PRELIMINARY SPECIFICATION

PE4210

SPDT Low Insertion Loss MOSFET RF Switch

Features

- Single 3.0 V Power Supply
- Low Insertion loss: 0.40 dB at 1.0 GHz and 2.0 GHz
- High isolation of 36 dB at 1.0 GHz, 26 dB at 2.0 GHz
- Typical 1 dB compression of +15 dBm
- Low voltage CMOS logic control
- Low Cost

Product Description

The PE4210 Low Insertion Loss 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 and eliminates the need for a negative voltage supply. The control inputs are low voltage CMOS compatible.

The PE4210 Low Insertion Loss MOSFET RF Switch 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.

Figure 1. Functional Schematic Diagram

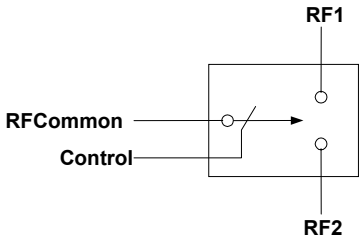


Figure 2. Package Drawings

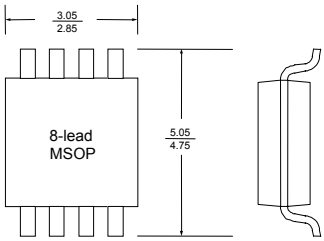


Table 1. Electrical Specifications @ +25 °C, V_{DD} = 3 V (Z_S = Z_L = 50 Ω)

Parameter	Conditions	Minimum	Typical	Maximum	Units
Operating Frequency		10		2500	MHz
Insertion Loss	1000 MHz 2000 MHz		0.40 0.40		dB dB
Isolation	1000 MHz 2000 MHz		36 26		dB dB
Return Loss	1000 MHz 2000 MHz		20 14		dB 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			1		µs
Video Feedthrough[1]			2.5		mV_{pp}
Input 1 dB Compression	2000 MHz		15		dBm
Input IP3	2000 MHz, 5 dBm		35		dBm

Figure 3. Pin Configuration

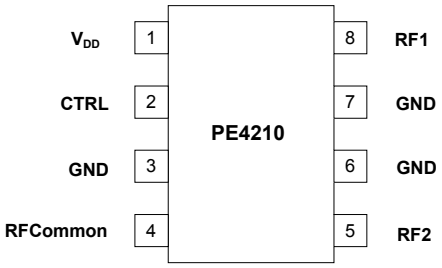


Table 2. Pin Descriptions

Pin No.	Pin Name	Description
1	V_{DD}	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	Low voltage CMOS 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_{DD}	Power Supply Voltage	-0.3	4.0	V
V_I	Voltage on any input	-0.3	V_{DD} + 0.3	V
T_{ST}	Storage temperature range	-65	150	°C
T_{OP}	Operating temperature range	-40	85	°C
V_{ESD}	ESD Voltage (Human Body Model)	200		V

Table 4. DC Electrical Specifications

Parameter	Min	Typ	Max	Units
V_{DD} Power Supply Voltage	2.7	3.0	3.3	V
Power Supply Current		< 1		μA
Control Voltage High	0.7x V_{DD}			V
Control Voltage Low			0.3x V_{DD}	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

