



# GaAs INTEGRATED CIRCUIT

## $\mu$ PG2163T5N

### SPDT SWITCH FOR 2.4 GHz AND 6 GHz DUAL-BAND WIRELESS LAN

#### DESCRIPTION

The  $\mu$ PG2163T5N is GaAs MMIC SPDT (Single Pole Double Throw) switch which was developed for 2.4 GHz and 6 GHz dual-band wireless LAN. This device can operate frequency from 2.4 GHz band and 6 GHz band, having the low insertion loss and high isolation.

This device is housed in a 6-pin plastic TSON (Thin Small Out-line Non-leaded) package. And this package is able to high-density surface mounting.

#### FEATURES

- Operating frequency : f = 2.4 to 2.5 GHz and 4.9 to 6.0 GHz
- Switch control voltage :  $V_{\text{cont (H)}} = 2.8$  to 5.0 V (3.0 V TYP.)  
:  $V_{\text{cont (L)}} = -0.3$  to 0.3 V (0 V TYP.)
- Low insertion loss :  $L_{\text{ins1}} = 0.40$  dB TYP. @ f = 2.4 to 2.5 GHz,  $V_{\text{cont (H)}} = 3.0$  V,  $V_{\text{cont (L)}} = 0$  V  
:  $L_{\text{ins2}} = 0.50$  dB TYP. @ f = 4.9 to 6.0 GHz,  $V_{\text{cont (H)}} = 3.0$  V,  $V_{\text{cont (L)}} = 0$  V
- High isolation :  $ISL1 = 38$  dB TYP. @ f = 2.4 to 2.5 GHz,  $V_{\text{cont (H)}} = 3.0$  V,  $V_{\text{cont (L)}} = 0$  V  
:  $ISL2 = 30$  dB TYP. @ f = 4.9 to 6.0 GHz,  $V_{\text{cont (H)}} = 3.0$  V,  $V_{\text{cont (L)}} = 0$  V
- Handling power :  $P_{\text{in (1 dB)}} = +31.0$  dBm TYP. @ f = 2.5 GHz,  $V_{\text{cont (H)}} = 3.0$  V,  $V_{\text{cont (L)}} = 0$  V  
:  $P_{\text{in (1 dB)}} = +29.0$  dBm TYP. @ f = 6.0 GHz,  $V_{\text{cont (H)}} = 3.0$  V,  $V_{\text{cont (L)}} = 0$  V
- High-density surface mounting : 6-pin plastic TSON package (1.5 × 1.5 × 0.37 mm)

#### APPLICATIONS

- Dual-band wireless LAN (IEEE802.11a + b/g)

#### ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
$\mu$ PG2163T5N-E2	$\mu$ PG2163T5N-E2-A	6-pin plastic TSON (Pb-Free)	G4X	<ul style="list-style-type: none"><li>• Embossed tape 8 mm wide</li><li>• Pin 1, 6 face the perforation side of the tape</li><li>• Qty 3 kpcs/reel</li></ul>

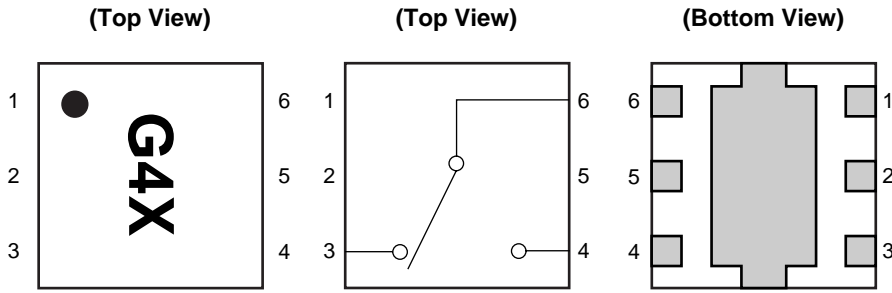
**Remark** To order evaluation samples, contact your nearby sales office.

Part number for sample order:  $\mu$ PG2163T5N

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

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

**PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM**



Pin No.	Pin Name
1	GND
2	V <sub>cont2</sub>
3	OUT2 (RX)
4	OUT1 (TX)
5	V <sub>cont1</sub>
6	IN (ANT)

**Remark** Exposed pad : GND

**TRUTH TABLE**

V <sub>cont1</sub>	V <sub>cont2</sub>	IN (ANT)–OUT1 (TX)	IN (ANT)–OUT2 (RX)
High	Low	OFF	ON
Low	High	ON	OFF

**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	V
Input Power	P <sub>in</sub>	+32	dBm
Operating Ambient Temperature	T <sub>A</sub>	-45 to +85	°C
Storage Temperature	T <sub>stg</sub>	-55 to +135	°C

