



Mini-Circuits

FAST SWITCHING

SPDT RF Switch

M3SWA-2-50DRA+

50Ω 0.3 to 4500 MHz Absorptive RF Switch with Internal Driver
Single Supply Voltage, +3 V to +5 V

FEATURES

- High Isolation, 52 dB at 1 GHz
- Low Insertion Loss, 0.8 dB Typ. at 1 GHz
- Low Supply Current Consumption, 50 μ A Typ.
- Fast Rise/Fall Time, 16 ns Typ.



Generic photo used for illustration purposes only

CASE STYLE: DL805

+RoHS Compliant

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

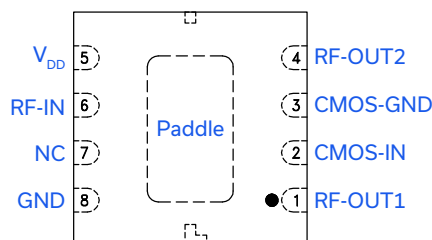
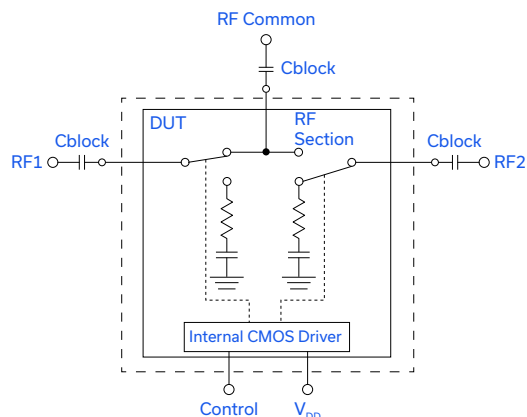
APPLICATIONS

- Defense
- Communication Infrastructure
- Test and Measurement Equipment

PRODUCT OVERVIEW

The M3SWA-2-50DRA+ is a high isolation fast switching absorptive SPDT switch with integral CMOS driver, operates with single positive supply voltage while consuming, 50 μ A typical. It has been designed for wideband operation. It is packaged in a tiny 3.25 x 3.25 mm, 8-lead package passes +250 V for ESD (HBM).

SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



Function	Pad Number	Description
RF-IN	6	RF Common/ SUM Port, Requires external DC block
RF-OUT1	1	RF Out #1/In Port #1, Requires external DC block
RF-OUT2	4	RF Out #1/In Port #2, Requires external DC block
Control	2	CMOS Control IN
V _{DD}	5	Supply Voltage
NC	7	No Connection
CMOS-GND	3	CMOS Ground
GND	8, Paddle	RF Ground

REV. A
ECO-026600
M3SWA-2-50DRA+
MCL NY
260429





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RF ELECTRICAL SPECIFICATIONS¹, $T_{AMB} = +25^{\circ}\text{C}$, 50Ω, $V_{DD} = +5\text{ V}$

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		10		4500	MHz
Insertion Loss ^{2,3}	10	-	0.6	1.0	dB
	100	-	0.7	1.0	
	1000	-	0.8	1.2	
	2000	-	1.0	1.4	
	4500	-	1.2	1.9	
Isolation Between Common Port & RF1/RF2 Ports	10	-	74.0	-	dB
	100	-	59.3	-	
	1000	-	61.5	-	
	2000	-	50.8	-	
	4500	-	39.5	-	
Isolation Between RF1 & RF2 Ports	10	-	74.3	-	dB
	100	-	61.0	-	
	1000	-	51.8	-	
	2000	-	46.5	-	
	4500	-	37.4	-	
Return Loss (ON STATE)	10	-	24.3	-	dB
	100	-	24.1	-	
	1000	-	20.8	-	
	2000	-	16.7	-	
	4500	-	17.0	-	
Return Loss (OFF STATE)	500	-	12.9	-	dB
	1000	-	20.1	-	
	2000	-	28.6	-	
	4500	-	12.8	-	
Input 0.2 dB Compression	500-1000	-	+30	-	dBm
	1000-2000	-	+30	-	
	2000-4500	-	+27	-	

1. Tested on Mini-Circuits' test board TB-159A+, using Agilent's N5230A network analyzer (see Characterization test circuit, Fig. 1).

