



BIPOLAR ANALOG INTEGRATED CIRCUIT $\mu PC3237TK$

LOW NOISE WIDE BAND SILICON GERMANIUM MMIC AMPLIFIER FOR MOBILE COMMUNICATIONS

DESCRIPTION

The μ PC3237TK is a silicon germanium (SiGe) monolithic integrated circuit designed as low noise amplifier for the mobile digital TV etc. This device exhibits low noise figure and high power gain characteristics.

The package is 6-pin lead-less minimold, suitable for surface mount.

This IC is manufactured using our UHS2 (\underline{U} ltra <u>High Speed Process</u>) SiGe bipolar process.

FEATURES

•	S upply voltage	: Vcc = 2.4 to 3.3 V (2.8 V TYP.)
•	Low current consumption	: lcc = 5 mA TYP. @ Vcc = 2.8 V
•	Low noise	: NF = 1.4 dB TYP. @ f = 470 MHz
		NF = 1.5 dB TYP. @ f = 770 MHz
•	Power gain	: G _P = 15.3 dB TYP. @ f = 470 MHz
		G _P = 13.5 dB TYP. @ f = 770 MHz
•	High-density surface mounting	: 6-pin lead-less minimold package (1.5 \times 1.1 \times 0.55 mm)

APPLICATION

• Low noise amplifier for the mobile digital TV etc.

ORDERING INFORMATION

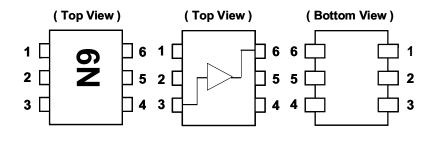
P art Number	Order Number	Package	Marking	S upplying F orm
μΡC 3237TK-E 2	μΡC3237TK-E2-A	6-pin lead-less minimold (1511 PKG) (Pb-Free)	6N	 8 mm wide embossed taping Pin 1, 6 face the perforation side of the tape Qty 5 kpcs/reel

Remark To order evaluation samples, contact your nearby sales office. Part number for sample order: μ PC3237TK-A

Caution Observe precautions when handling because these devices are sensitive to electrostaic 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



P in No.	P in Name
1	NC
2	GND
3	INPUT
4	Vcc
5	GND
6	OUTPUT

ABSOLUTE MAXIMUM RATINGS

Parameter	S ymbol	T es t C onditions	R atings	Unit
S upply V oltage	Vcc	TA = +25°C	3.6	V
Circuit Current	lcc	TA = +25°C	10	mA
Power Dissipation	PD	T _A = +85°C Note	203	mW
Operating Ambient Temperature	ΤA		-40 to +85	°C
S torage T emperature	T s tg		-55 to +150	°C
Input P ower	P in		+8	dBm

Note Mounted on double-side copper-clad $50 \times 50 \times 1.6$ mm epoxy glass PWB

RECOMMENDED OPERATING RANGE

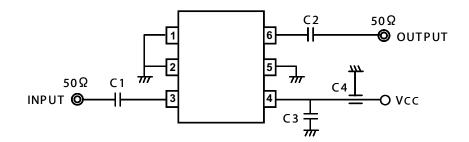
Parameter	S ymbol	MIN.	TYP.	MAX.	Unit
S upply V oltage	Vcc	2.4	2.8	3.3	V
Operating Ambient Temperature	ΤA	-40	+25	+85	°C

ELECTRICAL CHARACTERISTICS

(T_{A} = +25°C, V_{CC} = 2.8 V, Zs = ZL= 50 Ω , unless otherwise specified)

