DATA SHEET

NEC

PHOTOCOUPLER

PS2815-1,PS2815-4

LOW (AC) INPUT CURRENT, HIGH CTR 4, 16-PIN SSOP PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS2815-1 and PS2815-4 are optically coupled isolators containing GaAs light emitting diodes and an NPN silicon phototransistor in a plastic SSOP for high density applications.

The package is a Small SOP (Small Outline Package) type for high density mounting applications.

FEATURES

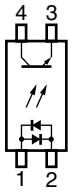
- AC input response
- High current transfer ratio (CTR = 200% TYP. @ $I_F = \pm 1$ mA)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Small and thin package (4, 16-pin SSOP, Pin pitch 1.27 mm)
- Ordering number of tape product: PS2815-1-F3, F4, PS2815-4-F3, F4
- ★ • Pb-Free product
- ★ • Safety standards: PS2815-1, -4
  - UL approved: File No. E72422
  - DIN EN60747-5-2 (VDE0884 Part2) approved (Option)

APPLICATIONS

- Programmable logic controllers
- Modem/FAX

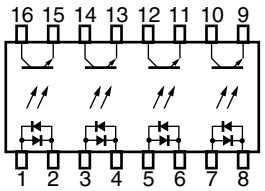
PIN CONNECTION
(Top View)

PS2815-1



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

PS2815-4



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

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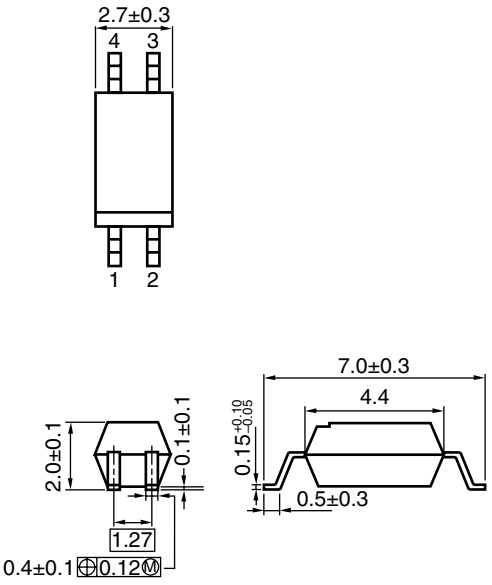
Date Published April 2005 CP(K)
Printed in Japan

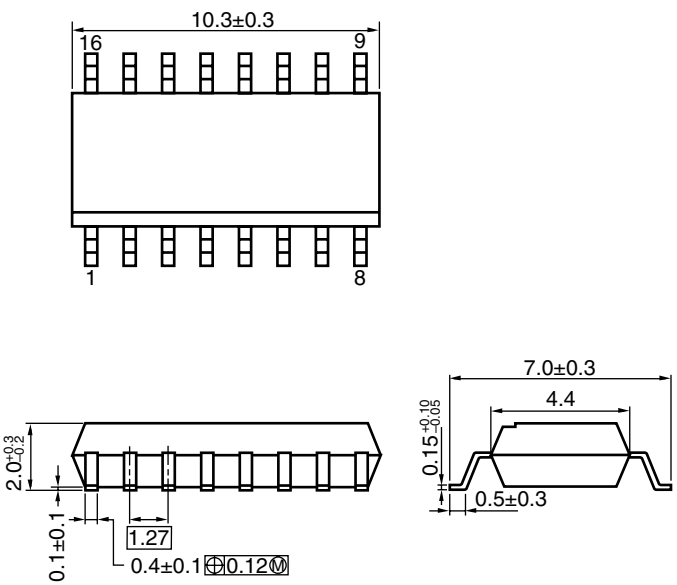
The mark ★ shows major revised points.

