

To our customers,

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>)

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HETERO JUNCTION FIELD EFFECT TRANSISTOR

NE42484A

**C to Ku BAND SUPER LOW NOISE AMPLIFIER
N-CHANNEL HJ-FET**
DESCRIPTION

The NE42484A is a Hetero Junction FET that utilizes the hetero junction to create high mobility electrons. Its excellent low noise and high associated gain make it suitable for DBS, TVRO and another commercial systems.

FEATURES

- Super Low Noise Figure & High Associated Gain
NF = 0.8 dB TYP., Ga = 10.5 dB TYP. at f = 12 GHz
- Gate Width : $W_g = 200 \mu\text{m}$

ORDERING INFORMATION

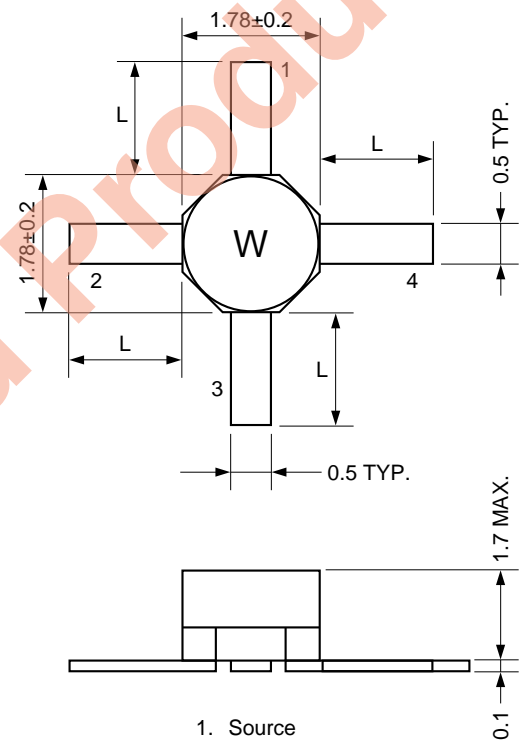
PART NUMBER	SUPPLYING FORM	LEAD LENGTH	MARKING
NE42484A-SL	STICK	L = 1.7 mm MIN.	W
NE42484A-T1	Tape & reel 1000 pcs./reel	L = 1.0 ± 0.2 mm	
NE42484A-T1A	Tape & reel 5000 pcs./reel	L = 1.0 ± 0.2 mm	

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Drain to Source Voltage	V _{DS}	4.0	V
Gate to Source Voltage	V _{GS}	-3.0	V
Drain Current	I _D	I _{DSS}	mA
Gate Current	I _G	100	μA
Total Power Dissipation	P _{tot}	165	mW
Channel Temperature	T _{ch}	150	°C
Storage Temperature	T _{stg}	-65 to +150	°C

RECOMMENDED OPERATING CONDITION (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	Unit
Drain to Source Voltage	V _{DS}		2	3	V
Drain Current	I _D		10	20	mA
Input Power	P _{in}			0	dBm

