Voltage Variable Attenuator 824 - 960 MHz

Features

- 25 dB Attenuation Range
- High IP3
- Excellent Linearity Performance
- Low Cost/High Performance
- 50 Ohm Nominal Impedance
- Lead-Free SOT-25 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS* Compliant Version of AT65-0009

Description

M/A-COM's MAATCC0013 is an integrated voltage variable attenuator containing two PIN diodes and a passive glass quadrature hybrid. This device is packaged in a 5 leaded SOT plastic surface mount package. Maximum attenuation is typically achieved at 3.5 V bias using the suggested bias circuit. The MAATCC0013 is ideally suited for GSM communication applications requiring variable attenuation in the 824 to 960 MHz bandwidth.

Ordering Information

| Part Number | Package |
|---------------|-------------------|
| MAATCC0013 | Bulk Packaging |
| MAATCC0013TR | 1000 piece reel |
| MAATCC0013-TB | Sample Test Board |

Note: Reference Application Note M513 for reel size information.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

Functional Diagram and Bias Circuitry



Pin Configuration

| Pin No. | Function | |
|---------|-----------------------|--|
| 1 | RFIN, V _B | |
| 2 | GND | |
| 3 | RFOUT, V _B | |
| 4 | GND | |
| 5 | GND | |

External Circuitry Parts¹

| Part | Value | Purpose | |
|-----------------|--------------------------|----------|--|
| C1 | 390 pF | DC Block | |
| C2 | 390 pF DC Block | | |
| C3 | 390 pF By-pass | | |
| C4 | 390 pF By-pass | | |
| L1 | 180 nH | RF Choke | |
| L2 | 180 nH RF Choke | | |
| R1 | 10 KOhm Current Limiting | | |
| C5 ² | 1.5 pF | RF Tune | |
| C6 ² | 1.5 pF RF Tune | | |

1. All external circuitry parts are readily available, low cost surface mount components (.060 in. x .030 in. or .080 in. x .050 in.).

 See Application Note MA-C-05010008A for external tuning capacitor values to suit specific Communication Bandwidths. Insertion Loss will vary depending on tuning capacitor value chosen.

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1

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Rev. V3

Electrical Specifications: $T_A = 25^{\circ}C$, $Z_0 = 50\Omega$, F = 824 to 960 MHz

| Parameter | Test Conditions | Units | Min | Тур | Max |
|---------------------------------------|--|----------------|-----|-------------------|-----|
| Insertion Loss | V _B = 0 V | dB | — | 1.7 | 2.1 |
| VSWR | | Ratio | — | 1.7 | 2.2 |
| Attenuation Flatness vs. Frequency | 0 - 10 dB 0 - 20 dB 0 - 30 dB | dB dB dB | | 1.3 1.3 2.5 | |
| Switching Speed | 50% control to 90%/10% RF | usec | — | 7.0 | — |
| Input IP3 | Two Tones 900 MHz, 905 MHz, +5 dBm V_B = 0 V | dBm | _ | 40 | _ |
| Input IP2 | Two Tones 900 MHz, 905 MHz, +5 dBm V_B = 0 V | dBm | — | 34 | — |
| Attenuation | I _B = 0.30 to 0.45 mA | dB | 25 | 28 | — |

Absolute Maximum Ratings ^{3,4}

| Parameter | Absolute Maximum |
|-----------------------|------------------|
| Max Input Power | +27 dBm |
| Operating Voltage | +5 V |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +125°C |

Exceeding any one or combination of these limits may 3. cause permanent damage to this device.

M/A-COM does not recommend sustained operation near 4. these survivability limits.

Please observe the following precautions to avoid

GMIC Circuits are sensitive to electrostatic

discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should

be used when handling these devices.

Recommended PCB Configuration⁵



^{5.} Circuit Material = FR-406, 0.031 inches thick. Line Width = 0.025 inches, Line Spacing = 0.0056 inches

Handling Procedures

Static Sensitivity

damage:

For further information and support please visit:

²

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Typical Performance Curves

Attenuation vs. Voltage with 1.5 pF Tuning Cap @ +25°C



Attenuation vs. Voltage with 1.5 pF Tuning Cap @ +85°C



Attenuation vs. Voltage with 1.5 pF Tuning Cap @ -40°C



Attenuation vs. Freq. With 1.5 pF Tuning Cap @ +25°C



Attenuation vs. Freq. With 1.5 pF Tuning Cap @ +85°C



Attenuation vs. Freq. With 1.5 pF Tuning Cap @ -40°C



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³



Voltage Variable Attenuator 824 - 960 MHz

Typical Performance Curves

VSWR vs. Freq. With 1.5 pF Tuning Cap @ +25°C



VSWR vs. Freq. With 1.5 pF Tuning Cap @ +85°C



VSWR vs. Freq. With 1.5 pF Tuning Cap @ -40°C



4

Loss vs. Frequency @ +25°C No Tuning Cap (See Note 2)



Loss vs. Frequency @ +85°C No Tuning Cap (See Note 2)



Loss vs. Frequency @ -40°C No Tuning Cap (See Note 2)



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Rev. V3



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Rev. V3

Lead-Free, SOT-25[†]



[†] Reference Application Note M538 for lead-free solder reflow recommendations.

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Rev. V3

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6