General Description

The MIC44F18 and MIC44F20 are a family of small size, high speed MOSFET drivers. The MIC44F18 is a non-inverting driver and the MIC44F20 is an inverting driver. Refer to the MIC44F18/19/20 product specification for more information.

This demo board has a flexible design and may be used to evaluate the drivers. The schematic is shown in Figure 1. A 1uf, 25V ceramic capacitor is connected between the "HV in" and "Ground" terminals and provides high frequency decoupling on the board. 1uf and 0.1uf capacitors are used to decoupling the Vdd to ground. A 30 volt, N-Channel, SO-8 FET is included with the board.
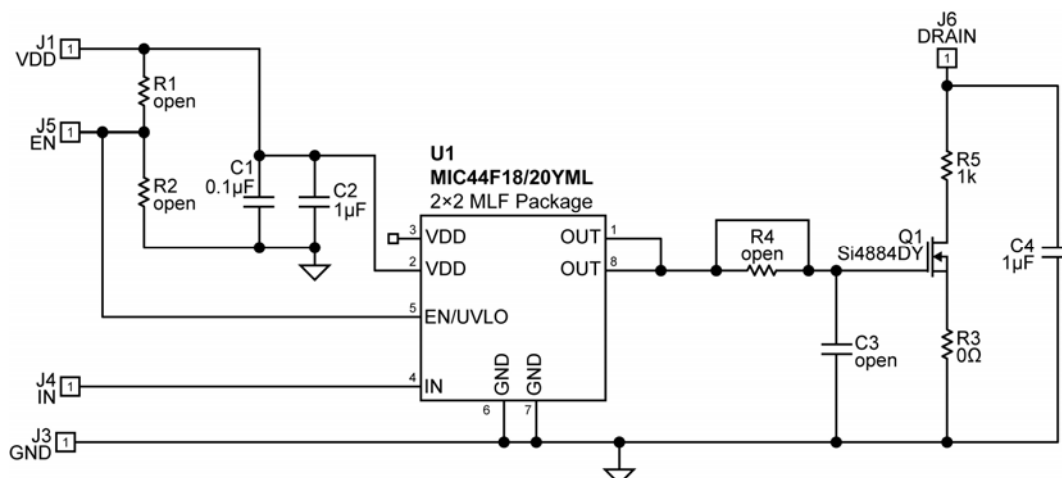
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Schematic

Figure 1. Evaluation Board Schematic

Specifications

Control IC (refer to board for part ID)
.... MIC44F18 or MIC44F20
Recommended "HV Supply" terminal voltage...... 0V to 25V
Recommended driver "Vdd" terminal voltage 4.5V to 13.2V

Precautions

The evaluation board does not have input reverse polarity protection. Applying a negative voltage at the "HV in" or "Vdd" terminals (with respect to the GND terminal) may permanently damage the components on the board. The voltage on the En/UVLO and IN terminals should not exceed the "Vdd" terminal voltage.

Requirements

At a minimum, the evaluation board requires an 5V supply to power the driver and a pulse generator or the output of a PWM control IC connected to the IN terminal. Another supply may be used to power the MOSFETs at the "HV in" terminal. The board can be used with either of the driver IC's.

Getting Started

Basic driver operation is observe by connecting a 5V or 12V supply to the board and applying a PWM signal to the "IN" terminal. The included SO-8 MOSFET can be removed or replaced with different FET.

Notes:

Gate source resistor location, R4, is shorted. Adding a resistor between the driver and the MOSFET gate requires cutting the etch between the pads.

Additional capacitance at location C3 may be used with a resistor in R4 for adding delay in the drive signal path. It may also be used as a location for a pulldown resistor if required.

The demo board comes with a zero ohm resistor in location R3 and a 1K resistor in location R5.   R3 may be removed and R5 can be shorted out for "high-side" FET applications.

Enable/UVLO

The UVLO circuit (Figure 2) disables the output until the V_{DD} supply voltage exceeds the UVLO threshold. Hysteresis in the UVLO circuit prevents noise and finite circuit impedance from causing chatter during turn-on and turn-off. The UVLO circuit may be programmed to a higher voltage than the internally set threshold with an external resistor divider.

