

# PE4220

## Product Description

The PE4220 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 an internal charge pump, eliminating the need for a negative voltage supply. The control inputs are low voltage CMOS compatible.

The PE4220 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 Low Insertion Loss MOSFET RF Switch

### Features

- Single 3.0 V Power Supply
- Low Insertion loss: 0.25 dB at 1.0 GHz, 0.65 dB at 2.0 GHz
- High isolation of 36 dB at 1.0 GHz, 26 dB at 2.0 GHz
- Typical 1 dB compression of +21 dBm
- Low voltage CMOS logic control
- Low Cost

Figure 1. Functional Schematic Diagram

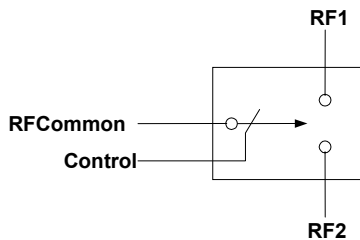


Figure 2. Package Drawings

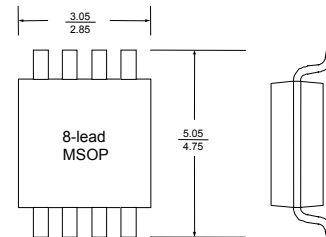
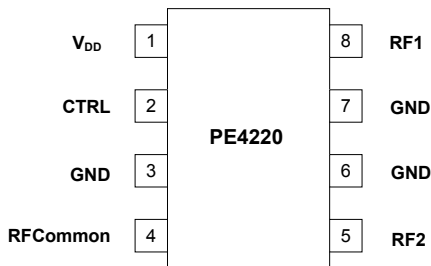


Table 1. Electrical Specifications @ +25 °C, V<sub>DD</sub> = 3 V (Z<sub>S</sub> = Z<sub>L</sub> = 50 Ω)

Parameter	Conditions	Minimum	Typical	Maximum	Units
Operating Frequency		10		2500	MHz
Insertion Loss	1000 MHz		0.25		dB
	2000 MHz		0.65		dB
Isolation	1000 MHz		36		dB
	2000 MHz		26		dB
Return Loss	1000 MHz		20		dB
	2000 MHz		14		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>			5.0		mV <sub>pp</sub>
Input 1 dB Compression	2000 MHz		21		dBm
Input IP3	2000 MHz, 8 dBm		39		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: High = RFCommon to RF1 signal path 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 = High	RFCommon to RF1
CTRL = 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

