CEL

PHOTOCOUPLER
PS2805-1,PS2805-4

HIGH ISOLATION VOLTAGE AC INPUT RESPONSE TYPE SSOP PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS2805-1 and PS2805-4 are optically coupled isolators containing GaAs light emitting diodes and an NPN silicon phototransistor in a plastic SSOP for high density applications.

This package has shield effect to cut off ambient light.

FEATURES

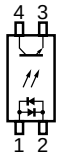
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Small and thin package (4,16-pin SSOP, Pin pitch 1.27 mm)
- High collector to emitter voltage (V_{CEO} = 80 V)
- AC input response
- High-speed switching (t_r = 3 μs TYP., t_f = 5 μs TYP.)
- Ordering number of tape product: PS2805-1-F3, F4, PS2805-4-F3, F4
- ★ Pb-Free product
- ★ Safety standards: PS2805-1, -4
  - UL approved: File No. E72422
  - BSI approved: No. 8188, 8189
  - DIN EN60747-5-2 (VDE0884 Part2) approved (Option)

APPLICATIONS

- Programmable logic controllers
- Measuring instruments
- Hybrid IC

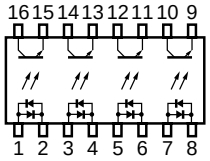
PIN CONNECTION
(Top View)

PS2805-1



1. Anode, Cathode
2. Cathode, Anode
3. Emitter
4. Collector

PS2805-4



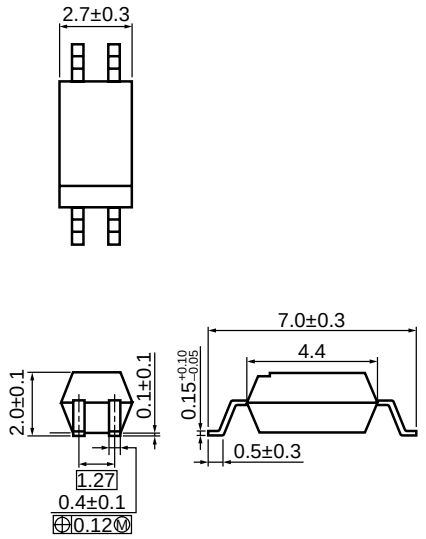
1. 3. 5. 7. Anode, Cathode
2. 4. 6. 8. Cathode, Anode
9. 11. 13. 15. Emitter
10. 12. 14. 16. Collector

Document No. PN10253EJ02V0DS (2nd edition)

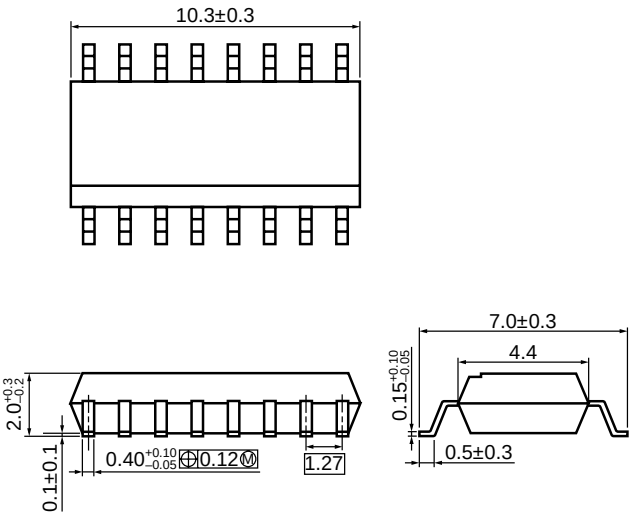
The mark ★ shows major revised points.

