

**HIGH CTR, 4-PIN ULTRA SMALL PACKAGE
FLAT-LEAD PHOTOCOUPLER**

–NEPOC Series–

DESCRIPTION

The PS2911-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon phototransistor in one package for high density mounting applications.

An ultra small flat-lead package has been provided which realizes a reduction in mounting area of about 30% compared with the PS28xx series.

FEATURES

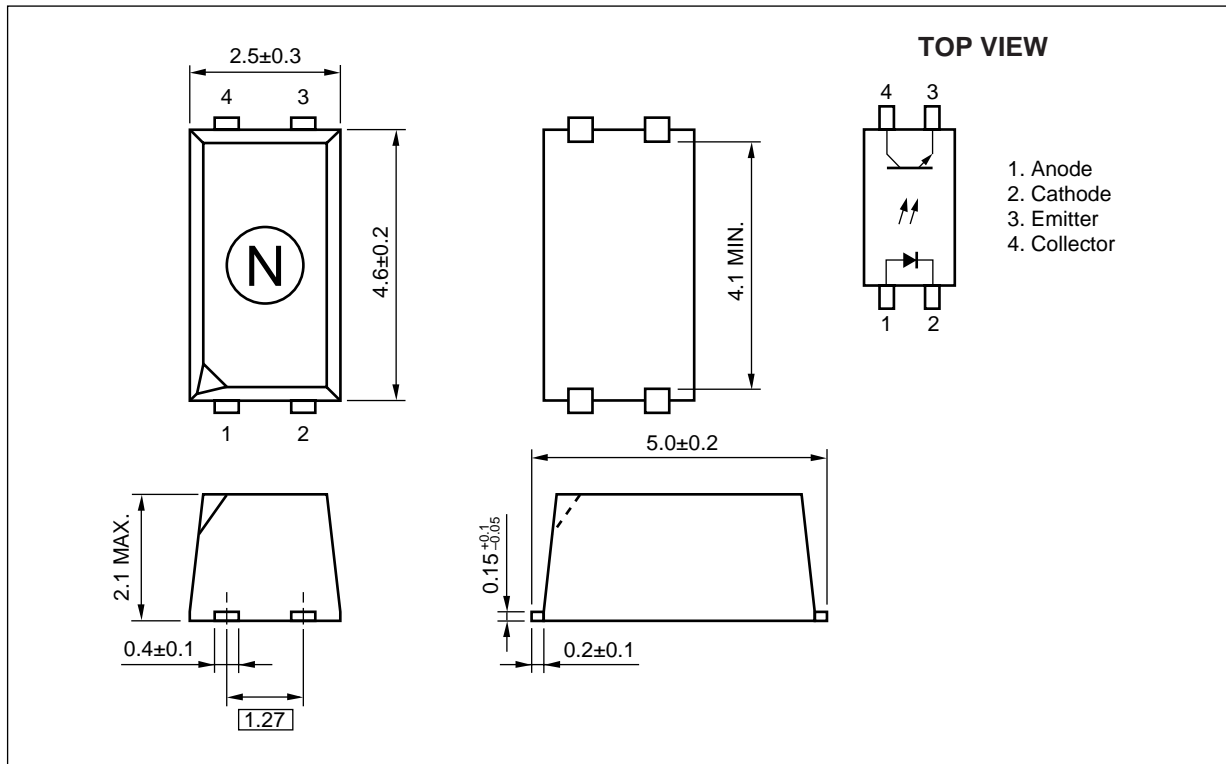
- ★ • Ultra small flat-lead package (4.6 (L) × 2.5 (W) × 2.1 (H) mm)
- High current transfer ratio (CTR = 200% TYP. @ $I_F = 1$ mA, $V_{CE} = 5$ V)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Ordering number of taping product: PS2911-1-F3, F4: 3 500 pcs/reel

