Single Driver for GaAs FET Switches and Attenuators

SWD-109
V5

Features

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

Description

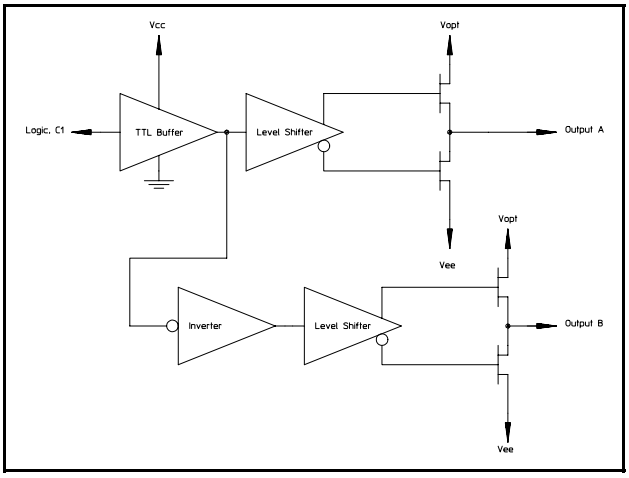
The SWD-109 is a single channel driver used to translate TTL control inputs into gate control voltages for GaAs FET microwave switches and attenuators. High speed analog CMOS technology is utilized to achieve low power dissipation at moderate to high speeds, encompassing most microwave switching applications. 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.

Ordering Information

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

Note: Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

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

Truth Table

Input	Outputs	
C1	**A**	**B**
Logic "0"	V_{EE}	V_{OPT}
Logic "1"	V_{OPT}	V_{EE}

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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

1. All voltages are relative to GND.
2. 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
ΔI_{CC}	Additional Supply Current, per TTL Input pin	V_{CC}= Max	V_{IN} = V_{CC} -2.1V	mA	—	—	1.0

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AC Characteristics Over Guaranteed Operating Range [3]

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

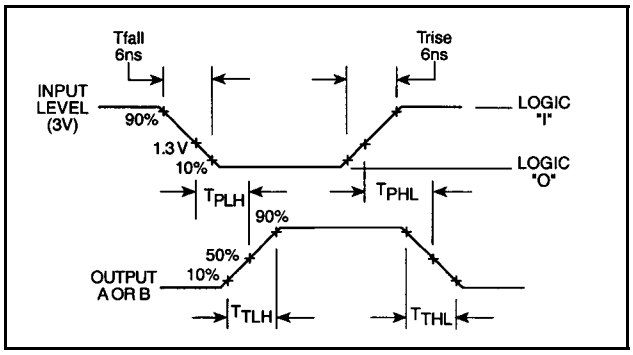
3. V_{CC} = 4.5V, V_{OPT} - V_{EE} = min or max, V_{OPT} = 0V, C_L = 25 pF, Trise, Tfall = 6ns. These conditions represent the worst case for slow delays.
4. Total Power Dissipation is calculated by the following formula: PD = V_{CC} ^{2}fC_{PDC} + (V_{OPT}-V_{EE}) ^{2}fC_{PDE}

Absolute Maximum Ratings[5]

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	Vcc +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



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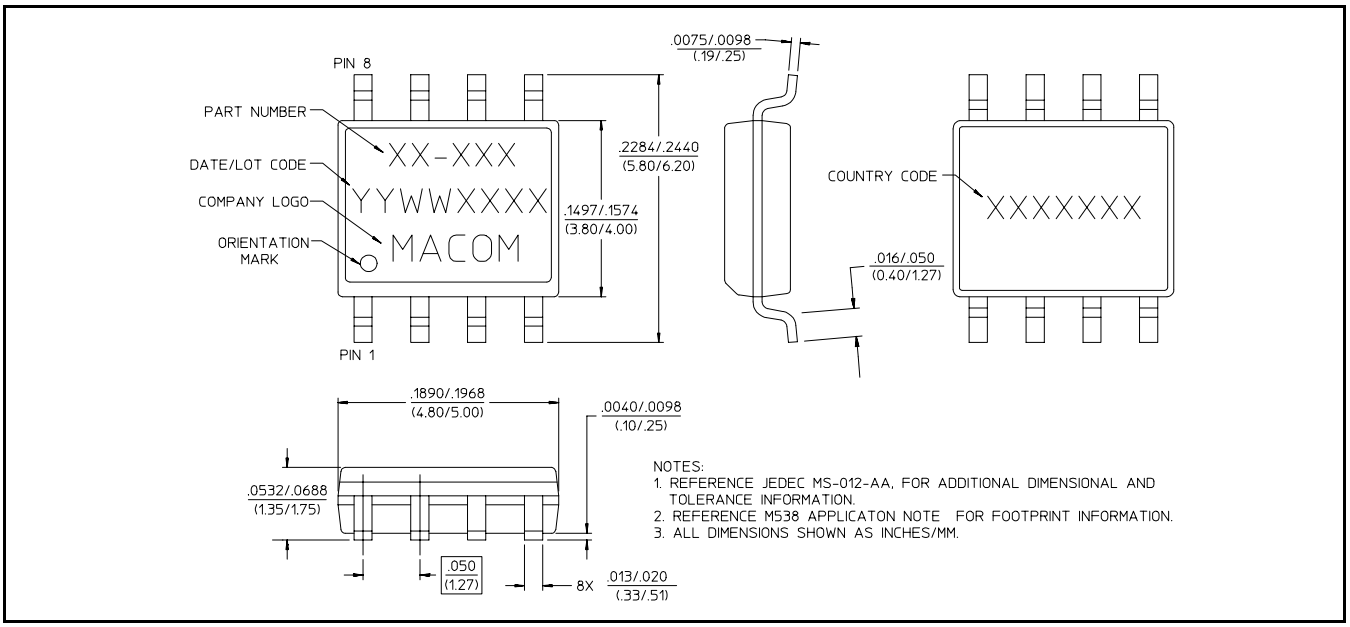
SO-8



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