

PS2811-1, PS2811-4

R08DS0104EJ0600

Rev.6.00

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

Apr. 24, 2024

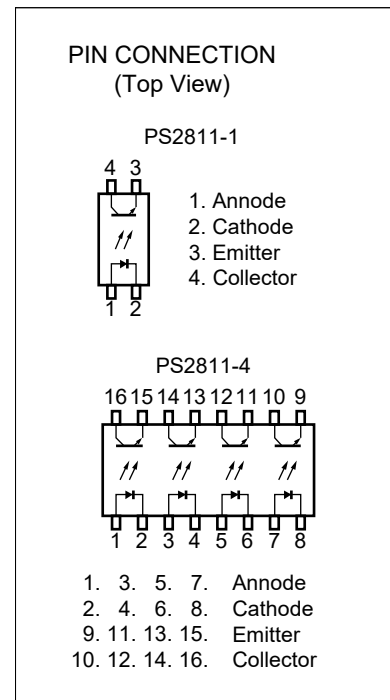
DESCRIPTION

The PS2811-1 and PS2811-4 are optically coupled isolators containing a GaAs light emitting diode 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

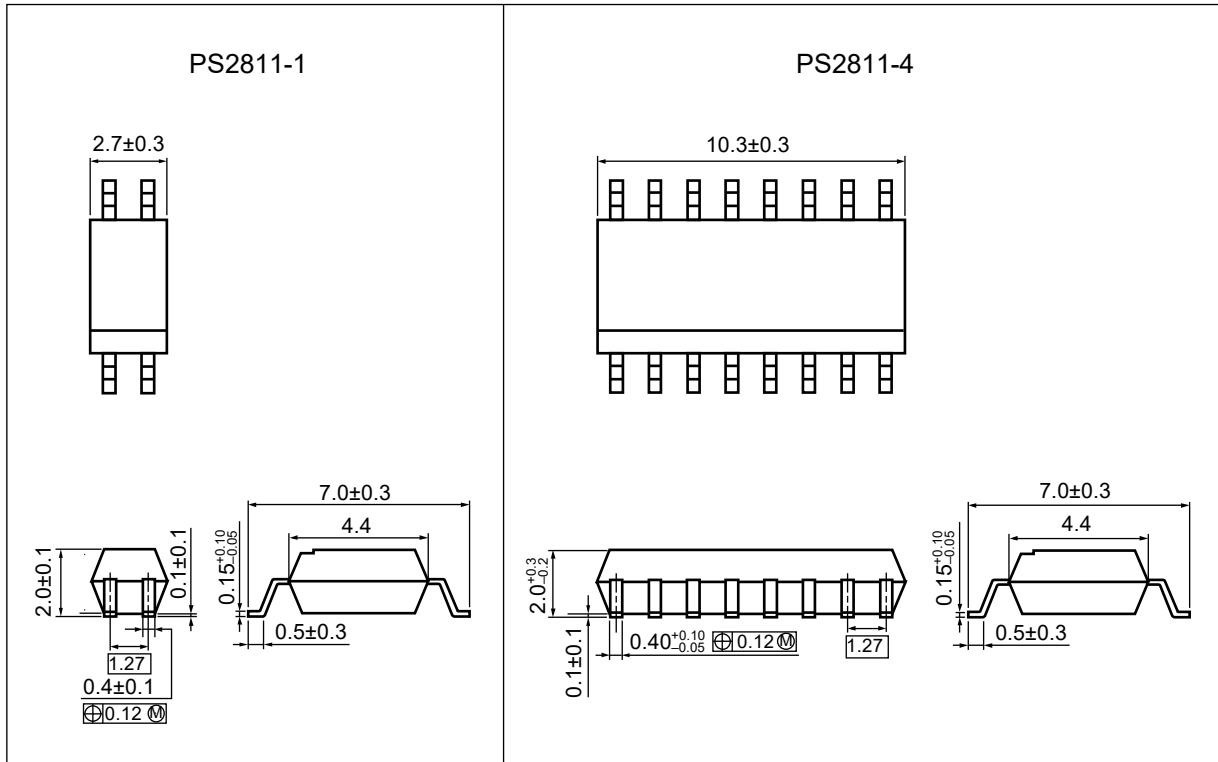
- High current transfer ratio (CTR = 200 % TYP. @ $I_F = 1 \text{ mA}$)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Small and thin package (4, 16-pin SSOP, Pin pitch 1.27 mm)
- Embossed tape product : PS2811-1-F3: 3 500 pcs/reel
: PS2811-4-F3: 2 500 pcs/reel
- Pb-free product
- Safety standards
 - UL approved: UL1577, Single protection
 - CSA approved: CAN/CSA-C22.2 No. 62368-1, Basic insulation
 - VDE approved: DIN EN IEC 60747-5-5 (Option)



