

# PE4232

## Product Description

The PE4232 is a high-isolation MOSFET Switch designed for CATV applications. It covers a broad frequency range from DC up to 1.3 GHz, and is non-reflective at both RF1 and RF2 ports. This SPST switch integrates a single-pin CMOS control interface, and provides low insertion loss while operating with extremely low bias from a single +3-volt supply. In a typical CATV application, the high isolation PE4232 can replace bulky and expensive mechanical switches.

The PE4232 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.

## SPST CATV MOSFET Switch

### Features

- Non-reflective 75-ohm switch
- High isolation: 90 dB at 5 MHz, 53 dB at 1 GHz
- Low insertion loss: 0.5 dB at 5 MHz, 0.75 dB at 1 GHz
- High 1 dB compression: +30 dBm
- CMOS/TTL single-pin control
- Single +3-volt supply operation
- Extremely low bias: 33  $\mu$ A @ 3V
- Integrated 75-ohm terminations

Figure 1. Functional Schematic Diagram

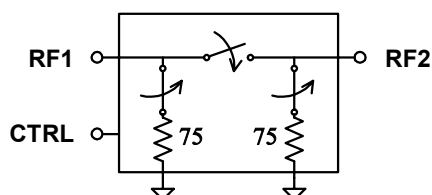


Figure 2. Package Type

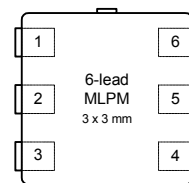


Table 1. Electrical Specifications @ +25 °C ( $Z_S = Z_L = 75 \Omega$ )

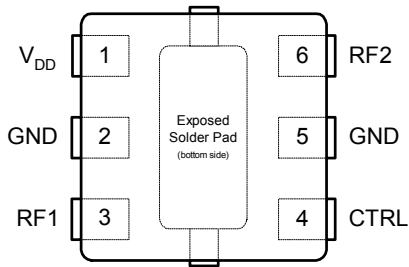
Parameter	Condition	Minimum	Typical	Maximum	Units
Operating Frequency <sup>1</sup>		DC		1300	MHz
Insertion Loss	DC – 50 MHz 1000 MHz		0.5 0.75	0.65 1.0	dB
Isolation	DC – 50 MHz 1000 MHz	75 50	90 53		dB
Return Loss	5 - 1000 MHz	14	20		dB
Input 1 dB Compression <sup>2</sup>	1000 MHz		30		dBm
Input IP2 <sup>2</sup>	1000 MHz		80		dBm
Input IP3 <sup>2</sup>	1000 MHz		50		dBm
Video Feedthrough <sup>3</sup>				15	mV <sub>pp</sub>
Switching Time			2		$\mu$ s

Notes: 1. Device linearity will begin to degrade below 1 MHz.

2. Measured in a 50  $\Omega$  system.

3. Measured with a 1 ns risetime, 0/3 V pulse and 500 MHz bandwidth.

**Figure 3. Pin Configuration (Top View)**



**Table 2. Pin Descriptions**

Pin No.	Pin Name	Description
1	V <sub>DD</sub>	Nominal 3 V supply connection. <sup>1</sup>
2	GND	Ground connection. <sup>3</sup>
3	RF1	RF port. <sup>2</sup>
4	CTRL	CMOS or TTL logic level: High = RF1 to RF2 signal path Low = RF1 isolated from RF2
5	GND	Ground connection. <sup>3</sup>
6	RF2	RF port. <sup>2</sup>

Notes: 1. A bypass capacitor should be placed as close as possible to the pin.  
2. Both RF pins must be DC blocked by an external capacitor or held at 0 V<sub>DC</sub>.  
3. The exposed pad must be soldered to the ground plane for proper switch performance.

**Table 3. Absolute Maximum Ratings**

Symbol	Parameter/Condition	Min	Max	Unit
V <sub>DD</sub>	Power supply voltage	-0.3	4.0	V
V <sub>I</sub>	Voltage on CTRL input	-0.3	5.5	V
T <sub>ST</sub>	Storage temperature	-65	150	°C
T <sub>OP</sub>	Operating temperature	-40	85	°C
P <sub>IN</sub>	Input power (50Ω)		33	dBm
V <sub>ESD</sub>	ESD voltage (Human Body Model)		200	V

**Table 4. DC Electrical Specifications @ 25 °C**

Parameter	Min	Typ	Max	Unit
V <sub>DD</sub> Power Supply	2.7	3.0	3.3	V
I <sub>DD</sub> Power Supply Current (V <sub>DD</sub> = 3V, V <sub>CTRL</sub> = 3V)		33		μA
Control Voltage High	0.7xV <sub>DD</sub>		5	V
Control Voltage Low	0		0.3xV <sub>DD</sub>	V

## 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.

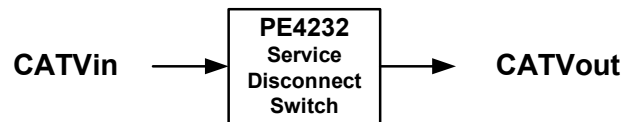
## Latch-Up Avoidance

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

## Device Description

The PE4232 high isolation SPST CATV Switch is designed to support CATV applications such as premise disconnect of a CATV signal path. This function is typically performed by bulky and expensive mechanical switches. The high isolation characteristics (>51 dB at 1 GHz, 90 dB at 5 MHz), high compression point, and integrated 75-ohm terminations make the PE4232 an ideal, low cost alternative.

