NEC

GaAs INTEGRATED CIRCUIT

μPG137GV

L-BAND SPDT SWITCH

DESCRIPTION

The μPG137GV is a L-Band SPDT (Single Pole Double Throw) GaAs FET switch which was developed for digital mobile communication system.

It housed in an very small 8-pin SSOP that is smaller than usual 8-pin SOP and easy to install and contributes to miniaturizing the system.

FEATURES

- Maximum transmission power : +35 dBm min. (@ V_{CONT} = +5 V/0 V)
  +34 dBm typ. (@ V_{CONT} = +3 V/0 V)
- Low insertion loss : 0.55 dB typ. (@ 1 GHz)
  0.65 dB typ. (@ 2 GHz)

APPLICATION

- Digital Cellular : GSM, PDC, PCN etc.
- PHS Base Station, PCS etc.

ORDERING INFORMATION

PART NUMBER	PACKAGE	PACKING FORM
μPG137GV-E1	8 pin plastic SSOP (175 mil)	Carrier tape width 12 mm Qty 2 kp/Reel.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

PARAMETERS	SYMBOL	RATINGS	UNIT
Control Voltage 1, 2	$V_{CONT1, 2}$	−0.6 to +6.0 (Note)	V
Input Power (V_{CONT} = +5 V)	P_{in}	+36	dBm
Input Power (V_{CONT} = +3 V)	P_{in}	+34	dBm
Total Power Dissipation	P_{tot}	0.7	W
Operating Temperature	T_{opt}	−50 to +80	°C
Storage Temperature	T_{stg}	−65 to +150	°C

Note ( ) stands for the case of positive control condition using the floating.
Condition $2.7 \leq |V_{CONT1} - V_{CONT2}| \leq 6.0$ V

Caution The IC must be handled with care to prevent static discharge because its circuit composed of GaAs MES FET.

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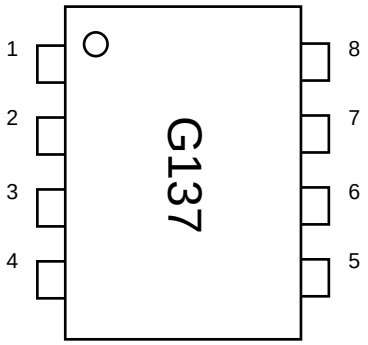
PIN CONNECTION DIAGRAM (Top View)



1. V_{CONT2}
2. OUT2
3. GND
4. GND
5. IN
6. GND
7. OUT1
8. V_{CONT1}

SPDT SWITCH IC SERIES PRODUCTS

PART NUMBER	PIN (1 dB) (dBm)	L_{INS} (dB)	ISL (dB)	V_{CONT} (V)	PACKAGE	APPLICATIONS
μPG130G	+34	0.5 @ 1 G	32 @ 1 G	–5/0	8-pin SSOP (175 mil)	PDC, IS-136, PHS
μPG131G	+30	0.6 @ 2 G	23 @ 2 G	–4/0		PHS, PCS, WLAN
μPG132G	+30	0.6 @ 2 G	22 @ 2 G	+3/0		PHS, PCS, WLAN
μPG133G	+25	0.6 @ 2 G	20 @ 2 G	–3/0		DIVERSITY, VCO
μPG137GV	+34	0.55 @ 1 G	25 @ 2 G	+3/0		PDC, GSM, IS-136
μPG138GV	+34 +37	0.55 @ 1 G	30 @ 1 G	–3/0 –5/0		PDC, GSM, IS-136

Remark As for detail information of series products, please refer to each data sheet.

[μPG137GV]

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Control Voltage (ON)	V_{CONT}	+2.7	+3.0	+5.3	V
Control Voltage (OFF)	V_{CONT}	–0.2	0	+0.2	V
Input Power (V_{CONT} = +5 V)	P_{in}			+35	dBm
Input Power (V_{CONT} = +3 V)	P_{in}			+33	dBm

ELECTRICAL CHARACTERISTICS

(UNLESS OTHERWISE SPECIFIED T_A = 25 °C, V_{CONT} = +3 V/0 V)

