**REPLACEMENT PART REFERENCE GUIDE, SWM-2-50DR+** 

**AN-80-014**

**ORIGINAL PART:** SWM-2-50DR+  
**REPLACEMENT PART:** M3SWA-2-50DRA+  

*Replacement Part has been judged by Mini-Circuits Engineering as a close replacement to Original Part.*

**MECHANICAL DIMENSIONS & PCB LAND PATTERN**

<table>
<thead>
<tr>
<th>ORIGINAL PART: SWM-2-50DR+</th>
<th>REPLACEMENT PART: M3SWA-2-50DRA+</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Image of ORIGINAL PART" /></td>
<td><img src="image2" alt="Image of REPLACEMENT PART" /></td>
</tr>
</tbody>
</table>

**Case Style DL1020**

**Outline Dimensions (inches / mm):**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>.103</td>
<td>.005</td>
<td>.136</td>
<td>.590</td>
<td>.050</td>
<td>.023</td>
<td>.043</td>
<td>.008</td>
<td>.024</td>
<td></td>
</tr>
</tbody>
</table>

**Case Style DL805**

**Outline Dimensions (inches / mm):**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.128</td>
<td>0.128</td>
<td>0.036</td>
<td>0.068</td>
<td>0.080</td>
<td>0.047</td>
<td>0.013</td>
<td>0.014</td>
<td>0.026</td>
<td></td>
</tr>
</tbody>
</table>

**Marking:**

- ORIGINAL PART: 2-50DR  
- REPLACEMENT PART: 3SWA

---

**Notes:**

a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.
Application Circuit

All RF connections must be DC blocked or held at 0V DC.

Application Circuit

Needs external blocking Capacitors on all RF ports
(Suggested value: 47 pF)

Pin Connections

<table>
<thead>
<tr>
<th>Function</th>
<th>Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF IN</td>
<td>6</td>
</tr>
<tr>
<td>RF OUT 1</td>
<td>1</td>
</tr>
<tr>
<td>RF OUT 2</td>
<td>4</td>
</tr>
<tr>
<td>TTL IN</td>
<td>2</td>
</tr>
<tr>
<td>+5V</td>
<td>5</td>
</tr>
<tr>
<td>-5V</td>
<td>7</td>
</tr>
<tr>
<td>TTL GND</td>
<td>3</td>
</tr>
<tr>
<td>GND</td>
<td>8</td>
</tr>
<tr>
<td>GND EXT</td>
<td>PADDLE</td>
</tr>
</tbody>
</table>

Pin Connections

<table>
<thead>
<tr>
<th>Function</th>
<th>Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF IN</td>
<td>6</td>
</tr>
<tr>
<td>RF OUT 1</td>
<td>1</td>
</tr>
<tr>
<td>RF OUT 2</td>
<td>4</td>
</tr>
<tr>
<td>CMOS CONTROL IN (Note 1)</td>
<td>2</td>
</tr>
<tr>
<td>+5V</td>
<td>5</td>
</tr>
<tr>
<td>No Connection (Note 2)</td>
<td>7</td>
</tr>
<tr>
<td>CMOS GND (Note 1)</td>
<td>3</td>
</tr>
<tr>
<td>GND</td>
<td>8</td>
</tr>
<tr>
<td>GND EXT</td>
<td>PADDLE</td>
</tr>
</tbody>
</table>

Notes: Pin Connections are same as in original part, except Pin 7 has no internal connection

1) Driver is CMOS compatible instead of TTL
2) In replacement situations, -5V can be applied to Pin 7 with no impact on performance

Notes:

a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.
CONCLUSIONS:

1) **FORM-FIT-FUNCTION COMPATIBLE**: 

Replacement part is not Form-Fit compatible. Customer PCB layout need to change plus external blocking Capacitors on RF ports are needed.

Following is a summary of Electrical changes/improvements:

