

PS2514-1, PS2514L-1

Data Sheet

R08DS0012EJ0100

Rev.1.00

Mar 19, 2012

HIGH-SPEED SWITCHING/HIGH ISOLATION VOLTAGE PHOTOCOUPLER SERIES

DESCRIPTION

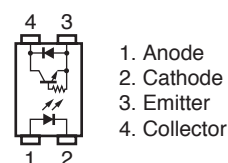
The PS2514-1 and PS2514L-1 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor, enabling relatively high switching speed with high load resistor of several k Ω .

The PS2514-1 is in a plastic DIP (Dual In-line Package) and the PS2514L-1 is lead bending type (Gull-wing) for surface mount.

FEATURES

- High isolation voltage (BV = 5 000 Vr.m.s.)
- High collector to emitter voltage ($V_{CEO} = 40$ V)
- Guaranteed maximum switching speed
 $(t_{off} \leq 25 \mu s @ I_F = 5 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 5 \text{ k}\Omega)$
- High-speed switching $(t_{on} = 15 \mu s \text{ TYP. @ } I_F = 5 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 5 \text{ k}\Omega)$
 $(t_{off} = 15 \mu s \text{ TYP. @ } I_F = 5 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 5 \text{ k}\Omega)$
- Embossed tape product: PS2514L-1-F3: 2 000 pcs/reel
- <R> • Pb-Free product
- <R> • Safety standards
 - UL approved: No. E72422
 - CSA approved: No. CA 101391 (CA5A, CAN/CSA-C22.2 60065, 60950)
 - CQC approved: CQC11001056759/CQC11001056758
CQC11001056865/CQC11001057073
 - DIN EN60747-5-2 (VDE0884 Part2) approved: No. 40008862 (Option)

PIN CONNECTION (Top View)

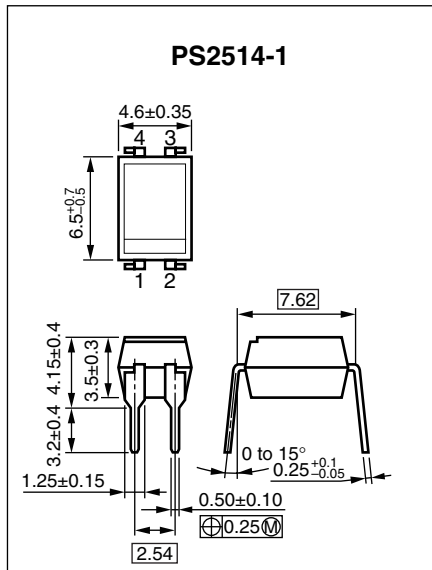
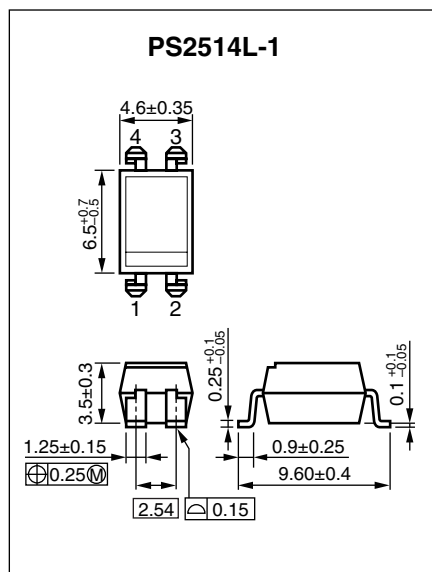


