MIC4403

1.5A High-Speed Floating-Load Driver

Preliminary Information

General Description

The MIC4403 is a modified version of the MIC4425 power MOSFET driver, intended to drive floating or isolated loads requiring high-current pulses. The load is intended to be connected between the outputs without other reference to supply or ground. Only when both logic inputs are high and the V_{DD} supply is energized, is power supplied to the load. This construction allows the implementation of a wide variety of redundant input controllers.

The low off-state output leakage and independence of the two half-circuits permit a wide variety of testing schemes to be utilized to assure functionality. The high peak current capability, short internal delays, and fast output rise and fall times ensure sufficient power will be available to the load when it is needed. The TTL and CMOS compatible inputs allow operation from a wide variety of input devices. The ability to swing the inputs negative without affecting device performance allows negative biases to be placed on the inputs for greater safety. In addition, the capacitive nature of the inputs allows the use of series resistors on the inputs for extra noise suppression.

Input voltage excursions above the supply voltage or below ground are clamped internally without damaging the device. The output stages are power CMOS and DMOS FETs with high speed body diodes to prevent damage to the driver from inductive kickbacks.

Features

- Built Using Contemporary BiCMOS/DMOS Process
- Latch-Up Protected: Fully Isolated Process is Inherently Immune to any Latch-Up
- Low Quiescent Current ..... 300µA Max
- Low Capacitive Inputs With 300mV Hysteresis
- Both Inputs Must Be Driven to Drive Load
- Low Output Leakage
- High Peak Current Capability
- Fast Output Rise Time
- Outputs Individually Testable
- 3A Single Ended (1.5A with Floating Load)

Applications

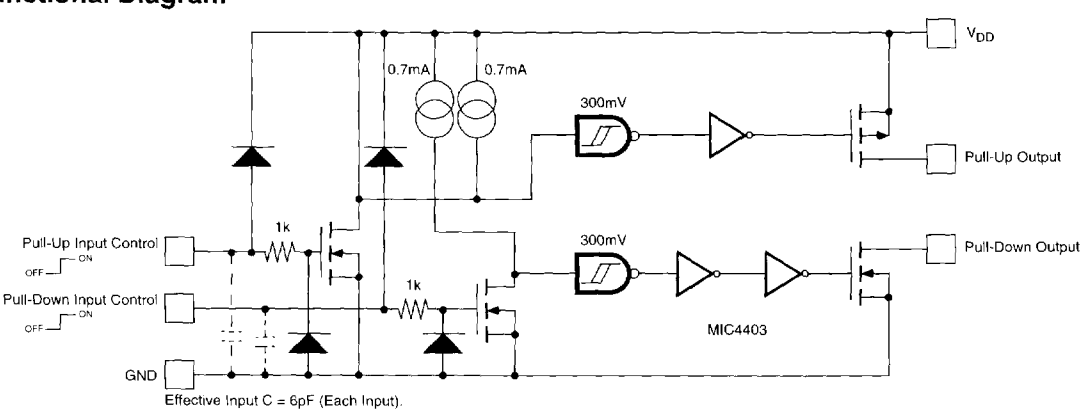
- Squib Drivers
- Isolated Load Drivers
- Pulsers
- Safety Interlocks

Ordering Information

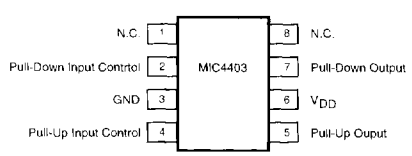
Part Number	Temperature Range	Package
MIC4403AJ	–55°C to +125°C	8-pin CerDIP
MIC4403BM	–40°C to +85°C	8-pin SOIC
MIC4403BN	–40°C to +85°C	8-pin PDIP
MIC4403CN	0°C to +70°C	8-Pin PDIP

6

Functional Diagram



Pin Configuration



Absolute Maximum Ratings (Note 1)

Supply Voltage ..... +22V
Maximum Die Temperature ..... +150°C
Storage Temperature Range ..... –65°C to +150°C
Lead Temperature (Soldering, 10 sec) ..... +300°C

Package Thermal Resistance

CerDIP θ_{JA} ..... 150°C/W
CerDIP θ_{JC} ..... 55°C/W
PDIP θ_{JA} ..... 125°C/W
PDIP θ_{JC} ..... 45°C/W
SOIC θ_{JA} ..... 250°C/W
SOIC θ_{JC} ..... 75°C/W

Note 1: Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specification is not implied. Exposure to Absolute Maximum Rating Conditions for extended periods may affect device reliability. Static-sensitive device. Unused devices must be stored in conductive material. Protect devices from static discharge and static fields.

