

**DATA SHEET**

# SKY13298-360LF: GaAs SP2T Switch for Ultra Wideband (UWB) 3–8 GHz

**Features**

- Positive voltage control (0/1.8 V to 0/3.3 V)
- High isolation 25 dB for BG1, 25 dB for BG3
- Low loss 0.7 dB typical for BG1, 0.9 dB for BG3
- Lead (Pb)-free and RoHS-compliant

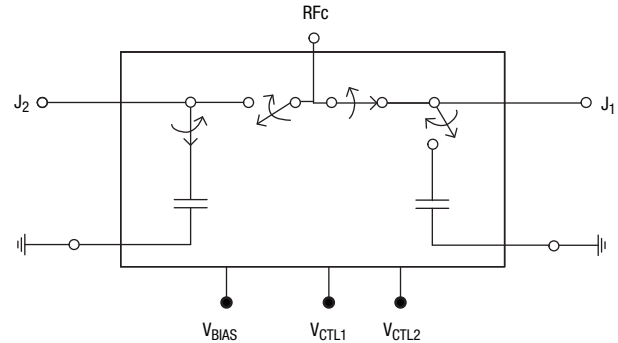
**Description**

The SKY13298-360LF is a pHEMT GaAs FET IC switch packaged in an 2 x 2 mm, 8-lead exposed pad plastic package for low-cost commercial applications. The use of the  $V_{BIAS}$  line enables the part to be used with low control bias voltages down to 1.8 V. This switch is ideal for Ultra Wide Band (UWB) applications covering BG1 and BG3. For 3.3 V control, the  $V_{BIAS}$  is not required and is left open circuit on the board.

**NEW** Skyworks offers lead (Pb)-free, RoHS (Restriction of Hazardous Substances)-compliant packaging.



**Functional Block Diagram**



**Electrical Specifications**

$V_{BIAS} = 1.8\text{ V}$ ,  $V_{CTL} = 0\text{ V}/1.8\text{ V}$ ,  $T = 25\text{ }^\circ\text{C}$ ,  $P_{INPUT} = 0\text{ dBm}$ ,  $Z_0 = 50\text{ }\Omega$ , unless otherwise noted

| Parameter                          | Frequency       | Min. | Typ. | Max. | Unit |
|------------------------------------|-----------------|------|------|------|------|
| Insertion Loss                     | 3.168–4.752 GHz |      | 0.7  | 0.9  | dB   |
|                                    | 6.336–7.920 GHz |      | 0.9  | 1.0  | dB   |
| Isolation                          | 3.168–4.752 GHz | 22   | 25   |      | dB   |
|                                    | 6.336–7.920 GHz | 19   | 22   |      | dB   |
| Return loss (Insertion loss state) | 3.168–4.752 GHz |      | 25   |      | dB   |
|                                    | 6.336–7.920 GHz |      | 12   |      | dB   |

## Operating Characteristics

**V<sub>BIAS</sub> = 1.8 V, V<sub>CTL</sub> = 0 V/1.8 V, T = 25 °C, P<sub>INPUT</sub> = 0 dBm, Z<sub>0</sub> = 50 Ω, unless otherwise noted**

