



# PRELIMINARY PRODUCT INFORMATION

## BIPOLAR ANALOG INTEGRATED CIRCUIT $\mu$ PC3237TK

### LOW NOISE WIDE BAND SILICON GERMANIUM MMIC AMPLIFIER FOR MOBILE COMMUNICATIONS

#### DESCRIPTION

The  $\mu$ 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 (Ultra High Speed Process) SiGe bipolar process.

#### FEATURES

- Supply voltage :  $V_{CC} = 2.4$  to  $3.3$  V (2.8 V TYP.)
- Low current consumption :  $I_{CC} = 5$  mA TYP. @  $V_{CC} = 2.8$  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

Part Number	Order Number	Package	Marking	Supplying Form
$\mu$ PC3237TK-E2	$\mu$ PC3237TK-E2-A	6-pin lead-less minimold (1511 PKG) (Pb-Free)	6N	<ul style="list-style-type: none"><li>• 8 mm wide embossed taping</li><li>• Pin 1, 6 face the perforation side of the tape</li><li>• Qty 5 kpcs/reel</li></ul>

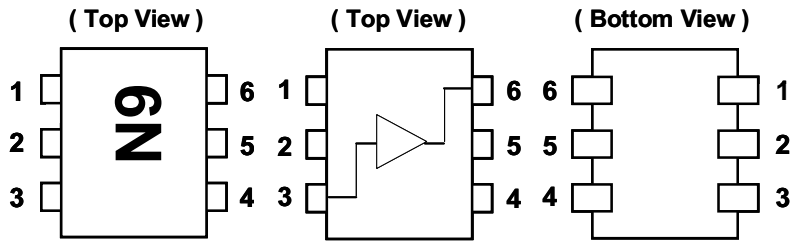
**Remark** To order evaluation samples, contact your nearby sales office.

Part number for sample order:  $\mu$ PC3237TK-A

**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**



Pin No.	Pin Name
1	NC
2	GND
3	INPUT
4	V <sub>CC</sub>
5	GND
6	OUTPUT

**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Test Conditions	Rating	Unit
Supply Voltage	V <sub>CC</sub>	T <sub>A</sub> = +25°C	3.6	V
Circuit Current	I <sub>CC</sub>	T <sub>A</sub> = +25°C	10	mA
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> = +85°C <b>Note</b>	203	mW
Operating Ambient Temperature	T <sub>A</sub>		-40 to +85	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C
Input Power	P <sub>in</sub>		+8	dBm

**Note** Mounted on double-side copper-clad 50 × 50 × 1.6 mm epoxy glass PWB

**RECOMMENDED OPERATING RANGE**

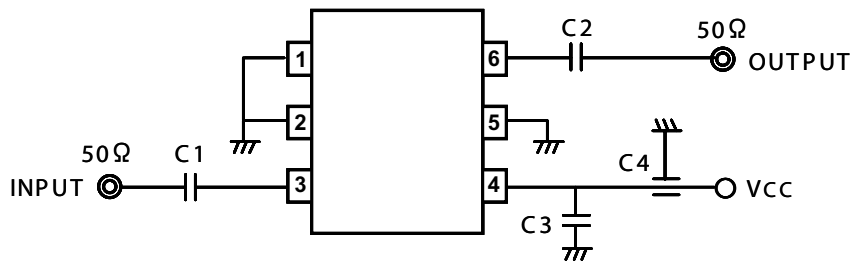
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V <sub>CC</sub>	2.4	2.8	3.3	V
Operating Ambient Temperature	T <sub>A</sub>	-40	+25	+85	°C

