

## PS2651, PS2652, PS2651L2, PS2652L2

LONG CREEPAGE TYPE HIGH ISOLATION VOLTAGE  
6 PIN PHOTOCOUPLER

## DESCRIPTION

PS2651, PS2652 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon photo-transistor in a plastic DIP (Dual In-line Package).

PS2651 has base pin and PS2652 has no base pin.

Creepage distance and clearance of leads are over 8 millimeters.

PS2651L2, PS2652L2 are lead bending type (Gull-wing) for surface mounting.

## FEATURES

- High isolation voltage (BV: 5 kV<sub>r.m.s.</sub> MIN.)
- Long creepage and clearance distance (8 mm MIN.)
- High collector to emitter voltage (V<sub>CEO</sub>: 80 V MIN.)
- High speed switching (t<sub>r</sub> = 3 μs, t<sub>f</sub> = 5 μs TYP.)
- High current transfer ratio (CTR: 200 % TYP.)
- 6 pin Dual In-line Package
- UL recognized (No. E72422(S))
- BS415, BS7002 recognized (No. 7250)
- SEMKO recognized (SS4410165) No. 9317144
- NEMKO recognized (NEK-HD19556) No. A21409
- DEMKO recognized (Section 101, 137) No. 300535
- SETI recognized (E69-89) No. 167265-08
- VDE0884 recognized: option

## ORDERING INFORMATION

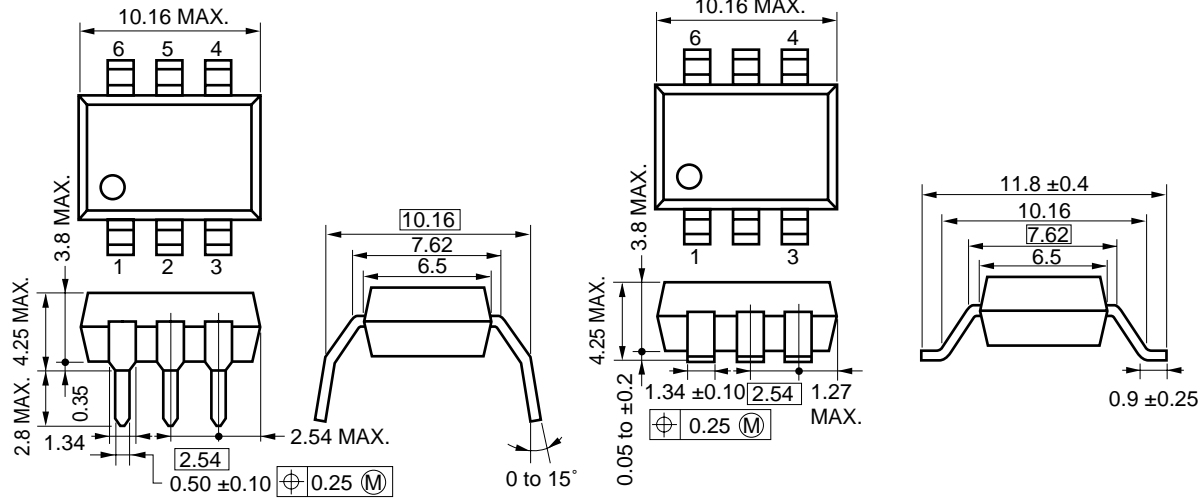
PART NUMBER	PACKAGE	SAFETY STANDARD APPROVAL
PS2651 PS2652	6 pin DIP 6 pin DIP	Normal specification products <ul style="list-style-type: none"> <li>• UL Approved</li> <li>• BSI Approved</li> <li>• SEMKO Approved</li> <li>• NEMKO Approved</li> <li>• DEMKO Approved</li> <li>• SETI Approved</li> </ul>
PS2651L2 PS2652L2	6 pin DIP, lead bending type 6 pin DIP, lead bending type	
PS2651-V PS2652-V	6 pin DIP 6 pin DIP	VDE0884 specification products <ul style="list-style-type: none"> <li>• VDE Approved</li> <li>• UL Approved</li> <li>• BSI Approved</li> <li>• SEMKO Approved</li> <li>• NEMKO Approved</li> <li>• DEMKO Approved</li> <li>• SETI Approved</li> </ul>
PS2651L2-V PS2652L2-V	6 pin DIP, lead bending type 6 pin DIP, lead bending type	

