CEL

NEC's 1.8 V L, S-BAND SPDT SWITCH

UPG2006TB

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:**
  I_{SL} = 29 dB TYP. @ V_{cont} = 1.8 V/0 V, f = 2 GHz
  I_{SL} = 25 dB TYP. @ V_{cont} = 1.8 V/0 V, f = 2.5 GHz
- **6-PIN SUPER MINIMOLD PACKAGE:**
  (2.0 x 1.25 x 0.9MM)

DESCRIPTION

NEC's UPG2006TB is a L, S-band SPDT (Single Pole Double Throw) switch for digital cellular or cordless telephone applications.

The device can operate from 500 MHz to 2.5 GHz, with low insertion loss and high isolation with 1.8 V control voltage.

APPLICATIONS

- **L, S-band digital cellular or cordless telephones**
- **Bluetooth™ , W-LAN and WLL**
- **Short Range Wireless**

ORDERING INFORMATION

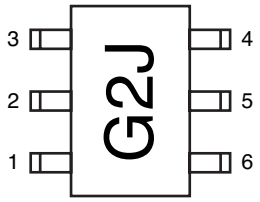
Part Number	Package	Marking	Supplying Form
UPG2006TB-E3	6-pin super minimold	G2J	• Embossed tape 8 mm wide • Pin 1, 2, 3 face the perforation side of the tape • Qty 3 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: UPG2006TB

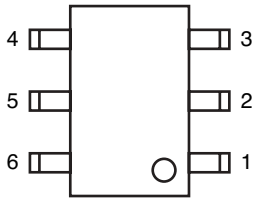
Caution **Observe precautions when handling because these devices are sensitive to electrostatic discharge.**

PIN CONNECTIONS

(Top View)



(Bottom View)



Pin No.	Pin Name
1	OUT1
2	GND
3	OUT2
4	V_{cont2}
5	IN
6	V_{DD1}

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 RANGE (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	$P_{in(1\ dB)}$	f = 2.0 GHz, V_{cont} = 1.8 V/0 V	17	20	–	dBm
Compression Point **Note2**		f = 2.0 GHz, V_{cont} = 2.8 V/0 V	22	25	–	dBm
Input Power at 0.1 dB	$P_{in(0.1\ dB)}$	f = 2.0 GHz, V_{cont} = 1.8 V/0 V	–	18	–	dBm
Compression Point **Note2**		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 $P_{in(0.1\ dB)}$ is the input power level when the insertion loss increase 1 dB or 0.1 more than that of linear range. All other characteristics are measured in linear range.

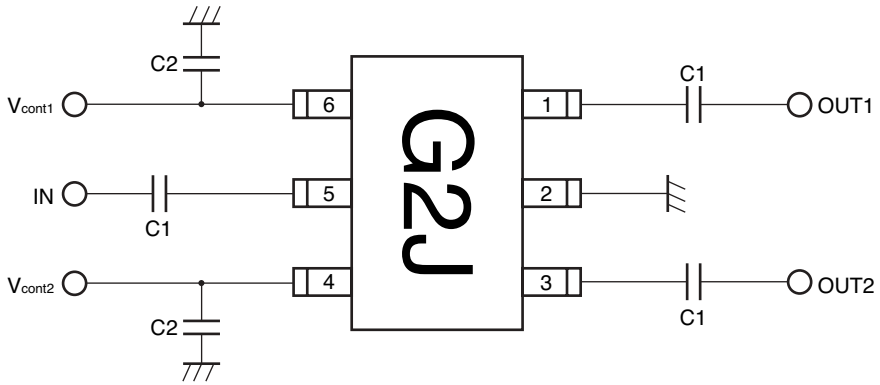
Cautions 1. It is necessary to use DC blocking capacitors for No.1 (OUT1), No.3 (OUT2) and No.5 (IN). The value of DC blocking capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with the actual board of the system.

The range of recommended DC blocking capacitor value is less than 100 pF.