**ELECTRICAL CHARACTERISTICS**

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

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	$I_{CC}$	No Signal	3.5	5	7	mA
Power Gain	$G_{P1}$	$f = 470\text{MHz}$ , $P_{in} = -30\text{ dBm}$	13.0	15.3	17.5	dB
	$G_{P2}$	$f = 770\text{MHz}$ , $P_{in} = -30\text{ dBm}$	11.0	13.5	16.0	dB
Noise Figure	NF1	$f = 470\text{MHz}$	—	1.4	1.9	dB
	NF2	$f = 770\text{MHz}$	—	1.5	2.0	dB
Input Return Loss	$R_{Lin1}$	$f = 470\text{MHz}$ , $P_{in} = -30\text{ dBm}$	6.5	9.5	—	dB
	$R_{Lin2}$	$f = 770\text{MHz}$ , $P_{in} = -30\text{ dBm}$	5.5	8.5	—	dB
Output Return Loss	$R_{Lout1}$	$f = 470\text{MHz}$ , $P_{in} = -30\text{ dBm}$	9	14	—	dB
	$R_{Lout2}$	$f = 770\text{MHz}$ , $P_{in} = -30\text{ dBm}$	10	15	—	dB
Isolation	ISL1	$f = 470\text{MHz}$ , $P_{in} = -30\text{ dBm}$	17	22	—	dB
	ISL2	$f = 770\text{MHz}$ , $P_{in} = -30\text{ dBm}$	16	21	—	dB
Gain 1 dB Compression Output Power	$P_{O(1\text{ dB})1}$	$f = 470\text{MHz}$	-8	-5.5	—	dBm
	$P_{O(1\text{ dB})2}$	$f = 770\text{MHz}$	-8	-5.5	—	dBm

**TEST CIRCUIT**



**COMPONENTS LIST**

Symbol	Type	Value
C1, C2	Chip Capacitor	100pF
C3	Chip Capacitor	1000pF
C4	Feed-through Capacitor	1000pF

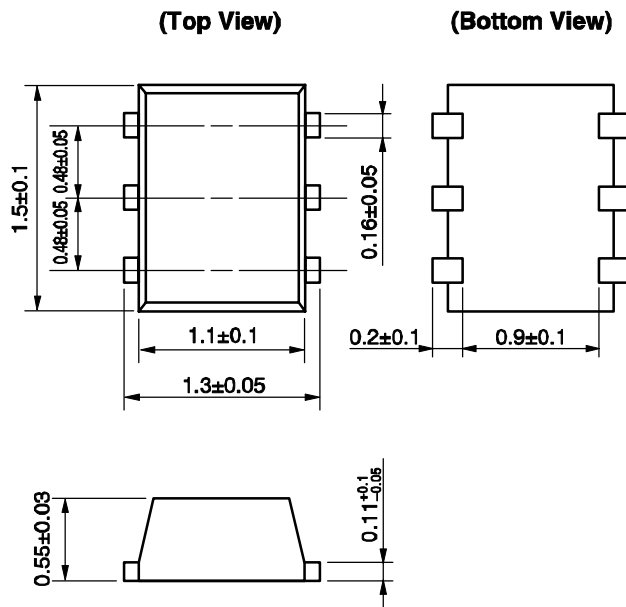
**STANDARD CHARACTERISTICS FOR REFERENCE**

(  $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 2.8\text{ V}$ ,  $Z_s = Z_L = 50\ \Omega$ , unless otherwise specified )

Parameter	Symbol	Test Conditions	Reference	Unit
Saturated Output Power	$P_{O(sat)1}$	$f = 470\text{MHz}$ , $P_{in} = 2\text{ dBm}$	1.3	dBm
	$P_{O(sat)2}$	$f = 770\text{MHz}$ , $P_{in} = 2\text{ dBm}$	1.3	dBm
Input 3rd Order Distortion Intercept Point	IIP3 1	$f_1=470\text{MHz}$ , $f_2=471\text{MHz}$	-10.5	dBm
	IIP3 2	$f_1=770\text{MHz}$ , $f_2=771\text{MHz}$	-9.5	dBm
Output 3rd Order Distortion Intercept Point	OIP3 1	$f_1=470\text{MHz}$ , $f_2=471\text{MHz}$	4.8	dBm
	OIP3 2	$f_1=770\text{MHz}$ , $f_2=771\text{MHz}$	4.0	dBm
K factor	K 1	$f = 470\text{MHz}$	1.15	-
	K 2	$f = 770\text{MHz}$	1.20	-

**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 V<sub>CC</sub> 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.

Soldering Method	Soldering Conditions	Condition S 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%(W t.) or below	IR 260
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%(W t.) or below	WS 260
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%(W t.) or below	HS 350

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

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M8E 02. 11-1

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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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