MIC4467/4468/4469

Quad 1.2A-Peak Low-Side MOSFET Driver

Bipolar/CMOS/DMOS

General Description

The MIC4467/8/9 family of 4-output CMOS buffer/drivers is an expansion from the earlier single- and dual-output drivers, to which they are functionally closely related. Because package pin count permitted it, each driver has been equipped with a 2-input logic gate for added flexibility. Placing four high-power drivers in a single package also improves system reliability and reduces total system cost. In some applications, one of these drivers can replace not only two packages of single-input drivers, but some of the associated logic as well.

Although primarily intended for driving power MOSFETs, and similar highly capacitive loads, these drivers are equally well suited to driving any other load (capacitive, resistive, or inductive), which requires a high-efficiency, low-impedance driver capable of high peak currents, rail-to-rail voltage swings, and fast switching times. For example, heavily loaded clock lines, coaxial cables, and piezoelectric transducers can all be

Features

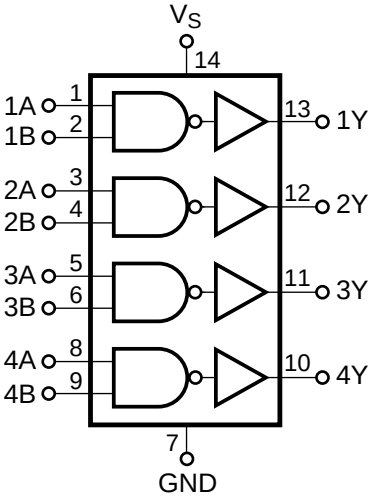
- Built using reliable, low power CMOS processes
- Latchproof. Withstands 500mA Inductive Kickback
- 3 Input Logic Choices
- Symmetrical Rise and Fall Times 25ns
- Short, Equal Delay Times 75ns
- High Peak Output Current 1.2A
- Wide Operating Range ..... 4.5 to 18V
- Low Equivalent Input Capacitance (typ) 6pF
- Inputs = Logic 1 for Any Input From 2.4V to V_S
- ESD Protected

Applications

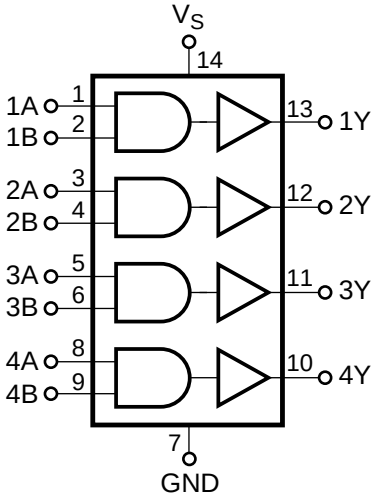
- General-Purpose CMOS Logic Buffer
- Driving All 4 MOSFETs in an H-Bridge
- Direct Small-Motor Driver
- Relay or Peripheral Drivers
- Dual Differential Output Power Drivers
- CCD Driver
- Pin-Switching Network Driver

Logic Diagrams

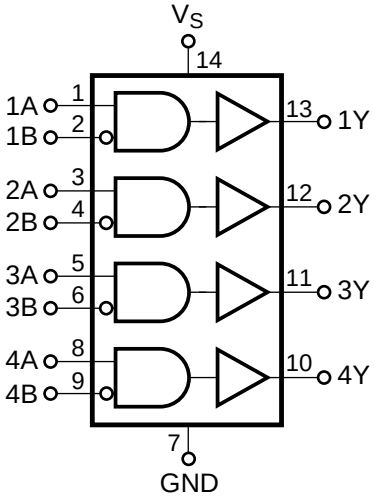
MIC4467



MIC4468



MIC4469



driven easily with MIC446X series drivers. The only limitation on loading is that total power dissipation in the IC must be kept within the power dissipation limits of the package.

The MIC446X series drivers are built using a BCD process. They will not latch under any conditions within their power and voltage ratings. They are not subject to damage when up to 5V of noise spiking (either polarity) occurs on the ground line. They can accept up to half an amp of inductive kickback current (either polarity) into their outputs without damage or logic upset.