**PACKAGE DIMENSIONS**

(Unit: mm)

PS2651  
PS2652

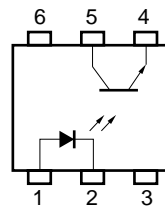
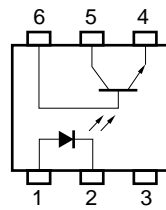
PS2651L2  
PS2652L2



**PIN CONNECTION (Top View)**

PS2651  
PS2651L2

PS2652  
PS2652L2



- 1. Anode
- 2. Cathode
- 3. NC
- 4. Emitter
- 5. Collector
- 6. Base

- 1. Anode
- 2. Cathode
- 3. NC
- 4. Emitter
- 5. Collector
- 6. NC

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C)**

Diode

Reverse Voltage	V <sub>R</sub>	6	V
Forward Current (DC)	I <sub>F</sub>	80	mA
Power Dissipation Derating	ΔP <sub>D</sub> /°C	1.5	mW/°C
Power Dissipation	P <sub>D</sub>	150	mW
Peak Forward Current (PW = 100 μs, Duty Cycle 1 %)	I <sub>F(Peak)</sub>	1	A

Transistor

Collector to Emitter Voltage	V <sub>CEO</sub>	80	V
Emitter to Collector Voltage	V <sub>ECO</sub>	7	V
Collector Current	I <sub>C</sub>	50	mA
Power Dissipation Derating	ΔP <sub>C</sub> /°C	1.5	mW/°C
Power Dissipation	P <sub>C</sub>	150	mW

Coupled

Isolation Voltage *1	BV	5 000	V <sub>r.m.s.</sub>
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C
Operating Temperature	T <sub>opt</sub>	-55 to +100	°C

\*1 AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60 % between input (Pin No. 1, 2, 3, Common) and output (Pin No. 4, 5, 6 Common).

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

	PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V <sub>F</sub>		1.1	1.4	V	I <sub>F</sub> = 10 mA
	Reverse Current	I <sub>R</sub>			5	μA	V <sub>R</sub> = 5 V
	Junction Capacitance	C <sub>t</sub>		30		pF	V = 0, f = 1.0 MHz
Transistor	Collector to Emitter Dark Current	I <sub>CEO</sub>			100	nA	V <sub>CE</sub> = 80 V, I <sub>F</sub> = 0
	DC Current Gain*2	h <sub>FE</sub>		700			I <sub>C</sub> = 2 mA, V <sub>CE</sub> = 5 V
Coupled	Current Transfer Ratio*3	CTR	50	200	400	%	I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V
	Collector Saturation Voltage	V <sub>CE(sat)</sub>			0.3	V	I <sub>F</sub> = 10 mA, I <sub>C</sub> = 2 mA
	Isolation Resistance	R <sub>1-2</sub>	10 <sup>11</sup>			Ω	V <sub>in-out</sub> = 1.0 kV
	Isolation Capacitance	C <sub>1-2</sub>		0.6		pF	V = 0, f = 1.0 MHz
	Rise Time*4	t <sub>r</sub>		3		μs	V <sub>CC</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω
Fall Time*4	t <sub>f</sub>		5		μs	V <sub>CC</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω	

