



**NEC's 4.8 TO 5.85 GHz  
HIGH POWER GaAs MMIC SPDT SWITCH**

**UPG2022T5G**

**FEATURES**

- **OPERATING FREQUENCY:**  
f = 4.8 to 5.85 GHz
- **LOW INSERTION LOSS:**  
0.8 dB TYP. @ f = 4.9 GHz  
0.7 dB TYP. @ f = 5.2 GHz  
0.8 dB TYP. @ f = 5.8 GHz
- **POWER HANDLING:**  
 $P_{in(0.1\text{ dB})} = +31\text{ dBm TYP. @ } f = 4.8\text{ to } 5.85\text{ GHz}$
- **CONTROL VOLTAGE:**  
 $V_{cont} = +2.8\text{ V/0 V}$
- **HIGH ISOLATION:**  
(Between INPUT and OUTPUT) = 23 dB TYP. @ f = 5.2 GHz  
(Between OUTPUT1 and OUTPUT2) = 22 dB TYP. @ f = 5.2
- **INPUT/OUTPUT RETURN LOSS:**  
10 dB MIN. @ f = 4.8 to 5.85 GHz
- **SWITCHING SPEED:**  
20 ns @  $t_{RISE}/t_{FALL}$  (10/90% RF)
- **6-PIN PLASTIC SON PACKAGE:**  
(2.0 × 3.0 × 0.75 mm)
- **LEAD FREE**

**DESCRIPTION**

NEC's UPG2022T5G is a high power GaAs MMIC SPDT (Single Pole Double Throw) switch. This device can operate from 4.8 to 5.85 GHz with low insertion loss. It is housed in a 6-pin plastic SON package.

**APPLICATIONS**

- 5 GHz BAND WLAN
- 5 GHz CORDLESS PHONES
- 5 GHz ELECTRONIC TOLL COLLECTION
- 5 GHz FIXED WIRELESS ACCESS

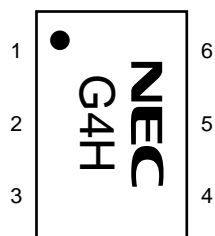
**ORDERING INFORMATION**

PART NUMBER	PACKAGE	MARKING	SUPPLYING FORM
UPG2022T5G-E1-A	6-pin plastic SON	G4H	<ul style="list-style-type: none"> <li>• Embossed tape 8 mm wide</li> <li>• Pin 1 face the perforation side of the tape</li> <li>• Qty 3 kpcs/reel</li> </ul>

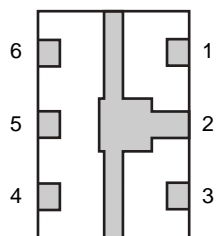
**Remark** To order evaluation samples, contact your nearby sales office.  
Part number for sample order: UPG2022T5G

PIN CONNECTIONS

(Top View)



(Bottom View)



PIN NO.	PIN NAME
1	OUTPUT1
2	GND
3	OUTPUT2
4	V <sub>cont2</sub>
5	INPUT
6	V <sub>cont1</sub>

ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Switch Control Voltage	V <sub>cont</sub>	-6.0 to +6.0 <sup>Note</sup>	V
Input Power	P <sub>in</sub>	+36	dBm
Operating Ambient Temperature	T <sub>A</sub>	-45 to +85	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

Notes | V<sub>cont1</sub> - V<sub>cont2</sub> | ≤ 6.0 V

RECOMMENDED OPERATING RANGE (T<sub>A</sub> = +25°C, unless otherwise specified)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Switch Control Voltage (H)	V <sub>cont (H)</sub>	2.7	2.8	3.3	V
Switch Control Voltage (L)	V <sub>cont (L)</sub>	-0.2	0	0.2	V
Operating Frequency	f	4.8		5.85	GHz
Operating Ambient Temperature	T <sub>A</sub>	-40	+25	+85	°C

**ELECTRICAL CHARACTERISTICS** ( $T_A = +25^\circ\text{C}$ ,  $V_{\text{cont}} = 2.8 \text{ V/0 V}$ ,  $Z_0 = 50 \Omega$ , DC blocking capacitors = 27 pF, Each port, unless otherwise specified)

