

1. DESCRIPTION

The XLSKY13351-378LF is a pHEMT GaAs FET I/C switch. The switch may be used in transmit/receive applications by connecting the RF common port (INPUT, pin 5) to either the OUTPUT1 or OUTPUT2 port (pin 1 or 3, respectively) using a low loss path (i.e., a positive voltage applied to either VCTL1 or VCTL2 pins). The switch is “reflective short” on the isolated port.

The switch is manufactured in a compact, 1 x 1 mm, 6-pin exposed pad plastic Micro Leadframe 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.

2. FEATURES

- Positive voltage control (0 and 1.8 V to 0 and 5.0 V)
- Broadband frequency range: 20 MHz to 6.0 GHz
- Very low insertion loss, 0.35 dB typical @ 2.45 GHz
- High isolation, 24 dB typical @ 2.45 GHz
- Excellent linearity performance, IP0.5dB = +30 dBm

3. APPLICATIONS

- WLAN 802.11 a/b/g/n networks
- WLAN repeaters
- ISM band radios
- Low power transmit receive systems

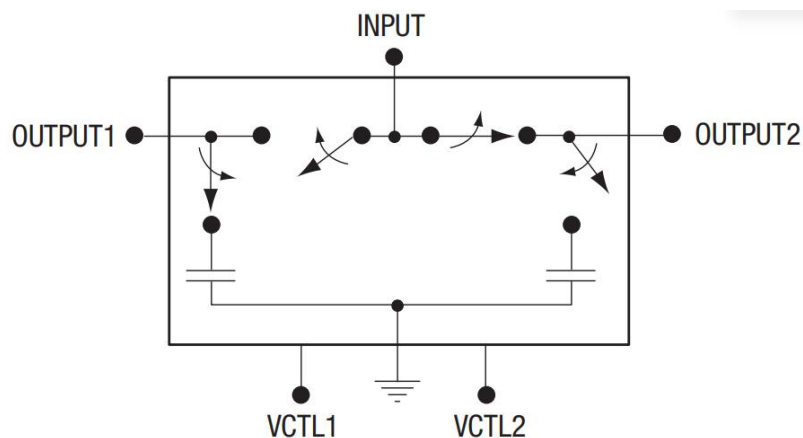


Figure 1. XLSKY13351-378LF Block Diagram

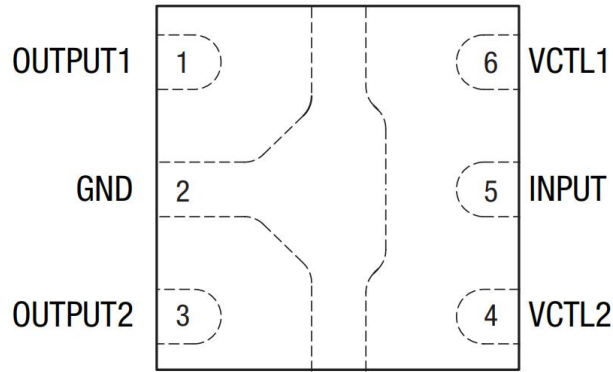


Figure 2. XLSKY13351-378LF Pinout (Top View)

Table 1. XLSKY13351-378LF Signal Descriptions

Pin	Name	Description
1	OUTPUT1	RF port. Must be DC blocked.
2	GND	Ground
3	OUTPUT2	RF port. Must be DC blocked.
4	VCTL2	DC control voltage
5	INPUT	RF port. Must be DC blocked
6	VCTL1	DC control voltage

4. ELECTRICAL AND MECHANICAL SPECIFICATIONS

The absolute maximum ratings of the XLSKY13351-378LF are provided in Table 2. The recommended operating conditions are specified in Table 3 and electrical specifications are provided in Table 4.

Typical performance characteristics of the XLSKY13351-378LF are illustrated in Figures 3 through 9.

The state of the XLSKY13351-378LF is determined by the logic provided in Table 5.

