

## Applications

- Tx/Rx and diversity
  - WLAN/Bluetooth®
  - Energy management
  - RFID
  - UHF/VHF: public safety bands
- WCDMA handsets and data cards
- 3G/4G wireless networks
- LNB/DBS matrix
- Microwave applications up to 8 GHz

## Features

- Low-insertion loss
- High isolation
- High linearity and low distortion
- High-power handling
- Broad frequency range: 20 MHz to 8 GHz
- Low bias and control-voltage



## General Purpose RF Switches

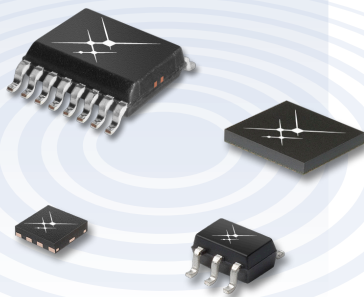
Select RF switches available from stock for prototype or high-volume production

Skyworks Solutions offers a select group of radio frequency (RF) switches from our diverse switch offering that are in stock and ready for immediate design into various markets including handsets, infrastructure, and automotive, CATV / Satcom, smart energy, medical, military, RFID, test and measurement, and WLAN / WiMAX / WiFi.

Our select switches portfolio includes the most popular, broad-market GaAs SPST, SPDT, SP3T, SP4T and DPDT products readily available to ship from stock. These devices provide excellent performance and value while utilizing Skyworks' proven technology for high reliability. The select switches are used in a wide variety of systems, including cellular telephone handsets and base stations, WLAN front-end modules, RF/microwave test instruments, satellite TV receivers and more. All pHEMT switches are broadband by design and require DC blocking capacitors for positive voltage operation. Select switches have been fully characterized for low-frequency applications, covering the UHF and VHF ranges.

Performance characteristics include broadband operation (VHF to 8 GHz), high-power handling, high isolation, low-insertion loss, and reflective or absorptive ports when they are placed into their high-isolation states. Our lead (Pb)-free, RoHS-compliant and Green™ products are fabricated in our high volume GaAs pHEMT facility. All switches are packaged in industry-standard, plastic surface-mount packages and leverage Skyworks' extensive design knowledge, technical leadership, manufacturing expertise and superior quality.

An application engineering team is available to assist you and with your design efforts. Application notes and block diagrams are accessible on Skyworks' Web site: [www.skyworksinc.com](http://www.skyworksinc.com).



### Innovation to Go™

Select products and sample/designer kits available for purchase online.

[www.skyworksinc.com](http://www.skyworksinc.com)



## Tx/Rx WLAN/Bluetooth® (802.11a,b,g,n)

| Description | Insertion Loss (dB) | Isolation (dB) | Input IP3 (dBm) | Input P <sub>1dB</sub> (dBm) | Package (mm)       | Part Number                                                                                        |
|-------------|---------------------|----------------|-----------------|------------------------------|--------------------|----------------------------------------------------------------------------------------------------|
| SPDT (R)    | 0.40                | 23             | 43              | 30                           | SC-88 6L 2.1 x 2.0 |  AS179-92LF     |
| SPDT (R)    | 0.35                | 24             | 50              | 30 (0.5 dB)                  | MLPD 6L 1 x 1      |  SKY13351-378LF |
| SPDT (R)    | 0.55                | 17             | 56              | 37                           | SOT 6L 2.8 x 2.9   | AS193-73LF                                                                                         |
| SP3T (R)    | 0.60                | 25             | 50              | 29                           | QFN 8L 1.5 x 1.5   |  SKY13317-373LF |
| SP4T (R)    | 0.60                | 26             | 51              | 30                           | MLPD 10L 2 x 3     |  SKY13322-375LF |
| DPDT (R)    | 0.95                | 22             | 60              | 34                           | QFN 6L 1.5 x 1.5   |  SKY13318-321LF |