**Figure 4. Typical Application Block Diagram**



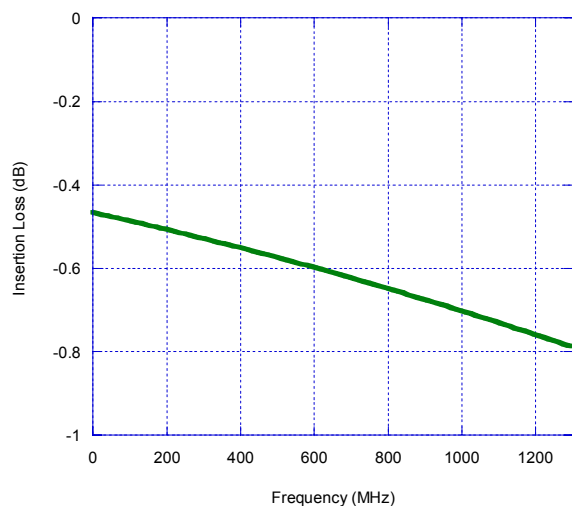
**Table 5. Truth Table**

Control Voltage	Signal Path
CTRL = CMOS or TTL High	RF1 to RF2
CTRL = CMOS or TTL Low	RF1 isolated from RF2

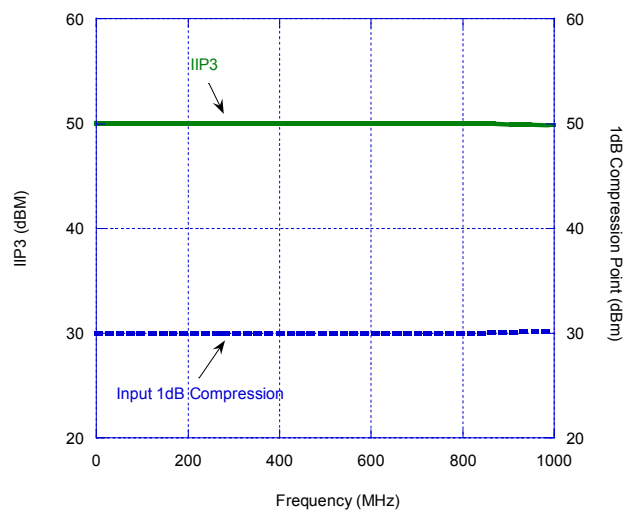
The control logic input pin (CTRL) is typically driven by a 3-volt CMOS logic level signal, and has a threshold of 50% of V<sub>DD</sub>. For flexibility to support systems that have 5-volt control logic drivers, the control logic input has been designed to handle a 5-volt logic HIGH signal. (A minimal current will be sourced out of the V<sub>DD</sub> pin when the control logic input voltage level exceeds V<sub>DD</sub>.)

