



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

UPG2006TB

FEATURES

- **LOW INSERTION LOSS:**
LINS = 0.3 dB TYP. @ $V_{cont} = 1.8\text{ V/0 V}$, $f = 1\text{ GHz}$
LINS = 0.45 dB TYP. @ $V_{cont} = 1.8\text{ V/0 V}$, $f = 2.5\text{ GHz}$
- **HIGH ISOLATION:**
ISL = 29 dB TYP. @ $V_{cont} = 1.8\text{ V/0 V}$, $f = 2\text{ GHz}$
ISL = 25 dB TYP. @ $V_{cont} = 1.8\text{ V/0 V}$, $f = 2.5\text{ GHz}$
- **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

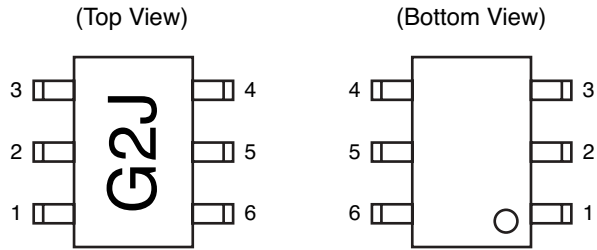
ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
UPG2006TB-E3	6-pin super minimold	G2J	<ul style="list-style-type: none">• 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



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}| ≤ 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

(TA = +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.

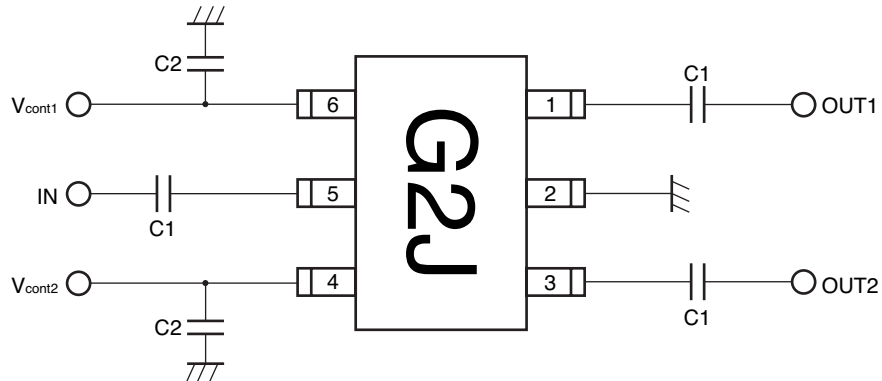
Cautions 1. It is necessary to use DC blocking capacitors for No.1 (OUT1), No.3 (OUT2) and No.5 (IN). The value of DC blocking capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with the actual board of the system.

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

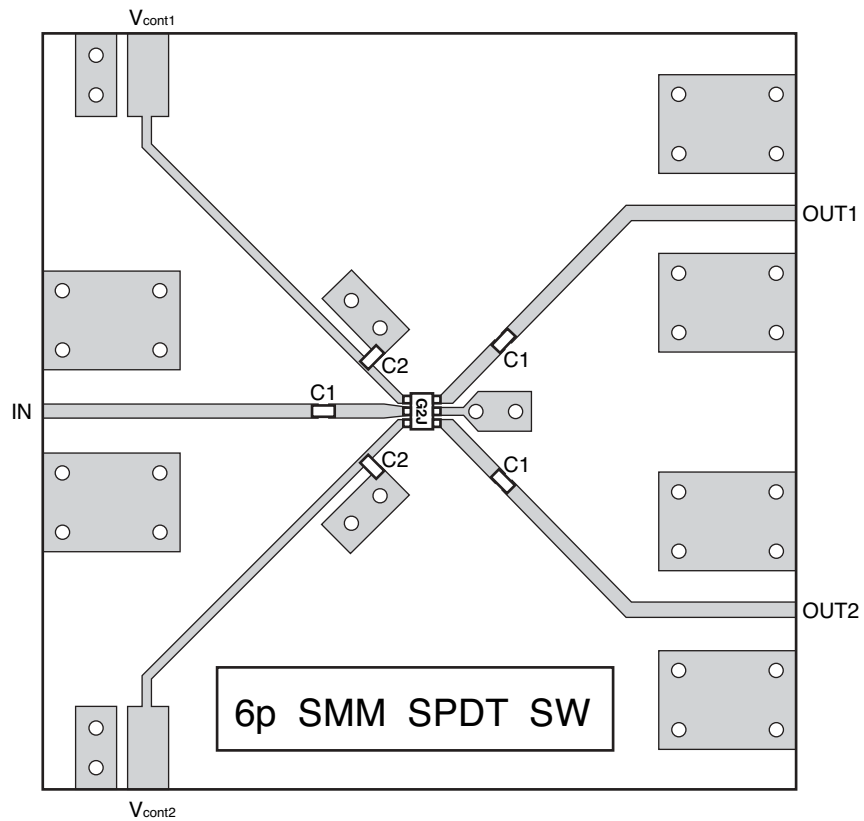
- 2.** The distance between the GND pin and ground pattern of the substrate should be as short as possible to reduce parasitic parameters.

