

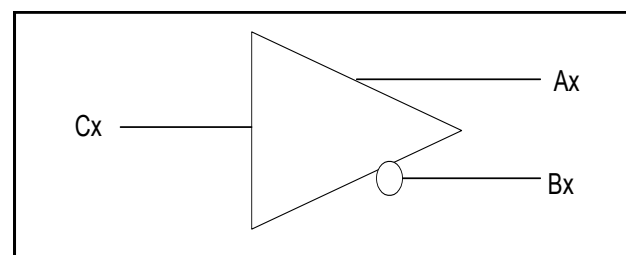
## Quad Driver for GaAs FET Switches and Attenuators

Rev. V3

## Features

- High Speed CMOS Technology
- Complementary Outputs
- Positive Voltage Control
- Low Power Dissipation
- Plastic SOIC Package for SMT Applications
- Tape and Reel Packaging Available
- Lead-Free SOIC-16 Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of DR65-0001

## Logic Diagram



## Description

M/A-COM's MADRC0004 is a Quad channel driver used to translate TTL control inputs into gate voltages for GaAs FET microwave switches and attenuators. High speed analog CMOS technology is utilized to achieve low power dissipation at moderate to high speeds, encompassing most microwave switching applications.

## Ordering Information

| Part Number | Package         |
|-------------|-----------------|
| MADRC0004   | Bulk Packaging  |
| MADRC0004TR | 1000 piece reel |

Note: Reference Application Note M513 for reel size information.

## Pin Configuration

| Pin No. | Function        | Pin No. | Function |
|---------|-----------------|---------|----------|
| 1       | A3              | 9       | C2       |
| 2       | B3              | 10      | C1       |
| 3       | A4              | 11      | GND      |
| 4       | B4              | 12      | GND      |
| 5       | V <sub>EE</sub> | 13      | A1       |
| 6       | V <sub>CC</sub> | 14      | B1       |
| 7       | C4              | 15      | A2       |
| 8       | C3              | 16      | B2       |

## Guaranteed Operating Ranges

| Symbol                                | Parameter <sup>1</sup>          | Unit | Min  | Typical | Max  |
|---------------------------------------|---------------------------------|------|------|---------|------|
| V <sub>CC</sub>                       | Positive DC Supply Voltage      | V    | 4.5  | 5.0     | 5.5  |
| V <sub>EE</sub>                       | Negative DC Supply Voltage      | V    | -5.5 | -5.0    | -4.5 |
| T <sub>A</sub>                        | Operating Ambient Temperature   | °C   | -40  | +25     | +85  |
| I <sub>OH</sub>                       | DC Output Current - HIGH        | mA   | —    | —       | -1.0 |
| I <sub>OL</sub>                       | DC Output Current - LOW         | mA   | —    | —       | 1.0  |
| T <sub>rise</sub> , T <sub>fall</sub> | Maximum Input Rise or Fall Time | nS   | —    | —       | 500  |

1. All voltages are relative to GND.

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

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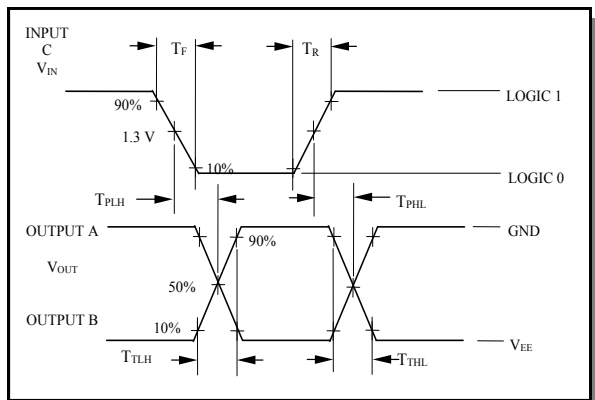
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## AC &amp; DC Characteristics Over Guaranteed Operating Range

| Symbol             | Parameter                                    | Test Conditions                                                      | Units         | Min   | Typ | Max            |
|--------------------|----------------------------------------------|----------------------------------------------------------------------|---------------|-------|-----|----------------|
| $V_{IH}$           | Input HIGH Voltage                           | Guaranteed HIGH Input Voltage                                        | V             | 2.0   | —   | -              |
| $V_{IL}$           | Input LOW Voltage                            | Guaranteed LOW Input Voltage                                         | V             | -     | —   | 0.8            |
| $V_{OH}$           | Output HIGH Voltage                          | $I_{OH} = -1 \text{ mA}$ $V_{EE} = \text{Max}$                       | V             | - 0.1 | —   | -              |
| $V_{OL}$           | Output LOW Voltage                           | $I_{OL} = 1 \text{ mA}$ $V_{EE} = \text{Max}$                        | V             | —     | —   | $V_{EE} + 0.1$ |
| $I_{IN}$           | Input Current                                | $V_{IN} = V_{CC}$ or GND $V_{EE} = \text{Min}$                       | $\mu\text{A}$ | -10   | 0   | 10             |
| $I_{CC}$           | Quiescent Supply Current                     | $V_{CC} = \text{Max}$ $V_{EE} = \text{Min}$ $V_{IN} = V_{CC}$ or GND | $\mu\text{A}$ | —     | —   | 400            |
| $\Delta I_{CC}$    | Additional Supply Current, per TTL Input pin | $V_{CC} = \text{Max}$ $V_{IN} = V_{CC} - 2.1 \text{ V}$              | mA            | —     | —   | 1.0            |
| $T_{PHL}, T_{PLH}$ | Propagation Delay                            | Guaranteed $-40^\circ \text{ C}$ to $+85^\circ \text{ C}$            | nS            | —     | —   | 50             |
| $T_{THL}, T_{TLH}$ | Output Transition Time                       | Guaranteed $-40^\circ \text{ C}$ to $+85^\circ \text{ C}$            | nS            | —     | —   | 25             |
|                    | Delay Skew, Output A to Output B             | Guaranteed $-40^\circ \text{ C}$ to $+85^\circ \text{ C}$            | nS            | —     | —   | 8              |

## Switching Waveforms



Note: See Switching Wave Forms for the definition of the switching terms. Supplies must be by-passed with .01  $\mu\text{F}$  Capacitors.

