CEL

PHOTOCOUPLER
PS2913-1

SINGLE Tr. OUTPUT, HIGH COLLECTOR TO EMITTER VOLTAGE 4-PIN ULTRA SMALL FLAT-LEAD PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS2913-1 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)
- Isolation distance (0.4 mm MIN.)
- High collector to emitter voltage (V_{CEO} = 120 V)
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Ordering number of taping product: PS2913-1-F3, F4: 3 500 pcs/reel
- <R> Safety standards
  - UL approved: File No. E72422
  - BSI approved: No. 8657, 8658
  - DIN EN60747-5-2 (VDE0884 Part2) approved (Option)

APPLICATIONS

- Hybrid IC
- Power supply

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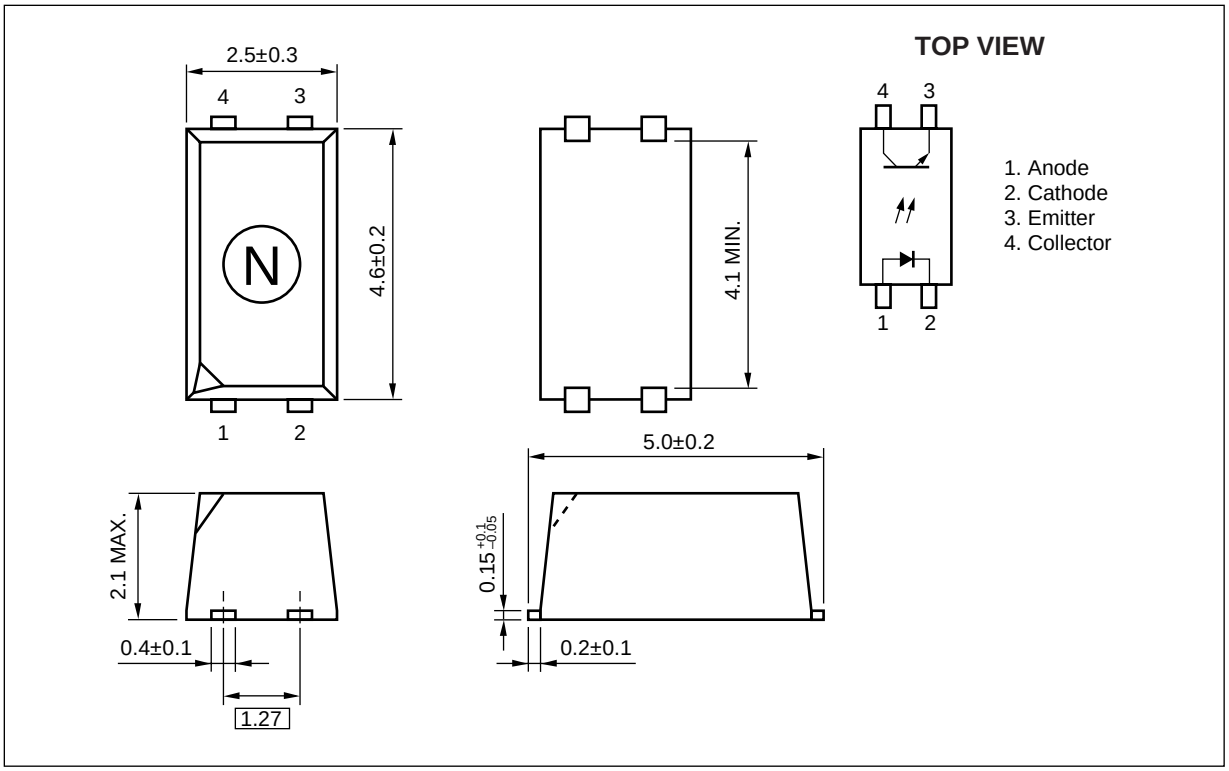
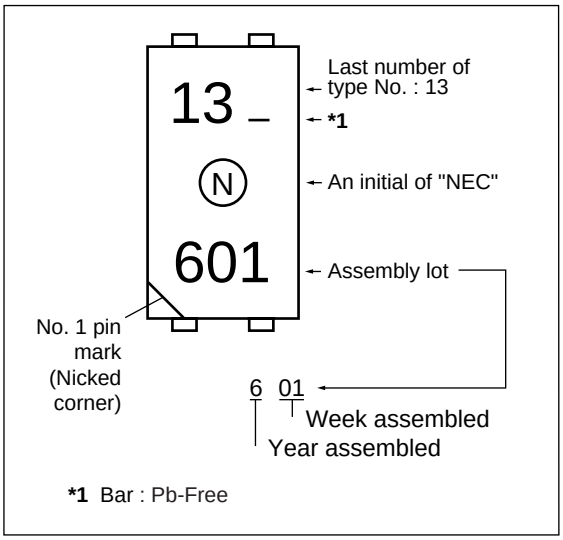
The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PACKAGE DIMENSIONS (UNIT: mm)