APPLICATIONS

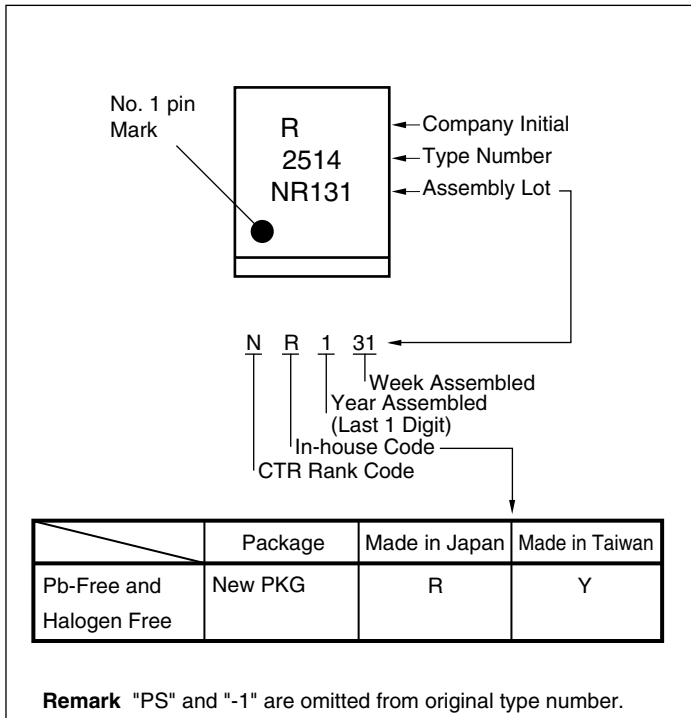
- Power supply
- FA equipment
- Electronic electricity meter

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.

PS2514-1,PS2514L-1**PACKAGE DIMENSIONS (UNIT: mm)****DIP Type****Lead Bending Type****PHOTOCOUPLER CONSTRUCTION**

Parameter	Unit (MIN.)
Air Distance	7 mm
Outer Creepage Distance	7 mm
Inner Creepage Distance	4 mm
Isolation Thickness	0.3 mm

PS2514-1,PS2514L-1**<R> MARKING EXAMPLE**

PS2514-1,PS2514L-1<R> **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification etc.	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS2514-1	PS2514-1Y-A	Pb-Free and Halogen Free	Magazine case 100 pcs	Standard products (UL, CSA, CQC approved)	PS2514-1
PS2514L-1	PS2514L-1Y-A				PS2514L-1
PS2514L-1-F3	PS2514L-1Y-F3-A		Embossed Tape 2 000 pcs/reel		
PS2514-1-V	PS2514-1Y-V-A		Magazine case 100 pcs	DIN EN60747-5-2 (VDE0884 Part2) approved (Option)	PS2514-1
PS2514L-1-V	PS2514L-1Y-V-A				PS2514L-1
PS2514L-1-V-F3	PS2514L-1Y-V-F3-A		Embossed Tape 2 000 pcs/reel		

*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	Reverse Voltage	V _R	6	V
	Forward Current (DC)	I _F	30	mA
	Power Dissipation Derating	ΔP _D /°C	1.5	mW/°C
	Power Dissipation	P _D	150	mW
	Peak Forward Current ^{*1}	I _{FP}	0.5	A
Transistor	Collector to Emitter Voltage	V _{CEO}	40	V
	Emitter to Collector Voltage	V _{ECO}	0.6	V
	Collector Current	I _C	20	mA
	Power Dissipation Derating	ΔP _C /°C	1.5	mW/°C
	Power Dissipation	P _C	150	mW
Isolation Voltage ^{*2}		BV	5 000	Vr.m.s.
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.