PACKAGE DIMENSIONS (UNIT: mm)

PS2805-1

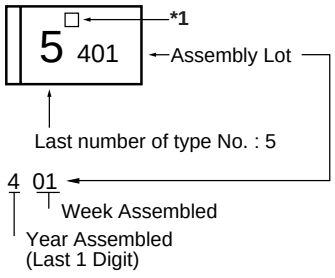


PS2805-4



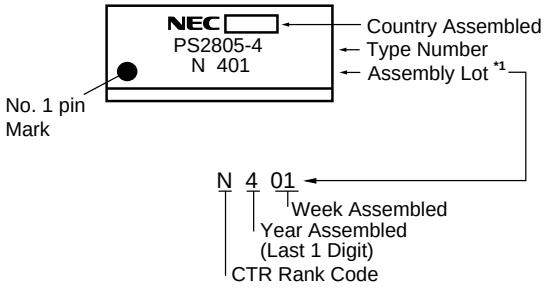
★ MARKING EXAMPLE

PS2805-1



***1** For external plating Pb-Free products, perform marking to indicate that these are Pb-Free products.

PS2805-4



***1** For the external plating Pb-Free product, L is indicated at the second digit of the rank.

★ ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number *1
PS2805-1	PS2805-1	Solder	50 pcs (Tape 50 pcs cut)	Standard products	PS2805-1
PS2805-1-F3	PS2805-1-F3	contains lead	Embossed Tape 3 500 pcs/reel	(UL approved)	
PS2805-1-F4	PS2805-1-F4				
PS2805-1-V	PS2805-1-V		50 pcs (Tape 50 pcs cut)	DIN EN60747-5-2	
PS2805-1-V-F3	PS2805-1-V-F3		Embossed Tape 3 500 pcs/reel	(VDE0884 Part2)	
PS2805-1-V-F4	PS2805-1-V-F4			Approved (Option)	
PS2805-4	PS2805-4		Magazine Case 45 pcs	Standard products	PS2805-4
PS2805-4-F3	PS2805-4-F3		Embossed Tape 2 500 pcs/reel	(UL approved)	
PS2805-4-F4	PS2805-4-F4				
PS2805-4-V	PS2805-4-V		Magazine Case 45 pcs	DIN EN60747-5-2	
PS2805-4-V-F3	PS2805-4-V-F3		Embossed Tape 2 500 pcs/reel	(VDE0884 Part2)	
PS2805-4-V-F4	PS2805-4-V-F4			Approved (Option)	
PS2805-1	PS2805-1-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products	PS2805-1
PS2805-1-F3	PS2805-1-F3-A		Embossed Tape 3 500 pcs/reel	(UL approved)	
PS2805-1-F4	PS2805-1-F4-A				
PS2805-1-V	PS2805-1-V-A		50 pcs (Tape 50 pcs cut)	DIN EN60747-5-2	
PS2805-1-V-F3	PS2805-1-V-F3-A		Embossed Tape 3 500 pcs/reel	(VDE0884 Part2)	
PS2805-1-V-F4	PS2805-1-V-F4-A			Approved (Option)	
PS2805-4	PS2805-4-A		Magazine Case 45 pcs	Standard products	PS2805-4
PS2805-4-F3	PS2805-4-F3-A		Embossed Tape 2 500 pcs/reel	(UL approved)	
PS2805-4-F4	PS2805-4-F4-A				
PS2805-4-V	PS2805-4-V-A		Magazine Case 45 pcs	DIN EN60747-5-2	
PS2805-4-V-F3	PS2805-4-V-F3-A		Embossed Tape 2 500 pcs/reel	(VDE0884 Part2)	
PS2805-4-V-F4	PS2805-4-V-F4-A			Approved (Option)	

***1** For the application of the Safety Standard, following part number should be used.

ABSOLUTE MAXIMUM RATINGS (Unless otherwise specified, T_A = 25°C)

Parameter		Symbol	Ratings		Unit
			PS2805-1	PS2805-4	
Diode	Forward Current (DC)	I_F	±50		mA
	Power Dissipation Derating	$\Delta P_D/°C$	0.6	0.8	mW/°C
	Power Dissipation	P_D	60	80	mW/ch
	Peak Forward Current *1	I_{FP}	±1		A
Transistor	Collector to Emitter Voltage	V_{CEO}	80		V
	Emitter to Collector Voltage	V_{ECO}	6		V
	Collector Current	I_C	50		mA/ch
	Power Dissipation Derating	$\Delta P_C/°C$	1.2		mW/°C
	Power Dissipation	P_C	120		mW/ch
Isolation Voltage *2		BV	2 500		Vr.m.s.
Operating Ambient Temperature		T_A	−55 to +100		°C
Storage Temperature		T_{stg}	−55 to +150		°C

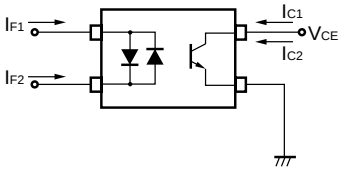
***1** PW = 100 μs, Duty Cycle = 1%

***2** AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output.
Pins 1-2 shorted together, 3-4 shorted together (PS2805-1).
Pins 1-8 shorted together, 9-16 shorted together (PS2805-4).