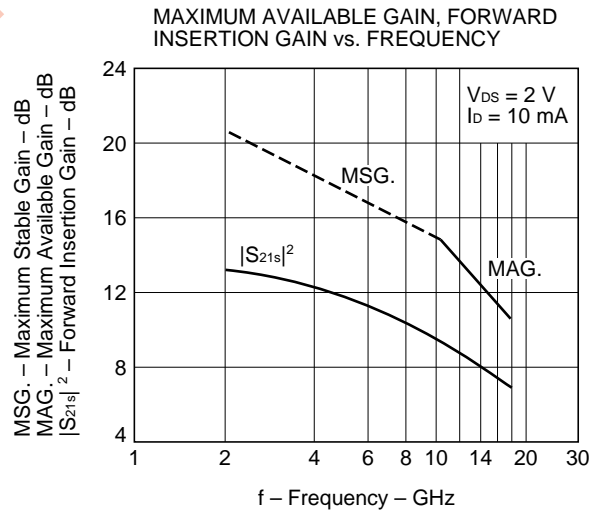
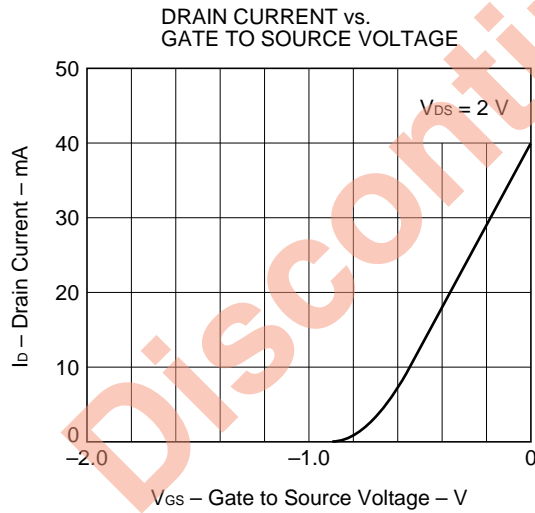
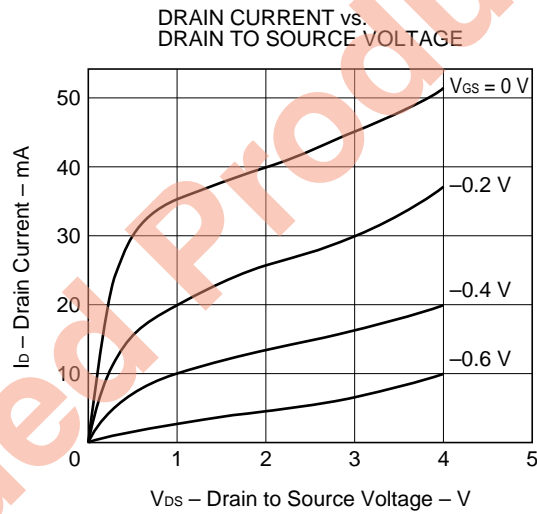
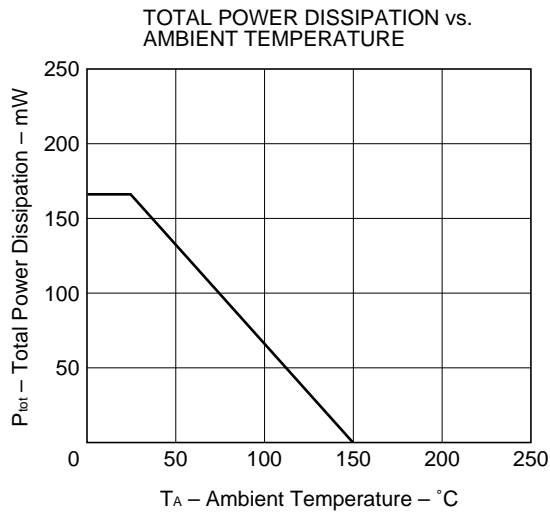
PACKAGE DIMENSIONS
(Unit : mm)


1. Source
2. Drain
3. Source
4. Gate

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Gate to Source Leak Current	I _{GSO}		0.5	10	μA	V _{GS} = -3 V
Saturated Drain Current	I _{DSS}	15	40	70	mA	V _{DS} = 2 V, V _{GS} = 0 V
Gate to Source Cutoff Voltage	V _{GS(off)}	-0.2	-0.8	-2.0	V	V _{DS} = 2 V, I _D = 100 μA
Transconductance	g _m	45	60		mS	V _{DS} = 2 V, I _D = 10 mA
Noise Figure	NF		0.8	1.2	dB	V _{DS} = 2 V, I _D = 10 mA, f = 12 GHz
Associated Gain	G _a	9.0	10.5		dB	

TYPICAL CHARACTERISTICS (T_A = 25 °C)