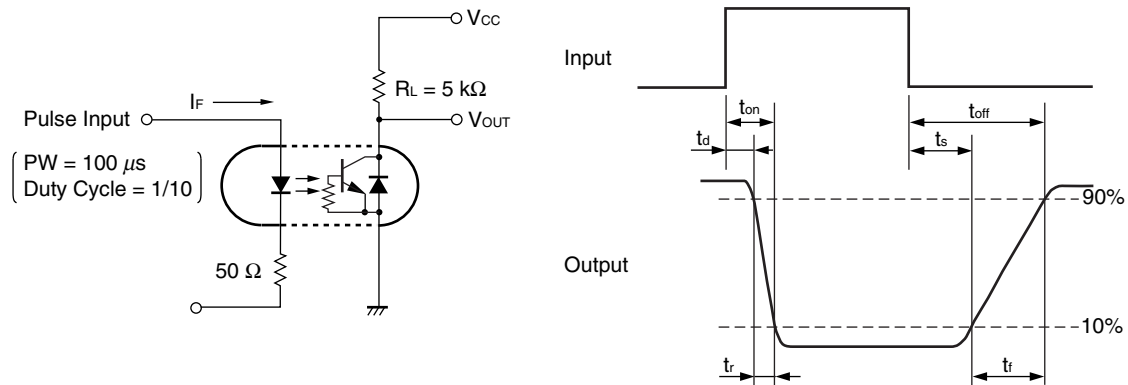
RECOMMENDED OPERATING CONDITIONS

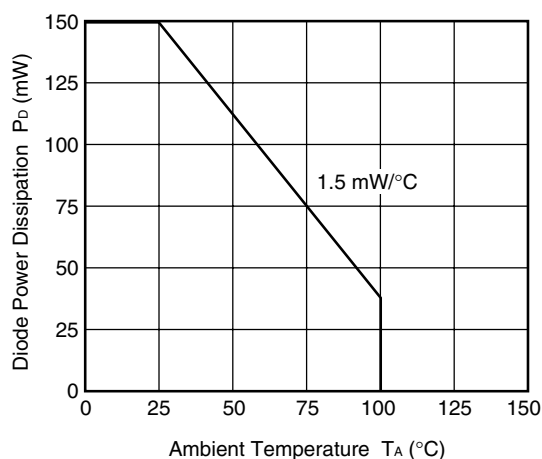
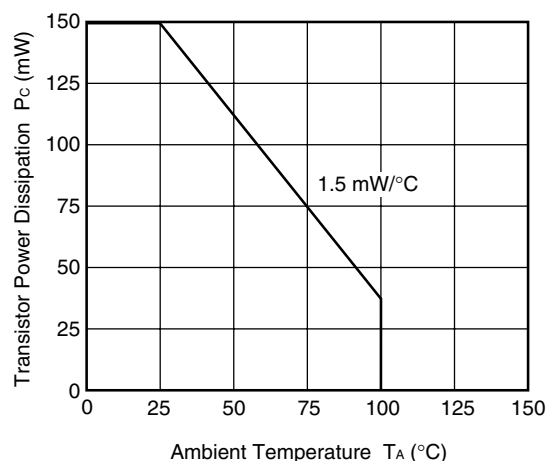
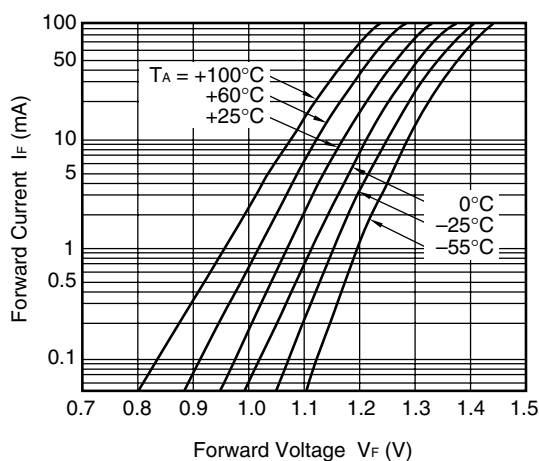
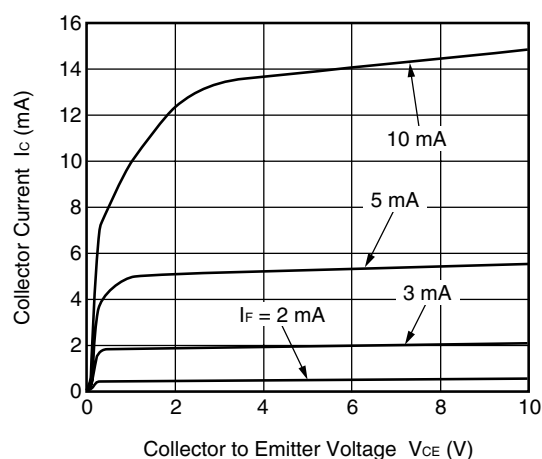
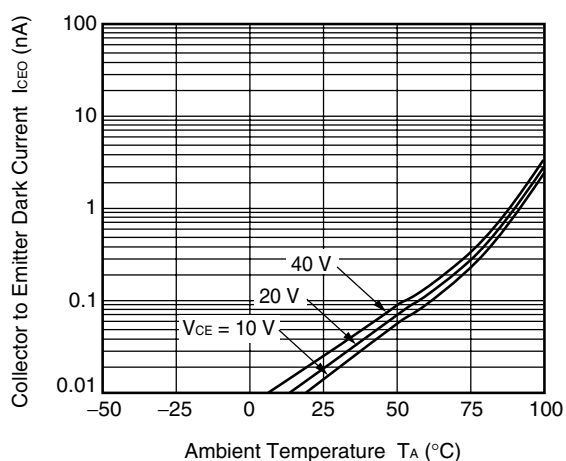
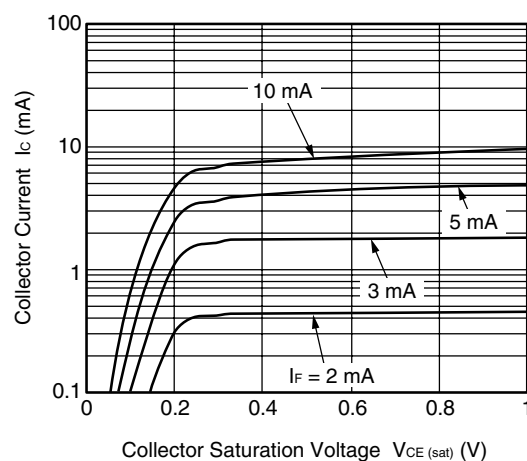
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Input Current	I _F	5	6	7	mA