APPLICATIONS

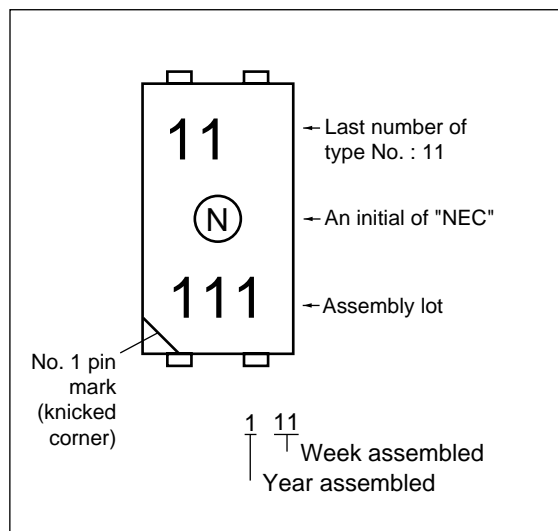
- DC/DC converter
- Modem/PC card

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

★ PACKAGE DIMENSIONS (UNIT: mm)



★ MARKING



PHOTOCOUPLER CONSTRUCTION

| Parameter | Unit (MIN.) |
|--------------------|-------------|
| Air Distance | 4 mm |
| Creepage Distance | 4 mm |
| Isolation Distance | 0.4 mm |

★ ORDERING INFORMATION

| Part Number | Package | Packing Style | Application Part Number ^{*1} |
|-------------|-----------------|------------------------------|---------------------------------------|
| PS2911-1-F3 | 4-pin ultra | Embossed Tape 3 500 pcs/reel | PS2911-1 |
| PS2911-1-F4 | small flat-lead | | |

*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 |
|---------------------------------|------------------------------------|---------------------|-------------|---------|
| ★ ★ Diode | Forward Current | I _F | 50 | mA |
| | Forward Current Derating | ΔI _F /°C | 0.5 | mA/°C |
| | Peak Forward Current ^{*1} | I _{FP} | 0.5 | A |
| | Power Dissipation | P _D | 60 | mW |
| | Reverse Voltage | V _R | 6 | V |
| Transistor | Collector to Emitter Voltage | V _{CEO} | 40 | V |
| | Emitter to Collector Voltage | V _{ECO} | 5 | V |
| | Collector Current | I _C | 40 | mA |
| | Power Dissipation Derating | ΔP _C /°C | 1.2 | mW/°C |
| | Power Dissipation | P _C | 120 | mW |
| Isolation Voltage ^{*2} | | BV | 2 500 | Vr.m.s. |
| Total Power Dissipation | | P _T | 160 | mW |
| 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

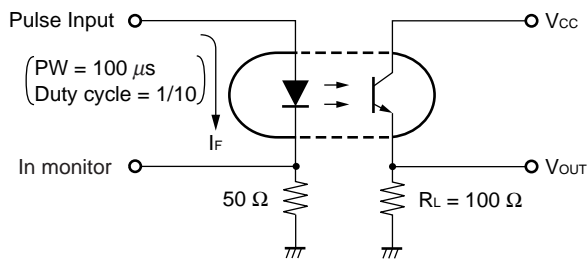
★ ELECTRICAL CHARACTERISTICS (T_A = 25°C)

| Parameter | | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|------------------------|--|----------------------|--|------------------|------|------|------|
| Diode | Forward Voltage | V _F | I _F = 1 mA | 0.9 | 1.1 | 1.3 | 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 | | 0.13 | 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 | | 5 | | μs |
| | Fall Time ^{*2} | t _f | | | 10 | | |
| | On Time ^{*2} | t _{on} | V _{CC} = 5 V, I _F = 1 mA, R _L = 5 kΩ | | 40 | | μs |
| | Storage Time ^{*2} | t _s | | | 10 | | μs |
| Off Time ^{*2} | t _{off} | | | | 120 | | μs |