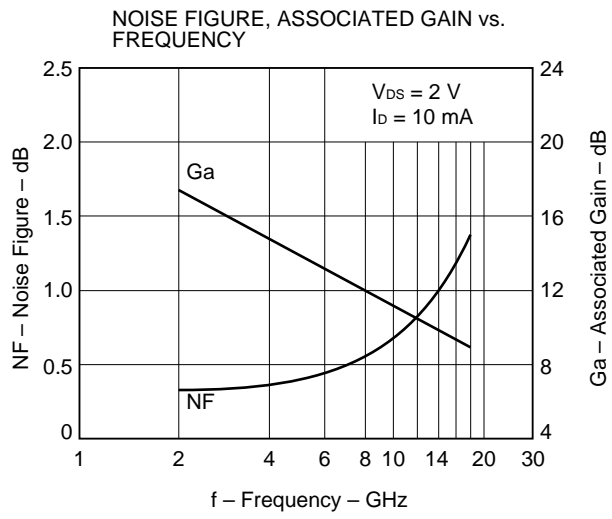
Gain Calculations

$$MSG = \frac{|S_{21}|}{|S_{12}|}$$

$$K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2|S_{12}||S_{21}|}$$

$$MAG = \frac{|S_{21}|}{|S_{12}|} \left(K \pm \sqrt{K^2 - 1} \right)$$

$$\Delta = S_{11} \cdot S_{22} - S_{21} \cdot S_{12}$$



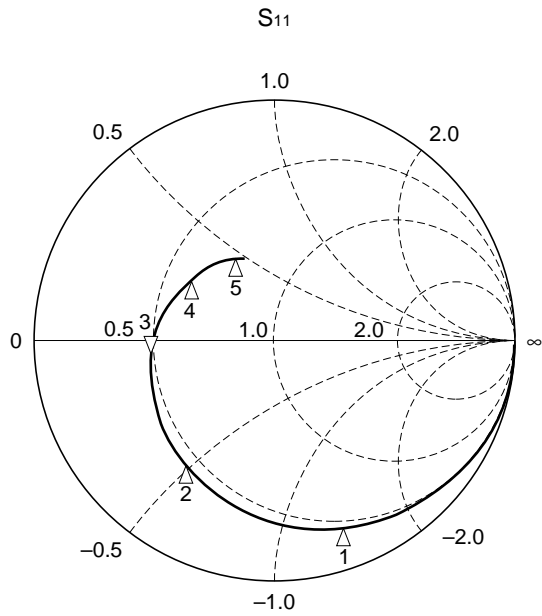
Discontinued Product

S-Parameters

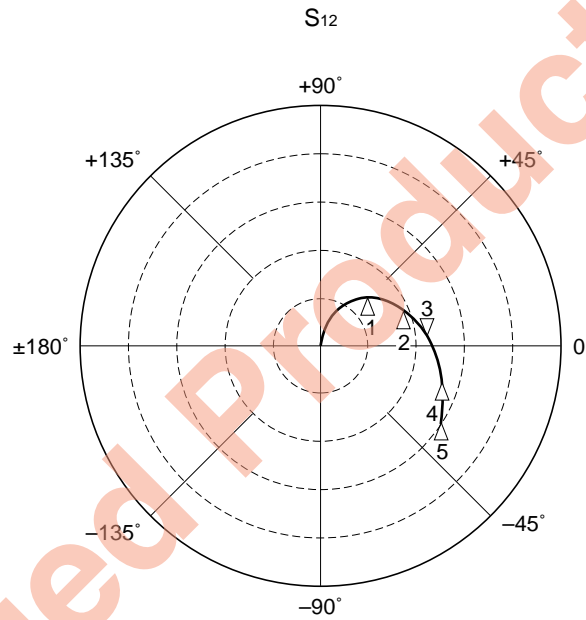
$V_{DS} = 2\text{ V}$, $I_D = 10\text{ mA}$