PACKAGE DIMENSIONS (UNIT: mm)

PS2815-1

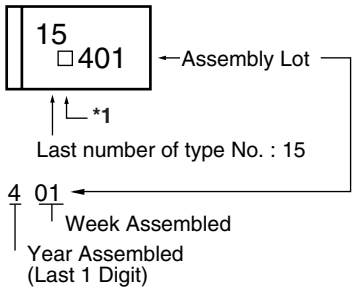


PS2815-4



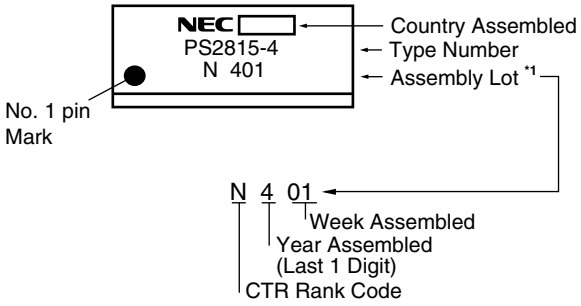
★ **MARKING EXAMPLE**

PS2815-1



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

PS2815-4



***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
PS2815-1	PS2815-1	Solder contains lead	50 pcs (Tape 50 pcs cut)	Standard products (UL approved)	PS2815-1
PS2815-1-F3	PS2815-1-F3		Embossed Tape 3 500 pcs/reel		
PS2815-1-F4	PS2815-1-F4				
PS2815-1-V	PS2815-1-V		50 pcs (Tape 50 pcs cut)	DIN EN60747-5-2 (VDE0884 Part2) Approved (Option)	
PS2815-1-V-F3	PS2815-1-V-F3		Embossed Tape 3 500 pcs/reel		
PS2815-1-V-F4	PS2815-1-V-F4				
PS2815-4	PS2815-4		Magazine Case 45 pcs	Standard products (UL approved)	PS2815-4
PS2815-4-F3	PS2815-4-F3		Embossed Tape 2 500 pcs/reel		
PS2815-4-F4	PS2815-4-F4				
PS2815-4-V	PS2815-4-V		Magazine Case 45 pcs	DIN EN60747-5-2 (VDE0884 Part2) Approved (Option)	
PS2815-4-V-F3	PS2815-4-V-F3		Embossed Tape 2 500 pcs/reel		
PS2815-4-V-F4	PS2815-4-V-F4				
PS2815-1	PS2815-1-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products (UL approved)	PS2815-1
PS2815-1-F3	PS2815-1-F3-A		Embossed Tape 3 500 pcs/reel		
PS2815-1-F4	PS2815-1-F4-A				
PS2815-1-V	PS2815-1-V-A		50 pcs (Tape 50 pcs cut)	DIN EN60747-5-2 (VDE0884 Part2) Approved (Option)	
PS2815-1-V-F3	PS2815-1-V-F3-A		Embossed Tape 3 500 pcs/reel		
PS2815-1-V-F4	PS2815-1-V-F4-A				
PS2815-4	PS2815-4-A		Magazine Case 45 pcs	Standard products (UL approved)	PS2815-4
PS2815-4-F3	PS2815-4-F3-A		Embossed Tape 2 500 pcs/reel		
PS2815-4-F4	PS2815-4-F4-A				
PS2815-4-V	PS2815-4-V-A		Magazine Case 45 pcs	DIN EN60747-5-2 (VDE0884 Part2) Approved (Option)	
PS2815-4-V-F3	PS2815-4-V-F3-A		Embossed Tape 2 500 pcs/reel		
PS2815-4-V-F4	PS2815-4-V-F4-A				

***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
			PS2815-1	PS2815-4	
Diode	Forward Current (DC)	I_F	±50		mA
	Power Dissipation Derating	ΔP_D/°C	0.6	0.7	mW/°C
	Power Dissipation	P_D	60	70	mW/ch
	Peak Forward Current*1	I_{FP}	±1.0		A
Transistor	Collector to Emitter Voltage	V_{CEO}	40		V
	Emitter to Collector Voltage	V_{ECO}	5		V
	Collector Current	I_C	40		mA/ch
	Power Dissipation Derating	ΔP_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

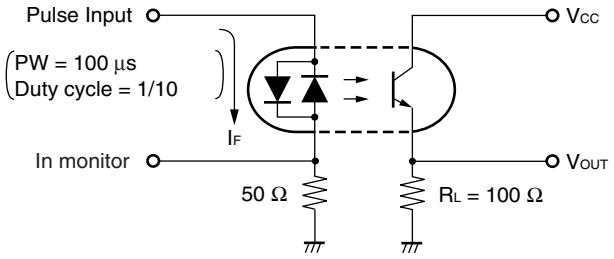
***1** PW = 100 μs, Duty Cycle = 1%

***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 (PS2815-1).
Pins 1-8 shorted together, 9-16 shorted together (PS2815-4).

