

PS2801C-1, PS2801C-4

HIGH ISOLATION VOLTAGE SSOP PHOTOCOUPLER

R08DS0072EJ0500

Rev.5.00

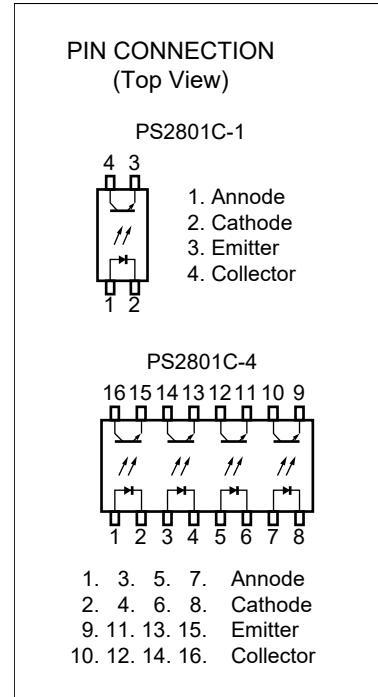
Apr. 24, 2024

DESCRIPTION

These products are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor in a plastic SSOP for high density applications to realize an excellent cost performance. This package has shield effect to cut off ambient light.

FEATURES

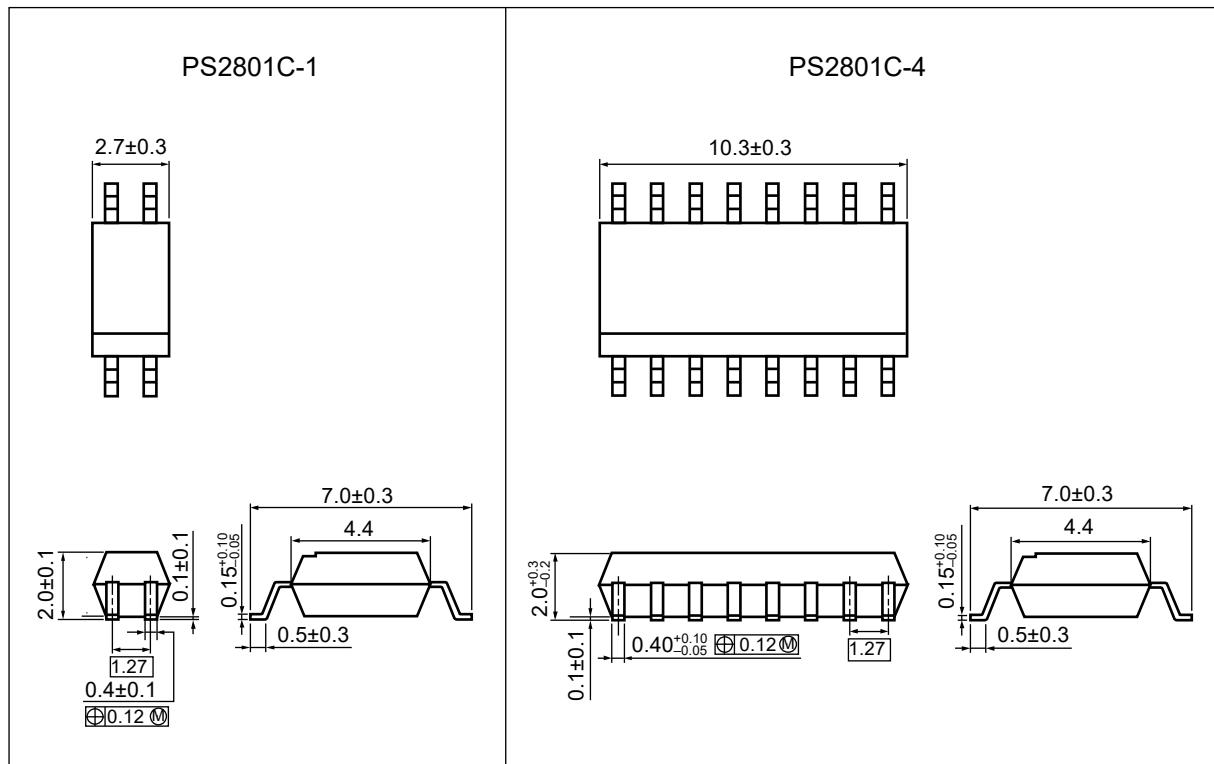
- High isolation voltage ($BV = 2\ 500\ V_{r.m.s.}$)
- Small and thin package (4, 16-pin SSOP, Pin pitch 1.27 mm)
- High collector to emitter voltage ($V_{CEO} : 80\ V$)
- Embossed tape product : PS2801C-1-F3: 3 500 pcs/reel
: PS2801C-4-F3: 2 500 pcs/reel
- Pb-free product
- Safety standards
 - UL approved: UL1577, Single protection
 - CSA approved: CAN/CSA-C22.2 No. 62368-1, Basic insulation
 - BSI approved: BS EN IEC 62368-1, Basic/Supplementary insulation (PS2801C-1 only)
 - VDE approved: DIN EN IEC 60747-5-5 (Option)



APPLICATIONS

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

PACKAGE DIMENSIONS (UNIT: mm)



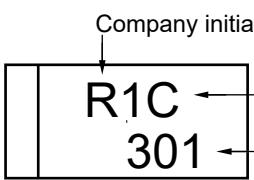
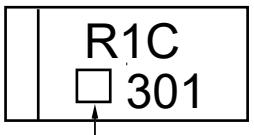
- Weight (4-pin SSOP) : 0.05 g (TYP.)
- Weight (16-pin SSOP) : 0.2 g (TYP.)