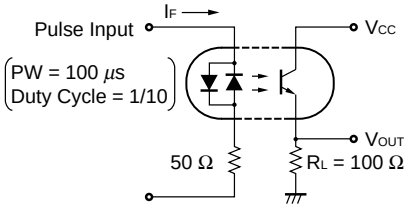
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = ±5 mA		1.1	1.4	V
	Terminal Capacitance	C_t	V = 0 V, f = 1.0 MHz		30		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	V_{CE} = 80 V, I_F = 0 mA			100	nA
Coupled	Current Transfer Ratio (I_C/I_F)	CTR	I_F = ±5 mA, V_{CE} = 5 V	80		600	%
	CTR Ratio *1	CTR1/ CTR2	I_F = 5 mA, V_{CE} = 5 V	0.3	1.0	3.0	
	Collector Saturation Voltage	$V_{CE(sat)}$	I_F = ±10 mA, I_C = 2 mA			0.3	V
	Isolation Resistance	R_{I-O}	V_{I-O} = 1.0 kV_{DC}	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1.0 MHz		0.4		pF
	Rise Time *2	t_r	V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω		3		μs
	Fall Time *2	t_f			5		

***1** CTR1 = I_{C1}/I_{F1}, CTR2 = I_{C2}/I_{F2}

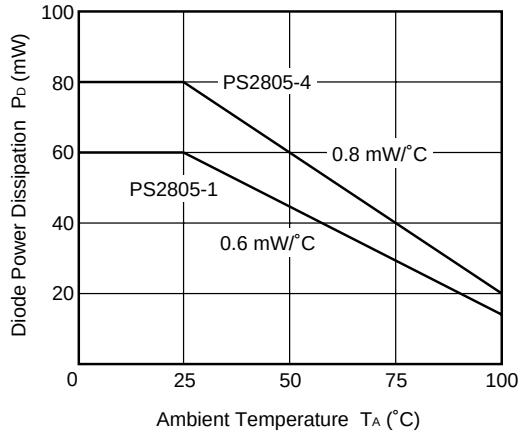


***2** Test circuit for switching time

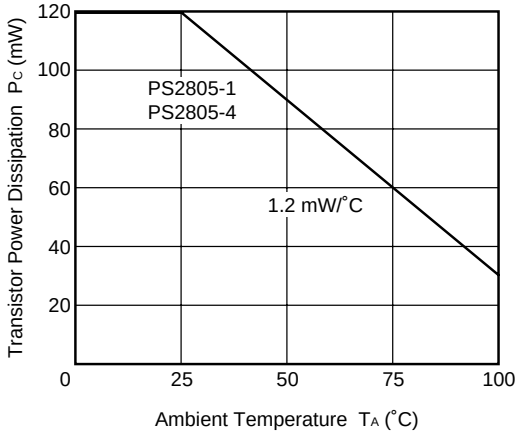


TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = 25°C)

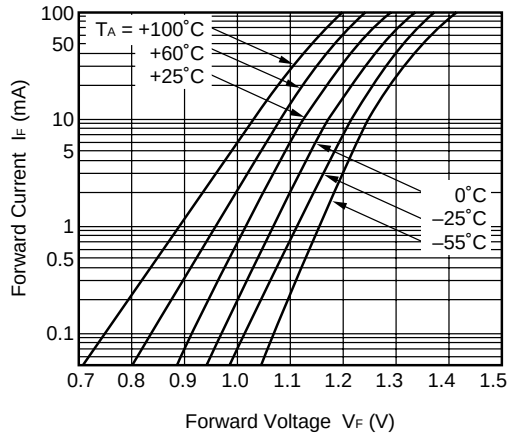
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