EVALUATION CIRCUIT

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



EVALUATION BOARD



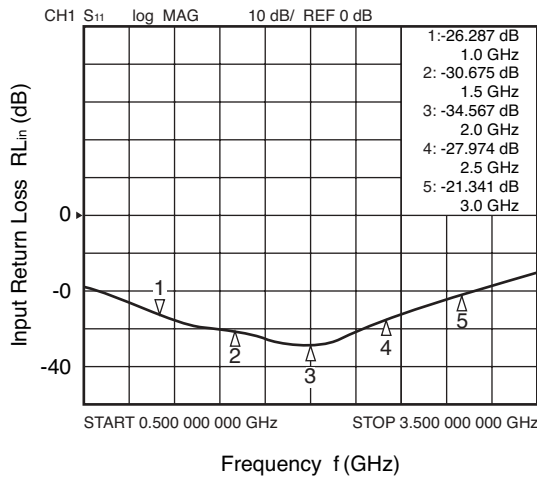
TRUTH TABLE

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

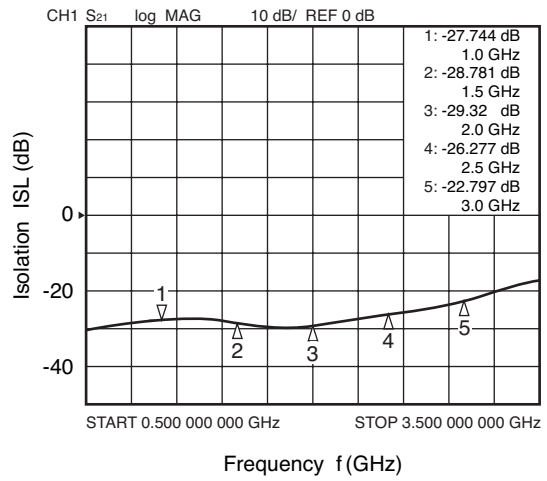
TYPICAL CHARACTERISTICS

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

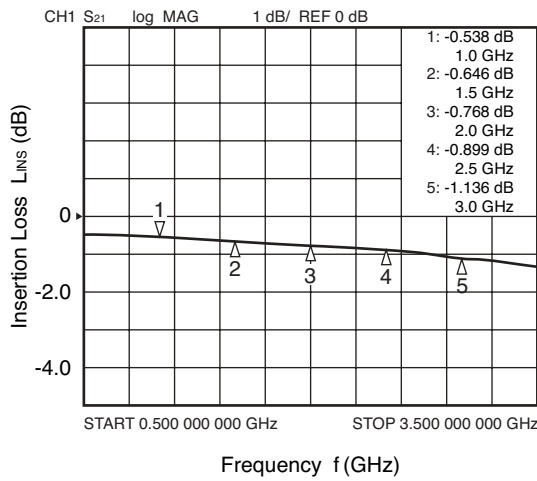
INPUT RETURN LOSS vs. FREQUENCY



