SPDT RF Switch JSW2-33HDR-75+

75Ω 5 to 3000 MHz High Power 3W

The Big Deal

- High IP3, +70 dBm typ.
- High Power P0.1dB greater than 3W
- Low Insertion Loss, 0.33 dB at 1 GHz



CASE STYLE: MT1818

Product Overview

JSW2-33HDR-75+ 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 (+70 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
High IIP3: +70 dBm typ.	Outstanding third order intercept perfomance makes this part ideal for use with high modulation signals such as digital CATV, QAM and other dense waveforms
Wideband operation 5-3000 MHz	Enables a single component to be used in a vast array of applications from VHF up to 3 GHz.
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

75Ω 5-3000 MHz

Reflective RF Switch with internal driver.
Single Supply Voltage, +2.3V to +4.8V, High Power 3W

Product Features

- High IP3, +70 dBm typ. at 150 MHz
- High Power, P0.1dB 3W
- High Isolation, 42 dB typ. at 1 GHz
- Low insertion loss, 0.33 dB typ. at 1 GHz
- Low current consumption, 37 µA typ.



JSW2-33HDR-75+

CASE STYLE: MT1818

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

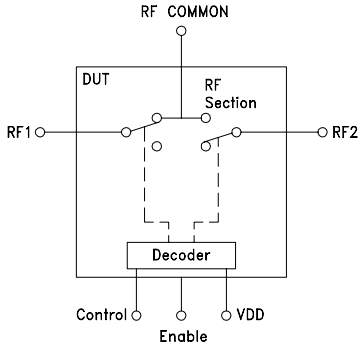
Typical Applications

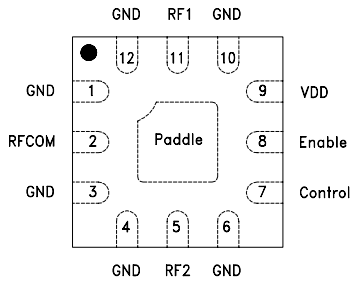
- CATV systems
- SATCOM system
- Automated Test Stations

General Description

JSW2-33HDR-75+ is a high power (35 dBm) reflective SPDT switch with integral CMOS driver, operates with single positive supply voltage while consuming, 37µA typical. JSW is a reflective short on output port in OFF state. It has been designed for very wideband operation of 5-3000 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
Ground	1,3,4,6,10,12	Ground Externally

RF Electrical Specifications[1], 5 - 3000 MHz, T_{AMB}=25°C, V_{DD}= +2.3 to 4.8V

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		5		3000	MHz
Insertion Loss[2] (ON STATE)	5 to 1000		0.33	0.48	dB
	1000 to 1500		0.44	0.58	
	1500 to 2000		0.51	0.64	
	2000 to 3000		0.53	0.64	
Input IP3 (V_{DD}=3V)	150		+70		dBm
	1800		+70		
0.1dB Input Compression[4]	20 to 3000		35.0		dBm
Isolation between Common port and RF1/RF2 Ports	5 to 1000	40	42		dB
	1000 to 1500	35	38		
	1500 to 2000	32	35		
	2000 to 3000	28	31		
Isolation between RF1 and RF2 ports[3]	5 to 1000	40	45		dB
	1000 to 1500	35	41		
	1500 to 2000	32	37		
	2000 to 3000	28	32		
Return Loss (ON STATE), all ports	5 to 1000		19		dB
	1000 to 1500		16		
	1500 to 2000		16		
	2000 to 3000		17		

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[5]	1.65		2.7	V
Control Current		1		µA
Shutdown mode - Supply Current		7		µA

Notes:
1. Tested on Mini-Circuit's test board TB-723-N+ (see Characterization Test Circuit, Fig.1).
2. Insertion loss values include 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.
5. If V_{DD} < 2.7, then Max Control Voltage High=V_{DD}

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_{P-P}

Absolute Maximum Ratings[6]

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to 125°C
V_{DD}, Supply Voltage	5.0V
Voltage Control	-0.2V Min. V_{DD} Max.
RF input power	5 Watt[7]

6. Operation of this device above any of these conditions may cause permanent damage.
7. 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

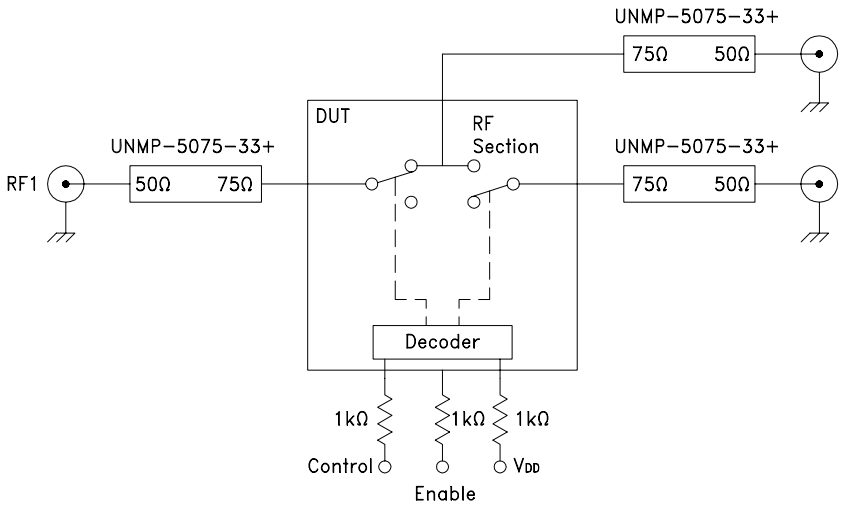


Figure 1: Block Diagram Of Test Circuit Used For Characterization.
(DUT soldered on Mini-Circuit's TB-723-N+)

