

Features

- Linearizes PIN Diode Attenuators Over a Wide Attenuation Range
- Output Currents up to 12 mA
- Operates with a Single Supply Voltage of +3V to +12V
- Low Quiescent Currents
- Single Control Voltage
- Test Boards are Available
- Tape and Reel Packaging Available
- SOW-16 Package

Description

M/A-COM's DR65-0002 is a break point free driver that produces a logarithmic output current suitable for linearizing PIN diode based shunt attenuators. This driver, in conjunction with customer defined external components, produces a linear transfer function (dB/V) between the input control voltage of the driver and the attenuation output of the PIN attenuator. The DR65-0002 has been optimized for linearizing M/A-COM's AT10-0009 or AT10-0017 attenuators, but will function well with most types of cathode grounded, PIN attenuators. The driver is packaged in a SOW-16 package for commercial SMT applications. A typical schematic for a 30 dB, 7.5 dB/V linear attenuator is shown in Figure 1.

Circuit Description:

(Reference Figures 1 and 2)

The input divider, R1 and the sum of R2 and R3, sets the overall transfer function of the circuit. To increase the transfer function, decrease the Control Voltage and the value of R1. Varying the value of R4 will optimize the linearity of the circuit. One can achieve a very linear transfer function (less than ± 1 dB/V) by driving the attenuator over a smaller portion of its dynamic range. In the case of the AT10-0009 and AT10-0017 attenuators, this would be limited to a dynamic range of 28 and 25 dB, respectively. Temperature compensation is a function temperature coefficient of the thermistor, R3, and the ratio of R2 to R3, and can only be optimized once the transfer function and linearity component values have been established.

Ordering Information

| Part Number | Package |
|---------------|--|
| DR65-0002 | Bulk Packaging |
| DR65-0002TR | 1000 piece reel |
| DR65-0002-TBG | Test Board with Circuit per Figure 1 (AT10-0009, GSM Attenuator) |
| DR65-0002-TBP | Test Board with Circuit per Figure 1 (AT10-0017, PCS Attenuator) |

Note: Reference Application Note M513 for reel size information.

Pin Configuration

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|-------------------|
| 1 | N/C | 9 | N/C |
| 2 | N/C | 10 | N/C |
| 3 | REF | 11 | N/C |
| 4 | INPUT + | 12 | OUTPUT |
| 5 | GND | 13 | N/C |
| 6 | N/C | 14 | + V _{CC} |
| 7 | N/C | 15 | N/C |
| 8 | N/C | 16 | N/C |

