

PE9354

Product Description

The PE9354 SPDT High Power UltraCMOS™ RF Switch is designed to cover a broad range of applications from near DC to 3000 MHz. This single-supply reflective switch integrates on-board CMOS control logic driven by a simple, single-pin CMOS and TTL compatible control input. Using a nominal +3-volt power supply, a typical input 1 dB compression point of +31 dBm can be achieved. The PE9354 also exhibits input-output isolation of better than 30 dB at 2000 MHz and is offered in a small 8-lead ceramic SOIC package.

The PE9354 is optimized for commercial space applications. Single Event Latch up (SEL) is physically impossible and Single Event Upset (SEU) is better than 10⁻⁹ errors per bit/day. Fabricated in Peregrine's UltraCMOS™ technology, the PE9354 offers excellent RF performance and intrinsic radiation tolerance.

**SPDT High Power
UltraCMOS™ RF Switch
Rad hard for Space Applications**

Features

- Single 3-volt power supply
- Low insertion loss: 0.55 dB at 2000 MHz
- High isolation of 30 dB at 2000 MHz
- Typical input 1 dB compression point of +31 dBm
- 100 Krad total dose
- Single-pin CMOS or TTL logic control
- Low cost

Figure 1. Functional Schematic Diagram

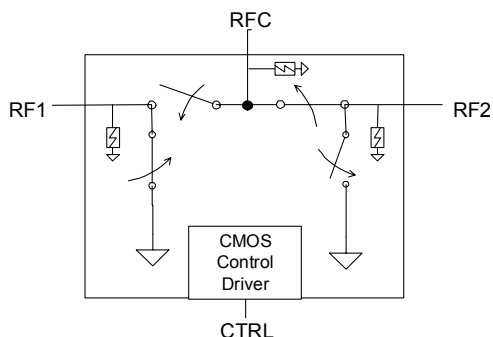


Figure 2. Package Type

8-lead CSOIC

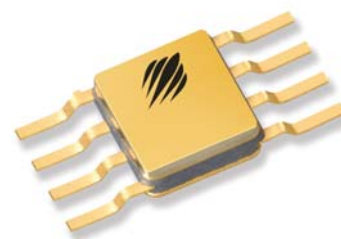
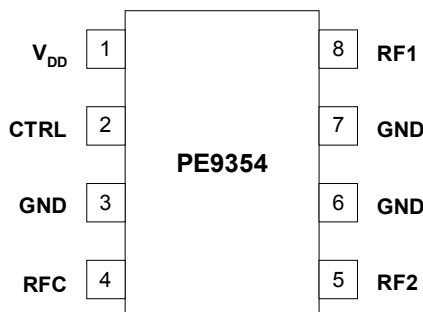


Table 1. A/C Electrical Specifications -55 °C to +125 °C, V_{DD} = 3.0 V (Z_S = Z_L = 50 Ω)

Parameter	Conditions	Minimum	Typical	Maximum	Units
Operation Frequency ¹		DC		3000	MHz
Insertion Loss	2000 MHz		0.55	0.80	dB
Isolation – RFC to RF1/RF2	2000 MHz	28	32		dB
Isolation – RF1 to RF2	2000 MHz	24	28		dB
Return Loss ²	2000 MHz		22		dB
Input 1 dB Compression	2000 MHz	28	31		dBm

Note: 1. Device linearity will begin to degrade below 10 MHz.

Note: 2. Return loss not measured in production due to equipment limitations

Figure 3. Pin Configuration

Table 2. Pin Descriptions

Pin No.	Pin Name	Description
1	V _{DD}	Nominal +3V supply connection.
2	CTRL	CMOS or TTL logic level: High = RFC to RF1 signal path Low = RFC to RF2 signal path
3	GND	Ground connection. Traces should be physically short and connected to ground plane for best performance.
4	RFC	Common RF port for switch. ¹
5	RF2	RF2 port. 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. ¹

Note 1: All RF pins must be DC blocked with an external series capacitor or held at 0 V_{DC}.

Table 4. DC Electrical Specifications

Parameter	Min	Typ	Max	Units
V _{DD} Power Supply Voltage	2.7	3.0	3.3	V
Input Leakage	-1		1	μA
I _{DD} Power Supply Current (V _{DD} = 3V, V _{CTRL} = 3V)		28	100	μA
Control Voltage High	0.7xV _{DD}			V
Control Voltage Low			0.3xV _{DD}	V

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 except for the CTRL input	-0.3	V _{DD} +0.3	V
V _{CTRL}	Voltage on CTRL input		5.0	V
T _{ST}	Storage temperature range	-65	150	°C
T _{OP}	Operating temperature range	-55	125	°C
P _{IN}	Input power (50 Ω)		32	dBm
V _{ESD}	ESD voltage (Human Body Model)		200	V
Total Dose	Total Cumulative Exposure to Ionizing Radiation		100k	Rads (Si)

Absolute Maximum Ratings are those values listed in the above table. Exceeding these values may cause permanent device damage. Functional operation should be restricted to the limits in the DC Electrical Specifications table. Exposure to absolute maximum ratings for extended periods may affect device reliability.

