

To our customers,

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## Old Company Name in Catalogs and Other Documents

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On April 1<sup>st</sup>, 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 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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

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(Note 2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

WIDE-BAND AMPLIFIER

The  $\mu$ PG100B and  $\mu$ PG101B are GaAs integrated circuits designed as wide band amplifiers. Both devices are available in chip form.

The  $\mu$ PG100B is low noise amplifier from 50 MHz to 3 GHz and  $\mu$ PG101B is a medium power amplifier in the same frequency band. These devices are most suitable for the IF stage of microwave communication system and the measurement equipment.

FEATURES

- Wide band : f = 50 MHz to 3 GHz
- Input/output impedance matched to 50  $\Omega$
- Hermetic sealed ceramic package assures high reliability

ORDERING INFORMATION

PART NUMBER	PACKAGE
$\mu$ PG100B	T-31, 8 PIN CERAMIC
$\mu$ PG101B	T-31, 8 PIN CERAMIC

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

		$\mu$ PG100B	$\mu$ PG101B	
Drain Voltage	V <sub>DD</sub>	+8	+10	V
Gate Voltage	V <sub>GG</sub>	-8	-8	V
Input Voltage	V <sub>in</sub>	-3 to +0.6	-5 to +0.6	V
Input Power	P <sub>in</sub>	+15	+15	dBm
Total Power Dissipation*	P <sub>tot</sub>	1.5	1.5	W
Operating Case Temperature	T <sub>opt</sub>	-65 to +125	-65 to +125	°C
Storage Temperature	T <sub>stg</sub>	-65 to +175	-65 to +175	°C

\* T<sub>C</sub> ≤ 125 °C

RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub> = 25 °C)

		$\mu$ PG100B	$\mu$ PG101B	
Drain Voltage	V <sub>DD</sub>	+5.0±0.5	+8.0±0.8	V
Gate Voltage	V <sub>GG</sub>	-5.0±0.5	-5.0±0.5	V
Input Power	P <sub>in</sub>	to +10	to +10	dBm
Operating Case Temperature	T <sub>opt</sub>	-50 to +80	-50 to +80	°C

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

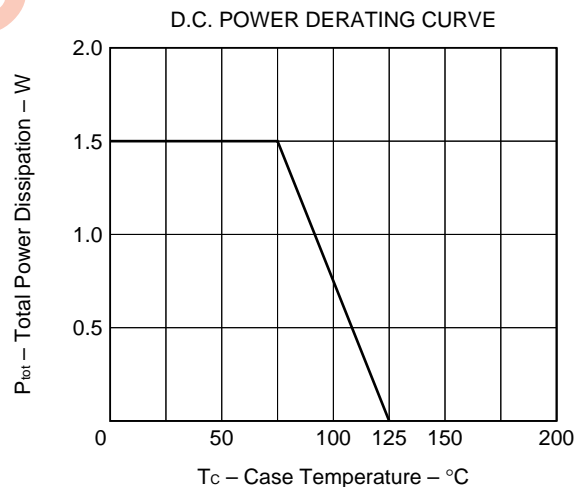
μPG100B

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Current	I <sub>DD</sub>	30	45	60	mA	V <sub>DD</sub> = +5 V, V <sub>GG</sub> = -5 V RF OFF
Gate Current	I <sub>GG</sub>		0.7	1.5	mA	
Power Gain	G <sub>p</sub>	14	16		dB	V <sub>DD</sub> = +5 V, V <sub>GG</sub> = -5 V f = 0.05 to 3 GHz
Gain Flatness	ΔG <sub>p</sub>			±1.5	dB	
Noise Figure	NF		2.7	3.5	dB	
Input Return Loss	RL <sub>in</sub>	7	10		dB	
Output Return Loss	RL <sub>out</sub>	7	10		dB	
Isolation	ISOL	30	40		dB	
Output Power at 1 dB Gain Compression Point	P <sub>O(1 dB)</sub>	+3	+6		dBm	

