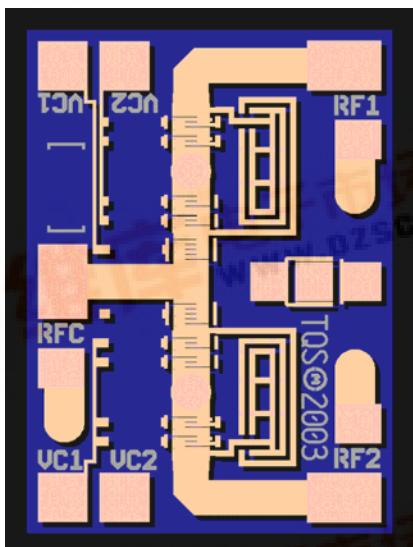
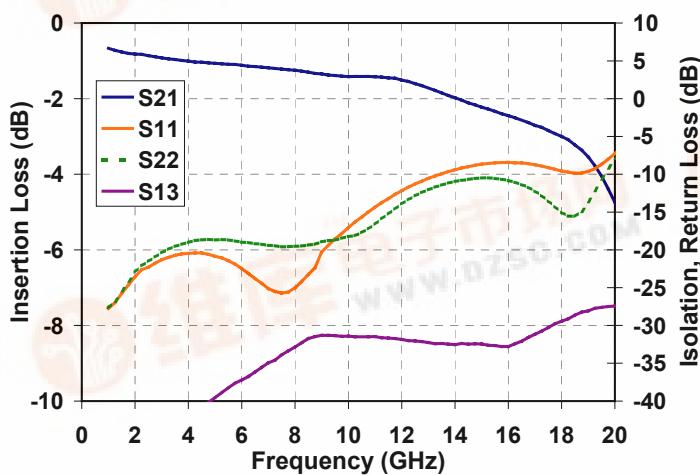


## High Power DC - 18GHz SPDT FET Switch **TGS2306-EPU**



### Preliminary Measured Performance

$V_{C1} = 0V$ ;  $V_{C2} = -5V$



### Key Features and Performance

- DC - 18 GHz Frequency Range
- 29 dBm Input P1dB @  $V_C = -5V$
- > 30 dB Isolation
- <1 nsec switching speed
- Control Voltage Application from Either Side of MMIC
- -3V or -5V Control Voltage
- 0.5μm pHEMT 3MI Technology
- Chip Dimensions:  
0.83 x 1.11 x 0.10 mm  
(0.033 x 0.044 x 0.004 inches)

### Description

The TriQuint TGS2306-EPU is a GaAs single-pole, double-throw (SPDT) FET monolithic switch designed to operate over the DC to 18GHz frequency range. This switch not only maintains a high isolation loss and a low insertion loss across a wide bandwidth, but also has very low power consumption and high power handling of 29dBm or greater input P1dB at  $V_C = 5V$ . These advantages, along with the small size of the chip, make the TGS2306-EPU ideal for use in high-speed radar and communication applications.

