

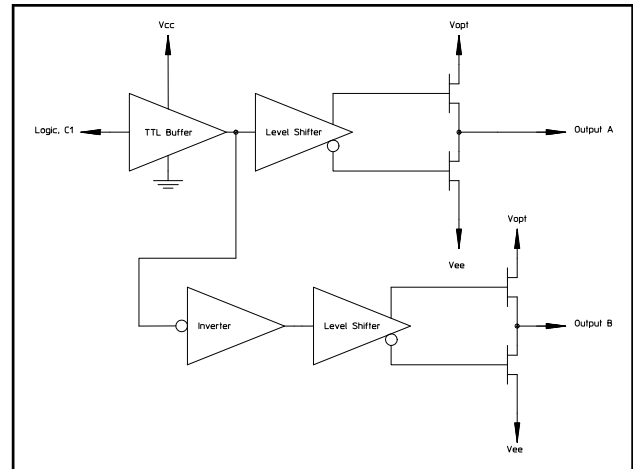
Features

- High Speed CMOS Technology
- Single Channel
- Positive Voltage Control
- Low Power Dissipation
- Low Cost Plastic SOIC-8 Package

Description

The SWD-109-PIN is a single channel driver used to translate TTL control inputs into gate control 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. The output HIGH level is optionally 0 to +2.0V (relative to GND) to optimize the intermodulation products of the control devices at low frequencies.

Functional Schematic



Ordering Information

| Part Number | Package |
|-------------|-----------------|
| SWD-109-PIN | Bulk Packaging |
| SWD-109TR | 1000 piece reel |

Note: Reference Application Note M513 for reel size information.

Pin Configuration

| Pin No. | Function |
|---------|-----------|
| 1 | Output A |
| 2 | GND |
| 3 | Vcc |
| 4 | C1, Logic |
| 5 | Vee |
| 6 | Vopt |
| 7 | GND |
| 8 | Output B |

Guaranteed Operating Ranges

| Symbol | Parameter ¹ | Unit | Min. | Typ. | Max. |
|---------------------------------------|-----------------------------------|------|------|------|------|
| V _{CC} | Positive DC Supply Voltage | V | 4.5 | 5.0 | 5.5 |
| V _{EE} | Negative DC Supply Voltage | V | -8.5 | -5.0 | -4.5 |
| V _{OPT} ² | Optional DC Output Supply Voltage | V | 0 | 1.0 | 2.0 |
| V _{OPT} -V _{EE} | Negative Supply Voltage Range | V | 4.5 | 6.5 | 11.0 |
| V _{CC} -V _{EE} | Positive to negative Supply Range | V | 9.0 | 10.0 | 14.0 |
| T _A | Operating Ambient temperature | °C | -40 | +25 | +85 |
| I _{OH} | DC Output Current - High | mA | — | — | -1.0 |
| I _{OL} | DC Output Current - Low | mA | — | — | 1.0 |
| T _{rise} , T _{fall} | Maximum Input Rise or Fall Time | ns | — | — | 500 |

- All voltages are relative to GND.
- V_{OPT} is grounded for most applications. 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 is on the GaAs MMICs will increase when positive controls are applied.

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 _{IH} | Output High Voltage | I _{OH} = -1 mA | V _{EE} = Max | V | V _{OPT} - 0.1 | — | — |
| V _{OL} | Output Low Voltage | I _{OL} = 1 mA | V _{EE} = Max | V | — | — | V _{EE} + 0.1 |
| I _{IN} | Input Leakage Current | V _{IN} = V _{CC} or GND | V _{EE} = Min | μA | — | .01 | 10 |
| I _{CC} | Quiescent Supply Current | V _{CC} = Max V _{OPT} = Min or Max | V _{EE} = Min V _{IN} = V _{CC} or GND | μA | — | — | 100 |
| Δ I _{CC} | Additional Supply Current, per TTL Input pin | V _{CC} = Max | V _{IN} = V _{CC} - 2.1V | mA | — | — | 1.0 |

