CEL

GaAs INTEGRATED CIRCUIT

μPG2030TK

L, S-BAND SPDT SWITCH

<R> DESCRIPTION

The μPG2030TK is a GaAs MMIC for L, S-band SPDT (Single Pole Double Throw) switch which were developed for mobile phone and other L, S-band applications.

This device can operate 2 control switching by control voltage 2.7 to 5.3 V, at frequencies from 0.5 to 2.5 GHz, having the low insertion loss and high isolation.

This device is housed in a 6-pin lead-less minimold package and is suitable for high-density surface mounting.

FEATURES

<R>
- Switch control voltage : $V_{cont\ (H)}$ = 2.7 to 5.3 V (2.8 V TYP.)
  : $V_{cont\ (L)}$ = −0.2 to +0.2 V (0 V TYP.)
- Low insertion loss : $L_{INS}1$ = 0.25 dB TYP. @ f = 0.5 to 1.0 GHz, V_{cont} = 2.8 V/0 V
  : $L_{INS}2$ = 0.30 dB TYP. @ f = 1.0 to 2.0 GHz, V_{cont} = 2.8 V/0 V
  : $L_{INS}3$ = 0.35 dB TYP. @ f = 2.0 to 2.5 GHz, V_{cont} = 2.8 V/0 V
- High isolation : ISL1 = 27 dB TYP. @ f = 0.5 to 2.0 GHz, V_{cont} = 2.8 V/0 V
  : ISL2 = 24 dB TYP. @ f = 2.0 to 2.5 GHz, V_{cont} = 2.8 V/0 V
- High power : $P_{in\ (0.1\ dB)}$ = +27.0 dBm TYP. @ f = 2.0 GHz, V_{cont} = 2.8 V/0 V
  : $P_{in\ (1\ dB)}$ = +30.0 dBm TYP. @ f = 2.0 GHz, V_{cont} = 2.8 V/0 V (Reference value)
- High-density surface mounting : 6-pin lead-less minimold package (1.5 × 1.1 × 0.55 mm)

APPLICATIONS

- PCS, W-LAN, WLL and Bluetooth™ etc.

<R> ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPG2030TK-E2	μPG2030TK-E2-A	6-pin lead-less minimold (1511 PKG) (Pb-free)	G3R	• Embossed tape 8 mm wide • Pin 1, 6 face the perforation side of the tape • Qty 5 kpcs/reel

Remark To order evaluation samples, please contact your nearby sales office.
Part number for sample order: μPG2030TK-A

Caution Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

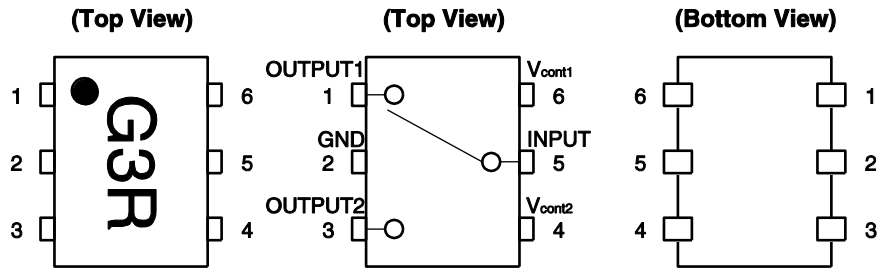
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Date Published August 2009 NS

The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

<R> 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
<R> 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

<R> **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
<R> Switch Control Voltage (H)	$V_{cont\ (H)}$	2.7	2.8	5.3	V
Switch Control Voltage (L)	$V_{cont\ (L)}$	–0.2	0	0.2	V

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{cont} = 2.8 V/0 V, DC cut capacitors = 56 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss 1	$L_{INS}1$	f = 0.5 to 1.0 GHz	–	0.25	0.45	dB
Insertion Loss 2	$L_{INS}2$	f = 1.0 to 2.0 GHz	–	0.30	0.50	dB
Insertion Loss 3	$L_{INS}3$	f = 2.0 to 2.5 GHz	–	0.35	0.55	dB
Isolation 1	ISL1	f = 0.5 to 2.0 GHz	23	27	–	dB
Isolation 2	ISL2	f = 2.0 to 2.5 GHz	20	24	–	dB
Input Return Loss	RL_{in}	f = 0.5 to 2.5 GHz	15	20	–	dB
Output Return Loss	RL_{out}	f = 0.5 to 2.5 GHz	15	20	–	dB
0.1 dB Gain Compression Input Power [Note]	$P_{in\ (0.1\ dB)}$	f = 2.0 GHz	+25.5	+27.0	–	dBm
		f = 2.5 GHz	+25.5	+27.0	–	dBm
Switch Control Current	I_{cont}	No signal	–	4	20	μA
Switch Control Speed	t_{SW}		–	50	500	ns

