



# MIC4606 Evaluation Board

85V Full-Bridge MOSFET Drivers  
with Adaptive Dead Time and  
Shoot-Through Protection

## General Description

The MIC4606 is an 85V full-bridge MOSFET driver that features adaptive dead time and shoot-through protection. The adaptive dead time circuitry actively monitors both sides of the full-bridge to minimize the time between high-side and low-side MOSFET transitions, thus maximizing power efficiency. Anti-shoot-through circuitry prevents erroneous inputs and noise from turning both MOSFETs of each side of the bridge on at the same time.

The MIC4606 also offers a wide 5.5V to 16V operating supply range to maximize system efficiency. The low 5.5V operating voltage allows longer run times in battery-powered applications. Additionally, the MIC4606's adjustable gate drive sets the gate drive voltage to VDD for optimal MOSFET  $R_{DS(ON)}$ , which minimizes power loss due to the MOSFET's  $R_{DS(ON)}$ .

## Requirements

The evaluation board requires a 5.5V to 16V power supply to power the VDD terminal (J1) of the MIC4606. Another supply (up to 85V) may be used to power the MOSFETs connected to the VIN terminal (J2). A pulse generator or the output of a PWM control IC may be connected to the HI and LI terminals (MIC4606-1), or PWM single input (MIC4606-2).

## Precautions

There is no reverse input protection on this board. When connecting the input sources, make sure that the correct polarity is observed.

Under extreme load conditions and with a high supply voltage (>48V) connected to the VIN terminal (J2), input transients can be quite large if long test leads are used. In such cases a 100 $\mu$ F, 100V electrolytic capacitor is needed across the VIN terminals to prevent overvoltage damage to the IC. This can be removed if a clean supply voltage on VIN is always guaranteed.

Datasheets and support documentation are available on Micrel's web site at: [www.micrel.com](http://www.micrel.com).

## Getting Started

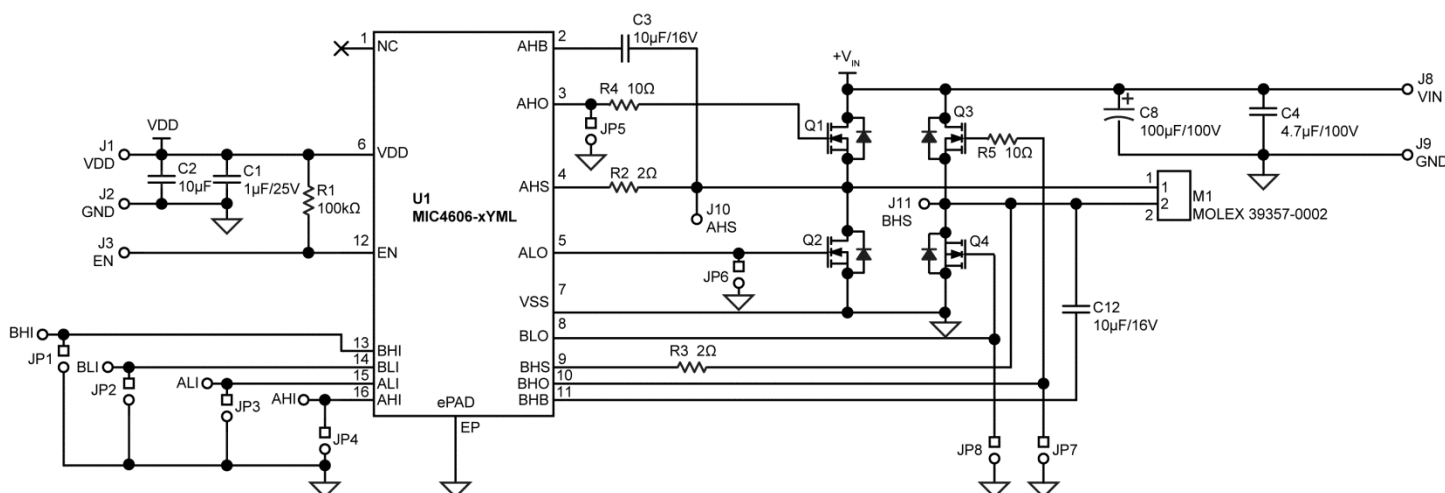
- 1. Connect VIN supply between the VIN and GND terminals and VDD supply between the VDD and GND terminals.**  
Connect a supply between the VIN terminal (J8) and the GND terminal (J9), paying careful attention to polarity and supply range ( $VIN \leq 85V$ ). Do not apply power until Step 5. Connect a supply between the VDD terminal (J1) and the GND terminal (J2), paying careful attention to polarity and supply range ( $5.5V \leq VDD < 16V$ ). Do not apply power until Step 5.
- 2. Connect the TTL-compatible HI and LI inputs (MIC4606-1), or the PWM single input (MIC4606-2).**  
Connect the xHI inputs (JP1/JP4) and xLI inputs (JP2/JP3) to a pulse generator or the output of a PWM control IC. Ensure that they are non-overlapping signals and are TTL compatible logic-levels. The xPWM single inputs replace the xHI inputs (JP1/JP4) for the MIC4606-2 option.
- 3. Monitor inputs and outputs.**  
Monitor the inputs xHI (JP1/JP4) and xLI (JP2/JP3) or xPWM (JP1/JP4) and outputs xHO (JP6, JP5) and xLO (JP7, JP8) with an oscilloscope.
- 4. Connect motor across HS and GND or connect HS to GND.**  
The simplest way to observe the MIC4606 operation is to connect a motor across the xHS terminals (J10 to J11), or across either xHS terminal (J10/J11) to GND (J9). Alternatively, the xHS terminals (J10/J11) can be shorted to GND (J9) with VIN turned OFF. AC/DC parameters can be measured in this configuration.
- 5. Turn-on supplies and HI/LI inputs.**  
Turn-on the VDD followed by VIN. Turn on the xHI and xLI inputs (MIC4606-1) or PWM single inputs (MIC4606-2)