APPLICATIONS

- Programmable logic controllers
- Small power supply
- Hybrid IC
- Modem/FAX

PACKAGE DIMENSIONS (UNIT: mm)



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

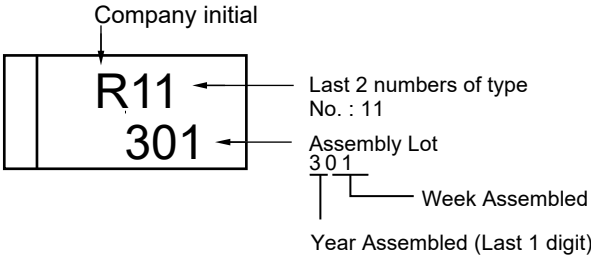
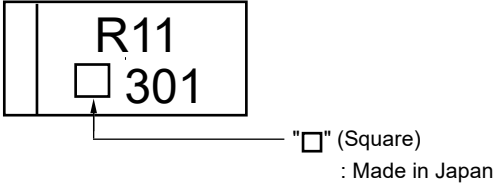
Weight (16-pin SSOP) : 0.2 g (TYP.)

PHOTOCOUPLER CONSTRUCTION

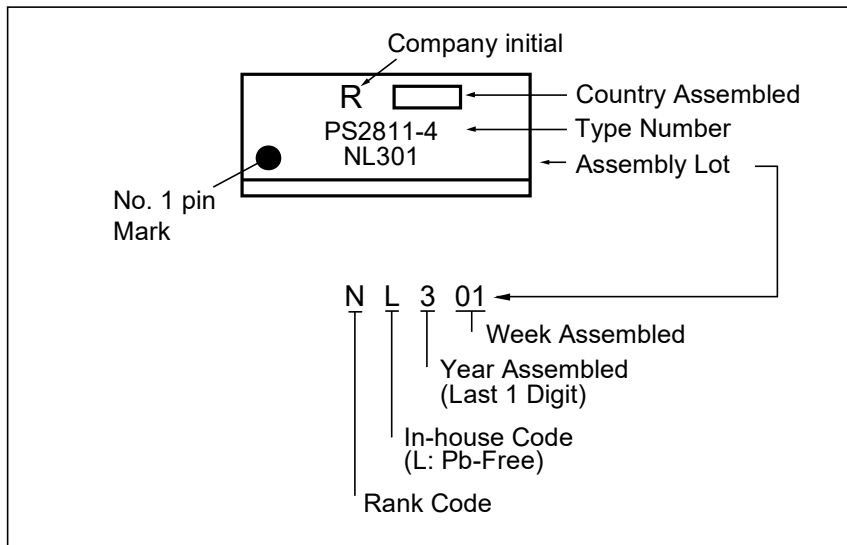
| Parameter | MIN. |
|---------------------|--------|
| Air Distance | 4.5 mm |
| Creepage Distance | 4.5 mm |
| Isolation Thickness | 0.1 mm |

MARKING EXAMPLE

PS2811-1

| | |
|-----------------------|--|
| <p>Made in Taiwan</p> |  |
| <p>Made in Japan</p> |  |

PS2811-4



ORDERING INFORMATION

| Part Number | Order Number *1 | Solder Plating Specification | Packing Style | Safety Standard Approval | Application Part Number *2 |
|---------------|-----------------|------------------------------|------------------------------|--------------------------|----------------------------|
| PS2811-1 | PS2811-1-A | Pb-Free | Embossed Tape 50 pcs | UL, CSA, Approved | PS2811-1 |
| PS2811-1-F3 | PS2811-1-F3-A | | Embossed Tape 3 500 pcs/reel | | |
| PS2811-1-V | PS2811-1-V-A | | Embossed Tape 50 pcs | UL, CSA, VDE Approved | |
| PS2811-1-V-F3 | PS2811-1-V-F3-A | | Embossed Tape 3 500 pcs/reel | | |
| PS2811-4 | PS2811-4-A | | Embossed Tape 10 pcs | UL, CSA, Approved | PS2811-4 |
| PS2811-4-F3 | PS2811-4-F3-A | | Embossed Tape 2 500 pcs/reel | | |
| PS2811-4-V | PS2811-4-V-A | | Embossed Tape 10 pcs | UL, CSA, VDE Approved | |
| PS2811-4-V-F3 | PS2811-4-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 : PS2811-1-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 |
|-------------------------------|------------------------------|---------------------|-------------|----------|---------|
| | | | PS2811-1 | PS2811-4 | |
| Diode | Forward Current (DC) | I _F | 50 | | mA/ch |
| | Reverse Voltage | V _R | 6 | | V |
| | 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/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 | 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 (PS2811-1).