PHOTOCOUPLED CONSTRUCTION

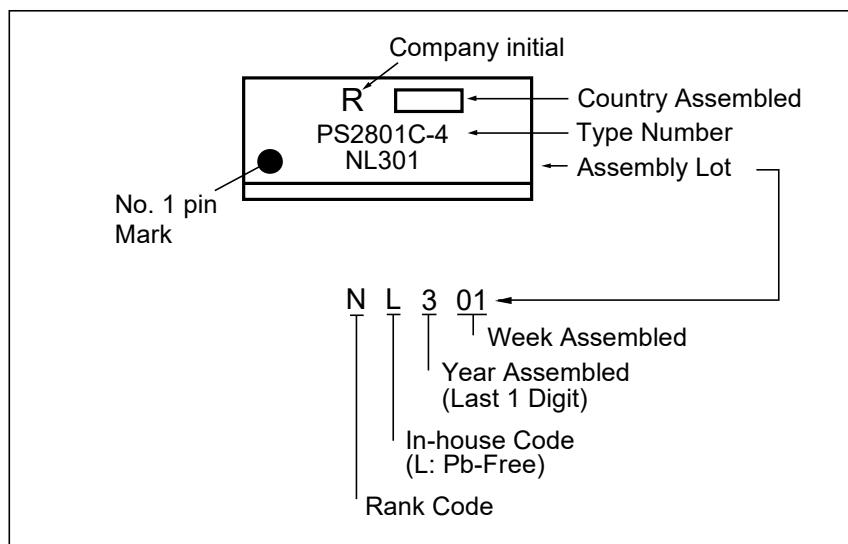
Parameter	MIN.
Air Distance	4.5 mm
Creepage Distance	4.5 mm
Isolation Distance	0.1 mm

MARKING EXAMPLE

PS2801C-1

Made in Taiwan	 <p>Company initial R1C 301 Last 2 numbers of type No. : 1C Assembly Lot 3.01 Week Assembled Year Assembled (Last 1 digit)</p>
Made in Japan	 <p>□ (Square) : Made in Japan</p>

PS2801C-4



ORDERING INFORMATION

Part Number	Order Number ^{*1}	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*2}	
PS2801C-1	PS2801C-1-A	Pb-Free	Embossed Tape 50 pcs	UL, CSA, BSI Approved	PS2801C-1	
PS2801C-1-F3	PS2801C-1-F3-A		Embossed Tape 3 500 pcs/reel			
PS2801C-4	PS2801C-4-A		Embossed Tape 10 pcs	UL, CSA Approved		
PS2801C-4-F3	PS2801C-4-F3-A		Embossed Tape 2 500 pcs/reel			
PS2801C-1-V	PS2801C-1-V-A		Embossed Tape 50 pcs	UL, CSA, BSI, VDE Approved		
PS2801C-1-V-F3	PS2801C-1-V-F3-A		Embossed Tape 3 500 pcs/reel			
PS2801C-4-V	PS2801C-4-V-A		Embossed Tape 10 pcs	UL, CSA, VDE Approved		
PS2801C-4-V-F3	PS2801C-4-V-F3-A		Embossed Tape 2 500 pcs/reel			

Notes: *1. When specifying CTR rank, please add "/CTR rank" after Order Number.

ex. L rank : PS2801C-1-A/L

Notes: *2. For the application of the safety standard, the following part number should be used.

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

Parameter	Symbol	Ratings		Unit
		PS2801C-1	PS2801C-4	
Diode	Forward Current (DC)	I _F	30	mA/ch
	Reverse Voltage	V _R	6	V
	Power Dissipation Derating	ΔP _D /°C	0.6	mW/°C
	Power Dissipation	P _D	60	mW/ch
	Peak Forward Current ^{*1}	I _{FP}	0.5	A/ch
Transistor	Collector to Emitter Voltage	V _{CEO}	80	V
	Emitter to Collector Voltage	V _{ECD}	5	V
	Collector Current	I _C	30	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

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 (PS2801C-1).

Pins 1-8 shorted together, 9-16 shorted together (PS2801C-4).

