

PS2806-1, PS2806-4

R08DS0176EJ0100

Rev.1.00

Aug 30, 2019

HIGH ISOLATION VOLTAGE AC INPUT, DARLINGTON TRANSISTOR TYPE SSOP PHOTOCOUPLER

DESCRIPTION

The PS2806-1 and PS2806-4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington connected phototransistor in a plastic SSOP for high density applications.

This package has shield effect to cut off ambient light.

FEATURES

- High isolation voltage ($BV = 2\,500\text{ V}_{r.m.s.}$)
- Small and thin package (4, 16-pin SSOP, Pin pitch 1.27 mm)
- AC input response
- High current transfer ratio ($CTR = 2\,000\%$ TYP. @ $I_F = \pm 1\text{ mA}$, $V_{CE} = 2\text{ V}$)
- Ordering number of tape product: PS2806-1-F3, PS2806-4-F3
- Pb-Free product
- Safety standards
 - UL approved: UL1577, Single protection
 - CSA approved: CAN/CSA-C22.2 No. 62368-1, Basic insulation
 - BSI approved: BS EN 62368-1, Basic/Supplementary insulation
 - VDE approved: DIN EN 60747-5-5 (Option)

APPLICATIONS

- Programmable logic controllers
- Measuring instruments
- Power supply
- Hybrid IC

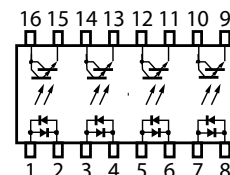
PIN CONNECTION (Top View)

PS2806-1



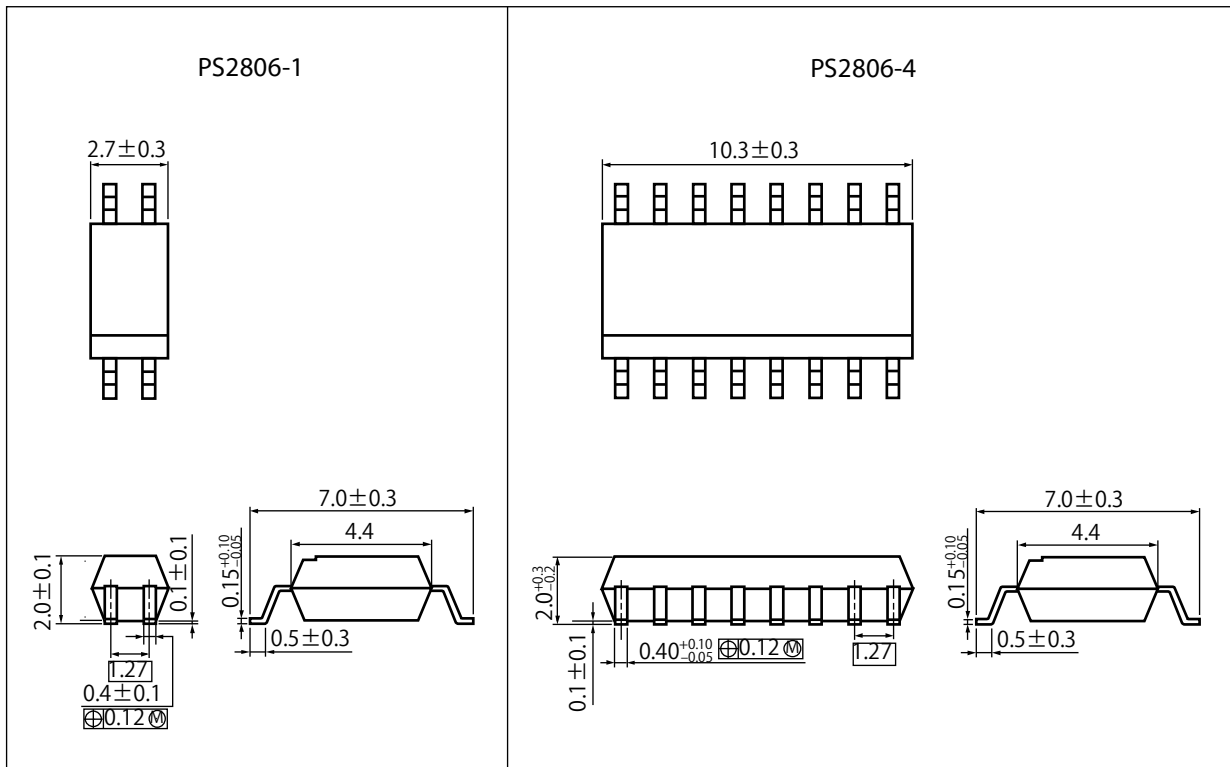
1. Anode, Cathode
2. Cathode, Anode
3. Emitter
4. Collector

PS2806-4



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

PACKAGE DIMENSIONS (UNIT: mm)