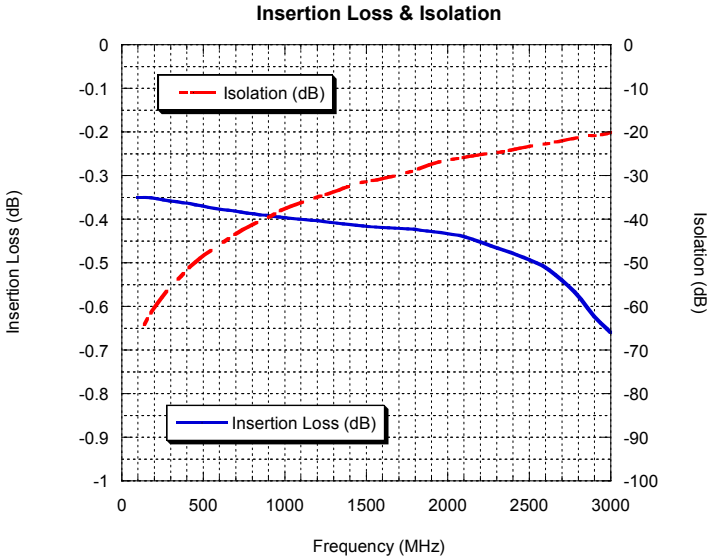


Figure 5. 1 dB Compression Point & IP3

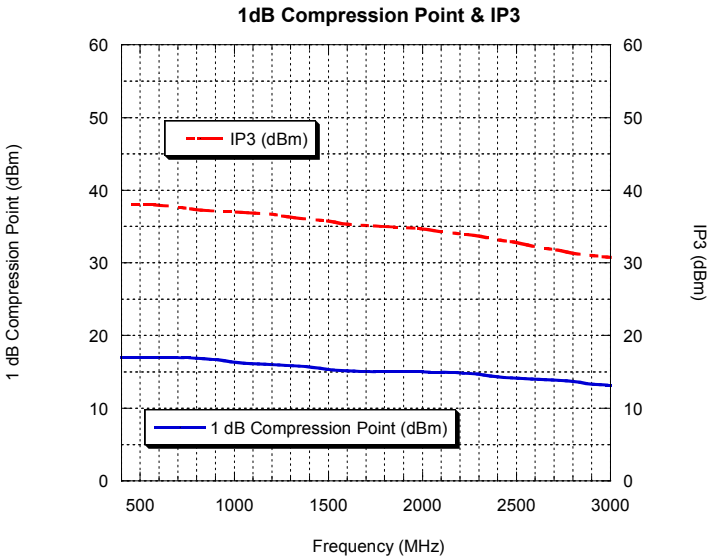


Figure 6. Switching Time

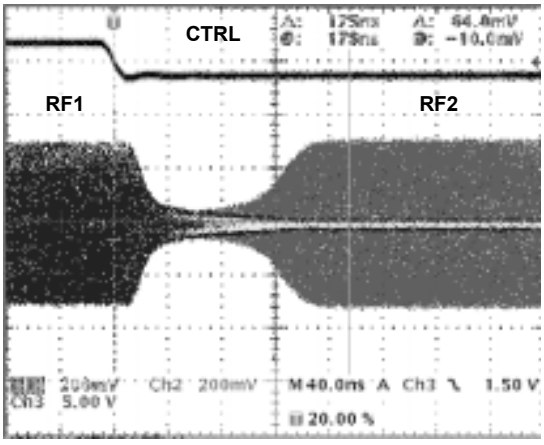
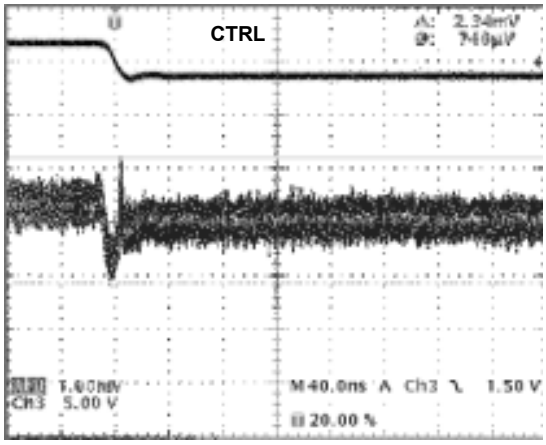


