



VOD3120AB Evaluation Board User's Guide

By Dimitrij Martins and Achim M. Kruck

INTRODUCTION

The "VOD3120AB - IGBT and MOSFET Driver" evaluation board provides a readily available platform for performance and design evaluation of Vishay's 2.5 A IGBT and MOSFET drivers. It also contains provisions for a buffered IR LED driver and custom specific output stage.

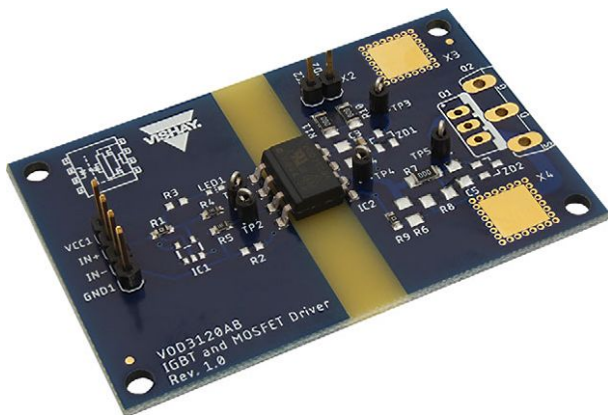


Fig. 1 - VOD3120AB Evaluation Board Picture

DESCRIPTION

The IR LED on the input side can be differentially driven with a 5 V signal at X₁ (IN+, IN-), resulting in a forward current I_F of 10 mA. The output side of the VOD3120A provides a push-pull stage and is accessible at TP₄ or TP₅.

The VOD3120A power supply must be connected at X₂ (V_{CC2}, GND₂) and can be up to 30 V. Pad X₃ and pad X₄ provide access to the drain and source of Q₁ or Q₂.

TEST CONFIGURATION

The default configuration requires the connection of a 5 V pulse source GEN to drive the IR LED at the input and a power supply for IC₂ at the output side, as shown in Fig. 2.

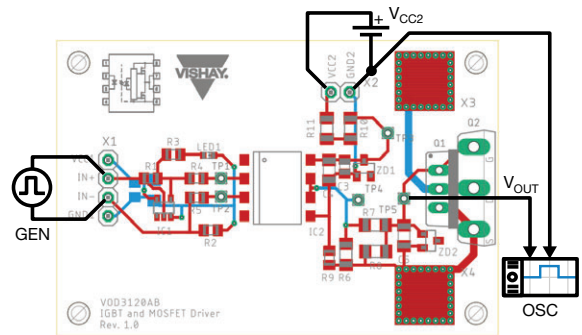


Fig. 2 - Default Connection

ALTERNATIVE CONFIGURATION

For testing purposes, R₇, C₅, and R₈ provide a R-CR combination for emulating the gate input impedance.

Both Q₁ and Q₂ provide footprints for assembling custom IGBTs or MOSFETs in combination with pad X₃ and pad X₄. The wiring is shown in Fig. 3.

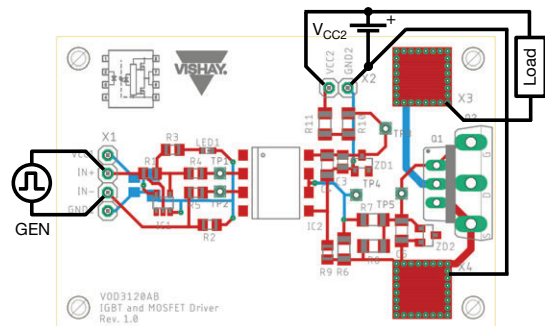


Fig. 3 - Q1 or Q2 IGBT / MOSFET Connection

To avoid discharge effects or ESD events at the IGBT or MOSFET gate, ZD₂ can be used as a two-line protection element. Its value depends on the IGBT or MOSFET threshold voltage and application.

APPLICATION NOTE

VOD3120AB Evaluation Board User's Guide

For current or voltage limiting, dividing, or filtering, R₆, R₇, and R₈ can be used together with C₅.

The gate voltage can be monitored at TP₄, while the voltage drop at R₇, in combination with TP₄ and TP₅, can be used for current monitoring.

The power supply for IC₂ at X₂ (V_{CC2}, GND₂) is intended to be directly connected to the IGBT power supply.

