

**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**

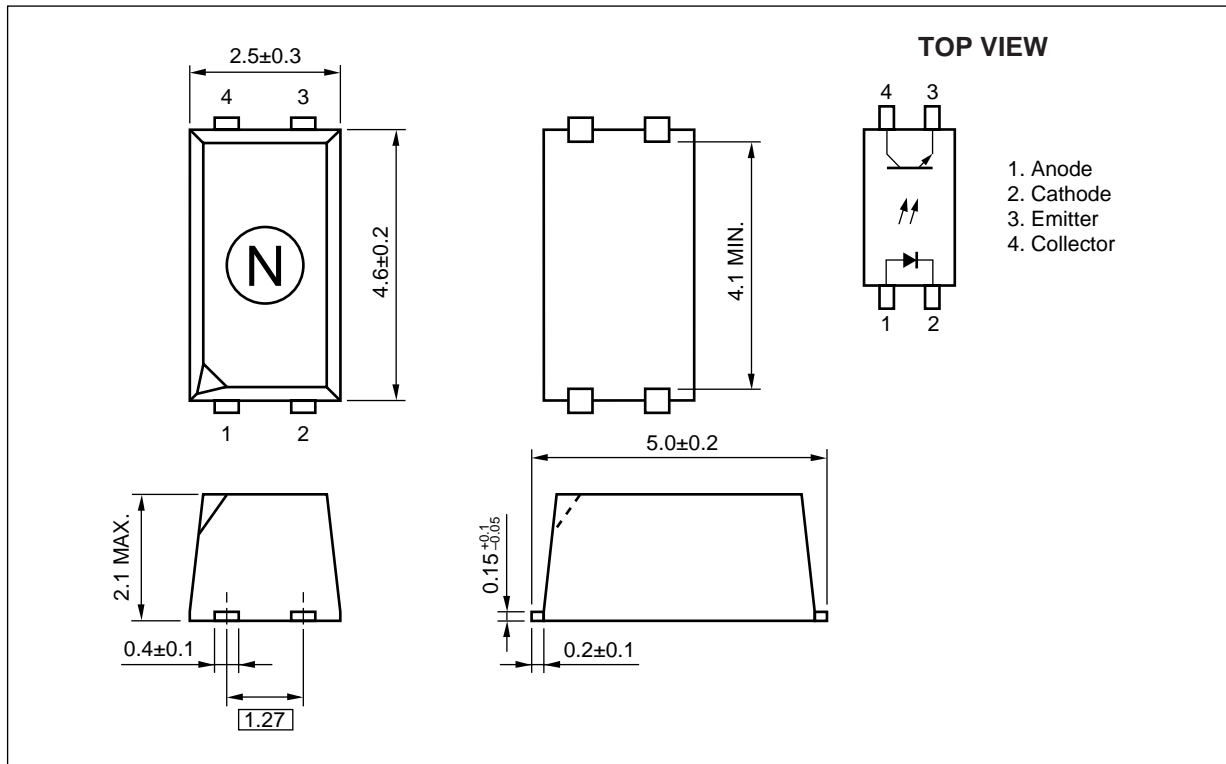
- Ultra small flat-lead package (4.6 (L) × 2.5 (W) × 2.1 (H) mm)
- High current transfer ratio (CTR = 200% TYP. @  $I_F = 1 \text{ mA}$ ,  $V_{CE} = 5 \text{ V}$ )
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Ordering number of taping product: PS2911-1-F3, F4: 3 500 pcs/reel

**APPLICATIONS**

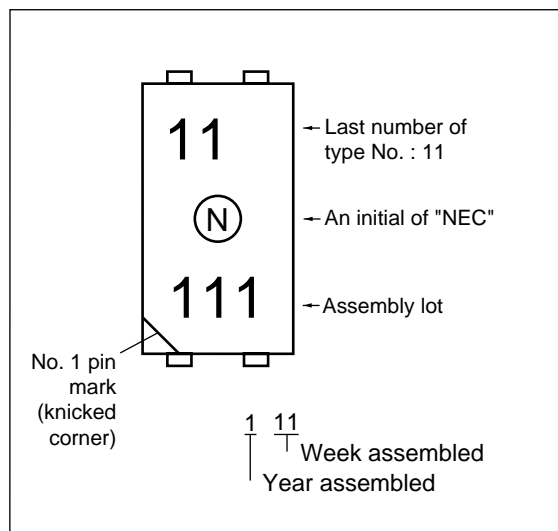
- DC/DC converter
- Modem/PC card

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices 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 <sup>*1</sup>
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<sub>A</sub> = 25°C, unless otherwise specified)**

