

RD2.0ES to RD39ES

400 mW DHD ZENER DIODE

(DO-34)

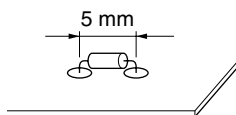
DESCRIPTION

NEC Type RD2.0ES to RD39ES Series are planar type diodes into DO-34 Package (Body length 2.4 mm MAX.) with DHD (Double Heatsink Diode) construction having allowable power dissipation of 400 mW.

FEATURES

- DO-34 Glass sealed package

This diode can be inserted into a PC board with a shorter pitch (5 mm)



- Planar process
- DHD (Double Heatsink Diode) construction
- Vz Applied E24 standard

ORDERING INFORMATION

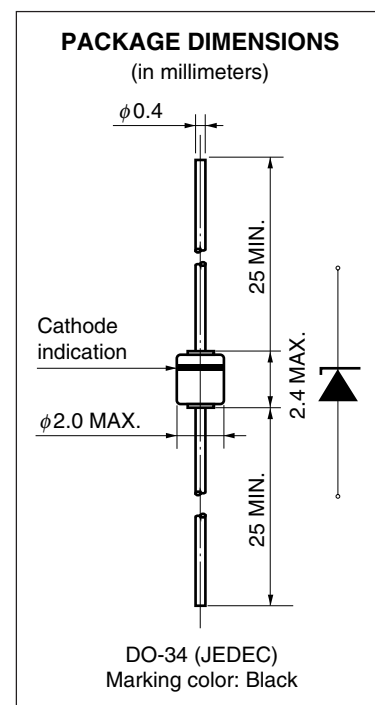
RD2.0ES to RD39ES with suffix "AB1", "AB2", or "AB3" should be applied for orders for suffix "AB".

APPLICATIONS

Circuits for Constant Voltage, Constant Current, Waveform clipper, Surge absorber, etc.

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

Forward Current	I_F	150 mA	
Power Dissipation	P	400 mW	to see Fig. 6
Surge Reverse Power	P_{RSM}	100 W ($t = 10 \mu\text{s}$)	to see Fig. 10
Junction Temperature	T_j	175°C	
Storage Temperature	T_{stg}	-65 to $+175^\circ\text{C}$	