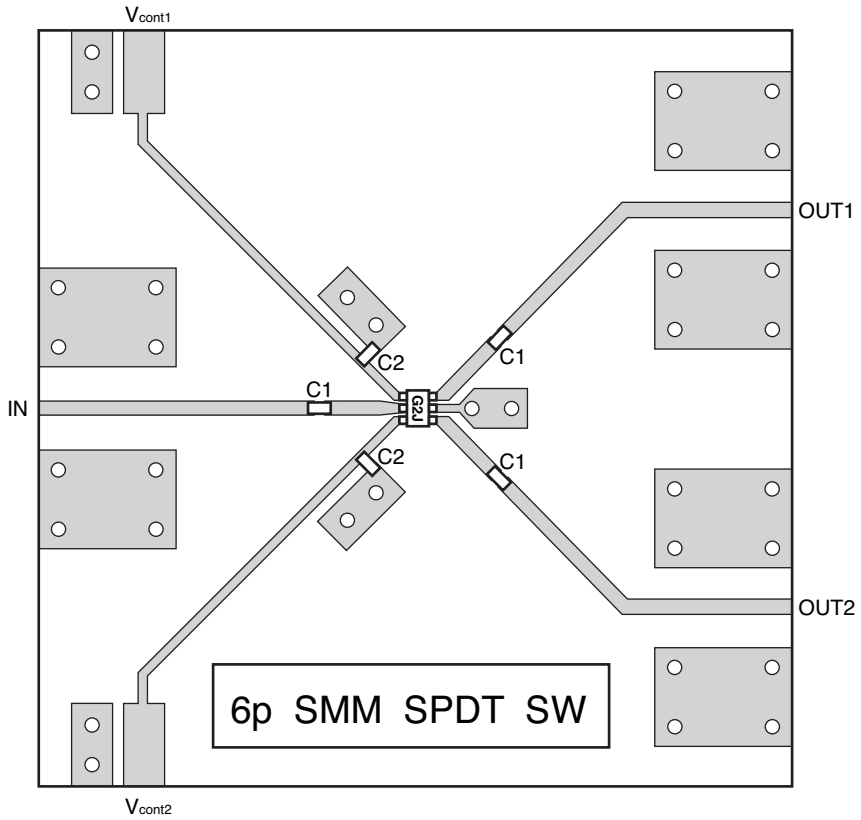
2. The distance between the GND pin and ground pattern of the substrate should be as short as possible to reduce parasitic parameters.

EVALUATION CIRCUIT

(Vcont1 = 1.8 V, Vcont2 = 0 V or Vcont2 = 0 V, Vcont1 = 1.8 V, off chip DC blocking capacitors value C1 = 51 pF, C2 = 1 000 pF (Bypass), using NEC standard evaluation board)



