DATA SHEET

SKY5A2108: Sky5® 2.4 to 8.3 GHz SPDT Switch

Applications

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

Features

- AEC-Q100 Grade 2 qualified (–40 to +105 °C)
- Broadband frequency range: 2.4 to 8.3 GHz
- Low insertion loss, 0.6 dB typical @ 5.9 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)
- For RoHS and other product compliance information, see the Skyworks Certificate of Conformance.

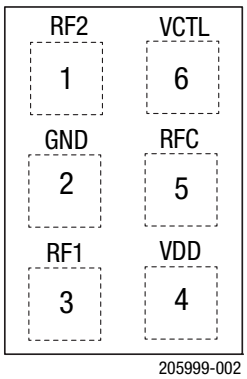


Figure 1. Pinout (Top View)

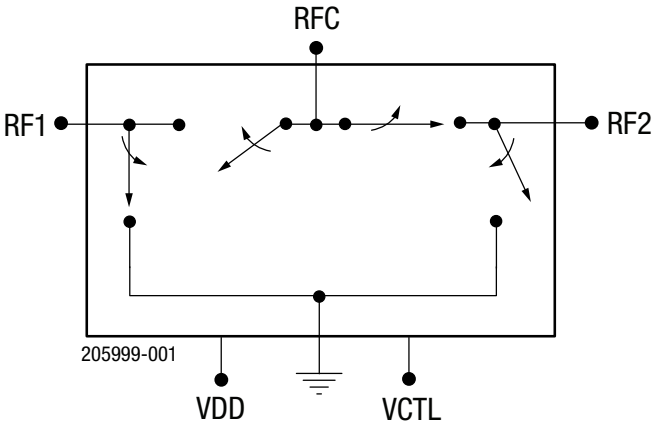


Figure 2. Block Diagram

Description

The SKY5A2108 is a single-pole, double-throw (SPDT) switch intended for mode switching in WLAN applications. Using advanced switching technologies, the SKY5A2108 maintains low insertion loss and high isolation for all switching paths. The SKY5A2108 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. 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 SKY5A2108 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 SKY5A2108 is determined by the logic provided in Table 6.

Table 2. Absolute Maximum Ratings[1]

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	+105	°C
Electrostatic discharge (ESD): Human Body Model	HBM		1500	V

[1] 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.

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

Table 3. 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 High	 V_{CTL_L} V_{CTL_H}	 0 1.1		 0.4 2.0[1]	 V V
Operating temperature	Top		+25		°C

[1]VCTL_H maximum is 2 V. For VCTL_H maximum of 3.6 V, a voltage divider (650 kΩ/1 MΩ) must be used.
See Figure 3, Note 1 for use of VCTL_H maximum of 3.6 V with voltage divider.

Table 4. Electrical Specifications[1]

(VDD = 3.3 V, VCTL = 0 V and 1.8 V, TOP = +25 °C, PIN = 0 dBm, characteristic impedance [ZO] = 50 Ω, unless otherwise noted)						
Parameter	**Symbol**	**Test Condition**	**Minimum**	**Typical**	**Maximum**	**Units**
Insertion loss	IL	2400 to 5000 MHz 5150 to 5925 MHz 5925 to 7125 MHz 7125 to 8300 MHz		0.5 0.6 0.9 0.9	0.85 1 1.2 1.4	dB dB dB dB
Isolation	ISO	2400 to 5000 MHz 5150 to 5925 MHz 5125 To 7125 MHz 7125 to 8300 MHz	25 22 19 17	29 26 23 20		dB dB dB dB
Input return loss	[S11]	2400 to 5000 MHz 5150 to 5925 MHz 5925 to 7125 MHz 7125 to 8300 MHz	15 12 8 8	23 18 12 13		dB dB dB dB
Output return loss	[S22]	2400 to 5000 MHz 5150 to 5925 MHz 5925 to 7125 MHz 7125 to 8300 MHz	15 12 8 8	25 15 10 11		dB dB dB dB
P0.1dB compression point	P0.1dB	5125 to 7125 MHz		31		dBm
Harmonics	2fo	P_{IN} = +24 dBm CW fo = 5150 to 7125 MHz		–59	–52	dBm
	3fo	P_{IN} = +24 dBm CW fo = 5150 to 7125 MHz		–66	–55	dBm
Error vector magnitude	EVM	Pin = 24 dBm, AX80-MCS11, F0 = 5150 to 7125 MHz		–50		dB
IIP3	IIP3	Tone1 = Tone2 = 20 dBm Tone spacing = 10 MHz fo = 5150 to 7125 MHz	55	63		dBm
Group delay	GD	2400 to 8300 MHz	3	17	35	ps
Turn on time	Ton	Application of VDD to switch ready for use		1	10	µs
Switching speed	Tsw	50% V_{CTL} to 90% RF		120	200	ns
Supply current	Idd			15	27	µA
Control current	Ictrl	VCTRL = 1.1 to 2.0 V VCTRL = 3.3 V[2]		0.3 2	10 10	µA

