



**NEC's WIDE BAND
SINGLE CONTROL CMOS SPDT SWITCH**

UPD5710TK

FEATURES

- **SUPPLY VOLTAGE :**
1.8 to 3.3 V (2.8 V TYP.)
- **SINGLE 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:**
0.6 dB TYP. @ DC to 1.0 GHz
0.8 dB TYP. @ 1.0 to 2.0 GHz
0.95 dB TYP. @ 2.0 to 2.5 GHz
- **HIGH ISOLATION:**
32.5 dB TYP. @ DC to 1.0 GHz
25 dB TYP. @ 1.0 to 2.0 GHz
22.5 dB TYP. @ 2.0 to 2.5 GHz
- **POWER HANDLING:**
 $P_{in(0.1\text{ dB})} = +17.0$ dBm TYP. @ 1.0GHz, $V_{DD} = 2.8$ V
 $P_{in(1\text{ dB})} = +21.0$ dBm TYP. @ 1.0 GHz, $V_{DD} = 2.8$ V
- **HIGH-DENSITY SURFACE MOUNT PACKAGE:**
6-pin minimold package (1.5 × 1.1 × 0.55 mm)
- **Pb-FREE**

DESCRIPTION

NEC's UPD5710TK is a wide-band, single control CMOS MMIC SPDT (Single Pole Double Throw) switch for mobile communications, instrumentation, short range wireless, and general-purpose RF switching applications.

This device can operate from DC to 2.5GHz with low insertion loss and high isolation, and generally does not require blocking capacitors on the RF lines.

The UPD5710TK is housed in a Pb-Free 6-pin minimold (1511) package, suitable for high-density surface mounting.

APPLICATIONS

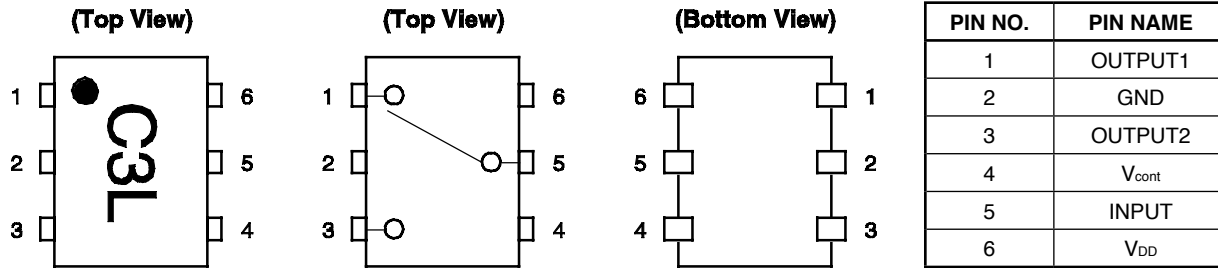
- **MOBILE COMMUNICATIONS**
- **SET TOP BOXES**
- **SHORT RANGE WIRELESS**
- **INSTRUMENTATION**

ORDERING INFORMATION

PART NUMBER	PACKAGE	MARKING	SUPPLYING FORM
μPD5710TK-E2-A	6-pinlead-less minimold (1511)	C3L	<ul style="list-style-type: none"> • 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: UPD5710TK-A

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



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

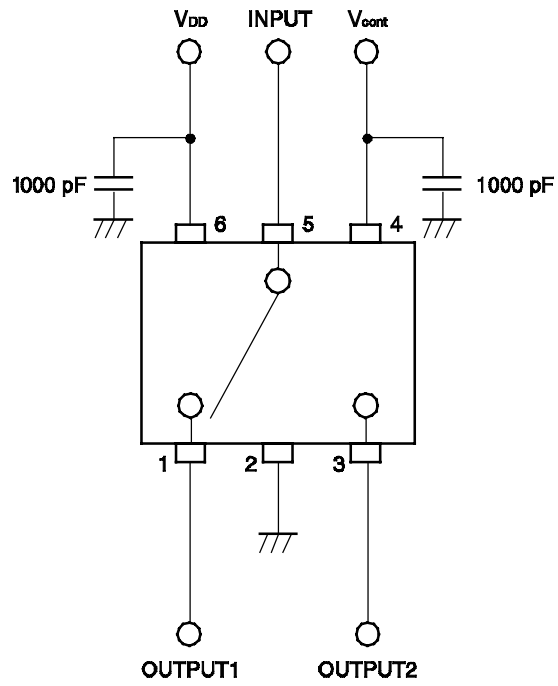
Notes 1. | V_{cont(H)} - V_{DD} | ≤ 0.1 V

