GaAs INTEGRATED CIRCUIT

μPG2179TB

L, S-BAND SPDT SWITCH

DESCRIPTION

The μPG2179TB is a GaAs MMIC for L, S-band SPDT (Single Pole Double Throw) switch which were developed for mobile phone and another L, S-band application. This device can operate 2 control switching by control voltage 2.5 ★ to 5.3 V. This device can operate frequency from 0.05 to 3.0 GHz, having the low insertion loss and high isolation.

This device is housed in a 6-pin super minimold package. And this package is able to high-density surface mounting.

★ FEATURES

- Switch control voltage : $V_{cont\ (H)}$ = 2.5 to 5.3 V (3.0 V TYP.)
  : $V_{cont\ (L)}$ = –0.2 to +0.2 V (0 V TYP.)
- Low insertion loss : L_{ins1} = 0.25 dB TYP. @ f = 0.05 to 1.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : L_{ins2} = 0.30 dB TYP. @ f = 1.0 to 2.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : L_{ins3} = 0.35 dB TYP. @ f = 2.0 to 2.5 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : L_{ins4} = 0.40 dB TYP. @ f = 2.5 to 3.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
- High isolation : ISL1 = 27 dB TYP. @ f = 0.05 to 2.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : ISL2 = 24 dB TYP. @ f = 2.0 to 3.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
- Handling power : $P_{in\ (0.1\ dB)}$ = +29.0 dBm TYP. @ f = 0.5 to 3.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
  : $P_{in\ (1\ dB)}$ = +32.0 dBm TYP. @ f = 0.5 to 3.0 GHz, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V
- High-density surface mounting : 6-pin super minimold package (2.0 × 1.25 × 0.9 mm)

APPLICATIONS

- L, S-band digital cellular or cordless telephone
- PCS, W-LAN, WLL and Bluetooth™ etc.

★ ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μPG2179TB-E4	6-pin super minimold	G4C	• Embossed tape 8 mm wide • Pin 4, 5, 6 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: μPG2179TB

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

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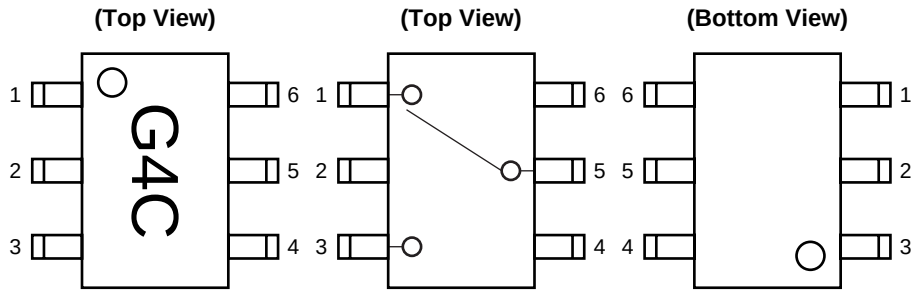
The mark ★ shows major revised points.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



Pin No.	Pin Name
1	OUTPUT1
2	GND
3	OUTPUT2
4	V_{cont2}
5	INPUT
6	V_{cont1}

TRUTH TABLE

V_{cont1}	V_{cont2}	INPUT–OUTPUT1	INPUT–OUTPUT2
Low	High	ON	OFF
High	Low	OFF	ON

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

Parameter	Symbol	Ratings	Unit
Switch Control Voltage	V_{cont}	6.0 Note	V
Input Power	P_{in}	+33	dBm
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, unless otherwise specified)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
★ Switch Control Voltage (H)	$V_{cont\ (H)}$	2.5	3.0	5.3	V
Switch Control Voltage (L)	$V_{cont\ (L)}$	–0.2	0	0.2	V

★ ELECTRICAL CHARACTERISTICS

(T_A = +25°C, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V, DC cut capacitors = 100 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss 1	L_{ins1}	f = 0.05 to 1.0 GHz Note1	–	0.25	0.45	dB
Insertion Loss 2	L_{ins2}	f = 1.0 to 2.0 GHz	–	0.30	0.50	dB
Insertion Loss 3	L_{ins3}	f = 2.0 to 2.5 GHz	–	0.35	0.55	dB
Insertion Loss 4	L_{ins4}	f = 2.5 to 3.0 GHz	–	0.40	0.60	dB
Isolation 1	ISL1	f = 0.05 to 2.0 GHz Note1	23	27	–	dB
Isolation 2	ISL2	f = 2.0 to 3.0 GHz	20	24	–	dB
Input Return Loss	RL_{in}	f = 0.05 to 3.0 GHz Note1	15	20	–	dB
Output Return Loss	RL_{out}	f = 0.05 to 3.0 GHz Note1	15	20	–	dB
0.1 dB Loss Compression Input Power Note2	$P_{in\ (0.1\ dB)}$	f = 2.0 GHz	+25.5	+29.0	–	dBm
		f = 2.5 GHz	+25.5	+29.0	–	dBm
		f = 0.5 to 3.0 GHz	–	+29.0	–	dBm
Switch Control Current	I_{cont}	No signal	–	4	20	μA
Switch Control Speed	t_{sw}	50%CTL to 90/10%RF	–	50	500	ns

