

Guaranteed Operating Ranges ^{4,5,8}

| Symbol | Parameter | Unit | Min. | Typ. | Max. |
|----------------------|-----------------------------------|------|-------|----------|----------|
| V_{CC} | Positive DC Supply Voltage | V | 4.5 | 5.0 | 5.5 |
| V_{EE} | Negative DC Supply Voltage | V | -10.5 | -5.0 | -4.5 |
| $V_{OPT}^{6,7}$ | Optional DC Output Supply Voltage | V | 0 | — | V_{CC} |
| $V_{OPT} - V_{EE}$ | Negative Supply Voltage Range | V | 4.5 | Note 6,7 | 16.0 |
| $V_{CC} - V_{EE}$ | Positive to negative Supply Range | V | 9.0 | 10.0 | 16.0 |
| T_{OPER} | Operating Temperature | °C | -40 | +25 | +85 |
| I_{OH} | DC Output Current - High | mA | -50 | — | — |
| I_{OL} | DC Output Current - Low | mA | — | — | 50 |
| T_{rise}, T_{fall} | Maximum Input Rise or Fall Time | ns | — | — | 500 |

4. Unused logic inputs must be tied to either GND or V_{CC} .
5. All voltages are relative to GND.
6. V_{OPT} is grounded in most cases when FETs are driven. To improve the intermodulation performance and the 1 dB compression point of GaAs control devices at low frequencies, V_{OPT} can be increased to between 1.0 and 2.0V. The nonlinear characteristics of the GaAs control devices will approximate performance at 500 MHz. It should be noted that the control current that is on the GaAs MMICs will increase when positive controls are applied.
7. When this driver is used to drive PIN diodes, V_{OPT} is often set to +5.0V, with V_{EE} set to -5.0V.
8. 0.01 uF decoupling capacitors are required on the power supply lines.

Truth Table

| Input | Outputs | |
|-----------|-----------|-----------|
| | A | B |
| Logic "0" | V_{EE} | V_{OPT} |
| Logic "1" | V_{OPT} | V_{EE} |

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.

DC Characteristics over Guaranteed Operating Range

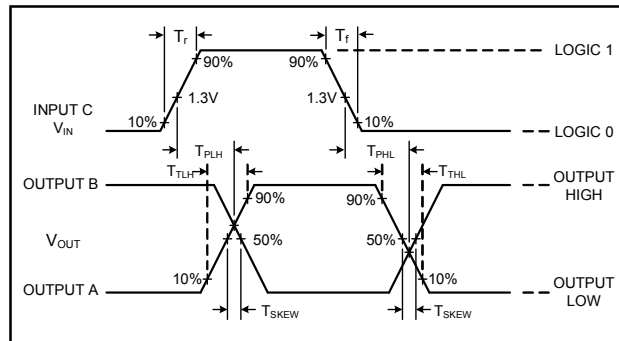
| Symbol | Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|-----------------|---|--|---------------|-----------------|------|----------------|
| V_{IH} | Input High Voltage | Guaranteed High Input Voltage | V | 2.0 | — | — |
| V_{IL} | Input Low Voltage | Guaranteed Low Input Voltage | V | — | — | 0.8 |
| V_{OH} | Output High Voltage | $I_{OH} = -1 \text{ mA}$ | V | $V_{OPT} - 0.1$ | — | — |
| V_{OL} | Output Low Voltage | $I_{OL} = 1 \text{ mA}$ | V | — | — | $V_{EE} + 0.1$ |
| I_{IN} | Input Leakage Current | $V_{IN} = V_{CC} \text{ or GND}, V_{EE} = \text{min}, V_{CC} = \text{max}, V_{OPT} = \text{min or max}$ | μA | -1 | — | 1 |
| R_{NFET} | Output Resistance NFET On (to V_{EE}) | $V_{CC} = 5.0\text{V}, V_{EE} = -5.0\text{V}, V_{OPT} = 5.0\text{V}, V_{OUT} = -4.9\text{V} +25^\circ\text{C}$ | Ω | — | 30 | — |
| R_{PFET} | Output Resistance PFET On (to V_{OPT}) | $V_{CC} = 5.0\text{V}, V_{EE} = -5.0\text{V}, V_{OPT} = 5.0\text{V}, V_{OUT} = 4.9\text{V} +25^\circ\text{C}$ | Ω | — | 30 | — |
| I_{CC} | Quiescent Supply Current | $V_{IN} = V_{CC} \text{ or GND}, V_{EE} = -10.5\text{V}, V_{CC} = 5.5\text{V}, V_{OPT} = 5.5\text{V}, \text{No Output Load}$ | μA | — | 1 | — |
| ΔI_{CC} | Additional Supply Current (per TTL Input pin) | $V_{CC} = \text{max}, V_{IN} = V_{CC} - 2.1\text{V}$ | mA | — | 1 | — |
| I_{EE} | Quiescent Supply Current | $V_{IN} = V_{CC} \text{ or GND}, V_{EE} = -10.5\text{V}, V_{CC} = 5.5\text{V}, V_{OPT} = 5.5\text{V}, \text{No Output Load}$ | μA | — | 1 | — |
| I_{OPT} | Quiescent Supply Current | $V_{IN} = V_{CC} \text{ or GND}, V_{EE} = -10.5\text{V}, V_{CC} = 5.5\text{V}, V_{OPT} = 5.5\text{V}, \text{No Output Load}$ | μA | — | 1 | — |

