



**THE DATASHEET OF  
JSW2-63DR+**



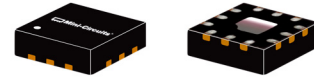
# SPDT RF Switch

## JSW2-63DR+

50Ω    5 to 6000 MHz    High Power 3W

### The Big Deal

- Single Positive Supply Voltage
- High Power P0.1dB, 3W
- Low Insertion Loss, 0.33 dB at 1 GHz



CASE STYLE: MT1818

### Product Overview

JSW2-63DR+ is a high-power reflective SPDT RF switch, with reflective short on output ports in the OFF state. Made using a Silicon-on-Insulator process, it provides very high IP3 (55 dBm typ.). This switch also has a built-in CMOS driver and negative voltage generator, all packaged in a tiny 2x2mm package, enabling it to operate over wideband and fit into tight spaces.

### Key Features

Feature	Advantages
Wideband operation 5-6000 MHz	Enables a single component to be used in a vast array of applications from VHF up to 6 GHz.
High IIP3: 55 dBm typ.	Results in little or negligible inter-modulation generation, meeting requirements for digital communication signals.
Low Loss, 0.33 dB at 1 GHz & high input power, 3W	Low loss and high power capability enables a single switch to be used for a variety of applications, saving inventory.
Built in negative voltage generator	Operates with single positive supply voltage; no need for DC blocking capacitors, unless external DC is present at the RF ports.
Built-in CMOS driver	No need for external driver, saving PCB space and cost.
Tiny MCLP package 2 x 2mm, 12-lead	Provides low inductance, repeatable transitions, and excellent thermal contact to PCB.



# SPDT RF Switch

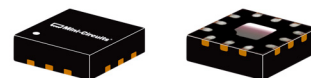
50Ω 5-6000 MHz

Reflective RF Switch with internal driver.

Single Supply Voltage, +2.3V to +4.8V, High Power 3W

## Product Features

- High Isolation, 40 dB typ. at 1 GHz
- Low insertion loss, 0.33 dB typ. at 1 GHz
- High IP3, 55 dBm typ. at 1 GHz
- Low current consumption, 37  $\mu$ A typ.
- High Power, P0.1dB 3W typ.



## JSW2-63DR+

CASE STYLE: MT1818

## Typical Applications

- CATV systems
- SATCOM system
- Automated Test Stations

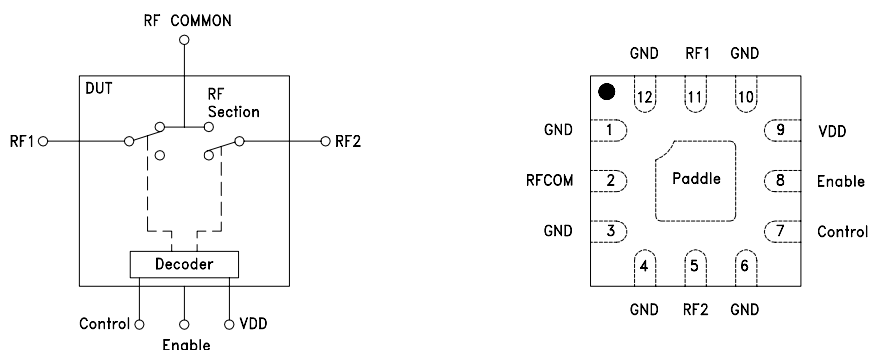
**+RoHS Compliant**

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

## General Description

JSW2-63DR+ is a high power 3W reflective SPDT switch with integral CMOS driver, operates with single positive supply voltage while consuming, 37 $\mu$ A typical. JSW is a reflective short on output port in OFF state. It has been designed for very wideband operation of 5-6000 MHz. It is packaged in a tiny 2mm x 2mm x 0.55mm package and is rated MSL1 and class 1B for ESD (HBM)

## Simplified Schematic and Pad Description



Function	Pad Number	Description
RF COM	2	RF Common/ SUM Port, (see Fig. 2)
RF1	11	RF Out #1/In Port #1, (see Fig. 2)
RF2	5	RF Out #1/In Port #2, (see Fig. 2)
Control	7	CMOS Control IN
VDD	9	Supply Voltage
Enable	8	Shutdown mode enabled by connecting to logic low
GND	1,3,4,6,10,12	Ground



