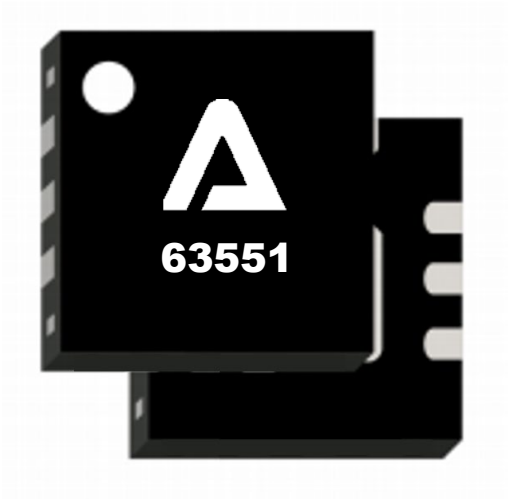
ATF63551-11

20 MHz to 6.0 GHz GaAs SPDT Switch



6 Pin 1×1 mm DFN Package

Key Features

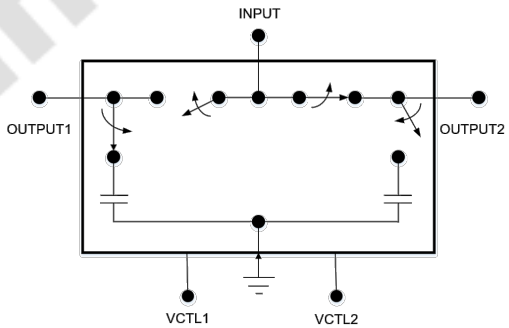
- Positive voltage control (0 and 1.8 V to 0 and 5.0 V)
- Broadband frequency range: 20 MHz to 6.0 GHz
- Very low insertion loss, 0.3 dB typical @ 2.45 GHz
- High isolation, 29 dB typical @ 2.45 GHz
- Excellent linearity performance, IP0.5dB = +30 dBm
- Ultra-miniature, MLPD (6-pin, 1 x 1 mm) package (MSL1, 260 °C per JEDEC J-STD-020)

Product Overview

The ATF63551-11 is a SOI SPDT 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.

Function Block Diagram



ATF63551-11 Block Diagram

Applications

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

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Absolute Maximum Rating

Parameter	Symbol	Min	Max	Units
Input power:				
>500 MHz, 5 V, CW			+32	dBm
>500 MHz, 2.7 V, CW	P_{IN}		+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

NOTE: 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.

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

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Electrical Specifications

(V_{CTL} = 0 V and +2.7 V, T_{OP} = +25 °C, P_{IN} = 0 dBm, Characteristic Impedance [Z_0] = 50 Ω, 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		0.30 0.40	0.50 0.65	dB dB
Isolation	Iso	0.02 to 3.0 GHz 3.0 to 6.0 GHz	24 24	29 27		dB dB
Return loss (insertion loss state)		0.02 to 3.0 GHz 3.0 to 6.0 GHz		25 20		dB dB
Switching characteristics: Rise/fall time On/off time		 10/90% or 90/10% RF 50% V_{TCL} to 90/10% RF		 40 80		 ns ns
Video feedthrough				25		mV
0.5 dB input compression point	IPO.5dB	V_{TCL} = 0 and 1.8 V @ 2.45 GHz V_{TCL} = 0 and 2.7 V @ 2.45 GHz	+24.5 +28	+26.5 +30		dBm dBm
Input IP3	IIP3	P_{IN} = +20 dBm/tone V_{TCL} = 0 and 1.8 V @ 2.45 GHz V_{TCL} = 0 and 2.7 V @ 2.45 GHz V_{TCL} = 1.8 V @ 5.8 GHz V_{TCL} = 2.7 V @ 5.8 GHz	 +44 +48	 +48 +52 +46 +48		 dBm dBm dBm dBm
Error vector magnitude	EVM	802.11a, 54 Mbps, P_{IN} = <+24 dBm, V_{TCL} = 2.7 V 802.11a, 54 Mbps, P_{IN} = <+24 dBm, V_{TCL} = 2.7 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 V V_{CTL_H} = 5 V		5 5		µA µA

NOTE: Performance is guaranteed only under the conditions listed in this table.

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Truth Table

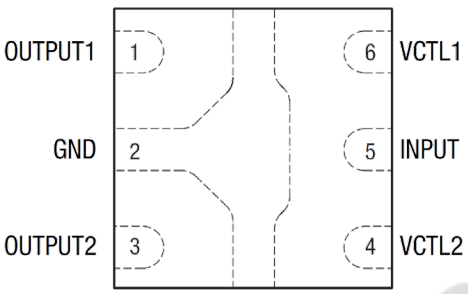
VCTL1 (Pin 6)	VCTL2 (Pin 4)	INPUT to OUTPUT1 Path	INPUT to OUTPUT1 Path
1	0	Isolation	Insertion loss
0	1	Insertion loss	Isolation

NOTE: "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.