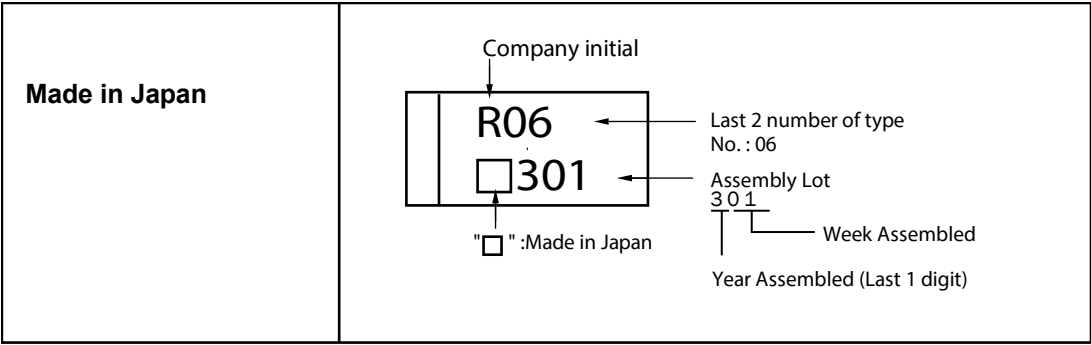


PHOTOCOUPLER CONSTRUCTION

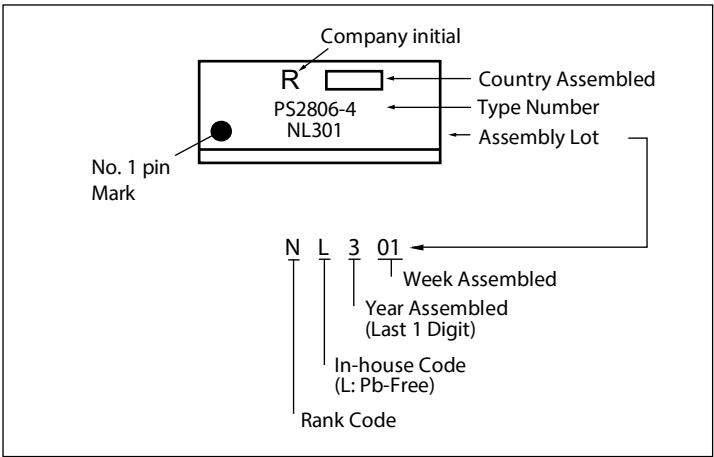
Parameter	Unit (MIN.)
Air Distance	4.5 mm
Creepage Distance	4.5 mm
Isolation Thickness	0.1 mm

MARKING EXAMPLE

PS2806-1



PS2806-4



ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS2806-1	PS2806-1-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products (UL, BSI, CSA approved)	PS2806-1
PS2806-1-F3	PS2806-1-F3-A		Embossed Tape 3 500 pcs/reel		
PS2806-4	PS2806-4-A		10 pcs (Tape 10 pcs cut)		PS2806-4
PS2806-4-F3	PS2806-4-F3-A		Embossed Tape 2 500 pcs/reel		
PS2806-1-V	PS2806-1-V-A		50 pcs (Tape 50 pcs cut)	UL, BSI, CSA, DIN EN 60747-5-5 approved	PS2806-1
PS2806-1-V-F3	PS2806-1-V-F3-A		Embossed Tape 3 500 pcs/reel		
PS2806-4-V	PS2806-4-V-A		10 pcs (Tape 10 pcs cut)		PS2806-4
PS2806-4-V-F3	PS2806-4-V-F3-A		Embossed Tape 2 500 pcs/reel		

Note: ^{*1}. For the application of the Safety Standard, following part number should be used.

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

Parameter		Symbol	Ratings		Unit
			PS2806-1	PS2806-4	
Diode	Forward Current (DC)	I _F	±50		mA/ch
	Power Dissipation Derating	ΔP _D /°C	0.6	0.8	mW/°C
	Power Dissipation	P _D	60	80	mW/ch
	Peak Forward Current ^{*1}	I _{FP}	±1		A/ch
Transistor	Collector to Emitter Voltage	V _{CEO}	40		V
	Emitter to Collector Voltage	V _{ECO}	6		V
	Collector Current	I _C	90	100	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		V _{r.m.s.}
Operating Ambient Temperature		T _A	-55 to +100		°C
Storage Temperature		T _{stg}	-55 to +150		°C

Notes: ^{*1}. PW = 100 μs, Duty Cycle = 1%

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

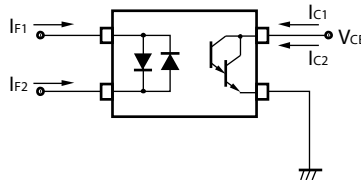
Pins 1-2 shorted together, 3-4 shorted together (PS2806-1).

Pins 1-8 shorted together, 9-16 shorted together (PS2806-4).

