"High Frequency Ceramic Solutions"

433 MHz Impedance Matched Balun + LPF Integrated Front-End SMD Passive Component for SiLabs Si4455, Si4460, Si4461, Si4463, and Si4464 Chipsets

P/N 0433BM41A0019

General Specifications

<table>
<thead>
<tr>
<th>Part Number</th>
<th>0433BM41A0019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range(MHz)</td>
<td>424-444</td>
</tr>
<tr>
<td>Balanced Impedance</td>
<td>Si4455, Si4460, Si4461, Si4463, Si4464</td>
</tr>
<tr>
<td>Unbalanced impedance</td>
<td>50Ω (single ended)</td>
</tr>
</tbody>
</table>

Average Insertion Loss when connected to Si44XX chipset (Active OP Tx/Rx) | 0.9dB Typ@25C |

1.5dB max. (-45 to +85C)

Insertion Loss when component measured by itself (passive insertion loss) | 1.6dB Typ in Rx, 1.4dB Typ in Tx @25C |

2.2dB max. in Rx, 1.9dB max. in Tx (-45 to +85C)

<table>
<thead>
<tr>
<th>Attenuation (dB) (min.)</th>
<th>35 min. @ 2xf MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35 min. @ 3xf MHz</td>
</tr>
<tr>
<td></td>
<td>35 min. @ 4xf MHz</td>
</tr>
<tr>
<td></td>
<td>35 min. @ 5xf MHz</td>
</tr>
</tbody>
</table>

Phase Diff. (deg.) | 180° ± 10 |

VSWR @ BW | 2.0 max. |

Amplitude Difference (dB) | 2.0 max. |

Reel Quantity | 4,000 |

Operating Temperature | -40 to +85°C |

Recommended Storage Conditions for Unused product on T&R | +5 ~ +35°C, Humidity 45~75%RH, 18 months. |

Input Power | 500mW max. (CW) |

Part Number Explanation

P/N Suffix | Packing Style | Function |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Bulk</td>
<td>eg. 0433BM41A0019S</td>
</tr>
<tr>
<td>E</td>
<td>T &amp; R</td>
<td>eg. 0433BM41A0019E</td>
</tr>
</tbody>
</table>

Termination style | Ni/Sn |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Suffix = None</td>
<td>eg. 0433BM41A0019(E or S)</td>
</tr>
</tbody>
</table>

Mechanical Dimensions

<table>
<thead>
<tr>
<th>L</th>
<th>W</th>
<th>T</th>
<th>a1</th>
<th>a2</th>
<th>b</th>
<th>c</th>
<th>g</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.126 ± 0.008</td>
<td>0.098 ± 0.008</td>
<td>0.059 ± 0.006</td>
<td>0.022 ± 0.006</td>
<td>0.028 ± 0.008</td>
<td>0.004 min.</td>
<td>0.012 ± 0.008</td>
<td>0.018 ± 0.006</td>
<td>0.039 ± 0.008</td>
</tr>
<tr>
<td>3.20 ± 0.20</td>
<td>2.50 ± 0.20</td>
<td>1.50 ± 0.15</td>
<td>0.55 ± 0.15</td>
<td>0.70 ± 0.20</td>
<td>0.1 min.</td>
<td>0.30 ± 0.20</td>
<td>0.45 ± 0.15</td>
<td>1.00 ± 0.20</td>
</tr>
</tbody>
</table>

Terminal Configuration

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
<th>No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>5</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>Ant</td>
<td>6</td>
<td>TX</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>7</td>
<td>RXN</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>8</td>
<td>RXP</td>
</tr>
</tbody>
</table>

DC Connection for Pins

(1) Pin1 – Pin3 – Pin4 – Pin5
(2) Pin2 – Pin7– Pin8

Do you need to download the reference design/layout files? Go to: https://www.johansontechnology.com/silabs

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Montaging Considerations

* Line/Via width should be designed to match 50Ohm characteristic impedance, depending on PCB material and thickness.

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Measuring Diagram

**Tx Mode**

- Port 4
  - (42.2-j81.6 Ω)
  - GND GND
- Port 1
  - (50 Ω)
  - GND

**Rx Mode**

- Port 4
  - (3.5k // 1.65pF)
  - GND GND
- Port 1
  - (50 Ω)
  - GND

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Measuring Diagram (cont.)

**Tx Mode:**
- Port1: Antenna Port
- Port1 Terminate impedance: 50ohm
- Ports 2 and 3: Rx Balanced Port
- Port 2 and 3 Terminate impedance: 1/2 x (the loading impedance ZIC,RX off of Si4455)
- Port4: Tx Port
- Port4 Terminate impedance: Complex conjugate to ZIC,TX on of Si4455

IL = S41  
RL = S11 / S44

**Rx Mode:**
- Port 1: Antenna Port
- Port1 Terminate impedance: 50ohm
- Ports 2 and 3: Rx Balanced Port
- Port 2 and 3 Terminate impedance: Complex conjugate to 1/2 x (Balance impedance of ZIC,RX on of Si4455)
- Port4: Tx Port
- Port4 Terminate impedance: The loading impedance ZIC,TX off of Si4455

IL = Sds21  
RL = Sss11 / Sdd22

Amp_balance = dB(S(3,1)/S(2,1))

Typical Electrical Characteristics (T=25oC)

**TX mode:**

Insertion and Return Loss

```
freq, GHz
0.3  1.3  2.3  3.3
-60  -50  -40  -30  -20  -10   0
RL S44  RL S11  IL S41
```

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Typical Electrical Characteristics (T=25°C)

RX mode:

Insertion and Return Loss

Amplitude and Phase Balance

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<table>
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<tr>
<th>Application Notes, Layout Files, and more</th>
<th><a href="http://www.johansontechnology.com/silabs">www.johansontechnology.com/silabs</a></th>
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<tbody>
<tr>
<td>RoHS Compliance</td>
<td><a href="http://www.johansontechnology.com/technical-notes/rohs-compliance.html">www.johansontechnology.com/technical-notes/rohs-compliance.html</a></td>
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<td>Soldering Information</td>
<td><a href="http://www.johansontechnology.com/ipcsoldering-profile">www.johansontechnology.com/ipcsoldering-profile</a></td>
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<tr>
<td>Antenna layout and tuning techniques</td>
<td><a href="http://www.johansontechnology.com/tuning">www.johansontechnology.com/tuning</a></td>
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<td>Antenna layout review, tuning, and characterization services</td>
<td><a href="http://www.johansontechnology.com/ipcantennaservices">www.johansontechnology.com/ipcantennaservices</a></td>
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<tr>
<td>MSL Info</td>
<td><a href="http://www.johansontechnology.com/technical-notes/msl-rating">www.johansontechnology.com/technical-notes/msl-rating</a></td>
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<td>Recommended Storage Condition and Max Shelf Life</td>
<td><a href="http://www.johansontechnology.com/recommended-storage-conditions">www.johansontechnology.com/recommended-storage-conditions</a></td>
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<td>Packaging information</td>
<td><a href="http://www.johansontechnology.com/tape-reel-packaging">www.johansontechnology.com/tape-reel-packaging</a></td>
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