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.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Type Number	Suffix	Zener Voltage V _Z (V) Note 1			Dynamic Impedance Z _Z (Ω) Note 2		Knee Dynamic Impedance Z _{ZK} (Ω) Note 2		Reverse Current I _R (μA)	
		MIN.	MAX.	I _Z (mA)	MAX.	I _Z (mA)	MAX.	I _Z (mA)	MAX.	V _R (V)
RD2.0ES	AB	1.88	2.20	5	100	5	1000	0.5	120	0.5
	AB1	1.88	2.10							
	AB2	2.02	2.20							
RD2.2ES	AB	2.12	2.41	5	100	5	1000	0.5	120	0.7
	AB1	2.12	2.30							
	AB2	2.22	2.41							
RD2.4ES	AB	2.33	2.63	5	100	5	1000	0.5	120	1.0
	AB1	2.33	2.52							
	AB2	2.43	2.63							
RD2.7ES	AB	2.54	2.91	5	110	5	1000	0.5	100	1.0
	AB1	2.54	2.75							
	AB2	2.69	2.91							
RD3.0ES	AB	2.85	3.22	5	120	5	1000	0.5	50	1.0
	AB1	2.85	3.07							
	AB2	3.01	3.22							
RD3.3ES	AB	3.16	3.53	5	120	5	1000	0.5	20	1.0
	AB1	3.16	3.38							
	AB2	3.32	3.53							
RD3.6ES	AB	3.47	3.83	5	120	5	1100	0.5	10	1.0
	AB1	3.47	3.68							
	AB2	3.62	3.83							
RD3.9ES	AB	3.77	4.14	5	120	5	1200	0.5	5	1.0
	AB1	3.77	3.98							
	AB2	3.92	4.14							
RD4.3ES	AB	4.05	4.53	5	120	5	1200	0.5	5	1.0
	AB1	4.05	4.26							
	AB2	4.20	4.40							
	AB3	4.34	4.53							
RD4.7ES	AB	4.47	4.91	5	100	5	1200	0.5	5	1.0
	AB1	4.47	4.65							
	AB2	4.59	4.77							
	AB3	4.71	4.91							
RD5.1ES	AB	4.85	5.35	5	70	5	1200	0.5	5	1.5
	AB1	4.85	5.03							
	AB2	4.97	5.18							
	AB3	5.12	5.35							
RD5.6ES	AB	5.29	5.88	5	40	5	900	0.5	5	2.5
	AB1	5.29	5.52							
	AB2	5.46	5.70							
	AB3	5.64	5.88							
RD6.2ES	AB	5.81	6.40	5	30	5	500	0.5	5	3.0
	AB1	5.81	6.06							
	AB2	5.99	6.24							
	AB3	6.16	6.40							
RD6.8ES	AB	6.32	6.97	5	25	5	150	0.5	2	3.5
	AB1	6.32	6.59							
	AB2	6.52	6.79							
	AB3	6.70	6.97							
RD7.5ES	AB	6.88	7.64	5	25	5	120	0.5	0.5	4.0
	AB1	6.88	7.19							
	AB2	7.11	7.41							
	AB3	7.33	7.64							
RD8.2ES	AB	7.56	8.41	5	20	5	120	0.5	0.5	5.0
	AB1	7.56	7.90							
	AB2	7.82	8.15							
	AB3	8.07	8.41							
RD9.1ES	AB	8.33	9.29	5	20	5	120	0.5	0.5	6.0
	AB1	8.33	8.70							
	AB2	8.61	8.99							
	AB3	8.89	9.29							
RD10ES	AB	9.19	10.30	5	20	5	120	0.5	0.2	7.0