Parameter		Symbol	Ratings	Unit
Diode	Forward Current	I <sub>F</sub>	50	mA
	Forward Current Derating	ΔI <sub>F</sub> /°C	0.5	mA/°C
	Peak Forward Current <sup>*1</sup>	I <sub>FP</sub>	0.5	A
	Power Dissipation	P <sub>D</sub>	60	mW
	Reverse Voltage	V <sub>R</sub>	6	V
Transistor	Collector to Emitter Voltage	V <sub>CEO</sub>	40	V
	Emitter to Collector Voltage	V <sub>ECO</sub>	5	V
	Collector Current	I <sub>C</sub>	40	mA
	Power Dissipation Derating	ΔP <sub>C</sub> /°C	1.2	mW/°C
	Power Dissipation	P <sub>C</sub>	120	mW
Isolation Voltage <sup>*2</sup>		BV	2 500	Vr.m.s.
Total Power Dissipation		P <sub>T</sub>	160	mW
Operating Ambient Temperature		T <sub>A</sub>	-55 to +100	°C
Storage Temperature		T <sub>stg</sub>	-55 to +150	°C

\*1 PW = 100 μs, Duty Cycle = 1%

\*2 AC voltage for 1 minute at T<sub>A</sub> = 25°C, RH = 60% between input and output

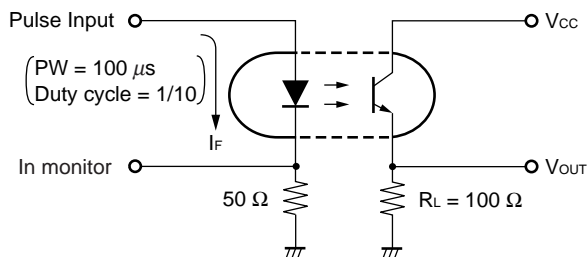
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 1 mA	0.9	1.1	1.3	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5 V			5	μA
	Terminal Capacitance	C <sub>t</sub>	V = 0 V, f = 1 MHz		15		pF
Transistor	Collector to Emitter Dark Current	I <sub>CEO</sub>	I <sub>F</sub> = 0 mA, V <sub>CE</sub> = 40 V			100	nA
Coupled	Current Transfer Ratio (I <sub>c</sub> /I <sub>f</sub> ) <sup>*1</sup>	CTR	I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 5 V	100	200	400	%
	Collector Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>F</sub> = 1 mA, I <sub>c</sub> = 0.2 mA		0.13	0.3	V
	Isolation Resistance	R <sub>I-O</sub>	V <sub>I-O</sub> = 1 kV <sub>DC</sub>	10 <sup>11</sup>			Ω
	Isolation Capacitance	C <sub>I-O</sub>	V = 0 V, f = 1 MHz		0.4		pF
	Rise Time <sup>*2</sup>	t <sub>r</sub>	V <sub>CC</sub> = 5 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω		5		μs
	Fall Time <sup>*2</sup>	t <sub>f</sub>			10		
	On Time <sup>*2</sup>	t <sub>on</sub>	V <sub>CC</sub> = 5 V, I <sub>F</sub> = 1 mA, R <sub>L</sub> = 5 kΩ		40		μs
	Storage Time <sup>*2</sup>	t <sub>s</sub>			10		μs
Off Time <sup>*2</sup>	t <sub>off</sub>				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**