[1] Performance is guaranteed only under the conditions listed in this table.
[2] A voltage divider (650 kΩ/1 MΩ) is used.

Table 5. Electrical Specifications[1]

(VDD = 3.3 V, VCTL = 0 V and 1.8 V, TOP = -40 °C, PIN = 0 dBm, characteristic impedance [ZO] = 50 Ω, unless otherwise noted)						
Parameter	**Symbol**	**Test Condition**	**Minimum**	**Typical**	**Maximum**	**Units**
Insertion loss	IL	2400 to 5000 MHz 5150 to 5925 MHz 5925 to 7125 MHz 7125 to 8300 MHz		0.5 0.6 0.75 0.8	0.85 1 1.3 1.4	dB dB dB dB
Isolation	ISO	2400 to 5000 MHz 5150 to 5925 MHz 5125 To 7125 MHz 7125 to 8300 MHz	25 22 19 17	28 26 23 20		dB dB dB dB
Input return loss	[S11]	2400 to 5000 MHz 5150 to 5925 MHz 5925 to 7125 MHz 7125 to 8300 MHz	15 12 8 8	23 19 12 13		dB dB dB dB
Output return loss	[S22]	2400 to 5000 MHz 5150 to 5925 MHz 5925 to 7125 MHz 7125 to 8300 MHz	15 12 8 8	25 16 10 11		dB dB dB dB
P0.1dB compression point	P0.1dB	5125 to 7125 MHz		31		dBm
Harmonics	2fo	PIN = +24 dBm CW fo = 5150 to 7125 MHz		–58	–52	dBm
	3fo	PIN = +24 dBm CW fo = 5150 to 7125 MHz		–66	–55	dBm
Error vector magnitude	EVM	Pin = 24 dBm, AX80-MCS11, F0 = 5150 to 7125 MHz		–50		dB
IIP3	IIP3	Tone1 = Tone2 = 20 dBm Tone spacing = 10 MHz fo = 5150 to 7125 MHz	55	65		dBm
Group delay	GD	2400 to 8300 MHz	3	17	35	ps
Turn on time	Ton	Application of VDD to switch ready for use		1	10	µs
Switching speed	TSW	50% V_{CTL} to 90% RF		120	200	ns
Supply current	Idd			15	25	µA
Control current	Ictrl	VCTRL = 1.1 to 2.0 V VCTRL = 3.3 V[2]		0.3 2	10 10	µA

[1] Performance is guaranteed only under the conditions listed in this table.
[2] A voltage divider (650 kΩ/1 MΩ) is used.

