NEC

GaAs INTEGRATED CIRCUIT

μPG2010TB

L-BAND SPDT SWITCH

DESCRIPTION

The μPG2010TB is GaAs MMIC for L-band SPDT (Single Pole Double Throw) switch which were developed for mobile phone and another L-band application.

This device can operate frequency from 0.5 to 2.5 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

- Supply voltage : V_{DD} = 2.7 to 3.0 V (2.8 V TYP.)
- Switch control voltage : $V_{cont\ (H)}$ = 2.7 to 3.0 V (2.8 V TYP.)
  : $V_{cont\ (L)}$ = −0.2 to +0.2 V (0 V TYP.)
- Low insertion loss : L_{INS1} = 0.25 dB TYP. @ f = 0.5 to 1.0 GHz, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V
  : L_{INS2} = 0.30 dB TYP. @ f = 2.0 GHz, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V
  : L_{INS3} = 0.35 dB TYP. @ f = 2.5 GHz, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V (Reference value)
- High isolation : ISL1 = 28 dB TYP. @ f = 0.5 to 2.0 GHz, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V
  : ISL2 = 25 dB TYP. @ f = 2.5 GHz, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V (Reference value)
- High power : $P_{in\ (0.1\ dB)}$ = +33.0 dBm TYP. @ f = 1.0 GHz, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V
- High-density surface mounting : 6-pin super minimold package (2.0 × 1.25 × 0.9 mm)

APPLICATIONS

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

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μPG2010TB-E3	6-pin super minimold	G2Y	• 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: μPG2010TB

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

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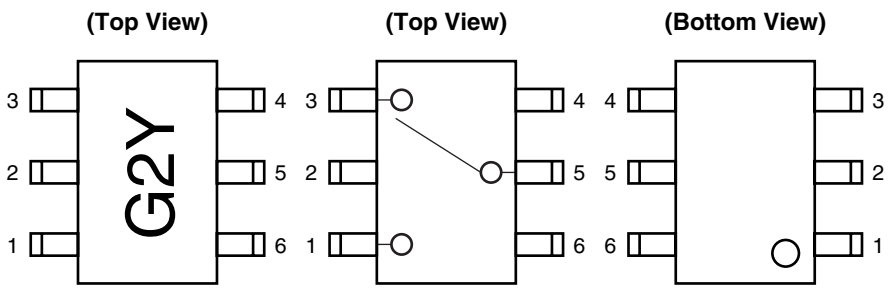
The mark ★ shows major revised points.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



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

TRUTH TABLE

V_{cont}	INPUT–OUTPUT1	INPUT–OUTPUT2
Low	ON	OFF
High	OFF	ON

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

Parameter	Symbol	Ratings	Unit
Supply Voltage	V_{DD}	6.0	V
Switch Control Voltage	V_{cont}	6.0	V
Input Power	P_{in}	+36	dBm
Power Dissipation	P_D	150 Note	mW
Operating Ambient Temperature	T_A	–45 to +85	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note Mounted on double-sided copper-clad 50 × 50 × 1.6 mm epoxy glass PWB, T_A = +85°C

RECOMMENDED OPERATING RANGE (T_A = +25°C, unless otherwise specified)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V_{DD}	2.7	2.8	3.0	V
Switch Control Voltage (H)	$V_{cont\ (H)}$	2.7	2.8	3.0	V
Switch Control Voltage (L)	$V_{cont\ (L)}$	–0.2	0	0.2	V

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{DD} = 2.8 V, 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_{INS1}	f = 0.5 to 1.0 GHz	–	0.25	0.45	dB
Insertion Loss 2	L_{INS2}	f = 2.0 GHz	–	0.30	0.50	dB
Isolation 1	ISL1	f = 0.5 to 2.0 GHz	24	28	–	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 = 1.0 GHz	+31.5	+33.0	–	dBm
2nd Harmonics	$2f_0$	f = 1.0 GHz, P_{in} = +30.5 dBm	65	75	–	dBc
3rd Harmonics	$3f_0$	f = 1.0 GHz, P_{in} = +30.5 dBm	65	75	–	dBc
Supply Current	I_{DD}		–	50	100	μA
Switch Control Current	I_{cont}		–	4	20	μA

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.