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

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	$I_F = 5\text{ mA}$		1.1	1.3	V
	Reverse Current	I_R	$V_R = 5\text{ V}$			5	μA
	Terminal Capacitance	C_i	$V = 0\text{ V}, f = 1.0\text{ MHz}$		10		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	$V_{CE} = 40\text{ V}, I_F = 0\text{ mA}$			100	nA
Coupled	Current Transfer Ratio	CTR	$I_F = 5\text{ mA}, V_{CE} = 5\text{ V}$	50	125	200	%
	Collector Saturation Voltage	$V_{CE(sat)}$	$I_F = 5\text{ mA}, I_C = 1\text{ mA}$			0.35	V
	Isolation Resistance	R_{I-O}	$V_{I-O} = 1.0\text{ kV}_{DC}$	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	$V = 0\text{ V}, f = 1.0\text{ MHz}$		0.5		pF
	Turn-on Time ^{*1}	t_{on}	$V_{CC} = 5\text{ V}, I_F = 5\text{ mA}, R_L = 5\text{ k}\Omega$		15	25	μs
	Turn-off Time ^{*1}	t_{off}			15	25	

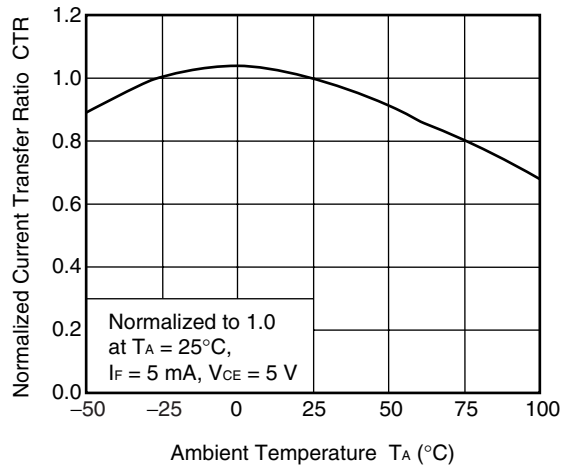
*1 Test circuit for switching time



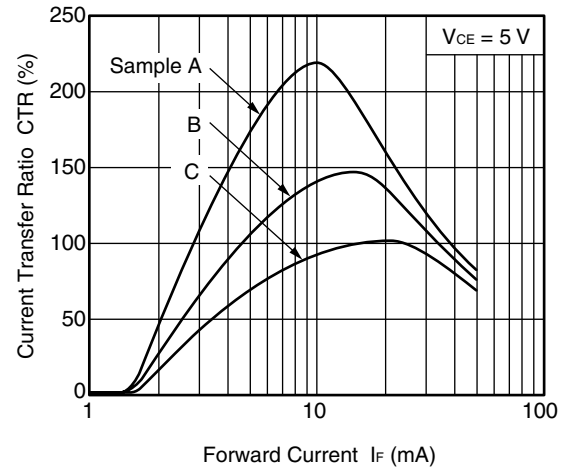
<R> **TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)****DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE****TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE****FORWARD CURRENT vs. FORWARD VOLTAGE****COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE****COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE****COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE**

Remark The graphs indicate nominal characteristics.