Table 6. Electrical Specifications[1]

(VDD = 3.3 V, VCTL = 0 V and 1.8 V, TOP = +105 °C, PIN = 0 dBm, characteristic impedance [ZO] = 50 Ω, unless otherwise noted)						
Parameter	**Symbol**	**Test Condition**	**Minimum**	**Typical**	**Maximum**	**Units**
Insertion loss	IL	2400 to 5000 MHz 5150 to 5925 MHz 5925 to 7125 MHz 7125 to 8300 MHz		0.6 0.8 1.1 1.1	0.85 1 1.4 1.6	dB dB dB dB
Isolation	ISO	2400 to 5000 MHz 5150 to 5925 MHz 5125 To 7125 MHz 7125 to 8300 MHz	25 22 19 17	28 26 23 20		dB dB dB dB
Input return loss	[S11]	2400 to 5000 MHz 5150 to 5925 MHz 5925 to 7125 MHz 7125 to 8300 MHz	14 12 8 8	22 17 13 13		dB dB dB dB
Output return loss	[S22]	2400 to 5000 MHz 5150 to 5925 MHz 5925 to 7125 MHz 7125 to 8300 MHz	14 11 8 8	24 15 10 10		dB dB dB dB
P0.1dB compression point	P0.1dB	5125 to 7125 MHz		31		dBm
Harmonics	2fo	PIN = +24 dBm CW fo = 5150 to 7125 MHz		–55	–52	dBm
	3fo	PIN = +24 dBm CW fo = 5150 to 7125 MHz		–66	–55	dBm
Error vector magnitude	EVM	Pin = 24 dBm, AX80-MCS11, F0 = 5150 to 7125 MHz		–50		dB
IIP3	IIP3	Tone1 = Tone2 = 20 dBm Tone spacing = 10 MHz fo = 5150 to 7125 MHz	55	63		dBm
Group delay	GD	2400 to 8300 MHz	3	17	35	ps
Turn on time	Ton	Application of VDD to switch ready for use		1	10	µs
Switching speed	Tsw	50% V_{CTL} to 90% RF		120	200	ns
Supply current	Idd			15	30	µA
Control current	Ictrl	VCTRL = 1.1 to 2.0 V VCTRL = 3.3 V[2]		0.3 2	10 10	µA

[1] Performance is guaranteed only under the conditions listed in this table.
[2] A voltage divider (650 kΩ/1 MΩ) is used.

Table 7. Truth Table[1]

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

[1] "1" indicates VDD = 2.7 to 5 V, VCTL = 1.1 to 3.6 V. A voltage divider is recommended if VCTL is above 2.0 V, see Note 1 in Figure 3.
"0" indicates VCTL = 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

An Evaluation Board is used to test the performance of the SKY5A2108 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 SKY5A2108 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 SKY5A2108 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.

