

PRELIMINARY DATA SHEET

NEC

GaAs HBT INTEGRATED CIRCUIT

μPG2317T5J

InGaP POWER AMPLIFIER FOR DUAL BAND W-LAN

DESCRIPTION

The μPG2317T5J is a GaAs HBT MMIC power amplifier for Dual (2.4 GHz and 5.8 GHz) band wireless LAN.

This device realizes high efficiency, high gain and high output power by using InGaP HBT and shut-down function.

This device is housed in a 12-pin plastic TQFN (Thin Quad Flat Non-leaded) package. And this package is able to high-density surface mounting.

FEATURES

- Operating frequency : $f_{opt} = 2\ 400$ to $2\ 500$ MHz (L-band)
: $f_{opt} = 4\ 900$ to $5\ 850$ MHz (H-band)
- Supply voltage : $V_{CC(H), (L)} = 3.0$ to 3.6 V (3.3 V TYP.)
- Control voltage : $V_{enable(H), (L)} = 0$ to 2.9 V (2.8 V TYP.)
- Circuit current : $I_{CC(L)} = 125$ mA TYP. @ $P_{out} = +18$ dBm, 11g OFDM 54 Mbps signal
: $I_{CC(H)} = 150$ mA TYP. @ $P_{out} = +18$ dBm, 11a OFDM 54 Mbps signal
- Power gain : $G_P(L) = 29$ dB TYP. @ $P_{out} = +18$ dBm, 11g OFDM 54 Mbps signal
: $G_P(H) = 27$ dB TYP. @ $P_{out} = +18$ dBm, 11a OFDM 54 Mbps signal
- Error vector magnitude : $EVM(L) = 3.0\%$ TYP. @ $P_{out} = +18$ dBm, 11g OFDM 54 Mbps signal
: $EVM(H) = 4.0\%$ TYP. @ $P_{out} = +18$ dBm, 11a OFDM 54 Mbps signal
- High-density surface mounting : 12-pin plastic TQFN package ($2.5 \times 2.5 \times 0.37$ mm)

APPLICATION

- Power Amplifier for 802.11a/b/g, etc.

ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPG2317T5J-E2	μPG2317T5J-E2-A	12-pin plastic TQFN (Pb-Free)	2317	<ul style="list-style-type: none">• Embossed tape 8 mm wide• Pin 10, 11, 12 face the perforation side of the tape• Qty 3 kpcs/reel

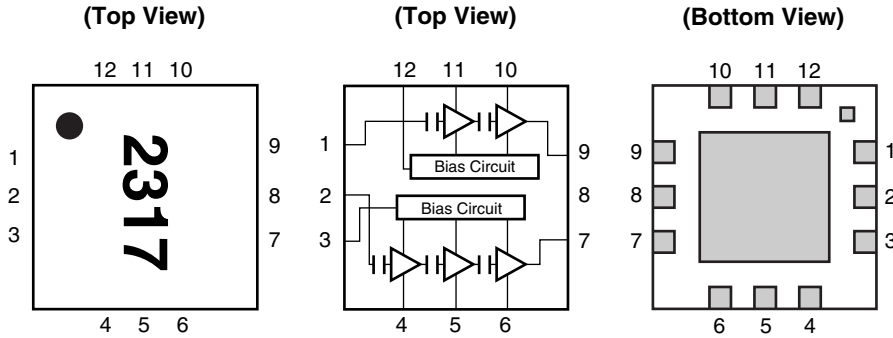
Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: μPG2317T5J

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.
Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



Pin No.	Pin Name
1	P _{in} (L)
2	P _{in} (H)
3	V _{enable} (H)
4	V _{cc1} (H)
5	V _{cc2} (H)
6	V _{cc3} (H)
7	P _{out} (H)
8	GND
9	P _{out} (L)
10	V _{cc2} (L)
11	V _{cc1} (L)
12	V _{enable} (L)

Remark Exposed pad : GND

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

Parameter	Symbol	Ratings	Unit
Supply Voltage	V _{CC} (H), (L)	5.0	V
Control Voltage	V _{enable} (H), (L)	3.2	V
Input Power	P _{in}	+5	dBm
Power Dissipation	P _D	500 ^{Note}	mW
Operating Ambient Temperature	T _A	-45 to +85	°C
Storage Temperature	T _{stg}	-55 to +150	°C

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, unless otherwise specified)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V _{CC} (H), (L)	3.0	3.3	3.6	V
Control Voltage	V _{enable} (H), (L)	0 ^{Note}	2.8	2.9	V

Note Shut down

ELECTRICAL CHARACTERISTICS 1

($T_A = +25^\circ\text{C}$, $V_{CC(L)} = 3.3\text{ V}$, $V_{enable(L)} = 2.8\text{ V}$, external input and output matching, RF signal: 11g OFDM 54 Mbps at L-band, unless otherwise specified)

