

DATA SHEET

SKY13347-360LF: 0.5 – 3.0 GHz SPST Switch, 50 Ω Terminated

Applications

- Wireless infrastructure systems

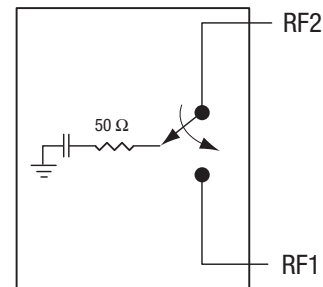
Features

- 50 Ω terminated RF output
- Low insertion loss: 0.7 dB @ 2.0 GHz
- High isolation: 35 dB @ 2.0 GHz
- Small, DFN (8-pin, 2 x 2 mm) package (MSL1, 260 °C per JEDEC J-STD-020)

NEW



Skyworks Green™ products are RoHS (Restriction of Hazardous Substances)-compliant, conform to the EIA/EICTA/JEITA Joint Industry Guide (JIG) Level A guidelines, are halogen free according to IEC-61249-2-21, and contain <1,000 ppm antimony trioxide in polymeric materials.



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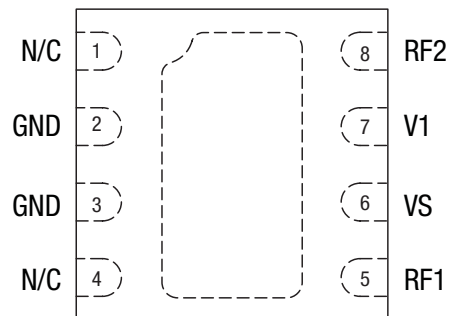
Figure 1. SKY13347-360LF Block Diagram

Description

The SKY13347-360LF is a pHEMT GaAs Single-Pole, Single-Throw (SPST) switch with a 50 Ω terminated output. The high linearity performance, low insertion loss, and high isolation achieved by the SKY13347-360LF make it an ideal choice for many cellular and wireless infrastructure applications.

The switch is manufactured in a compact, 2 x 2 mm, 8-pin Dual Flat No-Lead (DFN) package.

A functional block diagram is shown in Figure 1. The pin configuration and package are shown in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.



S2179

**Figure 2. SKY13347-360LF Pinout – 6-Pin MLPD
(Top View)**

Table 1. SKY13347-360LF Signal Descriptions

| Pin # | Name | Description | Pin # | Name | Description |
|-------|------|--|-------|------|---------------------------------------|
| 1 | N/C | No connection. May be connected to ground with no change in performance. | 5 | RF1 | RF port 1. Must be DC blocked. |
| 2 | GND | Ground | 6 | VS | DC bias voltage. Refer to Table 4. |
| 3 | GND | Ground | 7 | V1 | DC control voltage. Refer to Table 4. |
| 4 | N/C | No connection. May be connected to ground with no change in performance. | 8 | RF2 | RF port 2. Must be DC blocked. |

Table 2. SKY13347-360LF Absolute Maximum Ratings

| Parameter | Symbol | Minimum | Maximum | Units |
|-----------------------|------------------|---------|----------------|-------|
| DC supply voltage | V _S | | 6 | V |
| Control voltage | V ₁ | | V _S | V |
| Input power | P _{IN} | | +32 | dBm |
| Storage temperature | T _{STG} | –40 | +125 | °C |
| Operating temperature | T _{OP} | –40 | +85 | °C |

Note: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

CAUTION: Although this device is designed to be as robust as possible, Electrostatic Discharge (ESD) 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 should be used at all times.

Functional Description

Switching is controlled by a single control voltage on the V1 pin. Depending on the logic applied to the control pin, the RF1 and RF2 signals (pins 5 and 8, respectively) are connected to each other either by a low insertion loss path or a high isolation path.

Both RF ports of the switch require DC blocking capacitors. The value of either blocking capacitor determines the low frequency of operation.

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY13347-360LF are provided in Table 2. Electrical specifications are provided in Table 3.

Typical performance characteristics of the SKY13347-360LF are illustrated in Figures 3 through 7.