Pins 1-8 shorted together, 9-16 shorted together (PS2811-4).

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 |
| | Reverse Current | I _R | V _R = 5 V | | | 5 | μA |
| | Terminal Capacitance | C _t | V = 0 V, f = 1 MHz | | 15 | | 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) ^{*1} | 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 ^{*2} | t _r | V _{CC} = 5 V, I _C = 2 mA, R _L = 100 Ω | | 4 | | μs |
| | Fall Time ^{*2} | t _f | | | 5 | | |
| | Turn-on Time ^{*2} | t _{on} | | | 7 | | |
| | Turn-off Time ^{*2} | t _{off} | | | 5 | | |

Notes: *1. CTR rank

PS2811-1

N : 100 to 400 (%)

K : 200 to 400 (%)

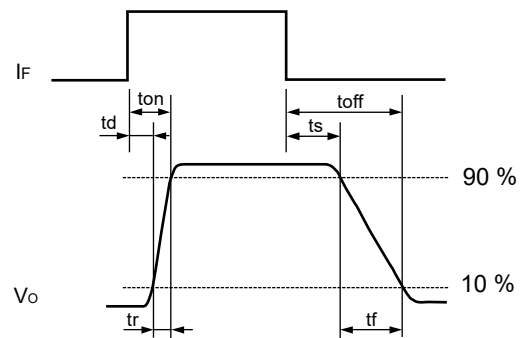
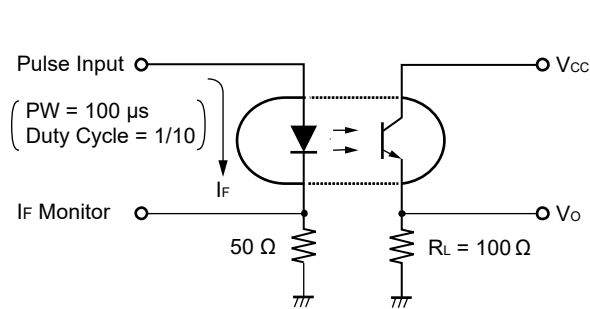
L : 150 to 300 (%)

M: 100 to 200 (%)

PS2811-4

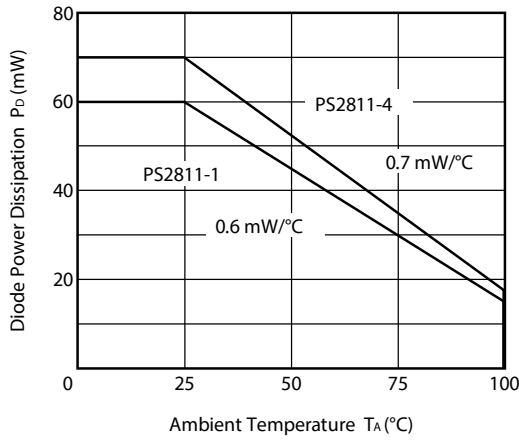
N : 100 to 400 (%)

*2. Test circuit for switching time

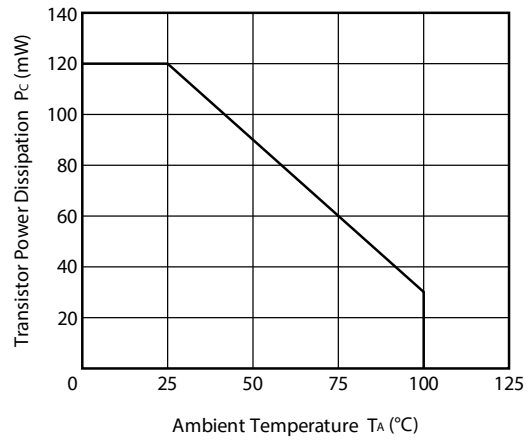


TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified)

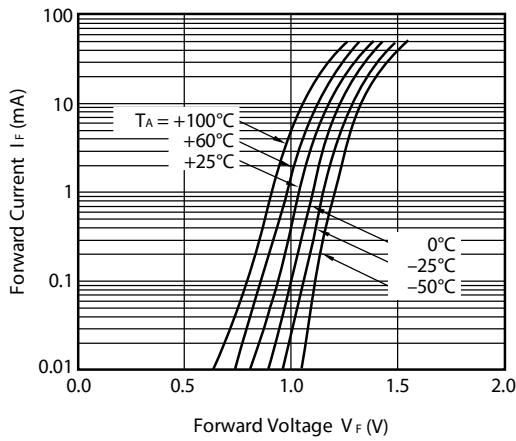
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