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

STANDARD CHARACTERISTICS FOR REFERENCE

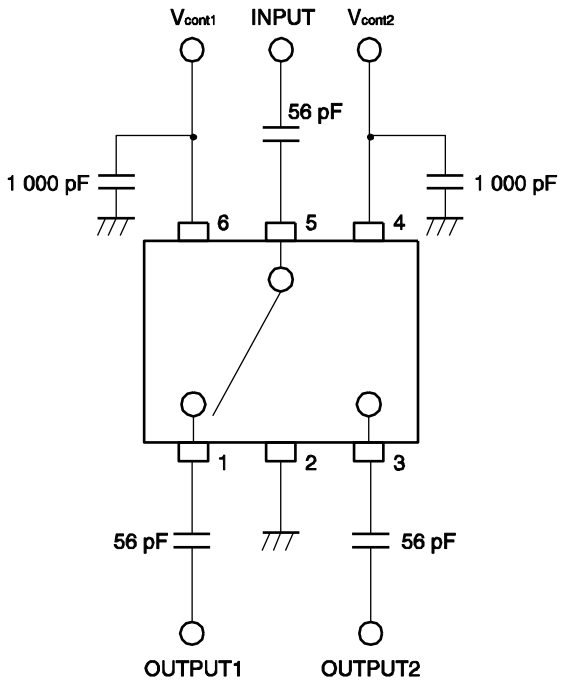
(T_A = +25°C, V_{cont} = 2.8 V/0 V, DC cut capacitors = 56 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
1 dB Gain Compression Input Power [Note]	$P_{in\ (1\ dB)}$	f = 2.0 GHz	–	+30.0	–	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.

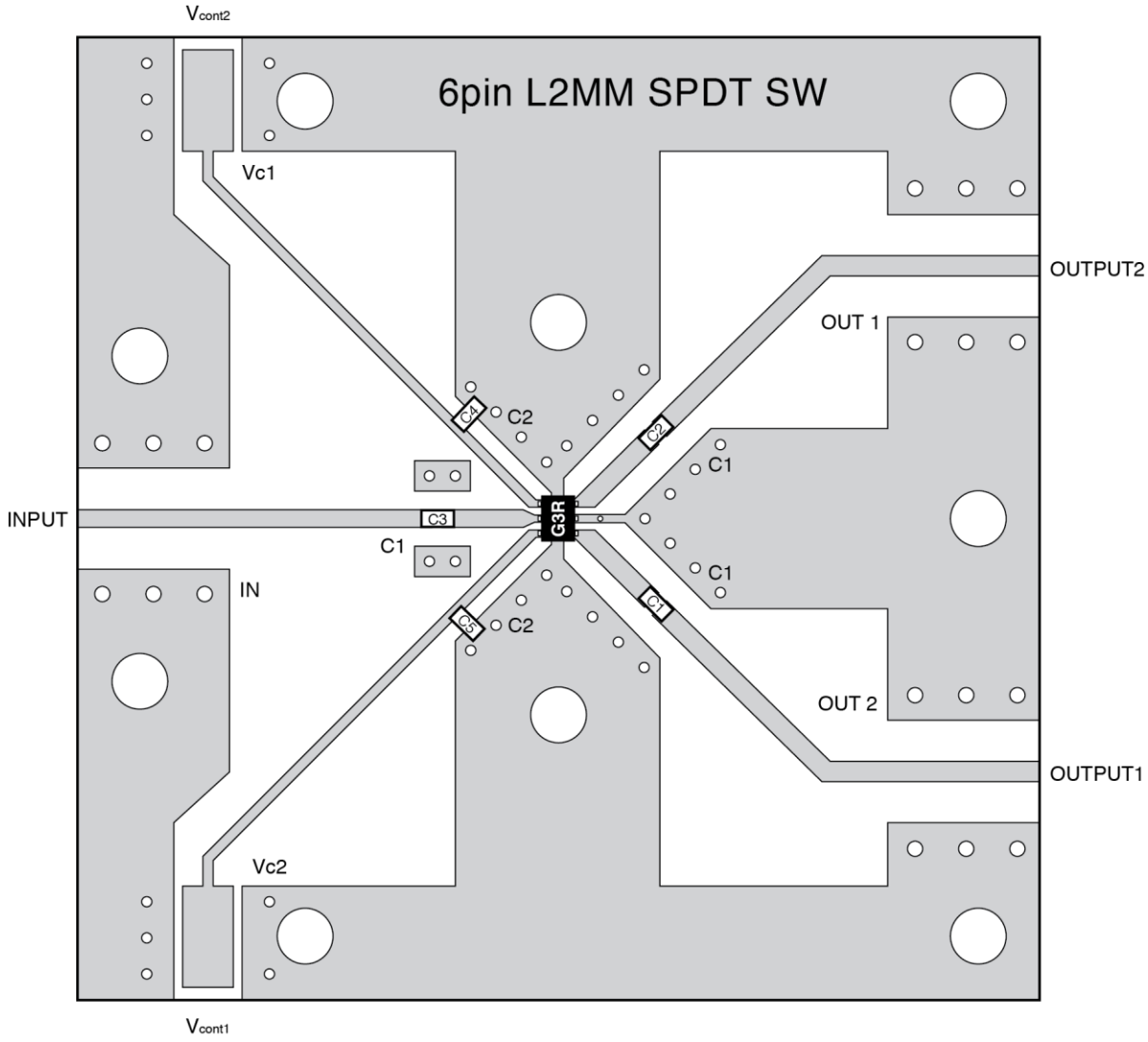
Caution This device is used it is necessary to use DC cut capacitors.
The value of DC cut capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system. The range of recommended DC cut capacitor value is less than 100 pF.