Table 2. XLSKY13351-378LF Absolute Maximum Ratings⁽¹⁾

Parameter	Symbol	Minimum	Maximum	Units
Input power:				
>500 MHz, 5 V, CW	P_{IN}		+32	dBm
>500 MHz, 2.7 V, CW			+31	dBm
802.11g, 54 Mbps, 64 QAM, 2.4-2.5 GHz			+26	dBm
802.11g, 54 Mbps, 64 QAM, 5.2-5.8 GHz			+25	dBm
Storage temperature	T_{STG}	-65	+150	°C
Operating temperature	T_{OP}	-40	+85	°C

(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:

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 when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.

Table 3. XLSKY13351-378LF Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
Frequency	f	0.02		6.0	GHz
Control voltage:					
low	V _{CTL_L}	0		0.2	V
high	V _{CTL_H}	1.8		5.0	V
Operating temperature	T _{OP}		+25		°C

Table 4. XLSKY13351-378LF Electrical Specifications⁽¹⁾

($V_{CTL} = 0\text{ V}$ and $+2.7\text{ V}$, $T_{OP} = +25\text{ }^{\circ}\text{C}$, $P_{IN} = 0\text{ dBm}$, Characteristic Impedance [Z_0] = $50\text{ }\Omega$, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Frequency	f		0.02		6.0	GHz
Insertion loss	IL	0.02 to 3.0 GHz 3.0 to 6.0 GHz		0.35 0.50	0.50 0.65	dB dB
Isolation	I_{SO}	0.02 to 3.0 GHz 3.0 to 6.0 GHz	22 22	24 26		dB dB
Return loss (insertion loss state)		0.02 to 3.0 GHz 3.0 to 6.0 GHz		25 15		dB dB
Switching characteristics: Rise/fall time On/off time		10/90% or 90/10% RF 50% V_{CTL} to 90/10% RF		40 100		ns ns
Video feedthrough				25		mV
0.5 dB input compression point	IP0.5dB	$V_{CTL} = 0$ and 1.8 V @ 2.45 GHz $V_{CTL} = 0$ and 2.7 V @ 2.45 GHz $V_{CTL} = 0$ and 2.7 V @ 48 MHz	+21 +29 +26	+22 +30 +26		dBm dBm dBm
Input IP3	IIP3	$P_{IN} = +20\text{ dBm/ tone}$ $V_{CTL} = 0$ and 1.8 V @ 2.45 GHz $V_{CTL} = 0$ and 2.7 V @ 2.45 GHz $V_{CTL} = 1.8\text{ V}$ @ 5.8 GHz $V_{CTL} = 2.7\text{ V}$ @ 5.8 GHz	+30 +46 	+32 +50 +30 +46		dBm dBm dBm dBm
Error vector magnitude	EVM	802.11a, 54 Mbps, $P_{IN} = <+24\text{ dBm}$, $V_{CTL} = 2.7\text{ V}$ 802.11g, 54 Mbps, $P_{IN} = <+25.5\text{ dBm}$, $V_{CTL} = 2.7\text{ V}$		2.5 2.5		% %
Control voltage: Low High	V_{CTL_L} V_{CTL_H}		0 1.8	 2.7	0.2 5.0	V V
Supply current	I_{CC}	$V_{CTL_L} = 0\text{ V}$ $V_{CTL_H} = 5\text{ V}$		5 5		μA μA

(1) Performance is guaranteed only under the conditions listed in this table.

5. TYPICAL PERFORMANCE CHARACTERISTICS

($V_{CTL} = 0\text{ V}$ and $+2.7\text{ V}$, $T_{OP} = +25^{\circ}\text{C}$, $P_{IN} = 0\text{ dBm}$, Characteristic Impedance [Z_0] = $50\ \Omega$, Blocking Capacitors = 100 pF , Bypass Capacitors = 33 pF , Unless Otherwise Noted)