Figure 1. Linear Attenuator Schematic

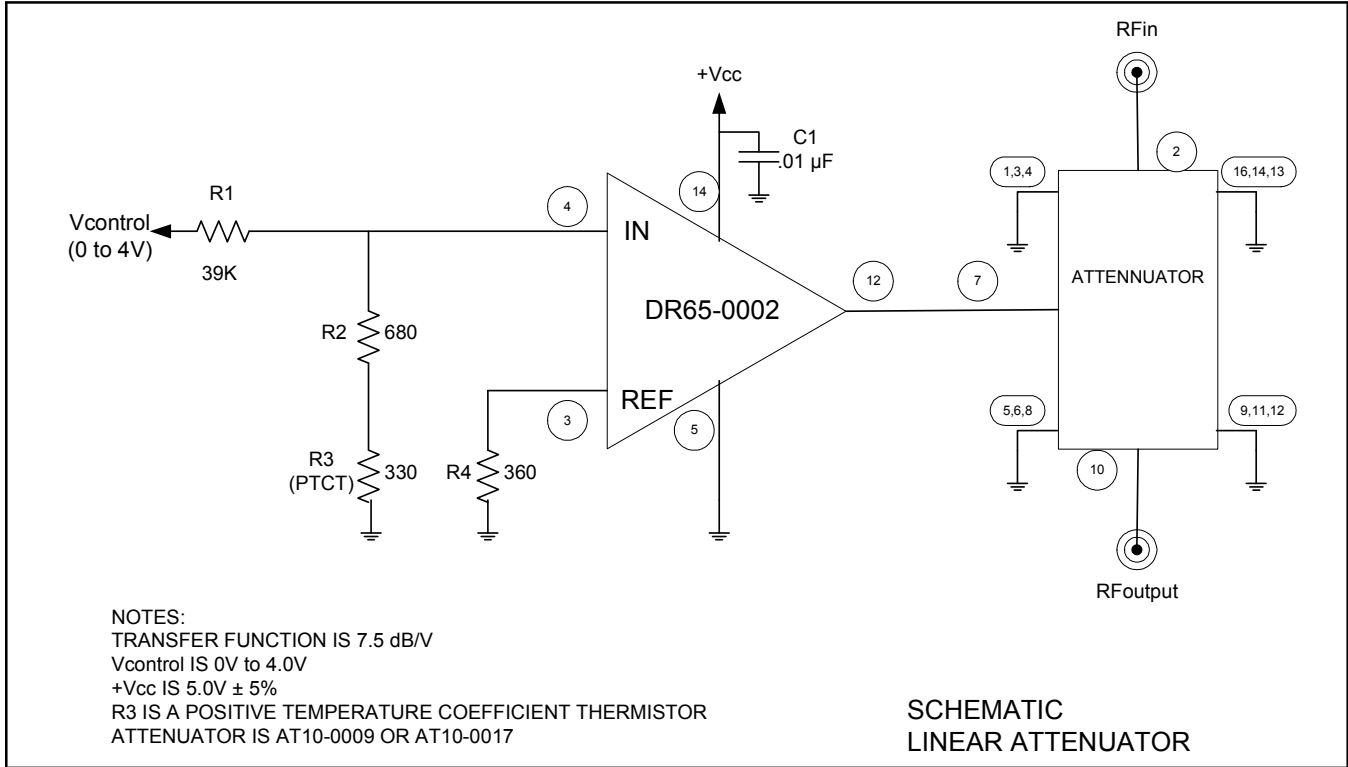
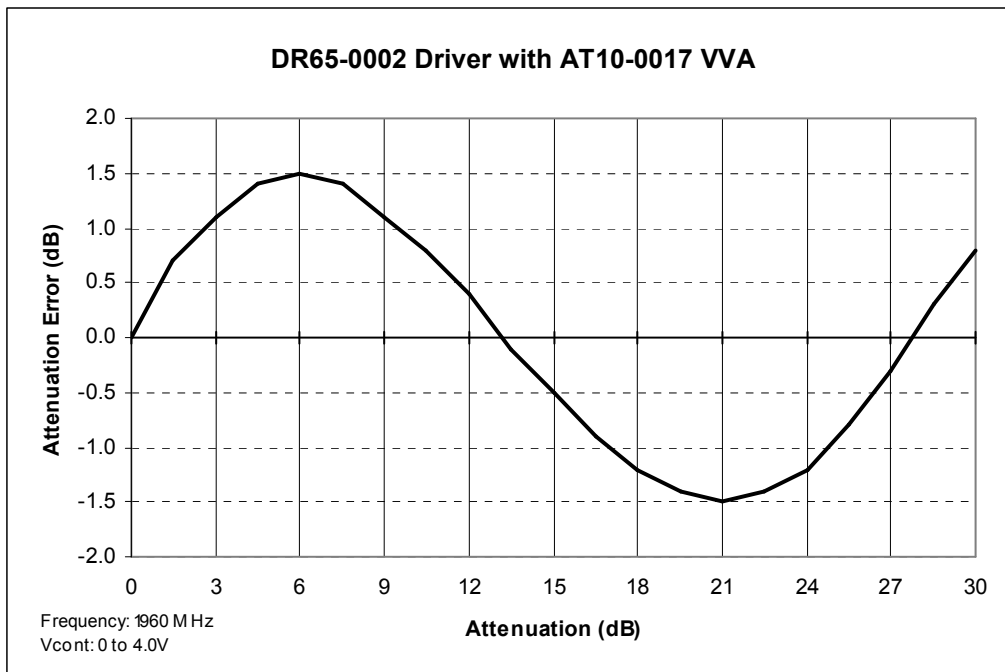


Figure 2. Typical Attenuation Error



ADVANCED: Data Sheets contain information regarding a product M/A-COM is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.