Electrical Characteristics

Unless otherwise specified, specifications measured at $T_A = 25°C$ with $4.5V \leq V_{DD} \leq 18V$.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Input						
V_{IH}	Logic 1 High Input Voltage		2.4		V_{DD} + 0.3	V
V_{IL}	Logic 0 Low Input Voltage		–5		0.8	V
I_{IN}	Input Current	$0V \leq V_{IN} \leq 5V_{DD}$	–1	±0.01	1	µA
Output						
V_{OH}	High Output Voltage		V_{DD} – 0.025			V
V_{OL}	Low Output Voltage				0.025	V
R_O	Output Resistance, Pull-Up	I_{OUT} = 10mA, V_{DD} = 18V		2.8	5	Ω
R_O	Output Resistance, Pull-Down	I_{OUT} = 10mA, V_{DD} = 18V		3.5	5	Ω
I_{PK}	Peak Output Current			1.5		A
Switching Time						
t_R	Rise Time	Figure 1, C_L = 1800pF		23	35	ns
t_F	Fall Time	Figure 1, C_L = 1800pF		25	35	ns
t_{D1}	Delay Time	Figure 1, C_L = 1800pF		17	75	ns
t_{D2}	Delay Time	Figure 1, C_L = 1800pF		23	75	ns
Power Supply						
I_S	Power Supply Current	V_{IN} = 3V (both inputs)		1.4	2.5	mA
		V_{IN} = 0V (both inputs)		0.17	0.25	mA

Electrical Characteristics, continued

Specifications measured **over operating temperature range** with $4.5V \le V_{DD} \le 18V$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Input						
V_{IH}	Logic 1 High Input Voltage		2.4		V_{DD} + 0.3	V
V_{IL}	Logic 0 Low Input Voltage		–5		0.8	V
I_{IN}	Input Current	$0V \le V_{IN} \le V_{DD}$	–10	±0.01	10	µA
Output						
V_{OH}	High Output Voltage		V_{DD} – 0.025			V
V_{OL}	Low Output Voltage				0.025	V
R_O	Output Resistance, Pull-Up	I_{OUT} = 10mA, V_{DD} = 18V $V_{IN} \ge 2.4V$		3.7	8	Ω
R_O	Output Resistance, Pull-Down	I_{OUT} = –10mA, V_{DD} = 18V $V_{IN} \ge 2.4V$		5.5	8	Ω
Switching Time						
t_R	Rise Time	Figure 1, C_L = 1800pF		24	60	ns
t_F	Fall Time	Figure 1, C_L = 1800pF		32	60	ns
t_{D1}	Delay Time	Figure 1, C_L = 1800pF		19	100	ns
t_{D2}	Delay Time	Figure 1, C_L=1800pF		19	100	ns
Power Supply						
I_S	Power Supply Current	V_{IN} = 3V (both inputs)		1.6	3.5	mA
		V_{IN} = 0V (both inputs)		0.25	0.3	mA

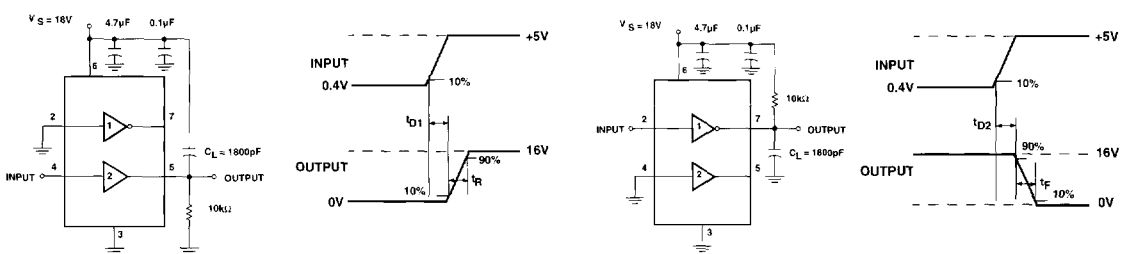


Figure 1. MIC4403 Switching time test circuit.