**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>	2.8	3.0	5.0	V
Switch Control Voltage (L)	V <sub>cont (L)</sub>	-0.3	0	0.3	V
Operating Frequency 1	f1	2.4	-	2.5	GHz
Operating Frequency 2	f2	4.9	-	6.0	GHz

**ELECTRICAL CHARACTERISTICS**

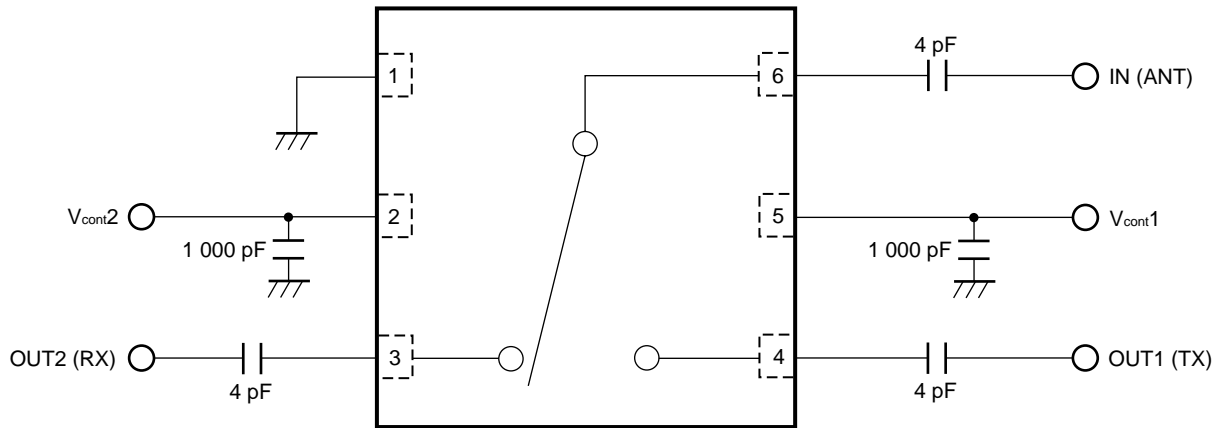
( $T_A = +25^\circ\text{C}$ ,  $V_{\text{cont (H)}} = 3.0 \text{ V}$ ,  $V_{\text{cont (L)}} = 0 \text{ V}$ ,  $Z_0 = 50 \Omega$ , DC blocking capacitors = 4 pF, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Insertion Loss 1	$L_{\text{ins1}}$	f = 2.4 to 2.5 GHz	–	0.40	0.60	dB
Insertion Loss 2	$L_{\text{ins2}}$	f = 4.9 to 6.0 GHz	–	0.50	0.80	dB
Isolation 1	ISL1	f = 2.4 to 2.5 GHz	35	38	–	dB
Isolation 2	ISL2	f = 4.9 to 6.0 GHz	27	30	–	dB
Input Return Loss 1	$RL_{\text{in1}}$	f = 2.4 to 2.5 GHz	–	15	–	dB
Input Return Loss 2	$RL_{\text{in2}}$	f = 4.9 to 6.0 GHz	–	15	–	dB
Output Return Loss 1	$RL_{\text{out1}}$	f = 2.4 to 2.5 GHz	–	15	–	dB
Output Return Loss 2	$RL_{\text{out2}}$	f = 4.9 to 6.0 GHz	–	15	–	dB
1 dB Loss Compression Input Power 1 <b>Note</b>	$P_{\text{in (1 dB) 1}}$	f = 2.4 to 2.5 GHz	–	+31.0	–	dBm
1 dB Loss Compression Input Power 2 <b>Note</b>	$P_{\text{in (1 dB) 2}}$	f = 4.9 to 6.0 GHz	–	+29.0	–	dBm
Input 3rd Order Distortion Intercept Point	IIP <sub>3</sub>		–	+55	–	dBm
Switch Control Current	$I_{\text{cont}}$		–	0.1	1.0	$\mu\text{A}$
Switch Control Speed	$t_{\text{sw}}$	50% CTL to 90/10%	–	50	–	ns