μPG101B

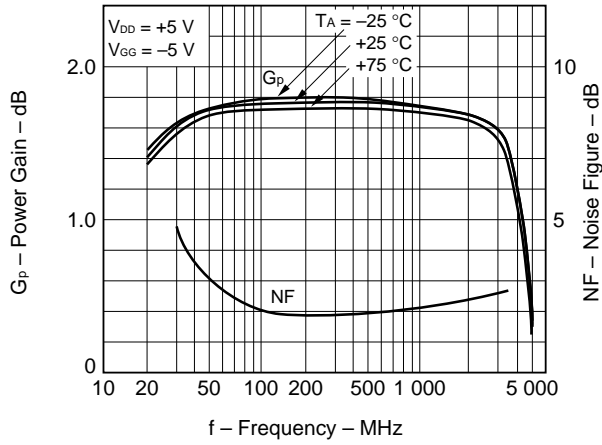
CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Current	I <sub>DD</sub>	70	100	140	mA	V <sub>DD</sub> = +8 V, V <sub>GG</sub> = -5 V RF OFF
Gate Current	I <sub>GG</sub>		1.0	3.0	mA	
Power Gain	G <sub>p</sub>	12	14		dB	V <sub>DD</sub> = +8 V, V <sub>GG</sub> = -5 V f = 0.05 to 3 GHz
Gain Flatness	ΔG <sub>p</sub>			±1.5	dB	
Noise Figure	NF		5	7	dB	
Input Return Loss	RL <sub>in</sub>	6	8		dB	
Output Return Loss	RL <sub>out</sub>	6	8		dB	
Isolation	ISOL	30	40		dB	
Output Power at 1 dB Gain Compression Point	P <sub>O(1 dB)</sub>	+16	+18		dBm	

**TYPICAL PERFORMANCE CURVES**

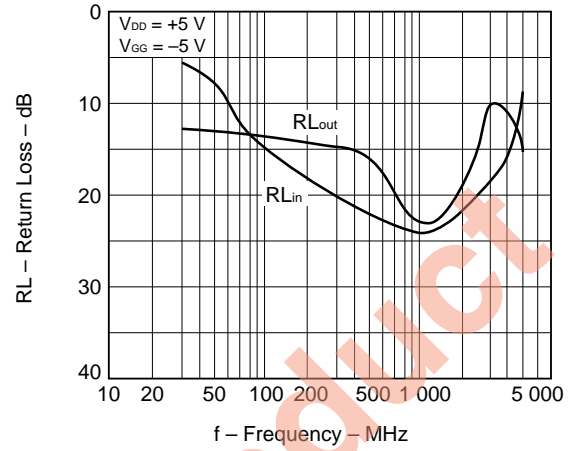


$\mu$ PG100B

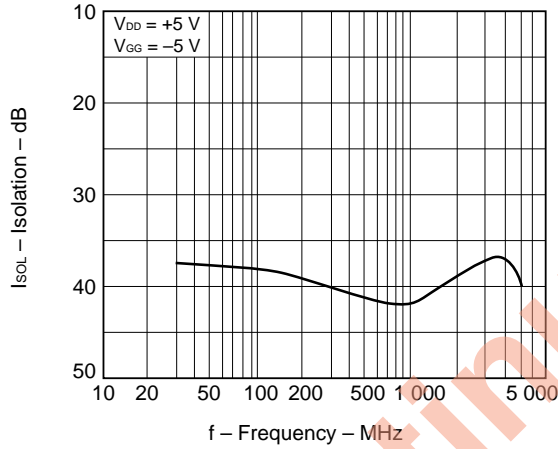
POWER GAIN AND NOISE FIGURE vs. FREQUENCY



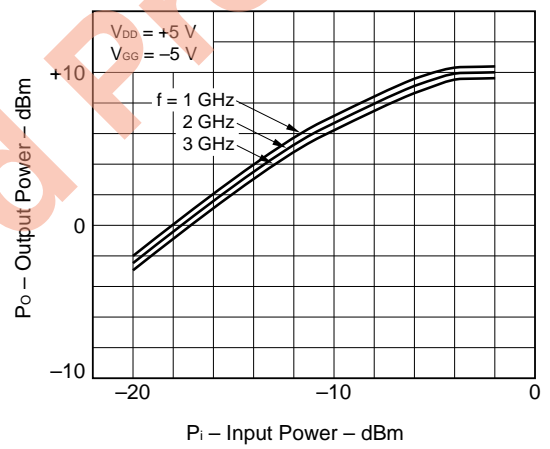
INPUT AND OUTPUT RETURN LOSS vs. FREQUENCY



