

**DATA SHEET**

# SKY59608-711LF: Sky5® 2.4 to 8.3 GHz SPDT Switch

## Applications

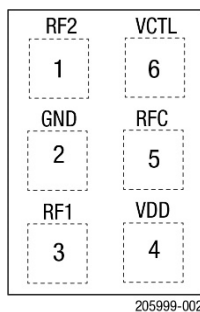
- WiFi 6E T/R switches
- WLAN repeaters
- UWB applications
- Low power transmit/receive systems
- Smartphones
- Connectivity modules

## Features

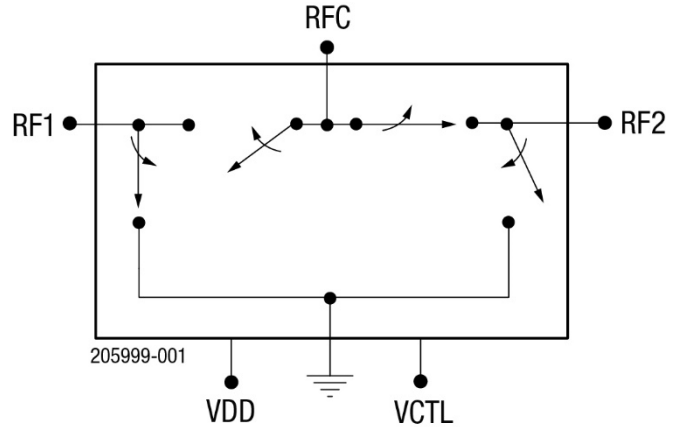
- Broadband frequency range: 2.4 to 8.3 GHz
- Low insertion loss, 0.75 dB typical @ 5 to 7 GHz
- High isolation, 23 dB typical @ 5 to 7 GHz
- Excellent linearity performance, IP0.1dB = +31 dBm
- Single control logic
- 1.1 V and 3.6 V logic compatibility
- Wide 2.7 to 5 V supply voltage range
- 200 nS switching time
- Ultra-miniature, MLPD (6-pin, 1.1 x 0.7 x 0.45 mm) package (MSL1, 260 °C per JEDEC J-STD-020)



Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.



**Figure 2. SKY59608-711LF Pinout (Top View)**



**Figure 1. SKY59608-711LF Block Diagram**

## Description

The SKY59608-711LF is a single-pole, double-throw (SPDT) switch intended for mode switching in WLAN applications. Using advanced switching technologies, the SKY59608-711LF maintains low insertion loss and high isolation for all switching paths. The SKY59608-711LF is part of our Sky5® product portfolio.

The high-linearity performance and low insertion loss achieved by the switch make it an ideal choice for low-power transmit/receive applications. Depending on the logic voltage applied to the control pin (VCTL), the RFC pin is connected to one of the two switched RF outputs (RF1 or RF2) using a low insertion loss path, while the path between the RFC pin and the other RF pin is in a high-isolation state. The switch is a “reflective short” on the isolated port.

The switch is manufactured in a compact, 1.1 x 0.7 x 0.45 mm, 6-pin exposed pad plastic Micro Lead-frame Package Dual (MLPD) 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.

**Table 1. SKY59608-711LF Signal Descriptions**

| Pin | Name | Description | Pin | Name | Description       |
|-----|------|-------------|-----|------|-------------------|
| 1   | RF2  | RF port     | 4   | VDD  | DC supply voltage |
| 2   | GND  | Ground      | 5   | RFC  | RF common port    |
| 3   | RF1  | RF port     | 6   | VCTL | Control pin       |

### Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY59608-711LF are provided in Table 2. The recommended operating conditions are specified in Table 3, and electrical specifications are provided in Table 4.

The state of the SKY59608-711LF is determined by the logic provided in Table 5.

**Table 2. SKY59608-711LF Absolute Maximum Ratings<sup>1</sup>**

| Parameter             | Symbol | Minimum | Maximum | Units |
|-----------------------|--------|---------|---------|-------|
| Input power           | PIN    |         | +32     | dBm   |
| Supply voltage        | VDD    |         | 5.5     | V     |
| Control voltage       | VCTL   |         | 3.7     | V     |
| Storage temperature   | TSTG   | -65     | +150    | °C    |
| Operating temperature | TOP    | -40     | +90     | °C    |

<sup>1</sup> 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.

