

PRELIMINARY DATA SHEET

NEC

PHOTOCOUPLER PS2561D-1, PS2561DL-1 PS2561DL1-1, PS2561DL2-1

DIP PHOTOCOUPLER OPERATING AMBIENT TEMPERATURE 110°C

—NEPOC Series—

DESCRIPTION

The PS2561D-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon phototransistor.

The PS2561D-1 is in a plastic DIP (Dual In-line Package) and the PS2561DL-1 is lead bending type (Gull-wing) for surface mount.

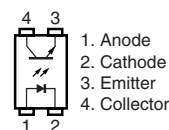
The PS2561DL1-1 is lead bending type for long creepage distance.

The PS2561DL2-1 is lead bending type for long creepage distance (Gull-wing) for surface mount.

FEATURES

- Operating ambient temperature: 110°C
- High Isolation voltage ($BV = 5\,000\text{ V r.m.s.}$)
- High collector to emitter voltage ($V_{CEO} = 80\text{ V}$)
- High current transfer ratio ($CTR = 160\%$ TYP.)
- High-speed switching ($t_r = 3\text{ }\mu\text{s}$ TYP., $t_f = 5\text{ }\mu\text{s}$ TYP.)
- Ordering number of taping product: PS2561DL-1-F3 : 2 000 pcs/reel
: PS2561DL2-1-E3: 1 000 pcs/reel
- Pb-Free product

PIN CONNECTION (Top View)



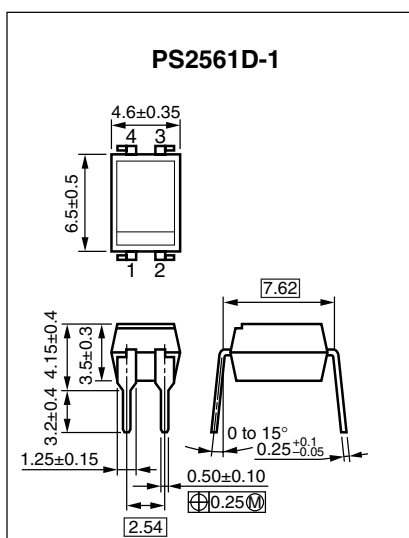
APPLICATIONS

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

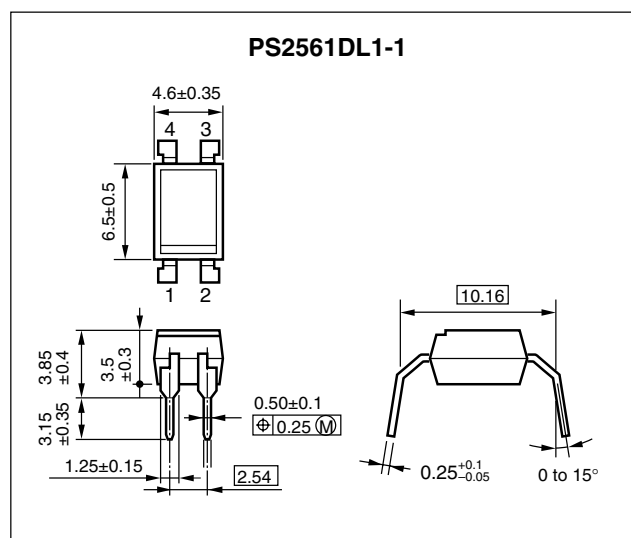
The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.

PACKAGE DIMENSIONS (UNIT : mm)