2. Insertion loss values are de-embedded from test board loss.

3. Needs external blocking capacitors on all RF ports. (Suggested Value = 47 pF)

DC ELECTRICAL SPECIFICATIONS

Parameter	Min.	Typ.	Max.	Units
Supply Voltage, V_{DD}	+3.0	-	+5.0	V
Supply Current	-	50	200	μA
Control Voltage Low	0	-	+0.5	V
Control Voltage High	+0.7 V_{DD}	-	V_{DD}	V
Control Current	-	0.2	10	μA





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SWITCHING SPECIFICATIONS

Parameter	Condition	Min.	Typ.	Max.	Units
Switching Time 50% Control to 90%/10% RF	RF P _{IN} = 0 dBm RF Freq. = 500 MHz Control Freq. = 500 KHz Control High = +3.7 V Control Low = 0 V	-	29	-	ns
Video Leakage		-	24.8	-	mV
Rise/Fall Time 10 to 90% or 90 to 10%		-	16	-	ns

ABSOLUTE MAXIMUM RATINGS⁴

Parameter	Ratings
Operating Temperature	-55°C to +100°C
Storage Temperature	-55°C to +100°C
V _{DD} , Supply Voltage	+2.7 V min., +5.5 V max.
Voltage Control	-0.2 V min., V _{DD} max.
RF Input Power	+30 dBm

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	
	RF1	RF2
HIGH	OFF	ON
LOW	ON	OFF

ON - Low Insertion Loss State

OFF - Isolation State





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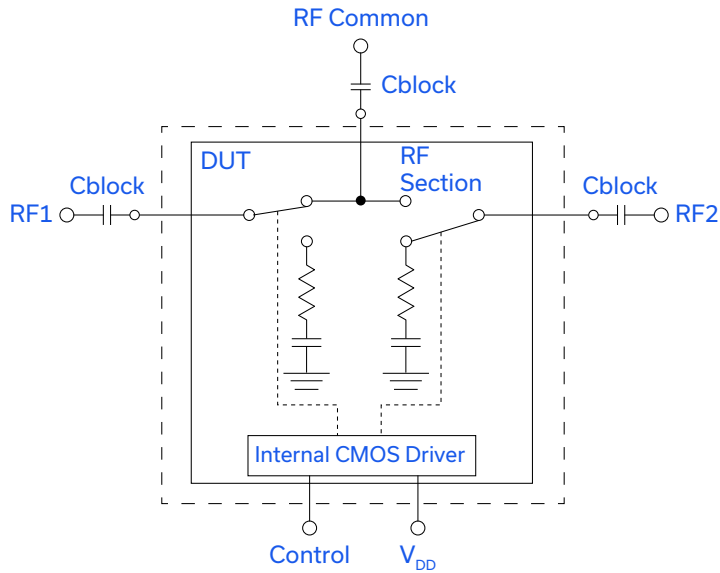
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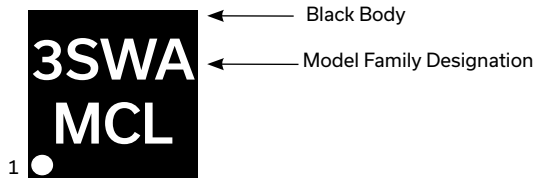
CHARACTERIZATION TEST CIRCUIT



Frequency (MHz)	Cblock (Suggested Value)
0.3-500	0.1 μ F
500-4500	47 pF

Figure 1. Block Diagram of Test Circuit Used for Characterization
(DUT Soldered on Mini-Circuits' TB-159A+)

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	DL805 Plastic package, exposed paddle, Lead Finish: Matte Tin
Tape & Reel	F58
Standard Quantities Available on Reel	7" Reels with 1000 devices 13" Reels with 2000 or 4000 devices
Suggested Layout for PCB Design	PL-120A
Evaluation Board	TB-159A+
Environmental Ratings	ENV16

ESD RATING

Human Body Model (HBM): Class 1A (250 to 500 V) in accordance with ESD STM5.1-2001

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