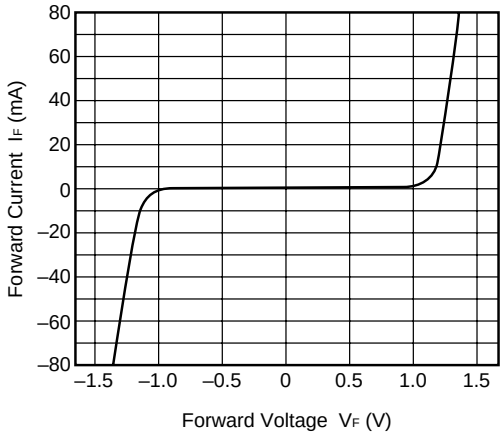
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



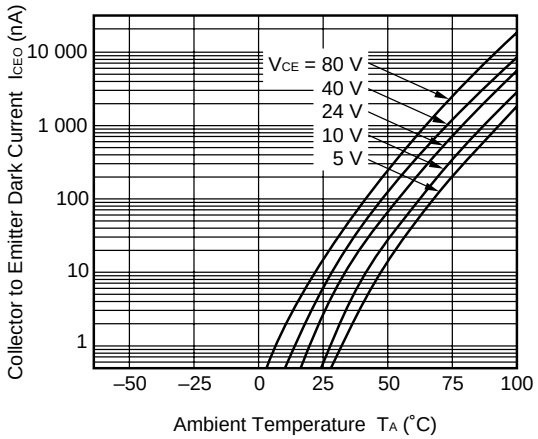
FORWARD CURRENT vs. FORWARD VOLTAGE



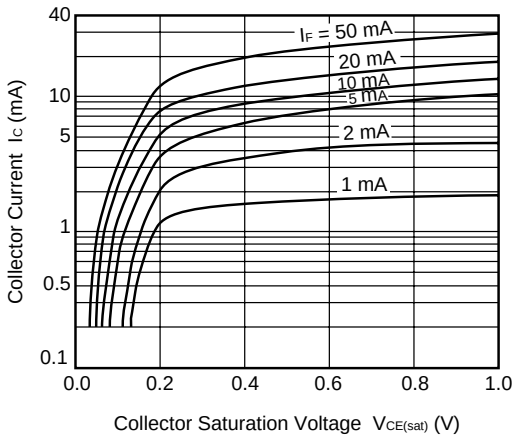
FORWARD CURRENT vs. FORWARD VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

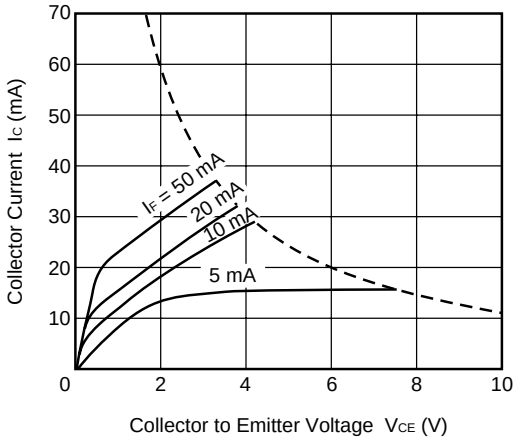


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

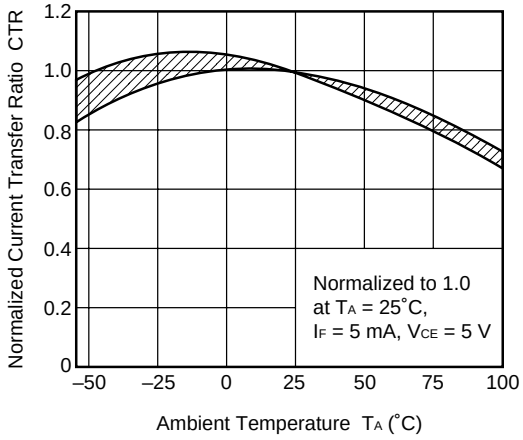


Remark The graphs indicate nominal characteristics.