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, $V_{DD} = 2.8\text{V}$, $V_{\text{cont(H)}} = 2.8\text{ V}$, $V_{\text{cont(L)}} = 0\text{ V}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Insertion Loss 1	L_{ins1}	$f = \text{DC to } 1.0\text{ GHz}$	-	0.6	0.8	dB
Insertion Loss 2	L_{ins2}	$f = 1.0\text{ to } 2.0\text{ GHz}$	-	0.8	1.0	dB
Insertion Loss 3	L_{ins3}	$f = 2.0\text{ to } 2.5\text{ GHz}$	-	0.95	1.2	dB
Isolation 1	ISL1	$f = \text{DC to } 1.0\text{ GHz}$	30	32.5	-	dB
Isolation 2	ISL2	$f = 1.0\text{ to } 2.0\text{ GHz}$	22	25	-	dB
Isolation 3	ISL3	$f = 2.0\text{ to } 2.5\text{ GHz}$	-	22.5	-	dB
Input Return Loss	RL_{in}	$f = \text{DC to } 2.5\text{ GHz}$	15	20	-	dB
Output Return Loss	RL_{out}	$f = \text{DC to } 2.5\text{ GHz}$	15	20	-	dB
0.1 dB Loss Compression Input Power ^{Note}	$P_{\text{in (0.1 dB)}}$	$f = 1.0\text{ GHz}$	+13.5	+17.0	-	dBm
1 dB Loss Compression Input Power ^{Note}	$P_{\text{in (1 dB)}}$	$f = 1.0\text{ GHz}$	-	+21.0	-	dBm
Intermodulation Intercept Point	IIP_3	2 tone, 1.000/1.001GHz, 1 MHz spacing	-	+33	-	dBm
Supply Current	I_{DD}	No RF	-	0.01	1.0	μA
Switch Control Current	I_{cont}	No RF	-	0.01	1.0	μA
Switch Control Speed	t_{sw}		-	30	50	ns

