

# PE4230

## Product Description

The PE4230 High Power MOSFET RF Switch is designed to cover a broad range of uses in the 10 MHz through 2.5 GHz frequency range. This switch integrates on-board CMOS control logic with a low voltage CMOS compatible control input. Using nominal power supply voltages, a 1 dB compression point of +30 dBm can be achieved.

The PE4230 High Power MOSFET RF Switch is manufactured in Peregrine's patented Ultra Thin Silicon (UTSi<sup>®</sup>) CMOS process, offering the performance of GaAs with the economy and integration of conventional CMOS.

## SPDT High Power MOSFET RF Switch

### Features

- Single 3.0 V Power Supply
- Low Insertion loss: 0.44 dB at 1.0 GHz, 0.50 dB at 2.0 GHz
- High isolation of 38 dB at 1.0 GHz, 28 dB at 2.0 GHz
- Typical 1 dB compression of +30 dBm
- Low voltage CMOS logic control
- Low Cost

Figure 1. Functional Schematic Diagram

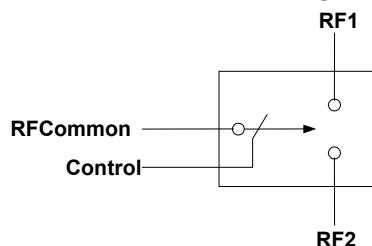


Figure 2. Package Drawings

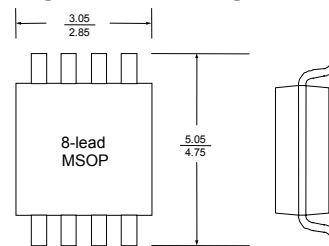
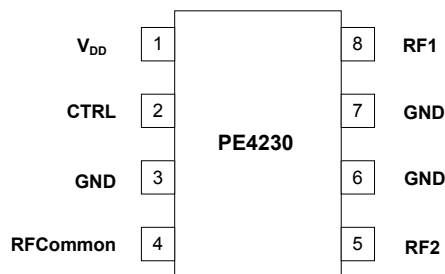


Table 1. Electrical Specifications @ +25 °C, V<sub>DD</sub> = 3 V (Z<sub>S</sub> = Z<sub>L</sub> = 50 Ω)

| Parameter                      | Conditions                        | Minimum | Typical      | Maximum | Units            |
|--------------------------------|-----------------------------------|---------|--------------|---------|------------------|
| Operation Frequency            |                                   | 10      |              | 2500    | MHz              |
| Insertion Loss                 | 1000 MHz<br>2000 MHz              |         | 0.44<br>0.50 |         | dB<br>dB         |
| Isolation                      | 1000 MHz<br>2000 MHz              |         | 38<br>28     |         | dB<br>dB         |
| Return Loss                    | 1000 MHz<br>2000 MHz              |         | 20<br>14     |         | dB<br>dB         |
| 'ON' Switching Time            | CTRL to 0.1 dB final value, 2 GHz |         | 200          |         | ns               |
| 'OFF' Switching Time           | CTRL to 25 dB isolation, 2 GHz    |         | 90           |         | ns               |
| Full Cycle Switching Time      |                                   |         | 5            |         | μs               |
| Video Feedthrough <sup>1</sup> |                                   |         | 15           |         | mV <sub>pp</sub> |
| Input 1 dB Compression         | 2000 MHz                          |         | 30           |         | dBm              |
| Input IP3                      | 2000 MHz, 17 dBm                  |         | 50           |         | dBm              |

**Figure 3. Pin Configuration**



**Table 2. Pin Descriptions**

| Pin No. | Pin Name        | Description   |
|---------|-----------------|---|
| 1       | V <sub>DD</sub> | Nominal 3 V supply connection. A bypass capacitor (100 pF) to the ground plane should be placed as close as possible to the pin |
| 2       | CTRL            | CMOS or TTL logic level:<br>High = RFCommon to RF1 signal path<br>Low = RFCommon to RF2 signal path                             |
| 3       | GND             | Ground connection. Traces should be physically short and connected to ground plane for best performance.                        |
| 4       | RF Common       | Common RF port for switch (Note 1)  |
| 5       | RF2             | RF2 port (Note 1)   |
| 6       | GND             | Ground Connection. Traces should be physically short and connected to ground plane for best performance.                        |
| 7       | GND             | Ground Connection. Traces should be physically short and connected to ground plane for best performance.                        |
| 8       | RF1             | RF1 port (Note 1)   |