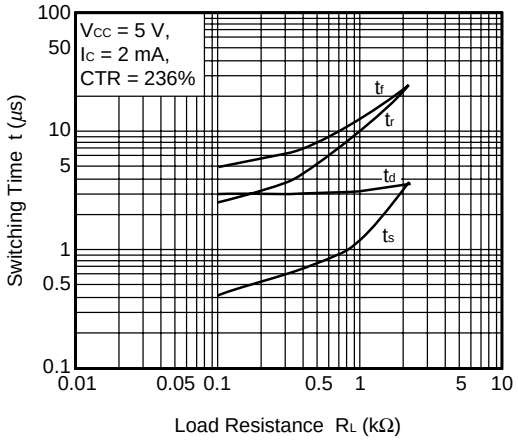
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



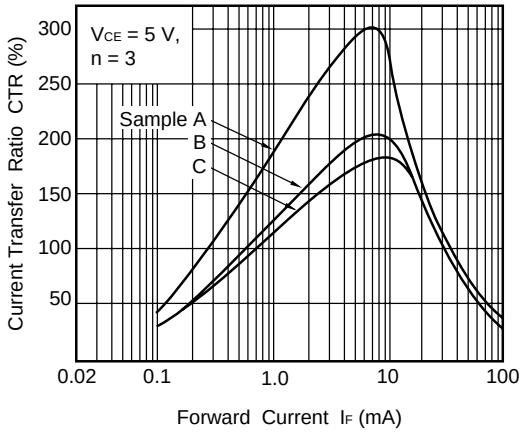
NORMALIZED CURRENT TRANSFER
RATIO vs. AMBIENT TEMPERATURE



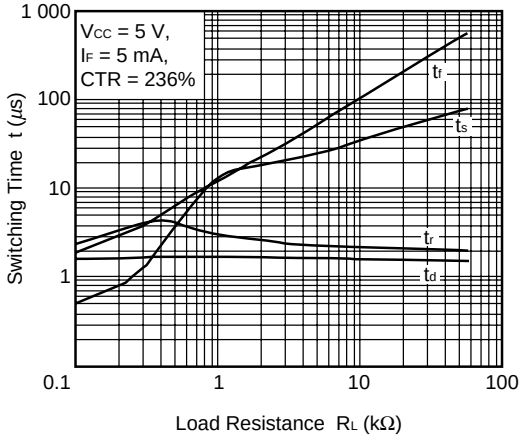
★ SWITCHING TIME vs.
LOAD RESISTANCE



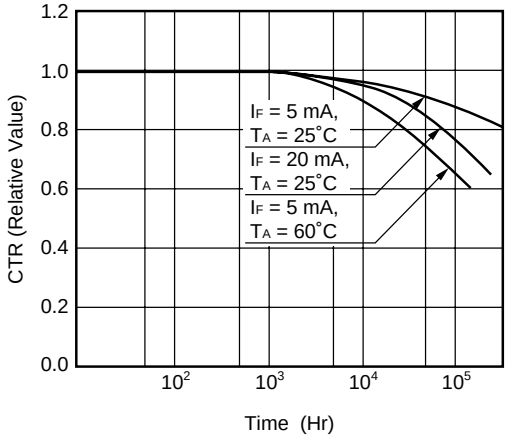
CURRENT TRANSFER RATIO vs.
FORWARD CURRENT



SWITCHING TIME vs.
LOAD RESISTANCE

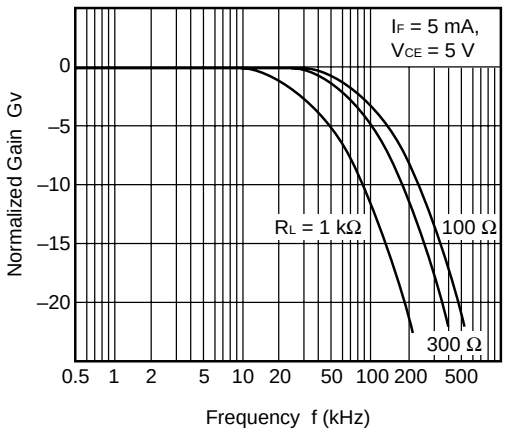


LONG TERM CTR DEGRADATION



Remark The graphs indicate nominal characteristics.