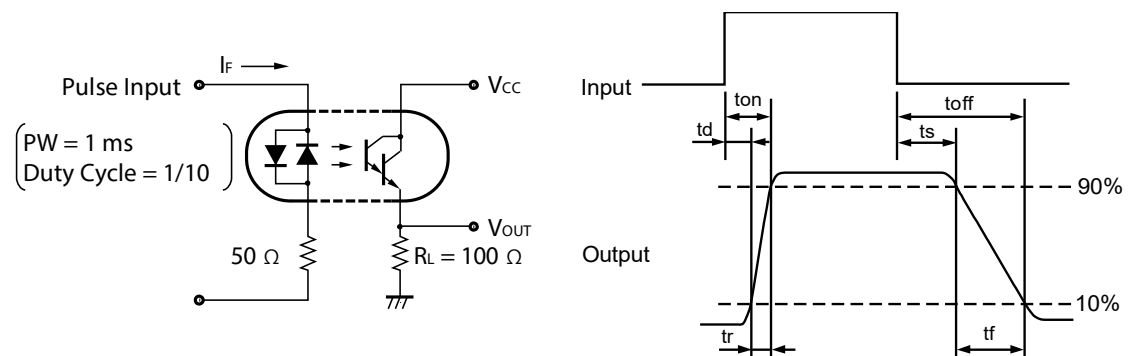
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	$I_F = \pm 5\text{ mA}$		1.1	1.4	V
	Terminal Capacitance	C_t	$V = 0\text{ V}$, $f = 1.0\text{ MHz}$		30		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	$V_{CE} = 40\text{ V}$, $I_F = 0\text{ mA}$			400	nA
Coupled	Current Transfer Ratio (I_C/I_F)	CTR	$I_F = \pm 1\text{ mA}$, $V_{CE} = 2\text{ V}$	200	2 000		%
	CTR Ratio *1	CTR1/ CTR2	$I_F = 1\text{ mA}$, $V_{CE} = 2\text{ V}$	0.3	1.0	3.0	
	Collector Saturation Voltage	$V_{CE(sat)}$	$I_F = \pm 1\text{ mA}$, $I_C = 2\text{ mA}$			1.0	V
	Isolation Resistance	R_{I-O}	$V_{I-O} = 1.0\text{ kV}_{DC}$	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	$V = 0\text{ V}$, $f = 1.0\text{ MHz}$		0.4		pF
	Rise Time *2	t_r	$V_{CC} = 5\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\ \Omega$		200		μs
	Fall Time *2	t_f			200		