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 | |
|-----------|------------------|------------------|
| | C1 | B |
| Logic "0" | V _{EE} | V _{OPT} |
| Logic "1" | V _{OPT} | V _{EE} |

AC Characteristics Over Guaranteed Operating Range³

| Symbol | Parameter | -55 to +25°C | ≤+85°C | ≤+125°C | Unit |
|-------------------|--|--------------|--------|---------|------|
| T _{PLH} | Propagation Delay | 22 | 25 | 30 | ns |
| T _{PHL} | Propagation Delay | 22 | 25 | 30 | ns |
| T _{TLH} | Output Rising Transition Time | 9.0 | 9.0 | 9.0 | ns |
| T _{THL} | Output Falling Transition Time | 8.0 | 8.0 | 8.0 | ns |
| T _{skew} | Delay Skew, Output A to Output B | 4.0 | 4.0 | 4.0 | ns |
| C _{IN} | Input Capacitance | 10 | 10 | 10 | pF |
| C _{PDC} | Power Dissipation Capacitance ⁴ | 10 | 10 | 10 | pF |
| C _{PDE} | Power Dissipation Capacitance ⁴ | 140 | 140 | 140 | pF |

3. V_{CC} = 4.5V, V_{OPT} - V_{EE} = min or max, V_{OPT} = 0V, C_L = 25 pF, Trise, Tfall = 6ns. These conditions represent the worst case for slow delays.

4. Total Power Dissipation is calculated by the following formula: PD = V_{CC}²fC_{PDC} + (V_{OPT}-V_{EE})²fC_{PDE}

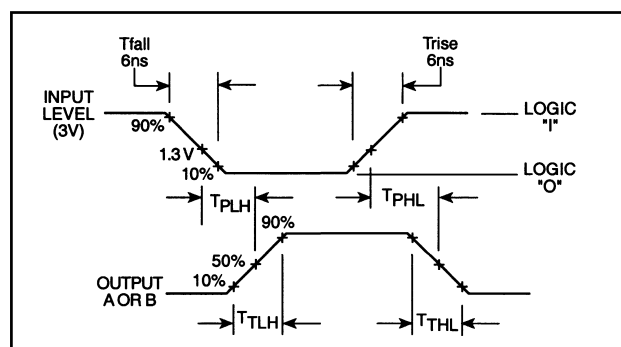
Absolute Maximum Ratings⁵

| Symbol | Parameter | Min | Max | Unit |
|-----------------------------------|---|-----------------------|-----------------------|------|
| V _{CC} | Positive DC Supply Voltage | -0.5 | 7.0 | V |
| V _{EE} | Negative DC Supply Voltage | -9.0 | 0.5 | V |
| V _{OPT} | Optional DC Output Supply Voltage | -0.5 | V _{CC} +0.5 | V |
| V _{OPT} -V _{EE} | Output to Negative Supply Voltage Range | -0.5 | 11.0 | V |
| V _{CC} -V _{EE} | Positive to Negative Supply Voltage Range | -0.5 | 14.0 | V |
| V _I | DC Input Voltage | -0.5 | V _{CC} +0.5 | V |
| I _I | DC Input Current | -25 | 25 | mA |
| V _O | DC Output Voltage | V _{EE} - 0.5 | V _{OPT} +0.5 | V |
| P _D ⁶ | Power Dissipation in Still Air | — | 500 | mW |
| V _O | DC Output Current | -25 | 25 | mA |
| T _{STG} | Storage Temperature | -65 | 150 | °C |