Ordering Information

Part No.	Package	Temp. Range
MIC44xxCN*	14-Pin Plastic DIP	0° to +70°C
MIC44xxCWM*	16-Pin Wide SOIC	0° to +70°C
MIC44xxBN*	14-Pin Plastic DIP	–40° to +85°C
MIC44xxBWM*	16-Pin Wide SOIC	–40° to +85°C

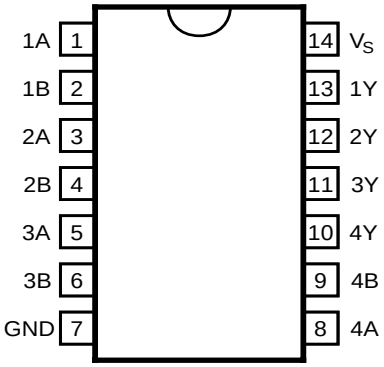
* xx identifies input logic:
67 — NAND
68 — AND
69 — AND with 1 inverting input

Truth Table

Part No.	Inputs A	Inputs B	Output Y
MIC4467 (Each Driver)	L	X	H
	X	L	H
	H	H	L
MIC4468 (Each Driver)	H	H	H
	L	X	L
	X	L	L
MIC4469 (Each Driver)	L	X	L
	X	H	L
	H	L	H

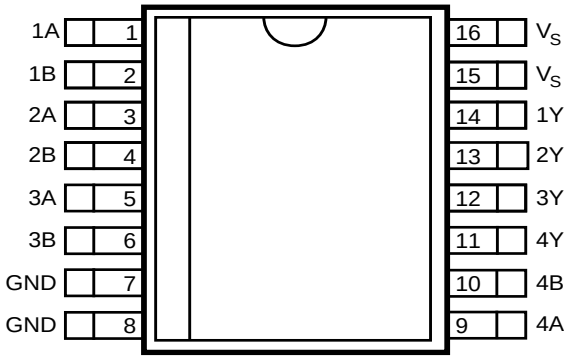
Pin Configurations

14-Pin DIP (N)



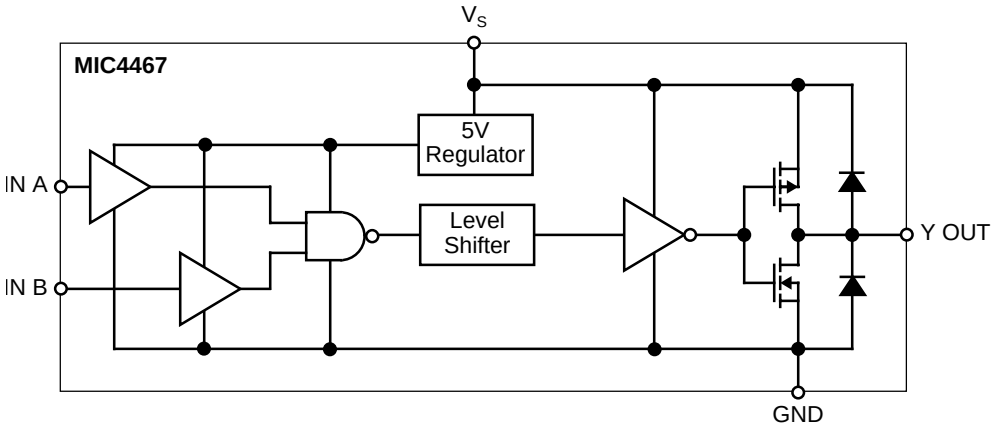
TOP VIEW

16-Pin Wide SOIC (WM)

