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Renesas Electronics website: http://www.renesas.com

April 1<sup>st</sup>, 2010 Renesas Electronics Corporation

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## **PHOTOCOUPLER**

# PS2561-1,PS2561L-1,PS2561L1-1,PS2561L2-1

## HIGH ISOLATION VOLTAGE SINGLE TRANSISTOR TYPE MULTI PHOTOCOUPLER SERIES

-NEPOC Series-

#### **DESCRIPTION**

The PS2561-1 is optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

The PS2561-1 is in a plastic DIP (Dual In-line Package) and the PS2561L-1 is lead bending type (Gull-wing) for surface mount.

The PS2561L1-1 is lead bending type for long creepage distance.

The PS2561L2-1 is lead bending type for long creepage distance (Gull-wing) for surface mount.

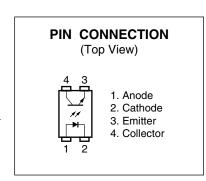
### **FEATURES**

- High Isolation voltage (BV = 5 000 Vr.m.s.)
- High collector to emitter voltage (VcEo = 80 V)
- High current transfer ratio (CTR = 200% TYP.)
- High-speed switching ( $t_r = 3 \mu s$  TYP.,  $t_f = 5 \mu s$  TYP.)
- Ordering number of taping product: PS2561L-1-E3, E4, F3, F4, PS2561L2-1-E3, E4
- Safety standards
  - UL approved: No. E72422
  - CSA approved: No. CA 101391
  - BSI approved: No. 7112/7420
  - SEMKO approved: No. 303059, 307244
  - NEMKO approved: No. P03200272, P03200747
  - DEMKO approved: No. 312341, 312340
  - FIMKO approved: No. FI 10620, FI 11898
  - DIN EN60747-5-2 (VDE0884 Part2) approved: No. 40008862 (Option)

### **APPLICATIONS**

<R>

- Power supply
- Telephone/FAX.
- FA/OA equipment
- Programmable logic controller

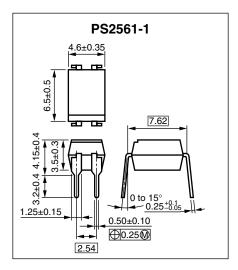


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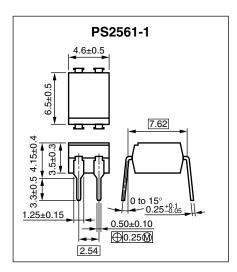