*1 CTR rank

- N : 100 to 400 (%)
- K : 200 to 400 (%)
- L : 150 to 300 (%)
- M : 100 to 200 (%)

*2 Test circuit for switching time

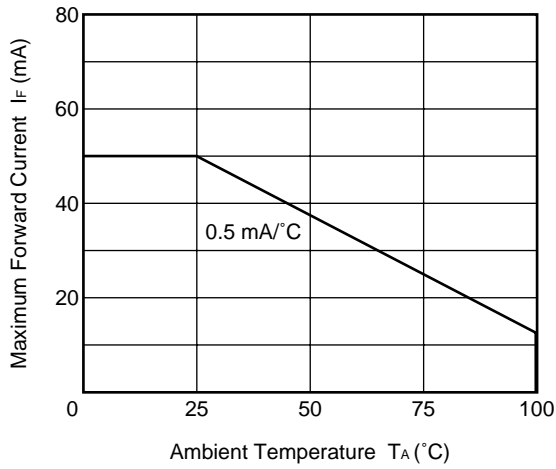


★ CAUTIONS REGARDING NOISE

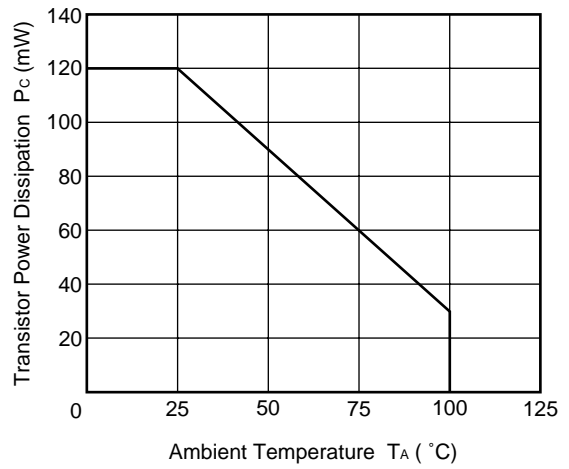
Be aware that when voltage is applied suddenly between the photocoupler's input and output or between corrector-emitters at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

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

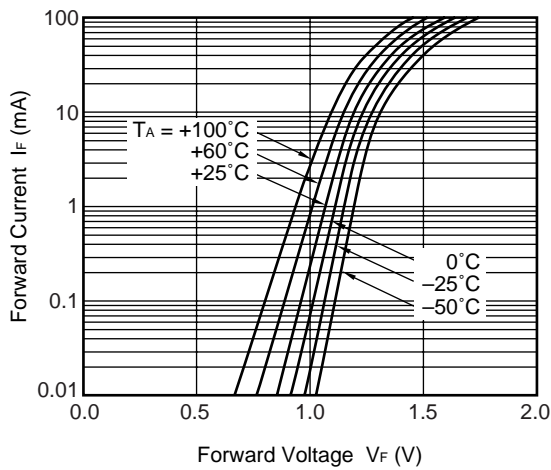
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



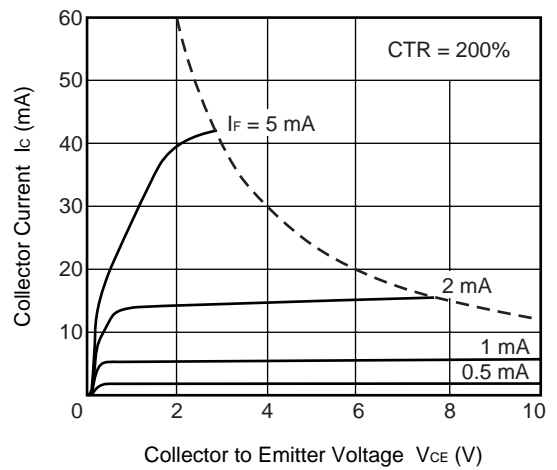
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



