

FAQ Application Note for BTN7030-1EPA

Frequently asked questions

About this document

Scope and purpose

This application note is intended to provide helpful suggestions and hints how to set up and handle specific functionalities which are not subject of the datasheet and might be interesting for end users. It is organized in a frequently asked question style and doesn't follow any specific order.

Note: The following information is given as a hint for the implementation of the device only and shall not be regarded as a description or warranty of a certain functionality, condition or quality of the device.

Intended audience

This document is intended for customer and field application engineers to answer frequently asked question for the NovalithIC™ BTN7030-1EPA integrated half-bridge device.

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Introduction

1 Introduction

The NovalithIC™ Lite is part of an integrated half-bridge family, suitable for driving DC motors and solenoids.

The device is a monolithic chip integrated in SMART7 technology. BTN7030-1EPA is a protected half-bridge with integrated driver, providing protection and diagnosis functions. The high side power stage is built using a N-channel vertical power MOSFET with charge pump, while the low side power stage uses no charge pump. This device has an exposed pad which ensures better cooling.

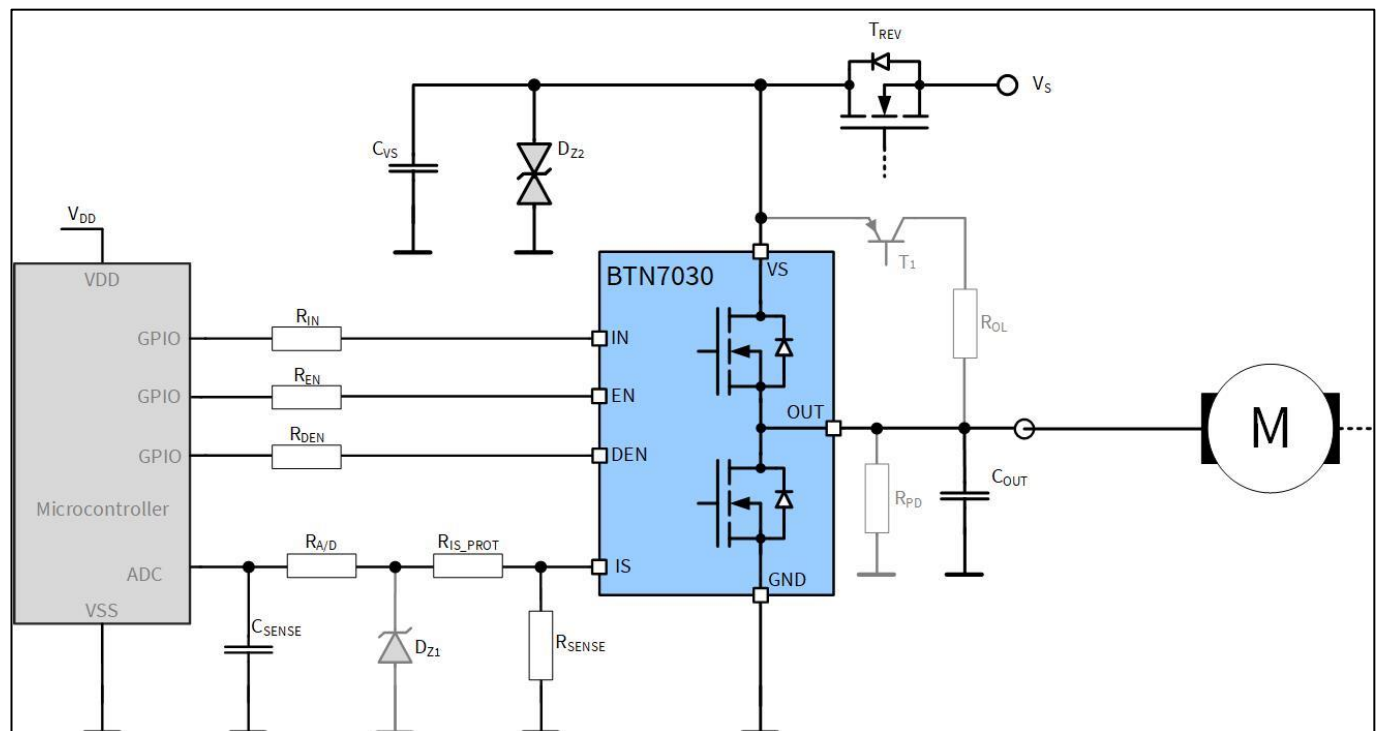


Figure 1 Application diagram

2 BTN7030-1EPA overview

The BTN7030-1EPA provides a cost optimized solution targeting low current (<15 A) DC motor applications with 0 – 2 kHz.

