

### Ultra-High Linearity UltraCMOS™ Broadband Quad MOSFET Array

#### Features

- Ultimate Quad MOSFET array
- Ultra-high linearity, broadband performance beyond 6.0 GHz
- Ideal for mixer applications
- Up/down conversion
- Low conversion loss
- High LO Isolation
- Optimized for stringent military applications

#### Product Description

The PE84140 is an ultra-high linearity, passive broadband Quad MOSFET array with high dynamic range performance capable of operation beyond 6.0 GHz. This quad array operates with differential signals at all ports (RF, LO, IF), allowing mixers to be built that use LO powers from -7 dBm to +20 dBm. Typical applications range from frequency up/down conversion to phase detection for Cellular/PCS Base Stations, Wireless Broadband Communications and STB/Cable modems.

The PE84140 is optimized for stringent military applications. It is manufactured on Peregrine's UltraCMOS™ process, a patented variation of silicon-on-insulator (SOI) technology on a sapphire substrate, offering the performance of GaAs with the economy and integration of conventional CMOS.

Figure 1. Functional Diagram

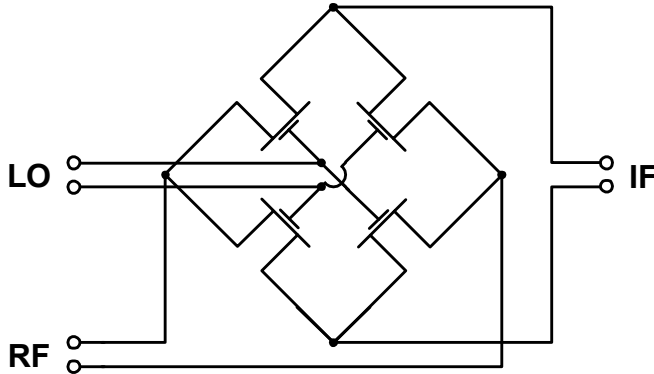


Figure 2. Package Type

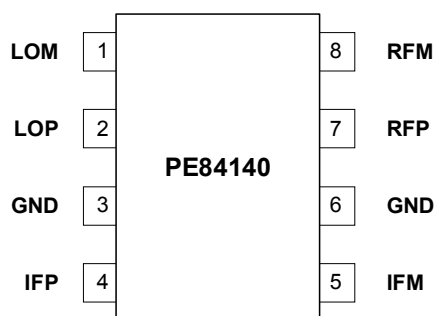
8-lead MSOP



Table 1. AC and DC Electrical Specifications @ +25 °C

Symbol	Characteristics	Min	Typ	Max	Units	Test Conditions
F <sub>TYP</sub>	Operating Frequency Range <sup>1</sup>	DC	6.0		GHz	
V <sub>DS</sub>	Drain-Source Voltage		330		mV	V <sub>GS</sub> = +3V, I <sub>DS</sub> = 40 mA
V <sub>DS Match</sub>	Drain-Source Voltage Match		20		mV	
V <sub>T</sub>	Threshold Voltage		-100		mV	V <sub>DS</sub> = 0.1V; per ASTM F617-00
R <sub>DS</sub>	Drain-Source 'ON' Resistance		8.25		Ω	V <sub>GS</sub> = +3V, I <sub>DS</sub> = 40 mA

Note 1: Typical untested operating frequency range of Quad MOSFET transistors.

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

**Table 2. Pin Descriptions**

Pin No.	Pin Name	Description
1	LOM	LO Input Connection (Gate)
2	LOP	LO Input Connection (Gate)
3	GND	Ground Connection
4	IFP	IF Output Connection (Drain)
5	IFM	IF Output Connection (Drain)
6	GND	Ground Connection
7	RFP	RF Input Connection (Source)
8	RFM	RF Input Connection (Source)

**Table 3. Absolute Maximum Ratings**

Symbol	Parameter/Conditions	Min	Max	Units
$T_{ST}$	Storage temperature range	-65	150	°C
$T_{OP}$	Operating temperature range	-55	125	°C
$V_{DC+AC}$	Maximum DC plus peak AC voltage across Drain-Source		±3.3	V
$V_{DC+AC}$	Maximum DC plus peak AC voltage across Gate-Drain or Gate-Source		±4.2	V
$V_{ESD}$	ESD Sensitive Device		250	V

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

This MOSFET device has minimally protected inputs and is highly susceptible to ESD damage. When handling this UltraCMOS™ device, observe the same precautions that you would use with other ESD-sensitive devices.