Note1. DC cut capacitor = 1 000 pF at f = 0.05 to 0.5 GHz.

2. $P_{in\ (0.1\ dB)}$ is measured the input power level when the insertion loss increases more 0.1 dB than that of linear range.

★ STANDARD CHARACTERISTICS FOR REFERENCE

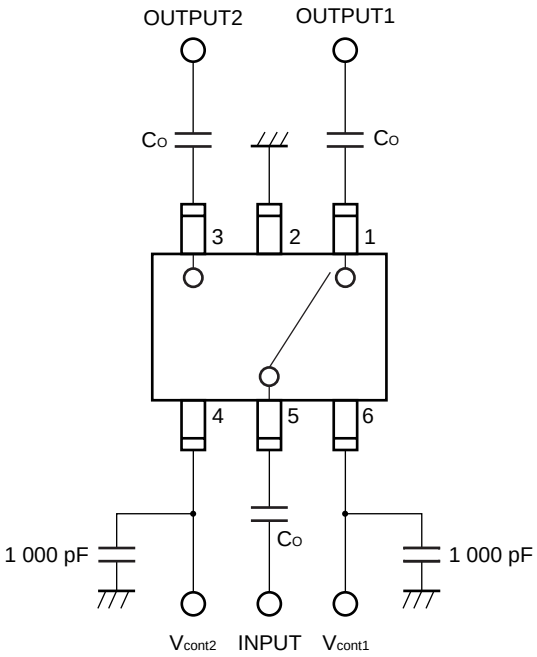
(T_A = +25°C, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V, DC cut capacitors = 100 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
1 dB Loss Compression Input Power Note	$P_{in\ (1\ dB)}$	f = 0.5 to 3.0 GHz	–	+32.0	–	dBm
3rd Order Intermodulation Intercept Point	IIP_3	f = 0.5 to 3.0 GHz, 2 tone, 5 MHz spicing	–	+60.0	–	dBm

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

★ **Caution When using this IC, a DC coupling capacitor must be externally attached to the I/O pins.**
A DC coupling capacitor with a capacitance of 100 pF or lower is recommended when using a frequency of 0.5 GHz or higher, and one with a capacitance of 1,000 pF is recommended when using a frequency of less than 0.5 GHz. The ideal value changes depending on the frequency and bandwidth used, so select a capacitor with a suitable capacitance according to the usage conditions.

