

## VN7003ALH Evaluation Board

Data brief



### Features

Max transient supply voltage	$V_{CC}$	40 V
Operating voltage range	$V_{CC}$	4 to 28 V
Typ. on-state resistance (per Ch)	$R_{ON}$	3.5 m $\Omega$
Current limitation (typ)	$I_{LIMH}$	135 A
Stand-by current (max)	$I_{STBY}$	0.5 $\mu$ A
Minimum cranking supply voltage ( $V_{CC}$ decreasing)	$V_{USD\_Cranking}$	3 V

- Simple single IC application board dedicated for VN7003ALH
- Provides electrical connectivity and thermal heat-sinking for easy prototyping
- General device features
  - Single channel smart high-side driver with CurrentSense analog feedback
  - Very low standby current
  - Compatible with 3 V and 5 V CMOS outputs

- Extreme low voltage operation for deep cold cranking applications (compliant with LV124, revision 2013)
- Diagnostic functions
  - Dedicated high precision proportional load current sense
  - Overload and short to ground (power limitation) indication
  - Thermal shutdown indication
  - OFF-state open-load detection
  - Output short to VCC detection
- Protections
  - Undervoltage shutdown
  - Overvoltage clamp
  - Load current limitation
  - Self limiting of fast thermal transients
  - Loss of ground and loss of VCC
  - Configurable latch-off on overtemperature or power limitation
  - Reverse battery
  - Electrostatic discharge protection

### Applications

Specially intended for Automotive Smart Power Distribution, Glow Plug, Heating Systems, DC Motors, Relay replacement and high power resistive and inductive actuators.

### Description

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

**Table 1. Device summary**

Order Code	Reference
EV-VN7003ALH	VN7003ALH Evaluation Board

# 1 Overview

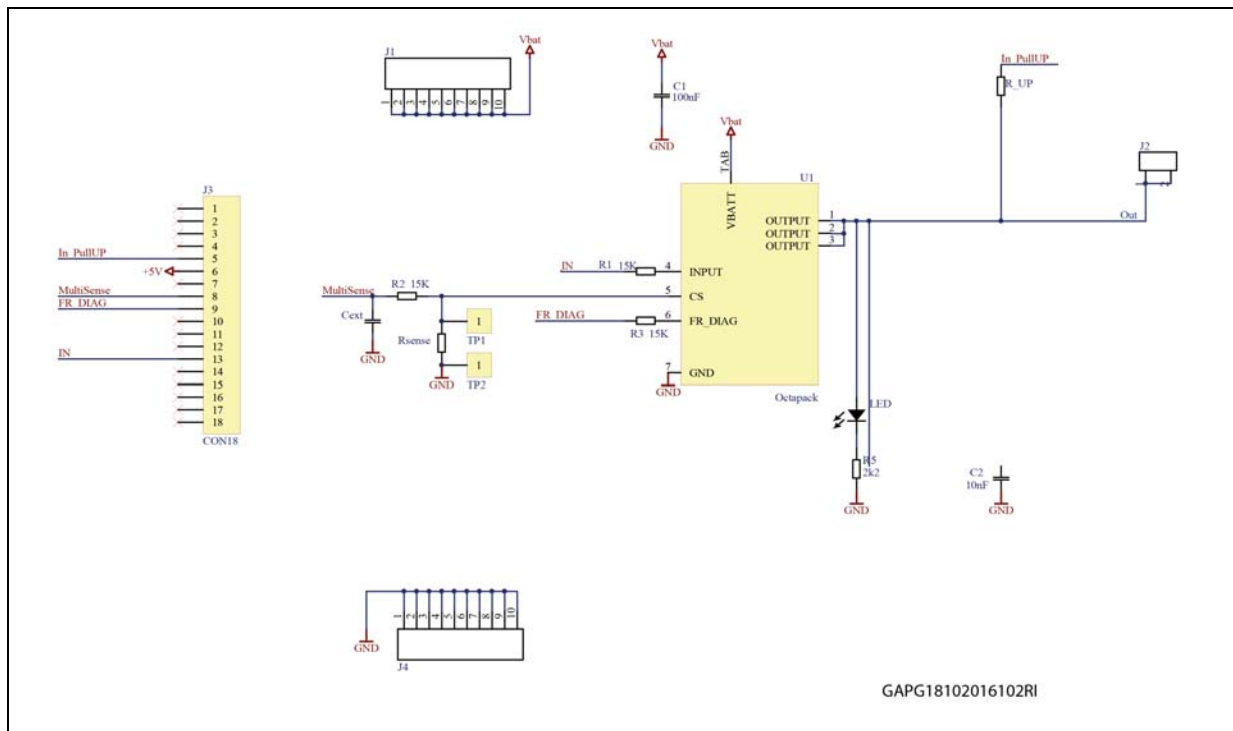
The board comes pre-assembled with VN7003ALH high-side driver. On board minimum set of electrical components (as for device datasheet recommendation) is enabling the user to directly connect the load, the power supply and the microcontroller without any additional effort in external component design and connection.