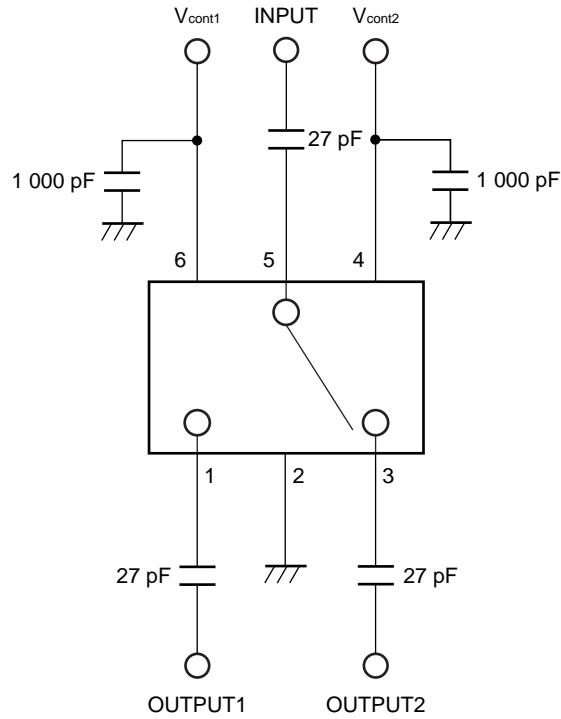
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Insertion Loss	$L_{\text{INS}}$	f = 4.9 GHz	-	0.8	1.1	dB
		f = 5.2 GHz	-	0.7	1.1	dB
		f = 5.8 GHz	-	0.8	1.1	dB
Isolation 1 (between OUTPUT1 and OUTPUT2)	ISL1	f = 4.9 GHz	13	18	-	dB
		f = 5.2 GHz	15	22	-	dB
		f = 5.8 GHz	15	20	-	dB
Input Return Loss	$RL_{\text{in}}$	f = 4.9 GHz	10	22	-	dB
		f = 5.2 GHz	10	29	-	dB
		f = 5.8 GHz	10	19	-	dB
Output Return Loss	$RL_{\text{out}}$	f = 4.9 GHz	10	21	-	dB
		f = 5.2 GHz	10	29	-	dB
		f = 5.8 GHz	10	20	-	dB
0.1 dB Gain Compression Input Power	$P_{\text{in (0.1 dB)}}$	f = 4.9 to 5.8 GHz	30	31	-	dBm
Switching Control Speed	$t_{\text{SW}}$	$t_{\text{RISE}}/t_{\text{FALL}}$ (10/90% RF)	-	20	-	ns
Switching Control Current	$I_{\text{cont}}$		-	0.5	1	$\mu\text{A}$

**STANDARD CHARACTERISTICS FOR REFERENCE**

( $T_A = +25^\circ\text{C}$ ,  $V_{\text{cont}} = 2.8 \text{ V/0 V}$ ,  $Z_0 = 50 \Omega$ , DC blocking capacitors = 27 pF, Each port, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Isolation 2 (between INPUT and OUTPUT)	ISL2	f = 4.9 GHz	-	18	-	dB
		f = 5.2 GHz	-	23	-	dB
		f = 5.8 GHz	-	21	-	dB

EVALUATION CIRCUIT



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

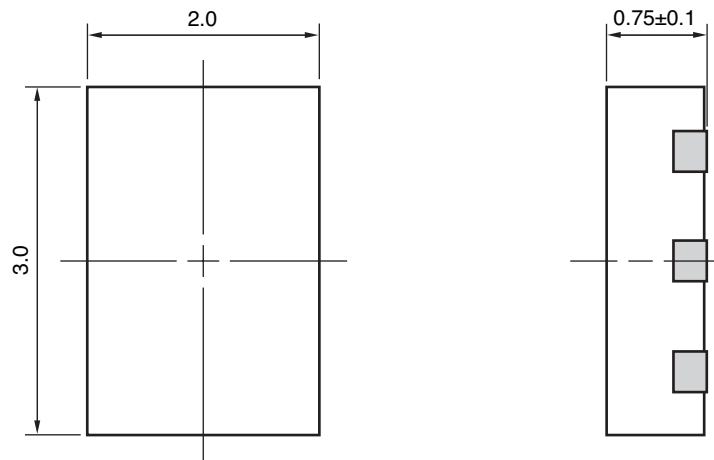
TRUTH TABLE OF SWITCHING BY CONDITION OF CONTROL VOLTAGE

		V <sub>CONT1</sub>	
		V <sub>CONT</sub> (H)	V <sub>CONT</sub> (L)
V <sub>CONT2</sub>	V <sub>CONT</sub> (H)	<p><b>Note</b></p>	
	V <sub>CONT</sub> (L)		<p><b>Note</b></p>

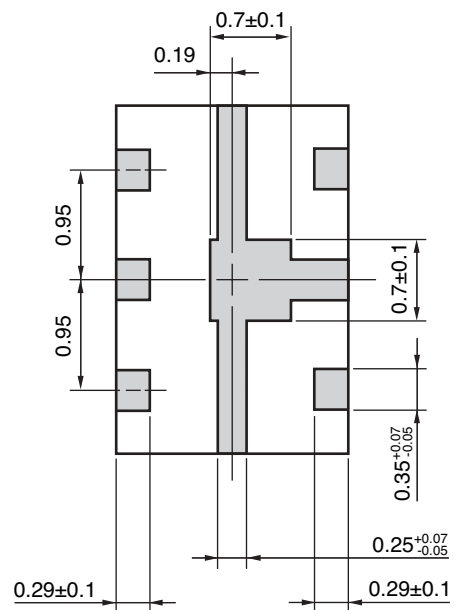
**Note** In case of V<sub>CONT1</sub> = V<sub>CONT2</sub> = High or V<sub>CONT1</sub> = V<sub>CONT2</sub> = Low, (that is same control voltage for both pins), input signal of INPUT (Pin 5) is output from OUTPUT1 (Pin 1) and OUTPUT2 (Pin 3).

## PACKAGE DIMENSIONS

## 6-PIN PLASTIC SON (UNIT:mm)



(Bottom View)



**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.

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