

PRELIMINARY DATA SHEET

SKY13268-344: GaAs SPDT Switch

300 kHz–3 GHz

Medium Power

Applications

- Transceiver transmit-receive switching in GSM, CDMA, WCDMA, WLAN, Bluetooth®, Zigbee®, land mobile radio base stations or terminal equipment
- General purpose medium power switch in telecommunications applications

Features

- Broadband: 300 kHz - 3 GHz
- Low insertion loss: 0.3 dB @ 900 MHz
- $P_{1\text{ dB}}$: +30 dBm typical @ 3 V
- Low distortion: IP3 +43 dBm @ 3 V
- Low current consumption: < 100 A @ 3 V
- Ultraminiature SOT-666 6 lead package

Description

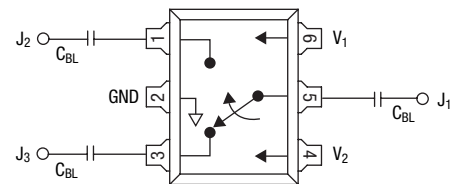
The SKY13268-344 is a monolithic SPDT switch fabricated using Skyworks Solutions' proprietary GaAs pHEMTs as the switching elements. This wideband switch operates with RF signals from 300 kHz to 3 GHz. The RF signal paths within the SKY13268-344 are fully bilateral. Ports J_2 and J_3 , RF input/output terminals are reflective.

Switching is controlled via two control voltage inputs, which are compatible with CMOS logic levels. Depending upon the logic voltage level applied to the

control voltage pin, the Common RF pin, J_1 , is connected to one of two switched RF pins (J_2 or J_3) via a low insertion loss path, while the path between the RF common and the other RF pin is in its high isolation state.

DC power consumption is very low, 100 μ A maximum with control voltage of 3 V. The switch can operate over the temperature range of -40 °C to 85 °C.

An evaluation board is available upon request.



DC blocking capacitors (C_{BL}) must be supplied externally for positive voltage operation. $C_{BL} = 100$ pF for operation >500 MHz.

Figure 1. Function Block Diagram

Table 1. Electrical Specifications ($V_{CTL} = 0\text{ V/3 V}$, $T = 25^\circ\text{ C}$, $P_{INPUT} = 0\text{ dBm}$, $Z_0 = 50\ \Omega$, unless otherwise noted)

Parameter	Frequency ⁽²⁾	Min.	Typ.	Max.	Unit
Insertion loss	300 kHz–1.0 GHz		0.3	0.4	dB
	1.0–2.0 GHz		0.4	0.5	dB
	2.0–3.0 GHz		0.4	0.6	dB
Isolation	300 kHz–1.0 GHz	20	25		dB
	1.0–2.0 GHz	20	25		dB
	2.0–3.0 GHz	20	23		dB
VSWR	300 kHz–1.0 GHz		1.3:1	1.4:1	
	1.0–2.0 GHz		1.3:1	1.4:1	
	2.0–3.0 GHz		1.3:1	1.4:1	

Table 2. Operating Characteristics ($V_{CTL} = 0\text{ V/3 V}$, $T = 25^\circ\text{ C}$, $P_{INPUT} = 0\text{ dBm}$, $Z_0 = 50\ \Omega$, unless otherwise noted)

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching characteristics						
Rise, fall	10/90% or 90/10% RF			36		ns
On, off	50% CTL to 90/10% RF			58		ns
Video feedthru	Pulse rise time = 1 ns, Measurement BW = 500 MHz			25		mV
Input power for 1 dB compression	$V_{LOW} = 0\text{ V}$, $V_{HIGH} = 3\text{ V}$	0.5–3.0 GHz		+30		dBm
	$V_{LOW} = 0\text{ V}$, $V_{HIGH} = 5\text{ V}$	0.5–3.0 GHz		+34		dBm
Intermodulation intercept point (IP3)	For two-tone input power +5 dBm					
	$V_{LOW} = 0\text{ V}$, $V_{HIGH} = 3\text{ V}$ $V_{LOW} = 0\text{ V}$, $V_{HIGH} = 5\text{ V}$	0.5–3.0 GHz 0.5–3.0 GHz		+43 +50		dBm dBm
Thermal resistance				25		°C/W
Control voltages	$V_{LOW} = 0\text{ @ }20\ \mu\text{A max.}$ $V_{HIGH} = +3\text{ V @ }100\ \mu\text{A max. to }+5\text{ V @ }200\ \mu\text{A max.}$					