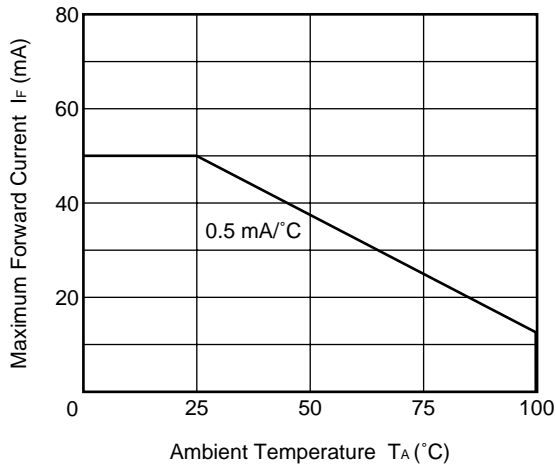


**CAUTIONS REGARDING NOISE**

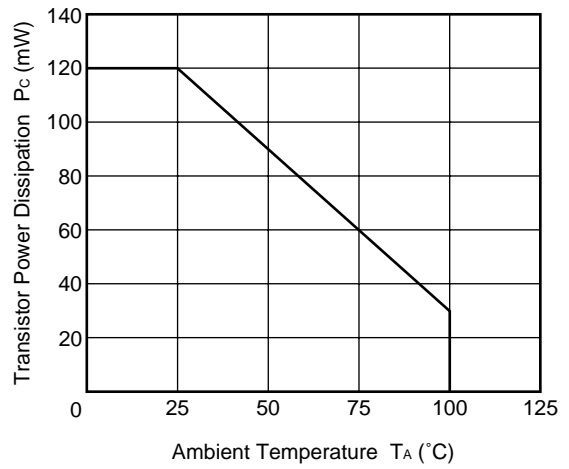
Be aware that when voltage is applied suddenly between the photocoupler's input and output or between corrector-emitters at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

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

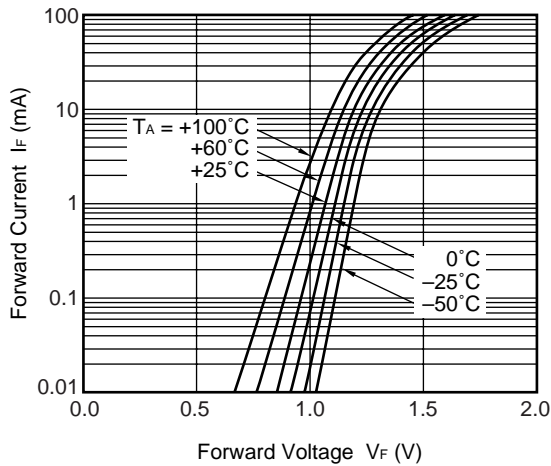
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



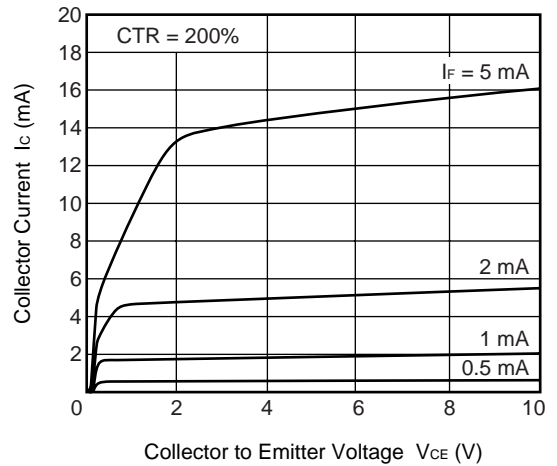
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



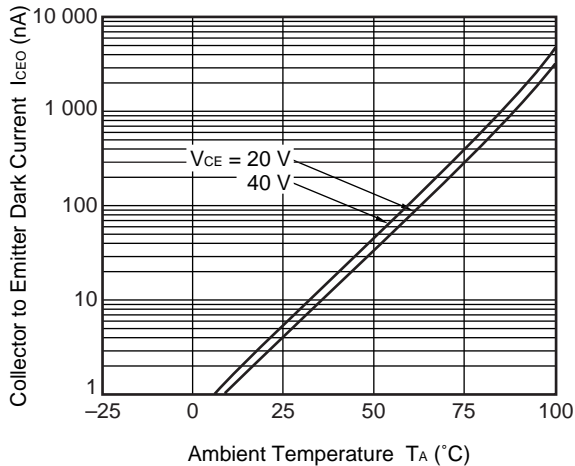
FORWARD CURRENT vs. FORWARD VOLTAGE



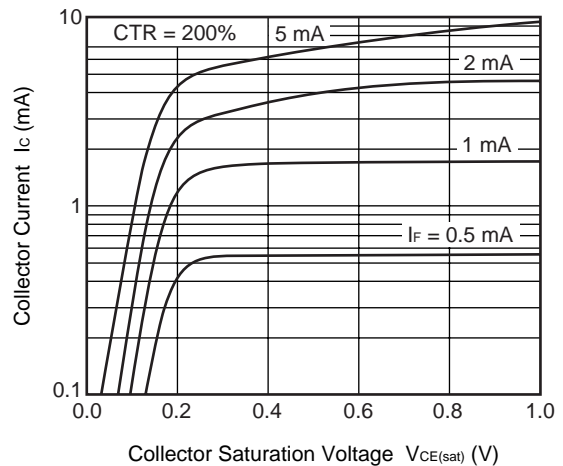
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