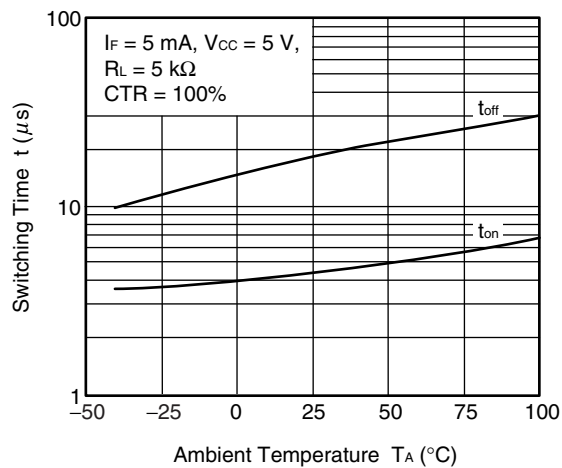
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



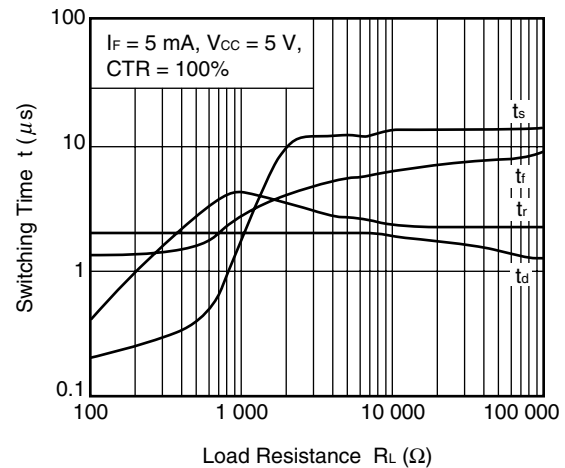
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