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**ESD HANDLING:** Industry-standard ESD handling precautions must be adhered to at all times to avoid damage to this device.

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**Table 3. SKY59608-711LF Recommended Operating Conditions**

| Parameter             | Symbol | Minimum | Typical | Maximum | Units |
|-----------------------|--------|---------|---------|---------|-------|
| Operating frequency   | fo     | 2.4     |         | 8.3     | GHz   |
| Supply voltage        | VDD    | 2.7     | 3.3     | 5       | V     |
| Control voltage:      |        |         |         |         |       |
| Low                   | VCTL_L | 0       |         | 0.4     | V     |
| High                  | VCTL_H | 1.1     |         | 3.6     | V     |
| Operating temperature | TOP    |         | +25     |         | °C    |

**Table 4. SKY59608-711LF Electrical Specifications<sup>1</sup>**

(V<sub>DD</sub> = 3.3 V, V<sub>CTL</sub> = 0 V and 1.8 V, T<sub>OP</sub> = +25 °C, P<sub>IN</sub> = 0 dBm, Characteristic Impedance [Z<sub>0</sub>] = 50 Ω, Unless Otherwise Noted)

| Parameter                | Symbol            | Test Condition   | Minimum | Typical | Maximum | Units |
|--------------------------|-------------------|--|---------|---------|---------|-------|
| Insertion loss           | IL                | 2400 to 5000 MHz   |         | 0.5     | 0.85    | dB    |
|                          |                   | 5150 to 5925 MHz   |         | 0.6     | 1       | dB    |
|                          |                   | 5925 to 7125 MHz   |         | 0.75    | 1.2     | dB    |
|                          |                   | 7125 to 8300 MHz   |         | 0.8     | 1.4     | dB    |
| Isolation                | ISO               | 2400 to 5000 MHz   | 25      | 28      |         | dB    |
|                          |                   | 5150 to 5925 MHz   | 22      | 26      |         | dB    |
|                          |                   | 5125 To 7125 MHz   | 19      | 23      |         | dB    |
|                          |                   | 7125 to 8300 MHz   | 17      | 20      |         | dB    |
| Input return loss        | [S11]             | 5150 to 7125 MHz   | 10      | 14      |         | dB    |
| Output return loss       | [S22]             | 5150 to 7125 MHz   | 10      | 14      |         | dB    |
| P0.1dB compression point | P0.1dB            | 5125 to 7125 MHz   |         | +31     |         | dBm   |
| Harmonics                | 2fo               | P <sub>IN</sub> = +24 dBm: AX80-MCS0<br>fo = 5150 to 7125 MHz              |         | -70     | -60     | dBm   |
|                          | 3fo               | P <sub>IN</sub> = +24 dBm: AX80-MCS0<br>fo = 5150 to 7125 MHz              |         | -66     | -55     | dBm   |
| Error vector magnitude   | EVM               | P <sub>in</sub> = 24 dBm, AX80-MCS11,<br>F <sub>0</sub> = 5150 to 7125 MHz |         | -50     |         | dB    |
| IIP3                     | IIP3              | Tone1 = Tone2 = 20 dBm<br>Tone spacing = 10 MHz<br>fo = 5150 to 7125 MHz   | 55      | 63      |         | dBm   |
| Turn on time             | T <sub>on</sub>   | Application of V <sub>DD</sub> to switch ready for use                     |         | 1       | 10      | μs    |
| Switching speed          | T <sub>sw</sub>   | 50% V <sub>CTL</sub> to 90% RF   |         | 120     | 200     | ns    |
| Supply current           | I <sub>DD</sub>   |  |         | 15      | 30      | μA    |
| Control current          | I <sub>CTRL</sub> | V <sub>CTRL</sub> = 1.1 to 2.0 V   |         | 0.3     | 10      | μA    |
|                          |                   | V <sub>CTRL</sub> = 3.3 V <sup>2</sup>                                     |         | 2       | 10      | μA    |

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

<sup>2</sup> A voltage divider (650 kΩ/1 MΩ) is used.