| Parameter  | Condition  | Frequency  | Min.     | Typ.                     | Max.       | Unit                         |
|--|--|--|----------|--------------------------|------------|------------------------------|
| Switching characteristics<br>Rise/fall time<br>On/off time | 10/90% or 90/10% RF<br>50% V <sub>CTL</sub> to 90/10% RF   |  |          | 20<br>20                 |            | ns<br>ns                     |
| Input power for 1 dB compression                           | V <sub>BIAS</sub> = 1.8 V, V <sub>CTL</sub> = 0 V/1.8 V<br>V <sub>BIAS</sub> = 1.8 V, V <sub>CTL</sub> = 0 V/1.8 V<br>V <sub>BIAS</sub> = open circuit, V <sub>CTL</sub> = 0 V/3.3 V<br>V <sub>BIAS</sub> = open circuit, V <sub>CTL</sub> = 0 V/3.3 V | 3.168–4.752 GHz<br>6.336–7.920 GHz<br>3.168–4.752 GHz<br>6.336–7.920 GHz     |          | 18<br>16<br>26<br>24     |            | dBm<br>dBm<br>dBm<br>dBm     |
| Intermodulation intercept point (IP3)                      | For two tone input power 5 dBm/tone<br>1 MHz spacing,<br>V <sub>BIAS</sub> = 1.8 V, V <sub>CTL</sub> = 0 V/1.8 V<br><br>V <sub>BIAS</sub> = 0 V, V <sub>CTL</sub> = 0 V/3.3 V  | 3.168–4.752 GHz<br>6.336–7.920 GHz<br><br>3.168–4.752 GHz<br>6.336–7.920 GHz |          | 39<br>34<br><br>47<br>42 |            | dBm<br>dBm<br><br>dBm<br>dBm |
| Control voltages   | V <sub>CTL</sub> LOW<br>V <sub>CTL</sub> HIGH = V <sub>BIAS</sub>  |  | 0<br>1.8 |                          | 0.2<br>3.3 | V<br>V                       |
| Supply voltage   | V <sub>BIAS</sub>  |  | 1.8      |                          | 3.3        | V                            |
| Supply currents  | V <sub>BIAS</sub> = 1.8 to 3.3 V<br>V <sub>CTL</sub> LOW, V <sub>CTL</sub> HIGH  |  |          | 5<br>5                   |            | μA<br>μA                     |

## Truth Table

| V <sub>BIAS</sub> | V <sub>CTL1</sub> | V <sub>CTL2</sub> | RFc-J <sub>1</sub> | RFc-J <sub>2</sub> |
|-------------------|-------------------|-------------------|--------------------|--------------------|
| 1                 | 1                 | 0                 | Insertion loss     | Isolation          |
| 1                 | 0                 | 1                 | Isolation          | Insertion loss     |

"1" = 1.8 to 3.3 V.

"0" = 0 V.

For "1" > 3 V, V<sub>BIAS</sub> is not necessary and may be left open ckt.

Any state other than described in the truth table will put the switch in an undefined state.

## Absolute Maximum Ratings

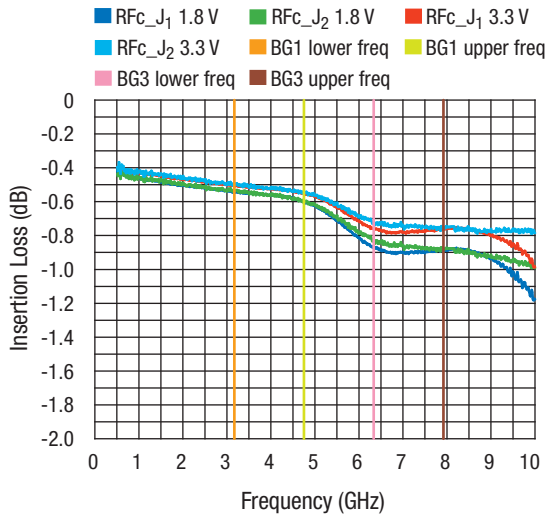
| Characteristic                  | Value                         |
|---------------------------------|-------------------------------|
| V <sub>BIAS</sub> voltage range | 1.8 ≤ V <sub>BIAS</sub> ≤ 5 V |
| RF input power @ 3 V            | 27 dBm                        |
| Operating temperature           | -40 °C to +85 °C              |
| Storage temperature             | -65 °C to +150 °C             |

Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

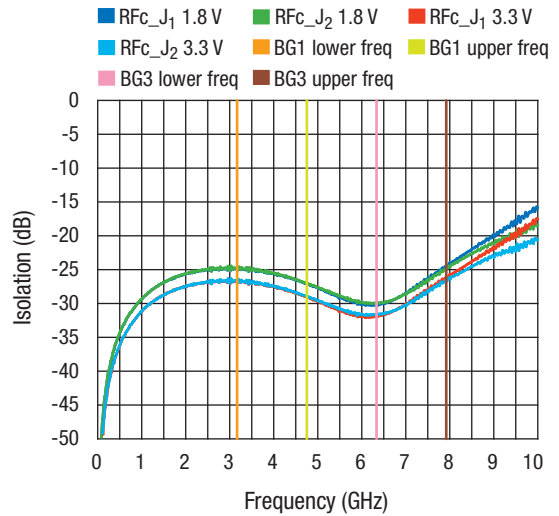
**CAUTION:** Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

### Typical Performance Data

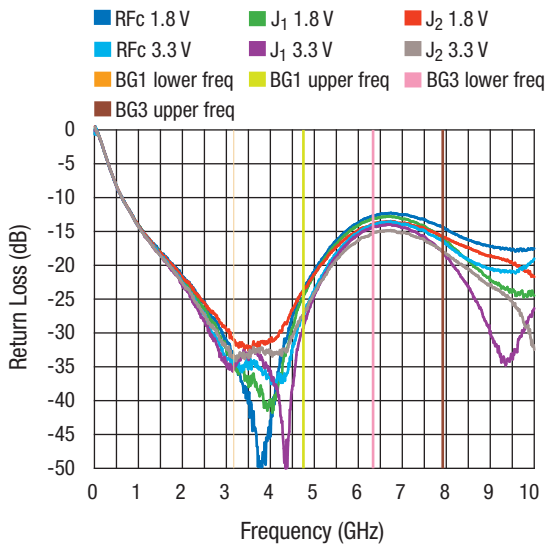
$V_{BIAS} = 1.8\text{ V}$ ,  $V_{CTL} = 0\text{ V}/1.8\text{ V}$ , and  $V_{BIAS} = \text{Open Circuit}$ ,  $V_{CTL} = 0\text{ V}/3.3\text{ V}$ ,  $T = 25\text{ }^\circ\text{C}$ ,  $P_{INPUT} = 0\text{ dBm}$ ,  $Z_0 = 50\text{ }\Omega$ ,  
 $C_{BLK} = 15\text{ pF}$ ,  $C_{BP} = 33\text{ pF}$  unless otherwise noted