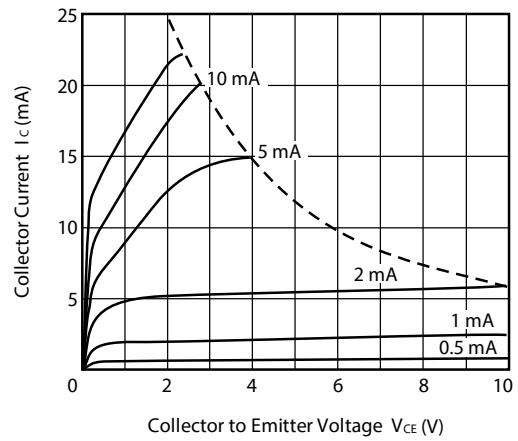
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



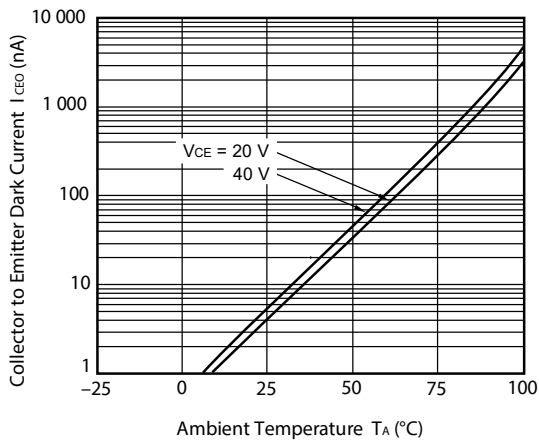
FORWARD CURRENT vs. FORWARD VOLTAGE



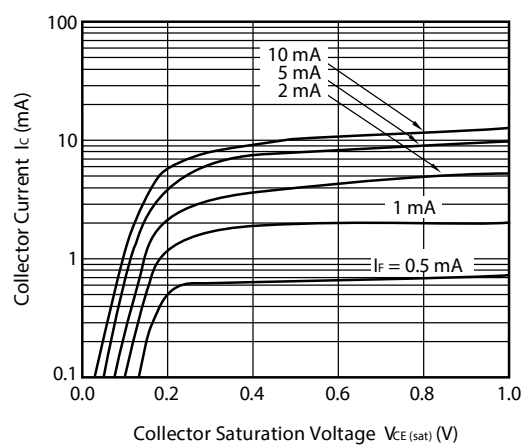
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



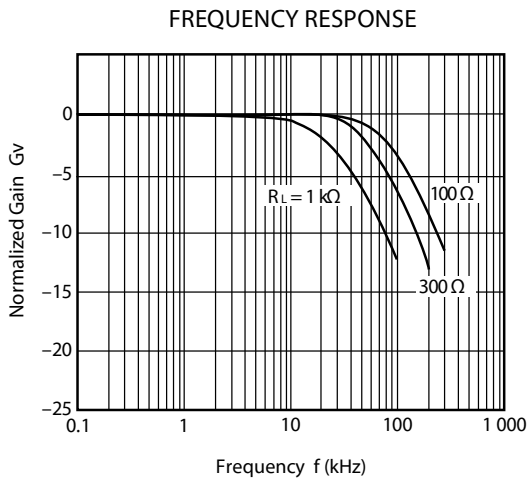
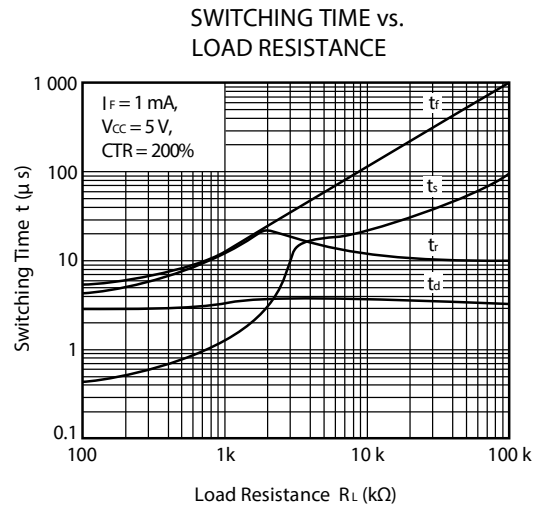
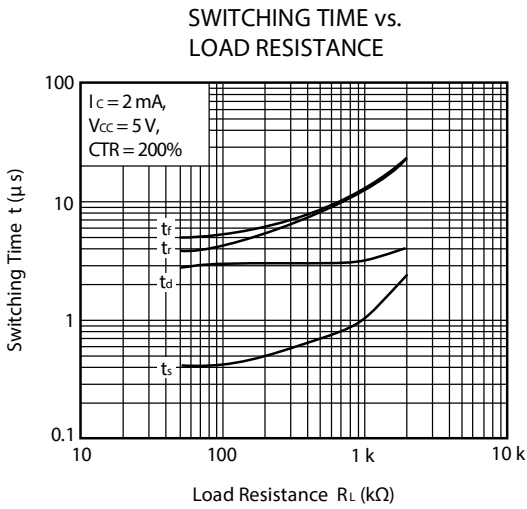
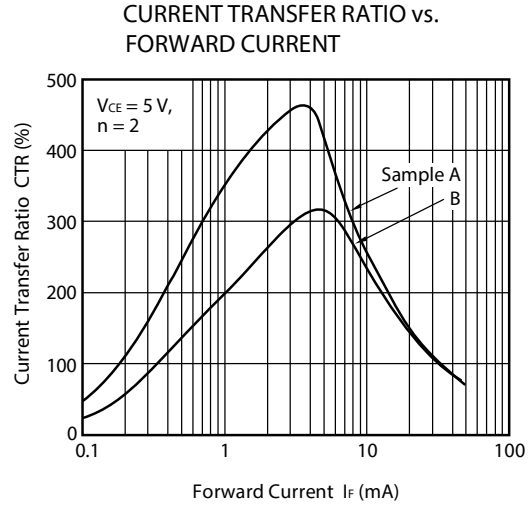
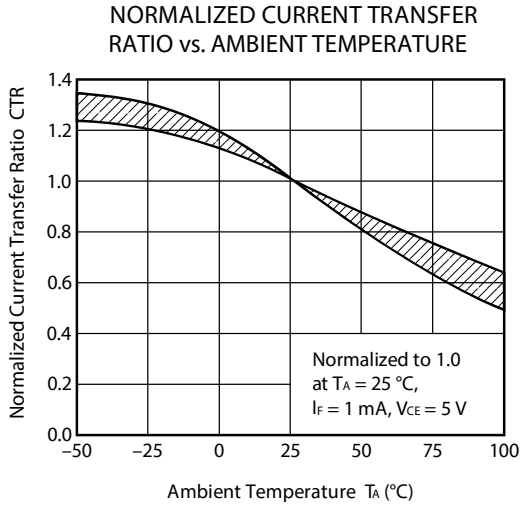
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



