

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 Shrink SOP (Small Outline Package) type for high density mounting applications.

FEATURES

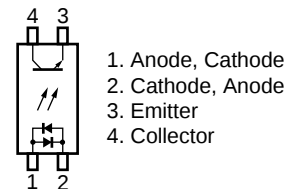
- AC input response
- High current transfer ratio (CTR = 200% TYP. @ $I_F = \pm 1$ mA)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Small and thin package (4, 16-pin SSOP, Pin pitch 1.27 mm)
- ★ • Ordering number of taping product: PS2815-1-F3, F4: 3 500 pcs/reel
: PS2815-4-F3, F4: 2 500 pcs/reel
- Pb-Free product
- Safety standards
 - UL approved: File No. E72422
- ★ • CSA approved: No. CA 101391 (CA5A, CAN/CSA-C22.2 60065, 60950)
- ★ • DIN EN60747-5-2 (VDE0884 Part2) approved: No. 40008905 (Option)

APPLICATIONS

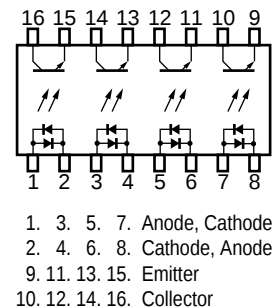
- Programmable logic controllers
- Modem/FAX

PIN CONNECTION (Top View)

