



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 driven easily with MIC446X series drivers. The only limitation

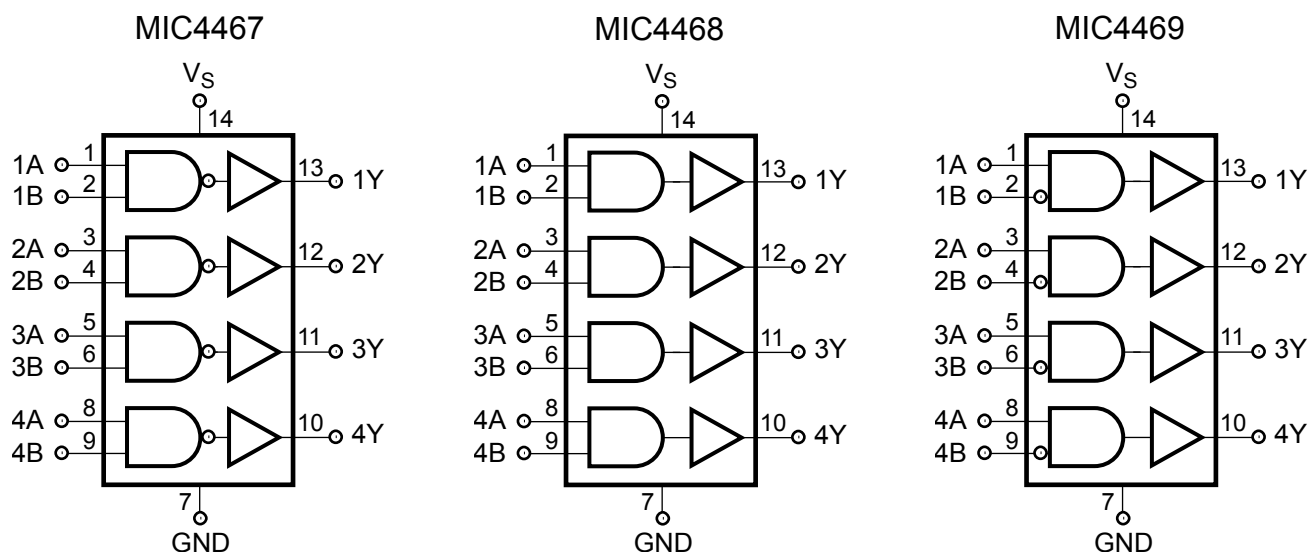
Features

- Built using reliable, low power CMOS processes
- Latchproof. Withstands 500mA Inductive Kickback
- 3 Input Logic Choices
- Symmetrical Rise and Fall Times25ns
- Short, Equal Delay Times75ns
- 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



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

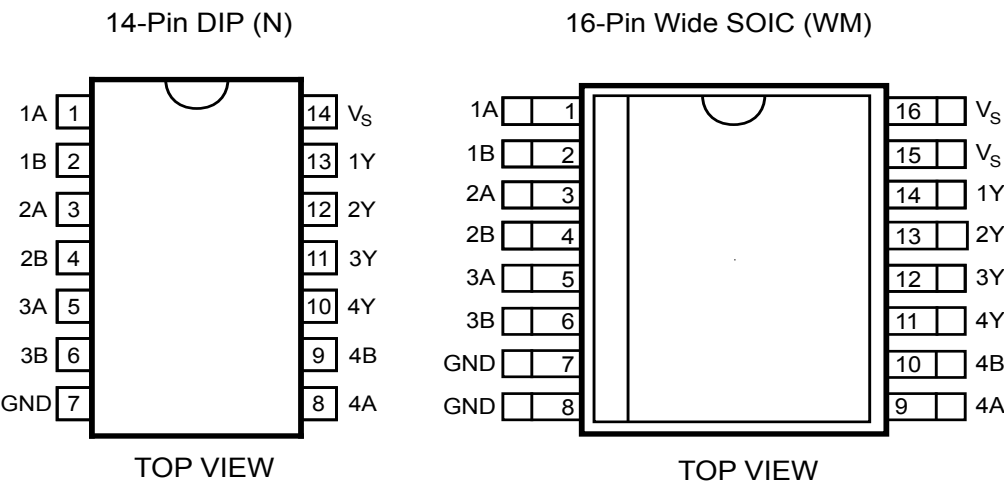
Part Number		Temperature Range	Package
Standard	Pb-Free		
MIC44xxCN*	MIC44xxZN*	0°C to +70°C	14-pin Plastic DIP
MIC44xxCWM*	MIC44xxZWM*	0°C to +70°C	16-pin Wide SOIC
MIC44xxBN*	MIC44xxYN*	−40°C to +85°C	14-pin Plastic DIP
MIC44xxBWM*	MIC44xxYWM*	−40°C to +85°C	16-pin Wide SOIC

* xx identifies input logic:
67 — NAND 68 — AND 69 — AND with 1 inverting input
**Pb-Free industrial grade PDIP available in MIC4468 & MIC4469 only.