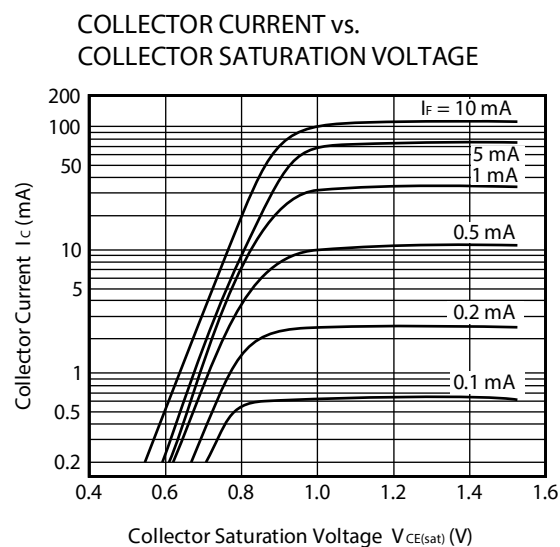
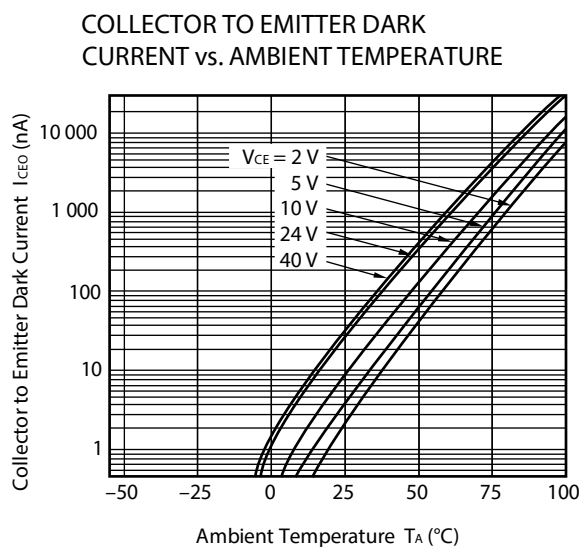
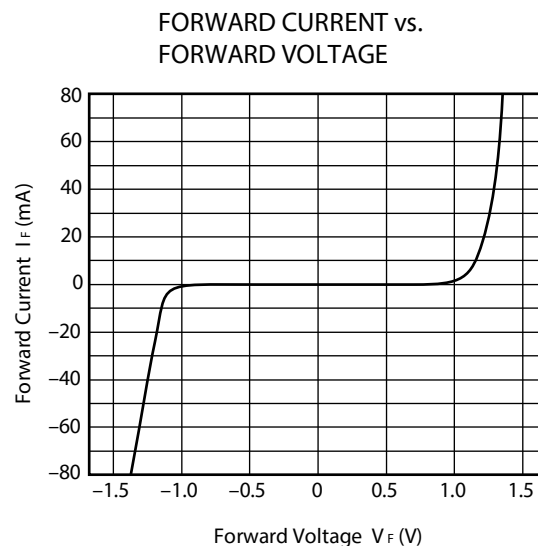
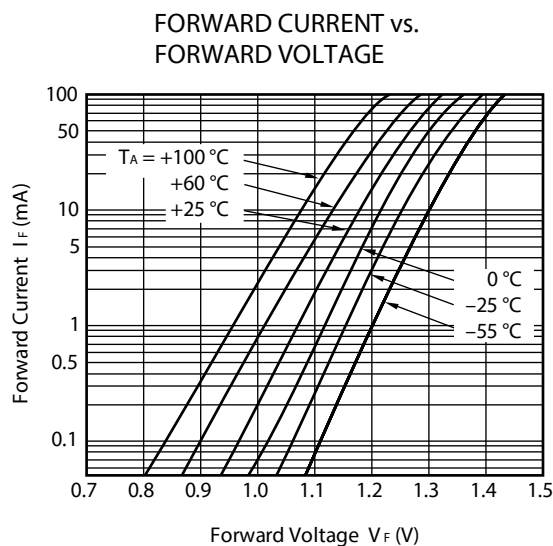
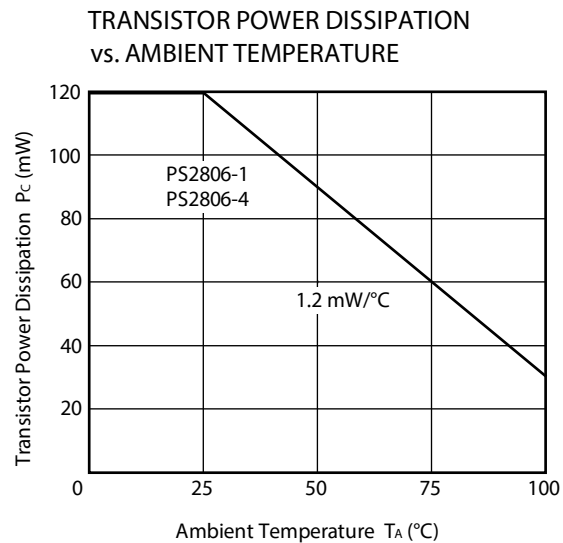
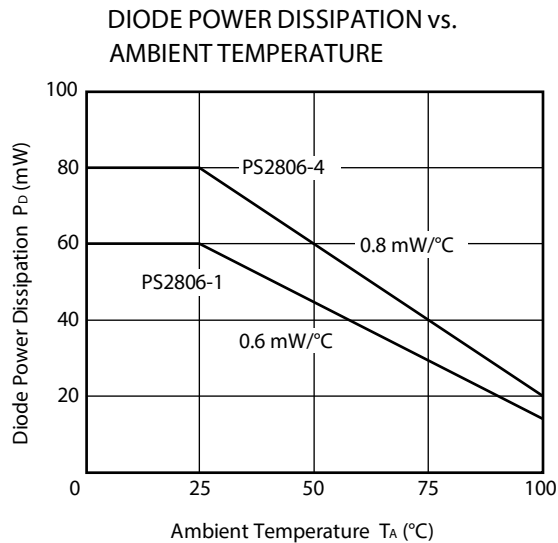
Notes: *1. $CTR1 = I_{C1}/I_{F1}$, $CTR2 = I_{C2}/I_{F2}$



