Test Data
For PMP10645
04/22/2015

Contents

1. Overview

The PMP10645 reference design is designed for SM74101 mosfet driver with a Fly-Buck power supply to drive half bridge. The SM74101 is a tiny 7A mosfet driver which can support 3A source current and 7A sink current. It has a tiny WSON-6 package and an 8-Lead exposed-pad MSOP package. It also provides both inverting and non-inverting inputs to satisfy requirements for inverting and non-inverting gate drive with a single device type. The isolated output Fly-Buck power supply has four outputs to supply the gate driver bias in motor drive or inverter applications. It features the LM5017, 7.5-100V wide Vin, 600mA, Constant On-Time (COT), synchronous buck regulator configured in the Fly-Buck topology. The Fly-Buck converter is a simple, cost effective and compact isolated power solution. The reference board generates two pairs of +8 V and -4.5V outputs each with 100mA current capability. The user can use jumpers to set Unipolar or Bipolar PWM gate driver. The user can also set higher gate voltage by changing the Fly-buck feedback resistor when set the Unipolar PWM gate driver.

2. Power Specification

For gate driver:

Input: 5V PWM signal
Output: Unipolar or Bipolar PWM gate driver

For Fly-Buck:

Vin range: 19V – 30V
Nominal Vin = 24V
Quad Isolated Outputs: 2 x (+8V@100mA, -4.5V@100mA)
Fsw = 350kHz

3. Block Diagram

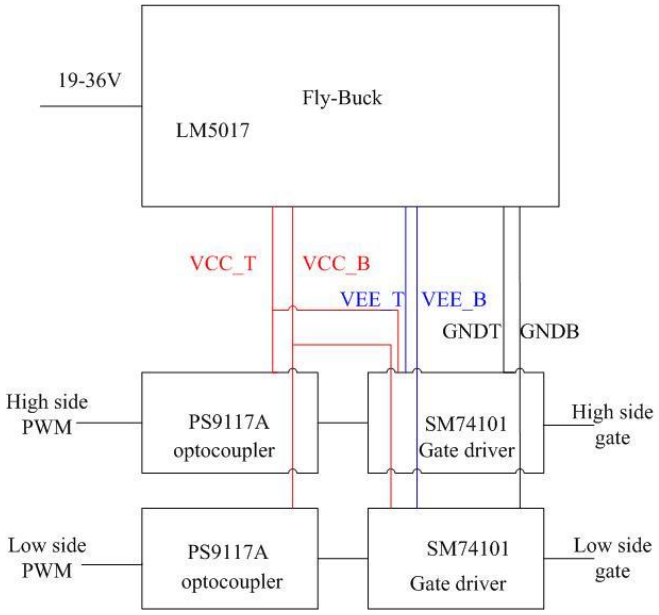
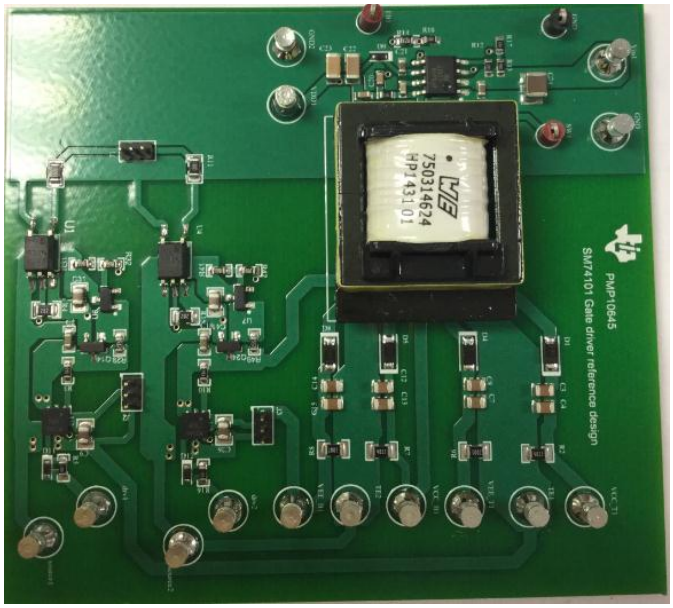