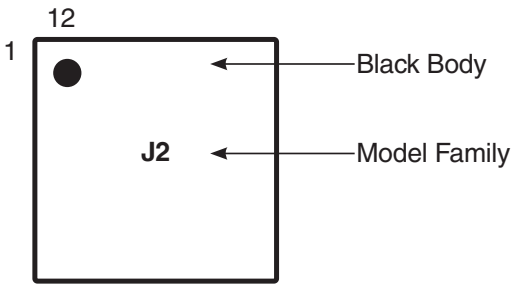
Test Equipment:

For Insertion loss, Isolation, Return loss:
Agilent's N5230A Network Analyzer , E3631A power supply. Mini-Circuits Matching Pad UNMP-5075-33+
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_{DD}= +2.3 and +4.8V, Control= 0 and 1.65V.
For Insertion loss, isolation and return loss: Pin=0 dBm
For Input IP3: Pin=+20 dBm / tone. Tones: 154.6 MHz & 165.0 MHz / 1747.5 MHz & 1842.5 MHz
For Switching time: RF frequency: DC at 0 dBm, Control Frequency: 500 KHz and 0 and +1.65V.

Product Marking



Recommended Application Circuit

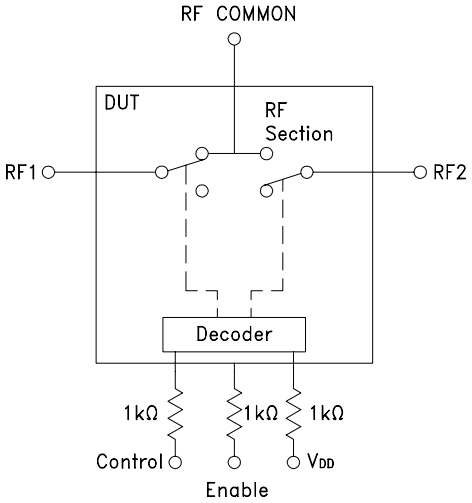


Fig. 2: Evaluation board includes case, connectors and components soldered to PCB.

Additional Detailed Technical Information *additional information is available on our dash board. To access this information click here*	
Performance Data	Data Table
	Swept Graphs
Case Style	MT1818 *Plastic package; Lead finish: NiPd Au*
Tape & Reel **Standard quantities available on reel**	F108 *7" reels with 20, 50, 100, 200, 500, 1K or 3K devices*
Suggested Layout for PCB Design	PL-415
Evaluation Board	TB-723H-F+
Environmental Ratings	ENV75

ESD Rating

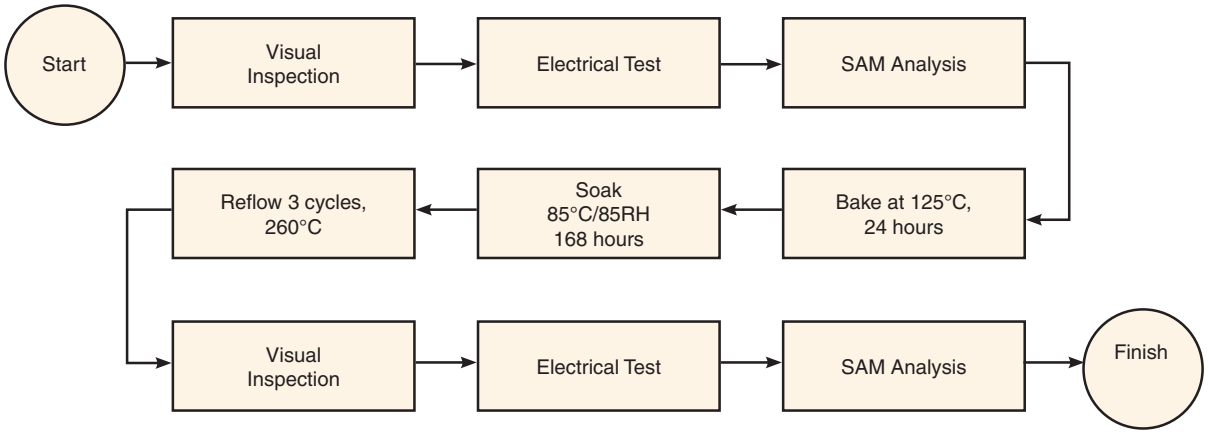
Human Body Model (HBM): Class 1B (500 to < 1000V) in accordance with JESD22-A114

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