To our customers,

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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RENESAS

DATA SHEET

GaAs HBT INTEGRATED CIRCUIT

Phase-out/Discontinued

μPG2301T5L

POWER AMPLIFIER FOR Bluetooth™ Class 1

DESCRIPTION

The μPG2301T5L is GaAs HBT MMIC for power amplifier which were developed for Bluetooth Class 1.

This device realizes high efficiency, high gain and high output power by using InGaP HBT. This device is housed in a 12-pin plastic TSQFN package. And this package is able to high-density surface mounting.

FEATURES

- Operation frequency : f_{opt} = 2 400 to 2 500 MHz (2 450 MHz TYP.)
- Supply voltage : $V_{CC}1, 2 = V_{bias}$ = 2.7 to 3.6 V (3.3 V TYP.)
- Control voltage : V_{cont} = 0 to 3.6 V (2.5 V TYP.)
  : V_{enable} = 0 to 3.1 V (2.9 V TYP.)
- Circuit current : I_{CC} = 120 mA TYP. @ $V_{CC}1, 2 = V_{bias}$ = 3.3 V, V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm
- Maximum power : $P_{out\ (MAX.)}$ = +23 dBm TYP. @ $V_{CC}1, 2 = V_{bias}$ = 3.3 V, V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm
- Gain Control Range : GCR = 23 dB TYP. @ $V_{CC}1, 2 = V_{bias}$ = 3.3 V, V_{cont} = 0 to 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm
- Power gain : G_P = 23 dB TYP. (Reference value)
- High efficiency : PAE = 50% TYP. (Reference value)
- Shut down function
- High-density surface mounting : 12-pin plastic TSQFN package (2.0 × 2.0 × 0.37 mm)

APPLICATIONS

- Power Amplifier for Bluetooth Class 1 etc.

ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPG2301T5L-E2	μPG2301T5L-E2-A	12-pin plastic TSQFN (Pb-Free) Note	2301	• Embossed tape 8 mm wide • Pin 10, 11, 12 face the perforation side of the tape • Qty 3 kpcs/reel

Note With regards to terminal solder (the solder contains lead) plated products (conventionally plated), contact your nearby sales office.

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPG2301T5L

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

Document No. PG10559EJ01V0DS (1st edition)
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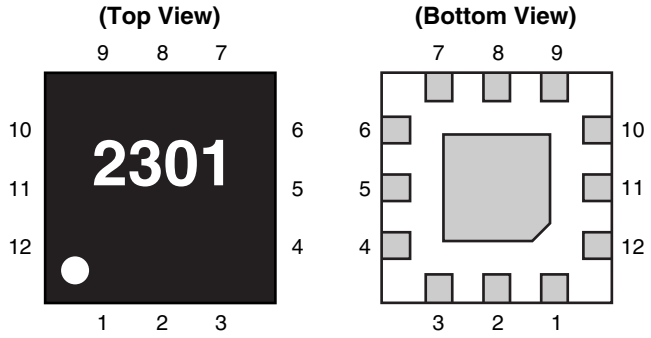
PIN CONNECTIONS



Pin No.	Pin Name
1	GND (NC)
2	GND
3	OUT/V_{CC}2
4	GND (NC)
5	V_{enable}
6	V_{bias}
7	V_{CC}1
8	GND
9	IN
10	GND (NC)
11	V_{cont}
12	GND (NC)

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

Parameter	Symbol	Ratings	Unit
Supply Voltage	V_{CC}1, 2	5.5	V
	V_{bias}		
Control Voltage	V_{cont}	3.6	V
	V_{enable}		
Circuit Current	I_{CC}	400	mA
Control Current	I_{cont}	0.5	mA
	I_{enable}		
Power Dissipation	P_D	700 Note	mW
Operating Ambient Temperature	T_A	–40 to +85	°C
Storage Temperature	T_{stg}	–55 to +150	°C
Input Power	P_{in}	+10	dBm

Note Mounted on double-sided copper-clad 50 × 50 × 1.6 mm epoxy glass PWB, T_A = +85°C

RECOMMENDED OPERATING RANGE (T_A = +25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating Frequency	f_{opt}	2 400	2 450	2 500	MHz
Supply Voltage	V_{CC}1, 2	2.7	3.3	3.6	V
	V_{bias}				
Control Voltage	V_{cont}	0	2.5	3.6	V
	V_{enable}	0	2.9	3.1	

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, $V_{CC}1, 2 = V_{bias}$ = 3.3 V, f = 2 450 MHz, External input and output matching, unless otherwise specified)