**Table 5. SKY59608-711LF Truth Table<sup>1</sup>**

| VDD (Pin 4) | VCTL (Pin 6) | RFC to RF1 Path | RFC to RF2 Path |
|-------------|--------------|-----------------|-----------------|
| 1           | 0            | Insertion loss  | Isolation       |
| 1           | 1            | Isolation       | Insertion loss  |

<sup>1</sup> "1" indicates V<sub>DD</sub> = 2.7 to 5 V, V<sub>CTL</sub> = 1.1 to 3.6 V. A voltage divider is recommended if V<sub>CTL</sub> is above 2.0 V.

"0" indicates V<sub>CTL</sub> = 0 to 0.4 V.

Any state other than described in this table places the switch into an undefined state. An undefined state will not damage the device.

### Evaluation Board Description

The SKY59608-711LF Evaluation Board is used to test the performance of the SKY59608-711LF SPDT Switch. An Evaluation Board diagram is provided in Figure 3. An assembly drawing for the Evaluation Board is shown in Figure 4.

### Package Dimensions

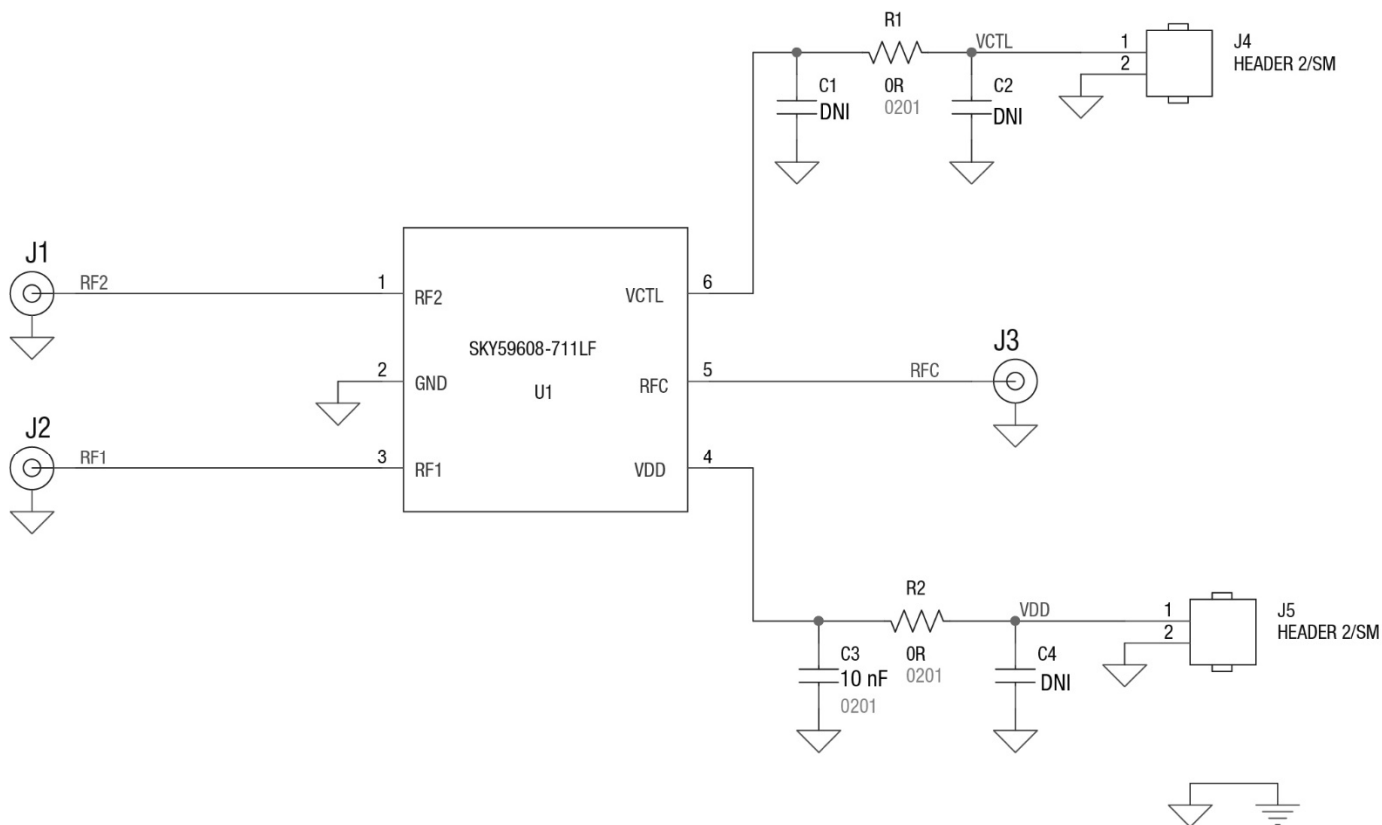
The PCB layout footprint for the SKY59608-711LF is provided in Figure 5. Typical part markings are shown in Figure 6. Package dimensions are shown in Figure 7, and tape and reel dimensions are provided in Figure 8.

