DATA SHEET

PHOTOCOUPLER PS8302L,PS8302L2

1 Mbps, HIGH CMR, ANALOG OUTPUT TYPE, 8 mm CREEPAGE 6-PIN SDIP PHOTOCOUPLER -NEPOC Series-

DESCRIPTION

NEC

The PS8302L and PS8302L2 are optical coupled isolators containing a GaAlAs LED on the input side and a PIN photodiode and a high-speed amplifier transistor on the output side on one chip.

The PS8302L and PS8302L2 are designed specifically for high supply voltage and high common mode transient immunity (CMR).

The PS8302L and PS8302L2 are in 6-pin plastic SDIP (Shrink Dual In-line Package). The PS8302L2 has 8 mm creepage distance and is half size of 8-pin DIP.

The PS8302L is lead bending type (Gull-wing) for surface mounting.

The PS8302L2 is lead bending type for long creepage distance (Gull-wing) for surface mount.

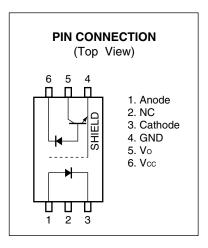
FEATURES

- High common mode transient immunity (CMH, CML = $\pm 15 \text{ kV}/\mu \text{s}$ MIN.)
- Half size of 8-pin DIP
- Long creepage distance (8 mm MIN. : PS8302L2)
- High supply voltage (Vcc = 35 V)
- High isolation voltage (BV = 5 000 Vr.m.s.)
- High-speed response (tPHL = 0.8 μ s MAX., tPLH = 0.8 μ s MAX.)
- Pb-Free product
- Safety standards
 - UL approved: No. E72422
 - CSA approved: No. CA 101391 (CA5A, CAN/CSA-C22.2 60065, 60950)
 - DIN EN60747-5-2 (VDE0884 Part2) approved: No. 40024069 (Option)

APPLICATIONS

<R>

- Computer and peripheral manufactures
- General purpose inverter
- · Substitutions for relays and pulse transformers
- · Power supply



The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version. Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.

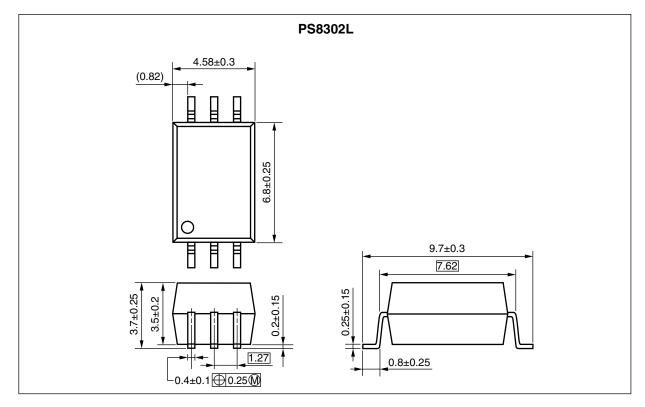
The mark <R> shows major revised points. © NEC Ele

© NEC Electronics Corporation 2007, 2009

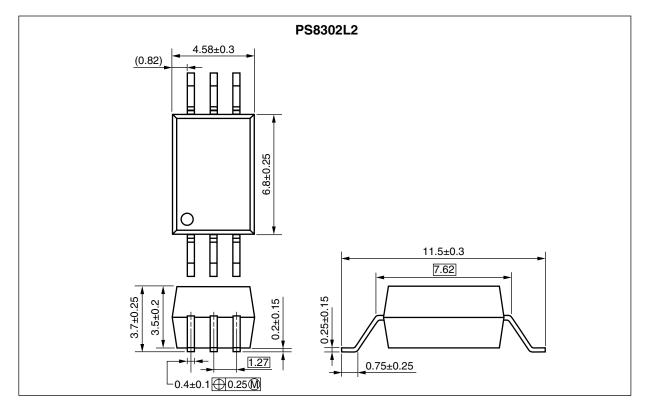
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PACKAGE DIMENSIONS (UNIT: mm)