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	$I_F = 5 \text{ mA}$		1.2	1.4
	Reverse Current	I_R	$V_R = 5 \text{ V}$		5	μA
	Terminal Capacitance	C_t	$V = 0 \text{ V}, f = 1.0 \text{ MHz}$		10	pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	$V_{CE} = 80 \text{ V}, I_F = 0 \text{ mA}$		100	nA
Coupled	Current Transfer Ratio (I_C/I_F) ^{*1}	CTR	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	50	400	%
	Collector Saturation Voltage	$V_{CE(\text{sat})}$	$I_F = 10 \text{ mA}, I_C = 2 \text{ mA}$		0.13	0.3
	Isolation Resistance	R_{I-O}	$V_{I-O} = 1.0 \text{ kV}_{\text{DC}}$	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	$V_{CC} = 5 \text{ V}, I_C = 2 \text{ mA}, R_L = 100 \Omega$		5	μs
	Fall Time ^{*2}	t_f			7	
	Turn-on Time ^{*2}	t_{on}			10	
	Turn-off Time ^{*2}	t_{off}			7	

Notes: *1. CTR rank

PS2801C-1

N : 50 to 400 (%)

P : 150 to 300 (%)

L : 100 to 300 (%)

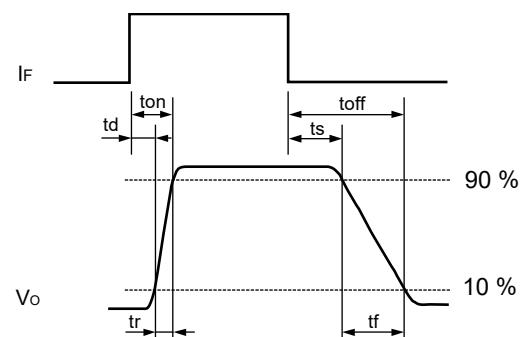
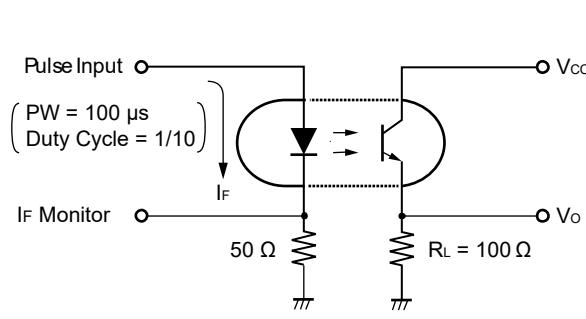
M : 100 to 400 (%)

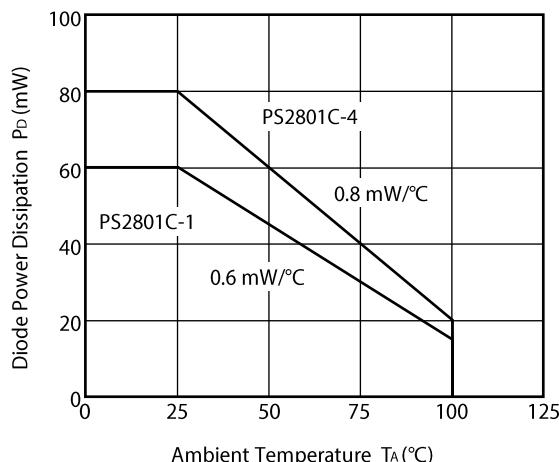
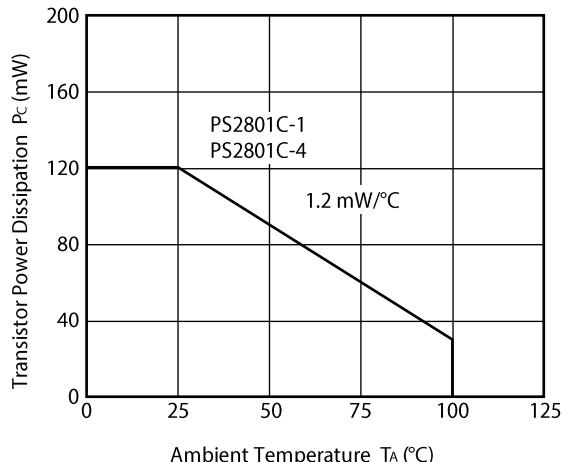
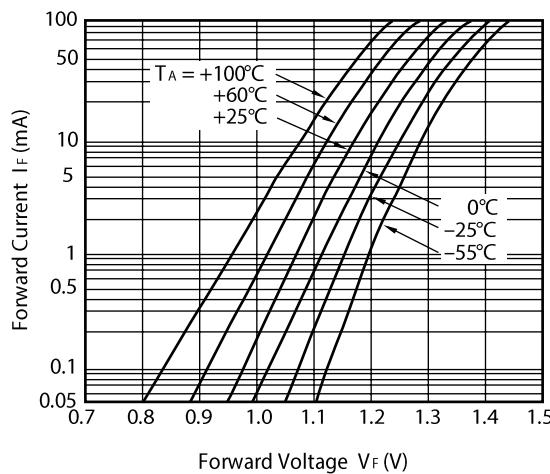
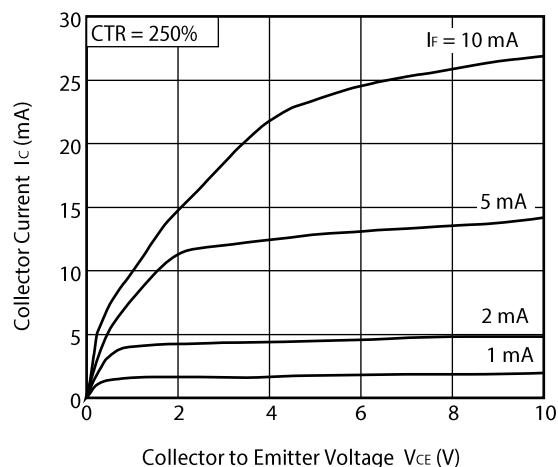
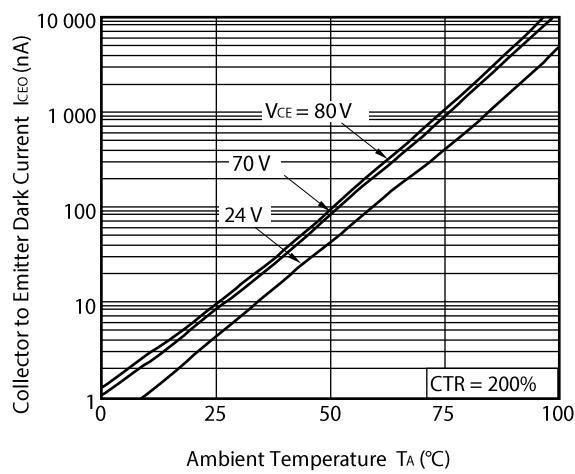
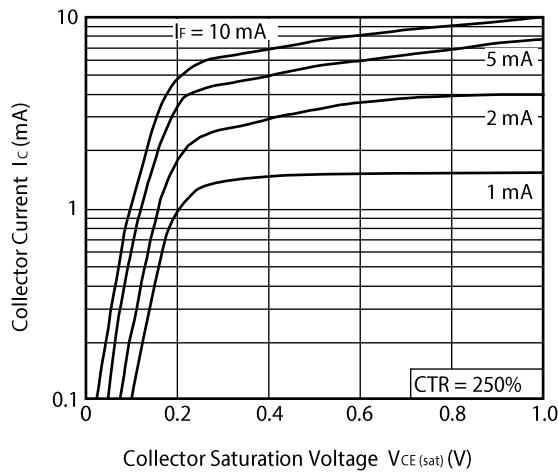
PS2801C-4