The VN7003ALH is a single channel high-side driver manufactured using ST proprietary VIPower® technology and housed in the Octapack 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, overload active management by power limitation and overtemperature shutdown.

A combination of INPUT and FR\_DIAG pins latches the output in case of fault, disables the latch-off functionality and enables OFF-state diagnostic.

Figure 1. EV-VN7003ALH schematic



## 2 Board connections

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

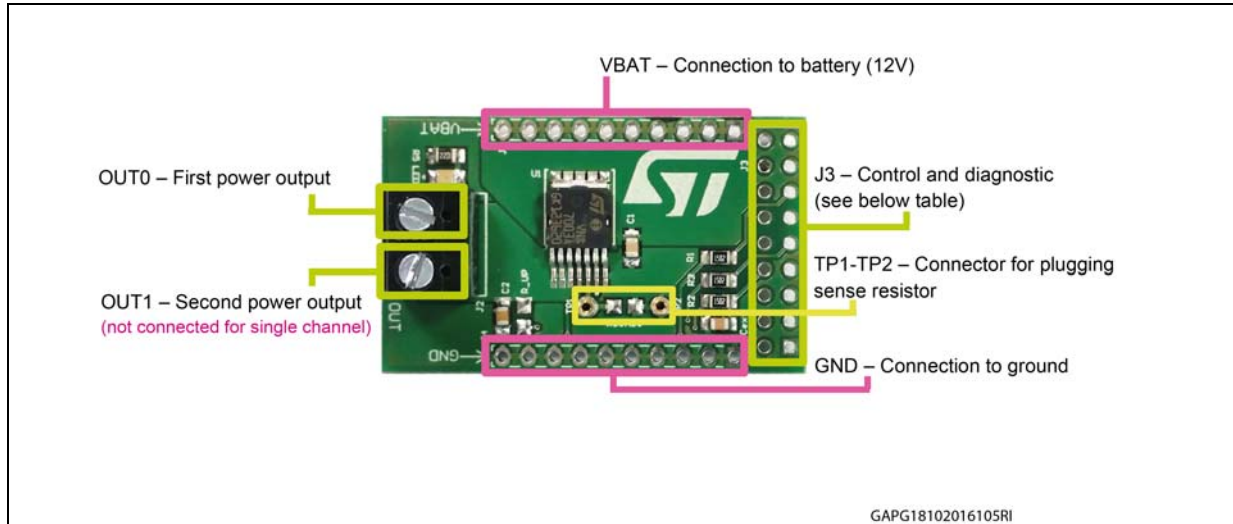


Table 2. J3 connector: pin functions

Connector	Pin number	Pin name	Pin function
J3	1...4	N/A	Not connected
J3	5	IN_PullUP	Connection to optional external pull-up resistor for open load detection in off-state.
J3	6	+5 V	5V Power Supply
J3	7	N/A	Not connected
J3	8	Multisense	Analog current sense output pin delivers a current proportional to the load current.
J3	9	FR_DIAG	Sets auto-restart and latch-off protection. Moreover, it enables OFF-state diagnostic.
J3	10...11	N/A	Not connected
J3	12	N/A	Not connected
J3	13	IN0	Voltage controlled input pin with hysteresis, compatible with 3 V and 5 V CMOS outputs. It controls OUT0 switch state.
J3	14	IN1	Voltage controlled input pin with hysteresis, compatible with 3 V and 5 V CMOS outputs. It controls OUT1 switch state (input not available for single channel).
J3	15...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 R<sub>sense</sub>.