CHARACTERISTICS	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Insertion Loss 1	L_{INS1}	f = 100 M to 1 GHz		0.55	0.75	dB
Insertion Loss 2	L_{INS2}	f = 2.0 GHz		0.65	0.90	dB
Insertion Loss 3	L_{INS3}	f = 2.5 GHz		0.8 Note 1		dB
Isolation 1	I_{SL1}	f = 100 M to 2 GHz	20	25		dB
Input Return Loss	RL_{in}	f = 100 M to 2 GHz	11			dB
Output Return Loss	RL_{out}		11			dB
Input Power at 1 dB Compression Point	P_{in} (1 dB) Note 2	f = 500 M to 2 GHz	+32	+34		dBm
Input Power at 0.5 dB Compression Point	P_{in} (0.5 dB)	f = 500 M to 2 GHz V_{CONT} = +5 V/0 V	+34			dBm
Switching Speed	t_{SW}			30		ns
Control Current	I_{CONT}	V_{CONT} = +5 V/0 V			5	μA

Notes 1. Characteristic for reference at 2.0 to 2.5 GHz.

2. P_{in} (1 dB) is measured the input power level when the insertion loss increase more 1 dB than that of linear range.

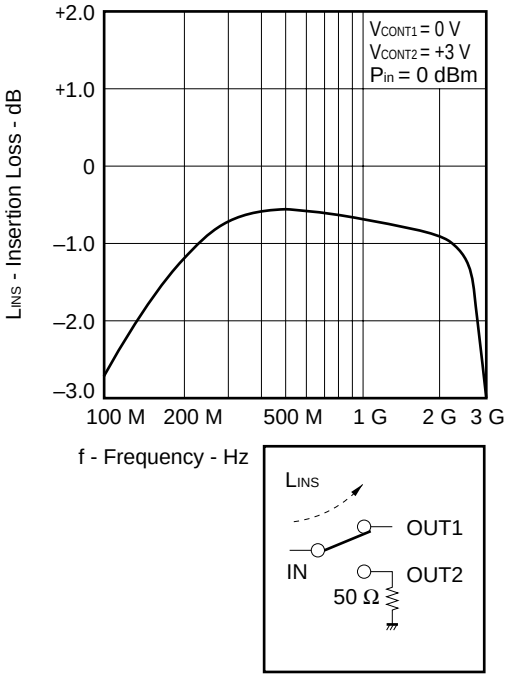
All other characteristics are measured in linear range.

NOTE ON CORRECT USE

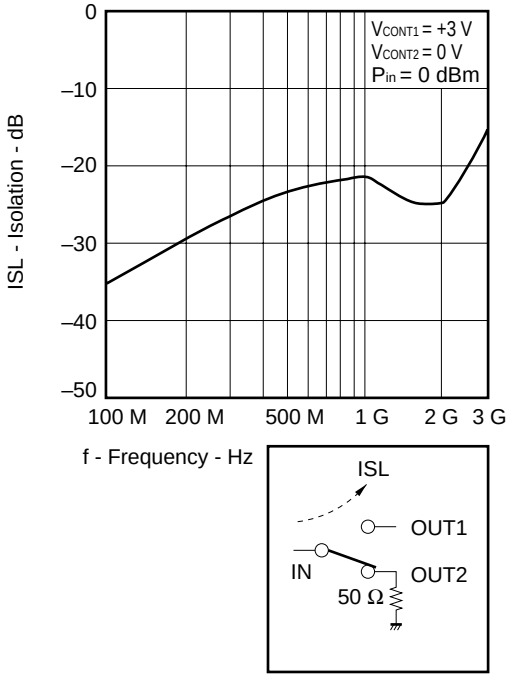
- When the μPG137GV is used it is necessary to use DC blocking capacitor for No. 2 pin (OUT2), No. 5 pin (IN) and No. 7 pin (OUT1). The value of DC blocking capacitors should be chosen to accommodata the frequency of operation.
- Insertion loss and isolation of the IN-OUT2 is better than that of IN-OUT1, because No. 7 pin (OUT1) is placed to same side of No. 5 pin (IN).
- The distance between IC's GND pins and ground pattarn of substrate should be as shorter as possible to avoid parasitic parameters.