N : 50 to 400 (%)

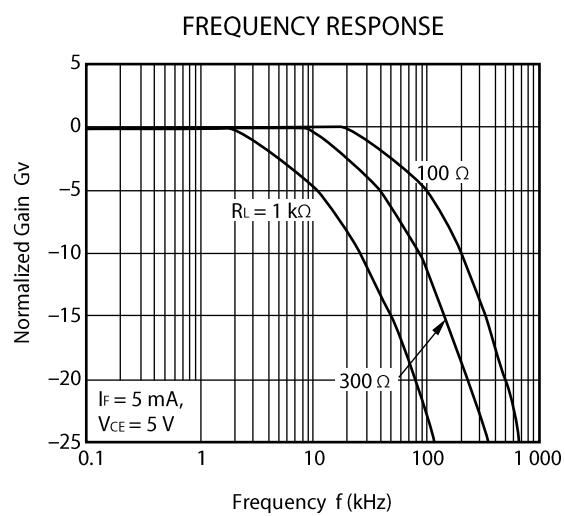
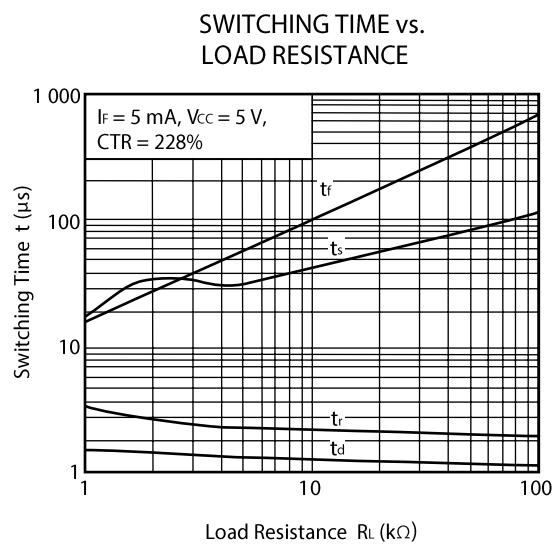
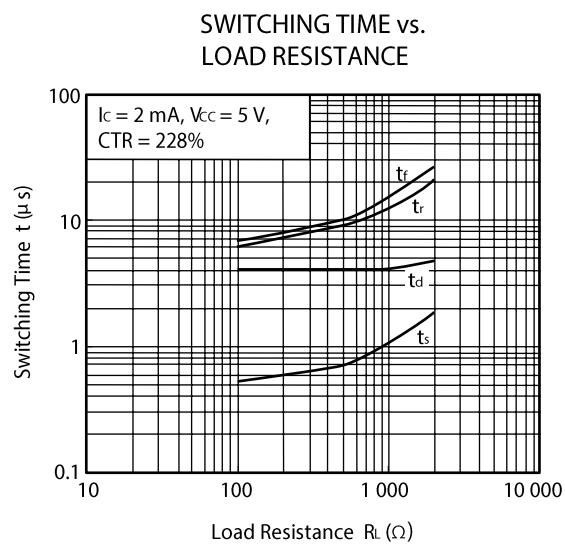
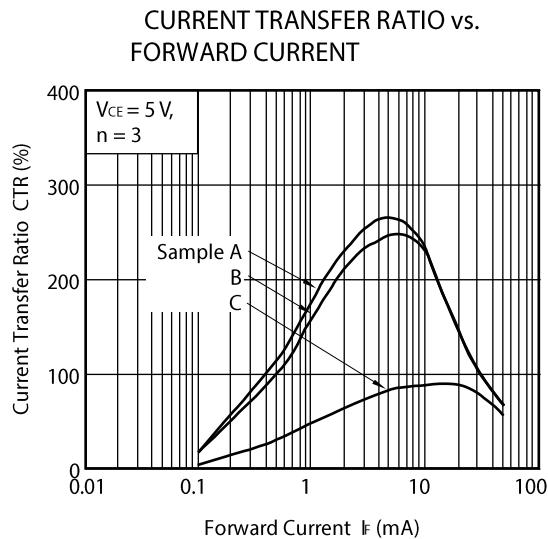
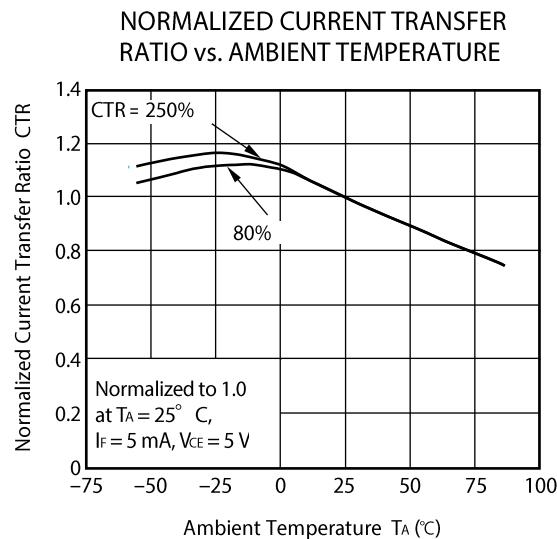
M : 100 to 400 (%)