Typical performance: See Paragraphs 2

Min/Max Specifications seen below,

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Original Part (SWM-2-50DR+)</th>
<th>Replacement Part (M3SWA-2-50DRA+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Power Supply (Vdd)</td>
<td>4.8 to 5.2V</td>
<td>+3V to +5.0V</td>
</tr>
<tr>
<td>Negative Power Supply(Vss)</td>
<td>-5.2 to -4.8V</td>
<td>Not Required</td>
</tr>
<tr>
<td>Control Input Low Voltage</td>
<td>0V min, 0.8V max</td>
<td>0V Min, 0.5 Max</td>
</tr>
<tr>
<td>Control Input High Voltage</td>
<td>2V min, 5V max.</td>
<td>0.7Vdd to Vdd</td>
</tr>
<tr>
<td>+5V Positive Supply Current (Idd)</td>
<td>9mA Max.</td>
<td>50 µA typ., 200 µA max</td>
</tr>
<tr>
<td>-5V Negative Supply Current (Iss)</td>
<td>9mA Max.</td>
<td>---</td>
</tr>
<tr>
<td>Control Current</td>
<td>High V, 5mA Max, Low V, 0.2mA Max</td>
<td>0.2uA typ., 10 uA max</td>
</tr>
<tr>
<td>Rise/Fall Time (10 to 90%)</td>
<td>5ns typ. 15ns Max</td>
<td>16 ns Typ.</td>
</tr>
<tr>
<td>Switching Time (turn on/off) 50% Control to 90% RF/10% RF</td>
<td>10ns typ. 20ns Max</td>
<td>29 ns Typ.</td>
</tr>
<tr>
<td>ESD HBM</td>
<td>Class 1C (1000 to &lt;2000V)</td>
<td>Class 1A (250 to &lt; 500V)</td>
</tr>
<tr>
<td>Absorptive</td>
<td>No</td>
<td>Yes, from 500-4500 MHz (See Paragraph 3)</td>
</tr>
<tr>
<td>DC Blocking Caps on RF ports</td>
<td>All RF connections must be DC blocked or held at 0V DC.</td>
<td>Needs external blocking Capacitors on all RF ports (Suggested value: 47 pF)</td>
</tr>
</tbody>
</table>

Notes:

a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.
### 2) PERFORMANCE COMPARISON CURVES: Original Part (Vdd = 4.6 & -4.6V, Vctrl = 0 & 4.6V)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>INSERTION LOSS</td>
<td>10</td>
<td>10</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>S-1 (dB)</td>
<td>100</td>
<td>100</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>2000</td>
<td>1000</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>0.6</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>S-2 (dB)</td>
<td>2000</td>
<td>2000</td>
<td>1.0</td>
<td>1.0</td>
<td>1.1</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>4500</td>
<td>4500</td>
<td>1.4</td>
<td>1.5</td>
<td>1.6</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

### Replacement Part (Vdd =5V, Vctrl = 0 & 3.7V)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>INSERTION LOSS</td>
<td>10</td>
<td>10</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>S-1 (dB)</td>
<td>100</td>
<td>100</td>
<td>0.6</td>
<td>0.6</td>
<td>0.7</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>1000</td>
<td>1000</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>0.6</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>S-2 (dB)</td>
<td>2000</td>
<td>2000</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>4500</td>
<td>4500</td>
<td>1.3</td>
<td>1.4</td>
<td>1.4</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

### Notes:

a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.
3) **PERFORMANCE COMPARISON CURVES: Original Part (Vdd = 4.6 & -4.6V, Vctrl = 0 & 4.6V)**

**Replacement Part (Vdd =5V, Vctrl = 0 & 3.7V)**

| Data of Replacement Part | Data of Original Part |

**Notes:**

- Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.
Notes:
a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.
1) **SWITCHING/RISE/FALL TIME COMPARISON**

**Original Part** (Vdd = 5 & -5V, Vctrl = 0 & 3.7V)

**Replacement Part** (Vdd = 5V, Vctrl = 0 & 3.7V)

Rise Time: 10 to 90% RF, Fall Time: 90% to 10% RF

Switching Time:
On Time 50% Control to 90%/10% RF, Fall Time 50% Control to 10% RF

---

**Notes:**
a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.
**APPLICATION NOTE**

**IMPORTANT NOTICE**

© 2015 Mini-Circuits

This document is provided as an accommodation to Mini-Circuits customers in connection with Mini-Circuits parts only. In that regard, this document is for informational and guideline purposes only. Mini-Circuits assumes no responsibility for errors or omissions in this document or for any information contained herein.

Mini-Circuits may change this document or the Mini-Circuits parts referenced herein (collectively, the “Materials”) from time to time, without notice. Mini-Circuits makes no commitment to update or correct any of the Materials, and Mini-Circuits shall have no responsibility whatsoever on account of any updates or corrections to the Materials or Mini-Circuits’ failure to do so.

Mini-Circuits customers are solely responsible for the products, systems, and applications in which Mini-Circuits parts are incorporated or used. In that regard, customers are responsible for consulting with their own engineers and other appropriate professionals who are familiar with the specific products and systems into which Mini-Circuits’ parts are to be incorporated or used so that the proper selection, installation/integration, use and safeguards are made. Accordingly, Mini-Circuits assumes no liability therefore.

In addition, your use of this document and the information contained herein is subject to Mini-Circuits’ standard terms of use, which are available at www.minicircuits.com/homepage/terms_of_use.html.

Mini-Circuits and the Mini-Circuits logo are registered trademarks of Scientific Components Corporation d/b/a Mini-Circuits. All other third-party trademarks are the property of their respective owners. A reference to any third-party trademark does not constitute or imply any endorsement, affiliation, sponsorship, or recommendation: (i) by Mini-Circuits of such third-party’s products, services, processes, or other information; or (ii) by any such third-party of Mini-Circuits or its products, services, processes, or other information.

Notes:

a. Suitability for model replacement within a particular system must be determined by and is solely the responsibility of the customer based on, among other things, electrical performance criteria, stimulus conditions, application, compatibility with other components and environmental conditions and stresses.