### Latch-Up Avoidance

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

### Device Description

The PE84140 passive broadband Quad MOSFET array is designed for use in up-conversion and down-conversion applications for high performance systems.

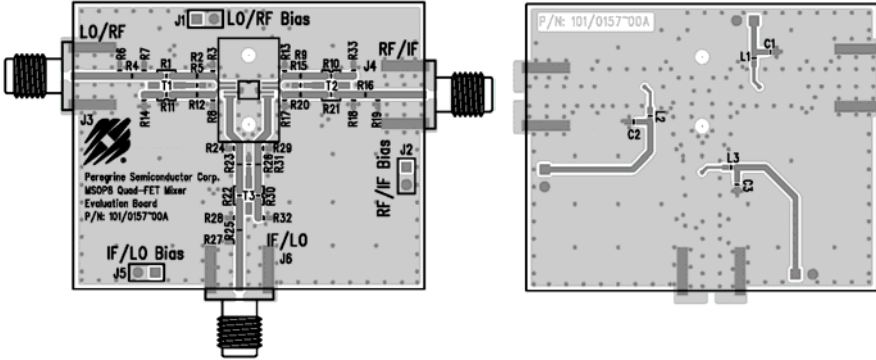
The PE84140 is an ideal mixer core for a wide range of mixer products, including module level solutions that incorporate baluns or other single-ended matching structures enabling three-port operation.

The performance level of this passive mixer is made possible by the very high linearity afforded by Peregrine's UltraCMOS™ process.