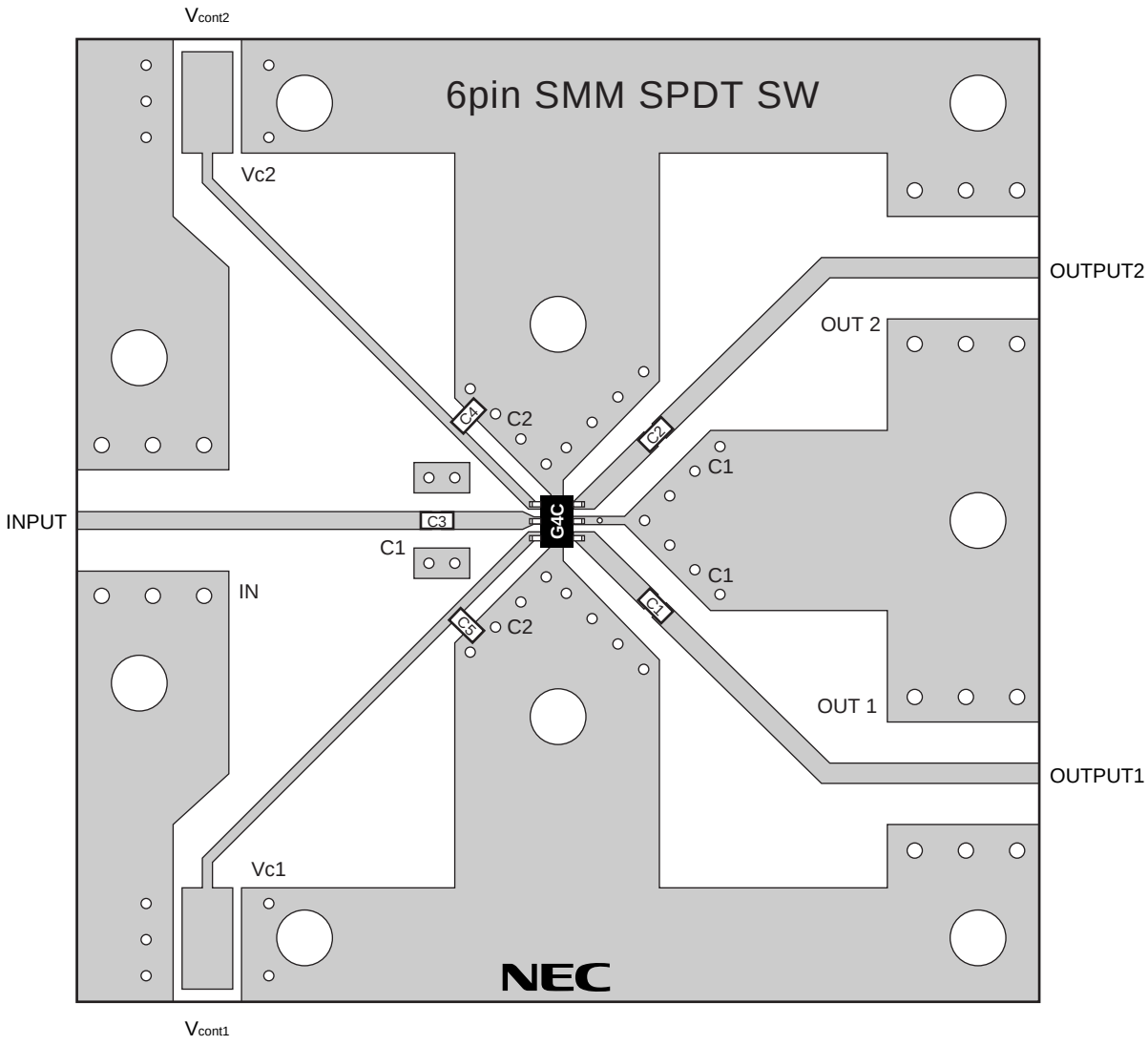
★ EVALUATION CIRCUIT



Remark C_O : 0.05 to 0.5 GHz 1 000 pF
0.5 to 3.0 GHz 100 pF

The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

★ **ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD**



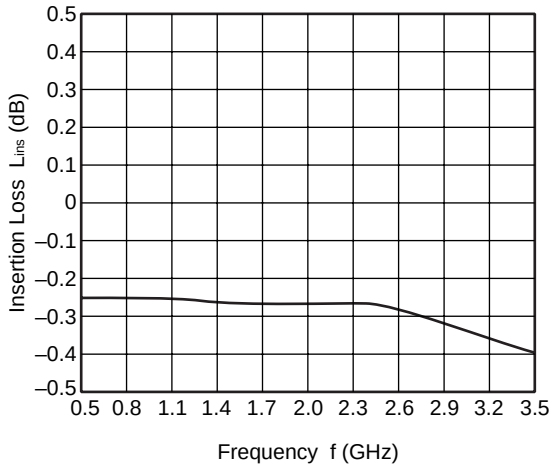
USING THE NEC EVALUATION BOARD

Symbol	Values
C1, C2, C3	100 pF
C4, C5	1 000 pF

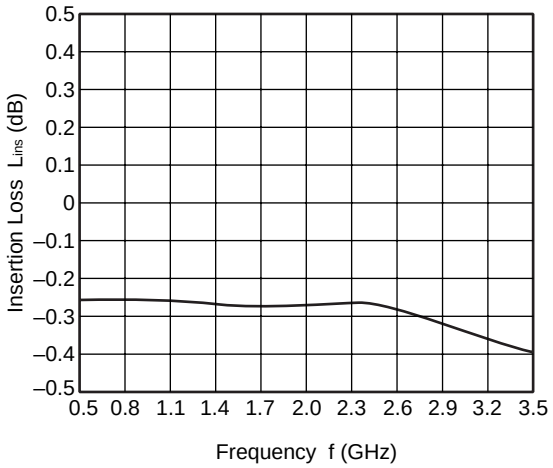
TYPICAL CHARACTERISTICS

★ **(T_A = +25°C, $V_{cont\ (H)}$ = 3.0 V, $V_{cont\ (L)}$ = 0 V, DC cut capacitors = 100 pF, unless otherwise specified)**