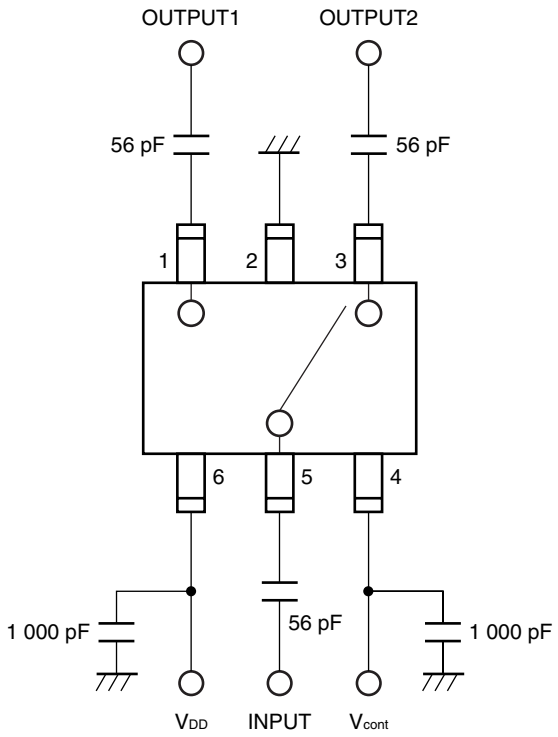
STANDARD CHARACTERISTICS FOR REFERENCE

(T_A = +25°C, V_{DD} = 2.8 V, 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 3	L_{INS3}	f = 2.5 GHz	–	0.35	–	dB
Isolation 2	ISL2	f = 2.5 GHz	–	25	–	dB
Switch Control Speed	t_{SW}		–	1	–	μs

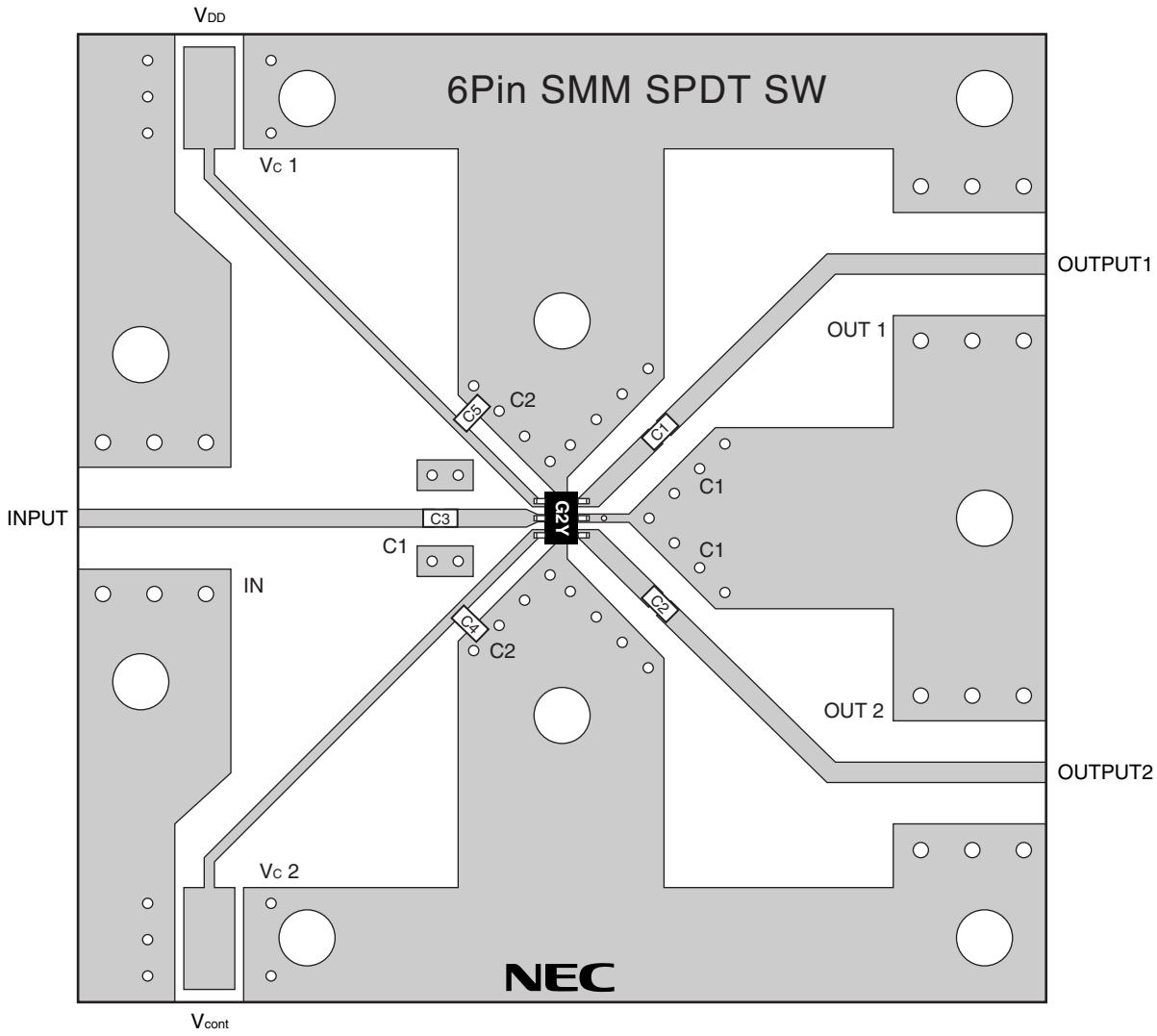
Caution This device is used it is necessary to use DC cut capacitors.
The value of DC cut capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system. The range of recommended DC cut capacitor value is less than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