### 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 SKY59608-711LF 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.



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Figure 3. SKY59608-711LF Evaluation Board Schematic

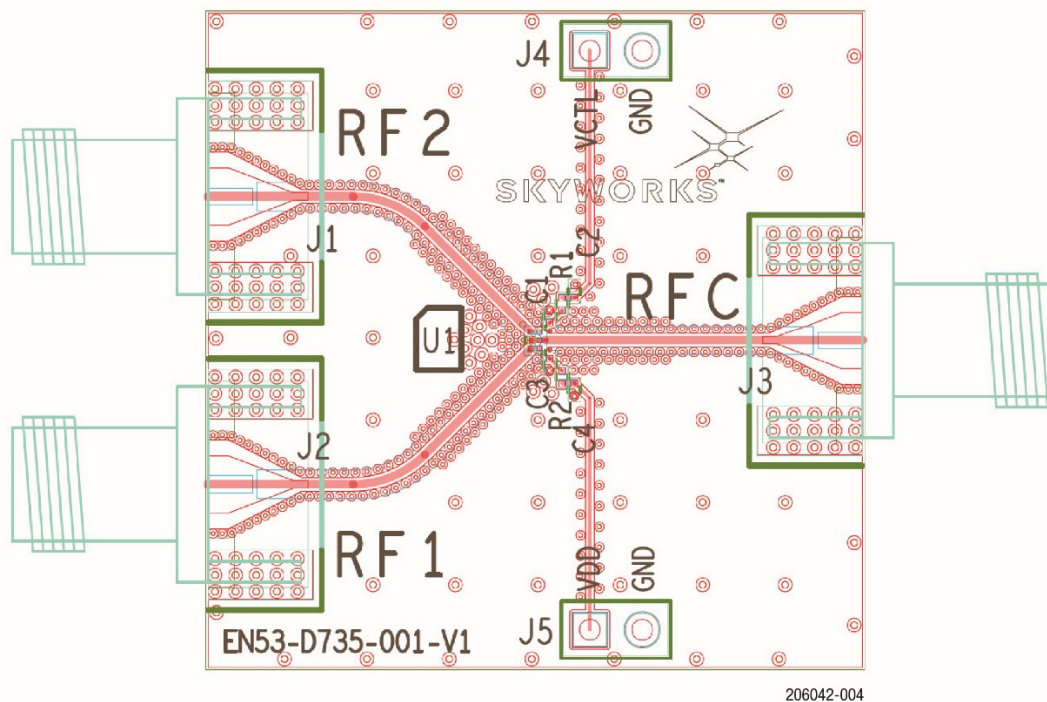
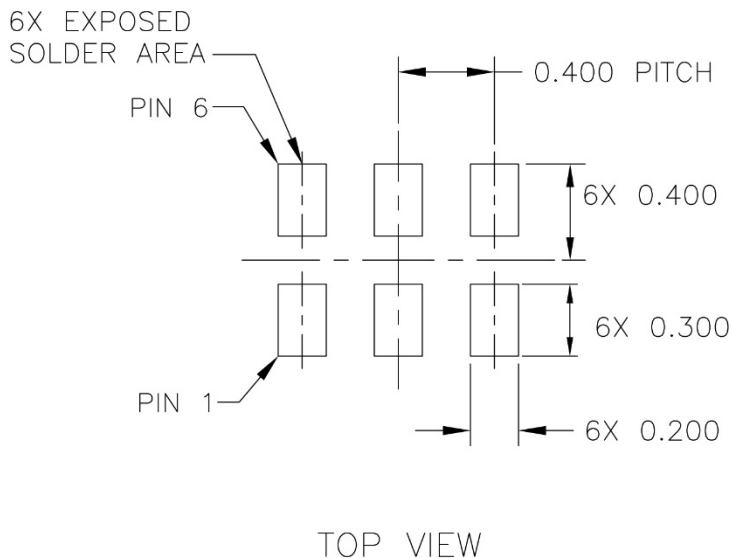


