To our customers,

Old Company Name in Catalogs and Other Documents

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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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GaAs INTEGRATED CIRCUIT

Phase-out/Discontinued

μPG2006TB

L, S-BAND 1.8 V CONTROL VOLTAGE SPDT SWITCH

DESCRIPTION

The μPG2006TB is an L, S-band SPDT (Single Pole Double Throw) GaAs FET switch which was developed for digital cellular or cordless telephone application. The device can operate from 500 MHz to 2.5 GHz, having the low insertion loss and high isolation by 1.8 V control voltage.

FEATURES

- Low insertion loss : L_{INS} = 0.3 dB TYP. @ V_{cont} = 1.8 V/0 V, f = 1 GHz
  L_{INS} = 0.45 dB TYP. @ V_{cont} = 1.8 V/0 V, f = 2.5 GHz
- High isolation : ISL = 29 dB TYP. @ V_{cont} = 1.8 V/0 V, f = 2 GHz
  ISL = 25 dB TYP. @ V_{cont} = 1.8 V/0 V, f = 2.5 GHz
- 6-pin super minimold package (2.0 × 1.25 × 0.9 mm)

APPLICATION

- L, S-band digital cellular or cordless telephone
- Buletooth™, W-LAN and WLL applications

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μPG2006TB-E3	6-pin super minimold	G2J	• Embossed tape 8 mm wide • Pin 1, 2, 3 face the perforation side of the tape • Qty 3 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPG2006TB

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

Document No. PG10179EJ01V0DS (1st edition)
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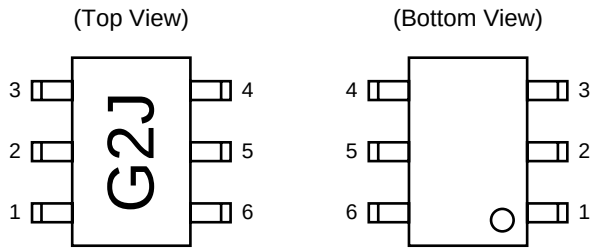
Printed in Japan

PIN CONNECTIONS



Pin No.	Pin Name
1	OUT1
2	GND
3	OUT2
4	V_{cont2}
5	IN
6	V_{cont1}

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Control Voltage 1, 2	$V_{cont1, 2}$	–6.0 to +6.0 Note	V
Input Power (V_{cont} = 1.8 V)	P_{in}	+23	dBm
Total Power Dissipation	P_{tot}	0.15	W
Operating Ambient Temperature	T_A	–45 to +85	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note $|V_{cont1}-V_{cont2}| \leq 6.0$ V

RECOMMENDED OPERATING RENGE (T_A = +25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Control Voltage (High)	$V_{cont(H)}$	+1.6	+1.8	+5.3	V
Control Voltage (Low)	$V_{cont(L)}$	–0.2	0	+0.2	V

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{cont1} = 1.8 V, V_{cont2} = 0 V or V_{cont1} = 0 V, V_{cont2} = 1.8 V, Z_O = 50 Ω, Off chip DC blocking capacitors value; 51 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss	L_{INS}	f = 0.1 to 1.0 GHz Note1	–	0.30	0.55	dB
		f = to 2.0 GHz	–	0.40	0.60	dB
		f = to 2.5 GHz	–	0.45	0.65	dB
Isolation	ISL	f = 0.1 to 2.0 GHz Note1	25	29	–	dB
		f = to 2.5 GHz	20	25	–	dB
Input Return Loss	RL_{in}	f = 0.1 to 1.0 GHz Note1	13	–	–	dB
		f = to 2.5 GHz	16	21	–	dB
Output Return Loss	RL_{out}	f = 0.1 to 1.0 GHz Note1	13	–	–	dB
		f = to 2.5 GHz	16	21	–	dB
Input Power at 1 dB Compression Point Note2	$P_{in(1\ dB)}$	f = 2.0 GHz, V_{cont} = 1.8 V/0 V	17	20	–	dBm
		f = 2.0 GHz, V_{cont} = 2.8 V/0 V	22	25	–	dBm
Input Power at 0.1 dB Compression Point Note2	$P_{in(0.1\ dB)}$	f = 2.0 GHz, V_{cont} = 1.8 V/0 V	–	18	–	dBm
		f = 2.0 GHz, V_{cont} = 2.8 V/0 V	–	23	–	dBm
Switching Speed	t_{SW}		–	50	200	ns
Control Current	I_{cont}	V_{cont} = 1.8 V/0 V, RF Non	–	0.5	10	μA