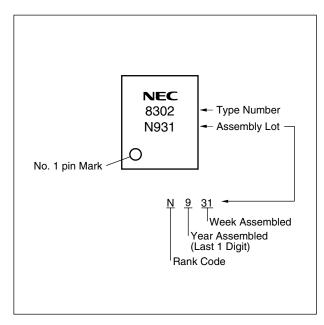
Lead Bending Type (Gull-wing) For Surface Mount



Lead Bending Type For Long Creepage Distance (Gull-wing) For Surface Mount



<R> MARKING EXAMPLE



PHOTOCOUPLER CONSTRUCTION

Parameter	PS8302L	PS8302L2	
Air Distance (MIN.)	7 mm	8 mm	
Outer Creepage Distance (MIN.)	7 mm	8 mm	
Isolation Distance (MIN.)	0.4 mm	0.4 mm	

ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{⁺1}
PS8302L	PS8302L-AX	Pb-Free	20 pcs (Tape 20 pcs cut)	Standard products	PS8302L
PS8302L-E3	PS8302L-E3-AX	(Ni/Pd/Au)	Embossed Tape 2 000 pcs/reel	(UL, CSA approved)	
PS8302L2	PS8302L2-AX		20 pcs (Tape 20 pcs cut)		PS8302L2
PS8302L2-E3	PS8302L2-E3-AX		Embossed Tape 2 000 pcs/reel		
PS8302L-V	PS8302L-V-AX		20 pcs (Tape 20 pcs cut)	DIN EN60747-5-2	PS8302L
PS8302L-V-E3	PS8302L-V-E3-AX		Embossed Tape 2 000 pcs/reel	(VDE0884 Part2)	
PS8302L2-V	PS8302L2-V-AX		20 pcs (Tape 20 pcs cut)	Approved (Option)	PS8302L2
PS8302L2-V-E3	PS8302L2-V-E3-AX		Embossed Tape 2 000 pcs/reel		

*1 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	Forward Current [™]	lF	25	mA
	Reverse Voltage	VR	5	V
Detector	Supply Voltage	Vcc	35	V
	Output Voltage	Vo	35	V
	Output Current	lo	8	mA
	Power Dissipation ²	Pc	100	mW
Isolation V	oltage ^{*3}	BV	5 000	Vr.m.s.
Operating Ambient Temperature		TA	–55 to +110	°C
Storage Temperature		Tstg	-55 to +125	°C

*1 Reduced to 0.3 mA/°C at $T_A = 70^{\circ}C$ or more.

*2 Reduced to 2.0 mW/°C at $T_A = 75^{\circ}C$ or more.

*3 AC voltage for 1 minute at $T_A = 25^{\circ}$ C, RH = 60% between input and output. Pins 1-3 shorted together, 4-6 shorted together.

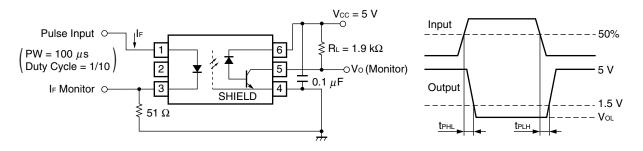
<R> ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)