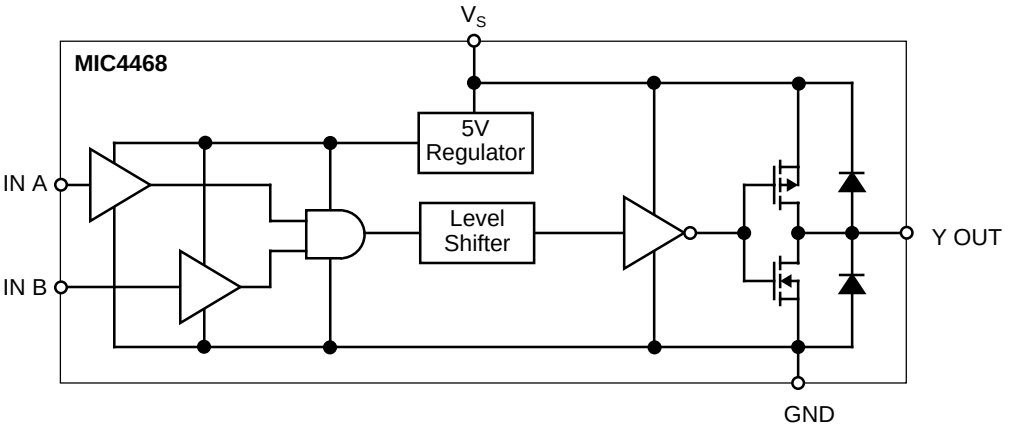


TOP VIEW

Block Diagrams



Functional Diagram for One Driver (Four Drivers per Package–Ground Unused Inputs)



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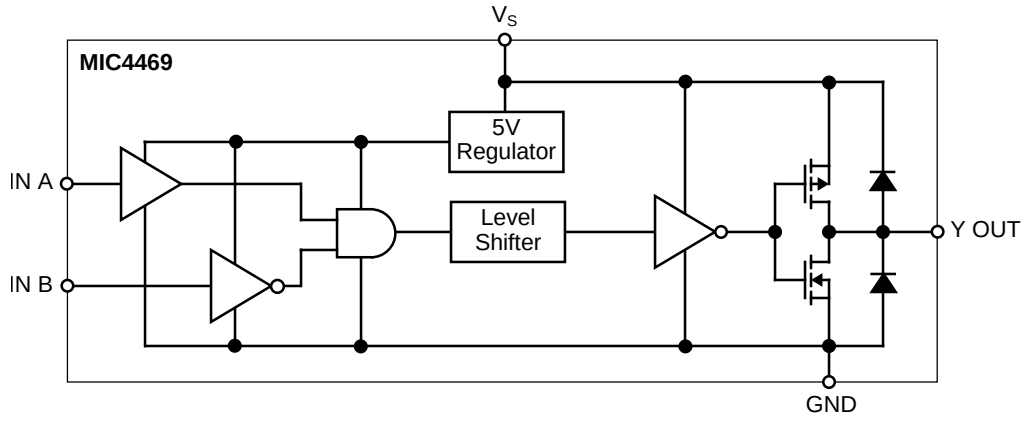


Functional Diagram for One Driver (Four Drivers per Package–Ground Unused Inputs)

Absolute Maximum Ratings (Notes 1 and 2)

Supply Voltage 22V
Input Voltage (GND – 5V) to (V_S + 0.3V)
Maximum Chip Temperature
  Operating 150°C
  Storage –65° to +150°C
Maximum Load Temperature
  (10 sec, for soldering) 300°C
Operating Ambient Temperature
  C Version 0° to +70°C
  B Version –40° to +85°C

Power Dissipation
  N Package (14-Pin Plastic DIP) 1.5W
  WM Package (16-Pin Wide SOIC) 1W

Package Thermal Resistance
  N Package (14-Pin Plastic DIP) θ_{JA} 80°C/W
  WM Package (16-Pin Wide SOIC) θ_{JA} 120°C/W

Electrical Characteristics: Measured at T_A = 25°C with 4.5V ≤ V_S ≤ 18V unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
INPUT						
V_{IH}	Logic 1 Input Voltage		2.4	1.3		V
V_{IL}	Logic 0 Input Voltage			1.2	0.8	V
I_{IN}	Input Current	$0 \le V_{IN} \le V_S$	–1		1	µA
OUTPUT						
V_{OH}	High Output Voltage	I_{LOAD} = 10mA	V_S-0.15			V
V_{OL}	Low Output Voltage	I_{LOAD} = 10mA			0.15	V
R_O	Output Resistance	I_{OUT} = 10mA, V_S = 18V		5	15	Ω
I_{PK}	Peak Output Current			1.2		A
I	Latch-Up Protection Withstand Reverse Current		>500			mA
SWITCHING TIME						
t_R	Rise Time	Test Figure 1		14	25	ns
t_F	Fall Time	Test Figure 1		13	25	ns
t_{D1}	Delay Time	Test Figure 1		30	75	ns
t_{D2}	Delay Time	Test Figure 1		45	75	ns
POWER SUPPLY						
I_S	Power Supply Current Supply			0.2	4	mA

Electrical Characteristics:

Measured over operating temperature range with $4.5V \le V_S \le 18V$ unless otherwise specified.