**RF Electrical Specifications<sup>(1)</sup>, 5 - 6000 MHz, T<sub>AMB</sub>=25°C, V<sub>DD</sub>= +2.3 to 4.8V**

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		5		6000	MHz
Insertion Loss <sup>(2)</sup> (ON STATE)	5 to 1000		0.33	0.40	dB
	1000 to 2500		0.40	0.50	
	2500 to 5000		0.57	0.75	
	5000 to 6000		0.57	0.80	
Isolation between Common port and RF1/RF2 Ports	5 to 1000	40	42		dB
	1000 to 2500	30	33		
	2500 to 5000	22	24		
	5000 to 6000	18	21		
Isolation between RF1 and RF2 ports <sup>(3)</sup>	5 to 1000	40	46		dB
	1000 to 2500	30	35		
	2500 to 5000	22	26		
	5000 to 6000	18	22		
Return Loss (ON STATE), all ports	5 to 1000		25		dB
	1000 to 2500		22		
	2500 to 5000		14		
	5000 to 6000		14		
Input IP3 (V <sub>DD</sub> =3V)	5 to 1000		56		dBm
	1000 to 2500		62		
	2500 to 5000		59		
	5000 to 6000		59		
0.1dB Input Compression <sup>(4)</sup>	5 to 6000		35		dBm

**DC Operating Electrical Specifications**

Parameter	Min.	Typ.	Max.	Units
VDD, Supply Voltage	2.3		4.8	V
Supply Current		37		µA
Control Enable Voltage Low	0		0.4	V
Control Enable Voltage High	1.65		VDD	V
Control Current		1		µA
Shutdown mode - Supply Current		7		µA

Notes:

1. Tested on Mini-Circuit's test board TB-725+ (see Characterization Test Circuit, Fig.1).
2. Insertion loss values are de-embedded from test board loss.
3. Enable voltage "HI", either RF1 or RF2 are ON.
4. Do not exceed RF input power as shown in Absolute Maximum Rating table.

**Switching Specifications**

Parameter	Min.	Typ.	Max.	Units
Rise/Fall Time (10 to 90% or 90 to 10% RF)	—	0.5 (Rise Time) 0.7 (Fall Time)	—	µSec
Switching Time, 50% CTRL to 90/10% RF	—	1.9 (ON Time) 1.1 (OFF Time)	—	µSec
Video Feedthrough, (control 0 to 1.65V, freq.=10 KHz)	—	3.0	—	mV <sub>p,p</sub>

**Absolute Maximum Ratings<sup>(5)</sup>**

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to 125°C
V <sub>DD</sub> , Supply Voltage	5.0V
Voltage Control	-0.2V Min. V <sub>DD</sub> Max.
RF input power	5 Watt <sup>6</sup>

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

6. Derate linearly to 2.5W at 85°C.

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

State of:		RF Common to	
Control Voltage	Enable Voltage	RF1	RF2
High	High	ON	OFF
Low	High	OFF	ON
Low/High	Low	Shutdown	

ON- low insertion loss state    OFF- Isolation State

**Characterization Test Circuit**

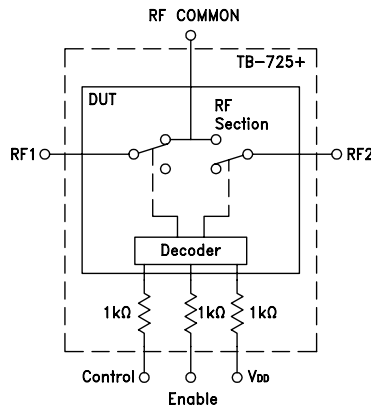


Figure 1: Block Diagram Of Test Circuit Used For Characterization. (DUT soldered on Mini-Circuit's TB-725+)

**Test Equipment:**

**For Insertion loss, Isolation, Return loss:**

Agilent's N5230A Network Analyzer , E3631A power supply.

**For Switching Time and Video Feed through**

Agilent's AG54832B HP81110A pulse generator, HPE3631A Network Analyzer , E3631A power supply.

Agilent's N90A Spectrum Analyzer , E8257D Generator U200A

**For Compression:**

R&S Network Analyzer ZVA24, E3631A power supply.

