DATA SHEET

NEC

CMOS INTEGRATED CIRCUIT

μPD5710TK

WIDE BAND SPDT SWITCH

DESCRIPTION

The μPD5710TK is a CMOS MMIC for wide band SPDT (Single Pole Double Throw) switch which were developed for mobile communications, wireless communications and another general-purpose RF switching application.

This device can operate frequency from DC to 2.5 GHz, having the low insertion loss and high isolation.

This device is housed in a 6-pin lead-less minimold (1511) package. And this package is able to high-density surface mounting.

FEATURES

- Supply voltage : V_{DD} = 1.8 to 3.3 V (2.8 V TYP.)
- Switch control voltage : $V_{cont\ (H)}$ = 1.8 to 3.3 V (2.8 V TYP.)
  : $V_{cont\ (L)}$ = –0.2 to +0.2 V (0 V TYP.)
- Low insertion loss : L_{ins1} = 0.6 dB TYP. @ f = DC to 1.0 GHz, V_{DD} = 2.8 V, $V_{cont\ (H)}$ = 2.8 V, $V_{cont\ (L)}$ = 0 V
  : L_{ins2} = 0.8 dB TYP. @ f = 1.0 to 2.0 GHz, V_{DD} = 2.8 V, $V_{cont\ (H)}$ = 2.8 V, $V_{cont\ (L)}$ = 0 V
  : L_{ins3} = 0.95 dB TYP. @ f = 2.0 to 2.5 GHz, V_{DD} = 2.8 V, $V_{cont\ (H)}$ = 2.8 V, $V_{cont\ (L)}$ = 0 V
- High isolation : ISL1 = 32.5 dB TYP. @ f = DC to 1.0 GHz, V_{DD} = 2.8 V, $V_{cont\ (H)}$ = 2.8 V, $V_{cont\ (L)}$ = 0 V
  : ISL2 = 25 dB TYP. @ f = 1.0 to 2.0 GHz, V_{DD} = 2.8 V, $V_{cont\ (H)}$ = 2.8 V, $V_{cont\ (L)}$ = 0 V
  : ISL3 = 22.5 dB TYP. @ f = 2.0 to 2.5 GHz, V_{DD} = 2.8 V, $V_{cont\ (H)}$ = 2.8 V, $V_{cont\ (L)}$ = 0 V
- Handling power : $P_{in\ (0.1\ dB)}$ = +17.0 dBm TYP. @ f = 1.0 GHz, V_{DD} = 2.8 V, $V_{cont\ (H)}$ = 2.8 V, $V_{cont\ (L)}$ = 0 V
  : $P_{in\ (1\ dB)}$ = +21.0 dBm TYP. @ f = 1.0 GHz, V_{DD} = 2.8 V, $V_{cont\ (H)}$ = 2.8 V, $V_{cont\ (L)}$ = 0 V
- High-density surface mounting : 6-pin lead-less minimold package (1.5 × 1.1 × 0.55 mm)

APPLICATIONS

- Mobile communications
- Wireless communications
- Another general-purpose RF switching applications

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μPD5710TK-E2	6-pin lead-less minimold (1511)	C3L	• Embossed tape 8 mm wide • Pin 1, 6 face the perforation side of the tape • Qty 5 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPD5710TK

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

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

Document No. PU10492EJ02V0DS (2nd edition)
Date Published May 2004 CP(K)
Printed in Japan

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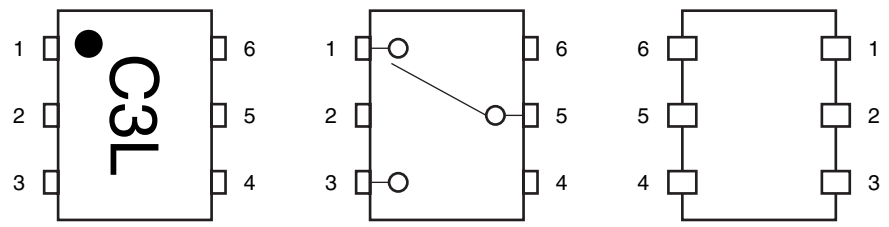
PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

(Top View) (Top View) (Bottom View)



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	OFF	ON
High	ON	OFF

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

Parameter	Symbol	Ratings	Unit
Supply Voltage	V_{DD}	+4.6	V
Switch Control Voltage	V_{cont}	+4.6	V
Continuous Current	I_{DC}	60	mA
Input Power	P_{in}	+23	dBm
Operating Ambient Temperature	T_A	–45 to +85	°C
Storage Temperature	T_{stg}	–65 to +150	°C