	AB1	9.19	9.59							
	AB2	9.48	9.90							
	AB3	9.82	10.30							

Type Number	Suffix	Zener Voltage V_Z (V) ^{Note 1}			Dynamic Impedance Z_Z (Ω) ^{Note 2}		Knee Dynamic Impedance Z_{ZK} (Ω) ^{Note 2}		Reverse Current I_R (μA)	
		MIN.	MAX.	I_Z (mA)	MAX.	I_Z (mA)	MAX.	I_Z (mA)	MAX.	V_R (V)
RD11ES	AB	10.18	11.26	5	20	5	120	0.5	0.2	8.0
	AB1	10.18	10.63							
	AB2	10.50	10.95							
	AB3	10.82	11.26							
RD12ES	AB	11.13	12.30	5	25	5	110	0.5	0.2	9.0
	AB1	11.13	11.63							
	AB2	11.50	11.92							
	AB3	11.80	12.30							
RD13ES	AB	12.18	13.62	5	25	5	110	0.5	0.2	10
	AB1	12.18	12.71							
	AB2	12.59	13.16							
	AB3	13.03	13.62							
RD15ES	AB	13.48	15.02	5	25	5	110	0.5	0.2	11
	AB1	13.48	14.09							
	AB2	13.95	14.56							
	AB3	14.42	15.02							
RD16ES	AB	14.87	16.50	5	25	5	150	0.5	0.2	12
	AB1	14.87	15.50							
	AB2	15.33	15.96							
	AB3	15.79	16.50							
RD18ES	AB	16.34	18.30	5	30	5	150	0.5	0.2	13
	AB1	16.34	17.06							
	AB2	16.90	17.67							
	AB3	17.51	18.30							
RD20ES	AB	18.14	20.45	5	30	5	200	0.5	0.2	15
	AB1	18.14	18.96							
	AB2	18.80	19.68							
	AB3	19.52	20.45							
RD22ES	AB	20.23	22.61	5	30	5	200	0.5	0.2	17
	AB1	20.23	21.08							
	AB2	20.76	21.65							
	AB3	21.22	22.09							
	AB4	21.68	22.61							
RD24ES	AB	22.26	24.81	5	35	5	200	0.5	0.2	19
	AB1	22.26	23.12							
	AB2	22.75	23.73							
	AB3	23.29	24.27							
	AB4	23.81	24.81							
RD27ES	AB	24.26	27.64	5	45	5	250	0.5	0.2	21
	AB1	24.26	25.52							
	AB2	24.97	26.26							
	AB3	25.63	26.95							
	AB4	26.29	27.64							
RD30ES	AB	26.99	30.51	5	55	5	250	0.5	0.2	23
	AB1	26.99	28.39							
	AB2	27.70	29.13							
	AB3	28.36	29.82							
	AB4	29.02	30.51							
RD33ES	AB	29.68	33.11	5	65	5	250	0.5	0.2	25
	AB1	29.68	31.22							
	AB2	30.32	31.88							
	AB3	30.90	32.50							
	AB4	31.49	33.11							
RD36ES	AB	32.14	35.77	5	75	5	250	0.5	0.2	27
	AB1	32.14	33.79							
	AB2	32.79	34.49							
	AB3	33.40	35.13							
	AB4	34.01	35.77							
RD39ES	AB	34.68	38.52	5	85	5	250	0.5	0.2	30
	AB1	34.68	36.47							
	AB2	35.36	37.19							
	AB3	36.00	37.85							
	AB4	36.63	38.52							