**TABLE I**  
**MAXIMUM RATINGS**

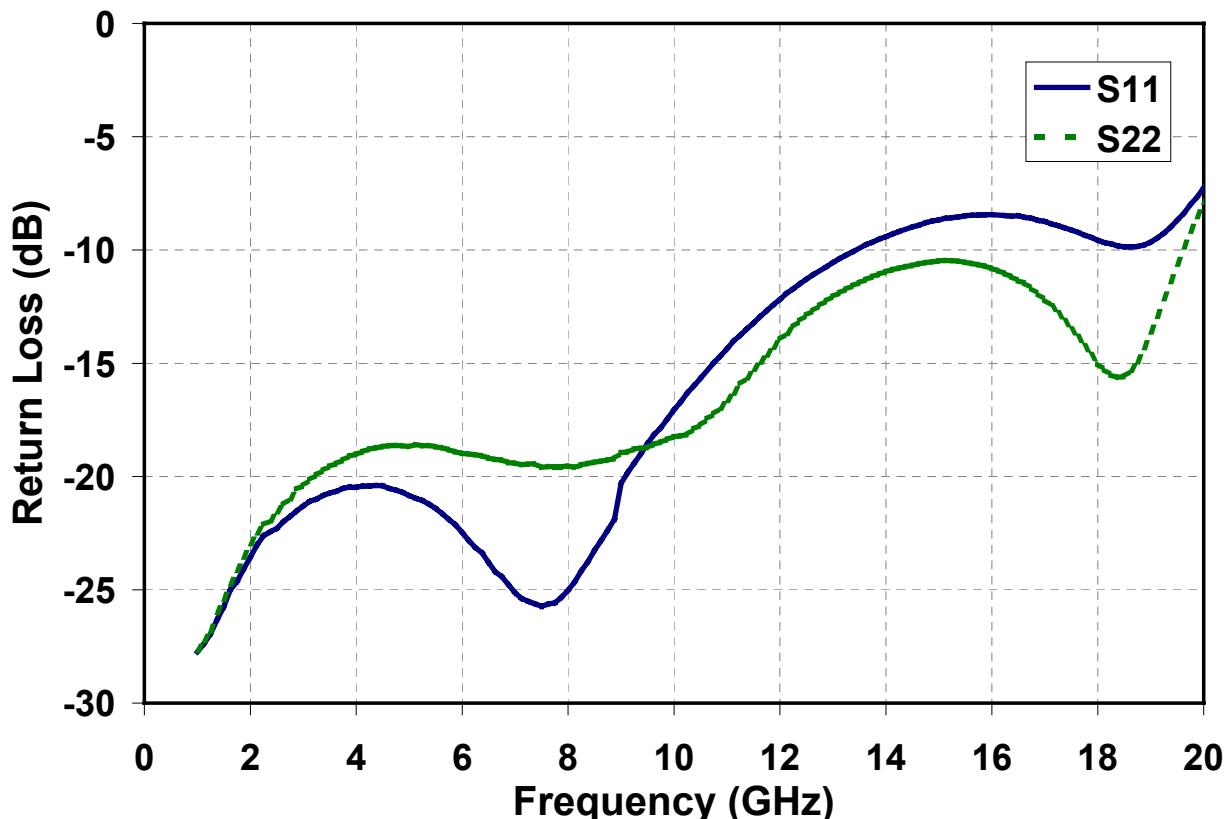
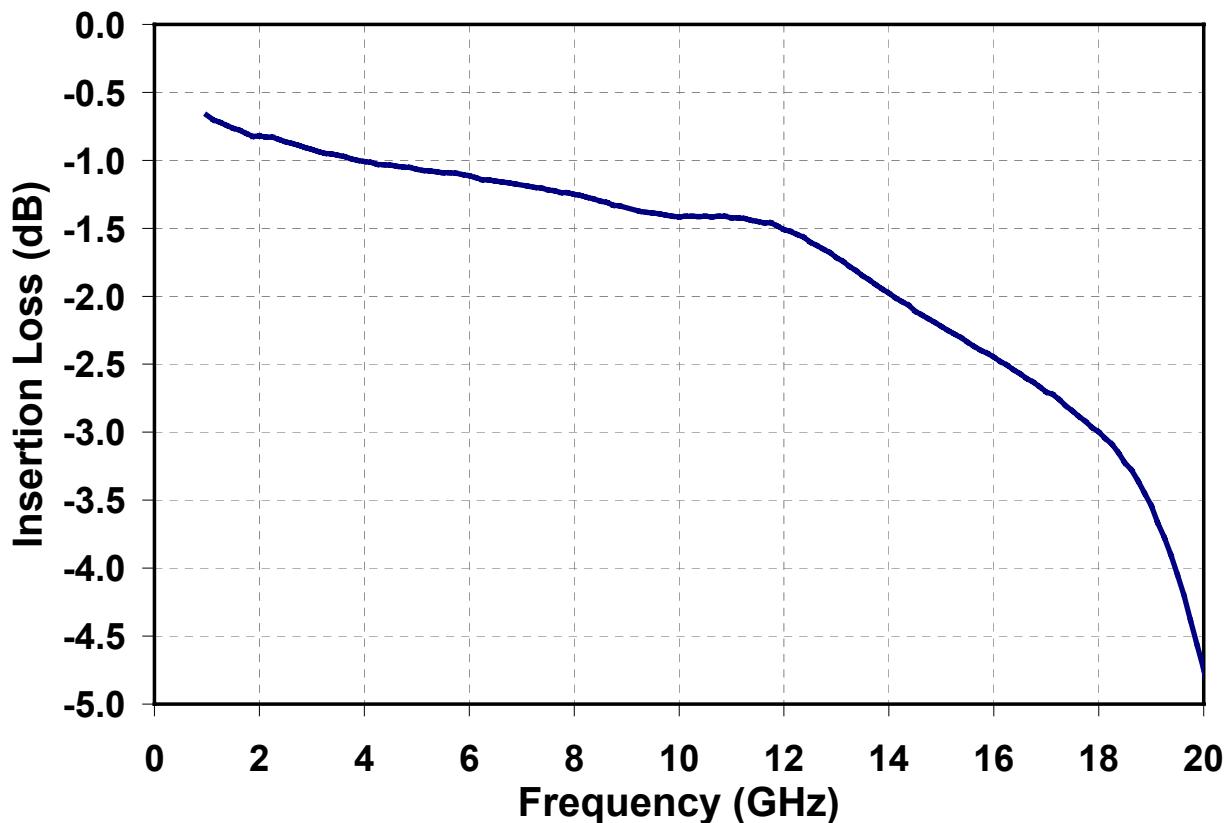
Symbol	Parameter	Value	Notes
$V_C$	Control Voltage	-7 V	<u>1/ 2/</u>
$I_C$	Control Current	2.25 mA	<u>1/ 2/</u>
$P_{IN}$	Input Continuous Wave Power	TBD	<u>1/ 2/</u>
$P_D$	Power Dissipation	TBD	<u>1/ 2/ 3/</u>
$T_{CH}$	Operating Channel Temperature	150 $^{\circ}$ C	<u>4/</u>
$T_M$	Mounting Temperature (30 Seconds)	320 $^{\circ}$ C	
$T_{STG}$	Storage Temperature	-65 to 150 $^{\circ}$ C	