EVALUATION BOARD



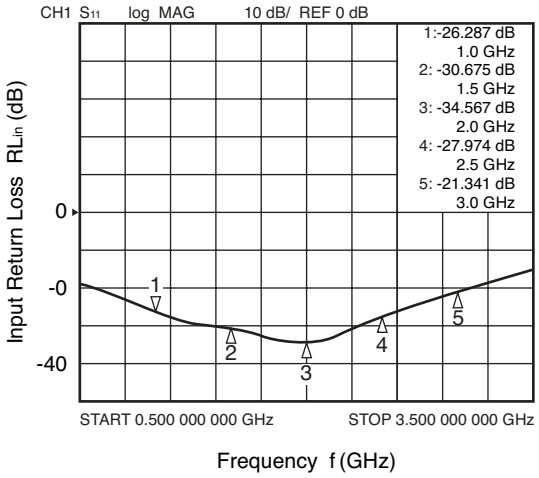
TRUTH TABLE

Vcont1	Vcont2	IN–OUT1	IN–OUT2
Low	High	ON	OFF
High	Low	OFF	ON

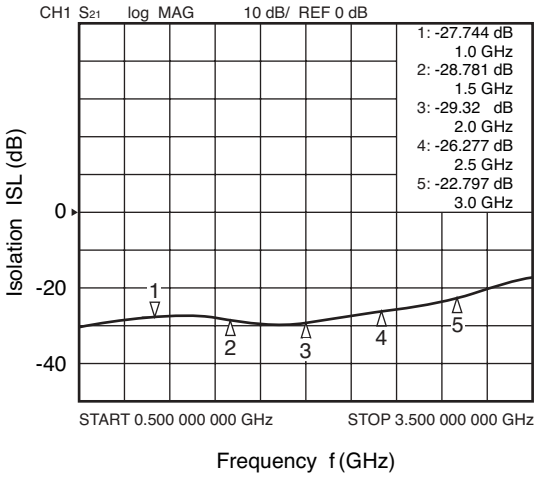
TYPICAL CHARACTERISTICS

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

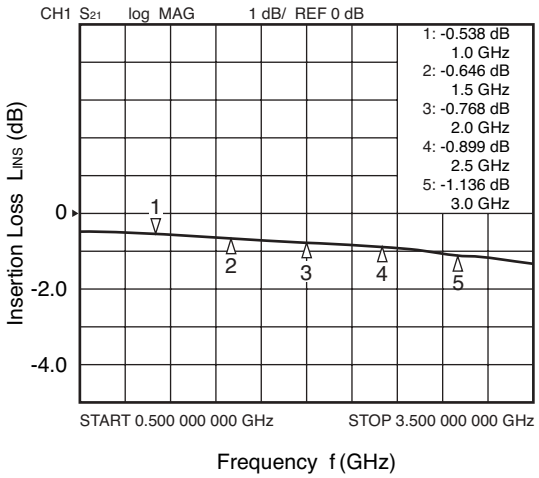
INPUT RETURN LOSS vs. FREQUENCY



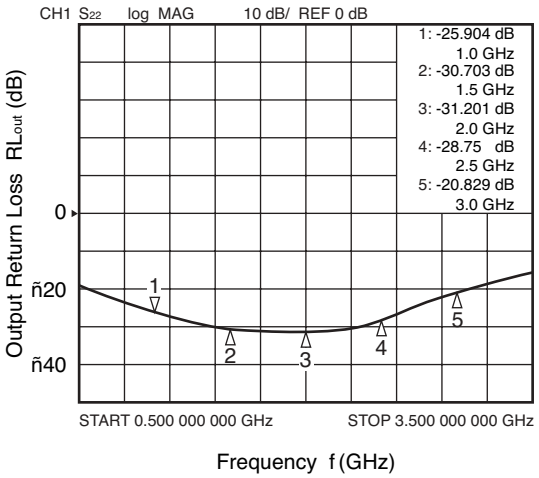
ISOLATION vs. FREQUENCY



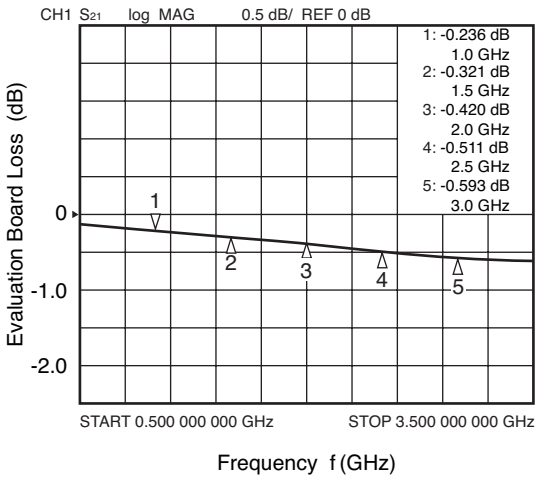
INSERTION LOSS vs. FREQUENCY



OUTPUT RETURN LOSS vs. FREQUENCY



EVALUATION BOARD LOSS vs. FREQUENCY



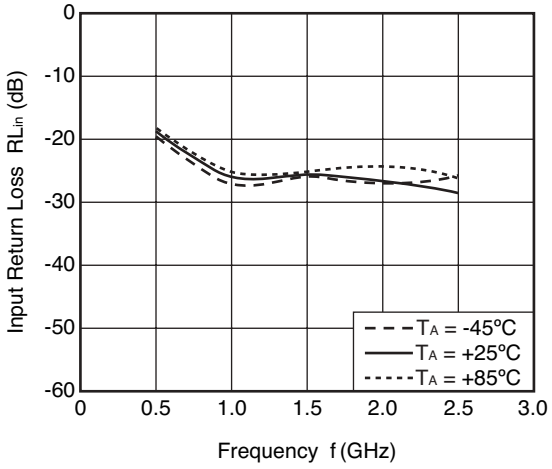
Caution These characteristics values include the losses of the NEC evaluation board.