Notes 1. tested with pulse (40 ms)

2. Z_Z and Z_{ZK} are measured at I_Z by given a very small A.C. current signal.

3. Suffix AB is Suffix AB1, AB2, AB3 or AB4.

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

Fig. 1 ZENER CURRENT vs. ZENER VOLTAGE

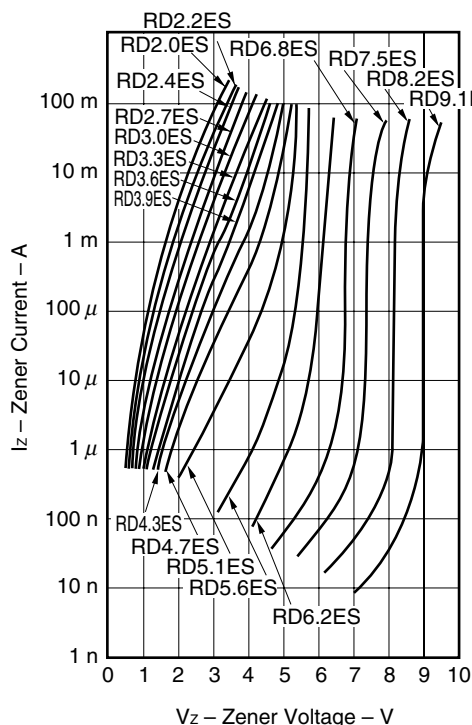


Fig. 2 ZENER CURRENT vs. ZENER VOLTAGE

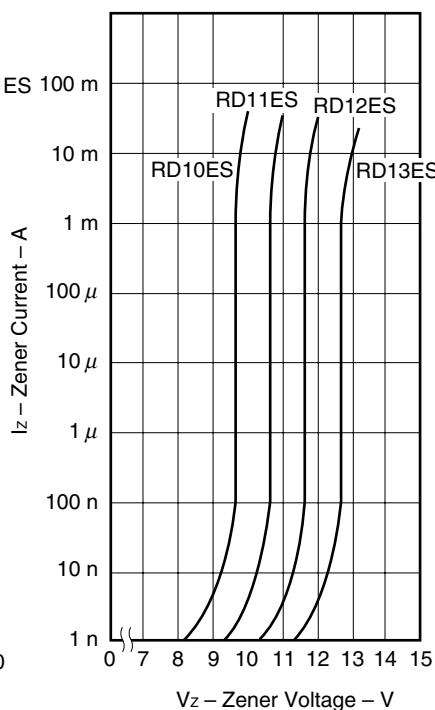


Fig. 3 ZENER CURRENT vs. ZENER VOLTAGE

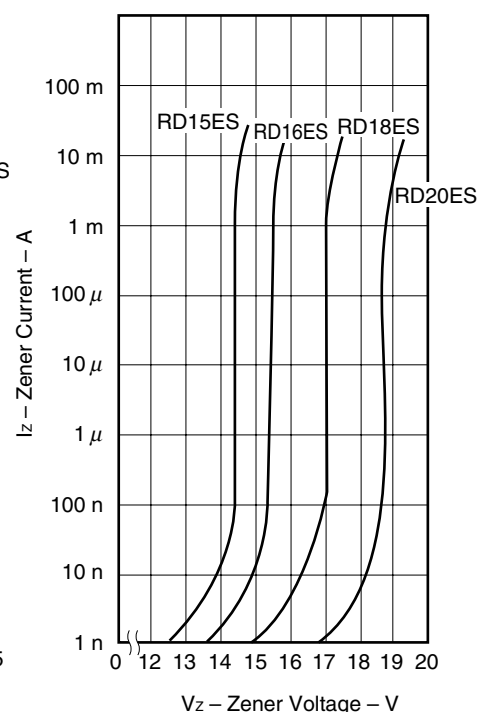


Fig. 4 ZENER CURRENT vs. ZENER VOLTAGE

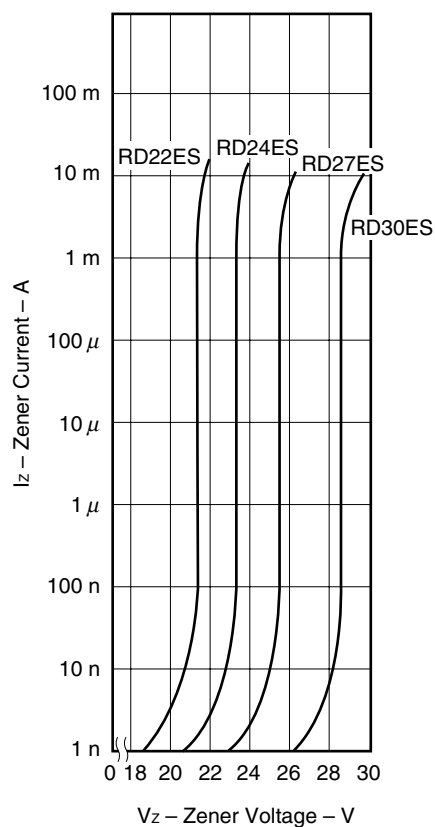