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

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V_{DD}	+1.8	+2.8	+3.3	V
Switch Control Voltage (H)	$V_{cont (H)}$	+1.8	+2.8	+3.3	V
Switch Control Voltage (L)	$V_{cont (L)}$	–0.2	0	+0.2	V

Remark $|V_{cont (H)} - V_{DD}| \leq 0.1$ V

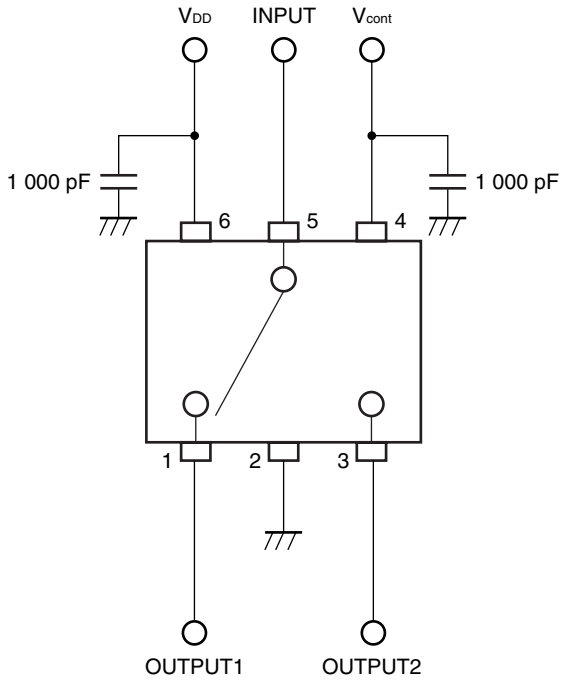
ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{DD} = 2.8 V, $V_{cont\,(H)}$ = 2.8 V, $V_{cont\,(L)}$ = 0 V, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss 1	L_{ins1}	f = DC to 1.0 GHz	–	0.6	0.8	dB
Insertion Loss 2	L_{ins2}	f = 1.0 to 2.0 GHz	–	0.8	1.0	dB
Insertion Loss 3	L_{ins3}	f = 2.0 to 2.5 GHz	–	0.95	1.2	dB
Isolation 1	ISL1	f = DC to 1.0 GHz	30	32.5	–	dB
Isolation 2	ISL2	f = 1.0 to 2.0 GHz	22	25	–	dB
Isolation 3	ISL3	f = 2.0 to 2.5 GHz	–	22.5	–	dB
Input Return Loss	RL_{in}	f = DC to 2.5 GHz	15	20	–	dB
Output Return Loss	RL_{out}	f = DC to 2.5 GHz	15	20	–	dB
0.1 dB Loss Compression Input Power[Note]	$P_{in\,(0.1\,dB)}$	f = 1.0 GHz	+13.5	+17.0	–	dBm
1 dB Loss Compression Input Power[Note]	$P_{in\,(1\,dB)}$	f = 1.0 GHz	–	+21.0	–	dBm
Intermodulation Intercept Point	IIP_3	2 tone, 1.000/1.001 GHz, 1 MHz spicing	–	+33.0	–	dBm
Supply Voltage	I_{DD}	RF None	–	0.01	1.0	μA
Switch Control Current	I_{cont}	RF None	–	0.01	1.0	μA
Switch Control Speed	t_{SW}		–	30	50	ns