*2. Test circuit for switching time



TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)DIODE POWER DISSIPATION vs.
AMBIENT TEMPERATURETRANSISTOR POWER DISSIPATION
vs. AMBIENT TEMPERATUREFORWARD CURRENT vs.
FORWARD VOLTAGECOLLECTOR CURRENT vs.
COLLECTOR TO Emitter VOLTAGECOLLECTOR TO Emitter DARK
CURRENT vs. AMBIENT TEMPERATURECOLLECTOR CURRENT vs.
COLLECTOR SATURATION VOLTAGE

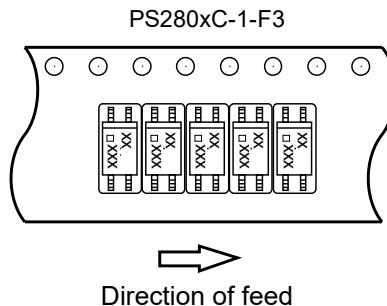
Remark The graphs indicate nominal characteristics.



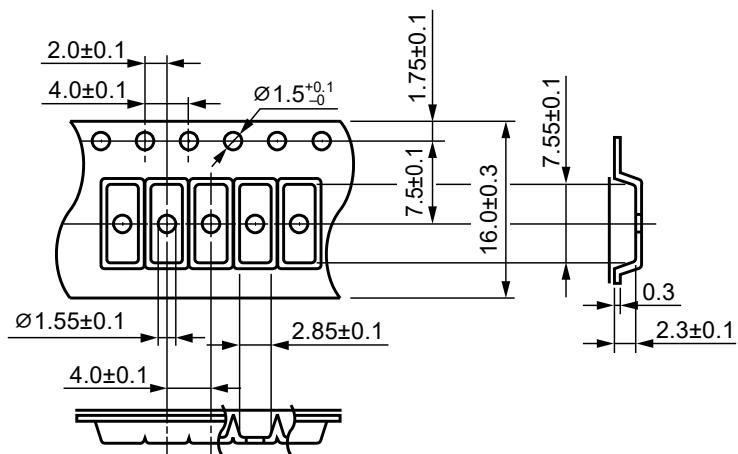
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

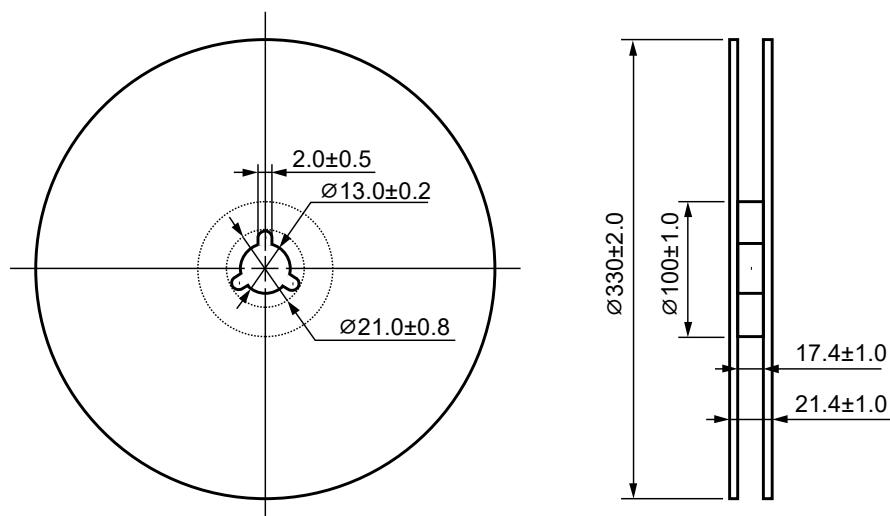
Taping Direction



Outline and Dimensions (Tape)