EVALUATION CIRCUIT (V_{cont} = 2.8 V/0 V, DC cut capacitors = 56 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



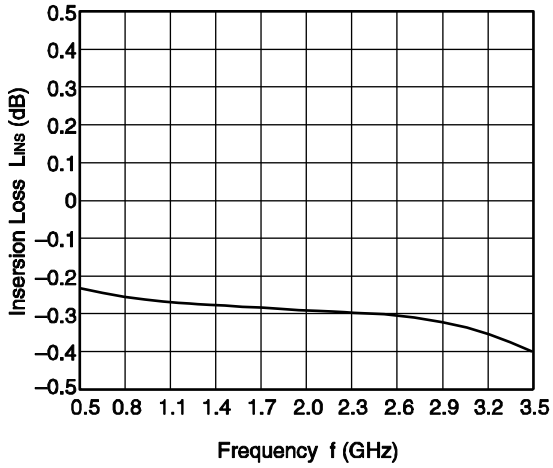
USING THE EVALUATION BOARD

Symbol	Values
C1, C2, C3	56 pF
C4, C5	1 000 pF

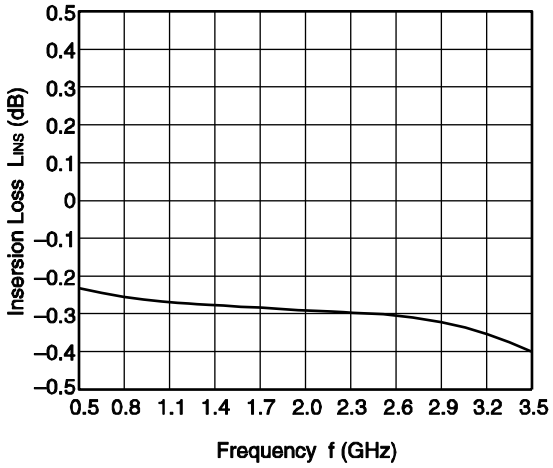
TYPICAL CHARACTERISTICS

(T_A = +25°C, V_{cont} = 2.8 V/0 V, DC cut capacitors = 56 pF, unless otherwise specified)

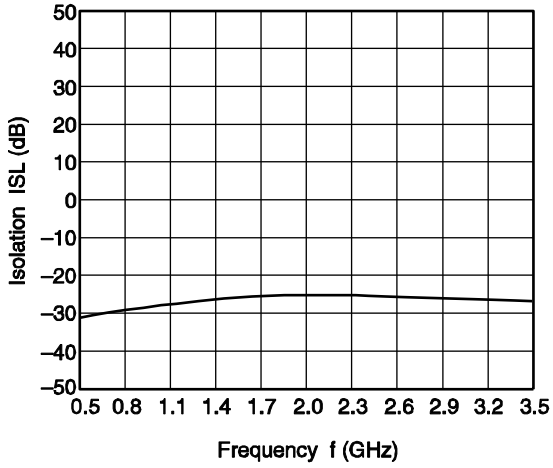
INPUT–OUTPUT1 •
INSERSION LOSS vs. FREQUENCY