Remark The graphs indicate nominal characteristics.

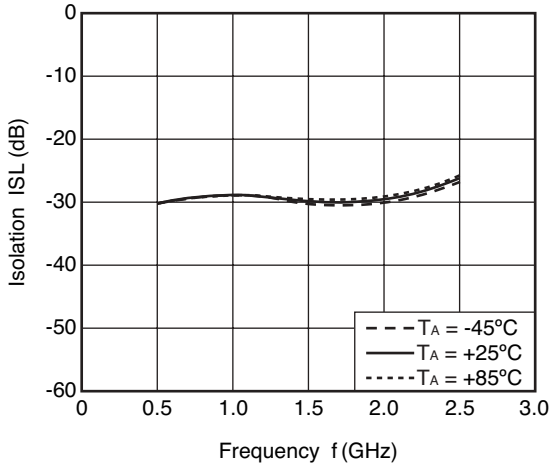
TYPICAL CHARACTERISTICS

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

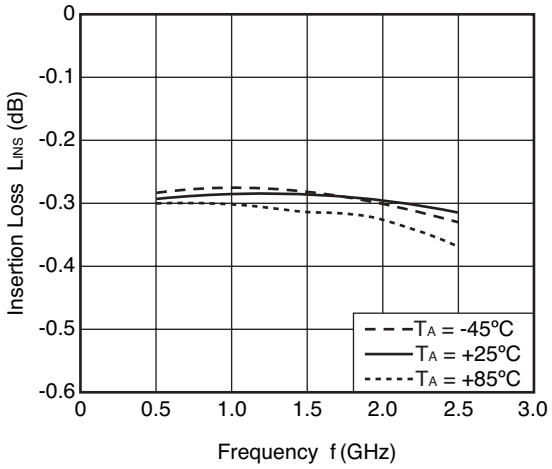
INPUT RETURN LOSS vs. FREQUENCY



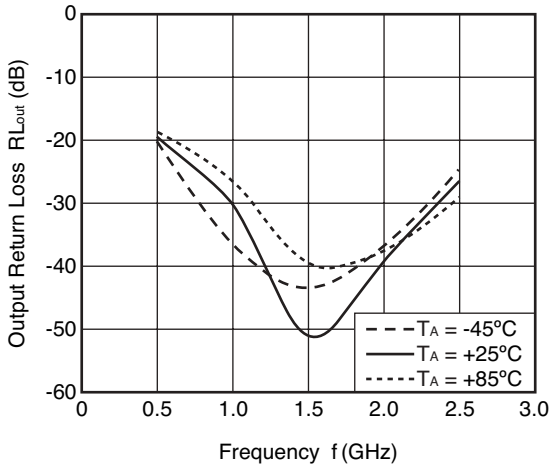
ISOLATION vs. FREQUENCY



INSERTION LOSS vs. FREQUENCY



OUTPUT RETURN LOSS vs. FREQUENCY



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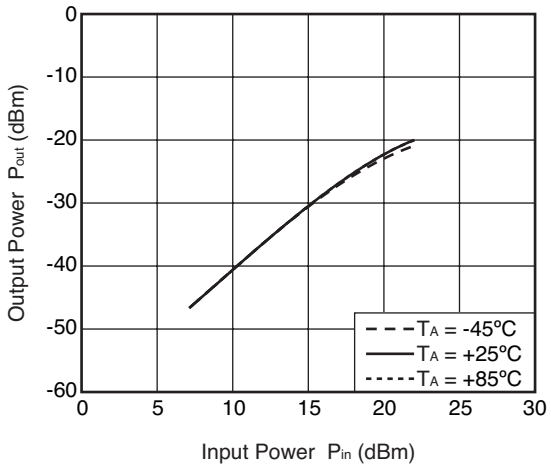
Remark The graphs indicate nominal characteristics.