The state of the SKY13347-360LF is determined by the logic provided in Table 4.

Table 3. SKY13347-360LF Electrical Specifications (Note 1)**(V_I = 0 V and +3.0 V, T_{OP} = +25 °C, P_{IN} = 0 dBm, Characteristic Impedance [Z₀] = 50 Ω, C_{BLK} = 47 pF, Unless Otherwise Noted)**

| Parameter | Symbol | Test Condition | Min | Typical | Max | Units |
|---|--------|--|-----|---------|------|-------|
| Insertion loss | IL | RF1 to RF2 | | | | |
| | | 0.5 GHz | | 0.60 | 0.70 | dB |
| | | 1.0 GHz | | 0.65 | 0.75 | dB |
| | | 1.5 GHz | | 0.70 | 0.80 | dB |
| | | 2.0 GHz | | 0.70 | 0.80 | dB |
| | | 2.5 GHz | | 0.75 | 0.85 | dB |
| | | 3.0 GHz | | 0.80 | 0.90 | dB |
| Isolation | Iso | RF1 to RF2 | | | | |
| | | 0.5 GHz | 40 | 45 | | dB |
| | | 1.0 GHz | 30 | 35 | | dB |
| | | 1.5 GHz | 30 | 35 | | dB |
| | | 2.0 GHz | 30 | 35 | | dB |
| | | 2.5 GHz | 25 | 30 | | dB |
| | | 3.0 GHz | 25 | 30 | | dB |
| Return loss | RL | 0.5 GHz to 3.0 GHz, RF1 and RF2 in insertion loss state | | 20 | | dB |
| | | 0.5 GHz to 3.0 GHz, RF2 in isolation state | | 15 | | dB |
| 1 dB Input Compression Point | IP1dB | 0.5 to 3.0 GHz | | +31 | | dBm |
| 3 rd Order Input Intercept Point | IIP3 | 0.5 to 3.0 GHz, P _{IN} = +5 dBm/tone, 1 MHz spacing | | +40 | | dBm |
| Switching speed | | 10% to 90% RF | | 70 | | ns |
| | | 90% to 10% RF | | 10 | | ns |
| | | 50% V _I to 90% RF | | 85 | | ns |
| | | 50% V _I to 10% RF | | 10 | | ns |

Note 1: Performance is guaranteed only under the conditions listed in this Table.

Typical Performance Characteristics

($V_1 = 0\text{ V}$ and $+3.0\text{ V}$, $T_{OP} = +25\text{ }^{\circ}\text{C}$, $P_{IN} = 0\text{ dBm}$, Characteristic Impedance $[Z_0] = 50\text{ }\Omega$, $C_{BLK} = 47\text{ pF}$, Unless Otherwise Noted)