START 500 MHz, STOP 18 GHz, STEP 500 MHz

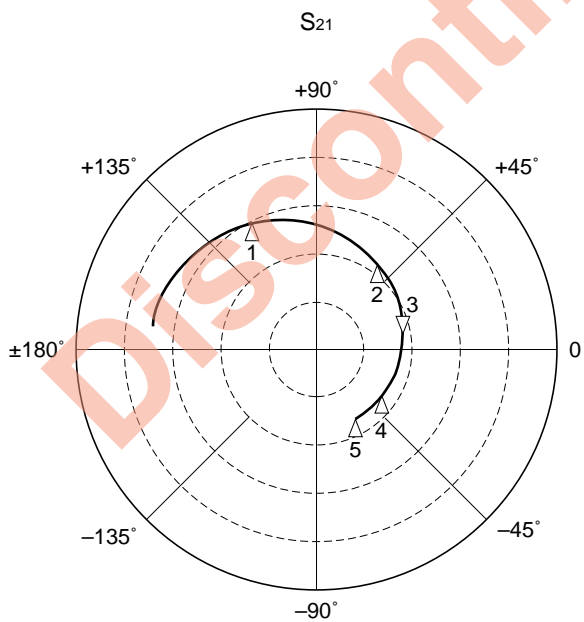
- Marker
 1: 4 GHz
 2: 8 GHz
 3: 12 GHz
 4: 16 GHz
 5: 18 GHz



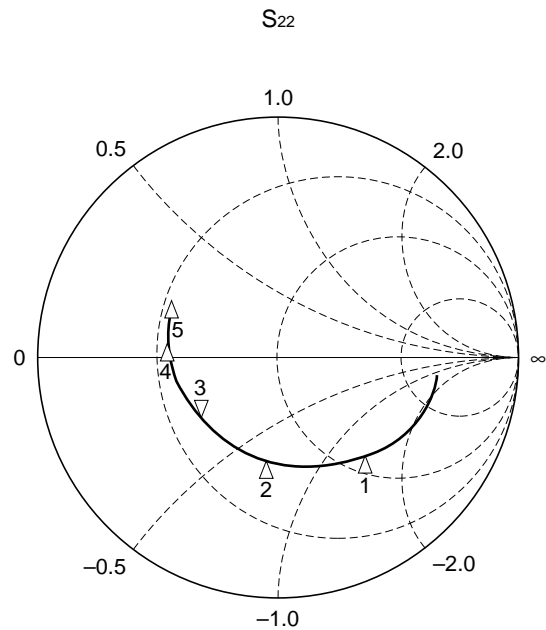
$R_{max.} = 1$



$R_{max.} = 0.25$



$R_{max.} = 7.5$



$R_{max.} = 1$

S-Parameters

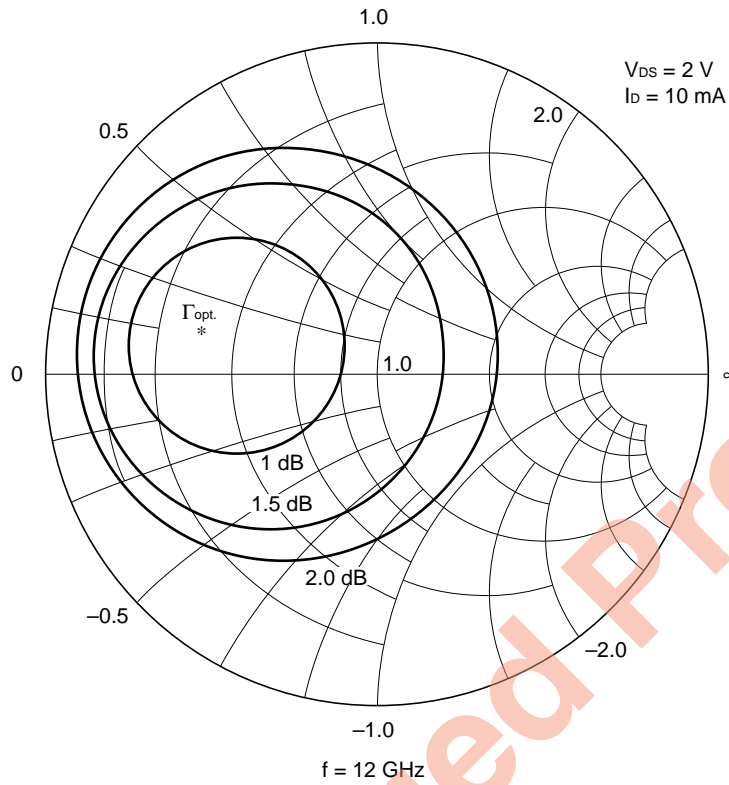
MAG. AND ANG.