PS2815-1

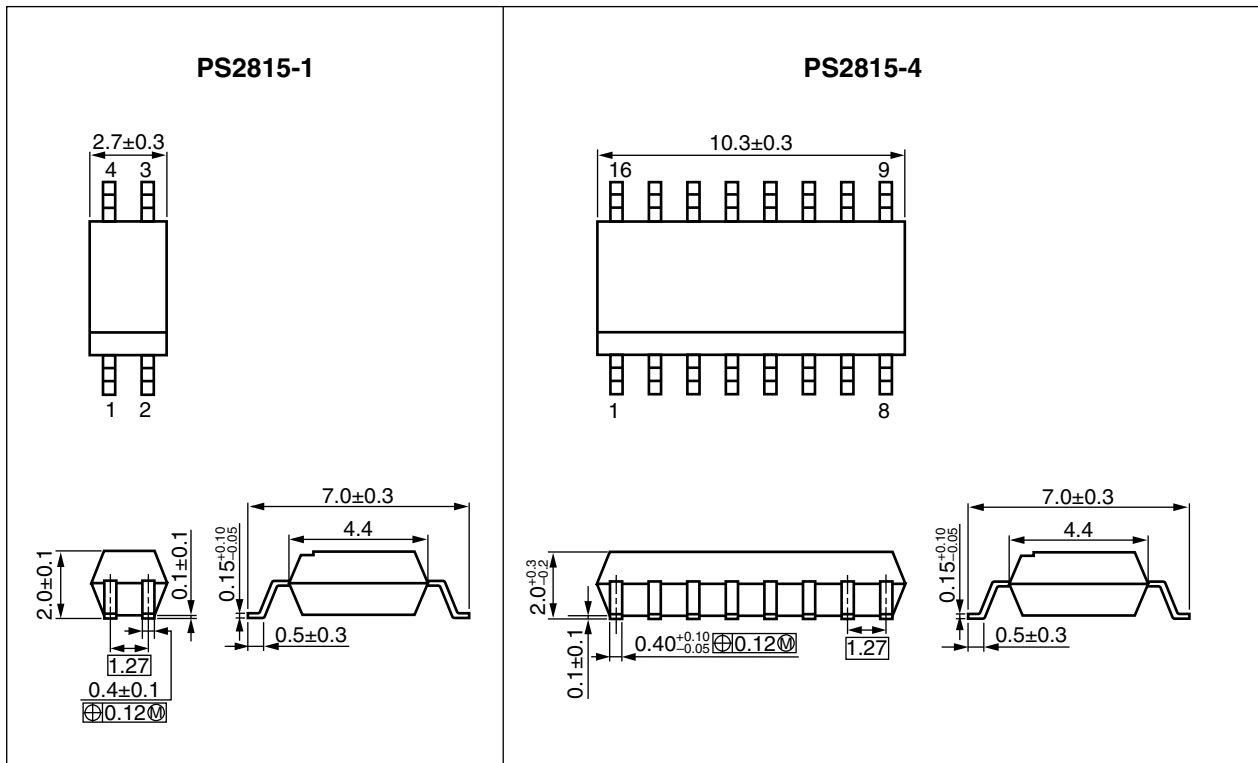


PS2815-4



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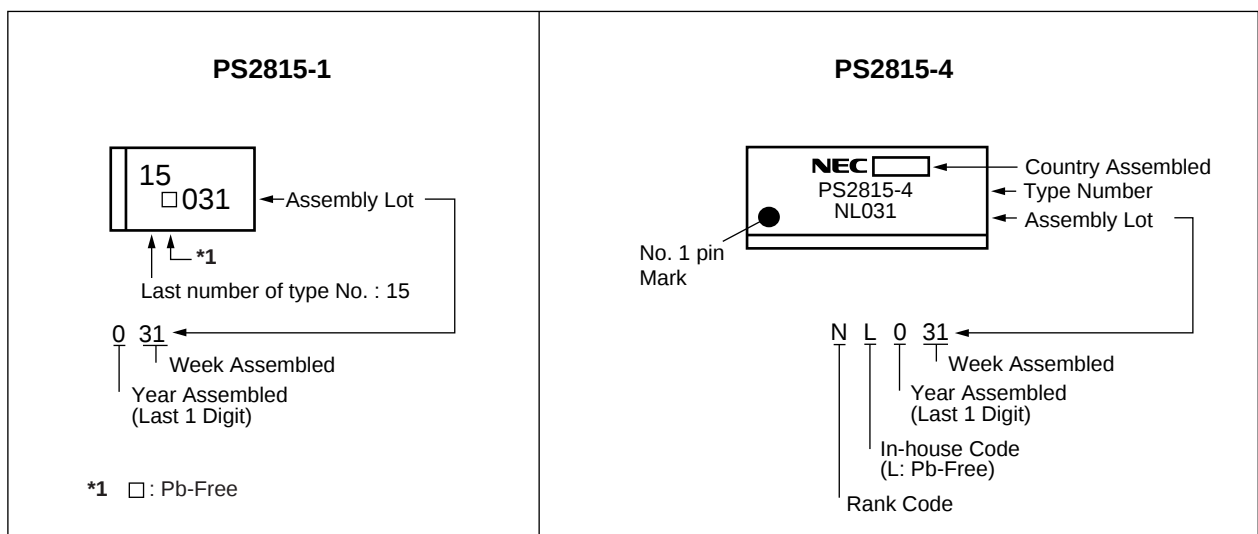
PACKAGE DIMENSIONS (UNIT: mm)



★ PHOTOCOUPLER CONSTRUCTION

Parameter	Unit (MIN.)
Air Distance	4.5 mm
Outer Creepage Distance	4.5 mm
Inner Creepage Distance	2.5 mm
Isolation Thickness	0.1 mm

★ MARKING EXAMPLE



★ ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS2815-1	PS2815-1-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products (UL, CSA 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, CSA 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 ($T_A = 25^\circ\text{C}$, unless otherwise specified)