**Note 1:** All RF pins must be DC blocked with an external series capacitor.

**Table 3. Absolute Maximum Ratings**

| Symbol           | Parameter/Conditions           | Min  | Max                  | Units |
|------------------|--------------------------------|------|----------------------|-------|
| V <sub>DD</sub>  | Power supply voltage           | -0.3 | 4.0                  | V     |
| V <sub>I</sub>   | Voltage on any input           | -0.3 | V <sub>DD</sub> +0.3 | V     |
| T <sub>ST</sub>  | Storage temperature range      | -65  | 150                  | °C    |
| T <sub>OP</sub>  | Operating temperature range    | -40  | 85                   | °C    |
| V <sub>ESD</sub> | ESD voltage (Human Body Model) | 200  |                      | V     |

**Table 4. DC Electrical Specifications**

| Parameter                            | Min                  | Typ | Max                  | Units |
|--------------------------------------|----------------------|-----|----------------------|-------|
| V <sub>DD</sub> Power Supply Voltage | 2.7                  | 3.0 | 3.3                  | V     |
| Power Supply Current                 |                      | 29  |                      | μA    |
| Control Voltage High                 | 0.7x V <sub>DD</sub> |     |                      | V     |
| Control Voltage Low                  |                      |     | 0.3x V <sub>DD</sub> | V     |

**Table 5. Control Logic Truth Table**

| Control Voltage         | Signal Path     |
|-------------------------|-----------------|
| CTRL = CMOS or TTL High | RFCommon to RF1 |
| CTRL = CMOS or TTL Low  | RFCommon to RF2 |

### Electrostatic Discharge (ESD) Precautions

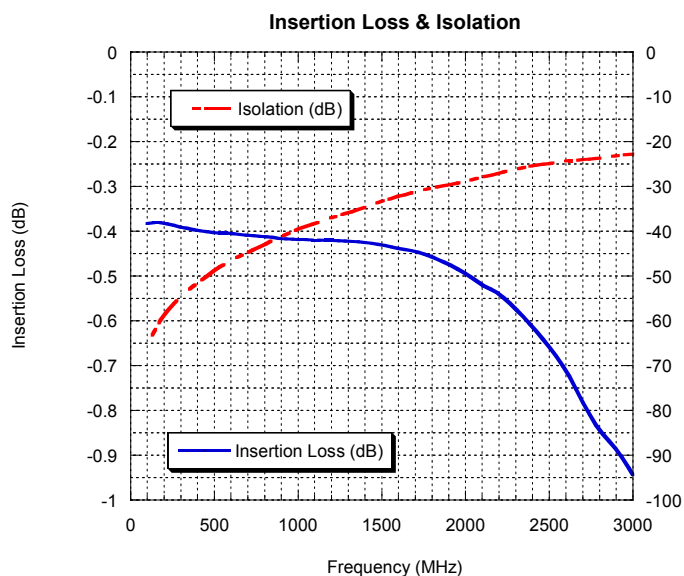
When handling this UTSi device, observe the same precautions that you would use with other ESD-sensitive devices. Although this device contains circuitry to protect it from damage due to ESD, precautions should be taken to avoid exceeding the rating specified in Table 3.