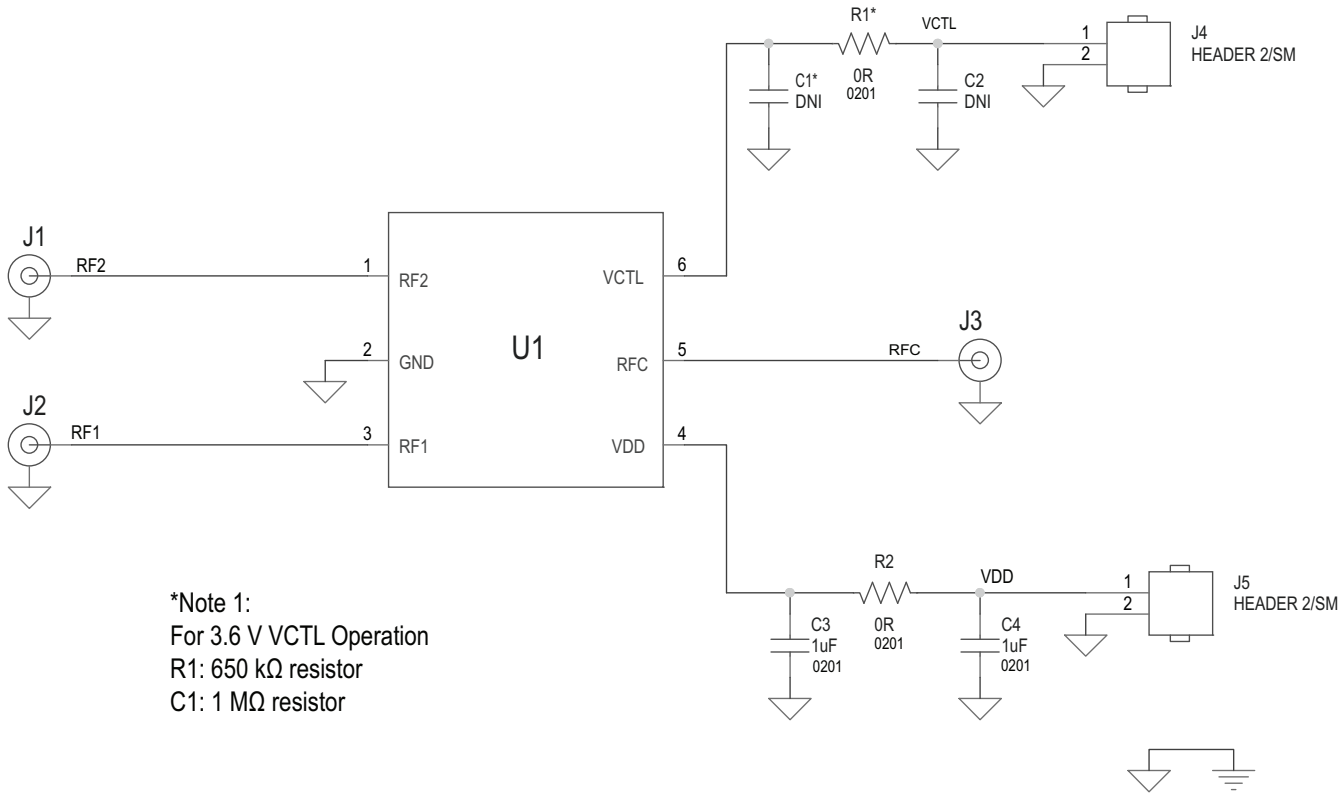


Figure 3. Evaluation Board Schematic

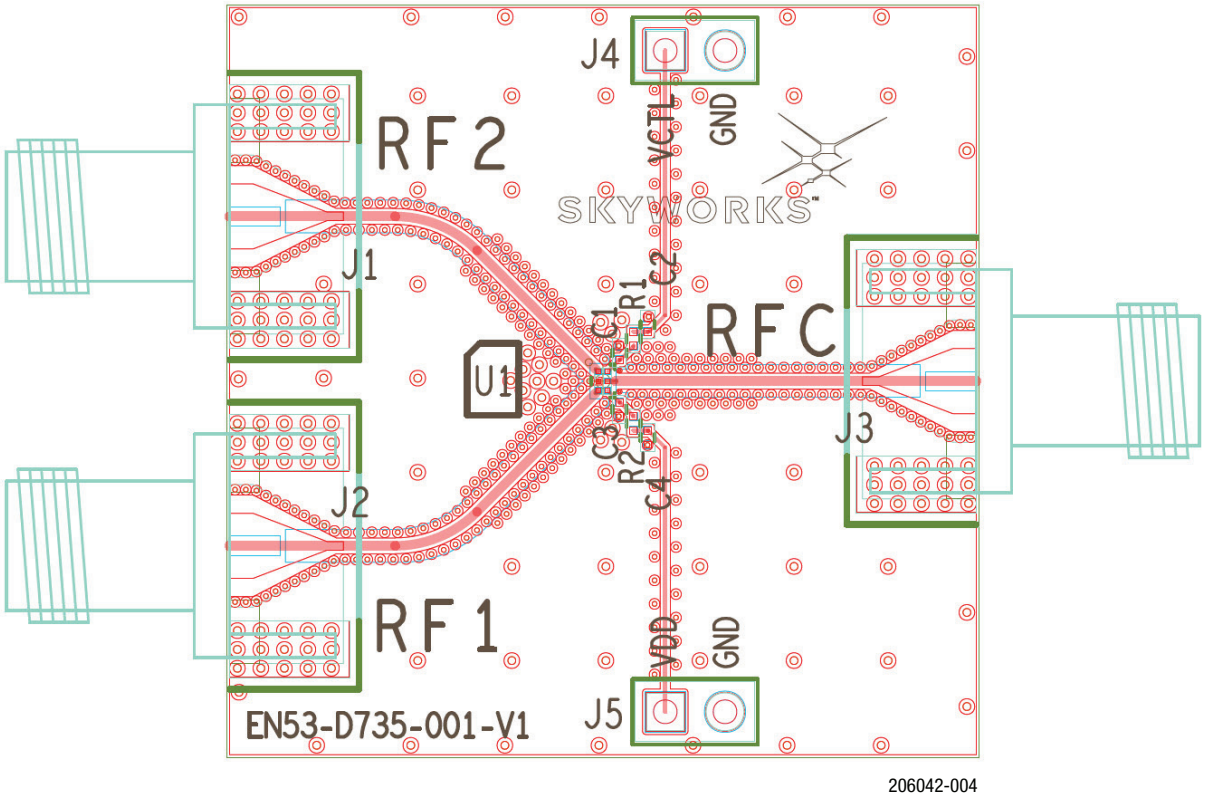


Figure 4. Evaluation Board Assembly Diagram