AC Characteristics Over Guaranteed Operating Range⁹

| Symbol | Parameter | Typical performance | | | Unit |
|------------|---------------------------------------|---------------------|-------|-------|------|
| | | -40°C | +85°C | +85°C | |
| T_{PLH} | Propagation Delay | 20 | 22 | 25 | ns |
| T_{PHL} | Propagation Delay | 20 | 22 | 25 | ns |
| T_{TLH} | Output Transition Time (Rising Edge) | 5 | 5 | 8 | ns |
| T_{THL} | Output Transition Time (Falling Edge) | 4 | 4 | 5 | ns |
| T_{skew} | Delay Skew | 2.5 | 2.5 | 2.5 | ns |
| PRF (max) | 50% Duty Cycle | DC | — | 10 | MHz |
| C_{IN} | Input Capacitance | 5 | 5 | 5 | pF |

9. $V_{CC} = +4.5V$, $V_{EE} = -4.5V$, $V_{OPT} = 0V$ or $+4.5V$, $C_L = 25$ pF, T_{rise} , $T_{fall} = 6$ ns

Switching Waveforms

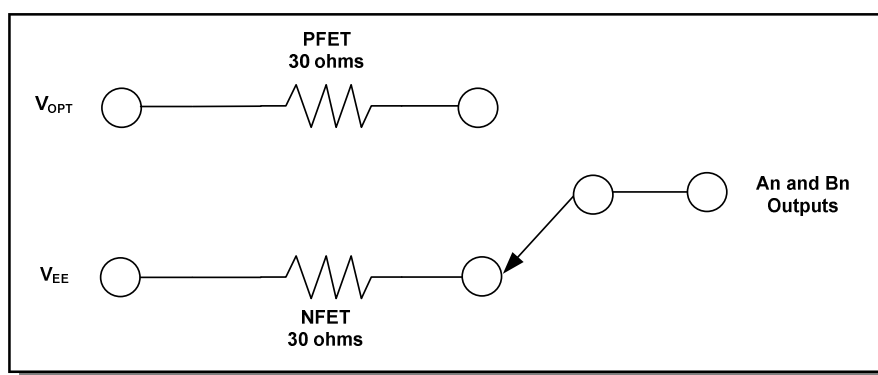


Absolute Maximum Ratings¹¹

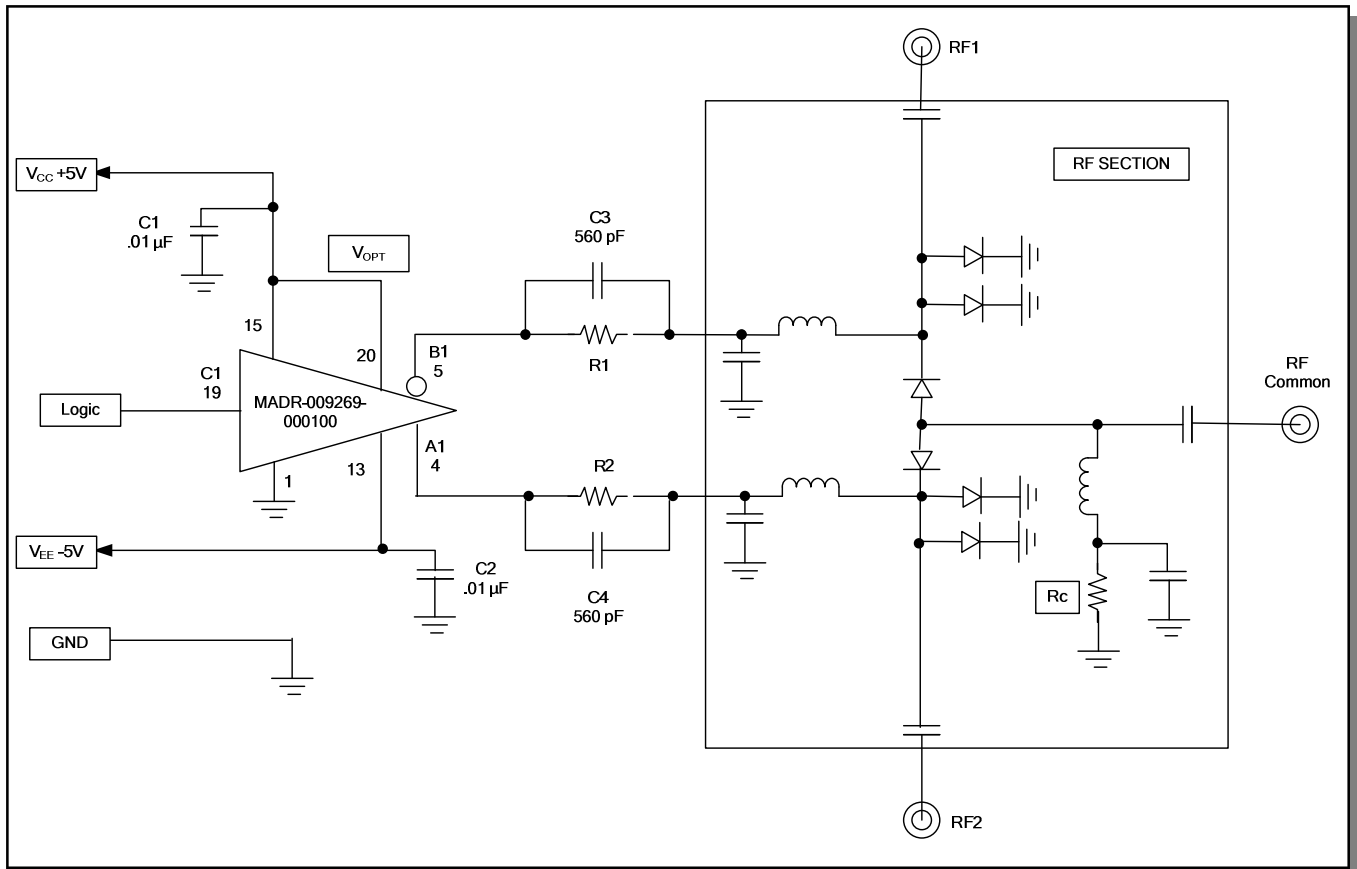
| Symbol | Parameter | Min | Max | Unit |
|---------------------|---|-----------------|-----------------|------|