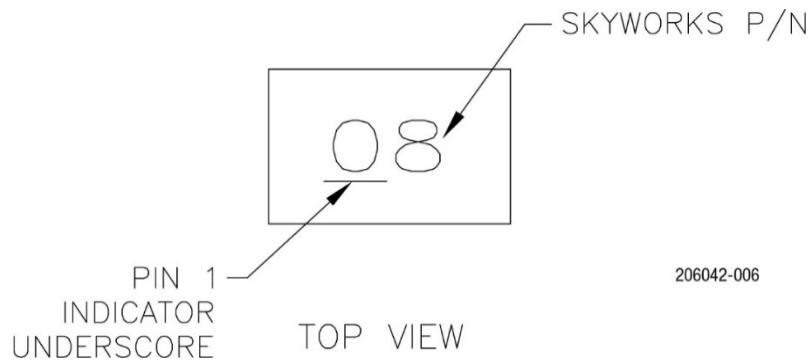
Figure 4. SKY59608-711LF Evaluation Board Assembly Diagram



UNLESS OTHERWISE SPECIFIED  
 DIMENSIONS ARE IN MILLIMETERS  
 TOLERANCES ON FINISH: RMS 63  
 ANGLES: ±1/2° FRACTIONS: ±1/64  
 3 PLACE DECIMALS: ±0.025  
 2 PLACE DECIMALS: ±0.05  
 1 PLACE DECIMALS: ±0.1

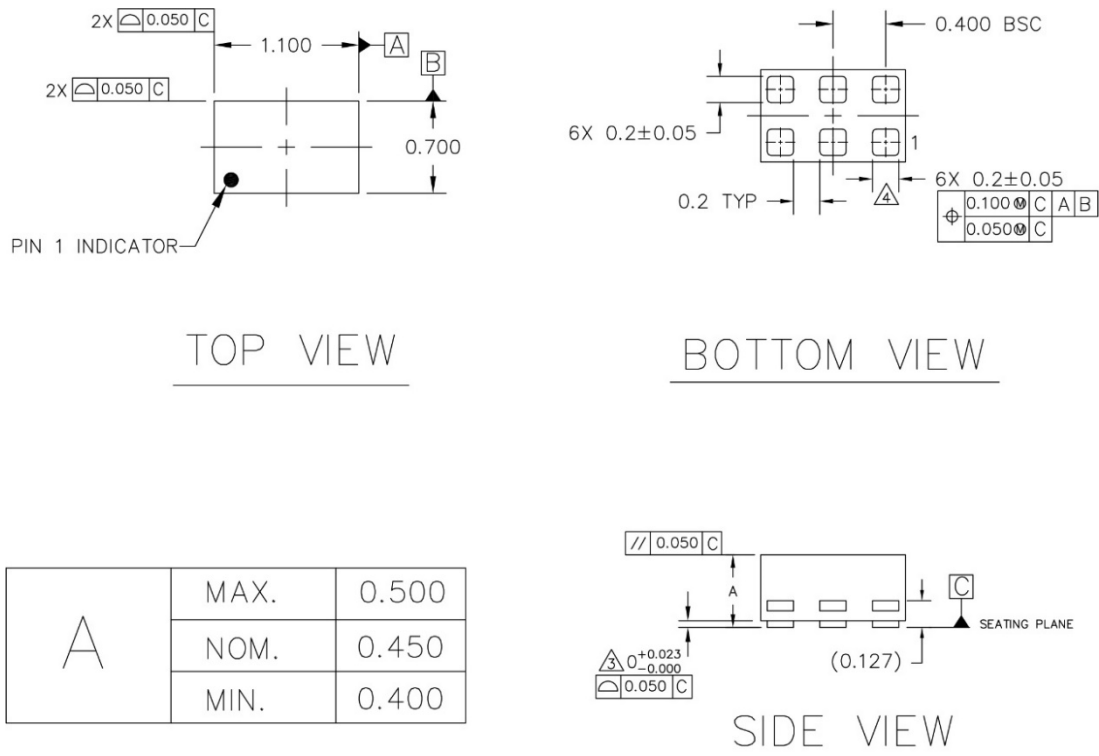
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Figure 5. SKY59608-711LF PCB Layout Footprint (Top View)