Parameter	S ymbol	T es t C onditions	MIN.	TYP.	MAX.	Unit
Circuit Current	lcc	No Signal	3.5	5	7	mA
Power Gain	G₽1	$f = 470 MHz, P_{in} = -30 dBm$	13.0	15.3	17.5	dB
	GP2	$f = 770 MHz$, $P_{in} = -30 dBm$	11.0	13.5	16.0	dB
Nois e Figure	NF1	f = 470MHz	_	1.4	1.9	dB
	NF2	f = 770MHz	-	1.5	2.0	dB
Input R eturn Los s	R Lin1	$f = 470 MHz, P_{in} = -30 dBm$	6.5	9.5	_	dB
	R Lin2	$f = 770 MHz, P_{in} = -30 dBm$	5.5	8.5	_	dB
Output R eturn Los s	R Lout1	$f = 470 MHz, P_{in} = -30 dBm$	9	14	_	dB
	R Lout2	$f = 770 MHz, P_{in} = -30 dBm$	10	15	_	dB
Isolation	ISL1	$f = 470 MHz, P_{in} = -30 dBm$	17	22	_	dB
	IS L 2	$f = 770 MHz, P_{in} = -30 dBm$	16	21	_	dB
Gain 1 dB Compression Output	P o (1 dB)1	f = 470MHz	-8	-5.5	_	dBm
Power	P o (1 dB)2	f = 770MHz	-8	-5.5	_	dBm

TEST CIRCUIT



COMPONENTS LIST

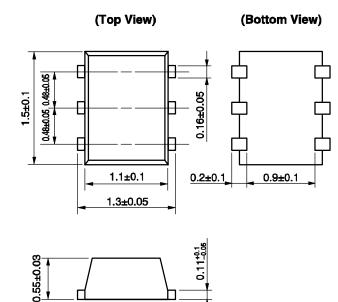
S ymbol	Туре	Value
C1, C2	Chip Capacitor	100pF
C 3	Chip Capacitor	1000pF
C4	Feed-through Capacitor	1000pF

Parameter	S ymbol	T es t C onditions	Reference	Unit
S aturated Output P ower	Po(sat)1	f = 470MHz, P in = 2 dB m	1.3	dBm
	Po(sat)2	$f = 770MHz$, $P_{in} = 2 dB m$	1.3	dBm
Input 3rd Order Distortion	IIP 3 1	f1=470MHz, f2=471MHz	-10.5	dB m
Intercept P oint	IIP 3 2	f1=770MHz, f2=771MHz	-9.5	dBm
Output 3rd Order Distortion	OIP31	f1=470MHz, f2=471MHz	4.8	dBm
Intercept P oint	OIP32	f1=770MHz, f2=771MHz	4.0	dBm
K factor	K 1	f = 470MHz	1.15	_
	К 2	f = 770MHz	1.20	_

STANDARD CHARACTERISTICS FOR REFERENCE ($T_A = +25^{\circ}C$, $V_{CC} = 2.8$ V, $Z_S = Z_L = 50 \Omega$, unless otherwise specified)

PACKAGE DIMENSIONS

6-PIN LEAD-LESS MINIMOLD (1511 PKG) (UNIT: mm)



NOTES ON CORRECT USE

- (1) Observe precautions for handling because of electro-static sensitive devices.
- (2) Form a ground pattern as widely as possible to minimize ground impedance (to prevent undesired oscillation). All the ground terminals must be connected together with wide ground pattern to decrease impedance difference.
- (3) The bypass capacitor should be attached to Vcc line.
- (4) The DC cut capacitor should be attached to Input and Output pin.
- (5) Pin 1 (NC) should be connected to the ground pattern.

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.

S oldering Method	S oldering C onditions		C ondition S ymbol
Infrared R eflow	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% (W t.) or below	IR 260
W ave S oldering	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 s econds or less : 120°C or below : 1 time : 0.2% (W t.) or below	W \$ 260
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	HS 350

Caution Do not use different soldering methods together (except for partial heating).

- The information in this document is current as of May, 2007. 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)

- "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).

M8E 02. 11-1



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)	Concentratio in CEL		
Lead (Pb)	< 1000 PPM	-A Not Detected	-AZ (*)	
Mercury	< 1000 PPM	Not De	etected	
Cadmium	< 100 PPM	Not Detected		
Hexavalent Chromium	alent Chromium < 1000 PPM Not De		etected	
РВВ	< 1000 PPM	Not De	etected	
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.

In no event shall CEL's liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.

See CEL Terms and Conditions for additional clarification of warranties and liability.

Important Information and Disclaimer: Information provided by CEL on its website or in other communications concerting the substance content of its products represents knowledge and belief as of the date that it is provided. CEL bases its knowledge and belief on information provided by third parties and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. CEL has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. CEL and CEL suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.