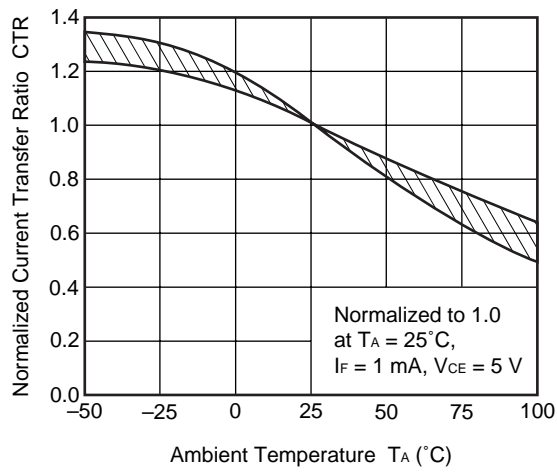
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



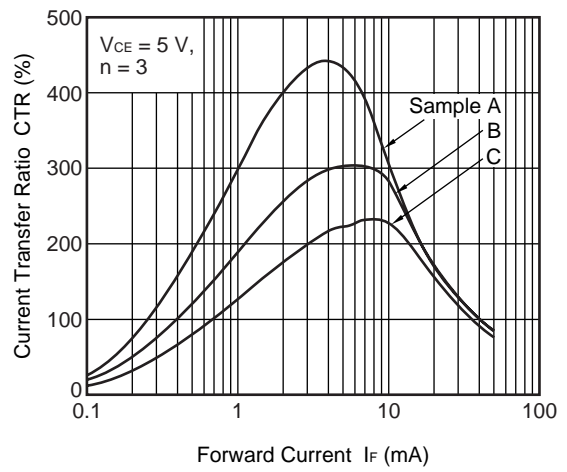
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



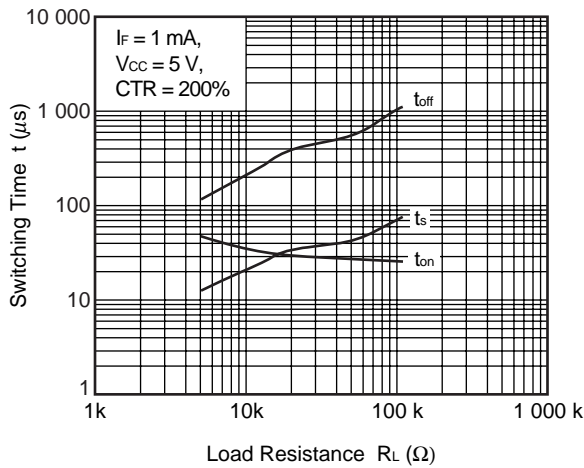
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



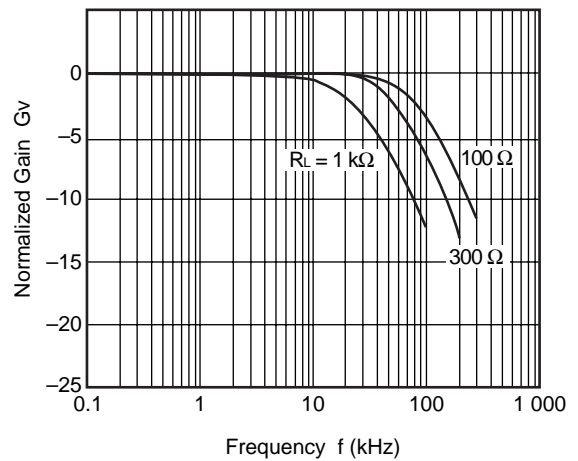
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



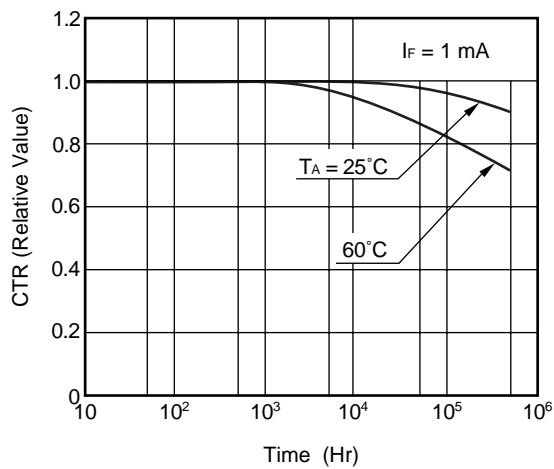
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