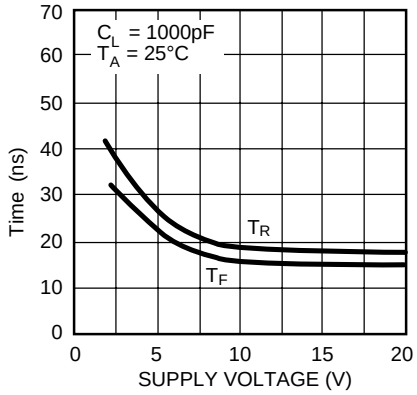
Symbol	Parameter	Conditions	Min	Typ	Max	Units
INPUT						
V_{IH}	Logic 1 Input Voltage		2.4	1.4		V
V_{IL}	Logic 0 Input Voltage			1.0	0.8	V
I_{IN}	Input Current	$0 \le V_{IN} \le V_S$	–1		1	µA
OUTPUT						
V_{OH}	High Output Voltage	I_{LOAD} = 10 mA	V_S-0.3			V
V_{OL}	Low Output Voltage	I_{LOAD} = 10 mA			0.3	V
R_O	Output Resistance	I_{OUT} = 10 mA, V_S = 18V		7	30	Ω
I_{PK}	Peak Output Current			1.2		A
I	Latch-Up Protection Withstand Reverse Current		500			mA
SWITCHING TIME						
t_R	Rise Time	Test Figure 1		17	50	ns
t_F	Fall Time	Test Figure 1		16	50	ns
t_{D1}	Delay Time	Test Figure 1		35	100	ns
t_{D2}	Delay Time	Test Figure 1		55	100	ns
POWER SUPPLY						
I_S	Power Supply Current Supply			0.4	8	mA

NOTE 1: Functional operation above the absolute maximum stress ratings is not implied.

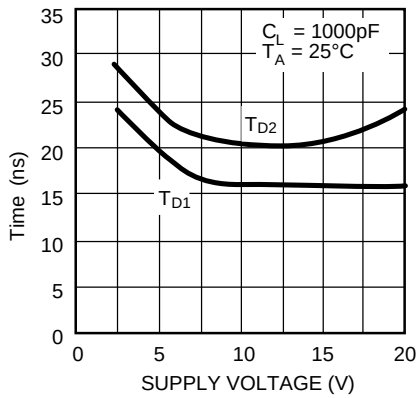
NOTE 2: Static sensitive device. Store only in conductive containers. Handling personnel and equipment should be grounded to prevent static damage.