## PACKAGE DIMENSIONS (UNIT: mm)

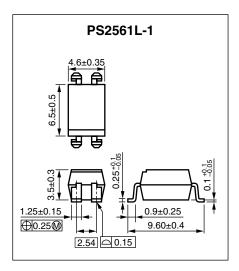
## **DIP Type (New package)**



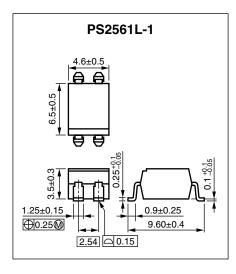
## **DIP Type**



## Lead Bending Type (New package)

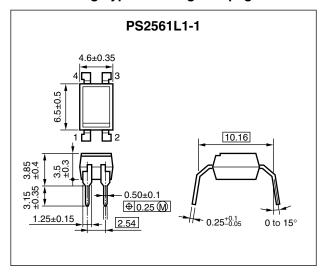


## **Lead Bending Type**

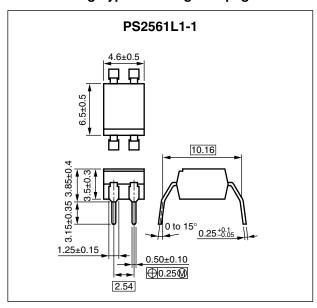




## Lead Bending Type For Long Creepage Distance (New Package)

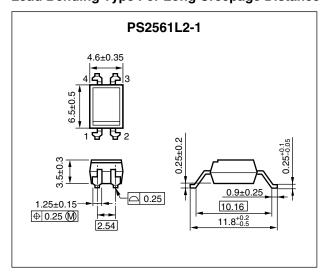


## **Lead Bending Type For Long Creepage Distance**

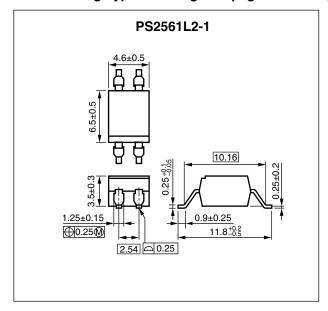


## **NEC**

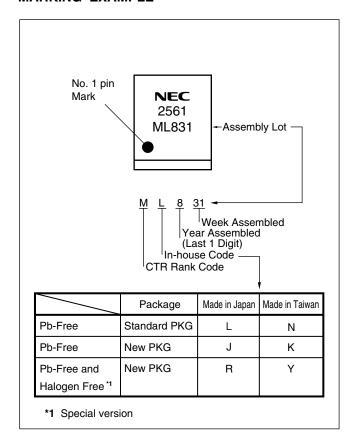
## Lead Bending Type For Long Creepage Distance (Gull-Wing) (New Package)



## **Lead Bending Type For Long Creepage Distance (Gull-Wing)**



### <R> MARKING EXAMPLE





## <R> ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part
PS2561-1	PS2561-1-A	Pb-Free	Magazine case 100 pcs	Standard products	PS2561-1
PS2561L-1	PS2561L-1-A			(UL, CSA, BSI,	
PS2561L1-1	PS2561L1-1-A			NEMKO, SEMKO,	
PS2561L2-1	PS2561L2-1-A			DEMKO, FIMKO	
PS2561L-1-E3	PS2561L-1-E3-A		Embossed Tape 1 000 pcs/reel	approved)	
PS2561L-1-E4	PS2561L-1-E4-A				
PS2561L-1-F3	PS2561L-1-F3-A		Embossed Tape 2 000 pcs/reel		
PS2561L-1-F4	PS2561L-1-F4-A				
PS2561L2-1-E3	PS2561L2-1-E3-A		Embossed Tape 1 000 pcs/reel		
PS2561L2-1-E4	PS2561L2-1-E4-A				
PS2561-1-V	PS2561-1-V-A		Magazine case 100 pcs	DIN EN60747-5-2	
PS2561L-1-V	PS2561L-1-V-A			(VDE0884 Part2)	
PS2561L1-1-V	PS2561L1-1-V-A			approved products	
PS2561L2-1-V	PS2561L2-1-V-A			(Option)	
PS2561L-1-V-E3	PS2561L-1-V-E3-A		Embossed Tape 1 000 pcs/reel		
PS2561L-1-V-E4	PS2561L-1-V-E4-A				
PS2561L-1-V-F3	PS2561L-1-V-F3-A		Embossed Tape 2 000 pcs/reel		
PS2561L-1-V-F4	PS2561L-1-V-F4-A				
PS2561L2-1-V-E3	PS2561L2-1-V-E3-A		Embossed Tape 1 000 pcs/reel		
PS2561L2-1-V-E4	PS2561L2-1-V-E4-A				
PS2561-1	PS2561-1Y-A	Special version	Magazine case 100 pcs	Standard products	PS2561-1
PS2561L-1	PS2561L-1Y-A	(Pb-Free and		(UL, CSA, BSI,	
PS2561L1-1	PS2561L1-1Y-A	Halogen Free)		NEMKO, SEMKO,	
PS2561L2-1	PS2561L2-1Y-A			DEMKO, FIMKO	
PS2561L-1-F3	PS2561L-1Y-F3-A		Embossed Tape 2 000 pcs/reel	approved)	
PS2561L2-1-E3	PS2561L2-1Y-E3-A		Embossed Tape 1 000 pcs/reel		
PS2561-1-V	PS2561-1Y-V-A		Magazine case 100 pcs	DIN EN60747-5-2	
PS2561L-1-V	PS2561L-1Y-V-A			(VDE0884 Part2)	
PS2561L1-1-V	PS2561L1-1Y-V-A			approved products	
PS2561L2-1-V	PS2561L2-1Y-V-A			(Option)	
PS2561L-1-V-F3	PS2561L-1Y-V-F3-A		Embossed Tape 2 000 pcs/reel		
PS2561L2-1-V-E3	PS2561L2-1Y-V-E3-A		Embossed Tape 1 000 pcs/reel		

<sup>\*1</sup> For the application of the Safety Standard, following part number should be used.