| V_{CC} | Positive DC Supply Voltage | -0.5 | 7.0 | V |
| I_{CC} | Positive DC Supply Current ($-0.5V \leq V_{IN} \leq 0.8V$; $2.0V \leq V_{IN} \leq V_{CC} + 0.5V$; $V_{CC} - V_{IN} \leq 7.0V$) | — | 20 | mA |
| V_{EE} | Negative DC Supply Voltage | -11.0 | 0.5 | V |
| I_{EE} | Negative DC Supply Current (per Output) ¹² | -60 | — | mA |
| V_{OPT} | Optional DC Output Supply Voltage | -0.5 | Note 13 | V |
| I_{OPT} | Optional DC Output Supply Current (per Output) ¹² | — | 60 | mA |
| $V_{OPT} - V_{EE}$ | Output to Negative Supply Voltage Range | -0.5 | 18.0 | V |
| $V_{CC} - V_{EE}$ | Positive to Negative Supply Voltage Range | -0.5 | 18.0 | V |
| V_{IN} | DC Input Voltage | -0.5 Note 14 | $V_{CC} + 0.5$ | V |
| V_O | DC Output Voltage | $V_{EE} - 0.5$ | $V_{OPT} + 0.5$ | V |
| P_D ¹⁵ | Power Dissipation in Still Air | — | 500 | mW |
| T_{OPER} | Operating Temperature | -55 | 125 | °C |
| T_{STG} | Storage Temperature | -65 | 150 | °C |
| ESD | ESD Sensitivity | 2.0 | — | kV |