## Evaluation Kit

Figure 4. Evaluation Board Layout

Peregrine Specification 101/0157



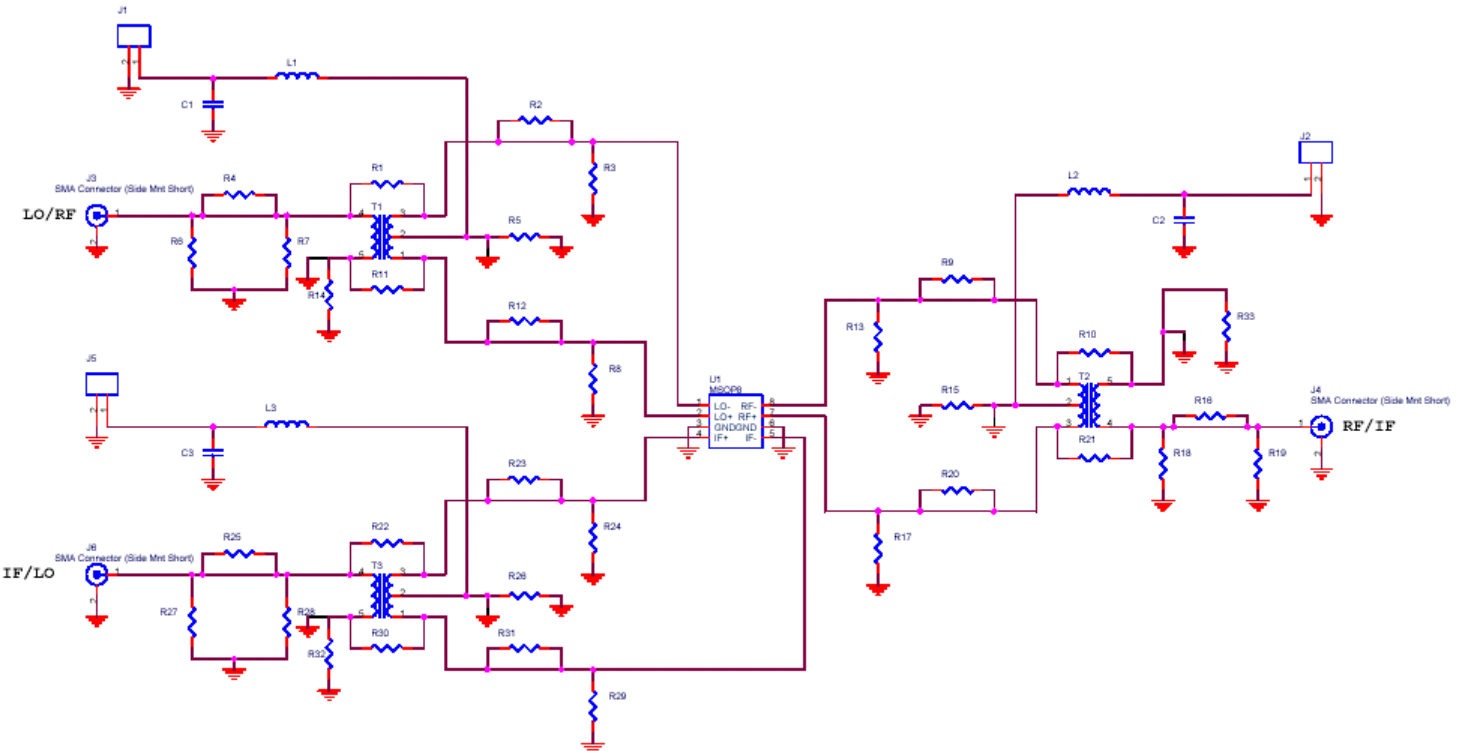
## Applications Support

If you have a problem with your evaluation kit or if you have applications questions, please contact applications support:

E-Mail: [help@psemi.com](mailto:help@psemi.com) (fastest response)  
Phone: (858) 731-9400