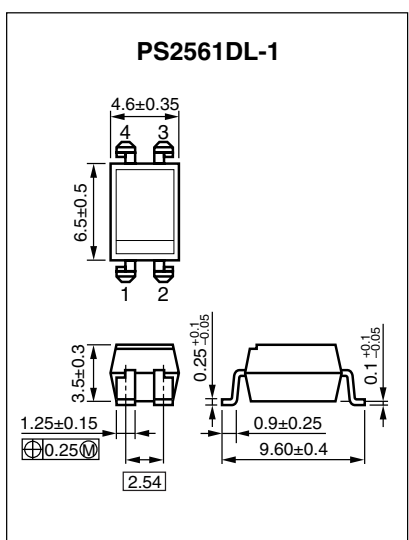
DIP Type



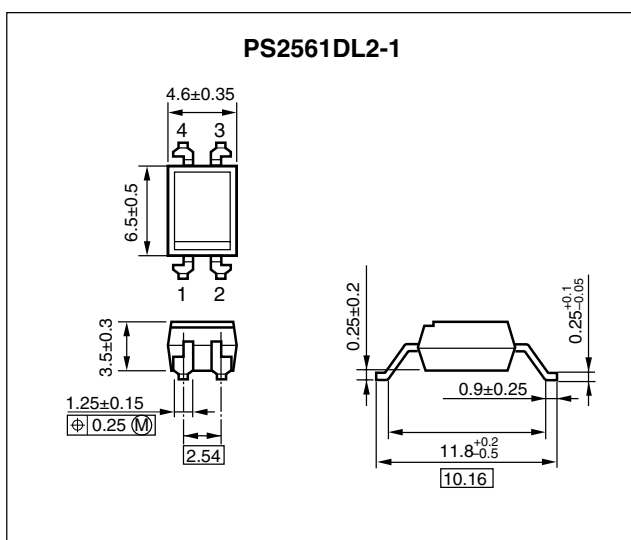
Long Creepage Distance



Lead Bending Type



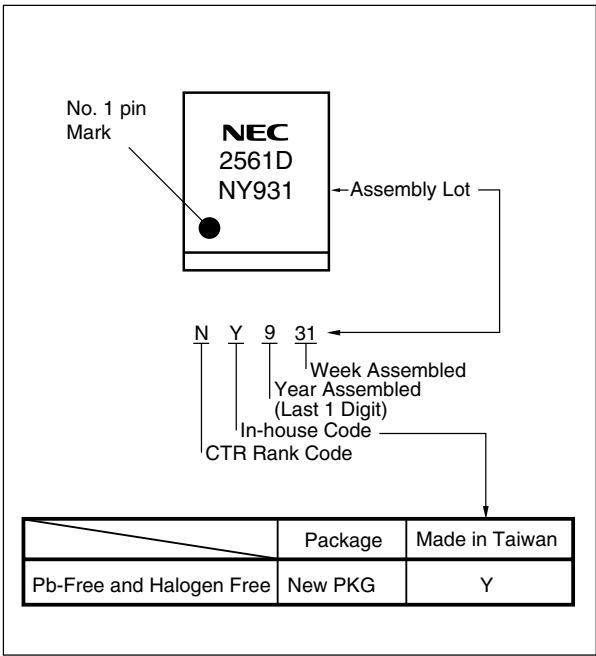
Long Creepage Distance (Gull-Wing)



PHOTOCOUPLER CONSTRUCTION

Parameter	PS2561D-1, PS2561DL-1	PS2561DL1-1, PS2561DL2-1
Air Distance (MIN.)	7 mm	8 mm
Outer Creepage Distance (MIN.)	7 mm	8 mm
Inner Creepage Distance (MIN.)	4 mm	4 mm
Isolation Distance (MIN.)	0.4 mm	0.4 mm

MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}	
PS2561D-1	PS2561D-1Y-A	Special version (Pb-Free and Halogen Free)	Magazine case 100 pcs	Standard products	PS2561D-1	
PS2561DL-1	PS2561DL-1Y-A			(UL, CSA, BSI,	PS2561DL-1	
PS2561DL1-1	PS2561DL1-1Y-A			NEMKO, DEMKO,	PS2561DL1-1	
PS2561DL2-1	PS2561DL2-1Y-A			SEMKO, FIMKO	PS2561DL2-1	
PS2561DL-1-F3	PS2561DL-1Y-F3-A		awaiting approval)	Embossed Tape 2 000 pcs/reel	PS2561DL-1	
PS2561DL2-1-E3	PS2561DL2-1Y-E3-A			Embossed Tape 1 000 pcs/reel	PS2561DL2-1	
PS2561D-1-V	PS2561D-1Y-V-A		Magazine case 100 pcs	DIN EN60747-5-2 (VDE0884 Part2) awaiting approval (Option)	PS2561D-1	
PS2561DL-1-V	PS2561DL-1Y-V-A				PS2561DL-1	
PS2561DL1-1-V	PS2561DL1-1Y-V-A				PS2561DL1-1	
PS2561DL2-1-V	PS2561DL2-1Y-V-A				PS2561DL2-1	
PS2561DL-1-V-F3	PS2561DL-1Y-V-F3-A				Embossed Tape 2 000 pcs/reel	PS2561DL-1
PS2561DL2-1-V-E3	PS2561DL2-1Y-V-E3-A				Embossed Tape 1 000 pcs/reel	PS2561DL2-1

^{*1} For the application of the Safety Standard, following part number should be used.