TYPICAL CHARACTERISTICS (T_A = 25 °C) (This data is including loss of the test fixture)

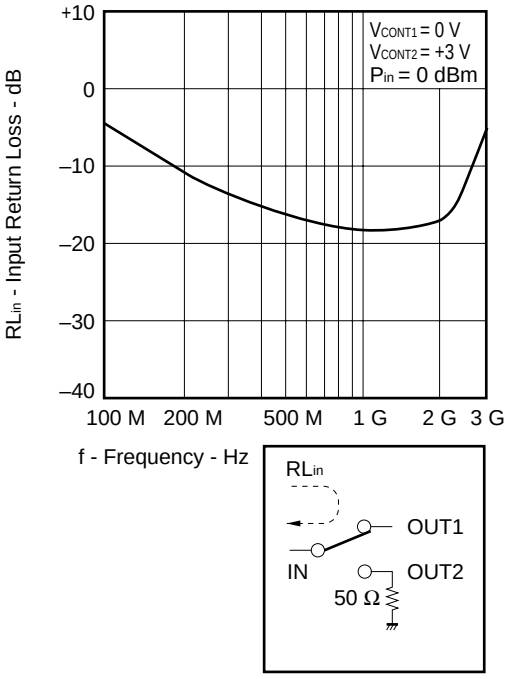
IN-OUT1 INSERTION LOSS vs. FREQUENCY



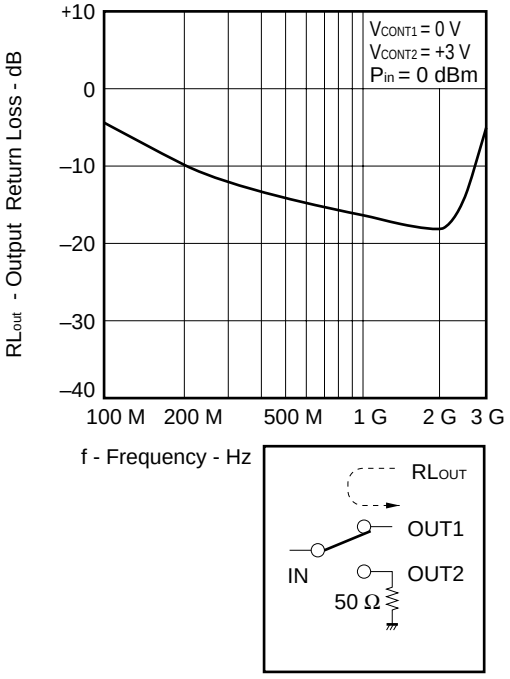
IN-OUT1 ISOLATION vs. FREQUENCY



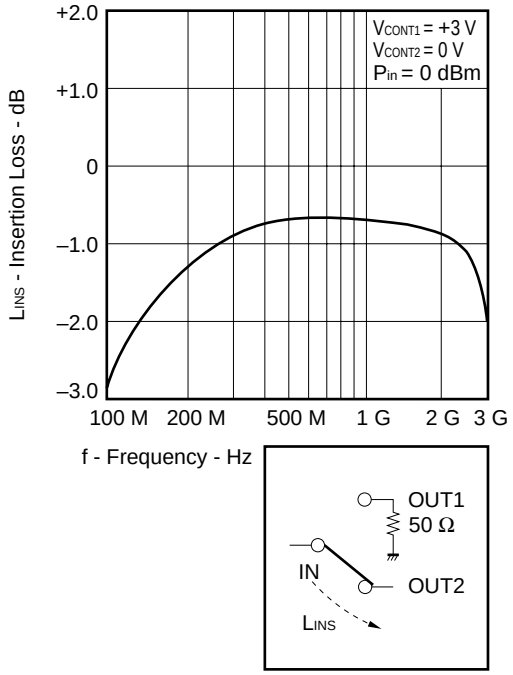
IN-OUT1 INPUT RETURN LOSS vs. FREQUENCY



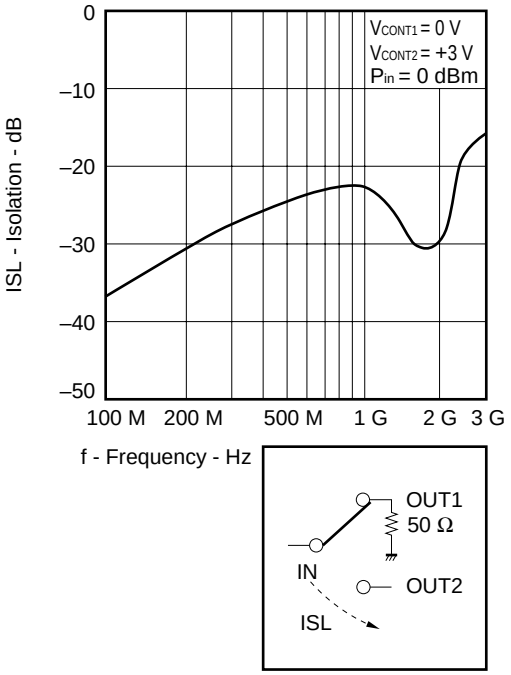
IN-OUT1 OUTPUT RETURN LOSS vs. FREQUENCY