Parameter		Symbol	Ratings		Unit
			PS2815-1	PS2815-4	
Diode	Forward Current (DC)	I_F	± 50		mA/ch
	Power Dissipation Derating	$\Delta P_D/^\circ\text{C}$	0.6	0.7	mW/ $^\circ\text{C}$
	Power Dissipation	P_D	60	70	mW/ch
	Peak Forward Current ^{*1}	I_{FP}	± 1.0		A/ch
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	$\Delta P_C/^\circ\text{C}$	1.2		mW/ $^\circ\text{C}$
	Power Dissipation	P_C	120		mW/ch
Isolation Voltage ^{*2}		BV	2 500		Vr.m.s.
Operating Ambient Temperature		T_A	-55 to +100		$^\circ\text{C}$
Storage Temperature		T_{stg}	-55 to +150		$^\circ\text{C}$

^{*1} PW = 100 μs , Duty Cycle = 1%

^{*2} AC voltage for 1 minute at $T_A = 25^\circ\text{C}$, RH = 60% between input and output.

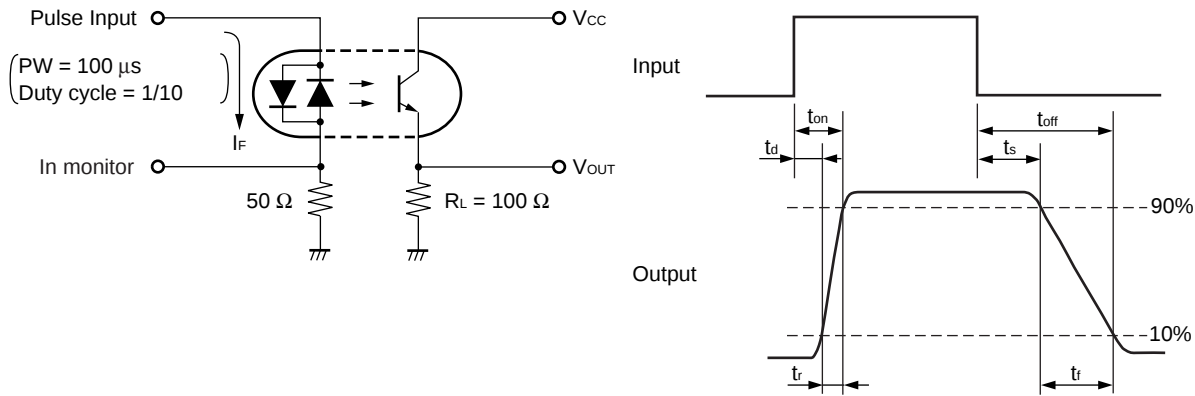
Pins 1-2 shorted together, 3-4 shorted together (PS2815-1).