## ABSOLUTE MAXIMUM RATINGS (TA = 25°C, unless otherwise specified)

	Parameter	Symbol	Ratings	Unit
Diode	Reverse Voltage	VR	6	V
	Forward Current (DC)	lF	80	mA
	Power Dissipation Derating	⊿P₀/°C	1.5	mW/°C
	Power Dissipation	Po	150	mW
	Peak Forward Current <sup>1</sup>	IFP	1	Α
Transistor	Collector to Emitter Voltage	Vceo	80	V
	Emitter to Collector Voltage	VECO	7	V
	Collector Current	lc	50	mA
	Power Dissipation Derating	⊿Pc/°C	1.5	mW/°C
	Power Dissipation	Pc	150	mW
Isolation Voltage <sup>'2</sup>		BV	5 000	Vr.m.s.
Operating Ambient Temperature		TA	-55 to +100	°C
Storage Temperature		T <sub>stg</sub>	-55 to +150	°C

<sup>\*1</sup> PW = 100  $\mu$ s, Duty Cycle = 1%

<sup>\*2</sup> AC voltage for 1 minute at  $T_A = 25^{\circ}C$ , RH = 60% between input and output Pins 1-2 shorted together, 3-4 shorted together.



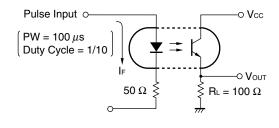
## **ELECTRICAL CHARACTERISTICS (TA = 25°C)**

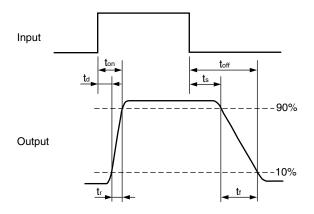
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	VF	IF = 10 mA		1.17	1.4	٧
	Reverse Current	lR	V <sub>R</sub> = 5 V			5	μΑ
	Terminal Capacitance	Ct	V = 0 V, f = 1.0 MHz		50		pF
Transistor	Collector to Emitter Dark Current	Iceo	VcE = 80 V, IF = 0 mA			100	nA
Coupled	Current Transfer Ratio	CTR	$I_F = 5 \text{ mA}, \text{ Vce} = 5 \text{ V}$	80	200	400	%
	Collector Saturation Voltage	VCE (sat)	IF = 10 mA, Ic = 2 mA			0.3	V
	Isolation Resistance	R <sub>I-O</sub>	Vi-o = 1.0 kVpc	10 <sup>11</sup>			Ω
	Isolation Capacitance	C <sub>I-O</sub>	V = 0 V, f = 1.0 MHz		0.5		pF
	Rise Time <sup>2</sup>	<b>t</b> r	Vcc = 10 V, Ic = 2 mA, RL = 100 $\Omega$		3		μs
	Fall Time <sup>*2</sup>	<b>t</b> f			5		

### \*1 CTR rank

L : 200 to 400 (%)
M : 80 to 240 (%)
D : 100 to 300 (%)
H : 80 to 160 (%)
W : 130 to 260 (%)

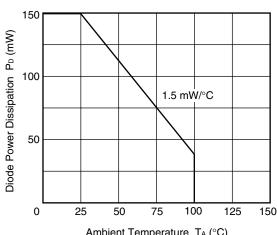
### <R> \*2 Test circuit for switching time





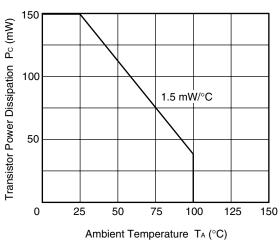
### TYPICAL CHARACTERISTICS (TA = 25°C, unless otherwise specified)



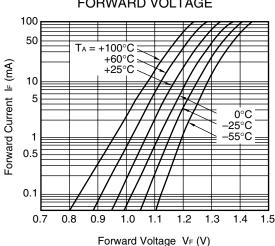


Ambient Temperature TA (°C)