11. All voltages are referenced to GND. All inputs and outputs incorporate latch-up protection structures.
12. The maximum I_{EE} and I_{OPT} are specified under the condition of $V_{CC} = 5.5V$, $V_{EE} = -5.5V$, $V_{OPT} = 5.5V$, and the total power dissipation is within 500 mW in still air.
13. The absolute maximum rating for V_{OPT} is $V_{CC} + 0.5V$, or $+7.0V$, whichever is less.
14. If $V_{CC} \geq 6.5V$, then the minimum for V_{IN} is $V_{CC} - 7.0V$.
15. Derate $-7 \text{ mW}/^\circ\text{C}$ from 65°C to 85°C .

Equivalent Output Circuit for A and B Outputs (50 mA load at 25°)



Typical Application for a SPDT Switch

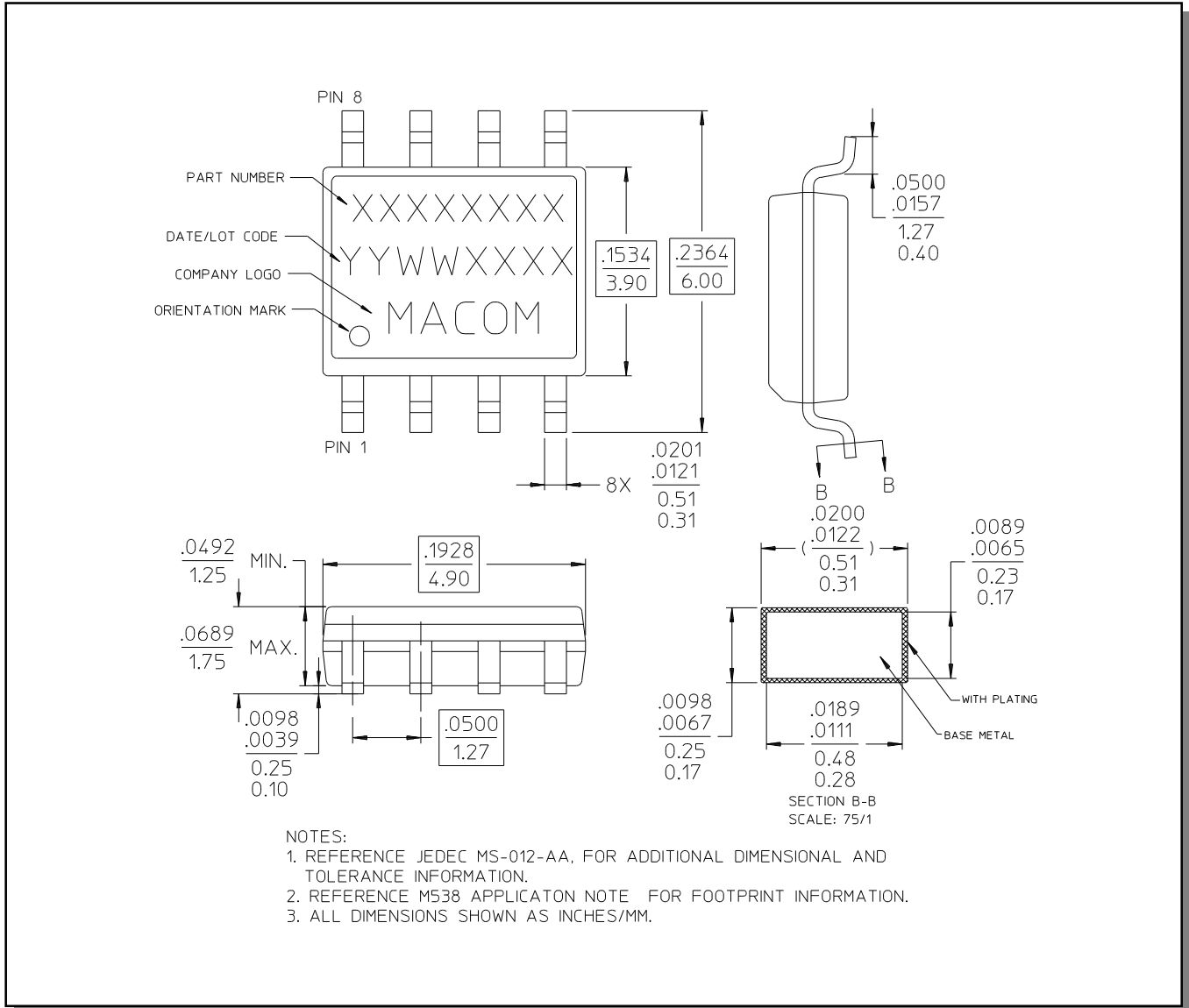


Description of Circuit

The MADR-009269-000100 provides a pair of complementary outputs that are each capable of driving a maximum of ± 50 mA into a load. In addition, with proper capacitor selection (C3 & C4) used in parallel with the current setting resistor (R1 & R2), additional spiking current can be achieved.

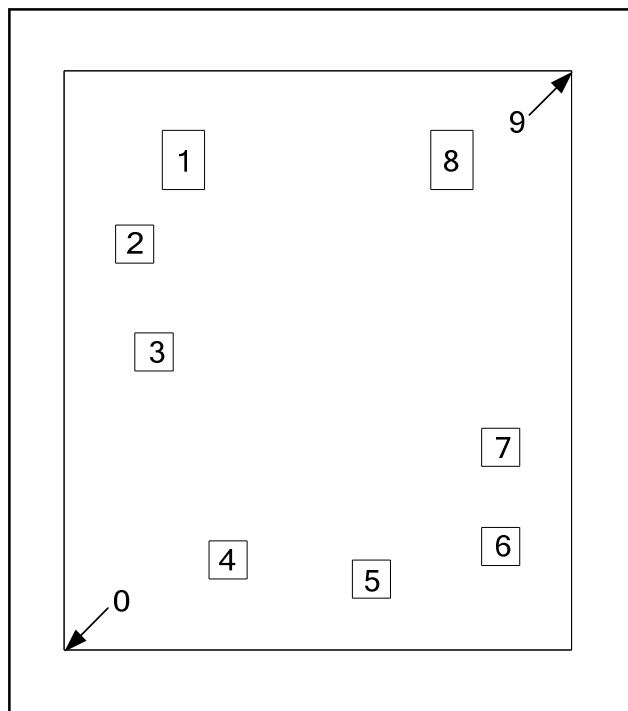
To achieve the Non-Inverting and Inverting complementary voltages, each output is switched between two internal FETs. The FETs are connected to V_{OPT} for the positive output and V_{EE} for the negative output. V_{OPT} and V_{EE} are adjustable