FAST SWITCHING

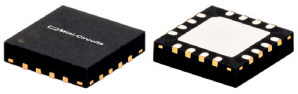
SPDT RF Switch

VSWA2-63DR+

50Ω 500 to 6000 MHz Absorptive RF Switch with Internal Driver
Single Supply Voltage, +3 V to +5 V

FEATURES

- High Isolation, 65 dB Typ. at 1 GHz
- Low Insertion Loss, 1.0 dB Typ. at 1 GHz
- High IP3, +50 dBm Typ. at 1 GHz
- Fast Switching, Rise/Fall Time, 23 ns Typ.
- Low Current Consumption, 12 µA Typ.



Generic photo used for illustration purposes only

CASE STYLE: DG1235-1

+RoHS Compliant
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

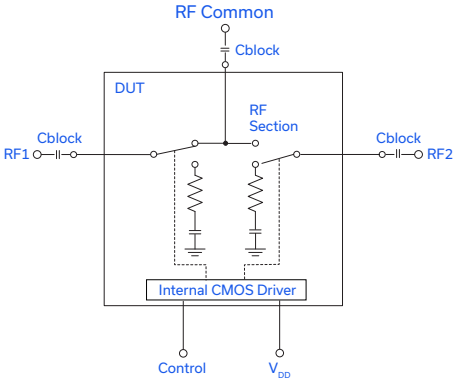
APPLICATIONS

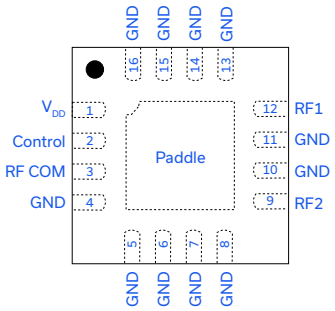
- Automated Switching Networks
- Cellular/ PCS
- ISM, WCDMA, WiMAX, LTE

PRODUCT OVERVIEW

The VSWA2-63DR+ is a high isolation absorptive SPDT switch with integral CMOS driver, operates with single positive supply voltage while consuming, 12 µA typical. It has been designed for very wideband operation of 500 to 6000 MHz for 50Ω systems and yet is usable in 75Ω systems with degraded return loss. This switch is usable over an extended frequencies from 300 kHz to 500 MHz with reflective switch performance. It is packaged in a tiny 4x4x0.9 mm package and is rated MSL1 and class 1A ESD.

SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION





Function	Pad Number	Description
RF COM	3	RF Common/SUM Port, Requires DC block (see Fig. 2)
RF1	12	RF Out #1/In Port #1, Requires DC block (see Fig. 2)
RF2	9	RF Out #2/In Port #2, Requires DC block (see Fig. 2)
Control	2	CMOS Control IN
V_{DD}	1	Supply Voltage
GND	4,5,6,7,8,10,11 13,14,15,16 & Paddle	RF Ground

REV. G
ECO-026600
VSWA2-63DR+
MCL NY
250818

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RF ELECTRICAL SPECIFICATIONS[1], T_{AMB} = +25°C, V_{DD} = +3 V TO +5 V

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		500		6000	MHz
Insertion Loss[2]	0.3-500		0.7		dB
	500-2000		0.7	1.3	
	2000-3000		0.8	1.5	
	3000-4000		0.9	1.5	
	4000-6000		1.0	1.9	
Isolation Between Common Port and RF1/RF2 Ports	0.3-500		73		dB
	500-2000	56	66		
	2000-3000	50	64		
	3000-4000	45	58		
	4000-6000	38	54		
Isolation Between RF1 and RF2 Ports	0.3-500		74		dB
	500-1000	50	60		
	1000-2000	45	56		
	2000-3000	40	52		
	3000-4000	38	50		
	4000-6000	34	46		
Return Loss (ON STATE)	0.3-500		24		dB
	500-2000		23		
	2000-3000		23		
	3000-4000		22		
	4000-6000		20		
Return Loss @ RF1/RF2 Ports (OFF STATE)	500-2000		23		dB
	2000-3000		33		
	3000-4000		23		
	4000-6000		24		
Input IP3 V_{DD} = +3 V	500-2000		+46		dBm
	2000-6000		+40		
Input IP3 V_{DD} = +5 V	500-2000		+50		
	2000-6000		+44		
Input Compression[3] 1 dB, V_{DD} = +3 V	500-2000		+24		dBm
	2000-6000		+22		
Input Compression[3] 0.2 dB, V_{DD} = +5 V	500-2000		+30		
	2000-6000		+27		