- 1/ These ratings represent the maximum operable values for this device
- 2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed  $P_D$  at a package base temperature of 70 $^{\circ}$ C
- 3/ When operated at this bias condition with a baseplate temperature of 70 $^{\circ}$ C, the MTTF is reduced to 1.0E+6 hours
- 4/ Junction operating temperature will directly affect the device median time to failure (MTTF). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

**TABLE II**  
**TRUTH TABLE**

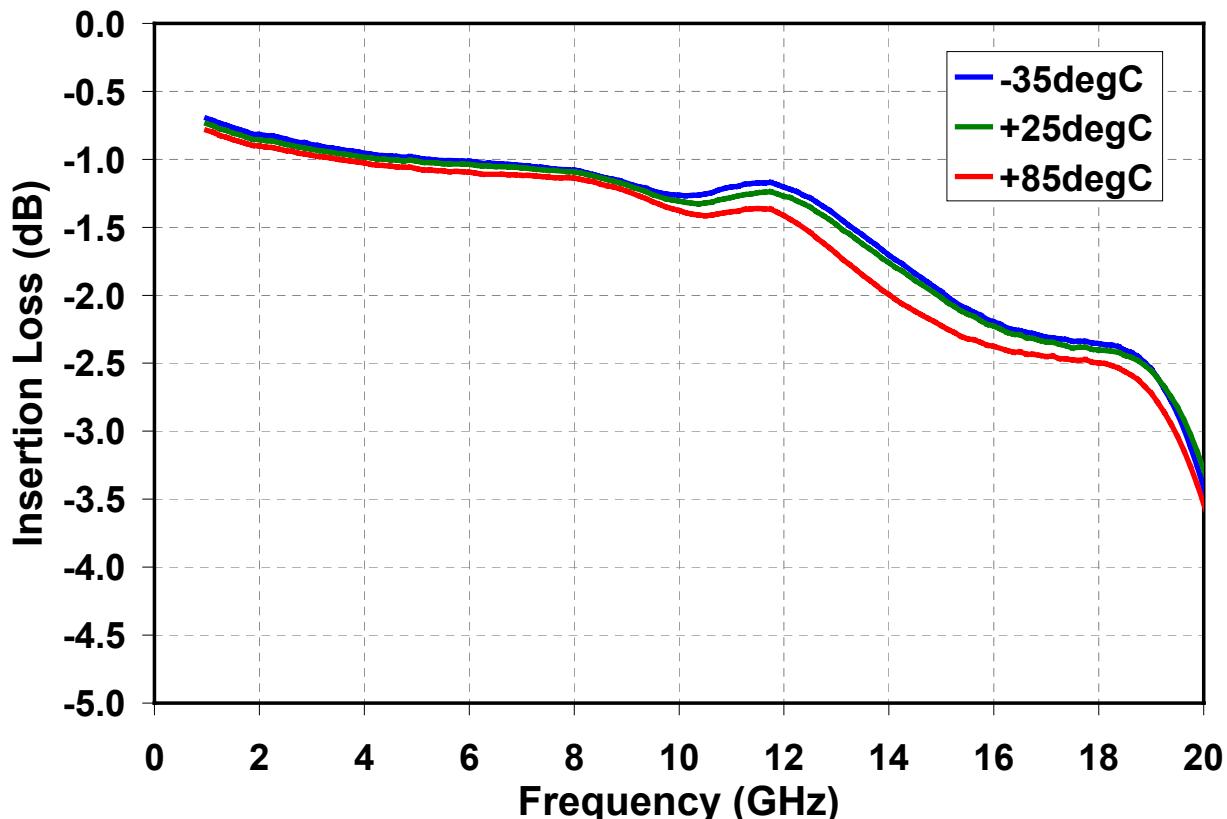
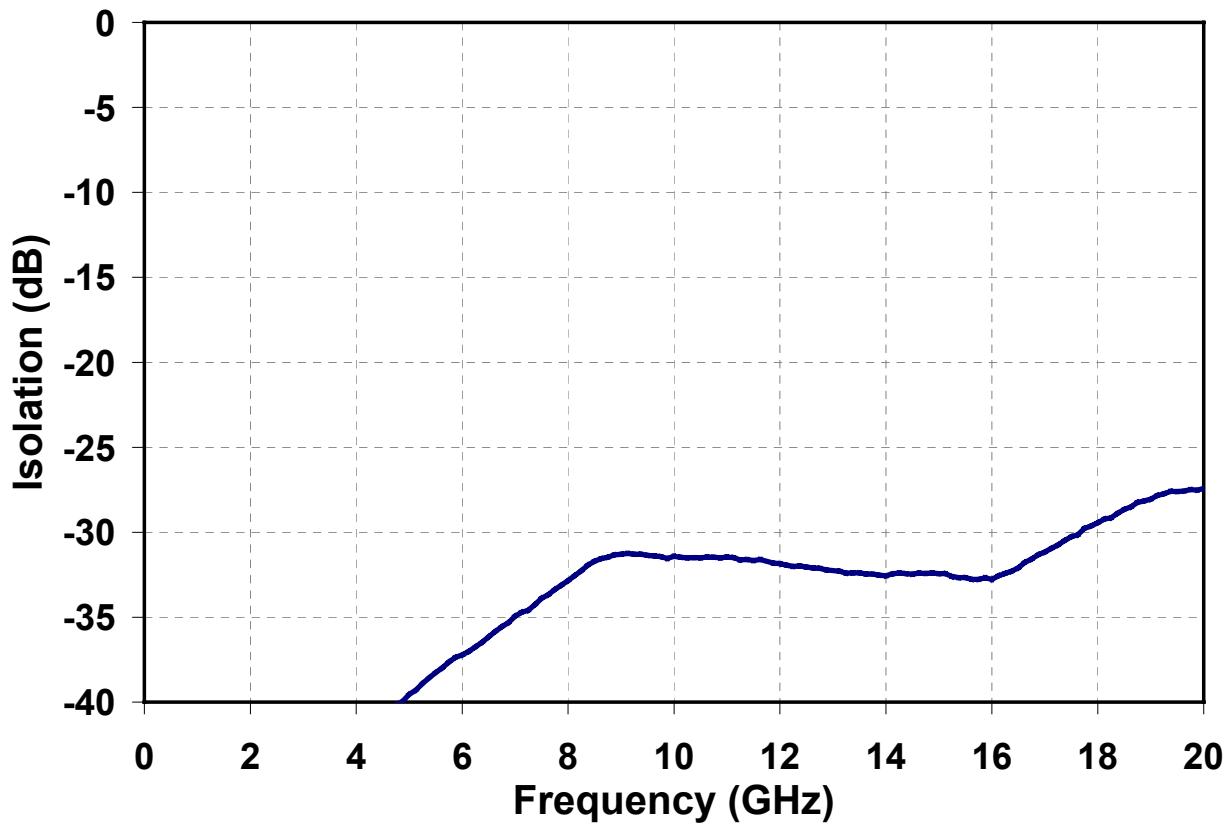
Selected RF Output	$V_{C1}$	$V_{C2}$
RF Out 1	0 V	-5 V
RF Out 2	-5 V	0 V