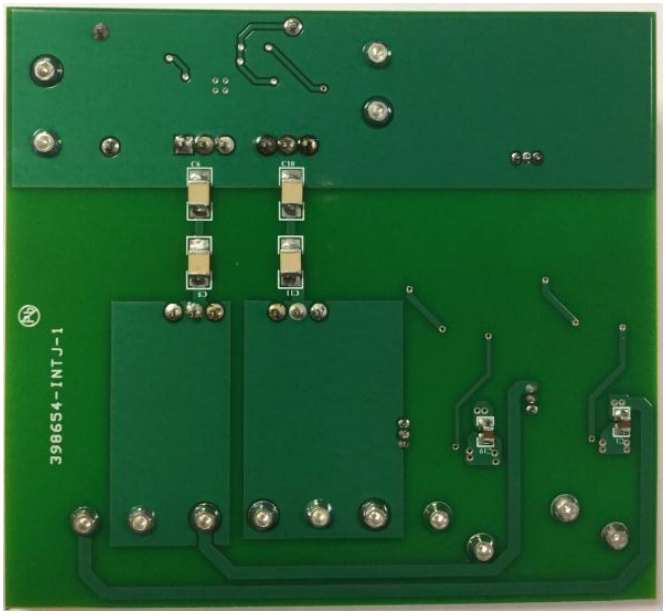
Figure 1

The Fly-Buck can provide the isolated power supply for the gate diver. We also use the optocoupler and the small delay time tiny gate driver to isolate and drive the pwm signal. Because the optocoupler is inverting logical. So we can set the gate diver inverting logical too to get the right logic.

4. **Board Photo**



(a) Top



(b) Bottom

Figure 2

Size: 78x71mm^2

4. **Connector Description**

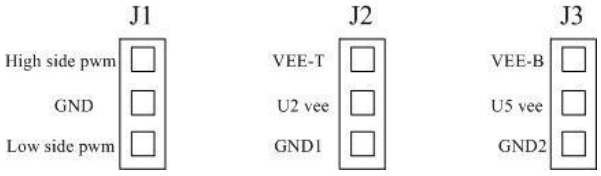


Figure 3

J1 –is high side and low side pwm signal can provide by the MCU (Micro Controller Unit).
J2 –is optional for the Unipolar or Bipolar PWM high side gate driver.
J3 –is optional for the Unipolar or Bipolar PWM low side gate driver.

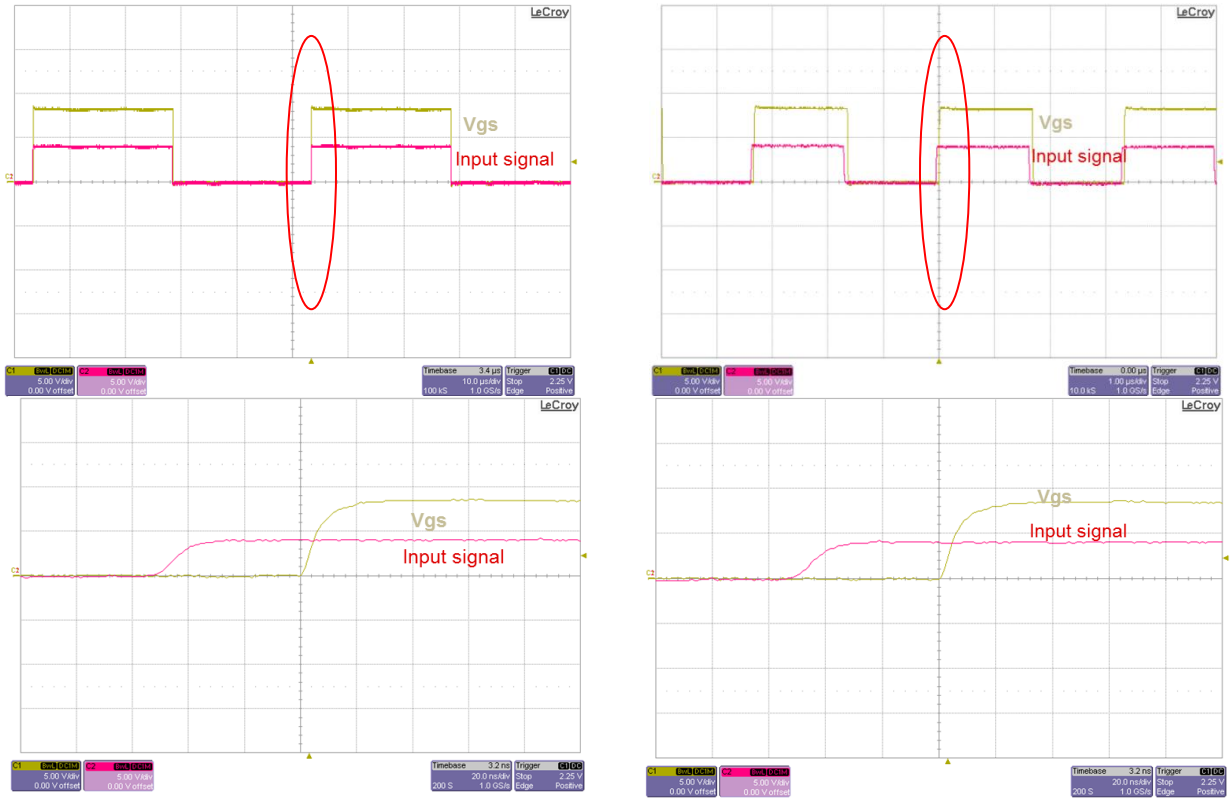
(a) (b)