ISOLATION vs. FREQUENCY



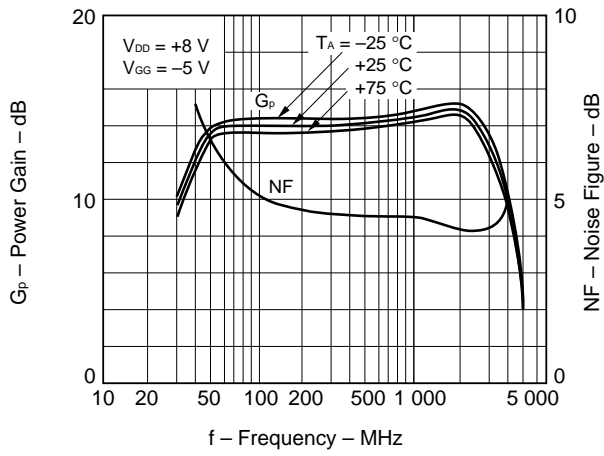
OUTPUT POWER vs. INPUT POWER



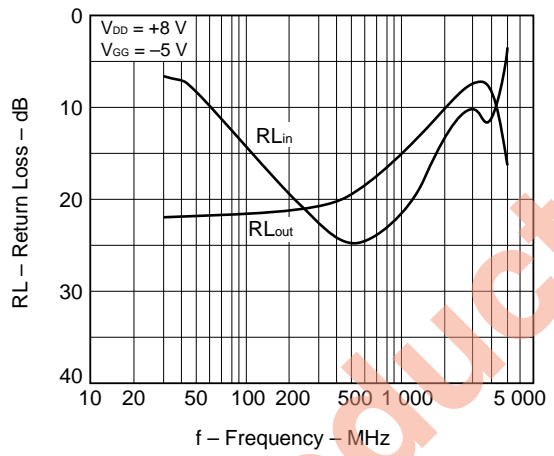
Discontinued Product

$\mu$ PG101B

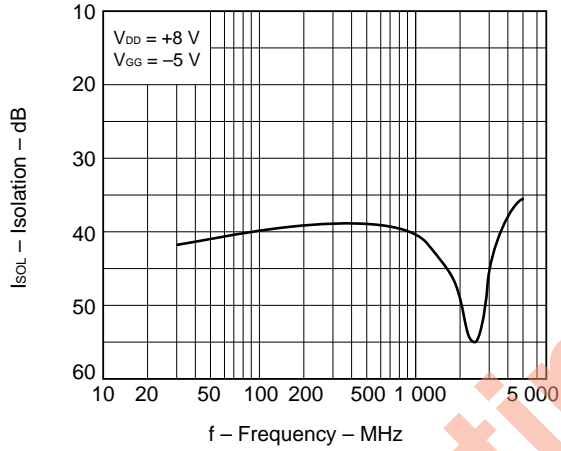
POWER GAIN AND NOISE FIGURE vs. FREQUENCY



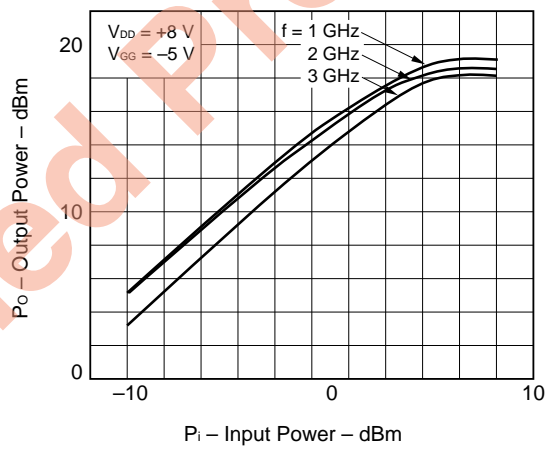
INPUT AND OUTPUT RETURN LOSS vs. FREQUENCY



