

# GaAs INTEGRATED CIRCUIT $\mu PG2012TK$

# L-BAND SPDT SWITCH

#### DESCRIPTION

The  $\mu$ PG2012TK is a 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 GHz to 2.5 GHz, having the low insertion loss and high isolation.

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

#### **FEATURES**

•	Supply voltage	: V <sub>DD</sub> = 2.7 to 3.0 V (2.8 V TYP.)
•	Switch control voltage	: V <sub>cont (H)</sub> = 2.7 to 3.0 V (2.8 V TYP.)
		: V <sub>cont (L)</sub> = -0.2 to +0.2 V (0 V TYP.)
•	Low insertion loss	: LINS1 = 0.27 dB TYP. @ f = 0.5 to 1.0 GHz, VDD = 2.8 V, Vcont = 2.8 V/0 V
		: LINS2 = 0.30 dB TYP. @ f = 2.0 GHz, Vdd = 2.8 V, Vcont = 2.8 V/0 V
		: LINS3 = 0.30 dB TYP. @ f = 2.5 GHz, VDD = 2.8 V, Vcont = 2.8 V/0 V (Reference
		value)
•	High isolation	: ISL1 = 30 dB TYP. @ f = 0.5 to 2.0 GHz, V_DD = 2.8 V, V_cont = 2.8 V/0 V
		: ISL2 = 30 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 lead-less minimold package (1.5 $\times$ 1.1 $\times$ 0.55 mm)

#### **APPLICATIONS**

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

#### **ORDERING INFORMATION**

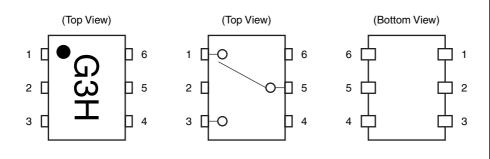
Part Number	Package	Marking	Supplying Form
μPG2012TK-E2	6-pin lead-less minimold (1511)	G3H	<ul> <li>Embossed tape 8 mm wide</li> <li>Pin 1, 6 face the perforation side of the tape</li> <li>Qty 5 kpcs/reel</li> </ul>

**Remark** To order evaluation samples, contact your nearby sales office. Part number for sample order:  $\mu$ PG2012TK

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

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#### ★ PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



Pin No.	Pin Name
1	OUTPUT1
2	GND
3	OUTPUT2
4	Vcont
5	INPUT
6	VDD

## TRUTH TABLE

Vcont	INPUT-OUTPUT1	INPUT-OUTPUT2	
Low	OFF	ON	
High	ON	OFF	

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

Parameter	Symbol	Ratings	Unit
Supply Voltage	VDD	+6.0	V
Switch Control Voltage	Vcont	+6.0	v
Input Power	Pin	+26	dBm
Power Dissipation	PD	150 <sup>Note</sup>	mW
Operating Ambient Temperature	TA	-45 to +85	°C
Storage Temperature	Tstg	–55 to +150	°C

Note Mounted on double-sided copper-clad  $50 \times 50 \times 1.6$  mm epoxy glass PWB, T<sub>A</sub> = +85°C

### **RECOMMENDED OPERATING RANGE (TA = +25°C, unless otherwise specified)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	VDD	2.7	2.8	3.0	V
Switch Control Voltage (H)	Vcont(H)	2.7	2.8	3.0	V
Switch Control Voltage (L)	Vcont(L)	-0.2	0	0.2	V

## **ELECTRICAL CHARACTERISTICS**

(TA = +25°C, VDD = 2.8 V, Vcont = 2.8 V/0 V, DC cut capacitors = 56 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss1	LINS1	f = 0.5 to 1.0 GHz	-	0.27	0.50	dB
Insertion Loss2	LINS2	f = 2.0 GHz	-	0.30	0.50	dB
Isolation1	ISL1	f = 0.5 to 2.0 GHz	24	30	-	dB
Input Return Loss	RLin	f = 0.5 to 2.5 GHz	15	20	-	dB
Output Return Loss	RLout	f = 0.5 to 2.5 GHz	15	20	-	dB
0.1 dB Gain Compression Input Power <sup>№™</sup>	Pin(0.1 dB)	f = 2.0 GHz	+17.5	+20.5	-	dBm
Supply Current	loo		-	50	100	μA
Switching Control Current	Icont		-	4	20	μA

**Note** P<sub>in(0.1dB)</sub> is measured the input power level when the insertion loss increases more 0.1 dB than that of linear range.

#### STANDARD CHARACTERISTICS FOR REFERENCE

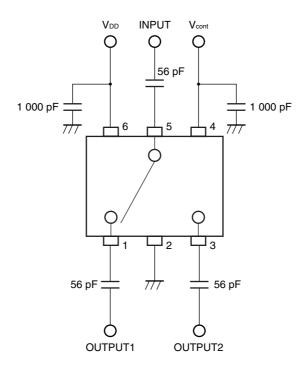
(TA = +25°C, VDD = 2.8 V,Vcont = 2.8 V/0 V, DC cut capacitors = 56 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss3	Lins3	f = 2.5 GHz	-	0.30	-	dB
Isolation2	ISL2	f = 2.5 GHz	-	30	_	dB
1 dB Gain Compression Input Power ™	Pin(1 dB)	f = 2.0 GHz	-	+24.0	_	dBm
Switching Control Speed	tsw		Ι	300	-	ns

**Note** P<sub>in(1dB)</sub> is measured the input power level when the insertion loss increases more 1 dB than that of linear range.

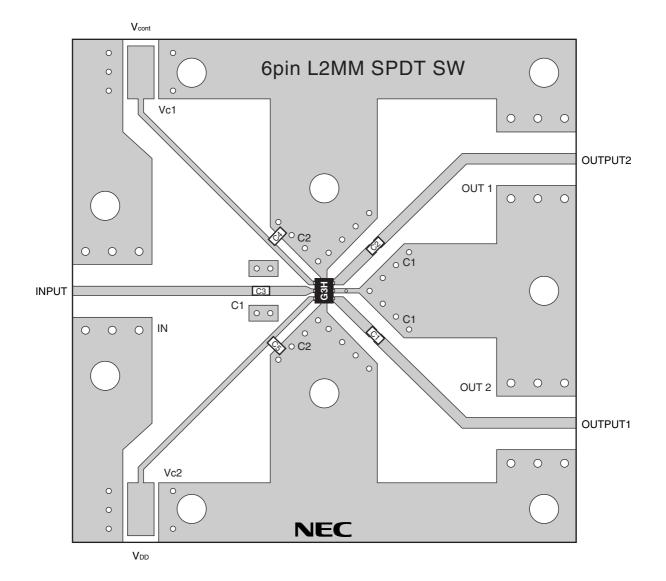
Caution This device is used it is necessary to use DC cut capacitors. The value of DC cut capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system. The range of recommended DC cut capacitor value is less than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

# EVALUATION CIRCUIT (VDD = 2.8 V, Vcont = 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

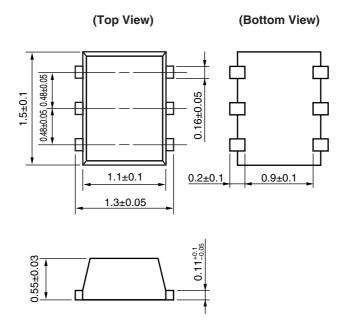


#### USING THE NEC EVALUATION BOARD

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

## ★ 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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Caution GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.			
	Do not destroy or burn the product.			
	Do not cut or cleave off any part of the product.			
	Do not crush or chemically dissolve the product.			
	Do not put the product in the mouth.			
	Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.			

► For further information, please contact

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