

# PE9302

## Product Description

The PE9302 is a high performance monolithic CMOS prescaler with a fixed divide ratio of 4. Its operating frequency range is 1.5 GHz to 3.5 GHz. The PE9302 operates on a nominal 3 V supply and draws only 14 mA. It is packaged in a small 8-lead flat pack and is ideal for space applications.

The PE9302 is manufactured in Peregrine's patented Ultra Thin Silicon (UTSi®) CMOS process, offering the performance of GaAs with the economy and integration of conventional CMOS.

## 3.5 GHz Low Power CMOS Divide-by-4 Prescaler For RAD-Hard Applications

### Features

- High-frequency operation: 1.5 GHz to 3.5 GHz
- Fixed divide ratio of 4
- Low-power operation: 14 mA typical @ 3 V across frequency
- Small package: 8-lead formed flat pack

## Product Benefits

- SEL Immune due to UTSi CMOS
- SEU  $<10^{-10}$  errors / bit-day
- 100 Krads (Si) Total Dose

Figure 1. Package Drawing

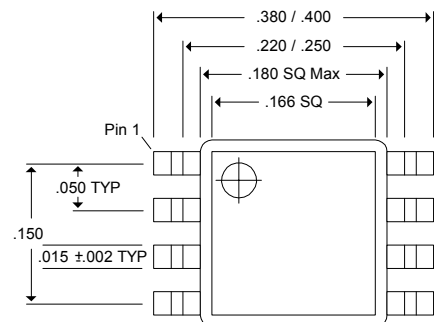
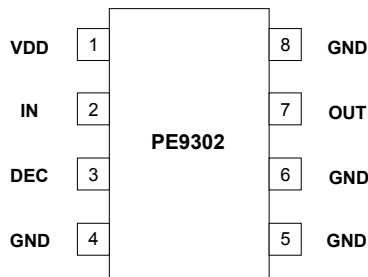


Table 1. Electrical Specifications @ +25 °C ( $Z_S = Z_L = 50 \Omega$ )

Parameter	Minimum	Typical	Maximum	Units
Supply Voltage	2.85	3.0	3.15	V
Supply Current		14	17	mA
Input Frequency ( $F_{IN}$ )	1.5		3.5	GHz
Input Power ( $P_{IN}$ )	-10		+5	dBm
Output Power	-5			dBm

**Figure 2. Pin Configuration**

**Table 2. Pin Descriptions**

Pin No.	Pin Name	Description
1	VDD	Power supply pin. Bypassing is required.
2	IN	Input signal pin. Should be coupled with a capacitor (eg 15 pF).
3	DEC	Power supply decoupling pin. Place capacitors as close as possible and connect directly to the ground plane (eg 10 nF & 10 pF).
4	GND	Ground pin. Ground pattern on the board should be as wide as possible to reduce ground impedance.
5	GND	Ground pin.
6	GND	Ground pin.
7	OUT	Divided frequency output pin. This pin should be coupled with a capacitor (eg 100 pF).
8	GND	Ground Pin.

**Table 3. Absolute Maximum Ratings**

Symbol	Parameter/Conditions	Min	Max	Units
VDD	Supply voltage		4.0	V
T <sub>ST</sub>	Storage temperature range	-65	150	°C
T <sub>OP</sub>	Operating temperature range	-40	85	°C
VESD	ESD voltage (Human Body Model)		250	V
P <sub>INMAX</sub>	Maximum input power		10	dBm

### Electrostatic Discharge (ESD) Precautions

When handling this UTSi device, observe the same precautions that you would use with other ESD-sensitive devices. Although this device contains circuitry to protect it from damage due to ESD, precautions should be taken to avoid exceeding the rating specified in Table 3.

### Latch-Up Avoidance

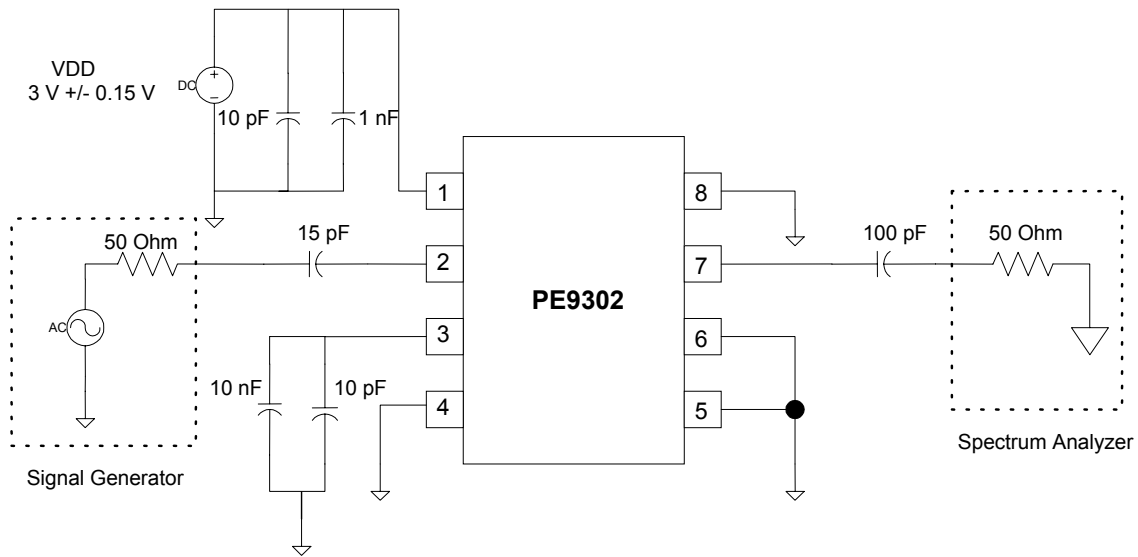
Unlike conventional CMOS devices, UTSi CMOS devices are immune to latch-up.