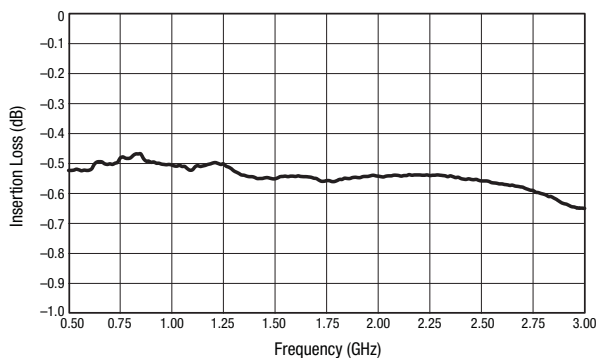


Figure 3. RF1 to RF2 Insertion Loss vs Frequency

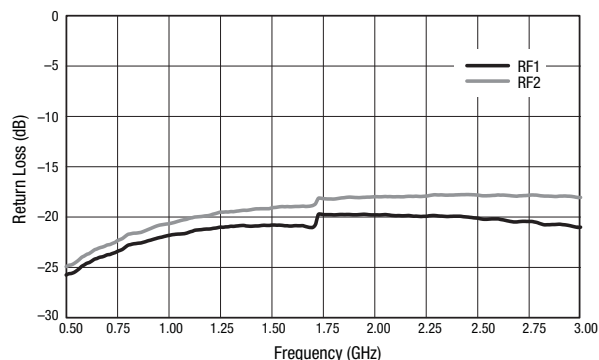


Figure 4. Return Loss (Insertion Loss State) vs Frequency

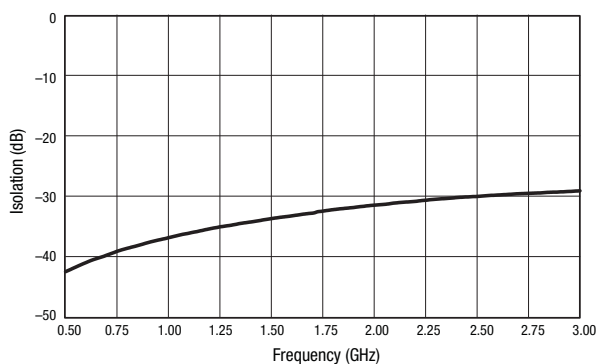


Figure 5. Isolation vs Frequency

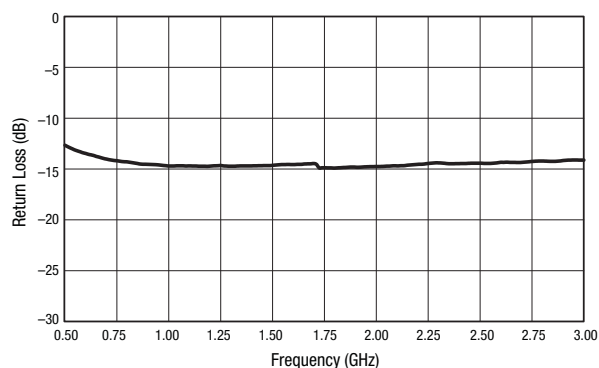


Figure 6. RF2 Return Loss (Isolation State) vs Frequency

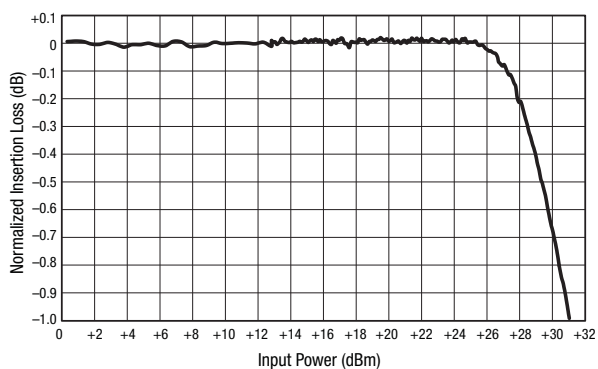


Figure 7. Normalized Insertion Loss vs Input Power

Table 4. SKY13347-360LF Truth Table

| VS (Pin 6) | V1 (Pin 7) | RF State |
|------------|------------|----------------|
| 1 | 0 | Isolation |
| 1 | VS | Insertion loss |

Note: "1" = +1.8 V to +5.0 V. "0" = 0 V to +0.2 V. Any state not described in this Table places the switch into an undefined state. An undefined state will not damage the device.

Evaluation Board Description

The SKY13347-360LF Evaluation Board is used to test the performance of the SKY13347-360LF SPDT Switch. An Evaluation Board schematic diagram is provided in Figure 8. An assembly drawing for the Evaluation Board is shown in Figure 9.

Package Dimensions

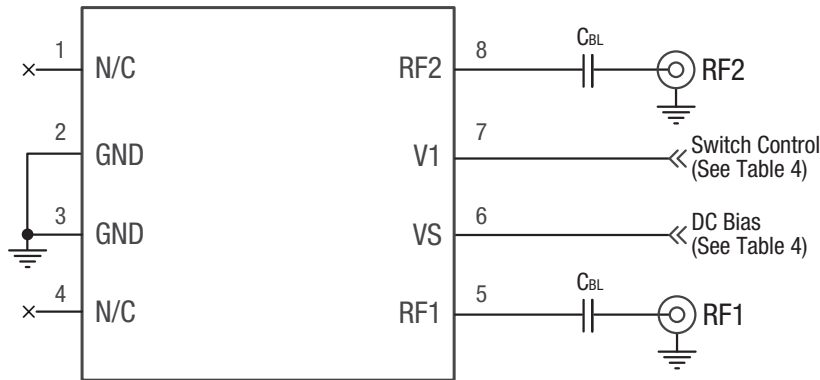
The PCB layout footprint for the SKY13347-360LF is provided in Figure 10. Typical case markings are shown in Figure 11. Package dimensions for the 6-pin MLPD are shown in Figure 12, and tape and reel dimensions are provided in Figure 13.

