



Mini-Circuits

FAST SWITCHING

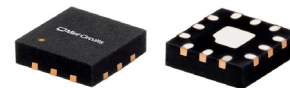
SPDT RF Switch

JSW2-33DR-75+

75Ω 5 to 3000 MHz Reflective RF Switch with Internal Driver
Single Supply Voltage, + 2.3 V to +4.8 V, High Power, 3 W

THE BIG DEAL

- High Isolation, 42 dB Typ. at 1 GHz
- Low Insertion Loss, 0.38 dB Typ. at 1 GHz
- High IP3, +56 dBm Typ. at 1 GHz
- Low Current Consumption, 37 μ A Typ.
- High Power, P0.1dB 3 W



Generic photo used for illustration purposes only

CASE STYLE: MT1818

+RoHS Compliant

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

APPLICATIONS

- CATV Systems
- SATCOM System
- Automated Test Stations

PRODUCT OVERVIEW

The JSW2-33DR-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 (+55 dBm typ.). This switch also has a built-in CMOS driver and negative voltage generator, all packaged in a tiny 2x2 mm package, enabling it to operate over wideband and fit into tight spaces.

KEY FEATURES

Features	Advantages
Wideband Operation, 5 to 3000 MHz	Enables a single component to be used in a vast array of applications from VHF up to 3000 MHz.
High IIP3, +55 dBm Typ.	Results in little or negligible inter-modulation generation, meeting requirements for digital communication signals.
Low Loss, 0.38 dB at 1 GHz & High Input Power, 3 W	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, 2x2 mm, 12-Lead	Provides low inductance, repeatable transitions, and excellent thermal contact to PCB.

REV. D
ECO-026600
JSW2-33DR-75+
MCL NY
250818





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RF ELECTRICAL SPECIFICATIONS¹, $T_{AMB} = +25^{\circ}\text{C}$, $V_{DD} = +2.3 \text{ V TO } +4.8 \text{ V}$

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		5		3000	MHz
Insertion Loss ² (ON STATE)	5-1000		0.38	0.48	dB
	1000-1500		0.48	0.58	
	1500-2000		0.54	0.64	
	2000-3000		0.53	0.64	
Isolation Between Common Port and RF1 / RF2 Ports	5-1000	40	42		dB
	1000-1500	35	38		
	1500-2000	32	35		
	2000-3000	28	31		
Isolation Between RF1 and RF2 Ports ³	5-1000	40	45		dB
	1000-1500	35	41		
	1500-2000	32	37		
	2000-3000	28	32		
Return Loss (ON STATE), All Ports	5-1000		19		dB
	1000-1500		16		
	1500-2000		16		
	2000-3000		17		
Input IP3 ($V_{DD} = +3 \text{ V}$)	5-1000		+56		dBm
	1000-1500		+62		
	1500-2000		+63		
	2000-3000		+63		
0.1 dB Input Compression ⁴	5-3000		+35.0		dBm

1. Tested on Mini-Circuit's test board TB-723-F+ (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.

DC OPERATING ELECTRICAL SPECIFICATIONS

Parameter	Min.	Typ.	Max.	Units
V_{DD} , 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		V_{DD}	V
Control Current		1		μA
Shutdown Mode - Supply Current		7		μA

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 Feed-Through, (Control 0 to +1.65 V, Freq. = 10 KHz)		3.0		mV _{p,p}





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ABSOLUTE MAXIMUM RATINGS⁵

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +125°C
V _{DD} , Supply Voltage	+5.0 V
Voltage Control	-0.2 V min. V _{DD} max.
RF Input Power	5 W ⁶

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

6. Derate linearly to 2.5 W 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

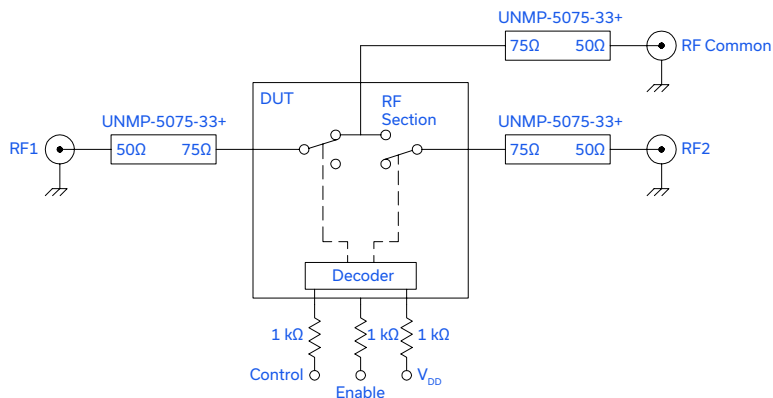


Figure 1: Block Diagram of Test Circuit Used for Characterization
(DUT soldered on Mini-Circuit's TB-723-F+)