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Reverse Voltage	V_R	6	V
	Forward Current (DC)	I_F	40	mA
	Power Dissipation Derating	$\Delta P_D/^\circ\text{C}$	1.5	mW/ $^\circ\text{C}$
	Power Dissipation	P_D	150	mW
	Peak Forward Current ^{*1}	I_{FP}	1	A
Transistor	Collector to Emitter Voltage	V_{CEO}	80	V
	Emitter to Collector Voltage	V_{ECO}	7	V
	Collector Current	I_C	50	mA
	Power Dissipation Derating	$\Delta P_C/^\circ\text{C}$	1.5	mW/ $^\circ\text{C}$
	Power Dissipation	P_C	150	mW
Isolation Voltage ^{*2}		BV	5 000	Vr.m.s.
Operating Ambient Temperature		T_A	-55 to +110	$^\circ\text{C}$
Storage Temperature		T_{stg}	-55 to +150	$^\circ\text{C}$

*1 $PW = 100 \mu\text{s}$, Duty Cycle = 1%

*2 AC voltage for 1 minute at $T_A = 25^\circ\text{C}$, RH = 60% between input and output.

Pins 1-2 shorted together, 3-4 shorted together.

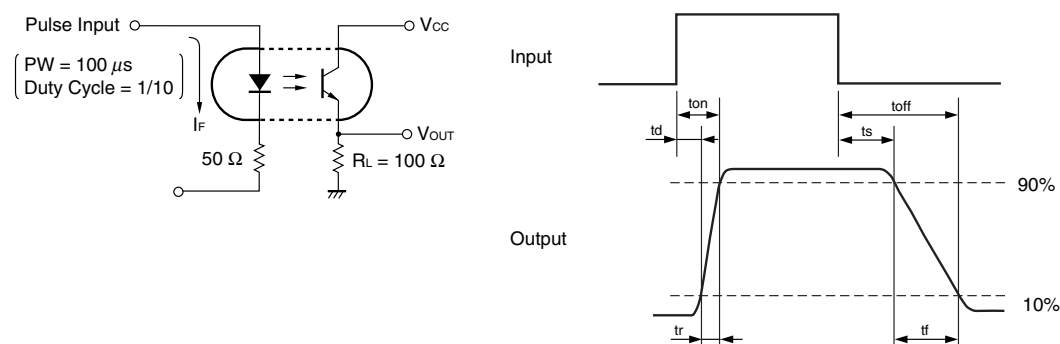
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V _F	I _F = 10 mA		1.2	1.4	V
	Reverse Current	I _R	V _R = 5 V			5	μA
	Terminal Capacitance	C _t	V = 0 V, f = 1.0 MHz		10		pF
Transistor	Collector to Emitter Dark Current	I _{CEO}	V _{CE} = 48 V, I _F = 0 mA			100	nA
Coupled	Current Transfer Ratio (I _C /I _F) ^{*1}	CTR	I _F = 5 mA, V _{CE} = 5 V	50	160	400	%
			I _F = 1 mA, V _{CE} = 5 V	10	80		
	Collector Saturation Voltage	V _{CE(sat)}	I _F = 10 mA, I _C = 2 mA			0.3	V
	Isolation Resistance	R _{I-O}	V _{I-O} = 1.0 kV _{DC}	10 ¹¹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1.0 MHz		0.5		pF
	Rise Time ^{*2}	t _r	V _{CC} = 10 V, I _C = 2 mA, R _L = 100 Ω		3		μs
	Fall Time ^{*2}	t _f			5		