	Parameter	Symbol	Conditions	MIN.	TYP. ^{*1}	MAX.	Unit
Diode	Forward Voltage	VF	IF = 16 mA		1.6	2.0	V
	Reverse Current	IR	V _R = 3 V			10	μA
	Forward Voltage Temperature Coefficient	⊿VF/⊿Ta	I⊧ = 16 mA		-2.1		mV/°C
	Terminal Capacitance	Ct	V = 0 V, f = 1 MHz		30		pF
Detector	High Level Output Current	Іон (1)	$I_F = 0 \text{ mA}, \text{ Vcc} = V_0 = 5.5 \text{ V}$		3	500	nA
	High Level Output Current	Іон (2)	$I_F = 0 \text{ mA}, \text{ Vcc} = V_0 = 35 \text{ V}$			100	μA
	Low Level Output Voltage	Vol	$I_{\rm F}$ = 16 mA, Vcc = 4.5 V, Io = 2.4 mA		0.15	0.4	V
	High Level Supply Current	Іссн	IF = 0 mA, Vo = open, Vcc = 35 V		0.01	1	μA
	Low Level Supply Current	lcc∟	I_F = 16 mA, Vo = open, Vcc = 35 V		150		
Coupled	Current Transfer Ratio	CTR	I_{F} = 16 mA, Vcc = 4.5 V, Vo = 0.4 V	15			%
	Input-Output Isolation Resistance	Rı-o	VI-0 = 1 kVDC	10 ¹¹			Ω
	Input-Output Isolation Capacitance	CI-O	V = 0 V, f = 1 MHz		0.7		pF
	Propagation Delay Time $(H \rightarrow L)^{2}$	tph∟	IF = 16 mA, Vcc = 5 V, RL = 1.9 k Ω		0.3	0.8	μs
	Propagation Delay Time $(L \rightarrow H)^{2}$	tр∟н			0.33	0.8	
	Common Mode Transient Immunity at High Level Output ³	СМн	$I_{\text{F}} = 0 \text{ mA}, \text{ V}_{\text{CC}} = 5 \text{ V}, \text{ R}_{\text{L}} = 4.1 \text{ k}\Omega,$ $V_{\text{CM}} = 1.5 \text{ kV}$	15			kV/ <i>µ</i> s
	Common Mode Transient Immunity at Low Level Output ^{'3}	CM∟	IF = 16 mA, Vcc = 5 V, RL = 4.1 kΩ, Vcм = 1.5 kV	-15			

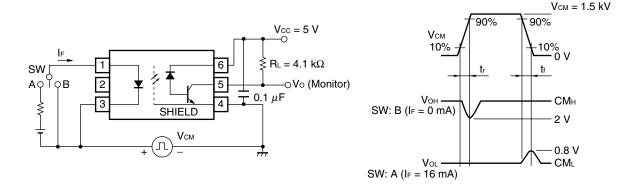
*1 Typical values at T_A = 25°C

NEC

*2 Test circuit for propagation delay time



*3 Test circuit for common mode transient immunity



USAGE CAUTIONS

- 1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
- 2. By-pass capacitor of 0.1 μ F is used between Vcc and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.
- <R>

3. Pin 2 (which is an NC⁻¹ pin) can either be connected directly to the GND pin on the LED side or left open. Unconnected pins should not be used as a bypass for signals or for any other similar purpose because this may degrade the internal noise environment of the device.

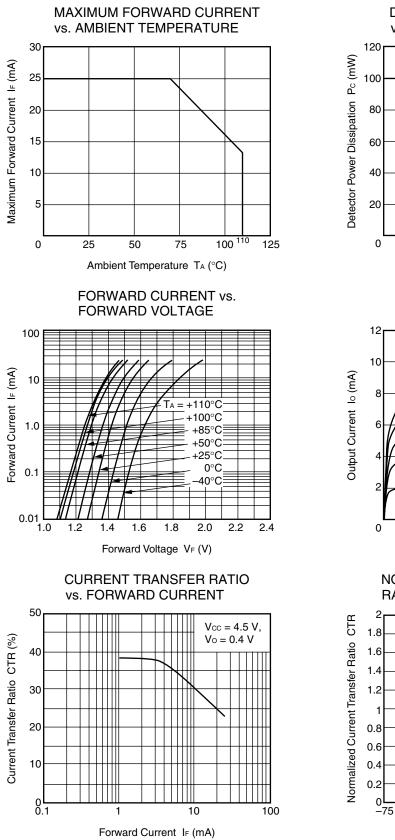
*1 NC: Not connected (No connection)