Figure 4

If connect the jumper as figure 4(a), user can get the Bipolar PWM gate signal. If connect the jumper as figure 4(b), user can get the Unipolar PWM gate signal.

5. **Test result**

1) Delay time test: Give a signal at the input of the optocoupler, then test the delay time between the optocoupler and the output signal of SM74101.



(a) PWM signal frequency 20khz (b) PWM signal frequency 300khz

Figure 5

Test Result: The total delay time of the optocoupler and the gate driver is only 30ns when the pwm signal frequency is 20khz or 300khz.

2) Source and sink current test: Give a 20khz PWM signal at the input of the optocoupler, use 1ohm drive resistor and 100nF capacitive load. Check the voltage drop on 1 ohm resistor.

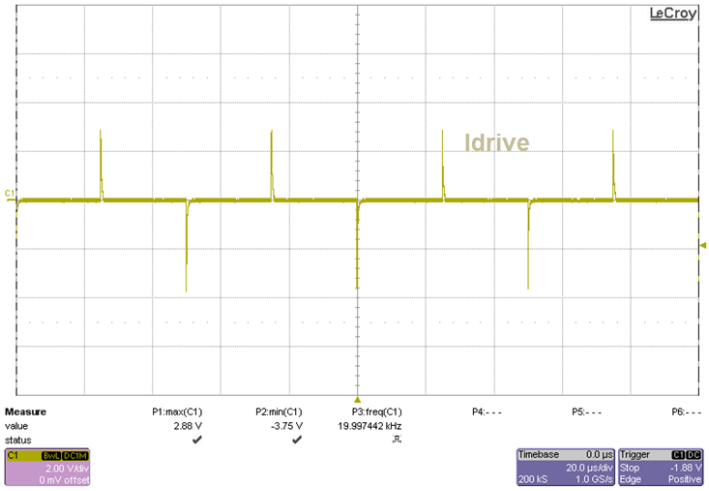


Figure 6

Test Result: SM74101 can provide 3A source current according to figure 6, the sink current can be higher when use a smaller drive resistor.

3) Rise and fall time test: Give a 300khz PWM signal at the input of the optocoupler, use 1ohm drive resistor and 2.2nF capacitor load. Check the output signal waveform rise and fall time.

