SGS-THOMSON MICROELECTRONICS

APPLICATION NOTE

TRIPLE GALVANIC INSULATED HIGH SIDE DRIVING WITH TD310

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INTRODUCTION

The TD310 is a triple MOS or IGBT driver which integrates all functions suited for compact and highly secure driving such as adjustable Under Voltage Lockout feature (UVLO), sense comparator with alarm output and automatic shutdown, independent operational amplifier, enable pin, global standby mode (e.g.: for portable applications), and a wide range of supply voltage.

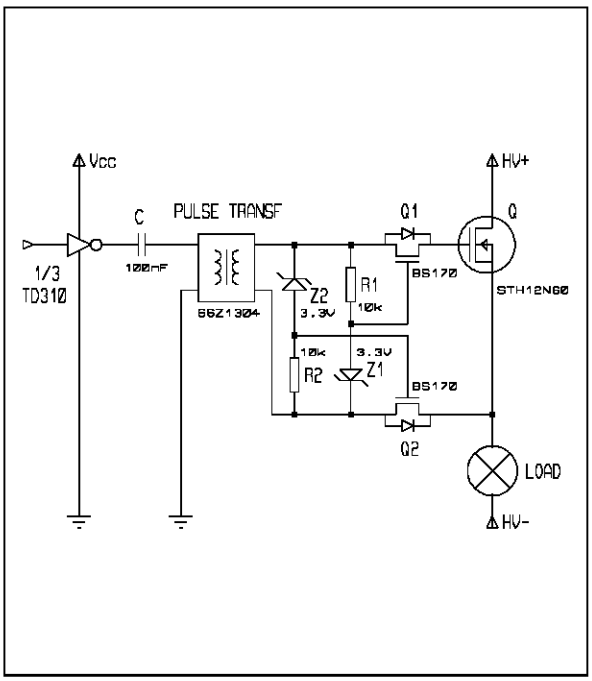
The following describes how to ensure complete galvanic insulation when driving high side POWER MOSFETs, using one pulse transformer and two low cost MOSFETs per TD310 output.

PRINCIPLE

The TD310 output square signal is derived in positive and negative pulses by means of the capacitor C (refer to Figure 1) and the magnetising inductance and impedance of the pulse transformer's primary. The pulses are transferred to the transformer's secondary as ON and OFF orders for the Power transistor Q.
The positive (resp. negative) pulse on the transformer's secondary switches the transistor Q2 (resp. Q1) ON and the current flows through the intrinsic diode of Q1 (resp. Q2) to charge (resp. discharge) the transistor Q gate.
The zener diodes Z1,Z2 are needed to avoid parasitic reconduction of the MOSFETs Q1,Q2 by clamping the damped oscillation after the main pulse.

The threshold voltage of the zener diodes should be chosen taking into consideration the transformer's secondary parasitic oscillation magnitude. The resistors R1,R2 are needed to keep the gates of Q1 and Q2 discharged when these transistors are OFF.
Figure 1 shows a high side MOSFET driven by one driver output and a pulse transformer.

Figure 1



PERFORMANCES

The high side MOSFET transistor can be driven at 50kHz and more with the schematic and components of figure 1.
Best performances of the described application are given at 50% duty cycle.
The Vgs dV/dt switching ON and OFF reach 200V/µs.

Figure 2 shows the resulting traces of the above described application:

- Vcc=15V; HV=250VDC; Load=60W lamp
- 1 : Input
- A : Transformer's secondary ON and OFF pulses
- 4 : Vgs(Q)

Figure 2

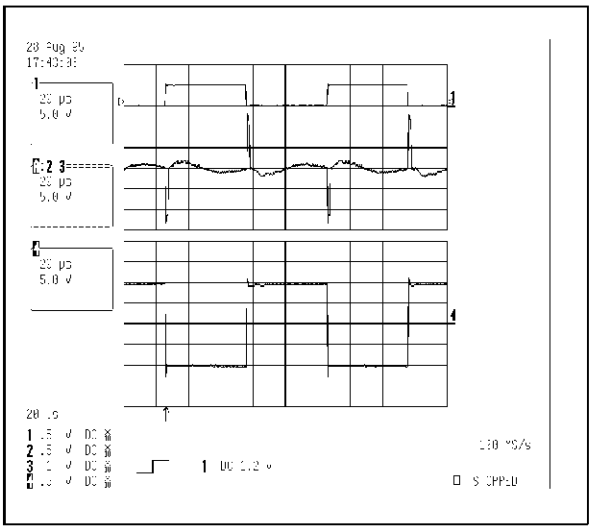
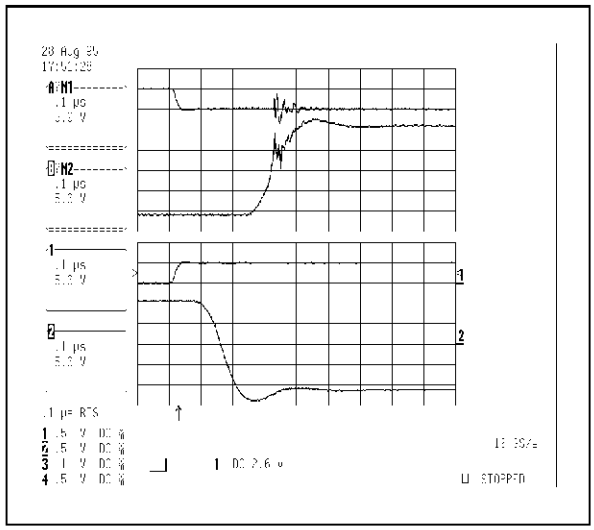


Figure 3 shows the ON and OFF switching traces of the high side MOSFET.

- A : Input
- 1 : Input
- B : Vgs(Q) switch ON
- 2 : Vgs(Q) switch OFF

Figure 3



Notes :

1 : The TD310 UVLO, Alarm, Enable and Current Sense functions as well as the additional Operational Amplifier are left to the user's convenience.

2 : Two TD310 and two triple pulse transformers make a fully insulated three-phase motor control.

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