### Device Functional Considerations

The PE9302 takes an input signal frequency from between 1.5 GHz to 3.5 GHz and produces an output signal frequency one-fourth that of the supplied input. In order for the prescaler to work properly, several conditions need to be adhered to. It is crucial that pin 3 be supplied with a bypass capacitor to ground. In addition, the input and output signals (pins 2 & 7, respectively) need to be ac coupled via an external capacitor as shown in the test circuit below.

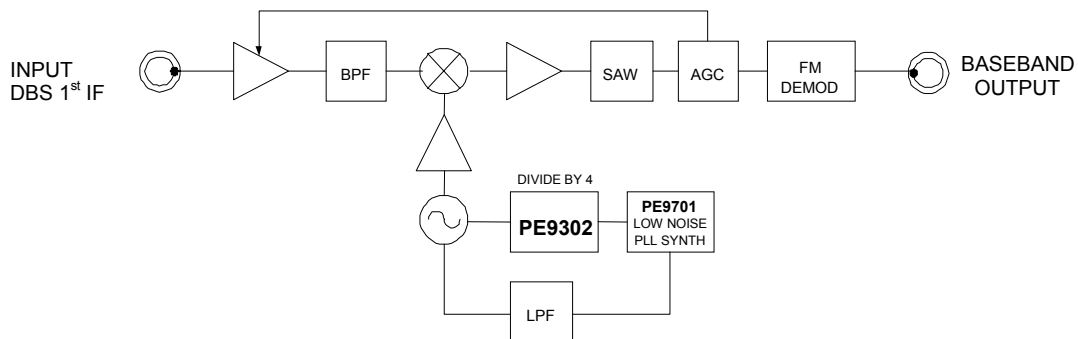
The ground pattern on the board should be made as wide as possible to minimize ground impedance.

**Figure 3. Test Circuit Block Diagram**



**Figure 4. High Frequency System Application**

The wideband frequency of operation of the PE9302 makes it an ideal part for use in a DBS down converter system.

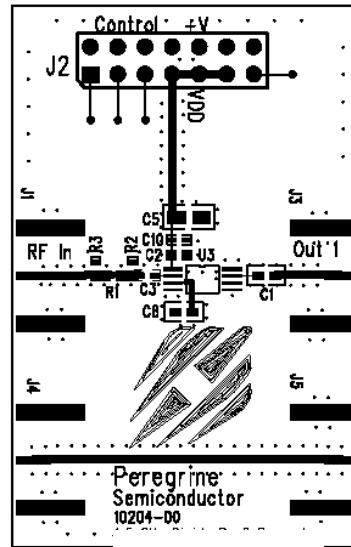


### Evaluation Board Description

The PE9302 evaluation board is depicted in Figure 5. The input is driven into the RF In port while the divided output is taken at Out 1. Both input and output contain footprints for AC coupling capacitors (C3 and C1 respectively). The power supply connection is provided near the top of the evaluation board, J2 Pin 1 as supply, J2 Pin 2 as ground. In addition C2, C5, and C10 are placeholders for power supply decoupling capacitors. Placeholders C4, C6, and C8 are needed for required bypass capacitors.

**Note:** C4 and C6 are located on the underside of the evaluation board.

Figure 5. PE9302 Evaluation Board



### Evaluation Board Test Setup

The PE9302 can be tested on the evaluation board using the test setup shown in Figure 3 on page 3. In the test setup, it is essential that the power supply is properly decoupled and bypass capacitors are used for pin 3. In addition, the input and output need to be AC coupled.

### Testing

The PE9302 Evaluation Board was measured prior to shipment using the setup depicted in Figure 3. Testing was performed at room temperature and  $V_{DD} = 2.85$  V.

The input sensitivity plot for the PE9302 board is included with the evaluation kit.

### Applications Support

If you have a problem with your evaluation kit or if you have applications questions call (858) 455-0660 and ask for applications support. You may also contact us by fax or e-mail:

**Fax:** (858) 455-0770

**E-Mail:** [help@peregrine-semi.com](mailto:help@peregrine-semi.com)

**Table 4. Ordering Information**

<b>Order Code</b>	<b>Part Marking</b>	<b>Description</b>	<b>Package</b>	<b>Shipping Method</b>
9302-01	9302	PE9302 Engineering Samples	8-lead FLAT PACK	Tray
9302-11	9302	PE9302 Production Units	8-lead FLAT PACK	Tray
9302-00	PE9302-EK	PE9302 Evaluation Kit	Evaluation Board	1 / Box

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### **Advance Information**

The product is in a formative or design stage. The data sheet contains design target specifications for product development. Specifications and features may change in any manner without notice.

### **Preliminary Specification**

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