SPDT RF Switch VSW2-33-10W+

CASE STYLE: JZ1436

The Big Deal

- High Input Power, 10W (cold switching)
- Very low insertion loss, 0.5 dB typ. at 1GHz
- Positive Control Voltage, 0/3V or 0/5V
- Small Size: 2mm x 3mm x 1mm

Product Overview

VSW2-33-10W+ is a PHEMT high power reflective SPDT switch operates with positive control voltage while consuming, 20µA typical. Compared to competitive models, it operates over a wide frequency range, 50-3000 MHz and control voltages up to +5V. It is packaged in a tiny 2mm x 3mm x 1mm package and is rated MSL1 and class 1A for HBM.

Feature	Advantages
Broadband: 50-3000 MHz	Covers a range of wireless applications such as Cellular, PCS, LTE, WiMAX, Avionics, Broadcast, CATV,GPS, Radar etc.
High Input Power: 10W (cold switching) at +5V control	Suitable for Transmit/receive switching
Low Insertion Loss: 0.5 dB typ. at 1 GHz	Premium high power is transmitted with minimal loss and temperature rise of the DUT. In receive path results in minimal increase of system noise figure.
Positive control Voltage: 0/3V or 0/5V	No external components are required for change of operating voltage from 3 to 5V
Good Isolation: 26 dB to 1 GHz and 18 dB to 3 GHz	Minimizes filtering requirement.

SPDT RF Switch

50Ω 50-3000 MHz

Reflective RF Switch 10W
Positive Control Voltage; +3V to +5V

VSW2-33-10W+

CASE STYLE: JZ1436
PRICE: $2.95 ea. QTY. (20)

+ RoHS compliant in accordance with EU Directive (2002/95/EC)

The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.

Product Features

- High Power, 10 W (cold switching)
- Good Isolation, 26 dB typ. at 1 GHz
- Low insertion loss, 0.5 dB typ. at 1 GHz
- High IP3, 56 dBm typ. at 1 GHz
- Small size, 3mm x 2mm x 0.89 mm
- Aqueous washable

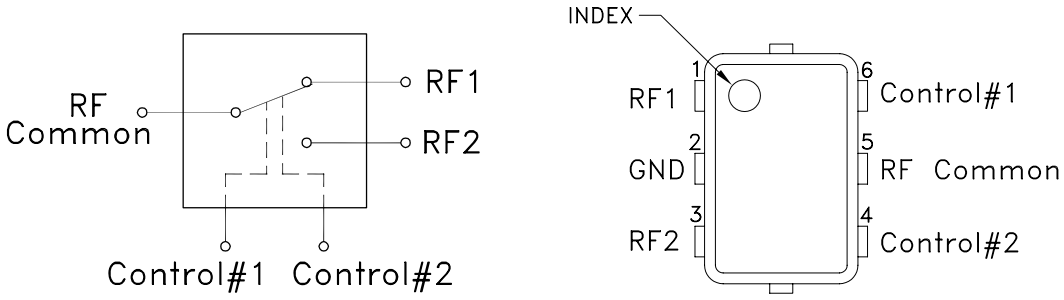
Typical Applications

- Automated switching networks
- Cellular/ PCS
- ISM, WCDMA, WiMAX, LTE, TD-SCDMA

General Description

VSW2-33-10W+ is a high power reflective SPDT switch operates with positive control voltage while consuming, 20μA typical. It has been designed for very wideband operation of 50-3000 MHz for 50Ω systems. It is packaged in a tiny 2mm x 3mm x 1mm package and is rated MSL1 and class 1A for HBM.

Simplified Schematic and Pad Description



Function	Pad Number	Description
RF COM	5	RF Common/ SUM Port, requires DC block (see Fig. 2)
RF1	1	RF Out #1/In Port #1, requires DC block (see Fig. 2)
RF2	3	RF Out #2/In Port #2, requires DC block (see Fig. 2)
Control #1 (V_{CTL1})	6	Control IN #1
Control #2 (V_{CTL2})	4	Control IN #2
GND	2	RF DC Ground

RF Electrical Specifications[1], 50 - 3000 MHz, T_{AMB}=25°C, V_{CTL}= +3V to +5V

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		50		3000	MHz
Insertion Loss[2]	50	—	0.4	—	dB
	500	—	0.4	0.6	
	1000	—	0.5	0.7	
	2000	—	0.6	0.8	
	3000	—	0.6	0.8	
Isolation (From RF COM to RF1/RF2 and RF1 to RF2 ports)	50	—	42	—	dB
	500	28	31	—	
	1000	23	26	—	
	2000	17	22	—	
	3000	15	18	—	
Return Loss (ON STATE)	50	—	24	—	dB
	500	—	27	—	
	1000	—	21	—	
	2000	—	17	—	
	3000	—	19	—	
Input IP3	100	—	55	—	dBm
	500	—	56	—	
	1000	—	56	—	
	2000	—	55	—	
	3000	—	53	—	
Operating Power [4,5] (cold switching) V_{CTL}=3V	50	—	—	7	W
	1000	—	—	7	
	2000	—	—	7	
	3000	—	—	7	
V_{CTL}=5V	50	—	—	10	
	1000	—	—	10	
	2000	—	—	9	
	3000	—	—	7	