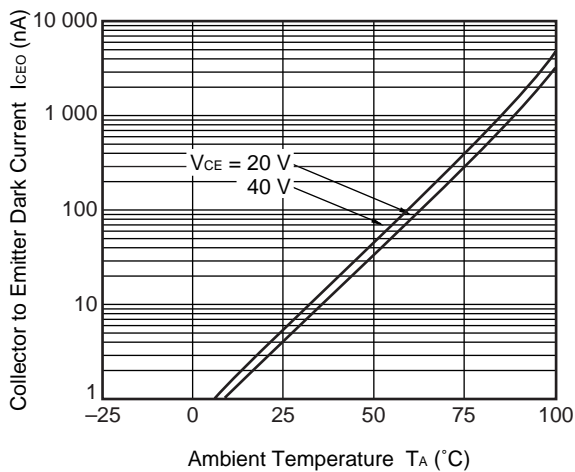
FORWARD CURRENT vs. FORWARD VOLTAGE



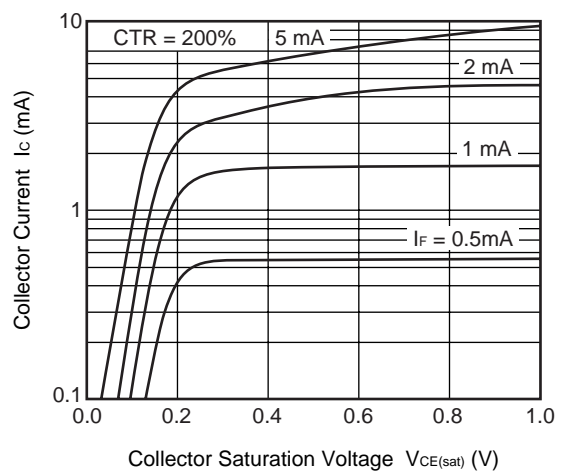
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



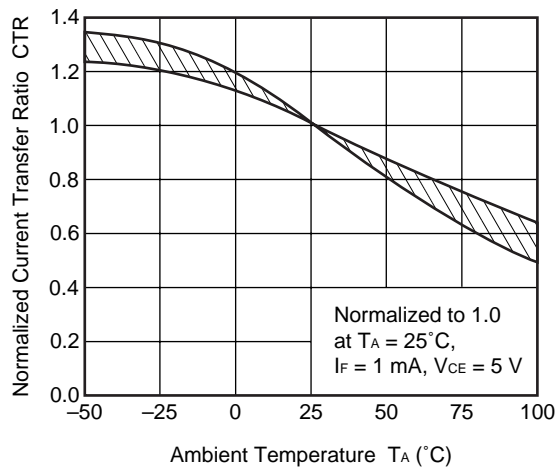
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



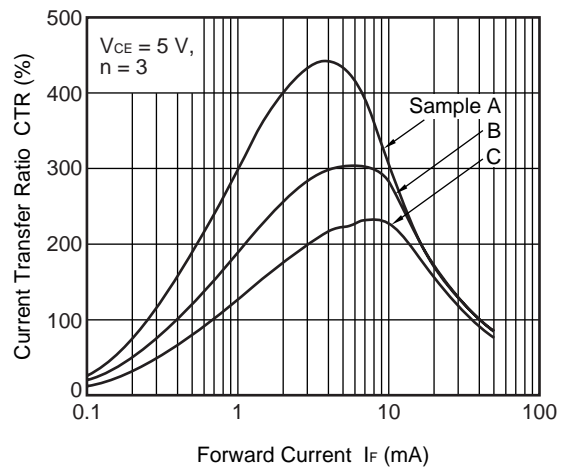
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