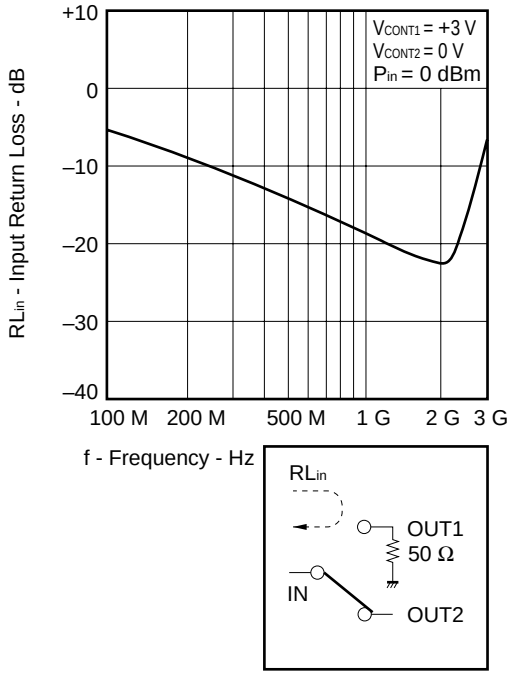
IN-OUT2 INSERTION LOSS vs. FREQUENCY



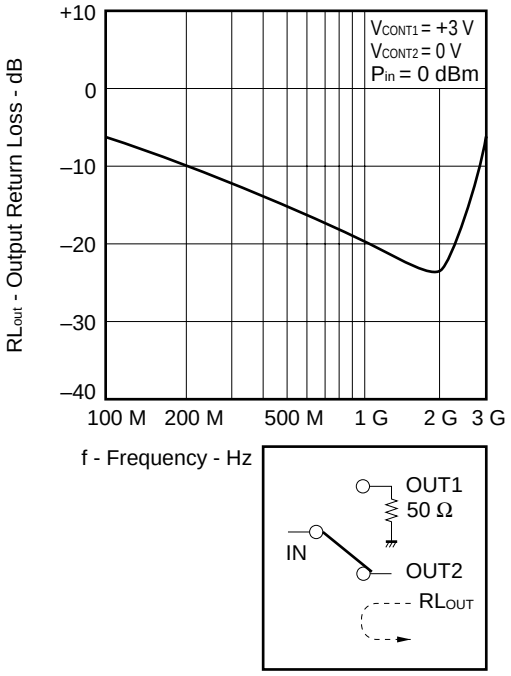
IN-OUT2 ISOLATION vs. FREQUENCY



IN-OUT2 INPUT RETURN LOSS vs. FREQUENCY

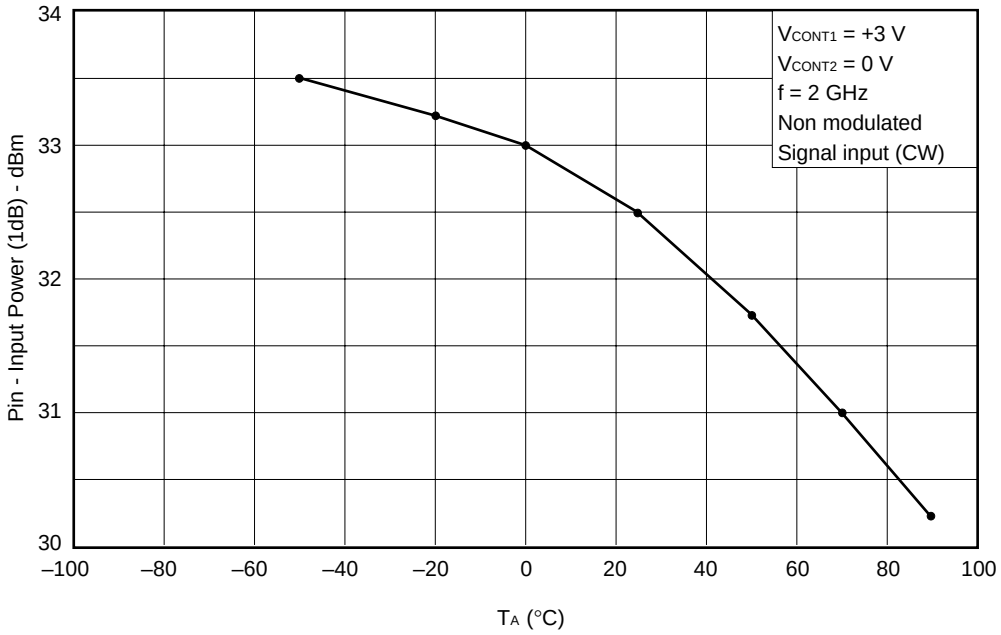