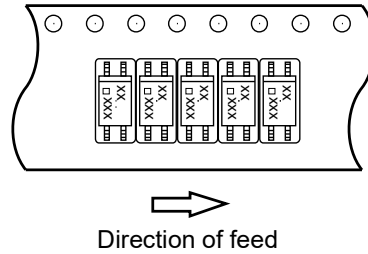
Remark The graphs indicate nominal characteristics.



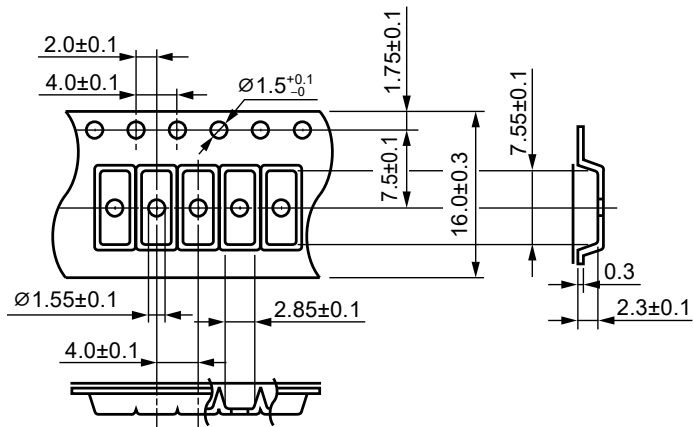
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

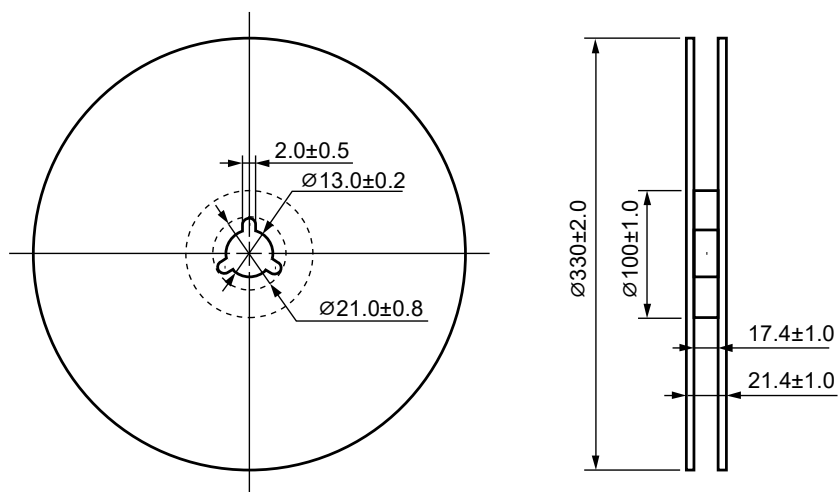
Taping Direction



Outline and Dimensions (Tape)