Table 3. Absolute Maximum Ratings

Characteristic	Value
Control voltage range	$-0.2 \leq V_C \leq 8\text{ V}$
RF input power	6 W for $f > 500\text{ MHz}$, $V_{CTL} = 0/7\text{ V}$
Storage temperature range	$-65^\circ\text{ C to }+150^\circ\text{ C}$
Operating temperature range	$-40^\circ\text{ C to }+85^\circ\text{ C}$

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, 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 must be employed at all times.

Typical Performance Data (0, +3 V)

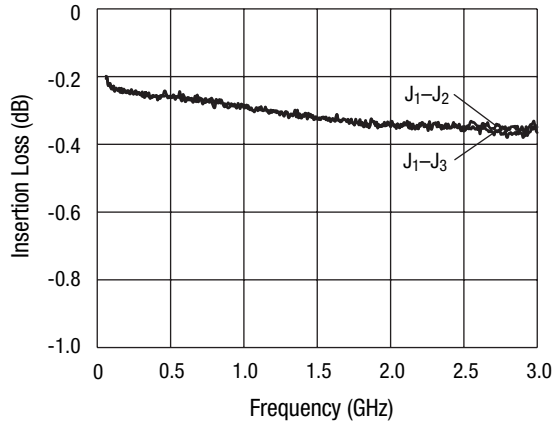


Figure 2. Insertion Loss vs. Frequency

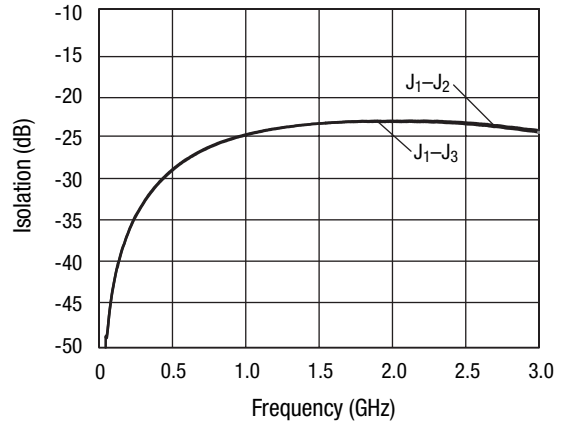


Figure 3. Isolation vs. Frequency

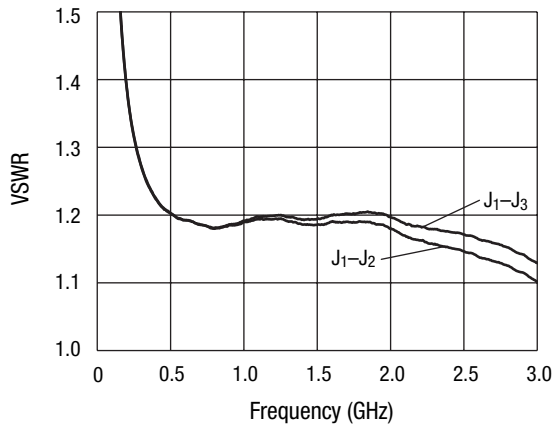
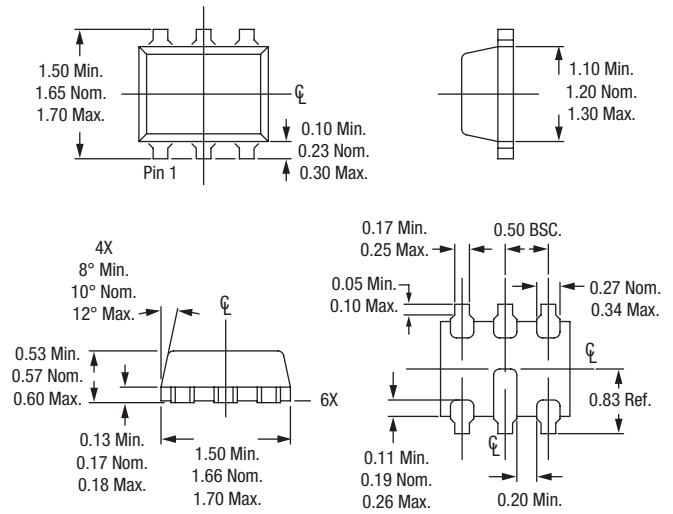