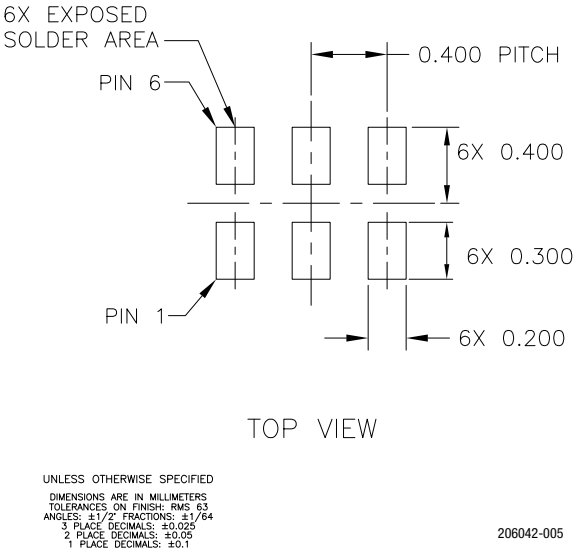


Figure 5. PCB Layout Footprint (Top View)

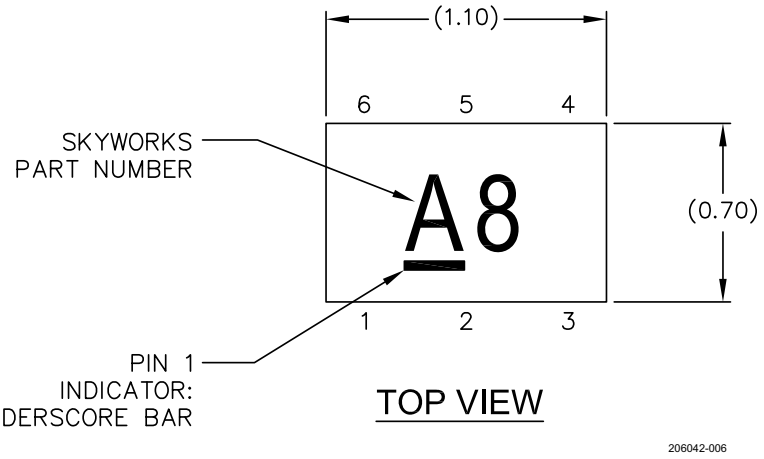
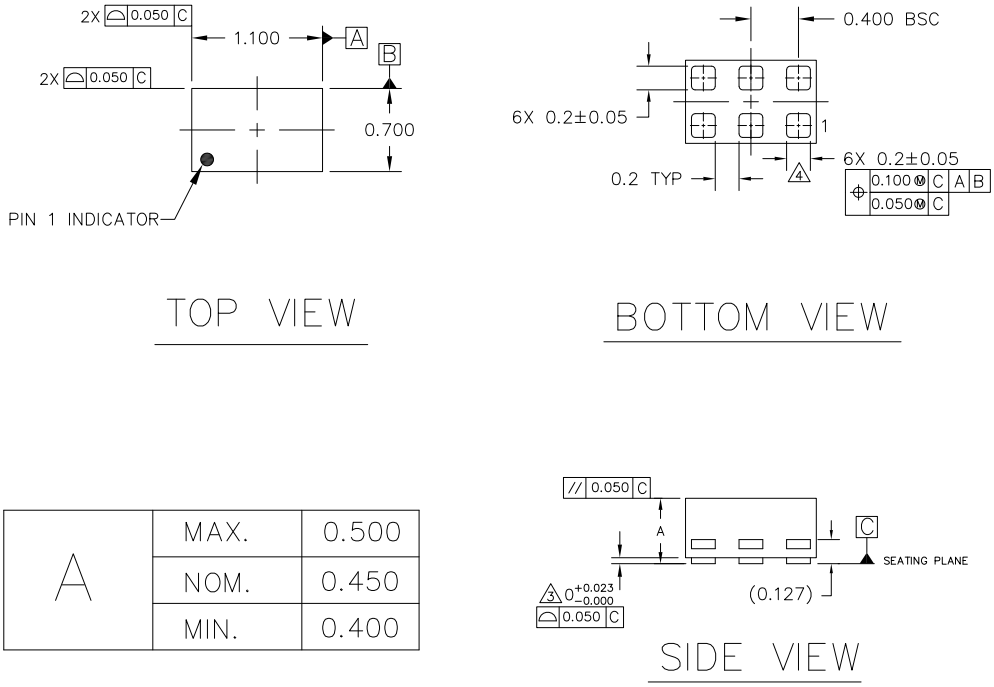