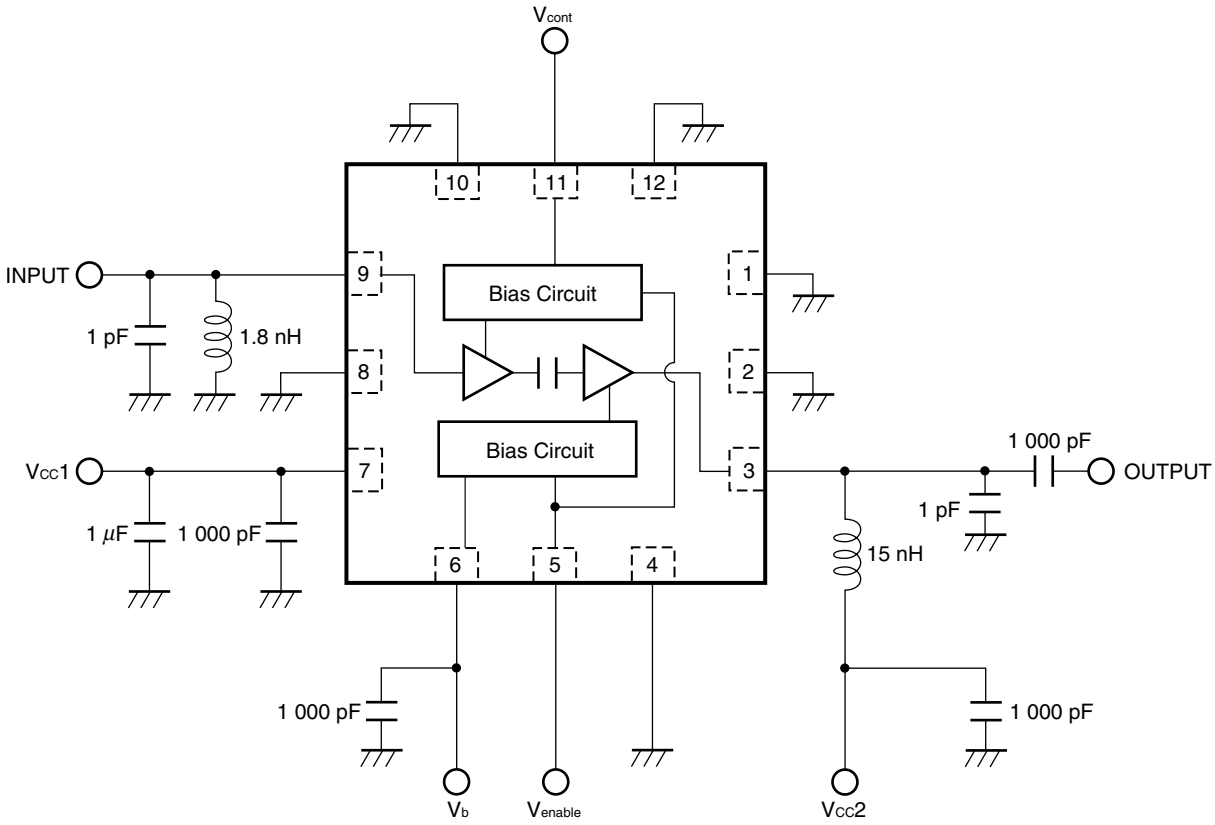
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	I_{CC}	V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	110	120	130	mA
Shut Down Current	$I_{shut\ down}$	V_{cont} = 2.5 V, V_{enable} = 0 V, P_{in} = +4 dBm	–	0.1	1.0	μA
Output Power 1	$P_{out}1$	V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	+21	+23	+24.5	dBm
Output Power 2	$P_{out}2$	V_{cont} = 0 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	–	0	+1	dBm
Gain Control Range	GCR	V_{cont} = 0 to 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	20	23	–	dB

STANDARD CHARACTERISTICS FOR REFERENCE

(T_A = +25°C, $V_{CC}1, 2 = V_{bias}$ = 3.3 V, f = 2 450 MHz, External input and output matching, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Efficiency	PAE	V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	–	50	–	%
Power Gain1	G_P1	V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = −5 dBm	–	23	–	dB
Power Gain2	G_P2	V_{cont} = 2.5 V, V_{enable} = 2.9 V, P_{in} = +4 dBm	–	19	–	dB

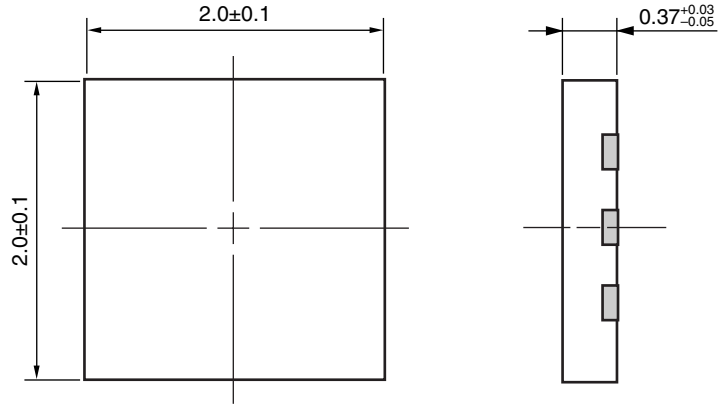
EVALUATION CIRCUIT ($V_{CC}1, 2 = V_{bias}$ = 3.3 V, f = 2 450 MHz)



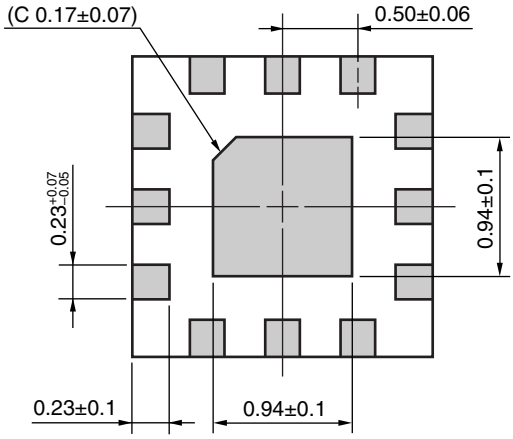
The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

PACKAGE DIMENSIONS

12-PIN PLASTIC TSQFN (UNIT: mm)



(Bottom View)



Remark ( ) : Reference value

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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
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 (terminal 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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M8E 00.4-0110

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▶**For further information, please contact**

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