\*2 PS2651, PS2651L2 only

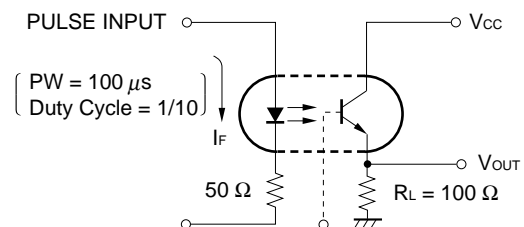
\*4 Test Circuit for Switching Time

\*3 CTR rank

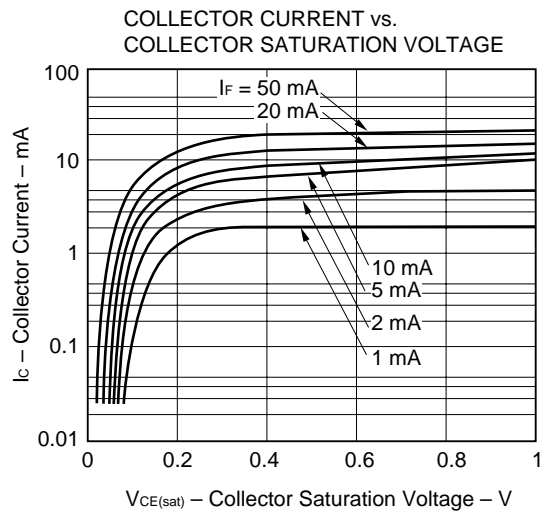
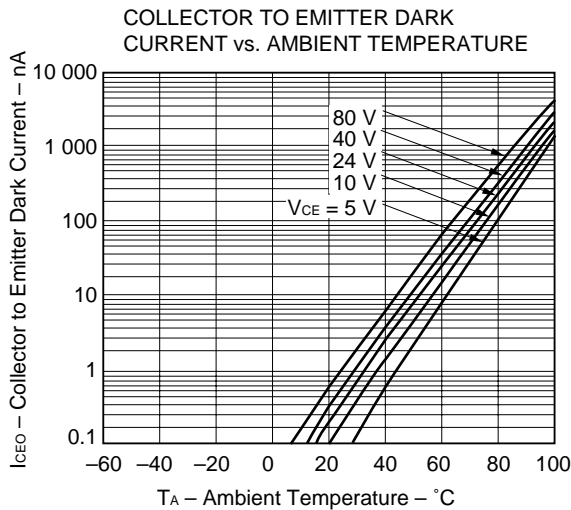