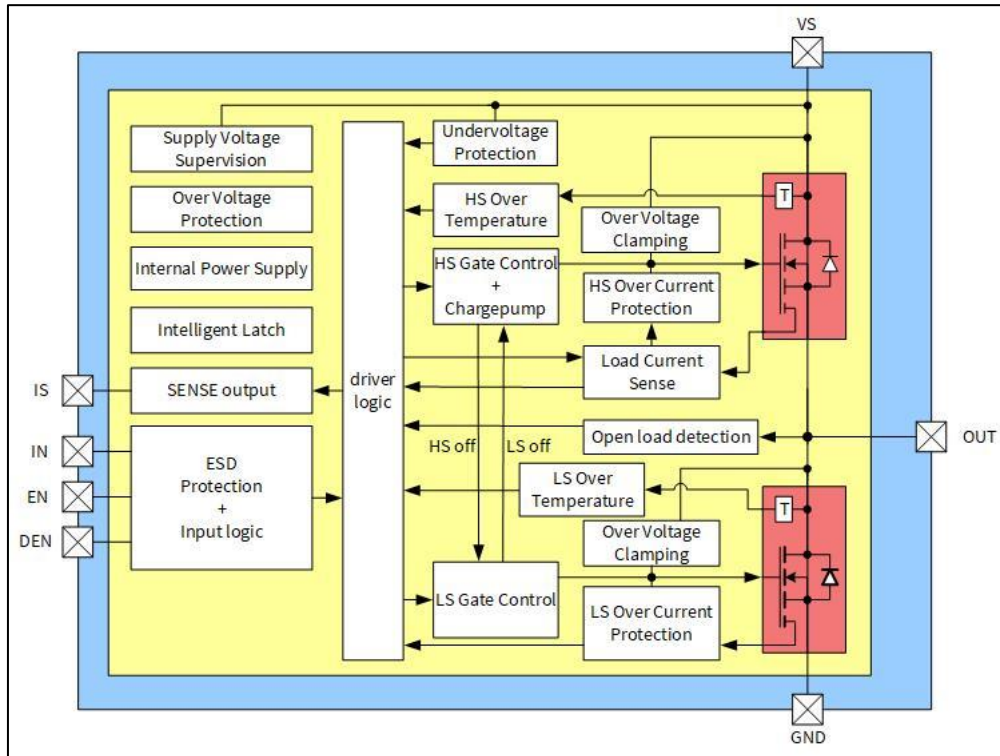


Figure 2 Block diagram

2.1 Key features of the BTN7030-1EPA Novalith IC™

- Path resistance of max. 62 mΩ @ 150°C (typ. 32 mΩ @ 25°C)
- High side: max. 25.5 mΩ @ 150°C (typ. 12 mΩ @ 25°C)
- Low side: max. 36.5 mΩ @ 150°C (typ. 20 mΩ @ 25°C)
- Current limitation level of 14 A @ 150°C, 17 A @ 25°C
- Status flag diagnosis with current sense capability
- Overtemperature shut down with latch behavior
- Undervoltage shut down
- Cross current protection
- Open load in ON and OFF detection
- Short circuit to GND and VBAT detection
- Driver circuit with logic level inputs
- Operation up to 28 V (normal operation 6 V – 18 V)
- Green Product (RoHS compliant)
- AEC Qualified in PG-TSDSO-14 package

3 FAQ questions

In this chapter FAQ will be listed in no specific order.

3.1 Can one microcontroller I/O port drive two EN, DEN, IN pins?

- From a functional perspective, there is no limitation with regard to driving multiple input pins of the same functionality from a single I/O port.