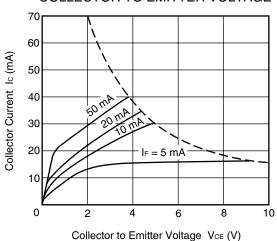
### TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



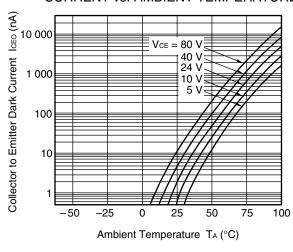
FORWARD CURRENT vs. FORWARD VOLTAGE



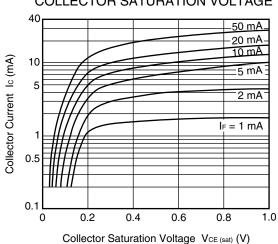
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



## COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

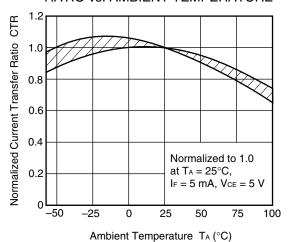


COLLECTOR CURRENT vs. **COLLECTOR SATURATION VOLTAGE** 

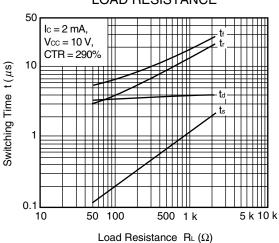


Remark The graphs indicate nominal characteristics.

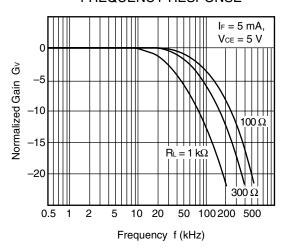
# NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



# SWITCHING TIME vs. LOAD RESISTANCE

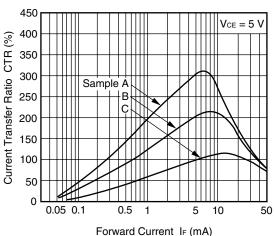


## FREQUENCY RESPONSE

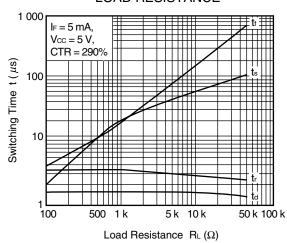


### **Remark** The graphs indicate nominal characteristics.

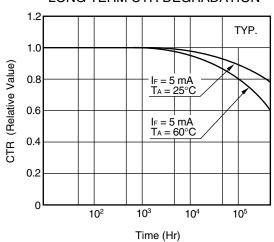
# CURRENT TRANSFER RATIO vs. FORWARD CURRENT