<R> **MARKING EXAMPLE**



PHOTOCOUPLER CONSTRUCTION

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

<R> **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS2913-1	PS2913-1-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products	PS2913-1
PS2913-1-F3	PS2913-1-F3-A		Embossed Tape 3 500 pcs/reel	(UL, BSI approved)	
PS2913-1-F4	PS2913-1-F4-A				
PS2913-1-V	PS2913-1-V-A		50 pcs (Tape 50 pcs cut)	DIN EN60747-5-2	
PS2913-1-V-F3	PS2913-1-V-F3-A		Embossed Tape 3 500 pcs/reel	(VDE0884 Part2)	
PS2913-1-V-F4	PS2913-1-V-F4-A			Approved (Option)	

***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}	120	V
	Emitter to Collector Voltage	V_{ECO}	6	V
	Collector Current	I_C	30	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
Pins 1-2 shorted together, 3-4 shorted together.

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} = 120 V			100	nA
Coupled	Current Transfer Ratio (I_C/I_F) *1	CTR	I_F = 1 mA, V_{CE} = 5 V	50	100	200	%
	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		10		μs
	Fall Time*2	t_f			10		
	On Time*2	t_{on}	V_{CC} = 5 V, I_F = 1 mA, R_L = 5 kΩ		80		μs
	Storage Time*2	t_s			5		μs
	Off Time*2	t_{off}			50		μs

***1** CTR rank

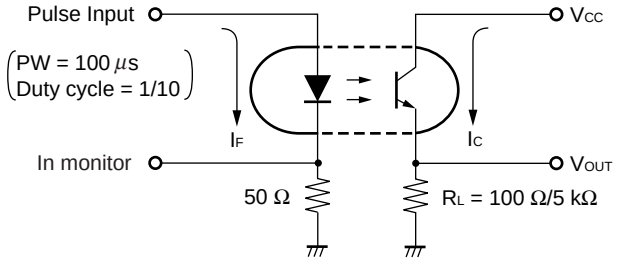
N : 50 to 200 (%)

K : 100 to 200 (%)

L : 75 to 150 (%)

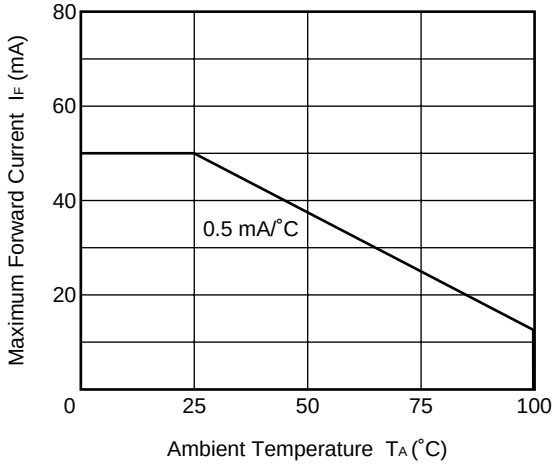
M : 50 to 100 (%)