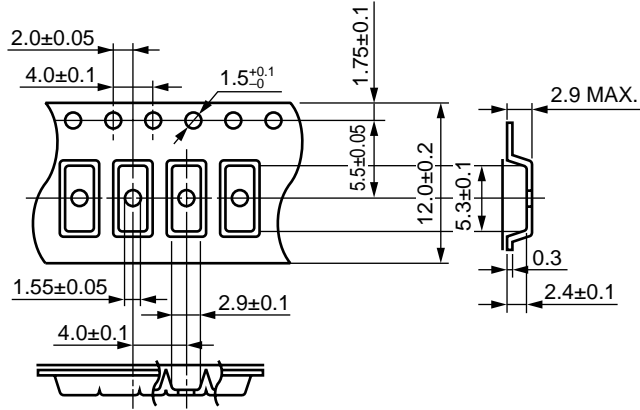
LONG TERM CTR DEGRADATION



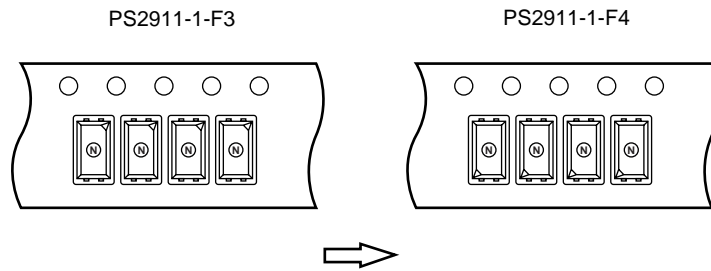
**Remark** The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

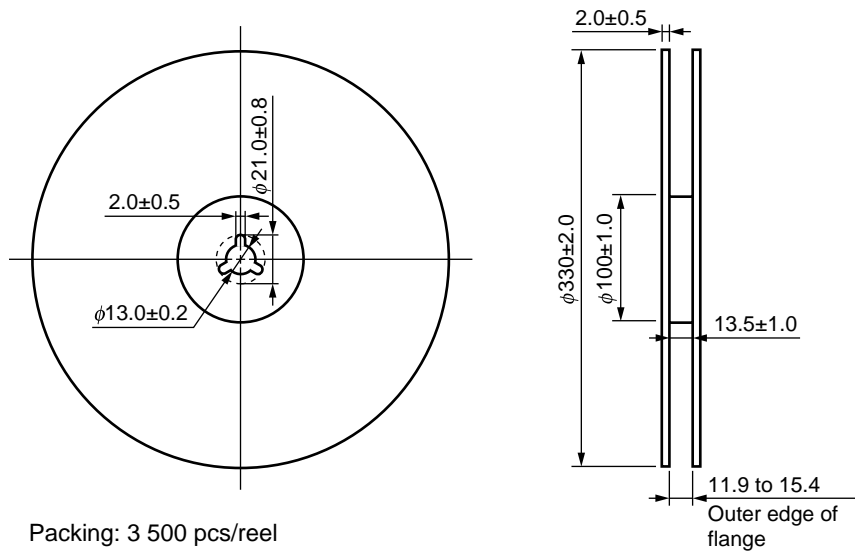
Outline and Dimensions (Tape)



