NEC's ¼W SINGLE CONTROL L-BAND SPDT SWITCH

UPG2012TB

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} = 0.27 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:**
  ISL_1 = = 28 dB TYP. @ f = 0.5 to 2.0 GHz, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V
  ISL_2 = 25 dB TYP. @ f = 2.5 GHz, V_{DD} = 2.8 V, V_{cont} = 2.8 V/0 V
  (Reference value)

- **HIGH-DENSITY SURFACE MOUNTING:**
  6-pin super minimold package (2.0 × 1.25 × 0.9 mm)

DESCRIPTION

NEC's UPG2012TB is a single control GaAs MMIC L-band SPDT (Single Pole Double Throw) switch for mobile phone and L-band applications.

This device can operate from 0.5 to 2.5 GHz, with low insertion loss and high isolation.

This device is housed in a 6-pin super minimold package, suitable for high-density surface mounting.

APPLICATIONS

- **L-band digital cellular or cordless handsets**
- **PCS, W-LAN, WLL and Bluetooth^{TM}**
- **Short Range Wireless**

ORDERING INFORMATION

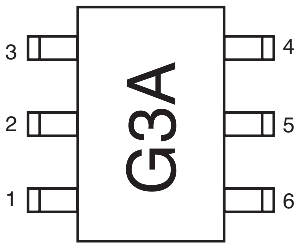
Part Number	Package	Marking	Supplying Form
UPG2012TB-E3-A	6-pin super minimold	G3A	• Embossed tape 8 mm wide • Pin 1, 2, 3 face the perforation side of the tape • Qty 3 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: UPG2012TB

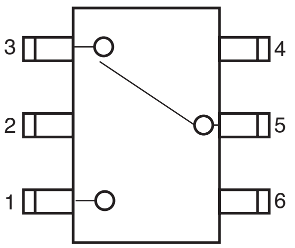
Caution **Observe precautions when handling because these devices are sensitive to electrostatic discharge.**

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

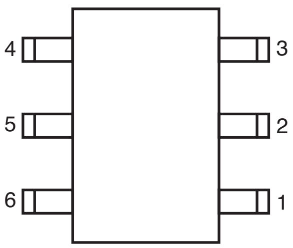
(Top View)



(Top View)



(Bottom View)



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

TRUTH TABLE

Vcont	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}	+6.0	V
Switch Control Voltage	V_{cont}	+6.0	V
Input Power	P_{in}	+26	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
Switch 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 blocking capacitors = 56 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss1	L_{INS1}	f = 0.5 to 1.0 GHz	–	0.27	0.50	dB
Insertion Loss2	L_{INS2}	f = 2.0 GHz	–	0.30	0.50	dB
Isolation1	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 = 2.0 GHz	+17.5	+20.5	–	dBm
Supply Current	I_{DD}		–	50	100	μA
Switching Control Current	I_{cont}		–	4	20	μA

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

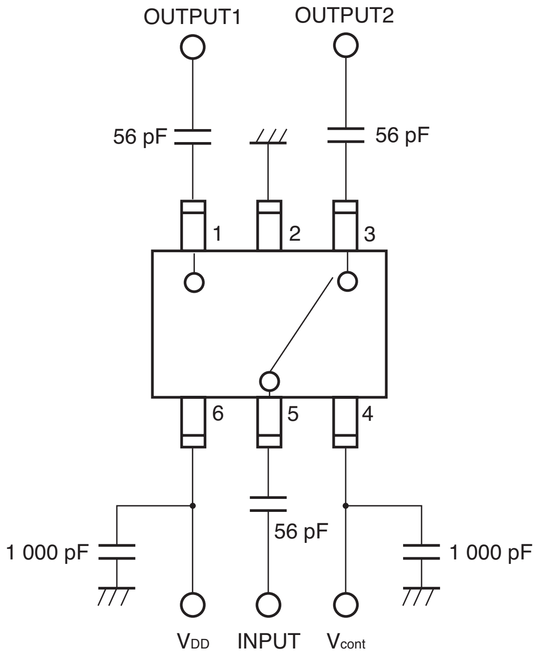
STANDARD CHARACTERISTICS FOR REFERENCE

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

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss3	L_{INS3}	f = 2.5 GHz	–	0.30	–	dB
Isolation2	ISL2	f = 2.5 GHz	–	25	–	dB
1 dB Gain Compression Input Power **Note**	$P_{in(1\ dB)}$	f = 2.0 GHz	–	+24.0	–	dBm
Switching Control Speed	t_{SW}		–	300	–	ns