Notes 1. Off chip DC blocking capacitors at frequency range of 0.1 to 0.5 GHz 1 000 pF

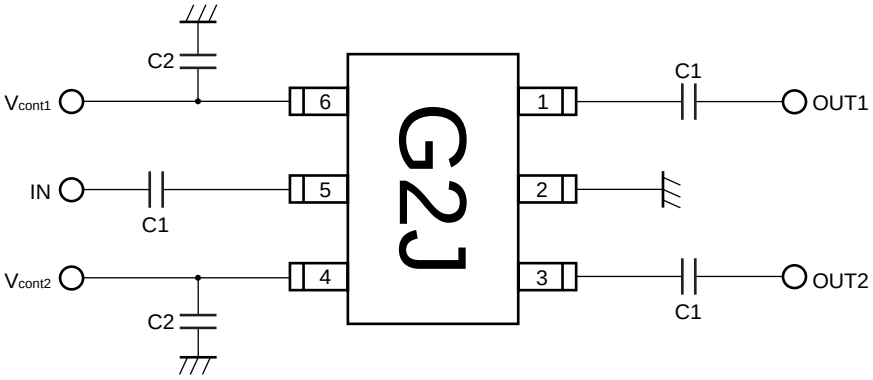
2. $P_{in(1\ dB)}$ or $P_{in(0.1\ dB)}$ are measured the input power level when the insertion loss increase more 1 dB or 0.1 than that of linear range. All other characteristics are measured in linear range.

Cautions 1. When the μPG2006TB is used it is necessary to use DC blocking capacitors for No.1 (OUT1), No.3 (OUT2) and No.5 (IN). The value of DC blocking capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system.
The range of recommended DC blocking capacitor value is less than 100 pF.

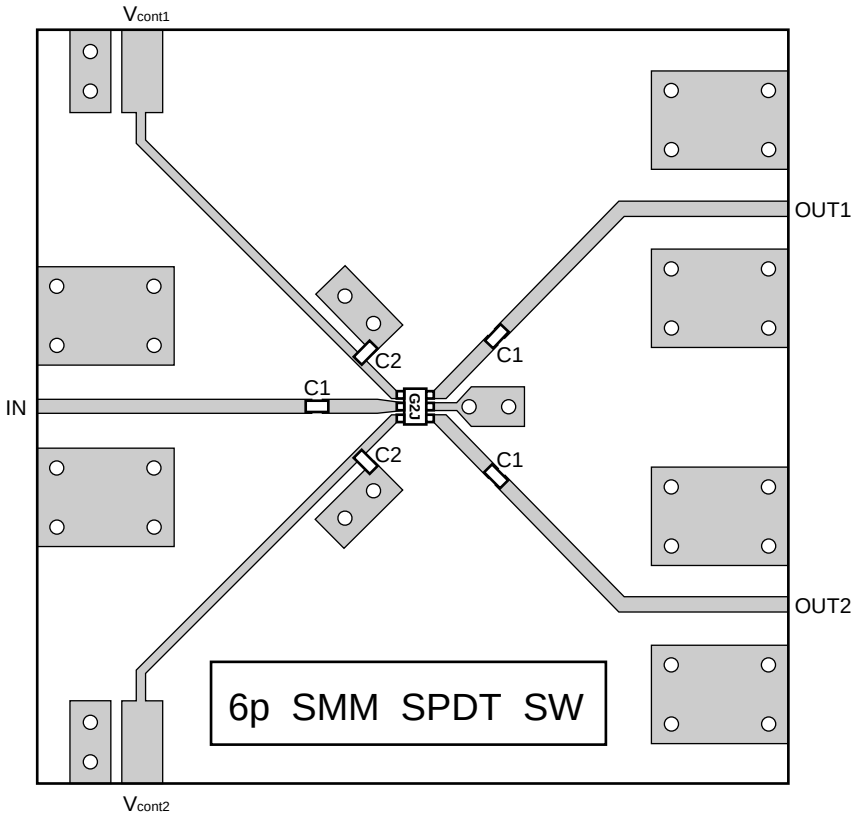
2. The distance between IC's GND pin and ground pattern of substrate should be as shorter as possible to avoid parasitic parameters.