**Typical Performance Data @ +25 °C**  
(75-ohm impedance except as indicated)

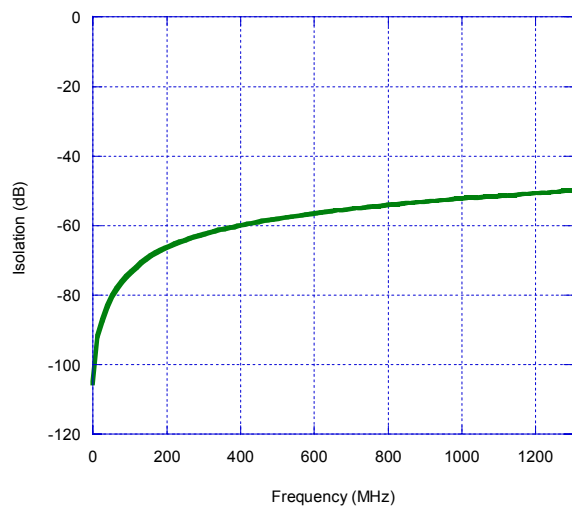
**Figure 5. Insertion Loss**



**Figure 6. Input 1 dB Compression Point & IIP3**  
(50-ohm system impedance)

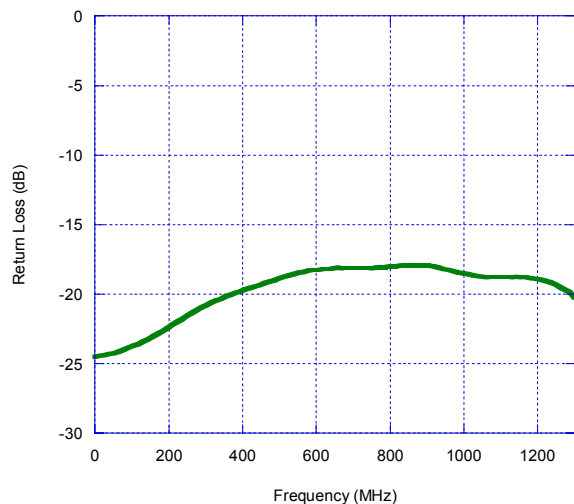


**Figure 7. Isolation**

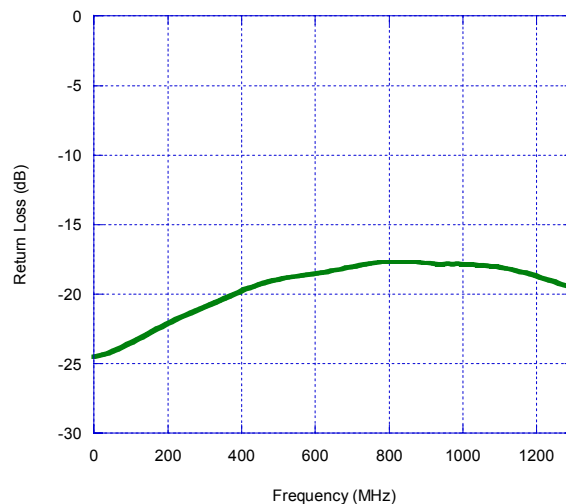


**Typical Performance Data @ +25 °C**  
**(75-ohm impedance)**

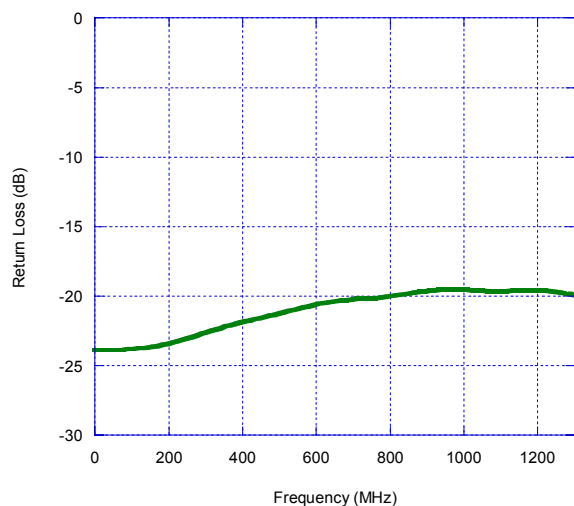
**Figure 8. RF1 Return Loss (CTRL = High)**



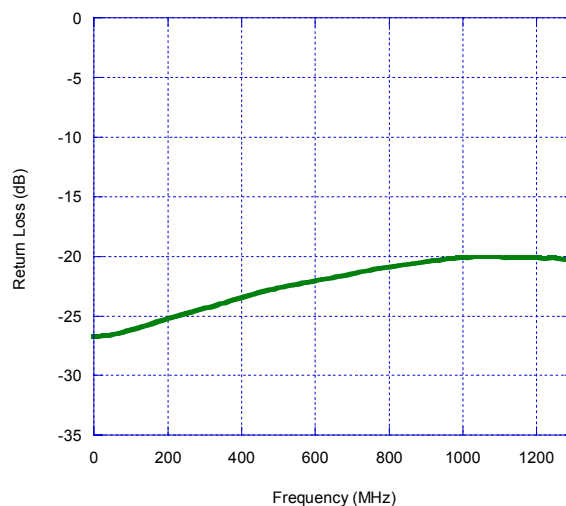
**Figure 9. RF2 Return Loss (CTRL = High)**



**Figure 10. RF1 Return Loss (CTRL = Low)**



**Figure 11. RF2 Return Loss (CTRL = Low)**



6-lead MLPM



Order Code	Part Marking	Description	Package	Shipping Method
4232-01	4232	PE4232-06MLP3x3-12800F	6-lead 3x3mm MLPM	12800 units / Canister
4232-02	4232	PE4232-06MLP3x3-3000C	6-lead 3x3mm MLPM	3000 units / T&R
4232-00	PE4232-EK	PE4232-06MLP3x3-EK	Evaluation Board	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

For a list of representatives in your area, please refer to our Web site at: <http://www.peregrine-semi.com>

## Data Sheet Identification

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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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