***2** Test circuit for switching time

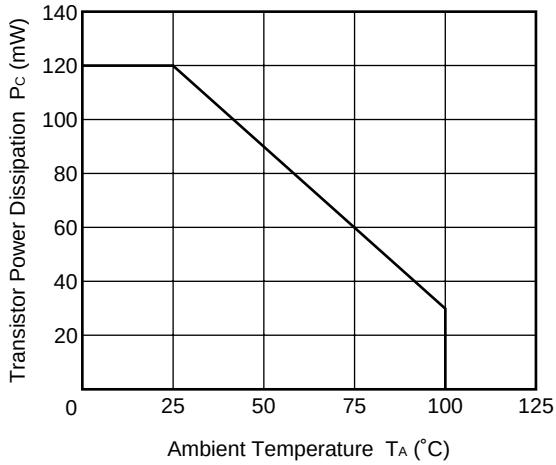


TYPICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

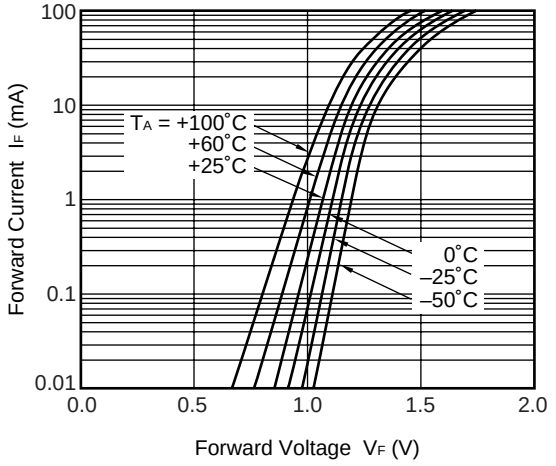
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



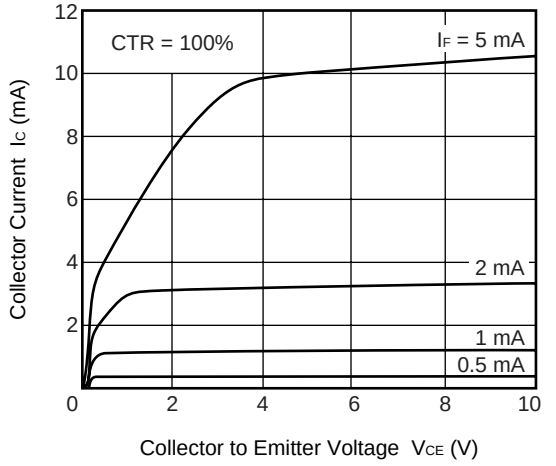
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



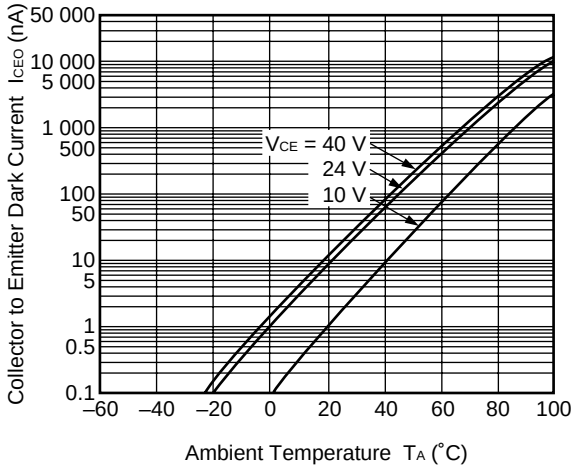
FORWARD CURRENT vs. FORWARD VOLTAGE



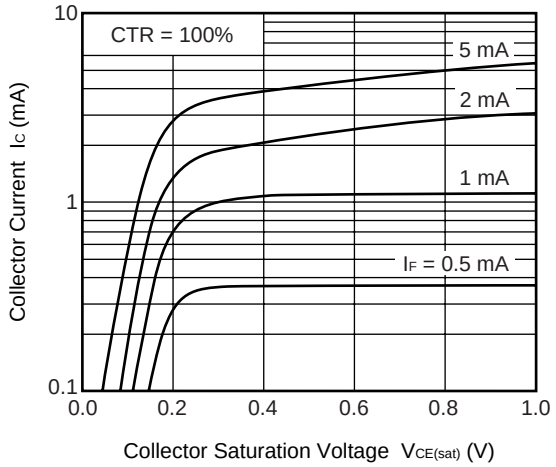
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