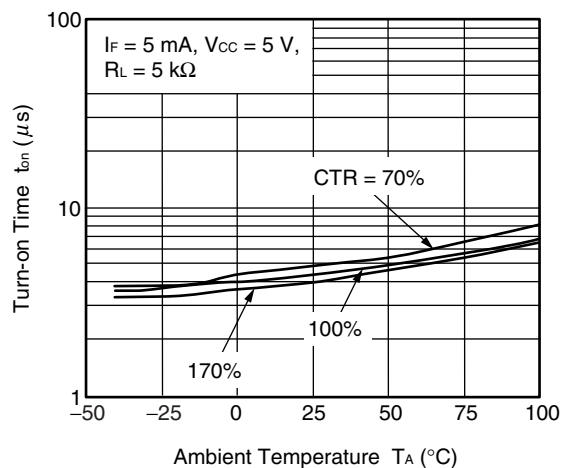
SWITCHING TIME vs. LOAD RESISTANCE



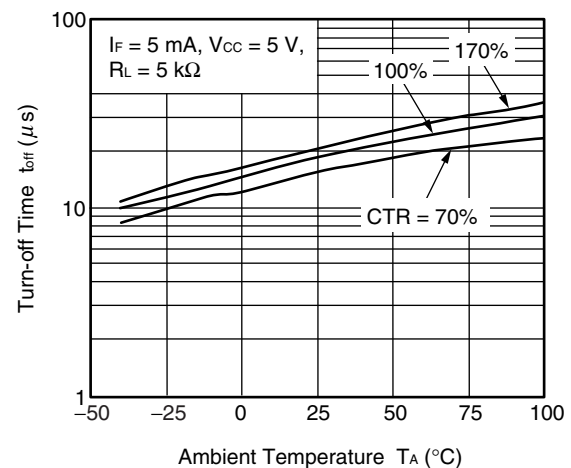
SWITCHING TIME vs. LOAD RESISTANCE



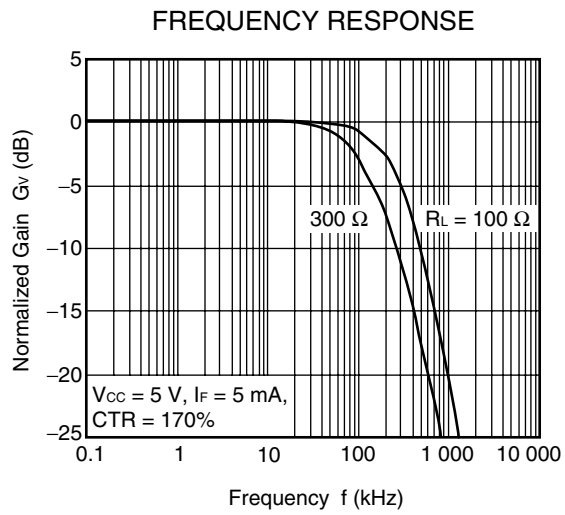
TURN-ON TIME vs. AMBIENT TEMPERATURE



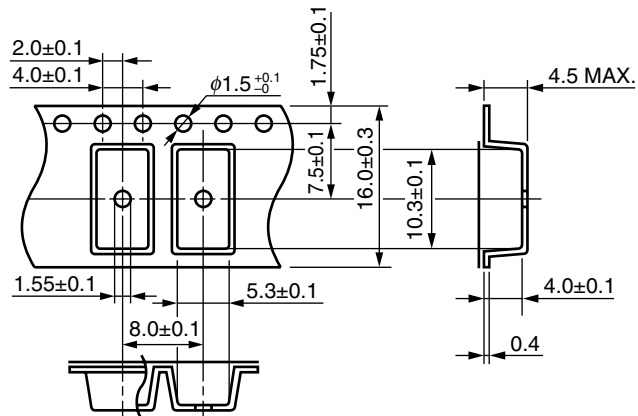
TURN-OFF TIME vs. AMBIENT TEMPERATURE



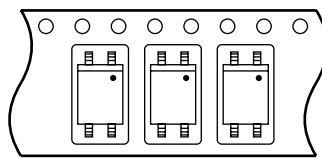
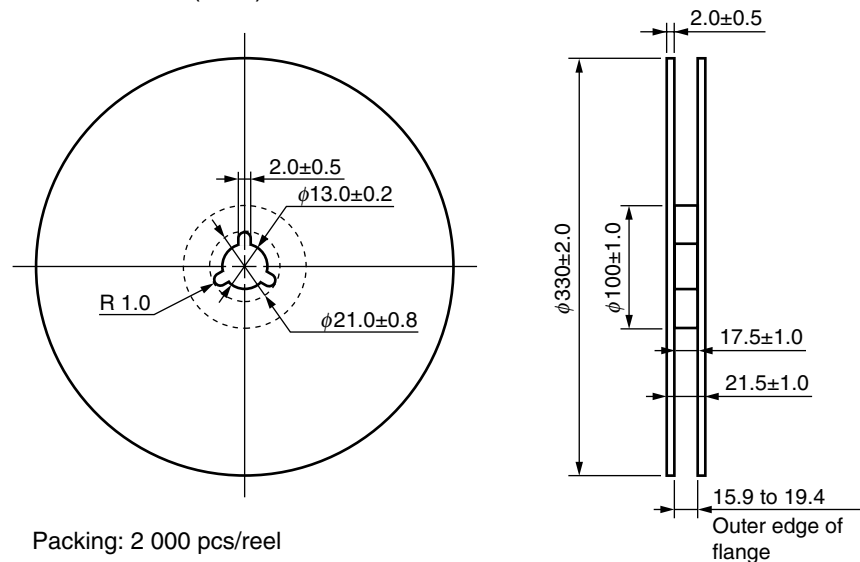
Remark The graphs indicate nominal characteristics.

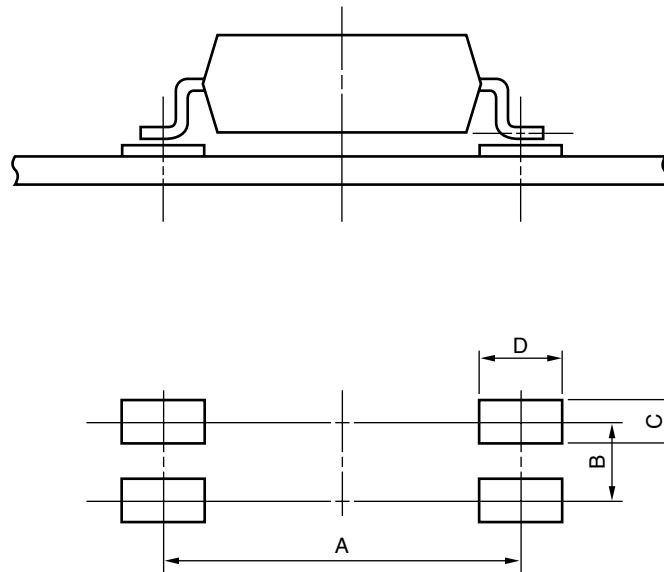


Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)**Outline and Dimensions (Tape)****Tape Direction**