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

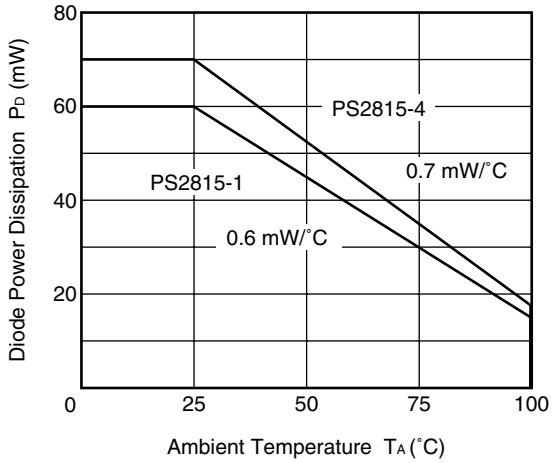
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = ±5 mA		1.15	1.4	V
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz		30		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	I_F = 0 mA, V_{CE} = 40 V			100	nA
Coupled	Current Transfer Ratio (I_C/I_F)	CTR	I_F = ±1 mA, V_{CE} = 5 V	100	200	400	%
	Collector Saturation Voltage	$V_{CE\ (sat)}$	I_F = ±1 mA, I_C = 0.2 mA			0.3	V
	Isolation Resistance	R_{I-O}	V_{I-O} = 1 kV_{DC}	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz		0.4		pF
	Rise Time*1	t_r	V_{CC} = 5 V, I_C = 2 mA, R_L = 100 Ω		4		μs
	Fall Time*1	t_f			5		

***1** Test circuit for switching time

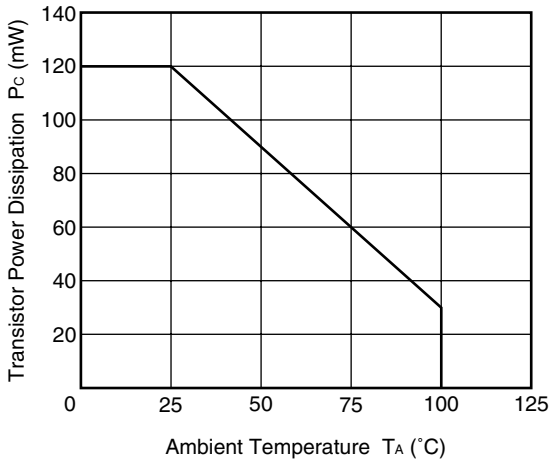


TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = 25°C)

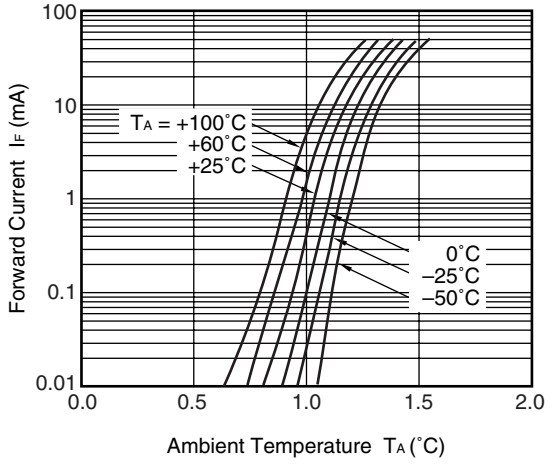
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