Package and Handling Information

Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SKY13347-360LF is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information*, document number 200164.

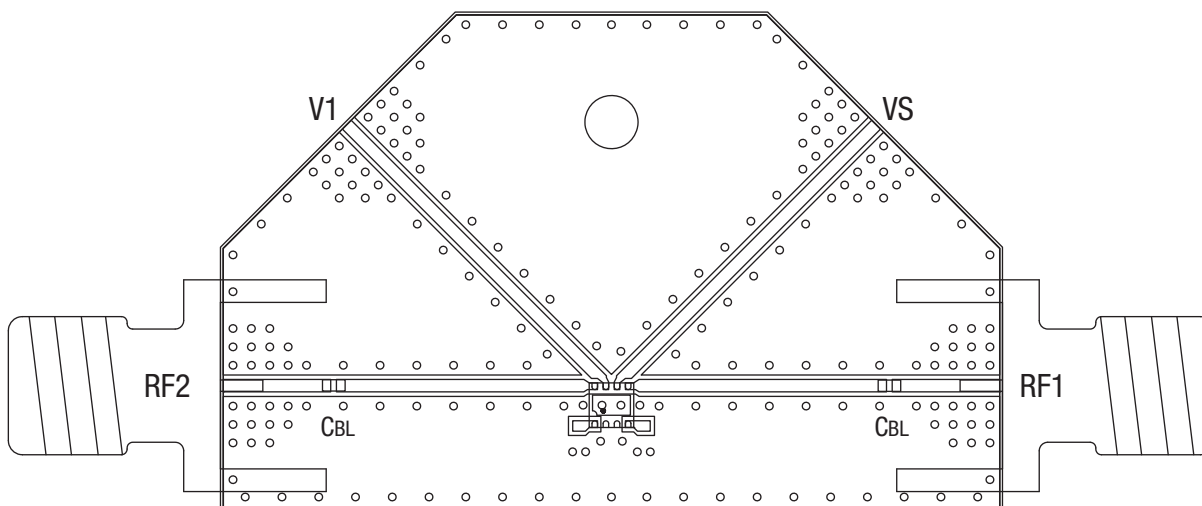
Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.



Note: $C_{BL} = 47\text{ pF}$ for $>500\text{ MHz}$ operation; 220 pF for operation down to 50 MHz .
Higher values recommended for lower frequency operation.
Exposed paddle must be grounded.

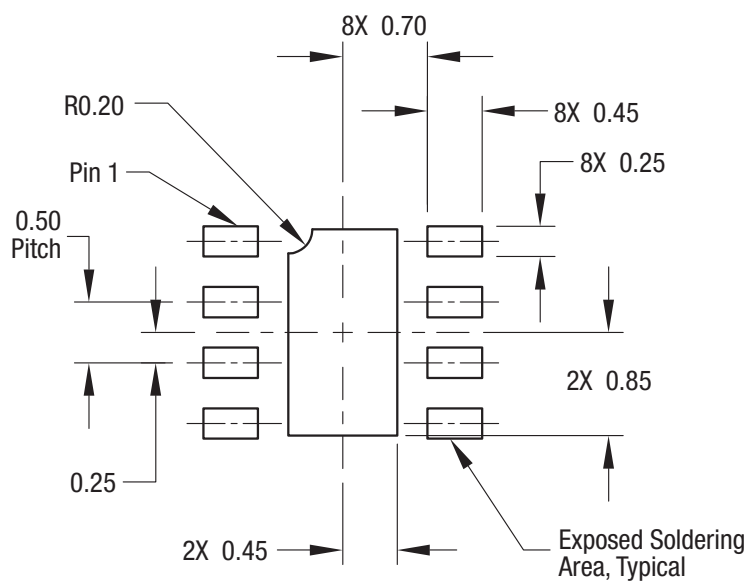
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Figure 8. SKY13347-360LF Evaluation Board Schematic



