

μPG2163T5N

GaAs Integrated Circuit
Broadband SPDT Switch for Dual-Band Wireless LAN

R09DS0019EJ0300
Rev.3.00
May 19, 2011

DESCRIPTION

The μPG2163T5N 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 at frequencies from 0.5 to 2.5 GHz, 4.9 to 6.0 GHz and 8.0 GHz, with 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.

<R> FEATURES

- Operating frequency : f = 0.5 to 2.5 GHz, 4.9 to 6.0 GHz and 8.0 GHz
- Switch control voltage : V_{cont (H)} = 2.8 to 5.0 V (3.0 V TYP.)
: V_{cont (L)} = -0.3 to 0.3 V (0 V TYP.)
- Low insertion loss : L_{ins1} = 0.40 dB TYP. @ f = 2.4 to 2.5 GHz
: L_{ins2} = 0.50 dB TYP. @ f = 4.9 to 6.0 GHz
: L_{ins3} = 0.90 dB TYP. @ f = 8.0 GHz
: L_{ins4} = 0.50 dB TYP. @ f = 0.5 to 2.5 GHz
- High isolation : ISL1 = 38 dB TYP. @ f = 2.4 to 2.5 GHz
: ISL2 = 30 dB TYP. @ f = 4.9 to 6.0 GHz
: ISL3 = 23 dB TYP. @ f = 8.0 GHz
: ISL4 = 43 dB TYP. @ f = 0.5 to 1.0 GHz
: ISL5 = 38 dB TYP. @ f = 1.0 to 2.5 GHz
- Handling power : P_{in (1 dB)} = +31.0 dBm TYP. @ f = 2.5 GHz, V_{cont (H)} = 3.0 V, V_{cont (L)} = 0 V
: P_{in (1 dB)} = +29.0 dBm TYP. @ f = 6.0 GHz, V_{cont (H)} = 3.0 V, V_{cont (L)} = 0 V
- High-density surface mounting : 6-pin plastic TSON package (1.5 × 1.5 × 0.37 mm)

<R> APPLICATIONS

- Dual-band wireless LAN (IEEE802.11a/b/g/n), etc.

ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPG2163T5N-E2	μPG2163T5N-E2-A	6-pin plastic TSON (Pb-Free)	G4X	<ul style="list-style-type: none"> • Embossed tape 8 mm wide • Pin 1, 6 face the perforation side of the tape • Qty 3 kpcs/reel

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

Part number for sample order: μPG2163T5N

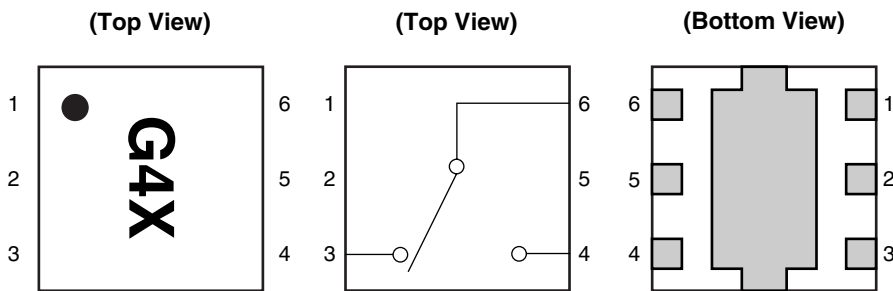
CAUTION

Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



Pin No.	Pin Name
1	GND
2	V _{cont2}
3	OUT2 (RX)
4	OUT1 (TX)
5	V _{cont1}
6	IN (ANT)

Remark Exposed pad : GND

TRUTH TABLE

V _{cont1}	V _{cont2}	IN (ANT)–OUT1 (TX)	IN (ANT)–OUT2 (RX)
High	Low	OFF	ON
Low	High	ON	OFF