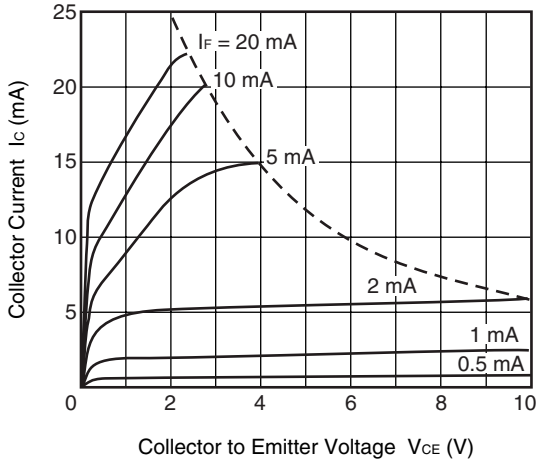
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



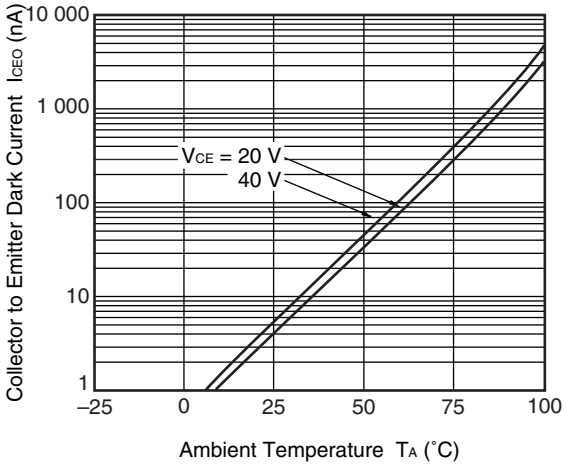
FORWARD CURRENT vs. AMBIENT TEMPERATURE



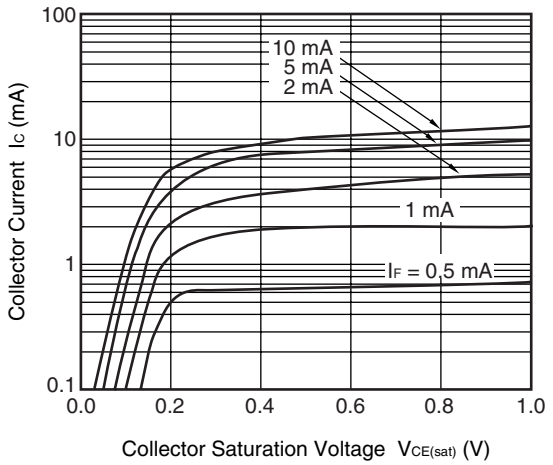
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

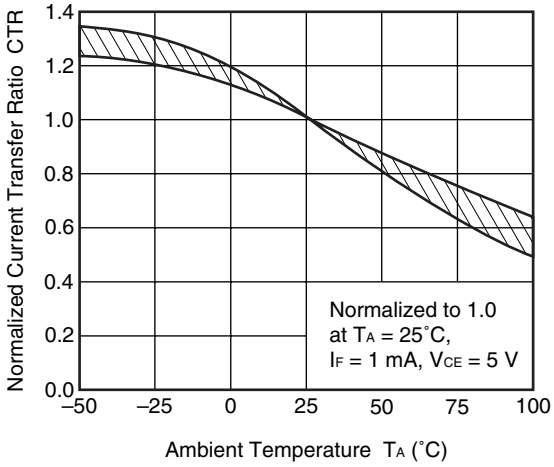


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

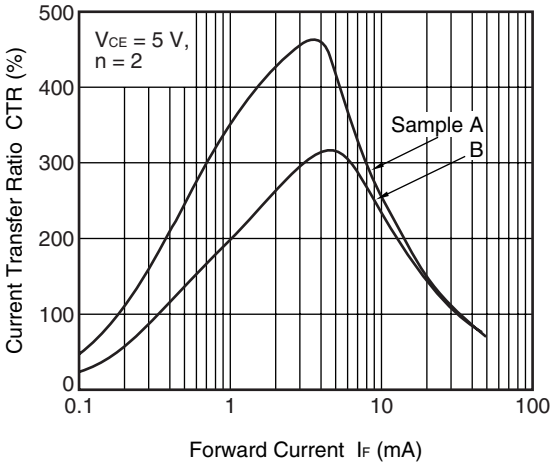


Remark The graphs indicate nominal characteristics.