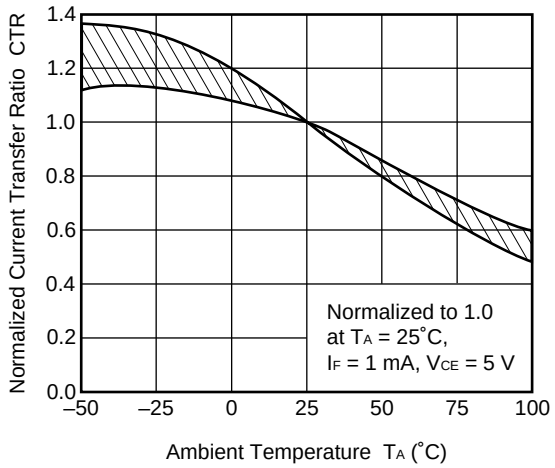


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

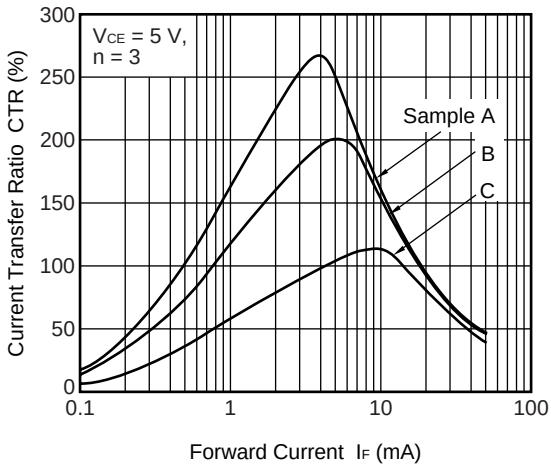


Remark The graphs indicate nominal characteristics.

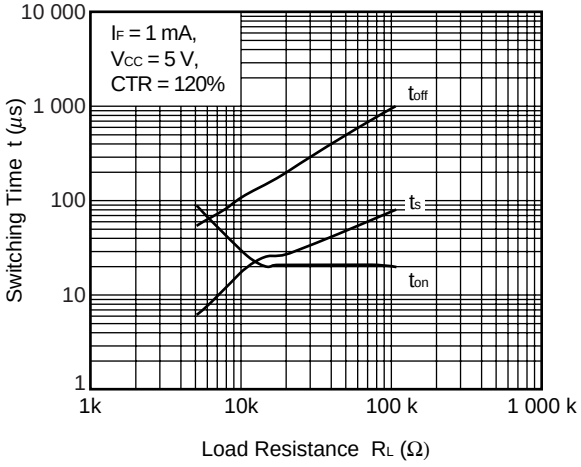
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



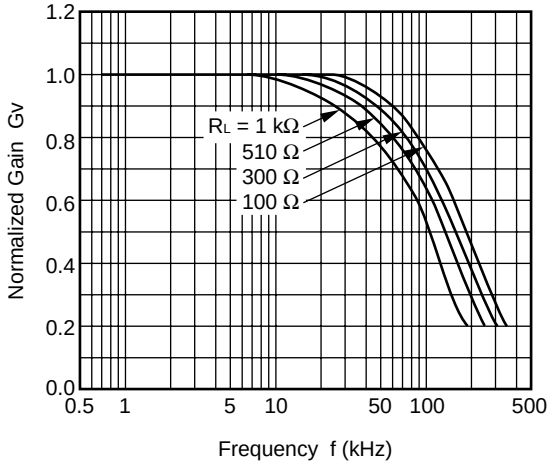
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



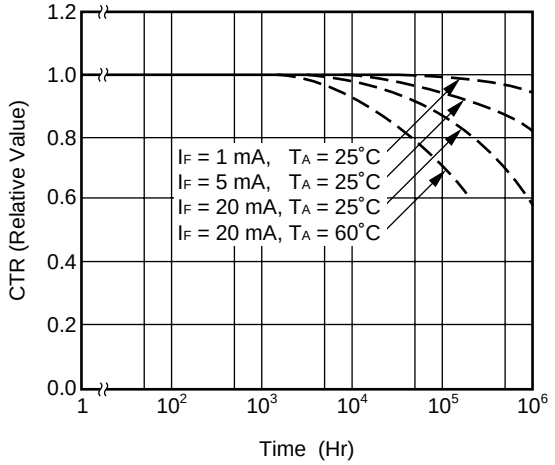
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