Signal Description

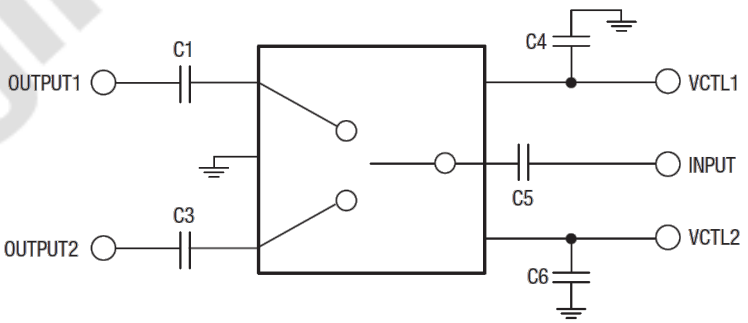


ATF63551-11 Pinout (Top View)

ATF63551-11 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 voltageRF

Evaluation Board Description



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.

Evaluation Board Schematic

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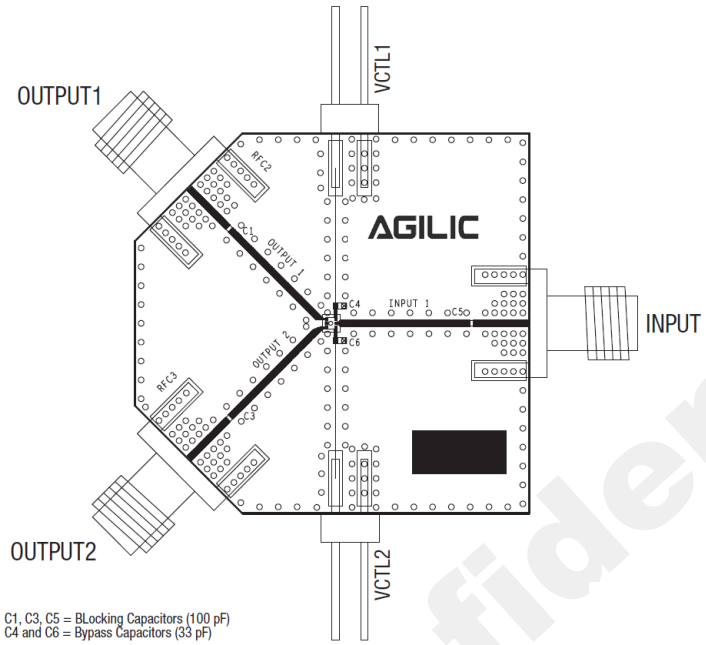
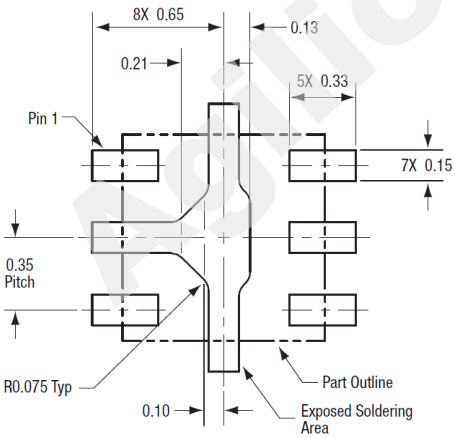
Evaluation Board Description

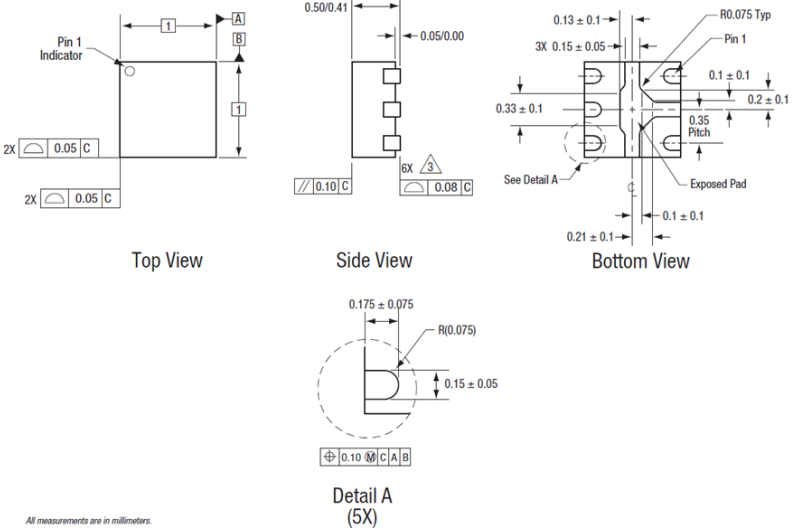


Evaluation Board Assembly Diagram

Package Dimensions



PCB Layout Footprint (Top View)



PCB Layout Package Dimensions