1. Tested on Mini-Circuit's test board TB-486+, using Agilent's N5230A network analyzer (see Characterization Test Circuit, Fig. 1).
2. Insertion loss values are de-embedded from test board loss.
3. Do not exceed RF input power as shown in Absolute Maximum Rating table.

DC ELECTRICAL SPECIFICATIONS

Parameter	Min.	Typ.	Max.	Units
V_{DD}, Supply Voltage	+3		+5	V
Supply Current (V_{DD} = +5 V)[4]		50		µA
Control Voltage Low	0		+0.5	V
Control Voltage High[5]	+2.7[6]		V_{DD}	V
Control Current		5		µA

4. Supply current increases with switching repetition rate. See graph.
5. CMOS interface. Latch up condition may occur when logic high signal is applied prior to power supply.
6. +3.5 V for V_{DD} = +4 V to +5 V

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SWITCHING SPECIFICATIONS

Parameter	Min.	Typ.	Max.	Units
Rise/Fall Time (10 to 90% or 90 to 10% RF)		23		ns
Switching Time, 50% CTRL to 90/10% RF		35		ns
Video Feed-Through, (Control 0 to +3 V, Freq. = 500 KHz, V_{DD} = +5 V)		25		mV_{P-P}

ABSOLUTE MAXIMUM RATINGS[7]

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C
V_{DD}, Supply Voltage	+2.7 V to +5.5 V
Voltage Control	-0.2 V min., V_{DD} max.
RF Input Power	1 W
Dissipated Power at +25°C	350 mW

7. 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	
	RF1	RF2
LOW	ON	OFF
HIGH	OFF	ON

ON - Low Insertion Loss State
OFF - Isolation State

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CHARACTERIZATION TEST CIRCUIT

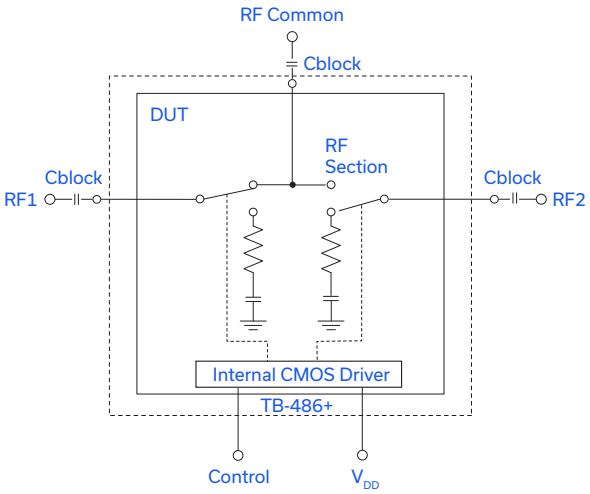


Figure 1. Block Diagram of Test Circuit Used for Characterization (DUT Soldered on Mini-Circuits' TB-486+)

Test Equipment:

For Insertion Loss, Isolation, Return Loss and DC Current:

Agilent's N5230A Network Analyzer, E3631A power supply. Cblock: Internal to network Analyzer.

For Switching Time and DC Current:

Agilent's 54832B oscilloscope, 81110A pulse generator and E3631 A power supply. Cblock: Mini-Circuits BLK-18-S+

For Input IP3:

Mini-Circuits DC blocks: BLK-18-S+ on all ports, Agilent's E8257D signal generators, 437B power meter,

N9020A Signal analyzer and E3631 A power supply.

For Compression:

Mini-Circuits DC blocks: BLK-18-S+ on all ports. ZVE-8G and ZHL-42W amplifier as driver amplifier at RF Common.