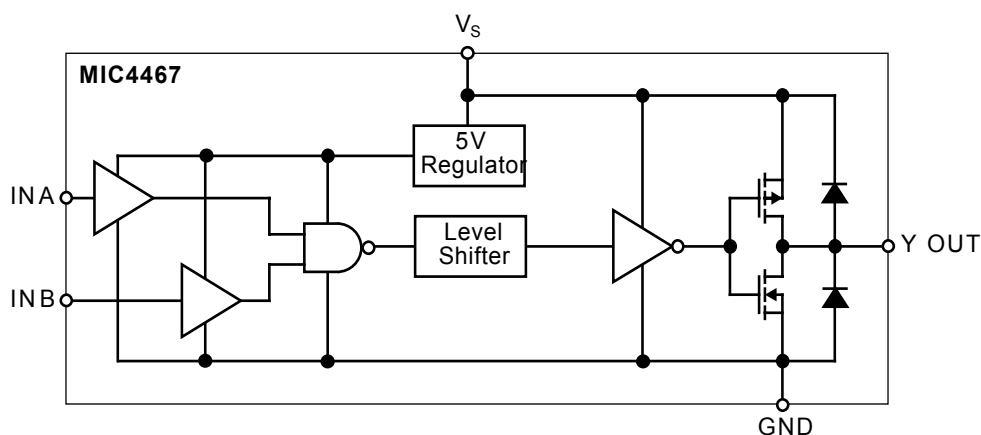
Truth Table

Part No.	Inputs		Output Y
	A	B	
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