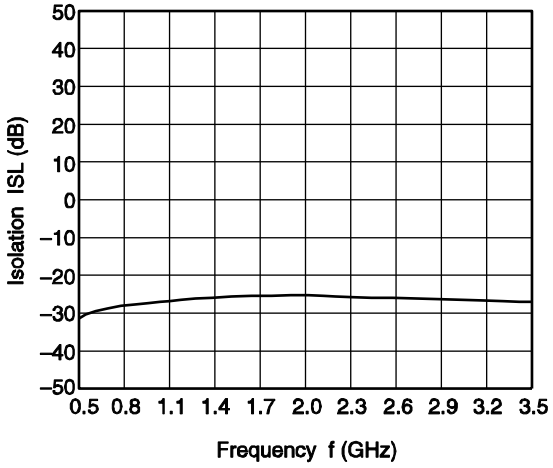
INPUT–OUTPUT2 •
INSERSION LOSS vs. FREQUENCY



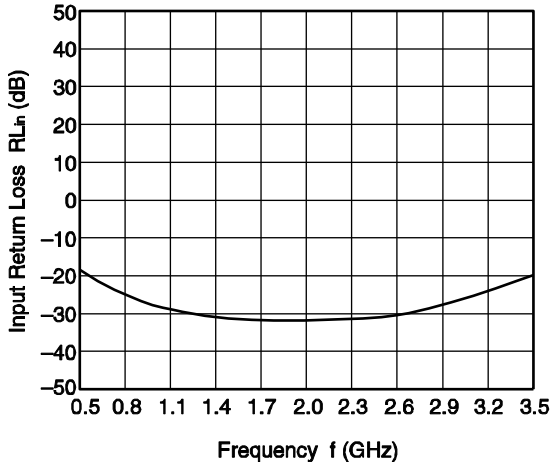
INPUT–OUTPUT1 •
ISOLATION vs. FREQUENCY



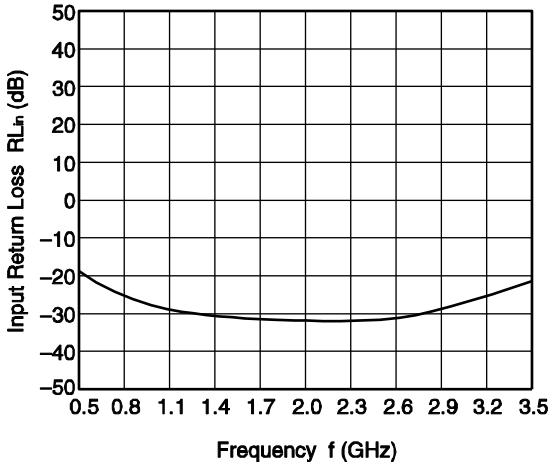
INPUT–OUTPUT2 •
ISOLATION vs. FREQUENCY



INPUT–OUTPUT1 •
INPUT RETURN LOSS vs. FREQUENCY

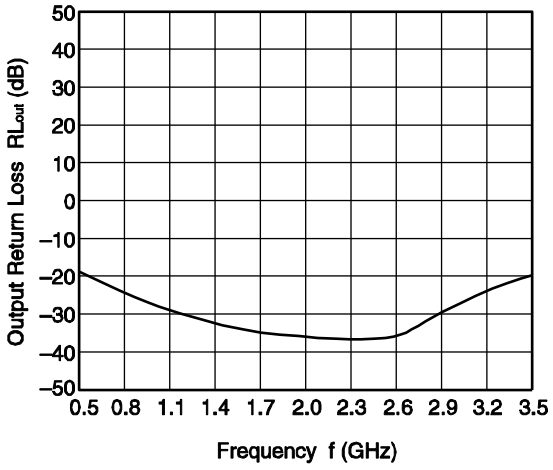


INPUT–OUTPUT2 •
INPUT RETURN LOSS vs. FREQUENCY

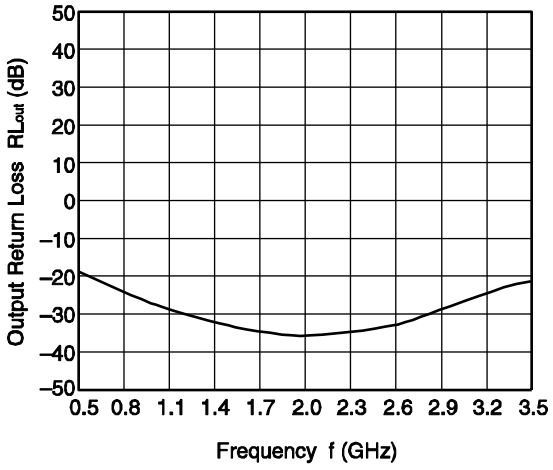


Remark The graphs indicate nominal characteristics.

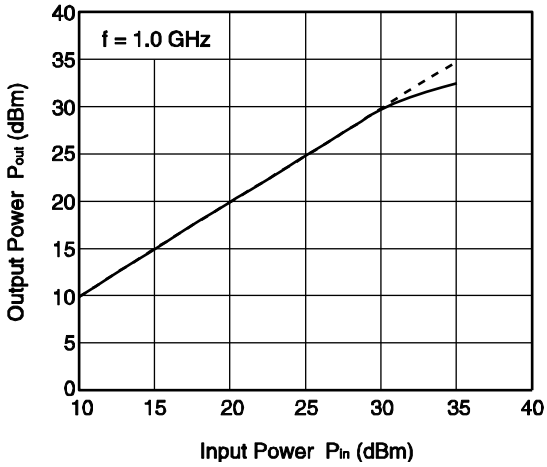
INPUT–OUTPUT1 •
OUTPUT RETURN LOSS vs. FREQUENCY



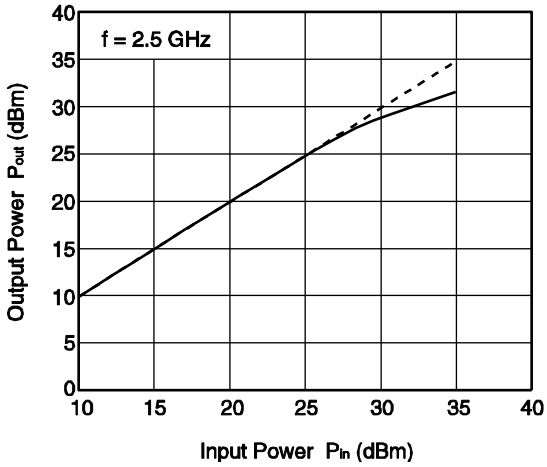
INPUT–OUTPUT2