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Figure 9. SKY13347-360LF Evaluation Board Assembly Diagram



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Figure 10. SKY13347-360LF PCB Layout Footprint (Top View)

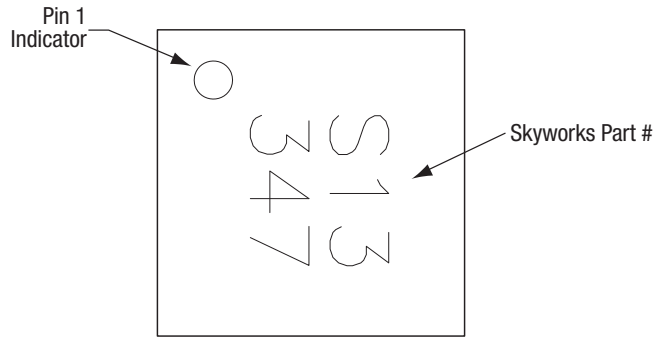
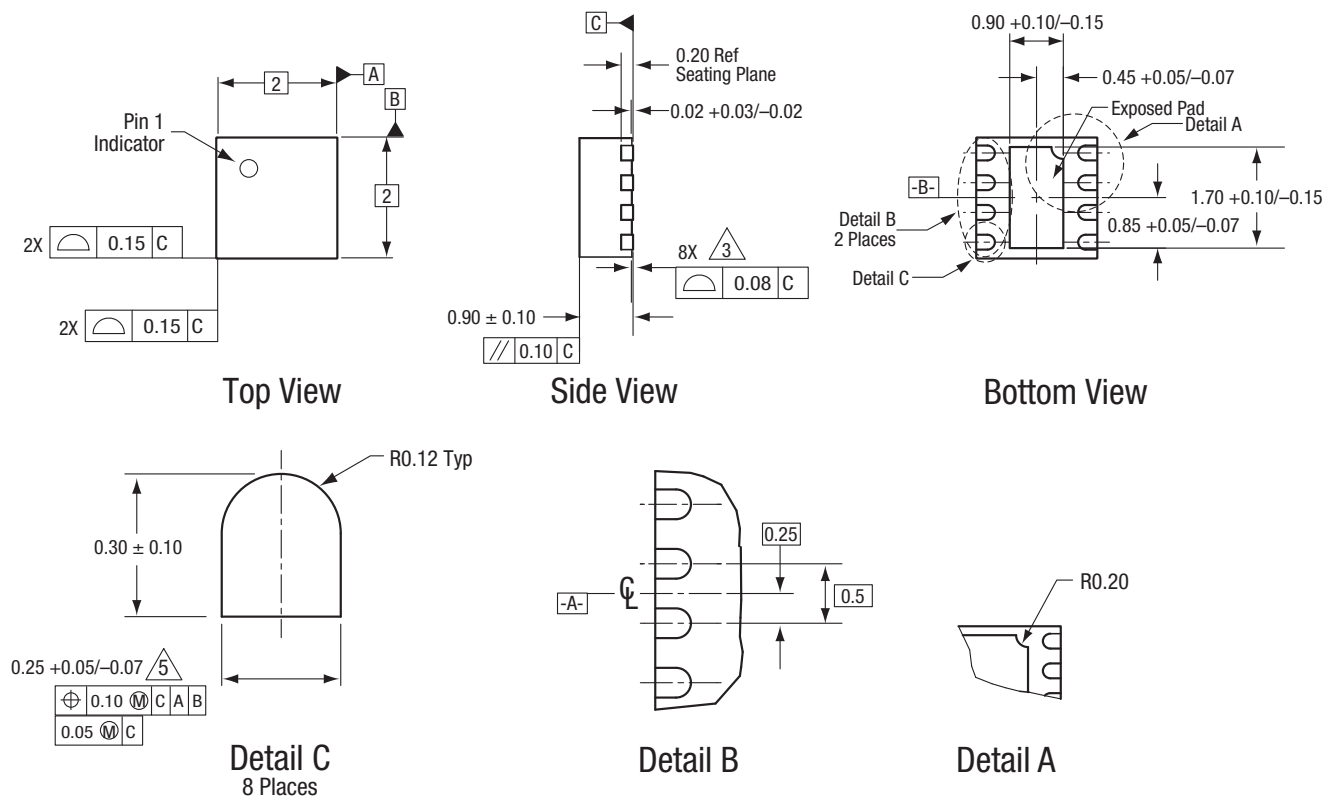