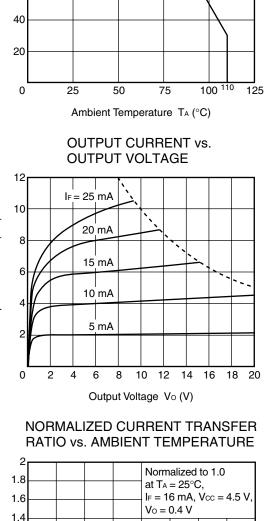
4. Avoid storage at a high temperature and high humidity.

DETECTOR POWER DISSIPATION

vs. AMBIENT TEMPERATURE

<R> TYPICAL CHARACTERISTICS (TA = 25°C, unless otherwise specified)





-50

-25

0

25

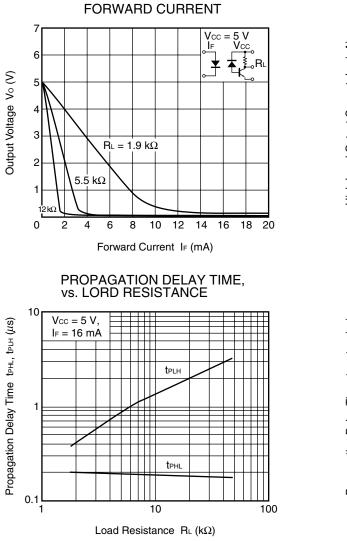
Ambient Temperature TA (°C)

50

75

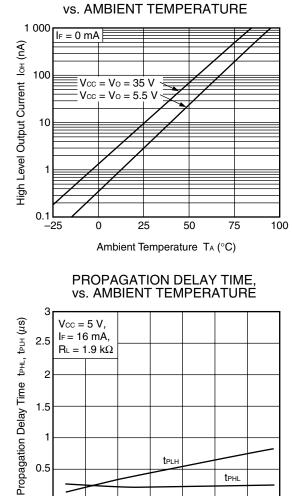
100 125

Remark The graphs indicate nominal characteristics.



OUTPUT VOLTAGE vs.

Remark The graphs indicate nominal characteristics.



tPLH

Ambient Temperature T_A (°C)

