

TLE9210x dual supply application

About this document

Scope and purpose

This application note provides information about how to control multiple half bridges supplied by two power supplies with the TLE92108/4 devices.

This document should be used in conjunction with the corresponding datasheet, which contains full technical details on the device specification and operation.

Intended audience

Developers working with the TLE92108/4-232QX.

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1 Introduction

The TLE92108/4 is a Multiple-MOSFET driver IC dedicated to control up to sixteen n-channel MOSFETs. Eight half-bridge drivers are integrated in TLE92108, respectively four half-bridge drivers in TLE92104 for DC motor control applications such as automotive power seats, power lift gates, cargo cover, sunroof, door lock, window lifts, etc.

2 Symbols and abbreviation

Overview of symbols

Symbol	Description
HB	Half bridge
DS	Drain-Source
VDS	Drain-Source voltage
HS	High side
DH	Drain input for high-sides
CSIN	Inverting input of the Current Sense Amplifier
DC	Direct current
SH	Source of high side MOSFET
VSH	Voltage of SH pin
V_{GS}	Gate-source voltage
VBAT	Power supply voltage

3 Dual supply application

3.1 Background

In some applications, HBs are supplied by two power supplies, as is shown in [Figure 1](#). With TLE9210x devices, it is possible to monitor the VDS of all HBs and detect short circuit errors, even if there are two different power supplies.

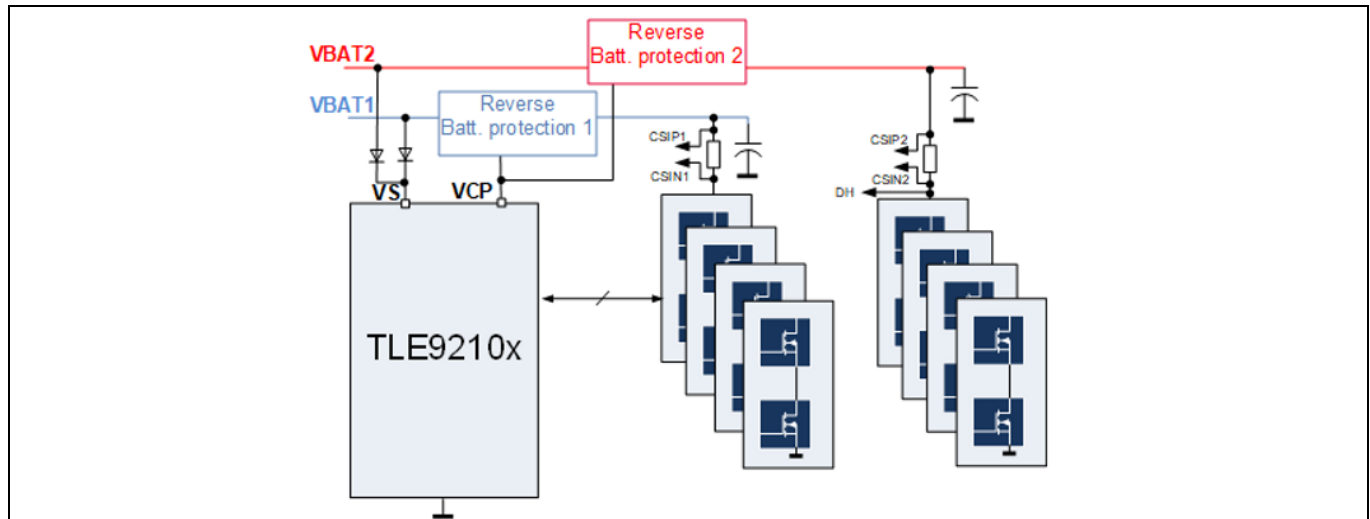


Figure 1 Multiple HBs supplied by two power supplies

3.2 Device configuration

When using TLE9210x devices, the reference of drain voltage of the HS MOSFET can be configured as from DH pin or CSIN1 pin:

- If HBxD = 0_B, Drain-source monitoring: DH - VSHx (default)
- If HBxD = 1_B, Drain-source monitoring: CSIN1 - VSHx

This feature makes it possible to correctly monitor the VDS of two groups of HBs supplied by two power sources. If a DS overvoltage is detected, the corresponding HB is latched off. As is shown in [Figure 1](#), the DS monitoring of HBs supplied by VBAT1 is configured as CSIN1 - VSHx; and the DS monitoring of HBs supplied by VBAT2 is configured as DH - VSHx.

If the voltage level of two power supplies are different, a wired OR gate should be implemented to supply the device with the power source at higher voltage level, as is shown in [Figure 1](#).