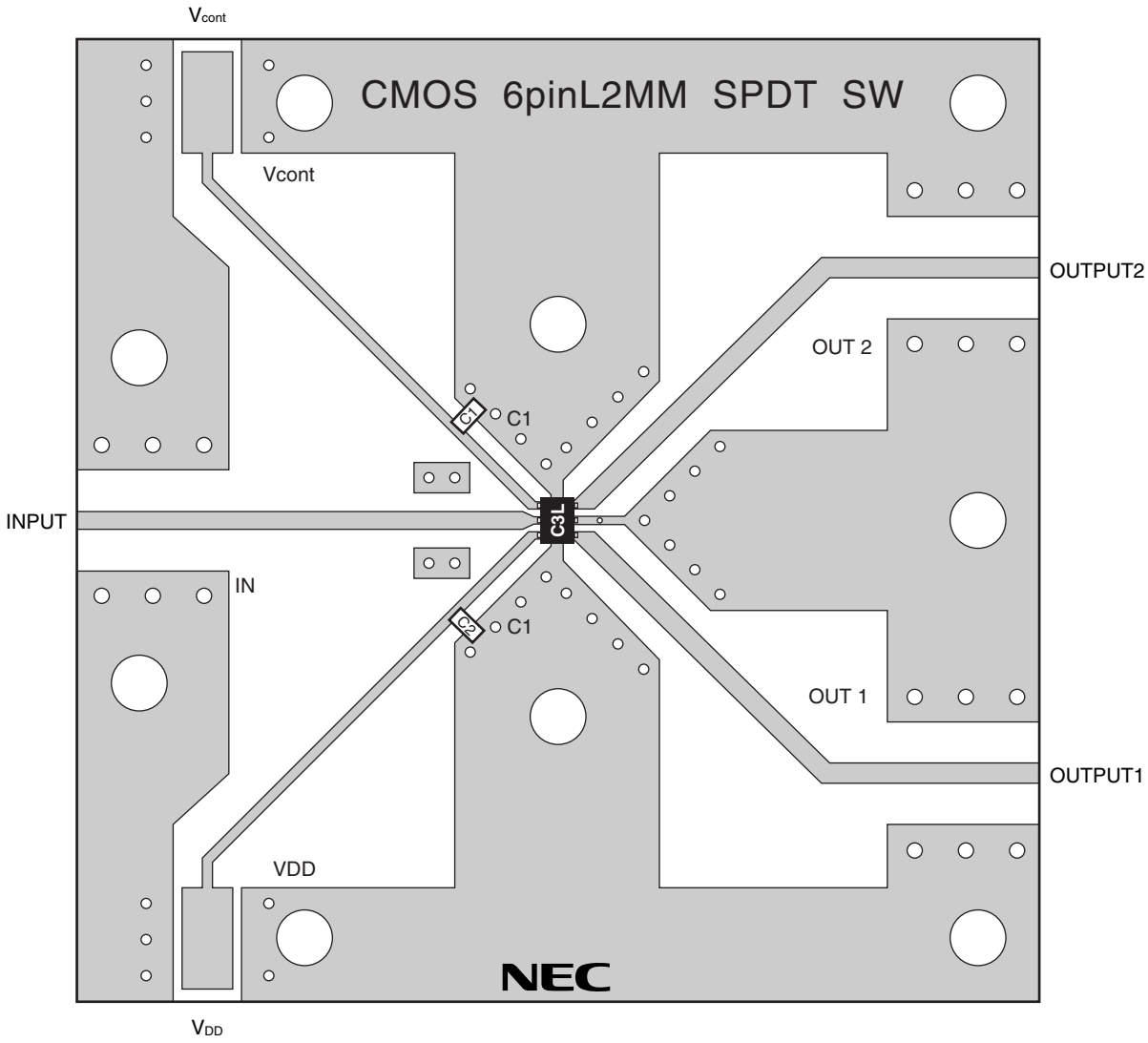
Note $P_{in\,(0.1\,dB)}$ or $P_{in\,(1\,dB)}$ are measured the input power level when the insertion loss increases more 0.1 dB or 1 dB than that of linear range.