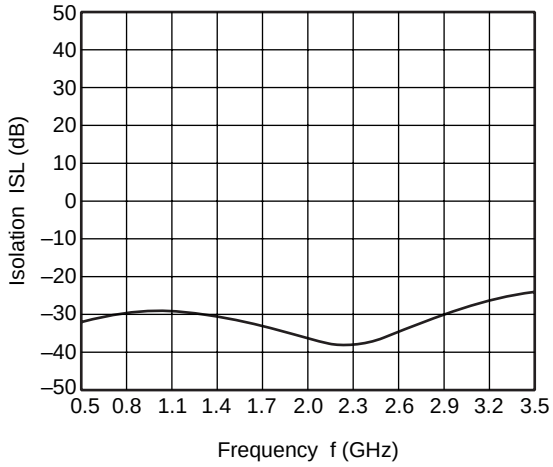
INPUT–OUTPUT1
INSERTION LOSS vs. FREQUENCY



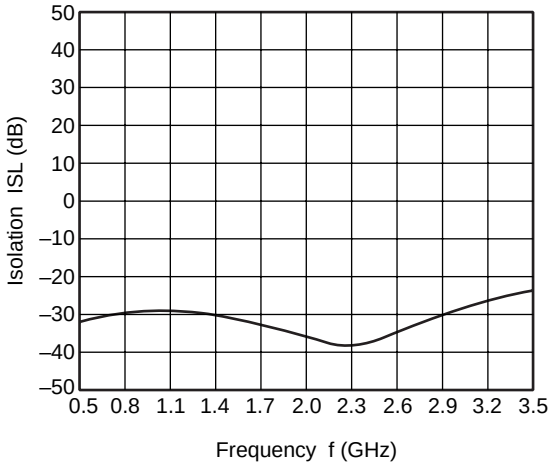
INPUT–OUTPUT2
INSERTION LOSS vs. FREQUENCY