V_{DS} = 2 V, I_D = 10 mA

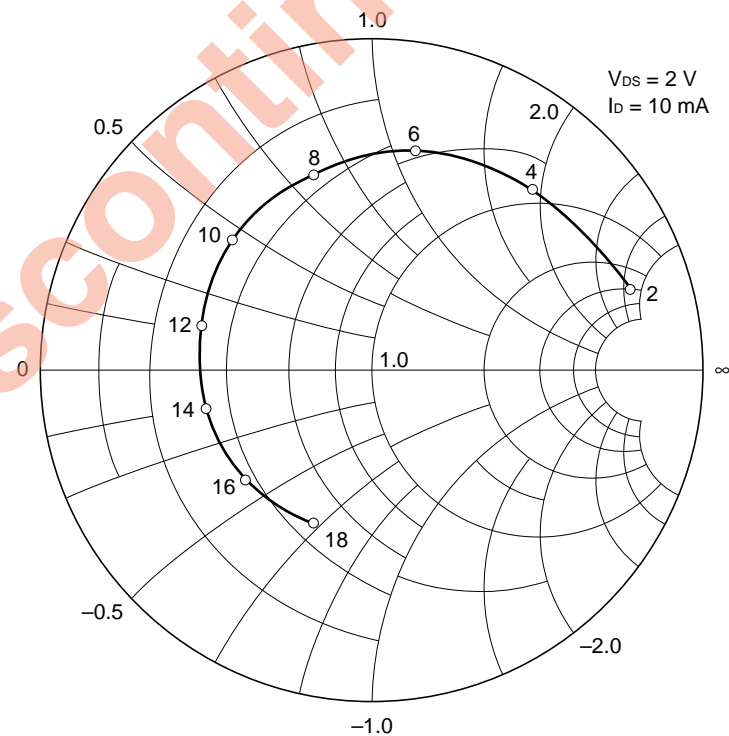
FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
500	.997	-9.5	5.049	170.5	.011	85.7	.683	-6.5
1000	.986	-18.7	4.979	161.5	.020	78.3	.676	-12.7
1500	.971	-28.0	4.913	152.4	.030	71.7	.666	-18.8
2000	.948	-36.7	4.801	143.7	.039	66.9	.650	-24.9
2500	.924	-45.5	4.690	135.0	.046	61.6	.635	-30.4
3000	.896	-54.0	4.575	126.8	.055	55.7	.618	-36.1
3500	.867	-62.3	4.430	118.9	.059	51.8	.598	-41.9
4000	.837	-70.3	4.295	111.0	.065	47.1	.574	-47.3
4500	.806	-78.2	4.168	103.3	.071	43.5	.552	-53.2
5000	.776	-85.7	4.027	95.9	.076	38.3	.530	-59.1
5500	.749	-93.3	3.885	88.5	.079	34.9	.506	-65.4
6000	.722	-100.5	3.749	81.6	.082	31.1	.486	-70.6
6500	.699	-107.2	3.612	74.7	.085	28.3	.469	-76.9
7000	.673	-113.5	3.477	68.1	.087	25.5	.456	-82.5
7500	.653	-119.3	3.350	62.1	.089	23.1	.448	-88.3
8000	.634	-125.2	3.250	55.9	.091	21.1	.439	-93.7
8500	.618	-130.4	3.146	50.3	.093	18.0	.434	-99.2
9000	.600	-135.6	3.063	44.4	.094	17.4	.430	-104.7
9500	.584	-141.1	2.991	38.7	.097	16.1	.430	-110.0
10000	.566	-146.4	2.923	32.8	.100	13.1	.421	-115.9
10500	.551	-152.0	2.861	27.3	.101	11.7	.416	-121.8
11000	.535	-157.9	2.802	21.5	.102	8.4	.416	-127.5
11500	.524	-163.9	2.744	15.8	.105	7.7	.408	-134.0
12000	.510	-169.8	3.697	10.1	.108	5.7	.404	-141.9
12500	.500	-175.4	2.641	4.2	.109	3.1	.407	-147.8
13000	.489	179.0	2.581	-1.7	.111	1.9	.414	-154.6
13500	.478	173.4	2.534	-7.3	.114	-0.0	.422	-160.5
14000	.464	168.4	2.493	-12.6	.119	-2.1	.432	-166.4
14500	.453	163.1	2.444	-18.5	.121	-5.6	.449	-172.5
15000	.437	157.3	2.410	-24.0	.126	-7.8	.464	-178.3
15500	.427	151.3	2.388	-29.6	.127	-10.4	.474	175.4
16000	.410	145.0	2.353	-35.9	.134	-13.7	.483	170.3
16500	.395	137.6	2.339	-41.8	.135	-16.8	.494	164.6
17000	.384	129.7	2.323	-48.2	.138	-21.1	.506	158.6
17500	.373	120.8	2.295	-54.2	.140	-24.9	.520	152.4
18000	.358	111.4	2.265	-60.9	.145	-27.3	.537	147.3