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

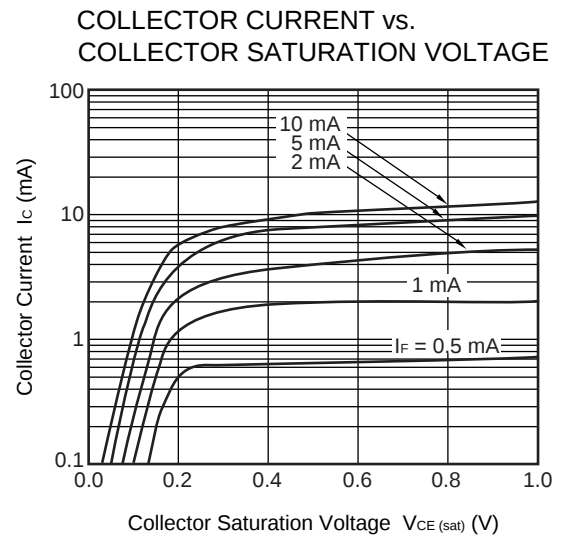
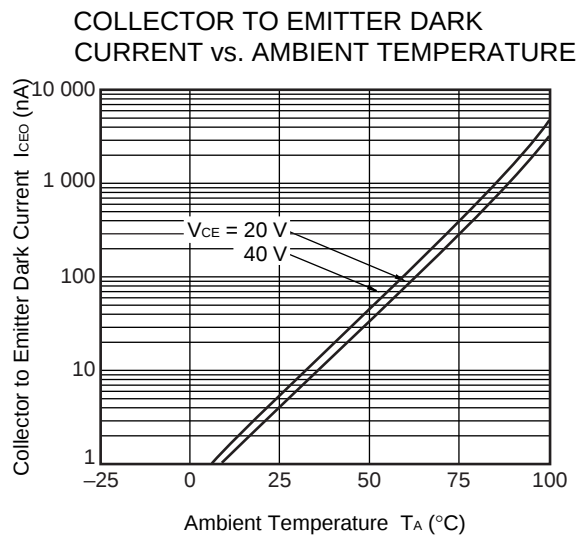
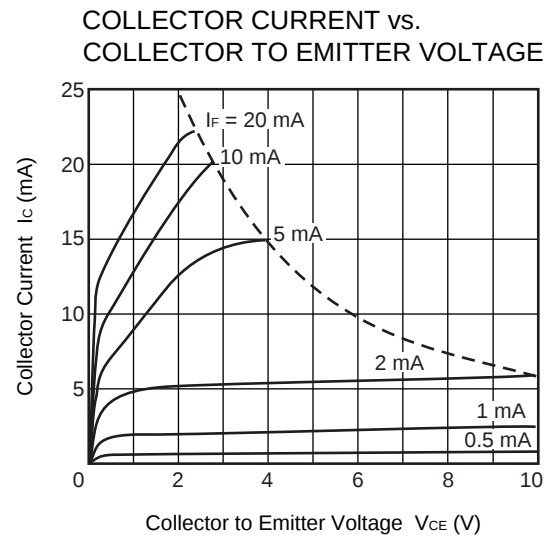
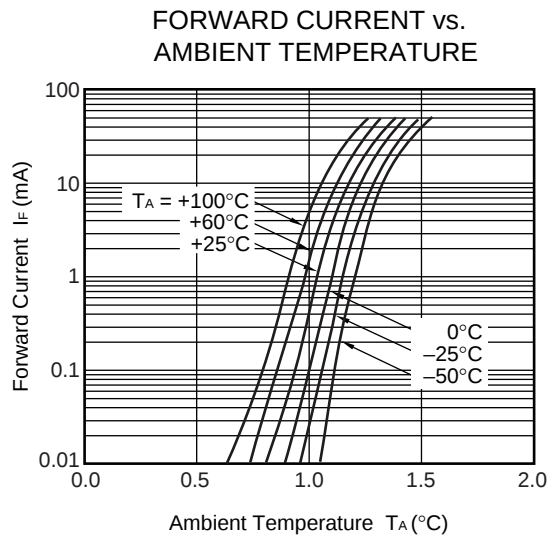
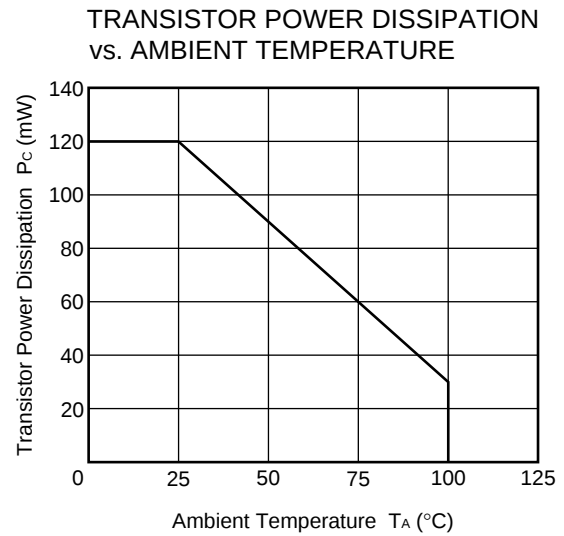
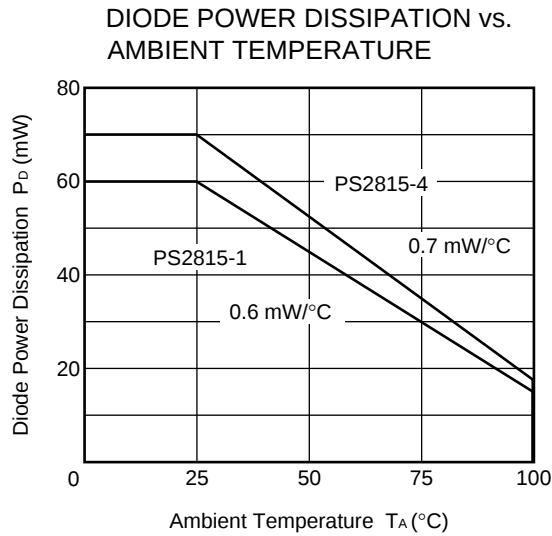
ELECTRICAL CHARACTERISTICS (TA = 25°C)