IN-OUT2 OUTPUT RETURN LOSS vs. FREQUENCY

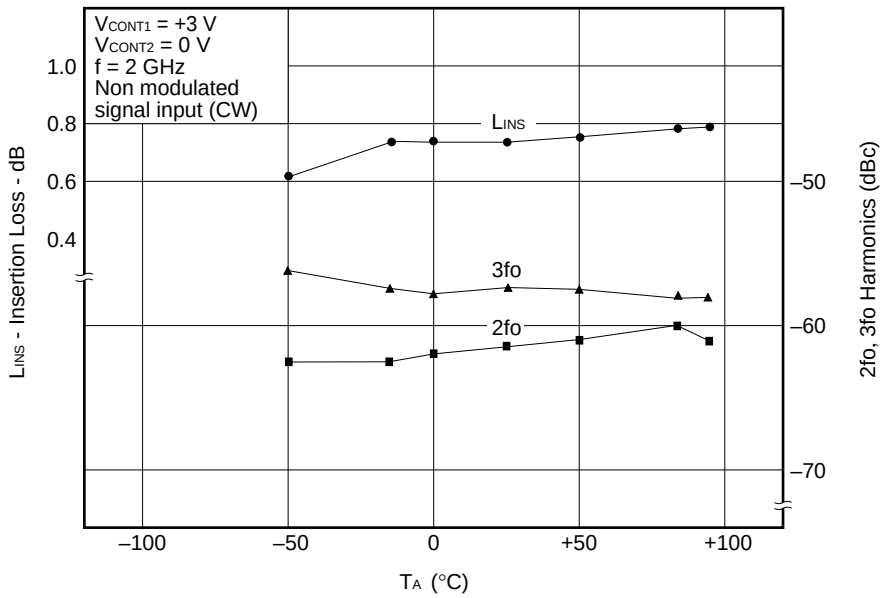


TEMPERATURE CHARACTERISTICS

Pin (1dB) vs. AMBIENT TEMPERATURE

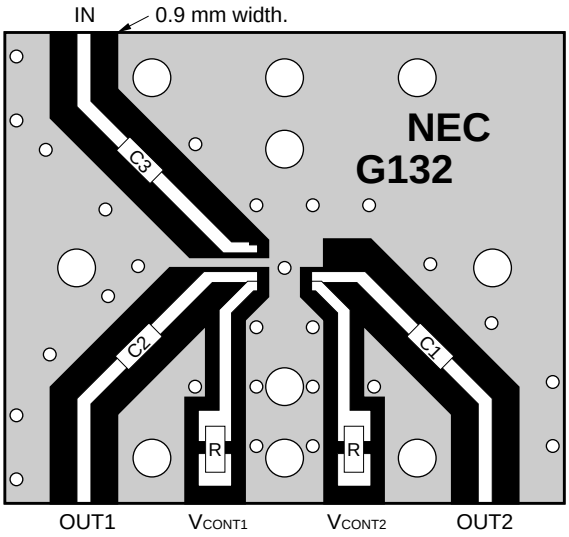


INSERTION LOSS, 2fo, 3fo vs. AMBIENT TEMPERATURE



[μPG137GV]