ISOLATION vs. FREQUENCY



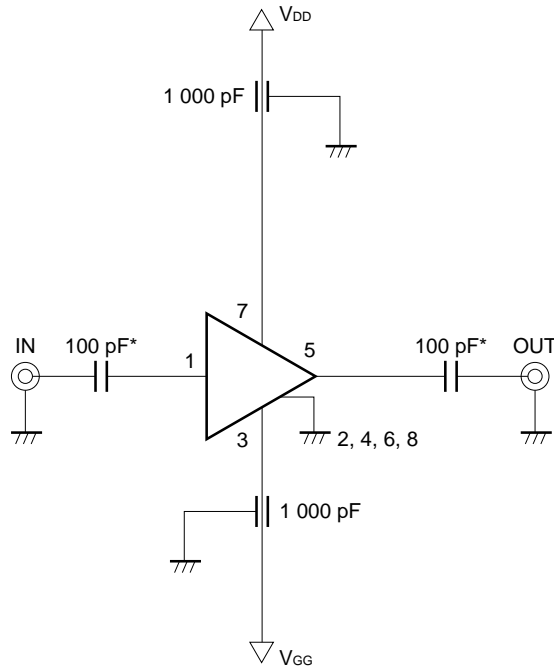
OUTPUT POWER vs. INPUT POWER



Discontinued

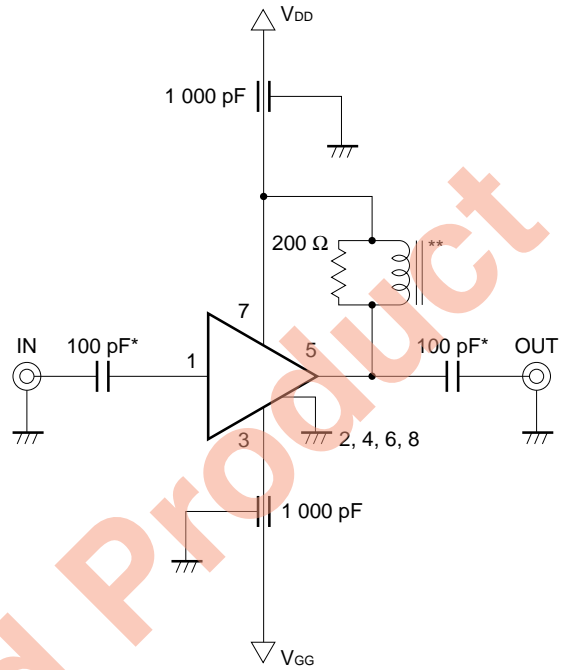
TEST CIRCUIT

$\mu$ PG100B



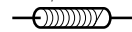
\* Chip capacitor

$\mu$ PG101B

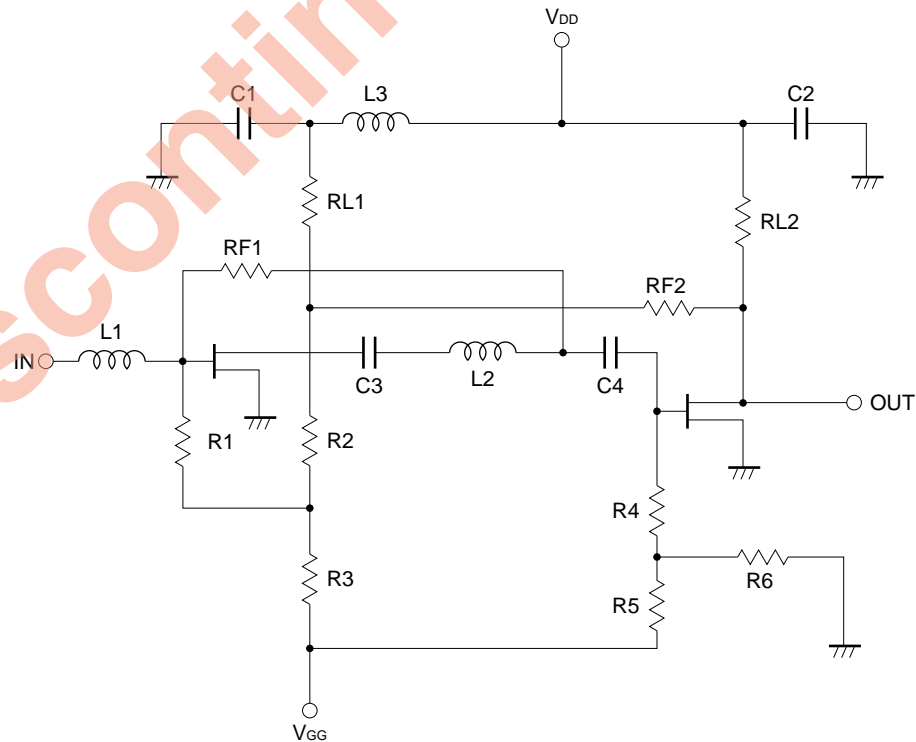


\* Chip capacitor

\*\* Choke Coil :  $\phi$ 0.1 mm, 15T

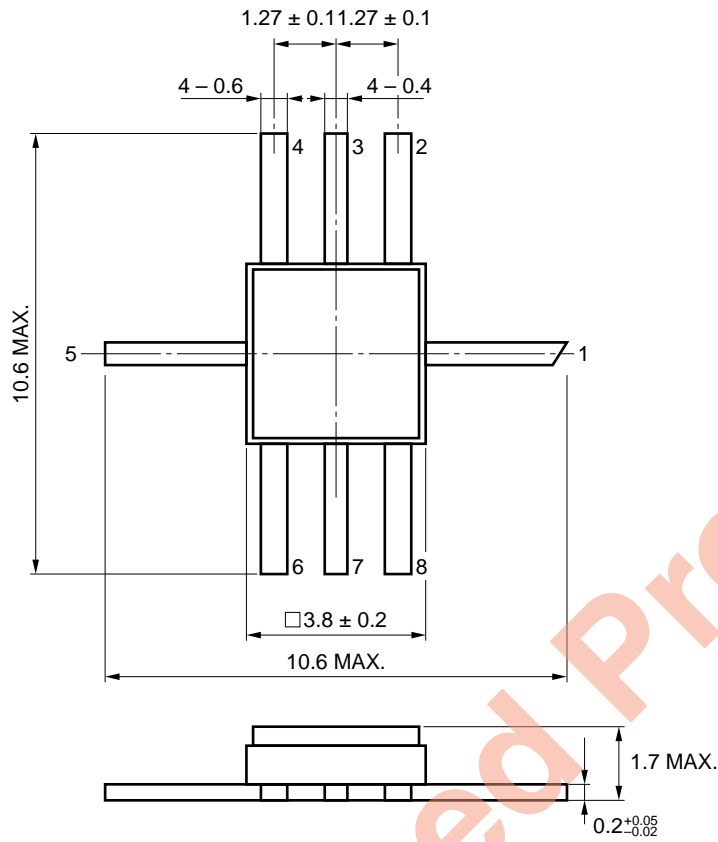


EQUIVALENT CIRCUIT



Discontinued Product

PACKAGE DIMENSIONS (Unit : mm)



**PIN CONNECTIONS:**

- 1. INPUT
- 2. GND
- 3. V<sub>GG</sub>
- 4. GND
- 5. OUTPUT
- 6. GND
- 7. V<sub>DD</sub>
- 8. GND



**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" (C10535E).

Soldering process	Soldering conditions	Symbol
Infrared ray reflow	Peak package's surface temperature: 230 °C or below, Reflow time: 10 seconds or below (210 °C or higher), Number of reflow process: 1, Exposure limit*: None	
Partial heating method	Terminal temperature: 260 °C or below, Flow time: 10 seconds or below, Exposure limit*: None	