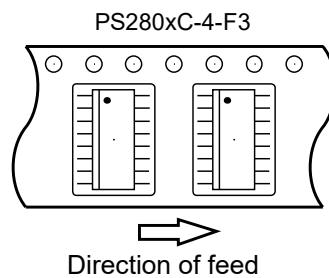


Outline and Dimensions (Reel)

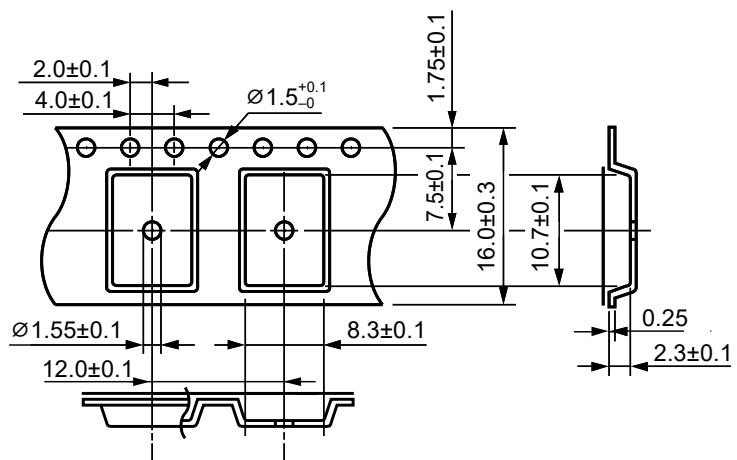


Packing : 3 500 pcs/reel

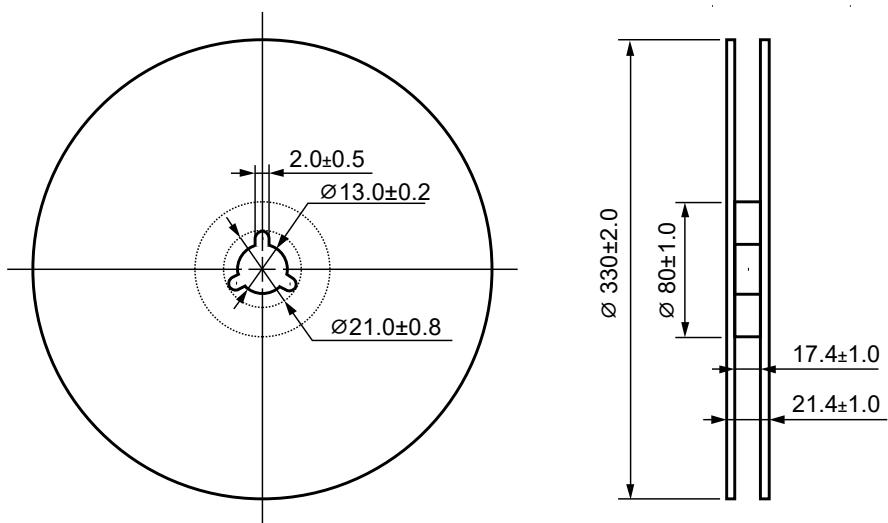
Tape Direction



Outline and Dimensions (Tape)