The package includes a through-hole resistor, to be mounted on TP1-TP2 - see [Figure 4](#).

Different R<sub>sense</sub> 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**

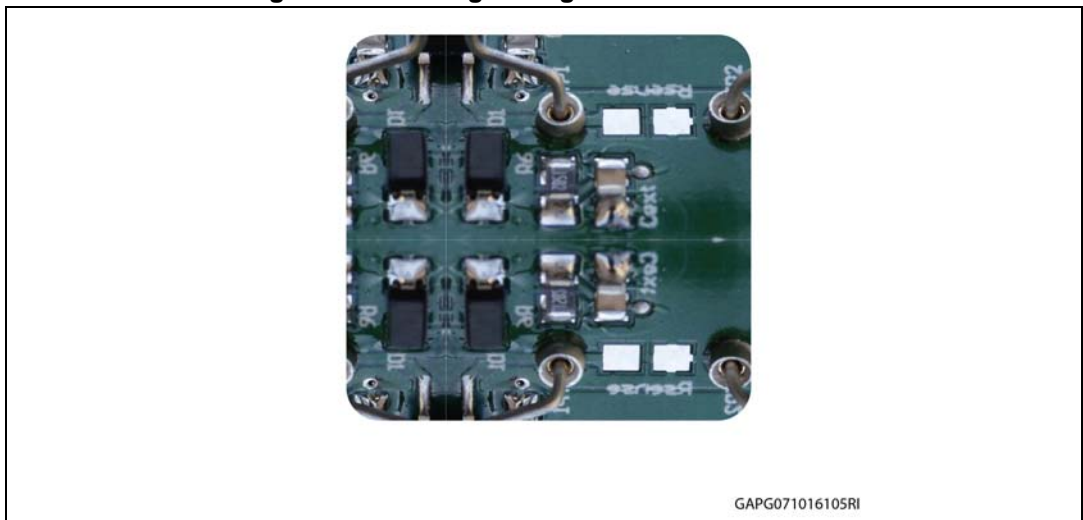
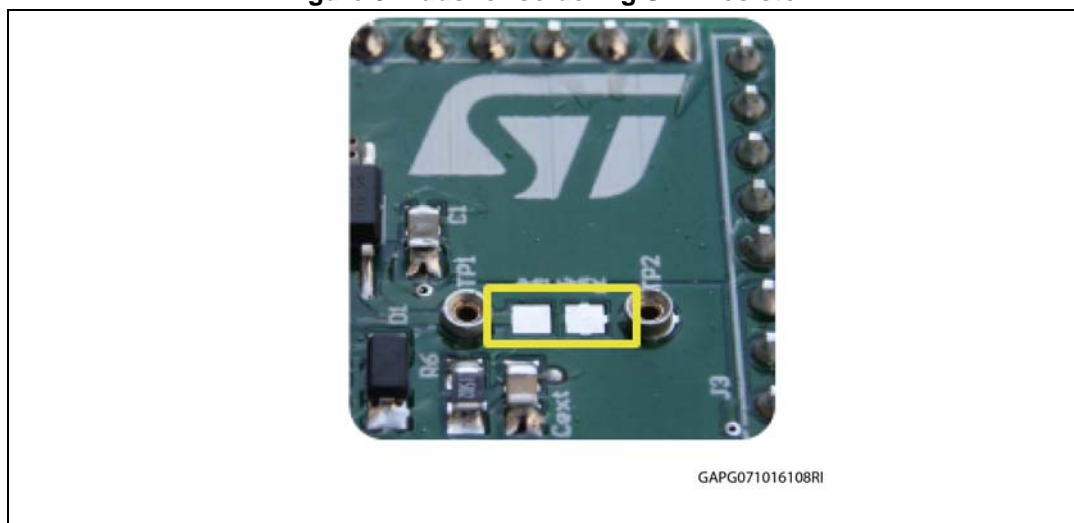


Figure 5. Pads for soldering SMD resistor



### 3 Thermal data

**Table 3. EV-VN7003ALH thermal data**

Symbol	Parameter	Max	Unit
Rthj-amb	Thermal resistance junction-ambient (MAX)	39°	°C/W

**Table 4. 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

## 4 Revision history

Table 5. Document revision history

Date	Revision	Changes
17-Oct-2016	1	Initial release.

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