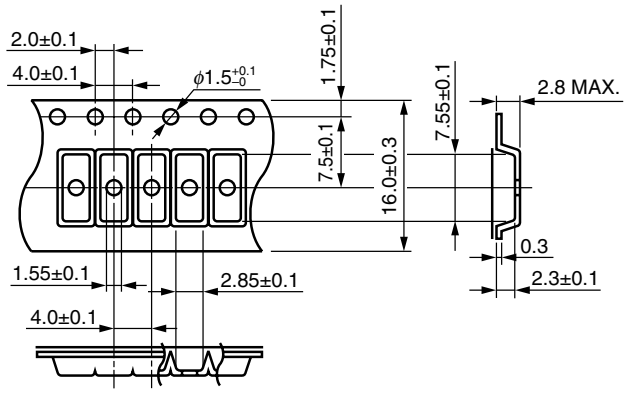
FREQUENCY RESPONSE



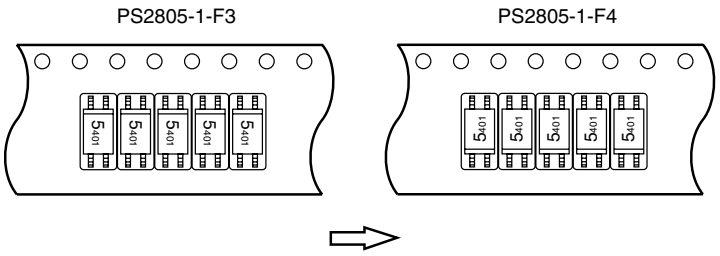
Remark The graph indicates nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

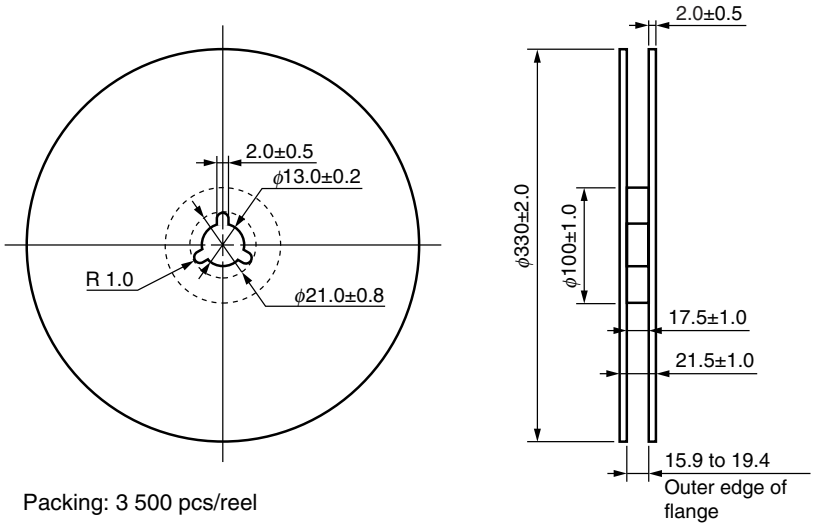
Outline and Dimensions (Tape)



Tape Direciton

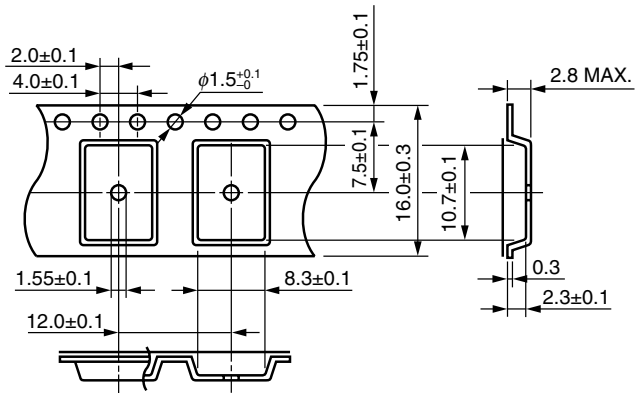


Outline and Dimensions (Reel)