'x' denotes Channel A or B

## Ordering Information

Part Number	Description
MIC4606-1YML EV	MIC4606-1YML Evaluation Board
MIC4606-2YML EV	MIC4606-2YML Evaluation Board

## Evaluation Board Schematic



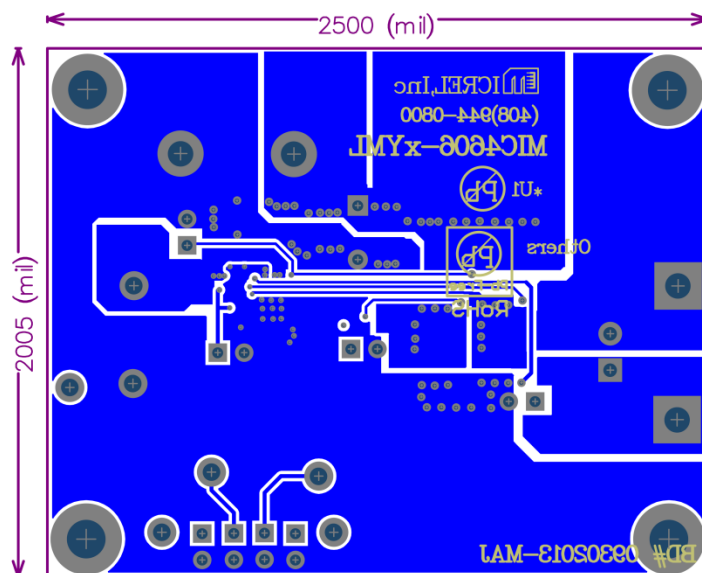
## Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1	06033D105MAT2A	AVX <sup>(1)</sup>	1µF Ceramic Capacitor, 25V, X5R, Size 0603	1
C2	C1608X5R1C106M080AB	TDK <sup>(2)</sup>	10µF Ceramic Capacitor, 16V, X5R, Size 0603	1
C3, C12	0805YD106MAT2A	AVX	10µF Ceramic Capacitor, 16V, X5R, Size 0805	2
C4	C3225X7S2A475M200AB	TDK	4.7µF Ceramic Capacitor, 100V, X7S, Size 1210	1
C8	B41827A9107M	EPCOS <sup>(3)</sup>	100µF Aluminum Electrolytic Capacitor, 100V	1
Q1, Q2, Q3, Q4	AM7414	Analog Power <sup>(4)</sup>	100V, N-Channel MOSFET	4
R1	CRCW06031002FRT1	Vishay <sup>(5)</sup>	100kΩ, Tolerance 1%, Size 0603	1
R2, R3	CRCW08052R0FRT1	Vishay	2Ω, Size 0805	2
R4, R5	CRCW08050100FRT1	Vishay	10Ω, Size 0805	2
U1	MIC4606-1YML	Micrel, Inc. <sup>(6)</sup>	85V Full-Bridge MOSFET Drivers with Adaptive Dead Time and Shoot-Through Protection	1
	MIC4606-2YML			1

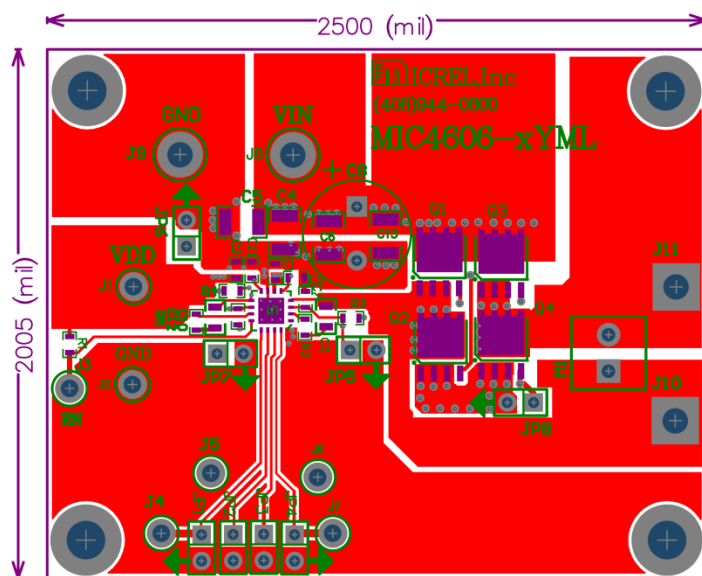
### Notes:

1. AVX: [www.avx.com](http://www.avx.com).
2. TDK: [www.tdk.com](http://www.tdk.com).
3. EPCOS: [www.epcos.com](http://www.epcos.com).
4. Analog Power: [www.analogpowerinc.com](http://www.analogpowerinc.com).
5. Vishay: [www.vishay.com](http://www.vishay.com).
6. Micrel, Inc.: [www.micrel.com](http://www.micrel.com).

## PCB Layout Recommendations



### Bottom Layer



## Top Layer

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