**Fixtured Measurement**



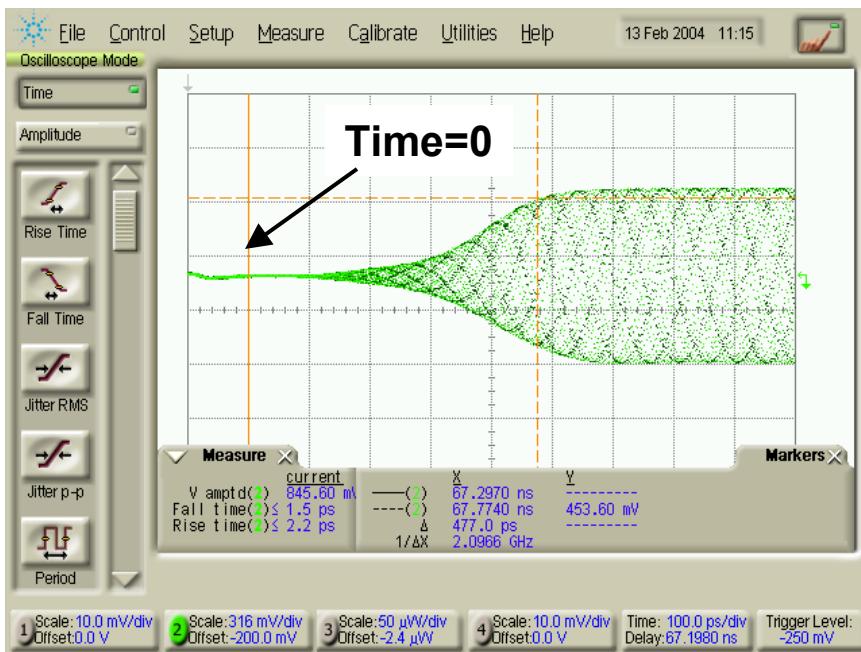
Note: Devices designated as *EPU* are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