TEST BOARD

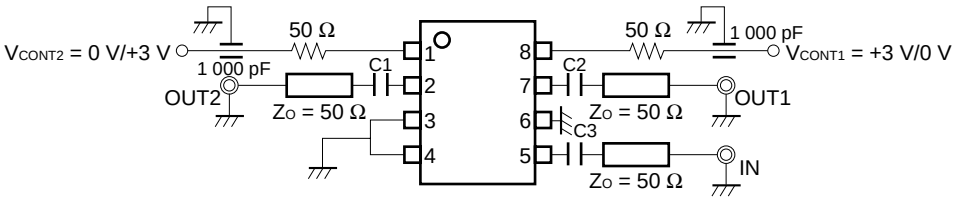


0.4 mm thickness teflon glass

R = 50 Ω

Using the same board that of μPG132G

TEST CIRCUIT



C1, C2, C3 = 51 PF

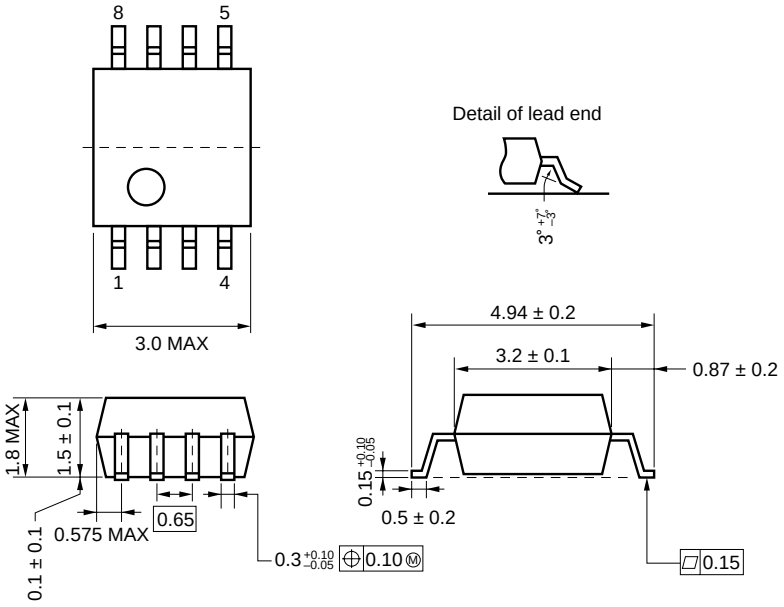
[μPG137GV]

TRUTH TABLE OF SWITCHING BY CONDITION OF CONTROL VOLTAGE

		V_{CONT1}	
		+3 V	0 V
V_{CONT2}	+3 V	IN → OUT1, OUT2	IN → OUT1, OUT2
	0 V	IN → OUT2; OUT1	IN; OUT1, OUT2

PACKGE DIMENSIONS

8-PIN PLASTIC SHRINK SOP (175 mil) (Unit mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered in the following recommended conditions. Other soldering methods and conditions than the recommended conditions are to be consulted with our sales representatives.

[μPG137GV]

Soldering process	Soldering conditions	Recommended condition symbol
Infrared ray reflow	Package peak temperature: 235 °C Hour: within 30 s. (more than 210 °C) Time: 3 times, Limited days: no.[Note]	IR35-00-3
VPS	Package peak temperature: 215 °C Hour: within 40 s. (more than 200 °C) Time: 3 times, Limited days: no.[Note]	VP15-00-3
Wave soldering	Soldering tub temperature: less than 260 °C, Hour: within 10 s. Time: 1 time, Limited days: no.[Note]	WS60-00-1
Pin part heating	Pin area temperature: less than 300 °C, Hour: within 10 s. Limited days: no.[Note]	

Note It is storage days after opening a dry pack, the storage conditions are 25 °C, less than 65 %, RH.

Caution The combined use of soldering method is to be avoided (However, except the pin area heating method).

[MEMO]

[MEMO]

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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