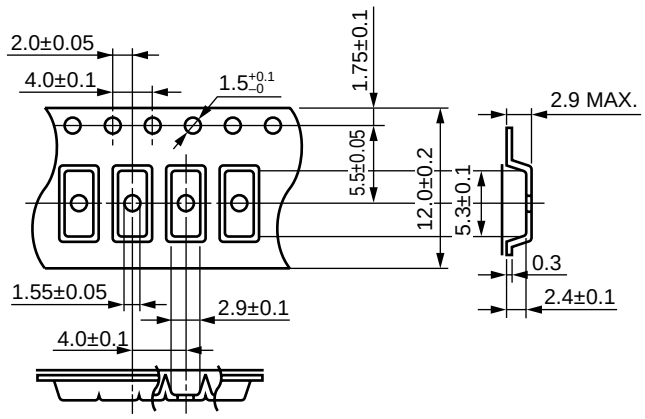
LONG TERM CTR DEGRADATION



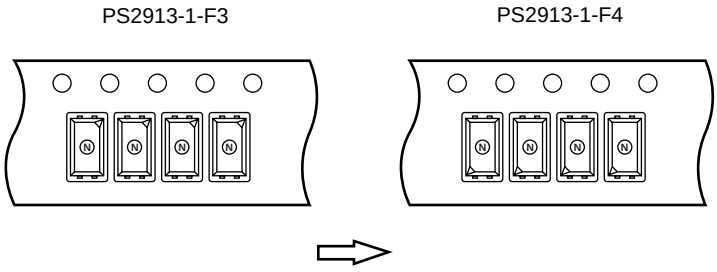
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

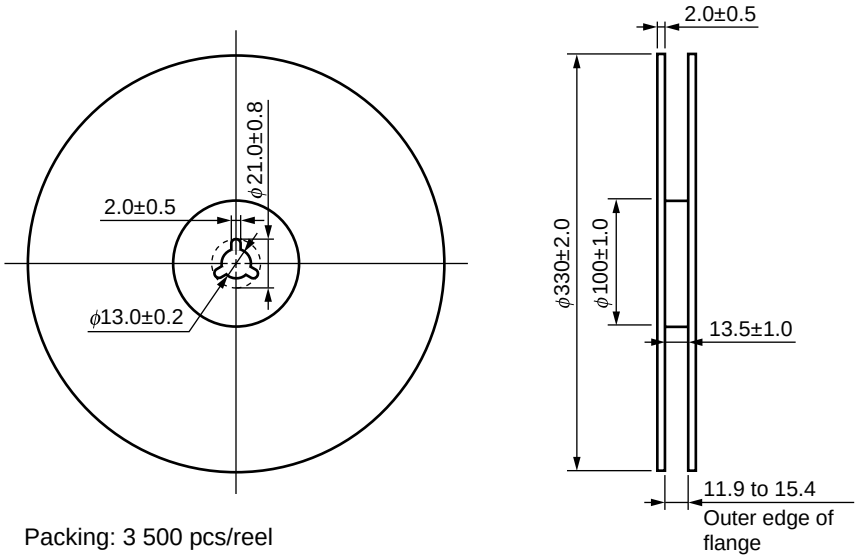
Outline and Dimensions (Tape)



