



## 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  $\mu$ 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

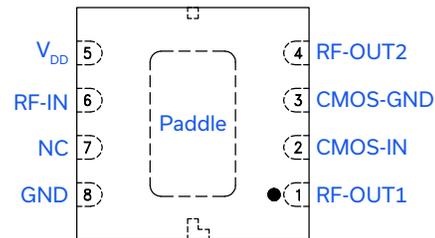
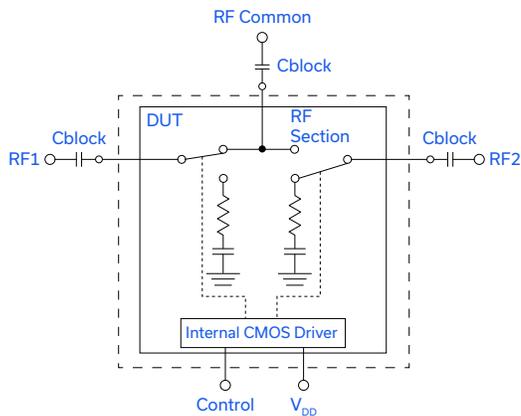
### APPLICATIONS

- 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  $\mu$ A typical. It has been designed for wideband operation. It is packaged in a tiny 3.25x3.25 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 <sub>DD</sub>	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  
250818



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**M3SWA-2-50DRA+**50Ω 0.3 to 4500 MHz Absorptive RF Switch with Internal Driver  
Single Supply Voltage, +3 V to +5 V**RF ELECTRICAL SPECIFICATIONS<sup>1</sup>, T<sub>AMB</sub> = +25°C, 50Ω, V<sub>DD</sub> = +5 V**

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		10		4500	MHz
Insertion Loss <sup>2,3</sup>	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 <sub>DD</sub>	+3.0		+5.0	V
Supply Current		50	200	μA
Control Voltage Low	0		+0.5	V
Control Voltage High	+0.7 V <sub>DD</sub>		V <sub>DD</sub>	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 <sub>IN</sub> = 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 RATINGS<sup>4</sup>

Parameter	Ratings
Operating Temperature	-55°C to +100°C
Storage Temperature	-55°C to +100°C
V <sub>DD</sub> , Supply Voltage	+2.7 V min., +5.5 V max.
Voltage Control	-0.2 V min., V <sub>DD</sub> 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





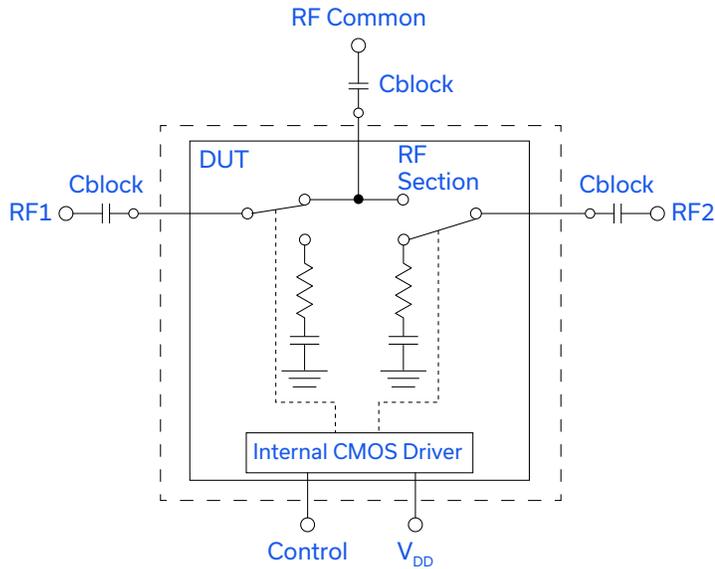
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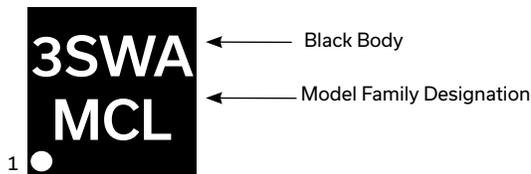
### CHARACTERIZATION TEST CIRCUIT



Frequency (MHz)	Cblock (Suggested Value)
0.3-500	0.1 μF
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](#)**

<b>Performance Data</b>	Data Table Swept Graphs
<b>Case Style</b>	DL805 Plastic package, exposed paddle, Lead Finish: Matte Tin
<b>Tape &amp; Reel</b>	F58
<b>Standard Quantities Available on Reel</b>	7" Reels with 1000 devices 13" Reels with 2000 or 4000 devices
<b>Suggested Layout for PCB Design</b>	PL-120A
<b>Evaluation Board</b>	TB-159A+
<b>Environmental Ratings</b>	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](http://www.minicircuits.com/terms/viewterm.html)