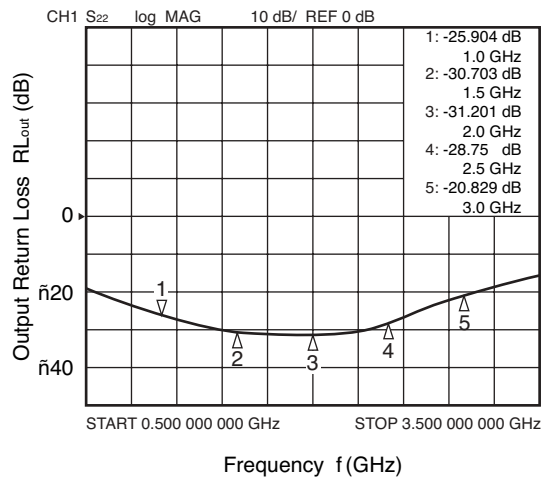
ISOLATION vs. FREQUENCY



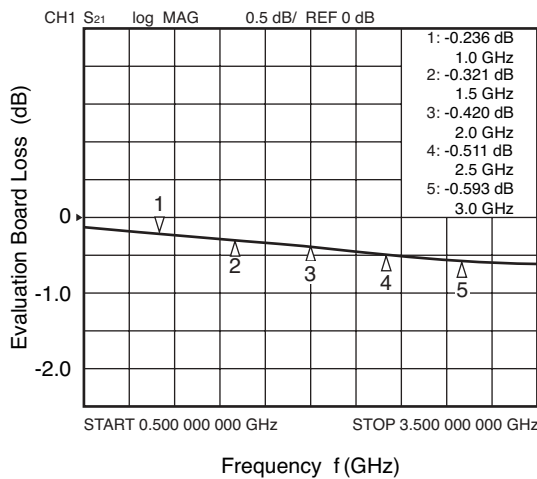
INSERTION LOSS vs. FREQUENCY



OUTPUT RETURN LOSS vs. FREQUENCY



EVALUATION BOARD LOSS vs. FREQUENCY

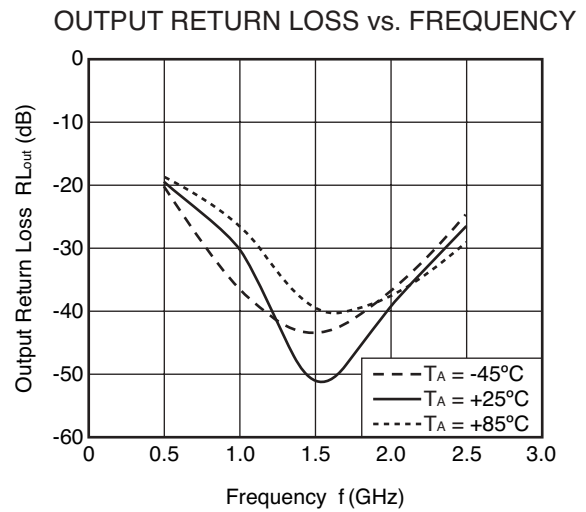
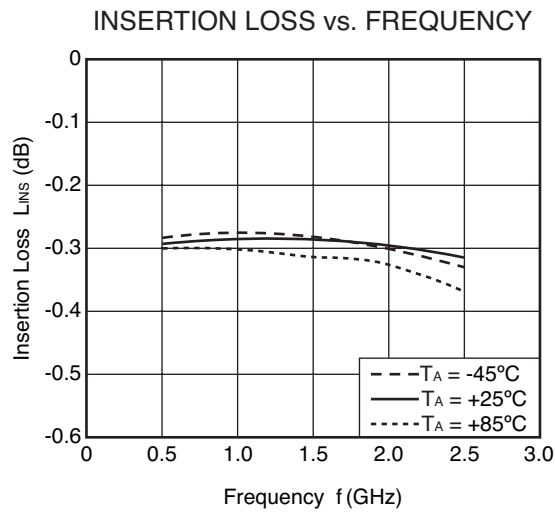
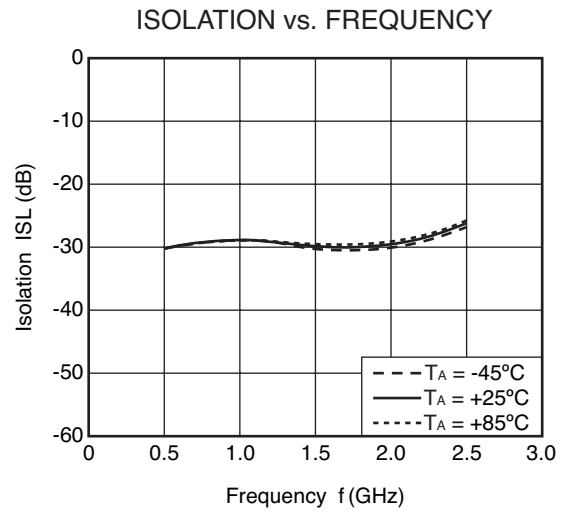
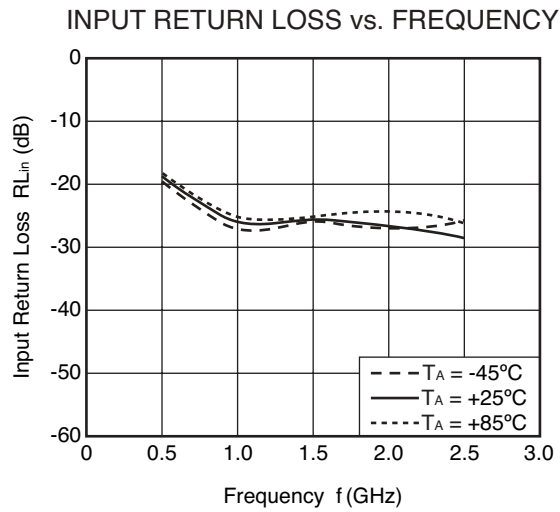