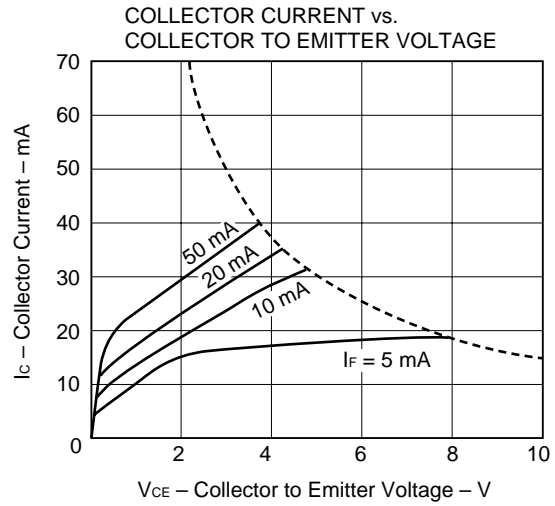
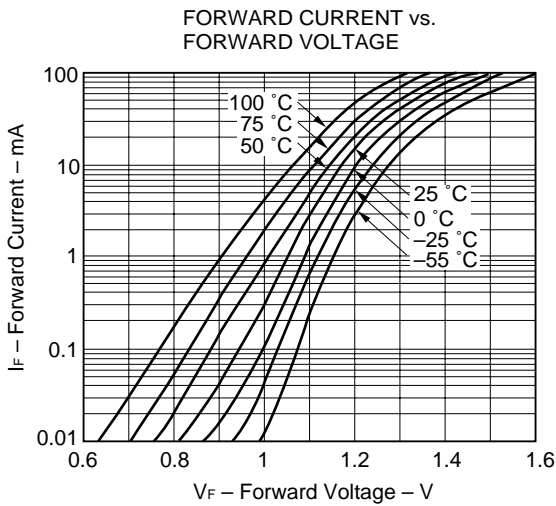
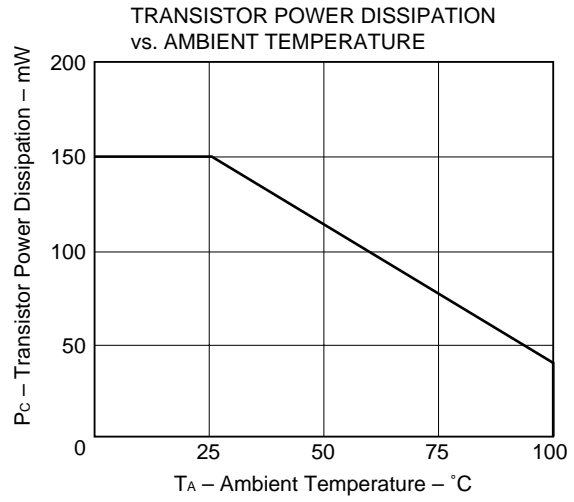
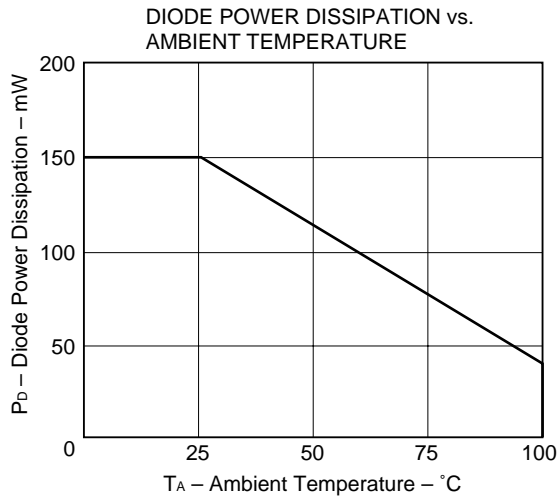
K : 160 to 400 (%)