**Note**  $P_{\text{in (1 dB)}}$  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 blocking capacitors.

EVALUATION CIRCUIT

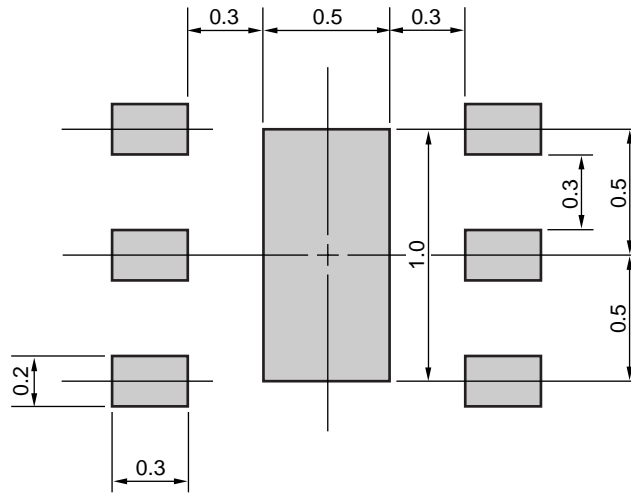


The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

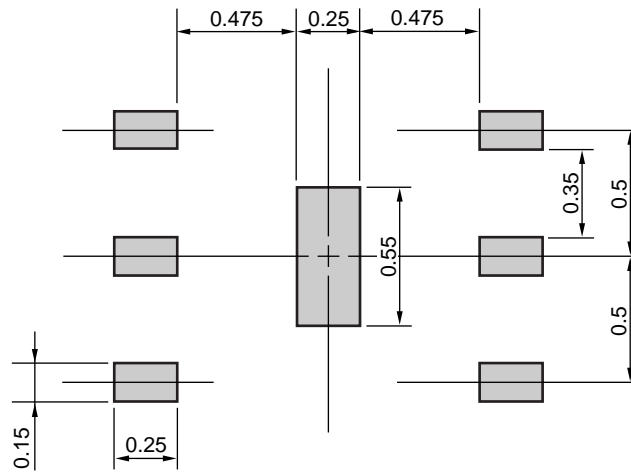
**MOUNTING PAD DIMENSIONS**

**6-PIN PLASTIC TSON (UNIT: mm)**

**MOUNTING PAD**



**SOLDER PAD**

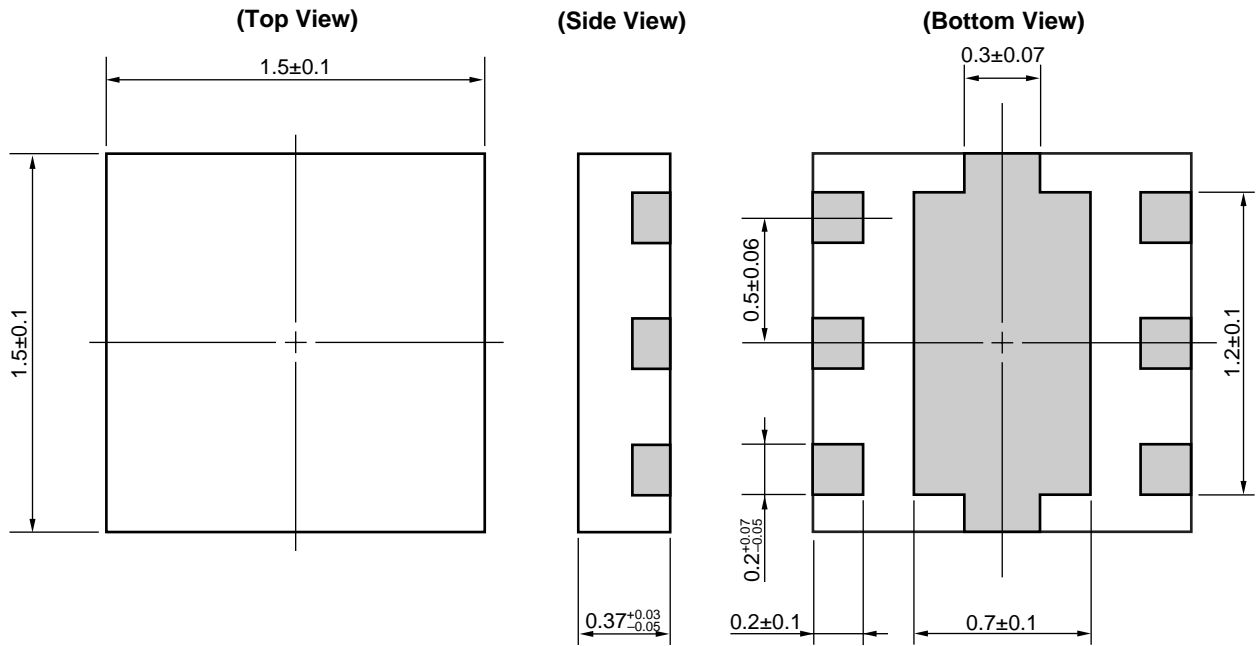


Solder thickness : 0.08 mm

**Remark** The mounting pad layouts in this document are for reference only.

PACKAGE DIMENSIONS

6-PIN PLASTIC TSON (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
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 (terminal 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).**

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	
		-A	-AZ
Lead (Pb)	< 1000 PPM	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	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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