*1 CTR rank

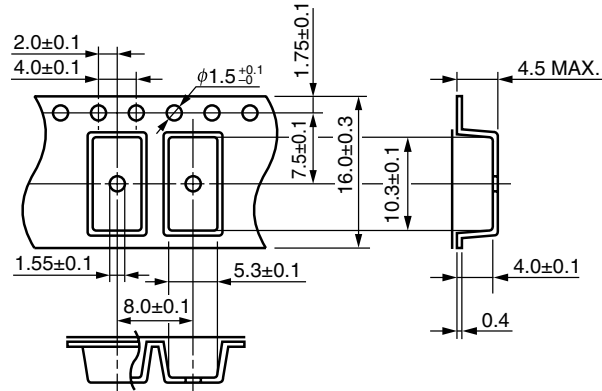
CTR Rank	CTR (%)	Conditions
H	80 to 160	I _F = 5 mA, V _{CE} = 5 V
	16 and larger	I _F = 1 mA, V _{CE} = 5 V
Q	100 to 200	I _F = 5 mA, V _{CE} = 5 V
	20 and larger	I _F = 1 mA, V _{CE} = 5 V
W	130 to 260	I _F = 5 mA, V _{CE} = 5 V
	26 and larger	I _F = 1 mA, V _{CE} = 5 V
L	200 to 400	I _F = 5 mA, V _{CE} = 5 V
	40 and larger	I _F = 1 mA, V _{CE} = 5 V
N	50 to 400	I _F = 5 mA, V _{CE} = 5 V
	10 and larger	I _F = 1 mA, V _{CE} = 5 V

*2 Test circuit for switching time



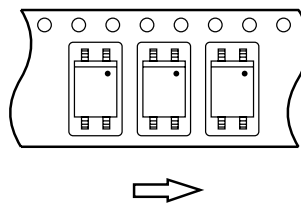
TAPING SPECIFICATIONS (UNIT : mm)

Outline and Dimensions (Tape)

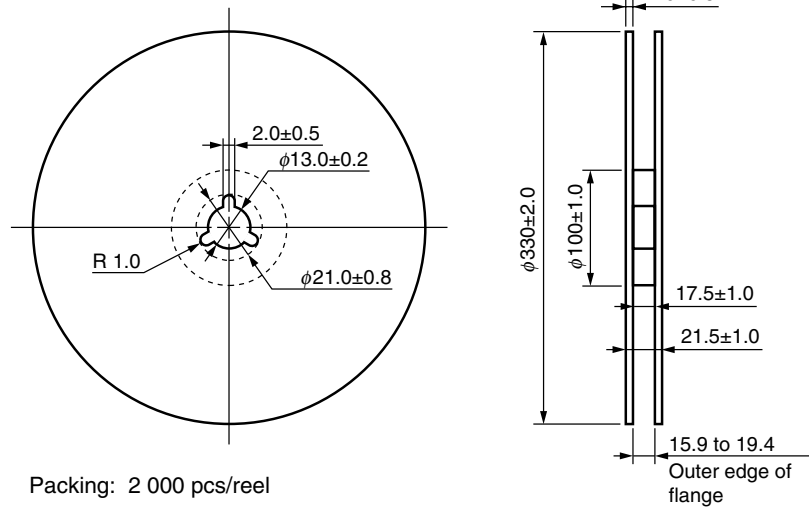


Tape Direction

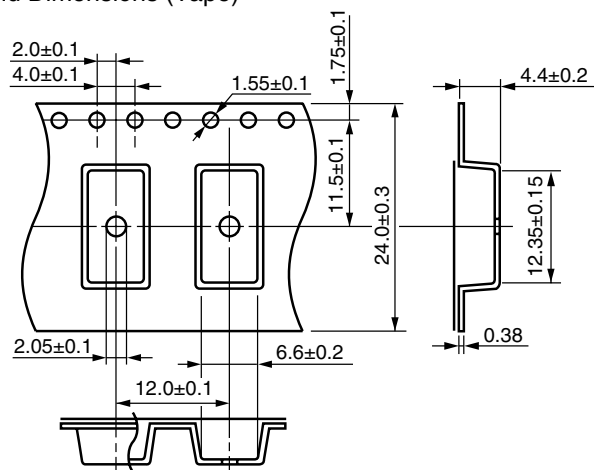
PS2561DL-1-F3



Outline and Dimensions (Reel)

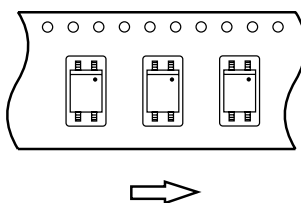


Outline and Dimensions (Tape)