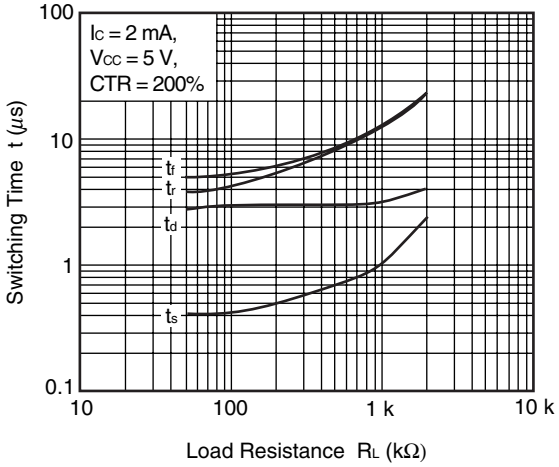
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



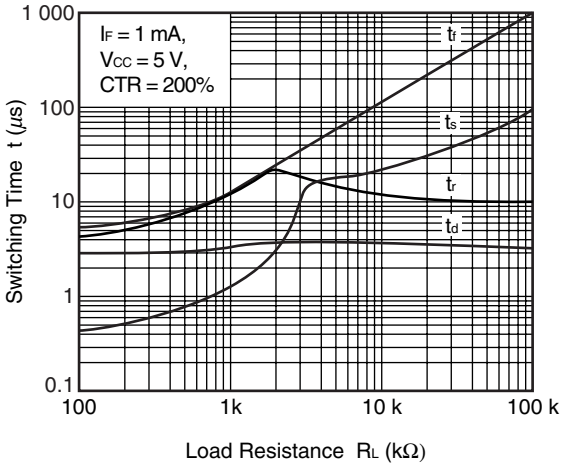
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



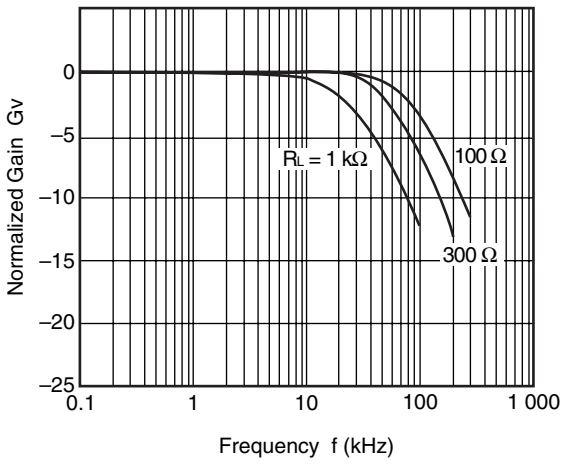
SWITCHING TIME vs. LOAD RESISTANCE



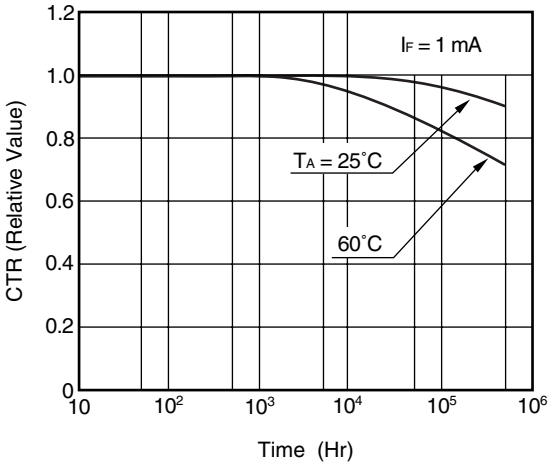
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