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

Parameter	Symbol	Ratings	Unit
Switch Control Voltage	V _{cont}	-6.0 to +6.0	V
Input Power	P _{in}	+32	dBm
Operating Ambient Temperature	T _A	-45 to +85	°C
Storage Temperature	T _{stg}	-55 to +135	°C

<R> **RECOMMENDED OPERATING RANGE (T_A = +25°C, unless otherwise specified)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Switch Control Voltage (H)	V _{cont (H)}	2.8	3.0	5.0	V
Switch Control Voltage (L)	V _{cont (L)}	-0.3	0	0.3	V
Operating Frequency 1 ^{Note 1}	f1	2.4	-	2.5	GHz
Operating Frequency 2 ^{Note 1}	f2	4.9	-	6.0	GHz
Operating Frequency 3 ^{Note 2}	f3	-	8.0	-	GHz
Operating Frequency 4 ^{Note 3}	f4	0.5	-	1.0	GHz
Operating Frequency 5 ^{Note 3}	f5	1.0	-	2.4	GHz

- Notes 1.** DC blocking capacitors = 4 pF
- 2.** DC blocking capacitors = 2 pF
- 3.** DC blocking capacitors = 100 pF

<R> 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 _{ins1}	f = 2.4 to 2.5 GHz	–	0.40	0.60	dB
Insertion Loss 2	L _{ins2}	f = 4.9 to 6.0 GHz	–	0.50	0.80	dB
Insertion Loss 3	L _{ins3}	f = 8.0 GHz ^{Note 1}	–	0.90	–	dB
Insertion Loss 4	L _{ins4}	f = 0.5 to 2.5 GHz ^{Note 2}	–	0.50	–	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
Isolation 3	ISL3	f = 8.0 GHz ^{Note 1}	–	23	–	dB
Isolation 4	ISL4	f = 0.5 to 1.0 GHz ^{Note 2}	40	43	–	dB
Isolation 5	ISL5	f = 1.0 to 2.5 GHz ^{Note 2}	35	38	–	dB
Input Return Loss 1	RL _{in1}	f = 2.4 to 2.5 GHz	–	15	–	dB
Input Return Loss 2	RL _{in2}	f = 4.9 to 6.0 GHz	–	15	–	dB
Input Return Loss 3	RL _{in3}	f = 8.0 GHz ^{Note 1}	–	15	–	dB
Input Return Loss 4	RL _{in4}	f = 0.5 to 2.5 GHz ^{Note 2}	–	20	–	dB
Output Return Loss 1	RL _{out1}	f = 2.4 to 2.5 GHz	–	15	–	dB
Output Return Loss 2	RL _{out2}	f = 4.9 to 6.0 GHz	–	15	–	dB
Output Return Loss 3	RL _{out3}	f = 8.0 GHz ^{Note 1}	–	15	–	dB
Output Return Loss 4	RL _{out4}	f = 0.5 to 2.5 GHz ^{Note 2}	–	20	–	dB
1 dB Loss Compression Input Power 1 ^{Note 3}	P _{in (1 dB) 1}	f = 2.4 to 2.5 GHz	–	+31.0	–	dBm
1 dB Loss Compression Input Power 2 ^{Note 3}	P _{in (1 dB) 2}	f = 4.9 to 6.0 GHz	–	+29.0	–	dBm
Input 3rd Order Intercept Point	IIP ₃		–	+55	–	dBm
Switch Control Current	I _{cont}		–	0.1	1.0	μA
Switch Control Speed	t _{sw}	50% CTL to 90/10%	–	50	–	ns