EVALUATION CIRCUIT



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



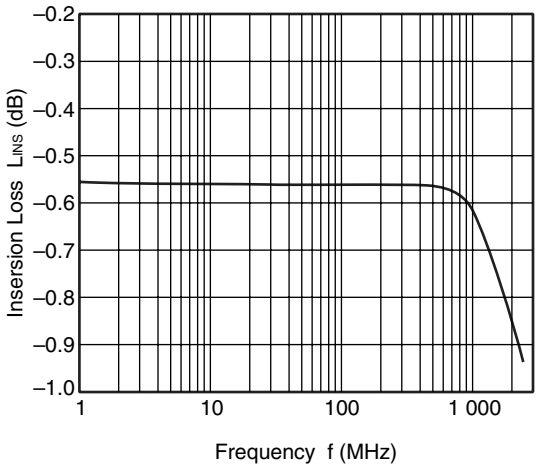
USING THE NEC EVALUATION BOARD

Symbol	Values
C1, C2	1 000 pF

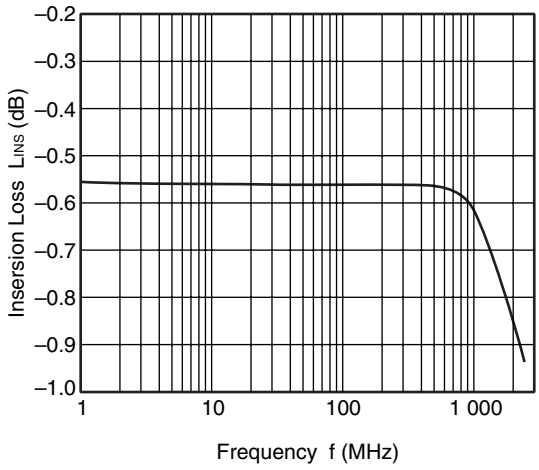
TYPICAL CHARACTERISTICS

(T_A = +25°C, V_{DD} = 2.8 V, $V_{cont\ (H)}$ = 2.8 V, $V_{cont\ (L)}$ = 0 V, unless otherwise specified)

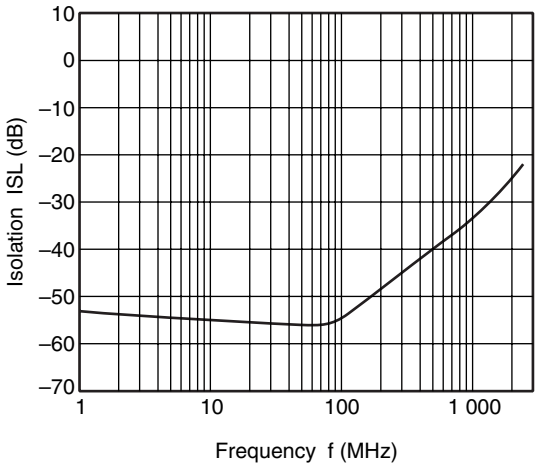
INPUT–OUTPUT1
INSERSION LOSS vs. FREQUENCY



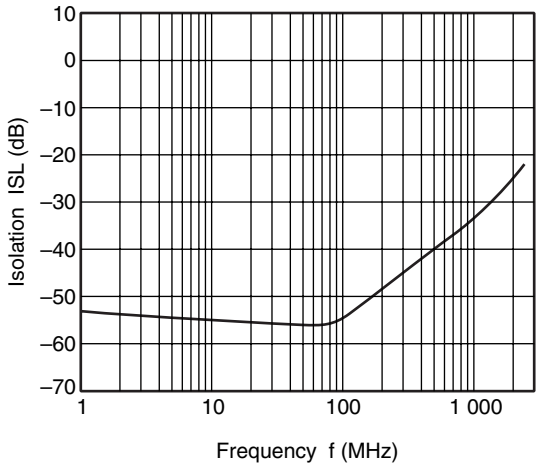
INPUT–OUTPUT2
INSERSION LOSS vs. FREQUENCY