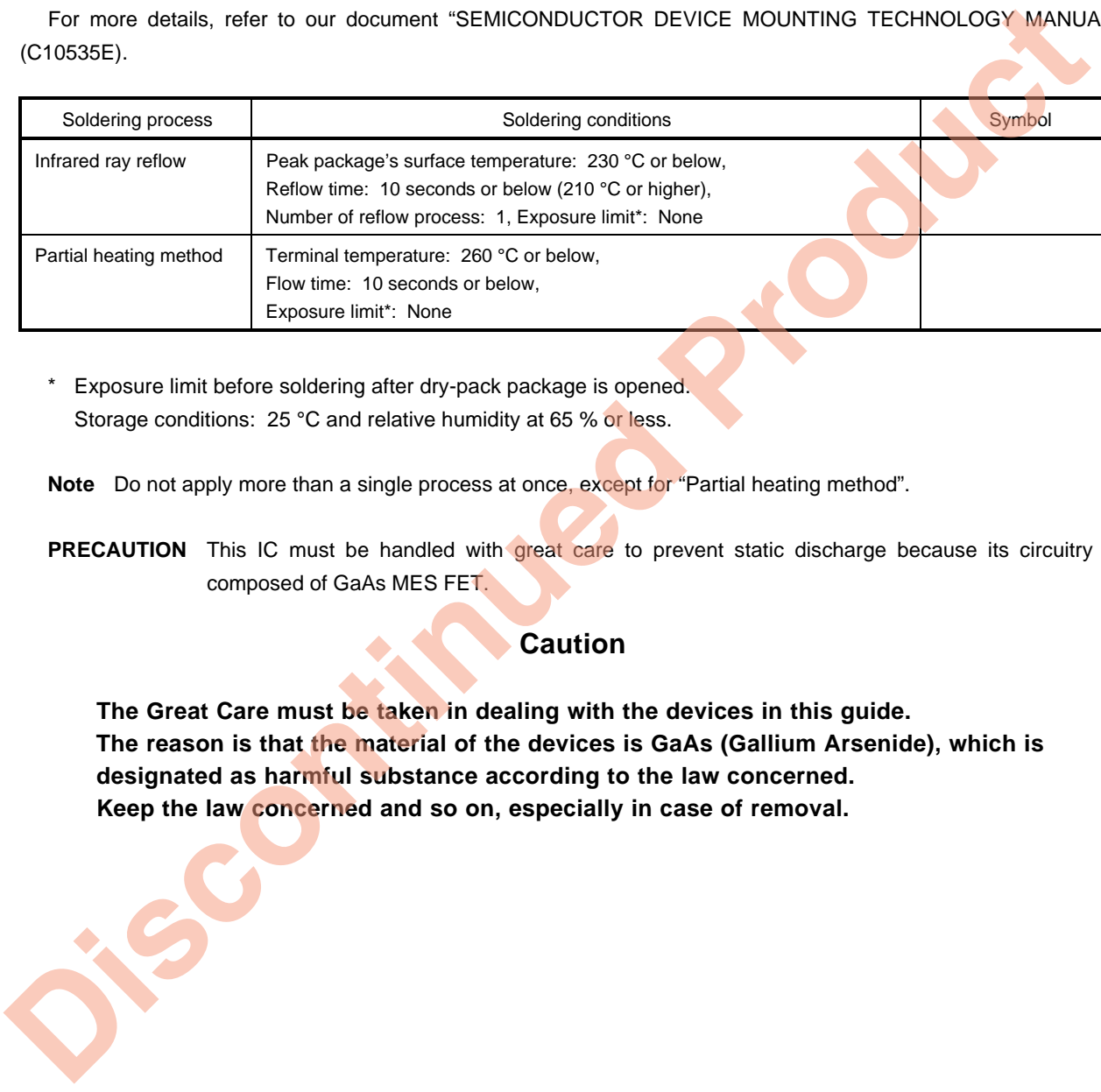
\* Exposure limit before soldering after dry-pack package is opened.  
Storage conditions: 25 °C and relative humidity at 65 % or less.

**Note** Do not apply more than a single process at once, except for "Partial heating method".

**PRECAUTION** This IC must be handled with great care to prevent static discharge because its circuitry is composed of GaAs MES FET.

**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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NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device 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: 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 is "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 an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.