TYPICAL CHARACTERISTICS

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

TEMPERATURE CHARACTERISTICS OF INPUT/OUTPUT

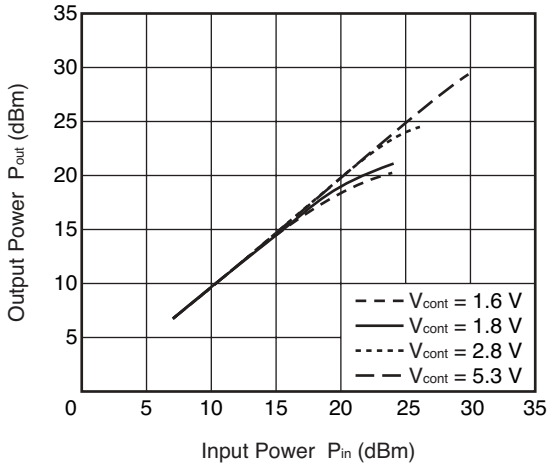


Remark The graphs indicate nominal characteristics.

TYPICAL CHARACTERISTICS

(f = 2 GHz, T_A = +25°C, OUT2 side is 50 Ω termination)

RELATION BETWEEN CONTROL VOLTAGE OF INPUT/OUTPUT

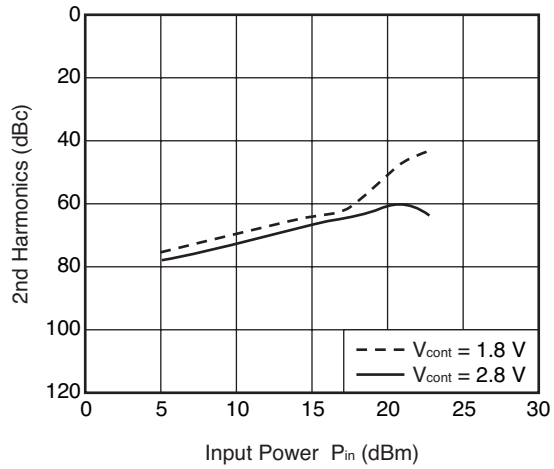


Remark The graphs indicate nominal characteristics.

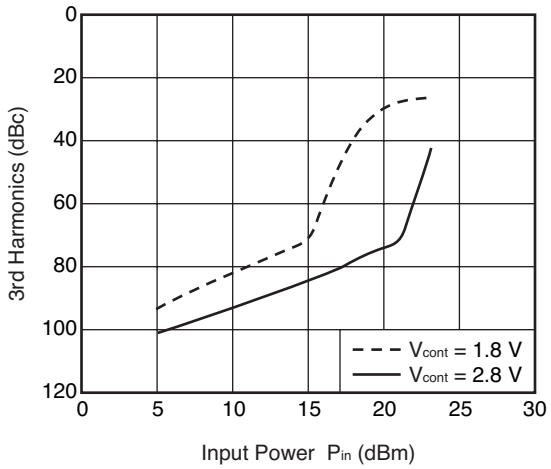
TYPICAL CHARACTERISTICS

(f = 2 GHz, TA = +25ºC, $V_{cont1/2}$ = 0 V/1.8 V, OUT2 side is 50 Ω termination)

RELATION BETWEEN CONTROL VOLTAGE OF 2nd HARMONICS



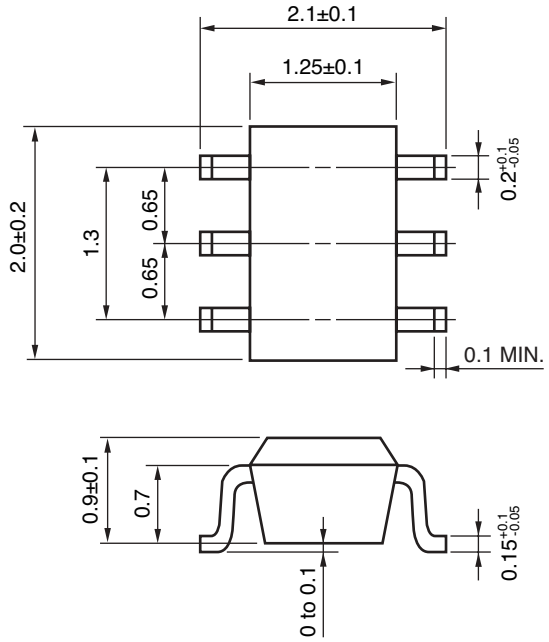
RELATION BETWEEN CONTROL VOLTAGE OF 3rd HARMONICS



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

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

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Authorized Distributor

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