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 V and +4.8 V, Control = 0 and +1.65 V

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

For Input IP3: P_{IN} = +10 dBm/tone

For Switching Time: RF Frequency: DC at 0 dBm, Control Frequency: 500 KHz and 0 and +1.65 V





Mini-Circuits

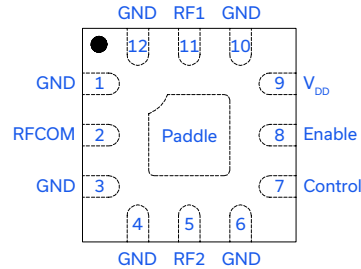
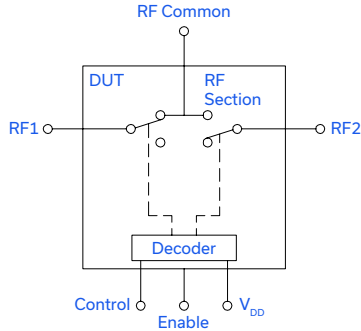
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SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



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
V _{DD}	9	Supply Voltage
Enable	8	Shutdown mode enabled by connecting to logic low
GND	1,3,4,6,10,12	Ground

RECOMMENDED APPLICATION CIRCUIT

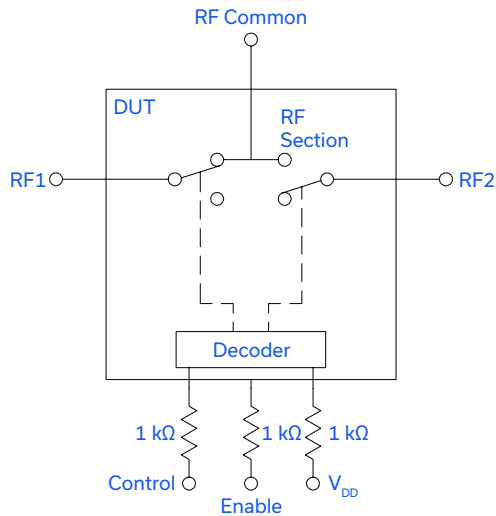
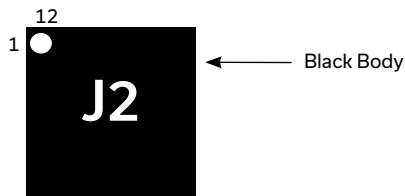


Figure 2. Evaluation board includes case, connectors and components soldered to PCB.

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	MT1818 Plastic package, Lead Finish: NiPdAu
Tape & Reel	F108
Standard Quantities Available on Reel	7" Reels with 20, 50, 100, 200, 500, 1000, 2000, or 3000 devices
Suggested Layout for PCB Design	PL-415
Evaluation Board	TB-723-F+
Environmental Ratings	ENV75

ESD RATING

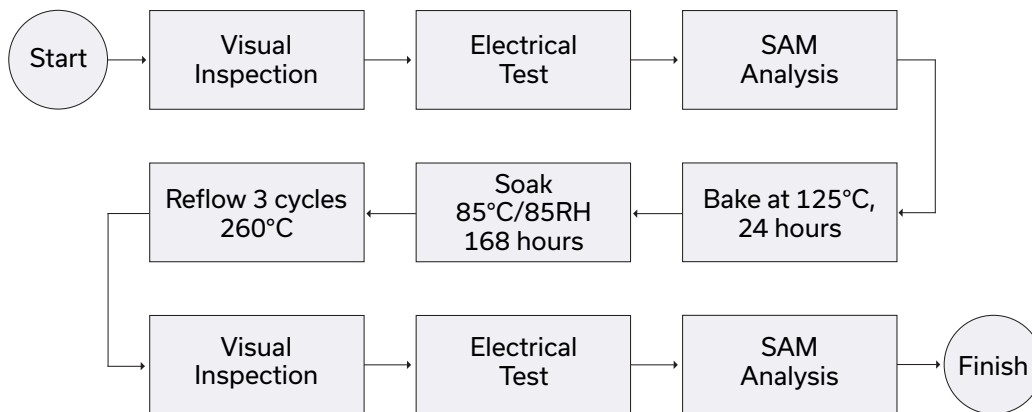
Human Body Model (HBM): Class 1B (500 to < 1000 V) in accordance with JESD22-A114

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

MSL RATING

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

MSL TEST FLOW CHART



NOTES

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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

