

# PRELIMINARY PRODUCT INFORMATION



## BIPOLAR ANALOG INTEGRATED CIRCUIT $\mu$ PC8232T5N

### SiGe:C LOW NOISE AMPLIFIER FOR GPS

#### DESCRIPTION

The  $\mu$ PC8232T5N is a silicon germanium carbon (SiGe:C) monolithic integrated circuit designed as low noise amplifier for GPS. This device exhibits low noise figure and high power gain characteristics, so this IC can improve the sensitivity of GPS receiver. In addition, the  $\mu$ PC8232T5N which is included output matching circuit contributes to reduce external components and system size.

The package is 6-pin plastic TSON (Thin Small Out-line Non-leaded) suitable for surface mount.

This IC is manufactured using our UHS4 (Ultra High Speed Process) SiGe:C bipolar process.

#### FEATURES

- Low noise : NF = 0.95 dB TYP. @  $f_{in}$  = 1575 MHz
- High gain : GP = 17 dB TYP. @  $f_{in}$  = 1575 MHz
- Low current consumption : ICC = 3.0 mA TYP. @ VCC = 3.0V
- Built-in power-save function
- High-density surface mounting : 6-pin plastic TSON package (1.5 × 1.5 × 0.37 mm)
- Included output matching circuit
- Included very robust bandgap regulator (Small VCC and TA dependence)
- Included protection circuits for ESD

#### APPLICATION

- Low noise amplifier for GPS

#### ORDERING INFORMATION

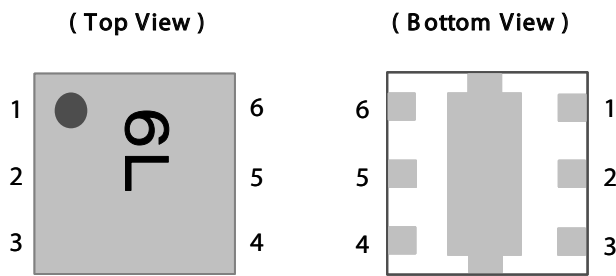
Part Number	Order Number	Package	Marking	Supplying Form
$\mu$ PC8232T5N-E2	$\mu$ PC8232T5N-E2-A	6-pin plastic TSON (Pb-Free)	6L	<ul style="list-style-type: none"><li>• 8mm wide embossed taping</li><li>• Pin 1, 6 face the perforation side of the tape</li><li>• Qty 3 kpcs/reel</li></ul>

**Remark** To order evaluation samples, contact your nearby sales office.  
Part number for sample order:  $\mu$ PC8232T5N

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

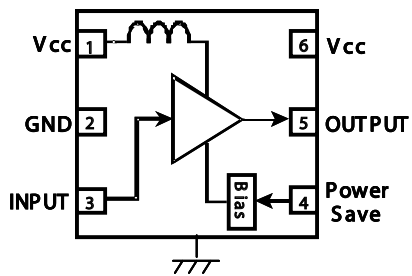
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**PIN CONNECTIONS**



Pin No.	Pin Name
1	Vcc
2	GND
3	INPUT
4	Power Save
5	OUTPUT
6	Vcc
EXPOSED PAD	GND

**INTERNAL BLOCK DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Test Conditions	Ratings	Unit
Supply Voltage	V <sub>CC</sub>	T <sub>A</sub> = + 25°C	4.0	V
Power-Saving Voltage	V <sub>PS</sub>	T <sub>A</sub> = + 25°C	4.0	V
Total Power Dissipation	P <sub>tot</sub>	T <sub>A</sub> = + 85°C <b>Note</b>	150	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>		+ 10	dBm

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

**RECOMMENDED OPERATING RANGE**

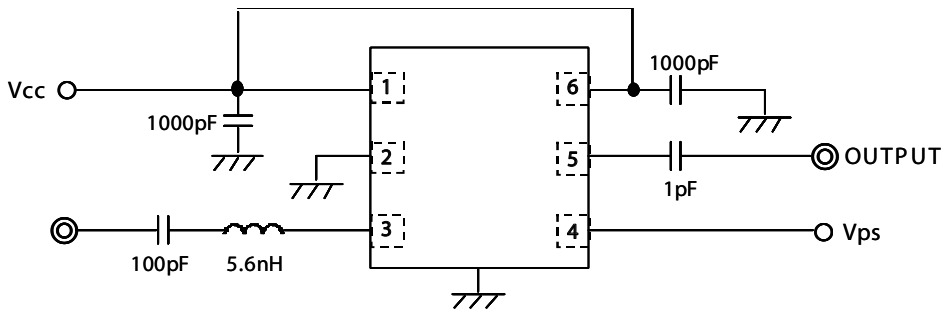
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V <sub>CC</sub>	2.5	3.0	3.3	V
Operating Ambient Temperature	T <sub>A</sub>	- 40	+ 25	+ 85	°C
Power Save Turn-on Voltage	V <sub>PSon</sub>	1.6	—	V <sub>CC</sub>	V
Power Save Turn-off Voltage	V <sub>PSoff</sub>	0	—	0.4	V