Electrostatic Discharge (ESD) Precautions

When handling this UltraCMOS™ 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, UltraCMOS™ devices are immune to latch-up.

Table 5. Control Logic Truth Table

Control Voltage	Signal Path
CTRL = CMOS or TTL High	RFC to RF1
CTRL = CMOS or TTL Low	RFC to 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_{DD}. 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_{DD} pin when the control logic input voltage level exceeds V_{DD}.)

Typical Performance Data @ -55 °C to 125 °C

Figure 4. Insertion Loss – RFC to RF1

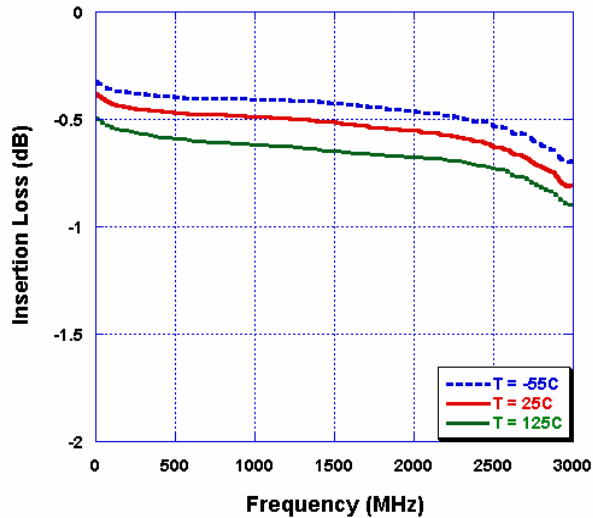


Figure 5. Input 1dB Compression Point

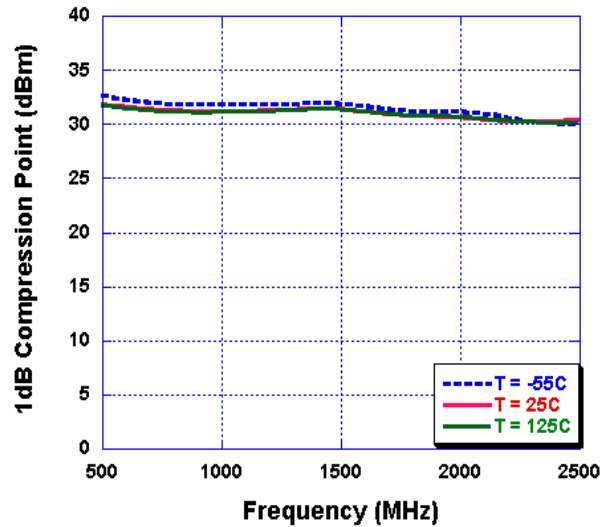


Figure 6. Insertion Loss – RFC to RF2

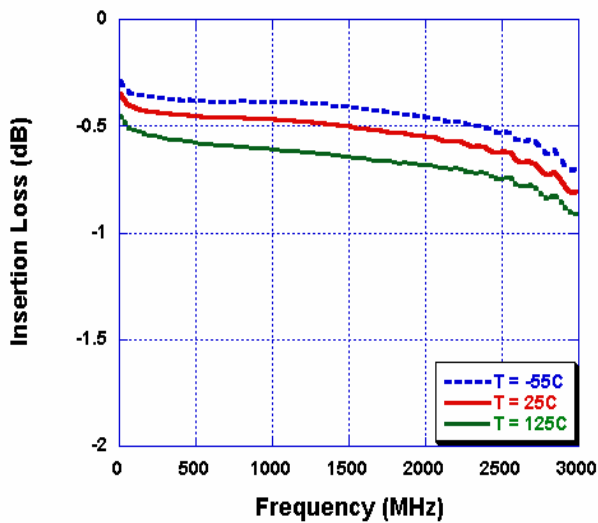
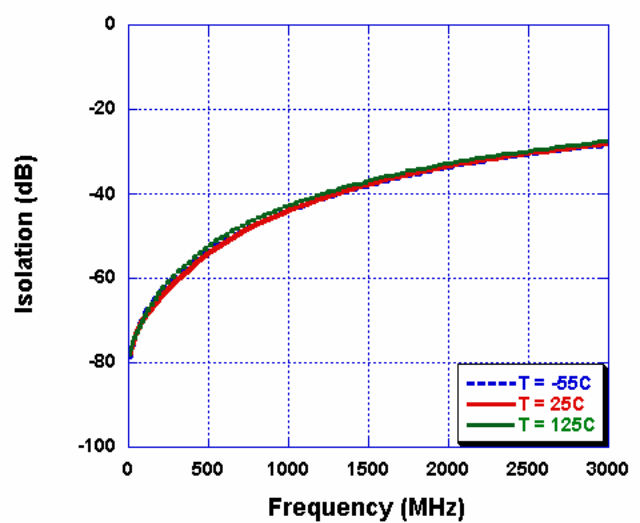