# SWITCHING TIME vs. LOAD RESISTANCE

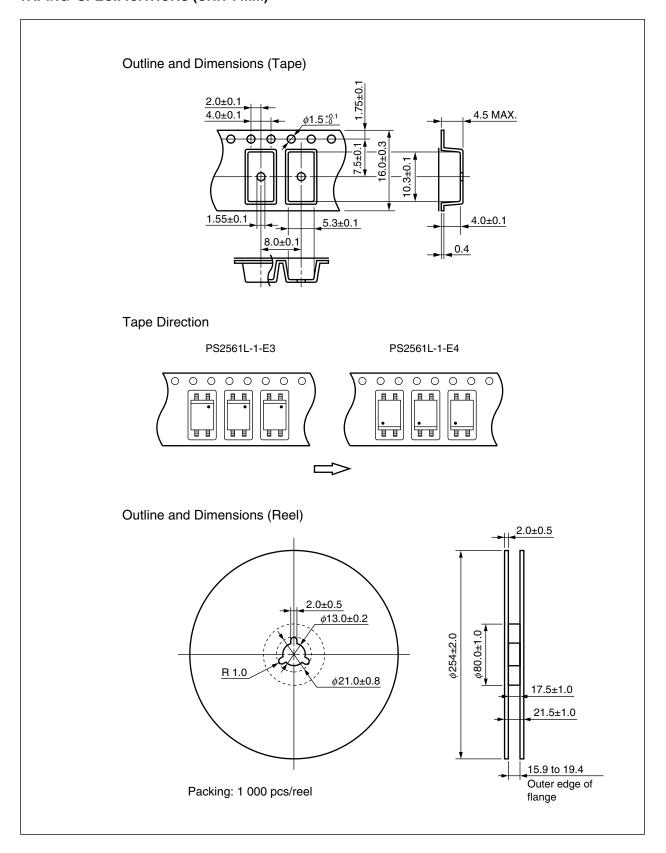


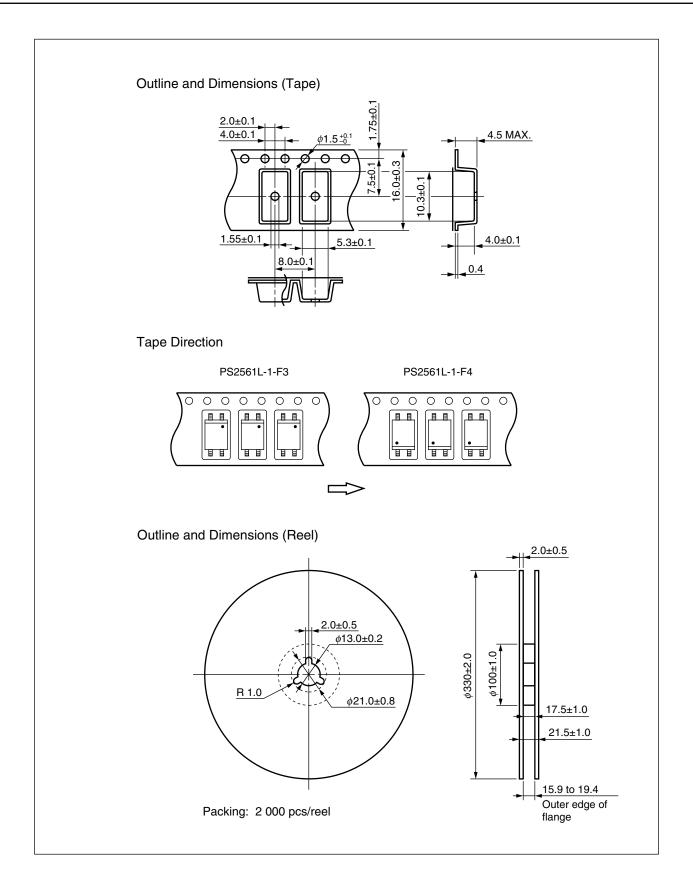
### LONG TERM CTR DEGRADATION

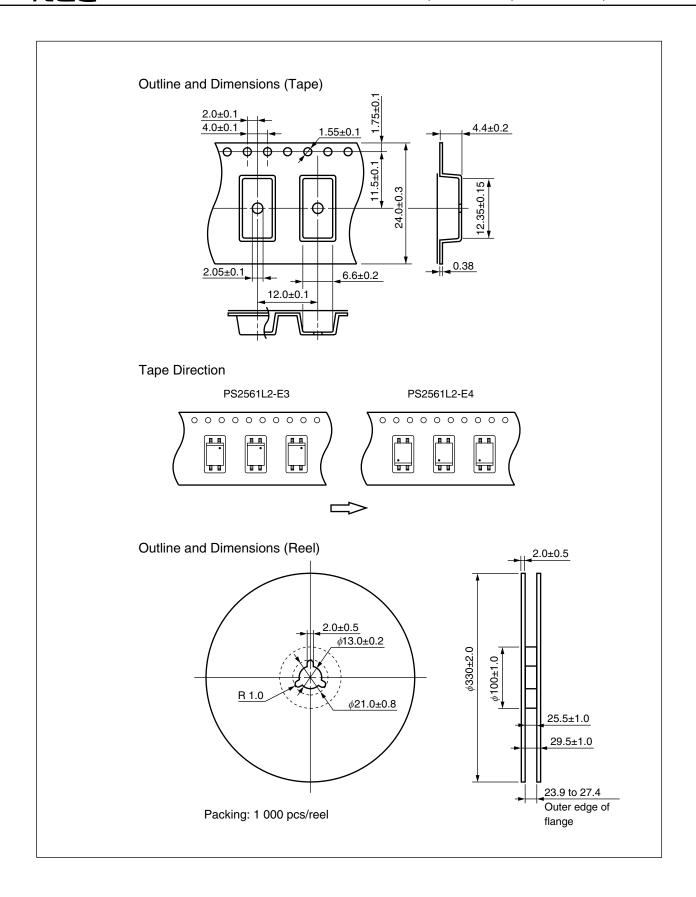




## TAPING SPECIFICATIONS (UNIT: mm)









#### NOTES ON HANDLING

### 1. Recommended soldering conditions

### (1) Infrared reflow soldering

Peak reflow temperature
 260°C or below (package surface temperature)