Figure 4. VSWR vs. Frequency



All dimensions are in mm.

Figure 5. SOT-666 Package Outline

Table 4. Truth Table¹

V ₁	V ₂	J ₁ -J ₂	J ₁ -J ₃
V _{HIGH}	0	Isolation	Insertion loss
0	V _{HIGH}	Insertion loss	Isolation
0	0	Not allowed	Not allowed
V _{HIGH}	V _{HIGH}	Not allowed	Not allowed

3 V ≤ V_{HIGH} ≤ 5 V.

Table 5. Pin Descriptions

Pin Number	Pin Name	Description
1	J ₂	RF input/output – RF input or output port which is either connected via a low insertion loss path to RF Common (J ₁) or isolated from RF common, according to the logic levels applied to V ₁ and V ₂
2	GND	Equipotential point – Equipotential point for control voltage and RF circuits. Must be connected to PCB ground via lowest possible impedance
3	J ₃	RF input/output – RF input or output port which is either connected via a low insertion loss path to RF Common (J ₁) or isolated from RF Common, according to the logic levels applied to V ₁ and V ₂
4	V ₂	Control voltage – Control voltage input #2
5	J ₁	RF common input/output – RF input/output port that is connected via low insertion loss path to either RF1 or RF2, depending upon the voltage applied to control voltage pin
6	V ₁	Control voltage – Control voltage input #1

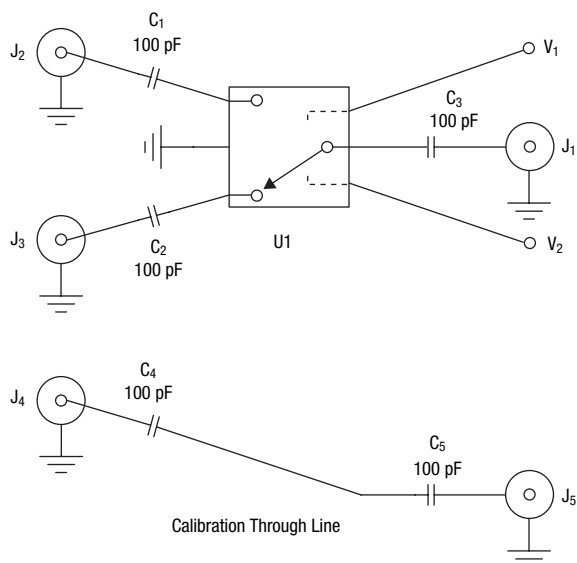
Evaluation Board

The evaluation board for SKY13268-344 allows the part to be fully exercised. The insertion loss of the transmission lines between J₁- U1 and U1 - J₂/J₃ can be determined by measuring the performance of the calibration through line, which contains two DC block capacitors in identical positions to the of the DC blocks present in the main circuit.

The state of the SKY13268-344 is controlled by applying the appropriate logic level voltages to ports V₁ and V₂, per Table 4.

Table 6. Evaluation Board Components

Component	Description	Default
C ₁ -C ₅	DC blocking capacitor	100 pF, size 0402
U1	SKY13268-344 GaAs SPDT	
J ₁ , J ₂ , J ₃ , J ₄ , J ₅	SMA connectors	

**Figure 6. SKY13268-344 Evaluation Circuit**