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**Figure 6. Typical Part Markings (Top View)**



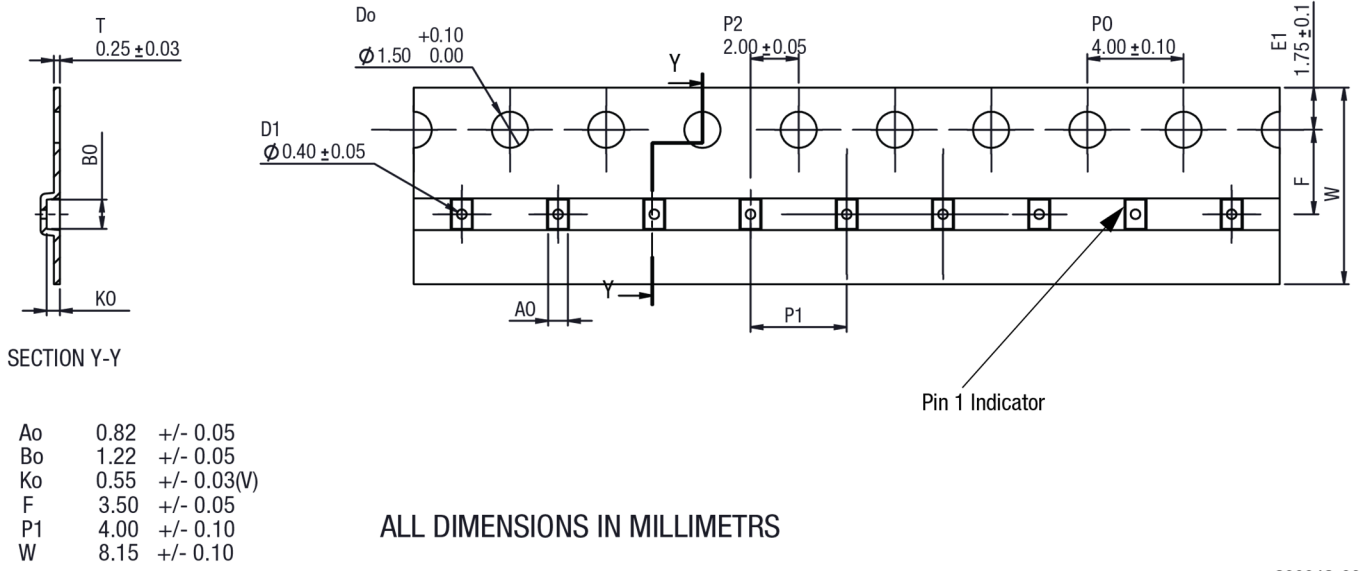
NOTES:

1. PLATING REQUIREMENT PER SOURCE CONTROL DRAWING (SCD) 2504.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. COPLANARITY APPLIES TO THE TERMINALS AND ALL OTHER BOTTOM SURFACE METALLIZATION.
4. DIMENSION APPLIES TO METALLIZED TERMINAL. IF THE TERMINAL HAS A RADIUS ON ITS END, THE WIDTH DIMENSION SHOULD NOT BE MEASURED IN THAT RADIUS AREA.
5. ALL DIMENSIONS ARE IN MILLIMETERS.

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**Figure 7. SKY59608-711LF Package Dimensions**

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**Figure 8. SKY59608-711LF Tape and Reel Dimensions**

## Ordering Information

| Model Name                                 | Manufacturing Part Number | Evaluation Board Part Number |
|--|---------------------------|------------------------------|
| SKY59608-711LF: 2.4 to 8.3 GHz SPDT Switch | SKY59608-711LF            | SKY59608-711EK1              |

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