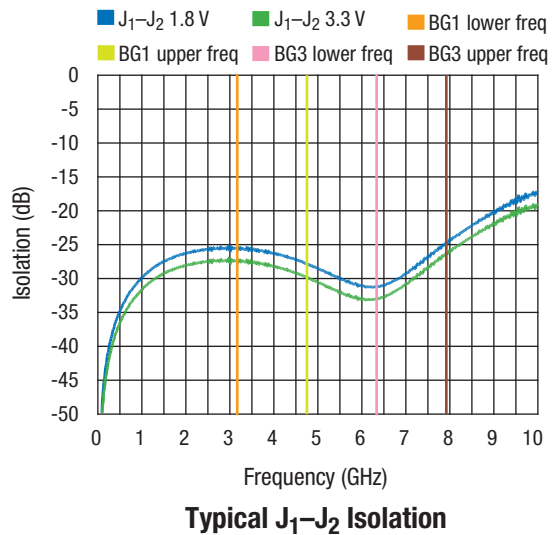
**Typical Insertion Loss**



**Typical Isolation**

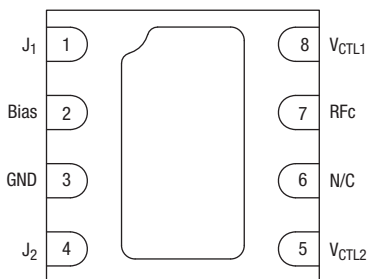


**Return Loss (Ins. Loss state)**



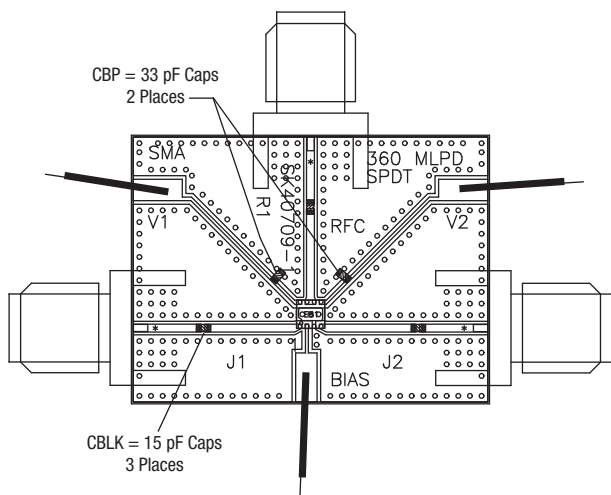
**Typical J1-J2 Isolation**

### Pin Out (Top View)

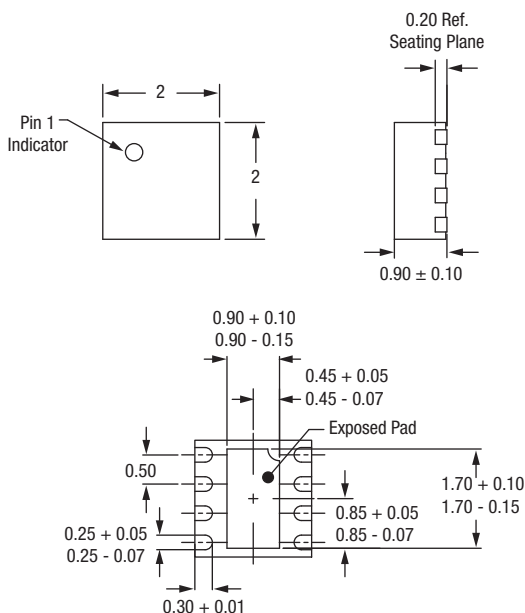


DC blocks are required on RFc, J<sub>1</sub>, J<sub>2</sub>.  
 C<sub>BLK</sub> = 15 pF for UWB band operation.

### Evaluation Board



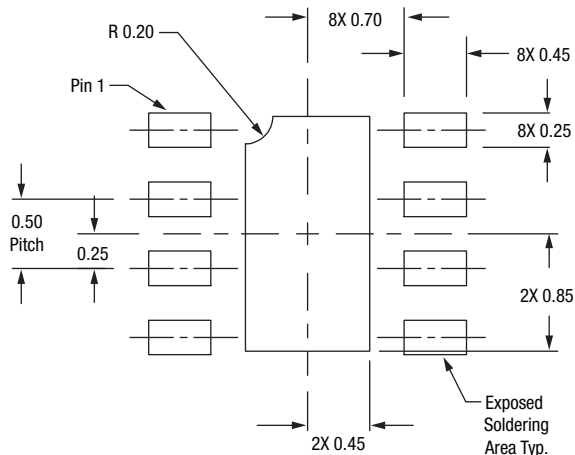
### QFN 8L 2 x 2 mm Package



### Pin Descriptions

| Pin Number     | Pin Name          | Description                    |
|----------------|-------------------|--------------------------------|
| 1              | J <sub>1</sub>    | RF port                        |
| 2              | Bias              | V <sub>BIAS</sub>              |
| 3              | Gnd               | Gnd                            |
| 4              | J <sub>2</sub>    | RF port                        |
| 5              | V <sub>CTL2</sub> | DC control voltage             |
| 6              | N/C               | No connect                     |
| 7              | RFc               | RF common port                 |
| 8              | V <sub>CTL1</sub> | DC control voltage             |
| Exposed paddle | Paddle            | Must be connected to RF ground |

### Suggested Land Pattern



### Recommended Solder Reflow Profiles

Refer to the [“Recommended Solder Reflow Profile”](#) Application Note.

### Tape and Reel Information

Refer to the [“Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation”](#) Application Note.

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