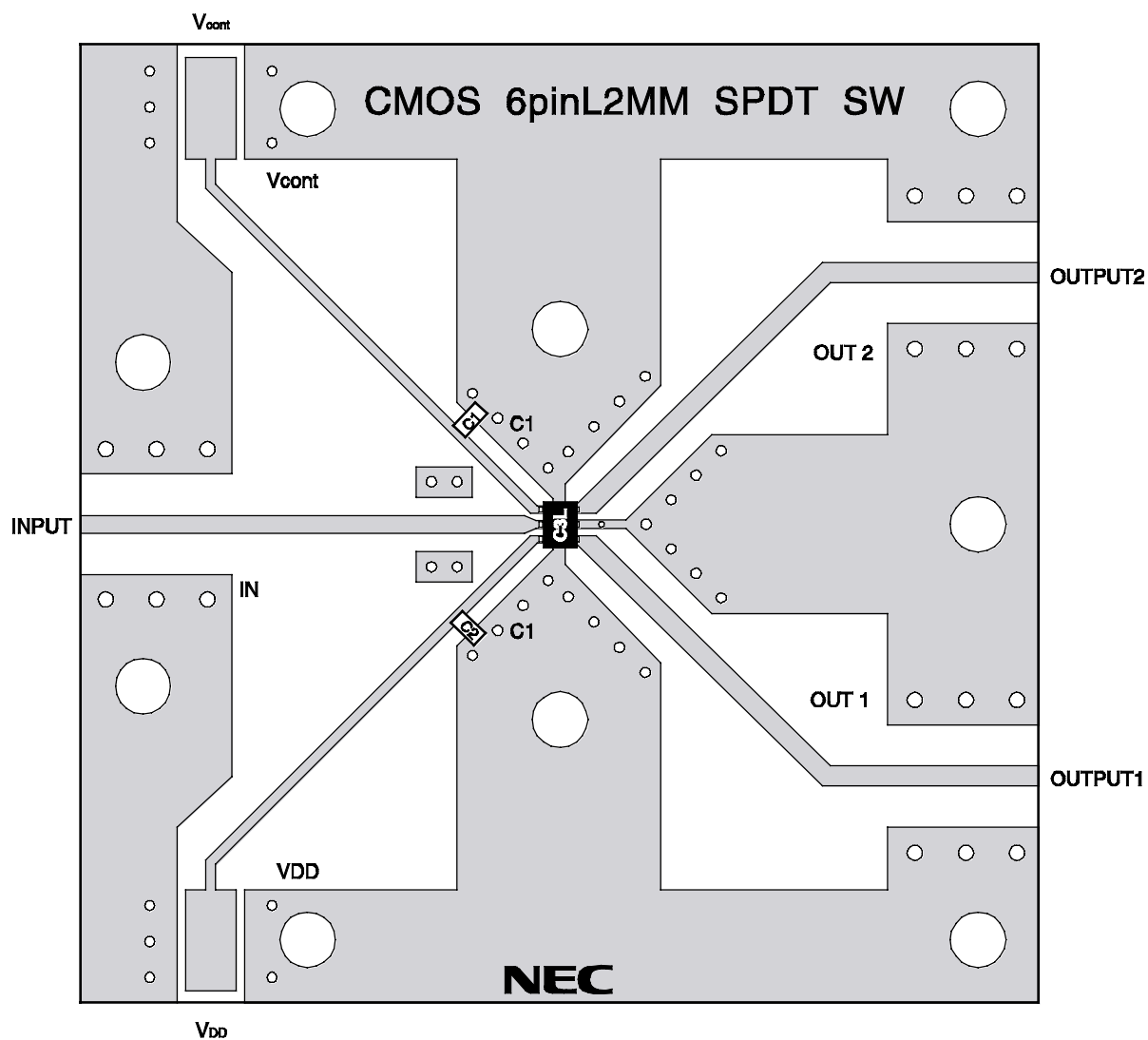
Notes . $P_{\text{in (0.1 dB)}}$ or $P_{\text{in (1 dB)}}$ are the measured input power level when the insertion loss increases 0.1 dB more or 1dB than that of linear range.