Note: Unused inputs must be tied to Ground

Absolute Maximum Ratings<sup>2,3</sup>

| Parameter             | Absolute Maximum                                |
|-----------------------|-------------------------------------------------|
| $V_{CC}$              | - .5V to + 6.0 V                                |
| $V_{EE}$              | - 6.0 V to - .5 V                               |
| $V_{CC} - V_{EE}$     | 12 V                                            |
| $V_{IN}^4$            | $V_{CC} + .5 \text{ V}$                         |
| $V_{OUT}$             | $V_{EE} - .5 \text{ V}$                         |
| Storage Temperature   | $-65^\circ \text{ C}$ to $+150^\circ \text{ C}$ |
| Operating Temperature | $-40^\circ \text{ C}$ to $+85^\circ \text{ C}$  |

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- M/A-COM does not recommend sustained operation near these survivability limits.
- Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

## Handling Procedures

Please observe the following precautions to avoid damage:

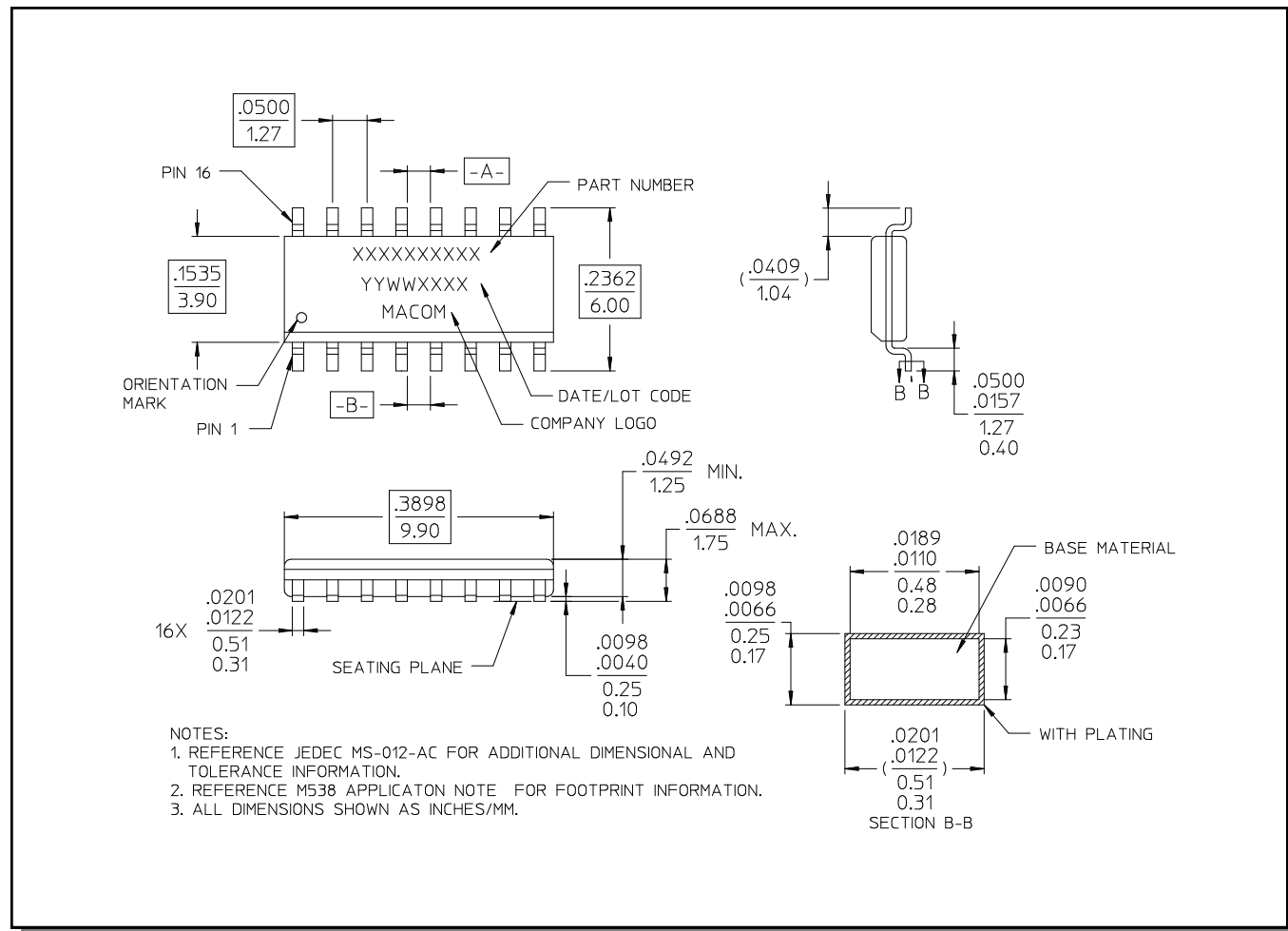
## Static Sensitivity

Silicon 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.

## Truth Table

| Input | Outputs  |          |
|-------|----------|----------|
| $C_X$ | $A_X$    | $B_X$    |
| 0     | $V_{EE}$ | GND      |
| 1     | GND      | $V_{EE}$ |

### Lead-Free, SOIC-16<sup>†</sup>



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.

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