Typical Characteristics

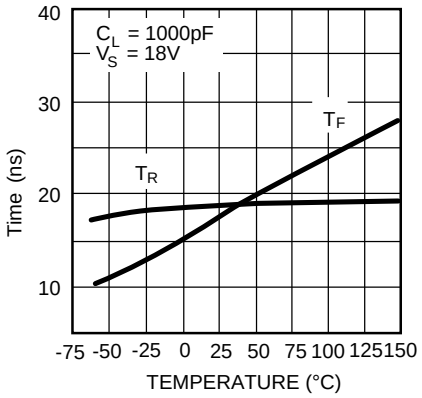
Rise and Fall Time vs. Supply Voltage



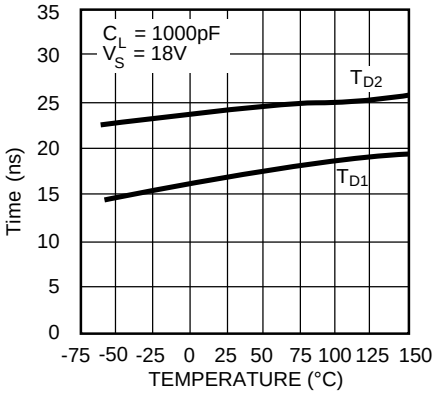
Delay Time vs. Supply Voltage



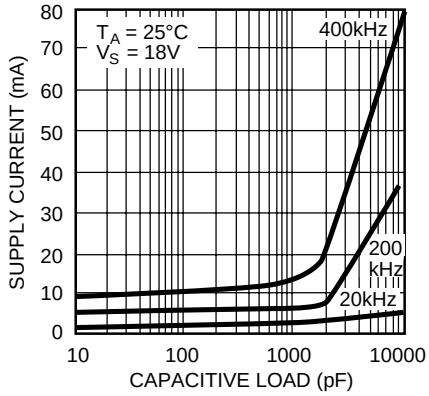
Rise and Fall Time vs. Temperature



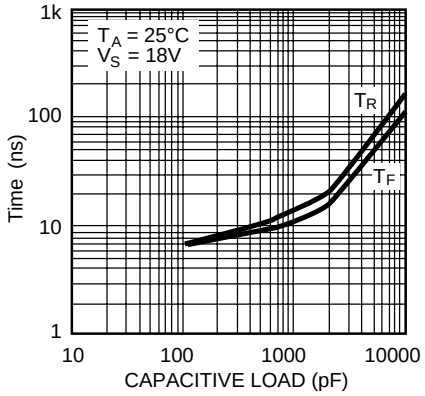
Delay Time vs. Temperature



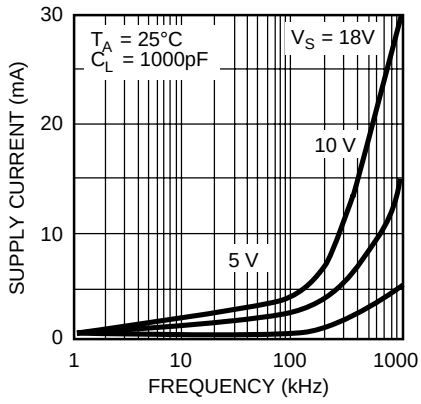
Supply Current vs. Capacitive Load



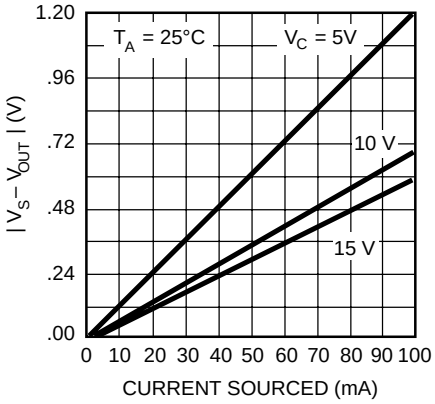
