

VN9E30F evaluation board



Product status link

[EV-VN9E30F](#)

Product summary

Order code	EV-VN9E30F

Features

Channel	V _{CC}	R _{DS(on)} typ.	I _{LIMH} typ.
0-5	28 V	30 mΩ	35 A

- Simple single IC application board dedicated to VN9E30F
- Provides electrical connectivity and thermal heat-sinking for easy prototyping
- General device features
 - Extreme low voltage operation for deep cold cranking applications (compliant with LV124, revision 2013)
 - 24-bit ST-SPI for full diagnostic and digital current sense feedback
 - Integrated 10-bit ADC for digital current sense
 - Integrated PWM engine with independent phase shift and frequency generation (for each channel)
 - Programmable Bulb/LED mode for all channels
 - Advanced limp home functions for robust fail-safe system
 - Very low standby current
 - Optimized electromagnetic emissions
 - Very low electromagnetic susceptibility
 - Control through direct inputs and/or SPI
 - Compliant with European directive 2002/95/EC
- Diagnostic functions
 - Digital proportional load current sense
 - Synchronous diagnostic of overload and short to GND, output shorted to V_{CC} and OFF-state open-load
 - Programmable case overtemperature warning
- Protections
 - Two levels load current limitation
 - Self limiting of fast thermal transients
 - Undervoltage shutdown
 - Overvoltage clamp
 - Latch-off or programmable time limited auto restart (power limitation and overtemperature shutdown)
 - Load dump protected
 - Protection against loss of ground
 - Reverse battery through self turn-on

Application

- Automotive resistive, inductive and capacitive loads

Description

The [EV-VN9E30F](#) board provides an easy way to connect ST VIPower M0-9SPI technology into existing system.

1 Overview

It comes pre-assembled with VN9E30F high-side driver. On board minimum set of electrical components (as for device datasheet recommendation) enables the user to directly connect the load, the power supply and the microcontroller without any additional effort in external component design and connection.

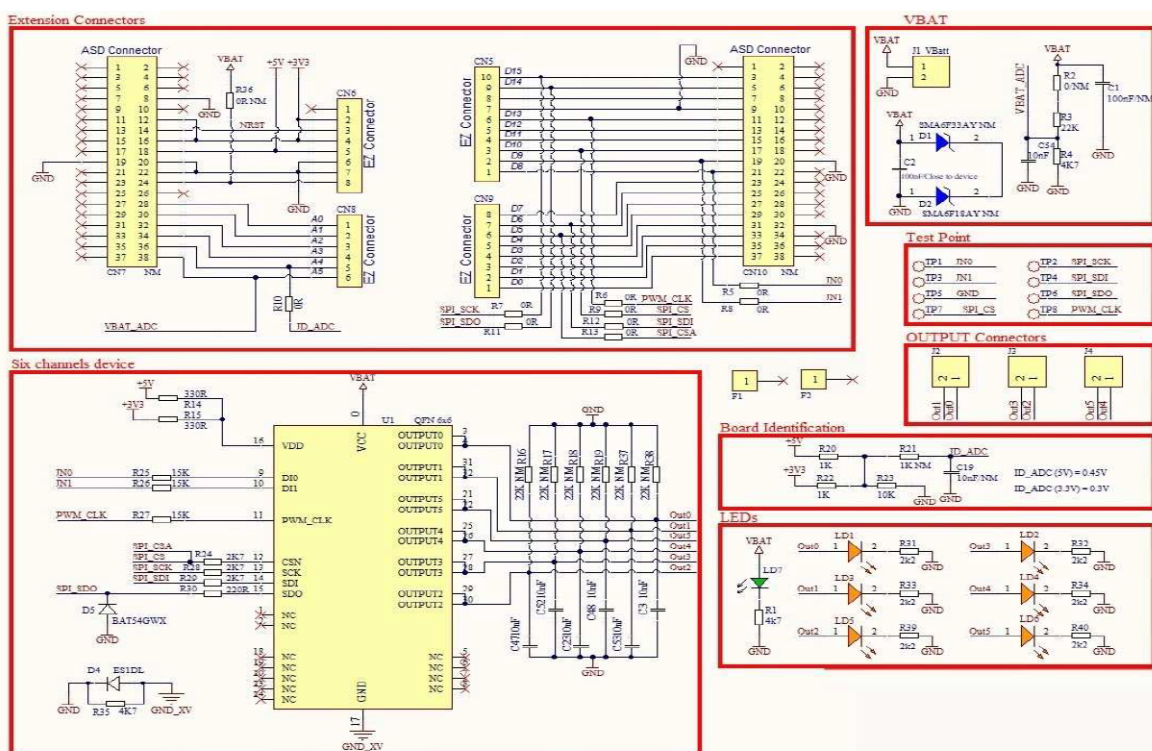
The VN9E30F is a device made using STMicroelectronics VIPower technology. It is intended for driving resistive or inductive loads directly connected to ground. The device is protected against voltage transient on V_{CC} pin. Programming, control and diagnostics are implemented via the SPI bus.