Fig. 5 ZENER CURRENT vs. ZENER VOLTAGE

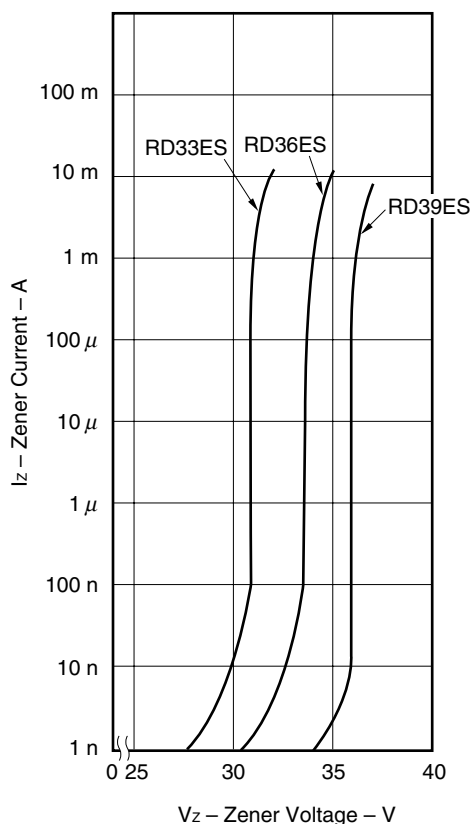


Fig. 6 POWER DISSIPATION vs. AMBIENT TEMPERATURE

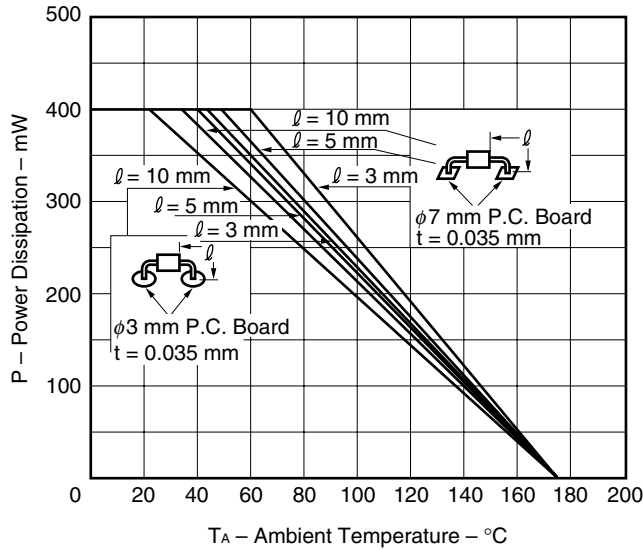


Fig. 7 THERMAL RESISTANCE vs. SIZE OF P.C BOARD

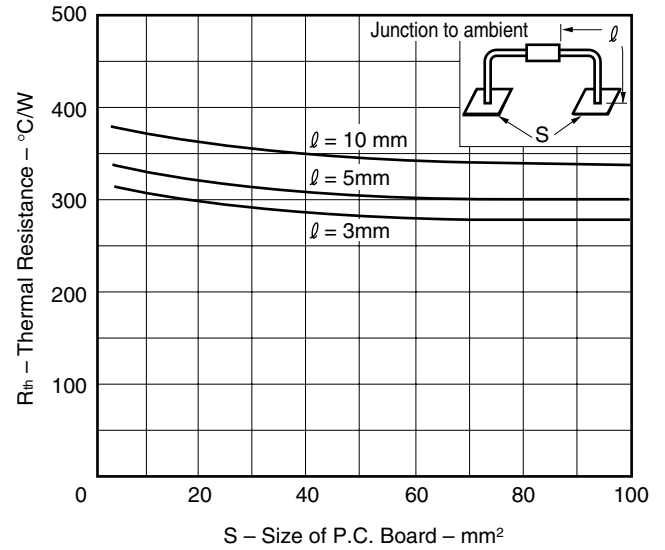


Fig. 8 DYNAMIC IMPEDANCE vs. ZENER CURRENT

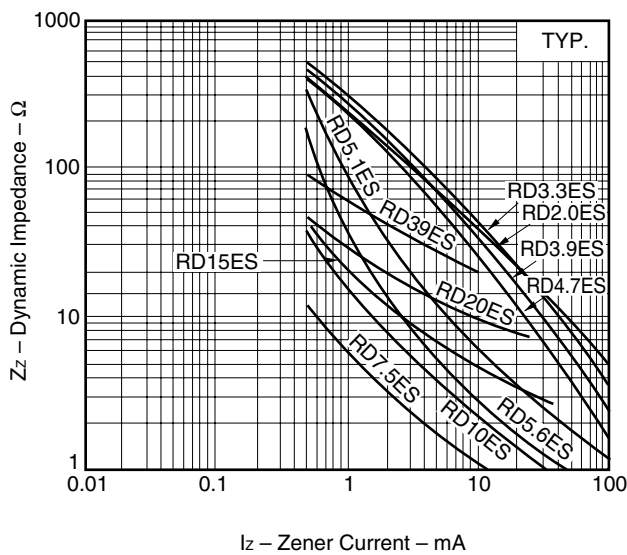


Fig. 9 ZENER VOLTAGE TEMPERATURE COEFFICIENT vs. ZENER VOLTAGE

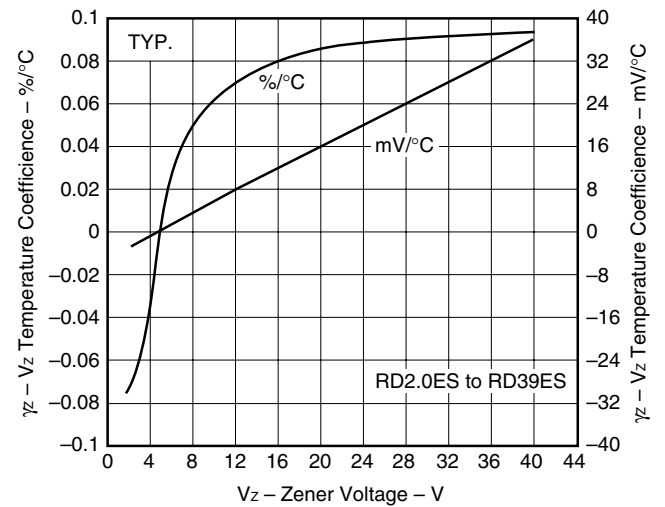


Fig. 10 SURGE REVERSE POWER RATINGS

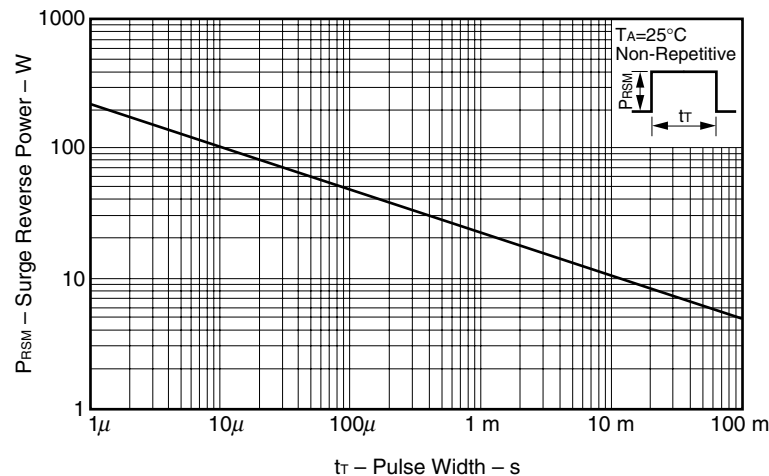