EVALUATION CIRCUIT (V_{DD} = 2.8 V, 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



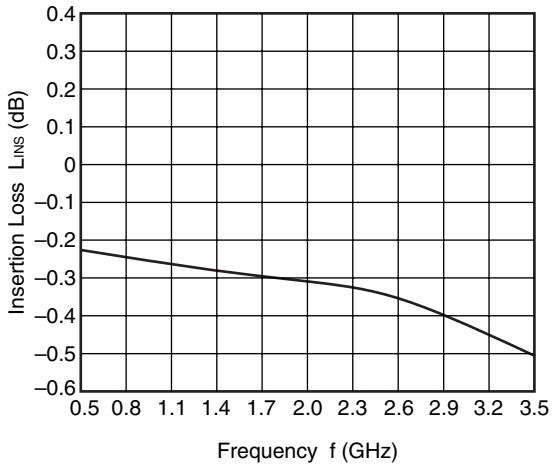
USING THE NEC EVALUATION BOARD

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

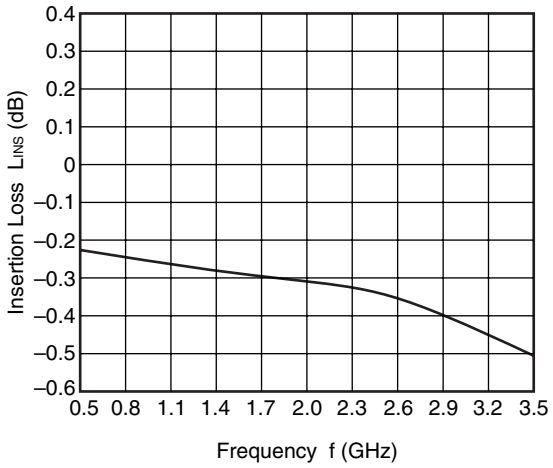
★ TYPICAL CHARACTERISTICS

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

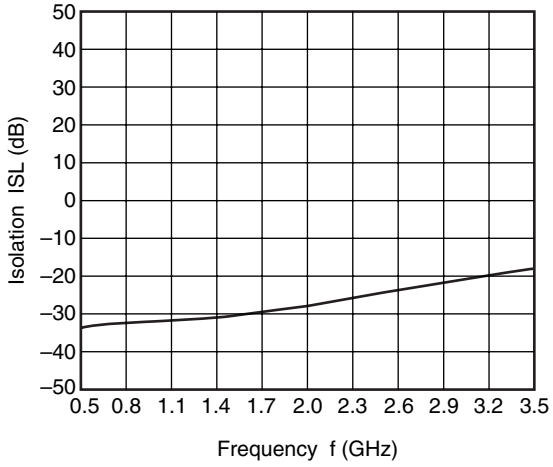
INPUT–OUTPUT1
INSERTION LOSS vs. FREQUENCY