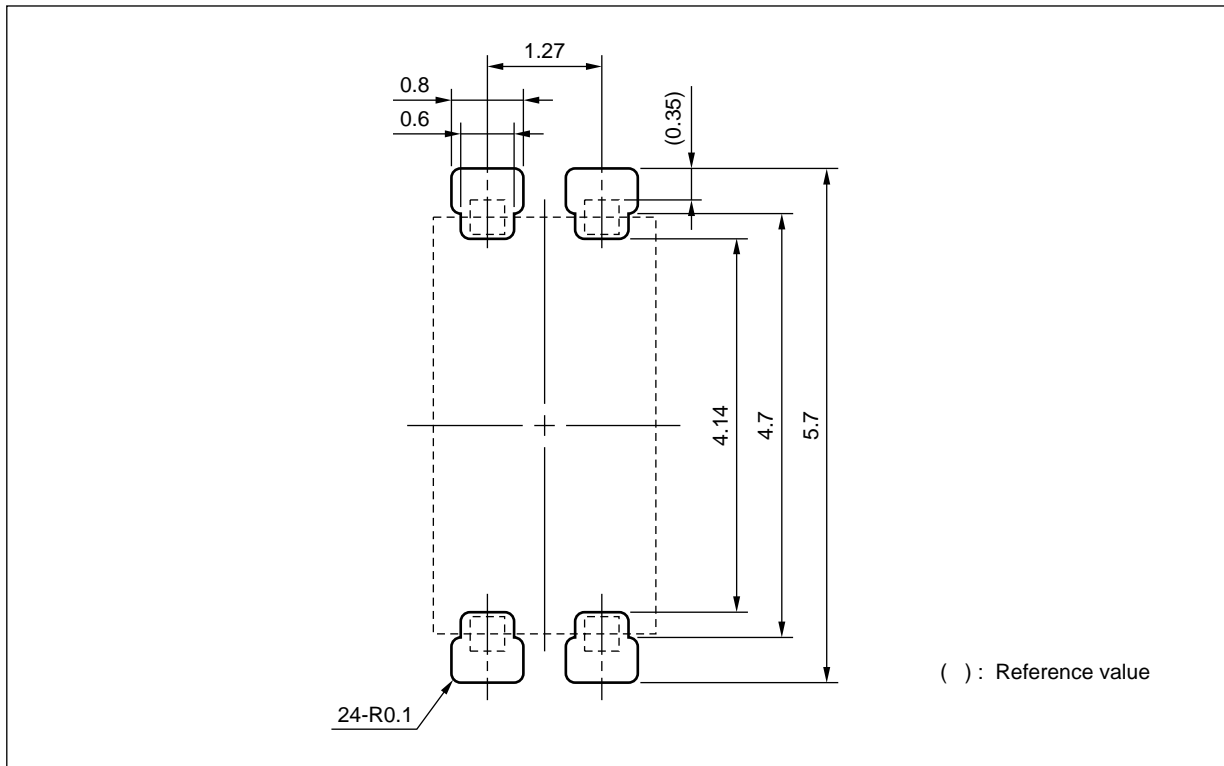
Tape Direction



Outline and Dimensions (Reel)



★ RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



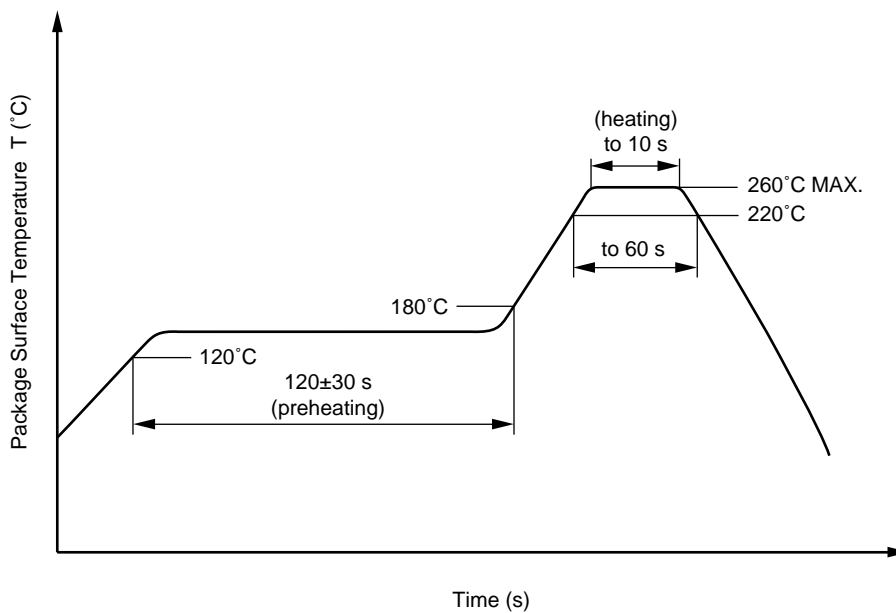
**Remark** This drawing is considered to meet air and outer creepage distance 4.0 mm minimum. All dimensions in this figure must be evaluated before use.

★ **RECOMMENDED SOLDERING CONDITIONS**

**(1) Infrared reflow soldering**

- Peak reflow temperature 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) 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.

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M8E 00.4-0110

**SAFETY INFORMATION ON THIS PRODUCT**

<p><b>Caution</b></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"> <li>• Do not destroy or burn the product.</li> <li>• Do not cut or cleave off any part of the product.</li> <li>• Do not crush or chemically dissolve the product.</li> <li>• Do not put the product in the mouth.</li> </ul> <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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► **Business issue**

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► **Technical issue**

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