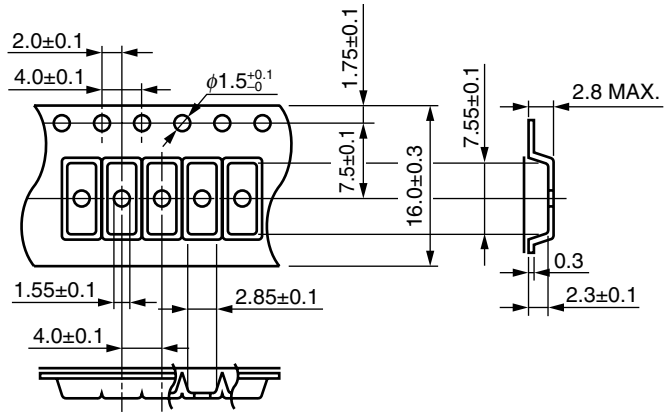
LONG TERM CTR DEGRADATION



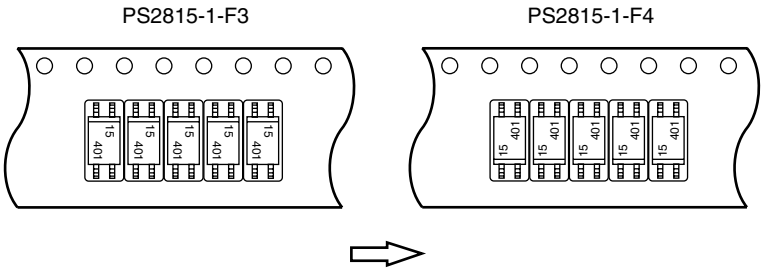
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

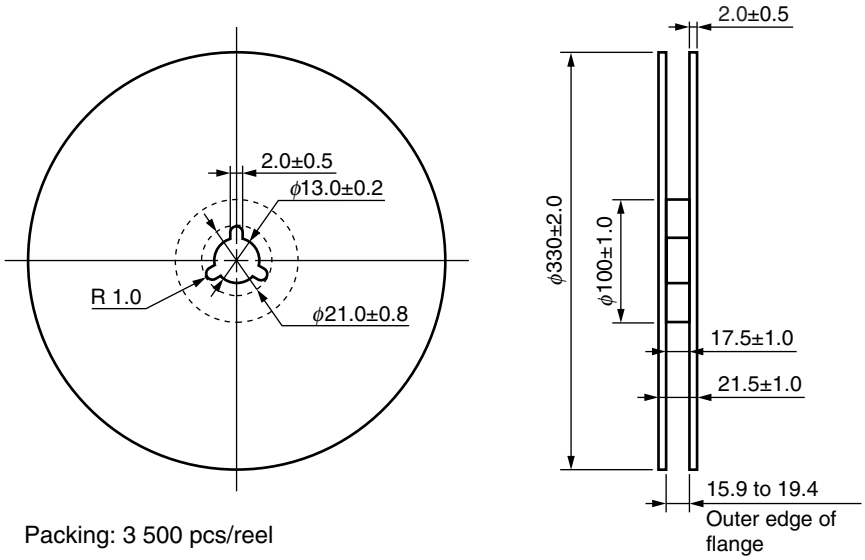
Outline and Dimensions (Tape)



Tape Direction

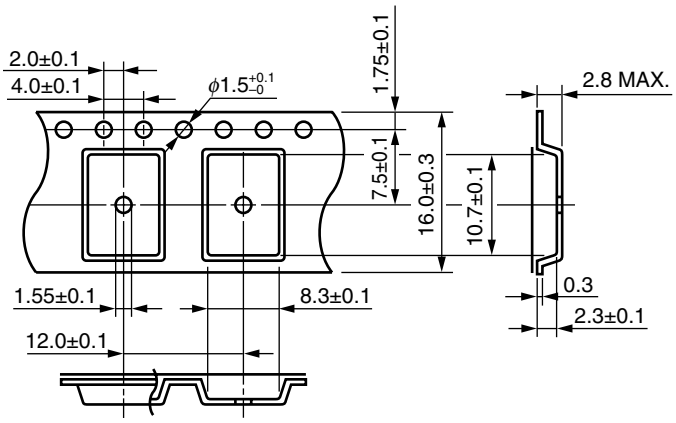


Outline and Dimensions (Reel)