EVALUATION CIRCUIT

V_{cont1} = 1.8 V, V_{cont2} = 0 V or V_{cont2} = 0 V, V_{cont1} = 1.8 V, off chip DC blocking capacitors value C1 = 51 pF, C2 = 1 000 pF (Bypass), using NEC standard evaluation board.



EVALUATION BOARD



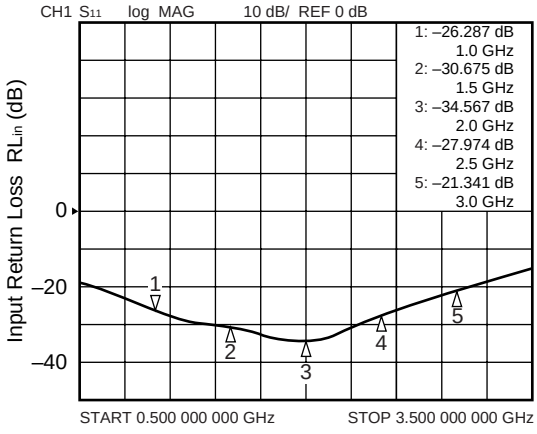
TRUTH TABLE

V_{cont1}	V_{cont2}	IN–OUT1	IN–OUT2
Low	High	ON	OFF
High	Low	OFF	ON

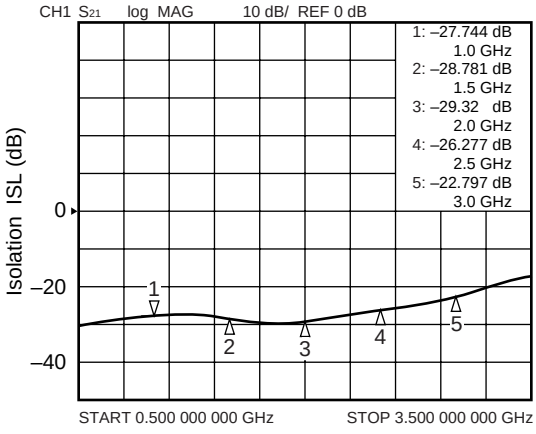
TYPICAL CHARACTERISTICS

TEST CONDITION: $V_{cont1/2}$ = 0 V/1.8 V, P_{in} = 0 dBm, OUT2 side is 50 Ω termination