50

25

tPHL

100

125

75

1

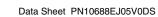
0.5

0**∟** -50

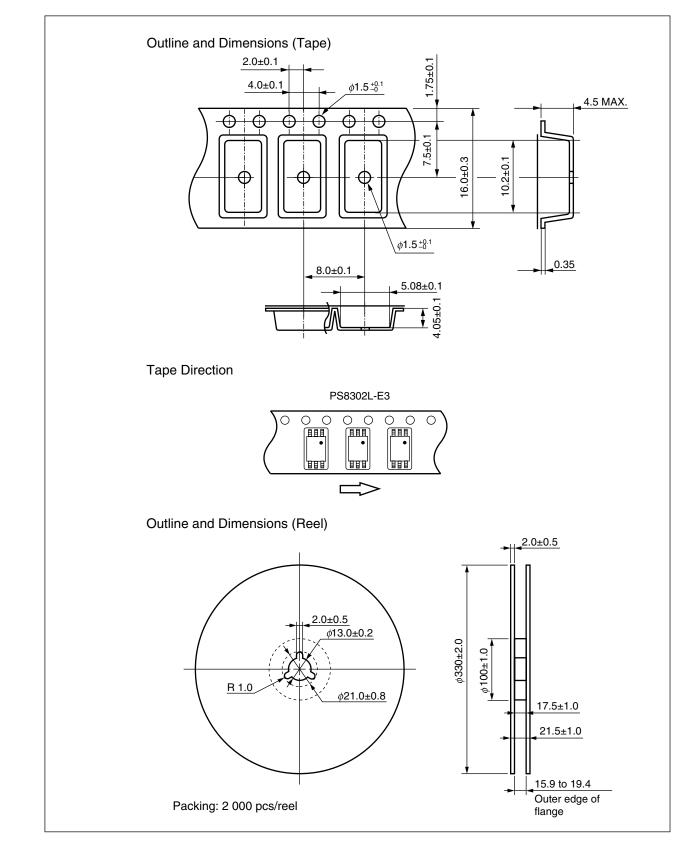
-25

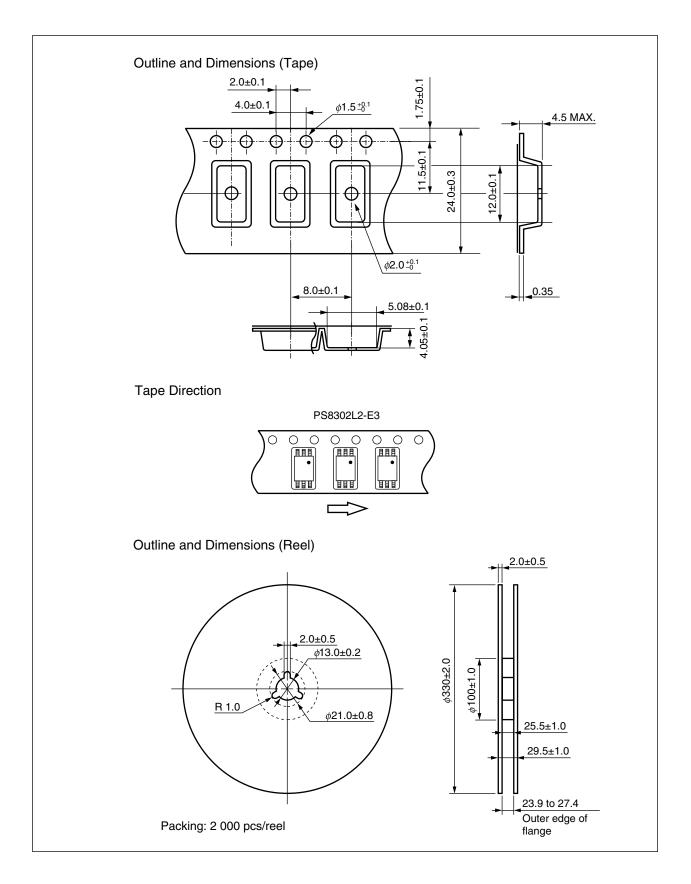
0

HIGH LEVEL OUTPUT CURRENT

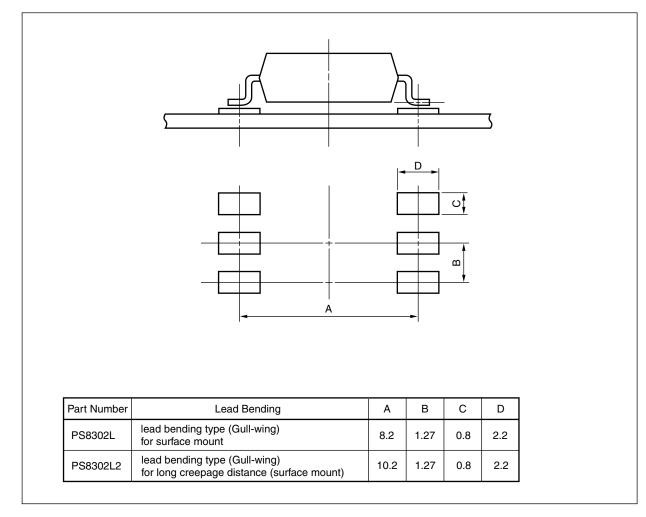


<R> TAPING SPECIFICATIONS (UNIT: mm)