Fixtured Measurement



Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

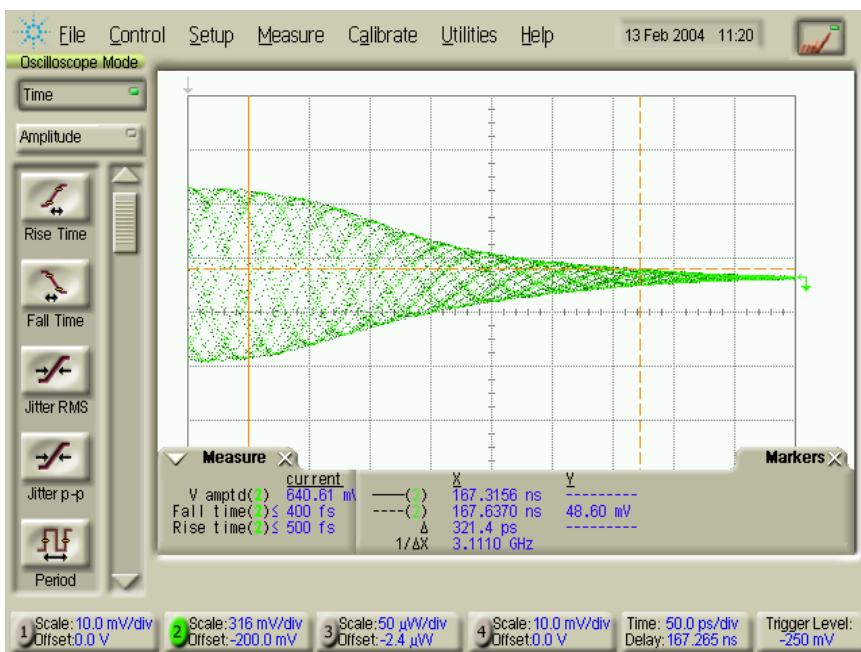
## Switching Speed Measurements



**Off to On**

**50% Control Signal to 90% RF = 480 psec**

**100 psec/div**



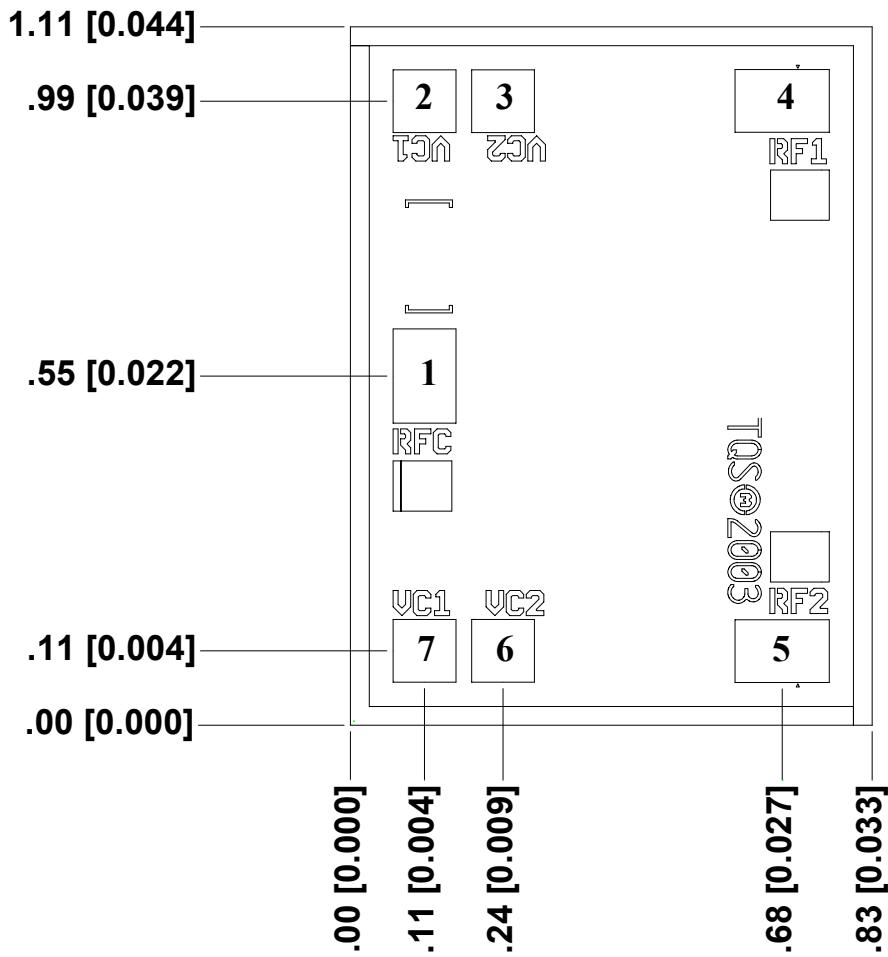
**On to Off**

**50% Control Signal to 10% RF = 320 psec**

**50 psec/div**

Measurement performed using a pulse generator with 100 psec rise/fall times driving 50 ohm transmission lines that were terminated in 50 ohms and attached to the VC1 and VC2 control inputs. Pulse generator provided complementary outputs.