Figure 7. Video Feedthrough*



*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

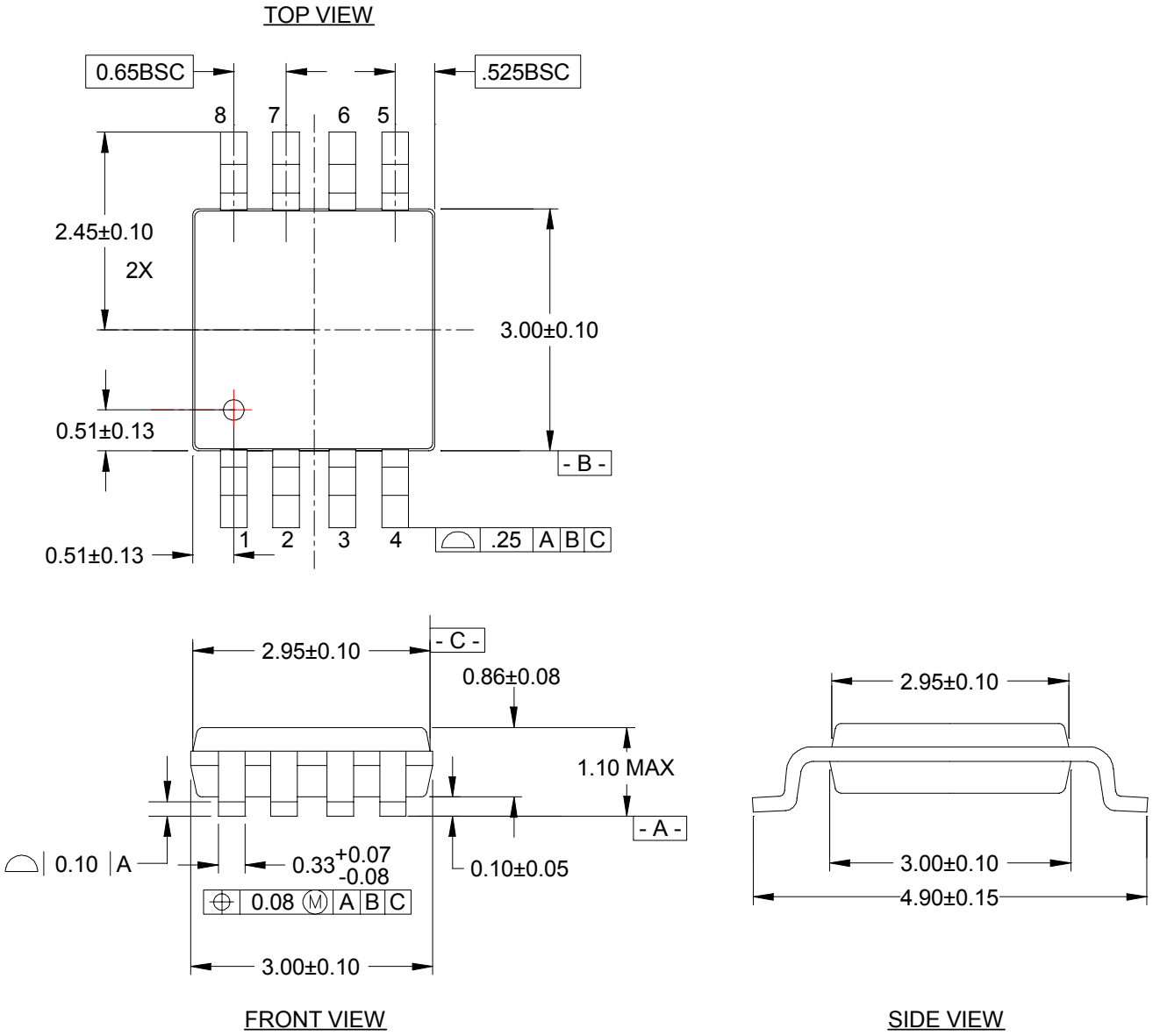


Table 6. Ordering Information

Order Code	Part Marking	Description	Package	Shipping Method
4210-21	4210		8-lead MSOP	50 pcs. / Tube
4210-22	4210		8-lead MSOP	2000 pcs. / T&R
4210-00	PE4210-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

Japan

Peregrine Semiconductor K.K.
The Imperial Tower, 15th floor
1-1-1 Uchisaiawaicho, Chiyoda-ku
Tokyo 100-0011 Japan
Tel: 03-3507-5755
Fax: 03-3507-5601

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

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

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

The data sheet contains preliminary data. Additional data may be added at a later date. Peregrine reserves the right to change specifications at any time without notice in order to supply the best possible product.

Product Specification

The data sheet contains final data. In the event Peregrine decides to change the specifications, Peregrine will notify customers of the intended changes by issuing a PCN (Product Change Notice).

The information in this data sheet is believed to be reliable. However, Peregrine assumes no liability for the use of this information. Use shall be entirely at the user's own risk.

No patent rights or licenses to any circuits described in this data sheet are implied or granted to any third party.

Peregrine's products are not designed or intended for use in devices or systems intended for surgical implant, or in other applications intended to support or sustain life, or in any application in which the failure of the Peregrine product could create a situation in which personal injury or death might occur. Peregrine assumes no liability for damages, including consequential or incidental damages, arising out of the use of its products in such applications.

Peregrine products are protected under one or more of the following U.S. patents: 6,090,648; 6,057,555; 5,973,382; 5,973,363; 5,930,638; 5,920,233; 5,895,957; 5,883,396; 5,864,162; 5,863,823; 5,861,336; 5,663,570; 5,610,790; 5,600,169; 5,596,205; 5,572,040; 5,492,857; 5,416,043. Other patents may be pending or applied for.