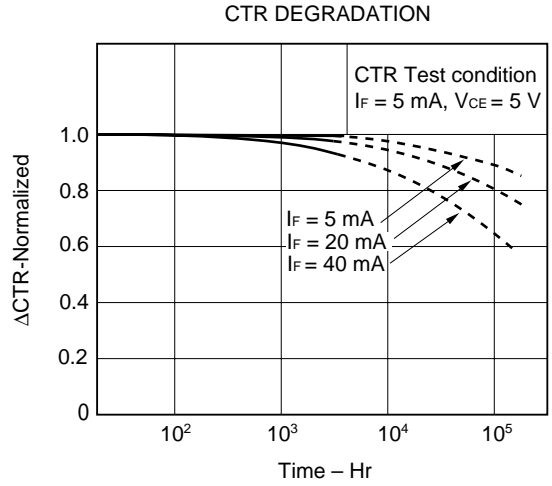
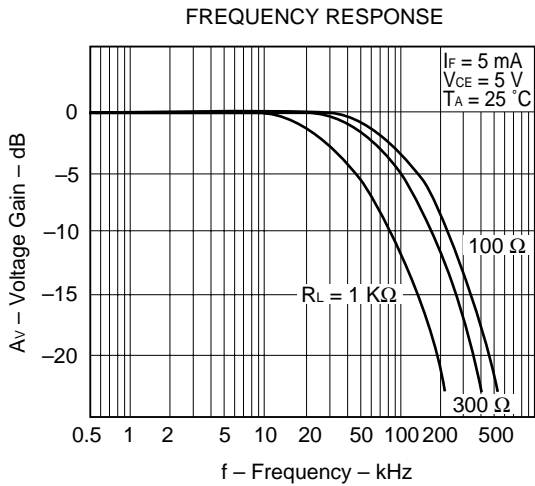
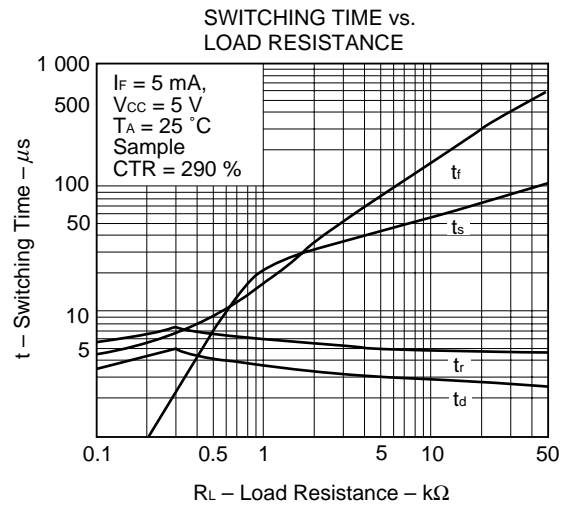
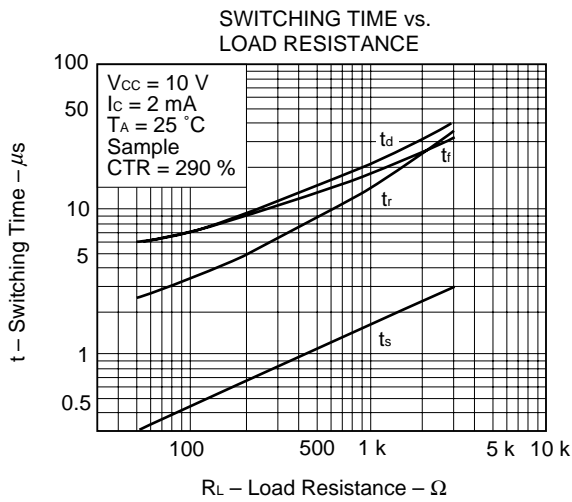
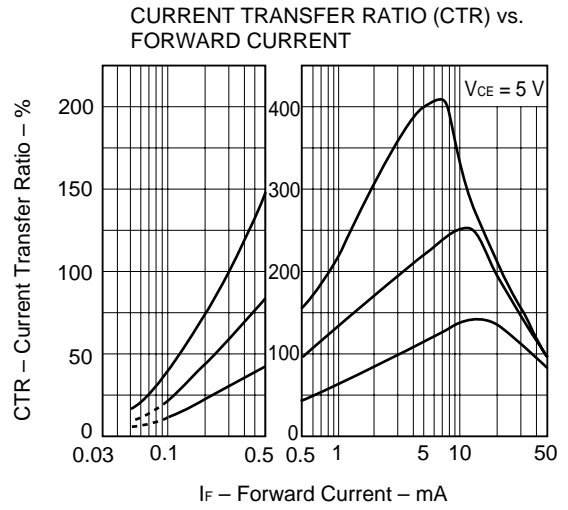
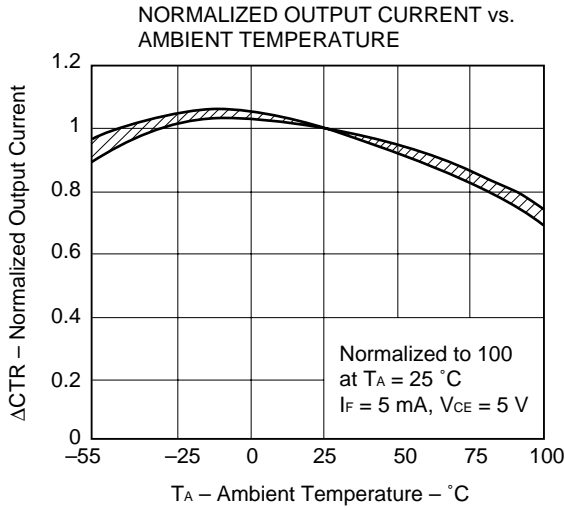
L : 80 to 240 (%)