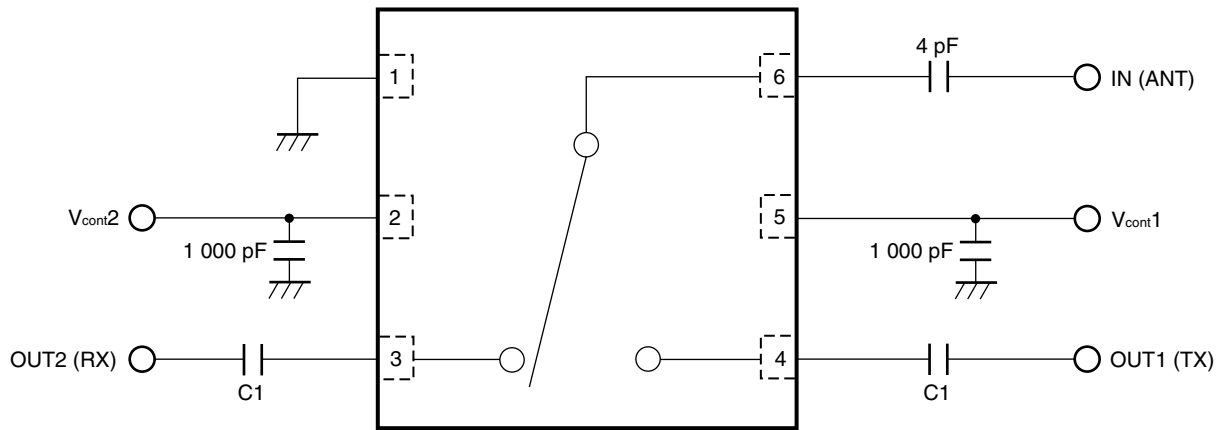
Notes 1. DC blocking capacitors = 2 pF

2. DC blocking capacitors = 100 pF

3. P_{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.

<R> EVALUATION CIRCUIT



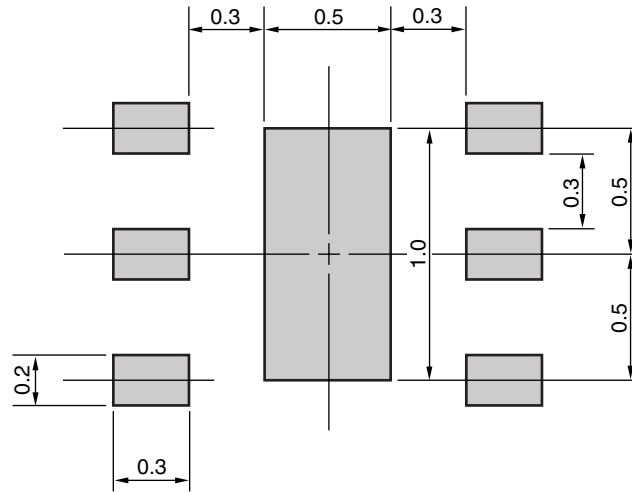
Remark C1: 2.4 to 2.5 GHz and 4.9 to 6.0 GHz 4 pF
8.0 GHz 2 pF
0.5 to 2.5 GHz 100 pF

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

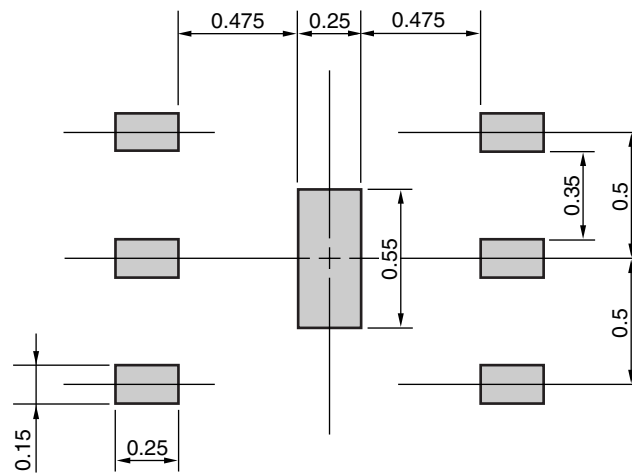
MOUNTING PAD AND SOLDER MASK LAYOUT DIMENSIONS

6-PIN PLASTIC TSON (UNIT: mm)