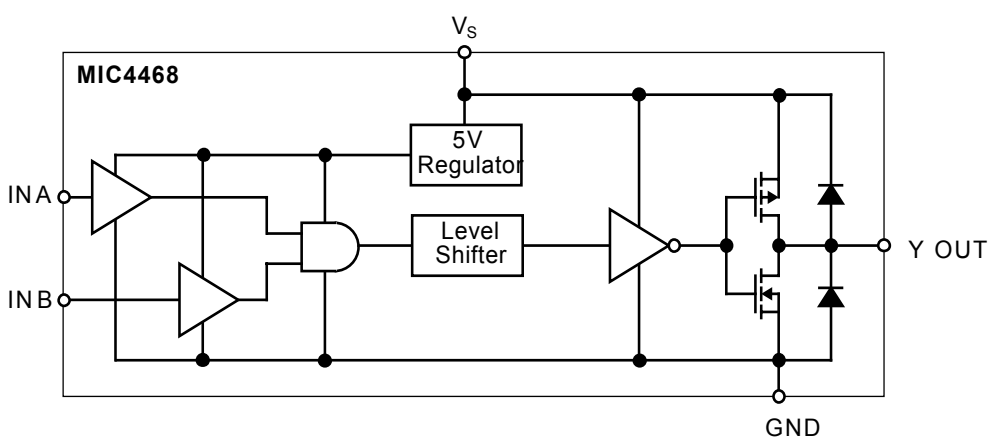
Pin Configurations



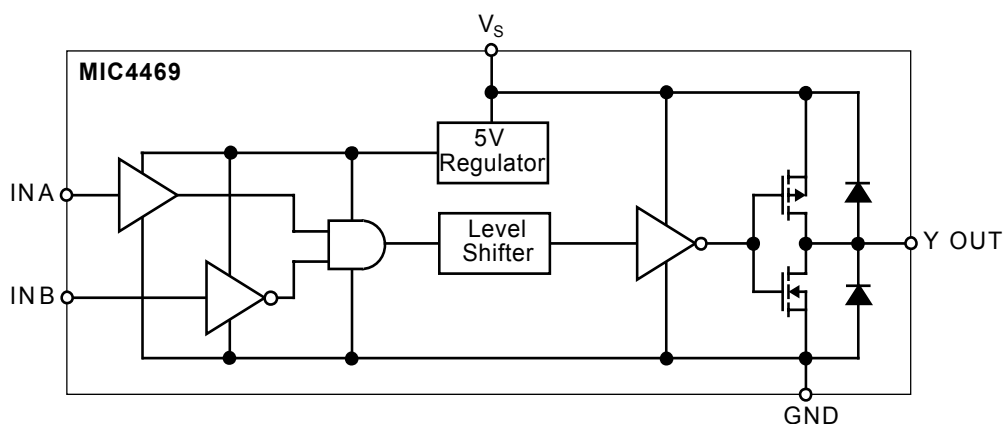
Block Diagrams



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



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



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 $T_A = 25^\circ\text{C}$ with $4.5V \leq V_S \leq 18V$ unless otherwise specified. (**Note 3**)

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	$0 \leq V_{IN} \leq V_S$	–1		1	μA
OUTPUT						
V_{OH}	High Output Voltage	$I_{LOAD} = 10\text{mA}$	$V_S - 0.15$			V
V_{OL}	Low Output Voltage	$I_{LOAD} = 10\text{mA}$			0.15	V
R_O	Output Resistance	$I_{OUT} = 10\text{mA}$, $V_S = 18V$		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

Note 3. Specification for packaged product only.

Electrical Characteristics:

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

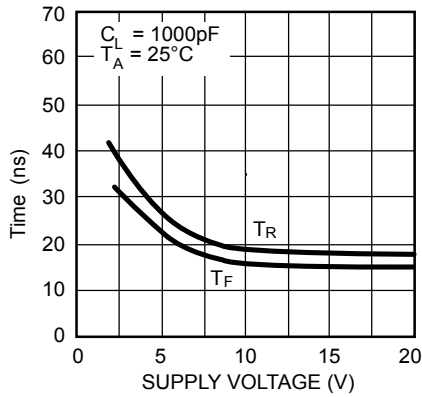
Symbol	Parameter	Conditions	Min	Typ	Max	Units
INPUT						
V_{IH}	Logic 1 Input Voltage		2.4	1.4		V
V_{IL}	Logic 0 Input Voltage			1.0	0.8	V
I_{IN}	Input Current	$0 \leq V_{IN} \leq V_S$	-1		1	μA
OUTPUT						
V_{OH}	High Output Voltage	$I_{LOAD} = 10 \text{ mA}$	$V_S - 0.3$			V
V_{OL}	Low Output Voltage	$I_{LOAD} = 10 \text{ mA}$			0.3	V
R_O	Output Resistance	$I_{OUT} = 10 \text{ mA}$, $V_S = 18V$		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.

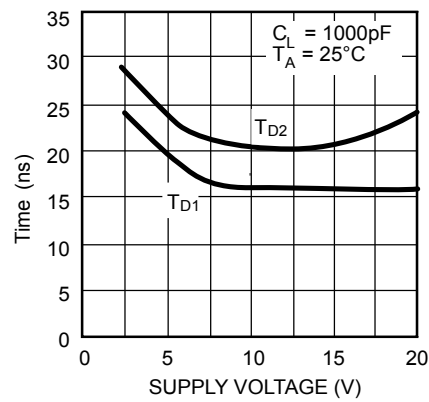
NOTE 2: Static sensitive device. Store only in conductive containers. Handling personnel and equipment should be grounded to prevent static damage.