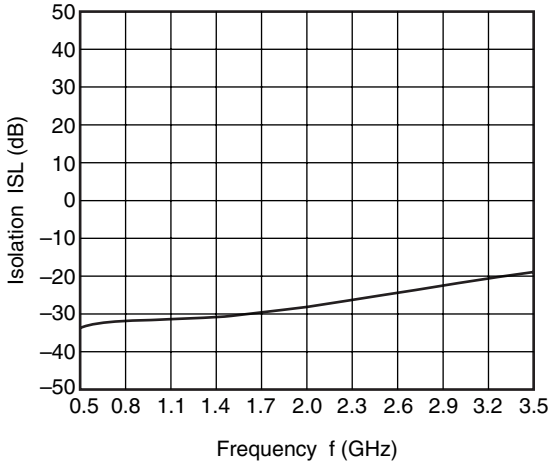
INPUT–OUTPUT2
INSERTION LOSS vs. FREQUENCY



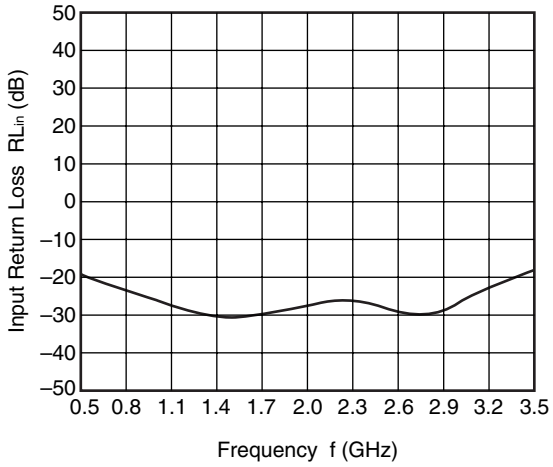
INPUT–OUTPUT1
ISOLATION vs. FREQUENCY



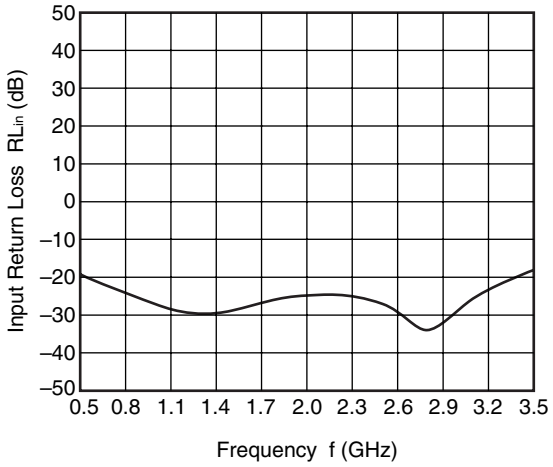
INPUT–OUTPUT2
ISOLATION vs. FREQUENCY



INPUT–OUTPUT1
INPUT RETURN LOSS vs. FREQUENCY

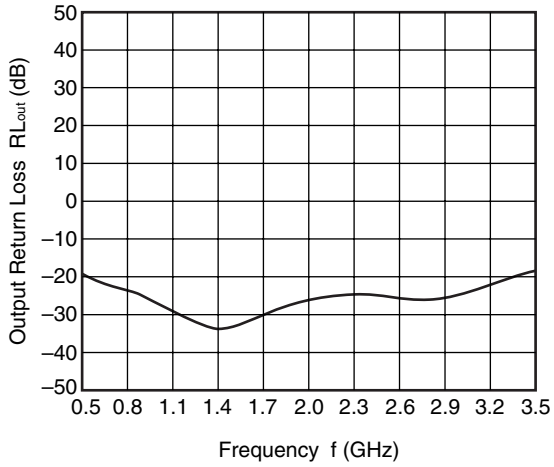


INPUT–OUTPUT2
INPUT RETURN LOSS vs. FREQUENCY

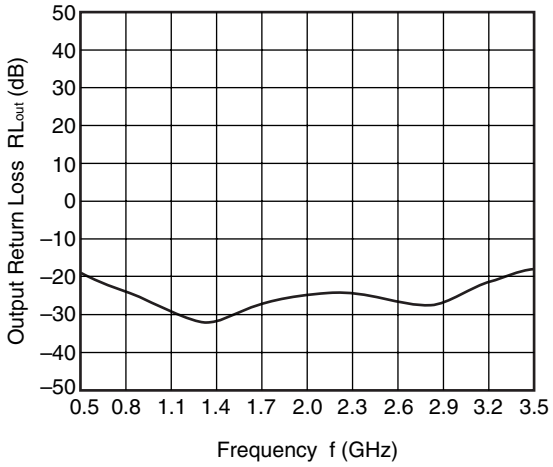


Remark The graphs indicate nominal characteristics.

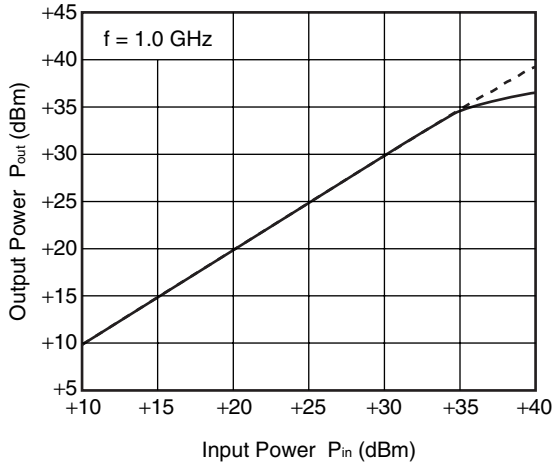