## Smart Energy, Broadband, Cellular Infrastructure, Test & Measurement, Military (COTS)

| Description | Frequency (GHz) | Insertion Loss (dB) | Isolation (dB) | Input IP3 (dBm) | Input P <sub>1dB</sub> (dBm) | Package (mm)       | Part Number                                                                                        |
|-------------|-----------------|---------------------|----------------|-----------------|------------------------------|--------------------|----------------------------------------------------------------------------------------------------|
| SPDT (R)    | 0.0003–2.5      | 0.3–0.4             | 25–24          | 48              | 30                           | SOT 6L 2.8 x 2.9   | AS169-73LF                                                                                         |
| SPDT (R)    | 0.1–2.5         | 0.3–0.55            | 30–17          | 56              | 37 (0.1 dB)                  | SC-88 6L 2.1 x 2.0 | SKY13270-92LF                                                                                      |
| SPDT (A)    | 0.1–6.0         | 0.8–1.5             | 62–42          | 46              | 30                           | QFN 16L 4 x 4      |  SKY13286-359LF |
| SPDT (R)    | 3.0–8.0         | 0.7–0.9             | 25–22          | 47              | 26                           | QFN 8L 2 x 2       |  SKY13298-360LF |
| SP3T (A)    | 0.5–2.5         | 0.9–1.2             | 62–55          | 43              | 30                           | QFN 20L 5 x 5      | SKY13277-355LF                                                                                     |
| SP4T (A)    | 0.5–3.0         | 0.4–0.9             | 45–25          | 40              | 26                           | SSOP 16L 6 x 4.9   | AS204-80LF                                                                                         |

## DBS/LNB 4 x 2 Matrix Switch

| Description | Frequency (GHz) | Insertion Loss (dB) | Isolation (dB) | Input P <sub>1dB</sub> (dBm) | Package (mm)  | Part Number    |
|-------------|-----------------|---------------------|----------------|------------------------------|---------------|----------------|
| LNB/DBS (A) | 0.25–2.15       | 7.5–8.5             | 40–31          | 15                           | QFN 20L 4 x 4 | SKY13272-340LF |

## UHF/VHF

| Description | Insertion Loss<br>f = 48 MHz (dB) | Isolation<br>f = 48 MHz (dB) | Input P <sub>1dB</sub><br>f = 48 MHz (dBm) | Insertion Loss<br>f = 1 GHz (dB) | Isolation<br>f = 1 GHz (dB) | Input P <sub>1dB</sub><br>f = 1 GHz (dBm) | Package (mm)       | Part Number                                                                                          |
|-------------|-----------------------------------|------------------------------|--------------------------------------------|----------------------------------|-----------------------------|-------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------|
| SPDT (R)    | 0.15                              | 56                           | 29                                         | 0.3                              | 25                          | 34                                        | SC-88 6L 2.1 x 2.0 |  AS179-92LF     |
| SPDT (R)    | 0.2                               | 55                           | 28                                         | 0.35                             | 24                          | 30 (0.5 dB)                               | MLPD 6L 1 x 1      |  SKY13351-378LF |
| SPDT (R)    | 0.3                               | 47                           | 33                                         | 0.45                             | 24                          | 37 (0.1 dB)                               | SC-88 6L 2.1 x 2.0 | SKY13270-92LF                                                                                        |
| SPDT (R)    | 0.3                               | 42                           | 38.5 (0.1 dB)                              | 0.4                              | 29                          | 38.5 (0.1 dB)                             | QFN 12L 3 x 3      | SKY13299-321LF                                                                                       |
| SPDT (R)    | 0.3                               | 44                           | 39.8 (0.8 dB)                              | 0.45                             | 23                          | 40.5 (0.1 dB)                             | MLPD 6L 2 x 3      |  SKY13290-313LF |
| SP3T (R)    | 0.3                               | 49                           | 26                                         | 0.45                             | 27                          | 29                                        | QFN 6L 1.5 x 1.5   |  SKY13317-373LF |
| SP4T (R)    | 0.3                               | 49                           | 26                                         | 0.6                              | 28                          | 30                                        | MLPD 10L 2 x 3     |  SKY13322-375LF |
| SP4T (R)    | 0.3                               | 54                           | 41                                         | 0.45                             | 24                          | 38 (0.1 dB)                               | QFN 16L 3 x 3      |  SKY14151-350LF |

SPDT = Single pole double throw  
 SP3T = Single pole three throw  
 SP4T = Single pole four throw  
 DPDT = Double pole double throw  
 R = Reflective  
 A = Absorptive (terminated)

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

## RF Switch Fundamentals

A switching field effect transistor (FET) functions as a three port device, where the source and drain ports form a conduction path or channel for the RF signal and the gate port controls whether the channel is opened or closed. A DC control voltage applied to the gate is required to create this function. Most switching FETs use a depletion mode configuration, which means that the channel is normally in its low resistance state with no voltage applied and in its high resistance state when a negative voltage is applied to the gate with respect to the drain and source. For positive control voltage operation, RF ground connections must be floated by inserting a DC block between the FET and ground. Also, DC blocks are required on the RF ports (see Figure 1).