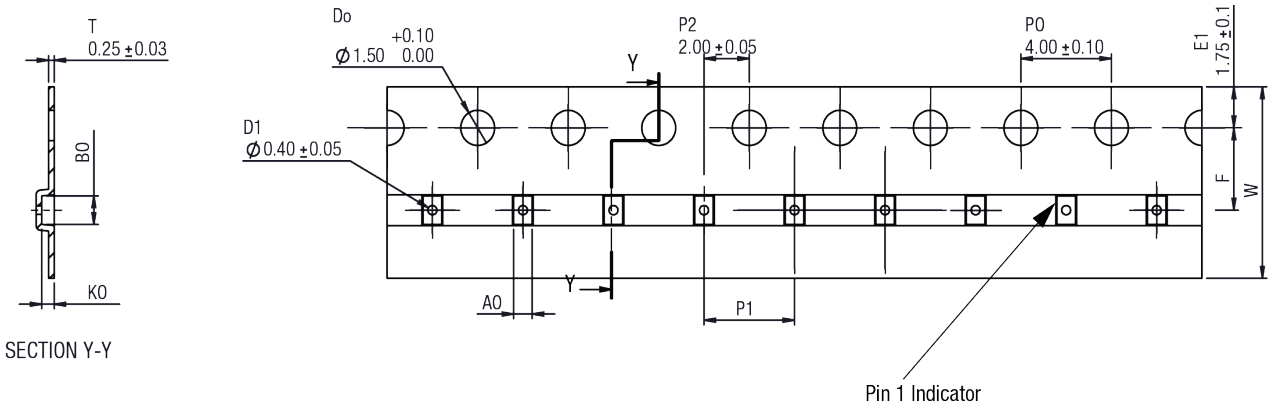
Figure 6. Typical Part Marking



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.

Figure 7. Package Dimensions



Ao	0.82	+/- 0.05
Bo	1.22	+/- 0.05
Ko	0.55	+/- 0.03(V)
F	3.50	+/- 0.05
P1	4.00	+/- 0.10
W	8.15	+/- 0.10

ALL DIMENSIONS IN MILLIMETRS

Figure 8. Tape and Reel Dimensions

Ordering Information

Part Number	Part Description	Evaluation Board Part Number
SKY5A2108	Sky5® 2.4 to 8.3 GHz SPDT Switch	SKY5A2108EK1