0
Fax: 0711-99010-19

Hannover Office

Podbielskistr. 164
D-30177 Hannover, Germany
Tel: 0511-33402-0
Fax: 0511-33402-34

Benelux Office

Boschdijk 187a
5612 HB Eindhoven,
The Netherlands
Tel: 040-2445845
Fax: 040-2444580

Scandinavia Office

P.O. Box 134
18322 Taeby, Sweden
Tel: 08-6380820
Fax: 08-6380388

NEC Electronics (UK) Limited

Cygnus House, Sunrise Parkway,
Milton Keynes, MK14 6NP, U.K.
Tel: 01908-691-133
Fax: 01908-670-290

NEC Electronics (France) S.A.

9, rue Paul Dautier-BP 187
78142 Velizy-Villacoublay Cédex
France
Tel: 01-30-67-58-00
Fax: 01-30675899

Madrid Office

Juan Esplandiú, 15
28007 Madrid, Spain
Tel: 91-504-2787
Fax: 91-504-2860

NEC Electronics Italiana s.r.l.

Via Fabio Filzi, 25/A,
20124 Milano, Italy
Tel: 02-667541
Fax: 02-66754299

[Asia & Oceania]

NEC Electronics Hong Kong Limited

12/F., Cityplaza 4,
12 Taikoo Wan Road, Hong Kong
Tel: 2886-9318
Fax: 2886-9022/9044

Seoul Branch

10F, ILSONG Bldg., 157-37,
Samsung-Dong, Kangnam-Ku
Seoul, the Republic of Korea
Tel: 02-528-0303
Fax: 02-528-4411

NEC Electronics Taiwan Ltd.

7F, No. 363 Fu Shing North Road
Taipei, Taiwan, R. O. C.
Tel: 02-2719-2377
Fax: 02-2719-5951

NEC Electronics Singapore Pte. Ltd.

101 Thomson Road #04-01/05
United Square, Singapore 307591
Tel: 65-253-8311
Fax: 65-250-3583