Figure 2
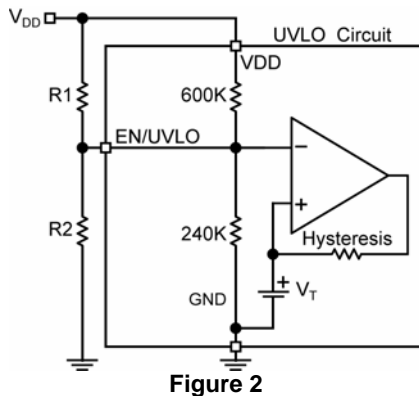
The V_{DD} turn on (rising V_{DD}) threshold is calculated as:

$$V_{DD\,enable} = V_{TH} \times \left[1 + \frac{R1}{R2}\right]$$

$$V_{DD\,hysteresis} = V_{Hyst} \times \left[1 + \frac{R1}{R2}\right]$$

where : V_{TH} = Enable Threshold Voltage

$VDD_{Hysteresis}$ = Hysteresis Voltage at the VDD pin

V_{Hyst} = Enable Hysteresis Voltage

It is important to keep the value of the external resistors at least 10 times lower than the typical values of the internal resistors. This prevents the internal resistors from affecting the accuracy of the enable calculation as well as preventing the higher tolerance of the internal resistors from affecting the tolerance of the enable voltage setting.

Bill of Materials

| Item	Part Number	Manufacturer	Description	Qty.
Q1	Si4884DY	Vishay/Siliconix(1)	30V N-channel MOSFET	1
C1	VJ0603Y104KXXAT.	Vishay/Vitramon(2)	0.1uf/25V, X7R ceramic cap 0603 size	1
C2	C1608X5R1C105M.	TDK(3)	1uf, 16V, X5R, Ceramic 0603 size	1
C4	C3216X7R1E105K	TDK(3)	1uf, 25V, X7R, Ceramic, 1206	1
	GRM188R61C105KA93	muRata(4)	1uf, 16V, X5R, Ceramic 0603 size	OR
	0603YD105MAT	AVX(5)	1uf, 16V, X5R, Ceramic 0603 size	OR
	GRM31MR71E105KA01	muRata(4)		OR
R3	CRCW06030000FKEY3.	Vishay Dale(6)	0 ohm, 1%, 0603, 1/16W	1
C3,R1, R2,R4			open location - 0603 size	0
R5	CRCW06031001FKEY3.	Vishay Dale(6)	1k ohm, 0603 size	1
				5
U1	**MIC44F18YML**	**Micrel[7]**	**MOSFET Driver 2x2 MLF Package**	**1**
	MIC44F20YML	**Micrel[7]**	**MOSFET Driver 2x2 MLF Package**	**Or**

Notes:

1. Vishay/Siliconix Tel: 402-644-4218

2. Vishay/Vitramon Tel: 402-644-4218

3. TDK Tel: 408-437-9585

4. Murata Tel: 949-916-4000

5. AVX Tel: 843-448-9411

6. Vishay Tel: 402-644-4218

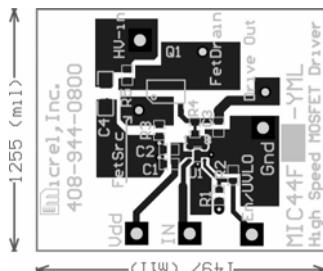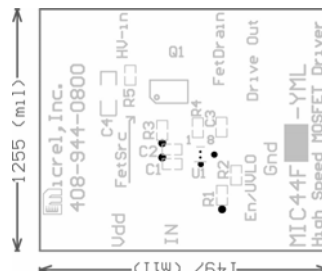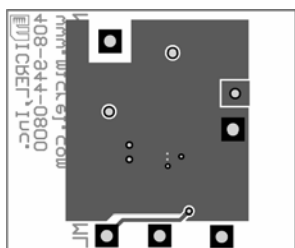7. Micrel Semiconductor Tel: 408-944-0800

PCB Layout
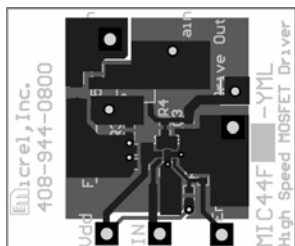
PCB
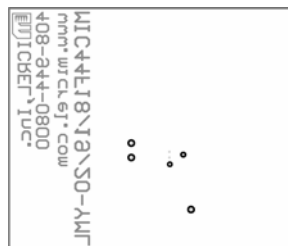
Bottom Silk

Top Layer

Top Silk

Bottom Layer

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