Noise Parameters

<TYPICAL CONSTANT NOISE FIGURE CIRCLE>



< $\Gamma_{opt.}$ vs. frequency>



START 2 GHz, STOP 18 GHz, STEP 2 GHz

<Noise Parameters>

$V_{DS} = 2 \text{ V}$, $I_D = 10 \text{ mA}$

Freq. (GHz)	NF _{min.} (dB)	G _a (dB)	Γ _{opt.}		R _n /50
			MAG.	ANG. (deg.)	
2.0	0.33	18.0	0.80	20	0.40
4.0	0.38	15.6	0.76	48	0.33
6.0	0.44	13.8	0.70	78	0.27
8.0	0.54	12.0	0.65	108	0.20
10.0	0.65	11.2	0.60	136	0.14
12.0	0.80	10.5	0.54	168	0.09
14.0	0.96	9.6	0.51	-168	0.09
16.0	1.15	8.9	0.49	-138	0.07
18.0	1.35	8.5	0.47	-110	0.07

Discontinued Product

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

<TYPES OF SURFACE MOUNT DEVICE>

For more details, refer to our document “SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL” (C10535EJ7V01F00).

Soldering process	Soldering conditions	Symbol
Infrared ray reflow	Peak package’s surface temperature: 230 °C or below, Reflow time: 30 seconds or below (210 °C or higher), Number of reflow process: 1, Exposure limit ^{Note} : None	IR30-00
Partial heating method	Terminal temperature: 230 °C or below, Flow time: 10 seconds or below, Exposure limit ^{Note} : None	

Note Exposure limit before soldering after dry-pack package is opened.

Storage conditions: 25 °C and relative humidity at 65 % or less.

Caution Do not apply more than a single process at once, except for “Partial heating method”.

PRECAUTION Avoid high static voltage and electric fields, because this device is Hetero Junction field effect transistor with shottky barrier gate.

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 Japanese law concerned and so on, especially in case of removal.

[MEMO]

Discontinued Product

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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.