A digital current sense feedback for each channel is provided through an integrated 10-bit ADC with 0.1% of FSR. Dedicated trimming bits allow to adjust the ADC reference current. The device is equipped with 6 outputs controllable via SPI or with the 2-OTP assignable direct inputs.

The device detects open-load in OFF-state conditions. Real time diagnostic is available through the SPI bus (open-load, output short to V_{CC} , overtemperature, communication error, power limitation or latch off). Output current limitation protects the device in an overload condition. The device can limit the dissipated power to a safe level up to thermal shutdown intervention. Thermal shutdown can be configured as latched off or programmable time limited auto restart.

The device enters a limp home mode in case of loss of digital supply (V_{DD}), reset of digital memory or watchdog monitoring time-out event. In limp home mode each output is set according to the programmed register: to be always OFF, or according to the 2x direct inputs pins.

Figure 1. Board schematics



2 Board connections

The Figure 2 shows the placement of the connectors to be used for supplying the evaluation board, connecting the load, and controlling the functionality and diagnostic of the device.

Figure 2. Evaluation board connections

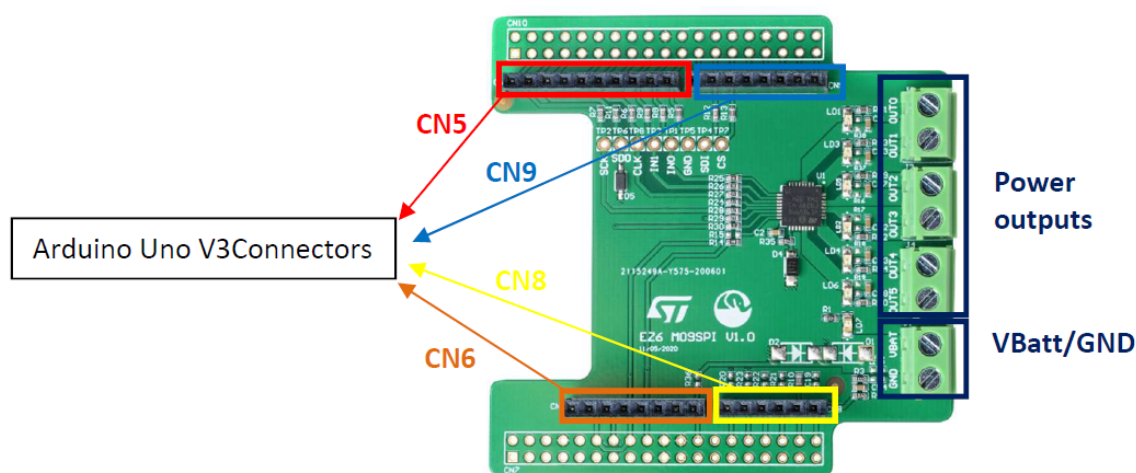


Table 1. CN connectors: pin functions

Pin number	Connector	Pin function
1	CN5	IN0
2	CN5	IN1
3	CN5	SPI_CS
4	CN5	
5	CN5	
6	CN5	PWM_CLK
7	CN5	GND
8	CN5	
9	CN5	SPI_SD0
10	CN5	SPI_SCK
2	CN6	
3	CN6	
4	CN6	3.3v
5	CN6	5V
6	CN6	GND
7	CN6	GND
8	CN6	
1	CN8	
2	CN8	
3	CN8	
4	CN8	

Pin number	Connector	Pin function
5	CN8	ID_ADC
6	CN8	VBATT_ADC
1	CN9	
2	CN9	
3	CN9	
4	CN9	
5	CN9	
6	CN9	SPI_CSA
7	CN9	SPI_SDI
8	CN9	

3 Thermal data

Table 2. VN9E30F thermal data

Symbol	Parameter	Max	Unit
R_{thJA}	Thermal resistance, junction-to-ambient (max.)	55	°C/W

Table 3. PCB specifications

Parameter	Value
Board dimensions	70 mm x 70 mm
Number of Cu layer	2
Layer Cu thickness	35 μ m
Board finish thickness	1.6 mm \pm 10%
Board material	FR4
Thermal vias diameter	0.3 mm

Revision history

Table 4. Document revision history

Date	Revision	Changes
23-May-2022	1	Initial release.

IMPORTANT NOTICE – READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgment.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2022 STMicroelectronics – All rights reserved