Besides, both power supplies should have their own reverse battery protection circuitry to avoid damage due to reversely connected battery.

4 Test results

4.1 Test with DC power sources

By applying two DC voltage sources both at 12V, as is shown in **Figure 2**, the device turns on and off the MOSFETs successfully. When the MOSFETs are ON, $V_{GS} = 11\text{ V}$.

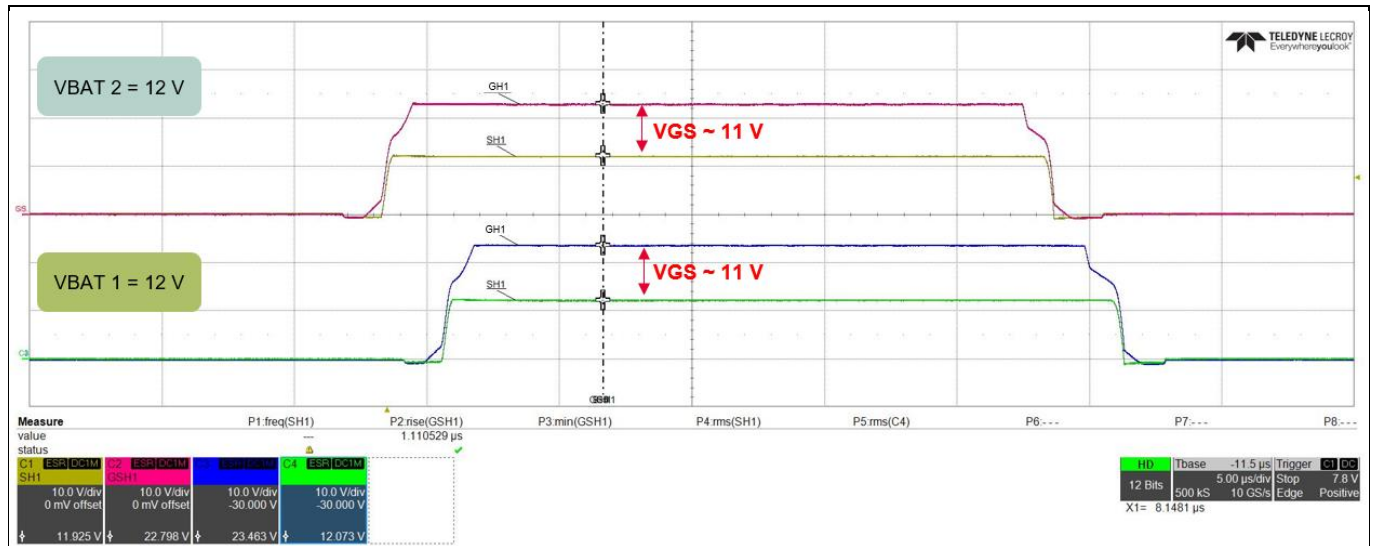


Figure 2 Dual supply at the same voltage level: $VSP1 = VSP2 = 12\text{ V}$

By applying two DC voltage sources at different voltage levels: $VSP1 = 12\text{ V}$, and $VSP2 = 17\text{ V}$, as is shown in **Figure 3**, the device turns the MOSFETs on and off successfully. When the MOSFETs are ON, still $V_{GS} = 11\text{ V}$, which is independent of the supply voltage. This is the benefit of floating gate drivers.