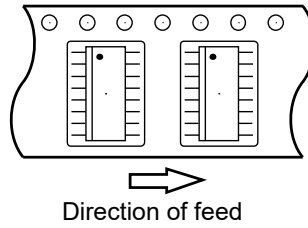


Outline and Demensions (Reel)

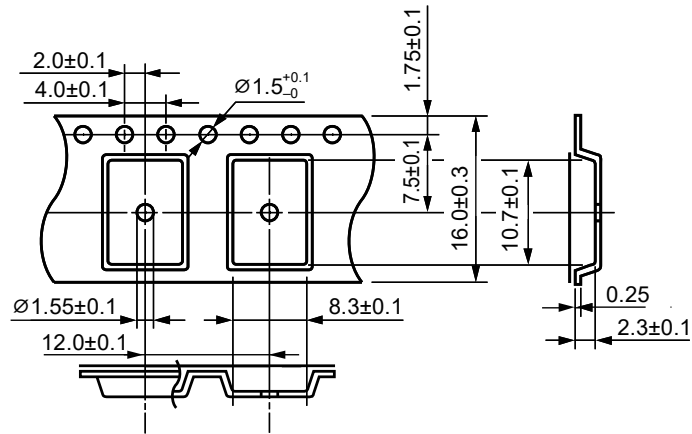


Packing : 3 500 pcs/reel

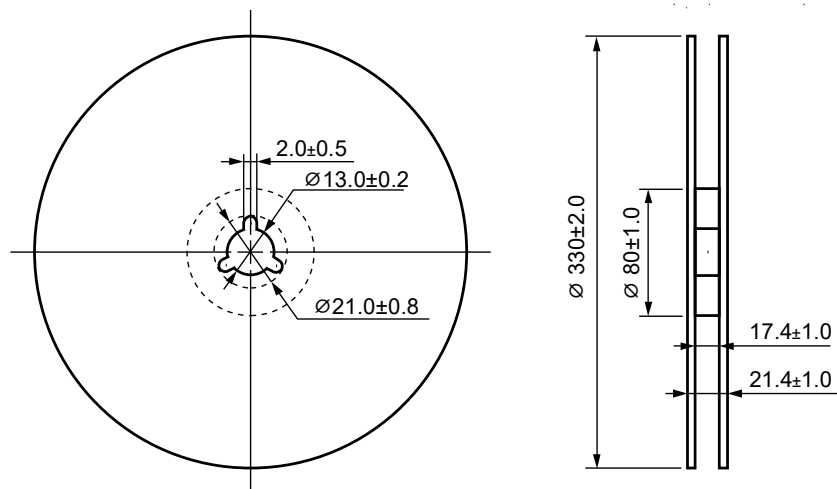
Tape Direction



Outline and Dimensions (Tape)