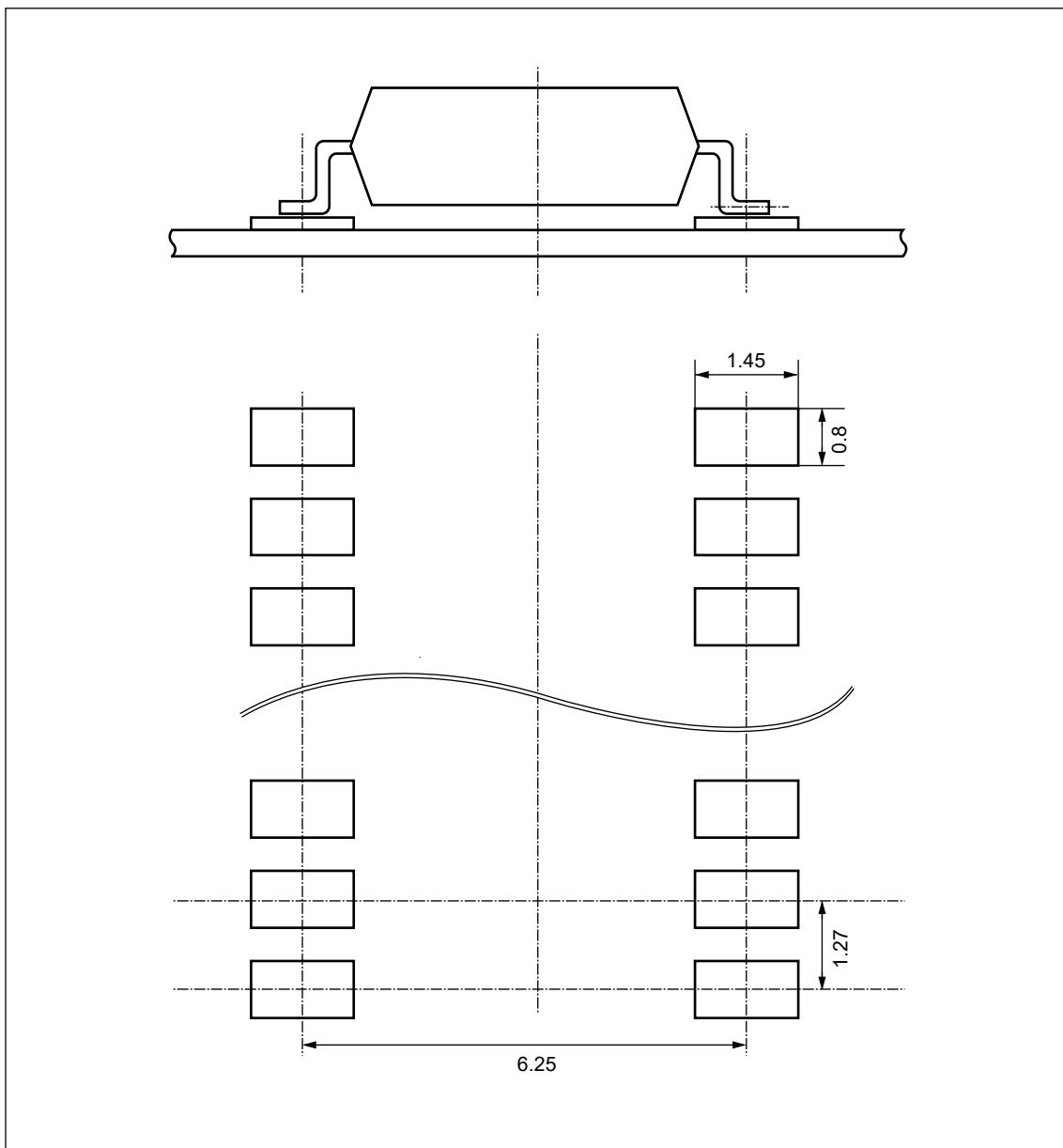


Outline and Dimensions (Reel)



Packing : 2 500 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



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

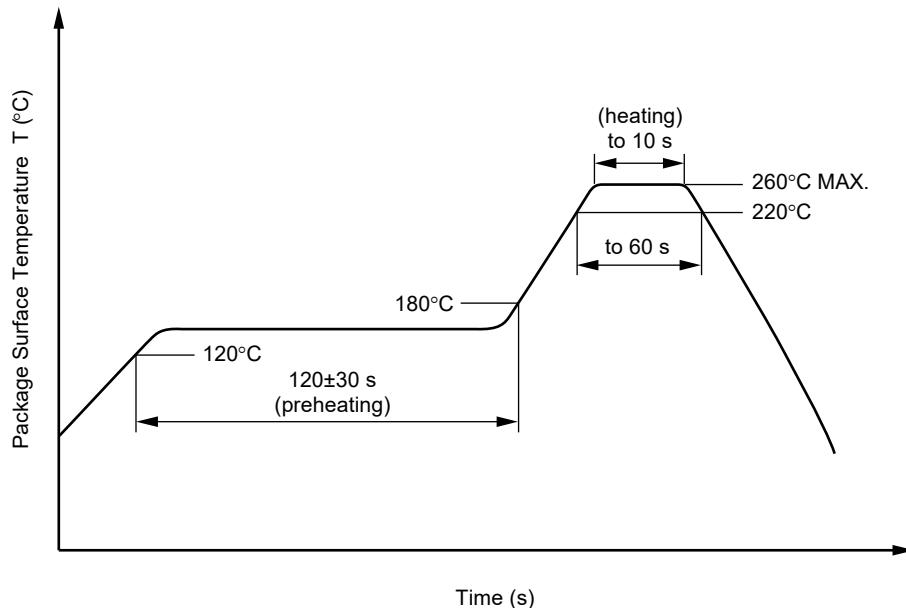
NOTES ON HANDLING

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 (per one side)	3 s or less
• Flux	Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)
• Place	1.5 to 2.0 mm or more away from the root of the lead

(4) Cautions

• Flux cleaning	Avoid cleaning with Freon- or halogen-based (chlorinated etc.) solvents.
• Fixing/Coating	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 $I_F = 1$ mA.