Typical Characteristics

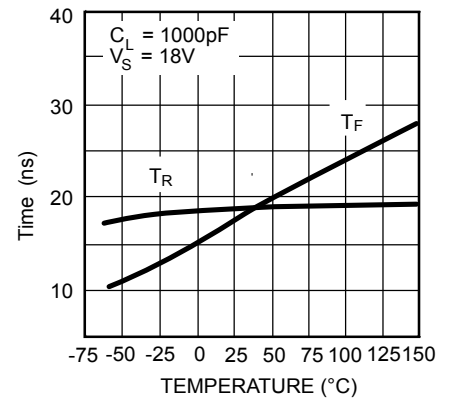
Rise and Fall Time vs.
Supply Voltage



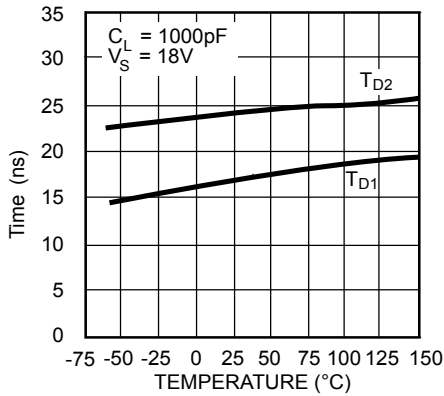
Delay Time vs. Supply Voltage



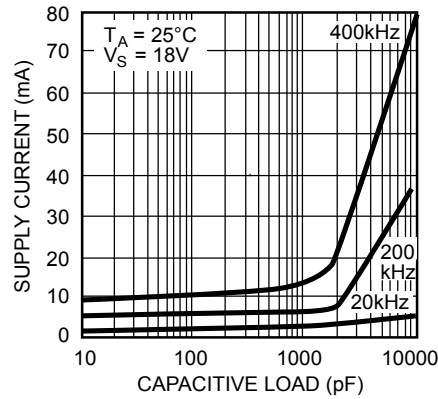
Rise and Fall Time
vs. Temperature



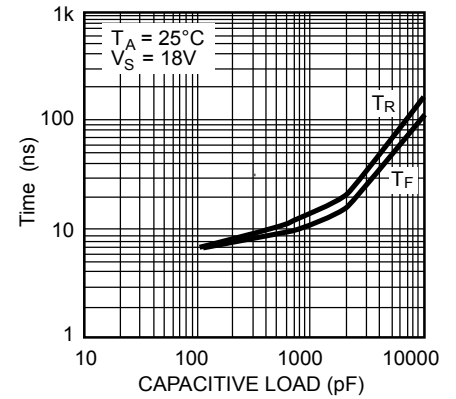
Delay Time vs. Temperature



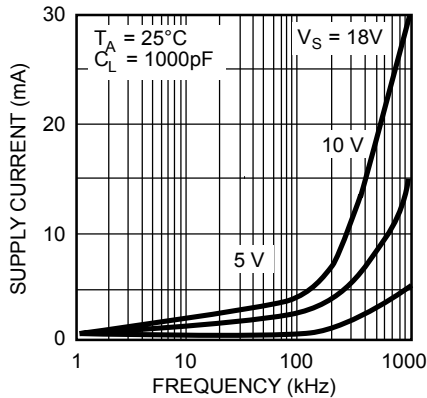