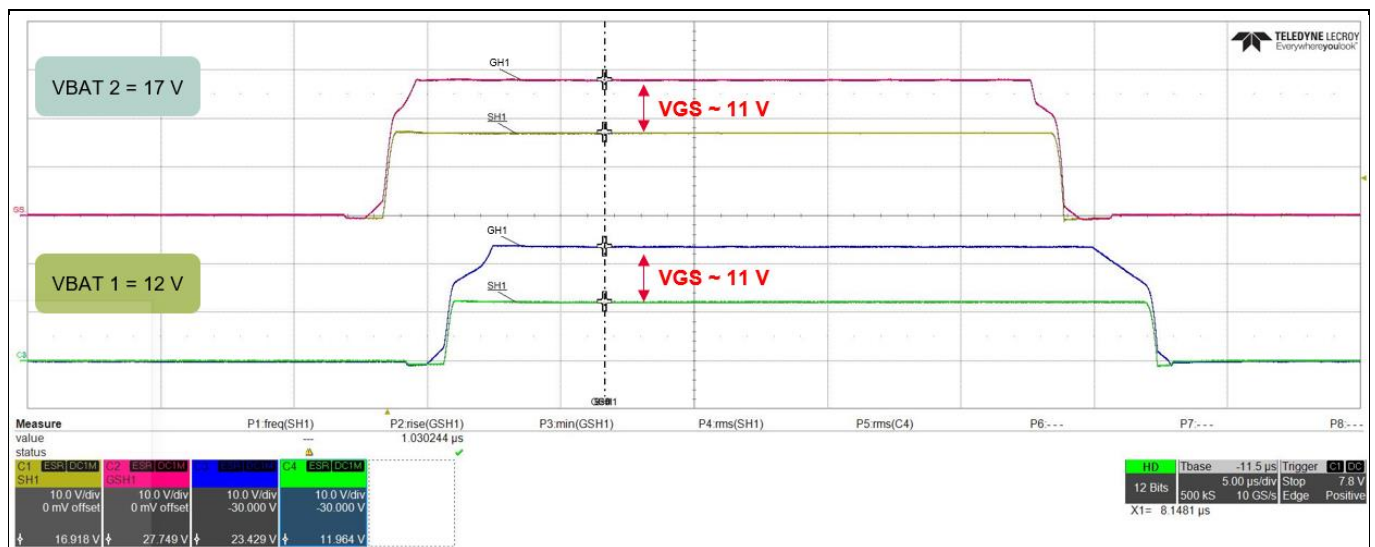


Figure 3 Dual supply at different voltage levels: $VSP1 < VSP2$

In conclusion, with correct configuration, the device is able to control multiple HBs supplied by two DC power supplies.

4.2 Test with DC and AC power sources

To further test the feasibility of controlling multiple HBs supplied by two power supplies, the E-06 superimposed alternating voltage replaces $VSP2$, and supplies one of the half bridge groups.

As is shown in **Figure 4**, the device turns on and off the MOSFETs correctly. When V_{pp} increases to 3 V or 6 V, the device is still able to control the MOSFETs.

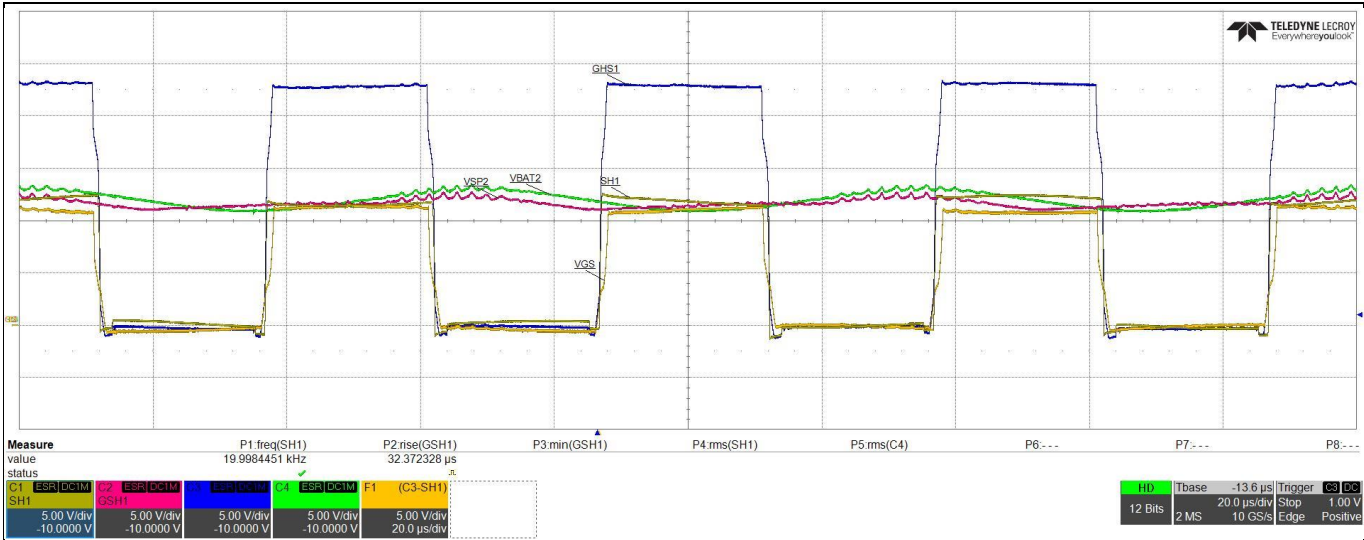


Figure 4 Measurement results

In conclusion, with correct configuration, the device is able to control multiple HBs supplied by a DC power supply and an E-06 superimposed alternating voltage.

Revision history

Document version	Date of release	Description of changes
01.00	2022-08-01	Initial document release

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Edition 2022-08-01

Published by

Infineon Technologies AG

81726 Munich, Germany

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Document reference

Z8F80186205

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