MOUNTING PAD



SOLDER MASK

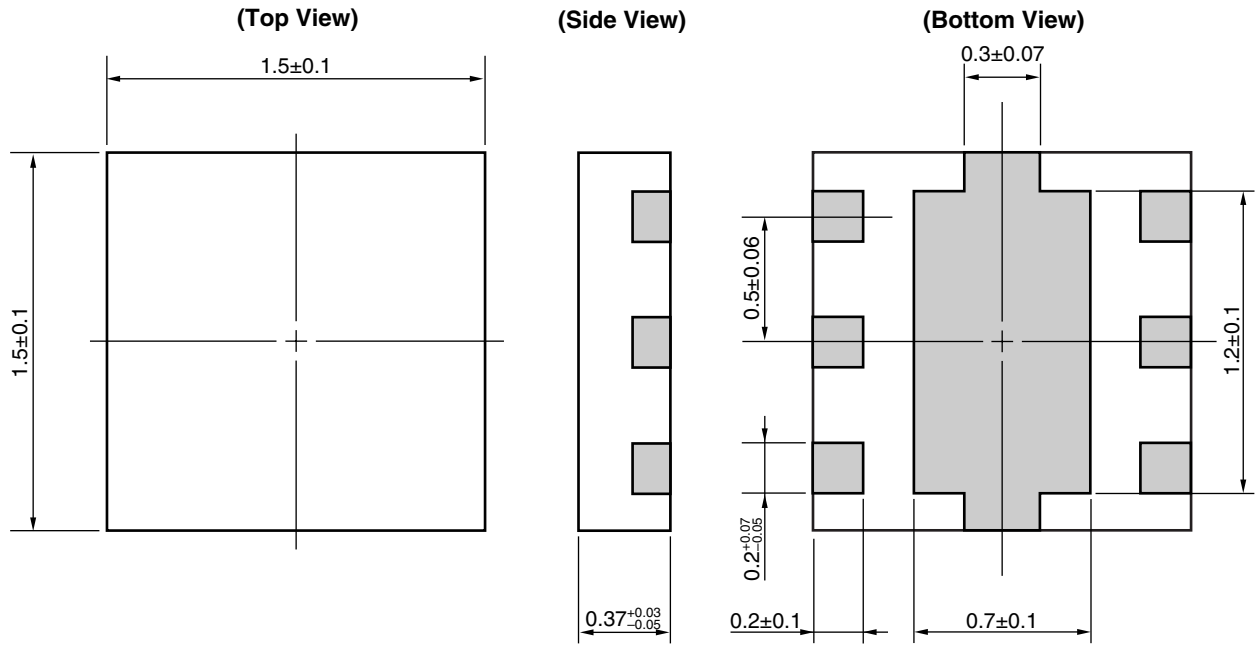


Solder thickness : 0.08 mm

Remark The mounting pad and solder mask layouts in this document are for reference only. When designing PCB, please consider workability of mounting, solder joint reliability, prevention of solder bridge and so on, in order to optimize the design.

PACKAGE DIMENSIONS

6-PIN PLASTIC TSON (UNIT: mm)



<R> **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
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).

Caution	GaAs Products	<p>This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.</p> <ul style="list-style-type: none">• Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.<ol style="list-style-type: none">1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.• Do not burn, destroy, cut, crush, or chemically dissolve the product.• Do not lick the product or in any way allow it to enter the mouth.
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Revision History	μPG2163T5N Data Sheet
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Rev.	Date	Description	
		Page	Summary
-	Feb 2008	-	Previous No. :PG10626EJ02V0DS
3.00	May 19, 2011	Throughout	Modification of operating frequencies f = 2.4 to 2.5 GHz and 4.9 to 6.0 GHz -> f = 0.5 to 2.5 GHz, 4.9 to 6.0 GHz and 8.0 GHz
		p.1	Modification of APPLICATIONS
		p.7	Modification of RECOMMENDED SOLDERING CONDITIONS

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-586-6000, Fax: +1-408-586-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
7F, No. 363 Fu Shing North Road Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 HarbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6276-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141

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