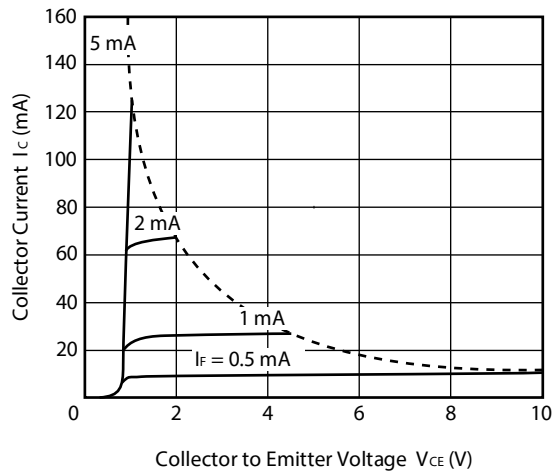
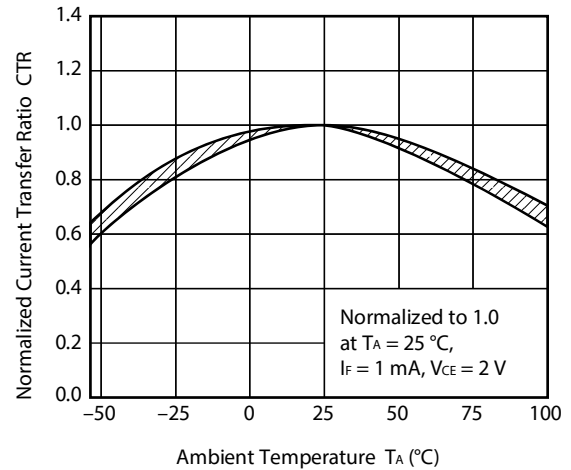
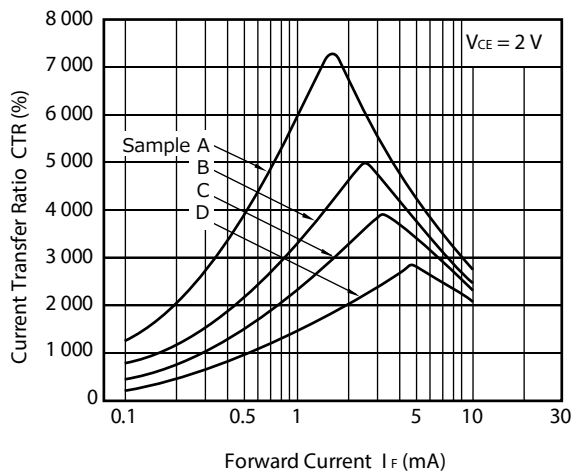
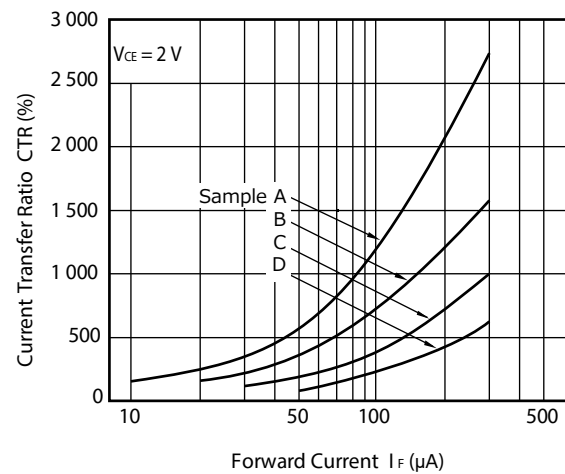
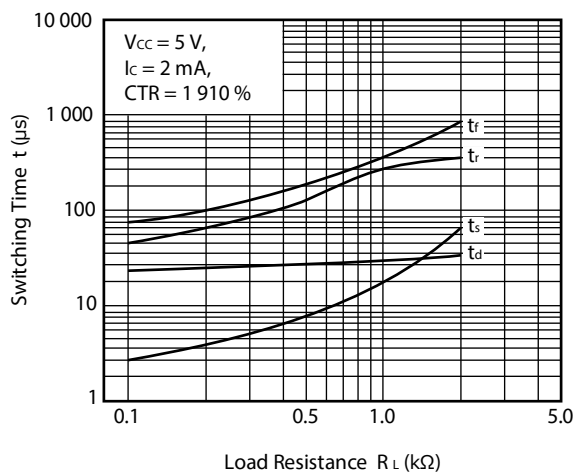
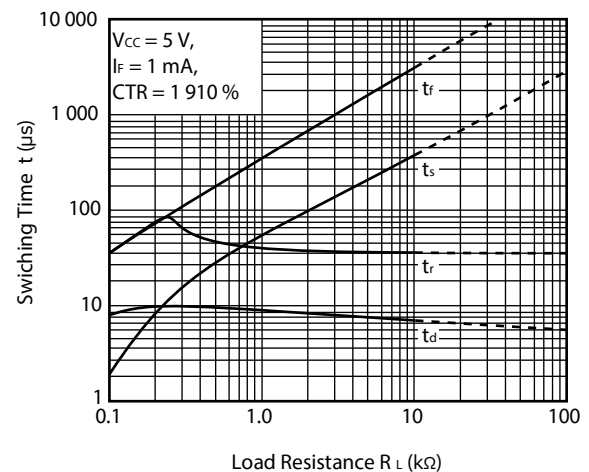
*2. Test circuit for switching time



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



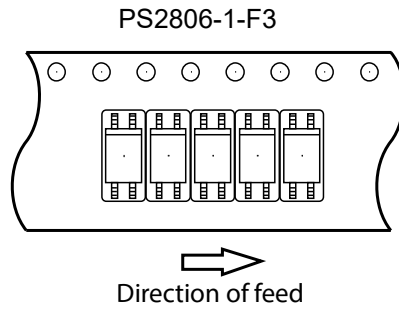
Remark The graphs indicate nominal characteristics.

COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGENORMALIZED CURRENT TRANSFER
RATIO vs. AMBIENT TEMPERATURECURRENT TRANSFER RATIO vs.
FORWARD CURRENTCURRENT TRANSFER RATIO vs.
FORWARD CURRENTSWITCHING TIME vs.
LOAD RESISTANCESWITCHING TIME vs.
LOAD RESISTANCE

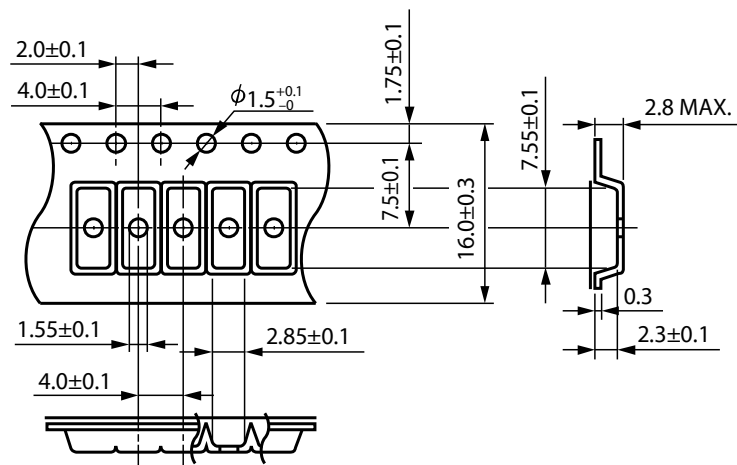
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