Agilent's N5230A Network Analyzer, E3631A power supply

Conditions:

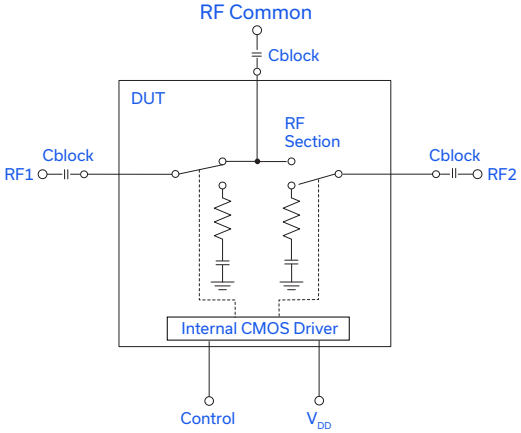
V_{DD} = +3 V and +5 V, Control = 0 V and +3 V

For Insertion Loss, Isolation and Return Loss: P_{IN} = 0 dBm

For Input IP3: P_{IN} = -5 dBm/tone

For Switching Time: RF Frequency: 500 MHz at 0 dBm, Control Frequency: 500 KHz and 0 V and +3 V

RECOMMENDED APPLICATION CIRCUIT

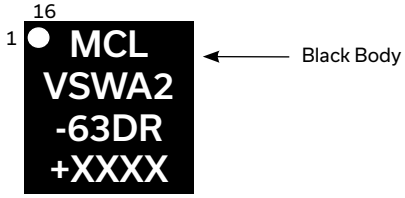


Frequency (MHz)	Cblock (Suggested Value)
0.3-500	0.1 µF
500-6000	47 pF

Cblock should be free of resonance over frequency of operation.

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

PRODUCT MARKING



Marking may contain other features or characters for internal lot control.

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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. TO ACCESS CLICK HERE

Performance Data	Data Table Swept Graphs
Case Style	DG1235-1 Plastic package, Lead Finish: Nickel Palladium Gold
Tape & Reel **Standard Quantities Available on Reel**	F87 7" Reels with 20, 50, 100, 200, or 500 devices 13" Reels with 3000 devices
Suggested Layout for PCB Design	PL-278
Evaluation Board	TB-486+
Environmental Ratings	ENV41

ESD RATING

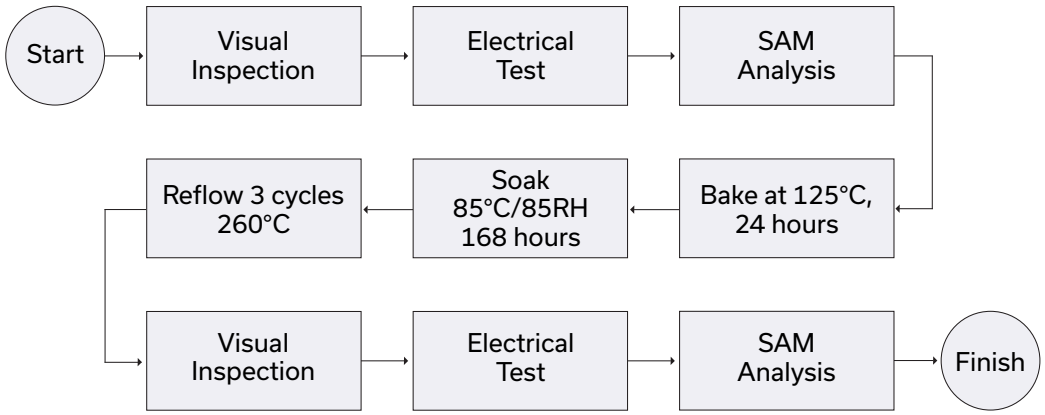
Human Body Model (HBM): Class 1A (250 to < 500 V) in accordance with JESD22-A114

Machine Model (MM): Class A (Passes 50 V) in accordance with JESD22-A115

MSL RATING

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

MSL TEST FLOW CHART



NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html