Supply Current vs.
Capacitive Load



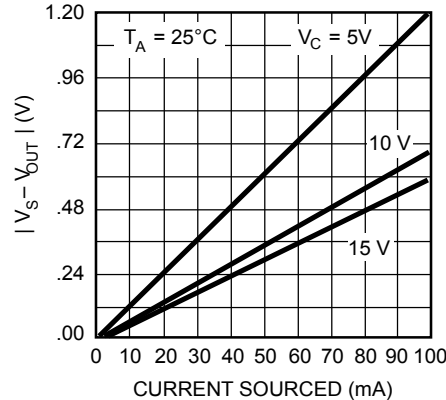
Rise and Fall Time vs.
Capacitive Load



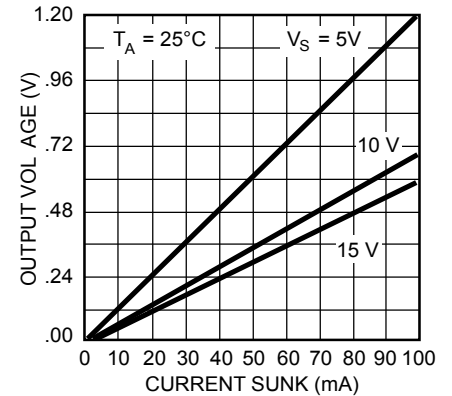
Supply Current vs. Frequency

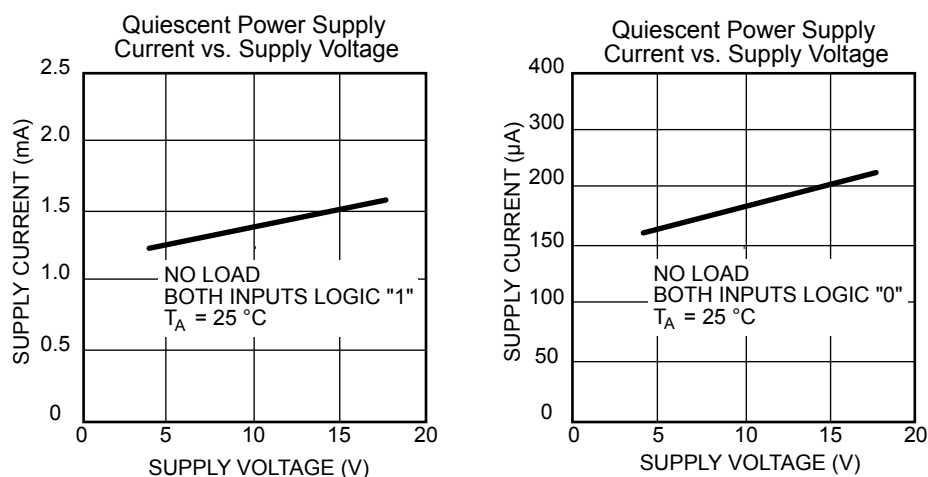


High Output vs. Current

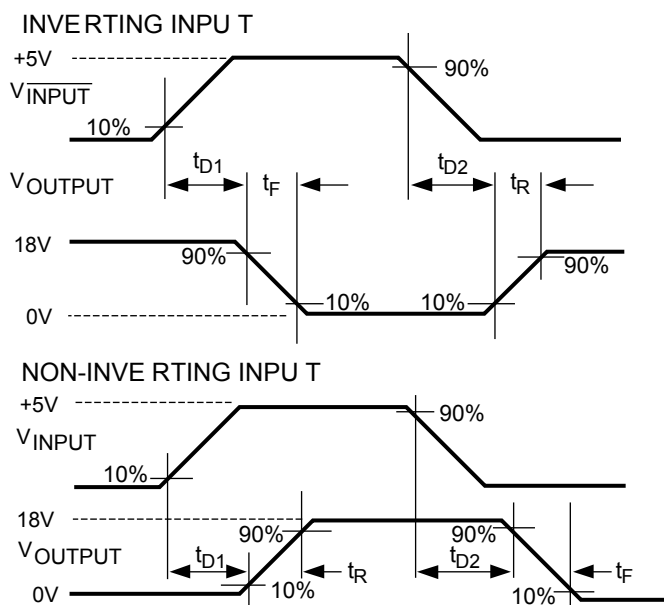
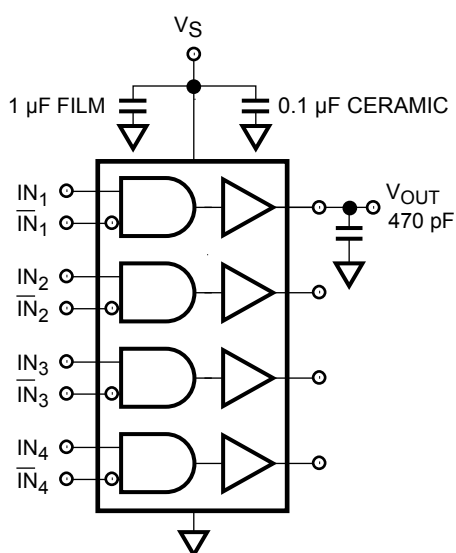