There is no problem as far as the uC I/O can handle the 2 x pull-down currents of EN pins. These currents are according to the Datasheet max. 25 μ A, so sinking/sourcing should not be an issue for the GPIO of the uC.

3.2 Cross-current protection mechanism

- BTN7030 has a cross-current protection in such a way that after one power output stage is switched off there is respectively $t_{\text{BLANK(HS-LS)}} / (LS-HS)$ delay before the other power stage can be switched on.

This means this mechanism is both state and time based.

3.3 What is the maximum IS pin voltage

- Voltage on IS pin will be always limited to V_S , and will not exceed it.
So, assuming V_{IS} should be 20 V, and $V_S = 12$ V, V_{IS} stays at 12 V.

3.4 Is the protection enabled during active state, even when diagnoses is disabled?

- Yes, when $DEN=0$, protection is active if a device is enabled $EN=1$ and in case of fault internal latch will be set.
- If at the same time $DEN=1$ it is possible to see the value of the IS pin:
 - o mirror the output current ($I_{IS} = I_{OUT}/k_{ILIS}$)
 - or
 - o indicate which fault condition occurred in the device

3.5 Does the device support active free-wheeling?

- HS switch: passive freewheeling is the default during the dead time (cross-current protection) and active freewheeling takes place after the dead time only if EN=IN=1.
- LS switch: passive freewheeling is the default during the dead time (cross-current protection) and active freewheeling takes place after the dead time independent from IN and EN in order to avoid the activation of the LS parasitic.

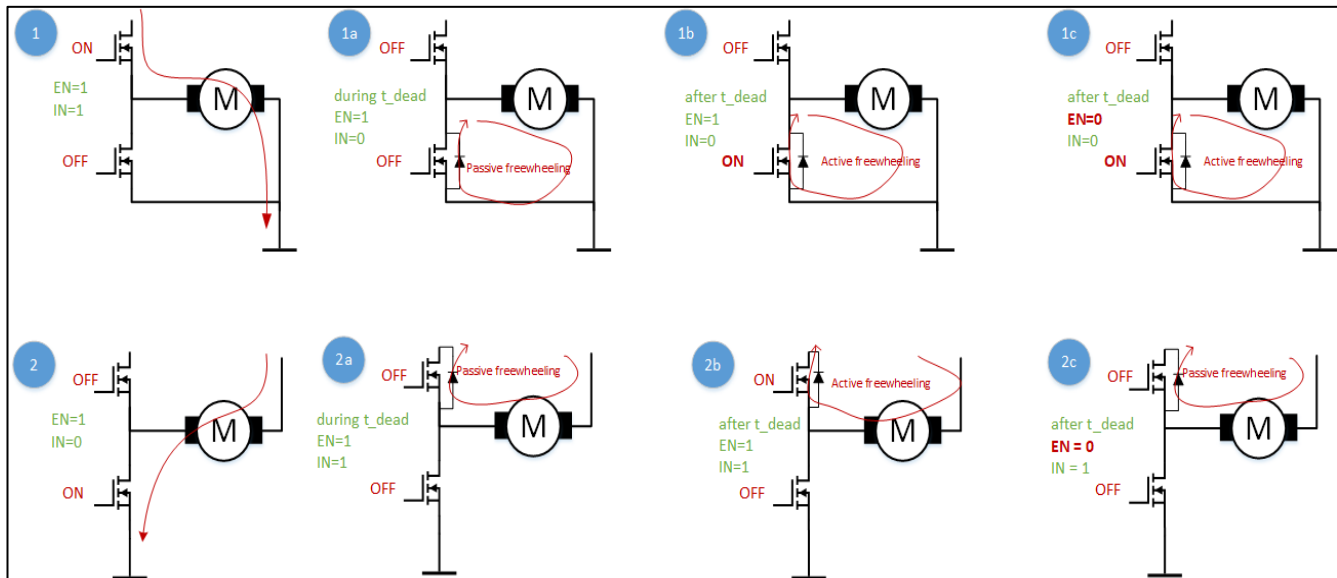


Figure 3 Freewheeling in BTN7030-1EPA

Revision history

Document version	Date of release	Description of changes
1.0	28.04.2021	Initial release

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