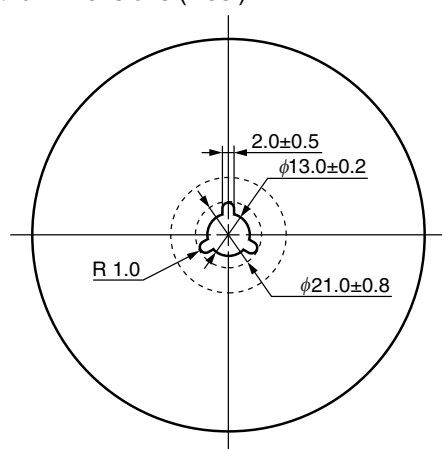


Tape Direction

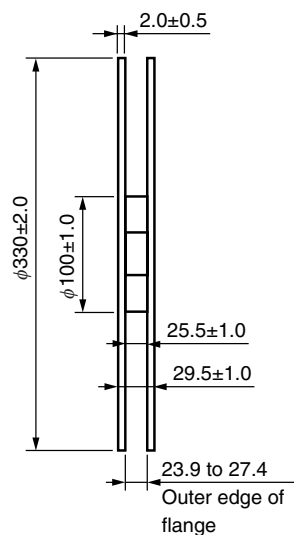
PS2561DL2-1-E3



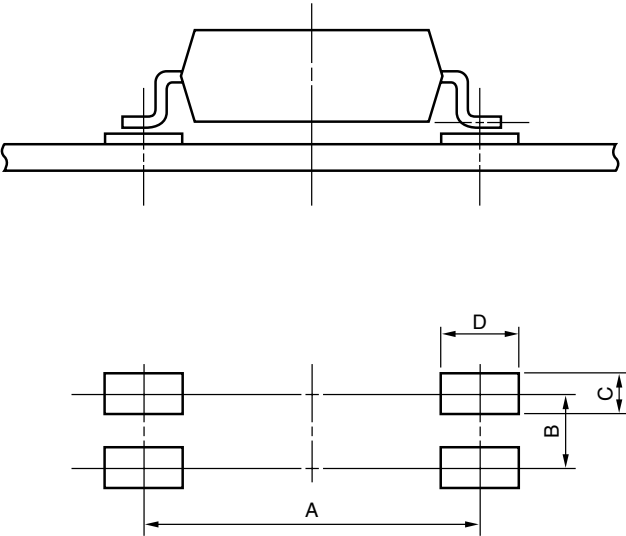
Outline and Dimensions (Reel)



Packing: 1 000 pcs/reel



RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



Part Number	Lead Bending	A	B	C	D
PS2561DL	lead bending type (Gull-wing) for long creepage distance (surface mount)	8.2	2.54	1.7	2.2
PS2561DL2	lead bending type (Gull-wing) for surface mount	10.2	2.54	1.7	2.2

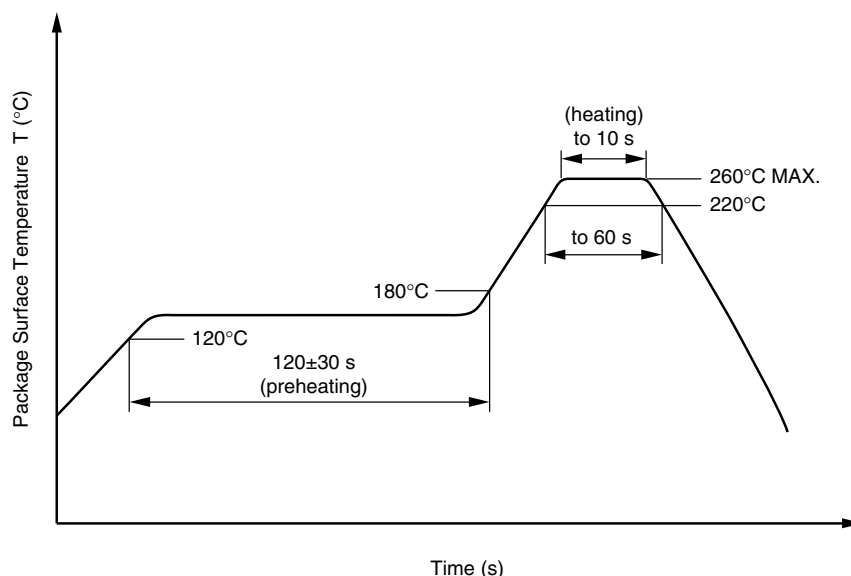
NOTES ON HANDLING

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.

(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 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.

- **The information in this document is current as of August, 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 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).

M8E0904E

<div>Caution</div>	GaAs Products	<p>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.</p> <ul style="list-style-type: none"> • 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. <ol style="list-style-type: none"> 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.
--------------------	---------------	---