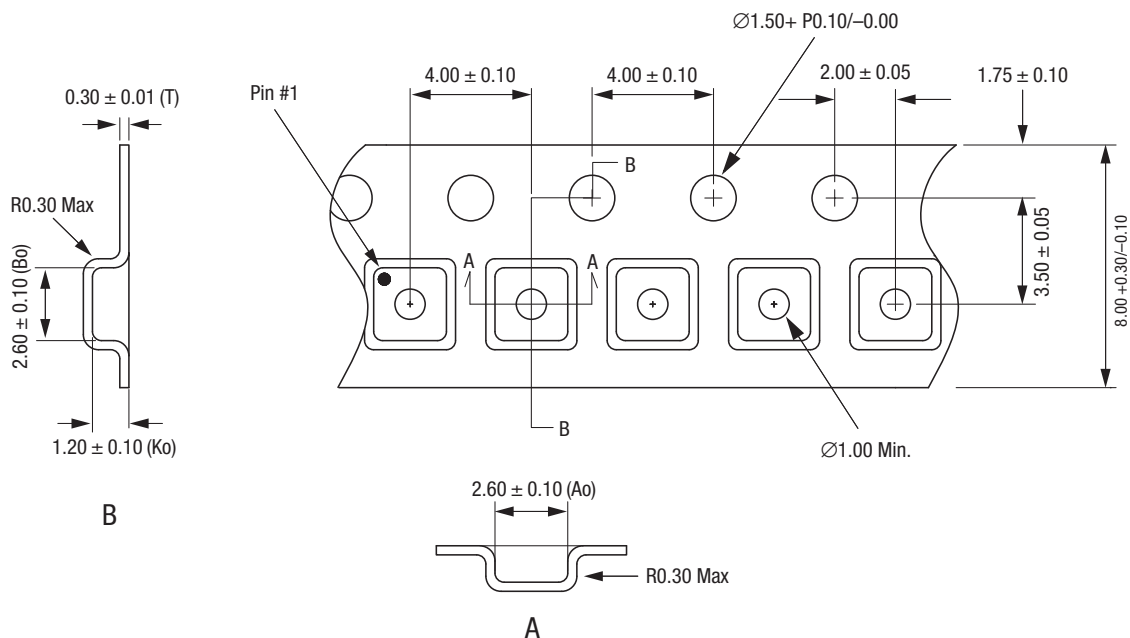
Figure 11. Typical Part Markings (Top View)



All measurements are in millimeters.
 Dimensioning and tolerancing according to ASME Y14.5M-1994.
 Coplanarity applies to the exposed heat sink slug as well as the terminals..
 Plating requirement per source control drawing (SCD) 2504.
 Dimension applies to metalized terminal and is measured between 0.15 mm and 0.30 mm from terminal tip.

S1415

Figure 12. SKY13347-360LF 8-Pin DFN Package Dimensions



Notes:
 1. Carrier tape: black conductive polystyrene.
 2. Cover tape material: transparent conductive HSA.
 3. Cover tape size: 5.40 mm width.
 4. All measurements are in millimeters.

S1480

Figure 13. SKY13347-360LF Tape and Reel Dimensions

Ordering Information

| Model Name | Manufacturing Part Number | Evaluation Kit Part Number |
|----------------------------|---------------------------|----------------------------|
| SKY13347-360LF SPST Switch | SKY13347-360LF | SKY13347-360LF-EVB |

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