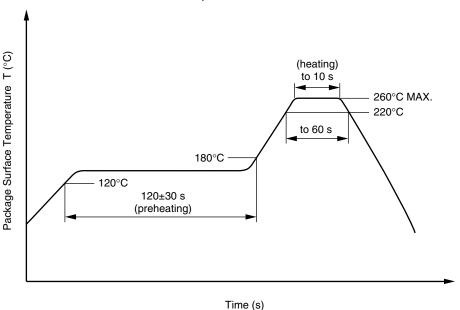
Time of peak reflow temperature
 Time of temperature higher than 220°C
 10 seconds or less
 60 seconds or less

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.

(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.

### 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. This tendency may sometimes be obvious, especially below I<sub>F</sub> = 1 mA.

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 Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.5 \times U_{\text{IORM}},  P_{\text{d}} < 5 \; \text{pC}$	Uювм Upr	890 1 335	V <sub>peak</sub> V <sub>peak</sub>
Test voltage (partial discharge test, procedure b for all devices) $U_{pr}=1.875\times U_{\text{IORM}},P_{\text{d}}<5\;\text{pC}$	U <sub>pr</sub>	1 669	$V_{peak}$
Highest permissible overvoltage	UTR	8 000	V <sub>peak</sub>
Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)		2	
Clearance distance		>7.0	mm
Creepage distance		>7.0	mm
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303 Part 11))	СТІ	175	
Material group (DIN EN 60664-1 VDE0110 Part 1)		III a	
Storage temperature range	Tstg	-55 to +150	°C
Operating temperature range	TA	-55 to +100	°C
Isolation resistance, minimum value $V_{IO} = 500 \ V \ dc \ at \ T_A = 25^{\circ}C$ $V_{IO} = 500 \ V \ dc \ at \ T_A \ MAX. \ at \ least \ 100^{\circ}C$	Ris MIN. Ris MIN.	10 <sup>12</sup> 10 <sup>11</sup>	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)			
Package temperature	Tsi	175	°C
Current (input current I <sub>F</sub> , Psi = 0)  Power (output or total power dissipation)	lsi Psi	400 700	mA mW
Isolation resistance Vio = 500 V dc at TA = Tsi	Ris MIN.	10°	Ω

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The "Specific" quality grade applies only to NEC Electronics products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of an NEC Electronics product depend on its quality grade, as indicated below. Customers must check the quality grade of each NEC Electronics product before using it in a particular application.

- "Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots.
- "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support).
- "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

The quality grade of NEC Electronics products is "Standard" unless otherwise expressly specified in NEC Electronics data sheets or data books, etc. If customers wish to use NEC Electronics products in applications not intended by NEC Electronics, they must contact an NEC Electronics sales representative in advance to determine NEC Electronics' willingness to support a given application.

#### (Note)

- (1) "NEC Electronics" as used in this statement means NEC Electronics Corporation and also includes its majority-owned subsidiaries.
- (2) "NEC Electronics products" means any product developed or manufactured by or for NEC Electronics (as defined above).

M8E 02.11-1

### 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.
  - 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.

## **Mouser Electronics**

**Authorized Distributor** 

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## **Renesas Electronics:**

<u>PS2561L2-1-V-A</u> <u>PS2561-1-A</u> <u>PS2561L1-1-A</u> <u>PS2561L1-1-A</u> <u>PS2561L2-1-V-F3-A</u> <u>PS2561L2-1-F3-A</u> <u>PS2561L2-1-F3-A</u> <u>PS2561L2-1-F3-A</u>



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов:
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
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- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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