If the supply voltage is above 30 V, R₁₀ - together with the small signal Zener diode ZD1 - can be used for voltage limitation and stabilization, and can be measured at TP₃. R₁₀ and R₁₁ should be able to handle the power dissipation.

For power supply stabilization and noise decoupling, a low ESR / ESL with high self-resonant frequency must be used. Typically C₃ provides both. If the application requires improved stabilization, C₄ may be added in parallel to C₃.

To enable ground-referred measurement, e.g. for adjusting the forward current or timing measurements, the voltage drop at R₂ and R₅ can be used with TP₂. Typical values are between 50 Ω and 1 kΩ.

If a high impedance input is needed, a logic gate driver IC₁ can be used to drive the IR LED. In this case omit R₁, set R₂ to 0 Ω, and apply a power supply of 5 V at X₁ (V_{CC1}, GND₁) as shown in Fig. 4.

If a current source is used, or for testing purposes, the input can be driven directly with the forward current by using 0 Ω jumpers for R₄ and R₅.

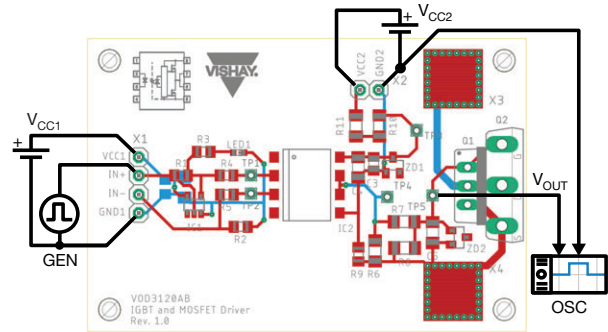


Fig. 4 - Q1 or Q2 IGBT / MOSFET Connection

Typically the ground node of IC₂ is connected to the IGBT emitter, here with R₉ as the short. For separate ground planes or different ground references for IC₂ and the IGBT / MOSFET, R₉ can be removed.

SCHEMATIC

The default assembly and schematic can be seen in Fig. 5.

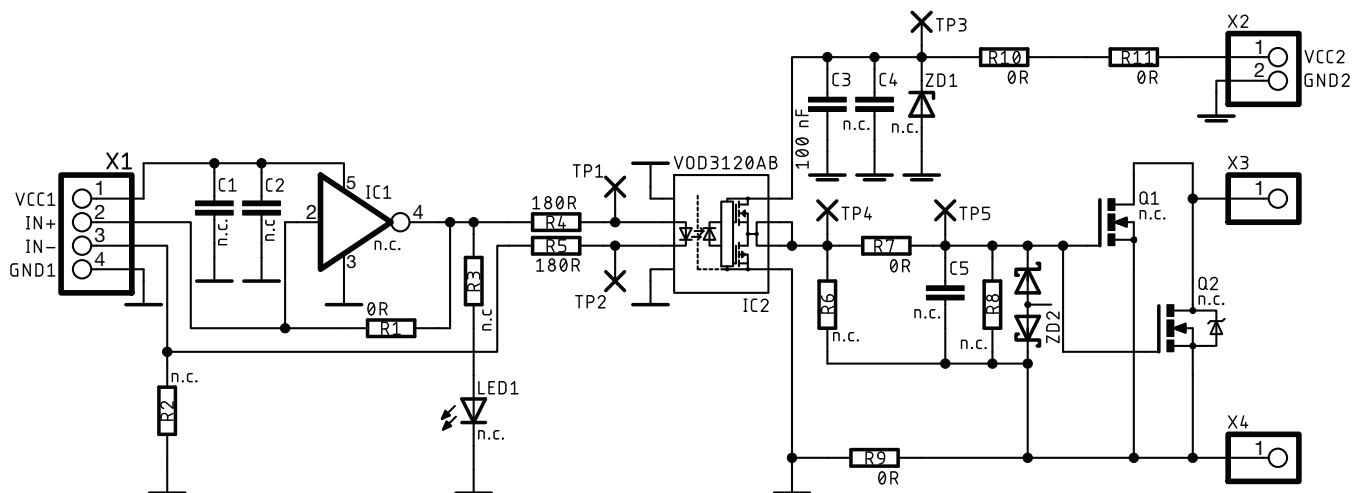


Fig. 5 - Schematic

APPLICATION NOTE

VOD3120AB Evaluation Board User's Guide

BOARD LAYOUT

Fig. 6 shows the top layout, Fig. 7 the bottom. The board can also be affixed using the holes in each corner.