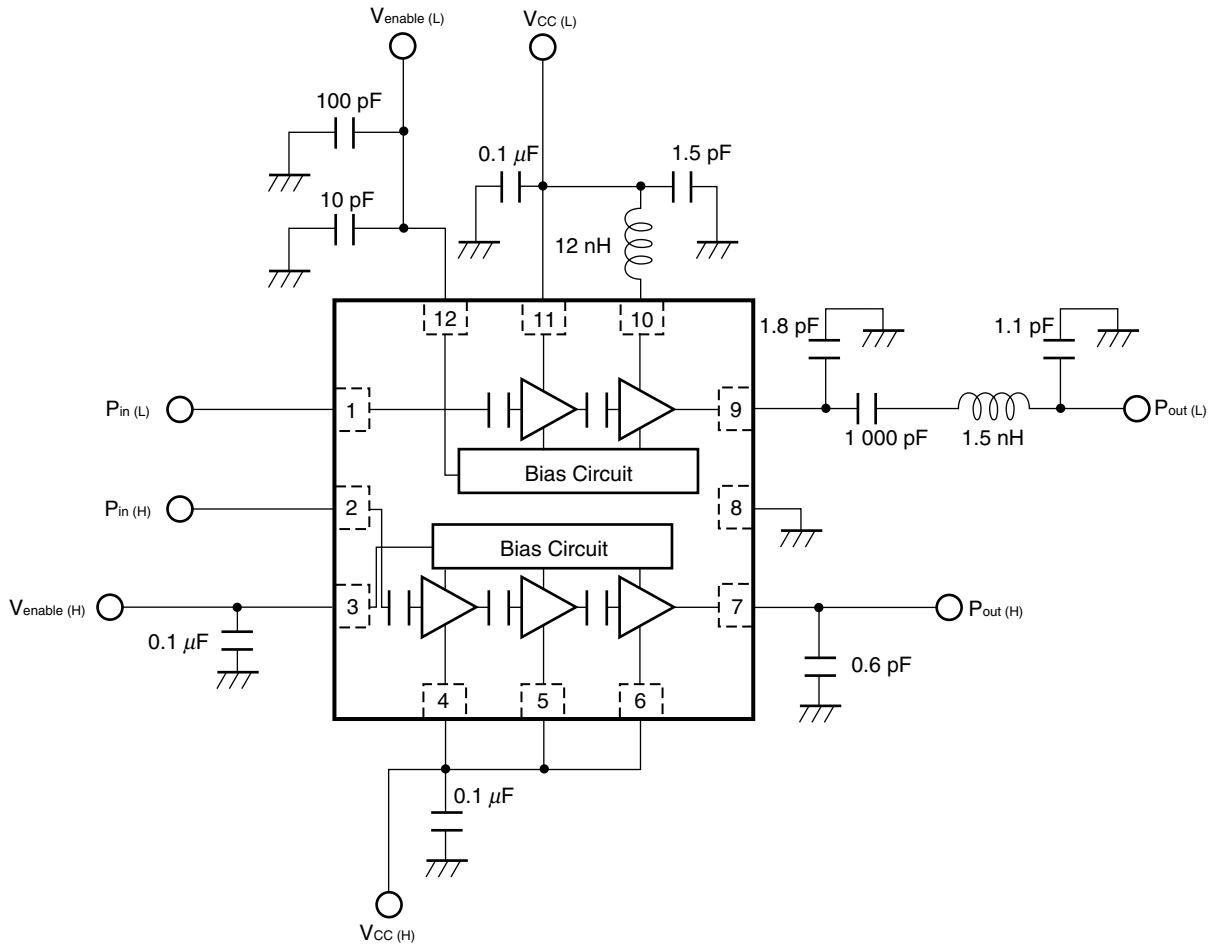
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Frequency Range	f_{opt}		2 400	2 450	2 500	MHz
Circuit Current	$I_{CC(L)}$	$P_{out} = +18\text{ dBm}$	–	125	140	mA
Power Gain	$G_P(L)$	$P_{out} = +18\text{ dBm}$	26	29	–	dB
Shut down Current	$I_{shut\ down(L)}$	$V_{enable(L)} = 0\text{ V}$	–	–	0.1	μA
Error Vector Magnitude	$EVM(L)$	$P_{out} = +18\text{ dBm}$	–	3.0	–	%
2nd Harmonics	$2f_0(L)$	$P_{out} = +18\text{ dBm}$	–	–35	–	dBc
3rd Harmonics	$3f_0(L)$	$P_{out} = +18\text{ dBm}$	–	–55	–	dBc
Enable Current	$I_{enable(L)}$	$P_{out} = +18\text{ dBm}$	–	2.5	5.0	mA
Idle Current	$I_q(L)$	No RF input	–	65	–	mA
Output Load Mismatch	–	VSWR 1: 5 all phase	No destruction			–