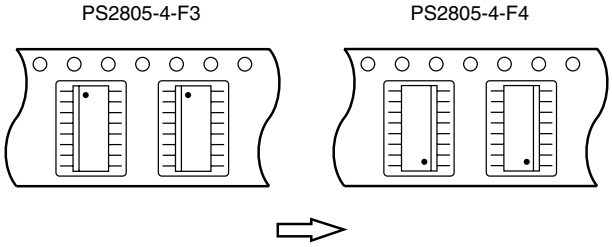


Packing: 3 500 pcs/reel

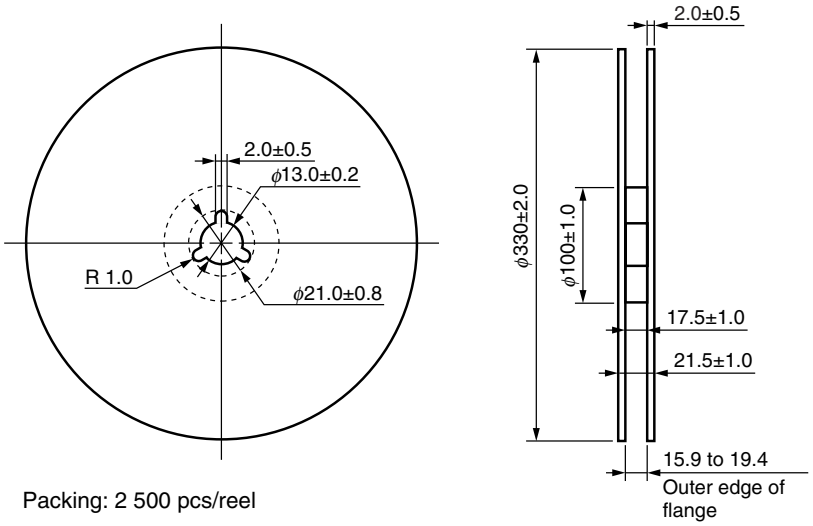
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

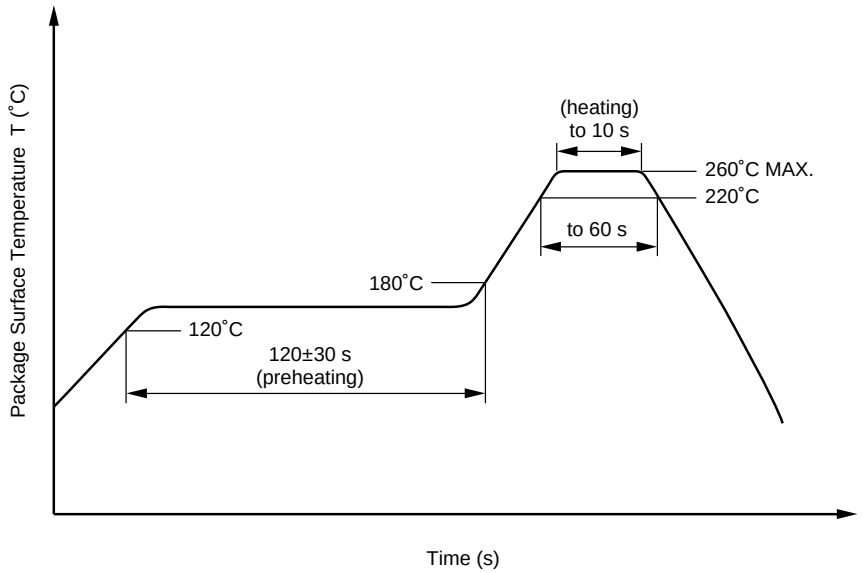
★ NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

• Peak reflow temperature	260°C or below (package surface temperature)
• Time of peak reflow temperature	10 seconds or less
• Time of temperature higher than 220°C	60 seconds or less
• Time to preheat temperature from 120 to 180°C	120±30 s
• 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) Wave soldering

• Temperature	260°C or below (molten solder temperature)
• Time	10 seconds or less
• Preheating conditions	120°C or below (package surface temperature)
• Number of times	One (Allowed to be dipped in solder including plastic mold portion.)
• Flux	Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(3) Soldering by soldering iron

• Peak temperature (lead part temperature)	350°C or below
• Time (each pins)	3 seconds or less
• Flux	Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead.

(b) Please be sure that the temperature of the package would not be heated over 100°C.