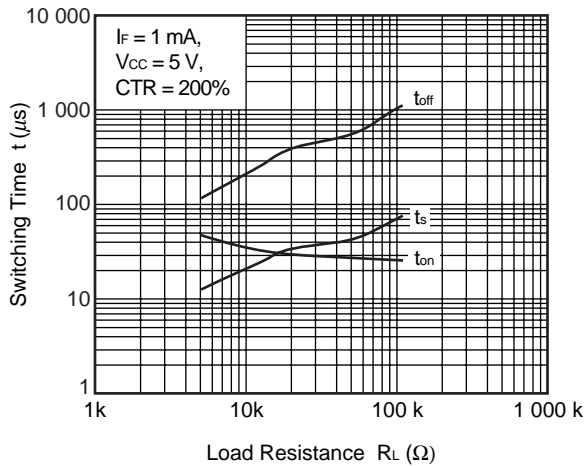
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



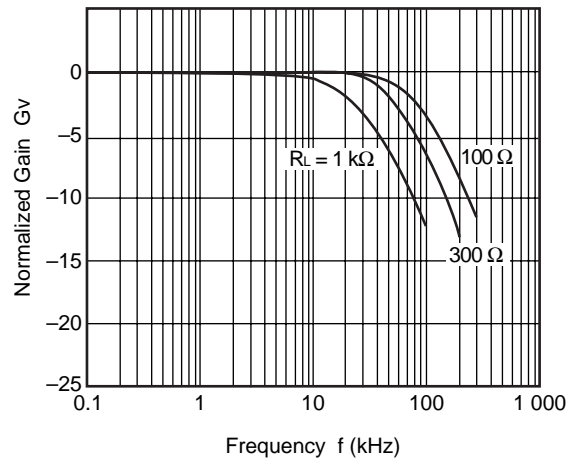
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



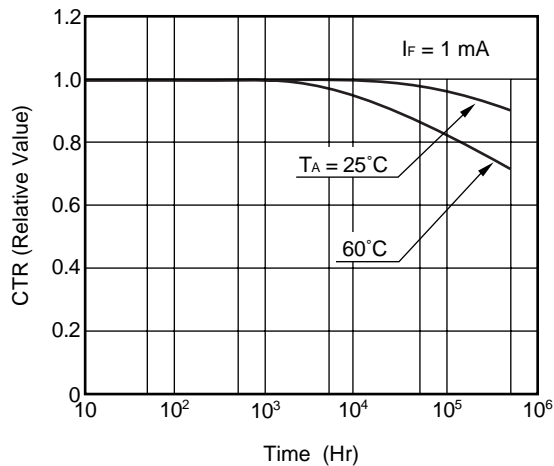
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



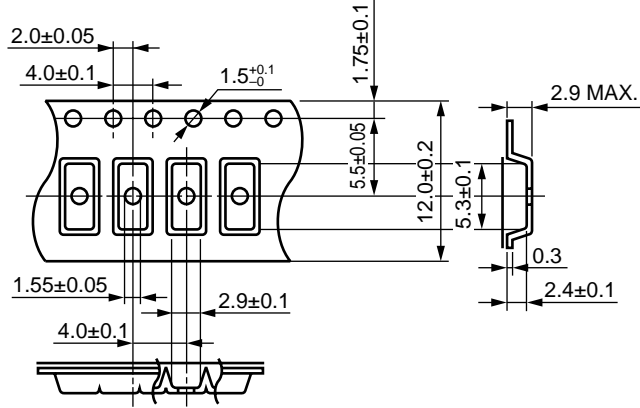
LONG TERM CTR DEGRADATION



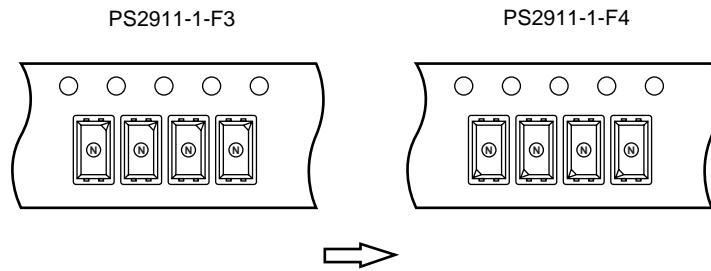
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (UNIT: mm)