Figure 7. Isolation – RFC to RF1



Typical Performance Data @ -55 °C to 125 °C

Figure 8. Isolation – RFC to RF2

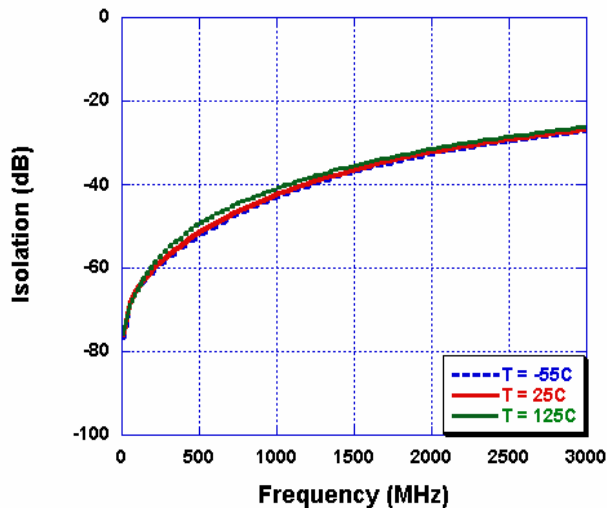


Figure 9. Isolation – RF1/RF2 to RF2/RF1

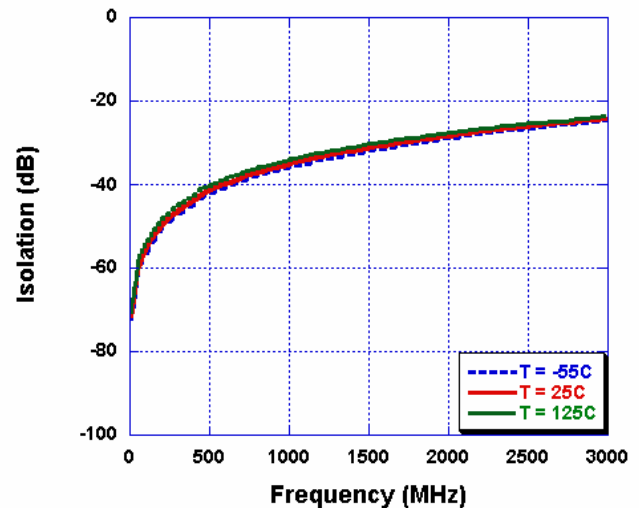


Figure 10. Return Loss – RFC

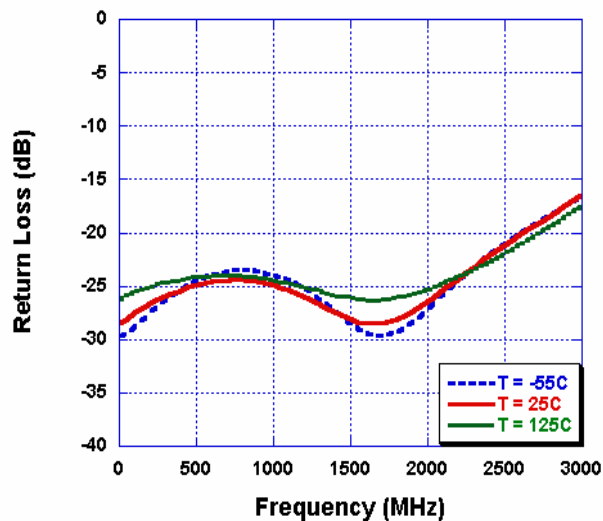


Figure 11. Return Loss – RF1, RF2

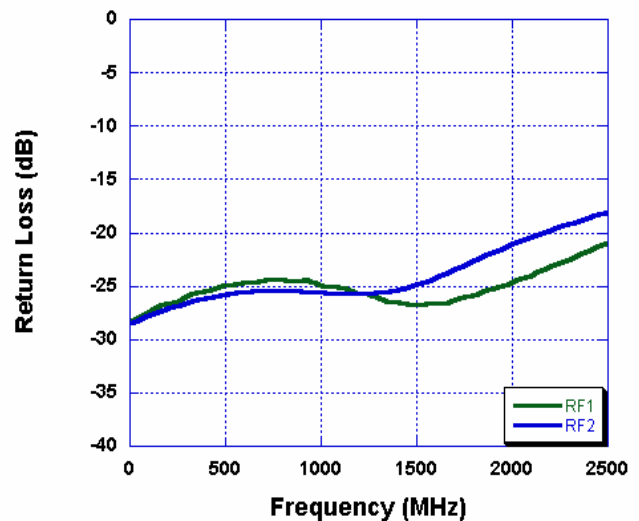


Figure 14. Package Drawing

8-lead CSOIC

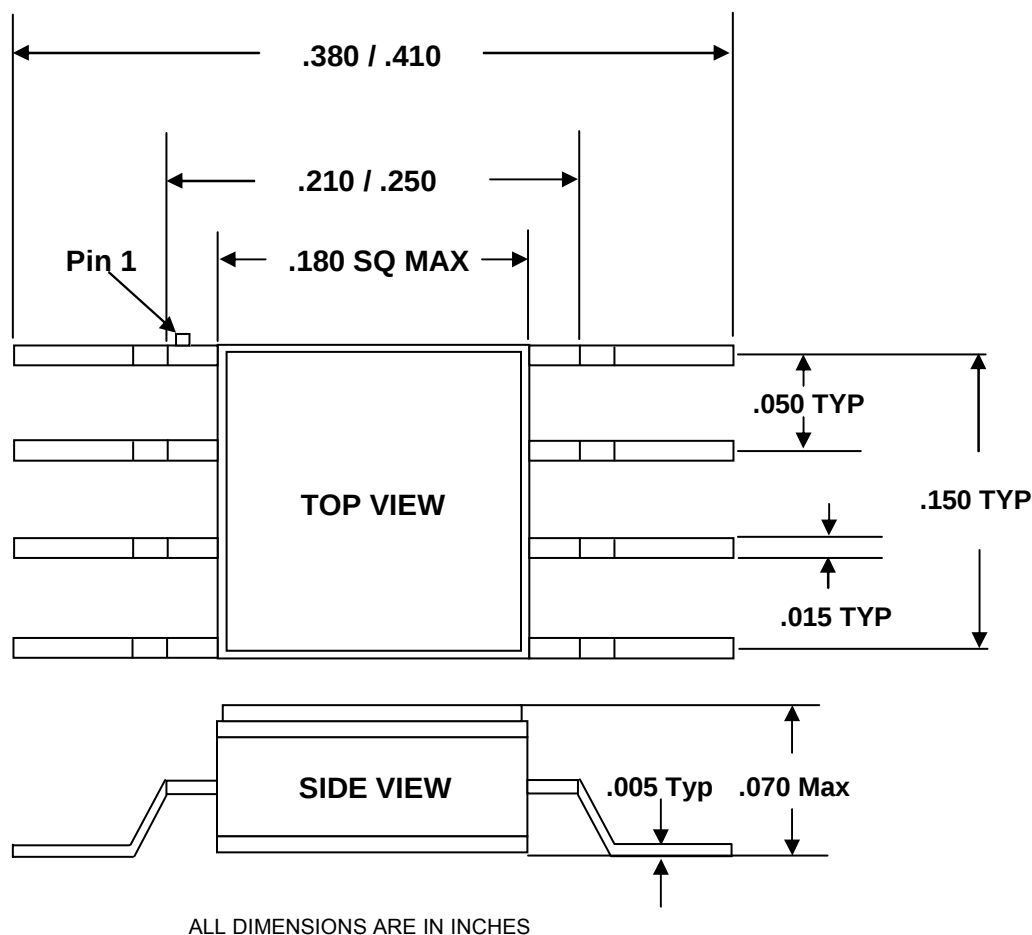


Table 6. Ordering Information

Order Code	Part Marking	Description	Package	Shipping Method
9354-01	PE9354 ES	Engineering Samples	8-lead Ceramic SOIC	50 units / Tray
9354-11	PE9354	Flight Units	8-lead Ceramic SOIC	50 units / Tray
9354-00	PE9354-EK	PE9354 Evaluation Kit	Evaluation Kit	1 / Box

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Data Sheet Identification

Advance Information

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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

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