**Mechanical Drawing**



**Units: millimeters [inches]**

**Thickness: 0.10 [0.004] (reference only)**

**Chip edge to bond pad dimensions are shown to center of bond pads.**

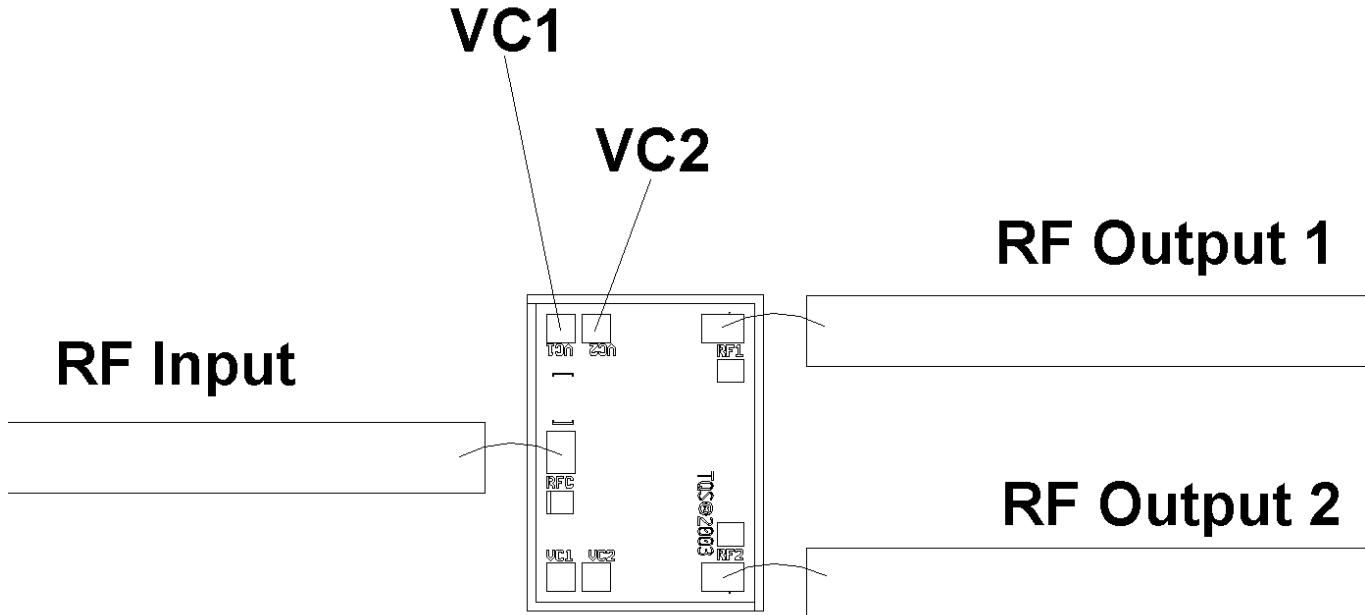
**Chip size tolerance:  $\pm 0.05$  [0.002]**

**RF ground through backside**

<b>Bond Pad #1</b>	<b>RF Input</b>	<b>0.10 x 0.20</b>	<b>[0.004 x 0.008]</b>
<b>Bond Pad #2</b>	<b>VC1</b>	<b>0.10 x 0.10</b>	<b>[0.004 x 0.004]</b>
<b>Bond Pad #3</b>	<b>VC2</b>	<b>0.10 x 0.10</b>	<b>[0.004 x 0.004]</b>
<b>Bond Pad #4</b>	<b>RF Output 1</b>	<b>0.20 x 0.10</b>	<b>[0.008 x 0.004]</b>
<b>Bond Pad #5</b>	<b>RF Output 2</b>	<b>0.20 x 0.10</b>	<b>[0.008 x 0.004]</b>
<b>Bond Pad #6</b>	<b>VC2</b>	<b>0.10 x 0.10</b>	<b>[0.004 x 0.004]</b>
<b>Bond Pad #7</b>	<b>VC1</b>	<b>0.10 x 0.10</b>	<b>[0.004 x 0.004]</b>

*Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.*

### Chip Assembly & Bonding Diagram



For optimum insertion loss and return loss, a single 0.001" bondwire of length 35 mils should be used. This will be approximately 0.42nH. Differences in bondwire length will have an impact on switch performance.

$V_{C1}$  &  $V_{C2}$  can be applied from either side of the MMIC.

DC blocks are required for the RF input and output.

***GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.***

## **Assembly Process Notes**

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300°C. (30 seconds maximum)
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Organic attachment can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.
- Microwave or radiant curing should not be used because of differential heating.
- Coefficient of thermal expansion matching is critical.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Maximum stage temperature is 200°C.

**GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.**