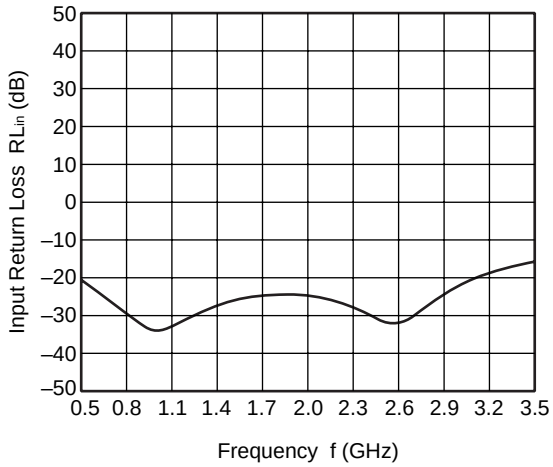
INPUT–OUTPUT1
ISOLATION vs. FREQUENCY



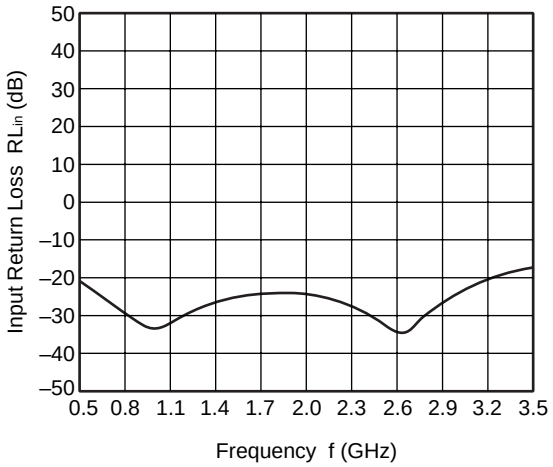
INPUT–OUTPUT2
ISOLATION vs. FREQUENCY



INPUT–OUTPUT1
INPUT RETURN LOSS vs. FREQUENCY

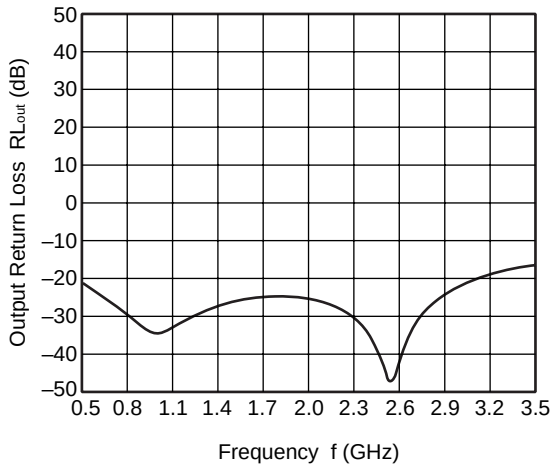


INPUT–OUTPUT2
INPUT RETURN LOSS vs. FREQUENCY

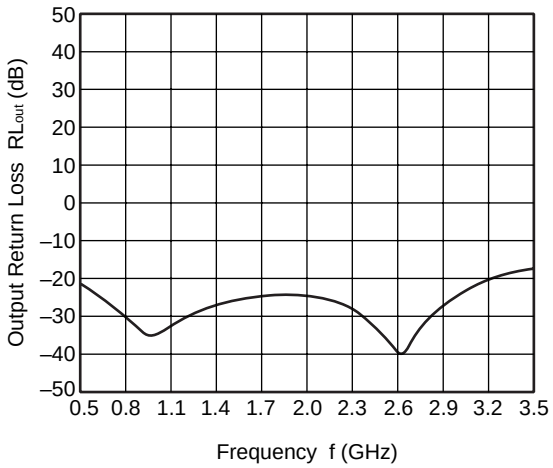


Remark The graphs indicate nominal characteristics.

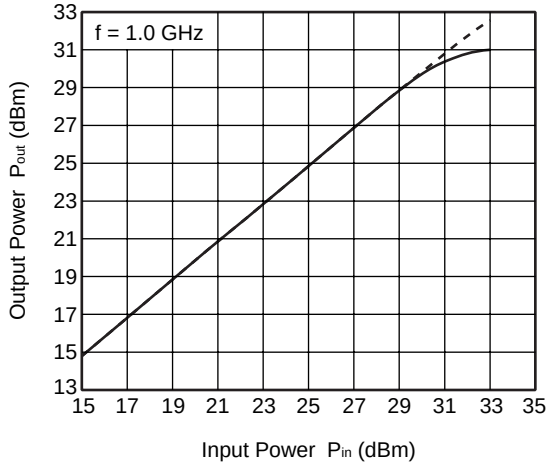
INPUT–OUTPUT1
OUTPUT RETURN LOSS vs. FREQUENCY



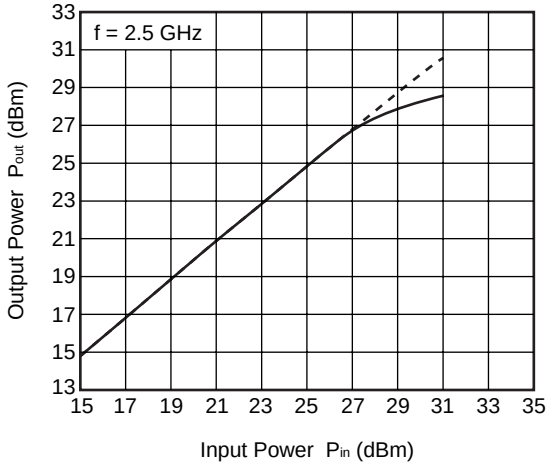
INPUT–OUTPUT2
OUTPUT RETURN LOSS vs. FREQUENCY



OUTPUT POWER vs. INPUT POWER



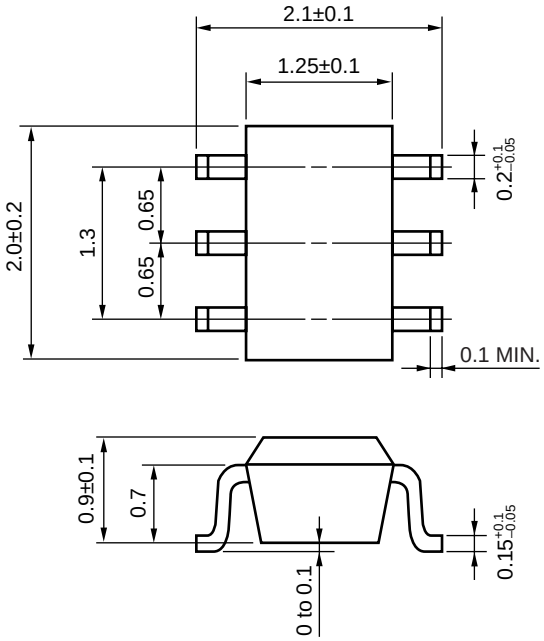
OUTPUT POWER vs. INPUT POWER



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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April 1st, 2010
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