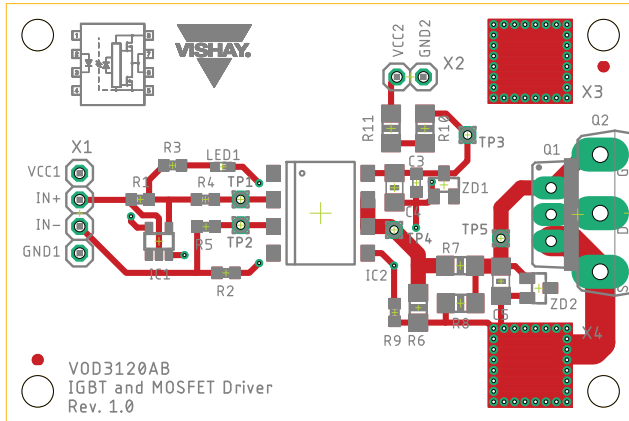


Fig. 6 - Top Layout

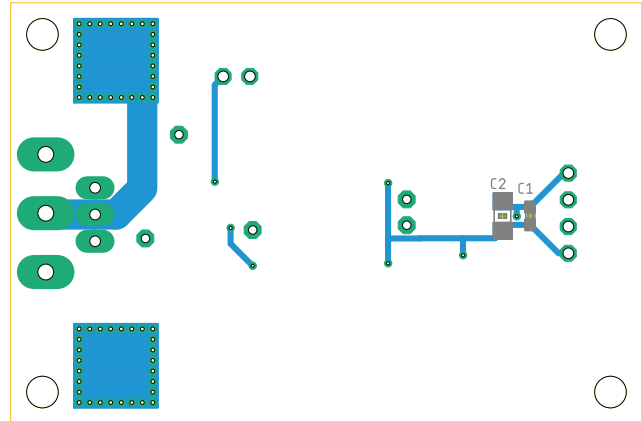


Fig. 7 - Bottom Layout

TABLE 1 - BILL OF MATERIALS			
IDENTIFIER	PART NUMBER	COMMENT	MANUFACTURER
IC1	74LVC1G04GW	Logic gate driver, not assembled	NEXPERIA
IC2	VOD3120AB	2.5 A IGBT and MOSFET driver	VISHAY
Q1	-	Custom power IGBT, TO220, not assembled	-
Q2	-	Custom power IGBT, TO247, not assembled	-
R1	CRCW08050000ZK	0 Ω jumper	VISHAY
R2	CRCW08050000ZK	0 Ω jumper	VISHAY
R3	CRCW0805510RFKTA	510 Ω resistance, not assembled	VISHAY
R4	CRCW0805180RFKTA	180 Ω resistance	VISHAY
R5	CRCW0805180RFKTA	180 Ω resistance	VISHAY
R6	-	Not assembled	-
R7	CRCW12060000ZSTA	0 Ω jumper	VISHAY
R8	-	Not assembled	-
R9	CRCW08050000ZK	0 Ω jumper	VISHAY
R10	CRCW12060000ZSTA	0 Ω jumper	VISHAY
R11	CRCW12060000ZSTA	0 Ω jumper	VISHAY
C1	-	Not assembled	-
C2	-	Not assembled	-
C3	VJ0805Y104KXXAT	100 nF capacitance	VISHAY
C4	-	Not assembled	-
C5	-	Not assembled	-
LED1	TLMG1100-GS08	0603 SMD LED, not assembled	VISHAY
X1	90120-0764	Pin header, 4 circuits	MOLEX
X2	90120-0762	Pin header, 2 circuits	MOLEX
TP1	151-203-RC	Test point, not assembled	KOBICONN
TP2	151-203-RC	Test point, not assembled	KOBICONN
TP3	151-203-RC	Test point, not assembled	KOBICONN
TP4	151-203-RC	Test point, not assembled	KOBICONN
TP5	151-203-RC	Test point, not assembled	KOBICONN
ZD1	BZX84C24-G	24 V small signal Zener diode, not assembled	VISHAY
ZD2	GSOT15C	15 V two-line ESD protection diode, not assembled	VISHAY
PCB	VOD3120_BRD	VOD3120AB evaluation board rev. 1.0	VISHAY

APPLICATION NOTE