**Conditions:**

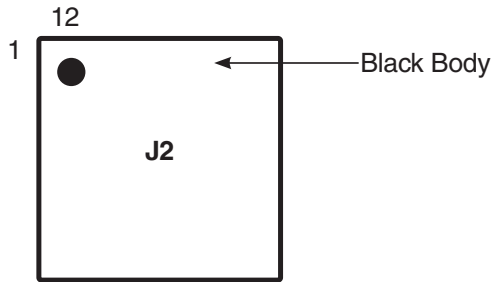
V<sub>DD</sub>= +2.3 and +4.8V, Control= 0 and 1.65V.

**For Insertion loss, isolation and return loss:** Pin=0 dBm

**For Input IP3:** Pin=+10dBm/tone.

**For Switching time:** RF frequency: 500 MHz at 0 dBm, Control Frequency: 10 KHz and 0 and +1.65V.

**Product Marking**



**Recommended Application Circuit**

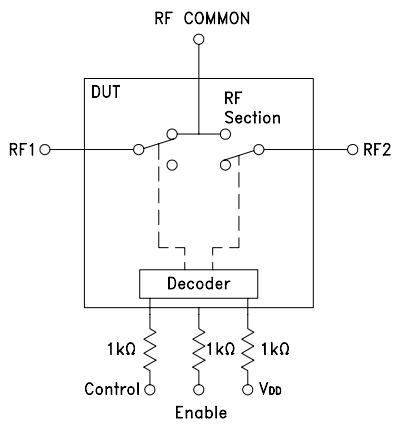


Fig. 2: Evaluation board includes case, connectors and components soldered to PCB.

<b>Additional Detailed Technical Information</b>	
<i>additional information is available on our dash board. To access this information <a href="#">click here</a></i>	
<b>Performance Data</b>	Data Table
	Swept Graphs
<b>Case Style</b>	MT1818 <i>Plastic package; Lead finish: NiPd Au</i>
<b>Tape &amp; Reel</b>	F108
<b>Standard quantities available on reel</b>	<i>7" reels with 20, 50, 100, 200, 500, 1K or 3K devices</i>
<b>Suggested Layout for PCB Design</b>	PL-414
<b>Evaluation Board</b>	TB-725+
<b>Environmental Ratings</b>	ENV75

**ESD Rating**

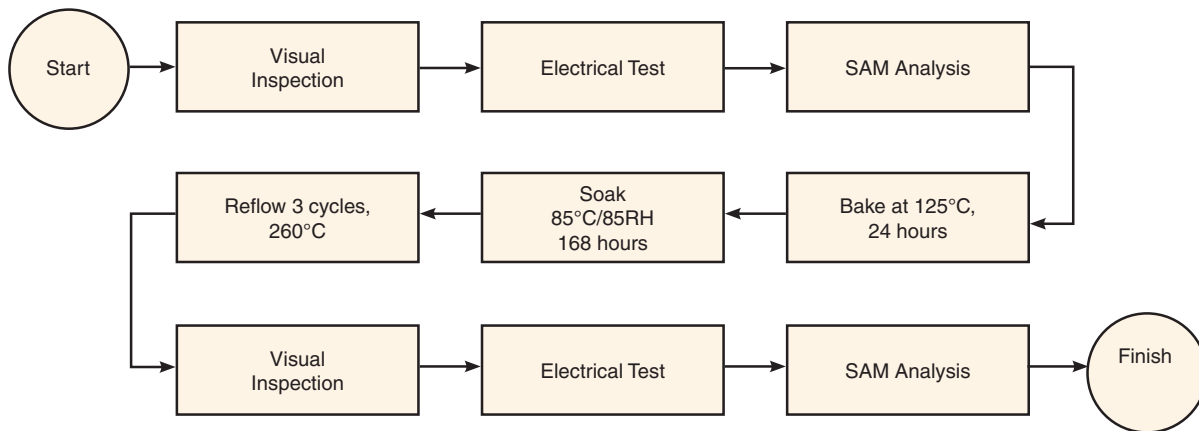
Human Body Model (HBM): Class 1B (500 to < 1000V) in accordance with JESD22-A114

Machine Model (MM): Class A (Pass 100V) in accordance with JESD22-A115

**MSL Rating**

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

**MSL Test Flow Chart**



**Additional 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/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)

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