M : 50 to 120 (%)



TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)





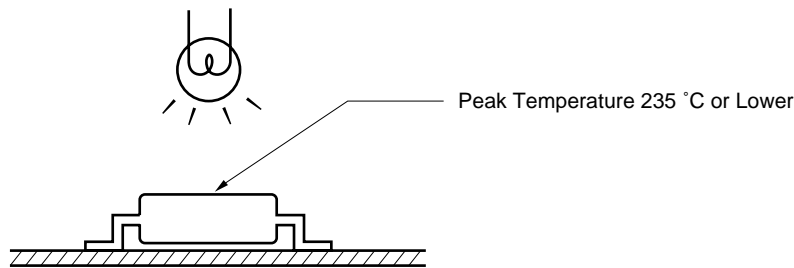
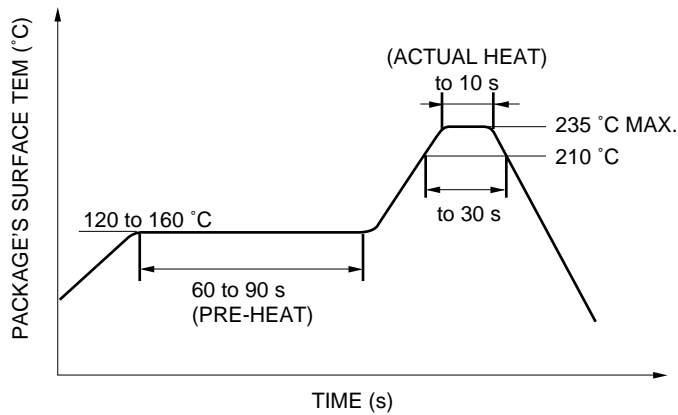
★ The measurement of TYPICAL CHARACTERISTICS are only for reference, not guaranteed.

**SOLDERING PRECAUTION**

(1) Infrared reflow soldering

- Peak reflow temperature : 235 °C or below (Plastic surface temperature)
- Reflow time : 30 seconds or less  
(Time period during which the plastic surface temperature is 210 °C)
- Number of reflow processes : Three
- Flux : Rosin flux containing small amount of chlorine  
(The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

**Infrared Ray Reflow Temperature Profile**



(2) Dip soldering

- Peak temperature : 260 °C or lower
- Time : 10 s or less
- Flux : Rosin-base flux

**SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)**

PARAMETER	SYMBOL	SPECK	UNIT
Application classification (DIN VDE 0109) for rated line voltages $\leq 300 V_{eff}$ for rated line voltages $\leq 600 V_{eff}$		IV III	
Climatic test class (DIN IEC 68 Teil 1/09.80)		55/100/21	
Dielectric strength maximum operating isolation voltage. Test voltage (partial discharge test procedure a for type test and random test) $U_{pr} = 1.2 \times U_{IORM}, Pd < 5 pC$	$U_{IORM}$ $U_{pr}$	890 1 068	$V_{peak}$ $V_{peak}$
Test voltage (partial discharge test procedure b for random test) $U_{pr} = 1.6 \times U_{IORM}, Pd < 5 pC$	$U_{pr}$	1 424	$V_{peak}$
Highest permissible overvoltage	$U_{TR}$	8 000	$V_{peak}$
Degree of pollution (DIN VDE 0109)		2	
Clearance distance		> 8.0	mm
Creepage distance <sup>1)</sup>		> 8.0	mm
Comparative tracking index (DIN IEC 112/VDE 0303 part 1)	CTI	175	
Material group (DIN VDE 0109)		IIIa	
Storage temperature range	$T_{stg}$	-55 to +150	Cel
Operating temperature range	$T_{amb}$	-55 to +100	Cel
Isolation resistance, minimum value $U_{IO} = 500 V$ dc at 25 Cel $U_{IO} = 500 V$ dc at $T_{amp}$ maximum at least 100 Cel	Ris min Ris min	$10^{12}$ $10^{11}$	ohm ohm
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)			
Package temperature	$T_{si}$	175	Cel
Current (input current IF, Psi = 0)	$I_{si}$	400	mA
Power (output or total power dissipation)	$P_{si}$	700	mW
Isolation resistance $U_{IO} = 500 V$ dc at 175 Cel ( $T_{si}$ )	Ris min	$10^9$	ohm

1) If a printed circuit is incorporated, the creepage distance and clearance may be reduced below this value (e.g. at a standard distance between soldering eye centers of 7.5 mm). If this is not permissible, the user shall take suitable measures.

## Caution

**The Great Care must be taken in dealing with the devices in this guide.  
The reason is that the material of the devices is GaAs (Gallium Arsenide), which is  
designated as harmful substance according to the law concerned.  
Keep the law concerned and so on, especially in case of removal.**

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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: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices in “Standard” unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact NEC Sales Representative in advance.

Anti-radioactive design is not implemented in this product.