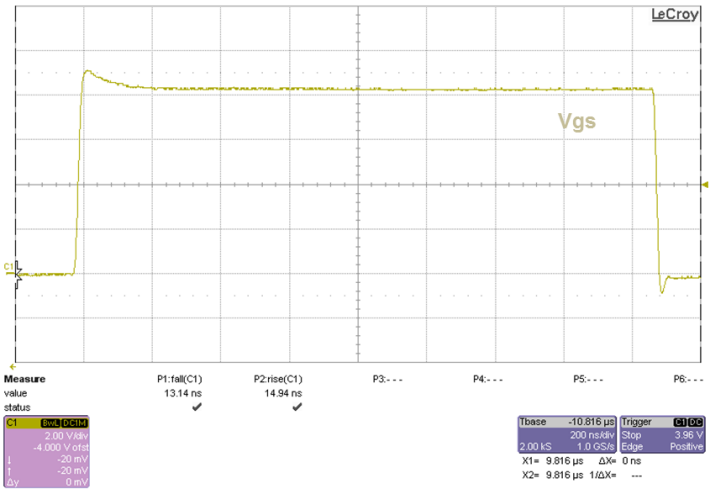


Figure 7 VCC=8V

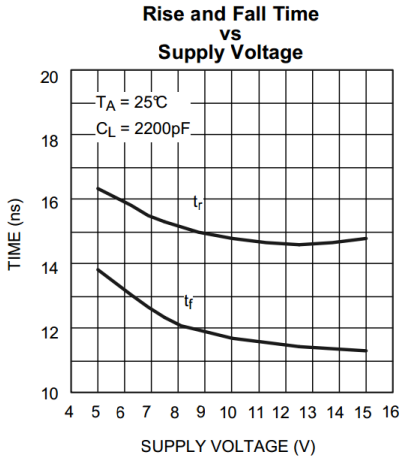
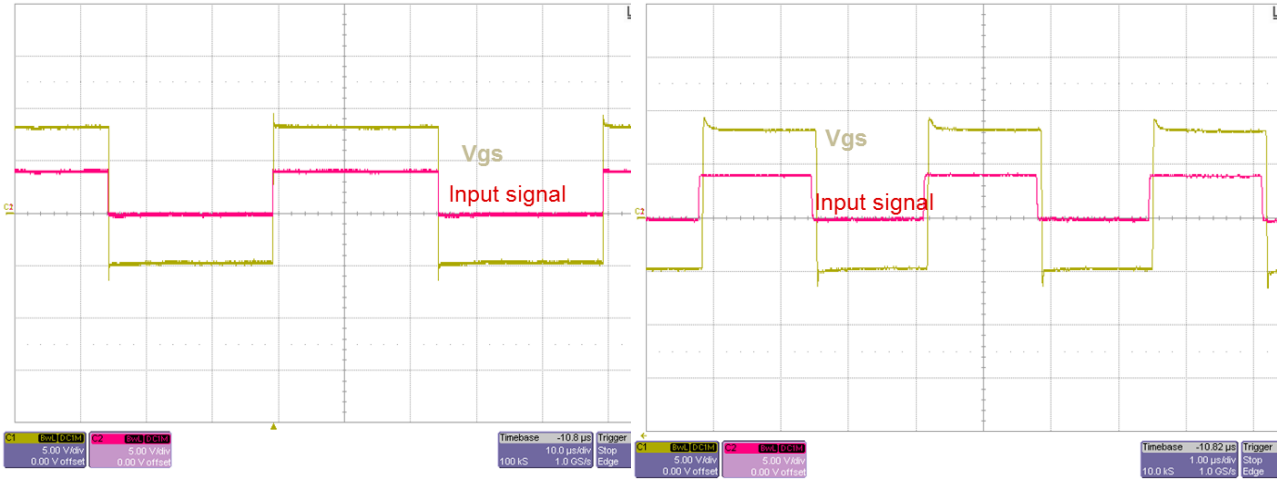


Figure 8 rise and fall time vs supply voltage (from SM74101 datasheet)

Test Result: The rise time is only 15ns, and the fall time only 13ns, almost the same as the datasheet data.

4) Bipolar PWM test: connect the J2 & J3 as the figure 4(a).



(a) PWM signal frequency 20khz (b) PWM signal frequency 300khz

Figure 9

Test Result: The board works well when the user set the Bipolar PWM gate signal out.

For Fly-buck:

Ti has many Fly-Buck reference designs, so this test report focuses on the gate driver SM74101. But the LM5017 Fly-Buck design is also a simple, cost effective and compact isolated power solution and it has very good cross regulation and line/load response.

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