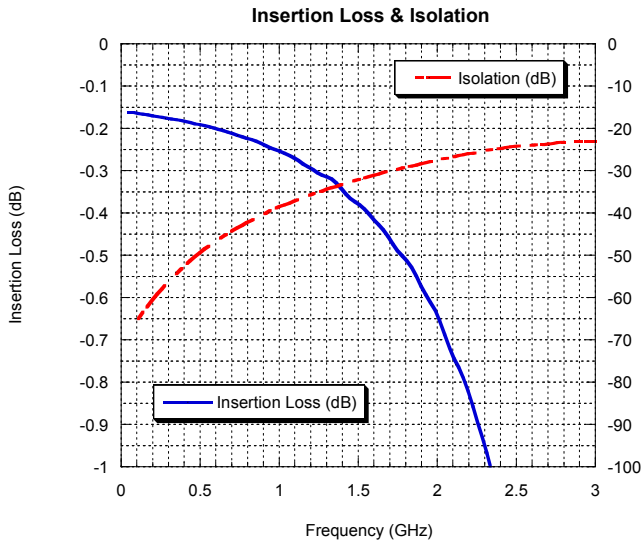


Figure 5. 1dB Compression Point & IP3

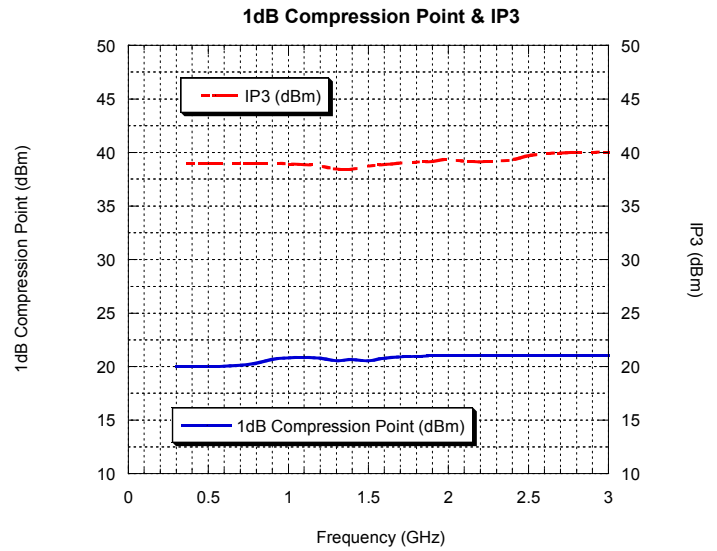


Figure 6. Switching Time

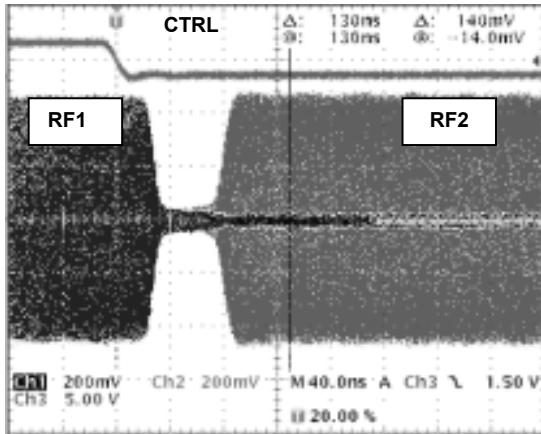
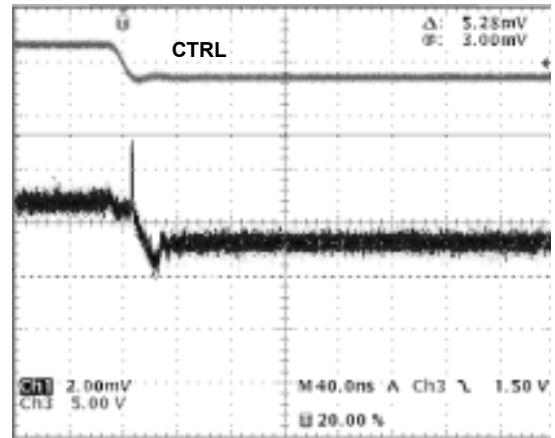