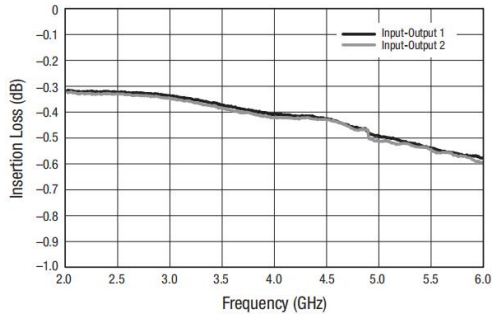


Figure 3. Typical Insertion Loss

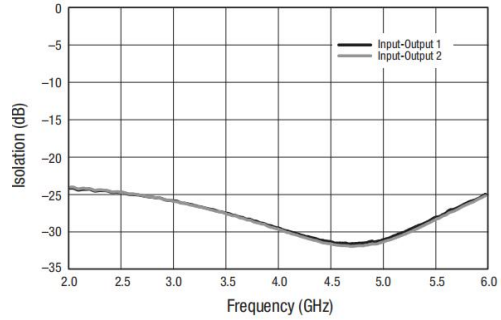


Figure 4. Typical Isolation

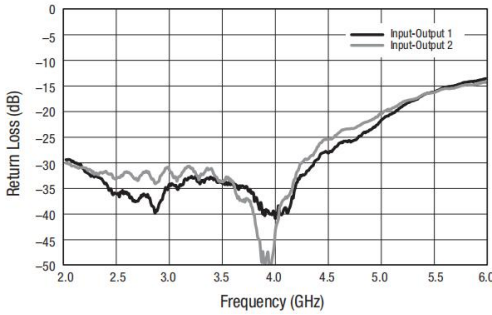


Figure 5. Typical Return Loss

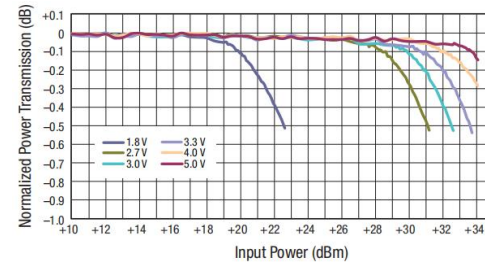


Figure 6. Compression vs Control Voltage (2450 MHz)

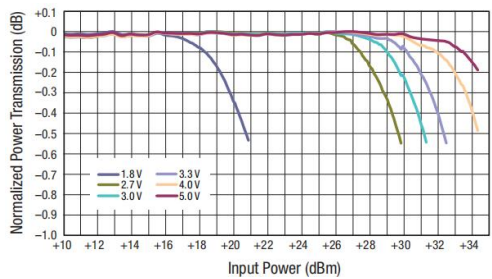


Figure 7. Compression vs Control Voltage (5.2 to 5.8 GHz)

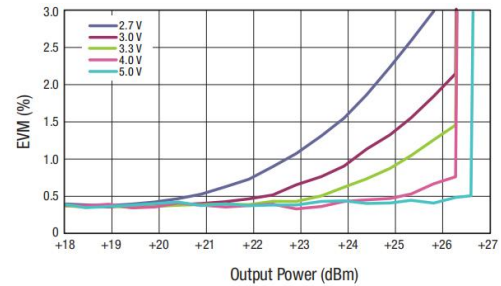


Figure 8. 802.11g EVM vs Output Power @ 2.45 GHz, 54 Mbps

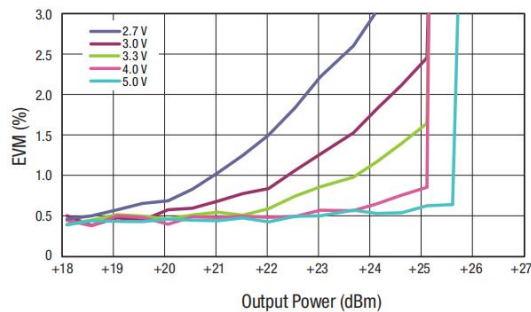


Figure 9. 802.11a EVM vs Output Power, 5.2-5.8 GHz, 54 Mbps

Table 5. XLSKY13351-378LF Truth Table⁽¹⁾

VCTL1 (Pin 6)	VCTL2 (Pin 4)	INPUT to OUTPUT1 Path	INPUT to OUTPUT2 Path
1	0	Isolation	Insertion loss
0	1	Insertion loss	Isolation