### Latch-Up Avoidance

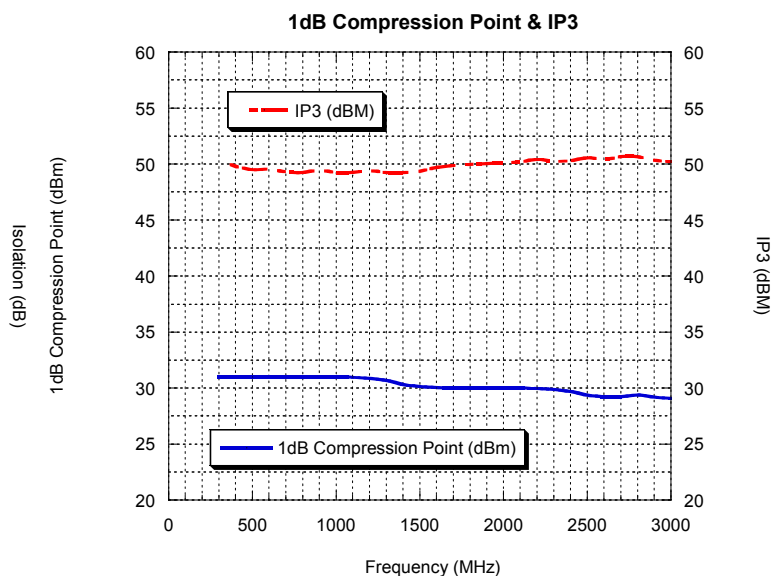
Unlike conventional CMOS devices, UTSi CMOS devices are immune to latch-up.

## Typical Performance Data @ +25 °C

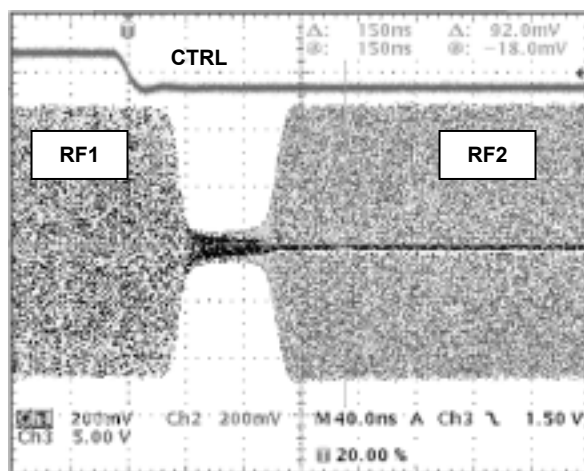
**Figure 4. Insertion Loss & Isolation**



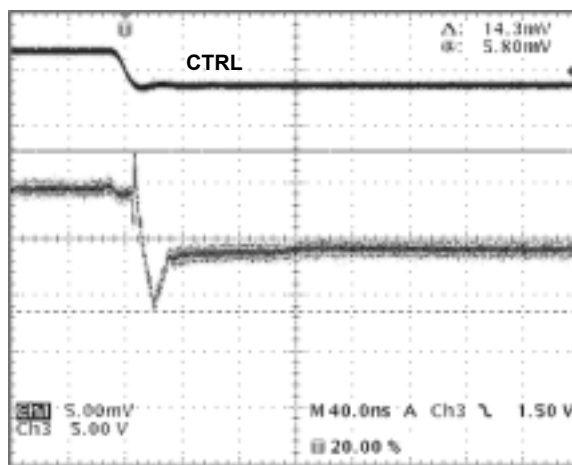
**Figure 5. 1 dB Compression Point & IP3**