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Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_0 = 50\Omega$

| Parameter | Test Conditions | Units | Min | Typ | Max |
|------------------------------------|-----------------------|-------|-----|-------|-----|
| Output Drive Current | Load Dependent | mA | 10 | — | — |
| +V _{CC} Supply Range | — | V | 3.0 | 5.0 | 12 |
| +V _{CC} Supply Tolerance | — | % | — | 5 | — |
| +V _{CC} Quiescent Current | No Load | mA | — | 1.0 | 2.0 |
| Linearity | Application Dependent | dB | ± 1 | ± 2.5 | — |
| Transfer Function | Application Dependent | dB/V | 3 | 7.5 | 10 |
| Settling Time | 50% Ctl to 90%/10% RF | µs | — | 50 | — |

Absolute Maximum Ratings ^{1,2}

| Parameter | Absolute Maximum |
|---------------------------|----------------------|
| +V _{CC} | +20 V |
| Input + | ± 5 V |
| REF | ± 5 V |
| Output Current | 20 mA |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +125°C |
| Package Power Dissipation | 150 mW |
| Lead Temperature | 300°C for 10 seconds |

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

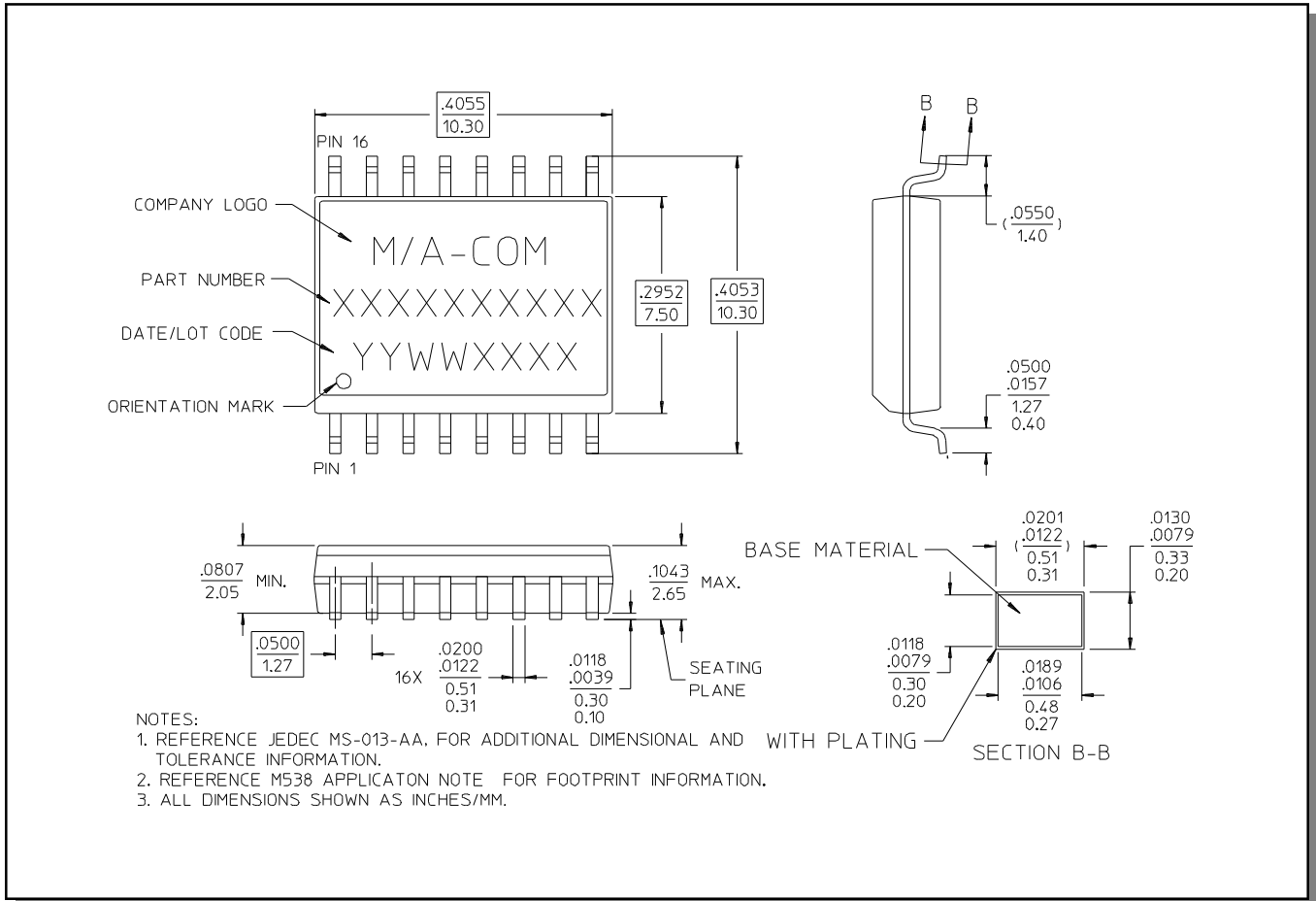
Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Gallium Arsenide Integrated 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.

SOW-16[†]



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