ELECTRICAL CHARACTERISTICS 2

($T_A = +25^\circ\text{C}$, $V_{CC(H)} = 3.3\text{ V}$, $V_{enable(H)} = 2.8\text{ V}$, external input and output matching, RF signal: 11a OFDM 54 Mbps at H-band, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Frequency Range	f_{opt}		4 900	5 200	5 850	MHz
Circuit Current	$I_{CC(H)}$	$P_{out} = +18\text{ dBm}$	–	150	180	mA
Power Gain	$G_P(H)$	$P_{out} = +18\text{ dBm}$	23	27	–	dB
Shut down Current	$I_{shut\ down(H)}$	$V_{enable(H)} = 0\text{ V}$	–	–	0.1	μA
Error Vector Magnitude	$EVM(H)$	$P_{out} = +18\text{ dBm}$	–	4.0	–	%
2nd Harmonics	$2f_0(H)$	$P_{out} = +18\text{ dBm}$	–	–40	–	dBc
3rd Harmonics	$3f_0(H)$	$P_{out} = +18\text{ dBm}$	–	–45	–	dBc
Enable Current	$I_{enable(H)}$	$P_{out} = +18\text{ dBm}$	–	4.0	6.0	mA
Idle Current	$I_q(H)$	No RF input	–	80	–	mA
Output Load Mismatch	–	VSWR 1: 5 all phase	No destruction			–

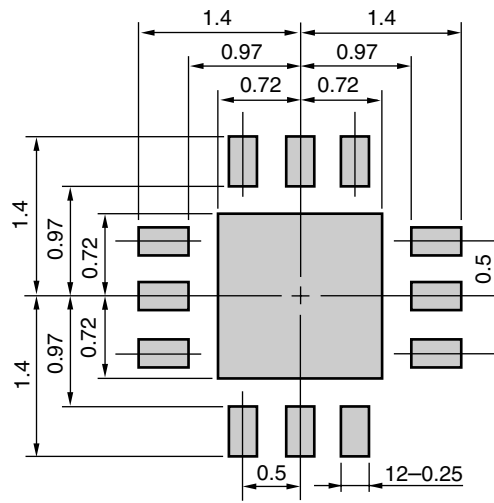
EVALUATION CIRCUIT



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

MOUNTING PAD LAYOUT DIMENSIONS

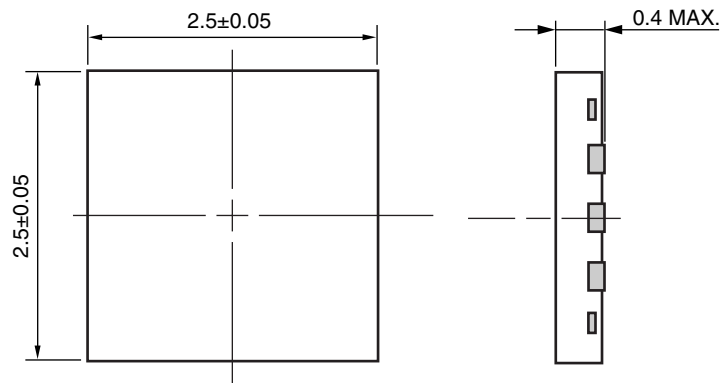
12-PIN PLASTIC TQFN (UNIT: mm)



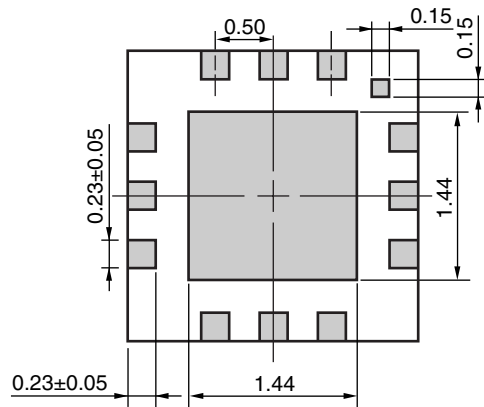
Remark The mounting pad layout in this document is for reference only.

PACKAGE DIMENSIONS

12-PIN PLASTIC TQFN (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
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).

- **The information in this document is current as of May, 2008. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets or data books, etc., for the most up-to-date specifications of NEC Electronics products. Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.**

- No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Electronics. NEC Electronics assumes no responsibility for any errors that may appear in this document.
- NEC Electronics does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC Electronics products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Electronics or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of a customer's equipment shall be done under the full responsibility of the customer. NEC Electronics assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC Electronics endeavors to enhance the quality, reliability and safety of NEC Electronics products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC Electronics products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment and anti-failure features.
- NEC Electronics products are classified into the following three quality grades: "Standard", "Special" and "Specific".

The "Specific" quality grade applies only to NEC Electronics products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of an NEC Electronics product depend on its quality grade, as indicated below. Customers must check the quality grade of each NEC Electronics product before using it in a particular application.

"Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots.

"Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support).

"Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

The quality grade of NEC Electronics products is "Standard" unless otherwise expressly specified in NEC Electronics data sheets or data books, etc. If customers wish to use NEC Electronics products in applications not intended by NEC Electronics, they must contact an NEC Electronics sales representative in advance to determine NEC Electronics' willingness to support a given application.

(Note)

- (1) "NEC Electronics" as used in this statement means NEC Electronics Corporation and also includes its majority-owned subsidiaries.
- (2) "NEC Electronics products" means any product developed or manufactured by or for NEC Electronics (as defined above).

<p>Caution GaAs Products</p>	<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.
-------------------------------------	---