for various configurations and have the following limitations: V_{EE} can be no more negative than -10.5 volts; V_{OPT} can be no more positive than $+5.5$ volts AND V_{OPT} must always be less than or equal to V_{CC} . Increasing V_{OPT} beyond V_{CC} will prevent the device from switching states when commanded to by the logic input. The most common configuration is to drive V_{EE} at -5.0 volts with V_{CC} and V_{OPT} tied together at $+5.0$ volts.

Lead-Free, SOIC-8[†]



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

Die Outline



Pad Configuration^{16,17}

Die Size: 1130 x 1290 μm (nominal)

| Pad No. | X (μm) nominal | Y (μm) nominal | Pad Size (μm) X x Y |
|---------|-----------------------------|-----------------------------|----------------------------------|
| 0 | 0 | 0 | Lower left edge of die |
| 1 | 266.40 | 1092.35 | 94 x 132 |
| 2 | 157.50 | 903.70 | 85 x 85 |
| 3 | 200.40 | 663.65 | 85 x 85 |
| 4 | 365.30 | 200.45 | 85 x 85 |
| 5 | 684.35 | 157.50 | 85 x 85 |
| 6 | 972.50 | 230.50 | 85 x 85 |
| 7 | 972.50 | 451.45 | 85 x 85 |
| 8 | 863.60 | 1092.35 | 94 x 132 |
| 9 | 1130 | 1290 | Upper right edge of die |

16. All X,Y dimensions are at bond pad center.

17. Die thickness is 8.0 mils.

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