Silicon PIN Diode Switch Element

Features
- Supports up to 40 W Power
- Low Insertion Loss, 0.25 dB up to 2.7 GHz
- Medium Isolation, 11 dB up to 2.7 GHz
- RoHS* Compliant

Description
A broadband, high linearity, medium power series switch element in a 2.0 x 1.3 mm QFN package. This device is designed for WiMax, Wibro, WLAN, TD-SCDMA and other wireless infrastructure applications. It is also suited for 0.1 ~ 3 GHz applications with up to 40 watts of power.

Electrical Specifications: $T_A = +25^\circ C$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakdown Voltage</td>
<td>$I_R = 10 \mu A$</td>
<td>250</td>
<td>—</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>$I_F = 50 mA$</td>
<td>—</td>
<td>900</td>
<td>—</td>
<td>mV</td>
</tr>
<tr>
<td>Junction Capacitance</td>
<td>$V_R = -50 V, 1 MHz$</td>
<td>—</td>
<td>0.12</td>
<td>—</td>
<td>pF</td>
</tr>
<tr>
<td>Series Resistance</td>
<td>$I_F = 10 mA, 500 MHz$</td>
<td>—</td>
<td>2.0</td>
<td>1.4</td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td>$I_F = 50 mA, 500 MHz$</td>
<td></td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>$I_F = 10 mA, I_R = 6 mA , 50%$</td>
<td>—</td>
<td>700</td>
<td>—</td>
<td>ns</td>
</tr>
<tr>
<td>I-Region</td>
<td>I-Layer</td>
<td>—</td>
<td>40</td>
<td>—</td>
<td>µs</td>
</tr>
<tr>
<td>Insertion Loss</td>
<td>$I_F = 50 mA, 2.025 GHz$</td>
<td>—</td>
<td>0.12</td>
<td>0.20</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>$I_F = 50 mA, 2.3 - 2.7 GHz$</td>
<td></td>
<td>0.25</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>$I_F = 50 mA, 2.025 GHz$</td>
<td>15</td>
<td>25</td>
<td>—</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>$I_F = 50 mA, 2.3 - 2.7 GHz$</td>
<td>15</td>
<td>20</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Isolation</td>
<td>$V_R = 10 V, 2.025 GHz$</td>
<td>10</td>
<td>14</td>
<td>—</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>$V_R = 10 V, 2.3 - 2.7 GHz$</td>
<td>9</td>
<td>11</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

## Absolute Maximum Ratings\(^1,^2\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakdown Voltage</td>
<td>250 V</td>
</tr>
<tr>
<td>Forward Current</td>
<td>100 mA</td>
</tr>
<tr>
<td>Thermal Resistance</td>
<td>20°CW</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>+175°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-55°C to +150°C</td>
</tr>
<tr>
<td>Solder Temperature</td>
<td>+260°C per JEDEC STD-J-20C</td>
</tr>
</tbody>
</table>

1. Exceeding any one or combination of these limits may cause permanent damage to this device.
2. MACOM does not recommend sustained operation near these survivability limits.

## Typical RF Performance Curves @ +25°C

**Insertion Loss**

**Isolation**

**Input Return Loss**

**Series Resistance vs. Current, 500 MHz**
Bias Schematic (0.1 - 3.0 GHz)

```
+5V

RF Output Enable

U1
SN74ACT14
Schmitt-Trigger

RF Input

+5V

Q1
BSS84LT1

R1 75Ω, 1/2W, 1210 chip resistor
KOA Speer
RK73B2ETTD750J

R2 1.2KΩ, 1/10W, 603 chip resistor
KOA Speer
RK73B1JTD122J

R3 1.2KΩ, 1/2W, 1210 chip resistor
KOA Speer
RK73B2ETTD122J

C1,C2,C3
356pF, 250VDC Capacitor, 0603 pkg
ATC
ATC600S560JT250XT

C1,C2,C3
15pF, 250VDC Capacitor, 0603 pkg
ATC
ATC600S150JT250XT

C1,C2,C3
6.8pF, 250VDC Capacitor, 0603 pkg
ATC
ATC600S6R8JT250XT

C4,C5
0.1 µF, 50VDC Capacitor, 0805 pkg
ATC
ATC0805XR7104KT2AT

L1,L3
420nH, 340mA, 700MHz SRF Inductor
Coilcraft
0402AF-421XJLW

L2,L4
51nH, 330mA, 2.3GHz SRF, Inductor
Coilcraft
0402HP-51NXJLW

Q1
50V, 130mA, P-Channel MOSFET
ON SEMI
BSS84LT1

Q2
60V, 310mA, N-Channel MOSFET
ON SEMI
2N7002E

U1
Hex Schmitt-Trigger TTL Inverter
Texas Instruments
SN74ACT14

Z1
13V, 2%, 500mW Zener Diode
Philips
BZX79-B13

DC1
1W, 5V to 12V DC/DC Converter
V-Infinity
VBT1-S5-S12-SMT-AFM
```

For further information and support please visit: https://www.macom.com/support
Silicon PIN Diode Switch Element

**PCB Layout**

**Schematic**

**Outline (0805P)**

Notes:
1. Dimensions do not include mold flashing.
2. Burrs and dumber shall not exceed 0.002” per surface.
3. Lead co-planarity is 0.003” max.
MACOM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with MACOM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppels or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.