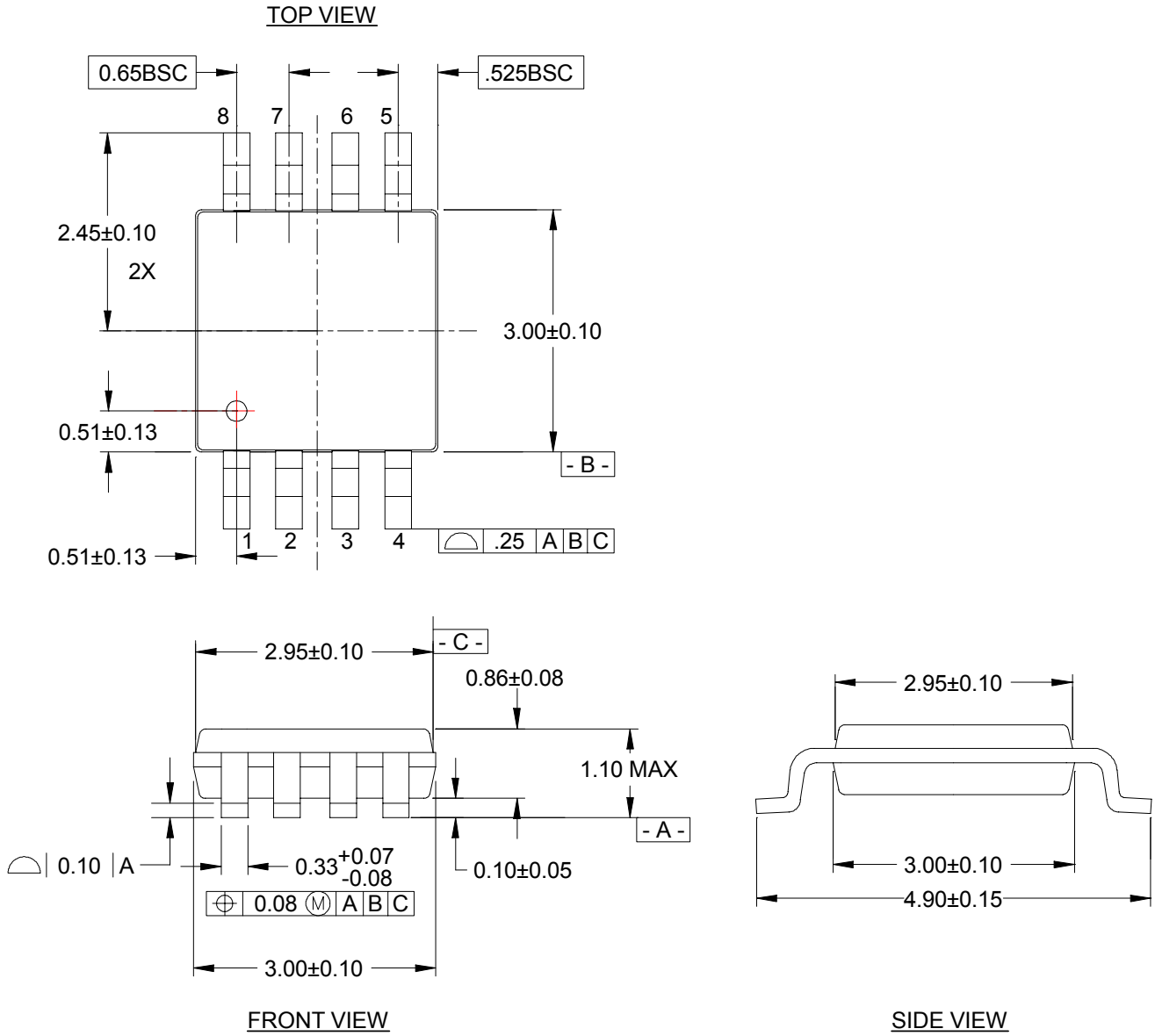
Figure 7. Video Feedthrough\*



\*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**

<b>Order Code</b>	<b>Part Marking</b>	<b>Description</b>	<b>Package</b>	<b>Shipping Method</b>
4220-21	4220		8-lead MSOP	50 pcs. / Tube
4220-22	4220		8-lead MSOP	2000 pcs. / T&R
4220-00	PE4220-EK		Evaluation Kit	1 / Box

## Sales Offices

### United States

#### Peregrine Semiconductor Corp.

6175 Nancy Ridge Drive  
San Diego, CA 92121  
Tel 1-858-455-0660  
Fax 1-858-455-0770

### Europe

#### Peregrine Semiconductor Europe

Aix-En-Provence Office  
Parc Club du Golf, bat 9  
13856 Aix-En-Provence Cedex 3  
France  
Tel 33-0-4-4239-3360  
Fax 33-0-4-4239-7227

### Japan

#### Peregrine Semiconductor K.K.

The Imperial Tower, 15th floor  
1-1-1 Uchisaiwaicho, Chiyoda-ku  
Tokyo 100-0011 Japan  
Tel: 03-3507-5755  
Fax: 03-3507-5601

### Australia

#### Peregrine Semiconductor Australia

8 Herb Elliot Ave.  
Homebush, NSW 2140  
Australia  
Tel: 011-61-2-9763-4111  
Fax: 011-61-2-9746-1501

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## Data Sheet Identification

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