



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

UPG2022T5G

FEATURES

- **OPERATING FREQUENCY:**
 $f = 4.8 \text{ to } 5.85 \text{ GHz}$
- **LOW INSERTION LOSS:**
0.8 dB TYP. @ $f = 4.9 \text{ GHz}$
0.7 dB TYP. @ $f = 5.2 \text{ GHz}$
0.8 dB TYP. @ $f = 5.8 \text{ GHz}$
- **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. @ $f = 5.2 \text{ GHz}$
(Between OUTPUT1 and OUTPUT2) = 22 dB TYP. @ $f = 5.2 \text{ GHz}$
- **INPUT/OUTPUT RETURN LOSS:**
10 dB MIN. @ $f = 4.8 \text{ to } 5.85 \text{ GHz}$
- **SWITCHING SPEED:**
20 ns @ t_{RISE}/t_{FALL} (10/90% RF)
- **6-PIN PLASTIC SON PACKAGE:**
($2.0 \times 3.0 \times 0.75 \text{ mm}$)
- **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

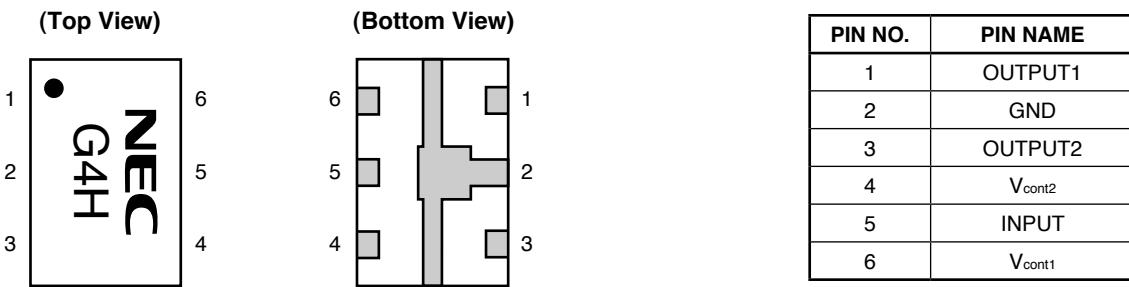
PART NUMBER	PACKAGE	MARKING	SUPPLYING FORM
UPG2022T5G-E1-A	6-pin plastic SON	G4H	<ul style="list-style-type: none"> • Embossed tape 8 mm wide • Pin 1 face the perforation side of the tape • Qty 3 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: UPG2022T5G

California Eastern Laboratories

PIN CONNECTIONS

**ABSOLUTE MAXIMUM RATINGS** ($T_A = +25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Switch Control Voltage	V_{cont}	-6.0 to +6.0 <small>Note</small>	V
Input Power	P_{in}	+36	dBm
Operating Ambient Temperature	T_A	-45 to +85	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

Notes $|V_{\text{cont1}} - V_{\text{cont2}}| \leq 6.0 \text{ V}$

RECOMMENDED OPERATING RANGE ($T_A = +25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Switch Control Voltage (H)	$V_{\text{cont (H)}}$	2.7	2.8	3.3	V
Switch Control Voltage (L)	$V_{\text{cont (L)}}$	-0.2	0	0.2	V
Operating Frequency	f	4.8		5.85	GHz
Operating Ambient Temperature	T_A	-40	+25	+85	$^\circ\text{C}$

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

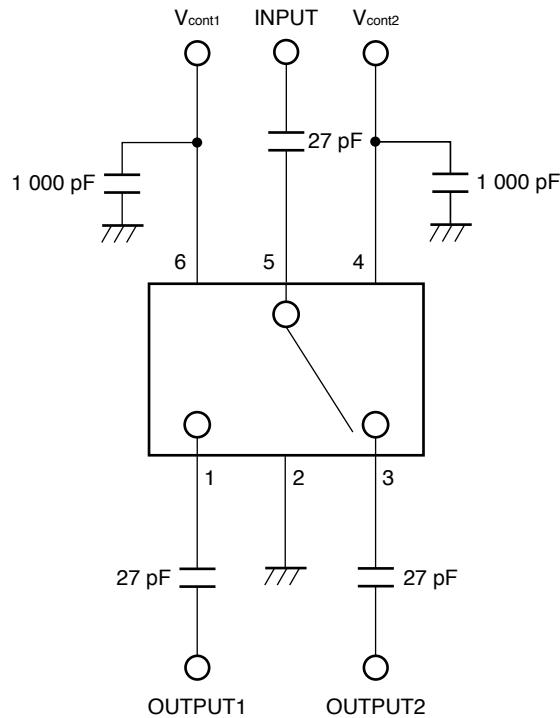
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Insertion Loss	L _{INS}	f = 4.9 GHz	–	0.8	1.1	dB
		f = 5.2 GHz	–	0.7	1.1	dB
		f = 5.8 GHz	–	0.8	1.1	dB
Isolation 1 (between OUTPUT1 and OUTPUT2)	ISL1	f = 4.9 GHz	13	18	–	dB
		f = 5.2 GHz	15	22	–	dB
		f = 5.8 GHz	15	20	–	dB
Input Return Loss	RL _{in}	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 _{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 _{in} (0.1 dB)	f = 4.9 to 5.8 GHz	30	31	–	dBm
Switching Control Speed	t _{sw}	t _{RISE} /t _{FALL} (10/90% RF)	–	20	–	ns
Switching Control Current	I _{cont}		–	0.5	1	μA