Tape Direction

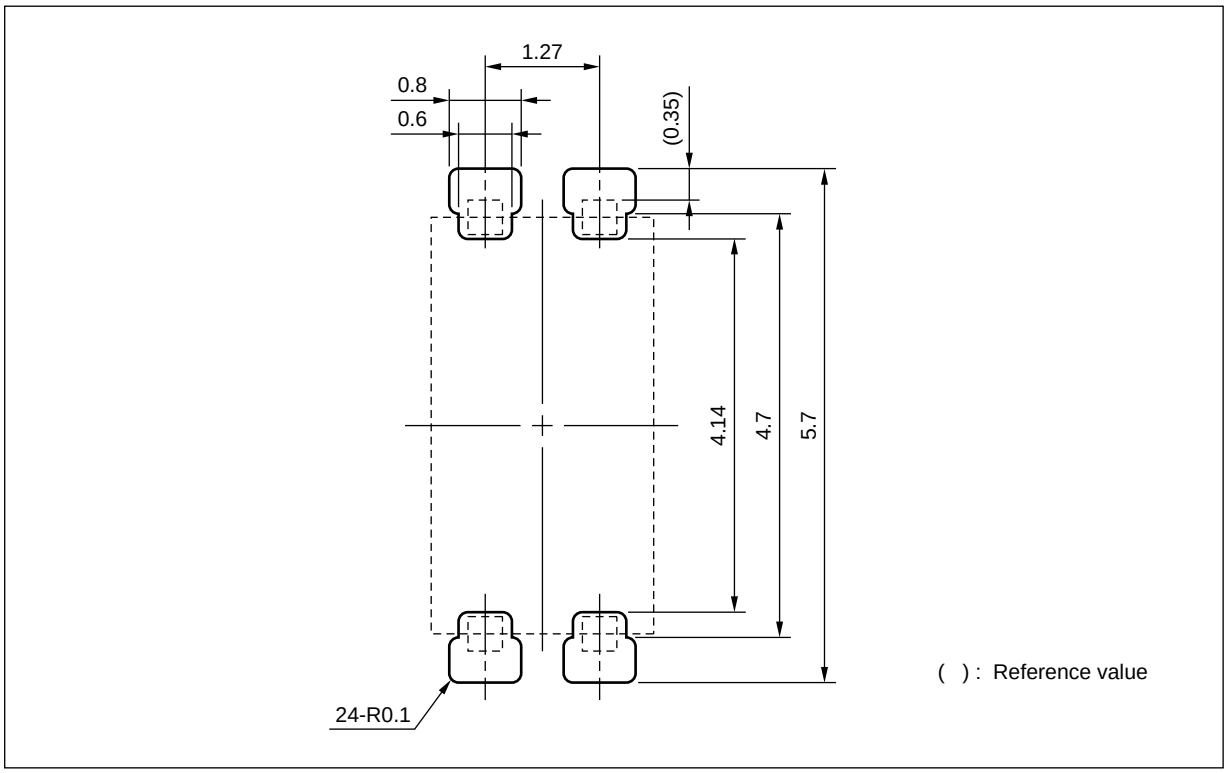


Outline and Dimensions (Reel)



Packing: 3 500 pcs/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.

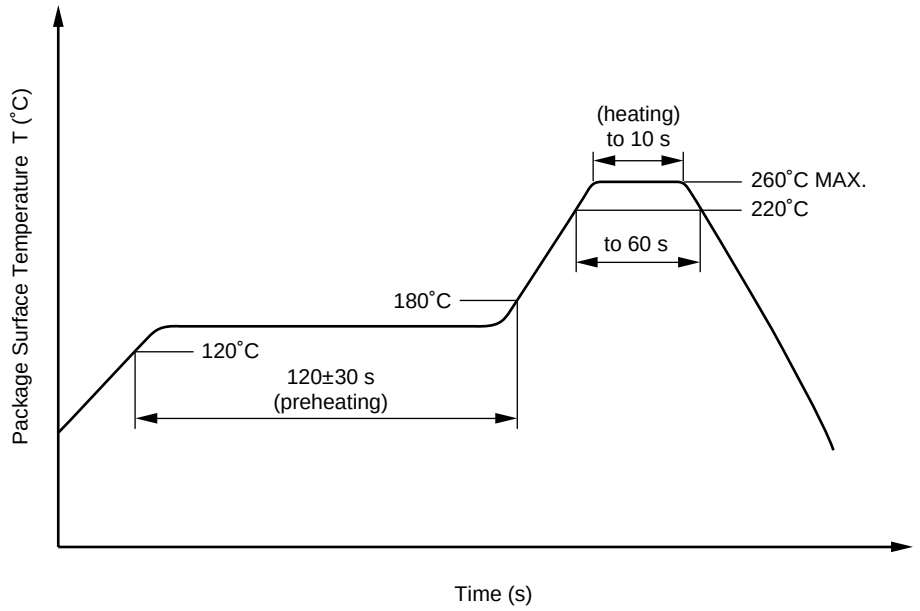
NOTES ON HANDLING

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.)

<R> **(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.

(b) Please be sure that the temperature of the package would not be heated over 100°C.

(4) Cautions

• Fluxes

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

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.

<R> **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.

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M8E 02. 11-1

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▶**For further information, please contact**

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