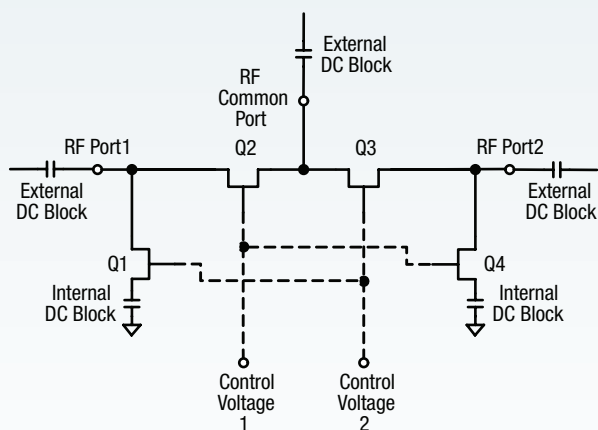


Figure 1. Typical SP2T with Series-Shunt Configuration

A complete switch can be fabricated by arranging FETs in various configurations depending upon the performance requirements of the end application. Figure 1 shows a typical single pole two-throw (SP2T) switch comprised of series and shunt FETs. In the isolation state, the shunt FET (e.g., Q1) is biased to produce a very low resistance, thus its input impedance is a reflective short. The series FET (e.g., Q2) in the same arm is biased to produce a very high resistance. In the low insertion loss state, the converse is true: the shunt FET is biased to produce a very large resistance, while its series FET is biased to produce very low resistance. Please refer to the “Published Articles” section available on Skyworks’ Web site ([www.skyworksinc.com/Press\\_Published\\_Articles.aspx](http://www.skyworksinc.com/Press_Published_Articles.aspx)) for more information about FET switch topologies and properties:

- Ultra-Miniature High Linearity SPDT Switch for WLAN Applications
- Top Considerations When Buying or Specifying an RF Switch
- RF/Microwave Solid State Switches: Part 1
- Solid State RF/Microwave Switch Technology: Part 2

Skyworks also offers switches with a  $50\ \Omega$  absorptive termination connected between the shunt FET(s) and AC ground. In Table 1, Skyworks switches are designated with “R” for reflective and “A” for absorptive.

Figure 2 illustrates the error vector magnitude (EVM) performance of low, medium, and high power switches. EVM is a typical specification to measure the amplitude and phase distortion with modulated signals such as WLAN 802.11a,b,g,n with a 10 dB peak to average ratio.

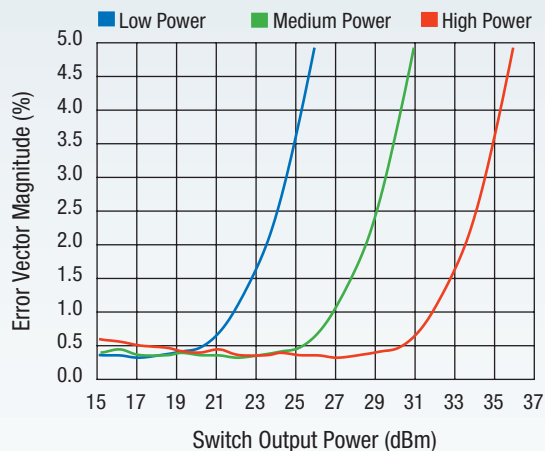


Figure 2. Error Vector Magnitude of Typical Low, Medium, and High Power Switches

## Transmit-Receive Switch

A SPDT switch can be used as a transmit-receive (Tx/Rx) switch, to alternately connect a transmitter and a receiver to a common single antenna in a single duplex system, as shown in Figure 3.

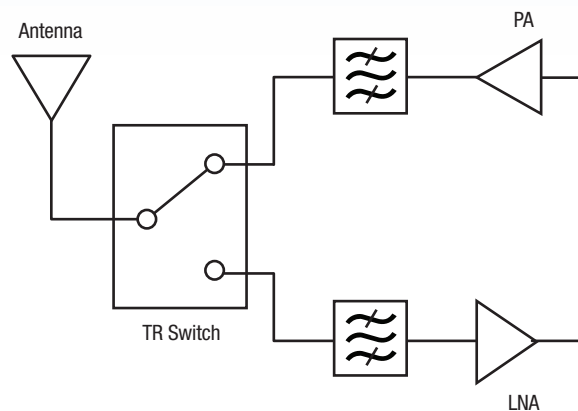


Figure 3. Simplified TR Switching Block Diagram



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