INPUT–OUTPUT1
OUTPUT RETURN LOSS vs. FREQUENCY



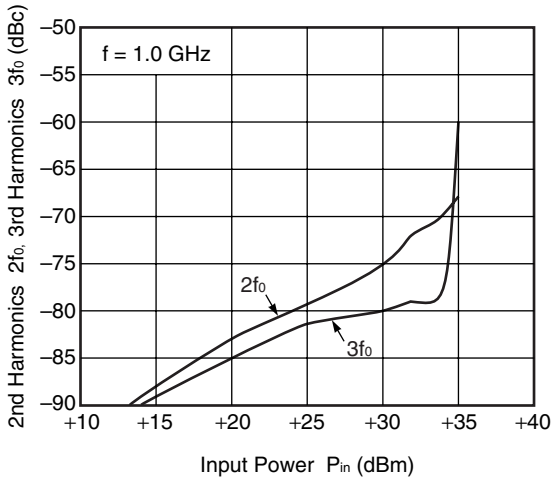
INPUT–OUTPUT2
OUTPUT RETURN LOSS vs. FREQUENCY



OUTPUT POWER vs. INPUT POWER



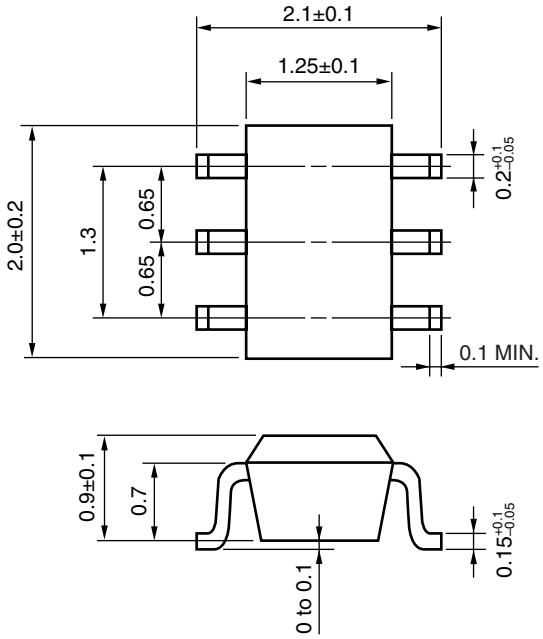
2ND HARMONICS, 3RD HARMONICS
vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN SUPTER 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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▶**For further information, please contact**

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