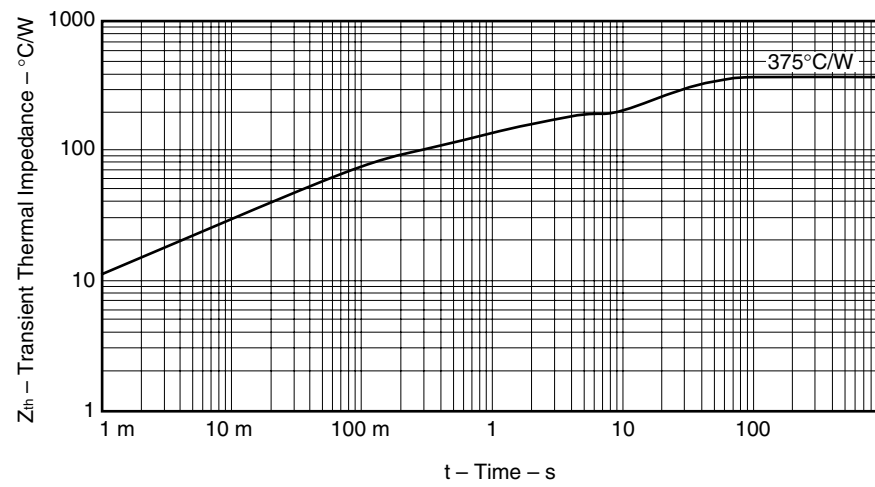


Fig. 11 TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC



- **The information in this document is current as of April, 2003. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets or data books, 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, reliability and safety of NEC Electronics products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC Electronics products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment and anti-failure features.
- 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).