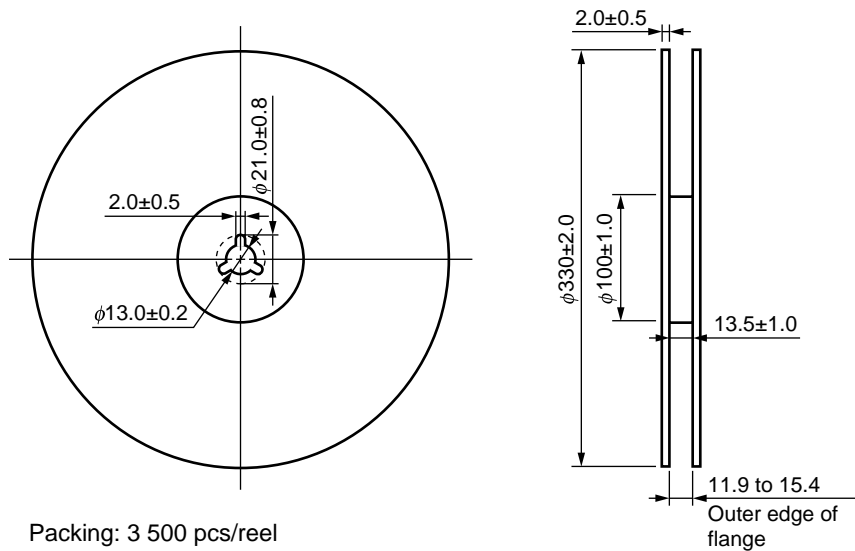
Outline and Dimensions (Tape)