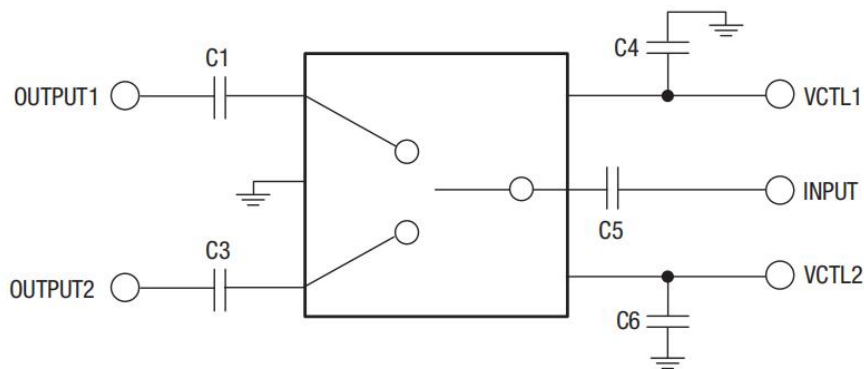
(1) "1" = +1.8 V to +5 V. "0" = 0 V to +0.2 V.

Any state other than described in this table places the switch into an undefined state.

An undefined state will not damage the device.

6. EVALUATION BOARD DESCRIPTION

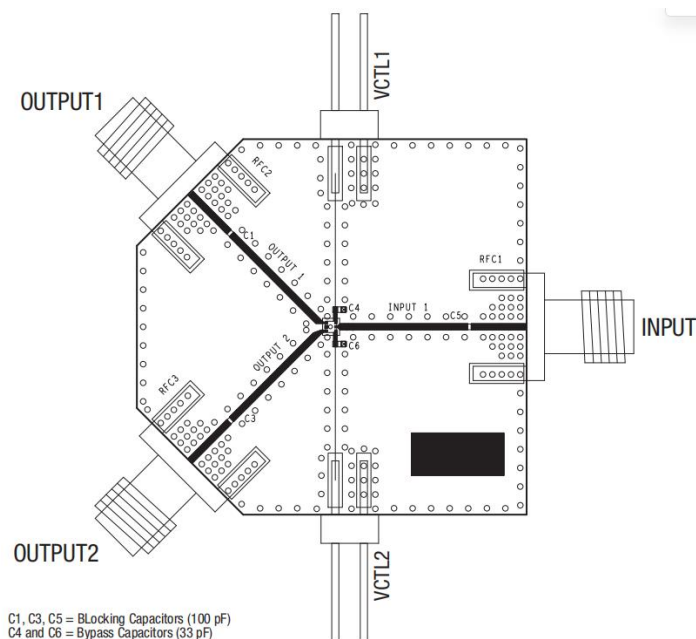
The XLSKY13351-378LF Evaluation Board is used to test the performance of the XLSKY13351-378LF SPDT Switch. An Evaluation Board schematic diagram is provided in Figure 10. An assembly drawing for the Evaluation Board is shown in Figure 11.



C1, C3, and C5 are DC blocking capacitors (100 pF) C4 and C6 are bypass capacitors (33 pF)

Use 10 nF DC blocking capacitors (C1, C3, and C5) for <50 MHz operation.