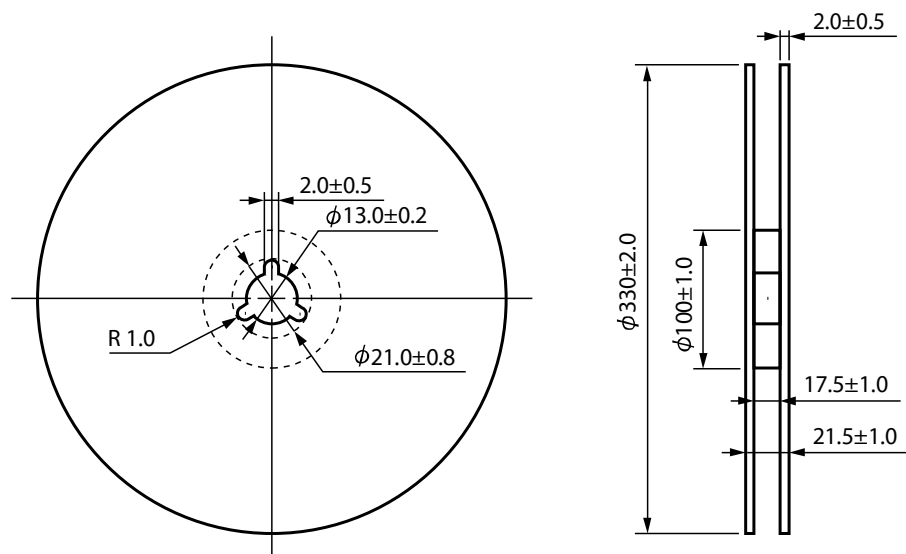
Tape Direction



Outline and Dimensions (Tape)

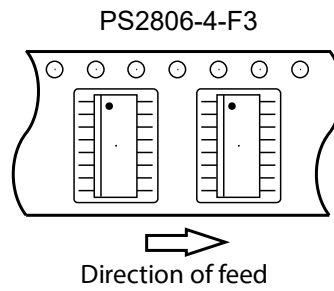


Outline and Dimensions (Reel)



Packing: 3 500 pcs/reel

Tape Direction



Outline and Dimensions (Tape)