Caution These characteristics values include the losses of the NEC evaluation board.

Remark The graphs indicate nominal characteristics.

TYPICAL CHARACTERISTICS

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

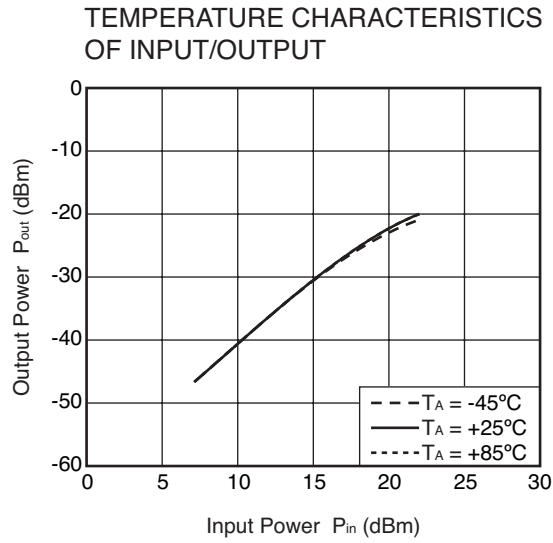


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TYPICAL CHARACTERISTICS

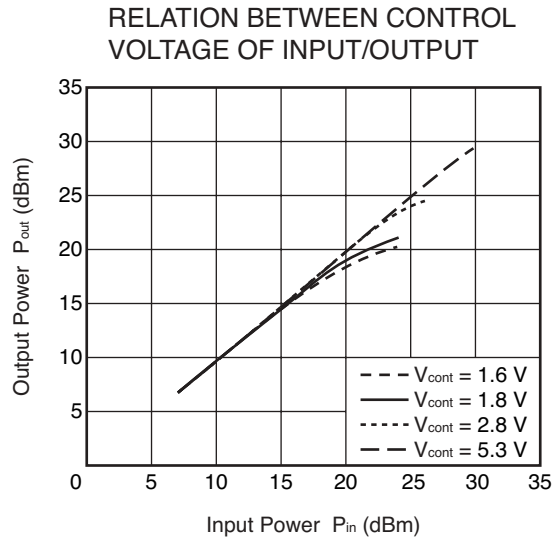
(f = 2 GHz, $V_{cont1/2} = 0$ V/1.8 V, OUT2 side is 50 Ω termination)



Remark The graphs indicate nominal characteristics.