**Figure 6. Switching Time**



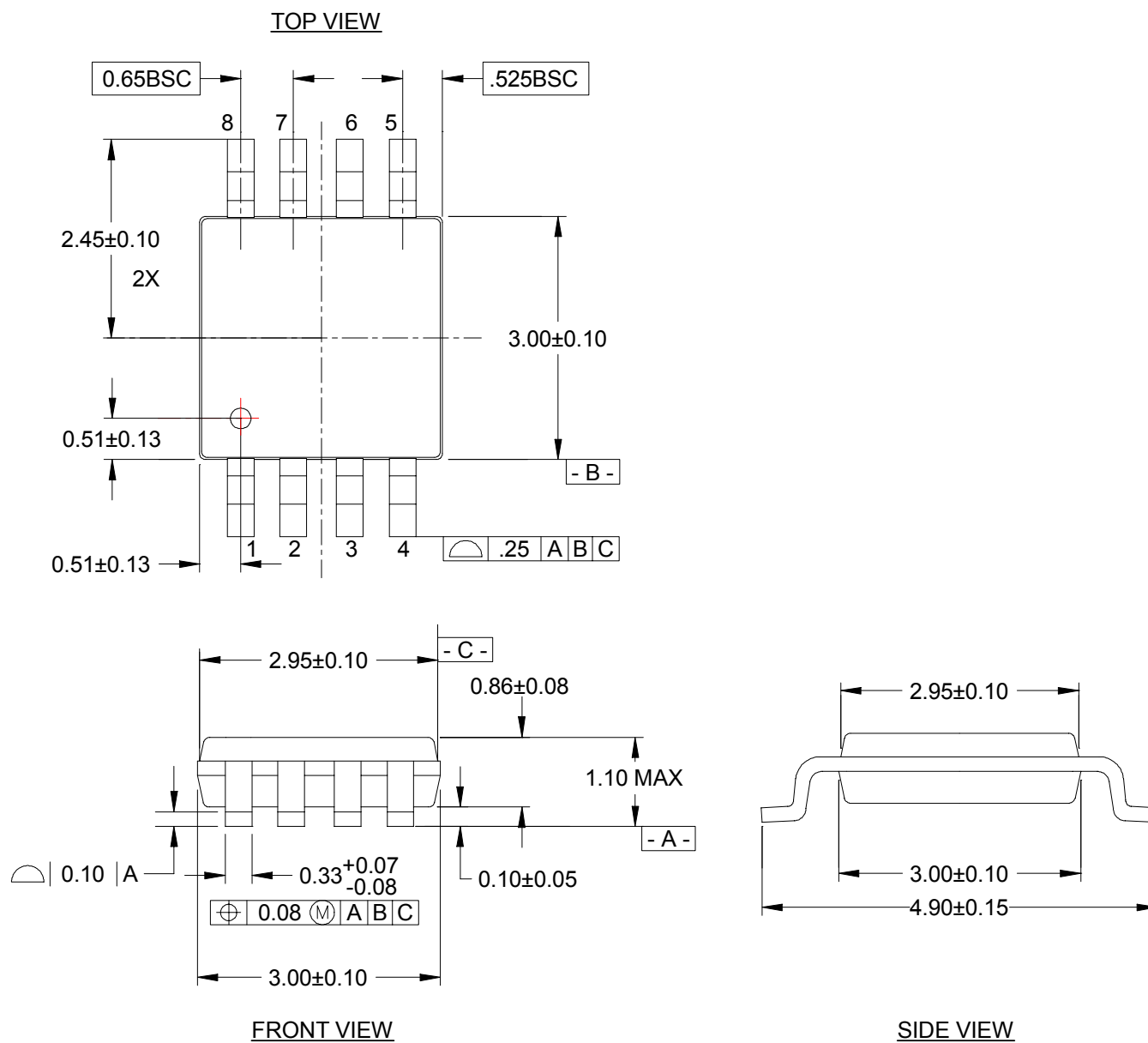
**Figure 7. Video Feedthrough\***



\*The DC transient at the output of any port of the switch when the control voltage is switched from Low to High or High to Low in a 50 ohm test set-up, measured with 1ns risetime pulses and 500 MHz bandwidth.

## Figure 8. Package Drawing

8-lead MSOP



**Table 6. Ordering Information**

| Order Code | Part Marking | Description | Package        | Shipping Method |
|------------|--------------|-------------|----------------|-----------------|
| 4230-21    | 4230         |             | 8-lead MSOP    | 50 pcs. / Tube  |
| 4230-22    | 4230         |             | 8-lead MSOP    | 2000 pcs. / T&R |
| 4230-00    | PE4230-EK    |             | Evaluation Kit | 1 / Box         |

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