OUTPUT RETURN LOSS vs. FREQUENCY



OUTPUT POWER vs. INPUT POWER



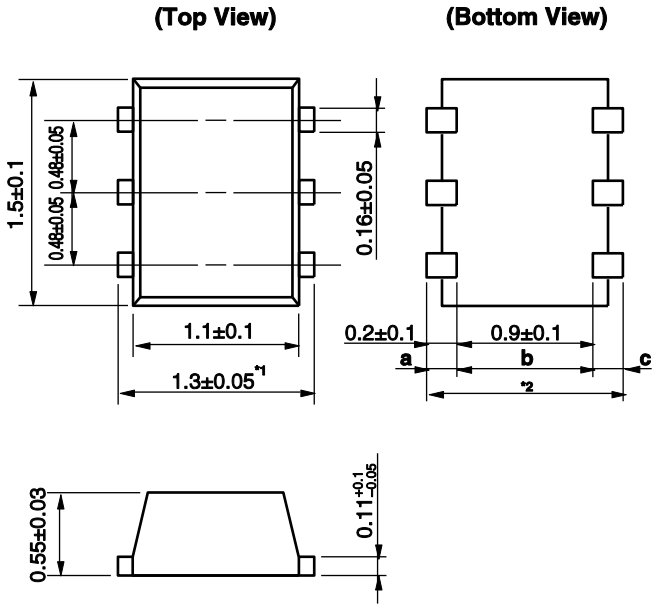
OUTPUT POWER vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

<R> **PACKAGE DIMENSIONS**

6-PIN LEAD-LESS MINIMOLD (1511 PKG) (UNIT: mm)



Remark Dimension*1 is bigger than dimension*2 (dimension*2 = **a** + **b** + **c**).

<R> **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
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).

Caution GaAs Products	This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points. • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.

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