TYPICAL CHARACTERISTICS

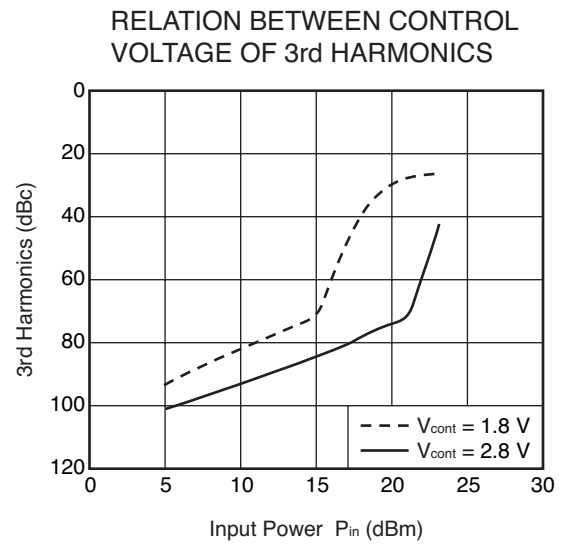
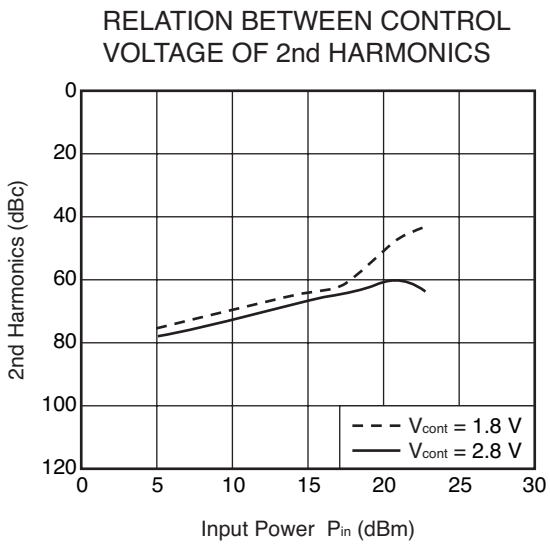
(f = 2 GHz, $T_A = +25^\circ\text{C}$, OUT2 side is 50 Ω termination)



Remark The graphs indicate nominal characteristics.

TYPICAL CHARACTERISTICS

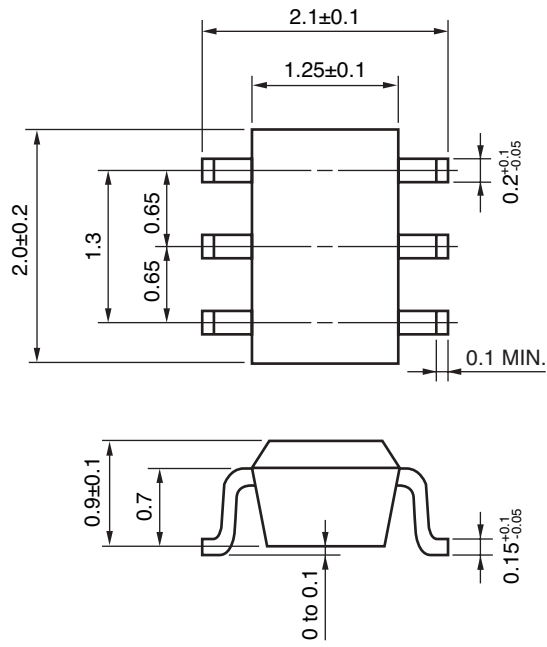
($f = 2$ GHz, $T_A = +25^\circ\text{C}$, $V_{\text{cont}1/2} = 0$ V/1.8 V, OUT2 side is $50\ \Omega$ termination)



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 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	IR260
VPS	Peak temperature (package surface temperature) : 215°C or below 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	VP215
Wave Soldering	Peak temperature (molten solder temperature) : 260°C or below 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	WS260
Partial Heating	Peak temperature (pin temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	HS350

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

Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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