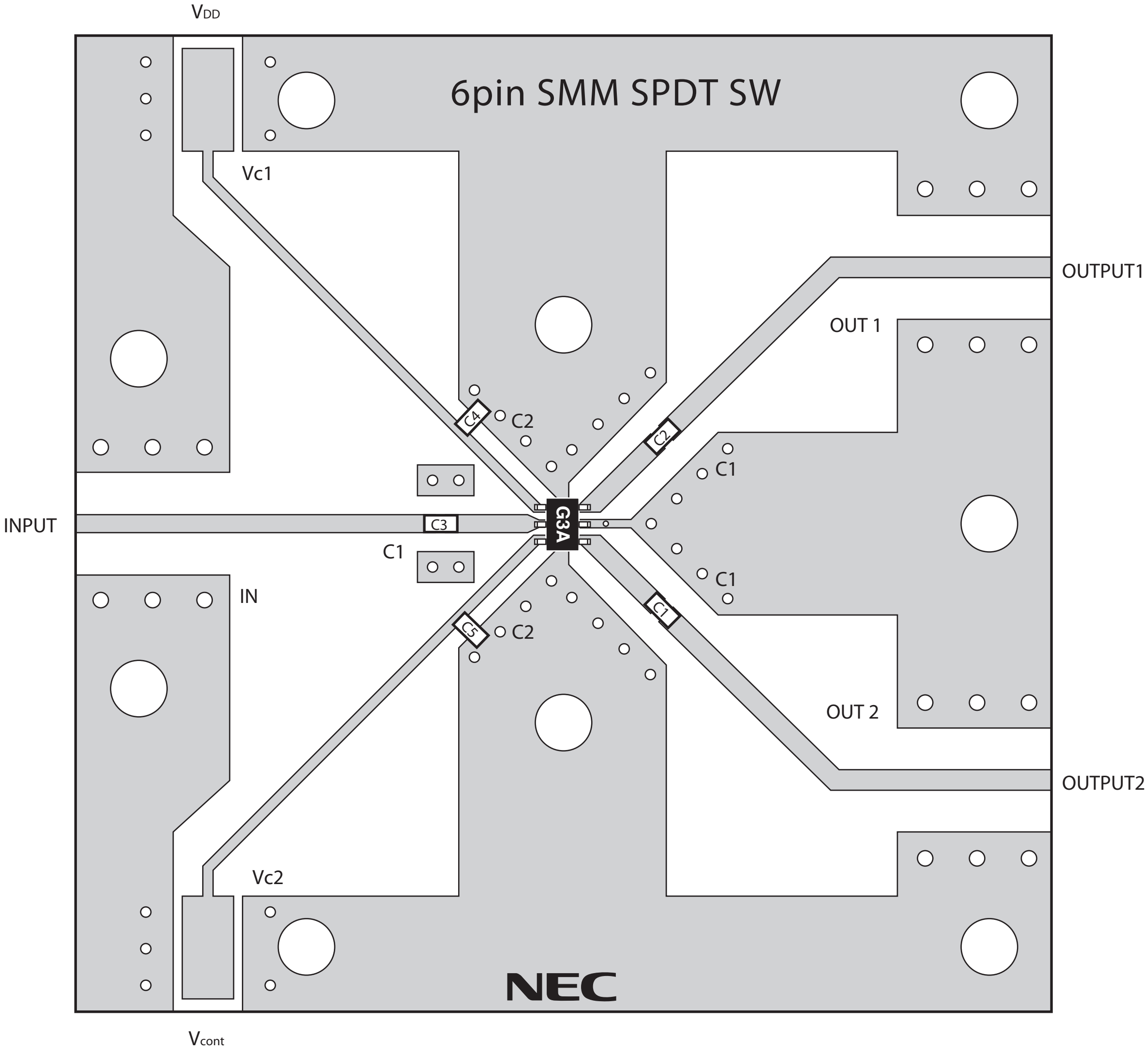
Caution **It is necessary to use DC blocking capacitors with the device.**
The value of DC blocking capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system. The range of recommended DC blocking capacitor value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

EVALUATION CIRCUIT (V$_{DD}$ = 2.8 V, V$_{cont}$ = 2.8 V/0 V, DC blocking 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

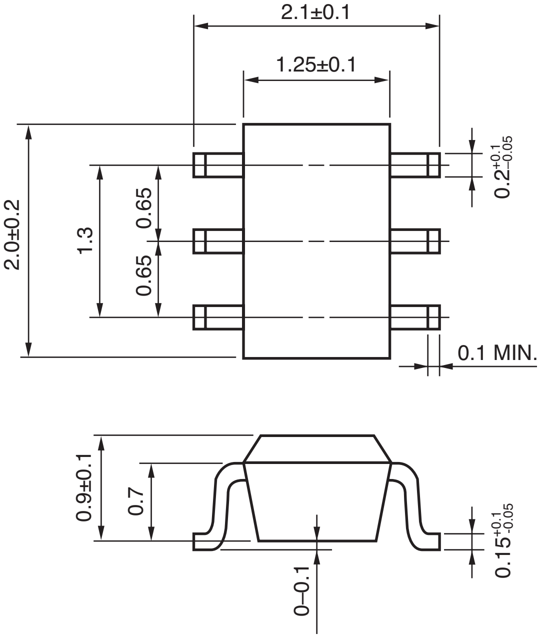


USING THE NEC EVALUATION BOARD

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

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).

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