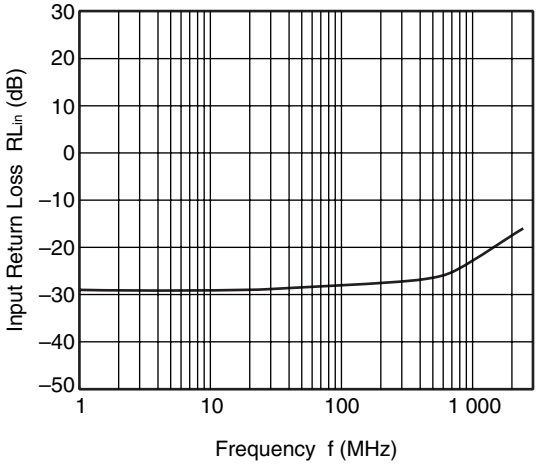
INPUT–OUTPUT1
ISOLATION vs. FREQUENCY



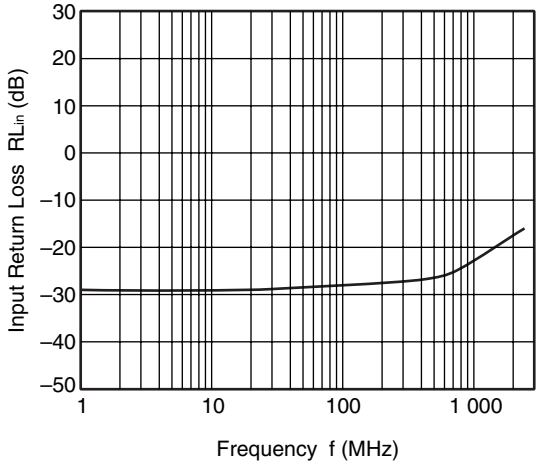
INPUT–OUTPUT2
ISOLATION vs. FREQUENCY



INPUT–OUTPUT1
INPUT RETURN LOSS vs. FREQUENCY

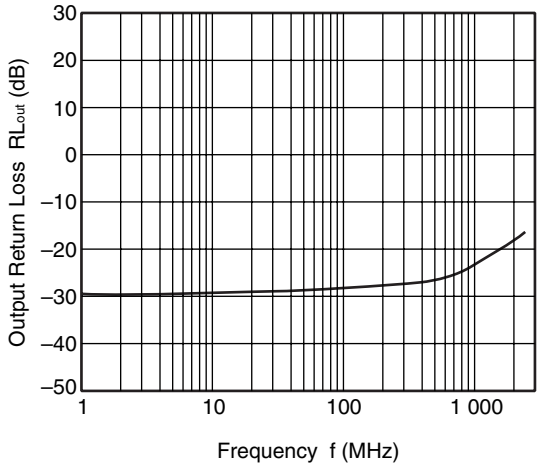


INPUT–OUTPUT2
INPUT RETURN LOSS vs. FREQUENCY

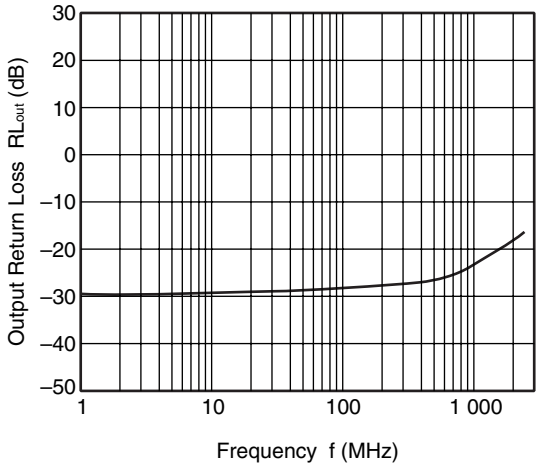


Remark The graphs indicate nominal characteristics.

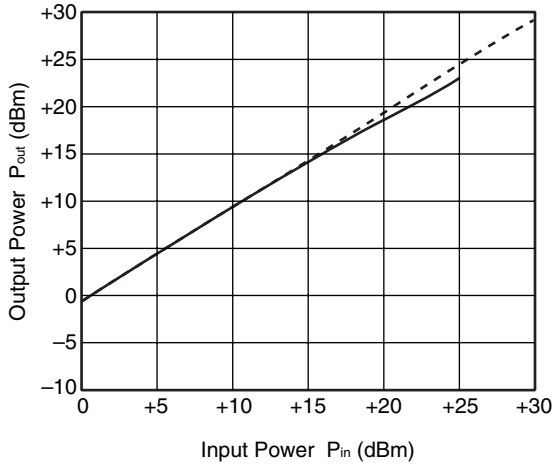
INPUT–OUTPUT1
OUTPUT RETURN LOSS vs. FREQUENCY



INPUT–OUTPUT2
OUTPUT RETURN LOSS vs. FREQUENCY



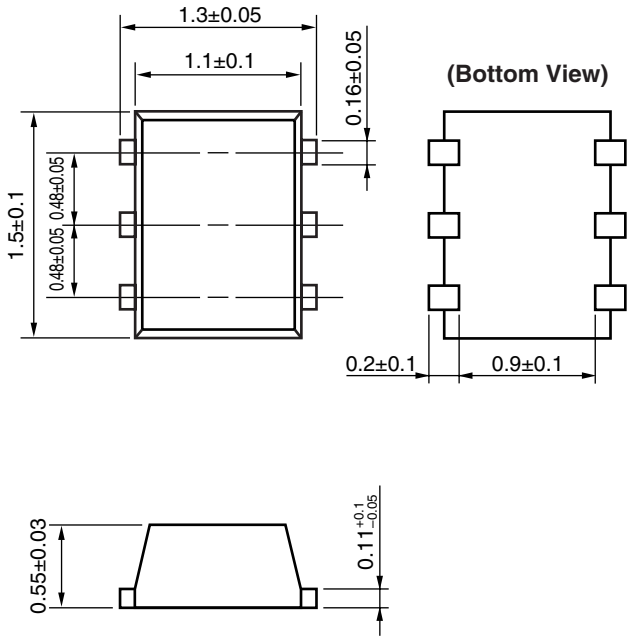
OUTPUT POWER vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN LEAD-LESS MINIMOLD (1511) (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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