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

★ *1 Test circuit for switching time

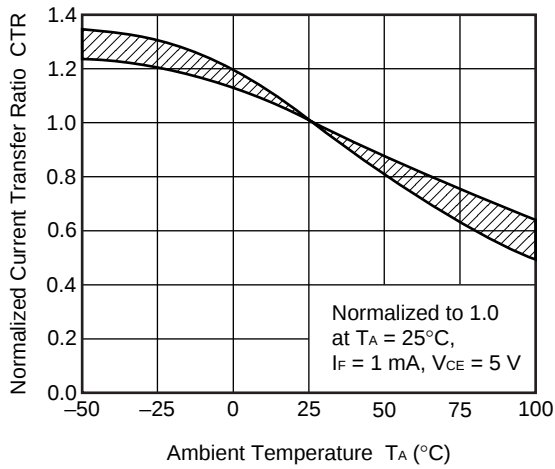


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

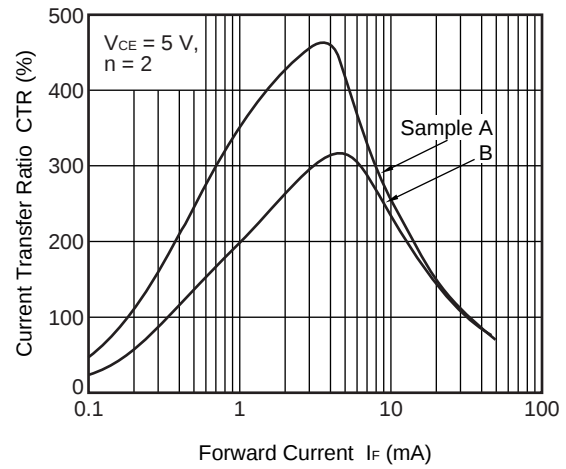


Remark The graphs indicate nominal characteristics.

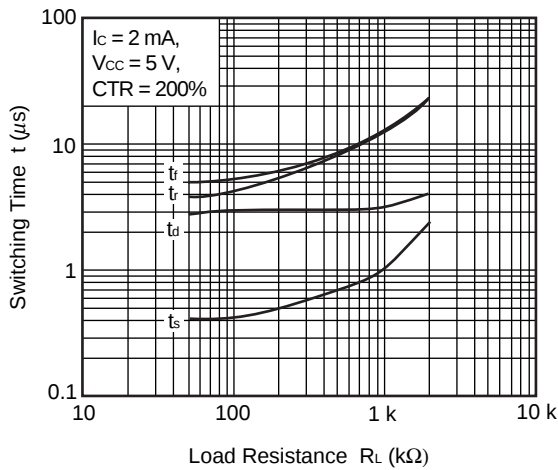
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