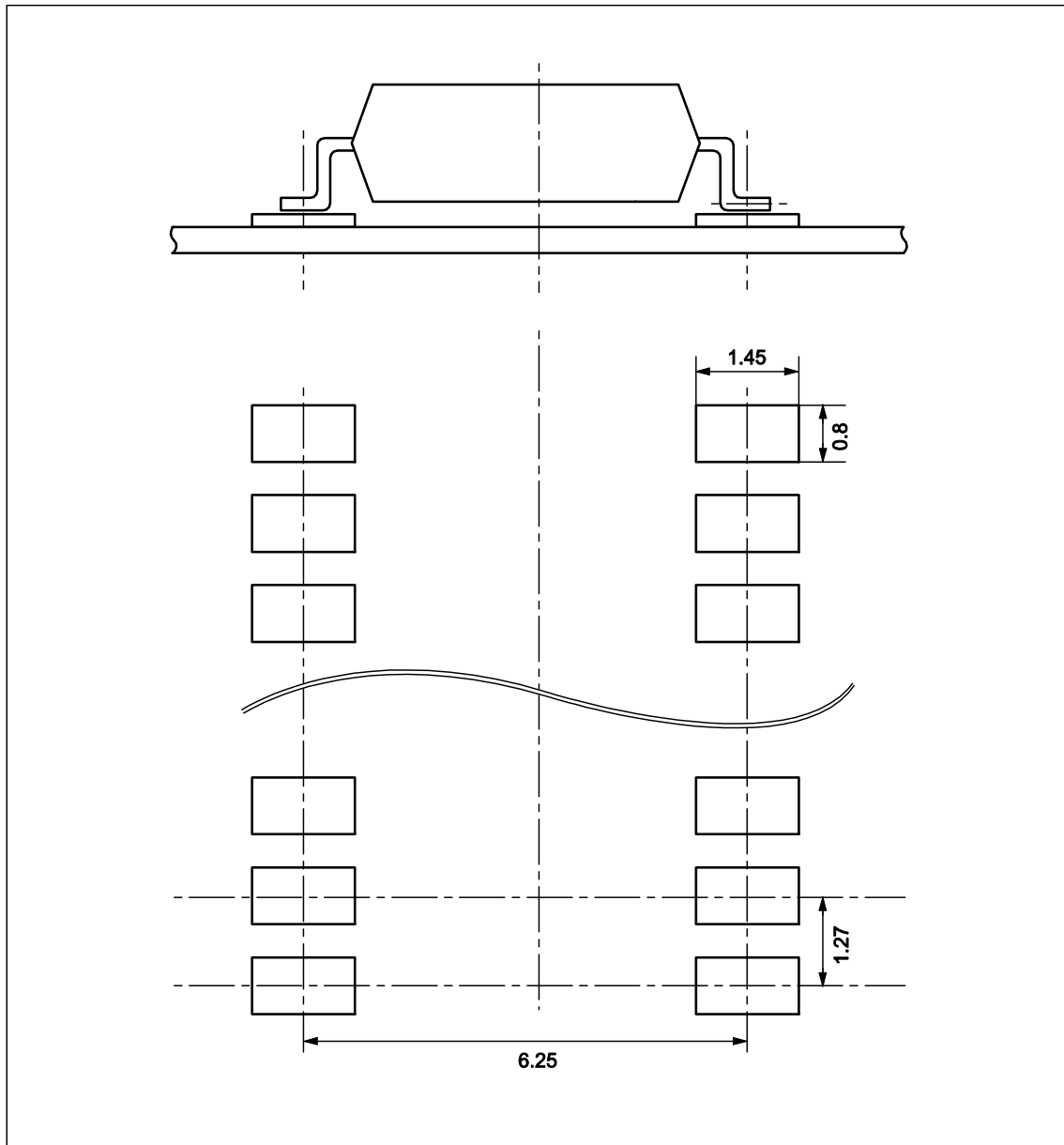


Outline and Dimensions (Reel)



Packing: 2 500 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



Remark All dimensions in this figure must be evaluated before use.

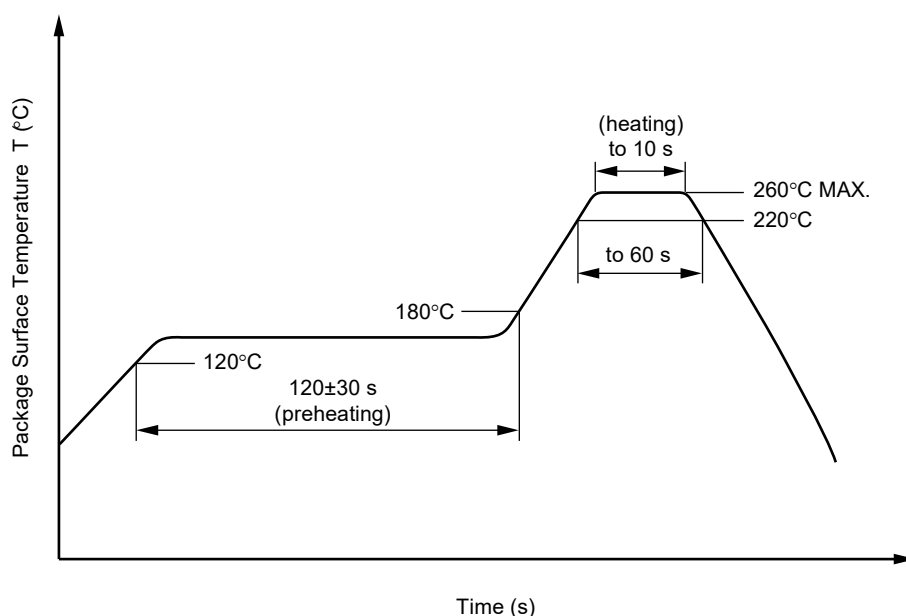
NOTES ON HANDLING

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

(4) Cautions

- Flux Cleaning
Avoid cleaning with Freon based or halogen-based (chlorinated etc.) solvents.
- Do not use fixing agents or coatings containing halogen-based substances.

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. This tendency may sometimes be obvious, especially below $I_F = 1 \text{ mA}$.

Therefore, check the characteristics under the actual operating conditions and thoroughly take variations or the like into consideration before use.