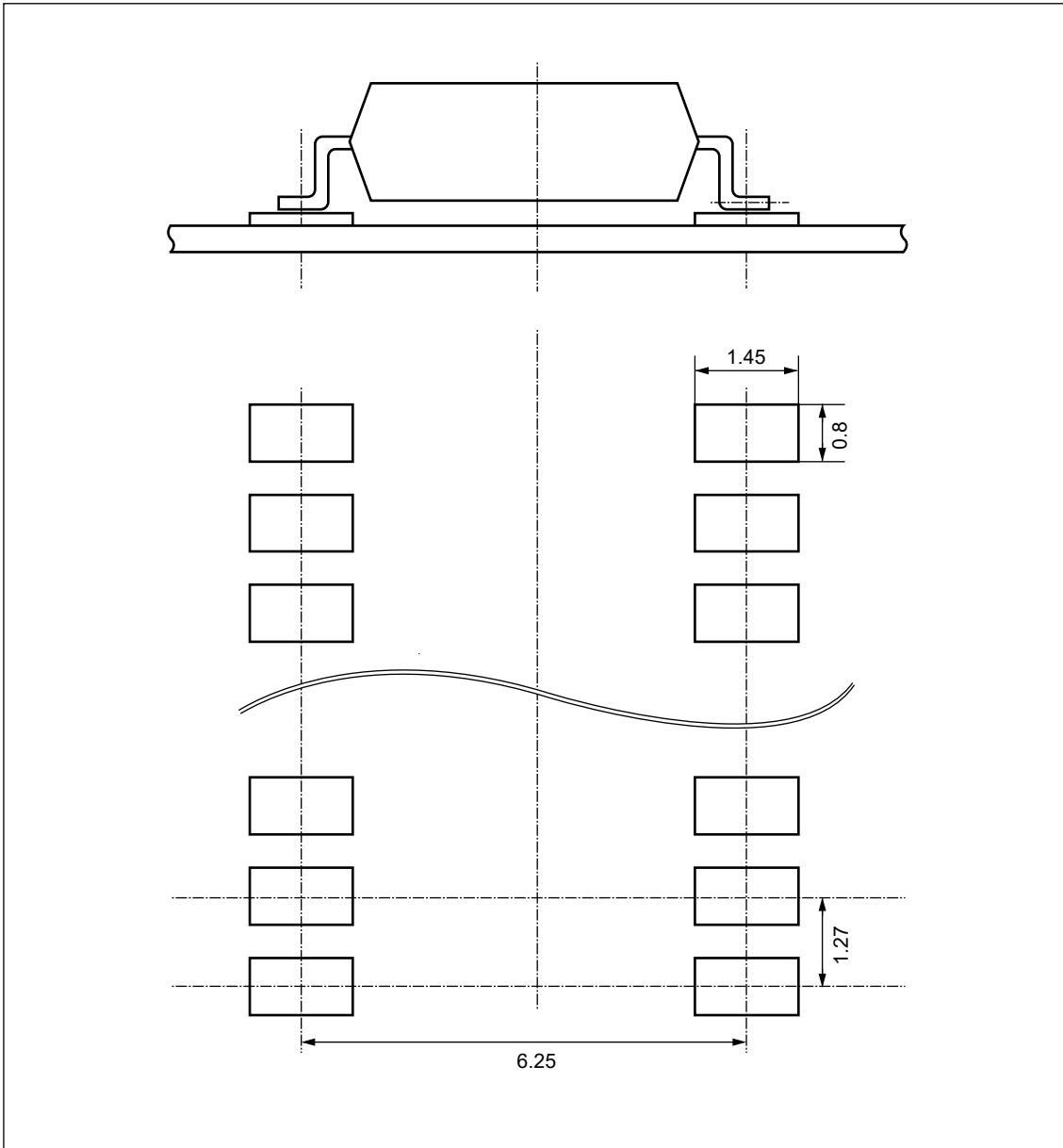


Outline and Dimensions (Reel)