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

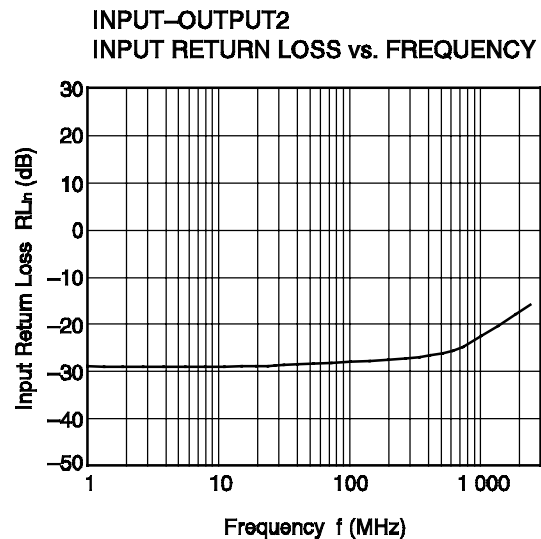
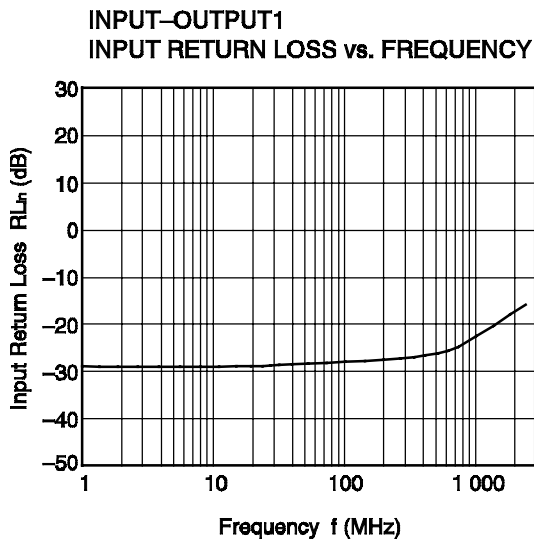
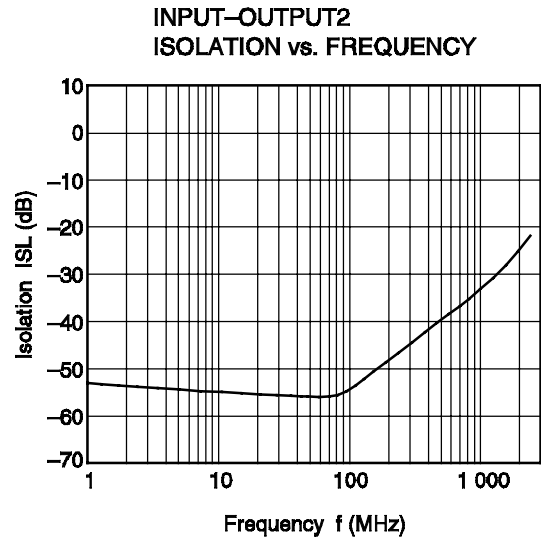
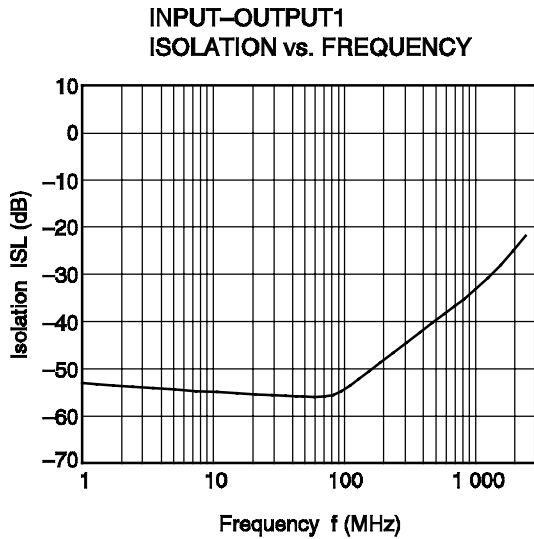
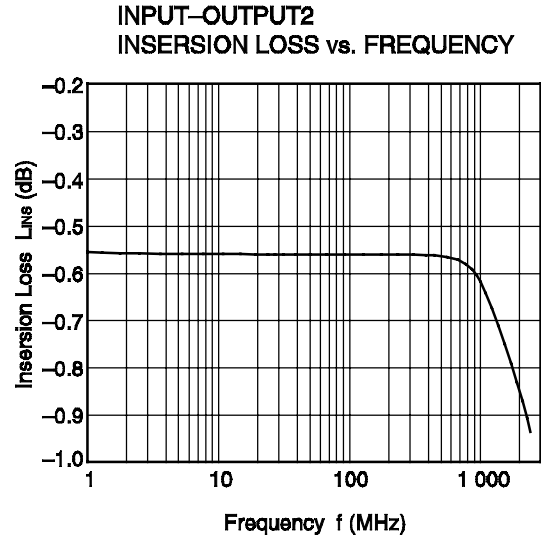
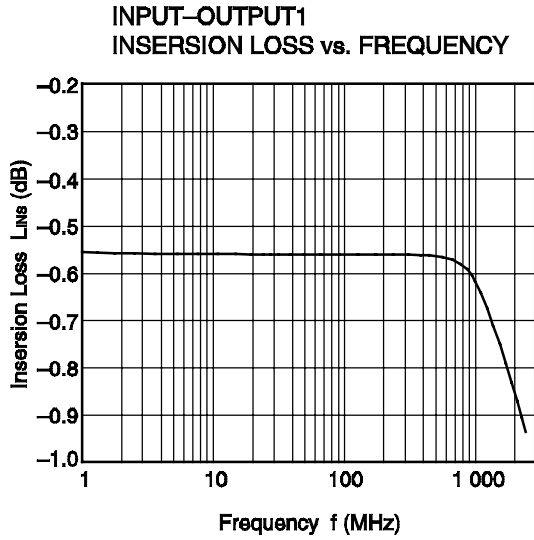