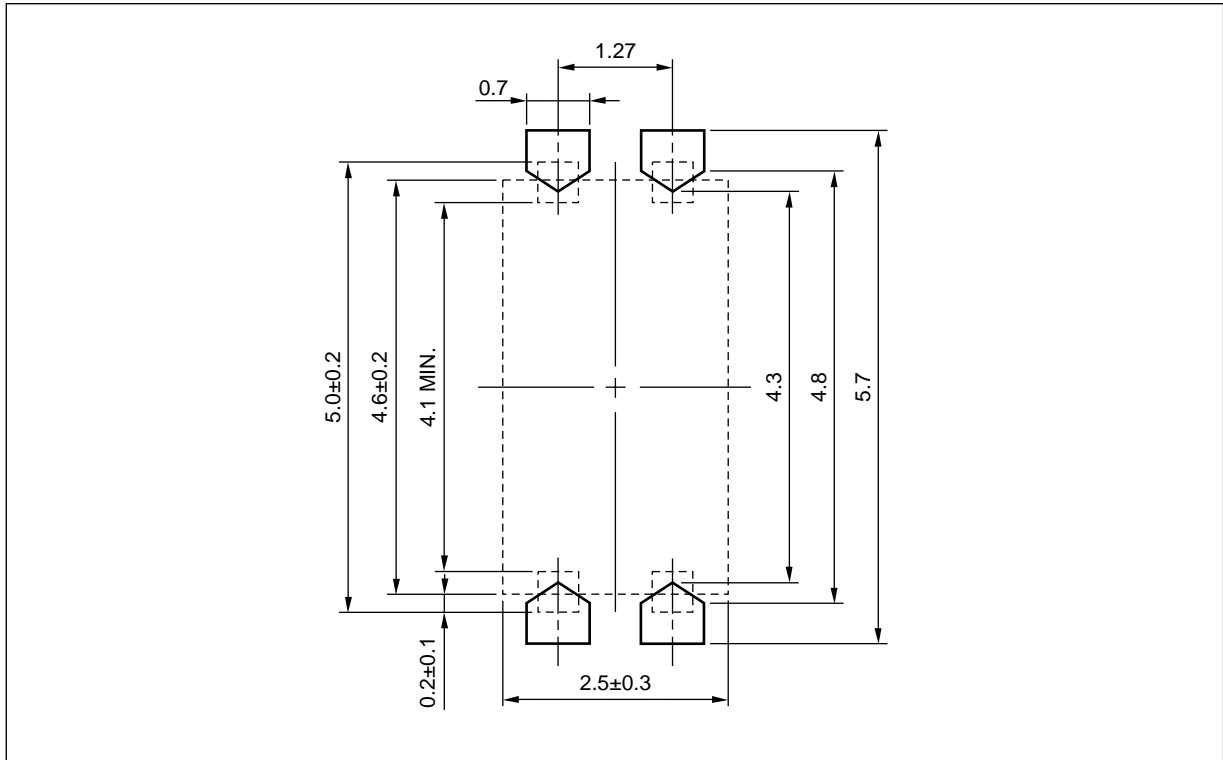
Tape Direction



Outline and Dimensions (Reel)



★ RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



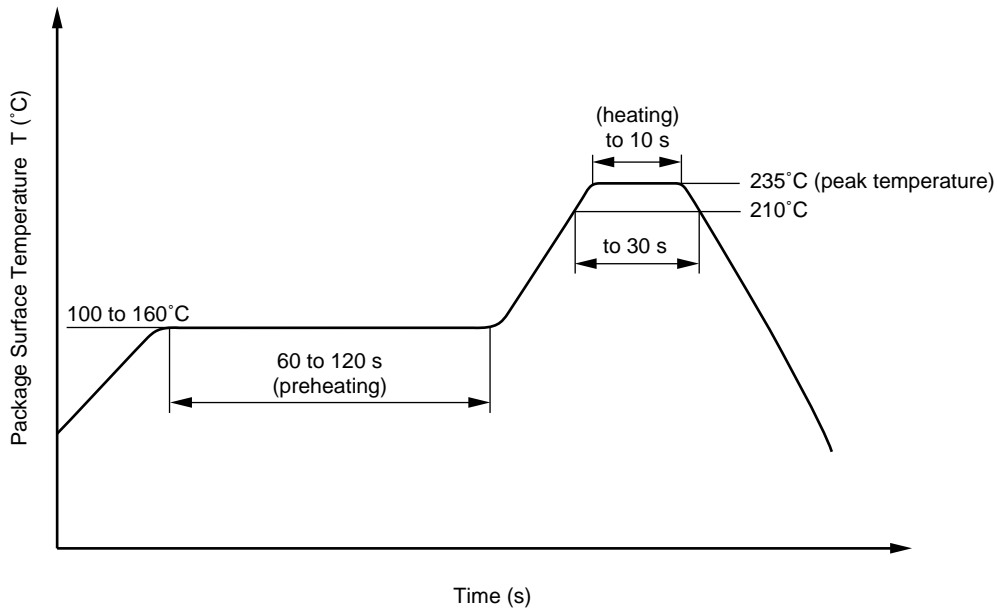
Remark This drawing is considered to meet air and outer creepage distance 4.0 mm minimum. All dimensions in this figure must be evaluated before use.

★ **RECOMMENDED SOLDERING CONDITIONS**

(1) Infrared reflow soldering

- Peak reflow temperature 235°C or below (package surface temperature)
- Time of temperature higher than 210°C 30 seconds or less
- 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 100°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) Cautions

- Fluxes
Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

★ **USAGE CAUTIONS**

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

[MEMO]

[MEMO]

SAFETY INFORMATION ON THIS PRODUCT

| | | |
|-----------------------|----------------------|---|
| <p>Caution</p> | <p>GaAs Products</p> | <p>The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p> |
|-----------------------|----------------------|---|

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M8E 00.4