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

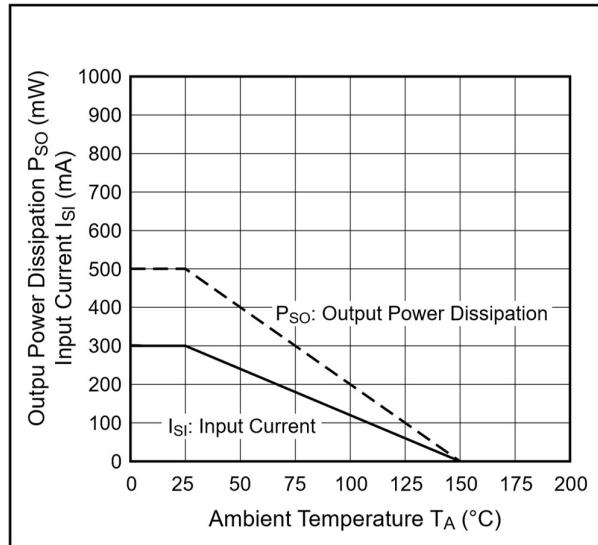
USAGE CAUTIONS

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

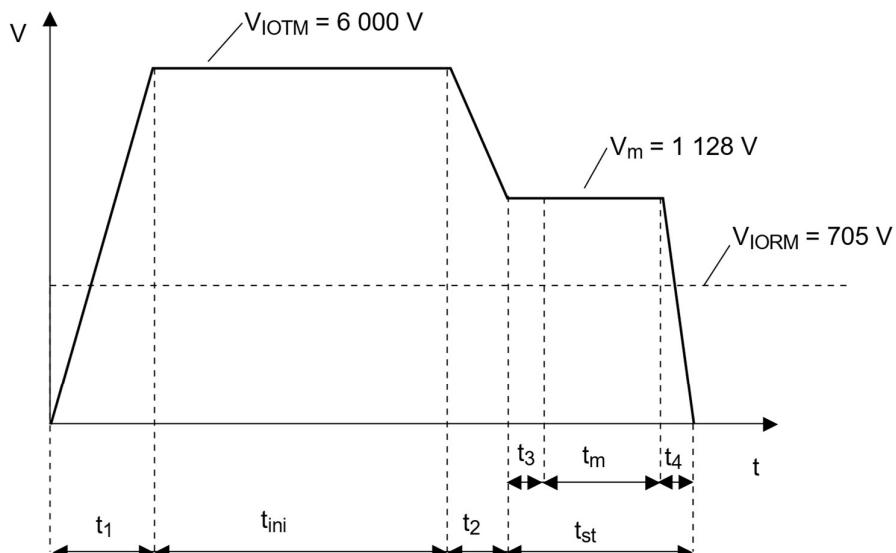
SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

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) $V_m = 1.6 \times V_{IORM}$, $q_{pd} < 5 \text{ pC}$	V_{IORM} V_m	705 1 128	V_{peak} V_{peak}
Test voltage (partial discharge test, procedure b for all devices) $V_m = 1.875 \times V_{IORM}$, $q_{pd} < 5 \text{ pC}$	V_m	1 322	V_{peak}
Highest permissible overvoltage	V_{IOTM}	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 $V_{I-O} = 500 \text{ V dc}$, $T_A = 25 \text{ °C}$ $V_{I-O} = 500 \text{ V dc}$, $T_A = \text{maximum temperature of rating, at least } 100 \text{ °C}$	$R_{I-O} \text{ MIN.}$ $R_{I-O} \text{ MIN.}$	10^{12} 10^{11}	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)			
Maximum ambient temperature	T_s	150	°C
Maximum input current	I_{SI}	300	mA
Maximum output power dissipation	P_{SO}	500	mW
Isolation resistance, minimum value at $V_{I-O} = 500 \text{ V dc}$, $T_A = T_s$	$R_{I-O} \text{ MIN.}$	10^9	Ω

Dependence of maximum safety ratings with package temperature



Method a) Destructive Test, Type and Sample Test



$t_1, t_2 = 1$ to 10 sec

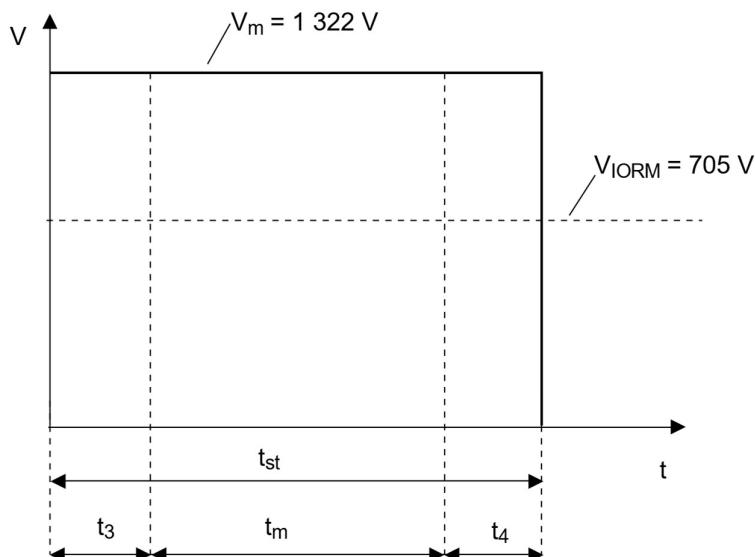
$t_3, t_4 = 1$ sec

$t_m = 10$ sec

$t_{st} = 12$ sec

$t_{ini} = 60$ sec

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



$t_3, t_4 = 0.1$ sec

$t_m = 1.0$ sec

$t_{st} = 1.2$ sec

Caution	GaAs Products	<p>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.</p> <ul style="list-style-type: none">• 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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