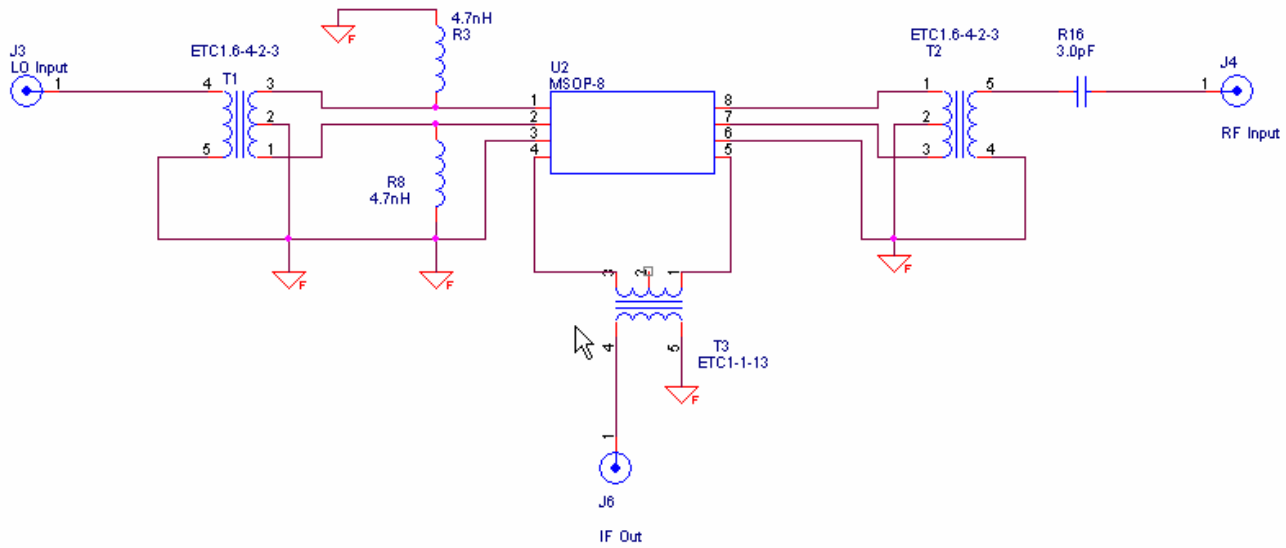
Figure 5. Evaluation Board Schematic

Peregrine Specification 102/0214



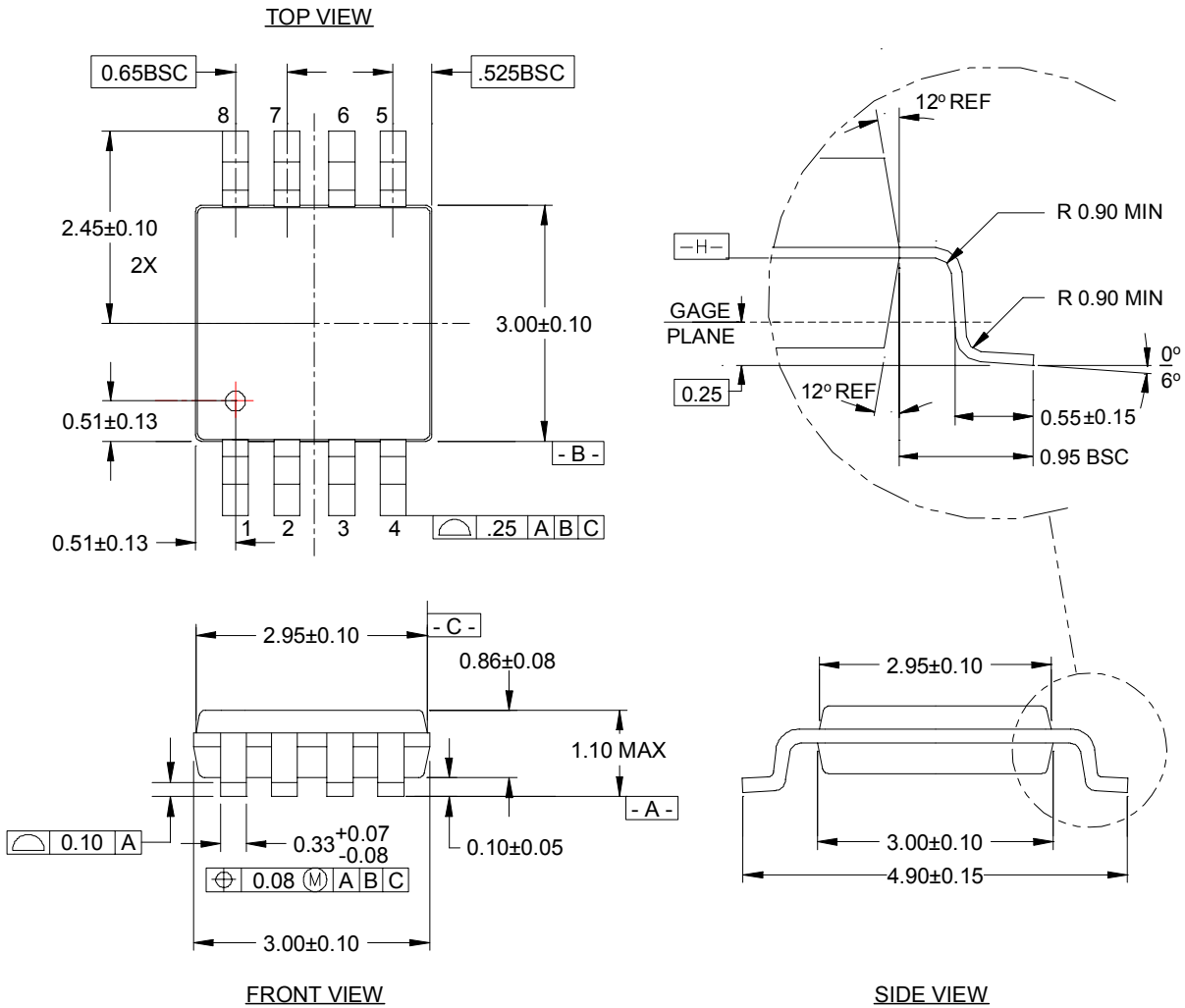
**Note:** This is the complete evaluation board schematic; which can be used for multiple configurations. Not all components need be populated. Refer to the typical schematic on the following page.

