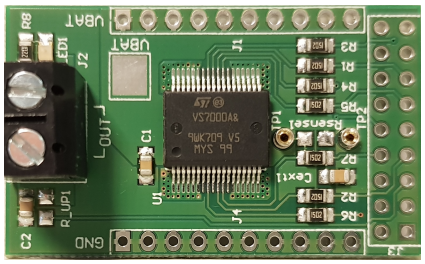
EV-VN7000AY

Data brief

VN7000AY Evaluation board



Features

Parameter	Symbol	Value
Max transient supply voltage	V_{CC}	40 V
Operating voltage range	V_{CC}	4 to 28 V
Typ. on-state resistance	R_{ON}	1.3 mΩ
Current limitation (typ)	I_{LIMH}	200 A
Stand-by current (max)	I_{STBY}	0.5 µA
Minimum cranking supply Voltage (V_{CC} decreasing)	$V_{USD_cranking}$	2.85 V

- Extreme low voltage operation for deep cold cranking applications (compliant with LV124, revision 2013)
- General
  - Single channel smart high-side driver
  - Very low standby current
  - Compatible with 3 V and 5 V CMOS outputs
- MultiSense diagnostic functions
  - Multiplexed analog feedback of: load current, V_{CC} supply voltage and T_{CHIP} device temperature
  - Overload and short to ground indication
  - Thermal shutdown indication
  - OFF-state open-load detection
  - Output short to V_{CC} detection
  - Sense enable/disable
- Protection
  - Undervoltage shutdown
  - Overvoltage clamp
  - Load current limitation
  - Latch-off on over temperature (ΔT_{J_SD} or TSD)
  - Loss of ground and loss of V_{CC}
  - Reverse battery with self switch of the PowerMOS
  - Electrostatic discharge protection

Product status link
EV-VN7000AY

Order code	Reference
EV-VN7000AY	VN7000AY Evaluation board

Application

- All types of Automotive resistive, inductive and capacitive loads.
- Especially intended for Automotive power distribution applications.

Description

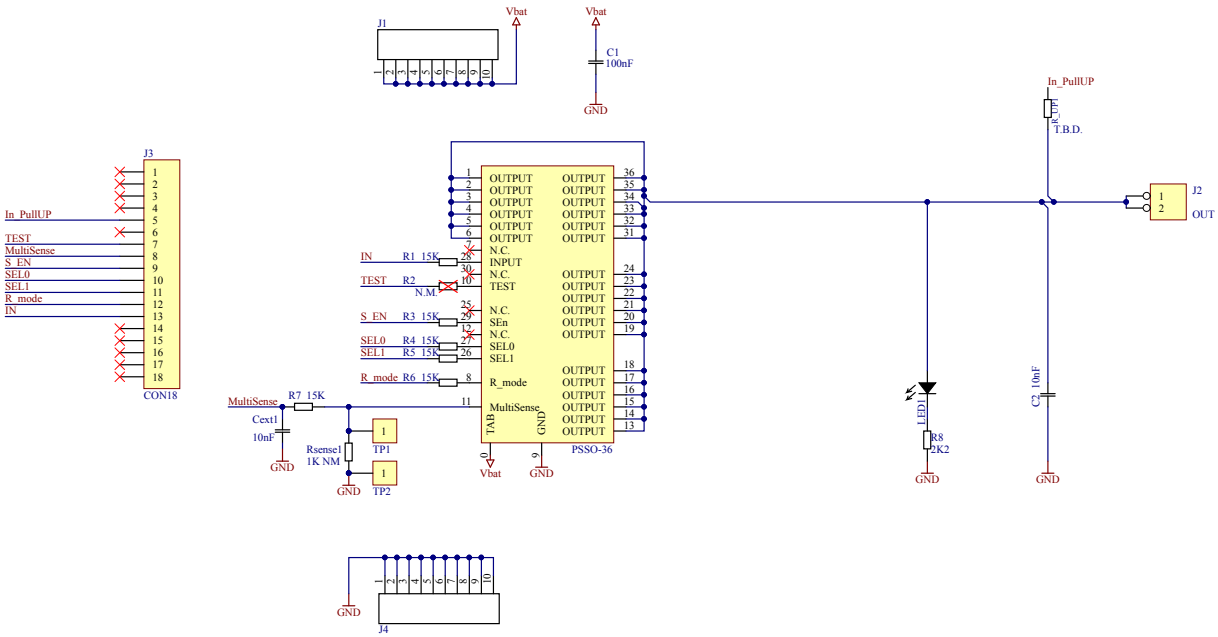
EV-VN7000AY board provides you an easy way to connect STMicroelectronics® VIPower® M0-7 technology into your existing system.

1 Overview

The board comes pre-assembled with VN7000AY High Side driver. On board minimum set of electrical components (as for device datasheet recommendation) is enabling the user to directly connect the load, the power supply and the microcontroller without any additional effort in external component design and connection.

The VN7000AY is a single channel high-side driver manufactured using ST proprietary VIPower® M0-7 technology and housed in PowerSSO-36 package. The device is designed to drive 12 V automotive grounded loads through a 3 V and 5 V CMOS-compatible interface, providing protection and diagnostics.The device integrates advanced protective functions such as load current limitation and overload management by ΔT_J and over-temperature shut-down with latch-off. A toggling on the INPUT pin unlatches the output in case of fault. A dedicated multifunction multiplexed analog output pin delivers sophisticated diagnostic functions including high precision proportional load current sense, supply voltage feedback and chip temperature sense, in addition to the detection of overload and short circuit to ground, short to V_{CC} and OFF-state open-load. A sense enable pin allows OFF-state diagnosis to be disabled during the module lowpower mode as well as external sense resistor sharing among similar devices. A R_mode pin allows to switch low respectively high R_{DSon} operating mode, so to adapt current sense precision and current limitation accordingly to the selected load.