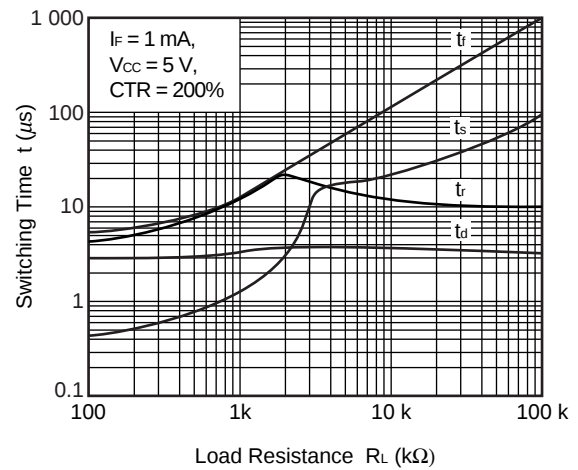
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



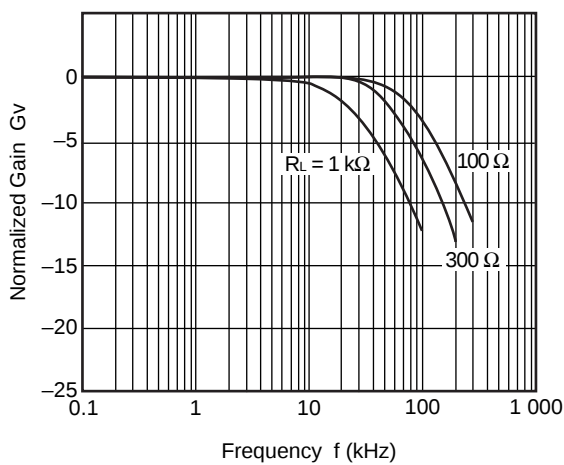
SWITCHING TIME vs. LOAD RESISTANCE



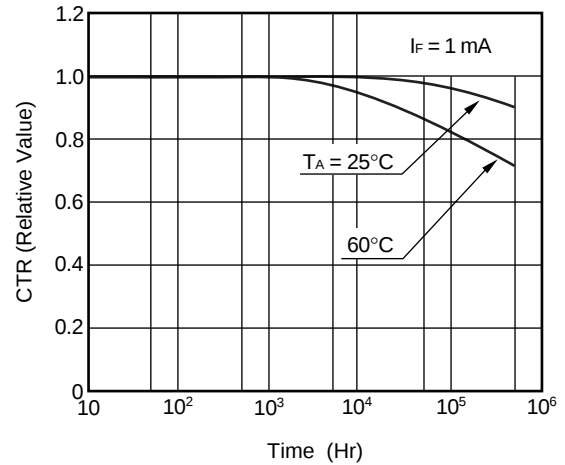
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



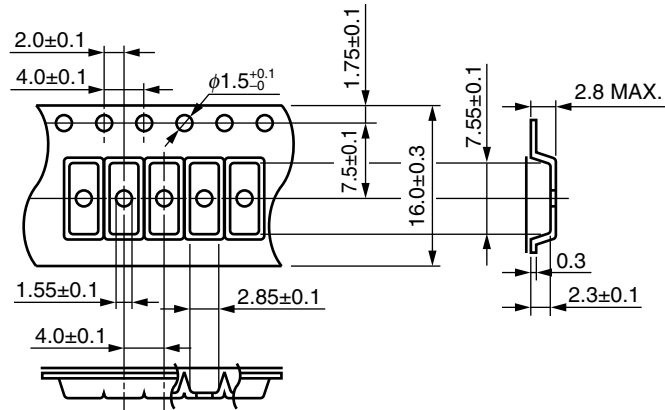
LONG TERM CTR DEGRADATION



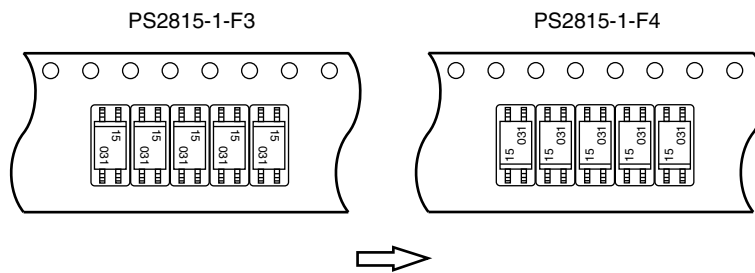
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