**ELECTRICAL CHARACTERISTICS**

( T<sub>A</sub> = +25°C, V<sub>CC</sub> = V<sub>PS</sub> = 3.0 V, f<sub>in</sub> = 1575MHz, unless otherwise specified )

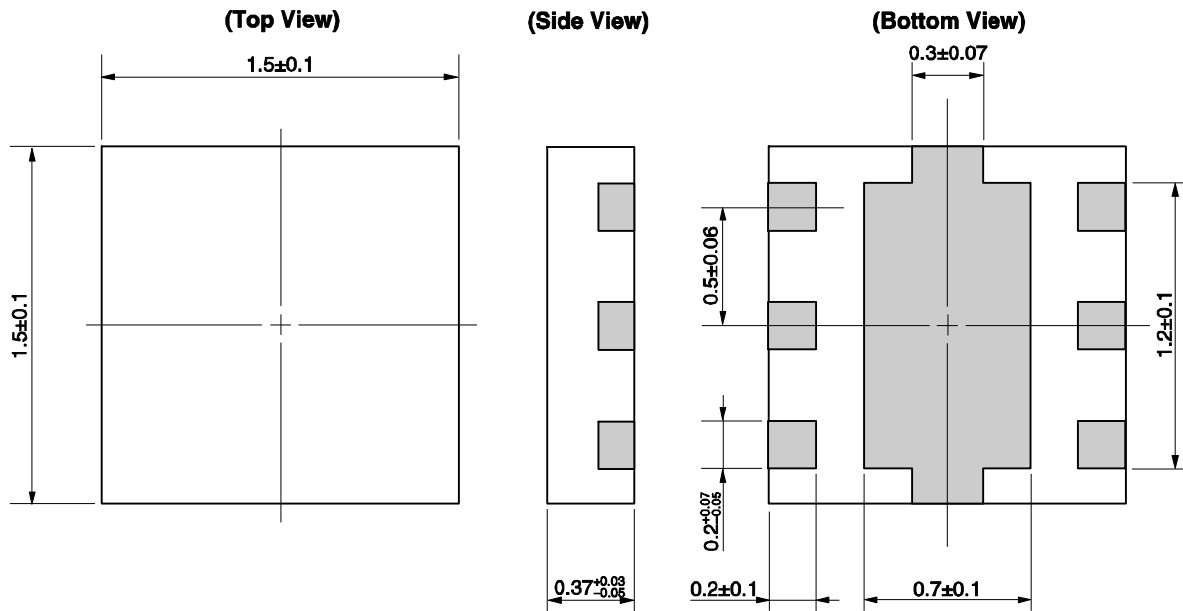
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	I <sub>CC</sub>	No signal (V <sub>PS</sub> = 3.0 V)	2.3	3.0	4.1	mA
		At Power-Saving Mode (V <sub>PS</sub> = 0 V)	—	—	1	μA
Power Gain	G <sub>P</sub>	P <sub>in</sub> =-35dBm	15	17	19	dB
Noise Figure	NF		—	0.95	1.25	dB
Input Return Loss	R <sub>L</sub> <sub>in</sub>		7	10	—	dB
Output Return Loss	R <sub>L</sub> <sub>out</sub>		10	20	—	dB
Isolation	ISL		—	40	—	dB
Input 3rd Order Distortion I Intercept Point	IIP <sub>3</sub>	f <sub>in1</sub> =1574MHz, f <sub>in2</sub> =1575MHz	—	- 8	—	dBm
Gain 1 dB Compression Input Power	P <sub>in</sub> (1 dB)		—	-21	—	dBm

**TEST CIRCUITS**



**PACKAGE DIMENSIONS**

**6-PIN PLASTIC TSON (UNIT: mm)**



**NOTE 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 pins 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) Do not supply DC voltage to INPUT pin.

**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	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%(Wt.) or below	WS 260
Partial Heating	Peak temperature (pin 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	HS 350

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

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)	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.

**Important Information and Disclaimer:** Information provided by CEL on its website or in other communications concerning 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.

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.

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