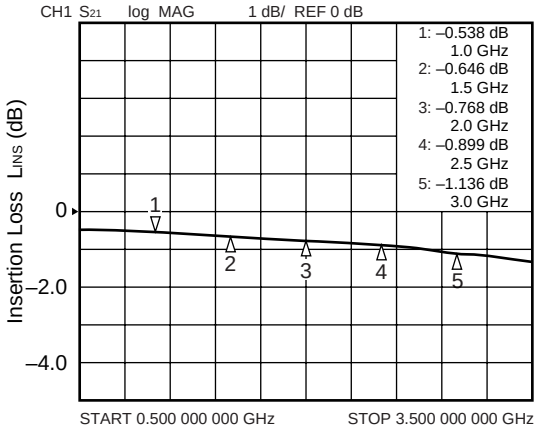
INPUT RETURN LOSS vs. FREQUENCY



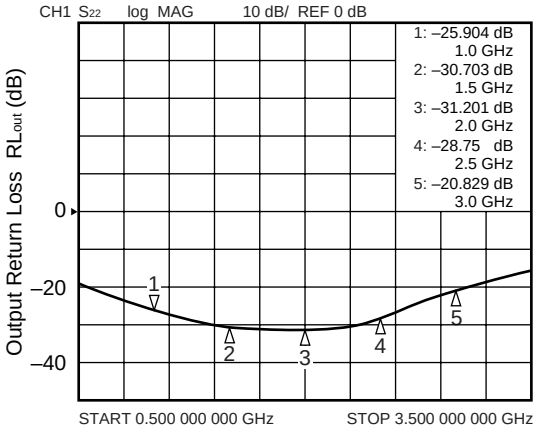
ISOLATION vs. FREQUENCY



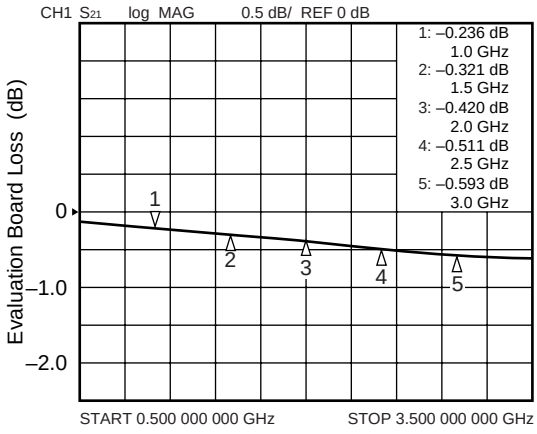
INSERTION LOSS vs. FREQUENCY



OUTPUT RETURN LOSS vs. FREQUENCY



EVALUATION BOARD LOSS vs. FREQUENCY



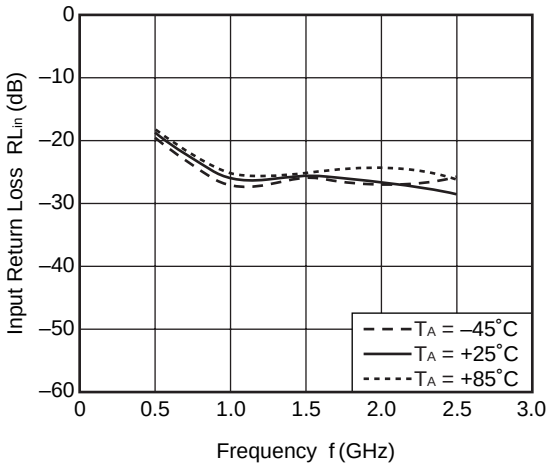
Caution These characteristics values include the loss of the NEC evaluation board.

Remark The graphs indicate nominal characteristics.

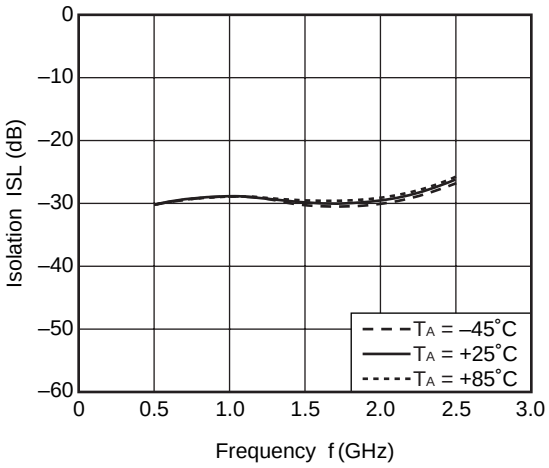
TYPICAL CHARACTERISTICS (Temperature dependency of each frequency characteristics)

TEST CONDITION: $V_{cont1/2}$ = 0 V/1.8 V, P_{in} = 0 dBm, OUT2 side is 50 Ω termination