PS2514L-1-F3

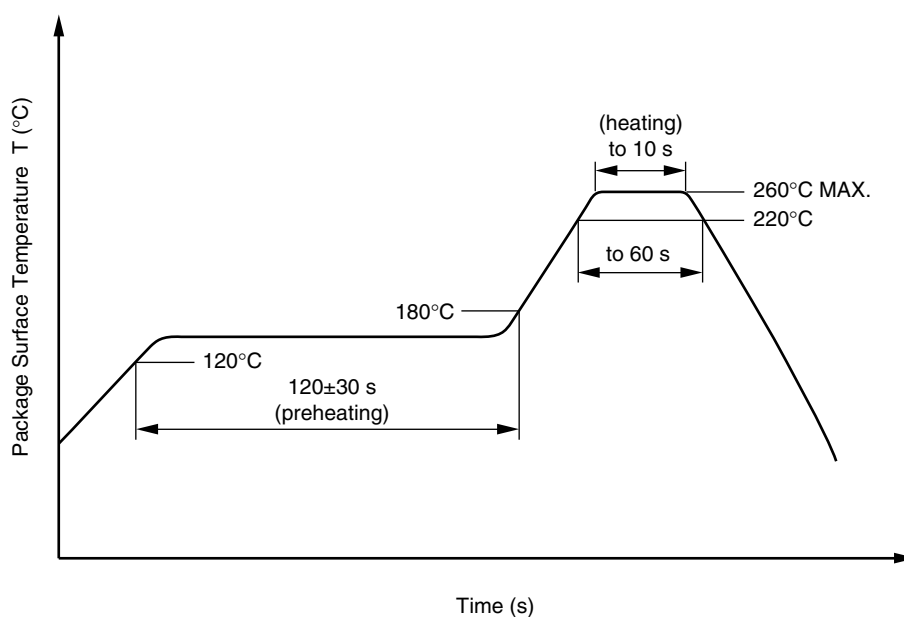
**Outline and Dimensions (Reel)**

PS2514-1,PS2514L-1**<R> RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)**

Part Number	Lead Bending	A	B	C	D
PS2514L	lead bending type (Gull-wing) for surface mount	9.2	2.54	1.7	2.2

<R> 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 (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.

(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 corrector-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.

<R> SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Spec.	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		55/100/21	
Dielectric strength maximum operating isolation voltage	U_{IORM}	890	V_{peak}
Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.5 \times U_{IORM}$, $P_d < 5 \text{ pC}$	U_{pr}	1 335	V_{peak}
Test voltage (partial discharge test, procedure b for all devices) $U_{pr} = 1.875 \times U_{IORM}$, $P_d < 5 \text{ pC}$	U_{pr}	1 669	V_{peak}
Highest permissible overvoltage	U_{TR}	8 000	V_{peak}
Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303 Part 11))	CTI	175	
Material group (DIN EN 60664-1 VDE0110 Part 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 $V_{IO} = 500 \text{ V dc}$ at $T_A = 25^\circ\text{C}$ $V_{IO} = 500 \text{ V dc}$ at $T_A \text{ MAX.}$ at least 100°C	$R_{is \text{ MIN.}}$ $R_{is \text{ MIN.}}$	10^{12} 10^{11}	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)			
Package temperature	T_{si}	175	°C
Current (input current I_F , $P_{si} = 0$)	I_{si}	400	mA
Power (output or total power dissipation)	P_{si}	700	mW
Isolation resistance $V_{IO} = 500 \text{ V dc}$ at $T_A = T_{si}$	$R_{is \text{ MIN.}}$	10^9	Ω

Caution

GaAs Products

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.

- 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.

Revision History	PS2514-1,PS2514L-1 Data Sheet
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Rev.	Date	Description	
		Page	Summary
0.01	May 28, 2010	–	First edition issued
1.00	Mar 19, 2012	Throughout	Preliminary Data Sheet -> Data Sheet
		Throughout	Safety standards approved
		p.1	Addition of Pb-Free product
		p.3	Modification of MARKING EXAMPLE
		p.4	Modification of ORDERING INFORMATION
		pp.6 to 8	Addition of TYPICAL CHARACTERISTICS
		p.10	Modification of RECOMMENDED MOUNT PAD DIMENSIONS
		pp.11 to 12	Addition of NOTES ON HANDLING
		p.13	Addition of SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

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