Figure 1. VN7000AY Evaluation board schematic



2 Board Connection

Below 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 connection

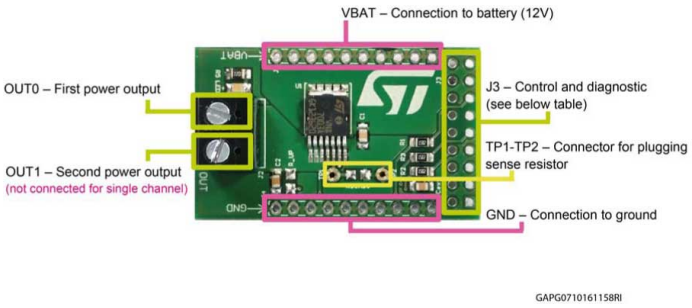


Table 1. J3 connector: pin functions

Number	Name	Function
1..4	N/A	Not connected
5	IN_PullUP	Connection to optional external pull-up resistor for open load detection in off-state.
6	N/A	Not connected
7	TEST	Not connected
8	MultiSense	Multiplexed analog sense output pin; it delivers a current proportional to the selected diagnostic: load current, supply voltage or chip temperature
9	S_EN	Active high compatible with 3 V and 5 V CMOS outputs pin; it enables the MultiSense diagnostic pin.
10	SEL0	Active high compatible with 3 V and 5 V CMOS outputs pin; together with SEL1, it addresses the MultiSense multiplexer.
11	SEL1	Active high compatible with 3 V and 5 V CMOS outputs pin; together with SEL0, it addresses the MultiSense multiplexer.
12	R_mode	Active high CMOS compatible input pin; it enables the high RDSon mode. If kept low, sets the low RDSon mode.
13	IN	Voltage controlled input pin with hysteresis, compatible with 3 V and 5 V CMOS outputs. It controls OUT0 switch state.
14..18	N/A	Not connected

In case the user wishes to utilize the Current Sense / MultiSense function of the device, it is necessary to plug a sense resistor in Rsense.

The package includes a through-hole resistor, to be mounted on TP1-TP2: see Figure 4.

Different Rsense values can be adopted based on user preference.

Another option is soldering an SMD resistor on the dedicated PCB pad, as shown in Figure 5.

Figure 3. No sense resistor

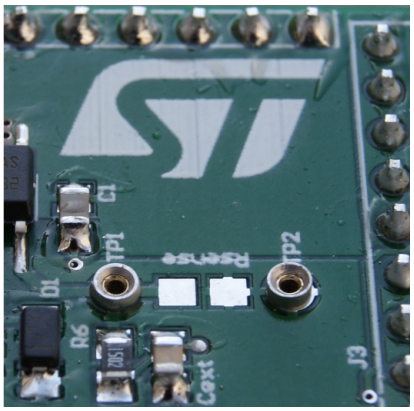


Figure 4. Mounting through-hole sense resistor

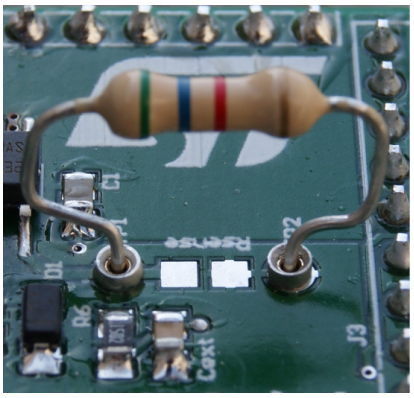
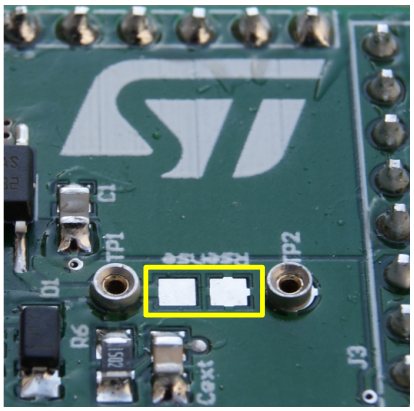


Figure 5. Pads for soldering SMD resistor



3 Thermal data

Table 2. EV-VN7000AY thermal data

Symbol	Parameter	Max	Unit
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient (Max)	39 °C	° C/W

Table 3. Pcb specifications

Parameter	Value
Board dimensions	25 mm X 41.5 mm
Number of CU layer	2
Layer Cu thickness	35 µm
Board finish thickness	1.6 mm +/-10 %
Board material	FR4
Thermal vias separation	1.1 mm
Thermal vias diameter	0.5 mm

Revision history

Table 4. Document revision history

Date	Version	Changes
19-Mar-2018	1	Initial release.
21-Jan-2020	2	Updated: Features; Section 1 Overview; Figure 1. VN7000AY Evaluation board schematic; Table 1. J3 connector: pin functions (Pin 7).

Contents

1 Overview 2
2 Board Connection 3
3 Thermal data 5
Revision history 6

List of tables

Table 1. J3 connector: pin functions . . . 3
Table 2. EV-VN7000AY thermal data . . . 5
Table 3. Pcb specifications . . . 5
Table 4. Document revision history . . . 6

List of figures

Figure 1. VN7000AY Evaluation board schematic 2
Figure 2. Evaluation board connection 3
Figure 3. No sense resistor 4
Figure 4. Mounting through-hole sense resistor 4
Figure 5. Pads for soldering SMD resistor 4

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