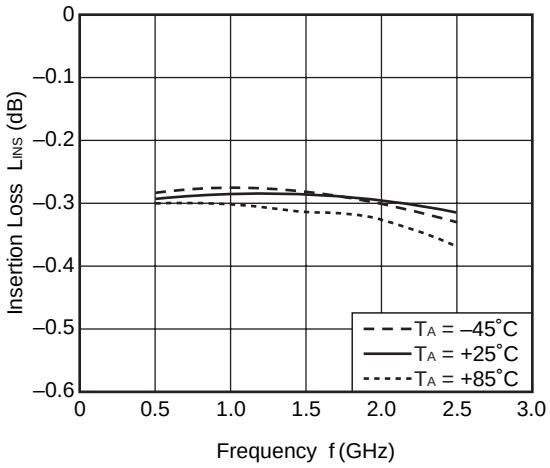
INPUT RETURN LOSS vs. FREQUENCY



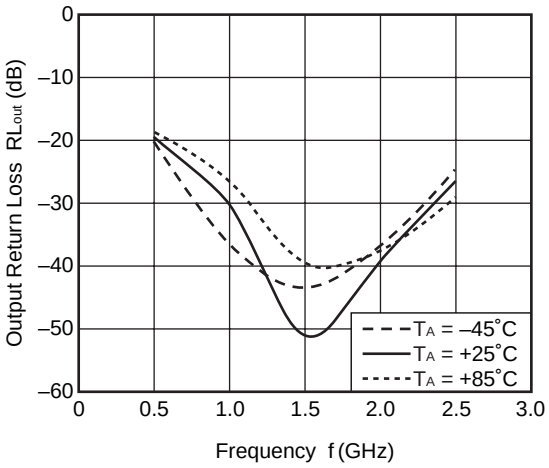
ISOLATION vs. FREQUENCY



INSERTION LOSS vs. FREQUENCY



OUTPUT RETURN LOSS vs. FREQUENCY



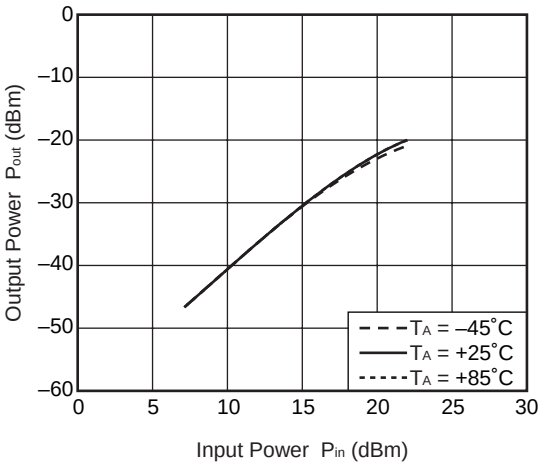
Caution These characteristics values do not include the loss of the NEC evaluation board.

Remark The graphs indicate nominal characteristics.

TYPICAL CHARACTERISTICS

TEST CONDITION: f = 2 GHz, $V_{cont1/2}$ = 0 V/1.8 V, OUT2 side is 50 Ω termination

TEMPERATURE CHARACTERISTICS OF INPUT/OUTPUT

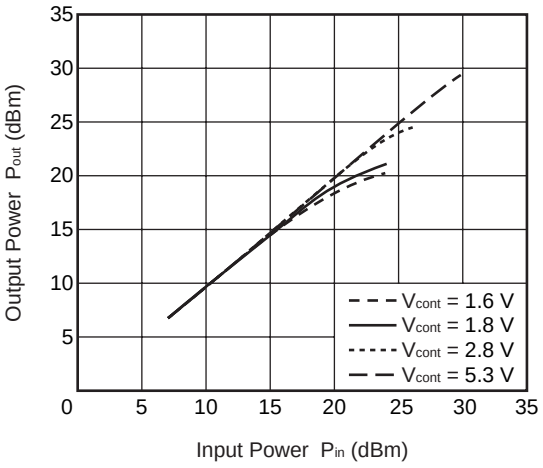


Remark The graphs indicate nominal characteristics.