5. All voltages are referenced to GND. All inputs and outputs incorporate latch-up protection structures.

6. Derate -7 mW/°C from 65°C to 85°C.

Switching Waveforms

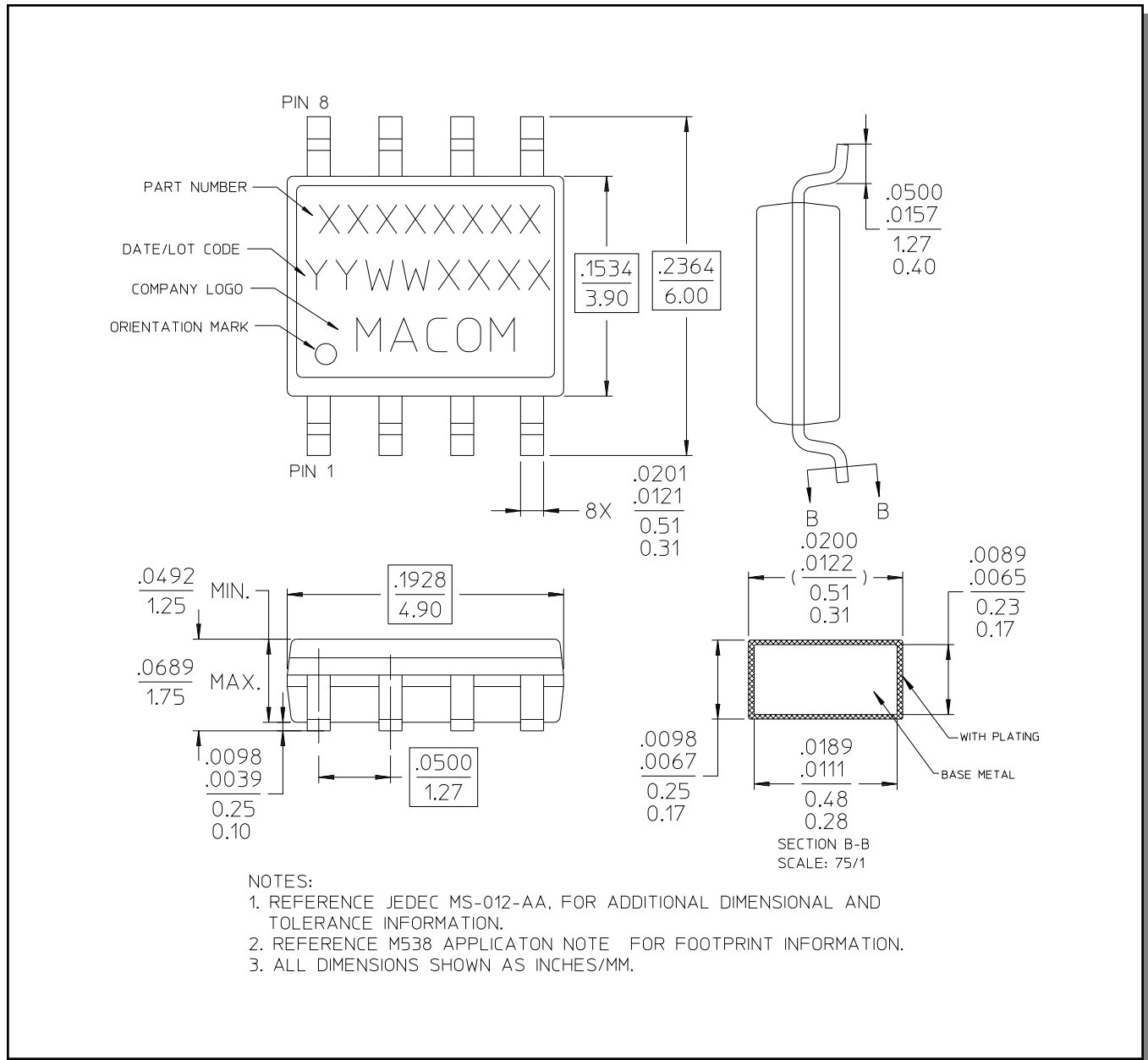


SWD-109-PIN

Single Driver for GaAs FET Switches and Attenuators

Rev. V6

SOIC-8[†]



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