<R> RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



<R> NOTES ON HANDLING

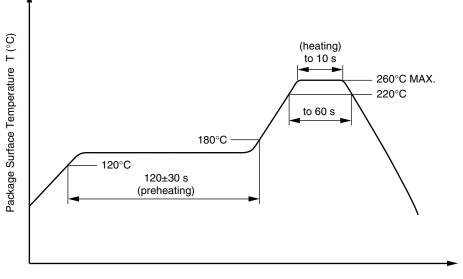
1. Recommended soldering conditions

(1) Infrared reflow soldering

- Peak reflow temperature
- Time of peak reflow temperature
- Time of temperature higher than 220°C
- Time to preheat temperature from 120 to 180°C
- Number of reflows
- Flux

260°C or below (package surface temperature) 10 seconds or less 60 seconds or less 120±30 s Three 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



Time (s)

(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 side may enter the on state, even if the voltage is within the absolute maximum ratings.

<R> SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Spec.	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		55/110/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.5 \times U_{IORM}, P_d < 5 pC$	Uiorm Upr	1 130 1 695	V _{peak} V _{peak}
Test voltage (partial discharge test, procedure b for all devices) U_{pr} = 1.875 \times U_{IORM}, P_{d} < 5 pC	Upr	2 119	Vpeak
Highest permissible overvoltage	Utr	8 000	Vpeak
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	Tstg	-55 to +125	°C
Operating temperature range	TA	–55 to +110	°C
Isolation resistance, minimum value $V_{IO} = 500 \text{ V dc at } T_A = 25^{\circ}\text{C}$ $V_{IO} = 500 \text{ V dc at } T_A \text{ MAX. at least } 100^{\circ}\text{C}$	Ris MIN. Ris MIN.	10 ¹² 10 ¹¹	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I⊧, Psi = 0) Power (output or total power dissipation) Isolation resistance	Tsi Isi Psi	175 400 700	°C mA mW
Vio = 500 V dc at T _A = Tsi	Ris MIN.	10 [°]	Ω

- The information in this document is current as of June, 2009. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets, etc., for the most up-to-date specifications of NEC Electronics products. Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.
- No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Electronics. NEC Electronics assumes no responsibility for any errors that may appear in this document.
- NEC Electronics does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC Electronics products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Electronics or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of a customer's equipment shall be done under the full responsibility of the customer. NEC Electronics assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC Electronics endeavors to enhance the quality and safety of NEC Electronics products, customers
 agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. In addition, NEC
 Electronics products are not taken measures to prevent radioactive rays in the product design. When customers
 use NEC Electronics products with their products, customers shall, on their own responsibility, incorporate
 sufficient safety measures such as redundancy, fire-containment and anti-failure features to their products in
 order to avoid risks of the damages to property (including public or social property) or injury (including death) to
 persons, as the result of defects of NEC Electronics products.
- NEC Electronics products are classified into the following three quality grades: "Standard", "Special" and "Specific".

The "Specific" quality grade applies only to NEC Electronics products developed based on a customerdesignated "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)

- "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).

M8E0904E

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 i any way allow it to enter the mouth.

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

April 1st, 2010 Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

Send any inquiries to http://www.renesas.com/inquiry.

Notice

- 1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
- Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
- 3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
- 4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
- 5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
- 6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
- 7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.
 - "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.
 - "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anticrime systems; safety equipment; and medical equipment not specifically designed for life support.
 - "Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
- 8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
- 9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
- 10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
- 11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
- 12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.
- (Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majorityowned subsidiaries.
- (Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Renesas Electronics:

 PS8302L2-E3-AX
 PS8302L-E3-AX
 PS8302L-AX
 PS8302L2-V-AX
 PS8302L2-V-E3-AX
 PS8302L-V-E3-AX

 PS8302L2-AX
 PS8302L2-AX
 PS8302L2-V-E3-AX
 PS8302L2-V-E3-AX
 PS8302L2-V-E3-AX



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

Наши преимущества:

- 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;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный) **Факс:** 8 (812) 320-02-42 **Электронная почта:** <u>org@eplast1.ru</u> **Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.