DC Electrical Specifications

Parameter	Min.	Typ.	Max.	Units
Control Voltage Low (V_{CTL})	0	—	0.2	V
Control Voltage High (V_{CTL})	2.8	—	5.2	V
Control Current at	—	—	—	µA
(V_{CTL})= 3V	—	20	—	
(V_{CTL})= 5V	—	42	—	

Notes:
1. Tested on Mini-Circuits' test board TB-530+, (see Characterization Test Circuit, Fig.1).
2. Insertion loss values are deembedded from test board loss.
3. Do not exceed RF input power as shown in Absolute Maximum Rating table.
4. Derate linearly to 3W at 85°C ground lead temperature.
5. Compression 0.1 dB typ. over 1000-3000 MHz and 0.5dB typical at 50 MHz at max. operating power.

Switching Specifications

Parameter	Control Voltage (V)	Min.	Typ.	Max.	Units
Rise/Fall Time (10 to 90% or 90 to 10% RF)	0/3		433		nSec
	0/5		150		
Switching Time, 50% CTRL to 90/10% RF	0/3		550		nSec
	0/5		306		
Video Feedthrough, (control 0 to 3V, freq.=500 KHz)	0/3		20		mV_{P-P}
	0/5		28		

Absolute Maximum Ratings[4]

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to 150°C
Control Voltage	10V
RF input power	22W, 50-2000 MHz 17W, 2000-3000 MHz

4. Operation of this device above any of these conditions may cause permanent damage.

Truth Table (State of control voltage selects the desired switch state)

State of Control Voltage		RF Common to	
V_{CTL1}	V_{CTL2}	RF1	RF2
Low	High	OFF	ON
High	Low	ON	OFF
Low	Low	N/A	N/A
High	High	N/A	N/A

ON- low insertion loss state OFF- Isolation State

Characterization Test Circuit

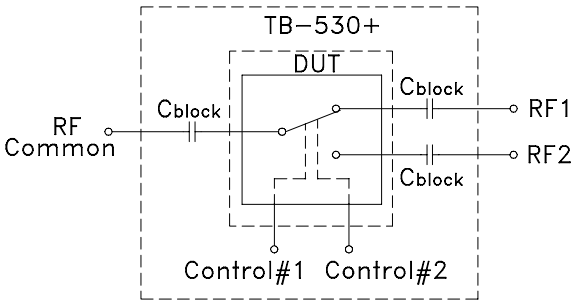


Figure 1: Block Diagram Of Test Circuit Used For Characterization.
(DUT soldered on Mini-Circuit's TB-530+, Cblock=1000pF)

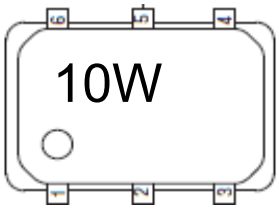
Test Equipment:

For Insertion loss, Isolation, Return loss and DC current:
Agilent's N5230A Network Analyzer , E3631A power supply.
For Switching Time and DC Current:
Agilent's 54832B oscilloscope, 81110A pulse generator and E3631A power supply.
For Input IP3:
Agilent's E8257D signal generators, E4418B power meter,
N9020A Signal analyzer and E3631A power supply.
For Compression:
LZY-1+/LZY-2+/ZHL-900A-10W/ZHL-16W-43+ amplifier as driver amplifier at RF Common.
Agilent's N5230A Network Analyzer, E3631A power supply

Conditions:

Control= 0 and 3V/5V
For Insertion loss, isolation and return loss: Pin=0 dBm
For Input IP3: Pin=+5dBm/tone.
For Switching time: RF frequency: 500 MHz at 0 dBm, Control Frequency: 100 KHz and 0 and +3/5V

Product Marking



Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

Performance data, graphs

Case Style: JZ1436
Plastic, finish: matte tin

Tape & Reel: F93

Suggested Layout for PCB Design: PL-324

Evaluation Board: TB-530+

Environmental Ratings: ENV57

Recommended Application Circuit

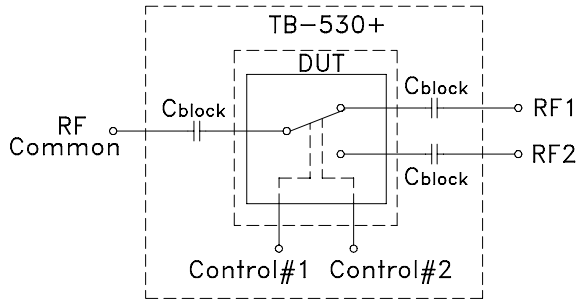


Fig. 2: Evaluation board includes case, connectors and components soldered to PCB.

Frequency (MHz)	Cblock (Suggested value)
50-3000	1000 pF

Cblock should be free of resonance over frequency of operation.

ESD Rating

Human Body Model (HBM): Class 1A (250 to < 500V) in accordance with JESD22-A114

Machine Model (MM): Class A (Passes 150V) in accordance with JESD22-A115

MSL Rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

MSL Test Flow Chart