STANDARD CHARACTERISTICS FOR REFERENCE

($T_A = +25^\circ\text{C}$, $V_{\text{cont}} = 2.8 \text{ V}/0 \text{ V}$, $Z_0 = 50 \Omega$, 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

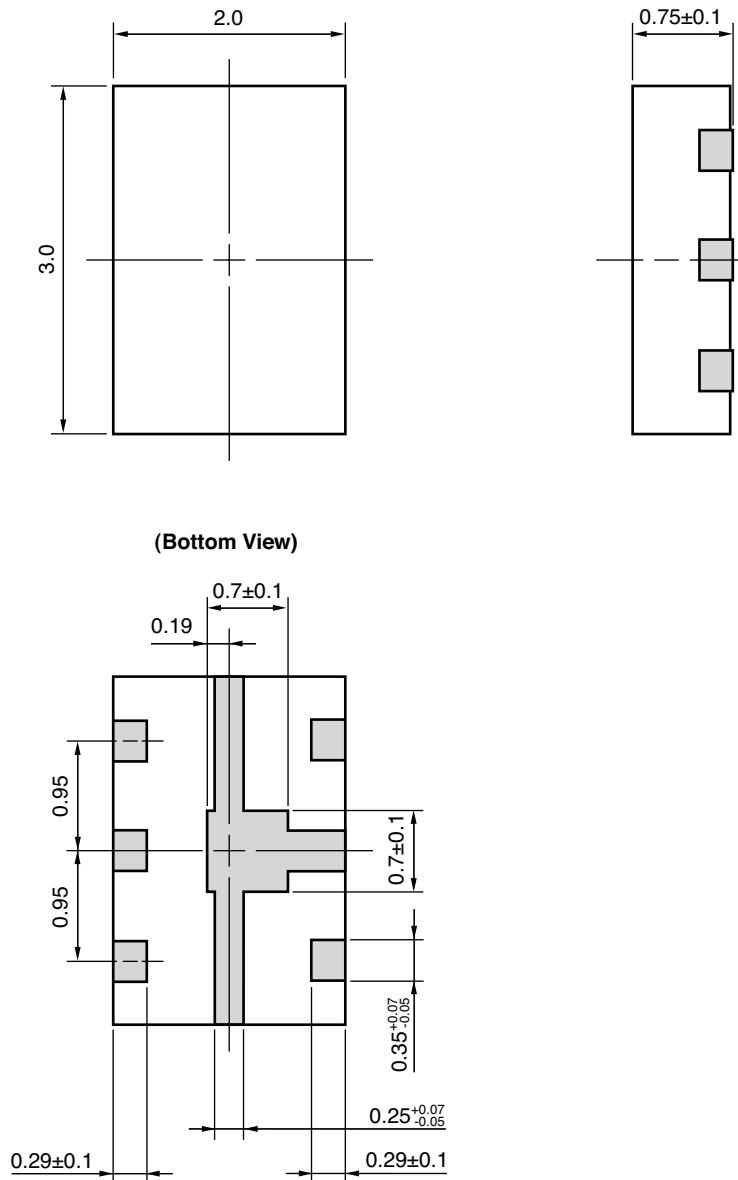


The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

TRUTH TABLE OF SWITCHING BY CONDITION OF CONTROL VOLTAGE

		V_{CONT1}	
		$V_{CONT(H)}$	$V_{CONT(L)}$
V_{CONT2}	$V_{CONT(H)}$	Note	
	$V_{CONT(H)}$	INPUT —— O OUTPUT1 —— O OUTPUT2 —— O	INPUT —— O OUTPUT1 —— O OUTPUT2 —— O
	$V_{CONT(L)}$	INPUT —— O OUTPUT1 —— O OUTPUT2 —— O	INPUT —— O OUTPUT1 —— O OUTPUT2 —— O

Note In case of $V_{CONT1} = V_{CONT2} = \text{High}$ or $V_{CONT1} = V_{CONT2} = \text{Low}$, (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)**

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).

Life Support Applications

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

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05/18/2004

NEC

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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix -A indicates that the device is Pb-free. The -AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
Lead (Pb)	< 1000 PPM	-A	-AZ
		Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

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