**Figure 6. Typical Schematic**



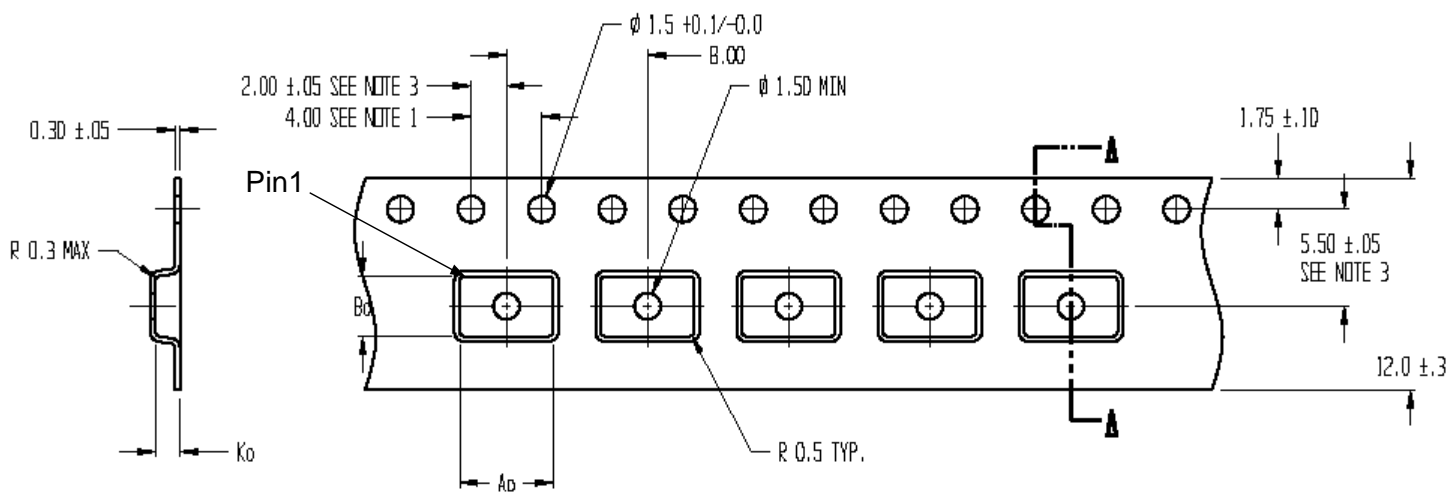
**Figure 7. Package Drawing**

8-lead MSOP



**Figure 8. Tape and Reel Specifications**

8-lead MSOP



Ad = 5.30  
Bo = 3.40  
Ko = 1.40

**NOTES:**

1. TO SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
2. CAMBER IN COMPLIANCE WITH EIA 481
3. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE

**Table 7. Ordering Information**

Order Code	Part Marking	Description	Package	Shipping Method
84140-01	84140	PE84140-08MSOP-50A	8-lead MSOP	50 units / Tube
84140-02	84140	PE84140-08MSOP-2000C	8-lead MSOP	2000 units / T&R
84140-00	PE84140-EK	PE84140-08MSOP-EK	Evaluation Kit	1 / Box

## Sales Offices

### *The Americas*

#### **Peregrine Semiconductor Corporation**

9450 Carroll Park Drive  
San Diego, CA 92121  
Tel: 858-731-9400  
Fax: 858-731-9499

### *Europe*

#### **Peregrine Semiconductor Europe**

Bâtiment Maine  
13-15 rue des Quatre Vents  
F-92380 Garches, France  
Tel: +33-1-4741-9173  
Fax : +33-1-4741-9173

#### **Space and Defense Products**

##### **Americas:**

Tel: 858-731-9453

##### **Europe, Asia Pacific:**

180 Rue Jean de Guiramand  
13852 Aix-En-Provence Cedex 3, France  
Tel: +33-4-4239-3361  
Fax: +33-4-4239-7227

### *North Asia Pacific*

#### **Peregrine Semiconductor K.K.**

Teikoku Hotel Tower 10B-6  
1-1-1 Uchisaiwai-cho, Chiyoda-ku  
Tokyo 100-0011 Japan  
Tel: +81-3-3502-5211  
Fax: +81-3-3502-5213

#### **Peregrine Semiconductor, Korea**

#B-2402, Kolon Tripolis, #210  
Geumgok-dong, Bundang-gu, Seongnam-si  
Gyeonggi-do, 463-480 S. Korea  
Tel: +82-31-728-4300  
Fax: +82-31-728-4305

### *South Asia Pacific*

#### **Peregrine Semiconductor, China**

Shanghai, 200040, P.R. China  
Tel: +86-21-5836-8276  
Fax: +86-21-5836-7652

For a list of representatives in your area, please refer to our Web site at: [www.psemi.com](http://www.psemi.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 DCN (Document 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.

The Peregrine name, logo, and UTSi are registered trademarks and UltraCMOS and HaRP are trademarks of Peregrine Semiconductor Corp.