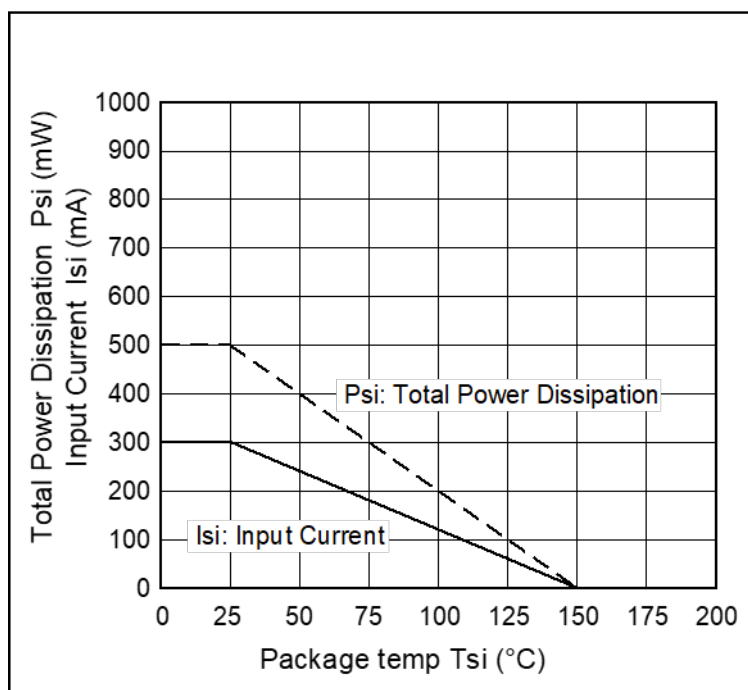
USAGE CAUTIONS

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

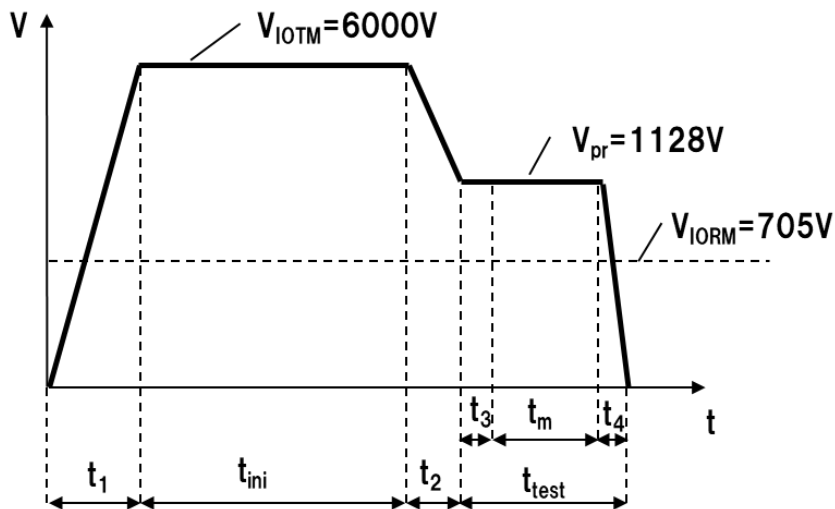
SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Rating	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) $U_{pr} = 1.6 \times U_{IORM}$, $P_d < 5 \text{ pC}$	U_{IORM} U_{pr}	705 1 128	V_{peak} V_{peak}
Test voltage (partial discharge test, procedure b for all devices) $U_{pr} = 1.875 \times U_{IORM}$, $P_d < 5 \text{ pC}$	U_{pr}	1 322	V_{peak}
Highest permissible overvoltage	U_{TR}	6 000	V_{peak}
Degree of pollution (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303-11))	CTI	175	
Material group (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		III a	
Storage temperature range	T_{stg}	-55 to +150	°C
Operating temperature range	T_A	-55 to +100	°C
Isolation resistance, minimum value $V_{IO} = 500 \text{ V dc}$ at $T_A = 25^\circ\text{C}$ $V_{IO} = 500 \text{ V dc}$ at $T_A \text{ MAX.}$ at least 100°C	$R_{is \text{ MIN.}}$ $R_{is \text{ MIN.}}$	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 $V_{IO} = 500 \text{ V dc}$ at $T_A = T_{si}$	T_{si} I_{si} P_{si} $R_{is \text{ MIN.}}$	150 300 500 10^9	°C mA mW Ω

Dependence of maximum safety ratings with package temperature



Method a) Destructive Test, Type and Sample Test



$t_1, t_2 = 1 \text{ to } 10 \text{ sec}$

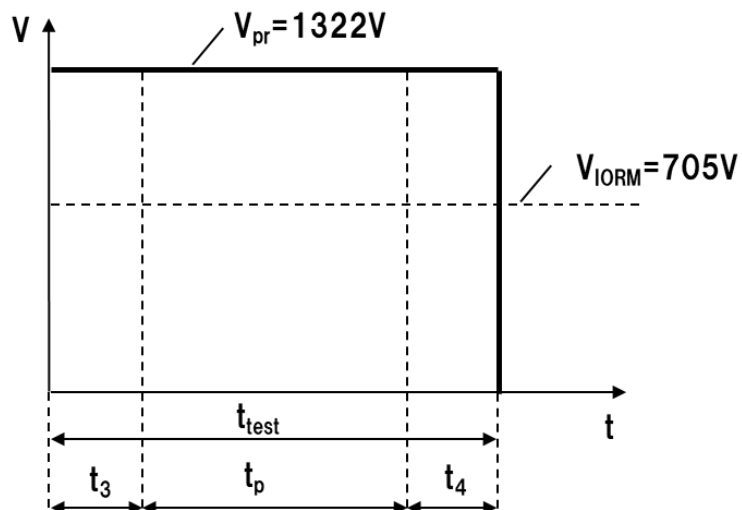
$t_3, t_4 = 1 \text{ sec}$

$t_m \text{ (PARTIAL DISCHARGE)} = 10 \text{ sec}$

$t_{test} = 12 \text{ sec}$

$t_{ini} = 60 \text{ sec}$

Method b) Non-destructive Test, 100% Production Test



$t_3, t_4 = 0.1 \text{ sec}$

$t_p \text{ (PARTIAL DISCHARGE)} = 1.0 \text{ sec}$

$t_{test} = 1.2 \text{ sec}$

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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