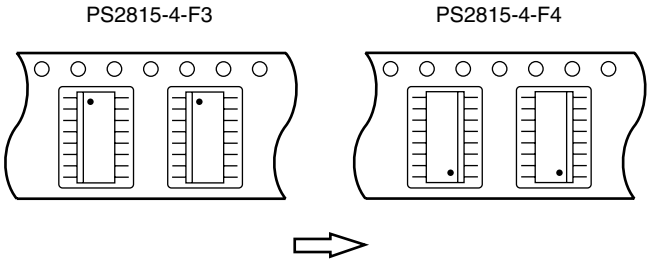


Packing: 3 500 pcs/reel

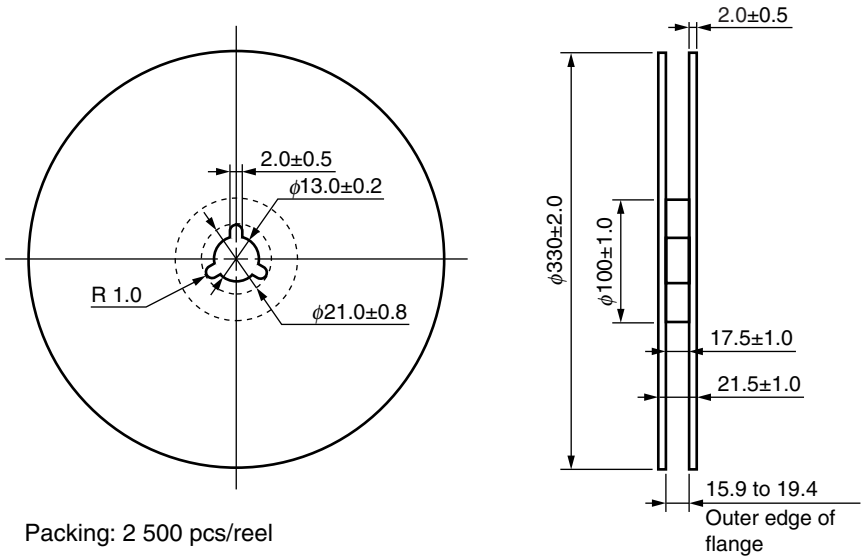
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

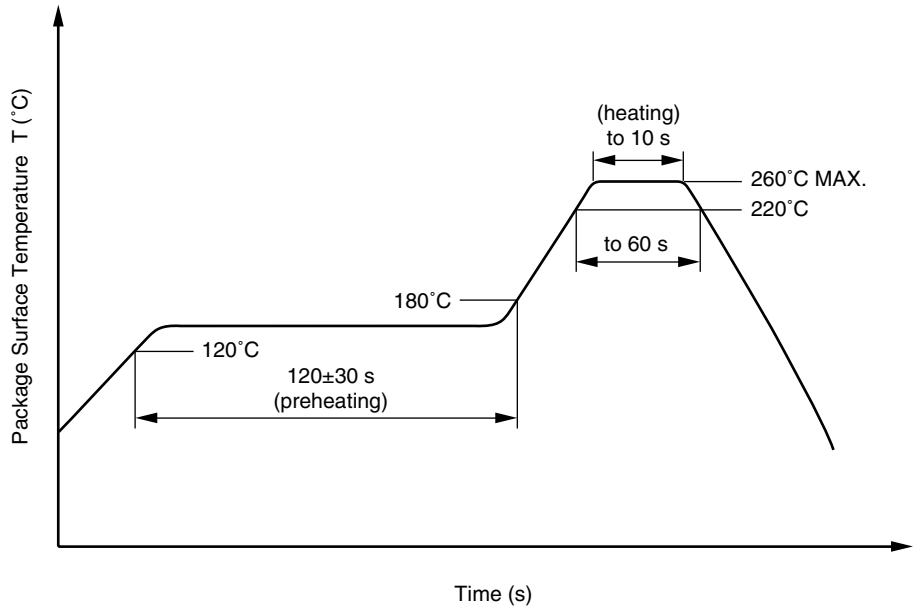
★ NOTES ON HANDLING

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.

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  (Note)

  (1) "NEC" as used in this statement means NEC Corporation, NEC Compound Semiconductor Devices, Ltd. 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 00.4-0110

Caution GaAs Products	This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points. • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.

▶**For further information, please contact**

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