Packing : 2 500 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



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

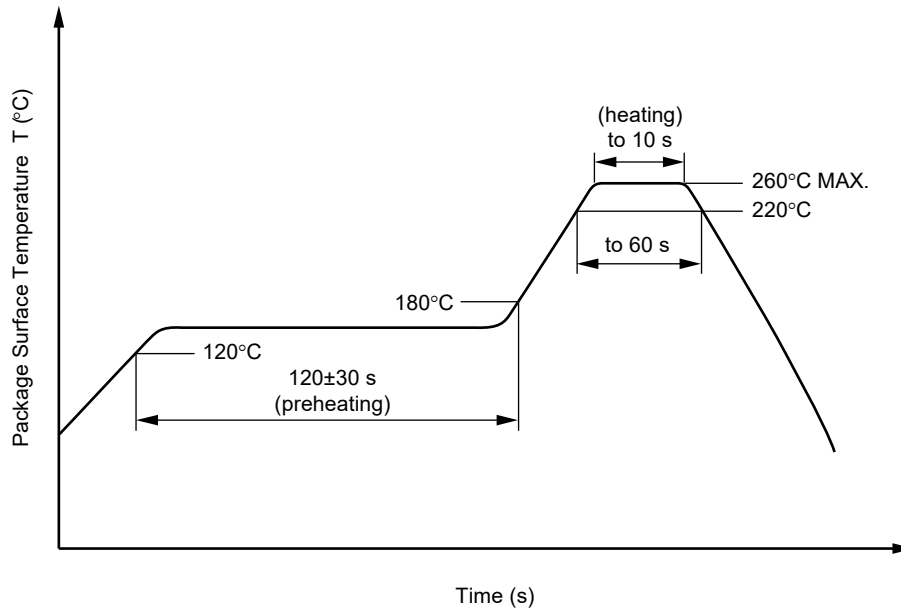
NOTES ON HANDLING

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

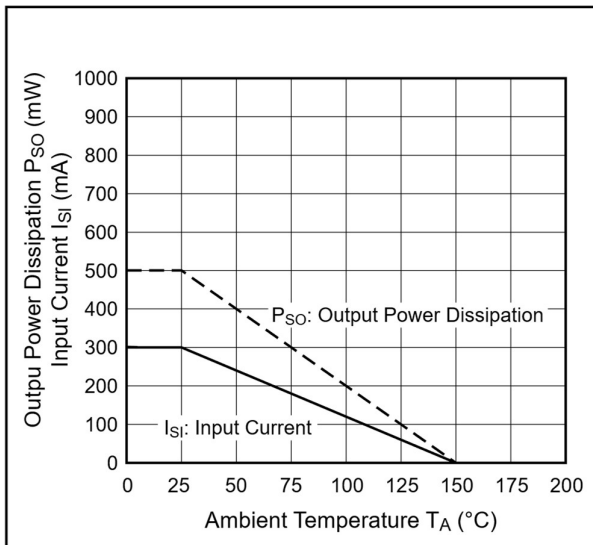
USAGE CAUTIONS

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

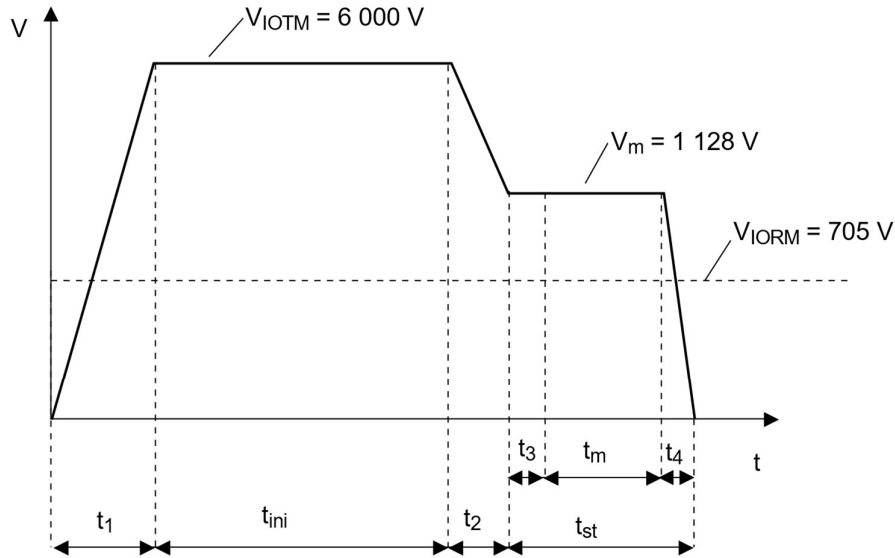
SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

| Parameter | Symbol | Rating | Unit |
|--|------------------------|-------------|------------|
| Climatic test class (IEC 60068-1/DIN EN 60068-1) | | 55/100/21 | |
| Dielectric strength | | | |
| maximum operating isolation voltage | V_{IORM} | 705 | V_{peak} |
| 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_m | 1 128 | 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 $V_{I-O} = 500 \text{ V dc}, T_A = 25 \text{ °C}$ | $R_{I-O \text{ MIN.}}$ | 10^{12} | Ω |
| $V_{I-O} = 500 \text{ V dc}, T_A = \text{maximum temperature of rating, at least } 100 \text{ °C}$ | $R_{I-O \text{ MIN.}}$ | 10^{11} | 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

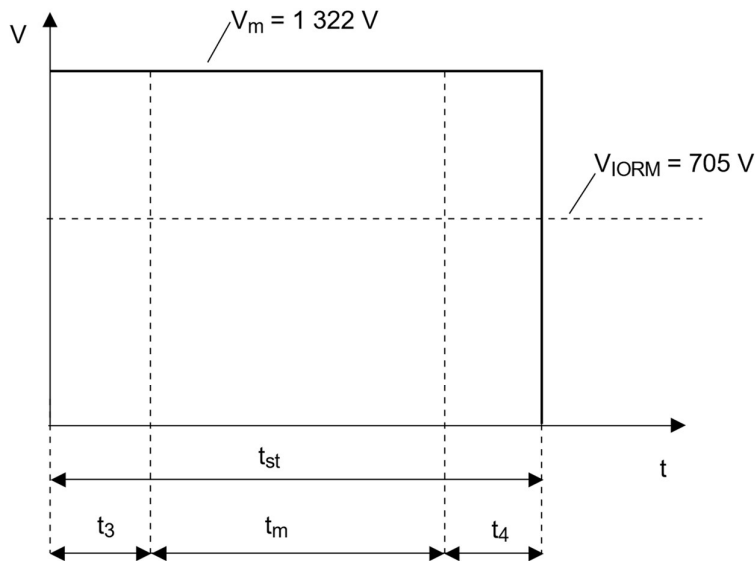


Method a) Destructive Test, Type and Sample Test



$t_1, t_2 = 1 \text{ to } 10 \text{ sec}$
 $t_3, t_4 = 1 \text{ sec}$
 $t_m = 10 \text{ sec}$
 $t_{st} = 12 \text{ sec}$
 $t_{ini} = 60 \text{ sec}$

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



$t_3, t_4 = 0.1 \text{ sec}$
 $t_m = 1.0 \text{ sec}$
 $t_{st} = 1.2 \text{ sec}$

| | | |
|----------------|---------------|--|
| 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.<ol style="list-style-type: none">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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