Low Output vs. Current

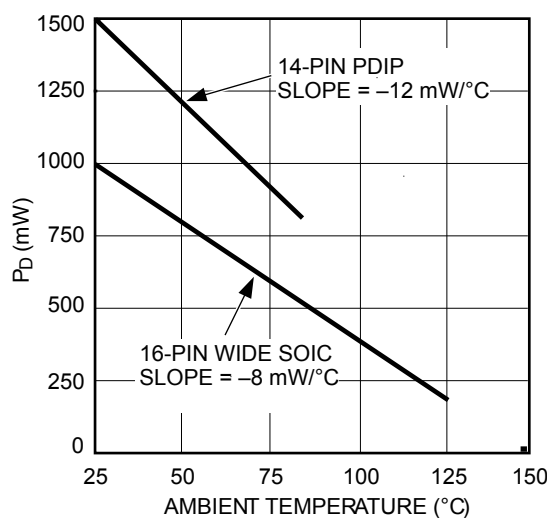




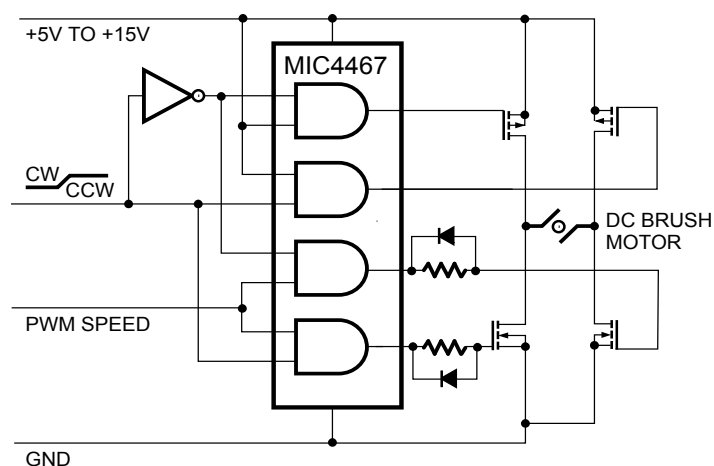
Test Figure 1



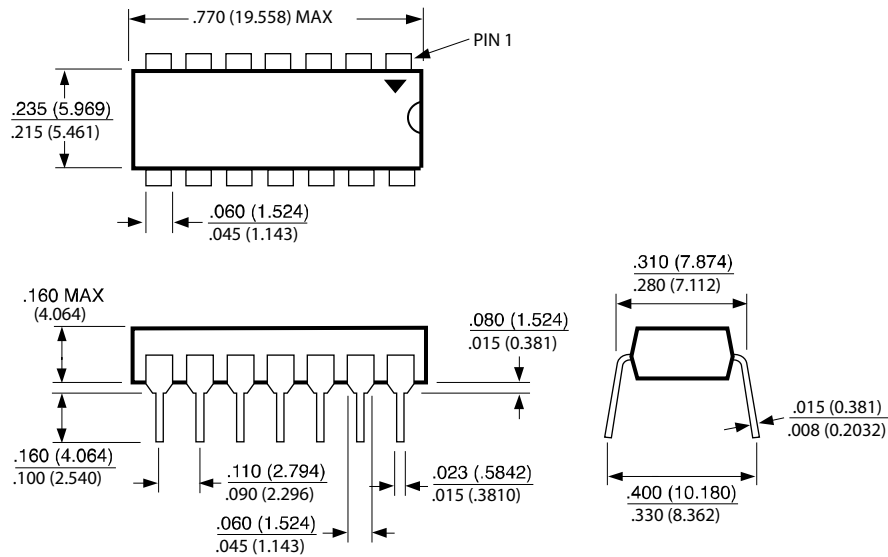
Package Power Dissipation



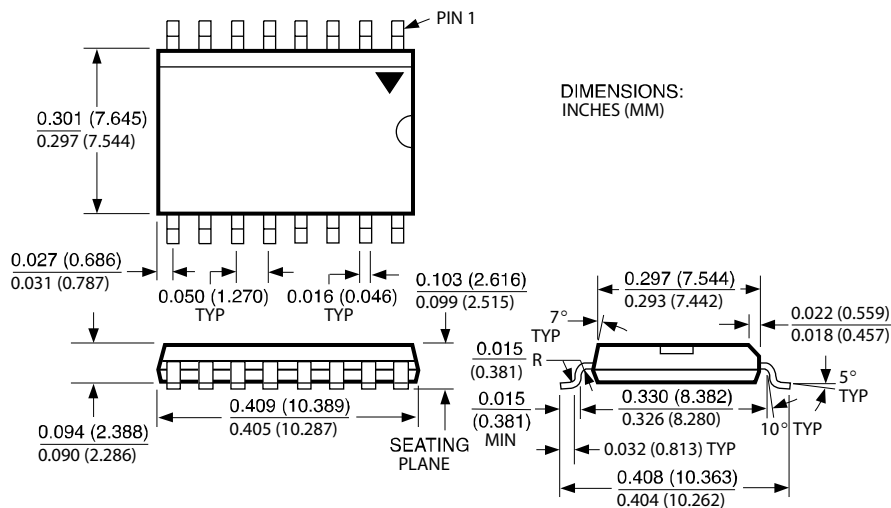
Quad Driver Drives H Bridge to Control Motor Speed and Direction



Package Information



14-Pin Plastic DIP (N)



16-Pin Wide SOP (WM)

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