Rise and Fall Time vs. Capacitive Load



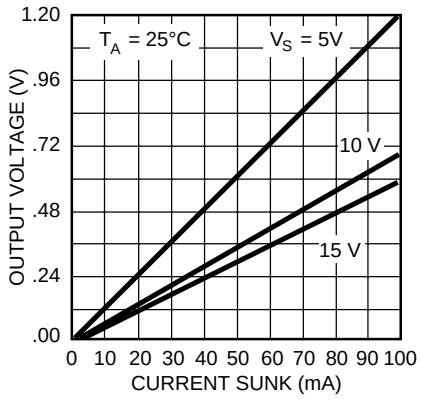
Supply Current vs. Frequency

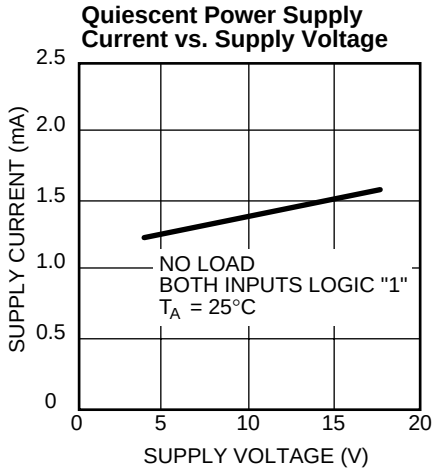


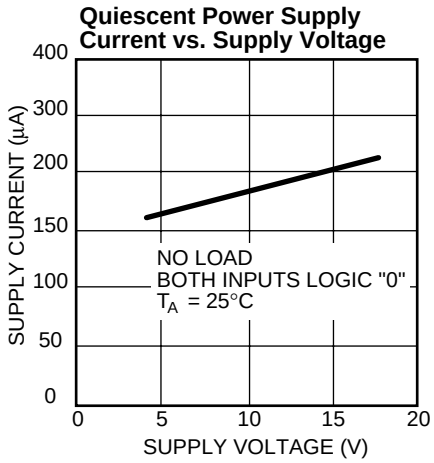
High Output vs. Current



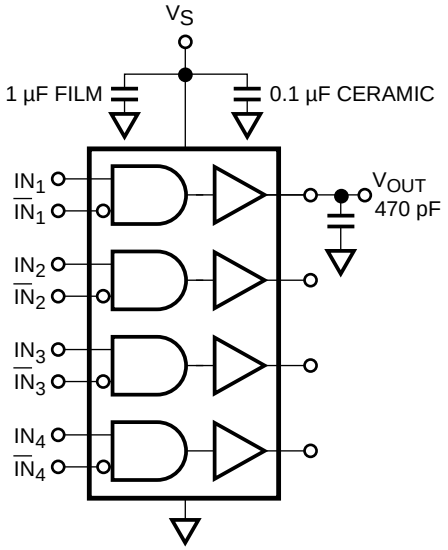
Low Output vs. Current

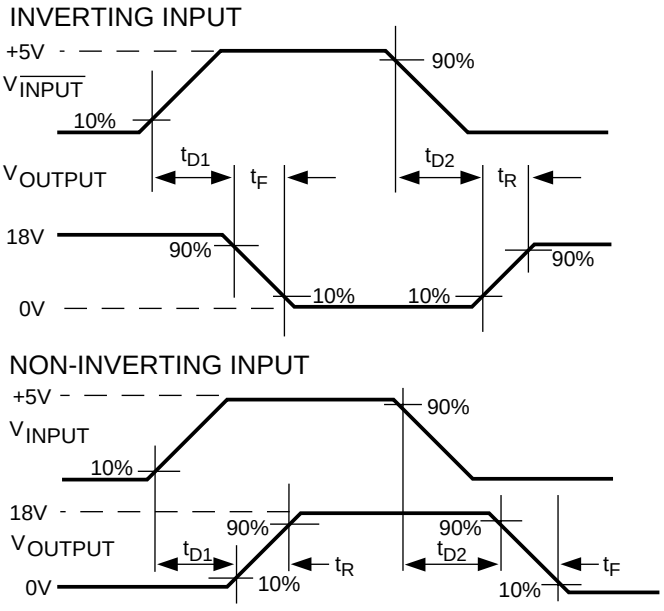




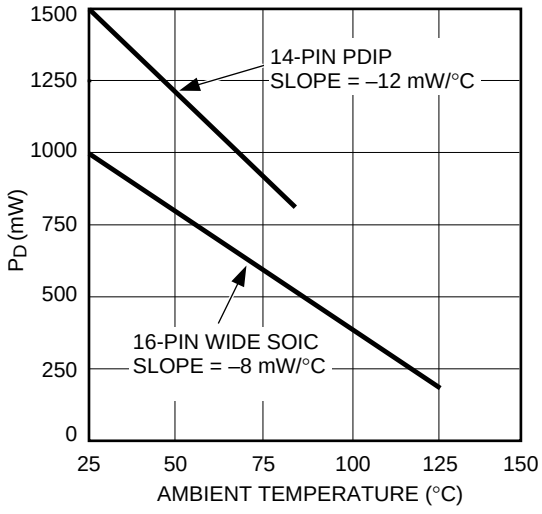


Test Figure 1





Package Power Dissipation



Quad Driver Drives H Bridge to Control Motor Speed and Direction