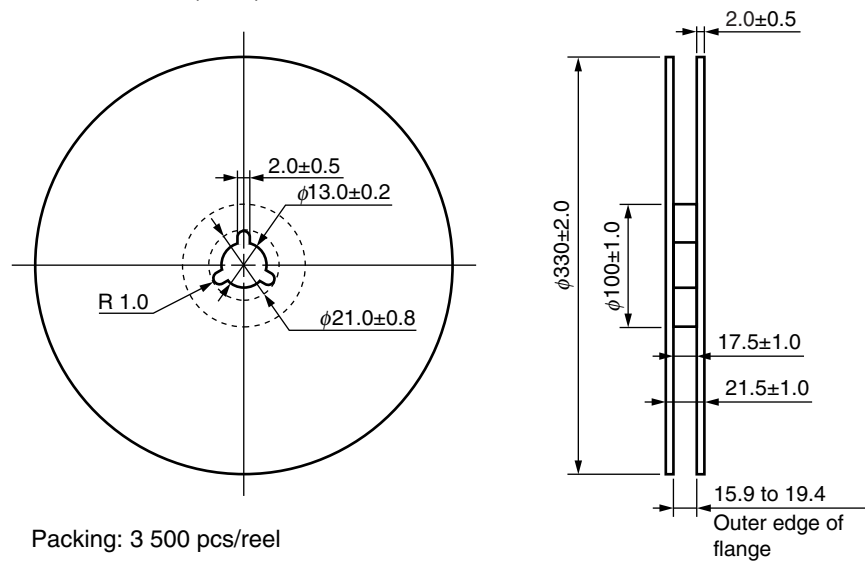
Outline and Dimensions (Tape)



Tape Direction



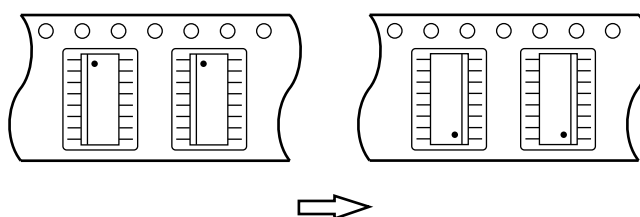
Outline and Dimensions (Reel)



Technical drawing of a mechanical part with dimensions:

- Top horizontal dimensions: 2.0 ± 0.1 , 4.0 ± 0.1
- Top right horizontal dimension: 2.8 MAX.
- Top vertical dimensions: 1.75 ± 0.1 , 7.5 ± 0.1
- Right vertical dimensions: 10.7 ± 0.1 , 16.0 ± 0.3
- Bottom left horizontal dimensions: 1.55 ± 0.1 , 12.0 ± 0.1
- Bottom right horizontal dimensions: 8.3 ± 0.1 , 0.3 , 2.3 ± 0.1
- Feature callout: $\phi 1.5^{+0.1}_{-0}$

PS2815-4-F4



Technical drawing of a circular part. The drawing shows a large outer circle and a smaller inner circle. The inner circle has a central hole. The dimensions are as follows:

- Outer circle diameter: $\phi 21.0 \pm 0.8$
- Inner circle diameter: $\phi 13.0 \pm 0.2$
- Central hole diameter: 2.0 ± 0.5
- Radius of the circular feature: $R 1.0$

Technical drawing of a vertical pipe section showing dimensions for the outer edge of the flange. The drawing includes the following dimensions:

- Overall diameter: $\phi 330 \pm 2.0$
- Inner diameter: $\phi 100 \pm 1.0$
- Flange thickness: 2.0 ± 0.5
- Distance from inner diameter to flange face: 17.5 ± 1.0
- Distance from inner diameter to outer edge of flange: 21.5 ± 1.0
- Distance from inner diameter to outer edge of flange (range): 15.9 to 19.4
- Label: Outer edge of flange

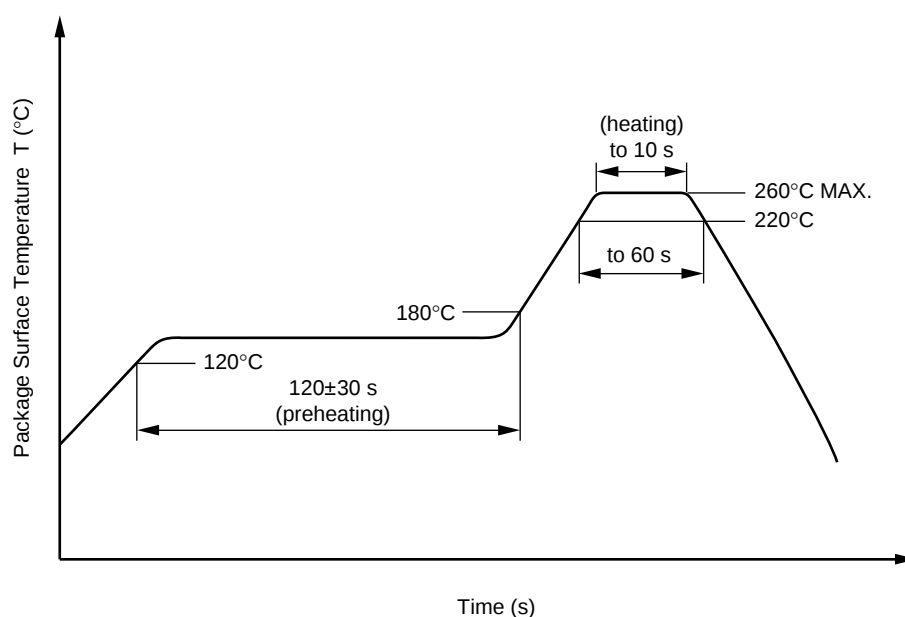
NOTES ON HANDLING

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.

3. Measurement conditions of current transfer ratios (CTR), which differ according to photocoupler

Check the setting values before use, since the forward current conditions at CTR measurement differ according to product.

When using products other than at the specified forward current, the characteristics curves may differ from the standard curves due to CTR value variations or the like. Therefore, check the characteristics under the actual operating conditions and thoroughly take variations or the like into consideration before use.

USAGE CAUTIONS

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

★ SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Spec.	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		55/100/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.5 \times U_{IORM}$, $P_d < 5$ pC	U_{IORM} U_{pr}	705 1 058	V_{peak} V_{peak}
Test voltage (partial discharge test, procedure b for all devices) $U_{pr} = 1.875 \times U_{IORM}$, $P_d < 5$ pC	U_{pr}	1 322	V_{peak}
Highest permissible overvoltage	U_{TR}	6 000	V_{peak}
Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303 Part 11))	CTI	175	
Material group (DIN EN 60664-1 VDE0110 Part 1)		III a	
Storage temperature range	T_{stg}	−55 to +150	°C
Operating temperature range	T_A	−55 to +100	°C
Isolation resistance, minimum value $V_{IO} = 500$ V dc at $T_A = 25^\circ\text{C}$ $V_{IO} = 500$ V dc at T_A MAX. at least 100°C	R_{is} MIN. R_{is} MIN.	10^{12} 10^{11}	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I_F , $P_{si} = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500$ V dc at $T_A = T_{si}$	T_{si} I_{si} P_{si} R_{is} MIN.	150 300 500 10^9	°C mA mW Ω

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M8E0904E

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.
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