(4) Cautions

• Fluxes

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

2. Cautions regarding noise

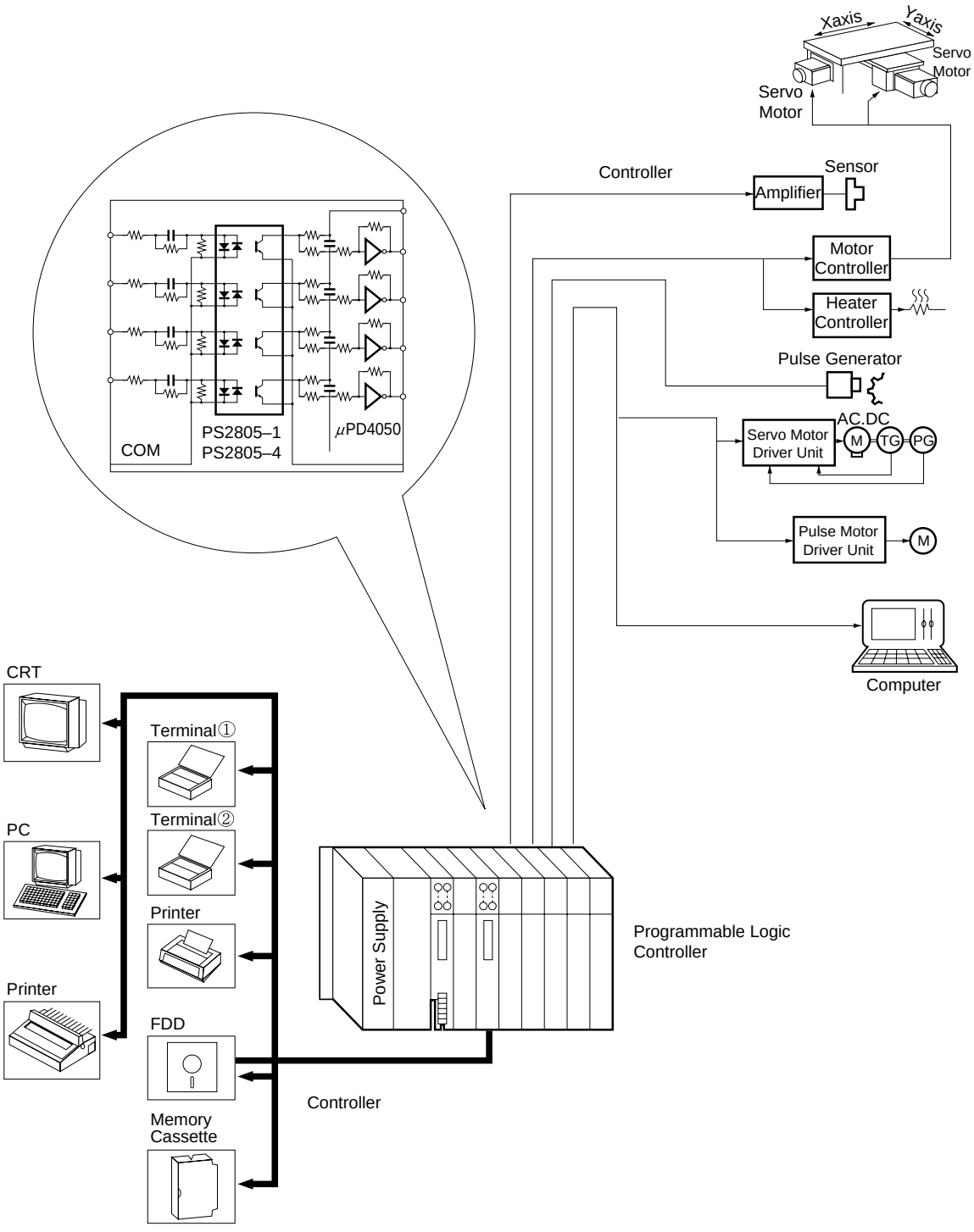
Be aware that when voltage is applied suddenly between the photocoupler's input and output or between collector-emitters at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

USAGE CAUTIONS

1. Protect against static electricity when handling.
2. Avoid storage at a high temperature and high humidity.

PROGRAMMABLE LOGIC CONTROLLERS EXAMPLE

Purpose: In-out interface



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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
Lead (Pb)	< 1000 PPM	-A	-AZ
		Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.