USING THE NEC EVALUATION BOARD

SYMBOL	VALUES
C1, C2	1,000 pF

TYPICAL CHARACTERISTIC

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

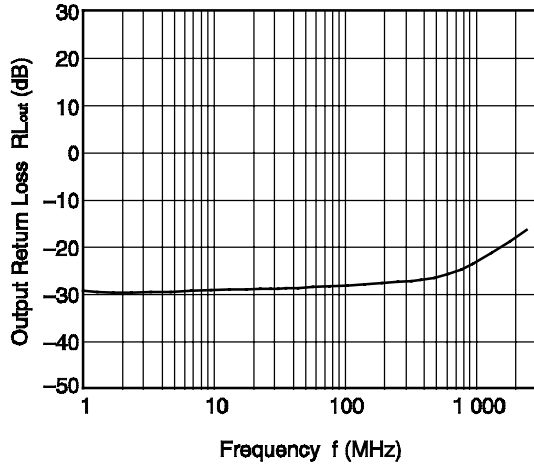


Remark The graphs indicate nominal characteristics.

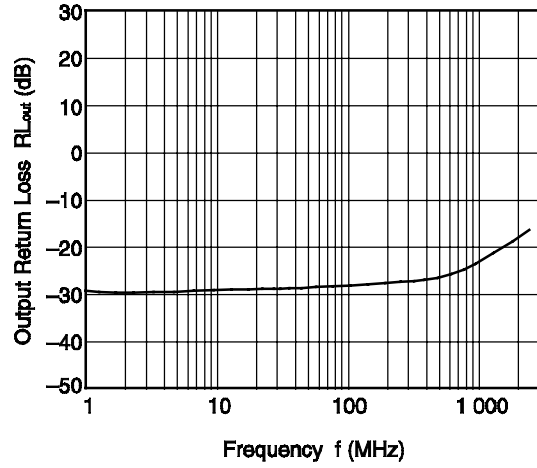
TYPICAL CHARACTERISTIC

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

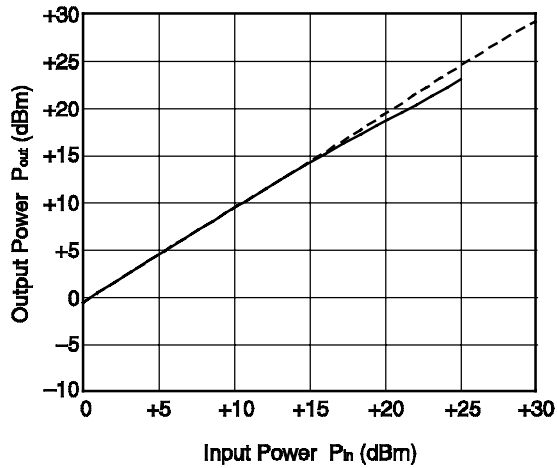
INPUT-OUTPUT1
OUTPUT RETURN LOSS vs. FREQUENCY



INPUT-OUTPUT2
OUTPUT RETURN LOSS vs. FREQUENCY



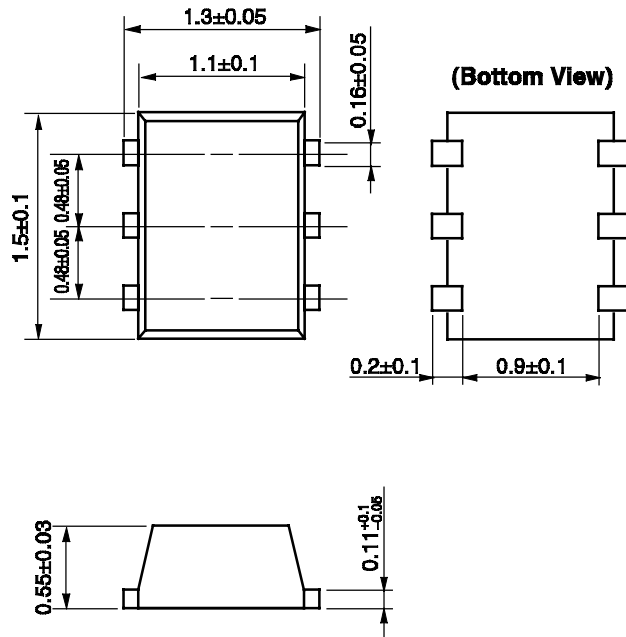
OUTPUT POWER vs. INPUT POWER



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) : 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.

CEL California Eastern Laboratories, Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.

4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • FAX (408) 988-0279 • www.cel.com

DATA SUBJECT TO CHANGE WITHOUT NOTICE

01/18/2005

NEC

A Business Partner of NEC Compound Semiconductor Devices, Ltd.