Figure 10. XLSKY13351-378LF Evaluation Board Schematic



C1, C3, C5 = Blocking Capacitors (100 pF)
C4 and C6 = Bypass Capacitors (33 pF)

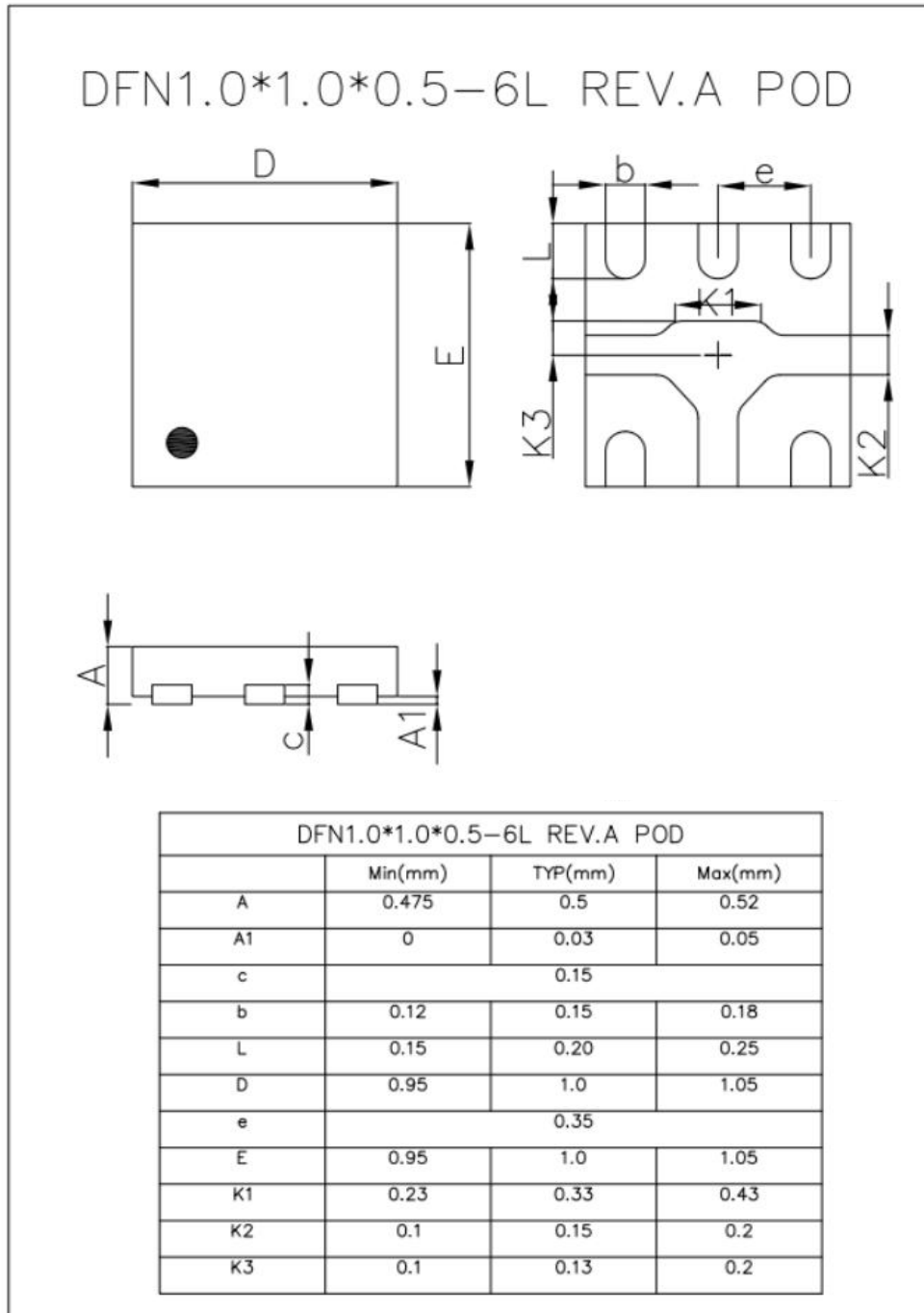
Figure 11. XLSKY13351-378LF Evaluation Board Assembly Diagram

7. ORDERING INFORMATION

Ordering Information

Part Number	Device Making	Package type	Body size (mm)	Temperate (°C)	MSL	Transpo Rt	Package Quantit
XLSKY13351-378LF	K	DFN-6	1.00*1.00	-40 to +85	MSL3	T&R	3000

8. DIMENSIONAL DRAWINGS



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