TYPICAL CHARACTERISTICS

TEST CONDITION: f = 2 GHz, T_A = +25°C, OUT2 side is 50 Ω termination

RELATION BETWEEN CONTROL VOLTAGE OF INPUT/OUTPUT

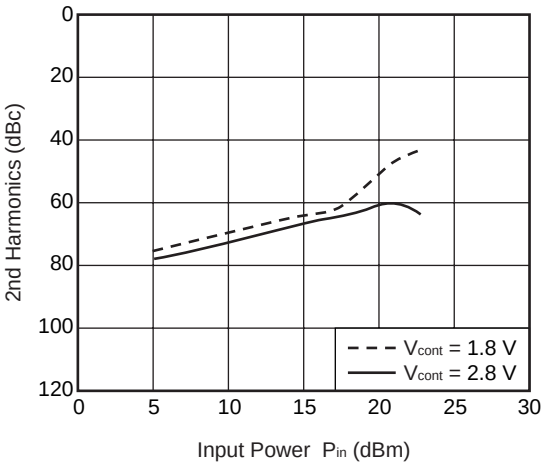


Remark The graphs indicate nominal characteristics.

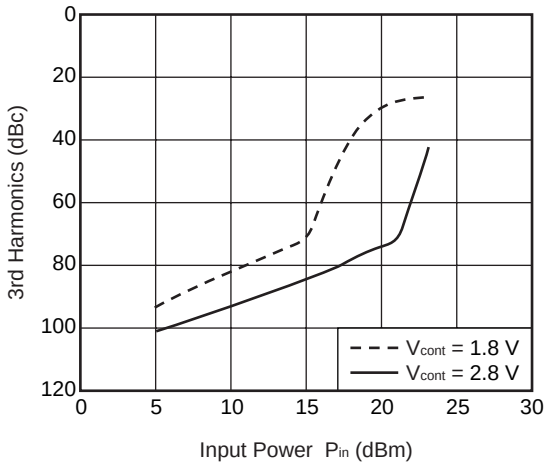
TYPICAL CHARACTERISTICS

TEST CONDITION: f = 2 GHz, T_A = +25°C, $V_{cont1/2}$ = 0 V/1.8 V, OUT2 side is 50 Ω termination

RELATION BETWEEN CONTROL VOLTAGE OF 2nd HARMONICS



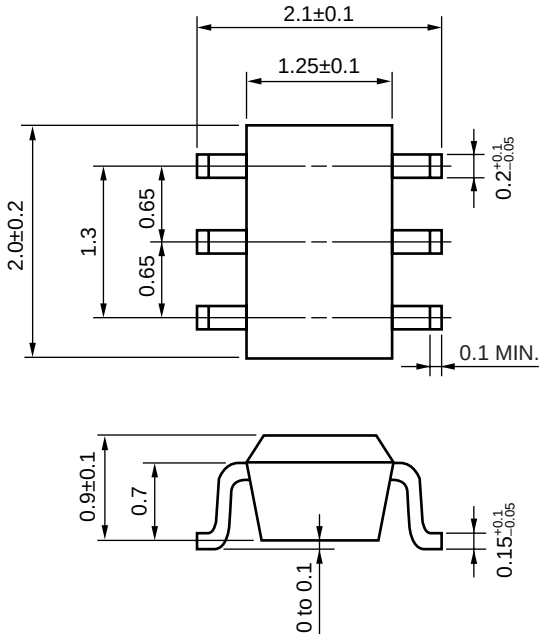
RELATION BETWEEN CONTROL VOLTAGE OF 3rd HARMONICS



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN SUPER MINIMOLD (UNIT: mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

Soldering Method	Soldering Conditions		Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature) Time at peak temperature Time at temperature of 220°C or higher Preheating time at 120 to 180°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 60 seconds or less : 120±30 seconds : 3 times : 0.2%(Wt.) or below	IR260
VPS	Peak temperature (package surface temperature) Time at temperature of 200°C or higher Preheating time at 120 to 150°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 215°C or below : 25 to 40 seconds : 30 to 60 seconds : 3 times : 0.2%(Wt.) or below	VP215
Wave Soldering	Peak temperature (molten solder temperature) Time at peak temperature Preheating temperature (package surface temperature) Maximum number of flow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 120°C or below : 1 time : 0.2%(Wt.) or below	WS260
Partial Heating	Peak temperature (pin temperature) Soldering time (per side of device) Maximum chlorine content of rosin flux (% mass)	: 350°C or below : 3 seconds or less : 0.2%(Wt.) or below	HS350

Caution Do not use different soldering methods together (except for partial heating).

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M8E 00.4-0110

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▶Business issue

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▶Technical issue

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